

SERIES: VOF-450C | DESCRIPTION: AC-DC POWER SUPPLY
FEATURES

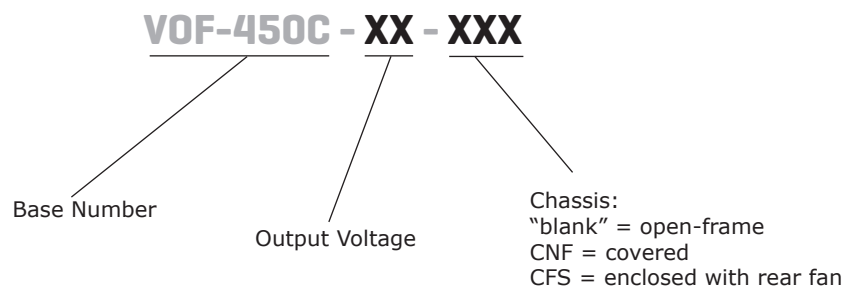
- 90~264 Vac and 127~370 Vdc input voltage range
- 3" x 5" open-frame footprint
- 250 W under natural convection, 450 W with airflow
- -40 ~ 70 °C temperature range
- active PFC
- 5 Vsby, 12 Vfan, power good, remote sense
- certified to 62368 safety standard
- designed to meet 60335 & 61558 safety requirements



| MODEL | output voltage | | output current | output power ² | ripple and noise ³ | efficiency ⁴ |
|-------------|----------------|-----------------------------|----------------|---------------------------|-------------------------------|-------------------------|
| | (Vdc) | range ¹ (Vdc) | max (A) | max (W) | max (mVp-p) | typ (%) |
| VOF-450C-12 | 12 | 11.4~12.6 | 33.3 | 400 | 200 | 91.0 |
| VOF-450C-15 | 15 | 14.25~15.75 | 26.70 | 400 | 200 | 92.0 |
| VOF-450C-24 | 24 | 22.8~25.2 | 18.75 | 450 | 200 | 93.0 |
| VOF-450C-27 | 27 | 25.65~28.35 | 16.70 | 450 | 200 | 93.5 |
| VOF-450C-36 | 36 | 34.2~37.8 | 12.50 | 450 | 200 | 93.0 |
| VOF-450C-48 | 48 | 45.6~50.4 | 9.40 | 450 | 200 | 94.0 |

Notes:

1. When adjusting the output voltage care should be taken never to exceed the stated output power or output current of the unit.
2. With 25 CFM of forced air cooling.
3. At full load, nominal input, 20 MHz bandwidth oscilloscope, tip & barrel method, output terminated with 47 uF electrolytic and 0.1 uF ceramic capacitors.
4. At 230 Vac.

PART NUMBER KEY


INPUT

| parameter | conditions/description | min | typ | max | units |
|---------------------------|---|------------|-----|-----|-------|
| voltage | ac input | 90 | | 264 | Vac |
| | dc input | 127 | | 370 | Vdc |
| frequency | | 47 | | 63 | Hz |
| current | at 90/115 Vac | | | 5.2 | A |
| | at 230 Vac | | | 2.6 | A |
| inrush current | at 115 Vac, cold start | | 40 | | A |
| | at 230 Vac, cold start | | 80 | | A |
| leakage current | at 264 Vac | | | 0.1 | mA |
| | contact leakage current earth leakage current | | | 0.5 | mA |
| power factor correction | at 115 Vac, full load | 0.98 | | | |
| | at 230 Vac, full load | 0.95 | | | |
| no load power consumption | at 230 Vac, PS-ON signal held low (output disabled) | | | 0.5 | W |
| PS_ON input signal | power ON | PS_ON high | 2 | 5 | V |
| | power OFF | PS_ON low | 0 | 0.5 | V |

OUTPUT

| parameter | conditions/description | min | typ | max | units |
|----------------------------|--|--|-------|-------|-------|
| output capacitance | 12, 15, 24 Vdc output models | | | 6,000 | μF |
| | 27 Vdc output model | | | 4,000 | μF |
| | 36 Vdc output model | | | 3,000 | μF |
| | 48 Vdc output model | | | 2,000 | μF |
| initial set point accuracy | full load | | ±2 | | % |
| | 12,15, 24 Vdc output models all other output models | | ±1 | | % |
| line regulation | rated load | | ±0.5 | | % |
| load regulation | 0 ~ 100% load | | ±1 | | % |
| hold-up time | at 115 Vac, 25°C, full load | 12 | | | ms |
| | at 230 Vac, 25°C, full load | 16 | | | ms |
| temperature coefficient | | | ±0.03 | | %/°C |
| fan power | output power of 12 Vdc/0.5A | | | 6 | W |
| VSTBY ⁵ | | | 5 | | V |
| PG signal | power ON | The PG signal goes high with 10ms~500ms delay after power set up. | 10 | 500 | ms |
| | power OFF/power FAIL | The TTL signal goes low at least 1ms before output below 90% at rated value. | 1 | - | ms |
| | HIGH level | high | 2 | 6 | V |
| | LOW level | low | 0 | 6 | V |

Note: 5. The load capacity is 0.6A without fan; the load capacity is 1A with fan 25CFM, tolerance2%, ripple: 120mVp-p(max.)

PROTECTIONS

| parameter | conditions/description | min | typ | max | units |
|-----------------------------|--|-----|-----|------|-------|
| over voltage protection | output shutdown, latching | | | | |
| | 12 Vdc output model | | | 15.6 | Vdc |
| | 15 Vdc output model | | | 19.5 | Vdc |
| | 24 Vdc output model | | | 31.2 | Vdc |
| | 27 Vdc output model | | | 35.1 | Vdc |
| | 36 Vdc output model | | | 46.8 | Vdc |
| | 48 Vdc output model | | | 60.0 | Vdc |
| over current protection | auto recovery, hiccup | 105 | | | % |
| short circuit protection | continuous, auto recovery, hiccup, recovery time <5s | | | | |
| over temperature protection | output shutdown, auto recovery | | | | |

SAFETY & COMPLIANCE

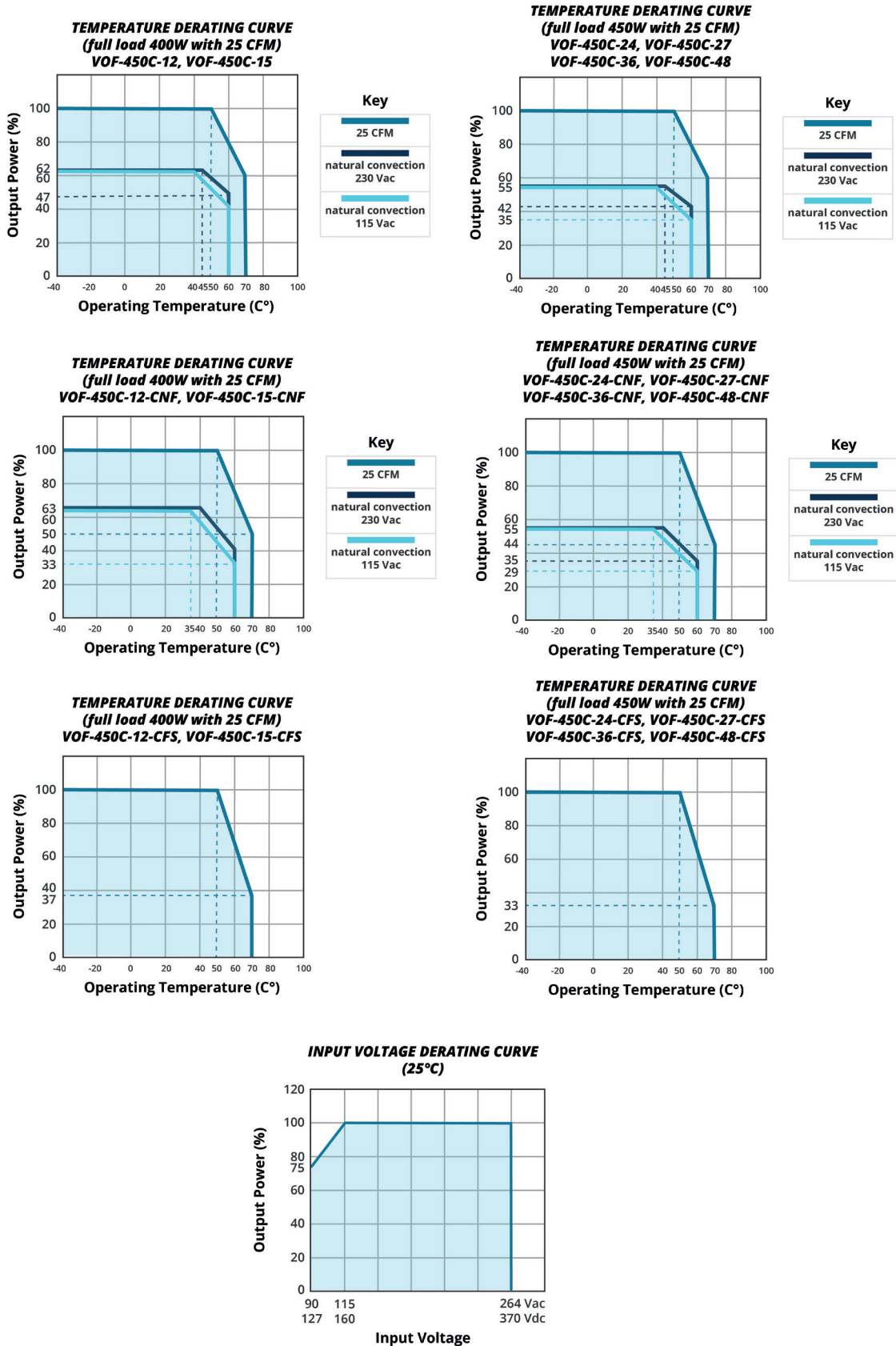
| parameter | conditions/description | min | typ | max | units |
|----------------------------------|---|---------|-----|-----|-------|
| isolation voltage | input to output, 1 min, <5mA | 4,000 | | | Vac |
| | input to ground, 1 min, <5mA | 2,000 | | | Vac |
| | output to ground, 1 min, <5mA | 1,500 | | | Vac |
| safety approvals | certified to 62368: EN/UL designed to meet 60335: EN designed to meet 61558: EN | | | | |
| safety class | Class I | | | | |
| conducted emissions ⁵ | EN55032(CISPR32) CLASS B | | | | |
| radiated emissions ⁵ | EN55032(CISPR32) CLASS B | | | | |
| harmonic current | IEC/EN61000-3-2 CLASS A and CLASS D | | | | |
| flicker | IEC/EN61000-3-3 | | | | |
| ESD | IEC/EN61000-4-2 Contact ±8KV/Air ±15KV, perf. Criteria A | | | | |
| radiated immunity | IEC/EN61000-4-3 10V/m, perf. Criteria A | | | | |
| EFT/burst | IEC/EN61000-4-4 ±2KV, perf. Criteria A | | | | |
| surge | IEC/EN61000-4-5 line to line ±2KV, line to ground ±4KV, perf. Criteria A | | | | |
| conducted immunity | IEC/EN61000-4-6 10Vr.m.s, perf. Criteria A | | | | |
| voltage dips and interruptions | IEC/EN61000-4-11 0%, 70% perf. Criteria B | | | | |
| MTBF | as per MIL-HDBK-217F at 25°C | 200,000 | | | hours |
| RoHS | yes | | | | |

Notes: 5. The power supply is considered a component of the end system. All EMC performance has been tested on a metal plate with the dimensions 360 x 360 x 1 mm. The power supply must be integrated into the end system for proper electromagnetic compatibility testing.

ENVIRONMENTAL

| parameter | conditions/description | min | typ | max | units |
|-----------------------|------------------------|-----|-----|-----|-------|
| operating temperature | see derating curves | -40 | | 70 | °C |
| storage temperature | | -40 | | 85 | °C |
| operating humidity | non-condensing | 20 | | 90 | % |
| storage humidity | non-condensing | 10 | | 95 | % |

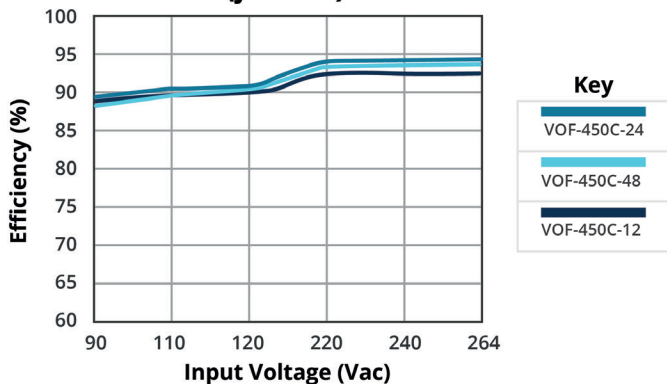
DERATING CURVES



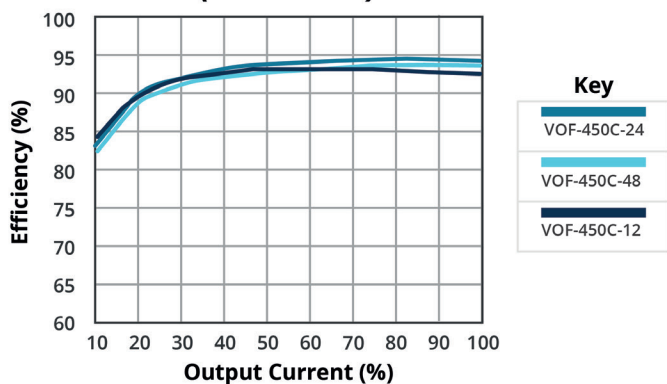
Note: With an AC input voltage between 90 ~ 115 Vac and a DC input between 127 ~ 160 Vdc the output power must be derated as per the temperature derating curves.

EFFICIENCY CURVES

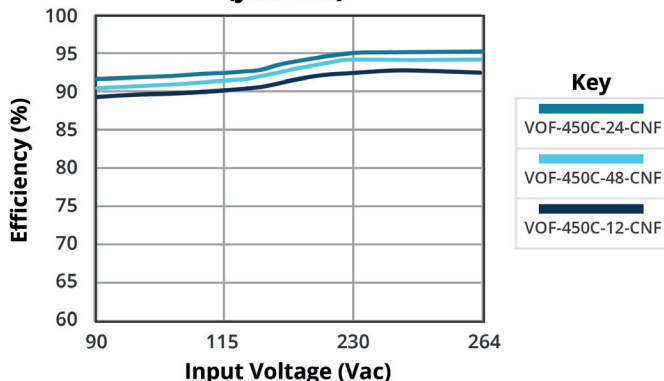
EFFICIENCY VS INPUT VOLTAGE
(full load)



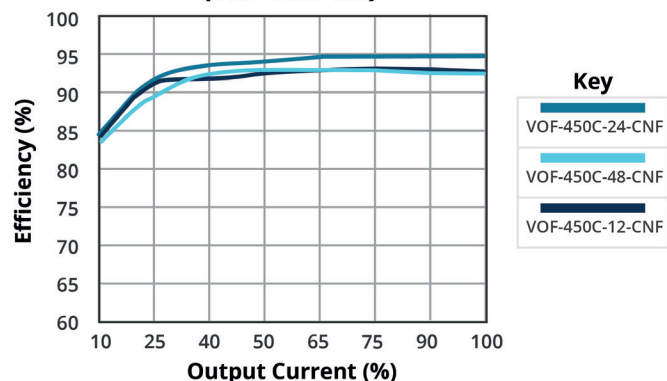
EFFICIENCY VS OUTPUT LOAD
($V_{in} = 230$ Vac)



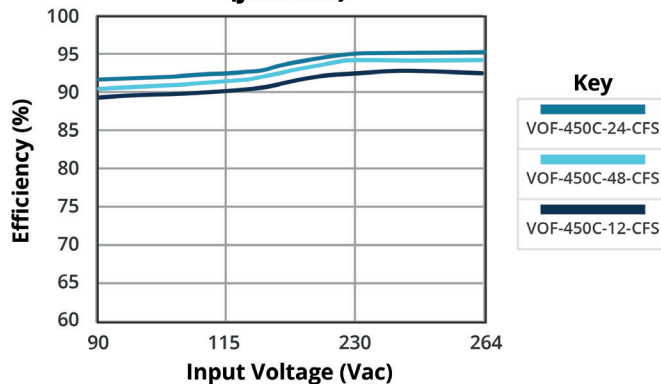
EFFICIENCY VS INPUT VOLTAGE
(full load)



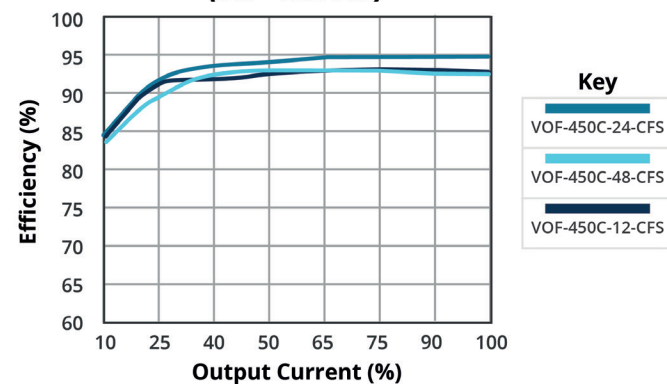
EFFICIENCY VS OUTPUT LOAD
($V_{in} = 230$ Vac)



EFFICIENCY VS INPUT VOLTAGE
(full load)



EFFICIENCY VS OUTPUT LOAD
($V_{in} = 230$ Vac)



MECHANICAL

| parameter | conditions/description | min | typ | max | units |
|------------|--|-----|-----|-----|-------|
| dimensions | open frame models: 127 × 76.2 × 38.5 [5.0 × 3.0 × 1.515 inch] | | | | mm |
| | covered models: 130.0 × 86.0 × 43.0 [5.118 × 3.385 × 1.692 inch] | | | | mm |
| | with rear fan: 160.0 × 86.0 × 43.0 [6.299 × 3.385 × 1.692 inch] | | | | mm |
| weight | open frame models | | 400 | | g |
| | covered models | | 605 | | g |
| | with rear fan | | 645 | | g |
| cooling | natural convection or 25 CFM forced air | | | | |

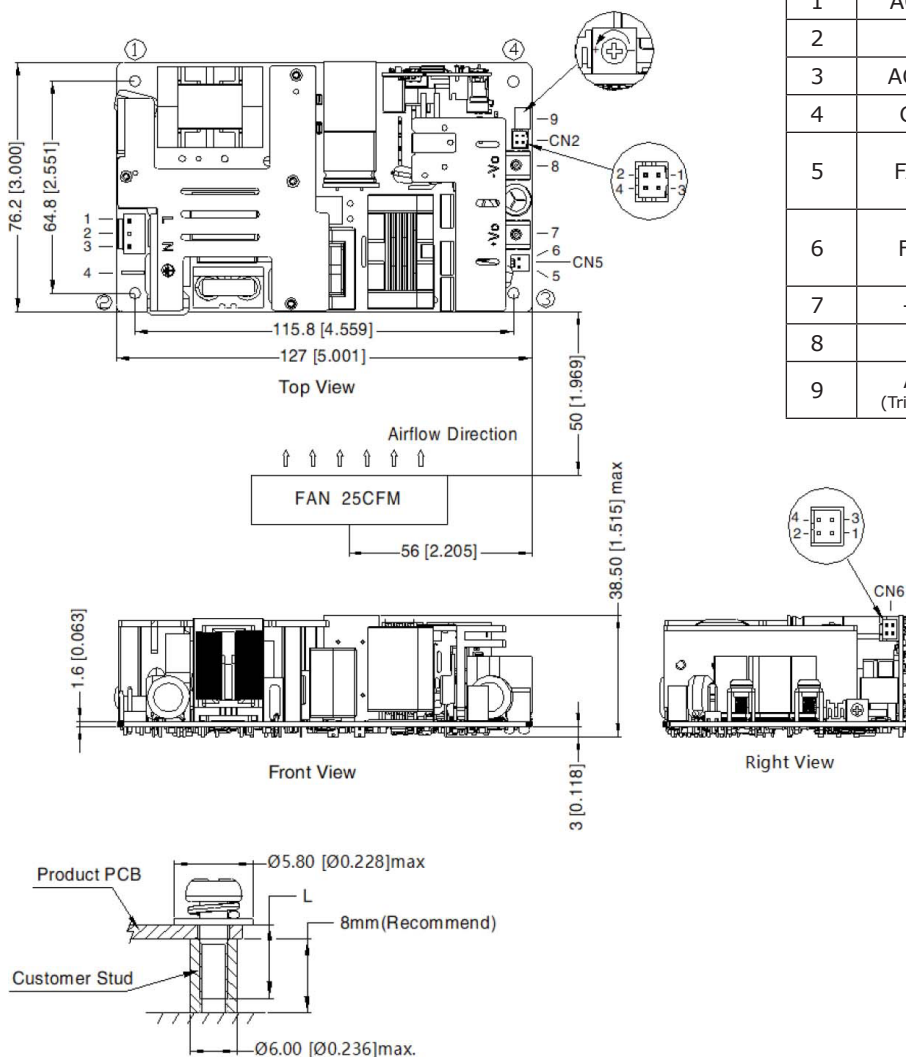
MECHANICAL DRAWING

Open-frame

units: mm [inch]

general tolerance: ±1.00 [±0.039]

pin 7,8 connector tightening torque: M4, 1.2N·m (max)



| PIN-OUT | | |
|---------|-------------------|--|
| PIN | Function | Mating Connector |
| 1 | AC (L) | Housing: JST VHR or equivalent Contact: JST SVH-21T-P1.1 or equivalent |
| 2 | NC | |
| 3 | AC (N) | |
| 4 | GND | Contact: JST SPS-21T-250 |
| 5 | FAN+ | CN5: Fan power output port Housing: TKP 2502 or equivalent Contact: TKP 8811 or equivalent |
| 6 | FAN- | |
| 7 | +Vo | |
| 8 | -Vo | |
| 9 | ADJ (Trim POT) | |

| CN6: PS_ON signal input port (3-4) 5Vdc standby (1-2) | | |
|--|----------|--|
| PIN | Function | Mating Connector |
| 1 | +5V | Housing: JST PHD-2*2Y or equivalent |
| 2 | GND | |
| 3 | PS-ON | Contact: JST PHD-TE or equivalent |
| 4 | GND | |

| CN2: remote sensing signal input port (1-2) PG signal (3-4) | | |
|--|----------|--|
| PIN | Function | Mating Connector |
| 1 | RS- | Housing: JST PHD-2*2Y or equivalent |
| 2 | RS+ | |
| 3 | GND | Contact: JST PHD-TE or equivalent |
| 4 | PG | |

| Position | Screw Spec. | L (recommended) | Torque (max) |
|----------|-------------|--------------------|-----------------|
| ①~④ | M3 | 6mm | 0.4 N·m |

Note: 1. Class I system ①, ②, ③ positions must be connected to the protective earth ground (⊕).
2. It is recommended that a minimum distance of 10mm be placed between the PCB edge and all other components.

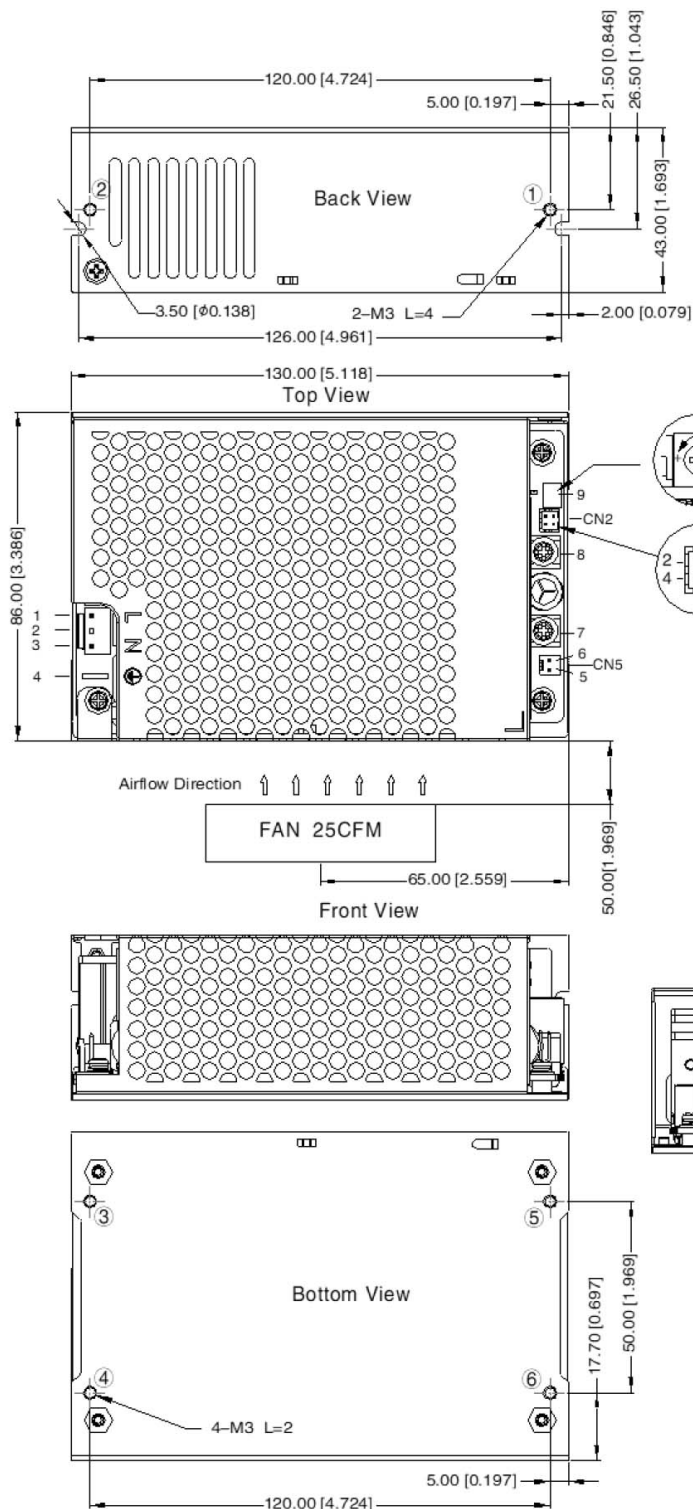
MECHANICAL DRAWING (CONTINUED)

Covered

units: mm [inch]

general tolerance: ±1.00 [±0.039]

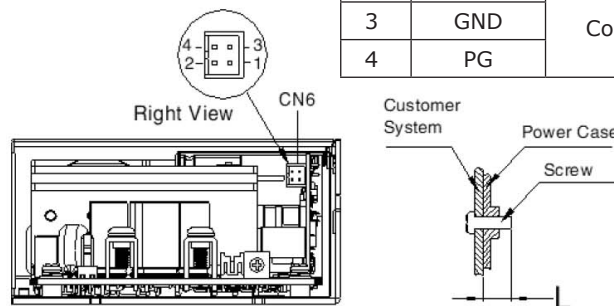
pin 7,8 connector tightening torque: M4, 1.2N·m (max)



| PIN-OUT | | |
|---------|-------------------|---|
| PIN | Function | Mating Connector |
| 1 | AC (L) | Housing: JST VHR or equivalent |
| 2 | NC | |
| 3 | AC (N) | Contact: JST SVH-21T-P1.1 or equivalent |
| 4 | GND | Contact: JST SPS-21T-250 |
| 5 | FAN+ | CN5: Fan power output port Housing: TKP 2502 or equivalent |
| 6 | FAN- | |
| 7 | +Vo | |
| 8 | -Vo | |
| 9 | ADJ (Trim POT) | |

| CN6: PS_ON signal input port (3-4) 5Vdc standby (1-2) | | |
|--|----------|--|
| PIN | Function | Mating Connector |
| 1 | +5V | Housing: JST PHD-2*2Y or equivalent |
| 2 | GND | |
| 3 | PS-ON | Contact: JST PHD-TE or equivalent |
| 4 | GND | |

| CN2: remote sensing signal input port (1-2) PG signal (3-4) | | |
|--|----------|--|
| PIN | Function | Mating Connector |
| 1 | RS- | Housing: JST PHD-2*2Y or equivalent |
| 2 | RS+ | |
| 3 | GND | Contact: JST PHD-TE or equivalent |
| 4 | PG | |



| Position | Screw Spec. | L (max) | Torque (max) |
|----------|-------------|---------|--------------|
| ①~② | M3 | 4mm | 0.4 N·m |
| ③~⑥ | M3 | 2mm | 0.4 N·m |

Note: Safety Class I integrations require the metal case to be securely fastened to protective earth ground (⊕).

MECHANICAL DRAWING (CONTINUED)

with rear fan:

units: mm [inch]

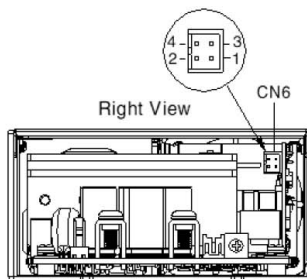
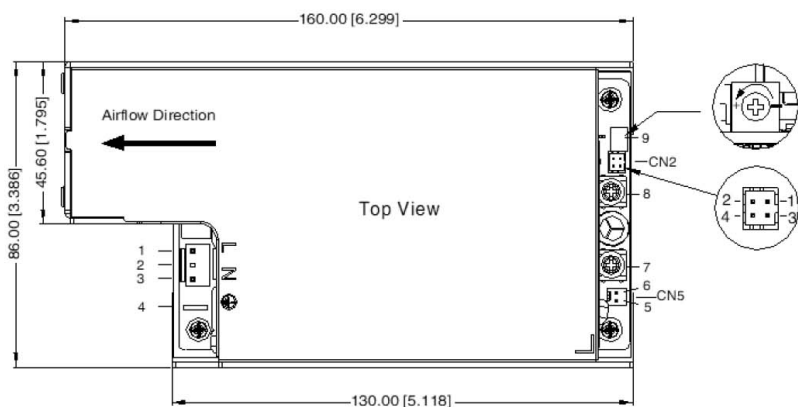
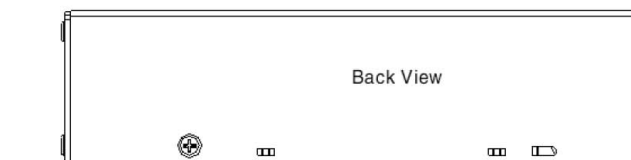
general tolerance: ± 1.00 [± 0.039]

pin 7,8 connector tightening torque: M4, 1.2N·m (max)

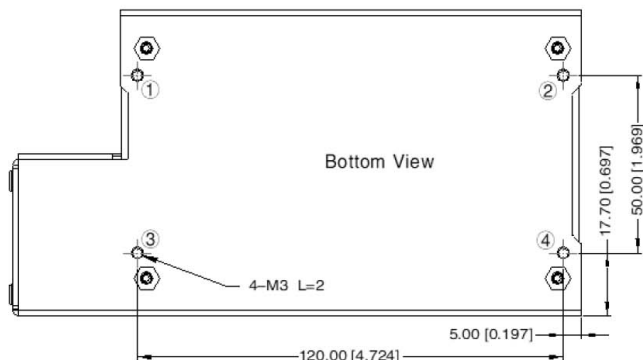
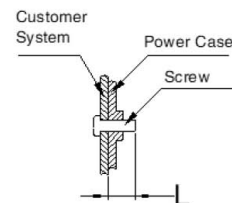
| Position | Screw Spec. | L (max) | Torque (max) |
|----------|-------------|---------|--------------|
| ①~④ | M3 | 2mm | 0.4 N·m |

Note: Safety Class I integrations require the metal case to be securely fastened to protective earth ground (Ⓛ).

| PIN-OUT | | |
|---------|----------------|--|
| PIN | Function | Mating Connector |
| 1 | AC (L) | Housing: JST VHR or equivalent Contact: JST SVH-21T-P1.1 or equivalent |
| 2 | NC | |
| 3 | AC (N) | |
| 4 | GND | Contact: JST SPS-21T-250 |
| 5 | FAN+ | CN5: Fan power output port Housing: TKP 2502 or equivalent Contact: TKP 8811 or equivalent |
| 6 | FAN- | |
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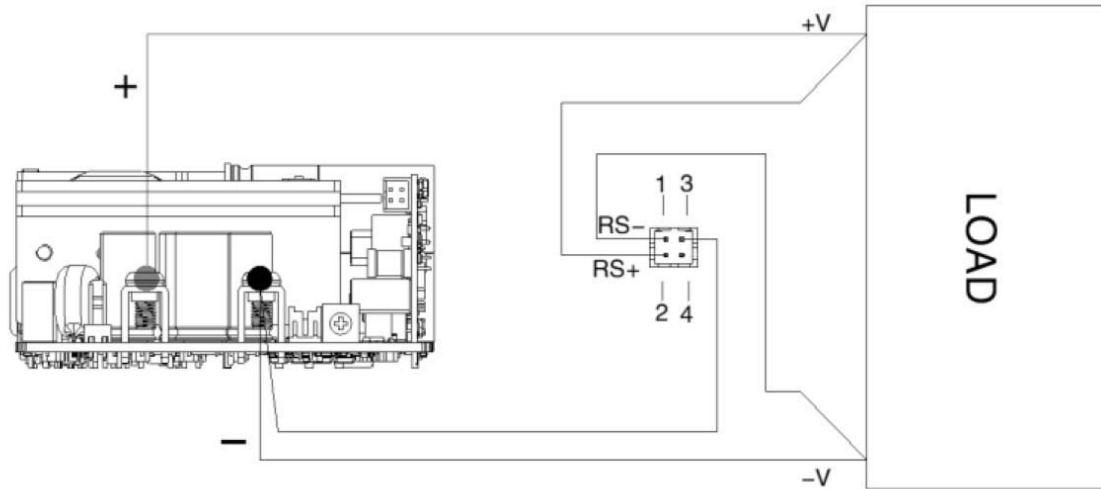
| CN6: PS_ON signal input port (3-4) 5Vdc standby (1-2) | | |
|--|----------|-------------------------------------|
| PIN | Function | Mating Connector |
| 1 | +5V | Housing: JST PHD-2*2Y or equivalent |
| 2 | GND | |
| 3 | PS-ON | Contact: JST PHD-TE or equivalent |
| 4 | GND | |



| CN2: remote sensing signal input port (1-2) PG signal (3-4) | | |
|--|----------|-------------------------------------|
| PIN | Function | Mating Connector |
| 1 | RS- | Housing: JST PHD-2*2Y or equivalent |
| 2 | RS+ | |
| 3 | GND | Contact: JST PHD-TE or equivalent |
| 4 | PG | |

REMOTE SENSE

Remote Sense signals (RS+ and RS-) can be used to compensate for voltage drops that occur within the output power cables. RS+ and RS- should always be routed as a twisted pair and never shorted together or reversed otherwise permanent damage may occur.



REVISION HISTORY

| rev. | description | date |
|------|----------------------------------|------------|
| 1.0 | initial release | 12/21/2021 |
| 1.01 | PG, REM, STDBY, and trim updated | 04/06/2022 |

The revision history provided is for informational purposes only and is believed to be accurate.



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