

AC-DC

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NV-350FEP	24
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NV-175	30
NV-175M	35
NVM-175	38
NV-300	41
Vega Series	46
Vega-Lite	51



Configurable

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.



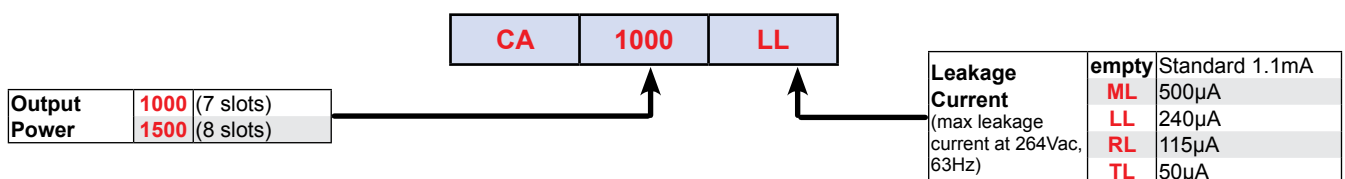
Features	Benefits
• Fast-on output connection	Reduces installation time/errors
• Worldwide Safety Approvals	Supports global use
• Up to 16 outputs	Eliminates need for additional supplies
• Medical Approval available (CA1000)	Simplifies approval process
• 3 Year Warranty	Low cost of ownership

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)
Power Factor	0.99 typical

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.

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



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

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	75%	typical 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
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)
Line Regulation	<0.5%	for 90-264Vac input change (210 - 264Vac for CA1500)
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	<150%	of rated current, when output voltage <1%
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

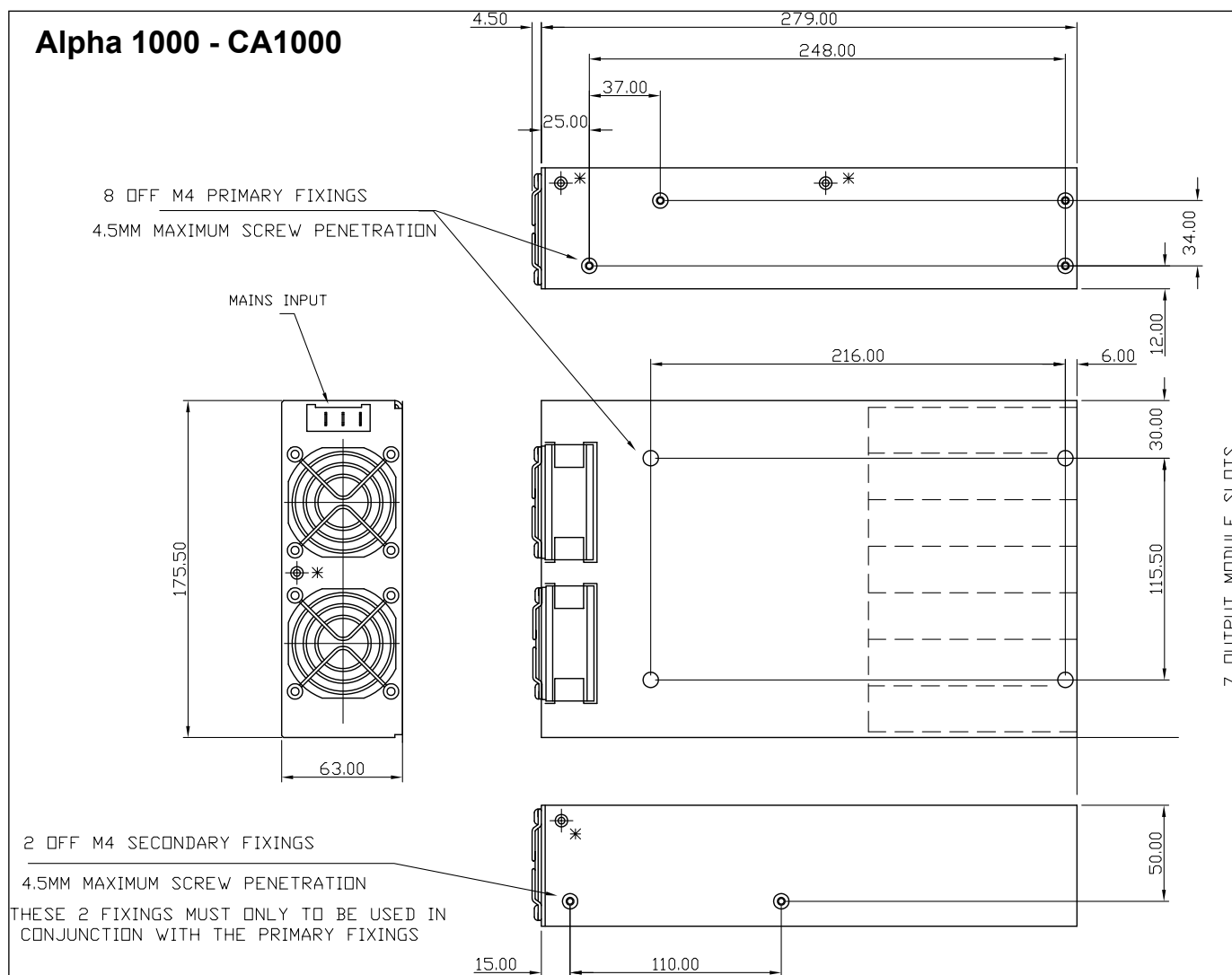
Product, Generic & Collateral Standards			
Low Voltage Power Supply, EMC	EN61204-3:2001	Compliant to High Severity Immunity	Class A emissions
Medical Electrical Equipment, EMC	EN61601-1-2:2001	Compliant	Class A emissions
Immunity for residential, commercial and light industrial environments	EN61000-6-1:2001	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, EN55022	(as per CISPR. 11/22) Class A see application note for details. Only for 'S' type leakage variants.
Conducted Emissions	EN55011, EN55022	(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

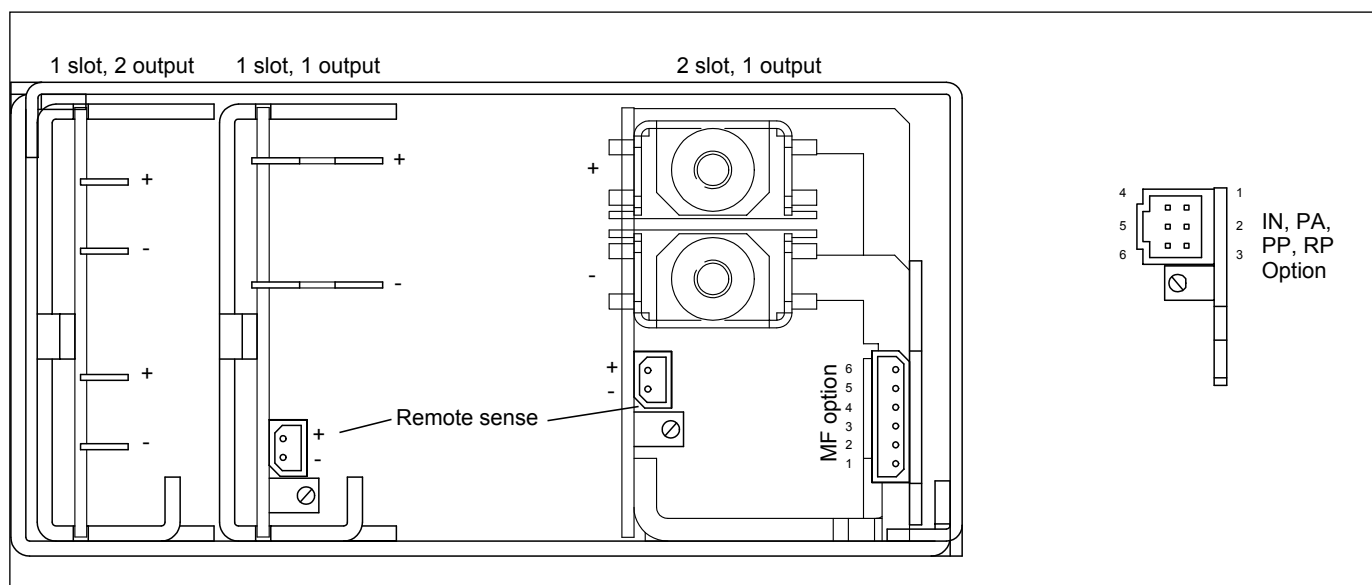
Immunity EN61000-6-2:2005, EN60601-1-2:2007				Criteria
Electrostatic Discharge	EN61000-4-2	Level 4	Air discharge 15kV, Contact discharge 8kV	A
Electromagnetic Field	EN61000-4-3	Level 3	12V/m	A
Fast / Burst Transient	EN61000-4-4	Level 4	ac input tested to 4kV dc output tested to 2kV Tested at 5kHz and 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	<i>Please check with technical sales for status of approvals</i>
Designed and manufactured under the control of ISO9001 and ISO13485 (including risk management).	

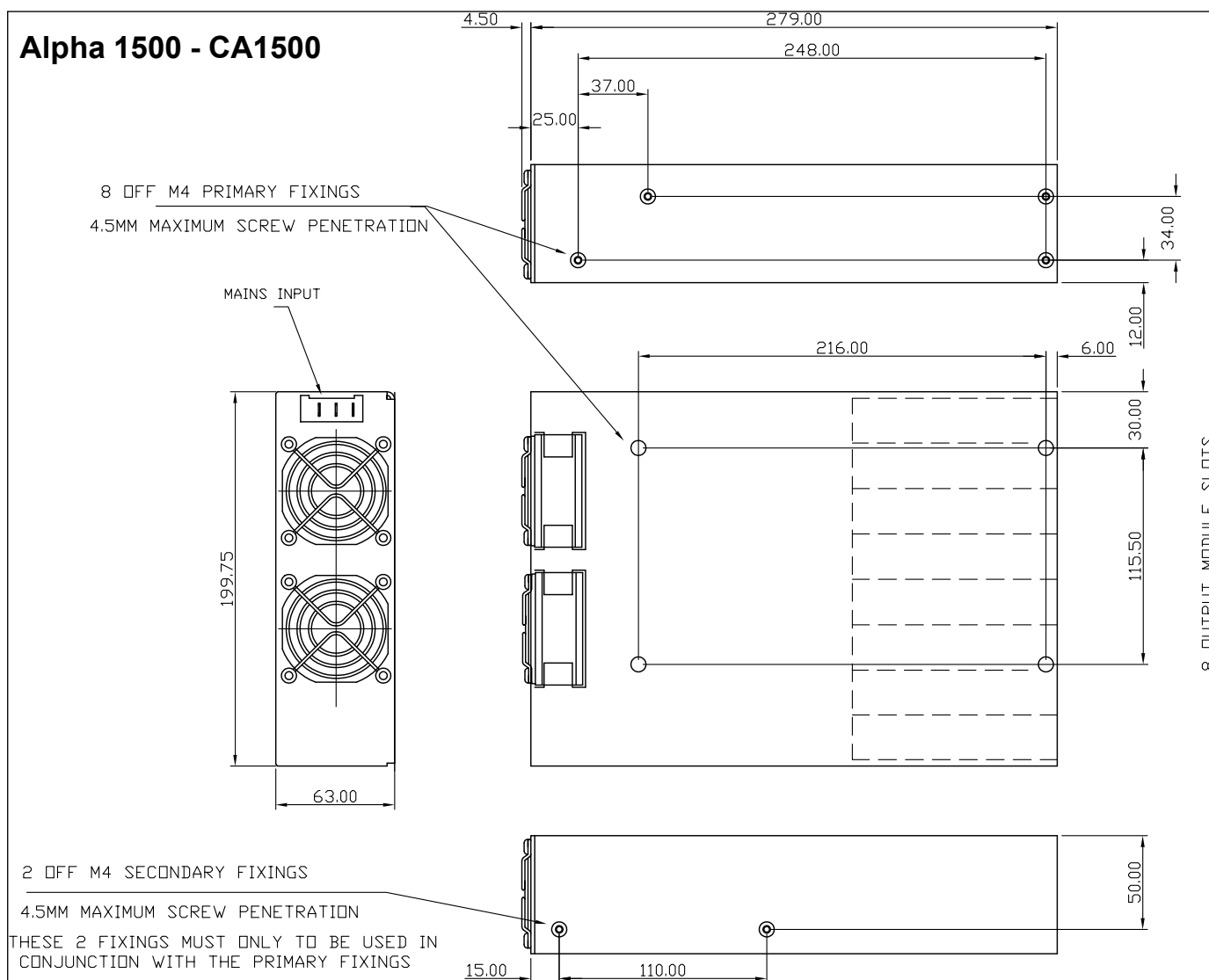




Option Connections



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



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Renewable

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



Features

- Convection cooled
- Reinforced isolation
- Full digital control
- ErP and Climate Savers Gold Level
- 5 Year Warranty

Benefits

- Silent operation
- Simplifies equipment design
- Improves Product Performance
- Minimises heat in system
- Low cost of ownership

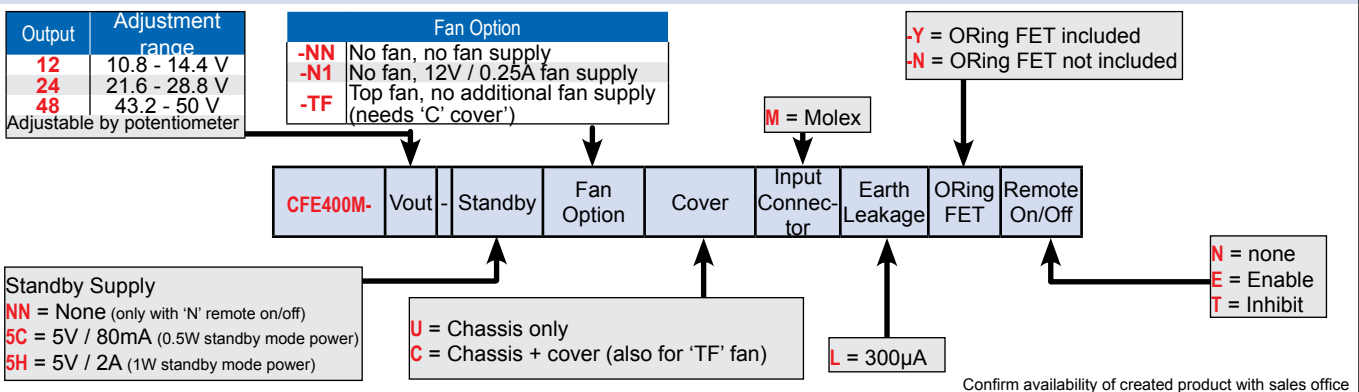
Input

Input Voltage	85-264Vac (100-240Vac nominal)	Input Frequency	47 - 63Hz (440Hz with reduced PFC - consult sales office)
Input Harmonics	EN61000-3-2 compliant	Power Factor	0.79 minimum
Input Fuse	Dual fuses (Live + Neutral) Fast acting (not user accessible)	Inrush Current	<25A at 25°C and 230Vac (cold start) (meets EN61000-3-3).
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

Volts	Current (fan/conv)	Convection cooled units / units without fan				Units with top fan	
		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



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

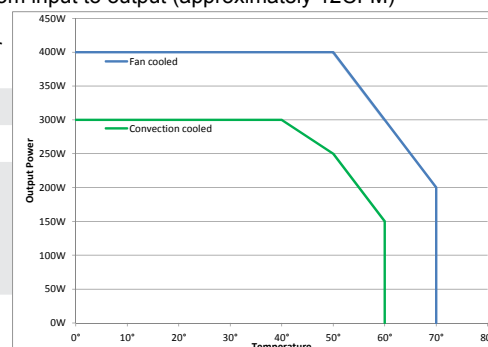
Fan cooled Convection		
Output Power	400W 300W	Continuous (including fan supply) or RMS (including Peak power) See handbook for details.
Peak Power	450W 450W	for 10 seconds. RMS power not to exceed Output Power stated above
Total Regulation	better than 2.25%	Including Line regulation of 0.25% (for 90-264Vac 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 or 5V / 2A, 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 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 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, EN55022	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B see application note for details
Conducted Emissions	EN55011, EN55022	(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

CHASSIS WITH COVER

177.80

100.00

48.70

CHASSIS WITH TOP MOUNTED FAN

177.80

100.00

48.70

71.20

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

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.

OUTPUT VOLTAGE ADJUSTMENT

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





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	Power Factor	0.97 typical
Input Fuse	Dual fuses (Live + Neutral) Fast acting (not user accessible)	Inrush Current	<20A at 25°C and 230Vac (cold start) (meets EN61000-3-3). <30A for EFE400
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		Case / Fan Option							
	EFE300	EFE400	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)
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										

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
Efficiency	90%		typical
Hold up	16ms		typical 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		Available 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 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	-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, EN55022	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B see application note for details
Conducted Emissions	EN55011, EN55022	(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:
A 4 OFF HOLES Ø3.5mm CLEARANCE FOR M3 FIXINGS.
B 8 OFF FIXING HOLES FOR M3, MAXIMUM PENETRATION 4.5mm.
MAXIMUM TORQUE 0.9Nm.
ALL TOLERANCES +/-0.5mm.

EFE400 (not -V version)

NOTE:
A 4 OFF HOLES Ø3.5mm CLEARANCE FOR M3 FIXINGS.
B 8 OFF FIXING HOLES FOR M3, MAXIMUM PENETRATION 4.5mm.
MAXIMUM TORQUE 0.9Nm.
ALL TOLERANCES +/-0.5mm.

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

- 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	Power Factor	0.97 typical
Input Fuse	Dual fuses (Live + Neutral) Fast acting (not user accessible)	Inrush Current	<40A at 25°C and 230Vac (cold start) (meets EN61000-3-3). <50A for EFE400M
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		Case / Fan Option									
	EFE300M	EFE400M										
12	11.4 - 13.2V	11.4 - 13.2V	-HN	Open frame, no fan, with 12V / 1A fan supply								
24	22.8 - 26.4V	22.8 - 26.4V	-HU	U chassis, no fan, with 12V / 1A fan supply								
28	27 - 32V	27 - 32V	-HC	Cover+chassis, no fan, with 12V / 1A fan supply								
48	47-50V	47-50V	-EC	Cover+chassis, end fan (temp controlled)								
50	50-54V	47-50V	-NN	Open frame, no fan, no fan supply								
			-NU	U chassis, no fan, no fan supply								
			-NC	Cover+chassis, no fan, no fan supply								

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 27 - 32V 48 47-50V 47-50V 50 50-54V 47-50V Required output voltage must be specified at time of ordering	Standby Voltage 0 = None (Only with EFE300M and 'N' Remote On/Off) 5 = 5V / 2A 12 = 12V / 1A	EFE300M- or EFE400M-	Vout	Standby	Case/Fan Option	Input Connector	D - Dual Fused	Earth Leakage	ORing FET	Remote On/Off	Output Connector
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-Y = ORing FET included -N = Without ORing FET blank = right angled -V = vertical	E = Enable T = Inhibit N = None
--	--

M = Molex (see connection drawings for details)	L = 300µA
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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
Efficiency	90%		typical. 87% typical if Standby Supply is fully loaded
Hold up	16ms		typical 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 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	Medical approval = -200 to 3000 metres operational (-200 to 5000m storage/transportation) Non medical approval = -200 to 5000, 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, EN55022	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B see application note for details
Conducted Emissions	EN55011, EN55022	(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

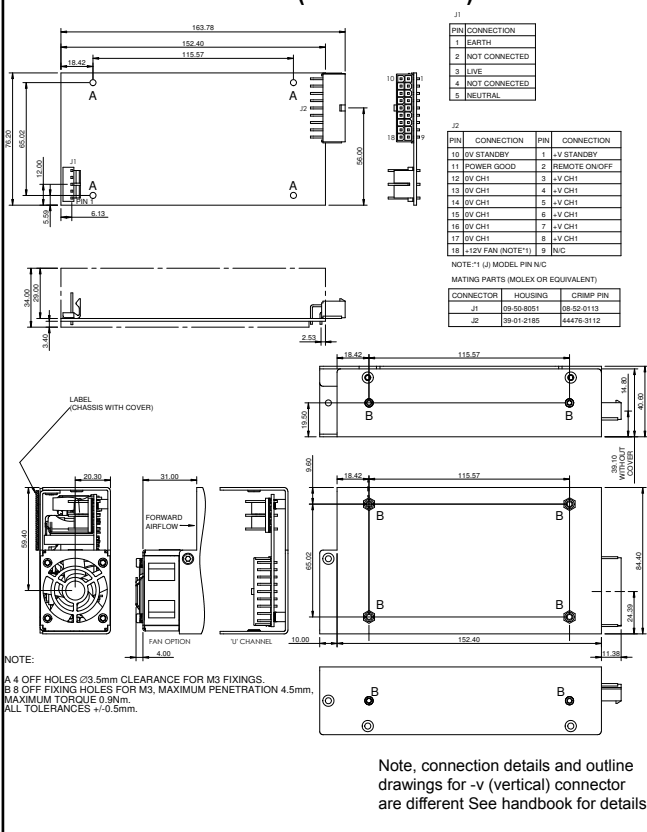
Electrostatic Discharge	EN61000-4-2	Level 4	Air discharge 15kV, Contact discharge 8kV Not applicable to open frame units	A
Electromagnetic Field	EN61000-4-3	Level 3	12V/m	A
Fast / Burst Transient	EN61000-4-4	Level 4	ac input tested to 4.4kV dc output tested to 2.2kV	A
Surge Immunity	EN61000-4-5	Level 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

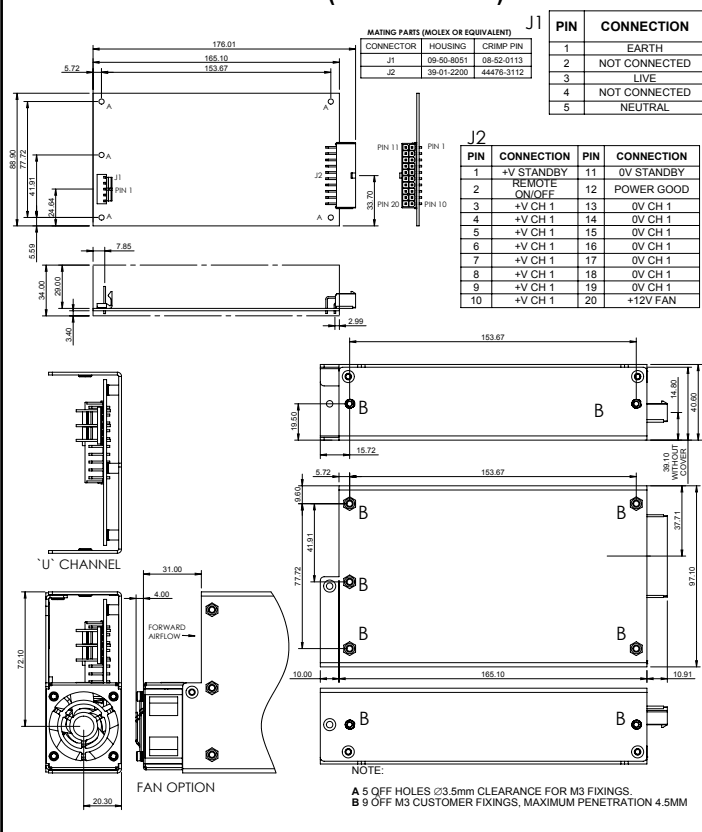
IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1	File E135494
IEC/EN 60601-1, UL/CSA 60601-1, ANSI/AAMI ES60601-1 CAN/CSA-C22.2 No 60601-1-08	File E349607
IEC/EN 61010-1	EFE300M approved (File E331788), EFE400M designed to meet
CE Mark (EN60950-1)	LV Directive 2006/95/EC
CB certificate and Report available 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)



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	Power Factor	0.97 typical
Input Fuse	NV-350 = 6.3A, NV-700 = 16A HBC Fast acting (not user accessible)	Inrush Current	NV-350 <15A NV-700 <40A
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)		at 25°C and 230Vac (cold start)

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.

- 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		NV3 or NV7	S	S	S	EN5V
Cooling	S Standard air - forward V Variable speed fan - forward ₆ R Reverse air ₄ C Customer air - no fan ₁						
Input Connection	S Screw I IEC320 ₂						
Leakage Current	S Standard	130µA max at 120Vac (60Hz), 260µA max at 240Vac (60Hz) ₅					
Primary Option₃	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						

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).



- Select Output Modules from the Module Tables below ensuring that no more than 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
- 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
				3.3 - 5.5	10A	55W
				7 - 15	5A	60W
DB	2	12 - 15	13A ₁	24 - 32	2A	50W
				3.3 - 5.5	10A	55W
				7 - 15	5A	60W
DB	2	24 - 28	7A ₂	24 - 32	2A	50W
				3.3 - 5.5	10A	55W
				7 - 15	5A	60W

- Derate linearly from 13A at 12.5V to 10A at 15.5V
- Derate linearly from 7A at 25V to 6A at 28V
- 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
- Derate linearly from 22.5A at 8V to 20A at 9V
- 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

- 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
- For NV3 - 400W max
For NV7 - 600W peak for up to 10sec, 450W average
- Only one per power supply, 48W max total power for module
- 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 above 700W output power)
Ripple and Noise	<1%	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.
	Reinforced	2 x MOOPs (3rd edition 60601) 4.3kVdc (Basic for 2nd edition 60601)
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% ($\pm 5\%$) 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. Turns on typically 5ms after ac is good and off typically 5ms before any channel falls below 95% of nominal
Global module good collector Global module good emitter	Uncommitted optocoupler. Turns on typically 200ms after all outputs are within 90% ($\pm 5\%$) of nominal and off typically 5ms before any channel falls below 90% ($\pm 5\%$) of nominal. 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	$\pm 3 \times 30g$ shocks in each plane, total 18 shocks 30g shock = 11ms (± 0.5 msec), 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 metres operational (5000m non operational)
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, EN55022	(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, EN55022	(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

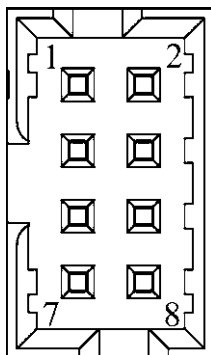
Approvals / Accreditations

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	<i>Please check with technical sales for status of approvals</i>
Designed and manufactured under the control of ISO9001 and ISO13485 (including risk management).	

PRIMARY OPTION / DA MODULE

DA Module

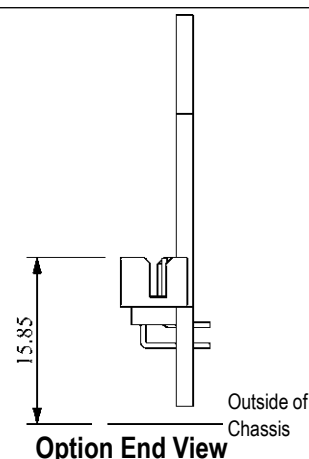
- 1 +12V (channel 1)
- 2 +12V (channel 1)
- 3 +12V (channel 1)
- 4 0V (common ch1 / ch2)
- 5 0V (common ch1 / ch2)
- 6 0V (common ch1 / ch2)
- 7 -12V (channel 2)
- 8 -12V (channel 2)



Primary Option

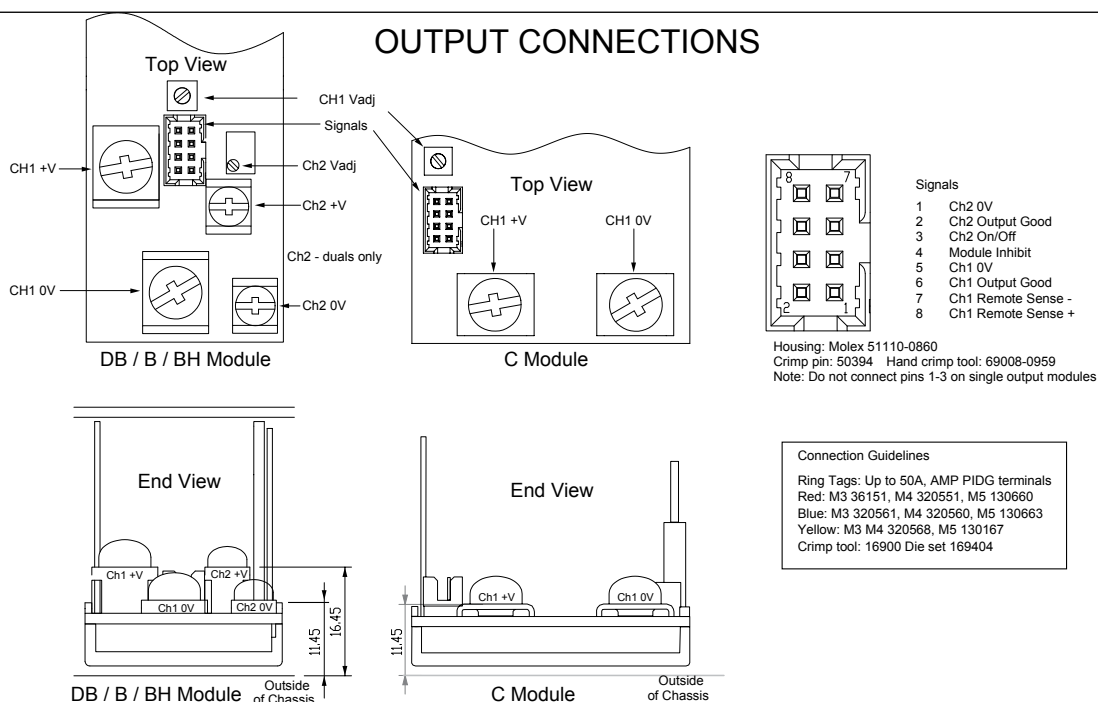
- 1 +V Standby
- 2 0V Standby
- 3 EN/ES & IN/IS Logic 1
- 4 EN/ES & IN/IS Logic 0
- 5 Global Module Good Collector
- 6 Global Module Good Emitter
- 7 AC good Collector
- 8 AC good Emitter

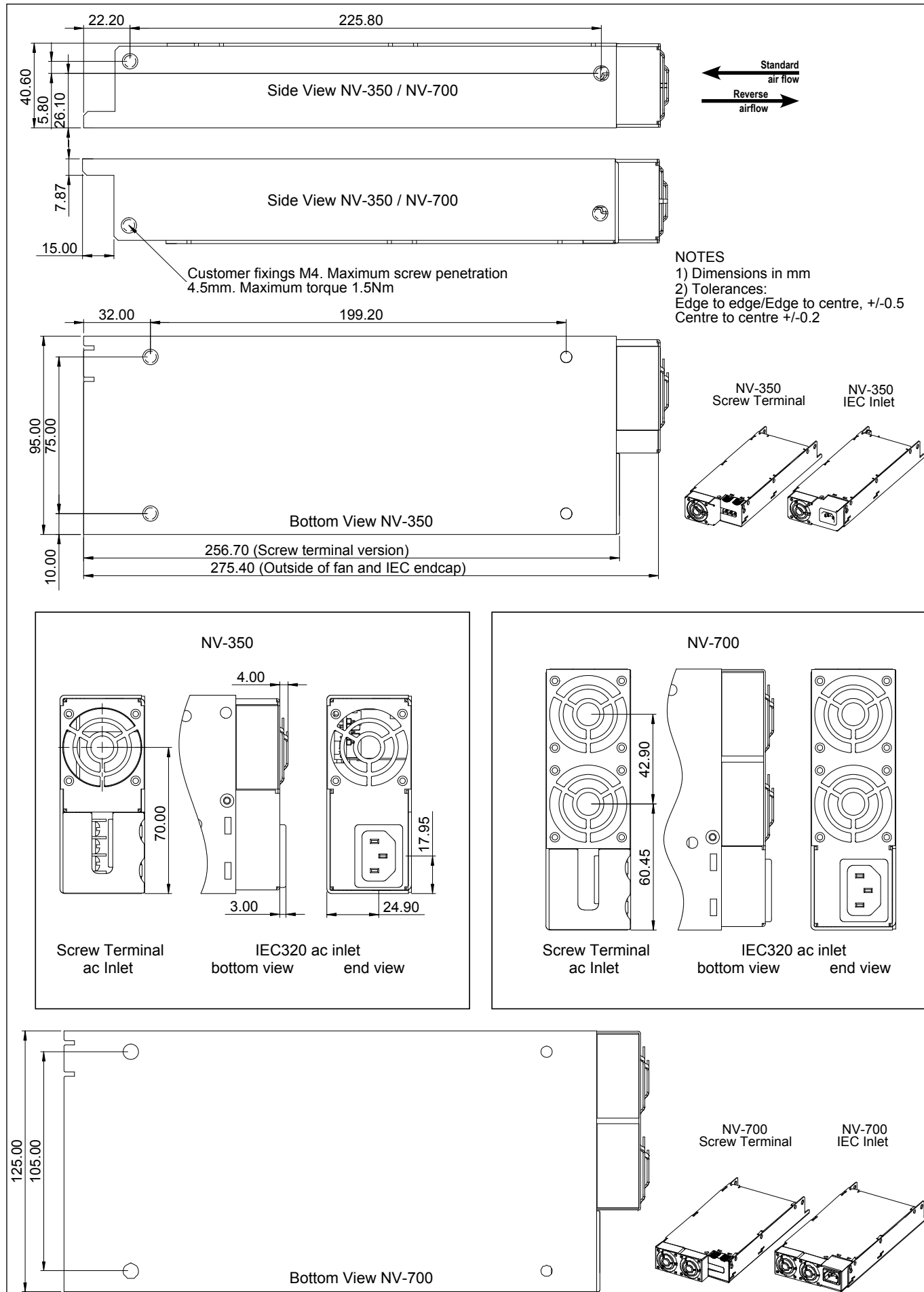
Housing: Molex 51110-0860
Crimp pin: 50394
Hand crimp tool: 69008-0959



Option End View

OUTPUT CONNECTIONS







Medical



Industrial



Test



Broadcast



Comms



Renewable

350W Front End Power Supply.



Features	Benefits
• High Efficiency	Minimises heat in system
• Low Profile	Fits 1U Applications
• High Power Density	Requires less space
• Medical Approval	Simplifies use in medical systems
• 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	Power Factor	0.97 typical
Input Fuse	6.3A HBC Fast acting (not user accessible)	Inrush Current	<15A at 25°C and 230Vac (cold start)
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

It is possible to create your own NV-350FEP configuration online at www.nv-power.com or by using the following guide.

1. Ensure total power requirement is 350W or less.
2. Select required Cooling, Connection and Controls/Signals from the following table.

Converter	NF3	350W	→	NF3	S	S	S	EN5V	Vout	FE
------------------	------------	-------------	---	------------	----------	----------	----------	-------------	-------------	-----------

Cooling	S	Standard air - forward	↑
	R	Reverse air	
	C	Customer air - no fan _a	

Input Connection	S	Screw	↑
	I	IEC320 _b	

Leakage Current	S	Standard	130µA max at 120Vac (60Hz), 260µA max at 240Vac (60Hz)	↑
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Primary Option_c	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	

Ch1 output	Voltage Range	Maximum Current	Power
	11.5 - 13.2V	29.2A	350W

a - Thermocoupled sample recommended to ensure adequate cooling - consult sales
b - Not with customer air Cooling
c - Leave blank for no primary option.

3. Select output voltage required for ch1 and follow with 'FE' for the module type. Ensure the voltage is inside the allowable voltage range.
4. Note, Channel 2 is fixed at 12V / 2A
5. Contact TDK-Lambda to issue a part number.



Output Specification

Voltage / Current	See guide on previous page	
Turn on time	1.5s max	at 90Vac and 100% rated output power
Rise time	<50ms	to 90% of voltage, monotonic rise above 10%
Efficiency	90%	typical
Hold up	16ms min	at 90Vac and 100% rated power
Ripple and Noise	<1%	pk-pk, using EIAJ test method & 20MHz bandwidth
Voltage Accuracy	<1%	of set voltage ($\pm 5\%$ for channel 2)
Remote Sense	Yes	standard on ch1, max 0.5V total line drop
Minimum Load	No	on any output
Temperature Coefficient	<0.02%	of rated voltage per °C
Total Regulation	1%	Including:- Load Regulation for 0-100% and Line Regulation for 90-264Vac input change (<2% for channel 2)
Transient Response	<4%	of set voltage for 50% load change
Recovery	500µs	for recovery to 1% of set voltage
Over Voltage Protection (ch1)	15 - 16V	
Over Current Protection (ch1)	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 MOOPs (3rd edition 60601) 4.3kVdc (Basic for 2nd edition 60601)
Input to Earth	Basic	2.3kVdc
Output to Earth		200Vdc

Signals (all signals referenced to 0V of channel 1)

Ch1 Good	Open collector output. 'On' indicates output is within 90% ($\pm 5\%$) of nominal
Ch1 Remote sense +/-	Connections for remote sense. Up to 0.5V total line drop can be compensated. If remote sense is not required, do not connect either 'Sense -' or 'Sense +'

Global Interface Signals - units fitted with primary option

AC good collector	Uncommitted optocoupler. Turns on typically 5ms after ac is good and off typically 5ms before any channel falls below 95% of nominal
EN/ES and IN/IS Logic 0	TTL low enables (ES) or inhibits (IS) the entire psu including fan (except standby)
EN/ES and IN/IS Logic 1	TTL high enables (ES) or inhibits (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 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	$\pm 3 \times 30g$ 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 metres operational (5000m non operational)
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	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 Criteria B for dip to 40% for 5 cycles below 154Vac nominal input	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, EN55022	(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, EN55022	(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

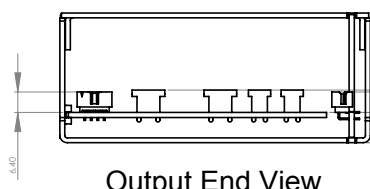
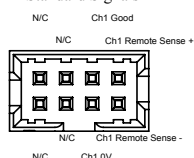
Approvals / Accreditations

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

Connection Guidelines

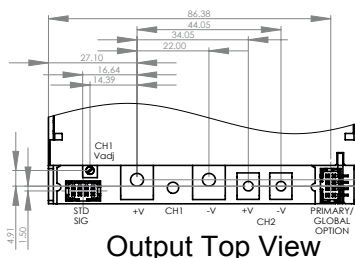
Ring Tags: Up to 50A. AMP PIDG terminals
 Red: M3 36151, M4 320551, M5 130660
 Blue: M3 320561, M4 320560, M5 130663
 Yellow: M4 320568, M5 130167
 Crimp tool: 16900 Die set 169404

Standard Signals



Output End View

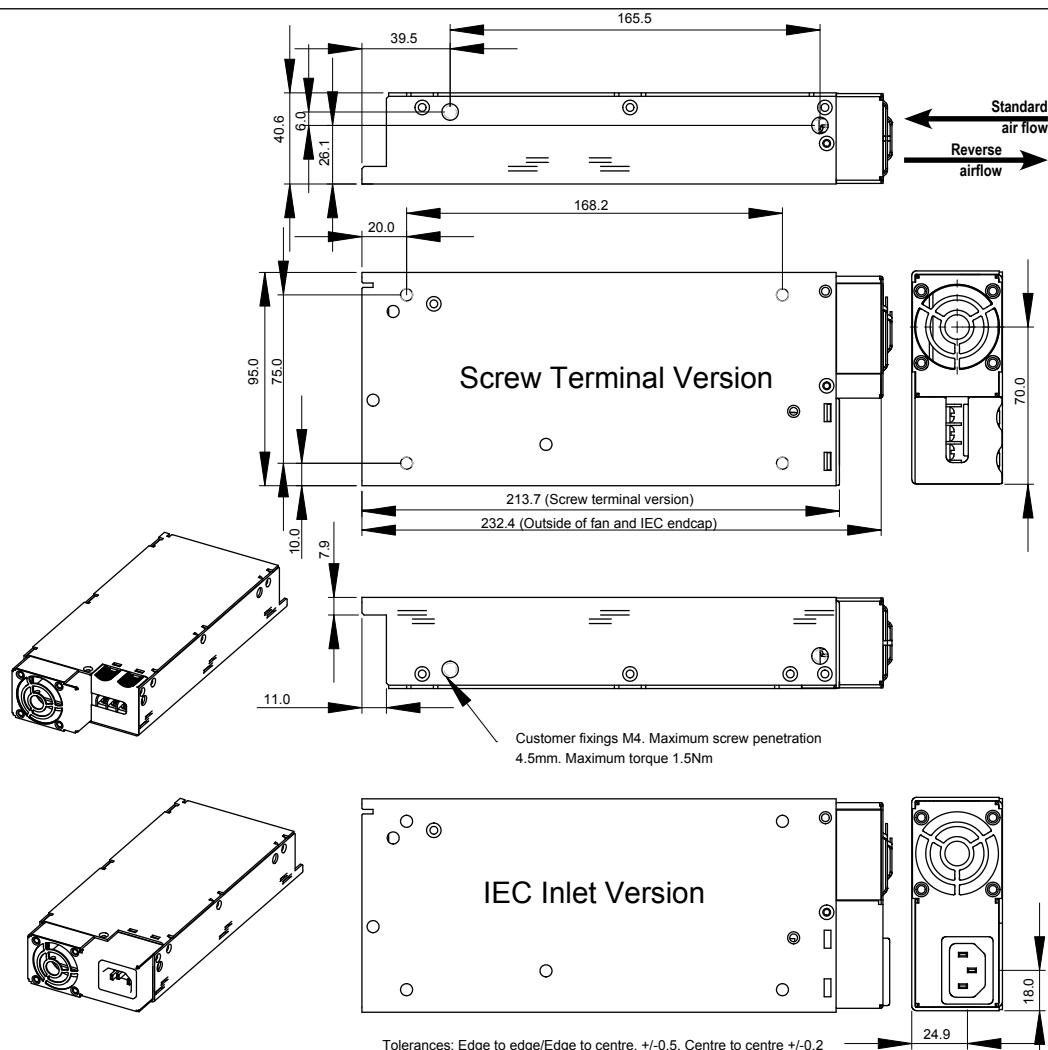
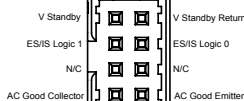
OUTPUT CONNECTIONS



Output Top View

Housing: Molex 51110-0860
 Crimp pin: 50394
 Hand crimp tool: 69008-0959
 1 housing + 8 crimps available as a single part (94158) from TDK-Lambda

Primary/Global Option





Industrial



Test



Broadcast

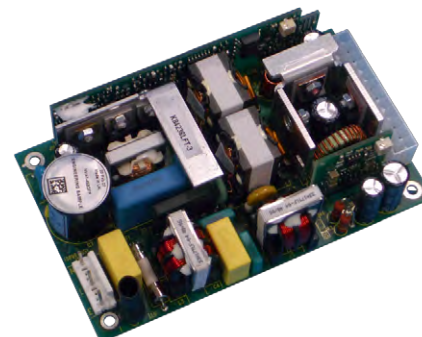


Comms



Renewable

100W Configurable ac-dc power supply.



Features	Benefits
• High Efficiency	Minimises heat in system
• Low Profile	Fits 1U Applications
• Single output connector	Simple and error free connection
• 4 outputs	Eliminates additional power supplies
• 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	Power Factor	0.97 typical
Input Fuse	Time delay (not user accessible)	Inrush Current	<40A at 25°C and 264Vac (cold start)
Earth Leakage Current	123µA at 120Vac (60Hz), 257µA max at 240Vac (60Hz)		

Isolation			
Input to Output	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	Ch2	Ch3	Ch4	
NVA1-453TT	5V / 10A	3.3V / 8A	12V / 3A	-12V / 1A	
NVA1-453FF	5V / 10A	3.3V / 8A	15V / 3A	-15V / 1A	
NVA1-4G5TT	24V / 4A	5V / 5A	12V / 3A	-12V / 1A	
NVA1-4G5FF	24V / 4A	5V / 5A	15V / 3A	-15V / 1A	

How To Create A Product Description							Confirm availability of created product with TDK-Lambda
	NVA1-	#o/p	Ch1	Ch2	Ch3	Ch4 ₁	Case Option
Number of outputs							
Letter / number from 'Available Ch1 - Ch4 Outputs' table to represent output voltage							
							Blank no case -C U chassis + cover -U U chassis
1. 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	Adjustment Range	Channel 3	Adjustment Range	Channel 4 ₂	Adjustment Range
5 5V / 10A ₁	4.75 - 5.25V	3 3.3V / 8A	3.14 - 3.46V	T 12V / 3A F 15V / 3A G 24V / 1.5A	Fixed Fixed Fixed	T -12V / 1A ₃ F -15V / 1A ₃	Fixed Fixed
G 24V / 4A	23 - 25V	5 5V / 5A	3.3 - 5.5V	T 12V / 3A F 15V / 3A	Fixed Fixed	T -12V / 1A F -15V / 1A	Fixed Fixed

1. Total power of 5V ch1 + 3.3V ch2 must not exceed 60W 2. Follow characters in red by 'P' for positive output channel 4. 3. If channel 3 = 24V (G), channel 4 must be 'P'

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 1.5% on channel 4 for 5V channel 1 configs.
Voltage Accuracy	±1%	±5% for Channels 3 & 4 (with Ch1 set to nominal voltage)
Remote Sense	Yes	Channels 1 & 2. Max 0.5V total line drop
Minimum Load	No	on any output. (For models with 12V or 15V ch3, a load ≥1A is required on ch3 to keep it in full regulation when Ch1 + Ch2 power ≥50W)
Total Regulation	1%	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. (5% for channels 3 & 4)
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	
Total Output Power	100W	
Ch1 Good Signal	Optional	Contact sales office for details

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)
Convection Rating	50W at 50°C. Max 50% output current on any output. See Application Notes for details
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	-200 to 3000 metres operational (-200 to 5000m storage/transportation)
Pollution	Degree 2, Material group IIIb

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 3	ac input tested to 2.2kV dc output tested to 1.1kV	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 220Vac nominal input [criteria A if less than 60% load]	A

Emissions EN61000-6-3:2007

Radiated Electric Field	EN55011, EN55022	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B see application note for details.
Conducted Emissions	EN55011, EN55022	(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



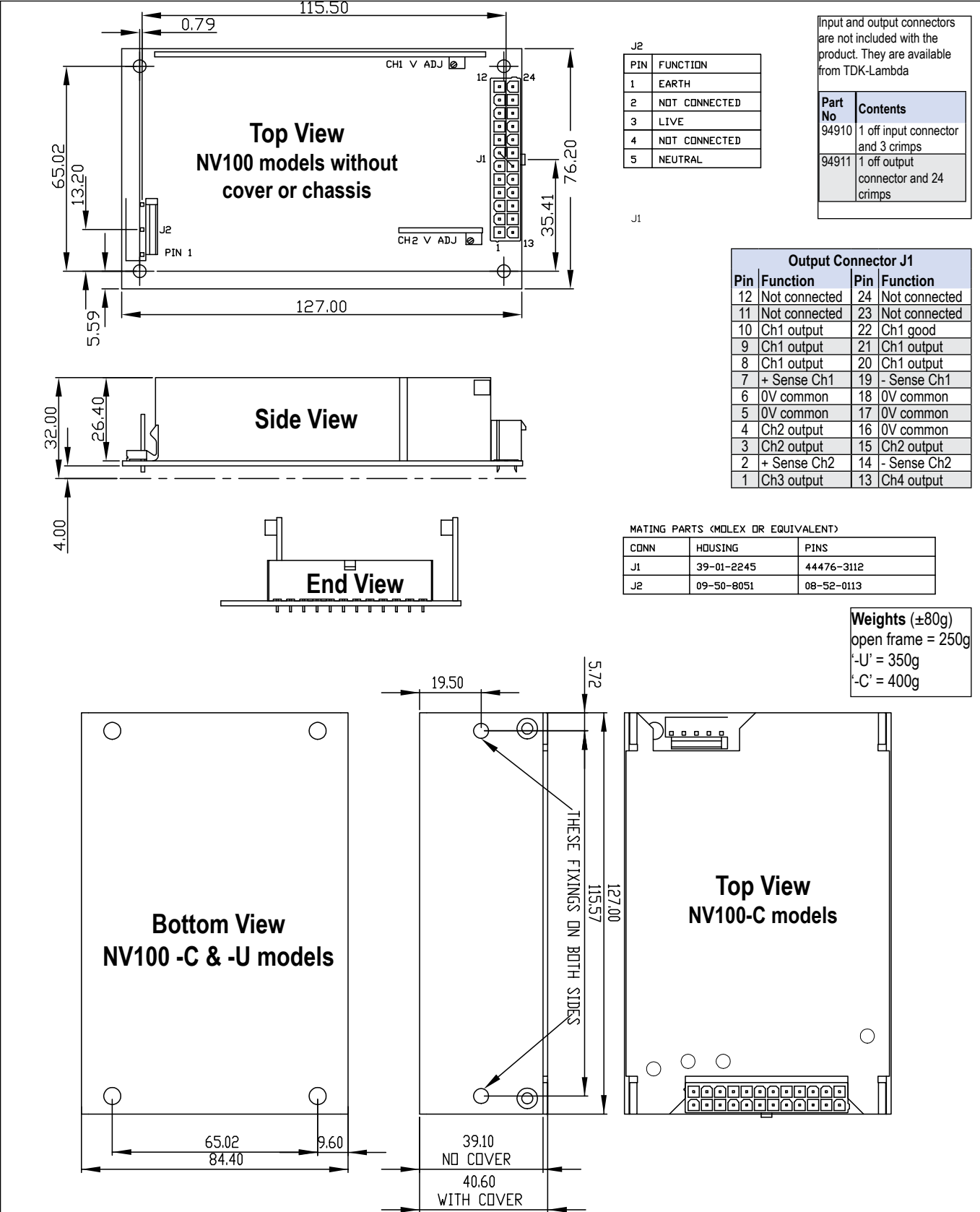
Safety Approvals

IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1
CE Mark (EN60950-1)
CB certificate and Report available on request

Notes

File E135494
LV Directive 2006/95/EC
Please check with technical sales for status of approvals

Outline & Connection Drawings





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	Power Factor	0.97 typical
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 2 2.7V / 15A 3 3.3V / 15A 0 Omit	0.9 - 2.5V 2.5 - 3.3V 2.5 - 3.3V	T 12V / 5A F 15V / 5A G 24V / 2.5A 0 Omit	12 - 15V 12 - 15V 18 - 24V	T -12V / 1A F -15V / 1A 3H -3.3V / 2A ₉ 5H -5V / 2A ₉ TH -12V / 2A ₉ FH -15V / 2A ₉ 0H Fan supply only 0 Omit	Fixed Fixed Fixed Fixed Fixed Fixed
T 12V / 15A F 15V / 12A	12 - 15V ₅ 12 - 15V ₆	5 5V / 10A ₁₀ 0 Omit	3.3 - 5.5V				
G 24V / 7.5A	24 - 28V ₇	5 5V / 8A ₈ 0 Omit	3.3 - 5.5V				

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

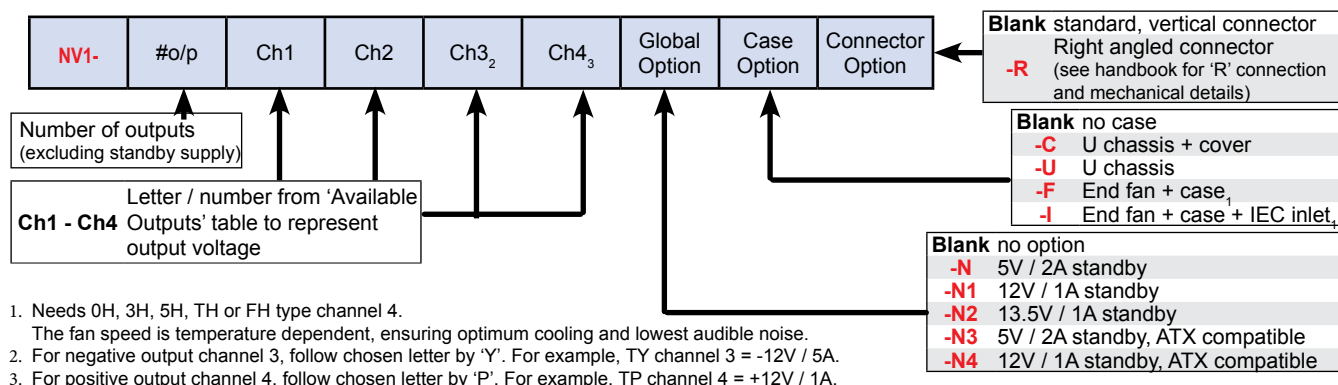
Other output options are available, please contact sales office with your requirements

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



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%	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

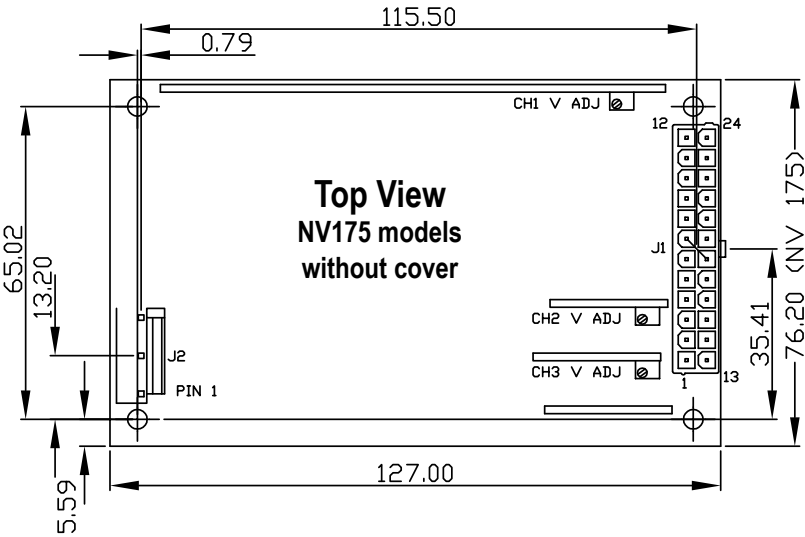
Emissions EN61000-6-3:2007, EN60601-1-2:2007			
Radiated Electric Field	EN55011, EN55022	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B see application note for details. Additional filtering is required for IEC inlet version	
Conducted Emissions	EN55011, EN55022	(as per CISPR.11/22) Class B, FCC47 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

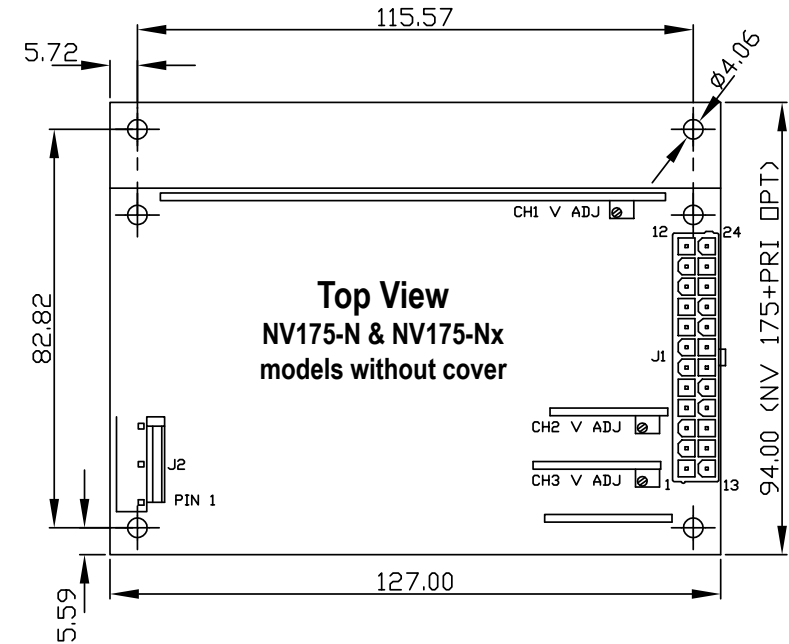
Approvals / Accreditations	
IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1	File E135494
IEC/EN 60601-1, UL/CSA 60601-1, ANSI/AAMI ES60601-1	File E349607
CAN/CSA-C22.2 No 60601-1-08	
IEC/EN61010	File E331788
CE Mark (EN60950-1)	LV Directive 2006/95/EC
CB certificate and Report available on request	Please 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



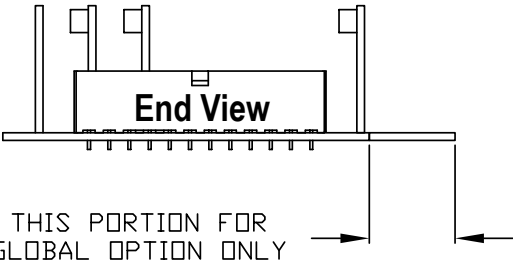
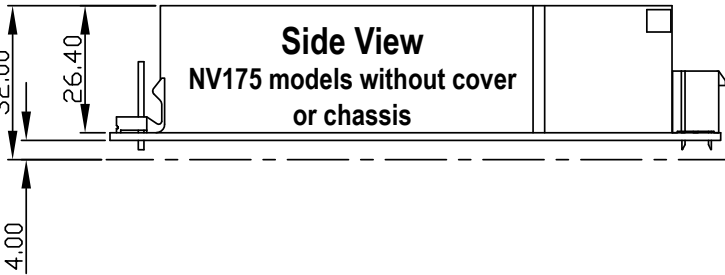
J1			
PIN	FUNCTION	PIN	FUNCTION
12	STANDBY +Ve	24	STANDBY RETURN
11	POWER GOOD	23	REMOTE ON/OFF
10	CH1 OUTPUT	22	CH1 GOOD
9	CH1 OUTPUT	21	CH1 OUTPUT
8	CH1 OUTPUT	20	CH1 OUTPUT
7	+SENSE CH1	19	-SENSE CH1
6	0V COMMON	18	0V COMMON
5	0V COMMON	17	0V COMMON
4	CH2 OUTPUT	16	0V COMMON
3	CH2 OUTPUT	15	CH2 OUTPUT
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

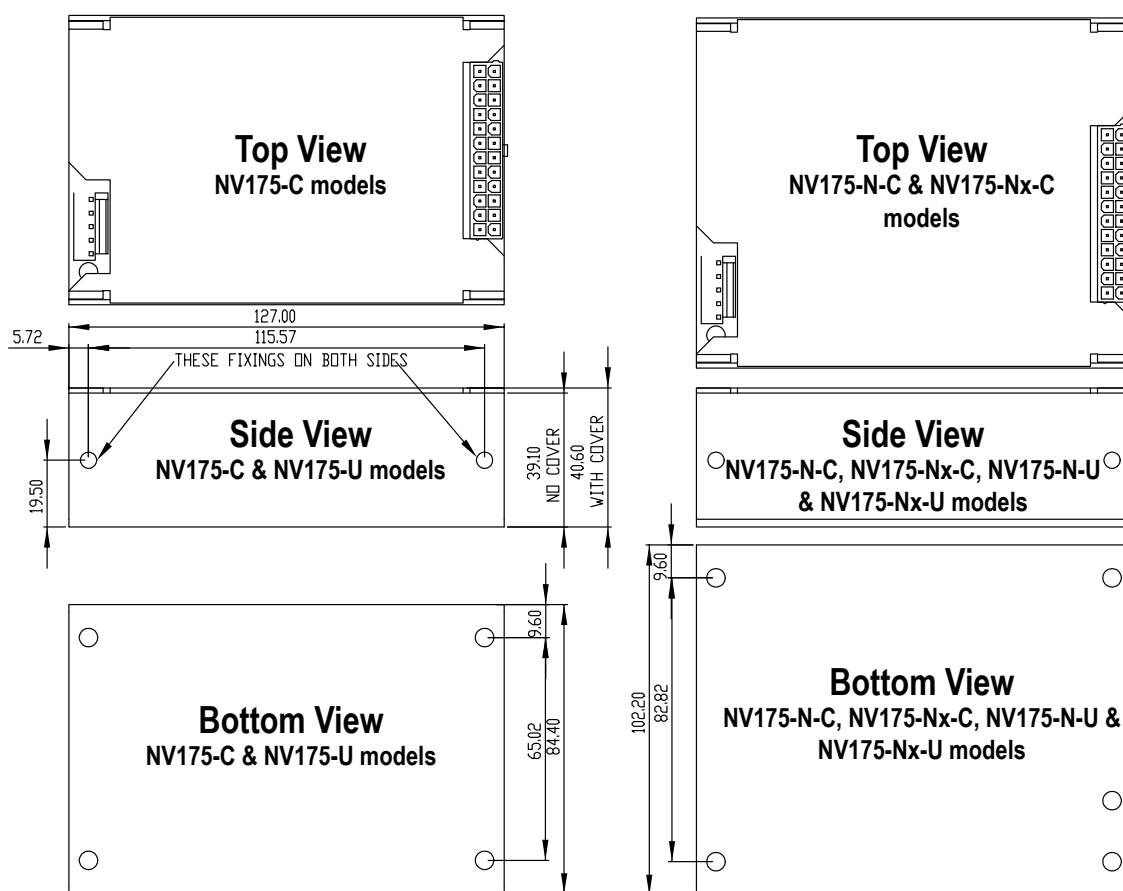
Part Number	Contents
94910	1 off input connector and 3 crimps
94911	1 off output connector and 24 crimps



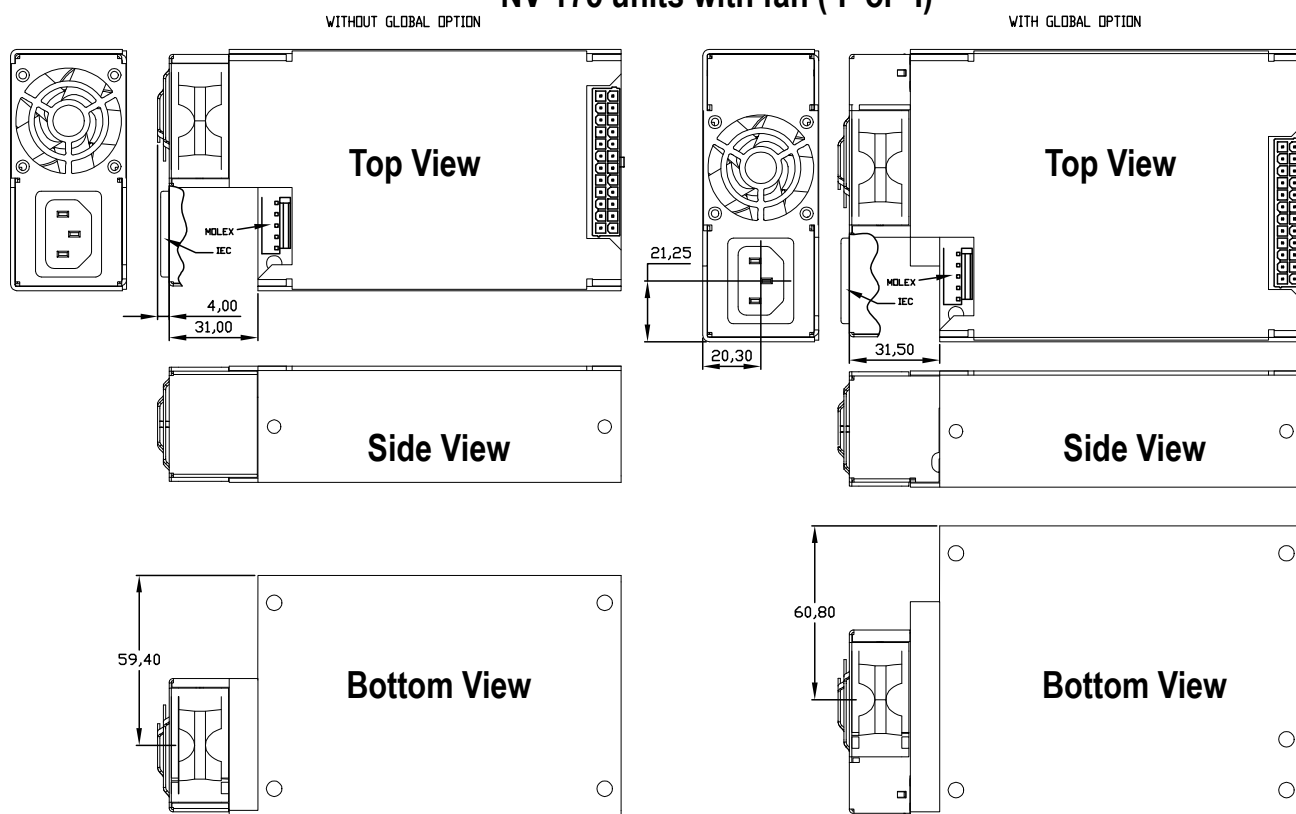
Notes: 1. All customer fixings M3 2. Maximum thread penetration 4.5mm 3. Maximum torque 0.9Nm 4. All tolerances +/-0.5mm



Outline & Connection Drawings



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



Other dimensions same as cases without fans (above)

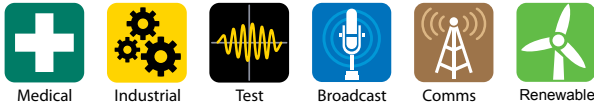
Notes: 1. All customer fixings M3

2. Maximum thread penetration 4.5mm

3. Maximum torque 0.9Nm

4. All tolerances +/-0.5mm





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	Power Factor	0.97 typical
Input Fuse	Fast acting (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, 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

Ch3₂

Ch4₃

Case Option

-M

Connector Option

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

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

Blank no case
-C U chassis + cover
-U U chassis
-F End fan + case₁
-I End fan + case + IEC inlet₁

Number of outputs

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

- Needs 0H, 3H, 5H, TH or FH type channel 4.
The fan speed is temperature dependent, ensuring optimum cooling and lowest audible noise.
- For negative output channel 3, follow chosen letter by 'Y'. For example, TY channel 3 = -12V / 5A.
- 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 O 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 OH Fan supply only O 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%	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

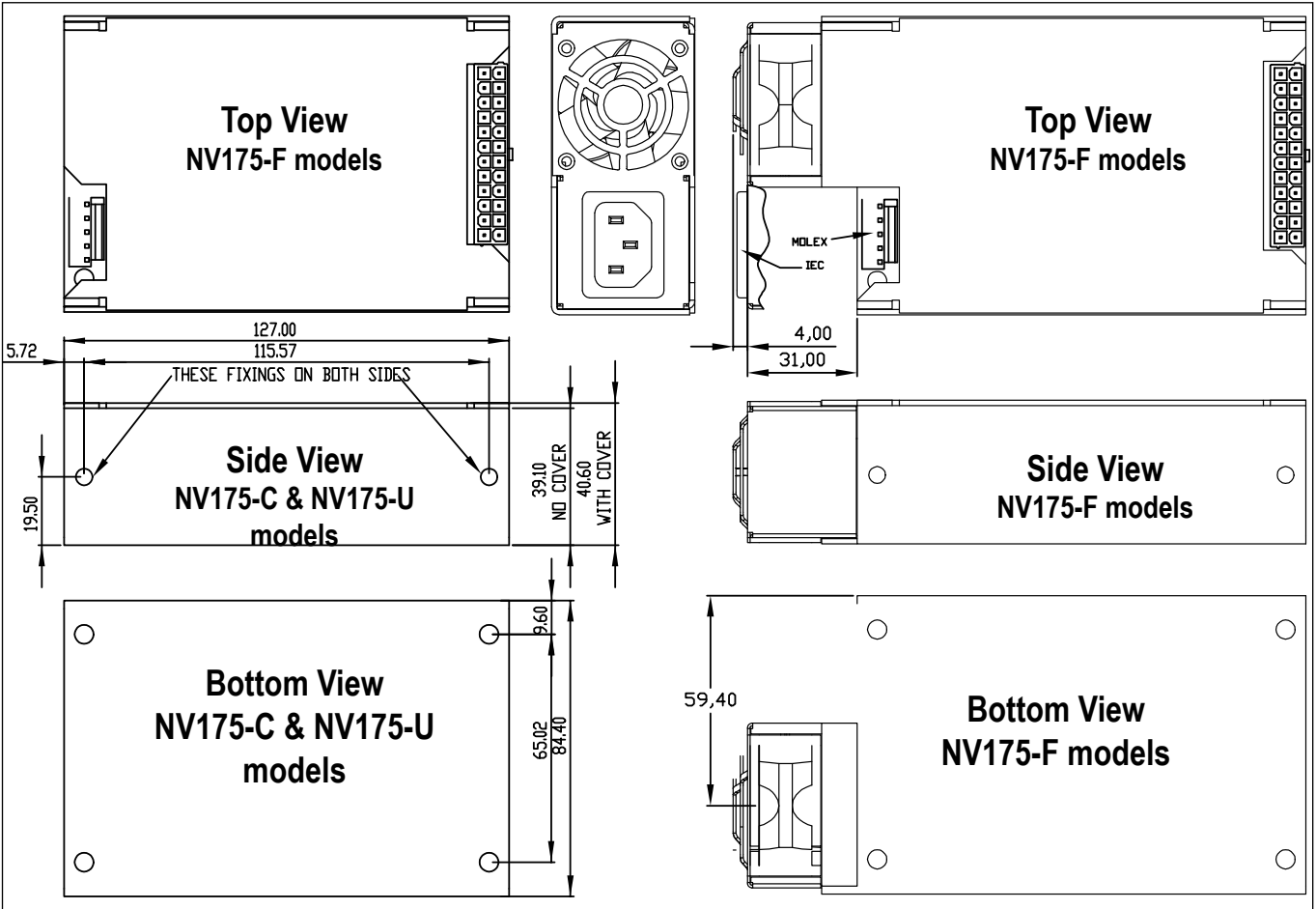
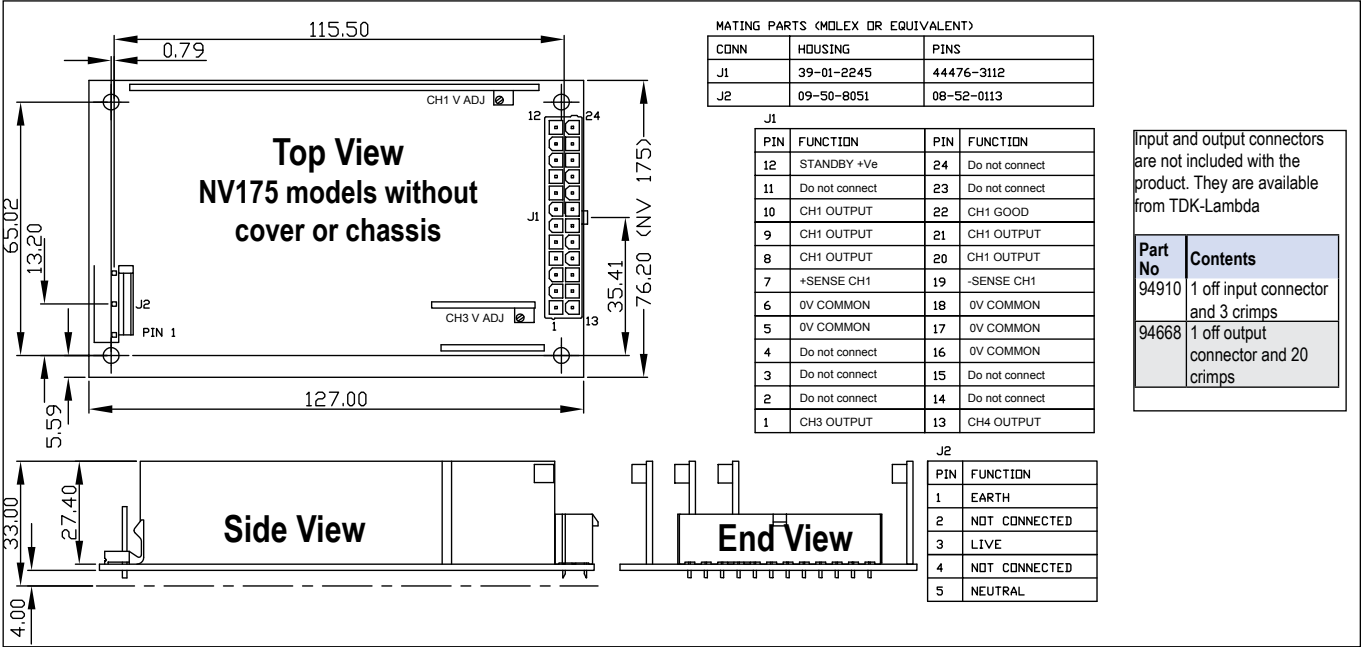
Environment	
Temperature	0°C to 50°C operational, -40°C to 70°C storage (max 12 months). Full load, with either '-F' option fitted or 2m/s air blown from input to output (approximately 10CFM)
Derating	50°C to 65°C derate each output by 2.5% per °C
Low Temp Startup	-20°C
Humidity	5 - 95% RH non condensing
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 IIb

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, EN55022	(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, EN55022	(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	File E349607
CAN/CSA-C22.2 No 60601-1-08	
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).	





Medical



Industrial



Test



Broadcast

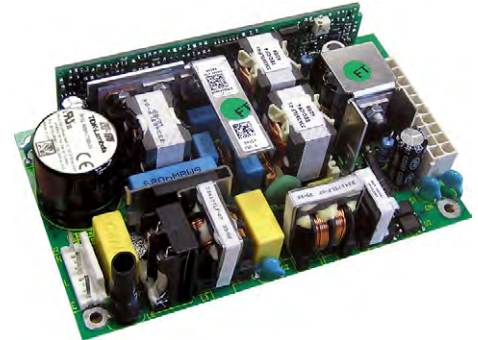


Comms



Renewable

180W Configurable Medical power supply.



Features

- High Efficiency
- Low Profile
- Dual Fusing
- 2 x MOPPs isolation
- 3 Year Warranty

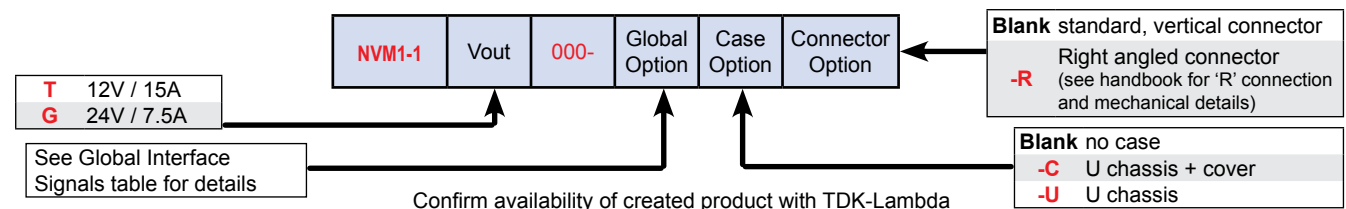
Benefits

- Minimises heat in system
- Fits 1U Applications
- Simplifies system design, reduces cost
- Simplifies system design
- Low cost of ownership

Input

Input Voltage	90-264Vac (100 - 240Vac nominal)	Input Frequency	45 - 63Hz
Input Harmonics	EN61000-3-2 compliant	Power Factor	0.97 typical
Input Fuse	Dual fused, Fast acting (not user accessible)	Inrush Current	<40A at 25°C and 230Vac (cold start)
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%	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	Power good = logic low signal to indicate when ac supply is good and output 1 is within regulation
S1	12V / 0.2A	Power good	Low	
S2	12V / 0.2A	Channel 1 good	High	Channel 1 good = logic low signal to indicate when output 1 is within regulation
S3	12V / 0.2A	Channel 1 good	Low	
S5	5V / 0.5A	Power good	Low	

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	<i>Please check with technical sales for status of approvals</i>
Designed and manufactured under the control of ISO9001 and ISO13485 (including risk management).	

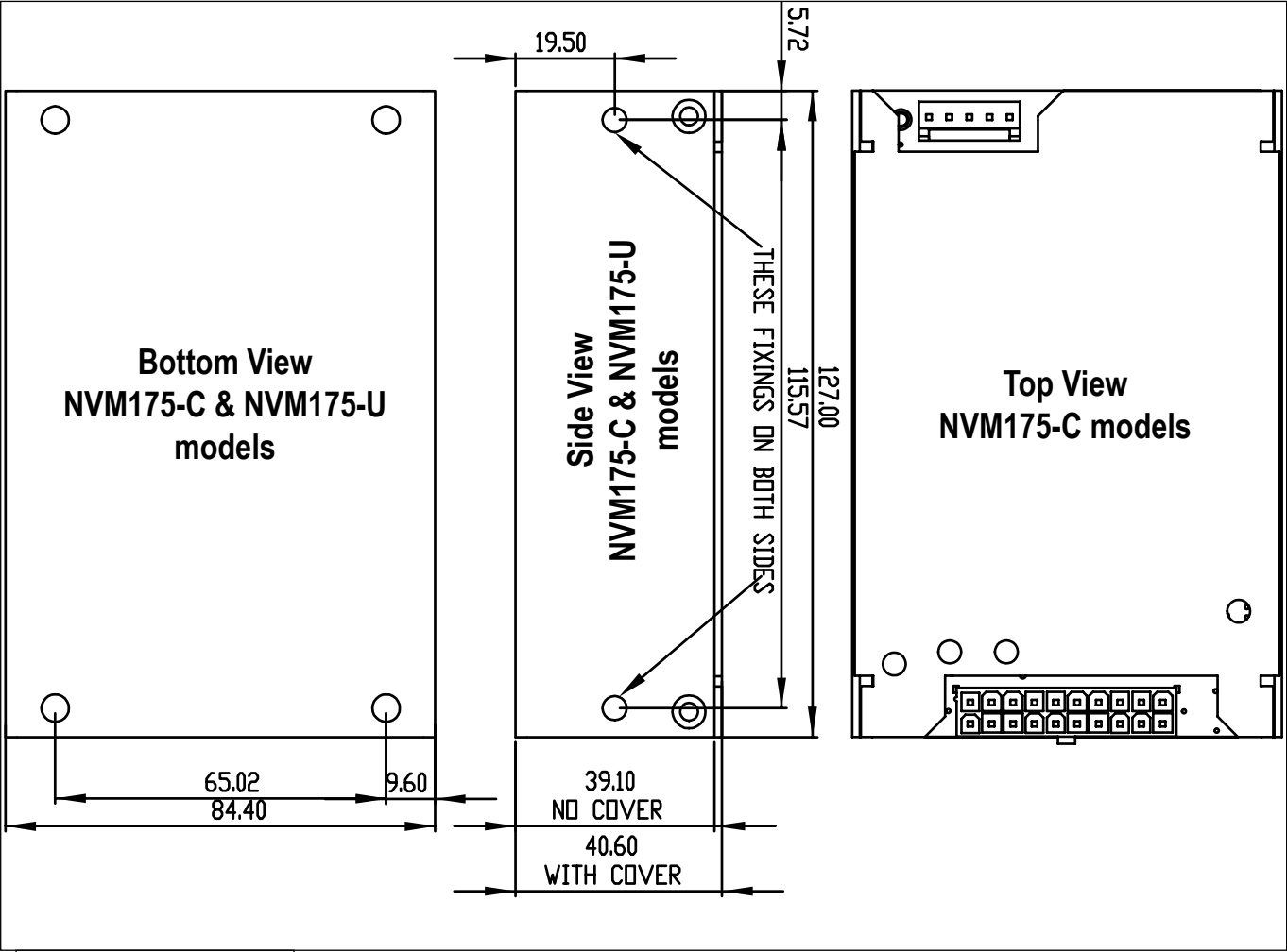
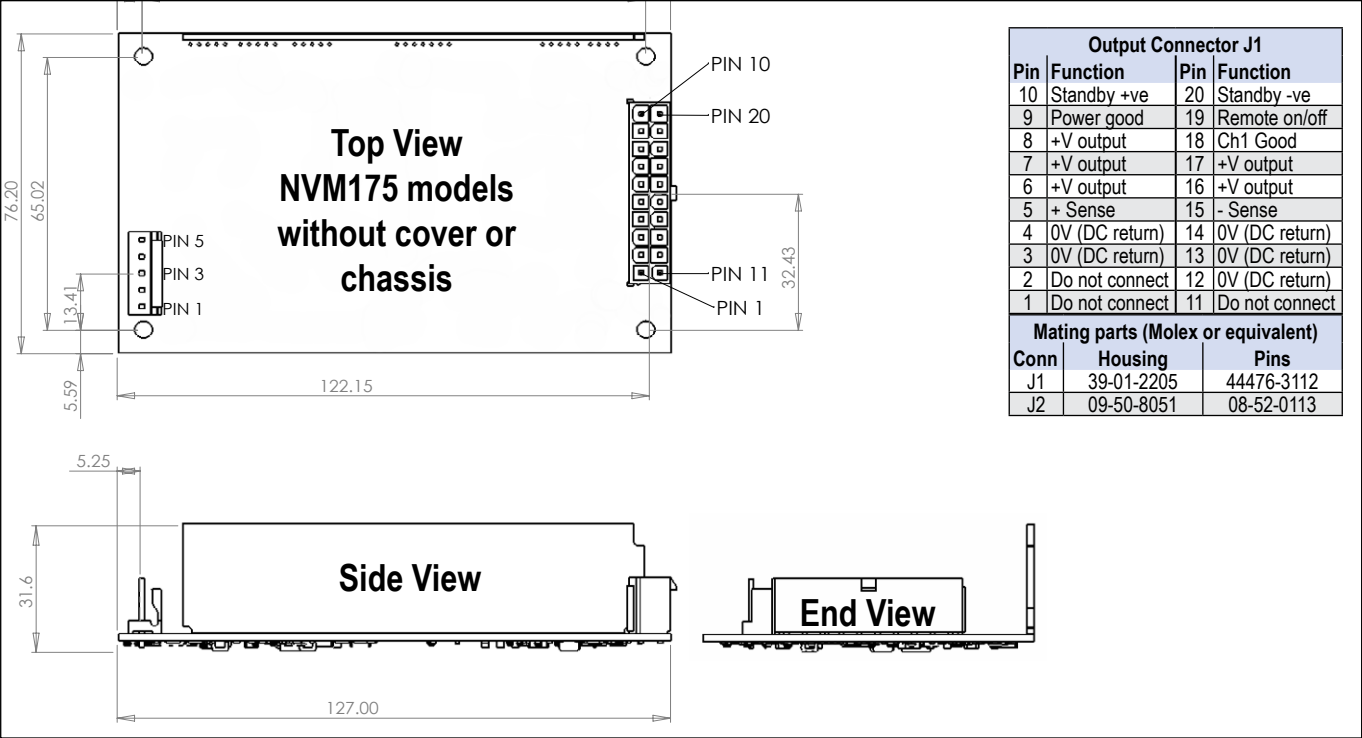
Immunity EN61000-6-2:2005, EN60601-1-2:2007

				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, EN55022	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B see application note for details.
Conducted Emissions	EN55011, EN55022	(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





- 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

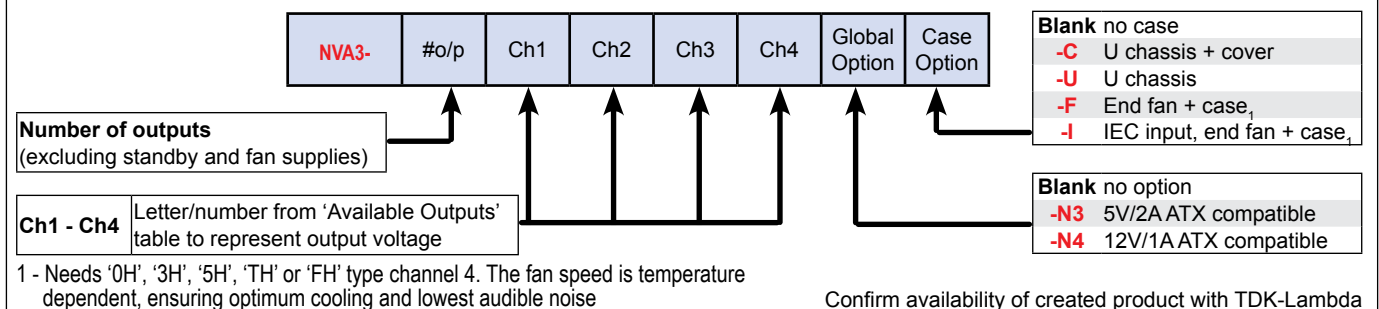
300W Configurable power supply.



Features	Benefits
• High Efficiency	Minimises heat in system
• Low Profile	Fits 1U Applications
• High Power Density	Requires less space
• Up To 5 Outputs	Eliminates need for additional supplies
• 3 Year Warranty	Low cost of ownership

Input			
Input Voltage	90-264Vac (below 100Vac input, derate by 3W / V)	Input Frequency	45 - 63Hz (440Hz with reduced PFC - consult sales office)
Input Harmonics	EN61000-3-2 compliant	Power Factor	0.97 typical
Input Fuse	6.3A Fast acting (not user accessible)	Inrush Current	15A typical 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, 0.5mA Single Fault Condition)		

How To Create A Product Description



QUICK SELECTOR - example configurations						
Model	Ch1	Ch2	Ch3	Ch4	Ch5	Global Option
NVA3-453TTH	5V / 40A	3.3V / 15A	12V / 5A	-12V / 2A	-	No
NVA3-453TTH-N3	5V / 40A	3.3V / 15A	12V / 5A	-12V / 2A	5V / 2A	ATX (-N3)
NVA3-350TTH	5V / 40A	-	12V / 5A	-12V / 2A	-	No
NVA3-350TTH-N3	5V / 40A	-	12V / 5A	-12V / 2A	5V / 2A	ATX (-N3)
NVA3-453FFH	5V / 40A	3.3V / 15A	15V / 5A	-15V / 2A	-	No
NVA3-453FFH-N3	5V / 40A	3.3V / 15A	15V / 5A	-15V / 2A	5V / 2A	ATX (-N3)
NVA3-350FFH	5V / 40A	-	15V / 5A	-15V / 2A	-	No
NVA3-350FFH-N3	5V / 40A	-	15V / 5A	-15V / 2A	5V / 2A	ATX (-N3)



AVAILABLE OUTPUTS															
Channel 1		Adjustment Range ₅		Channel 2 ₁		Adjustment Range ₅		Channel 3		Adjustment Range ₅		Channel 4 ₃		Adjustment Range	
5	5V / 40A ₂	5 - 5.5V		1	1.8V / 15A	0.9 - 2.5V		T	12V / 5A ₄	12 - 15V		3H	-3.3V / 2A ₈	Fixed	
				2	2.7V / 15A	2.5 - 3.8V									
				3	3.3V / 15A	2.5 - 3.8V									
				2H	2.7V / 24A	2.5 - 3.8V									
				3H	3.3V / 24A	2.5 - 3.8V									
				0	Omit										
T	12V / 25A	12 - 13V		5	5V / 10A	3.3 - 5.5V		TH	12V / 8A ₆	12 - 15V		5H	-5V / 2A ₈	Fixed	
				5H	5V / 16A	3.3 - 5.5V		F	15V / 4A ₄	12 - 15V		TH	-12V / 2A ₈	Fixed	
				0	Omit		FH	15V / 6.4A ₆	12 - 15V		FH	-15V / 2A ₈	Fixed		
G	24V / 12.5A	24 - 28V ₇		0	Omit			G	24V / 2.5A	18 - 24V		0H	Fan supply only		
				5	5V / 8A	5 - 5.5V		0	Omit		0	Omit			
				5H	5V / 12.5A	5 - 5.5V									
				T	12V / 10A	12 - 15.5V									
				F	15V / 10A	12 - 15.5V									
				0	Omit										

1. 1, 2, 3, 2H & 3H channel 2 only available with 5V channel 1.
5V / 10A channel 2 only available with 12 or 15V channel 1.
5V / 8A channel 2 only available with 24V channel 1
2. Maximum combined output current from Ch1 + Ch2 = 40A
3. Follow output letters by 'P' for positive output channel 4.
4. 60W max output power
5. Max voltage at the output (includes remote sense)
6. 96W max output power
7. 24-24.5V if any channel 2 fitted
24 - 26V is 24V channel 3 fitted
8. 1.5A max if fitted with 'F' option.

Other output options are available, please consult TDK-Lambda with your requirements

Output Specification		
Voltage / Current	See available outputs	
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 1.5% for units with 5V channel 1
Voltage Accuracy	±1%	±5% for Channel 4
Remote Sense	Yes	Channels 1 & 2. Max 0.5V total line drop
Minimum Load	No	on any output
Total Regulation	1.5%	For channels 1, 2 and 3 (2.5% for channel 4) 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	<5%	of set voltage for 40% 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	
Ch1 Good Signal	Yes	Provides a Logic 'Low' signal after Channel 1 output is within 90% (±5%) of nominal.
Output Power	300W	Total output power from all outputs for Vin above 180Vac, max output power = 300W + standby supply

Isolation		
Input to Output	Reinforced	2 x MOOPs (3rd edition 60601) 4.3kVdc
Input to Earth	Basic	2.3kVdc
Output to Earth		200Vdc



Global Interface Signals - units fitted with N3 or N4 options

ATX Remote on/off	TTL high or open circuit will inhibit 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

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 1.5m/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
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 198Vac nominal input	A
Voltage Fluctuations	EN61000-4-14	Class 3	For 100 - 240V Nominal	A

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

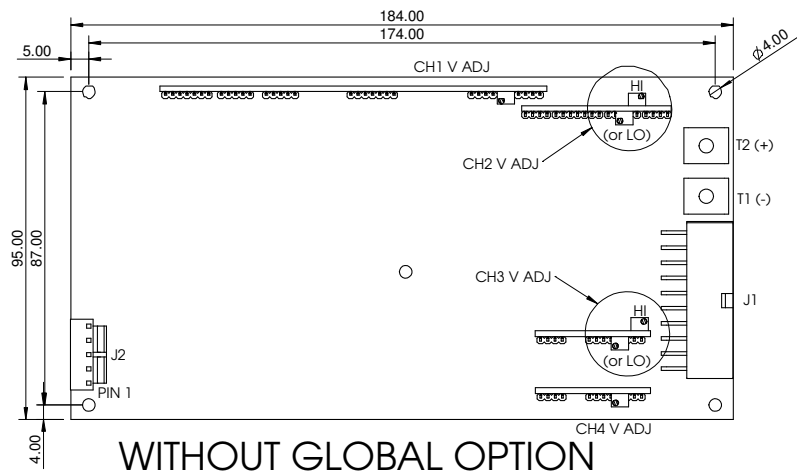
Radiated Electric Field	EN55011, EN55022	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B see application note for details. Additional filtering required for IEC inlet version.
Conducted Emissions	EN55011, EN55022	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B
Conducted Harmonics	EN61000-3-2	Class A
Flicker	EN61000-3-3	Compliant - d _{max} only

Approvals / Accreditations

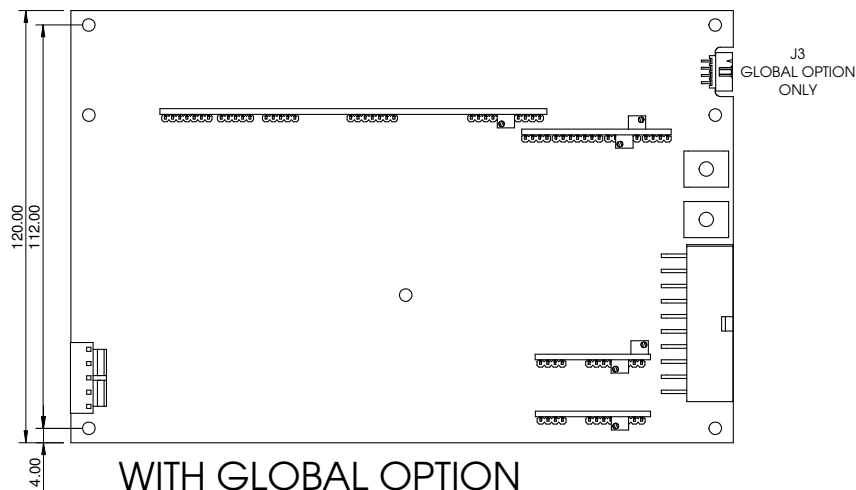
IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1	File E135494
IEC/EN 60601-1, UL/CSA 60601-1, ANSI/AAMI ES60601-1 CAN/CSA-C22.2 No 60601-1-08	File E349607
IEC/EN 61010-1	Designed to meet
CE Mark (EN60950-1)	LV Directive 2006/95/EC
CB certificate and Report available on request	<i>Please check with technical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



OUTLINE & CONNECTION DRAWINGS



WITHOUT GLOBAL OPTION



WITH GLOBAL OPTION

J2

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

J1

PIN	CONNECTION	PIN	CONNECTION
11	0V COMMON	1	0V COMMON
12	0V COMMON	2	0V COMMON
13	CH2 +Ve	3	CH2 +Ve
14	CH2 +Ve	4	CH2 +Ve
15	+SENSE CH1	5	-SENSE CH1
16	+SENSE CH2	6	-SENSE CH2
17	CH1 GOOD	7	N/C
18	CH3 +Ve	8	CH3 +Ve
19	0V COMMON	9	0V COMMON
20	CH4 O/P	10	CH4 O/P

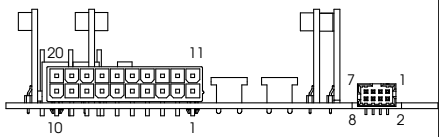
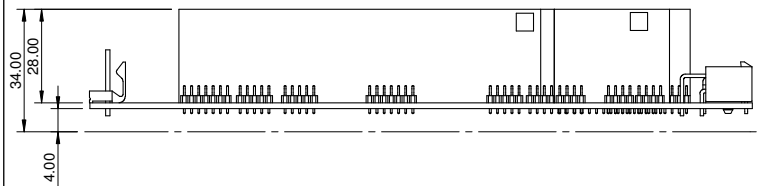
T1 & T2 (SEE TOP LEFT)

J3 (GLOBAL OPTION ONLY)

PIN	CONNECTION	PIN	CONNECTION
1	STANDBY -Ve	5	N/C
2	STANDBY +Ve	6	N/C
3	STANDBY -Ve	7	POWER GOOD
4	STANDBY +Ve	8	REM ON/OFF

MATING PARTS (MOLEX OR EQUIVALENT)

CONNECTOR	HOUSING	CRIMP PIN
J1	39-01-2205	44476-3112
J2	09-50-8051	08-52-0113
J3	51110-0860	50394
T1 & T2	N/A	TAG 19073-0165



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

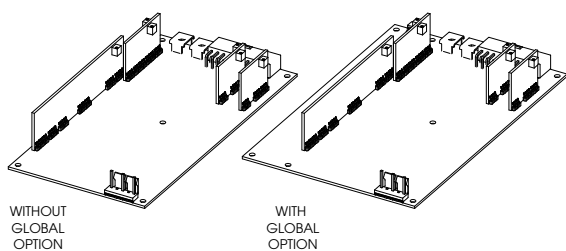
Input and output connectors are not included with the product. They are available from TDK-Lambda

1 off input connector and 3 crimps part number is 94910.
1 off output connector and 20 crimps part number is 94912.

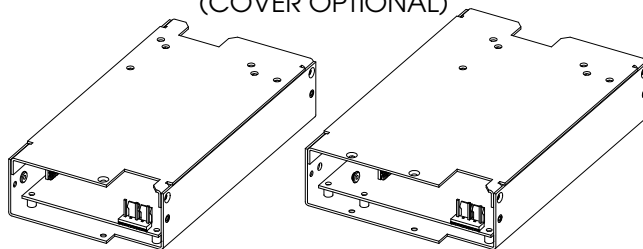


OUTLINE & CONNECTION DRAWINGS

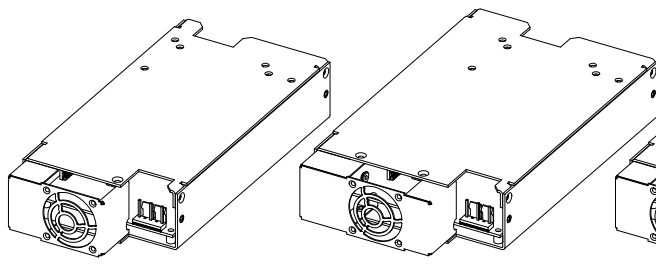
OPEN FRAME



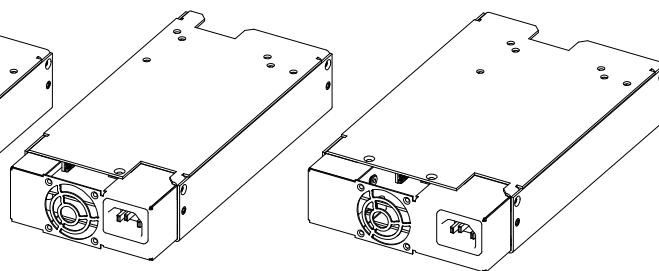
'U' CHASSIS (COVER OPTIONAL)



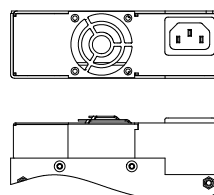
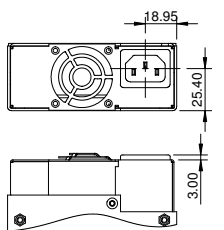
FAN OPTION



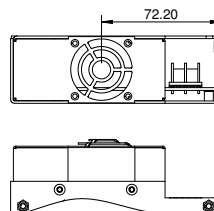
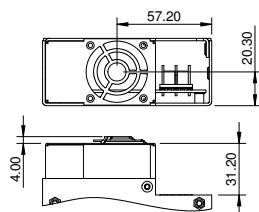
FAN+IEC OPTION



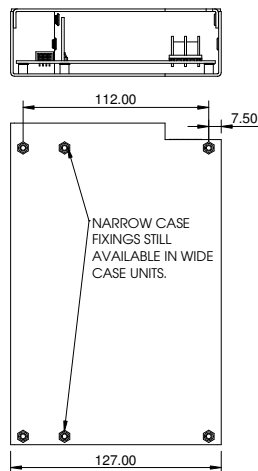
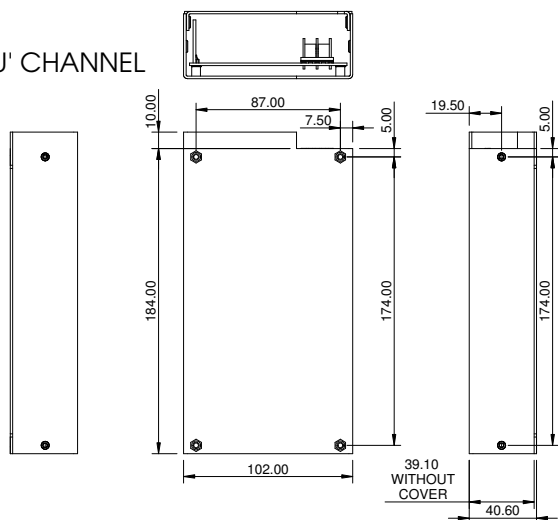
FAN+IEC OPTION



FAN OPTION



'U' CHANNEL



Notes

1. All customer fixings are M3
2. Maximum thread penetration 4.5mm
3. Maximum torque 0.9Nm
4. All tolerances $\pm 0.5\text{mm}$





Renewable



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			
B1L	1.8	-	3.8 _e	20	1	H1L/1L	1.8 - 3.8 _n 12			1.8 - 3.8 _n		8	1			
C1	1.8	-	4.1 _e	35	1	H1L/1H				3.9 - 5.5 _d		8	1			
C1Y	1.8	-	4.1 _e	40	1	H1L/2				5.6 - 9 _f		6	1			
D1L	1.8	-	3.8	50	1.5	H1L/3				9.1 - 16.2 _u		6	1			
E1	1.8	-	3.8 _e	60	2	H1L/4	3.9 - 5.5 _d 12			16.3 - 25 _p		4.5	1			
F1 _a	1.8	-	3.8	80	2	H1H/1L				1.8 - 3.8 _n		8	1			
Z2	1.8	-	3.8 _e	95	3	H1H/1H				3.9 - 5.5 _d		8	1			
Z3	1.8	-	3.8 _e	114	4	H1H/2				5.6 - 9 _f		6	1			
B1H	3.9	-	5.5 _d	20	1	H1H/3	5.6 - 9 _f 10			9.1 - 16.2 _u		6	1			
L1	4.2	-	5.5 _d	35	1	H1H/4				16.3 - 25 _p		4.5	1			
D2	3.8	-	9 _k	45	1.5	H2/1L				1.8 - 3.8 _n		8	1			
D1H	3.9	-	5.5 _d	50	1.5	H2/1H				3.9 - 5.5 _d		8	1			
E2	3.8	-	8 _k	60	2	H2/2	9.1 - 16.2 _u 10			5.6 - 9 _f		6	1			
Z18	4.2	-	5.5	66	2	H2/3				9.1 - 16.2 _u		6	1			
F2 _a	3.8	-	8	75	2	H2/4				16.3 - 25 _p		4.5	1			
Z4	3.9	-	5.5 _d	95	3	H3/1L				1.8 - 3.8 _n		8	1			
Z6	3.9	-	5.5 _d	104	3.5	H3/1H	16.2 - 285			3.9 - 5.5 _d		8	1			
B2	5	-	9 _f	25	1	H3/2				9.1 - 16.2 _u		6	1			
B3	9.1	-	16.2 _g	12	1	H3/3				5.6 - 9 _f		6	1			
C3	9.1	-	16.2 _g	18	1	H3/4				9.1 - 16.2 _u		6	1			
D3	8	-	16.5 _g	24	1.5	H5/1L	16.3 - 25 _p 4.51			16.3 - 25 _p		4.5	1			
E3L	8	-	13.9 _i	40	2	H5/1H				1.8 - 3.8 _n		8	1			
Z7	8	-	16.5 _g	45	3	H5/2				3.9 - 5.5 _d		8	1			
EE2	7.6	-	16 _g	45	4	H5/3				5.6 - 9 _f		6	1			
D4	14	-	21.5 _i	18	1.5	H5/4	Wide Range Programmable Modules			9.1 - 16.2 _u		6	1			
E4	14	-	19.9 _m	30	2											
E3H	14	-	15	36	2	Module				Voltage Range	Current	Slots				
C4	16.3	-	21.5 _i	14	1	W2 _a				1 - 7.5	30	1	Select features from table below			
CC3	18.2	-	32.4 _j	18	2	W5				0.5 - 32	8.5	1				
E5L _v	20	-	24	27	2											
B5	21.6	-	31 _h	6	1	Follow by				F or T	Fixed or Tracking Overvoltage protection					
C5	21.6	-	31 _j	10	1					F or S	Fast-on or Screw output terminals					
D5	21	-	28	15	1.5					R or V	Resistance (0-32kΩ) or Voltage (0-5V) programming					
E5H _v	24	-	28	25	2					1 Inhibit, Fixed Current Limit						
Z19 _{co}	24	-	28	36	3.5					1, 2, 3 or 4 2 Inhibit, Programmable Current Limit (0-5V)						
HH5/3	25.3	-	44.2 _b	5	1					3 Enable, Fixed Current Limit						
DD4	28	-	43 _s	18	3					4 Enable, Programmable Current Limit (0-5V)						
EE4 _c	28	-	38	22.5	4											
HH5/4	32.5	-	53 _t	4.5	1	Follow non wide range modules by F (Fast-on) or S (Screw) output terminals										
BB4	32.6	-	43 _q	10	2											
EE5L _{co}	40	-	48	18	4	Options - Single output Modules*			Options - Twin output Modules*							
C5B4	43	-	48	10	2	N	Output Inhibit, Module Good & Current Sharing			N	Output Inhibit, Module Good & Remote Sense					
EE5H _o	48	-	56	18	4					R	Remote Sense only					
CC5	48.1	-	62 _r	10	2											
DD5	42	-	56	15	3	* 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



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	75%	typical 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
Temperature Coefficient	<0.02%	of rated voltage per °C
Load Regulation	<0.5% or 25mV	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	120 - 130%	of set voltage for outputs > 4.1V (tracking OVP)
	140 - 150%	of set voltage for outputs < 4.1V (tracking OVP)
	120 - 150%	of max rated output (Fixed OVP)
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 (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, EN55022	(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, EN55022	(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

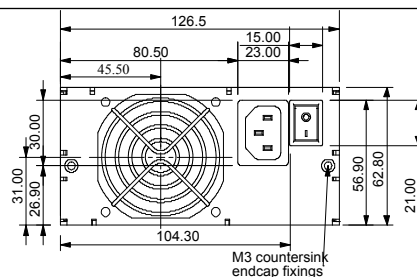
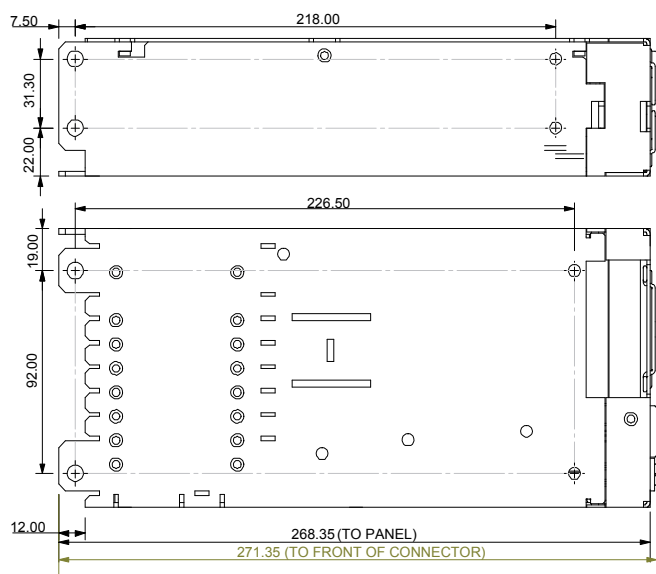
Immunity EN61000-6-2:2005, EN60601-1-2:2001

				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

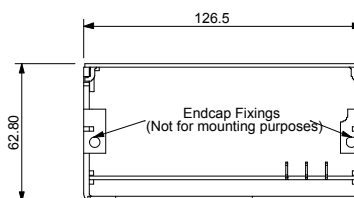
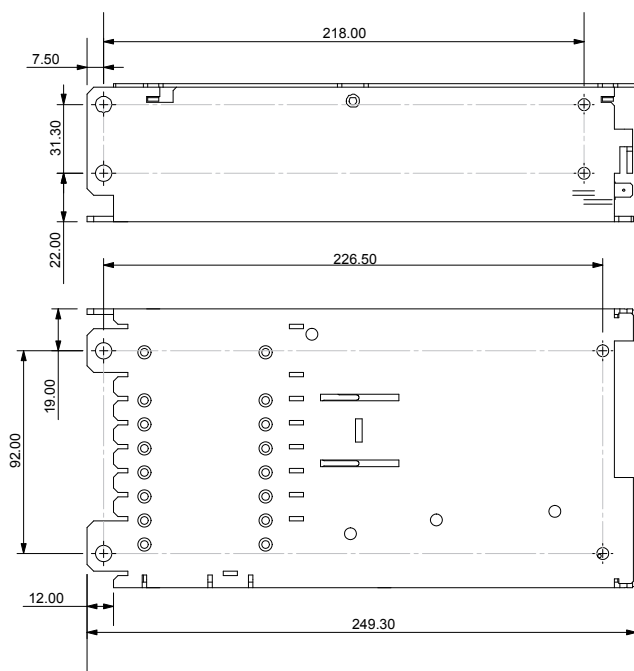
IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1	File E135494
IEC/EN 60601-1, UL/CSA 60601-1, ANSI/AAMI ES60601-1 CAN/CSA-C22.2 No 60601-1-08	File E349607 (not Vega dc, only for L, R and T leakage variants)
IEC/EN 61010-1	File E331788
CE Mark (EN60950-1)	LV Directive 2006/95/EC
CB certificate and Report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



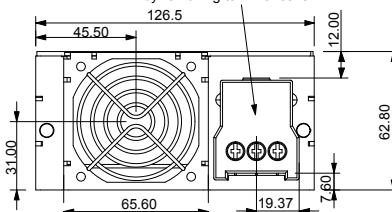
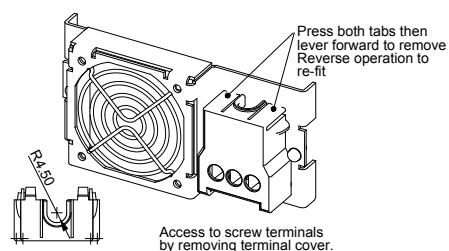
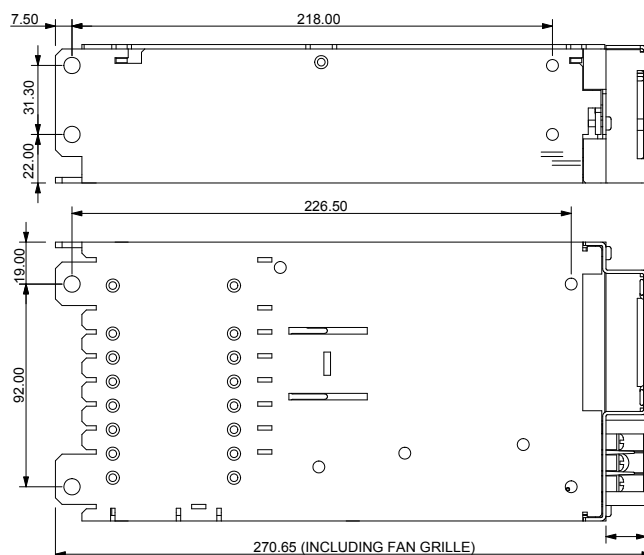


IEC-320 Connector Case

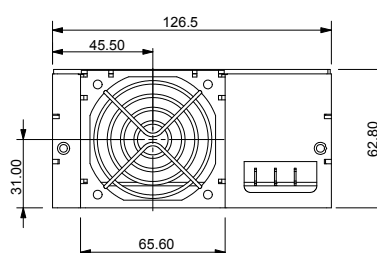
All versions have:-
8 x M4 Customer fixings
Max thread penetration:- 4.5mm



Customer Air Case (no fan)



Screw & Fast-on Terminal Case





Medical



Industrial



Test



Broadcast



Comms



Renewable

550W - 900W
Modular power supply.



Features

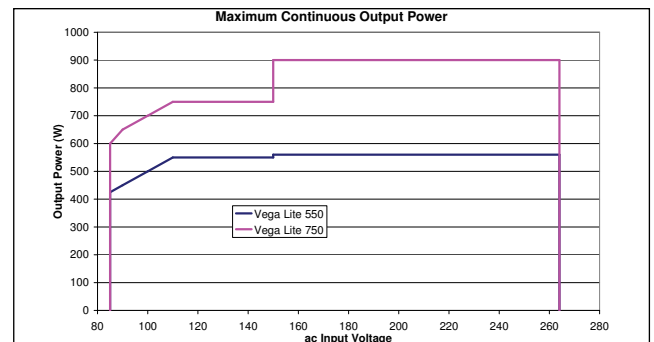
- Industry Leading Flexibility
- Screw, Fast-on or IEC connection
- Worldwide Safety Approvals
- Up to 11 outputs
- 3 Year Warranty

Benefits

- Suits your application
- Simplifies design into system
- Supports global use
- Eliminates need for additional supplies
- 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
Power Factor	0.99 typical



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				

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 5L1SN)
- 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)

Output Voltage	1 slot wide		1.5 slots wide		2 slots wide		3 slots wide	
	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							
Channel 2	Output Voltage	5V / 12A	12V / 10A	15V / 10A	18V / 5A	24V / 5A	28V / 5A
	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)

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
C1S	1.8	- 3.4	35	1	H1H/1LS	3.9 - 5.1	12	1.8 - 3.4	8	1
D1LS	1.8	- 3.8	50	1.5	H1H/3S	3.9 - 5.1	12	9.1 - 15.5	6	1
E1S	1.8	- 3.4	60	2	H3/1HS	9.1 - 15.5	10	3.9 - 5.1	8	1
L1S	4.2	- 5.1	35	1	H3/3S	9.1 - 15.5	10	9.1 - 15.5	6	1
D2S	3.8	- 7.5	45	1.5	H5/1H	16.2 - 28	5	3.9 - 5.1	8	1
D1HS	3.9	- 5.1	50	1.5	H5/3	16.2 - 28	5	9.1 - 15.5	6	1
E2S	3.8	- 7.5	60	2	H5/4	16.2 - 28	5	16.3 - 24	4.5	1
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						
					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 Earth / 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 25mV	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	120 - 130%	of set voltage for outputs > 4.1V (tracking OVP)
	140 - 150%	of set voltage for outputs < 4.1V (tracking OVP)
	120 - 150%	of max rated output (Fixed OVP)
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, EN55022	(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, EN55022	(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

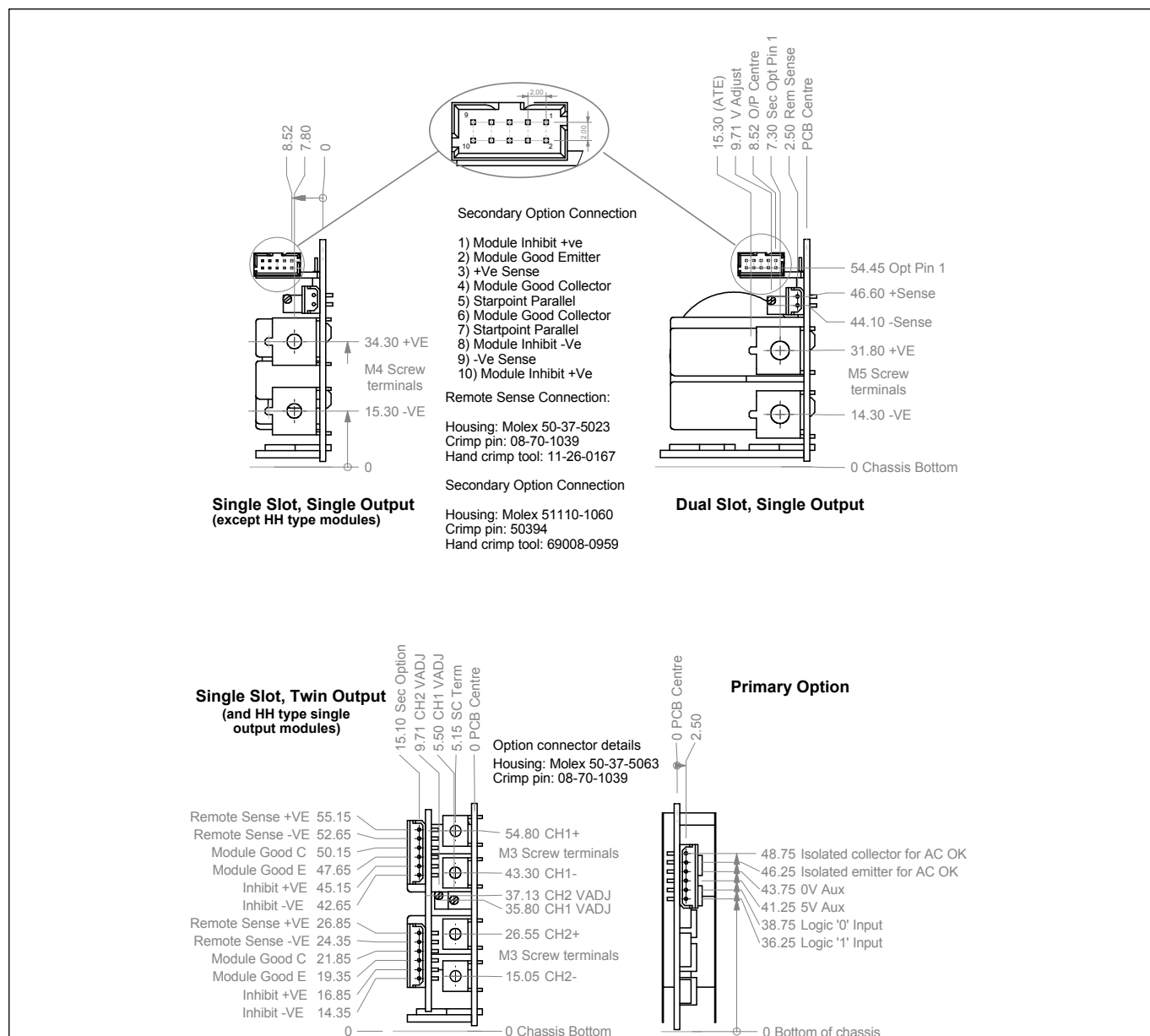
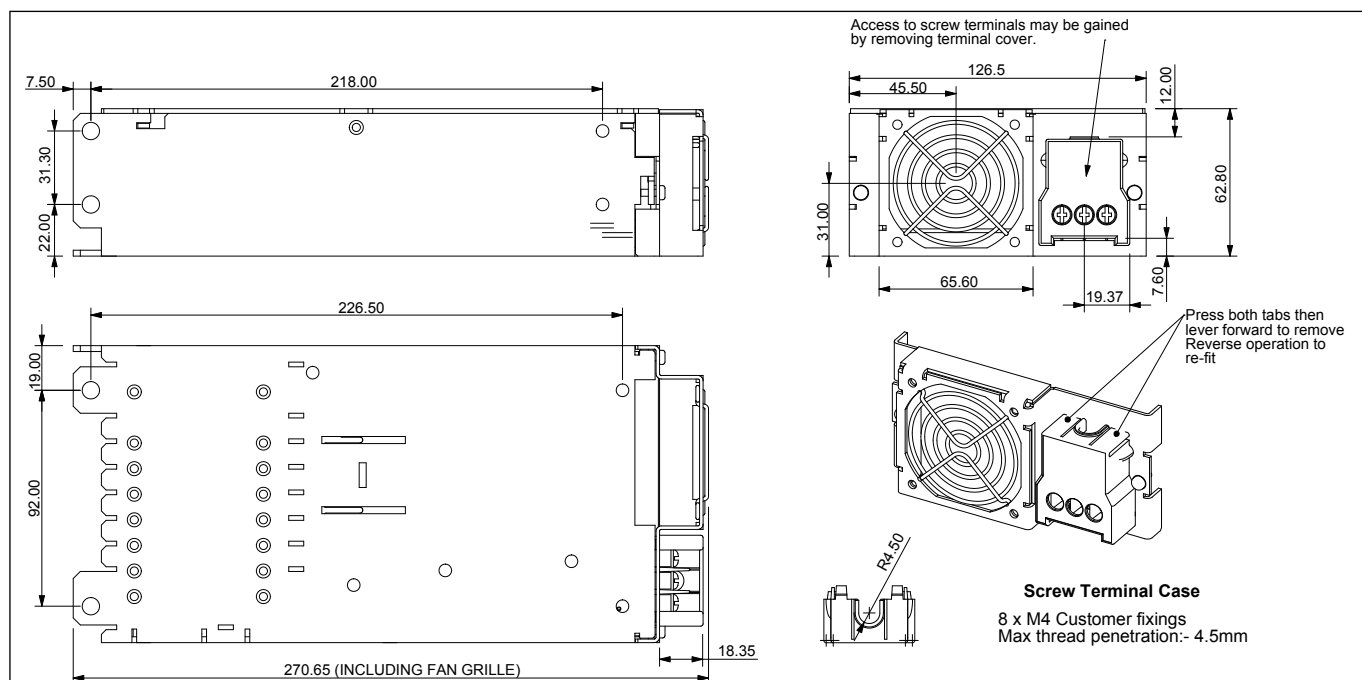
Immunity EN61000-6-2:2005, EN60601-1-2:2001

				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	<i>Please check with technical sales for status of approvals</i>
Designed and manufactured under the control of ISO9001 and ISO13485 (including risk management).	



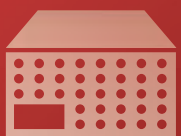




AC-DC Power Supplies

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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





- ErP¹, CEC² and EISA³ Compliant Models
- Wide Range AC Input
- Medical Certifications

Key Market Segments & Applications

Medical, Industrial Computing,
Life Sciences / Laboratory

DTM65-C Series

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

DTM65-C Features and Benefits

Features

- CEC and EISA Compliant
- Wide Range AC Input
- 87% Average Efficiency

Benefits

- Easier system compliance
- Global Operation
- Consumes less energy

Specifications

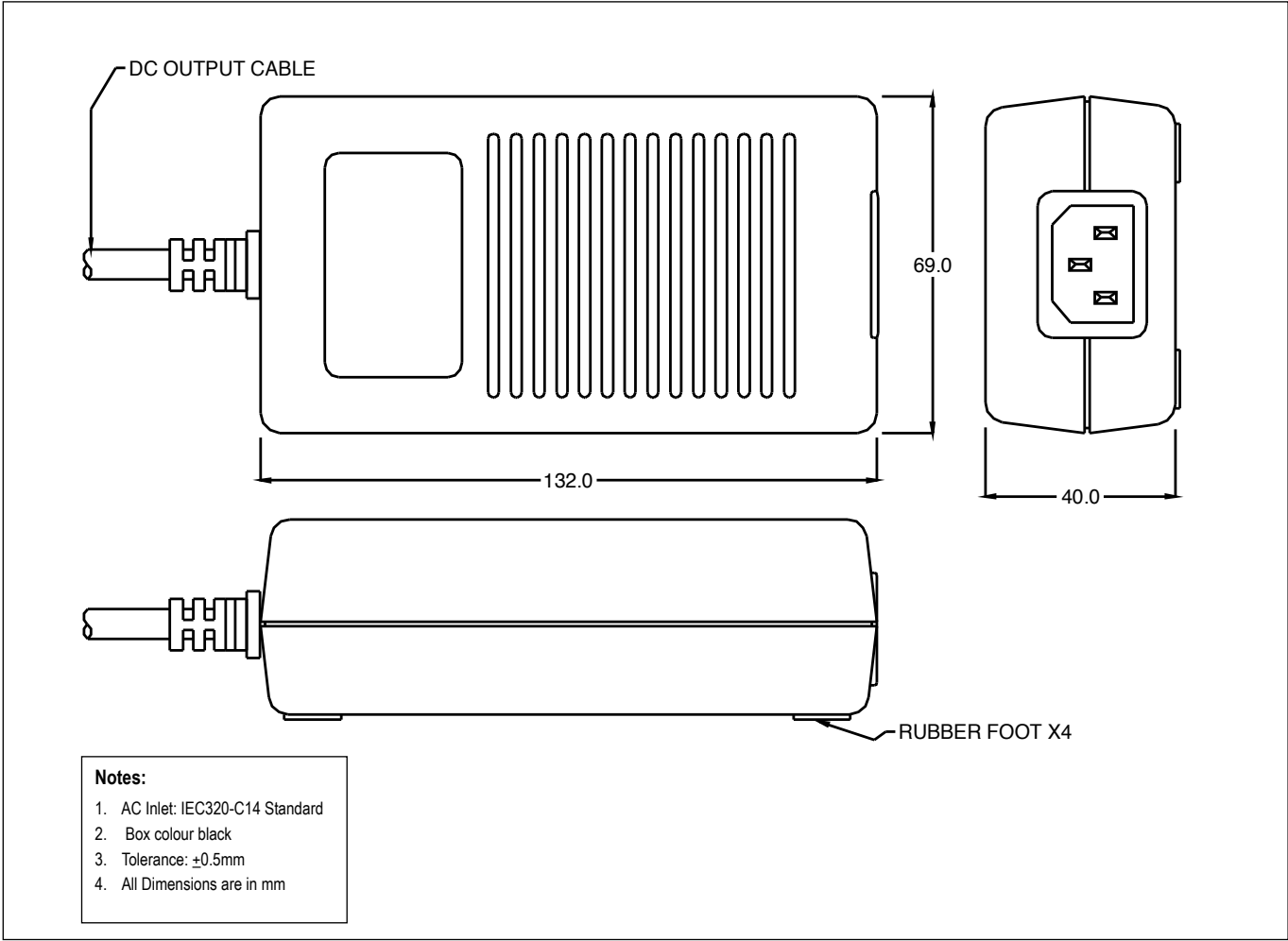
ITEMS		DTM65-C
Input Voltage range		90 - 264VAC (47 - 63Hz)
Inrush Current	A	100A at 230VAC input, 25°C ambient cold start
Input Current	A	2A at 90VAC, Full Load
Power Factor		None
Leakage Current (264VAC 63Hz)	mA	<300uA
Hold Up Time (Typ)	ms	16ms at 230VAC input
Temperature Coefficient		±0.05%/°C
Voltage Accuracy	%	±1%
Adjustment Range		None
Minimum Load	A	None
Total Regulation		12V Model: ±5%, >15V models ±3%
Ripple & Noise	%	1% or 100mV whichever is the greater
Short Circuit Protection	-	Continuous - hiccup mode
Overvoltage Protection	V	110 - 150% of nominal (Cycle input power to reset)
Average Efficiency	%	87%
Operating Temperature	°C	0 to +50°C
Storage Temperature	°C	-10 to +70°C
Humidity (non condensing)		10 - 90% RH
Cooling	-	Convection
Withstand Voltage		Input to Ground 1.5kVAC, Input to Output 4kVAC (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	3000m
Offload Power Consumption	W	< 0.5W
Conducted & Radiated EMI		EN60601-1-2, FCC Part 18 Class B
Immunity		EN55011
Weight (Typ)	g	460g
Size (WxLxH)	mm	69 x 132 x 39.9
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
DTM65PW120C	12	5.0	60	Step 2	V	V
DTM65PW150C	15	4.0	60	Step 2	V	V
DTM65PW180C	18	3.6	65	Step 2	V	V
DTM65PW240C	24	2.7	65	Step 2	V	V
DTM65PW360C	36	1.8	65	Step 2	V	V
DTM65PW480C	48	1.35	65	Step 2	V	V

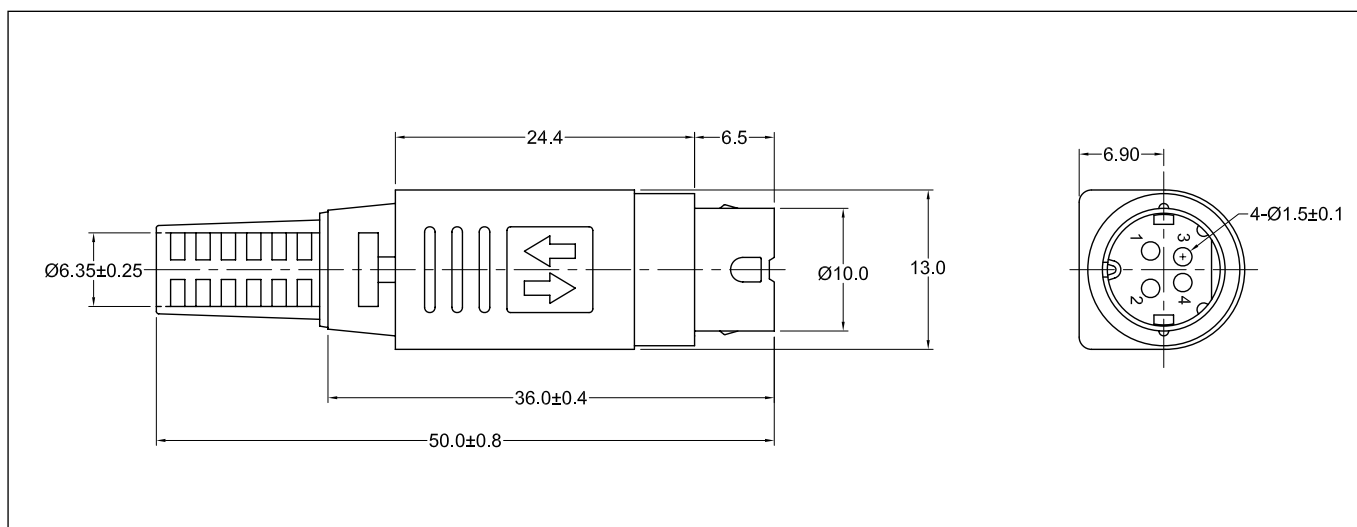
Outline Drawing DTM65-C Series



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



DTM65-C Output Connector



Pinout DTM65-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)





- ErP¹, CEC² and EISA³ 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

- CEC and EISA Compliant
- Wide Range AC Input
- 87% Average Efficiency

Benefits

- Easier system compliance
- Global Operation
- Consumes less energy

Specifications

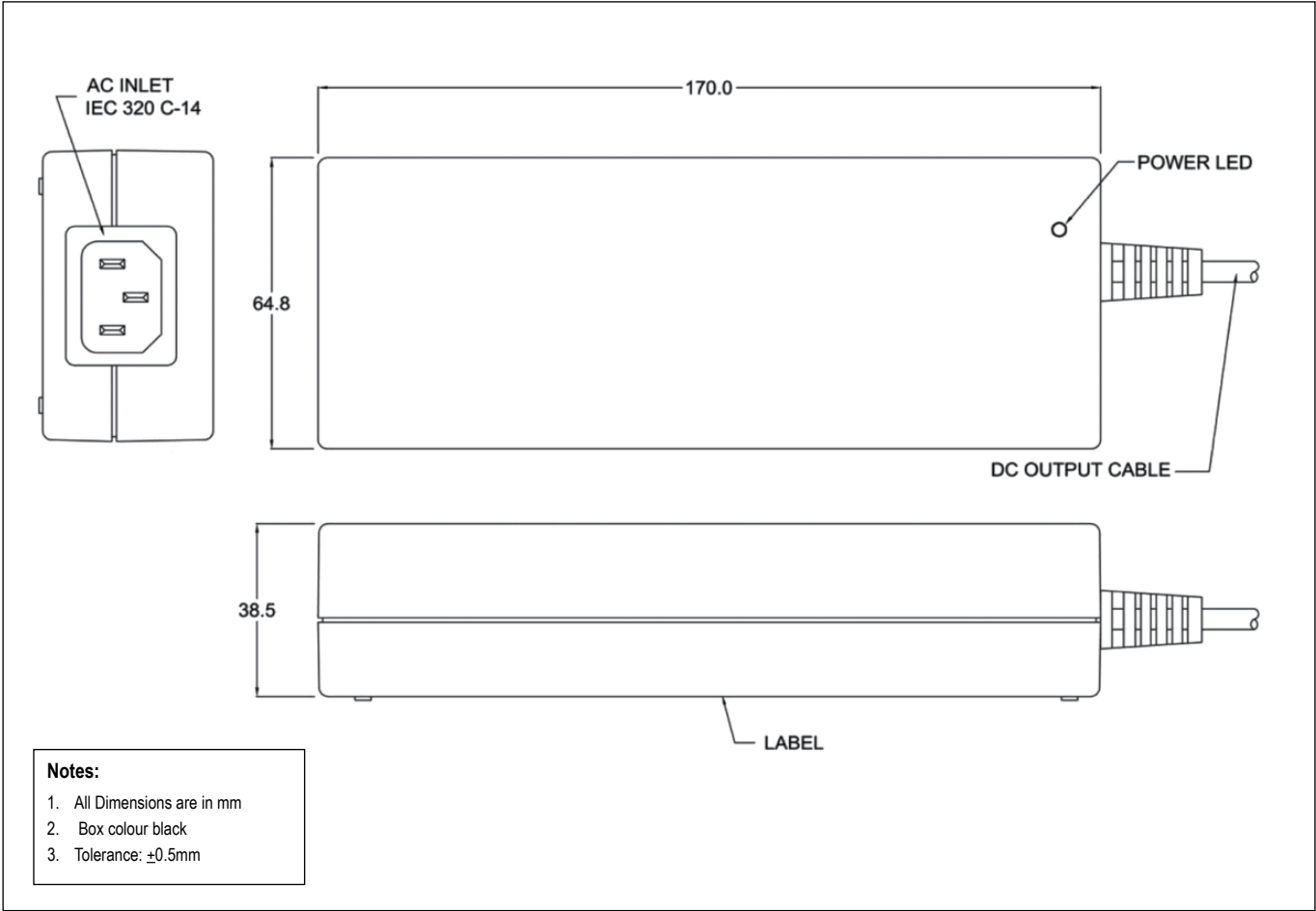
ITEMS		MODELS	DTM110PWxxx-C
Input Voltage range	VAC		90 - 264VAC (47 - 63Hz)
Inrush Current	A		100A at 230VAC input, 25°C ambient cold start
Input Current	A		2A at 90VAC, Full Load
Power Factor	-		Meets EN61000-3-2. >0.9 PF
Leakage Current (264VAC 60Hz)	μA		Typically 300μA
Hold Up Time (Typ)	ms		>10ms
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 (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		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

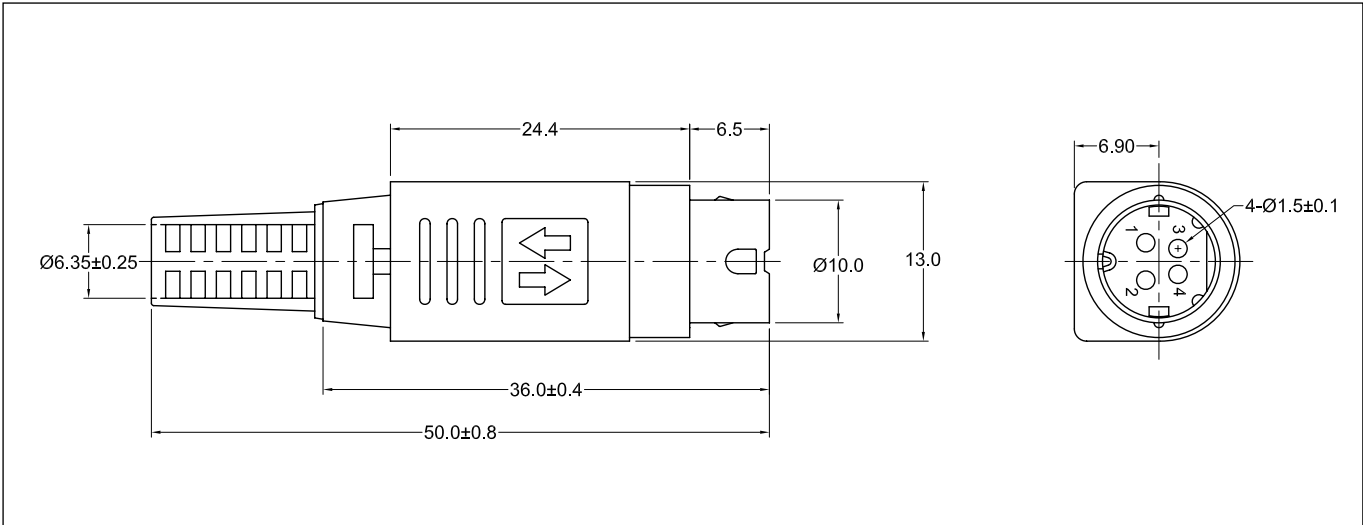
Outline Drawing DTM110-C Series



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)





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



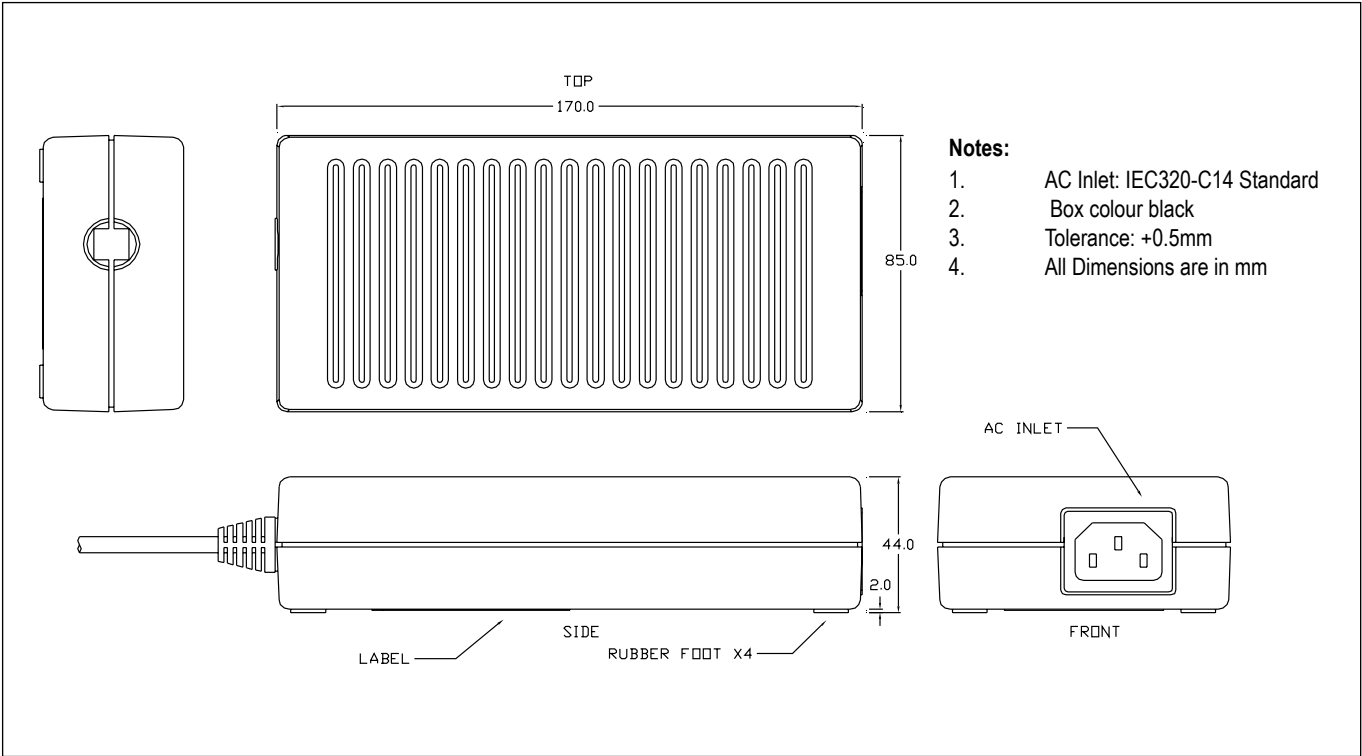
Specification		
Model	DT150PWxxx-C	
Input Voltage range	-	90 - 264VAC (47 - 63Hz)
Inrush Current	A	<60A at 230VAC input, 25°C ambient cold start
Input Current (Maximum)	A	2.5A
Power Factor	-	Typically 0.9 at full load (Meets EN61000-3-2)
Leakage Current	µA	<600µA at 264VAC 60Hz
Hold Up Time (Typ)	ms	>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





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

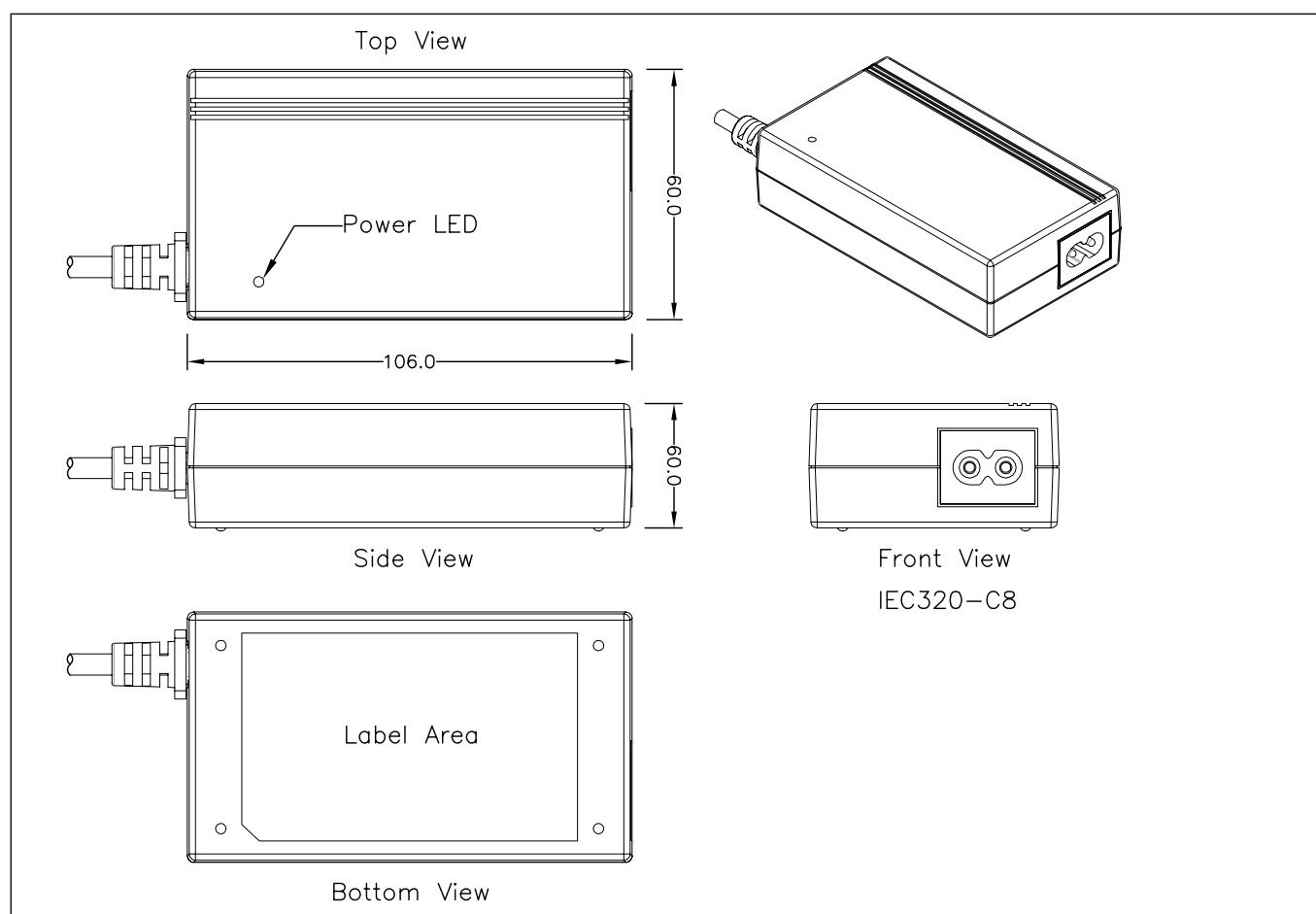
Specification		
Model		DTM65-C8
Input Voltage Range	VAC	90 - 264VAC (47 - 63Hz)
Inrush Current	A	<100A at 230VAC input, 25°C ambient cold start
Input Current	A	2A at 90VAC, Full Load
Power Factor	-	None
Hold Up Time (Typ)	ms	10ms at 115VAC input
Temperature Coefficient		±0.05%/°C
Voltage Accuracy	%	±1%
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	-	IP21
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





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

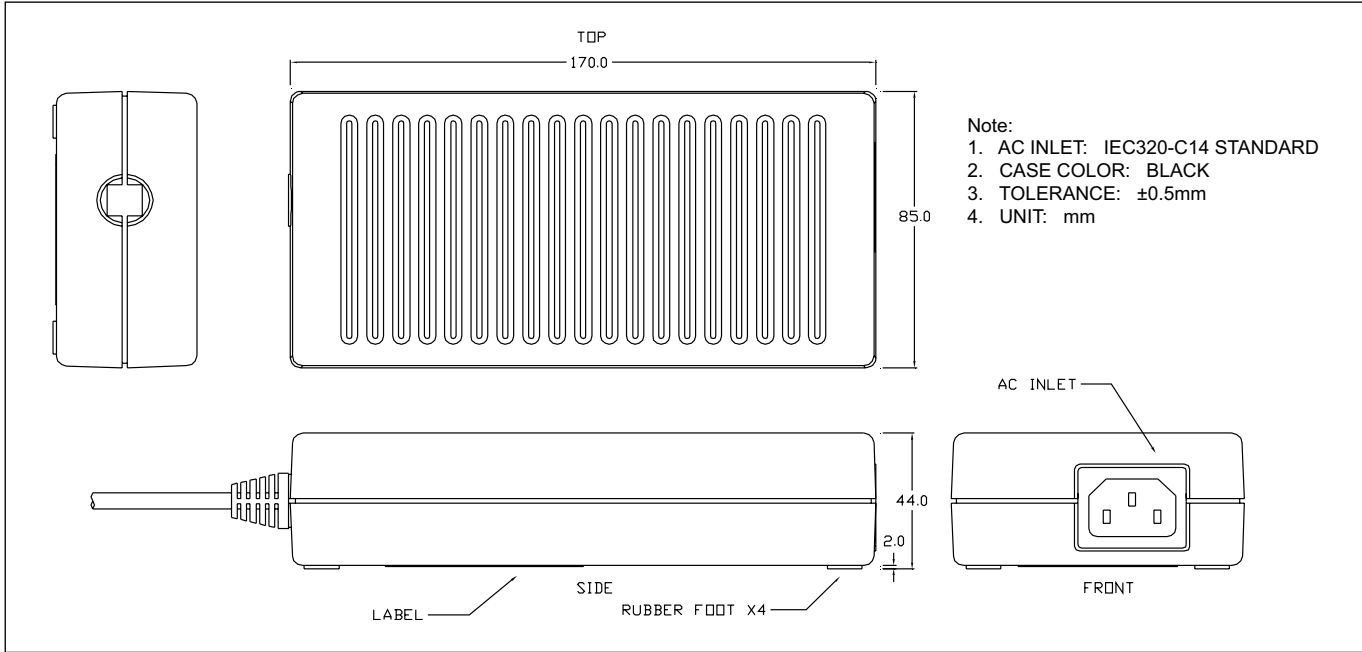
Notes: (1) EISA - Energy Independence and Security Act of 2007

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) (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 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



Output Rating			
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

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

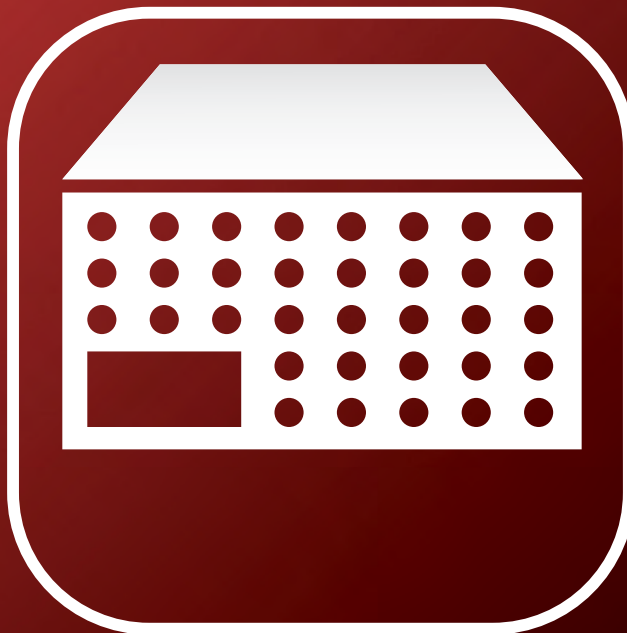




AC-DC Power Supplies

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HWS-/ME Series	99	ZPSA40 & 60 Series	160
HWS15A-150A Series	102	ZPSA100 Series	163
HWS300-1500 Series	107	ZWD-PAF Series	166
HWS300P & 600P Series	110	ZWQ Series	169
JWT Series	113	ZWS 150BP-240BP Series	172
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MTW Series	126		



Chassis mount

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





Industrial



Test



Broadcast



Comms



Renewable

**500W single output, conduction/
baseplate cooled power supply**

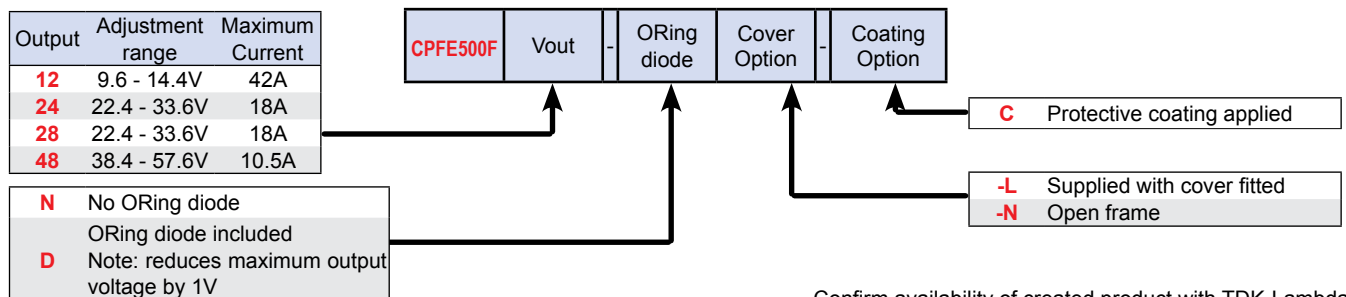


Features	Benefits
• Fanless	Longer field life and no fan noise
• Baseplate cooled	Conducts heat outside of the system
• Wide range ac input	Supports global use
• Diode ORing + share option	Increase system reliability
• 2 Year Warranty	Low cost of ownership

Input			
Input Voltage	90-265Vac	Input Frequency	47 - 63Hz (440Hz with reduced PFC - consult sales office)
Input Harmonics	EN61000-3-2 compliant	Power Factor	0.95 typical
Input Fuse	Fast acting (not user accessible)	Inrush Current	<40A at 25°C and 230Vac (cold start) (meets EN61000-3-3)
Earth Leakage Current	1.5mA at 230Vac (50Hz)		

QUICK SELECTOR - example configurations			Additional variants available, see "How to Create a Product Description"	
Output Voltage	Max Output Current	ORing diode?	Units with cover	
			Description	Order Code
12V	42A	Yes	CPFE500F-12-DL-C	T800097
		No	CPFE500F-12-NL-C	T800100
24V	18A	Yes	CPFE500F-24-DL-C	T800111
		No	CPFE500F-24-NL-C	T800122
28V	18A	Yes	CPFE500F-28-DL-C	T800133
		No	CPFE500F-28-NL-C	T800144
48V	10.5A	Yes	CPFE500F-48-DL-C	T800155
		No	CPFE500F-48-NL-C	T800166

How To Create A Product Description



Isolation			
Input to Output	4.24kVdc		
Input to Earth	2.12kVdc	Output to Earth	500Vdc



Output Specification

Total Output Power	504W	Continuous. Do not exceed maximum output current in 'How to create a product description'
Turn on time	1.5s max	at 90Vac and 100% rated output power
Efficiency	85%	typical (at 75% load, without ORing diodes, 230Vac input)
Hold up	10ms	typical at 230Vac, 100% load
Ripple and Noise	<1%	pk-pk, using EIAJ test method & 20MHz bandwidth (1.5% below -10°C)
Voltage Setting Accuracy	±2%	at 50% load
Remote Sense	Yes	Max 0.5V total line drop
Minimum Load	No	
Total Regulation	<4%	Including Line (for 90-264Vac input change), Load (for 0-100% load change) and Temperature (0-50°C). The ORing diode option adds 1V to the load regulation specification.
Transient Response	<10%	of set voltage for 50% load change (in 50µs within the range 25-100% load)
Recovery	500µs	for recovery to 2% of set voltage
Over Voltage Protection	Yes	Latching, need to cycle ac to restart unit
Short Circuit Protection	Yes	Auto recovery after removal of short circuit
Over Temperature Protection	Yes	Latching, need to cycle ac to restart unit
Series Operation	Yes	
Parallel Operation	Yes	Single wire, current share, up to 6 units

Global Signals

Remote on/off	Opto isolated, 2.5mA (10-14V) to enable power supply, less than 0.15mA (0.5V) to disable or fit supplied links to permanently enable (see handbook for details)
Standby supply	12V±2V / 20mA isolated supply, not affected by remote on/off.
Output good (ENA)	Open collector (10mA sink current). Low (on) when output is in regulation
ORing diode	(option) - Allows redundant connection of power supplies with no additional diodes required.

Environment

Baseplate Temperature	-40°C to 85°C operational (12V version 80°C max), -40°C to 85°C storage (max 12 months).
Low Temp Startup	-40°C
Humidity	20 - 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	-200 to 2000 metres operational (-200 to 5000m storage/transportation)
Weights	With lid = 1.4kg, no lid = 1.2kg
Pollution	Degree 2, Material group IIIb

Immunity EN61000-6-2:2005

				Criteria
Electrostatic Discharge	EN61000-4-2	Level 2	Air discharge level 3, Contact discharge level 2. Not applicable to units without cover fitted	A
Electromagnetic Field	EN61000-4-3	Level 3	12V/m	A
Fast / Burst Transient	EN61000-4-4	Level 3		A
Surge Immunity	EN61000-4-5	Level 4	Common mode - 4.4kVac, Differential - 2.2kVac	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.	A
Ring Wave	EN61000-4-12	Level 3	Common mode - 2.2kV, Differential - 1.1kV	A
Voltage Fluctuations	EN61000-4-14	Class 3		A

Emissions EN61000-6-3:2007

Radiated Electric Field	EN55011, EN55022	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B see application note for details.
Conducted Emissions	EN55011, EN55022 MIL STD 461E/462D CE102	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B 115V and 220V
Conducted Harmonics	EN61000-3-2	Class A, Class C at full load
Flicker	EN61000-3-3	Compliant - d _{max} <4% only



Safety Approvals

IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1
CE Mark (EN60950-1)
CB certificate and Report available on request

Notes

File E135494
LV Directive 2006/95/EC
Please check with technical sales for status of approvals

Outline & Connection Drawings

Signals Connections

Housing - Molex 22-01-1102
Crimp - Molex 08 70 0064
(or equivalents)

ac input connector

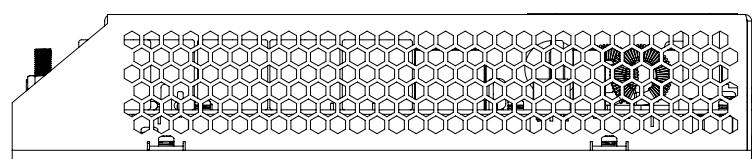
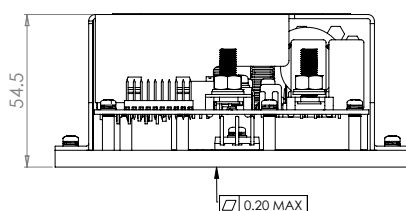
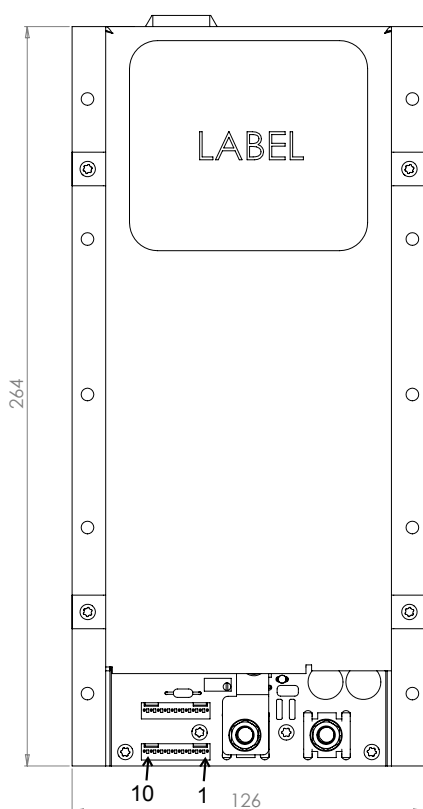
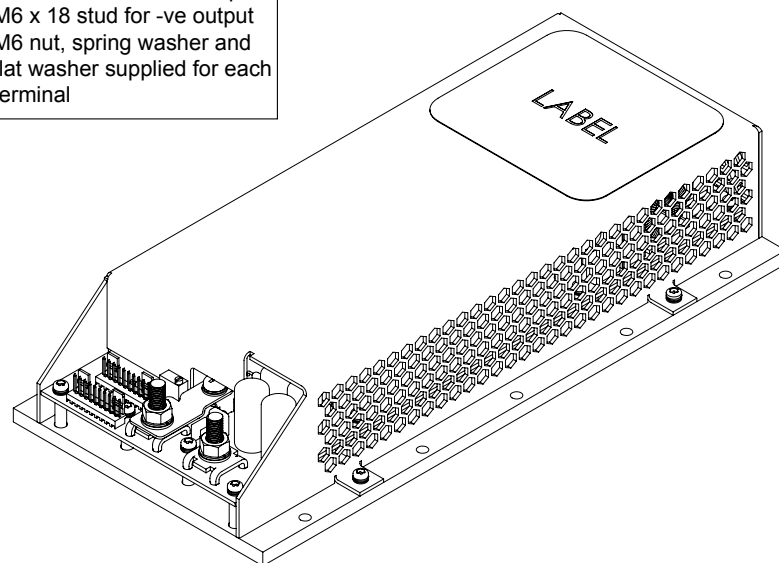
Housing Tyco 350766-4
Crimp 926895-1 (3 off)
or equivalent



Pin	Function
10	Do not connect
9	Output good - ENA
8	Trim
7	Current share
6	Aux
5	+remote on/off
4	-remote on/off
3	Aux common
2	- Sense
1	+ Sense



dc output
M6 x 18 stud for +ve output
M6 x 18 stud for -ve output
M6 nut, spring washer and
flat washer supplied for each
terminal



Notes: 1. Customer fixings 10 x M4 clearance holes

2. All tolerances $\pm 0.5\text{mm}$





Industrial



Test



Broadcast



Comms



Renewable

**1000W single output, conduction/
baseplate cooled power supply**



Features	Benefits
• Fanless	Longer field life and no fan noise
• Baseplate cooled	Conducts heat outside of the system
• Wide range ac input	Supports global use
• I ² C interface	Allows remote monitoring
• 2 Year Warranty	Low cost of ownership

Input			
Input Voltage	90-265Vac	Input Frequency	47 - 63Hz (440Hz with reduced PFC - consult sales office)
Input Harmonics	EN61000-3-2 compliant	Power Factor	0.95 typical (meets EN61000-3-2)
Input Fuse	Fast acting (not user accessible)	Inrush Current	<40A at 25°C and 230Vac (cold start) (meets EN61000-3-3)
Earth Leakage Current	1.5mA at 23Vac (50Hz)		

QUICK SELECTOR - example configurations			
Output Voltage	Adjustment Range	Maximum Output Current	Description
12V	9.6 - 14.4V	60A	CPFE1000F-12
28V	22.4 - 33.6V	36A	CPFE1000F-28
48V	38.4 - 57.6V	21A	CPFE1000F-48

Global Signals	
Remote on/off	Opto isolated, 2.5mA (10-14V) to enable power supply, less than 0.15mA (0.5V) to disable
Standby supply	12V±2V / 20mA isolated supply, not affected by remote on/off.
Output good (ENA)	Open collector (10mA sink current). Low (on) when output is in regulation
I ² C Signal	Normal or abnormal operation of the power module can be monitored by using the IOG terminal. This signal monitor output is located at secondary side (output side) and is an open collector output. This signal is LOW when inverter is normally operating and HIGH when inverter stops or when inverter is operating abnormally. (maximum sink current is 5mA, maximum applied voltage is 35V). See handbook for details.
Current Share (PC)	By connecting the PC terminal of each CPFE1000Fxx, output current can be equally drawn from each unit. A maximum of 6 units of the same model can be connected. See handbook for details.
I ² C	Provides manufacturing location, date, serial number, part number, unit revision, output voltage & current read back, base plate temperature, remote on/off, IOG, DC good and over temperature warning

Isolation			
Input to Output	4.24kVdc		
Input to Earth	2.12kVdc	Output to Earth	500Vdc



Output Specification		
Total Output Power	1008W	Continuous. (12V versions = 720W)
Turn on time	1.5s max	at 90Vac and 100% rated output power
Efficiency	79-86%	typical (model dependent)
Hold up	25ms	typical at 230Vac, 100% load
Ripple and Noise	<1%	pk-pk, using EIAJ test method & 20MHz bandwidth (2% below 0°C)
Voltage Setting Accuracy	±2%	at 50% load
Remote Sense	Yes	Max 0.5V total line drop
Minimum Load	No	
Total Regulation	<4%	Including Line (for 90-264Vac input change), Load (for 0-100% load change) and Temperature (0-50°C).
Transient Response	<10%	of set voltage for 50% load change (in 50µs within the range 25-100% load)
Recovery	500µs	for recovery to 2% of set voltage
Over Voltage Protection	Yes	Auto recovery
Short Circuit Protection	Yes	Auto recovery after removal of short circuit
Over Temperature Protection	Yes	Auto recovery

Environment		
Baseplate Temperature	-40°C to 85°C operational (CPFE1000F-28 and CPFE1000F-48, -40°C to 70°C below 170Vac input) -40°C to 100°C storage (max 12 months).	
Ambient Temperature	See 'Ambient Temperature Operating Limits'	
Low Temp Startup	-40°C	
Humidity	20 - 95% RH non condensing (non operating 10-95% RH) (PCB assembly protective coated)	
Shock	Conforms to MIL-STD-810E/F, Method 516.5, Pro I, IV, VI	
Vibration	Conforms to MIL-STD-810E, Method 514.4, Pro I, Cat 1,9	
Altitude	-200 to 2000 metres operational (-200 to 5000m storage/transportation)	
Pollution	Degree 2, Material group IIIb	

Ambient Temperature Operating Limits						
Model No	Input Voltage	Output Power				Derating Factor
		50°C	60°C	70°C	85°C	
CPFE1000F-12	85-170Vac	720W	720W	576W	360W	14.4W/°C
	170-265Vac	720W	720W	670W	595W	5W/°C
CPFE1000F-28	85-170Vac	1008W	864W	720W		14.4W/°C
	170-265Vac	1008W	1008W	958W	883W	5W/°C
CPFE1000F-48	85-170Vac	1008W	864W	720W		14.4W/°C
	170-265Vac	1008W	1008W	958W	883W	5W/°C

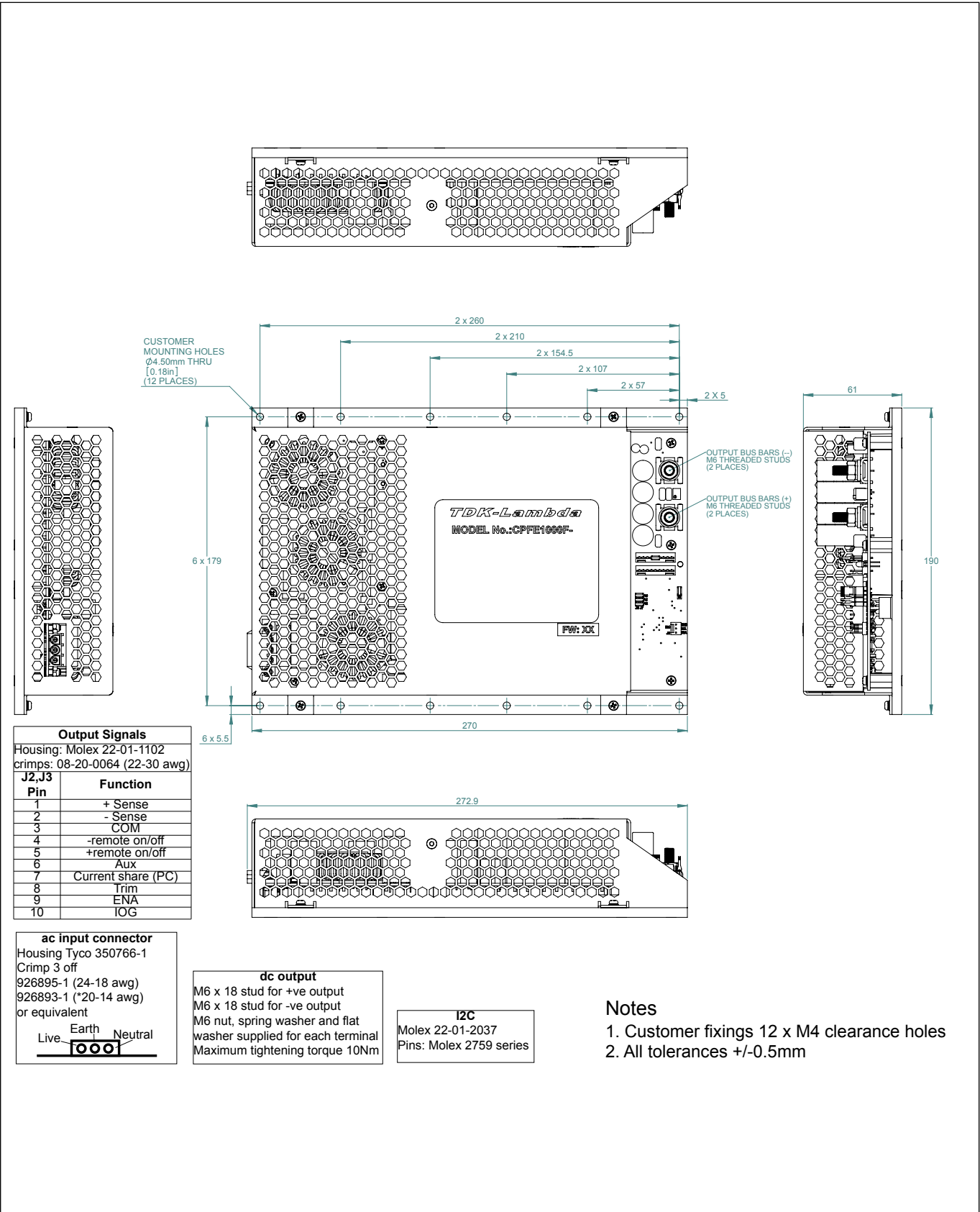
Immunity EN61000-6-2:2005				Criteria
Electrostatic Discharge	EN61000-4-2	Level 2	Air discharge level 3, Contact discharge level 2	A
Electromagnetic Field	EN61000-4-3	Level 3	12V/m	A
Fast / Burst Transient	EN61000-4-4	Level 3		A
Surge Immunity	EN61000-4-5	Level X (better than level 4)	Common mode - 6kVac, Differential - 3kVac	B
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	A
Ring Wave	EN61000-4-12	Level 3	Common mode - 2.2kV, Differential - 1.1kV	A
Voltage Fluctuations	EN61000-4-14	Class 3		A

Emissions EN61000-6-3:2007		
Radiated Electric Field	EN55011, EN55022	Class B see application note for details.
Conducted Emissions	EN55011, EN55022 MIL STD 461E/462D CE102	Class B
Conducted Harmonics	EN61000-3-2	
Flicker	EN61000-3-3	Compliant - d _{max} <4% only



Safety Approvals	Notes
IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1	File E135494
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





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

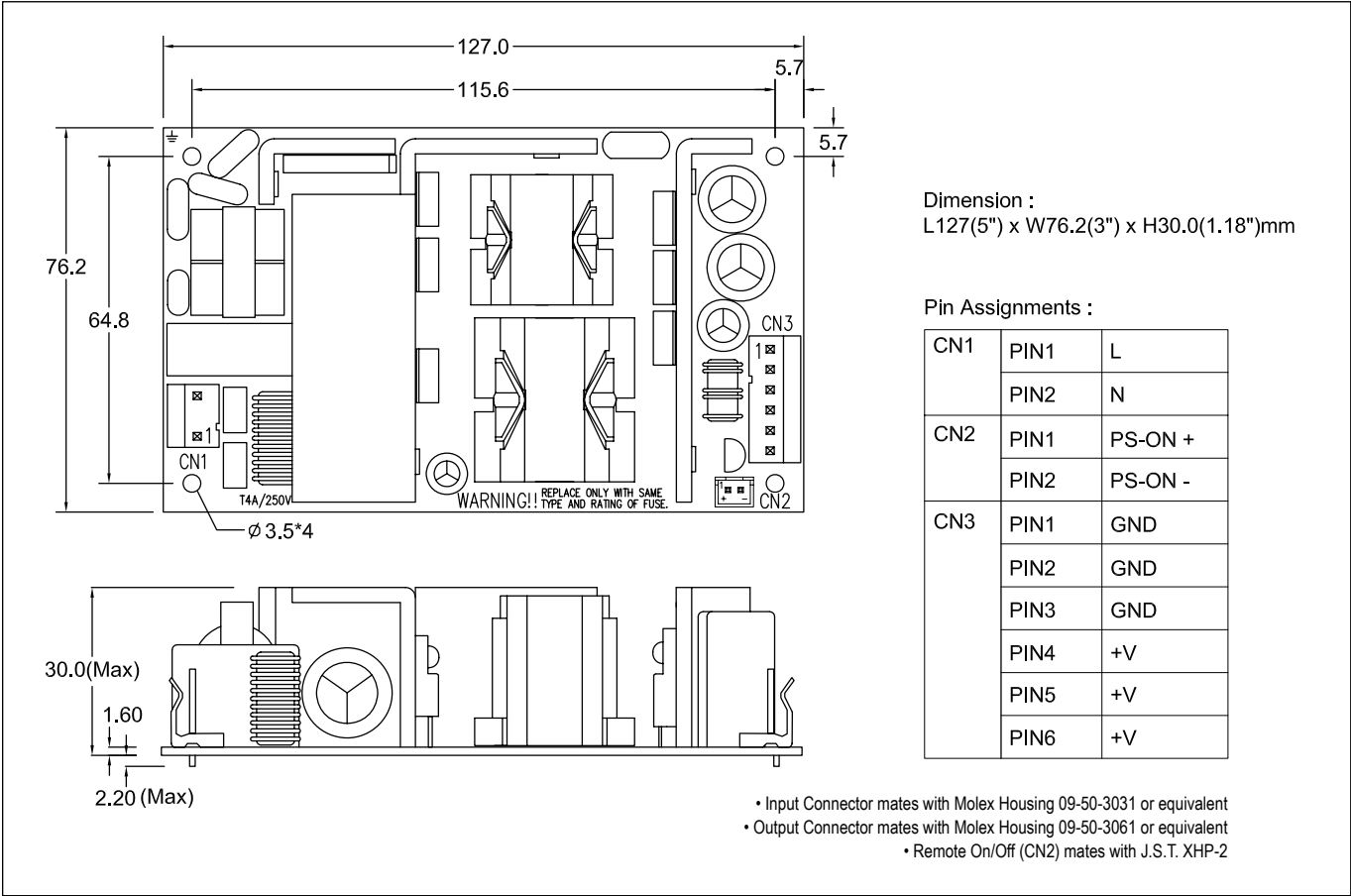
Specification		
Model		CSS150
Input Voltage range	V	90 - 264VAC (47 - 400Hz)(1) or 120 - 180VDC
Inrush Current	A	<60A maximum at 264VAC input, 25°C ambient cold start
Input Current (115/230VAC)	A	1.7 / 0.85
Power Factor Correction	-	Meets EN61000-3-2, >0.9
Leakage Current	µA	<250µA 264VAC 63Hz
Hold Up 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/s ² (10~55Hz:2G Constant, X,Y,Z 60min each.)
Shock	G	< 196.1 m/s ² (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





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: >17.5A, 18V: > 14.7A, 24V: > 11A, 48V: > 5.5A
Overvoltage Protection (4)	V	12V: 13.2 - 16.2V, 18V: 19.8 - 24.3V, 24V: 26.4 - 32.4V, 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
Safety Agency Certifications	-	EN/IEC/UL/ES/CSA 60601-1, EN/IEC/UL/CSA60950-1, CE Mark
Conducted & Radiated EMI	-	EN55011-B, EN55022-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

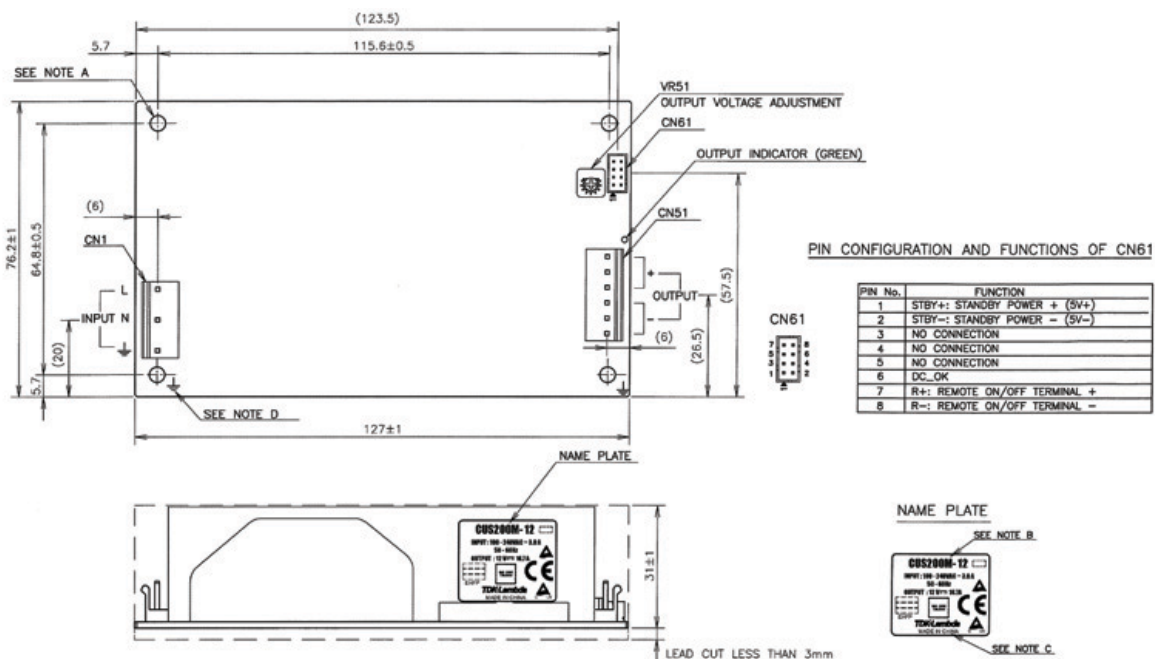
Model	Voltage	Adjust Range (V)	Max Current Conv (A)	Max Current Forced Air (A)	Max Power Forced Air (W)	Load Reg (mV)	Line Reg (mV)	Ripple Noise (mV)	Efficiency (typical) % ⁽⁴⁾
CUS200M-12	12V	11.7 - 12.6	16.7	16.7	200.4	120	60	180	92 / 93
CUS200M-18	18V	17.6 - 18.9	11.2	14.0	252.0	180	90	180	92 / 94
CUS200M-24	24V	23.5 - 25.2	8.4	10.5	252.0	240	120	240	92 / 94
CUS200M-48	48V	47 - 50.4	4.2	5.3	254.4	480	240	480	92 / 94

Notes: (4) 115 / 230VAC input with convection cooling

Options (available on request)

blank	Standard model
Suffix "/A"	Cased model with chassis & cover
Suffix "/L"	L-shaped chassis only, no cover

Outline Drawing CUS200M Series



NOTE:

- A: 4-φ3.5 HOLES ARE FOR CUSTOMER'S CHASSIS MOUNTING HOLES. ALL MUST BE SCREWED IN ORDER TO CONFORM THE VIBRATION AND EMI SPEC.
- 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.

CONNECTORS USED:

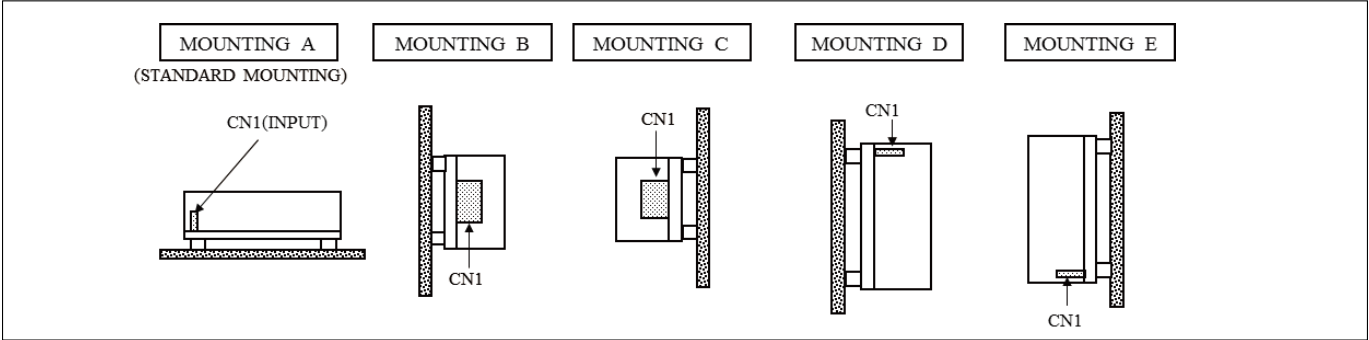
PART DESCRIPTION	PART NAME	HOUSING	QTY	CONTACT	QTY	CRIMPING TOOL	MANUFACT.
CN1 (INPUT TERMINAL)	B3PS-VH(LF)(SN)	WHR-SN	1	SVH-21T-P1.1	3	YC-160R, YC161R, YC164R	J.S.T
CN51 (OUTPUT TERMINAL)	B6P-VH(LF)(SN)	WHR-6N	1	SVH-41T-P1.1	6	YC-930R	J.S.T
CN61 (STANDBY TERMINAL)	B6P-PHDS(LF)(SN)	PHDR-08VS	1	SPHD-001T-P0.5	8	YC-610R, YC611R	J.S.T

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

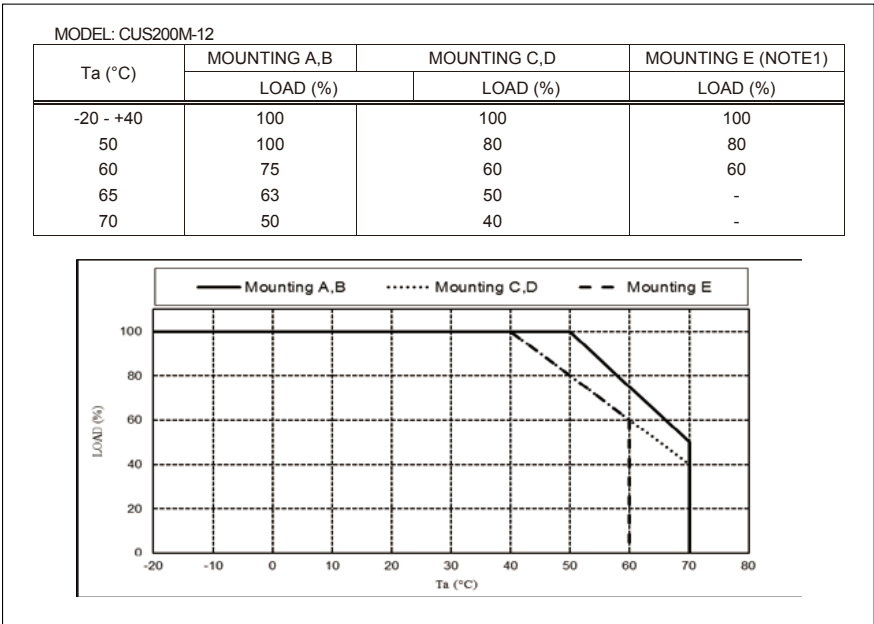
Notes: For detailed Instruction Manual, Cooling, Reliability Data, Electrolytic capacitor Lifetime data, Application advice like Mounting options, relevant Derating curves etc. please refer to "Technical Downloads" or contact factory for support



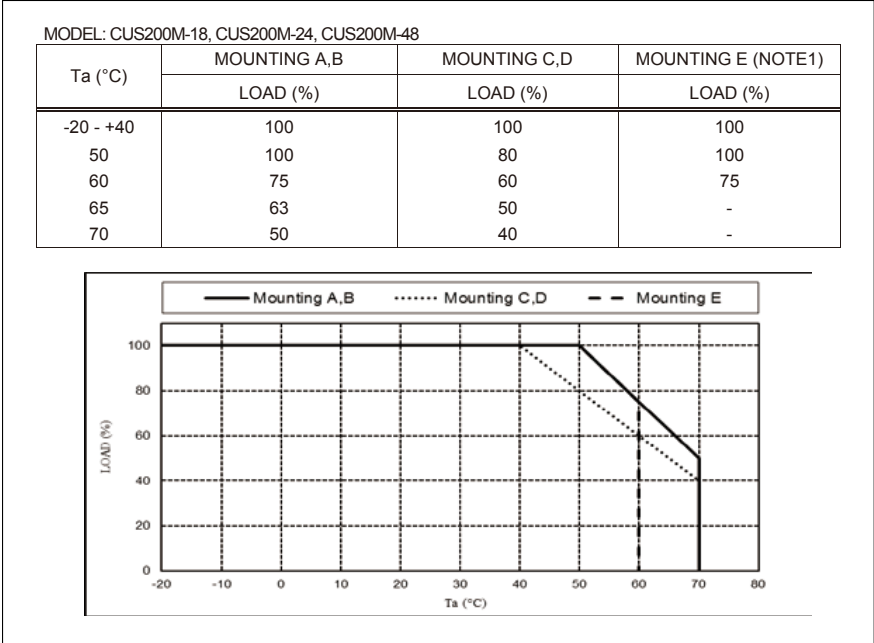
Output Derating according to the Mounting Direction



Output Derating CUS200M-12



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





Single Output 350W 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 draw (<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 Draw (3)	W	<0.5W at 230VAC
Temperature Coefficient	%/°C	<0.02%/°C
Overcurrent Protection	-	12V: >36A, 18V: > 24A, 24V: > 18A, 48V: > 9A
Overvoltage Protection (4)	V	12V: 13.8 - 16.2V, 18V: 20.7 - 24.3V, 24V: 27.6 - 32.4V, 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) BF Rated
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
Safety Agency Certifications	-	EN/IEC/UL/ES/CSA 60601-1, EN/IEC/UL/CSA60950-1, CE Mark
Conducted & Radiated EMI	-	EN55011-B, EN55022-B, FCC Class B (Radiated Class A)
Weight (Typ)	g	850
Size (LxWxH)	mm	190 x 87 x 40
Warranty	yrs	3

Notes:

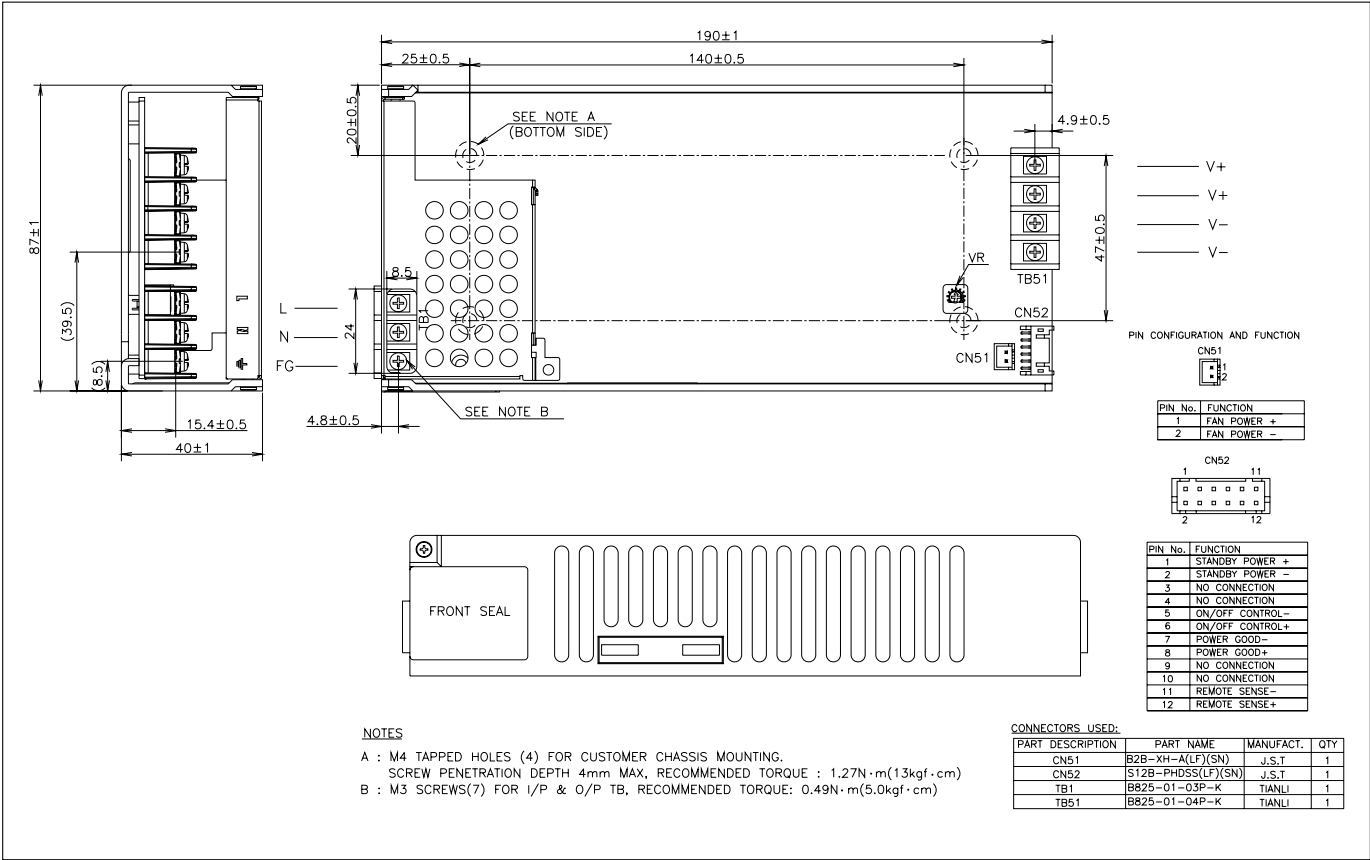
- (1) Derate linearly to 80% load from 115 to 85VAC input
- (2) 115 / 230VAC input
- (3) During Remote off and at no load condition
- (4) Cycle AC to reset



Model Selector								
Model	Voltage	Range (V)	Current (A)	Power (W)	Reg (mV)	Reg (mV)	Noise (mV)	Efficiency (typ) % ⁽⁵⁾
CUS350M-12/F	12V	11.4 - 12.6	29.0	348.0	60	48	120	91 / 93
CUS350M-18/F	18V	17.1 - 18.9	19.4	349.2	90	72	180	91 / 94
CUS350M-24/F	24V	22.8 - 25.2	14.7	352.8	120	96	240	91 / 94
CUS350M-48/F	48V	45.6 - 50.4	7.3	350.4	240	192	480	91 / 94

Notes: (5) 115 / 230VAC input. 350W output power

Outline Drawing CUS350M Series





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

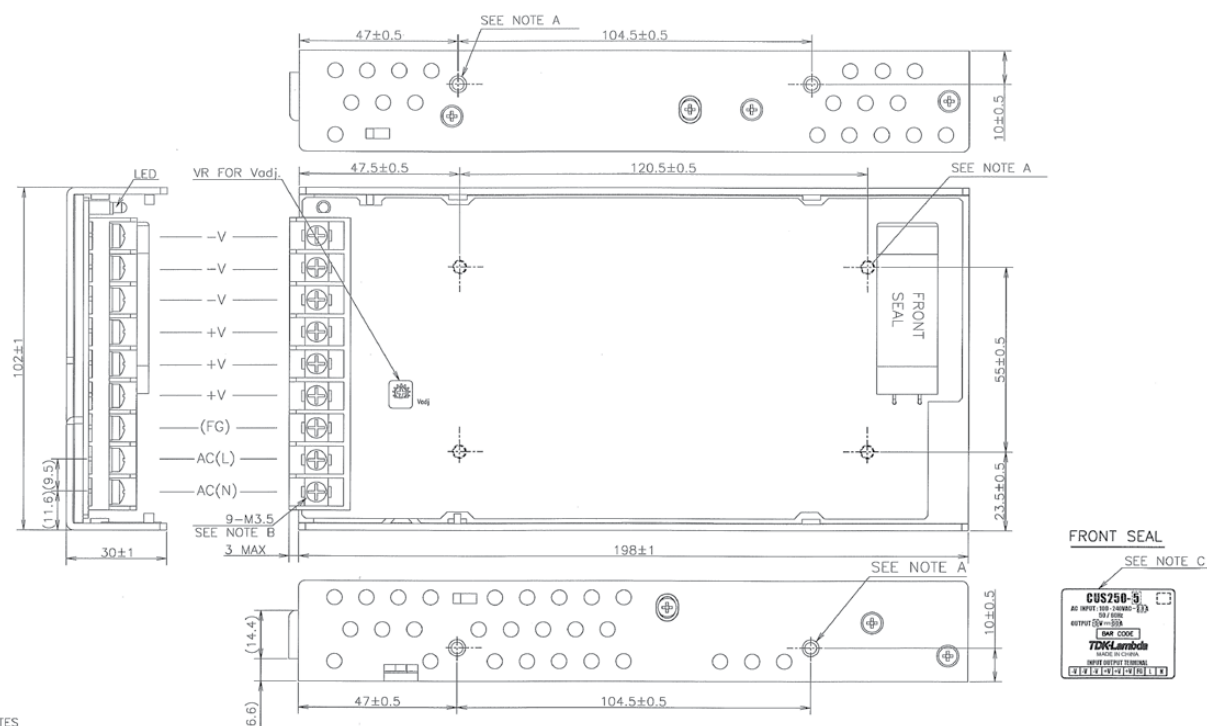
(3) See derating curves on page 3. Output derating vs input voltage - derate linearly to 80% load from 115VAC to 85VAC input (not for CUS250LD-3)



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

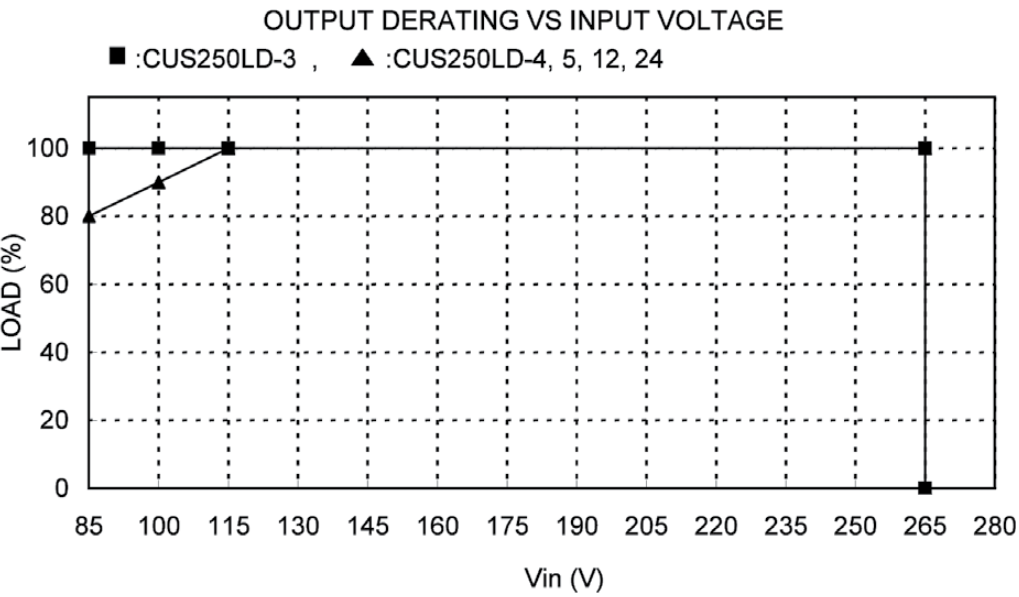
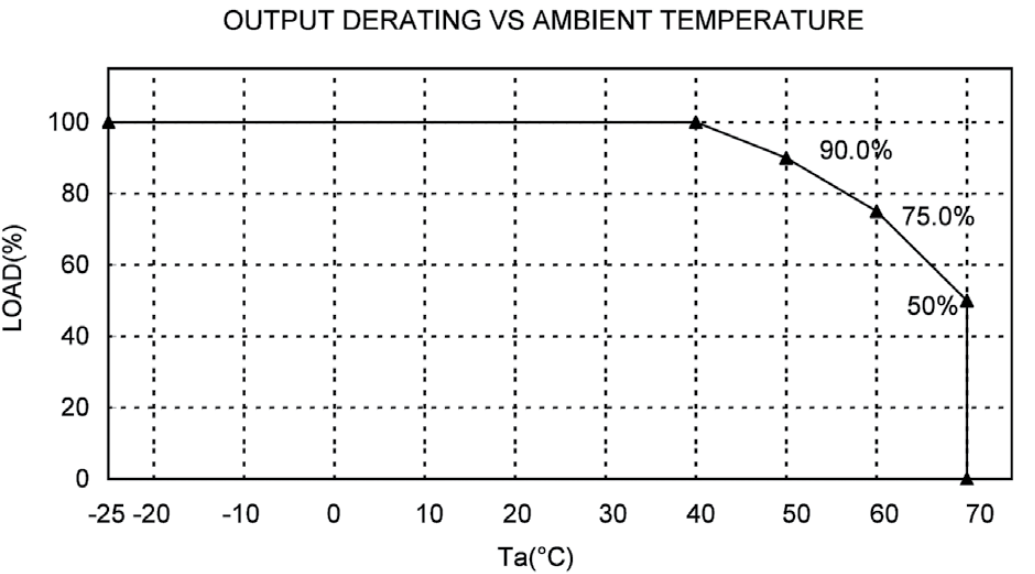


NOTES

- A: M3.5 EMBOSSED, TAPPED AND COUNTERSUNK HOLES (8) FOR CUSTOMER CHASSIS MOUNTING. SCREWS MUST NOT PROTRUDE INTO POWER SUPPLY BY MORE THAN 6mm.
- B: RECOMMENDED SCREW TORQUE (M3.5 SCREW) < 0.75N·m
- C: MODEL NAME, MAXIMUM OUTPUT POWER, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT ARE SHOWN HERE IN ACCORDANCE WITH THE SPECIFICATIONS.



Output Derating Curve CUS250LD





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/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	-	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



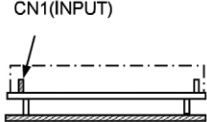
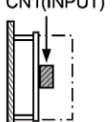
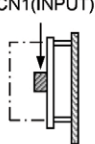
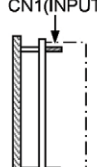
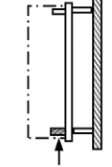
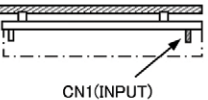
Model Selector								
Model		Voltage (V)	Adjust Range (V)	Maximum Current (A)	Maximum Power (W)	Load Reg. (mV)	Line Reg. (mV)	Ripple Noise (mV)
CUT75-522	V1	5V	5.0 - 5.25	8	40	100	50	120
	V2	+12V	FIXED	3	36	600	240	150
	V3	-12V	FIXED	1	-	600	240	150
CUT75-522	V1	5V	5.0 - 5.25	8	40	100	50	120
	V2	24V	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)

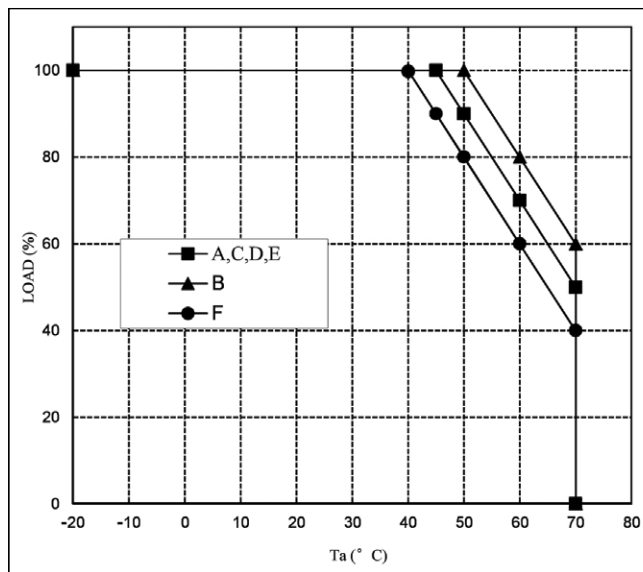
Preferred Models

Mounting Instructions CUT75 Series

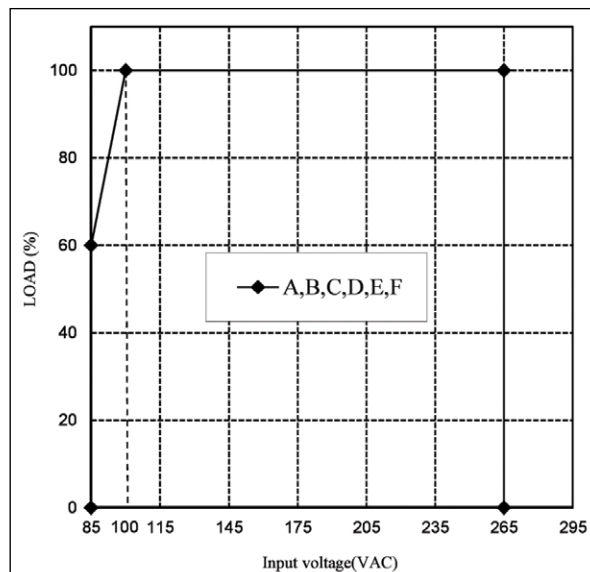
(MOUNTING A)	(MOUNTING B) (STANDARD MOUNTING)	(MOUNTING C)	(MOUNTING D)	(MOUNTING E)	(MOUNTING F)
					



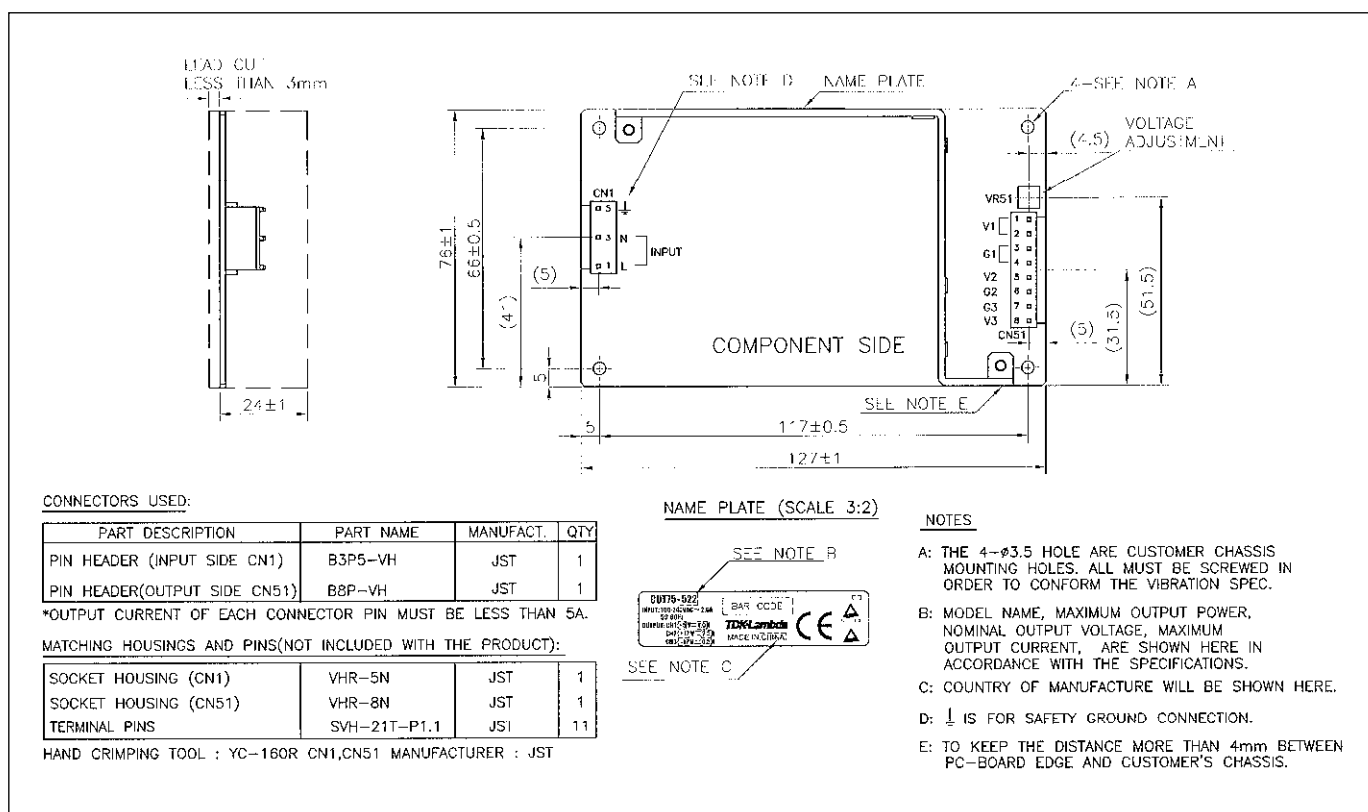
CUT75 Output derating vs Ambient Temperature



CUT75 Output derating vs Input Voltage



Outline Drawing CUT75 Series





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

- Convection Cooling
- Programmable Output Voltage
- Peak Power Capability 120% (24 & 36V models)
- Average Active Efficiency @ 230V : 92.7%

Benefits

- Easier System Integration, No Audible Noise
- Broad Range of Applications
- Lower Cost, Smaller Size
- 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) Class A, 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), -5 (Level 4), -6 (Level 3), -8 (Level 4), -11
Safety Agency Approvals		-	UL60950-1, CSA C22.2 No.60950-1-07 (2nd Edition), EN60950-1, IEC60950-1 (2nd Edition), CE
Conducted & Radiated EMI		-	Built to meet EN55022-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

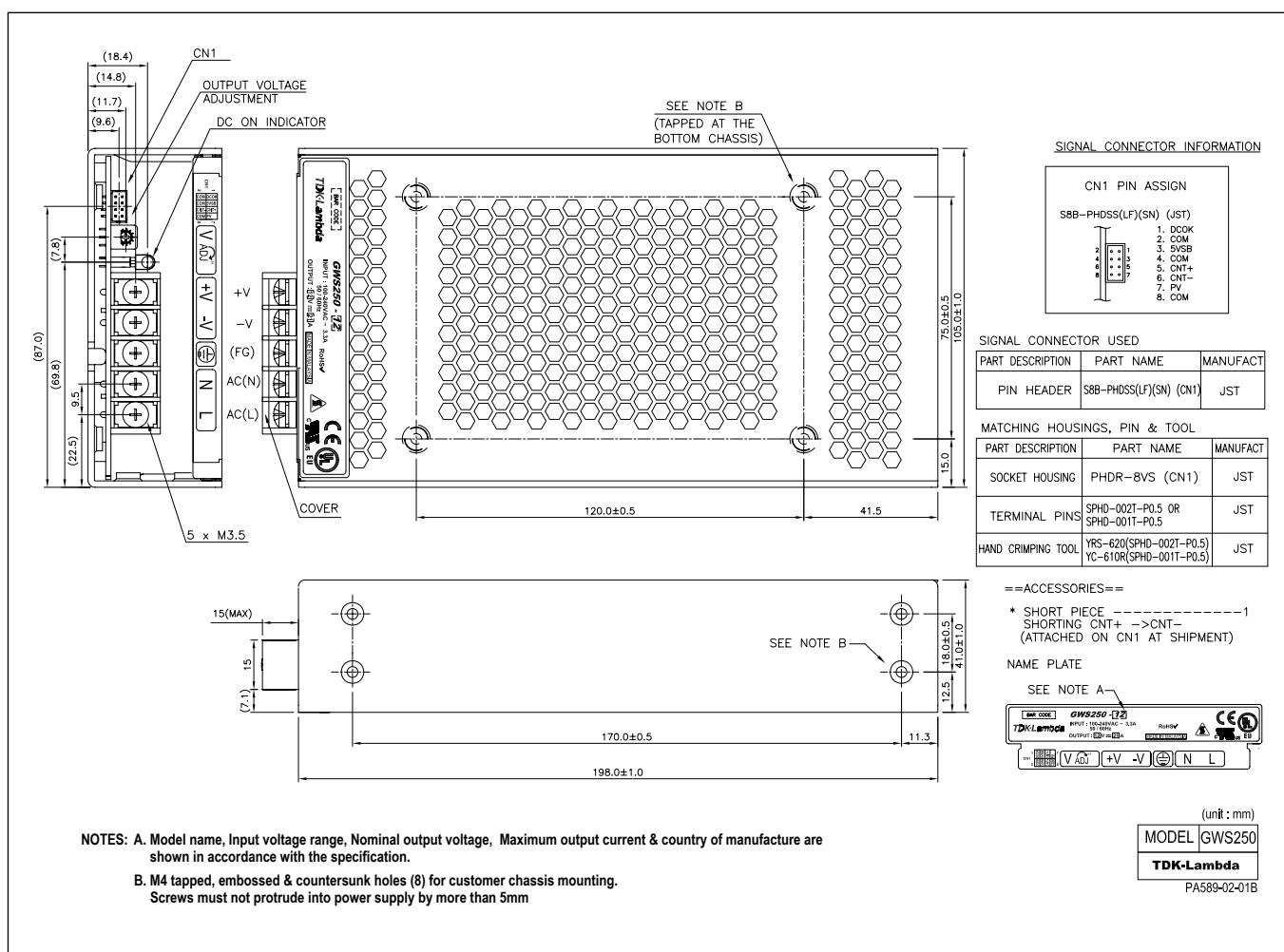


Model Selector

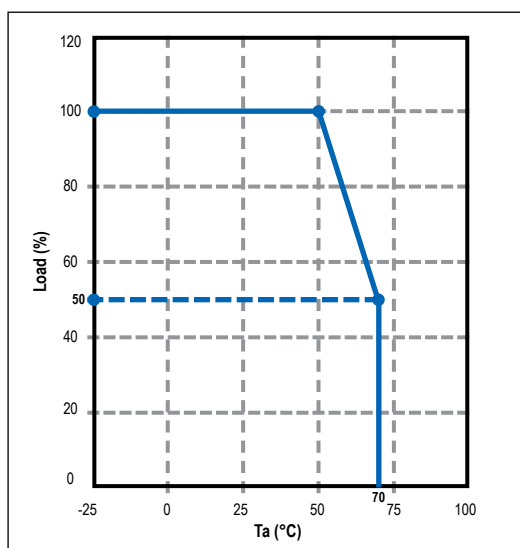
Model	Voltage (V)	Adjust Range (V)	Max Current (A)	Peak Current ⁽¹⁾ DC (A)	Load Reg. (mV)	Line Reg. (mV)	Ripple Noise (mV)	Efficiency (typ) % (230VAC)
GWS250-12	12V	10.8 - 13.2	21	-	96	48	120	92
GWS250-24	24V	22 - 28.8	10.5	12.5	192	96	150	92
GWS250-36	36V	32 - 40	7	8.4	288	144	200	93
GWS250-48	48V	42 - 57.6	5.3	-	384	192	250	93

Notes: (1) Peak current 10seconds max. 35% duty cycle max.

Outline Drawing GWS250



Output Derating Curve GWS250



Options

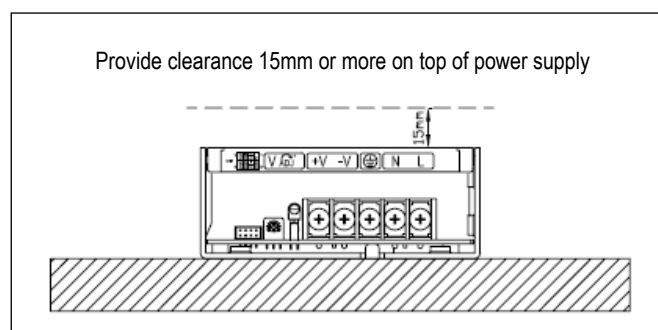
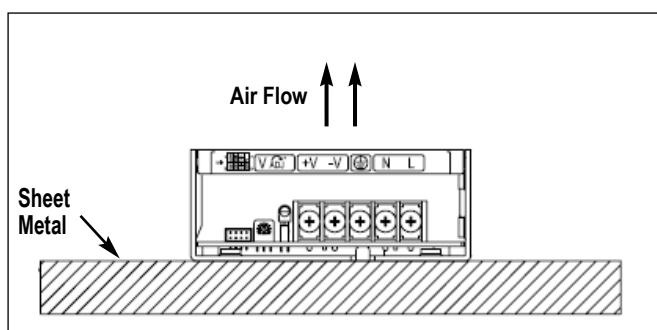
Suffix	Description
/T	OTP auto recovery after unit cools down
/RL	Remote ON/OFF reverse logic (Active High)
/BAT	Battery charging for 24V (21 -29V/8.8A) & 48V (42-58V/4.4A) only
/P	Power up to 350W with system airflow of 20cfm minimum and air blowing in from opposite side of input/output connectors
/L	Without cover

Notes: GWS250-XX/YYYYYYYYYYYY 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.

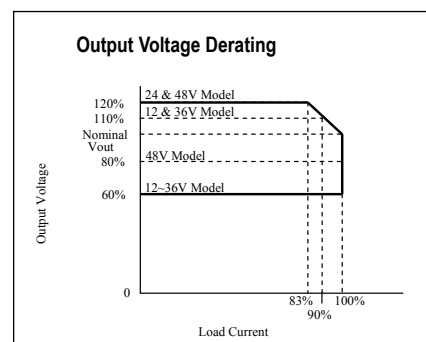
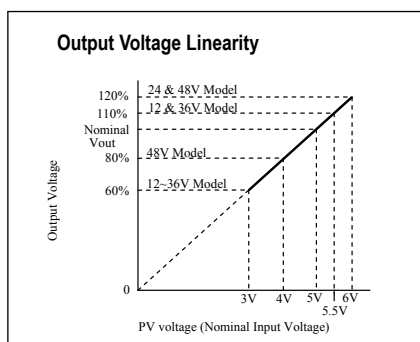
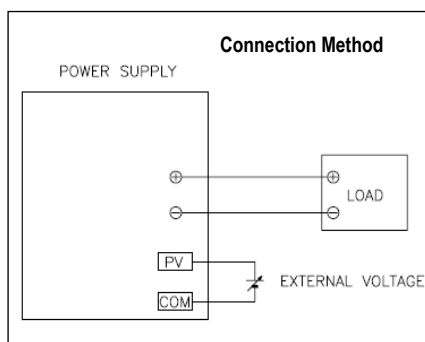
Mounting Options GWS250 - For other mounting versions please refer to Instruction Manual



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 ⁽⁴⁾

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) Class A, Class C > 35% Load
Input Current (115/230VAC)	A	4.5 / 2.3 (for 5V model) 5.5 / 2.7 (for other models)
Temperature Coefficient	°C	<0.02%/°C (0-50°C)
Overcurrent Protection	-	Hiccup (5V-12V models) Constant Current Limit (24V-48V models) >105% rated output power or >101% of peak output power
Overvoltage Protection (2)	V	5V: 5.75 - 6.75V, 7.5V: 8.6 - 10.1V, 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	12ms (5V-7.5V) - 16ms (12V-48V)
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/s ² 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	-	Approved by UL60950-1, CSA C22.2 No.60950-1-07 (2nd Edition), EN60950-1, IEC60950-1 (2nd Edition), CE
Conducted & Radiated EMI	-	Built to meet EN55022-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 (4) Excludes 5V and 7.5V models.

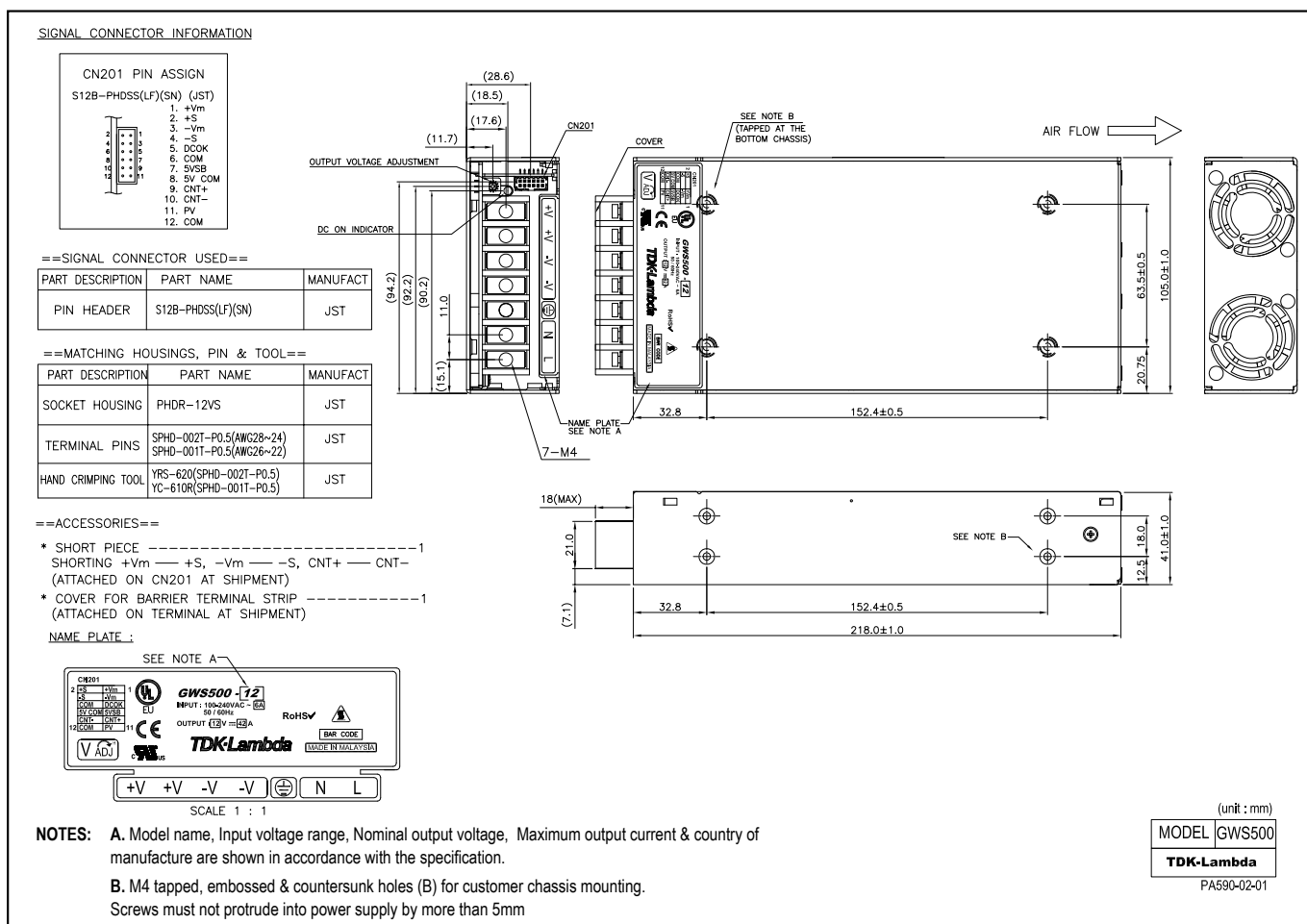


Model Selector

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)
GWS500-5	5V	4.5 - 5.5	80	-	50	25	150	84
GWS500-7.5	7.5V	6.75 - 8.25	67.2	-	70	35	150	87
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

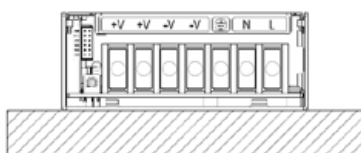
Notes: (1) Peak current 10seconds. 35% duty cycle max. (2) By trim pot provided. Wider adjustment is possible by external voltage control. See instruction manual for details.

Outline Drawing GWS500 Series

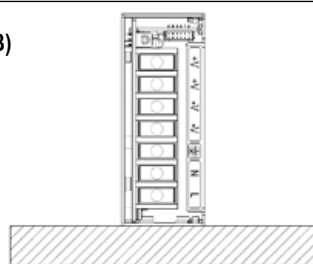


Mounting Options GWS500 Output Derating according to the Mounting Directions

(A) Standard Mounting



(B)

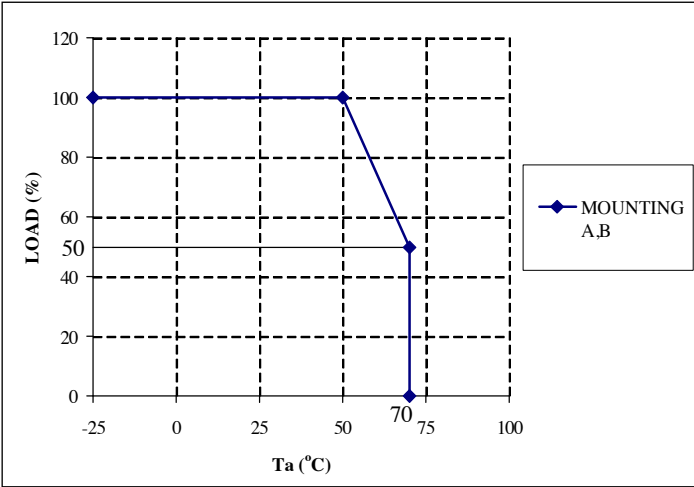


Mounting Method

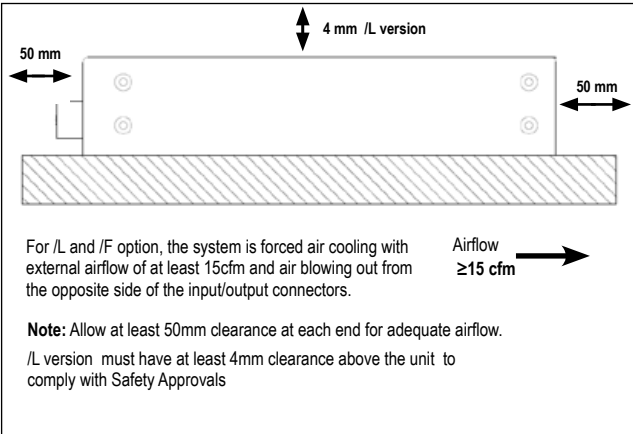
Output Derating according to the Mounting Directions
Recommended standard mounting is Method (A).
Method (B) is also possible.



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.





- Limited Lifetime Warranty
- -10°C to +71°C Operation (-40°C start up)
- Universal Input (85 - 265VAC)
- Conformally coated PCB's
- RoHS Compliant Design

HWS-/HD Series

Single Output Industrial
Power Supplies

Key Market Segments & Applications



HWS-/HD Features and Benefits

Features

- Limited Lifetime Warranty
- Conformally coated PCB's
- Wide Range AC Input

Benefits

- Lower Cost of Ownership
- Operates in Harsh Environments
- 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, >10MΩ 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/s²)					
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	200 260	420 470	1000	1600	3200	3800
Size (WxHxD) with cover		mm	31.5 x 82 x 95 31.5 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	126.5 X 82 X 280
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
(4) Consult Sales Office for use under DC Input conditions



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

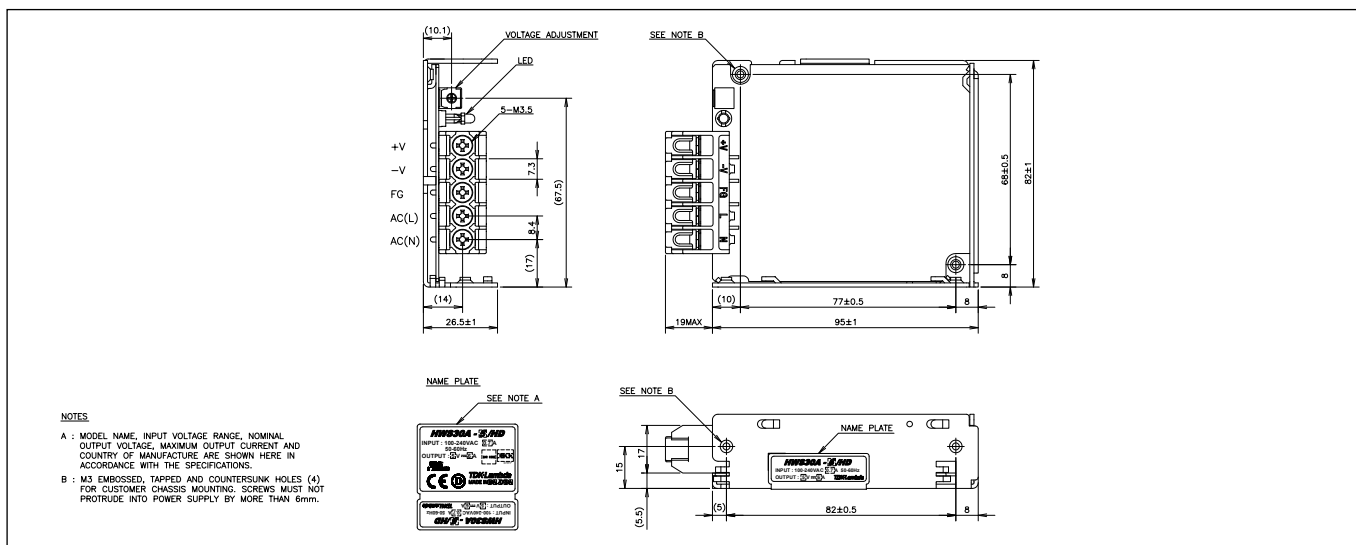
Options

Suffix	Description
Blank	No cover (except HWS300-1500 cover fitted as standard)
/A	Cover fitted (eg HWS100A-24/HDA) Deratings apply

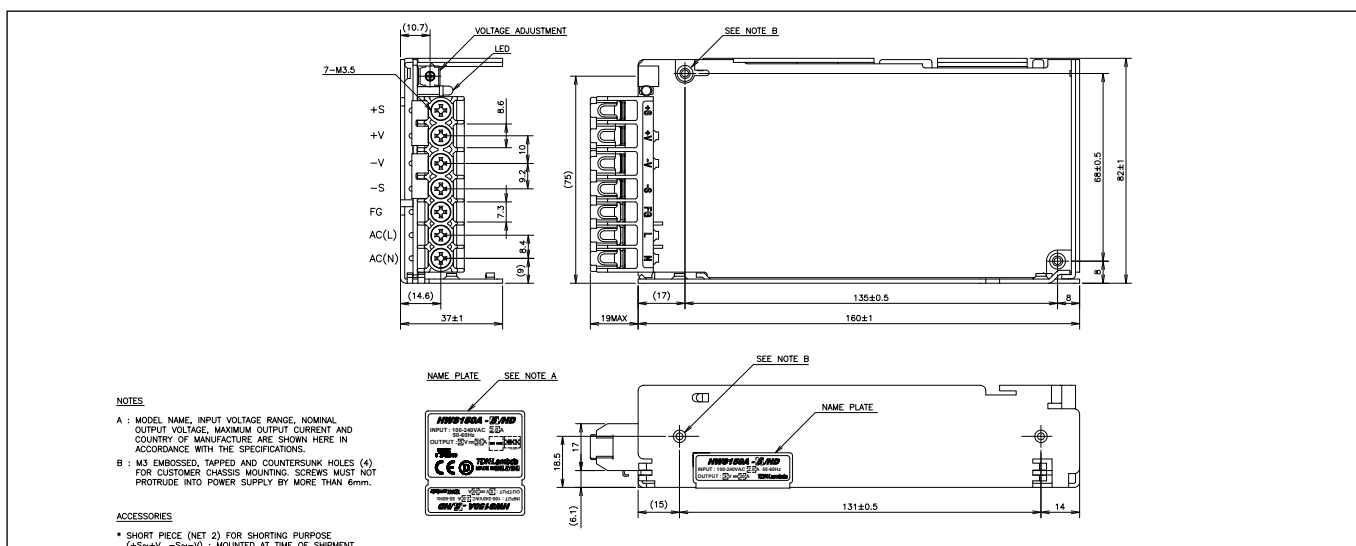
Notes: (3) Peak load for 10s maximum on time, 35% duty cycle at >200V input



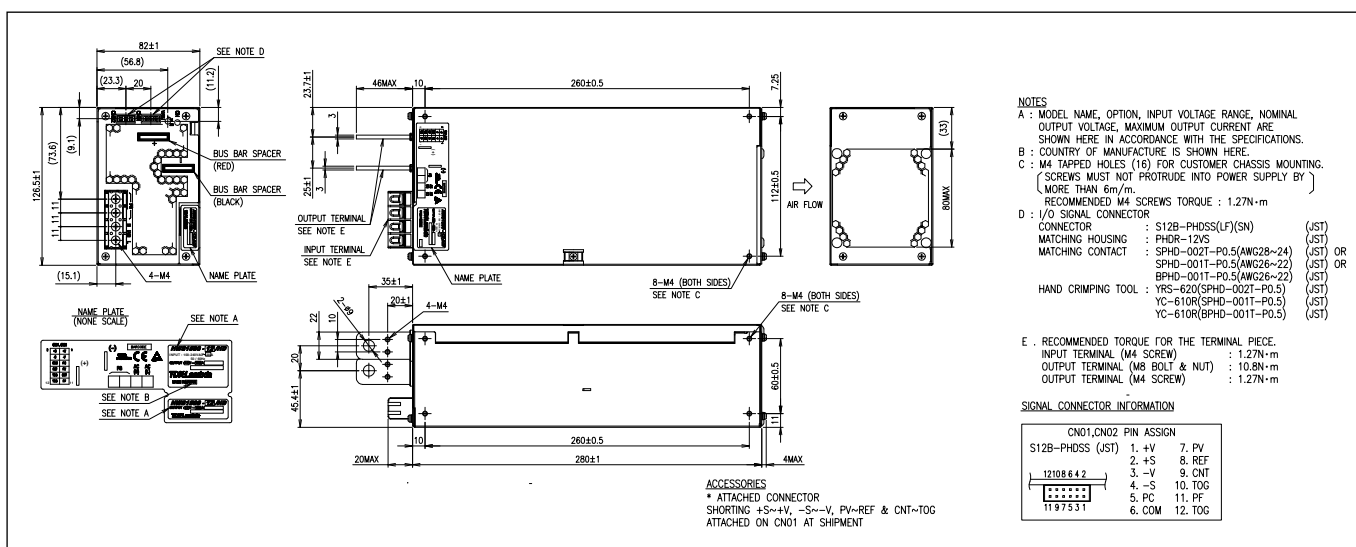
Outline Drawing HWS30A/HDA Series



Outline Drawing HWS150A/HDA Series



Outline Drawing HWS1500 Series





- 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

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	1.3 / 0.65	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)			26 x 82 x 95	33 x 82 x 160				
(with cover except 30 & 50W)	mm		26 x 82 x 120	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
Warranty			Limited Lifetime Warranty (See TDK-Lambda terms & conditions)					

Notes: (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



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)





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 Approvals	-	UL60950-1, CSA60950-1, EN60950-1, EN50178, UL508, 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	31.5x82x80	31.5x82x95	31.5x82x120	33x82x160	42x82x160
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.

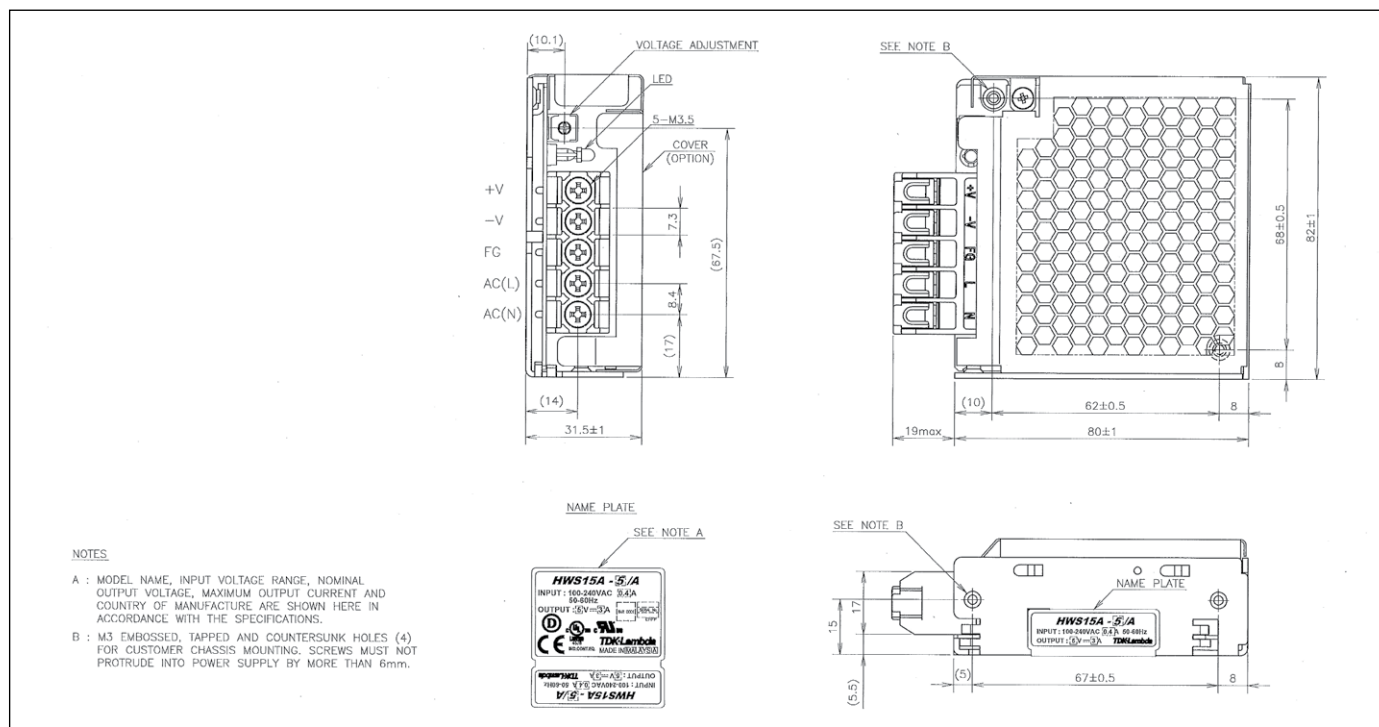


Model Selector								
Model	Voltage (V)	Adjust Range (V)	Max Current (A)	Load Reg (mV)	Line Reg (mV)	Ripple Noise (mV)	Over Voltage (V)	Efficiency (typ) %
HWS15A-3/A	3.3V	2.97 - 3.96	3	40	20	120	4.13-4.95	70/71
HWS30A-3/A	3.3V	2.97 - 3.96	6	40	20	120	4.13-4.95	75/77
HWS50A-3/A	3.3V	2.97 - 3.96	10	40	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

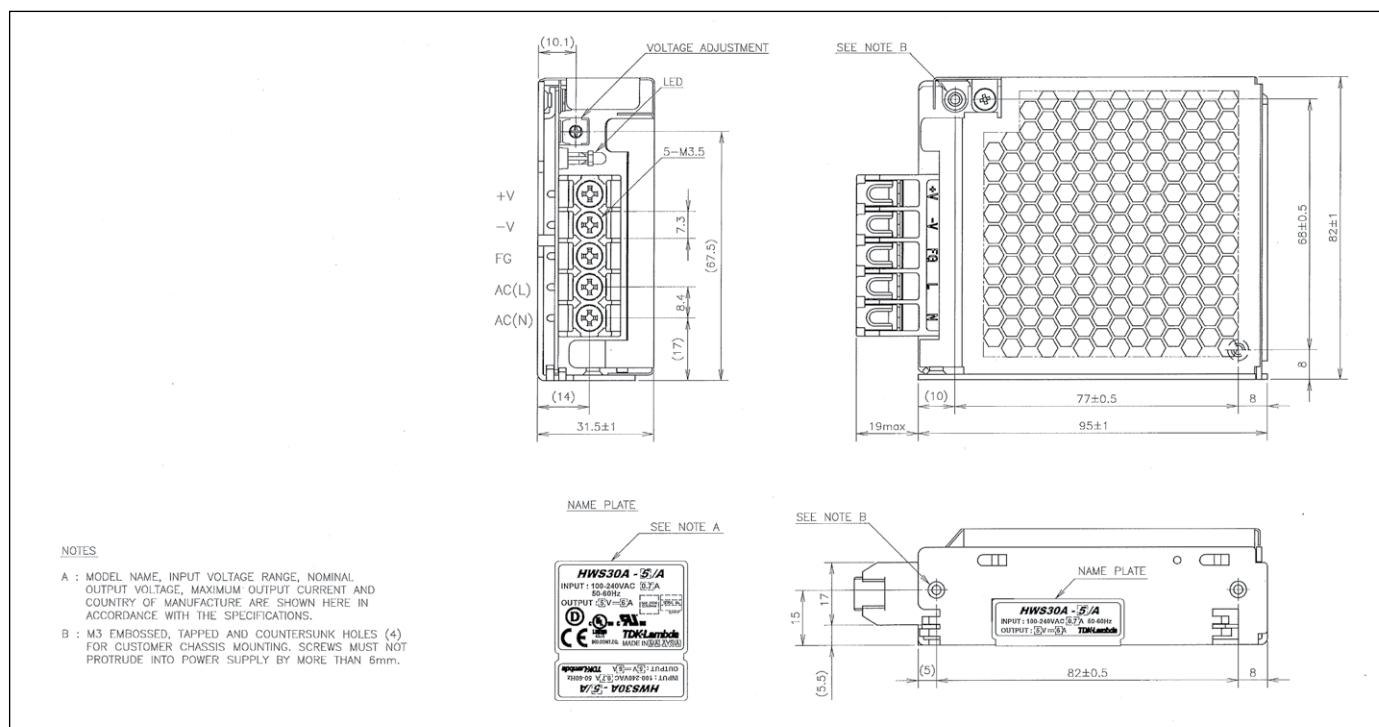
Options	
Suffix	Description
Blank	No Cover
/ A	Cover
/ R	Remote on/off (available 50W, 100W & 150W models)
/ HD	See HWS/HD datasheet for details. -40°C start up and PCB coating (not available on HWS15A)
/ ME	See HWS/ME datasheet for details of available models IEC/EN60601-1 medical approval (not available on HWS15A)



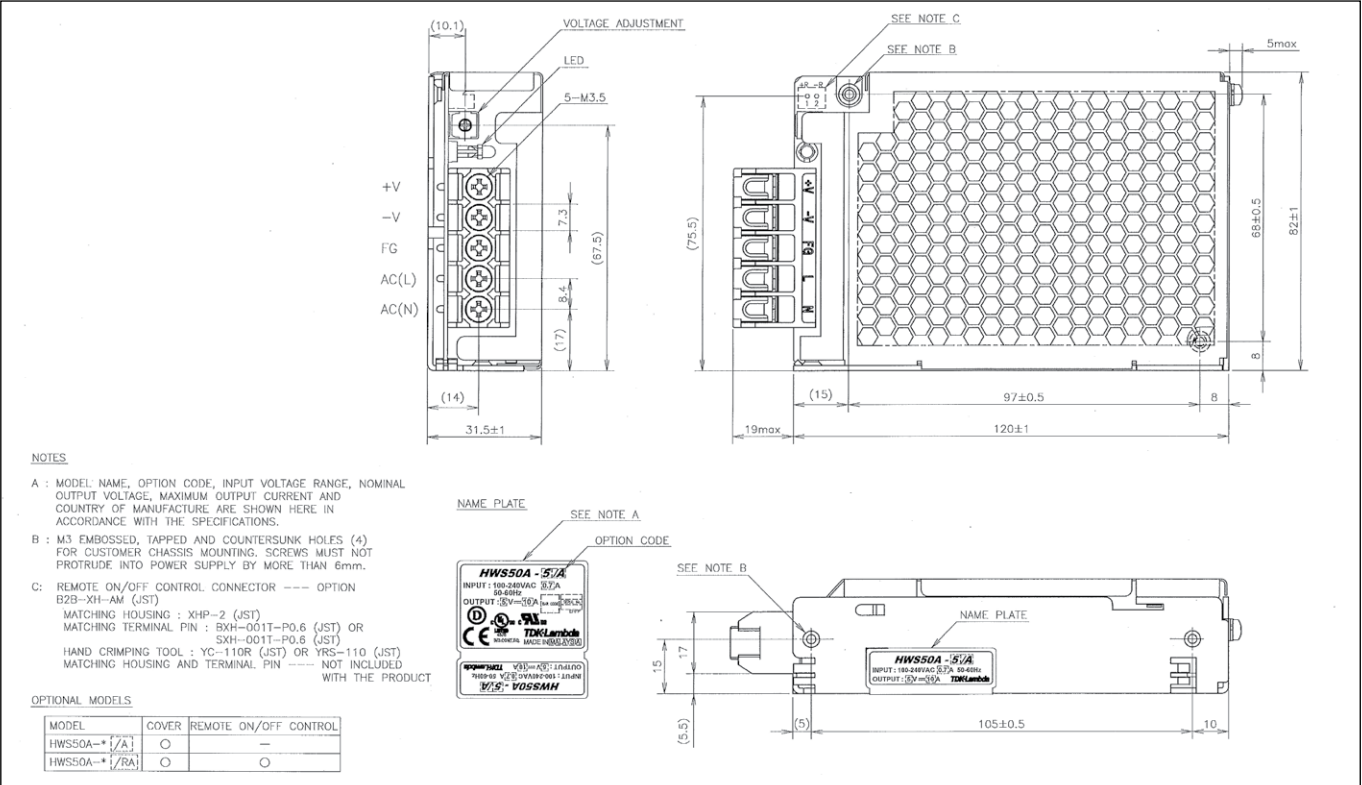
HWS15A/A Outline Drawing



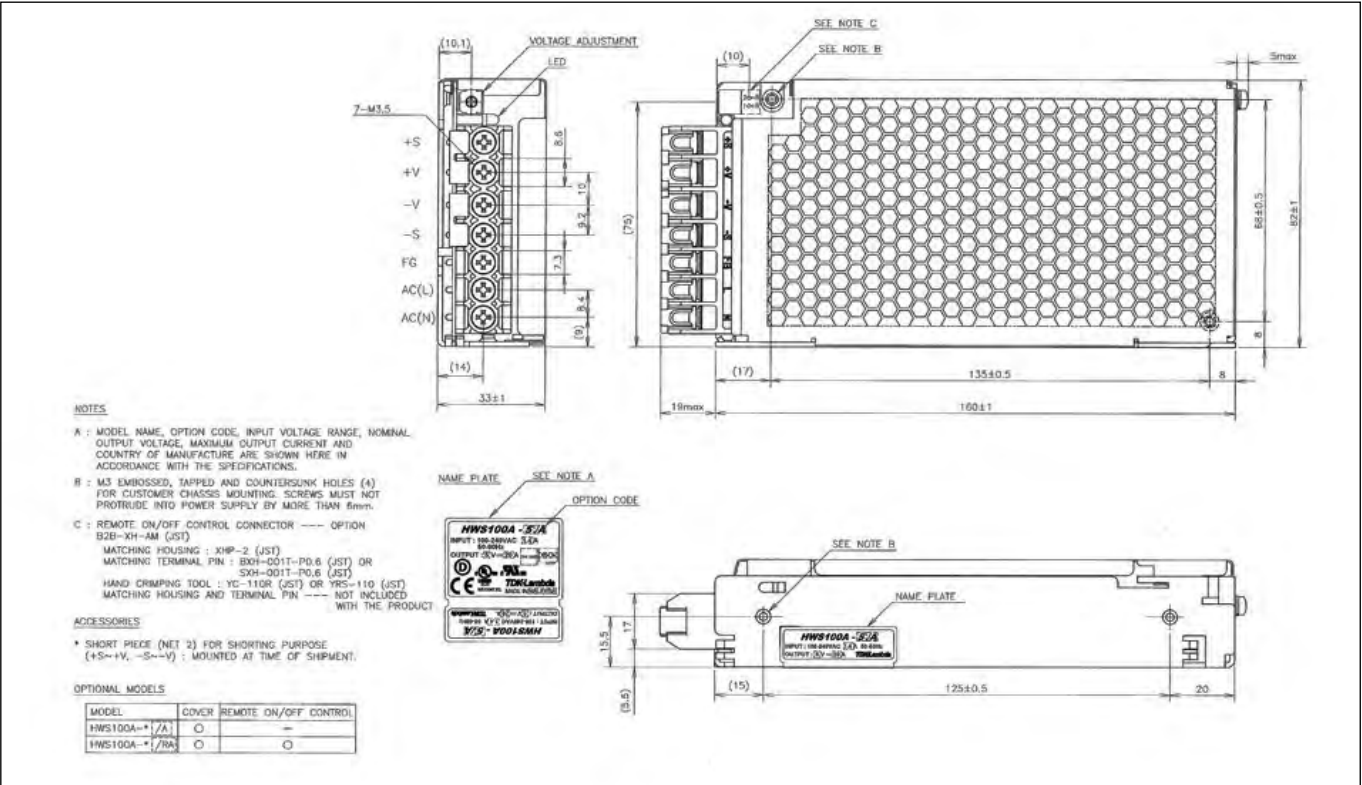
HWS30A/A Outline Drawing



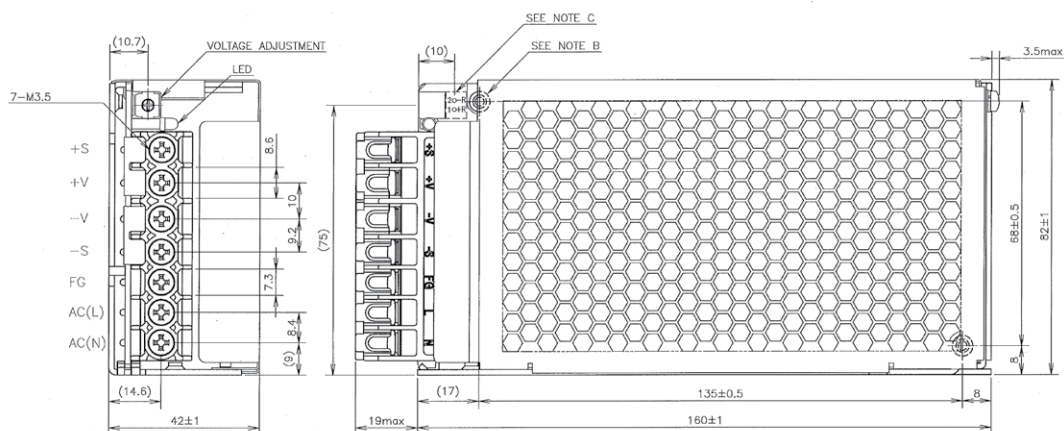
HWS50A/A Outline Drawing



HWS100A/A Outline Drawing



HWS150A/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)

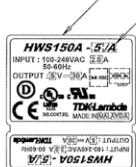
MATCHING TERMINAL PIN : BXH-001T-P0.6 (JST) OR SXH-001T-P0.6 (JST)

HAND CRIMPING TOOL : YC-110R (JST) OR YRS-110 (JST)

MATCHING HOUSING AND TERMINAL PIN ----- NOT INCLUDED WITH THE PRODUCT

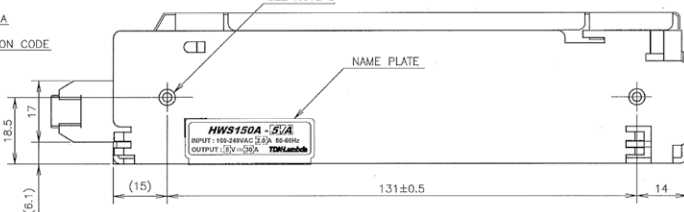
NAME PLATE

SEE NOTE A



OPTION CODE

SEE NOTE B



ACCESSORIES

* SHORT PIECE (NET 2) FOR SHORTING PURPOSE
(+S~-+V, -S~-+V) : MOUNTED AT TIME OF SHIPMENT.





- Limited Lifetime Warranty
- UL508 Approved
- SEMI F47 Compliant (high line AC)
- Universal Input (85 - 265VAC)
- High Efficiency
- RoHS Compliant Design

Key Market Segments & Applications

Factory Automation
Test & Measurement
Automated Service

HWS300-1500 Series

Single Output Industrial
Power Supplies

HWS300-1500 Features and Benefits

Features

- Limited Lifetime Warranty
- High Efficiency
- Wide Range AC Input

Benefits

- Lower Cost of Ownership
- Easier System Cooling
- Supports Global Use

Specifications

MODEL		HWS300	HWS600	HWS1000	HWS1500
ITEMS					
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	-	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/s ² 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
Warranty		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

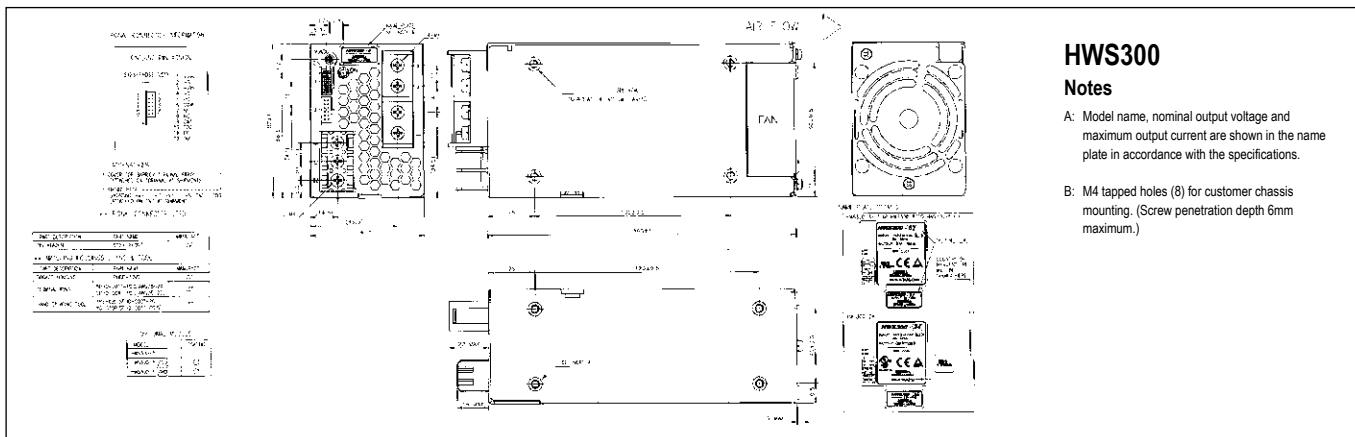
Suffix	Description
Blank	HWS300-1500 the cover is fitted as standard
/A	Not Applicable
/PV	HWS300, 600 (Standard on HWS1000 & 1500 all output voltages): 1-6V program voltage input to adjust output 20-120% of nominal (20-110% for 48V) (12V-48V models only for 300 & 600W):
/HD	See HWS30-1500/HD Datasheet 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



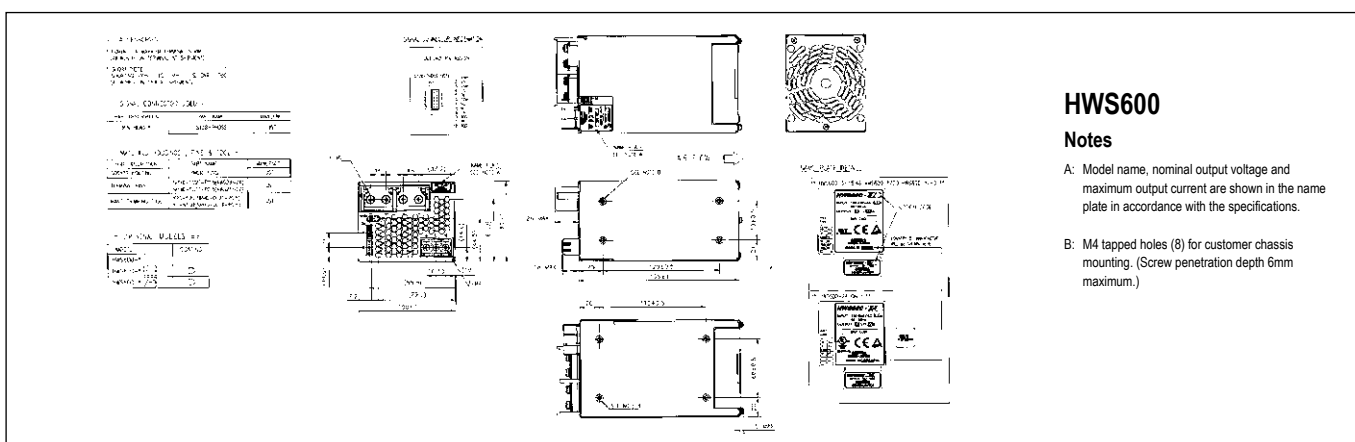
Outline Drawing HWS300 -1500 Series



HWS300

Notes

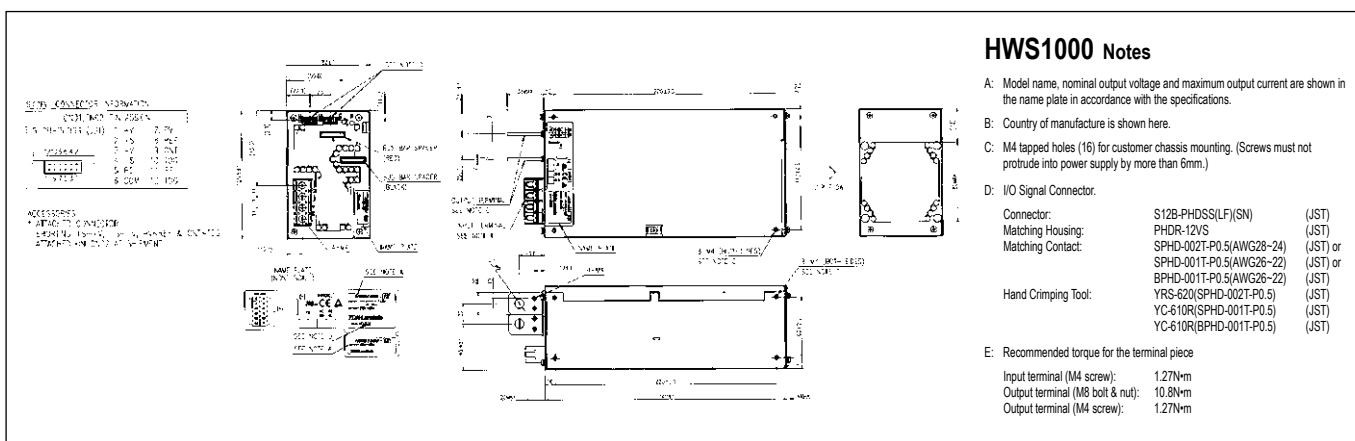
- A: Model name, nominal output voltage and maximum output current are shown in the name plate in accordance with the specifications.
- B: M4 tapped holes (8) for customer chassis mounting. (Screw penetration depth 6mm maximum.)



HWS600

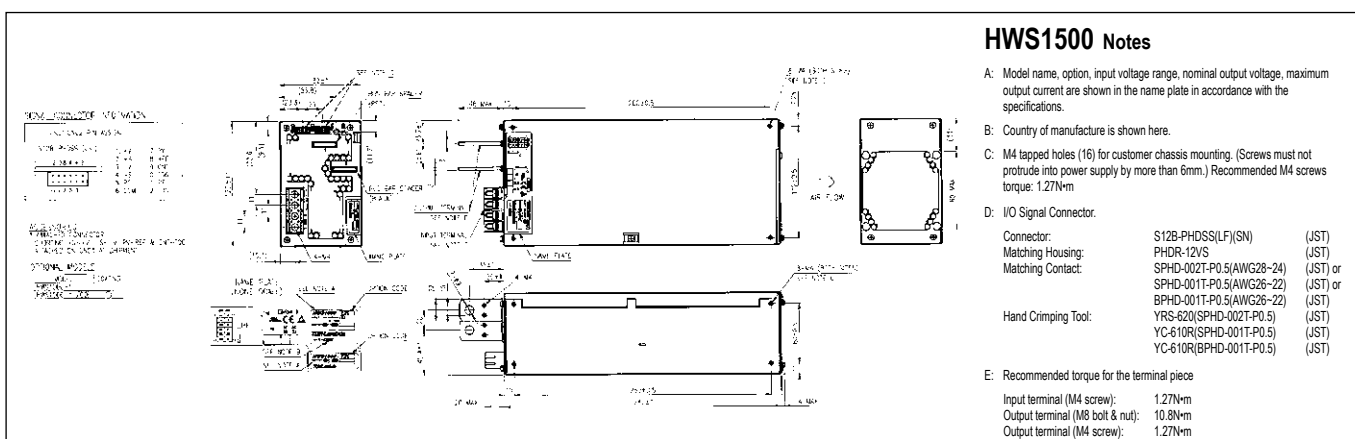
Notes

- 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

HWS300P & 600P Series

Peak Power Industrial
Power Supplies

Key Market Segments & Applications

Factory Automation
Process Control
Semiconductor Fabrication
Motor and Pump Drives

HWS300P & 600P Features and Benefits

Features

- Limited Lifetime Warranty
- Peak Power Capability
- High Efficiency

Benefits

- Lower Cost of Ownership
- Lower cost, smaller size
- Easier system cooling, less power used

Specifications

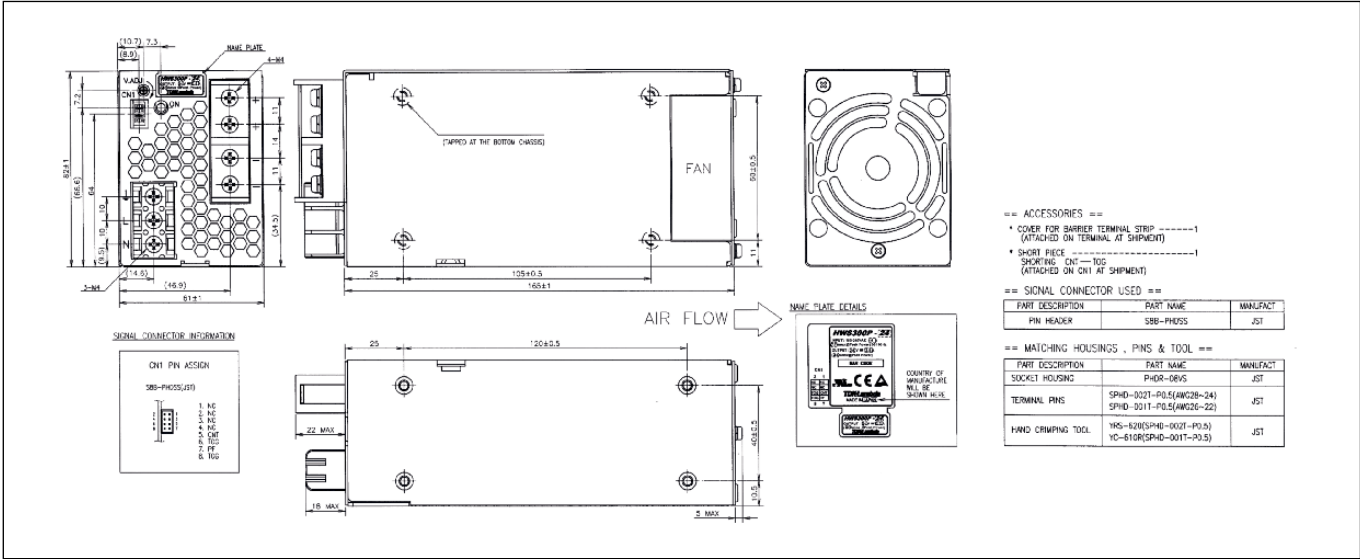
MODEL		HWS300P	HWS600P
ITEMS			
Input Voltage range	-	85 - 265VAC (47 - 63Hz) or 120 - 330VDC	
Input Current (Typ)	(1) A	3.6/1.9	7.2/3.7
Inrush Current	(1) A	20 / 40	
Power Factor	-	Meets EN61000-3-2	
Temperature Coefficient	-	<0.02%/°C	
Overcurrent Protection	-	See table on page 2 (Recycle AC or remote 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

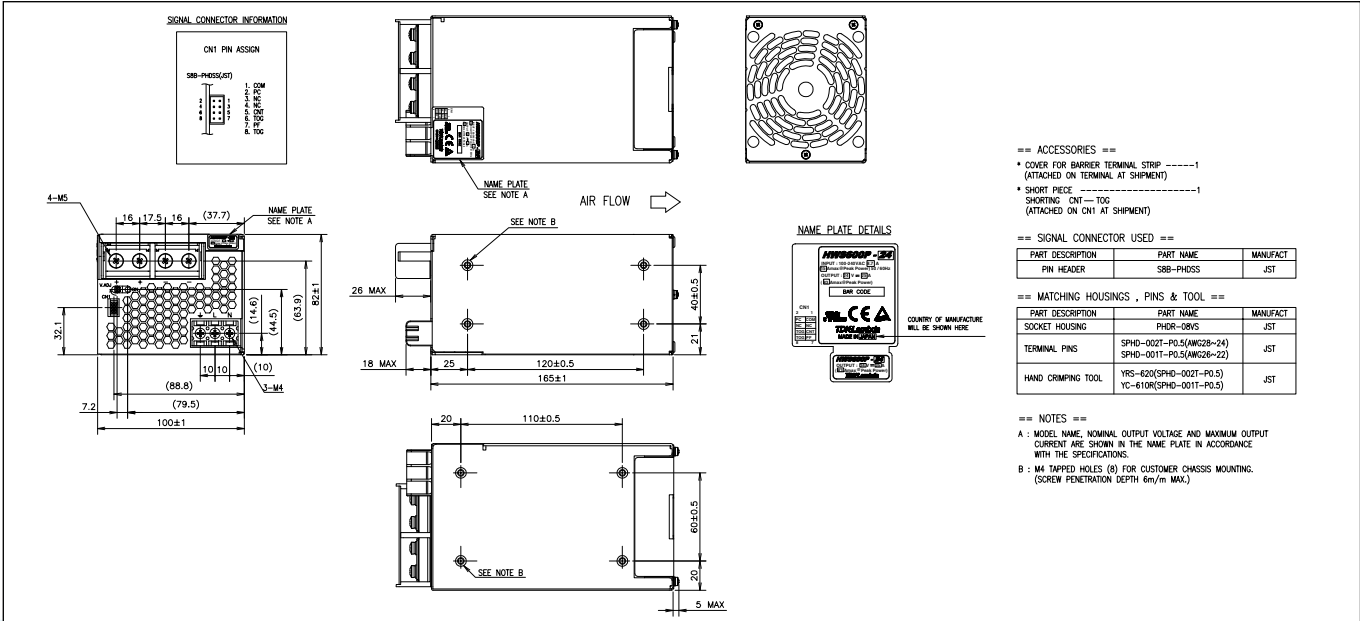


Model Selector								
Model	Voltage V	Adjust Range V	Max Avg. Current A	Max Avg. Power W	Peak Current A (1,2)	Max Peak Power W (1)	Overcurrent Minimum A	Overvoltage V
HWS300P-24	24V	19.2 - 26.4	12.5	300	21 / 42	504 / 1008	21.4 / 42.8	27.6 - 32.4
HWS600P-24	24V	19.2 - 26.4	25	600	40.5 / 83	972 / 1992	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)								

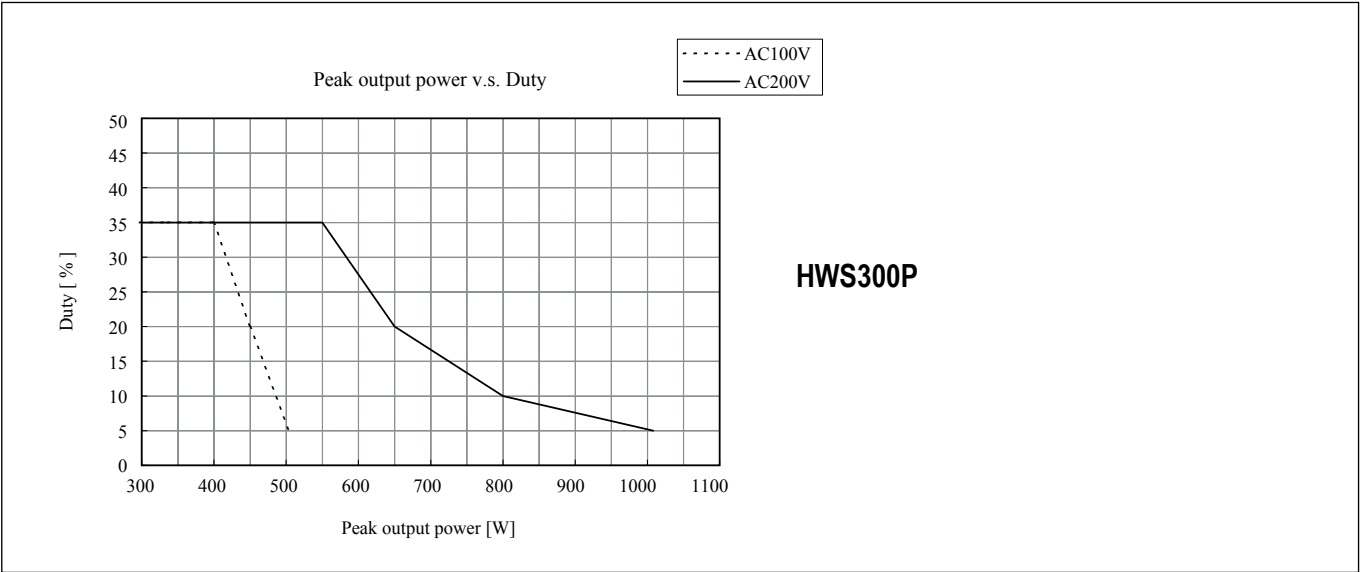
Outline Drawing HWS300P



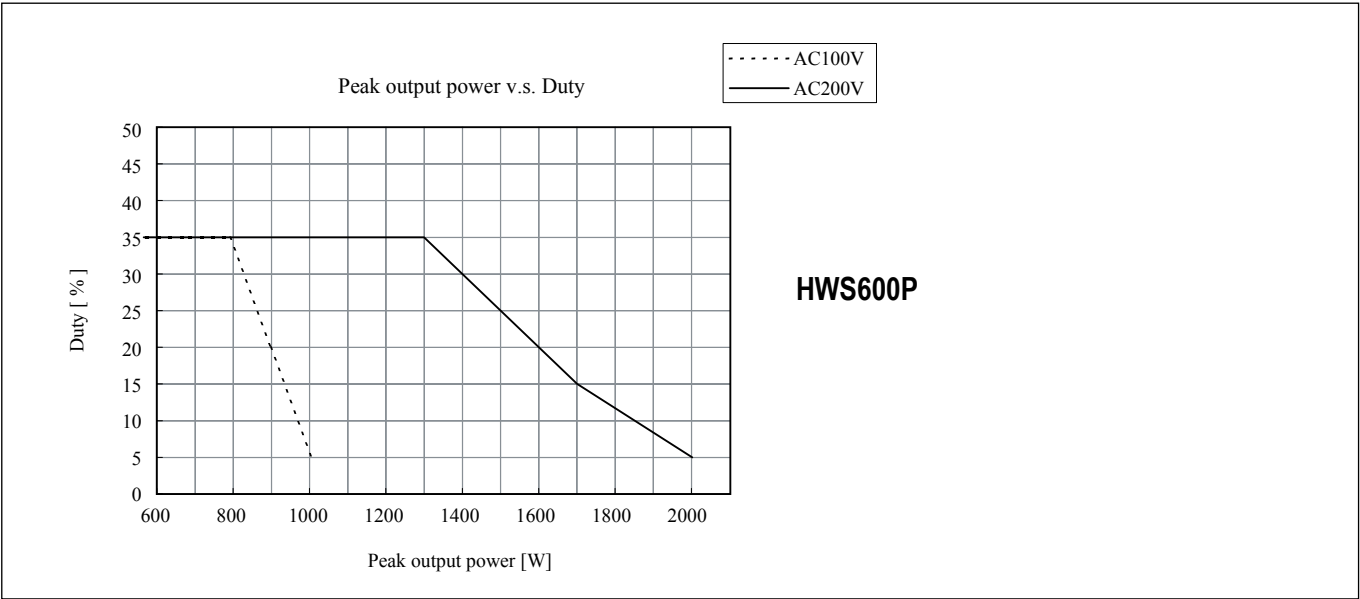
Outline Drawing HWS600P



HWS300P Peak Output Power vs. Duty Cycle



HWS600P Peak Output Power vs. Duty Cycle



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

- VDE01 60 Approved
- 5 Year Warranty
- Power Factor Corrected
- Level B EMI

Benefits

- No Additional Approvals Needed
- Lower Cost of Ownership
- Supports Global Use
- Assists Systems Compliance

Specifications

MODEL		JWT75	JWT100
ITEMS			
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%/°C, V3 <0.03%/°C	
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	-	-10°C to +65°C, derate linearly to 50% load from 50°C to 65°C -10°C to +50°C, derate linearly to 60% load from 40°C to 50°C with cover	
Storage Temperature	°C	-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 25°C & 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	

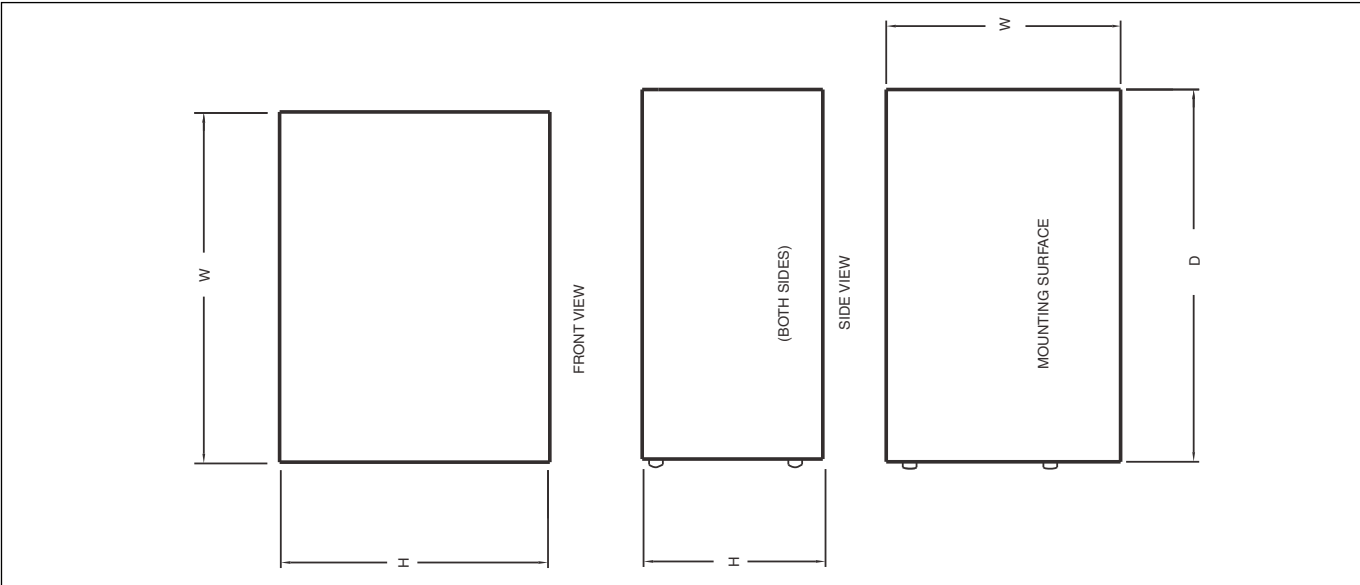
Note: See Installation Manual for full details, test methods of parameters and application notes.



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





- 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)
- Three Year Warranty

Key Market Segments & Applications

Test & Measurement
Automated Service
Factory Automation
General Purpose
LED Lighting & Display

LS25-150 Series

Single Output General Purpose
Power Supplies

LS25-150 Features and Benefits

Features

- High MTBF
- High efficiency
- -25 to +70°C operating temperature
- Low derating above 50 °C (up to 70% load available at 70° C)
- Curve B EMC

Benefits

- Superior Reliability
- Easier system cooling
- Suitable for indoor & outdoor enclosures
- Improved system power optimisation
- Assists system compliance

Specifications

		LS25	LS35	LS50	LS75	LS100	LS150
ITEMS							
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	3					



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

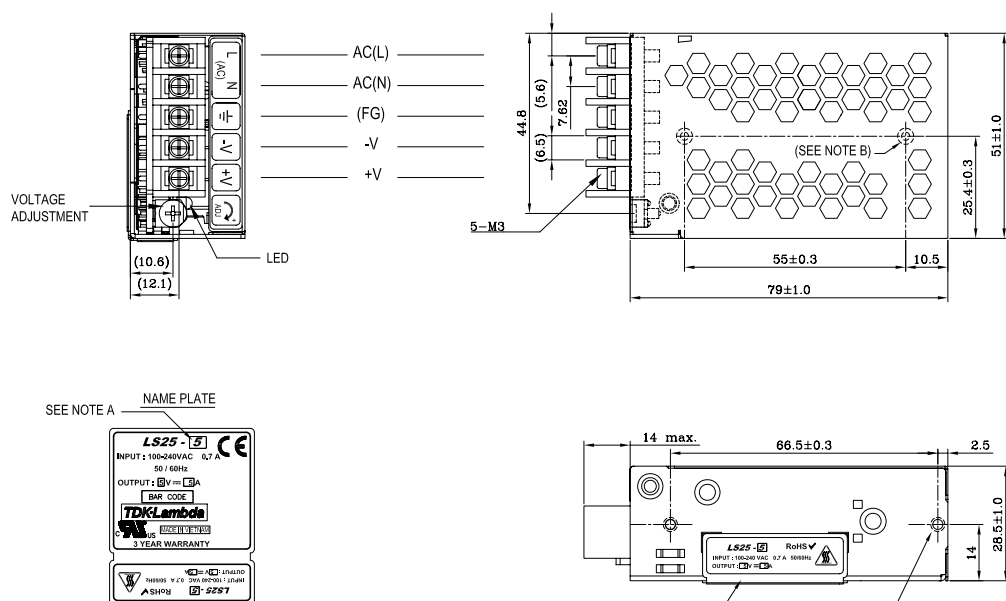
Notes: See page 1

- (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.



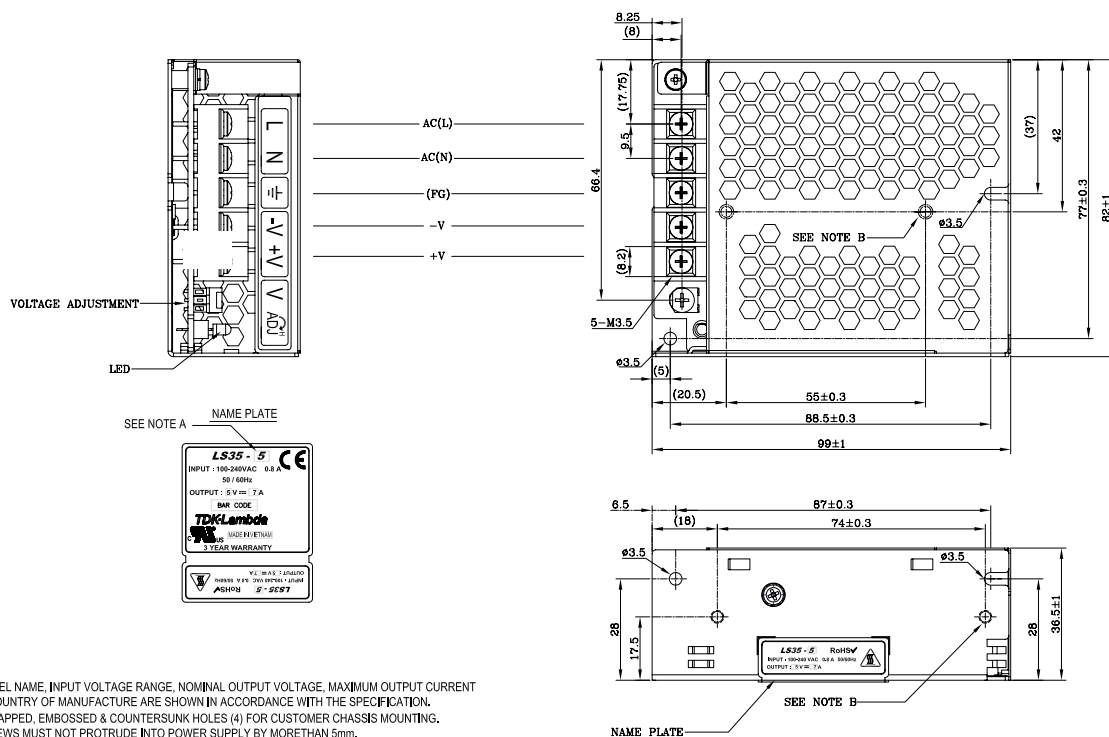
Outline Drawing LS25



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 = ± 0.3 mm.

Outline Drawing LS35

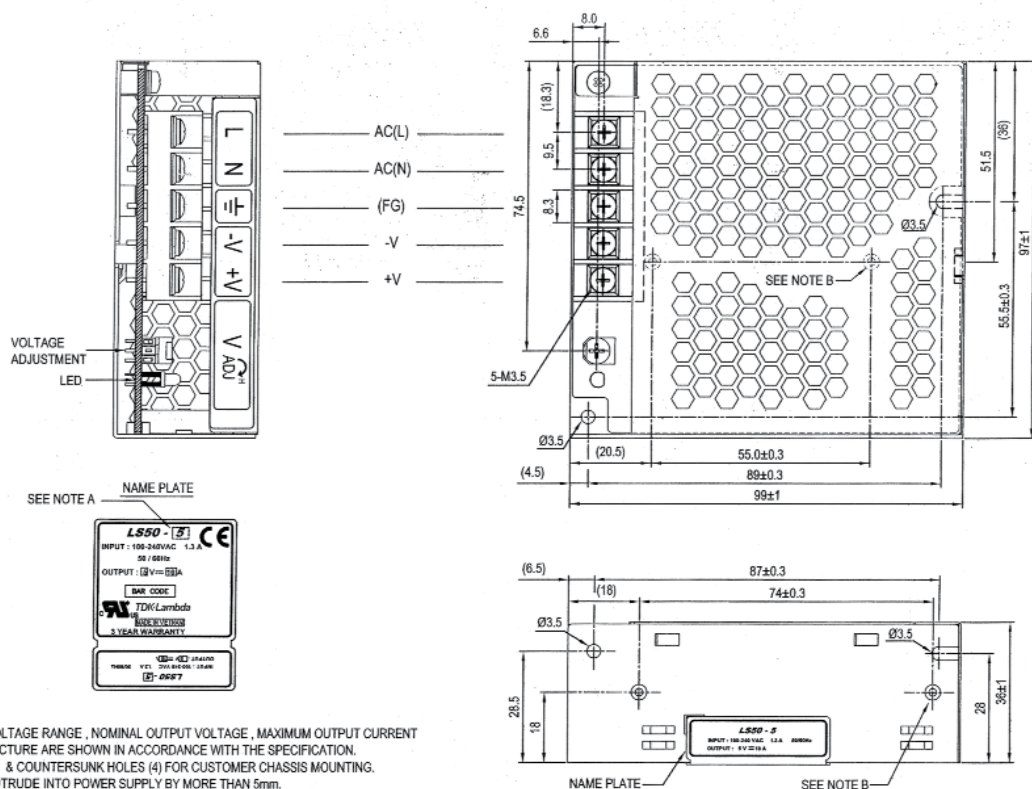


NOTES

- 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 MORE THAN 5mm.
- C. UNLESS OTHERWISE SPECIFIED, DIMENSION TOLERANCE = ± 0.3 mm.



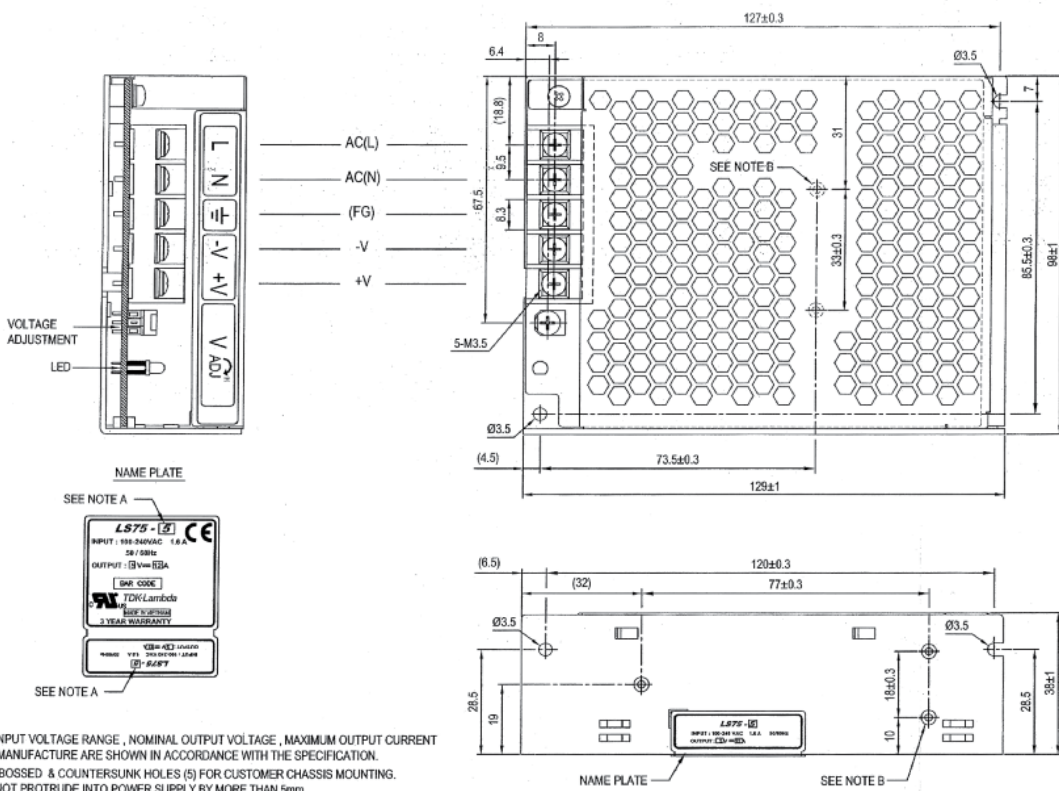
Outline Drawing LS50



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

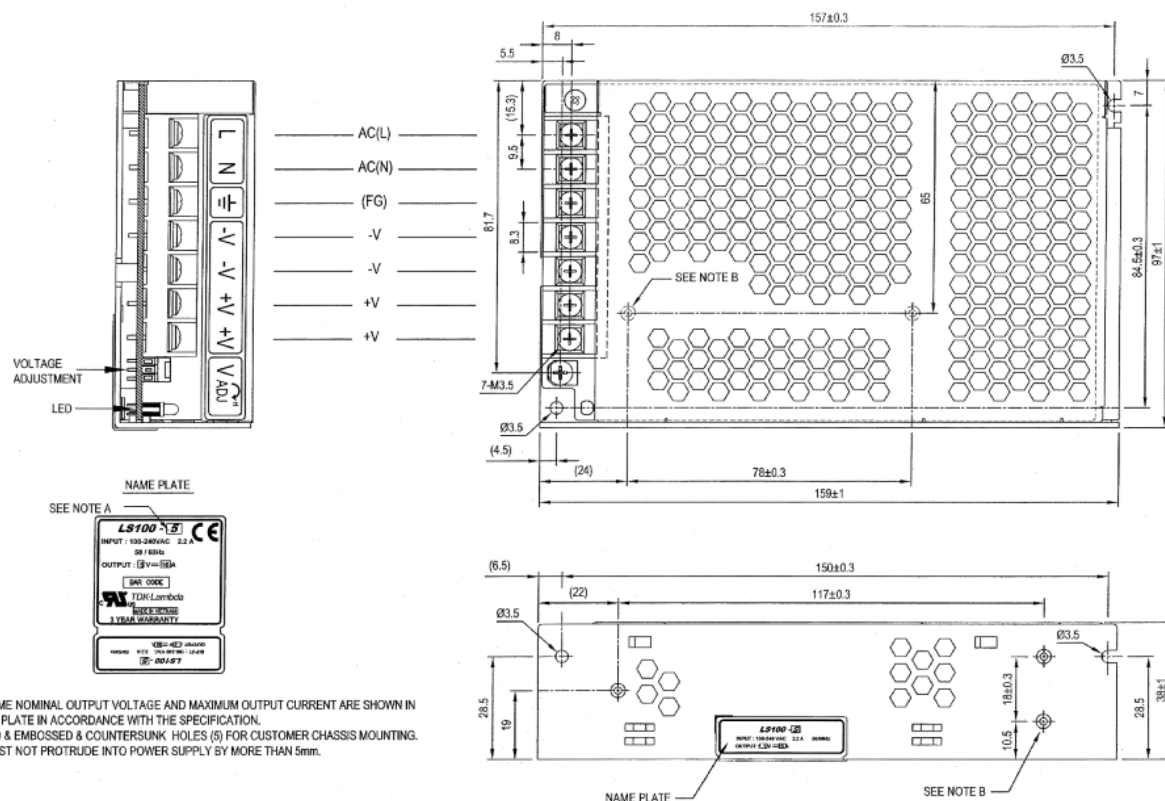


NOTES

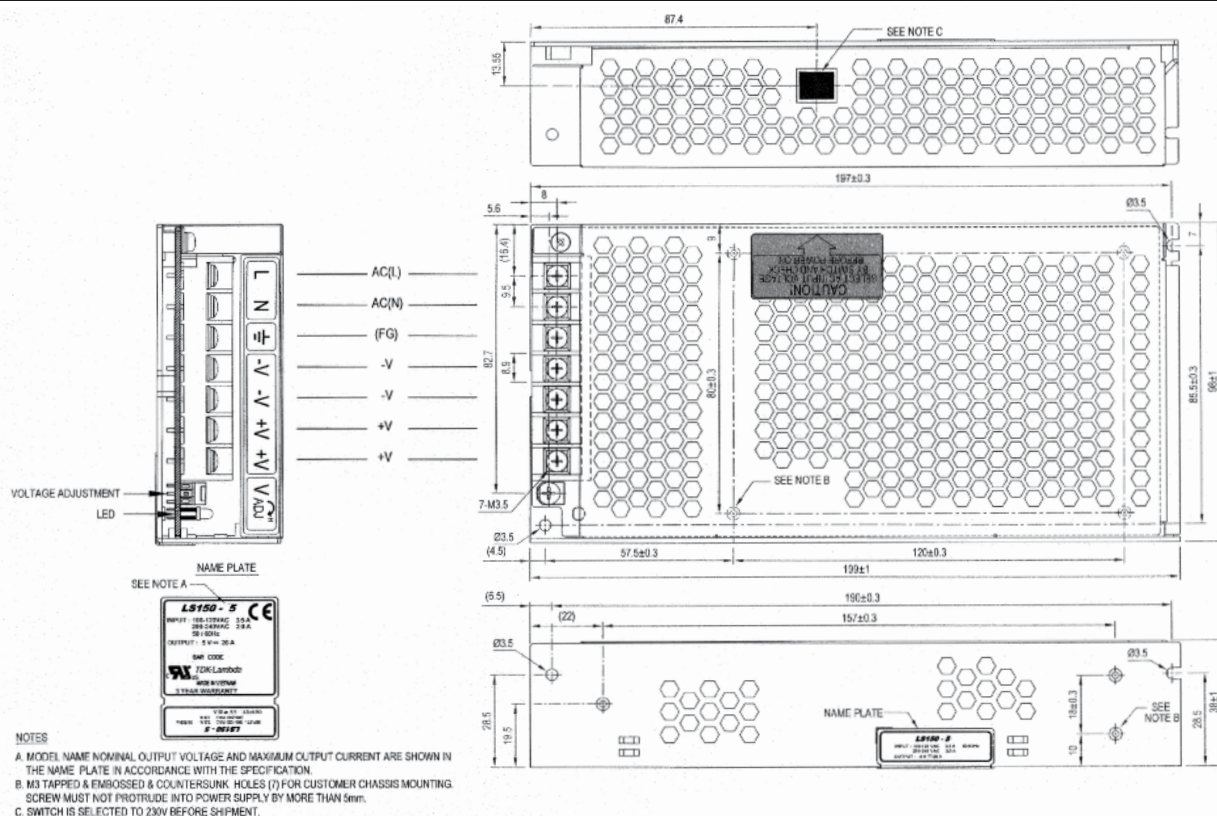
- A. MODEL NAME, INPUT VOLTAGE RANGE, NOMINAL OUTPUT VOLTAGE, MAXIMUM OUTPUT CURRENT & COUNTRY OF MANUFACTURE ARE SHOWN IN ACCORDANCE WITH THE SPECIFICATION.
- B. M3 TAPPED, EMBOSSED & COUNTERSUNK HOLES (5) FOR CUSTOMER CHASSIS MOUNTING. SCREWS MUST NOT PROTRUDE INTO POWER SUPPLY BY MORE THAN 5mm.



Outline Drawing LS100



Outline Drawing LS150





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
- Three year warranty
- 41mm high (for 1U racking)
- 250W peak rating on 24 & 36V models

Key Market Segments & Applications

Test and Measurement Light Industrial
Automated Service Kiosks
LED Lighting & Displays

LS200 Features and Benefits

Features

- High MTBF
- High efficiency
- -25 to +70°C operating temperature
- Low derating above 50°C (up to 60% load available at 70°C)
- Curve B EMC

Benefits

- Superior reliability
- Easier system cooling
- Suitable for indoor & outdoor enclosures
- Improved system power optimisation
- Assists system compliance

Specifications

MODEL		LS200 (enclosed style with internal fan)	LS200/L (U channel style - no internal fan)
ITEMS			
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	3	

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

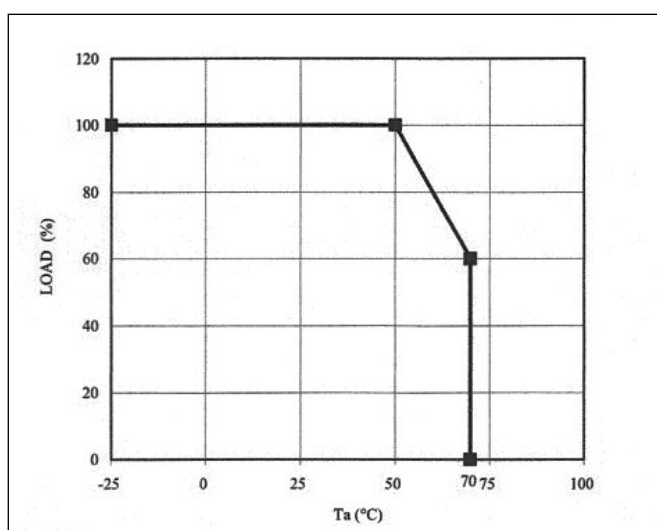
Notes

(3) Internal fan version or customer supplied airflow for /L models

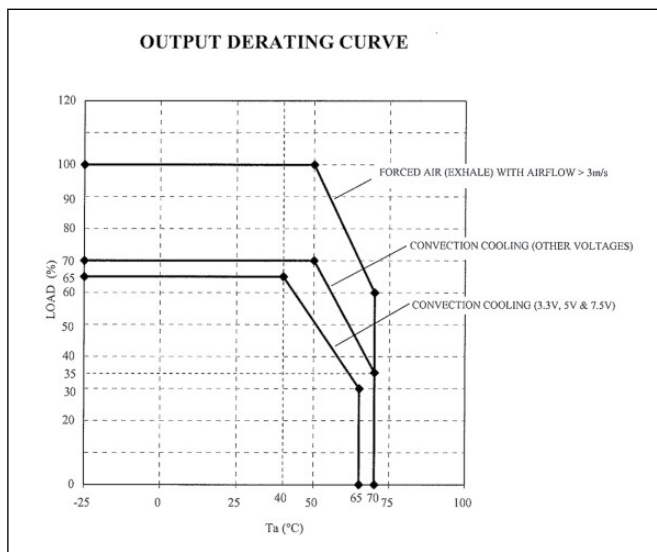
Options

Suffix	Description
/L	No cover or fan (U channel)
Blank	Cover and fan

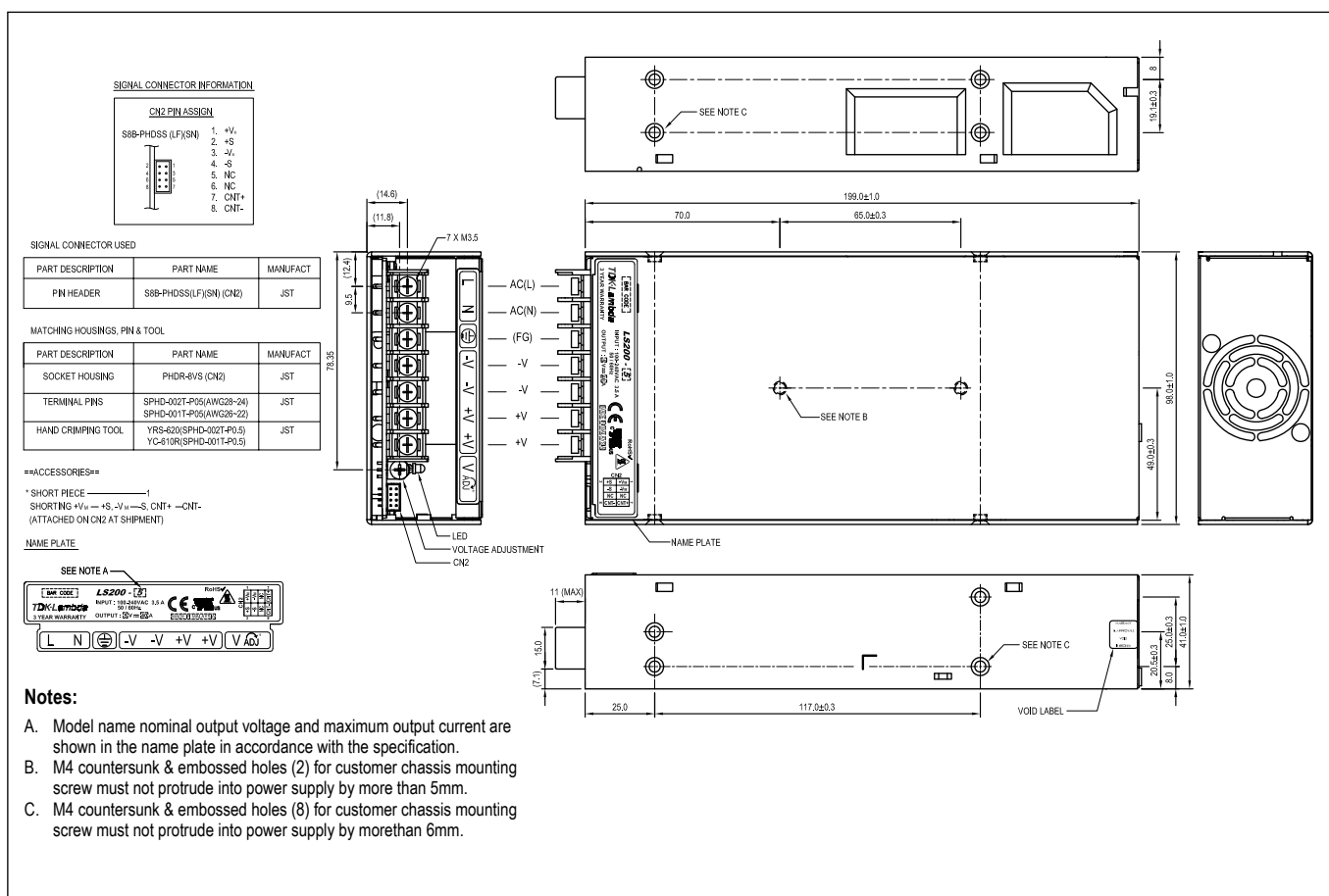
Derating Curve LS200



Derating Curve LS200/L



Outline Drawing LS200 Series





LZSA Series

Single Output Industrial
Power Supplies

- 5 Year Warranty
- -40°C to +71°C 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 Features and Benefits

Features

- Rugged mechanical design with coating on PCBS
- Superior thermal design
- Wide range adjustment of output
- Input voltage transient protected

Benefits

- High reliability in harsh conditions
- Longer life even at 71°C operation
- Reduces need for custom outputs
- Reduced system filtering

Specifications

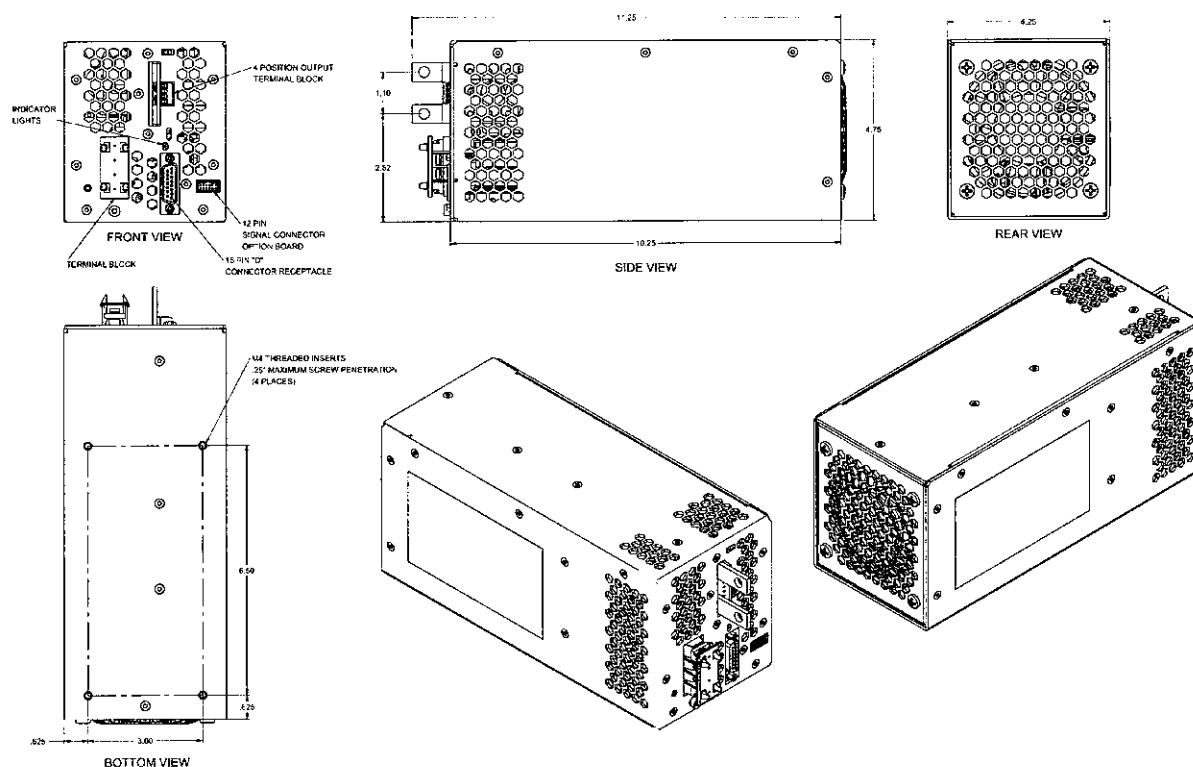
MODELS		LZSA500	LZSA1000	LZSA1500
ITEMS				
Input Voltage (47-440Hz)*	-	85 - 265V (1500W: See output rating below 100VAC) 100-400VDC		
Inrush Current (110 / 220VAC)	A	20 / 40A	40 / 80A	
Power Factor	-	EN61000-3-2 Class A		
Efficiency (typical)	%	84%		
Ripple & Noise (Max) Pk-Pk	-	75mV	75mV	24V: 75mV 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	°C	-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	°C	-40°C to +85°C		
Temperature Coefficient	-	0.01%/°C		
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)

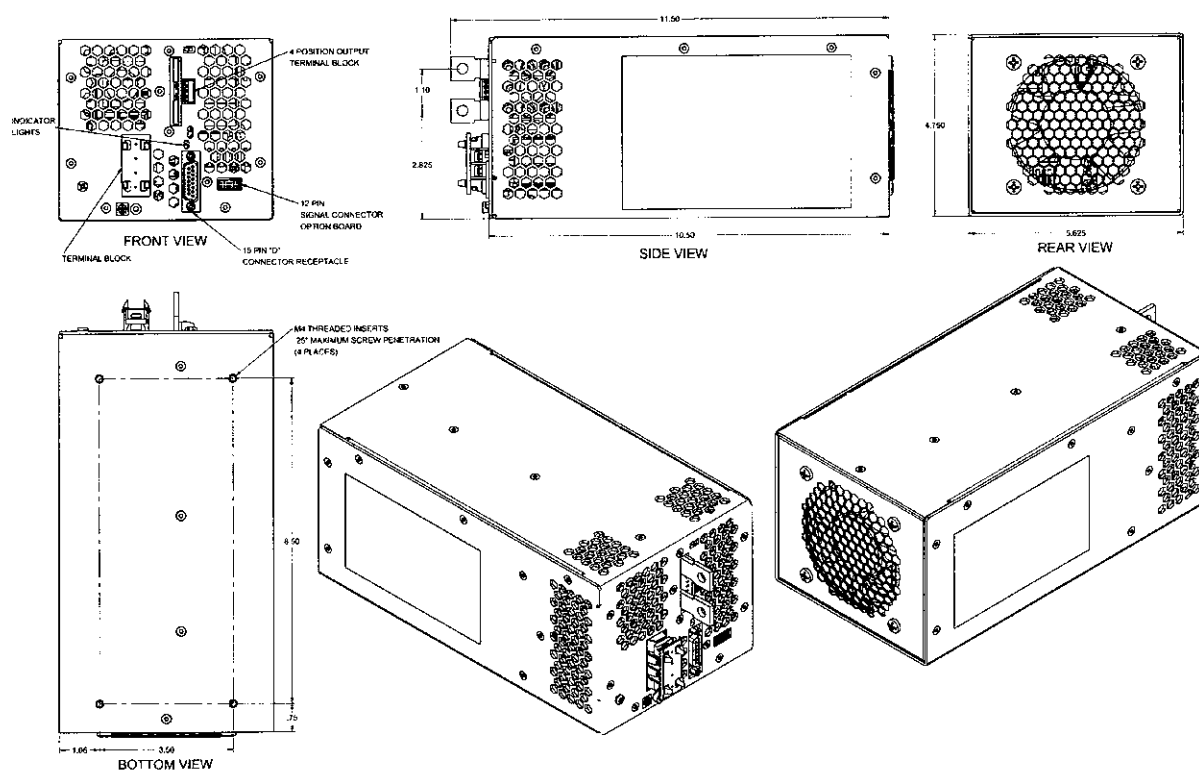
*Reduced power factor above 63Hz



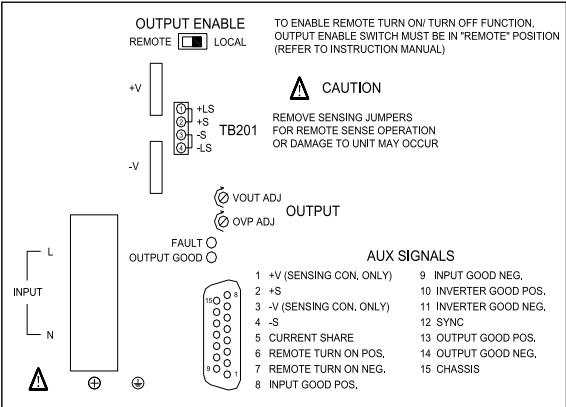
Outline Drawing LZSA500



Outline Drawing LZSA1000/1500



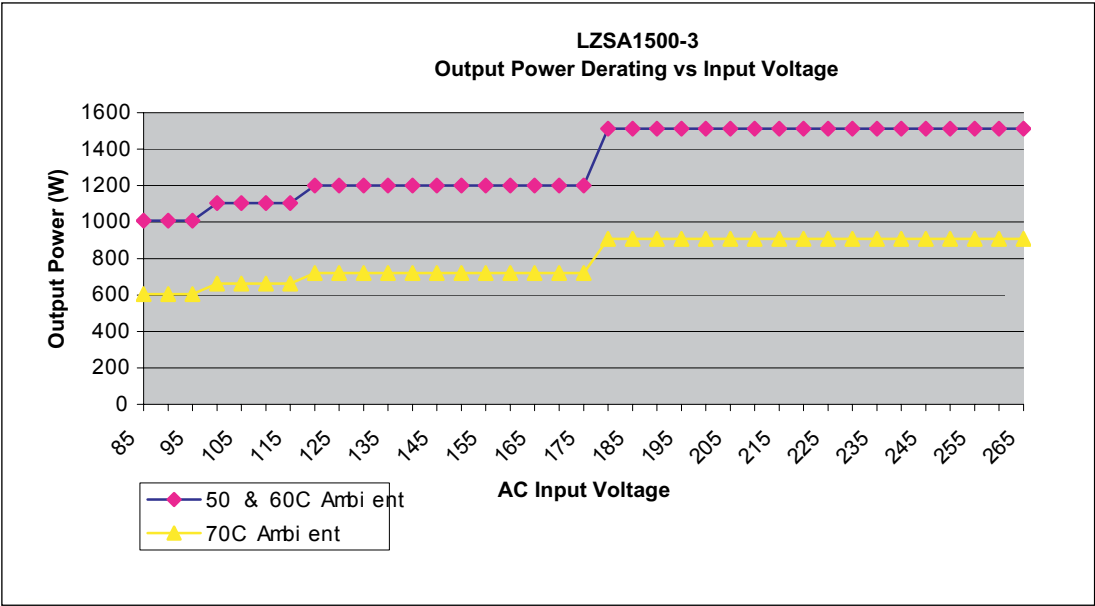
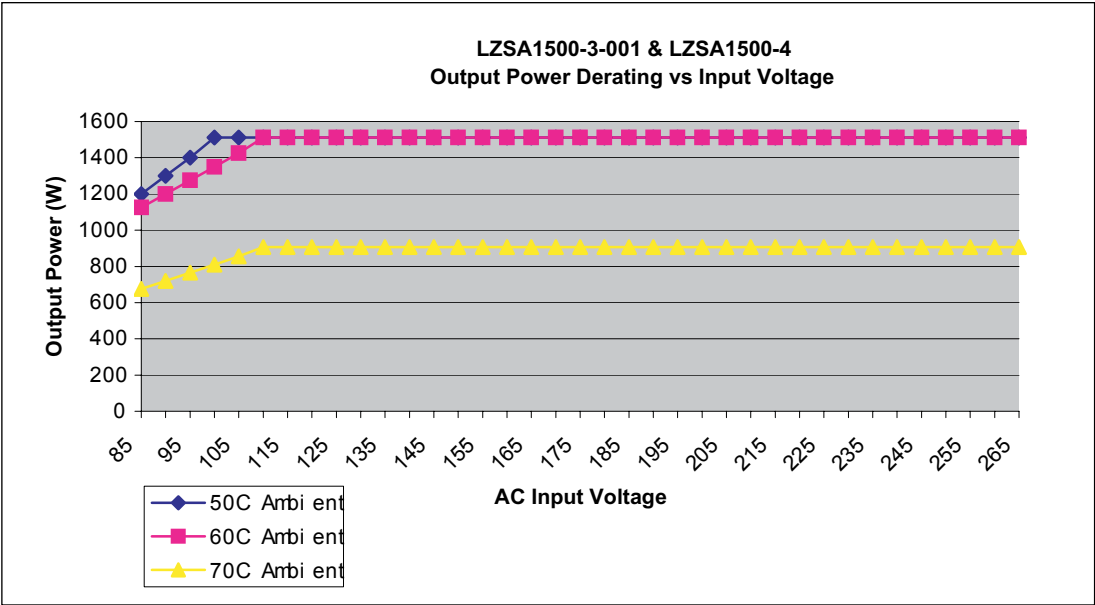
Connection Diagram LZSA500 Series

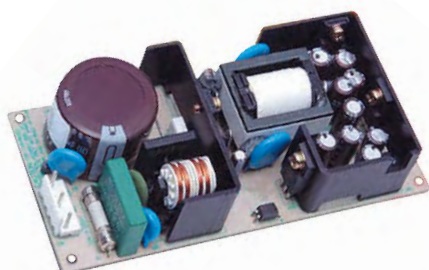


Model Selector				
Model	Nominal Voltage (V)	Adjustment Range (V)	Maximum Current (A)	Maximum Power (W)
LZSA500-3	24	18 - 29.4	21	504
LZSA1000-2	12	10 - 15.75	84	1008
LZSA1000-3	24	18 - 29.4	42	1008
LZSA1500-3-001	24	18 - 29.4	63	1512 ⁽¹⁾
LZSA1500-4	48	36 - 56	31.5	1512 ⁽¹⁾

Note (1) 1512W @ 180-265VAC, 1200W @ 120VAC, 1104W @ 100 VAC, 1008W @ 85VAC

Figure 1 - PIN Assignments for TB201 and chassis mounted "D" connector





- 26mm height
- 3 year Warranty
- Peak Load capable
- Light weight
- Output 1 isolated from outputs 2 & 3

MTW Series

15W to 60W Low Profile Triple
Output Power Supplies

Key Market Segments & Applications

Factory Automation
Test & Measurement
Automated Service
Portable Equipment

MTW Features and Benefits

Features

- Low Profile
- Three Year Warranty
- Output 1 is isolated from outputs 2 & 3

Benefits

- Assists System Integration
- Low Cost of Ownership
- 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	30	60
			17.5	33	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 linearly 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

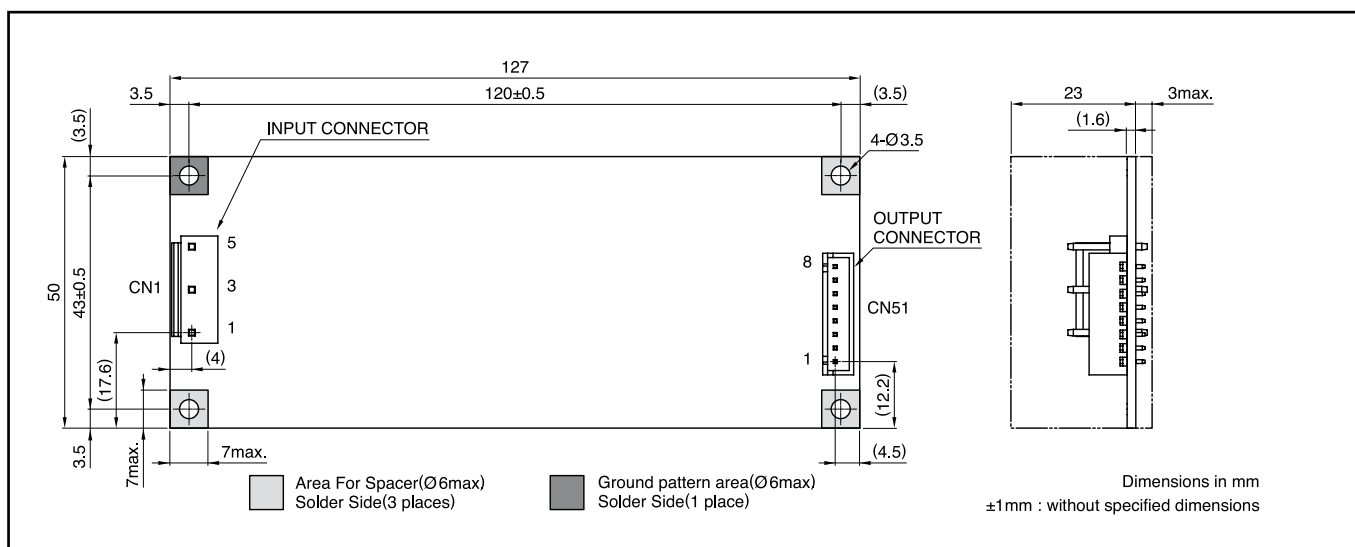
Model	Output	Voltage (V)	Regulation	Minimum Current (A)	Maximum Current (A)	Peak Current (A)	Ripple & Noise (mV)
MTW15-51212	V1	5V	4.75 - 5.25V	0	2.0	3.0	120
	V2	12V	11.4 - 12.6V	0	0.3	0.6	150
	V3	-12V	11.4 - 12.6V	0	0.2	0.3	150
MTW15-51515	V1	5V	4.75 - 5.25V	0	2.0	3.0	120
	V2	15V	14.4 - 15.6V	0	0.3	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

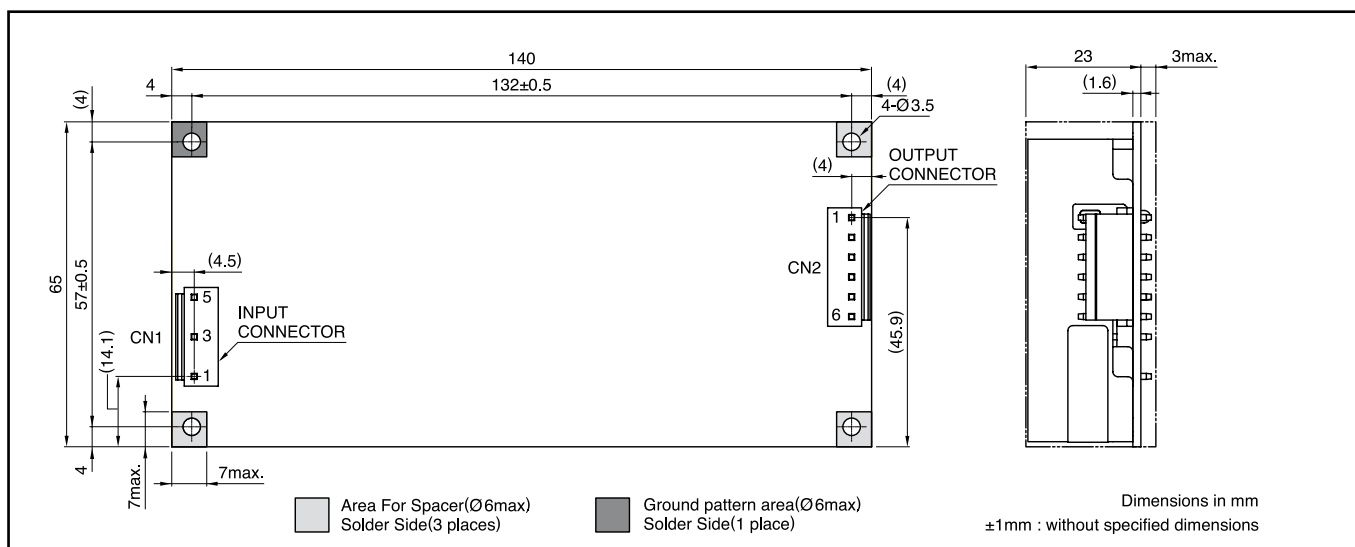
	Model	Input	Output
Connectors	MTW15	B3P5-VH-B	B8B-XH-2
JST	MTW30	B3P5-VH-B	B6P-VH-B
	MTW60	B3P5-VH-B	B8P-VH-B



Outline Drawing MTW15 Series



Outline Drawing MTW30 Series





MWS65 Series

2 x 4" 55 to 67W AC-DC Power Supplies

- Medical & ITE Certifications
- BF Rated
- Very Low 1" profile
- Industry Standard Footprint
- Up to 89% Efficient
- <0.3W Off-load Power Draw

Key Market Segments & Applications

Medical
Test & Measurement
Point of Sale
Datacom

MWS65 Features and Benefits

Features

- Industry standard footprint
- <0.3W off-load power draw
- BF rated
- 25mm Profile

Benefits

- Availability to second source
- Suitable for "Green" products
- Easy system compliance
- Less system space needed

Specifications

Model		MWS65
ITEMS		
AC Input Voltage Range	(1) -	85 - 265VAC (47 - 440Hz)
DC Input Voltage Range	-	120 - 370VDC
Input Current (115 / 230VAC)	A	1.25 / 0.62A
Inrush Current (115 / 230VAC)	A	30 / 60A (Cold Start)
Temperature Coefficient	-	±0.02%/°C
Minimum Load	-	None
Off-load Power Draw	W	<0.3W at 230VAC
Overcurrent Protection	%	> 105%
Overvoltage Protection	%	115 - 135%
Load Regulation	%	0.8%
Line Regulation	%	0.4%
Hold Up Time (Typ)	ms	10ms / 20ms (115VAC / 230VAC input)
Leakage Current	mA	<0.25mA at 265VAC, 63Hz
Operating Temperature	°C	-20°C to +70°C, derate linearly to 50% load from 50°C to 70°C, Guaranteed start up at -25°C
Cooling	-	Convection
Operating Humidity (non condensing)	%RH	10 - 90% RH
Storage Temperature	°C	-40°C to +85°C
Storage Humidity (non condensing)	%RH	10 - 95% RH
Withstand Voltage	-	Input to Ground 1.5kVAC, Input to Output 4kVAC, Output to Ground 1.5kVAC for 1 min.
Isolation Resistance	-	>100M at 25°C & 70%RH, Output to Ground 500VDC
Vibration (non operating)	-	19.6m/s ² (10 - 500Hz: constant sweep 1 min X, Y, Z for 1 hour)
Shock	-	< 196.1 m/s ² (20G), MIL-STD810-F
Safety Agency Certifications	-	UL60950-1, CSA60950-1, EN60950-1, EN50178 (OV II), CE Mark UL60601-1, EN60601-1 (2nd & 3rd edition)
Conducted & Radiated EMI	-	EN55011/EN55022-B, FCC Class B, VCCI-B
Immunity	-	EN61000-4-2 (lv 2,3), -3 (lv 3), -4 (lv 3), -5 (lv 2,3), -6 (lv3), -8 (lv4), -11
Weight (Typ)	g	150
Size (WxLxH)	mm	50.8 x 101.6 x 25.4 (including underside components)
Warranty	yrs	3

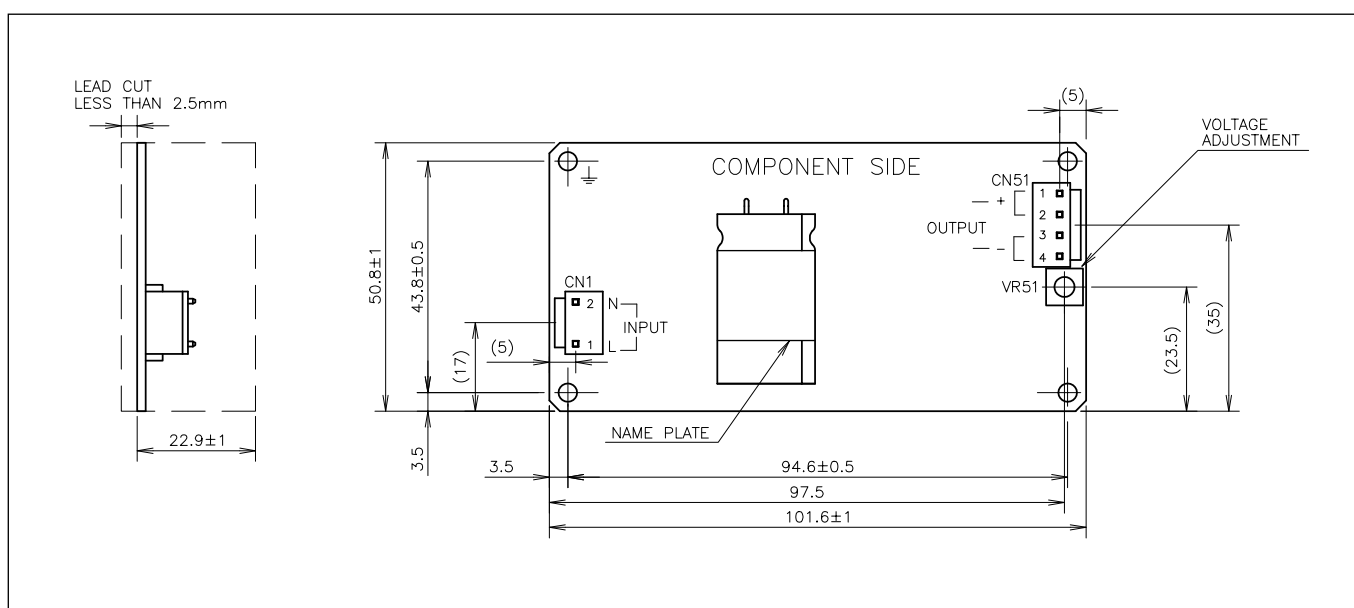
Notes: (1) < 90VAC Input See Derating Curve



Model Selector

Model	Output Voltage (V)	Adjustment Range (V)	Maximum Output (A)	Output Power (W)	Ripple/Noise (mV)	Efficiency (115/230VAC) (%)
MWS65-5	5V	4.5 - 5.5V	11A	55	120mV	80 / 82
MWS65-12	12V	10.8 - 13.2V	5A	60	150mV	84 / 86
MWS65-15	15V	13.5 - 16.5V	4.4A	66	150mV	85 / 87
MWS65-24	24V	21.6 - 26.4V	2.8A	67.2	150mV	86 / 88
MWS65-48	48V	43.2 - 52.8V	1.4A	67.2	200mV	87 / 89

Outline Drawing MWS65 Series



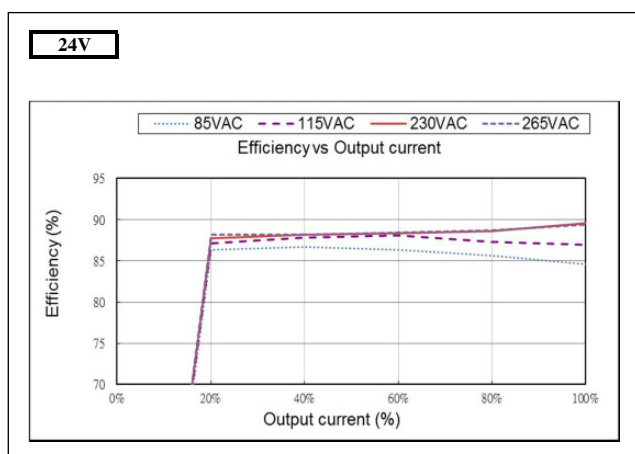
Connectors Used:

Part Description	Part Name	Manufacturer	Qty
Pin Header (input side CN1)	B2P3-VH(LF)(SN)	J.S.T	1
Pin Header (output side CN51)	B4P-VH(LF)S(SN)	J.S.T	1

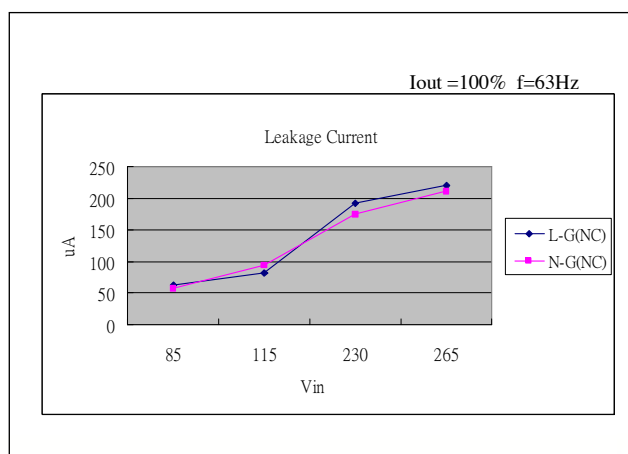
Matching Housings, Pins & Tools (not included with product):

Part Description	Part Name	Manufacturer	Qty
Socket Housing (CN1)	VAR-2/VHR-3N	J.S.T	1
Socket Housing (CN5)	VHR-4N	J.S.T	1
Terminal Pins	SVH-21T-P1.1 BVH-21T-P1.1	J.S.T	6
Hand Crimping Tool	YC-160R	J.S.T	-

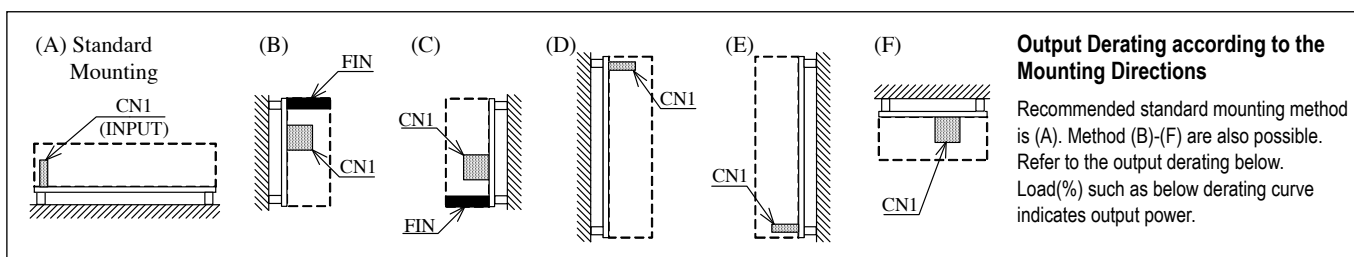
Efficiency vs Output Current



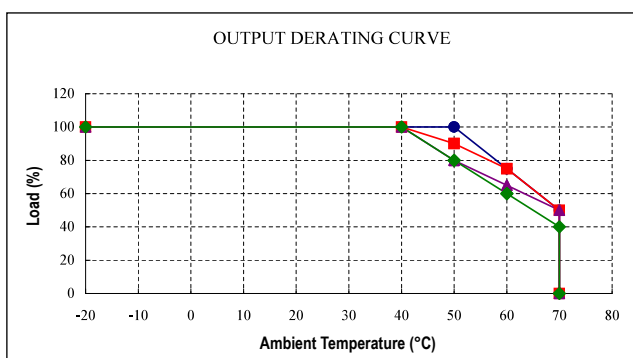
Leakage Current



Typical Mounting Method MWS65-24



Convection Cooling

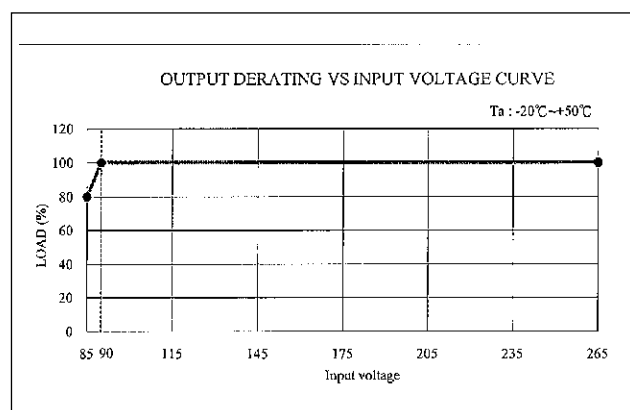


(*1) Output derating is different depending on the output voltage

- MOUNTING: (A)-(B) : 5V - 48V
- MOUNTING: (C) : 12V
- ▲ MOUNTING: (D)-(E) : 12V/48V
- ◆ MOUNTING: (D)-(E) : 15V/24V/48V
- ◆ MOUNTING: (D)-(E) : 5V
- ◆ MOUNTING: (F) : 5V - 48V

Ta(°C)	Load(%)	Load(%)	Load(%)	Load(%)
Mounting	A, B, C, D, E	C, D, E	D, E	F
-20~40	100	100	100	100
50	100	90	80	80
60	75	75	65	60
70	50	50	50	40

Derating Curve MWS65



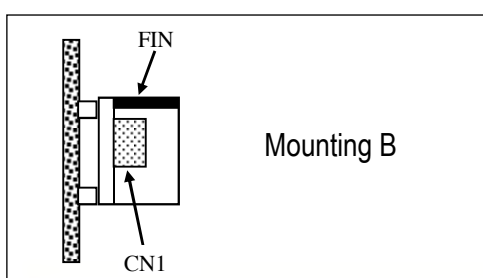
Example Electrolytic Capacitor Lifetime MWS65-24

Ta = 40°C — = 50°C ---- = 60°C

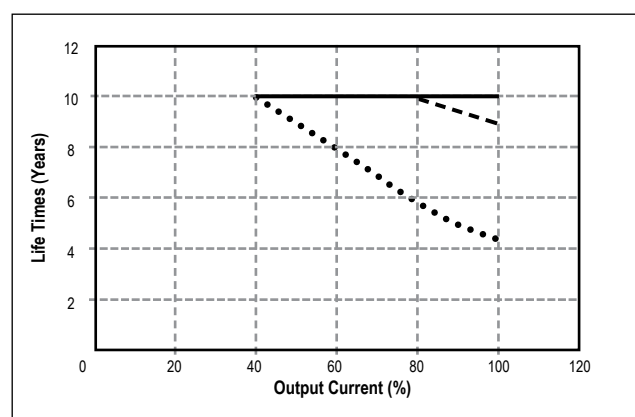
Vin = 230VAC

Load (%)	Life Time (Years)		
	Ta= 40°C	Ta= 50°C	Ta= 60°C
40	10.0	10.0	10.0
60	10.0	10.0	8.1
80	10.0	10.0	5.5
100	10.0	9.1	4.5

Mounting Method MWS65-24



Convection Cooling



For Electrolytic Cap life of other models
Please contact Technical Sales
or visit www.emea.tdk-lambda.com/mws





- 1U high
- Optional Internal ORing Diodes
- Current Share

RFE Series

1000W 1U Front End Power Supplies

RFE Features and Benefits

Features

1U high
Internal ORing diode option
Current Share
Full array of signals

Benefits

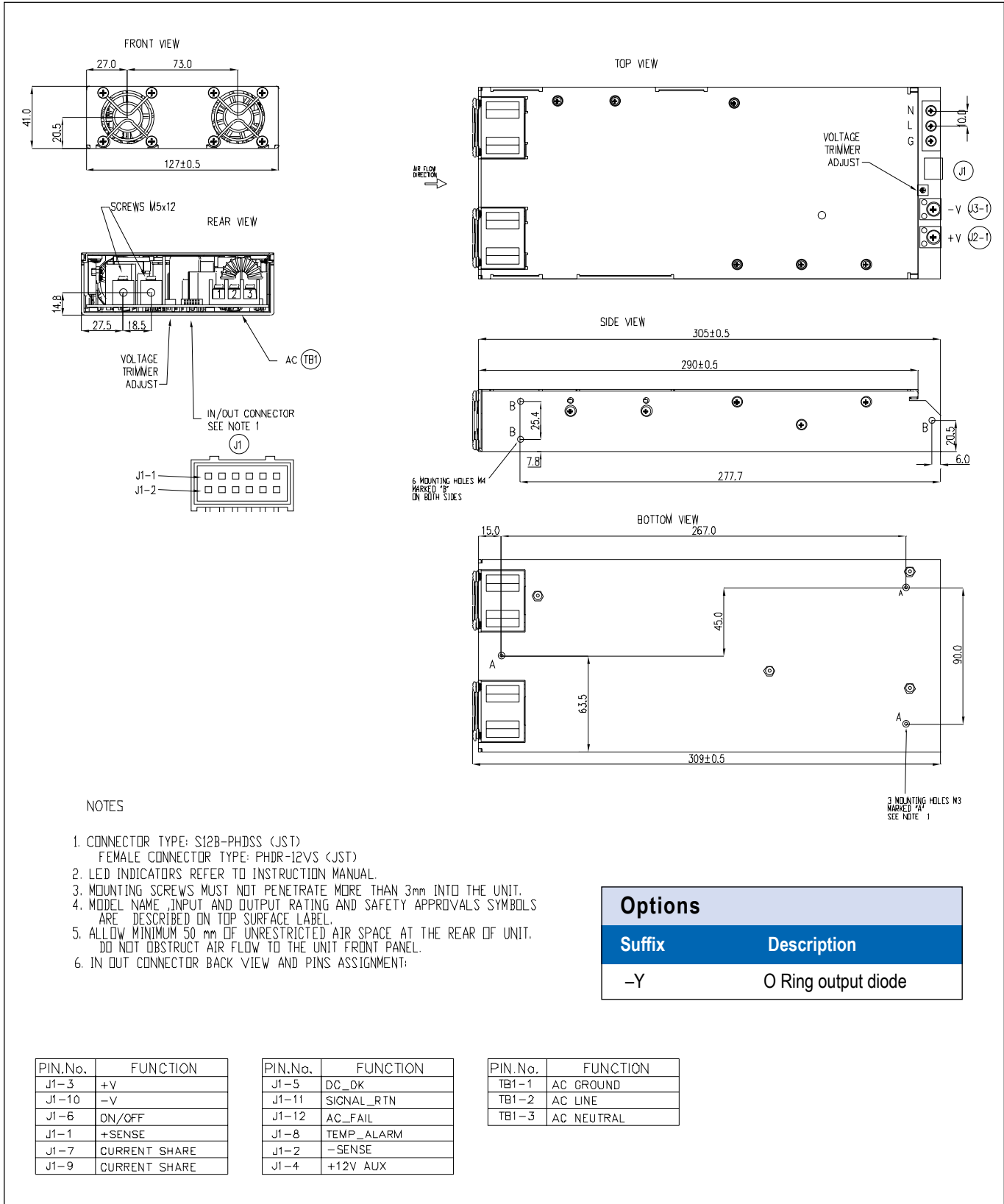
Utilizes less system space
Suitable for N+1 redundancy
Can be paralleled for higher power
Easier system monitoring

Specifications

MODEL		RFE1000-24	RFE1000-32	RFE1000-48
ITEMS				
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	-	Compensates 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





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



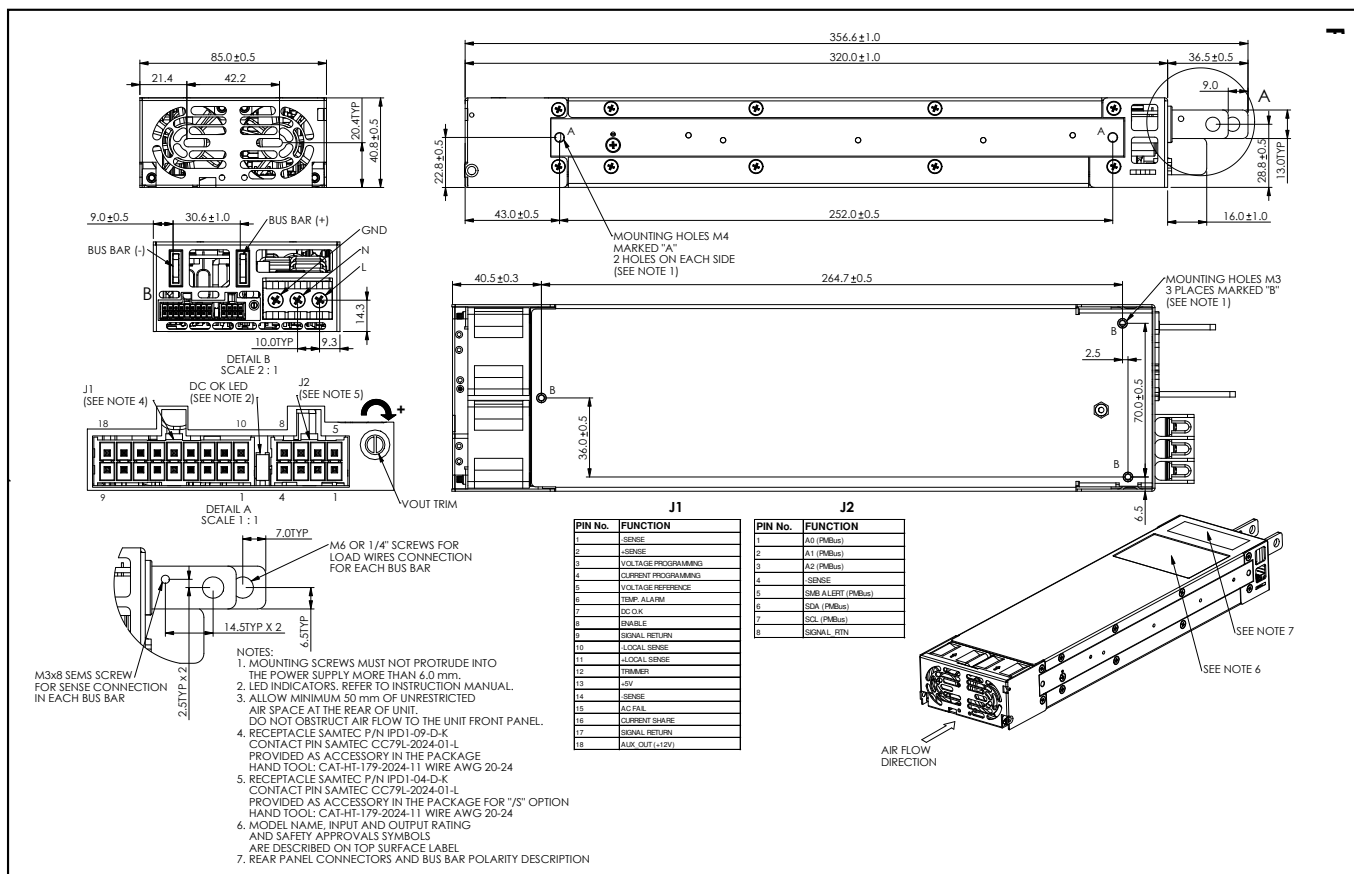
Model Selector

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)	r ² C
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





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



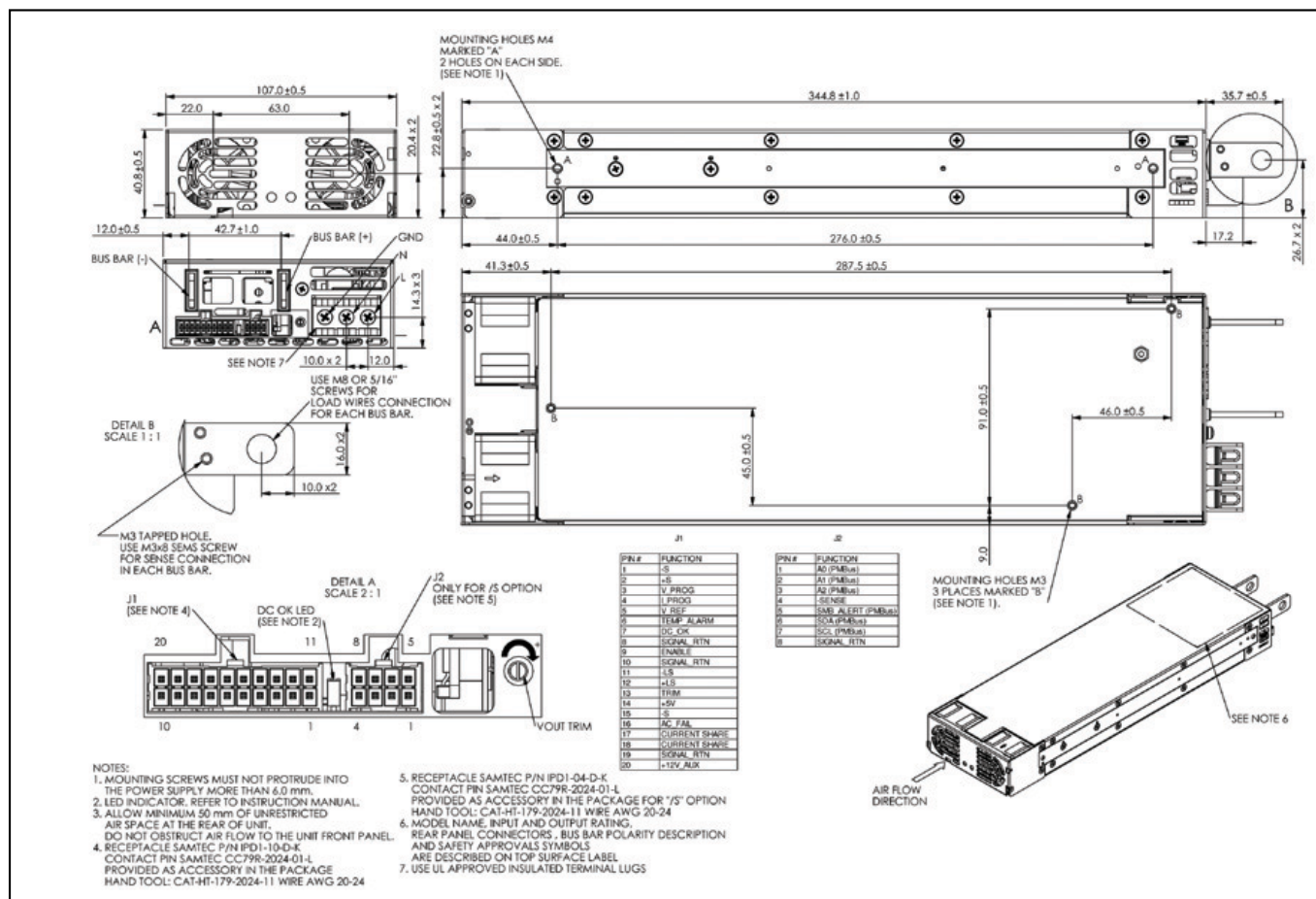
Model Selector

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⁾	I ² C
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





RTW Series

Single Output Industrial
Power Supplies

- 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 Features and Benefits

Features

- 5 Year Warranty
- Ultra Thin Package
- Wide range AC Input

Benefits

- Lower Cost of Ownership
- Allows use in small spaces
- Supports global use

Specifications

MODELS		50W	100W	150W	300W
ITEMS					
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			
DC Input Voltage	V	120 - 375VDC			
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			
Remote On/Off	-	Yes, see instruction manual on website			
DC Fail Signal	-	No			
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			
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

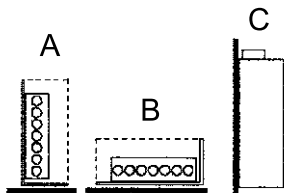
Notes: (2) 100/200VAC See website technical downloads for detailed information

Options	
Suffix	Description
L	Vertical Terminal Block (option for 50W & 100W models only)
C	Cover (50W, 100W & 150W models)
H	Cover (300W models)

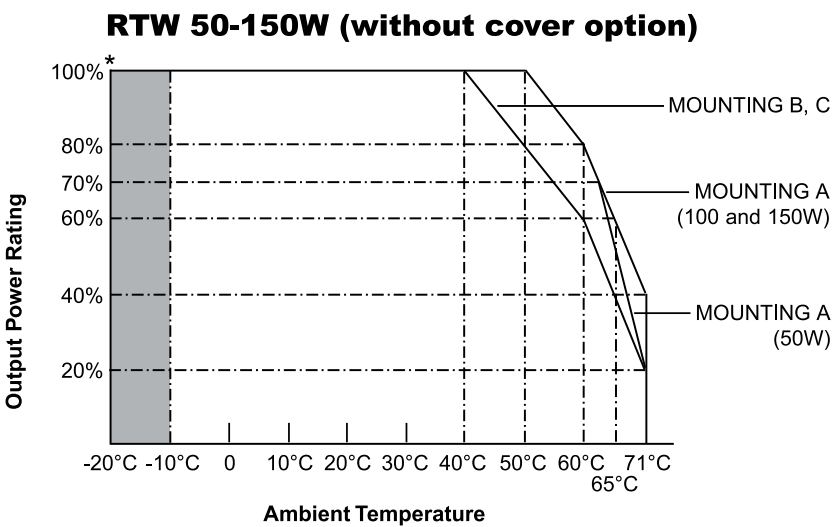


Derating Curves RTW50-150W Series

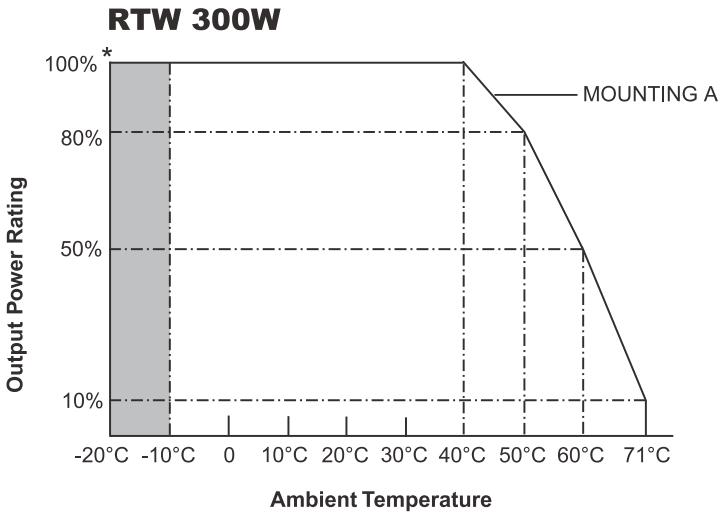
* AT INPUT VOLTAGE 85-90V,
DERATE TO 90%
(100W Models)



Mounting Directions



Derating Curve RTW 300W Series





50W to 600W Single Output General Purpose Power Supplies

Features	Benefits
• 10 Year e-cap Lifetime	• Better Field Reliability
• 5 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	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 (100/200VAC) (typ)	A	1.1 / 0.7	1.3 / 0.7	1.9 / 1.0	3.8 / 2.1	7.2 / 4.0
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				
Operating Temperature (1)	-	-10° to +70°C, derate above 45°C for 50W, 40°C for 100W & 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)	-	UL60950-1, CSA60950, EN60950-1, UL:508, CSA C22.2 No.107.1-01, CE Mark				
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
Warranty	Yrs	5				

Notes:

(1) RWS600B operates down to -20°C

(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

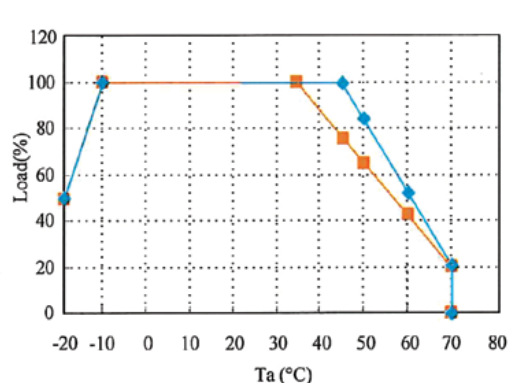
(3) Consult Sales Office for use under DC Input conditions



Model Selector

Model	Voltage	Adjust Range (V)	Max Current (A)	Max Output Power	Load Reg. (mV)	Line Reg. (mV)	Ripple Noise (mV)	Efficiency (typ) % 100/200VAC
RWS50B-5	5V	4.5-5.75	10	50	40	20	120	77 / 79
RWS100B-5	5V	4.5-5.75	14	70	40	20	120	77 / 79
RWS150B-5	5V	4.5-5.75	21	105	40	20	120	77 / 79
RWS300B-5	5V	4.5-5.75	50	250	40	20	120	75 / 78
RWS600B-5	5V	4.5-5.75	100	500	70	20	120	74 / 77
RWS50B-12	12V	10.8-13.8	4.3	51.6	96	48	150	82 / 84
RWS100B-12	12V	10.8-13.8	8.5	102	96	48	150	82 / 84
RWS150B-12	12V	10.8-13.8	13	156	96	48	150	84 / 87
RWS300B-12	12V	10.8-13.8	25	300	96	48	150	79 / 82
RWS600B-12	12V	10.8-13.8	50	600	96	48	150	81 / 84
RWS300B-15	15V	13.5-17.3	20	300	120	60	150	81 / 84
RWS600B-15	15V	13.5-17.3	40	600	120	60	150	81 / 84
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	85 / 87
RWS150B-24	24V	21.6-27.6	6.5	156	192	96	150	86 / 89
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	84 / 88
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	85 / 88
RWS50B-48	48V	43.2-52.8	1.1	52.8	384	192	200	86 / 88
RWS100B-48	48V	43.2-52.8	2.1	100.8	384	192	200	85 / 87
RWS150B-48	48V	43.2-52.8	3.3	158.4	384	192	200	86 / 89
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

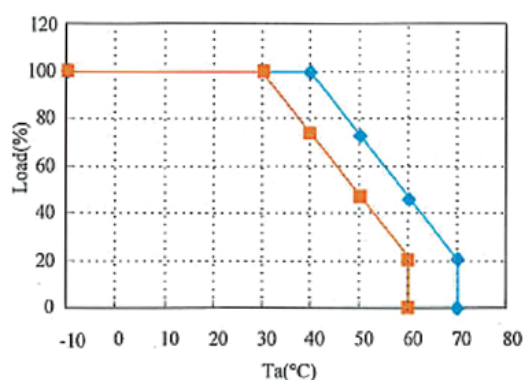
Output Derating RWS50B Series



◆ Mounting (A)
 ■ Mounting (B),(C),(D)

Ta(°C)	Load (%)	
	Mounting(A)	Mounting(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

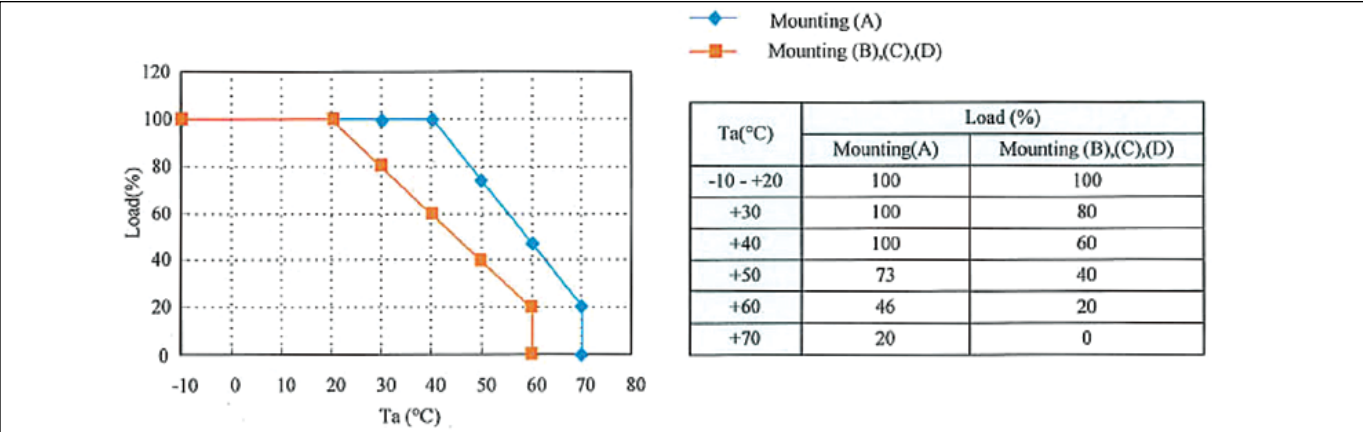


◆ Mounting (A)
 ■ Mounting (B),(C),(D)

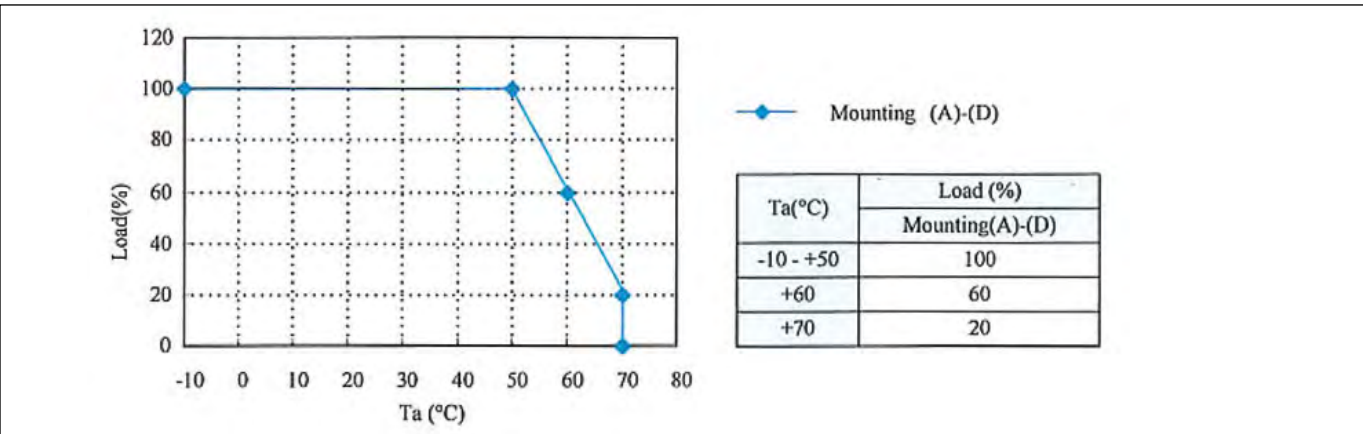
Ta(°C)	Load (%)	
	Mounting(A)	Mounting(B),(C),(D)
-10 - +30	100	100
+40	100	73
+50	73	47
+60	46	20
+70	20	0



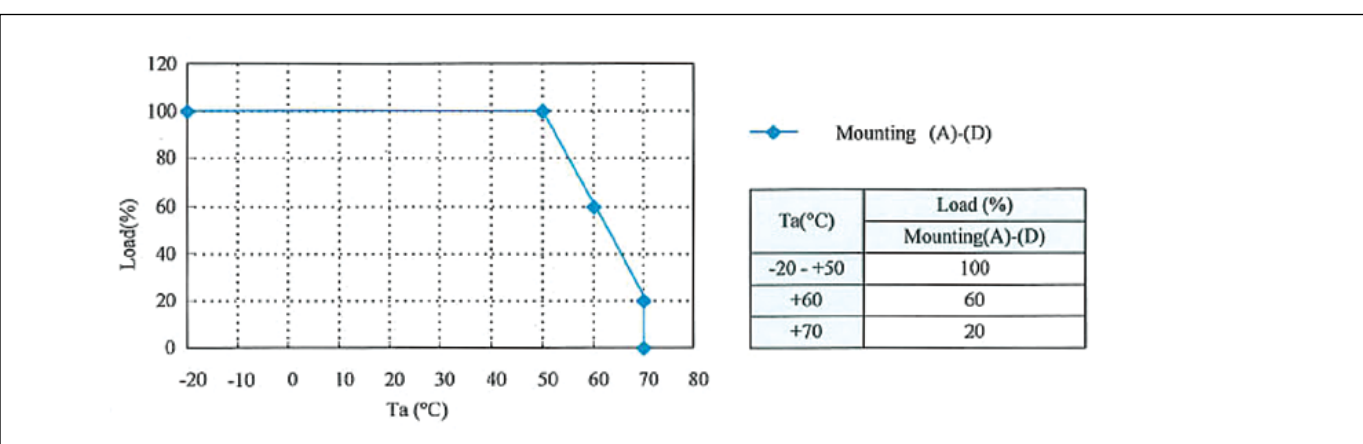
Output Derating RWS150B Series



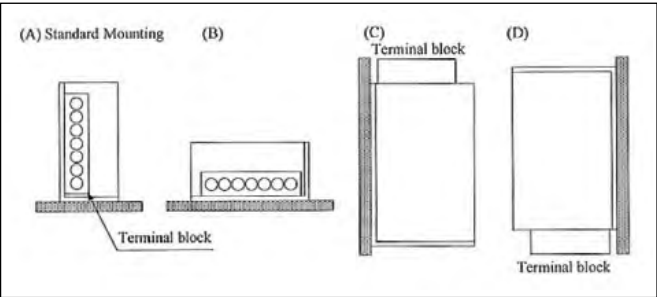
Output Derating RWS300B Series



Output Derating RWS600B Series



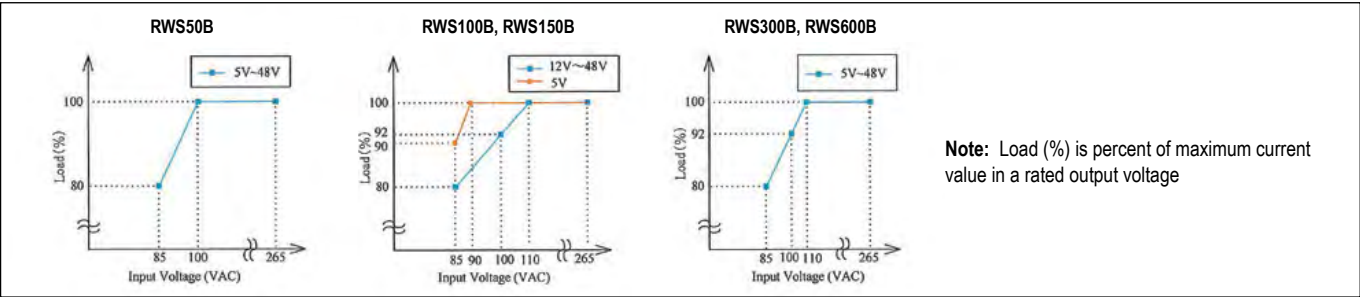
Mounting Direction RWS-B Series



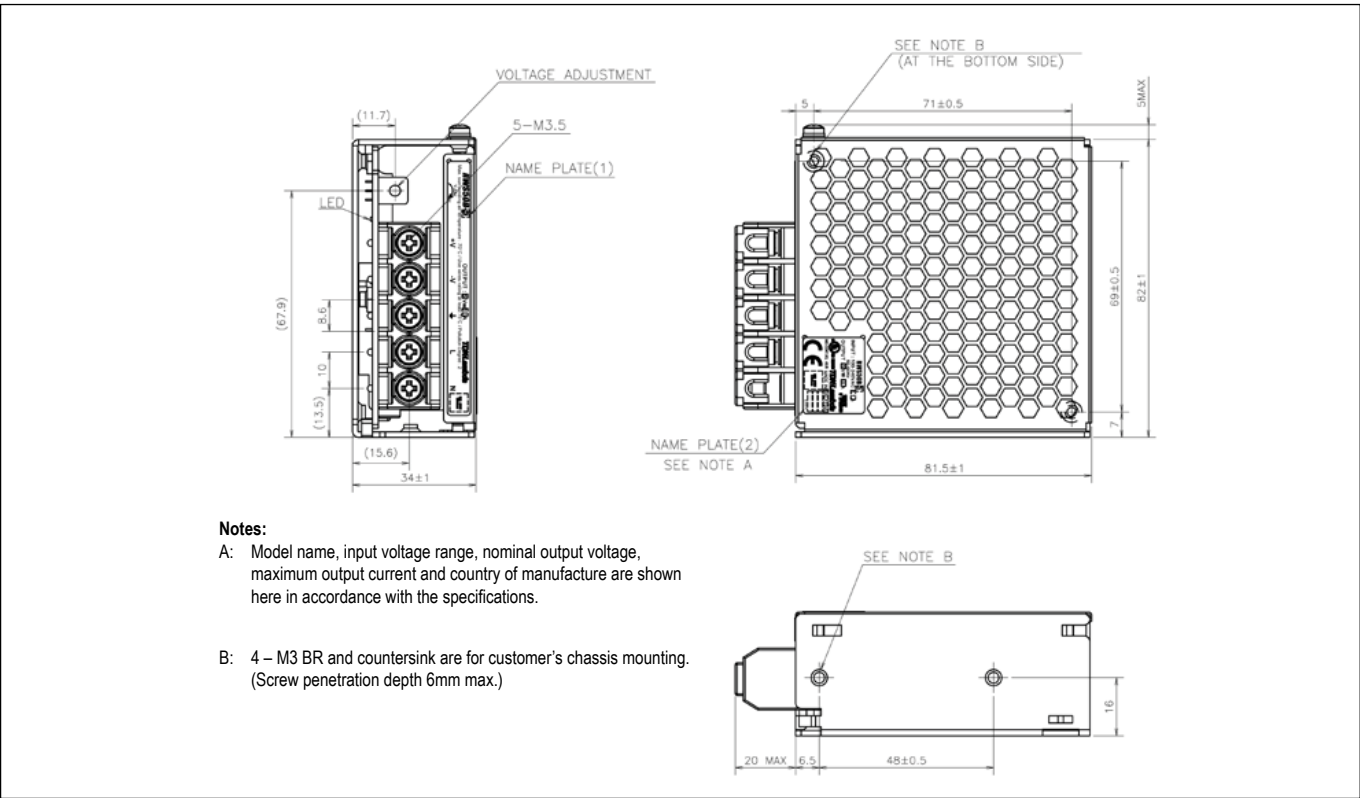
Options

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)

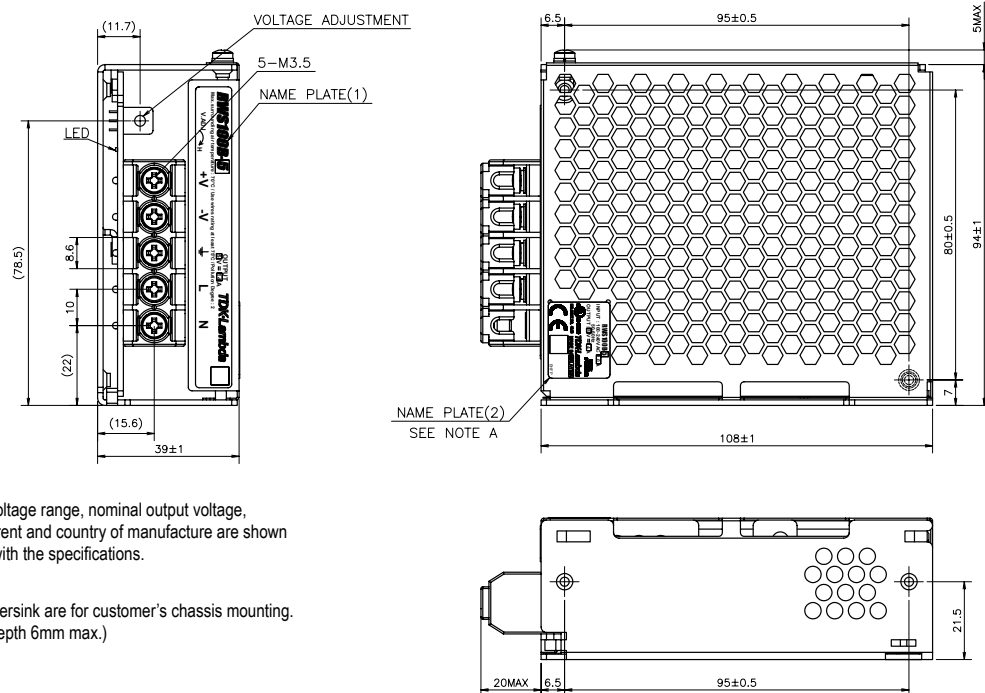
Output Derating according to Input Voltage



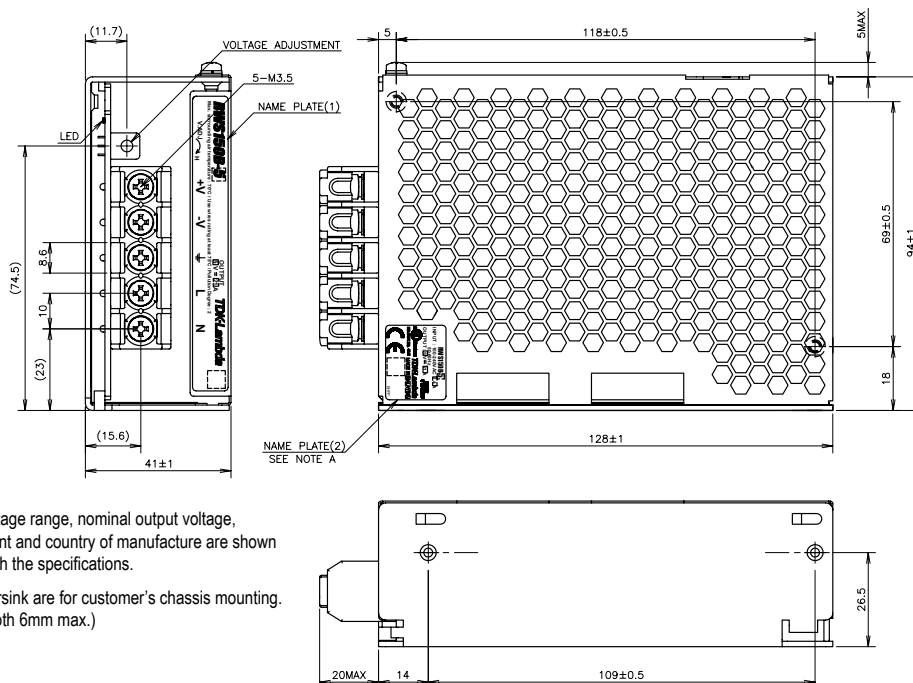
Outline Drawing RWS50B Series



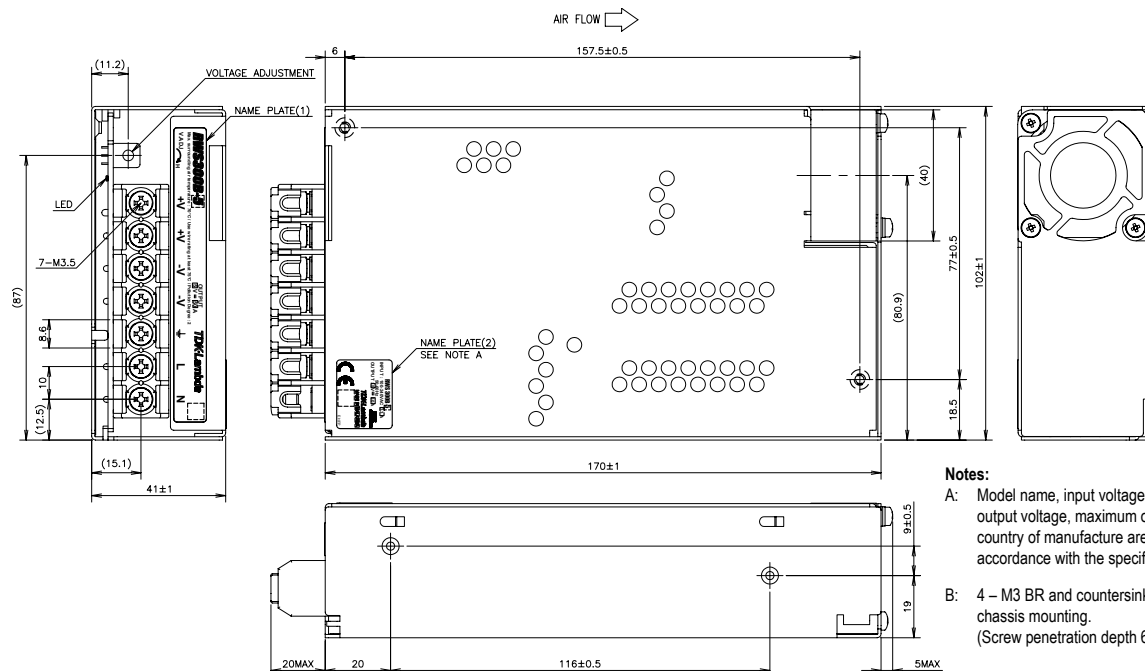
Outline Drawing RWS100B Series



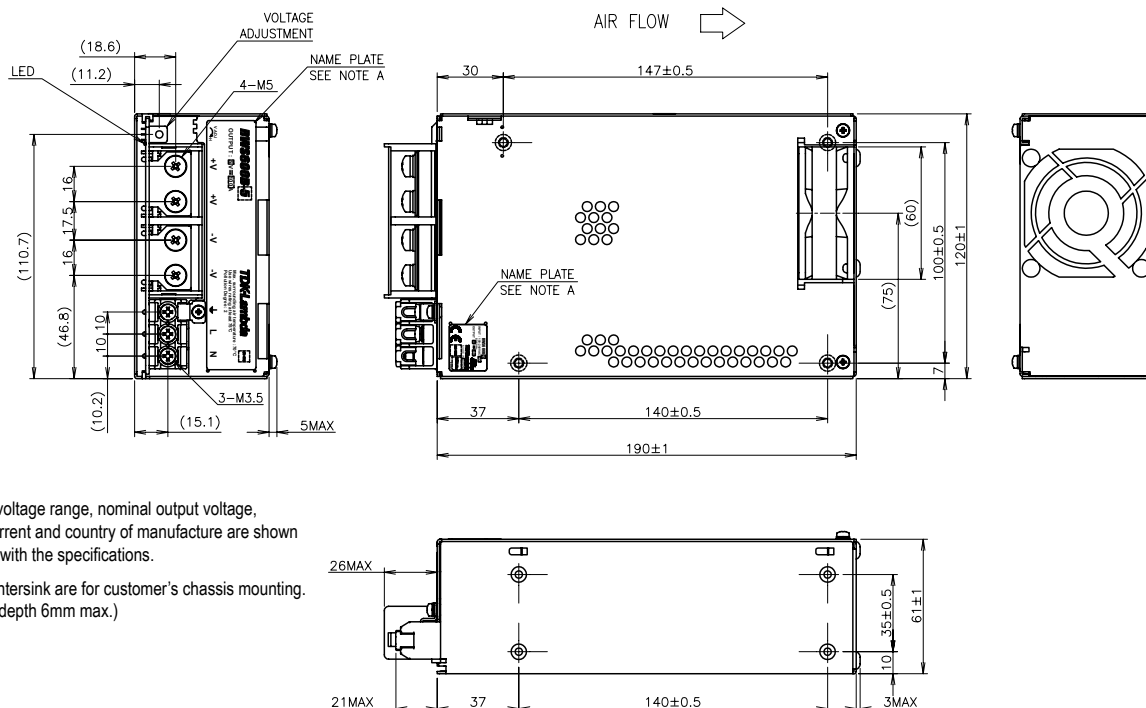
Outline Drawing RWS150B Series



Outline Drawing RWS300B Series



Outline Drawing RWS600B Series





- 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

- Temperature Controlled Fan
- Global safety Approvals
- Wide Temperature Range
- Level B EMI

Benefits

- Low Acoustic Noise
- Supports Global Use
- Suitable for Outdoor Temperature Extremes
- 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
Warranty	yrs	3	

Notes: (1) Worst case: <300μA at 264Vac, 63Hz (Normal condition); <500μA (Single Fault Condition).

*Safety certified for AC input only

**2 x MOPP, IEC60601-1 (3rd edition)



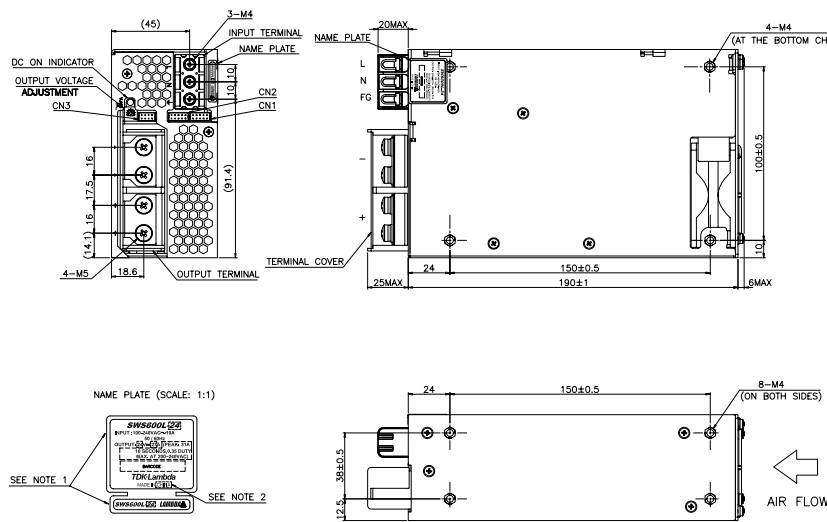
Note: (Numbers in brackets indicate peak current and power available at 170 - 265VAC Input, 10s max, 35% duty cycle)

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. ⁽²⁾ (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: ⁽²⁾ 115 / 230Vac



Outline Drawing SWS600L Series



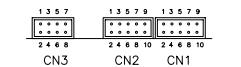
SIGNAL CONNECTOR INFORMATION

PIN CONFIGURATION AND FUNCTIONS OF CN1,CN2

PIN No.	FUNCTION
1	+V _{OUT} : +OUTPUT VOLTAGE MONITOR
2	+S : +SENSING
3	-V _{OUT} : -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



SIGNAL CONNECTOR USED

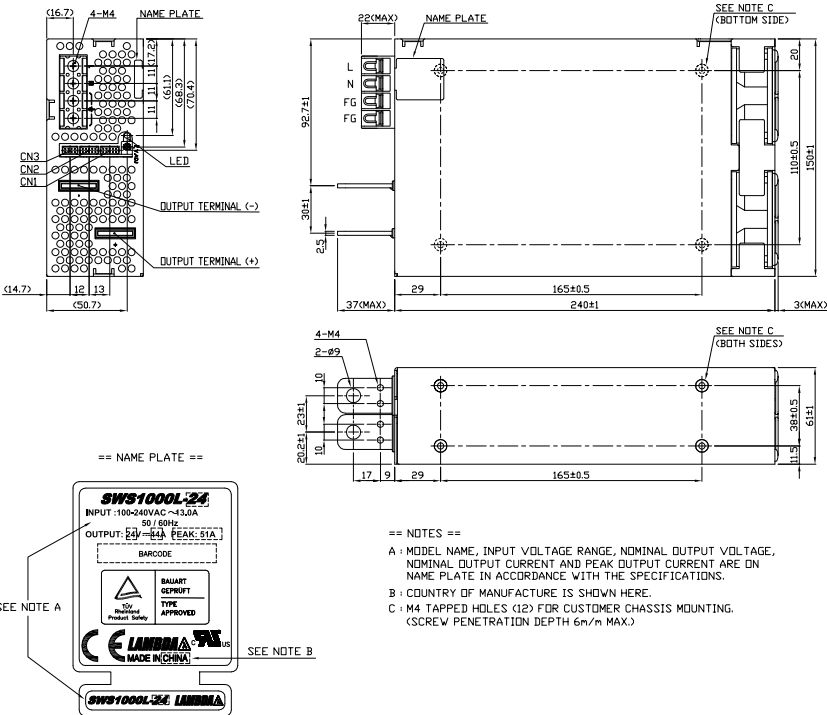
PART DESCRIPTION	PART NAME	MANUFACT
PIN HEADER	S10B-PHDS (CN1,CN2) S8B-PHDS (CN3)	JST

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(AWG26~22)	JST
HAND CRIMPING TOOL	YRS-620(SPHD-002T-P0.5) YC-610R(SPHD-001T-P0.5)	JST

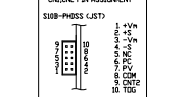
- NOTE:
- 1: MODEL NAME, INPUT VOLTAGE RANGE, NOMINAL OUTPUT VOLTAGE, NOMINAL OUTPUT CURRENT AND PEAK OUTPUT CURRENT ARE SHOWN ON THE NAME PLATE IN ACCORDANCE WITH THE SPECIFICATIONS
 - 2: COUNTRY OF MANUFACTURE IS SHOWN ON THE NAME PLATE IN ACCORDANCE WITH THE SPECIFICATIONS
 - 3: M4 TAPPED HOLES (12) FOR CUSTOMER CHASSIS MOUNTING (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

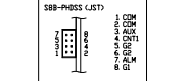


SIGNAL CONNECTOR INFORMATION

CN1,CN2 PIN ASSIGNMENT



CN3 PIN ASSIGNMENT



== ACCESSORIES ==

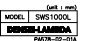
- SHORT PIECE -----1
SHORTING +V_{OUT} - +S, -V_{OUT} - -S
(ATTACHED ON CN1 AT SHIPMENT)

== SIGNAL CONNECTOR USED ==

PART DESCRIPTION	PART NAME	MANUFACT
PIN HEADER	S10B-PHDS (CN1 & CN2)	JST
PIN HEADER	S8B-PHDS (CN3)	JST

== MATCHING HOUSINGS , PINS & TOOL ==

PART DESCRIPTION	PART NAME	MANUFACT
SOCKET HOUSING	PHDR-10VS (CN1 & CN2)	JST
SOCKET HOUSING	PHDR-8VS (CN3)	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





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) 120 - 350VDC
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	-	>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/s ² Constant, X, Y, Z 1 hour each.
Shock	-	30G EN60068-2-27, -47, MIL-STD-810E
Approvals	-	IEC/EN/UL 60950-1, CSA22.2 No. 60950-1, IEC/EN 60601-1 (2nd & 3rd editions) CE mark Designed to meet IEC/EN/UL/CSA 61010-1, ANSI/AAMI ES60601-1:2005 (r) 2012 CQC safety standard GB4943.1-2011 (pending)
Conducted & Radiated EMI		EN55011 / EN55022 level B conducted, level A radiated
Immunity ⁽⁵⁾	-	EN 61000-4-2 (Level 3 criteria A) -3 (Level 3 criteria A) -4 (Level 3 criteria A), -5 (Level 3 criteria A), -6 (Level 3 criteria A), -8 (Level 3 criteria A), -11(class 3), -12(level 3) Meets the requirements of EN60601-1-2:2007 (as applicable to a component power supply)
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 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. Criteria B for dips and interruptions, contact technical support for full details.

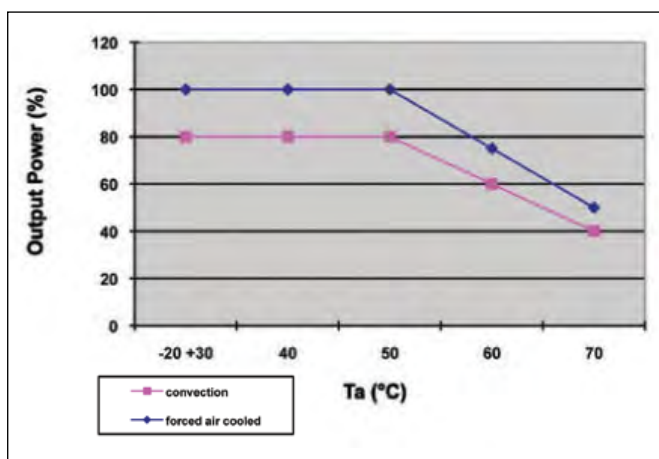


Model Selector

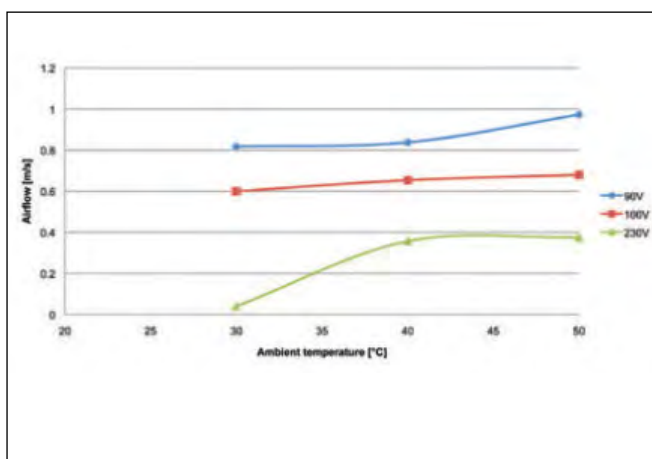
Model	Nominal Output Voltage (V)	Output Adjust Range (V)	Maximum Current Convection (A)	Maximum Current Forced Air (A)	Maximum Output Power Convection (W)	Maximum Output power Forced Air (W)	Ripple ⁽⁶⁾ and noise (mv pk-pk)	Load Reg from 0 - full load (mv)	Line Reg from 85-264Vac (mv)
ZMS100-12	12	11.4 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.

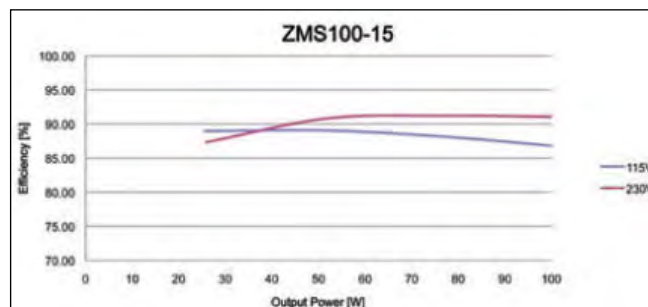
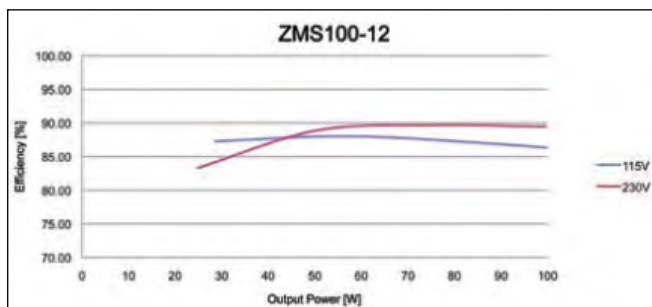
Output Derating ZMS100 Series Output



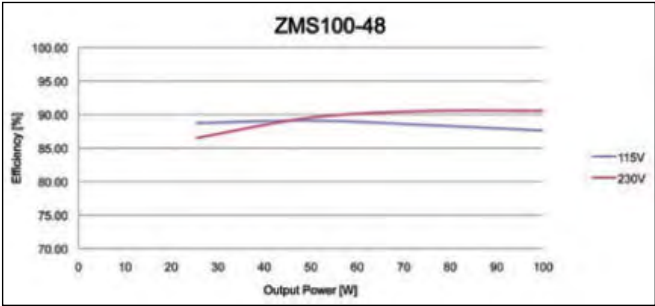
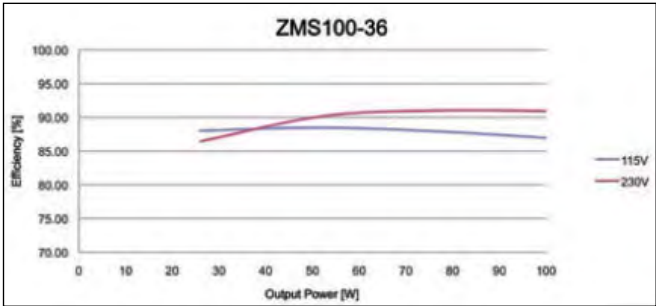
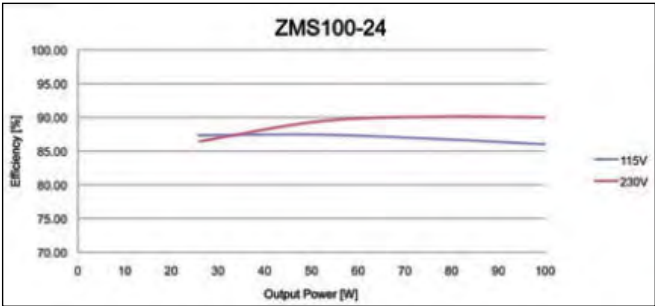
Minimum Required Airflow for ZMS100-24 at 100W



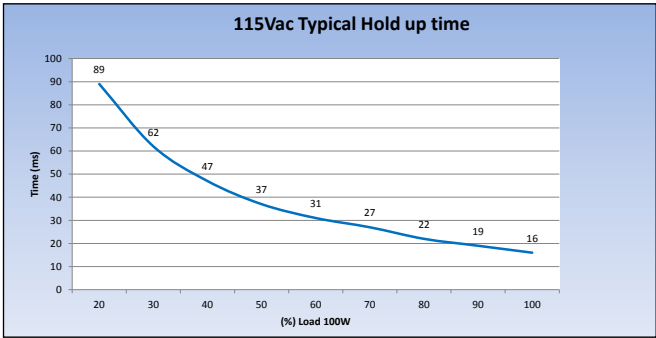
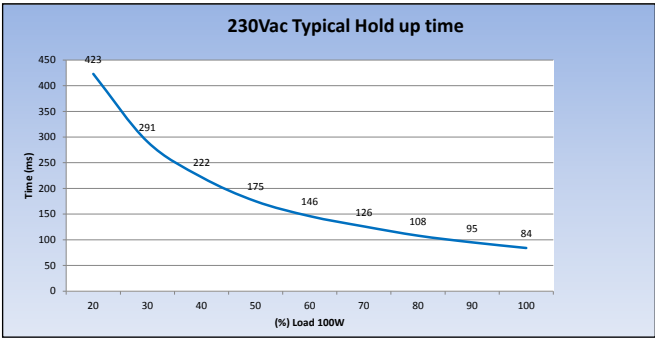
ZMS100 Series Efficiency Curves



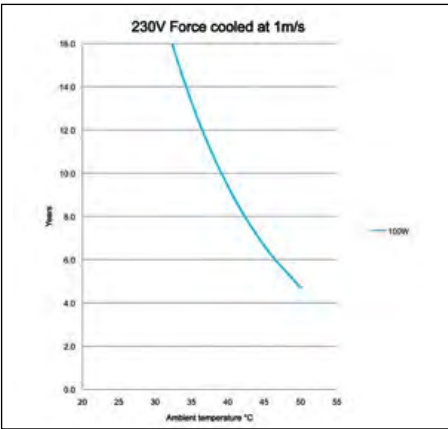
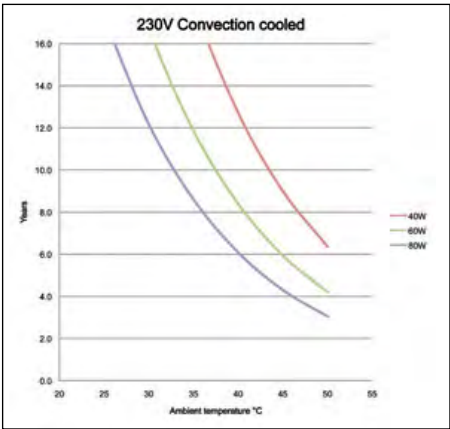
ZMS100 Series Efficiency Curves



Hold Up Time Characteristics for ZMS100 (12V)



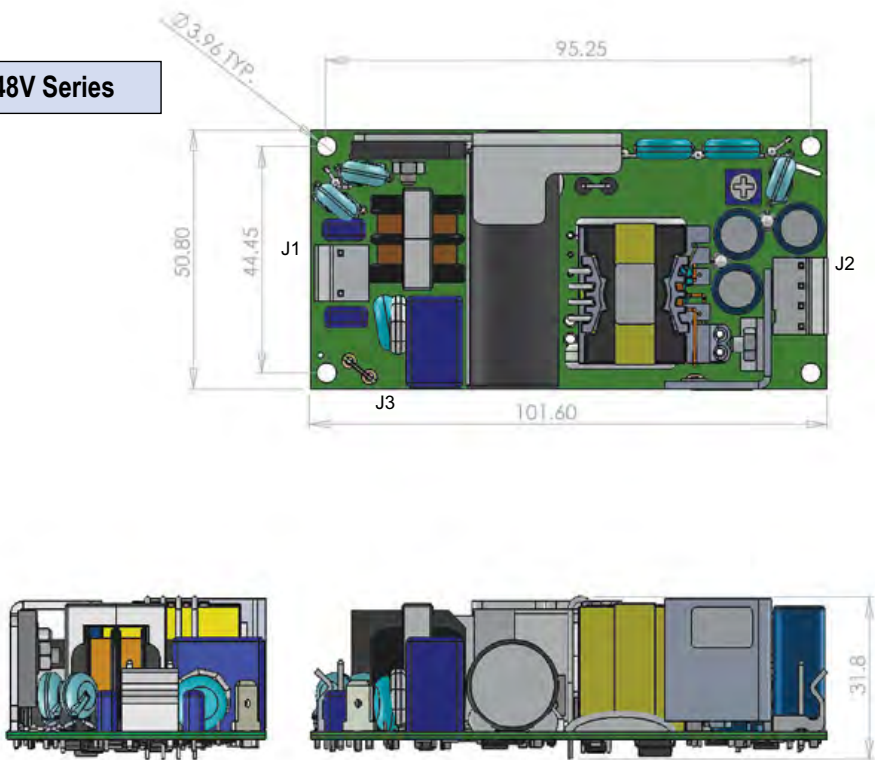
Electrolytic Capacitor: Example Life Curve



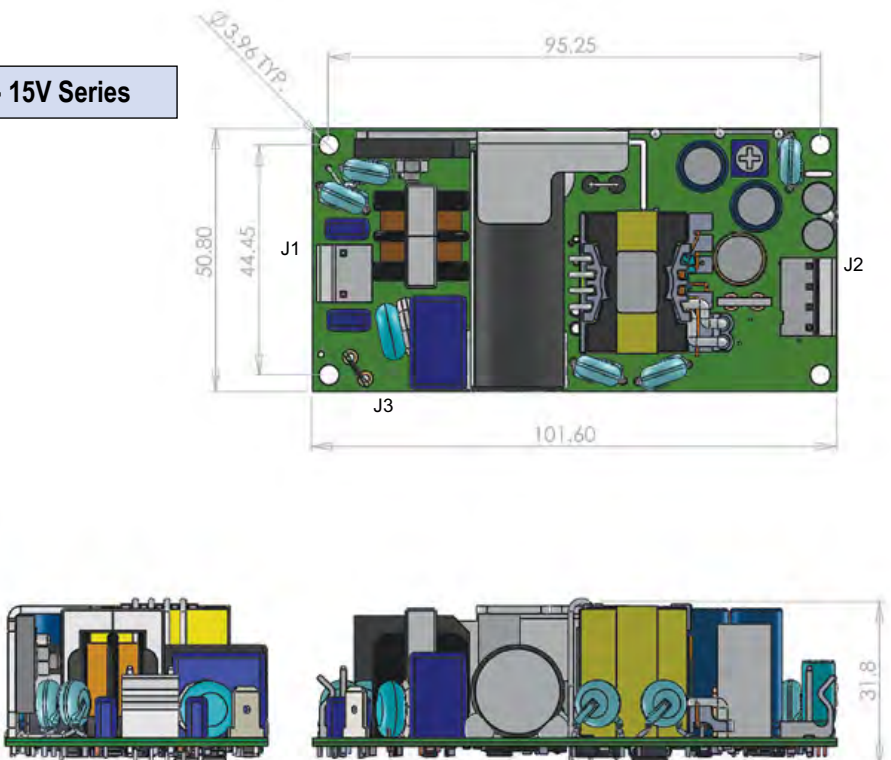
Notes: Based on ZMS100-12 bulk cap life estimates. Consult TDK-Lambda for other operating condition examples.



Outline Drawing ZMS100 24 - 48V Series



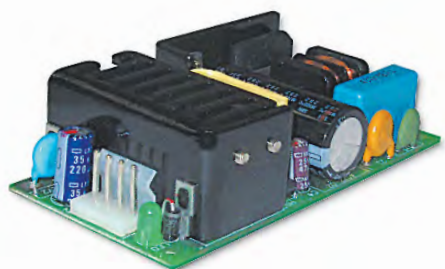
Outline Drawing ZMS100 12 - 15V Series



ZMS100 Series Pinout				
J1		J2		J3
PIN	Connection	PIN	Connection	PIN Connection
1	Live	1	+VE	1 Earth
2	Not Connected	2	+VE	
3	Neutral	3	0V	
		4	0V	

ZMS100 Mating Parts			
Connector	Housing	Crimp Pin	Manufacturer
J1	09-50-1031	08-70-1030	Molex
J2	09-50-1041	08-70-1030	Molex
J3	22-18AWG - 2-520407-2		
(Faston)	16-14AWG - 3-520408-2	-	Tyco





ZP40 & 60 Series

2" x 4" 40W to 60W

AC-DC Power Supplies

- 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 Features and Benefits

Features

- Industry Standard Footprint
- Up to 88% efficiency
- Broad Product Range
- Meets EN61000-4 Immunity

Benefits

- Available to Second Source
- Less System Heating
- Optimization of Power Supply to System
- Greater Reliability

Specifications

MODEL		ZPS40	ZPS60	ZPD40	ZPT40
ITEMS					
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/s² (10 - 55Hz: constant sweep 1 min X, Y, Z for 1 hour)			
Shock	-	< 196.1 m/s² (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

(5) ZPD/2PT models may require additional external filtering to meet conducted Class B

(3) Measured with 0.1μF ceramic & 10μF electrolytic at 20MHz BW

(4) ZPT40-3512N, V1 & V2 100mV

(6) Consult Sales Office for use under DC Input conditions

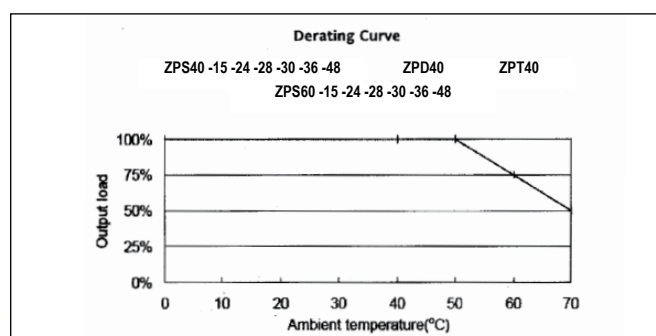
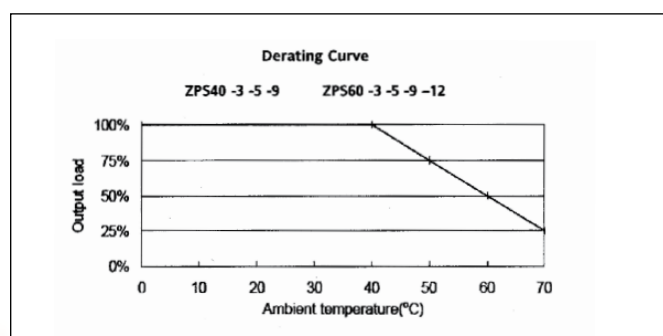


Model Selector

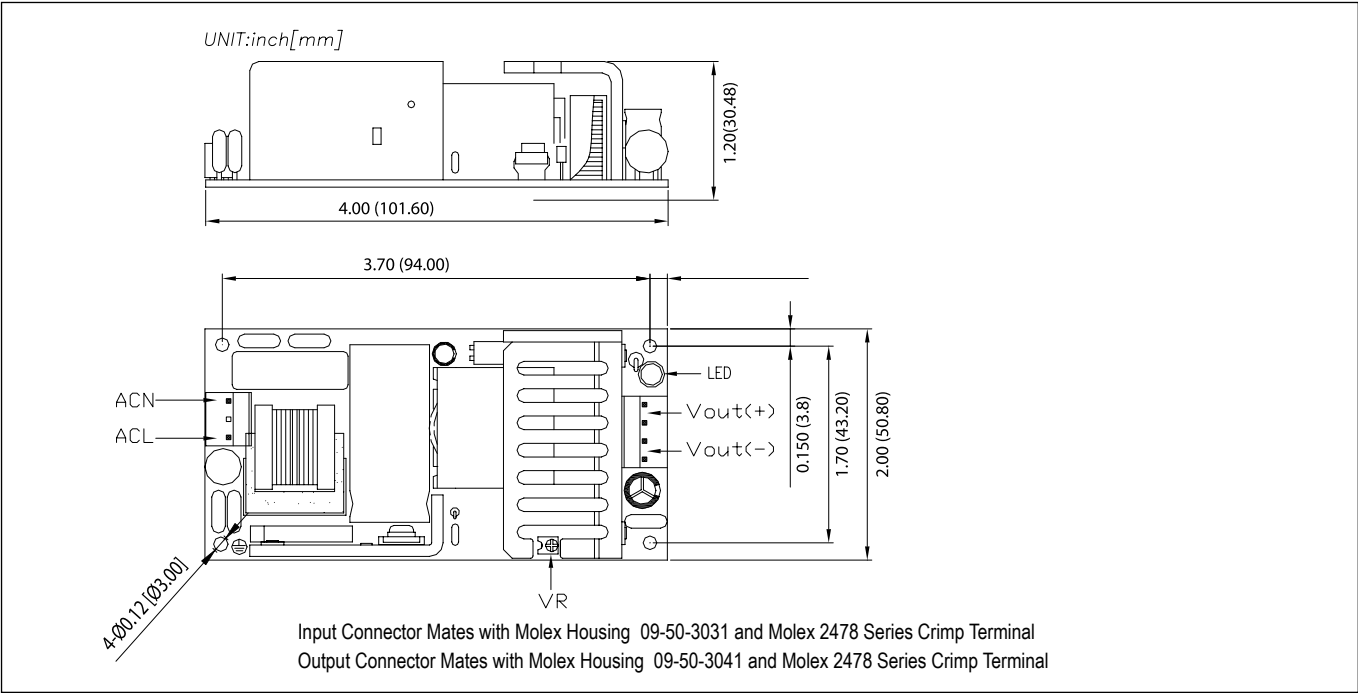
	Model		Output Voltage (V)	Maximum Output (A)	Peak Load (A) (5)	Output Pwr (W)	Eff.(3) (typ)%
Single Output	ZPS40-3R3	V1	3.3	6.0	7.2	20.0	74
	ZPS60-3R3	V1	3.3	8.0	8.5	26.0	74
	ZPS40-5	V1	5.0	6.0	7.2	30.0	78
	ZPS60-5	V1	5.0	8.0	9.0	40.0	78
	ZPS40-9	V1	9.0	4.45	5.34	40.0	82
	ZPS60-9	V1	9.0	6.67	8.0	60.0	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
(7) Min Load V1: 0.4A, V2: 0.2A

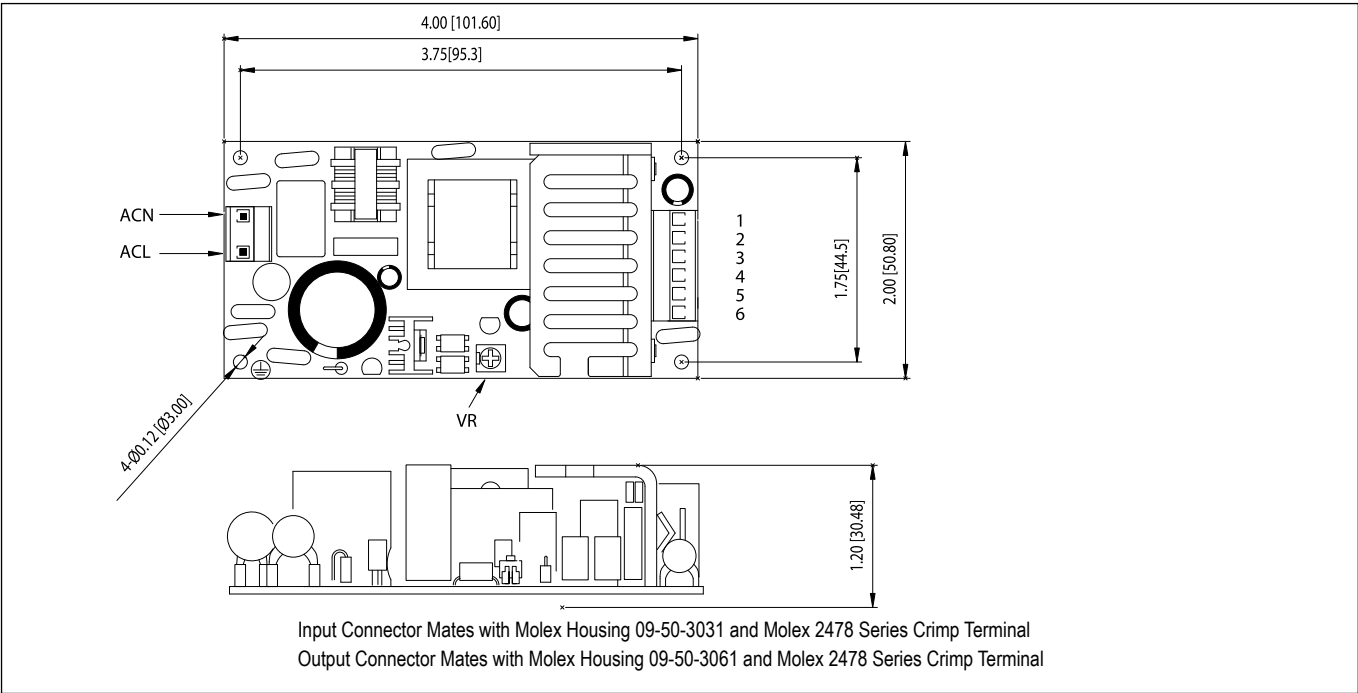
(6) 50 with 30CFM forced air cooling, derate linearly to 35W from 50°C to 70°C



Outline Drawing ZPS Series



Outline Drawing ZPD/ZPT Series



Pin Connection (ZPD/ZPT)			
PIN	Function	PIN	Function
1	V2	2	V1
3	V1	4	COM
5	COM	6	V3

INTERMEDIATE VOLTAGES AVAILABLE
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ZPSA20 Series

2" x 3.5" 20W AC-DC

Power Supplies

- 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 Features and Benefits

Features

- Industry Standard Footprint
- Up to 82% efficiency
- Broad Product Range
- Meets EN61000-4 Immunity

Benefits

- Available to Second Source
- Less System Heating
- Optimization of Power Supply to System
- Greater Reliability

Specifications

MODEL		ZPSA20
ITEMS		
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	0.25 / 0.12
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	16ms 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

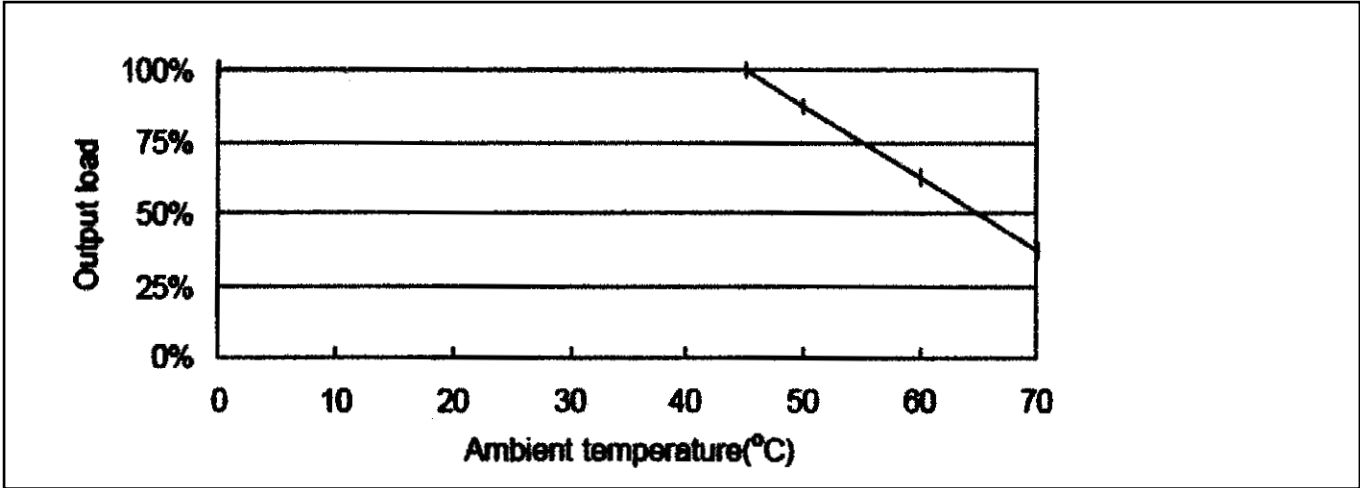
Notes:

(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 (2) Preliminary Data					

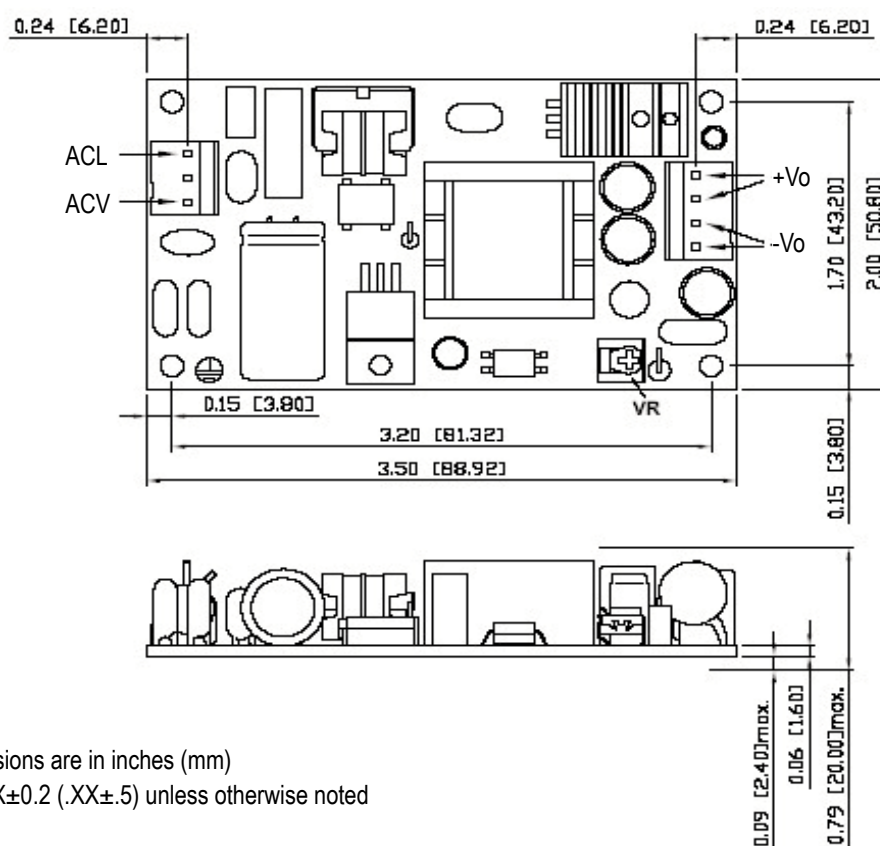
Derating Curve ZPSA20 Series



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Outline Drawing ZPSA20 Series



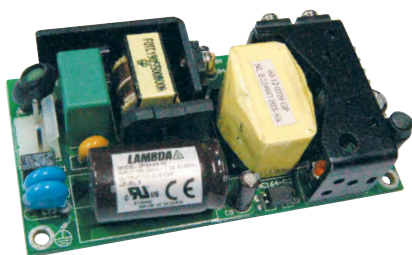
Note: All Dimensions are in inches (mm)
Tolerances: $XX \pm 0.2$ ($.XX \pm .5$) unless otherwise noted

Options

Suffix

Add Suffix -P for PCB Mount Pins





ZPSA40 & 60 Series

2" x 4" 40W to 60W

AC-DC Power Supplies

- 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 Features and Benefits

Features

- Industry Standard Footprint
- Up to 88% efficiency
- Broad Product Range
- Meets EN61000-4 Immunity

Benefits

- Available to Second Source
- Less System Heating
- Optimization of Power Supply to System
- Greater Reliability

Specifications

MODEL		ZPSA40	ZPSA60
ITEMS			
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 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	-	UL60950-1, 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



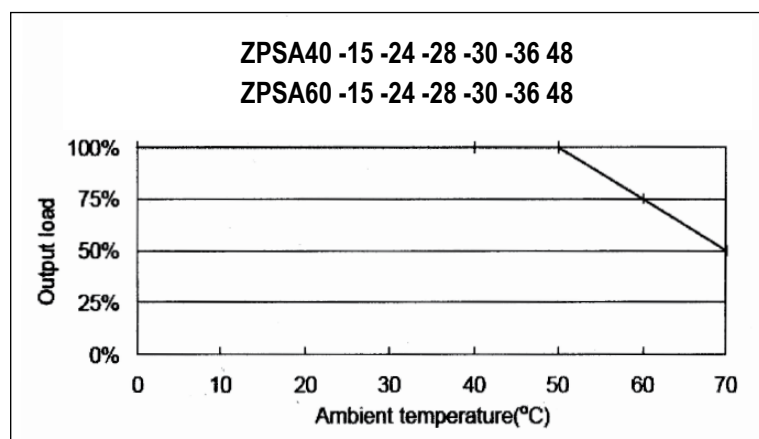
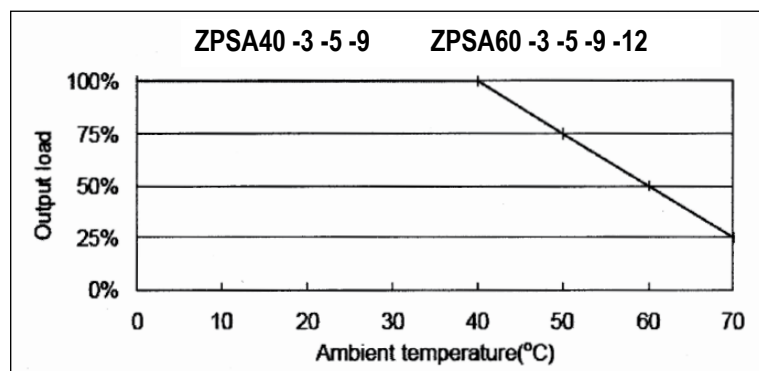
Model Selector

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

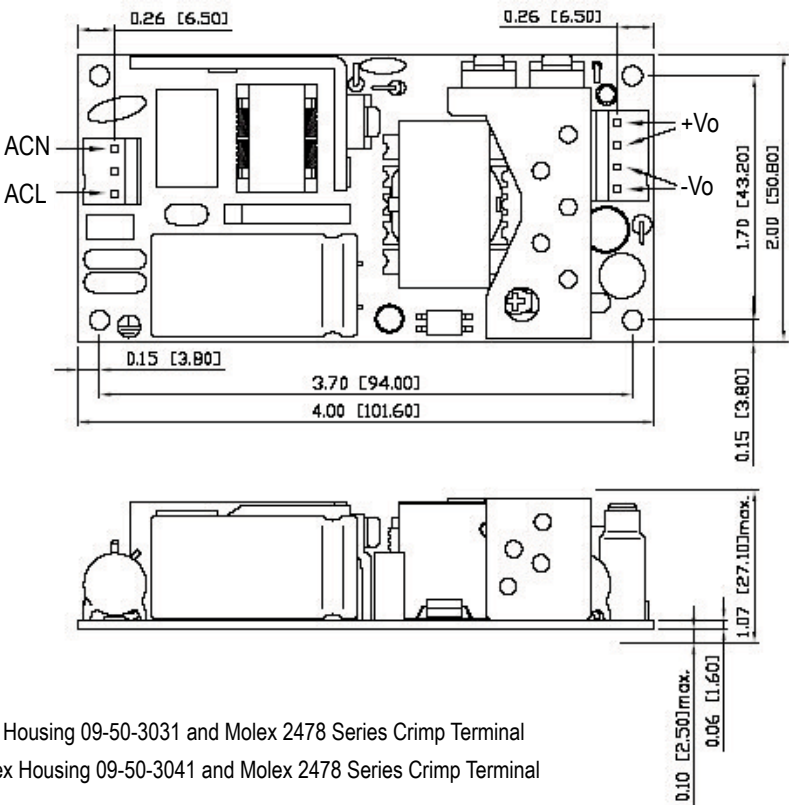
Derating Curve ZPSA40 & 60 Series

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Outline Drawing ZPSA40 & 60 Series

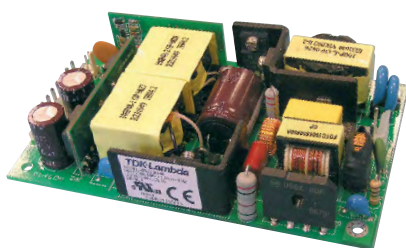
Note: All Dimensions are in inches (mm)
Tolerances: XX±0.2 (.XX±.5) unless otherwise noted



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





ZPSA100 Series

3" x 5" 100W AC-DC
Power Supplies

- 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 Features and Benefits

Features

- Industry Standard Footprint
- Up to 90% efficiency
- Broad Product Range
- Meets EN61000-4 Immunity
- Low Profile

Benefits

- Available to Second Source
- Less System Heating
- Optimization of Power Supply to System
- Greater Reliability

Specifications

MODEL		ZPSA100
ITEMS		
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/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/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

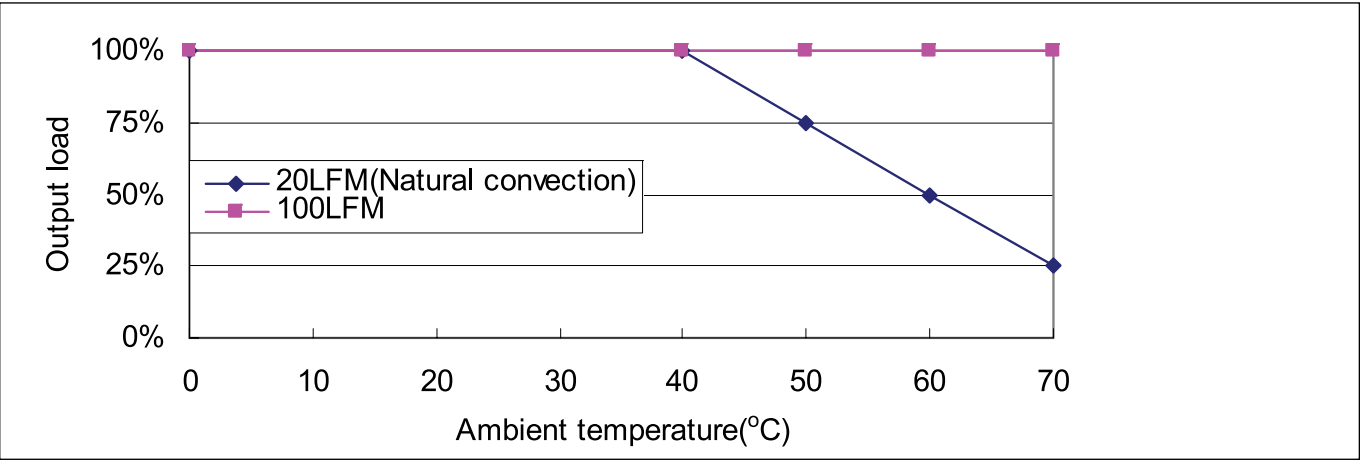
Notes:

- (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%

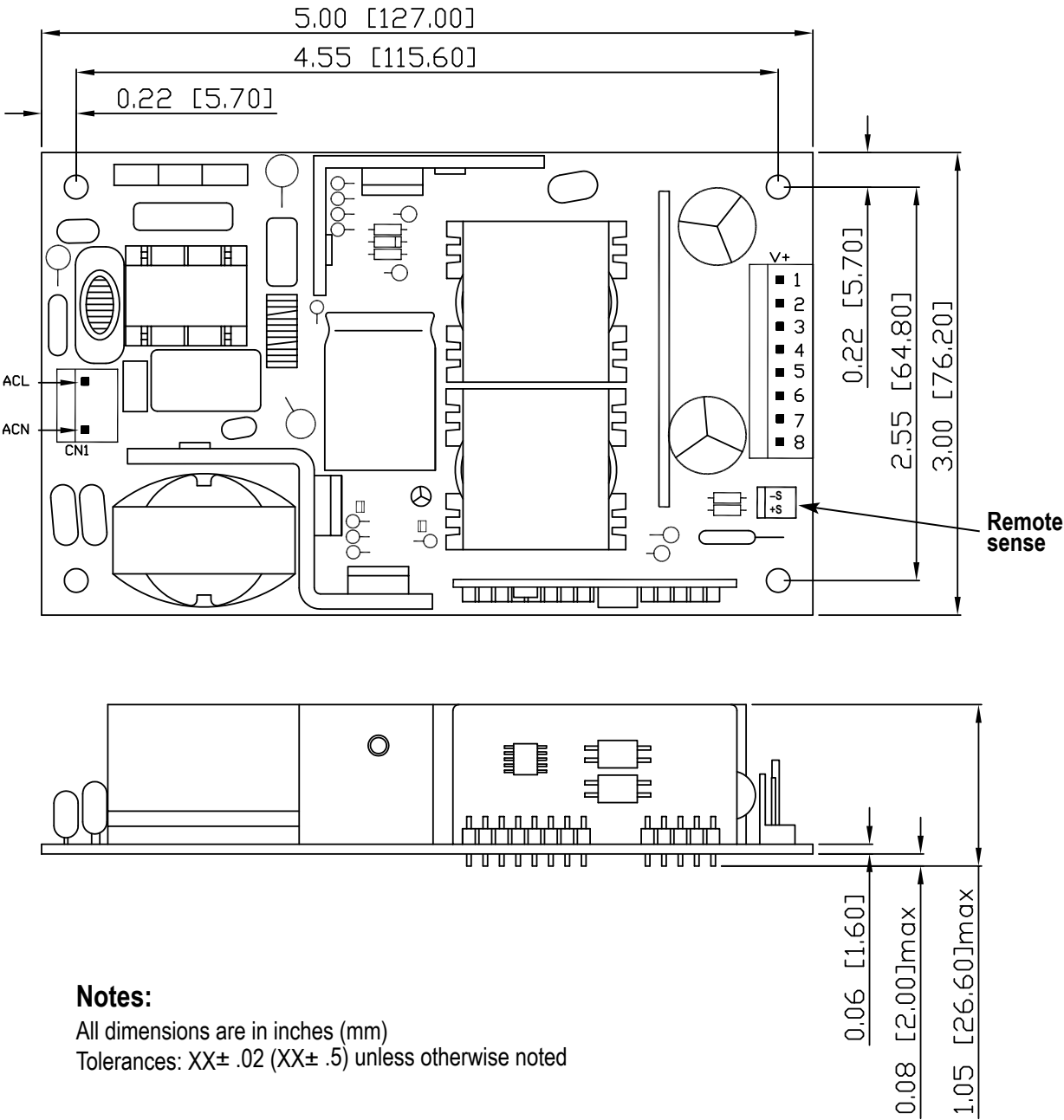
Derating Curve ZPSA100 Series



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Outline Drawing ZPSA100 Series



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

Key Market Segments & Applications

Factory Automation
Printer and Motor Drives
Kiosks

ZWD-PAF Series

100W to 440W

Dual Output Power Supplies

ZWD-PAF Features and Benefits

Features

- Input Transient Protected
- Power Factor Corrected
- 200% Peak Power Capability

Benefits

- Withstands Harsh Environments
- Supports Global Use
- Can Drive High current Start Up Devices or pulse loads

Specifications				
MODEL		ZWD100PAF-0524	ZWD150PAF-0524	ZWD225PAF-0524
ITEMS				
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		

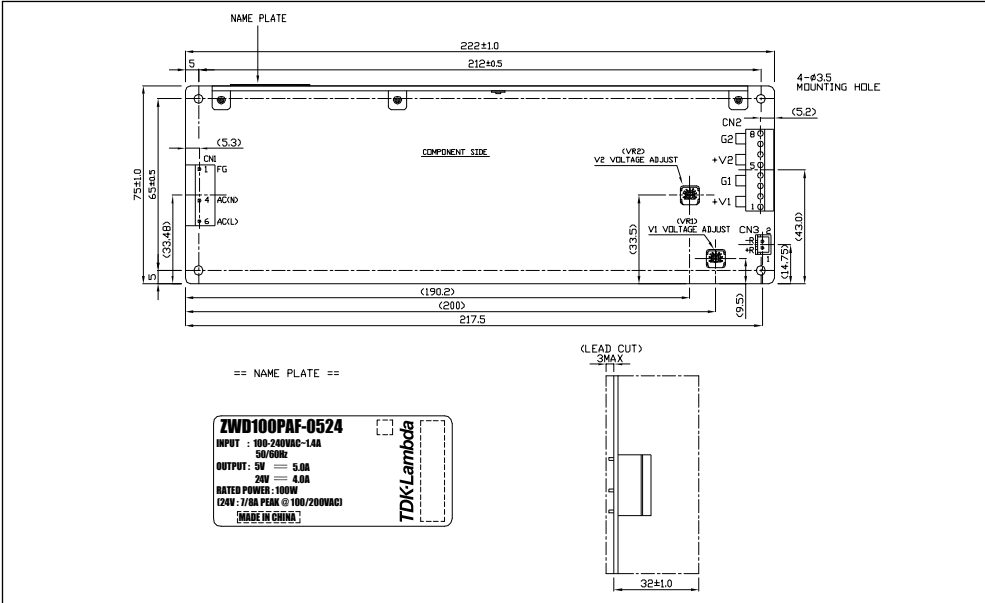
Notes: See installation manual for full specification.

(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

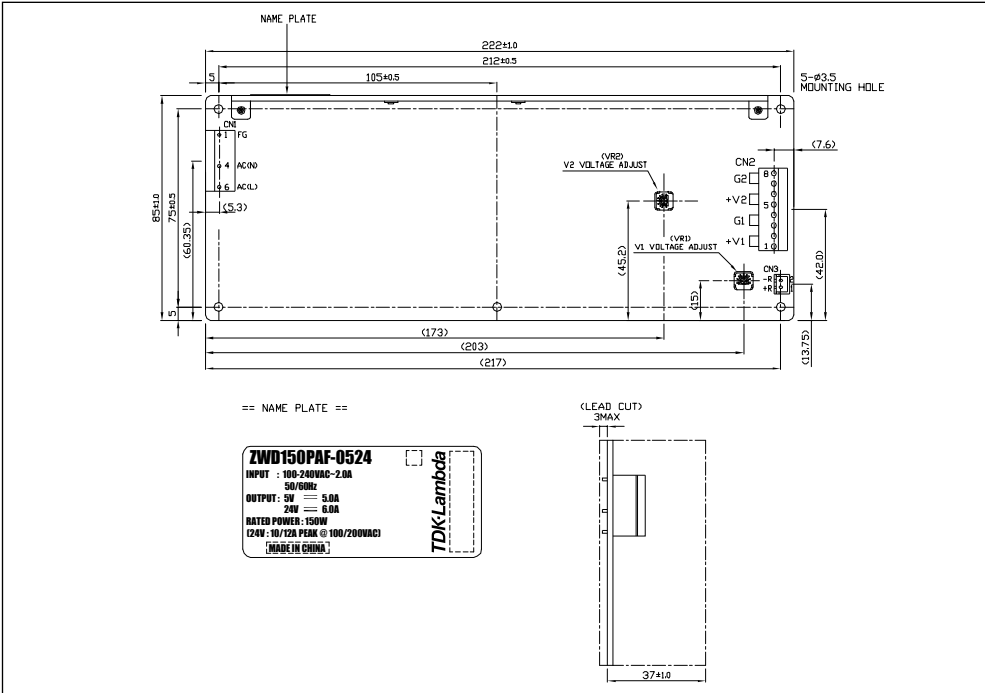


Model Selector								
Model	Output Output Voltage	Output Voltage Accuracy	Adjust Range	Max Current	Peak ^{1,5} Current	Max Peak ^{1,5} Power	Total ^{1,5} Average Power	Peak Power
ZWD100PAF-0524	5V	4.9 - 5.1V	4.5 - 5.5V	5A	-	-	100W	172 / 196W
	24V	23.52 - 24.48V	22.8 - 27.6V	4A	7 / 8A	168 / 192W		
ZWD150PAF-0524	5V	4.9 - 5.1V	4.5 - 5.5V	5A	-	-	150W	246 / 294W
	24V	23.52 - 24.48V	22.8 - 27.6V	6A	10 / 12A	240 / 288W		
ZWD225PAF-0524	5V	4.9 - 5.1V	4.5 - 5.5V	5A	-	-	225W	344 / 440W
	24V	23.52 - 24.48V	22.8 - 27.6V	9A	14 / 18A	336 / 432W		

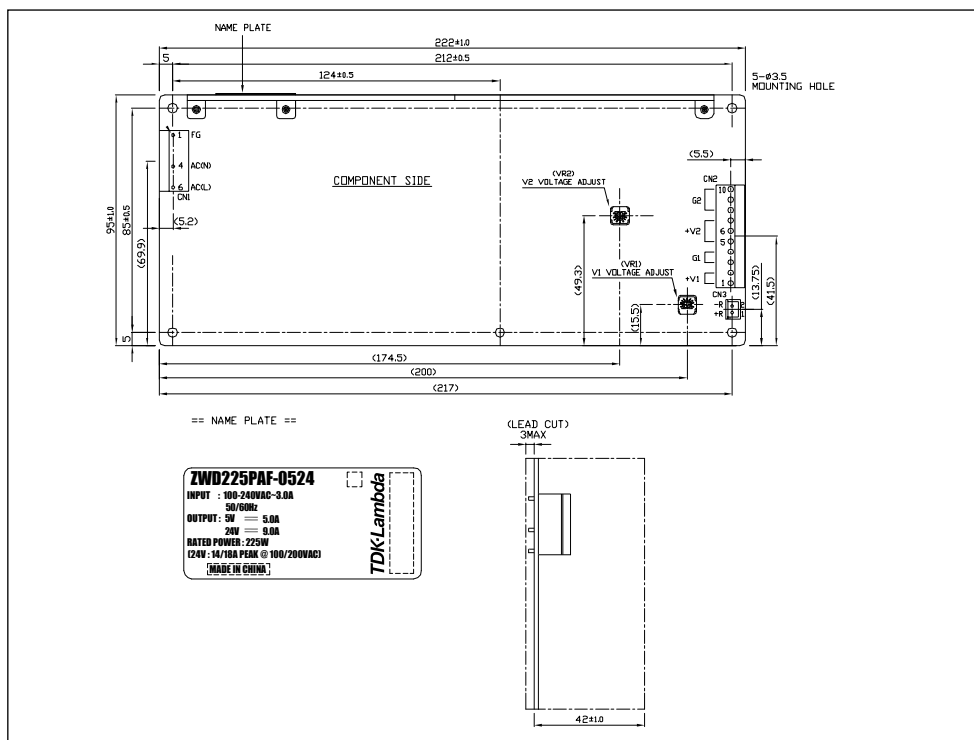
Outline Drawing ZWD100 Series



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

Preferred 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 • Adjustable Main and Fourth Output • Power Factor Corrected • Floating Fourth Output	• Fits in 1U Enclosures • System Optimization • Supports Global Use • 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





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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/s ² constant X, Y, Z 1 hour	
Shock	-	<196.1 m/s	
Safety agency Certifications	-	UL60950-1, CSA60950-1, EN60950-1, EN50178 (OV II), 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%

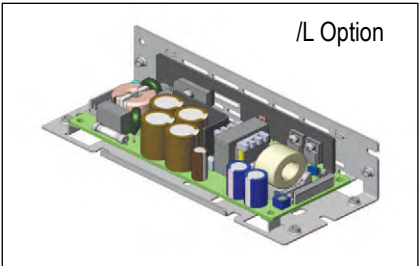
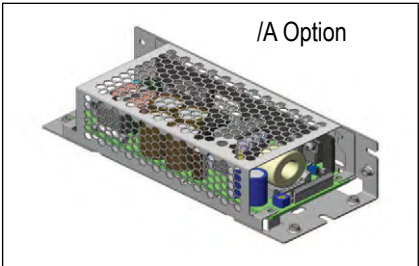
(4) Built to meet EN 61000-3-2 (5) Refer to detailed specifications & Application Notes

(6) 100/230VAC Input

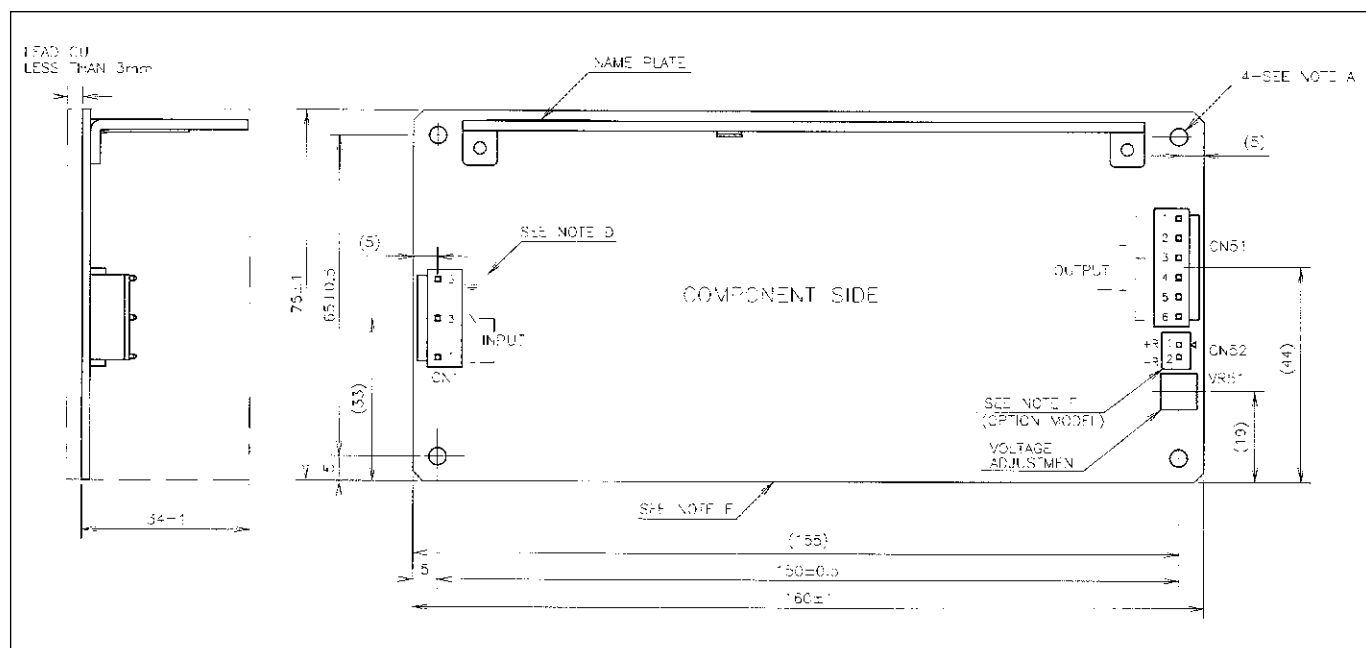


Model Selector											
Model	Output Voltage (V)	Output Adjust Range (V)	Average Output Current (A)	Peak Output Current (A)	Average Output Power (W)	Peak Output Power (W)	Efficiency at 200VAC Input (%)	Load reg (mV)	Line reg (mV)	OCP (A)	OVP (V)
ZWS150BP-24	24	21.6 - 27.5	6.3	12	151.2	288	90	192	96	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

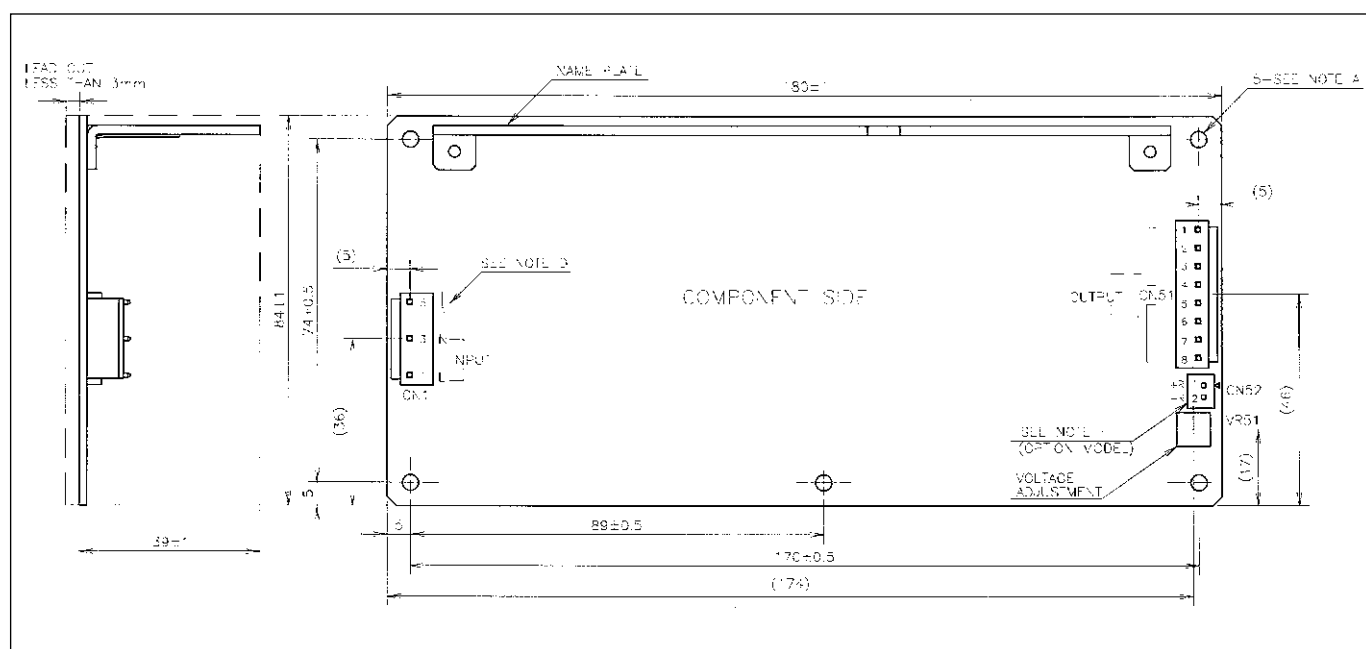
Option Description	
	Suffix
L-Plate and Cover	/A
L-Plate	/L
Conformally coated PCB	/CO2
Remote on/off	/R
Terminal Block (240W models only)	/T



Outline Drawing ZWS150BP



Outline Drawing ZWS240BP





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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	-	UL60950-1, CSA60950-1, EN60950-1, 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 Output 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

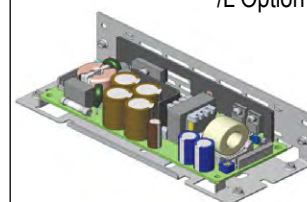
Option Description

	Suffix
L-Plate and Cover	/A
L-Plate	/L
Conformally coated PCB	/CO2
Remote on/off	/R
Fixed Output Voltage (by resistor)	/FV

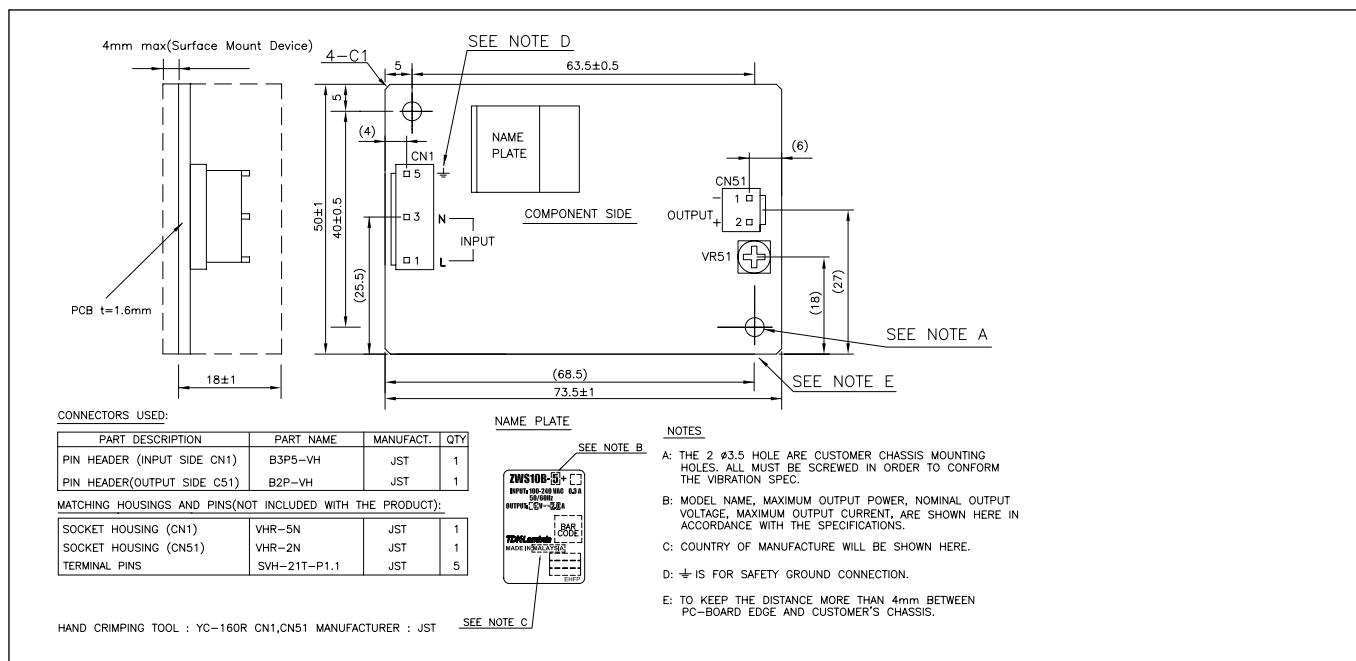
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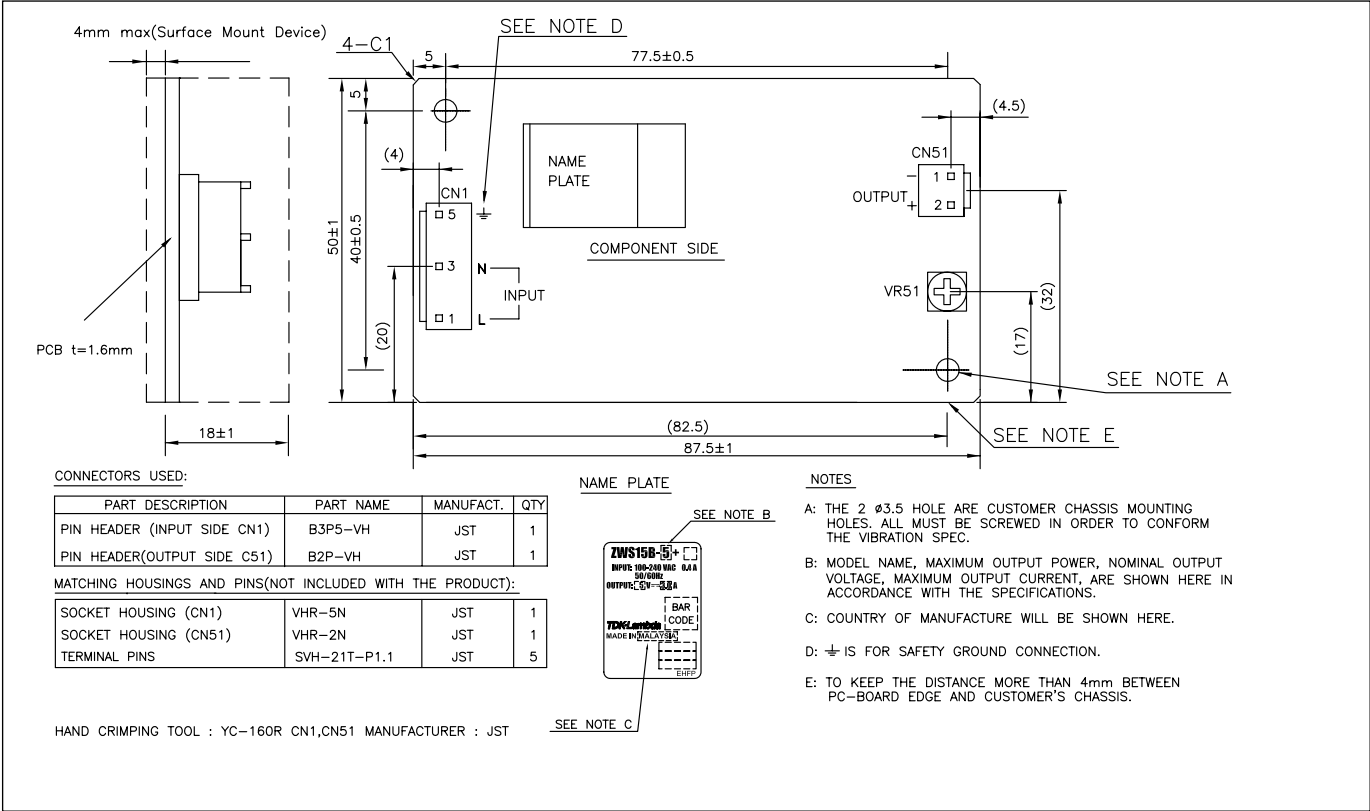
/L Option



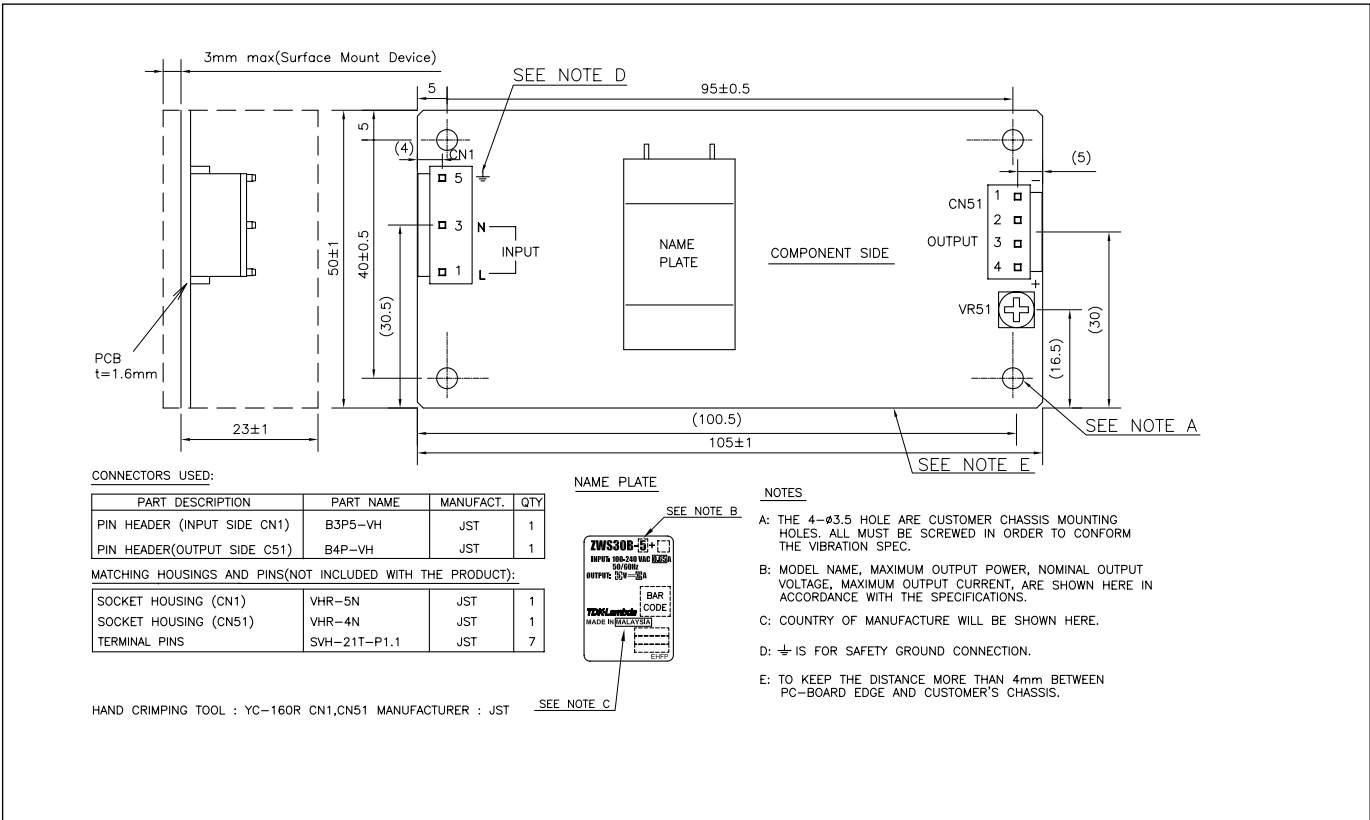
Outline Drawing ZWS10B



Outline Drawing ZWS15B



Outline Drawing ZWS30B





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**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	-	UL60950-1, CSA60950-1, EN60950-1, 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



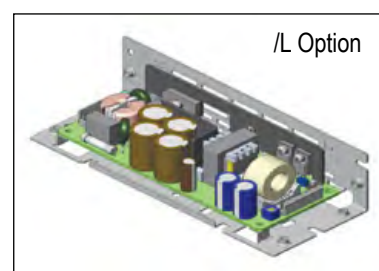
Model Selector										
Model	Output Voltage (V)	Output Adjust Range (V)	Max. Current (A)	Max. Output Power (W)	Efficiency at 200VAC (%)	Max. Ripple and Noise (mv pk-pk)	Load Reg. (mV)	Line Reg. (mV)	OCV (A)	OVP (V)
ZWS50BAF-3	3.3	2.97-3.63	10	33.0	78	160	40	20	>10.5	3.79-4.95
ZWS50BAF-5	5	4.5-5.5	10	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



/A Option



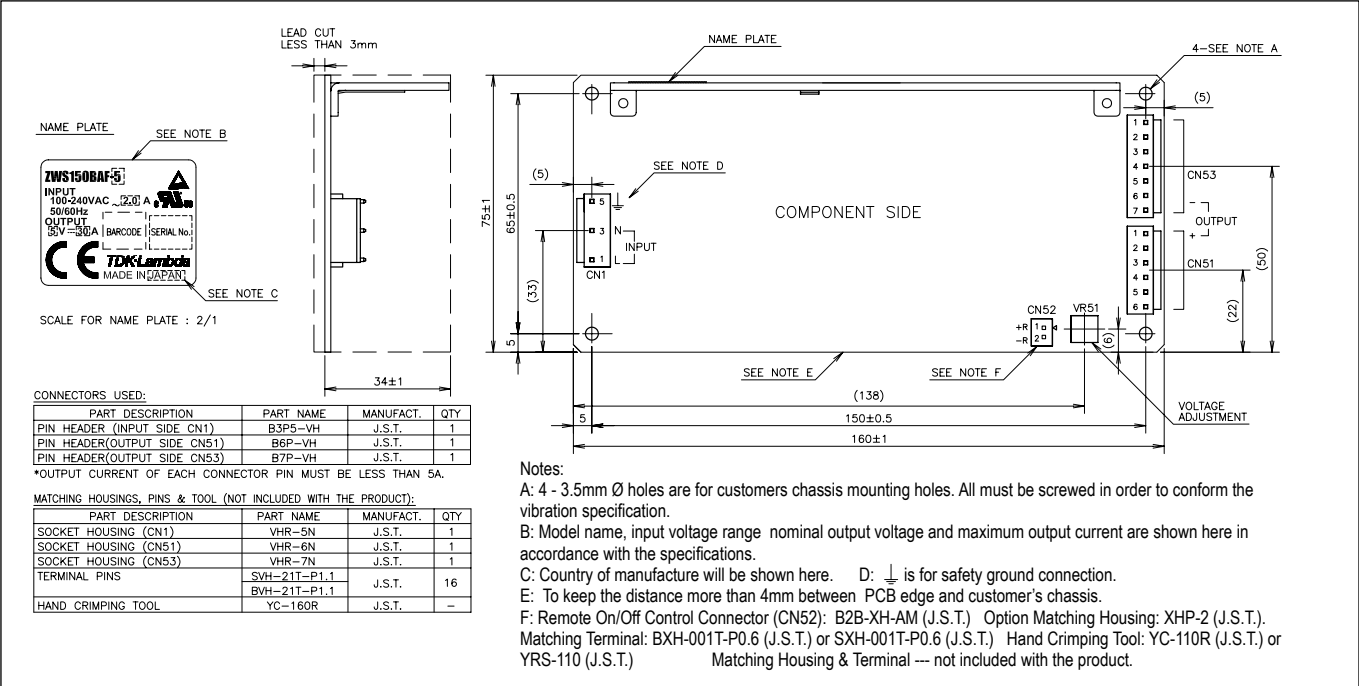
/L Option

ZWS-BAF Option Matrix								
Power	/A	/L	/CO2	/FV available for 12 24 & 48V models	/R	/T	/TL	/TA
50W	✓	✓	✓	✓				
75W	✓	✓	✓	✓				
100W	✓	✓	✓	✓	✓			
150W	✓	✓	✓	✓	✓			
300W	✓	✓	✓		✓	✓	✓	✓

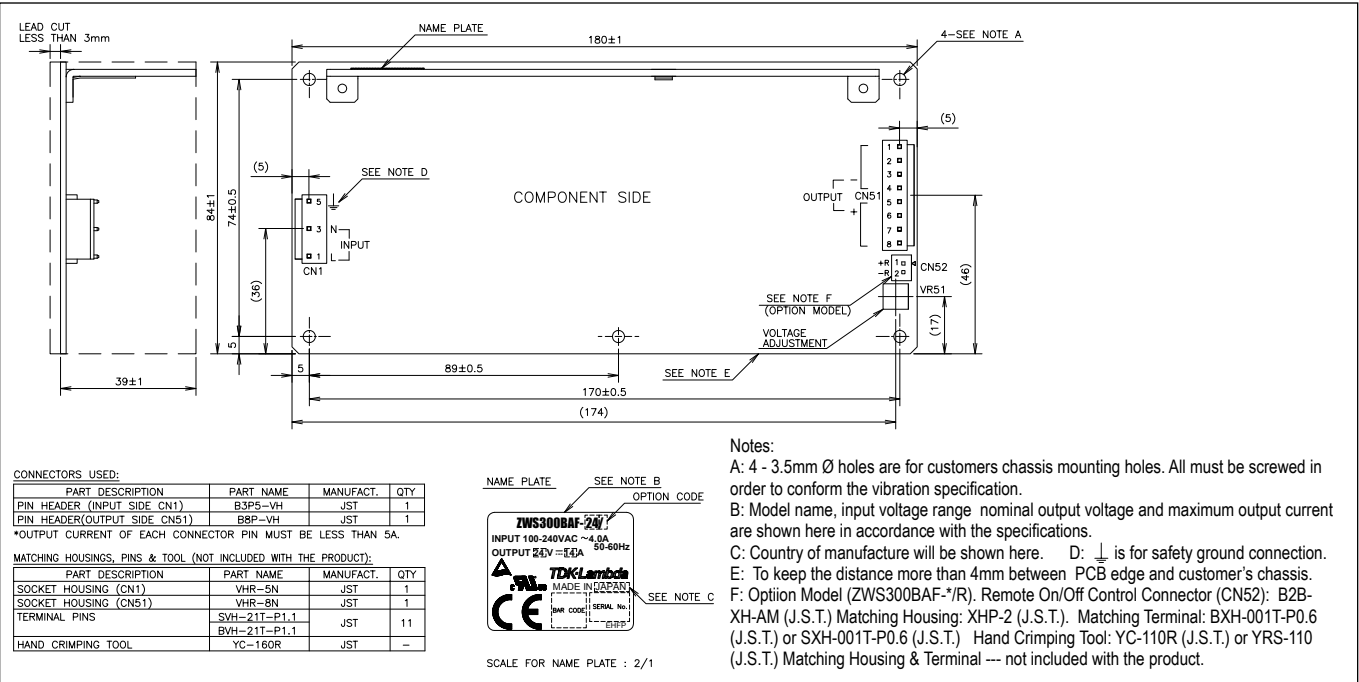
Note: Contact Sales for availability of /TL option



Outline Drawing ZWS150BAF



Outline Drawing ZWS300BAF



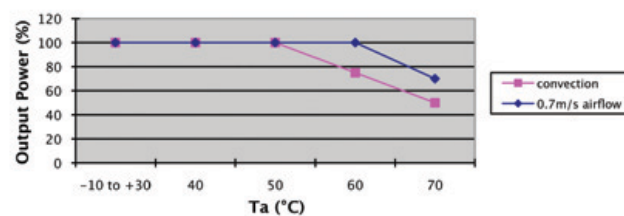
ZWS-BAF Output Derating

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 50 to 150W Models

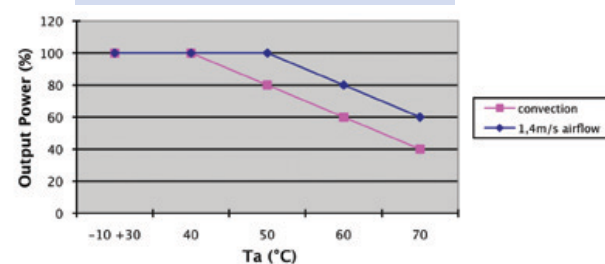


ZWS-BAF 300W 12V & 15V Models

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 12V & 15V Models

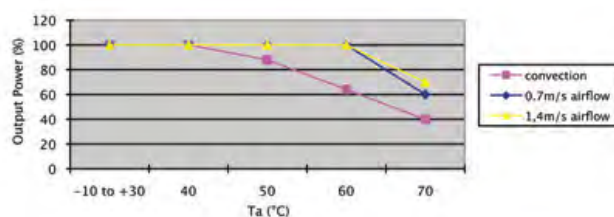


ZWS-BAF 300W 24V, 36V & 48V Models

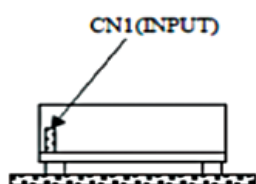
Mounting A, B ⁽¹⁾
Load %

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%

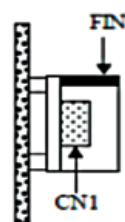
ZWS-BAF 300W 24V, 36V & 48V Models



Standard Mounting



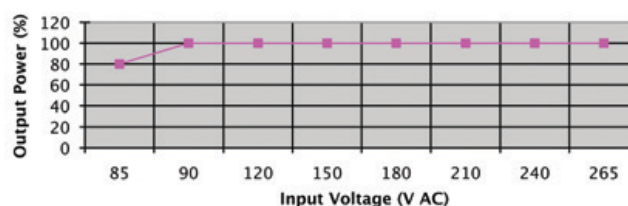
Mounting A



Mounting B

Note: (1) For other Mounting orientations, refer to Detailed Specifications & Application Notes

ZWS-BAF 300W all Models



ZWS-BAF 300W all models

Input Voltage VAC	LOAD %
85	80
90 - 265	100





ZWX Series

180W to 300W

Industrial ATX Power Supplies

- 90 - 150W Convection Cooled Ratings
- 1U High
- ATX SFX 12V Compatible
- Power Factor Corrected
- Peak Power Ratings
- No Minimum Loading Required

Key Market Segments & Applications

Industrial & Rack Mount

PC Applications

ZWX Features and Benefits

Features

- Convection Cooled Ratings
- Low Profile
- Industrial Grade
- No minimum loading

Benefits

- No Forced Air or Fan Needed
- Fits into 1U High Enclosures
- Greater Reliability & Field Life
- Easier to Use

Specifications

MODELS		ZWX180	ZWX240	ZWX300
ITEMS				
Input Voltage	V	85-265VAC (47-63Hz)		
Input Current (1)(2)	A	1.9 / 1.0	2.6 / 1.3	3.2 / 1.6
Inrush Current (2)	A	14 / 28 Cold start 25°C ambient		
Power Factor	-	Meets EN61000-3-2		
Leakage Current	mA	< 0.75		
Overcurrent Protection (3)	-	>1.05% of forced air current rating (5s delay and manual reset on V1, 2 & 3)		
Overvoltage Protection (4)	V	+3.3V: 3.76 - 4.3V, +5V: 5.74 - 7V, +12V: 13.4 - 15.6V		
Hold Up Time (Typ) (1)	ms	20ms at 100VAC		
Efficiency (1)(2)	%	81 / 84		
Remote On/Off	-	High: Unit off, Low: Unit On (enabled). Meets SFX12V		
DC Good PWR_OK	-	High: Power supply is good. Meets SFX12V		
Remote Sense	-	+3.3V Only		
Output Voltage Setpoint Accuracy	-	±5% (all outputs)		
Output Voltage Adjustment	-	None		
Line Regulation	mV	3.3V: 20mV, 5V: 48mV, +12V: 48mV, -12V: 20mV, +5Vsb: 20mV		
Load Regulation	mV	3.3V: 100mV, 5V: 300mV, +12V: 300mV, -12V: 100mV, +5Vsb: 100mV		
Ripple & Noise	mV	3.3V: 120mV, 5V: 150mV, +12V: 150mV, -12V: 120mV, +5Vsb: 120mV		
Operating Temperature	°C	-10 to +70, derate linearly to 20% load from 50 to 70		
Storage Temperature	°C	-30 to +85°C		
Humidity (non condensing)	%RH	Operating: 30 - 90, Non operating: 10 - 95		
Cooling	-	Convection or forced air cooled (30CFM, 0.85m3/min)		
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	-	>100Ω 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 (non operating)	m/s ²	< 392		
Safety Agency Approvals	-	UL60950-1, CSA60950-1, EN60950-1, EN50178 (OV II), CE Mark		
Conducted & Radiated EMI	-	EN55011/EN55022-B, FCC Class B, VCCI-B		
Immunity	-	EN61000-4-2, -3, -4, -5, -6, -8, -11		
Weight (Typ)	g	500	650	800
Size (WxHxD)	mm	94 X 36 X 210	106 X 36 X 225	118 X 36 X 250
Warranty	yrs	3 Years		



Model Selector								
Model		Output Voltage	Max Curr. (Convection)	Max Power (Convection)	Max Curr (Forced Air)	Max Power (Forced Air)	Peak Curr. (4) (Forced Air)	Peak Power (4) (Forced Air)
ZWX180	V1	+3.3V	6A(5)	90W	8.4A(5)	153W	12A(5)	180W
	V2	+5V	5A(5)		7A(5)		10A(5)	
	V3	+12V	6A		9A		13A	
	V4	-12V	0.2A		0.3A		0.3A	
	V5	+5V (sb)	1.4A		2A		2A	
ZWX240	V1	+3.3V	7A	120W	9.8A	204W	14A	240W
	V2	+5V	6A		8.4A		12A	
	V3	+12V	8A		11.2A		16A	
	V4	-12V	0.2A		0.3A		0.3A	
	V5	+5V (sb)	1.4A		2A		2A	
ZWX300	V1	+3.3V	10A	150W	14A	255W	20A	300W
	V2	+5V	6A		8.4A		12A	
	V3-1	+12V	4A(6)		5.6A		8A(7)	
	V3-2	+12V	8A(6)		11.2A		16A(7)	
	V4	-12V	0.2A		0.4A		0.4A	
	V5	+5V (sb)	1.4A		2A		2A	

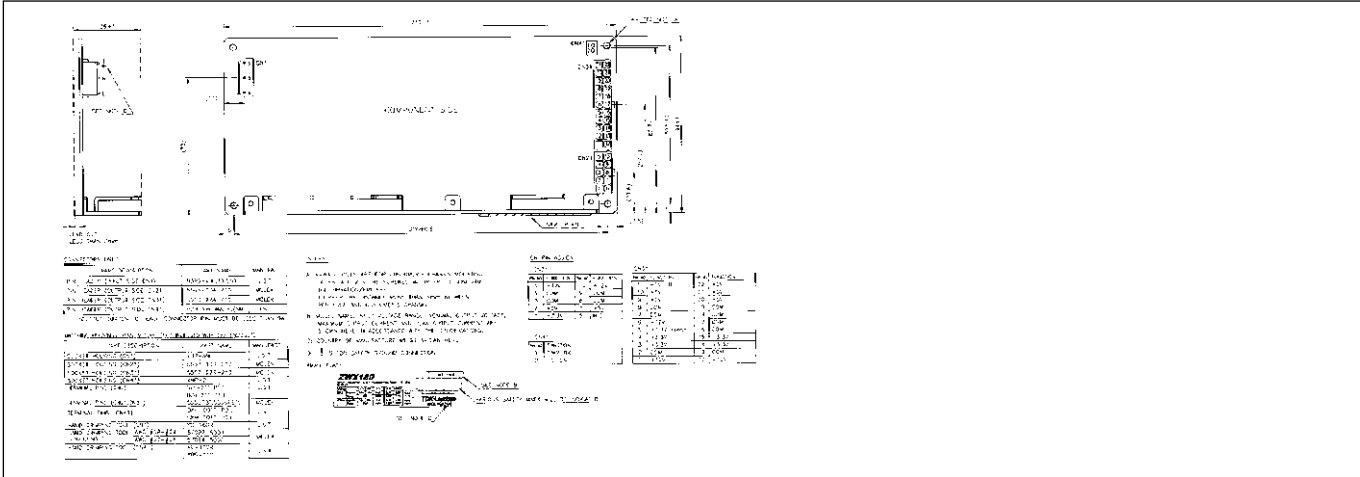
Options	
Suffix	Description
Blank	Open frame
/L1	L Bracket - input on the left side (rear mounting side facing away)
/L2	L Bracket - input on the right side (rear mounting side facing away)
/A1	L Bracket & Cover - input on the left side (rear mounting side facing away)
/A2	L Bracket & Cover - input on the right side (rear mounting side facing away)

- NOTES: Specification Table Page 1**
- (1) With output loading of:
ZWX180: V1=6.5A, V2=6.5A, V3=7.7A, V4=0.2A, V5=1A
ZWX240: V1=8.9A, V2=7.7A, V3=10.2A, V4=0.3A, V5=2A
ZWX300: V1=12A, V2=7A, V3-1=5A, V3-2=9.4A, V4=0.2A, V5=1A
 - (2) 100/200VAC
 - (3) Avoid prolonged operation in overload
 - (4) <5s operation at peak load

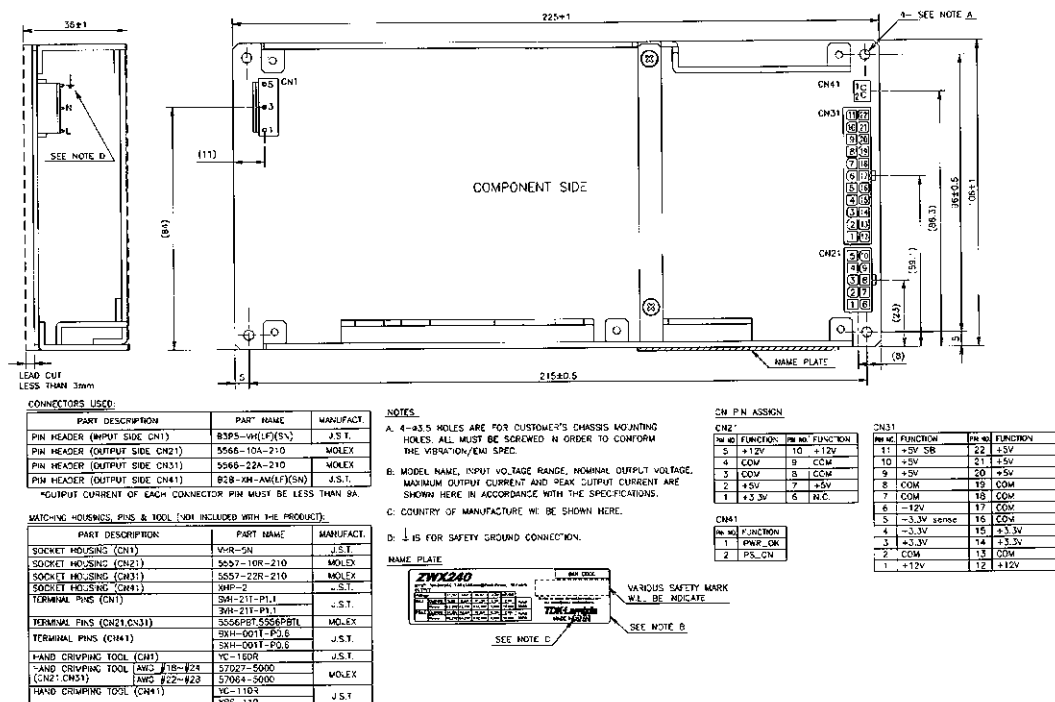
Cable Harness				
Connector	Harness	ZWX180	ZWX240	ZWX300
CN1	HA-2-IN	Y	Y	Y
CN21	ZWX-HA-04	Y	Y	Y
CN21(S-ATA)	ZWX-HA-02	Y	Y	Y
CN31/CN41	ZWX-HA-01	Y	Y	Y
CN51	ZWX-HA-03	-	-	Y

- Output Ratings Table above**
- (5) Maximum combined power of V1 & V2: 32W convection, 54W forced air, 63W peak
 - (6) V3-1 & V3-2 combined current limited to 10.9A (131W)
 - (7) V3-1 & V3-2 combined current limited to 22A (264W)

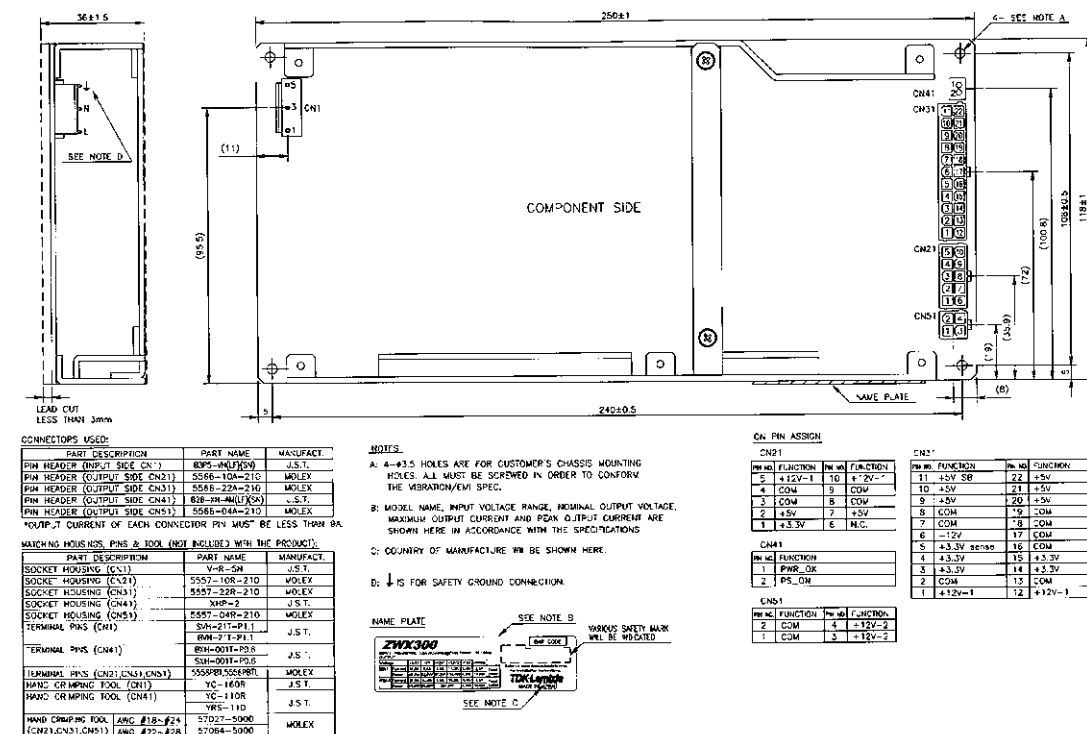
Outline Drawing ZWX180 Series



Outline Drawing ZWX240 Series

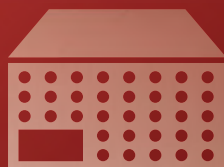
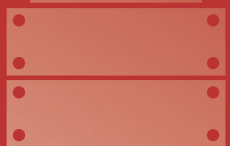


Outline Drawing ZWX300 Series





KM Series	187
KPSA Series	190
KW Series	193
PF Series	196
PFE300SA-1000F Series	199



PCB mount

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





KM Series

15 to 40W Medical AC-DC
PCB - Mount Power Supplies

- 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 Features and Benefits

Features

- Small Size
- Wide Input Range
- High efficiency

Benefits

- Minimises PCB Space
- Global use with no manual intervention
- Lower Heat Dissipated in System

Specifications							
MODELS		KMS15	KMD15	KMT15	KMS40	KMD40	KMT40
ITEMS							
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

		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

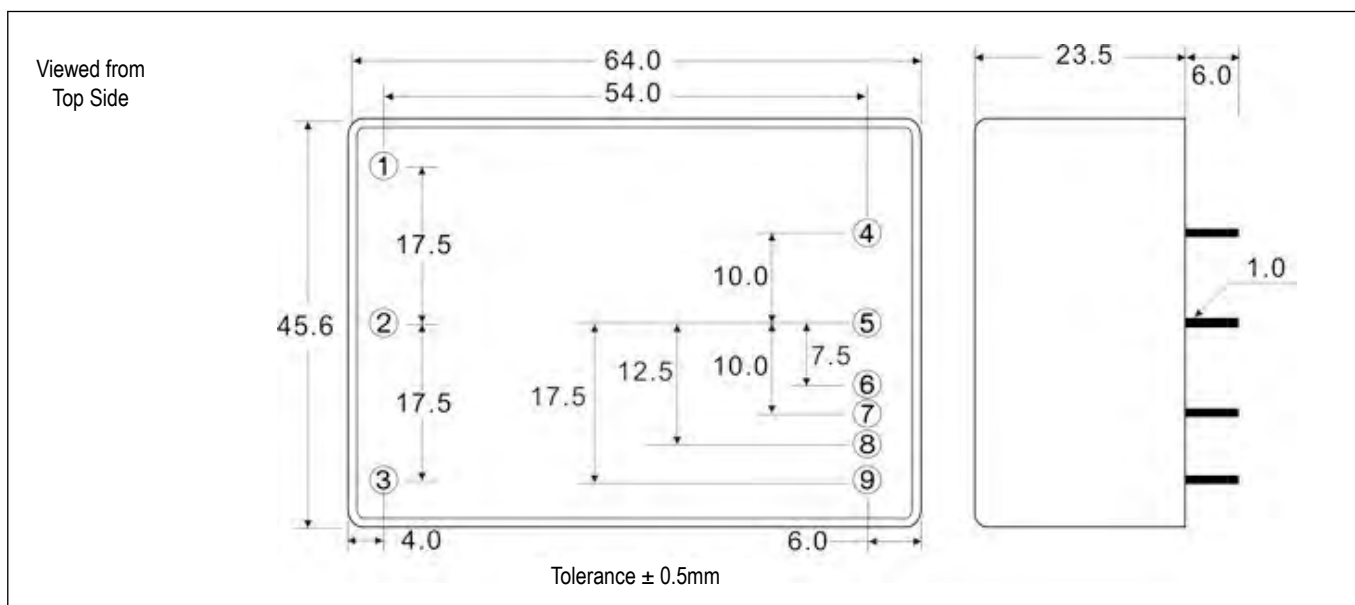
PIN #	Single O/P	Function Dual O/P	Triple O/P
1	No Pin	No Pin	No Pin
2	AC (L)	AC (L)	AC (L)
3	AC (N)	AC (N)	AC (N)
4	-DC	-DC	+5V GND
5	No Pin	GND	+5V
6	No Pin	No Pin	-DC
7	+DC	+DC	No Pin
8	No Pin	No Pin	GND
9	No Pin	No Pin	+DC

Pinout KM40

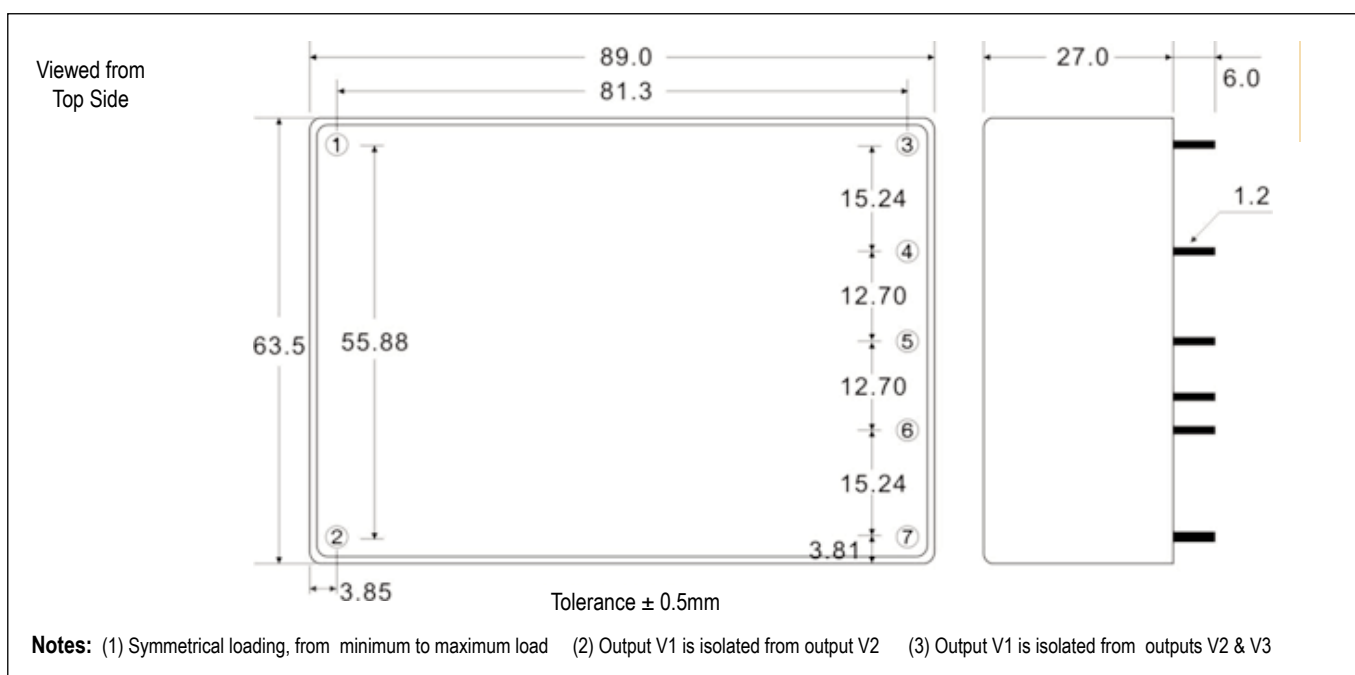
PIN #	Single O/P	Function Dual O/P	5S/12&24S	Triple O/P
1	AC (L)	AC (L)	AC (L)	AC (L)
2	AC (N)	AC (N)	AC (N)	AC (N)
3	+DC	+DC	+O/P2	+DC
4	No Pin	No Pin	+O/P1	+5V
5	-DC	GND	GND1	GND
6	No Pin	No Pin	GND2	+5V GND
7	No Connection	-DC	No Connection	-DC



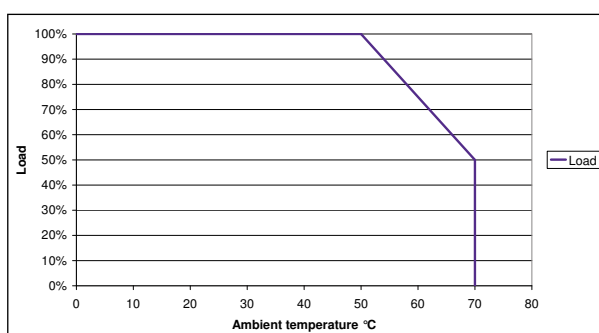
Outline Drawing KM15 Series



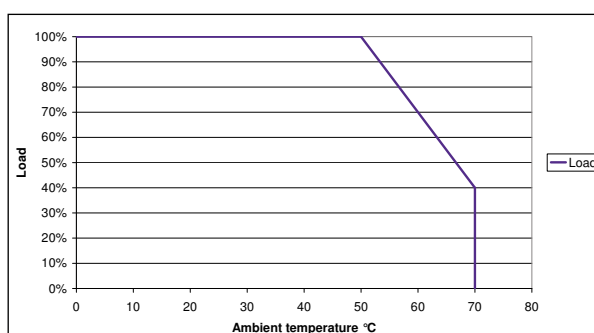
Outline Drawing KM40 Series

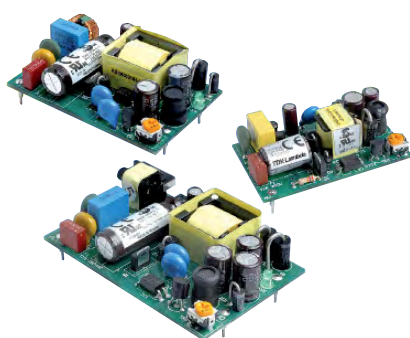


Derating Curves KM15 Series



Derating Curves KM40 Series





- 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

- Small Size
- Wide Input Range
- No External Components Needed

Benefits

- Minimises PCB Space
- Global use with no manual intervention
- Easy to use

Specifications				
MODEL		KPSA-5	KPSA-10	KPSA-15
ITEMS				
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/s ² (10 - 55Hz: constant sweep 1 min X, Y, Z for 1 hour)		
Shock	-	< 196.1 m/s ² (20G)		
Safety Agency Approvals	-	UL60950-1, 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:

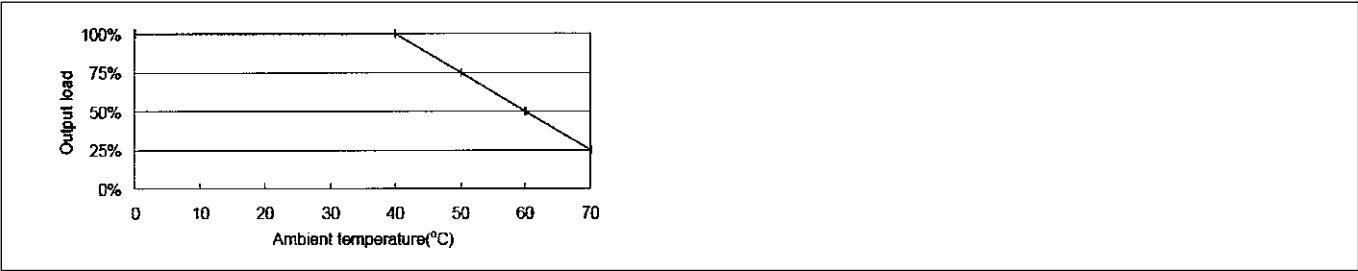
- (1) KPSA-5 Measured from 100 - 240VAC
(2) Measured with 0.1μF ceramic & 10μF electrolytic at 20MHz BW



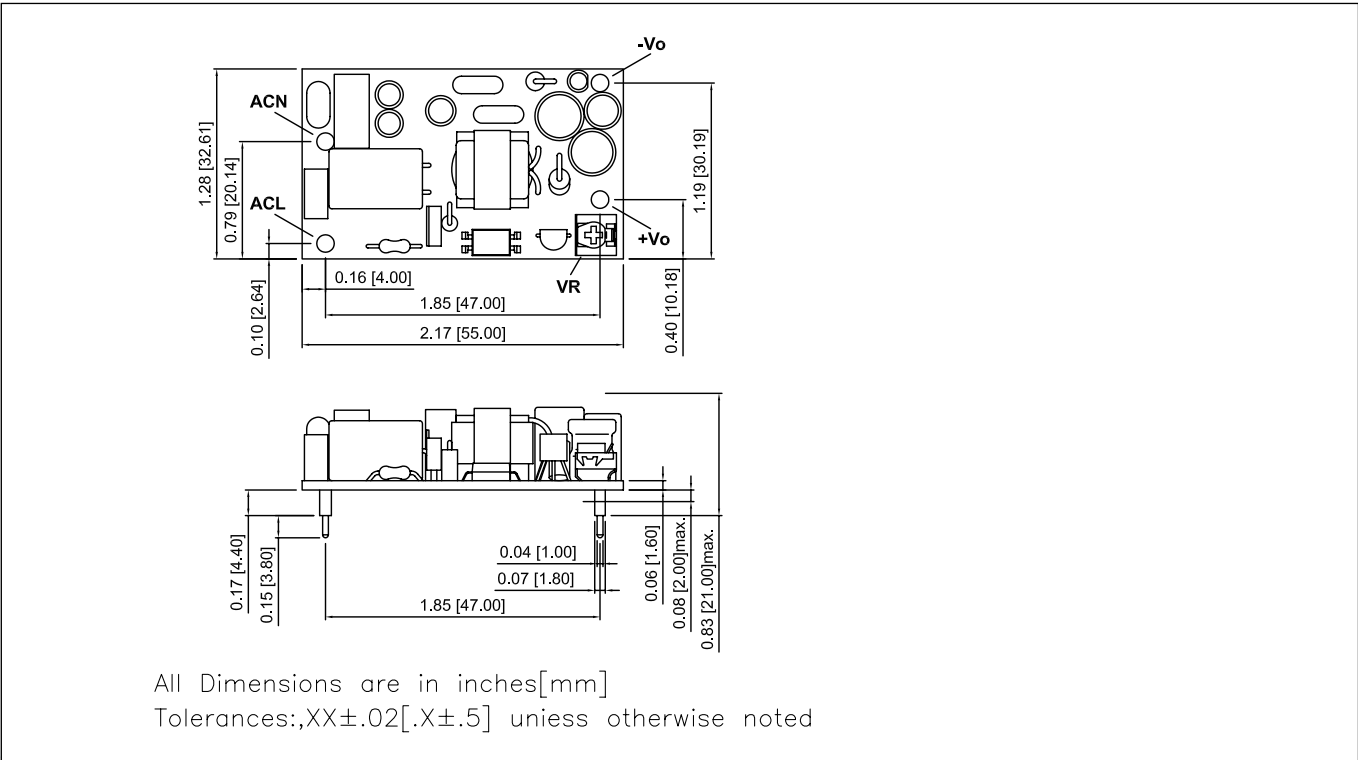
Model Selector

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

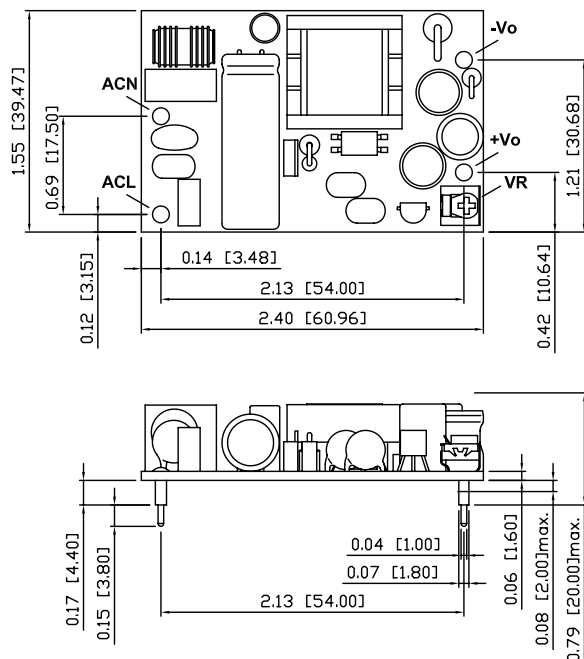
Derating Curve KPSA Series



Outline Drawing KPSA5 Series

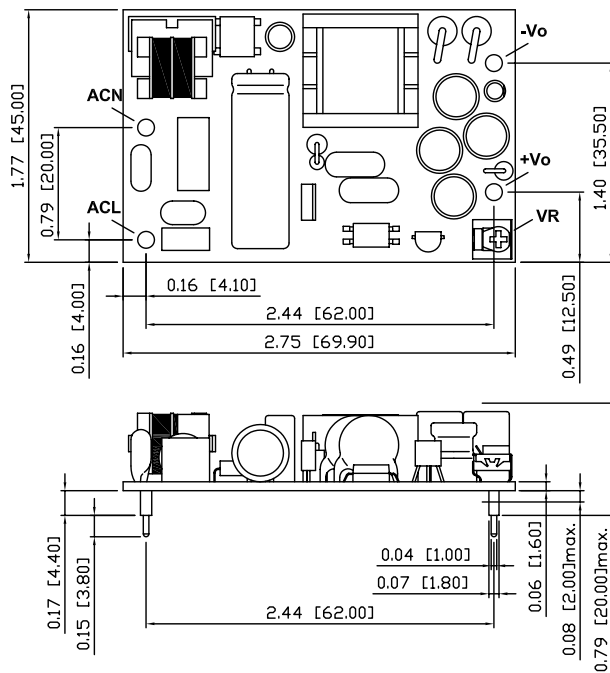


Outline Drawing KPSA10 Series



Note: All Dimensions are in inches (mm)
Tolerances: $XX \pm 0.2$ ($.X \pm .5$) unless
otherwise noted

Outline Drawing KPSA15 Series



Note: All Dimensions are in inches
(mm) Tolerances: $XX \pm 0.2$ ($.X \pm .5$)
unless otherwise noted

**INTERMEDIATE VOLTAGES AVAILABLE
PLEASE CONSULT SALES**





KW Series

Compact AC-DC
PCB-Mount Power Supplies

- 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 Features and Benefits

Features

- Small size
- Wide input range
- No external components needed

Benefits

- Minimises PCB space
- Global use with no manual intervention
- Easy to use

Specifications						
MODEL		5V	12V	15V	±12V	±15V
ITEMS						
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

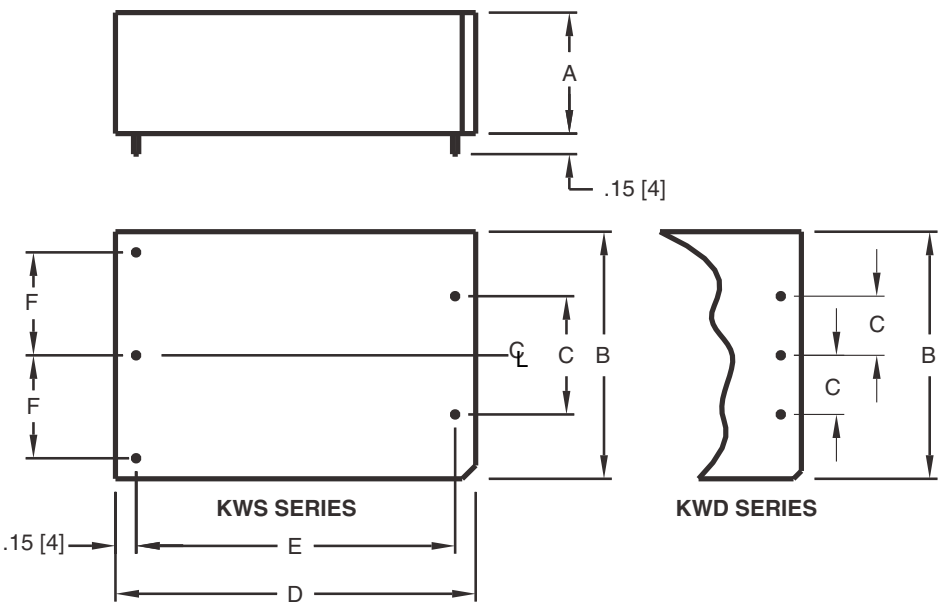


Model Selector			
Model	Voltage (V)	Power (W)	Current (A)
Single Output			
KWS5-5	5V	5	1.00
KWS10-5	5V	10	2.00
KWS15-5	5V	15	3.00
KWS5-12	12V	5	0.45
KWS10-12	12V	10	0.90
KWS15-12	12V	15	1.30
KWS5-15	15V	5	0.35
KWS10-15	15V	10	0.70
KWS15-15	15V	15	1.00
Dual Output			
KWD5-1212	±12V	5	±0.22
KWD10-1212	±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).





- 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

- Low profile
- Parallel
- Power Factor corrected (PF)
- Operation up to 85°C

Benefits

- Assist system integration
- For higher power or N+1 operation
- Supports Global Use
- Operates in harsh environments

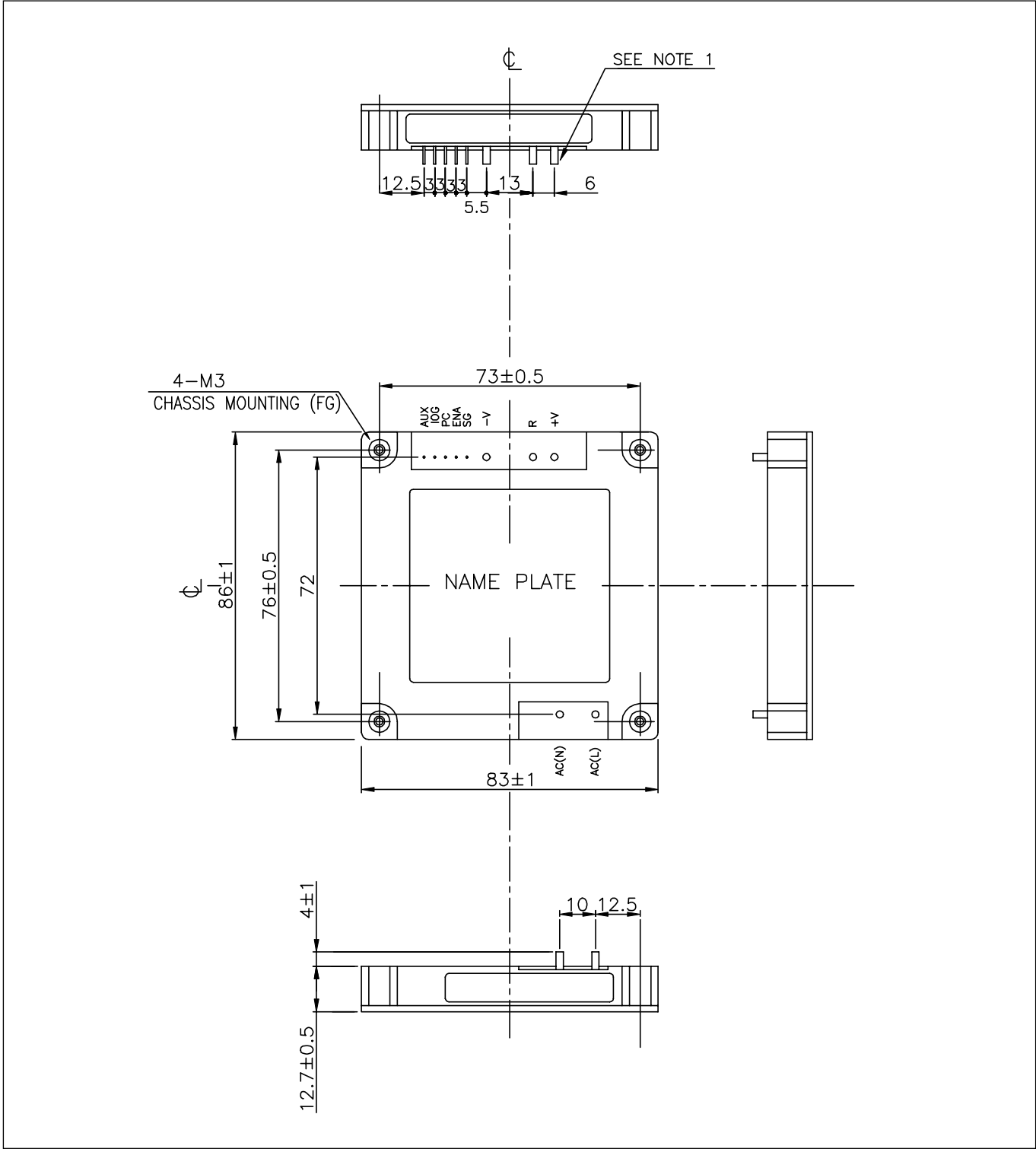
Specifications

		PF500A-360	PF1000A-360
Items			
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	-	UL60950-1, CSA22.2 No.60950-1, EN60950-1, & CE Mark	
Weight	g	130	200
Size (WxHxD)	mm	See outline line drawings	
Warranty	yrs	2	

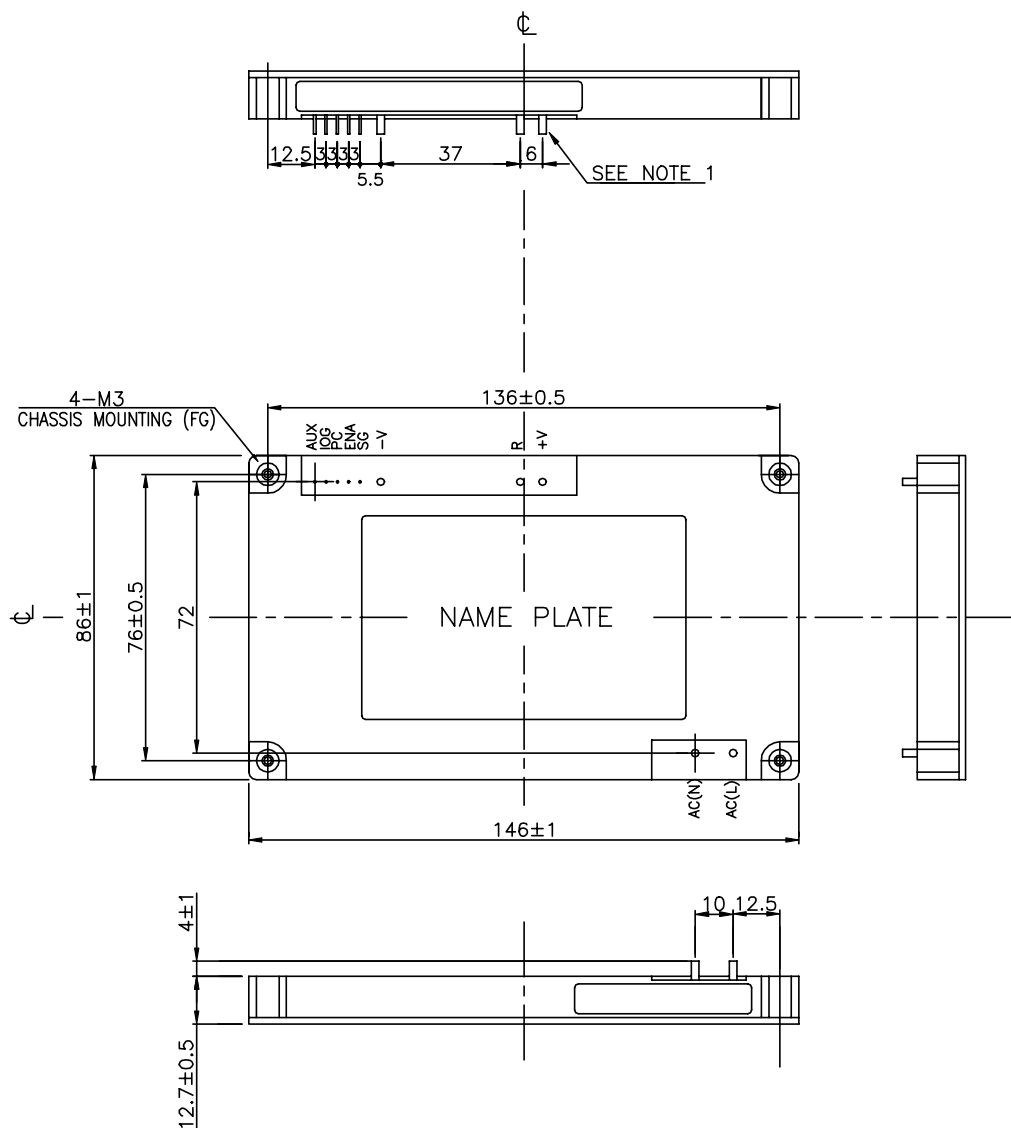
Notes: (Consult Installation Manual for detailed specifications, test methods and application notes)



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	PFE1000F
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	13.6 / 6.6
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	500
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
PFE1000F28 & PFE1000F48: -40 to 85°C below 170VAC input voltage. See instruction manuals for derating curves
- 3) PFE500F, PFE1000F: 500VDC Output to baseplate
- 4) Reduced PFC above 63Hz. Contact technical support for 440Hz operation.

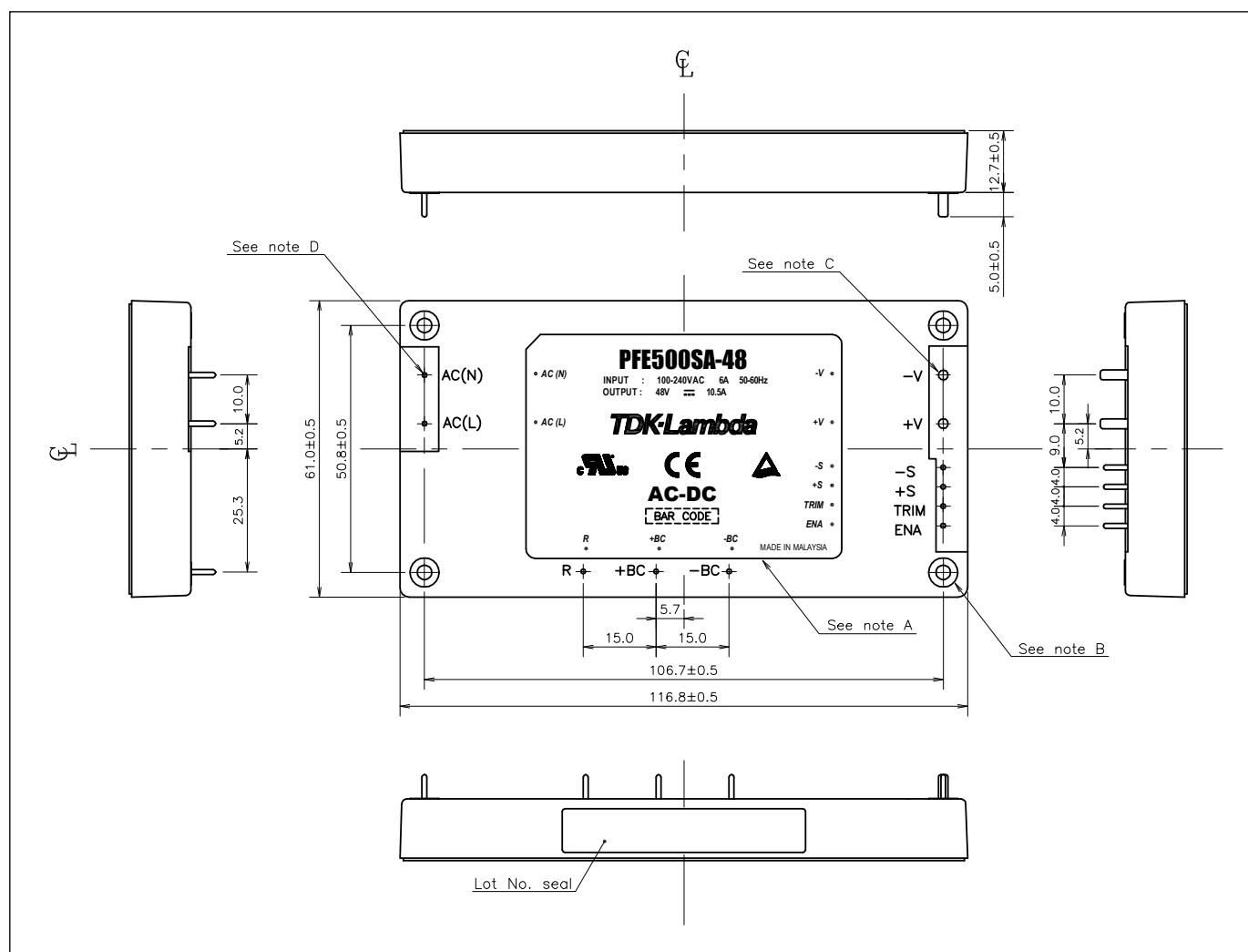


Model Selector

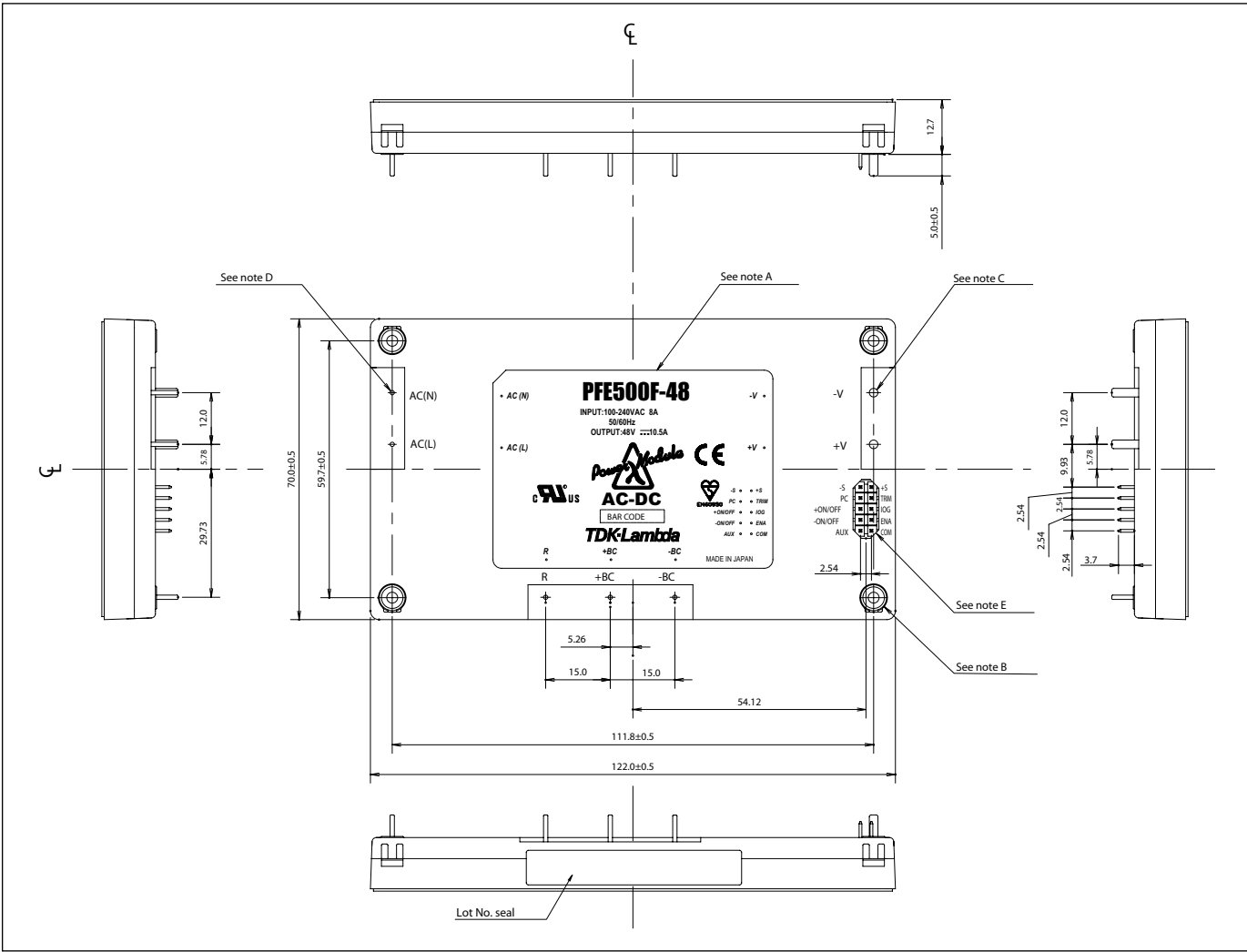
Model	Output Voltage (V)	Adjust. Range (V)	Maximum Current (A)	Maximum Wattage (W)	Load Reg. (mV)	Line Reg. (mV)	Efficiency typ ⁽⁴⁾
PFE300SA-12	12	9.6 - 14.4	25	300	48	48	84 / 85
PFE500SA-12	12	9.6 - 14.4	33	396	48	48	84 / 86
PFE500F-12	12	9.6 - 14.4	42	504	48	48	81 / 83
PFE1000F-12	12	9.6 - 14.4	60	720	48	48	80 / 82
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
PFE1000F-28	28	22.4 - 33.6	36	1008	56	56	85 / 87
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
PFE1000F-48	48	38.4 - 57.6	21	1008	96	96	84 / 86
PFE700SA-48	51	None	14	714	50 - 57V ⁽⁵⁾		89 / 91

Notes: (4) 100 / 200VAC. (5) Total regulation range

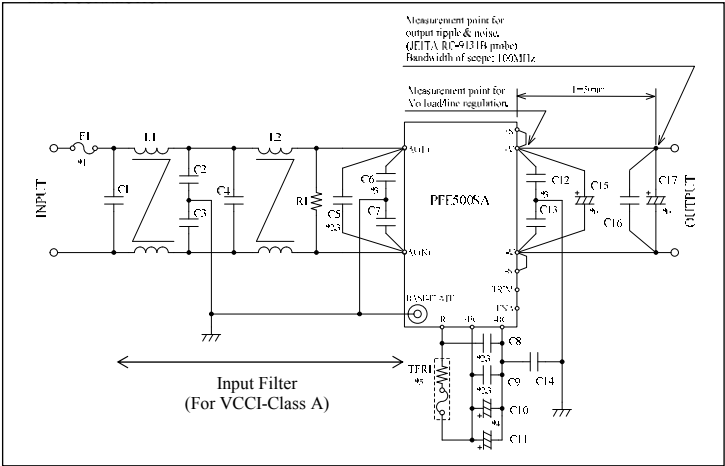
Outline Drawing PFE300SA & PFE500SA



Outline Drawing PFE500F



Basic Connection PFE500SA

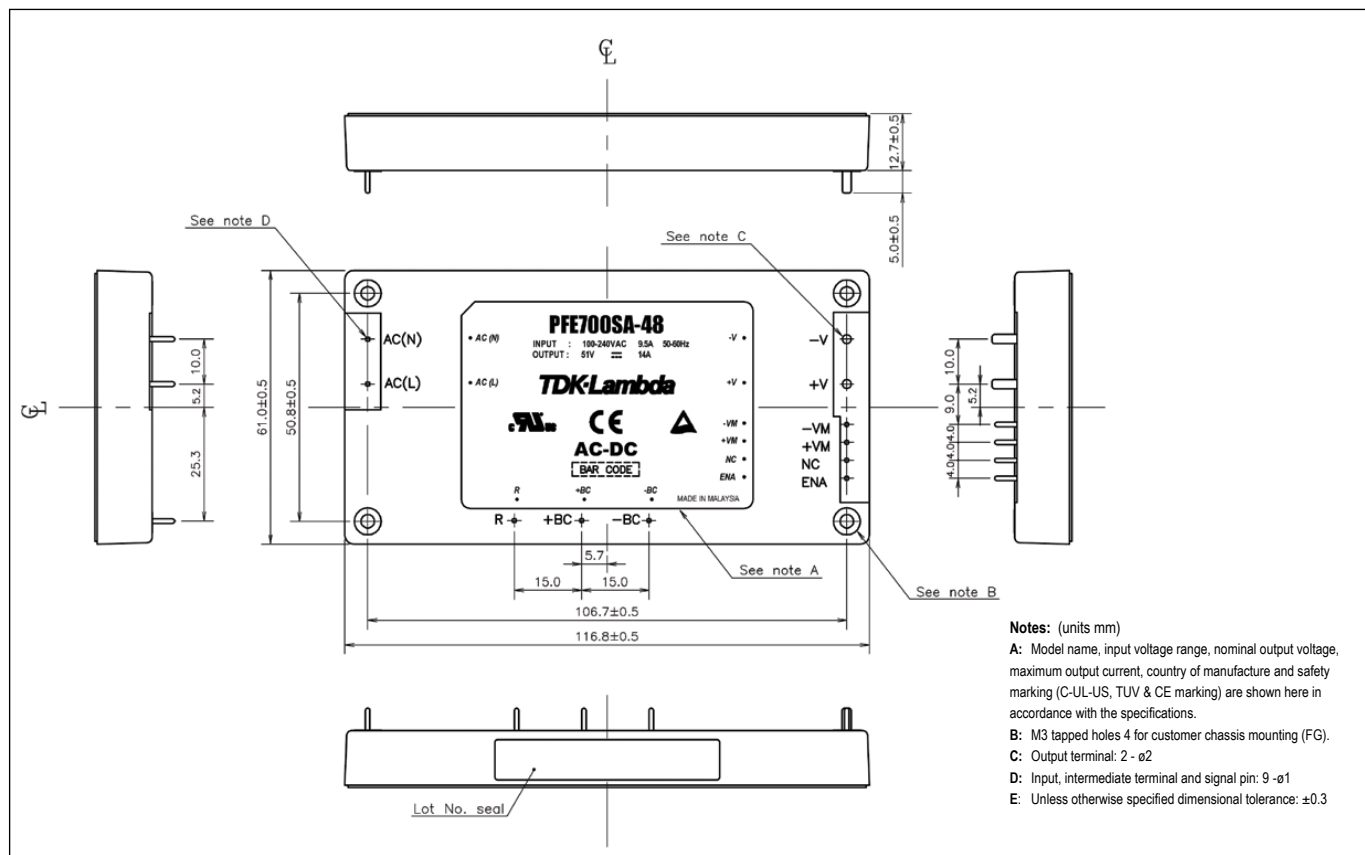


Heatsink Table		
Heatsink	Size (mm)	PFE Module
HAF-10L	116.8 x 25.4 x 61	PFE300/500/700SA
HAF-15L	116.8 x 38.1 x 61	PFE300/500/700SA
HAF-15T	116.8 x 38.1 x 61	PFE300/500/700SA
HAL-F12T	122 x 35 x 69.9	PFE500F
HAM-F10T	160 x 33.4 x 100	PFE1000F

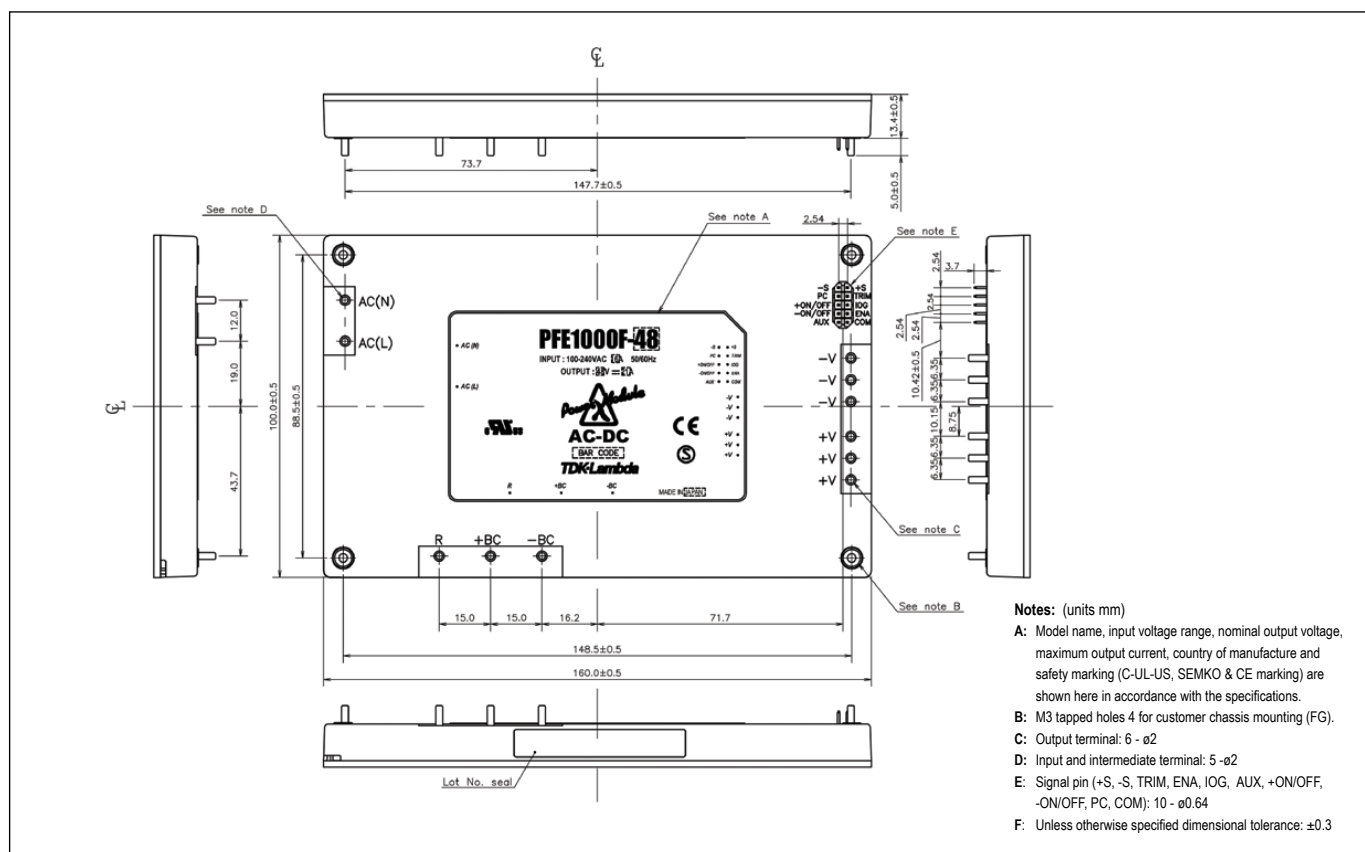
Options	
Suffix	Description
Blank	M3 tapped mounting inserts (4)
/T	3.3mm non-threaded inserts (4)



Outline Drawing PFE700SA

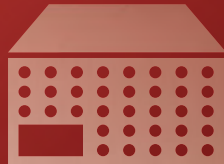


Outline Drawing PFE1000F





DLP Series	204
DLP-PU Series	207
DPP15 - 100 Series	210
DPP120 - 960 3 Phase	213
DPP120 & 240 Series	216
DPP480 Series	219
DRB Series	222
DRF Series	226
DSP Series	231
DRF/HL Series	234



DIN-Rail

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
- Low Cost
- 3 Year Warranty
- Semi F47 Compliant (DLP180&240 only)
- Convection Cooled
- Conducted and Radiated EMI, Class B
- Input Transient Protection, IEC61000-4
- NEC Class 2 Compliant (DLP75&100/C2 models only)

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

- PFC Compliant to EN61000-3-2
- UL508 Approvals
- 3 Year Warranty

Benefits

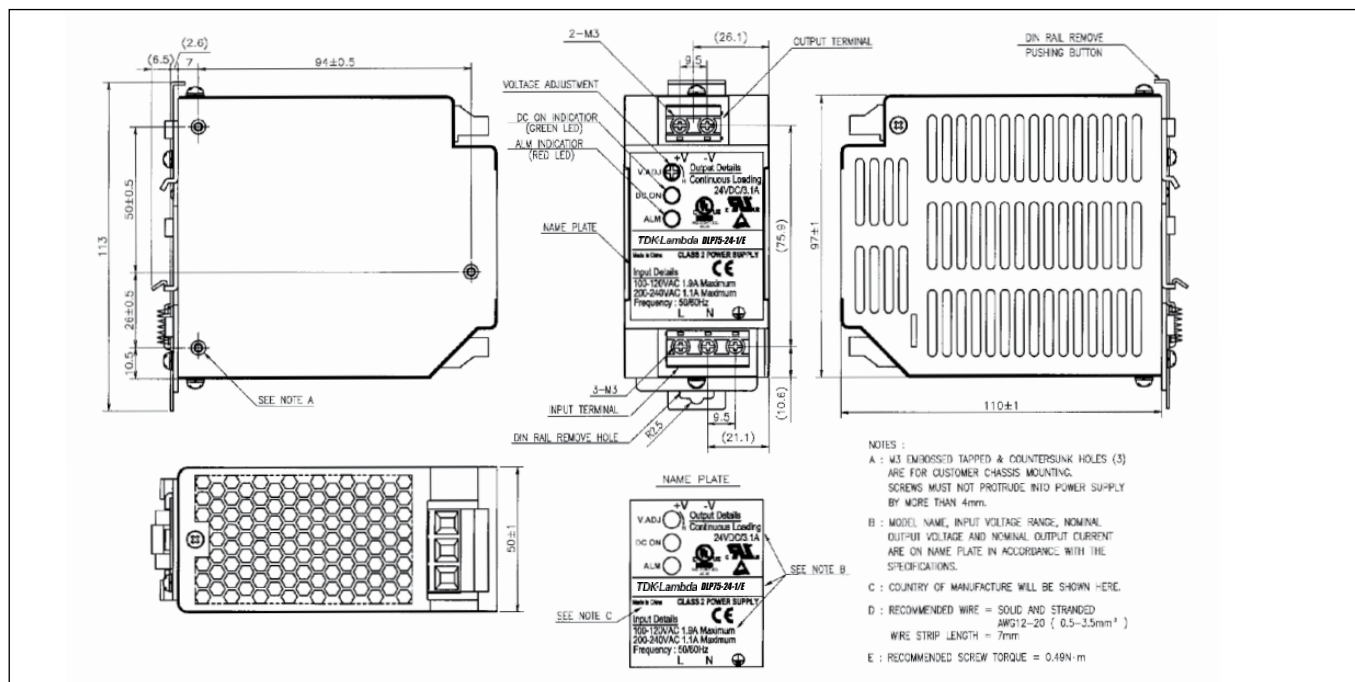
- Supports Global Use
- Enables System Certification
- Fix & Forget

Specifications

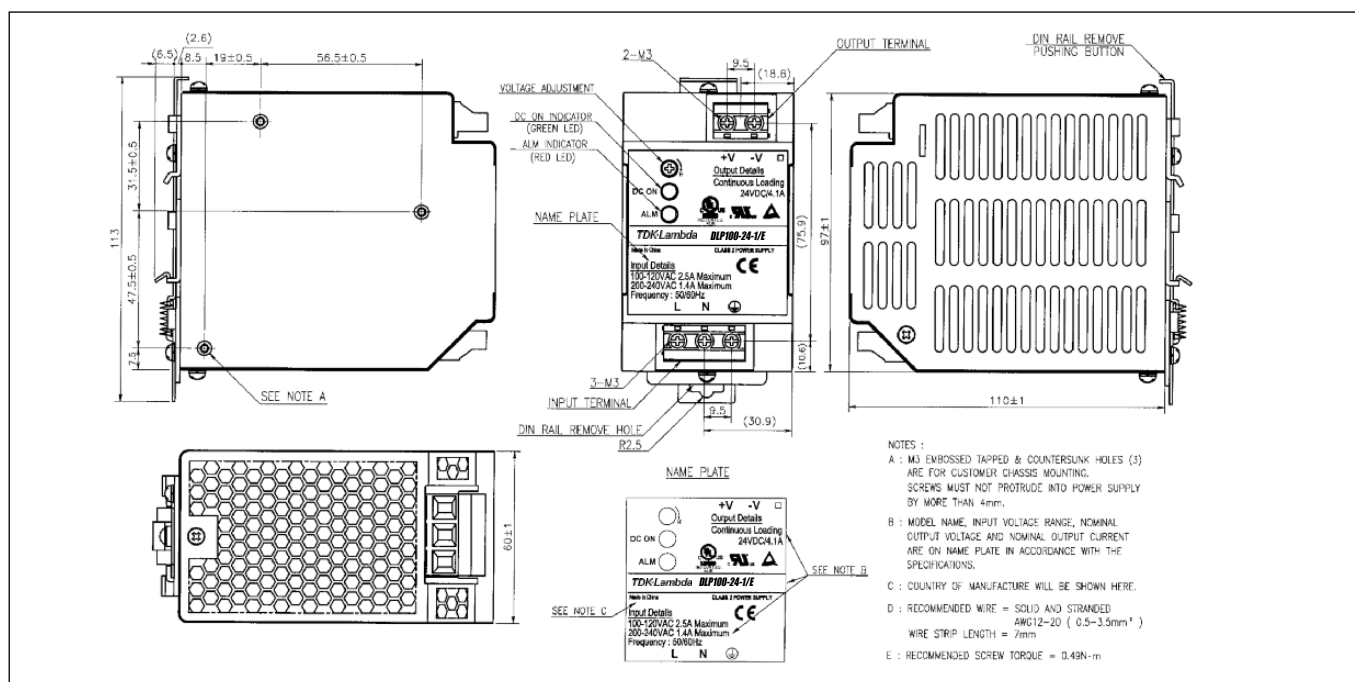
MODELS		DLP75-24-1/E DLP75-24-1/C2EJ	DLP100-24-1/E DLP100-24-1/C2EJ	DLP120-24-1/E	DLP180-24-1/E	DLP240-24-1/E
ITEMS						
Output Voltage	V	24	24	24	24	24
Output Current (/C2 models)	A	3.1 (2.5)	4.1 (3.7)	5.0	7.5	10
Output Power (/C2 models)	W	75 (60)	98.4 (88.8)	120	180	240
Output Voltage Adjustment	V	21.6 - 28 (fixed for /C2 models)				
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
	/C2	A	1.4/0.7	2.0/1.0	-	-
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				
	/C2	>105%, Constant Current				
Overvoltage Protection	-	~2.6A				
LED Indicators	-	~3.75A				
Operating Temperature (2)	°C	30-35V, latching, cycle AC line to reset (26-30V DLP75-24-1/C2EJ)				
Storage Temperature	°C	Green LED = DC ok Red LED = overcurrent				
Humidity (Non-Condensing)	%RH	Convection cooled, -10 to 60, derate linearly to 60% load from 50 to 60				
Withstand Voltage	-	-30~+85				
Vibration	-	30-90% operating 10-95% non operating				
Shock	-	Input - Ground 2kVAC, Input to Output 3kVAC, Output - Ground 500VAC				
Safety Agency Approvals	-	9.8m/s ² (1.0G) at DIN rail; (10-55Hz: 9.8m/s ² Constant, X,Y, Z each 1 hour)				
Conducted EMI	-	196m/s ² (20G)				
Radiated EMI	-	UL508, NEC Class 2(3) (/C2 models), UL60950, CSA60950, EN60950, CE, EN50178 Cat III (Pri)				
ESD	-	FCC-B, EN55011/EN55022-B, VCCI-B; Meets IEC61000-4-1				
Radiated RFI	-	EN55011/EN55022-B, FCC-Class B, VCCI-B				
Fast Transient Burst	-	IEC61000-4-2 ±10kV (Air), ±5kV (Contact)				
Lightning Surge	-	IEC61000-4-3 80-1000MHz, 12V/m 80% AM 1kHz				
Conducted RFI	-	IEC61000-4-4 2.4kV 5kHz				
Magnetic Field	-	IEC61000-4-5 4.4kV, 1.2x50µs (Common Mode) 2.4kV 1.2x50µs (Normal)				
Voltage Dips	-	IEC61000-4-6 150kHz-80MHz, 12V, 80% AM 1kHz				
Size	mm	IEC61000-4-8 36A/m				
Weight	g	IEC61000-4-11 70% 10ms, 40% 100ms, 0% 5s				
Warranty	-	50 x 97 x 110				
		470				
		60 x 97 x 110				
		540				
		60 x 97 x 110				
		540				
		80 x 97 x 110				
		780				
		120 x 97 x 110				
		1000				
		3 Years				



Outline Drawing DLP75 Series



Outline Drawing DLP100/120 Series



- Notes:** (1) DC input is not safety approved
(2) **DLP240-24-1/E:** -10°C~+70°C, derated linearly to 60% load from 50° to 70°C.

DLP75-24-1/C2EJ: -10°C~+70°C, derated linearly to 75% load from 50° to 60°C.

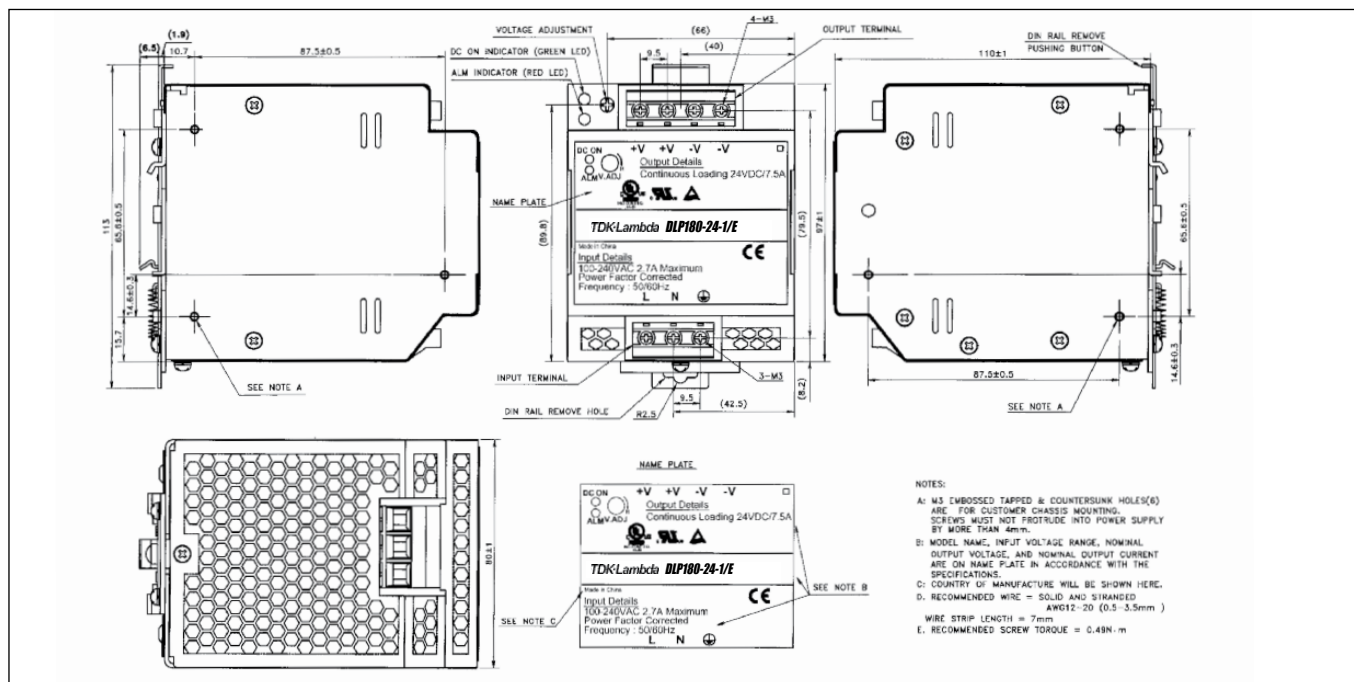
DLP100-24-1/C2EJ: -10°C~+70°C, derated linearly to 80% load from 50° to 60°C.



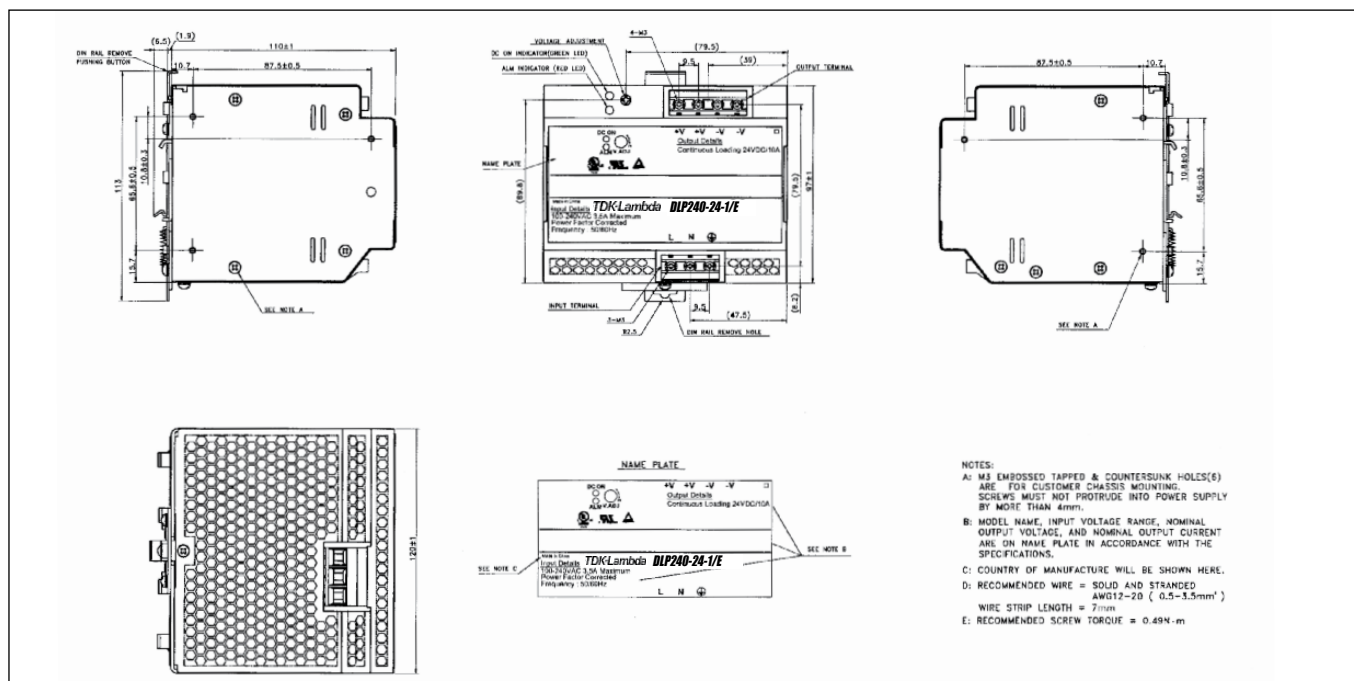
**Also available
DLP-PU
parallel unit
for redundancy**



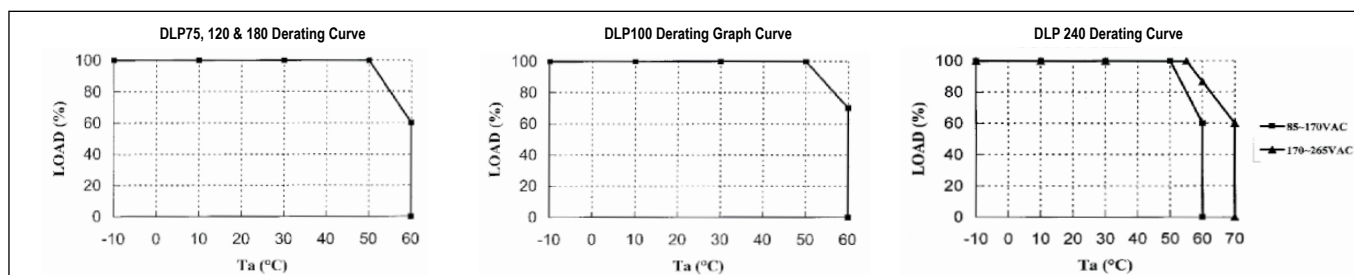
Outline Drawing DLP180 Series



Outline Drawing DLP240 Series



Derating Curve DLP





DLP-PU Series

Power Supply
Parallel or Redundancy Module

- OR-ing Diodes Included
- Alarm Signals
- LED Indicators
- DIN Rail Mounting

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

- Internal ORing Diodes
- Can Connect Two Units in Parallel
- Output Voltage Monitoring (via relays)
- DIN Rail Mounting

Benefits

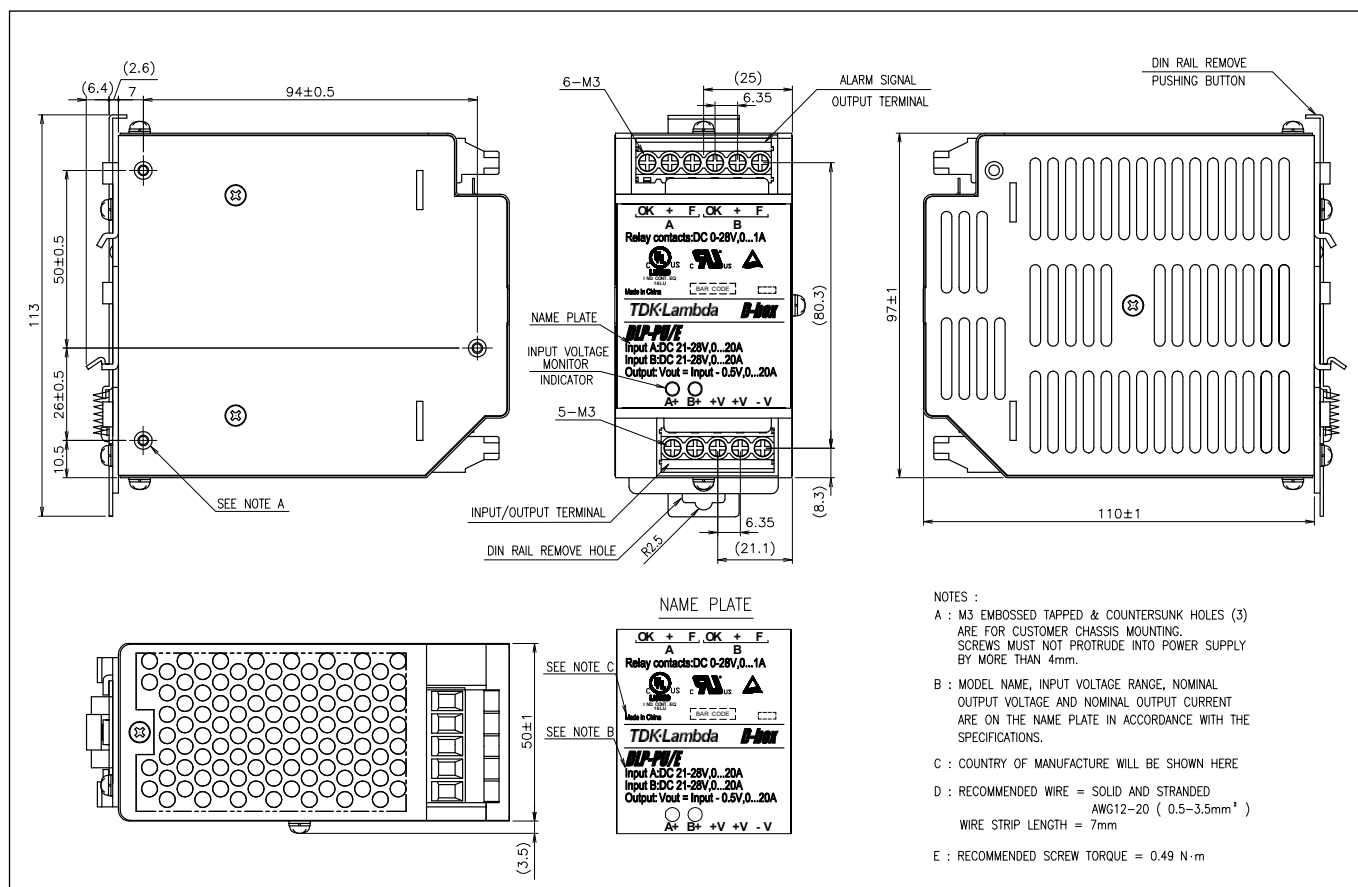
- Allows Redundant Operating
- Enables System Scalability
- Remote Alarm Notification
- Easier System Integration

Specifications

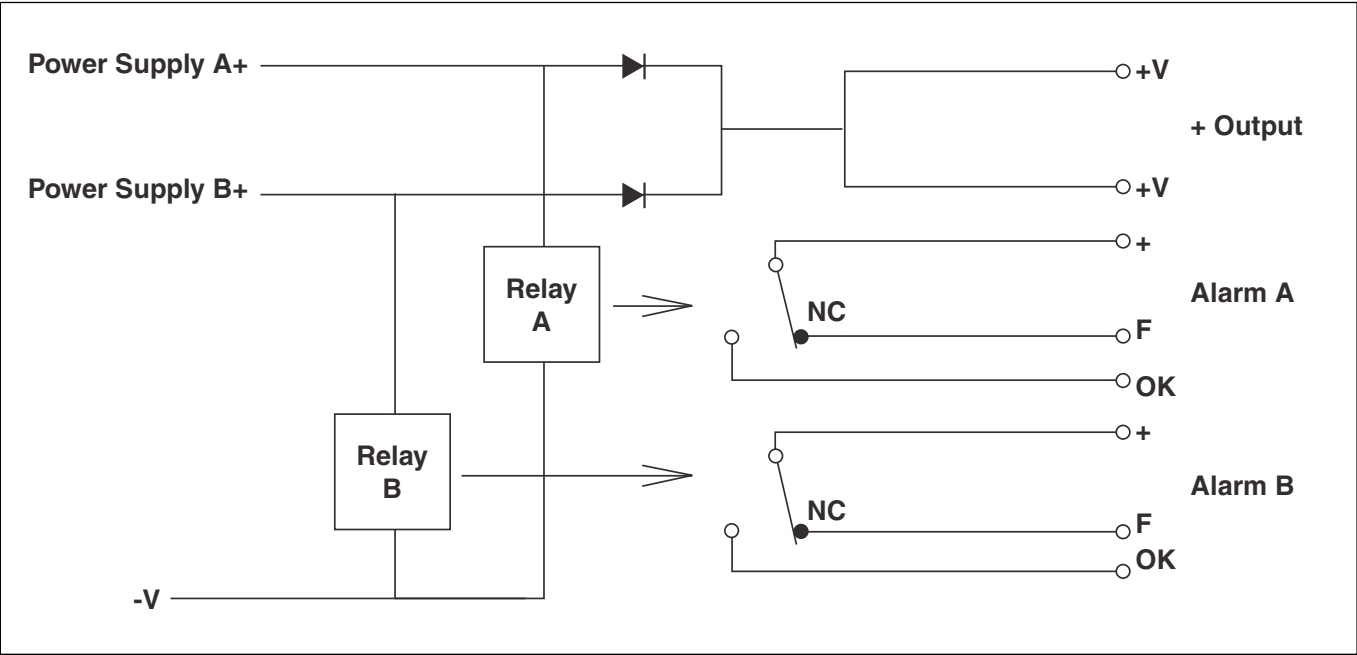
ITEMS	MODELS	DLP-PU/E
Input Voltage Range	VDC	21 - 28
Number of inputs	-	Two
Maximum Input Current	A	20 per input
Maximum Output Current	A	20
Overcurrent protection	-	None
Voltage Drop	VDC	0.5
Maximum Reverse Voltage	VDC	35
LED Indicators	-	Two green LEDs indicating each input is "good"
Input Voltage Alarm	-	Relay off when input is <19.2V ($\pm 1\%$) or > 30V ($\pm 5\%$). 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



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 Bandwidth)			
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) 0.002G ² /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

(3) Does not include DPP25-5 & DPP100-24 models. Evaluated to NEC NFPA70 Class 2 output per UL1310.

(2) Recommend 25mm clearance on all sides.

(4) Consult Sales Office for use under DC Input conditions

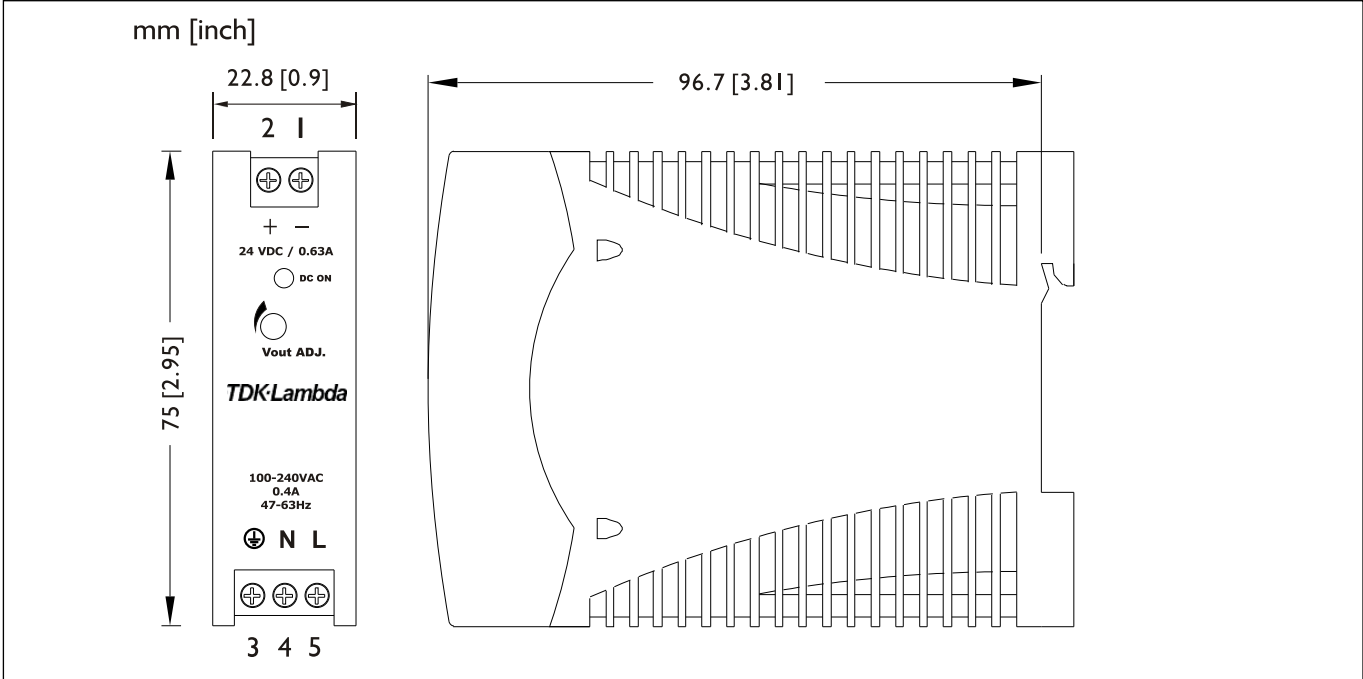


Model Selector					
Model	Output Voltage (V)	Output Adjust (V)	Output Curr. (A)	Max. Output Power (W)	Efficiency at Full Load (%)
DPP25-5	5	5-6	5	25	78
DPP30-12	12	9.9-12.1	2.5	30	82
DPP50-15	15	11.9-15.1	3.4	50	85
DPP15-24	24	22.5-28.5	0.63	15	80
DPP30-24	24	22.5-28.5	1.3	30	84
DPP50-24	24	22.5-28.5	2.1	50	86
DPP100-24	24	22.5-28.5	4.2	100	87
DPP50-48	48	48-56	1.05	50	87

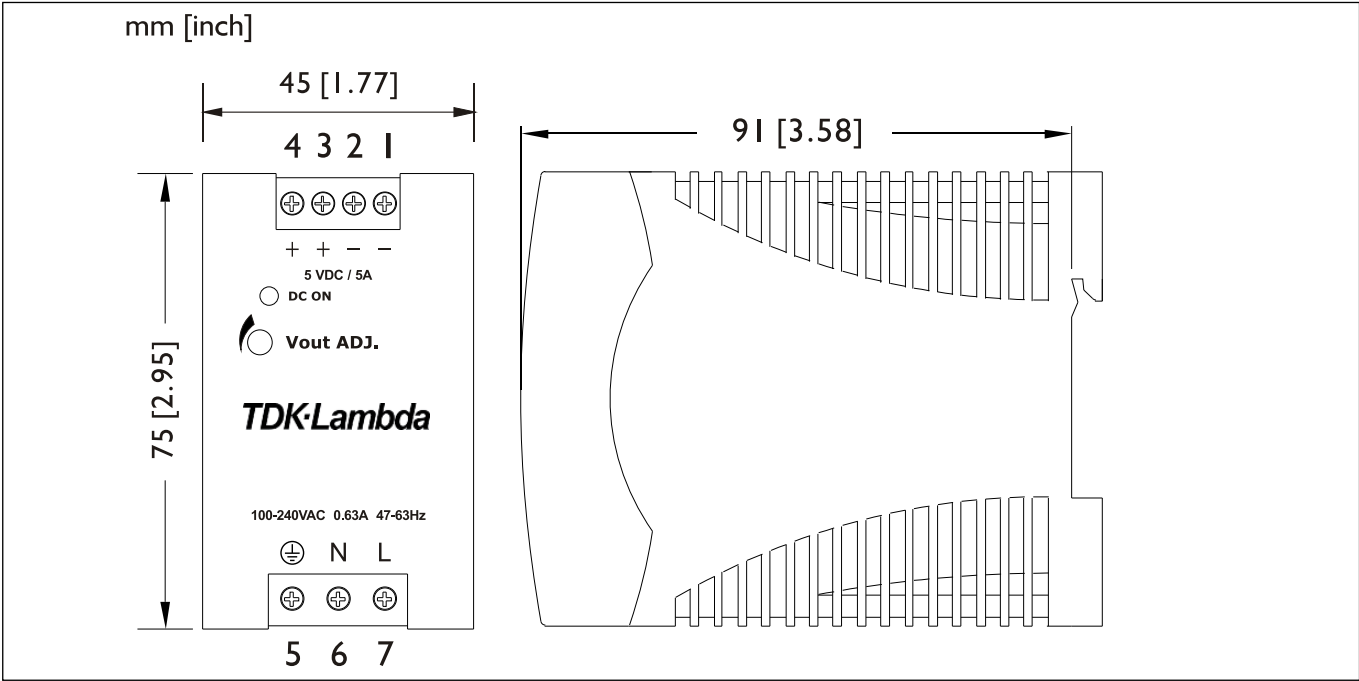
Installation

- Snap-on Mounting - snap onto DIN Rail TS35/7.5 or TS35/15 (no tools required)
- Cooling - Normal Convection
- Clearance - 25mm all sides
- Connection - Use copper wire 0.5-2.5mm² (AWG24-12)

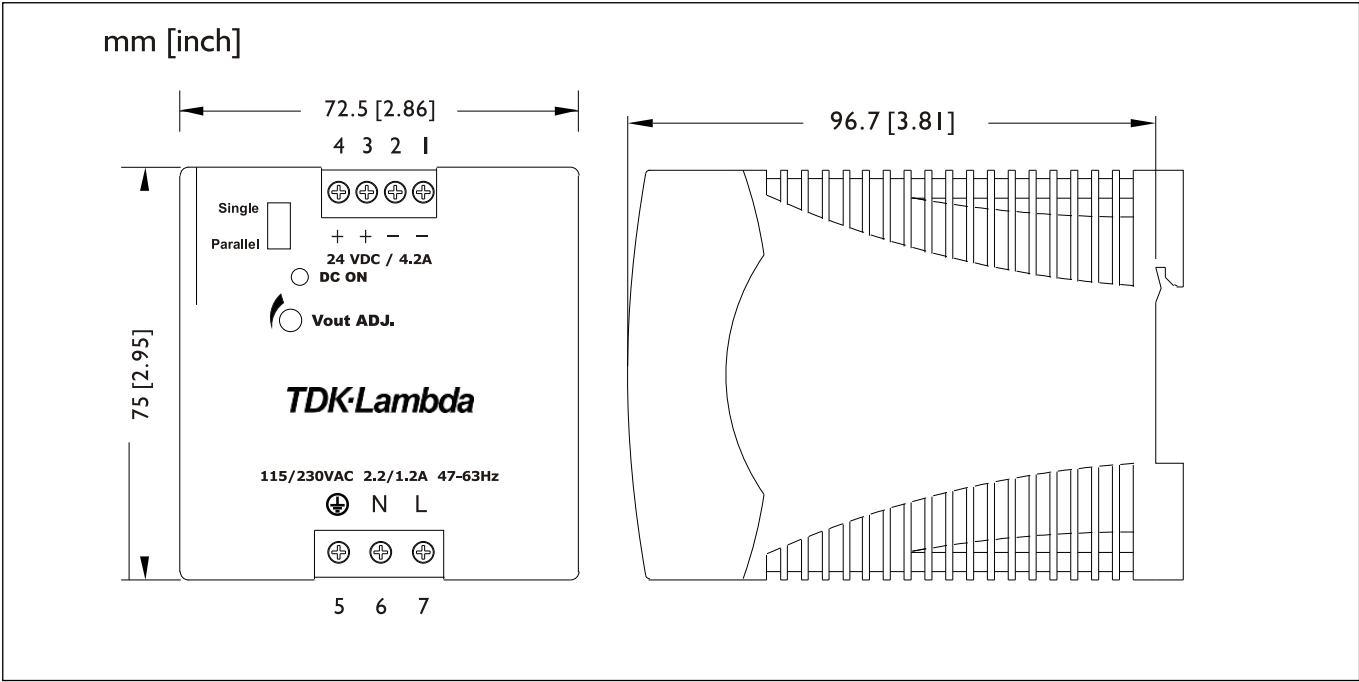
Outline Drawing DPP15 Series



Outline Drawing DPP25-DPP50 Series



Outline Drawing DPP100 Series





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

- 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

MODELS		DPP120-xx-3	DPP240-xx-3	DPP480-xx-3	DPP960-xx-3
ITEMS					
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% (±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			

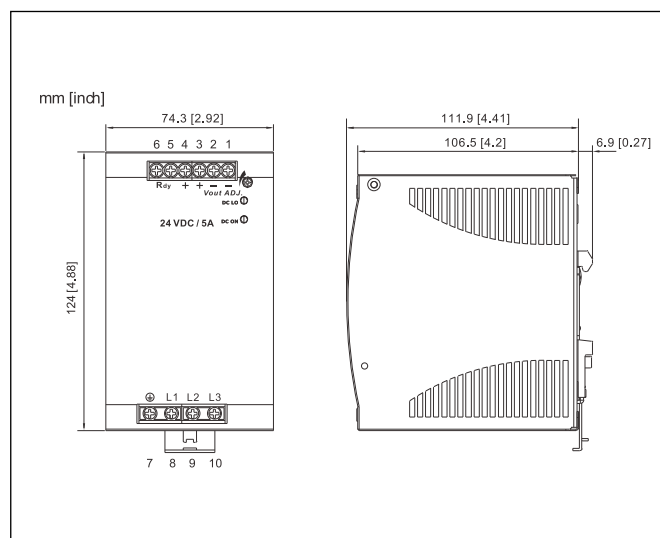


- Notes:** (1) Bi-phase input is permissible, but output load must be derated to 75% load
 (2) Passive, meets EN61000-3-2
 (3) DPP480 -30°C
 (4) Consult Sales Office for use under DC Input conditions

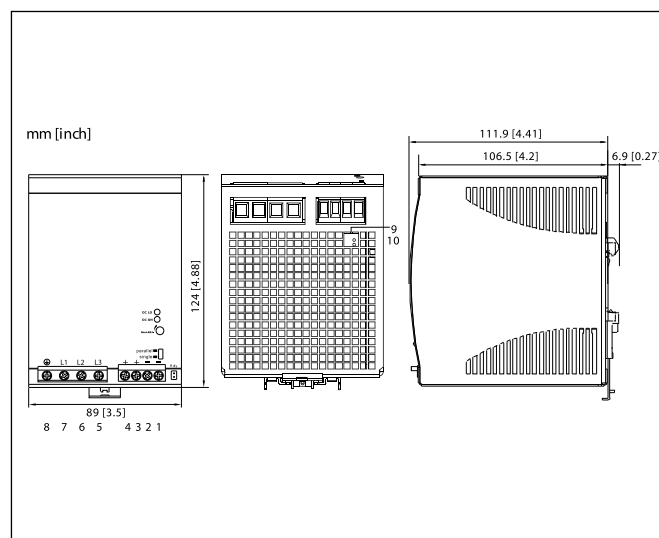
Model Selector					
Model	Voltage (V)	Adjust Range (V)	Output Current (A)	Overvoltage (V)	Efficiency (%)
DPP120-12-3	12V	11.4 - 14.5V	10A	14.5 - 17.4V	87%
DPP120-24-3	24V	22.5 - 28.5V	5A	30 - 33V	89%
DPP240-24-3	24V	22.5 - 28.5V	10A	30 - 33V	90%
DPP480-24-3	24V	22.5 - 28.5V	20A	30 - 33V	90%
DPP960-24-3	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%



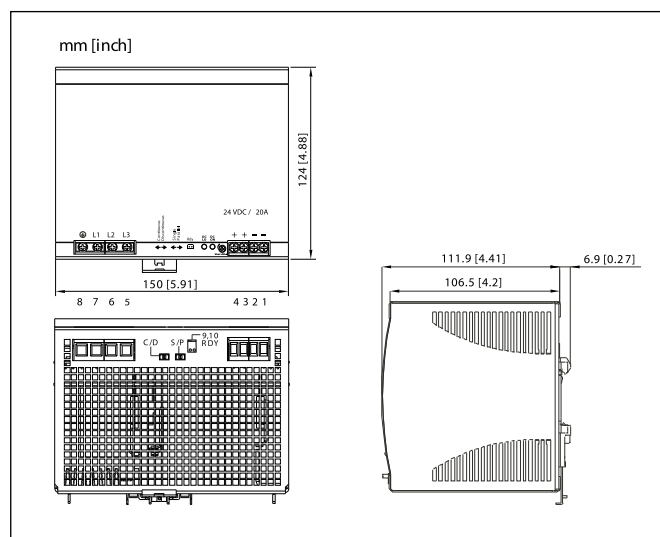
Outline Drawing DPP120



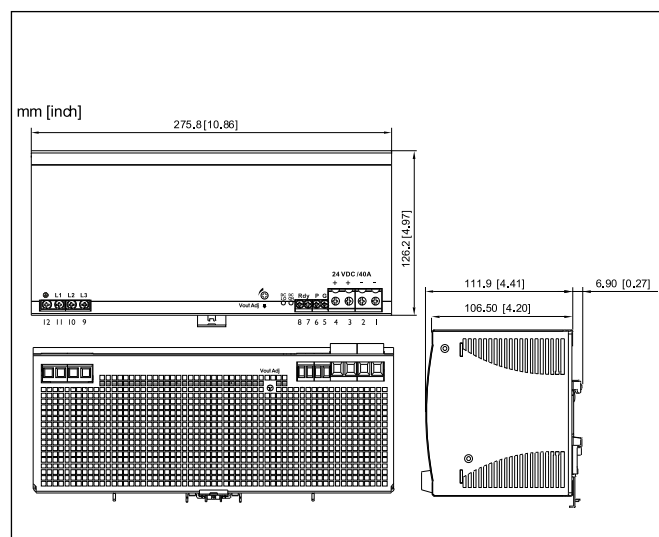
Outline Drawing DPP240



Outline Drawing DPP480



Outline Drawing DPP960



Snap-on Mounting: snap onto DIN Rail TS35/7.5 or TS35/15.
(no tools required)





- 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

- 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

MODELS		DPP120	DPP240
ITEMS			
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
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 condensing)	
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

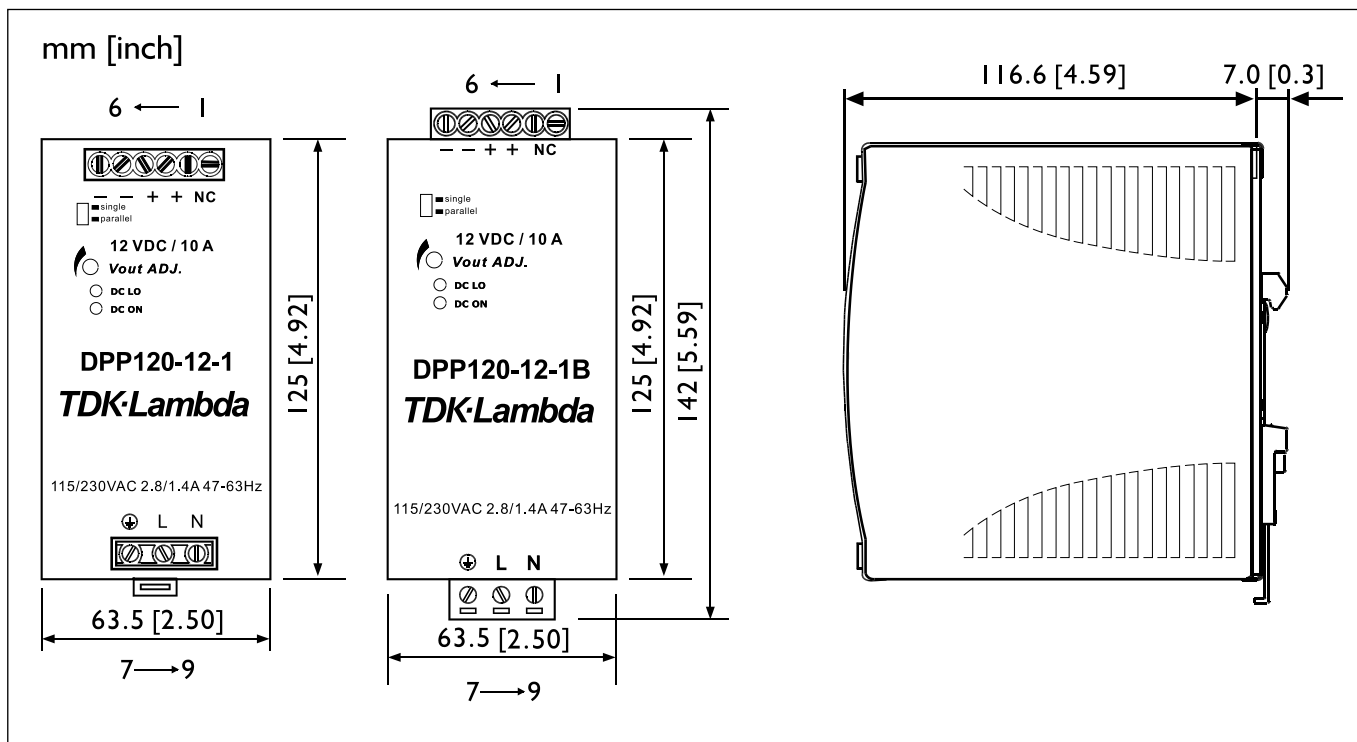
For plug type connectors add suffix 'B' to part number

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

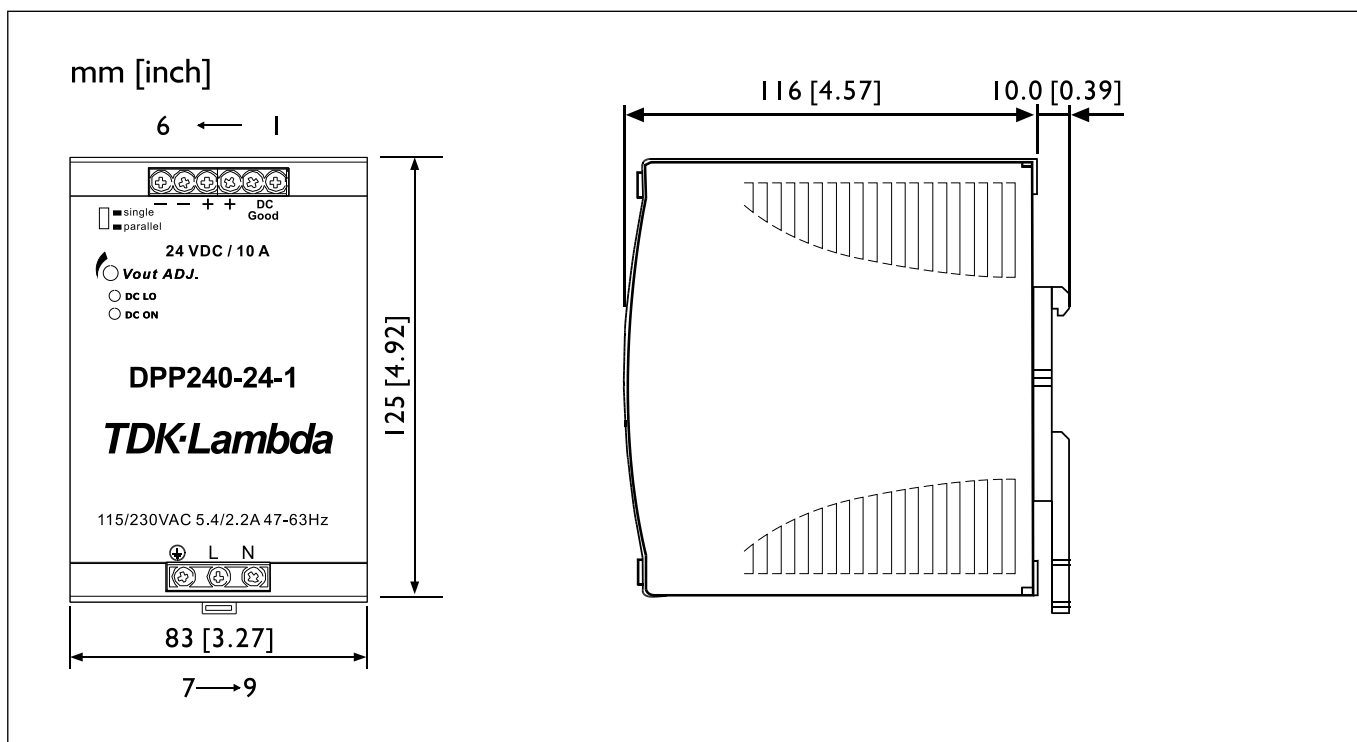
Options	
Suffix	Description
Blank	Non detachable connector
B	Detachable input & output connector



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

- 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

MODELS		DPP480-24-1	DPP480-48-1
ITEMS			
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

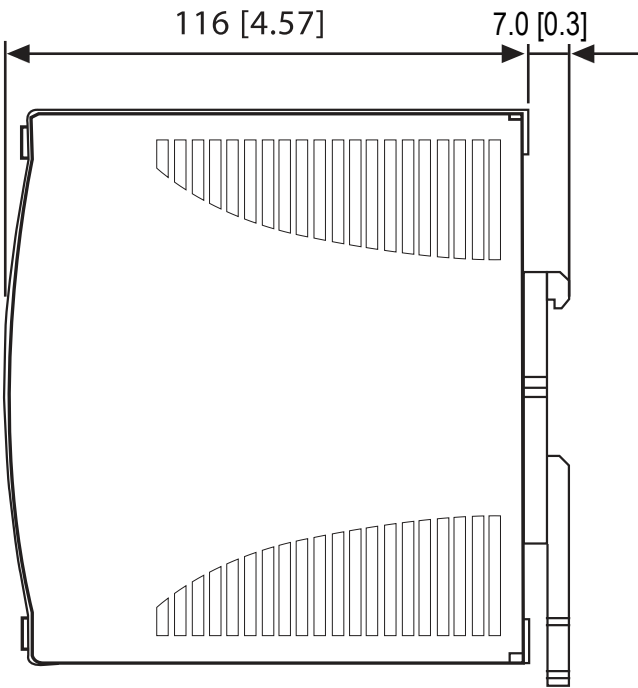
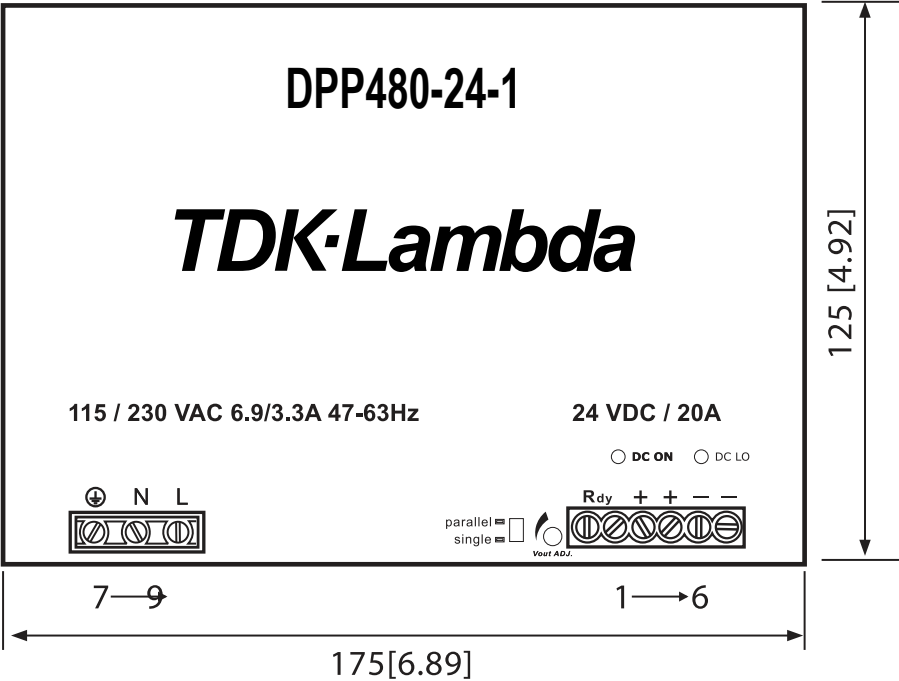
PIN Assignments

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)





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 to 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 / 24 / 48	24
Output current	A	0.63	2.5 / 1.25	6 / 3.4 / 2.1 / 1.05	4.2
Line regulation	mV	240	120 / 240	50 / 150 / 240 / 480	240
Load regulation	mV	240	120 / 240	50 / 150 / 240 / 480	240
Ripple & noise (max) (typ)	mV	20	40 / 30	30 / 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/s ² (30G) 11ms half sine			
Safety agency approvals (6)		UL60950-1, CSA22.2 No.60950-1 (2nd edition), EN60950-1, UL508			
Emissions		EN55022, CISPR22 class B			
Immunity		EN61000-4-2,-3,-4,-5,-6,-8,-11			
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 For UL508 operating temperature refers to surrounding air temperature
- 3 Low temperature start up: -40°C typical

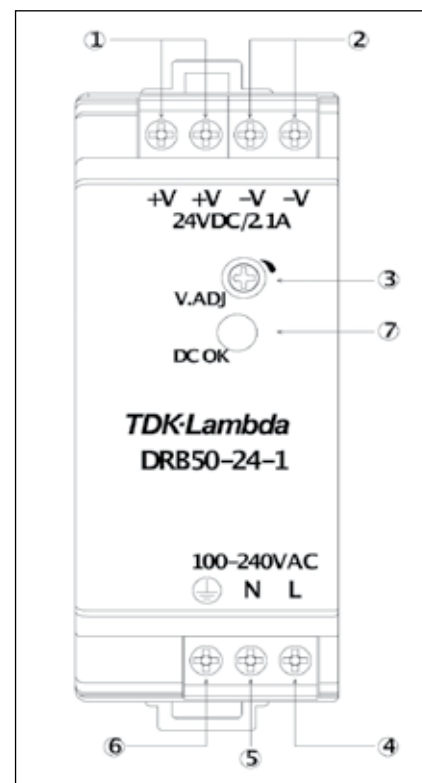
- 2 Refer to output derating curves
- 4 See installation instructions for mounting orientation
- 6 Consult Sales Office for use under DC Input conditions



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	50.4	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

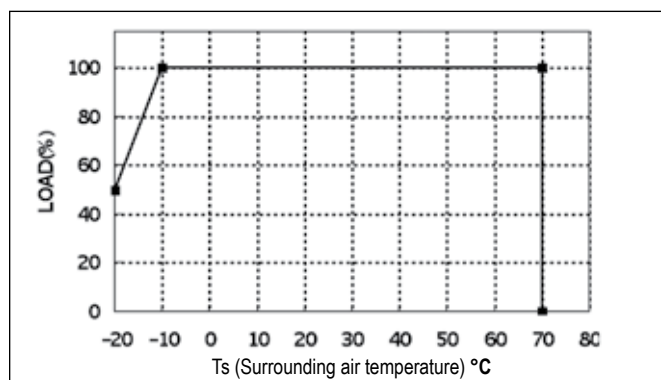
Terminal Explanation Example



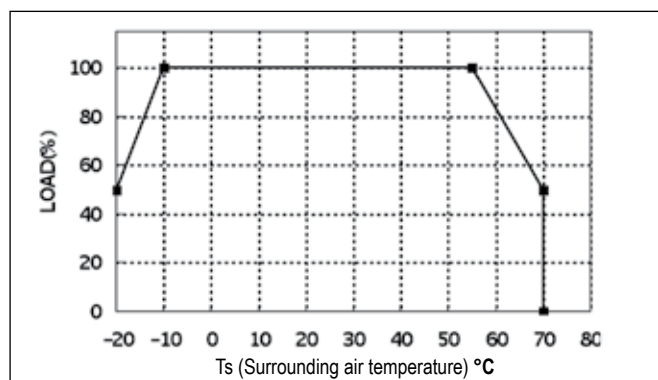
Connection

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

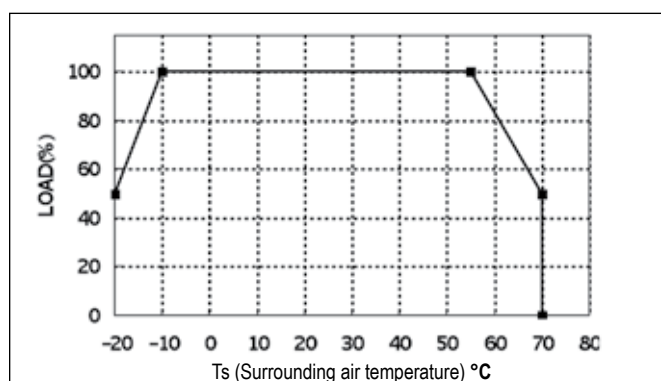
Output Derating DRB15 Series



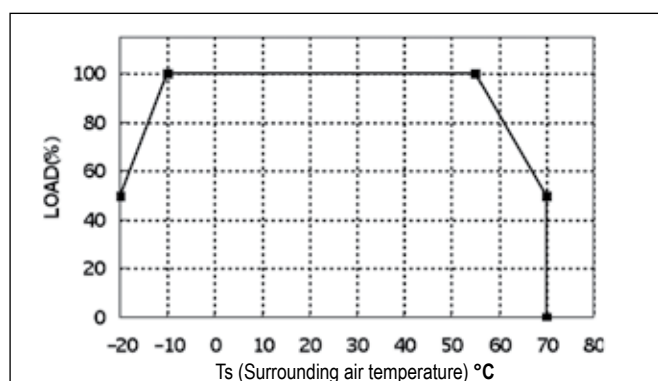
Output Derating DRB30 Series



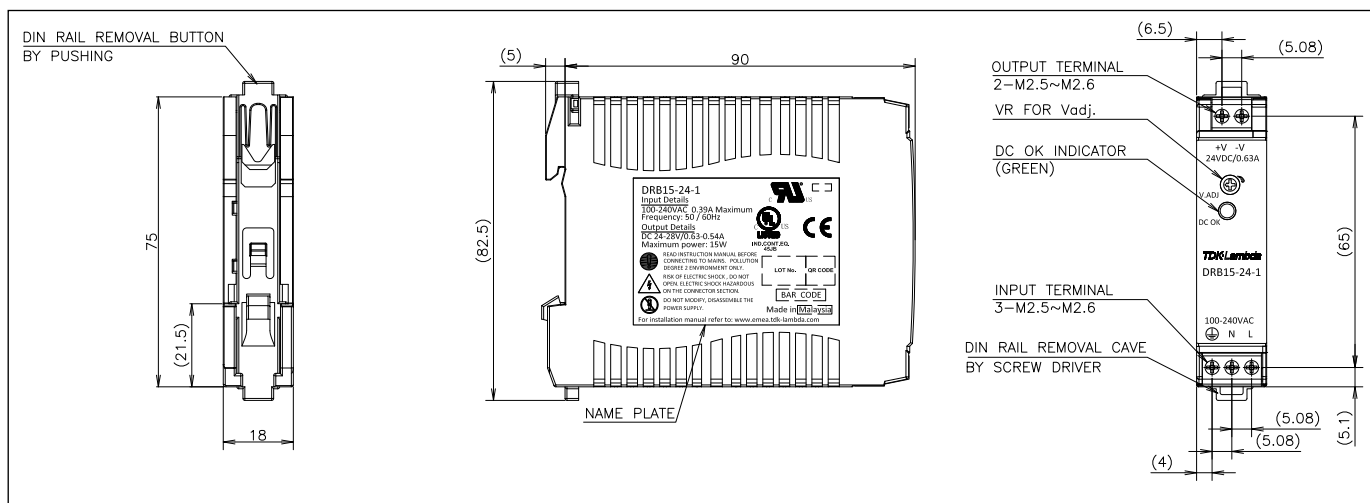
Output Derating DRB50 Series



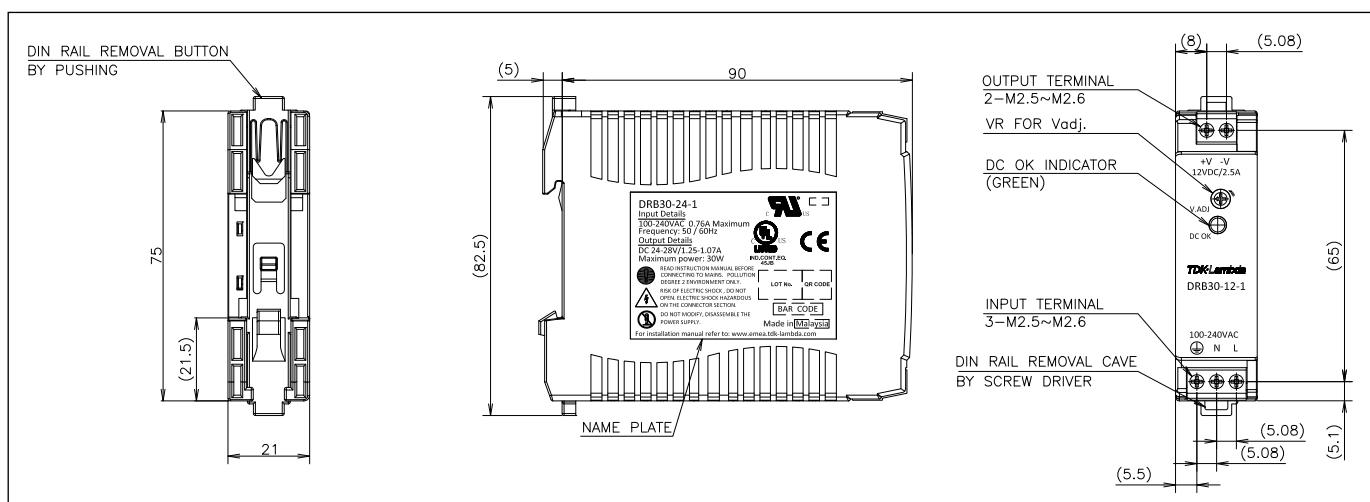
Output Derating DRB100 Series



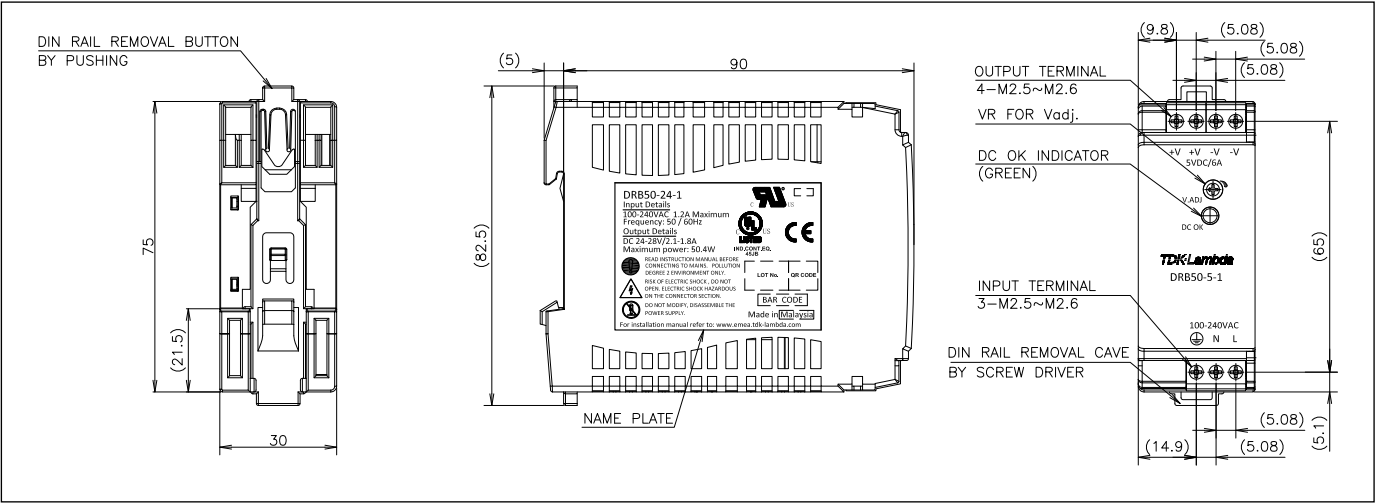
Outline Drawing DRB15 Series



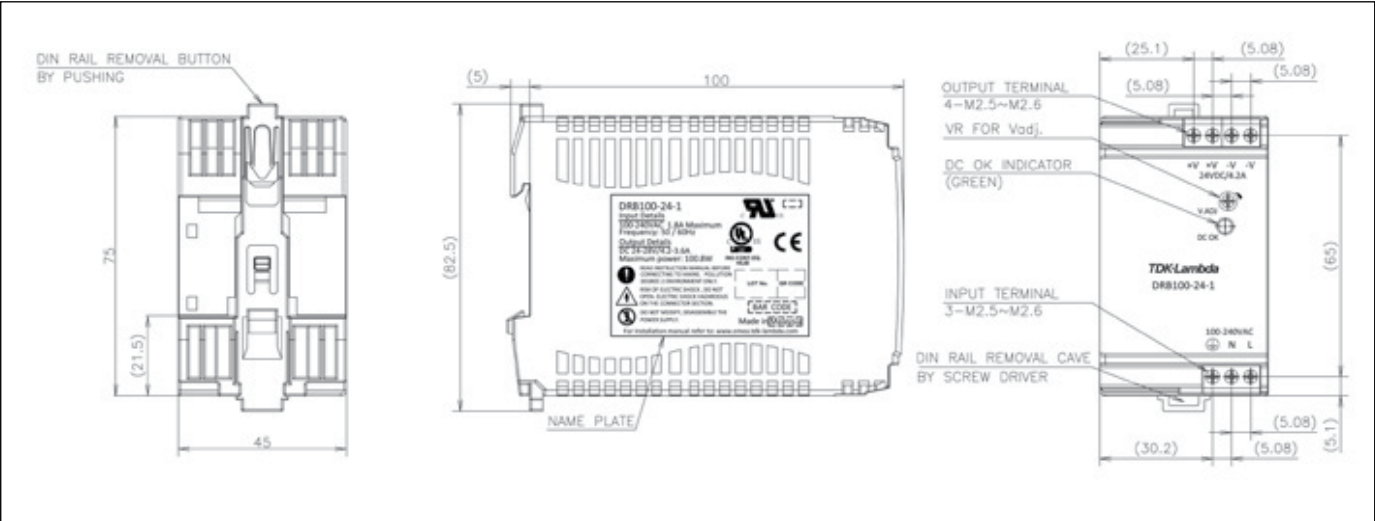
Outline Drawing DRB30 Series



Outline Drawing DRB50 Series



Outline Drawing DRB100 Series





Industrial



Test



Renewable



Broadcast

120W - 480W Single Output: 24V 180W - 720W Peak Power DIN Rail Mount Power Supplies



Features	Benefits
• 150% Peak Power, 4 sec	• Better Start-up of Capacitive & Inductive Loads
• Efficiency up to 94%	• 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
AC Input voltage range	VAC	85 - 264 (withstand 300VAC surge for 5s)		
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
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	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: >100MΩ (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	-	IEC/EN/UL60950-1, CE, UL508 listed, (ATEX / IECEx / Marine-GL approved models available)		
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 relevant FAE for DIN rail

Model Selector

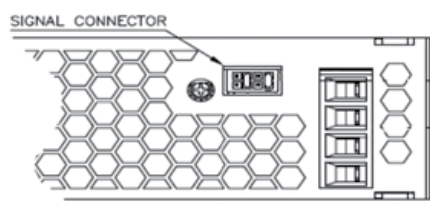
Model	Output Voltage	Output Adjust Range (V)	Max Output Current (A)	Max Output Power (W)	Efficiency at 115/230VAC (%)
DRF120-24-1	24	24 - 28	5	120	88 / 91
DRF240-24-1	24	24 - 28	10	240	93 / 94
DRF480-24-1	24	24 - 28	20	480	93 / 94

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	

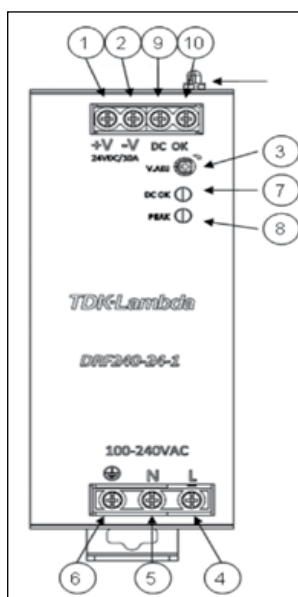
DRF120 example*

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

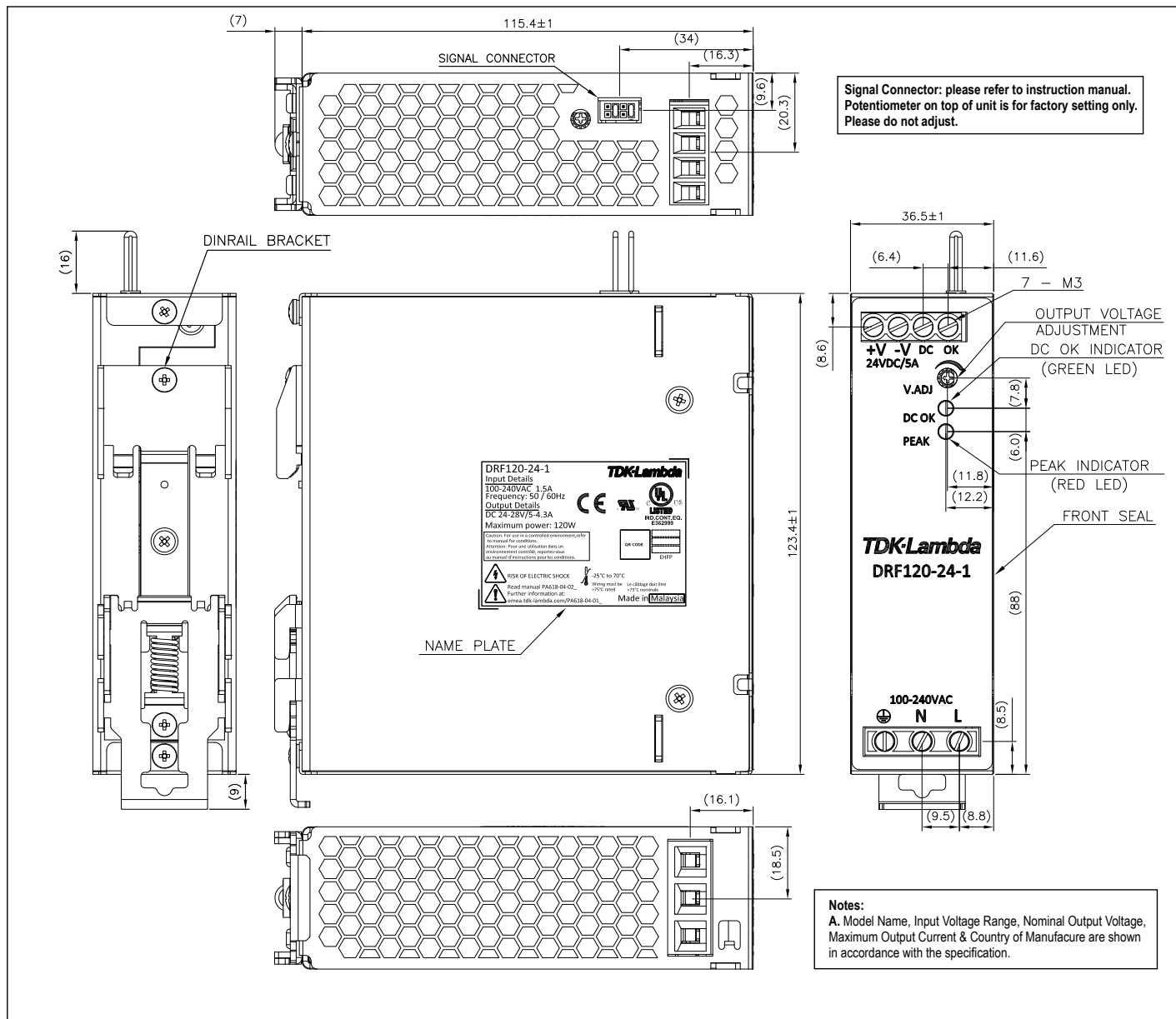
- 1 +V: +Output terminal
- 2 -V: -Output terminal
- 3 V.ADJ: Output voltage adjust trimmer
The output voltage rises when a trimmer is turned clockwise
- 4 L: AC Input terminal. Live line (fuse in line)
- 5 N: AC Input terminal. Neutral line
- 6 -V: Protective Earth
Connect to safety ground of apparatus 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

Optional Models available

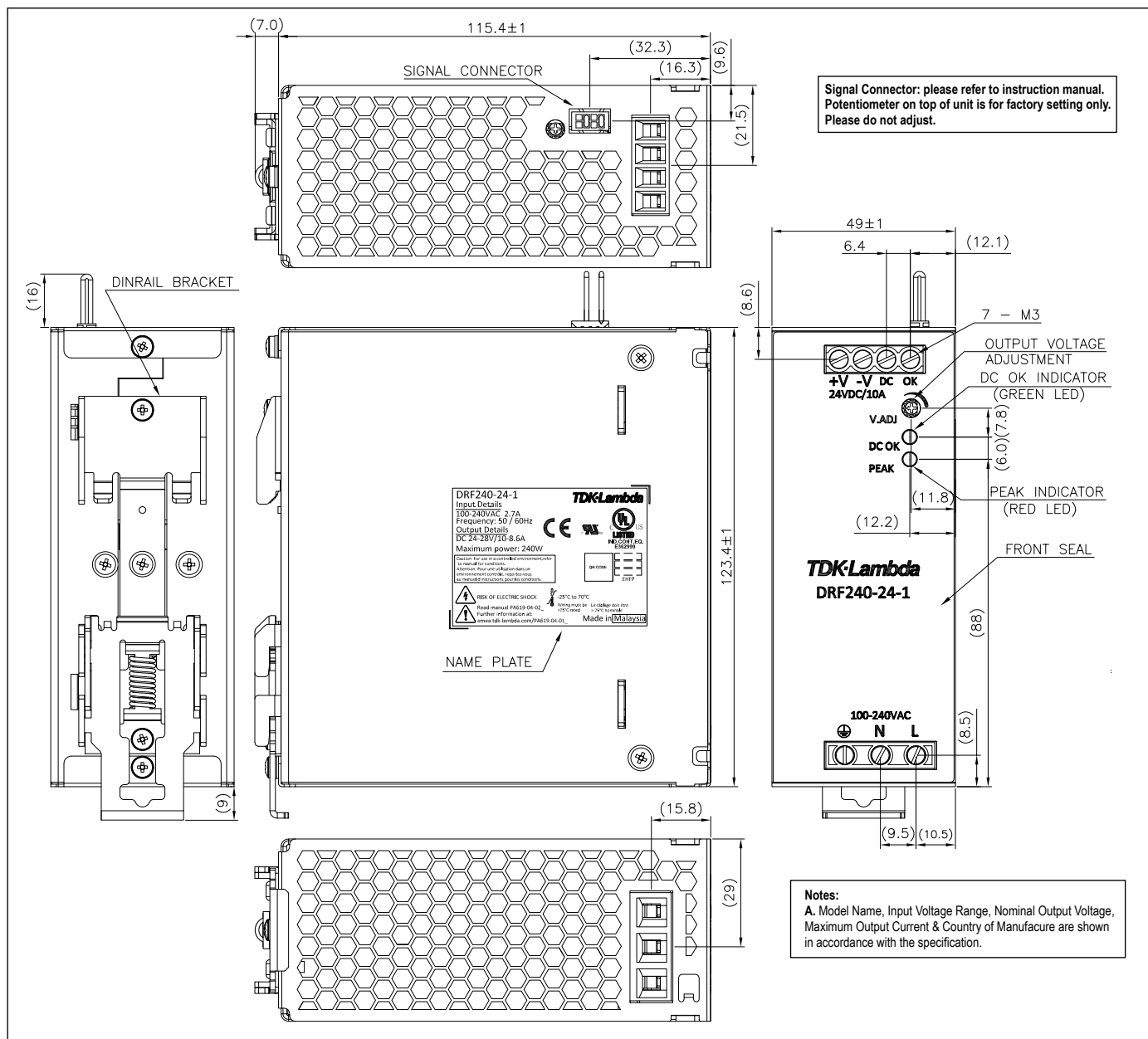
Suffix	Description
/HL	Conformally Coated (ATEX, IEC EX, GL)



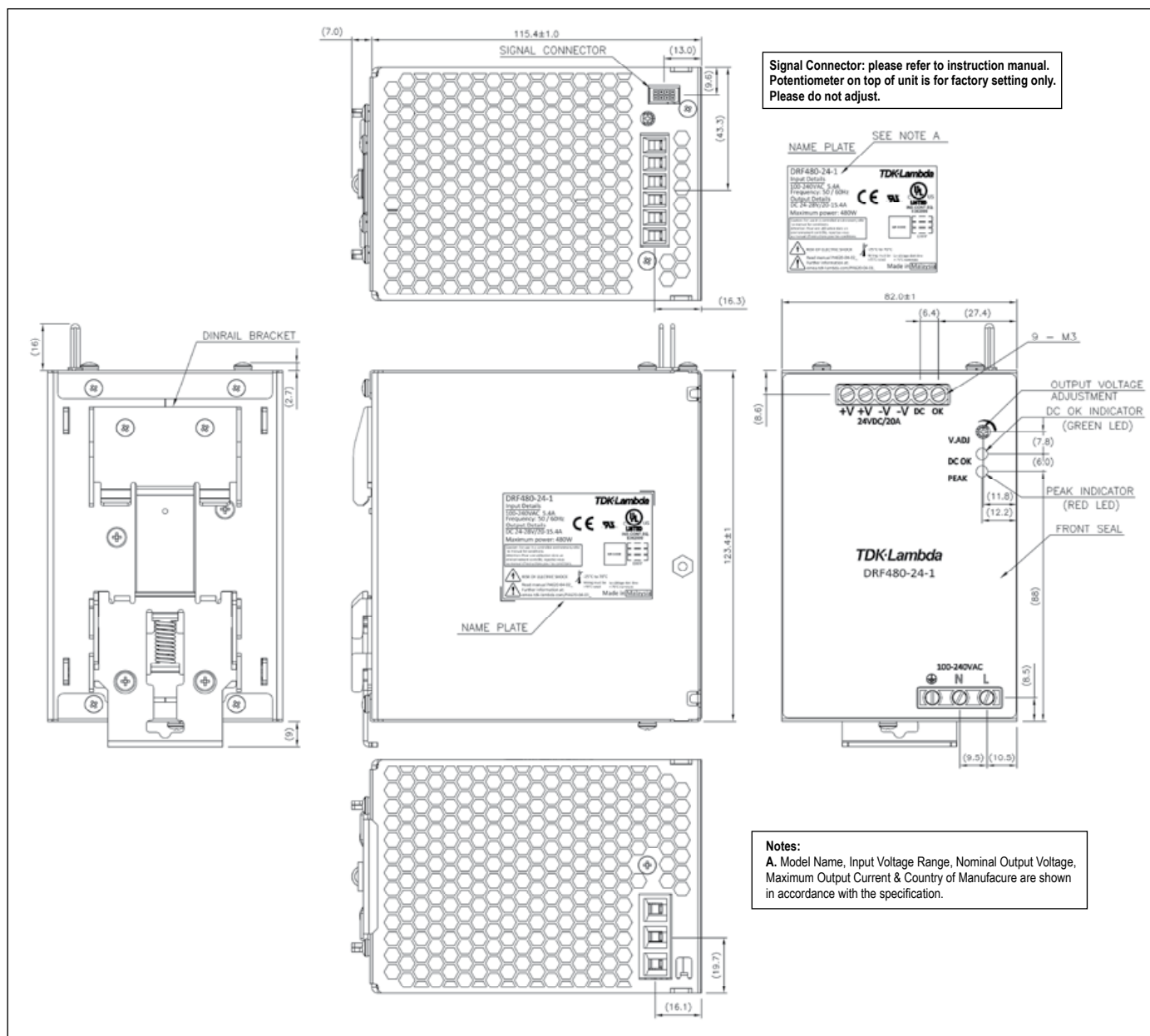
DRF120-24-1 Outline Drawing



DRF240-24-1 Outline Drawing



DRF480-24-1 Outline Drawing





DSP Series

7.5W to 100W Low Profile
Din Rail Mount Power Supplies

- 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

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

- Low 56mm Profile
- Wide Range AC
- Convection cooled

Benefits

- Fits into wall mounted cabinets
- Global use with no input selector switches
- No system fan required

Specifications

MODEL		DSP10	DSP30	DSP60	DSP100
ITEMS					
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 (Operating)		IEC60068-2-6 (Mounting by rail: Random wave, 100-500Hz, 2G, ea. along X, Y, Z axes 10min/cycle, 60 min)			
Shock (Operating)		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

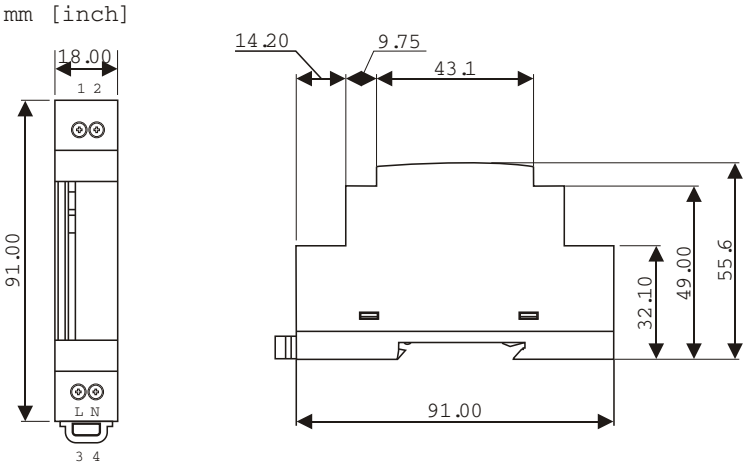
Note 3: Consult Sales Office for use under DC Input conditions



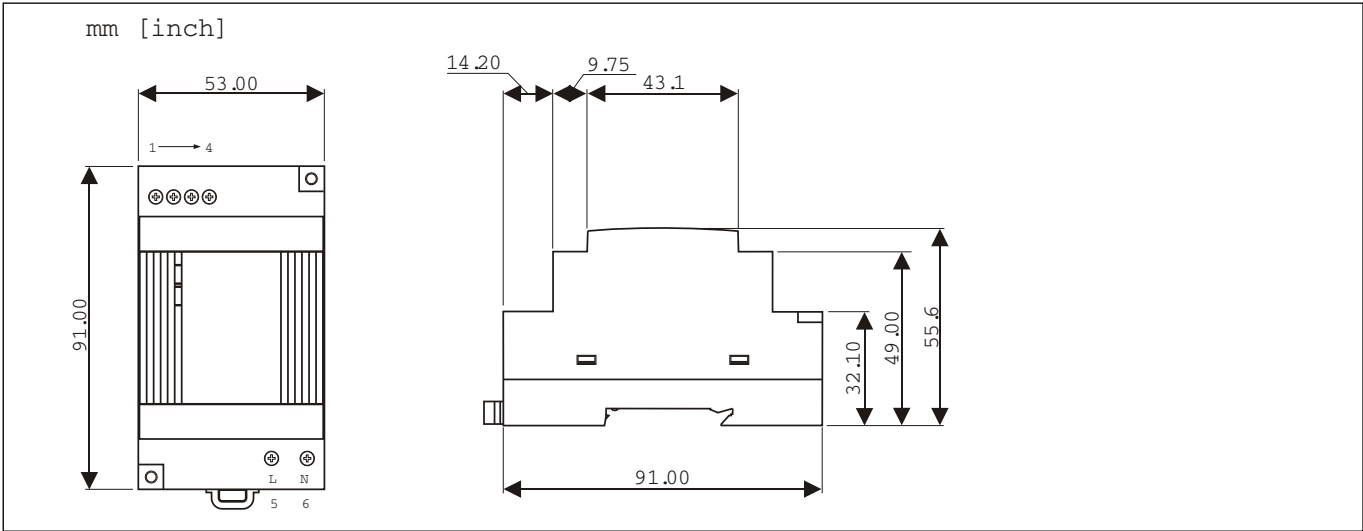
Model Selector

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

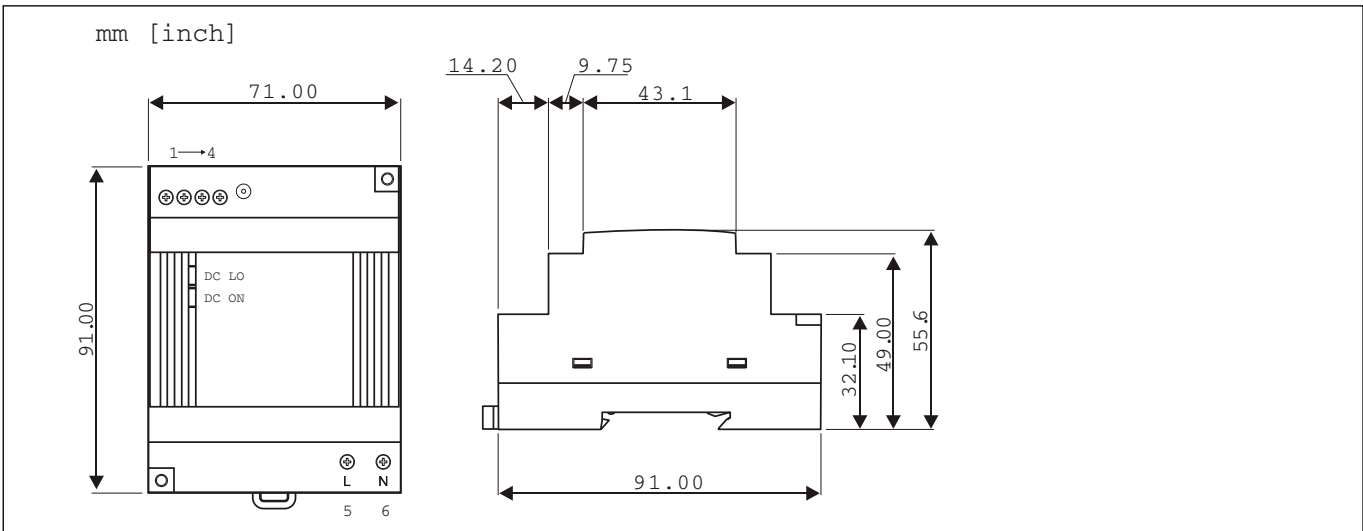
Outline Drawing DSP10 Series



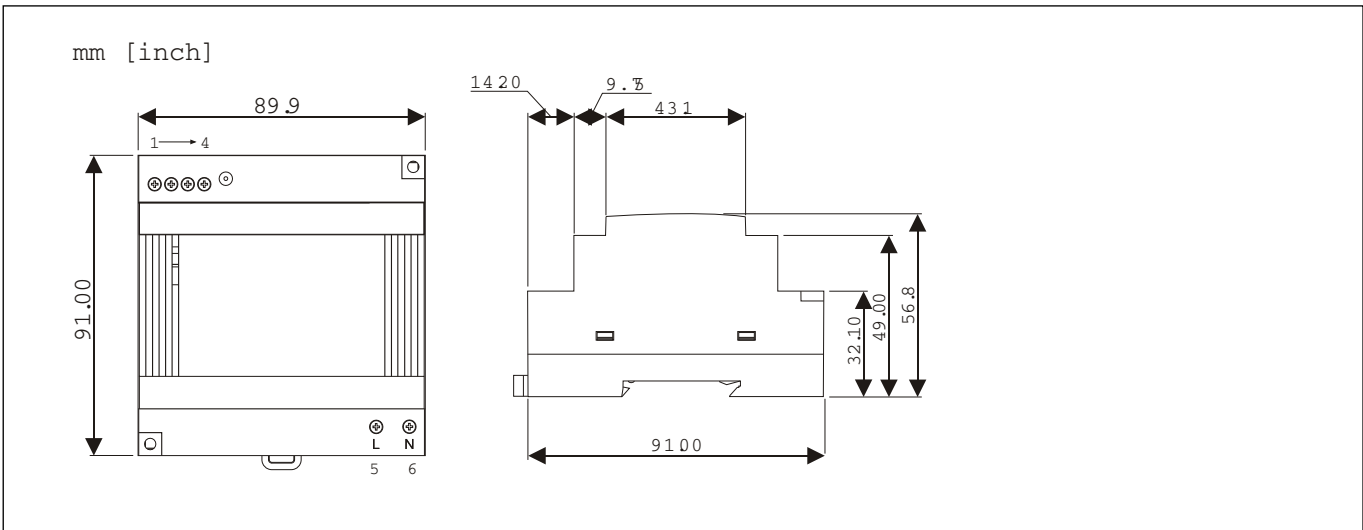
Outline Drawing DSP30 Series



Outline Drawing DSP60 Series



Outline Drawing DSP100 Series





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	20	40
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)		
Operating altitude	m	3,000		
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: >100MΩ (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 relevant 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

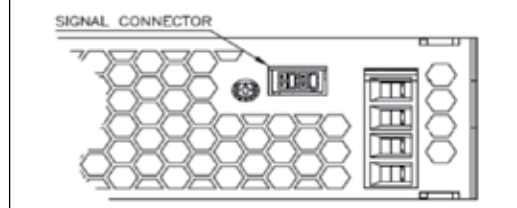
Model	Output Voltage	Output Adjust Range (V)	Max Output Current (A)	Peak Current	Max Output Power (W)	Peak Power	Efficiency at 115/230VAC (%)
DRF120-24-1/HL	24	24 - 28	5	7.5	120	180	89 / 91
DRF240-24-1/HL	24	24 - 28	10	15	240	360	92 / 94
DRF480-24-1/HL	24	24 - 28	20	30	480	720	93 / 94

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	

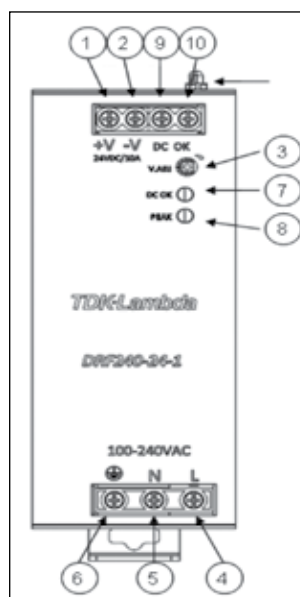
DRF120/HL example*

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

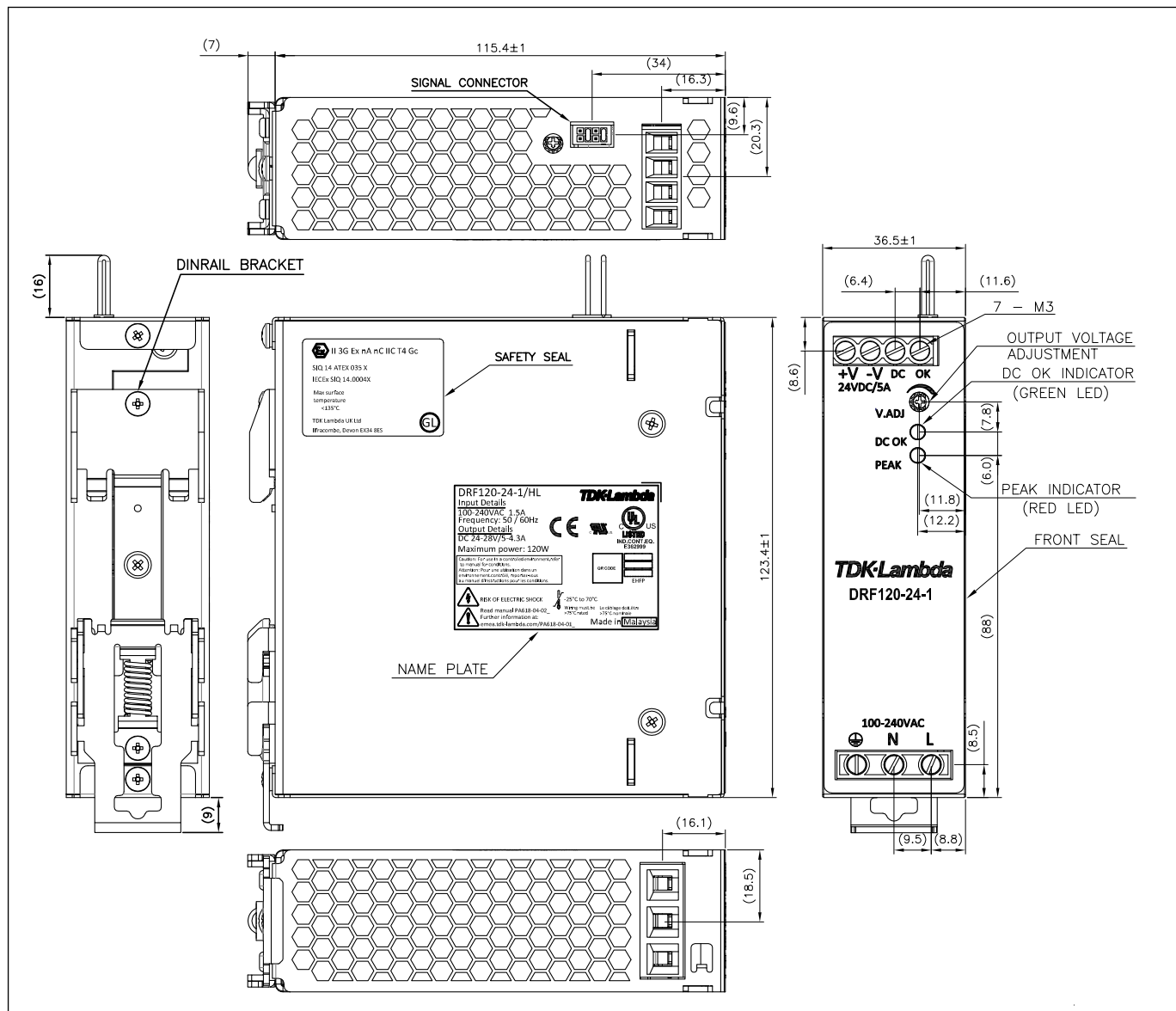


Connection

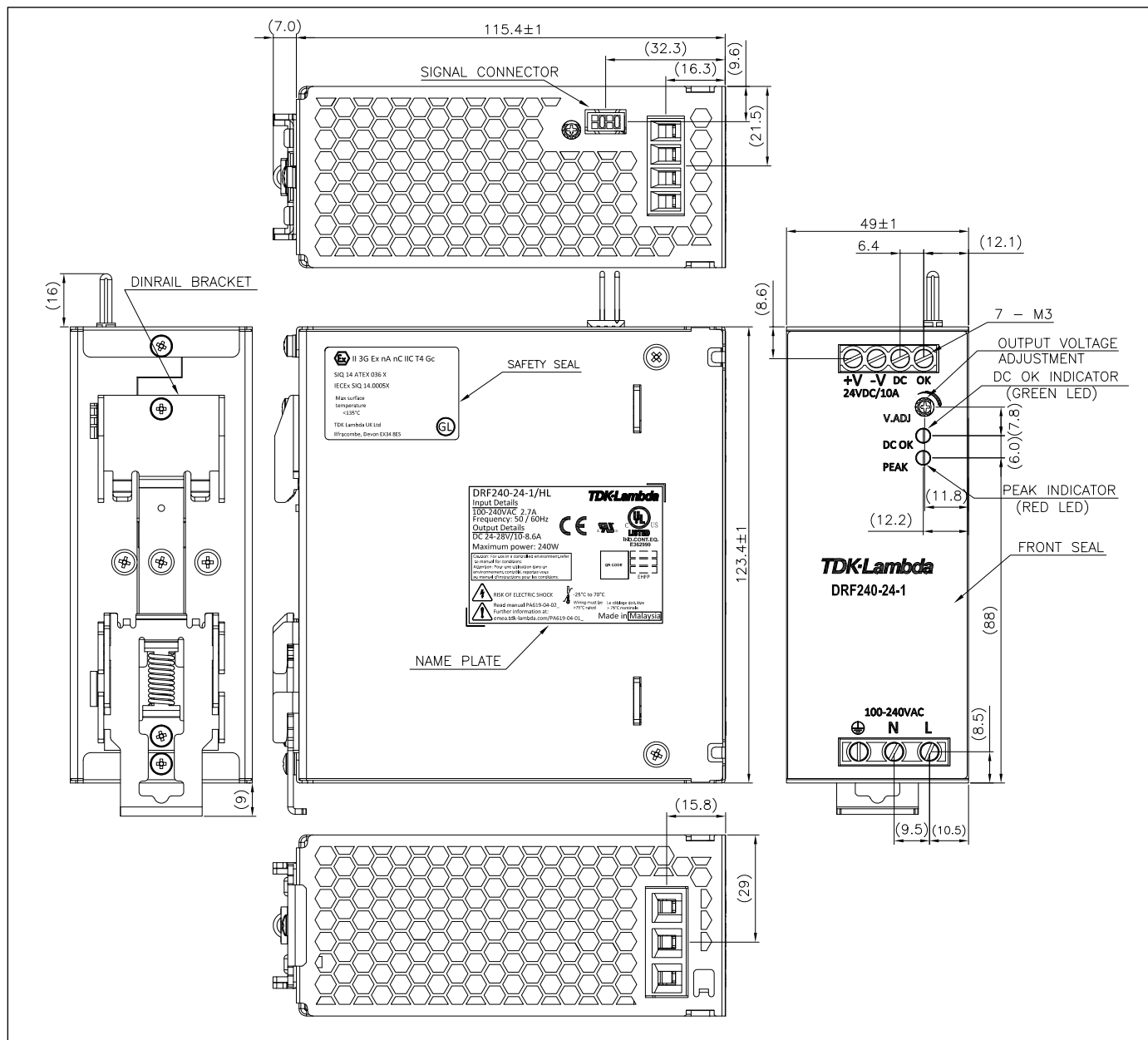
- 1 +V: +Output terminal
- 2 -V: -Output terminal
- 3 V.ADJ: Output voltage adjust trimmer
The output voltage rises when a trimmer is turned clockwise
- 4 L: AC Input terminal. Live line (fuse in line)
- 5 N: AC Input terminal. Neutral line
- 6 -V: Protective Earth
Connect to safety ground of apparatus 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



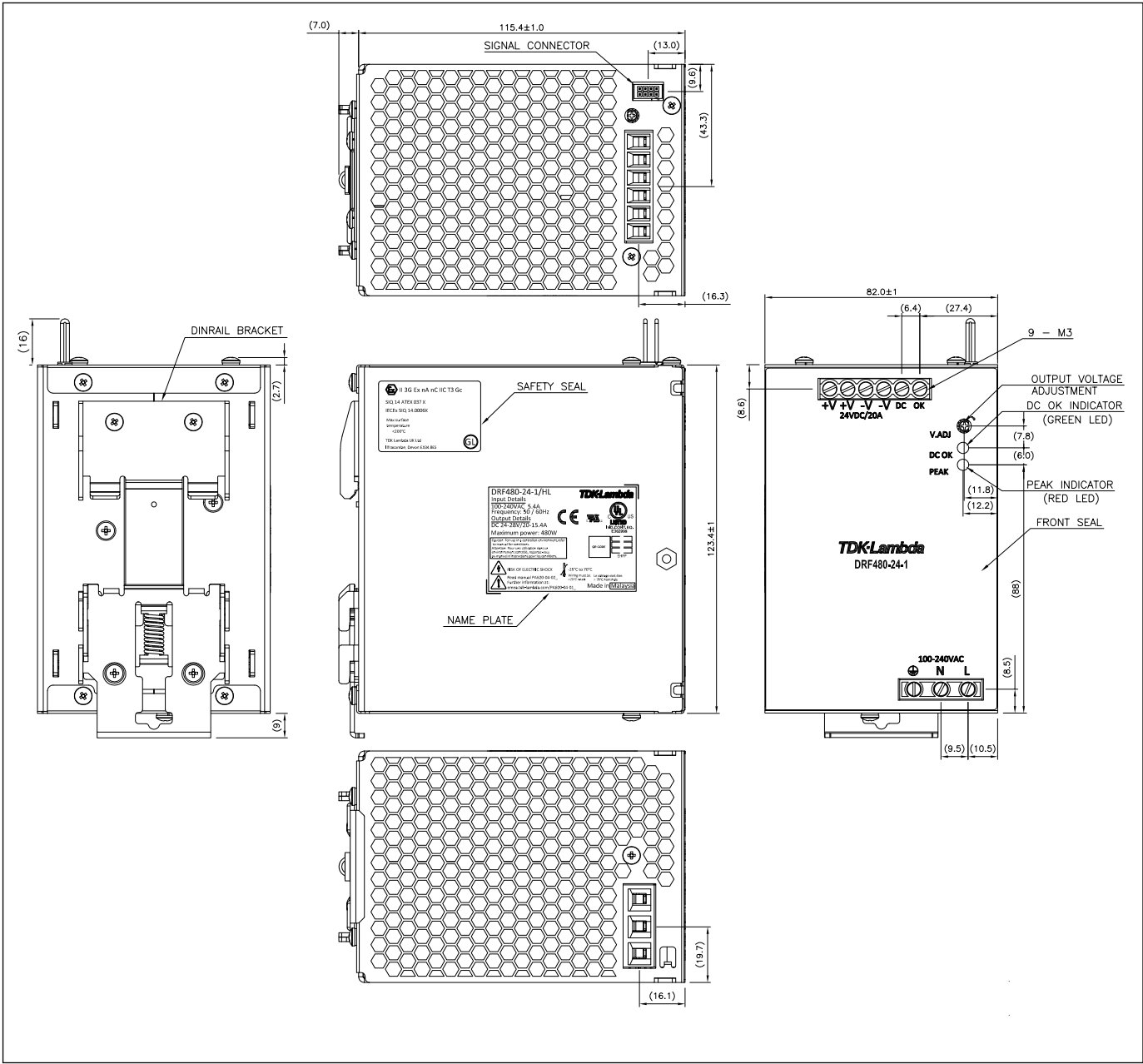
DRF120-24-1/HL Outline Drawing



DRF240-24-1/HL Outline Drawing



DRF480-24-1/HL Outline Drawing





FPS1000 Series	240
HFE1600 Series	243
HFE2500 Series	248
TH Series	251
TX Series	254



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

- 1U High
- Hotswap capable
- High Efficiency
- Full Array of Signals

Benefits

- Lower Cost of Ownership
- Suitable for N+1 Redundancy
- Less Heat Dissipated in System
- Easier System Monitoring

Specifications

MODELS		12V Nominal	24V Nominal	32V Nominal	48V Nominal
ITEMS					
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			
I ² C 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 - 63Hz ² (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	I ² C 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	I ² C 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)			

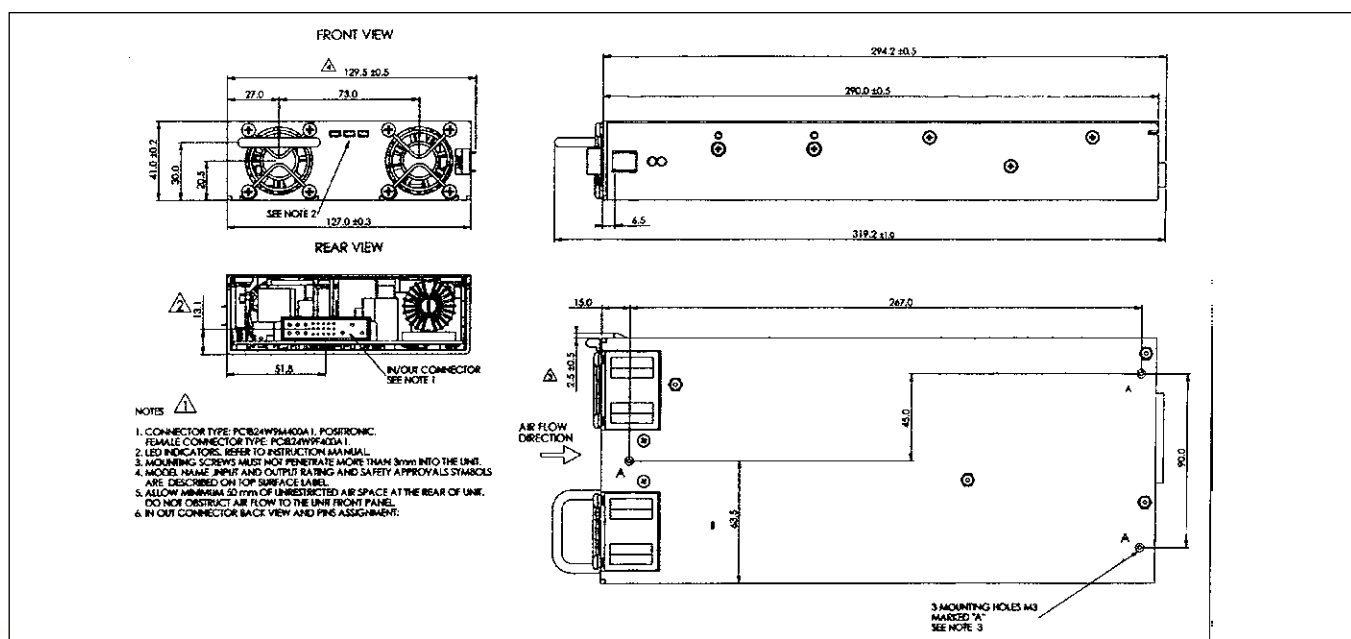
Options

Suffix	Description
/POE*	1500VAC Output to Ground Isolation (output noise 400mV)
*FPS100048 only	

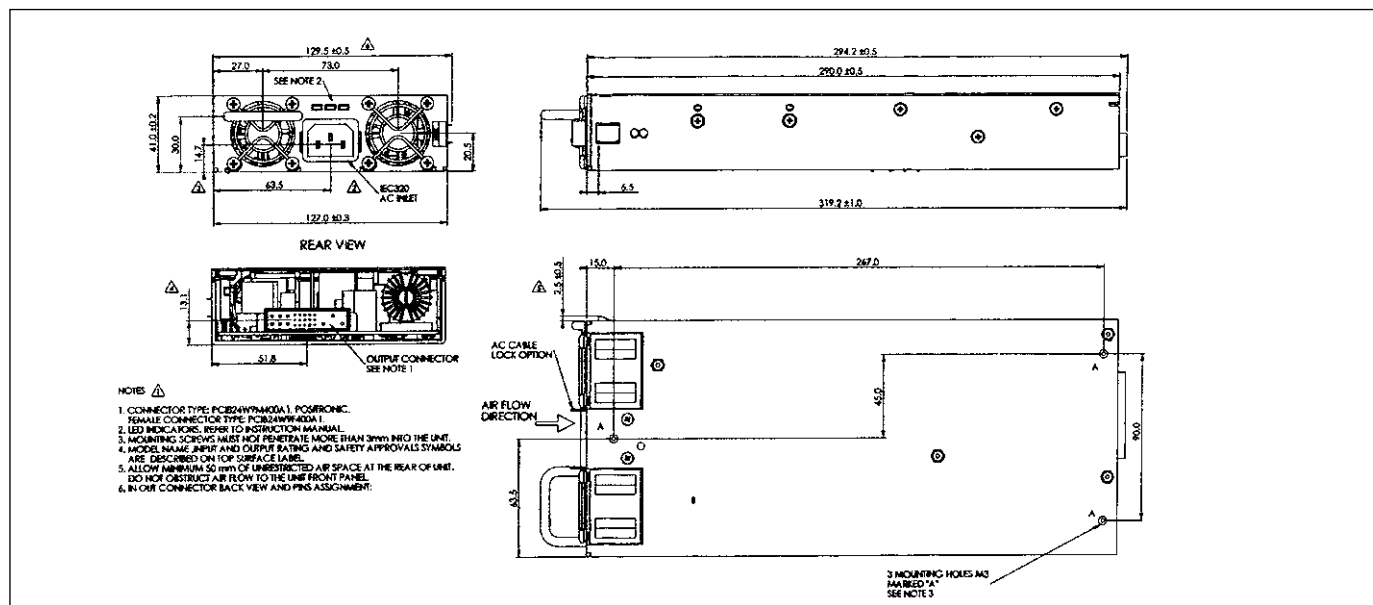
Full System (3 Modules & FPS s1U rack)

FPS3000 -	XX	/ X	
	12	BLANK	= Standard
	24	S	= I ² C
	32	P	= FRONT AC INPUT
	48		

Outline Drawing FPS1000 Series

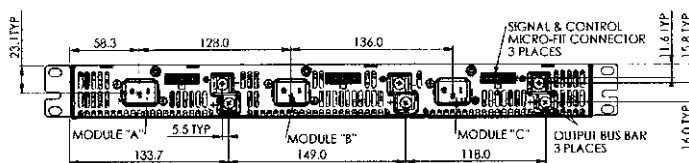


Outline Drawing FPS1000/P Series

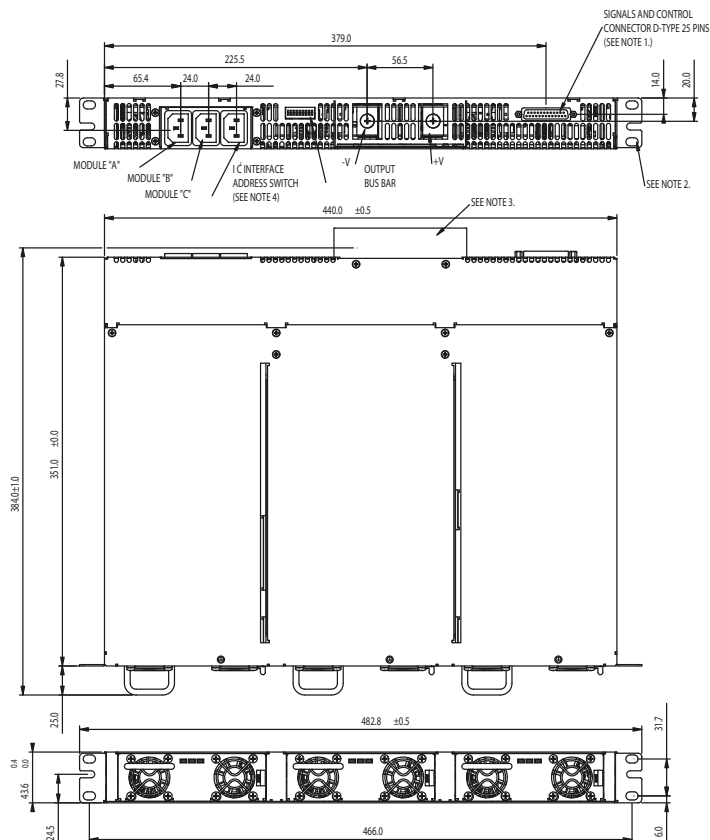


Outline Drawing FPS Racks

FPST1U Rear View



FPSS1U





HFE1600 Series

1600W 1U Hot Swap Front End
Power Supplies

- 25.2W/in³ 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 option



Key Market Segments & Applications

Power for Distributed Power Architecture
Industrial Automation

HFE1600 Features and Benefits

Features

- 1U high
- Internal ORing MOSFET & Current Share
- Status monitoring signals

Benefits

- Utilizes less system space
- Suitable for N+1 redundancy
- Easier system monitoring including PMBus

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%. Programmable by external voltage (0-5V)
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

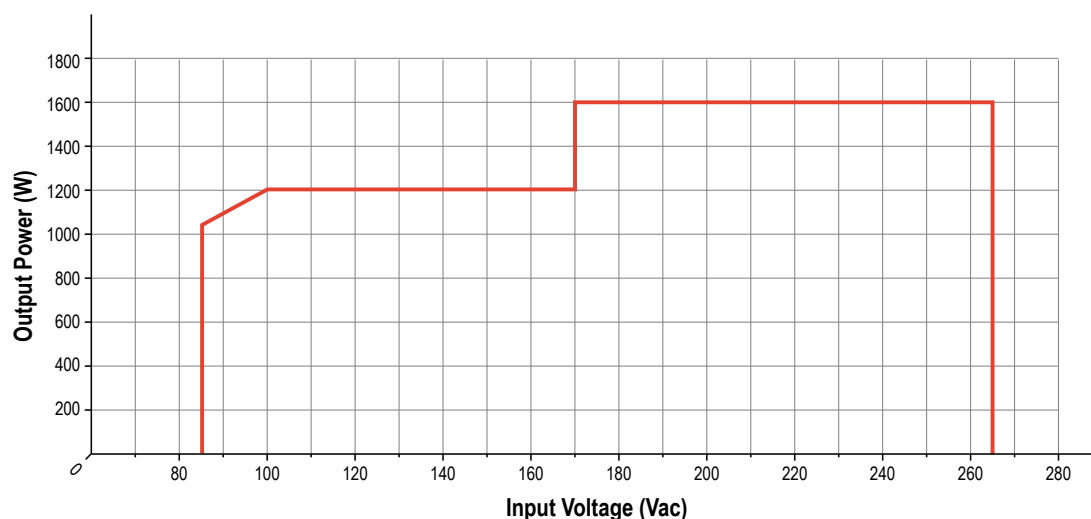
Model	Output Voltage	Adjust Range (1)	Max Current (Vin>170VAC)(2)	Max Power (Vin>170VAC)(2)	Max Current (100<Vin<170VAC)(2)	Max Power (100<Vin<170VAC)(2)
HFE1600-12	12V	9.6 - 13.2V	133A	1596W	100A	1200W
HFE1600-12/S	12V	9.6 - 13.2V	133A	1596W	100A	1200W
HFE1600-24	24V	19.2 - 29V	67A	1608W	50A	1200W
HFE1600-24/S	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⁾	I ² C
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 Model Selector

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

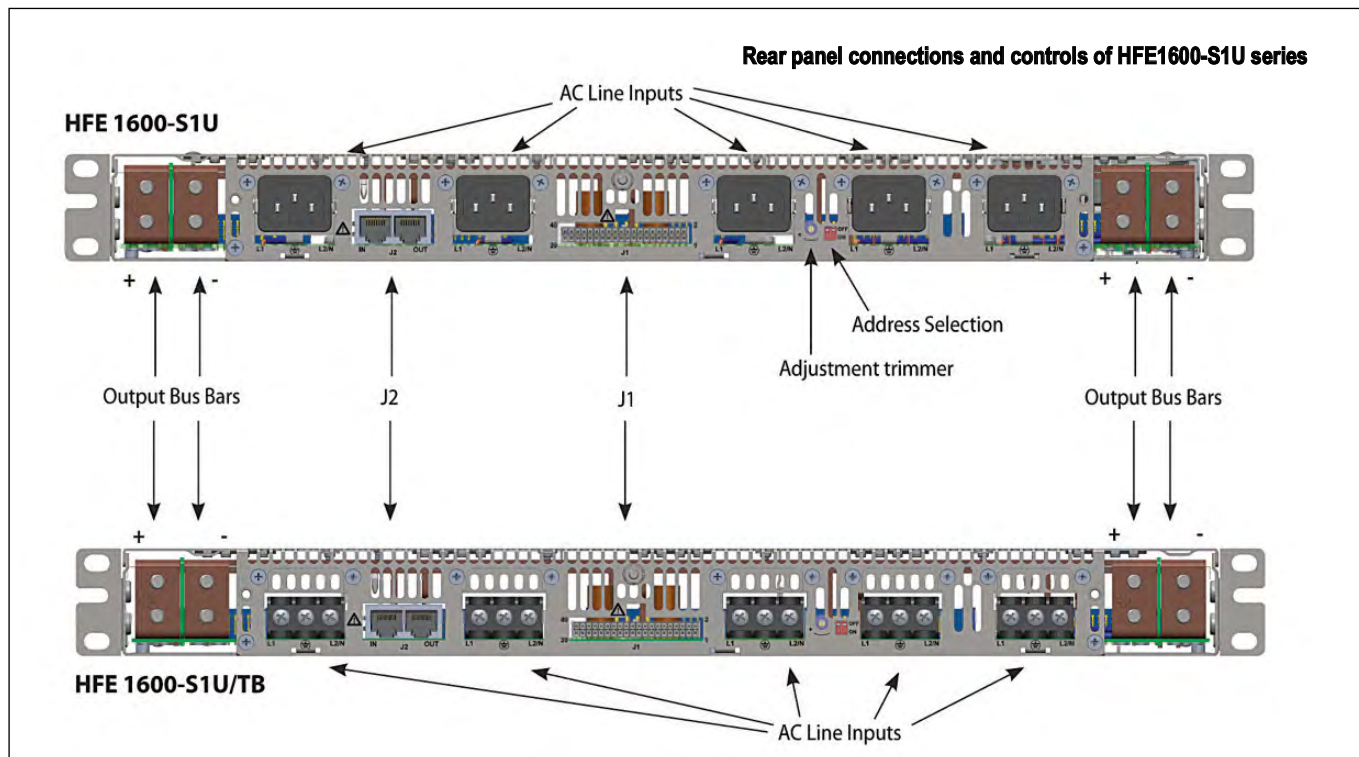


HFE 1600 Power Derating v's Input Voltage

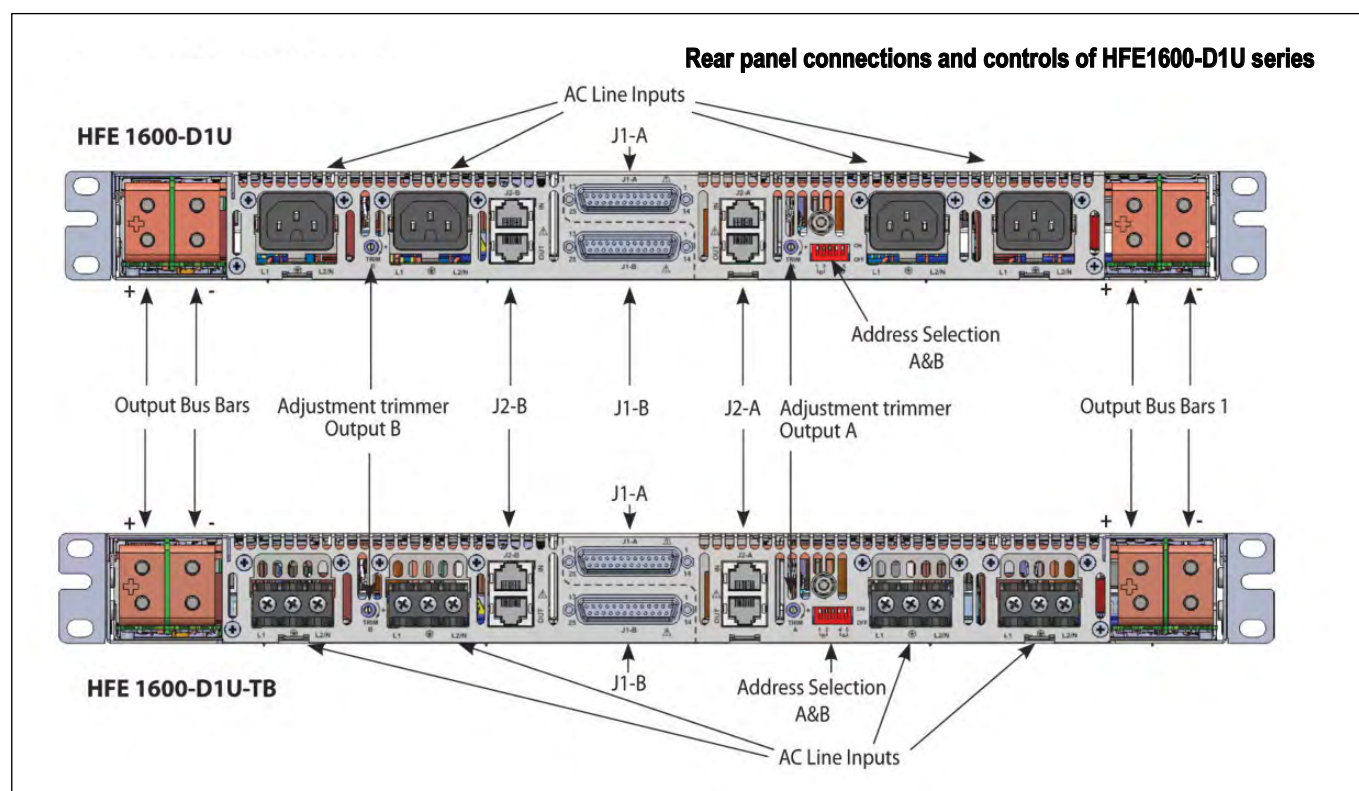


Available Rack Types

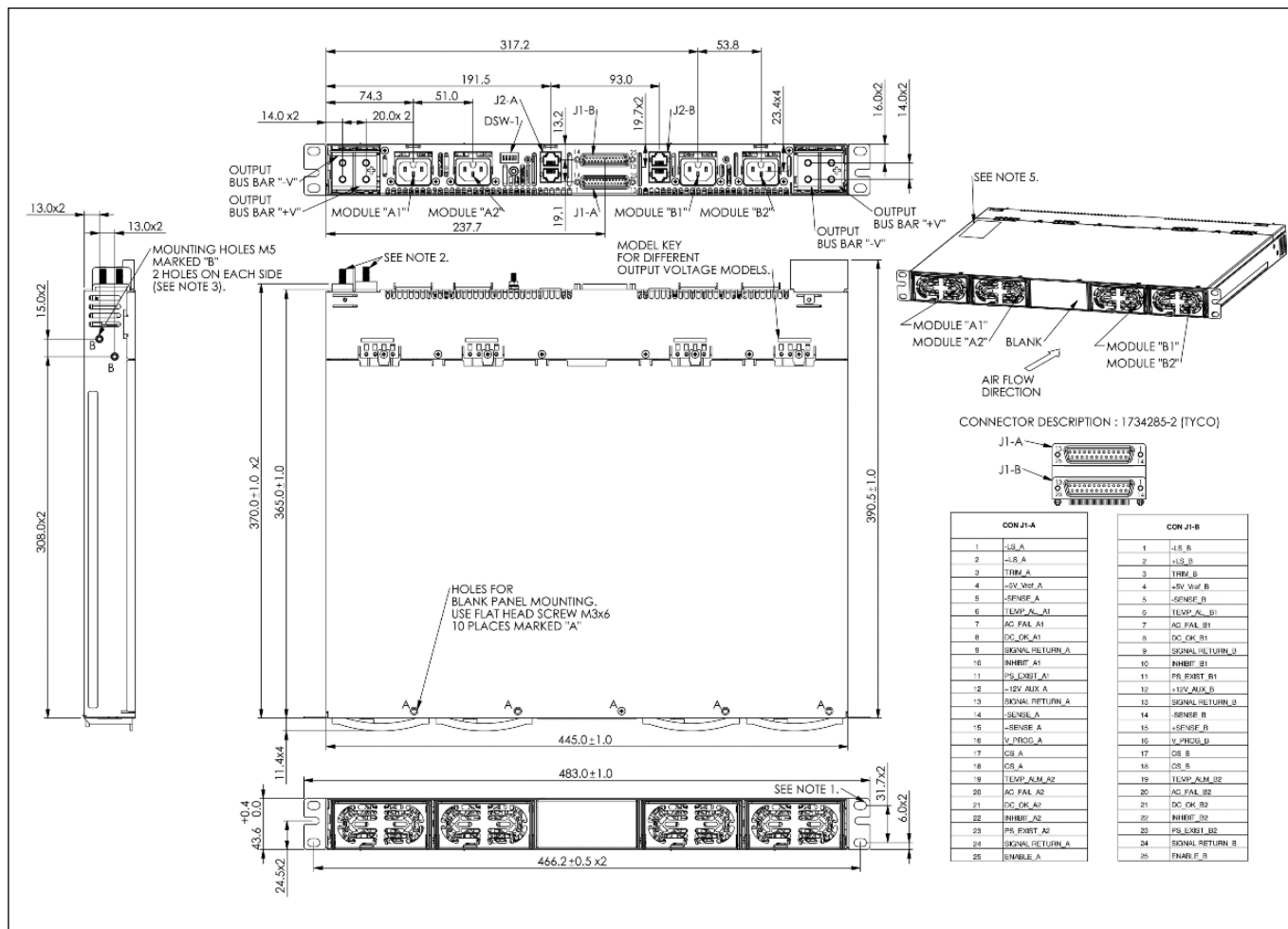
HFE1600-S1U - Five slot 19' rack single common output



HFE1600-D1U - Four slot (two isolated pairs), dual output 19' rack



Outline Drawing HFE1600 D1U Series

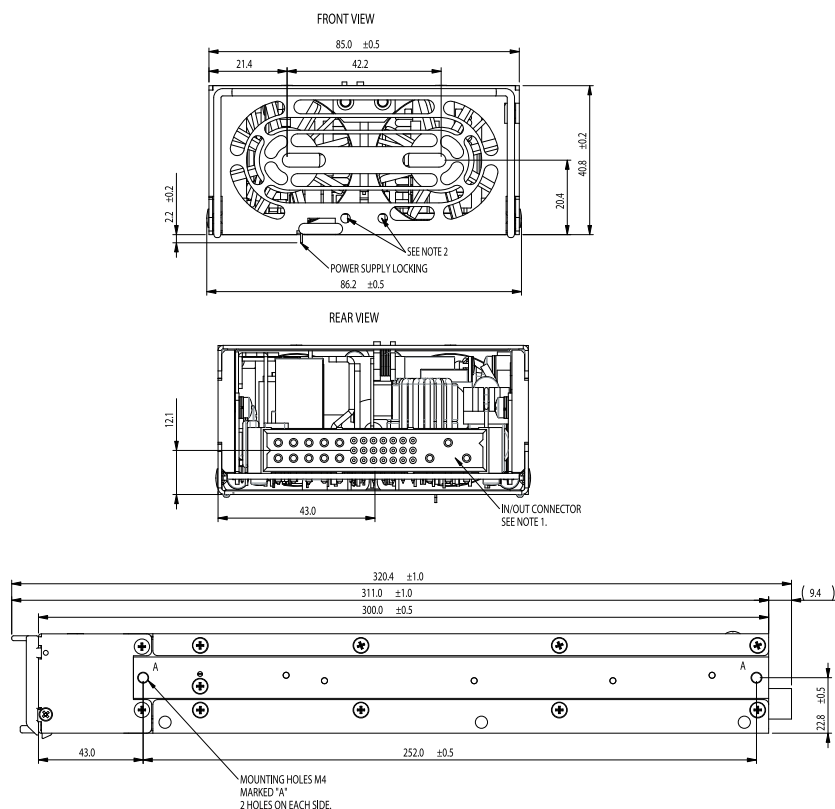


Notes:

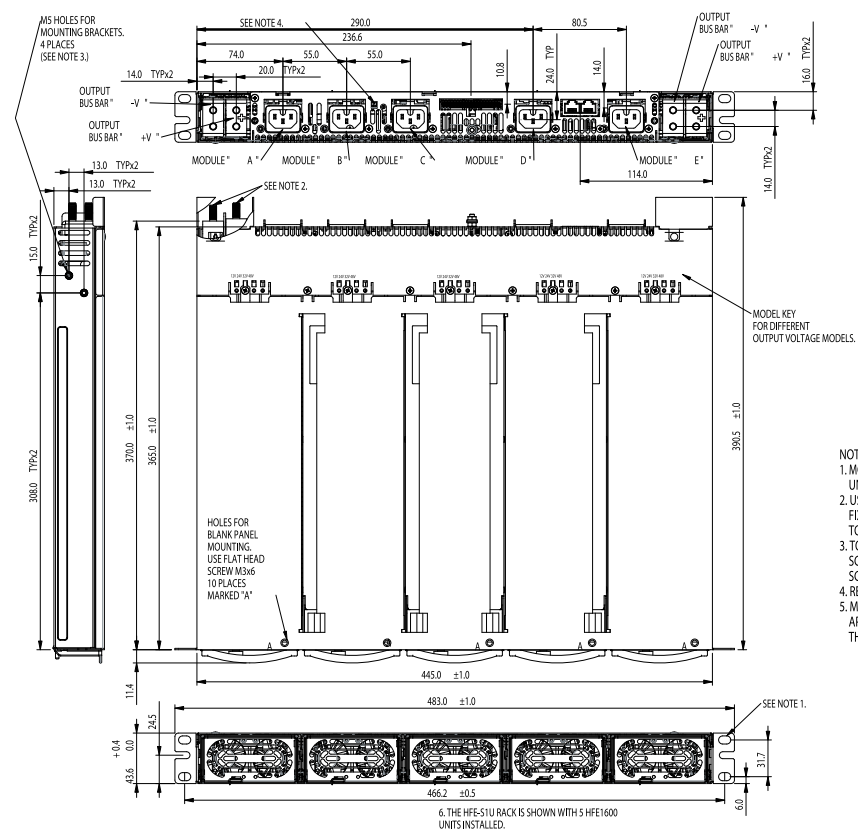
1. Mounting holes for rack 19" Use M6 x 12 screws to fix the unit to a rack.
2. Use nut, flat washer and spring washer for load wires. Fixing - Use lug for stud M6 for load wires. Recommended torque: 42-56 Kgf.cm.
3. To fix the mounting bracket to the chassis use M5 x 10 SEMS screws. Recommended tightening 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.



Outline Drawing HFE1600 Series



Outline Drawing HFE1600S1U Series





HFE2500 Series

2500W 1U Hot Swap Front End
Power Supplies

- 29.2W/in³ power density
- 1U rackmount containing up to 4 units
- Internal ORing MOSFET & Current Share
- Up to 10,000W in 1U rack
- PMBus option



Key Market Segments & Applications

Power for Distributed Power Architecture Industrial Automation



Industrial



Test



Broadcast



Comm

HFE2500 Features and Benefits

Features

- 1U high
- Internal ORing MOSFET & Current Share
- Full array of signals available

Benefits

- Utilizes less system space
- Suitable for N+1 redundancy
- Easier system monitoring including PMBus

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 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 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
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 (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

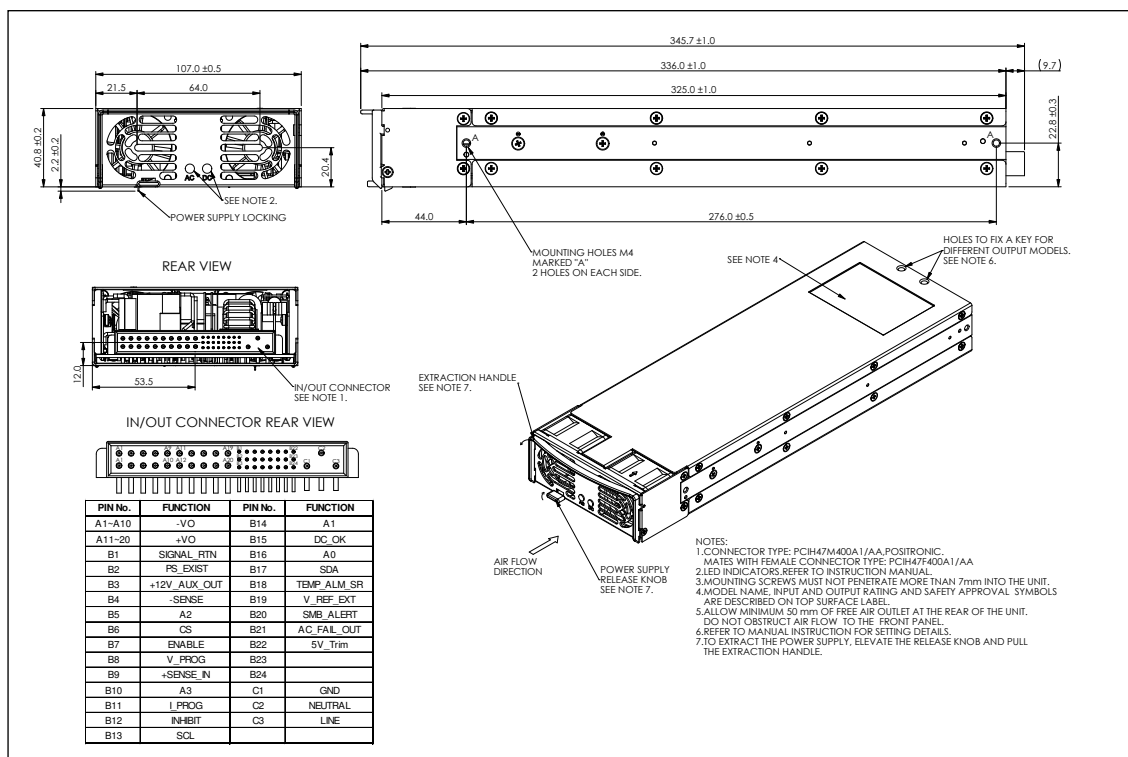
Model	Load Reg	Line Reg	Ripple & Noise	Efficiency (%) (3)	I ² C
HFE2500-12	60mV	30mV	240mV	90 / 92%	-
HFE2500-12/S	60mV	30mV	240mV	90 / 92%	Yes
HFE2500-24	120mV	60mV	240mV	90 / 92%	-
HFE2500-24/S	120mV	60mV	240mV	90 / 92%	Yes
HFE2500-48	240mV	120mV	480mV	91 / 93%	-
HFE2500-48/S	240mV	120mV	480mV	91 / 93%	Yes

(3) At 75% load, 115 / 230VAC input

Rack Model Selector

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	-

Outline Drawing HFE2500





- 1U High
- Up to 10kW in 19" Rack
- Hot Swap Capable
- High Efficiency

TH Series

1200W to 2500W

Front End Power Supplies

Key Market Segments & Applications

Power for distributed Power Architecture

Factory Automation

TH Features and Benefits

Features

- 1U High
- HotSwap Capable
- High efficiency
- Full array of signals

Benefits

- Utilises less cabinet space
- Suitable for N+1 redundancy
- Higher Density
- Easier System Monitoring

Specifications

MODEL		TH120012(5)	TH120024	TH120048	TH250048 (5)
		12V Nominal	24V Nominal	48V Nominal	
Output Voltage Range	VDC	10.5-14	21-28	42-56	42-56
Total Regulation	%			±1%	
Output Current	A(max)	100	50	25	50
Current limit (1)	A	120	60	30	60
Short Circuit Current	%	150	75	37	75
Output Noise	mV	250mV peak to peak (10kHz to 20MHz)			
Output Rise Time	ms	100-400 ms			
Dynamic Response	%	3% in 10ms for a 10-100% load change			
Overvoltage Protection (1)	VDC	13-15	27-30	50-60	50-60
Load Sharing	%	±5%			
I2C Programming	-	Set output Volt, Monitors AC present, Converter OK, Thermal Profile, Fan fail			
Signals (opto isolated) (4)	-	AC Fail, Module Alarm, Temp Alarm			
Remote On/Off	V	Shuts down outputs by applying 3.3 to 5V			
Auxiliary Outputs (3)	-	12V@100mA			
AC Input	VAC	90-264	90-264	90-264	180-264
Input Frequency	Hz	47-63			
Power Factor	-	0.99 typ. @ 230VAC, full load, meets EN61000-3-2			
Inrush Current (2)	A	30 amps peak			
Efficiency (at full load)	%	86	90	92	93
Immunity	-	EN61000-4-2,-3,-4,-5,-6,-8,-11			
EMC (conducted and radiated)	-	EN55022, Level B, FCC Class B			
Operating Temperature	°C	-40 to 70, derate linearly to 60% load above 50°C			
Storage Temperature	°C	-40 to 85			
Humidity	%	5 to 95 (non-condensing)			
Altitude	ft	-200 to 8000			
Shock	G	IEC68-2-27, Mil-STD-810E, 20G			
Vibration	Hz	IEC68-2-64 (random) 20-2000Hz, 30 minutes			
Safety Agency		UL60950-1, CSA 22.2 No. 60950-00, EN60950-1, CE Mark			
Size (L x W x H)	mm	362 x 102 x 43 (stand alone), 414 x 440 x 43 (THR4 Rack)			
Weight	Kg	Stand alone unit 2.7kg, Rack 4.05kg			
Warranty	-	2 Years			

1. Adjustable via 1°C or through Lambda Network Interface Card 2. Excludes Xcaps in the EMC input filter 3. Operates independent of main DC output and is referenced to (-)Vout
4. All three signals share a common return - logic ground 5. Use Rack Model THR400

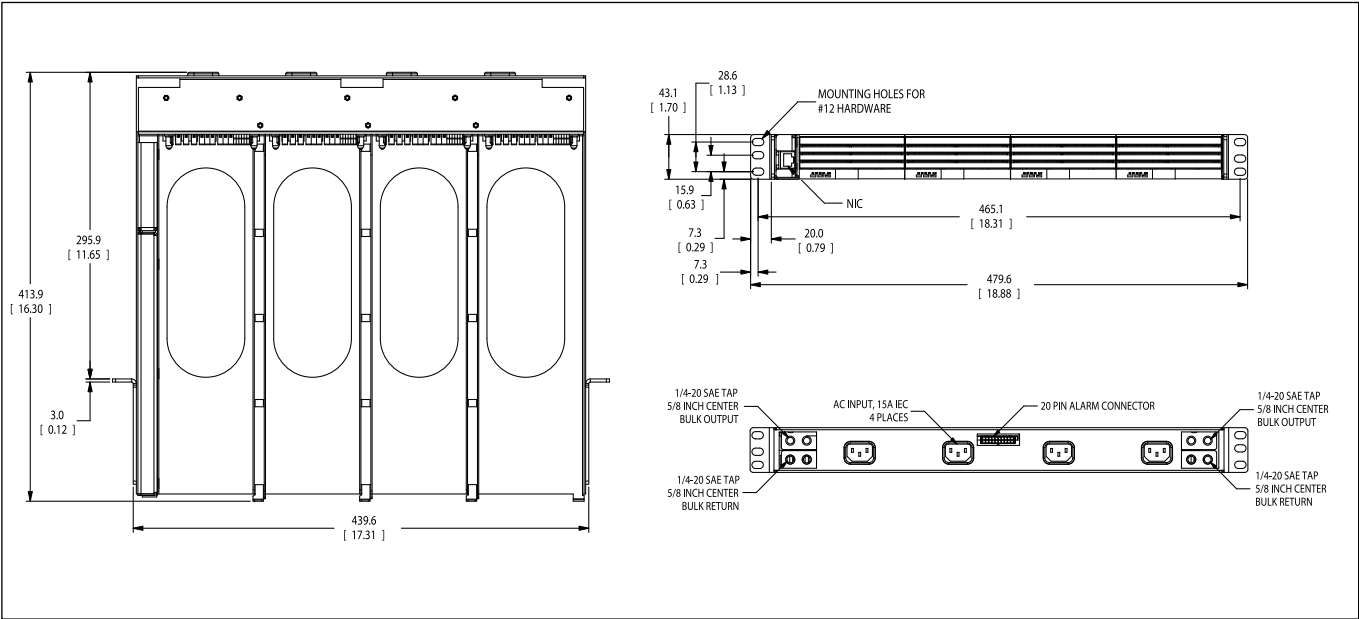


Model Selector			
Model	Output Voltage	Output Current	Maximum Power
TH120012 (5)	12V	100A	1200W
TH120024	24V	50A	1250W
TH120048	48V	25A	1250W
TH250048 (5)	48V	50A	2500W
THR4	19" Rack holds up to 4 TH Modules. 200A Max. output current		
THR400	19" Rack for 400A output holds up to 4 TH Modules.		
	Screw terminal mains input connection		
THRBP	Blanking panel for one module slot		
THR4NIC	Network interface card for 48V systems		
THR4NIC12	Network interface card for 12V systems		
THR4NIC24	Network interface card for 24V systems		
TLCK232	RS232 Communications Kit		
TLRC01	Signal Cable		

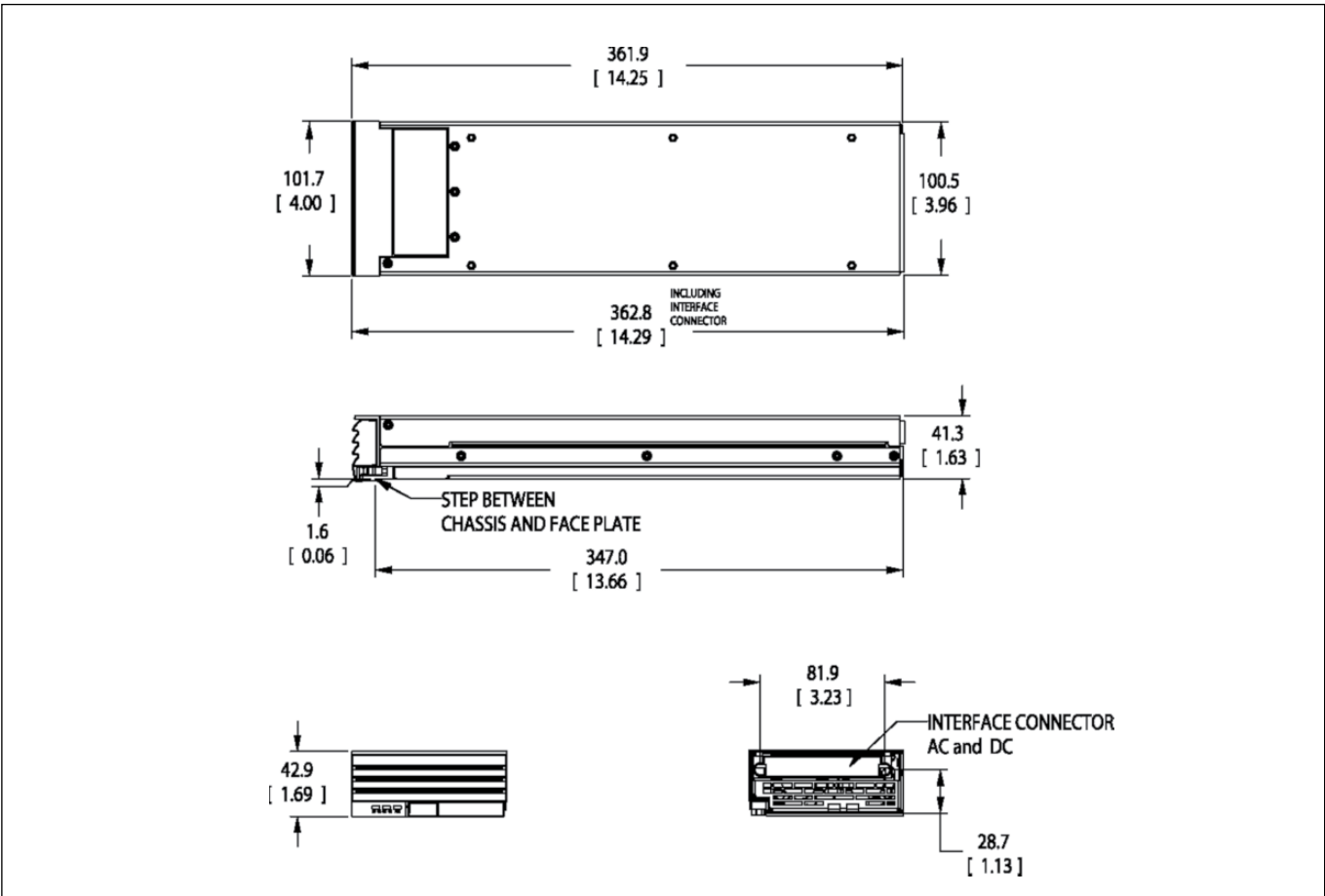
Alarm Connector			
Mating Housing	Molex Microfit	43025-2000	
Mating Terminal	Molex Microfit	43030-0002	



Outline Drawing TH Rack



Outline Drawing TH Series





- 2U high
- Up to 22.5 kW in 19" rack
- Hotswap capable
- High Efficiency

TX Series

3750W to 7500W
Front End Power Supplies

Key Market Segments & Applications

Power for Distributed Power Architecture
Factory Automation

TX Features and Benefits

Features

- 2U high
- Hotswap capable
- High efficiency

Benefits

- Utilises less cabinet space
- Suitable for N+1 redundancy
- Higher density

Specifications

MODEL		TX375024	TX500048	TX7500W48
ITEMS		24V Nominal	48V Nominal	
Output Voltage Range (1)	VDC	21-28	42-56	
Total Regulation	%	±1%		
Output Current	A(max)	150	100	150
Current limit (1)	A	155	110	155
Short Circuit Current	rms A	50	35	50
Output Noise	mV	250 peak to peak (10kHz to 20MHz)		
Output Rise Time	ms	100 - 400		
Dynamic Response	%	3% in 10ms for a 10-100% load change		
Overvoltage Protection (1)	VDC	27-30	54-60	
Load Sharing	%	±5% of full load		
i ² C Programming	-	Set output Volt, Monitors AC present, Converter OK, Thermal Profile, Fan fail		
Remote On/Off	V	Shuts down outputs by applying 3.3 to 5V		
Auxiliary Output		12V@200mA		
AC Input	VAC	180-264		180-305
Input Frequency	Hz	47-63		
Power Factor	-	0.99 typ. @ 230VAC, full load, meets EN61000-3-2		
Inrush Current (2)	A	30 amps peak		
Efficiency (at 230VAC)	%	90	92	92
Immunity	-	EN61000-4-2,-3,-4,-5,-6,-8,-11		
EMC (conducted and radiated)	-	EN55022, Level B, FCC Class B		
Operating Temperature	°C	-40 to 65 (full power)		-40 to 65 (3)
Storage Temperature	°C	-40 to 85		
Humidity	%	5 to 95 (non-condensing)		
Altitude	ft	-200 to 8000		
Shock	G	IEC68-2-27, Mil-STD-810E, 20G		
Vibration	Hz	IEC68-2-64 (random) 20-2000Hz, 30 minutes		
Safety Agency	-	UL60950-1, EN60950-1, CE Mark		
Size (L x W x H)	mm	405 x 132 x 82 (stand alone), 534 x 410 x 89 (THR3 Rack)		
Weight	Kg	Stand alone unit 6.75kg, Rack 5.4kg		
Warranty	-	2 Years		

1 Adjustable via i²C

2 Excludes Xcaps in the EMC input filter

3 TX7500W48 derate 2%/°C above 50°C to 65°C

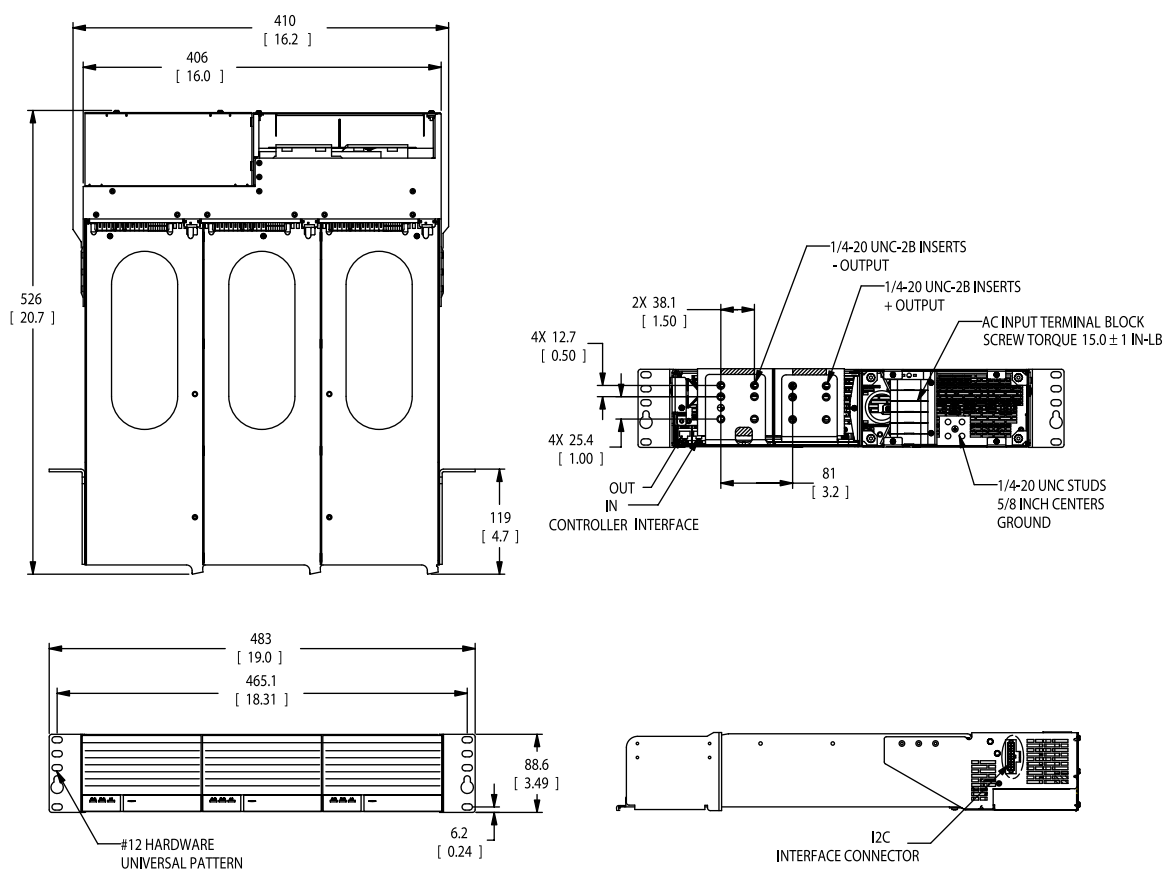
4 Operates independent of main DC output and is referenced to (-)Vout



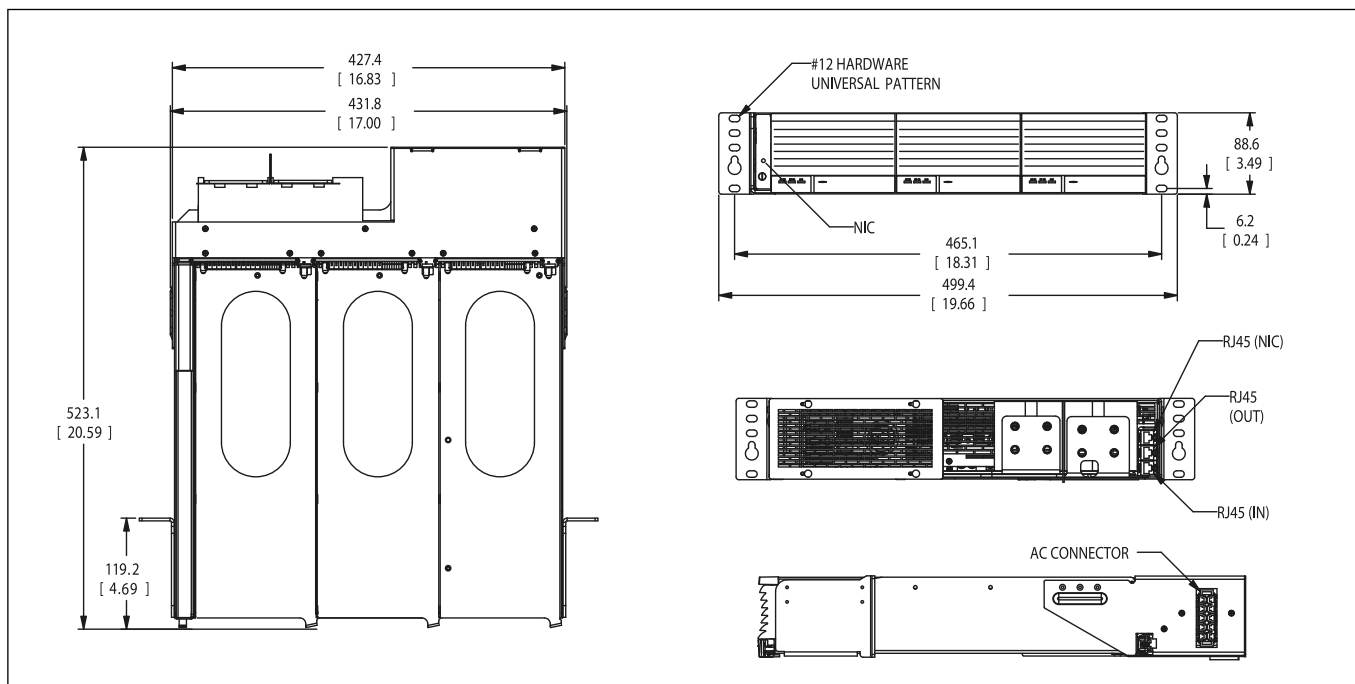
Model Selector

Model	Output Voltage	Output Current	Maximum Power
TX375024	24V	150A	3600W
TX500048	48V	100A	4800W
TX7500W48	48V	150A	7200W
TXR3	19" Rack holds up to 3 TX Modules (Individual AC Feed)		
TXR3025	19" Rack with 3 Phase DELTA Input (not for use with TX 500W48)		
TXR3026	19" Rack with 3 Phase WYE Input		
TXRBP	Blanking panel for one module slot		

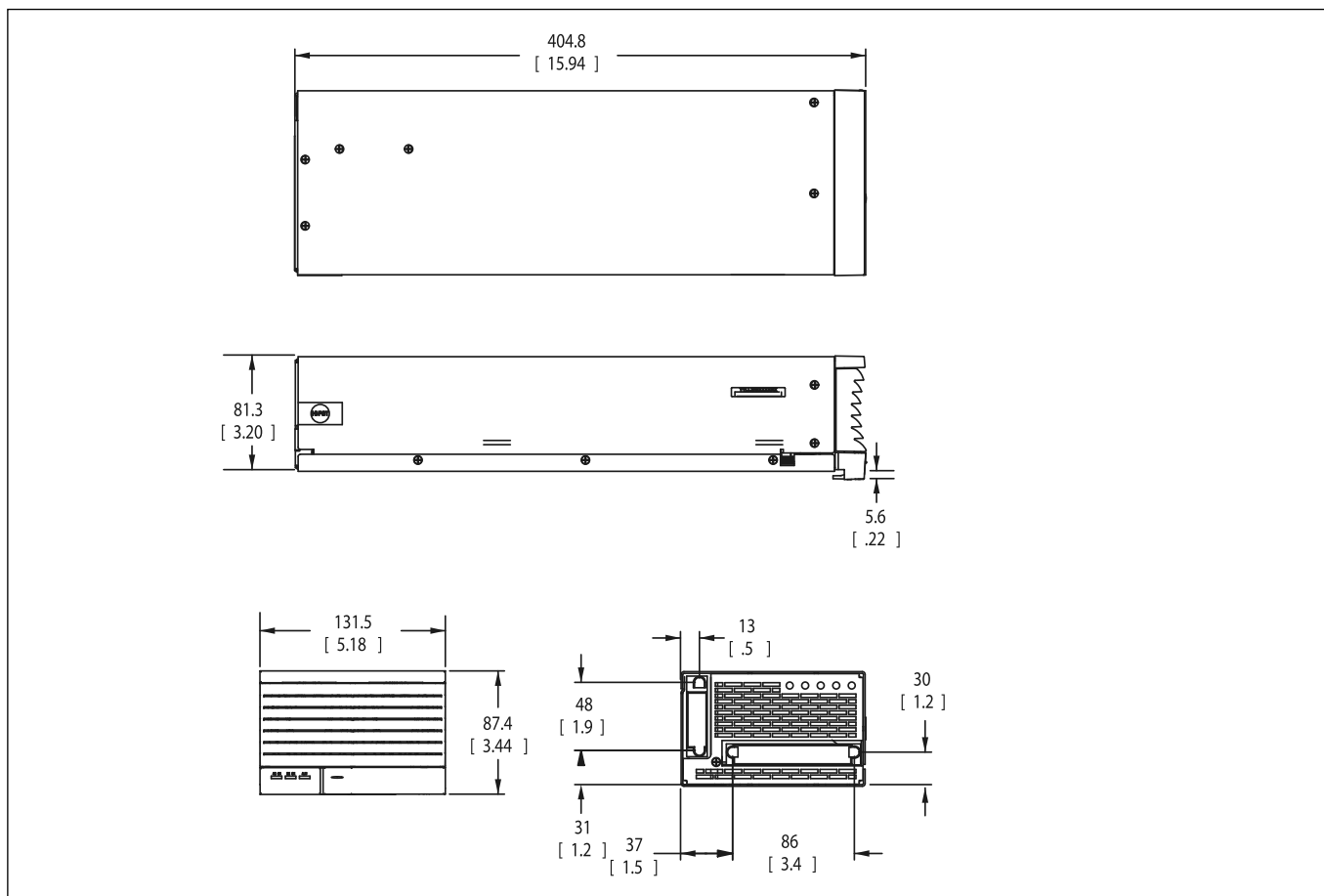
Outline Drawing TX



Outline Drawing TX Rack



Outline Drawing TX Module





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