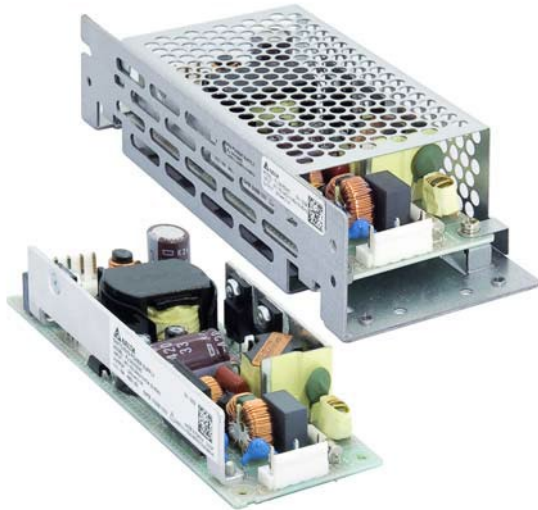


PJ Open Frame Power Supply

12 V 50 W 1 Phase / PJ-12V50W□NA

PJ



Highlights & Features

- Universal AC input voltage range (85 Vac – 264 Vac)
- Low Inrush Current / Low Leakage Current
- High efficiency and PF factor to conserve energy
- Conforms to harmonic current IEC/EN/BS EN 61000-3-2, Class A
- Conformal coating on PCBA to protect against chemical and dust pollutants
- Versatile configuration options: Open Frame, L Frame, Enclosed
- Long life capacitors

Safety Standards



CB Certified for worldwide use

| | |
|--------------------------------|--|
| Model Number: | PJ-12V50W□NA |
| Unit Weight: | Open Frame: 0.16 kg (0.35 lb) Enclosed: 0.28 kg (0.62 lb) |
| Dimensions (L x W x H): | Open Frame: 132 x 50 x 26.6 mm (5.19 x 1.96 x 1.05 inch) Enclosed: 162 x 60 x 36 mm (6.37 x 2.36 x 1.41 inch) |

General Description

The PJ series of Open Frame Power Supply comes with universal AC input at 85 Vac to 264 Vac. Other features include low leakage / Inrush current and conformal coating on the PCBAs to provide protection against dust and chemical pollutants. The built-in active PFC provides PF > 0.97 and fulfills Harmonic Current Emission according to IEC/EN/BS EN 61000-3-2. The PJ series is certified for EMC standards according to EN/BS EN 55011 for industrial, scientific and medical (ISM) radio-frequency equipment and EN/BS EN 55032 for Industrial Technology Equipment (ITE) radio-frequency equipment and EMS according to EN/BS EN 55024. In addition, the detachable input and output connectors are from JST and only recognized Japanese capacitors are used.

Metal chassis and case cover are available as options for different installation preferences. The PJ series conforms to major international safety standards according to EN/UL 62368-1 standards and are fully compliant with RoHS Directive for environmental protection.

Model Information

PJ Open Frame Power Supply

| Model Number | Input Voltage Range | Output Voltage | Output Current |
|--------------|---------------------|----------------|----------------|
| PJ-12V50W□NA | 85-264 Vac | 12 Vdc | 4.30 A |

Model Numbering

| | | | | CC Code | |
|-------------|----------------|--------------|---|--|----------------|
| PJ – | 12V | 50W | □ | N | A |
| PJ Series | Output Voltage | Output Power | Product Type B - Open Frame L - L Frame C - Enclosed | Remote ON/OFF Function N - No Remote ON/OFF | Delta Standard |

PJ Open Frame Power Supply

12 V 50 W 1 Phase / PJ-12V50W□NA

Specifications

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 | 0.65 A typ. @ 100 Vac, 0.35 A typ. @ 200 Vac |
| Efficiency at 100% Load | 83.0% typ. @ 100 Vac, 85.0% typ. @ 200 Vac |
| Max Inrush Current (Cold Start) | 15 A typ. @ 100 Vac, 30 A typ. @ 200 Vac |
| Power Factor Correction | 0.98 typ. @ 100 Vac, 0.97 typ. @ 200 Vac |
| Leakage Current | 0.1 mA @ 100 Vac, 0.2 mA @ 240 Vac |

Output Ratings / Characteristics

| | |
|--|---|
| Nominal Output Voltage | 12 Vdc |
| Output Voltage Tolerance | ± 1% (initial set point tolerance from factory) |
| Output Voltage Adjustment Range | 10.8-13.2 Vdc |
| Output Current | 4.30 A |
| Output Power | 51.6 W |
| Line Regulation | < 48 mV |
| Load Regulation | < 100 mV |
| Ripple (20 MHz) | < 120 mVpp @ 0°C to 50°C, < 160 mVpp @ -10°C to 0°C |
| Ripple Noise (20 MHz) | < 150 mVpp @ 0°C to 50°C, < 180 mVpp @ -10°C to 0°C |
| Start-up Time | 500 ms typ. @ 100 Vac |
| Hold-up Time | 20 ms typ. @ 100 Vac |
| Dynamic Response (Overshoot & Undershoot O/P Voltage) | ± 5% @ 0-50% load and 50-100% load |
| Start-up with Capacitive Loads | 8,000 µF Max |

Mechanical

| | | |
|------------------------|-----------------------|--|
| Case Cover / Chassis | | SGCC |
| Dimensions (L x W x H) | Open Frame Enlosed | 132 x 50 x 26.6 mm (5.19 x 1.96 x 1.05 inch) 162 x 60 x 36 mm (6.37 x 2.36 x 1.41 inch) |
| Unit Weight | Open Frame Enlosed | 0.16 kg (0.35 lb) 0.28 kg (0.62 lb) |
| Indicator | | NA |
| Cooling System | | Convection |
| Terminal | Input Output | JST B3P5-VH (LF)(SN) JST B4P-VH (LF)(SN) |
| Wire | | AWG 22-18 |

PJ Open Frame Power Supply

12 V 50 W 1 Phase / PJ-12V50W□NA

Environment

| | | |
|-----------------------------|------------------------|--|
| Surrounding Air Temperature | Operating | -10°C to +70°C |
| | Storage | -25°C to +75°C |
| Power De-rating | Mounting Orientation A | > 50°C de-rate power by 2.5% / °C < 90 Vac de-rate power by 2% / V |
| Operating Humidity | | 5 to 95% RH (Non-Condensing) |
| Operating Altitude | | 0 to 5,000 Meters (16,400 ft.) |
| Shock Test (Non-Operating) | | IEC 60068-2-27, 196.1 m/S ² (20G), 11ms, once along X, Y, and Z axis |
| Vibration (Operating) | | IEC 60068-2-6, 10 Hz to 55 Hz @ 19.6 m/S ² (2 G); 3 min period, 60 min per axis for all X, Y, Z direction |

Protections

| | |
|--------------------------|--|
| Overvoltage | 13.8-16.8 V, Latch Mode |
| Overload / Overcurrent | > 105% of rated load current, Hicc-up Mode, Non-Latching (Auto-Recovery) |
| Over Temperature | Latch Mode |
| Short Circuit | Hicc-up Mode, Non-Latching (Auto-Recovery when the fault is removed) |
| Protection Against Shock | Class I with PE* connection |

*PE: Primary Earth

Reliability Data

| | |
|------------------------|---------------------------------------|
| MTBF | > 200,000 hrs. as per JEITA RCR-9102B |
| Expected Cap Life Time | 10 years (115Vac, 50% load @ 40°C) |

Safety Standards / Directives

| | | |
|--------------------|--|--|
| Electrical Safety | TUV Bauart UL/cUL recognized CB scheme | EN 60950-1, EN 62368-1 UL 60950-1 and CSA C22.2 No. 60950-1 (File No. E131881) UL 62368-1 and CSA C22.2 No. 62368-1 (File No. E131881) IEC 60950-1, IEC 62368-1 |
| 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 | 3.0 KVac |
| | Input to Ground | 2.0 KVac |
| | Output to Ground | 0.5 KVac |

PJ Open Frame Power Supply

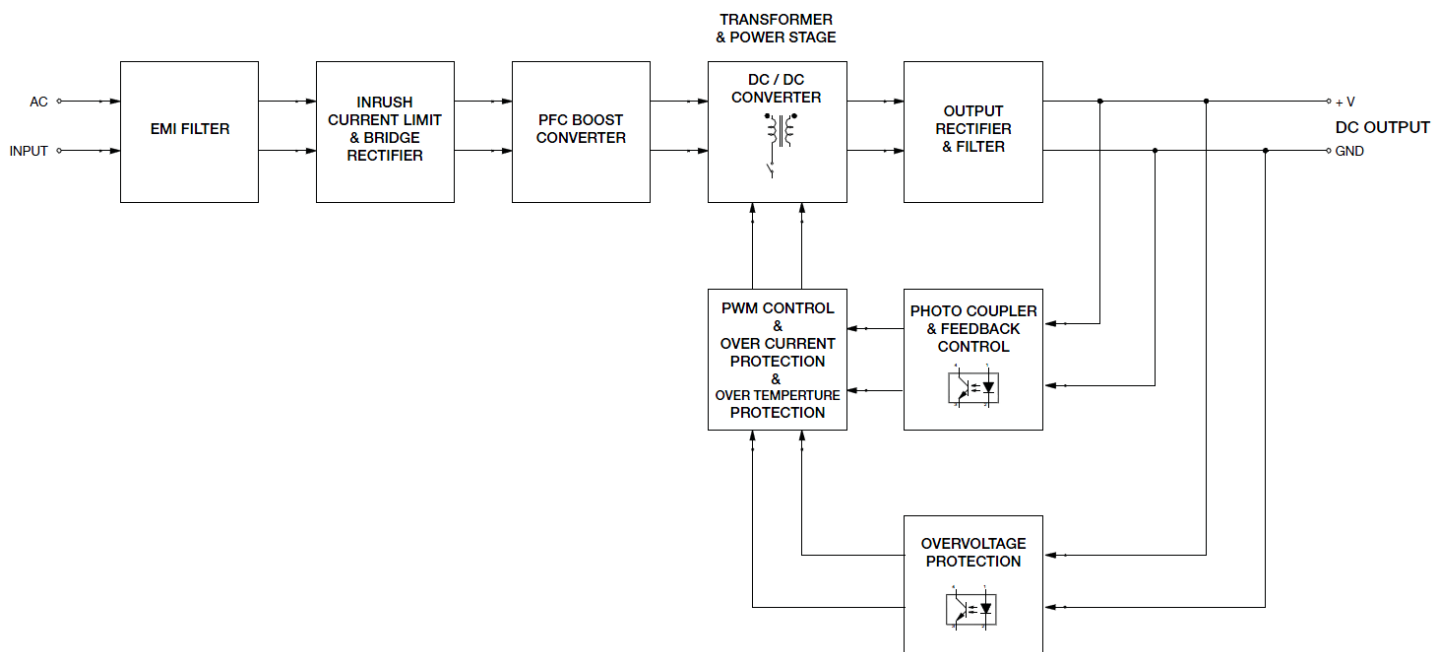
12 V 50 W 1 Phase / PJ-12V50W□NA

EMC

| | | |
|-----------------------------------|----------------|--|
| EMC / Emissions | | CISPR 32, EN/BS EN 55032, FCC Title 47: Class B |
| Immunity to | | EN/BS EN 55024 |
| 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 | Level 3 Criteria A ¹⁾ 80 MHz-1 GHz, 10 V/M with 1 kHz tone / 80% modulation |
| Electrical Fast Transient / Burst | IEC 61000-4-4 | Level 3 Criteria A ¹⁾ 2 kV |
| Surge | IEC 61000-4-5 | Level 3 Criteria A ¹⁾ Common Mode ²⁾ : 2 kV Differential Mode ³⁾ : 1 kV |
| Conducted | IEC 61000-4-6 | Level 3 Criteria A ¹⁾ 150 kHz - 80 MHz, 10 Vrms |
| Power Frequency Magnetic Fields | IEC 61000-4-8 | Criteria A ¹⁾ Magnetic field strength 30 A/Meter |
| Voltage Dips | IEC 61000-4-11 | 100% dip; 1 cycle (20ms); Self Recoverable |
| Low Energy Pulse Test (Ring Wave) | IEC 61000-4-12 | Level 3 Criteria A ¹⁾ Common Mode ²⁾ : 2 kV Differential Mode ³⁾ : 1 kV |
| Harmonic Current Emission | | IEC/EN/BS EN 61000-3-2, Class A |
| Voltage Fluctuation and Flicker | | IEC/EN/BS EN 61000-3-3 |

- 1) Criteria A: Normal performance within the specification limits
- 2) Asymmetrical: Common mode (Line to earth)
- 3) Symmetrical: Differential mode (Line to line)

Block Diagram

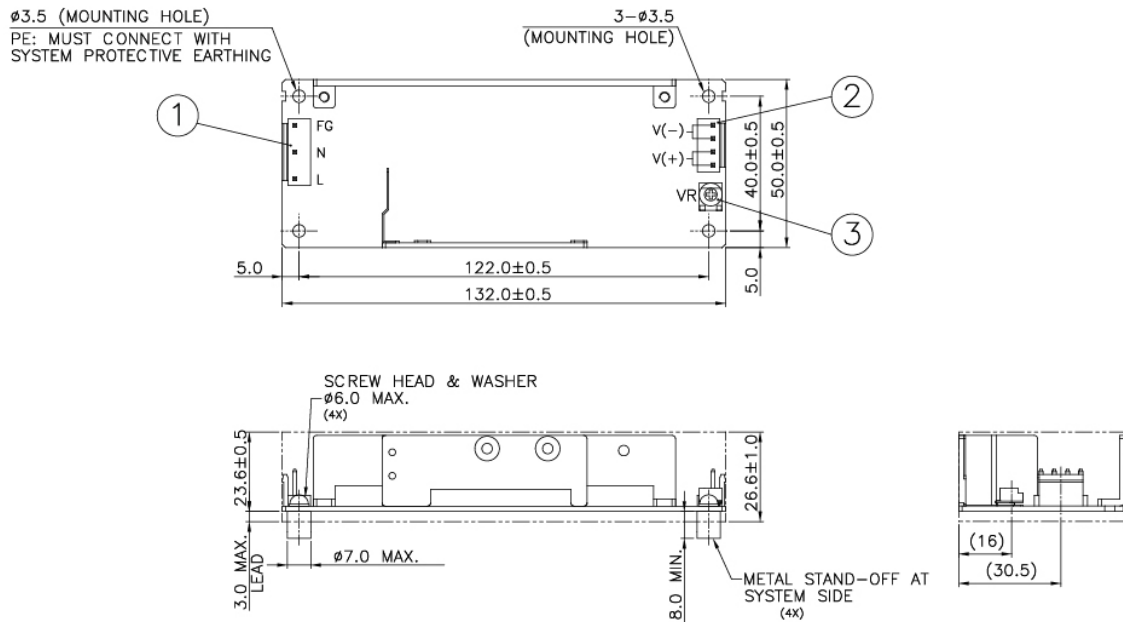


PJ Open Frame Power Supply

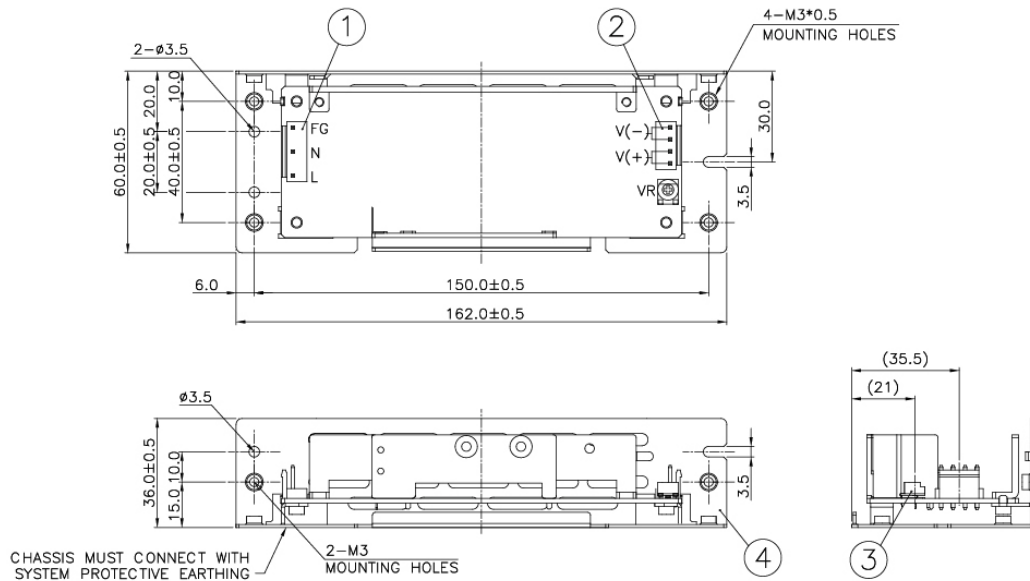
12 V 50 W 1 Phase / PJ-12V50W□NA

Dimensions

L x W x H: 132 x 50 x 26.6 mm (Open Frame)



L x W x H: 162 x 60 x 36 mm (L Frame)



| Item | Device Description |
|------|--------------------|
| 1 | Input Connector |
| 2 | Output Connector |
| 3 | VR |
| 4 | Chassis |

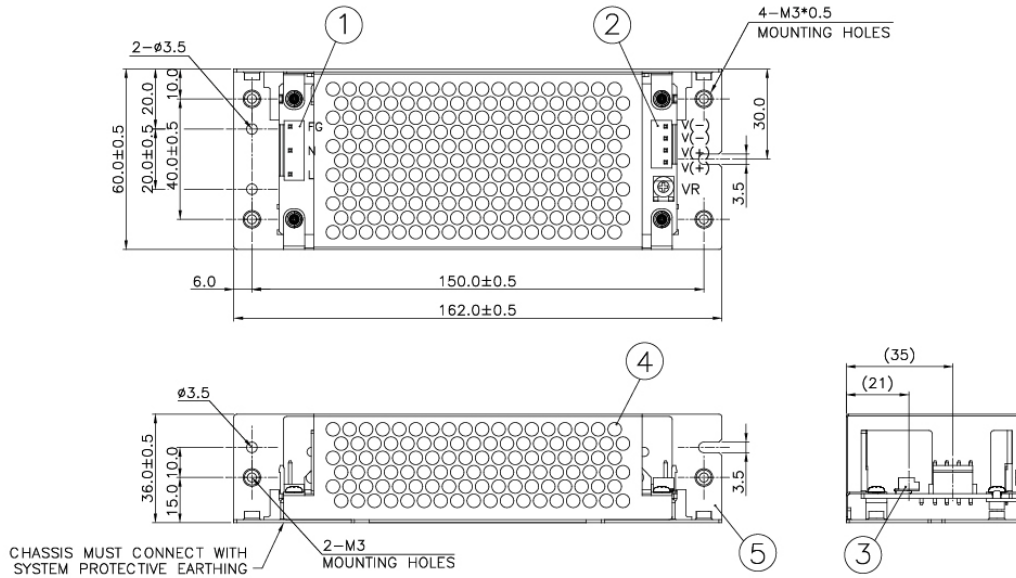
Notes

- Dimensions are in mm
- For information on Mounting Torque, and I/O Connector and Housing, please refer to Table 1 (Page 6).
- For L Frame type: There are 6 threaded mounting holes and 5 normal mounting holes.
- For Open Frame type: There are 4 normal mounting holes.

PJ Open Frame Power Supply

12 V 50 W 1 Phase / PJ-12V50W□NA

L x W x H: 162 x 60 x 36 mm (Enclosed)



| Item | Device Description |
|------|--------------------|
| 1 | Input Connector |
| 2 | Output Connector |
| 3 | VR |
| 4 | Cover |
| 5 | Chassis |

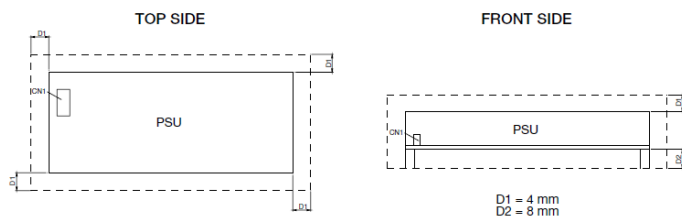
Notes

- Dimensions are in mm
- For information on Mounting Torque, and I/O Connector and Housing, please refer to Table 1 (Page 6).
- For Enclosed type: There are 6 threaded mounting holes and 5 normal mounting holes.

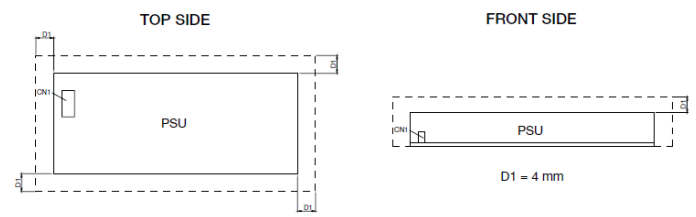
Assembly & Installation

Assembly Reference

■ Open Frame



■ L Frame / Enclosed



For safety reasons, please ensure the mounted device is kept at ≥ 4 mm safety distance at all sides from other components and equipments. **Please insert an insulation sheet between the system and product, if the safety distance is less than 4 mm.**

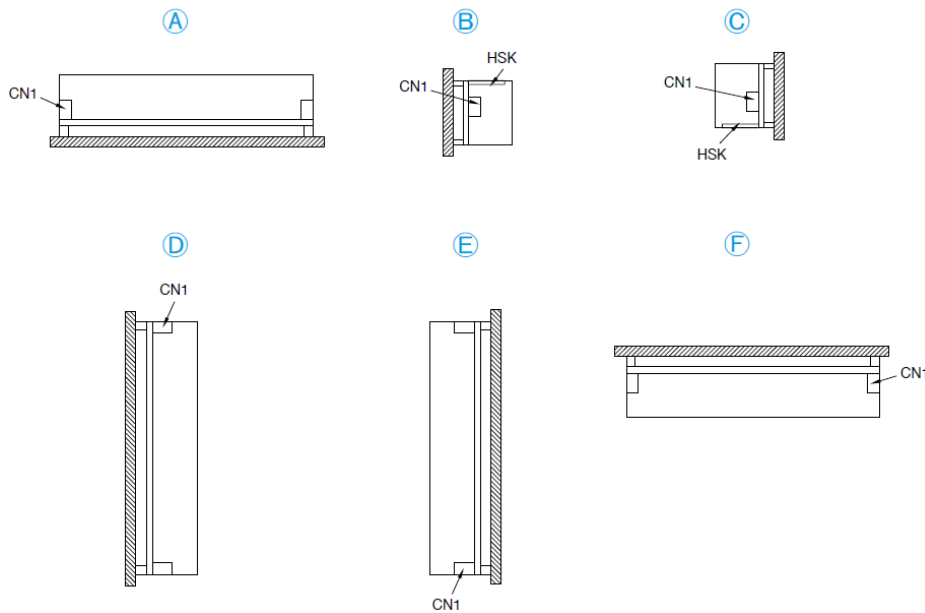
Use flexible cable (stranded or solid) of AWG No. 22-18. Please refer to Table 1 for the recommended Housing and Terminal.

| Table 1 | Connector (Board Mounting) | Housing | Terminal |
|--------------|----------------------------|---------|--------------|
| Input (JST) | B3P5-VH(LF)(SN) | VHR-5N | SVH-21T-P1.1 |
| Output (JST) | B4P-VH(LF)(SN) | VHR-4N | |

PJ Open Frame Power Supply

12 V 50 W 1 Phase / PJ-12V50W□NA

Mounting Orientation



- Any excessive twisting or bending may damage the device's PCB. Please handle the device with care.
- The device is not recommended to be placed on low thermal conductive surfaces. For example, plastics.
- Prevent any foreign metal, particles or conductors from entering the device through the openings during installation. It may cause: -Electric shock; Safety hazard; 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 metal surface.**

Engineering Data

Convection

■ Open Frame / L Frame

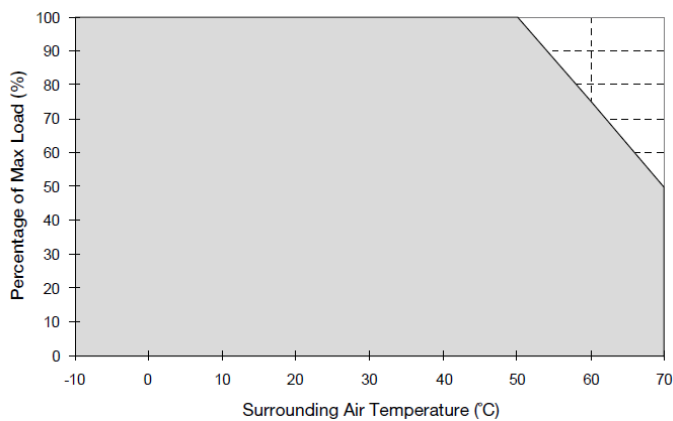


Fig.1.1 De-rating for Mounting Orientation A to F
> 50°C de-rate power by 2.5% / °C

■ Enclosed

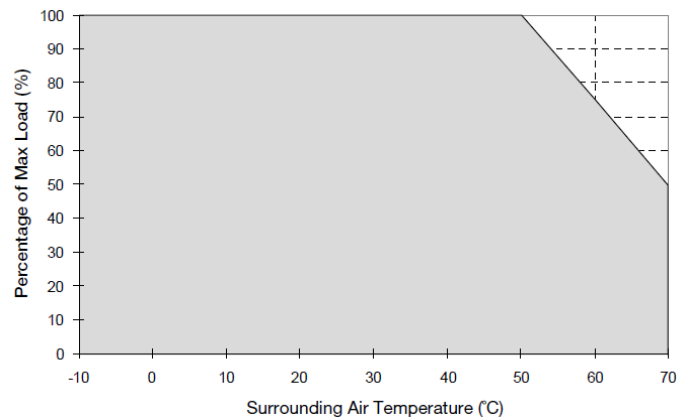


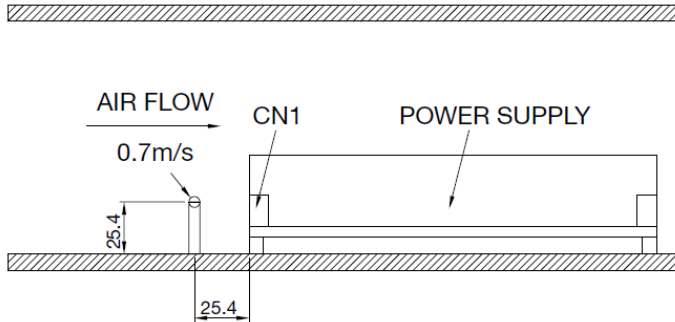
Fig.1.2 De-rating for Mounting Orientation A to F
> 40°C de-rate power by 2.5% / °C

PJ Open Frame Power Supply

12 V 50 W 1 Phase / PJ-12V50W□NA

Forced Cooling (Air Velocity > 0.7 m/s)

■ Air Flow Direction



■ Open Frame / L Frame

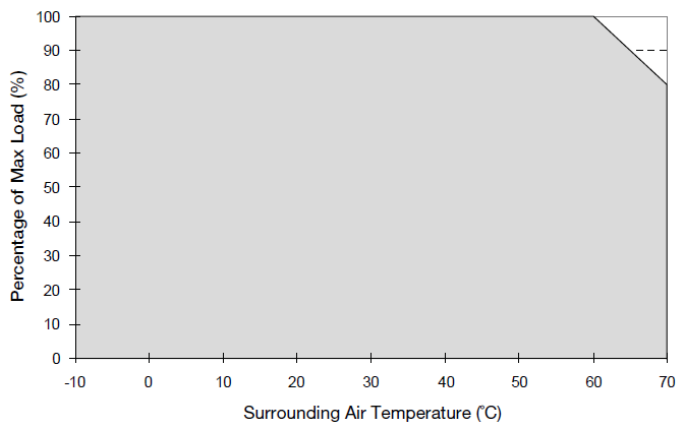


Fig.1.3 De-rating for Mounting Orientation A to F
> 60°C de-rate power by 2% / °C

■ Enclosed

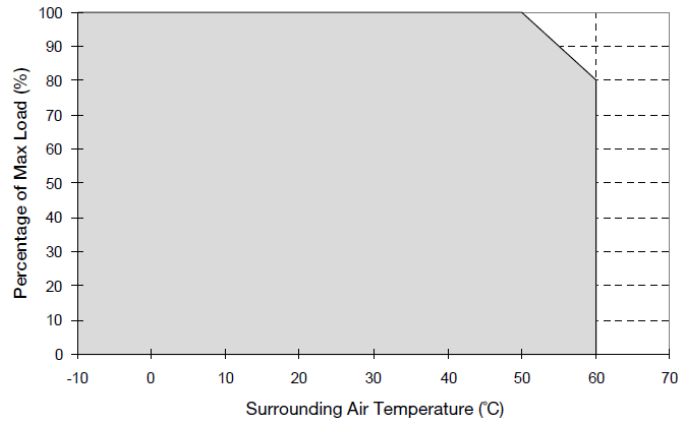


Fig.1.4 De-rating for Mounting Orientation A to F
> 50°C de-rate power by 2% / °C

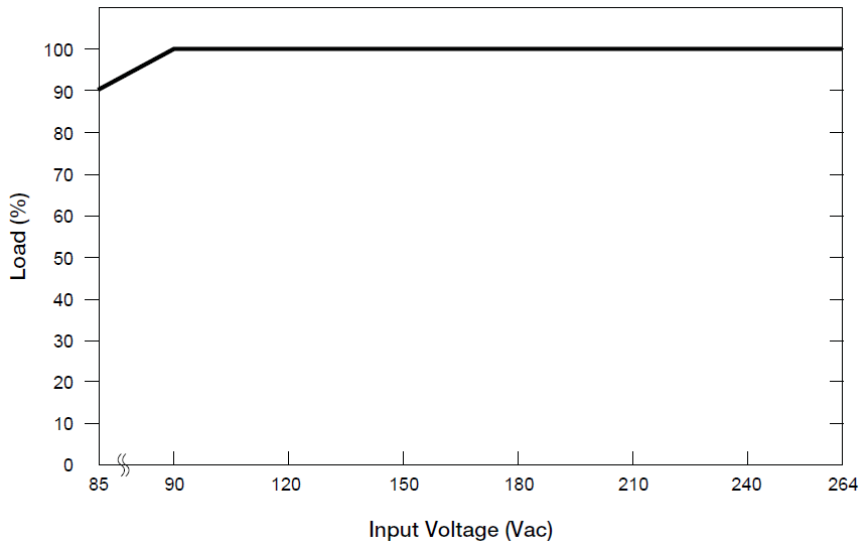
Notes

1. Power supply components may degrade, or be damaged, when the power supply is continuously used outside the shaded region, refer to the graphs shown above.
2. If the output capacity is not reduced when the surrounding air temperature is more than the upper limit temperature, the device will run into Over Temperature Protection. When activated, the output voltage will go into latch mode until the mains is reapplied and the surrounding air temperature drops to its normal operating temperature.
3. Depending on the surrounding air temperature and output load delivered by the power supply, the device housing can be very hot!
4. If the device has to be mounted in any other orientation, please do not hesitate to contact info@deltapsu.com for more details.

PJ Open Frame Power Supply

12 V 50 W 1 Phase / PJ-12V50W□NA

Output De-rating VS. Input Voltage



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

Functions

Start-up Time

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

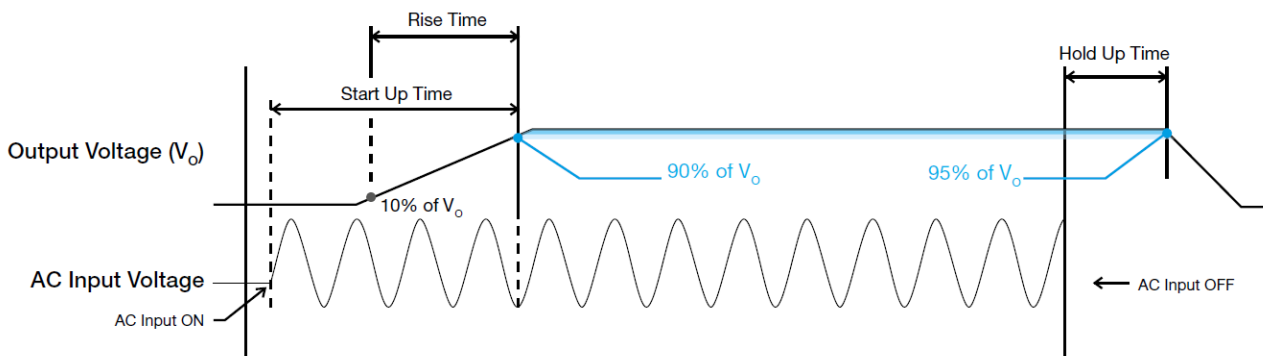
Rise Time

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

Hold-up Time

Time between the collapse of the AC input voltage, and the output falling to 95% of its steady state set value.

■ Graph illustrating the Start-up Time, Rise Time, and Hold-up Time

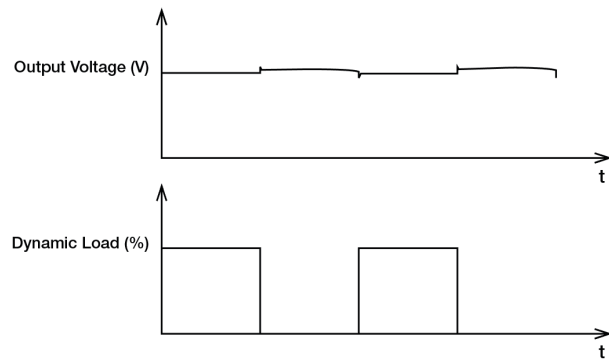


PJ Open Frame Power Supply

12 V 50 W 1 Phase / PJ-12V50W□NA

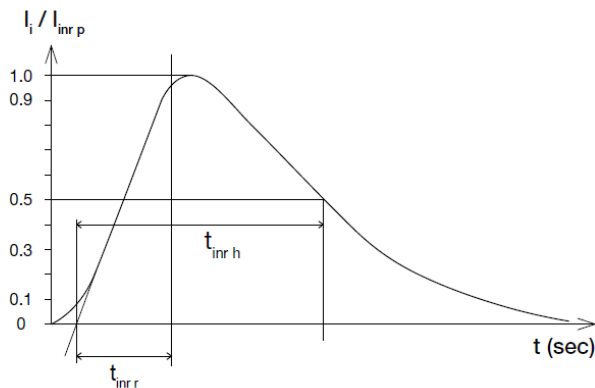
Dynamic Response

The power supply output voltage will remain within $\pm 5\%$ of its steady state value, when subjected to a dynamic load from 0 to 50% and 50 to 100% of its rated current.



Inrush Current

Inrush current is the peak, instantaneous, input current measured and, 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.



Overvoltage Protection

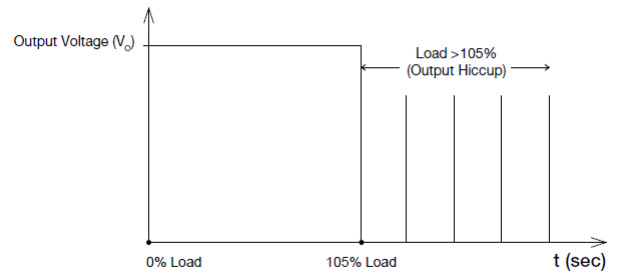
The power supply's overvoltage circuit will be activated when its internal feedback circuit fails. The output voltage shall not exceed its specifications defined on Page 3 under "Protections". **The power supply should be latch.**

Short Circuit Protection

The power supply's output OLP/OCP function also provides protection against short circuits. When a short circuit is applied, the output current will operate in "Hiccup mode", as shown in the illustration in the OLP/OCP section on this page. The power supply will return to normal operation after the short circuit is removed.

Overload & Overcurrent Protections

The power supply's Overload (OLP) and Overcurrent (OCP) Protections will be activated when output current exceeds 105% of I_o (Max load). In such occurrence, the V_o will start to droop and once the power supply has reached its maximum power limit, the protection is activated and the power supply will go into "Hiccup mode" (Auto-Recovery). The power supply will recover once the fault condition of the OLP and OCP is removed and I_o is back within the specifications.



Additionally, if the I_o is $<105\%$ but $>100\%$ for a prolonged period of time (depending on the load), the Over Temperature Protection (OTP) will be activated due to high temperature on critical components. The power supply will then go into latch mode until the fault is removed and the mains is reapplied.

Over Temperature Protection

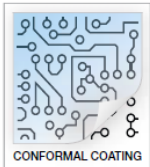
As mentioned above, the power supply also has Over Temperature Protection (OTP). This is activated when the overload condition persists for an extended duration and the output current is below the overload trigger point but $>100\%$ load. In the event of a higher operating condition at 100% load, the 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 mains is reapplied and the surrounding air temperature drops to its normal operating temperature.

PJ Open Frame Power Supply

12 V 50 W 1 Phase / PJ-12V50W□NA

Others

Conformal Coating



The Protective Coating Technology

Delta Electronics Group has designed the perfect dipping technique which penetrates everywhere including under device, and prevents leakage. The conformal coating dipping can be applied to PCBs or circuit board. The coating preserves the performance of precision electronic primarily by preventing ionizable contaminants such as salt from reaching circuit nodes, where the material slumps around sharp edges. This can be a problem especially in highly conversing atmosphere.

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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