# OPS2x4-60 | OPEN FRAME POWER SUPPLIES

## Features :

- 4 x 2 x 1.16 Inches Form Factor
- 60 Watts Convection
- No Load Power < 0.5 W
- -40°C to +70°C Operating Temperature
- Efficiencies up to 87%
- Class II Option Available
- Medical ( BF ) Safety Approvals
- Approved to Household, ITAV and Medical Standards

## SPECIFICATIONS:

| MODEL | | OPS2x4-60-05 | OPS2x4-60-12 | OPS2x4-60-15 | OPS2x4-60-24 | OPS2x4-60-48 |
|---|---|---|---|---|---|---|
| OUTPUT | NOMINAL DC VOLTAGE | 5 V | 12 V | 15 V | 24 V | 48 V |
| | RATED CURRENT ( CONVECTION ) | 10 A | 5 A | 4 A | 2.5 A | 1.25 A |
| | RATED CURRENT ( FORCED AIR ) | NA | NA | NA | NA | NA |
| | RATED POWER ( CONVECTION ) | 50 W | 60 W | 60 W | 60 W | 60 W |
| | RATED POWER ( FORCED AIR ) | NA | NA | NA | NA | NA |
| | RIPPLE & NOISE ( max ) | < 1.5 % of Vout | < 1 % of Vout | < 1 % of Vout | < 1 % of Vout | < 1 % of Vout |
| | VOLTAGE ADJ. RANGE | 5.0 to 6.0 V | 12 to 14 V | 15 to 17.5 V | 24 to 28 V | 48 to 56 V |
| | VOLTAGE TOLERANCE | ± 1 % | | | | |
| | LINE REGULATION | ± 0.5 % | | | | |
| | LOAD REGULATION | ± 1 % | | | | |
| | TURN ON TIME | < 1 sec @ 230 VAC & < 3 sec @ 115 VAC, Full load | | | | < 3 sec @ 230 VAC & < 6 sec @ 115 VAC, Full load |
| | HOLD UP TIME | ≥ 60 ms @ 230 VAC & ≥ 10 ms @ 115 VAC, Full load | | | | |
| | RISE TIME | < 100 ms | | | | |
| | FAN OUTPUT | Not Available | | | | |
| | TRANSIENT RESPONSE | Max excursion 5 % for step load change from 50 % to 100 % at 0.1 A / µsec slew rate, 50 % duty cycle, 50 / 60 Hz. Recovery time < 5 msec | | | | |
| INPUT | VOLTAGE RANGE* | 90 - 264 VAC ( 127 - 370 VDC ) **Note:** 90 - 305 VAC operation available on demand. | | | | |
| | FREQUENCY RANGE | 47 - 63 Hz | | | | |
| | EFFICIENCY @ 230 VAC | Up to 80 % | Up to 85 % | Up to 85 % | Up to 87 % | Up to 87 % |
| | AC CURRENT | 1.2 A @ 115 VAC; 0.8 A @ 230 VAC | | | | |
| | POWER FACTOR | No active PFC is available | | | | |
| | INRUSH CURRENT | < 60 Amps; Measured at 264 VAC, 25°C Ambient, Cold start | | | | |
| | LEAKAGE CURRENT | < 300 uA; 264 VAC input | | | | |
| | TOUCH CURRENT | < 100 uA; 264 VAC input | | | | |
| | NO LOAD POWER CONSUMPTION | < 0.5 W; 115 VAC input | | | | |
| PROTECTION | OVERLOAD | > 110 % of rated output current; Hiccup mode; Autorecovery type. | | | | |
| | OVERVOLTAGE | 7 - 9 VDC | 15.5 - 18.5 VDC | 18.5 - 22.5 VDC | 28.5 - 33.5 VDC | 56.5 - 66.5 VDC |
| | | Latched type; Input AC power to be recycled to recover the power supply | | | | |
| | OUTPUT SHORT CIRCUIT | Hiccup mode when output is shorted; Autorecovery type. | | | | |
| | OVER TEMPERATURE | Power supply shuts down when the temperature of PCB below main transformer reaches typically 120°C; Turns on only after the temperature falls below 90°C typically and AC power is recycled thereafter. | | | | |
| ENVIRONMENT | OPERATING TEMP | - 40°C to + 70°C; De-rate linearly above 50°C from 100 % load at 50°C to 50 % load at 70°C. **Note:** Only start up guaranteed at - 40°C with specification deterioration. | | | | |
| | STORAGE TEMP | - 40°C to + 85°C | | | | |
| | COOLING | Natural convection cooled | | | | |
| | HUMIDITY | 5 to 95 % RH, Non condensing | | | | |
| | ALTITUDE | 2000 m | | | | |
| | VIBRATION | Component: 10 ~ 500 Hz, 2 G 10 min. / 1 cycle, Period for 60 min. each along X, Y, Z axes | | | | |

**Note:** *Although power supply will work for the specified DC input voltage range, UL approval is only for the specified AC input voltage range.

| MODEL | | OPS2x4-60-05 | OPS2x4-60-12 | OPS2x4-60-15 | OPS2x4-60-24 | OPS2x4-60-48 |
|---|---|---|---|---|---|---|
| DIELECTRIC WITHSTAND | TEST VOLTAGE | I/P to Earth: 1500 VAC, I/P to O/P: 4000 VAC, O/P to Earth: 1500 VAC | | | | |
| RELIABILITY | MTBF | > 525K hrs. as per MIL-HDBK-217F (25°C) | | | | |
| MECHANICAL | DIMENSION | Overall: 4" x 2" x 1.16" ( L x W x H ) ; Height above PCB: 1" | | | | |
| | WEIGHT | < 150 gms | | | | |
| | MOUNTING | Open Frame | | | | |

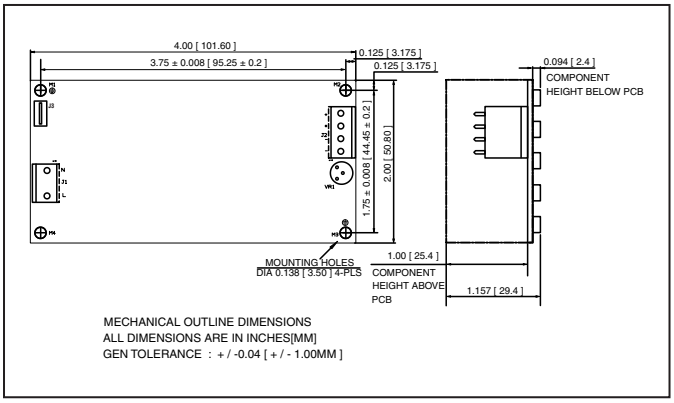
| Means of Protection | | Category |
|---|---|---|
| Primary to Secondary | 2 x MOPP ( Means of Patient Protection ) | IEC 60601-1 Ed 3 |
| Primary to Earth | 1 x MOPP ( Means of Patient Protection ) | |
| Secondary to Earth | 1 x MOPP ( Means of Patient Protection ) | |

## Connectors details

| Ref Des | Description | Type | Pin number | Function |
|---|---|---|---|---|
| J1 | Input AC connector | Tyco: 640445-3; Mates with 647402-3; Pin: 3-647409-1 | 1 | AC Neutral |
| | | | 2 | Not connected |
| | | | 3 | AC Line |
| J2 | Output DC connector | Tyco: 640445-4; Mates with 647402-4; Pin: 3-647409-1 | 1, 2 | V1 Negative |
| | | | 3, 4 | V1 Positive |
| J3 | Earth* | Molex: 19705-4301; Mates with 19003-0001 | - | Earth |

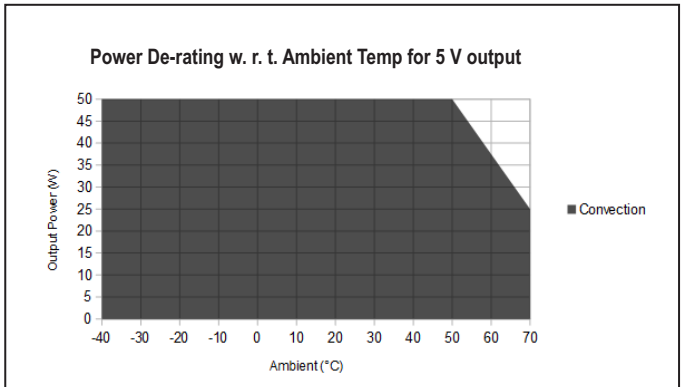
**Note:** * All the mounting holes marked with Earth symbol must be Earthed.

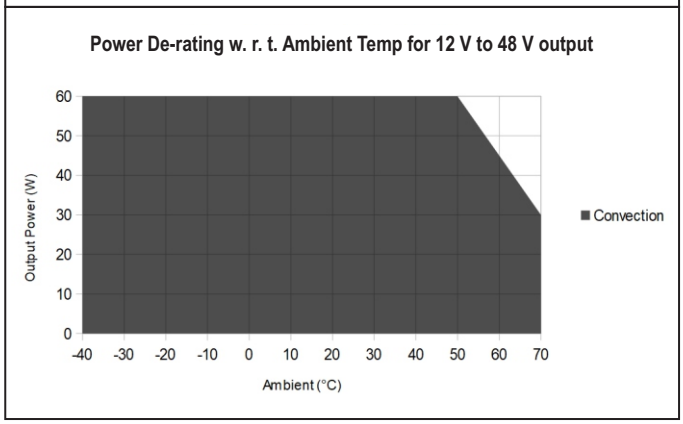
## Mechanical dimensions




**Note:**
1. This open frame power supply should preferably be mounted horizontally on 4 metal stand-offs having diameter not more than 6 mm and height not less than 7 mm.
2. Screws used to fix PCB on stand-offs should not have head diameter more than 6 mm.
3. Washer used should not have diameter more than 6 mm.

## De-rating curve



## Compliance

| Applicable EMI / EMC Standards | | |
|---|---|---|
| **Category** | **Reference Standards** | **Testing Level** |
| Conducted Emission | CISPR32 | CLASS B |
| Radiated Emission | CISPR32 | CLASS A |
| Electrostatic Discharge | IEC 61000-4-2 | Level 4, Criteria A<br>Level 3, Criteria A |
| Radiated Susceptibility | IEC 61000-4-3 | Level 3, Criteria B |
| Electrical Fast Transient / Burst | IEC 61000-4-4 | Level 3, Criteria A |
| Surge | IEC 61000-4-5 | Level 3, Criteria A |
| Conducted Susceptibility | IEC 61000-4-6 | Level 3, Criteria B |
| Power Frequency Magnetic Field | IEC 61000-4-8 | Level 4, Criteria A |
| Voltage Dips & Interruption | IEC 61000-4-11 | Criteria A & B |
| Safety | Approved to IEC / EN / UL 62368-1;<br>IEC / EN 60601-1; IEC / EN 61558 | |

## Ordering information

| Product Code | Description | Certification |
|---|---|---|
| **OPS2x4-60-05-A-1-CU** | Open Frame Power Supply with 4 x 2 x 1.16" Form factor, 5 V / 10 A, 50 Watts with Convection Cooling | |
| **OPS2x4-60-12-A-1-CU** | Open Frame Power Supply with 4 x 2 x 1.16" Form factor, 12 V / 5 A, 60 Watts with Convection Cooling | |
| **OPS2x4-60-15-A-1-CU** | Open Frame Power Supply with 4 x 2 x 1.16" Form factor, 15 V / 4 A, 60 Watts with Convection Cooling | |
| **OPS2x4-60-24-A-1-CU** | Open Frame Power Supply with 4 x 2 x 1.16" Form factor, 24 V / 2.5 A, 60 Watts with Convection Cooling | |
| **OPS2x4-60-48-A-1-CU** | Open Frame Power Supply with 4 x 2 x 1.16" Form factor, 48 V / 1.25 A, 60 Watts with Convection Cooling | |