

PMS Panel Mount Power Supply

PMS 1,200 W series / PMS-□V1K2W1BTD

PMS

Highlights & Features



- Universal AC input voltage
- Up to 1,200 Watt in 8.03" x 5" x 1.59" package
- Peak power supported
- Full power up to 50°C ambient
- Option for constant current
- Up to 500 KHrs MTBF
- 5 V / 2 A standby output
- Active current sharing
- Conformal coating
- Class B Conducted and Radiated EMI
- Remote On/Off and Power Good Signal
- PMBus Ver 1.3 supported
- Intelligent fan speed control
- Optional USB/RS232/RS485 adapter for communication
- Compliance to SEMI F47 @ 200Vac

Safety Standards



CB Certified for worldwide use

Model Number: PMS-□V1K2W1BTD
Unit Weight: 1.5 kg (3.3 lb)
Dimensions (L x W x H): 204 x 127.0 x 40.5 mm
 (8.03 x 5 x 1.59 inch)

General Description

PMS Series 1,200 W power supply offers the nominal output voltage of 24 V/48 V across a wide operating temperature range from -20°C to +70°C and obtains shock and vibration certification IEC 60068-2. The product is designed with 1U low profile and comes with a universal AC input voltage ranging from 85 Vac to 264 Vac. The PMS series is made for installation in limited spaces. Its built-in active PFC circuit provides high power factor values and conforms to harmonic current emission standards IEC/EN 61000-3-2, Class A.

Model Information

PMS Panel Mount Power Supply

Model Number	Input Voltage Range	Rated Output Voltage	Rated Output Current
PMS-24V1K2W1BTD	85 Vac ~ 264 Vac	24 Vdc	50.00 A
PMS-48V1K2W1BTD		48 Vdc	25.00 A

Model Numbering

PM	S –	□V	1K2W	1	B	T	D
Panel Mount	Product Type S – SMART Series	Output Voltage 24 – 24 V 48 – 48 V	Output Power	Single Phase	Family Code: B	T – Terminal block, without protective mesh cover	D – Remote On/Off (default on) & Constant Current Mode Protection

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Specifications

Model Number	PMS-24V1K2W1BTD	PMS-48V1K2W1BTD
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Input Ratings / Characteristics

Nominal Input Voltage	100-240 Vac	
Input Voltage Range	85-264 Vac	
Nominal Input Frequency	50-60 Hz	
Input Frequency Range	47-63 Hz	
Input Current (max)	15 A	
Input Surge Voltage (max)	300 Vac for 100 ms	
Efficiency at 100% Load @ 230Vac	93% typ.	94% typ.
No Load Power Consumption	6 W typ. @ remote off status	
Max Inrush Current (Cold Start)	40 A @ 264 Vac, cold/hot start	
Power Factor at 100% Load	0.95 @ 115 V/50 Hz, 230 V/50 Hz	
Leakage Current	< 0.3 mA @ 240Vac	

Output Ratings / Characteristics*1

Nominal Output Voltage	24 Vdc	48 Vdc
Total Regulation	± 3%	± 3%
Output Voltage Adjustment Range	24-28 Vdc	48-56 Vdc
Output Current	0-50.0 A	0-25.0 A
Constant Current (CV mode)	56 A (voltage range 19-26.4 V with 1,200 W max)	28 A (voltage range 38-52.8 V with 1,200 W max)
Output Power	1,200 W Max.	
Peak Power (max)	24 V: 1,500 W peak for 3 sec, @ 180~264 Vac 48 V: 1,500 W peak for 3 sec, @ 180~264 Vac	
Line Regulation	±0.5%	
Load Regulation	± 1%	
PAR ^D *2 (20MHz)	< 1% Vrated pk-pk @ rated load	
Rise Time	< 50 ms	
Start-up Time	2,000 ms with AC turn on	
Hold-up Time	16 ms @ 1000 W load, with nominal input range 20 ms @ 800 W load, with nominal input range	
Dynamic Response (Overshoot & Undershoot O/P Voltage)	± 5% @ 115 & 230 Vac input with 0-50% or 50-100% load change ± 10% @ 115 & 230 Vac input with 5-100% load change	
Start-up with Capacitive Loads	6,000 uF	
Nominal Standby Voltage Output*3	5 V	
Nominal Standby Current Output	2 A	
Total Regulation of Standby Output	± 3%	
Ripple & Noise of Standby Output	100 mV max	
Remote Sense	Up to 500 mV compensation for voltage drop across external wire connections to load. Short and reverse connection protected.	

*1 For power de-rating from > 50°C to 70°C, see power de-rating on page 8.

*2 PAR^D is measured with an AC coupling mode, and in parallel to end terminal with 0.1µF ceramic capacitor & 47µF electrolytic capacitor. PSU need to burn in > 5 minutes when AMB ≤ 0°C

*3 5V standby output is always on when AC is present

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Mechanical

Case Chassis	SGCC
Case Cover	SGCC
Dimensions (L x W x H)	204 x 127 x 40.5 mm (8.03 x 5 x 1.59 inch)
Unit Weight	1.5 kg (3.3 lb)
Cooling System	Force Cooling
Terminal	M3.5 x 3 Pins, CN1 / AC Input M5 x 2 Pins, CN101, 102 / DC Output

Environment

Surrounding Air Temperature	Operating	-20°C to +70°C
	Storage	-40°C to +85°C
Power De-rating	Temperature	> 50°C de-rate power by 2.5% / °C, Note: see power de-rating curves following page
	Input	< 90 Vac, de-rate power by 3.33% / Vac from 1,200 W
Operating Humidity		5-95% RH (Non-Condensing)
Operating Altitude		0 to 5,000 Meters (0 to 16,400 ft)
Shock Test	Non-Operating	IEC 60068-2-27, Half Sine Wave: 50 G for duration of 11 ms; 3 times per direction
Vibration	Operating	IEC 60068-2-6, Sine Wave: 5 Hz to 500 Hz @ 2G; 20 min per cycle, 60min for X, Y, Z direction
Pollution Degree		2
Acoustic Noise	Tolerance: ±2dB	< 45dB @ 80% load @ 25°C

*4 Acoustic Noise test set up according to ISO-7779

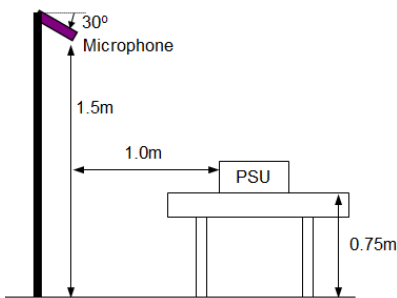


Fig 1. Acoustic Noise Testing Set Up

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Protections

Overvoltage	Main output 145% max of rated normal voltage, Latch Mode Standby 125% max of rated voltage, Latch Mode
Overload / Overcurrent	Main output 130% max of rated load current, Hiccup Mode, Non-Latching (Auto-Recovery) Standby 3.2A max with Hiccup Mode (Auto-Recovery)
Over Temperature	Latch Mode for Main output
Short Circuit	Hiccup Mode to Main output / Standby (Auto-Recovery when the fault is removed)
Protection Against Shock	Class I with PE*4 connection

*4 PE: Protection Earth

Reliability Data

MTBF	500K hrs based on Telcordia SR-332 (@ 115 Vac, 100% Load, 35°C)
Expected Cap Life Time	26,280 hrs, (@115 Vac, 100% load @ 25°C)

Safety Standards / Directives

Safety Entry Low Voltage	SELV	
Electrical Safety	TUV Bauart UL/cUL CB scheme CQC	EN 62368-1 UL 62368-1 and CAN/CSA C22.2 No. 62368-1 IEC 62368-1 GB 4943.1
CE	In conformance with EMC Directive 2014/30/EU and Low Voltage Directive 2014/35/EU	
UKCA	In conformance with Electromagnetic Compatibility Regulations 2016 and Electrical Equipment (Safety) Regulations 2016	
Galvanic Isolation	Input to Output	4.0 KVac
	Input to Ground	1.5 KVac
	Output to Ground	1.5 KVac

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EMC

Emissions (CE & RE)		EN 55032, KS C 9832, Comply to FCC Title 47: Class B
Electrostatic Discharge	IEC 61000-4-2	Level 4 Criteria A ¹⁾ Air Discharge: 15 kV Contact Discharge: 8 kV
Radiated Field	IEC 61000-4-3	Criteria A ¹⁾ 80MHz-2700MHz, 10V/m AM modulation Level 2 Criteria A ¹⁾ 385MHz-5785MHz, 28V/m Pulse mode and other modulation
Electrical Fast Transient / Burst	IEC 61000-4-4	Level 3 Criteria A ¹⁾ : 2kV
Surge	IEC 61000-4-5	Level 3 Criteria A ¹⁾ Common Mode ⁴⁾ : 2kV Differential Mode ⁵⁾ : 1kV
Conducted	IEC 61000-4-6	Level 2 Criteria A ¹⁾ 150kHz-80MHz, 3Vrms, 6Vrms at ISM bands and Amateur radio bands
Power Frequency Magnetic Fields	IEC 61000-4-8	Criteria A ¹⁾ Magnetic field strength 30A/m
Voltage Dips and Interruptions	IEC 61000-4-11	30% 10ms Criteria A ¹⁾ 60% 100ms Criteria B ²⁾ 100% 500ms Criteria B ²⁾
Harmonic Current Emission	IEC/EN 61000-3-2	Meet Class A limit
Voltage Fluctuation and Flicker		EN 61000-3-3
Voltage Sag Immunity SEMI F47 – 0706		24V: 80% of 200 Vac, 160 Vac, 1000 ms, Criteria A ¹⁾ 70% of 200 Vac, 140 Vac, 500 ms, Criteria A ¹⁾ 50% of 200 Vac, 100 Vac, 200 ms, Criteria A ¹⁾ 48V: 80% of 200 Vac, 160 Vac, 1000 ms, Criteria A ¹⁾ 70% of 200 Vac, 140 Vac, 500 ms, Criteria A ¹⁾ 50% of 200 Vac, 100 Vac, 200 ms, Criteria A ¹⁾

1) Criteria A: Normal performance within the specification limits

2) Criteria B: Output out of regulation, or shuts down during test. Automatically restored to normal operation after test.

3) Criteria C: Output out of regulation, shuts down during test (Need to recycle AC power cord to normal operation after test)

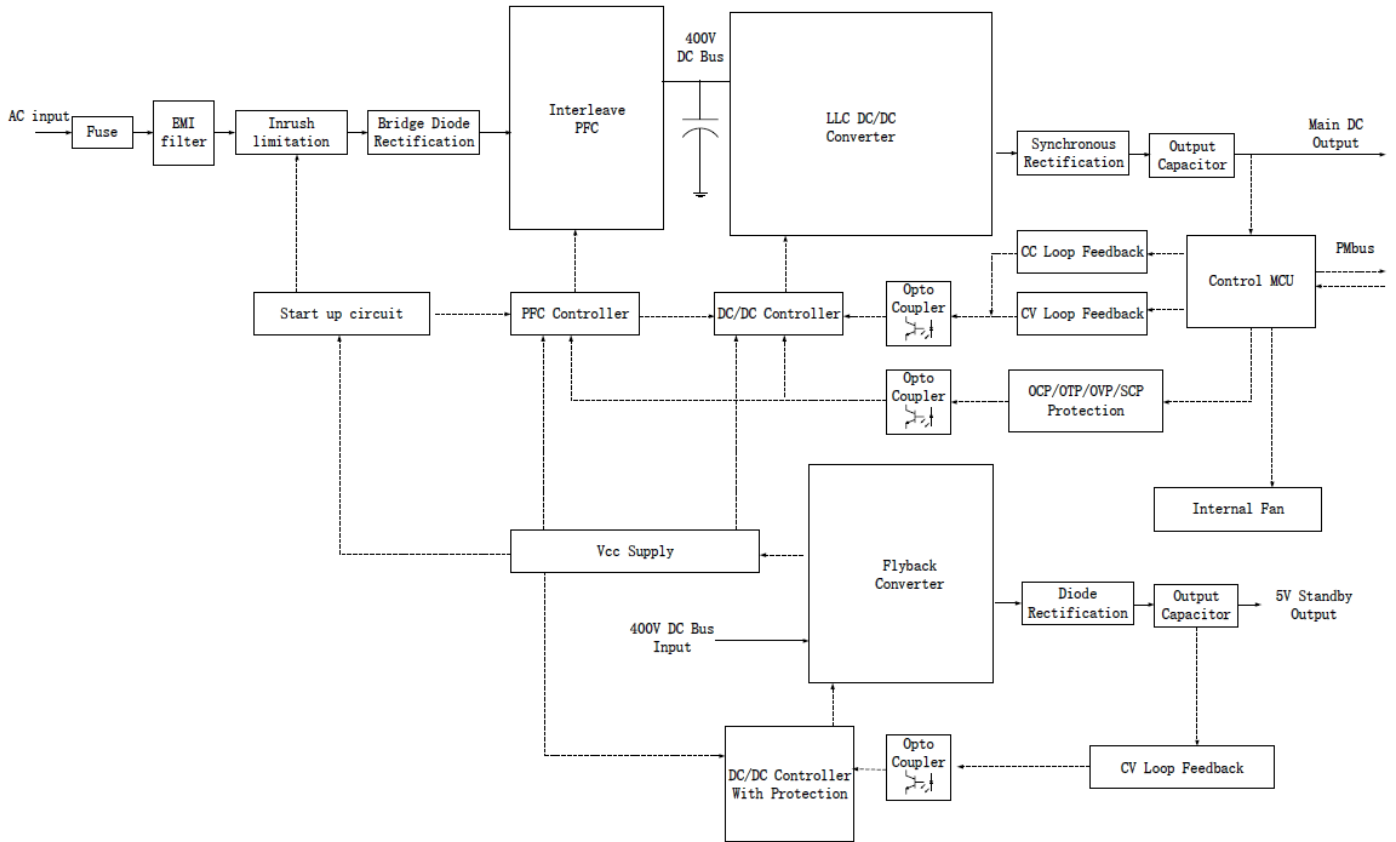
4) Asymmetrical: Common mode (Line to earth)

5) Symmetrical: Differential mode (Line to line)

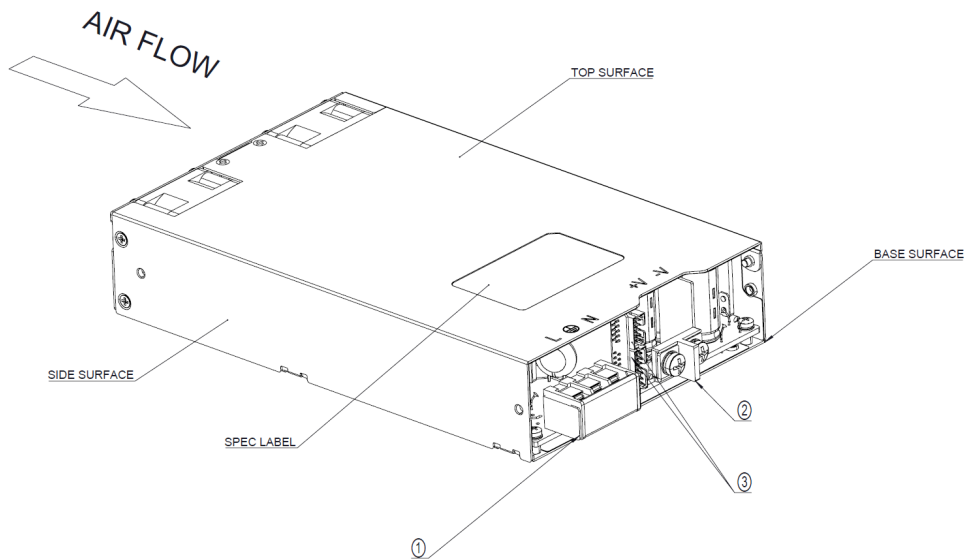
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Block Diagram



Device Descriptions



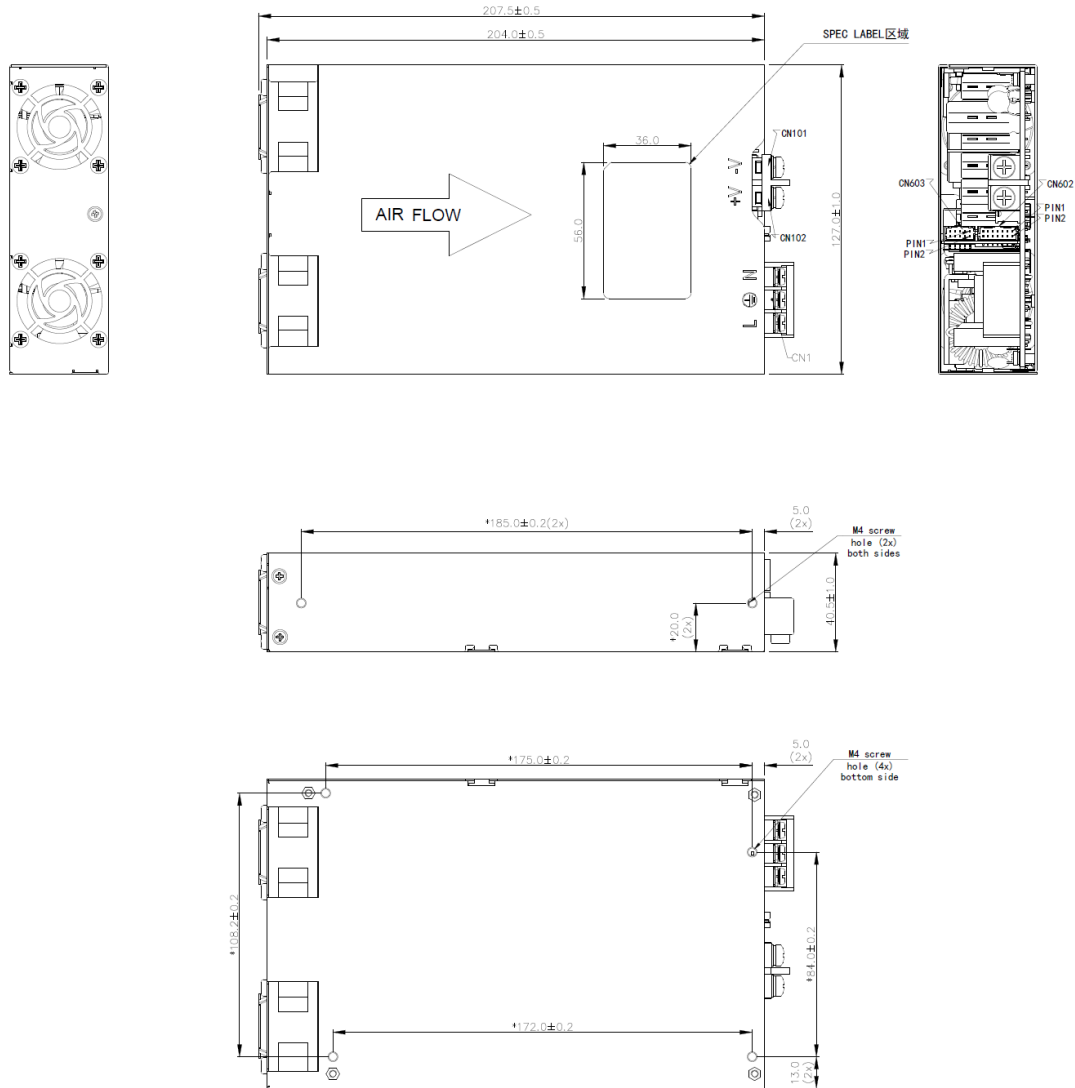
- 1) Input terminal block connector
- 2) Output terminal block connector
- 3) Communication block connector

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Dimensions

L x W x H: 204 x 127.0 x 40.5 mm (8.03 x 5 x 1.59 inch)



Notes:

1. Base plate mounting, M4 thread holes, maximum penetration 3.0 mm (0.12 inch) from outside face of chassis, torque 9~10 kgf.cm (7.8~8.7 inch.lbs).
2. Side mounting, M4 thread holes, maximum penetration 3.0 mm (0.12 inch) from outside face of chassis, torque 9~10 kgf.cm (7.8~8.7 inch.lbs).
3. CN101/CN102, M5 screw in two positions, maximum torque 21.0 kgf.cm (18.2 inch.lbs).
4. CN1, M3.5 screw in two positions, torque 6~7 kgf.cm (5.2~6.1 inch.lbs).
5. VR: clockwise is to increase the output voltage, anti-clockwise is to reduce the output voltage.
6. Built-in cooling fan. Must prevent dust suction into power supply, or use natural convection power supply if any concerns.
7. All dimensions are in millimeters and inches

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Connector Definition and Pin Assignment

Input Connector CN1(ANYTEK: YK50A)	
Pin 1	Earth
Pin 2	Line
Pin 3	Neutral
Output Connector	
CN101	DC RTN
	Vo
Control Connector CN603(Molex:87833-1051) Mating With Molex:51110-1051 Terminal:0503948052	
Pin 1	5V bus for I2C
Pin 2	DC RTN of 5V bus for I2C
Pin 3	Serial data signal (SDA)
Pin 4	Serial clock signal (SCL)
Pin 5	NC
Pin 6	NC
Pin 7	Address bit 0 (A0)
Pin 8	Address bit 1 (A1)
Pin 9	Address bit 2 (A2)
Pin 10	NC
Control Connector CN602(Molex:87833-7420) Mating With Molex:51110-1451 Terminal:0503948052	
Pin 1	Remote On_Off/Inhibit +
Pin 2	Remote On_Off/Inhibit -
Pin 3	Power Good-
Pin 4	Power Good+
Pin 5	NC
Pin 6	NC
Pin 7	5V Standby Output +
Pin 8	5V Standby Output +
Pin 9	DC RTN
Pin 10	DC RTN
Pin 11	Remote Sense +
Pin 12	Remote Sense -
Pin 13	Current Share
Pin 14	DC RTN

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Engineering Data

Output Load De-rating VS Surrounding Air Temperature

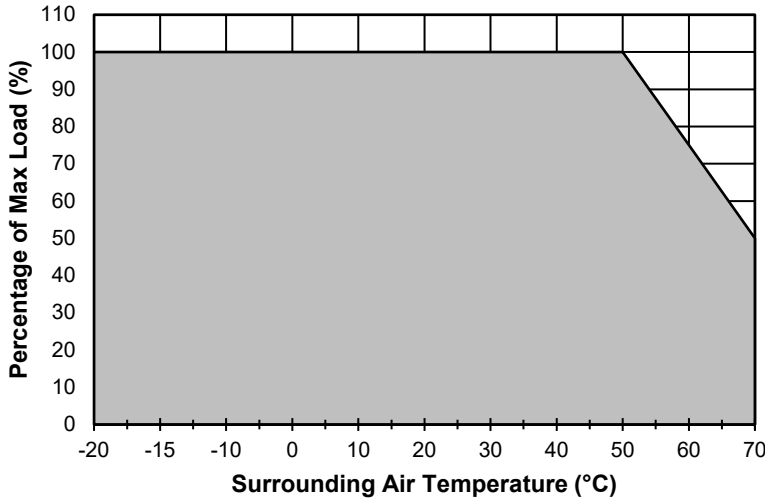
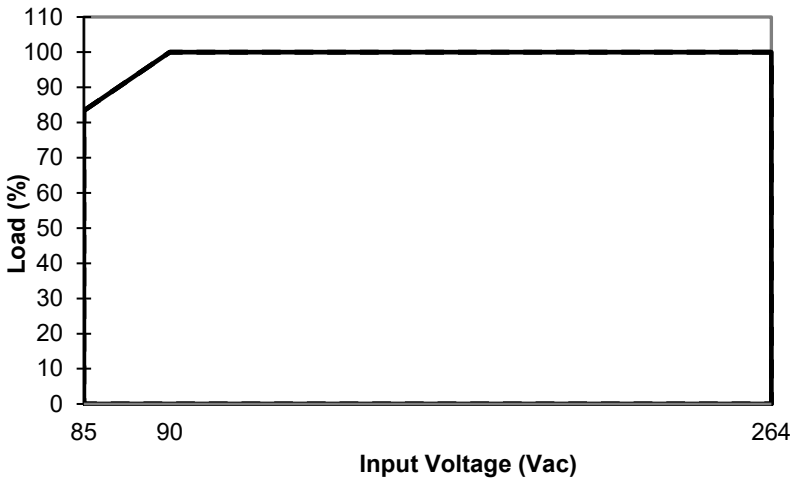


Fig. 2 De-rating for Horizontal Mounting Orientation
 > 50°C de-rate power by 2.5% / °C

Note

1. Power supply components may degrade, or be damaged, when the power supply is continuously used outside the shaded region, refer to the graph shown in Fig. 2 & Fig. 3.
2. The PSU will be bouncing and start up time will not exceed 5s when ambient temperature at -20°C.
3. If the output capacity is not reduced when the surrounding air temperature >50°C, the device will run into Over Temperature Protection. When activated, power supply will latch off, until the surrounding air temperature is lowered or the load is reduced as far as necessary to keep the device in working condition, and require removal/re-application of input AC voltage in order to restart.
4. In order for the device to function in the manner intended, it is also necessary to keep a safety distance as recommended in the safety instructions while the device is in operation.
5. Depending on the surrounding air temperature and output load delivered by the power supply, the device can be very hot!

Output Load De-rating VS Input Voltage



- No output power de-rating for the input voltage from 90 Vac to 264 Vac

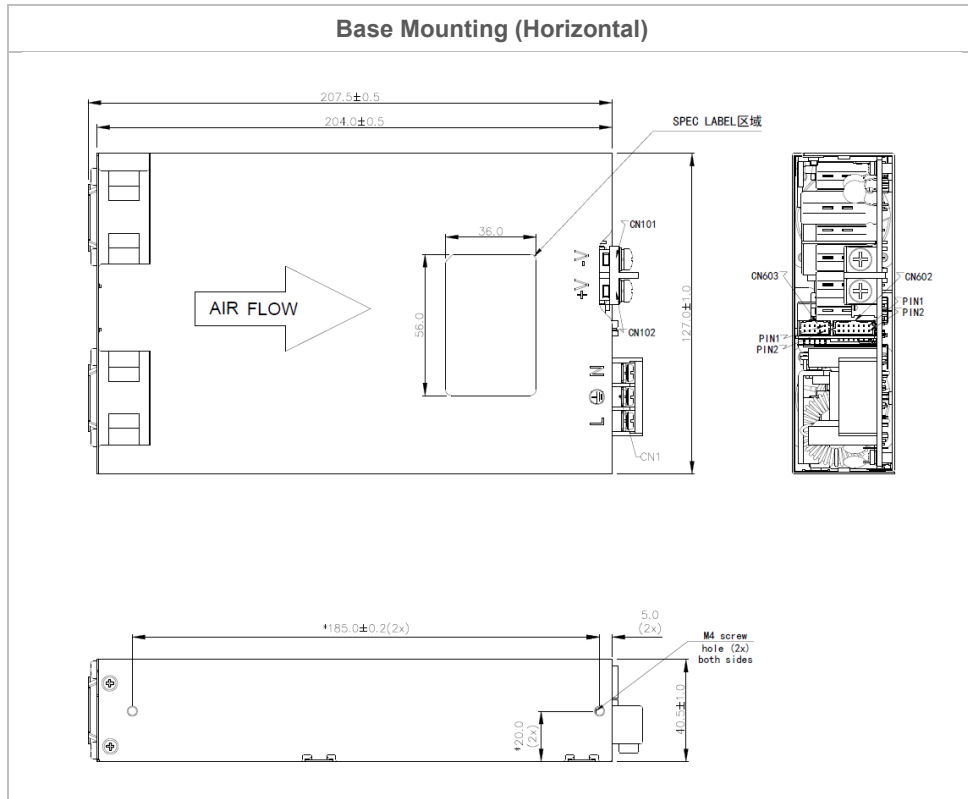
Fig. 3 De-rating for AC Input Voltage
 < 90 Vac de-rate power by 3.33% / V (100% load @ 90 Vac)

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Assembly & Installation

- Ⓐ Base Mounting: Fig. 3 shows the mounting hole locations for power supply assembly onto a metal mounting surface.
- Ⓑ This surface belongs to customer's end system or panel where the power supply is mounted.
- Ⓒ Connector



* If the device has to be mounted in any other orientation, please leave a message via the [Contact Us](#) form.

- Use flexible cable (stranded or solid) of AWG No.6. User should calculate and select the suitable wire specification (type/quantity/diameter) according to actual output current. The torque at the Connector shall not exceed 12.4 kgf.cm. (10.54 inch.lbs). The insulation stripping length should not exceed 0.275" or 7 mm. (Refer to Fig. 3).

Installation of Mounting Accessories

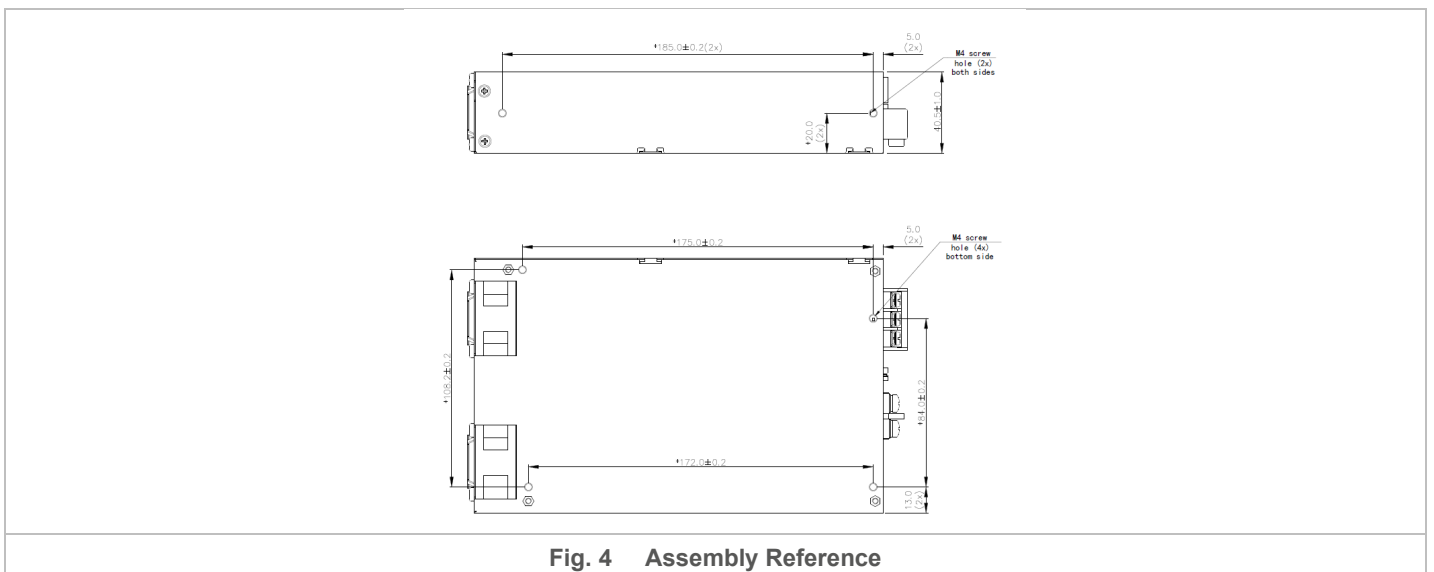
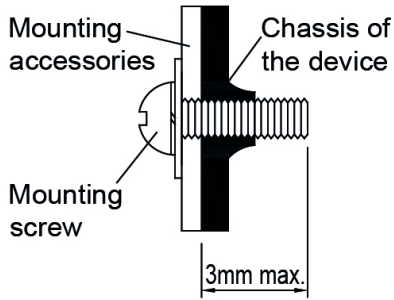


Fig. 4 Assembly Reference

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- Only use M4 screw ≤ 3 mm (0.12 inch) through the base mounting holes. This is to keep a safe distance between the screw and internal components.
- Recommended mounting tightening torque: 4~5 kgf.cm (3.47~4.33 inch.lbs).

Fig. 5 Mounting Screw

Safety Instructions

- If user's mounting orientation is not according to the recommended mounting orientations, please consult Delta for further information.
- To ensure sufficient convection cooling, always maintain a safety distance of ≥ 50 mm (1.97 inch) from all ventilated surfaces while the device is in operation.
- The device is not recommended to be placed on low thermal conductive surface. For example, plastics.
- The enclosure of the device can become very hot depending on the ambient temperature and load of the power supply. Do not touch the device while it is in operation or immediately after power is turned OFF. Risk of burning!
- Do not touch the terminals while power is being supplied. Risk of electric shock.
- Prevent any foreign metal, particles or conductors from entering the device through the openings during installation. It may cause: Electric shock; Safety Hazard; Fire; Product failure
- The power supply must be mounted by metal screws onto a grounded metal surface. It is highly recommended that the Earth terminal on the connector be connected to the grounded surface.

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Functions

Start-up Time

The time required for the output voltage to reach 90% of its final steady state value, after the input voltage is applied.

Rise Time

The time required for the output voltage to change from 10% to 90% of its final steady state value.

Hold-up Time

Time between the collapse of the AC input voltage, and the output falling to 90% of its steady state value.

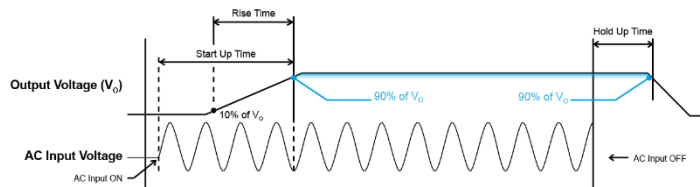


Fig. 6 Time Sequence

Dynamic Response (Main Output)

The power supply output voltage will remain within $\pm 5\%$ of its steady state value, when subjected to a dynamic load 50 to 100% of its rated current.

■ 50 to 100% Load

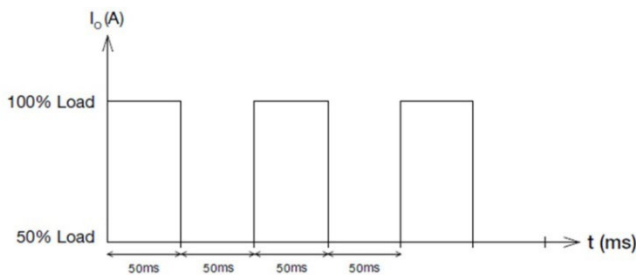


Fig. 7 Dynamic Load

Inrush Current

Inrush current is the input current that occurs when the input voltage is first applied. For AC input voltages, the maximum peak value of inrush current will occur during the first half cycle of the applied AC voltage. This peak value decreases exponentially during subsequent cycles of AC voltage.

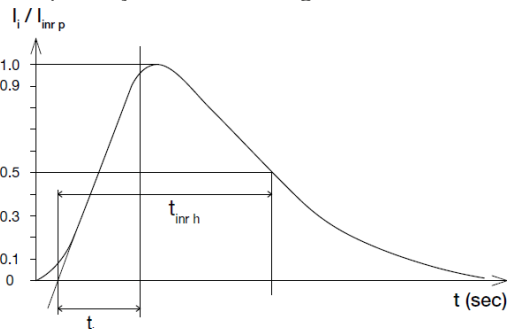


Fig. 8 Inrush Current

Overvoltage Protection

The power supply's overvoltage circuit will be activated when its internal feedback circuit fails. The output voltage shall not exceed its specifications defined on Page 3 under "Protections". Power supply will latch off, and require removal/re-application of input AC voltage in order to restart.

Overload & Over current Protections

The power supply's Overload (OLP) and Over current (OCP) Main output Overload (OLP) and Over current (OCP) Protections is achieved by constant output current control. If the output current increases higher than rated current, the current will be clamped to be constant ($<130\%$ rated current), output voltage will then drop if output impedance keeps decreasing in the constant current control. Finally output under voltage protection will be triggered if the output voltage falls below 75% rated value and enters "Hiccup mode" (Auto-Recovery). The power supply will recover once the fault condition causing the OLP and OCP is removed and I_o is back within the specified limit.

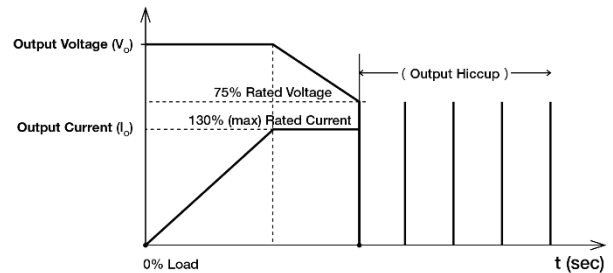


Fig. 9 Hiccup at OLP/OCP

Additionally, if the I_{out} is $>100\%$ for a prolong period of time (depending on the load), the Over Temperature Protection (OTP) may be activated due to high temperature on critical components. The power supply will then go into latch mode.

Short Circuit Protection

Output OLP/OCP function also provides protection against short circuits. When a short circuit is applied, the output current will operate in "Hiccup mode". The power supply will return to normal operation after the short circuit is removed.

Over Temperature Protection

As mentioned above, the power supply also has Over Temperature Protection (OTP). This is activated when the overload condition persists for an extended duration and the output current is below the overload trigger point but $>100\%$ load. In the event of a higher operating temperature condition at 100% load, the power supply will run into OTP when the surrounding air temperature is higher than the operating temperature. When activated, the output voltage will go into latch mode until the input voltage is removed; then, reapplied, and the surrounding air temperature drops to its normal operating temperature.

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Power Good

Power Good+/- pin is an isolated open collector transistor (80V/50mA rating). A resistor (suggested value 10 Kohm, 1/8 W) can be added between Power Good- pin and DC RTN, Power Good+ pin can be connected to 5 V standby (or, other available pull-up voltage that is no greater than the transistor rating). Value of resistor may have to be adjusted, depending on voltage used, and other end-use conditions of the Power Good+ pin connection to the product. When AC input is on, Power Good Signal (Shown in below figure) generated will be high. When AC input is off, Power Good Signal generated will be low. There will be a minimum of 5 milliseconds (at 1000 W load) between the time the Power Good Signal goes to low level, and the time when the output reaches 90% of its rated value.

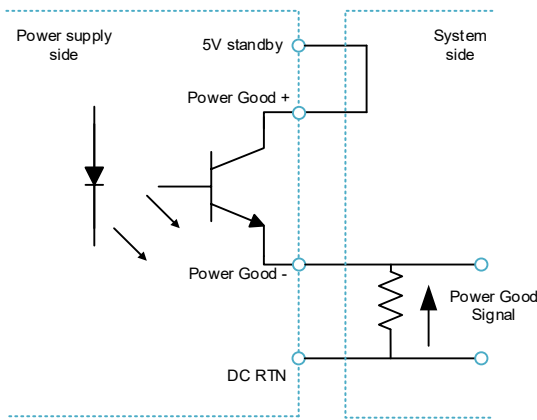


Fig. 10 Power Good Connection

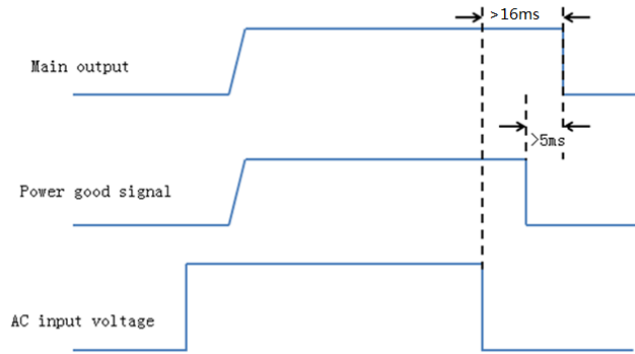


Fig. 11 Power Good Time Sequence

Remote On_Off/Inhibit

Remote ON_OFF/INHIBIT uses an isolated diode located within the power supply. This signal can be used to enable or disable only the main output. When the main output is disabled, the +5 V Standby output will continue to operate. System can use a switch to conduct through this diode (suggested pull up resistor to 5 V standby with 500~1 Kohm resistor) to disable the main out.

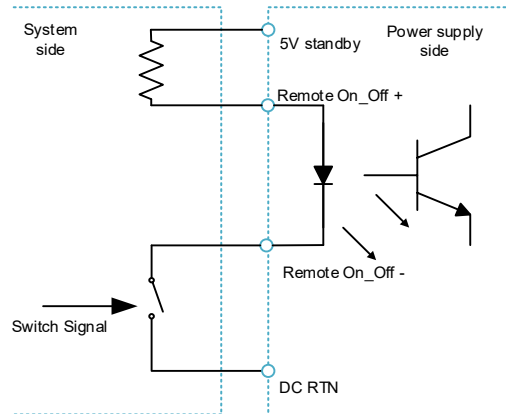


Fig. 12 Remote On_Off Connection

Remote Sense

Remote sense feature can be used to compensate for the extra voltage drop on output wires that are connected from the main output terminals, to the load. With wires connected from the remote sense pins, at the same locations as the wires from the main output, the remote sense function can compensate up to 500mV voltage drop. The power supply will not be damaged if the remote sense pins are shorted, or if a reverse/inverted polarity connection is made to the load

Voltage Adjustment

The power supply provides a potentiometer for user to adjust the output voltage. The output voltage is designed to be able to adjust up to $\pm 10\%$ of rated voltage, when the output is adjusted below nominal value, the maximum output current is the same as the nominal output, when the output is adjusted above nominal value, the output power cannot exceed the nominal maximum power (the maximum output current will be reduced accordingly).

PMBus

The power supply can communicate with the host product, using PMBus version 1.3 protocols. Multiple functions can be realized, such as monitoring the power supply operation status, and editing the power supply operating set-points. See user instruction for detailed control information.

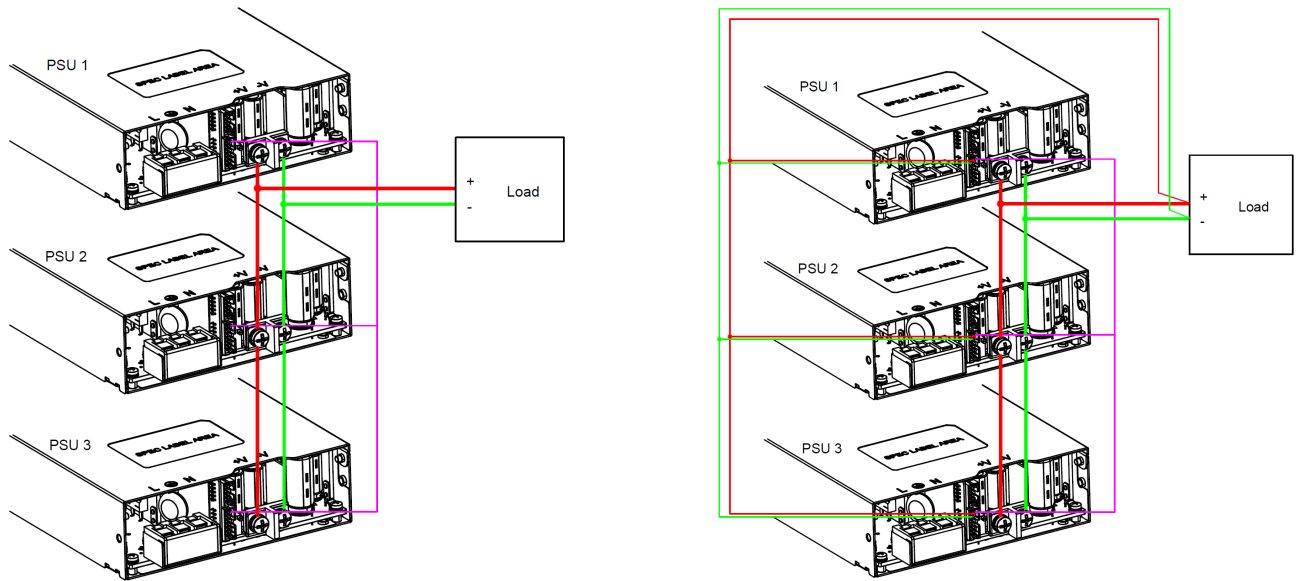
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Current Sharing

The power supply supports parallel current sharing function. Two power supply main outputs are connected in parallel and connected to the Load. The Current Share port can enable this function (Pin13 of CN602, refer to the power structure diagram and lead Foot definition), up to six power supplies can be connected in parallel.

When the power supply is connected in parallel, adjust the voltage difference between different power supplies to within ± 150 mV, and ensure that the maximum output current does not exceed 80% of the rated current.



Parallel Connection without Remote Sense

Parallel Connection with Remote Sense

Fig. 13 Parallel Connection

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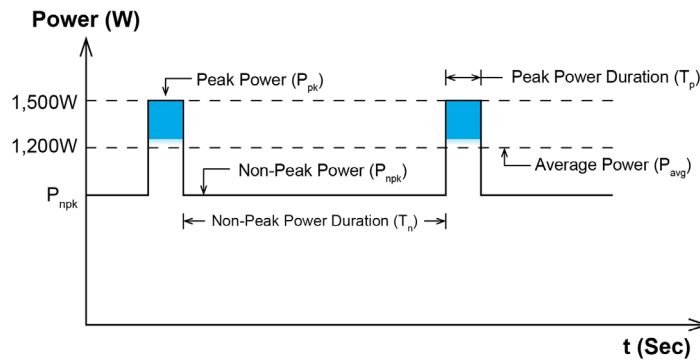
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Peak Power

Peak Power (P_{pk}) is the reserve power available constantly that allows reliable startup to support sudden and short spike of loads with high inrush current typically during turn on to remove the need of more expensive higher rated power supply unit.

After the output has reached its steady state set value, the power supply can support surge loads with a higher short-term power demand up to P_{pk} , for a maximum duration of 3 seconds.

During peak power, limit the average power within 8 seconds to no more than the rated output power (P_{rated}).



$$\text{Duty cycle (\%)} = \frac{T_p}{\text{Total Time}} ; (T_p \leq 3 \text{ sec})$$

$$\text{Average Output Power } (P_{avg}) = \frac{(P_{pk} \times T_p) + (P_{npk} \times T_n)}{\text{Total Time}}$$

OR

$$\text{Non-Peak Power } (P_{npk}) = \frac{(P_{avg} \times \text{Total Time}) - (P_{pk} \times T_p)}{T_n}$$

Peak Power (%)	Peak Power (P_{pk})	Peak Power Duration (T_p)	Duty Cycle	Non-Peak Power (P_{npk})	Non-Peak Power Duration (T_n)	Total Time (T)
125%	1,500W	3 sec	37.5%	1,020W	5 sec	8 sec

Fig. 14 Duty Cycle Calculation

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Attention

Delta provides all information in the datasheets on an "AS IS" basis and does not offer any kind of warranty through the information for using the product. In the event of any discrepancy between the information in the catalog and datasheets, the datasheets shall prevail (please refer to www.DeltaPSU.com for the latest datasheets information). Delta shall have no liability of indemnification for any claim or action arising from any error for the provided information in the datasheets. Customer shall take its responsibility for evaluation of using the product before placing an order with Delta.

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