AC-DC Power Supplies

EN

TDK·Lambda

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TDK·Lambda

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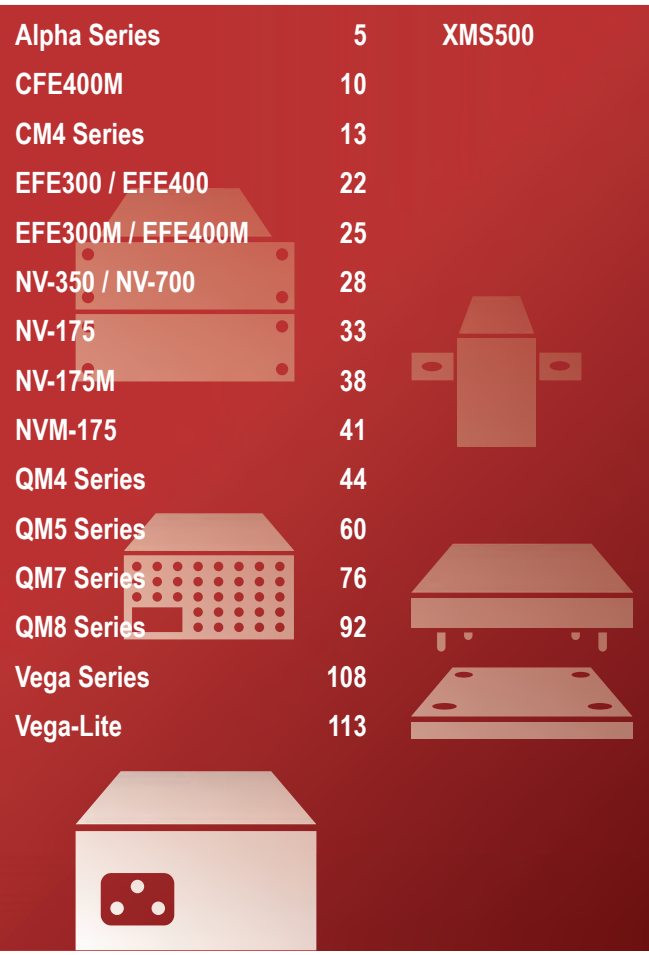


Configurable

Applications

Many but especially:

- Equipment needing several different or uncommon output voltages
- Systems with different output voltage requirements in same package style

Features

- 100W to 1500W output power
- 1 to 16 separate output voltages
- Single-phase, wide-range input
- Broad range of output voltages from 1.2V to 62Vdc
- Signal options on primary and secondary side
- Filter options with low leakage current for medical applications
- Cooling with integrated fans or external airflow (customer air)
- Safety approvals for international use
- Fast time to market
- Easy to configure with Quick Product Finder on TDK-Lambda website
- Combining outputs in parallel (for increased current or N+1 redundancy) and series (for increased output voltage) is possible with many of the product ranges, contact technical support for details

Medical Industrial Test Broadcast Comms Renewable

1000W - 1500W
Modular power supply.

Features	Benefits
• Fast-on output connection	Reduces installation time/errors
• Worldwide Safety Approvals	Supports global use
• Up to 16 outputs	Eliminates need for additional supplies
• Medical Approval available (CA1000)	Simplifies approval process
• 3 Year Warranty	Low cost of ownership

Input

Input Voltage	Alpha 1000 85 - 264Vac Alpha 1500 85 - 264Vac (1000W below 150Vac input)
Input Frequency	47 - 63Hz (440Hz with reduced PFC - consult sales office)
Input Fuse	20A / 250Vac HBC Fast acting (not user accessible)
Inrush Current	<50A at 25°C and 264Vac (cold start)
Leakage Current	1.1mA max at 264Vac & 63Hz (lower leakage versions available, see configuring guide)

How To Create A Product Description

The extensive range of output modules and options make it possible to achieve almost any combination of Volts and Amps. To achieve the optimum configuration, please contact our sales office. Alternatively, you can do this manually by using the guide below.

1. Calculate total output power to select the appropriate converter, then select required Cooling, Connection, Leakage Current and Controls/ Signals from the following table:

CA	1000	LL

Output Power	**1000**	(7 slots)
	1500	(8 slots)

Leakage Current (max leakage current at 264Vac, 63Hz)	**empty**	Standard 1.1mA
	ML	500µA
	LL	240µA
	RL	115µA
	TL	50µA

2. Select Output Modules and options from the “Output Voltages” tables.
   Example - if you require 5.2V / 18A with output inhibit :-
   a) Select B as closest match for voltage & current and prefix with voltage (eg **5.2B**)
   b) add suffix for option (if required)
   ‘_PA’ for parallel/current share (for N+1 redundant applications)
   ‘_PP’ for parallel (to increase current from one PSU)
   ‘_IN’ for inhibit
   ‘_MF’ (only applicable to 1st module) for global inhibit, ac fail and 5V / 50mA standby supply
   c) Repeat for other outputs.
   Ensure that the total number of slots of all selected modules is within the number allowed for the chosen converter. For example:-
   CA1000 5A 12/12E 24G which represents a four output 1000W Alpha with 1.1mA Earth leakage, and the following outputs:
   Output 1 = 5V/60A with remote sense
   Output 2 = 12V / 8A
   Output 3 = 12V / 8A
   Output 4 = 24V / 25A with remote sense
3. Contact TDK-Lambda to validate configuration and issue a part number.

OUTPUT VOLTAGES (single output modules)						OUTPUT VOLTAGES (twin output modules)									
Module	Adjustment Range (Volts)			Current (Amps)	Slots	Module	V1 Adjustment Range (Volts)			Current	V2 Adjustment Range (Volts)			Current (Amps)	Slots
A	4.5	-	5.5	60	2	E	5	-	16	8	5	-	16	8	1
AA	4.5	-	6.2	60	2	EB	4.5	-	5.5	9	4.5	-	5.5	9	1
B	4.5	-	5.5	25	1	EQ	4.5	-	5.5	9	2.7	-	3.9	9	1
BB	4.5	-	6.5	25	1	H	18	-	32	5[c]	18	-	32	5[c]	1
C	5	-	16	16[a]	1	P	18	-	29	5	5	-	16	8	1
D	18	-	29	8	1										
F	9	-	15.5	33	2										
G	17.5	-	29	25	2										
J	30	-	48	10[b]	2										
K	18	-	29	15	2										
L	1.8	-	3.2	25	1										
M	5	-	16	8	1										
N	18	-	32	5[c]	1										
Q	2.7	-	3.9	25	1										
R	2.7	-	3.9	60	2										
S	2.5	-	5.7	85	2										
T	1.8	-	3.2	60	2										
U	10	-	21	16	1										
W	4.5	-	5.5	15	1										
Z	4.5	-	5.5	25	1										

Notes:
a) 12A max above 12V
b) Derate output current by 0.25A / V above 40V
c) 1A max above 29V

Isolation

Input to Output	Reinforced	2 x MOOPs (3rd edition 60601) - 'LL', 'RL' and 'TL' variants of CA1000 only 4.3kVdc
Input to Earth	Basic	2.3kVdc
Output to Earth / Output to Earth		500Vdc

Output Specification

Voltage / Current	See output voltages table	
Turn on time	1.5s max	at 90Vac (150Vac for CA1500) and 100% rated output power
Rise time	<50ms	to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5% or 250mV	Load type dependent, no overshoot with resistive load
Efficiency	up to 75%	at 230Vac & 100% rated power, configuration dependent
Hold up	13ms min	at 90Vac and 100% rated power (8ms for CA1500 at 207Vac & 100% rated power)
Ripple and Noise	<2% or 100mV	pk-pk, using EIAJ test method & 20MHz bandwidth C and W modules <3%
Voltage Accuracy	<1%	of set voltage
Remote Sense	Yes	standard on single output modules
Minimum Load	No	on any output
Temperature Coefficient	<0.02%	of rated voltage per °C
Load Regulation	<0.5% or 25mV	for 0-100% load change, with sense connected (<2% without) T module < 2.5%
Line Regulation	<0.5%	for 90-264Vac input change (210 - 264Vac for CA1500) L and T modules <25mV
Cross Regulation	<0.2%	for 100% load change on any output
Transient Response	<10%	of set voltage for 50% load change (above 25% load)
Recovery	500µs	for recovery to 1% or 100mV of set voltage (1000µs for 'S' module)
Over Voltage Protection	Standard	for all outputs
Over Current Protection	Standard	for all outputs
Short Circuit Protection	Yes	
Over Temperature Protection	Yes	shuts down all outputs. Cycle ac off/on to reset Shutdown temperature varies according to ambient, output power and input voltage.

Environment	
Temperature	0°C to 70°C operational, -40°C to 70°C storage (max 12 months).
Derating	50°C to 70°C derate total output power and each output current by 2.5% per °C
Low Temp Startup	-20°C
Humidity	5 - 95% RH non condensing
Shock	3000 shocks, each of 10g (16ms) half sine
Vibration	10 - 200 Hz at 1.5g
Altitude	3000 metres operational (5000m non operational)
Pollution	Degree 2, Material group IIIb
IP Rating	IP 10

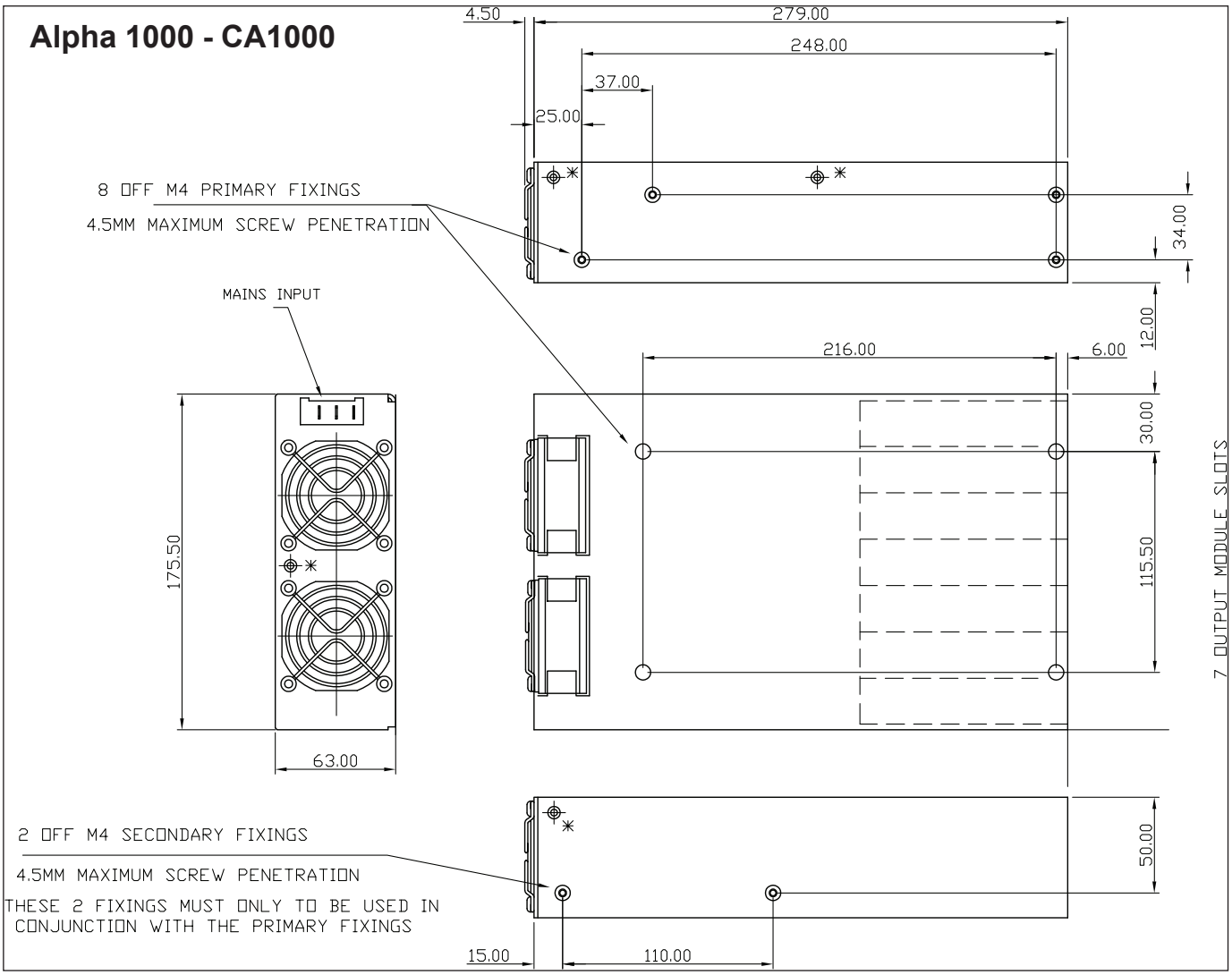
Product, Generic & Collateral Standards			
Low Voltage Power Supply, EMC	EN61204-3:2001	Compliant to High Severity Immunity	Class A emissions
Medical Electrical Equipment, EMC	EN61601-1-2:2001	Compliant	Class A emissions
Immunity for residential, commercial and light industrial environments	EN61000-6-1:2001	Compliant	
Immunity for industrial environments	EN61000-6-2:2001	Compliant	
Emissions for industrial environments	EN61000-6-4:2001	Compliant	

Emissions EN61000-6-3:2007, EN60601-1-2:2007		
Radiated Electric Field	EN55011, EN55032	(as per CISPR.11/22) Class A see application note for details. Only for 'S' type leakage variants.
Conducted Emissions	EN55011, EN55032	(as per CISPR.11/22) Class A Only for 'S' type leakage variants.
Conducted Harmonics	EN61000-3-2	Class A
Flicker	EN61000-3-3	Compliant - d_{max} only

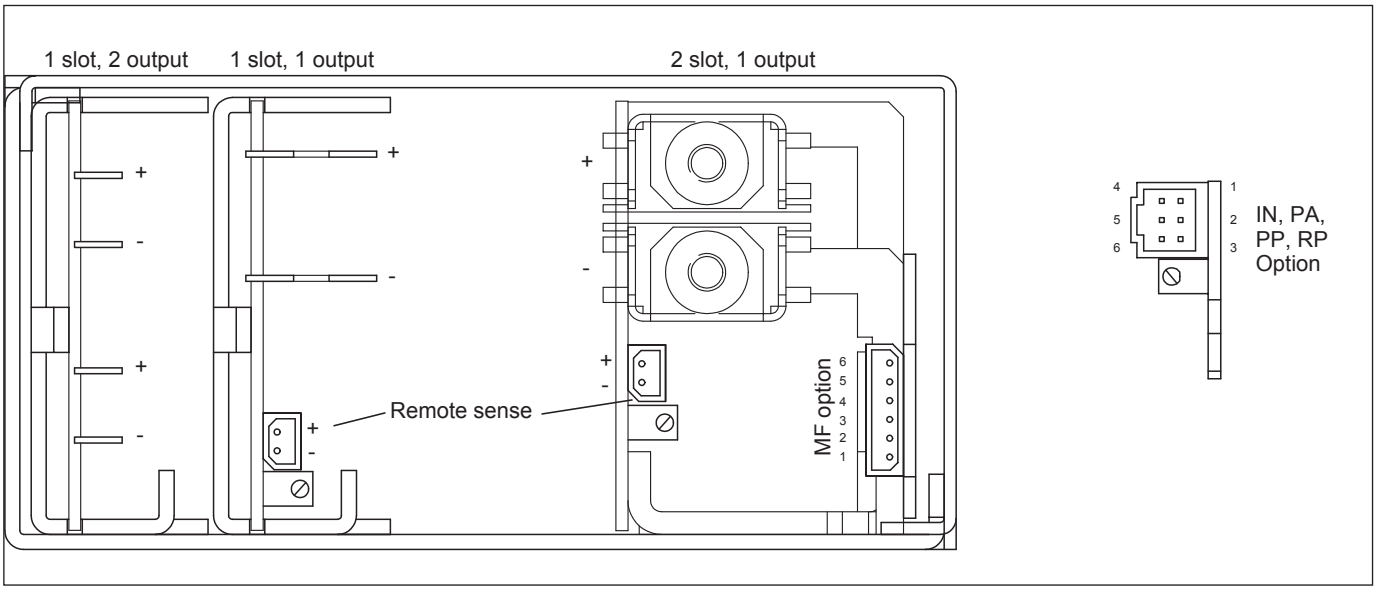
Immunity EN61000-6-2:2005, EN60601-1-2:2007				Criteria
Electrostatic Discharge	EN61000-4-2	Level 4	Air discharge 15kV, Contact discharge 8kV	A
Electromagnetic Field	EN61000-4-3	Level 3	12V/m	A
Fast / Burst Transient	EN61000-4-4	Level 4	ac input tested to 4kV dc output tested to 2kV Tested at 5kHz and 100kHz	A
Surge Immunity	EN61000-4-5	Level 3	Common mode - 2.2kV Differential - 1.1kV	A
Conducted RF Immunity	EN61000-4-6	Level 3	12V	A
Power Frequency Magnetic Field	EN61000-4-8	Level 4	30A/m	A
Voltage Dips, Variations, Interruptions	EN61000-4-11	Class 3		A B for 5s interruptions
Voltage Fluctuations	EN61000-4-14	Class 3	For 100 - 240Vac nominal	A

Approvals / Accreditations	
IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1	File E135494
IEC/EN 60601-1, UL/CSA 60601-1, ANSI/AAMI ES60601-1 CAN/CSA-C22.2 No 60601-1-08	File E349607 (not CA1500, only for LL, RL and TL leakage variants)
CE Mark (EN60950-1)	LV Directive 2006/95/EC
CB certificate and Report available on request	*Please check with technical sales for status of approvals*
Designed and manufactured under the control of ISO9001 and ISO13485 (including risk management).	

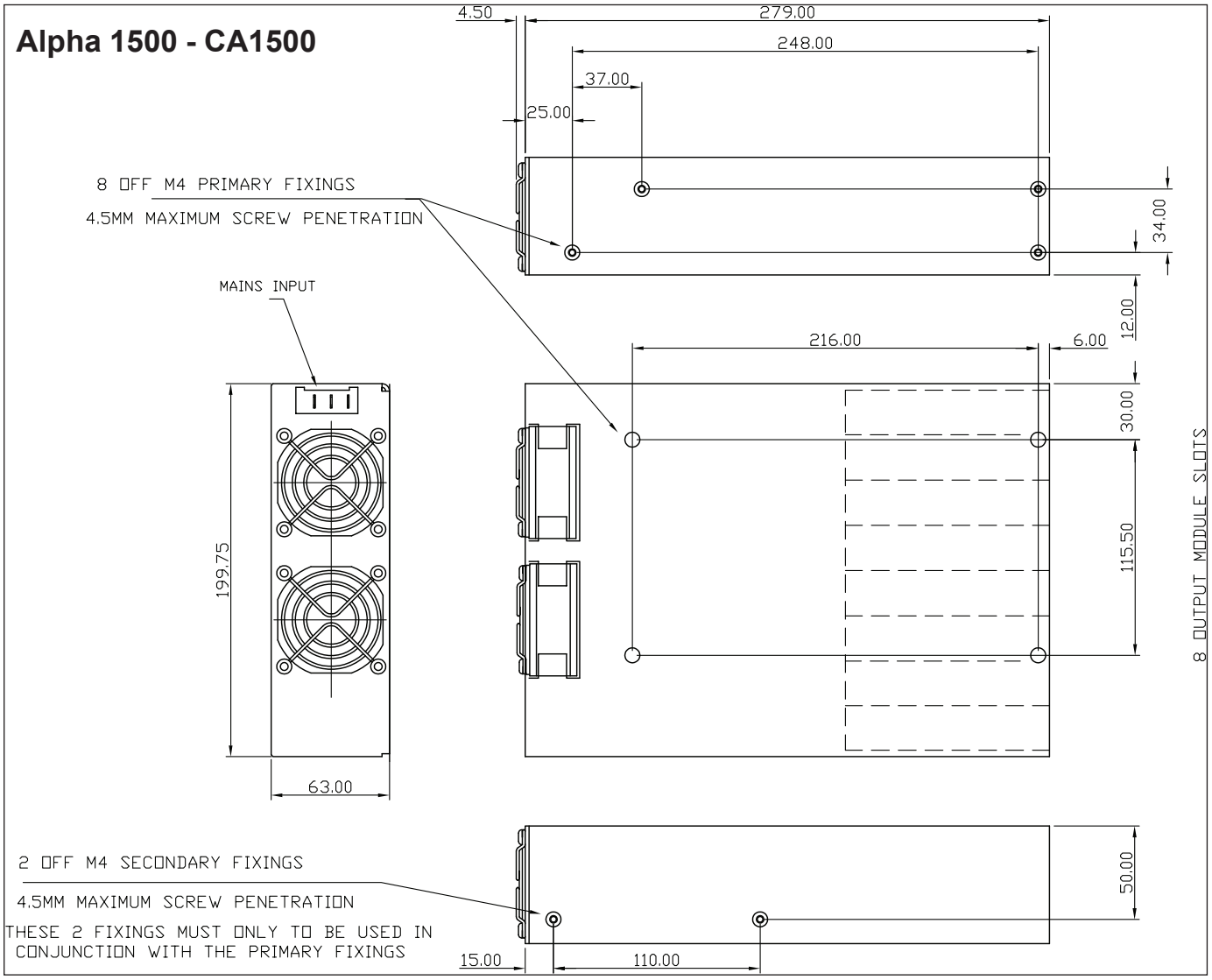
Alpha 1000 - CA1000



Option Connections



Alpha 1500 - CA1500



Option Connections					
Pin	**IN option**	**PA option**	**PP option**	**RP option**	**MF option**
1	n/c	+ Sense	+ Sense	+ Sense	Inhibit (low)
2	Module Good	Module Good	n/c	- Sense	5V supply
3	Inhibit	Star point	n/c	Control 2	Power Fail
4	n/c	- Sense	- Sense	n/c	0V
5	- Power	- Power	n/c	Control 1	Inhibit (high)
6	- Power	Star point	n/c	n/c	n/c

Medical Industrial Test Broadcast Comms Renewable

300W convection / 400W fan cooled, AC-DC power supply

Features	Benefits
• Convection cooled	Silent operation
• Reinforced isolation	Simplifies equipment design
• Full digital control	Improves Product Performance
• ErP and Climate Savers Gold Level	Minimises heat in system
• 5 Year Warranty	Low cost of ownership

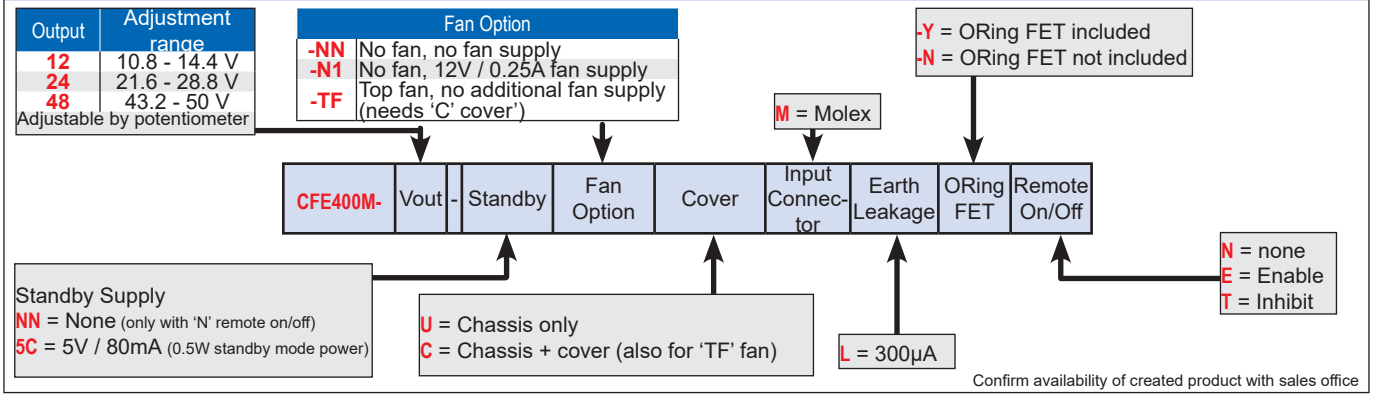
Input

Input Voltage	85-264Vac (100-240Vac nominal)	Input Frequency	47 - 63Hz (440Hz with reduced PFC - consult sales office)
Input Harmonics	EN61000-3-2 compliant	Inrush Current	<25A at 25°C and 230Vac (cold start) (meets EN61000-3-3).
Input Fuse	Dual fuses (Live + Neutral) Fast acting (not user accessible)		
Earth Leakage Current	140µA at 120Vac (60Hz), 280µA max at 240Vac (60Hz) Worst case leakage current is less than 300µA at 240Vac, 63Hz (normal condition, 0.5mA Single Fault Condition) Touch Current is <100µA NC, <500µA SFC at 264Vac, 60Hz		

Quick Selector (Standard models). Additional variants available - see below

Output		Convection cooled units / units without fan				Units with top fan	
Volts	Current (fan/conv)	U-Chassis		Cover + Chassis		Cover + Chassis	
		Description	Order Code	Description	Order Code	Description	Order Code
12V	33.3A / 25A	CFE400M-12-5C-N1UML-NT	U7Y0032	CFE400M-12-5C-N1CML-NT	U7Y0087	CFE400M-12-5C-TFCML-NT	U7Y0098
24V	16.7A / 12.5A	CFE400M-24-5C-N1UML-NT	U7Y0054	CFE400M-24-5C-N1CML-NT	U7Y0101	CFE400M-24-5C-TFCML-NT	U7Y0112
48V	8.3A / 6.25A	CFE400M-48-5C-N1UML-NT	U7Y0123	CFE400M-48-5C-N1CML-NT	U7Y0134	CFE400M-48-5C-TFCML-NT	U7Y0145

How To Create A Product Description



Confirm availability of created product with sales office

Isolation

Input to Output	Reinforced	2 x MOPPs (3rd edition 60601) 4kVac, 5.7kVdc type tested to 4kVac (equivalent to 5.7kVdc), production tested to 4.3kVdc.		
Input to Earth	Basic	1.5kVac, 2.3kVdc	Output to Earth	1.5kVac

Output Specification

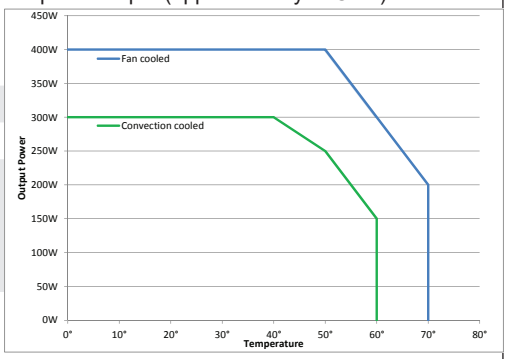
	Fan cooled	Convection	
Output Power	400W	300W	Continuous (including fan supply) or RMS (including Peak power) See handbook for details.
Peak Power	450W	450W	for 10 seconds. RMS power not to exceed Output Power stated above
Total Regulation	better than 2.25%		Including Line regulation of 0.25% (for 90-264Vac input change), Load regulation of 1% (for 0-100% load change) and thermal regulation of 0.02%/°C (0-50°C)
Ripple & Noise	1%		pk-pk, using EIAJ test method & 20MHz bandwidth
Voltage Setting Accuracy	±1%		at 50% load
Turn on Time	1.5s max		at 90 Vac & 100% rated output power
Efficiency	up to 94%		for 48V and 24V (up to 91% for 12V). At 230Vac, 75% load
Hold up	13ms		minimum at 100% of 400W load
Min Load	None		
Transient Response	<5%		of set voltage for 50% of 300W load change (in 500µs within the range 25 - 100% load)
Recovery	2ms max		for recovery to 2% of set voltage
Short circuit protection	Yes		Auto recovery after removal of short circuit
Over Temperature protection	Yes		Primary - auto recovers, secondary - cycle power to restart
Over Voltage Protection	Yes		Latching, need to cycle ac to restart unit.
Fan supply	12V / 0.25A		Depending on 'Fan Option' selected. See 'how to create a product description' for details
Parallel connection	Possible		For N+1 redundancy with ORing FET option. To increase output power requires optional droop share (contact sales office for details)

Global Signals

Remote on/off	Enable - TTL logic level low (relative to Standby 0V) enables channel 1 and fan supply Inhibit - TTL logic level low (relative to Standby 0V) inhibits channel 1 and fan supply
Standby Supply	5V / 80mA isolated supply, not affected by remote on/off.
Power Good	Logic high indicates ac supply is good and Ch1 is within regulation. Not available on units with no standby supply.
ORing FET	Allows redundant connection of power supplies with no additional/external diodes required.

Environment

Temperature	See derating chart. Fan cooled is with 1.5m/s air blown from input to output (approximately 12CFM) -40°C to 70°C storage (max 12 months). Fan cooling required if the unit is mounted with no free air circulation above (see handbook for mounting details)
Low Temp Startup	-20°C
Humidity	5 - 95% RH non condensing
Shock	±3 x 30g shocks in each plane, total 18 shocks 30g shock = 11ms (+/-0.5msec), half sine Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987. Conforms to MIL-STD-810E/F, Method 516.5, Pro I, IV, VI
Vibration	Single axis 10 - 500 Hz at 2*g* (sweep and endurance at resonance) in all 3 planes Conforms to EN60068-2-6, IEC68-2-6 Conforms to MIL-STD-810E, Method 514.4, Pro I, Cat 1,9
Altitude	Medical approval = -200 to 5000 metres operational (-200 to 3000m for 2nd edition 60601) Non medical approval = -200 to 5000 metres operational -200 to 5000m storage/transportation
Pollution	Degree 2, Material group IIIb



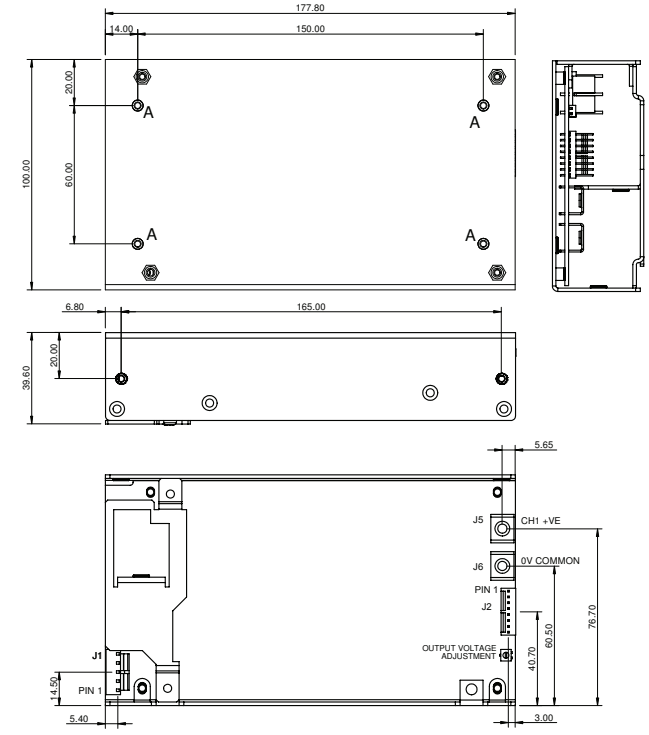
Emissions EN61000-6-3:2007, EN60601-1-2:2007

Radiated Electric Field	EN55011, EN55032	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B see application note for details
Conducted Emissions	EN55011, EN55032	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B
Conducted Harmonics	EN61000-3-2	Class A
Flicker	EN61000-3-3	Compliant - d_{max} only

Immunity EN61000-6-2:2005				Criteria
Electrostatic Discharge	EN61000-4-2	Level 4	Level 3 for Fan supply Not applicable to open frame units	A
Electromagnetic Field	EN61000-4-3	Level 3		A
Fast / Burst Transient	EN61000-4-4	Level 4		A
Surge Immunity	EN61000-4-5	Level 3		A
Conducted RF Immunity	EN61000-4-6	Level 3		A
Power Frequency Magnetic Field	EN61000-4-8	Level 3		A
Voltage Dips, Variations, Interruptions	EN61000-4-11	Class 3	Criteria B for 5 sec interruption Criteria B for 1 cycle interruption Criteria B for dip to 40% for 5 cycles below 154Vac (300W convection) or 176Vac (400W forced air cooled)	A
Ring Wave	EN61000-4-12	Level 3		A
Voltage Fluctuations	EN61000-4-14	Class 3		A

Approvals / Accreditations	
IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1	File E135494
IEC/EN 60601-1, UL/CSA 60601-1, ANSI/AAMI ES60601-1 CAN/CSA-C22.2 No 60601-1-08	File E349607
IEC/EN 61010-1 (designed to meet)	
CE Mark (EN60950-1)	LV Directive 2006/95/EC
CB certificate and Report available on request	*Please check with technical sales for status of approvals*
Designed and manufactured under the control of ISO9001 and ISO13485 (including risk management).	

Outline & Connection Drawings



J1

PIN	CONNECTION
1	EARTH
2	NOT CONNECTED
3	LIVE
4	NOT CONNECTED
5	NEUTRAL

J2

PIN	CONNECTION
1	FAN SUPPLY
2	REMOTE ON/OFF
3	PWR GOOD
4	FAN SUPPLY RTN
5	STANDBY RTN
6	STANDBY
7	- SENSE
8	+ SENSE

MATING PARTS

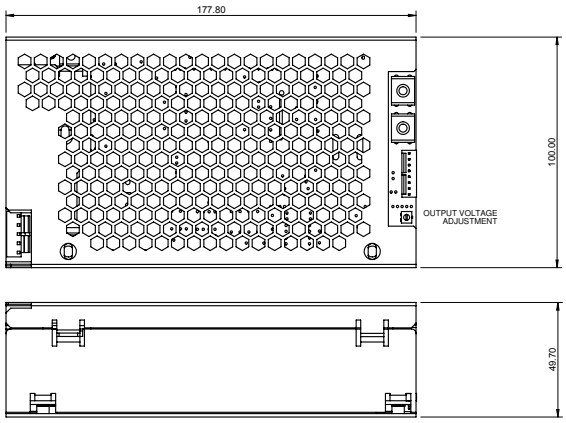
CONNECTOR	HOUSING	CRIMP PIN	MANUFACTURER
J1	09-50-8051	08-52-0113	MOLEX
J2	22-01-2085	0850-0032	MOLEX
J5 & J6	N/A	TAG 19073-0165	MOLEX

Connectors are not included with the product but they are available from TDK-Lambda
1 off input connector and 3 crimps are available as part number is 94910.
1 off feature connector and 8 crimps are available as part number 95109.

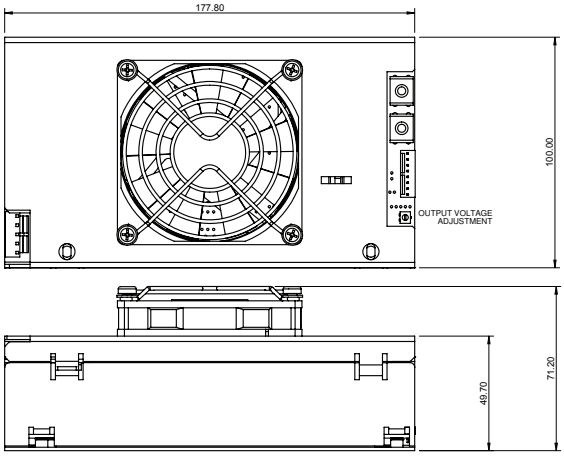
NOTE:

A 6 OFF FIXING HOLES FOR M3, MAXIMUM PENETRATION 3.3mm,
MAXIMUM TORQUE 0.9Nm.
ALL TOLERANCES +/-0.5mm.

CHASSIS WITH COVER



CHASSIS WITH TOP MOUNTED FAN



All specifications at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

600W Conduction Cooled Modular Power Supply

Medical Industrial Test Comm Broadcast Renewable Cots

Features	Benefits
• Conduction cooled	• No audible noise
• Wide output adjustment	• Suits non-standard voltages
• Compact 4 x 7 inch size	• Space saving in end equipment
• MIL-STD-461F compliant	• Suitable for COTS applications
• 5 year warranty	• Low cost of ownership
• External voltage control	• Remote programming of voltage and current

Specification

Model		CM4 Series	
Output power (1)	W	425W	600W (750W for 5s)
Input voltage	Vac	85 - 264Vac	120-264Vac
Frequency	-	47 - 63Hz (Contact factory for operation on 400Hz)	
Input fuses	-	8A / 250Vac HBC Fast acting (not user accessible) in both Live and Neutral lines	
Input current at 120Vac, 600W load	A	6A	
Inrush current	-	<20A at 25 and 264Vac (cold start)	
Leakage current	A	200µA maximum at 264Vac 63Hz	
Power factor	-	0.99 typical	
Hold up	ms	Typically 20ms	
Over temperature protection	-	All outputs are turned off. After unit cools down, recycle AC or toggle global remote on/off	
Cooling	-	Conduction, convection or forced air	
Standby power consumption	W	Less than 1W with global on/off activated	
No load power consumption	W	10 to 21W	
Efficiency	-	Up to 90% (see application note on website)	
Isolation	-		
Input to output	-	Reinforced: 2 x MOPPs (3rd edition 60601), 4kVac	
Input to earth	-	Basic: 1 x MOPP 1.5kVac	
Output to earth	-	500Vdc	
Output to output	-	500Vdc	
General	-		
Weight	g	650 + 100 for each output module fitted	
Size (L x W x H)	mm	177.8 x 101.6 x 41	
Warranty	yrs	5	

Notes: (1) Converter and module power must be de-rated by 2.5% for every 3 volts below 120Vac, down to a minimum of 85Vac

How To Create A Product Description

The extensive range of output modules and options make it possible to achieve almost any combination of Volts and Amps.
You can create your own CM configuration online at https://config.emea.tdk-lambda.com/. This method checks your configuration and offers the optimum solution.Alternatively, you can do this manually by using the guide below.

1. Select Output Modules from the table, based on output voltage and current. Ensure that the maximum number of slots does not exceed 4
2. For an S1 module set at 5V, S2 set at 12V, S3 set at 24V and a S4 set at 48V, please use the following nomenclature style: CM4 5S1 12S2 24S3 48S4
3. Contact TDK-Lambda to validate configuration

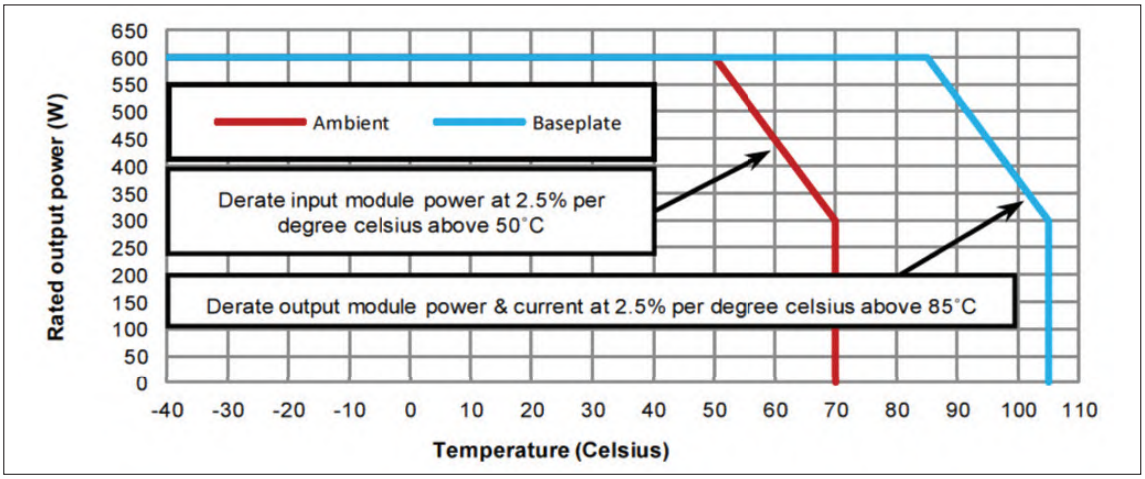
Output Modules

Module Name	Slots used	Module	Output Voltage Minimum	Output Voltage Vnominal	Output Voltage Maximum	Maximum Output Current	Maximum Output	Maximum Peak Power (5 sec)
S1	1	-	1.5V	5V	7.5V	25A	125W	187.5W
Z1	2	2 x S1 in parallel	1.5V	5V	7.5V	50A	250W	375W
ZA	3	3 x S1 in parallel	1.5V	5V	7.5V	75A	375W	562.5W
ZN	4	4 x S1 in parallel	1.5V	5V	7.5V	100A	500W	750W
Y1	2	2 x S1 in series	3V	10V	15V	25A	250W	375W
HA	4	4 x S1 in series/parallel	3V	10V	15V	50A	500W	750W
S2	1	-	4.5V	12V	15V	15A	150W	225W
Z2	2	2 x S2 in parallel	4.5V	12V	15V	30A	300W	450W
YA	3	3 x S1 in series	4.5V	15V	22.5V	25A	375W	562.5W
ZB	3	3 x S2 in parallel	4.5V	12V	15V	45A	450W	675W
ZP	4	4 x S2 in parallel	4.5V	12V	15V	60A	600W	750W
YN	4	4 x S1 in series	6V	20V	30V	25A	500W	750W
S3	1	-	9V	24V	30V	7.5A	150W	225W
Y2	2	2 x S2 in series	9V	24V	30V	15A	300W	450W
ZC	3	3 x S3 in parallel	9V	24V	30V	22.5A	450W	675W
HB	4	4 x S2 in series/parallel	9V	24V	30V	30A	600W	750W
ZQ	4	4 x S3 in parallel	9V	24V	30V	30A	600W	750W
YB	3	3 x S2 in series	13.5V	36V	45V	15A	450W	675W
S4	1	-	18V	48V	58V	3.75A	150W	217.5W
Y3	2	2 x S3 in series	18V	48V	60V	7.5A	300W	450W
ZD	3	3 x S4 in parallel	18V	48V	58V	11.25A	450W	652.5W
ZR	4	4 x S4 in parallel	18V	48V	58V	15A	600W	750W
YP	4	4 x S2 in series	18V	48V	60V	15A	600W	750W
YC	3	3 x S3 in series	27V	72V	90V	7.5A	450W	675W
Y4	2	2 x S4 in series	36V	96V	116V	3.75A	300W	435W
YQ	4	4 x S3 in series	36V	96V	120V	7.5A	600W	750W
YD	3	3 x S4 in series	54V	144V	174V	3.75A	450W	652.5W
YR	4	4 x S4 in series	72V	192V	232V	3.75A	600W	750W

Global Signals Specifications

Parameter	Details	Minimum	Typical	Maximum	Units
Bias Voltage		4.8	5	5.2	Volts
Bias Current				1	Amps
AC_OK Voltage	Low output level/High output level	0/4.8	0.03/5	0.1/5.2	Volts
AC_OK Current				10	mA
Power Good Voltage	Open collector output. Low output level. All slots. Absolute maximum = 6V	0.1		0.3	Volts
Power Good Current	Open collector output. Current sink only. All slots			50	mA
Tsns Voltage	Typical at 0°C internal temperature, 19.5mV/°C	0	0.4	5	Volts
Tsns Current				100	uA
Inhibit Voltage	Low input level/High input level. All slots	0/2.5		0.8/6	Volts
Inhibit Current	10k input impedence. All slots			1	mA

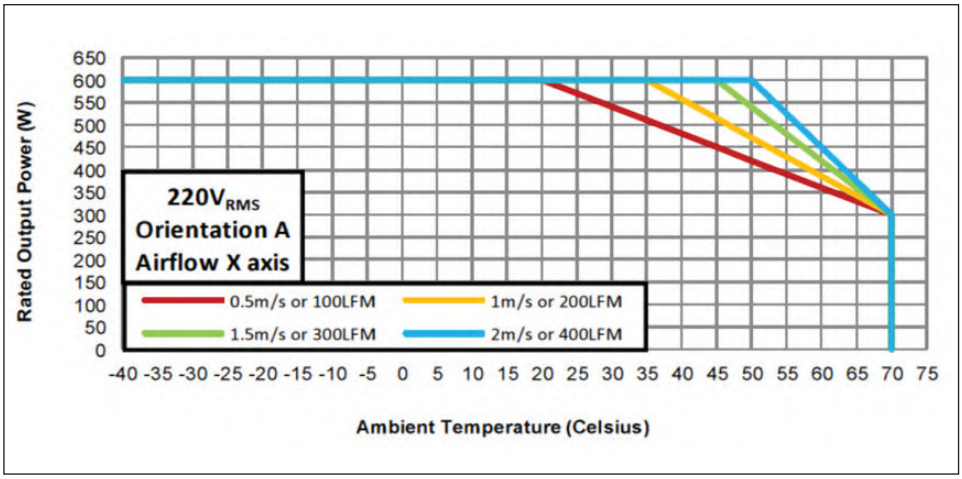
Environment (see installation manual for more details) - Conduction Cooling

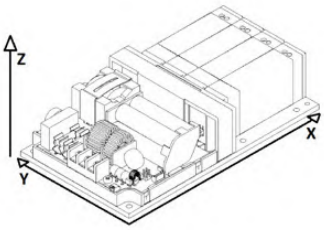


Apply appropriate derating to converter and modules for both ambient and baseplate temperatures

See Note 1:

Environment (see installation manual for more details) - Forced Air Cooling

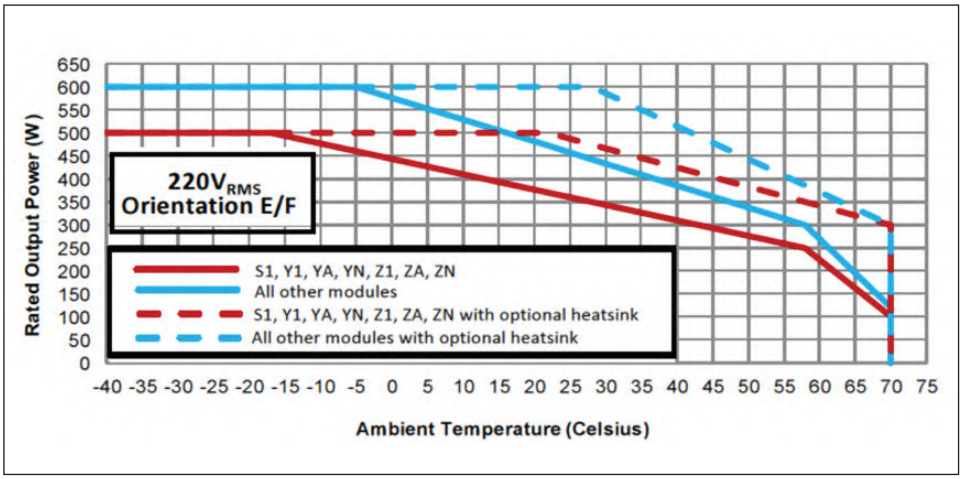


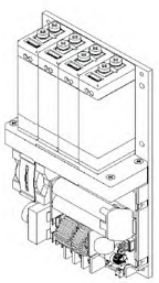


Orientation A

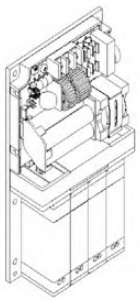
See Note 1:

Environment (see installation manual for more details) - Convection Cooling





Orientation E



Orientation F

See Note 1:

Note 1: To ensure reliability, component temperatures must be maintained below recommended levels in the end application.
The System cooling section of the user manual should be reviewed in detail and temperatures verified in the end application

Specification

Note: Actual ratings must be determined in the user application		
Humidity (non condensing)		5 - 95%RH
Altitude		Operational: 3000m, storage: 5000m
Shock	EN 60068-2-27	30g 18ms operating, MIL-STD-810G: Method 516.6, Procedure IV
Vibration	EN 60068-2-6 EN 60068-2-64 MIL-STD-810G	Sine,10 – 500 Hz, 3 axes, 1 oct/min., 10 cycles each axis Random, 5 – 500 Hz, 3 axes, 30 min. Method 514.6, Procedure I (General Vibration) Category 4 (Trucks & Trailers, Composite wheeled vehicle), Figure 514.6C-3. Category 7 (Aircraft, Jet cargo), Figure 514.6C-5 General exposure Category 24, (All, Minimum integrity) Figure 514.6E-1
Thermal shock (non operating)	MIL-STD-810G	Method 503.5 Procedure I-C. Multi-cycle. 3 shocks -51 to +85oC
Emissions		
Radiated electric field	EN55011/32	Class B
Radiated electric field, 30Hz-18GHz	MIL-STD-461F	RE102 (Ground, Fixed) when mounted in an enclosure
Conducted emissions	EN55011/32	FCC part 15, CISPR 22/11, Class B
Harmonic Distortion (PFC)	IEC61000-3-2	
Flicker & Fluctuation	IEC61000-3-3	
Immunity		
Electrostatic discharge	IEC61000-4-2	Test level 4: 15kV air, 8kV contact, IEC60601-1-2:2014
Radiated RF EM fields	IEC61000-4-3	Test Level 3: (10V/m, 80MHz-2.7GHz) sine wave AM 80% 1kHz
Proximity fields from RF	IEC61000-4-3	Test levels as per IEC60601-1-2:2014 Table 9
Radiated susceptibility, electric field	MIL-STD-461F	RS103 2 MHz to 40 GHz, 20V
Conducted susceptibility	MIL-STD-461F	CS115
Surge IEC61000-4-5		Test Level 3: 1kV L-N, 2kV L-E. As per IEC60601-1-2:2014
Conducted susceptibility	MIL-STD-461F	CS116
Shipboard electric power, voltage spike	MIL-STD-1399	“SECTION 300A, Type 1, 115V 60Hz single phase“
Conducted disturbances induced by RF fields	IEC61000-4-6	Test Level 3: 10V, 0.15 to 80MHz sine wave AM 80% 1kHz
Conducted susceptibility, power leads	MIL-STD-461F	CS101, 30Hz-150kHz
Conducted susceptibility, Bulk cable injection	MIL-STD-461F	CS114, 10kHz to 200MHz
Power Frequency Magnetic Fields	IEC61000-4-8	Test level 4: 30A/m 50Hz
Radiated susceptibility, Magnetic field	MIL-STD-461F	RS101
Voltage Dips Voltage Sag Immunity	IEC61000-4-11 SEMI-F47-0706	0% 10ms, 0% 20ms, 70% 0.5s (Criterion A) 40% 200mS (Criterion A at 240V and Criterion C at 100V) 0% 20mS, 70% 0.5s, 80% 1s,80% 10s,90% continuous (Criterion A) 50% 200mS (Criterion A at 240V and Criterion C at 100V) Criterion A is achieved for full power when Vin >=160V Criterion A is achieved at all input voltages when Pout <= 350W
Voltage interruptions	IEC61000-4-11	0% 250/300 cycle as per IEC60601-1-2:2014 (Criterion C)
Aircraft Electric Power Characteristic	MIL-STD-704F	SAC102,104,105,109,110 (MIL-HDBK-704-2) SXF102,104,105,109,110 (MIL-HDBK-704-6)
Safety certifications / accreditations		IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1 IEC/EN 60601-1, UL/CSA 60601-1, ANSI/AAMI ES60601-1 CAN/CSA-C22.2 No 60601-1 CE Mark Manufactured under the control of ISO9001 and ISO13485 (including risk management)
Global signals		
Global bias supply		4.8 - 5.2V 1A
AC_OK signal		Open collector, high on fail
Global DC power good		Open collector, high on fail if any module is <90% of set voltage
Global inhibit/enable		Turns off or on all modules and the converter
Internal temperature sensor		0 to ~3V signal proportionate to converter transformer temperature

Output Specification

Module	S1	S2	S3	S4
Vnom	5V	12V	24V	48V
Adjustment range	1.5 - 7.5V	4.5 - 15V	9 - 30V	18 - 58V
Turn on time	2s typical, 3s maximum			
Turn on rise time	<3.5ms (with resistive load) to 90% of voltage, monotonic rise above 10%			
Turn on overshoot	<0.1% of set voltage			
Ripple and noise	1% pk-pk of Vnom, using 20MHz bandwidth			
Voltage setting accuracy	+/-0.5% of factory set voltage			
Remote sense	Yes			
Minimum load	None			
Temperature coefficient	+/-0.02%/°C			
Load regulation (0-100% change)	+/-50mV	+/-100mV	+/-150mV	+/-300mV
Line regulation	+/-0.1% of Vnom for an 85-264Vac input change			
Cross regulation	+/-0.2% of Vnom			
Maximum transient deviation (25-75% change)	1V at 1A/µs	1.5V at 0.5A/µs	3V at 0.25A/µs	3V at 0.25A/µs
Transient recovery time	100µs recovery to within 10% of the output voltage set point			
Over voltage protection (typical)	9.5V	18V	36V	66V
Over current protection	105 - 125%			
Short circuit protection	Hiccup with auto recovery			
Over temperature protection	All outputs are turned off. After unit cools down, recycle AC or toggle global remote on/off			

Module	Y1/HA	Y2/HB	Y3	Y4
Vnom	10V	24V	48V	96V
Adjustment range	3 - 15V	9 - 30V	18 - 60V	36 - 116V
Turn on time	2s typical, 3s maximum			
Turn on rise time	<3.5ms (with resistive load) to 90% of voltage, monotonic rise above 10%			
Turn on overshoot	<0.1% of set voltage			
Ripple and noise	1% pk-pk of Vnom, using 20MHz bandwidth			
Voltage setting accuracy	+/-0.5% of factory set voltage			
Remote sense	Yes			
Minimum load	None			
Temperature coefficient	+/-0.02%/°C			
Load regulation (0-100% change)	+/-100mV	+/-200mV	+/-300mV	+/-600mV
Line regulation	+/-0.1% of Vnom for an 85-264Vac input change			
Cross regulation	+/-0.2% of Vnom			
Maximum transient deviation (25-75% change)	2V at 1A/µs	3V at 0.5A/µs	6V at 0.25A/µs	6V at 0.25A/µs
Transient recovery time	100µs recovery to within 10% of the output voltage set point			
Over voltage protection (typical)	19V	36V	72V	132V
Over current protection	105 - 125%			
Short circuit protection	Hiccup with auto recovery			
Over temperature protection	All outputs are turned off. After unit cools down, recycle AC or toggle global remote on/off			

Module	YA	YB	YC	YD
Vnom	15V	36V	72V	144V
Adjustment range	4.5 - 22.5V	13.5 - 45V	27 - 90V	54 - 174V
Turn on time	2s typical, 3s maximum			
Turn on rise time	<3.5ms (with resistive load) to 90% of voltage, monotonic rise above 10%			
Turn on overshoot	<0.1% of set voltage			
Ripple and noise	1% pk-pk of Vnom, using 20MHz bandwidth			
Voltage setting accuracy	+/-0.5% of factory set voltage			
Remote sense	Yes			
Minimum load	None			
Temperature coefficient	+/-0.02%/°C			
Load regulation (0-100% change)	+/-150mV	+/-300mV	+/-450mV	+/-900mV
Line regulation	+/-0.1% of Vnom for an 85-264Vac input change			
Cross regulation	+/-0.2% of Vnom			
Maximum transient deviation (25-75% change)	3V at 1A/µs	4.5V at 0.5A/µs	9V at 0.25A/µs	9V at 0.25A/µs
Transient recovery time	100µs recovery to within 10% of the output voltage set point			
Over voltage protection (typical)	28.5V	54V	108V	198V
Over current protection	105 - 125%			
Short circuit protection	Hiccup with auto recovery			
Over temperature protection	All outputs are turned off. After unit cools down, recycle AC or toggle global remote on/off			

Output Specification continued

Module	YN	YP	YQ	YR
Vnom	20V	48V	96V	192V
Adjustment range	6 - 30V	18 - 60V	36 - 120V	72 - 232V
Turn on time	2s typical, 3s maximum			
Turn on rise time	<3.5ms (with resistive load) to 90% of voltage, monotonic rise above 10%			
Turn on overshoot	<0.1% of set voltage			
Ripple and noise	1% pk-pk of Vnom, using 20MHz bandwidth			
Voltage setting accuracy	+/-0.5% of factory set voltage			
Remote sense	Yes			
Minimum load	None			
Temperature coefficient	+/-0.02%/°C			
Load regulation (0-100% change)	+/-200mV	+/-400mV	+/-600mV	+/-1200mV
Line regulation	+/-0.1% of Vnom for an 85-264Vac input change			
Cross regulation	+/-0.2% of Vnom			
Maximum transient deviation (25-75% change)	1V at 1A/µs	1.5V at 0.5A/µs	3V at 0.25A/µs	3V at 0.25A/µs
Transient recovery time	100µs recovery to within 10% of the output voltage set point			
Over voltage protection (typical)	38V	72V	144V	264V
Over current protection	105 - 125%			
Short circuit protection	Hiccup with auto recovery			
Over temperature protection	All outputs are turned off. After unit cools down, recycle AC or toggle global remote on/off			

Module	Z1 / ZA / ZN	Z2 / ZB / ZP	ZC / ZQ	ZD / ZR
Vnom	5V	12V	24V	48V
Adjustment range	1.5 - 7.5V	4.5 - 15V	9 - 30V	18 - 58V
Turn on time	2s typical, 3s maximum			
Turn on rise time	<3.5ms (with resistive load) to 90% of voltage, monotonic rise above 10%			
Turn on overshoot	<0.1% of set voltage			
Ripple and noise	1% pk-pk of Vnom, using 20MHz bandwidth			
Voltage setting accuracy	+/-0.5% of factory set voltage			
Remote sense	Yes			
Minimum load	None			
Temperature coefficient	+/-0.02%/°C			
Load regulation (0-100% change)	+/-50mV	+/-100mV	+/-150mV	+/-300mV
Line regulation	+/-0.1% of Vnom for an 85-264Vac input change			
Cross regulation	+/-0.2% of Vnom			
Maximum transient deviation (25-75% change)	1V at 1A/µs	1.5V at 0.5A/µs	3V at 0.25A/µs	3V at 0.25A/µs
Transient recovery time	100µs recovery to within 10% of the output voltage set point			
Over voltage protection (typical)	9.5V	18V	36V	66V
Over current protection	105 - 125%			
Short circuit protection	Hiccup with auto recovery			
Over temperature protection	All outputs are turned off. After unit cools down, recycle AC or toggle global remote on/off			

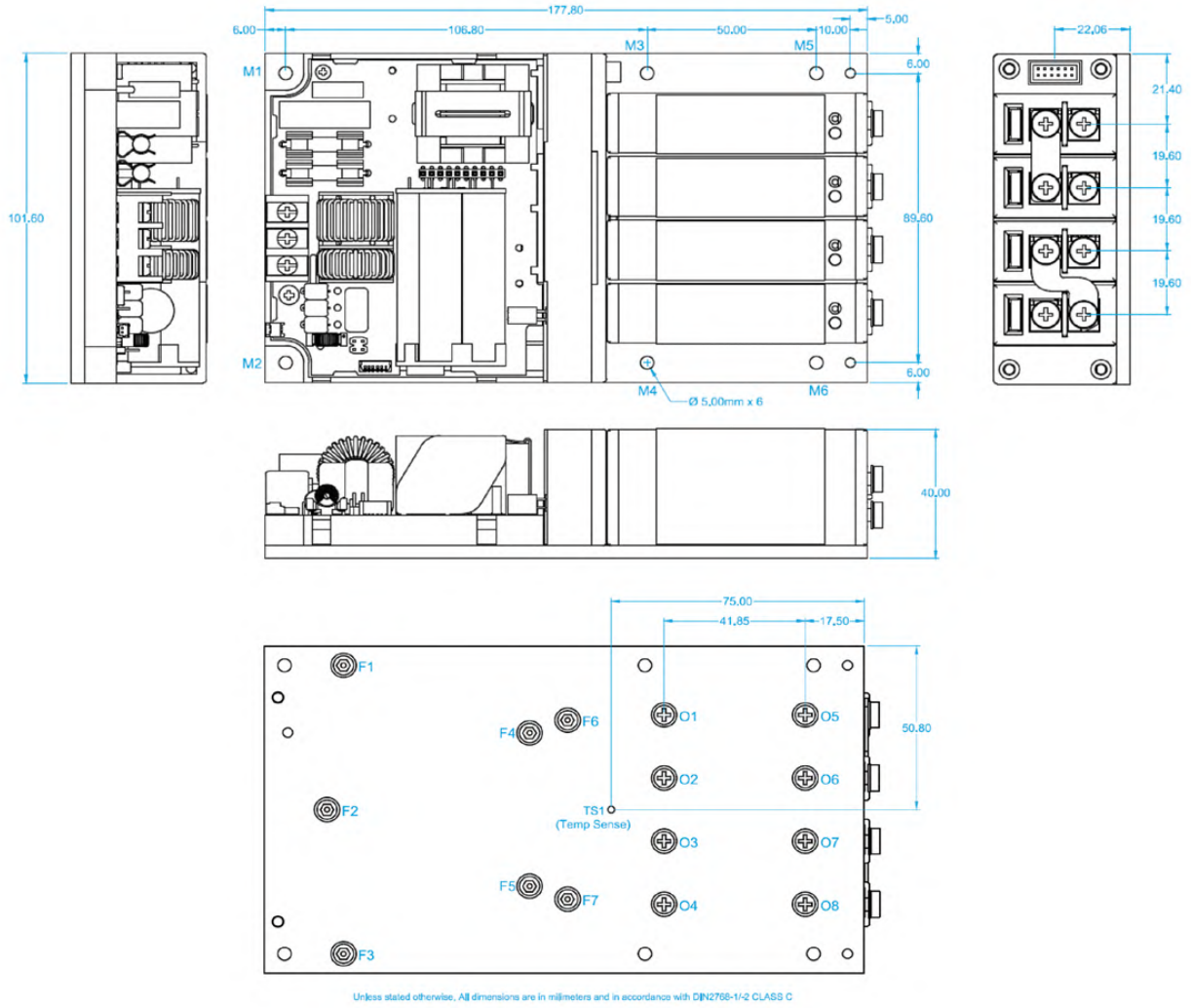
Output signal, programming & bias supply

Module good threshold	Open collector, off when output is below 90% of set point
Current monitor	The output current of the module can be measured using the ICONTROL signal
Remote Voltage Programming (S & Z modules only)	Adjusts the module set voltage by 0% to 131.5% with external 0 - 5V
Remote Current Programming (S & Z modules only)	Adjusts the module current limit point by 0% to 100% with external 0 to 4.5V
Current share accuracy	+/-5% for loads >20% of rating
Local bias supply	+4.2 - 5.V 10mA

Screws

Location	Details	Penetration	Torque
Baseplate Mount: M1 – M6	Hole diameter = 5.00mm	4mm Baseplate thickness	0.55NM
Output Module Connection	M4	-	0.5NM
Input Module Connection	6 - 32	-	0.8NM

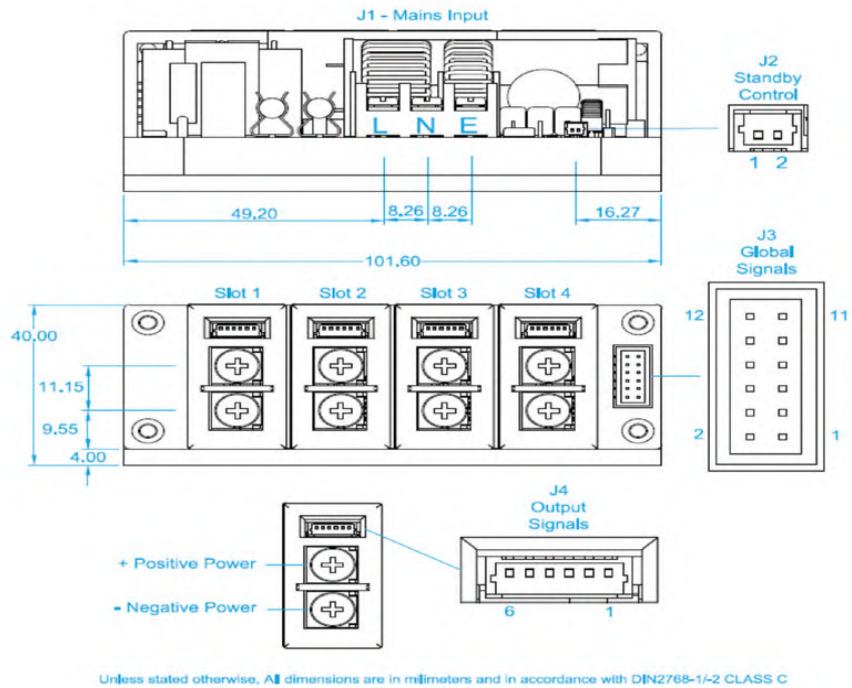
Outline Drawing CM4 Series



Pinouts

Circuit	Details
J1 – Mains Input	
1	Live
2	Neutral
3	Earth
J2 – Standby control	
1	Standby control negative
2	Standby control positive
J3 – Global Signals	
1	Slot 4 - Power Good
2	Slot 4 - Inhibit
3	Slot 3 - Power Good
4	Slot 3 - Inhibit
5	Slot 2 - Power Good
6	Slot 2 - Inhibit
7	Slot 1 - Power Good
8	Slot 1 - Inhibit
9	Temperature sense (TSNS)
10	AC OK
11	+5V (Bias Supply 1A)
12	COM
J4 – Output Signals	
1	- Sense
2	+ Sense
3	COM
4	I Control
5	V Control
6	+5V (Bias Supply 10mA)

Pinout CM4 Series



Mating Connectors

Ref.	Details	Manufacturer	Housing	Terminal
J1 - Mains Input	3 Pin, Barrier, 6-32 Steel Screws, 0.8 Nm or 7 Lb-In Torque (1)			
J2 - Standby control	2 Pin, 1.25mm, with Friction Lock, 28-30AWG	MOLEX	510210200	500588000
J3 - Global Signals	12 Pin, 2mm, with Friction Lock, 24-30 AWG, WIRE TO BOARD	MOLEX	511101260	503948051
	12 Pin, 2mm, with Friction Lock, 24-30 AWG, IDT CABLE TO BOARD	MOLEX	875681273	
J4 - Output Signals	6 PIN, 1.25mm, with Friction Lock, 28-30AWG	MOLEX	510210600	500588000
Output Power	Positive/Negative, M4 terminal, use appropriately rated crimp terminal			

Notes:

1. Cable 14-18AWG, 300V, 16A, 105°C, use appropriately rated crimp terminal.

2. Direct equivalents may be used for any connector parts.

3. All cables must be rated 105°C min, equivalent to UL1015

Industrial Test Broadcast Comms Renewable

300W and 400W, High Density AC-DC, digital power solution

Features	Benefits
• High peak power rating	Reduces size of power supply needed
• Full Digital Control	Improves Product Performance
• High Efficiency	Minimises heat in system
• Temperature controlled fan option	Reduces noise in system
• 5 Year Warranty	Low cost of ownership

Input

Input Voltage	90-264Vac	Input Frequency	45 - 63Hz (440Hz with reduced PFC - consult sales office)
Input Harmonics	EN61000-3-2 compliant	Inrush Current	<20A at 25°C and 230Vac (cold start) (meets EN61000-3-3). <30A for EFE400
Input Fuse	Dual fuses (Live + Neutral) Fast acting (not user accessible)		
Earth Leakage Current	410µA at 120Vac (60Hz), 858µA max at 240Vac (60Hz) Worst case leakage current is less than 1.0mA at 264Vac, 63Hz (normal condition, 1.8mA Single Fault Condition)		

Quick Selector (Standard models). Additional variants available - see below

Output Voltage	Current	Units without fan				Units with end fan	
		Open Frame		Cover + Chassis		Cover + Chassis	
		Description	Order Code	Description	Order Code	Description	Order Code
12V	25A	EFE300-12-CNMDS	U2Y002G	EFE300-12-CCMDS	U2Y001F	EFE300-12-ECMDS	U2Y003H
	33.3A	EFE400-12-CNMDS	U4Y002H	EFE400-12-CCMDS	U4Y001G	EFE400-12-ECMDS	U4Y003J
24V	12.5A	EFE300-24-CNMDS	U2Y005K	EFE300-24-CCMDS	U2Y004J	EFE300-24-ECMDS	U2Y006L
	16.7A	EFE400-24-CNMDS	U4Y005L	EFE400-24-CCMDS	U4Y004K	EFE400-24-ECMDS	U4Y006M

How To Create A Product Description

Output	Factory Setting Range EFE300	Factory Setting Range EFE400
12	11.4 - 13.2V	11.4 - 13.2V
24	22.8 - 26.4V	22.8 - 26.4V

Required output voltage must be specified at time of ordering

Case / Fan Option	
CN	Open frame, no fan, with 12V / 0.25A fan supply
CU	U chassis, no fan, with 12V / 0.25A fan supply
CC	Cover+chassis, no fan, with 12V / 0.25A fan supply
EC	Cover+chassis, end fan (temp controlled)

EFE300- or EFE400-	Vout	-	Case/Fan Option	Input Connector	D - Dual Fused	Earth Leakage	Output Connector

blank = right angled
-V = vertical

M = Molex (see connection drawings for details)

S = Standard (see above for details)

Confirm availability of created product with the sales office

Isolation

Input to Output	Reinforced	3kVac, 4.3kVdc		
Input to Earth	Basic	1.5kVac, 2.3kVdc	Output to Earth	200Vdc

Output Specification

	EFE300	EFE400	
Output Power	300W	400W	Continuous or RMS (including Peak power)
Peak Power	400W	530W	EFE300 - for 10 seconds EFE400 - for 10 seconds
Total Regulation	better than 4%		Including Line (for 90-264Vac input change), Load (for 0-100% load change) and temperature (0-50°C)
Ripple & Noise	1.5%		pk-pk, using EIAJ test method & 20MHz bandwidth
Voltage Setting Accuracy	±1%		at 50% load
Turn on Time	1.5s max		at 90 Vac & 100% rated output power. EFE400 2s max.
Efficiency	up to 90%		
Hold up	>16ms		at 90 Vac, 75% load
Min Load	None		
Transient Response	<5%		of set voltage for 50% load change (in 50µs within the range 25 - 100% load)
Recovery	<1ms		for recovery to 2% of set voltage
Short circuit protection	Yes		Auto recovery after removal of short circuit
Over Temperature protection	Yes		Primary - auto recovers, secondary - cycle power to restart
Over Voltage Protection	Yes		Latching, need to cycle ac to restart unit.
Fan supply	12V / 0.25A		Availble if 'no fan' is specified, otherwise used by PSU fan. No access to connector with -CC (cover + chassis) variant.

Environment

Temperature	0°C to 50°C operational, -40°C to 70°C storage (max 12 months). Full load, with 2m/s air blown from input to output (approximately 10CFM)
Derating	50°C to 70°C derate each output by 2.5% per °C
Low Temp Startup	-20°C
Humidity	5 - 95% RH non condensing
Shock	±3 x 30g shocks in each plane, total 18 shocks 30g shock = 11ms (+/-0.5msec), half sine Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987. Conforms to MIL-STD-810E/F, Method 516.5, Pro IV, VI
Vibration	Single axis 10 - 500 Hz at 2g (sweep and endurance at resonance) in all 3 planes Conforms to EN60068-2-6, IEC68-2-6 Conforms to MIL-STD-810E, Method 514.4, Pro I, Cat 1,9
Altitude	-200 to 3000 metres operational (-200 to 5000m storage/transportation)
Pollution	Degree 2, Material group IIIb

Emissions EN61000-6-3:2007

Radiated Electric Field	EN55011, EN55032	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B see application note for details
Conducted Emissions	EN55011, EN55032	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B
Conducted Harmonics	EN61000-3-2	Class A Class C - EFE300 at 100W and above, EFE400 at 200W and above
Flicker	EN61000-3-3	Compliant - d_{max} only

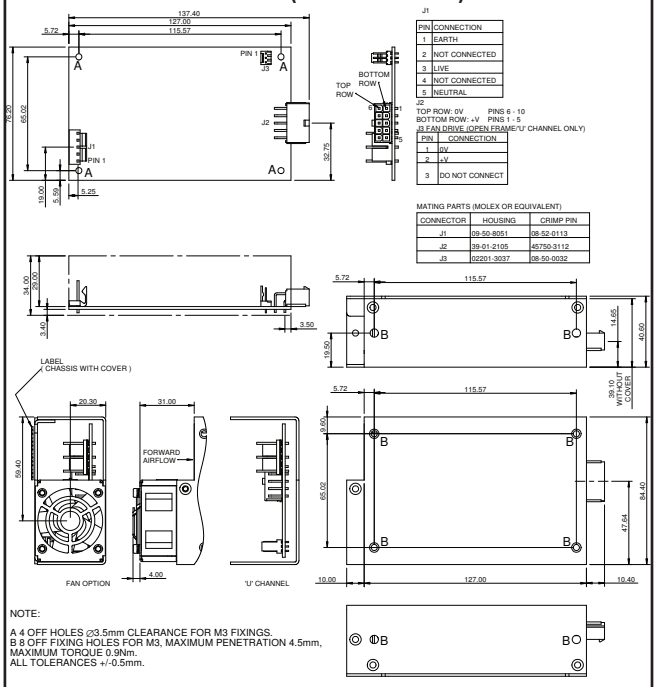
Immunity EN61000-6-2:2005				Criteria
Electrostatic Discharge	EN61000-4-2	Level 4	Air discharge 15kV, Contact discharge 8kV Not applicable to open frame units	A
Electromagnetic Field	EN61000-4-3	Level 3	12V/m	A
Fast / Burst Transient	EN61000-4-4	Level 4	ac input tested to 4.4kV dc output tested to 2.2kV	A
Surge Immunity	EN61000-4-5	Level 3	Common mode - 2.2kV Differential - 1.1kV	A
Conducted RF Immunity	EN61000-4-6	Level 3	12V	A
Power Frequency Magnetic Field	EN61000-4-8	Level 4	30A/m	A
Voltage Dips, Variations, Interruptions	EN61000-4-11	Class 3	Criteria B for dip to 40% for 5 cycles, 1 cycle interruption and 5 sec interruption	A
Ring Wave	EN61000-4-12	Level 3	Common mode - 2.2kV Differential - 1.1kV	A
Voltage Fluctuations	EN61000-4-14	Class 3		A

Safety Approvals

	Notes
IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1	File E135494
IEC/EN 61010-1	File E331788
CE Mark (EN60950-1)	LV Directive 2006/95/EC
CB certificate and Report available on request	*Please check with technical sales for status of approvals*

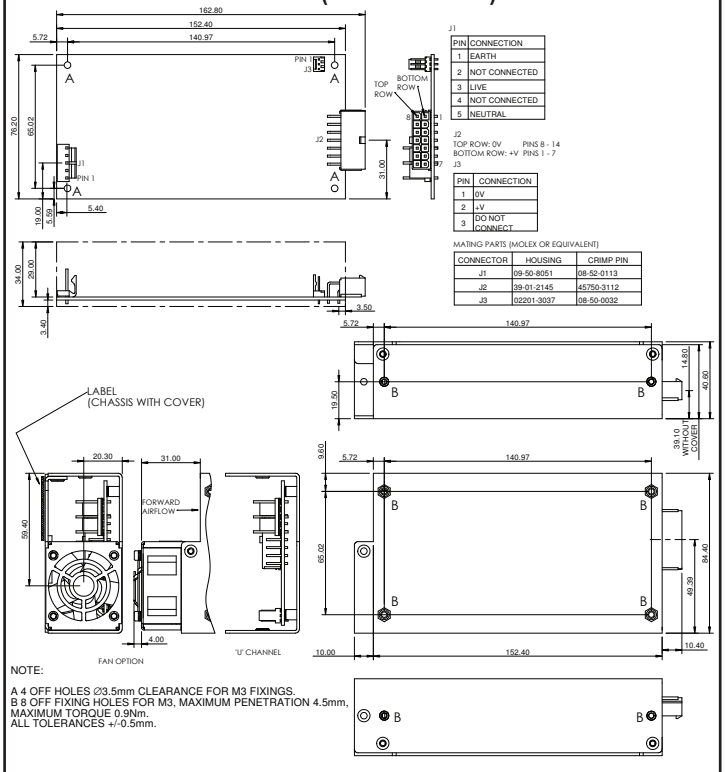
Outline & Connection Drawings

EFE300 (not -V version)



Note, connection details and outline drawings for -v (vertical) connector are different See handbook for details

EFE400 (not -V version)



Notes 1. All customer fixings M3
2. Maximum Penetration 4.5mm
3. Maximum torque 0.9Nm
4. All tolerances +/-0.5mm

Connectors are not included with the product. They are available from TDK-Lambda

1 off input connector and 3 crimps are available as part number is 94910.
1 off output connector and 10 crimps are available as part number 94750. (EFE300)
1 off output connector and 14 crimps are available as part number 94751 (EFE400)

Medical Industrial Test Broadcast Comms Renewable

300W and 400W, High Density AC-DC, digital power solution

Features	Benefits
• Reinforced isolation	Simplifies equipment design
• Full Digital Control	Improves Product Performance
• High Efficiency	Minimises heat in system
• Temperature controlled fan option	Reduces noise in system
• 5 Year Warranty	Low cost of ownership

Input

Input Voltage	90-264Vac	Input Frequency	45 - 63Hz (440Hz with reduced PFC - consult sales office)
Input Harmonics	EN61000-3-2 compliant	Inrush Current	<40A at 25°C and 230Vac (cold start) (meets EN61000-3-3). <50A for EFE400M
Input Fuse	Dual fuses (Live + Neutral) Fast acting (not user accessible)		
Earth Leakage Current	123µA at 120Vac (60Hz), 257µA max at 240Vac (60Hz) Worst case leakage current is less than 300µA at 264Vac, 63Hz (normal condition, 0.5mA Single Fault Condition)		

Quick Selector (Standard models). Additional variants available - see below

Output Voltage	Current	Units without fan				Units with end fan	
		Open Frame		Cover + Chassis		Cover + Chassis	
		Description	Order Code	Description	Order Code	Description	Order Code
12V	25A	EFE300M-12-5-HNMDL-YT	U5Y0020	EFE300M-12-5-HCMDL-YT	U5Y001Z	EFE300M-12-5-ECMDL-YT	U5Y0031
	33.3A	EFE400M-12-5-HNMDL-YT	U6Y001H	EFE400M-12-5-HCMDL-YT	U6Y004L	EFE400M-12-5-ECMDL-YT	U6Y007P
24V	12.5A	EFE300M-24-5-HNMDL-YT	U5Y0053	EFE300M-24-5-HCMDL-YT	U5Y0042	EFE300M-24-5-ECMDL-YT	U5Y0064
	16.7A	EFE400M-24-5-HNMDL-YT	U6Y002J	EFE400M-24-5-HCMDL-YT	U6Y005M	EFE400M-24-5-ECMDL-YT	U6Y008Q
48V	6.25A	EFE300M-48-5-HNMDL-YT	U5Y0201	EFE300M-48-5-HCMDL-YT	U5Y0223	EFE300M-48-5-ECMDL-YT	U5Y0166
	8.3A	EFE400M-48-5-HNMDL-YT	U6Y003K	EFE400M-48-5-HCMDL-YT	U6Y006N	EFE400M-48-5-ECMDL-YT	U6Y009R

How To Create A Product Description

Output	Factory Setting Range EFE300M	EFE400M
12	11.4 - 13.2V	11.4 - 13.2V
24	22.8 - 26.4V	22.8 - 26.4V
28	27 - 32V	
48	47-50V	47-50V
50	50-54V	

Required output voltage must be specified at time of ordering

Case / Fan Option	
-HN	Open frame, no fan, with 12V / 1A fan supply
-HU	U chassis, no fan, with 12V / 1A fan supply
-HC	Cover+chassis, no fan, with 12V / 1A fan supply
-EC	Cover+chassis, end fan (temp controlled)
-NN	Open frame, no fan, no fan supply
-NU	U chassis, no fan, no fan supply
-NC	Cover+chassis, no fan, no fan supply

-Y = ORing FET included
-N = Without ORing FET

blank = right angled
-V = vertical

EFE300M- or EFE400M-	Vout	-	Standby	Case/Fan Option	Input Connector	D - Dual Fused	Earth Leakage	ORing FET	Remote On/Off	Output Connector

Standby Voltage
0 = None (Only with EFE300M and 'N' Remote On/Off)
5 = 5V / 2A
12 = 12V / 1A

M = Molex
(see connection drawings for details)

L = 300µA

E = Enable
T = Inhibit
N = None

Confirm availability of created product with the sales office

Isolation

Input to Output	Reinforced	2 x MOPPs (3rd edition 60601) 4kVac, 5.7kVdc type tested to 4kVac (equivalent to 5.7kVdc), production tested to 4.3kVdc.			
Input to Earth	Basic	1.5kVac, 2.3kVdc	Output to Earth	1.5kVac	

Output Specification

	EFE300M	EFE400M	
Output Power	300W	400W	Continuous (including fan supply) or RMS (including Peak power) EFE400M derates below 100Vac input and units fitted with fan, vertical output connector, ORing FET derate. See handbook for details.
Peak Power	400W	530W	EFE300M - for 10 seconds. Outputs above 36V, 350W. EFE400M - for 10 seconds. Outputs 47V and above, 470W.
Total Regulation	better than 4%		Including Line (for 90-264Vac input change), Load (for 0-100% load change) and temperature (0-50°C)
Ripple & Noise	1.5%		pk-pk, using EIAJ test method & 20MHz bandwidth
Voltage Setting Accuracy	±1%		at 50% load
Turn on Time	1.5s max		at 90 Vac & 100% rated output power. EFE400M 2s max.
Efficiency	up to 90%		
Hold up	>16ms		at 90 Vac, 75% load
Min Load	None		
Transient Response	<5%		of set voltage for 50% load change (in 50µs within the range 25 - 100% load)
Recovery	<1ms		for recovery to 2% of set voltage
Short circuit protection	Yes		Auto recovery after removal of short circuit
Over Temperature protection	Yes		Primary - auto recovers, secondary - cycle power to restart
Over Voltage Protection	Yes		Latching, need to cycle ac to restart unit.
Fan supply	12V / 1A		Depending on 'Case/Fan Option' selected. See previous page for details

Global Signals

Remote on/off	Enable - TTL logic level low (relative to Standby 0V) enables channel 1 and fan supply Inhibit - TTL logic level low (relative to Standby 0V) inhibits channel 1 and fan supply
Standby Supply	5V / 2A or 12V / 1A, isolated supply, not affected by remote on/off.
Power Good	Logic high indicates ac supply is good and Ch1 is within regulation
ORing FET	Allows redundant connection of power supplies with no additional diodes required.

Environment

Temperature	0°C to 50°C operational, -40°C to 70°C storage (max 12 months). Full load, with 2m/s air blown from input to output (approximately 10CFM)
Derating	50°C to 70°C derate each output by 2.5% per °C
Low Temp Startup	-20°C
Humidity	5 - 95% RH non condensing
Shock	±3 x 30g shocks in each plane, total 18 shocks 30g shock = 11ms (+/-0.5msec), half sine Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987. Conforms to MIL-STD-810E/F, Method 516.5, Pro IV, VI
Vibration	Single axis 10 - 500 Hz at 2g (sweep and endurance at resonance) in all 3 planes Conforms to EN60068-2-6, IEC68-2-6 Conforms to MIL-STD-810E, Method 514.4, Pro I, Cat 1,9
Altitude	Medical approval = -200 to 3000 metres operational (-200 to 5000m storage/transportation) Non medical approval = -200 to 5000$_a$ metres operational (-200 to 5000m storage/transportation) a - non open frame EFE400M units = -200 to 4000 metres
Pollution	Degree 2, Material group IIIb

Emissions EN61000-6-3:2007, EN60601-1-2:2007

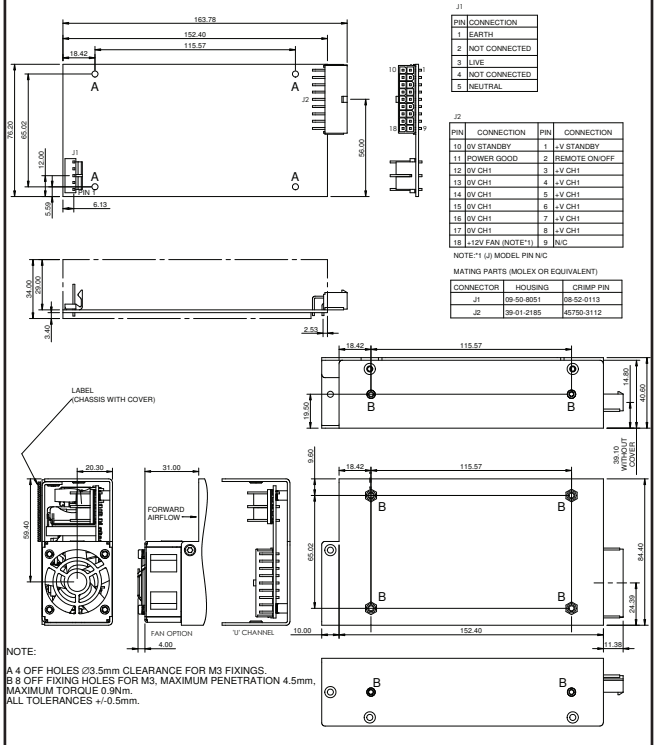
Radiated Electric Field	EN55011, EN55032	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B see application note for details
Conducted Emissions	EN55011, EN55032	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B
Conducted Harmonics	EN61000-3-2	Class A Class C - EFE300M at 100W and above
Flicker	EN61000-3-3	Compliant - d_{max} only

Immunity EN61000-6-2:2005				Criteria
Electrostatic Discharge	EN61000-4-2	Level 4	Air discharge 15kV, Contact discharge 8kV Not applicable to open frame units	A
Electromagnetic Field	EN61000-4-3	Level 3	12V/m	A
Fast / Burst Transient	EN61000-4-4	Level 4	ac input tested to 4.4kV dc output tested to 2.2kV	A
Surge Immunity	EN61000-4-5	Level 3	Common mode - 2.2kV Differential - 1.1kV	A
Conducted RF Immunity	EN61000-4-6	Level 3	12V	A
Power Frequency Magnetic Field	EN61000-4-8	Level 4	30A/m	A
Voltage Dips, Variations, Interruptions	EN61000-4-11	Class 3	Criteria B for 40% dip for 5 cycles (below 154Vac nominal), 1 cycle interruption and 5 sec interruption	A
Ring Wave	EN61000-4-12	Level 3	Common mode - 2.2kV Differential - 1.1kV	A
Voltage Fluctuations	EN61000-4-14	Class 3		A

Approvals / Accreditations	
IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1	File E135494
IEC/EN 60601-1, UL/CSA 60601-1, ANSI/AAMI ES60601-1 CAN/CSA-C22.2 No 60601-1-08	File E349607
IEC/EN 61010-1	EFE300M approved (File E331788), EFE400M designed to meet
CE Mark (EN60950-1)	LV Directive 2006/95/EC
CB certificate and Report available on request	*Please check with technical sales for status of approvals*
Designed and manufactured under the control of ISO9001 and ISO13485 (including risk management).	

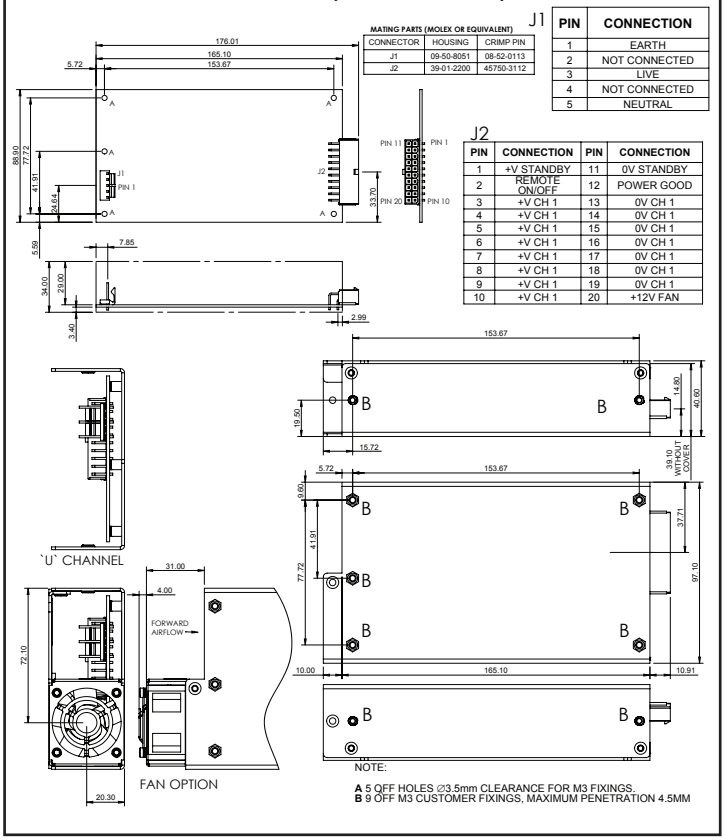
Outline & Connection Drawings

EFE300M (not -V version)



Note, connection details and outline drawings for -v (vertical) connector are different See handbook for details

EFE400M (not -V version)



Notes 1. All customer fixings M3
2. Maximum Penetration 4.5mm
3. Maximum torque 0.9Nm
4. All tolerances +/-0.5mm

Connectors are not included with the product. They are available from TDK-Lambda

1 off input connector and 3 crimps are available as part number is 94910.
1 off output connector and 18 crimps are available as part number 94752. (EFE300M)
1 off output connector and 20 crimps are available as part number 94912 (EFE400M)

Medical Industrial Test Broadcast Comms Renewable

350W - 1150W Modular power supply.

Features	Benefits
• High Efficiency	Minimises heat in system
• Low Profile	Fits 1U Applications
• High Power Density	Requires less space
• High Peak Power Rating	Enables use of smaller power supply
• 3 Year Warranty	Low cost of ownership

Input

Input Voltage	90-264Vac	Input Frequency	47 - 63Hz (440Hz with reduced PFC - consult sales office)	
Input Harmonics	EN61000-3-2 compliant	Inrush Current (cold start)	NV-350 <30A NV-700 <40A	at 25°C and 264Vac at 25°C and 230Vac
Input Fuse	NV-350 = 6.3A, NV-700 = 16A HBC Fast acting (not user accessible)			
Earth Leakage Current	130µA at 120Vac (60Hz), 260µA max at 240Vac (60Hz) Worst case leakage current is less than 300µA at 264Vac, 63Hz (normal condition, 0.5mA Single Fault Condition)			

How To Create A Product Description

The extensive range of output modules and options make it possible to achieve almost any combination of Volts and Amps. You can create your own NV350 or NV700 configuration online at www.nv-power.com. This method checks your configuration and offers the optimum solution. Alternatively, you can do this manually by using the guide below.

1. Calculate total output power to select the appropriate converter, then select required Cooling, Connection and Controls/Signals from the following table:

Converter	**NV3**	350 / 660W
	NV7	700 / 1150W

Cooling	**S**	**S**tandard air - forward
	V	**V**ariable speed fan - forward[6]
	R	**R**everse air[4]
	C	**C**ustomer air - no fan[1]

Input Connection	**S**	**S**crew
	I	IEC320[2]

Leakage Current	**S**	**S**tandard	130µA max at 120Vac (60Hz), 260µA max at 240Vac (60Hz)[5]

Primary Option[3]	**ES5V**	ac good,	psu enable,	5V/2A standby	
	ES12V	ac good,	psu enable,	12V/1A standby	
	IS5V	ac good,	psu inhibit,	5V/2A standby	
	IS12V	ac good,	psu inhibit,	12V/1A standby	
	EN5V	ac good,	psu enable,	5V/2A standby	global module good
	EN12V	ac good,	psu enable,	12V/1A standby	global module good
	IN5V	ac good,	psu inhibit,	5V/2A standby	global module good
	IN12V	ac good,	psu inhibit,	12V/1A standby	global module good

NV3 or NV7	S	S	S	EN5V

1 - Thermocoupled sample recommended to ensure adequate cooling - consult sales
2 - Not with customer air Cooling
3 - The Primary Option uses 1 slot. Leave blank for no primary option.
4 - Not with NV7
5 - Worst case leakage current is less than 300µA at 264Vac, 63Hz Normal Condition (<500µA Single Fault Condition)
6 - Recommended for new designs for NV-350. Not with NV7 (variable speed fan standard on NV7).

2. Select Output Modules from the Module Tables below ensuring that no more that 6 slots (NV-350) or 8 slots (NV-700) in total are used.
   Example - if you require 13V / 20A :-
   a) Select B as closest match for voltage & current and prefix with voltage eg 13BH
   b) Repeat for other outputs.
   This will create a complete product description eg NV3SSSES5V 13BH 12/15DB which represents a three output NV350 with Forward air cooling, Screw input terminals, standard leakage filter, ac good, PSU enable & 5V/2A aux supply
   Output 1 = 13V / 20A. Output 2 = 12V / 13A with screw terminals. Output 3 = 15V / 4A with screw terminals
   Max 350W continuous output power
3. Contact TDK-Lambda to validate configuration and issue a part number.

DUAL OUTPUT MODULES

Module		Output 1		Output 2		
Code	Slots	Voltage Range	Current	Voltage Range	Current	Max Power
DA	1[8]	12 (fixed)	3A	-12 (fixed)	1A	48W[8]
DB	2	3.2 - 3.6	25A	3.3 - 5.5	10A	55W
				7 - 15	5A	60W
				24 - 32	2A	50W
DB	2	4.75 - 5.5	25A	3.3 - 5.5	10A	55W
				7 - 15	5A	60W
				24 - 32	2A	50W
DB	2	5.5 - 6.5	25A	3.3 - 5.5	10A	55W
DB	2	12 - 15	13A[1]	3.3 - 5.5	10A	55W
				7 - 15	5A	60W
				24 - 32	2A	50W
DB	2	24 - 28	7A[2]	3.3 - 5.5	10A	55W
				7 - 15	5A	60W
				24 - 32	2A	50W

1. Derate linearly from 13A at 12.5V to 10A at 15.5V
2. Derate linearly from 7A at 25V to 6A at 28V
3. For NV3 - derate linearly from 40A at 5.2V to 36A at 5.5V
   For NV7 - derate linearly from 40A at 5V to 36A at 5.5V
4. Derate linearly from 22.5A at 8V to 20A at 9V
5. For NV3 - derate linearly from 20A at 13.2V to 16.5A at 15.5V
   For NV7 - derate linearly from 20A at 12.5V to 15.5A at 15.5V

SINGLE OUTPUT MODULES

Module		Output 1	Current	
Code	Slots	Voltage Range	Continuous	Peak
B	2	3.2 - 3.6	40A	
		4.75 - 5.5	40A[3]	
		7 - 9	22.5A[4]	
BH	2	12 - 15.5	20A[5]	
		24 - 28	10A[6]	
C	3	12 - 13.2	37.5A[7]	50A[7]
		15 - 16.5	30A[7]	37.5A[7]
		24 - 26.4	18.75A[7]	25A[7]
		27 - 32	16.6A[7]	19.7A[7]
CM	3	24 - 26.4	18.75A[7]	25A[7]
CC	6	48 - 52.8	18.75A[9]	25A[9]
		54 - 64	16.6A[9]	19.7A[9]

Higher output voltages available by connecting output modules in series. Contact technical support for details

6. For NV3 - derate linearly from 10A at 25.7V to 8.5A at 28V
   For NV7 - derate linearly from 10A at 24V to 8.5A at 28V
7. For NV3 - 400W max
   For NV7 - 600W peak for up to 10sec, 450W average
8. Only one per power supply, 48W max total power for module
9. For NV3 - limited by total output power, see below

OUTPUT POWER

		90-115Vac	115-150Vac	150-180Vac	180-264Vac	Comments	
NV-350	Continuous[6]	350W	450W	450W	660W	1. 350W average 2. 450W average 3. 600W average 4. 700W average	5. 1150W average 6. 250W for reverse air 7. Not for reverse air
	Peak (10s)[7]	400W[1]	500W[2]	500W[2]	740W[3]		
NV-700	Continuous	700W	700W	1150W	1150W		
	Peak (10s)		850W[4]	1150W	1450W[5]		

Output Specification

Voltage / Current	See module tables	
Turn on time	1.5s max	at 90Vac and 100% rated output power
Rise time	<50ms	to 90% of voltage, monotonic rise above 10% (27-32V C module < 100ms)
Efficiency	up to 90%	configuration dependent
Hold up	16ms min	at 90Vac and 100% rated power (12ms for NV-700)
Ripple and Noise	<1% or 50mV if greater	pk-pk, using EIAJ test method & 20MHz bandwidth
Voltage Accuracy	<1%	of set voltage (DA module: +5/-1% for channel 1, +2/-3.5% for channel 2)
Remote Sense	Yes	standard on single o/p + ch1 of dual modules, max 0.5V total line drop (DA module: None)
Minimum Load	No	on any output (DA module: 150mA on channel 1)
Temperature Coefficient	<0.02%	of rated voltage per °C
Load Regulation	<1%	for 0-100% load change (<2% for channel 2) (DA module: <3%)
Line Regulation	<0.1%	for 90-264Vac input change
Cross Regulation	<0.1%	for 100% load change on any output (DA module: 0.2% for channel 1, 3% for channel 2)
Transient Response	<4%	of set voltage for 50% load change
Recovery	500µs	for recovery to 1% of set voltage (DA module: 1000µs)
Over Voltage Protection	Yes	

Output Specification

Over Current Protection (singles)	110-150%	of module current. Hiccup mode. Module primary side protected
Power Limit (duals)	110-150%	of max Power ch1 + ch2. Hiccup mode. Module primary side protected (DA module: 110-220% for channel 1, 110-170% for channel 2)
Short Circuit Protection	Yes	
Over Temperature Protection	Yes	cycle ac off/on to reset Shutdown temperature varies according to ambient, output power and input voltage.

Isolation

Input to Output	Reinforced	2 x MOPPs (3rd edition 60601) 4kVac, 5.7kVdc type tested to 4kVac (equivalent to 5.7kVdc), production tested to 4.3kVdc.	Outputs from C, CC, CM or CMCM modules only
	Reinforced	2 x MOOPs (3rd edition 60601) 4.3kVdc (Basic for 2nd edition 60601)	Units with any other module or primary option fitted
Input to Earth	Basic	2.3kVdc	
Output to Earth		200Vdc	CM modules are 500Vac

Signals (all signals referenced to 0V of channel)

Ch1/Ch2 Module Good	Open collector output. 'On' indicates output is within 90% (± 5%) of nominal
Module inhibit	TTL logic high inhibits the output (both outputs for duals) of the module
Ch2 On/Off (duals only)	TTL logic low inhibits output 2 of the module

Global Interface Signals - units fitted with primary option

AC good collector AC good emitter	Uncommitted optocoupler. See application note for timings.
Global module good collector Global module good emitter	Uncommitted optocoupler. See application note for timings. Do not connect for ES and IS type primary options.
EN/ES and IN/IS Logic 0	TTL low enables (EN or ES) or inhibits (IN or IS) the entire psu including fan (except standby)
EN/ES and IN/IS Logic 1	TTL high enables (EN or ES) or inhibits (IN or IS) the entire psu including fan (except standby)
Standby Supply	5V / 2A (2.5A peak) or 12V / 1A (1.2A peak)

Environment

Temperature	0°C to 50°C operational, -40°C to 70°C storage (max 12 months).
Derating	50°C_a to 70°C derate total output power and each output current by 2.5% per °C
Low Temp Startup	-20°C
Humidity	5 - 95% RH non condensing
Shock	±3 x 30g shocks in each plane, total 18 shocks 30g shock = 11ms (+/-0.5msec), half sine Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987.
Vibration	Single axis 10 - 500 Hz at 2g (sweep and endurance at resonance) in all 3 planes
Altitude	3000/5000 metres operational (5000 metres non operational). See handbook for limitations of use.
Pollution	Degree 2, Material group IIIb

a - 45°C for NV7 with input voltage below 100Vac

Immunity EN61000-6-2:2005, EN60601-1-2:2007

				Criteria
Electrostatic Discharge	EN61000-4-2	Level 4	Air discharge 15kV, Contact discharge 8kV	A
Electromagnetic Field	EN61000-4-3	Level 3	12V/m	A
Fast / Burst Transient	EN61000-4-4	Level 4	ac input tested to 4.4kV dc output tested to 2.2kV	A
Surge Immunity	EN61000-4-5	Level 3	Common mode - 2.2kV, Differential - 1.1kV	A
Conducted RF Immunity	EN61000-4-6	Level 3	12V	A
Power Frequency Magnetic Field	EN61000-4-8	Level 4	30A/m	A
Voltage Dips, Variations, Interruptions	EN61000-4-11	Class 3	Criteria B for 5 sec interruption Dip to 40% for 5 cycles: NV350 - criteria B below 154Vac input at 350W output, criteria B at 660W output NV700 - criteria B below 198Vac input at 700W output, criteria B at 1150W output	A
Voltage Fluctuations	EN61000-4-14	Class 3	For 100 - 240V Nominal	A

Emissions EN61000-6-3:2007, EN60601-1-2:2007

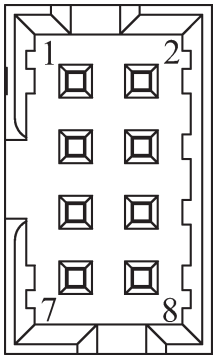
Radiated Electric Field	EN55011, EN55032	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B see application note for details. Additional filtering required for IEC inlet version.
Conducted Emissions	EN55011, EN55032	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B
Conducted Harmonics	EN61000-3-2	Class A
Flicker	EN61000-3-3	Compliant - d_{max} only

Approvals / Accreditations

IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1	File E135494
IEC/EN 60601-1, UL/CSA 60601-1, ANSI/AAMI ES60601-1 CAN/CSA-C22.2 No 60601-1-08	File E349607
IEC/EN 61010-1	File E331788
CE Mark (EN60950-1)	LV Directive 2006/95/EC
CB certificate and Report available on request	*Please check with technical sales for status of approvals*
Designed and manufactured under the control of ISO9001 and ISO13485 (including risk management).	

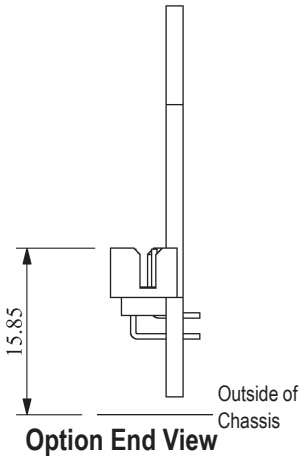
PRIMARY OPTION / DA MODULE

DA Module
1 +12V (channel 1)
2 +12V (channel 1)
3 +12V (channel 1)
4 0V (common ch1 / ch2)
5 0V (common ch1 / ch2)
6 0V (common ch1 / ch2)
7 -12V (channel 2)
8 -12V (channel 2)



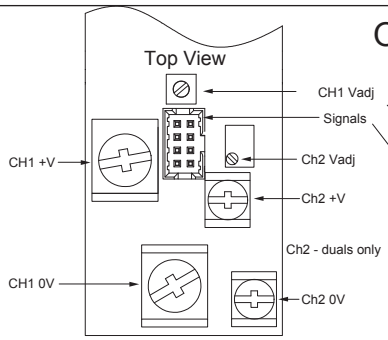
Primary Option
1 +V Standby
2 0V Standby
3 EN/ES & IN/IS Logic 1
4 EN/ES & IN/IS Logic 0
5 Global Module Good Collector
6 Global Module Good Emitter
7 AC good Collector
8 AC good Emitter

Housing: Molex 51110-0860
Crimp pin: 50394
Hand crimp tool: 69008-0959

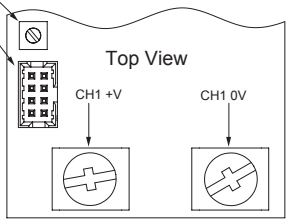


Option End View

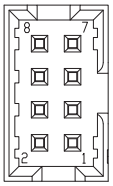
OUTPUT CONNECTIONS



DB / B / BH Module

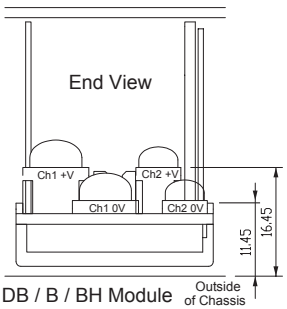


C Module

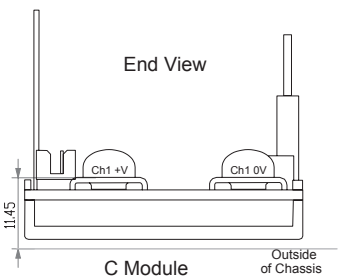


Signals
1 Ch2 0V
2 Ch2 Output Good
3 Ch2 On/Off
4 Module Inhibit
5 Ch1 0V
6 Ch1 Output Good
7 Ch1 Remote Sense -
8 Ch1 Remote Sense +

Housing: Molex 51110-0860
Crimp pin: 50394 Hand crimp tool: 69008-0959
Note: Do not connect pins 1-3 on single output modules



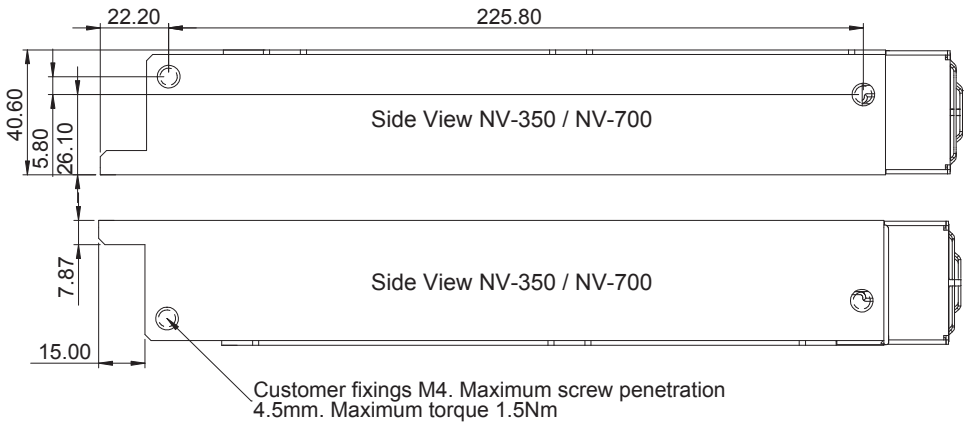
DB / B / BH Module

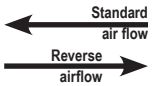


C Module

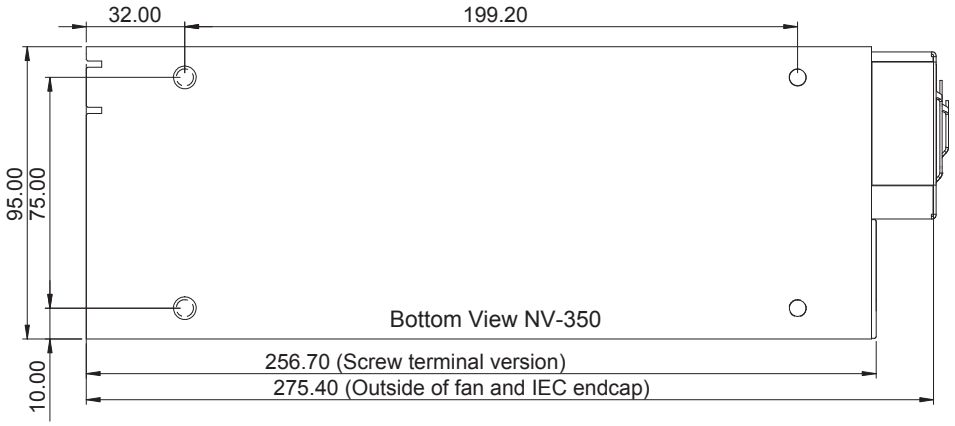
Connection Guidelines

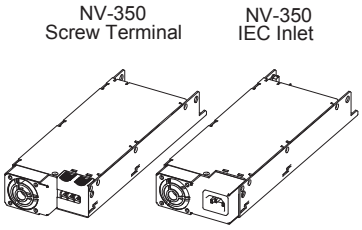
Ring Tags: Up to 50A, AMP PIDG terminals
Red: M3 36151, M4 320551, M5 130660
Blue: M3 320561, M4 320560, M5 130663
Yellow: M3 M4 320568, M5 130167
Crimp tool: 16900 Die set 169404

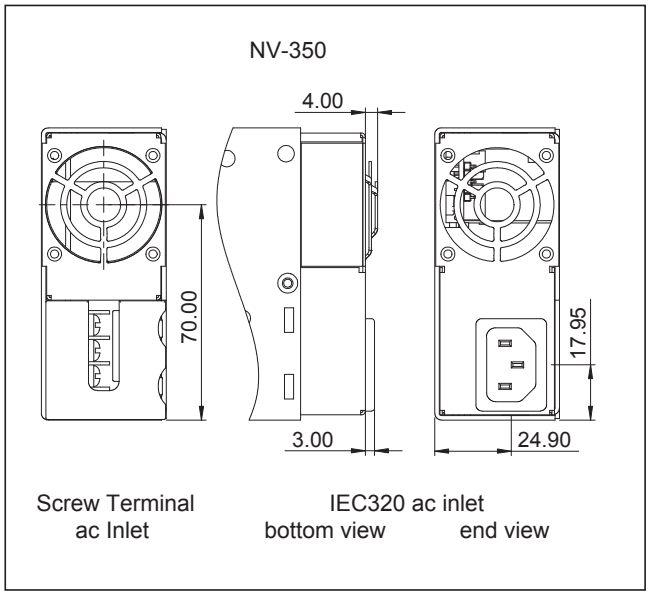


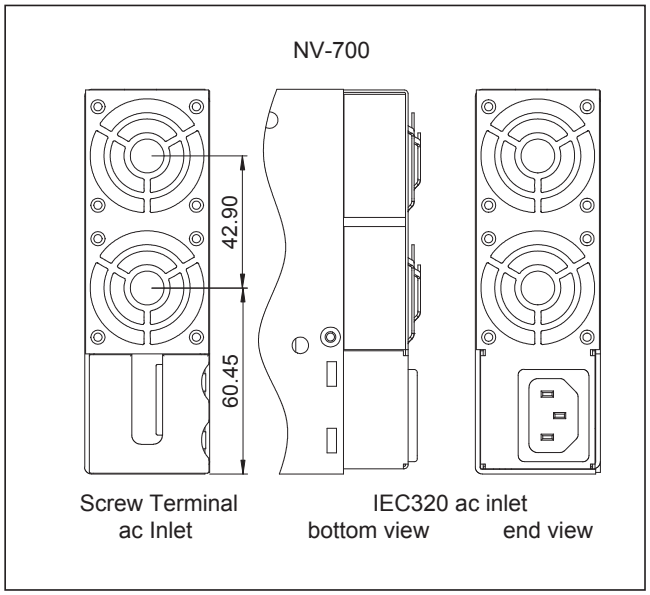


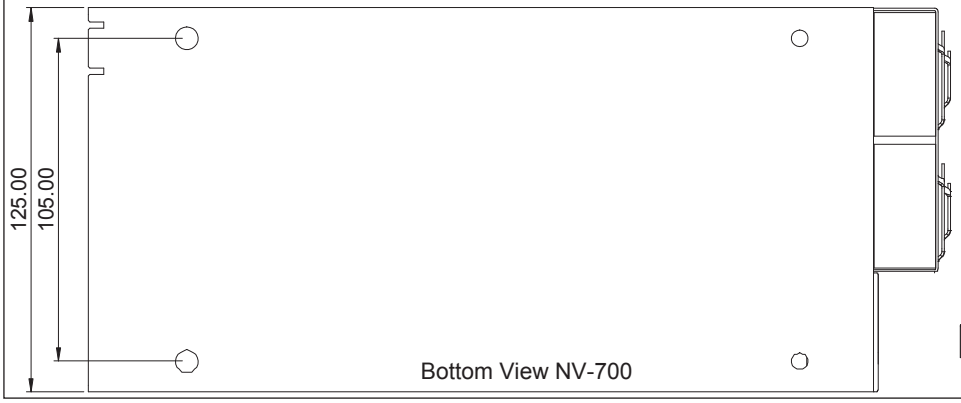
NOTES
1) Dimensions in mm
2) Tolerances:
Edge to edge/Edge to centre, +/-0.5
Centre to centre +/-0.2

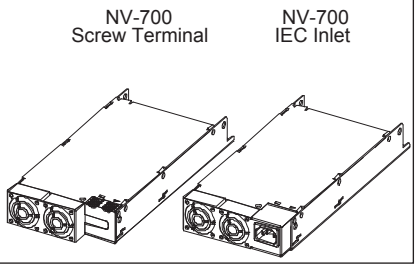












Medical Industrial Test Broadcast Comms Renewable

175/180/200W Configurable ac/dc power supply.

Features	Benefits
• High Efficiency	Minimises heat in system
• Low Profile	Fits 1U Applications
• High power density	Reduces space requirement
• Temperature controlled fan option	Reduces system noise
• 3 Year Warranty	Low cost of ownership

Input

Input Voltage	90-264Vac	Input Frequency	45 - 63Hz (440Hz with reduced PFC - consult sales office)
Input Harmonics	EN61000-3-2 compliant		
Input Fuse	Timelag (not user accessible)	Inrush Current	<40A at 25°C and 230Vac (cold start)
Earth Leakage Current	123µA at 120Vac (60Hz), 257µA max at 240Vac (60Hz) Worst case leakage current is less than 300µA at 264Vac, 63Hz (normal condition, 500µA Single Fault Condition)		

Available Outputs

Channel 1		Adjustment Range	Channel 2[1]		Adjustment Range	Channel 3[3]		Adjustment Range	Channel 4[4]		Adjustment Range
5	5V / 25A[2]	5 - 5.5V	1	1.8V / 15A	0.9 - 2.5V	T	12V / 5A	12 - 15V	T	-12V / 1A	Fixed
			2	2.7V / 15A	2.5 - 3.3V	F	15V / 5A	12 - 15V	F	-15V / 1A	Fixed
			3	3.3V / 15A	2.5 - 3.3V	G	24V / 2.5A	18 - 24V	3H	-3.3V / 2A[9]	Fixed
			0	Omit		0	Omit		5H	-5V / 2A[9]	Fixed
T	12V / 15A	12 - 15V[5]	5	5V / 10A[10]	3.3 - 5.5V				TH	-12V / 2A[9]	Fixed
F	15V / 12A	12 - 15V[6]	0	Omit					FH	-15V / 2A[9]	Fixed
G	24V / 7.5A	24 - 28V[7]	5	5V / 8A[8]	3.3 - 5.5V				0H	Fan supply only	
			0	Omit					0	Omit	

1. 1.8V, 2.7V, 3.3V channel 2 only available with 5V Channel 1
   5V/10A channel 2 only available with 12V or 15V Channel 1
   5V/8A channel 2 only available with 24V Channel 1.
2. Maximum combined output current from Ch1 & Ch2 = 25A
   Models with 5V channel 1 are limited to 175W output power
3. Follow letters in red by 'Y' for negative output channel 3.
4. Follow letters in red by 'P' for positive output channel 4.
5. 12 - 12.5V if 24V channel 3 fitted.
6. 14.5 - 15V if 24V channel 3 fitted
7. 24 - 24.5V if 5V channel 2 fitted
   24 - 26V if 24V channel 3 fitted.
8. 7A max with '-F' or '-I' option.
9. 1.5A max with '-F' or '-I'option.
10. 9A max with '-F' or '-I'option.

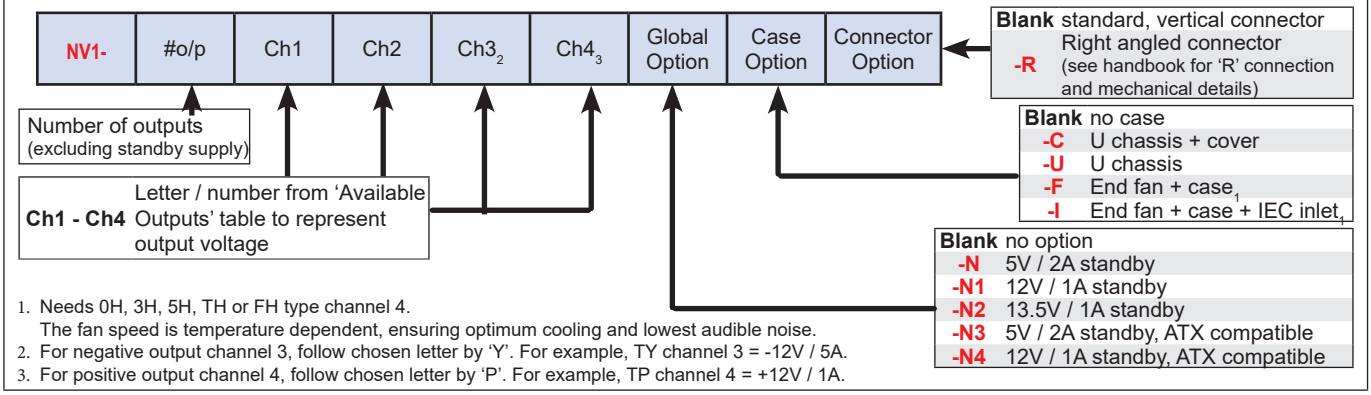
Other output options are available, please contact sales office with your requirements

Isolation

Input to Output	2 x MOOPs (3rd edition 60601) 4.3kVdc	Medical reinforced (2 x MOPPs) version available, contact sales office for details.
Input to Earth	1.5kVac, 2.3kVdc	
Output to Earth	200Vdc	

How To Create A Product Description

Confirm availability of created product with TDK-Lambda



1. Needs 0H, 3H, 5H, TH or FH type channel 4.
   The fan speed is temperature dependent, ensuring optimum cooling and lowest audible noise.
2. For negative output channel 3, follow chosen letter by 'Y'. For example, TY channel 3 = -12V / 5A.
3. For positive output channel 4, follow chosen letter by 'P'. For example, TP channel 4 = +12V / 1A.

Output Specification

Turn on time	1.5s max	at 90Vac and 100% rated output power
Efficiency	up to 90%	configuration dependent
Hold up	16ms min	at 90Vac
Ripple and Noise	<1%	(or 50mV if higher) pk-pk, using EIAJ test method & 20MHz bandwidth
Voltage Accuracy	±1%	±4% for Channel 4 with 'T' or 'F' type outputs, +4/-3% for all other channel 4.
Remote Sense	Yes	Channels 1 & 2. Max 0.5V total line drop
Minimum Load	No	on any output
Total Regulation	1% (or 50mV if greater)	Including Line (for 90-264Vac input change), Load (for 0-100% load change) and Cross (for 0-100% load change on any other output) regulation.
Transient Response	<4%	of set voltage for 50% load change (in 50µs within the range 25-100% load)
Recovery	500µs	for recovery to 1% of set voltage
Over Voltage Protection	Yes	See Application Notes for details
Short Circuit Protection	Yes	
Over Temperature Protection	Yes	
Peak Output Power	200W	Single output units with 12V, 15V or 24V (T, F or G). Average output power must not exceed 180W over any 5 minute period
Ch1 Good Signal	Yes	Provides a Logic 'Low' signal after Channel 1 output is within 90% (±5%) of nominal

QUICK SELECTOR - example configurations

Model	Ch1	Ch2	Ch3	Ch4	Ch5	Global Option
NV1-1T000	12V / 15A	-	-	-	-	No
NV1-1G000	24V / 7.5A	-	-	-	-	No
NV1-453TT	5V / 25A	3.3V / 15A	12V / 5A	-12V / 1A	-	No
NV1-453TT-N3	5V / 25A	3.3V / 15A	12V / 5A	-12V / 1A	5V / 2A	ATX (-N3)
NV1-453FF	5V / 25A	3.3V / 15A	15V / 5A	-15V / 1A	-	No
NV1-453FF-N3	5V / 25A	3.3V / 15A	15V / 5A	-15V / 1A	5V / 2A	ATX (-N3)
NV1-4G5TT	24V / 7.5A	5V / 8A	12V / 5A	-12V / 1A	-	No
NV1-4G5TT-N3	24V / 7.5A	5V / 8A	12V / 5A	-12V / 1A	5V / 2A	ATX (-N3)
NV1-4G5FF	24V / 7.5A	5V / 8A	15V / 5A	-15V / 1A	-	No
NV1-4G5FF-N3	24V / 7.5A	5V / 8A	15V / 5A	-15V / 1A	5V / 2A	ATX (-N3)

Additional variants available 'Built to Order' - see 'How to create a product description'

Global Signals (-N, -N1 and -N2 option models)	
Remote on/off	TTL logic level high inhibits all outputs (except Standby)
Power Good	Open collector output (referenced to PSU 0V). Turns on to indicate ac supply is good and output 1 is within regulation.
Standby Supply	Isolated supply, not affected by remote on/off -N option = 5V / 2A (2.5A peak) -N1 Option = 12V / 1A -N2 Option = 13.5V / 1A

Global Signals (-N3 and -N4 option models)	
ATX Remote on/off	TTL logic level high or open circuit inhibits all outputs (except Standby)
ATX Power Good	Logic high indicates ac supply is good and output 1 is within regulation.
Standby Supply	Common 0V with power supply. Not affected by ATX remote on/off -N3 option = 5V / 2A -N4 Option = 12V / 1A

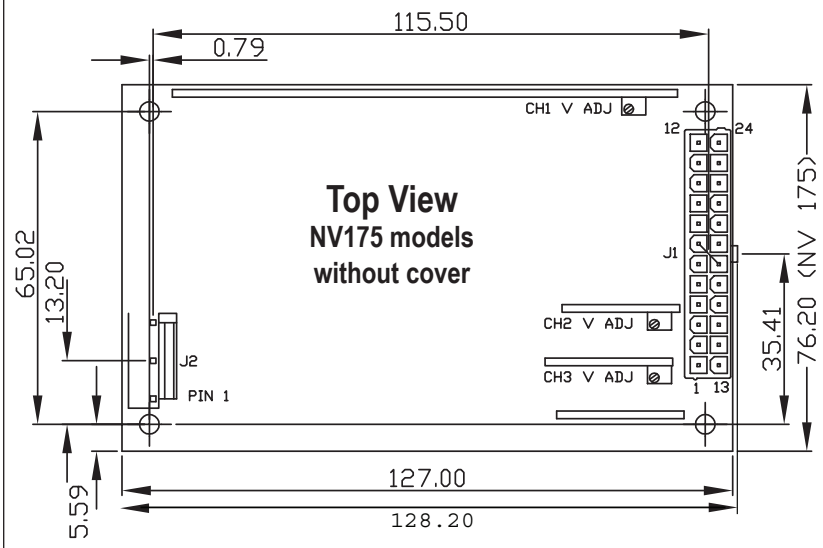
Immunity EN61000-6-2:2005, EN60601-1-2:2007				Criteria
Electrostatic Discharge	EN61000-4-2	Level 4	Air discharge 15kV, Contact discharge 8kV. Not applicable to open frame units	A
Electromagnetic Field	EN61000-4-3	Level 3	12V/m	A
Fast / Burst Transient	EN61000-4-4	Level 4	ac input tested to 4.4kV dc output tested to 2.2kV	A
Surge Immunity	EN61000-4-5	Level 3	Common mode - 2.2kV, Differential - 1.1kV	A
Conducted RF Immunity	EN61000-4-6	Level 3	12V	A
Power Frequency Magnetic Field	EN61000-4-8	Level 4	30A/m	A
Voltage Dips, Variations, Interruptions	EN61000-4-11	Class 3	Criteria B for 5 sec interruption and dips to 40% for 5 cycles below 154Vac nominal input	A

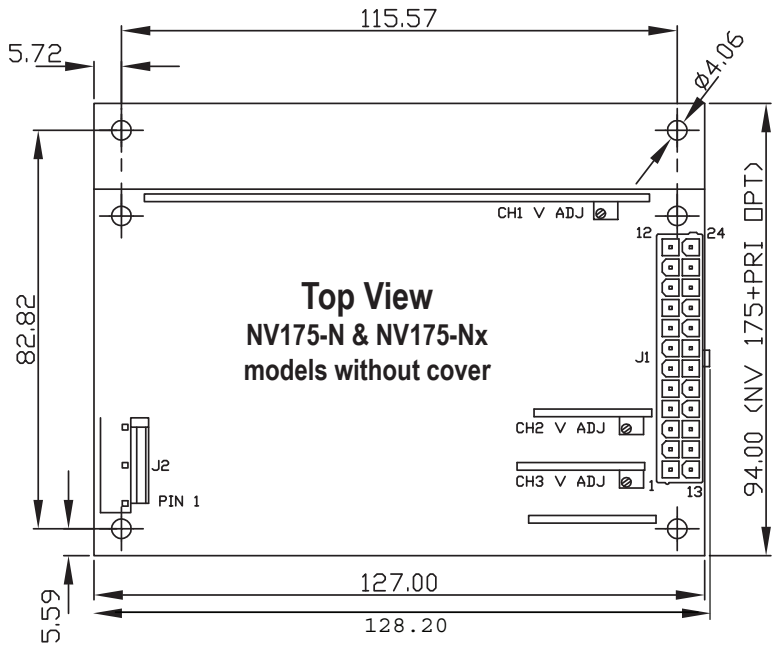
Emissions EN61000-6-3:2007, EN60601-1-2:2007		
Radiated Electric Field	EN55011, EN55032	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B see application note for details. Additional filtering is required for IEC inlet version
Conducted Emissions	EN55011, EN55032	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B
Conducted Harmonics	EN61000-3-2	Class A
Flicker	EN61000-3-3	Compliant - d_{max} only

Environment	
Temperature	0°C to 50°C operational, -40°C to 70°C storage (max 12 months). Full load, with either '-F' option fitted or 2m/s air blown from input to output (approximately 10CFM)
Derating	50°C to 70°C derate each output by 2.5% per °C
Low Temp Startup	-20°C
Humidity	5 - 95% RH non condensing
Shock	±3 x 30g shocks in each plane, total 18 shocks 30g shock = 11ms (+/-0.5msec), half sine Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987. Conforms to MIL-STD-810E/F, Method 516.5, Pro I, IV, VI
Vibration	Single axis 10 - 500 Hz at 2g (sweep and endurance at resonance) in all 3 planes Conforms to EN60068-2-6, IEC68-2-6 Conforms to MIL-STD-810E, Method 514.4, Pro I, Cat 1,9
Altitude	3000 metres operational
Pollution	Degree 2, Material group IIIb

Approvals / Accreditations	
IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1	File E135494
IEC/EN 60601-1, UL/CSA 60601-1, ANSI/AAMI ES60601-1 CAN/CSA-C22.2 No 60601-1-08	File E349607
IEC/EN61010	File E331788
CE Mark (EN60950-1)	LV Directive 2006/95/EC
CB certificate and Report available on request	*Please check with technical sales for status of approvals*
Designed and manufactured under the control of ISO9001 and ISO13485 (including risk management).	

Outline & Connection Drawings





J2

PIN	FUNCTION
1	EARTH
2	NOT CONNECTED
3	LIVE
4	NOT CONNECTED
5	NEUTRAL

J1

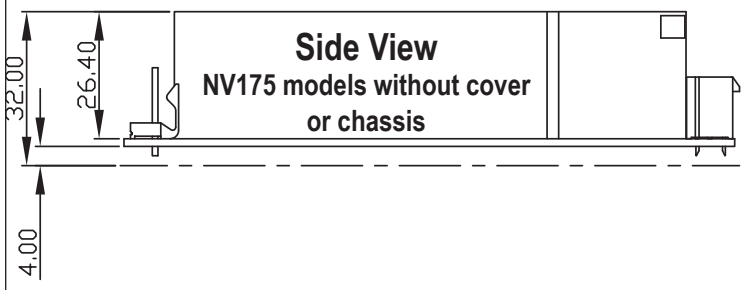
PIN	FUNCTION	PIN	FUNCTION
12	STANDBY +Ve	24	STANDBY RETURN
11	POWER GOOD	23	REMOTE ON/OFF
10	CH1 OUTPUT	22	CH1 GOOD
9	CH1 OUTPUT	21	CH1 OUTPUT
8	CH1 OUTPUT	20	CH1 OUTPUT
7	+SENSE CH1	19	-SENSE CH1
6	0V COMMON	18	0V COMMON
5	0V COMMON	17	0V COMMON
4	CH2 OUTPUT	16	0V COMMON
3	CH2 OUTPUT	15	CH2 OUTPUT
2	+SENSE CH2	14	-SENSE CH2
1	CH3 OUTPUT	13	CH4 OUTPUT

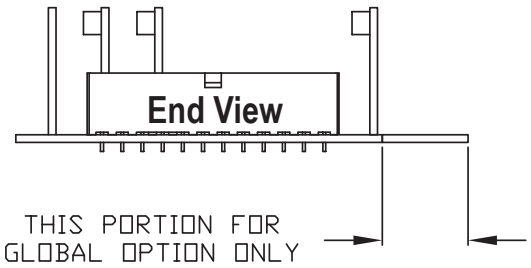
MATING PARTS (MOLEX OR EQUIVALENT)

CONN	HOUSING	PINS
J1	39-01-2245	44476-3112
J2	09-50-8051	08-52-0113

Input and output connectors are not included with the product. They are available from TDK-Lambda

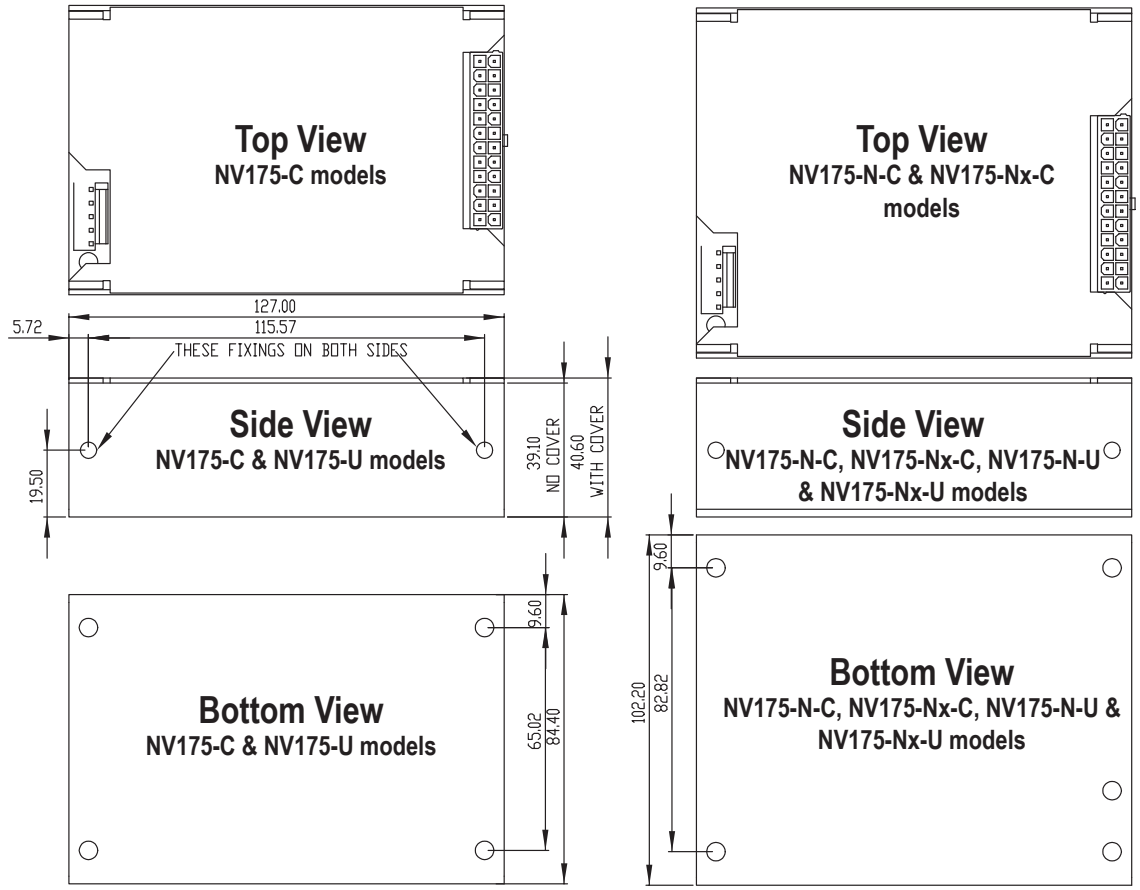
Part Number	Contents
94910	1 off input connector and 3 crimps
94911	1 off output connector and 24 crimps



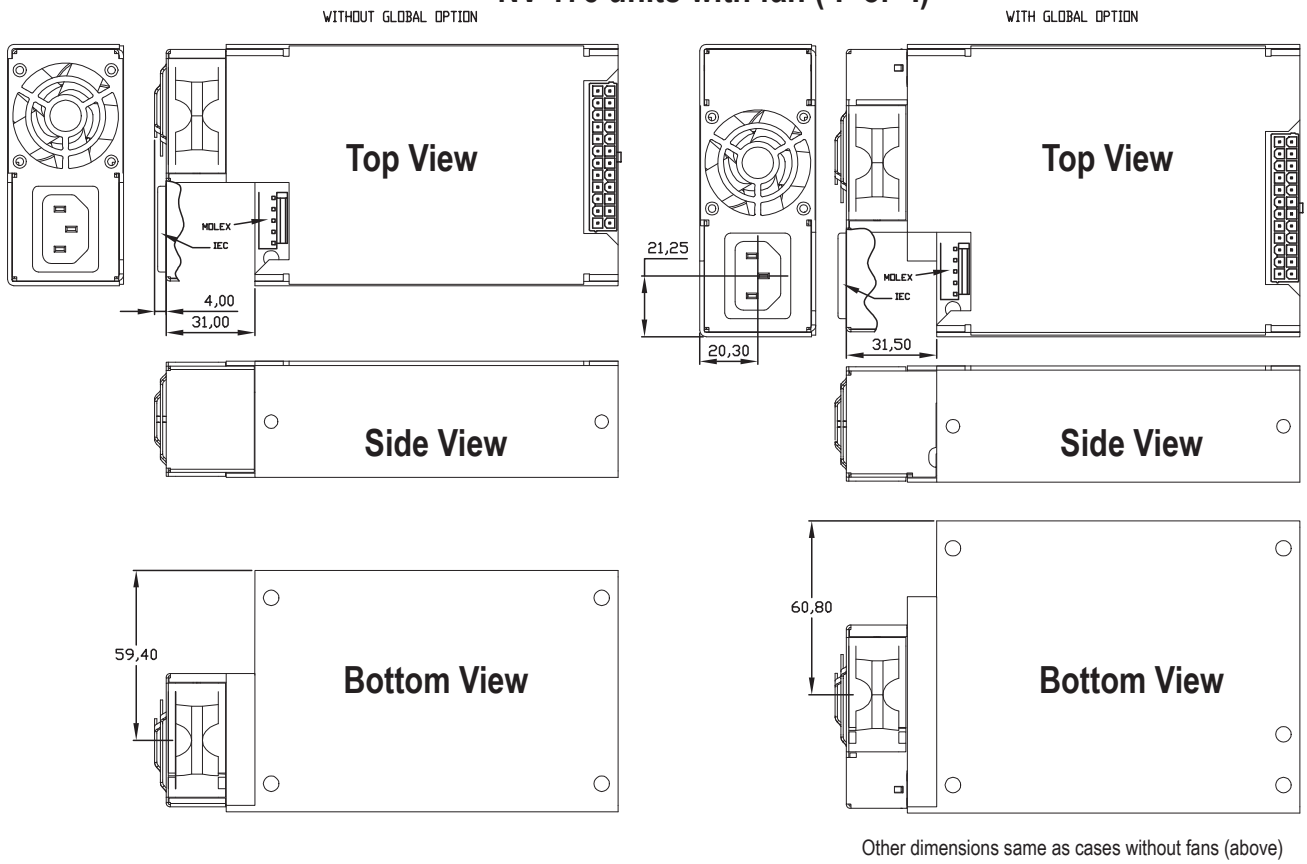


Notes: 1. All customer fixings M3 2. Maximum thread penetration 4.5mm 3. Maximum torque 0.9Nm 4. All tolerances +/-0.5mm

Outline & Connection Drawings



NV-175 units with fan (-F or -I)



Other dimensions same as cases without fans (above)

Notes: 1. All customer fixings M3 2. Maximum thread penetration 4.5mm 3. Maximum torque 0.9Nm 4. All tolerances +/-0.5mm

Medical Industrial Test Broadcast Comms Renewable

180-200W Configurable Medical power supply.

Features	Benefits
• High Efficiency	Minimises heat in system
• Low Profile	Fits 1U Applications
• Low Earth Leakage and Class B EMC	Simplifies system design, reduces cost
• 2 x MOPPs isolation	Simplifies system design
• 3 Year Warranty	Low cost of ownership

Input

Input Voltage	90-264Vac (100 - 240Vac nominal)	Input Frequency	45 - 63Hz
Input Harmonics	EN61000-3-2 compliant	Inrush Current	<40A at 25°C and 230Vac (cold start)
Input Fuse	Fast acting (not user accessible)		
Earth Leakage Current	123µA at 120Vac (60Hz), 257µA max at 240Vac (60Hz) Worst case leakage current is less than 300µA at 264Vac, 63Hz (normal condition, 0.5mA Single Fault Condition) Lower leakage versions available, contact sales office for details		

Isolation

Input to Output	2 x MOPPs (3rd edition 60601) 4kVac	type tested to 4kVac (equivalent to 5.7kVdc), production tested to 4.3kVdc	
Input to Earth	1.5kVac, 2.3kVdc	Output to Earth	200Vdc

QUICK SELECTOR - example configurations

Additional variants available, see "How to Create a Product Description"

Model	Ch1	Ch3	Ch4
NV1-1T000-M	12V / 15A	-	-
NV1-1G000-M	24V / 7.5A	-	-
NV1-3G0TT-M	24V / 7.5A	12V / 5A	-12V / 1A
NV1-3G0FF-M	24V / 7.5A	15V / 5A	-15V / 1A

How To Create A Product Description

Confirm availability of created product with TDK-Lambda

NV1-	#o/p	Ch1	0	$Ch3_2$	$Ch4_3$	Case Option	-M	Connector Option

Blank standard, vertical connector
R Right angled connector (see handbook for 'R' connection and mechanical details)

Number of outputs

Ch1, Ch3, Ch4 Letter / number from 'Available Outputs' table to represent output voltage

Medical with 4kVac (2 x MOPPs) input to output isolation

Blank no case
-C U chassis + cover
-U U chassis
-F End fan + case[1]
-I End fan + case + IEC inlet[1]

1. Needs 0H, 3H, 5H, TH or FH type channel 4.
   The fan speed is temperature dependent, ensuring optimum cooling and lowest audible noise.
2. For negative output channel 3, follow chosen letter by 'Y'. For example, TY channel 3 = -12V / 5A.
3. For positive output channel 4, follow chosen letter by 'P'. For example, TP channel 4 = +12V / 1A.

Available Outputs

Other output options are available, please contact sales office with your requirements

Channel 1	Adjustment Range	Channel 2	Channel 3[1]	Adjustment Range	Channel 4[2]	Adjustment Range
T 12V / 15A **F** 15V / 12A	12 - 15V[3] 12 - 15V[4]	Not available	**T** 12V / 5A **F** 15V / 5A **G** 24V / 2.5A **0** Omit	12 - 15V 12 - 15V 18 - 24V	**T** -12V / 1A **F** -15V / 1A **3HP** +3.3V / 2A[6] **5HP** +5V / 2A[6] **TH** -12V / 2A[6] **FH** -15V / 2A[6] **0H** Fan supply only **0** Omit	Fixed Fixed Fixed Fixed Fixed Fixed
G 24V / 7.5A	24 - 28V[5]					

1. Follow letters in red by 'Y' for negative output channel 3.
2. Follow letters in red by 'P' for positive output channel 4.
3. 12 - 12.5V if 24V channel 3 fitted.
4. 14.5 - 15V if 24V channel 3 fitted
5. 24 - 26V if 24V channel 3 fitted.
6. 1.5A max with '-F' or '-I' option.

Output Specification

Turn on time	1.5s max	at 90Vac and 100% rated output power
Efficiency	up to 90%	configuration dependent
Hold up	16ms min	at 90Vac
Ripple and Noise	<1%	(or 50mV if higher) pk-pk, using EIAJ test method & 20MHz bandwidth
Voltage Accuracy	±1%	±4% for Channel 4 with 'T' or 'F' type outputs, +4/-3% for all other channel 4.
Remote Sense	Yes	Channel 1. Max 0.5V total line drop
Minimum Load	No	on any output
Total Regulation	1% (or 50mV if greater)	Including Line (for 90-264Vac input change), Load (for 0-100% load change) and Cross (for 0-100% load change on any other output) regulation.
Transient Response	<4%	of set voltage for 50% load change (in 50µs within the range 25-100% load)
Recovery	500µs	for recovery to 1% of set voltage
Over Voltage Protection	Yes	See Application Notes for details
Short Circuit Protection	Yes	
Over Temperature Protection	Yes	
Peak Output Power	200W	Single output units with 12V, 15V or 24V (T, F or G). Average output power must not exceed 180W over any 5 minute period
Ch1 Good Signal	Yes	Provides a Logic 'Low' signal after Channel 1 output is within 90% (±5%) of nominal

Environment

Temperature	0°C to 50°C operational, -40°C to 70°C storage (max 12 months). Full load, with either '-F' option fitted or 2m/s air blown from input to output (approximately 10CFM)
Derating	50°C to 65°C derate each output by 2.5% per °C
Low Temp Startup	-20°C
Humidity	5 - 95% RH non condensing
Shock	±3 x 30g shocks in each plane, total 18 shocks 30g shock = 11ms (+/-0.5msec), half sine Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987. Conforms to MIL-STD-810E/F, Method 516.5, Pro I, IV, VI
Vibration	Single axis 10 - 500 Hz at 2g (sweep and endurance at resonance) in all 3 planes Conforms to EN60068-2-6, IEC68-2-6 Conforms to MIL-STD-810E, Method 514.4, Pro I, Cat 1,9
Altitude	3000 metres operational (4000m for NV1-1G000-M for 60601-1 3rd edition)
Pollution	Degree 2, Material group IIIb

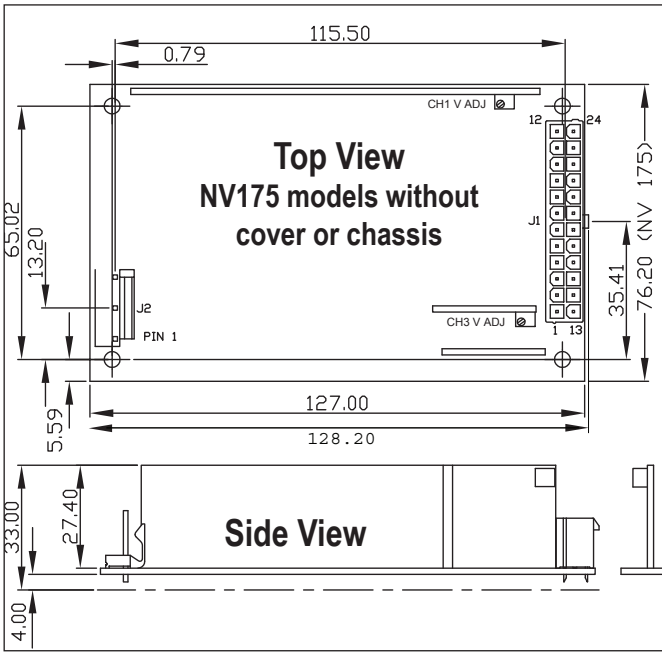
Immunity EN61000-6-2:2005, EN60601-1-2:2007

				Criteria
Electrostatic Discharge	EN61000-4-2	Level 4	Air discharge 15kV, Contact discharge 8kV. Not applicable to open frame units	A
Electromagnetic Field	EN61000-4-3	Level 3	12V/m	A
Fast / Burst Transient	EN61000-4-4	Level 4	ac input tested to 4.4kV dc output tested to 2.2kV	A
Surge Immunity	EN61000-4-5	Level 3	Common mode - 2.2kV, Differential - 1.1kV	A
Conducted RF Immunity	EN61000-4-6	Level 3	12V	A
Power Frequency Magnetic Field	EN61000-4-8	Level 4	30A/m	A
Voltage Dips, Variations, Interruptions	EN61000-4-11	Class 3	Criteria B for 5 sec interruption and dips to 40% for 5 cycles below 154Vac nominal input	A

Emissions EN61000-6-3:2007, EN60601-1-2:2007

Radiated Electric Field	EN55011, EN55032	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B see application note for details. Additional filtering required for IEC inlet version.
Conducted Emissions	EN55011, EN55032	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B
Conducted Harmonics	EN61000-3-2	Class A
Flicker	EN61000-3-3	Compliant - d_{max} only

Approvals / Accreditations	Notes
IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1	File E135494
IEC/EN 60601-1, UL/CSA 60601-1, ANSI/AAMI ES60601-1 CAN/CSA-C22.2 No 60601-1-08	File E349607
IEC/EN61010	Designed to meet
CE Mark (EN60950-1)	LV Directive 2006/95/EC
CB certificate and Report available on request	*Please check with technical sales for status of approvals*
Designed and manufactured under the control of ISO9001 and ISO13485 (including risk management).	



Mating Parts (Molex or Equivalent)

Conn	Housing	Pins
J1	39-01-2245	45750-3112
J2	09-50-8051	08-52-0113

J1

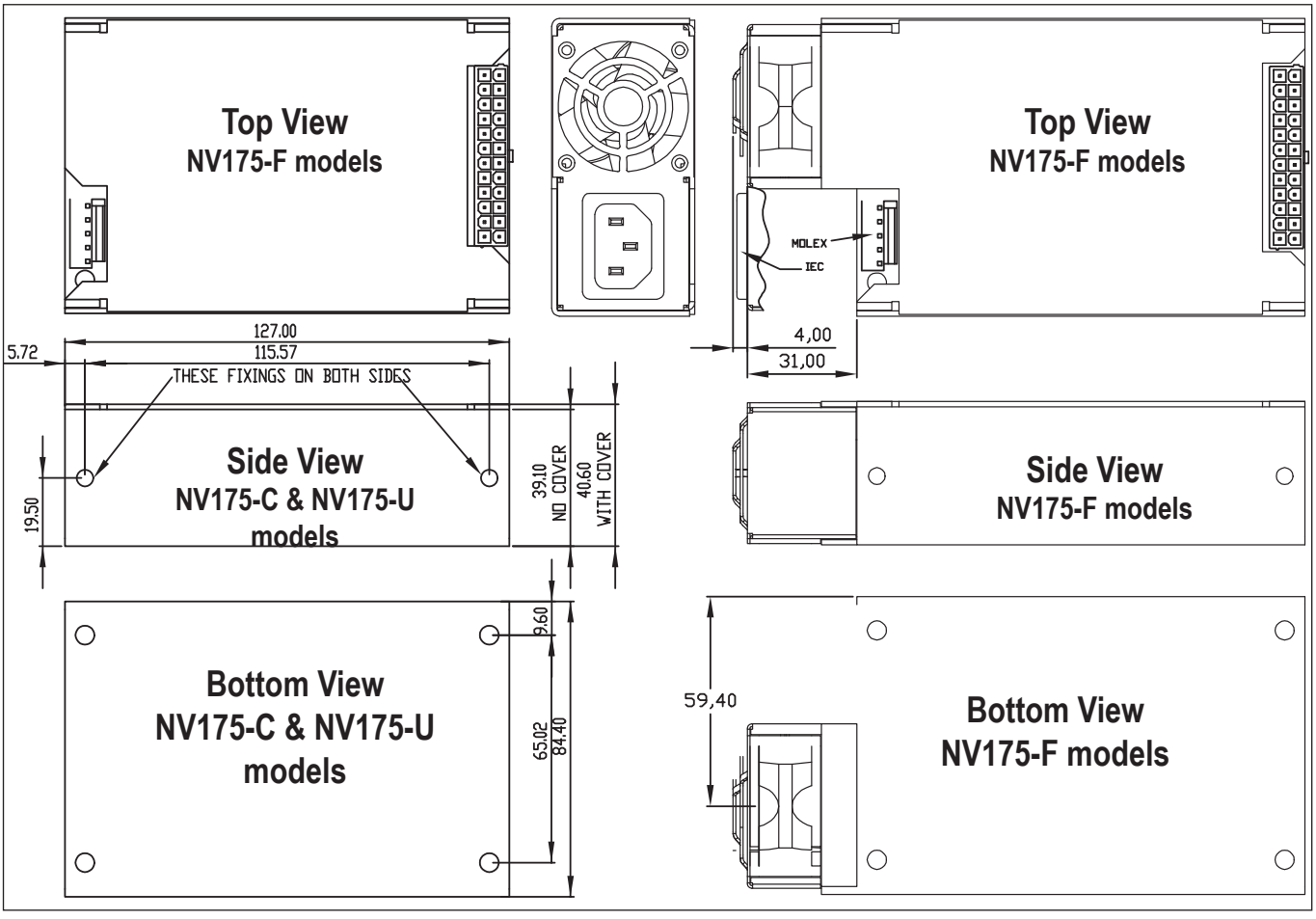
PIN	FUNCTION	PIN	FUNCTION
12	STANDBY +Ve	24	Do not connect
11	Do not connect	23	Do not connect
10	CH1 OUTPUT	22	CH1 GOOD
9	CH1 OUTPUT	21	CH1 OUTPUT
8	CH1 OUTPUT	20	CH1 OUTPUT
7	+SENSE CH1	19	-SENSE CH1
6	0V COMMON	18	0V COMMON
5	0V COMMON	17	0V COMMON
4	Do not connect	16	0V COMMON
3	Do not connect	15	Do not connect
2	Do not connect	14	Do not connect
1	CH3 OUTPUT	13	CH4 OUTPUT

J2

PIN	FUNCTION
1	EARTH
2	NOT CONNECTED
3	LIVE
4	NOT CONNECTED
5	NEUTRAL

Input and output connectors are not included with the product. They are available from TDK-Lambda

Part No	Contents
94910	1 off input connector and 3 crimps
94668	1 off output connector and 20 crimps

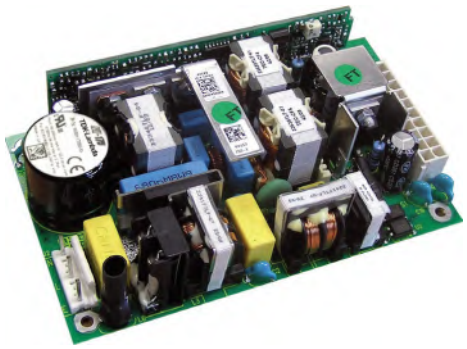


Notes: 1. All customer fixings M3 2. Maximum thread penetration 4.5mm 3. Maximum torque 0.9Nm 4. All tolerances +/-0.5mm

Medical Industrial Test Broadcast Comms Renewable

180W Configurable Medical power supply.

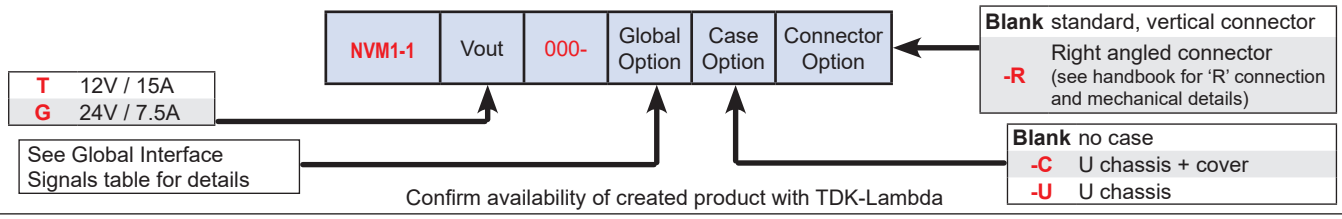
Features	Benefits
• High Efficiency	Minimises heat in system
• Low Profile	Fits 1U Applications
• Dual Fusing	Simplifies system design, reduces cost
• 2 x MOPPs isolation	Simplifies system design
• 3 Year Warranty	Low cost of ownership



Input

Input Voltage	90-264Vac (100 - 240Vac nominal)	Input Frequency	45 - 63Hz
Input Harmonics	EN61000-3-2 compliant	Inrush Current	<40A at 25°C and 230Vac (cold start)
Input Fuse	Dual fused, Fast acting (not user accessible)		
Earth Leakage Current	80µA at 120Vac (60Hz), 170µA max at 240Vac (60Hz) Worst case leakage current is less than 200µA at 264Vac, 63Hz (normal condition, 0.33mA Single Fault Condition)		

How To Create A Product Description



QUICK SELECTOR - example configurations

Model	Ch1	Standby	Remote On/Off
NVM1-1T000-S1	12V / 15A	12V / 0.2A	TTL high / OC to inhibit
NVM1-1G000-S1	24V / 7.5A	12V / 0.2A	TTL high / OC to inhibit

Output Specification

Turn on time	2s max	at 90Vac and 100% rated output power
Efficiency	up to 90%	
Hold up	16ms min	at 90Vac
Ripple and Noise	<1%	(or 50mV if higher) pk-pk, using EIAJ test method & 20MHz bandwidth
Voltage Accuracy	±1%	
Remote Sense	Yes	Channel 1. Max 0.5V total line drop
Minimum Load	No	on any output
Total Regulation	1% (or 50mV if greater)	Including Line (for 90-264Vac input change) and Load (for 0-100% load change)
Transient Response	<4%	of set voltage for 50% load change (in 50µs within the range 25-100% load)
Recovery	500µs	for recovery to 1% of set voltage
Over Voltage Protection	Yes	120-135% of Vout. Remove ac for 10 seconds then reapply to restart unit
Short Circuit Protection	Yes	
Over Temperature Protection	Yes	
Output Power	180W	

Isolation

Input to Output	Reinforced	2 x MOPPs (3rd edition 60601) 4.5kVac	type tested to 4.5kVac (equivalent to 6.3kVdc), production tested to 4.3kVdc
Input to Earth	Basic	1.5kVac, 2.3kVdc	
Output to Earth		1.5kVac	

Environment

Temperature	0°C to 50°C operational, -40°C to 85°C storage (max 12 months). Full load, with 2m/s air blown from input to output (approximately 10CFM)
Derating	50°C to 70°C derate each output by 2.5% per °C with 2m/s air blown from input to output
Low Temp Startup	-20°C
Humidity	5 - 95% RH non condensing
Shock	±3 x 30g shocks in each plane, total 18 shocks 30g shock = 11ms (+/-0.5msec), half sine Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987. Conforms to MIL-STD-810E/F, Method 516.5, Pro I, IV, VI
Vibration	Single axis 10 - 500 Hz at 2g (sweep and endurance at resonance) in all 3 planes Conforms to EN60068-2-6, IEC68-2-6 Conforms to MIL-STD-810E, Method 514.4, Pro I, Cat 1,9
Altitude	5000 metres operational (3000 metres for medical approval)
Pollution	Degree 2, Material group IIIb

Global Interface Signals

	Standby	PSU good signal	Logic level to enable main output
S	12V / 0.2A	Power good	High
S1	12V / 0.2A	Power good	Low
S2	12V / 0.2A	Channel 1 good	High
S3	12V / 0.2A	Channel 1 good	Low
S5	5V / 0.5A	Power good	Low

Power good = logic low signal to indicate when ac supply is good and output 1 is within regulation

Channel 1 good = logic low signal to indicate when output 1 is within regulation

Approvals / Accreditations

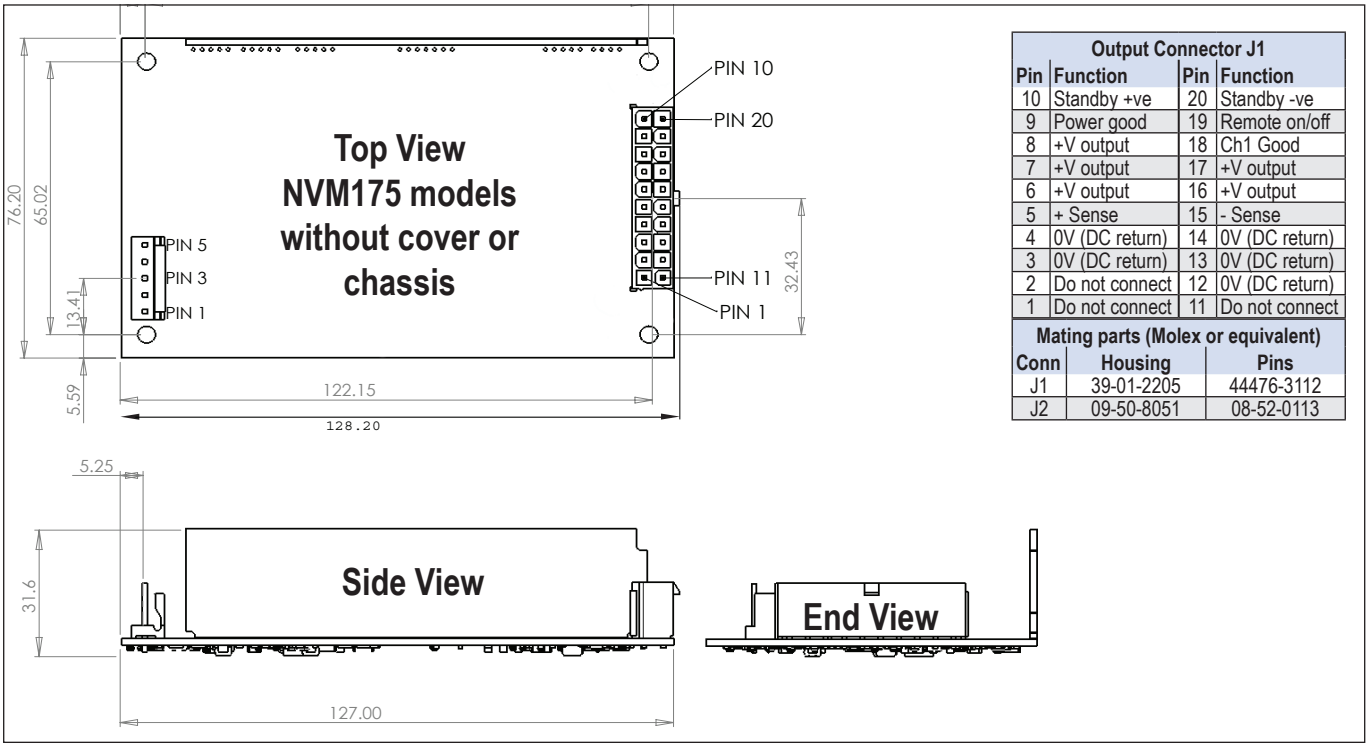
IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1	File E135494
IEC/EN 60601-1, UL/CSA 60601-1, ANSI/AAMI ES60601-1 CAN/CSA-C22.2 No 60601-1-08	File E349607
CE Mark (EN60950-1)	LV Directive 2006/95/EC
CB certificate and Report available on request	*Please check with technical sales for status of approvals*
Designed and manufactured under the control of ISO9001 and ISO13485 (including risk management).	

Immunity EN61000-6-2:2005, EN60601-1-2:2007

				Criteria
Electrostatic Discharge	EN61000-4-2	Level 3	Air discharge 8kV, Contact discharge 6kV. Not applicable to open frame units	A
Electromagnetic Field	EN61000-4-3	Level 3	12V/m	A
Fast / Burst Transient	EN61000-4-4	Level 4	ac input tested to 4.4kV dc output tested to 2.2kV	A
Surge Immunity	EN61000-4-5	Level 3	Common mode - 2.2kV, Differential - 1.1kV	A
Conducted RF Immunity	EN61000-4-6	Level 3	12V	A
Power Frequency Magnetic Field	EN61000-4-8	Level 4	30A/m	A
Voltage Dips, Variations, Interruptions	EN61000-4-11	Class 3	Criteria B for 5 sec interruption and dips to 40% for 5 cycles below 154Vac nominal input	A

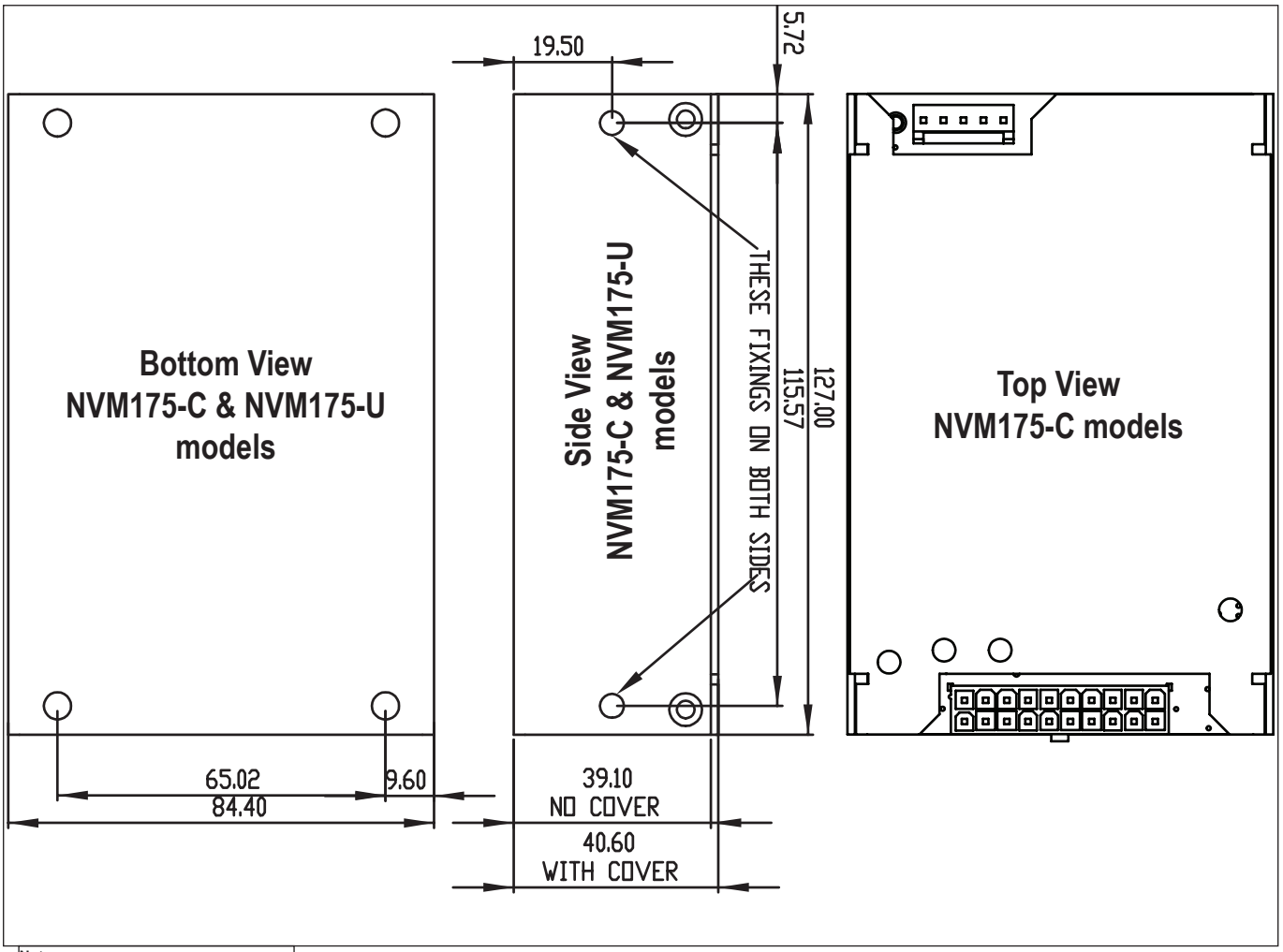
Emissions EN61000-6-3:2007, EN60601-1-2:2007

Radiated Electric Field	EN55011, EN55032	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B see application note for details.
Conducted Emissions	EN55011, EN55032	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B
Conducted Harmonics	EN61000-3-2	Class A
Flicker	EN61000-3-3	Compliant - d_{max} only



Output Connector J1			
Pin	Function	Pin	Function
10	Standby +ve	20	Standby -ve
9	Power good	19	Remote on/off
8	+V output	18	Ch1 Good
7	+V output	17	+V output
6	+V output	16	+V output
5	+ Sense	15	- Sense
4	0V (DC return)	14	0V (DC return)
3	0V (DC return)	13	0V (DC return)
2	Do not connect	12	0V (DC return)
1	Do not connect	11	Do not connect

Mating parts (Molex or equivalent)		
Conn	Housing	Pins
J1	39-01-2205	44476-3112
J2	09-50-8051	08-52-0113



Notes:
1. All customer fixings M3
2. Maximum thread penetration 4.5mm
3. Maximum torque 0.9Nm
4. All tolerances +/-0.5mm

Input and output connectors are not included with the product. They are available from TDK-Lambda

1 off input connector and 3 crimps part number is 94910.
1 off output connector and 20 crimps part number is 94668

Medical Industrial Test Broadcast Comms Renewable

550W / 650W
Modular power supply

Features	Benefits
• BF ready medical isolation (MOPP)	Eases design into systems (including BF)
• Low speed, low audible noise fan	Enhanced patient / user experience
• Up to 10 outputs	Eliminates need for additional supplies
• PMBus™ communication option	Remote monitoring and control
• 7 year warranty	Low cost of ownership

Input

Output power	550W	650W
Input voltage	90-264Vac	180-264Vac
Frequency	47 - 63 Hz (440Hz with reduced PFC)	
Input fuses	16A / 250Vac HBC Fast acting (not user accessible) in both Live and Neutral lines (single fusing optional)	
Inrush current	<40A at 25°C and 264Vac (cold start)	
Leakage current	See 'How To Create A Product Description' for details	
Touch current	<100µA	
Power factor	> 0.95 (at 230Vac, 100% load)	

Isolation

Input to output / signals	Reinforced	2 x MOPPs (3rd edition 60601) 4kVac, 5.7kVdc type tested to 4kVac (equivalent to 5.7kVdc), production tested to 4.3kVdc.
Input to earth	Basic	1 x MOPP, 1.5kVac
Output / signals to earth	Basic	1 x MOPP, 1.5kVac
Output / signals to output / signals	Basic	200Vdc

How To Create A Product Description

The extensive range of output modules and options make it possible to achieve almost any combination of Volts and Amps. You can create your own QM configuration online at https://config.emea.tdk-lambda.com/. This method checks your configuration and offers the optimum solution. Alternatively, you can do this manually by using the guide below.

1. Calculate total output power to select the appropriate converter, then select required Cooling, Connection, Leakage Current and Controls/ Signals from the following table:

QM4	F	S	D	L	T5H

Converter 4 slots wide	QM4	550W low line, 650W high line

Cooling	F	**Variable speed** Forward air - standard
	R	Reverse air (contact sales for details)
	C	Customer air - no fan (contact sales for details

Input Connection	S	Screw

Input fuse	D	Dual AC fuses
	E	Single AC fuse in Live line (contact sales for details)

Standby / Signals	blank	none
	E5L	5V / 250mA, Enable
	E5H	5V / 2A, 5V / 250mA, Enable
	E12H	12V / 1A, 5V / 250mA, Enable
	T5L	5V / 250mA, Inhibit
	T5H	5V / 2A, 5V / 250mA, Inhibit
	T12H	12V / 1A, 5V / 250mA, Inhibit
	P5H	5V / 2A, see PMBus™ app note
see specification page for details		

Leakage Current (max at 264Vac, 63Hz) Must also add the leakage current from modules and options	L	212µA
	R	77µA

2. Select Output Modules using the output voltages tables and the module specifications.
3. Contact TDK-Lambda to validate configuration and issue a part number.

Possible Outputs - see individual module data for full specifications

Module name	Slots used	Output voltage range			Maximum Output Current	Maximum Output Power
DM (ch2)	1 of 2 outputs in single slot	2.8V	-	3.8V	10A	33W
SB	1 slot	3.3V	-	3.63V	37A	122W
DM (ch2)	1 of 2 outputs in single slot	4.25V	-	5.75V	10A	50W
SA	1	5V	-	5V	15A	75W
SB	1	5V	-	5.5V	30A	150W
SC	2	5V	-	5.5V	60A	300W
ZD	3	5V	-	5.3V	80A	400W
ZF	4	5V	-	5.3V	110A	550W
YC	2	6.6V	-	7.26V	37A	244W
YC	2	10V	-	11V	30A	300W
YF	4	10V	-	11V	60A	600W
DH (ch1 or ch2)	1 of 2 outputs in single slot	10.2V	-	13.8V	10A	120W
DM (ch1)	1 of 2 outputs in single slot	11.9V	-	16.1V	10A	120W
DM (ch2)	1 of 2 outputs in single slot	11.9V	-	16.1V	8.3A	100W
SA	1	12V	-	12V	12.5A	150W
SB	1	12V	-	13.2V	25A	300W
SC	2	12V	-	13.2V	50A	600W
ZD	3	12V	-	12.8V	65A	780W
ZF	4	12V	-	12.8V	90A	1080W
DH (ch1 or ch2)	1 of 2 outputs in single slot	12.75V	-	17.25V	8A	120W
SA	1	15V	-	15V	10A	150W
SB	1	15V	-	16.5V	20A	300W
ZC	2	15V	-	16V	36A	540W
SB	1	18V	-	19.8V	16.7A	300W
ZC	2	18V	-	19.2V	30A	540W
DH (ch1 or ch2)	1 of 2 outputs in single slot	20.4V	-	27.6V	5A	120W
YB	1	20.4V	-	27.6V	9.8A	200W
DM (ch1)	1 of 2 outputs in single slot	20.8V	-	28.2V	5A	120W
DM (ch2)	1 of 2 outputs in single slot	23.5V	-	24.5V	4.16A	100W
SA	1	24V	-	24V	6.25A	150W
SB	1	24V	-	26.4V	12.5A	300W
SC	2	24V	-	26.4V	25A	600W
ZD	3	24V	-	25.6V	30A	720W
YF	4	24V	-	26.4V	50A	1200W
DH (ch1 or ch2)	1 of 2 outputs in single slot	23.0V	-	31V	4.4A	120W
YB	1	27.6V	-	34.5V	7.25A	200W
SB	1	28V	-	30.8V	10.7A	300W
ZC	2	28V	-	30V	19.3A	540W
YC	2	30V	-	33V	20A	600W
SC	2	36V	-	39.6V	16.7A	600W
ZF	4	36V	-	38.4V	29A	1044W
YB	1	40.8V	-	55.2V	4.9A	200W
SB	1	48V	-	52.8V	6.25A	300W
SC	2	48V	-	52.8V	12.5A	600W
ZD	3	48V	-	51.2V	15A	720W
YF	4	48V	-	52.8V	25A	1200W
YB	1	55.2V	-	62V	3.62A	200W
YC	2	56V	-	61.6V	10.7A	600W
YF	4	72V	-	79.2V	16.7A	1200W
YC	2	96V	-	105.6V	6.25A	600W
YF	4	96V	-	105.6V	12.5A	1200W

Note. 'Maximum Output Current' and 'Maximum Output Power' above are the maximum available from the module. It is not possible to exceed the 'Output Power' of the unit given on the previous page.

Output Specification		
Turn on time	2s max	at 90Vac (180Vac for 650W) and 100% rated output power
Efficiency	up to 91%	240Vac & above 50% rated power, configuration dependent
Hold up	16ms min 10ms min	at 550W output power. at 650W output power
Over temperature protection	Yes	converter protection shuts down all outputs (except standby supplies) and fan, auto restarts. Shutdown temperature varies according to ambient, output power and input voltage.

Environment	
Temperature	-20°C to 70°C operational, -40°C to 70°C storage (max 12 months).
Derating	50°C to 70°C derate total output power and each output current by 2.5% per °C Additionally, the 0.25A standby supply provided with the E5H, E12H, T5H and T12H options derates by 2.4% per °C from 25°C to 50°C when the unit is inhibited (fan not running)
Low temperature startup	-40°C
Humidity	5 - 95% RH non condensing
Shock	±3 x 30g shocks in each plane, total 18 shocks (11ms (+/-0.5msec), half sine) Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987. Conforms to MIL-STD-810G, Method 516.6, Pro IV
Vibration	Single axis 10 - 500 Hz at 2g (sweep and endurance at resonance) in all 3 planes Conforms to EN60068-2-6, IEC68-2-6 Conforms to MIL-STD-810G, Method 514.6, Pro I
Altitude	5000 metres operational, 5000 metres storage/transportation
Pollution	Degree 2, Material group IIIb
IP Rating	IPX0

Emissions EN61000-6-3:2007, EN60601-1-2:2015 - see application notes for best installation practice		
Radiated electric field	EN55011, EN55032	(as per CISPR.11/32) Class B, FCC47 part 15 subpart B - 'L' leakage current variants (Units with 'R' type leakage current option achieve Class A)
Conducted emissions	EN55011, EN55032	(as per CISPR.11/32) Class B, FCC47 part 15 subpart B - 'L' leakage current variants (Units with 'R' type leakage current option achieve Class A)
Conducted harmonics	EN61000-3-2	Class A and Class C
Flicker	EN61000-3-3	Compliant - d_{max} only

Immunity EN61000-6-2:2005, EN60601-1-2:2015 - see application notes for best installation practice				Criteria
Electrostatic discharge	EN61000-4-2	Level 4	F type cooling only	A
Electromagnetic field	EN61000-4-3	Level 3	Proximity fields, EN60601-1-2, Levels as defined in standard, Criteria A	A
Fast / burst transient	EN61000-4-4	Level 4	Tested at 5kHz and 100kHz	A
Surge immunity	EN61000-4-5	Level 3		A
Conducted RF immunity	EN61000-4-6	Level 3		A
Power frequency magnetic field	EN61000-4-8	Level 4		A
Voltage dips, variations, interruptions	EN61000-4-11	Class 3	Criteria B for 5s and 1 cycle interruptions	A
Voltage sags	Semi F-47	compliant	above 180Vac input	
Ring wave	EN61000-4-12	Level 3		A
	ANSI C62.41	Level 2		A
Voltage fluctuations	EN61000-4-14	Class 3	See EMC report for full details.	A

Approvals / Accreditations	
IEC/EN 62368-1, UL62368-1 / CSA 22.2 No 62368-1	File E135494
IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1	File E135494
IEC/EN 60601-1, UL/CSA 60601-1, ANSI/AAMI ES60601-1, CAN/CSA-C22.2 No 60601-1	File E349607
IEC/EN 61010-1	Results included in 60950 report
CE Mark (EN62368-1)	Low Voltage Directive (LVD), electromagnetic compatibility (EMC) and Restriction of Hazardous Substances (RoHS)
CB certificate and Report available on request	
Designed and manufactured under the control of ISO9001 and ISO13485 (including risk management).	

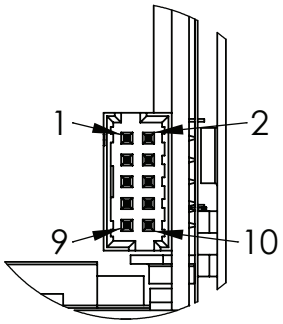
Standby / Signals

Maximum power per channel	See table below
Available signals (Exx or Txx type)	PSU inhibit (Txx type) or enable (Exx type), AC Good
Available signals (Pxx type)	PMBus™ control of power supply fan speed and fail warning Serial number, date of manufacture, run time, on/off power cycles For further details, see the product range application notes, PMBus™ section
Additional Leakage Current (max at 264Vac, 63Hz)	xxL = 13.1µA, xxH = 15µA Must also add the leakage current from modules and selected filter option.

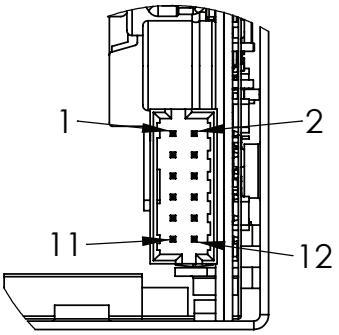
Available Output Voltages (at PSU signal connector)

Option type	Standby 1			Standby 2			PSU on/off
	V	Max Current	Power	V	Max Current	Power	
E5L	5V	250mA	1.25W	not available			Enable
E5H	5V	250mA	1.25W	5V	2A	10W	Enable
E12H	5V	250mA	1.25W	12V	1A	12W	Enable
T5L	5V	250mA	1.25W	not available			Inhibit
T5H	5V	250mA	1.25W	5V	2A	10W	Inhibit
T12H	5V	250mA	1.25W	12V	1A	12W	Inhibit
P5H	5V	2A	10W	not available			see PMBus™ application note

Txx or Exx option		
Pin	5L	5H or 12H
1	Do not connect	Standby 2 +
2		Standby 2 -
3	Standby 1 +	Standby 1 +
4	Standby 1 -	Standby 1 -
5	PSU on/off+	PSU on/off+
6	PSU on/off-	PSU on/off-
7	AC fail Out	AC fail Out
8	AC fail Rtn	AC fail Rtn
9	Do not connect	
10		



Pin	P5H option
1	Standby +
2	Standby -
3	Do not connect
4	Fan fail
5	Address 0
6	Address 1
7	Address 2
8	Address 3
9	SCL - Clock
10	SDA - Data
11	Control line in
12	GND



Output Specification

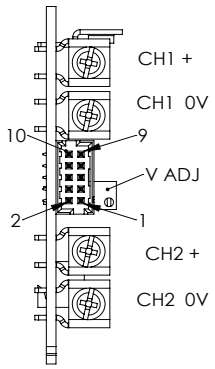
	Standby 1	Standby 2	
Rise time	<30ms		(with resistive load) to 90% of voltage, monotonic rise above 10%
Ripple and noise	<1%		pk-pk, using 20MHz bandwidth
Voltage setting accuracy	<3%		of set voltage
Remote sense	No		
Minimum load	0W		on any output
Temperature coefficient	0.02%		of rated voltage per °C
Load regulation	<1.5%	<1%	for 0-100% load change
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	<0.4%		for 100% load change on any output
Transient deviation	<5%		of set voltage for 25-50% load change
Recovery	1ms		for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, output shuts down, cycle ac to reset
Over current protection	Constant Current		Auto recovers
Short circuit protection	Constant Current		Auto recovers

DH Module - single slot width, 2 output channels

Maximum module power	200W	Total power from channel 1 + channel 2
Maximum power per channel	see table below	
Available signals	Module good, module inhibit	
Additional Leakage Current (max at 264Vac, 63Hz)	20.5µA Must also add the leakage current from other modules, any standby supply and selected filter option.	

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Channel 1				Channel 2			
Adjustment Range (Volts)	Current	Output power	Max C load	Adjustment Range (Volts)	Current	Output power	Max C load
10.2_a - 13.8	10A	120W	1000µF/A	10.2 - 13.8	10A	120W	1000µF/A
				12.75 - 17.25	8A	120W	1000µF/A
				20.4 - 27.6	5A	120W	750µF/A
12.75_b - 17.25	8A	120W	1000µF/A	12.75 - 17.25	8A	120W	1000µF/A
				20.4 - 27.6	5A	120W	750µF/A
20.4_c - 27.6	5A	120W	750µF/A	20.4 - 27.6	5A	120W	750µF/A
23.0_d - 31	4.4A	120W	750µF/A	23.0 - 31	4.4A	120W	750µF/A



Pin	Connection
1	Do not connect
2	
3	Module good collector
4	Module good emitter
5	Module inhibit anode
6	Module inhibit cathode
7	Do not connect
8	
9	
10	

Channel 1 and channel 2 of DH are both adjusted by single potentiometer. The V2 set = V2max x V1set / V1max

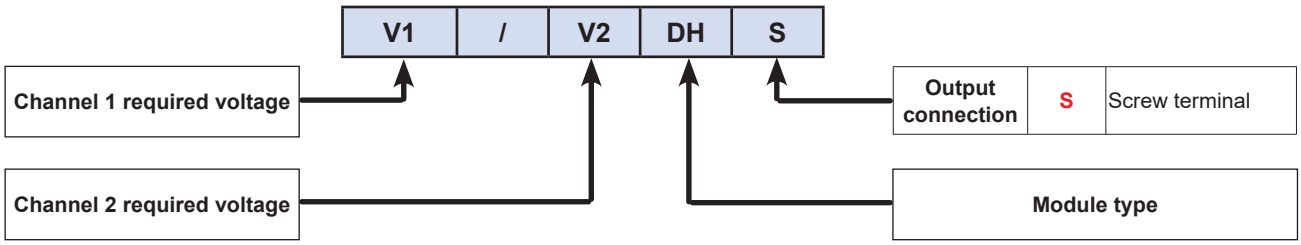
a, b, c, d - for output voltages below 10.8V(a), 13.5V(b), 21.6V(c) or 24.4V(d), a Minimum load of 1W must be applied to channel 1

Output Specification

Rise time	<50ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	zero	at full load with resistive load.
Ripple and noise		pk-pk, using 20MHz bandwidth
0°C - 70°C	1.5%	
-20°C - 0°C	2.25%	
Voltage setting accuracy	<1%	of set voltage (3% for channel 2)
Remote sense	No	
Minimum load	0W	Except for notes a, b, c and d above.
Temperature coefficient	0.03%	of rated voltage per °C
Load regulation	<6%	for 5-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	3%	for 5-100% load change on any output
Transient deviation	<4%	of set voltage for 50% load change (above 25% load)
Recovery	3ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down (both outputs), cycle ac to restart.
Module current protection	Hiccup	Protects channel 1 and channel 2, shuts down both outputs, auto-recovers when fault clears.
Short circuit protection	Hiccup	Shuts down both outputs, auto recovers.
Over temperature protection	Yes	Module protection shuts down both outputs, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required channel 1 and channel 2 voltages (from the table above)
For example, if you need 12V / 10A and 24V / 3A, you would choose **12/24DHS** as your required module.

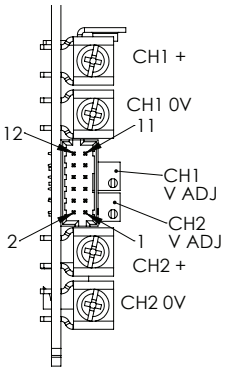


DM Module - single slot width, 1 or 2 output channels

Maximum module power	200W	Total power from channel 1 + channel 2
Maximum power per channel	see table below	
Available signals	Remote sense (channels 1 & 2), channel 1 good, channel 2 good, Channel 2 inhibit, module inhibit	
Additional Leakage Current (max at 264Vac, 63Hz)	22.3µA Must also add the leakage current from other modules, and standby supply and selected filter option.	

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Channel 1				Channel 2			
Adjustment Range (Volts)	Current	Output power	Max C load	Adjustment Range (Volts)	Current	Output power	Max C load
Channel 1 unused				2.8 - 3.8	10A	33W	500µF/A
				4.25 - 5.75	10A	50W	500µF/A
11.9 - 16.1	10A	120W	500µF/A	Channel 2 unused			
20.8 - 28.2	5A	120W	500µF/A				
11.9 - 16.1	10A	120W	500µF/A	2.8 - 3.8	10A	33W	500µF/A
				4.25 - 5.75	10A	50W	500µF/A
				11.9 - 16.1	8.3A	100W	500µF/A
				23.5 - 24.5	4.16A	100W	500µF/A
20.8 - 28.2	5A	120W	500µF/A	2.8 - 3.8	10A	33W	500µF/A
				4.25 - 5.75	10A	50W	500µF/A
21.6 - 28.2	5A	120W	500µF/A	23.5 - 24.5	4.16A	100W	500µF/A

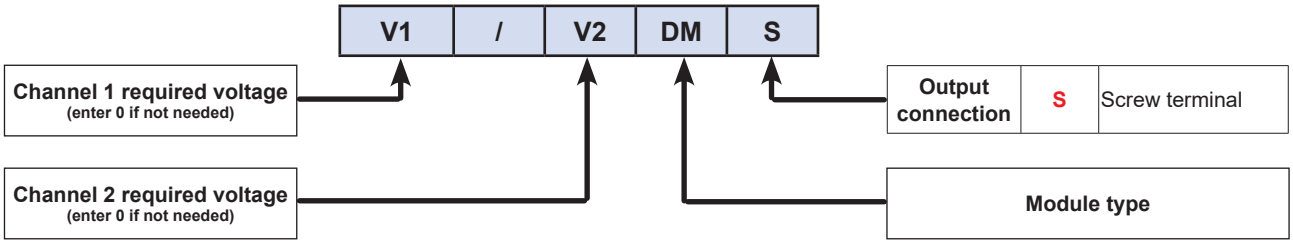


Pin	Connection
1	Ch2 sense +
2	Ch2 sense -
3	Ch2 inhibit anode
4	Ch2 inhibit cathode
5	Ch2 good collector
6	Ch2 good emitter
7	Ch1 good collector
8	Ch1 good emitter
9	Module inhibit anode
10	Module inhibit cathode
11	Ch1 sense +
12	Ch1 sense -

Output Specification	Ch1	Ch2	
Rise time	<20ms	<50ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%	<5%	Load type dependent, no overshoot at full load with resistive load
Ripple and noise			pk-pk, using 20MHz bandwidth
0°C - 70°C	1.5%	75mV	1.5% for ch2 outputs >10V, 2% for outputs 11-17V
-20°C - 0°C	2.25%	75mV	2% for ch2 outputs >10V, 2.5% for outputs 11-17V
Voltage setting accuracy	<1%	<1%	of set voltage
Remote sense	Yes		0.5V (voltage at the output terminals must be within the specified adjustment range)
Minimum load	0W		Refer to application note for details.
Temperature coefficient	0.02%		of rated voltage per °C
Load regulation	max of 50mV or <1% of set voltage		for 0-100% load change
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	1.5%		for 100% load change on any output
Transient deviation	<4%	<5%	of set voltage for 50% load change (above 25% load). 250mV for outputs below 5V
Recovery	3ms	7ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, module shuts down (both outputs), cycle ac to restart.
Over current protection	Hiccup	Constant current	Ch1 protection shuts down both outputs.
Short circuit protection	Hiccup	Constant current	Ch1 protection shuts down both outputs. Refer to application note for details.
Over temperature protection	Yes	Yes	Ch1 protection shuts down both outputs, cycle ac to restart. Ch2 protection shuts down ch2 only, auto recovers when fault clears. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required channel 1 and channel 2 voltages (from the table above)
For example, if you need 12V / 10A and 3.3V / 10A, you would choose **12/3.3DMS** as your required module.

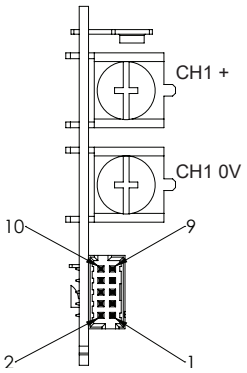


SA Module - single slot width, 1 output channel

Maximum power per channel	see table below
Available signals	Remote sense (5V module only)
Additional Leakage Current (max at 264Vac, 63Hz)	14.6µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Output voltage	Current	Output power	Maximum capacitive load
5V	15A	75W	1000µF/A
12V	12.5A	150W	1000µF/A
15V	10A	150W	1000µF/A
24V	6.25A	150W	750µF/A



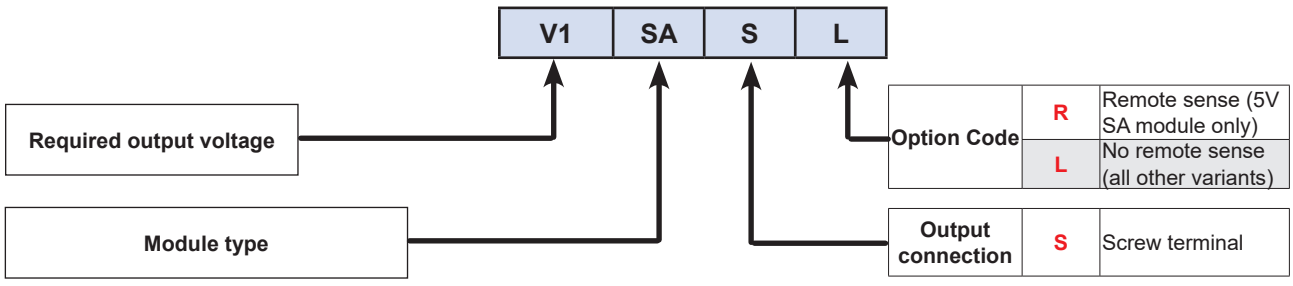
Pin	Connection
1	Do not connect
2	
3	
4	
5	
6	
7	Remote sense +
8	Remote sense -
9	Do not connect
10	

Output Specification

Rise time	<75ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5% or 250mV	Load type dependent, no overshoot at full load with resistive load 6% for 12V output
Ripple and noise		pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1%	
-20°C - 0°C, >5% load	2%	
≤5% load	2%	
Voltage setting accuracy	<1%	of set voltage
Remote sense	Yes	On 5V module only
Minimum load	No	on any output
Temperature coefficient	<0.02%	of rated voltage per °C
Load regulation	<1%	for 0-100% load change
Line regulation	<0.2%	for 90-264Vac input change
Cross regulation	<0.2%	for 100% load change on any output
Transient deviation	<5% or 250mV	of set voltage for 50% load change (above 25% load)
Recovery	5ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down, cycle ac to restart
Over current protection	Hiccup	Auto recovers after removal of load
Short circuit protection	Yes	Indefinitely protected
Over temperature protection	Yes	Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 15V / 10A, you would choose **15SASL** as your required module.

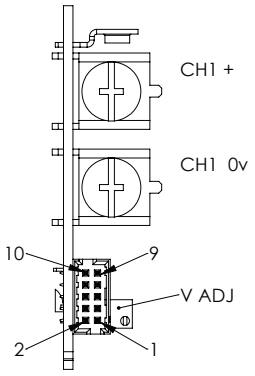


SB Module - single slot width, 1 output channel

Maximum power per channel	see table below
Available signals	Remote sense, module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	14.6µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output power	Max Capacitive Load
3.3	-	3.63	37A	122W	1000µF/A
5	-	5.5	30A	150W	1000µF/A
12	-	13.2	25A	300W	1000µF/A
15	-	16.5	20A	300W	1000µF/A
18	-	19.8	16.7A	300W	1000µF/A
24	-	26.4	12.5A	300W	750µF/A
28	-	30.8	10.7A	300W	500µF/A
48	-	52.8	6.25A	300W	250µF/A



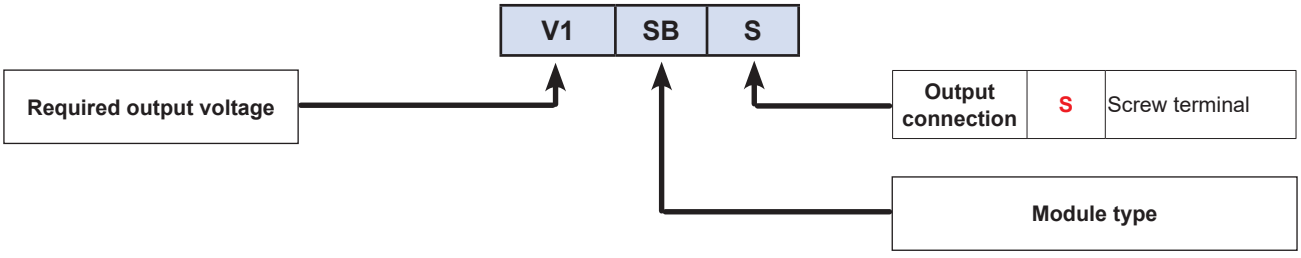
Pin	Connection
1	Do not connect
2	
3	Module good collector
4	Module good emitter
5	Module inhibit anode
6	Module inhibit cathode
7	Remote sense +
8	Remote sense -
9	Do not connect
10	

Output Specification

Rise time	<75ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%	Load type dependent
Ripple and noise	max of	pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1% or 50mV	
-20°C - 0°C, >5% load	2% or 100mV	
≤5% load	4%	
Voltage setting accuracy	<1%	of set voltage
Remote sense	Yes	0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W	
Temperature coefficient	0.016%	of rated voltage per °C
Load regulation	<1%	for 0-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	0.1%	(5mV for outputs below 5V) for 100% load change on any output
Transient deviation	<5%	of set voltage for 50% load change (above 25% load) 250mV for outputs below 5V
Recovery	1ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup	Auto recovers after removal of load
Short circuit protection	Yes	Indefinitely protected
Over temperature protection	Yes	Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 12.2V / 24.5A, you would choose **12.2SBS** as your required module.

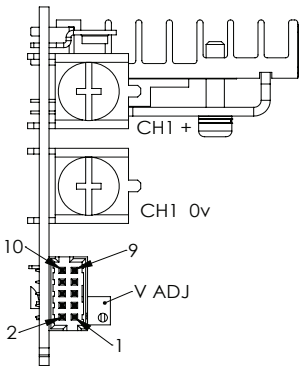


SC Module - two slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Remote sense, module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	13.8µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output power	Maximum capacitive load
5	-	5.5	60A	300W	1000µF/A
12	-	13.2	50A	600W	1000µF/A
24	-	26.4	25A	600W	750µF/A
36	-	39.6	16.7A	600W	300µF/A
48	-	52.8	12.5A	600W	250µF/A



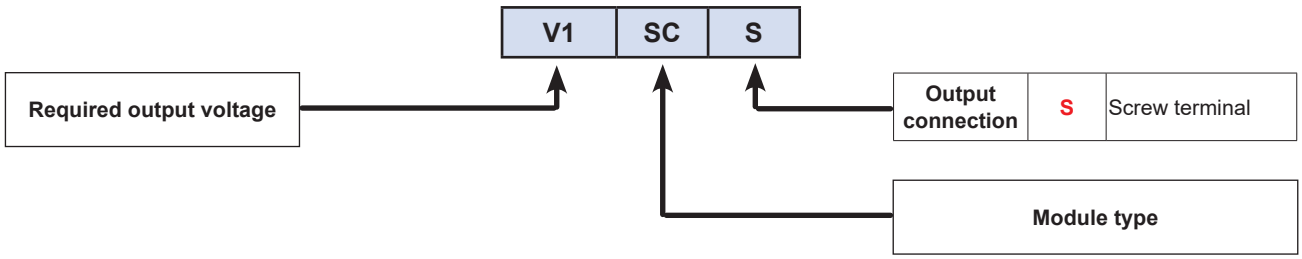
Pin	Connection
1	Do not connect
2	
3	Module good collector
4	Module good emitter
5	Module inhibit anode
6	Module inhibit cathode
7	Remote sense +
8	Remote sense -
9	Do not connect
10	

Output Specification

Rise time	<75ms		(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%		Load type dependent
Ripple and noise	V_{out}<10V	V_{out}>10V	pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1.5%	1%	
-20°C - 0°C, >5% load	3%	2%	
≤5% load	4%	4%	
Voltage setting accuracy	<1%		of set voltage
Remote sense	Yes		0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W		
Temperature coefficient	0.016%		of rated voltage per °C
Load regulation	<1%		for 0-100% load change
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	0.1%		for 100% load change on any output
Transient deviation	<5%		of set voltage for 50% load change (above 25% load)
Recovery	1ms		for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup		Auto recovers after removal of load
Short circuit protection	Yes		Indefinitely protected
Over temperature protection	Yes		Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 12.2V / 49A, you would choose **12.2SCS** as your required module.

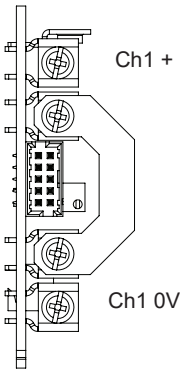


YB Module - single slot width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	20.5µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output power	Maximum capacitive load
20.4	-	27.6	9.8A	200W	500µF/A
27.6	-	34.5	7.25A	200W	500µF/A
40.8	-	55.2	4.9A	200W	375µF/A
55.2	-	62	3.62A	200W	375µF/A



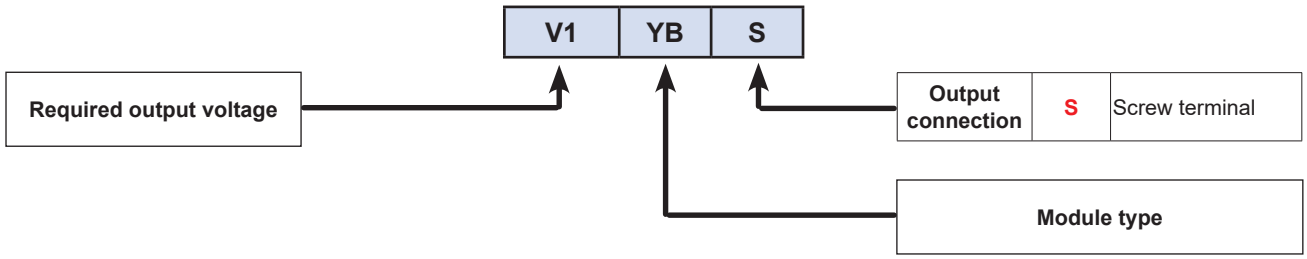
Pin	Connection
1	Do not connect
2	
3	Module good collector
4	Module good emitter
5	Module inhibit anode
6	Module inhibit cathode
7	Do not connect
8	
9	
10	

Output Specification

Rise time	<75ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	zero	at full load with resistive load. Load type dependent, <7% overshoot with capacitive load
Ripple and noise		pk-pk, using 20MHz bandwidth
0°C - 70°C	1.5%	
-20°C - 0°C	2.25%	
Voltage setting accuracy	<2%	of set voltage
Remote sense	No	
Minimum load	0W	
Temperature coefficient	0.03%	of rated voltage per °C
Load regulation	<6%	for 5-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	<1%	for 100% load change on any output
Transient deviation	<8%	of set voltage for 50% load change (above 25% load)
Recovery	5ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup	Auto recovers
Short circuit protection	Hiccup	Auto recovers.
Over temperature protection	Yes	Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 41V / 4A, you would choose **41YBS** as your required module.

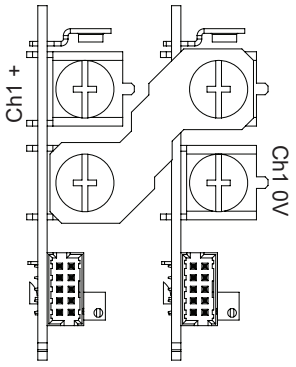


YC Module - two slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	29.2µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output Power	Max Capacitive Load
6.6	-	7.26	37A	244W	1000µF/A
10	-	11	30A	300W	1000µF/A
30	-	33	20A	600W	1000µF/A
56	-	61.6	10.7A	600W	350µF/A
96	-	105.6V	6.25A	600W	125µF/A



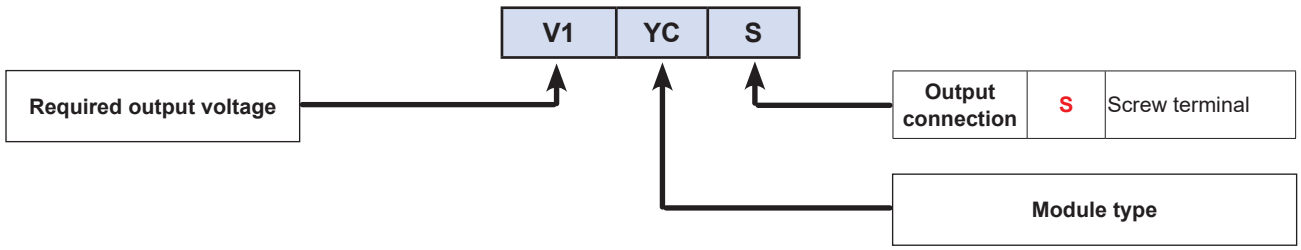
See application notes for signal connection details

Output Specification

Rise time	<75ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%	Load type dependent
Ripple and noise		pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1%	
-20°C - 0°C, >5% load	2%	
≤5% load	4%	
Voltage setting accuracy	<1%	of set voltage
Remote sense	Yes	0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W	
Temperature coefficient	0.016%	of rated voltage per °C
Load regulation	<1%	for 0-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	0.1%	(10mV for outputs below 10V) for 100% load change on any output
Transient deviation	<5%	of set voltage for 50% load change (above 25% load)
Recovery	1ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup	Auto recovers
Short circuit protection	Yes	Indefinitely protected
Over temperature protection	Yes	Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 58V / 10A, you would choose **58YCS** as your required module.

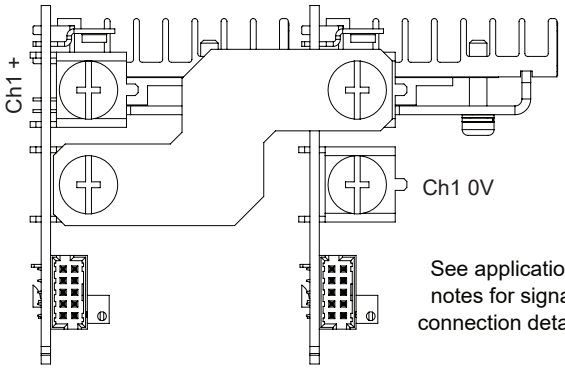


YF Module - four slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	27.6µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output power	Max Capacitive Load
10	-	11	60A	600W	1000µF/A
24	-	26.4	50A	1200W	650µF/A
48	-	52.8	25A	1200W	500µF/A
72	-	79.2	16.7A	1200W	150µF/A
96	-	105.6V	12.5A	1200W	125µF/A



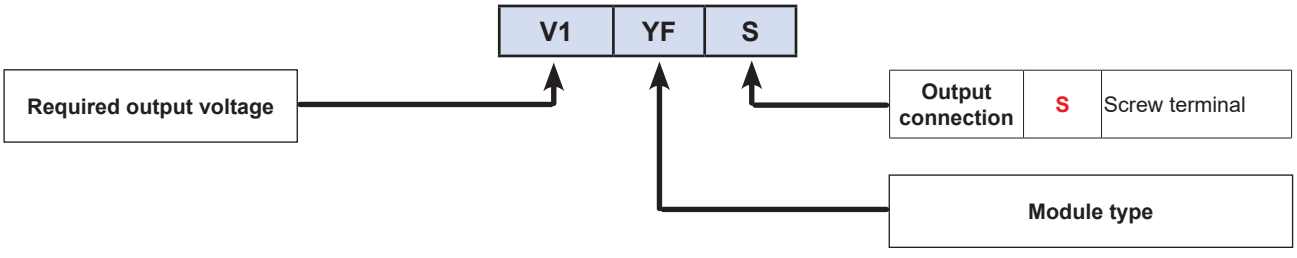
See application notes for signal connection details

Output Specification

Rise time	<75ms		(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%		Load type dependent
Ripple and noise	V_{out}<20V	V_{out}>20V	pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1.5%	1%	
-20°C - 0°C, >5% load	3%	2%	
≤5% load	4%	4%	
Voltage setting accuracy	<1%		of set voltage
Remote sense	Yes		0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W		
Temperature coefficient	0.016%		of rated voltage per °C
Load regulation	<1%		for 0-100% load change
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	0.1%		for 100% load change on any output
Transient deviation	<5%		of set voltage for 50% load change (above 25% load)
Recovery	1ms		for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup		Auto recovers
Short circuit protection	Yes		Indefinitely protected
Over temperature protection	Yes		Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 48V / 25A, you would choose **48YFS** as your required module.

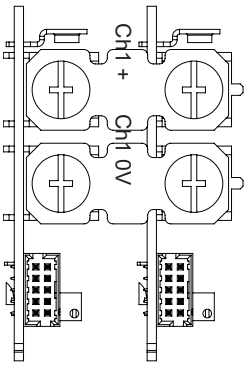


ZC Module - two slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	29.2µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output Power	Maximum capacitive load
15	-	16.0	36A	540W	1000µF/A
18	-	19.2	30A	540W	1000µF/A
28	-	30	19.3A	540W	500µF/A



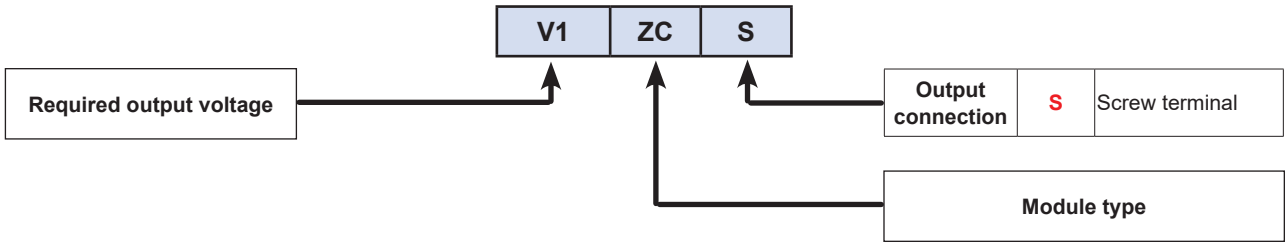
See application notes for signal connection details

Output Specification

Rise time	<75ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%	Load type dependent
Ripple and noise		pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1%	
-20°C - 0°C, >5% load	2%	
≤5% load	4%	
Voltage setting accuracy	<1%	of set voltage
Remote sense	Yes	0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W	
Temperature coefficient	0.016%	of rated voltage per °C
Load regulation	<3.5%	for 1-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	0.1%	for 100% load change on any output
Transient deviation	<5%	of set voltage for 50% load change (above 25% load)
Recovery	30ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup	Auto recovers after removal of load
Short circuit protection	Yes	Indefinitely protected
Over temperature protection	Yes	Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 15V / 36A, you would choose 15**ZCS** as your required module.

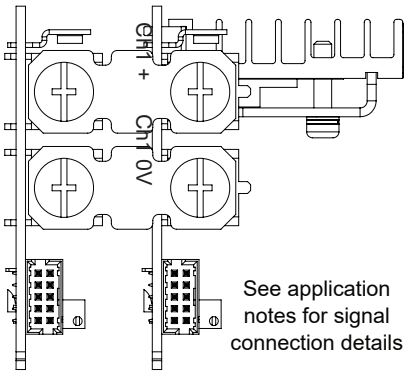


ZD Module - three slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	28.3µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts) at PSU output terminal			Current	Output power	Maximum capacitive load
5	-	5.3	80A	400W	1000µF/A
12	-	12.8	65A	780W	1000µF/A
24	-	25.6	30A	720W	750µF/A
48	-	51.2	15A	720W	250µF/A



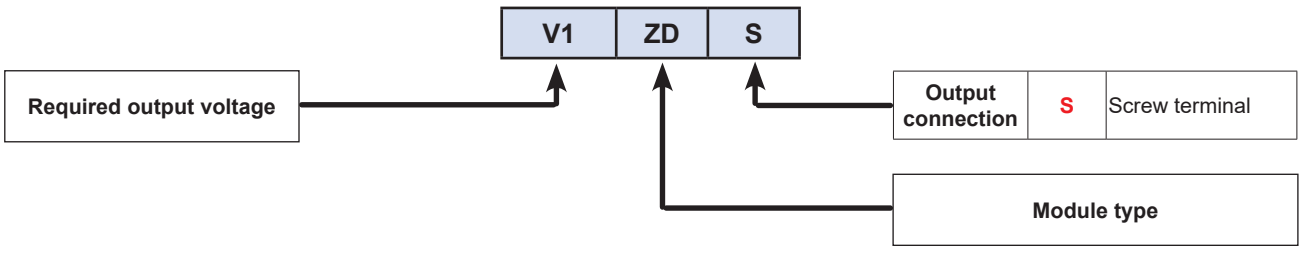
See application notes for signal connection details

Output Specification

Rise time	<75ms		(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%		Load type dependent
Ripple and noise	V_{out}<10V	V_{out}>10V	pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1.5%	1%	
-20°C - 0°C, >5% load	3%	2%	
≤5% load	4%	4%	
Voltage setting accuracy	<1%		of set voltage
Remote sense	Yes		0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W		
Temperature coefficient	0.016%		of rated voltage per °C
Load regulation	<3.5%		for 1-100% load change (<2.5% for 5-5.3V output)
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	0.1%		for 100% load change on any output
Transient deviation	<5%		of set voltage for 50% load change (above 25% load)
Recovery	30ms		for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup		Auto recovers after removal of load
Short circuit protection	Yes		Indefinitely protected
Over temperature protection	Yes		Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 48V / 16A, you would choose **48ZDS** as your required module.

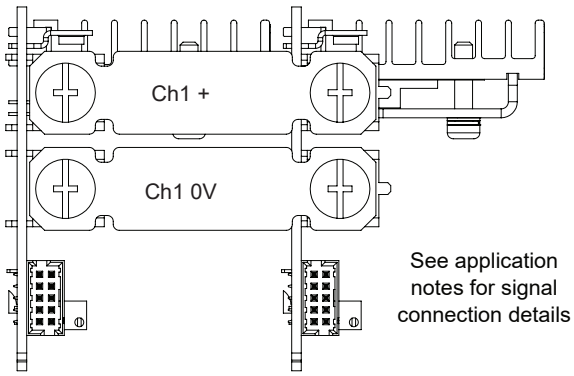


ZF Module - four slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	27.6µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)	Current	Output power	Maximum capacitive load
5 - 5.3	110A	550W	1000µF/A
12 - 12.8	90A	1080W	1000µF/A
36 - 38.4	29A	1044W	300µF/A



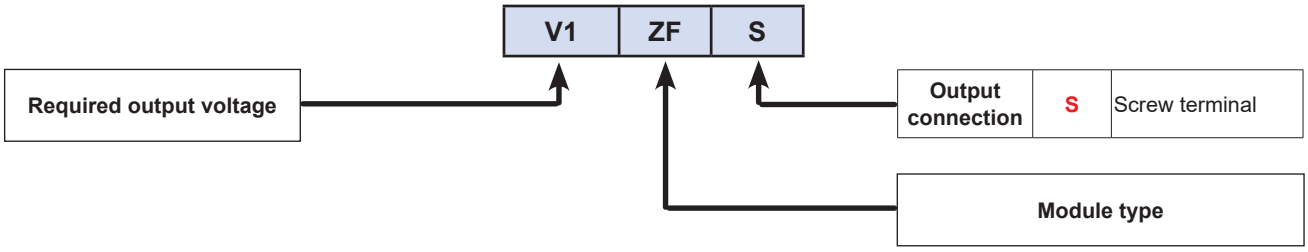
See application notes for signal connection details

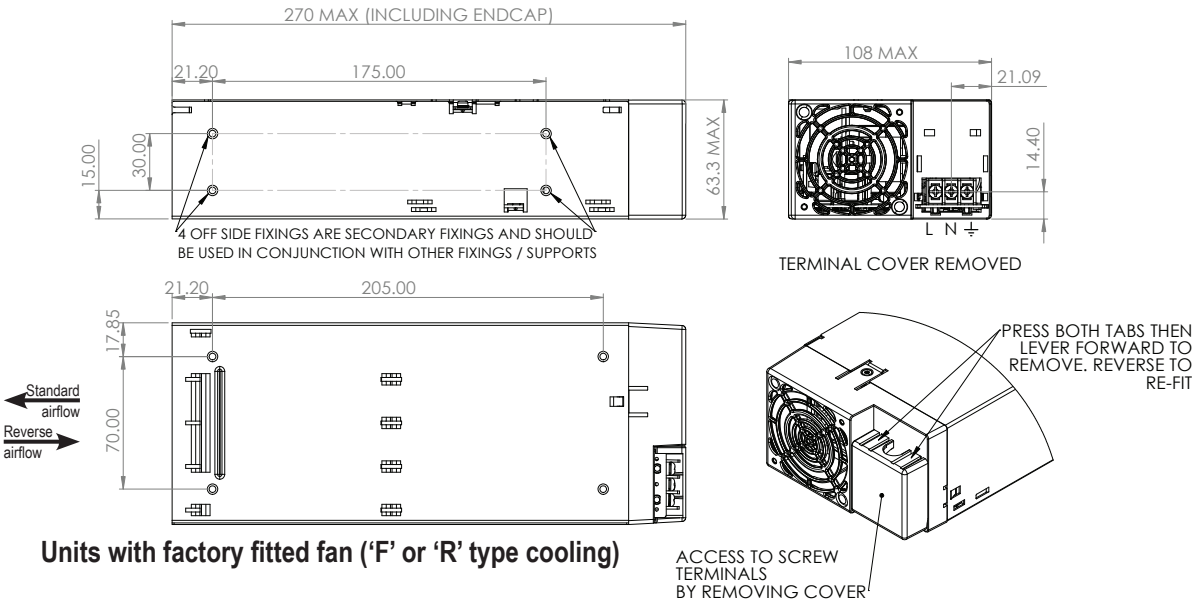
Output Specification

Rise time	<75ms		(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%		Load type dependent
Ripple and noise	V_{out}<10V	V_{out}>10V	pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1.5%	1%	
-20°C - 0°C, >5% load	3%	2%	
≤5% load	4%	4%	
Voltage setting accuracy	<1%		of set voltage
Remote sense	Yes		0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W		
Temperature coefficient	0.016%		of rated voltage per °C
Load regulation	<3.5%		for 1-100% load change (<2.5% for 5-5.3V output)
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	0.1%		for 100% load change on any output
Transient deviation	<5%		of set voltage for 50% load change (above 25% load)
Recovery	30ms		for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup		Auto recovers after removal of load
Short circuit protection	Yes		Indefinitely protected
Over temperature protection	Yes		Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

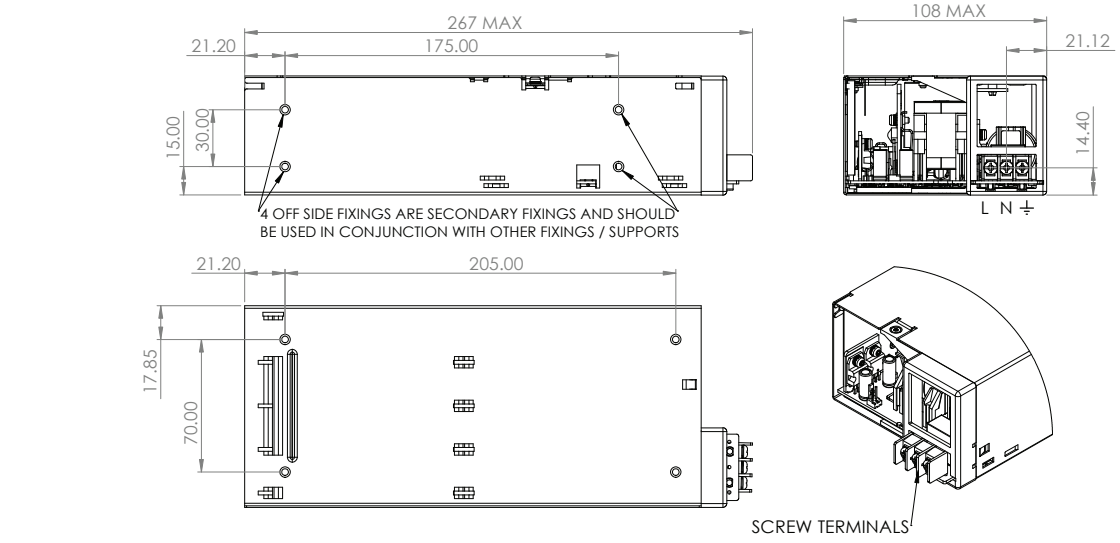
Choose your required output voltage (from the table above)
For example, if you need 12V / 90A, you would choose **12ZFS** as your required module.





Units with factory fitted fan ('F' or 'R' type cooling)

Customer Fixings.
8 holes M4.
Max thread penetration:- 4.5mm



Customer Fixings.
8 holes M4.
Max thread penetration:- 4.5mm

Units with Customer Air ('C' type cooling)

Customer fixings. 8 holes M4. Max thread penetration:- 4.5mm

Medical Industrial Test Broadcast Comms Renewable

700W / 1200W
Modular power supply

Features	Benefits
• BF ready medical isolation (MOPP)	Eases design into systems (including BF)
• Low speed, low audible noise fan	Enhanced patient / user experience
• Up to 12 outputs	Eliminates need for additional supplies
• PMBus™ communication option	Remote monitoring and control
• 7 year warranty	Low cost of ownership

Input	QM5		QM5H	
Output power	700W	800W	700W	1200W
Input voltage	90-264Vac	180-264Vac	90-264Vac	180-264Vac
Frequency	47 - 63 Hz (440Hz with reduced PFC)			
Input fuses	16A / 250Vac HBC Fast acting (not user accessible) in both Live and Neutral lines (single fusing optional)			
Inrush current	<40A at 25°C and 264Vac (cold start)			
Leakage current	See 'How To Create A Product Description' for details			
Touch current	<100µA (with 4 or fewer modules). For other configurations, contact sales for details.			
Power factor	> 0.95 (at 230Vac, 100% load)			

Isolation		
Input to output / signals	Reinforced	2 x MOPPs (3rd edition 60601) 4kVac, 5.7kVdc type tested to 4kVac (equivalent to 5.7kVdc), production tested to 4.3kVdc.
Input to earth	Basic	1 x MOPP, 1.5kVac
Output / signals to earth	Basic	1 x MOPP, 1.5kVac
Output / signals to output / signals	Basic	200Vdc

How To Create A Product Description

The extensive range of output modules and options make it possible to achieve almost any combination of Volts and Amps. You can create your own QM configuration online at https://config.emea.tdk-lambda.com/. This method checks your configuration and offers the optimum solution. Alternatively, you can do this manually by using the guide below.

1. Calculate total output power to select the appropriate converter, then select required Cooling, Connection, Leakage Current and Controls/ Signals from the following table:

QM5	F	S	D	L	T5H

Converter 5 slots wide		
	QM5	700W low line, 800W high line
	QM5H	700W low line, 1200W high line

Cooling		
	F	Variable speed Forward air - standard
	R	Reverse air (contact sales for details)
	C	Customer air - no fan (contact sales for details

Input Connection		
	S	Screw
	I	IEC320

Input fuse		
	D	Dual AC fuses
	E	Single AC fuse in Live line (contact sales for details)

Standby / Signals		
	blank	none
	E5L	5V / 250mA, Enable
	E5H	5V / 2A, 5V / 250mA, Enable
	E12H	12V / 1A, 5V / 250mA, Enable
	T5L	5V / 250mA, Inhibit
	T5H	5V / 2A, 5V / 250mA, Inhibit
	T12H	12V / 1A, 5V / 250mA, Inhibit
	P5H	5V / 2A, see PMBus™ app note

see specification page for details

Leakage Current (max at 264Vac, 63Hz) Must also add the leakage current from modules and options		
	L	212µA
	R	77µA

2. Select Output Modules using the output voltages tables and the module specifications.
3. Contact TDK-Lambda to validate configuration and issue a part number.

Possible Outputs - see individual module data for full specifications

Module name	Slots used	Output voltage range			Maximum Output Current	Maximum Output Power
DM (ch2)	1 of 2 outputs in single slot	2.8V	-	3.8V	10A	33W
SB	1 slot	3.3V	-	3.63V	37A	122W
DM (ch2)	1 of 2 outputs in single slot	4.25V	-	5.75V	10A	50W
SA	1	5V	-	5V	15A	75W
SB	1	5V	-	5.5V	30A	150W
SC	2	5V	-	5.5V	60A	300W
ZD	3	5V	-	5.3V	80A	400W
ZF	4	5V	-	5.3V	110A	550W
YC	2	6.6V	-	7.26V	37A	244W
YC	2	10V	-	11V	30A	300W
YF	4	10V	-	11V	60A	600W
DH (ch1 or ch2)	1 of 2 outputs in single slot	10.2V	-	13.8V	10A	120W
DM (ch1)	1 of 2 outputs in single slot	11.9V	-	16.1V	10A	120W
DM (ch2)	1 of 2 outputs in single slot	11.9V	-	16.1V	8.3A	100W
SA	1	12V	-	12V	12.5A	150W
SB	1	12V	-	13.2V	25A	300W
SC	2	12V	-	13.2V	50A	600W
ZD	3	12V	-	12.8V	65A	780W
ZF	4	12V	-	12.8V	90A	1080W
DH (ch1 or ch2)	1 of 2 outputs in single slot	12.75V	-	17.25V	8A	120W
SA	1	15V	-	15V	10A	150W
SB	1	15V	-	16.5V	20A	300W
ZC	2	15V	-	16V	36A	540W
SB	1	18V	-	19.8V	16.7A	300W
ZC	2	18V	-	19.2V	30A	540W
DH (ch1 or ch2)	1 of 2 outputs in single slot	20.4V	-	27.6V	5A	120W
YB	1	20.4V	-	27.6V	9.8A	200W
DM (ch1)	1 of 2 outputs in single slot	20.8V	-	28.2V	5A	120W
DM (ch2)	1 of 2 outputs in single slot	23.5V	-	24.5V	4.16A	100W
SA	1	24V	-	24V	6.25A	150W
SB	1	24V	-	26.4V	12.5A	300W
SC	2	24V	-	26.4V	25A	600W
ZD	3	24V	-	25.6V	30A	720W
YF	4	24V	-	26.4V	50A	1200W
DH (ch1 or ch2)	1 of 2 outputs in single slot	23.0V	-	31V	4.4A	120W
YB	1	27.6V	-	34.5V	7.25A	200W
SB	1	28V	-	30.8V	10.7A	300W
ZC	2	28V	-	30V	19.3A	540W
YC	2	30V	-	33V	20A	600W
SC	2	36V	-	39.6V	16.7A	600W
ZF	4	36V	-	38.4V	29A	1044W
YB	1	40.8V	-	55.2V	4.9A	200W
SB	1	48V	-	52.8V	6.25A	300W
SC	2	48V	-	52.8V	12.5A	600W
ZD	3	48V	-	51.2V	15A	720W
YF	4	48V	-	52.8V	25A	1200W
YB	1	55.2V	-	62V	3.62A	200W
YC	2	56V	-	61.6V	10.7A	600W
YF	4	72V	-	79.2V	16.7A	1200W
YC	2	96V	-	105.6V	6.25A	600W
YF	4	96V	-	105.6V	12.5A	1200W

Note. 'Maximum Output Current' and 'Maximum Output Power' above are the maximum available from the module. It is not possible to exceed the 'Output Power' of the unit given on the previous page.

Output Specification		
Turn on time	2s max	at 90Vac (180Vac for 1200W) and 100% rated output power
Efficiency	up to 91%	240Vac & above 50% rated power, configuration dependent
Hold up	16ms min 10ms min	at 700W output power. 1 cycle ride-through option available, contact sales for details. at 1200W output power
Over temperature protection	Yes	converter protection shuts down all outputs (except standby supplies) and fan, auto restarts. Shutdown temperature varies according to ambient, output power and input voltage.

Environment	
Temperature	-20°C to 70°C operational, -40°C to 70°C storage (max 12 months).
Derating	50°C to 70°C derate total output power and each output current by 2.5% per °C Additionally, the 0.25A standby supply provided with the E5H, E12H, T5H and T12H options derates by 2.4% per °C from 25°C to 50°C when the unit is inhibited (fan not running)
Low temperature startup	-40°C
Humidity	5 - 95% RH non condensing
Shock	±3 x 30g shocks in each plane, total 18 shocks (11ms (+/-0.5msec), half sine) Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987. Conforms to MIL-STD-810G, Method 516.6, Pro IV
Vibration	Single axis 10 - 500 Hz at 2g (sweep and endurance at resonance) in all 3 planes Conforms to EN60068-2-6, IEC68-2-6 Conforms to MIL-STD-810G, Method 514.6, Pro I
Altitude	5000 metres operational, 5000 metres storage/transportation
Pollution	Degree 2, Material group IIIb
IP Rating	IPX0

Emissions EN61000-6-3:2007, EN60601-1-2:2015 - see application notes for best installation practice		
Radiated electric field	EN55011, EN55032	(as per CISPR.11/32) Class B, FCC47 part 15 subpart B - 'L' leakage current variants (Units with 'R' type leakage current option achieve Class A)
Conducted emissions	EN55011, EN55032	(as per CISPR.11/32) Class B, FCC47 part 15 subpart B - 'L' leakage current variants (Units with 'R' type leakage current option achieve Class A)
Conducted harmonics	EN61000-3-2	Class A and Class C
Flicker	EN61000-3-3	Compliant - d_{max} only

Immunity EN61000-6-2:2005, EN60601-1-2:2015 - see application notes for best installation practice				Criteria
Electrostatic discharge	EN61000-4-2	Level 4	F type cooling only	A
Electromagnetic field	EN61000-4-3	Level 3	Proximity fields, EN60601-1-2, Levels as defined in standard, Criteria A	A
Fast / burst transient	EN61000-4-4	Level 4	Tested at 5kHz and 100kHz	A
Surge immunity	EN61000-4-5	Level 3		A
Conducted RF immunity	EN61000-4-6	Level 3		A
Power frequency magnetic field	EN61000-4-8	Level 4		A
Voltage dips, variations, interruptions	EN61000-4-11	Class 3	Criteria B for 5s and 1 cycle interruptions	A
Voltage sags	Semi F-47	compliant	above 180Vac input	
Ring wave	EN61000-4-12	Level 3		A
	ANSI C62.41	Level 2		A
Voltage fluctuations	EN61000-4-14	Class 3	See EMC report for full details.	A

Approvals / Accreditations	
IEC/EN 62368-1, UL62368-1 / CSA 22.2 No 62368-1	File E135494
IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1	File E135494
IEC/EN 60601-1, UL/CSA 60601-1, ANSI/AAMI ES60601-1, CAN/CSA-C22.2 No 60601-1	File E349607
IEC/EN 61010-1	Results included in 60950 report
CE Mark (EN62368-1)	Low Voltage Directive (LVD), electromagnetic compatibility (EMC) and Restriction of Hazardous Substances (RoHS)
CB certificate and Report available on request	
Designed and manufactured under the control of ISO9001 and ISO13485 (including risk management).	

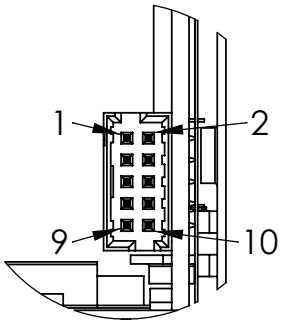
Standby / Signals

Maximum power per channel	See table below
Available signals (Exx or Txx type)	PSU inhibit (Txx type) or enable (Exx type), AC Good
Available signals (Pxx type)	PMBus™ control of power supply fan speed and fail warning Serial number, date of manufacture, run time, on/off power cycles For further details, see the product range application notes, PMBus™ section
Additional Leakage Current (max at 264Vac, 63Hz)	xxL = 13.1µA, xxH = 15µA Must also add the leakage current from modules and selected filter option.

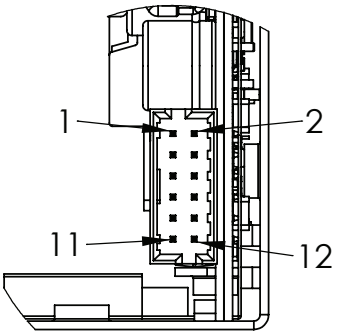
Available Output Voltages (at PSU signal connector)

Option type	Standby 1			Standby 2			PSU on/off
	V	Max Current	Power	V	Max Current	Power	
E5L	5V	250mA	1.25W	not available			Enable
E5H	5V	250mA	1.25W	5V	2A	10W	Enable
E12H	5V	250mA	1.25W	12V	1A	12W	Enable
T5L	5V	250mA	1.25W	not available			Inhibit
T5H	5V	250mA	1.25W	5V	2A	10W	Inhibit
T12H	5V	250mA	1.25W	12V	1A	12W	Inhibit
P5H	5V	2A	10W	not available			see PMBus™ application note

Txx or Exx option		
Pin	5L	5H or 12H
1	Do not connect	Standby 2 +
2		Standby 2 -
3	Standby 1 +	Standby 1 +
4	Standby 1 -	Standby 1 -
5	PSU on/off+	PSU on/off+
6	PSU on/off-	PSU on/off-
7	AC fail Out	AC fail Out
8	AC fail Rtn	AC fail Rtn
9	Do not connect	
10		



Pin	P5H option
1	Standby +
2	Standby -
3	Do not connect
4	Fan fail
5	Address 0
6	Address 1
7	Address 2
8	Address 3
9	SCL - Clock
10	SDA - Data
11	Control line in
12	GND



Output Specification

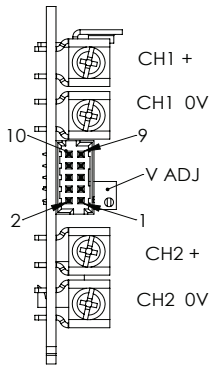
	Standby 1	Standby 2	
Rise time	<30ms		(with resistive load) to 90% of voltage, monotonic rise above 10%
Ripple and noise	<1%		pk-pk, using 20MHz bandwidth
Voltage setting accuracy	<3%		of set voltage
Remote sense	No		
Minimum load	0W		on any output
Temperature coefficient	0.02%		of rated voltage per °C
Load regulation	<1.5%	<1%	for 0-100% load change
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	<0.4%		for 100% load change on any output
Transient deviation	<5%		of set voltage for 25-50% load change
Recovery	1ms		for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, output shuts down, cycle ac to reset
Over current protection	Constant Current		Auto recovers
Short circuit protection	Constant Current		Auto recovers

DH Module - single slot width, 2 output channels

Maximum module power	200W	Total power from channel 1 + channel 2
Maximum power per channel	see table below	
Available signals	Module good, module inhibit	
Additional Leakage Current (max at 264Vac, 63Hz)	20.5µA Must also add the leakage current from other modules, any standby supply and selected filter option.	

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Channel 1				Channel 2			
Adjustment Range (Volts)	Current	Output power	Max C load	Adjustment Range (Volts)	Current	Output power	Max C load
10.2_a - 13.8	10A	120W	1000µF/A	10.2 - 13.8	10A	120W	1000µF/A
				12.75 - 17.25	8A	120W	1000µF/A
				20.4 - 27.6	5A	120W	750µF/A
12.75_b - 17.25	8A	120W	1000µF/A	12.75 - 17.25	8A	120W	1000µF/A
				20.4 - 27.6	5A	120W	750µF/A
20.4_c - 27.6	5A	120W	750µF/A	20.4 - 27.6	5A	120W	750µF/A
23.0_d - 31	4.4A	120W	750µF/A	23.0 - 31	4.4A	120W	750µF/A



Pin	Connection
1	Do not connect
2	
3	Module good collector
4	Module good emitter
5	Module inhibit anode
6	Module inhibit cathode
7	Do not connect
8	
9	
10	

Channel 1 and channel 2 of DH are both adjusted by single potentiometer. The V2 set = V2max x V1set / V1max

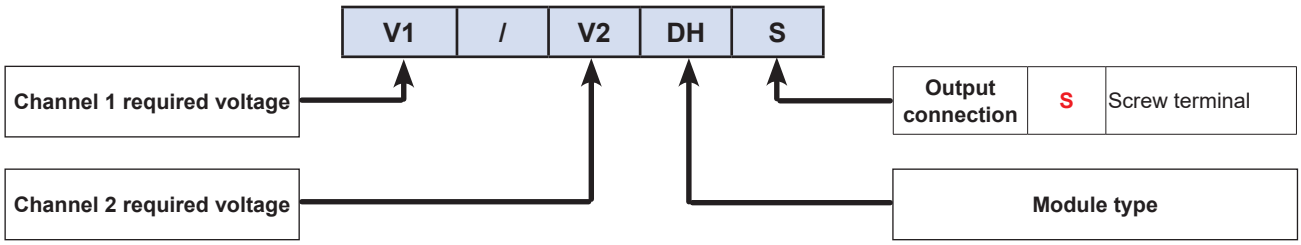
a, b, c, d - for output voltages below 10.8V(a), 13.5V(b), 21.6V(c) or 24.4V(d), a Minimum load of 1W must be applied to channel 1

Output Specification

Rise time	<50ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	zero	at full load with resistive load.
Ripple and noise		pk-pk, using 20MHz bandwidth
0°C - 70°C	1.5%	
-20°C - 0°C	2.25%	
Voltage setting accuracy	<1%	of set voltage (3% for channel 2)
Remote sense	No	
Minimum load	0W	Except for notes a, b, c and d above.
Temperature coefficient	0.03%	of rated voltage per °C
Load regulation	<6%	for 5-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	3%	for 5-100% load change on any output
Transient deviation	<4%	of set voltage for 50% load change (above 25% load)
Recovery	3ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down (both outputs), cycle ac to restart.
Module current protection	Hiccup	Protects channel 1 and channel 2, shuts down both outputs, auto-recovers when fault clears.
Short circuit protection	Hiccup	Shuts down both outputs, auto recovers.
Over temperature protection	Yes	Module protection shuts down both outputs, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required channel 1 and channel 2 voltages (from the table above)
For example, if you need 12V / 10A and 24V / 3A, you would choose **12/24DHS** as your required module.

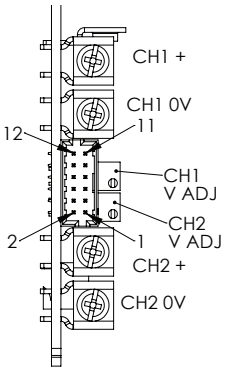


DM Module - single slot width, 1 or 2 output channels

Maximum module power	200W	Total power from channel 1 + channel 2
Maximum power per channel	see table below	
Available signals	Remote sense (channels 1 & 2), channel 1 good, channel 2 good, Channel 2 inhibit, module inhibit	
Additional Leakage Current (max at 264Vac, 63Hz)	22.3µA Must also add the leakage current from other modules, and standby supply and selected filter option.	

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Channel 1				Channel 2			
Adjustment Range (Volts)	Current	Output power	Max C load	Adjustment Range (Volts)	Current	Output power	Max C load
Channel 1 unused				2.8 - 3.8	10A	33W	500µF/A
				4.25 - 5.75	10A	50W	500µF/A
11.9 - 16.1	10A	120W	500µF/A	Channel 2 unused			
20.8 - 28.2	5A	120W	500µF/A				
11.9 - 16.1	10A	120W	500µF/A	2.8 - 3.8	10A	33W	500µF/A
				4.25 - 5.75	10A	50W	500µF/A
				11.9 - 16.1	8.3A	100W	500µF/A
				23.5 - 24.5	4.16A	100W	500µF/A
20.8 - 28.2	5A	120W	500µF/A	2.8 - 3.8	10A	33W	500µF/A
				4.25 - 5.75	10A	50W	500µF/A
21.6 - 28.2	5A	120W	500µF/A	23.5 - 24.5	4.16A	100W	500µF/A

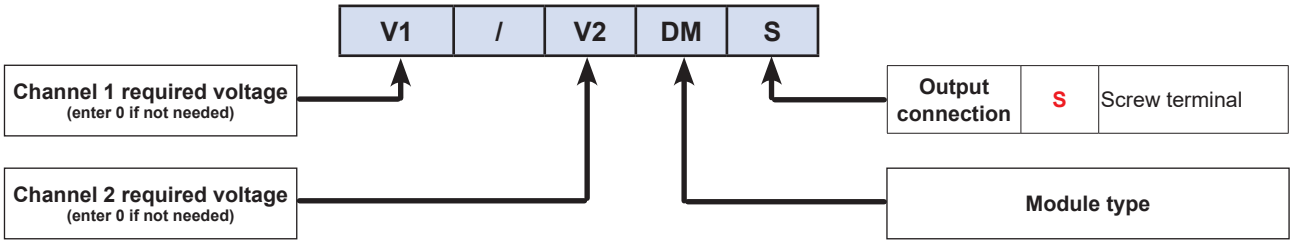


Pin	Connection
1	Ch2 sense +
2	Ch2 sense -
3	Ch2 inhibit anode
4	Ch2 inhibit cathode
5	Ch2 good collector
6	Ch2 good emitter
7	Ch1 good collector
8	Ch1 good emitter
9	Module inhibit anode
10	Module inhibit cathode
11	Ch1 sense +
12	Ch1 sense -

Output Specification	Ch1	Ch2	
Rise time	<20ms	<50ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%	<5%	Load type dependent, no overshoot at full load with resistive load
Ripple and noise			pk-pk, using 20MHz bandwidth
0°C - 70°C	1.5%	75mV	1.5% for ch2 outputs >10V, 2% for outputs 11-17V
-20°C - 0°C	2.25%	75mV	2% for ch2 outputs >10V, 2.5% for outputs 11-17V
Voltage setting accuracy	<1%	<1%	of set voltage
Remote sense	Yes		0.5V (voltage at the output terminals must be within the specified adjustment range)
Minimum load	0W		Refer to application note for details.
Temperature coefficient	0.02%		of rated voltage per °C
Load regulation	max of 50mV or <1% of set voltage		for 0-100% load change
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	1.5%		for 100% load change on any output
Transient deviation	<4%	<5%	of set voltage for 50% load change (above 25% load). 250mV for outputs below 5V
Recovery	3ms	7ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, module shuts down (both outputs), cycle ac to restart.
Over current protection	Hiccup	Constant current	Ch1 protection shuts down both outputs.
Short circuit protection	Hiccup	Constant current	Ch1 protection shuts down both outputs. Refer to application note for details.
Over temperature protection	Yes	Yes	Ch1 protection shuts down both outputs, cycle ac to restart. Ch2 protection shuts down ch2 only, auto recovers when fault clears. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required channel 1 and channel 2 voltages (from the table above)
For example, if you need 12V / 10A and 3.3V / 10A, you would choose **12/3.3DMS** as your required module.

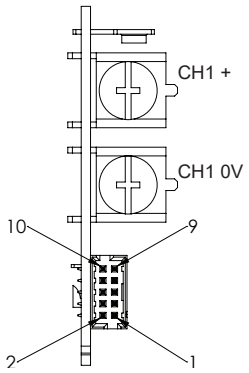


SA Module - single slot width, 1 output channel

Maximum power per channel	see table below
Available signals	Remote sense (5V module only)
Additional Leakage Current (max at 264Vac, 63Hz)	14.6µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Output voltage	Current	Output power	Maximum capacitive load
5V	15A	75W	1000µF/A
12V	12.5A	150W	1000µF/A
15V	10A	150W	1000µF/A
24V	6.25A	150W	750µF/A



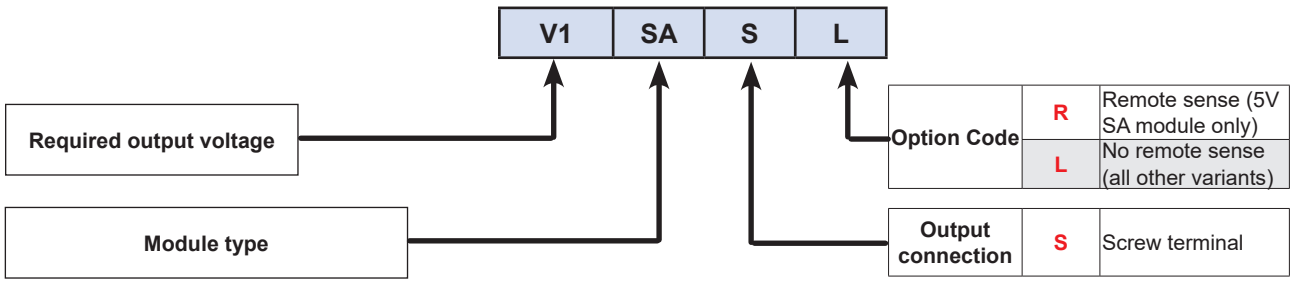
Pin	Connection
1	Do not connect
2	
3	
4	
5	
6	
7	Remote sense +
8	Remote sense -
9	Do not connect
10	

Output Specification

Rise time	<75ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5% or 250mV	Load type dependent, no overshoot at full load with resistive load 6% for 12V output
Ripple and noise		pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1%	
-20°C - 0°C, >5% load	2%	
≤5% load	2%	
Voltage setting accuracy	<1%	of set voltage
Remote sense	Yes	On 5V module only
Minimum load	No	on any output
Temperature coefficient	<0.02%	of rated voltage per °C
Load regulation	<1%	for 0-100% load change
Line regulation	<0.2%	for 90-264Vac input change
Cross regulation	<0.2%	for 100% load change on any output
Transient deviation	<5% or 250mV	of set voltage for 50% load change (above 25% load)
Recovery	5ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down, cycle ac to restart
Over current protection	Hiccup	Auto recovers after removal of load
Short circuit protection	Yes	Indefinitely protected
Over temperature protection	Yes	Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 15V / 10A, you would choose **15SASL** as your required module.

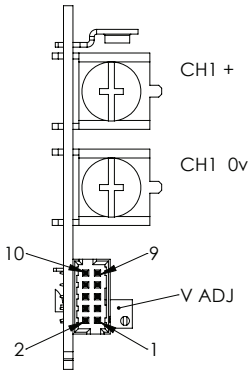


SB Module - single slot width, 1 output channel

Maximum power per channel	see table below
Available signals	Remote sense, module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	14.6µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output power	Max Capacitive Load
3.3	-	3.63	37A	122W	1000µF/A
5	-	5.5	30A	150W	1000µF/A
12	-	13.2	25A	300W	1000µF/A
15	-	16.5	20A	300W	1000µF/A
18	-	19.8	16.7A	300W	1000µF/A
24	-	26.4	12.5A	300W	750µF/A
28	-	30.8	10.7A	300W	500µF/A
48	-	52.8	6.25A	300W	250µF/A



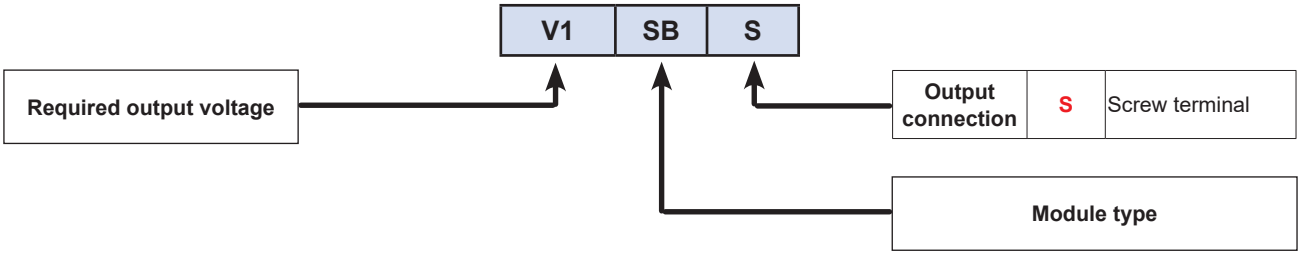
Pin	Connection
1	Do not connect
2	
3	Module good collector
4	Module good emitter
5	Module inhibit anode
6	Module inhibit cathode
7	Remote sense +
8	Remote sense -
9	Do not connect
10	

Output Specification

Rise time	<75ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%	Load type dependent
Ripple and noise	max of	pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1% or 50mV	
-20°C - 0°C, >5% load	2% or 100mV	
≤5% load	4%	
Voltage setting accuracy	<1%	of set voltage
Remote sense	Yes	0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W	
Temperature coefficient	0.016%	of rated voltage per °C
Load regulation	<1%	for 0-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	0.1%	(5mV for outputs below 5V) for 100% load change on any output
Transient deviation	<5%	of set voltage for 50% load change (above 25% load) 250mV for outputs below 5V
Recovery	1ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup	Auto recovers after removal of load
Short circuit protection	Yes	Indefinitely protected
Over temperature protection	Yes	Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 12.2V / 24.5A, you would choose **12.2SBS** as your required module.

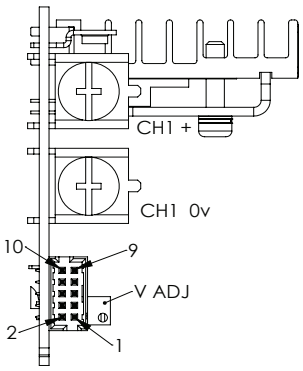


SC Module - two slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Remote sense, module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	13.8µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output power	Maximum capacitive load
5	-	5.5	60A	300W	1000µF/A
12	-	13.2	50A	600W	1000µF/A
24	-	26.4	25A	600W	750µF/A
36	-	39.6	16.7A	600W	300µF/A
48	-	52.8	12.5A	600W	250µF/A



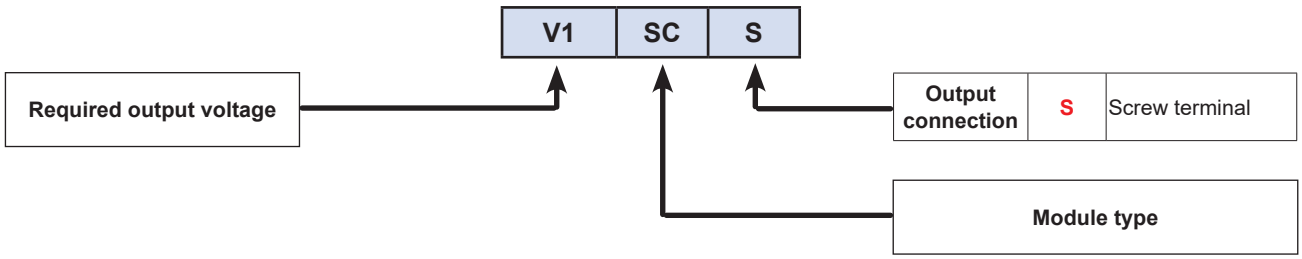
Pin	Connection
1	Do not connect
2	
3	Module good collector
4	Module good emitter
5	Module inhibit anode
6	Module inhibit cathode
7	Remote sense +
8	Remote sense -
9	Do not connect
10	

Output Specification

Rise time	<75ms		(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%		Load type dependent
Ripple and noise	V_{out}<10V	V_{out}>10V	pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1.5%	1%	
-20°C - 0°C, >5% load	3%	2%	
≤5% load	4%	4%	
Voltage setting accuracy	<1%		of set voltage
Remote sense	Yes		0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W		
Temperature coefficient	0.016%		of rated voltage per °C
Load regulation	<1%		for 0-100% load change
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	0.1%		for 100% load change on any output
Transient deviation	<5%		of set voltage for 50% load change (above 25% load)
Recovery	1ms		for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup		Auto recovers after removal of load
Short circuit protection	Yes		Indefinitely protected
Over temperature protection	Yes		Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 12.2V / 49A, you would choose **12.2SCS** as your required module.

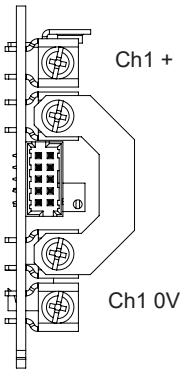


YB Module - single slot width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	20.5µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output power	Maximum capacitive load
20.4	-	27.6	9.8A	200W	500µF/A
27.6	-	34.5	7.25A	200W	500µF/A
40.8	-	55.2	4.9A	200W	375µF/A
55.2	-	62	3.62A	200W	375µF/A



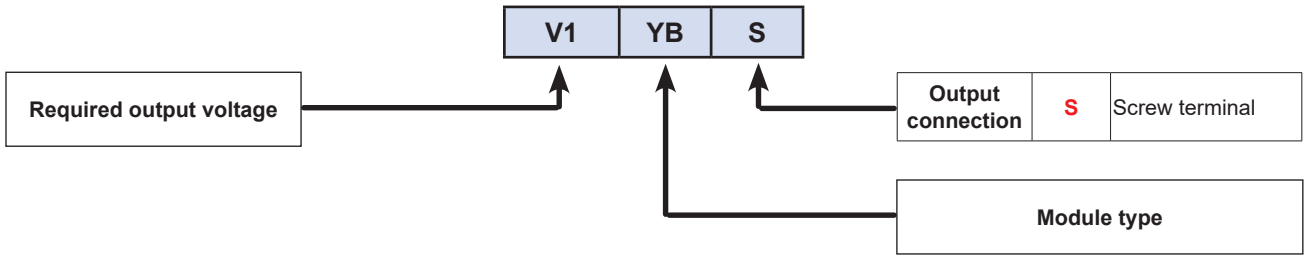
Pin	Connection
1	Do not connect
2	
3	Module good collector
4	Module good emitter
5	Module inhibit anode
6	Module inhibit cathode
7	Do not connect
8	
9	
10	

Output Specification

Rise time	<75ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	zero	at full load with resistive load. Load type dependent, <7% overshoot with capacitive load
Ripple and noise		pk-pk, using 20MHz bandwidth
0°C - 70°C	1.5%	
-20°C - 0°C	2.25%	
Voltage setting accuracy	<2%	of set voltage
Remote sense	No	
Minimum load	0W	
Temperature coefficient	0.03%	of rated voltage per °C
Load regulation	<6%	for 5-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	<1%	for 100% load change on any output
Transient deviation	<8%	of set voltage for 50% load change (above 25% load)
Recovery	5ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup	Auto recovers
Short circuit protection	Hiccup	Auto recovers.
Over temperature protection	Yes	Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 41V / 4A, you would choose **41YBS** as your required module.

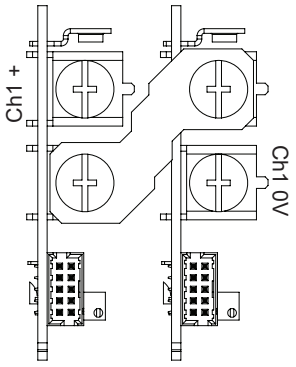


YC Module - two slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	29.2µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output Power	Max Capacitive Load
6.6	-	7.26	37A	244W	1000µF/A
10	-	11	30A	300W	1000µF/A
30	-	33	20A	600W	1000µF/A
56	-	61.6	10.7A	600W	350µF/A
96	-	105.6V	6.25A	600W	125µF/A



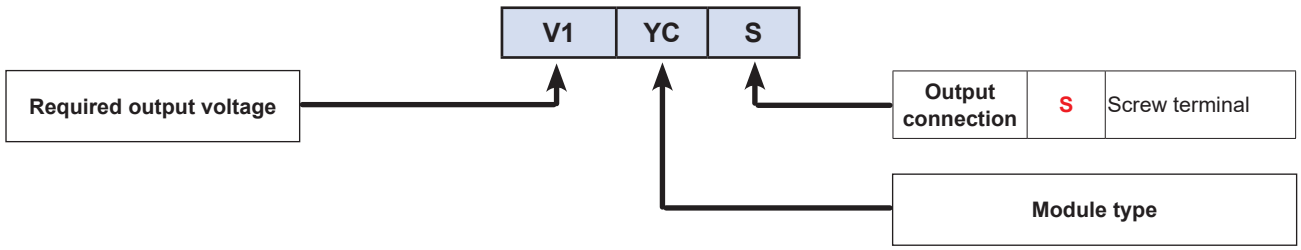
See application notes for signal connection details

Output Specification

Rise time	<75ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%	Load type dependent
Ripple and noise		pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1%	
-20°C - 0°C, >5% load	2%	
≤5% load	4%	
Voltage setting accuracy	<1%	of set voltage
Remote sense	Yes	0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W	
Temperature coefficient	0.016%	of rated voltage per °C
Load regulation	<1%	for 0-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	0.1%	(10mV for outputs below 10V) for 100% load change on any output
Transient deviation	<5%	of set voltage for 50% load change (above 25% load)
Recovery	1ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup	Auto recovers
Short circuit protection	Yes	Indefinitely protected
Over temperature protection	Yes	Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 58V / 10A, you would choose **58YCS** as your required module.

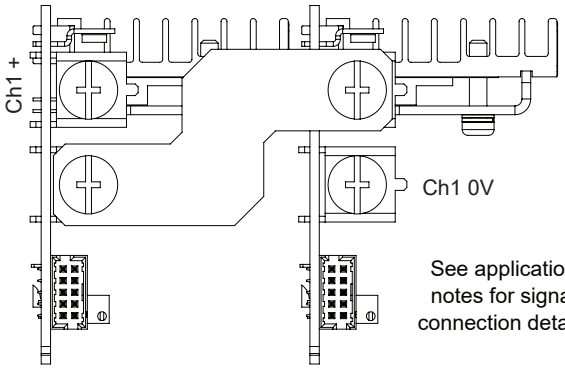


YF Module - four slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	27.6µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output power	Max Capacitive Load
10	-	11	60A	600W	1000µF/A
24	-	26.4	50A	1200W	650µF/A
48	-	52.8	25A	1200W	500µF/A
72	-	79.2	16.7A	1200W	150µF/A
96	-	105.6V	12.5A	1200W	125µF/A



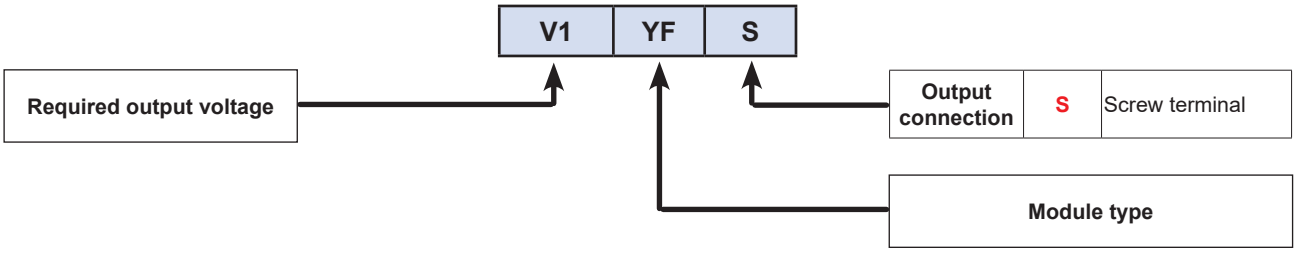
See application notes for signal connection details

Output Specification

Rise time	<75ms		(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%		Load type dependent
Ripple and noise	V_{out}<20V	V_{out}>20V	pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1.5%	1%	
-20°C - 0°C, >5% load	3%	2%	
≤5% load	4%	4%	
Voltage setting accuracy	<1%		of set voltage
Remote sense	Yes		0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W		
Temperature coefficient	0.016%		of rated voltage per °C
Load regulation	<1%		for 0-100% load change
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	0.1%		for 100% load change on any output
Transient deviation	<5%		of set voltage for 50% load change (above 25% load)
Recovery	1ms		for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup		Auto recovers
Short circuit protection	Yes		Indefinitely protected
Over temperature protection	Yes		Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 48V / 25A, you would choose **48YFS** as your required module.

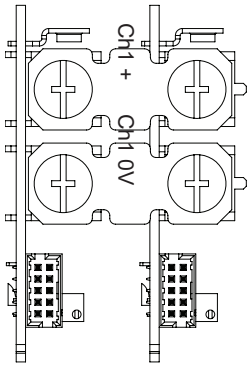


ZC Module - two slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	29.2µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output Power	Maximum capacitive load
15	-	16.0	36A	540W	1000µF/A
18	-	19.2	30A	540W	1000µF/A
28	-	30	19.3A	540W	500µF/A



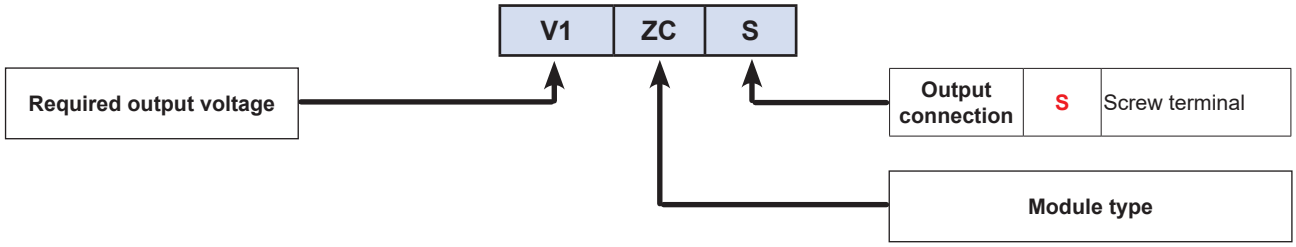
See application notes for signal connection details

Output Specification

Rise time	<75ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%	Load type dependent
Ripple and noise		pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1%	
-20°C - 0°C, >5% load	2%	
≤5% load	4%	
Voltage setting accuracy	<1%	of set voltage
Remote sense	Yes	0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W	
Temperature coefficient	0.016%	of rated voltage per °C
Load regulation	<3.5%	for 1-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	0.1%	for 100% load change on any output
Transient deviation	<5%	of set voltage for 50% load change (above 25% load)
Recovery	30ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup	Auto recovers after removal of load
Short circuit protection	Yes	Indefinitely protected
Over temperature protection	Yes	Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 15V / 36A, you would choose 15**ZCS** as your required module.

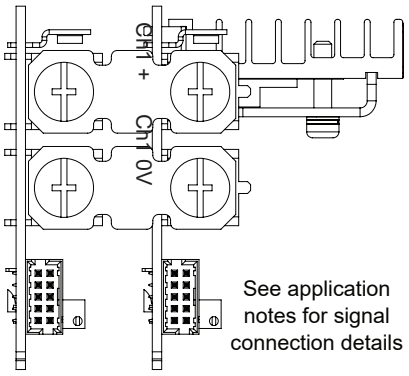


ZD Module - three slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	28.3µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts) at PSU output terminal			Current	Output power	Maximum capacitive load
5	-	5.3	80A	400W	1000µF/A
12	-	12.8	65A	780W	1000µF/A
24	-	25.6	30A	720W	750µF/A
48	-	51.2	15A	720W	250µF/A



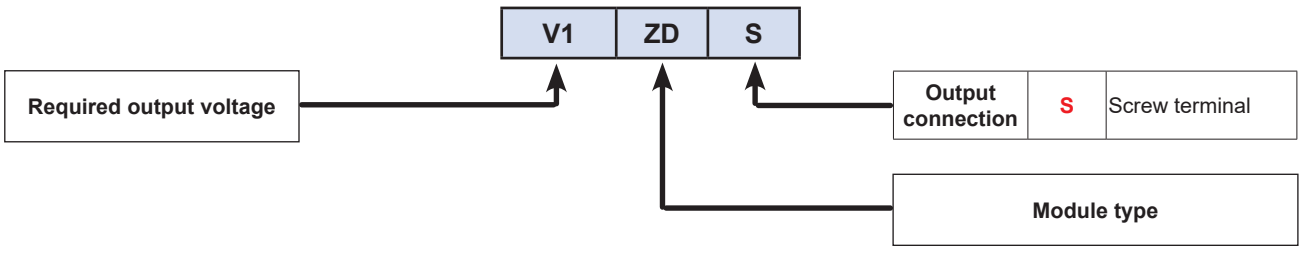
See application notes for signal connection details

Output Specification

Rise time	<75ms		(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%		Load type dependent
Ripple and noise	V_{out}<10V	V_{out}>10V	pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1.5%	1%	
-20°C - 0°C, >5% load	3%	2%	
≤5% load	4%	4%	
Voltage setting accuracy	<1%		of set voltage
Remote sense	Yes		0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W		
Temperature coefficient	0.016%		of rated voltage per °C
Load regulation	<3.5%		for 1-100% load change (<2.5% for 5-5.3V output)
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	0.1%		for 100% load change on any output
Transient deviation	<5%		of set voltage for 50% load change (above 25% load)
Recovery	30ms		for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup		Auto recovers after removal of load
Short circuit protection	Yes		Indefinitely protected
Over temperature protection	Yes		Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 48V / 16A, you would choose **48ZDS** as your required module.

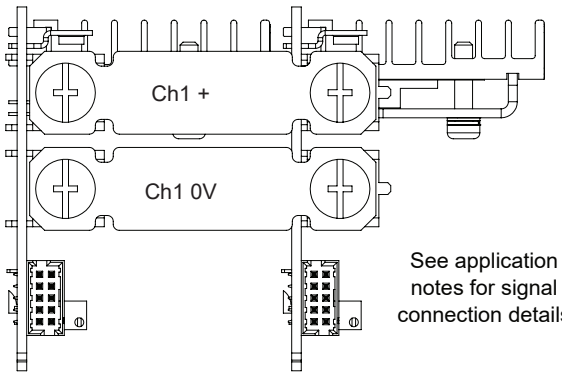


ZF Module - four slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	27.6µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)	Current	Output power	Maximum capacitive load
5 - 5.3	110A	550W	1000µF/A
12 - 12.8	90A	1080W	1000µF/A
36 - 38.4	29A	1044W	300µF/A



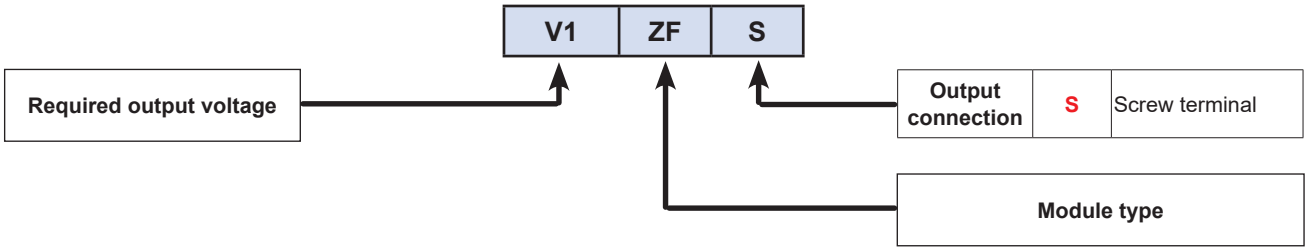
See application notes for signal connection details

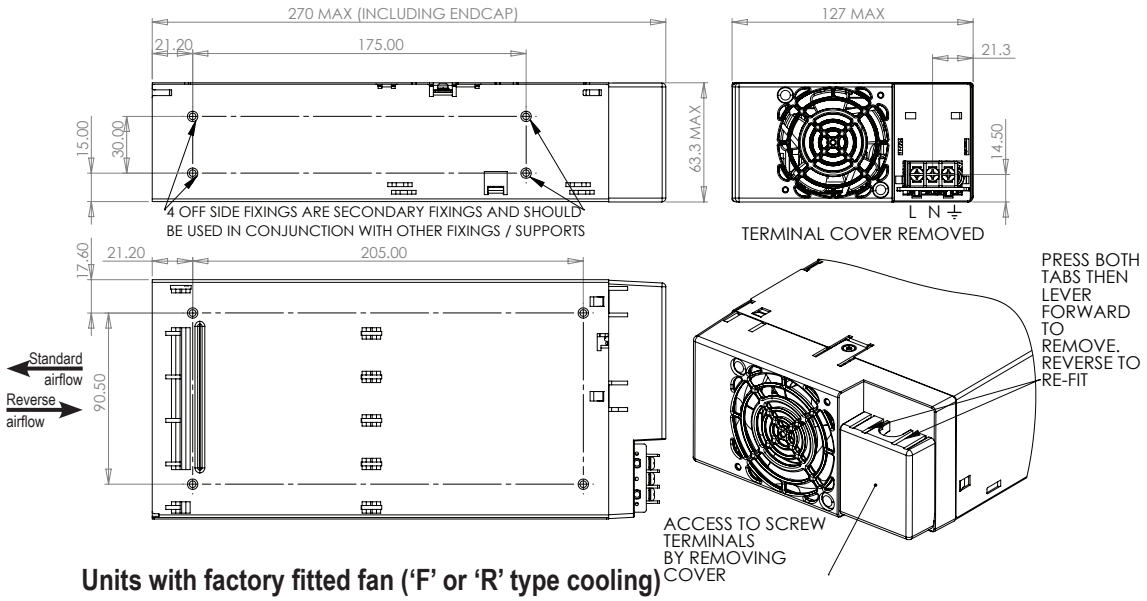
Output Specification

Rise time	<75ms		(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%		Load type dependent
Ripple and noise	V_{out}<10V	V_{out}>10V	pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1.5%	1%	
-20°C - 0°C, >5% load	3%	2%	
≤5% load	4%	4%	
Voltage setting accuracy	<1%		of set voltage
Remote sense	Yes		0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W		
Temperature coefficient	0.016%		of rated voltage per °C
Load regulation	<3.5%		for 1-100% load change (<2.5% for 5-5.3V output)
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	0.1%		for 100% load change on any output
Transient deviation	<5%		of set voltage for 50% load change (above 25% load)
Recovery	30ms		for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup		Auto recovers after removal of load
Short circuit protection	Yes		Indefinitely protected
Over temperature protection	Yes		Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

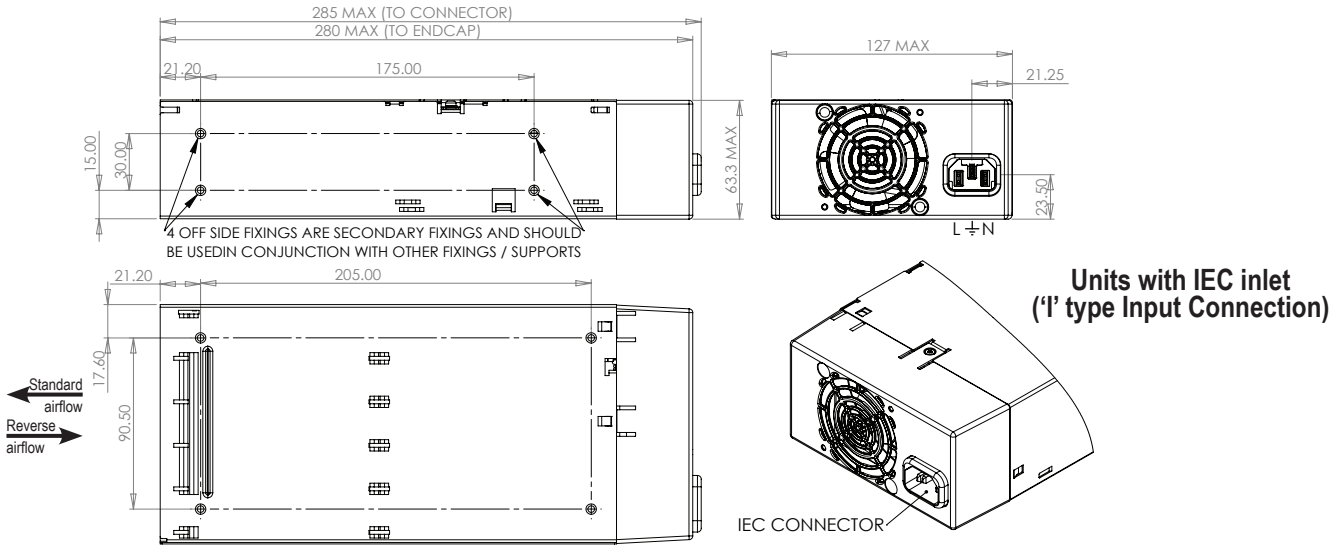
How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 12V / 90A, you would choose **12ZFS** as your required module.

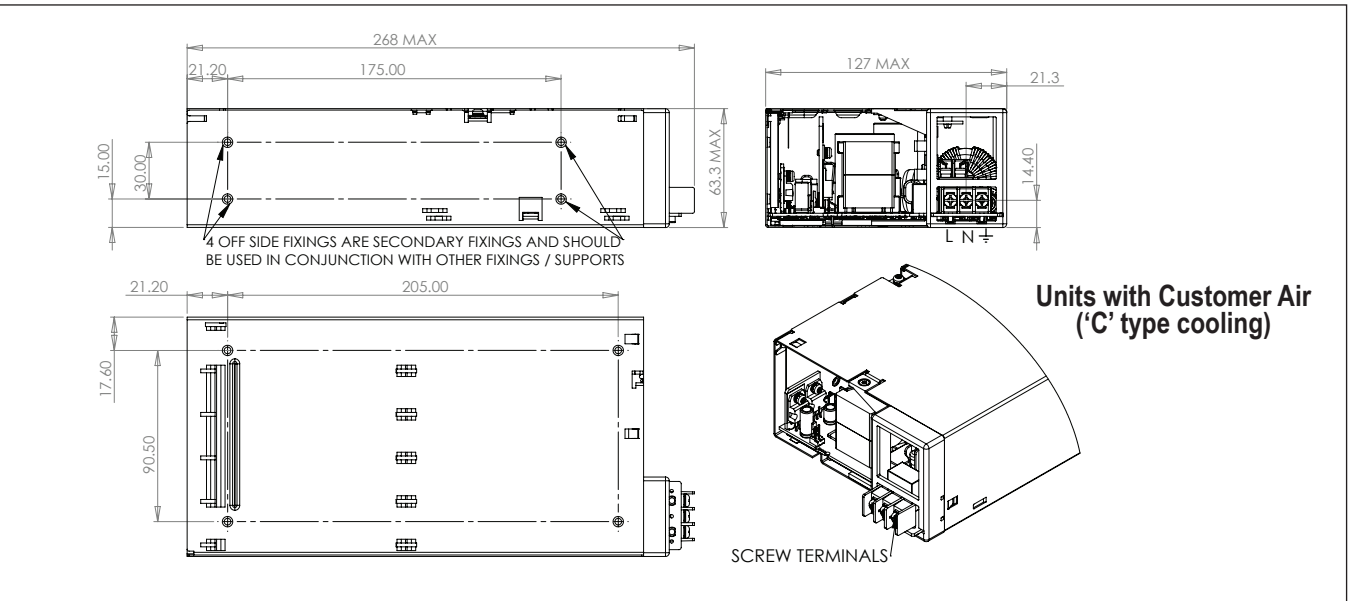




Units with factory fitted fan ('F' or 'R' type cooling)



Units with IEC inlet ('I' type Input Connection)



Units with Customer Air ('C' type cooling)

Customer fixings. 8 holes M4. Max thread penetration:- 4.5mm

Medical Industrial Test Broadcast Comms Renewable

1200W / 1500W
Modular power supply

Features	Benefits
• BF ready medical isolation (MOPP)	Eases design into systems (including BF)
• Low speed, low audible noise fans	Enhanced patient / user experience
• Up to 16 outputs	Eliminates need for additional supplies
• PMBus™ communication option	Remote monitoring and control
• 7 year warranty	Low cost of ownership

Input

Output power	1200W	1500W
Input voltage	90-264Vac	150-264Vac
Frequency	47 - 63 Hz (440Hz with reduced PFC)	
Input fuses	25A / 250Vac HBC Fast acting (not user accessible) in both Live and Neutral lines (single fusing optional)	
Inrush current	<45A at 25°C and 264Vac (cold start)	
Leakage current	See 'How To Create A Product Description' for details	
Touch current	<100µA (with 4 or fewer modules). For other configurations, contact sales for details.	
Power factor	> 0.95 (at 230Vac, 100% load)	

Isolation

Input to output / signals	Reinforced	2 x MOPPs (3rd edition 60601) 4kVac, 5.7kVdc type tested to 4kVac (equivalent to 5.7kVdc), production tested to 4.3kVdc.
Input to earth	Basic	1 x MOPP, 1.5kVac
Output / signals to earth	Basic	1 x MOPP, 1.5kVac
Output / signals to output / signals	Basic	200Vdc

How To Create A Product Description

The extensive range of output modules and options make it possible to achieve almost any combination of Volts and Amps. You can create your own QM configuration online at https://config.emea.tdk-lambda.com/. This method checks your configuration and offers the optimum solution. Alternatively, you can do this manually by using the guide below.

1. Calculate total output power to select the appropriate converter, then select required Cooling, Connection, Leakage Current and Controls/ Signals from the following table:

QM7	F	S	D	L	T5H

Converter	QM7	7 slots wide (follow by 'H' for extended holdup, contact sales for details)
Cooling	F	**Variable speed Forward air - standard**
	R	Reverse air (contact sales for details)
	C	Customer air - no fan (contact sales for details)
Input Connection	S	Screw
Input fuse	D	Dual AC fuses
	E	Single AC fuse in Live line (contact sales for details)

Standby / Signals	blank	none
	E5L	5V / 250mA, Enable
	E5H	5V / 2A, 5V / 250mA, Enable
	E12H	12V / 1A, 5V / 250mA, Enable
	T5L	5V / 250mA, Inhibit
	T5H	5V / 2A, 5V / 250mA, Inhibit
	T12H	12V / 1A, 5V / 250mA, Inhibit
	P5H	5V / 2A, see PMBus™ app note

see specification page for details

Leakage Current (max at 264Vac, 63Hz) Must also add the leakage current from modules and options	L	214µA
	R	77µA

2. Select Output Modules using the output voltages tables and the module specifications.
3. Contact TDK-Lambda to validate configuration and issue a part number.

Possible Outputs - see individual module data for full specifications

Module name	Slots used	Output voltage range			Maximum Output Current	Maximum Output Power
DM (ch2)	1 of 2 outputs in single slot	2.8V	-	3.8V	10A	33W
SB	1 slot	3.3V	-	3.63V	37A	122W
DM (ch2)	1 of 2 outputs in single slot	4.25V	-	5.75V	10A	50W
SA	1	5V	-	5V	15A	75W
SB	1	5V	-	5.5V	30A	150W
SC	2	5V	-	5.5V	60A	300W
ZD	3	5V	-	5.3V	80A	400W
ZF	4	5V	-	5.3V	110A	550W
YC	2	6.6V	-	7.26V	37A	244W
YC	2	10V	-	11V	30A	300W
YF	4	10V	-	11V	60A	600W
DH (ch1 or ch2)	1 of 2 outputs in single slot	10.2V	-	13.8V	10A	120W
DM (ch1)	1 of 2 outputs in single slot	11.9V	-	16.1V	10A	120W
DM (ch2)	1 of 2 outputs in single slot	11.9V	-	16.1V	8.3A	100W
SA	1	12V	-	12V	12.5A	150W
SB	1	12V	-	13.2V	25A	300W
SC	2	12V	-	13.2V	50A	600W
ZD	3	12V	-	12.8V	65A	780W
ZF	4	12V	-	12.8V	90A	1080W
DH (ch1 or ch2)	1 of 2 outputs in single slot	12.75V	-	17.25V	8A	120W
SA	1	15V	-	15V	10A	150W
SB	1	15V	-	16.5V	20A	300W
ZC	2	15V	-	16V	36A	540W
SB	1	18V	-	19.8V	16.7A	300W
ZC	2	18V	-	19.2V	30A	540W
DH (ch1 or ch2)	1 of 2 outputs in single slot	20.4V	-	27.6V	5A	120W
YB	1	20.4V	-	27.6V	9.8A	200W
DM (ch1)	1 of 2 outputs in single slot	20.8V	-	28.2V	5A	120W
DM (ch2)	1 of 2 outputs in single slot	23.5V	-	24.5V	4.16A	100W
SA	1	24V	-	24V	6.25A	150W
SB	1	24V	-	26.4V	12.5A	300W
SC	2	24V	-	26.4V	25A	600W
ZD	3	24V	-	25.6V	30A	720W
YF	4	24V	-	26.4V	50A	1200W
DH (ch1 or ch2)	1 of 2 outputs in single slot	23.0V	-	31V	4.4A	120W
YB	1	27.6V	-	34.5V	7.25A	200W
SB	1	28V	-	30.8V	10.7A	300W
ZC	2	28V	-	30V	19.3A	540W
YC	2	30V	-	33V	20A	600W
SC	2	36V	-	39.6V	16.7A	600W
ZF	4	36V	-	38.4V	29A	1044W
YB	1	40.8V	-	55.2V	4.9A	200W
SB	1	48V	-	52.8V	6.25A	300W
SC	2	48V	-	52.8V	12.5A	600W
ZD	3	48V	-	51.2V	15A	720W
YF	4	48V	-	52.8V	25A	1200W
YB	1	55.2V	-	62V	3.62A	200W
YC	2	56V	-	61.6V	10.7A	600W
YF	4	72V	-	79.2V	16.7A	1200W
YC	2	96V	-	105.6V	6.25A	600W
YF	4	96V	-	105.6V	12.5A	1200W

Note. 'Maximum Output Current' and 'Maximum Output Power' above are the maximum available from the module. It is not possible to exceed the 'Output Power' of the unit given on the previous page.

Output Specification		
Turn on time	2s max	at 90Vac (150Vac for 1500W) and 100% rated output power
Efficiency	up to 91%	240Vac & above 50% rated power, configuration dependent
Hold up	20ms min 16ms min	at 1200W output power. 1 cycle ride-through option available, contact sales for details. at 1500W output power
Over temperature protection	Yes	converter protection shuts down all outputs (except standby supplies) and fan, auto restarts. Shutdown temperature varies according to ambient, output power and input voltage.

Environment	
Temperature	-20°C to 70°C operational, -40°C to 70°C storage (max 12 months).
Derating	50°C to 70°C derate total output power and each output current by 2.5% per °C Additionally, the 0.25A standby supply provided with the E5H, E12H, T5H and T12H options derates by 2.4% per °C from 25°C to 50°C when the unit is inhibited (fan not running)
Low temperature startup	-40°C
Humidity	5 - 95% RH non condensing
Shock	±3 x 20g shocks in each plane, total 18 shocks (11ms (+/-0.5msec), half sine) Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987. Conforms to MIL-STD-810G, Method 516.6, Pro IV
Vibration	Single axis 10 - 500 Hz at 2g (sweep and endurance at resonance) in all 3 planes Conforms to EN60068-2-6, IEC68-2-6 Conforms to MIL-STD-810G, Method 514.6, Pro I
Altitude	5000 metres operational, 5000 metres storage/transportation
Pollution	Degree 2, Material group IIIb
IP Rating	IPX0

Emissions EN61000-6-3:2007, EN60601-1-2:2015 - see application notes for best installation practice		
Radiated electric field	EN55011, EN55032	(as per CISPR.11/32) Class B, FCC47 part 15 subpart B - 'L' leakage current variants (Units with 'R' type leakage current option achieve Class A)
Conducted emissions	EN55011, EN55032	(as per CISPR.11/32) Class B, FCC47 part 15 subpart B - 'L' leakage current variants (Units with 'R' type leakage current option achieve Class A)
Conducted harmonics	EN61000-3-2	Class A and Class C
Flicker	EN61000-3-3	Compliant - d_{max} only

Immunity EN61000-6-2:2005, EN60601-1-2:2015 - see application notes for best installation practice				Criteria
Electrostatic discharge	EN61000-4-2	Level 4	F type cooling only	A
Electromagnetic field	EN61000-4-3	Level 3	Proximity fields, EN60601-1-2, Levels as defined in standard, Criteria A	A
Fast / burst transient	EN61000-4-4	Level 4	Tested at 5kHz and 100kHz	A
Surge immunity	EN61000-4-5	Level 3		A
Conducted RF immunity	EN61000-4-6	Level 3		A
Power frequency magnetic field	EN61000-4-8	Level 4		A
Voltage dips, variations, interruptions	EN61000-4-11	Class 3	Criteria B for 5s and 1 cycle interruptions	A
Voltage sags	Semi F-47	compliant	above 180Vac input	
Ring wave	EN61000-4-12	Level 3		A
	ANSI C62.41	Level 2		A
Voltage fluctuations	EN61000-4-14	Class 3	See EMC report for full details.	A

Approvals / Accreditations	
IEC/EN 62368-1, UL62368-1 / CSA 22.2 No 62368-1	File E135494
IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1	File E135494
IEC/EN 60601-1, UL/CSA 60601-1, ANSI/AAMI ES60601-1, CAN/CSA-C22.2 No 60601-1	File E349607
IEC/EN 61010-1	Results included in 60950 report
CE Mark (EN62368-1)	Low Voltage Directive (LVD), electromagnetic compatibility (EMC) and Restriction of Hazardous Substances (RoHS)
CB certificate and Report available on request	
Designed and manufactured under the control of ISO9001 and ISO13485 (including risk management).	

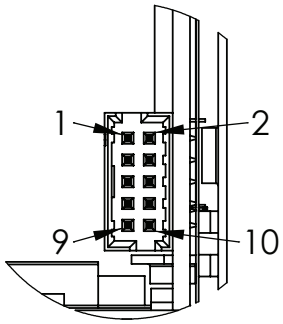
Standby / Signals

Maximum power per channel	See table below
Available signals (Exx or Txx type)	PSU inhibit (Txx type) or enable (Exx type), AC Good
Available signals (Pxx type)	PMBus™ control of power supply fan speed and fail warning Serial number, date of manufacture, run time, on/off power cycles For further details, see the product range application notes, PMBus™ section
Additional Leakage Current (max at 264Vac, 63Hz)	xxL = 13.1µA, xxH = 15µA Must also add the leakage current from modules and selected filter option.

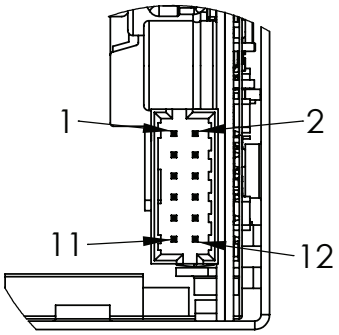
Available Output Voltages (at PSU signal connector)

Option type	Standby 1			Standby 2			PSU on/off
	V	Max Current	Power	V	Max Current	Power	
E5L	5V	250mA	1.25W	not available			Enable
E5H	5V	250mA	1.25W	5V	2A	10W	Enable
E12H	5V	250mA	1.25W	12V	1A	12W	Enable
T5L	5V	250mA	1.25W	not available			Inhibit
T5H	5V	250mA	1.25W	5V	2A	10W	Inhibit
T12H	5V	250mA	1.25W	12V	1A	12W	Inhibit
P5H	5V	2A	10W	not available			see PMBus™ application note

Txx or Exx option		
Pin	5L	5H or 12H
1	Do not connect	Standby 2 +
2		Standby 2 -
3	Standby 1 +	Standby 1 +
4	Standby 1 -	Standby 1 -
5	PSU on/off+	PSU on/off+
6	PSU on/off-	PSU on/off-
7	AC fail Out	AC fail Out
8	AC fail Rtn	AC fail Rtn
9	Do not connect	
10		



Pin	P5H option
1	Standby +
2	Standby -
3	Do not connect
4	Fan fail
5	Address 0
6	Address 1
7	Address 2
8	Address 3
9	SCL - Clock
10	SDA - Data
11	Control line in
12	GND



Output Specification

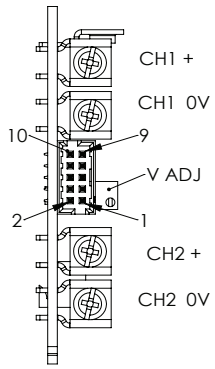
	Standby 1	Standby 2	
Rise time	<30ms		(with resistive load) to 90% of voltage, monotonic rise above 10%
Ripple and noise	<1%		pk-pk, using 20MHz bandwidth
Voltage setting accuracy	<3%		of set voltage
Remote sense	No		
Minimum load	0W		on any output
Temperature coefficient	0.02%		of rated voltage per °C
Load regulation	<1.5%	<1%	for 0-100% load change
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	<0.4%		for 100% load change on any output
Transient deviation	<5%		of set voltage for 25-50% load change
Recovery	1ms		for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, output shuts down, cycle ac to reset
Over current protection	Constant Current		Auto recovers
Short circuit protection	Constant Current		Auto recovers

DH Module - single slot width, 2 output channels

Maximum module power	200W	Total power from channel 1 + channel 2
Maximum power per channel	see table below	
Available signals	Module good, module inhibit	
Additional Leakage Current (max at 264Vac, 63Hz)	20.5µA Must also add the leakage current from other modules, any standby supply and selected filter option.	

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Channel 1				Channel 2			
Adjustment Range (Volts)	Current	Output power	Max C load	Adjustment Range (Volts)	Current	Output power	Max C load
10.2_a - 13.8	10A	120W	1000µF/A	10.2 - 13.8	10A	120W	1000µF/A
				12.75 - 17.25	8A	120W	1000µF/A
				20.4 - 27.6	5A	120W	750µF/A
12.75_b - 17.25	8A	120W	1000µF/A	12.75 - 17.25	8A	120W	1000µF/A
				20.4 - 27.6	5A	120W	750µF/A
20.4_c - 27.6	5A	120W	750µF/A	20.4 - 27.6	5A	120W	750µF/A
23.0_d - 31	4.4A	120W	750µF/A	23.0 - 31	4.4A	120W	750µF/A



Pin	Connection
1	Do not connect
2	
3	Module good collector
4	Module good emitter
5	Module inhibit anode
6	Module inhibit cathode
7	Do not connect
8	
9	
10	

Channel 1 and channel 2 of DH are both adjusted by single potentiometer. The V2 set = V2max x V1set / V1max

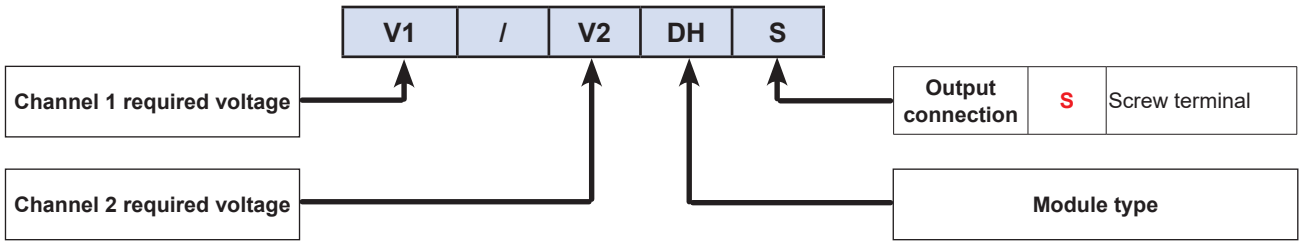
a, b, c, d - for output voltages below 10.8V(a), 13.5V(b), 21.6V(c) or 24.4V(d), a Minimum load of 1W must be applied to channel 1

Output Specification

Rise time	<50ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	zero	at full load with resistive load.
Ripple and noise		pk-pk, using 20MHz bandwidth
0°C - 70°C	1.5%	
-20°C - 0°C	2.25%	
Voltage setting accuracy	<1%	of set voltage (3% for channel 2)
Remote sense	No	
Minimum load	0W	Except for notes a, b, c and d above.
Temperature coefficient	0.03%	of rated voltage per °C
Load regulation	<6%	for 5-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	3%	for 5-100% load change on any output
Transient deviation	<4%	of set voltage for 50% load change (above 25% load)
Recovery	3ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down (both outputs), cycle ac to restart.
Module current protection	Hiccup	Protects channel 1 and channel 2, shuts down both outputs, auto-recovers when fault clears.
Short circuit protection	Hiccup	Shuts down both outputs, auto recovers.
Over temperature protection	Yes	Module protection shuts down both outputs, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required channel 1 and channel 2 voltages (from the table above)
For example, if you need 12V / 10A and 24V / 3A, you would choose **12/24DHS** as your required module.

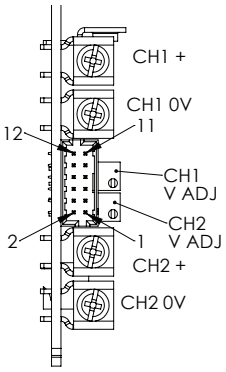


DM Module - single slot width, 1 or 2 output channels

Maximum module power	200W	Total power from channel 1 + channel 2
Maximum power per channel	see table below	
Available signals	Remote sense (channels 1 & 2), channel 1 good, channel 2 good, Channel 2 inhibit, module inhibit	
Additional Leakage Current (max at 264Vac, 63Hz)	22.3µA Must also add the leakage current from other modules, and standby supply and selected filter option.	

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Channel 1				Channel 2			
Adjustment Range (Volts)	Current	Output power	Max C load	Adjustment Range (Volts)	Current	Output power	Max C load
Channel 1 unused				2.8 - 3.8	10A	33W	500µF/A
				4.25 - 5.75	10A	50W	500µF/A
11.9 - 16.1	10A	120W	500µF/A	Channel 2 unused			
20.8 - 28.2	5A	120W	500µF/A				
11.9 - 16.1	10A	120W	500µF/A	2.8 - 3.8	10A	33W	500µF/A
				4.25 - 5.75	10A	50W	500µF/A
				11.9 - 16.1	8.3A	100W	500µF/A
				23.5 - 24.5	4.16A	100W	500µF/A
20.8 - 28.2	5A	120W	500µF/A	2.8 - 3.8	10A	33W	500µF/A
				4.25 - 5.75	10A	50W	500µF/A
21.6 - 28.2	5A	120W	500µF/A	23.5 - 24.5	4.16A	100W	500µF/A

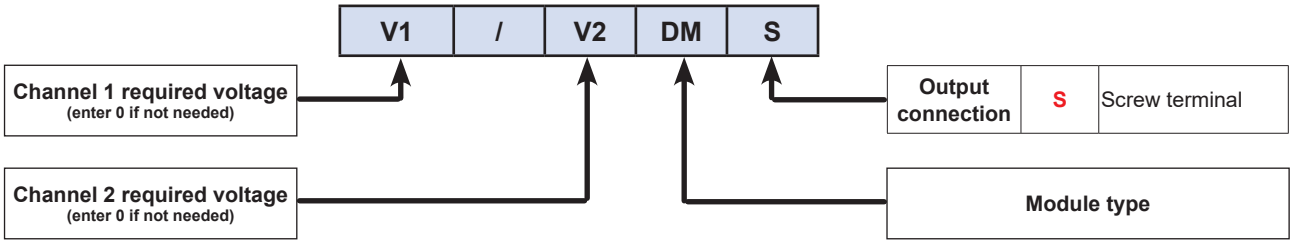


Pin	Connection
1	Ch2 sense +
2	Ch2 sense -
3	Ch2 inhibit anode
4	Ch2 inhibit cathode
5	Ch2 good collector
6	Ch2 good emitter
7	Ch1 good collector
8	Ch1 good emitter
9	Module inhibit anode
10	Module inhibit cathode
11	Ch1 sense +
12	Ch1 sense -

Output Specification	Ch1	Ch2	
Rise time	<20ms	<50ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%	<5%	Load type dependent, no overshoot at full load with resistive load
Ripple and noise			pk-pk, using 20MHz bandwidth
0°C - 70°C	1.5%	75mV	1.5% for ch2 outputs >10V, 2% for outputs 11-17V
-20°C - 0°C	2.25%	75mV	2% for ch2 outputs >10V, 2.5% for outputs 11-17V
Voltage setting accuracy	<1%	<1%	of set voltage
Remote sense	Yes		0.5V (voltage at the output terminals must be within the specified adjustment range)
Minimum load	0W		Refer to application note for details.
Temperature coefficient	0.02%		of rated voltage per °C
Load regulation	max of 50mV or <1% of set voltage		for 0-100% load change
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	1.5%		for 100% load change on any output
Transient deviation	<4%	<5%	of set voltage for 50% load change (above 25% load). 250mV for outputs below 5V
Recovery	3ms	7ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, module shuts down (both outputs), cycle ac to restart.
Over current protection	Hiccup	Constant current	Ch1 protection shuts down both outputs.
Short circuit protection	Hiccup	Constant current	Ch1 protection shuts down both outputs. Refer to application note for details.
Over temperature protection	Yes	Yes	Ch1 protection shuts down both outputs, cycle ac to restart. Ch2 protection shuts down ch2 only, auto recovers when fault clears. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required channel 1 and channel 2 voltages (from the table above)
For example, if you need 12V / 10A and 3.3V / 10A, you would choose **12/3.3DMS** as your required module.

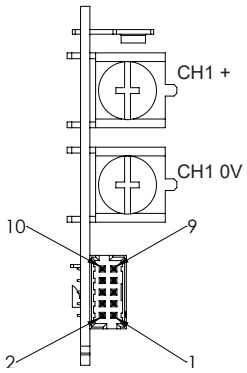


SA Module - single slot width, 1 output channel

Maximum power per channel	see table below
Available signals	Remote sense (5V module only)
Additional Leakage Current (max at 264Vac, 63Hz)	14.6µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Output voltage	Current	Output power	Maximum capacitive load
5V	15A	75W	1000µF/A
12V	12.5A	150W	1000µF/A
15V	10A	150W	1000µF/A
24V	6.25A	150W	750µF/A



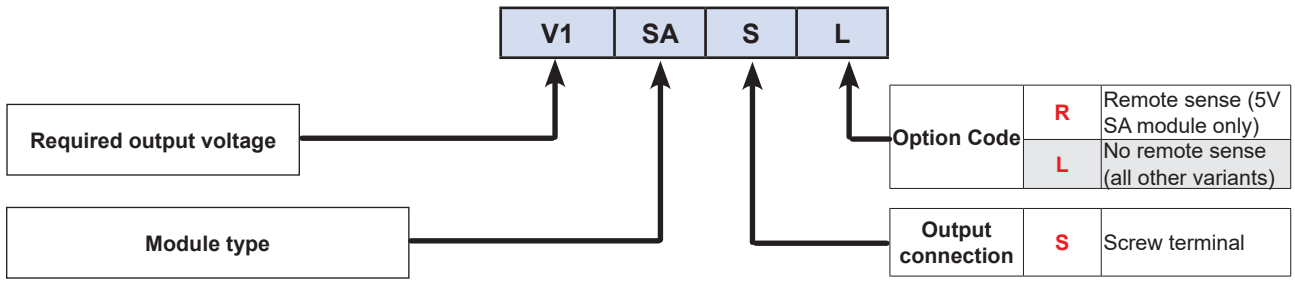
Pin	Connection
1	Do not connect
2	
3	
4	
5	
6	
7	Remote sense +
8	Remote sense -
9	Do not connect
10	

Output Specification

Rise time	<75ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5% or 250mV	Load type dependent, no overshoot at full load with resistive load 6% for 12V output
Ripple and noise		pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1%	
-20°C - 0°C, >5% load	2%	
≤5% load	2%	
Voltage setting accuracy	<1%	of set voltage
Remote sense	Yes	On 5V module only
Minimum load	No	on any output
Temperature coefficient	<0.02%	of rated voltage per °C
Load regulation	<1%	for 0-100% load change
Line regulation	<0.2%	for 90-264Vac input change
Cross regulation	<0.2%	for 100% load change on any output
Transient deviation	<5% or 250mV	of set voltage for 50% load change (above 25% load)
Recovery	5ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down, cycle ac to restart
Over current protection	Hiccup	Auto recovers after removal of load
Short circuit protection	Yes	Indefinitely protected
Over temperature protection	Yes	Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 15V / 10A, you would choose **15SASL** as your required module.

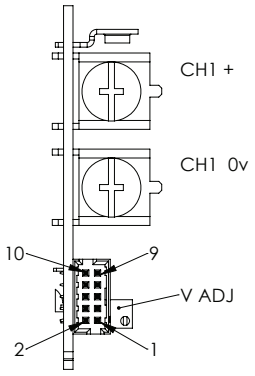


SB Module - single slot width, 1 output channel

Maximum power per channel	see table below
Available signals	Remote sense, module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	14.6µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output power	Max Capacitive Load
3.3	-	3.63	37A	122W	1000µF/A
5	-	5.5	30A	150W	1000µF/A
12	-	13.2	25A	300W	1000µF/A
15	-	16.5	20A	300W	1000µF/A
18	-	19.8	16.7A	300W	1000µF/A
24	-	26.4	12.5A	300W	750µF/A
28	-	30.8	10.7A	300W	500µF/A
48	-	52.8	6.25A	300W	250µF/A



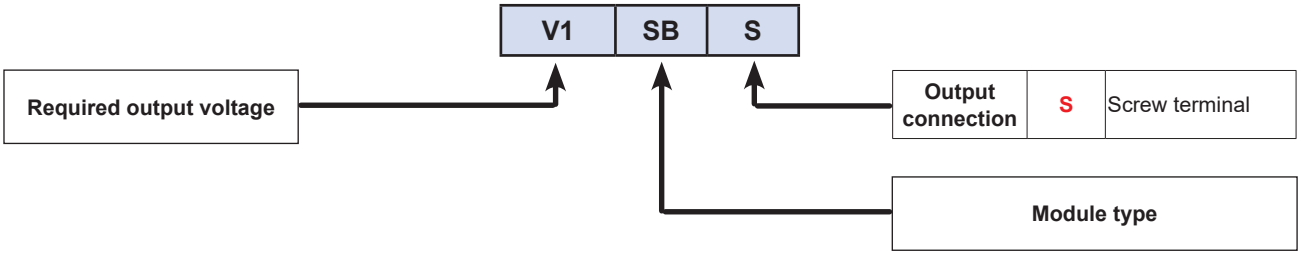
Pin	Connection
1	Do not connect
2	
3	Module good collector
4	Module good emitter
5	Module inhibit anode
6	Module inhibit cathode
7	Remote sense +
8	Remote sense -
9	Do not connect
10	

Output Specification

Rise time	<75ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%	Load type dependent
Ripple and noise	max of	pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1% or 50mV	
-20°C - 0°C, >5% load	2% or 100mV	
≤5% load	4%	
Voltage setting accuracy	<1%	of set voltage
Remote sense	Yes	0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W	
Temperature coefficient	0.016%	of rated voltage per °C
Load regulation	<1%	for 0-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	0.1%	(5mV for outputs below 5V) for 100% load change on any output
Transient deviation	<5%	of set voltage for 50% load change (above 25% load) 250mV for outputs below 5V
Recovery	1ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup	Auto recovers after removal of load
Short circuit protection	Yes	Indefinitely protected
Over temperature protection	Yes	Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 12.2V / 24.5A, you would choose **12.2SBS** as your required module.

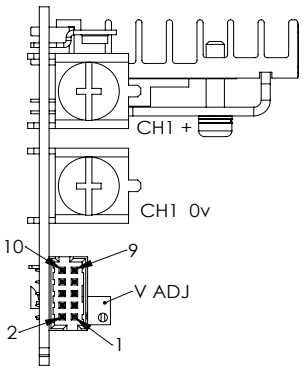


SC Module - two slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Remote sense, module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	13.8µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output power	Maximum capacitive load
5	-	5.5	60A	300W	1000µF/A
12	-	13.2	50A	600W	1000µF/A
24	-	26.4	25A	600W	750µF/A
36	-	39.6	16.7A	600W	300µF/A
48	-	52.8	12.5A	600W	250µF/A



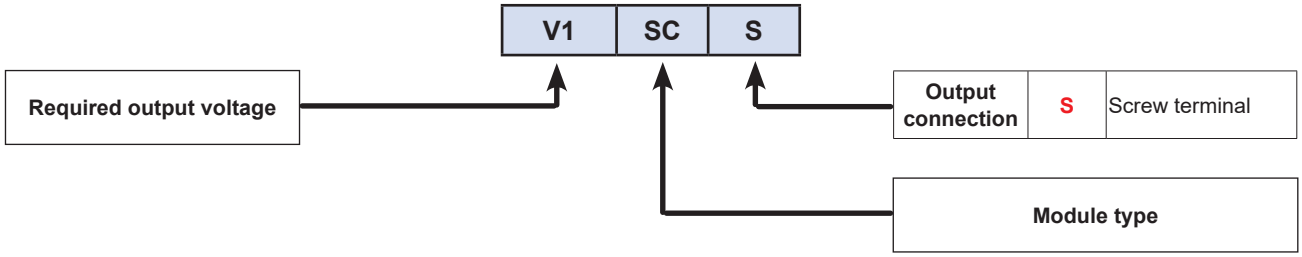
Pin	Connection
1	Do not connect
2	
3	Module good collector
4	Module good emitter
5	Module inhibit anode
6	Module inhibit cathode
7	Remote sense +
8	Remote sense -
9	Do not connect
10	

Output Specification

Rise time	<75ms		(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%		Load type dependent
Ripple and noise	V_{out}<10V	V_{out}>10V	pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1.5%	1%	
-20°C - 0°C, >5% load	3%	2%	
≤5% load	4%	4%	
Voltage setting accuracy	<1%		of set voltage
Remote sense	Yes		0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W		
Temperature coefficient	0.016%		of rated voltage per °C
Load regulation	<1%		for 0-100% load change
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	0.1%		for 100% load change on any output
Transient deviation	<5%		of set voltage for 50% load change (above 25% load)
Recovery	1ms		for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup		Auto recovers after removal of load
Short circuit protection	Yes		Indefinitely protected
Over temperature protection	Yes		Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 12.2V / 49A, you would choose **12.2SCS** as your required module.

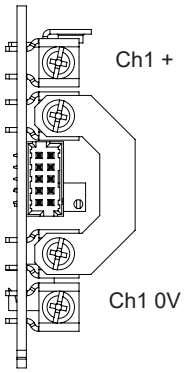


YB Module - single slot width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	20.5µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output power	Maximum capacitive load
20.4	-	27.6	9.8A	200W	500µF/A
27.6	-	34.5	7.25A	200W	500µF/A
40.8	-	55.2	4.9A	200W	375µF/A
55.2	-	62	3.62A	200W	375µF/A



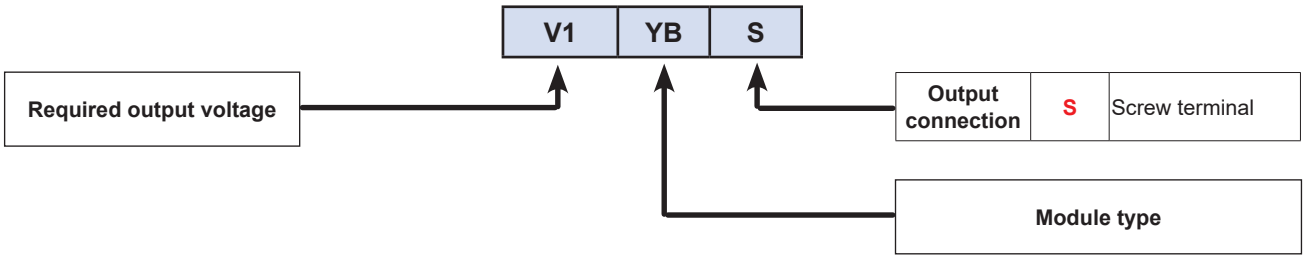
Pin	Connection
1	Do not connect
2	
3	Module good collector
4	Module good emitter
5	Module inhibit anode
6	Module inhibit cathode
7	Do not connect
8	
9	
10	

Output Specification

Rise time	<75ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	zero	at full load with resistive load. Load type dependent, <7% overshoot with capacitive load
Ripple and noise		pk-pk, using 20MHz bandwidth
0°C - 70°C	1.5%	
-20°C - 0°C	2.25%	
Voltage setting accuracy	<2%	of set voltage
Remote sense	No	
Minimum load	0W	
Temperature coefficient	0.03%	of rated voltage per °C
Load regulation	<6%	for 5-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	<1%	for 100% load change on any output
Transient deviation	<8%	of set voltage for 50% load change (above 25% load)
Recovery	5ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup	Auto recovers
Short circuit protection	Hiccup	Auto recovers.
Over temperature protection	Yes	Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 41V / 4A, you would choose **41YBS** as your required module.

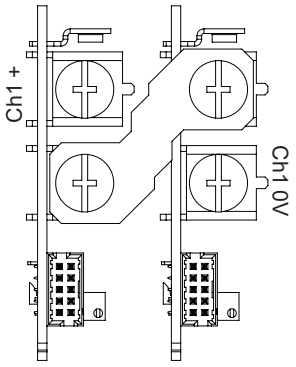


YC Module - two slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	29.2µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output Power	Max Capacitive Load
6.6	-	7.26	37A	244W	1000µF/A
10	-	11	30A	300W	1000µF/A
30	-	33	20A	600W	1000µF/A
56	-	61.6	10.7A	600W	350µF/A
96	-	105.6V	6.25A	600W	125µF/A



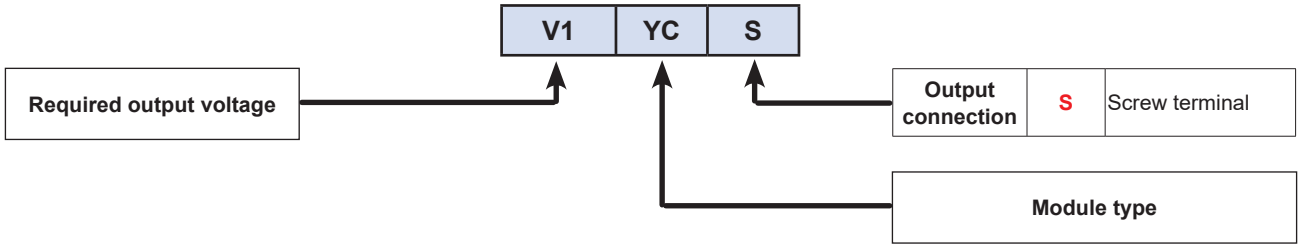
See application notes for signal connection details

Output Specification

Rise time	<75ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%	Load type dependent
Ripple and noise		pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1%	
-20°C - 0°C, >5% load	2%	
≤5% load	4%	
Voltage setting accuracy	<1%	of set voltage
Remote sense	Yes	0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W	
Temperature coefficient	0.016%	of rated voltage per °C
Load regulation	<1%	for 0-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	0.1%	(10mV for outputs below 10V) for 100% load change on any output
Transient deviation	<5%	of set voltage for 50% load change (above 25% load)
Recovery	1ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup	Auto recovers
Short circuit protection	Yes	Indefinitely protected
Over temperature protection	Yes	Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 58V / 10A, you would choose **58YCS** as your required module.

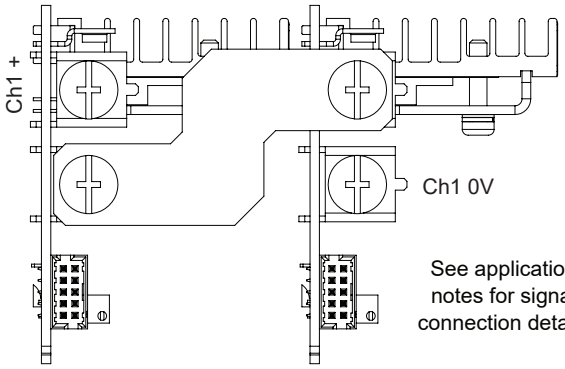


YF Module - four slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	27.6µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output power	Max Capacitive Load
10	-	11	60A	600W	1000µF/A
24	-	26.4	50A	1200W	650µF/A
48	-	52.8	25A	1200W	500µF/A
72	-	79.2	16.7A	1200W	150µF/A
96	-	105.6V	12.5A	1200W	125µF/A



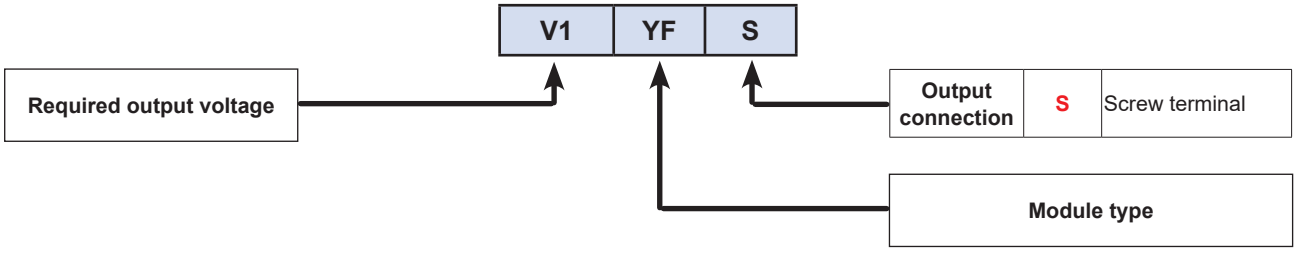
See application notes for signal connection details

Output Specification

Rise time	<75ms		(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%		Load type dependent
Ripple and noise	V_{out}<20V	V_{out}>20V	pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1.5%	1%	
-20°C - 0°C, >5% load	3%	2%	
≤5% load	4%	4%	
Voltage setting accuracy	<1%		of set voltage
Remote sense	Yes		0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W		
Temperature coefficient	0.016%		of rated voltage per °C
Load regulation	<1%		for 0-100% load change
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	0.1%		for 100% load change on any output
Transient deviation	<5%		of set voltage for 50% load change (above 25% load)
Recovery	1ms		for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup		Auto recovers
Short circuit protection	Yes		Indefinitely protected
Over temperature protection	Yes		Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 48V / 25A, you would choose **48YFS** as your required module.

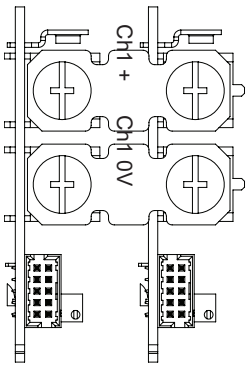


ZC Module - two slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	29.2µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output Power	Maximum capacitive load
15	-	16.0	36A	540W	1000µF/A
18	-	19.2	30A	540W	1000µF/A
28	-	30	19.3A	540W	500µF/A



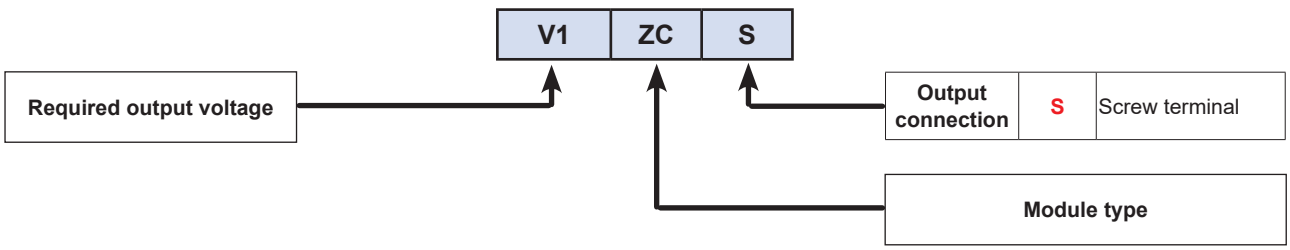
See application notes for signal connection details

Output Specification

Rise time	<75ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%	Load type dependent
Ripple and noise		pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1%	
-20°C - 0°C, >5% load	2%	
≤5% load	4%	
Voltage setting accuracy	<1%	of set voltage
Remote sense	Yes	0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W	
Temperature coefficient	0.016%	of rated voltage per °C
Load regulation	<3.5%	for 1-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	0.1%	for 100% load change on any output
Transient deviation	<5%	of set voltage for 50% load change (above 25% load)
Recovery	30ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup	Auto recovers after removal of load
Short circuit protection	Yes	Indefinitely protected
Over temperature protection	Yes	Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 15V / 36A, you would choose 15**ZCS** as your required module.

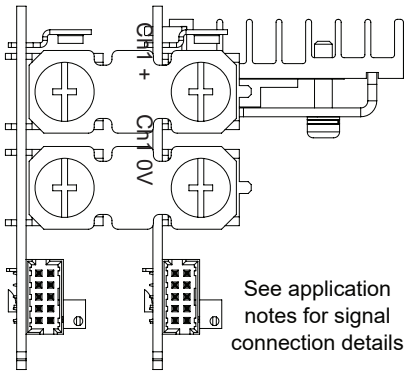


ZD Module - three slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	28.3µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts) at PSU output terminal			Current	Output power	Maximum capacitive load
5	-	5.3	80A	400W	1000µF/A
12	-	12.8	65A	780W	1000µF/A
24	-	25.6	30A	720W	750µF/A
48	-	51.2	15A	720W	250µF/A



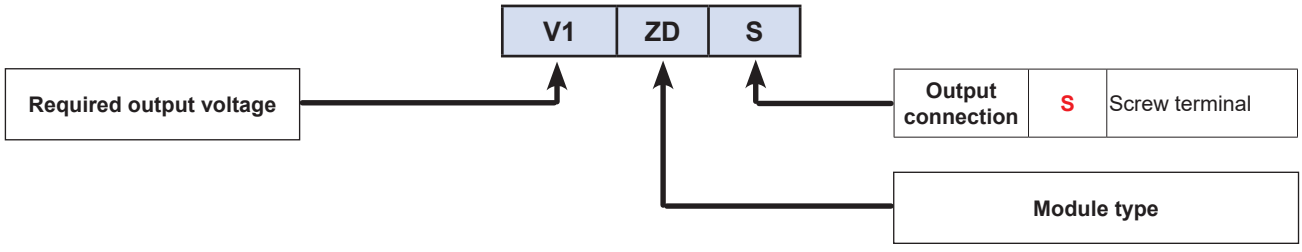
See application notes for signal connection details

Output Specification

Rise time	<75ms		(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%		Load type dependent
Ripple and noise	V_{out}<10V	V_{out}>10V	pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1.5%	1%	
-20°C - 0°C, >5% load	3%	2%	
≤5% load	4%	4%	
Voltage setting accuracy	<1%		of set voltage
Remote sense	Yes		0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W		
Temperature coefficient	0.016%		of rated voltage per °C
Load regulation	<3.5%		for 1-100% load change (<2.5% for 5-5.3V output)
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	0.1%		for 100% load change on any output
Transient deviation	<5%		of set voltage for 50% load change (above 25% load)
Recovery	30ms		for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup		Auto recovers after removal of load
Short circuit protection	Yes		Indefinitely protected
Over temperature protection	Yes		Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 48V / 16A, you would choose **48ZDS** as your required module.

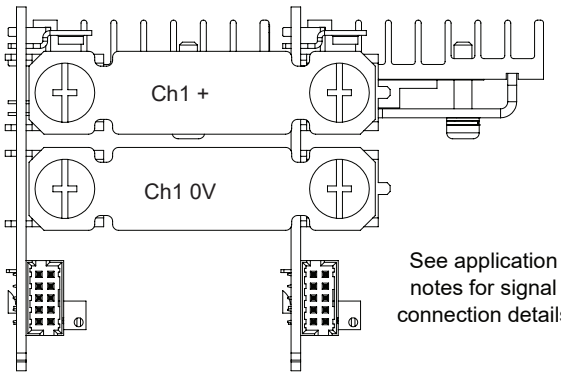


ZF Module - four slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	27.6µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)	Current	Output power	Maximum capacitive load
5 - 5.3	110A	550W	1000µF/A
12 - 12.8	90A	1080W	1000µF/A
36 - 38.4	29A	1044W	300µF/A



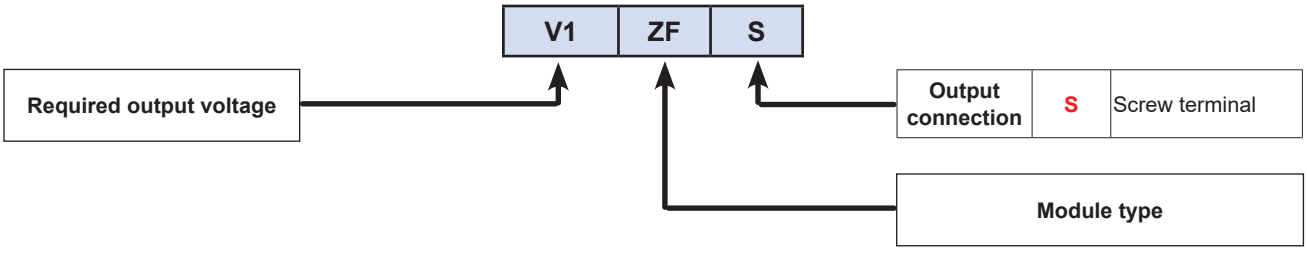
See application notes for signal connection details

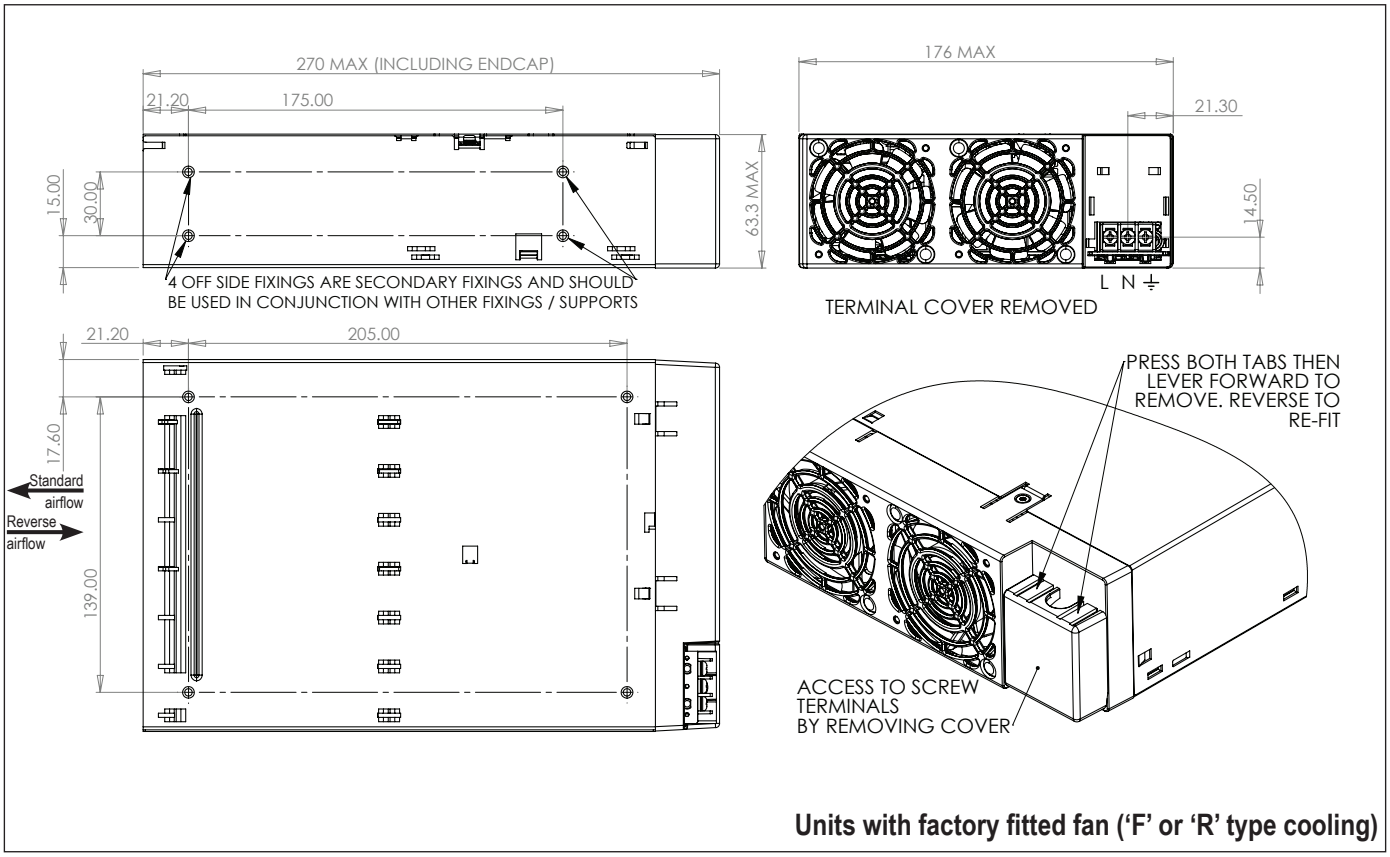
Output Specification

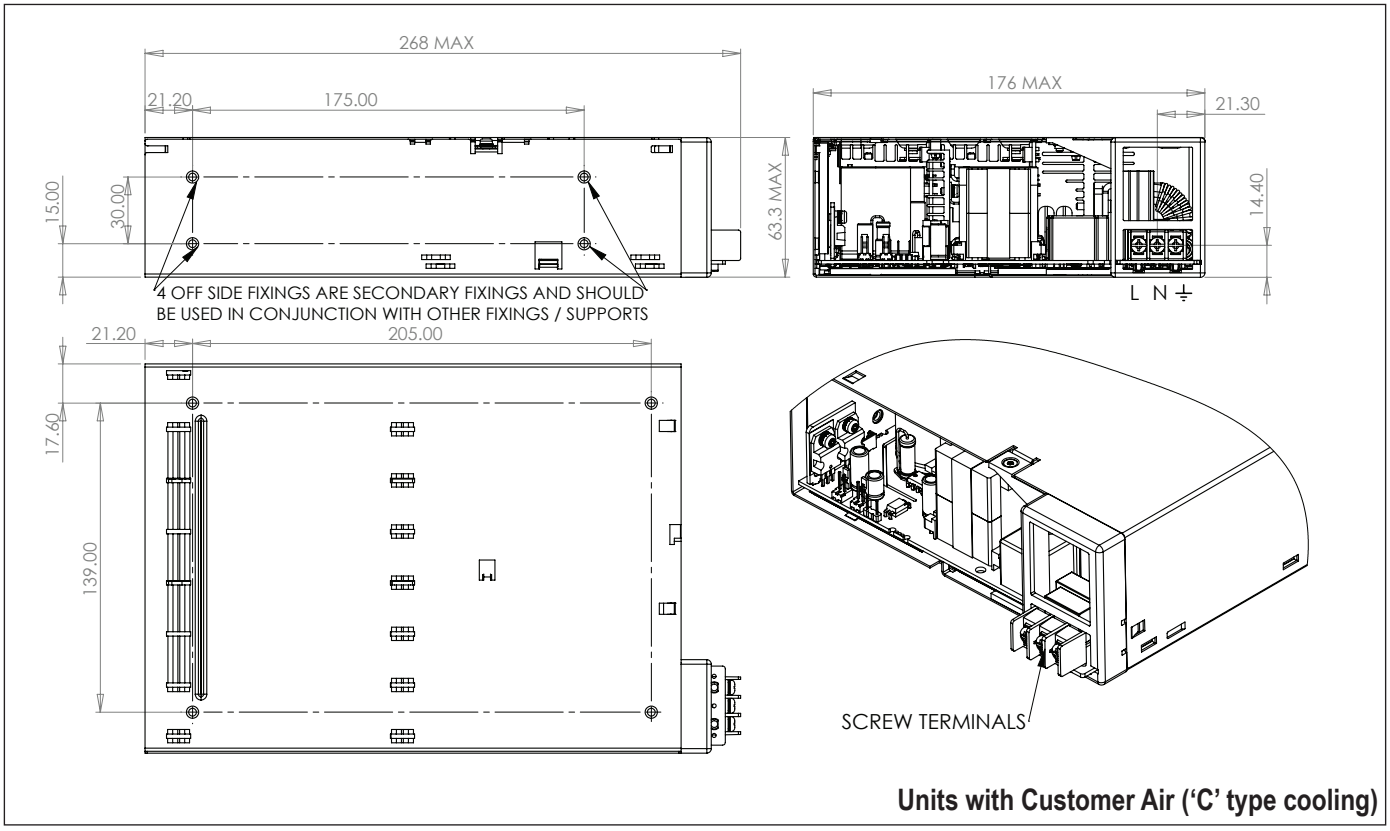
Rise time	<75ms		(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%		Load type dependent
Ripple and noise	V_{out}<10V	V_{out}>10V	pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1.5%	1%	
-20°C - 0°C, >5% load	3%	2%	
≤5% load	4%	4%	
Voltage setting accuracy	<1%		of set voltage
Remote sense	Yes		0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W		
Temperature coefficient	0.016%		of rated voltage per °C
Load regulation	<3.5%		for 1-100% load change (<2.5% for 5-5.3V output)
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	0.1%		for 100% load change on any output
Transient deviation	<5%		of set voltage for 50% load change (above 25% load)
Recovery	30ms		for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup		Auto recovers after removal of load
Short circuit protection	Yes		Indefinitely protected
Over temperature protection	Yes		Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 12V / 90A, you would choose **12ZFS** as your required module.







Customer fixings. 8 holes M4. Max thread penetration:- 4.5mm

Medical Industrial Test Broadcast Comms Renewable

1200W - 2000W
Modular power supply

Features	Benefits
• BF ready medical isolation (MOPP)	Eases design into systems (including BF)
• Low speed, low audible noise fans	Enhanced patient / user experience
• Up to 18 outputs	Eliminates need for additional supplies
• PMBus™ communication option	Remote monitoring and control
• 7 year warranty	Low cost of ownership

Input		QM8	QM8B
Output power -	90-264Vac	1200W	
Output power -	180-264Vac	1500W	2000W
Frequency		47 - 63 Hz (440Hz with reduced PFC)	
Input fuses		25A / 250Vac HBC Fast acting (not user accessible) in both Live and Neutral lines (single fusing optional)	
Inrush current		<45A at 25°C and 264Vac (cold start)	
Leakage current		See 'How To Create A Product Description' for details	
Touch current		<100µA (with 4 or fewer modules). For other configurations, contact sales for details.	
Power factor		> 0.95 (at 230Vac, 100% load)	

Isolation

Input to output / signals	Reinforced	2 x MOPPs (3rd edition 60601) 4kVac, 5.7kVdc type tested to 4kVac (equivalent to 5.7kVdc), production tested to 4.3kVdc.
Input to earth	Basic	1 x MOPP, 1.5kVac
Output / signals to earth	Basic	1 x MOPP, 1.5kVac
Output / signals to output / signals	Basic	200Vdc

How To Create A Product Description

The extensive range of output modules and options make it possible to achieve almost any combination of Volts and Amps. You can create your own QM configuration online at https://config.emea.tdk-lambda.com/. This method checks your configuration and offers the optimum solution. Alternatively, you can do this manually by using the guide below.

1. Calculate total output power to select the appropriate converter, then select required Cooling, Connection, Leakage Current and Controls/ Signals from the following table:

QM8	F	S	D	L	T5H

Converter 8 slots wide		
	QM8	1500W high line
	QM8B	2000W high line

Cooling		
	F	**Variable speed Forward air - standard**
	R	Reverse air (contact sales for details)
	C	Customer air - no fan (contact sales for details)

Input Connection		
	S	Screw

Input fuse		
	D	Dual AC fuses
	E	Single AC fuse in Live line (contact sales for details)

Standby / Signals		
	blank	none
	E5L	5V / 250mA, Enable
	E5H	5V / 2A, 5V / 250mA, Enable
	E12H	12V / 1A, 5V / 250mA, Enable
	T5L	5V / 250mA, Inhibit
	T5H	5V / 2A, 5V / 250mA, Inhibit
	T12H	12V / 1A, 5V / 250mA, Inhibit
	P5H	5V / 2A, see PMBus™ app note
see specification page for details		

Leakage Current (max at 264Vac, 63Hz) Must also add the leakage current from modules and options		
	L	214µA
	R	77µA

2. Select Output Modules using the output voltages tables and the module specifications.
3. Contact TDK-Lambda to validate configuration and issue a part number.

Possible Outputs - see individual module data for full specifications

Module name	Slots used	Output voltage range			Maximum Output Current	Maximum Output Power
DM (ch2)	1 of 2 outputs in single slot	2.8V	-	3.8V	10A	33W
SB	1 slot	3.3V	-	3.63V	37A	122W
DM (ch2)	1 of 2 outputs in single slot	4.25V	-	5.75V	10A	50W
SA	1	5V	-	5V	15A	75W
SB	1	5V	-	5.5V	30A	150W
SC	2	5V	-	5.5V	60A	300W
ZD	3	5V	-	5.3V	80A	400W
ZF	4	5V	-	5.3V	110A	550W
YC	2	6.6V	-	7.26V	37A	244W
YC	2	10V	-	11V	30A	300W
YF	4	10V	-	11V	60A	600W
DH (ch1 or ch2)	1 of 2 outputs in single slot	10.2V	-	13.8V	10A	120W
DM (ch1)	1 of 2 outputs in single slot	11.9V	-	16.1V	10A	120W
DM (ch2)	1 of 2 outputs in single slot	11.9V	-	16.1V	8.3A	100W
SA	1	12V	-	12V	12.5A	150W
SB	1	12V	-	13.2V	25A	300W
SC	2	12V	-	13.2V	50A	600W
ZD	3	12V	-	12.8V	65A	780W
ZF	4	12V	-	12.8V	90A	1080W
DH (ch1 or ch2)	1 of 2 outputs in single slot	12.75V	-	17.25V	8A	120W
SA	1	15V	-	15V	10A	150W
SB	1	15V	-	16.5V	20A	300W
ZC	2	15V	-	16V	36A	540W
SB	1	18V	-	19.8V	16.7A	300W
ZC	2	18V	-	19.2V	30A	540W
DH (ch1 or ch2)	1 of 2 outputs in single slot	20.4V	-	27.6V	5A	120W
YB	1	20.4V	-	27.6V	9.8A	200W
DM (ch1)	1 of 2 outputs in single slot	20.8V	-	28.2V	5A	120W
DM (ch2)	1 of 2 outputs in single slot	23.5V	-	24.5V	4.16A	100W
SA	1	24V	-	24V	6.25A	150W
SB	1	24V	-	26.4V	12.5A	300W
SC	2	24V	-	26.4V	25A	600W
ZD	3	24V	-	25.6V	30A	720W
YF	4	24V	-	26.4V	50A	1200W
DH (ch1 or ch2)	1 of 2 outputs in single slot	23.0V	-	31V	4.4A	120W
YB	1	27.6V	-	34.5V	7.25A	200W
SB	1	28V	-	30.8V	10.7A	300W
ZC	2	28V	-	30V	19.3A	540W
YC	2	30V	-	33V	20A	600W
SC	2	36V	-	39.6V	16.7A	600W
ZF	4	36V	-	38.4V	29A	1044W
YB	1	40.8V	-	55.2V	4.9A	200W
SB	1	48V	-	52.8V	6.25A	300W
SC	2	48V	-	52.8V	12.5A	600W
ZD	3	48V	-	51.2V	15A	720W
YF	4	48V	-	52.8V	25A	1200W
YB	1	55.2V	-	62V	3.62A	200W
YC	2	56V	-	61.6V	10.7A	600W
YF	4	72V	-	79.2V	16.7A	1200W
YC	2	96V	-	105.6V	6.25A	600W
YF	4	96V	-	105.6V	12.5A	1200W

Note. 'Maximum Output Current' and 'Maximum Output Power' above are the maximum available from the module. It is not possible to exceed the 'Output Power' of the unit given on the previous page.

Output Specification		
Turn on time	2s max	at 90Vac (180Vac above 1200W) and 100% rated output power
Efficiency	up to 91%	240Vac & above 50% rated power, configuration dependent
Hold up	20ms min 16ms min	at 1200W output power. QM8B - 1 cycle ride-through. at 2000W (QM8B) or 1500W (QM8) output power
Over temperature protection	Yes	converter protection shuts down all outputs (except standby supplies) and fan, auto restarts. Shutdown temperature varies according to ambient, output power and input voltage.

Environment	
Temperature	-20°C to 70°C operational, -40°C to 70°C storage (max 12 months).
Derating	50°C to 70°C derate total output power and each output current by 2.5% per °C Additionally, the 0.25A standby supply provided with the E5H, E12H, T5H and T12H options derates by 2.4% per °C from 25°C to 50°C when the unit is inhibited (fan not running)
Low temperature startup	-40°C
Humidity	5 - 95% RH non condensing
Shock	±3 x 20g shocks in each plane, total 18 shocks (11ms (+/-0.5msec), half sine) Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987. Conforms to MIL-STD-810G, Method 516.6, Pro IV
Vibration	Single axis 10 - 500 Hz at 2g (sweep and endurance at resonance) in all 3 planes Conforms to EN60068-2-6, IEC68-2-6 Conforms to MIL-STD-810G, Method 514.6, Pro I
Altitude	5000 metres operational, 5000 metres storage/transportation
Pollution	Degree 2, Material group IIIb
IP Rating	IPX0

Emissions EN61000-6-3:2007, EN60601-1-2:2015 - see application notes for best installation practice		
Radiated electric field	EN55011, EN55032	(as per CISPR.11/32) Class B, FCC47 part 15 subpart B - 'L' leakage current variants (Units with 'R' type leakage current option achieve Class A)
Conducted emissions	EN55011, EN55032	(as per CISPR.11/32) Class B, FCC47 part 15 subpart B - 'L' leakage current variants (Units with 'R' type leakage current option achieve Class A)
Conducted harmonics	EN61000-3-2	Class A and Class C
Flicker	EN61000-3-3	Compliant - d_{max} only

Immunity EN61000-6-2:2005, EN60601-1-2:2015 - see application notes for best installation practice				Criteria
Electrostatic discharge	EN61000-4-2	Level 4	F type cooling only	A
Electromagnetic field	EN61000-4-3	Level 3	Proximity fields, EN60601-1-2, Levels as defined in standard, Criteria A	A
Fast / burst transient	EN61000-4-4	Level 4	Tested at 5kHz and 100kHz	A
Surge immunity	EN61000-4-5	Level 3		A
Conducted RF immunity	EN61000-4-6	Level 3		A
Power frequency magnetic field	EN61000-4-8	Level 4		A
Voltage dips, variations, interruptions	EN61000-4-11	Class 3	Criteria B for 5s and 1 cycle interruptions	A
Voltage sags	Semi F-47	compliant	above 180Vac input	
Ring wave	EN61000-4-12	Level 3		A
	ANSI C62.41	Level 2		A
Voltage fluctuations	EN61000-4-14	Class 3	See EMC report for full details.	A

Approvals / Accreditations	
IEC/EN 62368-1, UL62368-1 / CSA 22.2 No 62368-1	File E135494
IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1	File E135494
IEC/EN 60601-1, UL/CSA 60601-1, ANSI/AAMI ES60601-1, CAN/CSA-C22.2 No 60601-1	File E349607
IEC/EN 61010-1	Results included in 60950 report
CE Mark (EN62368-1)	Low Voltage Directive (LVD), electromagnetic compatibility (EMC) and Restriction of Hazardous Substances (RoHS)
CB certificate and Report available on request	
Designed and manufactured under the control of ISO9001 and ISO13485 (including risk management).	

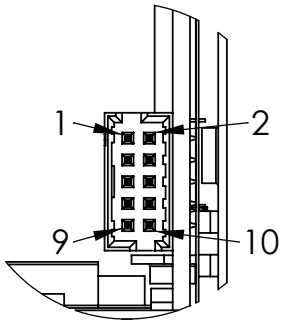
Standby / Signals

Maximum power per channel	See table below
Available signals (Exx or Txx type)	PSU inhibit (Txx type) or enable (Exx type), AC Good
Available signals (Pxx type)	PMBus™ control of power supply fan speed and fail warning Serial number, date of manufacture, run time, on/off power cycles For further details, see the product range application notes, PMBus™ section
Additional Leakage Current (max at 264Vac, 63Hz)	xxL = 13.1µA, xxH = 15µA Must also add the leakage current from modules and selected filter option.

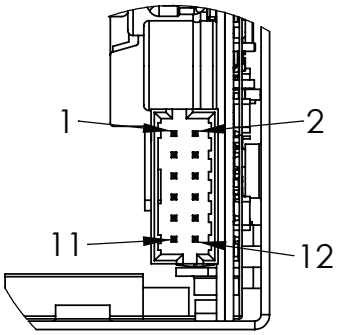
Available Output Voltages (at PSU signal connector)

Option type	Standby 1			Standby 2			PSU on/off
	V	Max Current	Power	V	Max Current	Power	
E5L	5V	250mA	1.25W	not available			Enable
E5H	5V	250mA	1.25W	5V	2A	10W	Enable
E12H	5V	250mA	1.25W	12V	1A	12W	Enable
T5L	5V	250mA	1.25W	not available			Inhibit
T5H	5V	250mA	1.25W	5V	2A	10W	Inhibit
T12H	5V	250mA	1.25W	12V	1A	12W	Inhibit
P5H	5V	2A	10W	not available			see PMBus™ application note

Txx or Exx option		
Pin	5L	5H or 12H
1	Do not connect	Standby 2 +
2		Standby 2 -
3	Standby 1 +	Standby 1 +
4	Standby 1 -	Standby 1 -
5	PSU on/off+	PSU on/off+
6	PSU on/off-	PSU on/off-
7	AC fail Out	AC fail Out
8	AC fail Rtn	AC fail Rtn
9	Do not connect	
10		



Pin	P5H option
1	Standby +
2	Standby -
3	Do not connect
4	Fan fail
5	Address 0
6	Address 1
7	Address 2
8	Address 3
9	SCL - Clock
10	SDA - Data
11	Control line in
12	GND



Output Specification

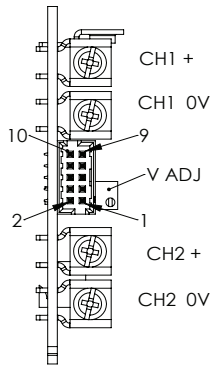
	Standby 1	Standby 2	
Rise time	<30ms		(with resistive load) to 90% of voltage, monotonic rise above 10%
Ripple and noise	<1%		pk-pk, using 20MHz bandwidth
Voltage setting accuracy	<3%		of set voltage
Remote sense	No		
Minimum load	0W		on any output
Temperature coefficient	0.02%		of rated voltage per °C
Load regulation	<1.5%	<1%	for 0-100% load change
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	<0.4%		for 100% load change on any output
Transient deviation	<5%		of set voltage for 25-50% load change
Recovery	1ms		for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, output shuts down, cycle ac to reset
Over current protection	Constant Current		Auto recovers
Short circuit protection	Constant Current		Auto recovers

DH Module - single slot width, 2 output channels

Maximum module power	200W	Total power from channel 1 + channel 2
Maximum power per channel	see table below	
Available signals	Module good, module inhibit	
Additional Leakage Current (max at 264Vac, 63Hz)	20.5µA Must also add the leakage current from other modules, any standby supply and selected filter option.	

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Channel 1				Channel 2			
Adjustment Range (Volts)	Current	Output power	Max C load	Adjustment Range (Volts)	Current	Output power	Max C load
10.2_a - 13.8	10A	120W	1000µF/A	10.2 - 13.8	10A	120W	1000µF/A
				12.75 - 17.25	8A	120W	1000µF/A
				20.4 - 27.6	5A	120W	750µF/A
12.75_b - 17.25	8A	120W	1000µF/A	12.75 - 17.25	8A	120W	1000µF/A
				20.4 - 27.6	5A	120W	750µF/A
20.4_c - 27.6	5A	120W	750µF/A	20.4 - 27.6	5A	120W	750µF/A
23.0_d - 31	4.4A	120W	750µF/A	23.0 - 31	4.4A	120W	750µF/A



Pin	Connection
1	Do not connect
2	
3	Module good collector
4	Module good emitter
5	Module inhibit anode
6	Module inhibit cathode
7	Do not connect
8	
9	
10	

Channel 1 and channel 2 of DH are both adjusted by single potentiometer. The V2 set = V2max x V1set / V1max

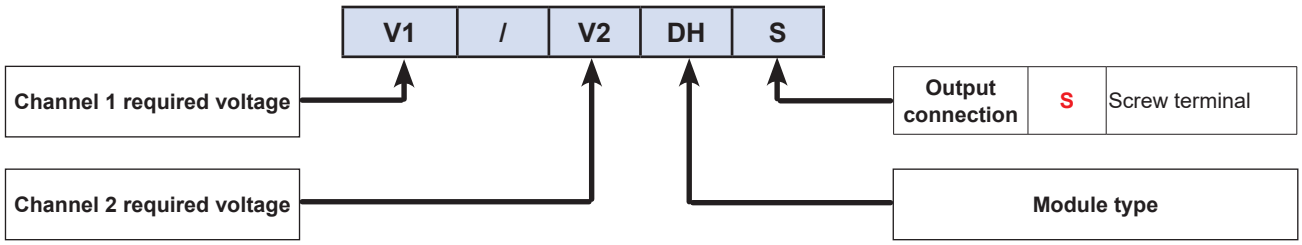
a, b, c, d - for output voltages below 10.8V(a), 13.5V(b), 21.6V(c) or 24.4V(d), a Minimum load of 1W must be applied to channel 1

Output Specification

Rise time	<50ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	zero	at full load with resistive load.
Ripple and noise		pk-pk, using 20MHz bandwidth
0°C - 70°C	1.5%	
-20°C - 0°C	2.25%	
Voltage setting accuracy	<1%	of set voltage (3% for channel 2)
Remote sense	No	
Minimum load	0W	Except for notes a, b, c and d above.
Temperature coefficient	0.03%	of rated voltage per °C
Load regulation	<6%	for 5-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	3%	for 5-100% load change on any output
Transient deviation	<4%	of set voltage for 50% load change (above 25% load)
Recovery	3ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down (both outputs), cycle ac to restart.
Module current protection	Hiccup	Protects channel 1 and channel 2, shuts down both outputs, auto-recovers when fault clears.
Short circuit protection	Hiccup	Shuts down both outputs, auto recovers.
Over temperature protection	Yes	Module protection shuts down both outputs, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required channel 1 and channel 2 voltages (from the table above)
For example, if you need 12V / 10A and 24V / 3A, you would choose **12/24DHS** as your required module.

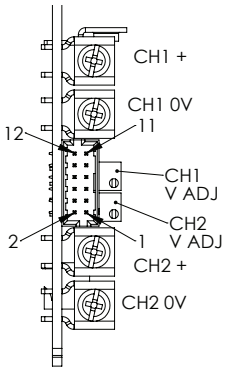


DM Module - single slot width, 1 or 2 output channels

Maximum module power	200W	Total power from channel 1 + channel 2
Maximum power per channel	see table below	
Available signals	Remote sense (channels 1 & 2), channel 1 good, channel 2 good, Channel 2 inhibit, module inhibit	
Additional Leakage Current (max at 264Vac, 63Hz)	22.3µA Must also add the leakage current from other modules, and standby supply and selected filter option.	

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Channel 1				Channel 2			
Adjustment Range (Volts)	Current	Output power	Max C load	Adjustment Range (Volts)	Current	Output power	Max C load
Channel 1 unused				2.8 - 3.8	10A	33W	500µF/A
				4.25 - 5.75	10A	50W	500µF/A
11.9 - 16.1	10A	120W	500µF/A	Channel 2 unused			
20.8 - 28.2	5A	120W	500µF/A				
11.9 - 16.1	10A	120W	500µF/A	2.8 - 3.8	10A	33W	500µF/A
				4.25 - 5.75	10A	50W	500µF/A
				11.9 - 16.1	8.3A	100W	500µF/A
				23.5 - 24.5	4.16A	100W	500µF/A
20.8 - 28.2	5A	120W	500µF/A	2.8 - 3.8	10A	33W	500µF/A
				4.25 - 5.75	10A	50W	500µF/A
21.6 - 28.2	5A	120W	500µF/A	23.5 - 24.5	4.16A	100W	500µF/A



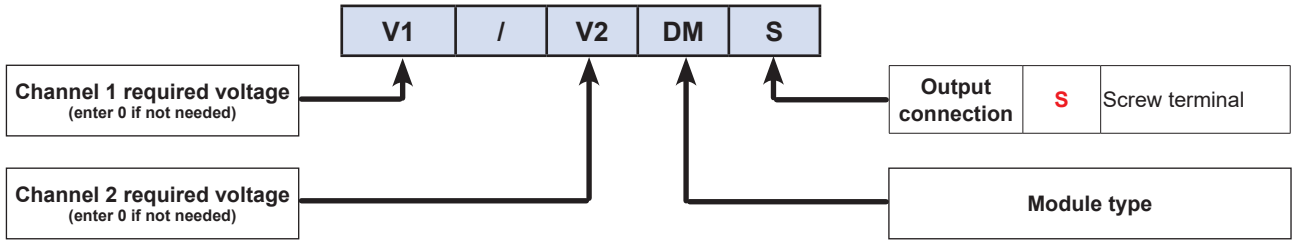
Pin	Connection
1	Ch2 sense +
2	Ch2 sense -
3	Ch2 inhibit anode
4	Ch2 inhibit cathode
5	Ch2 good collector
6	Ch2 good emitter
7	Ch1 good collector
8	Ch1 good emitter
9	Module inhibit anode
10	Module inhibit cathode
11	Ch1 sense +
12	Ch1 sense -

Output Specification

	Ch1	Ch2	
Rise time	<20ms	<50ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%	<5%	Load type dependent, no overshoot at full load with resistive load
Ripple and noise			pk-pk, using 20MHz bandwidth
0°C - 70°C	1.5%	75mV	1.5% for ch2 outputs >10V, 2% for outputs 11-17V
-20°C - 0°C	2.25%	75mV	2% for ch2 outputs >10V, 2.5% for outputs 11-17V
Voltage setting accuracy	<1%	<1%	of set voltage
Remote sense	Yes		0.5V (voltage at the output terminals must be within the specified adjustment range)
Minimum load	0W		Refer to application note for details.
Temperature coefficient	0.02%		of rated voltage per °C
Load regulation	max of 50mV or <1% of set voltage		for 0-100% load change
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	1.5%		for 100% load change on any output
Transient deviation	<4%	<5%	of set voltage for 50% load change (above 25% load). 250mV for outputs below 5V
Recovery	3ms	7ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, module shuts down (both outputs), cycle ac to restart.
Over current protection	Hiccup	Constant current	Ch1 protection shuts down both outputs.
Short circuit protection	Hiccup	Constant current	Ch1 protection shuts down both outputs. Refer to application note for details.
Over temperature protection	Yes	Yes	Ch1 protection shuts down both outputs, cycle ac to restart. Ch2 protection shuts down ch2 only, auto recovers when fault clears. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required channel 1 and channel 2 voltages (from the table above)
For example, if you need 12V / 10A and 3.3V / 10A, you would choose **12/3.3DMS** as your required module.

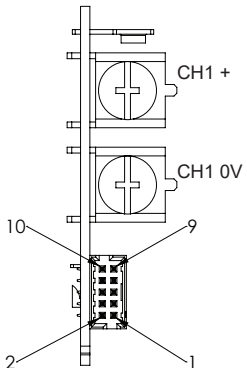


SA Module - single slot width, 1 output channel

Maximum power per channel	see table below
Available signals	Remote sense (5V module only)
Additional Leakage Current (max at 264Vac, 63Hz)	14.6µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Output voltage	Current	Output power	Maximum capacitive load
5V	15A	75W	1000µF/A
12V	12.5A	150W	1000µF/A
15V	10A	150W	1000µF/A
24V	6.25A	150W	750µF/A



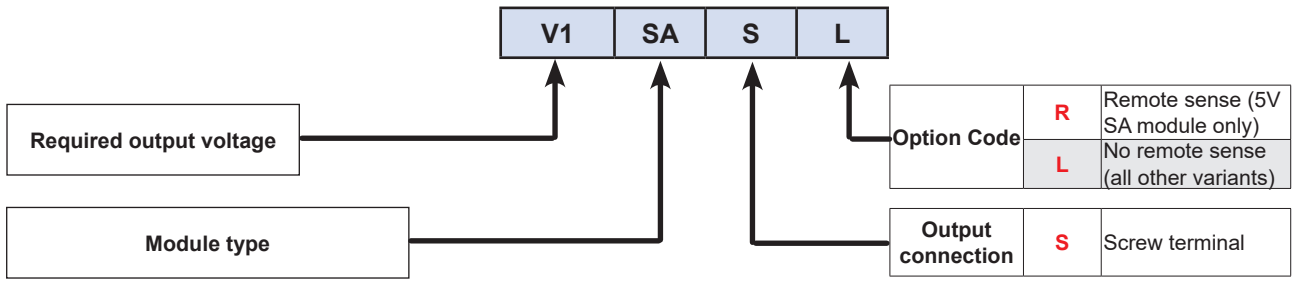
Pin	Connection
1	Do not connect
2	
3	
4	
5	
6	
7	Remote sense +
8	Remote sense -
9	Do not connect
10	

Output Specification

Rise time	<75ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5% or 250mV	Load type dependent, no overshoot at full load with resistive load 6% for 12V output
Ripple and noise		pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1%	
-20°C - 0°C, >5% load	2%	
≤5% load	2%	
Voltage setting accuracy	<1%	of set voltage
Remote sense	Yes	On 5V module only
Minimum load	No	on any output
Temperature coefficient	<0.02%	of rated voltage per °C
Load regulation	<1%	for 0-100% load change
Line regulation	<0.2%	for 90-264Vac input change
Cross regulation	<0.2%	for 100% load change on any output
Transient deviation	<5% or 250mV	of set voltage for 50% load change (above 25% load)
Recovery	5ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down, cycle ac to restart
Over current protection	Hiccup	Auto recovers after removal of load
Short circuit protection	Yes	Indefinitely protected
Over temperature protection	Yes	Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 15V / 10A, you would choose **15SASL** as your required module.

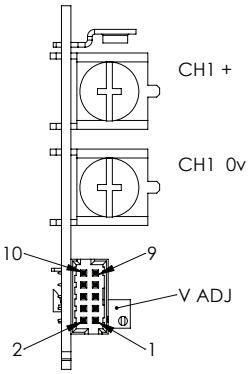


SB Module - single slot width, 1 output channel

Maximum power per channel	see table below
Available signals	Remote sense, module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	14.6µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output power	Max Capacitive Load
3.3	-	3.63	37A	122W	1000µF/A
5	-	5.5	30A	150W	1000µF/A
12	-	13.2	25A	300W	1000µF/A
15	-	16.5	20A	300W	1000µF/A
18	-	19.8	16.7A	300W	1000µF/A
24	-	26.4	12.5A	300W	750µF/A
28	-	30.8	10.7A	300W	500µF/A
48	-	52.8	6.25A	300W	250µF/A



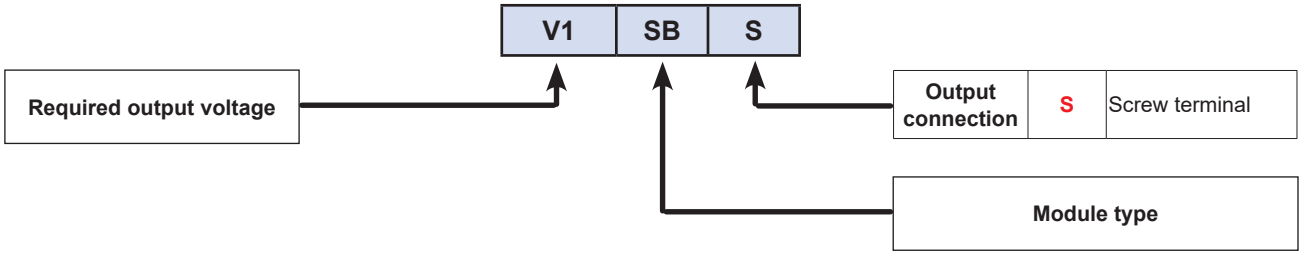
Pin	Connection
1	Do not connect
2	
3	Module good collector
4	Module good emitter
5	Module inhibit anode
6	Module inhibit cathode
7	Remote sense +
8	Remote sense -
9	Do not connect
10	

Output Specification

Rise time	<75ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%	Load type dependent
Ripple and noise	max of	pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1% or 50mV	
-20°C - 0°C, >5% load	2% or 100mV	
≤5% load	4%	
Voltage setting accuracy	<1%	of set voltage
Remote sense	Yes	0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W	
Temperature coefficient	0.016%	of rated voltage per °C
Load regulation	<1%	for 0-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	0.1%	(5mV for outputs below 5V) for 100% load change on any output
Transient deviation	<5%	of set voltage for 50% load change (above 25% load) 250mV for outputs below 5V
Recovery	1ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup	Auto recovers after removal of load
Short circuit protection	Yes	Indefinitely protected
Over temperature protection	Yes	Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 12.2V / 24.5A, you would choose **12.2SBS** as your required module.

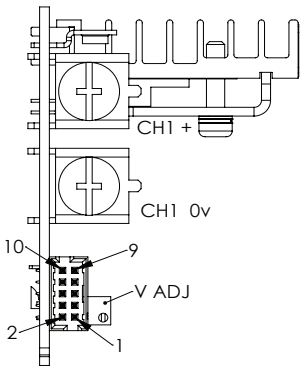


SC Module - two slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Remote sense, module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	13.8µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output power	Maximum capacitive load
5	-	5.5	60A	300W	1000µF/A
12	-	13.2	50A	600W	1000µF/A
24	-	26.4	25A	600W	750µF/A
36	-	39.6	16.7A	600W	300µF/A
48	-	52.8	12.5A	600W	250µF/A



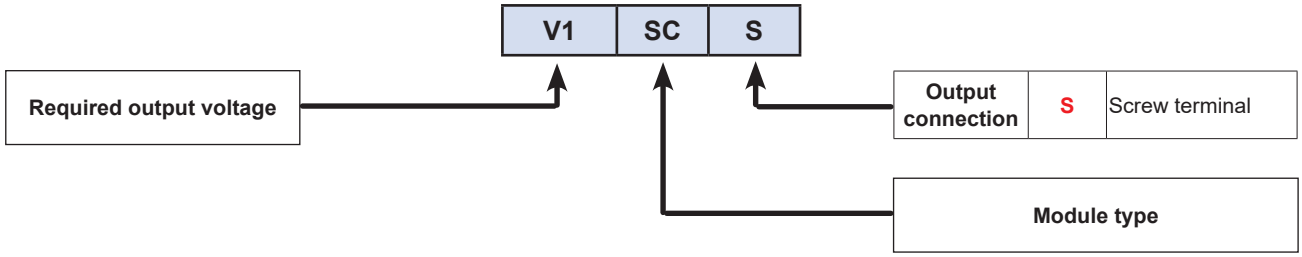
Pin	Connection
1	Do not connect
2	
3	Module good collector
4	Module good emitter
5	Module inhibit anode
6	Module inhibit cathode
7	Remote sense +
8	Remote sense -
9	Do not connect
10	

Output Specification

Rise time	<75ms		(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%		Load type dependent
Ripple and noise	V_{out}<10V	V_{out}>10V	pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1.5%	1%	
-20°C - 0°C, >5% load	3%	2%	
≤5% load	4%	4%	
Voltage setting accuracy	<1%		of set voltage
Remote sense	Yes		0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W		
Temperature coefficient	0.016%		of rated voltage per °C
Load regulation	<1%		for 0-100% load change
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	0.1%		for 100% load change on any output
Transient deviation	<5%		of set voltage for 50% load change (above 25% load)
Recovery	1ms		for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup		Auto recovers after removal of load
Short circuit protection	Yes		Indefinitely protected
Over temperature protection	Yes		Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 12.2V / 49A, you would choose **12.2SCS** as your required module.

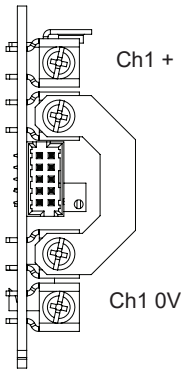


YB Module - single slot width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	20.5µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output power	Maximum capacitive load
20.4	-	27.6	9.8A	200W	500µF/A
27.6	-	34.5	7.25A	200W	500µF/A
40.8	-	55.2	4.9A	200W	375µF/A
55.2	-	62	3.62A	200W	375µF/A



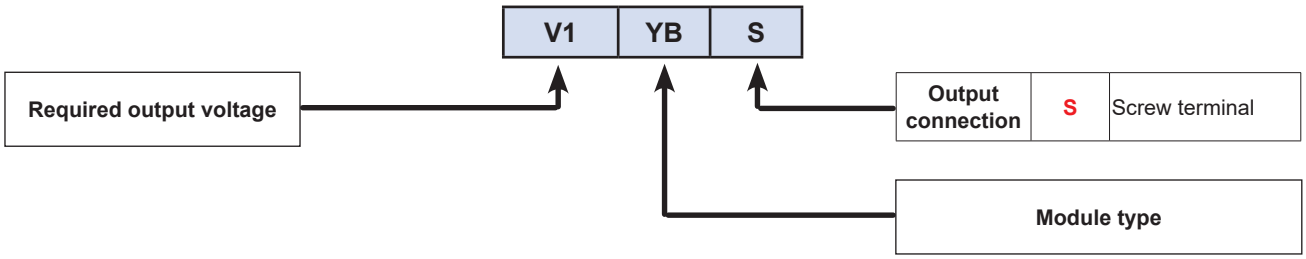
Pin	Connection
1	Do not connect
2	
3	Module good collector
4	Module good emitter
5	Module inhibit anode
6	Module inhibit cathode
7	Do not connect
8	
9	
10	

Output Specification

Rise time	<75ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	zero	at full load with resistive load. Load type dependent, <7% overshoot with capacitive load
Ripple and noise		pk-pk, using 20MHz bandwidth
0°C - 70°C	1.5%	
-20°C - 0°C	2.25%	
Voltage setting accuracy	<2%	of set voltage
Remote sense	No	
Minimum load	0W	
Temperature coefficient	0.03%	of rated voltage per °C
Load regulation	<6%	for 5-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	<1%	for 100% load change on any output
Transient deviation	<8%	of set voltage for 50% load change (above 25% load)
Recovery	5ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup	Auto recovers
Short circuit protection	Hiccup	Auto recovers.
Over temperature protection	Yes	Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 41V / 4A, you would choose **41YBS** as your required module.

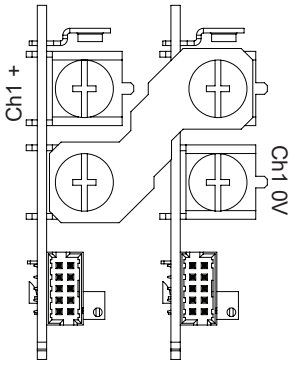


YC Module - two slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	29.2µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output Power	Max Capacitive Load
6.6	-	7.26	37A	244W	1000µF/A
10	-	11	30A	300W	1000µF/A
30	-	33	20A	600W	1000µF/A
56	-	61.6	10.7A	600W	350µF/A
96	-	105.6V	6.25A	600W	125µF/A



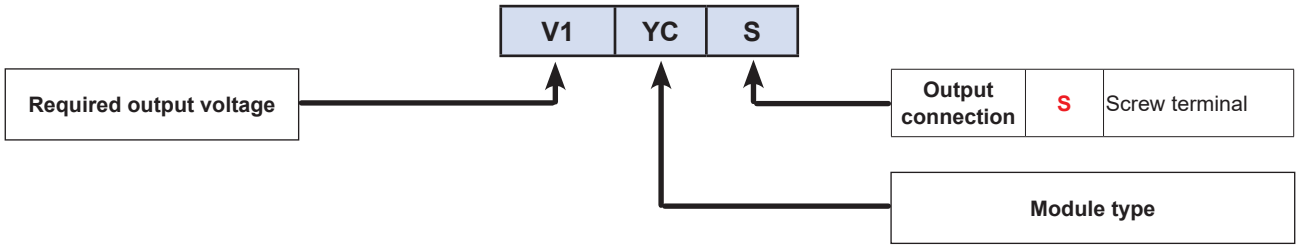
See application notes for signal connection details

Output Specification

Rise time	<75ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%	Load type dependent
Ripple and noise		pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1%	
-20°C - 0°C, >5% load	2%	
≤5% load	4%	
Voltage setting accuracy	<1%	of set voltage
Remote sense	Yes	0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W	
Temperature coefficient	0.016%	of rated voltage per °C
Load regulation	<1%	for 0-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	0.1%	(10mV for outputs below 10V) for 100% load change on any output
Transient deviation	<5%	of set voltage for 50% load change (above 25% load)
Recovery	1ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup	Auto recovers
Short circuit protection	Yes	Indefinitely protected
Over temperature protection	Yes	Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 58V / 10A, you would choose **58YCS** as your required module.

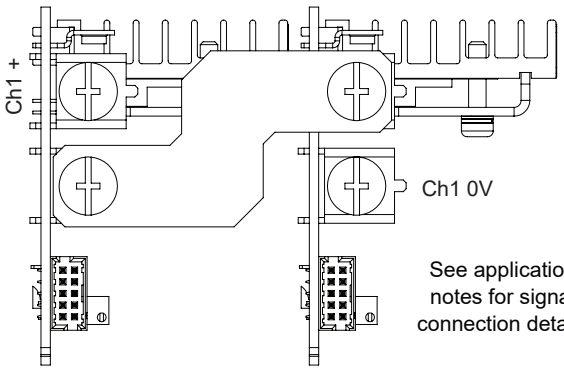


YF Module - four slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	27.6µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output power	Max Capacitive Load
10	-	11	60A	600W	1000µF/A
24	-	26.4	50A	1200W	650µF/A
48	-	52.8	25A	1200W	500µF/A
72	-	79.2	16.7A	1200W	150µF/A
96	-	105.6V	12.5A	1200W	125µF/A



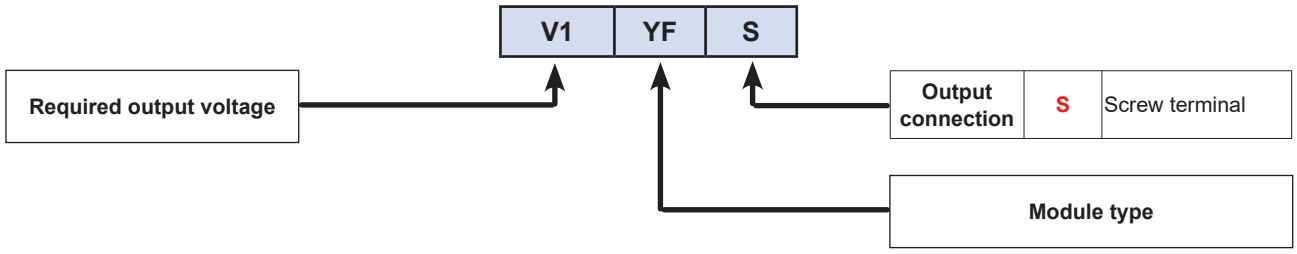
See application notes for signal connection details

Output Specification

Rise time	<75ms		(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%		Load type dependent
Ripple and noise	V_{out}<20V	V_{out}>20V	pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1.5%	1%	
-20°C - 0°C, >5% load	3%	2%	
≤5% load	4%	4%	
Voltage setting accuracy	<1%		of set voltage
Remote sense	Yes		0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W		
Temperature coefficient	0.016%		of rated voltage per °C
Load regulation	<1%		for 0-100% load change
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	0.1%		for 100% load change on any output
Transient deviation	<5%		of set voltage for 50% load change (above 25% load)
Recovery	1ms		for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup		Auto recovers
Short circuit protection	Yes		Indefinitely protected
Over temperature protection	Yes		Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 48V / 25A, you would choose **48YFS** as your required module.

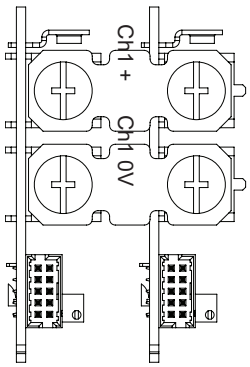


ZC Module - two slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	29.2µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output Power	Maximum capacitive load
15	-	16.0	36A	540W	1000µF/A
18	-	19.2	30A	540W	1000µF/A
28	-	30	19.3A	540W	500µF/A



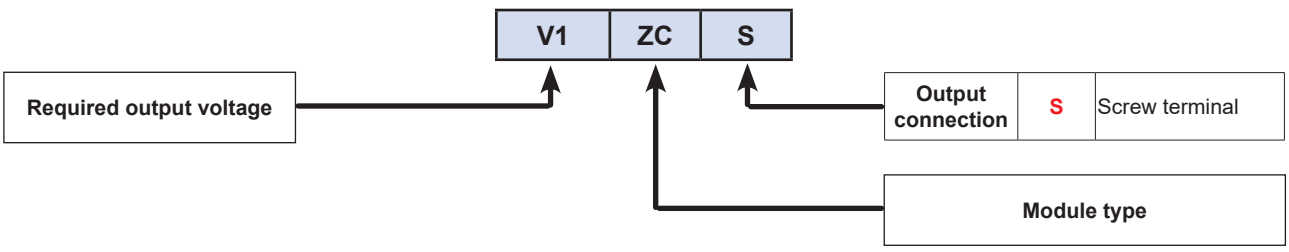
See application notes for signal connection details

Output Specification

Rise time	<75ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%	Load type dependent
Ripple and noise		pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1%	
-20°C - 0°C, >5% load	2%	
≤5% load	4%	
Voltage setting accuracy	<1%	of set voltage
Remote sense	Yes	0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W	
Temperature coefficient	0.016%	of rated voltage per °C
Load regulation	<3.5%	for 1-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	0.1%	for 100% load change on any output
Transient deviation	<5%	of set voltage for 50% load change (above 25% load)
Recovery	30ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup	Auto recovers after removal of load
Short circuit protection	Yes	Indefinitely protected
Over temperature protection	Yes	Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 15V / 36A, you would choose 15**ZCS** as your required module.

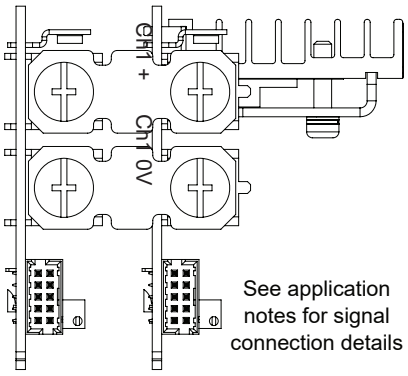


ZD Module - three slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	28.3µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts) at PSU output terminal			Current	Output power	Maximum capacitive load
5	-	5.3	80A	400W	1000µF/A
12	-	12.8	65A	780W	1000µF/A
24	-	25.6	30A	720W	750µF/A
48	-	51.2	15A	720W	250µF/A



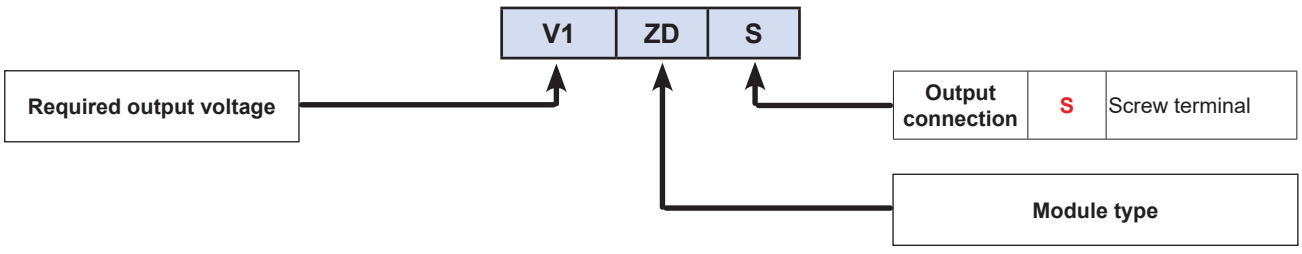
See application notes for signal connection details

Output Specification

Rise time	<75ms		(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%		Load type dependent
Ripple and noise	V_{out}<10V	V_{out}>10V	pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1.5%	1%	
-20°C - 0°C, >5% load	3%	2%	
≤5% load	4%	4%	
Voltage setting accuracy	<1%		of set voltage
Remote sense	Yes		0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W		
Temperature coefficient	0.016%		of rated voltage per °C
Load regulation	<3.5%		for 1-100% load change (<2.5% for 5-5.3V output)
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	0.1%		for 100% load change on any output
Transient deviation	<5%		of set voltage for 50% load change (above 25% load)
Recovery	30ms		for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup		Auto recovers after removal of load
Short circuit protection	Yes		Indefinitely protected
Over temperature protection	Yes		Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 48V / 16A, you would choose **48ZDS** as your required module.

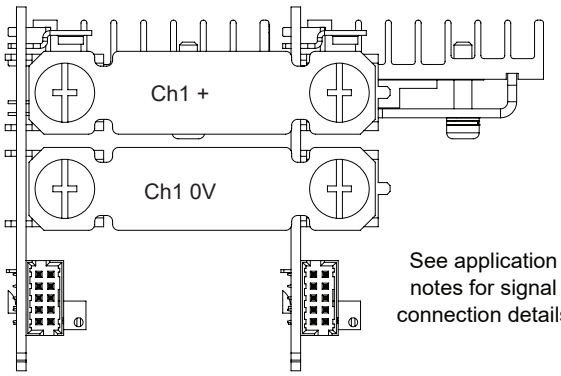


ZF Module - four slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit
Additional Leakage Current (max at 264Vac, 63Hz)	27.6µA Must also add the leakage current from other modules, any standby supply and selected filter option.

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)	Current	Output power	Maximum capacitive load
5 - 5.3	110A	550W	1000µF/A
12 - 12.8	90A	1080W	1000µF/A
36 - 38.4	29A	1044W	300µF/A



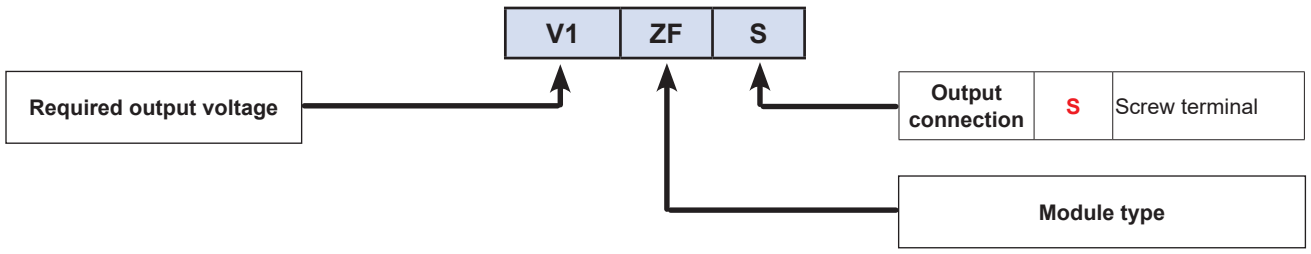
See application notes for signal connection details

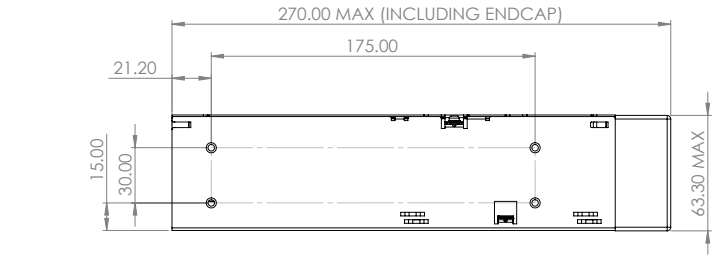
Output Specification

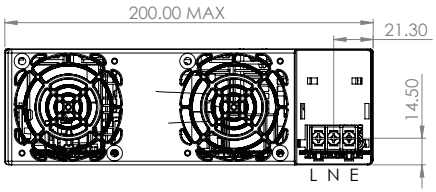
Rise time	<75ms		(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%		Load type dependent
Ripple and noise	V_{out}<10V	V_{out}>10V	pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1.5%	1%	
-20°C - 0°C, >5% load	3%	2%	
≤5% load	4%	4%	
Voltage setting accuracy	<1%		of set voltage
Remote sense	Yes		0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W		
Temperature coefficient	0.016%		of rated voltage per °C
Load regulation	<3.5%		for 1-100% load change (<2.5% for 5-5.3V output)
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	0.1%		for 100% load change on any output
Transient deviation	<5%		of set voltage for 50% load change (above 25% load)
Recovery	30ms		for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup		Auto recovers after removal of load
Short circuit protection	Yes		Indefinitely protected
Over temperature protection	Yes		Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

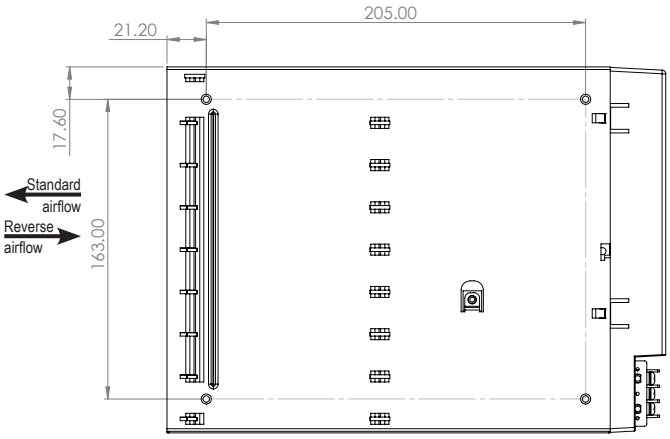
Choose your required output voltage (from the table above)
For example, if you need 12V / 90A, you would choose **12ZFS** as your required module.

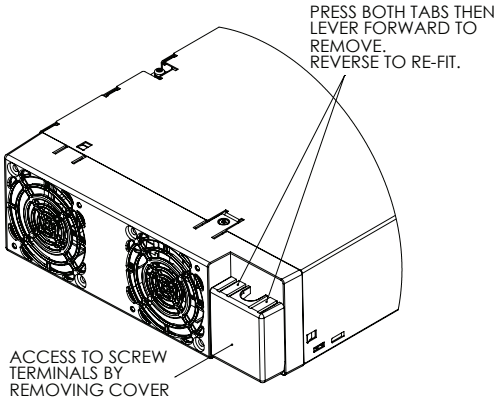




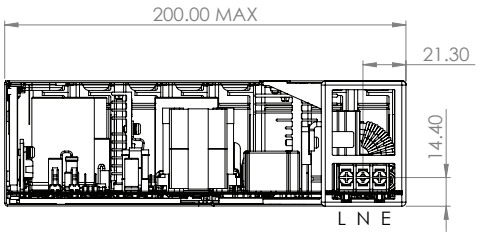


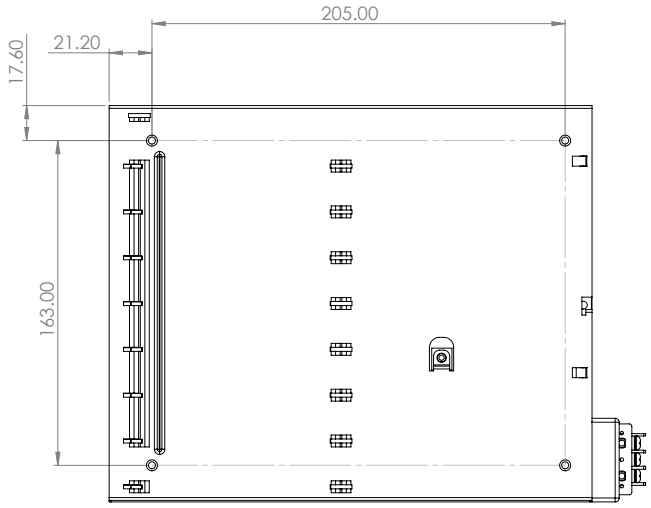
TERMINAL COVER REMOVED

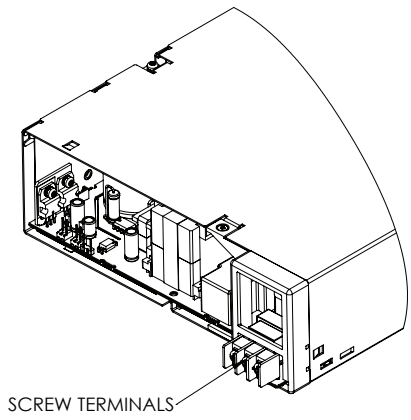




Units with factory fitted fan ('F' or 'R' type cooling)







Units with Customer Air ('C' type cooling)

Customer fixings. 8 holes M4. Max thread penetration:- 4.5mm

Medical Industrial Test Broadcast Comms Renewable

450W - 900W
Modular power supply.

Features	Benefits
• Industry leading flexibility	Suits your application
• Screw, Fast-on or IEC connection	Simplifies design into system
• Worldwide safety approvals	Supports global use
• Up to 11 outputs	Eliminates need for additional supplies
• 3 year warranty	Low cost of ownership

Input

	Vega 450, 650 and 900	Vega dc (450W)
Input Voltage / Frequency	90-264Vac / 47 - 63 Hz (440Hz with reduced PFC) 900W version is 150-264Vac only, 650W below 150Vac	34 - 75Vdc derate linearly below 44V to 340W at 34V
Input Fuse	16A / 250Vac HBC Fast acting (not user accessible)	20A Fast acting (not user accessible)
Inrush Current	<40A at 25°C and 264Vac (cold start)	<40A at 25°C, ETSI EN300 132-2
Leakage Current	See 'How To Create A Product Description' for details	n/a

How To Create A Product Description

The extensive range of output modules and options make it possible to achieve almost any combination of Volts and Amps. You can create your own Vega configuration online at https://config.emea.tdk-lambda.com/. This method checks your configuration and offers the optimum solution. Alternatively, you can do this manually by using the guide below.

1. Calculate total output power to select the appropriate converter, then select required Cooling, Connection, Leakage Current and Controls/ Signals from the following table:

V4	F	S	S	F

Converter		
	V0	450W (dc in)
	V4	450W
	V6	650W
	V9	900W

Cooling		
	F	Forward air - standard
	Q_d	Forward air - Quiet
	R_a	Reverse air
	P_{ad}	Reverse air - Quiet fan
	C_b	Customer air - no fan

Input Connection		
	S	Screw
	F_d	Fast-on terminal
	I_d	IEC320 with switch

Primary Option		
	F	ac fail, psu+fan inhibit, 5V/100mA standby
	FV	ac fail, psu+fan inhibit, 5V/300mA standby
	xFW_{cd}	ac fail, psu+fan inhibit, 5-15V/1A standby
	E	ac fail, psu+fan enable, 5V/100mA standby
	EV	ac fail, psu+fan enable, 5V/300mA standby
	xEW_{cd}	ac fail, psu+fan enable, 5-15V/1A standby

Leakage Current (max leakage current at 264Vac, 63Hz)		
	S	Standard 1.5mA
	M	650µA
	L	290µA
	R	175µA
	T	60µA

2. Select Output Modules and options from the output voltages tables.
   Example - if you require 5.2V / 18A with output inhibit :-
   a) Select B1H as closest match for voltage & current and prefix with voltage (eg **5.2B1H**)
   b) add suffix 'S' or 'F' for Screw or Fast-on output connection (eg 5.2B1H**S**)
   c) add suffix 'N' for output inhibit if required (eg 5.2B1HS**N**)
   d) Repeat for other outputs.
   Ensure you do not select more than a total of 5 slots width of modules. This will create a complete product description eg V6FSSF 5L1SN 12/12H3/3S 24C5S which represents a four output 650W Vega with Forward air, Screw terminal input, 1.5mA leakage, ac Fail, Global inhibit & 5V/100mA standby supply with the following outputs:
   Output 1 = 5V/35A (with output inhibit, module good and current share option). Output 2 = 12V / 10A, Output 3 = 12V / 6A, Output 4 = 24V / 10A, all with screw terminal outputs.
3. Contact TDK-Lambda to validate configuration and issue a part number.

a) Not available for Vega 900
b) Thermocoupled sample recommended to ensure adequate cooling - consult sales
c) xFX and xEW options increase leakage current by 90µA. Replace 'x' with required output voltage (5FW = 5V standby supply)
d) Not available for Vega dc

OUTPUT VOLTAGES (single output modules)

Module	Adjustment Range (Volts)	Current (Amps)	Slots
B1L	1.8 - 3.8[e]	20	1
C1	1.8 - 4.1[e]	35	1
C1Y	1.8 - 4.1[e]	40	1
D1L	1.8 - 3.8	50	1.5
E1	1.8 - 3.8[e]	60	2
F1[a]	1.8 - 3.8	80	2
Z2	1.8 - 3.8[e]	95	3
Z3	1.8 - 3.8[e]	114	4
B1H	3.9 - 5.5[d]	20	1
L1	4.2 - 5.5[d]	35	1
D2	3.8 - 9[k]	45	1.5
D1H	3.9 - 5.5[d]	50	1.5
E2	3.8 - 8[k]	60	2
Z18	4.2 - 5.5	66	2
F2[a]	3.8 - 8	75	2
Z4	3.9 - 5.5[d]	95	3
Z6	3.9 - 5.5[d]	104	3.5
B2	5 - 9[f]	25	1
B3	9.1 - 16.2[g]	12	1
C3	9.1 - 16.2[g]	18	1
D3	8 - 16.5[g]	24	1.5
E3L	8 - 13.9[l]	40	2
Z7	8 - 16.5[g]	45	3
EE2	7.6 - 16[g]	45	4
D4	14 - 21.5[i]	18	1.5
E4	14 - 19.9[m]	30	2
E3H	14 - 15	36	2
C4	16.3 - 21.5[i]	14	1
CC3	18.2 - 32.4[j]	18	2
E5L[v]	20 - 24	27	2
B5	21.6 - 31[h]	6	1
C5	21.6 - 31[j]	10	1
D5	21 - 28	15	1.5
E5H[v]	24 - 28	25	2
Z19[co]	24 - 28	36	3.5
HH5/3	25.3 - 44.2[b]	5	1
DD4	28 - 43[s]	18	3
EE4[c]	28 - 38	22.5	4
HH5/4	32.5 - 53[t]	4.5	1
BB4	32.6 - 43[q]	10	2
EE5L[co]	40 - 48	18	4
C5B4	43 - 48	10	2
EE5H[o]	48 - 56	18	4
CC5	48.1 - 62[r]	10	2
DD5	42 - 56	15	3

OUTPUT VOLTAGES (twin output modules)

Module	V1 Adjustment Range (Volts)	Current	V2 Adjustment Range (Volts)	Current (Amps)	Slots
H1L/1L	1.8 - 3.8[n]	12	1.8 - 3.8[n]	8	1
H1L/1H			3.9 - 5.5[d]	8	1
H1L/2			5.6 - 9[f]	6	1
H1L/3			9.1 - 16.2[u]	6	1
H1L/4			16.3 - 25[p]	4.5	1
H1H/1L	3.9 - 5.5[d]	12	1.8 - 3.8[n]	8	1
H1H/1H			3.9 - 5.5[d]	8	1
H1H/2			5.6 - 9[f]	6	1
H1H/3			9.1 - 16.2[u]	6	1
H1H/4			16.3 - 25[p]	4.5	1
H2/1L	5.6 - 9[f]	10	1.8 - 3.8[n]	8	1
H2/1H			3.9 - 5.5[d]	8	1
H2/2			5.6 - 9[f]	6	1
H2/3			9.1 - 16.2[u]	6	1
H2/4			16.3 - 25[p]	4.5	1
H3/1L	9.1 - 16.2[u]	10	1.8 - 3.8[n]	8	1
H3/1H			3.9 - 5.5[d]	8	1
H3/2			5.6 - 9[f]	6	1
H3/3			9.1 - 16.2[u]	6	1
H3/4			16.3 - 25[p]	4.5	1
H5/1L	16.2 - 28	5	1.8 - 3.8[n]	8	1
H5/1H			3.9 - 5.5[d]	8	1
H5/2			5.6 - 9[f]	6	1
H5/3			9.1 - 16.2[u]	6	1
H5/4			16.3 - 25[p]	4.5	1

Wide Range Programmable Modules

Module	Voltage Range	Current	Slots	
W2[a]	0.25[w] - 7.5	30	1	Select features from table below
W5	0.25[x] - 32	8.5	1	

Follow by

- **F** or **T** — Fixed or Tracking Overvoltage protection
- **F** or **S** — Fast-on or Screw output terminals
- **R** or **V** — Resistance (0-32kΩ) or Voltage (0-5V) programming
- **1**, **2**, **3** or **4**
  - **1** Inhibit, Fixed Current Limit
  - **2** Inhibit, Programmable Current Limit (0-5V)
  - **3** Enable, Fixed Current Limit
  - **4** Enable, Programmable Current Limit (0-5V)

Follow non wide range modules by **F** (Fast-on) or **S** (Screw) output terminals

Options - Single output Modules*		Options - Twin output Modules*	
N	Output Inhibit, Module Good & Current Sharing	N	Output Inhibit, Module Good & Remote Sense
		R	Remote Sense only

* see configuring guide

a) F1, F2 and W2 modules not for Vega 900
b) 38V max for 900W
c) Only available for Vega 900
d) 5.1V max for 900W
e) 3.4V max for 900W
f) 8V max for 900W
g) 15V max for 900W
h) 28V max for 900W
i) 18V max for 900W
j) 30V max for 900W
k) 7.5V max for 900W
l) 12.5V max for 900W
m) 19V max for 900W
n) 3.4V max for 900W
o) 'N' option not available
p) 24V max for 900W
q) 40V max for 900W
r) 60V max for 900W
s) 36V max for 900W
t) 52V max for 900W
u) 15.5V max for 900W
v) 'N' option not available if more than 1 module fitted
w) 500mA min load below 1V
x) 100mA minimum load below 2V

Isolation		
Input to Output	Reinforced	2 x MOPPs (3rd edition 60601) - units without xFW or xEW primary option fitted 4kVac, 5.7kVdc type tested to 4kVac (equivalent to 5.7kVdc), production tested to 4.3kVdc.
Input to Earth	Basic	2.3kVdc
Output to Output / Output to Earth		200Vdc

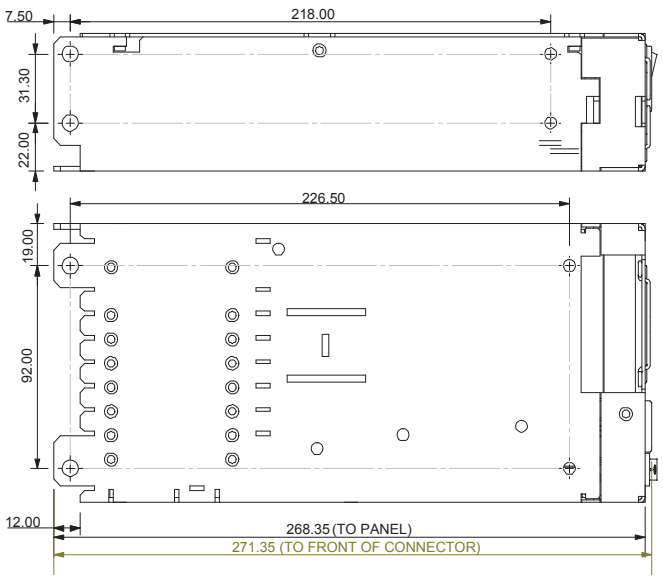
Output Specification		
Voltage / Current	See output voltages table	
Turn on time	1.5s max	at 90Vac (150Vac for 900W, 48Vdc for Vega dc) and 100% rated output power
Rise time	<50ms	to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5% or 250mV	Load type dependent, no overshoot with resistive load
Efficiency	up to 75%	at 230Vac (48Vdc for Vega dc) & 100% rated power, configuration dependent
Hold up	16ms min	at 90Vac (150Vac for 900W) and 100% rated power (10ms min for Vega dc)
Ripple and Noise	<1% or 50mV	pk-pk, using EIAJ test method & 20MHz bandwidth
Voltage Accuracy	<1%	of set voltage
Remote Sense	Yes	standard on single output modules, max 0.75V total line drop. Option for twin output modules
Minimum Load	No	on any output (except W2 and W5 modules which need 0.5A load to achieve full specification)
Temperature Coefficient	<0.02%	of rated voltage per °C
Load Regulation	<0.5% or 50mV	for 0-100% load change
Line Regulation	<0.1%	for 90-264Vac input change (34 - 75Vdc for Vega dc)
Cross Regulation	<0.2%	for 100% load change on any output
Transient Response	<6% or 300mV	of set voltage for 50% load change (above 25% load)
Recovery	500µs	for recovery to 1% or 100mV of set voltage
Over Voltage Protection	Yes	Refer to application notes for details
Over Current Protection (singles)	105-125% 110-170%	of rated current, constant current characteristic For EE2, EE4, EE5L, EE5H, Z2, Z18 and Z19 modules
Short Circuit Protection	<150%	of rated current, when output voltage <1%
Over Temperature Protection	Yes	shuts down all outputs and fan. Cycle ac off/on to reset Shutdown temperature varies according to ambient, output power and input voltage. ac fail signal (if fitted) provides 5ms warning of thermal shutdown

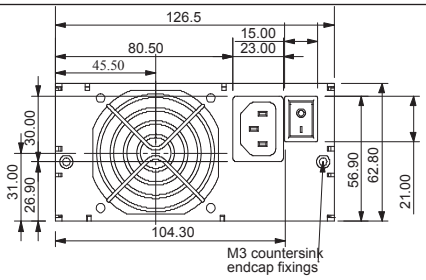
Environment	
Temperature	0°C to 65°C operational, -40°C to 70°C storage (max 12 months).
Derating	50°C to 65°C derate total output power and each output current by 2.5% per °C
Low Temp Startup	-20°C
Humidity	5 - 95% RH non condensing
Shock	±3 x 30g shocks in each plane, total 18 shocks 30g shock = 11ms (+/-0.5msec), half sine Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987. Conforms to MIL-STD-810E/F, Method 516.5, Pro I, IV, VI
Vibration	Single axis 10 - 500 Hz at 2g (sweep and endurance at resonance) in all 3 planes Conforms to EN60068-2-6, IEC68-2-6 Conforms to MIL-STD-810E, Method 514.4, Pro I, Cat 1, 9
Altitude	5000 metres operational/non operational (IEC inlet 3000m operational, 5000m non operational)
Pollution	Degree 2, Material group IIIb
IP Rating	IP 10

Emissions EN61000-6-3:2007, EN60601-1-2:2001		
Radiated Electric Field	EN55011, EN55032	(as per CISPR.11/22) Class B (Class A for Vega dc), FCC47 part 15 subpart B see application note for details. Additional filtering required for IEC inlet version. Only for 'S' type leakage variants.
Conducted Emissions	EN55011, EN55032	(as per CISPR.11/22) Class B (Class A for Vega dc), FCC47 part 15 subpart B Only for 'S' type leakage variants. 'M' and 'L' types meet Class A
Conducted Harmonics	EN61000-3-2	Class A - not applicable to Vega dc
Flicker	EN61000-3-3	Compliant - d_{max} only - not applicable to Vega dc

Immunity EN61000-6-2:2005, EN60601-1-2:2001				Criteria
Electrostatic Discharge	EN61000-4-2	Level 4	Air discharge 15kV, Contact discharge 8kV	A
Electromagnetic Field	EN61000-4-3	Level 3	12V/m	A
Fast / Burst Transient	EN61000-4-4	Level 4 Level 3 for Vega dc	ac input tested to 4.4kV (2kV for Vega dc) dc output tested to 2.2kV (1kV for Vega dc) Tested at 5kHz and 100kHz	A
Surge Immunity	EN61000-4-5	Level 3 Level 2 for Vega dc	Common mode - 2.2kV (1.1kV for Vega dc) Differential - 1.1kV (0.55kV for Vega dc)	A
Conducted RF Immunity	EN61000-4-6	Level 3	12V	A
Power Frequency Magnetic Field	EN61000-4-8	Level 4	30A/m	A
Voltage Dips, Variations, Interruptions	EN61000-4-11	Class 3 na - Vega dc		A B for 5s interruptions

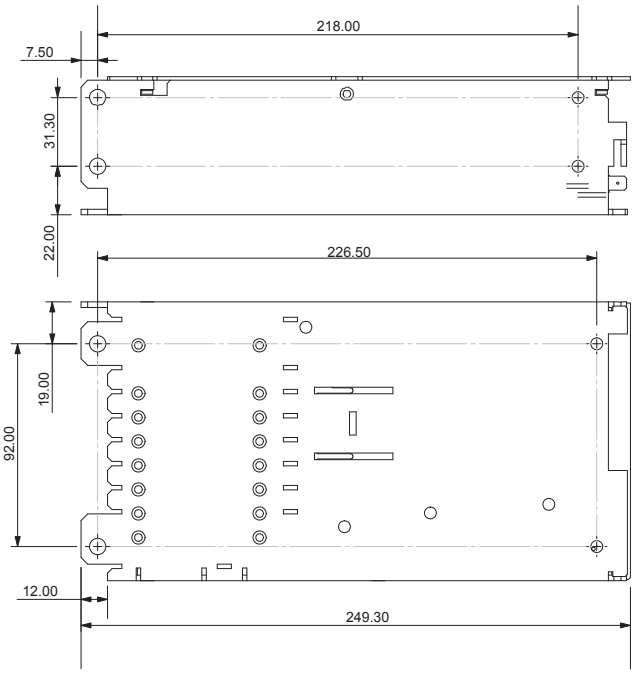
Approvals / Accreditations	
IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1	File E135494
IEC/EN 60601-1, UL/CSA 60601-1, ANSI/AAMI ES60601-1 CAN/CSA-C22.2 No 60601-1-08	File E349607 (not Vega dc, only for L, R and T leakage variants)
IEC/EN 61010-1	File E331788
CE Mark (EN60950-1)	LV Directive 2006/95/EC
CB certificate and Report available on request	*Please check with technical sales for status of approvals*
Designed and manufactured under the control of ISO9001 and ISO13485 (including risk management).	

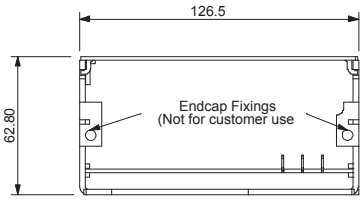




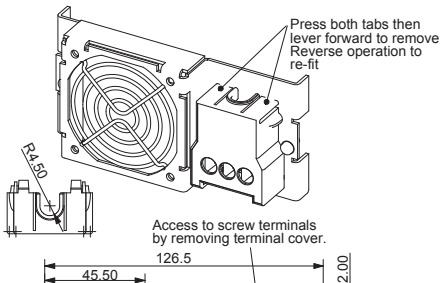
IEC-320 Connector Case

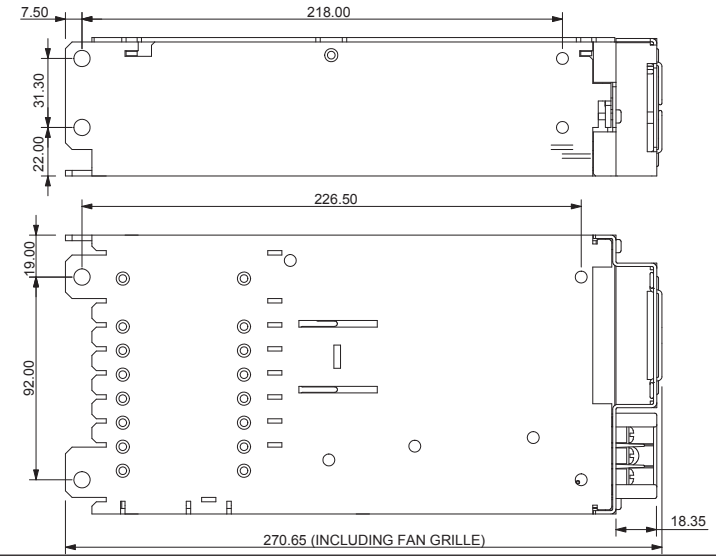
All versions have:-
8 x M4 Customer fixings
Max thread penetration:- 4.5mm



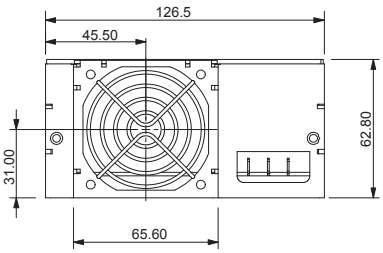


Customer Air Case (no fan)





Screw & Fast-on Terminal Case



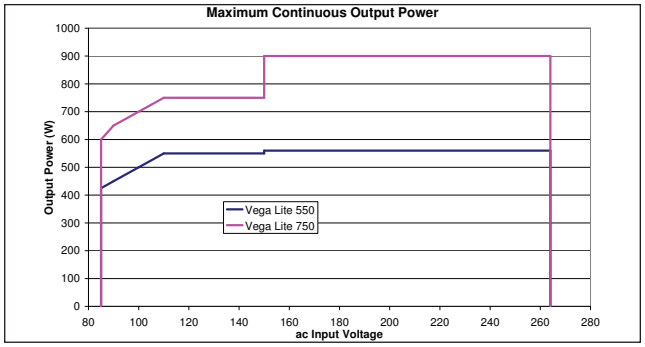
Medical Industrial Test Broadcast Comms Renewable

550W - 900W
Modular power supply.

Features	Benefits
• Industry Leading Flexibility	Suits your application
• Screw, Fast-on or IEC connection	Simplifies design into system
• Worldwide Safety Approvals	Supports global use
• Up to 11 outputs	Eliminates need for additional supplies
• 3 Year Warranty	Low cost of ownership

Input

Input Voltage / Frequency	90-264Vac / 47 - 63 Hz (440Hz with reduced PFC)
Input Fuse	16A / 250Vac HBC Fast acting (not user accessible)
Inrush Current	<40A at 25°C and 264Vac (cold start)
Leakage Current	See 'How To Create A Product Description' for details



How To Create A Product Description

The extensive range of output modules and options make it possible to achieve all popular combinations of Volts and Amps. You can create your own Vega configuration online at http://vega.emea.tdk-lambda.com/ . This method checks your configuration and offers the optimum solution. Alternatively, you can do this manually by using the guide below.

1. Calculate total output power to select the appropriate converter, then select required Cooling, Connection, Leakage Current and Controls/ Signals from the following table:

Converter	**V5**	550W
	V7	750/900W
Cooling	**F**	Forward air - standard
Input Connection	**S**	Screw
Leakage Current	**S**	Standard 1.5mA
	L	290µA

(max leakage current at 264Vac, 63Hz)

Primary Option	**F**	ac fail, psu+fan inhibit, 5V/100mA standby
	E	ac fail, psu+fan enable, 5V/100mA standby

V5	F	S	S	F

2. Select Output Modules and options from the Available Output Voltages tables.
   Example - if you require 5V / 18A with output inhibit :-
   a) Select 5L1S as closest match for voltage & current
   b) add suffix 'N' for output inhibit if required (eg 5L1S**N**)
   c) Repeat for other outputs.
   Ensure you do not select more than a total of 5 slots width of modules. This will create a complete product description eg **V5FSSF 5L1SN 12/12H3/3S 24C5S** which represents a four output 550W VegaLite with Forward air, Screw terminal input, 1.5mA leakage, ac Fail, Global inhibit & 5V/100mA standby supply with the following outputs:
   Output 1 = 5V/35A (with output inhibit, module good and current share option). Output 2 = 12V / 10A, Output 3 = 12V / 6A, Output 4 = 24V / 10A, all with screw terminal outputs.
3. Contact TDK-Lambda to validate configuration and issue a part number.

OUTPUT VOLTAGES (single output modules)

	1 slot wide		1.5 slots wide		2 slots wide		3 slots wide	
Output Voltage	Module	Current	Module	Current	Module	Current	Module	Current
1.8V	1.8C1S	35A	1.8D1LS	50A	1.8E1S	60A		
2V	2C1S	35A	2D1LS	50A	2E1S	60A		
3.3V	3.3C1S	35A	3.3D1LS	50A	3.3E1S	60A		
5V	5L1S	35A	5D1HS	50A	5E2S	60A		
6.5V	6.5B2S	25A	6.5D2S	45A	6.5E2S	60A		
12V	12C3S	18A	12D3S	24A	12E3LS	40A		
15V	15C3S	18A	15D3S	24A	15E4S	30A		
18V	18C4S	14A	18D4S	18A	18E4S	30A		
24V	24C5S	10A	24D5S	15A	24E5HS	25A		
28V	28C5S	10A	28D5S	15A	28E5HS	25A		
36V	36HH5/4S	4.5A			36BB4S	10A		
48V	48HH5/4S	4.5A			48C5B4S	10A	48DD5S	15A

OUTPUT VOLTAGES (twin output modules) - all 1 slot width

		Channel 1					
	Output Voltage	5V / 12A	12V / 10A	15V / 10A	18V / 5A	24V / 5A	28V / 5A
Channel 2	1.8V / 8A	5/1.8H1H/1LS					
	2V / 8A	5/2H1H/1LS					
	3.3V / 8A	5/3.3H1H/1LS					
	5V / 8A		12/5H3/1HS	15/5H3/1HS	18/5H5/1HS	24/5H5/1HS	28/5H5/1HS
	12V / 6A	5/12H1H/3S	12/12H3/3S	15/12H3/3S	18/12H5/3S	24/12H5/3S	28/12H5/3S
	15V / 6A	5/15H1H/3S	12/15H3/3S	15/15H3/3S	18/15H5/3S	24/15H5/3S	28/15H5/3S
	18V / 4.5A				18/18H5/4S	24/18H5/4S	28/18H5/4S
	24V / 4.5A				18/24H5/4S	24/24H5/4S	28/24H5/4S

OUTPUT VOLTAGES (single output modules)

Module	Adjustment Range (Volts)			Current (Amps)	Slots
C1S	1.8	-	3.4	35	1
D1LS	1.8	-	3.8	50	1.5
E1S	1.8	-	3.4	60	2
L1S	4.2	-	5.1	35	1
D2S	3.8	-	7.5	45	1.5
D1HS	3.9	-	5.1	50	1.5
E2S	3.8	-	7.5	60	2
B2S	5	-	8	25	1
C3S	9.1	-	15	18	1
D3S	8	-	15	24	1.5
E3LS	8	-	12.5	40	2
D4S	14	-	18	18	1.5
E4S	14	-	19	30	2
C4S	16.3	-	21.5	14	1
C5S	21.6	-	30	10	1
D5S	21	-	28	15	1.5
E5HS	24	-	28	25	2
HH5/4S	32.5	-	48	4.5	1
BB4S	32.6	-	40	10	2
C5B4S	43	-	48	10	2
DD5S	42	-	56	15	3

OUTPUT VOLTAGES (twin output modules)

Module	V1 Adjustment Range (Volts)			Current	V2 Adjustment Range (Volts)			Current (Amps)	Slots
H1H/1LS	3.9	-	5.1	12	1.8	-	3.4	8	1
H1H/3S	3.9	-	5.1	12	9.1	-	15.5	6	1
H3/1HS	9.1	-	15.5	10	3.9	-	5.1	8	1
H3/3S	9.1	-	15.5	10	9.1	-	15.5	6	1
H5/1H	16.2	-	28	5	3.9	-	5.1	8	1
H5/3	16.2	-	28	5	9.1	-	15.5	6	1
H5/4	16.2	-	28	5	16.3	-	24	4.5	1

Options - Single output Modules*		Options - Twin output Modules*	
N	Output Inhibit, Module Good & Current Sharing	N	Output Inhibit, Module Good & Remote Sense
		R	Remote Sense only

* see configuring guide

Isolation		
Input to Output	Reinforced	2 x MOPPs (3rd edition 60601) 4kVac, 5.7kVdc type tested to 4kVac (equivalent to 5.7kVdc), production tested to 4.3kVdc.
Input to Earth	Basic	2.3kVdc
Output to Output / Output to Earth		200Vdc

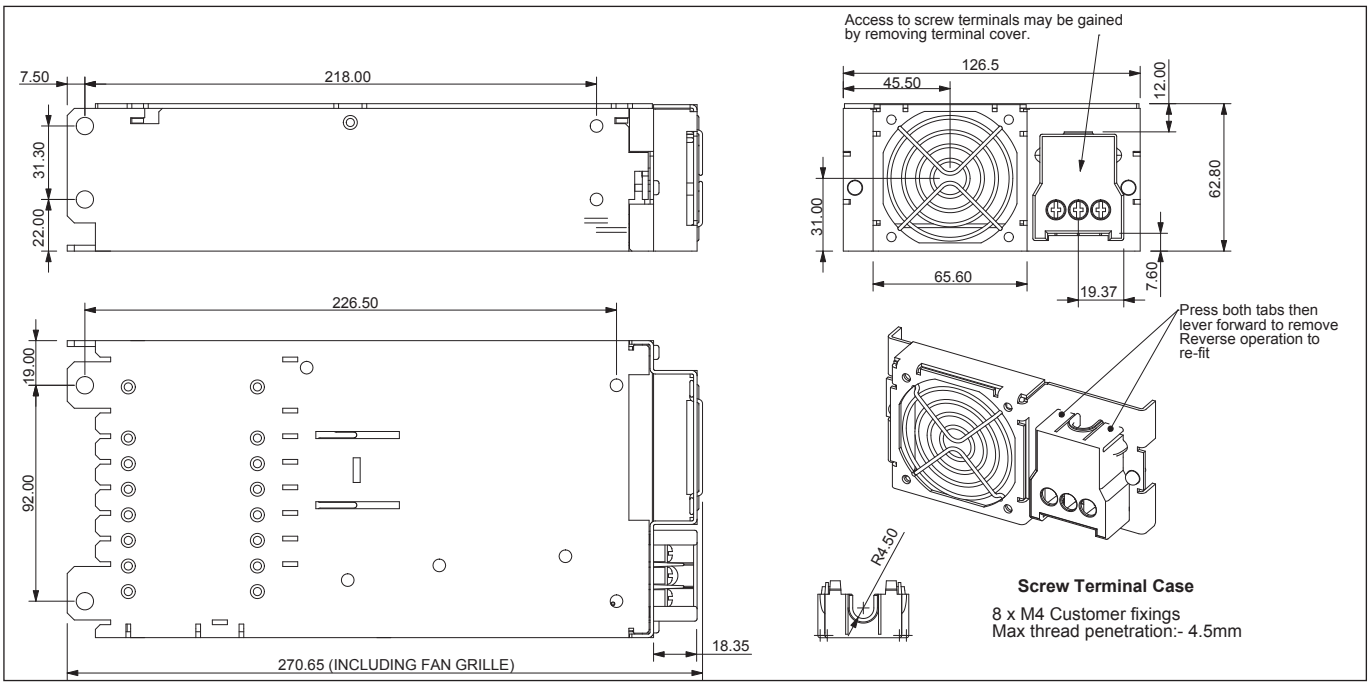
Output Specification		
Voltage / Current	See output voltages tables	
Turn on time	1.5s max	at 90Vac and 100% rated output power
Rise time	<50ms	to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5% or 250mV	Load type dependent, no overshoot with resistive load
Efficiency	75%	typical at 230Vac & 100% rated power, configuration dependent
Hold up	16ms min	at 100Vac and 100% rated power
Ripple and Noise	<1% or 50mV	pk-pk, using EIAJ test method & 20MHz bandwidth
Voltage Accuracy	<1%	of set voltage
Remote Sense	Yes	standard on single output modules, max 0.75V total line drop. Option for twin output modules
Minimum Load	No	on any output
Temperature Coefficient	<0.02%	of rated voltage per °C
Load Regulation	<0.5% or 50mV	for 0-100% load change
Line Regulation	<0.1%	for 100-264Vac input change
Cross Regulation	<0.2%	for 100% load change on any other output
Transient Response	<6% or 300mV	of set voltage for 50% load change (above 25% load)
Recovery	500µs	for recovery to 1% or 100mV of set voltage
Over Voltage Protection	Yes	Refer to application notes for details
Over Current Protection (singles)	105-125%	of rated current, constant current characteristic
Short Circuit Protection	<150%	of rated current, when output voltage <1%
Over Temperature Protection	Yes	shuts down all outputs and fan. Cycle ac off/on to reset Shutdown temperature varies according to ambient, output power and input voltage. ac fail signal (if fitted) provides 5ms warning of thermal shutdown

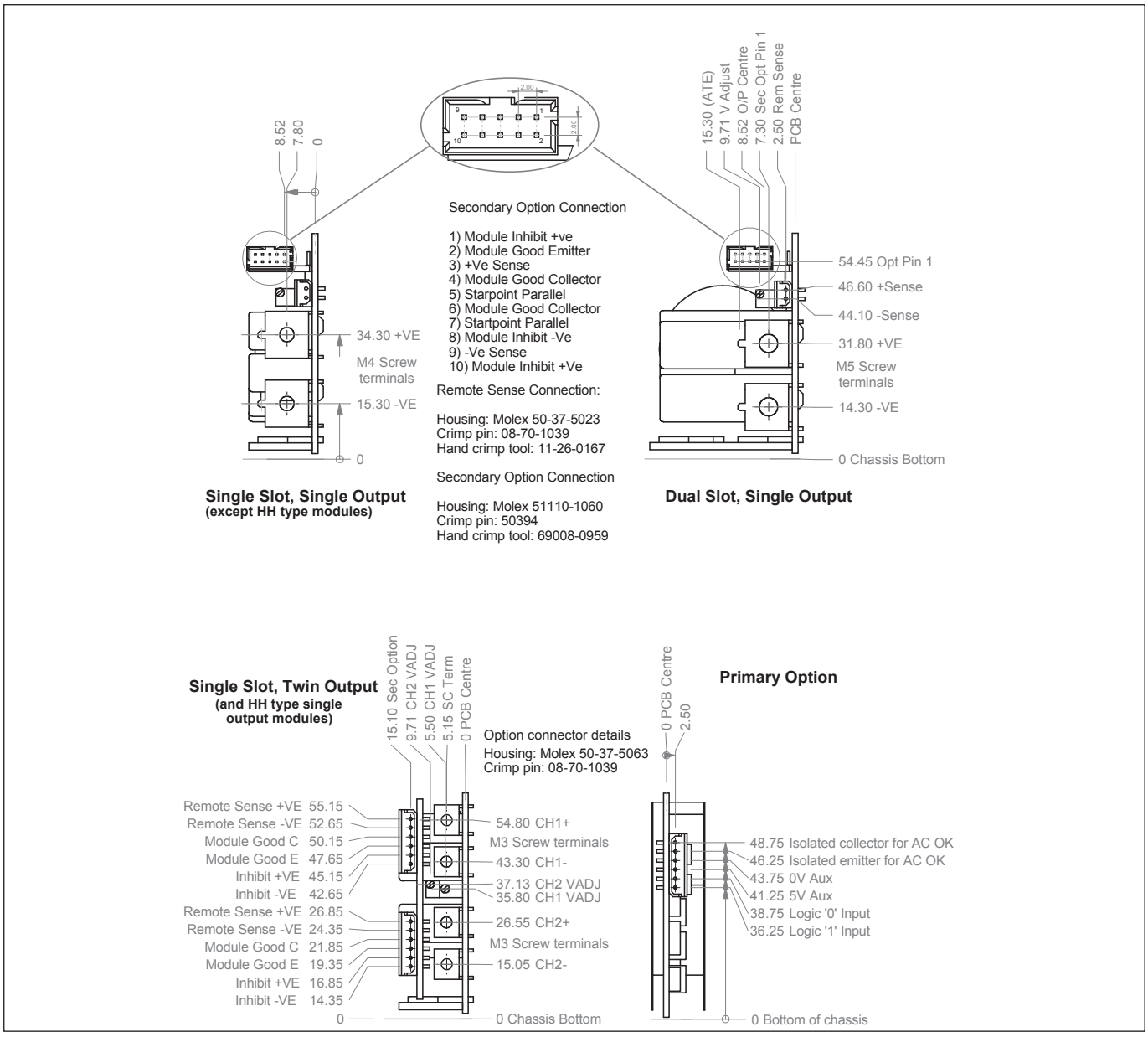
Environment	
Temperature	0°C to 65°C operational, -40°C to 70°C storage (max 12 months).
Derating	50°C to 65°C derate total output power and each output current by 2.5% per °C
Low Temp Startup	-20°C
Humidity	5 - 95% RH non condensing
Shock	±3 x 30g shocks in each plane, total 18 shocks 30g shock = 11ms (+/-0.5msec), half sine Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987. Conforms to MIL-STD-810E/F, Method 516.5, Pro I, IV, VI
Vibration	Single axis 10 - 500 Hz at 2g (sweep and endurance at resonance) in all 3 planes Conforms to EN60068-2-6, IEC68-2-6 Conforms to MIL-STD-810E, Method 514.4, Pro I, Cat 1, 9
Altitude	5000 metres operational/non operational
Pollution	Degree 2, Material group IIIb
IP Rating	IP 10

Emissions EN61000-6-3:2007, EN60601-1-2:2001		
Radiated Electric Field	EN55011, EN55032	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B see application note for details. Only for 'S' type leakage variants.
Conducted Emissions	EN55011, EN55032	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B Only for 'S' type leakage variants. 'L' types meet Class A
Conducted Harmonics	EN61000-3-2	Class A
Flicker	EN61000-3-3	Compliant - d_{max} only

Immunity EN61000-6-2:2005, EN60601-1-2:2001				Criteria
Electrostatic Discharge	EN61000-4-2	Level 4	Air discharge 15kV, Contact discharge 8kV	A
Electromagnetic Field	EN61000-4-3	Level 3	12V/m	A
Fast / Burst Transient	EN61000-4-4	Level 4	ac input tested to 4.4kV dc output tested to 2.2kV Tested at 5kHz and 100kHz	A
Surge Immunity	EN61000-4-5	Level 3	Common mode - 2.2kV Differential - 1.1kV	A
Conducted RF Immunity	EN61000-4-6	Level 3	12V	A
Power Frequency Magnetic Field	EN61000-4-8	Level 4	30A/m	A
Voltage Dips, Variations, Interruptions	EN61000-4-11	Class 3		A B for 5s interruptions

Approvals / Accreditations	
IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1	File E135494
IEC/EN 60601-1, UL/CSA 60601-1, ANSI/AAMI ES60601-1 CAN/CSA-C22.2 No 60601-1-08	File E349607 (only for L leakage variants)
IEC/EN 61010-1	File E331788
CE Mark (EN60950-1)	LV Directive 2006/95/EC
CB certificate and Report available on request	*Please check with technical sales for status of approvals*
Designed and manufactured under the control of ISO9001 and ISO13485 (including risk management).	

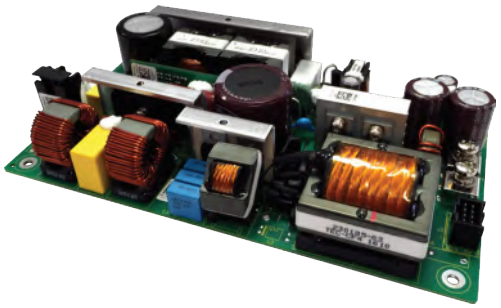

Access to screw terminals may be gained by removing terminal cover.
7.50
218.00
31.30
22.00
126.5
45.50
12.00
62.80
31.00
65.60
19.37
7.60
226.50
19.00
92.00
18.35
270.65 (INCLUDING FAN GRILLE)
Press both tabs then lever forward to remove
Reverse operation to re-fit
R4.50
Screw Terminal Case
8 x M4 Customer fixings
Max thread penetration:- 4.5mm


8.52
7.80
0
34.30 +VE
M4 Screw terminals
15.30 -VE
0
Single Slot, Single Output
(except HH type modules)
Secondary Option Connection
1) Module Inhibit +ve
2) Module Good Emitter
3) +Ve Sense
4) Module Good Collector
5) Starpoint Parallel
6) Module Good Collector
7) Startpoint Parallel
8) Module Inhibit -Ve
9) -Ve Sense
10) Module Inhibit +Ve
Remote Sense Connection:
Housing: Molex 50-37-5023
Crimp pin: 08-70-1039
Hand crimp tool: 11-26-0167
Secondary Option Connection
Housing: Molex 51110-1060
Crimp pin: 50394
Hand crimp tool: 69008-0959
15.30 (ATE)
9.71 V Adjust
8.52 O/P Centre
7.30 Sec Opt Pin 1
2.50 Rem Sense
PCB Centre
54.45 Opt Pin 1
46.60 +Sense
44.10 -Sense
31.80 +VE
M5 Screw terminals
14.30 -VE
0 Chassis Bottom
Dual Slot, Single Output
Single Slot, Twin Output
(and HH type single output modules)
15.10 Sec Option
9.71 CH2 VADJ
5.50 CH1 VADJ
5.15 SC Term
0 PCB Centre
Option connector details
Housing: Molex 50-37-5063
Crimp pin: 08-70-1039
Remote Sense +VE 55.15
Remote Sense -VE 52.65
Module Good C 50.15
Module Good E 47.65
Inhibit +VE 45.15
Inhibit -VE 42.65
Remote Sense +VE 26.85
Remote Sense -VE 24.35
Module Good C 21.85
Module Good E 19.35
Inhibit +VE 16.85
Inhibit -VE 14.35
0
54.80 CH1+
M3 Screw terminals
43.30 CH1-
37.13 CH2 VADJ
35.80 CH1 VADJ
26.55 CH2+
M3 Screw terminals
15.05 CH2-
0 Chassis Bottom
Primary Option
0 PCB Centre
2.50
48.75 Isolated collector for AC OK
46.25 Isolated emitter for AC OK
43.75 0V Aux
41.25 5V Aux
38.75 Logic '0' Input
36.25 Logic '1' Input
0 Bottom of chassis

Medical Industrial Test Broadcast Comms Renewable

500W, Configurable, Class I or II AC-DC, power supply

Features	Benefits
• BF ready medical isolation (MOPP)	Eases design into systems (including BF)
• Class I / II with level B EMC	Eliminates need for additional EMC filters
• 1U profile	Enables equipment to be smaller
• Low airflow requirement	Allows quieter system design
• 5 Year Warranty	Low cost of ownership



Input

Input Voltage	90-264Vac (100-240Vac nominal) able to withstand input voltages of up to 300Vac for up to 5 seconds	Input Frequency	47 - 63Hz
Input Harmonics	EN61000-3-2 compliant	Power Factor	0.95 min at 110Vac input
Input Fuse	Dual fusing (single fuse optional) Time Delay (not user replaceable)	Inrush Current	<40A at 25°C and 265Vac (cold start) (meets EN61000-3-3).
Earth Leakage Current	specified at 264Vac (63Hz). see 'How To Create A Product Description' for options		

Quick Selector (Standard models). Additional variants available - see 'How To Create A Product Description'

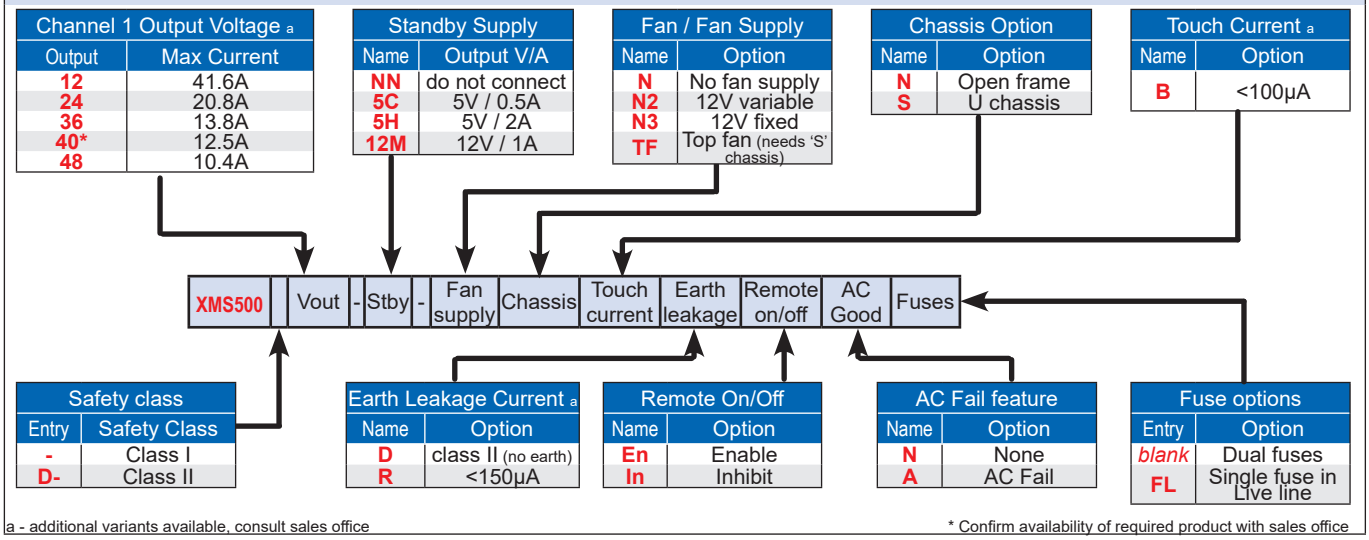
Output		Cover / Chassis / Fan type	Class I		Class II	
Volts	Current		Product Description	Order code	Product Description	Order code
12V	41.6A	Open Frame	XMS500-12-5H-N2NBRInA	XMS5001M	XMS500D-12-5H-N2NBDInA	XMS50024
		U chassis	XMS500-12-5H-N2SBRInA	XMS5003X	XMS500D-12-5H-N2SBDInA	XMS5004F
		Top fan	XMS500-12-5H-TFSBRInA	XMS5005Y	XMS500D-12-5H-TFSBDInA	XMS5006G
24V	20.8A	Open Frame	XMS500-24-5H-N2NBRInA	XMS50070	XMS500D-24-5H-N2NBDInA	XMS5008H
		U chassis	XMS500-24-5H-N2SBRInA	XMS50091	XMS500D-24-5H-N2SBDInA	XMS500BN
		Top fan	XMS500-24-5H-TFSBRInA	XMS500C6	XMS500D-24-5H-TFSBDInA	XMS500DP
36V	13.8A	Open Frame	XMS500-36-5H-N2NBRInA	XMS500FR	XMS500D-36-5H-N2NBDInA	XMS500G8
		U chassis	XMS500-36-5H-N2SBRInA	XMS500HS	XMS500D-36-5H-N2SBDInA	XMS500JT
		Top fan	XMS500-36-5H-TFSBRInA	XMS500KB	XMS500D-36-5H-TFSBDInA	XMS500LV
48V	10.4A	Open Frame	XMS500-48-5H-N2NBRInA	XMS500MC	XMS500D-48-5H-N2NBDInA	XMS500NW
		U chassis	XMS500-48-5H-N2SBRInA	XMS500PX	XMS500D-48-5H-N2SBDInA	XMS500RY
		Top fan	XMS500-48-5H-TFSBRInA	XMS500SG	XMS500D-48-5H-TFSBDInA	XMS500T0

Standard models include:-
'5H' standby (5V / 2A), 'N2' fan supply (12V / 0.3A variable supply voltage) [except on Top fan variants], 'B' touch current (<100µA), 'In' remote on/off (inhibit) and 'A' AC Fail. Class I standard models include 'R' earth leakage (<150µA).

Isolation

Input to Output	Reinforced	2 x MoPP, 5.7kVdc, 4kVac			
Input to Earth (class I only)	Basic	1 x MoPP, 1.5kVac, 2.3kVdc	Output to Earth (class I only)	Basic	1 x MoPP, 1.5kVac, 2.3kVdc

How To Create A Product Description



a - additional variants available, consult sales office

* Confirm availability of required product with sales office

Output Specification

Output Power	500W	Continuous with specified airflow or top fan.
Total Regulation	better than 2%	Including Line regulation of 0.1% (for 90-264Vac input change), Load regulation of 1% (for 0-100% load change) and thermal regulation of 0.02%/°C (0-50°C)
Ripple & Noise	1%	pk-pk, using EIAJ test method & 20MHz bandwidth
Voltage Setting Accuracy	±1%	at 50% load
Turn on Time	1.0s max	at 90 Vac & 100% rated output power
Efficiency	up to 92%	At 230Vac, 100% load
Hold up	16ms	minimum at 100% load 20ms holdup option available, consult sales office for details.
Min Load	None	
Transient Response		
Deviation	<5%	of set voltage for 25% to 100% load change
Recovery time	<2ms	for recovery to 2% of set voltage
Short circuit protection	Yes	Hiccup mode, auto recovery after removal of short circuit
Over Temperature protection	Yes	Latching, need to cycle ac to restart unit.
Over Voltage Protection	Yes	Latching, need to cycle ac to restart unit.

Signals

Remote on/off J2, pin 5	Enable (-En option) - Connect to Standby + to enable channel 1. Open circuit or 0V to inhibit. Inhibit (-In option) - Connect to Standby + to inhibit channel 1. Open circuit or 0V to enable. Maximum current required = 2mA for 5V standby supply, 7mA for 12V standby supply
AC Fail	Provides ac fail functionality. Logic high = ac fail, 0V = ac good.

Additional Outputs

Fan supply options	N	None
	N2	12V / 0.3A (with 12V output, 0.15A with all other outputs). Output voltage varies with heat sink temperature. See application note for details.
	N3	12V / 0.3A (with 12V output, 0.15A with all other outputs). Constant voltage.
	TF	Top fan (fan supply not for customer use as used by factory fitted top fan)
Standby Supply options	NN	None
	5C	5V / 0.5A
	5H	5V / 2A
	12M	12V / 1A

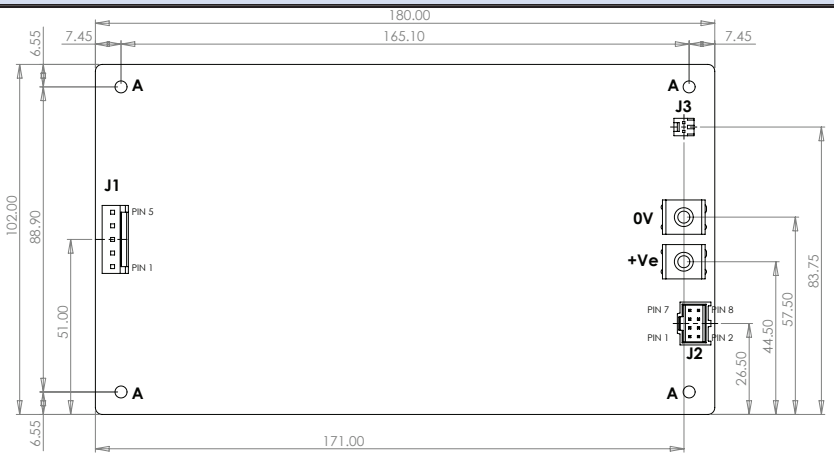
Environment	
Temperature	0°C to 50°C operational Full load with top fan (TF) fitted or 1m/s air blown (approximately 10 CFM). See handbook for maximum component temperatures. Convection cooled operation is possible by maintaining the specified component temperatures. Storage -40°C to 85°C (70°C for Top Fan versions) (max 12 months).
Derating	50°C to 70°C, derate output by 2.5% per °C
Low Temp Startup	-20°C
Humidity	5 - 95% RH non condensing
Shock	±3 x 30g shocks in each plane, total 18 shocks 30g shock = 11ms (+/-0.5msec), half sine Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987. Conforms to MIL-STD-810G, Method 516.6, Pro IV, VI
Vibration	Single axis 10 - 200 Hz at 2*g* (sweep and endurance at resonance) in all 3 planes Conforms to EN60068-2-6, IEC68-2-6 Conforms to MIL-STD-810G, Method 514.4, Pro I, Cat 1,9
Altitude	-200 to 5000 metres operational (3000m for 60601-1) (-200 to 5000m storage/transportation)
Pollution	Degree 2, Material group 3

Emissions EN61000-6-3		
Radiated Emissions	EN55011, EN55032	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B see application note for details
Conducted Emissions	EN55011, EN55032	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B
Conducted Harmonics	EN61000-3-2	Class A
Flicker	EN61000-3-3	Compliant - d_{max} only

Immunity EN61000-6-2:2005				Criteria
Electrostatic Discharge	EN61000-4-2	Level 4	Only when fitted in a chassis Level 3 on I/O / signal pins	A
Electromagnetic Field	EN61000-4-3	Level 3		A
Fast / Burst Transient	EN61000-4-4	Level 4		A
Surge Immunity	EN61000-4-5	Level 3		A
Conducted RF Immunity	EN61000-4-6	Level 3		A
Power Frequency Magnetic Field	EN61000-4-8	Level 3		A
Voltage Dips, Variations, Interruptions	EN61000-4-11	Class 3	Criteria B for 5 sec interruption Criteria B for 1 cycle interruption	A
Ring Wave	EN61000-4-12	Level 3		B
Voltage Fluctuations	EN61000-4-14	Class 3		A

Approvals / Accreditations	
IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1	File E135494
IEC/EN 60601-1, UL/CSA 60601-1, ANSI/AAMI ES60601-1 CAN/CSA-C22.2 No 60601-1-08	File E349607
IEC/EN 61010-1 (designed to meet)	
IEC/EN/UL/CSA 60065 (designed to meet)	
CE Mark (EN60950-1)	Low Voltage Directive (LVD)
CB certificate and Report available on request	*Please check with technical sales for status of approvals*
Designed and manufactured under the control of ISO9001 and ISO13485 (including risk management).	

Outline & Connection Drawings - Class I (with earth)



J1	
PIN	CONNECTION
1	LIVE
2	NOT CONNECTED
3	NEUTRAL
4	NOT CONNECTED
5	EARTH

J3	
PIN	CONNECTION
1	0V
2	FAN +

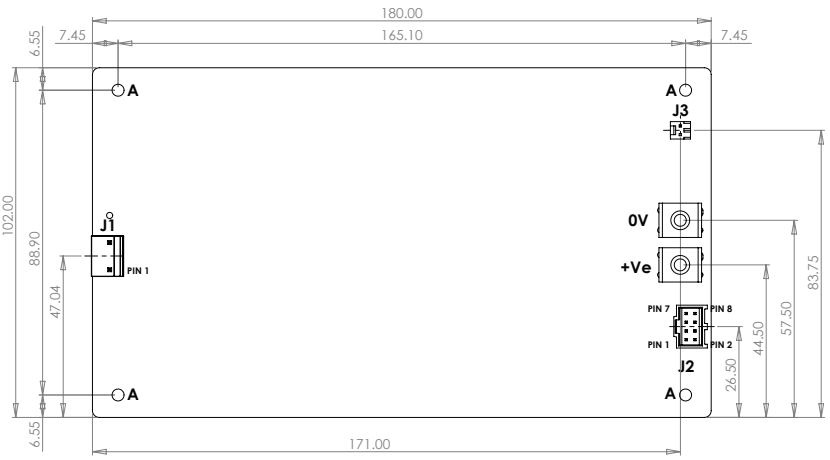
J2	
PIN	CONNECTION
1	STANDBY +
2	0V
3	STANDBY +
4	0V
5	REMOTE ON/OFF
6	AC FAIL
7	TEMP SENSE
8	TEMP SENSE

Connectors are not included with the product but they are available from TDK-Lambda

MATING PARTS (MOLEX OR EQUIVALENT)		
CONNECTOR	HOUSING	CRIMP PIN
J1	09-50-8051	08-52-0113
J2	90142-0008	90119-0109
J3	51191-0200	50802-9001

A 4 OFF HOLES ∅3.5mm CLEARANCE FOR M3 FIXINGS
ALL TOLERANCES ± 0.5mm

Outline & Connection Drawings - Class II product



J1	
PIN	CONNECTION
1	LIVE
2	NOT CONNECTED
3	NEUTRAL

J3	
PIN	CONNECTION
1	0V
2	FAN +

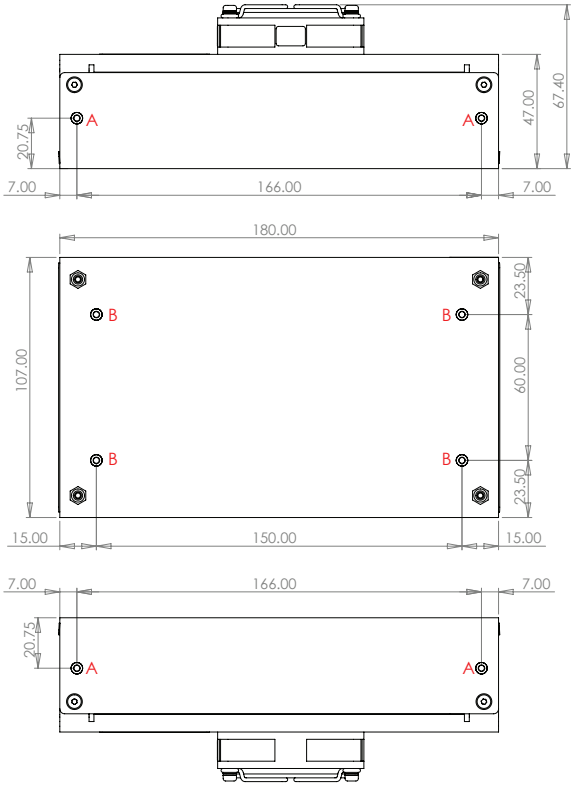
J2	
PIN	CONNECTION
1	STANDBY +
2	0V
3	STANDBY +
4	0V
5	REMOTE ON/OFF
6	AC FAIL
7	TEMP SENSE
8	TEMP SENSE

MATING PARTS (MOLEX OR EQUIVALENT)		
CONNECTOR	HOUSING	CRIMP PIN
J1	09-50-1031	08-70-1030
J2	90142-0008	90119-0109
J3	51191-0200	50802-9001

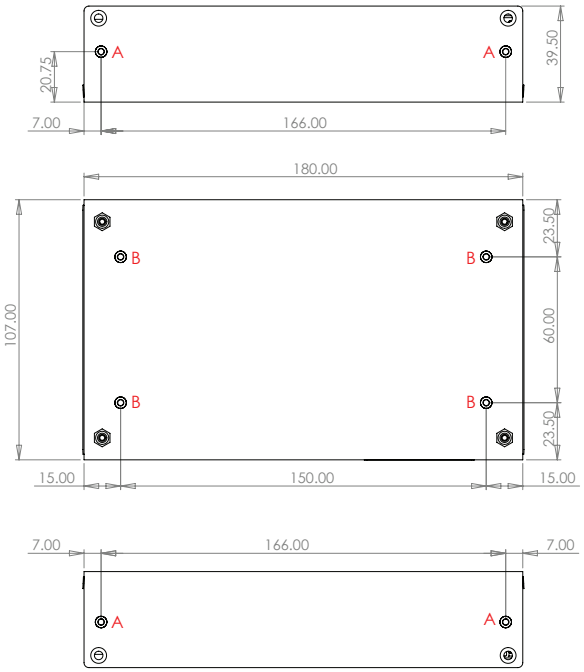
A 4 OFF HOLES ∅3.5mm CLEARANCE FOR M3 FIXINGS
ALL TOLERANCES ± 0.5mm

Outline Drawings

STANDARD CHASSIS + TOP FAN



STANDARD CHASSIS



A HOLES: 4 OFF FIXING HOLES FOR M3, MAXIMUM PENETRATION 3mm.
B HOLES: 4 OFF FIXING HOLES FOR M3 MAXIMUM PENETRATION 2.4mm
MAXIMUM TORQUE 0.5-0.6Nm
ALL TOLERANCES ± 0.5mm

All specifications at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

AC-DC Power Supplies

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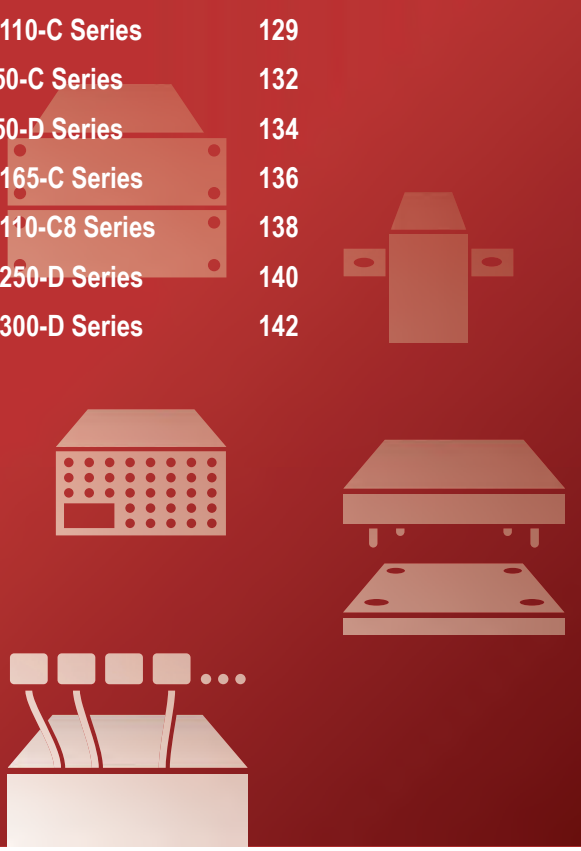
DT150-C Series	132
DT150-D Series	134
DTM165-C Series	136
DTM110-C8 Series	138
DTM250-D Series	140
DTM300-D Series	142



External/Desktop

Applications

- External power supplies as accessory for end equipment
- Typically used for portable equipment

Features

- Fully enclosed plastic case
- Plug and play – no input range setting or output voltage adjustment required
- IEC mains input connection
- DC output cable and connector
- ErP, CEC and EISA compliant models
- DTM series suitable for medical equipment

TDK·Lambda

www.uk.tdk-lambda.com/dtm

- EU ErP Tier 2, DOE level VI Compliant Models
- Wide Range AC Input
- Medical Certifications

Key Market Segments & Applications

Medical, Industrial Computing,
Life Sciences / Laboratory

DTM65-D Series

40W to 65W Medical AC-DC External Power Supplies

DTM65-D Features and Benefits

Features	Benefits
• EU Erp Tier 2, DOE level VI	• Easier system compliance
• Wide Range AC Input	• Global Operation
• >89% Average Efficiency [1]	• Consumes less energy

Specifications

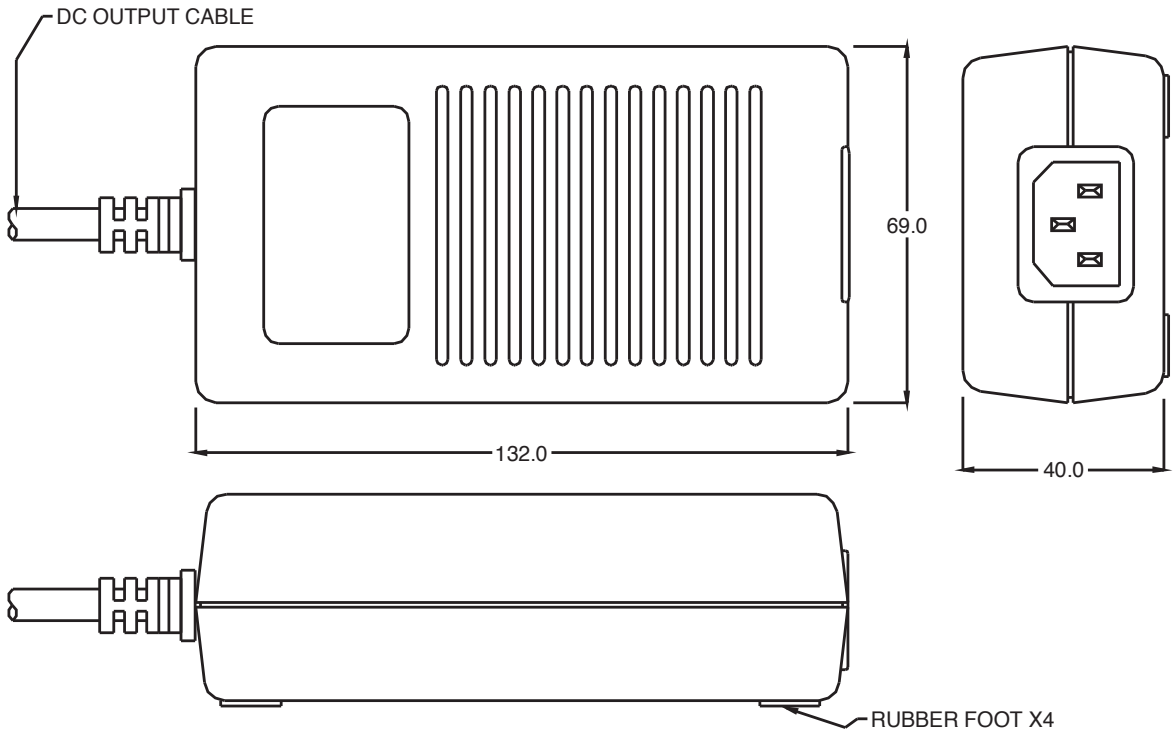
ITEMS		DTM65-D
Input Voltage Range		90 - 264VAC (47 - 63Hz)
Inrush Current [2]	A	90A at 230VAC input, 25°C ambient cold start
Input Current	A	2A at 90VAC, Full Load
Power Factor		None
Earth Leakage Current (264VAC 63Hz)	µA	<300µA
Touch Current	µA	<100µA
Hold Up Time (Typ)	ms	16ms at 230VAC input
Temperature Coefficient		±0.05%/°C
Voltage Accuracy	%	±1%
Adjustment Range		None
Minimum Load	A	None
Total Regulation		5V, 12V, 15V models: ±5%, 19V model: ±3%
Ripple & Noise	%	1% or 120mV whichever is the greater
Short Circuit Protection	-	Continuous - hiccup mode
Overvoltage Protection	V	110 - 150% of nominal (Cycle input power to reset)
Average Efficiency	%	89%
Operating Temperature	°C	-20°C to +60°C (Derate linearly to 50% load from +51°C to +60°C)
Storage Temperature	°C	-20°C to +85°C
Humidity (non condensing)		20 - 90% RH
Cooling	-	Convection
Withstand Voltage		Input to Ground 1.5kVAC, Input to Output 4kVAC (2 x MOPPs) (Output is connected to Ground)
Vibration (non operating)		23.52m/s^2 (10 - 55Hz: constant sweep 1 min X, Y, Z for 1 hour)
Shock		< 196.1 m/s^2 (20G)
Safety Agency Approvals	-	CE, UL60601-1, EN60601-1, IEC60601-1
Safety Class	-	Class I
Altitude	m	5000m
Offload Power Consumption	W	< 0.15W
Conducted & Radiated EMI		EN55011B, EN60601-1-2, FCC Part 18 Class B
Immunity		IEC60601-1-2, Ed4:2014/2015
Weight (Typ)	g	390g
Size (WxLxH)	mm	69 x 132 x 40
Cable Length	mm	1050mm
AC Input Connector		IEC 320-C14 (Accepts IEC 320-C13)
Output Connector		Kycon KPPx-4P or equivalent, Pins 1 & 2: -Vout, Pins 3 & 4: +Vout
Warranty	yrs	3

Notes: **(1)** Average efficiency 87.3% for 5V model **(2)** Inrush current for 5V model 120A peak @ 230VAC cold start @ 25°C

Model Selector

Model	Output (V)	Maximum Output (A)	Maximum Power (W)	ErP	DOE Efficiency Level
DTM65PW050D	5	8.0	40	Tier 2	VI
DTM65PW120D	12	5.0	60	Tier 2	VI
DTM65PW150D	15	4.0	60	Tier 2	VI
DTM65PW190D	19	3.6	65	Tier 2	VI
DTM65PW240D	24	2.7	65	Tier 2	VI
DTM65PW280D	28	2.32	65	Tier 2	VI
DTM65PW360D	36	1.8	65	Tier 2	VI
DTM65PW480D	48	1.35	65	Tier 2	VI

Outline Drawing DTM65-D Series

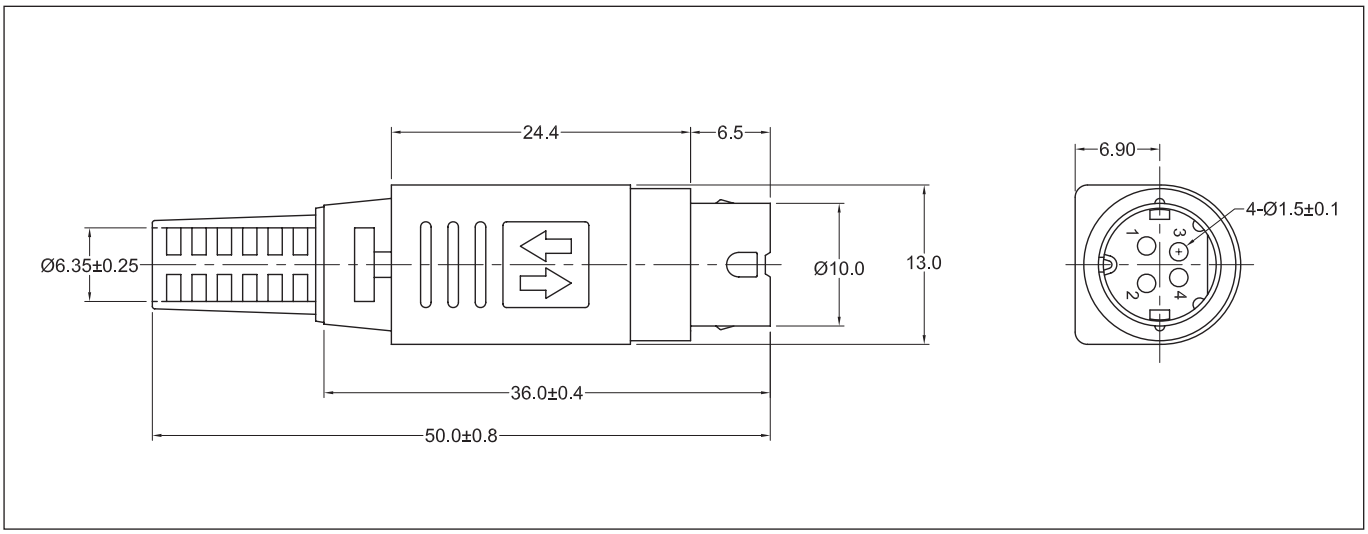


Notes:

1. AC Inlet: IEC320-C14 Standard
2. Box colour black
3. Tolerance: ±0.5mm
4. All Dimensions are in mm

Other External AC-DC Products - **DTM65-C8, DTM110-C, DTM110-C8, DTM165, DTM250, DTM300**

DTM65-D Output Connector



Pinout DTM65-D Model

Pin	Function
1	- Vout
2	- Vout
3	+ Vout
4	+ Vout

Alternative output connectors are available
Please contact Sales for further information (min quantities apply)

Medical Home Medical

40W to 65W Medical AC-DC External Power Supplies

Features	Benefits
• CEC, ErP and EISA(1) Level V Compliant, Meets DoE Level VI	• Easier System Approvals
• Wide Range AC, Class II IEC320-C8 Input	• Global Operation
• 60601-1 & 60601-1-11 Medical Certification /2xMoPP	• Simplifies Equipment Design
• >88% Average Efficiency, <0.21W No Load Power	• Consumes Less Energy

Notes: (1) EISA - Energy Independence and Security Act of 2007

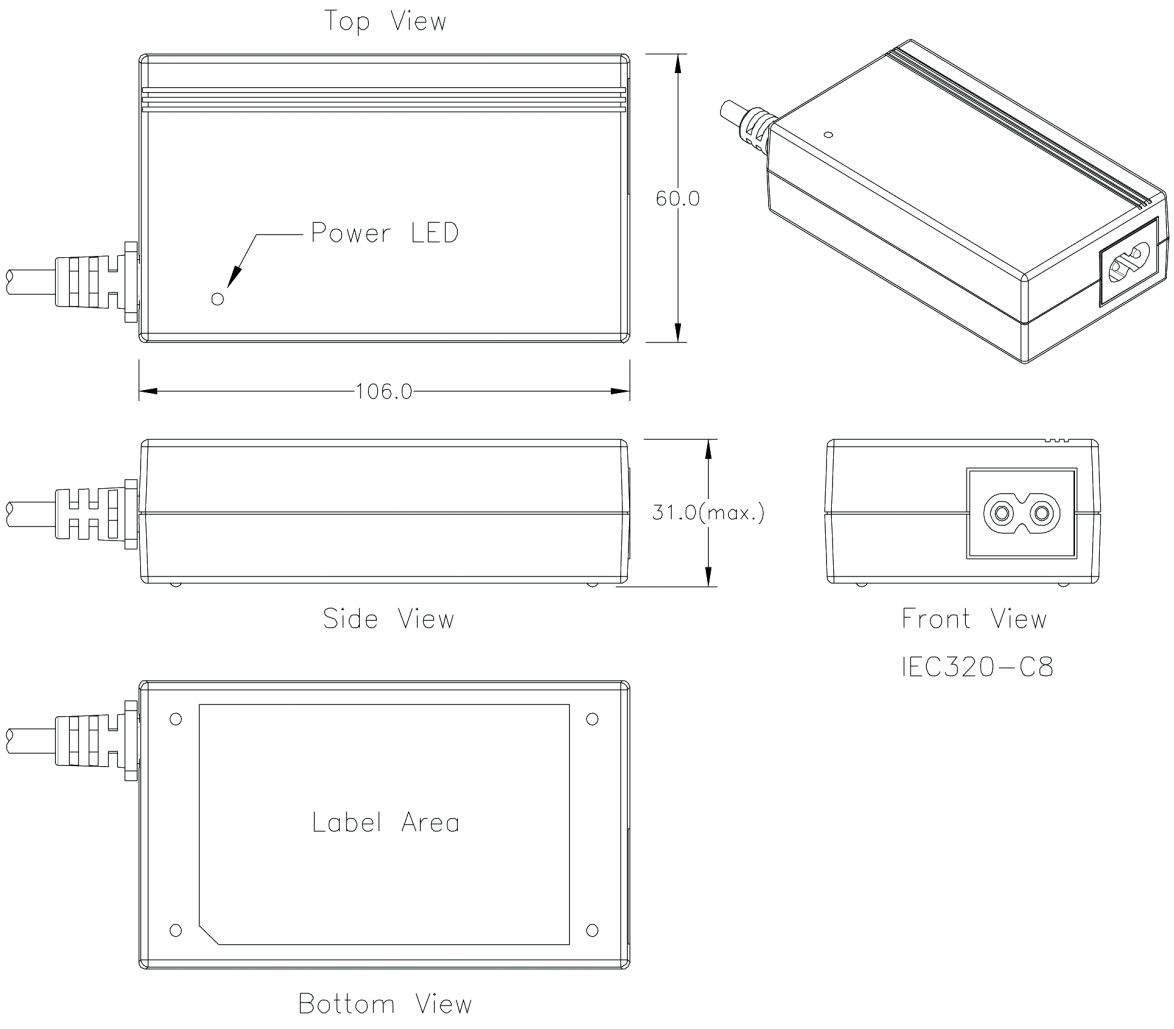
Specification

Model		DTM65-C8
Input Voltage Range	VAC	90 - 264VAC (47 - 63Hz)
Inrush Current	A	<100A at 230VAC input, 25°C ambient cold start
Input Current	A	2A at 90VAC, Full Load
Power Factor	-	None
Hold Up Time (Typ)	ms	10ms at 115VAC input
Temperature Coefficient		±0.05%/°C
Voltage Accuracy	%	±1%
Adjustment Range	-	None
Minimum Load	A	None
Total Regulation	-	5V to 15V Models:±5%, >15V models ±3%
Ripple & Noise	%	1% pk-pk
Overload & Short Circuit Protection	-	Continuous - hiccup mode
Overvoltage Protection	V	110 - 150% of nominal (Cycle input power to reset)
Overtemperature Protection	-	Yes (Cycle input power to reset)
Efficiency	%	>88%, average efficiency (5V model: >83.8%)
Operating Temperature	-	0°C to 60°C derate linearly to 50% load from 41°C to 60°C
Storage Temperature	°C	-10°C to 70°C
Humidity (non condensing)	%RH	10 - 90% RH
Cooling	-	Convection
Withstand Voltage	VAC	Input to Output 4kVAC
Vibration (non operating)	-	23.52m/s^2 (10 - 55Hz: constant sweep 1 min X, Y, Z for 1 hour)
Shock	-	< 196.1 m/s^2 (20G)
Safety Agency Certifications	-	UL/EN/IEC60601-1, CSA-C22.2 No.60601 3rd edition (2 x MOPP)
Offload Power Consumption	W	< 0.21W
EMC	-	EN55011B, EN60601-1-2
IP Rating	-	IP22
Weight (Typ)	g	240g
Size (WxLxH)	mm	60 x 106 x 31
Cable Length	mm	1050
AC Input Connector	-	IEC 320-C8 (2 prong)
Output Connector	-	Kycon KPP-4P or equivalent Pins 1 & 2: -Vout, Pins 3 & 4: +Vout
Warranty	Years	2

Output Rating

Model	Output (V)	Maximum Output (A)	Maximum Power (W)	Efficiency Level
DTM65PW050C8	5	8	40	V
DTM65PW120C8	12	5	60	VI
DTM65PW150C8	15	4	60	VI
DTM65PW190C8	19	3.42	65	VI
DTM65PW240C8	24	2.7	65	VI
DTM65PW280C8	28	2.32	65	VI
DTM65PW480C8	48	1.35	65	VI

Outline Drawing DTM65-C8 Series



Other External AC-DC Products

DTM65-C	40W to 65W Medical Adapters
DTM110-C	90W to 110W Medical Adapters
DTM165	160W to 165W Medical Adapters

- ErP[1], CEC[2] and EISA[3] Compliant Models
- Wide Range AC Input
- Medical Certifications

Key Market Segments & Applications

Medical, Industrial Computing,
Life Sciences / Laboratory

DTM110-C Series

90W to 110W Medical AC-DC External Power Supplies

DTM110-C Features and Benefits

Features	Benefits
• CEC and EISA Compliant	• Easier system compliance
• Wide Range AC Input	• Global Operation
• 87% Average Efficiency	• Consumes less energy

Specifications

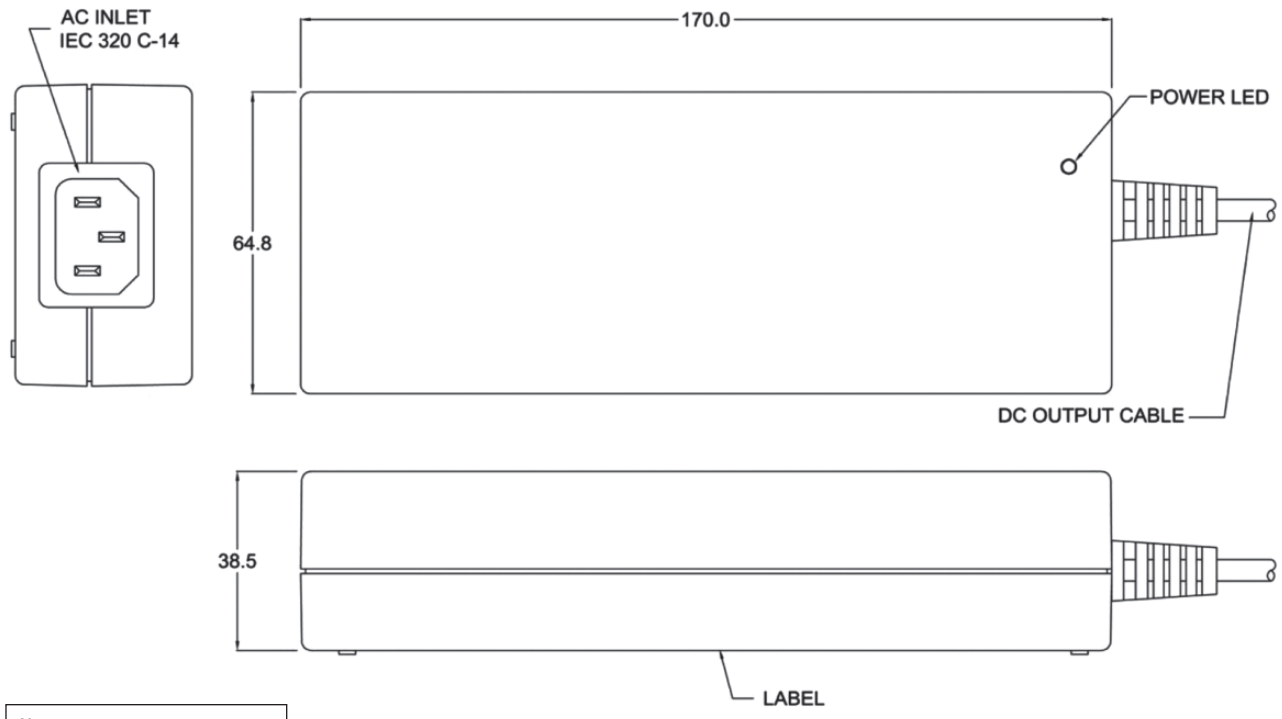
ITEMS / MODELS		DTM110PWxxx-C
Input Voltage range	VAC	90 - 264VAC (47 - 63Hz)
Inrush Current	A	100A at 230VAC input, 25°C ambient cold start
Input Current	A	2A at 90VAC, Full Load
Power Factor	-	Meets EN61000-3-2. >0.9 PF
Leakage Current (264VAC 60Hz)	μA	Typically 300μA
Hold Up Time (Typ)	ms	>10ms
Temperature Coefficient	%/°C	±0.05%/°C
Voltage Accuracy	%	±1%
Adjustment Range	V	None
Minimum Load	A	None
Total Regulation	%	12V to 15V Models: ±5%, >15V models ±3%
Ripple & Noise	%	1%
Short Circuit Protection	-	<160% - hiccup mode
Overvoltage Protection	V	110 - 150% of nominal (Cycle input power to reset)
Average Efficiency	%	87%
Operating Temperature	°C	0 to +40°C
Storage Temperature	°C	-10 to +70°C
Humidity (non condensing)	%RH	10 - 90%RH
Cooling	-	Convection
Withstand Voltage	VAC	Input to Ground 1.5kVAC, Input to Output 4kVAC
Vibration (non operating)	-	23.52m/s² (10 - 55Hz: constant sweep 1 min X, Y, Z for 1 hour)
Shock	-	< 196.1 m/s² (20G)
Safety Agency Approvals	-	CE, UL60601-1, EN60601-1, IEC60601-1
Safety Class	-	Class I
Altitude	m	3000m
Offload Power Consumption	W	< 0.5W
Conducted & Radiated EMI	-	EN60601-1-2, FCC Part 18 Class B
Immunity	-	EN55011
Weight (Typ)	g	605g
Size (WxLxH)	mm	170 x 64.8 x 38.5
Cable Length	mm	1050mm
AC Input Connector	-	IEC 320-C14 (Accepts IEC 320-C13)
Output Connector	-	Kycon KPPx-4P or equivalent Pins 1 & 2: -Vout, Pins 3 & 4: +Vout
Warranty	yrs	2

Notes: (1) ErP - Energy Related Products (2) Californian Energy Commission (3) EISA - Energy Independence and Security Act of 2007

Model Selector

Model	Output (V)	Maximum Output (A)	Maximum Power (W)	ErP	CEC	EISA Efficiency Level
DTM110PW120C	12	7.5	90	Step 2	V	V
DTM110PW135C	13.5	6.67	90	Step 2	V	V
DTM110PW150C	15	6.67	100	Step 2	V	V
DTM110PW190C	19	5.8	110	Step 2	V	V
DTM110PW200C	20	5.5	110	Step 2	V	V
DTM110PW240C	24	4.6	110	Step 2	V	V

Outline Drawing DTM110-C Series

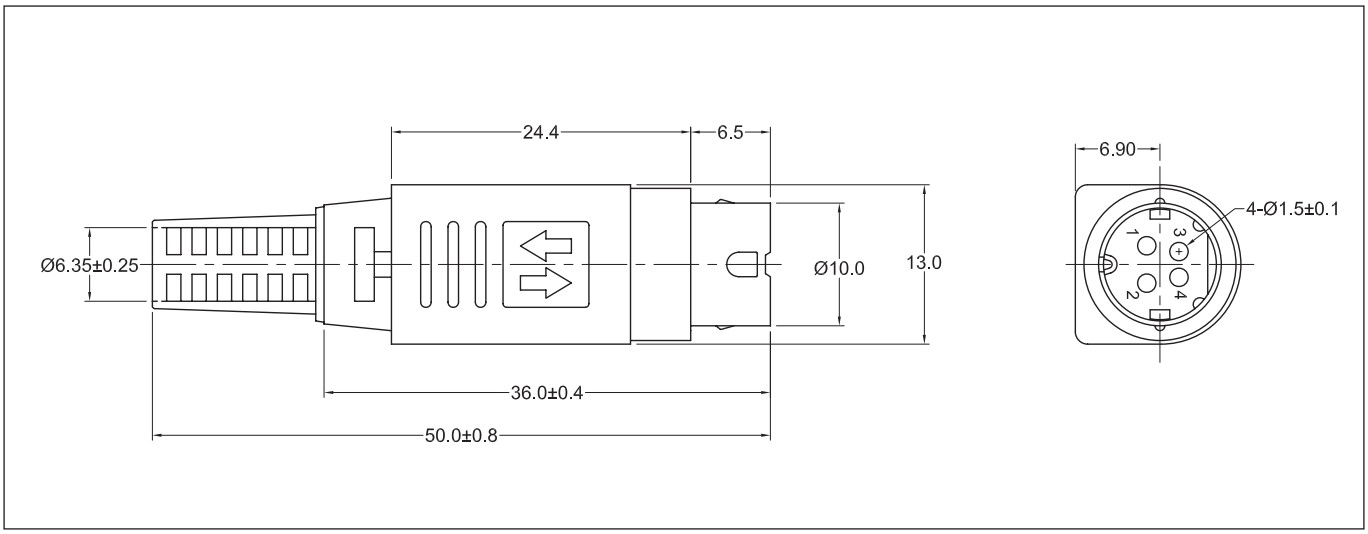


Notes:

1. All Dimensions are in mm
2. Box colour black
3. Tolerance: ±0.5mm

Other External AC-DC Products - **DTM65-C, DTM65-C8, DTM165**

DTM110-C Output Connector



Pinout DTM110-C Model

Pin	Function
1	- Vout
2	- Vout
3	+ Vout
4	+ Vout

Alternative output connectors are available
Please contact Sales for further information (min quantities apply)

Industrial Test Comm Broadcast

150W AC-DC External Power Supplies

Features	Benefits
• ErP, CEC and EISA Compliant	• Easier system compliance
• Wide Range AC Input	• Global Operation
• 87% Average Efficiency	• Consumes less energy

Specification

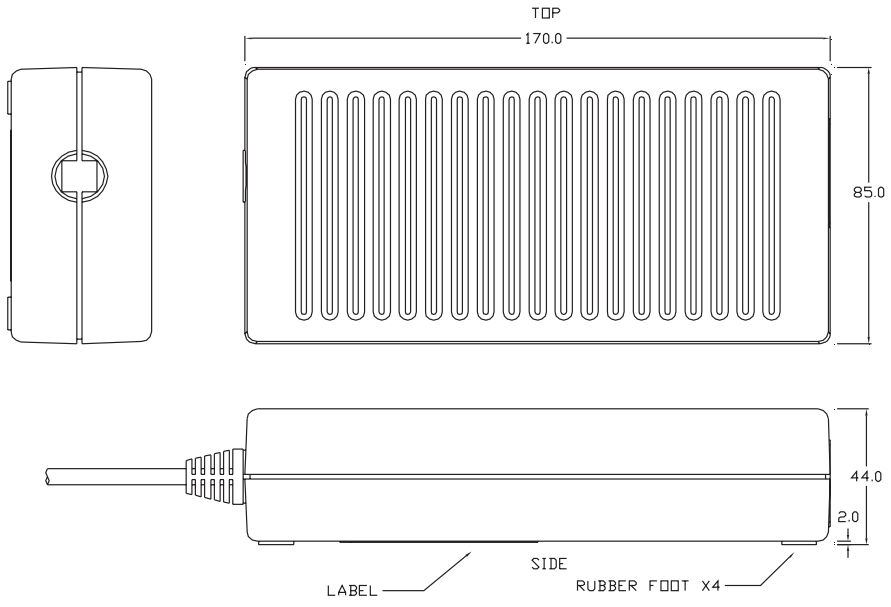
Model		DT150PWxxx-C
Input Voltage range	-	90 - 264VAC (47 - 63Hz)
Inrush Current	A	<60A at 230VAC input, 25°C ambient cold start
Input Current (Maximum)	A	2.5A
Power Factor	-	Typically 0.9 at full load (Meets EN61000-3-2)
Leakage Current	µA	<600uA at 264VAC 60Hz
Hold Up Time (Typ)	ms	>20ms at 115VAC input
Temperature Coefficient	-	±0.05%/°C
Voltage Accuracy	%	±1%
Adjustment Range	-	None
Minimum Load	A	None
Total Regulation	-	+5% / -2%
Ripple & Noise	%	See model selector
Short Circuit Protection	-	Continuous - hiccup mode (Auto Recovery)
Overvoltage Protection	V	110 - 130% of nominal (Cycle input power to reset)
Efficiency	%	>87% Avg. Active Efficiency
Operating Temperature	°C	0 to +40°C
Storage Temperature	°C	-10 to +85°C
Humidity (non condensing)	-	20 - 90% RH
Cooling	-	Convection
Withstand Voltage	-	Input to Ground 1.5kVAC, Input to Output 3kVAC for 1 min. (Output is connected to Ground internally)
Isolation Resistance	-	>20M at 25°C & 70%RH, Output to Ground 500VDC
Vibration (non operating)	-	23.52m/s^2 (10 - 55Hz: constant sweep 1 min X, Y, Z for 1 hour)
Shock	-	< 196.1 m/s^2 (20G)
Safety Agency Approvals	-	CSA/UL60950-1, EN609501-1, IEC60950-1
Safety Class	-	Class I
Offload Power Consumption	-	< 0.5W
Conducted & Radiated EMI	-	EN55022-B, FCC Class B
Immunity	-	EN55024
Weight (Typ)	g	780g
Size (WxLxH)	mm	85 x 170 x 44
Cable Length & Thickness	mm	1050mm; 12 to 24V Models: #14 AWG, 36 to 48V Models: #16 AWG
AC Input Connector	-	IEC 320-C14 (Accepts IEC 320-C13)
Output Connector	-	Kycon KPPx-4P or equivalent Pins 1 & 2: -Vout, Pins 3 & 4: +Vout
MTBF	-	140,000 hours, 100% load, 25°C ambient, MIL-HNBK
Warranty	yrs	2

Notes: (1) ErP - Energy Related Products (2) Californian Energy Commission (3) EISA - Energy Independence and Security Act of 2007

Model Selector

Model	Output (V)	Maximum Output (A)	Maximum Power (W)	Ripple & Noise (mV)	ErP2	CEC V	EISA Efficiency Level V
DT150PW120C	12	11.67	140	240	Y	Y	Y
DT150PW160C	16	9.38	150	320	Y	Y	Y
DT150PW190C	19	7.90	150	380	Y	Y	Y
DT150PW240C	24	6.25	150	480	Y	Y	Y
DT150PW360C	36	4.17	150	480	Y	Y	Y
DT150PW480C	48	3.13	150	480	Y	Y	Y

Outline Drawing DT150-C Series



Notes:

1. AC Inlet: IEC320-C14 Standard
2. Box colour black
3. Tolerance: +0.5mm
4. All Dimensions are in mm

Industrial Test Comm Broadcast

150W AC-DC External Power Supplies

Features	Benefits
• EU CoC Tier 2 & DoE Level VI Compliant (1) (2)	• Easier system compliance
• Wide Range AC Input	• Global Operation
• 89% Average Efficiency	• Consumes less energy

Specification

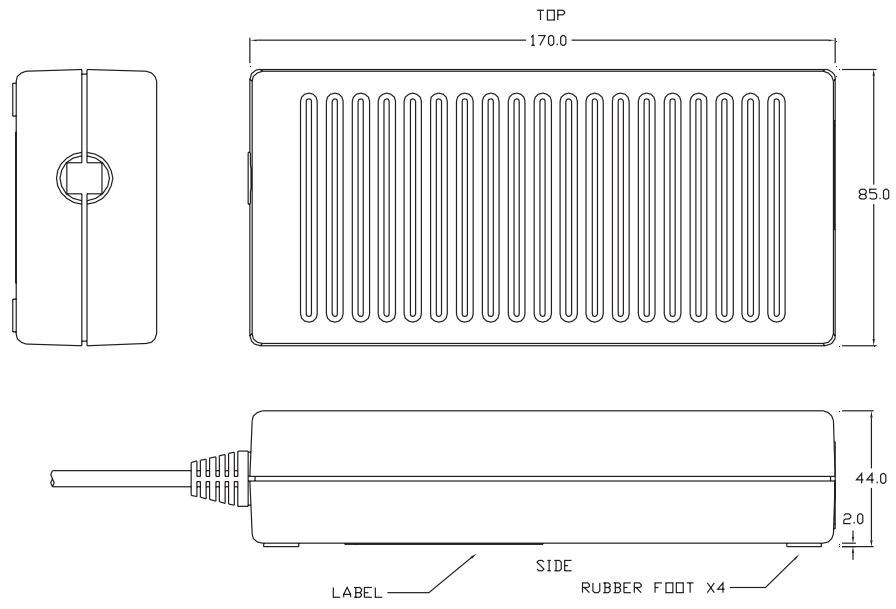
Model		DT150PWxxx-D
Input Voltage range	-	90 - 264VAC (47 - 63Hz)
Inrush Current	A	<60A at 230VAC input, 25°C ambient cold start
Input Current (Maximum)	A	2.5A
Power Factor	-	Typically 0.9 at full load (Meets EN61000-3-2)
Leakage Current	µA	<600uA at 264VAC 60Hz
Hold Up Time (Typ)	ms	>20ms at 115VAC input
Temperature Coefficient	-	±0.05%/°C
Voltage Accuracy	%	±1%
Adjustment Range	-	None
Minimum Load	A	None
Total Regulation	-	+5% / -2%
Ripple & Noise	%	See model selector
Short Circuit Protection	-	Continuous - hiccup mode (Auto Recovery)
Overvoltage Protection	V	110 - 130% of nominal (Cycle input power to reset)
Efficiency	%	>89% Avg. Active Efficiency
Operating Temperature	°C	0 to +60°C
Storage Temperature	°C	-10 to +85°C
Humidity (non condensing)	-	20 - 90% RH
Cooling	-	Convection
Withstand Voltage	VAC	Input to Ground 1.5kVAC, Input to Output 3kVAC, Output to Ground 500VDC*
Isolation Resistance	Ω	>20MΩ at 25°C & 70%RH, Output to Ground 500VDC
Vibration (non operating)	-	23.52m/s^2 (10 - 55Hz: constant sweep 1 min X, Y, Z for 1 hour)
Shock	-	< 196.1 m/s^2 (20G)
Safety Agency Approvals	-	CSA/UL60950-1, EN609501-1, IEC60950-1
Safety Class	-	Class I
Off Load Power Consumption	-	< 0.21W
Conducted & Radiated EMI	-	EN55022-B, FCC Class B
Immunity	-	EN55024
Weight (Typ)	g	780g
Size (WxLxH)	mm	85 x 170 x 44
Cable Length & Thickness	mm	1050mm; 12 to 24V Models: #14 AWG, 36 to 48V Models: #16 AWG
AC Input Connector	-	IEC 320-C14 (Accepts IEC 320-C13)
Output Connector	-	Kycon KPPx-4P or equivalent Pins 1 & 2: -Vout, Pins 3 & 4: +Vout
MTBF	-	140,000 hours, 100% load, 25°C ambient, MIL-HNBK
Warranty	yrs	2

Notes: **(1)** EU CoC - European Code of Conduct **(2)** Department of Energy * Versions available for output to be internally connected to ground. Contact local sales office

Model Selector

Model	Output (V)	Maximum Output (A)	Maximum Power (W)	Ripple & Noise (mV)	ErP2	CEC V	EISA Efficiency Level VI
DT150PW120D	12	11.67	140	240	Y	Y	Y
DT150PW160D	16	9.38	150	320	Y	Y	Y
DT150PW190D	19	7.90	150	380	Y	Y	Y
DT150PW240D	24	6.25	150	480	Y	Y	Y
DT150PW360D	36	4.17	150	480	Y	Y	Y
DT150PW480D	48	3.13	150	480	Y	Y	Y

Outline Drawing DT150-D Series



Notes:

1. AC Inlet: IEC320-C14 Standard
2. Box colour black
3. Tolerance: +0.5mm
4. All Dimensions are in mm

Medical

160W to 165W Medical AC-DC External Power Supplies

Features	Benefits
• CEC, ErP and EISA(1) Level V Compliant	• Easier System Approvals
• Wide Range AC Input	• Global Operation
• 60601-1 Medical Certification /2xMoPP	• Simplifies Equipment Design
• >87% Average Efficiency	• Consumes Less Energy

Notes: (1) EISA - Energy Independence and Security Act of 2007

Specification

Model		DTM165PWxxx-C
Input Voltage Range	VAC	90 - 264VAC (47 - 63Hz)
Inrush Current	A	<130A at 230VAC input, 25°C ambient cold start
Input Current	A	2.5A at 90VAC, Full Load
Power Factor	-	Meets EN61000-3-2. >0.9 PF
Leakage Current (264VAC 60Hz)	uA	<300uA
Hold Up Time (Typ)	ms	>10ms
Temperature Coefficient	%/°C	±0.05%/°C
Voltage Accuracy	%	±1%
Adjustment Range	V	None
Minimum Load	A	None
Total Regulation	%	12V to 19V Models:±5%, >19V models ±3%
Ripple & Noise	%	1%
Short Circuit Protection	-	<160% - hiccup mode
Overvoltage Protection	V	120 - 150% of nominal (Cycle input power to reset)
Efficiency	%	>87% average efficiency
Operating Temperature	°C	0°C to 60°C, derate linearly 50% load from 40°C to 60°C
Storage Temperature	°C	-10°C to 80°C
Humidity (non condensing)	%RH	0 - 90%RH
Cooling	-	Convection
Withstand Voltage	VAC	Input to Ground 1.5kVAC, Input to Output 4kVAC (Reinforced) (2 x MOPPs) (1)
Vibration (non operating)	-	23.52m/s² (10 - 55Hz: constant sweep 1 min X, Y, Z for 1 hour)
Shock	-	< 196.1 m/s² (20G)
Safety Agency Certification	-	UL60601-1, EN60601-1, IEC60601-1, CE Mark
Efficiency Level	-	CEC, ErP, EISA level V
Offload Power Consumption	W	< 0.5W
Conducted & Radiated EMI	-	EN55022, FCC Part 18 Class B
Immunity	-	EN55011:2007+A2:2007
Weight (Typ)	g	790
Size (WxLxH)	mm	85 x 170 x 44
Cable Length	mm	1050
AC Input Connector	-	IEC 320-C14 (Accepts IEC 320-C13)
Output Connector	-	Kycon KPPx-4P or equivalent Pins 1 & 2: -Vout, Pins 3 & 4: +Vout
Warranty	yrs	2

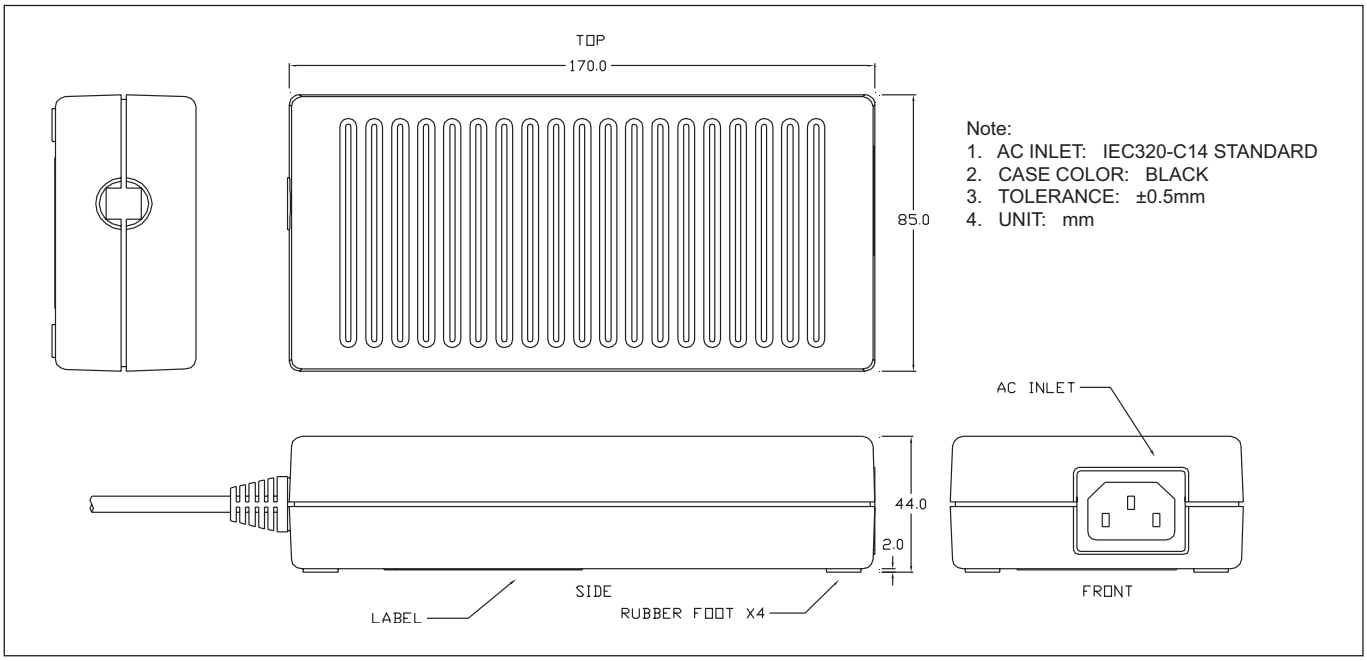
Note: (1) Output isolated and output grounded options available, see model selector

Model Selector

Model	Output (V)	Maximum Output (A)	Maximum Power (W)
DTM165PW120C	12	13.333	160
DTM165PW150C	15	10.67	160
DTM165PW190C	19	8.42	160
DTM165PW240C	24	6.88	165
DTM165PW280C	28	5.89	165
DTM165PW360C	36	4.58	165
DTM165PW480C	48	3.44	165

Standard model - output isolated from GND
Option: add suffix -G (DTM165PWxxxC-G) for output connected to GND

Outline Drawing DTM165-C Series



Other External AC-DC Products

DTM65-C	40W to 65W Medical Adapters
DTM65-C8	40W to 65W Medical Adapters
DTM110-C	90W to 110W Medical Adapters

Medical Test Comm Broadcast

110W Medical/ITE Class II External Power Supplies

Features	Benefits
• Meets DoE Level VI & EU Tier 2 Efficiency	• Easier System Approvals
• 60601-1 & 60601-1-11 Medical Certification /2xMoPP	• Suitable for B & BF Rated Equipment
• Wide Range AC, Class II Input IEC320-C8	• Global Operation
• < 0.15W Off-load Power Draw	• Consumes Less Energy

Specification

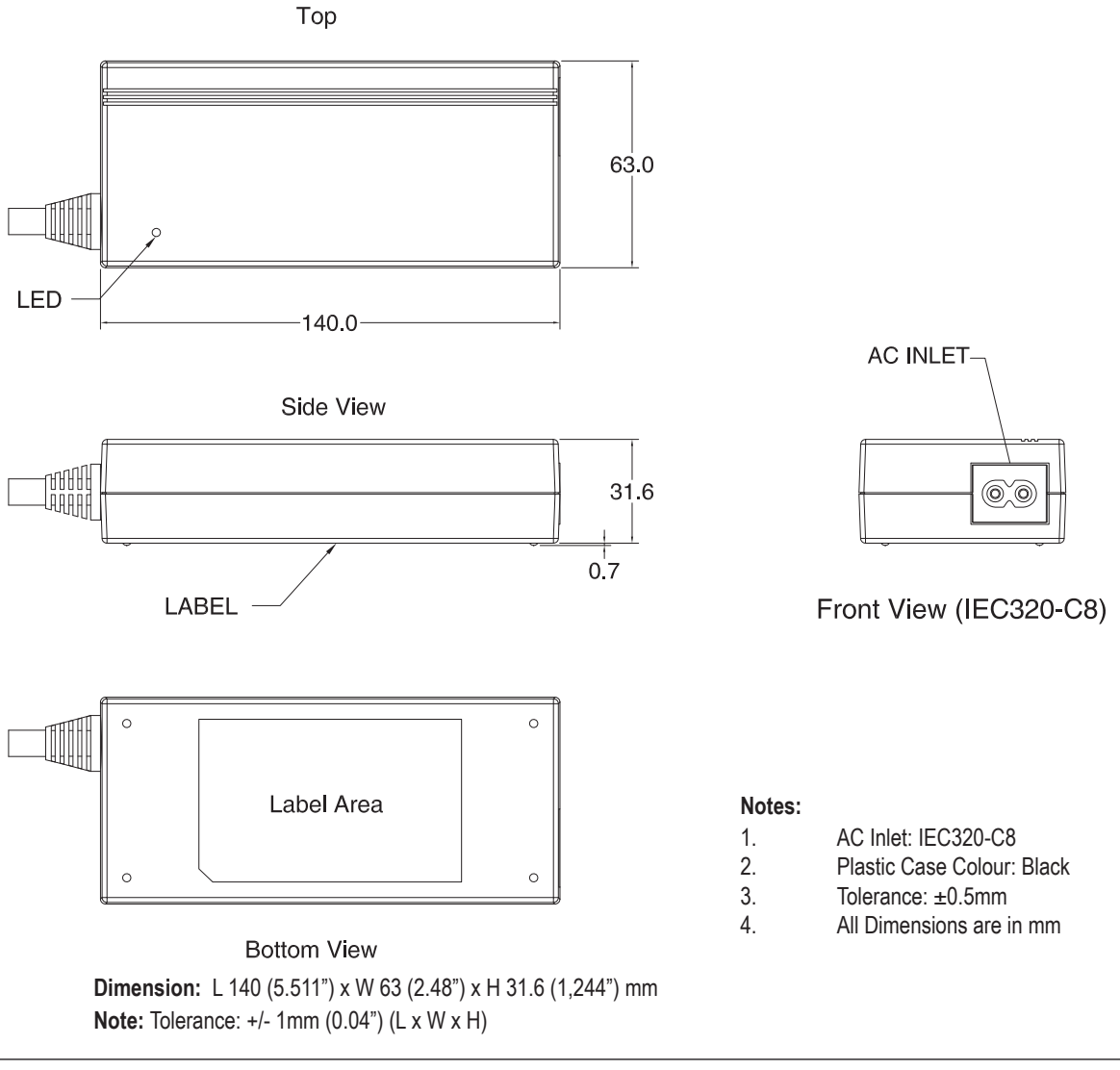
Model		DTM110-C8
Input Voltage range	VAC	90 - 264VAC (47 - 63Hz)
Inrush Current	A	<120A at 230VAC input, 25°C ambient cold start
Input Current	A	2A @90VAC; 1.25A @264VAC Maximum
Touch Current	-	<100uA @ 264VAC
Power Factor	-	Meets EN61000-3-2, >0.9 at 230VAC full load
Hold Up Time (Typ)	ms	10ms at 115VAC input
Temperature Coefficient	%/°C	±0.05%/°C
Adjustment Range	-	None
Minimum Load	A	None
Total Regulation	%	12-19V: ±5%, 24-48V: ±3%
Ripple & Noise (pk-pk)	mV	150mV
Overload & Short Circuit Protection	-	105 - 150% - hiccup mode
Overvoltage Protection	V	Cycle input power to reset
Efficiency	%	>89%, average efficiency
Operating Temperature	°C	-20°C to +60°C derate linearly to 50% load from 40°C to 60°C Derate linearly to 80% load from 0°C to -20°C
Storage Temperature	°C	-20°C to +85°C
Humidity (non condensing)	%RH	0 - 95%RH
Cooling	-	Convection
Withstand Voltage	VAC	Input to Output 4kVAC (2xMoPP)
Safety Agency Certification	-	IEC/ES/CSA/EN60601-1, IEC60601-1-11, IEC/UL/CSA/EN60950-1, CE Mark
Offload Power Consumption	W	< 0.15W
EMC	-	EN60601-2, IEC60601-1-2 Ed4:2014, EN55011 Class B, EN55032 Class B, FCC Part 15 Class B, FCC Part 18 Class B
IP Rating	-	IP41
Altitude	m	5,000m maximum
Weight (Typ)	g	780g
Size (WxLxH)	mm	63 x 140 x 33
Cable Length	mm	1000
AC Input Connector	-	IEC320-C8 (2 prong)
Output Connector	-	Kycon KPPX-4P or equivalent; Pins 1 & 2: -Vout, Pins 3 & 4: +Vout
Warranty	yrs	3

Notes: Other connectors are available. Contact factory.

Model Selector

Model	Output (V)	Maximum Output (A)	Maximum Power (W)
DTM110PW-120C8	12V	8.75A	105W
DTM110PW-150C8	15V	7.34A	110W
DTM110PW-190C8	19V	5.79A	110W
DTM110PW-240C8	24V	4.59A	110W
DTM110PW-280C8	28V	3.93A	110W
DTM110PW-360C8	36V	3.06A	110W
DTM110PW-480C8	48V	2.29A	110W

Outline Drawing DTM110-C8 Series



Dimension: L 140 (5.511") x W 63 (2.48") x H 31.6 (1,244") mm
Note: Tolerance: +/- 1mm (0.04") (L x W x H)

Notes:
1. AC Inlet: IEC320-C8
2. Plastic Case Colour: Black
3. Tolerance: ±0.5mm
4. All Dimensions are in mm

Medical Test Comm Broadcast

250W Medical / ITE External Power Supplies

Features	Benefits
• Meets DoE Level VI & EU Tier 2 Efficiency	• Easier System Design
• Medical & ITE Certifications	• Suitable for B & BF Rated Systems
• < 0.15W Off-load Power Draw	• Consumes Less Energy
• Meets IEC60601-1-2 Ed4	• Simplifies Equipment Design

Specification

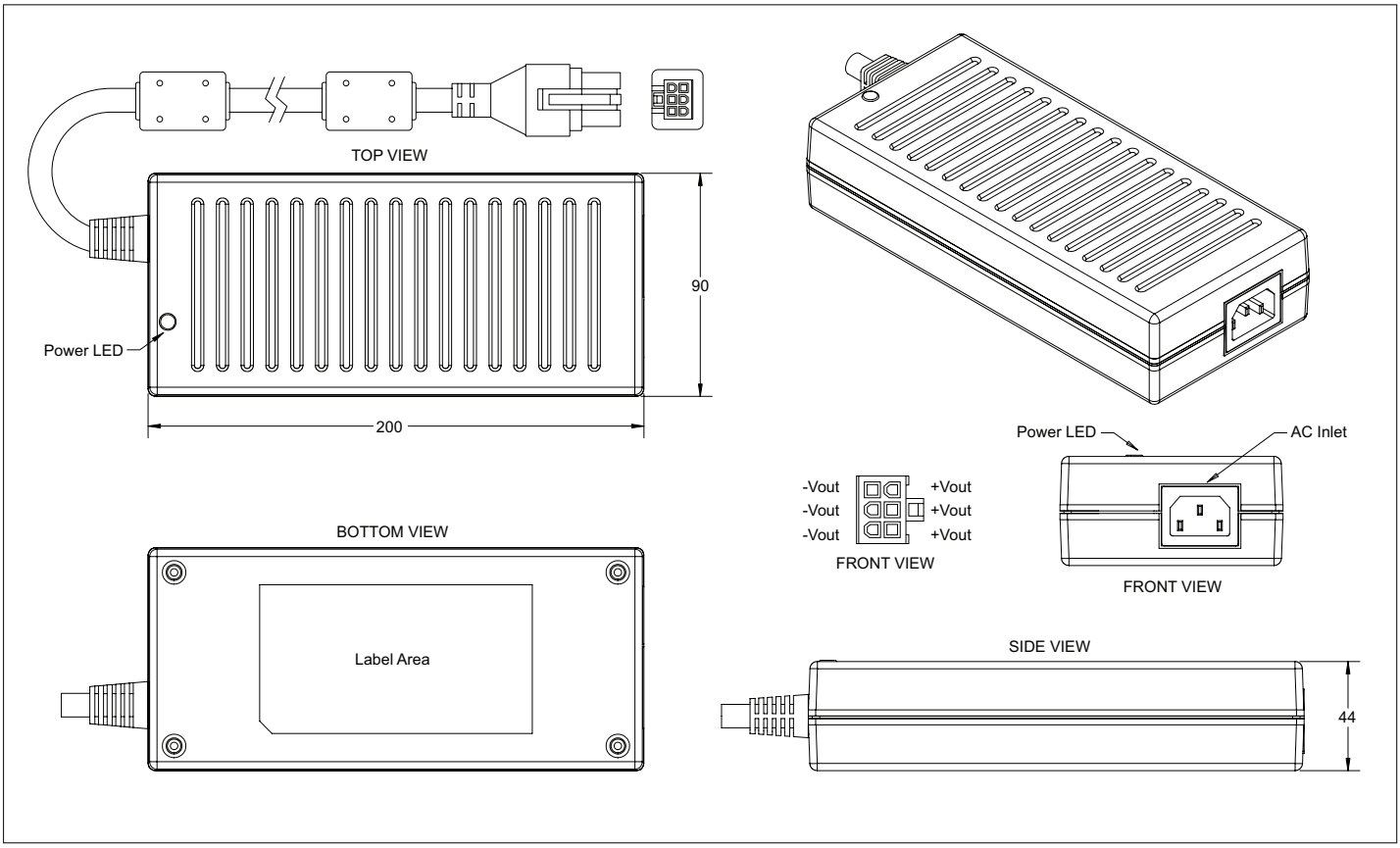
Model		DTM250-D
Input Voltage range	VAC	90 - 264VAC (47 - 63Hz)
Inrush Current	A	<80A at 230VAC input, 25°C ambient cold start
Input Current	A	2.5A @115VAC; 1.3A @230VAC Maximum
Touch Current	-	<100uA @ 264VAC
Power Factor	-	Meets EN61000-3-2, >0.9 at 230VAC full load
Hold Up Time (Typ)	ms	10ms at 115VAC input
Temperature Coefficient	%/°C	±0.05%/°C
Adjustment Range	-	None
Minimum Load	A	None
Total Regulation	%	±5%
Ripple & Noise (pk-pk)	mV	12V: 240mV, 19 - 54V: 300mV
Overload & Short Circuit Protection	-	105 - 160% - hiccup mode
Overvoltage Protection	V	Auto-recovery
Efficiency	%	>89%, average efficiency
Operating Temperature	°C	-20°C to +60°C derate linearly to 50% load from 40°C to 60°C Derate linearly to 80% load from 0°C to -20°C
Storage Temperature	°C	-20°C to +85°C
Humidity (non condensing)	%RH	0 - 95%RH
Cooling	-	Convection
Withstand Voltage	VAC	Input to Output 4kVAC (2xMoPP), Input and Output to Ground 1.5kVAC (1xMoPP)
Safety Agency Certification	-	IEC/ES/CSA/EN60601-1, IEC60601-1-11, IEC/UL/CSA/EN60950-1, CE Mark
Offload Power Consumption	W	< 0.15W
EMC	-	IEC60601-1-2 Ed4:2014, EN55011 Class B, EN55032 Class B, FCC Part 15 Class B, FCC Part 18 Class B
Altitude	m	5,000m maximum
Weight (Typ)	g	1300g
Size (WxLxH)	(mm)	90 x 200 x 45mm
Cable Length	mm	800mm
AC Input Connector	-	IEC 320-C14 (3 prong)
Output Mating Connector	-	Molex Mini Fit 39-28-1063 or equivalent; Pins 1 - 3: -Vout, Pins 4 - 6: +Vout
Warranty	yrs	3

Notes: Other connectors are available. Contact factory.

Model Selector

Model	Output (V)	Maximum Output (A)	Maximum Power (W)
DTM250PW120D	12V	20.83A	250W
DTM250PW190D	19V	13.157A	250W
DTM250PW240D	24V	10.416A	250W
DTM250PW280D	28V	8.928A	250W
DTM250PW360D	36V	6.94A	250W
DTM250PW480D	48V	5.208A	250W
DTM250PW540D	54V	4.629A	250W

Outline Drawing DTM250-D Series



Medical Test Comm Broadcast

300W Medical/ITE Class I and II External Power Supplies

Features	Benefits
• Meets 60601-1 & 60601-1-2 Ed , 2014	• Simplifies B & BF Equipment Design
• Wide Range AC, Class I & Class II inputs	• Global Operation
• <0.5W No Load Power	• Consumes Less Energy
• Meets DoE Level VI Efficiency	• Easier System Approvals

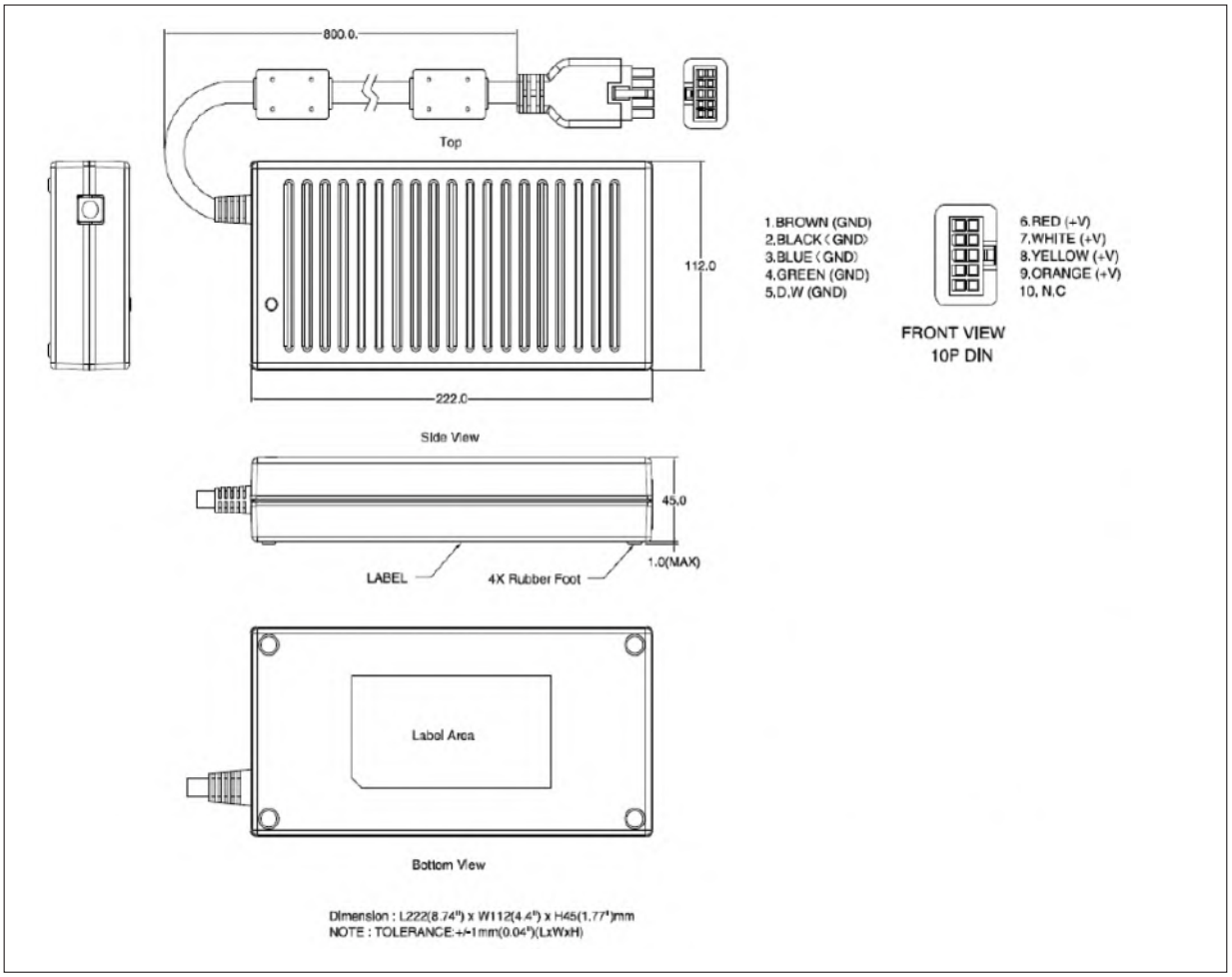
Specification

Model		DTM300M-D
Input Voltage range	VAC	90 - 264VAC (47 - 63Hz)
Inrush Current	A	<70A at 230VAC input, 25°C ambient cold start
Input Current	A	3A at 115VAC Maximum
Touch Current	-	<100uA @ 264VAC
Power Factor	-	Meets EN61000-3-2, >0.9 at 230VAC full load
Hold Up Time (Typ)	ms	10ms at 115VAC input
Temperature Coefficient	%/°C	±0.05%/°C
Adjustment Range	-	None
Minimum Load	A	None
Total Regulation	%	±5% (-20 to -30°C ±10%)
Ripple & Noise	mV	12V model: 240mV; all others 300mV
Overload & Short Circuit Protection	-	105 - 150% - hiccup mode
Overvoltage Protection	V	Auto-recovery
Efficiency	%	>88%, average efficiency
Operating Temperature	°C	-30 to +60°C derate linearly to 50% load from 40 to 60°C Derate linearly to 70% load from 0 to -30°C
Storage Temperature	°C	-30 to +85°C
Humidity (non condensing)	%RH	0 - 95%RH
Cooling	-	Convection
Withstand Voltage	VAC	Class I: Input to Ground 1.5kVAC, Input to Output 4kVAC (2xMoPP), Output to Ground: 1.5kVAC Class II: Input to Output 4kVAC (2xMoPP)
Safety Agency Certification	-	IEC/ES/CSA/EN60601-1, IEC/UL/CSA/EN60950-1, CE Mark
No Load Power Consumption	W	< 0.5W
EMC	-	EN60601-2, IEC60601-1-2 Ed4:2014, EN55011 Class B, EN55024 Class B EN55024 Class B, FCC Part 15 Class B, FCC Part 18 Class B
Altitude	m	5,000 maximum
Weight (Typ)	g	1570g
Size (WxLxH)	mm	112 x 222 x 45
Cable Length	mm	800
AC Input Connector	-	Class I: IEC 320-C14 (3 prong); Class II: IEC 320-C18 (2 prong)
Output Connector	-	See Output Connector on page 3
Warranty	yrs	3

Model Selector

Model	Output (V)	Maximum Output (A)	Maximum Power (W)	Ripple /Noise	Regulation (mV)	Efficiency Level	Class
DTM300PW-120D1	12V	25A	300W	240mV	±5%	VI	I
DTM300PW-150D1	15V	20A	300W	300mV	±5%	VI	I
DTM300PW-190D1	19V	15.79A	300W	300mV	±5%	VI	I
DTM300PW-240D1	24V	12.5A	300W	300mV	±5%	VI	I
DTM300PW-280D1	28V	10.71A	300W	300mV	±5%	VI	I
DTM300PW-480D1	48V	6.25A	300W	300mV	±5%	VI	I
DTM300PW-540D1	54V	5.56A	300W	300mV	±5%	VI	I
DTM300PW-120D2	12V	25A	300W	240mV	±5%	VI	II
DTM300PW-150D2	15V	20A	300W	300mV	±5%	VI	II
DTM300PW-190D2	19V	15.79A	300W	300mV	±5%	VI	II
DTM300PW-240D2	24V	12.5A	300W	300mV	±5%	VI	II
DTM300PW-280D2	28V	10.71A	300W	300mV	±5%	VI	II
DTM300PW-480D2	48V	6.25A	300W	300mV	±5%	VI	II
DTM300PW-540D2	54V	5.56A	300W	300mV	±5%	VI	II

Outline Drawing DTM300-D Series



AC-DC Power Supplies

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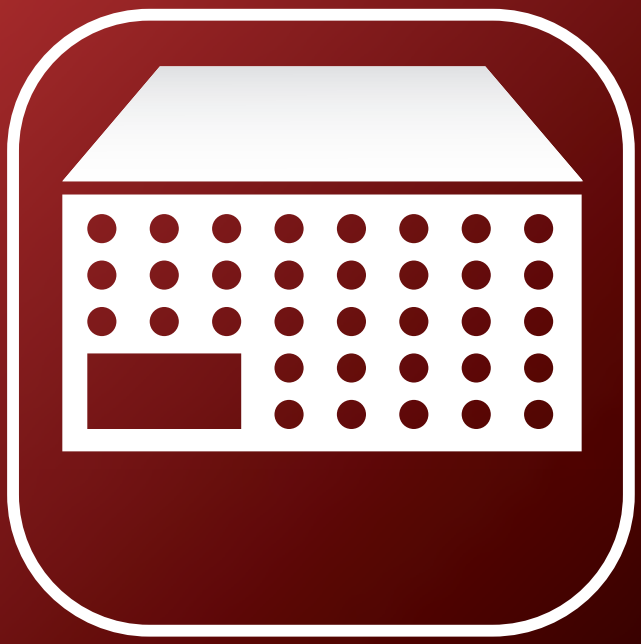
EVS	191	ZMS100	270
GWS250	193	ZP40 & 60	274
GWS500	196	ZPSA20	277
GXE600	199	ZPSA40 & 60	280
HWS-/HD	202	ZPSA100	283
HWS-/ME	205	ZWD-PAF	286
HWS15A-150A	208	ZWQ	289
HWS300-1500	213	ZWS 150BP-240BP	292
HWS300P & 600P	216	ZWS-B 10-30W	295
JWT	219	ZWS-BAF	298
LS25-150	221	ZWS240RC-24	303
LS200	226		



Chassis mount

Applications

- Embedded (built-in) power supplies for a broad range of applications
- Suitable for industrial applications, automation, test equipment
- High reliability and low cost products available

Features

- 5 to 2500W output power
- Single-phase wide range input 85 – 265Vac
- Power factor correction meets EN61000-3-2 class A harmonics
- Input/output connection with screw terminals or PCB connectors
- Enclosed or open frame case style
- Safety meets EN/IEC/UL 60950-1 standard. CE marked for Low Voltage Directive

Medical Industrial Comm Broadcast

2 x4" 40-65W AC-DC Medical & ITE Power Supplies

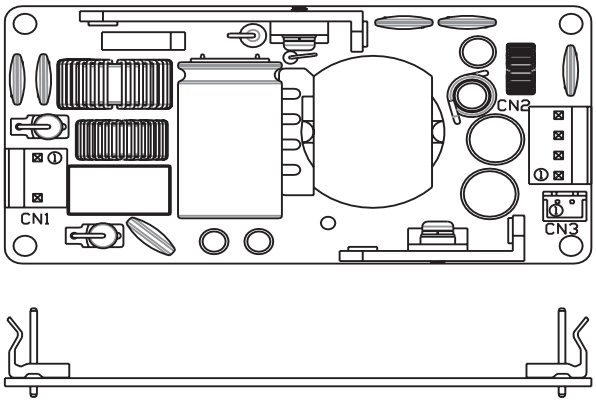
Features	Benefits
• Industry Standard Footprint	• Availability to Second Source
• Wide Range AC Input	• Global Operation
• Dual Input Fuses	• Easier System Compliance

Specification

Model		CSS65A
Input Voltage Range	-	90 - 264VAC (47 - 63Hz)
Inrush Current (115/230VAC)	A	Less than 45A / 90A, 25°C ambient cold start
Input Current (115/230VAC)	A	2 / 1
Leakage Current	uA	<250uA 264VAC 63Hz
Touch Current	uA	<100uA 264VAC 63Hz
Hold Up Time (Typ)	ms	>10ms at 115VAC input
Off-Load Power Consumption	W	<75mW
Average Efficiency	%	5V: 86%, 12-54V: 89%
Temperature Coefficient	%/°C	±0.05%/°C
Output Voltage Accuracy	%	±1%
Output Adjustment Range	-	None
Remote Sense	-	Yes
Minimum Load	A	None
Output Regulation	%	5V: ±5%, 12-28V: ±3%, 48-54V: ±2%
Ripple & Noise	%	See Model Selector
Overcurrent Protection	-	110 - 180%, Auto-Recovery
Overvoltage Protection	V	110 - 130% of nominal (Cycle input power to reset)
Operating Temperature	°C	0°C to +70°C derate linearly to 50% load from 50°C to 70°C
Storage Temperature	°C	-40°C to +85°C
Humidity (non condensing)	%RH	10 - 90%RH
Cooling	-	Convection
Withstand Voltage	VAC	Input to Ground 1.5kVAC, Input to Output 4kVAC (Reinforced) (2 x MOPPS), Output to Ground 1.5kVAC (1xMOPPS).
Isolation Resistance	MΩ	>20MΩ at 25°C & 70%RH, Output to Ground 500VDC
Vibration (non operating)	-	23.52m/s^2 (10 - 55Hz: constant sweep 1 min X, Y, Z for 1 hour)
Shock	-	< 196.1 m/s^2 (20G)
Safety Agency Approvals	-	UL/CSA/IEC/EN60601-1, ANSI/AAMI ES60601-1,UL/CSA/IEC/EN60950-1, CE Mark
Conducted & Radiated EMI	-	EN55011-B, FCC Class B
Immunity	-	EN60601-1-2, IEC61000-4
Altitude	m	Medical: 3,000m, ITE: 5,000m
Weight (Typ)	g	136g
Size (WxLxH)	mm	50.8 x 101.6 x 30.5 (including underside components)

Outline Drawing CSS65A Series

Input/Output Connectors (Molex)



CN1: Input Connector (Molex)
Mates with 5265 09-76-1020 or equivalent

Pin #	Signal
1	AC Line
2	AC Neutral

CN1: Input Connector (JST)
Mates with JST VHR-3N or equivalent

Pin #	Signal
1	AC Neutral
2	AC Line

CN2: Output Connector (Molex)
Mates with 5239 09-52-4044 or equivalent

Pin #	Signal
1	+Vout
2	+Vout
3	0V
4	0V

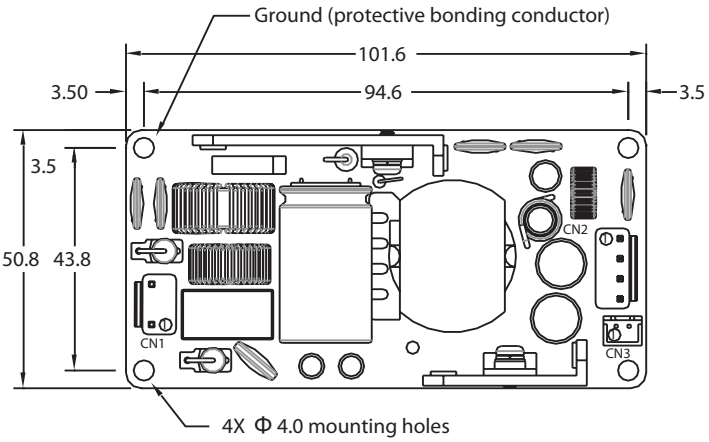
CN2: Output Connector (JST)
Mates with JST VHR-4N or equivalent

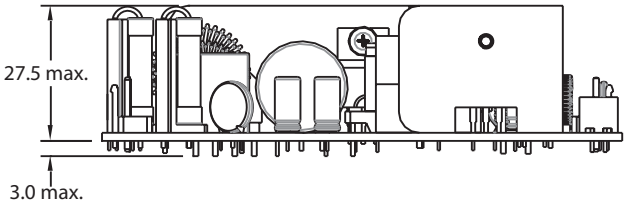
Pin #	Signal
1	0V
2	0V
3	+Vout
4	+Vout

CN3: Remote Sense (JST Only)

Pin #	Signal
1	+V sense
2	0V sense

JST Input/Output Connectors shown (/J option)





Model Selector

Model	Output (V)	Maximum Output (A)	Maximum Power (W)	Ripple and Noise Full Load (mV)	Ripple and Noise <30% Load (mV) (1)
CSS65A-5	5	8.0	40	100	200
CSS65A-12	12	5.42	65	120	200
CSS65A-15	15	4.34	65	120	300
CSS65A-19	19	3.43	65	120	300
CSS65A-24	24	2.71	65	200	300
CSS65A-28	28	2.33	65	200	350
CSS65A-48	48	1.36	65	200	480
CSS65A-54	54	1.21	65	200	480

Notes: (1) Ripple level increases at light loading to meet new efficiency standards

Options

Suffix	Description
Blank	Molex Input and Output Connectors
/J	JST Input and Output Connectors

Medical Industrial Test Comm Broadcast

3 x 5” 150W AC-DC Medical Power Supplies

Features	Benefits
• No Load Power <0.5W	• Energy Saving
• Low Profile, Industry Standard Footprint	• Fits 1U Applications
• Dual input fuses	• Simplifies System Design, Reduces Cost

Specification

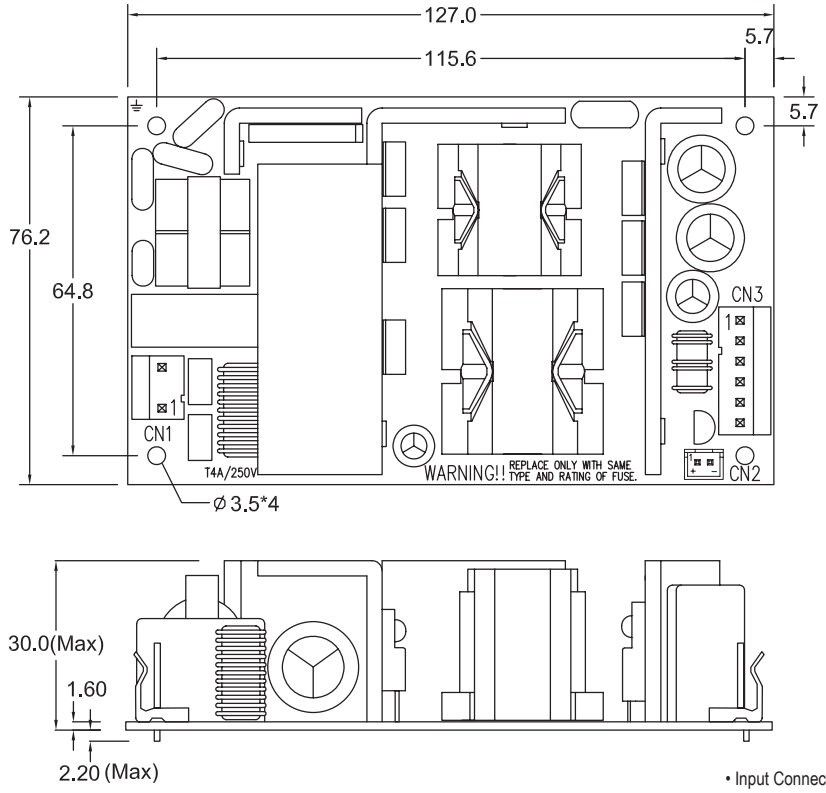
Model		CSS150
Input Voltage range	V	90 - 264VAC (47 - 400Hz)(1) or 120 - 180VDC
Inrush Current	A	<60A maximum at 264VAC input, 25°C ambient cold start
Input Current (115/230VAC)	A	1.7 / 0.85
Power Factor Correction	-	Meets EN61000-3-2, >0.9
Leakage Current	µA	<250µA 264VAC 63Hz
Hold Up Time (Typ)	ms	16ms at 115VAC input
Temperature Coefficient	-	±0.05%/°C
Voltage Accuracy	%	±1%
Minimum Load	A	None
Total Regulation	%	±3%
Ripple & Noise	%	2% peak to peak
Overcurrent Protection	-	110 - 150%
Overvoltage Protection	V	110 - 150% of nominal (Cycle input power to reset)
Remote On/Off	-	Unit on: Floating or low <1.2V, Unit off: Apply 5V with respect to 0V
Efficiency	%	89% typical
No load power	W	<0.5W
Operating Temperature	°C	0 to +70°C derate linearly to 50% load from 50 to 70°C
Storage Temperature	°C	-20°C to +85°C
Humidity (non condensing)	-	20 - 95% RH
Cooling	-	Convection or forced air (2.5m/s)
Withstand Voltage	-	Input to Ground 1.5kVAC, 3kVAC (2 x MOOPs 3rd Edition), Output to Ground 500VDC for 1 min.
Isolation Resistance	Ω	>100M Ω at 25°C & 70%RH, Output to Ground 500VDC
Vibration (non operating)	-	19.6m/s2 (10~55Hz:2G Constant, X,Y,Z 60min each.)
Shock	G	< 196.1 m/s2 (2G)
Safety Agency Approvals	-	UL60601-1, EN60601-1, IEC60601-1, UL60950-1, EN60950-1, CE Mark
Conducted & Radiated EMI	-	EN55011-B, FCC Class B
Immunity	-	EN60601-1-2
MTBF	-	180,000 (MIL-217F-HDBK)
Weight (Typ)	g	340g
Size (WxLxH)	mm	127 x 76.2 x 33 (including underside components)
Warranty	yrs	2

(1) Derate linearly to 90W convection rating from 90 to 100VAC input

Model Selector

Model	Output Voltage (V)	Voltage Adjust (V)	Maximum Current Convection (A)	Maximum Power Convection (W)	Maximum Current Forced Air	Maximum Power Forced Air
CSS150-12	12V	11.64 - 12.36V	8.3A	100W	12.5A	150W
CSS150-15	15V	14.55 - 15.45V	6.7A	100W	10A	150W
CSS150-24	24V	23.28 - 24.72V	4.2A	100W	6.3A	150W
CSS150-36	36V	34.92 - 37.08V	2.8A	100W	4.2A	150W
CSS150-48	48V	46.60 - 49.44V	2.1A	100W	3.1A	150W

Outline Drawing CSS150 Series



Dimension :
L127(5") x W76.2(3") x H30.0(1.18")mm

Pin Assignments :

CN1	PIN1	L
	PIN2	N
CN2	PIN1	PS-ON +
	PIN2	PS-ON -
CN3	PIN1	GND
	PIN2	GND
	PIN3	GND
	PIN4	+V
	PIN5	+V
	PIN6	+V

- Input Connector mates with Molex Housing 09-50-3031 or equivalent
- Output Connector mates with Molex Housing 09-50-3061 or equivalent
- Remote On/Off (CN2) mates with J.S.T. XHP-2

Single Output 30 to 60W Medical & ITE Power Supplies

www.us.tdk-lambda.com/lp/products/cus-m-series
emea.tdk-lambda.com/cus30_60m

The CUS30M and CUS60M are 2" x 3" footprint AC/DC power supplies with outputs ranging from 5V to 48V. They are certified to IEC60601-1 3rd edition (medical), IEC60950-1 and IEC60335-1 with compliance to EN60601-1-2:2015 Edition 4 immunity requirements. Rated at 30W and 60W, these compact products meet class B conducted and radiated EMI in either a Class I or Class II (double insulated) construction, without the need for external filtering.

Features	Benefits
• 30 to 60W Convection Cooled	• Quiet Operation
• Medical Certification (2 x MoPP)	• Suitable for B and BF Rated Equipment
• Class B Conducted and Radiated EMI	• Easier System Compliance
• Suitable for Class I and II Installations	• Flexible Utilisation
• Compact 2" x 3" Footprint	• Space Saving in End Equipment
• Enclosure, Mounting and Connection Options	• Versatile Application

Model Selector

Model	Output Voltage (V)	Maximum Current (A)	Maximum Power (A)	Load Reg (mV)	Line Reg (mV)	Ripple Noise (mV) (1)	Efficiency (typ) % (2)	Average Active Efficiency (typ) % (2)
CUS60M-5	5	6	30	100	20	120	81 / 81	81 / 79.5
CUS30M-12	12	2.5	30	120	48	120	87 / 88	87 / 87
CUS60M-12	12	5	60	120	48	120	87 / 88	87 / 86
CUS30M-15	15	2	30	120	60	150	87 / 88	87 / 87
CUS60M-15	15	4	60	120	60	150	87.5 / 87	87 / 86.5
CUS30M-18	18	1.7	30.6	144	72	150	87 / 88	87 / 87
CUS60M-18	18	3.35	60.3	144	72	150	88 / 88	87 / 87
CUS30M-24	24	1.25	30	192	96	150	88 / 90	87 / 87
CUS60M-24	24	2.5	60	192	96	150	89 / 90	88 / 87
CUS30M-36	36	0.84	30.24	288	144	200	88 / 90	88 / 89
CUS30M-48	48	0.63	30.24	384	192	200	88 / 90	88 / 89
CUS60M-48	48	1.25	60	384	192	200	90 / 91	90 / 89

Options

Suffix	Description
Blank	Open frame, JST connectors
/A	Cover, JST connectors. See website for derating
/CO	Open frame, JST connectors, pcb coating
/M	Open frame, Molex 5195-03 & -04 mating connectors
/P	Open frame, JST connectors, Pcb mount
/SF	Open frame, JST connectors, single fuse, (Line only)

Specifications

Model		CUS30M	CUS60M
Input			
Input Voltage range	V	85 - 265VAC (3)	
Input Frequency	Hz	47- 63Hz	
Input Current (115/230VAC)	A	0.6 / 0.4	5V: 0.7 / 0.5, 12-48V: 1.2 / 0.8
Inrush Current (typ) (Cold Start)	A	30A at 115VAC, 60A at 230VAC	
Leakage Current	uA	<250µA at 265VAC, 60Hz	<200µA at 265VAC, 60Hz
Touch Current	uA	100µA at 265VAC, 60Hz	60µA at 265VAC, 60Hz
Harmonic Compliance	-	Meets EN61000-3-2	
No Load Power Consumption	W	<0.3W at nominal	<0.5W at nominal
Hold Up Time (typ) at 115VAC Input	ms	20 / 100	
Efficiency	-	See model selector	
Average Efficiency	-	See model selector. Measured at 25%, 50%, 75% and 100% load conditions	
Conducted & Radiated EMI	-	EN55011-B, EN55032-B, FCC Class B	
Immunity	-	IEC61000-4-2~8, IEC60601-1-2 Ed4. See immunity table	
Insulation Class	-	Construction suitable for Class I or Class II installation	
Safety Agency Certifications	-	EN/IEC/UL/ES/CSA60601-1, EN/IEC/UL/CSA60950-1, IEC60335-1, CE Mark	

Immunity

Test	Standard	Test Level	Criteria	Notes
ESD	EN61000-4-2	3 & 4	A	Level 4 contact discharge only
Radiated Susceptibility	EN61000-4-3	3	A	-
Electrical Fast Transient Burst	EN61000-4-4	3	A	-
Surge	EN61000-4-5	3 & 4	A	Level 4 common mode only
Conducted Susceptibility	EN61000-4-6	3	A	-
Magnetic fields	EN61000-4-8	4	A	-
Voltage Dips	EN61000-4-11	Class 3	B	100 - 120VAC
			A	200 - 240VAC
Short Interruptions	EN61000-4-11	Class 3	B	-
Voltage Dips	EN60601-1-2:2015	Class 2	B	100 - 120VAC
			A	200 - 240VAC
Short Interruptions	EN60601-1-2:2015	Class 2	B	-
SEMI F47 Line Dip	SEMI F47	-	-	At input voltages > 200VAC

Specifications

Model		CUS30M	CUS60M
Output			
Line Regulation	mV	See model selector	
Load Regulation	mV	See model selector	
Ripple & Noise	mV	See model selector	
Temperature Coefficient	%/°C	<0.02%/°C	
Minimum Load	-	No minimum load required	
Overcurrent Protection	A	>105% of rated current. Class 2 Limited Power Source (4)	
Overvoltage Protection (5)	V	> 115% of nominal output	>120% of nominal output
Remote Sense	-	No	
Indicators	-	None	
Parallel Operation	-	Not possible	
Series Operation	-	Possible, see installation manual	
Environmental			
Operating Temperature (-30°C start-up)	°C	-20 to +70°C. Derate linearly to 50% load from +50 to +70°C (6)	
Storage Temperature	°C	-40° to +85°C	
Humidity (non condensing)	%RH	10 - 90%RH (Operating & Storage)	
Cooling	-	Convection	
Altitude	m	5,000m, derate operating ambient by 5°C/1000m above 3,000m	
Withstand Voltage (For 1 minute)	VAC	Input to Ground 2kVAC (1xMOPP), Input to Output 4kVAC (2xMOPPs), Output to Ground 1.5kVAC (1xMOPP) suitable for B & BF rated equipment	
Isolation Resistance	MΩ	>100MΩ at 25°C, 70%RH & 500VDC Output to Ground	
Vibration (Non Operating)	-	10 - 500Hz: 19.6m/s^2 constant sweep 1 min X, Y, Z for 1 hour	
Shock	-	< 196.1 m/s^2	
Other			
Size (WxLxH)	mm	50.8 x 76.2 x 24.2	50.8 x 76.2 x 26.7
Size (WxLxH)	Inches	2 x 3 x 0.95	2 x 3 x 1.05
Connectors (JST)	-	Input (CN1): B2P3-VH(LF)(SN) (Mates with VHR-3N housing). Output (CN-51): B4P-VH(LF)(SN) (Mates with VHR-4N)	
MTBF - Telcordia SR-332 issue 3 (7)	Hours	9,960,323	7,084,410
Warranty	yrs	3 years	

Notes
See website for detailed specifications, test methods and installation manual
See installation manual for terminal pin and hand tool information
(1) Ripple level increases at light loading to meet new efficiency standards
(2) 115/230VAC. Average efficiency measured at 25, 50, 75 and 100% load
(3) CUS30M: Derate linearly to 80% load from 115VAC to 85VAC. CUS60M-12, 18 & 48: Derate linearly to 80% load from 100VAC to 85VAC. CUS60M-15 derate linearly to 60% load from 100Vac
(4) All models except CUS60M-5
(5) Shutdown Cycle AC input to reset
(6) CUS30M-18, 48 and CUS60M-12: Derate linearly to 50% load from +45 to +70oC. CUS60M-15: 50% load from +40 to +70oC. Models with /A cover have additional derating, see website.
(7) 24V output model, 25°C ambient, full load, 230VAC input

2 x 4" 100W AC-DC Power Supplies

Medical Industrial Test LED Broadcast

Features	Benefits
• 100W Convection Rating	• Quiet Operation
• 75W With 1m/s Airflow at 85°C Ambient	• Suitable for High Ambient Temperature Environments
• ITE & Medical Certifications (2 x MOPP)	• Suitable for B & BF Rated Equipment
• Suitable for Class I and Class II installations	• Flexible Utilisation
• Class B Conducted and Radiated EMI	• Easier System Compliance

Specification

Model		CUS100ME
Input Voltage range	-	85 - 264VAC (47 - 440Hz [1]). Derate linearly to 90% load from 90 to 85VAC input
Inrush Current (Cold start at 230VAC input)	A	<65A
Input Current (100W load)	A	1.4A at 100VAC input
Hold Up Time	ms	>24ms
Harmonic Compliance	-	EN/IEC61000-3-2 Class A. Minimum PF 0.97/0.89 (115/230Vac, 100% load)
Leakage Current	µA	<250µA at 230VAC 63Hz
Touch Current (enclosure leakage)	µA	<100µA
Temperature Coefficient	%/°C	±0.02%/°C
No Load Power Draw at 230VAC input	W	<0.5W
Output Adjustment	-	No adjustment
Ripple & Noise	mV (pk-pk)	<1% of nominal output for operating temperatures above 0°C At -20°C: 12V model <4%, 15V & 18V model <3%, other models <2%
Load Regulation	mV	≤1% (0 - 100% load)
Line Regulation	mV	≤0.5% (85 - 264VAC)
Short Circuit & Overcurrent Protection	%	110 - 190%. Hiccup mode, automatic recovery
Overvoltage Protection	V	115-140% of standard output voltage for each model, 48V model max 60V. Latching (unit shutdown), cycle AC input to reset
Efficiency	%	Up to 94%
Active Average Efficiency	%	>87%
Operating Temperature	-	-20°C to +85°C, see derating curves for operation above +50°C [2]
Storage Temperature	°C	-40°C to +85°C
Operational Altitude	m	5000m
Humidity (non condensing)	%RH	5 - 95 (15 - 90 for /F option), operational and non operational
Cooling	-	Convection, conduction (coldplate) or forced air cooling [2]
Withstand Voltage	VAC	Input to Ground 1.5kVAC (1xMOPP), Input to Output 4kVAC (2xMOPP), Output to Ground 1.5kVAC (1xMOPP)
Isolation Resistance	MΩ	>100MΩ at 25C & 70%RH, Output to Ground 500VDC
Insulation Class	-	Construction suitable for Class I or Class II installation
Vibration (non operating)	-	2G, 10-500Hz for 1 hour
Shock (non operating)	-	30G, 11ms half sine
Safety Agency Certifications [3]	-	IEC/EN/UL60950-1 and 60601-1. ES60601-1. IEC/EN/UL62368-1. Designed to meet IEC61010-1.
Conducted & Radiated EMI	-	EN55011 / EN55032-B (See application notes for conditions)
Immunity	-	Compliant with EN60601-1-2, 2015 (Ed4), see immunity table on page 3
Weight	g	Open Frame: 180g; /U: 240g; /A: 255g; /B: 220g
Size (WxLxH)	mm	Open frame version: 50.8 x 101.6 x 31.5
Warranty	yrs	5
Connectors	-	Input: JST B2P3-VH, Output: JST B6P-VH

Note (1): For operation at 400-440Hz, please contact Technical Sales **Note (2):** See website for full derating curves and all case styles
Note (3): EN60335-1 Compliant versions available subject to MOQ. Please contact Sales.

Specification parameters apply at 25°C ambient temperature unless otherwise stated

Style	Cooling	Output Power / Ambient Temperature			
		-20 to 50°C	70°C	80°C	85°C
Open frame	Convection	100W	60W	20W	-
/U or /B	Conduction	100W	100W	50W	-
All versions	1m/s air	100W	100W	83.3W	75W

Model Selector

Model	Nominal Output Voltage (V)	Maximum [2] Current Convection (A)	Maximum [2] Power (W)
CUS100ME-12	12	8.33	100
CUS100ME-12/U	12	8.33	100
CUS100ME-12/A	12	8.33	100
CUS100ME-12/B	12	8.33	100
CUS100ME-15	15	6.66	100
CUS100ME-15/U	15	6.66	100
CUS100ME-15/A	15	6.66	100
CUS100ME-15/B	15	6.66	100
CUS100ME-18	18	5.55	100
CUS100ME-18/U	18	5.55	100
CUS100ME-18/A	18	5.55	100
CUS100ME-18/B	18	5.55	100
CUS100ME-24	24	4.16	100
CUS100ME-24/U	24	4.16	100
CUS100ME-24/A	24	4.16	100
CUS100ME-24/B	24	4.16	100
CUS100ME-28	28	3.57	100
CUS100ME-28/U	28	3.57	100
CUS100ME-28/A	28	3.57	100
CUS100ME-28/B	28	3.57	100
CUS100ME-36	36	2.77	100
CUS100ME-36/U	36	2.77	100
CUS100ME-36/A	36	2.77	100
CUS100ME-36/B	36	2.77	100
CUS100ME-48	48	2.08	100
CUS100ME-48/U	48	2.08	100
CUS100ME-48/A	48	2.08	100
CUS100ME-48/B	48	2.08	100

Note 2: See website for full derating curves and all case styles
Non-standard outputs can be requested within the following ranges.

Model	CUS100ME-12	CUS100ME-15	CUS100ME-18	CUS100ME-24	CUS100ME-28	CUS100ME-36	CUS100ME-48
Voltage Range	12 - 13.2	15 -16.5	18 -19.8	24 - 26.4	28 -30.8	36 - 39.6	48 - 50

Non-standard output versions may be subject to minimum order quantities and variations to specification.
For all non-standard output voltage settings please consult Sales.

Part Numbering Scheme

CUS100ME- 12 / U E M

Output voltage 12, 15, 18, 24, 28, 36, 48

blank	open pcb
U	U channel
A	U channel with cover
B	baseplate

blank	dual fuses
E	Single input fuse in line line

(these options subject to MOQ, please consult Sales)

blank	JST connectors
M	Molex connectors

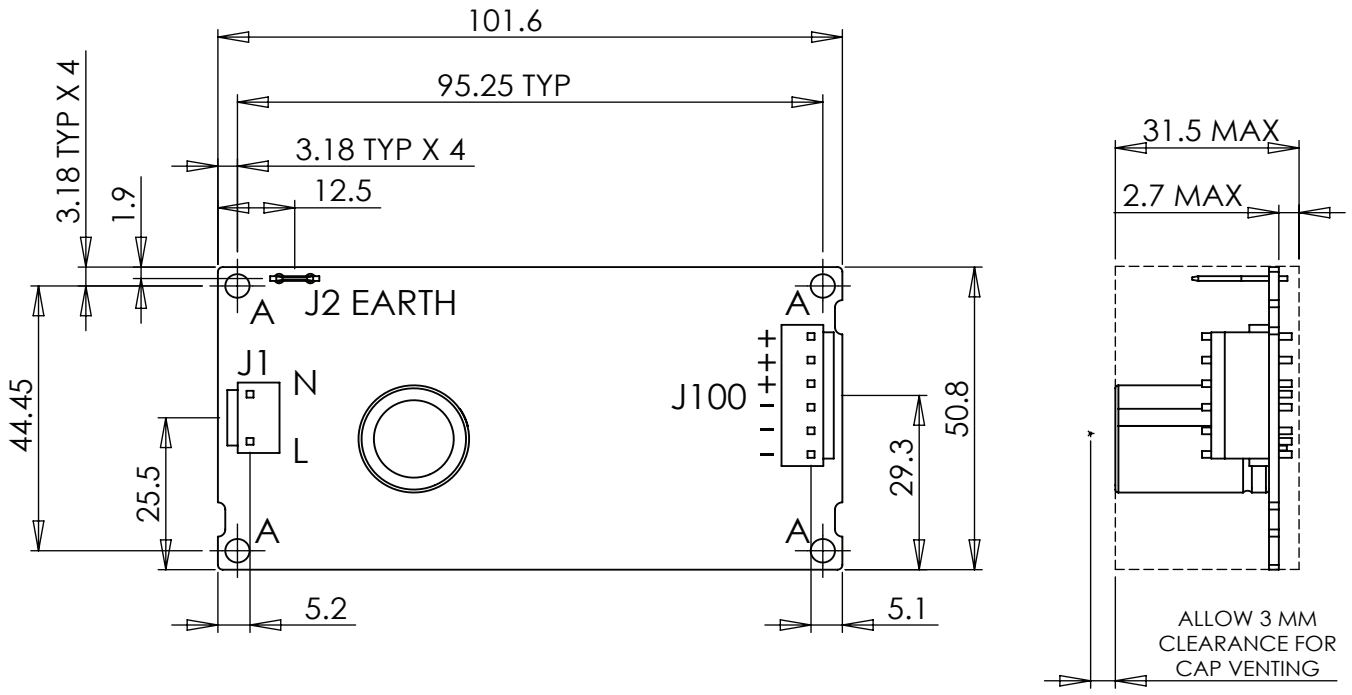
Examples; CUS100ME-24/UEM, CUS100ME-12V5/A

Immunity Levels

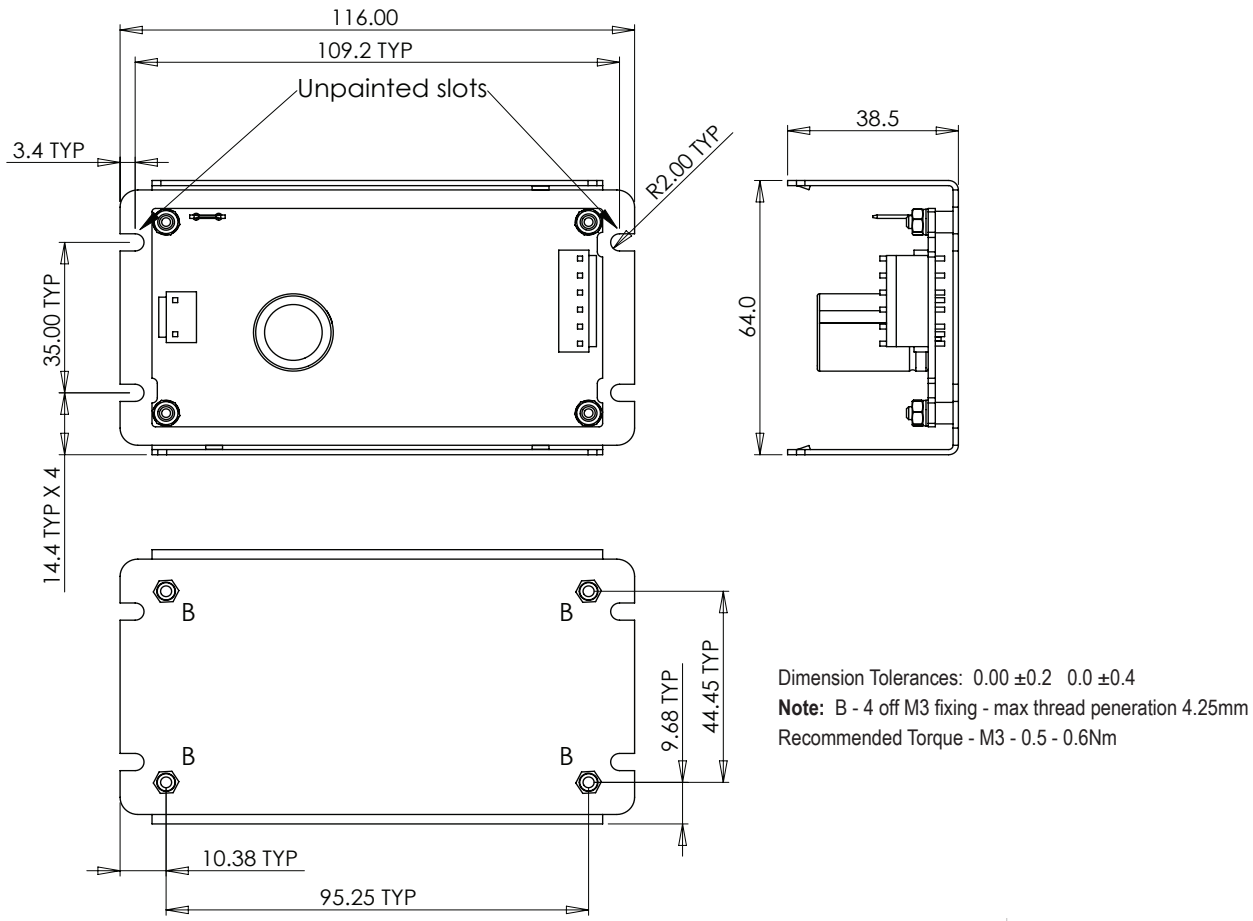
Test	Standard	Test Level	Criteria	Notes The power stated below is total power (main output + fan output)
ESD	EN61000-4-2	4	A	
Radiated Susceptibility	EN61000-4-3	3	A	inc proximity field requirements of EN60601-1-2:2015
Electrical Fast Transient Burst	EN61000-4-4	4	A	(AC Port, 5kHz and 100KHz)
Surge	EN61000-4-5	3	A	-
Conducted Susceptibility	EN61000-4-6	3	A	-
Magnetic fields	EN61000-4-8	4	A	-
Voltage Dips & Interruptions	EN61000-4-11 Class 3 Industrial inc EN55024 (100VAC)	0% for 1/2 cycle	A	-
		0% for 1 cycle	A	-
		40% for 10/12 cycles	B	-
		70% for 25/30 cycles	A	-
		80% for 250/300 cycles	A	-
		0% for 250/300 cycles	B	-
	EN61000-4-11 Class 3 Industrial inc EN55024 (240VAC)	0% for 1/2 cycle	A	-
		0% for 1 cycle	A	-
		40% for 10/12 cycles	A	-
		70% for 25/30 cycles	A	-
		80% for 250/300 cycles	A	-
		0% for 250/300 cycles	B	-
	EN60601-1-2:2015 (100VAC)	0% for 1/2 cycle	A	-
		0% for 1 cycle	A	-
		70% for 25/30 cycles	A	-
		0% for 250/300 cycles	B	-
	EN60601-1-2:2015 (240VAC)	0% for 1/2 cycle	A	-
		0% for 1 cycle	A	-
		70% for 25/30 cycles	A	-
		0% for 250/300 cycles	B	-
Ringwave Test	EN61000-4-12	3	A	-
Voltage Fluctuations	EN61000-4-14	Class 3	A	-

Criteria A definition: the output stays within +/-5% of regulation

Outline drawing CUS100ME (Open Frame unit)

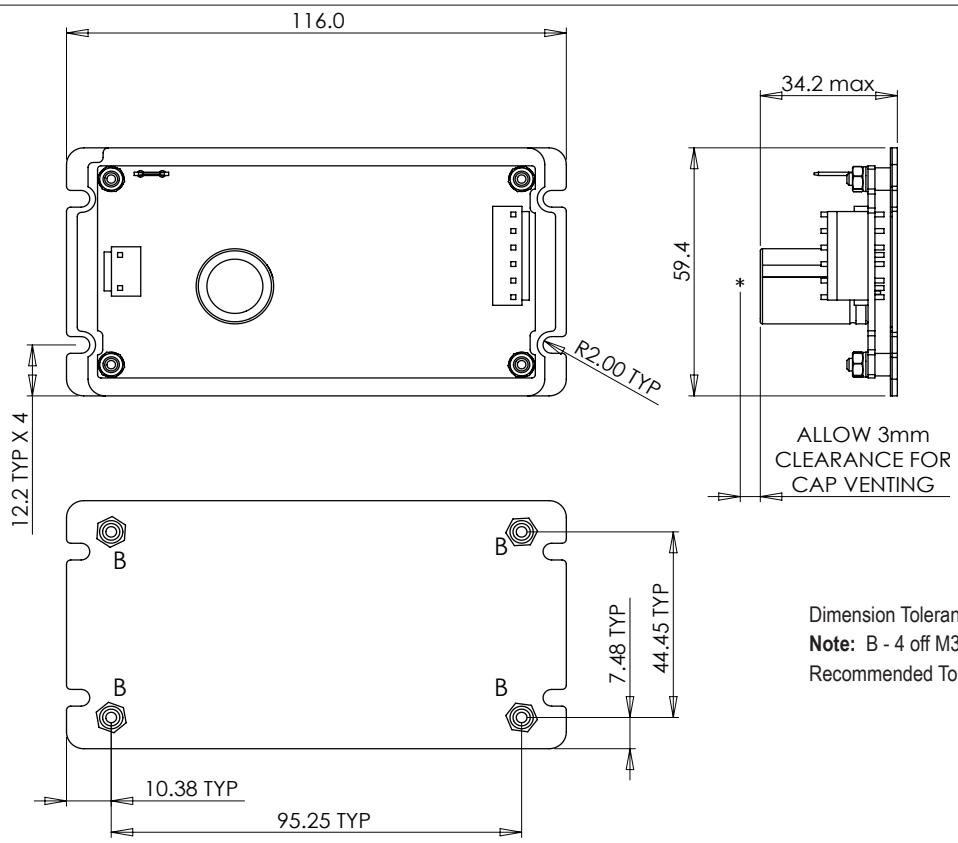


Outline drawing CUS100ME/U (U Channel) Option



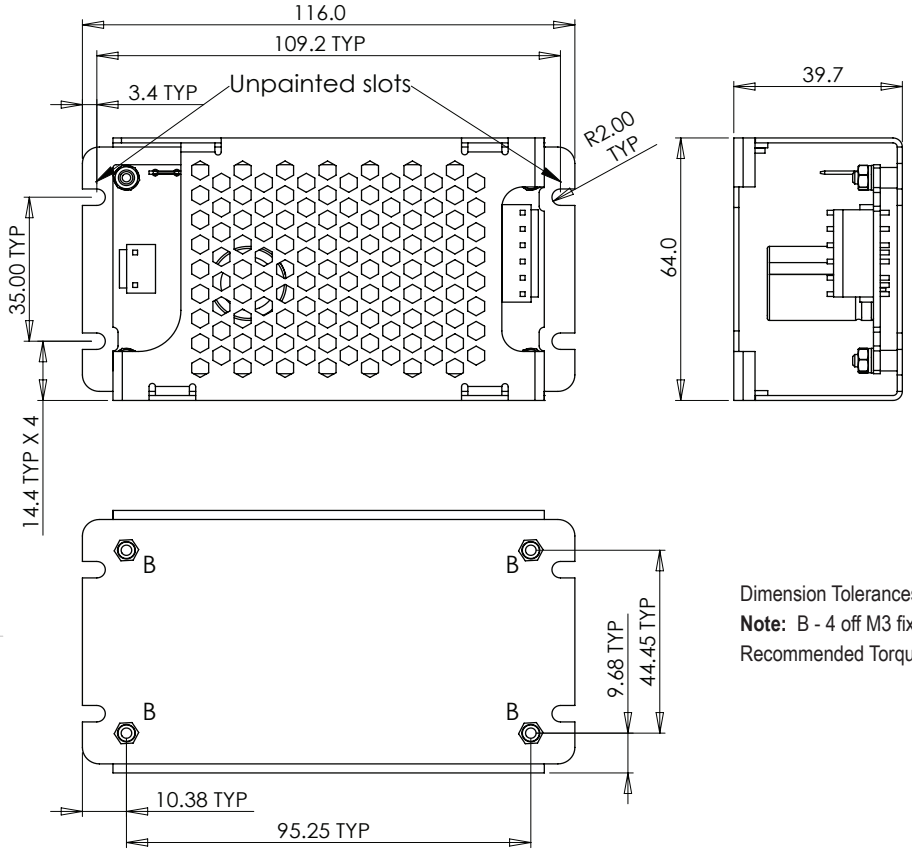
Dimension Tolerances: 0.00 ±0.2 0.0 ±0.4
Note: B - 4 off M3 fixing - max thread peneration 4.25mm
Recommended Torque - M3 - 0.5 - 0.6Nm

Outline drawing CUS100ME/B (Baseplate) Option



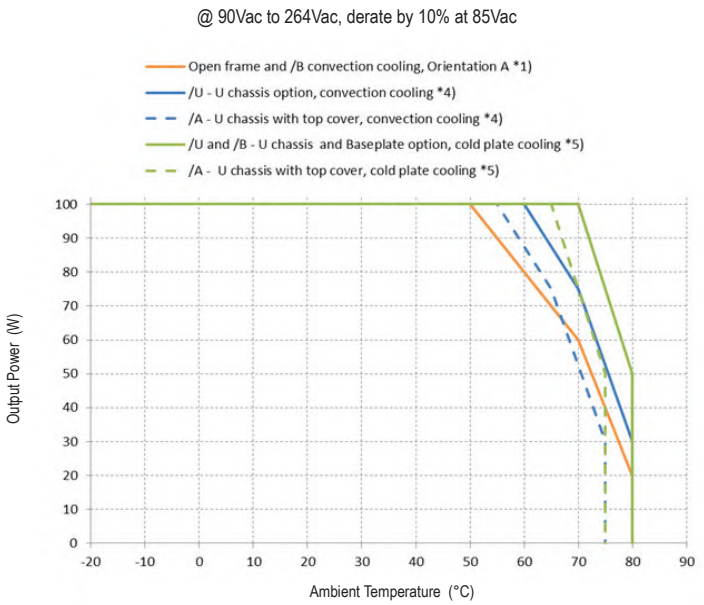
Dimension Tolerances: 0.00 ±0.2 0.0 ±0.4
Note: B - 4 off M3 fixing - max thread peneration 4.25mm
Recommended Torque - M3 - 0.5 - 0.6Nm

Outline drawing CUS100ME/A (U Channel with cover) Option

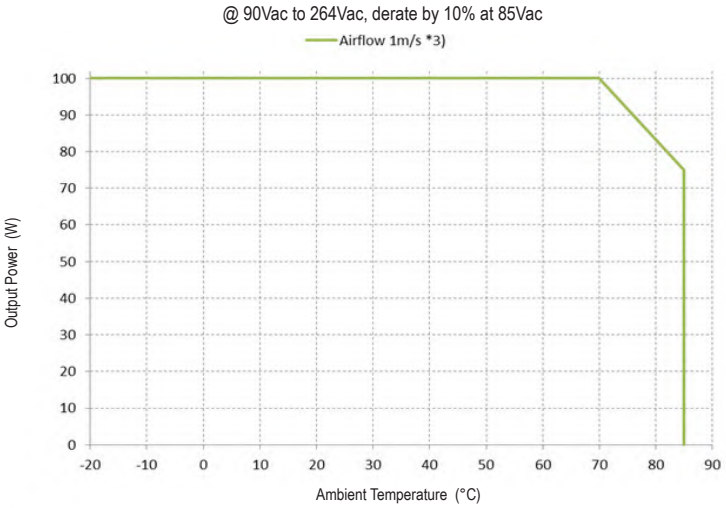


Dimension Tolerances: 0.00 ±0.2 0.0 ±0.4
Note: B - 4 off M3 fixing - max thread peneration 4.25mm
Recommended Torque - M3 - 0.5 - 0.6Nm

Output Power vs Ambient Temperature (Convection/Conduction Cooled)



Output Power vs Ambient Temperature (Forced Air Cooled)



Notes:

1) 50mm above surface

2) Not applicable

3) Tested with airflow direction G (see Application Note)

4) 50mm above surface, orientation A (see Application Note) no additional coldplate

5) U chassis or Baseplate fixed on a coldplate (system chassis), orientation A (see Application Note)
/B baseplate option performance is the same as with the U chassis option for coldplate cooling

2 x 4” 150W AC-DC Power Supplies

Medical Industrial Test LED Broadcast

Features	Benefits
• Compact 2x4 inch Footprint	• Space Saving in End Equipment
• Medical Approval with 2 x MoPP Isolation	• Suitable for B and BF Type Medical Equipment
• Suitable for Class I and Class II (no earth) Installations	• Flexible Utilisation
• 150W Convection Cooled Rating (for U channel)	• Quiet Operation
• Class B Conducted and Radiated EMI	• Easier System EMC Compliance
• Options for U channel, Cover, Baseplate and Top Fan	• Versatile Application
• Operation up to 85°C	• Suitable for High Ambient Temperature Environments

Specification

Model		CUS150M
Input Voltage range **(1) (2)**	-	85 - 264VAC (47 - 63Hz)
Inrush Current (Cold start at 230VAC input)	A	<65A
Input Current (150W load)	A	2.2A (at 100VAC)
Hold Up Time	ms	>18ms
Harmonic Compliance	-	EN/IEC61000-3-2 Class A, Class C >120W. Minimum PF 0.98/0.92 (115/230Vac, 100% load)
Leakage Current	µA	<250µA at 230VAC 63Hz
Touch Current (enclosure leakage)	µA	<100µA
Temperature Coefficient	%/°C	±0.02%/°C
No Load Power Consumption at 230VAC input	W	<0.5W
Fan Supply	-	10 - 12V (see model selector), 0.5A, +14/-6% regulation
Ripple & Noise	mV (pk-pk)	<1% of nominal output for operating temperatures above 0°C At -20°C: 12V model <4%, 15V & 18V model <3%, other models <2%
Load Regulation	mV	≤1% (0 - 100% load)
Line Regulation	mV	≤0.5% (90 - 264VAC)
Short Circuit & Overcurrent Protection	-	110 - 170%. Hiccup mode, automatic recovery
Overvoltage Protection	V	115-140% of standard output voltage for each model, 48V model max 60V. Latching (unit shutdown), cycle AC input to reset
Efficiency	%	Up to 94%
Active Average Efficiency	%	>91%
Operating Temperature	°C	-20°C to +85°C (70°C maximum for fan version /F), see derating curves for operation above +50°C
Storage Temperature	°C	-40°C to +85°C (70°C maximum for fan version /F)
Operational Altitude	m	5000
Humidity (non condensing)	%RH	5 - 95 (15 - 90 for /F option), operational and non operational
Cooling	-	See rating curves for convection and forced air
Withstand Voltage	VAC	Input to Ground 1.5kVAC (1xMOPP), Input to Output 4kVAC (2xMOPP), Output to Ground 1.5kVAC (1xMOPP)
Isolation Resistance	Ω	>100MΩ at 25°C & 70%RH
Insulation Class	-	Construction suitable for Class I or Class II installation
Vibration (non operating)	-	2G, 10-500Hz for 1 hour
Shock (non operating)	-	30G, 11ms half sine
Safety Agency Certifications **(3)**	-	IEC/EN/UL60950-1 and 60601-1. ES60601-1. IEC/EN/UL62368-1 Designed to meet IEC61010-1
Conducted & Radiated EMI	-	EN55011 / EN55032 Class B (see application notes for conditions)
Immunity	-	Compliant with EN60601-1-2;2015 (Ed4), see immunity table on page 3
Weight	g	185 (open PCB version)
Size (WxLxH)	mm	50.8 x 101.6 x 31.5 (open PCB version)
Warranty	yrs	5
Connectors	-	Input: JST B2P3-VH, Output: JST B6P-VH, Fan: Molex 22-04-1021

Notes: (1) For operation at 440Hz please consult Technical Sales. **(2)** Derate linearly to 90% load from 90 to 85VAC input
(3) EN60335-1 Compliant versions available subject to MOQ. Please contact Sales. ***Specification parameters apply at 25°C ambient temperature unless otherwise stated.***

Model Selector

Model	Nominal Output Voltage (V)	Fan Supply Voltage (V)	Maximum (1) Current Convection (A)	Maximum Current (Forced Air)	Maximum (1) Power Convection (W)	Maximum Power Forced Air (W)
CUS150M-12	12	11.6	10.00	12.50	120	150
CUS150M-12/U	12	11.6	12.50	12.50	150	150
CUS150M-12/A	12	11.6	12.50	12.50	150	150
CUS150M-12/B	12	11.6	12.50	12.50	150	150
CUS150M-12/F	12	11.6	12.50	n/a	150	n/a
CUS150M-15	15	9.8	8.00	10.00	120	150
CUS150M-15/U	15	9.8	10.00	10.00	150	150
CUS150M-15/A	15	9.8	10.00	10.00	150	150
CUS150M-15/B	15	9.8	10.00	10.00	150	150
CUS150M-15/F	15	9.8	10.00	n/a	150	n/a
CUS150M-18	18	11.6	6.66	8.33	120	150
CUS150M-18/U	18	11.6	8.33	8.33	150	150
CUS150M-18/A	18	11.6	8.33	8.33	150	150
CUS150M-18/B	18	11.6	8.33	8.33	150	150
CUS150M-18/F	18	11.6	8.33	n/a	150	n/a
CUS150M-24	24	11.6	5.00	6.25	120	150
CUS150M-24/U	24	11.6	6.25	6.25	150	150
CUS150M-24/A	24	11.6	6.25	6.25	150	150
CUS150M-24/B	24	11.6	6.25	6.25	150	150
CUS150M-24/F	24	11.6	6.25	n/a	150	n/a
CUS150M-28	28	10.8	4.28	5.36	120	150
CUS150M-28/U	28	10.8	5.36	5.36	150	150
CUS150M-28/A	28	10.8	5.36	5.36	150	150
CUS150M-28/B	28	10.8	5.36	5.36	150	150
CUS150M-28/F	28	10.8	5.36	n/a	150	n/a
CUS150M-36	36	11.6	3.33	4.16	120	150
CUS150M-36/U	36	11.6	4.16	4.16	150	150
CUS150M-36/A	36	11.6	4.16	4.16	150	150
CUS150M-36/B	36	11.6	4.16	4.16	150	150
CUS150M-36/F	36	11.6	4.16	n/a	150	n/a
CUS150M-48	48	11.6	2.50	3.12	120	150
CUS150M-48/U	48	11.6	3.12	3.12	150	150
CUS150M-48/A	48	11.6	3.12	3.12	150	150
CUS150M-48/B	48	11.6	3.12	3.12	150	150
CUS150M-48/F	48	11.6	3.12	n/a	150	n/a

Note:(1) Please see rating curves for ambient temperature.

Output voltage is factory set and not user adjustable
Non-standard outputs can be requested within the following ranges (not for /F version);

Model	CUS150M-12	CUS150M-15	CUS150M-18	CUS150M-24	CUS150M-28	CUS150M-36	CUS150M-48
Voltage Range	12 - 13.2	15 -16.5	18 -19.8	24 - 26.4	28 -30.8	36 - 39.6	48 - 50

Non-standard output versions may be subject to minimum order quantities and variations to specification. For all non-standard output voltage settings please consult Sales.

Part Numbering Scheme

CUS150M- 12 / U E M

Output voltage 12, 15, 18, 24, 28, 36, 48

blank	open pcb
U	U channel
A	U channel with cover
B	baseplate
F	U channel with cover and top mounted fan

blank	dual fuses
E	single input fuse in line line

(these options subject to MOQ, please consult Sales)

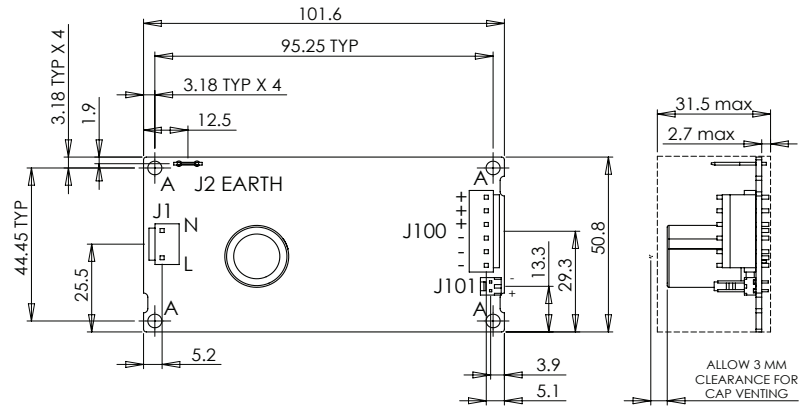
blank	JST connectors
M	Molex connectors

Examples; CUS150M-24/UE CUS150M-12V5/A

Immunity Levels

Test	Standard	Test Level	Criteria	Notes The power stated below is total power (main output + fan output)
ESD	EN61000-4-2	4	A	
Radiated Susceptibility	EN61000-4-3	3	A	inc proximity field requirements of EN60601-1-2:2015
Electrical Fast Transient Burst	EN61000-4-4	4	A	(AC Port, 5kHz and 100KHz)
Surge	EN61000-4-5	3	A	-
Conducted Susceptibility	EN61000-4-6	3	A	-
Magnetic fields	EN61000-4-8	4	A	-
Voltage Dips & Interruptions	EN61000-4-11 Class 3 Industrial inc EN55024 (100VAC)	0% for 1/2 cycle	A	-
		0% for 1 cycle	A/B	A up to 125W, B above 125W
		40% for 10/12 cycles	B	-
		70% for 25/30 cycles	A	-
		80% for 250/300 cycles	A	-
		0% for 250/300 cycles	B	-
	EN61000-4-11 Class 3 Industrial inc EN55024 (240VAC)	0% for 1/2 cycle	A	-
		0% for 1 cycle	A/B	A up to 125W, B above 125W
		40% for 10/12 cycles	A/B	A up to 120W, B above 120W
		70% for 25/30 cycles	A	-
		80% for 250/300 cycles	A	-
		0% for 250/300 cycles	B	-
	EN60601-1-2:2015 (100VAC)	0% for 1/2 cycle	A	-
		0% for 1 cycle	A/B	A up to 125W, B above 125W
		70% for 25/30 cycles	A	-
		0% for 250/300 cycles	B	-
	EN60601-1-2:2015 (240VAC)	0% for 1/2 cycle	A	-
		0% for 1 cycle	A/B	A up to 125W, B above 125W
		70% for 25/30 cycles	A	-
		0% for 250/300 cycles	B	-
Ringwave Test	EN61000-4-12	3	A	-
Voltage Fluctuations	EN61000-4-14	Class 3	A	-

Outline Drawing CUS150M Open Frame Unit



OPEN FRAME UNIT

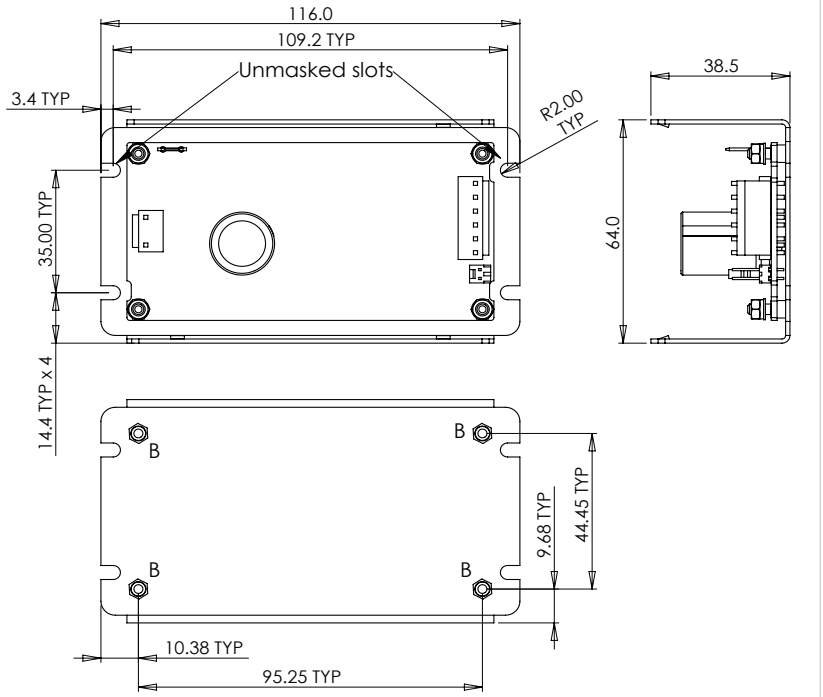
DIMENSION TOLERANCES: 0.00 ±0.2 0.0 ±0.4

(CONNECTOR PART NUMBERS ALSO IN APPLICATION NOTE)

REF DES	MANUFACTURER	CONNECTOR TYPE	MATING HOUSING	CRIMP
J1	JST	B2P3-VH	VAR-2	20-18AWG - SVA-41T-P1.1
J1 M-option	Molex	10-63-4027	09-50-1031	08-70-1031
J2	Tyco	62490	22-18AWG - 2-520407-2 16-14AWG - 3-520408-2	22-18AWG - 2-520407-2 16-14AWG - 2-520408-2
J100	JST	B6P-VH	VHR-6N	22-18AWG - SVH-21T-P1.1 20-16AWG - SVH-41T-P1.1
J100 M-option	Molex	09-65-2068	09-50-1061	08-70-1031
J101	Molex	22-04-1021	51191-0200	Series 50802

NOTE:
A - 4 OFF FIXING HOLES ø3.96 TO ACCOMMODATE M3 SCREWS

Outline Drawing CUS150M/U (U Channel) Option

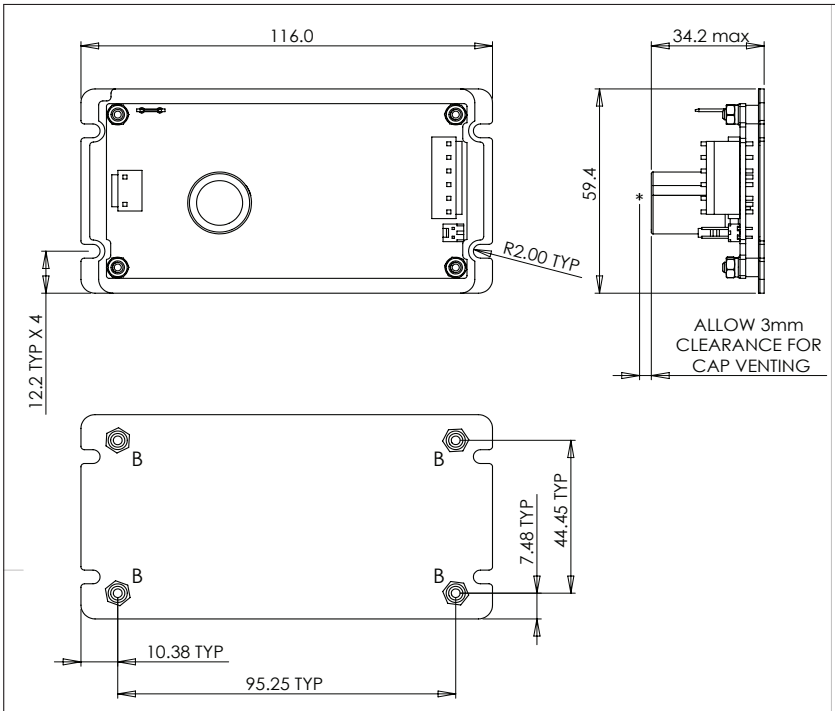


DIMENSION TOLERANCES: 0.00 ±0.2 0.0 ±0.4

NOTE: B - 4 OFF M3 FIXING - max thread penetration 4.25 mm

RECOMMENDED TORQUE - M3 - 0.5 - 0.6 Nm

Outline Drawing CUS150M/B (Baseplate) Option

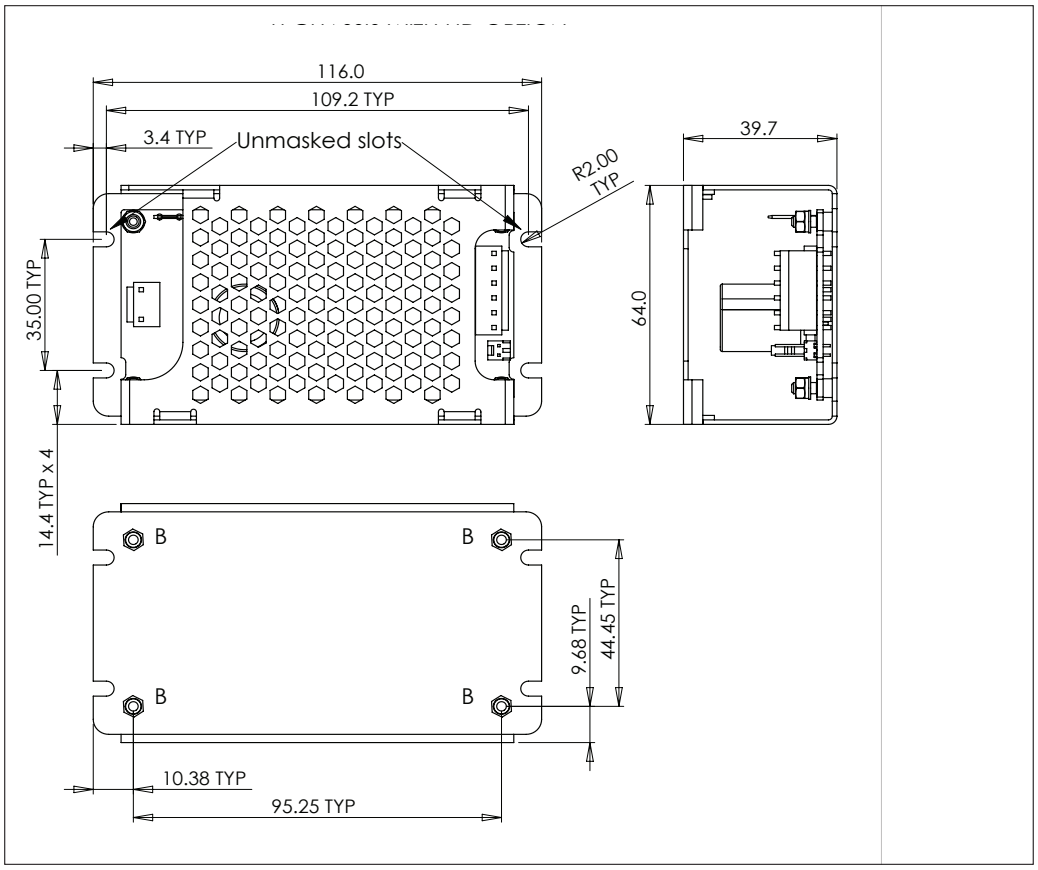


DIMENSION TOLERANCES: 0.00 ±0.2 0.0 ±0.4

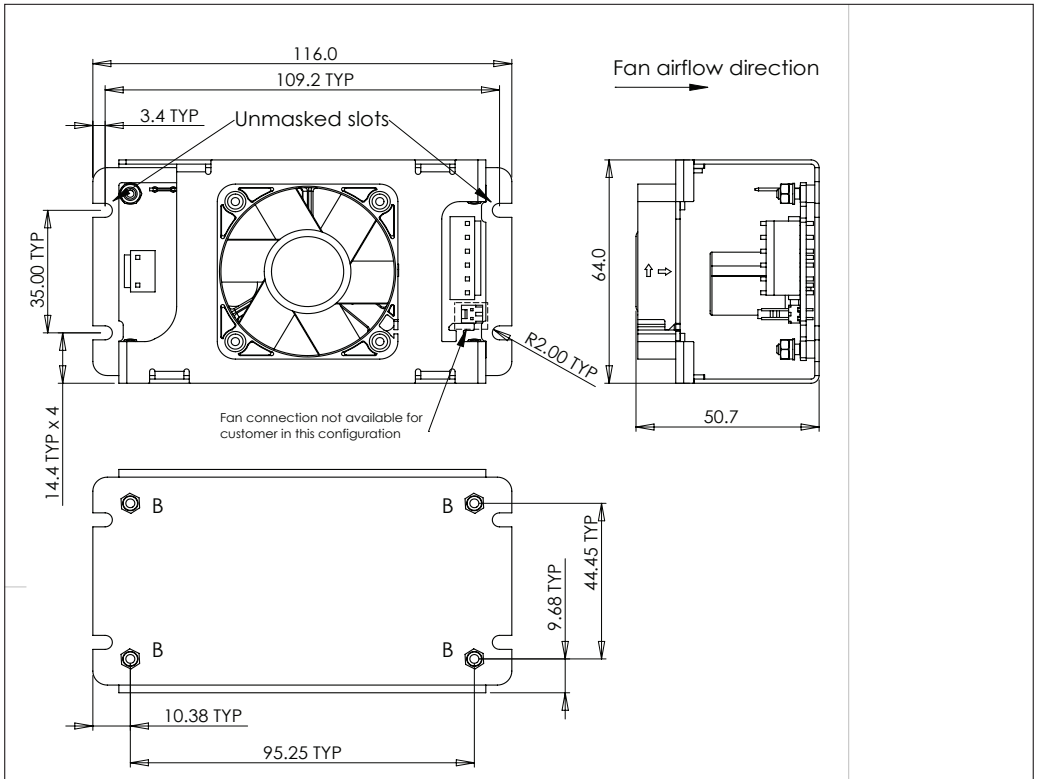
NOTE: B - 4 OFF M3 FIXING - max thread penetration 4.25 mm

RECOMMENDED TORQUE - M3 - 0.5 - 0.6 Nm

Outline Drawing CUS150M/A (U Channel with Cover) Option

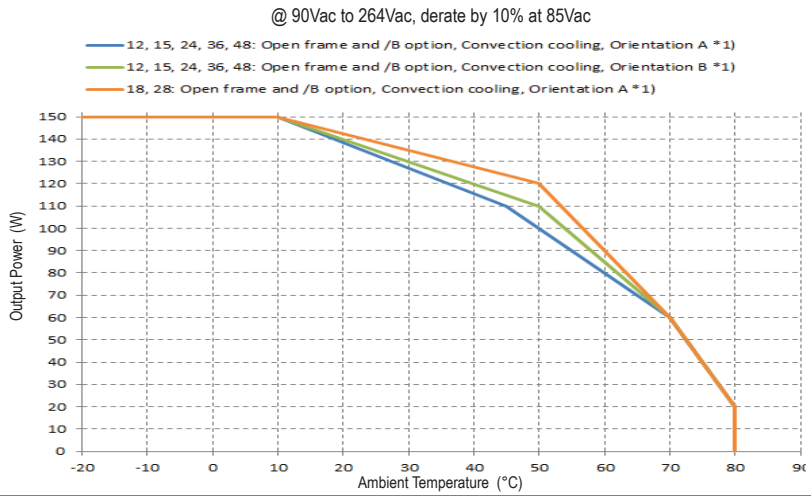


Outline Drawing CUS150M/F (U Channel with Cover & Top Mounted Fan) Option

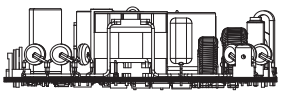


DIMENSION TOLERANCES: 0.00 ±0.2 0.0 ±0.4
NOTE: B - 4 OFF M3 FIXING - max thread penetration 4.25 mm

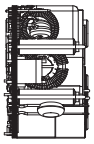
Output Power vs Ambient Temperature (Open Frame & /B Units)



Horizontal Orientation A

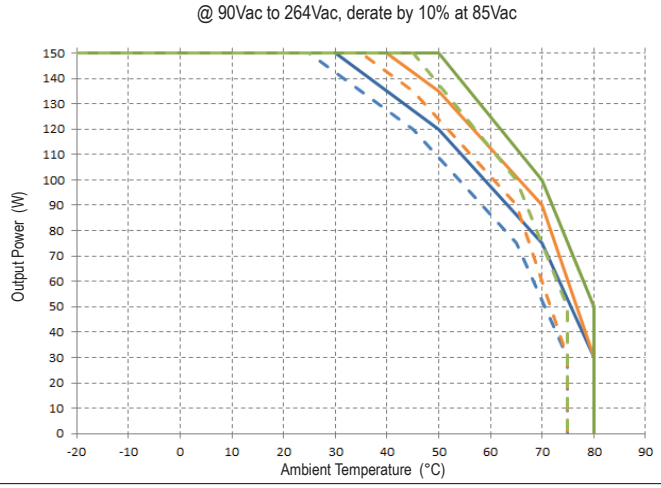


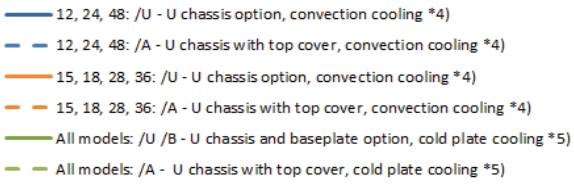
Vertical Orientation B



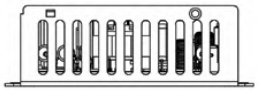
Note (*1) 50mm above surface, see instruction manual for maximum component temperatures.

Output Power vs Ambient Temperature (/U and /A versions)



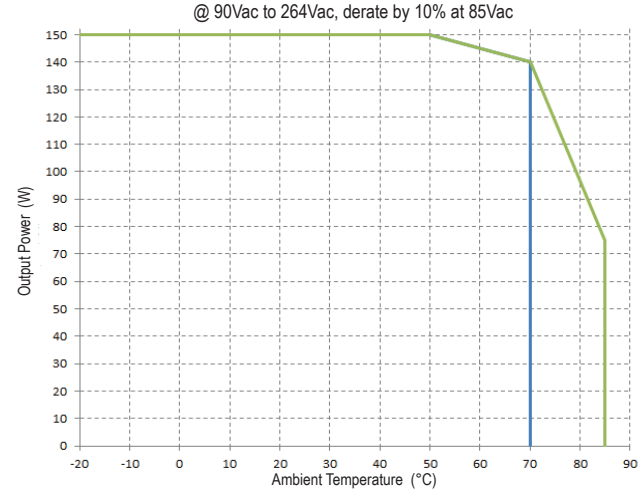


Horizontal Orientation A



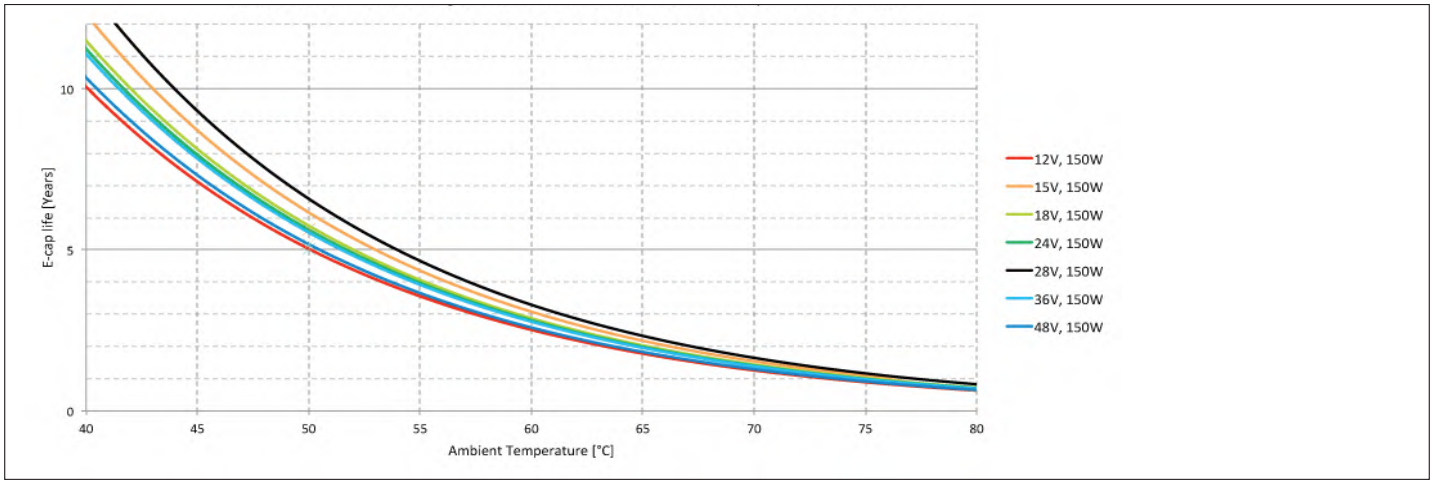
Note (*4) 50mm above surface, orientation A, no additional cold plate. *See application note.*
Note (*5) U chassis or Baseplate fixed on a cold plate (system chassis). *See application note.*

Output Power vs Ambient Temperature (/F version and Open Frame with Airflow)



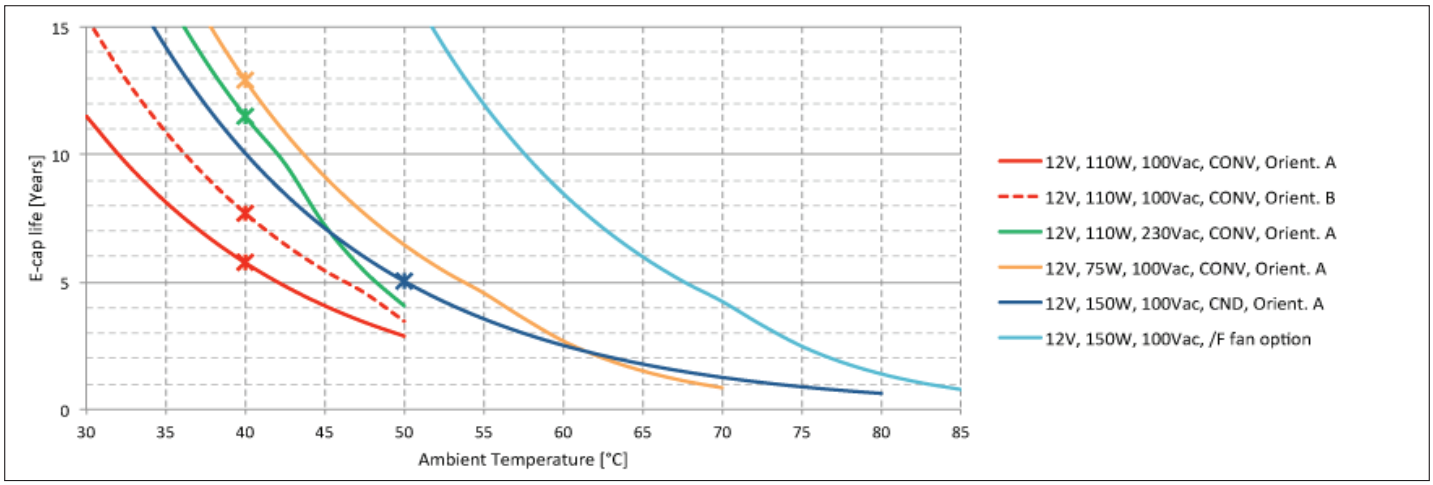
Note (*2) Limited by fan specification to maximum of 70°C. **Note (*3)** *See application note.*

CUS150M E-Cap Life vs Ambient Temperature



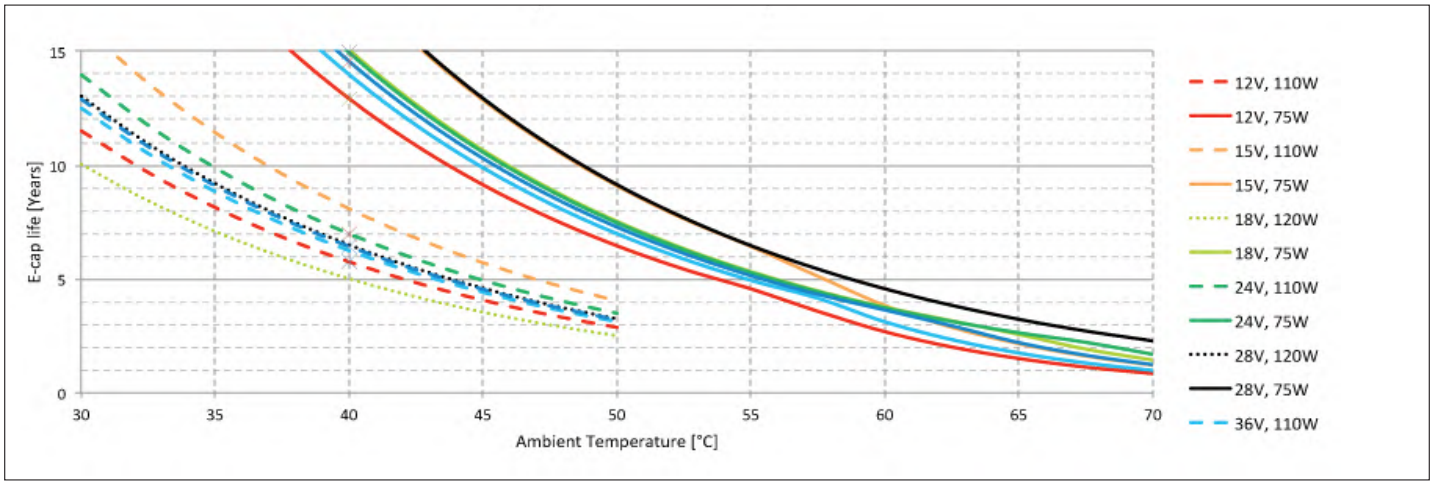
All models: Conduction cooling 150W, 100Vac, measured at 50˚C, other points are calculated

CUS150M E-Cap Life vs Ambient Temperature 12V model: Additional Cooling Options

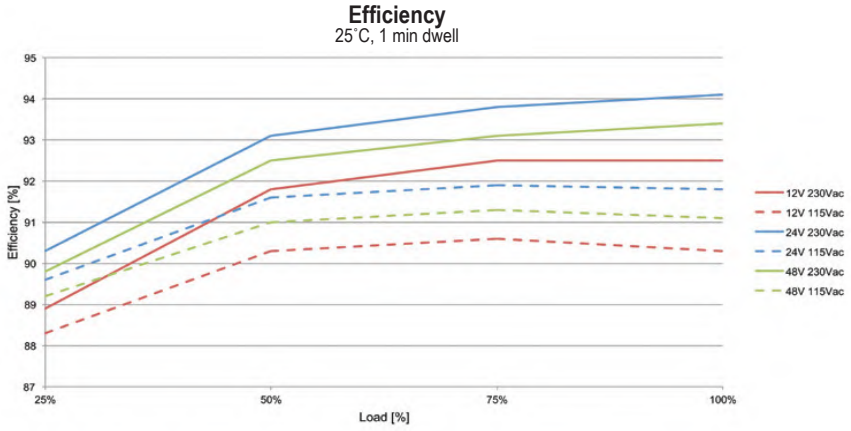


Notes: CONV: Convection Cooling, CND: Conduction Cooling

CUS150M E-Cap Life vs Ambient Temperature 12, 15, 24, 36, 48: conv 110W, 75W, 18, 28: conv 120W, 75W



CUS150M Efficiency Graph



Critical component maximum allowable temperature table

Circuit reference	Description	Maximum temperature (˚C)
L1	Common mode choke	110 (130)
L2	PFC choke	125 (130)
L3	Differential mode choke	125 (130)
C1	Film capacitor	105
C2, C110	Electrolytic capacitors	86 (105)
C6, C102, C104, C105	Electrolytic capacitors	92 (105)
C3	X capacitor	100
C5, C100, C101, C103	Y capacitor	105
TX100	Transformer winding	110
XU101, XU102	Opto-coupler	100 (110)
XD8	Diode	130
J1	Input connector	105
J100	Output connector	105

The higher temperature limits shown in brackets may be used but product life may be reduced

Note: Please refer to installation handbook for full details

LED Industrial Test Comm Broadcast

79-153W Single Output Power Supplies

Features	Benefits
• Convection or Conduction Cooled	• Fan-Less Operation
• Up to 206W Peak Power Capability	• Capable of Driving Dynamic LED Displays
• Low 31mm Height	• Fits In Low Profile Signage
• -40°C Ambient Temperature Start Up	• Suitable for Outdoor Use

Specification

Model		CUS200LD
AC Input Voltage	VAC	85 - 265VAC (1)
Input Frequency	Hz	47 - 63Hz
Inrush Current (cold start)	A	20A at 115VAC, 40A at 230VAC
Power Factor	-	Meets EN61000-3-2 (Typical PF 0.95/0.9) (2)
Input Current	A	Varies by model, please see detailed specification on website
Temperature Coefficient	%/°C	<0.02%/°C
Overcurrent Protection	-	> 101% of peak current rating
Overvoltage Protection (3)	V	See model selector
Hold Up Time (115 / 230V input)	ms	20ms typical
Leakage Current	mA	<0.75mA at 265VAC, 60Hz
Ripple and Noise	%	3.3-7.5V: 120mV, 12-24V: 150mV, 28-48V: 200mV
Line and Load Regulation	%	See model selector
Remote Sense	-	No
Operating Temperature	°C	-25°C to +70°C. Start up at -40°C Convection cooled: Derate linearly to 40% load from +40°C to +70°C Conduction cooled: Derate linearly to 40% load from +45°C to +70°C
Storage Temperature	°C	-40°C to +85°C
Humidity (non condensing)	%RH	10 - 95%RH (Operating & Storage)
Cooling	-	Convection or Conduction Cooled (Mounted on a 2mm thick aluminium plate 400x400mm)
Withstand Voltage	-	Input to Ground 2kVAC, Input to Output 3kVAC, Output to Ground 500VAC
Isolation Resistance	MΩ	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC
Vibration (non operating)	-	10 - 55Hz: 19.6m/s^2 constant sweep 1 min X, Y, Z for 1 hour
Shock	-	< 196.1 m/s^2 (20G)
Immunity	-	IEC61000-4-2 (lv 2, 3), -3 (lv3), -4 (lv 3), -5 (lv3, 4), -6 (lv 3), -8 (lv 4), -11
Safety Agency Certifications	-	IEC/UL/CSA/EN 60950-1, CE Mark
Conducted & Radiated EMI	-	EN55011-B, EN55032-B, FCC Class B
Weight (Typ)	g	430
Size (LxWxH)	mm	160 x 60 x 31
Warranty	yrs	3

Notes: See specification for conditions and test methods

(1) 4.2V model: Derate linearly to 90% load from 115 to 85VAC input. 5-48V models: Derate linearly to 80% load from 115 to 85VAC input

(2) 115 / 230VAC input

(3) Cycle AC to reset

Model Selector

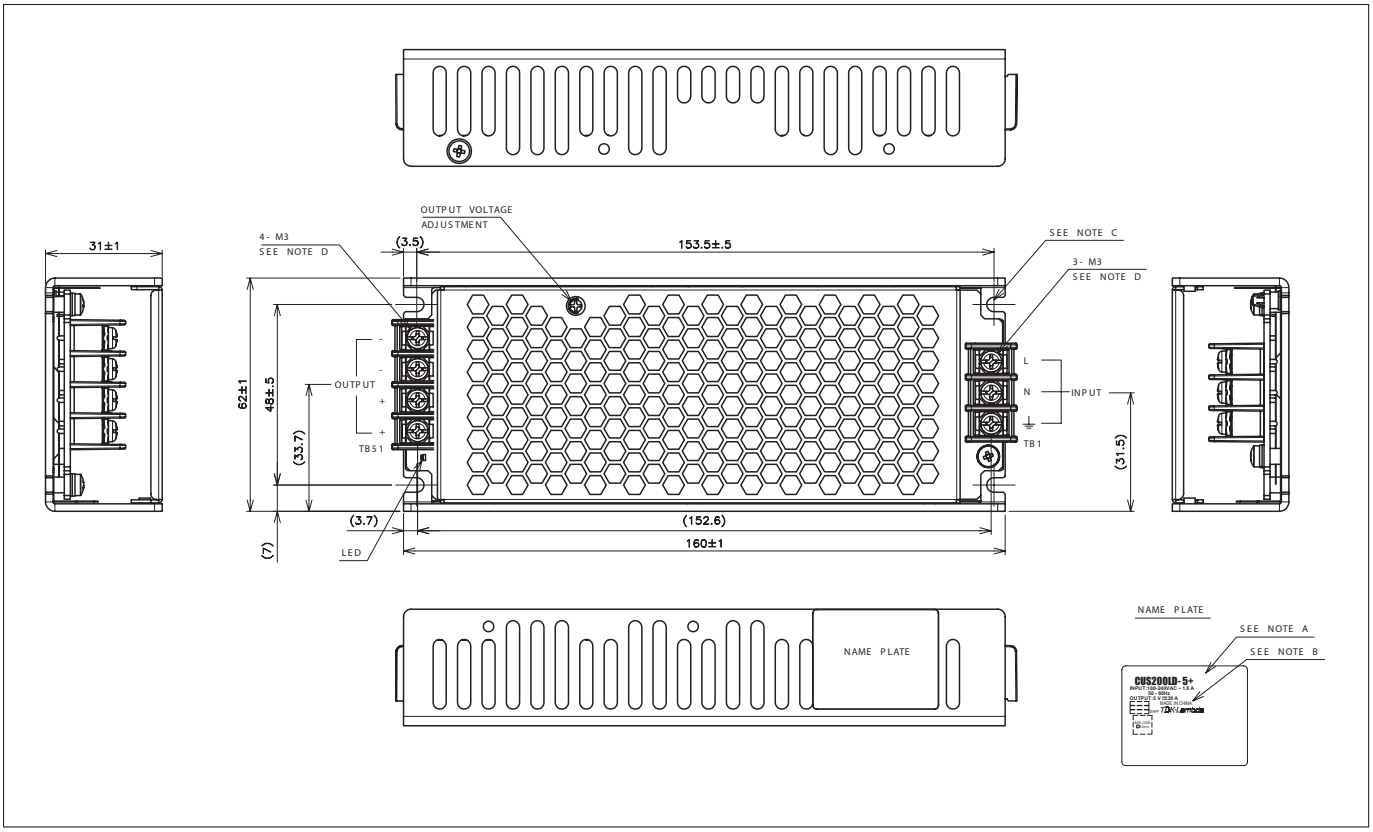
Model	Output Voltage	Adjust Range (V)	Max Current Convection (A)	Max Power Convection (W)	Max Current Conduction (A)	Max Power Conduction (W)	Peak Current (4) (A)	Load Reg (mV)	Line Reg (mV)	Overvoltage	Efficiency (typ) % (5)
CUS200LD-3	3.3V	2.97 - 3.63V	24A	79.2W	30A	99W	40A	26mV	13mV	3.8 - 5.44V	82 / 83%
CUS200LD-4	4.2V	3.78 - 4.62V	24A	100.8W	30A	126W	40A	33mV	16mV	4.83 - 6.51V	85 / 87%
CUS200LD-5	5V	4.5 - 5.5V	24A	120W	30A	150W	40A	40mV	20mV	5.75 - 7.5V	87 / 89%
CUS200LD-7R5	7.5V	6.375 - 8.25V	16A	120W	20A	150W	26.6A	60mV	30mV	8.63 - 10.87V	88 / 90%
CUS200LD-12	12V	10.8 - 13.2V	10A	120W	12.5A	150W	16.7A	96mV	48mV	13.8 - 17.4V	87 / 89%
CUS200LD-15	15V	13.5 - 16.5V	8A	120W	10A	150W	13.4A	120mV	60mV	17.25 - 21.75V	87 / 89%
CUS200LD-24	24V	21.6 - 26.4V	5A	120W	6.3A	151.2W	8.4A	192mV	96mV	27.6 - 34.8V	87 / 89%
CUS200LD-28	28V	25.2 - 30.8V	4.3A	120.4W	5.4A	151.2W	7.2A	224mV	112mV	32.2 - 40.6V	87 / 90%
CUS200LD-48	48V	43.2 - 52.8V	2.5A	120W	3.15A	151.2W	4.2A	384mV	192mV	55.2 - 69.6V	88 / 90%

Notes: See specification for conditions and test methods

(4) Convection cooling: Peak current for less than 10 seconds, with a duty cycle of <35%
Conduction cooling: Peak current for less than 5 seconds, with a duty cycle of <35%

(5) 115 / 230VAC input. Conduction cooled ratings

Outline Drawing CUS200LD Series



Medical Industrial Test Comm Broadcast

Single Output 200 to 250W Medical & ITE Power Supplies

Features	Benefits
• IEC 60601-1 (2x MOPP) & IEC 60950-1 Approvals	• Suitable for B & BF type Medical and ITE Applications
• 200W Convection cooled rating	• No fan noise, good for noise-sensitive environments
• Low profile (34 mm), Standard 3"x5" format	• Space saving & easy system integration
• 5V Standby power supply on board	• No additional circuitry needed, saves cost
• Operating Altitude up to 5000m	• Supports global use & global sales of equipment
• High Efficiency up to 94 %, Low off-load power consumption (<0.5W)	• Excellent "environmental footprint"

Specification

Model		CUS200M
AC Input Voltage	VAC	85 - 265VAC (1)
Input Frequency	Hz	47 - 63Hz
Inrush Current (cold start)	A	35A at 115VAC, 70A at 230VAC
Power Factor	-	Meets EN61000-3-2 Class A (Typical PF 0.99/0.95) (2)
Input Current (115/230VAC)	A	200W output: 2.2 / 1.1A; 250W output: 3.0 / 1.5A
Off-load Power Consumption (3)	W	<0.5W at 230VAC
Temperature Coefficient	%/°C	<0.02%/°C
Overcurrent Protection	-	12V: >17.2A, 18V: > 14.7A, 24V: > 11A, 36V: > 7.4A, 48V: > 5.5A
Overvoltage Protection (4)	V	12V: 13.2 - 16.2V, 18V: 19.8 - 24.3V, 24V: 26.4 - 32.4V, 36V: 39.6 - 48.6V, 48V: 52.8 - 64.8V
Hold Up Time (115 / 230V input)	ms	16ms at 200W output, 12ms at 250W
Leakage Current	mA	<0.3mA at 265VAC, 60Hz
Remote On/Off	-	Apply voltage to isolated terminals to shut unit down
Power Good	-	Isolated transistor, On = Good. Gives >5ms warning of AC power loss
Standby Voltage	-	5V 0.6A (convection), 1A (forced air)
Operating Temperature	°C	-20°C to +70°C. Derate linearly to 50% load from +50°C to +70°C
Storage Temperature	°C	-40°C to +85°C
Humidity (non condensing)	%RH	10 - 95%RH (Operating & Storage)
Cooling	-	Convection or Forced Air Cooled (1.5m/s across terminals)
Withstand Voltage	-	Input to Ground 2kVAC (1xMOPP), Input to Output 4kVAC (2xMOPPs), Output to Ground 1.5kVAC (1xMOPP) Suitable for B and BF rated medical equipment
Isolation Resistance	Ω	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC
Vibration (non operating)	-	10 - 55Hz: 19.6m/s^2 constant sweep 1 min X, Y, Z for 1 hour
Shock	-	< 196.1 m/s^2 (20G)
Immunity	-	IEC61000-4-2 (lv 2, 3), -3 (lv3), -4 (lv 3), -5 (lv3, 4), -6 (lv 3), -8 (lv 4), -11, EN60601-1-2:2015 (Ed4)
Safety Agency Certifications	-	EN/IEC/UL/ES/CSA 60601-1, EN/IEC/UL/CSA60950-1, CE Mark
Conducted & Radiated EMI	-	EN55011-B, FCC Class B
Weight (Typ)	g	350
Size (LxWxH)	mm	127 x 76.2 x 34
Warranty	yrs	3

Notes:

(1) Derate linearly to 80% load from 115 to 85VAC input
(2) 115 / 230VAC input
(3) Refers to input power during remote off and standby 5V in at no load condition
(4) Cycle AC to reset

Model Selector

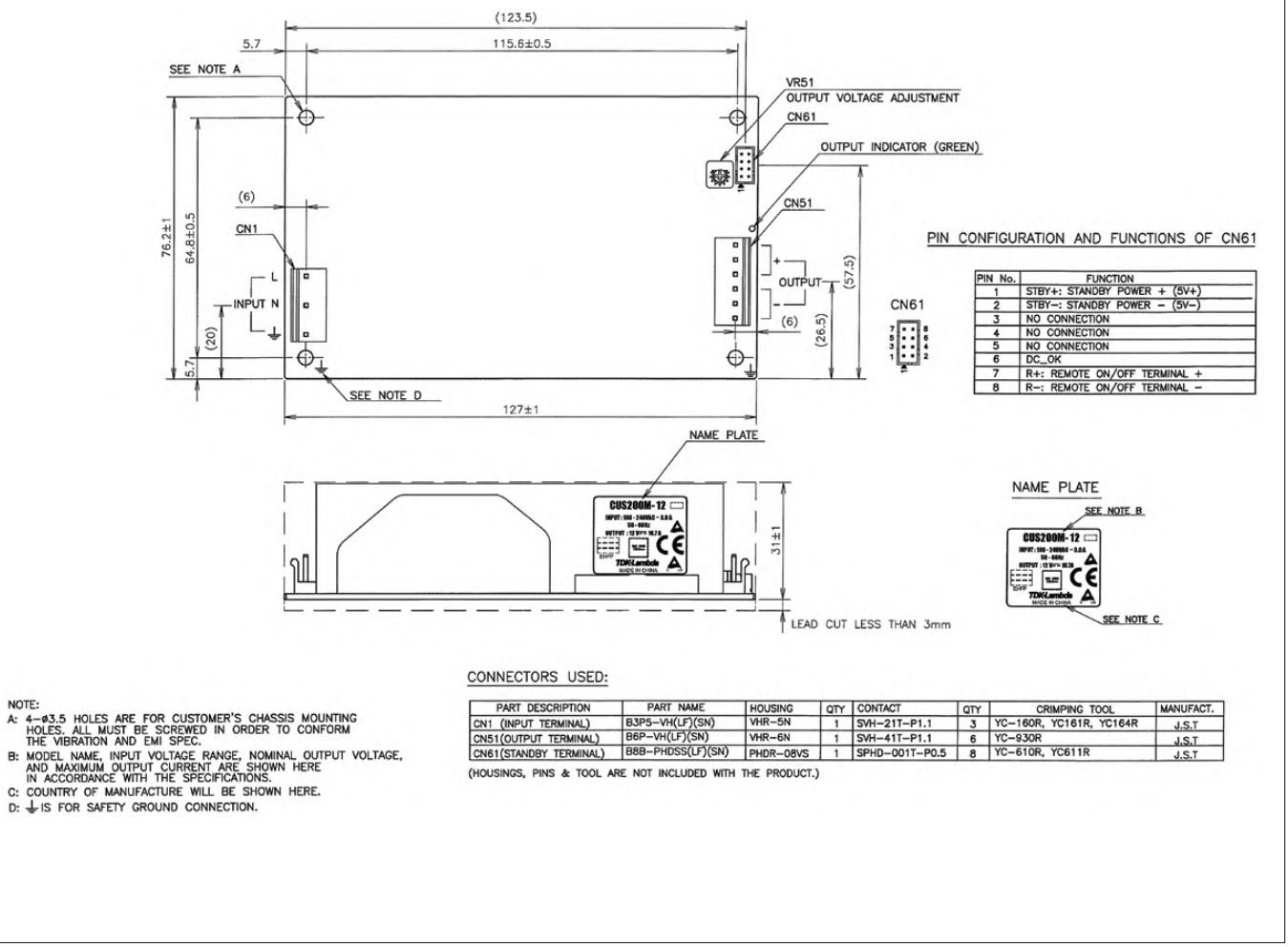
Model	Voltage	Adjust Range (V)	Max Current Conv (A)	Max Current Forced Air (A)	Max Power Forced Air (W)	Load Reg (mV)	Line Reg (mV)	Ripple Noise (mV)	Efficiency (typical) % (5)
CUS200M-12	12V	11.7 - 12.6	16.7	16.7	200.4	120	60	180	92 / 93
CUS200M-18	18V	17.6 - 18.9	11.2	14.0	252.0	180	90	180	92 / 94
CUS200M-24	24V	23.5 - 25.2	8.4	10.5	252.0	240	120	240	92 / 94
CUS200M-36	36V	35.2 -37.8	5.5	7.0	252.0	360	180	360	92 / 94
CUS200M-48	48V	47 - 50.4	4.2	5.3	254.4	480	240	480	92 / 94

Notes:(5) 115 / 230VAC input with convection cooling

Options (available on request)

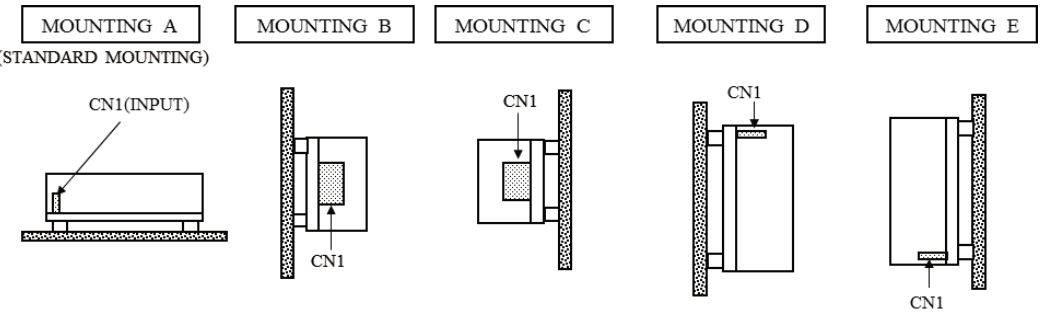
blank	Standard model
Suffix "/A"	Cased model with chassis & cover
Suffix "/L"	L bracket, no cover

Outline Drawing CUS200M Series



Notes: For detailed Instruction Manual, Cooling, Reliability Data, Electrolytic capacitor Lifetime data, Application advice like Mounting options, relevant Derating curves etc. please refer to "Technical Downloads" or contact factory for support

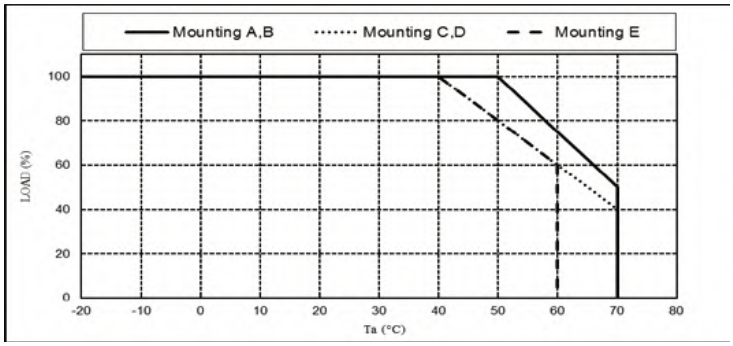
Output Derating according to the Mounting Direction



Output Derating CUS200M-12

MODEL: CUS200M-12

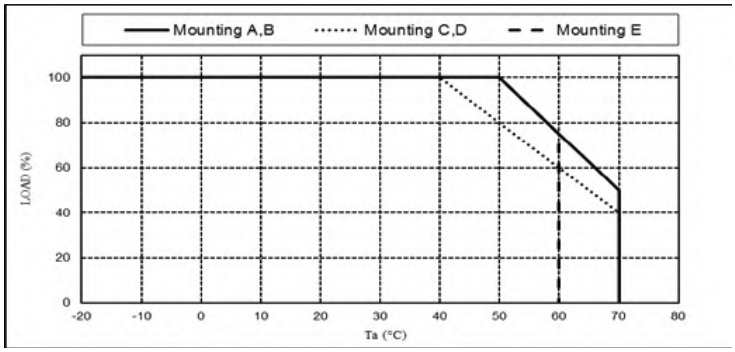
Ta (°C)	MOUNTING A,B	MOUNTING C,D	MOUNTING E (NOTE1)
	LOAD (%)	LOAD (%)	LOAD (%)
-20 - +40	100	100	100
50	100	80	80
60	75	60	60
65	63	50	-
70	50	40	-



Output Derating CUS200M-18, CUS200M-24, CUS200M-36, CUS200M-48

MODEL: CUS200M-18, CUS200M-24, CUS200M-48

Ta (°C)	MOUNTING A,B	MOUNTING C,D	MOUNTING E (NOTE1)
	LOAD (%)	LOAD (%)	LOAD (%)
-20 - +40	100	100	100
50	100	80	100
60	75	60	75
65	63	50	-
70	50	40	-

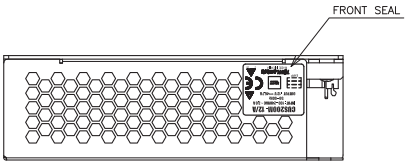


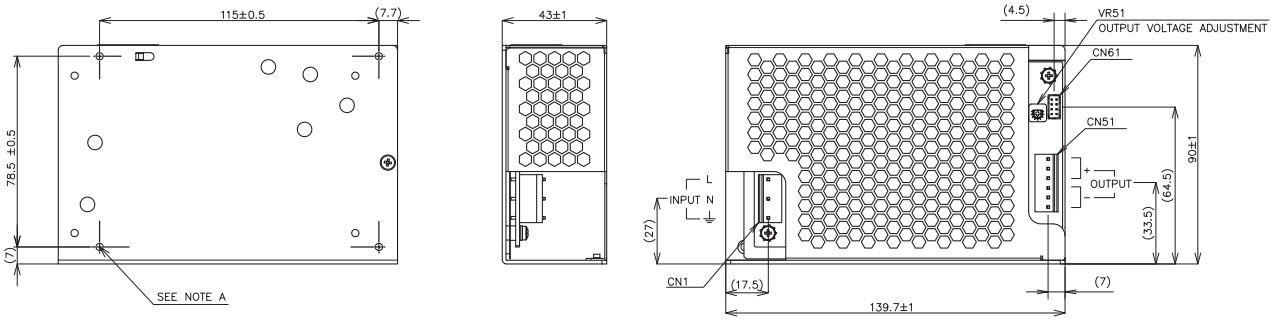
Outline Drawing CUS200M/A Series

CONNECTORS USED:

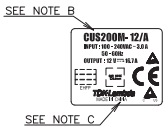
PART DESCRIPTION	PART NAME	HOUSING	QTY	CONTACT	QTY	CRIMPING TOOL	MANUFACT.
CN1 (INPUT TERMINAL)	B3P5-VH(LF)(SN)	VHR-5N	1	SVH-21T-P1.1	3	YC-160R, YC161R, YC164R	J.S.T
CN51(OUTPUT TERMINAL)	B6P-VH(LF)(SN)	VHR-6N	1	SVH-41T-P1.1	6	YC-930R	J.S.T
CN61(STANDBY TERMINAL)	B8B-PHDSS(LF)(SN)	PHDR-08VS	1	SPHD-001T-P0.5	8	YC-610R, YC611R	J.S.T

(HOUSINGS, PINS & TOOL ARE NOT INCLUDED WITH THE PRODUCT.)





FRONT SEAL
SCALE 1:1



PIN CONFIGURATION AND FUNCTIONS OF CN61

PIN No.	FUNCTION
1	STBY+: STANDBY POWER + (5V+)
2	STBY−: STANDBY POWER − (5V−)
3	NO CONNECTION
4	NO CONNECTION
5	NO CONNECTION
6	DC_OK
7	R+: REMOTE ON/OFF TERMINAL +
8	R−: REMOTE ON/OFF TERMINAL −

NOTE:
A: 4-M3 TAPPED HOES ARE FOR CUSTOMER'S CHASSIS MOUNTING HOLES. ALL MUST BE SCREWED IN ORDER TO CONFORM THE VIBRATION AND EMI SPEC.
(SCREW PENETRATION DEPTH 4mm MAX.)
B: MODEL NAME, INPUT VOLTAGE RANGE, NOMINAL OUTPUT VOLTAGE, AND MAXIMUM OUTPUT CURRENT ARE SHOWN HERE IN ACCORDANCE WITH THE SPECIFICATIONS.
C: COUNTRY OF MANUFACTURE WILL BE SHOWN HERE.
D: ⏚ IS FOR SAFETY GROUND CONNECTION.

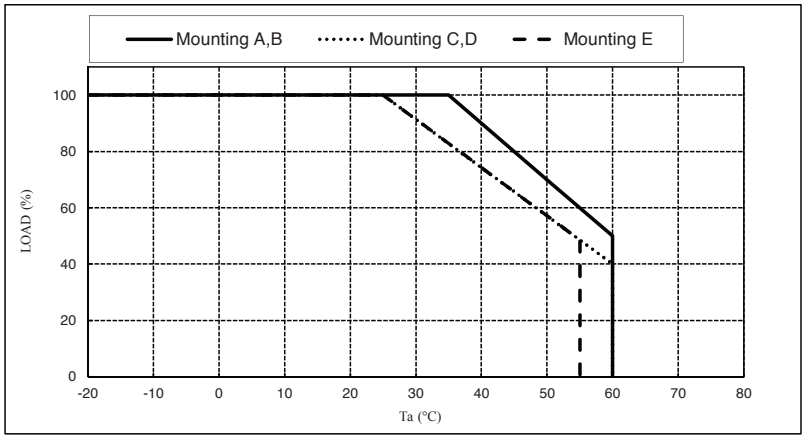
(unit : mm)

MODEL NAME	CUS200M/A
TDK-Lambda	

CA811-02-01/A-A

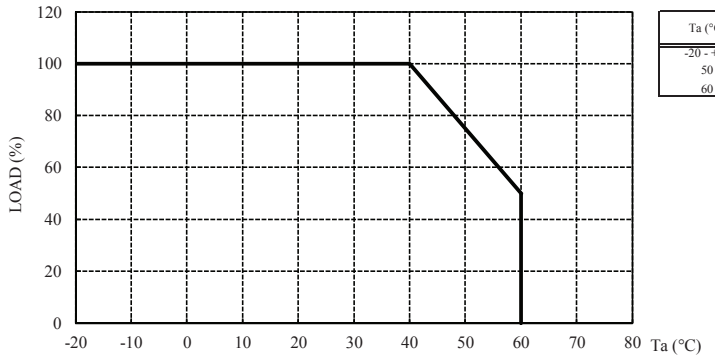
Output Derating CUS200M/A

Ta (°C)	MOUNTING A,B	MOUNTING C,D	MOUNTING E
	LOAD (%)	LOAD (%)	LOAD (%)
-20 - +25	100	100	100
35	100	82	82
45	80	65	65
50	70	57	57
55	60	48	48
60	50	40	-



Output Derating versus Operating Ambient Temp (Ta) CUS200M/A

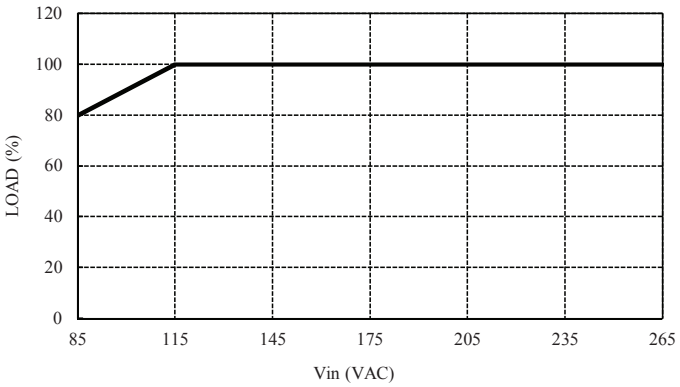
*** Cooling: Forced Air Cooling for all Mounting and all Models**



Ta (°C)	LOAD (%)
-20 - +40	100
50	75
60	50

Output Derating versus Input Voltage (all Models)

INPUT VOLTAGE (VAC)	LOAD (%)
85	80
115~265	100



Medical Industrial Test Comm Broadcast

Single Output 350W/420W Medical & ITE Power Supplies

Features	Benefits
• IEC60601 3rd Ed. (2x MoPP)	• Suitable for B and BF type medical equipment
• 350W Convection cooled rating	• No fan noise, good for noise-sensitive environments
• Low profile (40 mm)	• Suits 1U applications, saves space
• Low off-load power consumption (<0.5W)	• Better "environmental footprint"
• 5V Aux & 12V fan supply (F-option)	• Embedded features save cost of external circuitry
• Operating altitude up to 5000m	• Supports global use

Specification

Model		CUS350M/F
AC Input Voltage	VAC	85 - 265VAC (1)
Input Frequency	Hz	47 - 63Hz
DC Input Voltage	VDC	120 - 370VDC (No safety certification)
Inrush Current (cold start)	A	20A at 115VAC, 40A at 230VAC
Power Factor	-	Meets EN61000-3-2 (Typical PF 0.99/0.95) (2)
Input Current (115/230VAC)	A	4 / 2A (350W output)
Off-load Power Consumption (3)	W	<0.5W at 230VAC
Temperature Coefficient	%/°C	<0.02%/°C
Overcurrent Protection	-	12V: >38A, 18V: > 26A, 24V: > 20A, 36V: > 13, 48V: > 9.7A
Overvoltage Protection (4)	V	12V: 13.8 - 16.2V, 18V: 20.7 - 24.3V, 24V: 27.6 - 32.4V, 36V: 41.4 - 48.6V, 48V: 55.2 - 64.8V
Hold Up Time (115 / 230V input)	ms	20ms at 350W output
Leakage Current	mA	<0.3mA
Remote Sense	-	Yes
Remote On/Off	-	Yes: Apply voltage to isolated terminals to shut unit down
Power Good	-	Yes: Isolated transistor, On = Good
Operating Temperature	°C	-20°C to +70°C Derate linearly to 50% load from 40°C to 70°C
Storage Temperature	°C	-40°C to +85°C
Humidity (non condensing)	%RH	10 - 95%RH (Operating & Storage)
Cooling	-	Convection or Forced Air Cooled
Withstand Voltage	-	Input to Ground 2kVAC (1xMOPP), Input to Output 4kVAC (2xMOPPs), Output to Ground 1.5kVAC (1xMOPP)*
Isolation Resistance	-	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC
Vibration (non operating)	-	10 - 55Hz: 19.6m/s^2 constant sweep 1 min X, Y, Z for 1 hour
Shock	-	< 196.1 m/s^2 (20G)
Immunity	-	IEC61000-4-2 (lv 2, 3), -3 (lv3), -4 (lv 3), -5 (lv3, 4), -6 (lv 3), -8 (lv 4), -11, EN60601-1-2;2015 (Ed4)
Safety Agency Certifications	-	EN/IEC/UL/ES/CSA 60601-1, EN/IEC/UL/CSA60950-1, CE Mark
Conducted & Radiated EMI	-	EN55011-B, FCC Class B (Radiated Class A)
Weight (Typ)	g	850
Size (LxWxH)	mm	190 x 87 x 40
Warranty	yrs	3

Notes:

(1) Derate linearly to 80% load from 115 to 85VAC input

(2) 115 / 230VAC input

(3) Refers to input power during remote off and standby, 5V & 12V fan supply at no load conditions

(4) Cycle AC to reset

* *Suitable for B & BF rated medical equipment*

Model Selector

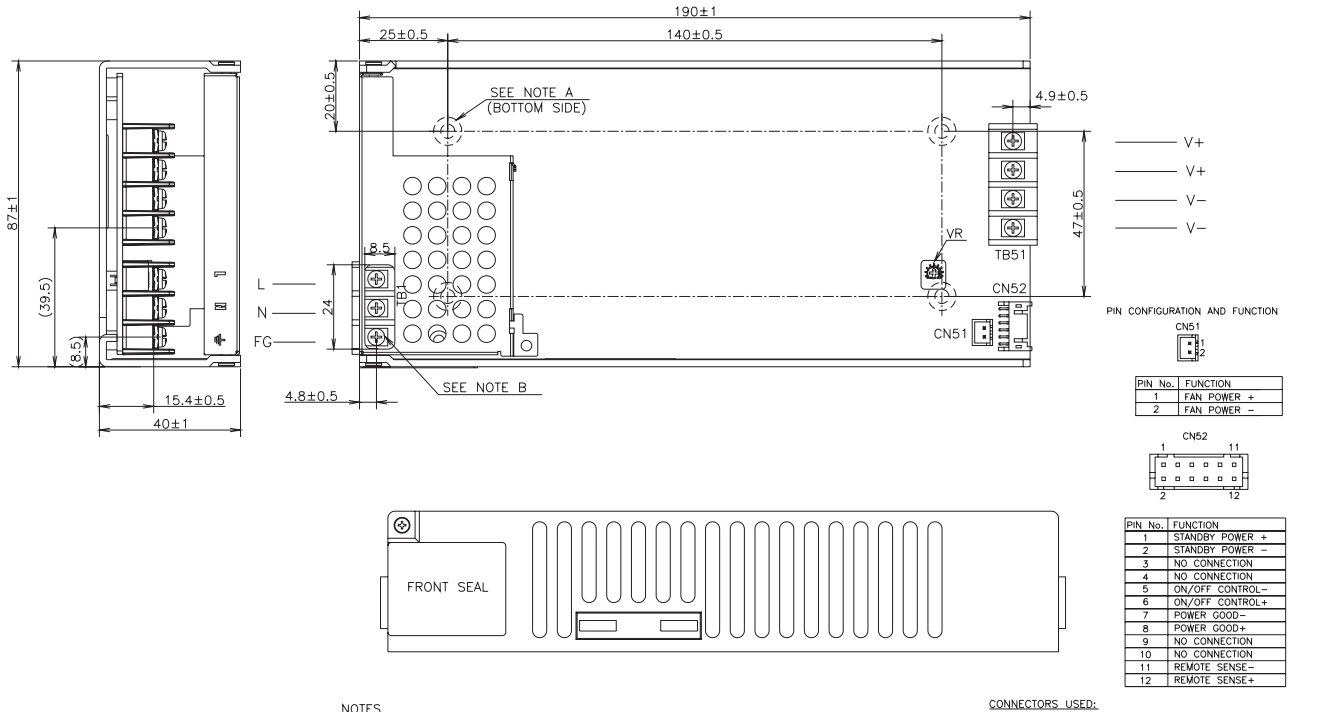
Model	Voltage	Adjust Range (V)	Maximum Current (A) Convection	Maximum Power (W) Convection	Forced Air	Maximum Power (W) Forced Air	Ripple Noise (mV)	Efficiency (typical) % (5)
CUS350M-12/F	12V	11.4 - 12.6	29.0	348.0	34.5	414.0	120	91 / 93
CUS350M-18/F	18V	17.1 - 18.9	19.4	349.2	23.0	414.0	180	91 / 94
CUS350M-24/F	24V	22.8 - 25.2	14.7	352.8	17.5	420.0	240	91 / 94
CUS350M-36/F	36V	34.2 - 37.8	9.7	349.2	11.5	414.0	360	91 / 93
CUS350M-48/F	48V	45.6 - 50.4	7.3	350.4	8.7	417.6	480	91 / 94

Notes: (5) 115 / 230VAC input. Convection and forced air ratings

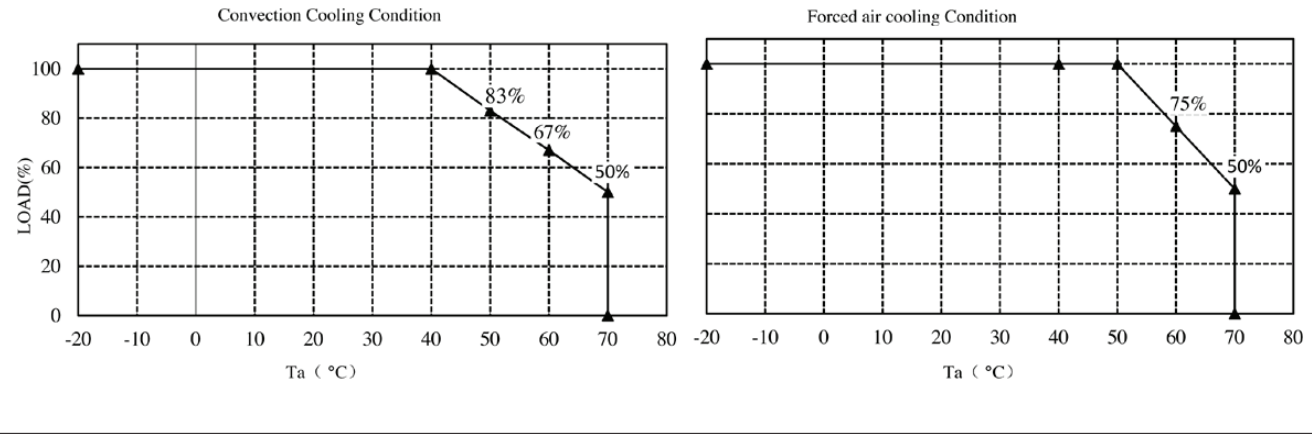
Options (available on request)

Suffix "/F	**Fan Supply & Power Good Signal Default model in EMEA**

Outline Drawing CUS350M Series

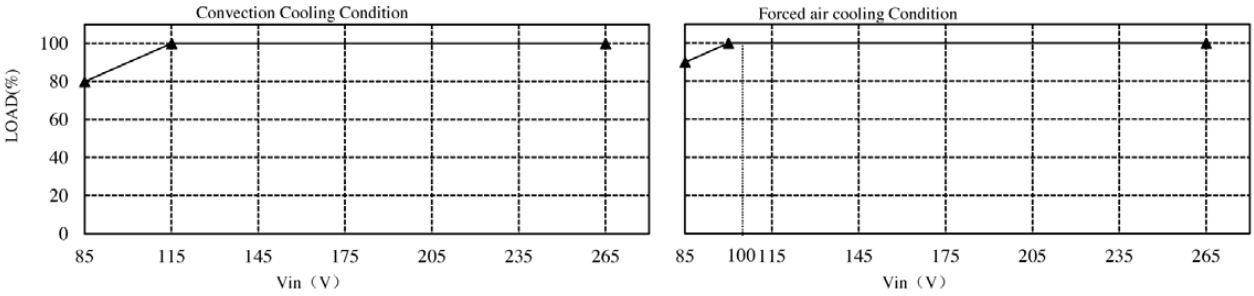


Output Derating Curve



Output Derating versus Input Voltage

INPUT VOLTAGE (VAC)	LOAD (%)	
	Convection cooling	Forced air cooling
85	80	90
115~265	100	100



LED Broadcast Test Comm

Single Output 250W Low Profile Power Supplies

Features	Benefits
• High efficiency up to 90%	• Compact convection cooled device
• 30mm high	• Slim design for use in panels
• Wide range AC input	• Allows global use
• Convection cooled	• No fan noise
• High grade component selection	• 3 year warranty

Specification

Model		CUS250LD
AC Input Voltage (3)	VAC	85 - 265VAC (300VAC for 5s)
Input Frequency	Hz	47 - 63Hz
DC Input Voltage	VDC	120 - 370VDC (No safety certification)
Inrush Current (cold start)	A	20A at 115VAC, 40A at 230VAC
Power Factor (1)	-	Meets EN61000-3-2 (Typical PF 0.98/0.95)
Input Current (115/230VAC)	A	2.8 / 1.4
Temperature Coefficient	-	<0.02%/°C
Overcurrent Protection	-	> 105%
Overvoltage Protection (2)	V	3.3V: 4 - 5.25V, 4.2V: 5 - 6.5V, 5V: 5.75 - 7.5V, 12V: 13.8 - 16.2V, 24V: 27.6 - 32.4V
Hold Up Time	ms	20ms
Leakage Current (240VAC 60Hz)	mA	<0.75mA
Remote Sense	-	No
LED Indicator	-	Green LED = On
Operating Temperature (3)	°C	-25°C to +70°C. Derate down to 50% load from +40°C to +70°C
Storage Temperature	°C	-30°C to +75°C
Operating Humidity (non condensing)	%	30 - 90% RH
Storage Humidity (non condensing)	%	10 - 90% RH
Cooling	-	Convection
Withstand Voltage	-	Input to Ground 2kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.
Isolation Resistance	-	>100M at 25°C & 70%RH, Output to Ground 500VDC
Vibration (non operating)	-	10 - 55Hz: 19.6m/s^2 constant sweep 1 min X, Y, Z for 1 hour
Shock	-	< 196.1 m/s^2 (20G)
Immunity	-	IEC61000-4-2 (lv 2, 3), -3 (lv3), -4 (lv 3), -5 (lv3, 4), -6 (lv 3), -8 (lv 4), -11
Safety Agency Certifications	-	UL60950-1, CSA60950-1-07 (cTUVus), EN60950-1, CE Mark
Conducted & Radiated EMI	-	EN55022-B, FCC--B
Weight (Typ)	g	700
Size (LxWxH)	mm	198 x 102 x 30
Warranty	yrs	3

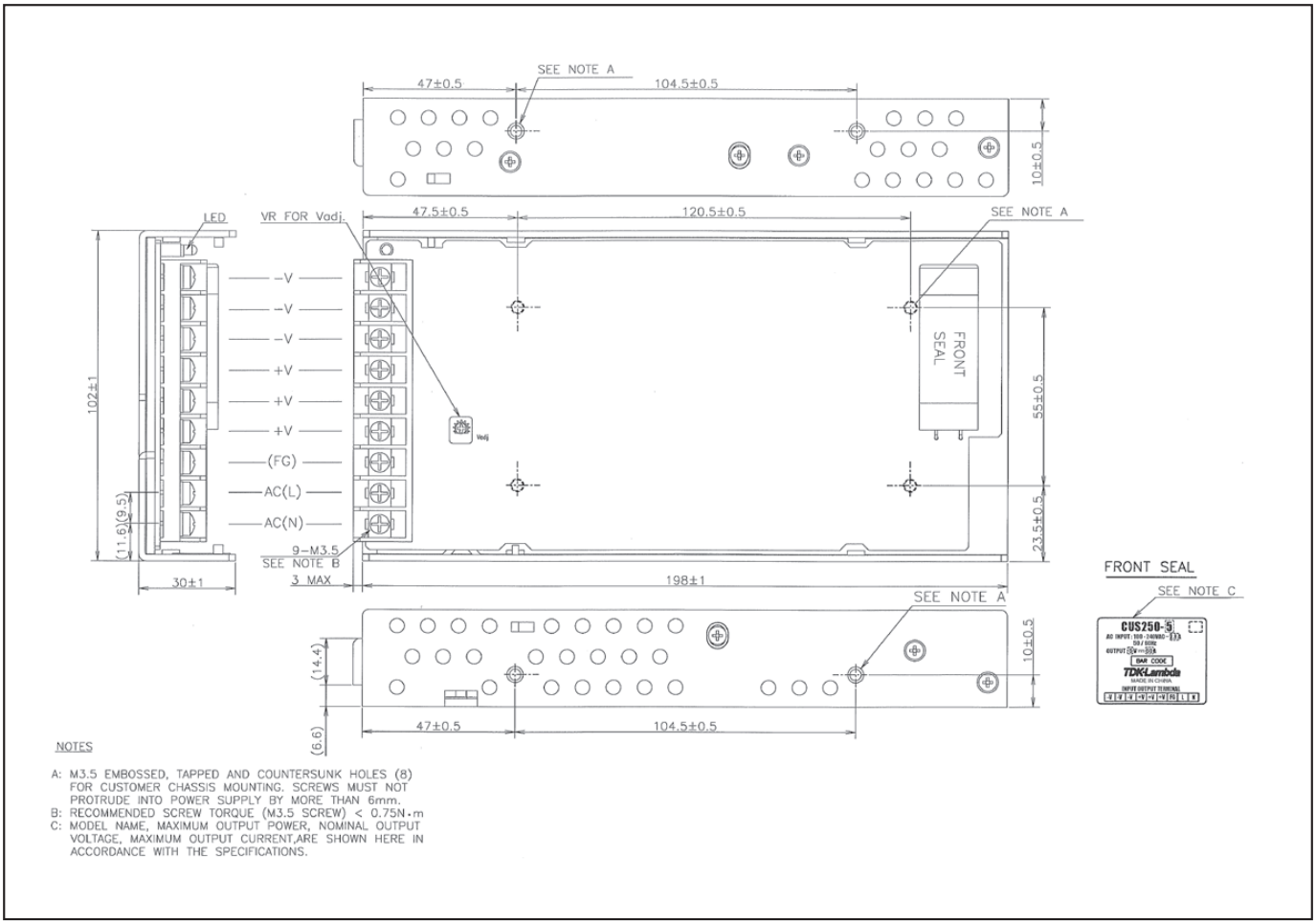
Notes:

(1) 115 / 230VAC input
(2) Cycle AC to reset
(3) See derating curves on page 3. Output derating vs input voltage - derate linearly to 80% load from 115VAC to 85VAC input **(not for CUS250LD-3)**

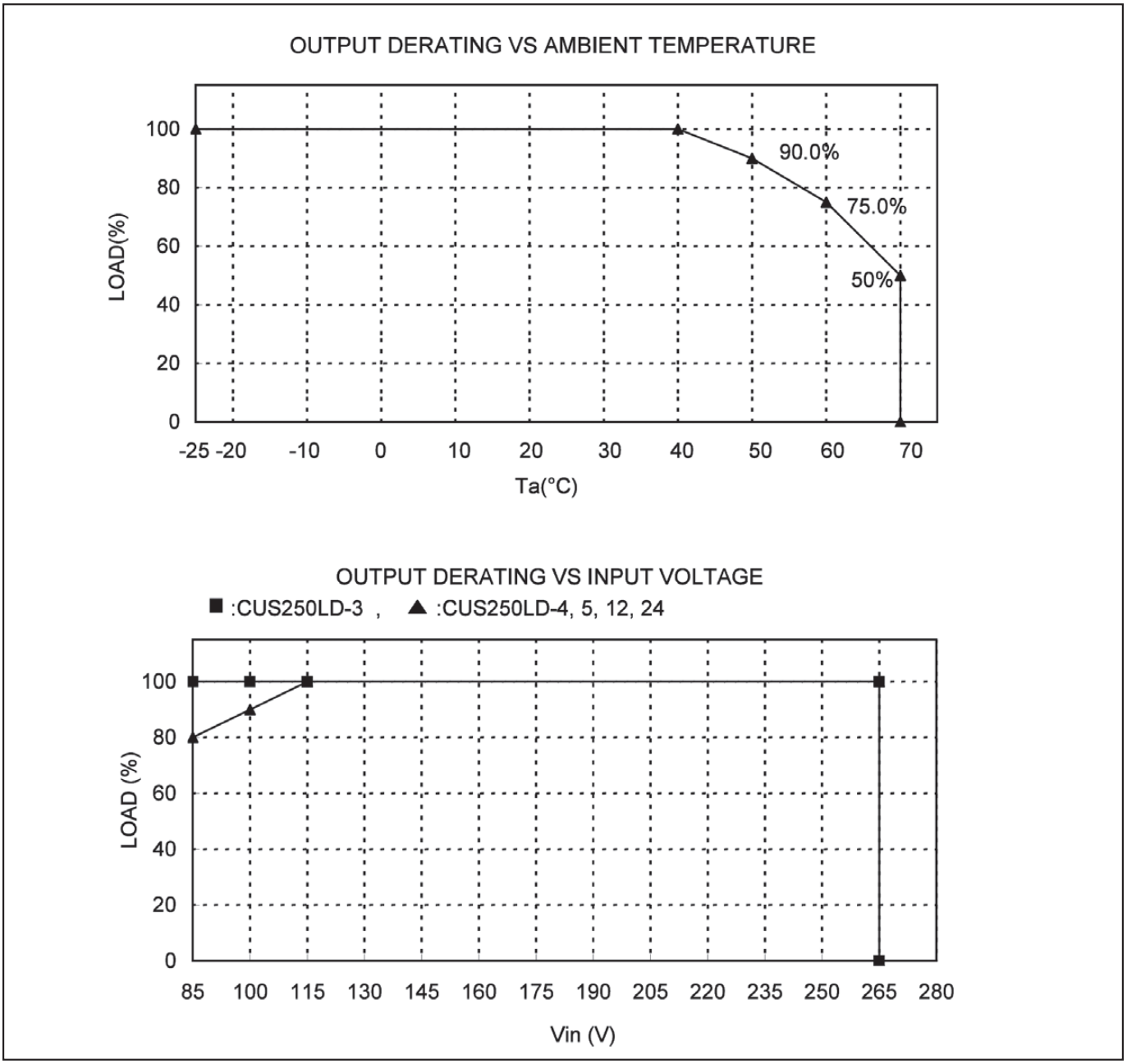
Model Selector

Model	Voltage	Adjust Range (V)	Max Current (A)	Max Power (W)	Load Reg (mV)	Line Reg (mV)	Ripple Noise (mV)	Efficiency (typ) % [1]
CUS250LD-3	3.3V	2.97 - 3.63	50	165	40	20	120	86 / 88
CUS250LD-4	4.2V	3.78 - 4.62	50	210	40	20	120	87 / 89
CUS250LD-5	5V	4.5 - 5.5	50	250	40	20	120	88 / 90
CUS250LD-12	12V	10.8 - 13.2	21	252	96	48	120	88 / 90
CUS250LD-24	24V	21.6 - 26.4	10.5	252	192	96	150	88 / 90

Outline Drawing CUS250LD Series



Output Derating Curve CUS250LD



Medical Industrial Test LED Comm Broadcast

1500W Medical and Industrial Power Supplies

Features	Benefits
• Enclosed Compact Construction	• Easy Installation
• Class B Conducted & Radiated EMI	• Simpler System Filtering
• Variable Speed Fan	• Quieter Operation
• Medical and Industrial Certifications	• Easier System Compliance
• 7 Year Warranty	• Lower Cost of Ownership

Specification

Model		CUS1500M
AC Input Voltage range (1)	VAC	85 - 265VAC (47 - 63Hz)
DC Input Voltage range *	VDC	120 - 340VDC*
Inrush Current (100 / 200VAC)	A	60 / 60A
Power Factor (100 / 200VAC)	-	Meets EN61000-3-2 (0.98 / 0.95)
Input Current (115/230VAC) (Typ)	A	16 / 8A
Temperature Coefficient	%/°C	<0.02%/°C
Regulation	-	See Model Selector
Overcurrent Protection	-	>105%, Constant Current Style. After 5s unit will shutdown
Overvoltage Protection	V	125-150% (115-125% for 48V), Cycle AC line to reset
Hold Up Time (Typ at 100% load)	ms	20ms
Leakage Current (max)	mA	<0.3mA
Standby Voltage	A	5V 1A (always on)
Remote Sense	-	Yes
Remote On/Off	-	Yes. Apply external or Standby voltage to enable output voltage
DC Good, Fan Alarm	-	Open collector signal, high on fail
Parallel Operation	-	Yes, up to 5 units
Series Operation	-	Yes
Operating Temperature	°C	-20°C to +60°C, derate linearly to 60% load from 50°C to 60°C Reverse air (/RF): -20°C to +70°C, derate linearly to 50% load from 50°C to 70°C
Storage Temperature	°C	-30°C to +75°C
Operating Humidity (non condensing)	%RH	20 - 90%RH
Storage Humidity (non condensing)	%RH	10 - 90%RH
Cooling	-	Internal variable speed fan, air intake from front. <45dBA noise
Withstand Voltage	VAC	Input to Ground 2kVAC (1xMoPP), Input to Output 4kVAC (2xMoPP), Output to Ground 1.5kVAC (1xMoPP) for 1 min.
Isolation Resistance	MΩ	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC
Vibration (non operating)	-	10 - 55Hz: 19.6m/s^2 (sweep 1 min) X, Y, Z for 1 hour
Shock	-	< 196.1 m/s^2
Safety Agency Certifications	-	IEC/ES/EN/CSA60601-1, IEC/UL/EN/CSA60950-1, IEC/UL/EN62368-1 EN62477-1 (OVC III), CE Mark
Line Dips	-	SEMI-F47 (200VAC input)
Conducted & Radiated EMI	-	EN55011 / EN55032-B, FCC Class B, VCCI-B
Immunity	-	IEC61000-4-2, -3, -4, -5, -6, -8, -11, IEC61000-6-2, IEC60601-1-2 Ed.4
Weight (Typ)	g	3,000g
Size (WxHxD)	mm	127 x 63 x 261mm
MTBF - Telcordia SR-332 issue 3 **	hours	769,670
Warranty	yrs	7

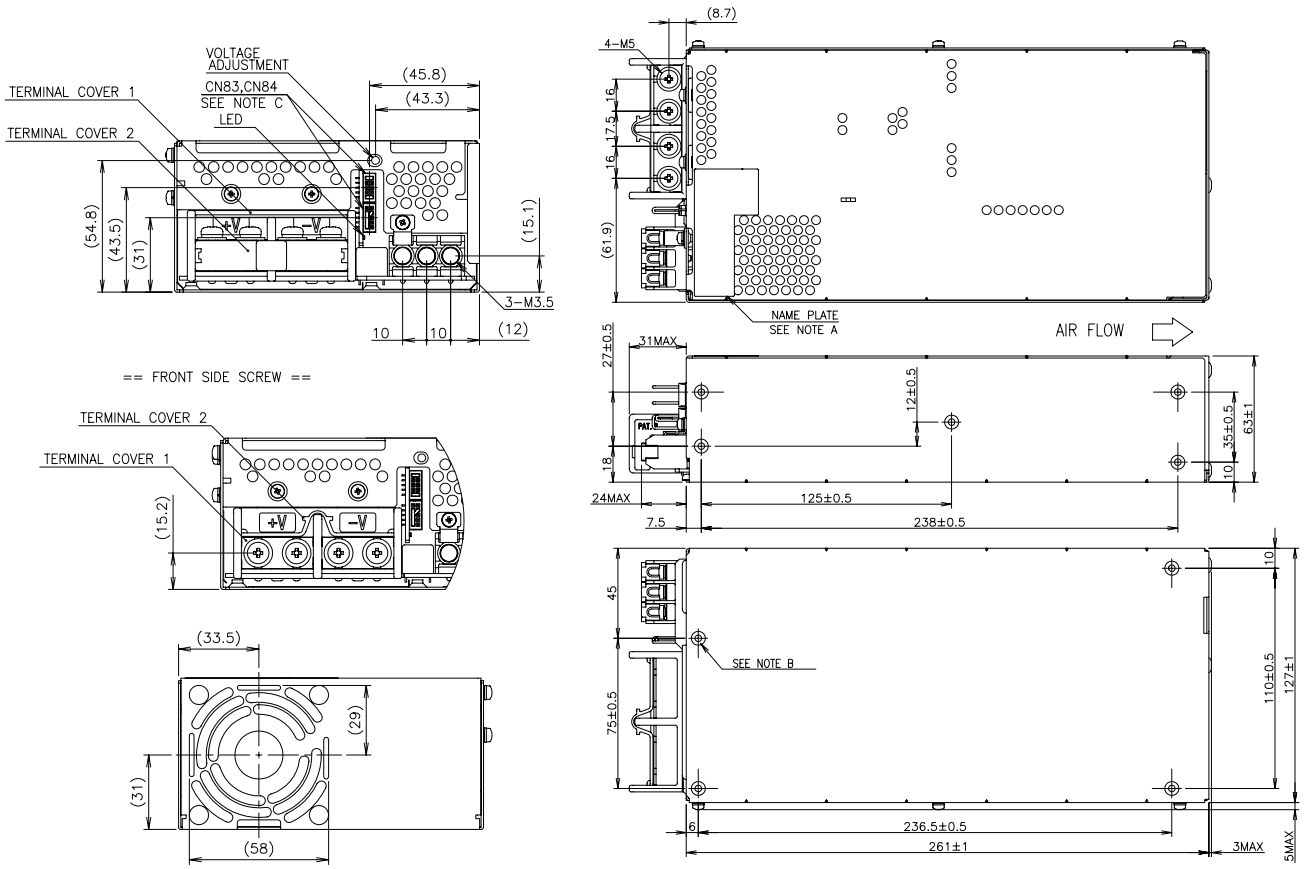
Notes: * Safety certified for AC input only ** 24V output model, 25°C ambient, full load, 230VAC input

(1) Derate linearly to 80% load from 90 to 85VAC input

Model Selector

Model	Voltage (V)	Adjust Range (V)	Max Current (A)	Max Output Power (W)	Load Reg (mV)	Line Reg (mV)	Ripple Noise (mV)	Efficiency (typ) % 115/230VAC
CUS1500M-12	12	10.2 -14.4	125	1500	96	48	150	82 / 85
CUS1500M-15	15	12.8 - 18	100	1500	120	60	150	82 / 85
CUS1500M-24	24	20.4 - 28.8	63	1512	144	96	180	85 / 88
CUS1500M-36	36	30.6 - 43.2	42	1512	216	144	250	85 / 88
CUS1500M-48	48	40.8 - 52.8	32	1536	288	192	300	85 / 88

Outline Drawing CUS1500M



Options

Suffix	Description
/SF	Single fuse (live line)
/RF	Reverse Fan (Air exits over input/output terminals)
/CO2	PCB coating

Test Industrial Broadcast Medical

Dual or Triple Output 35W Low Profile Power Supplies

Features	Benefits
• Compact 2 x 4 x 1.06" Footprint	• Space Saving in End Equipment
• Output 1 Isolated from Outputs 2 & 3	• Flexible Application
• Convection Cooled	• Quiet Operation
• Class B Conducted & Radiated EMI	• Easier System EMC Compliance

Specification

Model		CUT35-522	CUT35-5FF
AC Input Voltage (1)	VAC	85 - 265VAC	
Input Frequency	Hz	47 - 63Hz	
DC Input Voltage	VDC	88 - 370VDC (No safety certification)	
Inrush Current (cold start)	A	13A at 100VAC, 32A at 230VAC	
Power Factor	-	Meets EN61000-3-2	
Input Current (100 / 200VAC)	A	1 / 0.5	
Temperature Coefficient (-20 to +70°C)	-	V1: <0.02%/°C, V2 & 3 <0.03%/°C	
Overcurrent Protection	-	> 105%	
Overvoltage Protection (2)	V	V1: 5.7-7.0, V2: 13.8 - 16.8V	V1: 5.7-7.0, V2: 17.2 - 21.0V
Efficiency (typical at 200VAC Input)	%	81%	82%
Hold Up Time (115 / 230V input)	ms	20ms	
Leakage Current (265VAC 50Hz)	mA	<0.3mA	
Operating Temperature (3)	°C	Open Frame & /B:-20 to +70°C. Derate linearly to 70% load from +55°C to +70°C Cover: -20°C to +60°C. Derate linearly to 70% load from +45°C to +60°C	
Storage Temperature	°C	-30°C to +85°C	
Operating Humidity (non condensing)	-	5 - 95% RH	
Cooling	-	Convection	
Withstand Voltage	-	Input to Ground 2kVAC, Input to Output 3kVAC, Output to Ground 500VAC, V1 to V2 / V3 500VAC for 1 min.	
Isolation Resistance	Ω	>100MΩ at 25C & 70%RH, Output to Ground 500VDC	
Vibration (non operating)	-	10 - 55Hz: 19.6m/s^2 constant sweep 1 min X, Y, Z for 1 hour	
Shock	-	< 196.1 m/s^2 (20G)	
Immunity		IEC61000-4-2 (lv 3, 4), -3 (lv3), -4 (lv 4), -5 (lv3, 4), -6 (lv 3), -8 (lv 4), -11	
Safety Agency Certifications	-	UL60950-1, CSA60950-1-07 (cTUVus), EN60950-1, CE Mark ANSI/AAMI ES60601-1, CSA 60601-1 (cTUVus), IEC/EN60601-1 3rd Edition (2 x MOOP)	
Conducted & Radiated EMI	-	EN55011-B, FCC-B	
Weight (Typ)	g	Open frame: 90, Baseplate: 136, Cover: 175	
Size (W x L x H)	mm	Open Frame: 50.8 x 101.6 x 27 Baseplate (/B): 56.5 x 122 x 28 Cover (/A): 63.1 x 125 x 36	
Warranty	yrs	3	

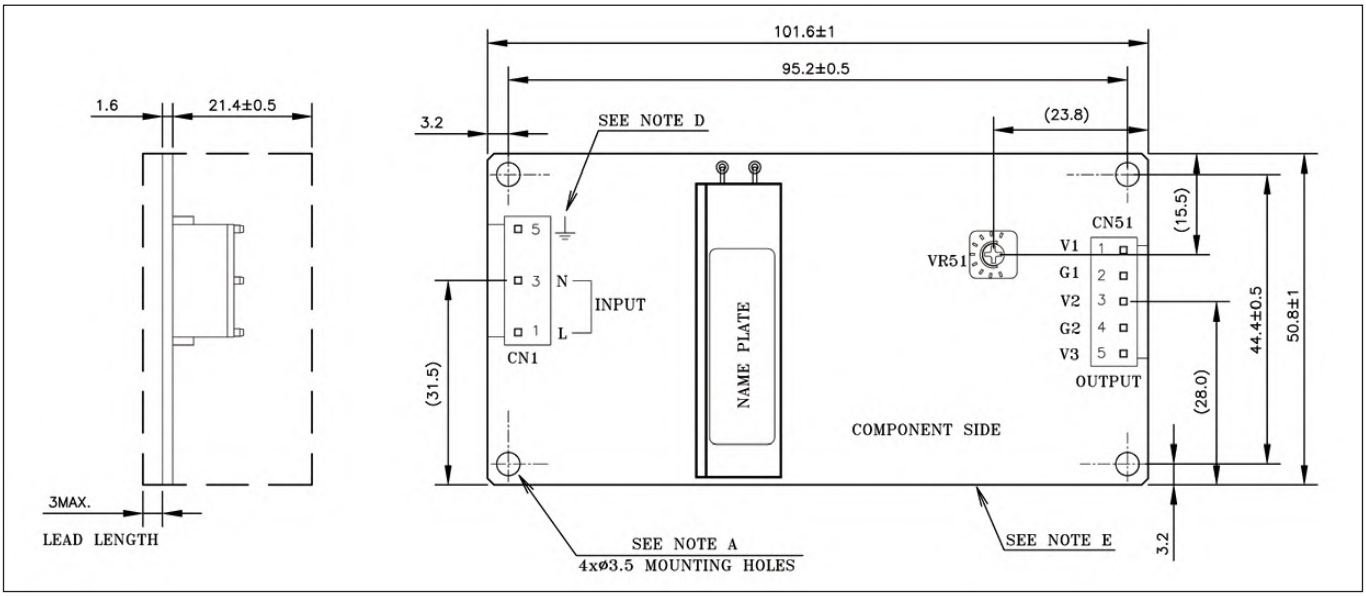
Notes: **(1)** Derate linearly to 60% load from 100VAC to 85VAC input when ambient is < -10°C
(2) Cycle AC to reset
(3) See derating curves in installation manual for all mounting orientatons

Model Selector

Model		Voltage (V)	Adjust Range (V)	Maximum Current (A)	Maximum Power (W)	Load Reg (mV)	Line Reg (mV)	Ripple Noise (mV)
CUT35-522	V 1	5V	5 - 5.25	3	15	100	50	120
	V2	+12V	Fixed	1.2	20.4	600	240	150
	V3	-12V	Fixed	0.85	20.4	600	240	150
CUT35-522	V1	5V	5 - 5.25	3	15	100	50	120
	V2	24V	Fixed	0.85	20.4	750	300	150
	(Leave common terminal unconnected)							
CUT35-5FF	V1	5V	5 - 5.25	3	15	100	50	120
	V2	+15V	Fixed	1	19.5	750	300	150
	V3	-15V	Fixed	0.65	19.5	750	300	150
CUT35-5FF	V1	5V	5 - 5.25	3	15	100	50	120
	V2	30V	Fixed	0.65	19.5	750	300	150
	(Leave common terminal unconnected)							

Note: CUT35 can be configured as a dual or single output.

Outline Drawing CUT35 Series



Options

Suffix	Description
Blank	Open frame with JST connectors
/A	Cover with JST connectors
/B	Baseplate with JST connectors

Medical Industrial Test Broadcast

Dual or Triple Output 75W Low Profile Power Supplies

Features	Benefits
•Triple (useable as dual) output supply	• Addresses multiple voltage needs in one hit
• Compact format (3 x 5" footprint only)	• Saves space & cost
• Low Profile (1.06" only)	• Allows flat constructions, slim solutions
• High Efficiency 85%	• Facilitates de-heating / cooling
• Individual output regulation	• Supports e.g. test, measurement & sensing solutions
• Good cost-value relation	• Helps improve appliance competitiveness
• Several mechanical & connector options	• Offers more implementation choices

Specification

Model		CUT75-522	CUT75-5FF
AC Input Voltage (1)	VAC	85 - 265VAC	
Input Frequency	Hz	47 - 63Hz	
DC Input Voltage	VDC	120 - 370VDC (No safety certification)	
Inrush Current (cold start)	A	18A at 100VAC, 36A at 200VAC	
Power Factor	-	Meets EN61000-3-2	
Input Current (100 / 200VAC)	A	2 / 1	
Temp. Coefficient (-20 to +70°C)	-	V1: <0.02%/°C, V2 & 3 <0.03%/°C	
Overcurrent Protection	-	> 105%	
Overvoltage Protection (2)	V	V1: 5.7-7.0, V2: 13.8 - 16.8	V1: 5.7-7.0, V2: 17.2 - 21.0
Hold Up Time (200VAC input)	ms	20ms	
Leakage Current (265VAC 50Hz)	mA	<0.3mA	
Operating Temperature (3)	-	-20 to +70°C. Derate linearly to 60% load from +50 to +70°C	
Storage Temperature	-	-30 to +85°C	
Op. Humidity (non condensing)	-	5 - 95% RH	
Cooling	-	Convection	
Withstand Voltage	-	Input to Ground 2kVAC, Input to Output 3kVAC, Output to Ground 500VAC, V1 to V2 / V3 500VAC for 1 min.	
Isolation Resistance	-	>100M at 25°C & 70%RH, Output to Ground 500VDC	
Vibration (non operating)	-	10 - 55Hz: 19.6m/s² constant sweep 1 min X, Y, Z for 1 hour	
Shock	-	< 196.1 m/s² (20G)	
Immunity	-	IEC61000-4-2 (lv 3, 4), -3 (lv3), -4 (lv 4), -5 (lv3, 4), -6 (lv 3), -8 (lv 4), -11,	
Safety Agency Certifications	-	IEC/EN/UL/CSA60950-1 (cTUVus), IEC/EN60601-1 3rd Edition (2 x MOOP)	
Conducted & Radiated EMI	-	EN55011/EN55022-B, FCC--B	
Weight (Typ)	g	210 (open frame version)	
Size (WxLxH)	mm	76 x 127 x 27	
Warranty	yrs	3	

Notes: **(1)** Derate linearly to 60% load from 100VAC to 85VAC input **(2)** Cycle AC to reset **(3)** See derating curves in instruction manual for all mounting orientations

Model Selector

Model		Voltage (V)	Adjust Range (V)	Maximum Current (A)	Maximum Power (W)	Load Reg. (mV)	Line Reg. (mV)	Ripple Noise (mV)
CUT75-522	V1	5V	5.0 - 5.25	8	40	100	50	120
	V2	+12V	FIXED	3	36	600	240	150
	V3	-12V	FIXED	1	-	600	240	150
CUT75-522	V1	5V	5.0 - 5.25	8	40	100	50	120
	V2	24V	FIXED	1	24	750	300	150
	(Leave common terminal unconnected)							
CUT75-5FF	V1	5V	5.0 - 5.25	8	40	100	50	120
	V2	+15V	FIXED	2.5	37.5	750	300	150
	V3	-15V	FIXED	1	-	750	300	150
CUT75-5FF	V1	5V	5.0 - 5.25	8	40	100	50	120
	V2	30V	FIXED	1	30	750	300	150
	(Leave common terminal unconnected)							

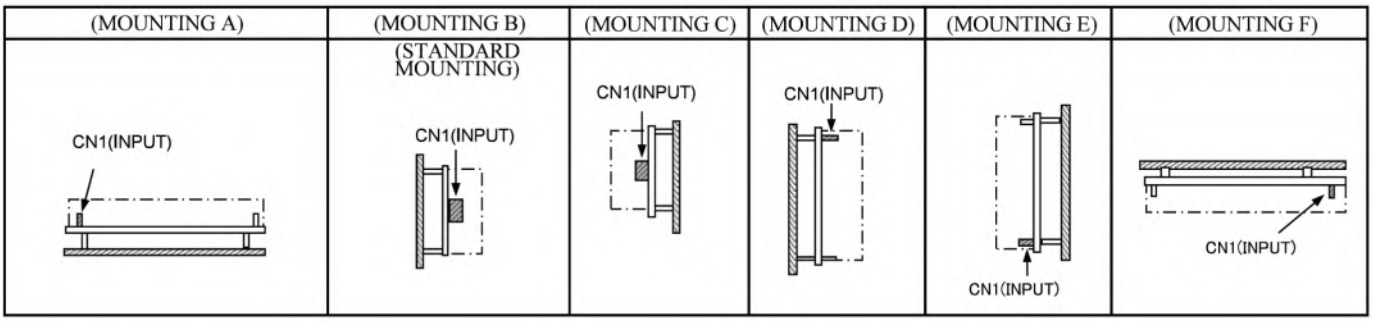
Note: CUT75 can be configured as a dual or triple output.

Options

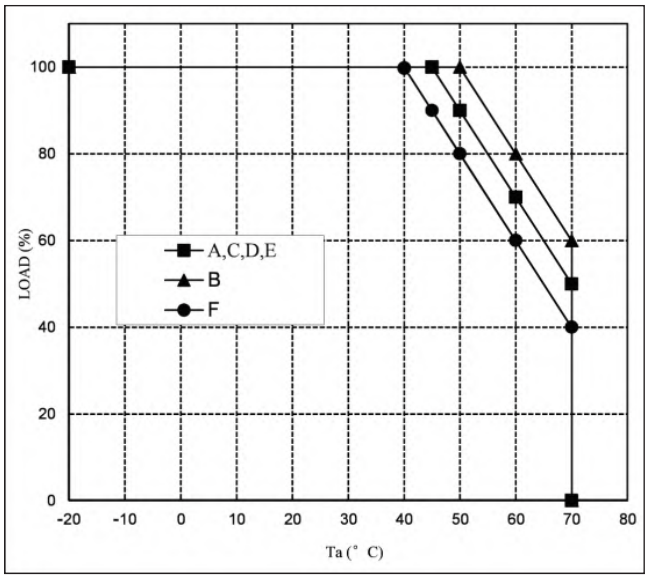
Suffix	Description
Blank	**Open frame with PIN (JST) connectors**
/A	Cover with PIN (JST) connectors
/B	**Baseplate with PIN (JST) connectors**
/T	Open frame with Terminal Block (screw connections)
/TA	Cover model with Terminal Block (screw connections)
/TB	Baseplate model Terminal Block (screw connections)

Preferred Models

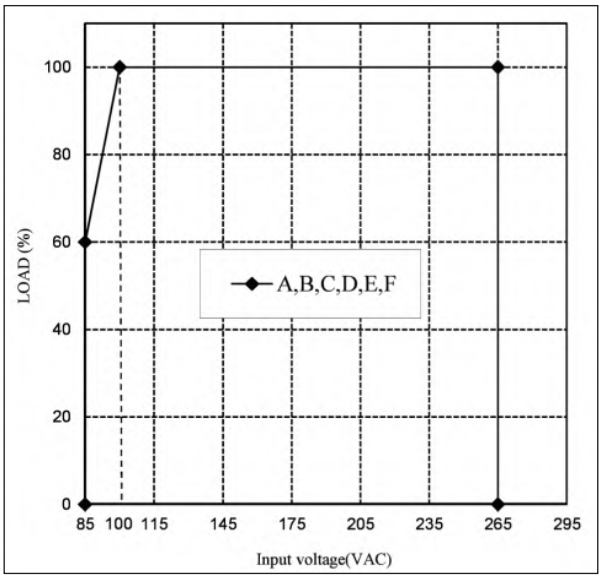
Mounting Instructions CUT75 Series



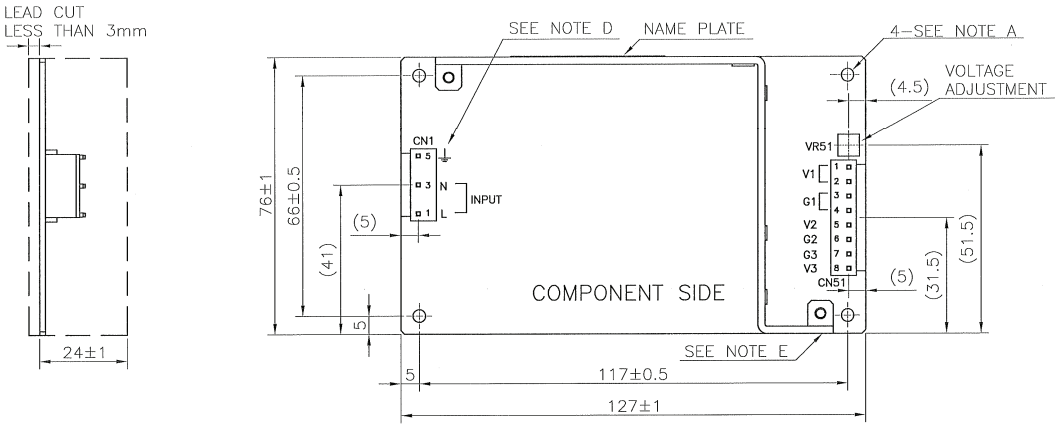
CUT75 Output derating vs Ambient Temperature



CUT75 Output derating vs Input Voltage



Outline Drawing CUT75 Series



CONNECTORS USED:

PART DESCRIPTION	PART NAME	MANUFACT.	QTY
PIN HEADER (INPUT SIDE CN1)	B3P5—VH	JST	1
PIN HEADER(OUTPUT SIDE CN51)	B8P—VH	JST	1

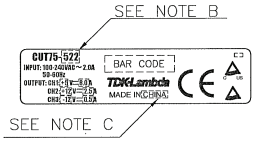
*OUTPUT CURRENT OF EACH CONNECTOR PIN MUST BE LESS THAN 5A.

MATCHING HOUSINGS AND PINS(NOT INCLUDED WITH THE PRODUCT):

SOCKET HOUSING (CN1)	VHR—5N	JST	1
SOCKET HOUSING (CN51)	VHR—8N	JST	1
TERMINAL PINS	SVH—21T—P1.1	JST	11

HAND CRIMPING TOOL : YC—160R CN1,CN51 MANUFACTURER : JST

NAME PLATE (SCALE 3:2)



NOTES

A: THE 4—ø3.5 HOLE ARE CUSTOMER CHASSIS MOUNTING HOLES. ALL MUST BE SCREWED IN ORDER TO CONFORM THE VIBRATION SPEC.

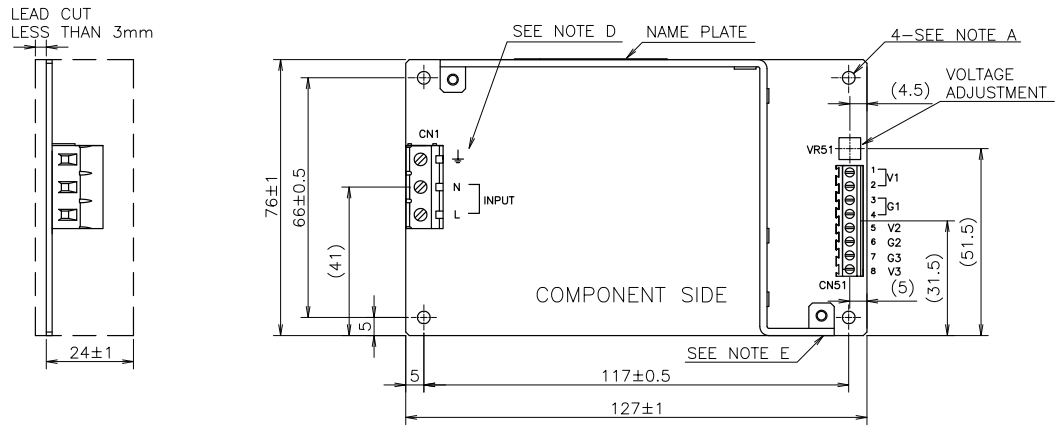
B: MODEL NAME, MAXIMUM OUTPUT POWER, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT, ARE SHOWN HERE IN ACCORDANCE WITH THE SPECIFICATIONS.

C: COUNTRY OF MANUFACTURE WILL BE SHOWN HERE.

D: ⏚ IS FOR SAFETY GROUND CONNECTION.

E: TO KEEP THE DISTANCE MORE THAN 4mm BETWEEN PC—BOARD EDGE AND CUSTOMER'S CHASSIS.

Outline Drawing CUT75/T Series

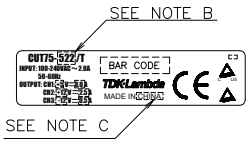


CONNECTORS USED:

PART DESCRIPTION	PART NAME	MANUFACT.	QTY
PIN HEADER (INPUT SIDE CN1)	TL402V-0754-03P-C12S	TIANLI	1
PIN HEADER(OUTPUT SIDE CN51)	TL100V-0755-08P-C12S	TIANLI	1

*OUTPUT CURRENT OF EACH CONNECTOR PIN MUST BE LESS THAN 5A.

NAME PLATE (SCALE 3:2)



NOTES

A: THE 4-Ø3.5 HOLE ARE CUSTOMER CHASSIS MOUNTING HOLES. ALL MUST BE SCREWED IN ORDER TO CONFORM THE VIBRATION SPEC.

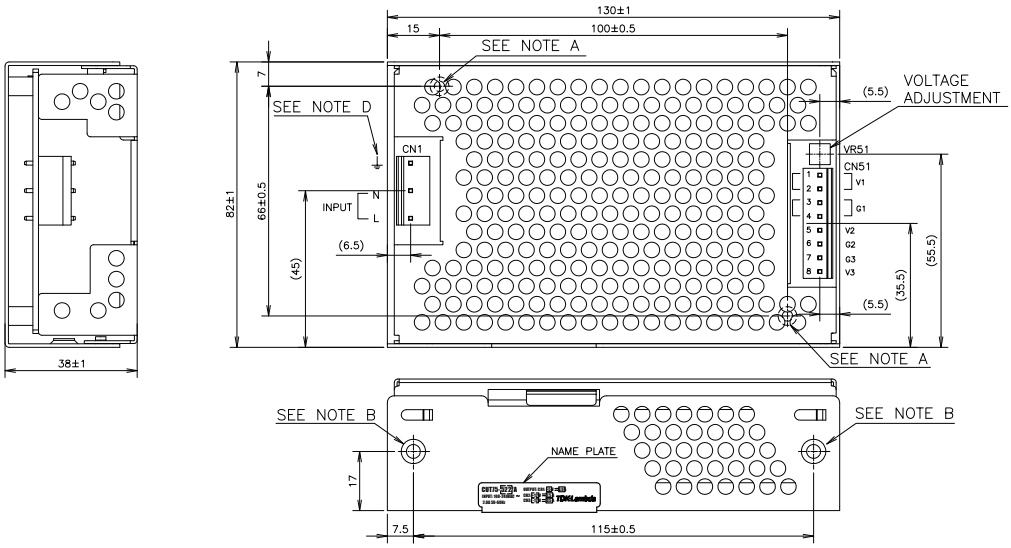
B: MODEL NAME, MAXIMUM OUTPUT POWER, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT, ARE SHOWN HERE IN ACCORDANCE WITH THE SPECIFICATIONS.

C: COUNTRY OF MANUFACTURE WILL BE SHOWN HERE.

D: ⏚ IS FOR SAFETY GROUND CONNECTION.

E: TO KEEP THE DISTANCE MORE THAN 4mm BETWEEN PC-BOARD EDGE AND CUSTOMER'S CHASSIS.

Outline Drawing CUT75/A Series



CONNECTORS USED:

PART DESCRIPTION	PART NAME	MANUFACT.	QTY
PIN HEADER (INPUT SIDE CN1)	B3P5-VH	JST	1
PIN HEADER(OUTPUT SIDE CN51)	B8P-VH	JST	1

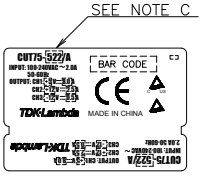
*OUTPUT CURRENT OF EACH CONNECTOR PIN MUST BE LESS THAN 5A.

MATCHING HOUSINGS AND PINS(NOT INCLUDED WITH THE PRODUCT):

SOCKET HOUSING (CN1)	VHR-5N	JST	1
SOCKET HOUSING (CN51)	VHR-8N	JST	1
TERMINAL PINS	SVH-21T-P1.1	JST	11

HAND CRIMPING TOOL : YC-160R CN1,CN51 MANUFACTURER : JST

NAME PLATE (SCALE 3:2)



NOTES

A: THE 2-M3 TAPPED & STANDOFF FOR CUSTOMER CHASSIS MOUNTING.SCREWS MUST NOT PROTRUDE INTO POWER SUPPLY BY MORE THAN 5mm.

B: THE 2-M4 EMBOSSED TAPPED & COUNTER-SUNK HOLES FOR CUSTOMER CHASSIS MOUNTING. SCREWS MUST NOT PROTRUDE INTO POWER SUPPLY BY MORE THAN 8mm.

C: MODEL NAME, MAXIMUM OUTPUT POWER, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT, ARE SHOWN HERE IN ACCORDANCE WITH THE SPECIFICATIONS.

D: ⏚ IS FOR SAFETY GROUND CONNECTION.

(unit : mm)

MODEL NAME	CUT75/A
TDK-Lambda	

CA809-02-01/A

Industrial Comm Renewable Automation

300 and 600W Constant Current Power Supplies

Features	Benefits
• 300W Convection cooled and 600W fan model	• Silent fanless chargers
• CC (constant current) mode	• Quick recharge, avoid battery overcharging
• CV (constant voltage) mode	• Supports charging of 12, 24 and 48V batteries
• 5 Year warranty	• Provides high reliability for battery charger and electrical storage system

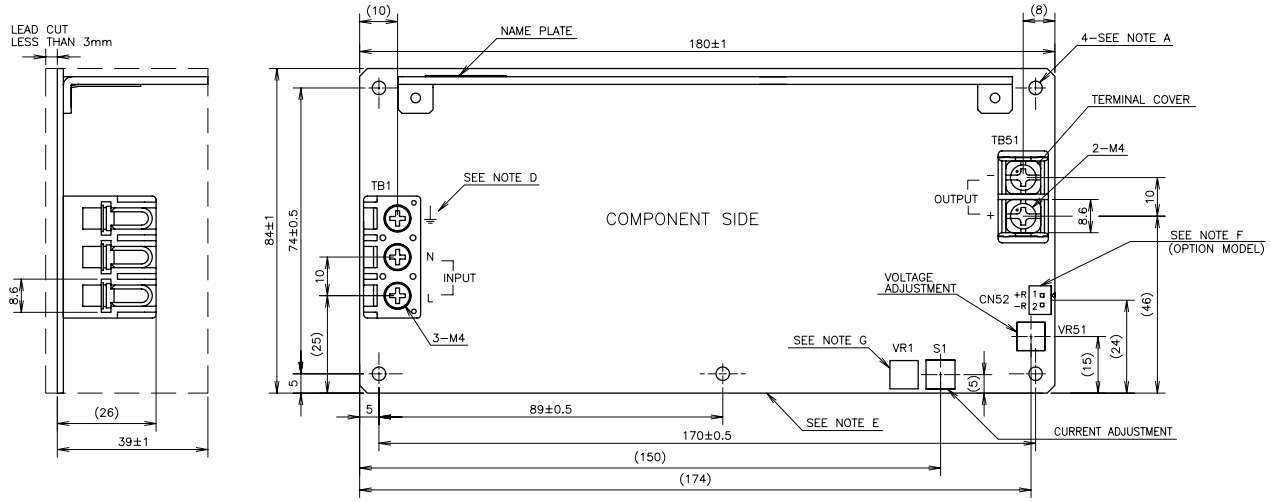
Specification

Model		EVS300	EVS600
Input Voltage	V	85-265VAC (47-63Hz)	85-265VAC (47-63Hz)
Input Current	A	3.6 / 1.8	7.2 / 4.0
Inrush Current (100/200VAC)	A	15 / 30	20 / 40
Power Factor (100/200VAC)	-	0.97/0.93	0.95/0.9
PFHC	-	Meets EN61000-3-2	
Leakage Current	mA	< 0.5mA	< 0.75mA
Temperature Coefficient	%/°C	<0.02%/°C	
Constant Current Setting Accuracy	A	±10%	
Overvoltage Protection	V	18V*: 19.8-23.4V, 36V: 39.6-46.8V, 57V: 62.7-74.1V (* EVS300 only)	
Hold Up Time (Typ)	ms	10ms at 100/110VAC input	
Efficiency (100/200VAC)	%	18V: 86/89%, 36V: 88/91%, 57V: 87/90%	36V: 85/88%, 57V: 84/87%
Remote On/Off	-	Optional	
Series & Parallel Operation	-	Yes, see instruction manual	
Operating Temperature (No external airflow)	°C	-20°C to +70°C Derate linearly to 40% load from 45°C to 70°C	-20°C to +70°C Derate linearly to 20% load from 50°C to 70°C
Operating Temperature External airflow (1.4m/s)	°C	-20°C to +70°C Derate linearly to 70% load from 60°C to 70°C	-20°C to +70°C Not applicable (EVS600 has internal fan)
Storage Temperature	°C	-30°C to +75°C	
Humidity (non condensing)	%RH	Operating: 30 - 90%RH, Storage: 10 - 90%RH	
Cooling	-	Convection or forced air	Internal fan
Withstand Voltage	VAC	Input to Ground 2kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.	
Isolation Resistance	MΩ	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC	
Vibration (non operating)	-	10 - 55Hz (1 minute sweep), 19.6m/s^2 constant, X, Y, Z 1 hour each	
Shock	-	< 196.1 m/s^2	
Safety Agency Certifications	-	UL60950-1, CSA60950-1, EN60950-1, CE Mark	
Conducted & Radiated EMI	-	EN55011/EN55022-B, FCC Class B, VCCI-B	
Immunity	-	EN61000-4-2, -3, -4, -5, -6, -8, -11; EN61000-6-2	
Weight (Typ)	g	540g (open frame)	1600g
Size (WxHxD)	mm	84 x 42 x 180mm	120 x 61 x 190mm
Warranty	yrs	5	

Model Selector

Model	Nominal Voltage Output	Adjust Range (V)	Max Current (100VAC)	Max Current (200VAC)	Current Adjust Range (100VAC)	Current Adjust Range (200VAC)	CV Line Reg (mV)	CV Load Reg (mV)	Ripple & Noise (mV)
EVS18-16R7	18V	12 - 18V	16.7A		8.35 - 16.70A		72	144	200
EVS36-8R4	36V	24 - 36V	8.4A		4.20 - 8.40A		144	252	250
EVS36-16R7	36V	24 - 36V	15.3A	16.7A	8.35 - 15.30A	8.35 - 16.70A	144	288	200
EVS57-5R3	57V	48 - 57V	5.3A		2.65 - 5.30A		228	285	250
EVS57-10R6	57V	48 - 57V	9.7A	10.6A	5.30 - 9.70A	5.30 - 10.60A	228	456	200

Outline Drawing EVS300W Series

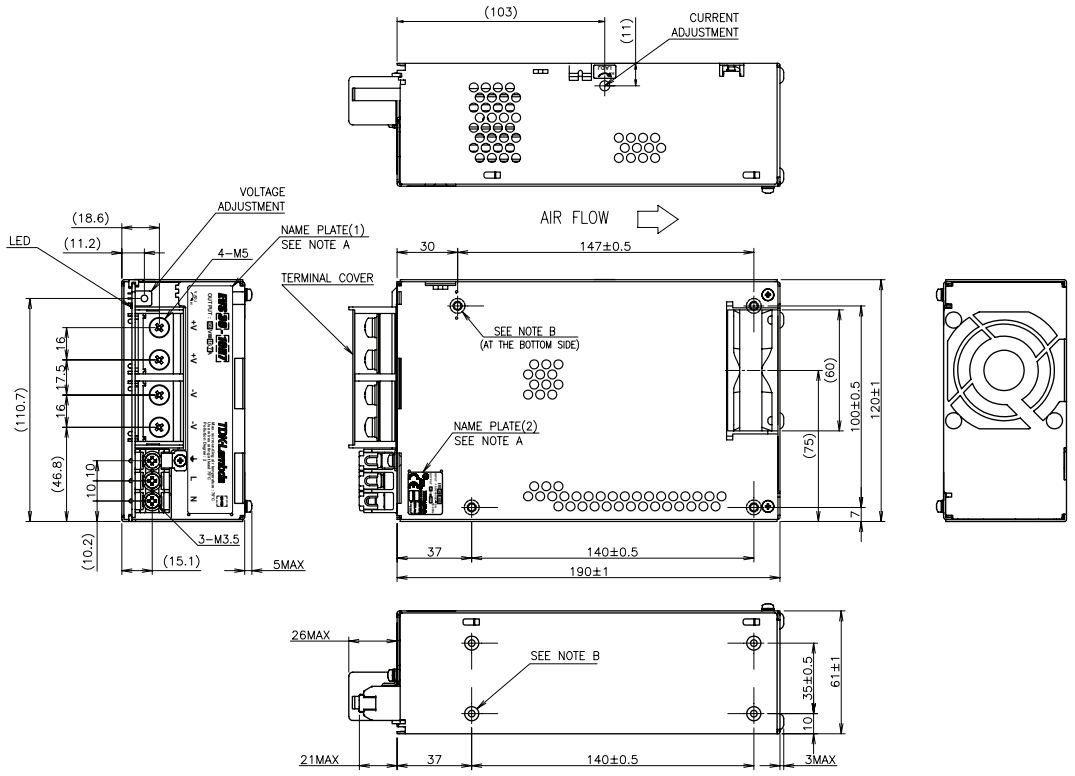


Options

Suffix	Description
-	None
/A	Cover & L Bracket (Standard on EVS600) *
/R	Remote On/Off
Example	EVS57-5R3/RA

Note: * without suffix

Outline Drawing EVS600W Series



Accessory

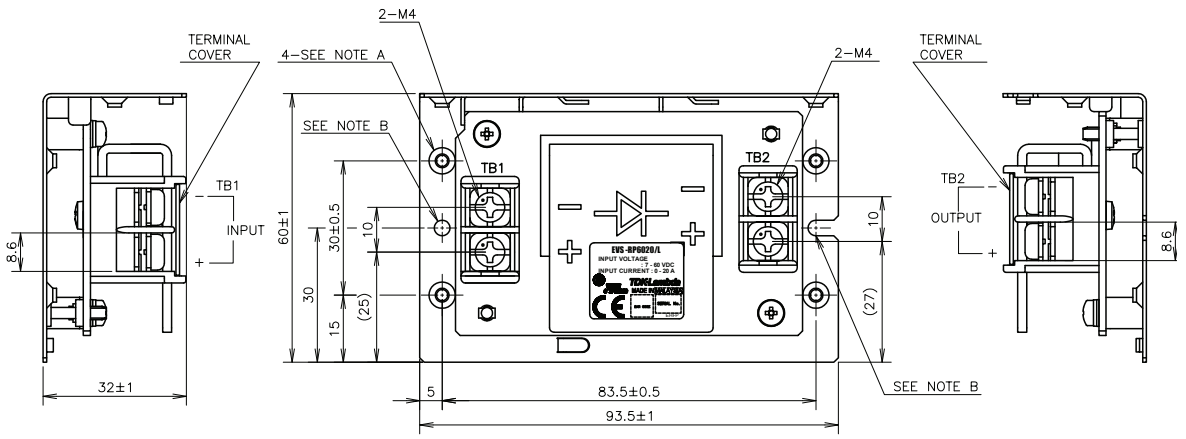
Model	Description
RP-60-20	20A Reverse current Prevention module for battery charging use (PCB type) *
RP-60-20/L	20A Reverse current Prevention module for battery charging use (on L bracket) *

*** The Reverse current Protection modules RP can also be used as replacement for Diode-modules (as e.g. DLP-PU)**

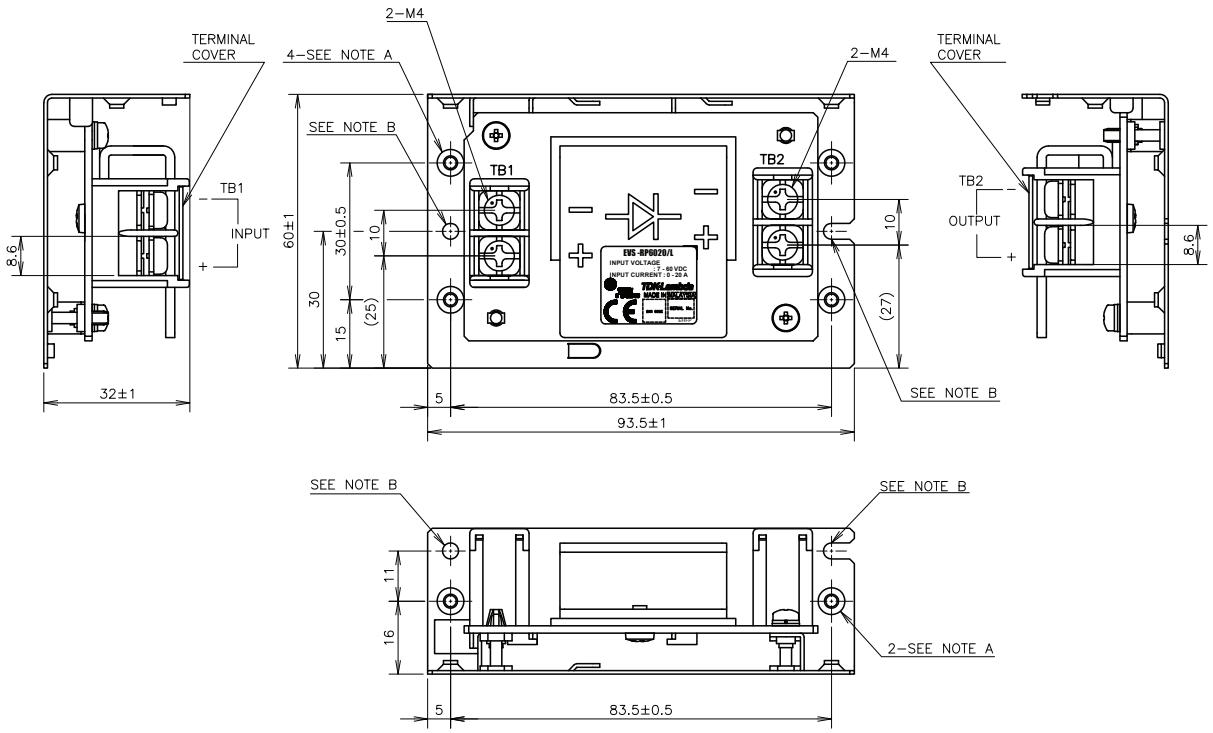
- For power up in parallel operation
- For Back-up diode (N + I redundant operation)

(**Note:** as from April 1st 2018 the **EVS-RP6020** has been renamed **RP-60-20**)

Outline Drawing RP-60-20 (Open frame)



Outline Drawing RP-60-20/L Series



Notes:
A: M3 embossed tapped and countersink holes (6) are for customer's chassis mounting
B: Dia 3.5mm holes (2) and R1.75 slot holes (2) are for customer's chassis mounting holes
C: Model name, input range and input current are shown here in accordance with the specifications
D: Country of manufacture will be shown here

Accessories:
* Terminal cover for barrier terminal strip ——2 (attached on terminal TB1 and TB2 at shipment)

Industrial Renewable Comm

20A Reverse Current Protection Module

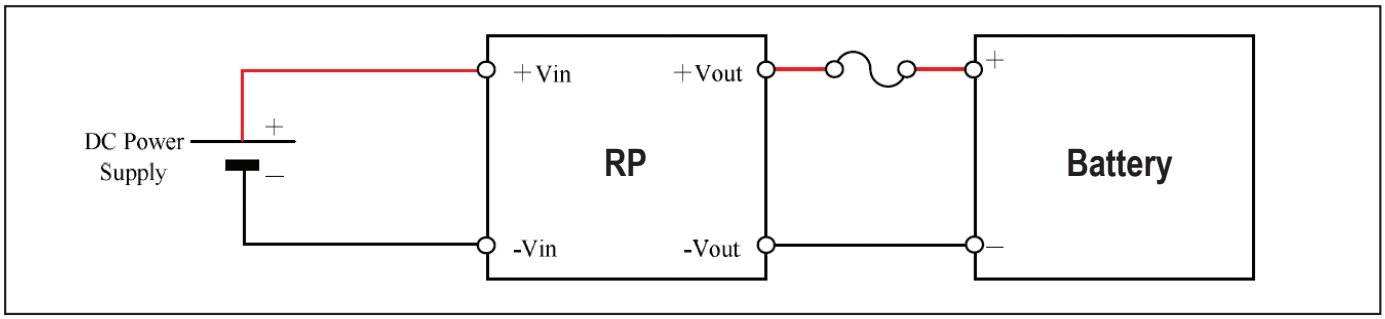
Features	Benefits
• Provides Reverse Current Protection	• Improves System Integrity
• Low Voltage Drop ORIng FET	• Lower Losses than Diode Units
• Compact Size	• Easy to Integrate
• Open Frame or L Bracket Construction	• More Mechanical Options for Designer

Specification

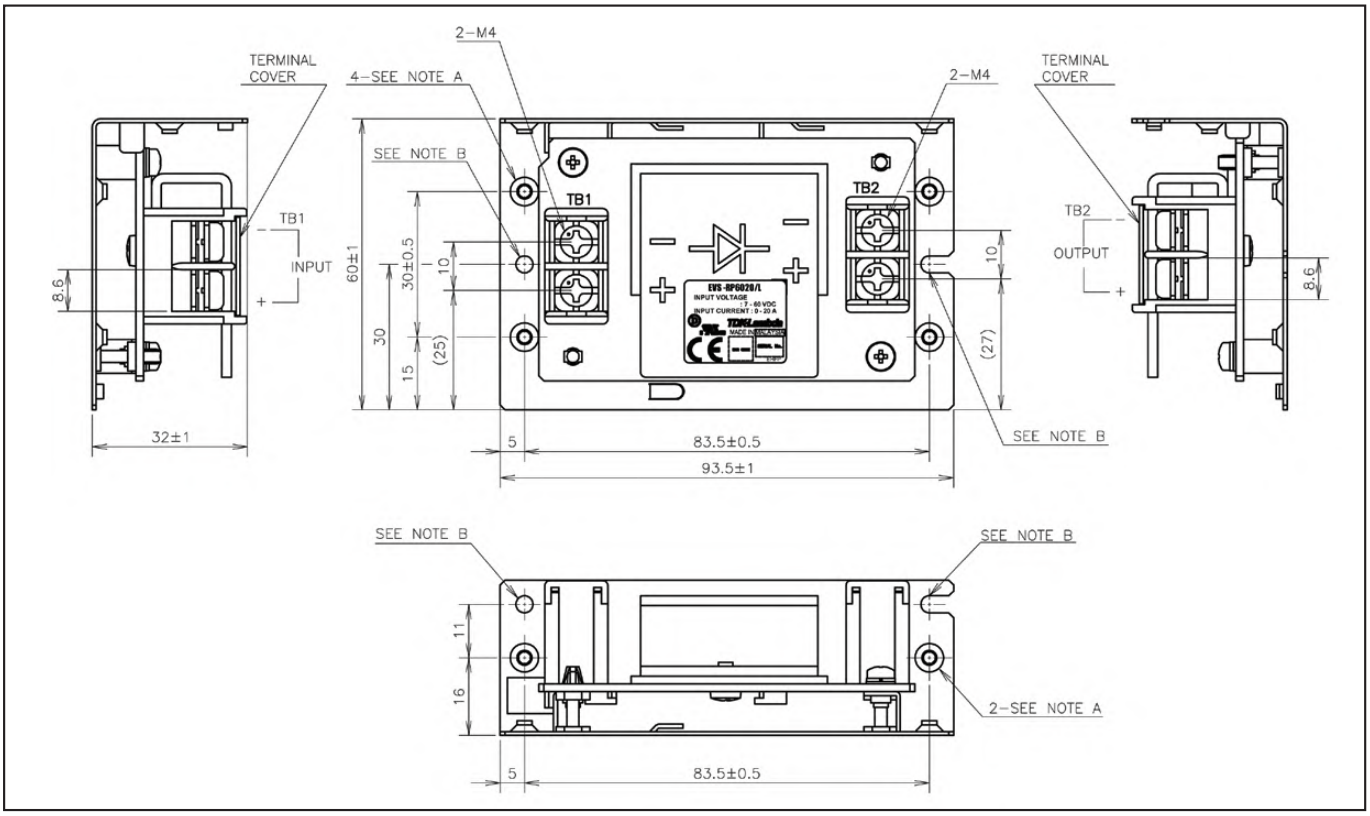
Model		RP-60-20
Input Voltage Range	VDC	7 - 60VDC
Maximum Current	A	20A
Voltage Drop	VDC	0.2V
Maximum Reverse Current	µA	50µA
Parallel Operation	-	Maximum 2 units, no current sharing function
Cooling	-	Convection or Forced Air
Operating Temperature	°C	Convection Cooling: -20°C to +74°C, derate linearly to 50% load from 50°C to 74°C Forced Air (≥1.4m/s) : -20°C to +74°C, derate linearly to 60% load from 60°C to 74°C
Storage Temperature	°C	-40°C to +85°C
Humidity (non condensing)	%RH	Operating: 20 - 90%RH, Storage: 10 - 90%RH
Withstand Voltage	VAC	Input or output to ground: 500VAC for 1 minute
Isolation Resistance	MΩ	Input or output to ground >100MΩ at 25°C, 70%RH and 500VDC
Vibration (non operating)	-	10-55Hz (sweep for 1 min), 19.6m/s^2 constant X, Y, Z each for 1 hour
Shock	-	196m/s^2
Safety Agency Certifications	-	UL60950-1, CSA60950-1, EN60950-1, CE mark for LVD and RoHS2
Size	mm	Open Frame: 50 x 26 x 77.5 L Bracket: 60 x 32 x 93.5
Weight	g	Open frame: 60g L Bracket: 100g
Warranty	yrs	5

Note: See Installation Manual for full details, test methods of parameters and application notes

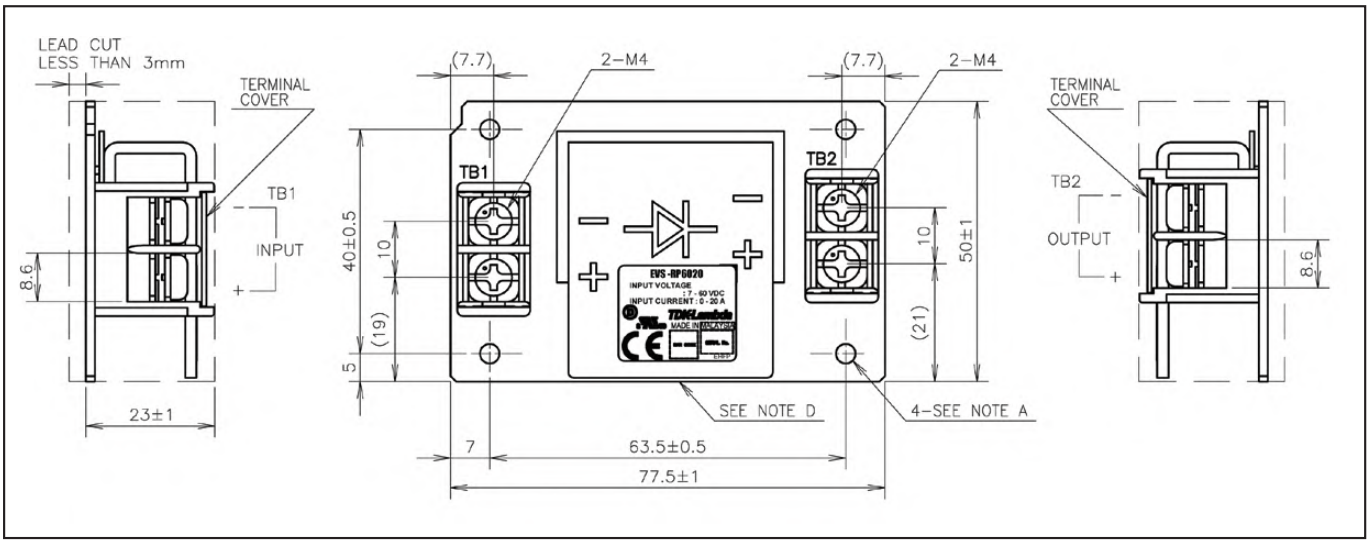
Application Sample



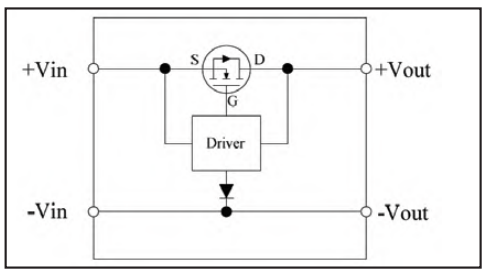
Outline Drawing RP-60-20/L (L bracket)



Outline Drawing RP-60-20 (Open frame)



Block Diagram



Options

Suffix	Description
-	Open Frame Construction
/L	L Bracket Construction

GWS250 Series

Single Output 250W Power Supplies

- Standby Power Draw < 0.5 Watt
- High Efficiency up to 93%
- Built to meet ErP
- 41 mm height (1U compatible)
- Convection Cooled
- 5V / 300mA Aux Supply
- Output Remote Programming
- Class C Harmonics (IEC 61000-3-2) above 25% Load
- Allows Use in Lighting Equipment
- Five Year Warranty

Key Market Segments & Applications

Targets all ErP compliant applications
Industrial, Traffic Controls, Automated Service, Kiosks
Test & Measurement, Entertainment Systems,
Communications & Broadcasting, LED Displays & Signage

GWS250 Features and Benefits

Features	Benefits
• Convection Cooling	• Easier System Integration, No Audible Noise
• Programmable Output Voltage	• Broad Range of Applications
• Peak Power Capability 120% (24 & 36V models)	• Lower Cost, Smaller Size
• Average Active Efficiency @ 230V : 92.7%	• Easier System Cooling, Less Energy Used, High Reliability

Specifications

ITEMS / MODEL			GWS250
AC Input Voltage		VAC	85 - 264VAC (300VAC for 5s)
Input Frequency		Hz	47 - 63Hz
DC Input Voltage		VDC	120 - 373VDC
Inrush Current (cold start)		A	20A at 115VAC, 40A at 230VAC
Power Factor	(1)	-	Meets EN61000-3-2 (Typical PF 0.98/0.95) ClassA, Class C> 25% Load
Input Current	(1)	A	3.0 / 1.4
Temperature Coefficient		°C	<0.02%/°C
Overcurrent Protection		-	>105% rated output power or >101% of peak output power
Overvoltage Protection	(2)	V	12V: 13.8 - 16.2V, 24V: 30.3 - 35.5V, 36V: 41.4 - 48.6V, 48V: 60 - 69.6V
Overtemperature Protection	(2)	-	Yes
Hold Up Time	(1)	ms	16ms
Leakage Current (Typ)		mA	0.75mA@230VAC
Remote Sense		-	No
Remote On/Off		-	Active Low
Standby Input Power	(3)	W	<0.5W
Aux Supply		-	5V/0.3A
Monitoring Signal		-	DC OK, open collector signal, High on Fail (Active Low)
LED Indicator		-	Green LED = On
Output Remote Programming		-	See installation manual for details
Operating Temperature		°C	-25°C to +70°C. (Refer to Output Derating Curve) Guaranteed Start Up at -40°C
Storage Temperature		°C	-30°C to +85°C
Operating Humidity		-	30 - 90% RH (non condensing)
Storage Humidity		-	10 - 95% RH (non condensing)
Cooling		-	Convection
Withstand Voltage		-	Input to FG 1.5kVAC (20mA), Input to Output 3kVAC (20mA), output to FG 500VAC (100mA) for 1 min
Isolation Resistance		Ω	>100MΩ at 25°C & 70%RH
Vibration (non operating)		-	10 - 55Hz: 19.6m/s² Constant sweep 1 min X, Y, Z for 1 hour each
Shock (in package)		-	< 196.1 m/s² (20G)
Immunity		-	Built to meet EN61000-4-2 (Level 2,3), -3 (Level 3), -4 (Level 3), -5 (Level 4), -6 (Level 3), -8 (Level 4), -11
Safety Agency Approvals		-	IEC/EN/UL/CSA 60950-1 and IEC/EN/UL/CSA 62368-1, CE Mark
Conducted & Radiated EMI		-	EN55032-B, CISPR22-B
Weight (Typ)		g	850
Size (L x W x H)		mm	198 x 105 x 41
Warranty		yrs	5

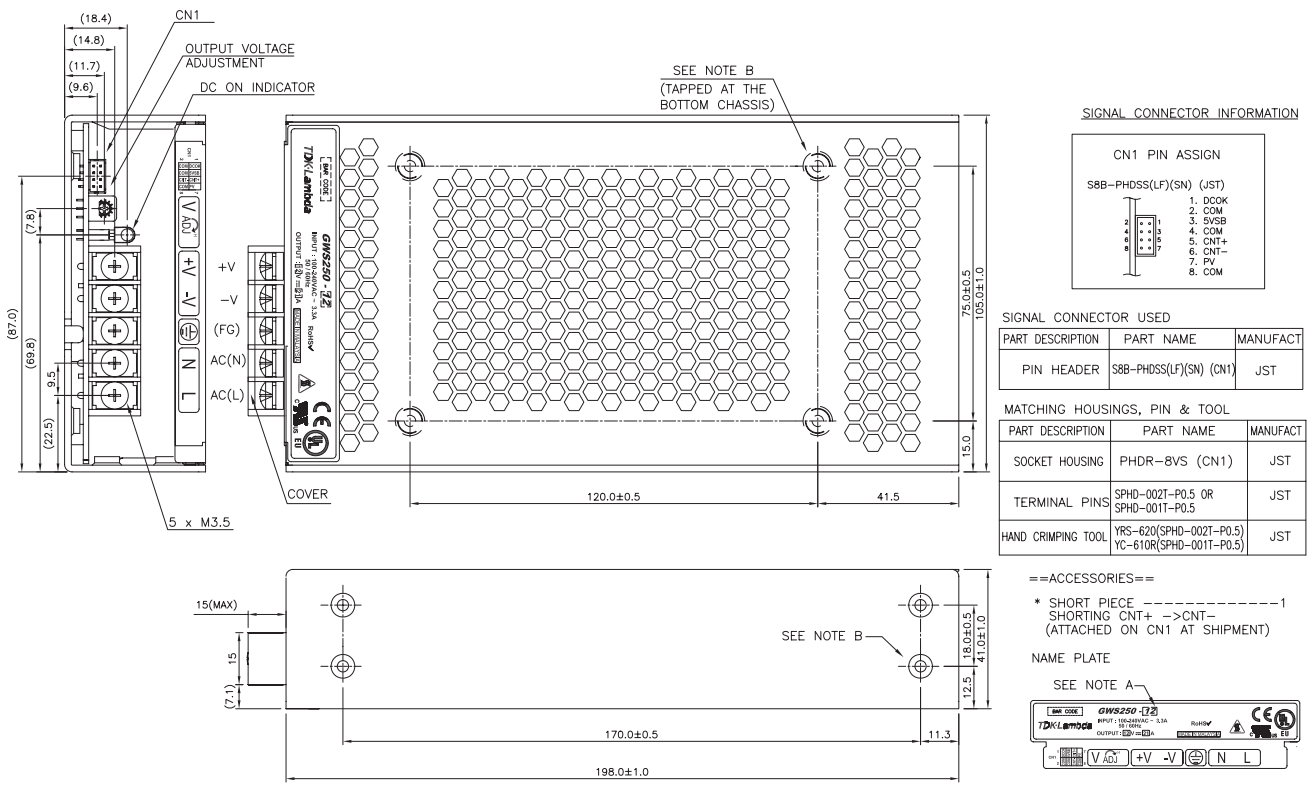
Notes: (1) 115 / 230VAC input (2) Recycle AC, or use remote on/off to reset (3) When remote off and 5V Aux supply @ no load

Model Selector

Model	Voltage (V)	Adjust Range (V)	Max Current (A)	Peak Current (1) DC (A)	Load Reg. (mV)	Line Reg. (mV)	Ripple Noise (mV)	Efficiency (typ) % (230VAC)
GWS250-12	12V	10.8 - 13.2	21	-	96	48	120	92
GWS250-24	24V	22 - 28.8	10.5	12.5	192	96	150	92
GWS250-36	36V	32 - 40	7	8.4	288	144	200	93
GWS250-48	48V	42 - 57.6	5.3	-	384	192	250	93

Notes: (1) Peak current 10seconds max. 35% duty cycle max.

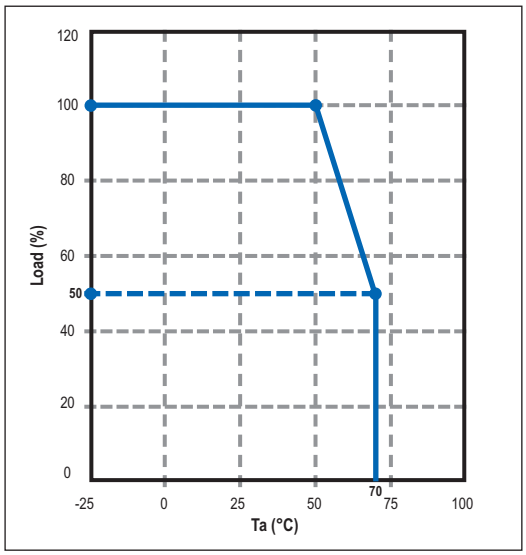
Outline Drawing GWS250



NOTES: A. Model name, Input voltage range, Nominal output voltage, Maximum output current & country of manufacture are shown in accordance with the specification.

B. M4 tapped, embossed & countersunk holes (8) for customer chassis mounting. Screws must not protrude into power supply by more than 5mm

Output Derating Curve GWS250



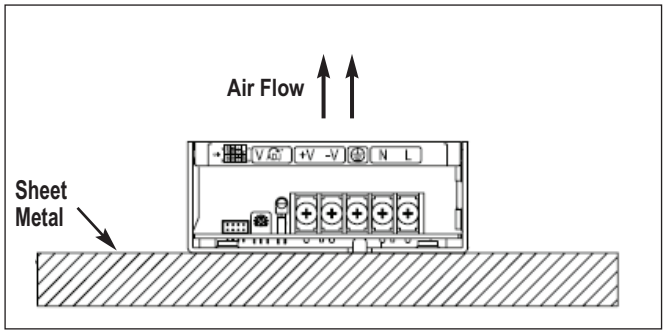
Options

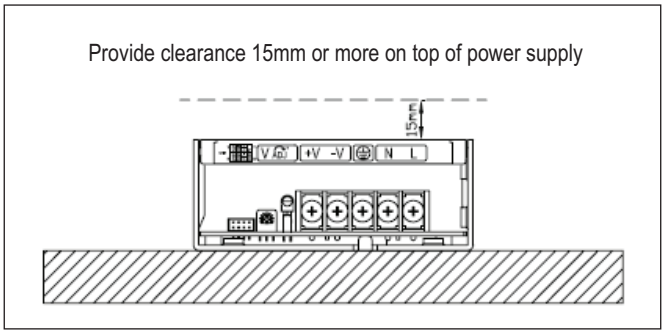
Suffix	Description
/T	OTP auto recovery after unit cools down
/RL	Remote ON/OFF reverse logic (Active High)
/BAT	Battery charging for 24V (21 -29V/8.8A) & 48V (42-58V/4.4A) only
/P	Power up to 350W with system airflow of 20cfm minimum and air blowing in from opposite side of input/output connectors
/L	Without cover

Notes: GWS250-XX/YYYYYYYYYYYYY where **XX** can be **12, 24, 36**, or **48**
Y option can be any combination of **P, L, RL, CO, CO2, T, BAT,** or blank

MOQs apply to Option models
Please contact your local TDK-Lambda sales office for details.

Mounting Options GWS250 - For other mounting versions please refer to Instruction Manual

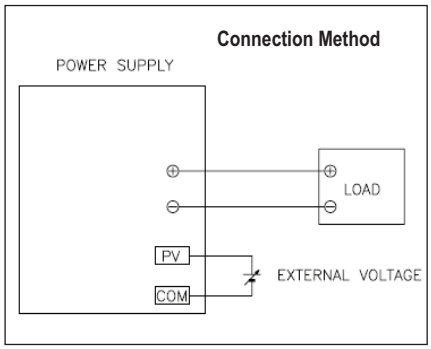


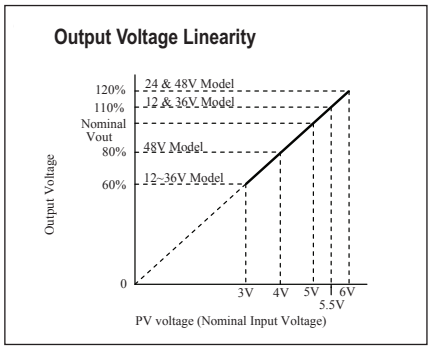


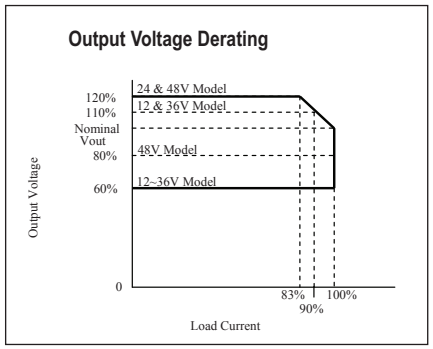
Mounting Method

1 This is convection cooling type power supply. In consideration of the heat radiation and safety, please keep a distance of more than 15mm between the power supply and the peripheral parts. When lining up multiple units, please make sure to place them 5mm or more apart from each other
2 Maximum allowable penetration of mounting screws into the power-supply is 5mm
3 Recommended torque for mounting screws (M4): 1.27 Nm (13.0 kgf.cm)

GWS250 Output Voltage External Control (PV)







Output voltage external control function is available. Output voltage can be varied by applying an external voltage (3-6V) to 'PV' and 'COM' terminals at signal connector CN1
Please consider the following characteristics.

Notes:

For 12V & 36V output model, limit output voltage variation range at 60% - 110%. At PV voltage variation 3V - 5.5V
For 24V output model, limit output voltage variation range at 60% - 120%. At PV voltage variation 3V - 6V
For 48V output model, limit output voltage variation range at 80% - 120%. At PV voltage variation 4V - 6V

LED Industrial Test Comm Broadcast

Single Output 500W Power Supplies

Features	Benefits
• Compact & Flat 1U Design	• Easier System Integration
• Programmable Output Voltage	• Broad Range of Applications
• Peak Power Capability 120% (24 & 36V models)	• Lower Cost, Smaller Size
• Average Active Efficiency @ 230V: 90.3%	• ErP Compliant

Specification

Model		GWS500
AC Input Voltage	VAC	85 - 264VAC (300VAC for 5s)
Input Frequency	Hz	47 - 63Hz
DC Input Voltage	VDC	120 - 373VDC
Inrush Current (cold start)	A	20A/40A at 115VAC, 40A/40A at 230VAC, Ta=25°C (First Inrush/Second Inrush)
Power Factor (1)	-	Meets EN61000-3-2 (Typical PF 0.98/0.95) ClassA, Class C> 35% Load
Input Current (115/230VAC)	A	5.5 / 2.7
Temperature Coefficient	°C	<0.02%/°C (0-50°C)
Overcurrent Protection	-	Hiccup (12V model) Constant Current Limit (24V-48V models)
		>105% rated output power or >101% of peak output power
Overvoltage Protection (2)	V	12V: 13.8 - 16.2V, 24V: 30.3 - 35.5V, 36V: 41.4 - 48.6V, 48V: 60 - 69.6V
Overtemperature Protection (2)	-	Yes - Shutdown Output and Manual Reset (CNT or Re-power on)
Hold Up Time (115 / 230V input)	ms	16ms
Leakage Current (230VAC 60Hz)	mA	<0.75mA
Remote Sense	-	Yes
Remote On/Off	-	Possible (Active Low)
Standby Input Power Draw (3)	W	<0.5W
5V Standby (always on)	-	5V 0.3A
DC Good	-	DC Good, open collector signal, High on Fail
LED Indicator	-	Green LED = On
Output Remote Programming	-	By external voltage. See installation manual for details
Operating Temperature	°C	-25°C to +70°C. Derate linearly to 50% load from +50°C to +70°C (-40°C start up)
Storage Temperature	°C	-30°C to +85°C
Operating Humidity	-	30 - 90% RH (non condensing)
Storage Humidity	-	10 - 95% RH (non condensing)
Cooling	-	Forced Air by Blower Fans
Withstand Voltage	-	Input - Output : 4.25kVDC (20mA), Input - FG :2.25kVDC (20mA) Output - FG : 500VDC (100mA) For 1min.
Isolation Resistance	Ω	>100MΩ (500VDC) at 25°C & 70%RH
Vibration (non operating)	-	10 - 55Hz: 19.6m/s2 constant sweep 1 min X, Y, Z for 1 hour
Shock	-	<196.1 m/s^2 (20G)
Immunity	-	Built To Meet EN61000-4-2 (Level 2,3), -3 (Level 3), -4 (Level 3), -5 (Level 3), -6 (Level 3), -8 (Level 4), -11
Safety Agency Approvals	-	IEC/EN/UL/CSA 60950-1 and IEC/EN/UL/CSA 62368-1, CE Mark
Conducted & Radiated EMI	-	EN55032-B, CISPR22-B
Weight (Typ)	g	1020
Size (L x W x H)	mm	218 x 105 x 41
Warranty	yrs	5

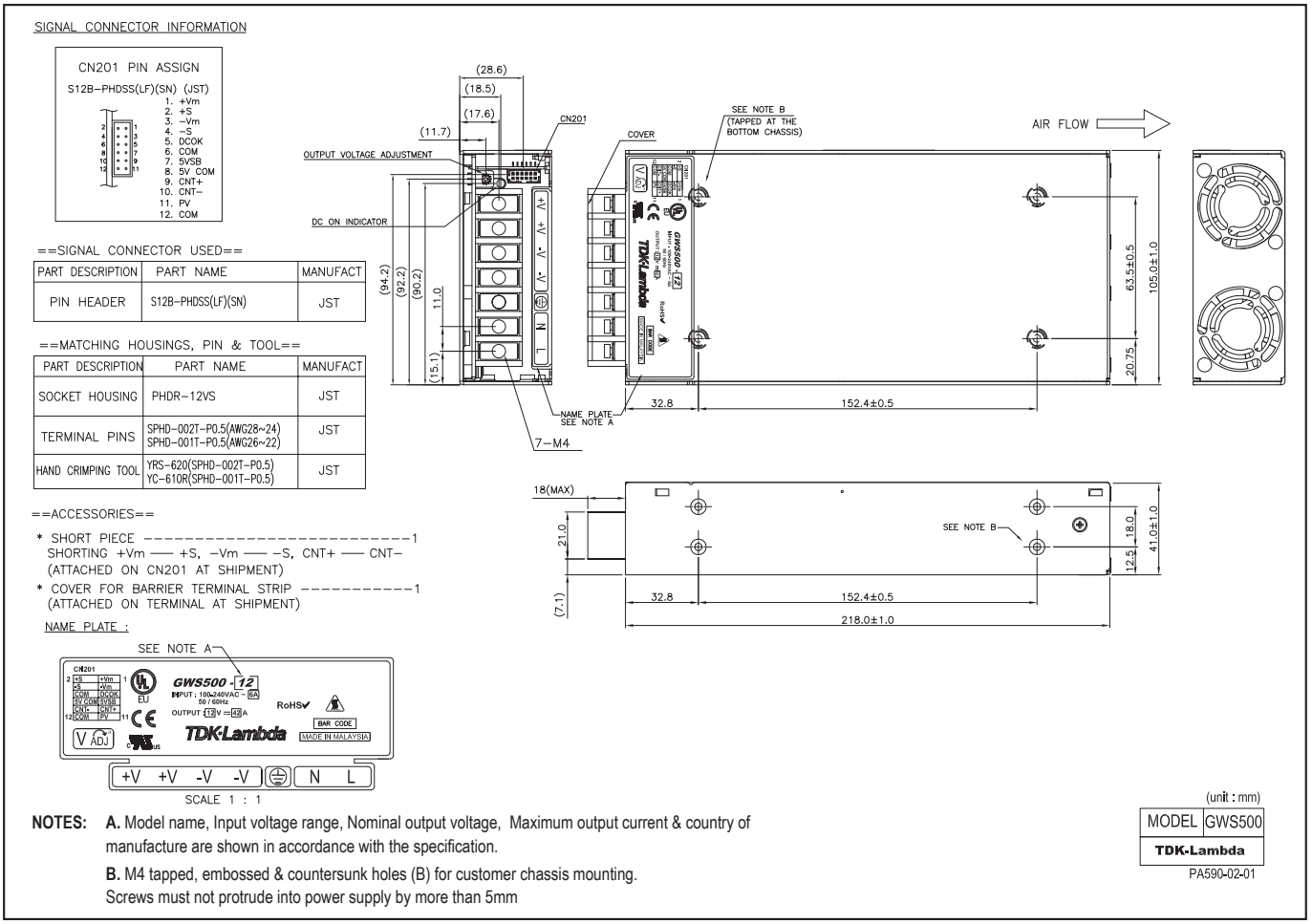
Notes: (1) 115 / 230VAC input (2) Recycle AC, or use remote on/off to reset (3) When remote off and 5V Aux supply @ no load

Model Selector

Model	Voltage (V)	Adjust [2] Range (V)	Max Current (A)	Peak Curr. [1] <10s (A)	Load Reg. (mV)	Line Reg. (mV)	Ripple Noise (mV)	Efficiency (typ) % (230VAC)
GWS500-12	12V	10.8 - 13.2	42	-	96	48	150	89
GWS500-24	24V	22 - 28.8	21	25.0	192	96	150	90
GWS500-36	36V	32 - 40	14	16.7	288	144	200	90
GWS500-48	48V	42 - 57.6	10.5	-	384	192	300	90

Notes: (1) Peak current 10seconds. 35% duty cycle max. (2) By trim pot provided. Wider adjustment is possible by external voltage control. **See instruction manual for details.**

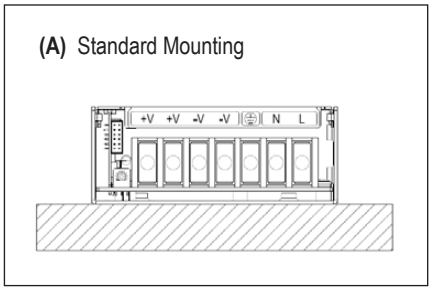
Outline Drawing GWS500 Series

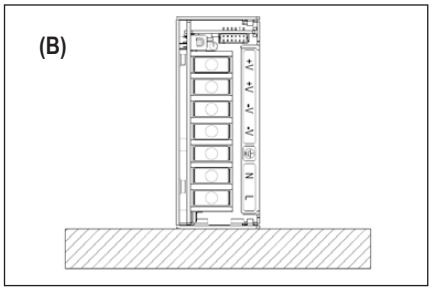


NOTES: **A.** Model name, Input voltage range, Nominal output voltage, Maximum output current & country of manufacture are shown in accordance with the specification.

B. M4 tapped, embossed & countersunk holes (B) for customer chassis mounting. Screws must not protrude into power supply by more than 5mm

Mounting Options GWS500 Output Derating according to the Mounting Directions

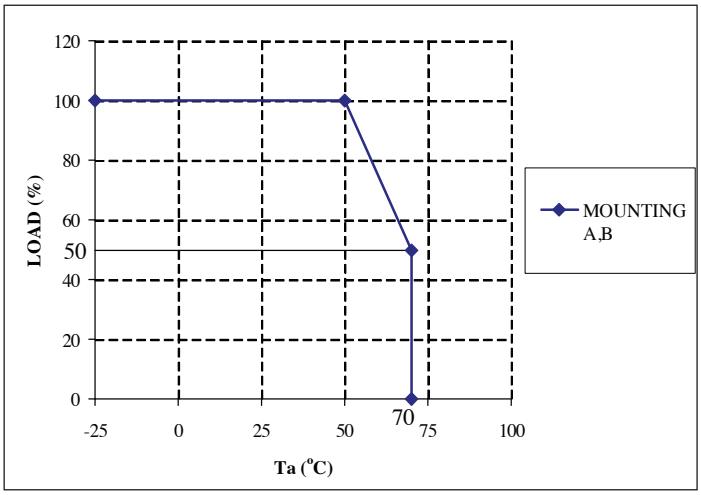




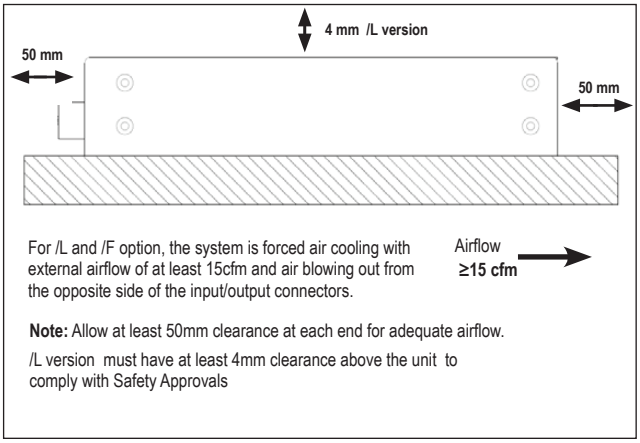
Mounting Method

Output Derating according to the Mounting Directions Recommended standard mounting is Method **(A)**. Method **(B)** is also possible.

Output Derating Curve GWS500



Mounting Options GWS500 /L /F options



Options

Suffix	Description
/ T	OTP auto recovery after unit cools down
/ RL	Remote ON/OFF reverse logic (Active High)
/ BAT	Battery charging for 24V (21~29V/17.6A) & 48V (42~58V/8.8A) only
/ F	Full cover without internal fan but require external forced air cooling
/ L	Without cover but require external forced air cooling
/ CO2	Double side coated pcb

MOQs apply to Option models
Please contact your local TDK-Lambda sales office for details.

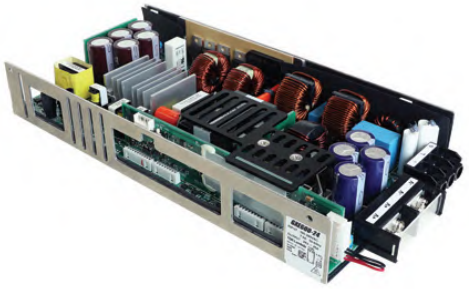
GWS500 Output Voltage External Control (PV)

Output voltage external control function is available. Output voltage can be varied by applying an external voltage (3–6V) to “PV” terminal and “COM” terminal.
See instruction manual for details.

Medical Industrial Test Comm Broadcast

Single Output 600W Programmable Medical & ITE Power Supplies

Features	Benefits
• Convection Cooled	• Low Acoustic Noise and Vibration
• Up to 95% Efficient	• Less Power Consumed
• Constant Voltage & Constant Current Modes	• Can be used as a Voltage or Current Source
• Monitoring & Programming Functions	• Read/write Capability for Flexibility
• Digital or Analog Programming	• For use with RS-485 or an External Voltage
• Seven Year Warranty	• Low Cost of Ownership



Specification

Model		GXE600-24	GXE600-48
AC Input Voltage range (1)	VAC	85 - 265VAC (47 - 63Hz). Withstands 300VAC for 5s	
Inrush Current (100 / 200VAC)	A	40 / 40A	
Power Factor (100 / 200VAC)	-	Meets EN61000-3-2 (0.99 / 0.95)	
Input Current (115/230VAC) (Typ)	A	6.1 / 3.1A	
Nominal Output Voltage	VDC	24V	48V
Maximum Output Current	A	25A	12.5A
Output Voltage Range (Manual Adjust)	VDC	19.2 - 28.8V	38.4 - 57.6V
Output Voltage Range (Via Programming) (2)	VDC	4.8 - 28.8V	9.6 - 57.6V
Current Limit Set Point (Via Programming) (2)	A	5 - 28.8A	2.5 - 14.4A
Temperature Coefficient	%/°C	<0.02%/°C	
Regulation	-	See Model Selector	
Overcurrent Protection (3)	-	>28.8A	>14.4A
Overvoltage Protection (3)	V	28.8 - 31.2V	57.6 - 62.4V
Hold Up Time (Typ at 100% load)	ms	20ms	
Leakage Current (max)	mA	<0.3mA	
Standby Voltage Vsb)	-	4.8V - 5.2V 1A	
Remote On/Off	-	Isolated opto-coupler. Unit off when current is flowing through the opto diode	
Power Fail Signal	-	Signal is high when the output voltage drops due to AC loss or OCP, OVP, OTP	
AC Fail Signal	-	Signal goes high when the AC input is not present	
Parallel Operation	-	Yes, up to five units	
Operating Temperature (-40°C start up)	°C	Convection: -20°C to +70°C, derate linearly to 50% load from 50°C to 70°C (4)	
Storage Temperature	°C	-40°C to +85°C	
Operating Humidity (non condensing)	%RH	20 - 90%RH	
Storage Humidity (non condensing)	%RH	10 - 90%RH	
Cooling	-	Convection or forced air cooling	
Withstand Voltage	VAC	Input to Ground 2kVAC (1xMOPP), Input to Output 4kVAC (2xMOPP), Output to Ground 1.5kVAC (1xMOPP), Output to Signals 100VAC for 1 min.	
Isolation Resistance	MΩ	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC	
Vibration (non operating)	-	10 - 55Hz: 19.6m/s² (sweep 1 min) X, Y, Z for 1 hour /HD version: Designed to meet MIL-STD-810G 514.7 Category 4, 10	
Shock	-	< 196.1 m/s² /HD version: Designed to meet MIL-STD-810G 516.7 Procedure I, VI	
Safety Agency Certifications	-	IEC/UL/CSA/EN60950-1, IEC/UL/CSA/EN62368-1, IEC/ES/CSA/EN60601-1, IEC/EN62477-1 (OVC III), CE Mark	
Line Dips	-	SEMI-F47 (200VAC input)	
Conducted & Radiated EMI	-	EN55011 / EN55032-B, FCC Class B, VCCI-B	
Immunity	-	IEC61000-4-2, -3, -4, -5, -6, -8, -11, IEC61000-6-2, IEC60601-1-2 Ed 4	
Weight (Typ)	g	1300	
Size (WxHxD)	mm	U Channel: 127 x 41 x 254mm, /A version: 127.5 x 50 x 254mm	
MTBF - Telcordia SR-332 issue 3 (5)	Hours	511,677 hours	
Warranty	Yrs	7	

Notes:
(1) 85Vac: 360W, 100 to <170Vac: 500W, 170V to 265Vac: 600W (Convection cooled). 600W when forced air is applied (see installation manual)
(2) Using RS-485 communications or external 1-6V voltage source. See installation manual for details
(3) Overcurrent & Overvoltage limits and recovery modes can be set using the RS-485 communications
(4) See installation manual for full derating curves
(5) 24V output model, 25°C ambient, full load, 230VAC input

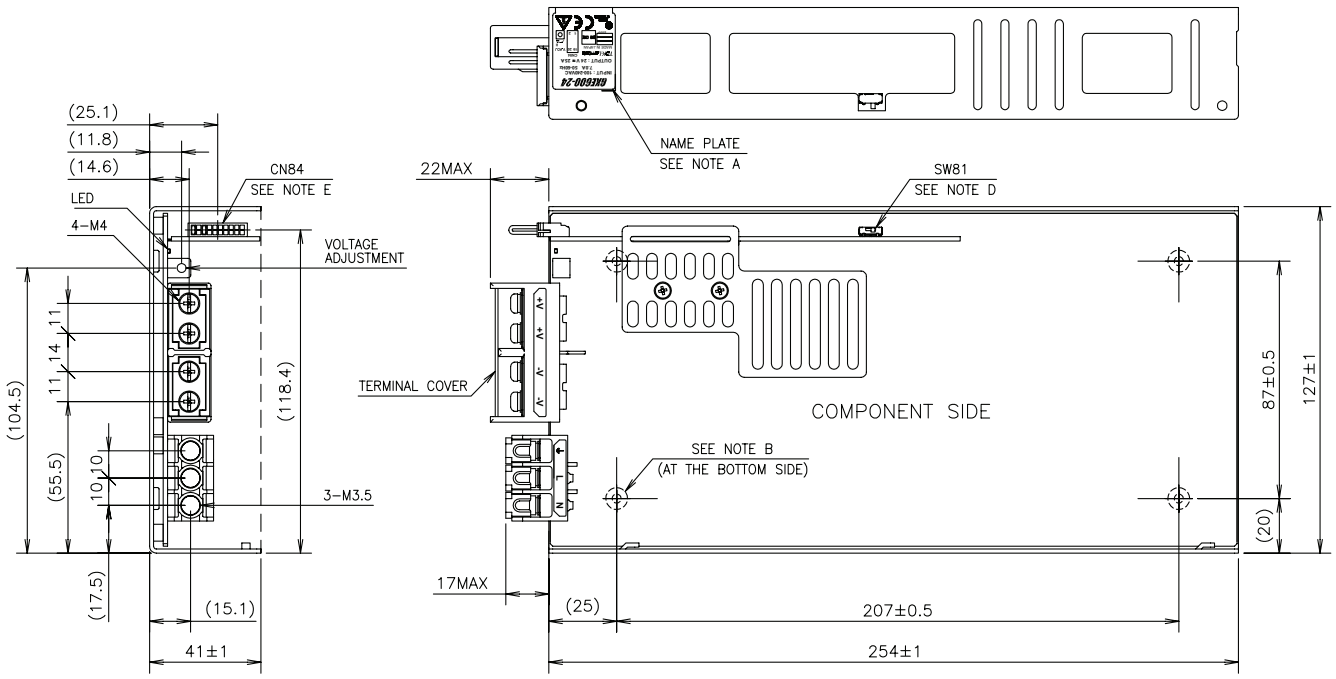
Model Selector

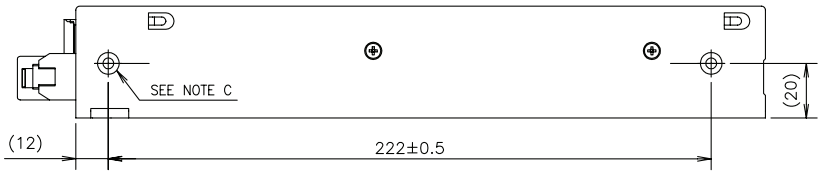
Model	Output Voltage (V)	Max Output Power (W)	Load Reg (mV)	Line Reg (mV)	Ripple Noise (mV)	Efficiency (typ) % 115/230 VAC
GXE600-24	24	600	144	96	150	92 / 95
GXE600-48	48	600	288	192	350	92 / 95

Monitoring and Programming Functions

Function	Digital (RS-485) Control	Analog Control
Output Voltage Monitor	Read back	No
Output Current Monitor	Read back	No
Output Voltage Programming	Adjustable	Adjustable, use a 1-6V external voltage source
Output Current Programming	Adjustable	Adjustable, use a 1-6V external voltage source
Over Voltage Protection Set Point	Adjustable	Fixed
Over Voltage Recovery	Auto-recovery or manual settings	Cycle AC input or use the remote on/off
Over Current Set Point	Adjustable	Fixed
Over Current Recovery	Auto recovery: Constant current, hiccup or foldback Latching: Constant current or foldback	Constant current, auto-recovery
Over Temperature Recovery	Cycle AC input or use the remote on/off	Cycle AC input or use the remote on/off
Remote On/Off	Yes, enable or inhibit type	Yes, enable or inhibit type
Internal Temperature Monitoring	Yes, -20˚C to +100˚C	No
Operating Run Time Log	Records more than 20 years of data	No
Remaining Electrolytic Capacitor Life	Indicates hours left	No
Alarm History	OCP, OVP, OTP, remote on/off, system error	No
Slew Rate (Rise-time) Control	Voltage and current	No
Communication Configuration	ID, Baud Rate, Parity	Not applicable
Product Information	Model #, serial #, lot #, firmware version	Not applicable
Power Fail Signal Threshold	Adjustable for either output voltage or current	Fixed (voltage only)

Outline Drawing GXE600 Series U-Channel





== NOTES ==

A : MODEL NAME, INPUT VOLTAGE RANGE, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT AND COUNTRY OF MANUFACTURE ARE SHOWN HERE IN ACCORDANCE WITH THE SPECIFICATIONS.

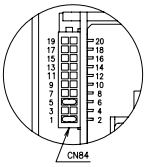
NAME PLATE DETAILS

B : 4-M4 TAPPED & STANDOFF ARE FOR CUSTOMER'S CHASSIS MOUNTING. (SCREW PENETRATION DEPTH 4mm MAX.)

C : 2-M4 TAPPED & STANDOFF ARE FOR CUSTOMER'S CHASSIS MOUNTING. *NOT ENSURED SPECIFICATION OF VIBRATION AND SHOCK. (SCREW PENETRATION DEPTH 4mm MAX.)

D : SW81 IS "EN" SIDE POSITION AT SHIPMENT.

E : SIGNAL CONNECTOR INFORMATION
PIN CONFIGURATION AND FUNCTION OF CN84.



== SIGNAL CONNECTOR USED ==

PART DESCRIPTION	PART NAME	MANUFACT
PIN HEADER	S20B-PHDSS	JST

== MATCHING HOUSINGS, PIN & TOOL ==

PART DESCRIPTION	PART NAME	MANUFACT
SOCKET HOUSING	PHDR-20VS	JST
TERMINAL PINS	SPHD-002T-P0.5(AWG28~24) SPHD-001T-P0.5(AWG26~22)	JST
HAND CRIMPING TOOL	YRS-620(SPHD-002T-P0.5) YC-610R(SPHD-001T-P0.5)	JST

== ACCESSORIES ==

* TERMINAL COVER ----------1
(ATTACHED ON TERMINAL AT SHIPMENT)

* SHORT PIECE ----------1
SHORTING +Vm — +S, -Vm — -S
(ATTACHED ON CN84 AT SHIPMENT)

PIN No.	CONFIGURATION	FUNCTION
1	+Vm	OUTPUT MONITOR TERMINAL (+V)
2	+S	REMOTE SENSING TERMINAL FOR +OUTPUT
3	NC	–
4	NC	–
5	-Vm	GND FOR OUTPUT MONITOR TERMINAL (-V)
6	-S	REMOTE SENSING TERMINAL FOR -OUTPUT
7	PC	CURRENT BALANCE TERMINAL
8	CC	OUTPUT CURRENT EXTERNAL CONTROL TERMINAL
9	PV	OUTPUT VOLTAGE EXTERNAL CONTROL TERMINAL
10	COM	GND FOR CC AND PV AND PC SIGNAL
11	PF	POWER FAIL SIGNAL TERMINAL
12	AC FAIL	AC FAIL (LOW AC) ALARM SIGNAL TERMINAL
13	CNT 1	REMOTE ON/OFF CONTROL TERMINAL (1)
14	+STB	STANDBY SUPPLY+ (5V,1A)
15	CNT 2	REMOTE ON/OFF CONTROL TERMINAL (2)
16	-STB	STANDBY SUPPLY- (CONNECTED TO TOG INTERNALLY)
17	SG	GND FOR +,-DATA (CONNECTED TO TOG INTERNALLY)
18	TOG	GND FOR CNT AND PF, AC FAIL SIGNALS
19	+DATA	RS485 +DATA (NON-INVERSION)
20	-DATA	RS485 -DATA (INVERSION)

HWS-/HD Series

Single Output Industrial Power Supplies

- Limited Lifetime Warranty
- -10°C to +71°C Operation (-40°C start up)
- Universal Input (85 - 265VAC)
- Conformally coated PCB's
- RoHS Compliant Design

Key Market Segments & Applications

Industrial | Test | Broadcast | Comm | LED | Cots

HWS-/HD Features and Benefits

Features	Benefits
• Limited Lifetime Warranty	• Lower Cost of Ownership
• Conformally coated PCB's	• Operates in Harsh Environments
• Wide Range AC Input	• Supports Global Use

Specifications

ITEMS \ MODELS			HWS30A HWS50A	HWS100A HWS150A	HWS300	HWS600	HWS1000	HWS1500
Input Voltage range	(4)		85 - 265VAC (47-63Hz) or 120 - 370VDC			85 - 265VAC (47-63Hz) or 120 - 330VDC		
Input Current (Typ)	(1)	A	0.65 / 0.4	1.3 / 0.65	4.1 / 2.1	8.1 / 3.9	13.5 / 7.0	19 / 10
		-	0.7 / 0.35	1.9 / 0.95				
Inrush Current	(1)	A	14 / 28		20 / 40			
Power Factor		-	Meets EN61000-3-2					
Temperature Coefficient		-	<0.02%/°C					
Overcurrent Protection		-	>104%					
Overvoltage Protection		V	Yes (See table on page 2)					
Hold Up Time (Typ)		ms	20					
Leakage Current (60Hz)		mA	<0.5mA		<0.75mA		<1.2mA	≤1.5mA
Remote Sense		-	No	Yes				
Indicator		-	Green LED = ON					
Remote On/Off		-	No		Yes (Isolated from output)			
Parallel operation		-	No		Single wire connection (5 units max)			
DC Good		-	No		Yes			
Remote Adjust (PV)		-	No				Yes (3)	
Operating Temperature & Derating			HWS30-150: -10°C to +71°C, (derating applies above 50°C please refer to individual model specification for derating graph) HWS300-1500: -10°C to +71°C, (-10 to +50°C: 100%, derate linearly to 50% load from +50 to +71°C) Guaranteed start up at -40°C (see specification sheets on website for details and derating)					
Storage Temperature			-40°C to +85°C					
Humidity (non condensing)		-	Operating: 30-90%RH (10 - 90% on HWS300-1500), Non operating 10-95%RH					
Cooling		-	Convection		Internal fan			
Withstand Voltage	(2)	-	Input to Ground 2kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.					
Isolation Resistance		-	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC, >10M Output to remote on/off 100VDC					
Vibration (non operating)		-	MIL-STD-810F 514.5 Category 4, 10					
Shock (in packaging)		-	MIL-STD-810F 516.5 Procedure I, VI (<196.1m/s^2)					
Safety Agency Approvals		-	UL60950-1, CSA60950-1, EN60950-1, EN50178, CE Mark					
Line Dip		-	Complies with SEMI F47 (200VAC line only)					
Conducted & Radiated EMI		-	EN55011 / EN55022-B, FCC-B, VCCI-B (Curve A for HWS1500)					
Immunity		-	IEC61000-4-2, -3, -4, -5, -6, -8, -11, IEC61000-6-2					
Weight (Typ)		g	200	420	1000	1600	3200	3800
			260	470				
Size (WxHxD) with cover		mm	31.5 x 82 x 95	33 x 82 x 160	61 X 82 X 165	100 X 82 X 165	126.5 X 82 X 240	126.5 X 82 X 280
			31.5 x 82 x 120	42 x 82 x 160				
MTBF	(5)	hrs	8,169,868	2,963,512	2,145,809	1,998,996	1,087,031	1,152,309
			3,726,622	2,676,081				
Warranty		-	Limited Lifetime Warranty (See TDK-Lambda terms & conditions)					

Notes: **(1)** 100/200VAC input. **(2)** HWS300-600 2.5kVAC Input to ground. **(3)** 1-6V program voltage input to adjust output 20-120% (typical) of nominal. See instruction for details & models with this feature.

Notes cont from page 1: **(4)** Consult Sales Office for use under DC Input conditions **(5)** According to Telcordia document SR-332, issue 3 "Reliability Prediction Procedure for Electronic Equipment" Conditions: ambient temp. 25°C, 230Vac input, full load (figures shown for 24V models)

Model Selector

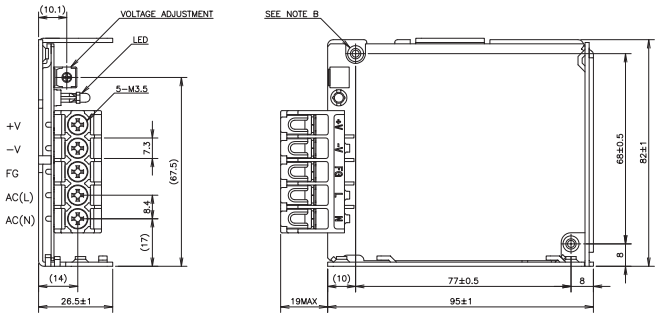
Model	Voltage (V)	Adjust Range (V)	Max Curr. (A)	Peak [3] Curr. (A)	Max. Power (W)	Peak [3] Power (W)	Load Reg (mV)	Line Reg (mV)	Ripple Noise (mV)	Over voltage (V)	Efficiency [1] typ %
HWS30A-3/HD	3.3	2.97 - 3.96	6		20		40	20	120	4.13 - 4.95	70/73
HWS50A-3/HD	3.3	2.97 - 3.96	10		33		40	20	120	4.13 - 4.95	76/78
HWS100A-3/HD	3.3	2.97 - 3.96	20		66		40	20	120	4.13 - 4.95	78/81
HWS150A-3/HD	3.3	2.97 - 3.96	30		99		40	20	120	4.13 - 4.95	78/81
HWS300-3/HD	3.3	2.64 - 3.96	60		198		30	20	120	4.13 - 4.95	74/77
HWS600-3/HD	3.3	2.64 - 3.96	120		396		30	20	120	4.13 - 4.95	75/78
HWS1000-3/HD	3.3	2.64 - 3.96	200		660		40	20	120	4.12 - 4.62	71/73
HWS1500-3/HD	3.3	2.64 - 3.96	300		990		60	36	200	4.12 - 4.62	72/75
HWS30A-5/HD	5	4.0 - 6.0	6		30		40	20	120	6.25 - 7.25	77/80
HWS50A-5/HD	5	4.0 - 6.0	10		50		40	20	120	6.25 - 7.25	82/84
HWS100A-5/HD	5	4.0 - 6.0	20		100		40	20	120	6.25 - 7.25	83/86
HWS150A-5/HD	5	4.0 - 6.0	30		150		40	20	120	6.25 - 7.25	83/86
HWS300-5/HD	5	4.0 - 6.0	60		300		30	20	120	6.25 - 7.25	79/82
HWS600-5/HD	5	4.0 - 6.0	120		600		30	20	120	6.25 - 7.25	80/83
HWS1000-5/HD	5	4.0 - 6.0	200		1000		30	20	120	6.25 - 7.0	76/78
HWS1500-5/HD	5	4.0 - 6.0	300		1500		60	36	200	6.25 - 7.0	77/81
HWS1000-6/HD	6	4.8 - 7.2	167		1002		30	20	150	7.5 -8.4	79/81
HWS1500-6/HD	6	4.8 - 7.2	250	300	1500	1800	60	36	200	6.25 - 7.0	79/82
HWS1000-7/HD	7.5	6.0 - 9.0	134	160	1005	1200	30	20	150	9.37 - 10.5	80/82
HWS1500-7/HD	7.5	6.0 - 9.0	200	240	1500	1800	60	40	200	9.37 - 10.5	81/83
HWS30A-12/HD	12	9.6 - 14.4	2.5		30		96	48	150	15.0 - 17.4	81/83
HWS50A-12/HD	12	9.6 - 14.4	4.3		51.6		96	48	150	15 - 17.4	81/83
HWS100A-12/HD	12	9.6 - 14.4	8.5		102		96	48	150	15 - 17.4	83/86
HWS150A-12/HD	12	9.6 - 14.4	13		156		96	48	150	15 - 17.4	83/86
HWS300-12/HD	12	9.6 - 14.4	27		324		72	48	150	15 - 17.4	80/83
HWS600-12/HD	12	9.6 - 14.4	53		636		72	48	150	15 - 17.4	80/83
HWS1000-12/HD	12	9.6 - 14.4	88	100	1056	1200	72	48	150	15 - 17.4	82/85
HWS1500-12/HD	12	9.6 - 14.4	125		1500		72	48	150	15 - 17.4	82/85
HWS30A-15/HD	15	12.0 - 18.0	2		30		120	60	150	18.8 - 21.8	81/84
HWS50A-15/HD	15	12.0 - 18.0	3.5		52.5		120	60	150	18.8 - 21.8	81/83
HWS100A-15/HD	15	12.0 - 18.0	7		105		120	60	150	18.8 - 21.8	83/86
HWS150A-15/HD	15	12.0 - 18.0	10		150		120	60	150	18.8 - 21.8	83/86
HWS300-15/HD	15	12.0 - 18.0	22		330		90	60	150	18.8 - 21.8	80/83
HWS600-15/HD	15	12.0 - 18.0	43		645		90	60	150	18.8 - 21.8	81/84
HWS1000-15/HD	15	12.0 - 18.0	70	80	1050	1200	90	60	150	18.7 - 21.8	83/85
HWS1500-15/HD	15	12.0 - 18.0	100		1500		90	60	150	18.7-21.8	83/87
HWS30A-24/HD	24	19.2 - 28.8	1.3		31.2		192	96	200	30 - 34.8	83/86
HWS50A-24/HD	24	19.2 - 28.8	2.2		52.8		192	96	150	30 - 34.8	82/84
HWS100A-24/HD	24	19.2 - 28.8	4.5		108		192	96	150	30 - 34.8	84/87
HWS150A-24/HD	24	19.2 - 28.8	6.5		156		192	96	150	30 - 34.8	85/88
HWS300-24/HD	24	19.2 - 28.8	14	16.5	336	396	144	96	150	30 - 34.8	82/85
HWS600-24/HD	24	19.2 - 28.8	27	31	648	744	144	96	150	30 - 34.8	82/85
HWS1000-24/HD	24	19.2 - 28.8	46	58.5	1104	1404	144	96	150	30 - 34.8	85/87
HWS1500-24/HD	24	19.2 - 28.8	65/70	105	1560/1680	2520[1]	144	96	200	30 - 34.8	84/88
HWS1000-36/HD	36	28.8 - 43.2	30.7	39	1104	1404	150	144	200	45 - 49.7	85/88
HWS1500-36/HD	36	28.8 - 43.2	42/46.5	70	1512/1674	2520[1]	150	144	200	45 - 49.7	84/88
HWS30A-48/HD	48	38.4 - 52.8	0.65		31.2		384	192	200	55.2 - 64.8	82/83
HWS50A-48/HD	48	38.4 - 52.8	1.1		52.8		384	192	200	55.2 - 64.8	83/85
HWS100A-48/HD	48	38.4 - 52.8	2.1		100.8		384	192	200	55.2 - 64.8	84/87
HWS150A-48/HD	48	38.4 - 52.8	3.3		158.4		384	192	200	55.2 - 64.8	85/88
HWS300-48/HD	48	38.4 - 52.8	7		336		288	192	350	55.2 - 64.8	82/85
HWS600-48/HD	48	38.4 - 52.8	13		624		288	192	350	55.2 - 64.8	83/86
HWS1000-48/HD	48	38.4 - 52.8	23	29.2	1104	1404	288	192	200	55.2 - 60.0	86/88
HWS1500-48/HD	48	38.4 - 52.8	32		1536		288	192	200	55.2 - 64.8	86/90
HWS1000-60/HD	60	48.0 - 66	18.4	23.4	1104	1404	360	240	400	69.0 - 75.0	85/88
HWS1500-60/HD	60	48.0 - 66	28	42	1536	2520	360	240	400	69.0 - 75.0	86/90

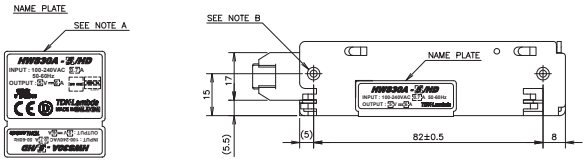
Notes: (3) Peak load for 10s maximum on time, 35% duty cycle at >200V input

Options

Suffix	Description
Blank	No cover (except HWS300-1500 cover fitted as standard) /A Cover fitted (eg HWS100A-24/HDA) Deratings apply

Outline Drawing HWS30A/HDA Series



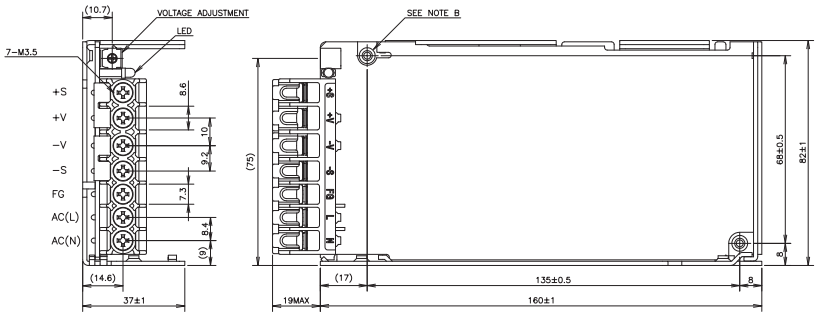


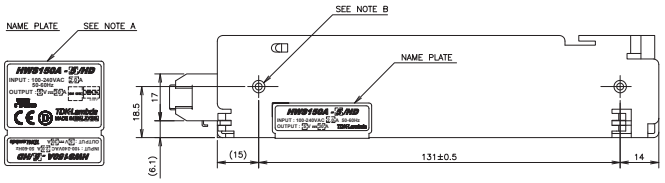
NOTES

A : MODEL NAME, INPUT VOLTAGE RANGE, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT AND COUNTRY OF MANUFACTURE ARE SHOWN HERE IN ACCORDANCE WITH THE SPECIFICATIONS.

B : M3 EMBOSSED, TAPPED AND COUNTERSUNK HOLES (4) FOR CUSTOMER CHASSIS MOUNTING. SCREWS MUST NOT PROTRUDE INTO POWER SUPPLY BY MORE THAN 6mm.

Outline Drawing HWS150A/HDA Series





NOTES

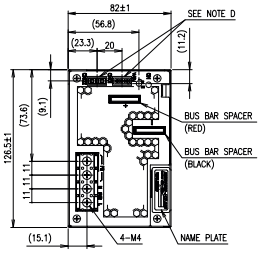
A : MODEL NAME, INPUT VOLTAGE RANGE, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT AND COUNTRY OF MANUFACTURE ARE SHOWN HERE IN ACCORDANCE WITH THE SPECIFICATIONS.

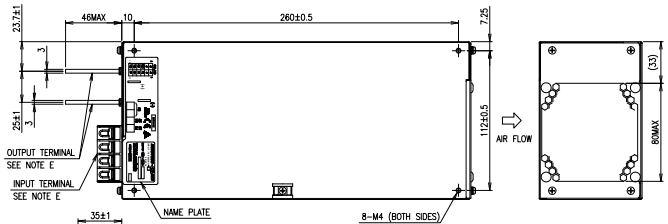
B : M3 EMBOSSED, TAPPED AND COUNTERSUNK HOLES (4) FOR CUSTOMER CHASSIS MOUNTING. SCREWS MUST NOT PROTRUDE INTO POWER SUPPLY BY MORE THAN 6mm.

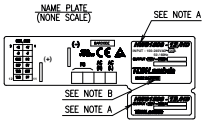
ACCESSORIES

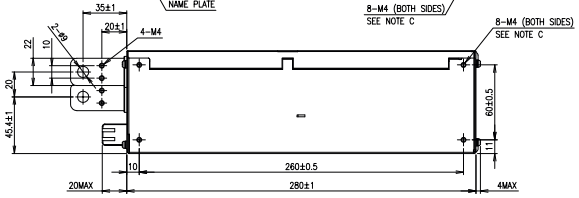
* SHORT PIECE (NET 2) FOR SHORTING PURPOSE (+S~+V, -S~-V) : MOUNTED AT TIME OF SHIPMENT.

Outline Drawing HWS1500 Series









ACCESSORIES

* ATTACHED CONNECTOR SHORTING +S~+V, -S~-V, PV~REF & CNT~TOG ATTACHED ON CN01 AT SHIPMENT

NOTES

A : MODEL NAME, OPTION, INPUT VOLTAGE RANGE, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT ARE SHOWN HERE IN ACCORDANCE WITH THE SPECIFICATIONS.

B : COUNTRY OF MANUFACTURE IS SHOWN HERE.

C : M4 TAPPED HOLES (16) FOR CUSTOMER CHASSIS MOUNTING. SCREWS MUST NOT PROTRUDE INTO POWER SUPPLY BY MORE THAN 6m/m. RECOMMENDED M4 SCREWS TORQUE : 1.27N·m

D : I/O SIGNAL CONNECTOR

CONNECTOR	: S12B-PHDSS(LF)(SN)	(JST)
MATCHING HOUSING	: PHDR-12VS	(JST)
MATCHING CONTACT	: SPHD-002T-P0.5(AWG28~24)	(JST) OR
	SPHD-001T-P0.5(AWG26~22)	(JST) OR
	BPHD-001T-P0.5(AWG26~22)	(JST)
HAND CRIMPING TOOL	: YRS-620(SPHD-002T-P0.5)	(JST)
	YC-610R(SPHD-001T-P0.5)	(JST)
	YC-610R(BPHD-001T-P0.5)	(JST)

E . RECOMMENDED TORQUE FOR THE TERMINAL PIECE.
INPUT TERMINAL (M4 SCREW) : 1.27N·m
OUTPUT TERMINAL (M8 BOLT & NUT) : 10.8N·m
OUTPUT TERMINAL (M4 SCREW) : 1.27N·m

SIGNAL CONNECTOR INFORMATION

CN01,CN02 PIN ASSIGN

S12B-PHDSS (JST)		
12108642 / 11975311	1. +V	7. PV
	2. +S	8. REF
	3. -V	9. CNT
	4. -S	10. TOG
	5. PC	11. PF
	6. COM	12. TOG

- Limited Lifetime Warranty
- Medical Approvals
- Universal Input (85 - 265VAC)
- High Efficiency
- Broad 30W to 1500W product range
- RoHS Compliant Design

HWS-/ME Series

Single Output
Medical Power Supplies

Key Market Segments & Applications

Medical | Industrial | Test | Broadcast | Comm | LED | Cots

HWS-/ME Features and Benefits

Features

- Limited Lifetime Warranty
- Medical Approvals
- Wide Range AC Input

Benefits

- Lower Cost of Ownership
- Reduces System Approval Times
- Supports Global Use

Specifications

ITEM / MODELS			HWS30A HWS50A	HWS100A HWS150A	HWS300	HWS600	HWS1000	HWS1500
Input Voltage	(4)		85-265VAC (47-63Hz) or 120-370VDC		85-265VAC (47-63Hz) or 120-330VDC			85-265VAC (47-63Hz)
Input Current (Typ)	(1)	A	0.65 / 0.4 0.65 / 0.35	1.3 / 0.65 1.9 / 0.95	4.1 / 2.1	8.1 / 3.9	13.5/7.0	19/10
Inrush Current	(1)	A	14 / 28		20 / 40			
Power Factor / Flicker			Meets EN61000-3-2, EN61000-3-3					
Temperature Coefficient		-	<0.02%/°C					
Overcurrent Protection		-	>104%					
Overvoltage Protection		V	Yes (See table on page 2)					
Hold Up Time (Typ)		ms	20					
Leakage Current (60Hz)	(2)	mA	<0.5mA					
Remote Sense			No		Yes			
Indicator		-	Green LED = ON					
Remote On/Off		-	No		Yes (Isolated from output)			
Parallel operation		-	No		Single wire conn. (5 units max)			
DC Good		-	No		Yes			
Voltage Programming			No					Yes
Operating Temperature and Derating		-	HWS30A-150A: -10°C to +70°C, (derating applies above 50°C please refer to individual model specification for derating graph) HWS300-1500: -10°C to +70°C, (-10 to +50°C: 100%, derate linearly to 50% load from +50°C to +70°C)					
Storage Temperature		°C	-30°C to +85°C					
Humidity (non condensing)		-	Operating: 30 - 90%RH (10 -90% on HWS300-1500), Non operating 10 - 95%RH					
Cooling		-	Convection		Internal fan			
Withstand Voltage	(3)	-	Input to Ground 2kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.					
Isolation Resistance		-	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC, >10MΩ Output to remote on/off 100VDC					
Vibration (non operating)		-	10 - 55Hz (1 min sweep), 19.6m/s² constant, X, Y, Z axis, one hour each					
Shock (in packaging)		-	< 196.1m/s²					
Safety Agency Approvals	(2)	-	ES60601-1, EN60601-1, CSA-C22.2 No6011-M90 (C-UL) (basic insulation), CE Mark					
Line Dip		-	Complies with SEMI F47 (200VAC line only)					
Conducted & Radiated EMI		-	EN55011 / EN55022-B, FCC-B, VCCI-B (HWS600 & 1500 Class A)					
Immunity		-	IEC61000-4-2, -3, -4, -5, -6, -8, -11, IEC61000-6-2					
Weight (Typ)		g	220 280	450 500	1000	1600	3200	3800
Size (WxHxD) (with cover except 30 & 50W)		mm	26 x 82 x 95 26 x 82 x 120	33 x 82 x 160 42 x 82 x 160	61 x 82 x 165	100 x 82 x 165	126.5 x 82 x 240	280 x 82 x 126.5
MTBF	(5)	hrs	8,169,868 3,726,622	2,963,512 2,676,081	2,145,809	1,998,996	1,087,031	1,152,309
Warranty			Limited Lifetime Warranty (See TDK-Lambda terms & conditions)					

Notes from page 1: **(1)** 100/200VAC input. **(2)** See clause 19.5DV.2 of UL60601 for equipment in proximity of patient.
(3) HWS300-600 2.5kVAC Input to ground. **(4)** Consult Sales Office for use under DC Input conditions
(5) According to Telcordia document SR-332, issue 3 "Reliability Prediction Procedure for Electronic Equipment"
Conditions: ambient temp. 25°C, 230Vac input, full load (figures shown for 24V models)

Model Selector

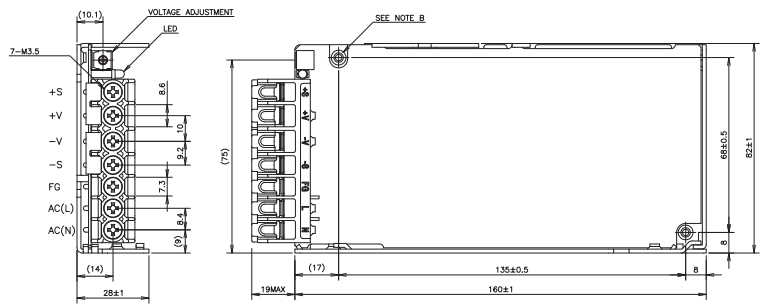
Model	Voltage	Adjust Range	Max Curr(A)[4]	Max Power(W)	Load Reg(mV)	Line Reg(mV)	Ripple Noise(mV)	Overvoltage (V)	Efficiency (typ)%[1]
HWS30A-5/ME	5V	4.0 - 6.0	6	30	40	20	120	6.25-7.25	77/80
HWS50A-5/ME	5V	4.0 - 6.0	10	50	40	20	120	6.25-7.25	82/84
HWS100A-5/ME	5V	4.0 - 6.0	20	100	40	20	120	6.25-7.25	83/86
HWS150A-5/ME	5V	4.0 - 6.0	30	150	40	20	120	6.25-7.25	83/86
HWS600-5/ME	5V	4.0 - 6.0	120	600	30	20	120	6.25-7.25	80/83
HWS30A-12/ME	12V	9.6 - 14.4	2.5	30	96	48	150	15-17.4	81/83
HWS50A-12/ME	12V	9.6 - 14.4	4.3	51.6	96	48	150	15-17.4	81/83
HWS100A-12/ME	12V	9.6 - 14.4	8.5	102	96	48	150	15-17.4	83/86
HWS150A-12/ME	12V	9.6 - 14.4	13	156	96	48	150	15-17.4	83/86
HWS300-12/ME	12V	9.6 - 14.4	27	324	72	48	150	15-17.4	80/83
HWS600-12/ME	12V	9.6 - 14.4	53	636	72	48	150	15-17.4	80/83
HWS30A-15/ME	15V	12.0 - 18.0	2	30	120	60	150	18.8-21.8	81/83
HWS50A-15/ME	15V	12.0 - 18.0	3.5	52.5	120	60	150	18.8-21.8	81/83
HWS100A-15/ME	15V	12.0 - 18.0	7	105	120	60	150	18.8-21.8	83/86
HWS150A-15/ME	15V	12.0 - 18.0	10	150	120	60	150	18.8-21.8	83/86
HWS300-15/ME	15V	12.0 - 18.0	22	330	90	60	150	18.8-21.8	82/85
HWS600-15/ME	15V	12.0 - 18.0	43	645	90	60	150	18.8-21.8	81/84
HWS30A-24/ME	24V	19.2 - 28.8	1.3	31.2	192	96	200	30-34.8	83/86
HWS50A-24/ME	24V	19.2 - 28.8	2.2	52.8	192	96	150	30-34.8	82/84
HWS100A-24/ME	24V	19.2 - 28.8	4.5	108	192	96	150	30-34.8	84/87
HWS150A-24/ME	24V	19.2 - 28.8	6.5	156	192	96	150	30-34.8	85/88
HWS300-24/ME	24V	19.2 - 28.8	14 (16.5 pk)	336	144	96	150	30-34.8	82/85
HWS600-24/ME	24V	19.2 - 28.8	27 (31 pk)	648	144	96	150	30-34.8	82/85
HWS1000-24/ME	24V	19.2 - 28.8	46 (58.5 pk)	1104	150	96	150	30-34.8	85/87
HWS1500-24/ME	24V	4.8 - 28.8(7)	65/70(1) (105pk(5))	1560/1680(1) (2520 pk(5))	144	96	200	30-34.8	84/88
HWS1000-36/ME	36V	28.8 - 43.2	30.7 (39 pk)	1104	150	144	200	45-49.7	85/88
HWS1500-36/ME	36V	7.2 - 43.2(6)	42/46.5(1) (70 pk)(5)	1512/1674(1) (2520 pk(5))	150	144	200	34-49.7	84/88
HWS30A-48/ME	48V	38.4 - 52.8	0.65	31.2	384	192	200	55.2-64.8	82/83
HWS50A-48/ME	48V	38.4 - 52.8	1.1	52.8	384	192	200	55.2-64.8	83/85
HWS100A-48/ME	48V	38.4 - 52.8	2.1	100.8	384	192	200	55.2-64.8	84/87
HWS150A-48/ME	48V	38.4 - 52.8	3.3	158.4	384	192	200	55.2-64.8	85/88
HWS300-48/ME	48V	38.4 - 52.8	7	336	288	192	350	55.2-64.8	82/85
HWS600-48/ME	48V	38.4 - 52.8	13	624	288	192	350	55.2-64.8	83/86
HWS1000-48/ME	48V	38-4 - 52.8	23	1104	300	192	200	55.2-60	86/88
HWS1500-48/ME	48V	9.6- 52.8(6)	32	1536	288	192	200	55.2-64.8	86/90

(4) Peak load for 10s maximum on time, 35% duty cycle **(5) 200-265AC Input**
(6) Using voltage programming input - see installation manual for details

Options

Suffix	Description
Blank	No cover (except HWS300-1500 cover fitted) as standard
/A	Cover fitted (egHWSA100-24/MEA)

Outline Drawing HWS100A/MEA Series



NOTES

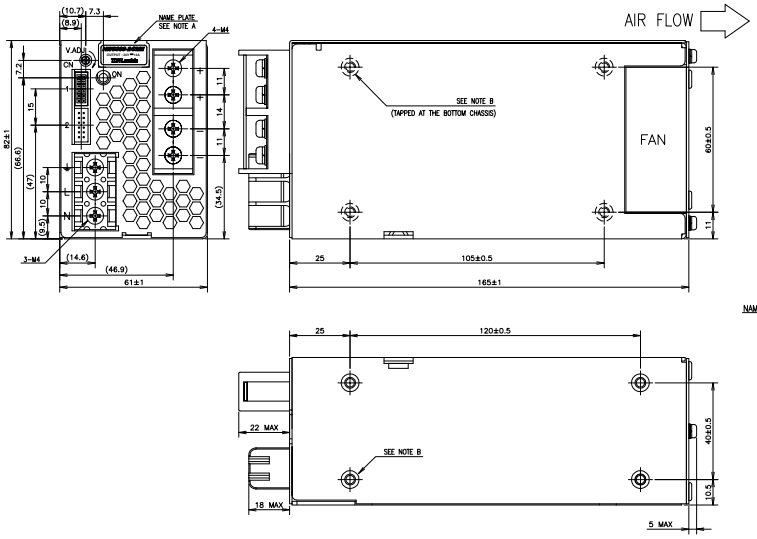
A : MODEL NAME, OPTION CODE, INPUT VOLTAGE RANGE, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT AND COUNTRY OF MANUFACTURE ARE SHOWN HERE IN ACCORDANCE WITH THE SPECIFICATIONS.

B : M3 EMBOSSED, TAPPED AND COUNTERSUNK HOLES (4) FOR CUSTOMER CHASSIS MOUNTING. SCREWS MUST NOT PROTRUDE INTO POWER SUPPLY BY MORE THAN 6mm.

ACCESSORIES

* SHORT PIECE (NET 2) FOR SHORTING PURPOSE (+S~+V, -S~-V) : MOUNTED AT TIME OF SHIPMENT.

Outline Drawing HWS300 Series



== NOTES ==

A : MODEL NAME, NOMINAL OUTPUT VOLTAGE AND MAXIMUM OUTPUT CURRENT ARE SHOWN IN THE NAME PLATE IN ACCORDANCE WITH THE SPECIFICATIONS.

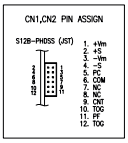
B : M4 TAPPED HOLES (8) FOR CUSTOMER CHASSIS MOUNTING. (SCREW PENETRATION DEPTH 6m/m MAX.)

== ACCESSORIES ==

* COVER FOR BARRIER TERMINAL STRIP ------1 (ATTACHED ON TERMINAL AT SHIPMENT)

* SHORT PIECE ------1 SHORTING +Vm~~+S, -Vm~~-S, CNT~~TOG (ATTACHED ON CN1 AT SHIPMENT)

SIGNAL CONNECTOR INFORMATION



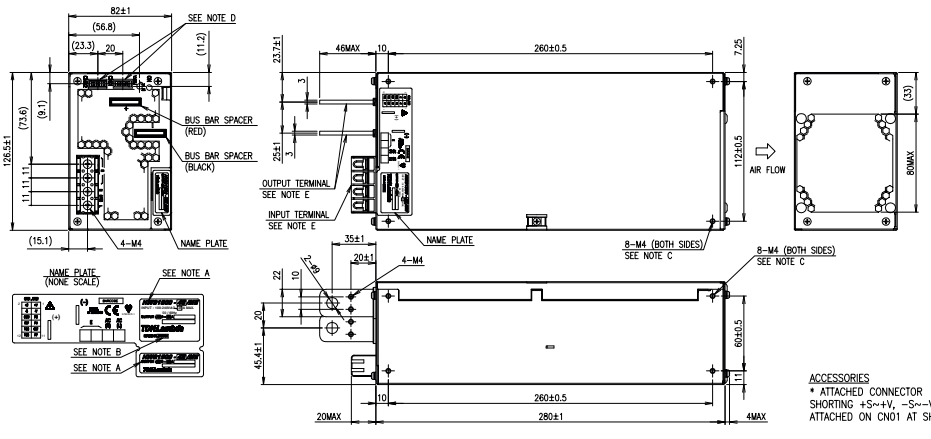
== SIGNAL CONNECTOR USED ==

PART DESCRIPTION	PART NAME	MANUFACT
PIN HEADER	S12B-PHDSS	JST

== MATCHING HOUSINGS , PINS & TOOL ==

PART DESCRIPTION	PART NAME	MANUFACT
SOCKET HOUSING	PHDR-12VS	JST
TERMINAL PINS	SPHD-002T-P0.5(AWG28~24) SPHD-001T-P0.5(AWG26~22)	JST
HAND CRIMPING TOOL	YRS-620(SPHD-002T-P0.5) YC-610R(SPHD-001T-P0.5)	JST

Outline Drawing HWS1500 Series



NOTES

A : MODEL NAME, OPTION, INPUT VOLTAGE RANGE, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT ARE SHOWN HERE IN ACCORDANCE WITH THE SPECIFICATIONS.

B : COUNTRY OF MANUFACTURE IS SHOWN HERE.

C : M4 TAPPED HOLES (16) FOR CUSTOMER CHASSIS MOUNTING. SCREWS MUST NOT PROTRUDE INTO POWER SUPPLY BY MORE THAN 6m/m. RECOMMENDED M4 SCREWS TORQUE : 1.27N·m

D : I/O SIGNAL CONNECTOR

CONNECTOR	: S12B-PHDSS(LF)(SN)	(JST)
MATCHING HOUSING	: PHDR-12VS	(JST)
MATCHING CONTACT	: SPHD-002T-P0.5(AWG28~24)	(JST) OR
	SPHD-001T-P0.5(AWG26~22)	(JST) OR
	BPHD-001T-P0.5(AWG26~22)	(JST)
HAND CRIMPING TOOL	: YRS-620(SPHD-002T-P0.5)	(JST)
	YC-610R(SPHD-001T-P0.5)	(JST)
	YC-610R(BPHD-001T-P0.5)	(JST)

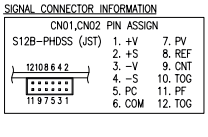
E : RECOMMENDED TORQUE FOR THE TERMINAL PIECE.

INPUT TERMINAL (M4 SCREW)	: 1.27N·m
OUTPUT TERMINAL (M8 BOLT & NUT)	: 10.8N·m
OUTPUT TERMINAL (M4 SCREW)	: 1.27N·m

ACCESSORIES

* ATTACHED CONNECTOR SHORTING +S~+V, -S~-V, PV~REF & CNT~TOG ATTACHED ON CN01 AT SHIPMENT

SIGNAL CONNECTOR INFORMATION



LED Industrial Test Comm Broadcast

Single Output Industrial Power Supplies

Features	Benefits
• Limited Lifetime Warranty	• Lower Cost of Ownership
• High Efficiency (up to 91%)	• Easier System Cooling
• Wide Range AC Input	• Supports Global Use

Specification

Model		HWS15A/A	HWS30A/A	HWS50A/A	HWS100A/A	HWS150A/A
Input Voltage Range	-	85 - 265VAC (47 - 63Hz) Withstands 300VAC for 5s or 120 - 370VDC*				
Input Current (Typ) **(1)**	A	0.35 / 0.2	0.65 / 0.4	0.65 / 0.35	1.3 / 0.65	1.9 / 0.95
Inrush Current **(1)**	A	14 / 28				
Power Factor	-	Meets EN61000-3-2				
		-	-	0.97/0.91	0.98/0.93	0.98/0.93
Temperature Coefficient	%/°C	<0.02%/°C				
Overcurrent Protection	%	>105%				
Overvoltage Protection	V	Yes (see table)				
Hold Up Time (Typ)	ms	20				
Leakage Current (max)	mA	<0.5mA (Typ 0.2mA at 100VAC, 0.4mA at 230VAC)				
Remote Sense	-	No			Yes	
Indicator	-	Green LED = ON				
Operating Temperature (with cover)	°C	-10°C to +70°C, derate from 50°C to 70°C (2)				
Storage Temperature	°C	-30 to +85°C				
Humidity (non condensing)	%RH	Operating: 30 - 90%RH, Non operating 10 - 95%RH				
Cooling	-	Convection				
Withstand Voltage	VAC	Input to Ground 2kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.				
Isolation Resistance	MΩ	>100M at 25°C & 70%RH, Output to Ground 500VDC				
Vibration (non operating)	-	10 - 55Hz (1 minute sweep), 19.6m/s^2 constant X, Y, Z 1 hour				
Shock	m/s^2	< 196.1 m/s^2				
Safety Agency Certifications	-	IEC/EN/UL/CSA60950-1, IEC/EN/UL/CSA62368-1 EN50178-1, UL508 and CE Mark				
Line Dip	-	Complies with SEMI F47 (200VAC line only)				
Conducted & Radiated EMI	-	EN55011 / EN55022-B, FCC-B, VCCI-B				
Immunity	-	IEC61000-4-2, -3, -4, -5, -6, -8, -11; IEC61000-6-2				
Weight (Typ)	g	190	240	300	470	520
Size (HxWxD) (with cover)	mm	31.5 x 82 x 80	31.5 x 82 x 95	31.5 x 82 x 120	33 x 82 x 160	42 x 82 x 160
MTBF **(3)**	hours	12,116,851	8,169,868	3,726,622	2,963,512	2,676,081
Warranty	-	Limited Lifetime Warranty (See TDK-Lambda's terms and conditions)				

Notes:

* Safety certified for AC input only

(1) 100/200VAC.

(2) Derating varies with model. Please refer to individual model specification for derating graphs.

(3) According to Telcordia document SR-332, issue 3, "Reliability Prediction Procedure for Electronic Equipment"
Conditions: ambient temp. 25deg C, 230Vac input, full load (figures shown for 24V models)

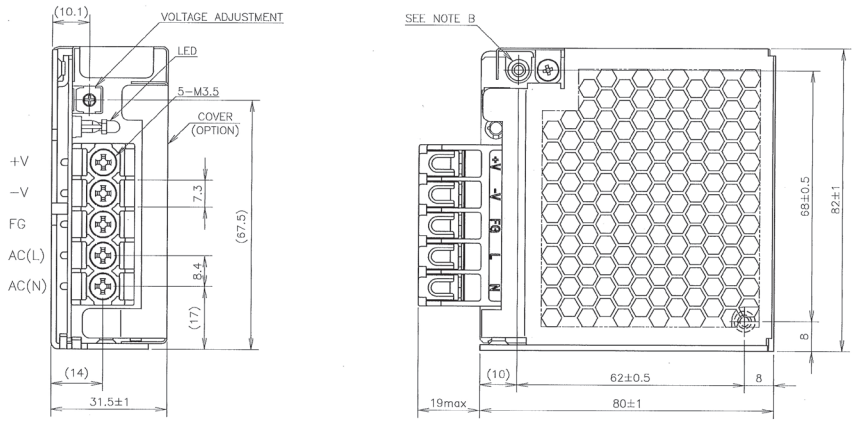
Model Selector

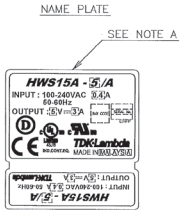
Model	Voltage (V)	Adjust Range (V)	Max Current (A)	Load Reg (mV)	Line Reg (mV)	Ripple Noise (mV)	Over Voltage (V)	Efficiency (typ) %
HWS15A-3/A	3.3V	2.97 - 3.96	3	40	20	120	4.13-4.95	70/71
HWS30A-3/A	3.3V	2.97 - 3.96	6	40	20	120	4.13-4.95	75/77
HWS50A-3/A	3.3V	2.97 - 3.96	10	40	20	120	4.13-4.95	76/78
HWS100A-3/A	3.3V	2.97 - 3.96	20	40	20	120	4.13-4.95	82/84
HWS150A-3/A	3.3V	2.97 - 3.96	30	40	20	120	4.13-4.95	82/84
HWS15A-5/A	5V	4.0 - 6.0	3	40	20	120	6.25-7.25	77/79
HWS30A-5/A	5V	4.0 - 6.0	6	40	20	120	6.25-7.25	80/82
HWS50A-5/A	5V	4.0 - 6.0	10	40	20	120	6.25-7.25	82/84
HWS100A-5/A	5V	4.0 - 6.0	20	40	20	120	6.25-7.25	84/86
HWS150A-5/A	5V	4.0 - 6.0	30	40	20	120	6.25-7.25	85/87
HWS15A-12/A	12V	9.6 - 14.4	1.3	96	48	150	15-17.4	80/83
HWS30A-12/A	12V	9.6 - 14.4	2.5	96	48	150	15-17.4	84/86
HWS50A-12/A	12V	9.6 - 14.4	4.3	96	48	150	15-17.4	83/85
HWS100A-12/A	12V	9.6 - 14.4	8.5	96	48	150	15-17.4	86/88
HWS150A-12/A	12V	9.6 - 14.4	13	96	48	150	15-17.4	85/88
HWS15A-15/A	15V	12.0 - 18.0	1	120	60	150	18.8-21.8	81/84
HWS30A-15/A	15V	12.0 - 18.0	2	120	60	150	18.8-21.8	85/87
HWS50A-15/A	15V	12.0 - 18.0	3.5	120	60	150	18.8-21.8	83/86
HWS100A-15/A	15V	12.0 - 18.0	7	120	60	150	18.8-21.8	86/88
HWS150A-15/A	15V	12.0 - 18.0	10	120	60	150	18.8-21.8	86/89
HWS15A-24/A	24V	19.2 - 28.8	0.65	150	96	150	30-34.8	82/85
HWS30A-24/A	24V	19.2 - 28.8	1.3	150	96	150	30-34.8	86/88
HWS50A-24/A	24V	19.2 - 28.8	2.2	150	96	150	30-34.8	84/87
HWS100A-24/A	24V	19.2 - 28.8	4.5	150	96	150	30-34.8	87/89
HWS150A-24/A	24V	19.2 - 28.8	6.5	150	96	150	30-34.8	88/90
HWS15A-48/A	48V	38.4 - 52.8	0.33	240	192	200	55.2-64.8	80/80
HWS30A-48/A	48V	38.4 - 52.8	0.65	240	192	200	55.2-64.8	82/83
HWS50A-48/A	48V	38.4 - 52.8	1.1	240	192	200	55.2-64.8	84/86
HWS100A-48/A	48V	38.4 - 52.8	2.1	240	192	200	55.2-64.8	88/90
HWS150A-48/A	48V	38.4 - 52.8	3.3	240	192	200	55.2-64.8	89/91

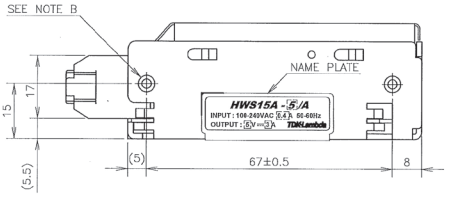
Options

Suffix	Description
Blank	No Cover
/ A	Cover
/ R	Remote on/off (available 50W, 100W &150W models)
/ HD	See HWS/HD datasheet for details. -40˚C start up and PCB coating **(not available on HWS15A)**
/ ME	See HWS/ME datasheet for details of available models IEC/EN60601-1 medical approval **(not available on HWS15A)**

HWS15A/A Outline Drawing





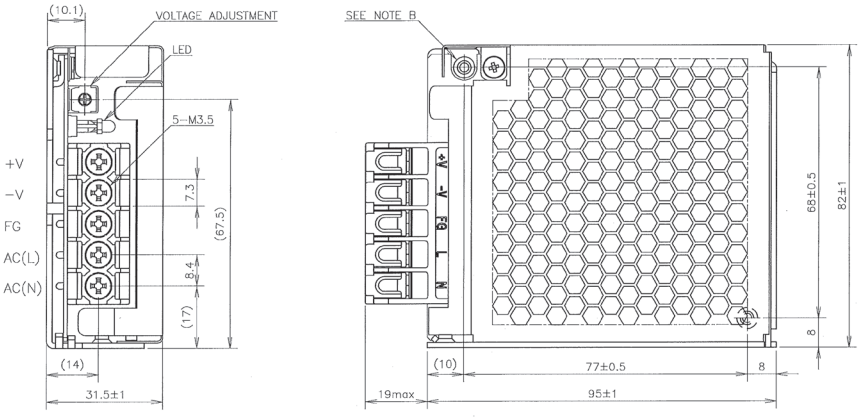


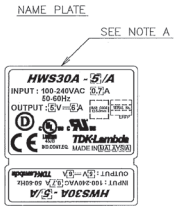
NOTES

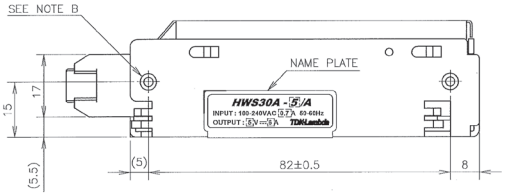
A : MODEL NAME, INPUT VOLTAGE RANGE, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT AND COUNTRY OF MANUFACTURE ARE SHOWN HERE IN ACCORDANCE WITH THE SPECIFICATIONS.

B : M3 EMBOSSED, TAPPED AND COUNTERSUNK HOLES (4) FOR CUSTOMER CHASSIS MOUNTING. SCREWS MUST NOT PROTRUDE INTO POWER SUPPLY BY MORE THAN 6mm.

HWS30A/A Outline Drawing





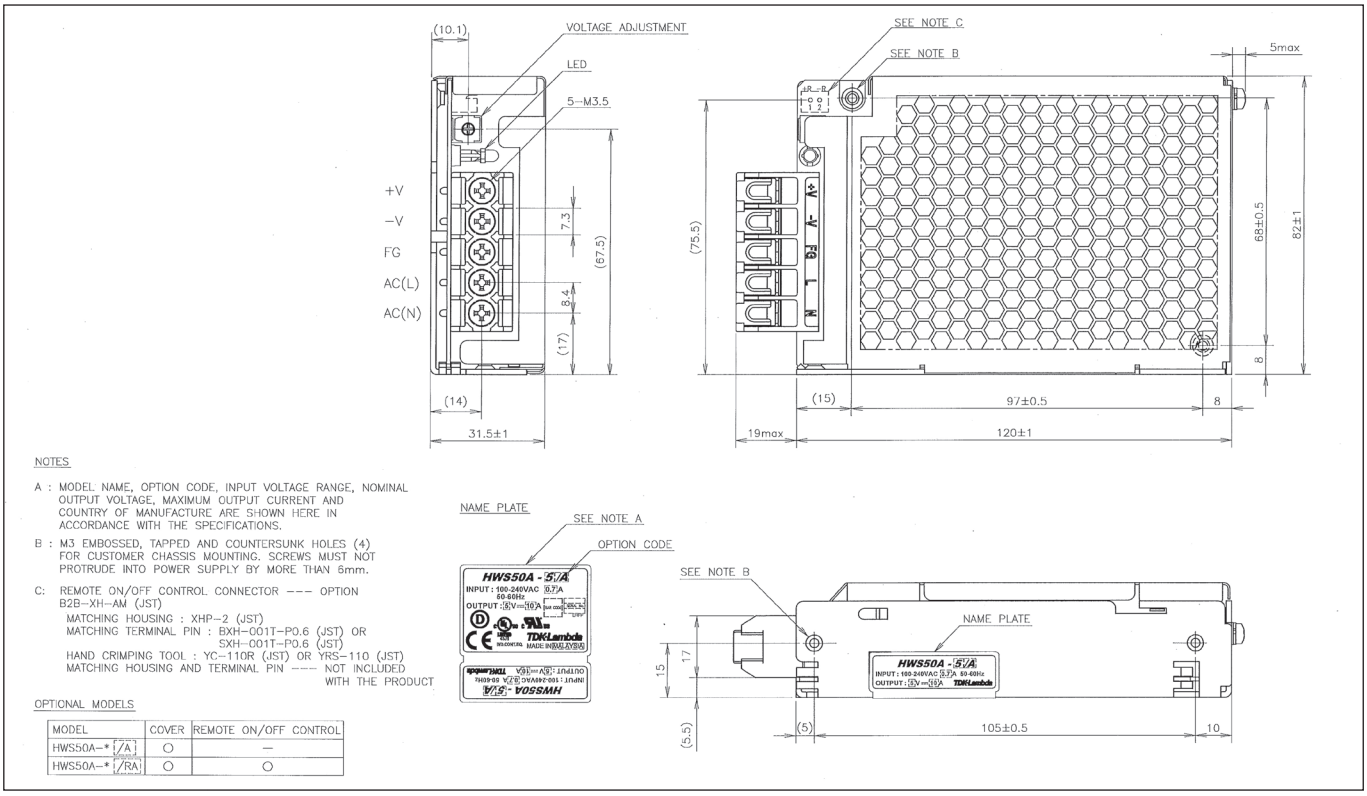


NOTES

A : MODEL NAME, INPUT VOLTAGE RANGE, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT AND COUNTRY OF MANUFACTURE ARE SHOWN HERE IN ACCORDANCE WITH THE SPECIFICATIONS.

B : M3 EMBOSSED, TAPPED AND COUNTERSUNK HOLES (4) FOR CUSTOMER CHASSIS MOUNTING. SCREWS MUST NOT PROTRUDE INTO POWER SUPPLY BY MORE THAN 6mm.

HWS50A/A Outline Drawing



NOTES

A : MODEL NAME, OPTION CODE, INPUT VOLTAGE RANGE, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT AND COUNTRY OF MANUFACTURE ARE SHOWN HERE IN ACCORDANCE WITH THE SPECIFICATIONS.

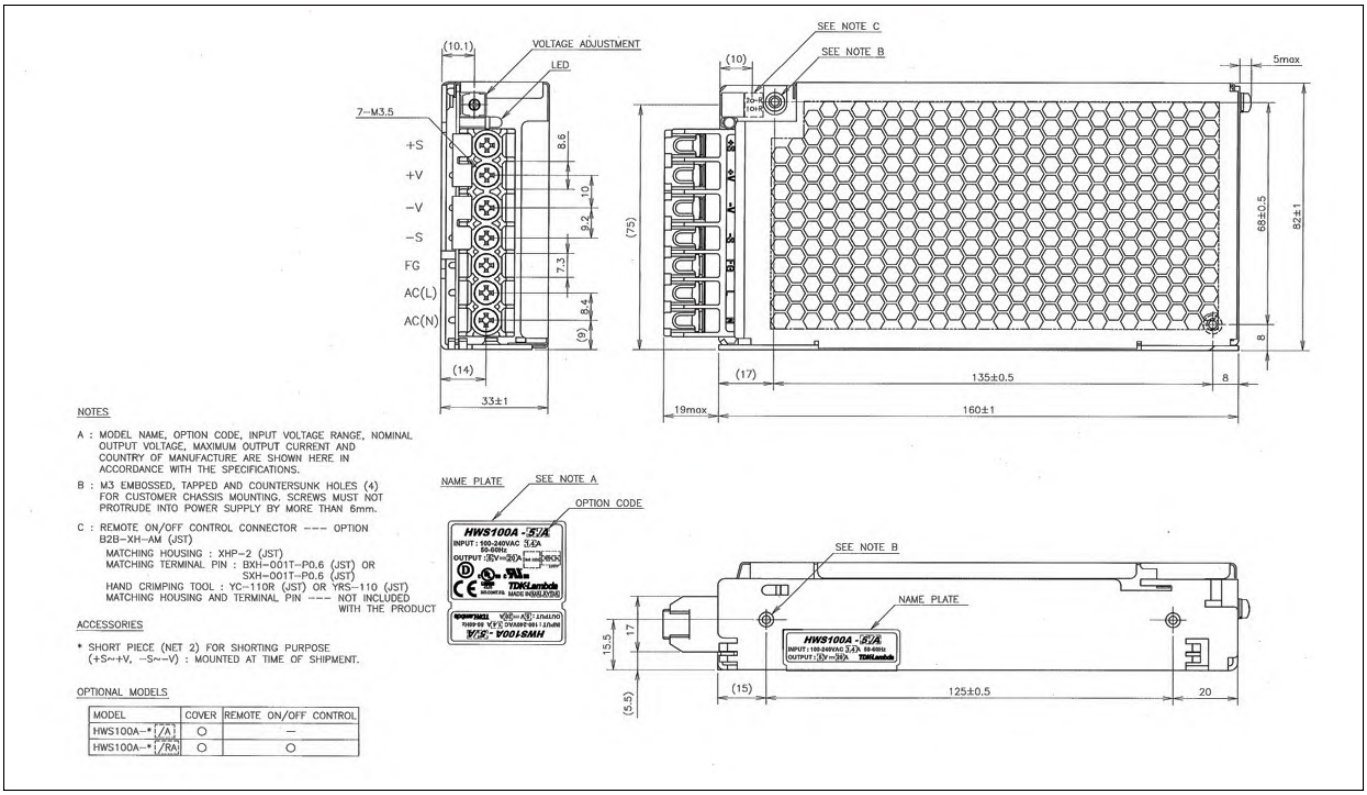
B : M3 EMBOSSED, TAPPED AND COUNTERSUNK HOLES (4) FOR CUSTOMER CHASSIS MOUNTING. SCREWS MUST NOT PROTRUDE INTO POWER SUPPLY BY MORE THAN 6mm.

C: REMOTE ON/OFF CONTROL CONNECTOR --- OPTION
B2B-XH-AM (JST)
MATCHING HOUSING : XHP-2 (JST)
MATCHING TERMINAL PIN : BXH-001T-P0.6 (JST) OR SXH-001T-P0.6 (JST)
HAND CRIMPING TOOL : YC-110R (JST) OR YRS-110 (JST)
MATCHING HOUSING AND TERMINAL PIN --- NOT INCLUDED WITH THE PRODUCT

OPTIONAL MODELS

MODEL	COVER	REMOTE ON/OFF CONTROL
HWS50A-*-/A	○	—
HWS50A-*-/RA	○	○

HWS100A/A Outline Drawing



NOTES

A : MODEL NAME, OPTION CODE, INPUT VOLTAGE RANGE, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT AND COUNTRY OF MANUFACTURE ARE SHOWN HERE IN ACCORDANCE WITH THE SPECIFICATIONS.

B : M3 EMBOSSED, TAPPED AND COUNTERSUNK HOLES (4) FOR CUSTOMER CHASSIS MOUNTING. SCREWS MUST NOT PROTRUDE INTO POWER SUPPLY BY MORE THAN 6mm.

C : REMOTE ON/OFF CONTROL CONNECTOR --- OPTION
B2B-XH-AM (JST)
MATCHING HOUSING : XHP-2 (JST)
MATCHING TERMINAL PIN : BXH-001T-P0.6 (JST) OR SXH-001T-P0.6 (JST)
HAND CRIMPING TOOL : YC-110R (JST) OR YRS-110 (JST)
MATCHING HOUSING AND TERMINAL PIN --- NOT INCLUDED WITH THE PRODUCT

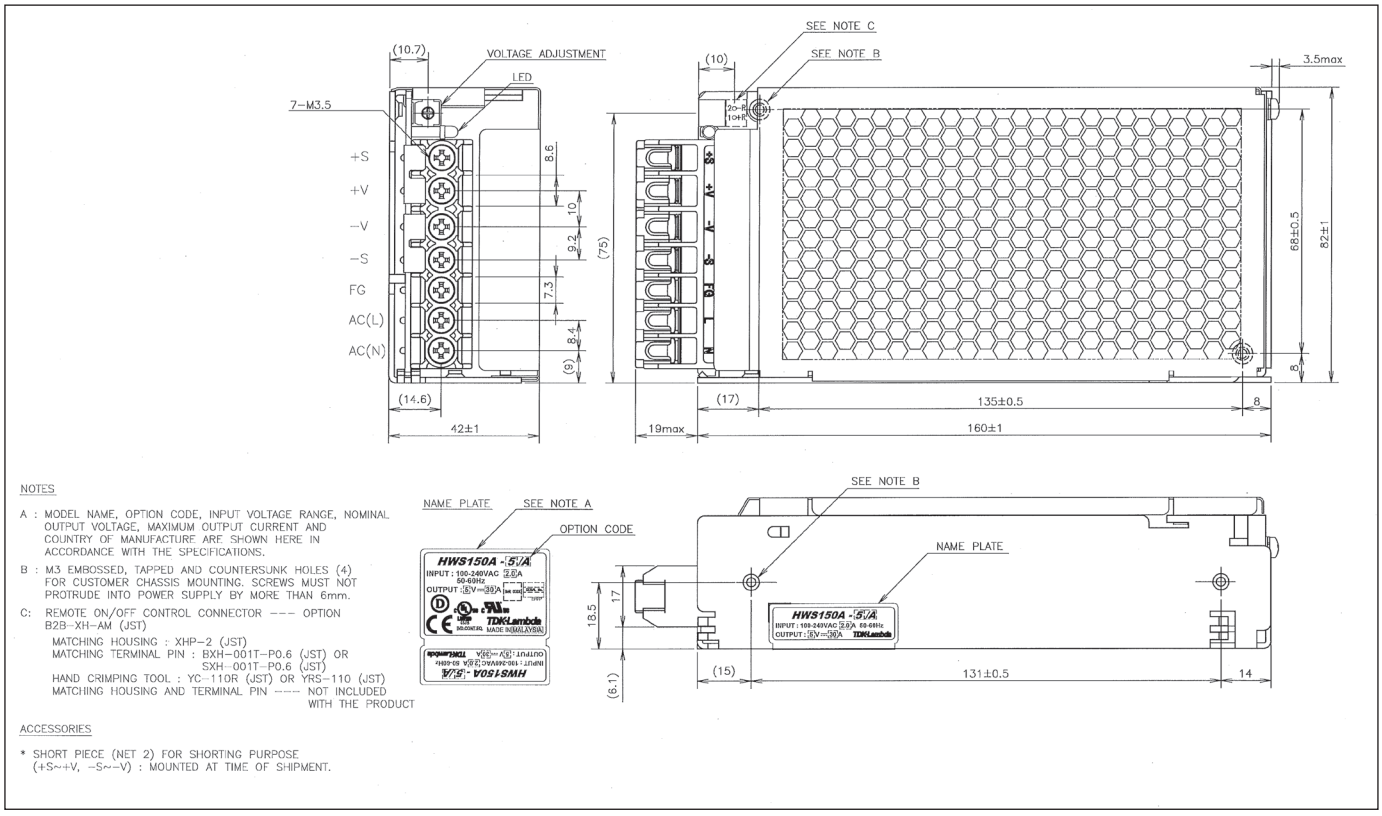
ACCESSORIES

* SHORT PIECE (NET 2) FOR SHORTING PURPOSE (+S--+V, -S--V) : MOUNTED AT TIME OF SHIPMENT.

OPTIONAL MODELS

MODEL	COVER	REMOTE ON/OFF CONTROL
HWS100A-*-/A	○	—
HWS100A-*-/RA	○	○

HWS150A/A Outline Drawing



- Limited Lifetime Warranty
- UL508 Approved
- SEMI F47 Compliant (high line AC)
- Universal Input (85 - 265VAC)
- High Efficiency
- RoHS Compliant Design

HWS300-1500 Series

Single Output Industrial Power Supplies

Key Market Segments & Applications

Factory Automation
Test & Measurement
Automated Service

HWS300-1500 Features and Benefits

Features	Benefits
• Limited Lifetime Warranty	• Lower Cost of Ownership
• High Efficiency	• Easier System Cooling
• Wide Range AC Input	• Supports Global Use

Specifications

ITEMS \ MODEL		HWS300	HWS600	HWS1000	HWS1500
Input Voltage range (47-63Hz)	-	85 - 265VAC or 120 - 330VDC			
Input Current (Typ) (1)	A	5V: 3.8/1.9; 12-48V: 4.2/2.1	5V: 7.5/3.6; 12-48V: 8.1/3.9	3.3V: 9.6/5.0; 5-60V: 13.5/7.0	3.3V: 15/8 5-60V: 19/10
Inrush Current (1)	A	20 / 40			
Power Factor	-	Meets EN61000-3-2			
Temperature Coefficient	-	<0.02%/°C			
Overcurrent Protection	-	>105% (>101% of peak current for peak current capable models)			
Overvoltage Protection	V	See table on page 2 (Recycle AC or remote on/off to reset)			
Hold Up Time (Typ)	ms	20 (HWS1500-7 - 16ms)			
Leakage Curr. (at 240VAC, 60Hz)	mA	<0.75mA		<1.2mA	<1.5mA
Remote Sense	-	Yes			
Indicator	-	Green LED = ON			
Remote on/off	-	Yes (Isolated from output)			
Parallel operation	-	Single wire connection (up to 5 units)			
DC Good	-	Yes			
Remote Adjust (PV)	-	External voltage adjusts output, see options table			
Operating Temperature	°C	-10 to +70°C, derate linearly to 50% load from 50 to 70 (2, 3)			
Storage Temperature	°C	-30 to +85°C			
Humidity (non condensing)	-	Operating: 10 - 90%RH, Non operating 10 - 95%RH			
Cooling	-	Internal fan			
Withstand Voltage (4)	-	Input to Ground 2.5kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.			
Isolation Resistance	-	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC			
Vibration (non operating)	-	10 - 55Hz (1 minute sweep), 19.6m/s2 constant X, Y, Z 1 hour			
Shock	-	< 196.1 m/s^2			
Safety Agency Approvals (5)	-	UL60950-1, CSA60950-1, EN60950-1, EN50178, UL508, CE Mark			
Line Dip	-	Complies with SEMI F47 (200VAC line only)			
Conducted & Radiated EMI	-	EN55011 / EN55022, FCC VCCI (HWS300, 600 & 1000: Class B, HWS1500: Class A)			
Recommended EMI Filter	-	RSEN-2006	RSEN-2010	RSEN-2020	RSEN-2030
Immunity	-	IEC61000-4-2, -3, -4, -6 (Level 3), -5, -8 (Level 4), -11			
Weight (Typ)	g	1,000	1,600	3,200	3,800
Size	mm	61 x 82 x 165	100 x 82 x 165	240 x 126.5 x 82	280 x 126.5 x 82
MTBF (6)	hrs	2,145,809	1,998,996	1,087,031	1,152,309
Warranty	yrs	Limited Lifetime Warranty			

Model Selector

Model	Voltage V	Adjust Range V(3)	Max Curr. A	Peak Curr. A(2)	Max. Pwr. W	Peak Power W	Load Reg mV	Line Reg mV	Ripple Noise mV	Over-voltage V	Eff. typ % (1)
HWS300-3	3.3V	2.64 - 3.96	60	-	198		30	20	120	4.13 - 4.95	74/77
HWS600-3	3.3V	2.64 - 3.96	120	-	396		30	20	120	4.13 - 4.95	75/78
HWS1000-3	3.3V	2.64 - 3.96	200		660		40	20	120	4.13 - 4.62	71/73
HWS1500-3	3.3V	2.64 - 3.96	300		990		60	36	150	4.12 - 4.62	72/75
HWS300-5	5V	4 - 6	60	-	300		30	20	120	6.25 -7.25	79/82
HWS600-5	5V	4 - 6	120	-	600		30	20	120	6.25 -7.25	80/83
HWS1000-5	5V	4 - 6	200		1000		40	20	120	6.25 - 7	76/78
HWS1500-5	5V	4 - 6	300		1500		60	36	150	4.0 - 6.0	77/81
HWS1000-6	6V	4.8 - 7.2	167		1002		60	36	150	7.5 - 8.4	79/81
HWS1500-6	6V	4.8 - 7.2	250	300	1500	1800	60	40	150	4.8 - 7.2	79/82
HWS1000-7	7.5V	6 - 9V	134	160	1005	1200	60	36	150	9.38 - 10.5	80/82
HWS1500-7	7.5V	6 - 9V	200	240	1500	1800	60	40	150	6.0 - 9.0	81/83
HWS300-12	12V	9.6 - 14.4	27	-	324		72	48	150	15 - 17.4	80/83
HWS600-12	12V	9.6 - 14.4	53	-	636		72	48	150	15 - 17.4	80/83
HWS1000-12	12V	9.6 - 14.4	88	100	1056	1200	100	48	150	15 - 17.4	82/85
HWS1500-12	12V	9.6 - 14.4	125	-	1500		72	48	150	15 - 17.4	82/85
HWS300-15	15V	12 - 18	22	-	330		90	60	150	18.8 - 21.8	80/83
HWS600-15	15V	12 - 18	43	-	645		90	60	150	18.8 - 21.8	81/84
HWS1000-15	15V	12 - 18	70	80	1050	1200	120	60	150	18.8 - 21.8	83/85
HWS1500-15	15V	12 - 18	100	-	1500		90	60	150	18.7 - 21.8	83/87
HWS300-24	24V	19.2 - 28.8	14	16.5	336	396	144	96	150	30 - 34.8	82/85
HWS600-24	24V	19.2 - 28.8	27	31	648	744	144	96	150	30 - 34.8	82/85
HWS1000-24	24V	19.2 - 28.8	46	58.5	1104	1404	150	96	150	30 - 34.8	85/87
HWS1500-24	24V	19.2 - 28.8	65/70 (1)	105	1560	2520	144	96	200	30 - 34.8	84/88
HWS1000-36	36V	28.8 - 43.2	30.7	39	1104	1404	150	144	200	45 - 49.7	85/88
HWS1500-36	36V	28.8 - 43.2	42/46.5 (1)	70	1512	2520	150	144	200	45 - 49.7	84/88
HWS300-48	48V	38.4 - 52.8	7	-	336		288	192	350	55.2 - 64.8	82/85
HWS600-48	48V	38.4 - 52.8	13	-	624		288	192	350	55.2 - 64.8	83/86
HWS1000-48	48V	38.4 - 52.8	23	29	1104	1404	300	192	200	55.2 - 64.8	86/88
HWS1500-48	48V	38.4 - 52.8	32	-	1536		288	192	200	55.2 - 64.8	86/90
HWS1000-60	60V	48 - 66	18.4	23.4	1104	1404	360	240	400	69 - 75	85/88
HWS1500-60	60V	48 - 66	28	42	1536	2520	360	240	400	69 - 75	86/90

Notes

(1) 100/200VAC

(2) 200-265VAC Input, 10s maximum on time with 35% duty cycle

(3) Use program input (PV) to adjust from 20-120% of nominal (20-110% for 48V models)

Options

Suffix	Description
Blank	HWS300-1500 the cover is fitted as standard
/A	Not Applicable HWS300-1500 the cover is fitted as standard
/PV	HWS300, 600 (Standard on HWS1000 & 1500 all output voltages): 1-6V program voltage input to adjust output 20-120% of nominal (20-110% for 48V) (12V-48V models only for 300 & 600W):
/HD	See HWS30-1500/HD Datasheet for details. -40 to +71(74)°C operation, conformally coated PCBs
/ME	See HWS30-1500/ME Datasheet for details. UL60601-1, EN60601-1 medical approvals

Specification Notes (See Page 1):

(1) 100/200VAC

(2) HWS start up -20°C. (-40°C see options table)

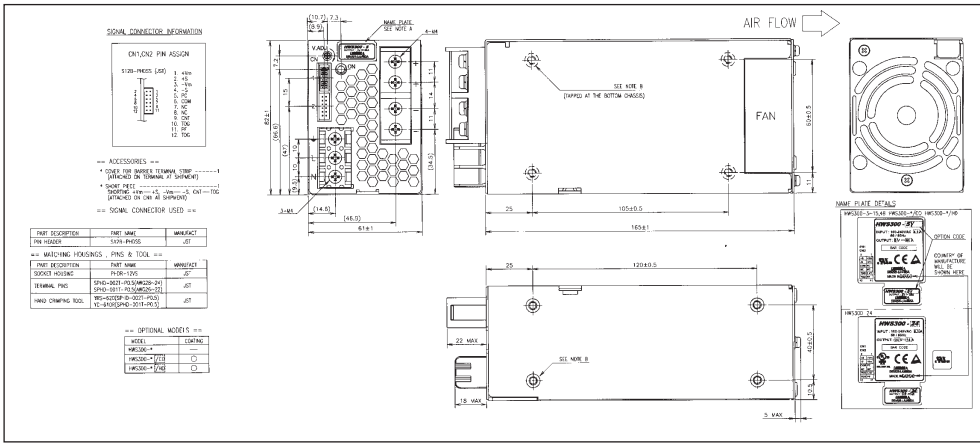
(3) HWS1000/1500 with 85VAC input:
See installation manual
HWS1000: -10 to +71°C.
HWS1000-5 derate linearly above 40°C

(4) 2kVAC HWS1000/1500 Input to ground

(5) UL60601-1, EN60601-1, see options.
UL508; HWS300/600 5V, 12V, 24V & 48V models

(6) According to Telcordia document SR-332, issue 3 "Reliability Prediction Procedure for Electronic Equipment" Conditions: ambient temp. 25°C, 230Vac input, full load (figures shown for 24V models)

Outline Drawing HWS300 -1500 Series

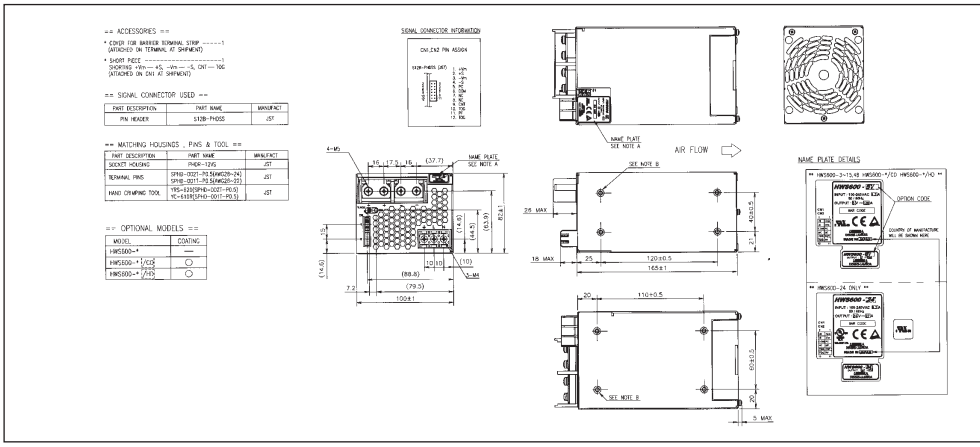


HWS300

Notes

A: Model name, nominal output voltage and maximum output current are shown in the name plate in accordance with the specifications.

B: M4 tapped holes (8) for customer chassis mounting. (Screw penetration depth 6mm maximum.)

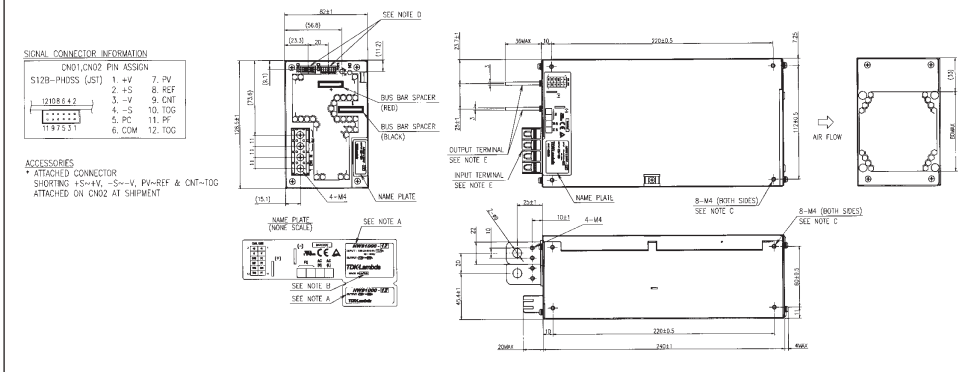


HWS600

Notes

A: Model name, nominal output voltage and maximum output current are shown in the name plate in accordance with the specifications.

B: M4 tapped holes (8) for customer chassis mounting. (Screw penetration depth 6mm maximum.)



HWS1000 Notes

A: Model name, nominal output voltage and maximum output current are shown in the name plate in accordance with the specifications.

B: Country of manufacture is shown here.

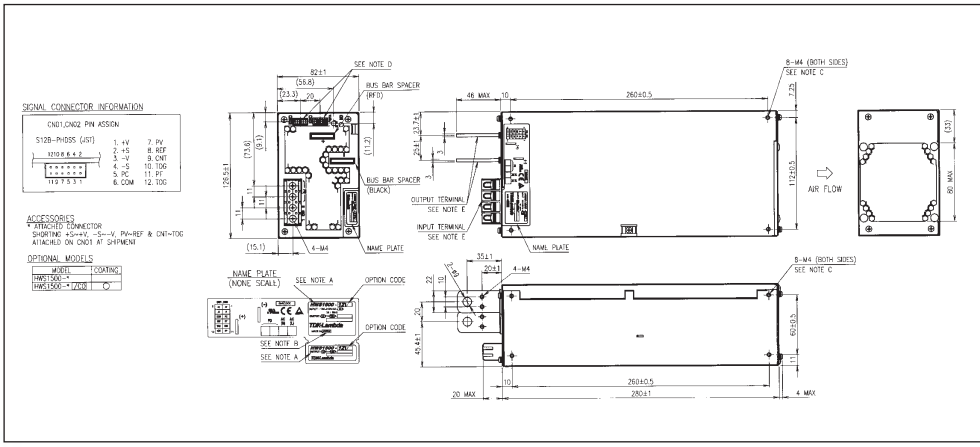
C: M4 tapped holes (16) for customer chassis mounting. (Screws must not protrude into power supply by more than 6mm.)

D: I/O Signal Connector.

Connector:	S12B-PHDSS(LF)(SN)	(JST)
Matching Housing:	PHDR-12VS	(JST)
Matching Contact:	SPHD-002T-P0.5(AWG28~24)	(JST) or
	SPHD-001T-P0.5(AWG26~22)	(JST) or
	BPHD-001T-P0.5(AWG26~22)	(JST)
Hand Crimping Tool:	YRS-620(SPHD-002T-P0.5)	(JST)
	YC-610R(SPHD-001T-P0.5)	(JST)
	YC-610R(BPHD-001T-P0.5)	(JST)

E: Recommended torque for the terminal piece

Input terminal (M4 screw):	1.27N•m
Output terminal (M8 bolt & nut):	10.8N•m
Output terminal (M4 screw):	1.27N•m



HWS1500 Notes

A: Model name, option, input voltage range, nominal output voltage, maximum output current are shown in the name plate in accordance with the specifications.

B: Country of manufacture is shown here.

C: M4 tapped holes (16) for customer chassis mounting. (Screws must not protrude into power supply by more than 6mm.) Recommended M4 screws torque: 1.27N•m

D: I/O Signal Connector.

Connector:	S12B-PHDSS(LF)(SN)	(JST)
Matching Housing:	PHDR-12VS	(JST)
Matching Contact:	SPHD-002T-P0.5(AWG28~24)	(JST) or
	SPHD-001T-P0.5(AWG26~22)	(JST) or
	BPHD-001T-P0.5(AWG26~22)	(JST)
Hand Crimping Tool:	YRS-620(SPHD-002T-P0.5)	(JST)
	YC-610R(SPHD-001T-P0.5)	(JST)
	YC-610R(BPHD-001T-P0.5)	(JST)

E: Recommended torque for the terminal piece

Input terminal (M4 screw):	1.27N•m
Output terminal (M8 bolt & nut):	10.8N•m
Output terminal (M4 screw):	1.27N•m

- Limited Lifetime Warranty
- 300% Peak Power Capability
- Small Package Size
- Universal Input (85 - 265VAC)
- High Efficiency

Key Market Segments & Applications

Factory Automation
Process Control
Semiconductor Fabrication
Motor and Pump Drives

HWS300P & 600P Series

Peak Power Industrial
Power Supplies

HWS300P & 600P Features and Benefits

Features	Benefits
• Limited Lifetime Warranty	• Lower Cost of Ownership
• Peak Power Capability	• Lower cost, smaller size
• High Efficiency	• Easier system cooling, less power used

Specifications

ITEMS / MODEL			HWS300P	HWS600P
Input Voltage range		-	85 - 265VAC (47 - 63Hz) or 120 - 330VDC	
Input Current (Typ)	(1)	A	3.6/1.9	7.2/3.7
Inrush Current	(1)	A	20 / 40	
Power Factor		-	Meets EN61000-3-2	
Temperature Coefficient		-	<0.02%/°C	
Overcurrent Protection		-	See table on page 2 (Recycle AC or remote on/off to reset)	
Overvoltage Protection		V	See table on page 2 (Recycle AC or remote on/off to reset)	
Hold Up Time (Typ)		ms	20	
Efficiency	(1)	%	84 / 87	
Leakage Curr. (@240VAC, 60Hz)		mA	<0.75mA (Typically 0.2mA at 100VAC)	
Remote Sense		-	No	
Indicator		-	Green LED = ON	
Remote on/off		-	Yes	
Line Regulation		mV	24V: 96mV, 36V: 144mV, 48V: 192mV	
Load Regulation		mV	24V: 144mV, 36V: 216mV, 48V: 288mV	
Ripple & Noise		mV	24V: 150mV, 36V: 200mV, 48V: 350mV	
Parallel operation		-	No	Yes, up to 2 units
DC Good		-	Yes	
Operating Temperature		-	-10°C to +70°C, derate linearly to 50% load from 50°C to 70°C	
Storage Temperature		-	-30°C to +85°C	
Humidity (non condensing)		-	Operating: 10 - 90%RH, Non operating 10 - 95%RH	
Cooling		-	Internal fan	
Withstand Voltage		-	Input to Ground 2.5kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.	
Isolation Resistance		-	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC	
Vibration (non operating)		-	10 - 55Hz (1 minute sweep), 19.6m/s² constant X, Y, Z 1 hour	
Shock		-	< 196.1 m/s²	
Safety Agency Certification		-	UL60950-1, CSA60950-1, EN60950-1, EN50178, CE Mark	
Line Dip		-	Complies with SEMI F47 (200VAC line only)	
Conducted & Radiated EMI		-	EN55011 / EN55022, FCC VCCI Class B	
Immunity		-	IEC61000-4-2, -3, -4, -6 (Level 3), -5, -8 (Level 4), -11	
Weight (Typ)		g	1,000	1,600
Size (WxHxD)		mm	61 x 82 x 165	100 x 82 x 165
Warranty		-	Limited Lifetime Warranty	

Notes: (1) 100/200VAC

Model Selector

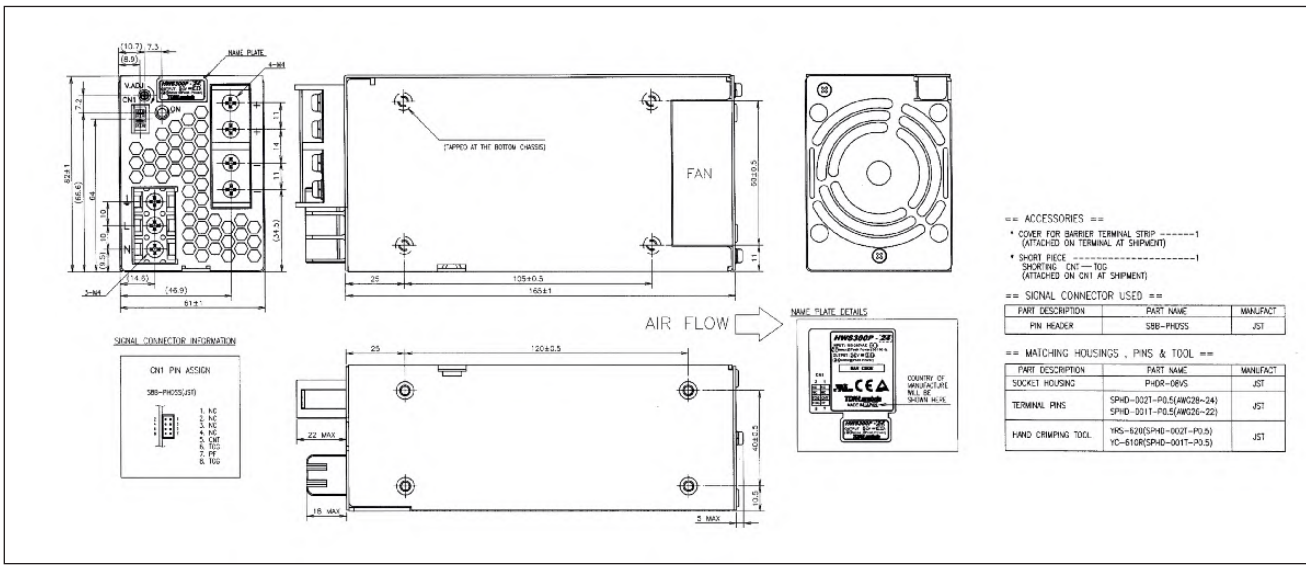
Model	Voltage V	Adjust Range V	Max Avg. Current A	Max Avg. Power W	Peak Current A (1,2)	Max Peak Power W (1)	Overcurrent Minimum A	Overvoltage V
HWS300P-24	24V	19.2 - 26.4	12.5	300	21 / 42	504 / 1008	21.4 / 42.8	27.6 - 32.4
HWS600P-24	24V	19.2 - 26.4	25	600	40.5 / 83	972 / 1992	41.3 / 84.6	27.6 - 32.4
HWS300P-36	36V	28.8 - 39.6	8.4	302.4	14 / 28	504 / 1008	14.3 / 28.6	41.4 - 48.6
HWS600P-36	36V	28.8 - 39.6	16.7	601.2	27 / 55.5	972 / 1998	27.5 / 56.6	41.4 - 48.6
HWS300P-48	48V	38.4 - 52.8	6.3	302.4	10.5 / 21	504 / 1008	10.7 / 21.4	55.2 - 64.8
HWS600P-48	48V	38.4 - 52.8	12.5	600	20 / 41.5	960 / 1992	20.4 / 42.3	55.2 - 64.8

Notes

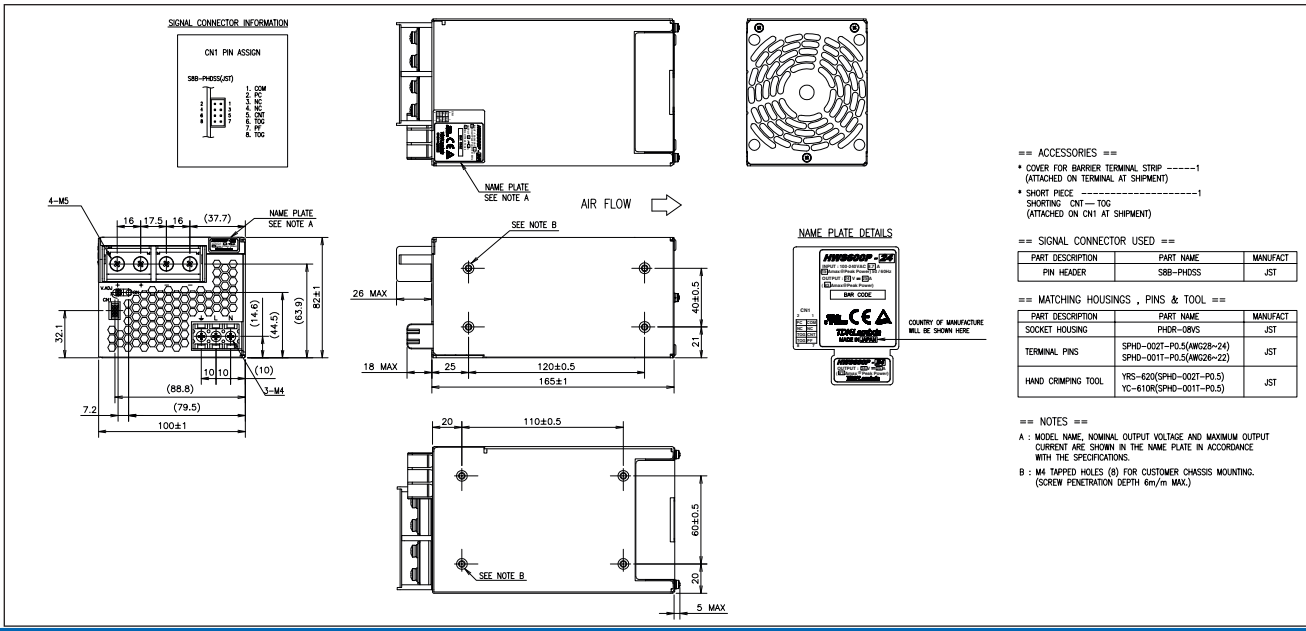
(1) 100/200VAC

(2) 200-265VAC Input, 5s maximum on time up to 35% duty cycle (see instruction manual)

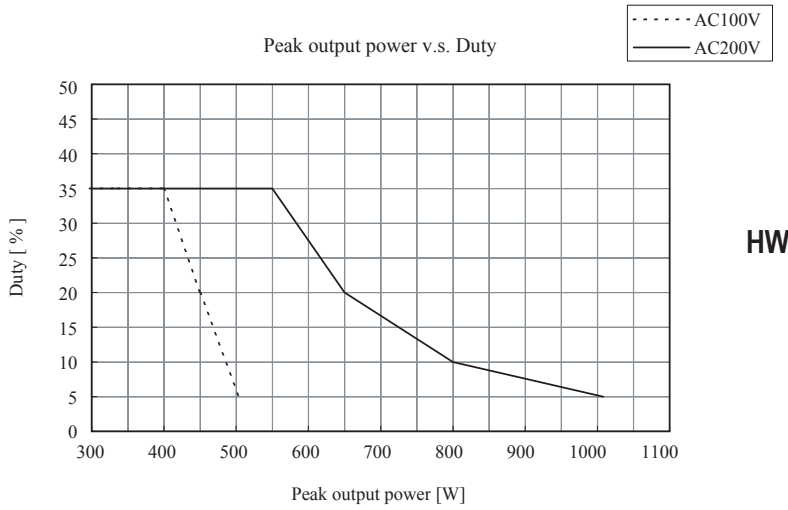
Outline Drawing HWS300P



Outline Drawing HWS600P

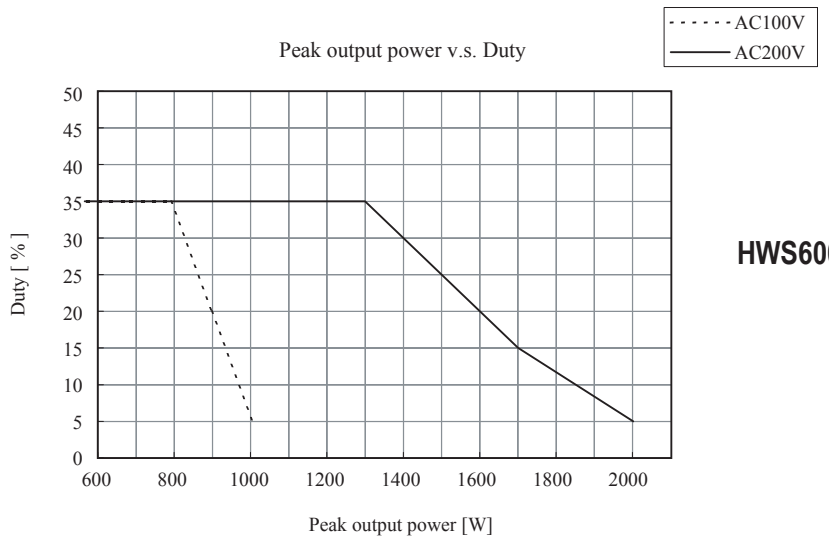


HWS300P Peak Output Power vs. Duty Cycle



HWS300P

HWS600P Peak Output Power vs. Duty Cycle



HWS600P

Options

Suffix	Description
Blank	HWS300-1500 cover is fitted as standard
/A	Not applicable

JWT Series

Triple Output
Industrial Power Supplies

- 5 Year Warranty
- Power Factor Corrected
- Approved to VDE01 60 Machinery Directive
- Universal Input (85 265VAC)

Key Market Segments & Applications

Factory Automation:	Process Control, NC-Machining, Automotive, Packaging Equipment, Materials Handling, Chemical Processing, Robots
Test & Measurement:	Burn-in & Test, Automated Test, Instrumentation, Measurement, Detection

JWT Features and Benefits

Features	Benefits
• VDE01 60 Approved	• No Additional Approvals Needed
• 5 Year Warranty	• Lower Cost of Ownership
• Power Factor Corrected	• Supports Global Use
• Level B EMI	• Assists Systems Compliance

Specifications

ITEMS \ MODEL		JWT75	JWT100
Max Output Power	W	75	100
Efficiency (Typ)	%	72	
Input Voltage range	-	85 - 265VAC (47 - 63Hz) or 120 - 330VDC	
Input Current Typ	A	1.2 / 0.6	1.4 / 0.7
Inrush Current	A	14A at 100VAC, 28A at 200VAC input	
Power Factor	-	Meets EN61000-3-2	
Output Voltage Accuracy	-	V1 variable, V2 & V3 +/-5%	
Temperature Coefficient	-	V1 & V2 <0.02%/ºC, V3 <0.03%/ºC	
Overcurrent Protection	-	>105%	
Overvoltage Protection	V	Main output only: 5.7 - 7V	
Hold Up Time (Typ)	ms	20	
Leakage Current	-	0.75mA Max, 0.44mA typical at 230VAC	
Operating Temperature	-	-10ºC to +65ºC, derate linearly to 50% load from 50ºC to 65ºC -10ºC to +50ºC, derate linearly to 60% load from 40ºC to 50ºC with cover	
Storage Temperature	ºC	-30 to +85	
Humidity	-	30 - 90% RH (operating), 10 - 95% RH (non operating)	
Cooling	-	Convection	
Withstand Voltage	-	Input to Ground 2kVAC (20mA), Input to Output 3kVAC (20mA), Output to Ground 500VAC (100mA) for 1 min.	
Isolation Resistance	-	>100M at 25ºC & 70%RH, Output to Ground 500VDC	
Vibration (non operating)	-	10 - 55Hz (1 minute sweep), 196m/s^2 constant X, Y, Z 1 hour	
Shock	-	<196.1m/s^2	
Safety Agency Approvals	-	UL/CSA60950-1, EN60950, VDE0160, CE Mark, Built to meet DENTORI	
Conducted & Radiated EMI	-	EN55011 / EN55022-B, FCC Class B, VCCI-B	
Weight (Typ)	g	600	720
Size (WxHxD)	mm	42 x 92 x 188	48 x 92 x 203
Warranty	-	5 Years	

Note: See Installation Manual for full details, test methods of parameters and application notes.

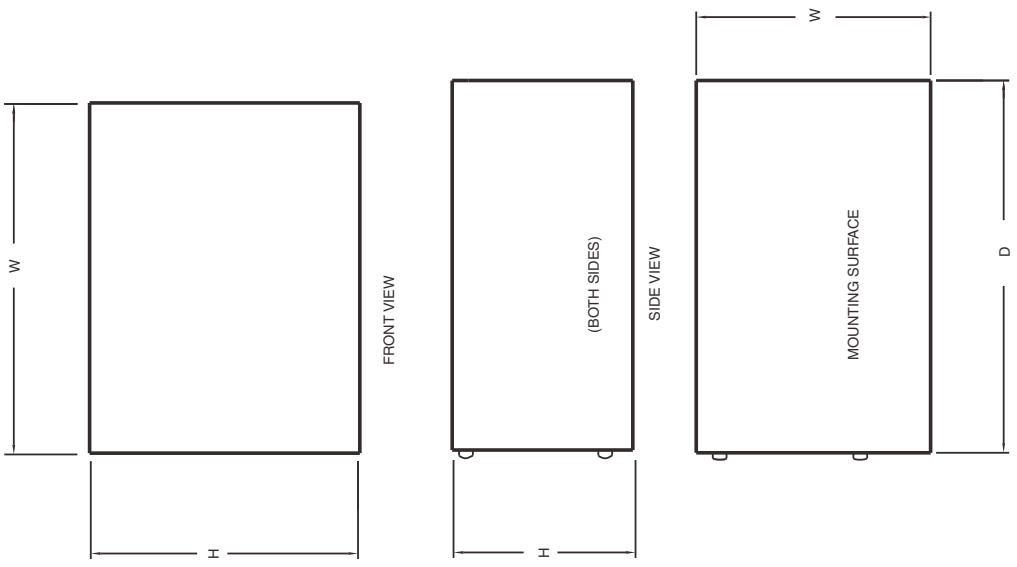
Model Selector

Model	Output	Voltage	Adjust. Range	Min Current (A)	Max Current (A)	Load Reg (mV)	Line Reg (mV)	Ripple & Noise (mV)
JWT75-522/A	V1	+5V	5 - 5.25	0.8	8	40	20	120
	V2	+12V	-	0	4	100	48	150
	V3	-12V	-	0	0.5	150	48	150
JWT75-5FF/A	V1	+5V	5 - 5.25	0.8	8	40	20	120
	V2	+15V	-	0	3.2	120	60	150
	V3	-15V	-	0	0.5	150	60	150
JWT75-525/A	V1	+5V	5 - 5.25	0.8	8	40	20	120
	V2	+12V	-	0	4	100	48	150
	V3	-5V	-	0	0.5	100	20	150
JWT100-522/A	V1	+5V	5 - 5.25	1.3	13	40	20	120
	V2	+12V	-	0	5.5	100	48	150
	V3	-12V	-	0	1	150	48	150
JWT100-5FF/A	V1	+5V	5 - 5.25	1.3	13	40	20	120
	V2	+15V	-	0	4.5	120	60	150
	V3	-15V	-	0	1	150	60	150
JWT100-525/A	V1	+5V	5 - 5.25	1.3	13	40	20	120
	V2	+12V	-	0	5.5	100	48	150
	V3	-5V	-	0	1	100	20	150

Options

Suffix	Description
Blank	Screw terminals, no cover
/A	Screw terminals, cover (Standard US stock item)
/B	Molex terminals, no cover
/C	Molex terminals, cover
/R	Remote On / Off
Example	**JWT75-525/RC**

Outline Drawing JWT Series



LS25-150 Series

Single Output General Purpose Power Supplies

- High MTBF up to 900 000 hours
- Superior operating temperature performance up to 70°C
- Very High efficiency up to 87%
- Very Low Cost
- Compact
- Withstands 300VAC surges (5s)
- Five Year Warranty

Key Market Segments & Applications

Test & Measurement
Automated Service
Factory Automation
General Purpose
LED Lighting & Display

LS25-150 Features and Benefits

Features	Benefits
• High MTBF	• Superior Reliability
• High efficiency	• Easier system cooling
• -25 to +70°C operating temperature	• Suitable for indoor & outdoor enclosures
• Low derating above 50 °C (up to 70% load available at 70° C)	• Improved system power optimasition
• Curve B EMC	• Assists system compliance

Specifications

ITEMS		LS25	LS35	LS50	LS75	LS100	LS150
AC Input Voltage (300VAC for 5s)	VAC	88 - 264VAC (See note (2) for LS100)					88-132/176-264VAC(1)
Input Frequency	Hz	47 - 63Hz					
DC Input Voltage	VDC	125 - 373VDC				248 - 273VDC	
Inrush Current (230VAC, cold start)	A	30	40	40	40	60	40
Power Factor	-	Meets EN61000-3-2, -3					
Input Current (115/230VAC)	A	0.7 / 0.4	0.8 / 0.55	1.3 / 0.8	1.6 / 1.0	2.2 / 1.2	3.5 / 2
Temperature Coefficient	-	<0.02%/°C (0 - 50°C)					
Overcurrent Protection	-	> 110%					
Overvoltage Protection	V	3.3V: 3.8-4.45V, 5V: 5.75-6.75V, 12V: 13.8-16.2V, 15V: 17.25-20.25V,24V: 27.6-32.4V, 36V: 41.4-48.6V, 48V: 55.2-64.8V					
Hold Up Time (115 / 230V input)	ms	14 / 80	12 / 80	14 / 60	14 / 60	25 / 150	20 / 28
Leakage Current (230VAC 60Hz)	mA	<1mA					
Remote Sense	-	No					
LED Indicator	-	Green LED = On					
Operating Temperature	-	-25 to +70°C. Derate linearly to 50% load from +50 to +70°C (2)					
Storage Temperature	°C	-40 to +85°C					
Operating Humidity	-	20 - 90% RH (non condensing)					
Storage Humidity	-	10 - 95% RH (non condensing)					
Cooling	-	Convection					
Withstand Voltage	-	Input to Ground 1.5kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.					
Isolation Resistance	-	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC					
Vibration (non operating)	-	10 - 55Hz: 19.6m/s^2 constant sweep 1 min X, Y, Z for 1 hour					
Shock	-	< 196.1 m/s^2 (20G)					
Immunity	-	IEC61000-4-2, -3, -4, -5, -6, -8, -11					
Safety Agency Approvals	-	UL60950-1, EN60950-1, IEC60950-1, CE Mark					
Conducted & Radiated EMI	-	EN55011/EN55022-B, FCC-B					
MTBF (MIL-HDBK-217F)	hrs	906.997	706.464	712,890	648,786	545,375	505,393
Weight (Typ)	g	170	270	350	410	600	700
Size (LxWxH)	mm	79 x 51 x 28	99 x 82 x 36	99 x 97 x 36	130 x 97 x 38	160 x 97 x 38	198 x 99 x 38
Warranty	yrs	5					

Model Selector

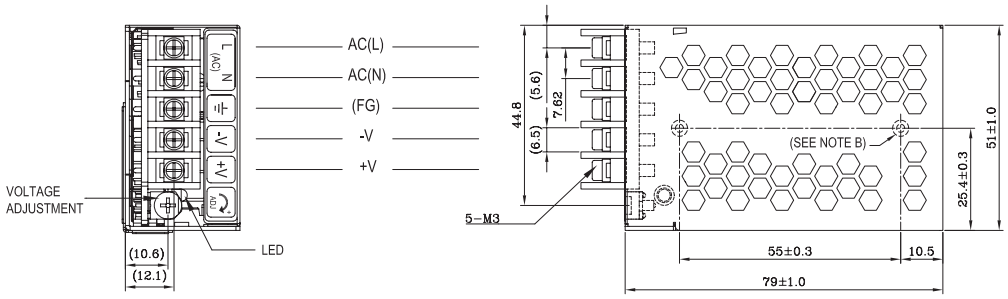
Model	Voltage	Adjust Range (V)	Max Current (A)	Load Reg (mV)	Line Reg (mV)	Ripple Noise (mV)	Efficiency (typ) %
LS25-3.3	3.3V	2.85 - 3.6	6	66	16.5	80	72
LS25-5	5V	4.5 - 5.5	5	50	25	80	77
LS25-12	12V	10.8 - 13.2	2.1	60	60	120	79
LS25-15	15V	13.5 - 16.5	1.7	75	75	120	82
LS25-24	24V	22 - 27.6	1.1	120	120	120	84
LS25-36	36V	32 - 40	0.75	150	150	150	85
LS25-48	48V	42 - 54	0.57	180	180	200	85
LS35-3.3	3.3V	2.85 - 3.6	7	66	16.5	80	73
LS35-5	5V	4.5 - 5.5	7	50	25	80	77
LS35-12	12V	10.8 - 13.2	3	60	60	120	81
LS35-15	15V	13.5 - 16.5	2.4	75	75	120	83
LS35-24	24V	22 - 27.6	1.5	120	120	120	84
LS35-36	36V	32 - 40	1	150	150	150	84
LS35-48	48V	42 - 54	0.8	180	180	200	84
LS50-3.3	3.3V	3.0 - 3.6	10	40	20	80	75
LS50-5	5V	4.75 - 5.5	10	40	20	80	80
LS50-12	12V	10.8 - 13.2	4.2	96	48	120	84
LS50-15	15V	13.5 - 16.5	3.4	120	60	120	85
LS50-24	24V	22 - 27.2	2.2	192	96	120	86
LS50-36	36V	32 - 40	1.4	288	144	150	86
LS50-48	48V	42 - 54	1.1	384	192	200	86
LS75-3.3	3.3V	3.0 - 3.6	15	40	20	80	75
LS75-5	5V	4.75 - 5.5	12	40	20	80	79
LS75-12	12V	10.8 - 13.2	6	96	48	120	84
LS75-15	15V	13.5 - 16.5	5	120	60	120	85
LS75-24	24V	22 - 27.2	3.2	192	96	120	86
LS75-36	36V	32 - 40	2.1	288	144	150	86
LS75-48	48V	42 - 54	1.6	384	192	200	87
LS100-3.3	3.3V	3.0 - 3.6	20	66	16.5	80	74
LS100-5	5V	4.75 - 5.5	16	50	25	80	77
LS100-12	12V	10.8 - 13.2	8.5	60	60	120	81
LS100-15	15V	13.5 - 16.5	7	75	75	120	82
LS100-24	24V	22 - 27.2	4.5	120	120	120	84
LS100-36	36V	32 - 40	3	150	150	150	84
LS100-48	48V	42 - 54	2.3	180	180	200	84
LS150-3.3	3.3V	3.0 - 3.6	30	66	16.5	80	74
LS150-5	5V	4.75 - 5.5	26	50	25	80	78
LS150-12	12V	10.8 - 13.2	12.5	60	60	120	83
LS150-15	15V	13.5 - 16.5	10	75	75	120	84
LS150-24	24V	22 - 27.2	6.5	120	120	120	86
LS150-36	36V	32 - 40	4.3	150	150	150	86
LS150-48	48V	42 - 54	3.3	180	180	200	87

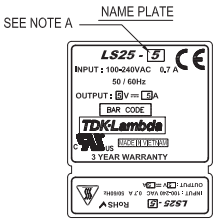
Notes: See page 1

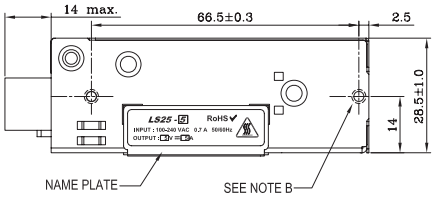
(1) Switch selectable for 115 or 230VAC

(2)
- LS50, LS75-3.3 & -5: Derate linearly to 70% load from +50 to +70°C.
- LS75-12,-15,-24,-36,-48 Derate linearly to 60% load from +50 to +70°C.
- LS100-3.3 & 5 Derate linearly to 60% load from +45 to +70°C. Derate linearly to 80% load from 115V to 88VAC input.
- LS100-12,-15,-24,-36,-48 Derate linearly to 60% load from +50 to +70°C. Derate linearly to 80% load from 115V to 88VAC input.
- LS150-3.3 & 5 Derate linearly to 50% load from +40 to +70°C.
- LS150-12,-15,-24,-36,-48 Derate linearly to 70% load from +50 to +70°C.

Outline Drawing LS25



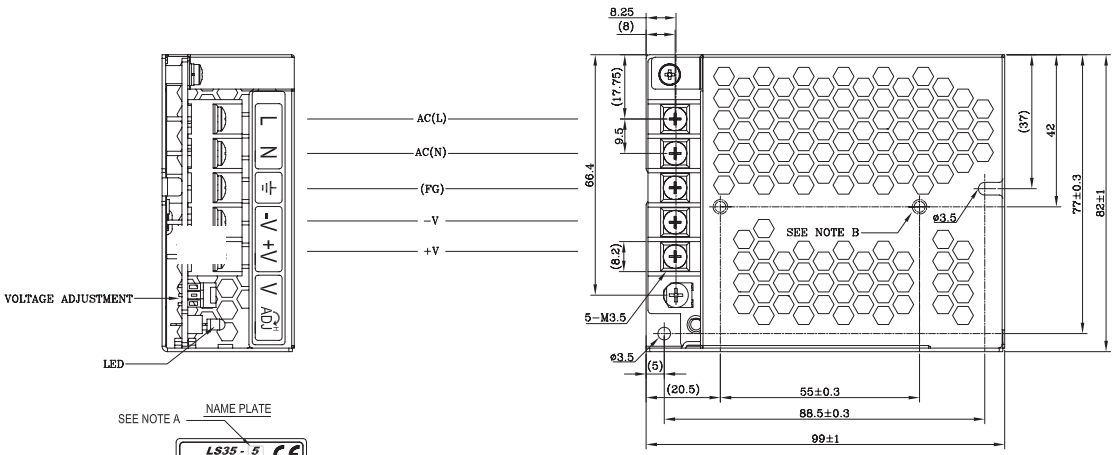


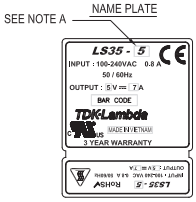


NOTES

A. MODEL NAME , INPUT VOLTAGE RANGE , NOMINAL OUTPUT VOLTAGE , MAXIMUM OUTPUT CURRENT & COUNTRY OF MANUFACTURE ARE SHOWN IN ACCORDANCE WITH THE SPECIFICATION.
B. M3 TAPPED , EMBOSSED & COUNTERSUNK HOLES (4) FOR CUSTOMER CHASSIS MOUNTING. SCREWS MUST NOT PROTRUDE INTO POWER SUPPLY BY MORE THAN 4mm.
C. UNLESS OTHERWISE SPECIFIED, DIMENSION TOLERANCE = ±0.3mm.

Outline Drawing LS35

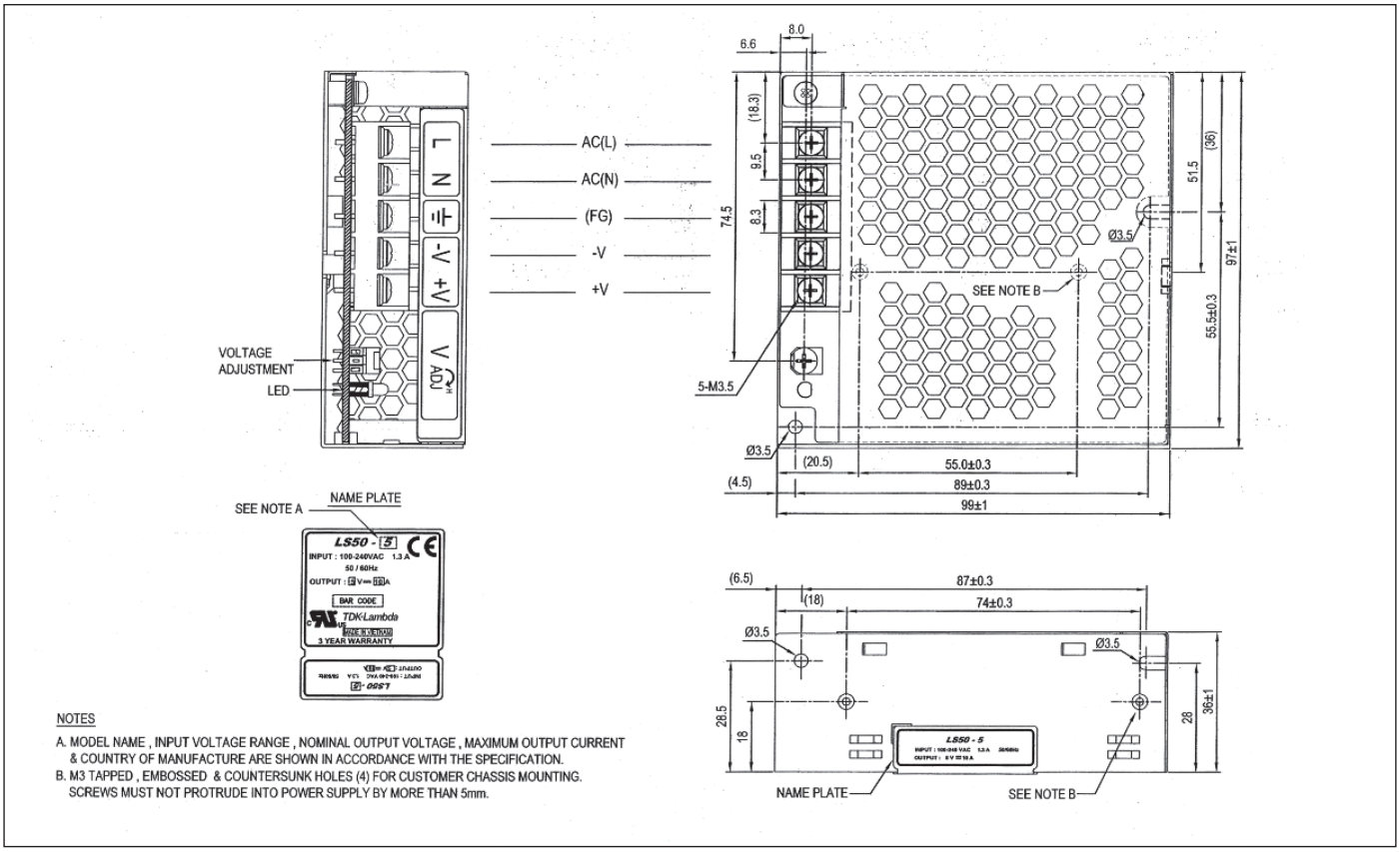




NOTES

A. MODEL NAME, INPUT VOLTAGE RANGE, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT & COUNTRY OF MANUFACTURE ARE SHOWN IN ACCORDANCE WITH THE SPECIFICATION.
B. M3 TAPPED, EMBOSSED & COUNTERSUNK HOLES (4) FOR CUSTOMER CHASSIS MOUNTING. SCREWS MUST NOT PROTRUDE INTO POWER SUPPLY BY MORETHAN 5mm.
C. UNLESS OTHERWISE SPECIFIED, DIMENSION TOLERANCE = ±0.3mm.

Outline Drawing LS50

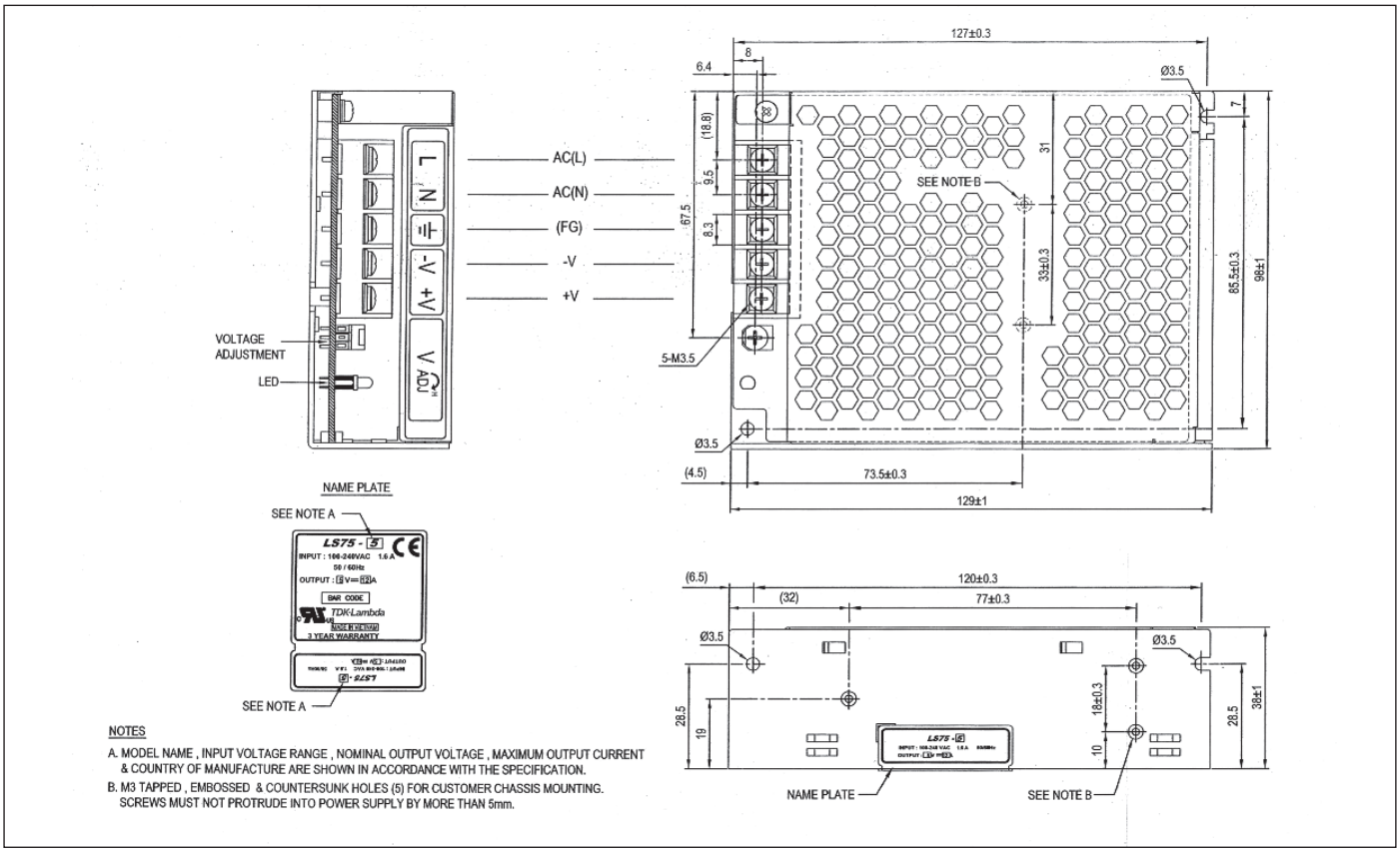


NOTES

A. MODEL NAME , INPUT VOLTAGE RANGE , NOMINAL OUTPUT VOLTAGE , MAXIMUM OUTPUT CURRENT & COUNTRY OF MANUFACTURE ARE SHOWN IN ACCORDANCE WITH THE SPECIFICATION.

B. M3 TAPPED , EMBOSSED & COUNTERSUNK HOLES (4) FOR CUSTOMER CHASSIS MOUNTING. SCREWS MUST NOT PROTRUDE INTO POWER SUPPLY BY MORE THAN 5mm.

Outline Drawing LS75

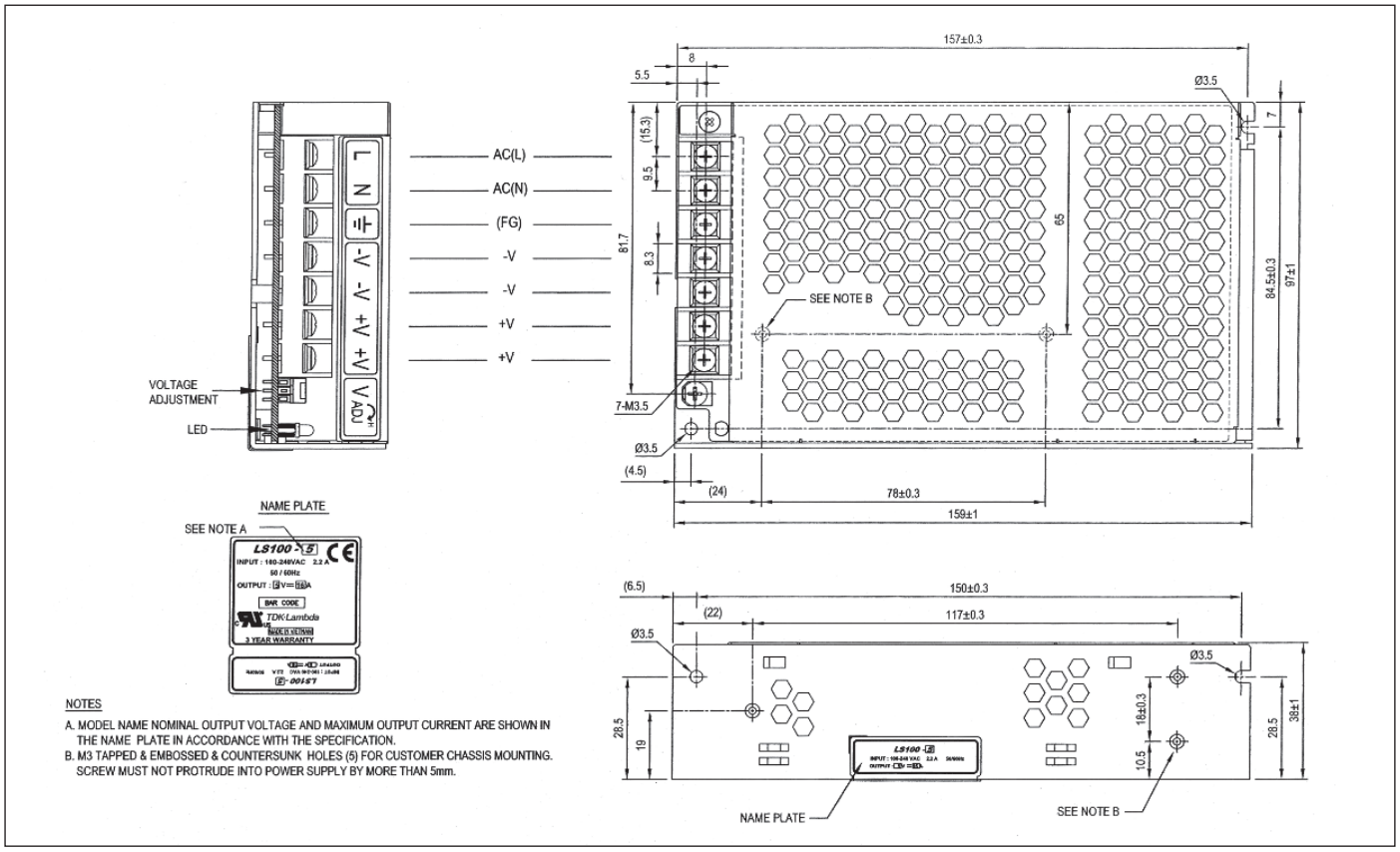


NOTES

A. MODEL NAME , INPUT VOLTAGE RANGE , NOMINAL OUTPUT VOLTAGE , MAXIMUM OUTPUT CURRENT & COUNTRY OF MANUFACTURE ARE SHOWN IN ACCORDANCE WITH THE SPECIFICATION.

B. M3 TAPPED , EMBOSSED & COUNTERSUNK HOLES (5) FOR CUSTOMER CHASSIS MOUNTING. SCREWS MUST NOT PROTRUDE INTO POWER SUPPLY BY MORE THAN 5mm.

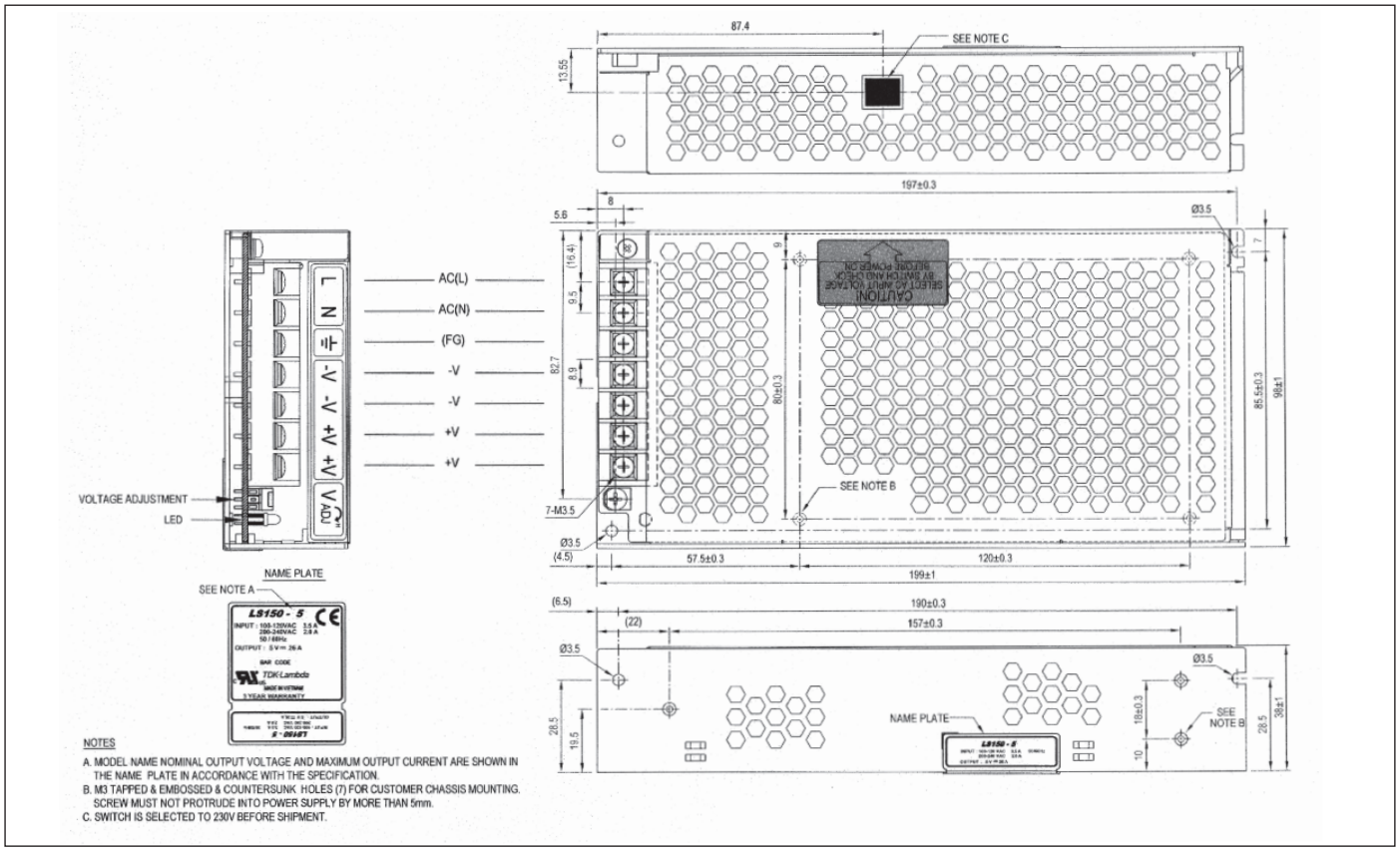
Outline Drawing LS100



NOTES

A. MODEL NAME NOMINAL OUTPUT VOLTAGE AND MAXIMUM OUTPUT CURRENT ARE SHOWN IN THE NAME PLATE IN ACCORDANCE WITH THE SPECIFICATION.
B. M3 TAPPED & EMBOSSED & COUNTERSUNK HOLES (5) FOR CUSTOMER CHASSIS MOUNTING. SCREW MUST NOT PROTRUDE INTO POWER SUPPLY BY MORE THAN 5mm.

Outline Drawing LS150



NOTES

A. MODEL NAME NOMINAL OUTPUT VOLTAGE AND MAXIMUM OUTPUT CURRENT ARE SHOWN IN THE NAME PLATE IN ACCORDANCE WITH THE SPECIFICATION.
B. M3 TAPPED & EMBOSSED & COUNTERSUNK HOLES (7) FOR CUSTOMER CHASSIS MOUNTING. SCREW MUST NOT PROTRUDE INTO POWER SUPPLY BY MORE THAN 5mm.
C. SWITCH IS SELECTED TO 230V BEFORE SHIPMENT.

LS200 Series

Single Output 150 - 200W
General Purpose Power Supplies

- Very low cost
- Small size
- Power factor corrected
- Wide range AC Input
- Convection or fan cooled
- Five year warranty
- 41mm high (for 1U racking)
- 250W peak rating on 24 & 36V models

Key Market Segments & Applications

Test and Measurement
Automated Service
LED Lighting & Displays
Light Industrial
Kiosks

LS200 Features and Benefits

Features	Benefits
• High MTBF	• Superior reliability
• High efficiency	• Easier system cooling
• -25 to +70˚C operating temperature	• Suitable for indoor & outdoor enclosures
• Low derating above 50˚C (up to 60% load available at 70˚C)	• Improved system power optimisation
• Curve B EMC	• Assists system compliance

Specifications

ITEMS / MODEL		**LS200** (enclosed style with internal fan)	**LS200/L** (U channel style - no internal fan)
AC Input Voltage (300VAC for 5s)	VAC	85 - 264VAC	
Input Frequency	Hz	47 - 63Hz	
DC Input Voltage	VDC	120 - 373VDC	
Inrush Current (230VAC, cold start)	A	60	
Power Factor	-	Meets EN61000-3-2, -3 (Typical PF 0.98/0.95) (1)	
Input Current (115/230VAC)	A	3.5 / 1.7 (typical)	
Temperature Coefficient	-	<0.02%/°C (0 - 50°C)	
Overcurrent Protection (2)	-	> 105% of nominal or peak. Constant current style	
Overvoltage Protection (2)	V	3.3V: 3.8 - 4.45V, 5V: 5.75 - 6.75V, 7.5V: 8.6 - 8.1V, 12V: 15.1 - 17.75V	
		15V: 17.25 - 20.25V, 24V: 30.25 - 35.5V, 36V: 41.4 - 48.6V, 48V: 60 - 69.6V	
Hold Up Time (115/230V input)	ms	20ms	
Leakage Current (230VAC 60Hz)	mA	<1mA	
Remote Sense	-	Yes	
Remote On/Off	-	On: 0 - 0.8V; Off: 3 - 12V	
LED Indicator	-	Green LED = On	
Operating Temperature	-	-25 to +70°C see derating curves	
Storage Temperature	°C	-40 to +85°C	
Operating Humidity	-	20 - 90% RH (non condensing)	
Storage Humidity	-	10 - 95% RH (non condensing)	
Cooling	-	Fan cooled (exhaust from fan end)	Convection or customer supplied airflow
Withstand Voltage	-	Input to Ground 1.5kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.	
Isolation Resistance	-	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC	
Vibration (non operating)	-	10 - 55Hz: 19.6m/s² constant sweep 1 min X, Y, Z for 1 hour	
Shock	-	< 196.1 m/s² (20G)	
Immunity	-	IEC61000-4-2, -3, -4, -5, -6, -8, -11	
Safety Agency Approvals	-	UL60950-1, CSA60950-1 (cUL), IEC60950-1 2nd Edition, CE Mark	
Conducted & Radiated EMI	-	EN55011/EN55022-B, FCC--B	
MTBF (MIL-HDBK-217F)	hrs	300,000	
Weight (Typ)	g	700	600
Size (LxWxH)	mm	199 x 98 x 41	
Warranty	yrs	5	

Notes (1) 115 / 230VAC input (2) Recycle AC to reset

Model Selector

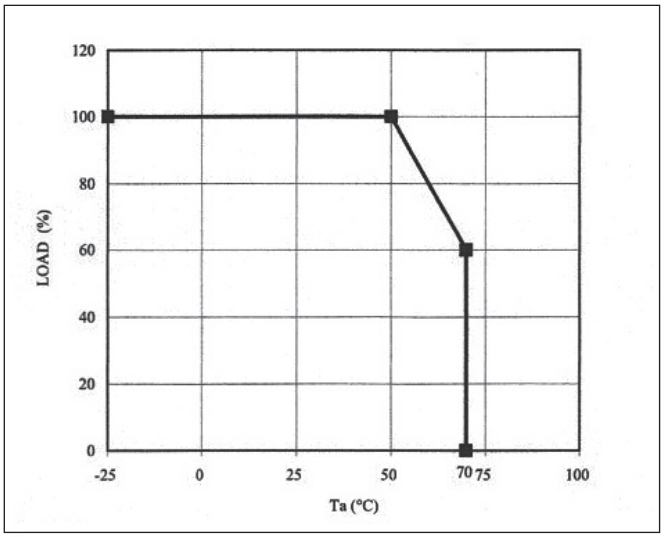
Model	Voltage	Adjust Range Range (V)	Max Current (A) (3)	Max Current Convection (A) (at nom output voltage)	Peak Current <10s, >35% DC (A)	Load Reg (mV)	Line Reg (mV)	Ripple Noise (mV)	Efficiency (typ) % (1)
LS200-3.3	3.3V	3.0 - 3.6	40	N/A	-	40	16	80	67 / 68
LS200-5	5V	4.75 - 5.5	40	N/A	-	40	20	80	72 / 75
LS200-7.5	7.5V	6.8 - 8.2	26.7	N/A	-	40	20	80	74 / 77
LS200-12	12V	10.8 - 14.4	16.7	N/A	-	96	48	120	76 / 79
LS200-15	15V	13.5 - 16.5	13.4	N/A	-	120	60	120	80 / 83
LS200-24	24V	22 - 28.8	8.4	N/A	10.4	192	96	120	82 / 84
LS200-36	36V	32 - 40	5.6	N/A	6.9	288	144	150	82 / 85
LS200-48	48V	42 - 57.6	4.2	N/A	-	384	192	200	82 / 85
LS200-3.3/L	3.3V	3.0 - 3.6	40	26	-	40	16	80	67 / 68
LS200-5/L	5V	4.75 - 5.5	40	26	-	40	20	80	72 / 75
LS200-7.5/L	7.5V	6.8 - 8.2	26.7	17.3	-	40	20	80	74 / 77
LS200-12/L	12V	10.8 - 14.4	16.7	11.6	-	96	48	120	76 / 79
LS200-15/L	15V	13.5 - 16.5	13.4	9.3	-	120	60	120	80 / 83
LS200-24/L	24V	22 - 28.8	8.4	5.8	10.4	192	96	120	82 / 84
LS200-36/L	36V	32 - 40	5.6	3.9	6.9	288	144	150	82 / 85
LS200-48/L	48V	42 - 57.6	4.2	2.9	-	384	192	200	82 / 85

Notes
(3) Internal fan version or customer supplied airflow for /L models

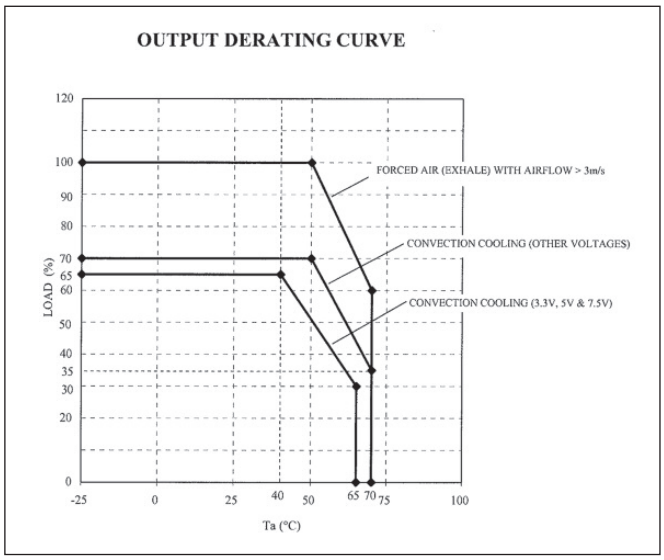
Options

Suffix	Description
/L	No cover or fan (U channel)
Blank	Cover and fan

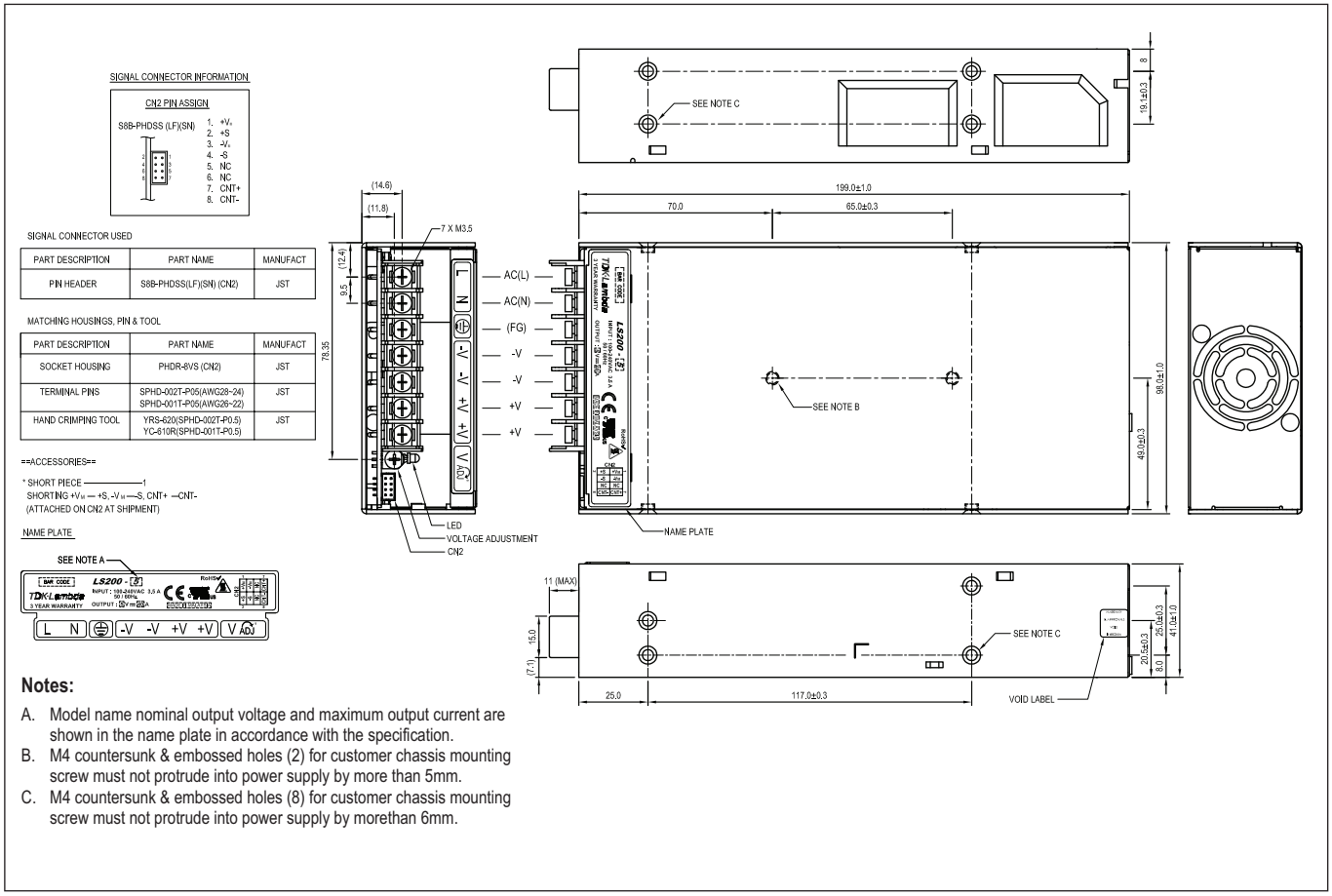
Derating Curve LS200



Derating Curve LS200/L



Outline Drawing LS200 Series



Notes:

A. Model name nominal output voltage and maximum output current are shown in the name plate in accordance with the specification.
B. M4 countersunk & embossed holes (2) for customer chassis mounting screw must not protrude into power supply by more than 5mm.
C. M4 countersunk & embossed holes (8) for customer chassis mounting screw must not protrude into power supply by morethan 6mm.

- 5 Year Warranty
- -40ºC to +71ºC Operation
- MIL-STD-810E Vibration / Shock
- Input transient protected
- UL508, SEMIF47, Factory Mutual (Class 1, Division 2)

Key Market Segments & Applications

Factory Automation
Process & Controls
Harsh Environments

LZSA Series

Single Output Industrial Power Supplies

LZSA Features and Benefits

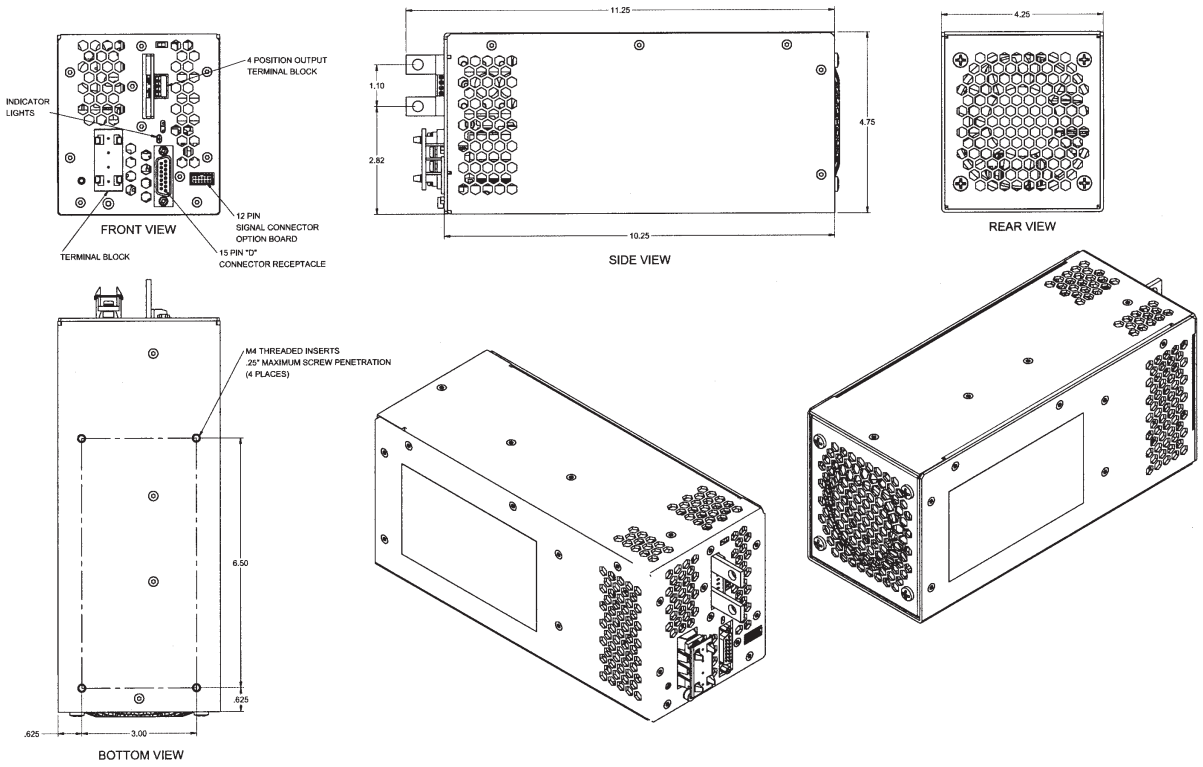
Features	Benefits
• Rugged mechanical design with coating on PCBS	• High reliability in harsh conditions
• Superior thermal design	• Longer life even at 71°C operation
• Wide range adjustment of output	• Reduces need for custom outputs
• Input voltage transient protected	• Reduced system filtering

Specifications

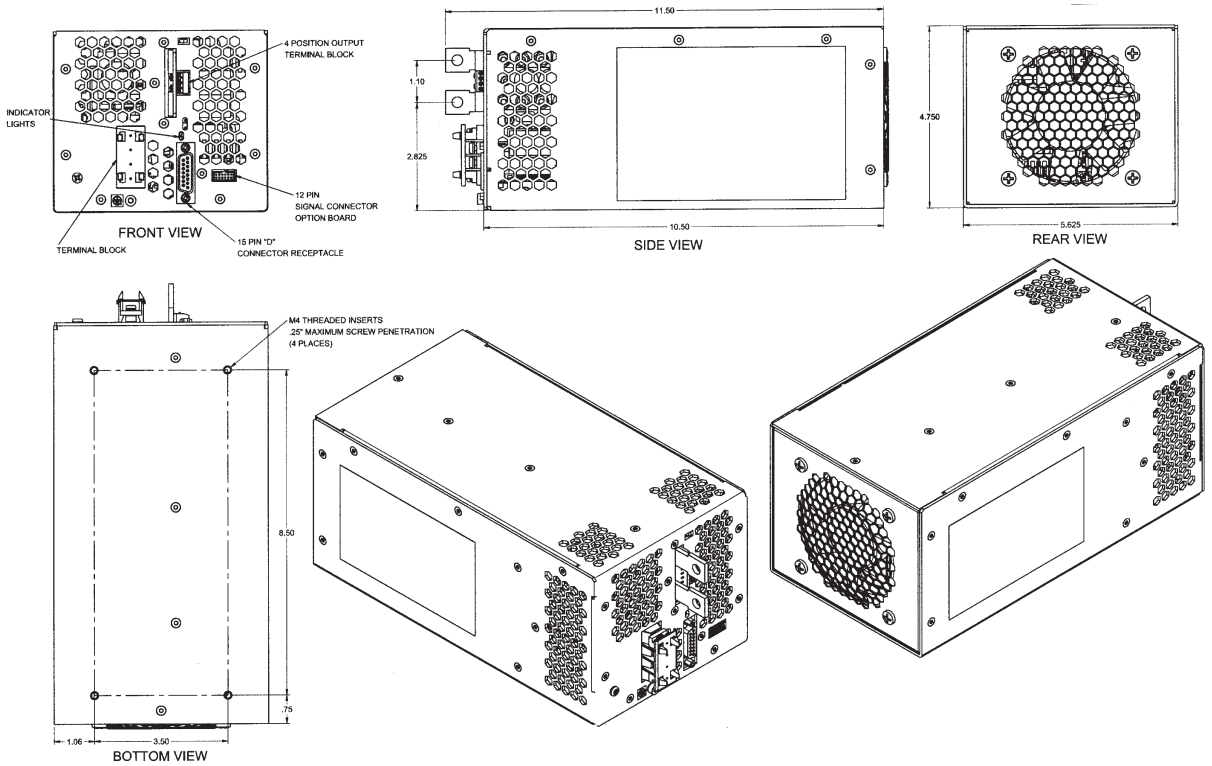
ITEMS \ MODELS		LZSA500	LZSA1000	LZSA1500
Input Voltage (47-440Hz)*	-	85 - 265V (1500W: See output rating below 100VAC) 100-400VDC		
Inrush Current (110 / 220VAC)	A	20 / 40A	40 / 80A	
Power Factor	-	EN61000-3-2 Class A		
Efficiency (typical)	%	84%		
Ripple & Noise (Max) Pk-Pk	-	75mV	75mV	24V: 75mV 48V: 150mV
Line Regulation	%	0.1%		
Load Regulation	%	0.1%		
Transient Response	-	±1% deviation, recovering to ±0.2% in <1.25ms (25% load change)		
Overcurrent Protection	-	110 - 130%		
Overvoltage Protection	V	User adjustable from front panel		
Thermal Protection	-	Internal thermostat. Recycle AC to reset		
Hold Up Time at 110VAC	ms	20ms Hold Up, 20ms Ride Through		
Remote Sense	-	Compensates for a total of 1V cable drop		
Remote Adjust	-	Using front panel potentiometer, Resistance (1k/V), or Voltage (1V/V)		
Remote On / Off	-	TTL compatible, active high		
Signals	-	Optocoupled transistor for AC Fail, DC Good, Inverter OK, 200kHz sync signal (ref-sense)		
Indicators	-	Green LED indicates output good, red LED indicates overvoltage or over temperature		
Parallel Connection	-	Single wire current share		
Operating Temperature	ºC	-40°C to +71°C, derate linearly to 60% load from 60°C to 71°C (20 min warm up period needed for <-30°C)		
Storage Temperature	ºC	-40°C to +85°C		
Temperature Coefficient	-	0.01%/ºC		
Humidity (non condensing)	%RH	10 - 90		
Cooling	-	Internal fan		
Withstand Voltage	-	Input - Ground 2,121VDC, Input - Output 4,242VDC, Output - Ground 500VDC		
Vibration	-	MIL-STD-810E, Method 516.4 Proc. I, II, IV, VI		
Shock	-	MIL-STD-810E, Method 514.4, Category 1, 9		
Safety Agency Approvals	-	UL60950-1, UL508, EN60950-1, FM 3600, 3611, 3810, & CE Mark. SEMIF47(>100VAC)		
Leakage current	uA	<500uA at 265VAC, 60Hz		
Emissions	-	EN55022/EN55011 Class B, EN61000-3-3, MIL STD461/462D CE102		
Immunity	-	EN61000-4-2, -3, -4, -5, -6, -8, -11. IEEE C62.41 (6kV/30 Ohm, Criteria A)		
Altitude	m	3,000m operating, 12,000m non operating		
Weight	kg	2.95	3.7	
Size (WxHxD) (w/o bus bars)	mm	108 x 121 x 260	143 x 121 x 267	
Warranty	yrs	5		

Notes: (Consult Installation Manual for detailed specifications, test methods and application notes) *Reduced power factor above 63Hz

Outline Drawing LZSA500



Outline Drawing LZSA1000/1500



Connection Diagram LZSA500 Series

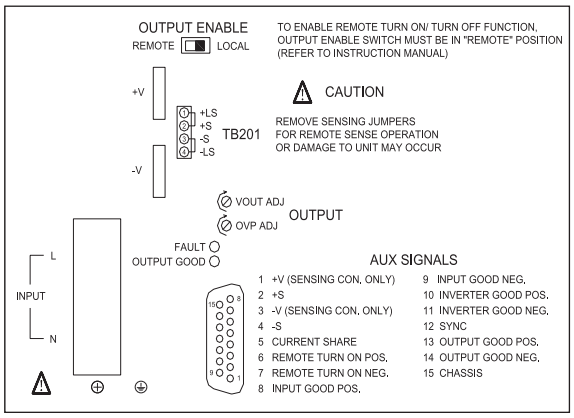
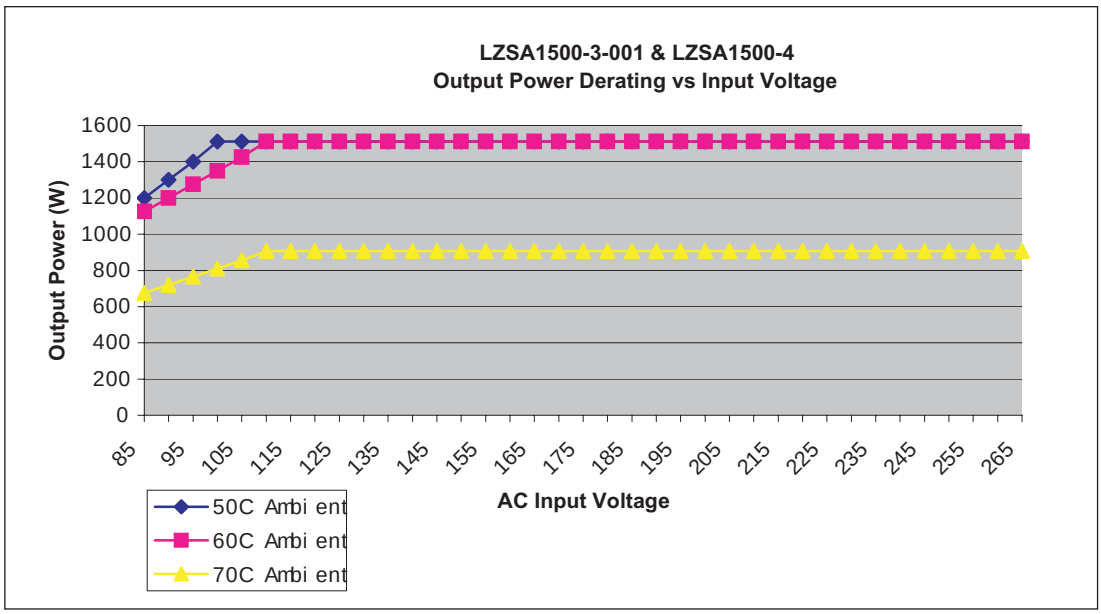


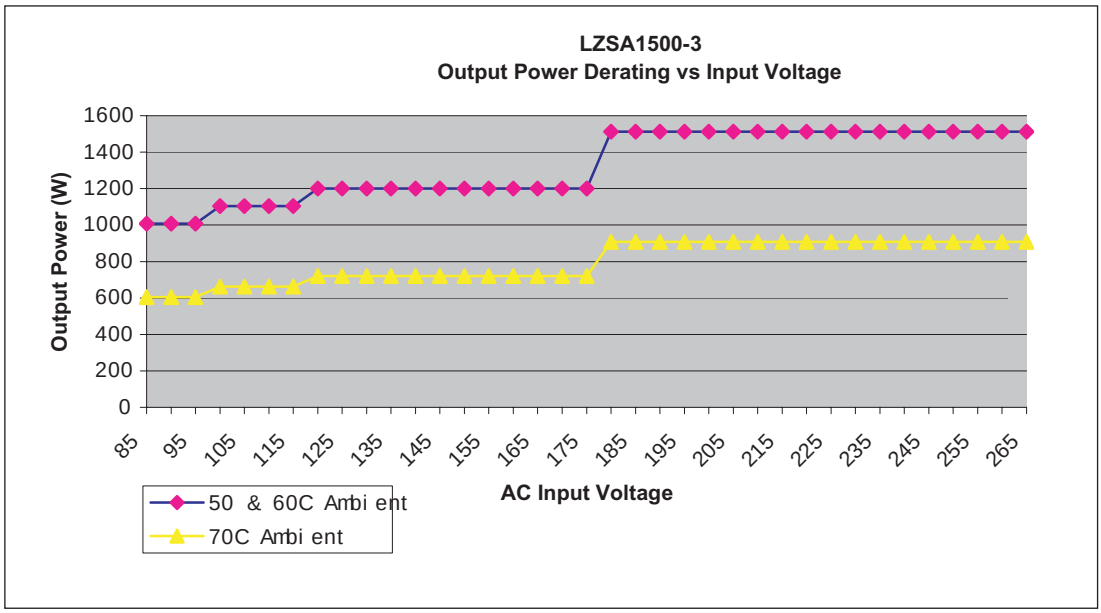
Figure 1 - PIN Assignments for TB201 and chassis mounted "D" connector

Model Selector

Model	Nominal Voltage (V)	Adjustment Range (V)	Maximum Current (A)	Maximum Power (W)
LZSA500-3	24	18 - 29.4	21	504
LZSA1000-2	12	10 - 15.75	84	1008
LZSA1000-3	24	18 - 29.4	42	1008
LZSA1500-3-001	24	18 - 29.4	63	1512(1)
LZSA1500-4	48	36 - 56	31.5	1512(1)

Note (1) 1512W @ 180-265VAC, 1200W @ 120VAC, 1104W @ 100 VAC, 1008W @ 85VAC





- 26mm height
- 3 year Warranty
- Peak Load capable
- Light weight
- Output 1 isolated from outputs 2 & 3

Key Market Segments & Applications

Factory Automation
Test & Measurement
Automated Service
Portable Equipment

MTW Series

15W to 60W Low Profile Triple Output Power Supplies

MTW Features and Benefits

Features	Benefits
• Low Profile	• Assists System Integration
• Three Year Warranty	• Low Cost of Ownership
• Output 1 is isolated from outputs 2 & 3	• Outputs V2 & V3 can be connected in series

Specifications

ITEMS / MODELS			MTW15-51212 MTW15-51515	MTW30-51212 MTW30-51515	MTW60-51212 MTW60-51515
Input Voltage Range		V	85 - 265VAC (47 - 440Hz)		
Input Current Typ	(1)	A	0.42 / 0.25	0.8 / 0.4	1.4 / 0.8
Inrush Current	(1)	A	25 / 50	20 / 40	20 / 40
Leakage Current (240VAC, 60Hz)		mA	0.75mA Max		
Max Output Power		W	16 17.5	30 33	60 62.5
Efficiency (Typ)		%	71	76	76
Hold Up Time	(1)	ms	20 / 150	20 / 140	10 / 20
Output Voltage Adjustment		-	Fixed		
Overcurrent Protection		-	Yes, automatic recovery. Hiccup style on MTW30 & 60		
Overvoltage Protection		V	V1: Zener Clamp	V1: Zener Clamp	V1 & V2: Zener Clamp
Operating Temperature		-	-20°C start up. -10°C to +60°C, derating linearily to 70% load above 50°C		
Storage Temperature		-	-30°C to +75°C		
Humidity (Non condensing)		-	10 - 90%RH (Operating & storage) at 35°C		
Cooling		-	Convection		
Withstand Voltage		-	Input to ground 2kVAC, Input to output 3kVAC, Output to ground 500VAC		
Vibration (non operating)		-	5 - 10Hz: 10mm amplitude, 10 - 200Hz: 2G (19.6m/s^2)10m sweep time, 3 axis, 1 hour each		
Shock		-	Acceleration: 60G (588m/s^2) Half sine wave, 6 - 16ms pulse duration, 3x each direction		
Safety Agency Approvals		-	UL60950-1, CSA C22.2 No 60950-1 (C-UL), EN60950-1		
Immunity		-	EN61000-4-2 (Lv 4), -3, -4 (Lv 3), -5 (Lv 4), -6 (Lv 3), -8 (Lv 4), -11		
Conducted EMI		-	FCC-Class B, EN55011-B, EN55022-B		
Weight (Typ)		g	150	210	330
Size (WxHxL)		mm	50 x 26 x 127	65 x 26 x 140	83 x 26 x 185
Warranty		yrs	3		

Notes:
(1) 100/240VAC

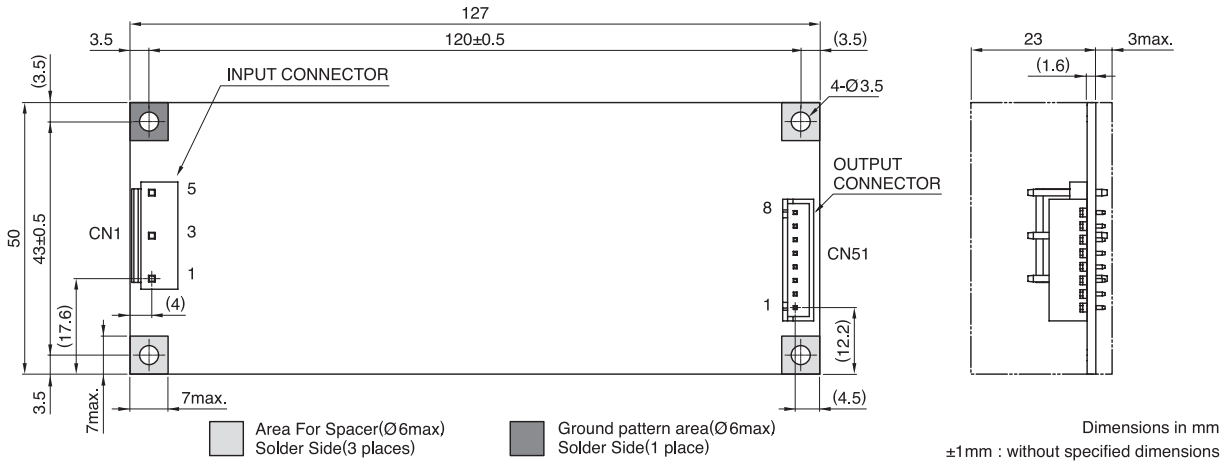
Model Selector

Model	Output	Voltage (V)	Regulation	Minimum Current (A)	Maximum Current (A)	Peak Current (A)	Ripple & Noise (mV)
MTW15-51212	V1	5V	4.75 - 5.25V	0	2.0	3.0	120
	V2	12V	11.4 - 12.6V	0	0.3	0.6	150
	V3	-12V	11.4 - 12.6V	0	0.2	0.3	150
MTW15-51515	V1	5V	4.75 - 5.25V	0	2.0	3.0	120
	V2	15V	14.4 - 15.6V	0	0.3	0.6	150
	V3	-15V	14.4 - 15.6V	0	0.2	0.3	150
MTW30-51212	V1	5V	4.9 - 5.3V	0	3	4.5	120
	V2	12V	11.4 - 12.6V	0	1.2	2.0	150
	V3	-12V	11.4 - 12.6V	0	0.3	0.45	150
MTW30-51515	V1	5V	4.9 - 5.3V	0	3	4.5	120
	V2	15V	14.25 - 15.75V	0	0.8	2.0	150
	V3	-15V	14.25 - 15.75V	0	0.3	0.45	150
MTW60-51212	V1	5V	4.9 - 5.3V	0	5.0	7.0	120
	V2	12V	11.4 - 12.6V	0	2.5	3.5	150
	V3	-12V	11.4 - 12.6V	0	0.5	0.7	150
MTW60-1515	V1	5V	4.9 - 5.3V	0	5.0	7.0	120
	V2	15V	14.25 - 15.75V	0	2.0	3.5	150
	V3	-15V	14.25 - 15.75V	0	0.5	0.7	150

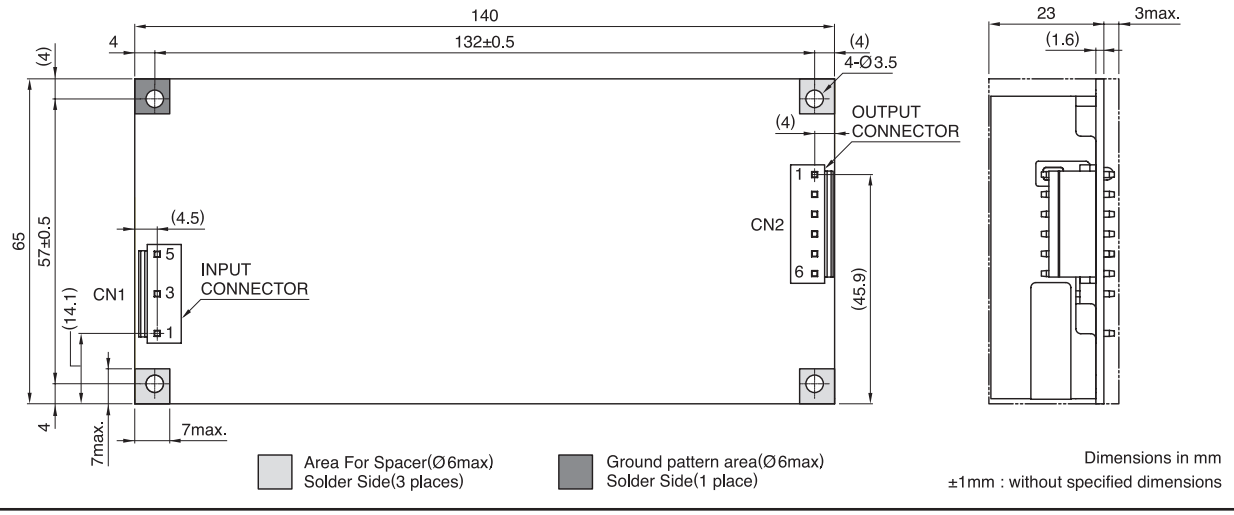
Mating Connectors

	Model	Input	Output
Connectors	MTW15	B3P5-VH-B	B8B-XH-2
JST	MTW30	B3P5-VH-B	B6P-VH-B
	MTW60	B3P5-VH-B	B8P-VH-B

Outline Drawing MTW15 Series



Outline Drawing MTW30 Series



Medical Industrial Test Broadcast Comms Renewable

Up to 1200W, Single Output, Medical and Industrial Power supply

Features	Benefits
• BF ready medical isolation (MOPP)	Eases design into systems (including BF)
• Low speed, low audible noise fan	Enhanced patient / user experience
• PMBus™ communication option	Remote monitoring and control
• 7 year warranty	Low cost of ownership

Multiple output units available, see TDK-Lambda's QM Series

Standard models. Select the order code from the table below according to the required output voltage and options.

Base Unit	Voltage	Adjustment range	Max Current	Max Output power	Ripple and noise 0-70°C >5%load	Ripple and noise 0-70°C ≤5%load	Ripple and noise -20-0°C >5%load	Ripple and noise -20-0°C ≤5%load	Load regulation	Max capacitive load	Transient response deviation[a]	Transient response recovery[b]
QS4-600-12	12	12-13.2V	50A	600W	4%	1%	4%	2%	<1%	1000µF/A	<5%	1ms
QS4-600-24	24	24-26.4V	25A	600W	4%	1%	4%	2%	<1%	750µF/A	<5%	1ms
QS4-600-48	48	48-52.8V	12.5A	600W	4%	1%	4%	2%	<1%	250µF/A	<5%	1ms
QS5-600-12	12	12-13.2V	50A	600W	4%	1%	4%	2%	<1%	1000µF/A	<5%	1ms
QS5-600-24	24	24-26.4V	25A	600W	4%	1%	4%	2%	<1%	750µF/A	<5%	1ms
QS5-600-48	48	48-52.8V	12.5A	600W	4%	1%	4%	2%	<1%	250µF/A	<5%	1ms
QS5H-1080-12	12	12-12.8V	90A	1080W	4%	1%	4%	2%	<3.5%	1000µF/A	<5%	30ms
QS5H-1200-24	24	24-26.4V	50A	1200W	4%	1%	4%	2%	<1%	650µF/A	<5%	1ms
QS5H-1200-48	48	48-52.8V	25A	1200W	4%	1%	4%	2%	<1%	500µF/A	<5%	1ms
QS7-1080-12	12	12-12.8V	90A	1080W	4%	1%	4%	2%	<3.5%	1000µF/A	<5%	30ms
QS7-1200-24	24	24-26.4V	50A	1200W	4%	1%	4%	2%	<1%	650µF/A	<5%	1ms
QS7-1200-48	48	48-52.8V	25A	1200W	4%	1%	4%	2%	<1%	500µF/A	<5%	1ms

a - Transient deviation as a percentage of set voltage for 50% load change above 25% load.
b - For recovery to 1% of set voltage

Order codes for standard models. See Standby/Signals section for details. Additional variants available - contact sales for details

Base unit		5V / 2A standby			5V / 0.25A standby	
	No standby	PMBus™ (-P5H)	Inhibit (-T5H)	Enable (-E5H)	Inhibit (-T5L)	Enable (-E5L)
QS4-600-12	QS400011	QS40002K	QS400034	QS40004N	QS400057	QS40006S
QS4-600-24	QS40007B	QS40008W	QS40009F	QS4000BD	QS4000CY	QS4000DH
QS4-600-48	QS4000FL	QS4000G5	QS4000HP	QS4000JT	QS4000KC	QS4000LX
QS5-600-12	QS5000VR	QS5000YW	QS50012N	QS50015M	QS50018X	QS5001C7
QS5-600-24	QS5000WP	QS50010M	QS50013N	QS50016P	QS50019R	QS5001D2
QS5-600-48	QS5000XN	QS50011G	QS50014G	QS50017F	QS5001B4	QS5001F8
QS5H-1080-12	QS50001M	QS5000GX	QS5000K7	QS50008F	QS5000ND	QS5000CX
QS5H-1200-24	QS50002N	QS5000HM	QS5000L6	QS50009G	QS5000PG	QS5000DY
QS5H-1200-48	QS500047	QS5000JP	QS5000M5	QS5000BW	QS5000RF	QS5000FY
QS7-1080-12	QS70001G	QS70008D	QS7000C5	QS7000GW	QS7000KY	QS7000NR
QS7-1200-24	QS700029	QS70009B	QS7000DL	QS7000HV	QS7000LS	QS7000PP
QS7-1200-48	QS70004B	QS7000BK	QS7000FM	QS7000JT	QS7000M0	QS7000RN

Input		
Input voltage	90-264Vac. QS5H limited to 700W output power below 180Vac input, QS4 limited to 550W below 180Vac input.	
Frequency	47 - 63 Hz (440Hz with reduced PFC)	
Input fuses	25A (QS5 = 16A) / 250Vac, HBC Fast acting (not user accessible) in both Live and Neutral lines (single fusing optional)	
Inrush current	QS5 & QS5H <40A, QS7 <45A	at 25°C and 264Vac (cold start)
Leakage current	<300µA	
Touch current	<100µA	
Power factor	> 0.95 (at 230Vac, 100% load)	

Isolation		
Input to output / signals	Reinforced	2 x MOPPs (3rd edition 60601) 4kVac, 5.7kVdc type tested to 4kVac (equivalent to 5.7kVdc), production tested to 4.3kVdc.
Input to earth	Basic	1 x MOPP, 1.5kVac
Output / signals to earth	Basic	1 x MOPP, 1.5kVac
Output / signals to output / signals	Basic	200Vdc

Output Specification	QS4/5/5H	QS7	
Turn on time	2s max		at 90Vac and 100% rated output power
Efficiency	up to 91%		240Vac & above 50% rated power, configuration dependent
Minimum hold up	10ms	20ms	at maximum output power.
Standard signals	Output good, output inhibit		
Rise time	<75ms		(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%		Load type dependent
Voltage setting accuracy	<1%		of set voltage
Remote sense	Yes		0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W		
Temperature coefficient	0.016%		of rated voltage per °C
Line regulation	<0.1%		for 90-264Vac input change
Over voltage protection	Yes		Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup		Auto recovers
Short circuit protection	Yes		Indefinitely protected
Over temperature protection	Yes		Primary side protection shuts down main output and fan, auto restarts. Secondary side protection shuts down main output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

Environment	
Temperature	-20°C to 70°C operational, -40°C to 70°C storage (max 12 months).
Derating	50°C to 70°C derate total output power and each output current by 2.5% per °C Additionally, the 0.25A standby supply provided with the E5H, E12H, T5H and T12H options derates by 2.4% per °C from 25°C to 50°C when the unit is inhibited (fan not running)
Low temperature startup	-40°C
Humidity	5 - 95% RH non condensing
Shock	±3 x 20g shocks in each plane, total 18 shocks (11ms (+/-0.5msec), half sine) Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987. Conforms to MIL-STD-810G, Method 516.6, Pro IV
Vibration	Single axis 10 - 500 Hz at 2g (sweep and endurance at resonance) in all 3 planes Conforms to EN60068-2-6, IEC68-2-6 Conforms to MIL-STD-810G, Method 514.6, Pro I
Altitude	5000 metres operational, 5000 metres storage/transportation
Pollution	Degree 2, Material group IIIb
IP Rating	IPX0

Immunity EN61000-6-2:2005, EN60601-1-2:2015 - see application notes for best installation practice				Criteria
Electrostatic discharge	EN61000-4-2	Level 4	F type cooling only	A
Electromagnetic field	EN61000-4-3	Level 3	Proximity fields, EN60601-1-2, Levels as defined in standard, Criteria A	A
Fast / burst transient	EN61000-4-4	Level 4	Tested at 5kHz and 100kHz	A
Surge immunity	EN61000-4-5	Level 3		A
Conducted RF immunity	EN61000-4-6	Level 3		A
Power frequency magnetic field	EN61000-4-8	Level 4		A
Voltage dips, variations, interruptions	EN61000-4-11	Class 3	Criteria B for 5s and 1 cycle interruptions	A
Voltage sags	Semi F-47	compliant	above 180Vac input	
Ring wave	EN61000-4-12	Level 3		A
	ANSI C62.41	Level 2		A
Voltage fluctuations	EN61000-4-14	Class 3	See EMC report for full details.	A

Emissions EN61000-6-3:2007, EN60601-1-2:2015 - see application notes for best installation practice		
Radiated electric field	EN55011, EN55032	(as per CISPR.11/32) Class B, FCC47 part 15 subpart B - 'L' leakage current variants (Units with 'R' type leakage current option achieve Class A)
Conducted emissions	EN55011, EN55032	(as per CISPR.11/32) Class B, FCC47 part 15 subpart B - 'L' leakage current variants (Units with 'R' type leakage current option achieve Class A)
Conducted harmonics	EN61000-3-2	Class A and Class C
Flicker	EN61000-3-3	Compliant - d_{max} only

Approvals / Accreditations	
IEC/EN 62368-1, UL62368-1 / CSA 22.2 No 62368-1	File E135494
IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1	File E135494
IEC/EN 60601-1, UL/CSA 60601-1, ANSI/AAMI ES60601-1, CAN/CSA-C22.2 No 60601-1	File E349607
IEC/EN 61010-1	Results included in 60950 report
CE Mark (EN62368-1)	Low Voltage Directive (LVD), electromagnetic compatibility (EMC) and Restriction of Hazardous Substances (RoHS)
CB certificate and Report available on request	
Designed and manufactured under the control of ISO9001 and ISO13485 (including risk management).	

Other variants (input connection, cooling, etc)

The standard models listed are supplied with 'F' cooling, Screw terminal inputs and outputs, dual ac fuses and 300µA earth leakage current. Other options are possible by selecting from the table below.

QS7-	1200-	24		-T5H	

Unit options blank for all defaults or all of

-Cooling -F	Input S	Fuse D	Leakage L

Case size	QS4	
	QS5	
	QS5H	
	QS7	
Output power	600	
	1080	
	1200	
Output voltage	12	
	24	
	48	
Output Connection	blank	Screw

Standby / Signals	blank	none
	-E5L	5V / 250mA, Enable
	-E5H	5V / 2A, 5V / 250mA, Enable
	-T5L	5V / 250mA, Inhibit
	-T5H	5V / 2A, 5V / 250mA, Inhibit
	-P5H	5V / 2A, see PMBus™ app note
see specification page for details		

Cooling	F	Variable speed Forward air
Input Connection	S	Screw (default)
	I	IEC320 (QS5 and QS5H only)
Input fuse	D	Dual AC fuses
Leakage Current (max at 264Vac, 63Hz)	L	300µA

Contact TDK-Lambda to validate configuration and issue a part number.

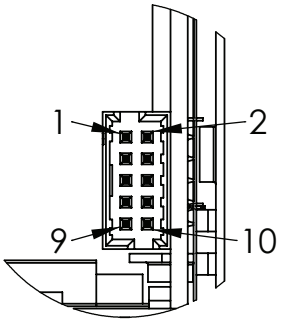
Standby / Signals

Maximum power per channel	See table below
Available signals (Exx or Txx type)	PSU inhibit (Txx type) or enable (Exx type), AC Good
Available signals (Pxx type)	PMBus™ control of power supply fan speed and fail warning Serial number, date of manufacture, run time, on/off power cycles For further details, see the product range application notes, PMBus™ section
Additional Leakage Current (max at 264Vac, 63Hz)	xxL = 13.1µA, xxH = 15µA Must also add the leakage current from modules and selected filter option.

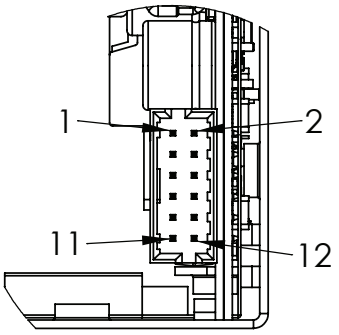
Available Output Voltages (at PSU signal connector)

Option type	Standby 1			Standby 2			PSU on/off
	V	Max Current	Power	V	Max Current	Power	
E5L	5V	250mA	1.25W	not available			Enable
E5H	5V	250mA	1.25W	5V	2A	10W	Enable
T5L	5V	250mA	1.25W	not available			Inhibit
T5H	5V	250mA	1.25W	5V	2A	10W	Inhibit
P5H	5V	2A	10W	not available			see PMBus™ application note

Txx or Exx option		
Pin	5L	5H
1	Do not connect	Standby 2 +
2		Standby 2 -
3	Standby 1 +	Standby 1 +
4	Standby 1 -	Standby 1 -
5	PSU on/off+	PSU on/off+
6	PSU on/off-	PSU on/off-
7	AC fail Out	AC fail Out
8	AC fail Rtn	AC fail Rtn
9	Do not connect	
10		



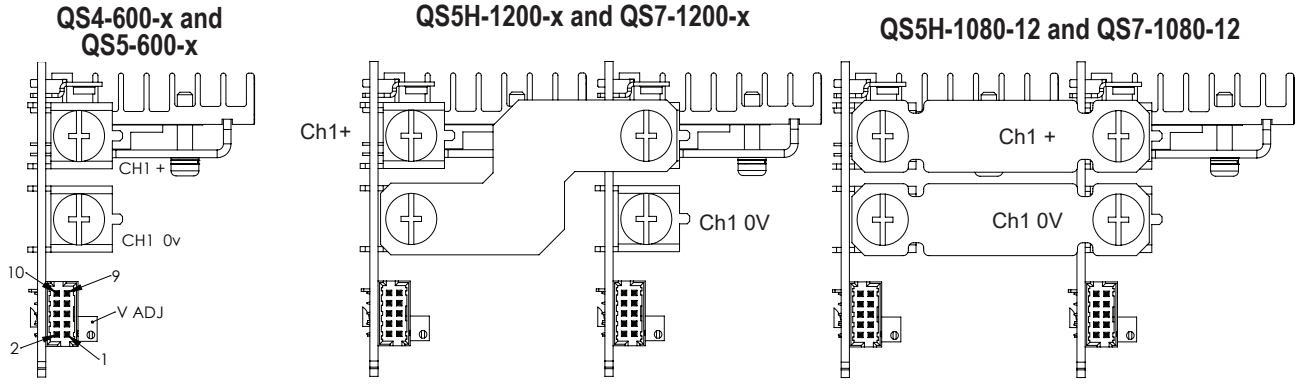
Pin	P5H option
1	Standby +
2	Standby -
3	Do not connect
4	Fan fail
5	Address 0
6	Address 1
7	Address 2
8	Address 3
9	SCL - Clock
10	SDA - Data
11	Control line in
12	GND



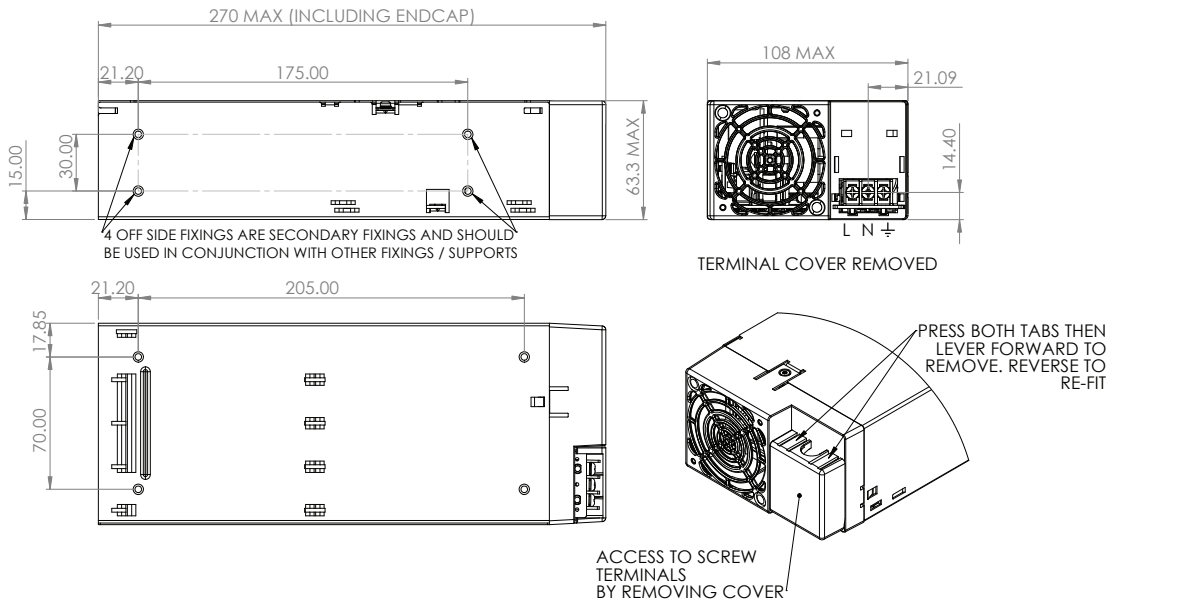
Output Specification

	Standby 1	Standby 2	
Rise time	<30ms		(with resistive load) to 90% of voltage, monotonic rise above 10%
Ripple and noise	<1%		pk-pk, using 20MHz bandwidth
Voltage setting accuracy	<3%		of set voltage
Remote sense	No		
Minimum load	0W		on any output
Temperature coefficient	0.02%		of rated voltage per °C
Load regulation	<1.5%	<1%	for 0-100% load change
Line regulation	<0.1%		for 90-264Vac input change
Cross regulation	<0.4%		for 100% load change on any output
Transient deviation	<5%		of set voltage for 25-50% load change
Recovery	1ms		for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes		Latching, output shuts down, cycle ac to reset
Over current protection	Constant Current		Auto recovers
Short circuit protection	Constant Current		Auto recovers

Output connections



See application notes for signal connection details



Customer Fixings.
8 holes M4.
Max thread penetration:- 4.5mm

QS4 Units with factory fitted fan ('F' or 'R' type cooling)

- 1U high
- Optional Internal ORing Diodes
- Current Share

RFE Series

1000W 1U Front End Power Supplies

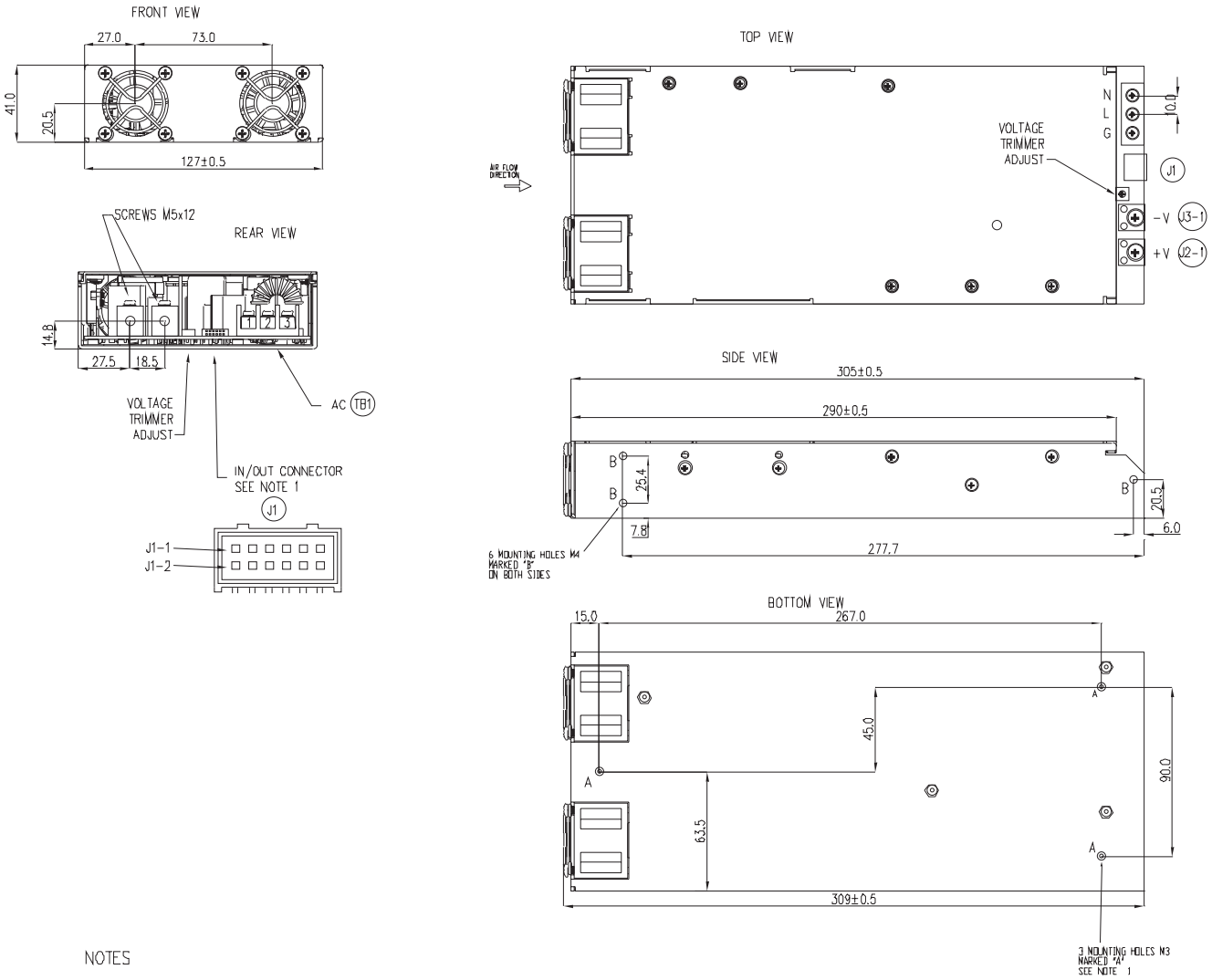
RFE Features and Benefits

Features	Benefits
1U high	Utilizes less system space
Internal ORing diode option	Suitable for N+1 redundancy
Current Share	Can be paralleled for higher power
Full array of signals	Easier system monitoring

Specifications

ITEMS / MODEL		RFE1000-24	RFE1000-32	RFE1000-48
Nominal Output Voltage	V	24V	32V	48V
Output Voltage Range (front panel)	V	21.5 - 29V	28.8 - 38.4V	43 - 58V
Output Current	A	40A	31A	21A
Output Power	W	960W	992W	1008W
Line Regulation	mV	96mV	128mV	192mV
Load Regulation	mV	192mV	256mV	384mV
Output Noise	mV	200mV	250mV	300mV
Overvoltage Protection (Latching)	V	31 to 34V	41.5 to 45.5V	62 to 66V
Overcurrent Protection	%	105 - 125%, Non foldback type		
Overtemperature	-	Yes, automatic reset		
Series Operation	-	Up to 3 units may be connected in series		
Current share	-	Single wire current sharing, up to 8 units		
Remote Sense	-	Compenstates for up to 1V on each load wire		
Signals (opto isolated)	-	DC OK, AC Fail, and Overtemperature warning, high on fail		
Remote On/Off	-	On: 0 - 0.6V or short, Off: 2- 15V or open		
Auxiliary Output	-	12V 0.25A bias voltage, (11.2 to 12.5V). Built in ORing diode		
AC Input Range	-	85 - 265VAC, 47 - 63Hz		
AC Input Current (100/200VAC)	A	12 / 6A		
Leakage Current	mA	<1.1mA at 230VAC input		
Inrush Current	A	<40A		
Hold up time (100VAC input)	ms	20ms typical		
Efficiency (typical) 100/200VAC	%	86 / 88%	86 /88%	87 / 89%
Power factor Correction	-	EN61000-3-2 class A (20-100% load), >0.98 at full load		
Immunity	-	EN61000-4-2, -3, -4, -5, -6, -11		
EMC (conducted and radiated)	-	EN55022, level B, FCC part 15J-B		
Operating Temperature	-	0°C to +70°C, derate 2%/°C from 50°C to 60°C, 2.5%/°C from 60°C to 70°C		
Storage Temperature	°C	-30°C to +85°C		
Withstand Voltage	-	Input to Output 3kVAC, Input to Ground 2kVAC, Output to Ground 500VAC for 1 min.		
Isolation Resistance	-	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC		
Cooling	-	Two variable speed internal fans, airflow exits across input/output		
Humidity	-	Operating: 10 - 90% RH, Storage: 10 - 95% RH (non condensing)		
Shock & Vibration	-	Meets ETS 300 019		
Safety Agency	-	UL60950-1, EN60950-1, CE Mark		
Input / Output Connector	-	Input: Screw terminals, Output: M5x12 screws, Signals: Mating connector JST PHDR-12VS		
Output indicator	-	Green LED DC OK		
Size (L x W x H)	mm	305 x 127 x 41		
Weight	g	2000		
Warranty	yrs	2		

Outline Drawing RFE Series



NOTES

1. CONNECTOR TYPE: S12B-PHDSS (JST)
   FEMALE CONNECTOR TYPE: PHDR-12VS (JST)
2. LED INDICATORS REFER TO INSTRUCTION MANUAL.
3. MOUNTING SCREWS MUST NOT PENETRATE MORE THAN 3mm INTO THE UNIT.
4. MODEL NAME ,INPUT AND OUTPUT RATING AND SAFETY APPROVALS SYMBOLS ARE DESCRIBED ON TOP SURFACE LABEL.
5. ALLOW MINIMUM 50 mm OF UNRESTRICTED AIR SPACE AT THE REAR OF UNIT. DO NOT OBSTRUCT AIR FLOW TO THE UNIT FRONT PANEL.
6. IN OUT CONNECTOR BACK VIEW AND PINS ASSIGNMENT:

Options

Suffix	Description
–Y	O Ring output diode

PIN.No.	FUNCTION
J1-3	+V
J1-10	-V
J1-6	ON/OFF
J1-1	+SENSE
J1-7	CURRENT SHARE
J1-9	CURRENT SHARE

PIN.No.	FUNCTION
J1-5	DC_OK
J1-11	SIGNAL_RTN
J1-12	AC_FAIL
J1-8	TEMP_ALARM
J1-2	-SENSE
J1-4	+12V AUX

PIN.No.	FUNCTION
TB1-1	AC GROUND
TB1-2	AC LINE
TB1-3	AC NEUTRAL

Industrial Test Comm

1600W 1U Front End Power Supplies

Features	Benefits
• 1U High	• Utilizes less system space
• Internal ORing FETs & Current Share	• Suitable for N+1 redundancy
• High Efficiency	• Easier system cooling
• I2C, PMBus™ Communication Option	• Easier system monitoring

Specification

Model		RFE1600
Input Voltage Range	VAC	85 - 265VAC, 47 - 63Hz. See model selector for power derating(2)
Input Current (Max) 100/230VAC	A	14.2 / 8.1A
Inrush Current	A	<35A
Power Factor Correction	-	Meets EN61000-3-2, PF > 0.98 at full load
Temperature Coefficient	%/°C	<0.02%/°C
Overcurrent Protection	%	105 - 115% (Programmable)
Overvoltage Protection	%	110% (Tracking). Cycle AC to reset or utilize Remote On/Off(1)
Overtemperature Protection	-	Shutdown with automatic reset. Warning signal provided(1)
Hold up time	ms	>10ms, 100/230VAC Input, 80% loading
Leakage Current	mA	< 0.75 / 1.5mA, 100 / 230VAC, 60Hz
Remote Sense Compensation	-	RFE1600-12: 0.25V / Wire, RFE1600-24: 0.5V / Wire, RFE1600-32: 0.75V / Wire, RFE1600-48: 1.0V / Wire
Indicators	-	AC OK: Green LED, DC OK / Fail: Green / Red LED
Remote On/Off	-	Yes, inhibit & enable
Parallel Operation	-	Yes, single wire current share, 5% accuracy of max current, up to 10 units
AC Fail Signal	-	Open Collector, ON when AC is within 85 - 270VAC
DC Good Signal	-	Open Collector, ON when output is above 85 to 95% of setpoint (tracking)
Remote Adjust	-	By either external 0 - 5V signal or 1k potentiometer(1)
I²C Interface	-	Isolated from output, Add suffix /S, PMBus™ compatible(1)
Auxiliary Output	-	11.2 - 12.5V, 0.5A, 240mV ripple and noise
Operating Temperature	°C	-10 to +70°C, derate 2%/°C from 50 to 60°C, 2.5%/°C from 60 to 70°C
Storage Temperature	°C	-30 to +85°C
Humidity (Non condensing)	%RH	Operating: 10 - 90%RH, Storage: 10 - 95%RH
Cooling	-	Two variable speed internal fans, airflow exits across input/output connector
Withstand Voltage	-	Input to Output 3kVAC, Input to Output 2kVAC, Output to Ground: RFE1600-12, -24V 500VAC, RFE1600-48 1.5kVAC
Isolation Resistance	MΩ	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC
Vibration (Basic transportation)	-	MIL-810F, method 514.5
Shock (Basic transportation)	G	30G
Safety Agency Certifications	-	UL60950-1, EN60950-1 (2nd Edition), CE Mark
Conducted and Radiated EMI	-	EN55022 & FCC part 15; Conducted class B, Radiated class A
Immunity	-	IEC61000-4-2 (lv 2,3), -3 (lv 2), -4 (lv2), -5 (lv3,4), -6 (lv2), -8 (lv 4), -11
Size (W x H x D)	mm	Power Supply: 85.1 x 40.9 x 320
Weight	g	1550
Warranty	yrs	3

Notes: (1) See installation manual for detailed specifications & test methods (2) Derate linearly 1%/V from 100VAC to 85VAC input

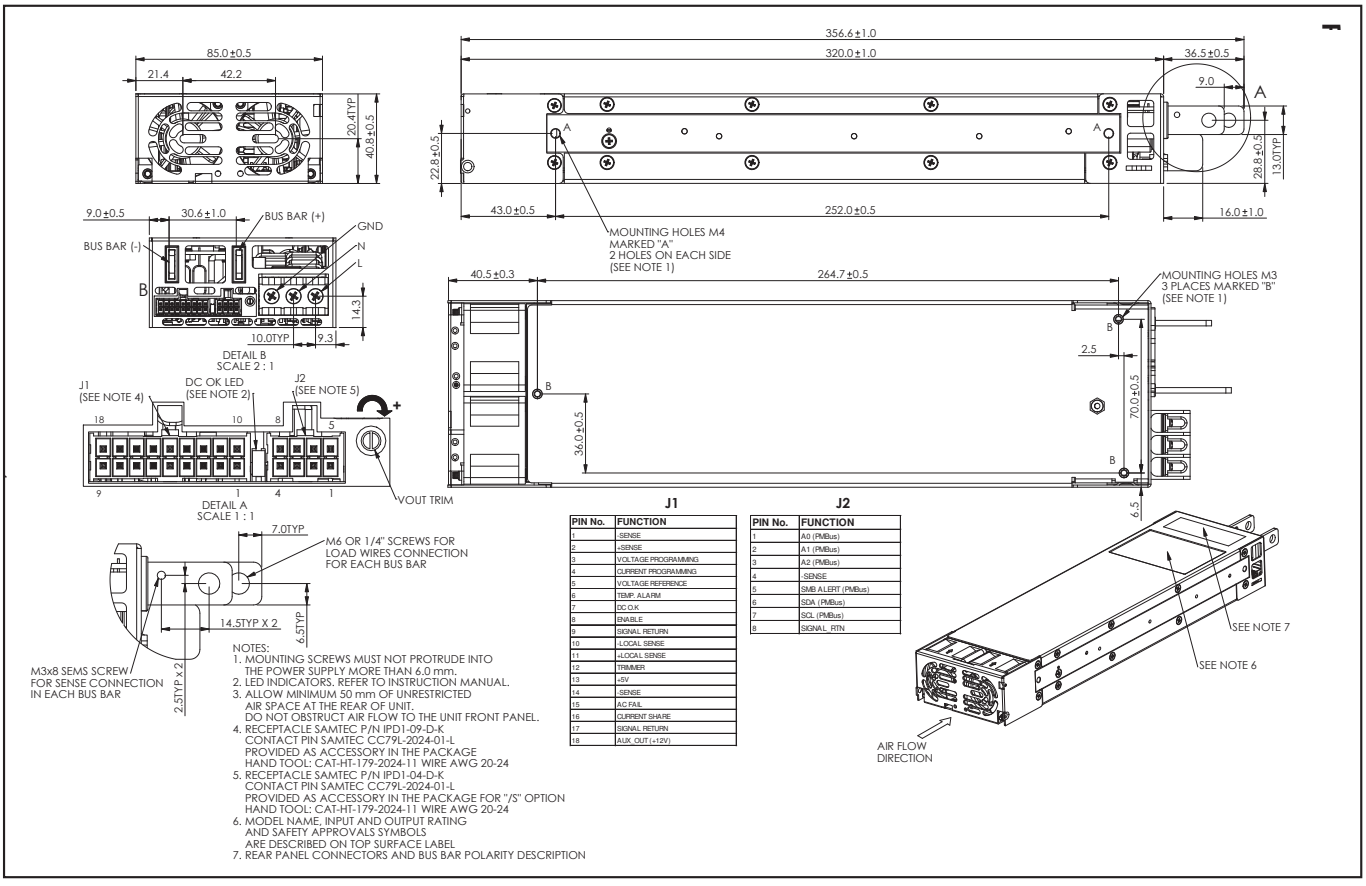
Model Selector

Model	Output Voltage	Adjust. Range(1)	Max Current (Vin>170VAC)	Max Power (Vin>170VAC)	Max Current (100<Vin<170VAC)	Max Power (100<Vin<170VAC)
RFE1600-12	12V	9.6 - 13.2V	133A	1596W	100A	1200W
RFE1600-12/S	12V	9.6 - 13.2V	133A	1596W	100A	1200W
RFE1600-24	24V	19.2 - 29V	67A	1608W	50A	1200W
RFE1600-24/S	24V	19.2 - 29V	67A	1608W	50A	1200W
RFE1600-32	32V	25.6 - 38.4V	47A	1504W	37.5A	1200W
RFE1600-32/S	32V	25.6 - 38.4V	47A	1504W	37.5A	1200W
RFE1600-48	48V	38.4 - 58V	33A	1584W	25A	1200W
RFE1600-48/S	48V	38.4 - 58V	33A	1584W	25A	1200W

Model	Load Reg	Line Reg	Ripple & Noise	Efficiency (1)	I^2C
RFE1600-12	60mV	30mV	240mV	87 / 90%	-
RFE1600-12/S	60mV	30mV	240mV	87 / 90%	Yes
RFE1600-24	120mV	60mV	240mV	88 / 90%	-
RFE1600-24/S	120mV	60mV	240mV	88 / 90%	Yes
RFE1600-32	160mV	80mV	320mV	88 / 90%	-
RFE1600-32/S	160mV	80mV	320mV	88 / 90%	Yes
RFE1600-48	240mV	120mV	480mV	89 / 92%	-
RFE1600-48/S	240mV	120mV	480mV	89 / 92%	Yes

Notes: (1) At 75% load, 100/230 VAC input

Outline Drawing RFE1600 Series



J1

PIN No.	FUNCTION
1	-SENSE
2	+SENSE
3	VOLTAGE PROGRAMMING
4	CURRENT PROGRAMMING
5	VOLTAGE REFERENCE
6	TEMP. ALARM
7	DC O.K.
8	ENABLE
9	SIGNAL RETURN
10	-LOCAL SENSE
11	+LOCAL SENSE
12	TRIMMER
13	+5V
14	-SENSE
15	AC FAIL
16	CURRENT SHARE
17	SIGNAL RETURN
18	AUX_OUT (+12V)

J2

PIN No.	FUNCTION
1	A0 (PMBus)
2	A1 (PMBus)
3	A2 (PMBus)
4	-SENSE
5	SMB ALERT (PMBus)
6	SDA (PMBus)
7	SCL (PMBus)
8	SIGNAL_RTN

NOTES:
1. MOUNTING SCREWS MUST NOT PROTRUDE INTO THE POWER SUPPLY MORE THAN 6.0 mm.
2. LED INDICATORS. REFER TO INSTRUCTION MANUAL.
3. ALLOW MINIMUM 50 mm OF UNRESTRICTED AIR SPACE AT THE REAR OF UNIT. DO NOT OBSTRUCT AIR FLOW TO THE UNIT FRONT PANEL.
4. RECEPTACLE SAMTEC P/N IPD1-09-D-K CONTACT PIN SAMTEC CC79L-2024-01-L PROVIDED AS ACCESSORY IN THE PACKAGE HAND TOOL: CAT-HT-179-2024-11 WIRE AWG 20-24
5. RECEPTACLE SAMTEC P/N IPD1-04-D-K CONTACT PIN SAMTEC CC79L-2024-01-L PROVIDED AS ACCESSORY IN THE PACKAGE FOR "/S" OPTION HAND TOOL: CAT-HT-179-2024-11 WIRE AWG 20-24
6. MODEL NAME, INPUT AND OUTPUT RATING AND SAFETY APPROVALS SYMBOLS ARE DESCRIBED ON TOP SURFACE LABEL
7. REAR PANEL CONNECTORS AND BUS BAR POLARITY DESCRIPTION

Industrial Test Comm

2500W 1U Power Supplies

Features	Benefits
• 1U High	• Utilizes less system space
• Internal ORing FETs & Current Share	• Suitable for N+1 redundancy
• High Efficiency	• Easier system cooling
• I2C, PMBus™ Communication Option	• Easier system monitoring

Specification

Model		RFE2500
Input Voltage Range (2)	VAC	85 - 265VAC, 47 - 63Hz. See model selector for power derating
Input Current (Max) 115/230VAC	A	15 / 12A
Inrush Current	A	<50A
Power Factor Correction	-	Meets EN61000-3-2, PF > 0.98 at full load
Temperature Coefficient	%/°C	<0.02%/°C
Overcurrent Protection	%	115VAC: >110%; 230VAC: 105 - 120%
Overvoltage Protection (1)	%	110% (Tracking). Cycle AC to reset or utilize Remote On/Off
Overtemperature Protection (1)	-	Shutdown with automatic reset. Warning signal provided
Hold up time	ms	>10ms, 100/230VAC Input, 80% loading
Leakage Current	mA	< 0.8 / 1.6mA, 115 / 230VAC, 60Hz
Remote Sense Compensation	-	12V: 0.25V/wire; 24V: 0.5V/wire; 48V: 1V/wire
Indicators	-	AC OK: Green LED, DC OK / Fail: Green / Red LED
Remote On/Off	-	Yes, inhibit & enable
Parallel Operation	-	Yes, single wire current share, 5% accuracy of max current, up to 8 units
AC Fail Signal	-	Open Collector, ON when AC is within 85 - 270VAC
DC Good Signal	-	Open Collector, ON when output is above 85 to 95% of setpoint (tracking)
Remote Adjust (1)	-	By either external 0 - 5V signal or 1k potentiometer
I²C Interface (1)	-	Isolated from output, Add suffix /S, PMBus compatible
Auxiliary Output	-	11.2 - 12.5V, 0.5A, 240mV ripple and noise
Operating Temperature	°C	-10°C to +70°C, derate 2%/°C from 50°C to 60°C, 2.5%/°C from 60°C to 70°C
Storage Temperature	°C	-30°C to +85°C
Humidity (Non condensing)	%RH	Operating: 10 - 90%RH, Storage: 10 - 95%RH
Cooling	-	Two variable speed internal fans, airflow exits across input/output connector
Withstand Voltage	-	Input to Output 3kVAC, Input to Ground 2kVAC, Output to Ground: RFE2500-12, -24V 500VAC, RFE2500-48 2250VAC
Isolation Resistance	MΩ	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC
Vibration (Basic transportation)	-	IEC60068-2-64 (Basic Transportation)
Shock (Basic transportation)	-	IEC60068-2-27 (Basic Transportation 20G)
Safety Agency Certifications	-	UL60950-1, EN60950-1 (2nd Edition), CE Mark
Conducted and Radiated EMI	-	EN55022 & FCC part 15; Conducted class B, Radiated class A
Immunity	-	IEC61000-4-2 (lv 2,3), -3 (lv 2), -4 (lv2), -5 (lv3,4), -6 (lv2), -8 (lv 4), -11
Size (W x H x D) (Excluding busbars)	mm	107 x 41 x 345
Weight	g	2500
Warranty	yrs	3

Notes: **(1)** See installation manual for detailed specifications & test methods **(2)** Derate linearly 1.3%/VAC from 100VAC to 85VAC input

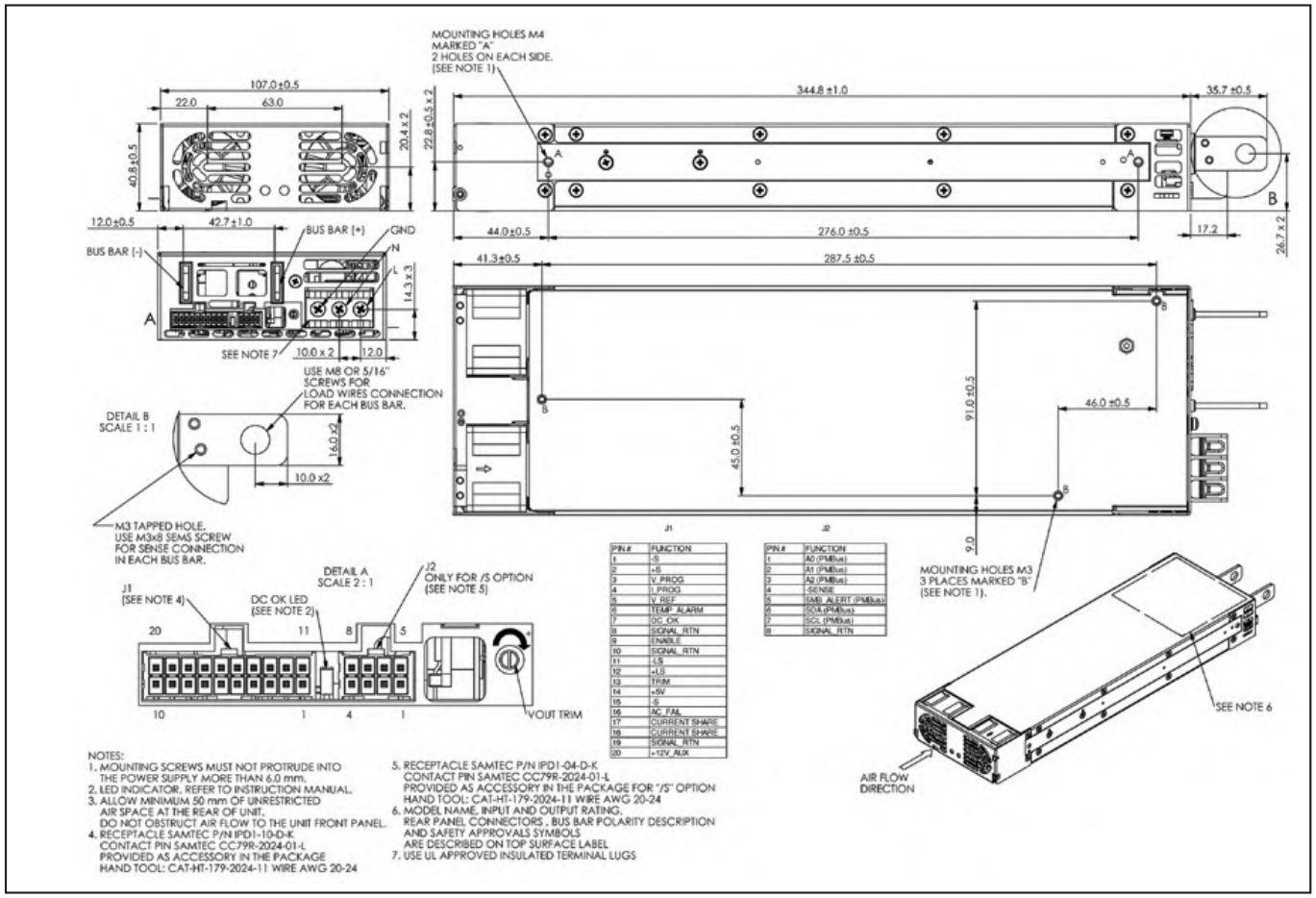
Model Selector

Model	Output Voltage	Adjust. Range(1)	Max Current (Vin>180VAC)	Max Power (Vin>180VAC)	Max Current (100<Vin<170VAC) (2)	Max Power (100<Vin<170VAC) (2)
RFE2500-12	12V	9.6 - 13.2V	200A	2400W	125A	1500W
RFE2500-12/S	12V	9.6 - 13.2V	200A	2400W	125A	1500W
RFE2500-24	24V	19.2 - 29V	96A	2304W	62.5A	1500W
RFE2500-24/S	24V	19.2 - 29V	96A	2304W	62.5A	1500W
RFE2500-48	48V	38.4 - 58V	52A	2496W	31.25A	1500W
RFE2500-48/S	48V	38.4 - 58V	52A	2496W	31.25A	1500W

Model	Load Reg	Line Reg	Ripple & Noise	Efficiency(3)	I²C
RFE2500-12	60mV	30mV	240mV	90 / 92%	-
RFE2500-12/S	60mV	30mV	240mV	90 / 92%	Yes
RFE2500-24	120mV	60mV	240mV	90 / 92%	-
RFE2500-24/S	120mV	60mV	240mV	90 / 92%	Yes
RFE2500-48	240mV	120mV	480mV	91 / 93%	-
RFE2500-48/S	240mV	120mV	480mV	91 / 93%	Yes

Notes: **(1)** See installation manual for detailed specifications & test methods **(2)** Derate linearly 1.3%/VAC from 100VAC to 85VAC input
(3) At 75% load, 115/230VAC input

Outline Drawing RFE2500 Series



- 5 Year Warranty
- Ultra Thin Package
- SEMI F47 Compliant (high line AC)
- Universal Input (85 - 265VAC)
- High Efficiency

Key Market Segments & Applications

Semiconductor Fabrication
Test & Measurement:
LED Signs

RTW Series

Single Output Industrial Power Supplies

RTW Features and Benefits

Features	Benefits
• 5 Year Warranty	• Lower Cost of Ownership
• Ultra Thin Package	• Allows use in small spaces
• Wide range AC Input	• Supports global use

Specifications

ITEMS \ MODELS		50W	100W	150W	300W
AC Input Voltage	-	85 - 265VAC (47 - 440Hz), 150-340VDC			
Input Current (100/200VAC) (Typ)	A	0.7 / 0.4	1.5 / 0.75	1.9 / 1.0	2.0 / 4.0
Inrush Current (100/200VAC)	A	14 / 28			15 / 30
DC Input Voltage	V	120 - 375VDC			150 - 340VDC
Power Factor	-	Meets EN61000-3-2			
Overcurrent Protection	-	Yes, typically 105 - 125% (100 & 150W hiccup style)			
Overvoltage Protection	V	Yes, typically 120-140%. Cycle input to reset			
Hold Up Time (100/200VAC)	ms	>20			
Leakage Current (max at 240VAC)	mA	0.6	0.45	0.65	0.75
Load Regulation	%	0.4% (0-100% load change)			
Line Regulation	%	0.2% (85-132 or 170-265VAC line change)			
Remote Sense	-	Yes			
Current Share	-	No			Yes
Remote On/Off	-	Yes, see instruction manual on website			
DC Fail Signal	-	No			Yes
Indicator	-	Green LED = ON			
Operating Temperature	-	-10°C to +71°C, -20°C start up. See derating curves on sheet 2			
Storage Temperature	°C	-30°C to +75°C			
Humidity (non condensing)	-	10 - 95%RH			
Cooling	-	Convection			
Withstand Voltage	-	Input to Ground 2kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.			
Isolation Resistance	-	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC			
Vibration (non operating)	-	5 - 200Hz (10 min sweep), 19.6m/s^2, 1 hour (Amplitude 10mm)			
Shock (Vertical mounting) (3)	-	196m/s^2		588m/s^2	
Safety Agency Approvals (1)	-	UL60950-1, CSA60950-1 (cUL), EN60950-1, CE Mark			
Line Dip	-	Complies with SEMI F47 (200VAC line only)			
Conducted & Radiated EMI	-	EN55011 / EN55022-B, FCC-B			
Immunity	-	IEC61000-4-2 (Level 4), -3, -4 (Level 3), -5 (Level 4)			
Weight (Typ)	g	290	450	600	1300
Size (WxHxD)	mm	22 x 82 x 124	25 x 82 x 160	30 x 92 x 180	40 x 120 x 250
Warranty	yrs	5			

Notes: (1) Consult Sales Office for use under DC Input conditions (2) 100/200VAC (3) Non operating, 11 ±5ms, 3 directions, 3 times each.

Model Selector

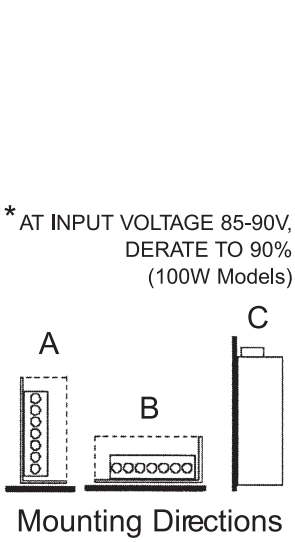
Model	Voltage (V)	Adjustment Range	Max Current (A)	Max Power (W)	Ripple/Noise (mV)	Efficiency (typ)%[2]	Pack Size
RTW03-12R	3.3V	2.6 - 4.0	12.5	41.2	120	75 / 77	50W
RTW03-25R	3.3V	2.6 - 4.0	25	82.5	120	79 / 81	100W
RTW03-35R	3.3V	2.6 - 4.0	35	115.5	120	80 / 83	150W
RTW03-70RH	3.3V	1.8 - 3.6	70	231	120	83 / 86	300W
RTW05-10R	5V	4.0 - 5.8	10	50	120	80 / 82	50W
RTW05-20R	5V	4.0 - 5.8	20	100	120	83 / 85	100W
RTW05-30R	5V	4.0 - 5.8	30	150	120	83 / 86	150W
RTW05-60RH	5V	3.5 - 5.6	60	300	120	84 / 87	300W
RTW12-4R3	12V	9.6 - 13.2	4.3	51.6	150	81 / 83	50W
RTW12-8R4	12V	9.6 - 13.2	8.4	100.8	150	84 / 86	100W
RTW12-12R	12V	9.6 - 13.2	12.5	150	150	84 / 87	150W
RTW12-25RH	12V	7.2 - 14.4	25	300	150	83 / 86	300W
RTW15-3R5	15V	12.0 - 16.5	3.5	52.5	150	82 / 85	50W
RTW15-6R7	15V	12.0 - 16.5	6.7	100.5	150	85 / 87	100W
RTW15-10R	15V	12.0 - 16.5	10	150	150	84 / 87	150W
RTW15-20RH	15V	10.5 - 18.0	20	300	150	83 / 86	300W
RTW24-2R2	24V	19.2 - 26.4	2.2	52.8	200	82 / 85	50W
RTW24-4R2	24V	19.2 - 26.4	4.2	100.8	200	85 / 87	100W
RTW24-6R3	24V	19.2 - 26.4	6.3	151.2	150	86 / 88	150W
RTW24-13RH	24V	16.8 - 26.4	13	312	200	85 / 88	300W
RTW28-1R8	28V	22.4 - 30.8	1.8	50.4	200	82 / 85	50W
RTW28-3R6	28V	22.4 - 30.8	3.6	100.8	200	85 / 87	100W
RTW28-5R4	28V	22.4 - 30.8	5.4	151.2	200	86 / 88	150W
RTW28-11RH	28V	19.6 - 33.6	11	308	200	85 / 88	300W
RTW48-1R1	48V	38.4 - 52.8	1.1	52.8	300	82 / 85	50W
RTW48-2R1	48V	38.4 - 52.8	2.1	100.8	300	85 / 88	100W
RTW48-3R2	48V	38.4 - 52.8	3.2	153.6	200	86 / 89	150W
RTW48-6R5H	48V	33.6 - 55.0	6.5	312	300	86 / 89	300W

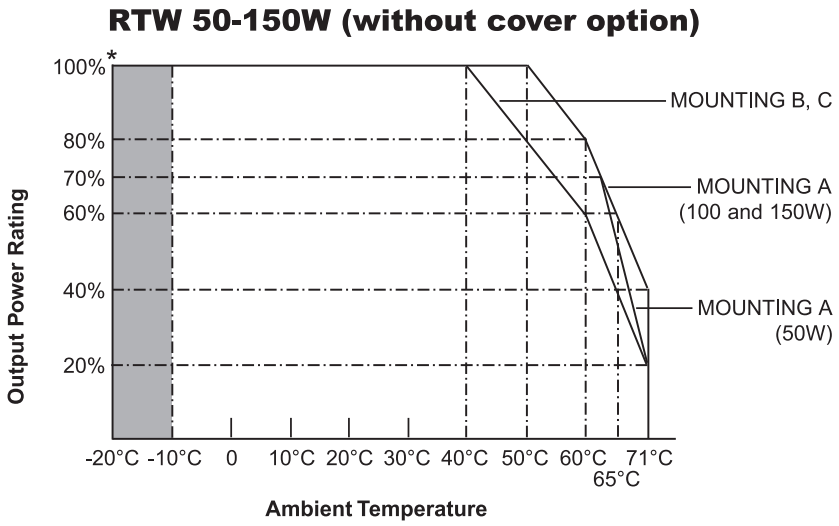
Notes: (2) 100/200VAC See website technical downloads for detailed information

Options

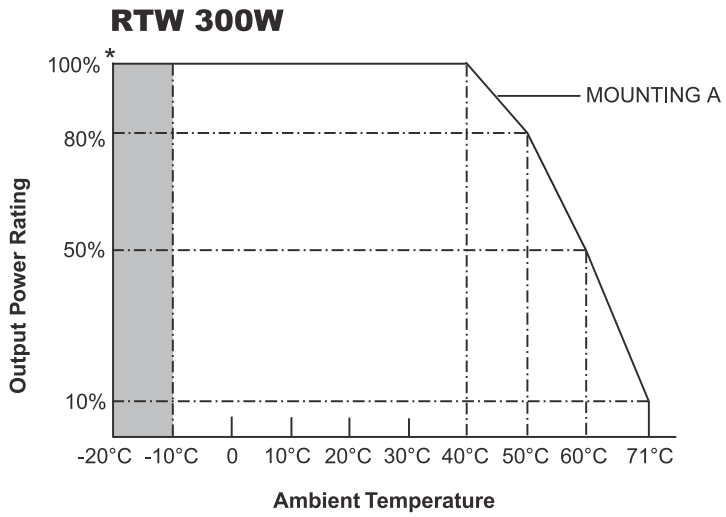
Suffix	Description
L	Vertical Terminal Block (option for 50W & 100W models only)
C	Cover (50W, 100W & 150W models)
H	Cover (300W models)

Derating Curves RTW50-150W Series





Derating Curve RTW 300W Series



Industrial Test Comm Broadcast LED

50W to 600W Single Output General Purpose Power Supplies

Features	Benefits
• 10 Year e-cap Lifetime	• Better Field Reliability
• 7 Year Warranty	• Lower Cost of Ownership
• Global Safety Approvals	• Supports Worldwide Use
• Compact Size	• Easier System Integration

Specification

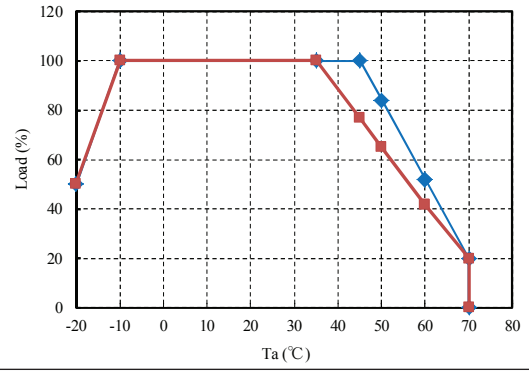
Model		RWS50B	RWS100B	RWS150B	RWS300B	RWS600B
AC Input Voltage range **(1)**	VAC	85 - 265VAC (47 - 63Hz), 300VAC for 5 seconds				
Inrush Current (100 / 200VAC)	A	18 / 36	15 / 30	16 / 32	17 / 34	20 / 40
Power Factor (100 / 200VAC)	-	Meets EN61000-3-2				
Input Current (115/230VAC) (typ)	A	1.1 / 0.65	1.2 / 0.65 (5V model 0.9/0.45)	1.8 / 0.9 (5v model 1.3/0.7)	3.6 / 1.9 (5v model 3.1/1.6)	6.6 / 3.6 (5v model 6.2/3.2)
DC Input	VDC	120 - 370VDC				120 - 330VDC
Temperature Coefficient	-	<0.02%/°C				
Regulation	-	See table				
Overcurrent Protection	-	>105%, 5V & 12V constant current limit & hiccup autorecovery, 24V &48V constant current limit with autorecovery				
Overvoltage Protection	V	115-140%, Cycle AC line to reset				
Hold Up Time (typ at full load)	ms	20ms				
Leakage Current (max)	uA	750uA maximum, typically 175uA at 115VAC, 63Hz				
Remote Sense	-	No				
Remote ON/OFF Control **(4)**	-	-	-	-	Option	Option
Parallel Operation	-	-	-	-	-	Option
Operating Temperature **(1)**	-	-20° to +70°C, derate above 45°C for 50W &100W, 40°C for 150W & 50°C for 300W & 600W (see graphs below)				
Storage Temperature	-	-30° to +75°C				
Operating Humidity (non condensing)	%RH	30 - 90				
Storage Humidity (non condensing)	%RH	10 - 90				
Cooling	-	Convection			Internal Fan	
Withstand Voltage	-	Input to Ground 2kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.				
Isolation Resistance	-	>100M at 25°C & 70%RH, Output to Ground 500VDC				
Vibration (non operating)	-	10 - 55Hz: 19.6m/s^2 (sweep 1 min) X, Y, Z for 1 hour				
Shock	-	< 196.1 m/s^2				
Safety Agency Approvals **(2) (3)**	-	IEC/EN/UL/CSA60950-1, IEC/EN/UL/CSA62368-1, UL508 and CE Mark				
Line Dips	-	SEMI-F47 (200VAC input)				
Conducted & Radiated EMI	-	EN55011 / EN55022-B, FCC Class B, VCCI-B				
Immunity	-	IEC61000-4-2, -3, -4, -5, -6, -8, -11				
Weight (Typ)	g	230	400	480	900	1600
Size (WxHxD)	mm	82 x 34 x 81.5	94 x 39 x 108	94 x 41 x 128	102 x 41 x 170	120 x 61 x 190
MTBF **(5)**	hours	4,170,949	1,978,533	2,235,743	2,027,824	2,157,340
Warranty	Yrs	7				

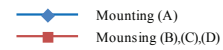
Notes:
(1) See graphs below for derating at low line input voltage
(2) UL508 & CSA C22.2 No.107.1-01 on RWS50B-5, -12, -24, RWS100B-5, -12, -24, RWS150B-5, -12, -24 & RWS300B-24 only
(3) Consult Sales Office for use under DC Input conditions **(4)** External 5V source required, see instruction manual for details
(5) According to Telcordia document SR-332, issue 3, "Reliability Prediction Procedure for Electronic Equipment". Conditions: ambient temp. 25deg C, 230Vac input, full load (figures shown for 24V models)

Model Selector

Model	Voltage	Adjust Range (V)	Max Current (A)	Max Output Power	Load Reg. (mV)	Line Reg. (mV)	Ripple Noise (mV)	Efficiency (typ) % 115/230VAC
RWS50B-5	5V	4.5-5.75	10	50	40	20	120	78 / 79
RWS100B-5	5V	4.5-5.75	14	70	40	20	120	77.5 / 79
RWS150B-5	5V	4.5-5.75	21	105	40	20	120	77.5 / 79.5
RWS300B-5	5V	4.5-5.75	50	250	40	20	120	75 / 78.5
RWS600B-5	5V	4.5-5.75	100	500	70	20	120	74 / 77.5
RWS50B-12	12V	10.8-13.8	4.3	51.6	96	48	150	83 / 84
RWS100B-12	12V	10.8-13.8	8.5	102	96	48	150	83 / 84
RWS150B-12	12V	10.8-13.8	13	156	96	48	150	84.5 / 87.5
RWS300B-12	12V	10.8-13.8	25	300	96	48	150	79.5 / 82.5
RWS600B-12	12V	10.8-13.8	50	600	96	48	150	82 / 84.5
RWS100B-15	15V	13.5-17.25	6.8	102	120	60	150	84 / 85
RWS150B-15	15V	13.5-17.25	10	150	120	60	150	84.5 / 87.5
RWS300B-15	15V	13.5-17.3	20	300	120	60	150	81.5 / 84.5
RWS600B-15	15V	13.5-17.3	40	600	120	60	150	82 / 84.5
RWS50B-24	24V	21.6-27.6	2.2	52.8	192	96	150	86 / 87
RWS100B-24	24V	21.6-27.6	4.5	108	192	96	150	86 / 87.5
RWS150B-24	24V	21.6-27.6	6.5	156	192	96	150	86.5 / 89.5
RWS300B-24	24V	21.6-27.6	12.5	300	192	96	150	85 / 88
RWS600B-24	24V	21.6-27.6	25	600	192	96	150	85 / 88.5
RWS150B-28	28V	25.2-32.2	5.4	151.2	224	112	180	86.5 / 89.5
RWS300B-36	36V	32.4-41.4	8.4	302.4	288	144	200	85 / 88
RWS600B-36	36V	32.4-41.4	16.7	601.2	288	144	200	84 / 88.5
RWS50B-48	48V	43.2-52.8	1.1	52.8	384	192	200	87 / 88
RWS100B-48	48V	43.2-52.8	2.1	100.8	384	192	200	86 / 87
RWS150B-48	48V	43.2-52.8	3.3	158.4	384	192	200	86.5 / 89.5
RWS300B-48	48V	43.2-52.8	6.3	302.4	384	192	200	85 / 88
RWS600B-48	48V	43.2-52.8	12.5	600	384	192	200	85 / 88.5

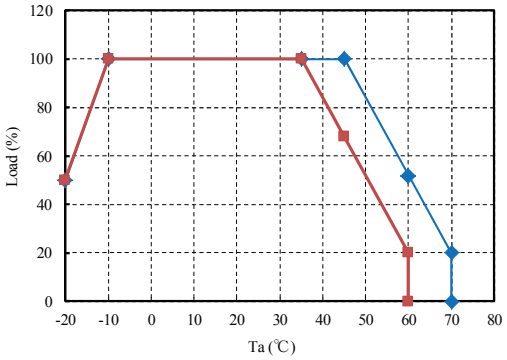
Output Derating RWS50B Series

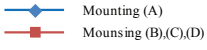




Ta (°C)	Load (%)	
	Mounting (A)	Mounsing (B),(C),(D)
-20	50	50
-10 - +35	100	100
45	100	77
50	84	65
60	52	42
70	20	20

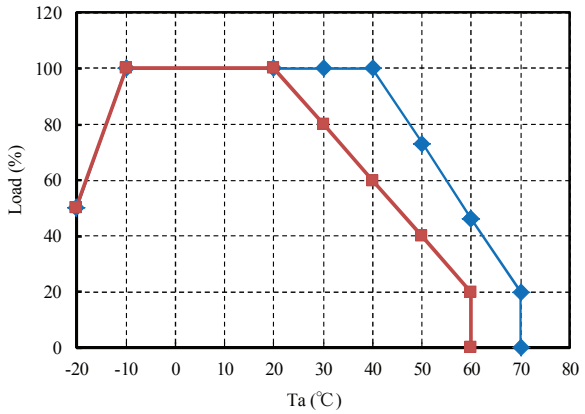
Output Derating RWS100B Series

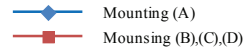




Ta (°C)	Load (%)	
	Mounting (A)	Mounsing (B),(C),(D)
-20	50	50
-10 - +35	100	100
45	100	68
60	52	20
70	20	-

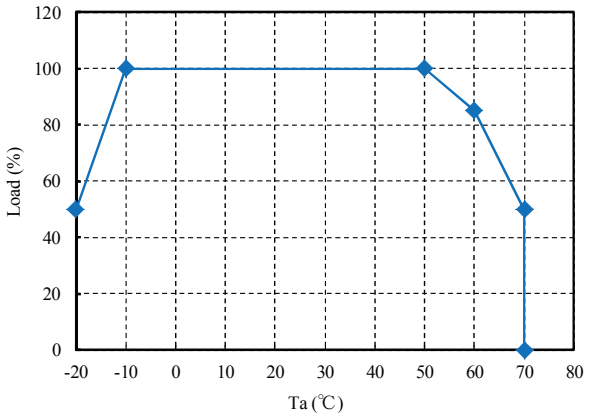
Output Derating RWS150B Series

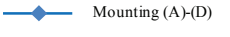




Ta (°C)	Load (%)	
	Mounting (A)	Mounsing (B),(C),(D)
-20	50	50
-10 - +20	100	100
30	100	80
40	100	60
50	73	40
60	46	20
70	20	-

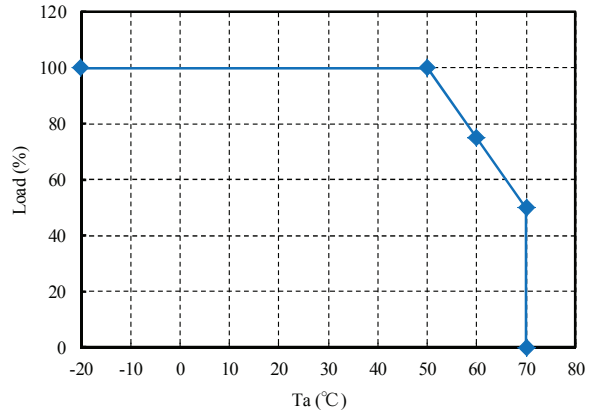
Output Derating RWS300B Series

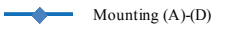




Ta (°C)	Load (%)
	Mounting (A)-(D)
-20	50
-10 - +50	100
60	85
70	50

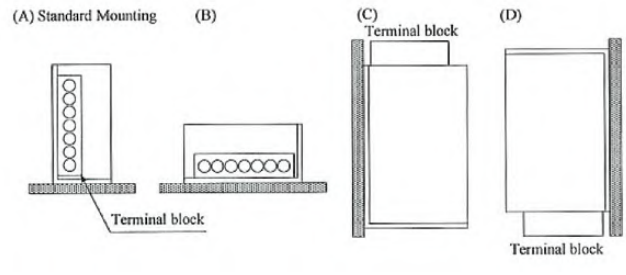
Output Derating RWS600B Series





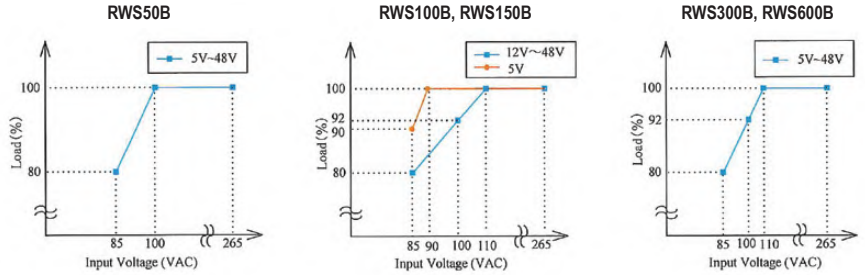
Ta (°C)	Load (%)
	Mounting (A)-(D)
-20 - +50	100
60	75
70	50

Mounting Direction RWS-B Series



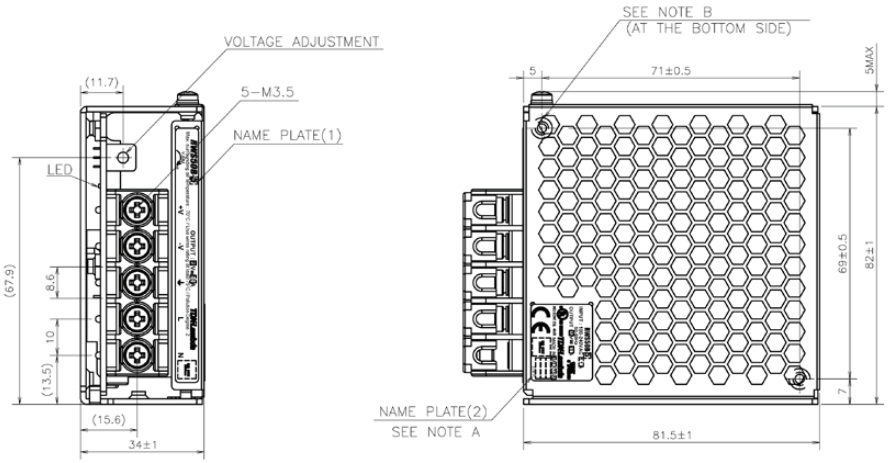
Options	
Suffix	**Description**
/CO2	Double Sided Board Coating
/R	Remote On/Off (RWS300B and RWS600B)
/RFO	Remote On/Off, Remote Sense, Parallel Operation, DC Good Signal (RWS600B only)
/FO	Remote Sense, Parallel Operation, DC Good Signal (RWS600B only)

Output Derating according to Input Voltage



Note: Load (%) is percent of maximum current value in a rated output voltage

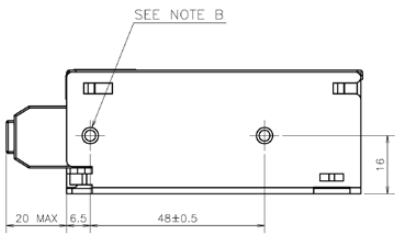
Outline Drawing RWS50B Series



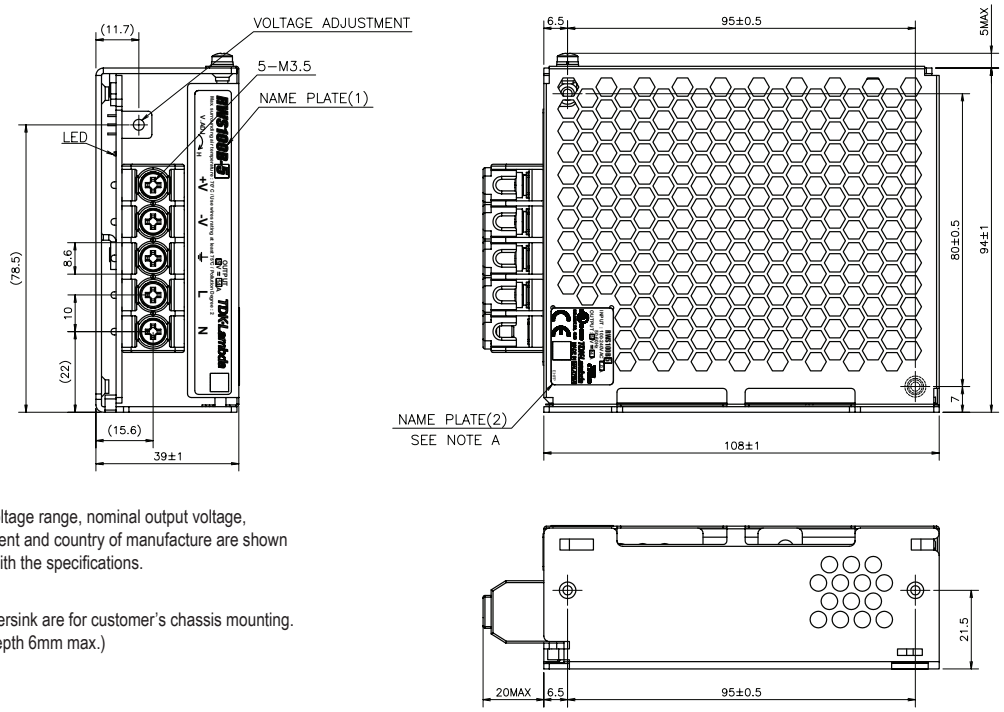
Notes:

A: Model name, input voltage range, nominal output voltage, maximum output current and country of manufacture are shown here in accordance with the specifications.

B: 4 – M3 BR and countersink are for customer's chassis mounting. (Screw penetration depth 6mm max.)



Outline Drawing RWS100B Series

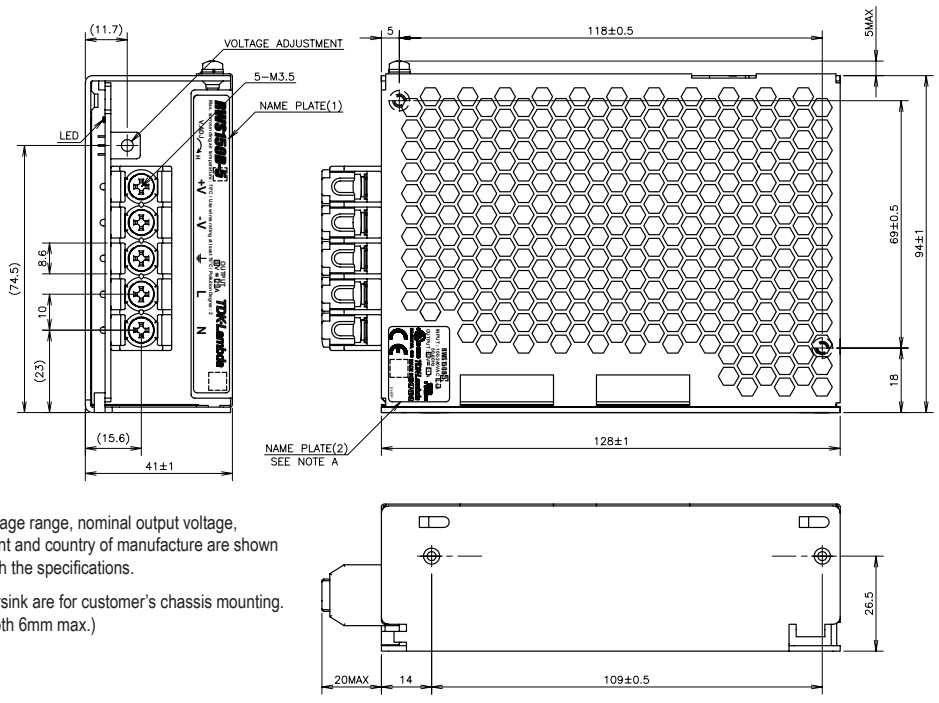


Notes:

A: Model name, input voltage range, nominal output voltage, maximum output current and country of manufacture are shown here in accordance with the specifications.

B: 4 – M3 BR and countersink are for customer's chassis mounting. (Screw penetration depth 6mm max.)

Outline Drawing RWS150B Series

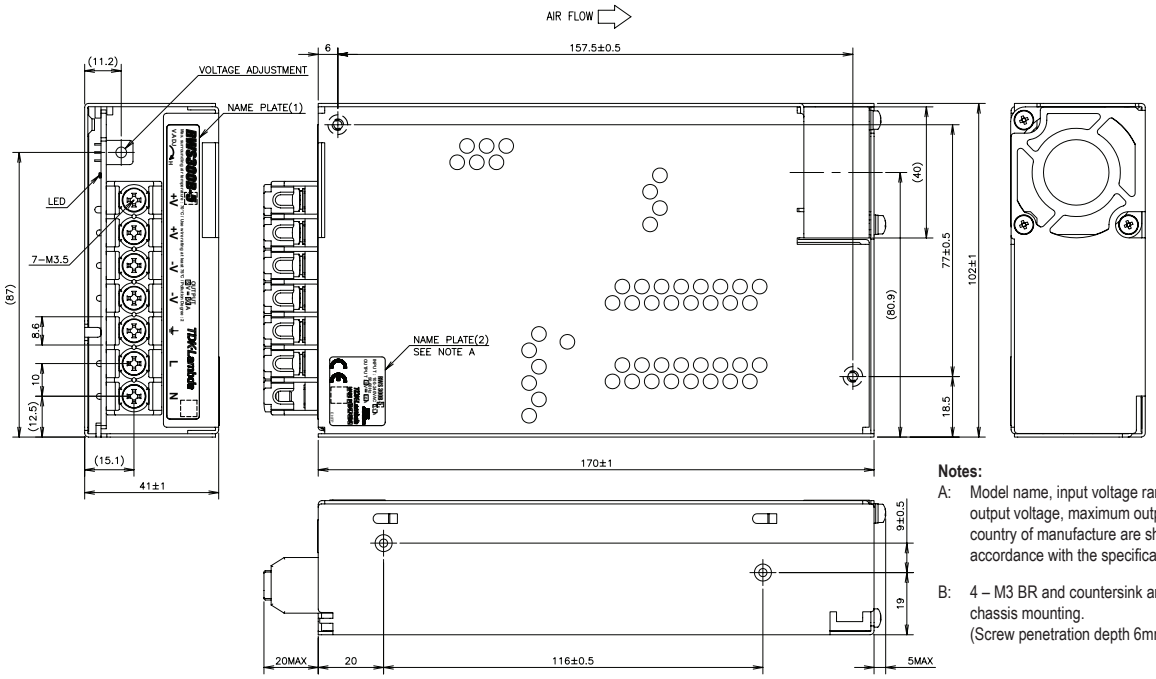


Notes:

A: Model name, input voltage range, nominal output voltage, maximum output current and country of manufacture are shown here in accordance with the specifications.

B: 4 – M3 BR and countersink are for customer's chassis mounting. (Screw penetration depth 6mm max.)

Outline Drawing RWS300B Series

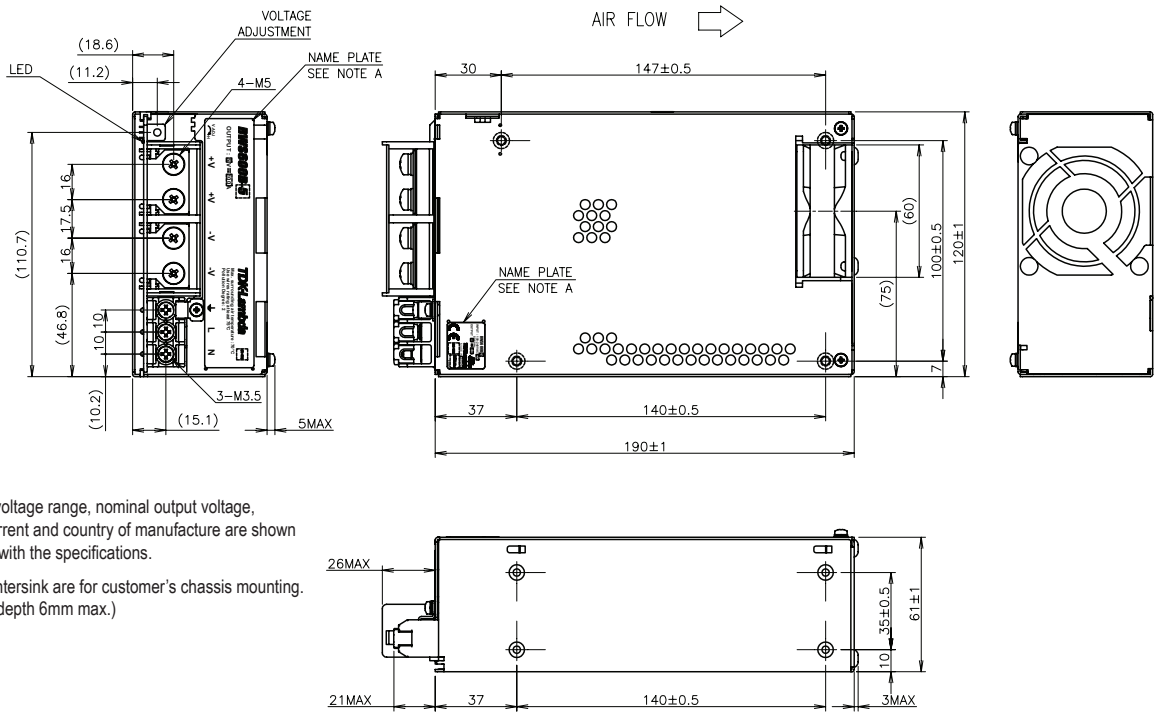


Notes:

A: Model name, input voltage range, nominal output voltage, maximum output current and country of manufacture are shown here in accordance with the specifications.

B: 4 – M3 BR and countersink are for customer's chassis mounting.
(Screw penetration depth 6mm max.)

Outline Drawing RWS600B Series



Notes:

A: Model name, input voltage range, nominal output voltage, maximum output current and country of manufacture are shown here in accordance with the specifications.

B: 8 – M4 BR and countersink are for customer's chassis mounting.
(Screw penetration depth 6mm max.)

LED Industrial Test Comm Broadcast

1000W to 1500W Single Output General Purpose Power Supplies

Features	Benefits
• Enclosed Compact Construction	• Easy Installation
• Class B Conducted & Radiated EMI	• Easier System Compliance
• SEMI F47 Line Dips	• Better System Integrity
• 7 Year Warranty	• Lower Cost of Ownership

Specification

Model		RWS1000B	RWS1500B
AC Input Voltage range (1)	VAC	85 - 265VAC (47 - 63Hz)	
DC Input Voltage range*	VDC	120 - 340VDC*	
Inrush Current (100 / 200VAC)	A	60 / 60A	
Power Factor (100 / 200VAC)	-	Meets EN61000-3-2 (0.98 / 0.95)	
Input Current (100/200VAC) (Typ)	A	13 / 7A	19 / 10A
Temperature Coefficient	%/°C	<0.02%/°C	
Regulation	-	See Model Selector	
Overcurrent Protection	-	>105%, Constant Current Style. After 5s unit will shutdown	
Overvoltage Protection	V	120-145% (115-125% for 48V), Cycle AC line to reset	
Hold Up Time (Typ at 100% load)	ms	20ms	
Leakage Current (max)	mA	<1.2mA	
Standby Voltage	-	5V 1A (always on). See options table	
Remote Sense	-	Yes	
Remote On/Off	-	See options table. Apply external voltage to enable output	
DC Good, Fan Alarm	-	See options table	
Parallel Operation	-	See options table	
Series Operation	-	Yes	
Operating Temperature	°C	-20 to +60°C, derate linearly to 60% load from 50 to 60°C. Reverse air (/RF): -20 to +70°C, derate linearly to 50% load from 50 to +70°C	
Storage Temperature	°C	-30 to +75°C	
Operating Humidity (non condensing)	%RH	20 - 90%RH	
Storage Humidity (non condensing)	%RH	10 - 90%RH	
Cooling	-	Internal Fan, air intake from input/output terminals	
Withstand Voltage	VAC	Input to Ground 2kVAC, Input to Output 4kVAC, Output to Ground 1.5kVAC for 1 min.	
Isolation Resistance	MΩ	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC	
Vibration (non operating)		10 - 55Hz: 19.6m/s^2 (sweep 1 min) X, Y, Z for 1 hour	
Shock	-	< 196.1 m/s^2	
Safety Agency Certifications	-	IEC/UL/CSA/EN60950-1, IEC/UL/CSA/EN62368-1, CE Mark	
Line Dips	-	SEMI-F47 (200VAC input)	
Conducted & Radiated EMI	-	EN55011 / EN55032-B, FCC Class B, VCCI-B	
Immunity	-	IEC61000-4-2, -3, -4, -5, -6, -8, -11, IEC61000-6-2	
Weight (Typ)	g	2,000g	3,000g
Size (WxHxD)	mm	127 x 63 x 198mm	127 x 63 x 261mm
MTBF - Telcordia SR-332 issue 3**	hours	1,834,313	1,222,361
Warranty	yrs	7	

Notes: *Safety certified for AC input only **24V output model, 25°C ambient, full load, 230VAC input
(1) Derate linearly to 80% load from 90 to 85VAC input

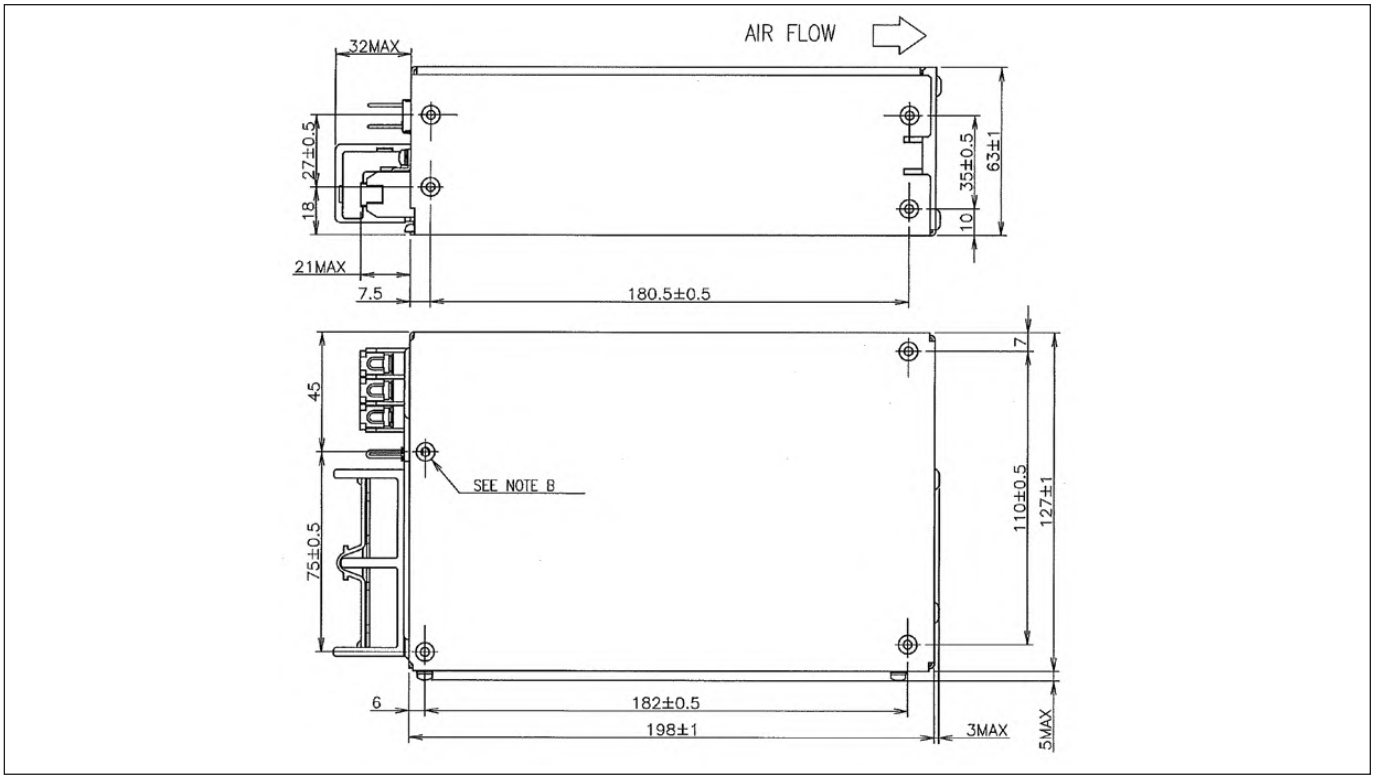
Model Selector

Model	Voltage (V)	Adjust Range (V)	Max Current (A)	Max Output Power (w)	Load Reg (mV)	Line Reg (mV)	Ripple Noise (mV)	Efficiency (typ) % 115/230VAC
RWS1000B-12	12	10.2-13.8	84	1008	96	48	150	82 / 85
RWS1000B-12/S	12	10.2-13.8	84	1008	96	48	150	82 / 85
RWS1500B-12	12	10.2-13.8	125	1500	96	48	150	81 / 85
RWS1500B-12/S	12	10.2-14.4	125	1500	96	48	150	81 / 85
RWS1000B-15	15	12.8-17.2	67	1005	120	60	150	82 / 85
RWS1000B-15/S	15	12.8-17.2	67	1005	120	60	150	82 / 85
RWS1500B-15	15	12.8-17.2	100	1500	120	60	150	82 / 85
RWS1500B-15/S	15	12.8-18.0	100	1500	120	60	150	82 / 85
RWS1000B-24	24	20.4-27.6	42	1008	144	96	180	85 / 88
RWS1000B-24/S	24	20.4-28.8	42	1008	144	96	180	85 / 88
RWS1500B-24	24	20.4-27.6	63	1512	144	96	180	85 / 88
RWS1500B-24/S	24	20.4-28.8	63	1512	144	96	180	85 / 88
RWS1000B-36	36	30.6-41.4	28	1008	216	144	250	85 / 88
RWS1000B-36/S	36	30.6-41.4	28	1008	216	144	250	85 / 88
RWS1500B-36	36	30.6-41.4	42	1512	216	144	250	85 / 88
RWS1500B-36/S	36	30.6-43.2	42	1512	216	144	250	85 / 88
RWS1000B-48	48	40.8-52.8	21	1008	288	192	300	85 / 88
RWS1000B-48/S	48	40.8-57.6	21	1008	288	192	300	85 / 88
RWS1500B-48	48	40.8-52.8	32	1536	288	192	300	85 / 88
RWS1500B-48/S	48	40.8-57.6	32	1536	288	192	300	85 / 88

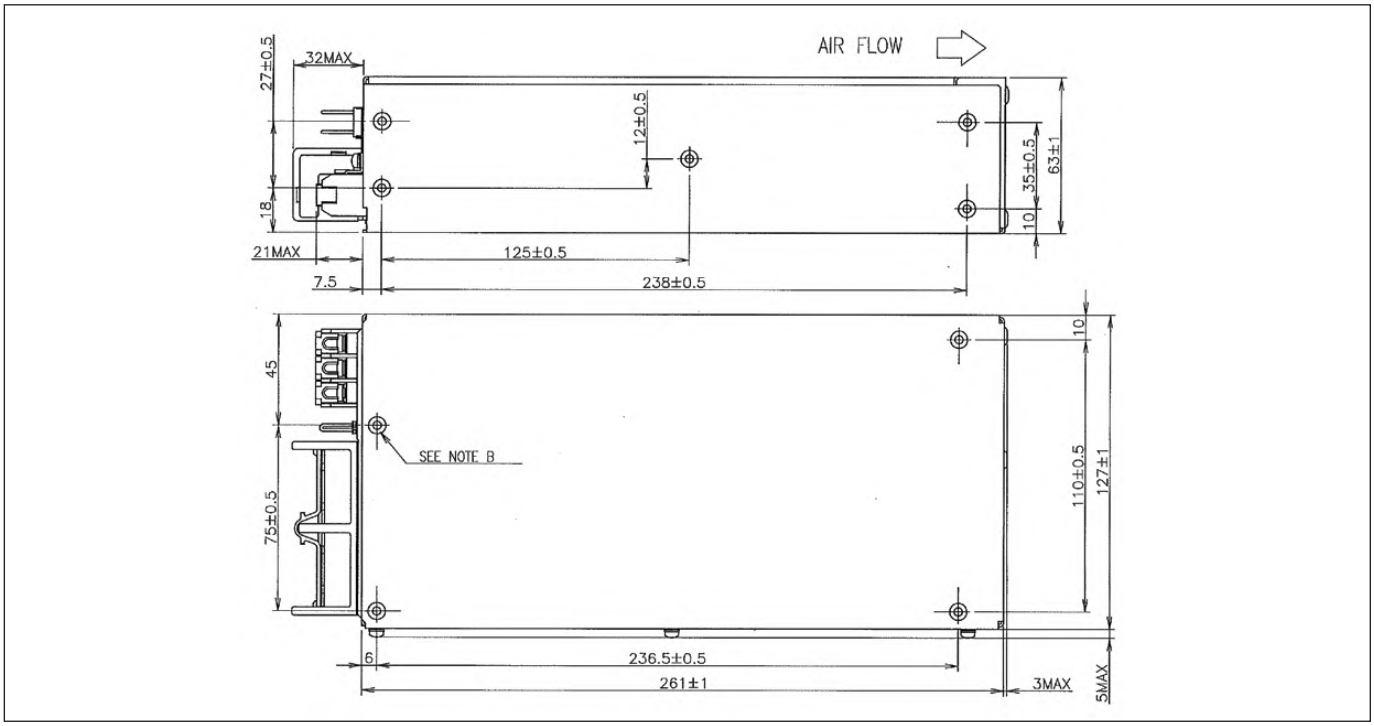
Options

Suffix	Description
/CO2	Double Sided Board Coating
/FO	Parallel Operation, DC Good and Fan Alarm Signals
/R	Remote On/Off
/RF	Reverse Fan (Air exits over input/output terminals)
/RFO	Remote On/Off, Parallel Operation, DC Good and Fan Alarm Signals
/S	5V 1A Standby Voltage and Remote On/Off

RWS 1000B Outline Drawing



RWS 1500B Outline Drawing



Medical

1000W to 1500W Single Output Medical Power Supplies

Features	Benefits
• Enclosed Compact Construction	• Easy Installation
• Medical Certifications	• Easier System Compliance
• 7 Year Warranty	• Lower Cost of Ownership

Specification

Model		RWS1000B/ME	RWS1500B/ME
AC Input Voltage range (1)	VAC	85 - 265VAC (47 - 63Hz)	
DC Input Voltage range*	VDC	120 - 340VDC*	
Inrush Current (100 / 200VAC)	A	60 / 60A	
Power Factor (100 / 200VAC)	-	Meets EN61000-3-2 (0.98 / 0.95)	
Input Current (100/200VAC) (Typ)	A	13 / 7A	19 / 10A
Temperature Coefficient	%/°C	<0.02%/°C	
Regulation	-	See Model Selector	
Overcurrent Protection	-	>105%, Constant Current Style. After 5s unit will shutdown	
Overvoltage Protection	V	120-145% (115-125% for 48V), Cycle AC line to reset	
Hold Up Time (Typ at 100% load)	ms	20ms	
Leakage Current (max)	mA	<0.3mA	
Remote Sense	-	Yes	
Remote On/Off	-	See options table. Apply external voltage to enable output	
DC Good, Fan Alarm	-	See options table	
Parallel Operation	-	See options table	
Series Operation	-	Yes	
Operating Temperature	°C	-20 to +60°C, derate linearly to 60% load from 50 to 60°C	
Storage Temperature	°C	-30 to +75°C	
Operating Humidity (non condensing)	%RH	20 - 90%RH	
Storage Humidity (non condensing)	%RH	10 - 90%RH	
Cooling	-	Internal Fan, air intake from input/output terminals	
Withstand Voltage	VAC	Input to Ground 2kVAC (1xMoPP), Input to Output 4kVAC (2xMoPP, Output to Ground 1.5kVAC (1xMoPP) for 1 min	
Isolation Resistance	MΩ	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC	
Vibration (non operating)		10 - 55Hz: 19.6m/s^2 (sweep 1 min) X, Y, Z for 1 hour	
Shock	-	< 196.1 m/s^2	
Safety Agency Certifications	-	ES60601-1, CSA60601, EN60601-1, CE Mark	
Line Dips	-	SEMI-F47 (200VAC input)	
Conducted & Radiated EMI	-	EN55011 / EN55032-A, FCC Class A, VCCI-A	
Immunity	-	IEC61000-4-2, -3, -4, -5, -6, -8, -11, IEC61000-6-2, EN60601-1-2	
Weight (Typ)	g	2,000g	3,000g
Size (WxHxD)	mm	127 x 63 x 198mm	127 x 63 x 261mm
MTBF - Telcordia SR-332 issue 3**	hours	1,834,313	1,222,361
Warranty	yrs	7	

Notes: *Safety certified for AC input only **24V output model, 25°C ambient, full load, 230VAC input
(1) Derate linearly to 80% load from 90 to 85VAC input

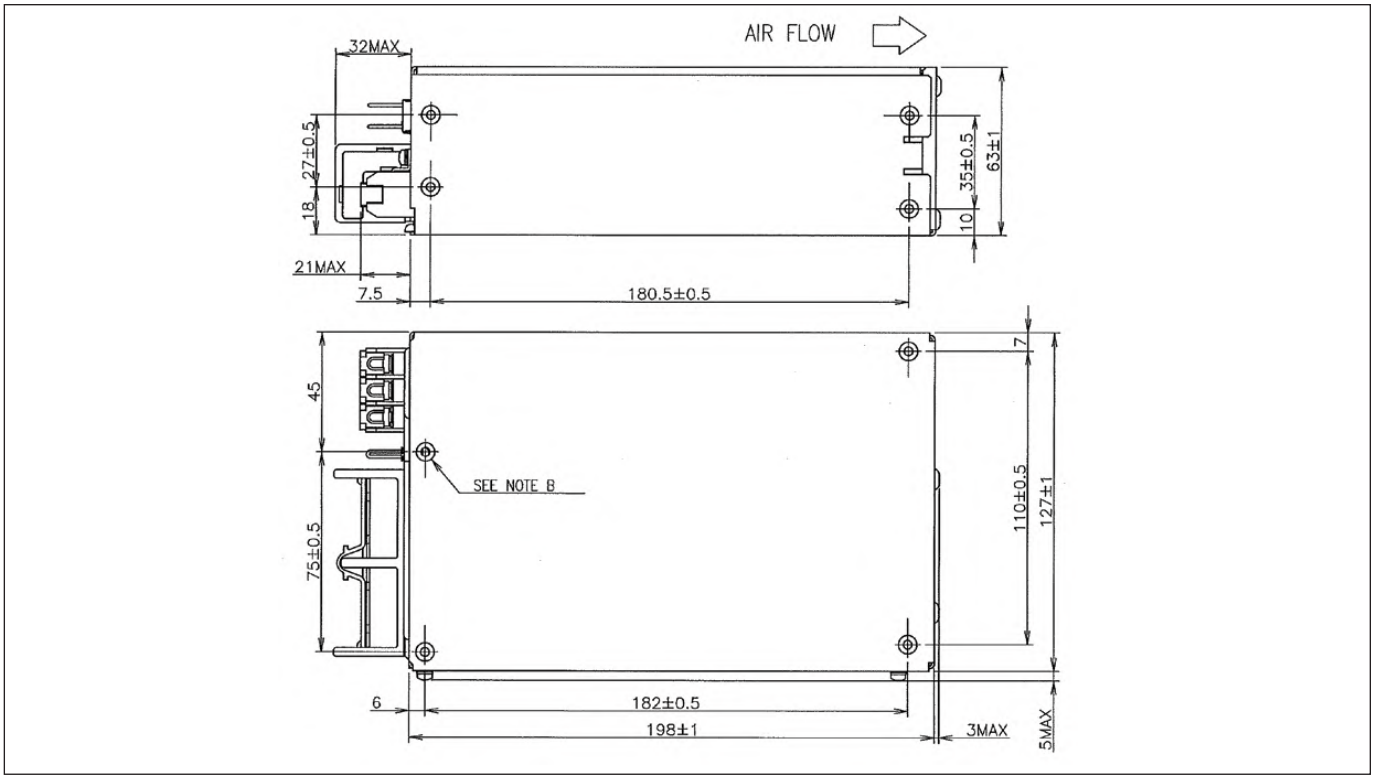
Model Selector

Model	Voltage	Adjust Range (V)	Max Current (A)	Max Output Power (w)	Load Reg (mV)	Line Reg (mV)	Ripple Noise (mV)	Efficiency (typ) % 115/230VAC
RWS1000B-12/ME	12V	10.2-13.8V	84	1008	96	48	150	82 / 85
RWS1500B-12/ME	12V	10.2-13.8V	125	1500	96	48	150	81 / 85
RWS1000B-15/ME	15V	12.8-17.2V	67	1005	120	60	150	82 / 85
RWS1500B-15/ME	15V	12.8-17.2V	100	1500	120	60	150	82 / 85
RWS1000B-24/ME	24V	20.4-27.6V	42	1008	144	96	180	85 / 88
RWS1500B-24/ME	24V	20.4-27.6V	63	1512	144	96	180	85 / 88
RWS1000B-36/ME	36V	30.6-41.4	28	1008	216	144	250	85 / 88
RWS1500B-36/ME	36V	30.6-41.4	42	1512	216	144	250	85 / 88
RWS1000B-48/ME	48V	40.8-52.8	21	1008	288	192	300	85 / 88
RWS1500B-48/ME	48V	40.8-52.8	32	1536	288	192	300	85 / 88

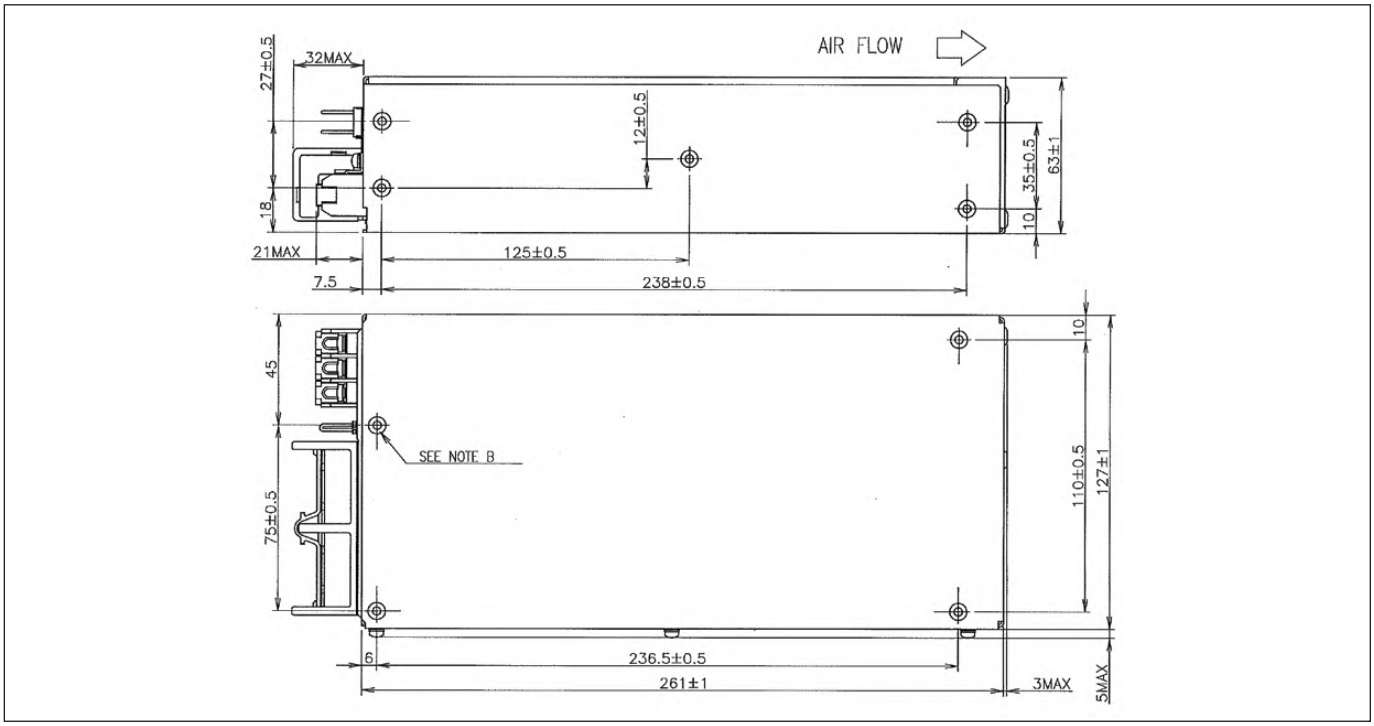
Options (Contact Sales for availability)

Suffix	Description
CO2	Double Sided Board Coating
FO	Parallel Operation, DC Good and Fan Alarm Signals
R	Remote On/Off
RF	Reverse Fan (Air exits over input/output terminals)
RFO	Remote On/Off, Parallel Operation, DC Good and Fan Alarm Signals

RWS 1000B/ME Outline Drawing



RWS 1500B/ME Outline Drawing



- Quiet Temperature Controlled Fan
- Low Cost
- Low Profile
- Wide Operating Temperature Range
- Active Power Factor Correction
- Medical Approvals (SWS1000L)

SWS600/1000L Series

600W and 1000W Low Profile Single Output Power Supplies

SWS600/1000L Features and Benefits

Features	Benefits
• Temperature Controlled Fan	• Low Acoustic Noise
• Global safety Approvals	• Supports Global Use
• Wide Temperature Range	• Suitable for Outdoor Temperature Extremes
• Level B EMI	• Assists System Compliance

Specifications

ITEMS \ MODEL		SWS600L	SWS1000L
Input Voltage range	-	85 - 265VAC (47 - 63Hz) or 120 - 350VDC*	
Inrush Current (115 / 230VAC)	A	20 / 40	
Power Factor	-	Meets EN61000-3-2 Class A	
Input Current (100/200VAC)	A	7.1 / 3.6 (3.3V : 5/2.5)	12/6 (3.3V : 8/4)
Temperature Coefficient	-	<0.02%/°C	
Overcurrent Protection	-	>105%, Constant current style	
Overvoltage Protection	V	125% -145%	
Over temperature Protection	-	Yes, cycle AC or Remote On/Off to reset	
Hold Up Time (Typ)	ms	20ms at 115/230VAC	
Leakage Current (max)	mA	<0.75mA	<0.3mA (1)
Remote Sense	-	Yes	
Parallel Connection	-	Yes	
Remote On/Off (CNT)	-	Yes	
Voltage Programming	-	Yes, 1-6V adjusts output from 20 - 120% of nominal	
DC Good & Fan Fail Signal	-	Yes, open collector output	
Auxiliary Output	-	12V 0.1A	
LED Indicator	-	Green LED = On	
Operating Temperature	-	-40°C start up. -20°C to 74°C, derating linearly to 50% load above 50°C	
Storage Temperature	-	-40°C to +85°C	
Humidity (non condensing)	-	20 - 90% RH operating, 10 - 95%RH non operating	
Cooling	-	Internal fan	
Withstand Voltage(One minute)	-	Input to Ground 2kVAC, Input to Output 3kVAC, Output to Ground 500VAC, Output to CNT 100VAC	Input to Ground 2kVAC, Input to Output 4kVAC**, Output to Ground 500VAC, Output to CNT 100VAC
Isolation Resistance	-	>50MΩ at 25°C & 70%RH, Output to Ground 500VDC	
Vibration (non operating)	-	MIL-STD-810F 514.5 CAT. 4,10	
Shock (in packaging)	-	MIL-STD-810F 516.5 Procedure 1, V1	
Immunity	-	EN61000-4-2, -3, -4, -5, -6, -8, -11	
Safety Agency Approvals	-	UL/CSA/EN 60950-1, UL/CSA/IEC/EN 60601-1 & ANSI/AAMI ES60601-1,(1000W only), IEC61010-1 (600W only), EN50178, CE Mark	
Conducted & Radiated EMI	-	EN55011 / EN55022-B, FCC Class B	
Weight (Typ)	g	1600	2300
Size (WxHxD)	mm	61 x 120 x 190	61 x 150 x 240
MTBF (2)	hrs	1,444,923	1,348,293
Warranty	yrs	3	

Notes: (1) Worst case: <300μA at 264Vac, 63Hz (Normal condition); <500μA (Single Fault Condition).

(2) According to Telcordia document SR-332, issue 3, "Reliability Prediction Procedure for Electronic Equipment" Conditions: ambient temp. 25°C, 230Vac input, full load (figures shown for 24V models)

*Safety certified for AC input only **2 x MOPP, IEC60601-1 (3rd edition)

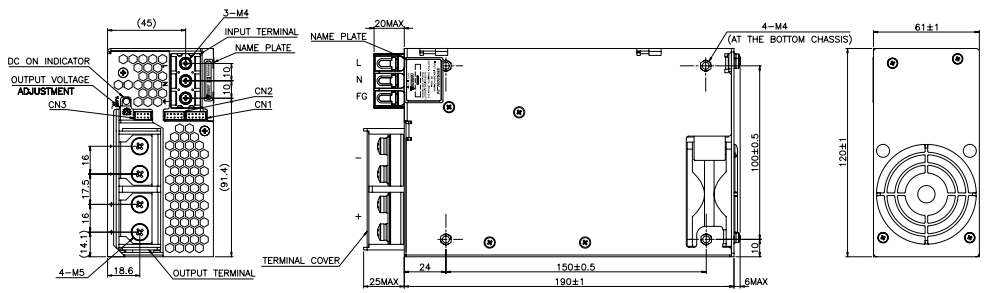
Note: (Numbers in brackets indicate peak current and power available at 170 - 265VAC Input, 10s max, 35% duty cycle)

Model Selector

Model	Voltage (V)	Adjust Range (via Trim Pot)	Max Curr. (A)	Max Pwr (W)	Load Reg (mV)	Line Reg (mV)	Ripple Noise (mV)	Eff.[3] (typ)%
SWS600L-3	3.3V	2.64 - 3.96V	120	396	30	20	120	70 / 72
SWS1000L-3	3.3V	2.64 - 3.96V	200	660	30	20	120	74 / 76
SWS600L-5	5V	4 - 6V	120	600	30	20	120	75 / 77
SWS1000L-5	5V	4 - 6V	200	1000	30	20	120	79 / 81
SWS600L-12	12V	9.6 - 14.4V	53	636	72	48	150	79 / 82
SWS1000L-12	12V	9.6 - 14.4V	88	1056	72	48	150	82 / 84
SWS600L-15	15V	12 - 19.5V	43	645	90	60	150	79 / 82
SWS1000L-15	15V	12 - 19.5V	70	1050	90	60	150	82 / 84
SWS600L-24	24V	19.2 - 28.8V	27 **(31)**	648 **(744)**	144	96	150	81 / 84
SWS1000L-24	24V	19.2 - 28.8V	44 **(51)**	1056 **(1224)**	144	96	150	84 / 86
SWS600L-36	36V	28.8 - 43.2V	18	648	216	144	200	82 / 84
SWS1000L-36	36V	28.8 - 43.2V	29	1044	216	144	200	84 / 86
SWS600L-48	48V	38.4- 56V	13 **(15)**	624 **(720)**	288	192	200	82 / 84
SWS1000L-48	48V	38.4- 56V	22 **(25)**	1056 **(1200)**	288	192	200	84 / 86
SWS600L-60	60V	48 - 66V	10	600	360	240	200	82 / 84
SWS1000L-60	60V	48 - 66V	17	1020	360	240	200	84 / 86

Note: [3] 115 / 230Vac

Outline Drawing SWS600L Series



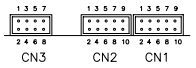
SIGNAL CONNECTOR INFORMATION

PIN CONFIGURATION AND FUNCTIONS OF CN1,CN2

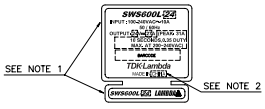
PIN No.	FUNCTION
1	+Vm : +OUTPUT VOLTAGE MONITOR
2	+S : +SENSING
3	−Vm : −OUTPUT VOLTAGE MONITOR
4	−S : −SENSING
5	N.C. : NO CONNECTION
6	PC : CURRENT BALANCE
7	PV : ADJUSTMENT OF OUTPUT VOLTAGE
8	COM : GROUND FOR PC AND PV SIGNAL
9	CNT2 : REMOTE ON/OFF
10	TOG : REMOTE ON/OFF GROUND

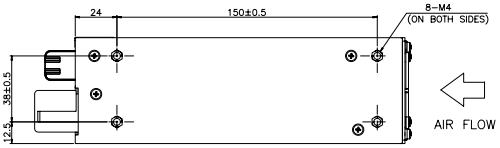
PIN CONFIGURATION AND FUNCTIONS OF CN3

PIN No.	FUNCTION
1	COM : GROUND FOR PC AND PV SIGNAL
2	COM : GROUND FOR PC AND PV SIGNAL
3	AUX : AUXILIARY OUTPUT (12V 0.1A)
4	CNT1 : REMOTE ON/OFF
5	G2 : GROUND FOR AUX AND CNT1
6	G2 : GROUND FOR AUX AND CNT1
7	ALM : ALARM
8	G1 : ALARM GROUND



NAME PLATE (SCALE: 1:1)





SIGNAL CONNECTOR USED

PART DESCRIPTION	PART NAME	MANUFACT
PIN HEADER	S10B-PHDSS (CN1,CN2) S8B-PHDSS (CN3)	JST

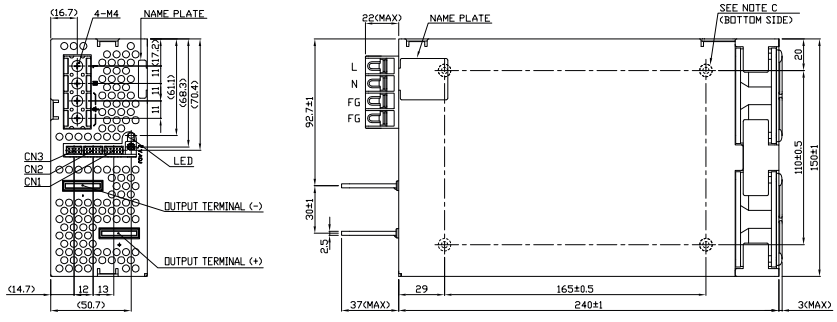
MATCHING HOUSINGS, PIN & TOOL

PART DESCRIPTION	PART NAME	MANUFACT
SOCKET HOUSING	PHDR-10VS (CN1,CN2) PHDR-8VS (CN3)	JST
TERMINAL PINS	SPHD-002T-P05(AWG28~24) SPHD-001T-P05(AWG26~24)	JST
HAND CRIMPING TOOL	YRS-620(SPHD-002T-P0.5) YC-610R(SPHD-001T-P0.5)	JST

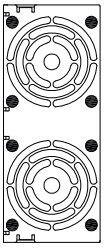
NOTE:

1: MODEL NAME, INPUT VOLTAGE RANGE, NOMINAL OUTPUT VOLTAGE, NOMINAL OUTPUT CURRENT AND PEAK OUTPUT CURRENT ARE SHOWN ON THE NAME PLATE IN ACCORDANCE WITH THE SPECIFICATIONS
2: COUNTRY OF MANUFACTURE IS SHOWN ON THE NAME PLATE IN ACCORDANCE WITH THE SPECIFICATIONS
3: M4 TAPPED HOLES (12) FOR CUSTOMER CHASSIS MOUTING (SCREW PENETRATION DEPTH 6m/m MAX.)
4: RECOMMENDED SCREW TORQUE OUTPUT TERMINAL(M5 SCREW) = 2.5N·m
INPUT TERMINAL(M4 SCREW) = 1.27N·m

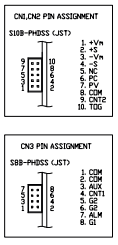
Outline Drawing SWS1000L Series



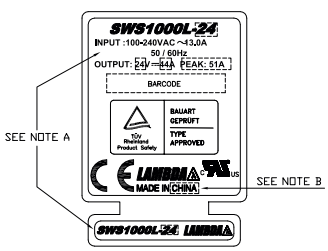
AIR FLOW



SIGNAL CONNECTOR INFORMATION



== NAME PLATE ==



== NOTES ==

A : MODEL NAME, INPUT VOLTAGE RANGE, NOMINAL OUTPUT VOLTAGE, NOMINAL OUTPUT CURRENT AND PEAK OUTPUT CURRENT ARE ON NAME PLATE IN ACCORDANCE WITH THE SPECIFICATIONS.
B : COUNTRY OF MANUFACTURE IS SHOWN HERE.
C : M4 TAPPED HOLES (12) FOR CUSTOMER CHASSIS MOUNTING. (SCREW PENETRATION DEPTH 6m/m MAX.)

== ACCESSORIES ==

* SHORT PIECE ----------1
SHORTING +Vm−+S, −Vm−−S
(ATTACHED ON CN1 AT SHIPMENT)

== SIGNAL CONNECTOR USED ==

PART DESCRIPTION	PART NAME	MANUFACT
PIN HEADER (CN1 & CN2)	S10B-PHDSS	JST
PIN HEADER (CN3)	S8B-PHDSS	JST

== MATCHING HOUSINGS , PINS & TOOL ==

PART DESCRIPTION	PART NAME	MANUFACT
SOCKET HOUSING (CN1 & CN2)	PHDR-10VS	JST
SOCKET HOUSING (CN3)	PHDR-8VS	JST
TERMINAL PINS	SPHD-002T-P0.5(AWG28-24) SPHD-001T-P0.5(AWG26-22)	JST
HAND CRIMPING TOOL	YRS-620(SPHD-002T-P0.5) YC-610R(SPHD-001T-P0.5)	JST

Cots Industrial Test Comm

3200W 3 Phase Input Industrial Power Supplies

Features	Benefits
• 400/440/480 VAC (Nominal) 3 Phase Delta or Wye	• Global Use
• Fully Regulated, Wide Range Adjustable Output	• Versatile Application
• Voltage and Current Programming	• Flexible Control Options
• -40°C (start up) to +70°C operation	• Suitable for Rugged Environments
• >92% Efficiency	• Easy System Cooling
• PMBus Communication	• Easier System Monitoring
• Built in ORing FET for parallel operation	• Suitable for N + 1 Redundancy

Specification

Model		TPS3000-24	TPS3000-48
Input Voltage (47-63Hz)	VAC	350 - 528VAC, Delta or Wye 3 phase	
Input Current	A	6A per phase max, steady state	
Inrush Current	A	<15A per phase (excluding initial spike charging EMI capacitors lasting <2mS)	
Power Factor Correction	-	0.93 typical	
Efficiency (1)	%	92.5%	92.5%
Ripple & Noise (Pk-Pk) (max) (2)	mV	130mV	260mV
Line Regulation	%	<0.25%	
Load Regulation	%	<0.5%	
Overcurrent Protection	-	Adjustable (70-105% of rated current)	
Overvoltage Protection	V	115% of setpoint (tracking)	
Thermal Protection	-	Internal thermostat. Automatic reset	
Hold Up Time	ms	>10mS at 80% of rated current, nominal input/output voltage	
Remote Sense	-	Compensates for a total of 1V cable drop	
Dropped Phase Signal	-	Open collector; off during normal operation, strobing during dropped phase state	
Remote On / Off	-	Selectable logic - enable or inhibit	
AC Fail Signal	-	Open Collector, ON when AC is above 340VAC and unit is enabled	
DC Good Signal	-	Open Collector, ON when output is above 85 to 95% of setpoint (tracking)	
Remote Adjust	-	0 - 5V adjusts output from V max to V min	
Parallel Connection	-	Single wire current share, up to 8 units. Built in ORing FET	
Standby Voltage	-	11.2V to 12.5V, 0.3A	
Operating Temperature	°C	-40°C to +70°C, see derating curve (20 min warm up needed for <-10°C)	
Storage Temperature	°C	-40°C to +85°C	
Temperature Coefficient	%/°C	0.02%/°C	
Humidity (non condensing)	%RH	10 - 90%RH	
Cooling	-	Internal variable speed fan	
Withstand Voltage	VAC	Input - Ground 2,000VAC, Input - Output 3,000VAC, Output - Ground 500VAC	
Isolation Resistance	MΩ	>100MΩ (25deg, 70%RH)	
Vibration	-	Designed to meet MIL-STD-810F, Method 514.5, Procedure I, Cat 1, 10	
Shock	-	Designed to meet MIL-STD-810F, Method 516.5, Procedure I, IV & VI	
Safety Agency Certifications	-	UL/CSA60950-1, EN60950-1, CE mark for LVD and RoHS2	
Voltage Dips	-	SEMI F47-0706	
Leakage Current	mA	<3mA	
Conducted Emissions	-	EN55022 Class A, FCC part 15 Class-A	
Immunity	-	EN61000-4-2, -3, -4, -5, -6, -8, -11	
Altitude	m	4000m	
Weight	kg	3.5	
Size (W x H x D)	mm	107 x 84.4 x 324 (excluding output busbars)	
Warranty	yrs	3	

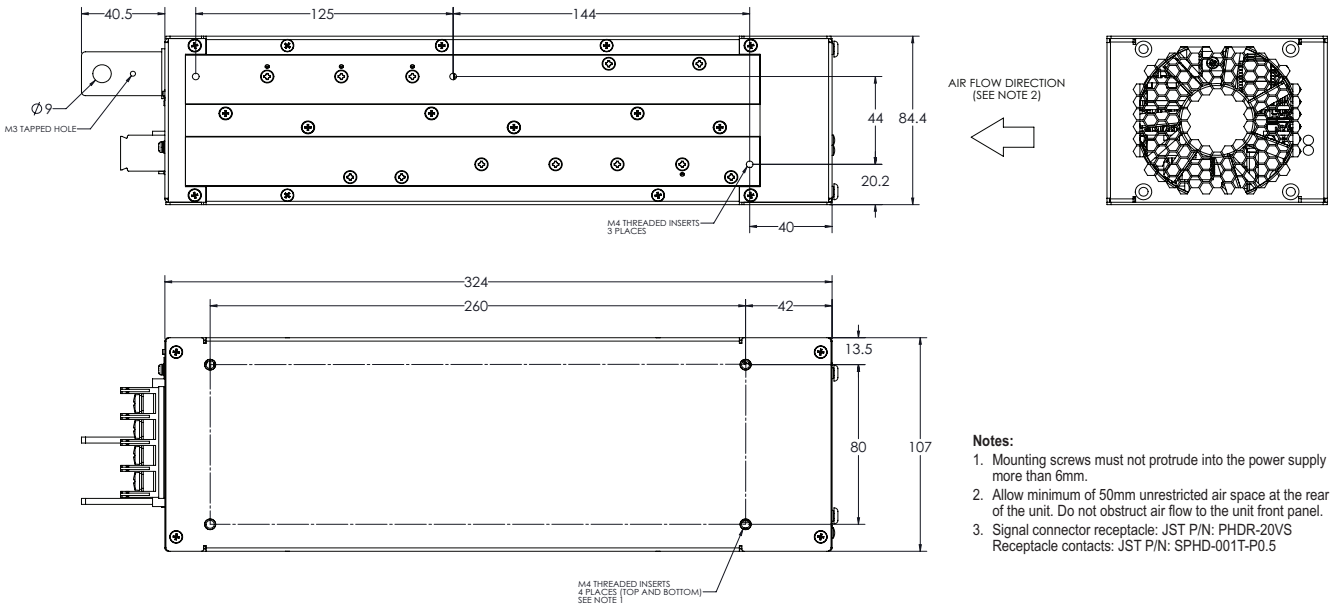
Notes: **(1)** Typical, 75-100% at rated current **(2)** Consult Installation Manual for detailed specifications, test methods and application notes

Model Selector

Model	Nominal Voltage (V)	Adjust. (4) Range (V)	Rated Current (A)	Maximum (3) Current (A)	Rated Power (W)	Maximum (3) Power (W)
TPS3000-24	24	19.2 - 29	125	133.3	3000	3200
TPS3000-48	48	38.4 - 58	66.7	66.7	3200	3200

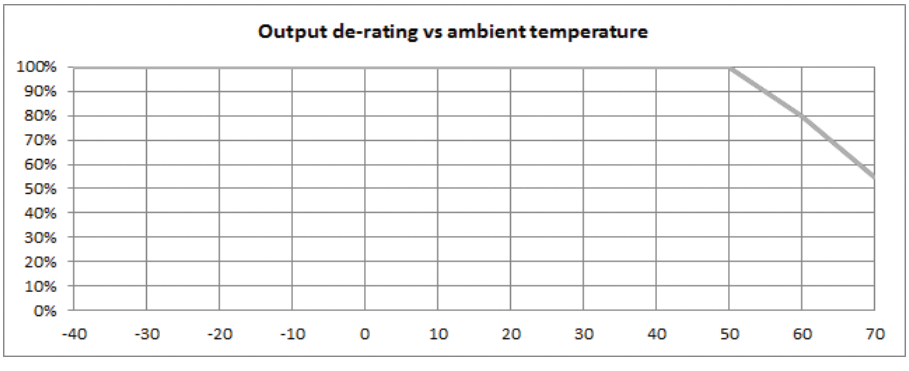
Notes: **(3)** Rated at nominal output voltage only.
(4) A minimum load of 0.5A is required to maintain regulation and ripple spec throughout the output voltage adjustment range.

Outline Drawing TPS3000 Series



Notes:
1. Mounting screws must not protrude into the power supply more than 6mm.
2. Allow minimum of 50mm unrestricted air space at the rear of the unit. Do not obstruct air flow to the unit front panel.
3. Signal connector receptacle: JST P/N: PHDR-20VS
   Receptacle contacts: JST P/N: SPHD-001T-P0.5

Derating Curve TPS3000 Series



4080W 3-Phase Input Industrial Power Supplies

COTS Industrial Test COMM Broadcast

The TPS series industrial AC-DC power supplies offer output power up to 4,080W in a 2U high package with 3 phase supply input. Features include voltage and current programming, remote on/off, remote sense, a standby supply, PMBus communication, built in ORing FET and wide operating temperature range of -40°C to +70°C. The TPS4000 is also designed to meet MIL-STD-461F/G RE102 EMI and MIL-STD-810F vibration and shock.

Features	Benefits
• 400/440/480 VAC (Nominal) 3 Phase Delta or Wye	• Global Use
• Fully Regulated, Wide Range Voltage Adjustment	• Versatile Application
• Voltage and Current Programming	• Flexible Control and Adjustment
• -40°C (start up) to +70°C operation	• Suitable for Rugged Environments
• 92% Typical Efficiency	• Less Energy Used
• PMBus Communication	• Remote Output Programming and Monitoring
• Built in ORing FET for parallel operation	• Suitable for N + 1 Redundancy

Model Selector

Model	Nominal Output Voltage (V)	Adjustment Range (V)	Max Current (A)	Max Power (W)	Max Current at Nominal Voltage (A)	Max Power at Nominal Voltage (V)
TPS4000-24	24	19.2 - 28.5	166	4000	170	4080
TPS4000-48	48	38.4 - 58	83.3	4000	85	4080

Contact Factory for status

Specification

Model		TPS4000
Input		
Input Voltage range	V	350 - 528VAC, Delta or Wye 3 phase
Input Frequency	Hz	47 - 63Hz
Input Current (At nominal Vin)	A	8A per phase (steady state)
Inrush Current at 400-480VAC (Cold Start)	A	<25A per phase (excluding initial filter capacitor charging <2ms)
Dropped Phase Power	W	1600W. Not recommended for long term operation
Leakage Current	uA	<3mA
Power Factor (400-480VAC)	-	0.92 typical at rated load, nominal Vin
Harmonics	-	Not applicable
Hold Up Time (typ) at 115VAC Input	ms	>10ms at 80% of rated current, nominal input/output voltage
Efficiency (Typical)	-	92%
Conducted & Radiated EMI	-	EN55032-A Conducted and radiated (In end system)
Immunity	-	EN61000, see immunity table. MIL-STD-461F/G CS101, CS114 (Army Ground), CS115, CS116
Line Dip	-	SEMI F47-0706 at 480VAC nominal (Criteria B)
Safety Agency Certifications	-	UL/CSA60950-1, EN60950-1, CE mark (LVD, EMC and RoHS)

Immunity

Test	Standard	Test Level	Criteria	Notes
ESD	EN61000-4-2	±8 kV air discharge, ±4 kV contact discharge	B	See test report
Radiated Susceptibility	EN61000-4-3	3 V/m from 80-1000 MHz (80% AM at 1kHz)	A	See test report
Electrical Fast Transient Burst	EN61000-4-4	Power line pulses of ± 1 kV; I/O line pulses of ± 0.5 kV	B	See test report
Surge	EN61000-4-5	3±2kV common mode, ±1kV differential mode	B	See test report
Conducted Susceptibility	EN61000-4-6	3 Vrms, 150 kHz - 80 MHz 1 kHz 80% AM	A	See test report
Magnetic fields	EN61000-4-8	Inductive loop at 50 Hz, to 30.0 amps (rms) per meter & 300.0 amps (rms) per meter	A	See test report
Voltage Dips and Input Interruptions	EN61000-4-11	Voltage Dips of 30% and >95%; Interruptions of >95%.	B / C	See test report

Specification

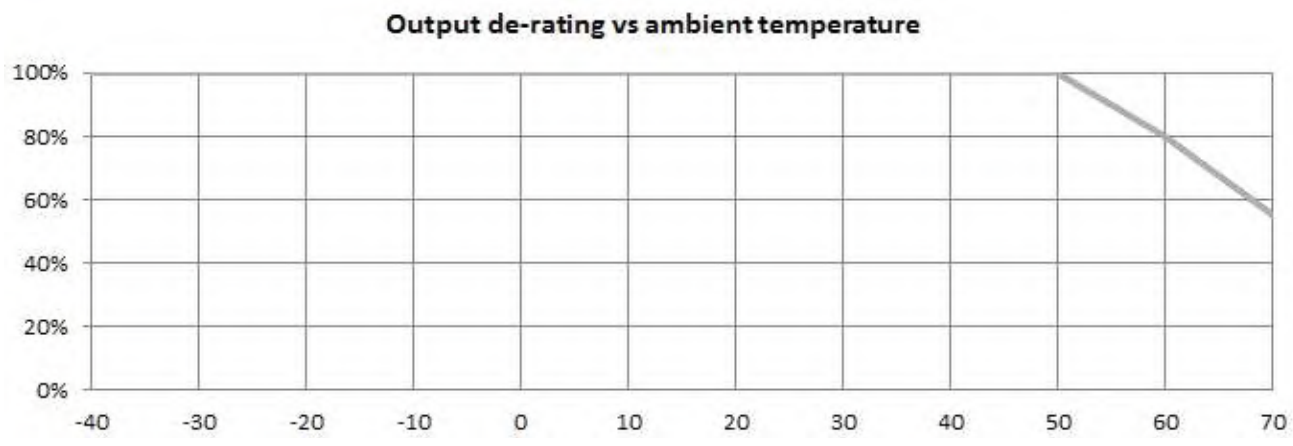
Model		TPS4000
Output		
Line Regulation	%	<0.25%
Load Regulation	%	<0.5%
Total Regulation	%	<1.75%
Warm Up Drift	%	<0.2%
Temperature Stability	-	0.05% of rated Vout for 8hrs after 30min warmup
Temperature Coefficient	ppm/°C	200ppm/°C
Ripple & Noise (pk-pk) Maximum	mV	24V model: 240mV, 48V model: 480mV
Minimum Load	A	None
Overcurrent Protection	%	Adjustable (70-105% of maximum rated current). Constant current style.
Overvoltage Protection	%	115% of output voltage set point (tracking). Cycle AC or use the remote on/off to reset
Overtemperature Protection	-	Internal thermostat. Automatic reset
Fan Fail	-	Blocked or fan failure detection. Cycle AC input or use PMBus to reset
Remote Sense	-	Compensates for a total of 1V cable drop
Remote On/Off	-	Enable or inhibit (selectable)
Voltage Programming	-	0 - 5V external voltage adjusts the output from Vout max to Vout min
Overcurrent Programming	-	0 - 5V external voltage adjusts the current limit from Iout max to Iout min
DC Good	-	Open Collector, ON when output is above 90% of output set point (tracking)
AC Fail	-	Open Collector, ON when AC input is above 340VAC, the load is >30% and unit is enabled
Dropped Phase Warning	-	Open collector, OFF during normal operation, active low during dropped phase state. Load >30%
Standby Voltage	-	11.2 - 12.5V, 0.3A
Indicators	-	Green LEDs indicates DC is OK and AC is ON. Blinking red/green during dropped phase (Load >30%)
Parallel Operation	-	Single wire current share, up to 8 units. (Internal ORing MOSFETs are fitted). Derate to 90% output power
Series Operation	-	Possible, see installation manual

Specification

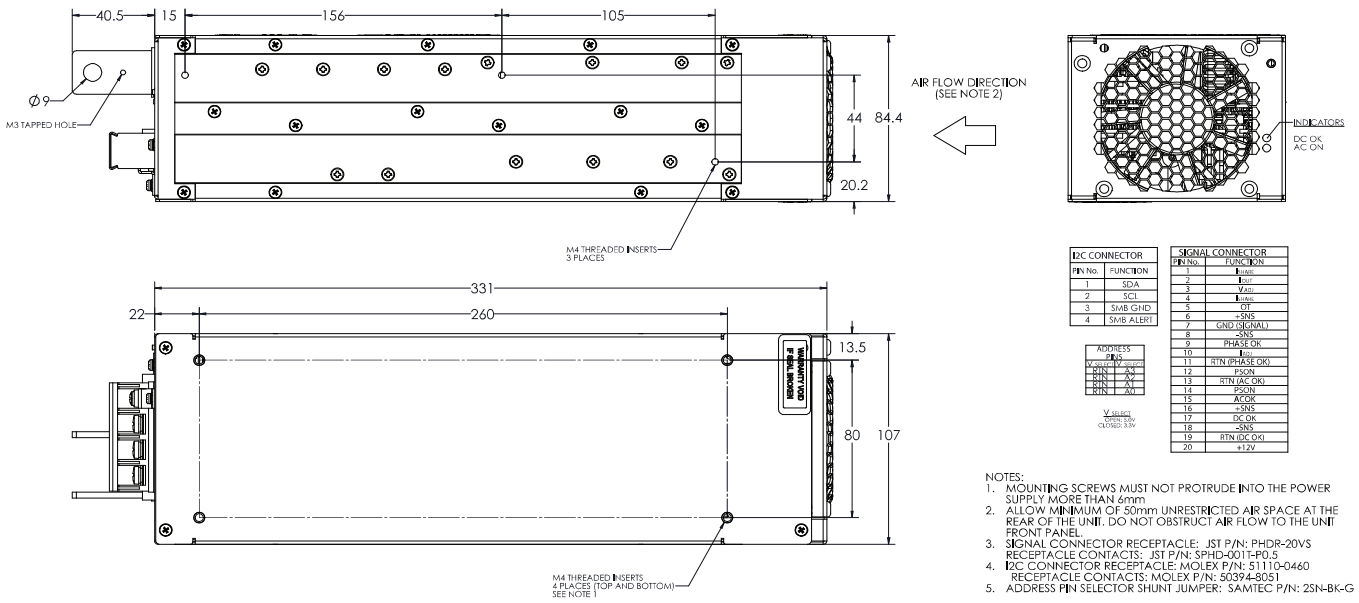
Model		TPS4000
Environmental		
Operating Temperature (-40°C start-up)	°C	-10° to +70°, derate linearly from 100% to 80% load from 50° to 60°, and from 80% to 55% at 70° (At -40°C a 10 min warm up at 80% load is required to meet specification)
Storage Temperature	°C	-40° to +85°
Humidity (non condensing)	%RH	10 - 95%RH
Cooling	-	Internal variable speed fan
Altitude	m	4,000m
Withstand Voltage (For 1 minute)	VAC	Input to Ground 2,000VAC, Input to Output 3,000VAC, Output to Ground 500VDC
Isolation Resistance	MΩ	>100MΩ at 25°C, 70%RH & 500VDC
Vibration (Operating)	-	Designed to meet MIL-STD-810F, Method 514.5, Proc I, Category 1, 10
Shock	-	Designed to meet MIL-STD-810F, Method 516.5, Procedure I, IV & VI
Other		
Weight (Typ)	g	4,000
Size (WxHxD)	mm	107 x 84.4 x 335 (excluding output busbars)
Size (WxHxD)	Inches	4.21 x 3.33 x 13.2 (excluding output busbars)
Mating Connectors	-	Signal: Housing, JST PHDR-20VS, Crimp terminals, SPHD-001T-P0.5 PMBus shunt jumper: Samtec 2SN-BK-G
MTBF - Telcordia SR-332 issue 3	hrs	250,000 hours Method 1, Ground Benign, 25C, nominal input
Warranty	yrs	3 years
PMBus Functions		
Output Voltage Monitoring		
Output Current Monitoring		
Internal Temperature Monitoring		
Remote On/Off Programming		
Remote Voltage Programming		
Remote Overcurrent Programming		
Fault Clearing		
Reading Manufacturing Related Data		

Notes
See website for detailed specifications, test methods and installation manual

Derating Curve



Outline Drawing



I2C CONNECTOR	
PIN No.	FUNCTION
1	SDA
2	SCL
3	SMB GND
4	SMB ALERT

SIGNAL CONNECTOR	
PIN No.	FUNCTION
1	I_{SHARE}
2	I_{OUT}
3	V_{ADJ}
4	I_{SHARE}
5	OT
6	+SNS
7	GND (SIGNAL)
8	-SNS
9	PHASE OK
10	I_{SCL}
11	RTN (PHASE OK)
12	PSON
13	RTN (AC OK)
14	PSON
15	ACOK
16	+SNS
17	DC OK
18	-SNS
19	RTN (DC OK)
20	+12V

ADDRESS PINS		
V_{ADJ} SELECT		V_{ADJ} SELECT
RTN	A3	
RTN	A2	
RTN	A1	
RTN	A0	

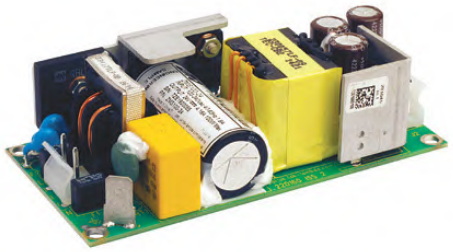
V_{ADJ} SELECT
OPEN: 5.0V
CLOSED: 3.3V

NOTES:
1. MOUNTING SCREWS MUST NOT PROTRUDE INTO THE POWER SUPPLY MORE THAN 6mm
2. ALLOW MINIMUM OF 50mm UNRESTRICTED AIR SPACE AT THE REAR OF THE UNIT. DO NOT OBSTRUCT AIR FLOW TO THE UNIT FRONT PANEL.
3. SIGNAL CONNECTOR RECEPTACLE: JST P/N: PHDR-20VS
   RECEPTACLE CONTACTS: JST P/N: SPHD-001T-P0.5
4. I2C CONNECTOR RECEPTACLE: MOLEX P/N: 51110-0460
   RECEPTACLE CONTACTS: MOLEX P/N: 50394-8051
5. ADDRESS PIN SELECTOR SHUNT JUMPER: SAMTEC P/N: 2SN-BK-G

LED Industrial Test Comm Broadcast Medical

80W Convection, 100W Forced-Air Cooled Single Output Power Supplies

Features	Benefits
• Long e-cap lifetime	• Better field reliability and service life
• Compact 2 x 4 inch footprint	• Space saving in end equipment
• Medical approval with 2 x MoPP isolation	• Suitable for B and BF type medical equipment
• Suitable for Class I and Class II installations	• Flexible utilisation
• Ceramic start-up cap	• Eradicates start-up cap dry out problems



Specification (1)

Model		ZMS100
AC Input Voltage range (2) (4)	-	85 - 264VAC (47-63Hz)
Input Fusing		Line and neutral
Input Current (Typ) (230V/115Vac)	A	1.0 / 2.0
Inrush Current - cold start	A	<40 (max at 264Vac input)
Harmonic Compliance	-	Compliant to EN/IEC61000-3-2 class A
Temperature Coefficient	-	<0.02% / °C
Typical Hold Up Time at 80W load,115/230Vac	ms	22 / 108
Typical Hold Up Time at 100W load,115/230Vac	ms	16 / 84 *(see graphs for more detail)*
Leakage Current	μA	<100μA at 100V 60Hz input, <250μA at 230V 50Hz
Touch Current (enclosure leakage)	μA	<100 μA
Cooling	-	80W with convection cooling, 100W max. with forced air cooling (see airflow rate graphs)
Efficiency	-	Up to 90% (see efficiency curves)
Operating Temperature	°C	-20°C to +70°C, derate linearly to 50% load from 50°C to 70°C
Storage Temperature	°C	-40°C to +85°C
Operational Altitude	-	5000m
Overcurrent Protection		hiccup (auto recovery)
Overvoltage Protection		Latching (unit shutdown, recycle mains to restart)
No Load Input Power at 230Vac	W	<0.5
Average Active Efficiency	%	>87
Humidity (non condensing)	RH	Operating and storage : 5 - 95% (non-condensing)
Withstand Voltage	-	Input to output 4kVac 2x MoPP, 1.5kVac input to ground 1x MoPP, 1.5kVac output to ground 1 x MoPP
Isolation Resistance	Ω	>100MΩ at 25°C & 70%RH
Isolation Class (3)		Construction suitable for Class II installations
Vibration	-	10 to 500Hz at 2G, EN60068-2-6 19,6m/s² Constant, X, Y, Z 1 hour each.
Shock	-	30G EN60068-2-27, -47, MIL-STD-810E
Approvals	-	IEC/EN/UL/CSA 62368-1, 60950-1 and 60601-1, ANSI/AAMI ES 60601-1, CE Mark. Designed to meet IEC/EN/UL/CSA 61010-1:2010. ZMS100-12, 15 and 24 are type tested to EN 60335-1.
Conducted & Radiated EMI (5)		EN 55011 / EN 55032 level B conducted, level A radiated
Weight (Typ)	g	150
Size (W x L x H)	mm	50.8 x 101.6 x 31.9
Warranty	yrs	3
Connectivity		Molex as standard with separate ground faston Input Molex 10-63-4027, output Molex 09-65-2048

Notes: **1.** Specification parameters apply at 25°C ambient temperature unless stated otherwise.

2. For 12V & 15V unit derate from 100% at 100V to 90% at 90V and to 80% at 85V, for 24V, 36V, & 48V unit derate from 100% at 90V to 90% at 85V. (convection and forced air ratings) .

3. ZMS100 uses Y1 capacitors to earth.

4. Consult Sales Office for use under DC Input conditions.

5. Additional measures will be needed if used in environments where Class B radiated is required.

Model Selector

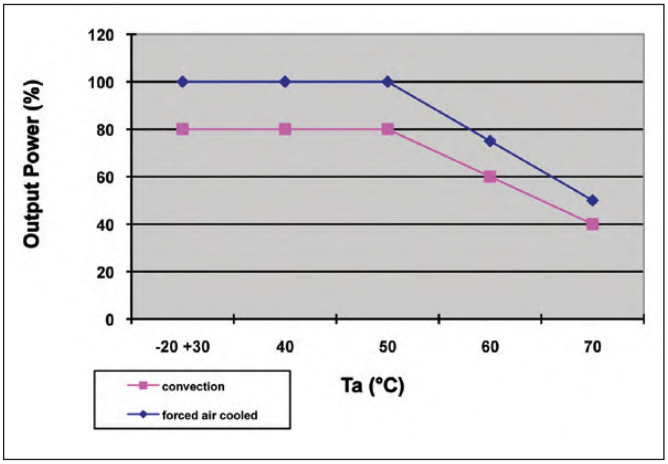
Model	Nominal Output Voltage (V)	Output Adjust Range (V)	Maximum Current Convection (A)	Maximum Current Forced Air (A)	Maximum Output Power Convection (W)	Maximum Output power Forced Air (W)	Ripple [6] and noise (mv pk-pk)	Load Reg from 0 - full load (mv)	Line Reg from 85-264Vac (mv)
ZMS100-12	12	11.4 to 13.2	6.7	8.4	80.4	100.8	120	120	60
ZMS100-15	15	14.25 to 16.5	5.4	6.7	81.0	100.5	150	150	75
ZMS100-24	24	22.8 to 26.4	3.4	4.2	81.6	100.8	240	240	120
ZMS100-36	36	34.2 to 39.6	2.25	2.8	81.0	100.8	360	360	180
ZMS100-48	48	45.6 to 52.8	1.67	2.1	80.2	100.8	480	480	240

Note: **6.** At 115Vac input, 25°C.

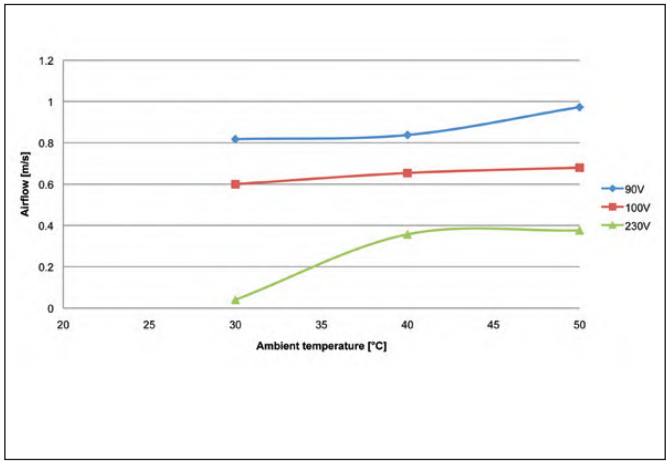
Immunity Levels

Test	Standard	Test Level	Criteria	Notes
ESD	EN61000-4-2	4	A	
Radiated Susceptibility	EN61000-4-3	3	A	inc proximity field requirements of EN60601-1-2:2015
Electrical Fast Transient Burst	EN61000-4-4	4	A	(AC Port, 5kHz and 100KHz)
Surge	EN61000-4-5	3	A	-
Conducted Susceptibility	EN61000-4-6	3	A	-
Magnetic fields	EN61000-4-8	4	A	-
Voltage Dips & Interruptions	EN61000-4-11 Class 3 Industrial inc EN55024 (100VAC)	0% for 1/2 cycle	A/B	A up to 94W, B above 94W
		0% for 1 cycle	A/B	A up to 54W, B above 54W
		40% for 10/12 cycles	B	-
		70% for 25/30 cycles	A/B	A up to 54W, B above 54W
		80% for 250/300 cycles	A/B	A up to 94W, B above 94W
		0% for 250/300 cycles	B	-
	EN61000-4-11 Class 3 Industrial inc EN55024 (240VAC)	0% for 1/2 cycle	A	100W
		0% for 1 cycle	A	100W
		40% for 10/12 cycles	A	-
		70% for 25/30 cycles	A	-
		80% for 250/300 cycles	A	-
		0% for 250/300 cycles	B	-
	EN60601-1-1:2015 (100VAC)	0% for 1/2 cycle	A/B	A up to 94W, B above 94W
		0% for 1 cycle	A/B	A up to 54W, B above 54W
		70% for 25/30 cycles	A/B	A up to 54W, B above 54W
		0% for 250/300 cycles	B	-
	EN60601-1-1:2015 (240VAC)	0% for 1/2 cycle	A	100W
		0% for 1 cycle	A	100W
		70% for 25/30 cycles	A	-
		0% for 250/300 cycles	B	-
Ringwave Test	EN61000-4-12	3	A	-
Voltage Fluctuations	EN61000-4-14	Class 3	A	-

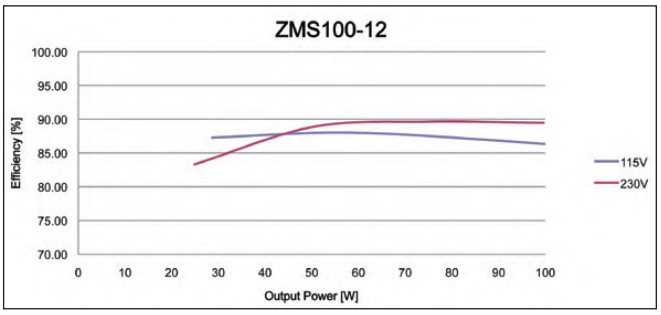
Output Derating ZMS100 SeriesOutput

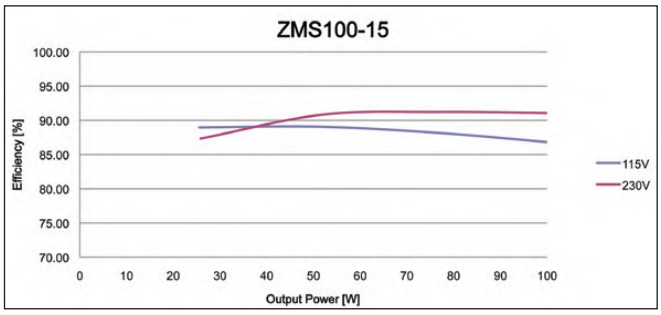


Minimum Required Airflow for ZMS100-24 at 100W

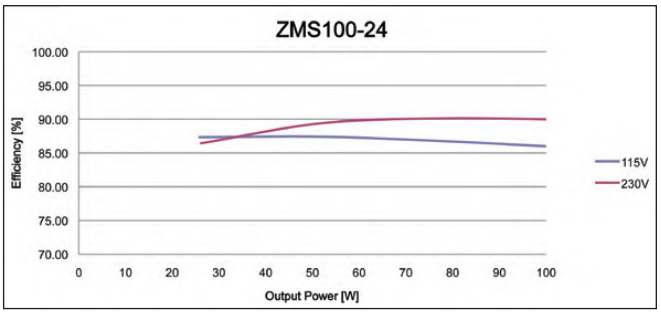


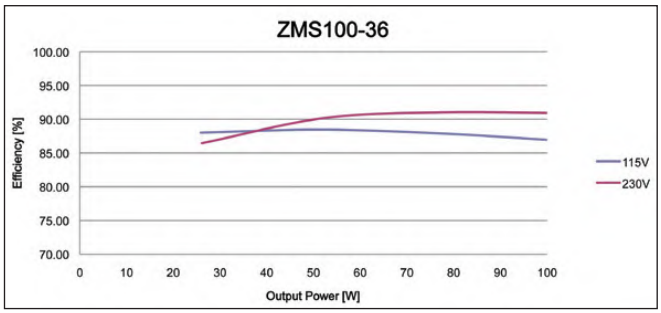
ZMS100 Series Efficiency Curves

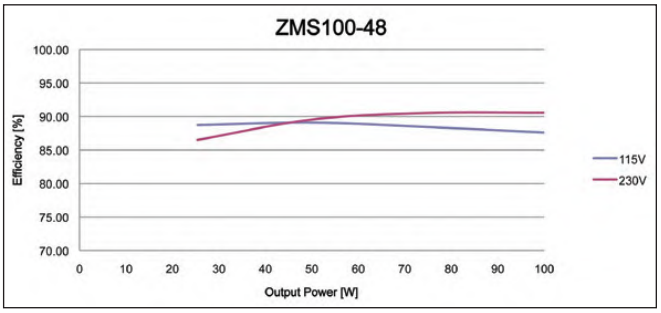




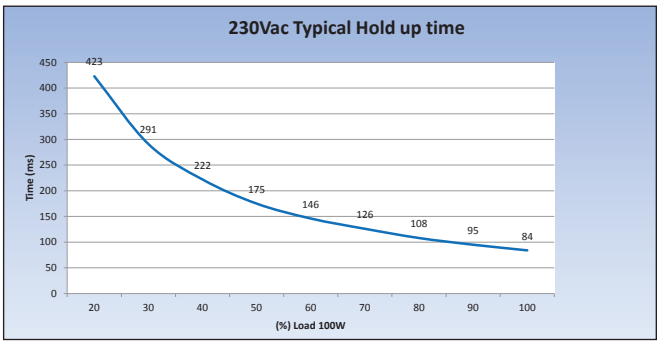
ZMS100 Series Efficiency Curves

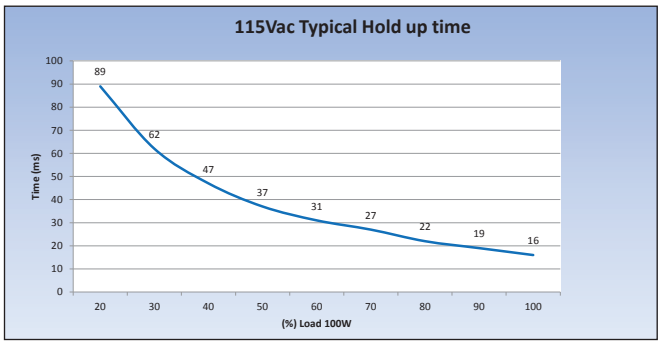




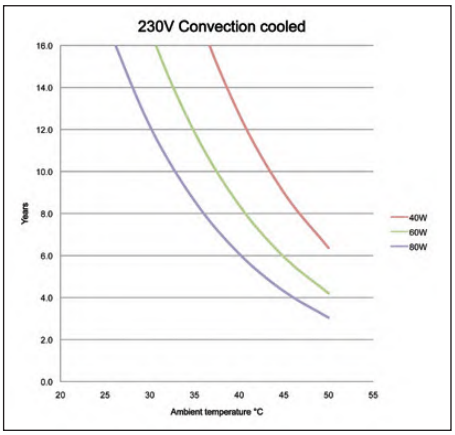


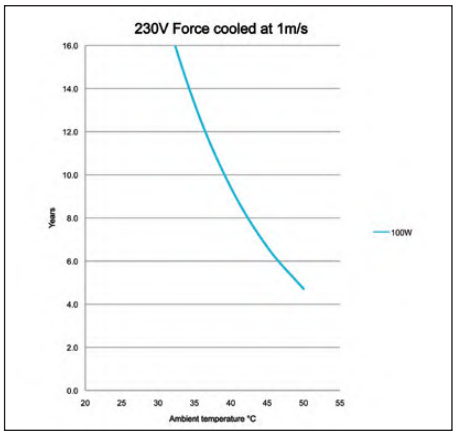
Hold Up Time Characteristics for ZMS100 (12V)





Electrolytic Capacitor: Example Life Curve





Notes: Based on ZMS100-12 bulk cap life estimates. Consult TDK-Lambda for other operating condition examples.

- Single and Multiple Outputs
- Wide Range AC Input
- Low Profile, Industry Standard Footprint
- Global Safety Agency Compliance
- RoHS Compliant

Key Market Segments & Applications

Video/Audio Routers
Datacom
Point of Sale
Test and Measurement
LED Signs and Lighting

ZP40 & 60 Series

2" x 4" 40W to 60W
AC-DC Power Supplies

ZP40 & 60 Features and Benefits

Features	Benefits
• Industry Standard Footprint	• Available to Second Source
• Up to 88% efficiency	• Less System Heating
• Broad Product Range	• Optimization of Power Supply to System
• Meets EN61000-4 Immunity	• Greater Reliability

Specifications

ITEMS / MODEL		ZPS40	ZPS60	ZPD40	ZPT40
Input Voltage range	-	90 - 264VAC (47 - 440Hz) or 120 - 370VDC			
Inrush Current (132/265VAC)	A	25 / 50 (cold start)			
Input Current (115/230VAC)	A	1.6 / 1.0			
Temperature Coefficient	-	±0.05%/°C			
Voltage Accuracy	-	±1%		V1: ±3%, V2: ±4%, V3: ±3%	
Minimum Load	A	None		V1: 0.4A, V2: 0.2A	
Load Regulation (1)	-	±1%		V1: ±3%, V2: ±5%, V3: ±1%	
Line Regulation (2)	-	±0.5%		V1: ±1%, V2: ±2%, V3: ±1%	
Ripple & Noise (3)(4)	mV	1% or 50mV whichever is greater			
Short Circuit Protection	-	Continuous - hiccup mode			
Overvoltage Protection	V	Typically 110-130% of nominal			
Hold Up Time (Typ)	ms	8ms at 115VAC input			
LED Indicator	-	Green LED = OK		None	
Operating Temperature		0 to +70°C with derating			
Storage Temperature	-	-20 to +85°C			
Humidity (non condensing)	-	10 - 95% RH			
Cooling	-	Convection			
Withstand Voltage		Input to Ground 1.5kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.			
Isolation Resistance		>100MΩ at 25°C & 70%RH, Output to Ground 500VDC			
Vibration (non operating)		23.52m/s^2 (10 - 55Hz: constant sweep 1 min X, Y, Z for 1 hour)			
Shock	-	< 196.1 m/s^2 (20G)			
Safety Agency Approvals (6)	-	UL60950-1, CSA60950-1, EN60950-1 Class I, CE Mark (LVD)			
Conducted & Radiated EMI (5)	-	EN55022-B, FCC Class B			
Immunity	-	EN61000-4-2,-3,-4,-5,-6,-8			
Weight (Typ)	g	180g			
Size (WxLxH)	mm	101.6 X 50.8 X 30.48 (including underside components)			
Warranty	yrs	2			

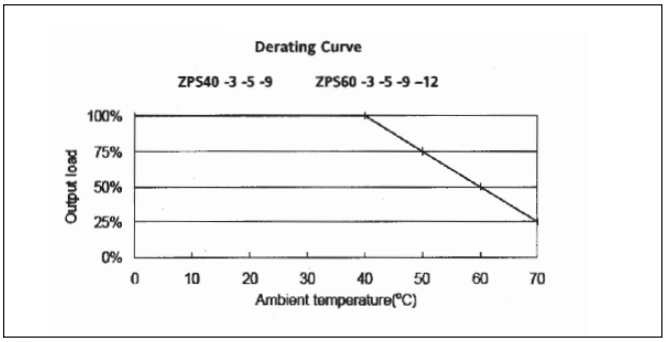
Notes:

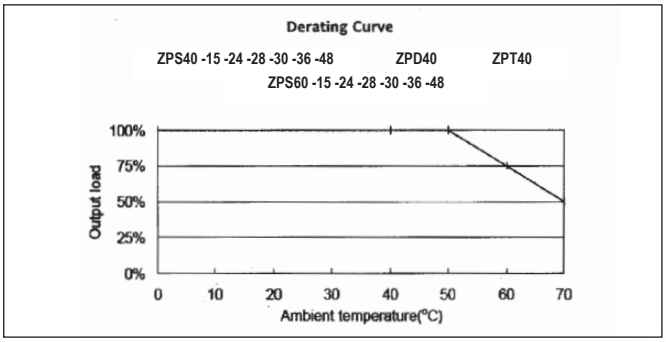
(1) ZPD, ZPT for a 60% to 100% or 100% to 60% change in load
(2) ZPT40-3512N V2: ±3%, ZPS/ZPD40: 100-240VAC
(3) Measured with 0.1μF ceramic & 10μF electrolytic at 20MHz BW
(4) ZPT40-3512N, V1 & V2 100mV
(5) ZPD/2PT models may require additional external filtering to meet conducted Class B
(6) Consult Sales Office for use under DC Input conditions

Model Selector

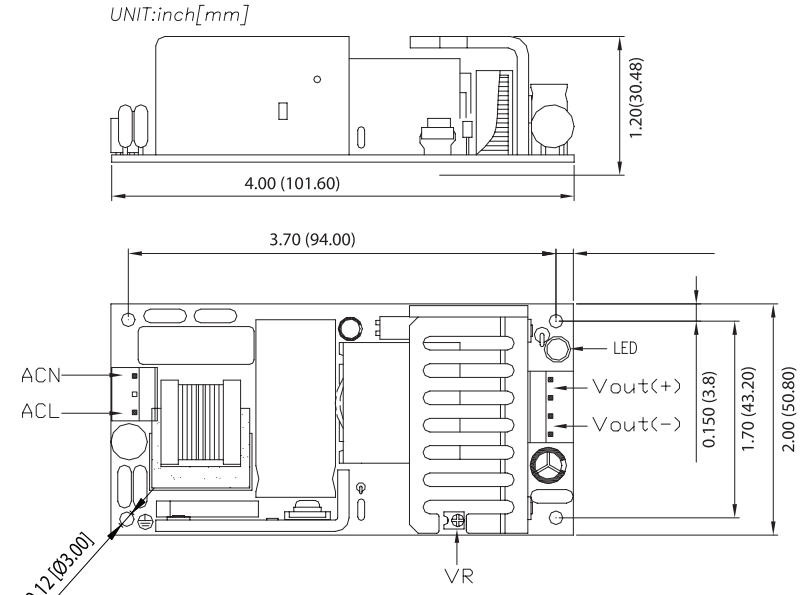
	Model		Output Voltage (V)	Maximum Output (A)	Peak Load (A) (5)	Output Pwr (W)	Eff.(3) (typ)%
Single Output	ZPS40-3R3	V1	3.3	6.0	7.2	20.0	74
	ZPS60-3R3	V1	3.3	8.0	8.5	26.0	74
	ZPS40-5	V1	5.0	6.0	7.2	30.0	78
	ZPS60-5	V1	5.0	8.0	9.0	40.0	78
	ZPS40-9	V1	9.0	4.45	5.34	40.0	82
	ZPS60-9	V1	9.0	6.67	8.0	60.0	82
	ZPS40-12	V1	12.0	3.34	4.0	40.0	84
	ZPS60-12	V1	12.0	5.0	6.0	60.0	84
	ZPS40-15	V1	15.0	2.67	3.2	40.0	85
	ZPS60-15	V1	15.0	4.0	4.8	60.0	85
	ZPS40-24	V1	24.0	1.67	2.0	40.0	86
	ZPS60-24	V1	24.0	2.5	3.0	60.0	86
	ZPS40-28	V1	28.0	1.43	1.71	40.0	86
	ZPS60-28	V1	28.0	2.14	2.57	60.0	86
	ZPS40-30	V1	30.0	1.33	1.6	40.0	86
	ZPS60-30	V1	30.0	2.0	2.4	60.0	86
	ZPS40-36	V1	36.0	1.11	1.33	40.0	87
	ZPS60-36	V1	36.0	1.67	2.0	60.0	87
	ZPS40-48	V1	48.0	0.834	1.0	40.0	88
	ZPS60-48	V1	48.0	1.25	1.5	60.0	88
Dual	ZPD40-512 (7)	V1	+5.0	3.2	4.0	40.0	77
		V2	+12.0	2.0	2.5		
	ZPD40-524 (7)	V1	+5.0	3.2	5.0	40.0 (6)	78
		V2	+24.0	1.0	1.5		
Triple Output	ZPT40-5125N (7)	V1	+5.0	3.2	5.0	40.5 (6)	75
		V2	+12.0	2.0	2.5		
		V3	-5.0	0.3	0.5		
	ZPT40-51212N (7)	V1	+5.0	3.2	5.0	42.6 (6)	75
		V2	+12.0	2.0	2.5		
		V3	-12.0	0.3	0.5		
	ZPT40-51515N (7)	V1	+5.0	3.2	4.5	42.0 (6)	75
		V2	+15.0	1.5	2.3		
		V3	-15.0	0.3	0.5		
	ZPT40-52412N (7)	V1	+5.0	3.2	5.0	42.6 (6)	75
		V2	+24.0	1.0	1.5		
		V3	-12.0	0.3	0.5		
	ZPT40-5245N (7)	V1	+5.0	3.2	5.0	40.5 (6)	75
		V2	+24.0	1.0	1.5		
		V3	-5.0	0.3	0.5		
	ZPT40-52412P (7)	V1	+5.0	3.2	5.0	42.6 (6)	75
		V2	+24.0	1.0	1.5		
		V3	+12.0	0.3	0.5		
	ZPT40-3512N (7)	V1	+3.3	5.0	7.0	30.0	70
		V2	+5.0	2.0	3.5		
		V3	-12.0	0.3	0.5		

Notes: (5) Average not to exceed max power, <30s, 10% duty cycle
(6) 50 with 30CFM forced air cooling, derate linearly to 35W from 50°C to 70°C
(7) Min Load V1: 0.4A, V2: 0.2A



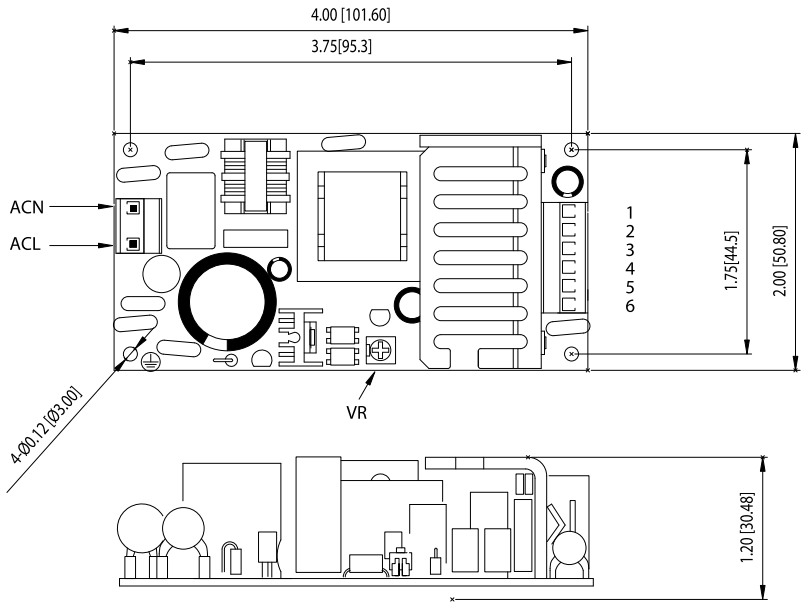


Outline Drawing ZPS Series



Input Connector Mates with Molex Housing 09-50-3031 and Molex 2478 Series Crimp Terminal
Output Connector Mates with Molex Housing 09-50-3041 and Molex 2478 Series Crimp Terminal

Outline Drawing ZPD/ZPT Series



Input Connector Mates with Molex Housing 09-50-3031 and Molex 2478 Series Crimp Terminal
Output Connector Mates with Molex Housing 09-50-3061 and Molex 2478 Series Crimp Terminal

Pin Connection (ZPD/ZPT)

PIN	Function	PIN	Function
1	V2	2	V1
3	V1	4	COM
5	COM	6	V3

INTERMEDIATE VOLTAGES AVAILABLE
PLEASE CONSULT SALES

- Wide Range AC Input
- Low Profile, Industry Standard Footprint
- Global Safety Agency Compliance
- RoHS Compliant

Key Market Segments & Applications

Video/Audio Routers
Datacom
Point of Sale
Test and Measurement
LED Signs and Lighting

ZPSA20 Series

2" x 3.5" 20W AC-DC
Power Supplies

ZPSA20 Features and Benefits

Features	Benefits
• Industry Standard Footprint	• Available to Second Source
• Up to 82% efficiency	• Less System Heating
• Broad Product Range	• Optimization of Power Supply to System
• Meets EN61000-4 Immunity	• Greater Reliability

Specifications

ITEMS / MODEL		ZPSA20
Input Voltage range (1)	-	85 - 264VAC (47 - 440Hz) or 120 - 370VDC
Inrush Current	A	40A max at 240VAC input, 25°C ambient cold start,
Input Current (115/230VAC)	A	0.4 / 0.25
Leakage Current	mA	0.6mA maximum (264VAC, 60Hz)
Temperature Coefficient	-	±0.05%/°C
Voltage Accuracy	-	±1%
Minimum Load	A	None
Load Regulation	-	±1%
Line Regulation	-	±0.5%
Ripple & Noise (2)	mV	1% or 50mV whichever is greater
Short Circuit Protection	-	Continuous - hiccup mode
Overvoltage Protection	V	Typically 110-130% of nominal
Hold Up Time (Typ)	ms	12ms at 115VAC input
Operating Temperature		0 to +70°C with derating
Storage Temperature	-	-20 to +85°C
Humidity (non condensing)	-	10 - 95% RH
Cooling	-	Convection
Withstand Voltage		Input to Ground 1.5kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.
Isolation Resistance		>100ΩM at 25°C & 70%RH, Output to Ground 500VDC
Vibration (non operating)		23.52m/s^2 (10 - 55Hz: constant sweep 1 min X, Y, Z for 1 hour)
Shock	-	< 196.1 m/s^2 (20G)
Safety Agency Approvals	-	UL60950, CSA60950, EN60950-1 Class 1, CE Mark (LVD)
Conducted & Radiated EMI	-	EN55022-B, FCC Class B
Immunity	-	EN61000-4-2,-3,-4,-6,-8
Weight (Typ)	g	100g
Size (WxLxH)	mm	88.9 X 50.8 X 20.32 (including underside components)
Warranty	yrs	2

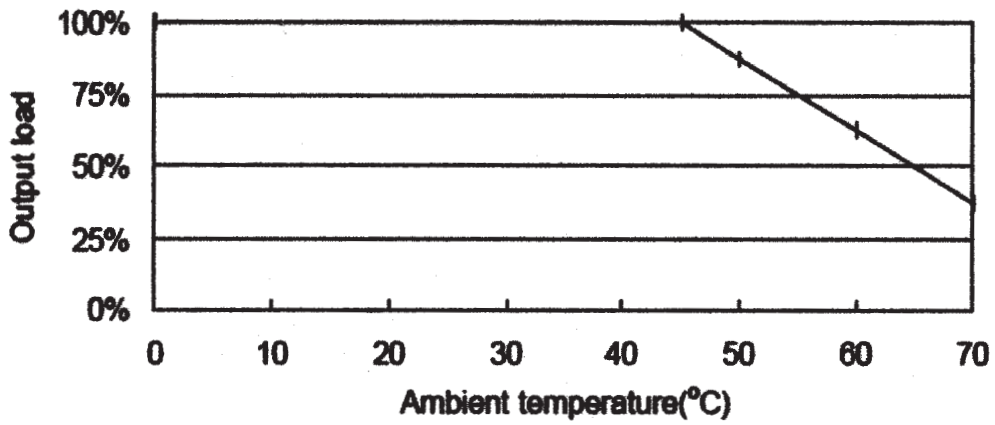
Notes:
(1) Safety certified for 47 - 63Hz input only (2) Measured with 0.1μF ceramic & 10μF electrolytic at 20MHz BW

Model Selector

Model		Output Voltage (V)	Maximum Output (A)	Peak Load (A) (1)	Efficiency (2) (typ)%
ZPSA20-3R3	V1	3.3	4.4	6.6	74
ZPSA20-5	V1	5.0	4.4	6.6	77
ZPSA20-9	V1	9.0	2.4	4.0	80
ZPSA20-12	V1	12.0	1.8	2.7	80
ZPSA20-15	V1	15.0	1.4	2.1	80
ZPSA20-24	V1	24	0.9	1.4	82

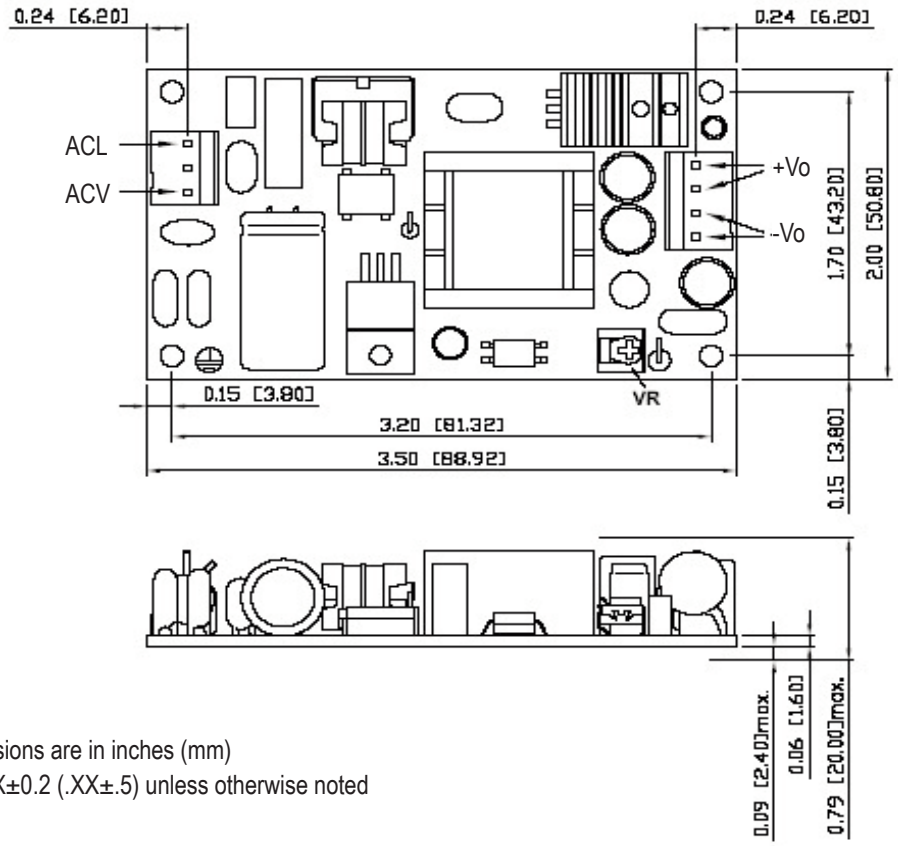
Notes: **(1)** Average not to exceed max power, <30s, 10% duty cycle (high line 240VAC)
(2) Preliminary Data

Derating Curve ZPSA20 Series



INTERMEDIATE VOLTAGES AVAILABLE
PLEASE CONSULT SALES

Outline Drawing ZPSA20 Series



Note: All Dimensions are in inches (mm)
Tolererances: XX±0.2 (.XX±.5) unless otherwise noted

Options
Suffix
Add Suffix -P for PCB Mount Pins

- Wide Range AC Input
- Low Profile, Industry Standard Footprint
- Global Safety Agency Compliance
- RoHS Compliant

Key Market Segments & Applications

Video/Audio Routers
Datacom
Point of Sale
Test and Measurement
LED Signs

ZPSA40 & 60 Series

2" x 4" 40W to 60W
AC-DC Power Supplies

ZPSA40 & 60 Features and Benefits

Features	Benefits
• Industry Standard Footprint	• Available to Second Source
• Up to 88% efficiency	• Less System Heating
• Broad Product Range	• Optimization of Power Supply to System
• Meets EN61000-4 Immunity	• Greater Reliability

Specifications

ITEMS / MODEL		ZPSA40	ZPSA60
Input Voltage range	-	90 - 264VAC (47 - 440Hz) or 120 - 370VDC	
Inrush Current (132/265VAC)	A	25 / 50	
Input Current (115/230VAC)	A	< 1.2A	< 1.4A
Leakage Current	mA	0.8mA max (264VAC, 60Hz)	
Temperature Coefficient	-	±0.05%/°C	
Voltage Accuracy	-	±1%	
Minimum Load	A	None	
Load Regulation	-	±1%	
Line Regulation	-	±0.5%	
Ripple & Noise (1)	mV	1% or 50mV whichever is greater	
Short Circuit Protection	-	Continuous - hiccup mode	
Overvoltage Protection	V	Typically 110-130% of nominal	
Hold Up Time (Typ)	ms	8ms at 115VAC input	
LED Indicator	-	Green LED = OK	
Operating Temperature		0 to +70°C with derating	
Storage Temperature	-	-20 to +85°C	
Humidity (non condensing)	-	10 - 95% RH	
Cooling	-	Convection	
Withstand Voltage		Input to Ground 1.5kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.	
Isolation Resistance		>100MΩ at 25C & 70%RH, Output to Ground 500VDC	
Vibration (non operating)		23.52m/s² (10 - 55Hz: constant sweep 1 min X, Y, Z for 1 hour)	
Shock	-	< 196.1 m/s² (20G)	
Safety Agency Approvals	-	UL60950-1, CSA60950-1, EN60950-1 Class I, CE Mark (LVD)	
Conducted & Radiated EMI	-	EN55022-B, FCC Class B	
Immunity	-	EN61000-4-2,-3,-4,-5,-6,-8	
Weight (Typ)	g	130g	
Size (WxLxH)	mm	101.6 X 50.8 X 27.1 (including underside components)	
Warranty	yrs	2	

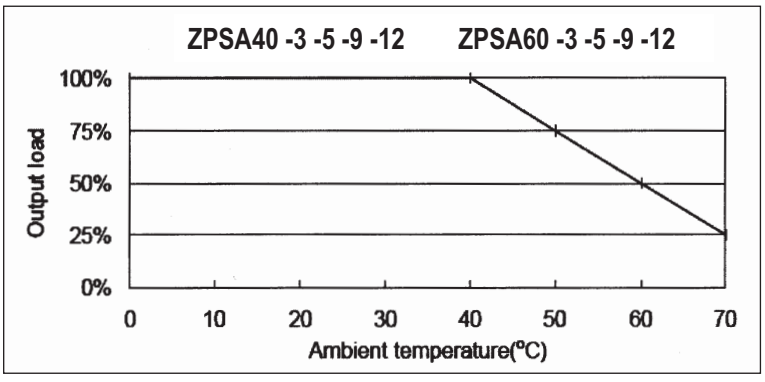
Notes: (1) Measured with 0.1μF ceramic & 10μF electrolytic at 20MHz BW

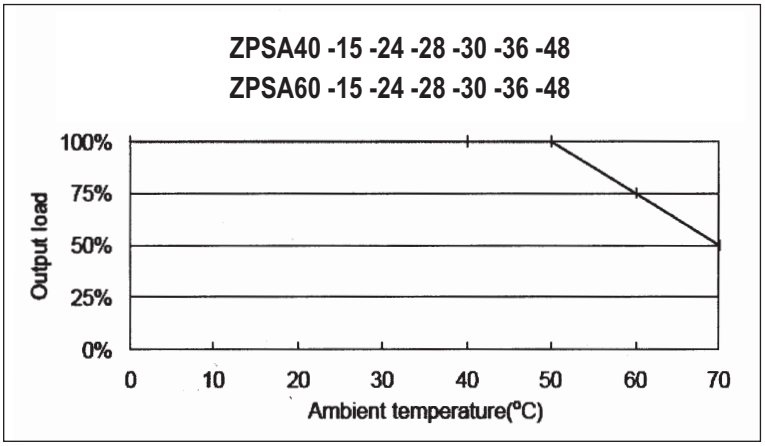
Model Selector

Model		Output Voltage (V)	Maximum Output (A)	Peak Load (A) (2)	Output Power (W)	Efficiency (typ)%
ZPSA40-3R3	V1	3.3	6.0	7.2	20.0	74
ZPSA60-3R3	V1	3.3	8.0	8.5	26.0	74
ZPSA40-5	V1	5.0	6.0	7.2	30.0	79
ZPSA60-5	V1	5.0	8.0	9.0	40.0	79
ZPSA40-9	V1	9.0	4.45	5.34	40.0	83
ZPSA60-9	V1	9.0	6.67	8.0	60.0	83
ZPSA40-12	V1	12.0	3.34	4.0	40.0	85
ZPSA60-12	V1	12.0	5.0	6.0	60.0	85
ZPSA40-15	V1	15.0	2.67	3.2	40.0	85
ZPSA60-15	V1	15.0	4.0	4.8	60.0	85
ZPSA40-24	V1	24.0	1.67	2.0	40.0	86
ZPSA60-24	V1	24.0	2.5	3.0	60.0	86
ZPSA40-28	V1	28.0	1.43	1.71	40.0	86
ZPSA60-28	V1	28.0	2.14	2.57	60.0	86
ZPSA40-30	V1	30.0	1.33	1.6	40.0	86
ZPSA60-30	V1	30.0	2.0	2.4	60.0	86
ZPSA40-36	V1	36.0	1.11	1.33	40.0	87
ZPSA60-36	V1	36.0	1.67	2.0	60.0	87
ZPSA40-48	V1	48.0	0.834	1.0	40.0	87
ZPSA60-48	V1	48.0	1.25	1.5	60.0	87

Notes: **(2) Average not to exceed max power, <30s, 10% duty cycle**

Derating Curve ZPSA40 & 60 Series

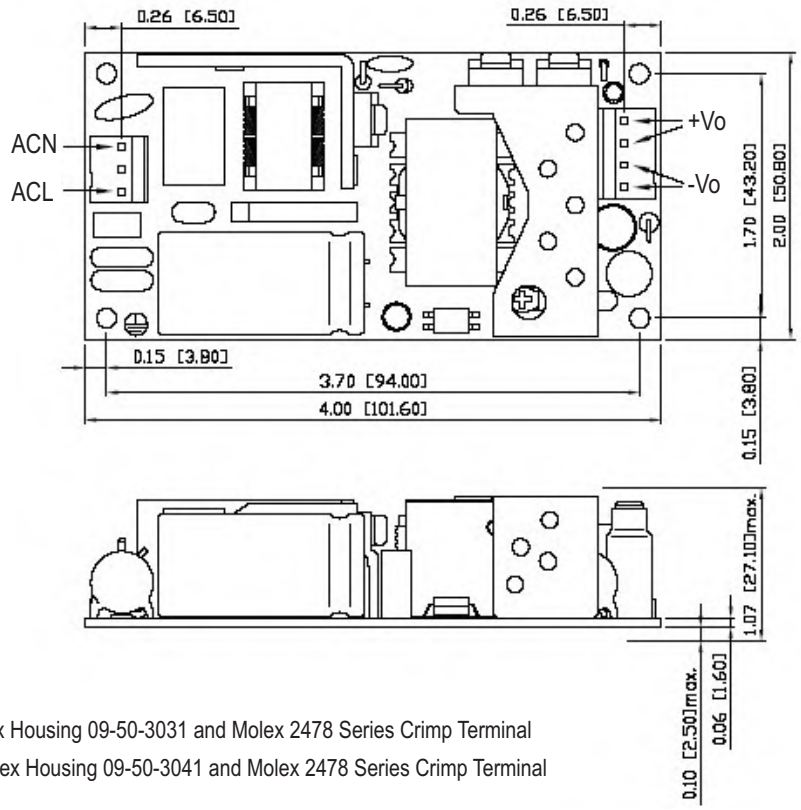




INTERMEDIATE VOLTAGES AVAILABLE
PLEASE CONSULT SALES

Outline Drawing ZPSA40 & 60 Series

Note: All Dimensions are in inches (mm)
Tolererances: XX±0.2 (.XX±.5) unless otherwise noted



Input Connector Mates with Molex Housing 09-50-3031 and Molex 2478 Series Crimp Terminal
Output Connector Mates with Molex Housing 09-50-3041 and Molex 2478 Series Crimp Terminal

Options

Suffix	Description
Blank	Molex connectors
/P	PCB mount pins

- PFC
- Wide Range AC Input
- Low Profile, Industry Standard Footprint
- Global Safety Agency Compliance
- RoHS Compliant

Key Market Segments & Applications

Video/Audio Routers
Datacom
Point of Sale
Test and Measurement
LED Information Displays

ZPSA100 Series

3" x 5" 100W AC-DC
Power Supplies

ZPSA100 Features and Benefits

Features	Benefits
• Industry Standard Footprint	• Available to Second Source
• Up to 90% efficiency	• Less System Heating
• Broad Product Range	• Optimization of Power Supply to System
• Meets EN61000-4 Immunity	• Greater Reliability
• Low Profile	

Specifications

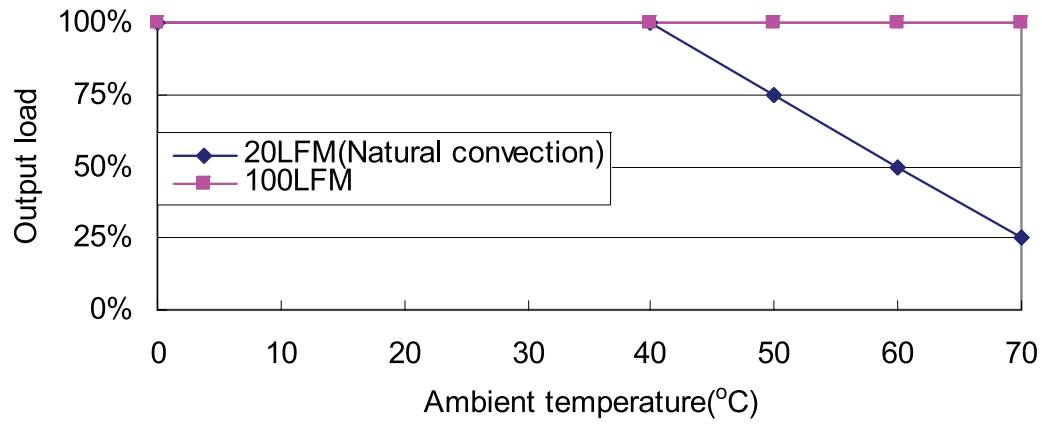
ITEMS / MODEL		ZPSA100
Input Voltage range	-	90 - 264VAC (47 - 440Hz) or 120 - 370VDC
Inrush Current	A	25 / 50 (cold start)
Input Current (115/230VAC)	A	1.1 / 0.6
Temperature Coefficient	-	±0.05%/°C
Voltage Accuracy	-	±1%
Minimum Load	A	None
Load Regulation	-	±1%
Line Regulation	-	±0.5%
Ripple & Noise (1)	mV	1% (for 5V, 2% or 50mV whichever is greater)
Short Circuit Protection	-	Foldback
Overvoltage Protection	V	Typically 110-130% of nominal, auto recovery
Hold Up Time (Typ)	ms	16ms at 115VAC input
Operating Temperature	°C	0 to +70°C with derating/air flow
Storage Temperature	°C	-20 to +85°C
Humidity (non condensing)	-	10 - 95% RH
Cooling (2)	-	Convection/air flow
Withstand Voltage		Input to Ground 1.5kVAC, Input to Output 3kVAC, Output to Ground 500VAC for 1 min.
Isolation Resistance		>100MΩ at 25°C & 70%RH, Output to Ground 500VDC
Vibration (non operating)		23.52m/s² (10 - 55Hz: constant sweep 1 min X, Y, Z for 1 hour)
Shock	-	< 196.1 m/s² (20G)
Safety Agency Approvals	-	UL/CSA/EN60950-1 (2nd Ed) Class I , CE Mark (LVD)
Conducted & Radiated EMI	-	EN55022-B, FCC Class B
Immunity	-	EN61000-4-2,-3,-4,-6,-8
Weight (Typ)	g	385
Size (WxLxH)	mm	127 X 76.2 X 26.6 (including underside components)
Warranty	yrs	2

Notes:
(1) 5V measured with 0.1μF ceramic & 220μF electrolytic at 20MHz BW, all other models measured with 0.1μF & 10uF ceramic electrolytic at 20MHz BW.
(2) 70°C operating with 100LFM air flow.

Model Selector

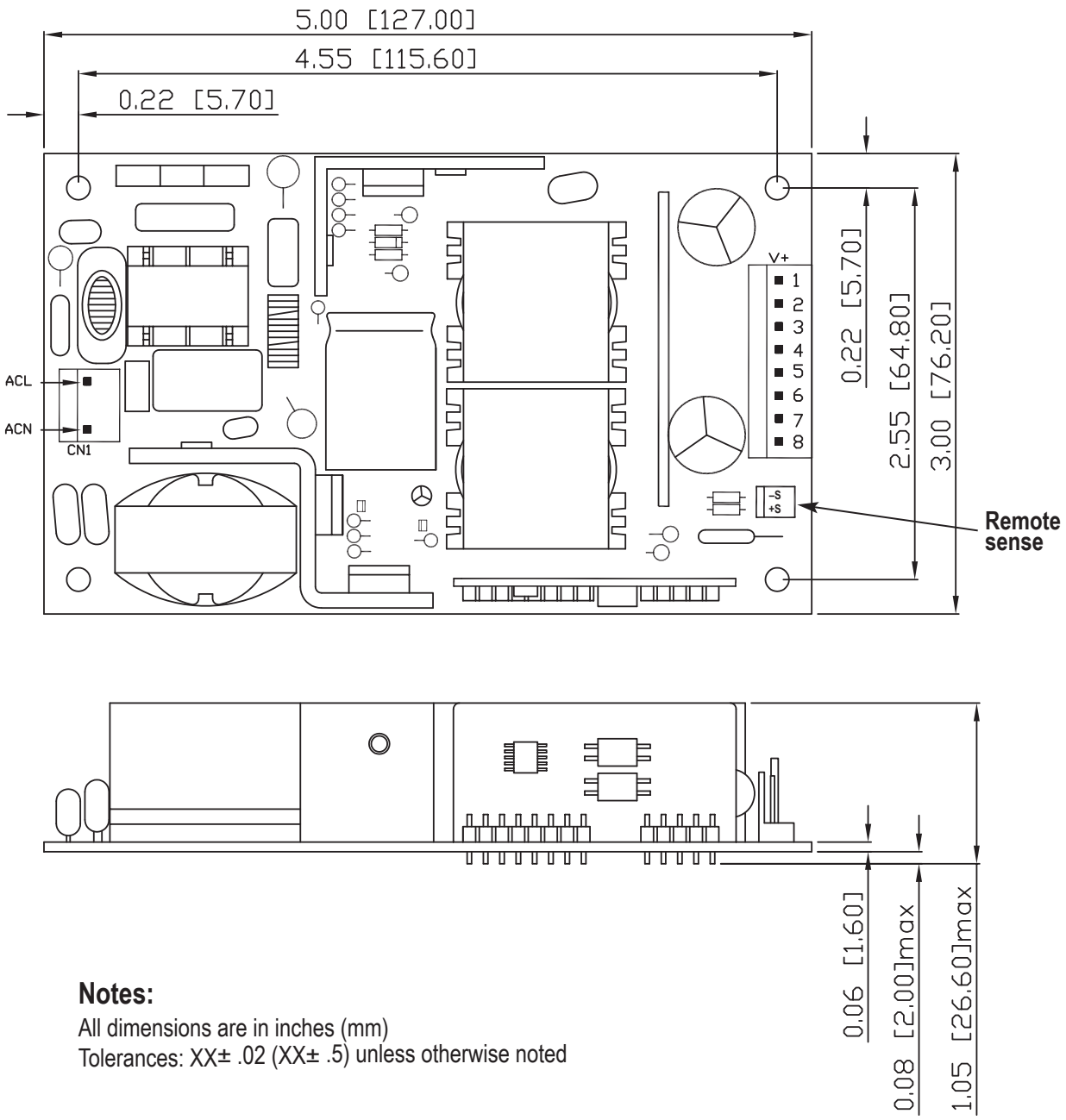
Model	Output Voltage (V)	Maximum Load (A)	Minimum Load (A)	Ripple and Noise	Voltage Accuracy	Line Regulation	Load Regulation
ZPSA100-5	5V	20A	0A	2%	+/- 1%	+/- 0.5%	+/- 1%
ZPSA100-9	9V	11.2A	0A	1%	+/- 1%	+/- 0.5%	+/- 1%
ZPSA100-12	12V	8.4A	0A	1%	+/- 1%	+/- 0.5%	+/- 1%
ZPSA100-15	15V	6.7A	0A	1%	+/- 1%	+/- 0.5%	+/- 1%
ZPSA100-18	18V	5.6A	0A	1%	+/- 1%	+/- 0.5%	+/- 1%
ZPSA100-24	24V	4.2A	0A	1%	+/- 1%	+/- 0.5%	+/- 1%
ZPSA100-48	48V	2.1A	0A	1%	+/- 1%	+/- 0.5%	+/- 1%

Derating Curve ZPSA100 Series



INTERMEDIATE VOLTAGES AVAILABLE
PLEASE CONSULT SALES

Outline Drawing ZPSA100 Series

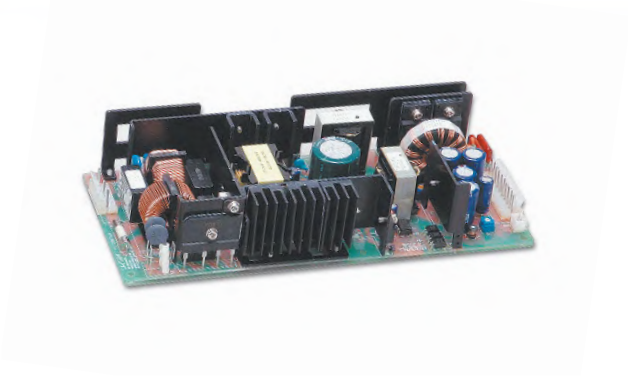


Notes:
All dimensions are in inches (mm)
Tolerances: XX± .02 (XX± .5) unless otherwise noted

PIN Assignments

Pin#	Function
1	Vout (+)
2	Vout (+)
3	Vout (+)
4	Vout (+)
5	Vout (–)
6	Vout (–)
7	Vout (–)
8	Vout (–)

Input Connector Mates with Molex Housing 09-50-3031 and Molex 2478 Series Crimp Terminal
Output Connector Mates with Molex Housing 09-50-1081 and Molex 5194 Series Crimp Terminal
Sense Connector Mates with Molex Housing 22-01-1022 and Molex 2759 or 5159 Crimp Terminal



- Universal Input (85 - 265VAC)
- Power Factor Corrected
- 200% Peak Power capability on 24V output
- 2 Year Warranty
- Individual output adjustment

ZWD-PAF Series

100W to 440W

Dual Output Power Supplies

Key Market Segments & Applications

Factory Automation
Printer and Motor Drives
Kiosks

ZWD-PAF Features and Benefits

Features	Benefits
• Input Transient Protected	• Withstands Harsh Environments
• Power Factor Corrected	• Supports Global Use
• 200% Peak Power Capability	• Can Drive High current Start Up Devices or pulse loads

Specifications

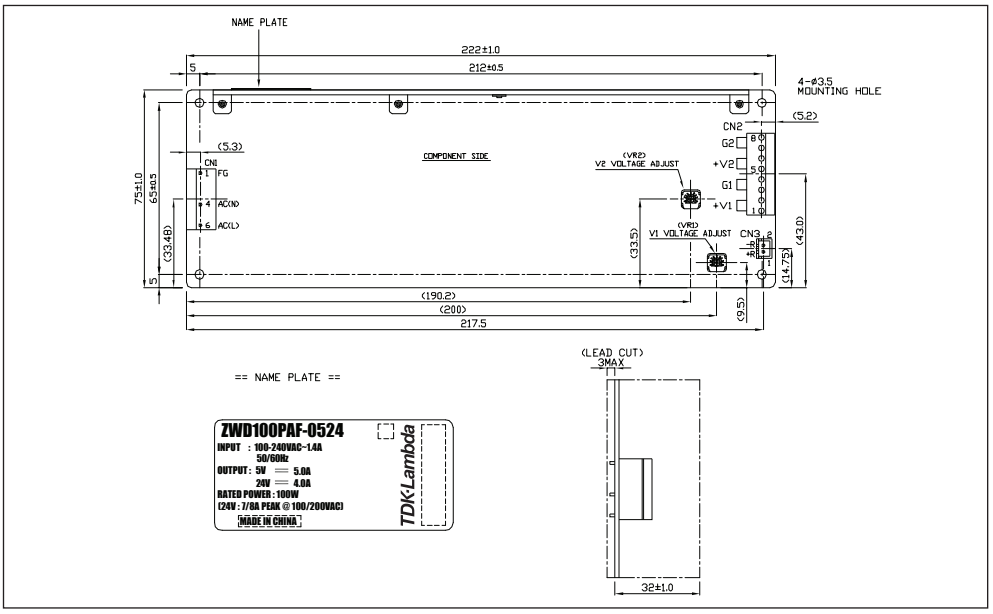
ITEMS / MODEL			ZWD100PAF-0524	ZWD150PAF-0524	ZWD225PAF-0524
Input Voltage		-	85-265VAC (47-63Hz), 120-370VDC		
Input Current	(1)	A	1.3 / 0.65	1.9 / 0.97	2.81 / 1.43
Inrush Current	(1)(2)	A	15 / 30		
Power Factor		-	0.99 at 100VAC, 0.95 at 200VAC, Meets EN61000-3-2		
Leakage Current		mA	0.75mA max		
Temperature Coefficient		-	<0.02%/°C		
Overcurrent Protection	(3)	-	5V output: >105%, 24V output: >205%		
Overvoltage Protection	(4)	V	120- 145%		
Hold Up Time (Typ)	(1)	ms	5V output: 40ms, 24V output: 20ms		
Efficiency	(2)	%	79 / 81	80 / 82	81 / 83
Remote On/Off		-	On 24V output only, remove jumper to shutdown		
Line Regulation		mV	5V output: 20mV, 24V output: 96mV		
Load Regulation		mV	5V output: 40mV, 24V output: 150mV		
Ripple & Noise		mV	5V output: 120mV, 24V output: 150mV		
Operating Temperature		-	(Open frame or L bracket) -10°C to +70°C, derate linearly to 0% load from 50°C to 70°C		
Operating Temperature		-	(With /A cover option) -10°C to +60°C, derate linearly to 0% load from 40°C to 60°C		
Storage Temperature		-	-30 to +85°C		
Humidity (non condensing)		-	Operating: 20 - 90%RH, Non-operating: 10 - 95% RH		
Cooling		-	Convection cooled		
Withstand Voltage		-	I/P to Gnd 2kVAC (20mA), I/P to O/P 3kVAC (20mA), O/P to Gnd 500VAC (100mA) for 1 min.		
Isolation Resistance		-	>100M at 25°C & 70%RH, Output to Ground 500VDC		
Vibration (non operating)		-	10 - 55Hz (1 minute sweep), 19.6m/s^2 constant X, Y, Z 1 hour		
Shock		-	< 196.1 m/s^2		
Safety Agency Approvals		-	EN60950-1, UL/CSA60950-1, EN50178, CE Mark		
Conducted & Radiated EMI		-	EN55022-B, FCC Class B, VCCI-B		
Immunity		-	EN61000-4-2, -3, -4, -5, -6, -8, -11		
Weight (Typ)		g	460 (780 with cover)	530 (885 with cover)	670 (1065 with cover)
Size (WxHxD)		mm	222 x 75 x 35	222 x 85 x 40	222 x 95 x 45
Warranty		yrs	2 Years		

Notes: See installation manual for full specification.
(1) 100/200VAC (2) 25°C ambient (cold start) (3) Avoid prolonged operation in overload (4) OVP on 24V output will shutdown 24V output only

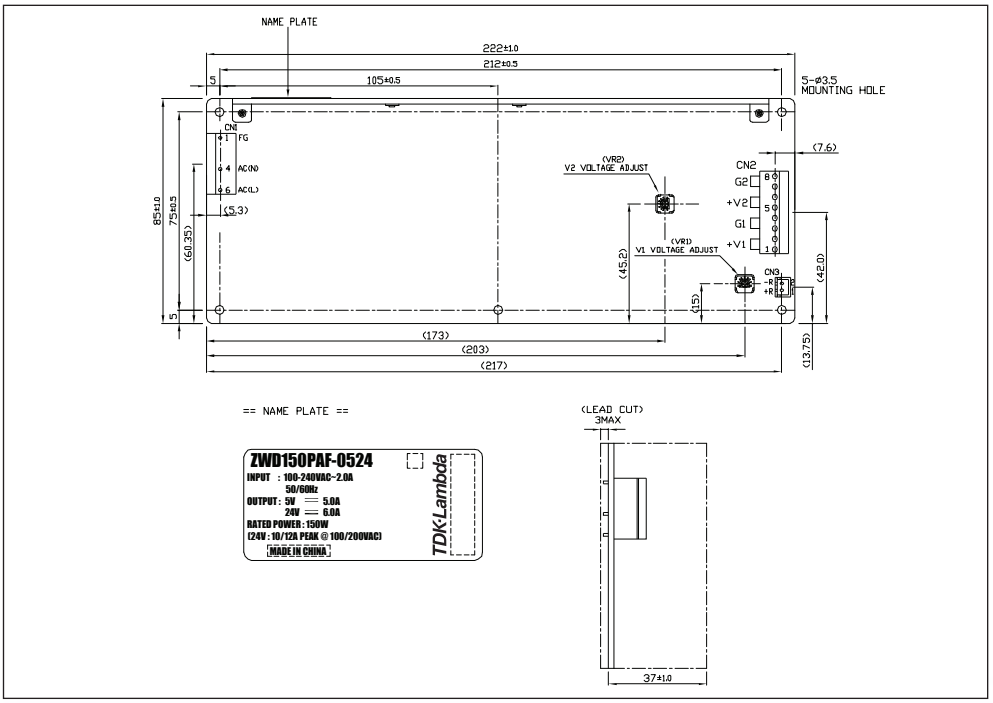
Model Selector

Model	Output Output Voltage	Output Voltage Accuracy	Adjust Range	Max Current	Peak[1,5] Current	Max Peak[1,5] Power	Total[1,5] Average Power	Peak Power
ZWD100PAF-0524	5V 24V	4.9 - 5.1V 23.52 - 24.48V	4.5 - 5.5V 22.8 - 27.6V	5A 4A	- 7 / 8A	- 168 / 192W	100W	172 / 196W
ZWD150PAF-0524	5V 24V	4.9 - 5.1V 23.52 - 24.48V	4.5 - 5.5V 22.8 - 27.6V	5A 6A	- 10 / 12A	- 240 / 288W	150W	246 / 294W
ZWD225PAF-0524	5V 24V	4.9 - 5.1V 23.52 - 24.48V	4.5 - 5.5V 22.8 - 27.6V	5A 9A	- 14 / 18A	- 336 / 432W	225W	344 / 440W

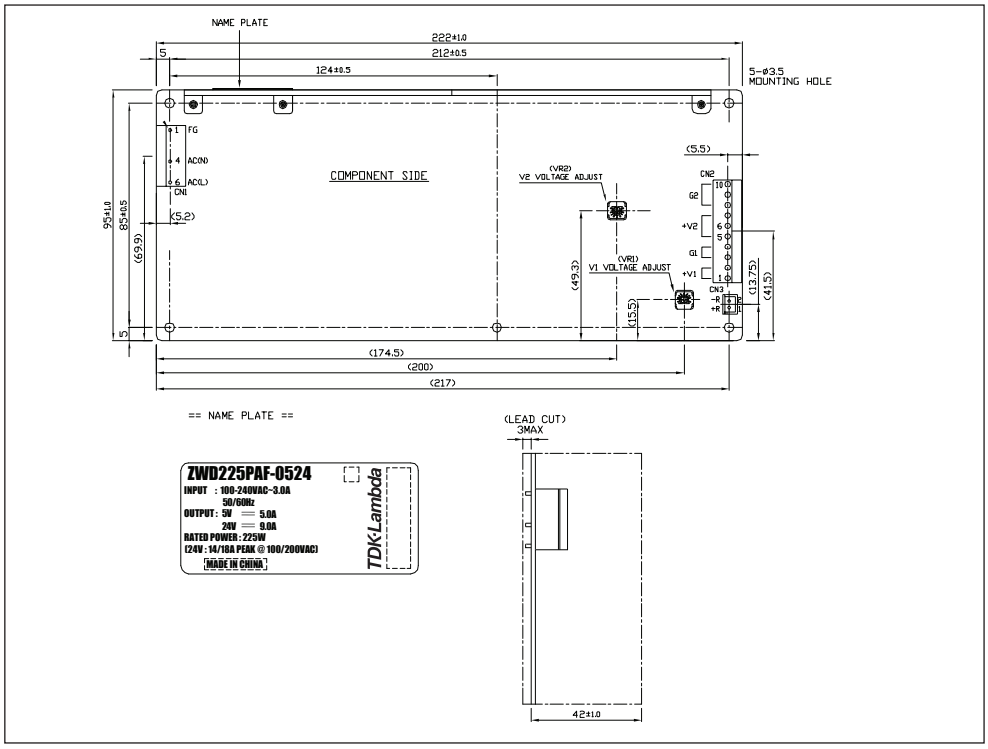
Outline Drawing ZWD100 Series



Outline Drawing ZWD150 Series



Outline Drawing ZWD225 Series



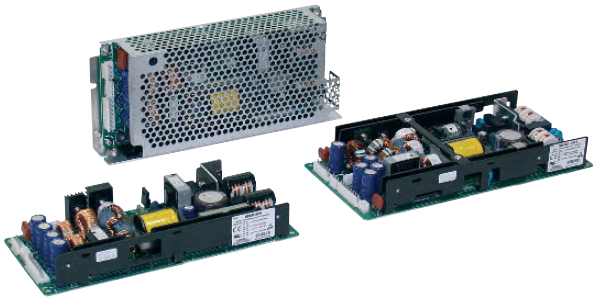
Notes:

(5) ZWD100PAF: For <10s max, duty cycle ≤0.35
ZWD150PAF: Up to 10A peak, <10s max, duty cycle ≤0.35; from 10-12A, <5s, duty cycle ≤0.2
ZWD225PAF: Up to 14A peak, <10s max, duty cycle ≤0.35; from 14-18A, <5s, duty cycle ≤0.2

Options

Suffix	Description
blank	Molex Input & Output Connector
/L	L Bracket
/A	Cover & L Bracket
/J	JST Input & Output Connector
/T	Vertical Mount Screw Terminals

Prefered option combination: blank, /L, /TL, or /TA
Example: ZWD100PAF-0524/TA



- Universal Input (85 - 265VAC)
- Power Factor Corrected
- Floating Adjustable Fourth Output
- Low Profile <1U High

Key Market Segments & Applications

Factory Automation
Test & Measurement
Light Industrial Equipment

ZWQ Series

80W to 170W
Quad Output Power Supplies

ZWQ Features and Benefits

Features	Benefits
• Low Profile	• Fits in 1U Enclosures
• Adjustable Main and Fourth Output	• System Optimization
• Power Factor Corrected	• Supports Global Use
• Floating Fourth Output	• Can be used as Positive or Negative Output

Specifications

Items / Models			ZWQ80 -5222	ZWQ80 -5223	ZWQ80 -5224	ZWQ80 -5225	ZWQ130 -5222	ZWQ130 -5223	ZWQ130 -5224	ZWQ130 -5225
Input Voltage		-	85-265VAC (47-63Hz), 120-370VDC							
Input Current	(1)	A	1.6 / 0.8				2.6 / 1.3			
Inrush Current	(1)	A	14/28							
Power Factor		-	Meets EN61000-3-2							
Temperature Coefficient		-	<0.02%/°C							
Max Output Power (convection)		W	80				130			
Max Output Power (forced air)		W	104	88.7	104	104	170	149.6	170	170
Overpower Protection	(2)	W	>109	>93	>109	>109	>173	>152	>173	>173
Minimum Load		A	V1: 0.9A Conv, 1.4A Forced Air				V1: 1.5A Conv, 2.1A Forced Air			
Output Voltage Accuracy		%	±5% for outputs V2 and V3							
Efficiency (Typ)		%	72							
Hold Up Time	(1)	ms	20							
Leakage Current		-	0.75mA max, 0.2mA (Typ) at 100VAC / 0.44mA(Typ) at 230VAC							
Remote On / Off		-	See installation manual (Not available with /A cover option)							
Oper Temp (convection cooled)		-	-10°C to 60°C, derate linearly to 50% load from 40°C to 60°C. (3)							
Oper Temp (forced air cooled)		-	-10°C to 70°C, derate linearly to 50% load from 50°C to 70°C. (>30cfm airflow) (3)							
Storage Temperature		-	-30°C to +85°C							
Humidity (non condensing)		-	Operating: 30 - 90% RH; Non-operating 10-95% RH							
Withstand Voltage			I/P~Gnd 2kVAC (20mA), I/P~O/P 3kVAC (20mA), O/P~Gnd 500VAC (100mA) for 1 min.							
Isolation Resistance		-	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC							
Vibration (non operating)		-	10 - 55Hz (1 minute sweep), 19.6m/s² constant X, Y, Z 1 hour							
Shock		-	< 196.1 m/s²							
Safety Agency Approvals		-	UL/CSA60950-1, EN60950-1, CE Mark, EN50178							
Conducted & Radiated EMI		-	EN55011, EN55022-B, FCC Class B, VCCI-B							
Immunity		-	EN61000-4-2,-3,-4,-5,-6,-8,-11							
Weight (Typ)		g	550				730			
Size (W x H x D)		mm	93.5 x 35 x 210				106 x 35 x 225			
Warranty		yr	1							

Notes:
(1) 100/200VAC
(2) Avoid prolonged operation in overload
(3) /A version - additional derating - See installation manual

Model Selector

MODEL	Output	Voltage (V)	Voltage Adjust Range (V)	Convect. (A)	Peak or Forced Air (A)(4)	Max Load Reg (mV)	Max Line Reg (mV)	Ripple Noise (mV)	OVP (V)(5)
ZWQ80-5222	V1	5	5.0-5.25	8.0	10.0	100	20	120	5.7-7.0
	V2	+12/15*	+12/+15	2.0	2.5	300	48	150	16.5-22.5
	V3	-12/15*	-12/-15	2.0	2.5	300	48	150	16.5-22.5
	V4	12	11.4-12.6	3.0	4.0	300	48	150	13.8-16.2
ZWQ80-5223	V1	5	5.0-5.25	8.0	10.0	100	20	120	5.7-7.0
	V2	+12/15*	+12/+15	2.0	2.5	300	48	150	16.5-22.5
	V3	-12/15*	-12/-15	2.0	2.5	300	48	150	16.5-22.5
	V4	3.3	2.0-3.63	7.0	9.0	100	20	120	3.79-4.95
ZWQ80-5224	V1	5	5.0-5.25	8.0	10.0	100	20	120	5.7-7.0
	V2	+12/15*	+12/+15	2.0	2.5	300	48	150	16.5-22.5
	V3	-12/15*	-12/-15	2.0	2.5	300	48	150	16.5-22.5
	V4	24	22.8-25.2	1.5	2.0	400	96	200	27.6-32.4
ZWQ80-5225	V1	5	5.0-5.25	8.0	10.0	100	20	120	5.7-7.0
	V2	+12/15*	+12/+15	2.0	2.5	300	48	150	16.5-22.5
	V3	-12/15*	-12/-15	2.0	2.5	300	48	150	16.5-22.5
	V4	5	2.0-5.25	7.0	9.0	100	20	120	5.7-7.0
ZWQ130-5222	V1	5	5.0-5.25	15.0	19.0	100	20	120	5.7-7.0
	V2	+12/15*	+12/+15	4.0	5.0	300	48	150	16.5-22.5
	V3	-12/15*	-12/-15	4.0	5.0	300	48	150	16.5-22.5
	V4	12	11.4-12.6	4.0	5.0	300	48	150	11.4-12.6
ZWQ130-5223	V1	5	5.0-5.25	15.0	19.0	100	20	120	5.7-7.0
	V2	+12/15*	+12/+15	4.0	5.0	300	48	150	16.5-22.5
	V3	-12/15*	-12/-15	4.0	5.0	300	48	150	16.5-22.5
	V4	3.3	2.0-3.63	10.0	12.0	100	20	120	3.79-4.95
ZWQ130-5224	V1	5	5.0-5.25	15.0	19.0	100	20	120	5.7-7.0
	V2	+12/15*	+12/+15	4.0	5.0	300	48	150	16.5-22.5
	V3	-12/15*	-12/-15	4.0	5.0	300	48	150	16.5-22.5
	V4	24	22.8-25.2	2.0	2.5	400	96	200	27.6-32.4
ZWQ130-5225	V1	5	5.0-5.25	15.0	19.0	100	20	120	5.7-7.0
	V2	+12/15*	+12/+15	4.0	5.0	300	48	150	16.5-22.5
	V3	-12/15*	-12/-15	4.0	5.0	300	48	150	16.5-22.5
	V4	5	2.0-5.25	10.0	12.0	100	20	120	5.7-7.0

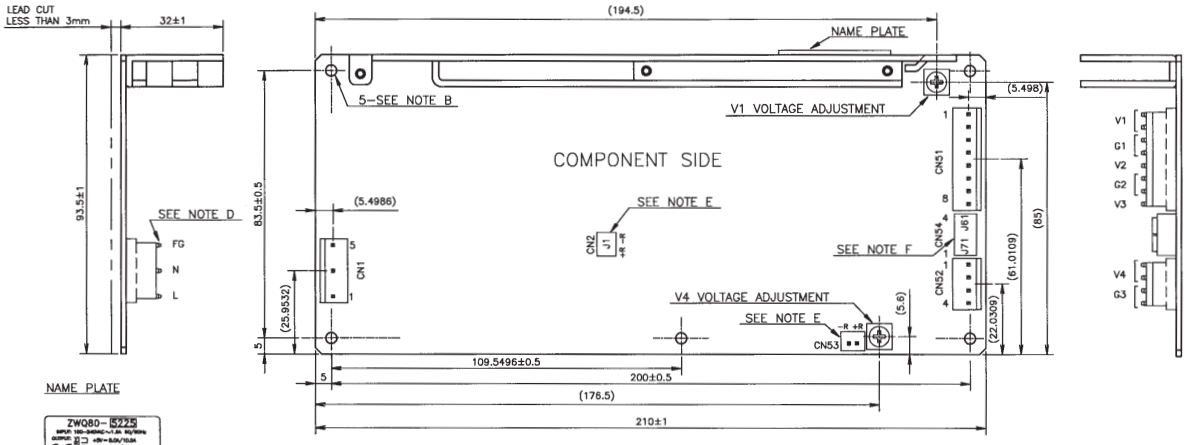
*** User selectable via connector on PCB. Outputs are floating from V1& V4**

Notes:
(4) Peak current draw must not exceed 10s duration, duty cycle 35%.
(5) OVP on any output will shut down all outputs. Recycle AC input to reset.

Options

Suffix	Description
blank	No cover or L Bracket
/L	L Bracket
/A	Cover and L Bracket

Outline Drawing ZWQ80 Series



= NOTES =

A: MODEL NAME, INPUT VOLTAGE RANGE, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT AND COUNTRY OF MANUFACTURE ARE SHOWN HERE IN ACCORDANCE WITH THE SPECIFICATIONS.

B: 5-ø3.5 HOLES FOR CUSTOMER'S CHASSIS MOUNTING HOLES. ALL MUST BE SCREWED IN ORDER TO CONFORM THE VIBRATION SPEC.

C: KEEP THE DISTANCE MORE THAN 4mm BETWEEN PCB EDGE AND CUSTOMER'S CHASSIS.

D: FG IS FOR SAFETY GROUND CONNECTION.

E: REMOTE ON/OFF CONTROL CONNECTOR (CN2,53) : B2B-XH-AM (J.S.T.)
MATCHING HOUSING : XHP-2 (J.S.T.)
MATCHING TERMINAL : BXH-001T-P0.6 (J.S.T.) OR SXH-001T-P0.6 (J.S.T.)
*CN2 IS NORMALLY SHORTED BY JM-2W-96(J.S.T.).

F: CONNECTOR TO CHANGE V2,V3 OUTPUT VOLTAGE (CN54) : B4B-XH-AM (J.S.T.)
J61 SHORT : V2 OUTPUT VOLTAGE IS +12V.(*)
J61 OPEN : V2 OUTPUT VOLTAGE IS +15V.
J71 SHORT : V3 OUTPUT VOLTAGE IS -12V.(*)
J71 OPEN : V3 OUTPUT VOLTAGE IS -15V.
*J61 AND J71 ARE NORMALLY SHORTED BY JM-2W-96(J.S.T.).

CONNECTORS USED:

PART DESCRIPTION	PART NAME	MANUFACT.	QTY
PIN HEADER (INPUT SIDE CN1)	B3P-5-VH	J.S.T.	1
PIN HEADER (OUTPUT SIDE CN51)	B8P-VH	J.S.T.	1
PIN HEADER (OUTPUT SIDE CN52)	B4P-VH	J.S.T.	1

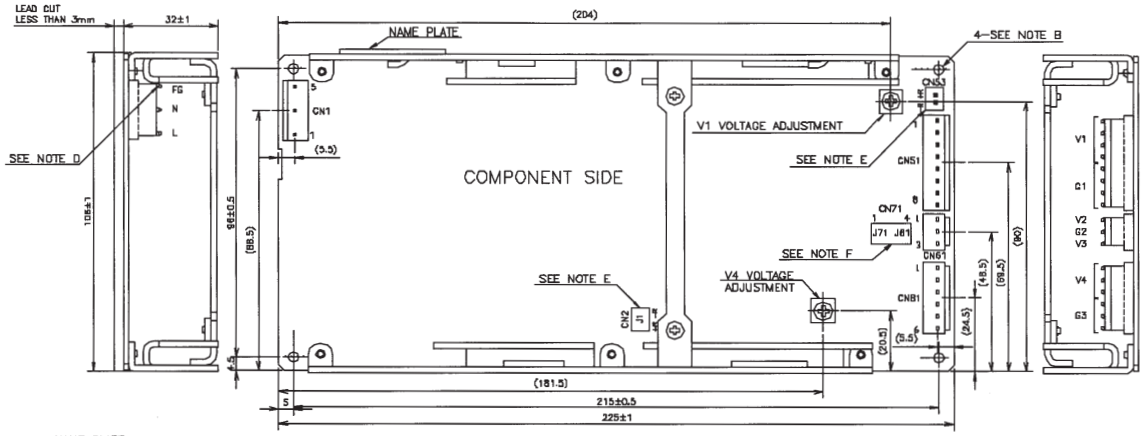
*OUTPUT CURRENT OF EACH CONNECTOR PIN MUST BE LESS THAN 5A.

MATCHING HOUSINGS & PINS (NOT INCLUDED WITH THE PRODUCT):

PART DESCRIPTION	PART NAME	MANUFACT.	QTY
SOCKET HOUSING (CN1)	VHR-5N	J.S.T.	1
SOCKET HOUSING (CN51)	VHR-8N	J.S.T.	1
SOCKET HOUSING (CN52)	VHR-4N	J.S.T.	1
TERMINAL PINS (CN1,51,52)	SVH-21T-P1.1	J.S.T.	15

HAND CRIMPING TOOL : YC-160R MANUFACT. : J.S.T.

Outline Drawing ZWQ130 Series



= NOTES =

A: MODEL NAME, INPUT VOLTAGE RANGE, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT AND COUNTRY OF MANUFACTURE ARE SHOWN HERE IN ACCORDANCE WITH THE SPECIFICATIONS.

B: 4-ø3.5 HOLES FOR CUSTOMER'S CHASSIS MOUNTING HOLES. ALL MUST BE SCREWED IN ORDER TO CONFORM THE VIBRATION SPEC.

C: KEEP THE DISTANCE MORE THAN 4mm BETWEEN POWER SUPPLY EDGE AND CUSTOMER'S CHASSIS.

D: FG IS FOR SAFETY GROUND CONNECTION.

E: REMOTE ON/OFF CONTROL CONNECTOR (CN2,53) : B2B-XH-AM (J.S.T.)
MATCHING HOUSING : XHP-2 (J.S.T.)
MATCHING TERMINAL : BXH-001T-P0.6 (J.S.T.) OR SXH-001T-P0.6 (J.S.T.)
*CN2 IS NORMALLY SHORTED BY JM-2W-96(J.S.T.).

F: CONNECTOR TO CHANGE V2,V3 OUTPUT VOLTAGE (CN71) : B4B-XH-AM (J.S.T.)
J61 SHORT : V2 OUTPUT VOLTAGE IS +12V.(*)
J61 OPEN : V2 OUTPUT VOLTAGE IS +15V.
J71 SHORT : V3 OUTPUT VOLTAGE IS -12V.(*)
J71 OPEN : V3 OUTPUT VOLTAGE IS -15V.
*J61 AND J71 ARE NORMALLY SHORTED BY JM-2W-96(J.S.T.).

CONNECTORS USED:

PART DESCRIPTION	PART NAME	MANUFACT.	QTY
PIN HEADER (INPUT SIDE CN1)	B3P-5-VH	J.S.T.	1
PIN HEADER (OUTPUT SIDE CN51)	B8P-VH	J.S.T.	1
PIN HEADER (OUTPUT SIDE CN61)	B3P-VH	J.S.T.	1
PIN HEADER (OUTPUT SIDE CN81)	B6P-VH	J.S.T.	1

*OUTPUT CURRENT OF EACH CONNECTOR PIN MUST BE LESS THAN 5A

MATCHING HOUSINGS & PINS (NOT INCLUDED WITH THE PRODUCT):

PART DESCRIPTION	PART NAME	MANUFACT.	QTY
SOCKET HOUSING (CN1)	VHR-5N	J.S.T.	1
SOCKET HOUSING (CN51)	VHR-8N	J.S.T.	1
SOCKET HOUSING (CN61)	VHR-3N	J.S.T.	1
SOCKET HOUSING (CN81)	VHR-6N	J.S.T.	1
TERMINAL PINS (CN1,51,61,81)	SVH-21T-P1.1	J.S.T.	20

*HAND CRIMPING TOOL: YC-160R MANUFACT: J.S.T

LED Industrial Test Comm Broadcast

Single Output
150-240W Power Supplies

Features	Benefits
• 200% Peak power capability	• Can drive high current start up devices
• 30% smaller than previous generation	• Simplifies equipment design
• Operating temp. -10 to +70°C	• Improved system power optimisation
• 10 Year E-cap lifetime	• Superior reliability

Specification

Model		ZWS150BP	ZWS240BP
ITEMS			
AC Input Voltage range (3)	-	85 - 265VAC (47-63Hz)	
DC Input Voltage range	-	120 - 370VDC	
Input Current (typical) (2)	A	1.9 / 0.95	2.8 / 1.5
Inrush Current (2)	A	15 / 30A - Cold Start	
Power Factor (Typical) (2) (4)	-	0.98 / 0.93	
Peak Power (5)	-	Conditions for Full Power : <5s Peak Power duration; duty = 35%	
Maximum Ripple and Noise (5)	mV	Tamb ≥0° to ≤70°C : 24V: 150mV; 36V: 360mV; 48V: 480mV Tamb ≥-10° to <0°C : 24V: 360mV; 36V: 540mV; 48V: 720mV	
Temperature Coefficient	-	<0.02% / °C	
Hold Up time (Typ) at 100VAC	ms	20ms	
Leakage Current (6)	-	0.2 / 0.4mA max.	
Remote Control	-	Option (see table next page)	
Operating Temperature (5)	- -	all models are convection : -10°C to +50°C=100% load; +60°C=75% load ; +70°C : 150W models=50% load ; 240W models=30% load	
Storage Temperature	°C	-30 to +75°C	
Humidity (non condensing)	-	Operating: 30 - 90%RH, Storage: 10 - 90%RH	
Withstand Voltage	-	I/P to Grnd 2kVAC (10mA), I/P to O/P: 3kVAC (10mA), O/P to Grnd: 500VAC (20mA) for 1mn	
Isolation Resistance	Ω	>100MΩ at 25°C & 70%RH, Output to Grnd: 500VDC	
Vibration (non operating)	-	10 - 55Hz (1 minute sweep), 19.6m/s² constant X, Y, Z 1 hour	
Shock	-	<196.1 m/s	
Safety agency Certifications	-	IEC/EN/UL/CSA60950-1, IEC/EN/UL/CSA62368-1, EN50178-1 (OV II) and CE Mark	
Conducted & Radiated EMI	-	EN55011 / EN55022-B, FCC-B, VCCI-B	
Immunity	-	IEC61000-4-2 (lv 2, 3), -3 (lv 3), -4 (lv 3), -5 (lv 3, 4), -6 (lv 3), -8 (lv 4), -11	
Weight (Typ)	g	360	520
Size (W x H x D)	mm	75 x 37 x 160	84 x 42 x 180
Warranty	yrs	5	

Notes:

(1) Avoid prolonged operation in overload (2) 100 / 200VAC Input (3) 85-90Vac = output current = 80%

(4) Built to meet EN 61000-3-2 (5) Refer to detailed specifications & Application Notes

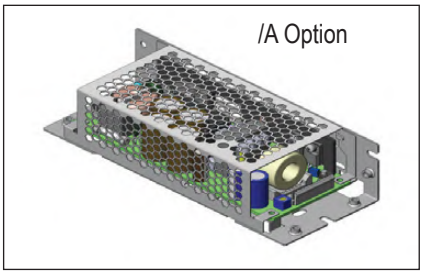
(6) 100/230VAC Input

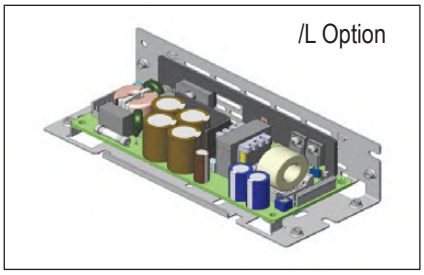
Model Selector

Model	Output Voltage (V)	Output Adjust Range (V)	Average Output Current (A)	Peak Output Current (A)	Averge Output Power (W)	Peak Output Power (W)	Efficiency at 200VAC Input (%)	Load reg (mV)	Line reg (mV)	OCP (A)	OVP (V)
ZWS150BP-24	24	21.6 - 27.5	6.3	12	151.2	288	90	192	96	12.66	28.8 - 33.6
ZWS150BP-36	36	32.4 - 39.6	4.2	8	151.2	288	90	288	144	8.44	41.4 - 48.6
ZWS150BP-48	48	39.6 - 52.8	3.2	6	153.6	288	90	384	192	6.43	55.2 - 64.8
ZWS240BP-24	24	21.6 - 27.5	10	20	240	480	91	192	96	20.10	28.8 - 33.6
ZWS240BP-36	36	32.4 - 39.6	6.7	13.4	241.2	482.4	91	288	144	13.47	41.4 - 48.6
ZWS240BP-48	48	39.6 - 52.8	5	10	240	480	91	384	192	10.05	55.2 - 64.8

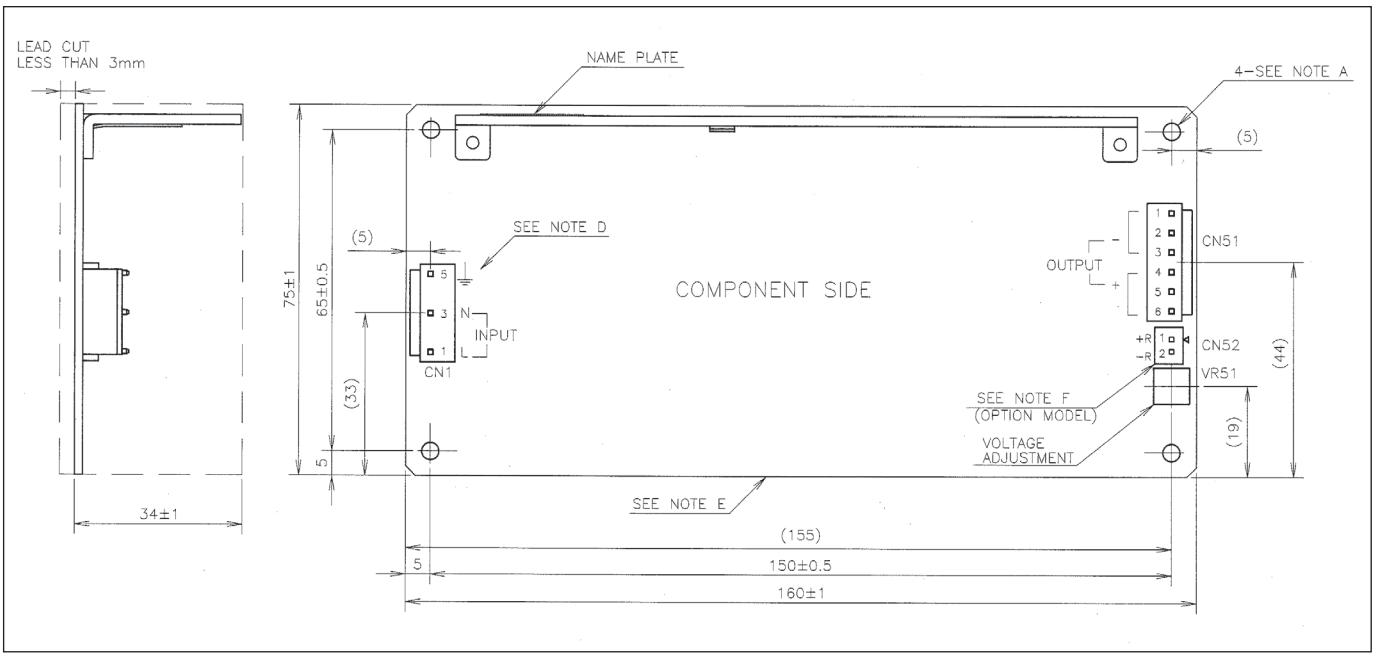
Option Description

	Suffix
L-Plate and Cover	/A
L-Plate	/L
Conformally coated PCB	/CO2
Remote on/off	/R
Terminal Block (240W models only)	/T

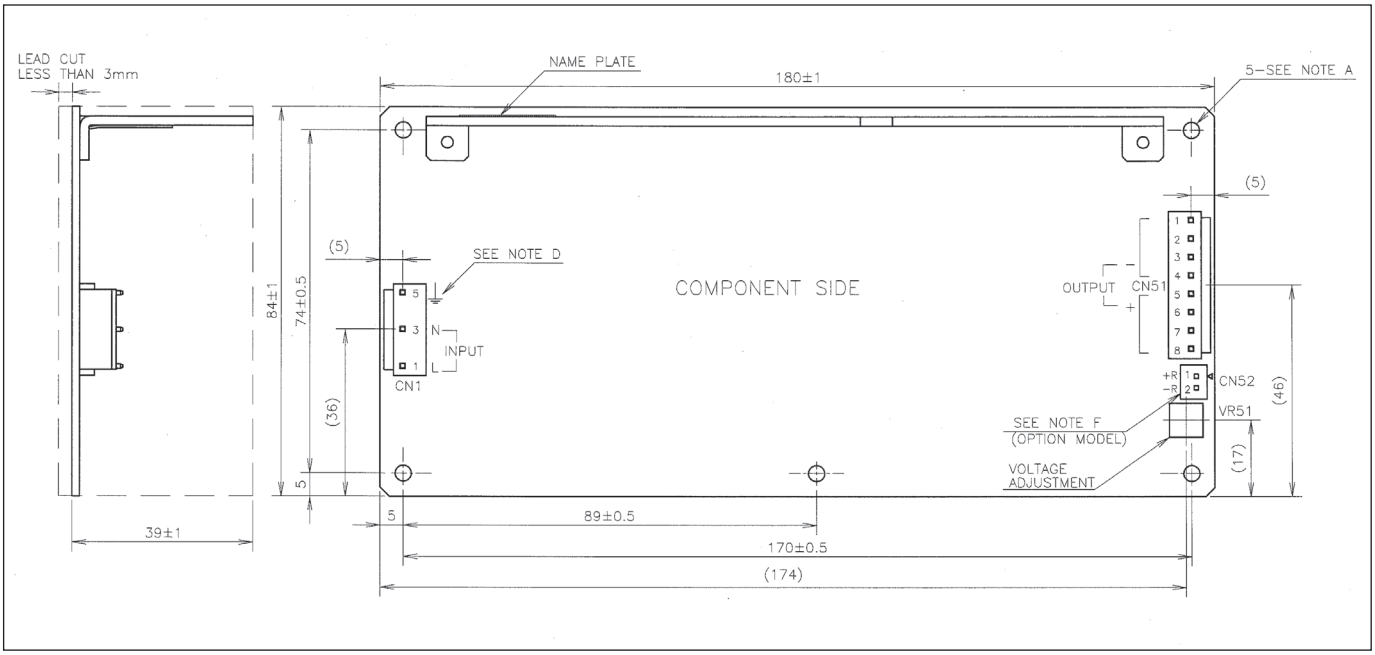




Outline Drawing ZWS150BP



Outline Drawing ZWS240BP



LED Industrial Test Comm Broadcast

Single Output
10-30W Power Supplies

Features	Benefits
• 30% smaller than previous generation	• Simplifies equipment design
• Operating temp. -10 to +70°C	• Improved system power optimisation
• No load input power <0.5 W	• Suitable for 'Green' products
• 10 year E-cap lifetime	• Superior reliability

Specification

Model		ZWS10B	ZWS15B	ZWS30B
ITEMS				
AC Input Voltage range (3)	-	85 - 265VAC (47-63Hz)		
DC Input Voltage range	-	120 - 370VDC		
Input Current (3.3V output) (2)	A	0.18 / 0.11	0.24 / 0.15	0.50 / 0.30
Input Current (5 to 24V output) (2)	A	0.25 / 0.13	0.34 / 0.17	0.65 / 0.35
Inrush Current (2)	A	15 / 30A - Cold Start		
No load power consumption (4)	W	<0.5		
Maximum Ripple and Noise (4)	mV	Tamb ≥0° to ≤70°C : 3.3 & 5V:120mV, 12 to 24V: 150mV Tamb ≥-10° to <0°C : 3.3 & 5V:160mV, 12 to 24V: 180mV		
Temperature Coefficient	-	<0.02%/°C		
Overcurrent protection (1)	-	>105% of maximum output current		
Hold Up time (Typ) at 100VAC	ms	20ms		
Leakage Current (5)	-	0.15 / 0.3mA max.		
Operating Temperature (4)	-	all models are convection : -10 to +50°C=100% load ; +60°C=70% load ; 10W & 30W models : +70°C=20% load ; 15W models : +70°C=40% load		
E-cap lifetime	-	10 year e-cap lifetime (80%load, 24 hours, 50°C)		
Storage Temperature	°C	-30°C to +75°C		
Humidity (non condensing)	-	Operating: 30 - 90%RH, Storage: 10 - 90%RH		
Withstand Voltage	-	I/P to Grnd 2kVAC (10mA), I/P to O/P: 3kVAC (10mA), O/P to Grnd: 500VAC (20mA) for 1mn		
Isolation Resistance	Ω	>100MΩ at 25°C & 70%RH, Output to Grnd: 500VDC		
Vibration (non operating)	-	10 - 55Hz (1 minute sweep), 19.6m/s² constant X, Y, Z 1 hour		
Shock	-	<196.1 m/s		
Safety agency Certifications	-	IEC/EN/UL/CSA60950-1, IEC/EN/UL/CSA62368-1, EN50178 (OV II), CE Mark		
Conducted & Radiated EMI	-	EN55011 / EN55022-B, FCC-B, VCCI-B		
Immunity	-	IEC61000-4-2 (lv 4), -3 (lv 3), -4 (lv 4), -5 (lv 4), -6 (lv 3), -8 (lv 4), -11		
Weight (Typ)	g	45	55	105
Size (W x H x D)	mm	50 x 22 x 73.5	50 x 22 x 87.5	50 x 26 x 105
Warranty	yrs		5	

Notes:

(1) Avoid prolonged operation in overload

(2) 100 / 200VAC Input

(3) 85-90Vac = output current = 80%

(4) Refer to detailed specifications & Application Notes

(5) 100/230VAC input

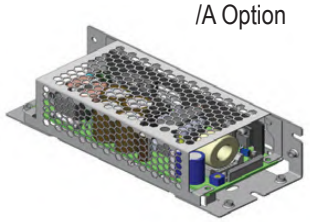
Model Selector

Model	Output Voltage (V)	Output Adjust Range (V)	Max Output Current (A)	Max Ouput Power (W)	Efficiency at 200VAC Input (%)	Load Reg. (mV)	Line Reg. (mV)	OVP (V)
ZWS10B-3	3.3V	2.97-3.63	2	6.6	70	40	20	4 - 5.25
ZWS10B-5	5V	4.5-5.5	2	10	78	40	20	5.75 - 7
ZWS10B-12	12V	10.8-13.2	0.9	10.8	83	96	48	13.8 - 16.2
ZWS10B-15	15V	13.5-16.5	0.7	10.5	84	120	60	17.3 - 20.3
ZWS10B-24	24V	21.6-26.4	0.5	12	85	150	96	27.6 - 32.4
ZWS15B-3	3.3V	2.97-3.63	3	9.9	71	40	20	4 - 5.25
ZWS15B-5	5V	4.5-5.5	3	15	78	40	20	5.75 - 7
ZWS15B-12	12V	10.8-13.2	1.3	15.6	83	96	48	13.8 - 16.2
ZWS15B-15	15V	13.5-16.5	1	15	84	120	60	17.3 - 20.3
ZWS15B-24	24V	21.6-26.4	0.7	16.8	85	150	96	27.6 - 32.4
ZWS30B-3	3.3V	2.97-3.63	6	19.8	77	40	20	4 - 5.25
ZWS30B-5	5V	4.5-5.5	6	30	82	40	20	5.75 - 7
ZWS30B-12	12V	10.8-13.2	2.5	30	86	96	48	13.8 - 16.2
ZWS30B-15	15V	13.5-16.5	2	30	86	120	60	17.3 - 20.3
ZWS30B-24	24V	21.6-26.4	1.3	31.2	88	150	96	27.6 - 32.4

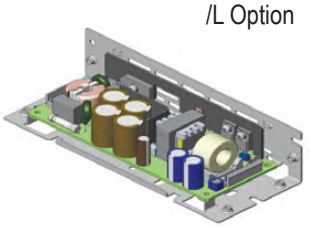
Option Description

	Suffix
L-Plate and Cover	/A
L-Plate	/L
Conformally coated PCB	/CO2
Remote on/off	/R
Fixed Output Voltage (by resistor)	/FV

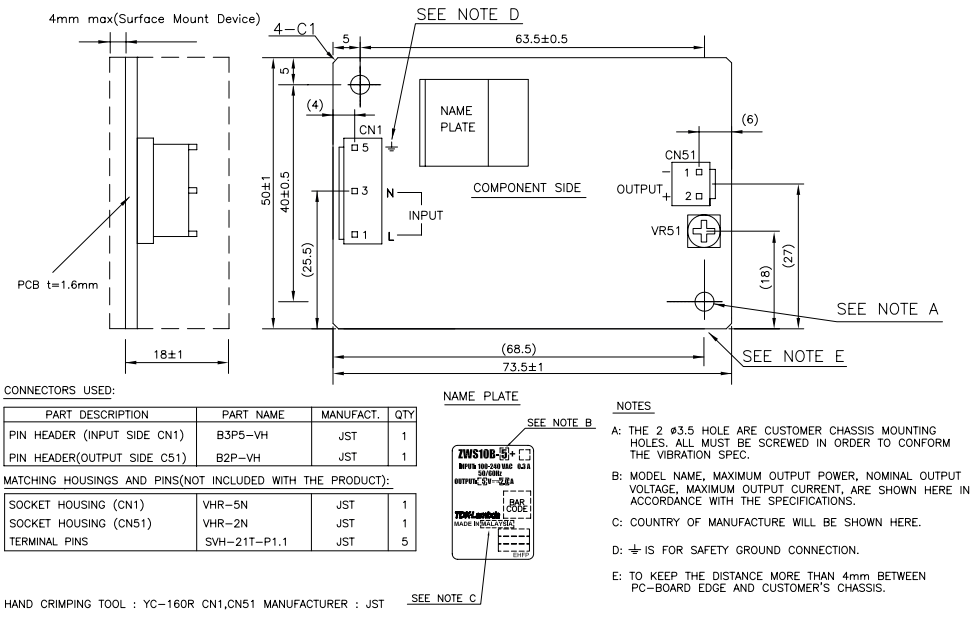
/A Option



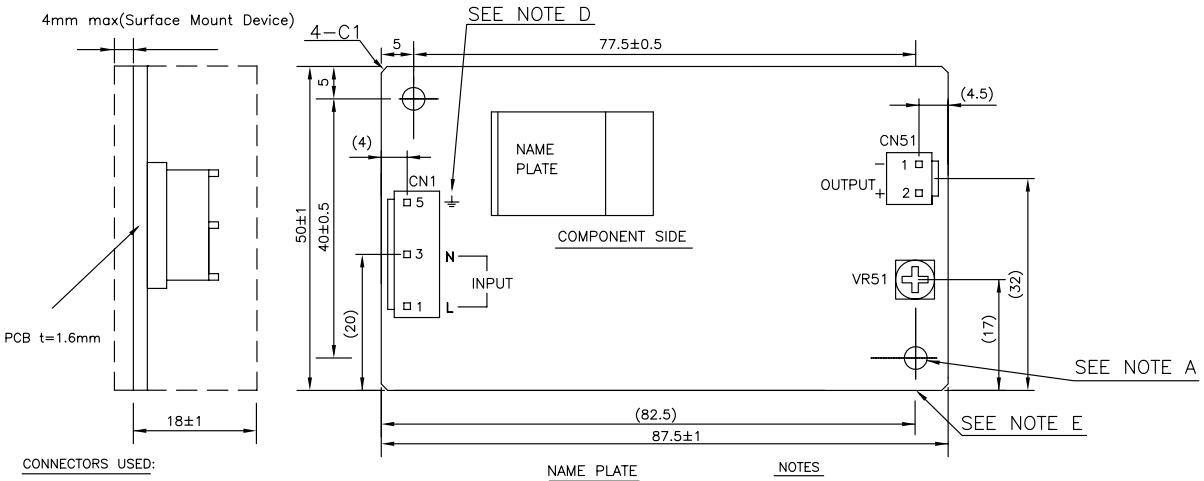
/L Option



Outline Drawing ZWS10B



Outline Drawing ZWS15B



CONNECTORS USED:

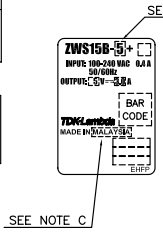
PART DESCRIPTION	PART NAME	MANUFACT.	QTY
PIN HEADER (INPUT SIDE CN1)	B3P5−VH	JST	1
PIN HEADER(OUTPUT SIDE C51)	B2P−VH	JST	1

MATCHING HOUSINGS AND PINS(NOT INCLUDED WITH THE PRODUCT):

SOCKET HOUSING (CN1)	VHR−5N	JST	1
SOCKET HOUSING (CN51)	VHR−2N	JST	1
TERMINAL PINS	SVH−21T−P1.1	JST	5

HAND CRIMPING TOOL : YC−160R CN1,CN51 MANUFACTURER : JST

NAME PLATE



NOTES

A: THE 2 ø3.5 HOLE ARE CUSTOMER CHASSIS MOUNTING HOLES. ALL MUST BE SCREWED IN ORDER TO CONFORM THE VIBRATION SPEC.

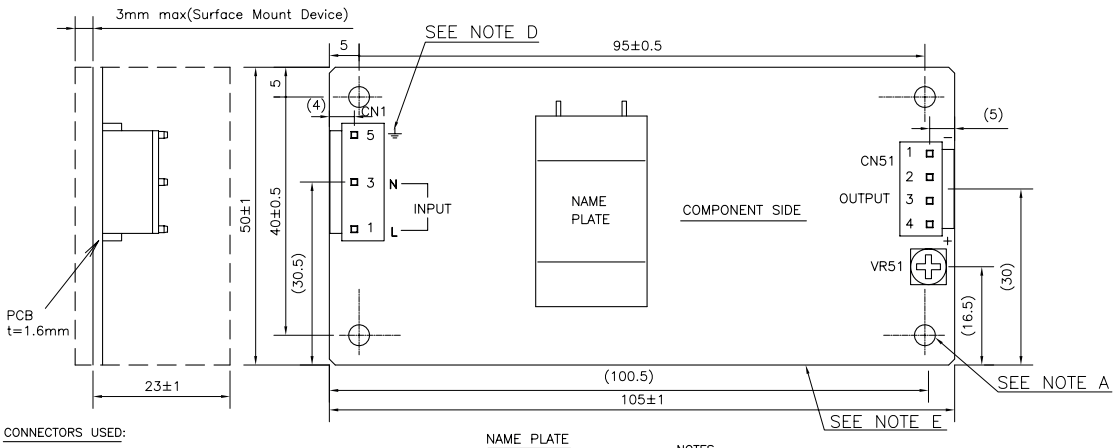
B: MODEL NAME, MAXIMUM OUTPUT POWER, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT, ARE SHOWN HERE IN ACCORDANCE WITH THE SPECIFICATIONS.

C: COUNTRY OF MANUFACTURE WILL BE SHOWN HERE.

D: ⏚ IS FOR SAFETY GROUND CONNECTION.

E: TO KEEP THE DISTANCE MORE THAN 4mm BETWEEN PC−BOARD EDGE AND CUSTOMER'S CHASSIS.

Outline Drawing ZWS30B



CONNECTORS USED:

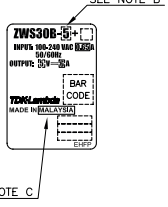
PART DESCRIPTION	PART NAME	MANUFACT.	QTY
PIN HEADER (INPUT SIDE CN1)	B3P5−VH	JST	1
PIN HEADER(OUTPUT SIDE C51)	B4P−VH	JST	1

MATCHING HOUSINGS AND PINS(NOT INCLUDED WITH THE PRODUCT):

SOCKET HOUSING (CN1)	VHR−5N	JST	1
SOCKET HOUSING (CN51)	VHR−4N	JST	1
TERMINAL PINS	SVH−21T−P1.1	JST	7

HAND CRIMPING TOOL : YC−160R CN1,CN51 MANUFACTURER : JST

NAME PLATE



NOTES

A: THE 4−ø3.5 HOLE ARE CUSTOMER CHASSIS MOUNTING HOLES. ALL MUST BE SCREWED IN ORDER TO CONFORM THE VIBRATION SPEC.

B: MODEL NAME, MAXIMUM OUTPUT POWER, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT, ARE SHOWN HERE IN ACCORDANCE WITH THE SPECIFICATIONS.

C: COUNTRY OF MANUFACTURE WILL BE SHOWN HERE.

D: ⏚ IS FOR SAFETY GROUND CONNECTION.

E: TO KEEP THE DISTANCE MORE THAN 4mm BETWEEN PC−BOARD EDGE AND CUSTOMER'S CHASSIS.

LED Industrial Test Comm Broadcast

50W to 300W Single Output Power Supplies, Low Cost & High Reliability Worldwide Use

Features	Benefits
• 10 Year e-cap Lifetime	• Better Field Reliability
• 5 Year Warranty	• Lower Cost of Ownership
• Convection Cooling	• Easier Use

Specification

MODEL		ZWS50-BAF	ZWS75-BAF	ZWS100-BAF	ZWS150-BAF	ZWS300-BAF
ITEMS						
AC Input Voltage range	-	85 - 265VAC (47-63Hz)				
DC Input Voltage range	-	120 - 370VDC				
Input Current (typical) (1)	A	3V model: 0.45/0.25 others: 0.65/0.35	3V model: 0.7/0.35 others: 0.95/0.5	3V model: 0.9/0.45 others:1.3/0.65	3V model: 1.3/0.65 others: 1.9/0.95	12 & 15V models: 3.7/1.9. others:3.6/1/8
Inrush Current - cold start (1)	A	15/28	14/28	28	14/28	15/ 30
PFHC	-	All models with Active Power Factor Correction - Designed to meet EN/IEC61000-3-2				
Power Factor (1)	-	3V model: 0.96/0.85 others: 0.97/0.91	3V model: 0.96/0.85 others: 0.97/0.91	3V model: 0.96/0.89 others:0.98/0.93		0.97/0.93
Temperature Coefficient	-	<0.02%/ °C				
Hold Up time (Typ) (1)	ms	20ms				18ms (typ) at 100Vac & full Load (20ms at 100Vac & 80% load)
Leakage Current (3)	mA	0.2 / 0.4 max.				
Remote On/Off	-	Option (see table next page)				
Cooling	-	All models are convection cooling				
Operating Temperature (2) (Convection)	-	-10°C to +70°C, derate linearly to 50% load from 50°C to 70°C				-10° to +70°C, derate linearly to 40% load from 45° to 70°C (from 40°C for 12 & 15V models)
Operating Temperature (2) (Forced Air)		Refer to output derating specifications				
E-cap lifetime (5)	-	Up to 10 years; 45°C ambient, 100% full load, 24 hours				
Storage Temperature	°C	-30°C to +75°C				
Humidity (non condensing)	-	Operating: 30 - 90% RH, Storage: 10 - 90% RH				
Withstand Voltage	-	I/P to Gnd 2kVAC (10mA), I/P to O/P: 3kVAC (10mA), O/P to Gnd: 500VAC (20mA) for 1mn				
Isolation Resistance	Ω	>100MΩ at 25°C & 70%RH, Output to Gnd: 500VDC				
Vibration (non operating)	-	10 - 55Hz (1 minute sweep), 19.6m/s² constant X, Y, Z 1 hour each				
Shock	-	<196.1 m/s				
Safety agency Certifications	-	IEC/EN/UL/CSA60950-1, IEC/EN/UL/CSA62368-1, EN50178 (OV II), CE Mark				
Conducted & Radiated EMI	-	EN55011 / EN55022-B, FCC-B, VCCI-B				
Immunity	-	IEC61000-6-2 ; IEC61000-4-2, -3, -4, -5, -6, -8, -11				
Weight (Typ)	g	165	230	290	390	540
Size (W x H x D) (4)	mm	50 x 26 x 132	50 x 33 x 150	62 x 33 x 155	75 x 37 x 160	84 x 42 x 180
Warranty	yrs	5				

Notes:

(1) 100 / 200VAC Input, nominal output voltage and max. output power
(2) Refer to Thermal Specifications & Application Notes
(3) 100 / 230VAC input
(4) Refer to Outline Drawing
(5) Refer to Reliability Data

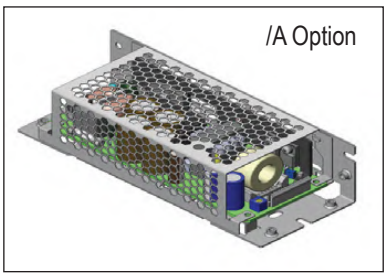
Model Selector

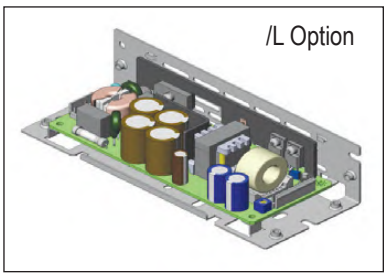
Model	Output Voltage (V)	Output Adjust Range (V)	Max. Current (A)	Max. Output Power (W)	Efficiency at 200VAC (%)	Max. Ripple and Noise (mv pk-pk)	Load Reg. (mV)	Line Reg. (mV)	OCP (A)	OVP (V)
ZWS50BAF-3	3.3	2.97-3.63	10	33.0	78	160	40	20	>10.5	3.79-4.95
ZWS50BAF-5	5	4.5-5.5	10	50.0	84	160	40	20	>10.5	5.75-7.0
ZWS50BAF-12	12	10.8-13.2	4.3	51.6	85	180	96	48	>4.51	13.8-16.2
ZWS50BAF-15	15	13.5-16.5	3.5	52.5	86	180	120	60	>3.67	17.3-20.3
ZWS50BAF-24	24	21.6-26.4	2.1	50.4	87	180	150	96	>2.2	27.6-32.4
ZWS50BAF-48	48	39.5-52.8	1.1	52.8	86	240	240	192	>1.15	55.2-64.8
ZWS75BAF-3	3.3	2.97-3.63	15	49.5	78	160	40	20	>15.7	3.79-4.95
ZWS75BAF-5	5	4.5-5.5	15	75.0	84	160	40	20	>15.7	5.75-7.0
ZWS75BAF-12	12	10.8-13.2	6.3	75.6	85	180	96	48	>6.61	13.8-16.2
ZWS75BAF-15	15	13.5-16.5	5	75.0	86	180	120	60	>5.25	17.3-20.3
ZWS75BAF-24	24	21.6-26.4	3.2	76.8	87	180	150	96	>3.36	27.6-32.4
ZWS75BAF-48	48	39.5-52.8	1.6	76.8	88	240	240	192	>1.68	55.2-64.8
ZWS100BAF-3	3.3	2.97-3.63	20	66.0	84	160	40	20	>21.0	3.79-4.95
ZWS100BAF-5	5	4.5-5.5	20	100.0	86	160	40	20	>21.0	5.75-7.0
ZWS100BAF-12	12	10.8-13.2	8.5	102.0	88	180	96	48	>8.93	13.8-16.2
ZWS100BAF-15	15	13.5-16.5	6.7	100.5	88	180	120	60	>7.04	17.3-20.3
ZWS100BAF-24	24	21.6-26.4	4.3	103.2	89	180	150	96	>4.52	27.6-32.4
ZWS100BAF-48	48	39.5-52.8	2.1	100.8	90	240	240	192	>2.21	55.2-64.8
ZWS150BAF-3	3.3	2.97-3.63	30	99	84	160	40	20	>31.5	3.79-4.95
ZWS150BAF-5	5	4.5-5.5	30	150	87	60	40	20	>31.5	5.75-7
ZWS150BAF-12	12	10.8-13.2	12.5	150	88	180	96	48	>13.13	13.8-16.2
ZWS150BAF-15	15	13.5-16.5	10	150	89	180	120	60	>10.5	17.3-20.3
ZWS150BAF-24	24	21.6-26.4	6.3	151.2	90	180	150	96	>6.62	27.6-32.4
ZWS150BAF-48	48	39.5-52.8	3.2	153.6	91	240	240	192	>3.36	55.2-64.8
ZWS300BAF-12	12	9.6-13.2	25.0(1)	300(1)	89	180	100	48	>26.25	13.8-16.2
ZWS300BAF-15	15	13.5-16.5	20.0(1)	300(1)	89	180	120	60	>23.1	17.3-20.3
ZWS300BAF-24	24	21.6-27.5	12.5(1)	300(1)	91	180	150	96	>14.7	28.8-33.6
ZWS300BAF-36	36	32.4-39.6	8.4(1)	302.4(1)	91	300	240	144	>9.87	41.4-48.6
ZWS300BAF-48	48	39.5-52.8	6.3(1)	302.4(1)	91	300	240	192	>7.35	55.2-64.8

Notes: (1) Values given for Convection Cooling: refer to detailed Specifications & Application Notes for 0.7m/s & 1.4m/s Forced Air

Option Description

	Suffix
L-Plate and Cover	/A
L-Plate	/L
Conformally coated PCB	/CO2
Fixed Output Voltage	/FV
Remote on/off	/R
Terminal Block	/T
Terminal Block with L-Plate	/TL
Terminal Block with L-Plate & Cover	/TA



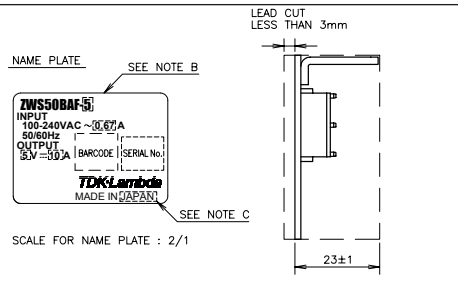


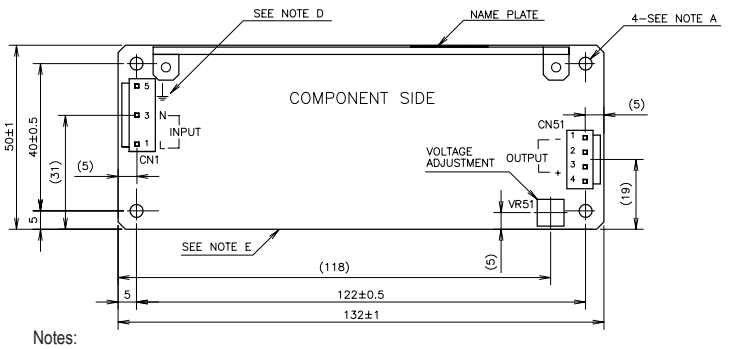
ZWS-BAF Option Matrix

Power	/A	/L	/CO2	/FV available for 12 24 & 48V models	/R	/T	/TL	/TA
50W	✓	✓	✓	✓				
75W	✓	✓	✓	✓				
100W	✓	✓	✓	✓	✓			
150W	✓	✓	✓	✓	✓			
300W	✓	✓	✓		✓	✓	✓	✓

Note: Contact Sales for availability of /TL option

Outline Drawing ZWS50BAF





CONNECTORS USED:

PART DESCRIPTION	PART NAME	MANUFACT.	QTY
PIN HEADER (INPUT SIDE CN1)	B3P5–VH	J.S.T.	1
PIN HEADER (OUTPUT SIDE CN51)	B4P–VH	J.S.T.	1

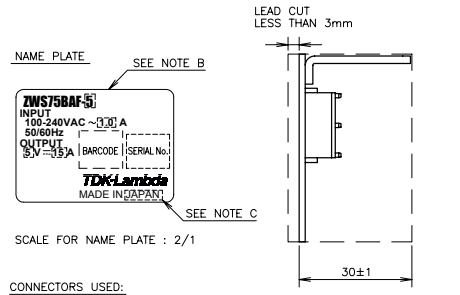
*OUTPUT CURRENT OF EACH CONNECTOR PIN MUST BE LESS THAN 5A.

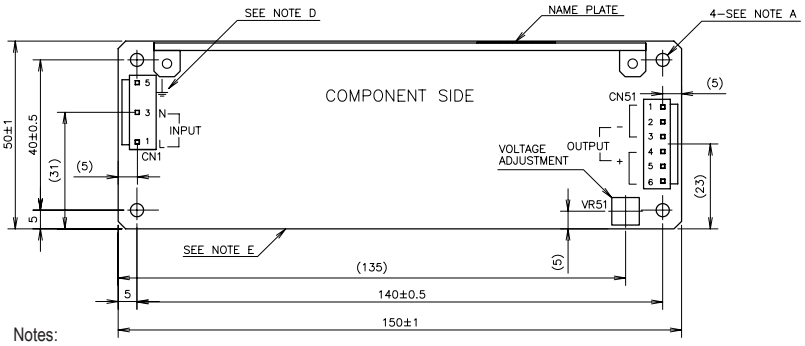
MATCHING HOUSINGS, PINS & TOOL (NOT INCLUDED WITH THE PRODUCT):

PART DESCRIPTION	PART NAME	MANUFACT.	QTY
SOCKET HOUSING (CN1)	VHR–5N	J.S.T.	1
SOCKET HOUSING (CN51)	VHR–4N	J.S.T.	1
TERMINAL PINS	SVH–21T–P1.1	J.S.T.	7
	BVH–21T–P1.1		
HAND CRIMPING TOOL	YC–160R	J.S.T.	–

Notes:
A: 4 - 3.5mm Ø holes are for customers chassis mounting holes. All must be screwed in order to conform the vibration specification.
B: Model name, input voltage range nominal output voltage and maximum output current are shown here in accordance with the specifications.
C: Country of manufacture will be shown here. D: ⏚ is for safety ground connection.
E: To keep the distance more than 4mm between PCB edge and customer's chassis.

Outline Drawing ZWS75BAF





CONNECTORS USED:

PART DESCRIPTION	PART NAME	MANUFACT.	QTY
PIN HEADER (INPUT SIDE CN1)	B3P5–VH	J.S.T.	1
PIN HEADER (OUTPUT SIDE CN51)	B6P–VH	J.S.T.	1

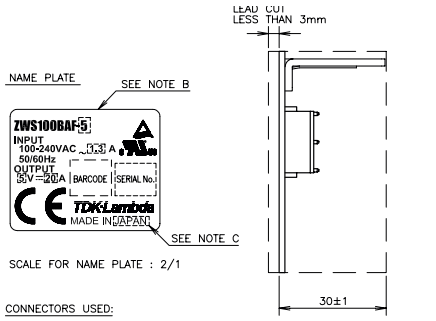
*OUTPUT CURRENT OF EACH CONNECTOR PIN MUST BE LESS THAN 5A.

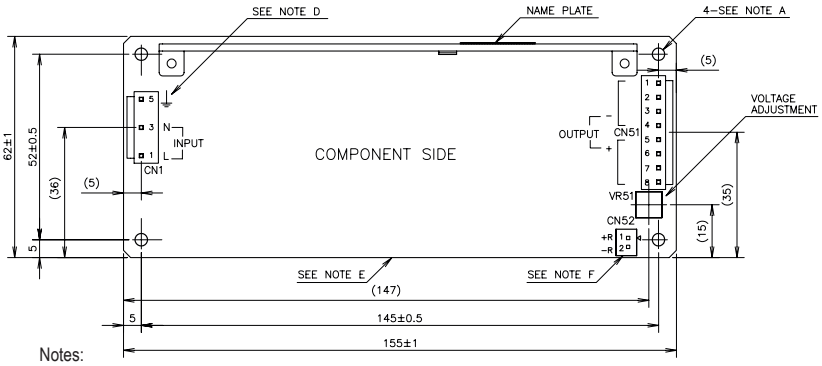
MATCHING HOUSINGS, PINS & TOOL (NOT INCLUDED WITH THE PRODUCT):

PART DESCRIPTION	PART NAME	MANUFACT.	QTY
SOCKET HOUSING (CN1)	VHR–5N	J.S.T.	1
SOCKET HOUSING (CN51)	VHR–6N	J.S.T.	1
TERMINAL PINS	SVH–21T–P1.1	J.S.T.	9
	BVH–21T–P1.1		
HAND CRIMPING TOOL	YC–160R	J.S.T.	–

Notes:
A: 4 - 3.5mm Ø holes are for customers chassis mounting holes. All must be screwed in order to conform the vibration specification.
B: Model name, input voltage range nominal output voltage and maximum output current are shown here in accordance with the specifications.
C: Country of manufacture will be shown here. D: ⏚ is for safety ground connection.
E: To keep the distance more than 4mm between PCB edge and customer's chassis.

Outline Drawing ZWS100BAF





CONNECTORS USED:

PART DESCRIPTION	PART NAME	MANUFACT.	QTY
PIN HEADER (INPUT SIDE CN1)	B3P5–VH	J.S.T.	1
PIN HEADER (OUTPUT SIDE CN51)	B8P–VH	J.S.T.	1

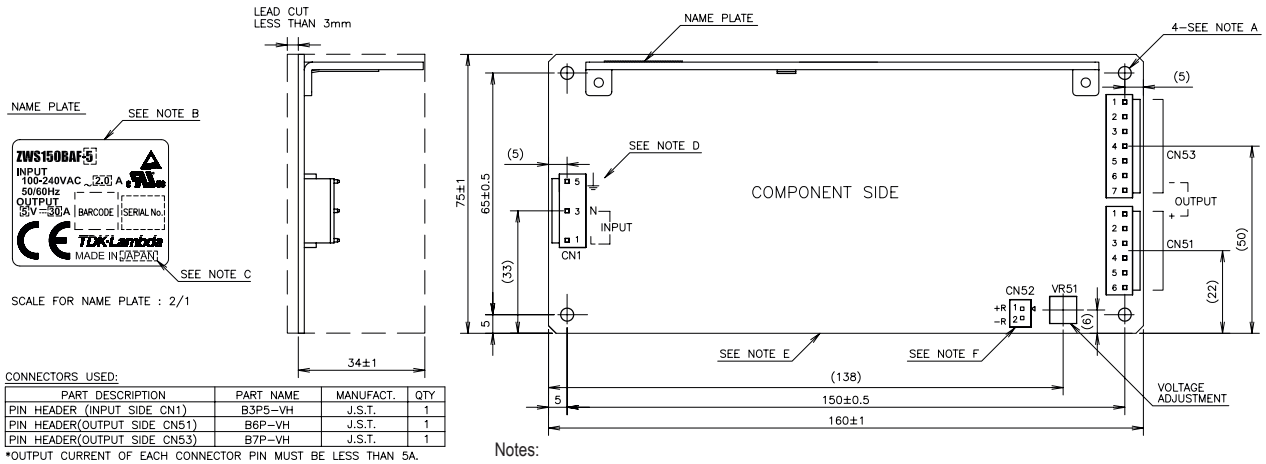
*OUTPUT CURRENT OF EACH CONNECTOR PIN MUST BE LESS THAN 5A.

MATCHING HOUSINGS, PINS & TOOL (NOT INCLUDED WITH THE PRODUCT):

PART DESCRIPTION	PART NAME	MANUFACT.	QTY
SOCKET HOUSING (CN1)	VHR–5N	J.S.T.	1
SOCKET HOUSING (CN51)	VHR–8N	J.S.T.	1
TERMINAL PINS	SVH–21T–P1.1	J.S.T.	11
	BVH–21T–P1.1		

Notes:
A: 4 - 3.5mm Ø holes are for customers chassis mounting holes. All must be screwed in order to conform the vibration specification.
B: Model name, input voltage range nominal output voltage and maximum output current are shown here in accordance with the specifications.
C: Country of manufacture will be shown here. D: ⏚ is for safety ground connection.
E: To keep the distance more than 4mm between PCB edge and customer's chassis.
F: Remote On/Off Control Connector (CN52): B2B-XH-AM (J.S.T.) Option Matching Housing: XHP-2 (J.S.T.). Matching Terminal: BXH-001T-P0.6 (J.S.T.) or SXH-001T-P0.6 (J.S.T.) Hand Crimping Tool: YC-110R (J.S.T.) or YRS-110 (J.S.T.) Matching Housing & Terminal --- not included with the product.

Outline Drawing ZWS150BAF



CONNECTORS USED:

PART DESCRIPTION	PART NAME	MANUFACT.	QTY
PIN HEADER (INPUT SIDE CN1)	B3P5–VH	J.S.T.	1
PIN HEADER(OUTPUT SIDE CN51)	B6P–VH	J.S.T.	1
PIN HEADER(OUTPUT SIDE CN53)	B7P–VH	J.S.T.	1

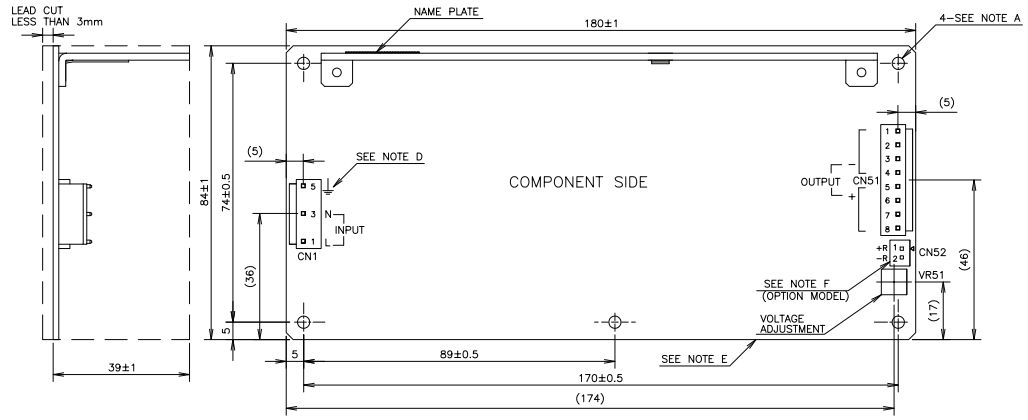
*OUTPUT CURRENT OF EACH CONNECTOR PIN MUST BE LESS THAN 5A.

MATCHING HOUSINGS, PINS & TOOL (NOT INCLUDED WITH THE PRODUCT):

PART DESCRIPTION	PART NAME	MANUFACT.	QTY
SOCKET HOUSING (CN1)	VHR–5N	J.S.T.	1
SOCKET HOUSING (CN51)	VHR–6N	J.S.T.	1
SOCKET HOUSING (CN53)	VHR–7N	J.S.T.	1
TERMINAL PINS	SVH–21T–P1.1 BVH–21T–P1.1	J.S.T.	16
HAND CRIMPING TOOL	YC–160R	J.S.T.	–

Notes:
A: 4 - 3.5mm Ø holes are for customers chassis mounting holes. All must be screwed in order to conform the vibration specification.
B: Model name, input voltage range nominal output voltage and maximum output current are shown here in accordance with the specifications.
C: Country of manufacture will be shown here. D: ⏚ is for safety ground connection.
E: To keep the distance more than 4mm between PCB edge and customer's chassis.
F: Remote On/Off Control Connector (CN52): B2B-XH-AM (J.S.T.) Option Matching Housing: XHP-2 (J.S.T.). Matching Terminal: BXH-001T-P0.6 (J.S.T.) or SXH-001T-P0.6 (J.S.T.) Hand Crimping Tool: YC-110R (J.S.T.) or YRS-110 (J.S.T.) Matching Housing & Terminal --- not included with the product.

Outline Drawing ZWS300BAF



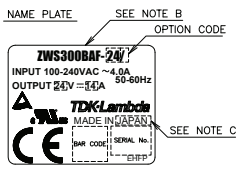
CONNECTORS USED:

PART DESCRIPTION	PART NAME	MANUFACT.	QTY
PIN HEADER (INPUT SIDE CN1)	B3P5–VH	JST	1
PIN HEADER(OUTPUT SIDE CN51)	B8P–VH	JST	1

*OUTPUT CURRENT OF EACH CONNECTOR PIN MUST BE LESS THAN 5A.

MATCHING HOUSINGS, PINS & TOOL (NOT INCLUDED WITH THE PRODUCT):

PART DESCRIPTION	PART NAME	MANUFACT.	QTY
SOCKET HOUSING (CN1)	VHR–5N	JST	1
SOCKET HOUSING (CN51)	VHR–8N	JST	1
TERMINAL PINS	SVH–21T–P1.1 BVH–21T–P1.1	JST	11
HAND CRIMPING TOOL	YC–160R	JST	–



SCALE FOR NAME PLATE : 2/1

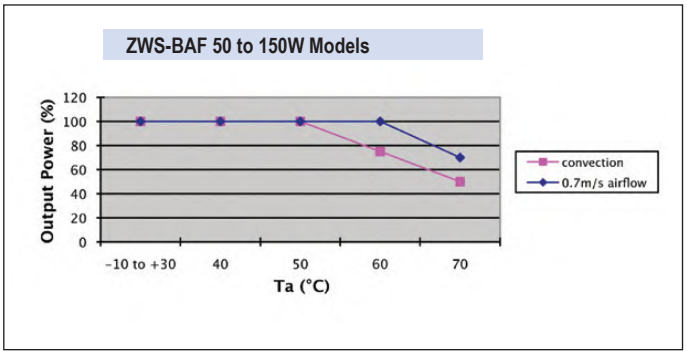
Notes:
A: 4 - 3.5mm Ø holes are for customers chassis mounting holes. All must be screwed in order to conform the vibration specification.
B: Model name, input voltage range nominal output voltage and maximum output current are shown here in accordance with the specifications.
C: Country of manufacture will be shown here. D: ⏚ is for safety ground connection.
E: To keep the distance more than 4mm between PCB edge and customer's chassis.
F: Optiion Model (ZWS300BAF-*/R). Remote On/Off Control Connector (CN52): B2B-XH-AM (J.S.T.) Matching Housing: XHP-2 (J.S.T.). Matching Terminal: BXH-001T-P0.6 (J.S.T.) or SXH-001T-P0.6 (J.S.T.) Hand Crimping Tool: YC-110R (J.S.T.) or YRS-110 (J.S.T.) Matching Housing & Terminal --- not included with the product.

ZWS-BAF Output Derating

ZWS-BAF 50 to 150W Models

Mounting A, B [1]
Load %

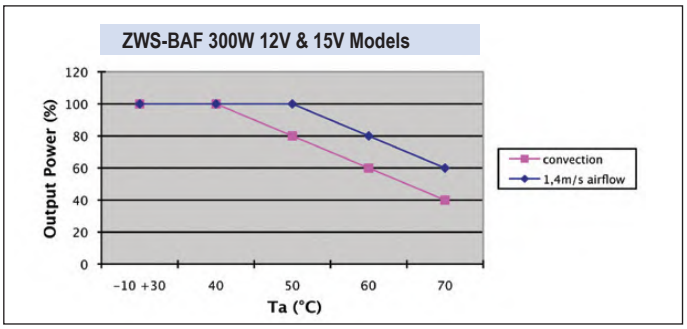
Ta (°C)	Convection	0.7m/s airflow
-10 - 35	100%	100%
40	100%	100%
45	100%	100%
50	100%	100%
60	75%	100%
70	50%	70%



ZWS-BAF 300W 12V & 15V Models

Mounting A [1]
Load %

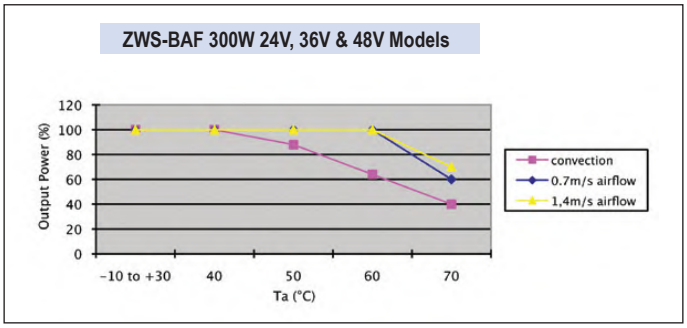
Ta (°C)	Convection	1.4m/s airflow
-10 - +30	100%	100%
40	100%	100%
50	80%	100%
60	60%	80%
70	40%	60%



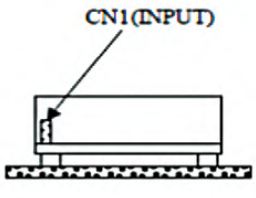
ZWS-BAF 300W 24V, 36V & 48V Models

Mounting A, B [1]
Load %

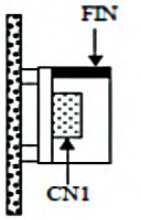
Ta (°C)	Convection	0.7m/s airflow	1.4m/s airflow
-10 - +30	100%	100%	100%
40	100%	100%	100%
50	88%	100%	100%
60	64%	100%	100%
70	40%	60%	70%



Standard Mounting

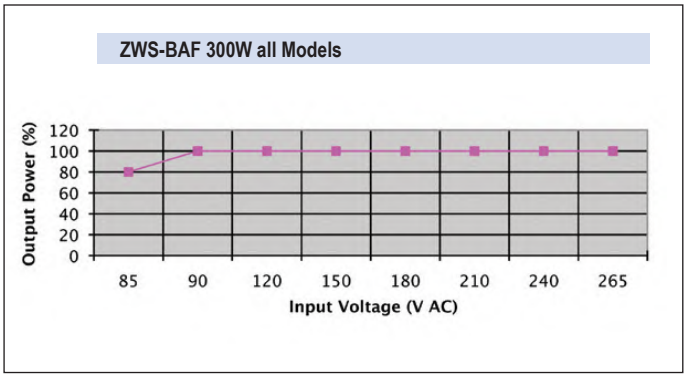


Mounting A



Mounting B

Note: (1) For other Mounting orientations, refer to Detailed Specifications & Application Notes



ZWS-BAF 300W all models

Input Voltage VAC	LOAD %
85	80
90 - 265	100

Industrial

240W 24V Output Power Supply with EN62477-1 OVC III

Features	Benefits
• Certified to IEC/EN62477-1 OVC III	• Direct Connection to Distribution Panel
• 12 Year e-cap Lifetime	• Long Field Life
• 5 Year Warranty	• Low Cost of Ownership
• Convection Cooling	• No External Cooling Air Required

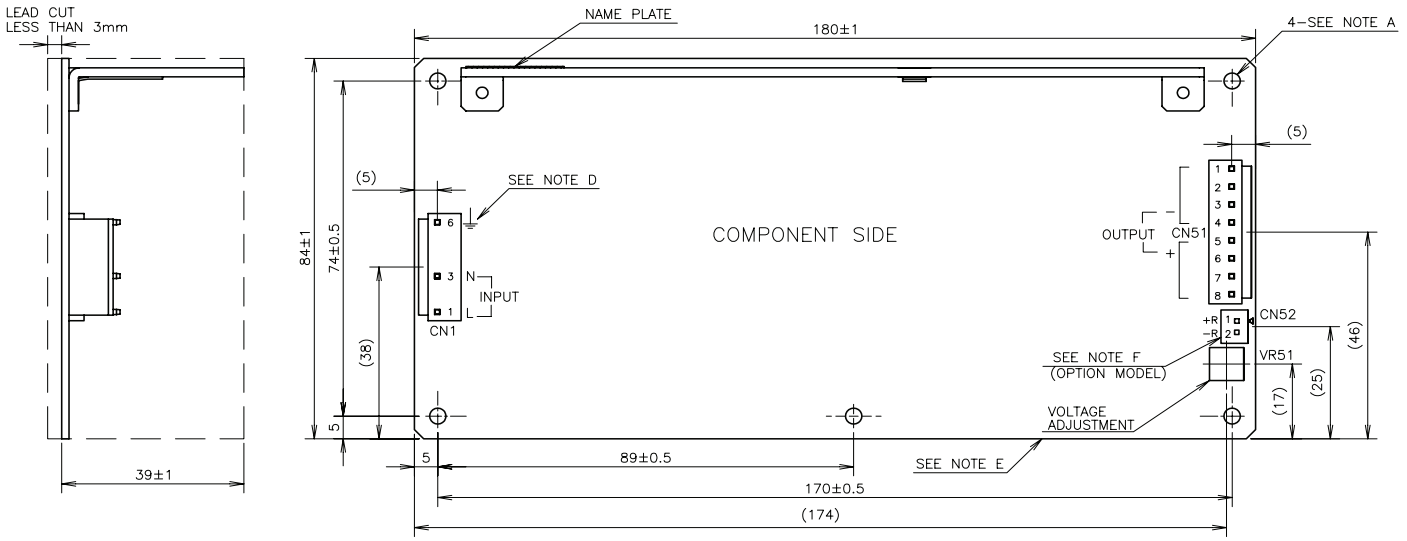
Specification

Model		ZWS240RC-24
Nominal Output Voltage	V	24V
Maximum Output Current	A	10A
Maximum Output Power	W	240W
Efficiency (typ)	%	87 / 90% (100 / 200VAC)
AC Input Voltage range (1)	-	85 - 265VAC (47 - 63Hz)
Input Current (typical) (2)	A	2.8 / 1.5A
Inrush Current - cold start (2)	A	15 / 30A
PFHC	-	Active Power Factor Correction - Designed to meet EN/IEC61000-3-2
Power Factor (2)	-	0.93 / 0.9
Output Voltage Accuracy	%	±2%
Output Voltage Range	VDC	21.6 - 26.4V
Ripple and Noise (pk-pk)	mV	200mV (0 to +70°C) (Maximum)
Line Regulation	mV	96mV (Maximum)
Load Regulation	mV	150mV (Maximum)
Temperature Coefficient	%°C	<0.02%/°C
Overcurrent Protection	-	>10.5A
Overvoltage Protection	V	27.6 - 32.4V (Cycle AC to reset)
Hold Up time (Typ) (2)	ms	31ms
Leakage Current (Typ) (3)	mA	0.2 / 0.4mA
Cooling	-	Convection
Operating Temperature (4)	°C	-10°C to +70°C, derate linearly to 30% load from +50°C to +70°C
E-cap lifetime (5)	yrs	Up to 12 years; 50°C ambient, 100% full load, 24 hours a day operation
Storage Temperature	°C	-30°C to +75°C
Humidity (non condensing)	%RH	Operating: 30 - 90%RH, Storage: 10 - 90%RH
Withstand Voltage	VAC	I/P to Gnd 2kVAC (10mA), I/P to O/P: 3kVAC (10mA), O/P to Gnd: 500VAC (20mA) for 1min Isolation
Resistance	Ω	>100MΩ at 25°C & 70%RH, Output to Gnd: 500VDC
Vibration (non operating)	-	10 - 55Hz (1 minute sweep), 19.6 m/s^2 constant X, Y, Z 1 hour each
Shock	-	<196.1m/s^2
Safety Agency Certifications	-	IEC/EN/UL/CSA60950-1, IEC/EN/UL/CSA62368-1, EN62477-1 (OVC III) and CE Mark
Conducted Emission	-	EN55011 / EN55032-B, FCC-B, VCCI-B
Radiated Emission	-	EN55011 / EN55032-A, FCC-A, VCCI-A
Immunity	-	IEC61000-6-2 ; IEC61000-4-2, -3, -4, -5, -6, -8, -11
Weight (Typ)	g	520
Size (W x H x D)	mm	84 x 42 x 180
Warranty	yrs	5

Notes:

(1) Derate linearly to 80% load from 90 to 85VAC input **(2)** 100/200VAC, full load **(3)** 100/230VAC
(4) Refer to Thermal Specifications & Application Notes **(5)** Refer to Reliability Data

Outline Drawing ZWS240RC Series



AC-DC Power Supplies

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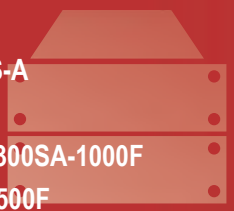
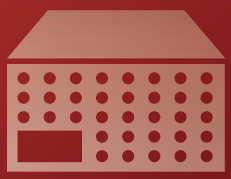
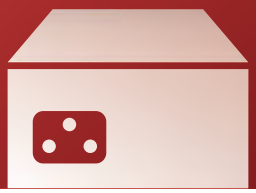
PFH500F	331







PCB mount

Applications

Power modules

- Distributed power architectures
- Customised designs with specific dimensions

PCB modules

- Low power applications

Features

- 5 to 1500W output power
- Single-phase wide range input 85 – 265Vac
- For PCB mounting
- Flexibility for different cooling concepts

TDK·Lambda

KAS Series

www.uk.tdk-lambda.com/kas

Test Industrial Broadcast Comm

2-4W Wide AC-DC Input PCB-Mount Power Supplies

Features	Benefits
• 90 - 305VAC Input Voltage	• Global Use
• Class II (No ground needed)	• Easy Rapid On-Board Integration
• Wide Temperature Range (-40 to +80°C)	• Use in a Range of Professional Industrial Applications
• Low off-load Power Consumption	• Friendly Environmental Footprint

Specification

Model		KAS2	KAS4
Input Voltage Range	-	90-305VAC 47-63Hz or 120-430VDC*	90-305VAC 47-440Hz or 120-430VDC*
Inrush Current Limiting (115 / 230VAC) (1)	A	30 / 50A	15 / 25A
Input Current (115 / 230VAC)	mA	75 / 55mA	110 / 70mA
No Load Power Consumption	W	<0.3W	
Recommended External Fuse	-	3.15 A slow blow type	
Temperature Coefficient	-	±0.02%/°C	
Voltage Set Accuracy	%	±6%	±2%
Minimum Load	-	None	
Overcurrent Protection	-	Hiccup mode, automatic recovery	
Overvoltage Protection	%	No	
Hold-up Time (115 / 230VAC)	ms	>15ms	
Leakage Current (Touch)	mA	<0.25mA at <240VAC	
Operating Temperature	-	-40°C to +80°C, derate linearly to 40% load from 60°C to 80°C	-40°C to +70°C, derate linearly to 40% load from 50°C to 70°C (2)
Storage Temperature	-	-40°C to +85°C	
Humidity	%RH	10% to 95% RH (non-condensing)	
Cooling	-	Convection	
Withstand Voltage	VAC	Input to output: 3kVAC	
Immunity	-	EN55024 (With external varistor L-N rated at 350Vrms maximum, 920V clamp, 0.6W minimum)	
Safety Agency Certification	-	UL/CSA/IEC/EN 60950-1, IEC/EN60335-1 (Designed to meet), CE Mark	
Conducted and Radiated EMI	-	EN55032 Class B	
Weight	g	19.9	26
Size (LxWxH)	mm	28.5 x 25.8 x 17.0	37.0 x 27.5 x 17.5
Mounting & Case	-	PC board mountable. Resin case (UL 94V-0)	
MTBF (MIL-HDBK-217F)	hrs	>450,000 hours	
Warranty	yrs	3	

Notes:

(1) Cold start, 25°C ambient. Requires 10Ω 5A external NTC thermistor

(2) Model dependent, see installation manual for details

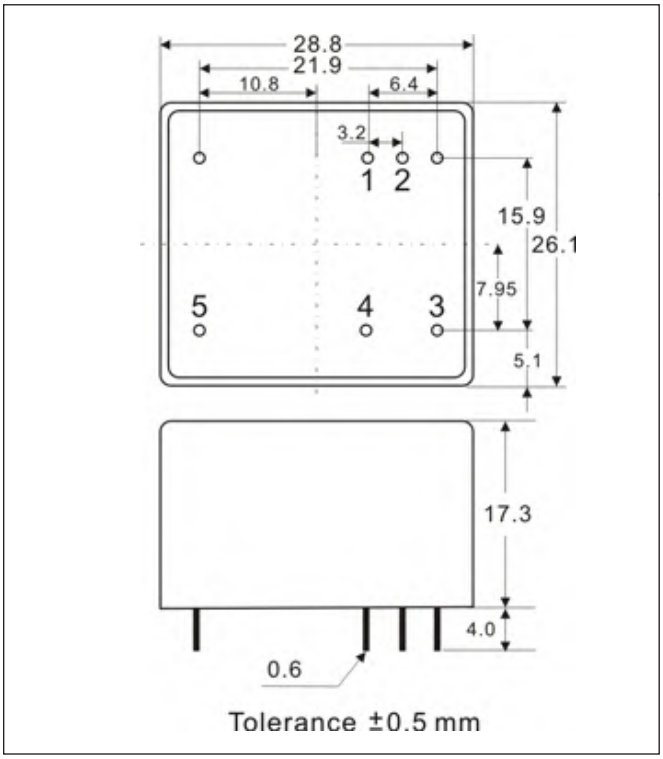
* Safety certified for AC input, 47-63Hz only

Model Selector

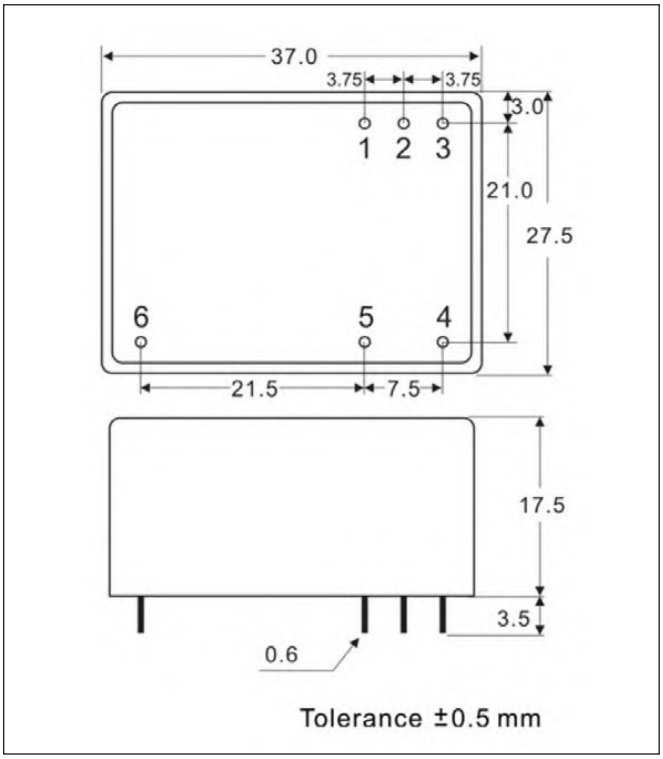
Model		Output Voltage (V)	Maximum Current (A)	Power (W)	Output Ripple & Noise (mV)	Line Regulation (mV)	Load Regulation (typ) (3)	Efficiency (%)	Maximum Capacitive Load (µF)
KAS2-3P3	V1	3.3V	0.6A	2W	300mV	±165mV	±198mV	66%	7000
KAS4-3P3	V1	3.3V	1.2A	4W	250mV	±16.5mV	±49.5mV	68%	5000
KAS2-5	V1	5V	0.4A	2W	300mV	±250mV	±300mV	70%	4000
KAS4-5	V1	5V	0.8A	4W	250mV	±25mV	±75mV	72%	4200
KAS4-8	V1	8V	0.5A	4W	200mV	±40mV	±120mV	74%	1470
KAS2-9	V1	9V	0.22A	2W	300mV	±450mV	±540mV	73%	1200
KAS4-9	V1	9V	0.444A	4W	200mV	±45mV	±135mV	75%	1330
KAS2-12	V1	12V	0.167A	2W	300mV	±600mV	±720mV	73%	500
KAS4-12	V1	12V	0.333A	4W	150mV	±24mV	±60mV	76%	680
KAS4-14	V1	14V	0.286A	4W	150mV	±28mV	±70mV	76%	470
KAS2-15	V1	15V	0.133A	2W	300mV	±750mV	±900mV	73%	350
KAS4-15	V1	15V	0.267A	4W	100mV	±30mV	±75mV	76%	330
KAS2-24	V1	24V	0.083A	2W	300mV	±1200mV	±1440mV	75%	110
KAS4-24	V1	24V	0.167A	4W	100mV	±48mV	±120mV	77%	120

Notes: (3) KAS2 10-100% load change

Outline Drawing KAS2



Outline Drawing KAS4



Pin Assignment

PIN #	KAS2	KAS4
1	+Vout	+Vout
2	-Vout	-Vout
3	Neutral	Not connected
4	Line	Line
5	Not connected	Neutral
6	-	Not connected

- Small Size & Lightweight
- PCB Board Mountable
- Wide Range Input
- Medical Safety Certifications (4kVAC Input - Output)
- Class II (No ground needed)

Key Market Segments & Applications

Portable Medical Equipment
General Low Power Applications

KM Series

15 to 40W Medical AC-DC
PCB - Mount Power Supplies

KM Features and Benefits

Features	Benefits
• Small Size	• Minimises PCB Space
• Wide Input Range	• Global use with no manual intervention
• High efficiency	• Lower Heat Dissipated in System

Specifications

ITEMS / MODELS		KMS15	KMD15	KMT15	KMS40	KMD40	KMT40
Input Voltage Range	-	90-264VAC 47-440Hz or 100-375VDC					
Inrush Current Limiting	A	10 / 20A, cold start, 25°C ambient (115 / 230VAC)					
Input Current (115 / 230VAC)	mA	220 / 118mA			860 / 460mA		
Internal Fuse (live line) (1)	-	250V/T2A			250V/T3.15A		
Temperature Coefficient (O/PV)	-	±0.01%/°C					
Ripple and Noise (pk-pk)	mV	50mV or 1%, whichever is greater					
Overcurrent Protection	-	> 105%, hiccup mode, automatic recovery					
Overvoltage Protection	%	Yes, Zener diode clamp					
Hold-up Time (typical)	ms	20ms			18ms		
Touch Current	mA	< 0.1					
Operating Temperature	-	-25°C to 70°C, derate linearly to 50% load from 50°C to 70°C. Max case temperature 95°C					
Storage Temperature	-	-40°C to 100°C					
Humidity	%RH	20% to 95% RH (non-condensing)					
Cooling	-	Convection, over temperature protected ~100°C case temperature)					
Withstand Voltage	VAC	Input to output: 4kVAC					
Immunity	-	EN60601-1-2					
Safety Agency Certification	-	IEC/EN 60601-1, UL/CSA 60601-1, ANSI/AAMI ES60601-1, CAN/CSA-C22.2 No. 60601-1-08, IEC/EN60950-1, CE Mark					
Conducted EMI	-	EN55011 Class B			EN55011 Class A (2)		
Switching Frequency	kHz	132kHz					
Weight	g	120			280		
Size (LxWxH)	mm	64 x 46 x 24			89 x 64 x 27		
Mounting & Case	-	PC board mountable. Plastic resin fibreglass case (UL 94V-0)					
MTBF	hrs	200,000 to 400,000 hours, model dependent					
Warranty	yrs	2					

Notes:

(1) For medical applications an equivalent external fuse should be installed in the neutral line
(2) Class I Applications: An external filter can be added to meet EN55011 Class B - see application notes

Model Selector

Model		Output Voltage (V)	Minimum Current (A)	Maximum Current) (A)	Power (W)	Output Set Accuracy (%)	Line Regulation (%)	Load Regulation (1) (%)	Cross Regulation	Efficiency (%)
Single Output										
KMS15-3P3	V1	3.3V	0A	3.00A	9.9W	±2%	0.5%	1%	-	74%
KMS40-3P3	V1	3.3V	80mA	8.00A	26.4W	±2%	0.5%	1%	-	75%
KMS15-5	V1	5V	0A	3.00A	15W	±2%	0.5%	1%	-	78%
KMS40-5	V1	5V	80mA	8.00A	40W	±2%	0.5%	1%	-	79%
KMS15-9	V1	9V	0A	1.67A	15W	±2%	0.5%	1%	-	79%
KMS40-9	V1	9V	44mA	4.44A	40W	±2%	0.5%	1%	-	82%
KMS15-12	V1	12V	0A	1.25A	15W	±2%	0.5%	1%	-	81%
KMS40-12	V1	12V	33mA	3.33A	40W	±2%	0.5%	1%	-	83%
KMS15-15	V1	15V	0A	1.00A	15W	±2%	0.5%	1%	-	81%
KMS40-15	V1	15V	26.7mA	2.67A	40W	±2%	0.5%	1%	-	83%
KMS15-24	V1	24V	0A	0.62A	15W	±2%	0.5%	1%	-	83%
KMS40-24	V1	24V	16.7mA	1.67A	40W	±2%	0.5%	1%	-	83%
Dual Output										
KMD15-55	V1	+5V	150mA	1.5A	15W	±2%	0.5%	1%	5%	78%
	V2	-5V	150mA	1.5A		±2%	0.5%	1%	5%	
KMD40-55	V1	+5V	400mA	4A	40W	±2%	0.5%	1%	5%	79%
	V2	-5V	400mA	4A		±2%	0.5%	1%	5%	
KMD40-512	V1	5V(2)	1250mA	5A	40W	±3%	0.5%	2%	1%	80%
	V2	12V(2)	312mA	1.25A		±5%	5.0%	6%	7%	
KMD40-524	V1	5V(2)	1250mA	5A	40W	±3%	0.5%	2%	1%	80%
	V2	24V(2)	156mA	0.625A		±5%	5.0%	6%	7%	
KMD15-1212	V1	+12V	62.5mA	0.625A	15W	±2%	0.5%	1%	3%	80%
	V2	-12V	62.5mA	0.625A		±2%	0.5%	1%	3%	
KMD40-1212	V1	+12V	166mA	1.66A	40W	±2%	0.5%	1%	5%	83%
	V2	-12V	166mA	1.66A		±2%	0.5%	1%	5%	
KMD15-1515	V1	+15V	50mA	0.5A	15W	±2%	0.5%	1%	3%	81%
	V2	-15V	50mA	0.5A		±2%	0.5%	1%	3%	
KMD40-1515	V1	+15V	133mA	1.33A	40W	±2%	0.5%	1%	5%	81%
	V2	-15V	133mA	1.33A		±2%	0.5%	1%	5%	
Triple Output										
KMT15-51212	V1	5V(3)	500mA	2A	15W	±2%	0.5%	1%	1%	78%
	V2	+12V	50mA	0.2A		±3%	2.0%	5%	5%	
	V3	-12V	50mA	0.2A		±3%	2.0%	5%	5%	
KMT40-51212	V1	5V(3)	1250mA	5A	40W	±3%	0.5%	3%	3%	80%
	V2	+12V	150mA	0.6A		±5%	5.0%	7%	7%	
	V3	-12V	150mA	0.6A		±5%	5.0%	7%	7%	
KMT15-51515	V1	5V(3)	500mA	2A	15W	±2%	0.5%	1%	1%	78%
	V2	+15V	37.5mA	0.15A		±3%	2.0%	5%	5%	
	V3	-15V	37.5mA	0.15A		±3%	2.0%	5%	5%	
KMT40-51515	V1	5V(3)	1250mA	5A	40W	±3%	0.5%	3%	3%	80%
	V2	+15V	125mA	0.5A		±5%	5.0%	7%	7%	
	V3	-15V	125mA	0.5A		±5%	5.0%	7%	7%	

Pinout KM15

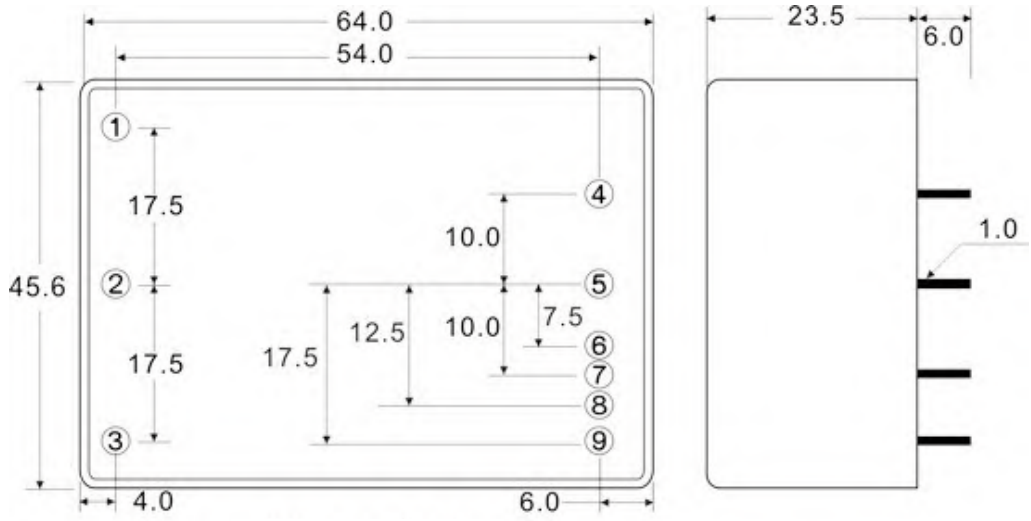
PIN #	Function		
	Single O/P	Dual O/P	Triple O/P
1	No Pin	No Pin	No Pin
2	AC (L)	AC (L)	AC (L)
3	AC (N)	AC (N)	AC (N)
4	-DC	-DC	+5V GND
5	No Pin	GND	+5V
6	No Pin	No Pin	-DC
7	+DC	+DC	No Pin
8	No Pin	No Pin	GND
9	No Pin	No Pin	+DC

Pinout KM40

PIN #	Function			
	Single O/P	Dual O/P	5S/12&24S	Triple O/P
1	AC (L)	AC (L)	AC (L)	AC (L)
2	AC (N)	AC (N)	AC (N)	AC (N)
3	+DC	+DC	+O/P2	+DC
4	No Pin	No Pin	+O/P1	+5V
5	-DC	GND	GND1	GND
6	No Pin	No Pin	GND2	+5V GND
7	No Connection	-DC	No Connection	-DC

Outline Drawing KM15 Series

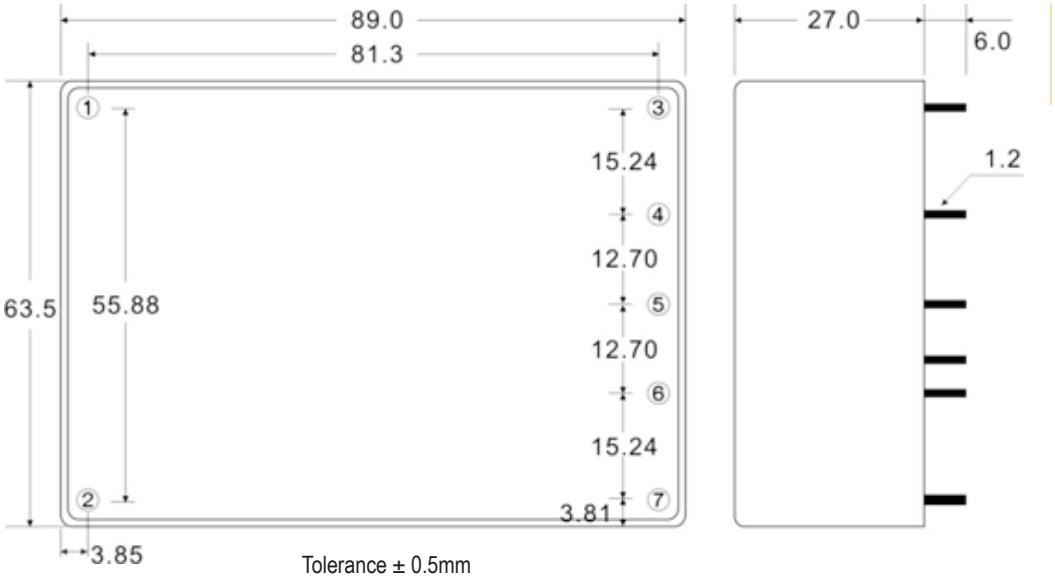
Viewed from Top Side



Tolerance ± 0.5mm

Outline Drawing KM40 Series

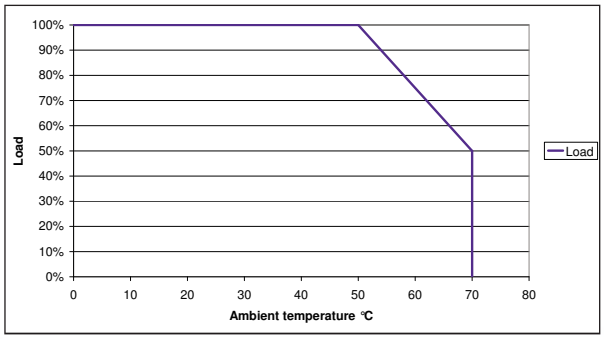
Viewed from Top Side



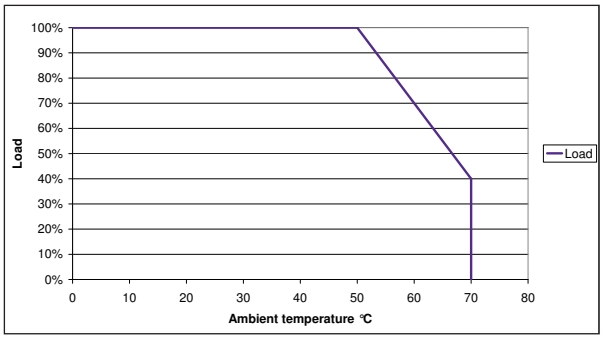
Tolerance ± 0.5mm

Notes: (1) Symmetrical loading, from minimum to maximum load (2) Output V1 is isolated from output V2 (3) Output V1 is isolated from outputs V2 & V3

Derating Curves KM15 Series



Derating Curves KM40 Series



TDK·Lambda

KMS-A Series

www.emea.tdk-lambda.com/kmsa

Medical Industrial Test Comm Broadcast

15-60W Medical AC-DC PCB-Mount Power Supplies

Features	Benefits
• Medical certifications at 5000m	• Suitable for B & BF applications worldwide
• I/O isolation 4KVAC, 2 x MoPP	• Patient protection at 250VACrms working voltage
• Low off-load power draw	• Efficient environmental footprint
• Class II (no ground needed)	• Simple system integration

Photo (KMS60A shown)

Specification

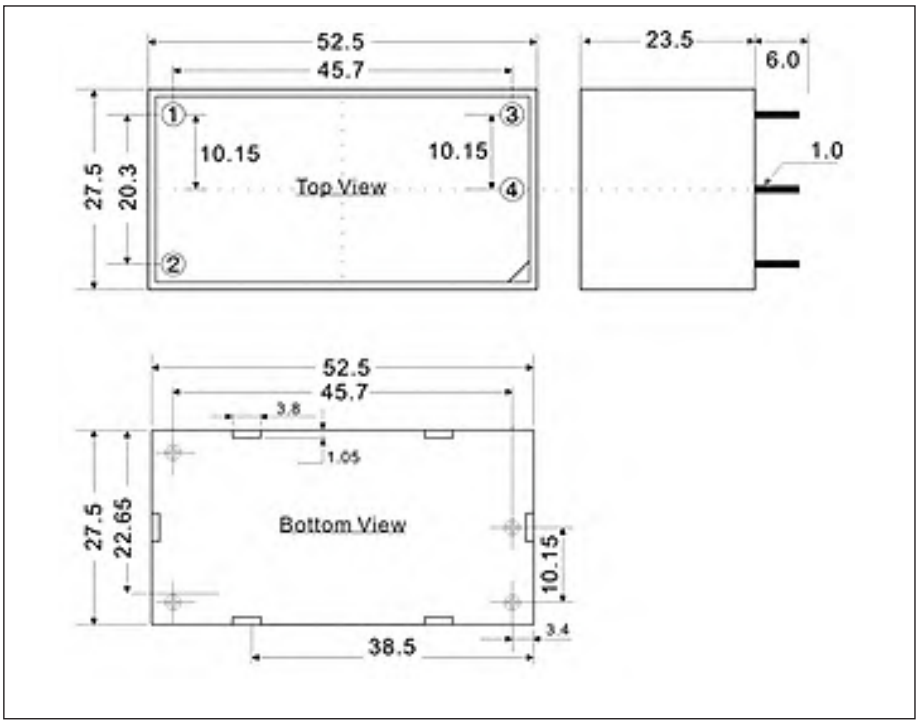
Model		KMS15A	KMS30A	KMS60A
Input Voltage Range (1)	-	90-264VAC 47-440Hz* or 120-370VDC*		
Inrush Current Limiting (115 / 230VAC) (2)	A	20 / 40A	30 / 60A	55 / 95A
Input Current (115 / 230VAC)	mA	385 / 250mA	650 / 400mA	1500 / 1000mA
Off-load Power Draw	W	<0.1W	<0.15W	<0.3W
Recommended External Fuse	-	3.15A (slow blow type)		
Temperature Coefficient	-	±0.05%/°C		
Voltage Set Accuracy	%	±2%		
Minimum Load	-	None		
Overcurrent Protection	-	Hiccup mode, automatic recovery		
Overvoltage Protection	%	Yes, Zener diode clamp		
Hold-up Time (115 / 230VAC)	ms	15 / 56ms (typ)	>10ms	
Leakage Current (Touch)	mA	<0.1mA at 264VAC		
Series or parallel operation	-	Yes, see application note for details		
Operating Temperature (3)	-	- 40°C to +80°C, derate linearly to 30% load from 50°C to 80°C		
Maximum Case Temperature	-	90°C (83°C <115VAC)	85°C (78°C <115VAC)	80°C (73°C <115VAC)
Storage Temperature	-	-40°C to +90°C		
Humidity	%RH	10% to 95% RH (non-condensing)		
Cooling	-	Convection		
Withstand Voltage	VAC	Input to output: 4kVAC, 2 x MOPPs		
Immunity	-	EN61000-4-2, -3, -4, -5, -6, -8, -11		
Altitude	m	5000m		
Safety Agency Certification	-	UL/CSA/IEC/EN 60950-1, ANSI/AAMI ES60601-1, IEC/EN 60601-1 (2xMOPPs)		
Conducted and Radiated EMI	-	EN55011 Class B		
Weight	g	59g	130g	280g
Size (LxWxH)	mm	52.5 x 27.5 x 23.5	64.0 x 45.0 x 23.5	89.0 x 63.5 x 27.0
Mounting & Case	-	PC board mountable. Plastic resin fiberglass case (UL 94V-0)		
MTBF	hrs	200,000 to 400,000 hours, model dependant		
Warranty	yrs	3 years		

(1) Derate linearly to 80% load below 110VAC (100VAC for KMS15A)
(2) Cold start, 25°C ambient
(3) Derate linearly to 80% load below -30C.
* Safety certified for AC input, 47-63Hz only

Model Selector Single Output

MODEL	Output Voltage (V)	Maximum Current (A)	Power (W)	Output Ripple & Noise (mV)	Line Regulation (%)	Load Regulation (%)	Efficiency (%)	Maximum Capacitive Load (µF)
KMS15A-5	5V	3A	15W	120mV	±25mV	±50mV	79%	7000
KMS30A-5	5V	5A	25W	100mV	±25mV	±50mV	84%	6800
KMS60A-5	5.1V	10A	51W	100mV	±25mV	±75mV	86%	10000
KMS15A-9	9V	1.666A	15W	120mV	±45mV	±90mV	80%	5000
KMS60A-9	9V	6.666A	60W	100mV	±45mV	±135mV	87%	5000
KMS15A-12	12V	1.25	15W	120mV	±60mV	±120mV	84%	1500
KMS30A-12	12V	2.5A	30W	150mV	±60mV	±120mV	89%	1600
KMS60A-12	12V	5A	60W	120mV	±60mV	±120mV	88%	5000
KMS15A-15	15V	1A	15W	150mV	±75mV	±150mV	84%	1000
KMS30A-15	15V	2A	30W	150mV	±75mV	±150mV	86%	1200
KMS60A-15	15V	4A	60W	150mV	±75mV	±150mV	86%	4000
KMS15A-24	24V	0.625	15W	240mV	±120mV	±240mV	85%	470
KMS30A-24	24V	1.25A	30W	240mV	±120mV	±240mV	86%	470
KMS60A-24	24V	2.5A	60W	240mV	±120mV	±240mV	87%	2000

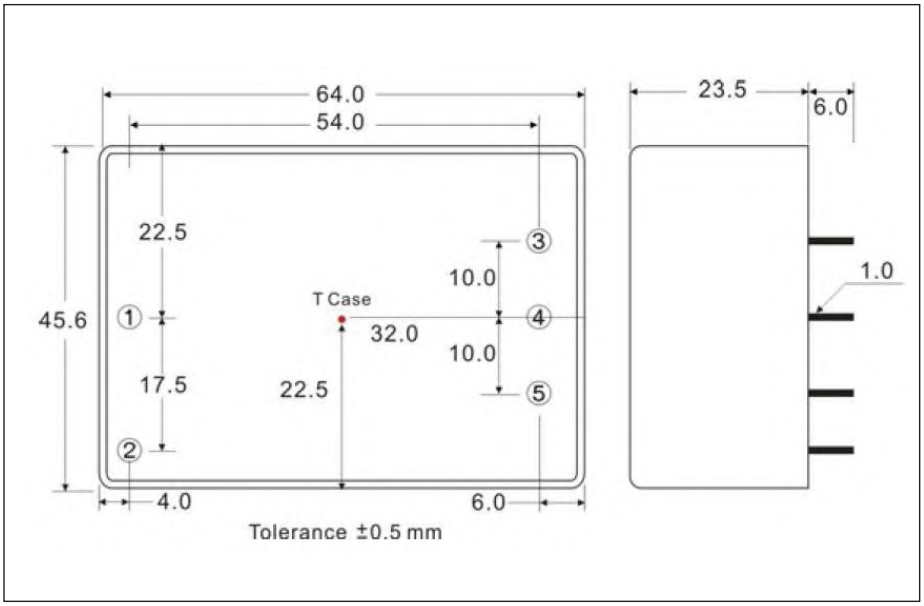
Outline Drawing KMSA15



KMSA15

Pin No.	Function
1	AC in (L)
2	AC in (N)
3	+DC Out
4	-DC Out

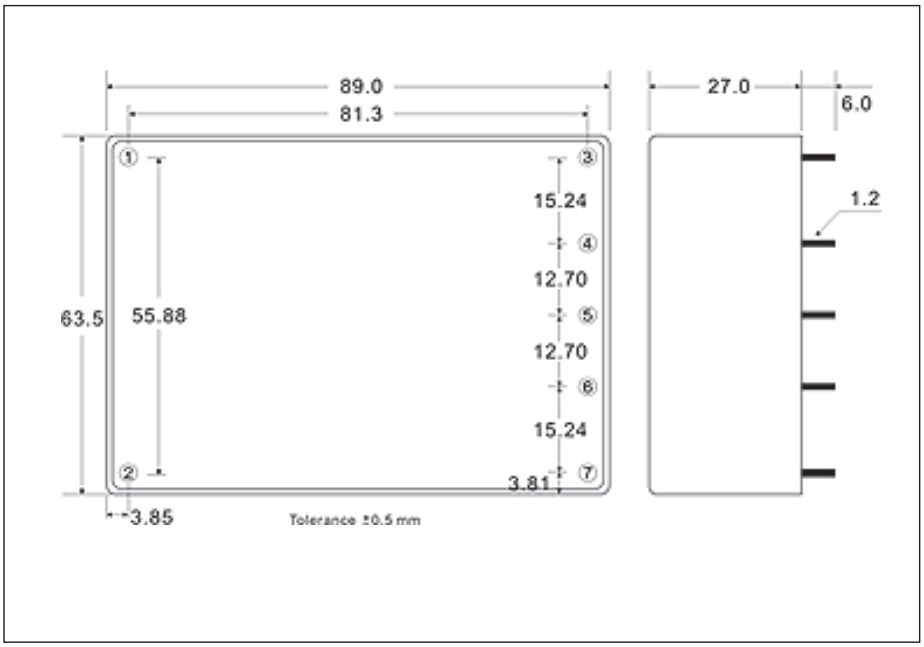
Outline Drawing KMSA30



KMSA30

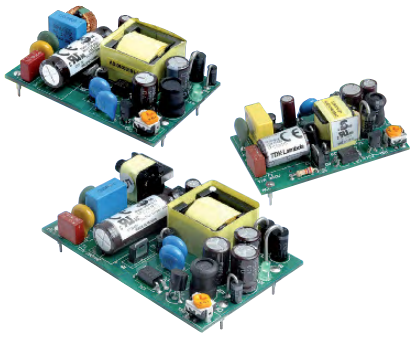
Pin No.	Function
1	AC in (N)
2	AC in (L)
3	-DC Out
4	No Pin
5	+DC Out

Outline Drawing KMSA60



KMSA60

Pin No.	Function
1	AC in (L)
2	AC in (N)
3	+DC Out
4	No Pin
5	-DC Out
6	No Pin
7	No Pin



- Small Size & Lightweight
- PCB Board Mountable
- Low Cost
- Universal Input Voltage
- RoHS Compliant

Key Market Segments & Applications

Factory Automation
Telecom
Datacom
Printers and motor drives
Instruments

KPSA Series

5 to 15W AC-DC
Board Mount Power Supplies

KPSA Features and Benefits

Features	Benefits
• Small Size	• Minimises PCB Space
• Wide Input Range	• Global use with no manual intervention
• No External Components Needed	• Easy to use

Specifications

ITEMS \ MODEL			KPSA-5	KPSA-10	KPSA-15
Input Voltage range		-	85 - 264VAC (47 - 63Hz) or 100 - 370VDC		
Inrush Current (115 / 230VAC)		A	30A Max at 230VAC		
Input Current		A	0.13 / 0.07	0.27 / 0.13	0.4 / 0.2
Temperature Coefficient		-	±0.05%/°C		
Voltage Accuracy		-	±1%		
Minimum Load		A	None		
Load Regulation		-	±1% (10% to 100% load)		
Line Regulation	(1)	-	±0.5%		
Ripple & Noise	(2)	mV	1% or 50mV whichever is greater		
Short Circuit Protection		-	Continuous - hiccup mode		
Overvoltage Protection		V	130-150%		
Hold Up Time (Typ@115VAC)		ms	12	12	12
LED Indicator		-	Green LED = OK		
Operating Temperature		°C	0 to +70 with derating		
Storage Temperature		°C	-20 to +85		
Humidity (non condensing)		%RH	10 - 95		
Cooling		-	Convection		
Withstand Voltage		-	Input to Output 3kVAC		
Vibration (non operating)		-	23.52m/s² (10 - 55Hz: constant sweep 1 min X, Y, Z for 1 hour)		
Shock		-	< 196.1 m/s² (20G)		
Safety Agency Approvals		-	UL60950-1, CSA60950-1, EN60950-1 Class II, CE Mark		
Conducted & Radiated EMI		-	EN55022-B, FCC Class B		
Immunity		-	EN61000-4 -2, -3, -4, -5, -6		
Weight (Typ)		g	28	40	48
Size (WxLxH; H above pcb)		mm	55 X 33 X 21	61 X 40 X 20	70 X 45 X 20
Warranty		yrs	2		

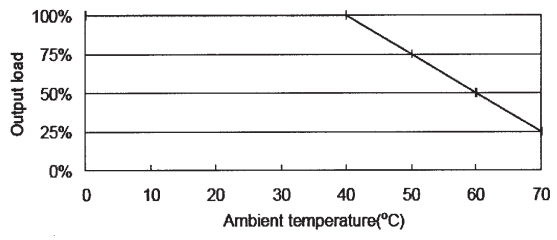
Notes:

(1) KPSA-5 Measured from 100 - 240VAC
(2) Measured with 0.1μF ceramic & 10μF electrolytic at 20MHz BW

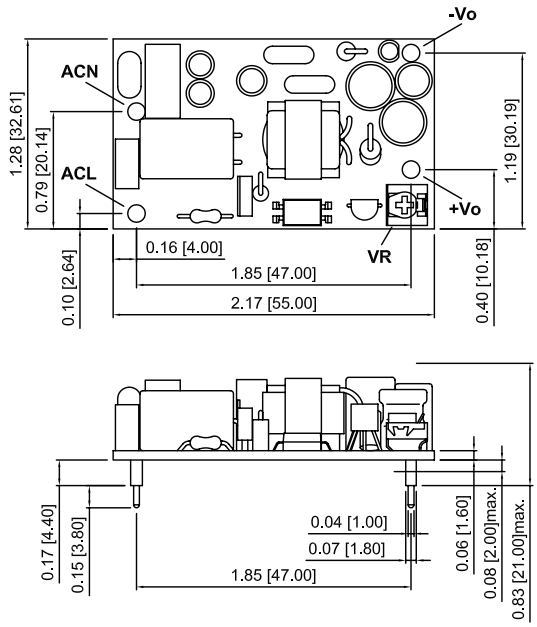
Model Selector

Model	Output Voltage (V)	Maximum Output (A)	Peak Load (A)	Output Pwr (W)	Eff (typ)%
KPSA5-3R3	3.3	1.25	-	4.1	70
KPSA5-5	5.0	1.00	-	5.0	70
KPSA5-12	12.0	0.42	-	5.0	70
KPSA5-15	15.0	0.33	-	5.0	70
KPSA5-24	24.0	0.23	-	5.5	76
KPSA10-3R3	3.3	2.50	3.80	8.3	65
KPSA10-5	5.0	2.00	2.80	10.0	70
KPSA10-12	12.0	0.84	1.20	10.1	75
KPSA10-15	15.0	0.67	1.00	10.1	75
KPSA10-24	24.0	0.42	0.65	10.1	76
KPSA15-3R3	3.3	3.00	4.50	9.9	70
KPSA15-5	5.0	3.00	4.50	15.0	73
KPSA15-12	12.0	1.25	1.80	15.0	80
KPSA15-15	15.0	1.00	1.50	15.0	80
KPSA15-24	24.0	0.63	0.95	15.1	82

Derating Curve KPSA Series

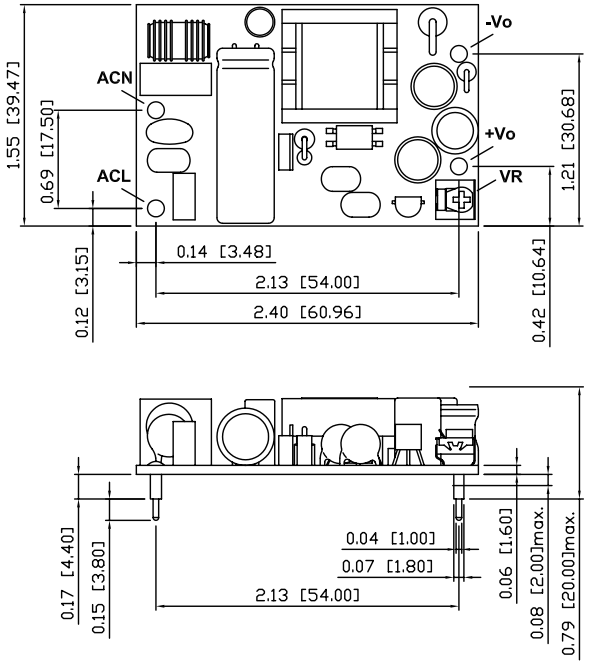


Outline Drawing KPSA5 Series



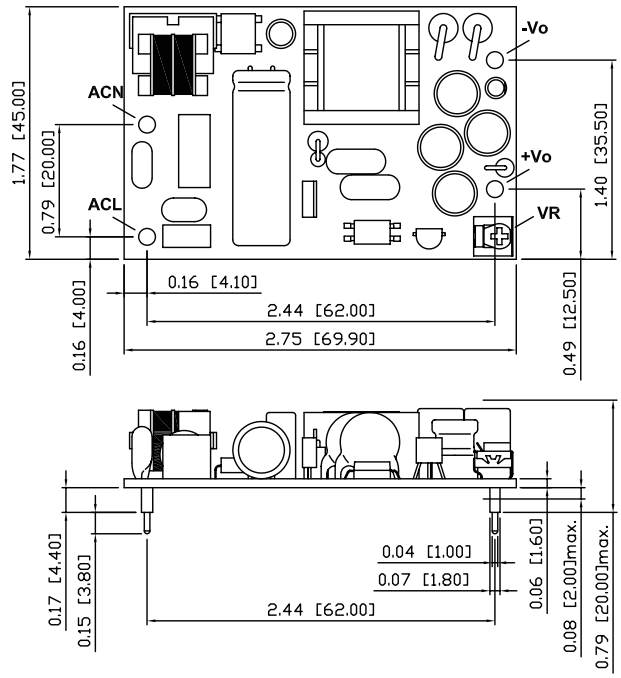
All Dimensions are in inches[mm]
Tolerances:,XX±.02[.X±.5] uniess otherwise noted

Outline Drawing KPSA10 Series



Note: All Dimensions are in inches (mm) Tolererances: XX±0.2 (.X±.5) unless otherwise noted

Outline Drawing KPSA15 Series



Note: All Dimensions are in inches (mm) Tolererances: XX±0.2 (.X±.5) unless otherwise noted

INTERMEDIATE VOLTAGES AVAILABLE
PLEASE CONSULT SALES

- Small size and lightweight
- PC Board Mountable
- -10 to +70 °C Continuous Operation
- 85 - 265VAC Wide Range Input
- World-wide Agency Approvals UL, CSA, TUV and CE Mark
- Convection Cooled
- Low Noise Conducted EMI Class B

KW Series

Compact AC-DC PCB-Mount Power Supplies

KW Features and Benefits

Features	Benefits
• Small size	• Minimises PCB space
• Wide input range	• Global use with no manual intervention
• No external components needed	• Easy to use

Specifications

ITEMS \ MODEL			5V	12V	15V	±12V	±15V
AC Input			85-265VAC 47-440Hz				
DC Input		VDC	110-340VDC				
Efficiency (typical)		%	67-74	70-77	70-77	69-75	69-75
Inrush Current Limiting	(1)	A	5 & 10W: 15/30A, 15W: 20/40A				
Conducted EMI		-	FCC20780 class B, VDE0871 Class B, VCCI-2 (with external cap).				
Output Voltage Accuracy		%	± 5% (fixed)				
Line Regulation		%	0.4%			0.5%	
Load Regulation		%	0.8%			5.0%	
Ripple and Noise (pk-pk)		mV	120	150			
Hold-up Time (typical)		ms	17ms				
Overvoltage Protection (typical)		%	~110% (zener clamp)				
Overcurrent Protection		-	105%				
Cooling		-	Convection				
Operating Temperature		-	-10°C to 70°C, derate linearly to 25% load from 50°C to 70°C				
Humidity		%RH	30 - 90% (Operating)				
Isolation		VAC	Input to output: 3kVAC; Input to Case: 2kVAC; Output to Case: 500VAC				
Mounting		-	PC board mountable				
Safety Agency Approval		-	UL1950, CSA 22.2 No. 60950-1-03, EN60950-1 & CE Mark (LVD)				
Weight		g	5W: 75, 10W: 100, 15W: 150				
Warranty		-	1 year				

Notes: (1) 100/200VAC @ 25°C

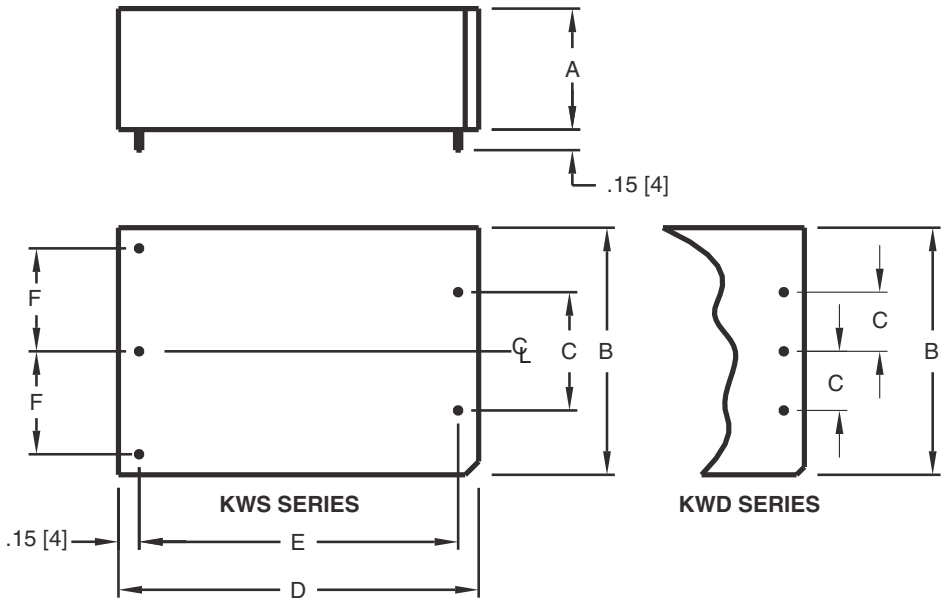
Model Selector

Model	Voltage (V)	Power (W)	Current (A)
Single Output			
KWS5-5	5V	5	1.00
KWS10-5	5V	10	2.00
KWS15-5	5V	15	3.00
KWS5-12	12V	5	0.45
KWS10-12	12V	10	0.90
KWS15-12	12V	15	1.30
KWS5-15	15V	5	0.35
KWS10-15	15V	10	0.70
KWS15-15	15V	15	1.00
Dual Output			
KWD5-1212	±12V	5	±0.22
KWD10-1212	±12V	10	±0.45
KWD15-1212	±12V	15	±0.65
KWD5-1515	±15V	5	±0.18
KWD10-1515	±15V	10	±0.36
KWD15-1515	±15V	15	±0.52

Pinout Table

Pin	Function
FG	Case (Frame Ground)
AC(N)	AC Neutral
AC(L)	AC Line
-V	Negative Voltage Out
+V	Positive Voltage Out
COM	Output common

Outline Drawing KW Series



DIMENSIONS:

MODEL	A	B	C	D	E	F
KWS5	.807 (20.5)	1.77 (45.0)	.787 (20.0)	2.16 (55.0)	1.850 (47.0)	.688 (17.5)
KWS10	.807 (20.5)	1.77 (45.0)	.787 (20.0)	2.52 (64.0)	2.125 (54.0)	.688 (17.5)
KWS15	.925 (23.5)	1.889 (48.0)	.905 (23.0)	2.75 (70.0)	2.440 (62.0)	.787 (20.0)
KWD5	.807 (20.5)	1.77 (45.0)	.393 (10.0)	2.16 (55.0)	1.850 (47.0)	.688 (17.5)
KWD10	.807 (20.5)	1.77 (45.0)	.393 (10.0)	2.52 (64.0)	2.125 (54.0)	.688 (17.5)
KWD15	.925 (23.5)	1.889 (48.0)	.453 (11.5)	2.75 (70.0)	2.440 (62.0)	.787 (20.0)

WEIGHT:

MODEL	GRAMS
KWS5	75
KWS10	100
KWS15	150
KWD5	75
KWD10	100
KWD15	150

NOTE:
1. DIMENSIONS ARE IN INCHES
   EXCEPT DIMENSIONS ( ) ARE IN MM.
2. PIN: 5x .039 (1.0).

Industrial Test Comm Broadcast

Single Output 5W to 25W AC-DC PCB-Mount Power Supplies

Features	Benefits
• Protection Class II, No Ground Connection	• Easy, rapid on-board integration
• Small footprint without the need for external components	• Saves space, time and cost
• Long Electrolytic Capacitor Lifetime	• Higher reliability, longer product or system life
• No load power consumption less than 0.5W	• Better energy efficiency, better environmental footprint
• Improved efficiencies up to 88%	• Reduced power losses, easier on board thermal management
• Wide Temperature Range -40°C (start up) to +85°C	• Enables use in wide range of professional industrial applications

Specification

Model		KWS5A	KWS10A	KWS15A	KWS25A
AC Input Voltage	VAC	85 - 265 (1)			
Input Frequency	Hz	47 - 440			
Inrush Current (cold start)	A	15 at 100VAC, 30 at 200VAC			
Power Factor	-	Meets EN61000-3-2			
Input Current (100/200VAC)	A	0.13 / 0.07	0.25 / 0.13	0.33 / 0.24	0.56 / 0.34
Output Voltage Accuracy	%	±5			
No Load Power Consumption	W	<0.5			
Temperature Coefficient	%/°C	<0.02			
Overcurrent Protection	-	> 105% of rated current			
Overvoltage Protection	V	5V: 5.75 - 7, 12V: 13.8 - 18.3, 15V: 17.25 - 22.4, 24V: 27.6 - 34			
Hold Up Time (100 / 200V input)	ms	15 / 30	10 / 20		
Leakage Current	mA	<0.25 at 265VAC, 60Hz			
Operating Temperature	°C	-40°C start-up; -10 to +85°C. See derating curve for details			
Storage Temperature	°C	-40 to +85°C			
Humidity (non condensing)	%RH	30 - 90 Operating, 20 - 95 Storage			
Cooling	-	Convection Cooled			
Withstand Voltage	VAC	Input to Output 3kVAC			
Isolation Resistance	MΩ	>100MΩ at 25°C & 70%RH, Input to Output 500VDC			
Vibration (non operating)	-	10 - 55Hz: 1.65mm p-p (Max 10G) sweep for 1 min X, Y, Z for 1 hour			
Shock	-	< 50G for 11 ±5ms on (X,Y,Z) each axis 3 times			
Immunity	-	IEC61000-4-2, -3, -4, -5, -6, -8, -11; IEC61000-6-2			
Safety Agency Certifications	-	IEC/EN/UL/CSA60950-1, IEC/EN/UL/CSA62368-1 and CE Mark			
Conducted & Radiated EMI	-	EN55011-A, EN55022-A, FCC Class A (Requires external X capacitor to meet -B)			
Weight (Typ)	g	35	35	60	85
Size (LxWxH)	mm	38.1 x 25.4 x 21.5		50.8 x 25.4 x 24	63.5 x 25.4 x 29
MTBF (2)	hours	14,416,059	7,784,121	8,202,502	5,747,627
Warranty	yrs	3			

Notes: **(1)** Derate to 80% load from 100 to 85VAC input (KWS5A 90% load from 90 to 85VAC)

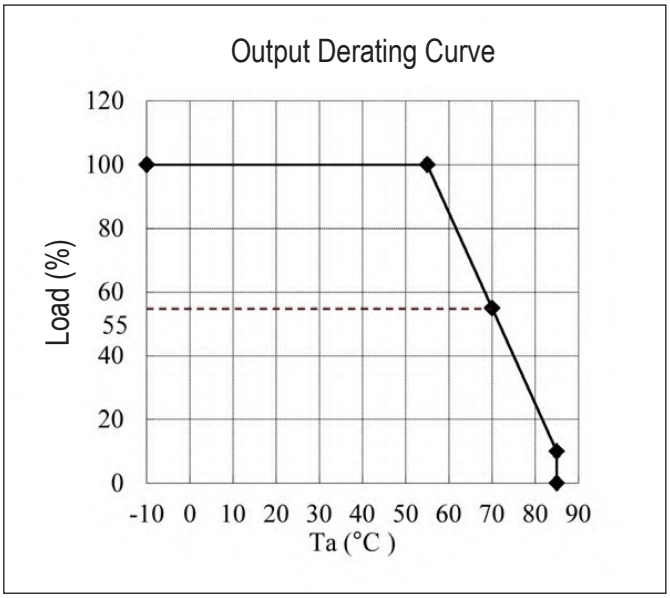
(2) According to Telcordia document SR-332, issue 3, "Reliability Prediction Procedure for Electronic Equipment" Conditions: ambient temp. 25°C, 230Vac input, full load (figures shown for 24V models)

Model Selector

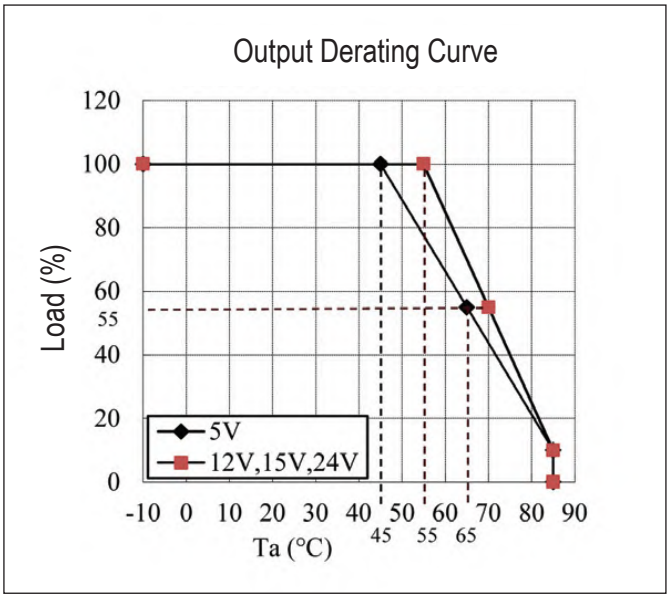
Model	Voltage (V)	Max Current (A)	Max Power (W)	Load Reg (mV)	Line Reg (mV)	Ripple Noise (mV)	Efficiency (typ) % (3)
KWS5A-5	5	1.0	5.0	40	20	200	76 / 74
KWS10A-5	5	2.0	10.0	40	20	200	76 / 77
KWS15A-5	5	3.0	15.0	40	20	200	77 / 78
KWS25A-5	5	5.0	25.0	40	20	200	81 / 82
KWS5A-12	12	0.45	5.4	96	48	240	78 / 75
KWS10A-12	12	0.9	10.8	96	48	240	80 / 81
KWS15A-12	12	1.3	15.6	96	48	240	81 / 83
KWS25A-12	12	2.2	26.4	96	48	240	84 / 86
KWS5A-15	15	0.35	5.3	120	60	240	79 / 75
KWS10A-15	15	0.7	10.5	120	60	240	81 / 82
KWS15A-15	15	1.0	15.0	120	60	240	82 / 84
KWS25A-15	15	1.7	25.5	120	60	240	85 / 87
KWS5A-24	24	0.22	5.3	150	96	240	80 / 77
KWS10A-24	24	0.5	12.0	150	96	240	82 / 84
KWS15A-24	24	0.7	16.8	150	96	240	82 / 85
KWS25A-24	24	1.1	26.4	150	96	240	86 / 88

Notes: (3) 115 / 230VAC input. Full load

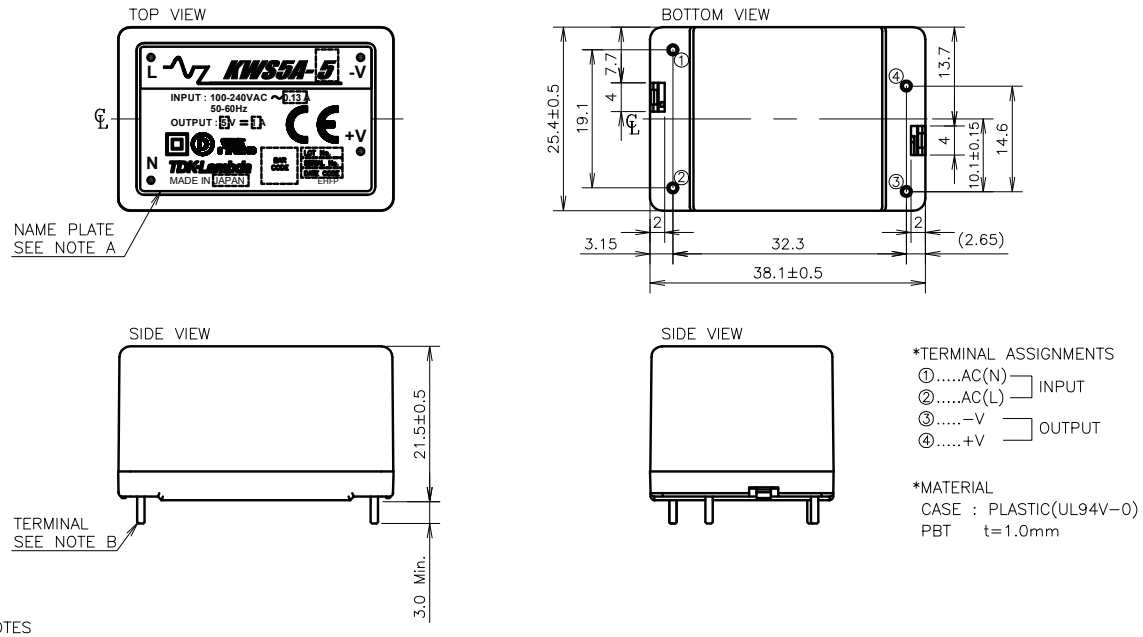
Output Derating Curve KWS5A



Output Derating Curve KWS-A Series (10, 15, 25W)



Outline Drawing KWS5A & KWS10A



NOTES

A: MODEL NAME, INPUT VOLTAGE RANGE, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT, COUNTRY OF MANUFACTURE AND ⊡MARKING ARE SHOWN HERE IN ACCORDANCE WITH THE SPECIFICATIONS.

B: INPUT AND OUTPUT TERMINALS : 4−ø1±0.1

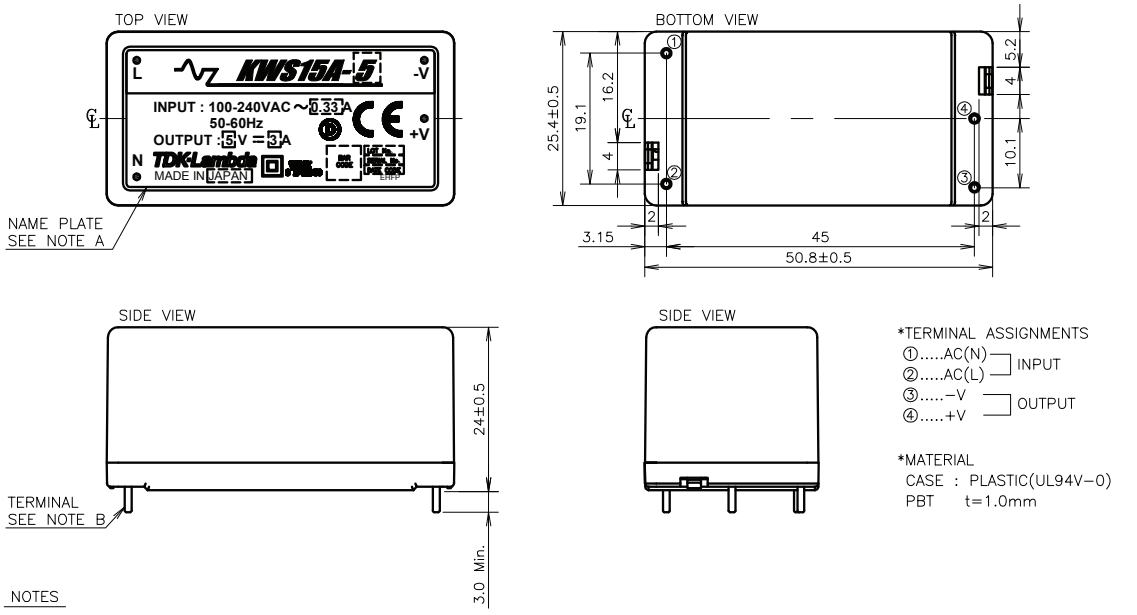
C: UNLESS OTHERWISE SPECIFIED DIMENSIONAL TOLERANCE : ±0.3

(unit : mm)

MODEL NAME	KWS5A
TDK-Lambda	

FC002−02−01

Outline Drawing KWS15A



NOTES

A: MODEL NAME, INPUT VOLTAGE RANGE, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT, COUNTRY OF MANUFACTURE AND ⊡MARKING ARE SHOWN HERE IN ACCORDANCE WITH THE SPECIFICATIONS.

B: INPUT AND OUTPUT TERMINALS : 4−ø1±0.1

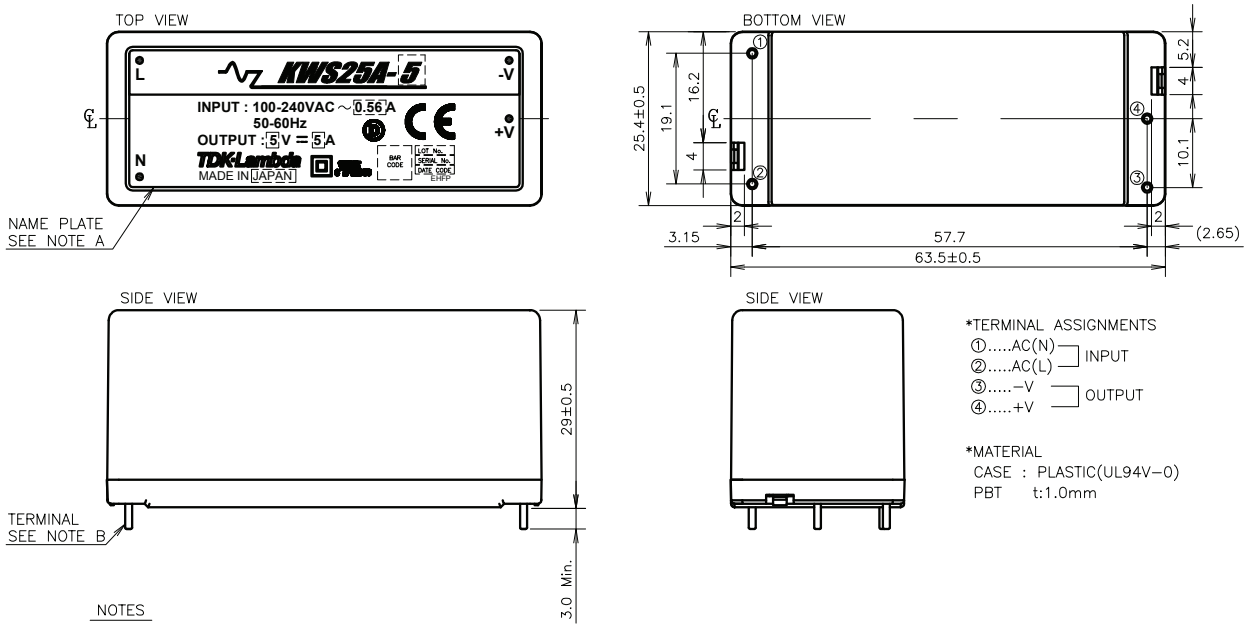
C: UNLESS OTHERWISE SPECIFIED DIMENSIONAL TOLERANCE : ±0.3

(unit : mm)

MODEL NAME	KWS15A
TDK-Lambda	

FC004−02−01

Outline Drawing KWS25A



NOTES

A: MODEL NAME, INPUT VOLTAGE RANGE, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT, COUNTRY OF MANUFACTURE AND ⊡MARKING ARE SHOWN HERE IN ACCORDANCE WITH THE SPECIFICATIONS.

B: INPUT AND OUTPUT TERMINALS : 4−ø1±0.1

C: UNLESS OTHERWISE SPECIFIED DIMENSIONAL TOLERANCE : ±0.3

(unit : mm)

MODEL NAME	KWS25A
TDK-Lambda	

FC005−02−01

- Suitable for use in Custom Power Supplies
- Provides high voltage DC to TDK-Lambda's PH & PAF Power Modules
- Parallel operation on PF Series
- 12.7mm profile

PF Series

Rectifier & Power Factor Correction Modules

PF Features and Benefits

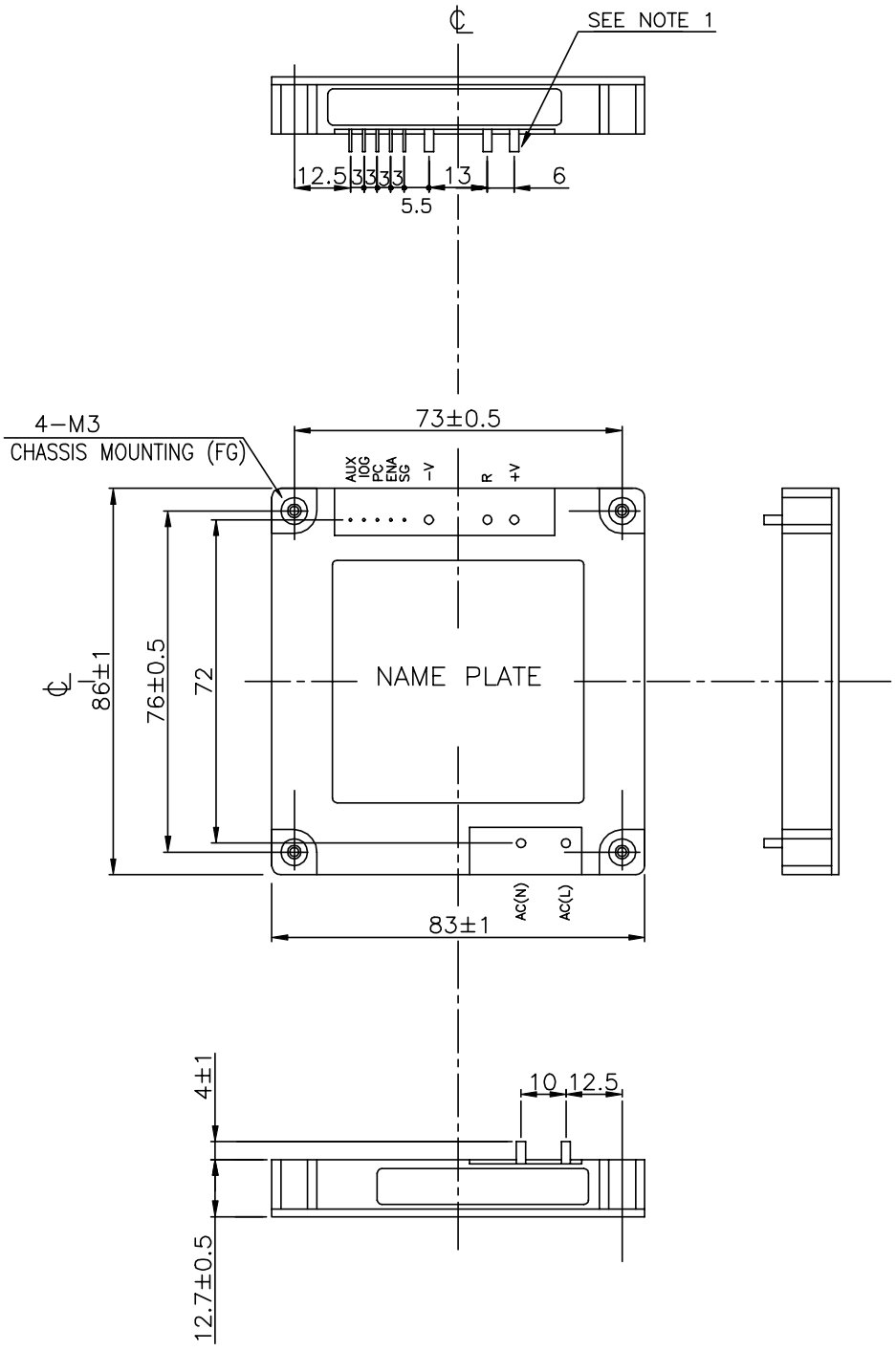
Features	Benefits
• Low profile	• Assist system integration
• Parallel	• For higher power or N+1 operation
• Power Factor corrected (PF)	• Supports Global Use
• Operation up to 85˚C	• Operates in harsh environments

Specifications

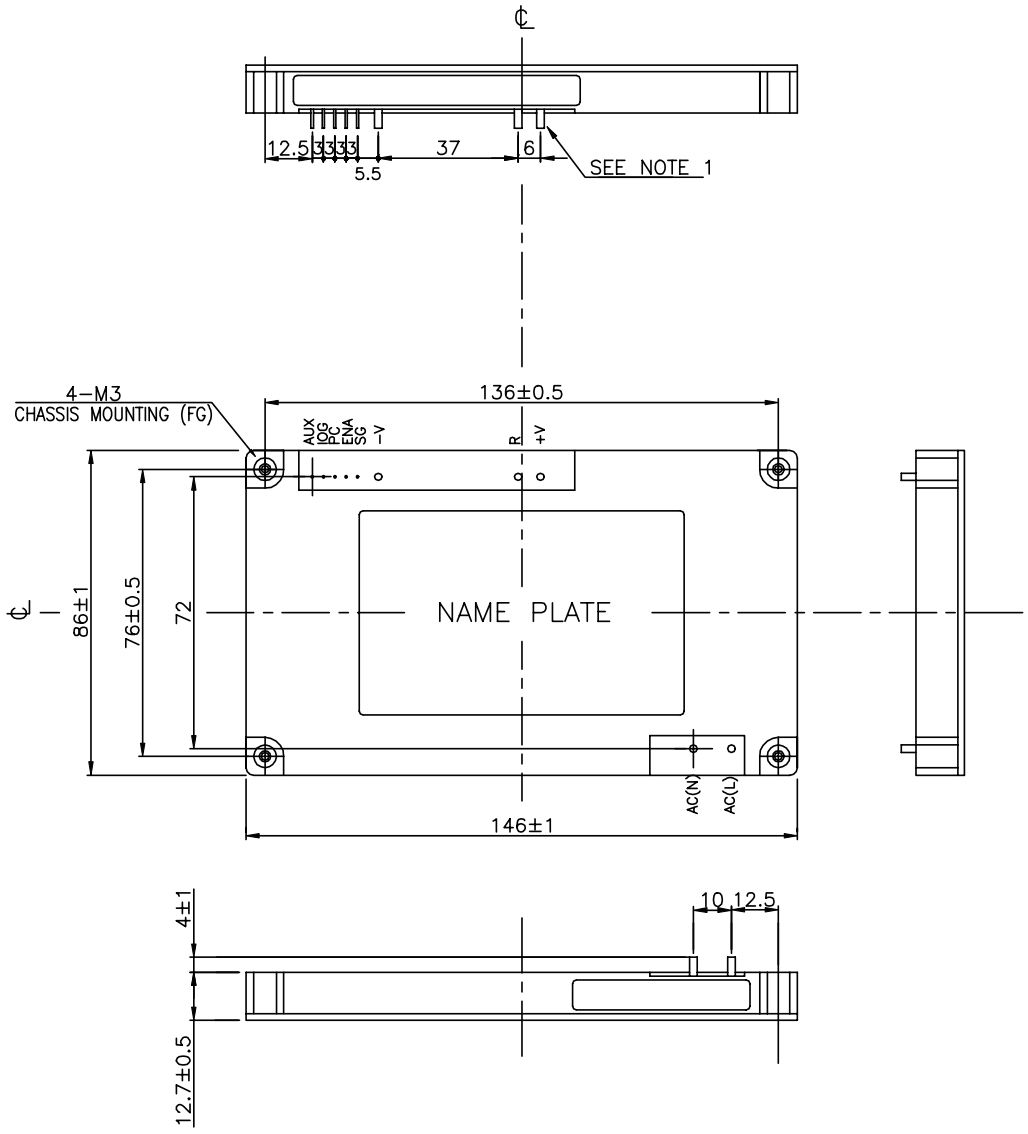
Items		PF500A-360	PF1000A-360
AC Input Voltage range & Frequency	VAC	85-265 wide range	
Input Frequency	-	47 - 63Hz	
Output Voltage	VDC	360	
Output Power at 100/200VAC	W	504/756W	1008/1512W
Load Regulation	-	10V	
Line Regulation	-	5V typical	
Inrush Current	A	External pins provided connection for in rush resistor	
Efficiency (typ) at full load	%	90% (100VAC), 95% (200VAC)	
Power Factor	-	Meets EN61000-3-2 (0.95 typical)	
Overcurrent Protection	-	Converter shutdown	
Overvoltage Protection	V	390 - 400VDC, manual reset	
Thermal Shutdown	-	Shuts down Inverter, manual reset	
Inverter Good Signal	-	Yes, when inverter is operating correctly	
Enable Signal	-	Signal provided to enable "PH" DC-DC converters	
Parallel Connection	-	Single wire current share	
Auxiliary Output Voltage	-	Yes - see installation manual	
Operating Baseplate Temperature	°C	-20°C to +85°C (no derating)	
Storage Temperature	°C	-40°C to +85°C	
Cooling	-	Conduction (see installation manuals for heatsinks)	
Withstand Voltage	-	Input - Ground 3kVAC for 1 min	
Safety Agency Approvals	-	IEC/EN/UL/CSA60950-1, IEC/EN/UL/CSA62368-1 and CE Mark	
Weight	g	130	200
Size (WxHxD)	mm	See outline line drawings	
Warranty	yrs	2	

Notes: (Consult Installation Manual for detailed specifications, test methods and application notes)

Outline Drawing PF500A



Outline Drawing PF1000A



Industrial Test Comm Broadcast LED Cots

300 to 1008W AC-DC Power Module

Features	Benefits
• Low Profile	• Assists System Integration
• High Efficiency	• Easier to Cool
• Power Factor Corrected	• Supports Global Use
• Operation up to 100°C Baseplate	• Suitable for Conduction Cooling

Specification

Model		PFE300SA PFE500SA	PFE700SA (semi-regulated)	PFE500F	PFE1000FA
AC Input	VAC	85 to 265VAC, 47-63Hz (up to 440Hz) (4)			
Input Current (100-200VAC)	A	3.8 / 1.8	8.0 / 4.0	6.8 / 3.4	12.4 / 6.0
Model dependant		6.0 / 2.9			
Inrush Current (100-200VAC) (1)	A	20 / 40 peak			
Power Factor	-	0.95 minimum, meets EN61000-3-2			
Output Voltage Setpoint Accuracy	-	±2%	±1V	±2%	±2%
Ripple and Noise (1)	-	1%	4V	1%	1%
Over Current Protection	%	105 - 140% (Automatic Recovery)			105 - 140% Manual reset
Over Voltage Protection	-	125 - 145%	60 - 69.6V	125 - 145%	125 - 145%
Series Operation	-	Yes			
Parallel Operation	-	No	Yes (Droop mode)	Yes (Single wire)	Yes (Single wire)
Power On Signal (ENA)	-	Open collector (10mA sink current). Low (on) when output is present			
Auxiliary Supply	-	None	None	10 - 14V, 20mA	10 - 14V, 20mA
Remote On/Off (Opto isolated)	-	None	None	High = On	High = On
Overtemperature Protection	-	Yes			
Operating Baseplate Temp.	°C	-40°C to +100°C (2)			
Storage Temperature	°C	-40°C to +100°C			
Humidity (non condensing)	-	Operating: 20 - 95%RH, Non Operating: 10 - 95%RH			
Cooling	-	Conduction			
Withstand Voltage (1 min) (3)	-	Input to Output 3kVAC, Input to Baseplate 2.5kVAC, Output to Baseplate 1.5kVDC			
Isolation Resistance	-	Output to baseplate: 100M Ohm at 500VDC, 25°C ambient, 70%RH			
Vibration (non operating)	-	10-55Hz (1 min sweep), constant amplitude 0.825mm (max 49m/s^2), X, Y, Z 1 hour each			
Shock	-	196.1m/s^2			
Safety Certifications	-	UL60950-1, CSA60950-1 (cUL), EN60950-1, CE mark (LVD)			
Weight	g	200	200	300	420
Size (WxHxL)	mm	61 x 12.7 x 116.8		70 x 12.7 x 122	100 x 13.4 x 160
Warranty	yrs	5			

Notes: (Consult Installation Manual for detailed specifications, test methods and application notes)

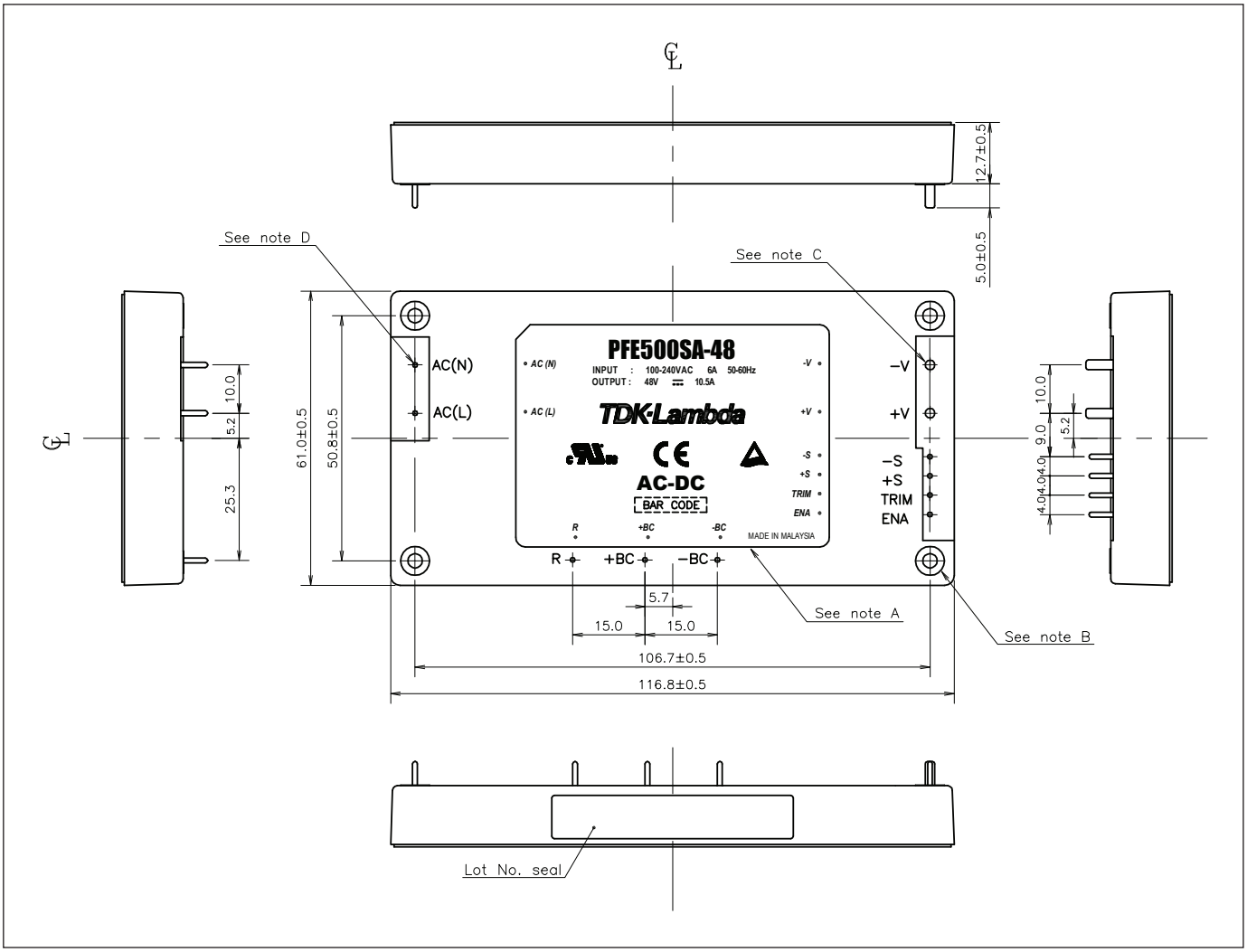
1) External components are required, consult Application Notes
2) PFE500SA-12, PFE500F-12: -40 to 85°C. **See instruction manuals for derating curves**
   PFE1000FA28 & PFE1000FA48: -40 to 85°C below 170VAC input voltage. **See instruction manuals for derating curves**
3) PFE500F, PFE1000FA: 500VDC Output to baseplate
4) Reduced PFC above 63Hz. Contact technical support for 440Hz operation.

Model Selector

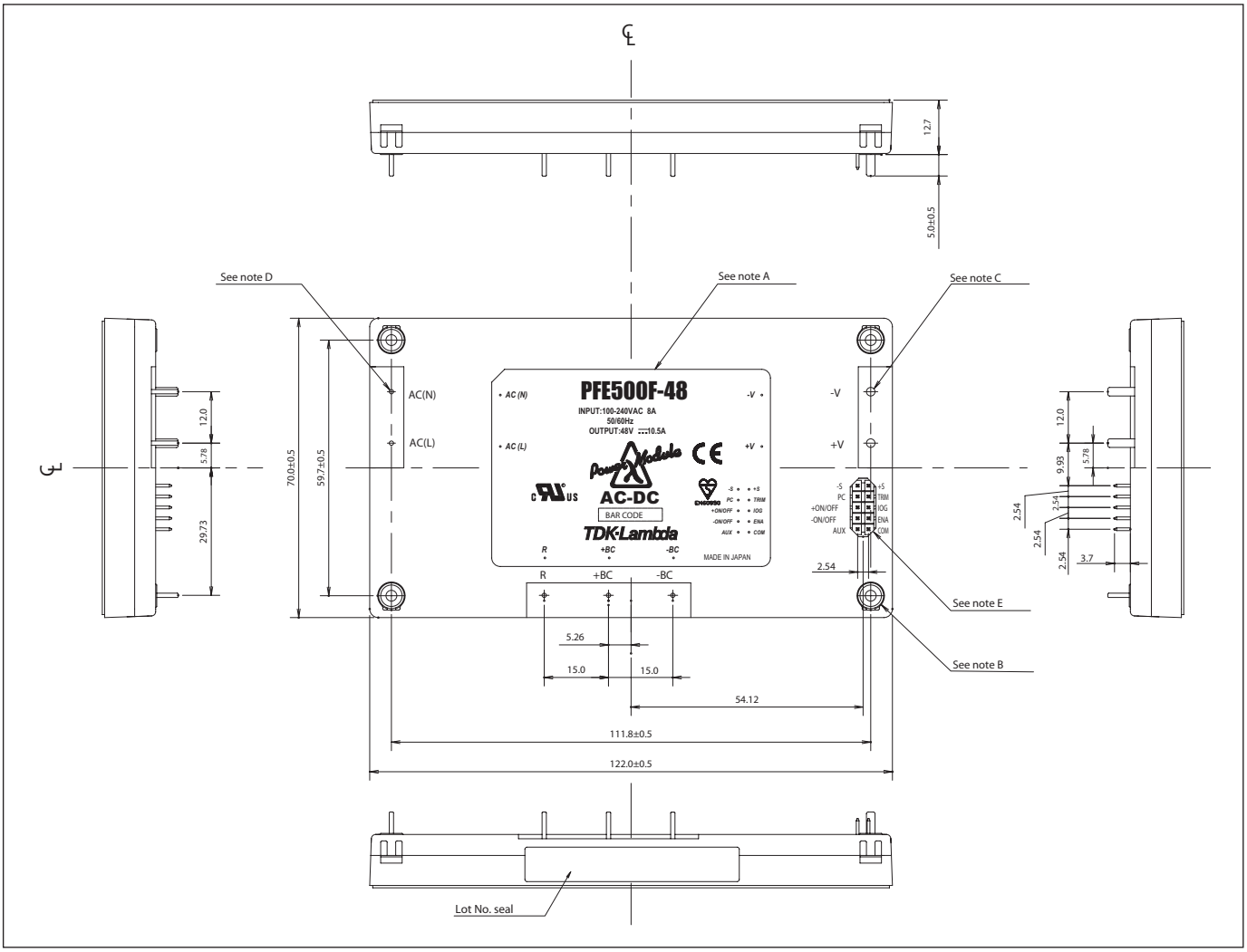
Model	Output Voltage (V)	Adjust. Range (V)	Maximum Current (A)	Maximum Wattage (W)	Load Reg. (mV)	Line Reg. (mV)	Efficiency typ (4)
PFE300SA-12	12	9.6 - 14.4	25	300	48	48	84 / 85
PFE500SA-12	12	9.6 - 14.4	33	396	48	48	84 / 86
PFE500F-12	12	9.6 - 14.4	42	504	48	48	81 / 83
PFE1000FA-12	12	9.6 - 14.4	60	720	48	48	84 / 86
PFE300SA-28	28	22.4 - 33.6	10.8	302	56	56	87 / 89
PFE500SA-28	28	22.4 - 33.6	18	504	56	56	87 / 89
PFE500F-28	28	22.4 - 33.6	18	504	56	56	84 / 86
PFE1000FA-28	28	22.4 - 33.6	36	1008	56	56	86 / 89
PFE300SA-48	48	38.4 - 57.6	6.3	302	96	96	88 / 90
PFE500SA-48	48	38.4 - 57.6	10.5	504	96	96	89 / 91
PFE500F-48	48	38.4 - 57.6	10.5	504	96	96	84 / 86
PFE1000FA-48	48	38.4 - 57.6	21	1008	96	96	87 / 90
PFE700SA-48	51	None	14	714	50 - 57V (5)		89 / 91

Notes: (4) 100 / 200VAC. (5) Total regulation range

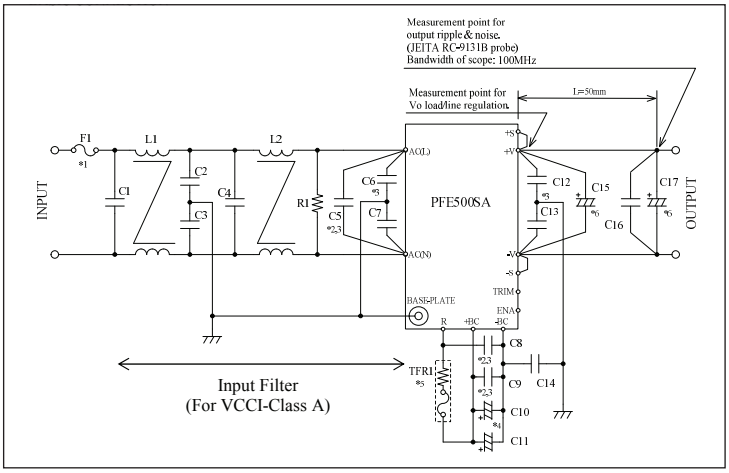
Outline Drawing PFE300SA & PFE500SA



Outline Drawing PFE500F



Basic Connection PFE500SA



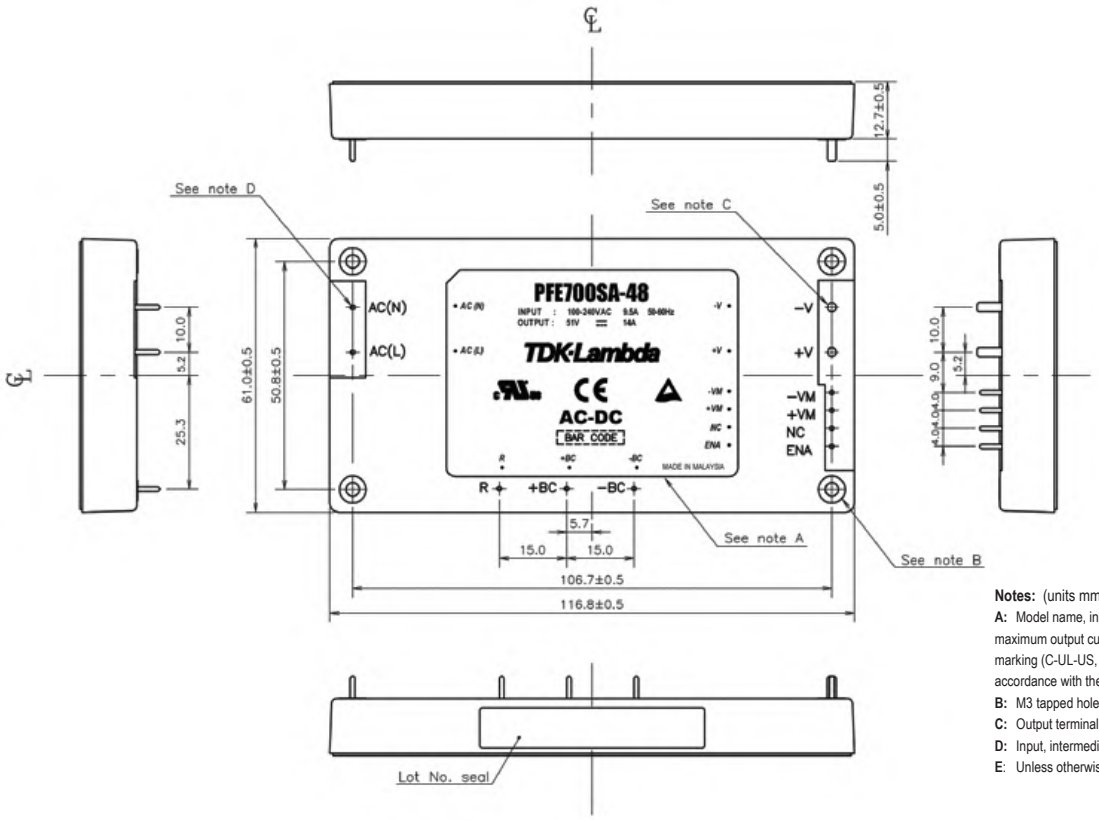
Heatsink Table

Heatsink	Size (mm)	PFE Module
HAF-10L	116.8 x 25.4 x 61	PFE300/500/700SA
HAF-15L	116.8 x 38.1 x 61	PFE300/500/700SA
HAF-15T	116.8 x 38.1 x 61	PFE300/500/700SA
HAL-F12T	122 x 35 x 69.9	PFE500F
HAM-F10T	160 x 33.4 x 100	PFE1000FA

Options

Suffix	Description
Blank	M3 tapped mounting inserts (4)
/T	3.3mm non-threaded inserts (4)

Outline Drawing PFE700SA



Notes: (units mm)

A: Model name, input voltage range, nominal output voltage, maximum output current, country of manufacture and safety marking (C-UL-US, TUV & CE marking) are shown here in accordance with the specifications.

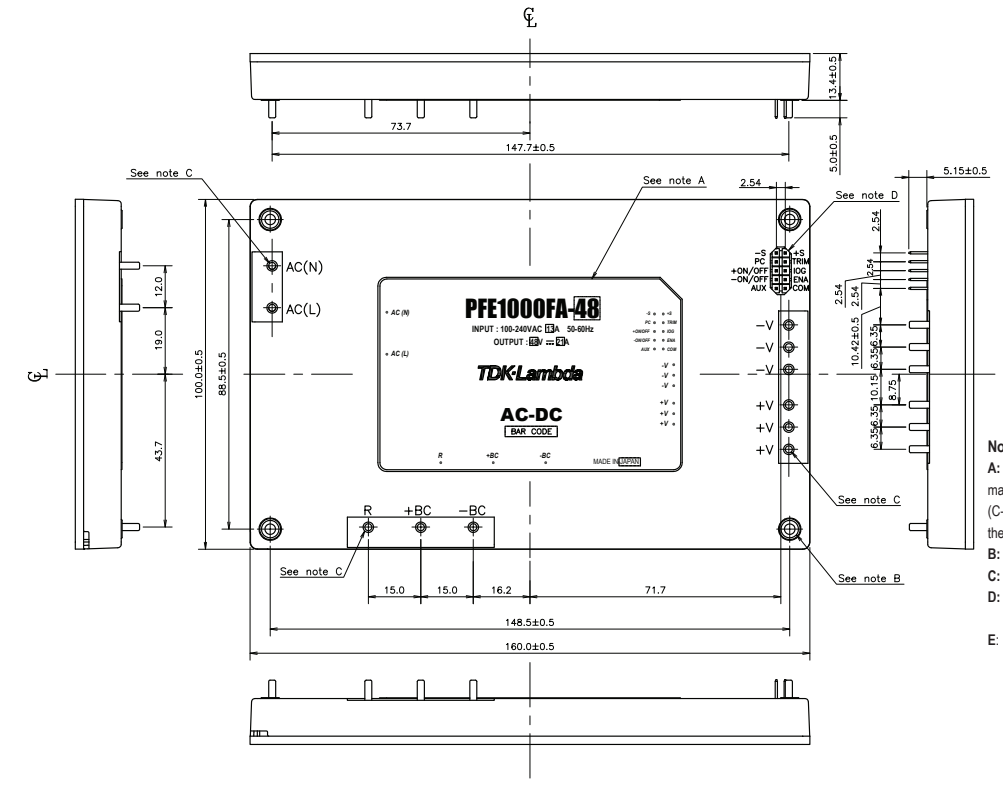
B: M3 tapped holes 4 for customer chassis mounting (FG).

C: Output terminal: 2 - ø2

D: Input, intermediate terminal and signal pin: 9 -ø1

E: Unless otherwise specified dimensional tolerance: ±0.3

Outline Drawing PFE1000FA



Notes: (units mm)

A: Model name, input voltage range, nominal output voltage, maximum output current, country of manufacture and safety marking (C-UL-US, TUV & CE marking) are shown here in accordance with the specifications.

B: M3 tapped holes 4 for customer chassis mounting (FG).

C: Input, intermediate and output terminal: 11 - ø2

D: Signal pin: (+S, –S, TRIM, ENA, IOG, AUX, +ON/OFF, –ON/OFF, PC, COM) : 10 – □0.64

E: Unless otherwise specified dimensional tolerance: ±0.3

500 Watt AC-DC Power Module

Cots | Industrial | Test | LED | Broadcast | COMM

Features	Benefits
• 2.4 x 4" Brick Foot-print with Metal Case	• Smaller Package Size
• Load Share (optional)	• Parallel Capable
• High Efficiency	• Less Heat in System
• PMBus™	• Control and Monitoring
• Suitable for Conduction Cooling	• No Forced Air Required

Specification

Model		PFH500F-28-R
AC Input Voltage (1)	VAC	85 to 265VAC, 47-63Hz
AC Input Current (typ) (4)	A	5 / 2.5A
Power Factor	-	0.95 minimum (Vin=230VAC, Io > 80%, Tc=25°C, meets EN61000-3-2
Inrush Current (typ) (4)	A	9A / 18A (peak) (20A max)
Input Turn - on Voltage	VAC	83V
Input Turn - off Voltage	VAC	79V
Hold -up (Typ.) (1) (2)	ms	20ms
Output Voltage Setpoint	VDC	27.5 - 28.5VDC (Vin=230VAC, Io=0%)
Start-up Delay (from application of Vin) (5)	s	2.3 / 1.1 sec (Vin = 115 / 230VAC, On/Off = On, Io = Io max., Vo = 0 to 0.1*Vo nom, Tc = 25°C)
Start-up Delay (from On / Off) (5)	s	2.2 / 1.1 sec (Vin = 115 / 230VAC, Io = Io max, Vo = 0 to 0.1*Vo nom, Tc = 25°C)
Output Voltage Rise Time (typ)	ms	65ms
Line Regulation (typ)	mV	42mV (0.15%) (Io=50% of Io,max, Vin=Vin,min to Vin, max)
Load Regulation (typ)	mV	28 mV (0.1%) (Vin=115/230 Vac, Io=0 to Io,max, excluding Droop)
Output Ripple (Pk to Pk) (3)	mV	400mV Typ. (500mV max.)
Over Voltage Protection (max)	VDC	35.5V
Over Current Protection (Hiccup) (max) (6)	A	21.5A
Maximum Output Capacitance	uF	3,000uF
Power Good Signal	mA	Open collector 200mA max. (Active low)
Auxiliary Supply	-	10-14V; 200mA
Remote On-Off	VDC	Low = On, < 0.8VDC (3.3V max input)
Over Temperature Protection	°C	Input line voltage dependent (see derating curves)
Series Operation	-	Yes (maximum of two units)
Parallel Operation (optional)	-	Droop Share
Operating Baseplate Temperature	°C	-40°C to 100°C (with derating)
Storage Temperature	°C	-55°C to 125°C
Humidity (non condensing)	%	Operating: 20 - 95%RH, Non Operating: 10 - 95%RH
Cooling	-	Conduction
Withstand Voltage (1 min)	VAC	Input to Output 3,000VAC: Input to Case 2,500VAC: Output to Case 1,500VDC
Isolation Resistance	Ω	Output to Case: 100MΩ at 500Vdc, 25C ambient, 70%RH
Vibration (Non Operating)	-	MIL-STD-810G: 514.6 Cat 4, Cat 21; Sine Vibration 23.52 m/s² Constant (XYZ Axis)
Shock	-	MIL-STD-810G: 516.6 Procedure I (XYZ Axis)
Safety Certifications	-	UL/cUL60950-1, IEC/EN60950-1, CE Mark
Size (typ)	mm	101.6 x 61.0 x 13.3
Weight	g	225
Warranty	Yrs	3

Notes: External components are required. Consult Installation Manual for detailed specifications, test methods and application notes.

1) Maximum Power will be de-rated at Vin < 100V with 6.7 W/V (400W@85Vin)
2) Typical holdup time with 2 x 470uF bulk cap, 100% Load
3) Vin=115/230Vac, Io=100%, Tc=25°C. Measured across one 0.1uF, four 10uF ceramic capacitors, and two 220uF electrolytic capacitors located 2 inches away. BW = 20MHz.
4) Vin = 115/230Vac, Io = 100%, Tc = 25°C

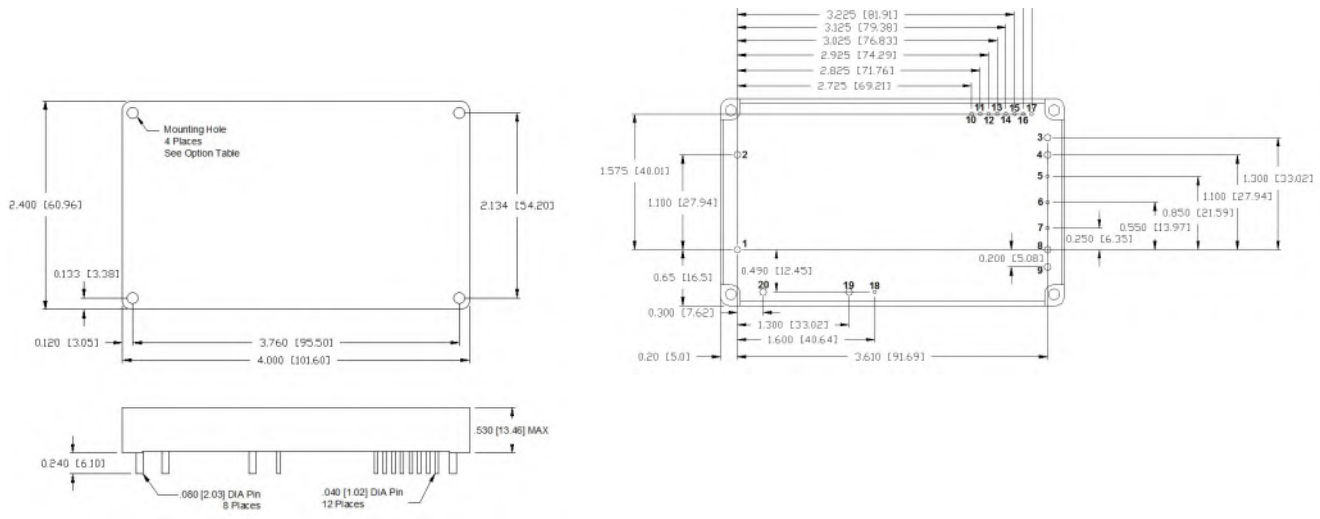
Specifications

Model	Voltage (V)	Range (V)	Current (A)	Wattage (W)	(typ) (%) (4)
PFH500F-28-XXX-R	28	22.4 - 33.6	18	504	90 / 92

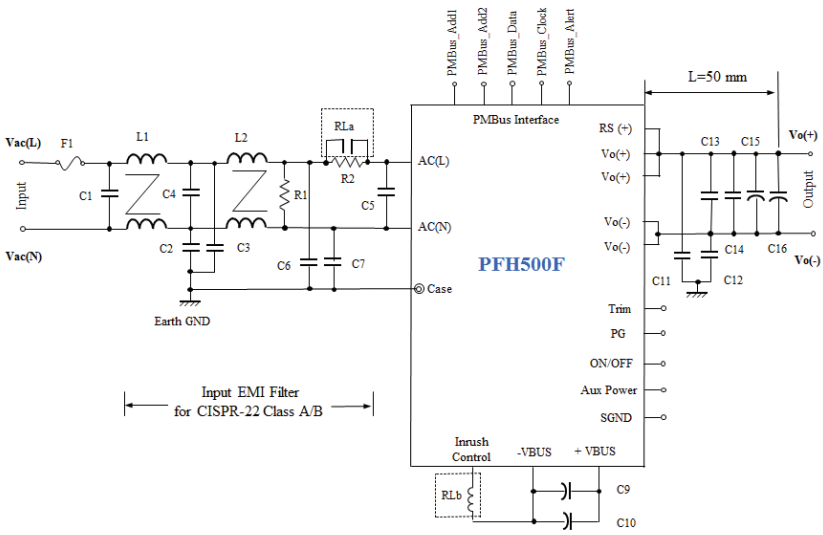
Model Selector

Model	Mounting Inserts	Overvoltage Protection	Overcurrent Protection	Overtemperature Protection	Pin Length	Droop Model Current Share
PFH500F-28-0D0-R	3.3mm Ø Non-threaded	Latching	Non-Latching	Non-Latching	0.24" (6.1mm)	Yes
PFH500F-28-1D0-R	3mm (M3) Threaded	Latching	Non-Latching	Non-Latching	0.24" (6.1mm)	Yes
PFH500F-28-000-R	3.3mm Ø Non-threaded	Latching	Non-Latching	Non-Latching	0.24" (6.1mm)	No
PFH500F-28-100-R	3mm (M3) Threaded	Latching	Non-Latching	Non-Latching	0.24" (6.1mm)	No

Outline Drawing PFH500F



Basic Connection Diagram PFH500F



Pin Assignment

PIN	Function	PIN	Function
1	AC Input (Line) or AC (L)	11	Secondary Signal GND or SGND
2	AC Input (Neutral) or AC (N)	12	Aux Power Supply or Aux Power
3	Vout (-)	13	PMBus Clock
4	Vout (-)	14	PMBus Data
5	ON/OFF	15	PMBus Alert
6	Trim	16	PMBus Address 2
7	Remote Sense (+) or RS (+)	17	PMBus Address 1
8	Vout (+)	18	Inrush Control or Inrush CTL
9	Vout (+)	19	- Boost Voltage Bus or - VBUS
10	Power Good or PG	20	+ Boost Voltage Bus or + VBUS

Heat Accessory

Part #	Description
HS00110	2.4" x 4" x 1.5" Al with cyclindrical pin fins & integrated thermal pad

Evaluation Board

Evaluation Kit Part #	Content
PFH05W-001-EVK-S0	Evaluation Kit Assembly with no module
PFH05W28-100-EVK-S1	Evaluation Kit Assembly with PFH500F-28-100-R module
PFH05W28-1D0-EVK-S1	Evaluation Kit Assembly with PFH500F-28-1D0-R module
PFH05W-S01-EVK-S0	Evaluation Kit Assembly with surge I/P filter, no module

AC-DC Power Supplies

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DRF	357
DRF/HL	363
DRL10-100	368
DRB120-480	372
DSP	375

DIN-Rail

Applications

- Factory Automation and controls
- Facility & Hotel or Home Automation
- Food & Beverage Industry
- Robot Controls
- Paper Handling, Sorting, Dispatch Systems
- Process Automation
- Conveyors, Elevators, Rolling Stairs
- Typical for DIN-Rail mounting in cabinets

Features

- Efficiency up to 94% – NEW DRF-Series
- Mainly with 24V output, but also other output voltages from 5V to 48V are available
- Power range from 10W to 1000W with convection-cooling
- Single-phase and three-phase input (for models from 120W output power onwards)
- Plastic cases for low-power units up to 100W, metal cases for higher output power
- Flat shape for wall mounted cabinets
- Slim shape for industrial cabinets
- UL 508 Listed
- Additional DC/DC-Converters up to 60W for DIN-Rail are also available

DLP Series

75 to 240W, 24V Output
DIN Rail Mount Power Supply

- Low Cost
- 3 Year Warranty
- Semi F47 Compliant (DLP180&240 only)
- Convection Cooled
- Conducted and Radiated EMI, Class B
- Input Transient Protection, IEC61000-4

Key Market Segments & Applications

Industrial Controls: Motor Control Systems
Factory Automation: Process Control, Automotive, Chemical Processing
Test & Measurement: Burn in & Test, Instrumentation Measurement

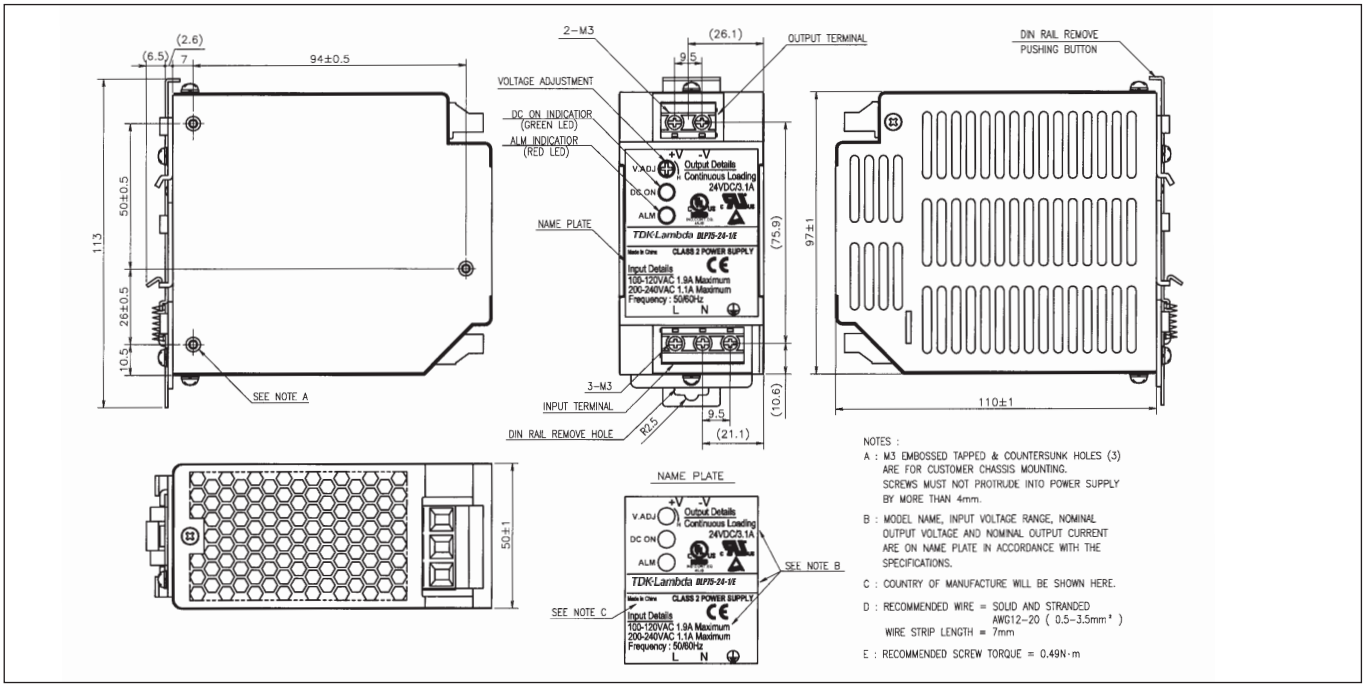
DLP Features and Benefits

Features	Benefits
• PFC Compliant to EN61000-3-2	• Supports Global Use
• UL508 Approvals	• Enables System Certification
• 3 Year Warranty	• Fit & Forget

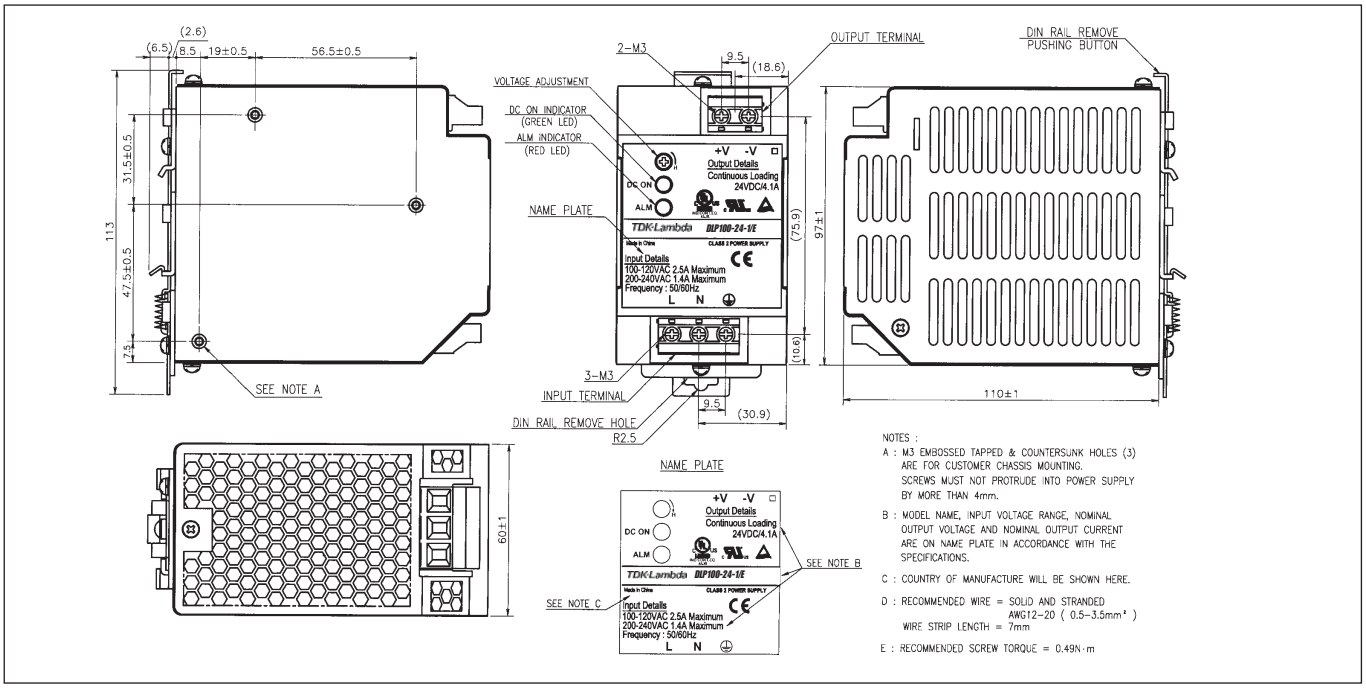
Specifications

MODELS		DLP75-24-1/E	DLP100-24-1/E	DLP120-24-1/E	DLP180-24-1/E	DLP240-24-1/E
Output Voltage	V	24	24	24	24	24
Output Current	A	3.1	4.1	5.0	7.5	10
Output Power	W	75	98.4	120	180	240
Output Voltage Adjustment	V	21.6 - 28				
Load Regulation	mV	192				
Line Regulation	mV	120				
Ripple/Noise (0-60°C)	mV	240				
AC Input Voltage & Frequency	-	85-132/170-265VAC, 47-63Hz Auto select			85-265VAC (47-63Hz) or 120-370VDC(1)	
Input Current 100/230VAC	A	1.7/0.8	2.3/1.2	2.4/1.3	2.3/1.0	3.0/1.3
Efficiency 100/230VAC	%	81/83	82/85	83/85	84/87	82/86
Power Factor	-	Meets EN61000-3-2 (DLP180, 240: >0.95)				
Inrush Current(Typ)100/230VAC	A	20/45				
Leakage Current	mA	Less than 0.75				
Hold-up Time 100/230VAC	ms	20/30 (Semi F47 Compliance, DLP 180 & 240 only)				
Overcurrent Protection	-	>105%,Fold Back	>105%, Constant Current			
Overvoltage Protection	-	30-35V, latching, cycle AC line to reset				
LED Indicators	-	Green LED = DC ok Red LED = overcurrent				
Operating Temperature (2)	°C	Convection cooled, -10°C to 60°C, derate linearly to 60% load from 50°C to 60°C				
Storage Temperature	°C	-30°C ~ +85°C				
Humidity (Non-Condensing)	%RH	30-90% operating 10-95% non operating				
Withstand Voltage	-	Input - Ground 2kVAC, Input to Output 3kVAC, Output - Ground 500VAC				
Vibration	-	9.8m/s² (1.0G) at DIN rail; (10-55Hz: 9.8m/s² Constant, X,Y, Z each 1 hour)				
Shock	-	196m/s² (20G)				
Safety Agency Approvals	-	UL508, NEC Class 2(3), UL60950, CSA60950, EN60950, CE, EN50178 Cat III (Pri)				
Conducted EMI	-	FCC-B, EN55011/EN55022-B, VCCI-B; Meets IEC61000-4-1				
Radiated EMI	-	EN55011/EN55022-B, FCC-Class B, VCCI-B				
ESD	-	IEC61000-4-2 ±10kV (Air), ±5kV (Contact)				
Radiated RFI	-	IEC61000-4-3 80-1000MHz,12V/m 80% AM 1kHz				
Fast Transient Burst	-	IEC61000-4-4 2.4kV 5kHz				
Lightning Surge	-	IEC61000-4-5 4.4kV, 1.2x50µs (Common Mode) 2.4kV 1.2x50µs (Normal)				
Conducted RFI	-	IEC61000-4-6 150kHz-80MHz, 12V, 80% AM 1kHz				
Magnetic Field	-	IEC61000-4-8 36A/m				
Voltage Dips	-	IEC61000-4-11 70% 10ms, 40% 100ms, 0% 5s				
Size	mm	50 x 97 x 110	60 x 97 x 110	60 x 97 x 110	80 x 97 x 110	120 x 97 x 110
Weight	g	470	540	540	780	1000
Warranty	yrs	3				

Outline Drawing DLP75 Series



Outline Drawing DLP100/120 Series

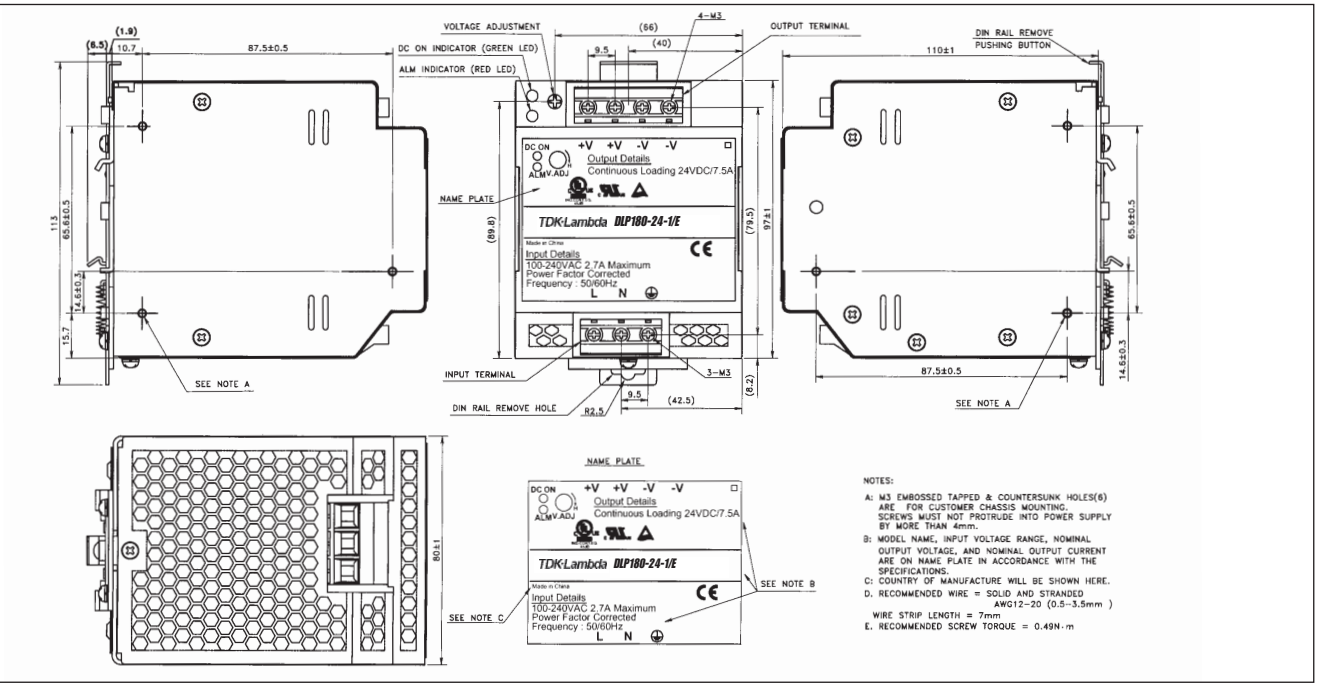


Also available DLP-PU parallel unit for redundancy

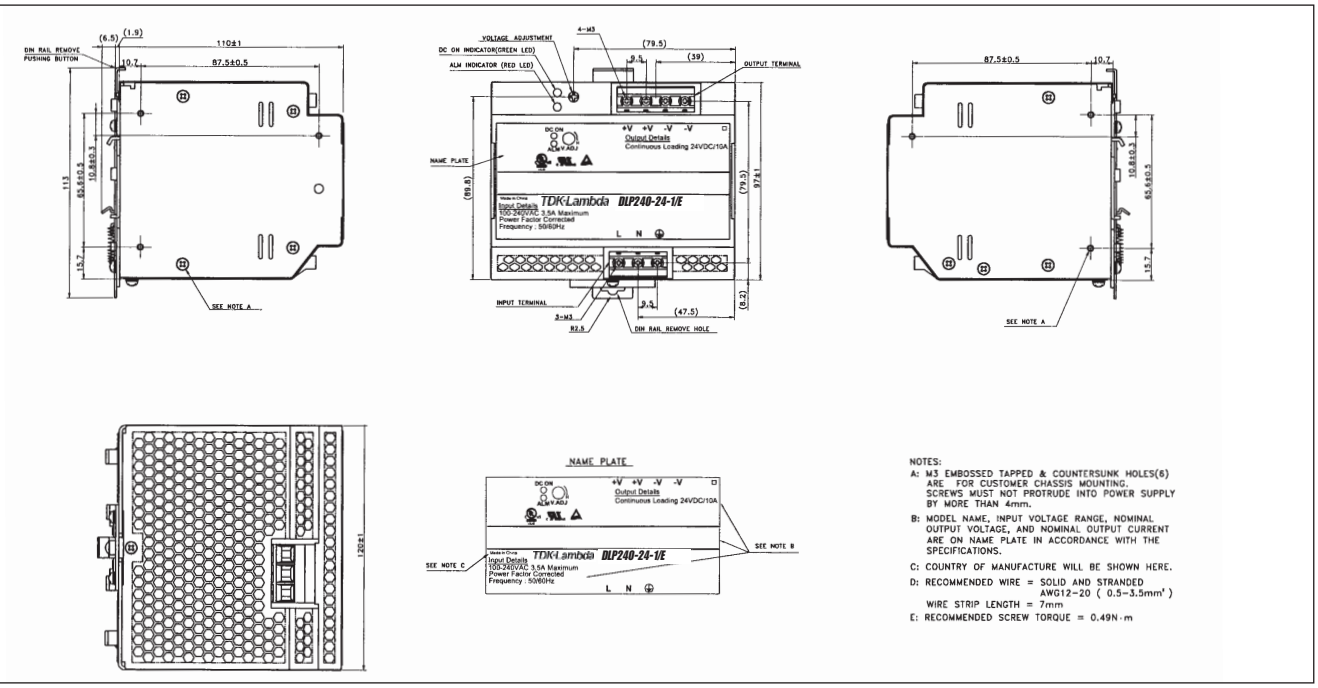
Notes: (1) DC input is not safety approved

(2) **DLP240-24-1/E**: 170-265VAC: -10°C~+70°C, derated linearly to 60% load from 50° to 70°C.

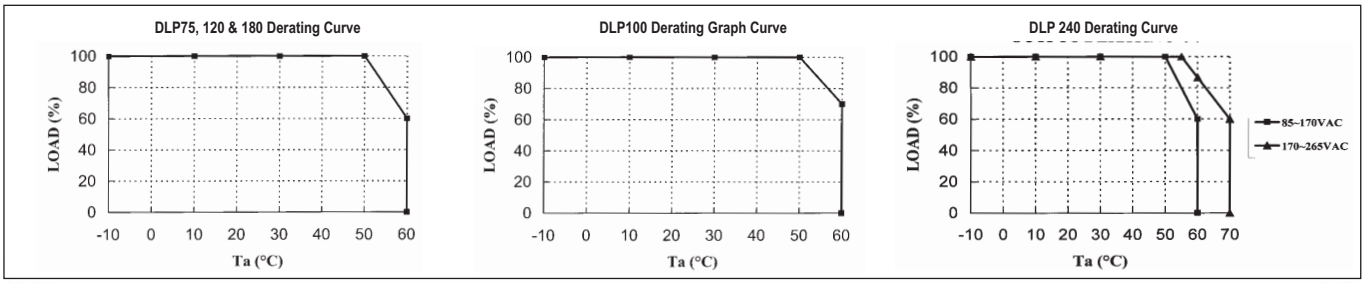
Outline Drawing DLP180 Series



Outline Drawing DLP240 Series



Derating Curve DLP



- OR-ing Diodes Included
- Alarm Signals
- LED Indicators
- DIN Rail Mounting

DLP-PU Series

Power Supply
Parallel or Redundancy Module

Key Market Segments & Applications

Industrial Controls:	Motor Control Systems
Factory Automation:	Process Control, Automotive, Chemical Processing
Test & Measurement:	Burn in & Test, Instrumentation Measurement

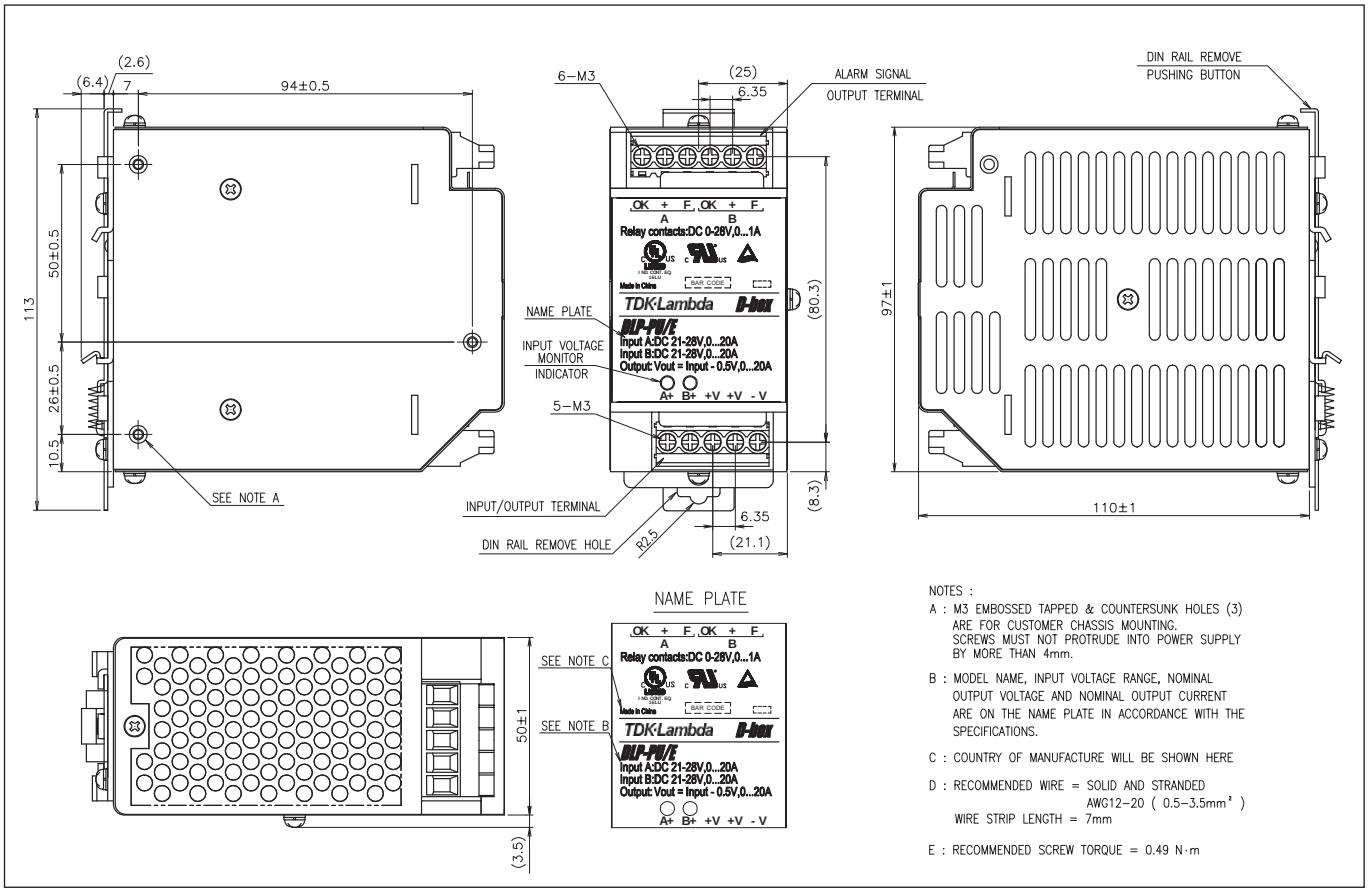
DLP-PU Features and Benefits

Features	Benefits
• Internal ORing Diodes	• Allows Redundant Operating
• Can Connect Two Units in Parallel	• Enables System Scalability
• Output Voltage Monitoring (via relays)	• Remote Alarm Notification
• DIN Rail Mounting	• Easier System Integration

Specifications

ITEMS / MODELS		DLP-PU/E
Input Voltage Range	VDC	21 - 28
Number of inputs	-	Two
Maximum Input Current	A	20 per input
Maximum Output Current	A	20
Overcurrent protection	-	None
Voltage Drop	VDC	0.5
Maximum Reverse Voltage	VDC	35
LED Indicators	-	Two green LEDs indicating each input is "good"
Input Voltage Alarm	-	Relay off when input is <19.2V (±1%) or > 30V (±5%). NO and NC contacts
Relay contact rating (max)	-	28VDC, 1A or 120VAC, 0.5A (5mA minimum recommended)
Cooling	-	Convection
Operating Temperature	°C	-10 to +70, derate linearly to 60% from 60 to 70
Storage Temperature	°C	-30 to +85
Humidity	-	Operating: 30 - 90%RH, Storage: 10 - 95%RH (non condensing)
Withstand Voltage	-	Input or Output - Chassis, Input or Output - Relay Contacts,
		Relay Contacts to Chassis; 500VAC for 1 min.
Isolation Resistance	-	Input or Output - Chassis, Input or Output - Relay Contacts,
		Relay Contacts to Chassis; >10M Ohms at 25°C, 70%RH and 500VDC
Vibration	-	Non operating, mounted on DIN Rail,10-55Hz (sweep for 1 min),
		9.8m/s^2 constant X, Y, Z each for 1 hour
Shock	-	196m/s^2
Safety Agency Approval	-	UL60950-1, CSA60950-1, EN60950-1, UL508, CSA22.2 No.14, EN60529 IP20, EN50178 Cat 1
Size	mm/in	50 x 97 x 110, (1.97x 3.81 x 4.33)
Weight	g	470
Warranty	yrs	3 Years

Outline Drawing DLP-PU Series



NOTES :

A : M3 EMBOSSED TAPPED & COUNTERSUNK HOLES (3) ARE FOR CUSTOMER CHASSIS MOUNTING. SCREWS MUST NOT PROTRUDE INTO POWER SUPPLY BY MORE THAN 4mm.

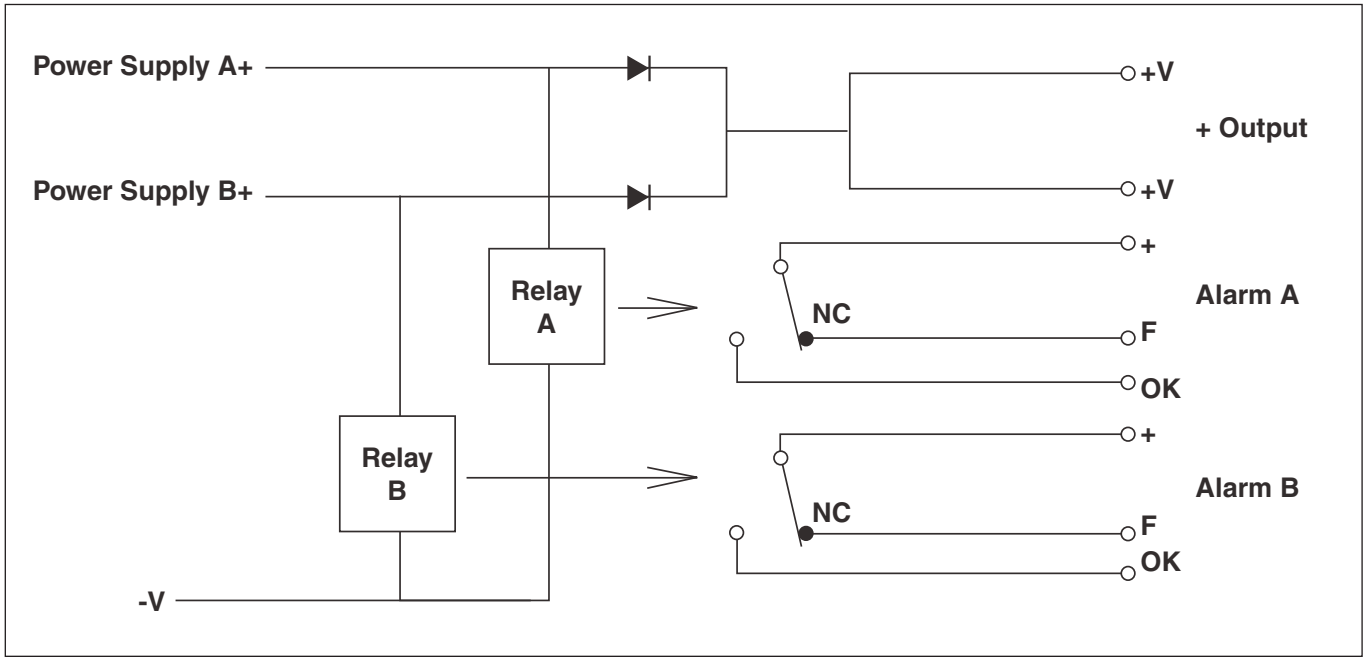
B : MODEL NAME, INPUT VOLTAGE RANGE, NOMINAL OUTPUT VOLTAGE AND NOMINAL OUTPUT CURRENT ARE ON THE NAME PLATE IN ACCORDANCE WITH THE SPECIFICATIONS.

C : COUNTRY OF MANUFACTURE WILL BE SHOWN HERE

D : RECOMMENDED WIRE = SOLID AND STRANDED AWG12-20 (0.5-3.5mm²)
WIRE STRIP LENGTH = 7mm

E : RECOMMENDED SCREW TORQUE = 0.49 N·m

Block Diagram DLP-PU Series



DPP15-100 Series

15-100W, 5-48V Output
DIN Rail Mount Power Supplies

- Low Cost
- 5V to 48V Outputs
- Universal Input
- Compact Size
- NEC Class 2 Compliant
- UL508 Listed
- -10°C to +71°C Operation
- RoHS Compliant

Key Market Segments & Applications

Industrial Controls:	Motor Control Systems
Factory Automation:	Process Control, Automotive, Chemical Processing
Test & Measurement:	Burn in & Test, Instrumentation Measurement

DPP15-100 Features and Benefits

Features

- PFC Compliant to EN61000-3-2
- UL508 Approvals
- TS35/7.5 or TS35/15 DIN Rail Mounting

Benefits

- Supports Global Use
- Easier System Configuration
- Easy System Integration

Specifications

ITEMS / MODELS		DPP15	DPP25/30	DPP50	DPP100
AC Input Voltage range (1)	VAC	85 - 264VAC			85 - 132VAC 176 - 264VAC
Input Frequency	Hz	47 - 63Hz			
DC Input Voltage range	VDC	90 - 375VDC			210 - 375VDC
Inrush Current (115 / 230VAC)	A	<35A	35 / 45A	35 / 50A	35 / 55A
Power Factor	-	Meets EN61000-3-2 Class A			
Max Input Current (230VAC)	A	0.25	0.4	0.7	1.2
Output Voltage Accuracy	%	±1% (24V outputs preset at 24.5V)			
Line Regulation	%	< 0.5%			
Load Regulation	%	< 0.5%			
Ripple/Noise	mV	<50mV (20MHz Bandwith)			
Overcurrent Protection (Typ)	-	>120%			
Overvoltage Protection	V	125 - 137.5%			
Hold Up Time (115VAC input)	ms	> 20ms			
Parallel switch	-	No			Yes
LED Indicator	-	Green LED = On			
Operating Temperature	-	-10°C to +71°C (Derate linearly 5%/°C from 61°C to 71°C)			
Storage Temperature	-	-25°C to +85°C			
Operating Humidity	-	20 - 90% RH (non condensing)			
Cooling (2)	-	Convection			
Withstand Voltage	-	Input to Output 3kVAC for 1 min.			
Shock	-	Half sine wave, 4G, 22ms, 3 times per face, X, Y, Z			
Vibration	-	10-500Hz (20 min sweep) 0.002G²/Hz, 1Grms acceleration X, Y, Z, 1 hour			
Isolation Resistance	Ω	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC			
Safety Agency Approvals (4)	-	UL60950-1, UL508, UL1310(3) (Class 2), EN60950-1, CE Mark			
Emissions	-	EN55011, EN55022 Class B Radiated & Conducted, EN61000-6-3			
Immunity	-	EN61000-6-2, EN61000-4-2 Level4, EN61000-4-3, EN61000-4-6 Level 3			
		EN61000-4-4 Level 4 (I/P) Level 3 (O/P), EN61000-4-5 Level 4, EN61000-4-8, EN61000-4-11			
Weight (Typ)	g	130	260		390
Size (WxHxD)	mm	23 x 75 x 97	45 x 75 x 91		73 x 75 x 97
Case material	-	Plastic			
MTBF (MIL-HDBK-217F, GF25)	Hours	287,000	>288,000	273,000	239,000
Warranty	yrs	3			

(1) Auto Select - DPP100 only
(2) Recommend 25mm clearance on all sides.
(3) Does not include DPP25-5 & DPP100-24 models. Evaluated to NEC NFPA70 Class 2 output per UL1310.
(4) Consult Sales Office for use under DC Input conditions

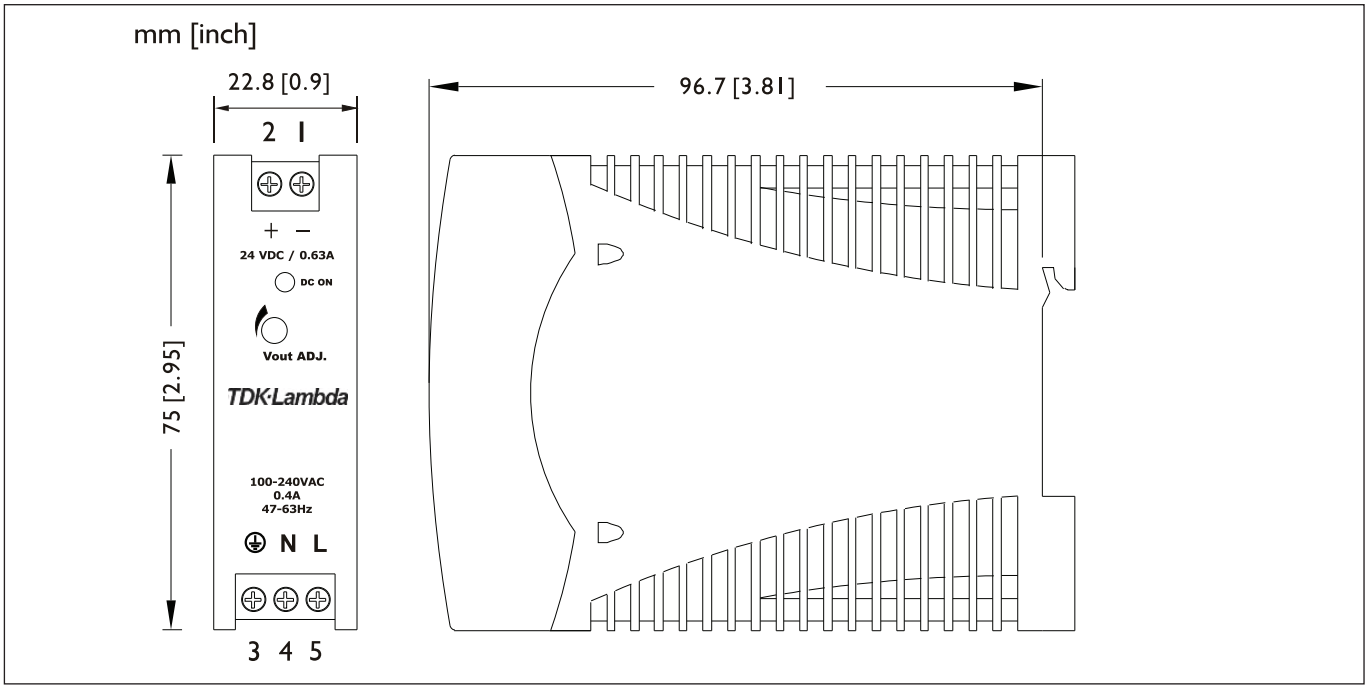
Model Selector

Model	Output Voltage (V)	Output Adjust (V)	Output Curr. (A)	Max. Output Power (W)	Efficiency at Full Load (%)
DPP25-5	5	5-6	5	25	78
DPP30-12	12	9.9-12.1	2.5	30	82
DPP50-15	15	11.9-15.1	3.4	50	85
DPP15-24	24	22.5-28.5	0.63	15	80
DPP30-24	24	22.5-28.5	1.3	30	84
DPP50-24	24	22.5-28.5	2.1	50	86
DPP100-24	24	22.5-28.5	4.2	100	87
DPP50-48	48	48-56	1.05	50	87

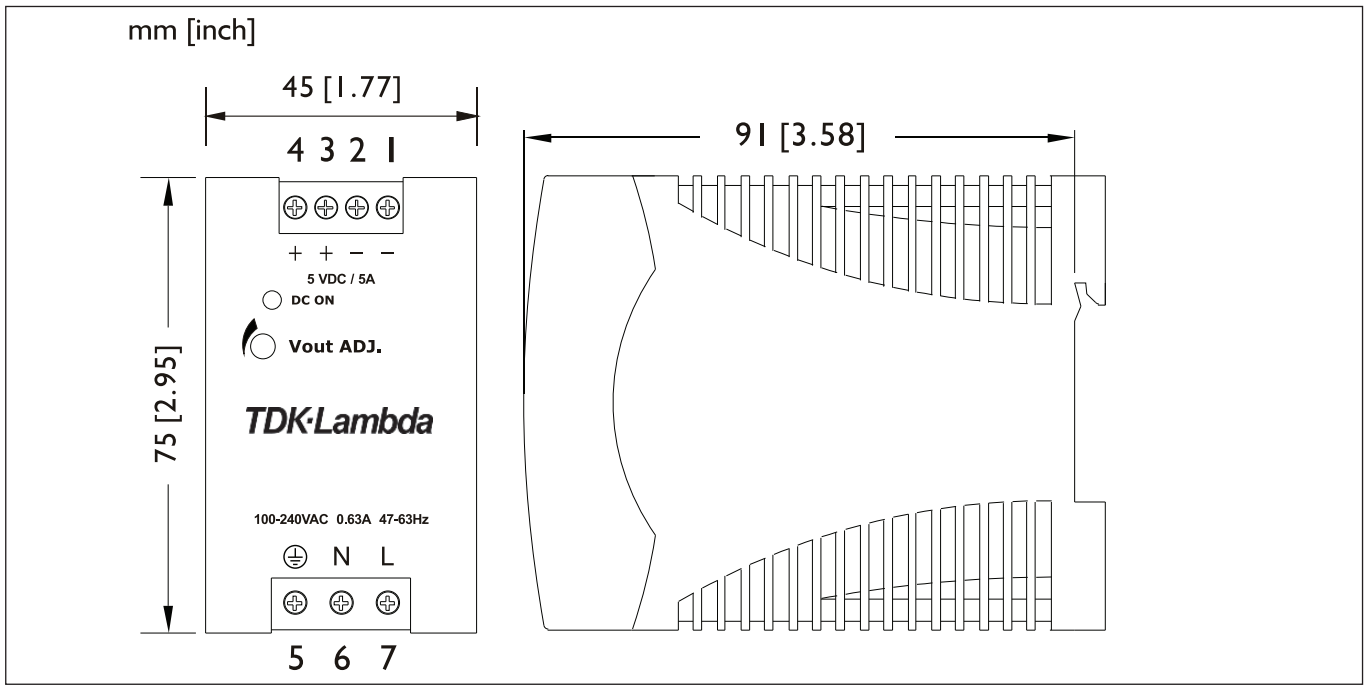
Installation

Snap-on Mounting - snap onto DIN Rail TS35/7.5 or TS35/15 (no tools required)
Cooling - Nornal Convection
Clearance - 25mm all sides
Connection - Use copper wire 0.5-2.5mm^2 (AWG24-12)

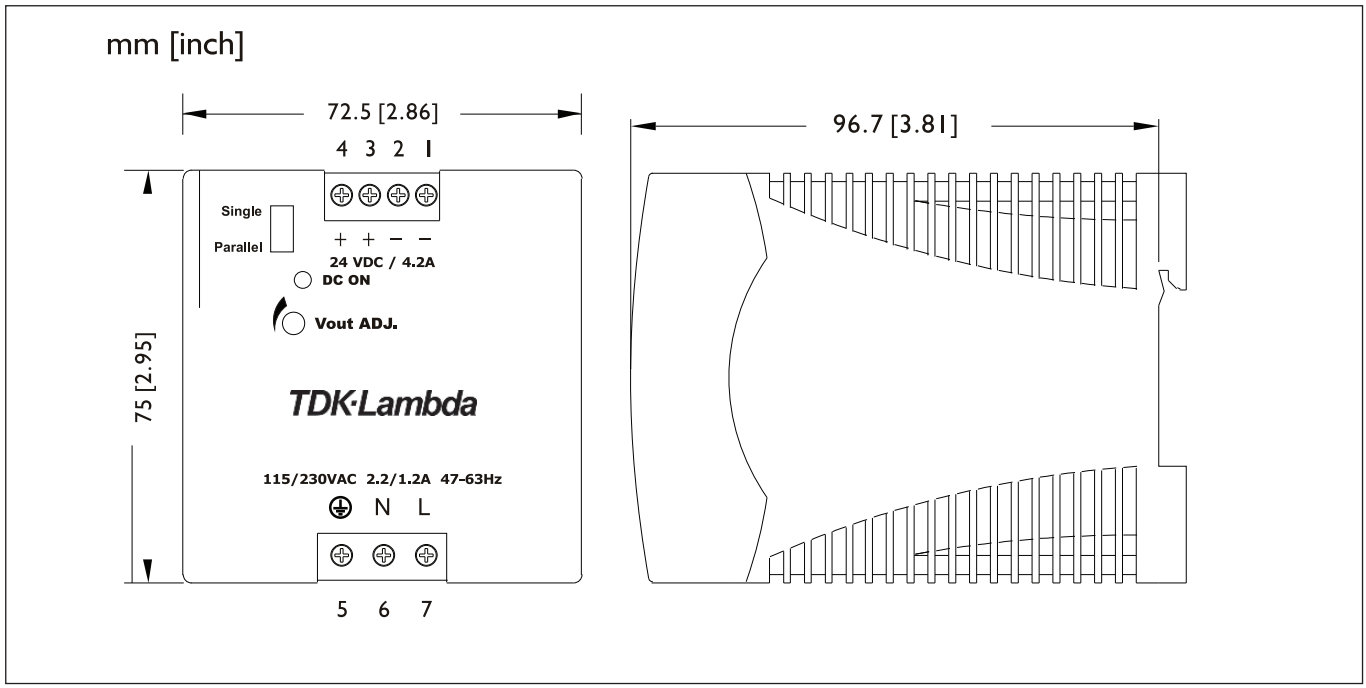
Outline Drawing DPP15 Series



Outline Drawing DPP25-DPP50 Series



Outline Drawing DPP100 Series



- Low Cost
- 12, 24 or 48V Outputs
- Wide Range AC Input
- Parallel Function Switch
- -40°C to +71°C Operation

Key Market Segments & Applications

Industrial Controls:	Motor Control Systems
Factory Automation:	Process Control, Automotive,
Test & Measurement:	Chemical Processing
	Burn in & Test,
	Instrumentation Measurement

DPP120 & 240 Series

120W & 240W Single Output DIN Rail Mount Power Supplies

DPP120 & 240 Features and Benefits

Features	Benefits
• PFC Compliant to EN61000-3-2	• Supports Global Use
• UL508 Approvals	• Easier System Configuration
• TS35/7.5 or TS35/15 DIN Rail Mounting	• Easy System Integration

Specifications

ITEMS / MODELS		DPP120	DPP240
AC Input Voltage range	VAC	90 - 132/180-264VAC (auto select)	
Input Frequency	Hz	47 - 63Hz	
DC Input Voltage range	VDC	210 - 370VDC	
Inrush Current (115 / 230VAC)	A	24/48A	30/60A
Power Factor	-	typ 0.7 at 230VAC input	
Input Current (115/230VAC)	A	2.2/0.83A	5.4/2.2A
Leakage Current	mA	3.5mA	
Output Voltage	V	12 , 24 or 48V	24 or 48V
Output Voltage Accuracy	%	-0, +1% of Nominal	
Line Regulation	%	±0.5%	
Load Regulation	%	±1% Single Mode	±5% Parallel Mode
Ripple and Noise (20MHz BW)	mV	<50mV	<100mV
Overcurrent Protection (Typ)	-	120 - 145%	
Overvoltage Protection	V	120 - 145%	
Hold Up Time (230VAC input)	ms	>30 ms	
Efficiency (typ)	%	84 - 90% (see table)	
Parallel Operation **(1)**	-	Up to 3 units	
LED Indicators	-	Green LED = On, Red LED = DC Output Low	
DC Good Relay (24V model only)		-0.3A rated normally open relay contacts, closes when output is above 17.6 - 19.4V	
Operating Temperature **(2)**	-	-40°C to +71°C (Derate linearly 2.5% per °C from 61°C to 71°C)	
Storage Temperature	-	-40°C to +85°C	
Operating Humidity	-	20 - 95% RH (non condendsing)	
Cooling **(3)**	-	Convection	
Withstand Voltage	-	Input to Output 3kVAC for 1 min.	
Isolation Resistance	Ω	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC	
Vibration (Operating)		IEC 60068-2-6 (Mounting by rail: Random wave, 10-500 Hz, 2G, ea. along X, Y, Z axes 10 min/cycle, 60 min)	
Shock (Operating)		IEC 60068-2-27 (Half sine wave, 4G, 22ms, 3 axes, 6 Faces, 3 times for each face)	
Safety Agency Approvals **(4)**	-	UL508 Listed, UL60950-1, EN60950-1, CE	
Conducted & Radiated EMI	-	EN55022 class B	
Weight (Typ)	g	920	1000
Size (HxWxD)	mm	125 x 63.5 x 123.6	125 x 83 x 126
Case material	-	Metal	
Warranty	yrs	3	

Notes: **(1)** For parallel operations a minimum 10% load is required - loading conditions 0.1Io min to 0.9Io max
(2) DPP120 -35°C
(3) Recommend 1° clearance on all sides
(4) Consult Sales Office for use under DC Input conditions

Model Selector

Model	Voltage (V)	Voltage Adjust (V)	Current (A)	Power (W)	Effic. (typ) %
DPP120-12	12	11.4 - 14.5	10	120	84
DPP120-24	24	22.5 - 28.5	5	120	86
DPP120-48	48	45 - 55	2.5	120	87
DPP240-24	24	22.5 - 28.5	10	240	89
DPP240-48	48	47 - 56	5	240	90

For plug type connectors add suffix **'B'** to part number

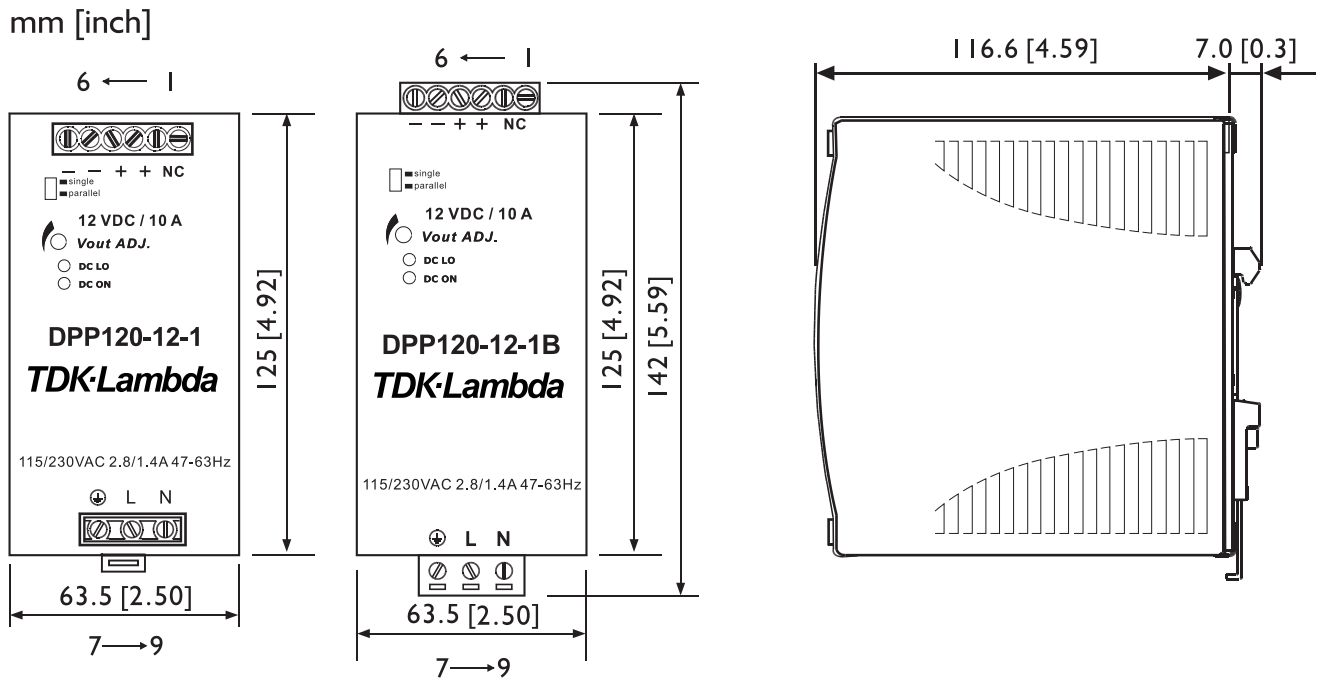
PIN Assignments

Pin#	Function
1	DC Good Relay
2	DC Good Relay
3	V+
4	V+
5	V-
6	V-
7	GND
8	L
9	N

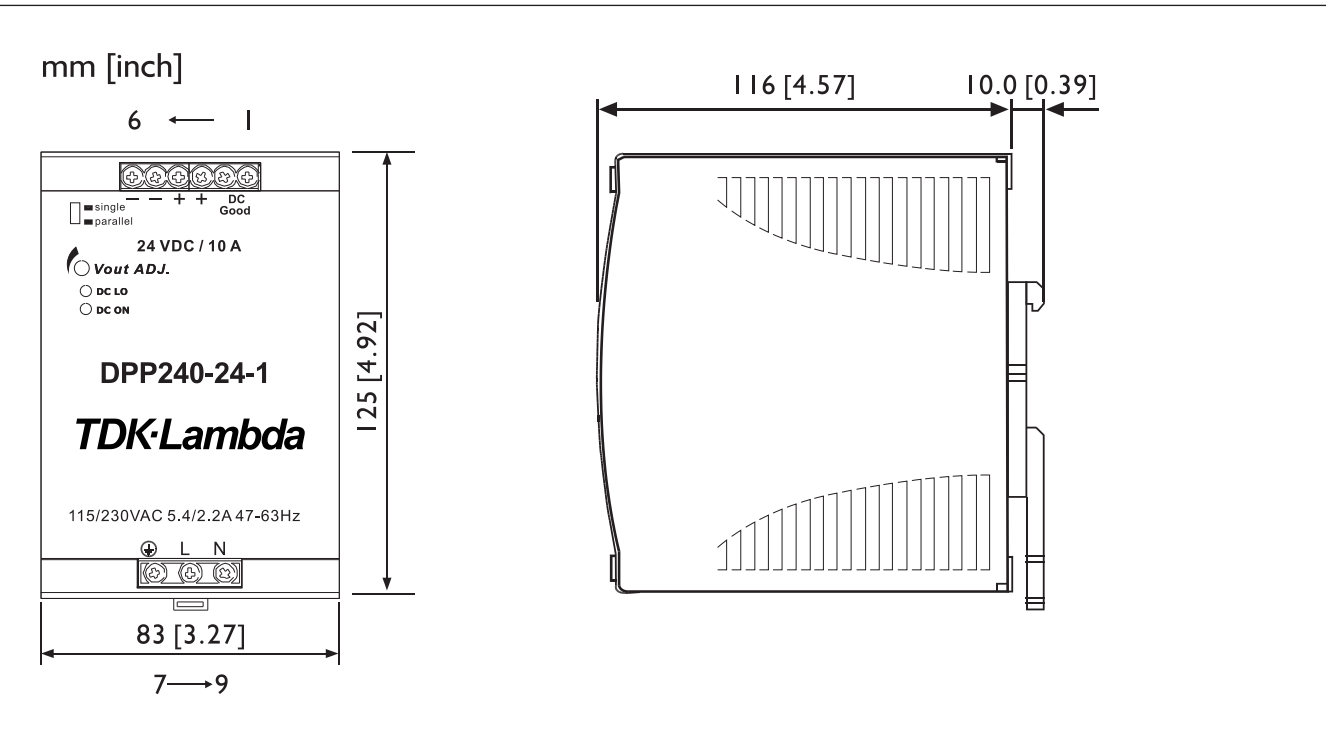
Options

Suffix	Description
Blank	Non detachable connector
B	Detachable input & output connector

Outline Drawing DPP120



Outline Drawing DPP240



DPP480 Series

480W Single Output
DIN Rail Mount Power Supplies

- Low Cost
- 24 or 48V Outputs
- Wide Range AC Input
- Active PFC
- Parallel Function Switch
- -40°C to +71°C Operation

Key Market Segments & Applications

Key Market Segments & Applications

Industrial Controls:	Motor Control Systems
Factory Automation:	Process Control, Automotive, Chemical Processing
Test & Measurement:	Burn in & Test, Instrumentation Measurement

DPP480 Features and Benefits

Features	Benefits
• PFC Compliant to EN61000-3-2	• Supports Global Use
• UL508 Approvals	• Easier System Configuration
• TS35/7.5 or TS35/15 DIN Rail Mounting	• Easy System Integration

Specifications

ITEMS / MODELS		DPP480-24-1	DPP480-48-1
AC Input Voltage range	VAC	90 - 264VAC	
Input Frequency	Hz	47 - 63Hz	
DC Input Voltage range	VDC	120 - 370VDC	
Inrush Current (115 / 230VAC)	A	25 / 50A	
Power Factor	-	Meets EN61000-3-2 Class A, typ 0.99 at 230VAC input	
Input Current (115/230VAC)	A	7 / 3.5A	
Output Voltage	V	24V	48V
Output Current	A	20A	10A
Output Voltage Adjustment Range	-	22.5 - 28.5V	47 - 56V
Output Voltage Accuracy	%	-0, +1% of Nominal	
Line Regulation	%	±0.5%	
Load Regulation	%	±0.5% (±5% when set in parallel mode)	
Ripple and Noise (20MHz BW)	mV	100mV	
Overcurrent Protection (Typ)	-	120 - 140%	
Overvoltage Protection	V	30 - 33V	57 - 63V
Hold Up Time (115VAC input)	ms	> 30ms	
Efficiency (typ)	%	89%	90%
Parallel operation	-	Set in single or parallel (droop) mode - maximum of 3 units	
LED Indicators	-	Green LED = On, Red LED = DC Output Low	
DC Good Relay (24V model only)	-	0.3A rated normally open relay contacts, closes when output is above 17.6 - 19.4V	
Operating Temperature	--	-40°C to +71°C (Derate linearly 2.5%/°C from 56°C to 71°C)(2)	
Storage Temperature	-	-40°C to +85°C	
Operating Humidity	-	20 - 95% RH (non condensing)	
Cooling (1)	-	Convection	
Withstand Voltage	-	Input to Output 3kVAC for 1 min.	
Isolation Resistance	Ω	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC	
Safety Agency Approvals (2)	-	UL508 Listed, UL60950-1, EN60950-1, CE	
Conducted & Radiated EMI	-	EN55022 class B	
Weight (Typ)	g	1920g	
Size (WxHxD)	mm	175 x 125 x 123	
Case material	-	Metal	
Warranty	yrs	3	

Notes:
(1) Recommend 1" clearance on all sides (2) Consult Sales Office for use under DC Input conditions

Model Selector

Model	Output Voltage (V)	Output Adjust (V)	Output Curr. (A)	Max. Output Power (W)	Efficiency at Full Load (%)
DPP480-24-1	24	22.5 - 28.5	20	480	89
DPP480-48-1	48	47.0 - 56.0	10	480	90

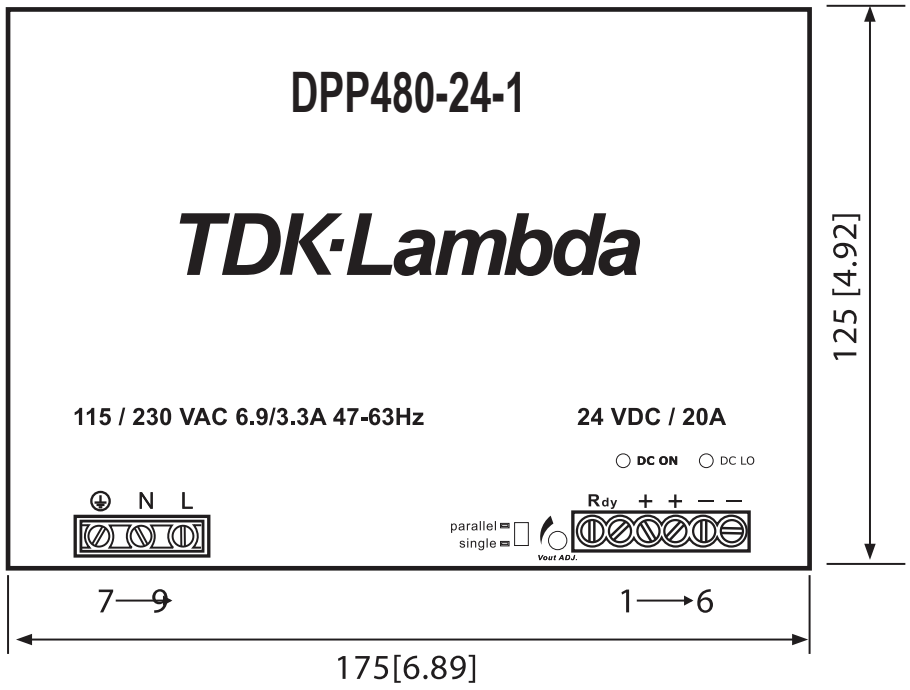
For plug type connectors add suffix **'B'** to part number

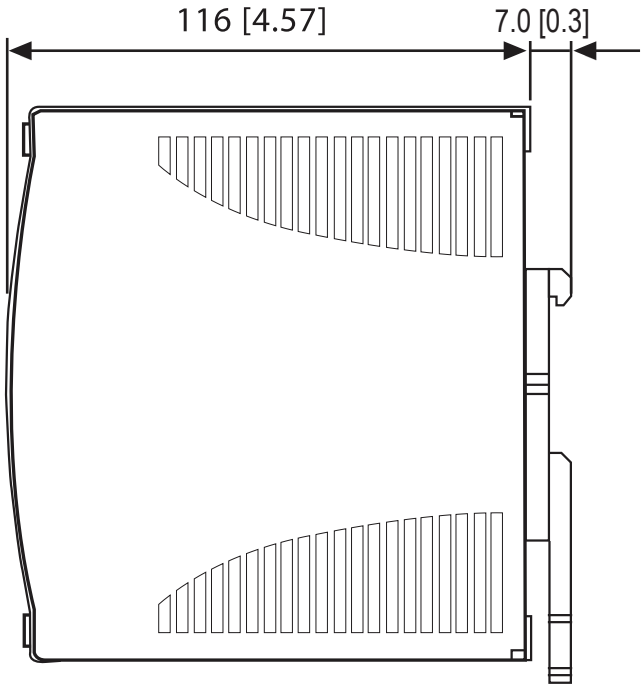
PIN Assignments

Pin#	Function
1	DC Good Relay
2	DC Good Relay
3	V+
4	V+
5	V-
6	V-
7	GND
8	N
9	L

Outline Drawing DPP480 Series

Dimensions are in millimeters (inches)





DPP120 - 960 Series

120W, 240W, 480W & 960W 3 Phase DIN Rail Mount Power Supplies

- Low Cost
- 12V, 24V or 48V Outputs
- Wide Range 340 to 575VAC Input
- Parallel Function Switch (240 & 480W)
- Current Share (960W)
- -40°C to +71°C Operation
- Convection Cooled

Key Market Segments & Applications

Industrial Controls:	Motor Control Systems
Factory Automation:	Process Control, Automotive,
Test & Measurement:	Chemical Processing
	Burn in & Test,
	Instrumentation Measurement

DPP120 - 960 Features and Benefits

Features	Benefits
• PFC Compliant to EN61000-3-2	• Supports Global Use
• UL508 Approvals	• Easier System Configuration
• TS35/7.5 or TS35/15 DIN Rail Mounting	• Easy System Integration

Specifications

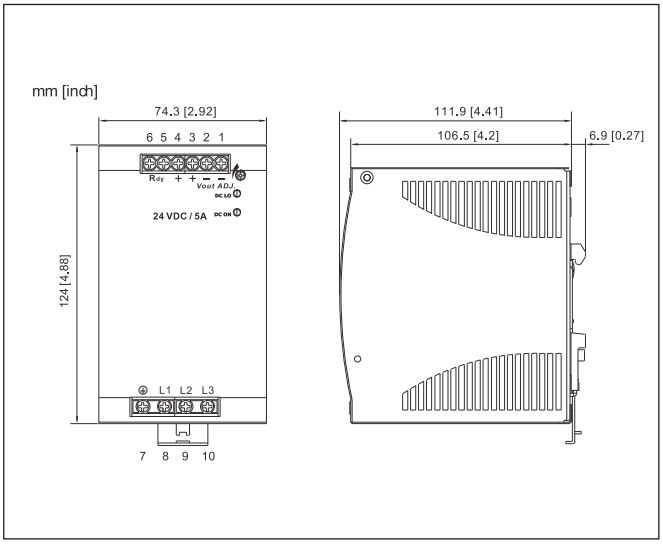
ITEMS / MODELS		DPP120-xx-3	DPP240-xx-3	DPP480-xx-3	DPP960-xx-3
AC Input Voltage range (1)	VAC	340 - 575VAC, three phase			
Input Frequency	Hz	47 - 63Hz			
DC Input Voltage range	VDC	480 - 820VDC			
Inrush Current (380-480VAC) (typ)	A	10A	20A	20A	30A
Power Factor (2)	-	0.55	0.55	0.65	0.8
Input Current (400VAC) (typ)	A	0.36A	0.65A	1.1A	1.72A
Output Voltage Accuracy	%	-0, +1% of Nominal			
Line Regulation	%	±1%			
Load Regulation	%	±1%	±1% (±5% when set in parallel mode)		
Ripple and Noise (20MHz BW)	mV	100mV	100mV	100mV	80mV
Overcurrent Protection (Typ)	-	115 - 135%	120 - 140%	110 - 135%	110 - 130%
Overvoltage Protection	V	See model selector			
Overtemperature Protection	-	Yes, auto recovery			
Hold Up Time (380-480VAC)	ms	> 20ms	> 20ms	> 20ms	> 15ms
Parallel operation (up to 90% load)	-	-	Set in parallel (droop) mode - up to 2 units		
LED Indicators	-	Green LED = On, Red LED = DC Output Low			
DC Good Relay (24V models only)	-	0.3A rated normally open relay contacts, closes when output is above 17.6 - 19.4V			
Operating Temperature	-	-40°C(3) to +71°C (Derate linearly 2.5%/°C from 61°C to 71°C, 3.5%/°C for DPP960)			
Storage Temperature	-	-40°C to +85°C			
Operating Humidity (non condensing)	-	20 - 95% RH			
Cooling	-	Convection. Recommend 25mm clearance on all sides			
Withstand Voltage	-	Input to Output 3kVAC, Input to Ground 1.5kVAC for 1 min.			
Isolation Resistance	Ω	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC			
Vibration	-	IEC 60068-2-6. 10- 500Hz, 2G on X, Y & Z axes			
Shock	-	IEC 60068-2-27. Half sinewave, 4G, 22ms, 3 times each face			
Safety Agency Approvals (4)	-	UL508 Listed, UL60950-1, EN60950-1, CE			
Conducted & Radiated EMI	-	EN55022 class B			
Immunity	-	IEC 61000-4-2, -3, 4, -5, -6. -8, -11			
Weight (Typ)	g	800	1100	1720	3400g
Size (WxHxD)	mm	74.3 x 124 x 111.9	89 x 124 x 111.9	150 x 124 x 111.9	275.8 x 126.2 x 111.9
Switching Frequency	kHz	70	25	80	52
MTBF (Bellcore Issue 6 @ 40°C, GB)	Hours	527,000	488,000	411,000	352,000
Case material	-	Metal			
Warranty	yrs	3			

Notes: **(1)** Bi-phase input is permissible, but output load must be derated to 75% load
(2) Passive, meets EN61000-3-2
(3) DPP480 -30˚C
(4) Consult Sales Office for use under DC Input conditions

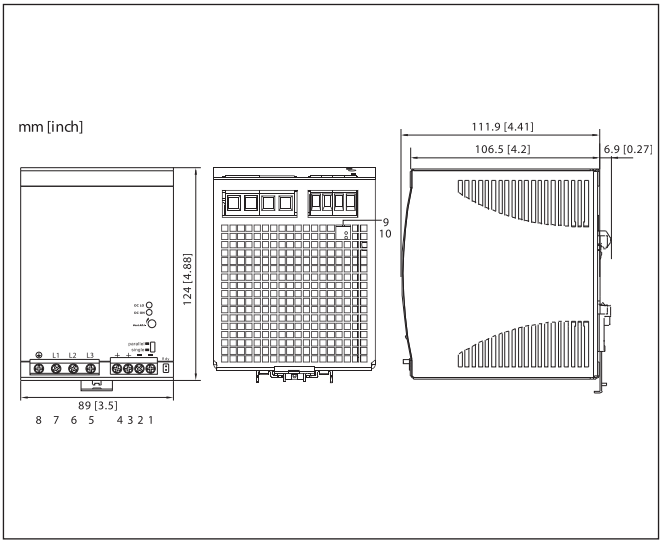
Model Selector

Model	Voltage (V)	Adjust Range (V)	Output Current (A)	Overvoltage (V)	Efficiency (%)
DPP120-12-3	12V	11.4 - 14.5V	10A	14.5 - 17.4V	87%
DPP120-24-3	24V	22.5 - 28.5V	5A	30 - 33V	89%
DPP240-24-3	24V	22.5 - 28.5V	10A	30 - 33V	90%
DPP480-24-3	24V	22.5 - 28.5V	20A	30 - 33V	90%
DPP960-24-3	24V	22.5 - 28.5V	40A	30 - 33V	92%
DPP240-48-3	48V	47 - 56V	5A	60 - 68V	91%
DPP480-48-3	48V	47 - 56V	10A	60 - 68V	91%
DPP960-48-3	48V	47 - 56V	20A	60 - 68V	93%

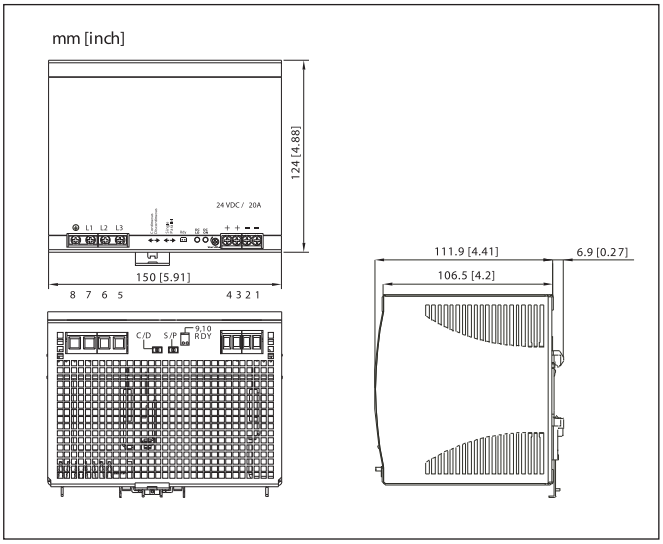
Outline Drawing DPP120



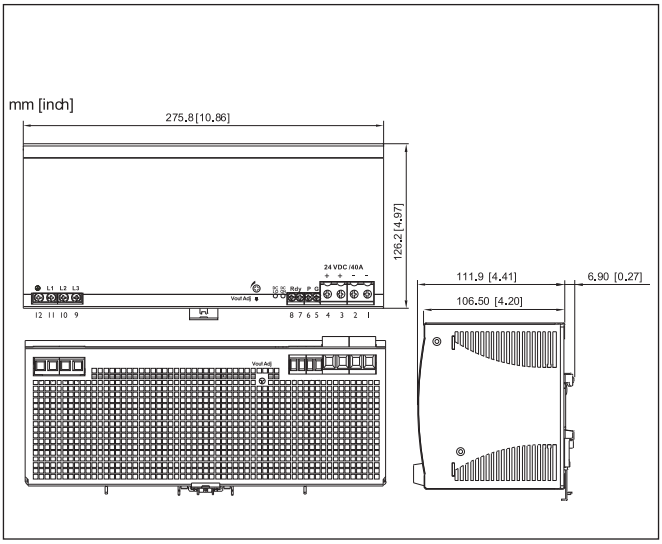
Outline Drawing DPP240



Outline Drawing DPP480



Outline Drawing DPP960



Snap-on Mounting: snap onto DIN Rail TS35/7.5 or TS35/15. (no tools required)

Industrial Test Renewable Broadcast

15W to 100W Single Output DIN Rail Mount Power Supplies

Features	Benefits
• Compact Footprint	• Saves Space on Rail & Cabinet Cost
• Efficiency up 91%	• Cooler Applications - Improved Thermal Performance
• ErP Compliant Design	• Better "Environmental Footprint"

Specification

Model		DRB15	DRB30	DRB50	DRB100
ITEMS					
AC input voltage range	VAC	85-264 (withstand 300VAC for 5 sec)			
Input frequency	Hz	47-63			
DC Input range	VDC	120 - 373			
Inrush cold (typ)	A	35A	40A	50A	40A
Power factor (typ) (110/230VAC)		0.55/0.42	0.56/0.46	0.6/0.5	0.98/0.93
Input current (typ)	A	0.27/0.17	0.55/0.33	0.9/0.55	1.2/0.6
Output voltage	V	24	12 / 24	5 / 12 / 15 / 24 / 48	24
Output current	A	0.63	2.5 / 1.25	6 / 3.4 / 3.4 / 2.1 / 1.05	4.2
Line regulation	mV	240	120 / 240	50 / 150 / 150 / 240 / 480	240
Load regulation	mV	240	120 / 240	50 / 150 / 150 / 240 / 480	240
Ripple & noise (max) (typ)	mV	20	40 / 30	30 / 20 / 20 / 30 / 40	30
Over current protection		Hiccup with auto recovery			
Over voltage protection (1)		5V: 115%-135%, 12V: 133%-156%, 24V: 125%-140%, 48V: 112%-142% (latch mode)			
Hold up time (230VAC)	ms	20 @100VAC, full load, 25°C			
Efficiency (typ) (230VAC)	%	90	88 / 90	80 / 90 / 90 / 91	91
Average efficiency (230VAC)	%	88	87/89	5V:n/a, 12V:88, 24V:87, 48V:87	87
No load power	W	<0.3	<0.3	<0.3	<0.5
Parallel operation		Not available			
Serial operation		Possible			
LED indicators		DC OK signal - green			
Operating temperature (2, 3, 5)	°C	-20°C to +70°C (see derating curves)			
Storage temperature	°C	-40°C to +85°C			
Operating humidity		5-95% RH (non condensing)			
Operating altitude	m	3,000			
Cooling (4)		Convection			
Withstand voltage		Input - Output : 3.0kVAC (20mA), Input - FG : 1.5kVAC (20mA)			
		Output - FG : 500VAC (100mA) 1 min.			
Isolation resistance	MΩ	Input-FG, Input-Output & Output-FG: More than 100MΩ (500VDC) at 25°C and 70%RH			
Vibration		Non-operating,10-55Hz(sweep for 1 min.):19.6 m/s^2 (2G) Constant, X,Y,Z each 1hr			
Shock		294m/s2(30G) 11ms half sine			
Safety agency approvals (6) (7)		UL60950-1, CSA22.2 No.60950-1 (2nd edition), EN60950-1, UL508, UL1310 class 2 Class 1 Div 2, Group A, B, C, D (ISA 12.12.01)			
Emissions		EN55022, CISPR22 class B			
Immunity		EN61000-4-2,-3,-4,-5,-6,-8,-11			
Line dips	-	SEMI -F47 (200VAC input)			
Weight (typ)	g	85	95	175	300
Size (W x H x D)	mm	18 x 75 x 90	21x75x90	30x75x90	45x75x100
Case material		Flame Retardant Polycarbonate (UL94 V-0)			
Warranty	yrs	3			

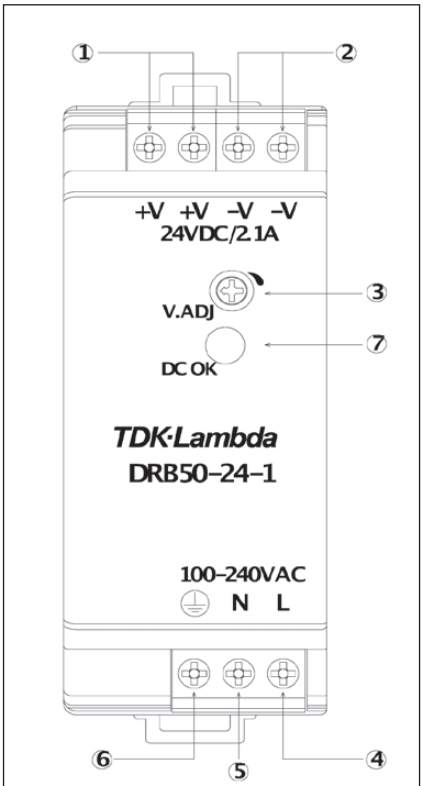
Notes:
1 Output will shutdown, manual reset required (power off then on)
2 Refer to output derating curves
3 For UL508 operating temperature refers to surrounding air temperature
4 See installation instructions for mounting orientation
5 Low temperature start up: -40°C typical
6 Consult Sales Office for use under DC Input conditions
7 See model selector

Model Selector

Model	Output Voltage	Output Adjust Range (V)	Max Output Current (A)	Max Output Power (W)	Efficiency at 115/230 VAC (%)
DRB15-24-1*	24	24-28	0.63	15.12	87/90
DRB30-12-1*	12	12-15	2.5	30	86/88
DRB30-24-1*	24	24-28	1.25	30	88/90
DRB50-5-1	5	5-5.5	6	30	79/80
DRB50-12-1*	12	12-15	3.4	51**	88/90
DRB50-15-1*	15	12-15	3.4	51**	88/90
DRB50-24-1*	24	24-28	2.1	50.4	88/90
DRB50-48-1*	48	48-52.8	1.05	50.4	90/91
DRB100-24-1	24	24-28	4.2	100.8	90/91

Note: * Output NEC Class 2 in accordance with UL1310
** Maximum power is 51W at 15V output, 40.8W when set at 12V output

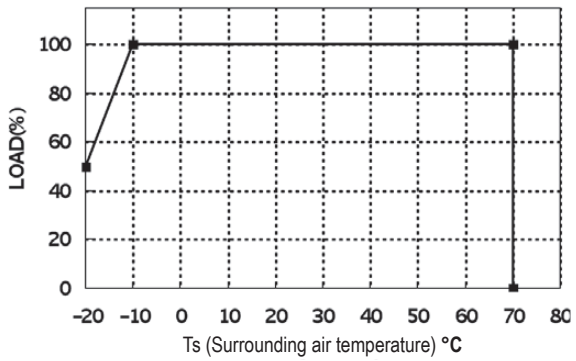
Terminal Explanation Example



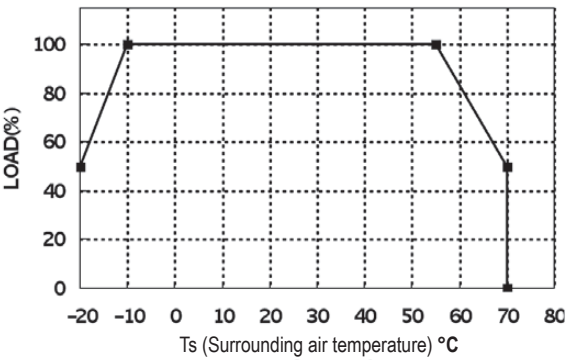
Connection

Pin	
1	+V: + Output terminal
2	-V: - Output terminal
3	V. adj: Output voltage adjust trimmer. The output voltage rises when the trimmer is turned clockwise
4	L: AC Input terminal live line (fuse in line)
5	N: AC Input terminal neutral line
6	E: Protective earth connect to safety ground of apparatus or equipment
7	DC OK: Green LED lights when output voltage on

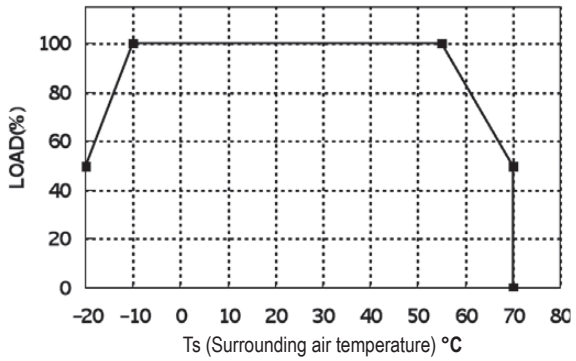
Output Derating DRB15 Series



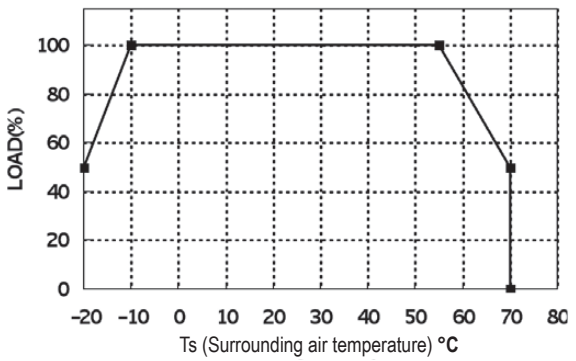
Output Derating DRB30 Series



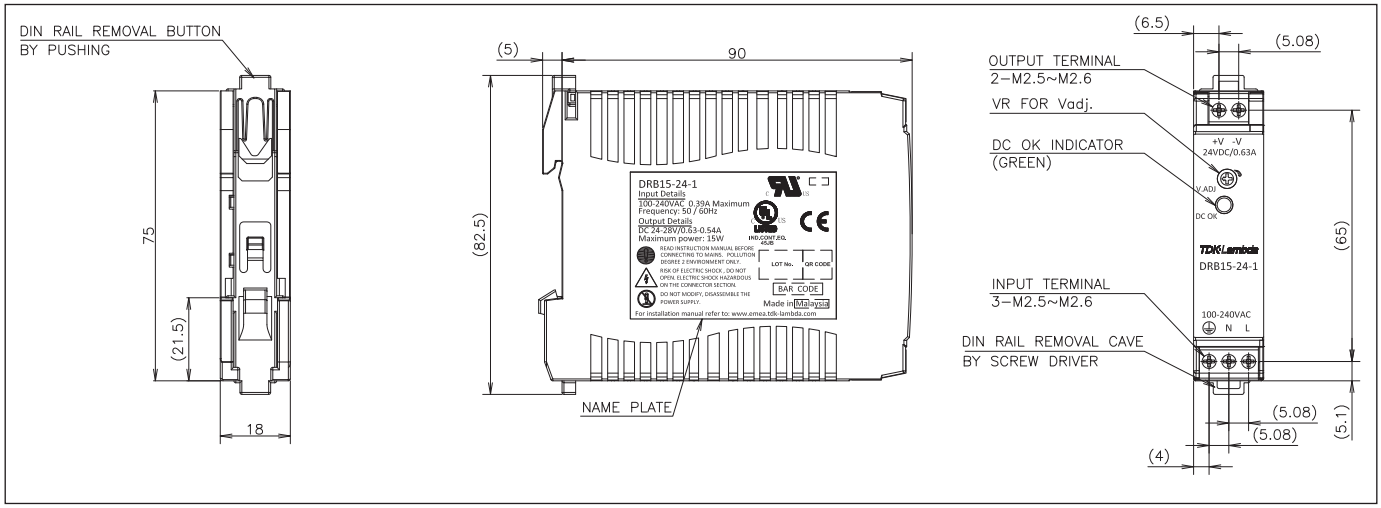
Output Derating DRB50 Series



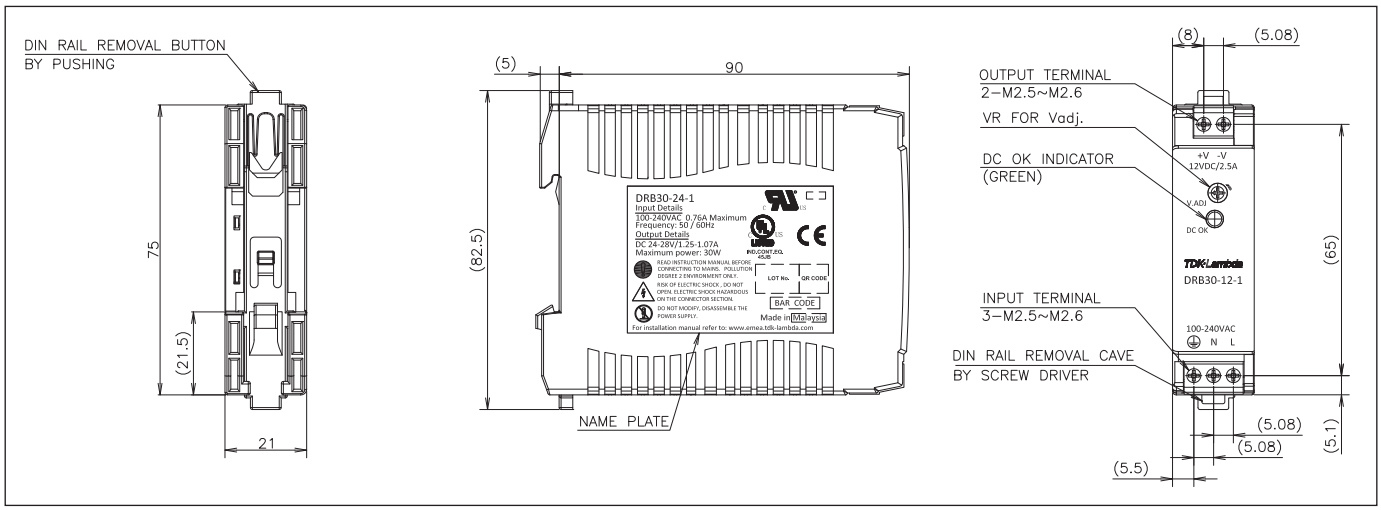
Output Derating DRB100 Series



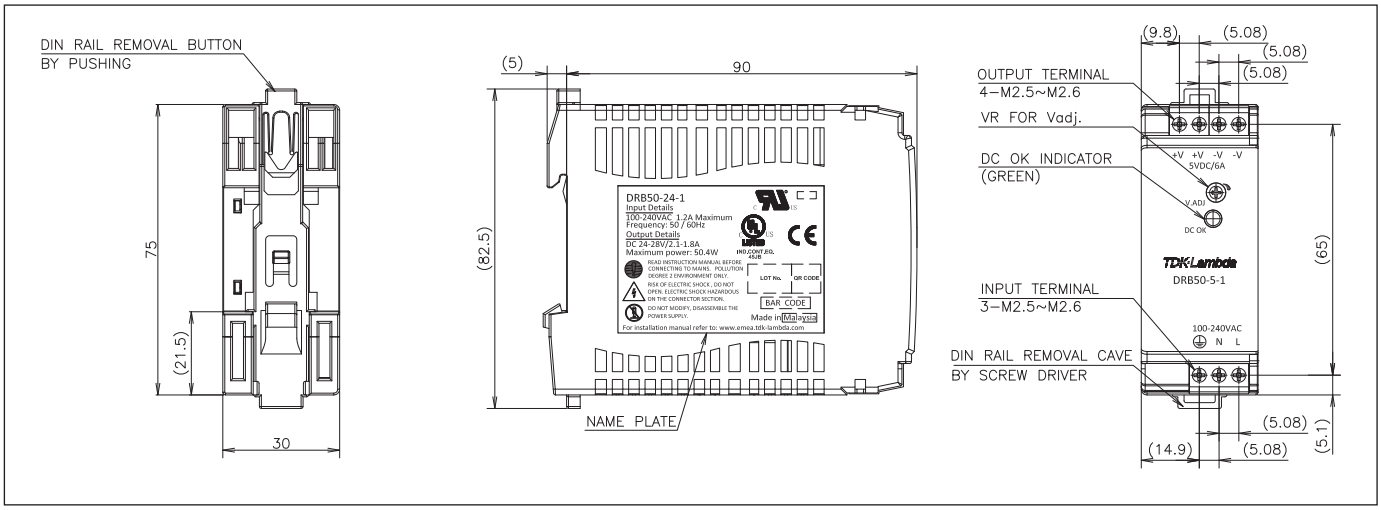
Outline Drawing DRB15 Series



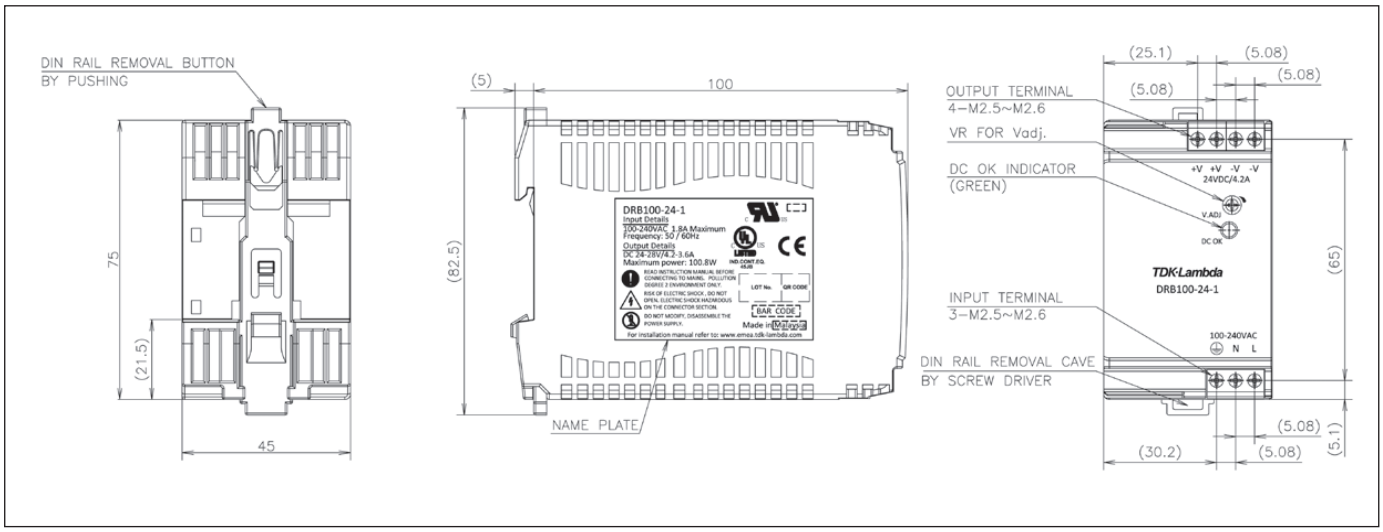
Outline Drawing DRB30 Series



Outline Drawing DRB50 Series



Outline Drawing DRB100 Series



Industrial Test Renewable Broadcast

120W - 960W Single Output 24V
180W - 1440W Peak Power
DIN Rail Mount Power Supplies

Features	Benefits
• 150% Peak Power, 4 sec	• Better Start-up of Capacitive & Inductive Loads
• Efficiency up to 95%	• Cooler Applications - Improved Thermal Performance
• Ultra Compact Footprint	• Saves Space on Rail and Cabinet Cost
• ErP Referenced Design	• Better "Environmental Footprint"
• Remote On/Off	• For Intelligent System Implementation
• Remote Programming	• Wide Range of Applications

Specifications

MODELS		DRF-120-24-1	DRF-240-24-1	DRF-480-24-1	DRF-960-24-1
AC Input voltage range	VAC	85 - 264 (withstand 300VAC surge for 5s)			180 - 264VAC
Input frequency	Hz	47 - 63			
Inrush cold (typ)	A	20			
Power factor (typ) (115/230)	-	0.98/0.95	0.98/0.95	0.98/0.92	-/0.98
Input current (typ) (2)	A	1.2/0.6	2.4/1.2	4.7/2.5	-/4.5
Output voltage	V	24			
Output current	A	5	10	20	40
Peak output current (1)	A	7.5	15	30	60
Peak output power (1)	W	180	360	720	1440
Line regulation	mV	<96			
Load regulation	mV	<240			
Ripple and noise (2 & 3)	mV	<240			
Over current protection (4)	-	> 105% peak output current			
Over voltage protection (5)	V	30 - 35.5			31.5 - 34
Hold up time (230VAC)	ms	>20			>10ms
Efficiency (typ) (230VAC)	%	91	94	94	95
Average efficiency (230VAC)	%	88.6	92.4	92	87
Standby input power (230VAC)	W	< 0.5	< 0.5	< 0.75	< 1
Parallel operation (6)	-	Possible			
Series operation (6)	-	Possible			
LED indicators	-	DC OK signal - green (Vout > 80% rated output voltage): Peak power mode - red			
DC OK relay	-	Relay contact 30V/1A (closed if Vout > 80% of rated output voltage)			
Operating temperature	°C	-25°C to +70°C. Start up at -40°C (Derate linearly to 75% load above 60°C (50°C for DRF960)			
Storage temperature	°C	-40°C to +85°C			
Operating humidity	%	5-95 RH (non condensing)			
Operating altitude	m	OVC II up to 3000m			OVC III up to 3000m OVC II up to 5000m
Cooling	-	Convection			
Withstand voltage	-	I/P to FG:1.5kVAC (20mA), I/P to O/P 3kVAC (20mA), O/P to FG: 500VDC (100mA) for 1 min (960W 500VAC)			
Isolation resistance	MΩ	I/P to FG, IP to O/P and O/P to FG: >100MOhms (500VDC) at 25°C & 70%RH			
Vibration	-	Non-operating,10-55Hz(sweep for 1 min.):19.6 m/s^2 constant, X,Y,Z axis 1 hour each			
Shock	-	<196m/s^2			
Safety agency certifications	-	IEC/EN/UL60950-1, CE, UL508 listed, (ATEX / IECEx / Marine-GL approved models available) Class 1 Div 2, Group A, B, C, D ISA 12.12.01 (DRF120-480 only)			
Emissions	-	EN55032-B, CISPR22-B			
Immunity	-	EN61000-4-2,-3,-4,-5,-6,-8,-11			
Line dips	-	SEMI -F47 (200VAC input)			
Weight (typ)	g	600	900	1300	1735
Size (W x H x D)	mm	36.5 x 123.4 x 115.4	49 x 123.4 x 115.4	82 x 123.4 x 115.4	110 x 123.4 x 139
Case material	-	Metal			
Warranty	yrs	5			

Notes from page 1

1. Operating period at peak output current is 4 sec, max duty cycle <35% & < rated output power
2. At 115 / 230VAC, Ta = 25°C, nominal output voltage, rated output power
3. Ripple & noise is measured at 20MHz using 300mm twisted pair of load wires terminated with 0.1μF film cap & 47μF electrolytic cap
4. Constant current (CC) limit for >105% of peak output current. CC limit with auto recovery within 4 sec, unit will shutdown at >4sec
5. Output will shutdown, manual reset by mains cycle off/on or CNT on/off
6. Refer to instruction manual

Model Selector

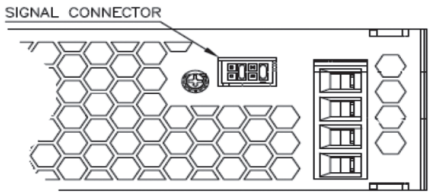
Model	Output Voltage	Output Adjust Range (V)	Max Output Current (A)	Peak Current	Max Output Power (W)	Peak Power	Efficiency at 115/230VAC (%)
DRF120-24-1	24	24 - 28	5	7.5	120	180	89 / 91
DRF240-24-1	24	24 - 28	10	15	240	360	93 / 94
DRF480-24-1	24	24 - 28	20	30	480	720	93 / 94
DRF960-24-1	24	24 - 28	40	60	960	1440	- / 95

Signal Connector Pin Assignment

PIN	Function	Detail
1	CB	For parallel operation cut the link between pins 1 & 2 for droop mode current share
2	CB-COM	
3	N/C	No Connection
4	N/C	
5	CNT+	Remote ON/OFF control, when CNT+ is pulled to TTL low the power supply turns ON, otherwise it turns OFF
6	CNT-	
7	PV	Programming voltage range 5 - 6V presets the output to 24 - 28V
8	COMM	

DRF120 example*

Signal Connector: please refer to instruction manual.
Potentiometer on top of unit is for factory setting only.
Please do not adjust.

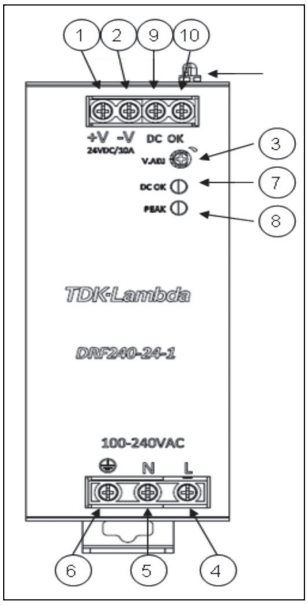


***Signal connectors are found on the topside of the unit.**
See product outline drawings for locations

Optional Models available (DRF120-480 only)

Suffix	Description
/HL	Conformally Coated (ATEX, IEC EX, GL)

Terminal Explanation



Connection

1 +V: +Output terminal

2 –V: –Output terminal

3 V.ADJ: Output voltage adjust trimmer
The output voltage rises when a trimmer is turned clockwise

4 L: AC Input terminal. Live line (fuse in line)

5 N: AC Input terminal. Neutral line

6 ⏚: Protective Earth
Connect to safety ground of apparatus or equipment

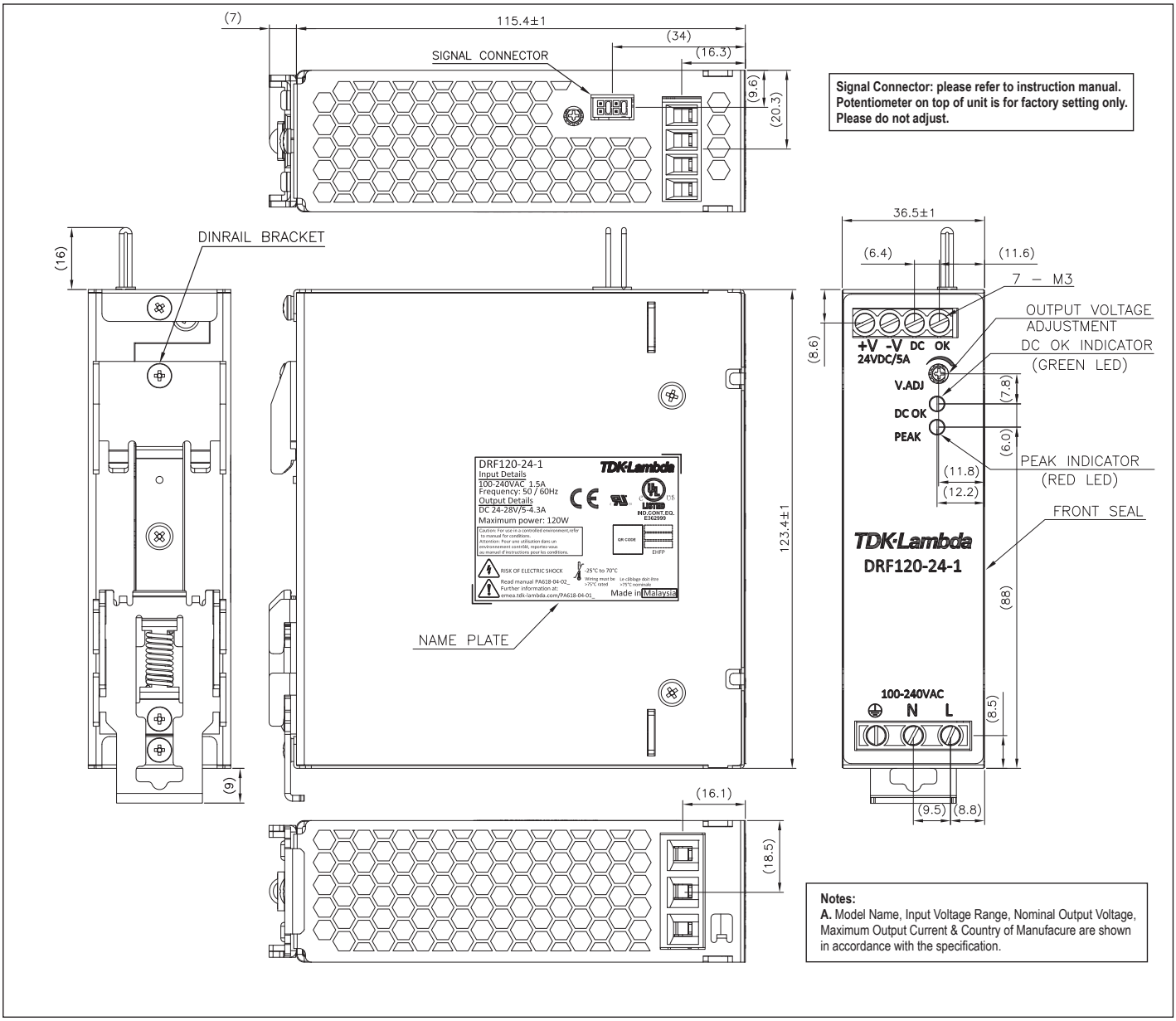
7 DC OK:
Green LED lights when output voltage is > 80% of rated output voltage

8 PEAK:
Red LED lights when unit is in peak power mode

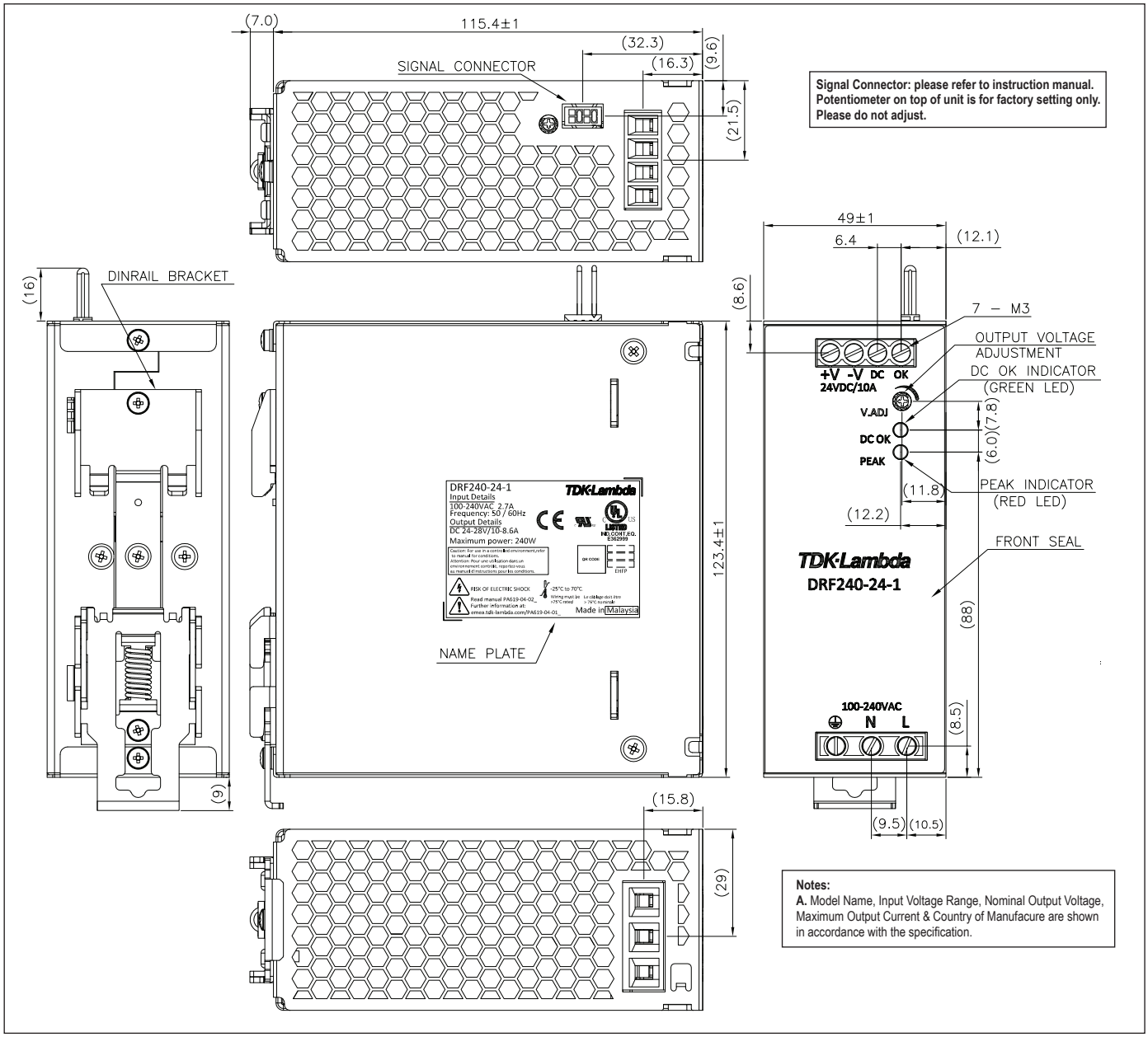
9 DC OK: Relay contact

10 DC OK: Relay contact

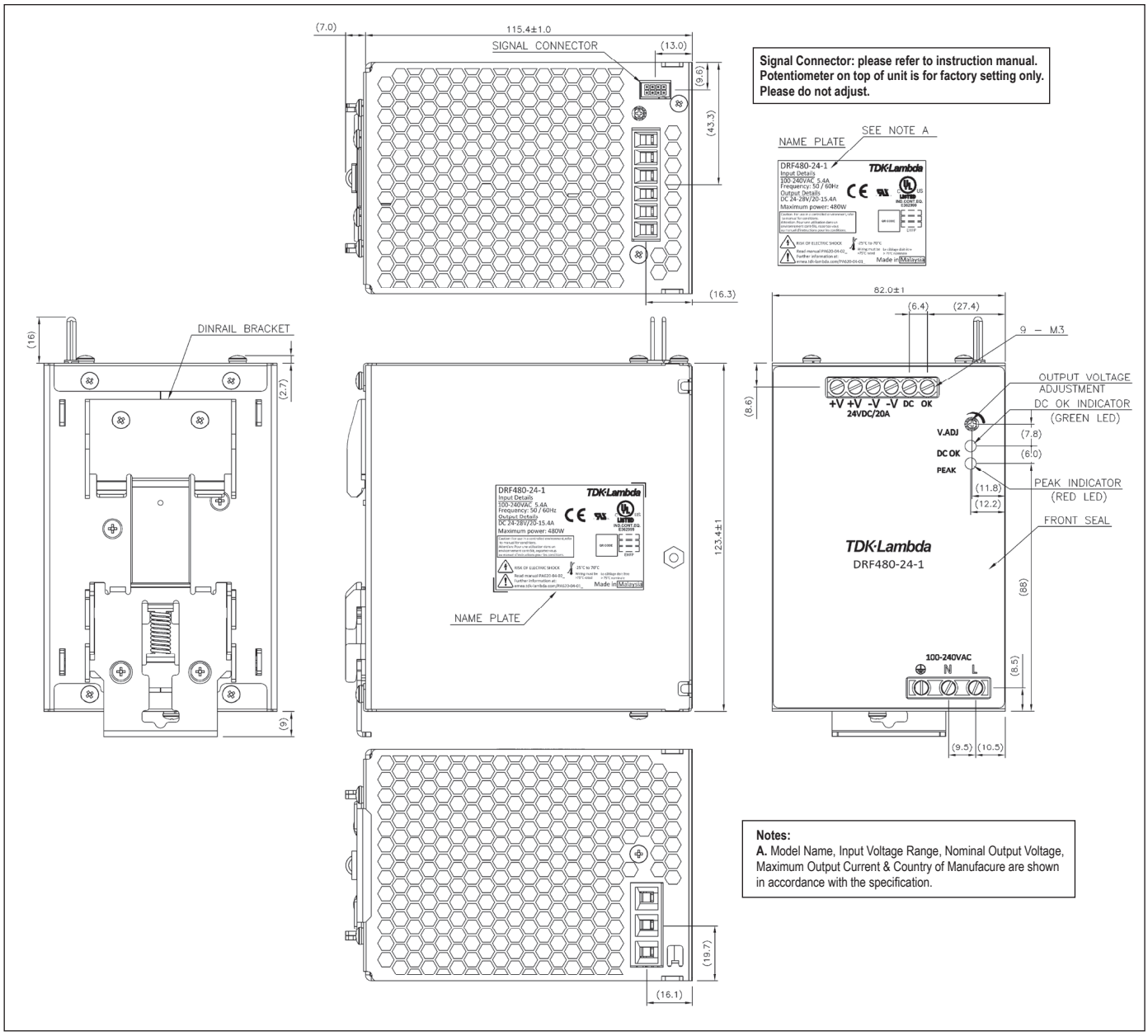
DRF120-24-1 Outline Drawing



DRF240-24-1 Outline Drawing

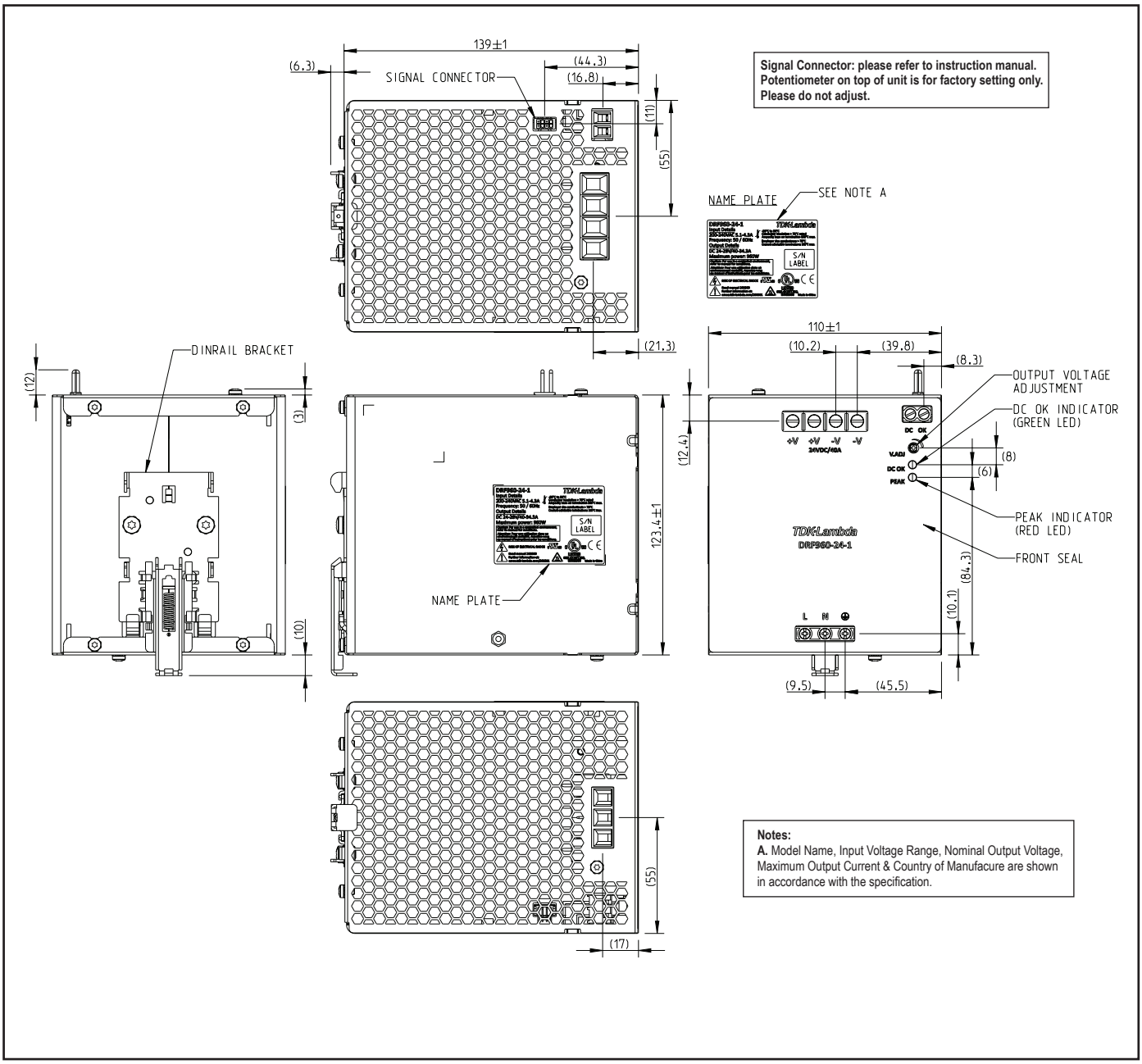


DRF480-24-1 Outline Drawing



Notes:
A. Model Name, Input Voltage Range, Nominal Output Voltage, Maximum Output Current & Country of Manufacure are shown in accordance with the specification.

DRF960-24-1 Outline Drawing



Industrial Test Renewable Broadcast HazLoc Marine

120W - 480W Single Output: 24V
180W - 720W Peak Power DIN Rail Mount Power Supplies for Hazardous Location

Features	Benefits
• IECEx / ATEX Approval	• Use in Explosive Atmospheres
• DNV / German Lloyd Approval	• Suits Marine, Shipbuilding Applications
• Conformal Coated Circuit Boards	• Resistance to Harsh Environment
• Narrow Convection Cooled Design	• Saves Space on Rail & Cabinet Cost
• Remote On/Off	• Supports Intelligent Controls
• ErP Referenced Design	• Improves "Environmental Footprint"

Specifications

MODELS		DRF120-24-1/HL	DRF240-24-1/HL	DRF480-24-1/HL
AC Input voltage range	VAC	85 - 264 (withstand 300VAC surge for 5s)		
Input frequency	Hz	47 - 63		
Inrush current @ cold start (typ)	A	20		
Power factor (typ) (115/230)	-	0.98/0.95	0.98/0.95	0.98/0.92
Input current (typ) (2)	A	1.2/0.6	2.4/1.2	4.7/2.5
Output voltage	V	24		
Output current	A	5	10	20
Peak output current (1)	A	7.5	15	30
Peak output power (1)	W	180	360	720
Line regulation	mV	<96		
Load regulation	mV	<240		
Ripple and noise (2 & 3)	mV	<240		
Over current protection (4)	-	> 105% peak output current		
Over voltage protection (5)	V	30 - 35.5		
Hold up time (230VAC)	ms	20		
Efficiency (typ) (230VAC)	%	91	94	
Average efficiency (230VAC)	%	88.6	92.4	92
Standby input power (230VAC)	W	< 0.5	< 0.5	< 0.75
Parallel operation (6)	-	Possible		
Series operation (6)	-	Possible		
LED indicators	-	DC OK signal - green (Vout > 80% rated output voltage): Peak power mode - red		
DC OK relay	-	Relay contact 30V/1A (closed if Vout > 80% of rated output voltage)		
Operating temperature	°C	-25°C to +70°C (60°C to 70°C derate to 75% load)		
Storage temperature (7)	°C	-40°C to +85°C		
Operating humidity	%	5-95 RH (non condensing)		
Operating altitude	m	Up to 3,000		
Cooling	-	Convection		
Withstand voltage	-	I/P to FG:1.5kVAC (20mA), I/P to O/P 3kVAC (20mA), O/P to FG: 500VAC (100mA) for 1 min		
Isolation resistance	MΩ	I/P to FG, IP to O/P and O/P to FG: >100MOhms (500VDC) at 25°C & 70%RH		
Vibration	-	Non-operating,10-55Hz(sweep for 1 min.):19.6 m/s^2 constant, X,Y,Z axis 1 hour each		
Shock	-	<196m/s^2		
Safety agency approvals (8)	-	IEC/EN/UL60950-1, CE, UL508 listed, IECEN60079-0, -15(IECEX, ATEX), DNV-GL		
Emissions	-	EN55022 Class B, CISPR22-B		
Immunity	-	EN61000-4-2,-3,-4,-5,-6,-8,-11		
Weight (typ)	g	600	900	1300
Size (W x H x D)	mm	36.5 x 123.4 x 115.4	49 x 123.4 x 115.4	82 x 123.4 x 115.4
Case material	-	Metal		
Warranty	yrs	5		

See Page 2 for Notes

Notes from page 1

1. Operating period at peak output current is 4 sec, max duty cycle <35% & < rated output power
2. At 115 / 230VAC, Ta = 25°C, nominal output voltage, rated output power
3. Ripple & noise is measured at 20MHz using 300mm twisted pair of load wires terminated with 0.1μF film cap & 47μF electrolytic cap
4. Constant current (CC) limit for >105% of peak output current. CC limit with auto recovery within 4 sec, unit will shutdown at >4sec
5. Output will shutdown, manual reset by mains cycle off/on or CNT on/off
6. Refer to instruction manual
7. For -30°C startup please contact your local sales contact or relevent FAE for DIN rail
8. IEC Ex/ATEX code for **DRF120/HL** & **DRF240/HL** - II 3G Ex nAnC IIc T4, **DRF480/HL** - II 3G Ex nAnc IIc T3 DNV-GL type approval procedure V1-7-1

Model Selector

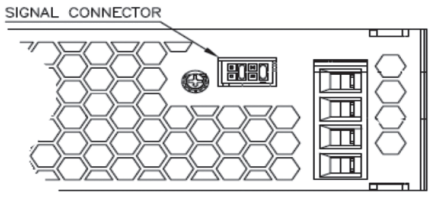
Model	Output Voltage	Output Adjust Range (V)	Max Output Current (A)	Peak Current	Max Output Power (W)	Peak Power	Efficiency at 115/230VAC (%)
DRF120-24-1/HL	24	24 - 28	5	7.5	120	180	89 / 91
DRF240-24-1/HL	24	24 - 28	10	15	240	360	93/ 94
DRF480-24-1/HL	24	24 - 28	20	30	480	720	93 / 94

Signal Connector Pin Assignment

PIN	Function	Detail
1	CB	For parallel operation cut the link between pins 1 & 2 for droop mode current share
2	CB-COM	
3	N/C	No Connection
4	N/C	
5	CNT+	Remote ON/OFF control, when CNT+ is pulled to TTL low the power supply turns ON, otherwise it turns OFF
6	CNT-	
7	PV	Programming voltage range 5 - 6V presets the output to 24 - 28V
8	COMM	

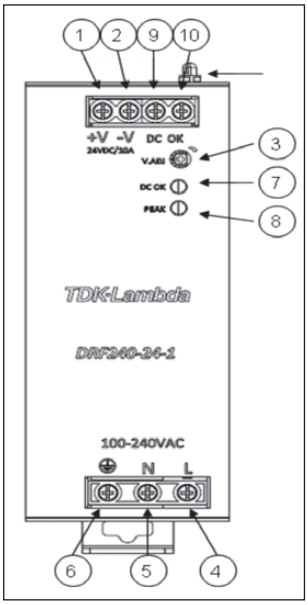
DRF120/HL example*

Signal Connector: please refer to instruction manual.
Potentiometer on top of unit is for factory setting only.
Please do not adjust.



***Signal connectors are found on the topside of the unit.**
See product outline drawings for locations

Terminal Explanation



Connection

1 +V: +Output terminal

2 –V: –Output terminal

3 V.ADJ: Output voltage adjust trimmer
The output voltage rises when a trimmer is turned clockwise

4 L: AC Input terminal. Live line (fuse in line)

5 N: AC Input terminal. Neutral line

6 ⏚: Protective Earth
Connect to safety ground of apparatus or equipment

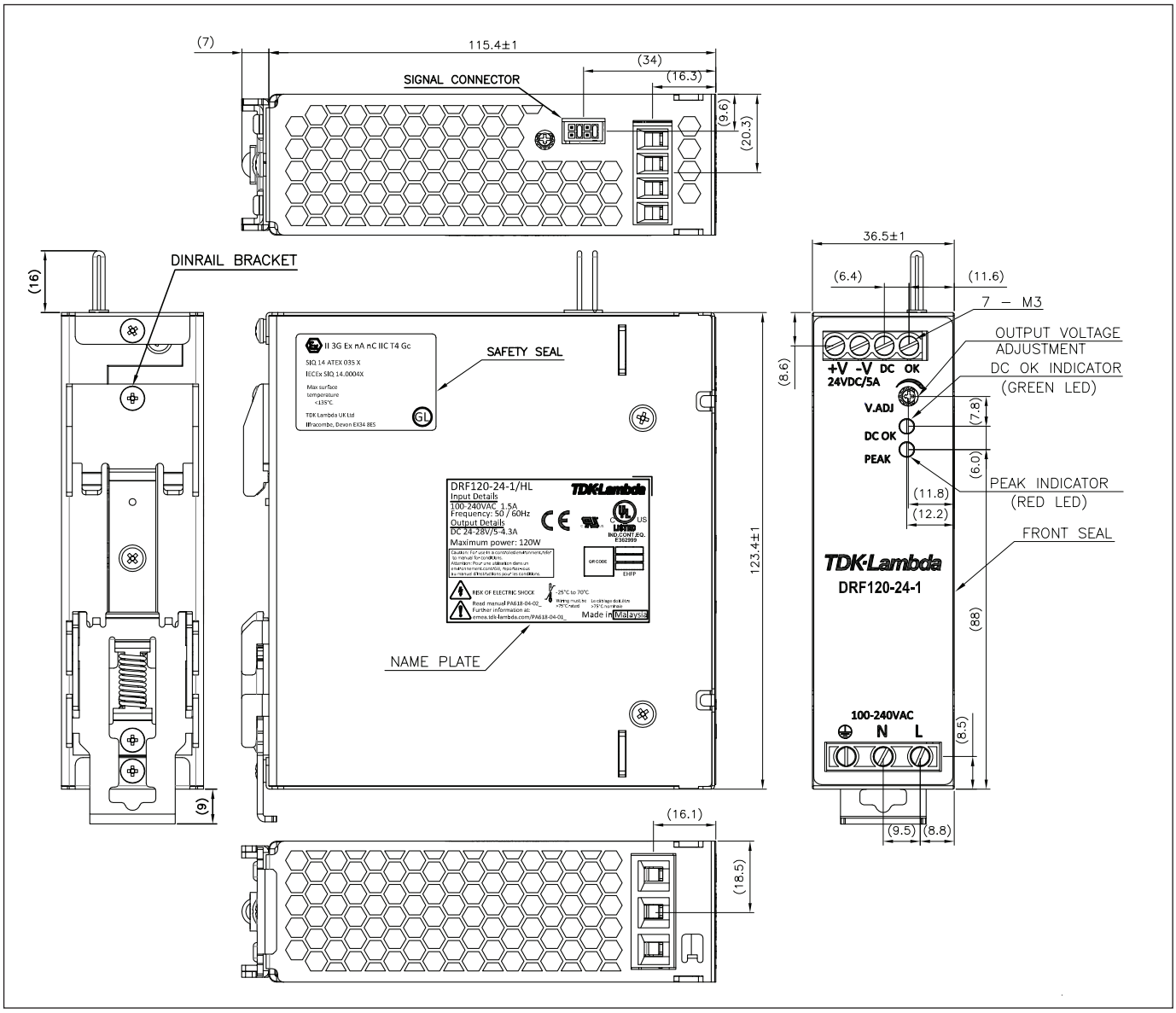
7 DC OK:
Green LED lights when output voltage is > 80% of rated output voltage

8 PEAK:
Red LED lights when unit is in peak power mode

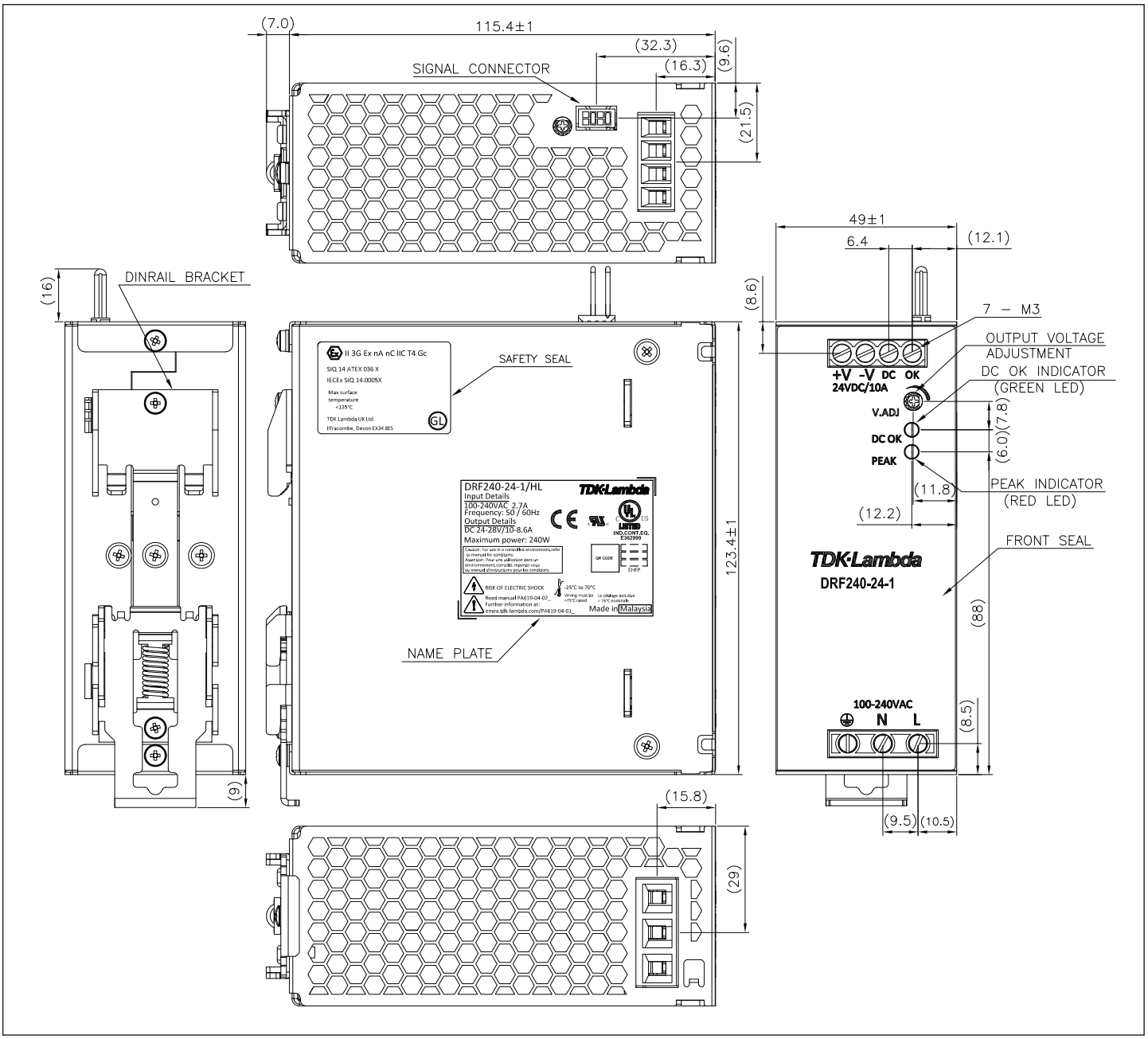
9 DC OK: Relay contact

10 DC OK: Relay contact

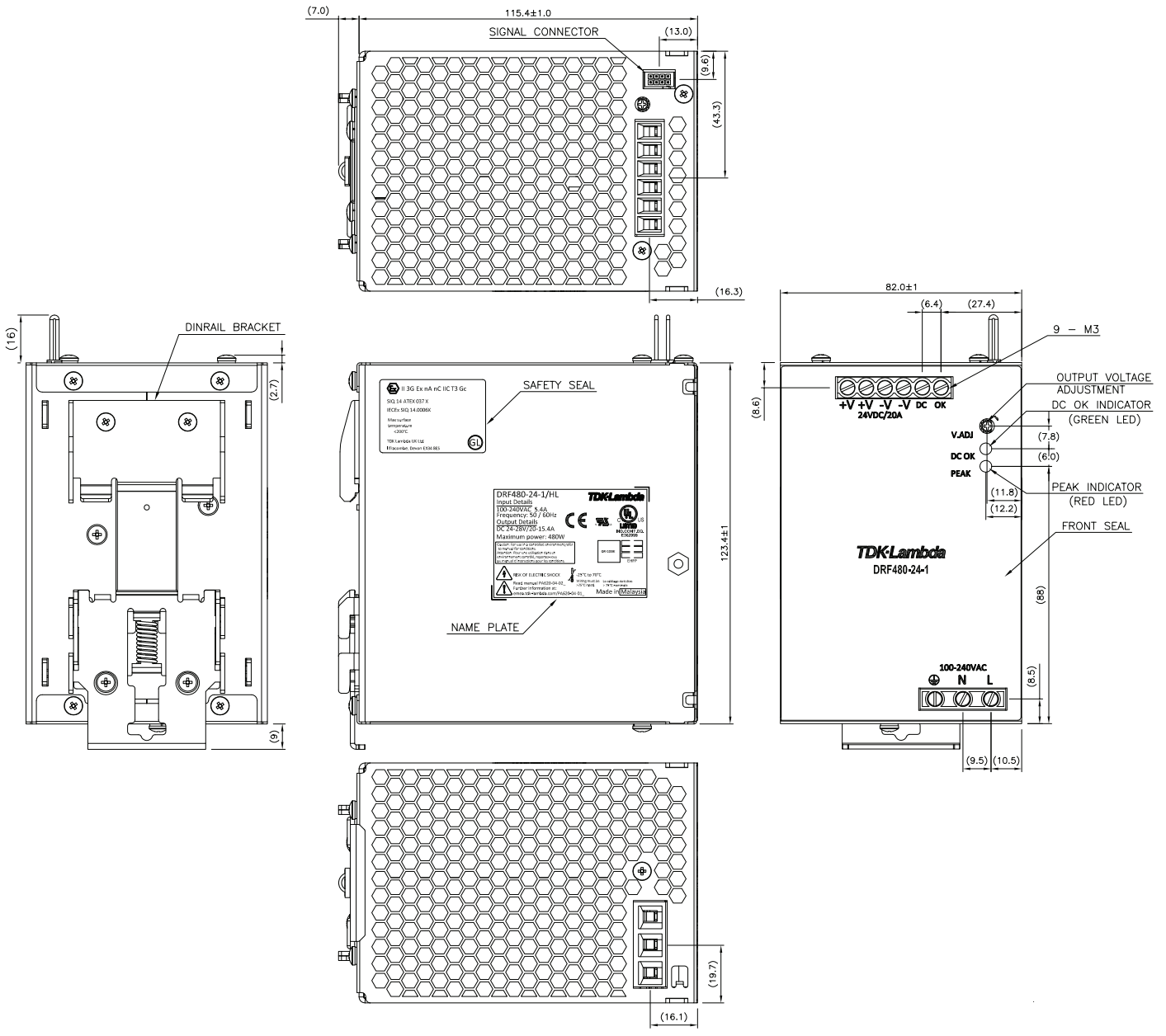
DRF120-24-1/HL Outline Drawing



DRF240-24-1/HL Outline Drawing



DRF480-24-1/HL Outline Drawing



Industrial Test Automation

10-100W Low Profile DIN Rail Mount Power Supplies

Features	Benefits
• High Efficiency, up to 90% @ 230VAC	• Energy Saving - Improved Thermal Performance
• UL1310 Class 2 Compliant	• Reduced Installation Costs (NEC Class 2)
• Low No Load Consumption	• ErP Compliant
• Long E-Cap-Life (>8 years @ 40°C, 75% Load, 230VAC)	• High In-Service Lifetime
• Class II, Wide Range Input (85-264VAC)	• Global Application, No Earth Required

Specification

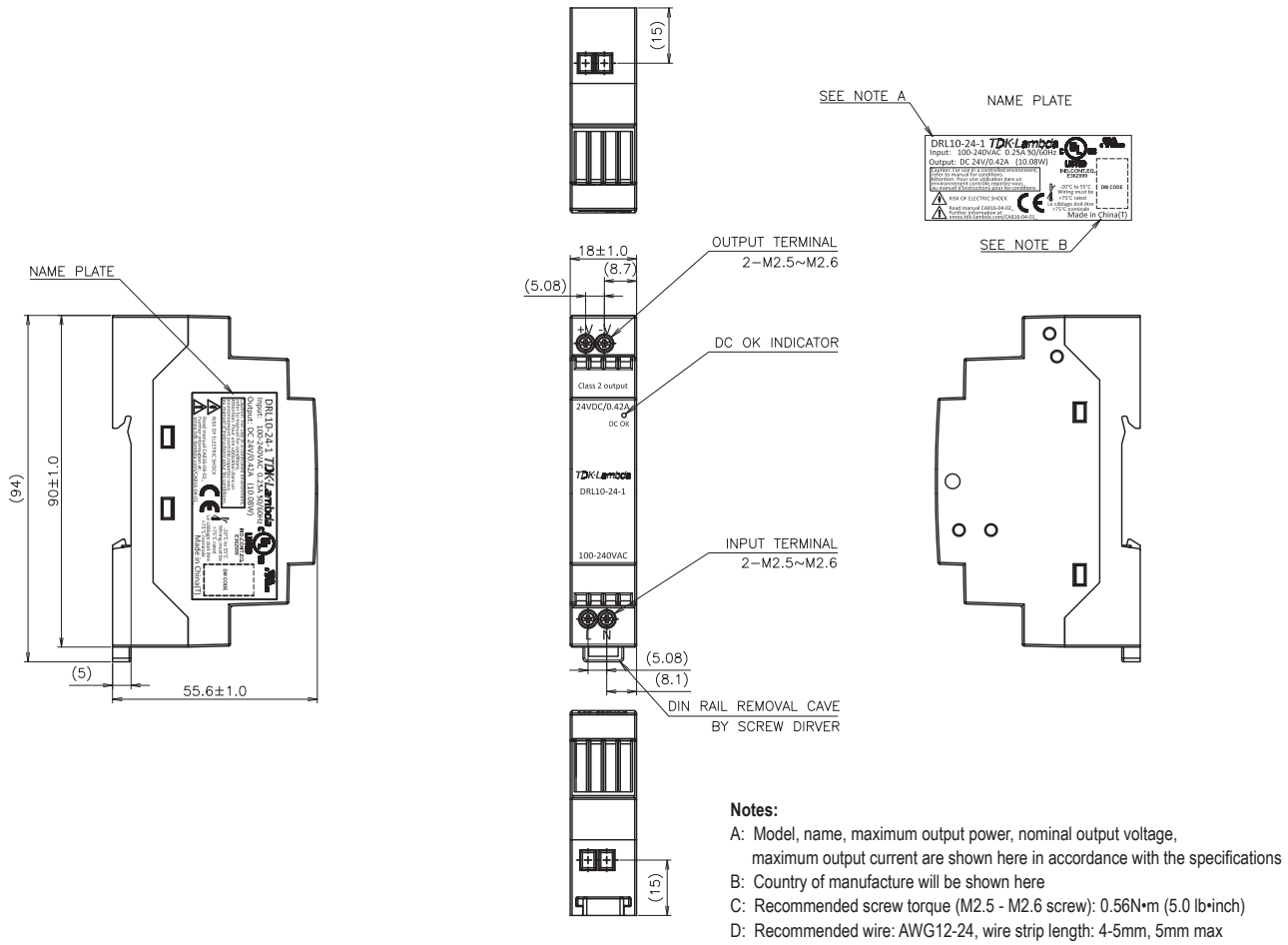
Model		DRL10	DRL30	DRL60	DRL100
Input Voltage Range	V	85 - 264VAC (Withstands 300VAC for 5 seconds)			
Input Frequency	Hz	47 - 63Hz			
Inrush Current at 230VAC (typ) (Cold Start)	A	40	50	60	60
Power Factor (115/230VAC)	A	Meets IEC61000-3-2 Class A 0.56 / 0.42	0.58 / 0.45	0.5 / 0.43	0.5 / 0.47
Input Current (110/230VAC)	A	0.18 / 0.12	0.6 / 0.4	1.2 / 0.8	2.0 / 1.1
Line & Load Regulation	-	See model selector			
Ripple & Noise	-	12V & 15V: 120mv, 24V: 240mv			
Overcurrent Protection	-	>105% Hiccup with auto recovery			
Overvoltage Protection	-	See model selector. Cycle AC input voltage to reset			
Hold Up Time (typ) at 115VAC Input	ms	20	20	20	15
Efficiency	-	See model selector			
No Load Power Draw	W	<0.3	<0.3	<0.5	<0.5
LED Indicator	-	Green LED indicates DC is OK			
Operating Temperature (-25°C start-up)	°C	DRL10, 30, 60: -20° to +71°, derate linearly from 100% to 60% load from 55° to 71° DRL100: -20° to +71°, derate linearly from 100% to 60% load from 51° to 71° DRL100 (<115VAC): -20° to +71°, derate linearly from 100% to 40% load from 40° to 71°			
Storage Temperature	°C	40° to +85°			
Operating Humidity (non condensing)	%RH	5 - 95			
Parallel Operation	-	Not available			
Series Opereration	-	Possible			
Cooling	-	Convection			
Operating Altitude	m	3,000			
Withstand Voltage (For 1 minute)	VAC	Input to Output 3kVAC			
Isolation Resistance	MΩ	>100MΩ at 25°C, 70%RH & 500VDC			
Vibration (Operating)	-	IEC 60068-2-6, Sine Wave, 10-500Hz, 19.6m/s^2 (2G peak) 10 min per cycle, 60 min for all X,Y,Z directions			
Shock	-	IEC 60068-2-27, Half Sine Wave, 39.2m/s^2 (4G) for a duration of 22ms 3 shocks for each 3 directions, 9 times in total			
Safety Agency Certifications	-	UL508 Listed, UL60950-1, UL1310 Class 2 (LPS), NEC Class 2 (see model selector table), CSA22.2 No.60950-1, EN60950-1, CE Mark			
Conducted & Radiated EMI	-	EN55022-B Conducted, EN55022-A Radiated			
Immunity	-	EN61000-4-2 (lvl 3) , -3 (lvl 3), -4 (lvl 4), -5 (lvl 3), -6 (lvl 3), -8 (lvl 4), -11 (class 3)			
Line Dip (200-240VAC)	-	SEMI F47 Compliant			
Weight (Typ)	g	65	120	200	280
Size (WxHxD)	mm	18 x 91 x 55.6	36 x 91 x 55.6	54 x 91 x 55.6	72 x 91 x 55.6
Case Material	-	Flame Retardant Polycarbonate (UL94 V-0)			
Warranty	yrs	3			

Model Selector

Model (1)	Output Voltage (V)	Adjust Range (V)	Max Current (A)	Max Power (W)	Load Reg (mV)	Line Reg (mV)	Overvoltage Protection Trigger Range (V)	Efficiency (115/230VAC) (%)	UL1310 Class 2
DRL10-12-1	12	-	0.84	10.08	120	120	13.8 - 16.2	85 / 85	Yes
DRL30-12-1	12	12 - 15	2.1	25.2	120	120	16 - 19	87 / 88	Yes
DRL60-12-1	12	12 - 15	4.5	54	120	120	16 - 19	87 / 87	Yes
DRL30-15-1	15	12 - 15	1.68	25.2	120	120	16 - 19	87 / 88	Yes
DRL60-15-1	15	12 - 15	3.6	54	120	120	16 - 19	87 / 87	Yes
DRL10-24-1	24	-	0.42	10	240	240	29 - 35	87 / 87	Yes
DRL30-24-1	24	24 - 28	1.25	30	240	240	29 - 35	88 / 90	Yes
DRL60-24-1	24	24 - 28	2.5	60	240	240	29 - 35	89 / 90	Yes
DRL100-24-1	24	24 - 28	4.2	100.8	240	240	29 - 35	88 / 90	No
DRL100-24-1/C2	24	-	3.67	88	240	240	26 - 30	88 / 90	Yes

(1) Models NEC Class 2 in accordance with UL1310, excludes DRL100-24
Suitable for mounting on DIN Rail TS-35/7.5 or TS35/15

Outline Drawing DRL10-1



Notes:

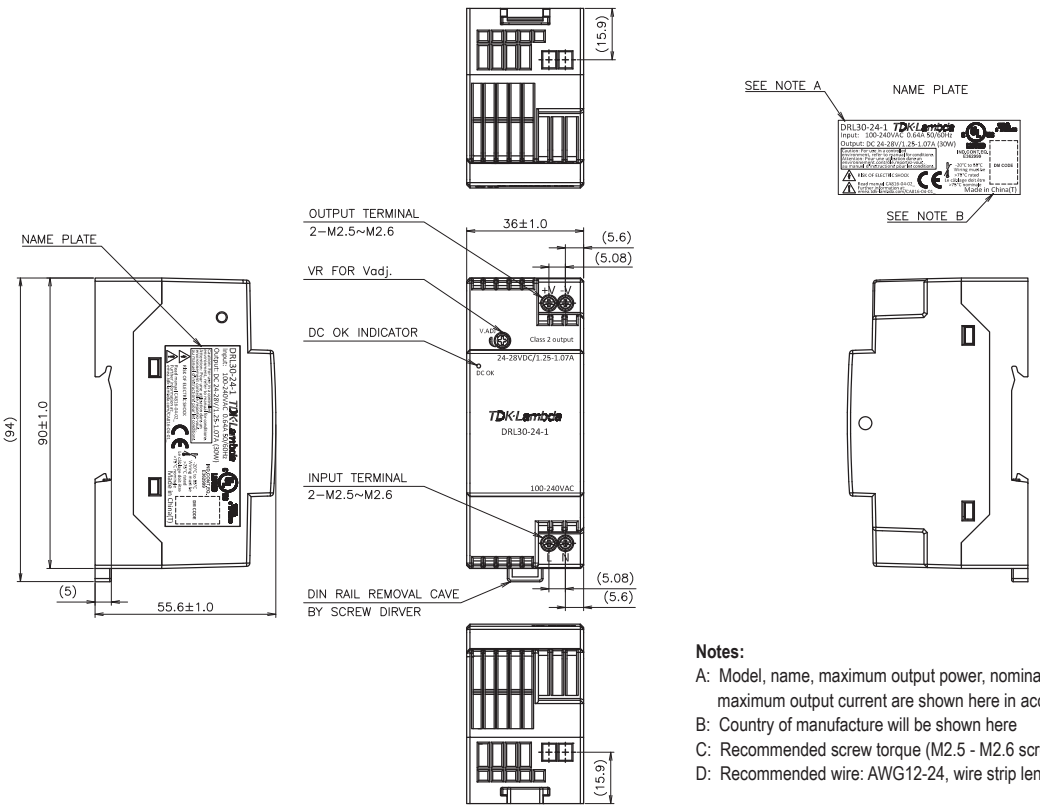
A: Model, name, maximum output power, nominal output voltage, maximum output current are shown here in accordance with the specifications

B: Country of manufacture will be shown here

C: Recommended screw torque (M2.5 - M2.6 screw): 0.56N•m (5.0 lb•inch)

D: Recommended wire: AWG12-24, wire strip length: 4-5mm, 5mm max

Outline Drawing DRL30-1



Notes:

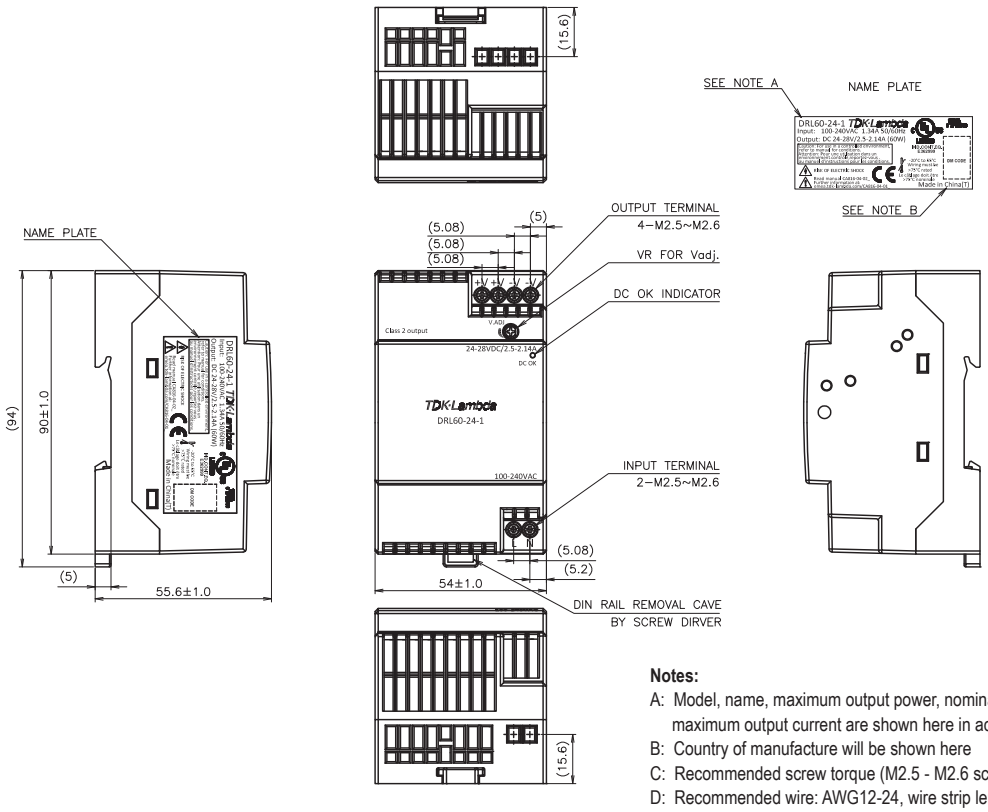
A: Model, name, maximum output power, nominal output voltage, maximum output current are shown here in accordance with the specifications

B: Country of manufacture will be shown here

C: Recommended screw torque (M2.5 - M2.6 screw): 0.56N•m (5.0 lb•inch)

D: Recommended wire: AWG12-24, wire strip length: 4-5mm, 5mm max

Outline Drawing DRL60-1



Notes:

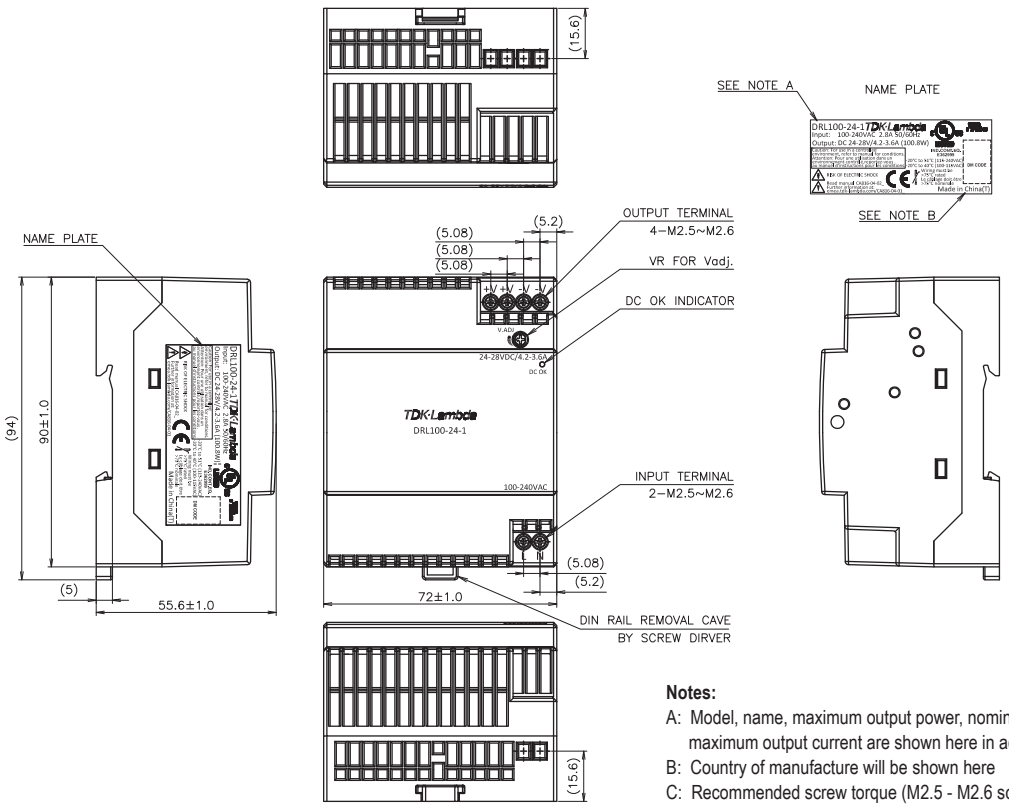
A: Model, name, maximum output power, nominal output voltage, maximum output current are shown here in accordance with the specifications

B: Country of manufacture will be shown here

C: Recommended screw torque (M2.5 - M2.6 screw): 0.56N•m (5.0 lb•inch)

D: Recommended wire: AWG12-24, wire strip length: 4-5mm, 5mm max

Outline Drawing DRL100-1



Notes:

A: Model, name, maximum output power, nominal output voltage, maximum output current are shown here in accordance with the specifications

B: Country of manufacture will be shown here

C: Recommended screw torque (M2.5 - M2.6 screw): 0.56N•m (5.0 lb•inch)

D: Recommended wire: AWG12-24, wire strip length: 4-5mm, 5mm max

Industrial Test

120W - 480W Single Output DIN Rail Mount Power Supplies

Features	Benefits
• High Efficiency	• Saves Energy & Cost
• Narrow Width	• More Space in Control Equipment
• Curve B, Conducted & Radiated EMI	• Easier System Integration
• Up to 7 Year eCap-Life	• Prolonged Lifetime Expectation

Specification

Model		DRB120-24-1	DRB240-24-1	DRB480-24-1	DRB480-48-1
Input Voltage Range	VAC	85 - 264 (withstands 300VAC for 5s)		90 - 264 (1)	
Input Frequency	Hz	47 - 63			
Inrush Current (Cold Start)	A	55A (Typical at 230VAC)		<40A (at 264VAC)	
Power Factor (115/230VAC) (2)	-	0.98 / 0.92		0.98 / 0.96	
Input Current (115/230VAC)	A	1.2 / 0.7 (115/230VAC)	2.4 / 1.4 (115/230VAC)	5 / 2.5 (115/230VAC)	
Leakage Current 264VAC 63Hz	mA	<1		<1.7	
Line Regulation	%	<0.1			
Load Regulation	%	<1			
Ripple and Noise	%	<1			
Temperature Coefficient	%/°C	<±0.02			
Overcurrent Protection	A	>6.06	>12.12	21 - 29	10.5 - 15
Overvoltage Protection (3)	V	30 - 35	30 - 35	30V ±2%	57V ±4%
Overtemperature Protection	-	Yes			
Hold Up Time	ms	20	20	>16	>16
No-load Power Consumption	W	<1	<1.5	<5	<5
Efficiency (120 / 230VAC)	%	See Model Selector			
Average efficiency (230VAC)	%	>87			
LED Indicator	-	Green LED = DC is OK			
DC OK Signal	-	Optocoupler; ON when Vout >80% of nominal output. 50V, 5mA maximum (20mA for DRB480)			
Operating Temperature	°C	DRB120/240: -25°C to +70°C. Start up at -40°C. (Derate linearly to 50% load from 55°C to 70°C) DRB480: -20°C to +70°C. Start up at -40°C. (Derate linearly to 62.5% load from 50°C to 70°C)			
Storage Temperature	°C	-40°C to +85°C			
Humidity (non condensing)	% RH	5 - 95%RH (Operating and storage)			
Parallel operation	-	No			
Series operation (4)	-	Yes			
Cooling	-	Convection			
Withstand Voltage (for 1 minute)	VAC	Input to Output 3kVAC, Input to GND 1.5kVAC, Output to GND 500VAC			
Isolation Resistance	MΩ	>100MΩ at 25°C, 70%RH & 500VDC			
Vibration (Non operating)	-	120/240W: 2G, 10 to 55Hz, 480W: 2G, IEC 60068-2-6, 10 to 500Hz			
Shock	-	120/240W: 20G, IEC 60068-2-27, half-sine, 22ms, 3 x each axis on DIN rail, 480W: 5G			
Safety agency certifications	-	UL508, IEC/EN/UL/CSA60950-1, CE Mark (LVD, EMC, RoHS2) In addition, for the DRB120 & 240: 120/240W: EN/UL/CSA62368-1, IEC/EN62477-1 OVC III (CB Report)			
Conducted & radiated EMI	-	EN55011-B, EN55032-B, CISPR11-B, CISPR22-B, EN61204-3 Class A			
Immunity	-	EN61000-4-2 (lvl 3), -3 (lvl 3), -4 (lvl 3), -5 (lvl 3), -6 (lvl 3), -8 (lvl 4), -11			
Line dips	-	SEMI -F47 (200VAC input)			
Weight (typ)	g	500	750	1000	1000
Size (W x H x D)	mm	35 x 124 x 125	41 x 124 x 125	84 x 124 x 125	
Case material	-	Metal			
Warranty	yrs	3			

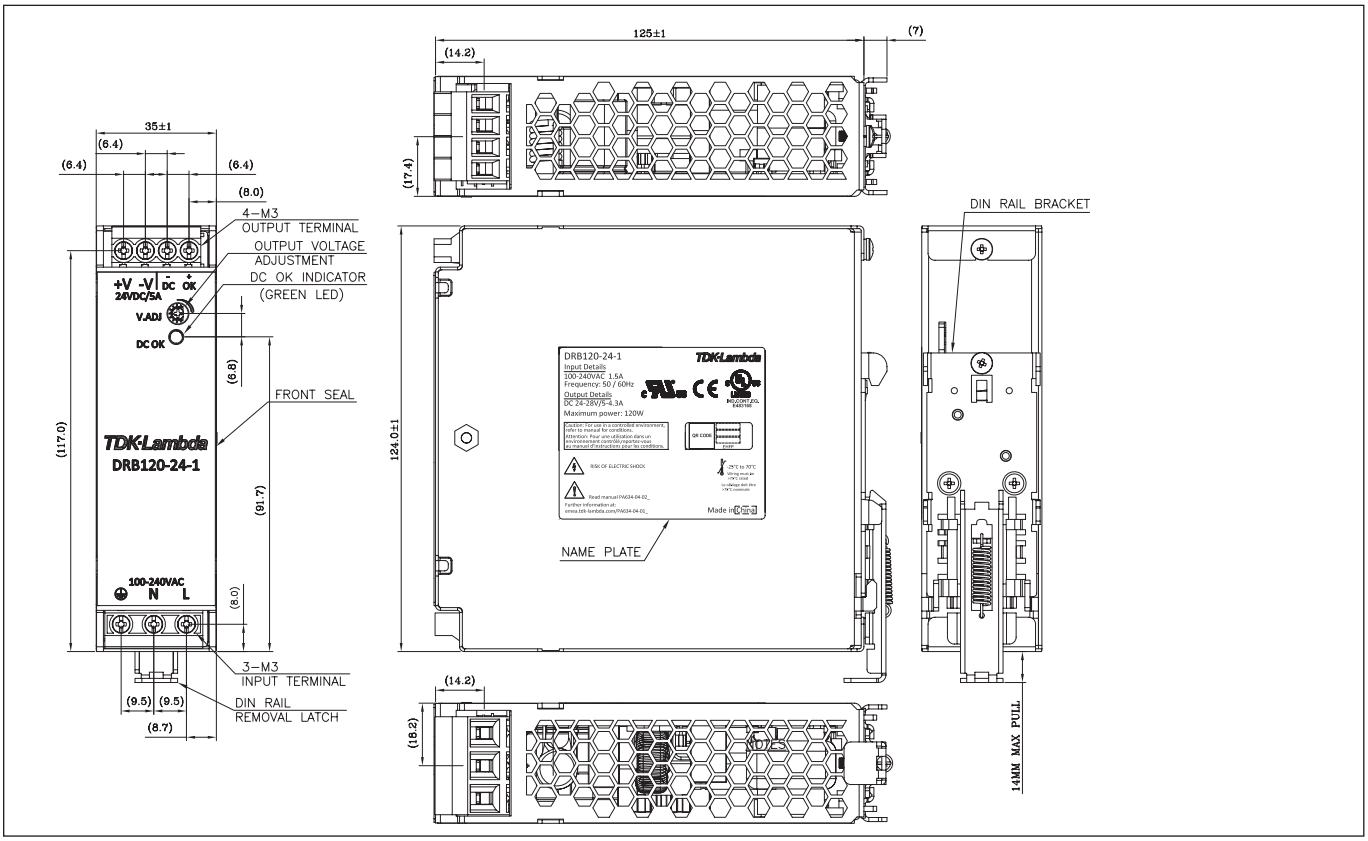
Notes: **(1)** Derate linearly to 92.5% load from 100 to 90VAC **(2)** EN61000-3-2 Class A **(3)** Cycle input voltage to reset **(4)** See installation manual

Model Selector

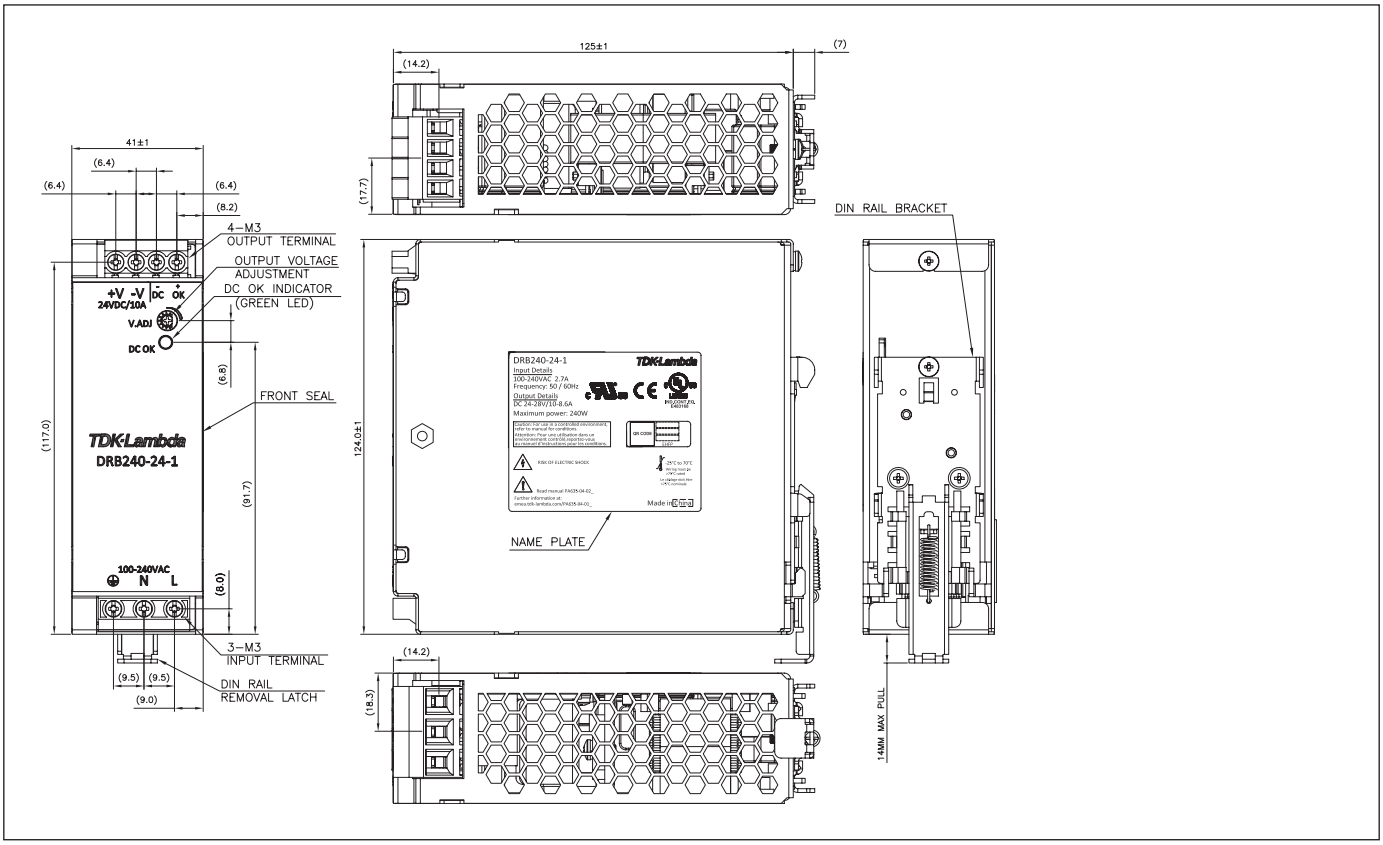
Model	Output Voltage (V)	Output Adjust Range (V)	Max Output Current (A)	Max Output Power (W)	Peak Output Current (5)	Peak Output Power (5)	Efficiency (120 / 230VAC)
DRB120-24-1	24V	24 - 28V	5A	120W	6A	144W	91 / 93% (Typ)
DRB240-24-1	24V	24 - 28V	10A	240W	12A	288W	91 / 93% (Typ)
DRB480-24-1	24V	24 - 26.4V	20A	480W	-	-	>90 / 92%
DRB480-48-1	48V	48 - 52.8V	10A	480W	-	-	>90 / 92%

Notes: (5) <10s, Duty Cycle < 35%

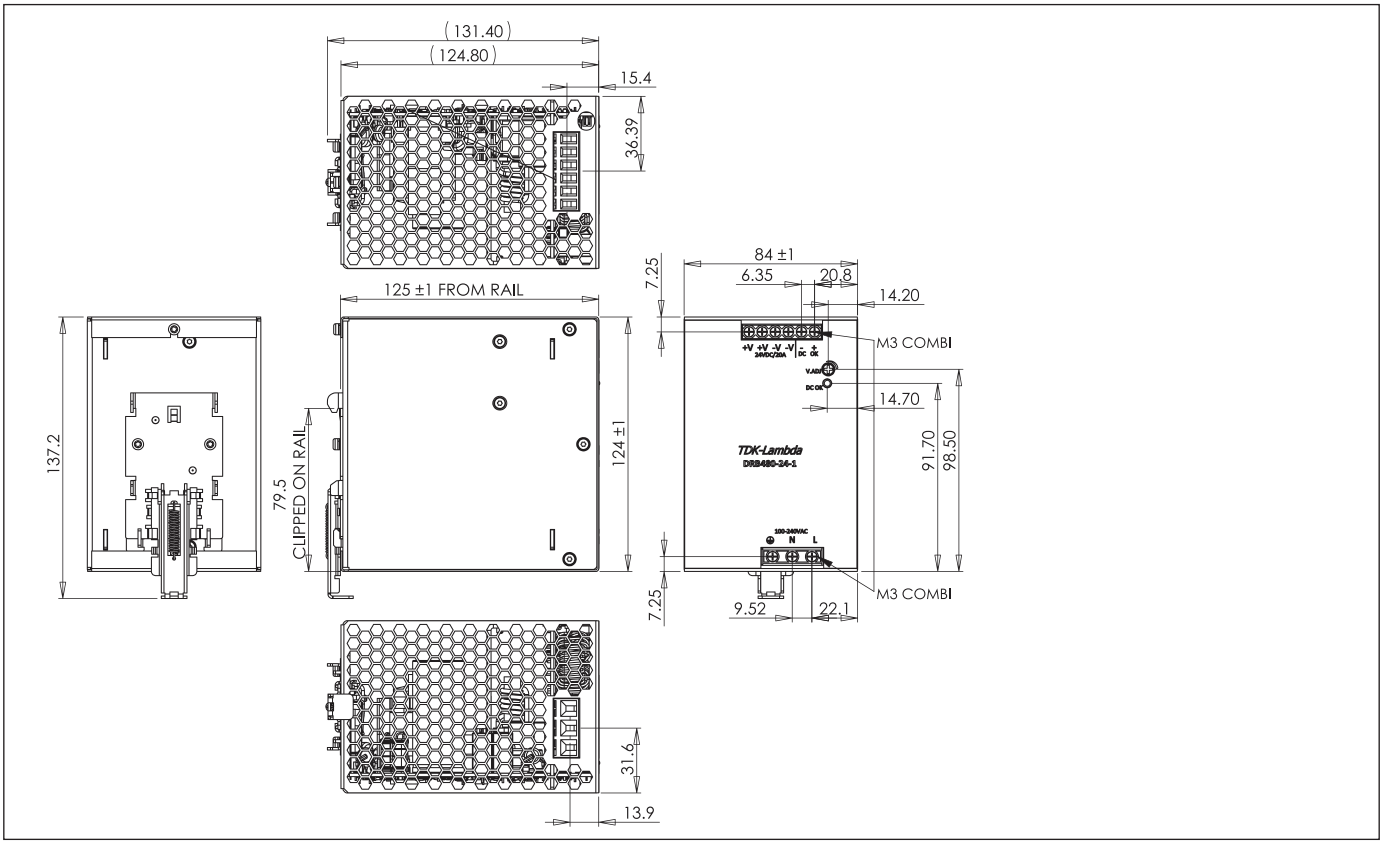
Outline Drawing DRB120



Outline Drawing DRB240



Outline Drawing DRB480



- Low Profile for Building Automation
- 5V to 24V Outputs
- Wide Range AC Input
- -25°C to +71°C Operation
- Convection Cooled
- UL1310 Class 2
- Class II Double Insulation

DSP Series

7.5W to 100W Low Profile Din Rail Mount Power Supplies

Key Market Segments & Applications

Building Services Automation:	Alarms and Security, Access and Fire Safety Systems, Lighting and Environment Control Systems.

DSP Features and Benefits

Features	Benefits
• Low 56mm Profile	• Fits into wall mounted cabinets
• Wide Range AC	• Global use with no input selector switches
• Convection cooled	• No system fan required

Specifications

ITEMS / MODEL		DSP10	DSP30	DSP60	DSP100
AC Input Voltage range	VAC	90 - 264VAC, Class II double insulated (No ground connection required)			
Input Frequency	Hz	47 - 63Hz			
DC Input Voltage range	VDC	120 - 370VDC			
Inrush Current (115 / 230VAC)	A	15 / 30A	25 / 50A	30 / 60A	30 / 60A
Power Factor		Meets EN61000-3-2, EN61000-3-3			
Output Voltage Accuracy	%	±1% of Nominal			
Line Regulation	%	1%			
Load Regulation	%	1%			
Ripple and Noise (20MHz BW)	mV	50mV(1)			
Overcurrent Protection (Typ)	-	110 - 160%, fold forward under short circuit (DSP100-24/C2 102-108%)			
Overvoltage Protection	V	120 - 145%			
Hold Up Time (115VAC input)	ms	See Model Selector			
LED Indicators	-	Green LED = On, Red LED = DC Output Low			
Operating Temperature	-	-25 to +71°C (Derate linearly 2.5%/°C from 55 to 71°C)			
Temperature Coefficient	%/°C	±0.02%/°C			
Storage Temperature	-	-25°C to +85°C			
Operating Humidity	-	20 - 95% RH (non condensing)			
Cooling	-	Convection			
Withstand Voltage	-	Input to Output 3kVAC for 1 min.			
Isolation Resistance	Ω	>100MΩ at 25°C & 70%RH, Input to Ground 500VDC			
Vibration *		IEC60068-2-6 (Mounting by rail: Random wave, 100-500Hz, 2G, ea. along X, Y, Z axes 10min/cycle, 60 min)			
Shock **		IEC60068-2-27 (Half sine wave, 4G, 22ms, 3 axes, 6 faces, 3 times for each face)			
Safety Agency Approvals (3)	-	UL1310 Class 2(2), UL508 Listed, UL60950-1, EN60950-1, CE			
Immunity	-	EN61000-4-2, -3, -4, -5, -6, -8 & -11			
Conducted & Radiated EMI	-	EN55022 class B	EN55022 class A		
Weight (Typ)	g	60	200	250	320
Size (WxHxD)	mm	18 x 91 x 55.6	53 x 91x 55.6	71 x 91 x 55.6	90 x 91 x 56.8
Case material	-	Plastic			
Warranty	yrs	3			

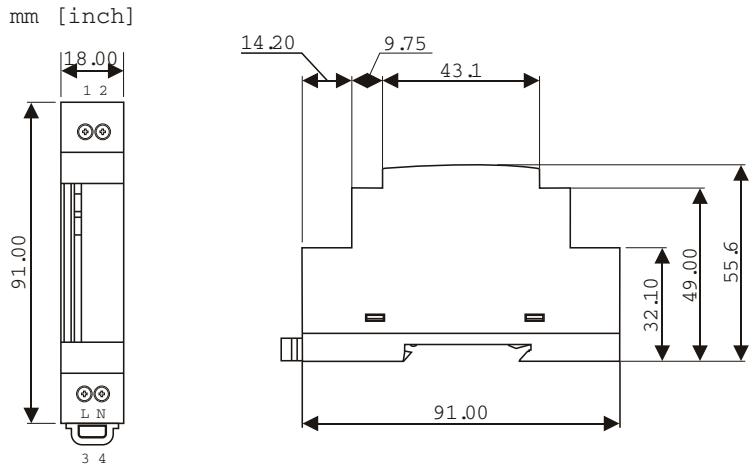
Note 1: For DSP100-24/C2 Ripple & Noise measured with Vin 115- 230 Vac. **Note 2:** Excludes Models: DSP60-5, DSP100-12, DSP100-15, DSP100-24

Note 3: Consult Sales Office for use under DC Input conditions. * (tested on the rail) ** (tested off the rail)

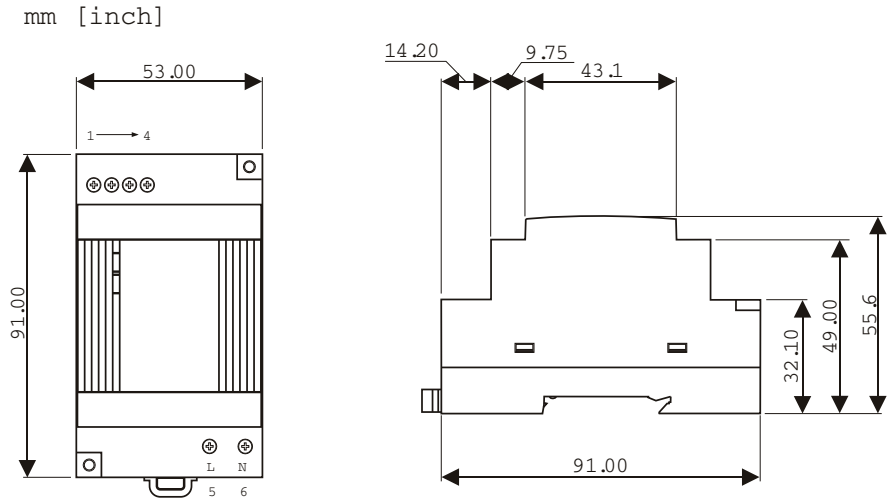
Model Selector

Model	Voltage (V)	Voltage Adjust (V)	Current (A)	Power (W)	Efficiency (Typ %)	HoldUp Time 115VAC in (ms)
DSP10-5	5	None	1.5	7.5	74	10
DSP30-5	5	5 - 5.5	3.0	15.0	74	25
DSP60-5	5	5 - 5.5	7.0	35.0	80	16
DSP10-12	12	None	0.83	10.0	78	10
DSP30-12	12	12 - 14	2.1	25.2	82	25
DSP60-12	12	12 - 14	4.5	54.0	84	16
DSP100-12	12	12 - 14	6.0	72.0	82	16
DSP10-15	15	None	0.67	10.1	78	60
DSP30-15	15	13.5 - 16.5	2.0	30.0	83	25
DSP60-15	15	13.5 - 16.5	4.0	60.0	85	12
DSP100-15	15	13.5 - 16.5	5.0	75.0	85	16
DSP10-24	24	None	0.42	10.1	80	60
DSP30-24	24	24 - 28	1.3	31.2	83	25
DSP60-24	24	24 - 28	2.5	60.0	86	12
DSP100-24/C2	24	20 -24.2	3.8	91.2	89	10
DSP100-24	24	24 - 28	4.2	100.8	85	10

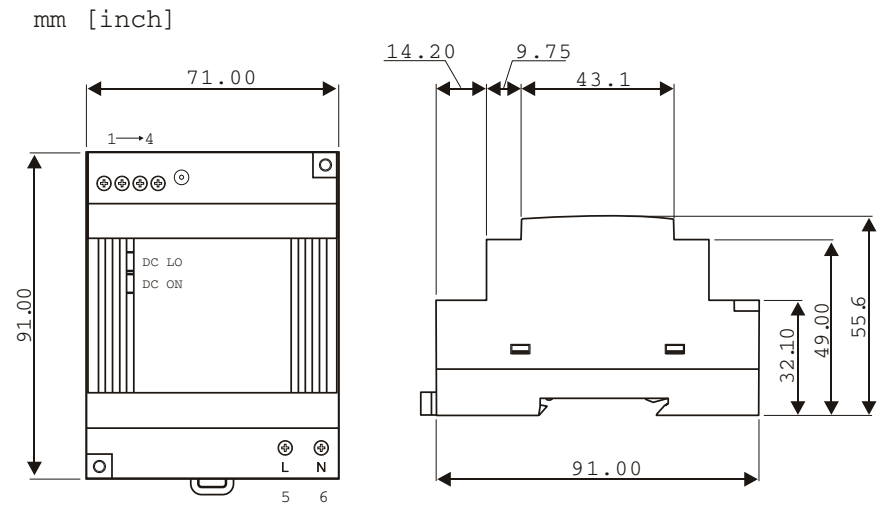
Outline Drawing DSP10 Series



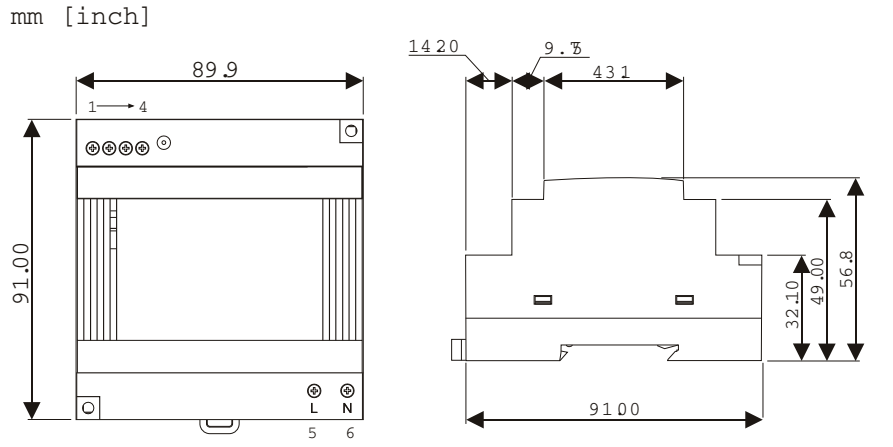
Outline Drawing DSP30 Series



Outline Drawing DSP60 Series



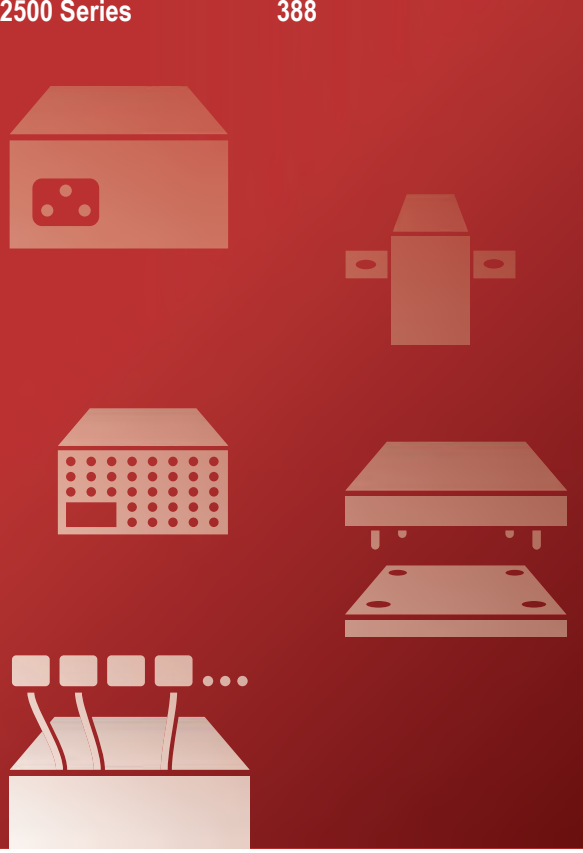
Outline Drawing DSP100 Series



AC-DC Power Supplies

Index

FPS1000 Series 379
HFE1600 Series 382
HFE2500 Series 388



Rack mount

Applications

- High reliability applications with n+1 redundancy
- High power applications for cabinet mounting
- Broadcast, RF-amplifiers, Telecoms

Features

- 19” rack with hot-swap power modules – up to 10kW in 1U
- Modules have integrated ORing MOSFETs for redundant operation
- Individual IEC connectors or terminal blocks for mains input
- Parallel operation between racks with active current sharing for higher output power levels
- 12V, 24V, 32V and 48V supplies for bus-voltages in distributed power architecture and other applications
- Optional PM-bus I²C interface for status monitoring and control

- 1U High
- Up to 3000W (3 units) in 19" Rack
- Hotswap capable (Oring Diodes Built In)
- Low Cost
- PoE Option

FPS1000 Series

1000W Front End Power Supplies

Key Market Segments & Applications

Power for Distributed Power Architecture
Factory Automation
RF Amplifiers

FPS Features and Benefits

Features	Benefits
• 1U High	• Lower Cost of Ownership
• Hotswap capable	• Suitable for N+1 Redundancy
• High Efficiency	• Less Heat Dissipated in System
• Full Array of Signals	• Easier System Monitoring

Specifications

ITEMS / MODELS			12V Nominal	24V Nominal	32V Nominal	48V Nominal
Output Voltage Range	(1)	V	10.5 - 13.2V	21.5 - 29V	28.8 - 38.4V	43 - 58V
Output Current		A	72A	40A	31A	21A
Line Regulation		-	<0.4%			
Load Regulation		-	<0.8%			
Output Noise		mV	150mV	200mV	250mV	300mV
Overvoltage Protection		V	14.3 to 15.7V	31 to 34V	41.5V to 45.5V	62 to 66V
Overcurrent Protection		-	105 - 125%, Constant Current type			
Load Sharing		-	Single wire current sharing, up to 8 units			
Remote Sense		-	Compensates for 1V on each output lead			
I²C Monitoring		-	Optional (Specify /S)			
Signals (opto isolated)		-	DC OK, AC Fail, and Over temperature warning, high on fail			
Remote On/Off		-	On: 0 - 0.6V or short, Off: 2- 15V or open			
Auxiliary Output		-	11.2-12.5VDC 0.25A			
AC Input	(2)	-	85 - 265VAC, 47 - 63Hz² (Derate 10% < 100VAC)			
Leakage Current		mA	<1.1mA at 230VAC input			
Inrush Current		A	<40A			
Hold up time (100VAC input)		-	20ms typical (at 80% rated load)			
Efficiency (typ) 100/200VAC		-	81 / 83%	84 / 86%	84 / 86%	85 / 88%
Power Factor Correction		-	EN61000-3-2 class A (20-100% load), >0.98 at full load			
Immunity		-	EN61000-4-2, -3, -4, -5, -6, -11			
EMC (conducted and radiated)		-	EN55022, level B, FCC Class B			
Operating Temperature		°C	0°C to +70°C, derate 2%/°C from 50°C to 60°C, 2.5%/°C from 60°C to 70°C			
Storage Temperature		°C	-30°C to +85°C			
Withstand Voltage		-	Input to Output 3kVAC, Input to Ground 2kVAC, Output to Ground 500VAC for 1 min.			
Cooling		-	Two internal fans, airflow from front to back (variable speed)			
Humidity		-	Operating: 10 - 90% RH, Storage: 10 - 95% RH (non condensing)			
Shock & Vibration		-	Built to meet ETS 300 019			
Safety Agency		-	UL60950-1, EN60950-1, CE Mark			
Input / Output Connector		-	Positronic PCIB24W9M400A1 (Mating #PCIB24W9F400A1)			
Front panel indicators		-	AC OK, DC OK, DC Fail			
Size (HxWxL)		mm	Stand alone: 41 x 127 x 290; Rack: 44 x 400 x 351			
Weight		g	2,000			
Warranty		yr	2			

Note 1 Via Trim pin on output connector

Note 2 47-440Hz with reduced PFC (100-265VAC)

Model Selector

Front AC Input Panel Configuration	Output Voltage	Output Current	Max Power	I²C Interface
FPS100012/P	12V	72A	864W	No
FPS100012/PS	12V	72A	864W	Yes
FPS100024/P	24V	40A	960W	No
FPS100024/PS	24V	40A	960W	Yes
FPS100032/P	32V	31A	992W	No
FPS100032/PS	32V	31A	992W	Yes
FPS100048/P	48V	21A	1008W	No
FPS100048/PS	48V	21A	1008W	Yes
FPSS1U/P	Rack (3 slot), contains two blanking panels			
FPST1U/P	Rack with 3 individual outputs (floating)			

Rear AC Input Panel Configuration	Output Voltage	Output Current	Max Power	I²C Interface
FPS100012	12V	72A	864W	No
FPS100012/S	12V	72A	864W	Yes
FPS100024	24V	40A	960W	No
FPS100024/S	24V	40A	960W	Yes
FPS100032	32V	31A	992W	No
FPS100032/S	32V	31A	992W	Yes
FPS100048	48V	21A	1008W	No
FPS100048/S	48V	21A	1008W	Yes
FPSS1U	Rack (3 slot), contains two blanking panels			
FPST1U	Rack with 3 individual outputs (floating)			

Options

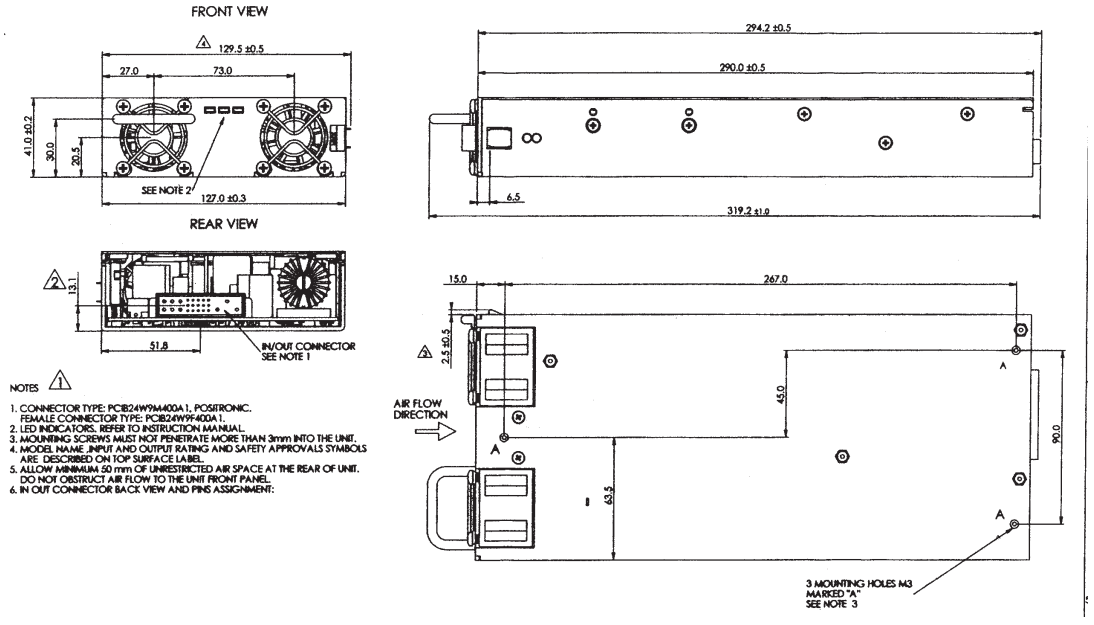
Suffix	Description
/POE*	1500VAC Output to Ground Isolation (output noise 400mV)

*FPS100048 only

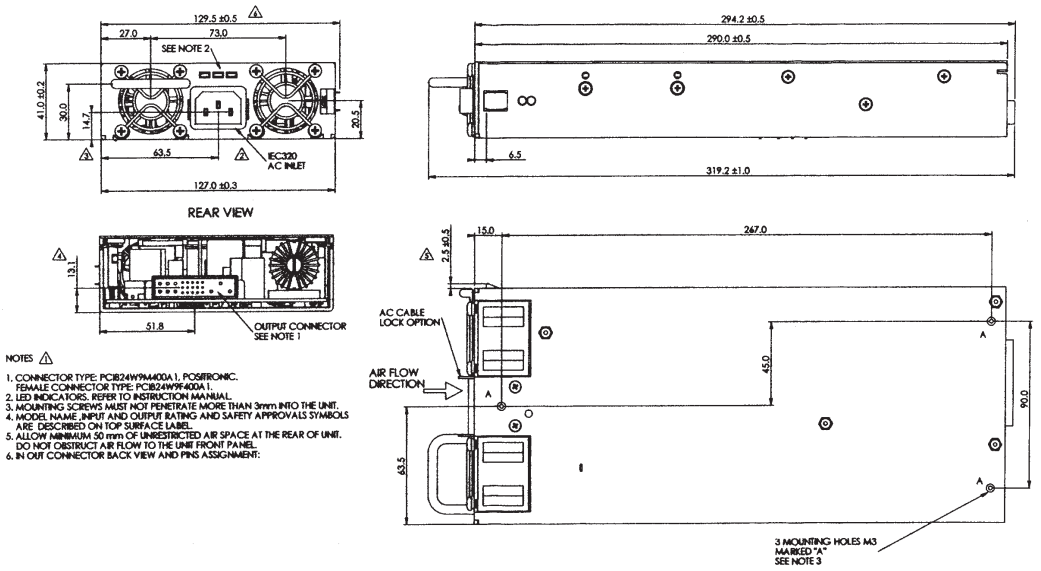
Full System (3 Modules & FPS s1U rack)

FPS3000 -	XX	/ X	
	12	BLANK	= Standard
	24	S	= I²C
	32	P	= FRONT AC INPUT
	48		

Outline Drawing FPS1000 Series

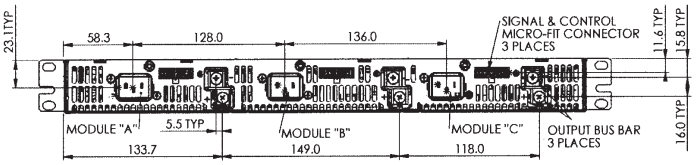


Outline Drawing FPS1000/P Series

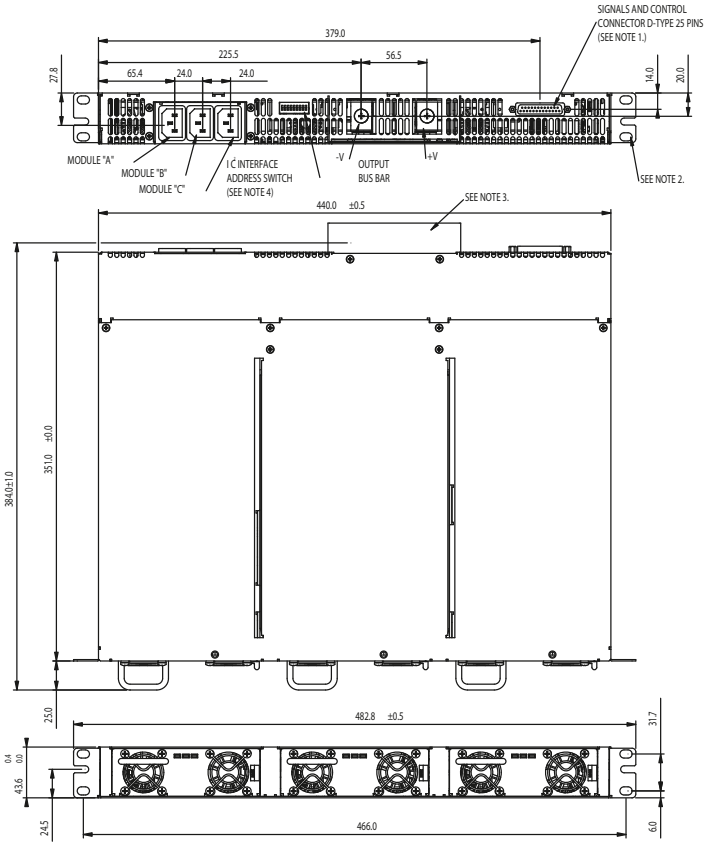


Outline Drawing FPS Racks

FPST1U Rear View



FPSS1U



- 25.2W/in^3 power density
- Internal ORing MOSFET & Current Share
- Climate Savers Computing efficiency standards
- Up to 8000W in 1U rack
- Single and dual output 1U racks
- PMBus™ (I^{2}C) and LAN options

HFE1600 Series

1600W 1U Hot Swap Front End Power Supplies

Key Market Segments & Applications

Power for Distributed Power Architecture
Industrial Automation

HFE1600 Features and Benefits

Features	Benefits
• 1U high	• Utilizes less system space
• Internal ORing MOSFET & Current Share	• Suitable for N+1 redundancy
• Status monitoring signals	• Easier system monitoring including PMBus™ and LAN

Specifications

ITEMS / MODELS			
Input Voltage Range	(2)	VAC	85 - 265VAC, 47 - 63Hz. See model selector for power derating
Input Current (Max) 100/230VAC		A	12.4 / 8.1A
Inrush Current		A	<35A
Power Factor Correction		-	Meets EN61000-3-2, PF > 0.98 at full load
Temperature Coefficient		%/°C	<0.02%/°C
Overcurrent Protection		%	105 - 120%
Overvoltage Protection	(1)	%	110% (Tracking). Cycle AC to reset or utilize Remote On/Off
Overtemperature Protection	(1)	-	Shutdown with automatic restart. Warning signal provided
Hold up time		ms	>10ms, 100/230VAC Input, 80% loading
Leakage Current		mA	< 0.75 / 1.5mA 100/230VAC, 60Hz
Remote Sense Compensation		-	HFE1600-12: 0.25V/wire, HFE1600-24: 0.5V/wire, HFE1600-32: 0.75V/wire, HFE1600-48: 1V/wire
Indicators		-	AC OK: Green LED, DC OK / Fail: Green / Red LED
Remote On/Off		-	Unit ON: 0 - 0.6V or short, OFF: 2 - 15V or open circuit
Parallel Operation		-	Yes, single wire current share, 90% accuracy, up to 10 units
AC Fail Signal		-	Open Collector, ON when AC is within 85 - 270VAC
DC Good Signal		-	Open Collector, ON when output is above 85 to 95% of setpoint (tracking)
Remote Adjust	(1)	-	By either external 0 - 5V signal or 1k potentiometer
I^{2}C Interface	(1)	-	Isolated from output, Add suffix /S, PMBus compatible
Auxiliary Output		-	11.2 - 12.5V, 0.5A, 240mV ripple and noise
Operating Temp. (-TB Rack)		°C	-10°C to +70°C, derate 2%/°C from 50°C to 60°C, 2.5%/°C from 60°C to 70°C
Operating Temp. (-IEC320 Rack)		°C	-10°C to +60°C, derate 2%/°C from 50°C to 60°C
Storage Temperature		°C	-30°C to +85°C
Humidity (Non condensing)		%RH	Operating: 10 - 90%RH, Storage: 10 - 95%RH
Cooling		-	Two variable speed internal fans, airflow exits across input/output connector
Withstand Voltage		-	I/P to O/P 3kVAC, I/P to Ground 2kVAC, O/P to Ground: HFE1600-12, -24V 500VAC, HFE1600-48 1.5kVAC
Isolation Resistance		Ω	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC
Vibration (Basic transportation)		-	Meets IEC61068-2-64
Shock (Basic transportation)		-	Meets IEC61068-2-27
Safety Agency Certifications		-	UL60950-1, EN60950-1, CE Mark
Line Dip		-	Complies with SEMI F47 (200VAC line only)
Conducted and Radiated EMI		-	EN55022 & FCC part 15; Conducted class B, Radiated class A
Immunity		-	IEC61000-4-2 (lv 2,3), -3 (lv 2), -4 (lv2), -5 (lv3,4), -6 (lv2), -8 (lv 4), -11
Size (W x H x D)		mm	Power Supply: 85 x 41 x 300, Rack: 445 x 44 x 365
Weight		g	Power Supply: 1550g, Rack: 4800g
Warranty		yrs	3

(1) See installation manual for detailed specifications & test methods **(2)** Derate output power linearly 1%/V from 100VAC to 85VAC input

Model Selector

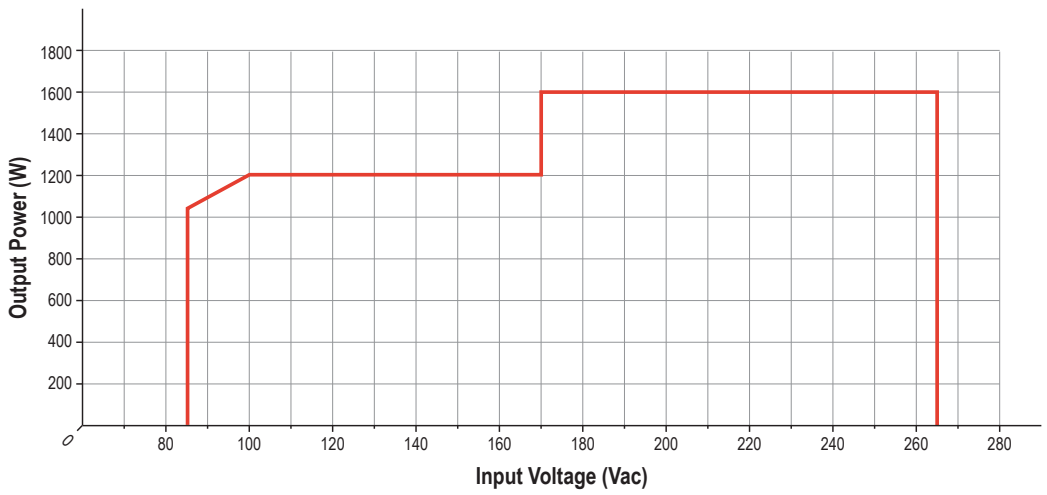
Model	Output Voltage	Adjust Range (1)	Max Current (Vin>170VAC)(2)	Max Power (Vin>170VAC)(2)	Max Current (100<Vin<170VAC)(2)	Max Power (100<Vin<170VAC)(2)
HFE1600-12	12V	9.6 - 13.2V	133A	1596W	100A	1200W
HFE1600-12/S	12V	9.6 - 13.2V	133A	1596W	100A	1200W
HFE1600-24	24V	19.2 - 29V	67A	1608W	50A	1200W
HFE1600-24/S	24V	19.2 - 29V	67A	1608W	50A	1200W
HFE1600-32	32V	25.6 - 38.4V	47A	1504W	37.5A	1200W
HFE1600-32/S	32V	25.6 - 38.4V	47A	1504W	37.5A	1200W
HFE1600-48	48V	38.4 - 58V	33A	1584W	25A	1200W
HFE1600-48/S	48V	38.4 - 58V	33A	1584W	25A	1200W

Model	Load Reg	Line Reg	Ripple & Noise	Efficiency (%)(3)	I²C
HFE1600-12	60mV	30mV	240mV	87 / 90%	-
HFE1600-12/S	60mV	30mV	240mV	87 / 90%	Yes
HFE1600-24	120mV	60mV	240mV	88 / 90%	-
HFE1600-24/S	120mV	60mV	240mV	88 / 90%	Yes
HFE1600-32	160mV	80mV	320mV	88 / 90%	-
HFE1600-32/S	160mV	80mV	320mV	88 / 90%	Yes
HFE1600-48	240mV	120mV	480mV	89 / 92%	-
HFE1600-48/S	240mV	120mV	480mV	89 / 92%	Yes

(3) At 75% load, 100 / 230VAC input

Rack and Accessories

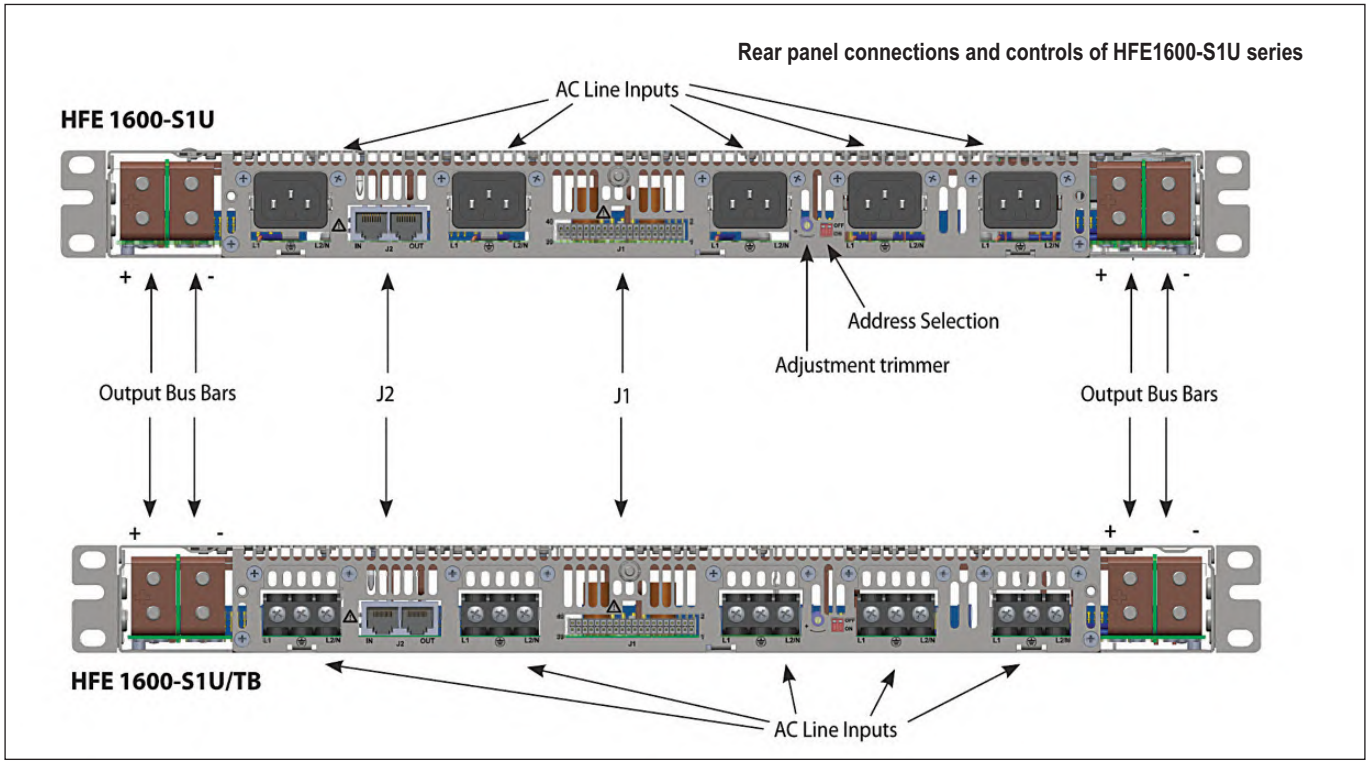
Model	Description	Maximum Rack Current
HFE1600-S1U	Five slot 19" rack, IEC320 input connectors (5)	266A per side (532A total)
HFE1600-S1U-TB	Five slot 19" rack, Terminal Block input connectors (5)	266A per side (532A total)
HFE1600/BP	One slot blanking panel, four provided with each rack	
HFE1600-D1U	Four slot (two isolated pairs), dual output 19" rack, IEC320 input connectors (4)	266A per side
HFE1600-D1U-TB	Four slot (two isolated pairs), dual output 19" rack, Terminal Block input connectors (4)	266A per side
HFE1600-LAN	Plug in LAN module. Takes up one rack slot. For use with /S models only	



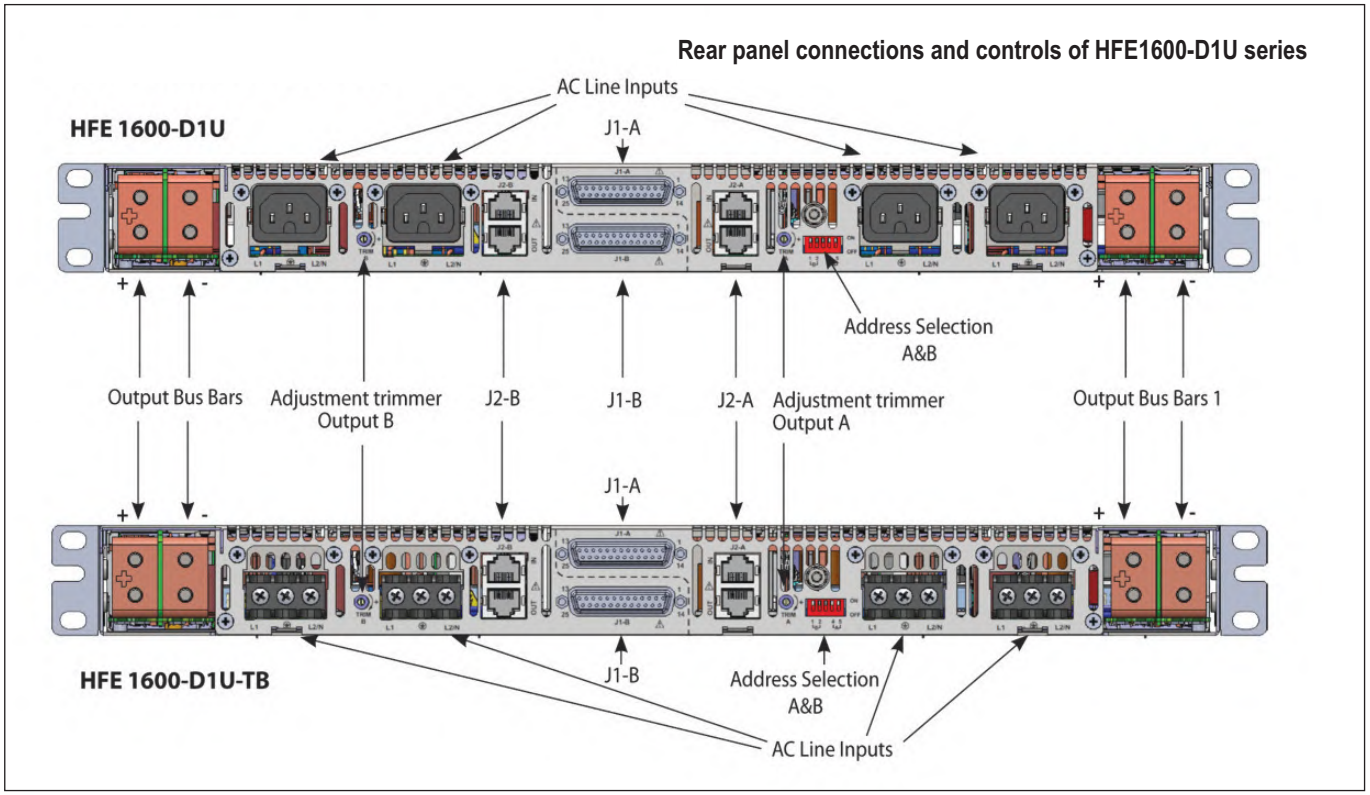
HFE 1600 Power Derating v's Input Voltage

Available Rack Types

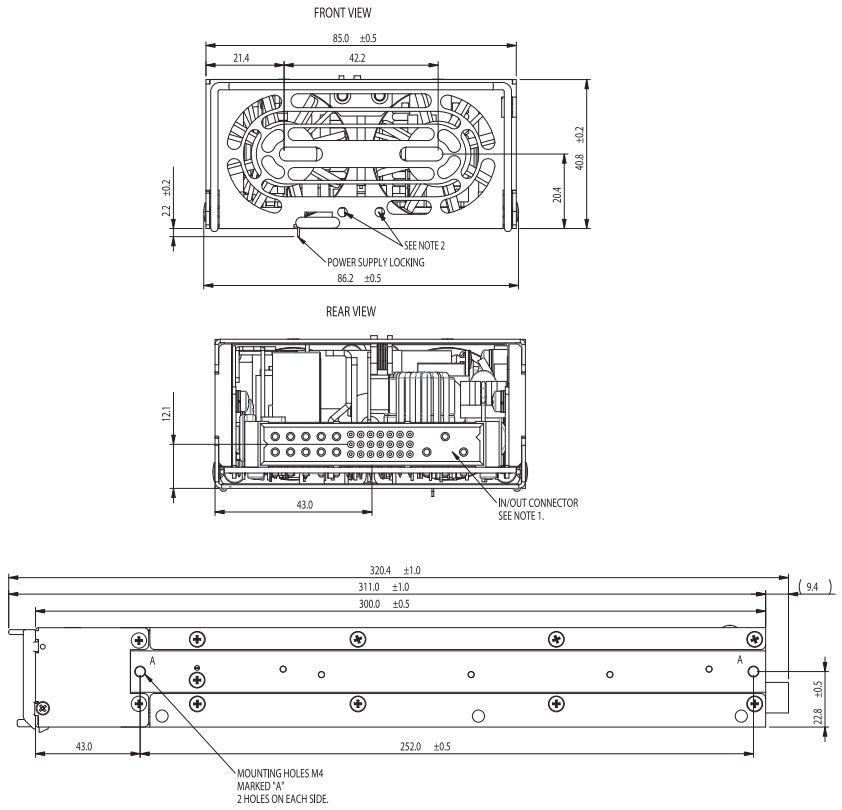
HFE1600-S1U - Five slot 19' rack single common output



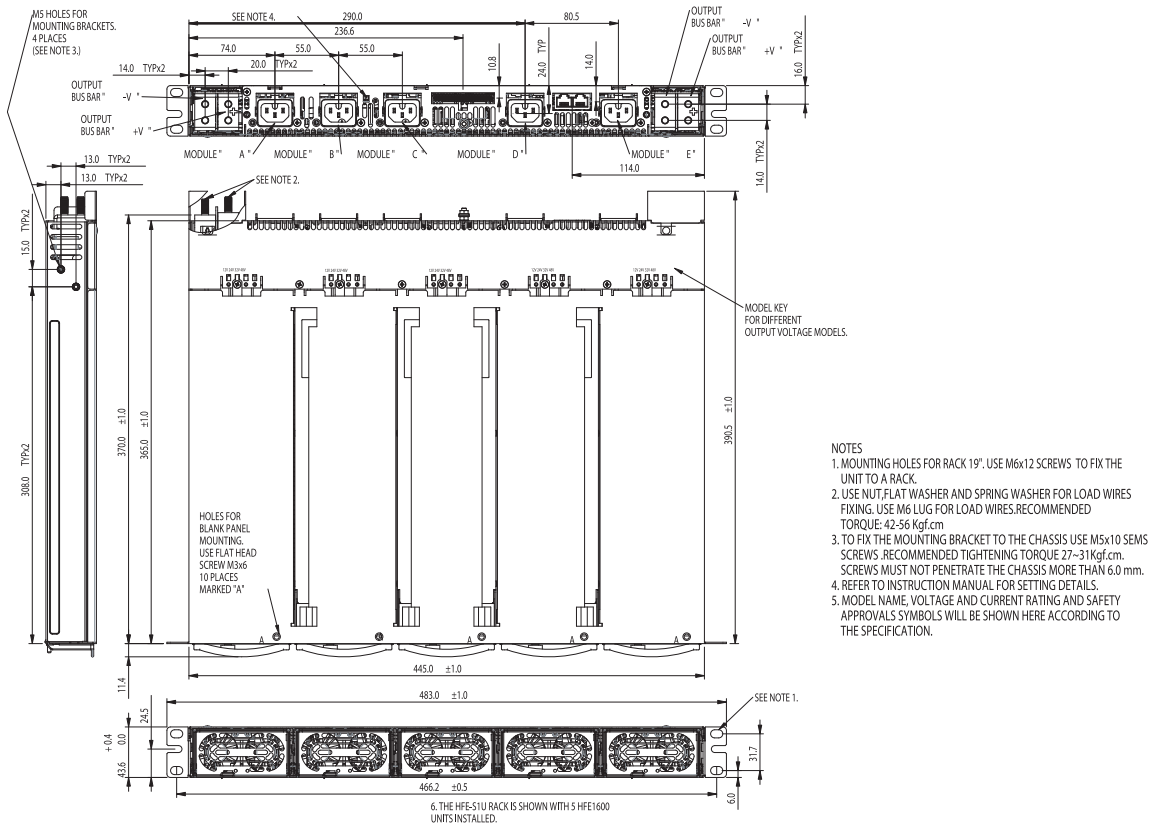
HFE1600-D1U - Four slot (two isolated pairs), dual output 19' rack



Outline Drawing HFE1600 Series

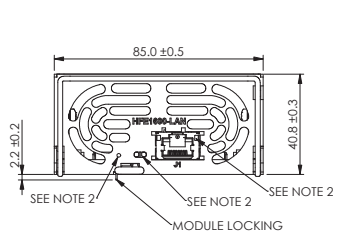


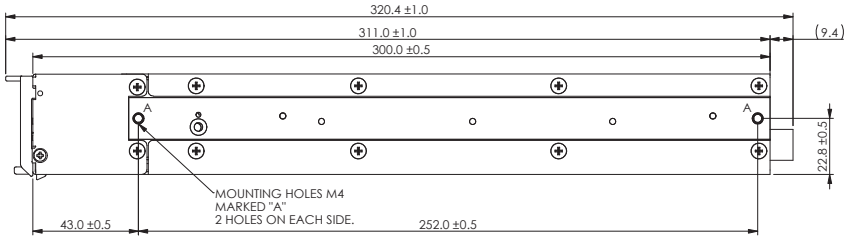
Outline Drawing HFE1600S1U Series



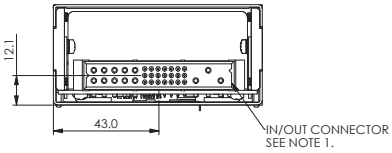
NOTES
1. MOUNTING HOLES FOR RACK 19". USE M6x12 SCREWS TO FIX THE UNIT TO A RACK.
2. USE NUT,FLAT WASHER AND SPRING WASHER FOR LOAD WIRES FIXING. USE M6 LUG FOR LOAD WIRES.RECOMMENDED TORQUE: 42-56 Kgf.cm
3. TO FIX THE MOUNTING BRACKET TO THE CHASSIS USE M5x10 SEMS SCREWS .RECOMMENDED TIGHTENING TORQUE 27~31Kgf.cm. SCREWS MUST NOT PENETRATE THE CHASSIS MORE THAN 6.0 mm.
4. REFER TO INSTRUCTION MANUAL FOR SETTING DETAILS.
5. MODEL NAME, VOLTAGE AND CURRENT RATING AND SAFETY APPROVALS SYMBOLS WILL BE SHOWN HERE ACCORDING TO THE SPECIFICATION.

Outline Drawing HFE1600- LAN

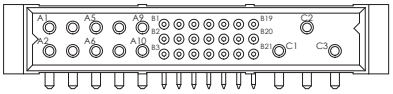


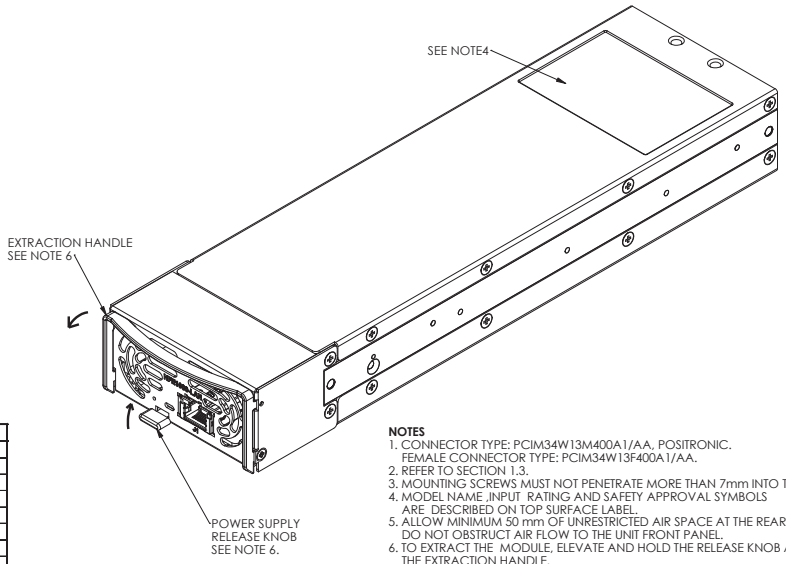


REAR VIEW



IN/OUT CONNECTOR REAR VIEW

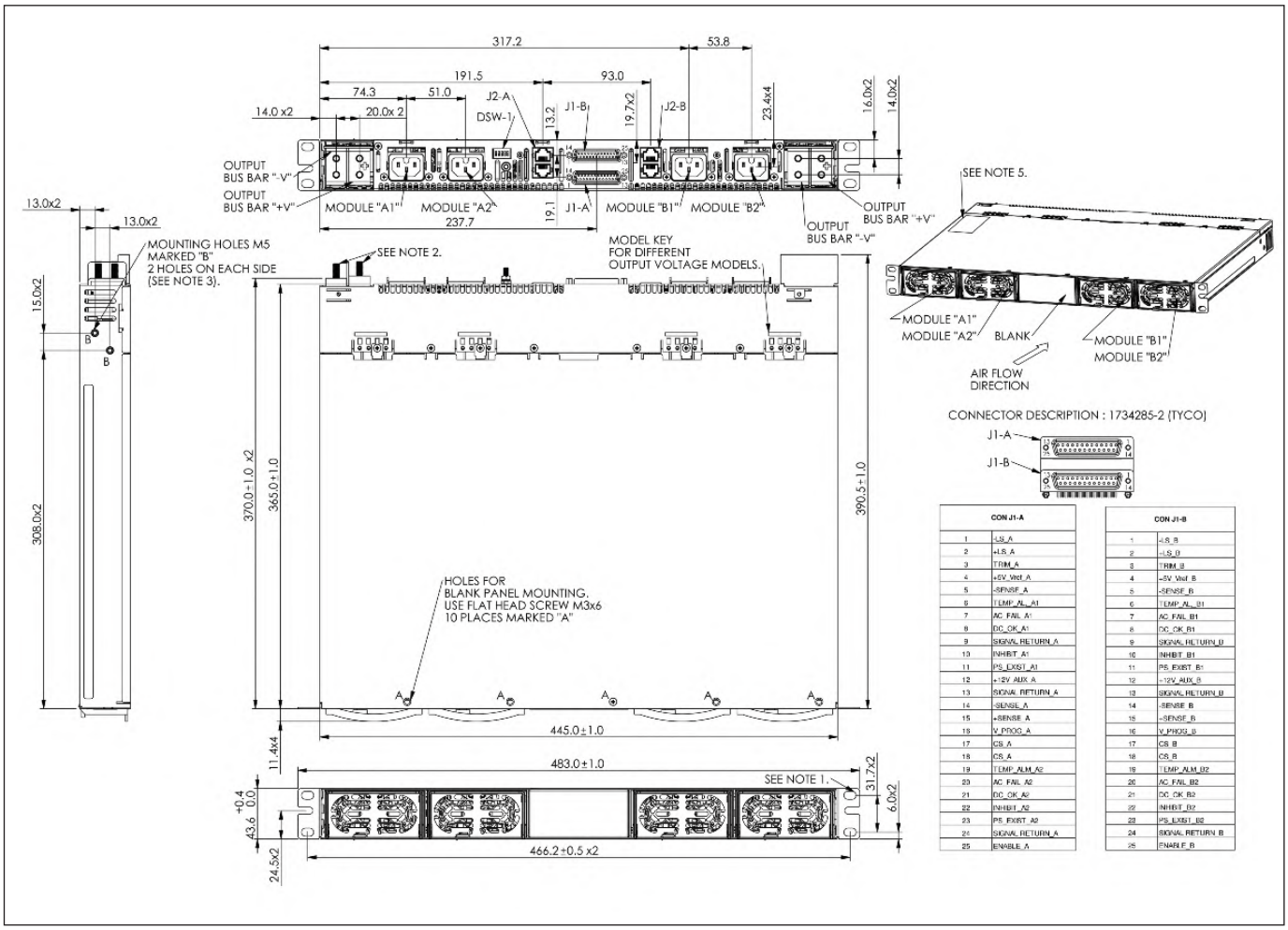




PIN No	FUNCTION	PIN No	FUNCTION
A1 ~ A5	NC	B12	NC
A6 ~ A10	NC	B13	SCL (SERIAL CLOCK)
B1	SIGNAL RETURN	B14	NC
B2	MODULE EXIST	B15	NC
B3	+12V_AUX_IN	B16	NC
B4	NC	B17	SDA (SERIAL DATA)
B5	NC	B18	NC
B6	NC	B19	NC
B7	NC	B20	SMB_ALERT
B8	NC	B21	NC
B9	NC	C1	NC
B10	NC	C2	NC
B11	NC	C3	NC

NOTES
1. CONNECTOR TYPE: PCIM34W13M400A1/AA, POSITRONIC.
   FEMALE CONNECTOR TYPE: PCIM34W13F400A1/AA.
2. REFER TO SECTION 1.3.
3. MOUNTING SCREWS MUST NOT PENETRATE MORE THAN 7mm INTO THE UNIT.
4. MODEL NAME ,INPUT RATING AND SAFETY APPROVAL SYMBOLS
   ARE DESCRIBED ON TOP SURFACE LABEL.
5. ALLOW MINIMUM 50 mm OF UNRESTRICTED AIR SPACE AT THE REAR OF UNIT.
   DO NOT OBSTRUCT AIR FLOW TO THE UNIT FRONT PANEL.
6. TO EXTRACT THE MODULE, ELEVATE AND HOLD THE RELEASE KNOB AND PULL
   THE EXTRACTION HANDLE.

Outline Drawing HFE1600 D1U Series



CON J1-A	
1	-LS_A
2	+LS_A
3	TRIM_A
4	+5V_Vlot_A
5	-SENSE_A
6	TEMP_AL_A1
7	AC FAIL A1
8	DC_OK_A1
9	SIGNAL RETURN_A
10	INHIBIT_A1
11	PS_EXIST_A1
12	+12V AUX_A
13	SIGNAL RETURN_A
14	-SENSE_A
15	+SENSE_A
16	V_PROG_A
17	CS_A
18	CS_A
19	TEMP_ALM_A2
20	AC FAIL A2
21	DC_OK_A2
22	INHIBIT_A2
23	PS_EXIST_A2
24	SIGNAL RETURN_A
25	ENABLE_A

CON J1-B	
1	-LS_B
2	+LS_B
3	TRIM_B
4	+5V_Vlot_B
5	-SENSE_B
6	TEMP_AL_B1
7	AC FAIL B1
8	DC_OK_B1
9	SIGNAL RETURN_B
10	INHIBIT_B1
11	PS_EXIST_B1
12	+12V_AUX_B
13	SIGNAL RETURN_B
14	-SENSE_B
15	+SENSE_B
16	V_PROG_B
17	CS_B
18	CS_B
19	TEMP_ALM_B2
20	AC FAIL B2
21	DC_OK_B2
22	INHIBIT_B2
23	PS_EXIST_B2
24	SIGNAL RETURN_B
25	ENABLE_B

Notes:

1. Mounting holes for rack 19" Use M6 x 12 screws to fix the unit to a rack.
2. Use nut, flat washer and spring washer for load wires. Fixing - Use lug for stud M6 for load wires. Recommended torque: 42-56 Kgf.cm.
3. To fix the mounting bracket to the chassis use M5 x 10 SEMS screws. Recommended tightening torque 27-31Kgf.cm. Screws must not penetrate the chassis more than 6.0mm.
4. The HFE1600-D1U rack is shown with a 4 HFE1600 unit installed and 1 blank panel.
5. Model name, voltage and current rating and safety approvals symbols will be shown here according to the specification.

HFE2500 Series

2500W 1U Hot Swap Front End Power Supplies

- 29.2W/in^3 power density
- 1U rackmount containing up to 4 units
- Internal ORing MOSFET & Current Share
- Up to 10,000W in 1U rack
- PMBus™ (I^2C) and LAN options

Key Market Segments & Applications

Power for Distributed Power Architecture Industrial Automation

Industrial | Test | Broadcast | Comm

HFE2500 Features and Benefits

Features	Benefits
• 1U high	• Utilizes less system space
• Internal ORing MOSFET & Current Share	• Suitable for N+1 redundancy
• Full array of signals available	• Easier system monitoring including PMBus™ and LAN

Specifications

ITEMS / MODELS			HFE2500
Input Voltage Range	(2)	VAC	85 - 265VAC, 47 - 63Hz. See model selector for power derating
Input Current (Max) 100/230VAC		A	17 / 12A
Inrush Current		A	<50A
Power Factor Correction		-	Meets EN61000-3-2, PF > 0.98 at full load
Temperature Coefficient		%/°C	<0.02%/°C
Overcurrent Protection		%	105 - 115%. Programmable by external voltage (0-5V)
Overvoltage Protection	(1)	%	110% ±3% (Tracking). Cycle AC to reset or utilize Remote On/Off
Overtemperature Protection	(1)	-	Shutdown with automatic reset. Warning signal provided
Hold-up time		ms	>10ms, 115/230VAC Input, 80% loading
Leakage Current		mA	< 0.75 / 1.5mA, 100 / 230VAC, 60Hz
Remote Sense Compensation		-	HFE2500-12: 0.25V / Wire, HFE2500-24: 0.5V, -48 1V / Wire
Indicators		-	AC OK: Green LED, DC OK / Fail: Green / Red LED
Remote On/Off		-	Unit ON: 0 - 0.6V or short, OFF: 2 - 15V or open circuit
Parallel Operation	(1)	-	Yes, single wire current share, 90% accuracy, up to 8 units
AC Fail Signal		-	Open Collector, ON when AC is within 85 - 270VAC
DC Good Signal		-	Open Collector, ON when output is above 85 to 95% of setpoint (tracking)
Remote Adjust	(1)	-	By either external 0 - 5V signal or 1k potentiometer
I^2C Interface	(1)	-	Isolated from output, Add suffix /S, PMBus compatible
Auxiliary Output		-	11.2 - 12.5V, 0.5A, 240mV ripple and noise
Operating Temperature		°C	-10°C to +70°C, derate 2%/°C from 50°C to 60°C, 2.5%/°C from 60°C to 70°C
Storage Temperature		°C	-30°C to +85°C
Humidity (Non condensing)		%RH	Operating: 10 - 90%RH, Storage: 10 - 95%RH
Cooling		-	Two variable speed internal fans, airflow exits across input/output connector
Withstand Voltage		-	I/P to O/P 3kVAC, I/P to Grnd 2kVAC, O/P to Grnd: HFE2500-12, -24V 500VAC, HFE2500-48 2250VDC
Isolation Resistance		MΩ	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC
Vibration (Basic transportation)		-	Meets IEC60068-2-64
Shock (Basic transportation)		-	Meets IEC60068-2-27
Safety Agency Certifications		-	UL60950-1, EN60950-1, CE Mark
Conducted and Radiated EMI		-	EN55022 & FCC part 15; Conducted class B, Radiated class A
Immunity		-	IEC61000-4-2 (lv 2,3), -3 (lv 2), -4 (lv 3), -5 (lv 3,4), -6 (lv 2), -8 (lv 4), -11
Size (W x H x D)		mm	Power Supply: 107 x 41 x 325, Rack: 445 x 44 x 402
Weight		g	Power Supply: 2100g, Rack: 5000g
Warranty yrs		Yrs	3

(1) See installation manual for detailed specifications & test methods (2) Derate linearly 1.3%/V from 100VAC to 85VAC input

Model Selector

Model	Output Voltage	Adjust Range (1)	Max Current (Vin>170VAC)	Max Power (Vin>170VAC)	Max Current (100<Vin<170VAC)(2)	Max Power (100<Vin<170VAC)(2)
HFE2500-12	12V	9.6 - 13.2V	200A	2400W	125A	1500W
HFE2500-12/S	12V	9.6 - 13.2V	200A	2400W	125A	1500W
HFE2500-24	24V	19.2 - 29V	104A	2496W	62.5A	1500W
HFE2500-24/S	24V	19.2 - 29V	104A	2496W	62.5A	1500W
HFE2500-48	48V	38.4 - 58V	52A	2496W	31.25A	1500W
HFE2500-48/S	48V	38.4 - 58V	52A	2496W	31.25A	1500W

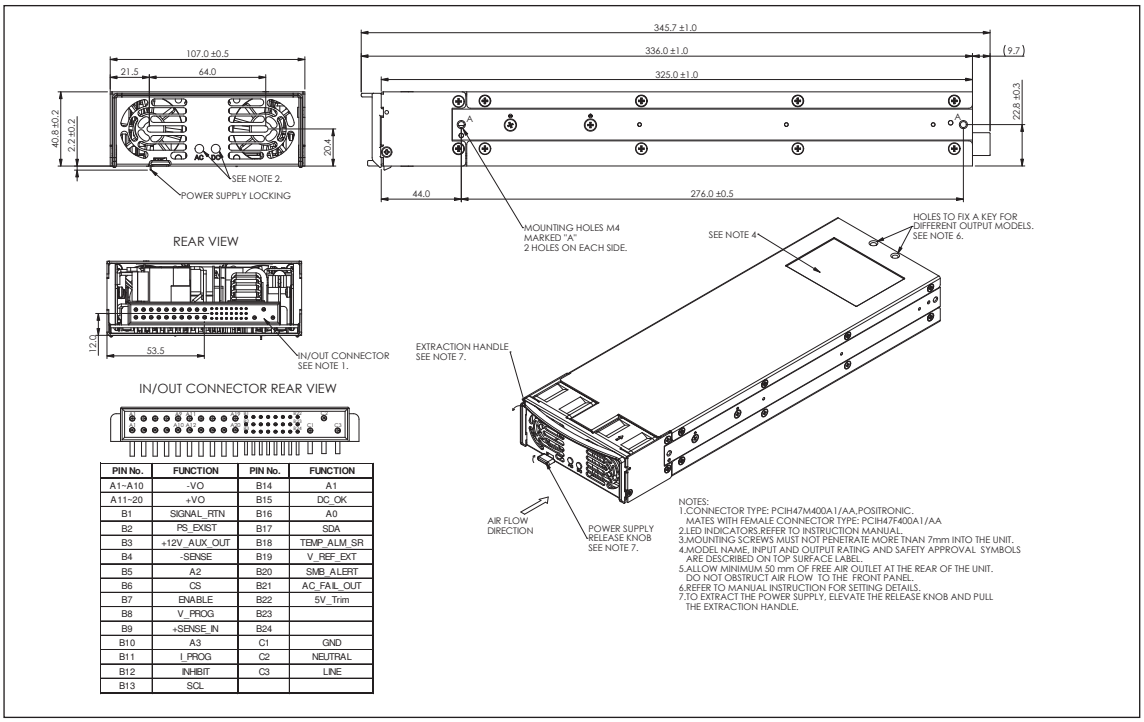
Model	Load Reg	Line Reg	Ripple & Noise	Efficiency (%)(3)	I²C
HFE2500-12	60mV	30mV	240mV	90 / 92%	-
HFE2500-12/S	60mV	30mV	240mV	90 / 92%	Yes
HFE2500-24	120mV	60mV	240mV	90 / 92%	-
HFE2500-24/S	120mV	60mV	240mV	90 / 92%	Yes
HFE2500-48	240mV	120mV	480mV	91 / 93%	-
HFE2500-48/S	240mV	120mV	480mV	91 / 93%	Yes

(3) At 75% load, 115 / 230VAC input

Rack and Accessories

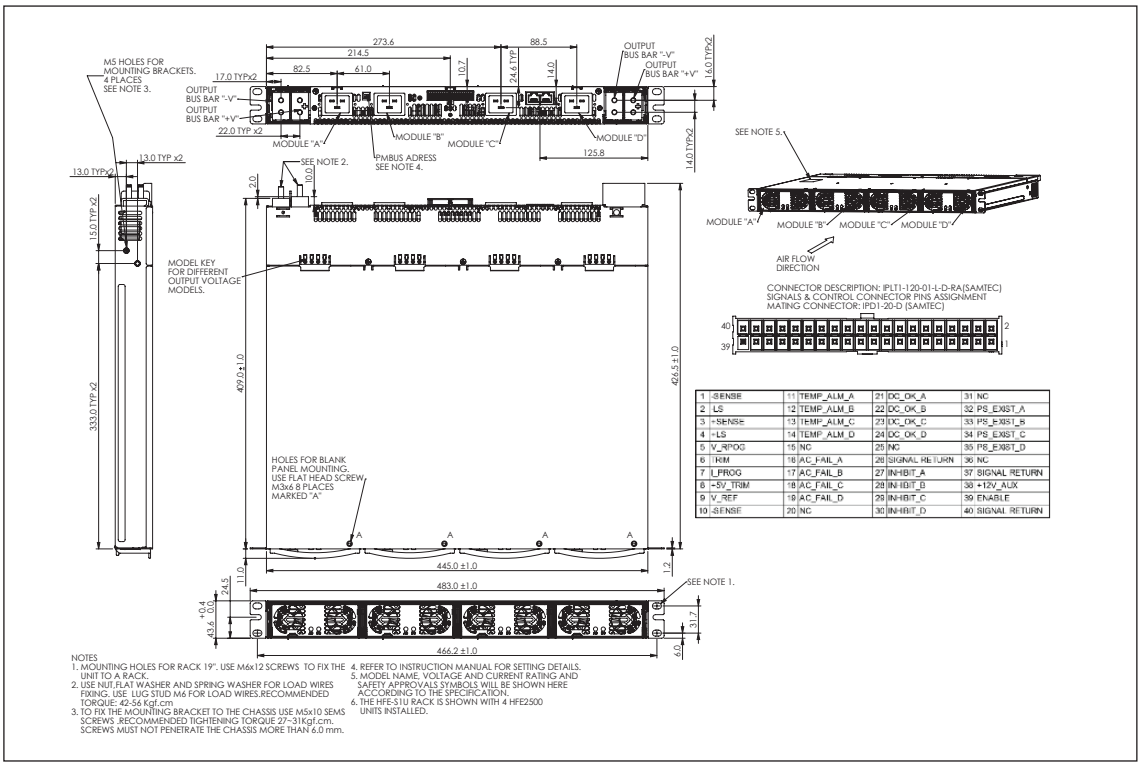
Model	Description	Maximum Rack Current
HFE2500-S1U	Four slot 19" rack, IEC320-C20 input connector	320A each side (640A total)
HFE2500-S1U-TB	Four slot 19" rack, Terminal Block input connector	320A each side (640A total)
HFE2500/BP	One slot blanking panel, two provided with each rack	-
HFE2500-LAN	Plug in LAN module. Takes up one rack slot. For use with /S models only	-

Outline Drawing HFE2500



PIN No.	FUNCTION	PIN No.	FUNCTION
A1~A10	-VO	B14	A1
A11~20	+VO	B15	DC_OK
B1	SIGNAL_RTN	B16	A0
B2	PS_EXIST	B17	SDA
B3	+12V_AUX_OUT	B18	TEMP_ALM_SR
B4	-SENSE	B19	V_REF_EXT
B5	A2	B20	SMB_ALERT
B6	CS	B21	AC_FAIL_OUT
B7	ENABLE	B22	5V_Trim
B8	V_PROG	B23	
B9	+SENSE_IN	B24	
B10	A3	C1	GND
B11	I_PROG	C2	NEUTRAL
B12	INHIBIT	C3	LINE
B13	SCL		

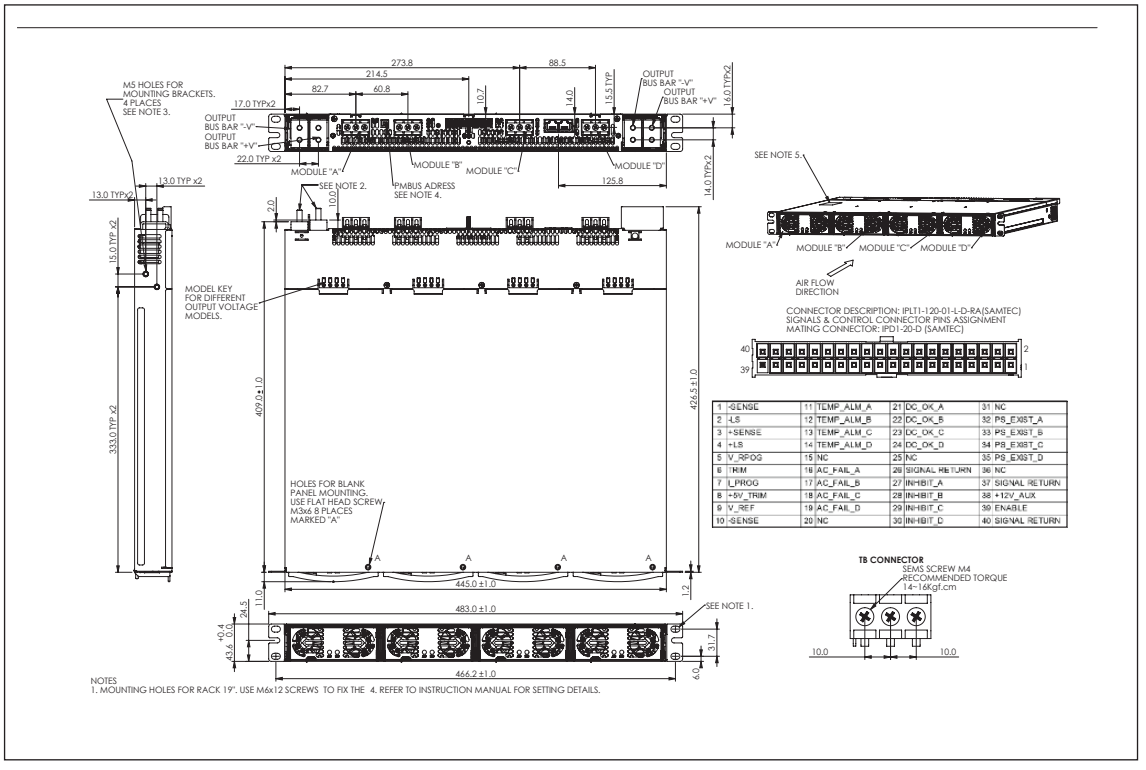
Outline Drawing HFE2500 - S1U



1	-SENSE	11	TEMP_ALM_A	21	DC_OK_A	31	NC
2	-LS	12	TEMP_ALM_B	22	DC_OK_B	32	PS_EXIST_A
3	+SENSE	13	TEMP_ALM_C	23	DC_OK_C	33	PS_EXIST_B
4	+LS	14	TEMP_ALM_D	24	DC_OK_D	34	PS_EXIST_C
5	V_RPOG	15	NC	25	NC	35	PS_EXIST_D
6	TRIM	16	AC_FAIL_A	26	SIGNAL RETURN	36	NC
7	I_PROG	17	AC_FAIL_B	27	INHIBIT_A	37	SIGNAL RETURN
8	+5V_TRIM	18	AC_FAIL_C	28	INHIBIT_B	38	+12V_AUX
9	V_REF	19	AC_FAIL_D	29	INHIBIT_C	39	ENABLE
10	-SENSE	20	NC	30	INHIBIT_D	40	SIGNAL RETURN

NOTES
1. MOUNTING HOLES FOR RACK 19". USE M6x12 SCREWS TO FIX THE UNIT TO A RACK.
2. USE NUT, FLAT WASHER AND SPRING WASHER FOR LOAD WIRES FIXING. USE LUG STUD M6 FOR LOAD WIRES.RECOMMENDED TORQUE: 42-56 Kgf.cm
3. TO FIX THE MOUNTING BRACKET TO THE CHASSIS USE M5x10 SEMS SCREWS .RECOMMENDED TIGHTENING TORQUE 27~31Kgf.cm. SCREWS MUST NOT PENETRATE THE CHASSIS MORE THAN 6.0 mm.
4. REFER TO INSTRUCTION MANUAL FOR SETTING DETAILS.
5. MODEL NAME, VOLTAGE AND CURRENT RATING AND SAFETY APPROVALS SYMBOLS WILL BE SHOWN HERE ACCORDING TO THE SPECIFICATION.
6. THE HFE-S1U RACK IS SHOWN WITH 4 HFE2500 UNITS INSTALLED.

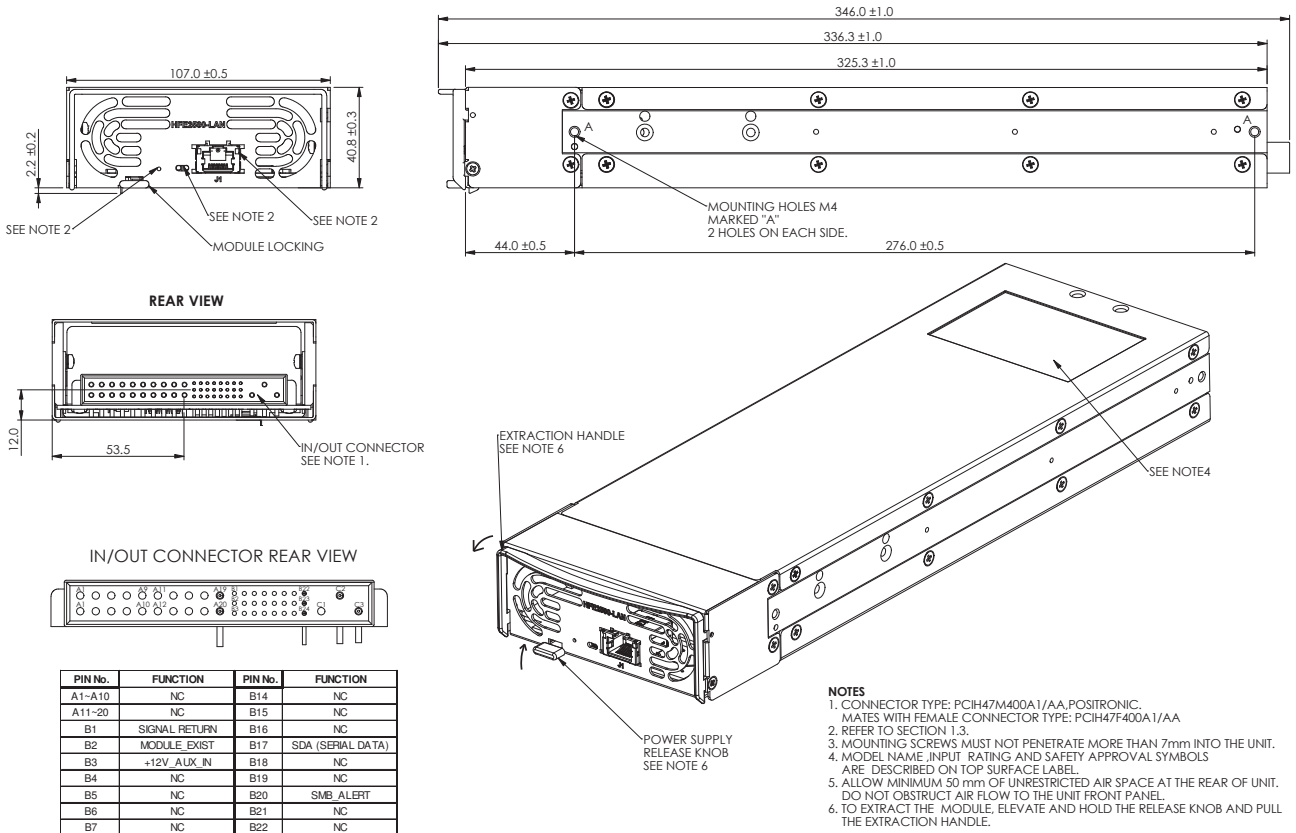
Outline Drawing HFE2500 - S1U - TB



1	-SENSE	11	TEMP_ALM_A	21	DC_OK_A	31	NC
2	-LS	12	TEMP_ALM_B	22	DC_OK_B	32	PS_EXIST_A
3	+SENSE	13	TEMP_ALM_C	23	DC_OK_C	33	PS_EXIST_B
4	+LS	14	TEMP_ALM_D	24	DC_OK_D	34	PS_EXIST_C
5	V_RPOG	15	NC	25	NC	35	PS_EXIST_D
6	TRIM	16	AC_FAIL_A	26	SIGNAL RETURN	36	NC
7	I_PROG	17	AC_FAIL_B	27	INHIBIT_A	37	SIGNAL RETURN
8	+5V_TRIM	18	AC_FAIL_C	28	INHIBIT_B	38	+12V_AUX
9	V_REF	19	AC_FAIL_D	29	INHIBIT_C	39	ENABLE
10	-SENSE	20	NC	30	INHIBIT_D	40	SIGNAL RETURN

NOTES
1. MOUNTING HOLES FOR RACK 19". USE M6x12 SCREWS TO FIX THE 4. REFER TO INSTRUCTION MANUAL FOR SETTING DETAILS.

Outline Drawing HFE2500- LAN



IN/OUT CONNECTOR REAR VIEW

PIN No.	FUNCTION	PIN No.	FUNCTION
A1~A10	NC	B14	NC
A11~20	NC	B15	NC
B1	SIGNAL RETURN	B16	NC
B2	MODULE_EXIST	B17	SDA (SERIAL DATA)
B3	+12V_AUX_IN	B18	NC
B4	NC	B19	NC
B5	NC	B20	SMB_ALERT
B6	NC	B21	NC
B7	NC	B22	NC
B8	NC	B23	NC
B9	NC	B24	NC
B10	NC	C1	NC
B11	NC	C2	NC
B12	NC	C3	NC
B13	SCL (SERIAL CLOCK)		

NOTES
1. CONNECTOR TYPE: PCIH47M400A1/AA,POSITRONIC.
   MATES WITH FEMALE CONNECTOR TYPE: PCIH47F400A1/AA
2. REFER TO SECTION 1.3.
3. MOUNTING SCREWS MUST NOT PENETRATE MORE THAN 7mm INTO THE UNIT.
4. MODEL NAME ,INPUT RATING AND SAFETY APPROVAL SYMBOLS
   ARE DESCRIBED ON TOP SURFACE LABEL.
5. ALLOW MINIMUM 50 mm OF UNRESTRICTED AIR SPACE AT THE REAR OF UNIT.
   DO NOT OBSTRUCT AIR FLOW TO THE UNIT FRONT PANEL.
6. TO EXTRACT THE MODULE, ELEVATE AND HOLD THE RELEASE KNOB AND PULL
   THE EXTRACTION HANDLE.

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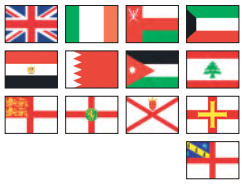

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