



### 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                                                                                                                                                        |                 |                 |                 |                 |
|             | 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 )<br><b>Note:</b> 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 |
|             | OUTPUT SHORT CIRCUIT         | Latched type; Input AC power to be recycled to recover the power supply<br>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.<br><b>Note:</b> 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 |
|-----------------------------|--------------|----------------------------------------------------------------------|--------------|--------------|--------------|--------------|
| <b>DIELECTRIC WITHSTAND</b> | TEST VOLTAGE | I/P to Earth: 1500 VAC, I/P to O/P: 4000 VAC, O/P to Earth: 1500 VAC |              |              |              |              |
| <b>RELIABILITY</b>          | MTBF         | > 525K hrs. as per MIL-HDBK-217F (25°C)                              |              |              |              |              |
| <b>MECHANICAL</b>           | DIMENSION    | Overall: 4" x 2" x 1.16" ( L x W x H ) ; Height above PCB: 1"        |              |              |              |              |
|                             | WEIGHT       | < 150 gms                                                            |              |              |              |              |
|                             | MOUNTING     | Open Frame                                                           |              |              |              |              |

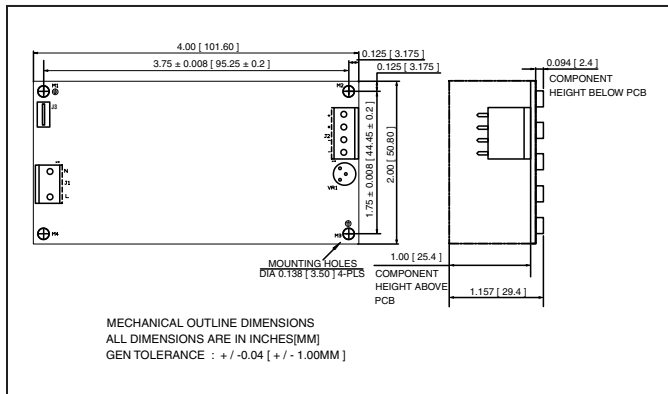
| Means of Protection  |                                          | Category         |
|----------------------|------------------------------------------|------------------|
| Primary to Secondary | 2 x MOPP ( Means of Patient Protection ) | IEC 60601-1 Ed 3 |
| Primary to Earth     | 1 x MOPP ( Means 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;<br>Mates with 647402-3;<br>Pin: 3-647409-1 | 1          | AC Neutral    |
|         |                     |                                                            | 2          | Not connected |
|         |                     |                                                            | 3          | AC Line       |
| J2      | Output DC connector | Tyco: 640445-4;<br>Mates with 647402-4;<br>Pin: 3-647409-1 | 1, 2       | V1 Negative   |
|         |                     |                                                            | 3, 4       | V1 Positive   |
| J3      | Earth*              | Molex: 19705-4301;<br>Mates with 19003-0001                | -          | Earth         |

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

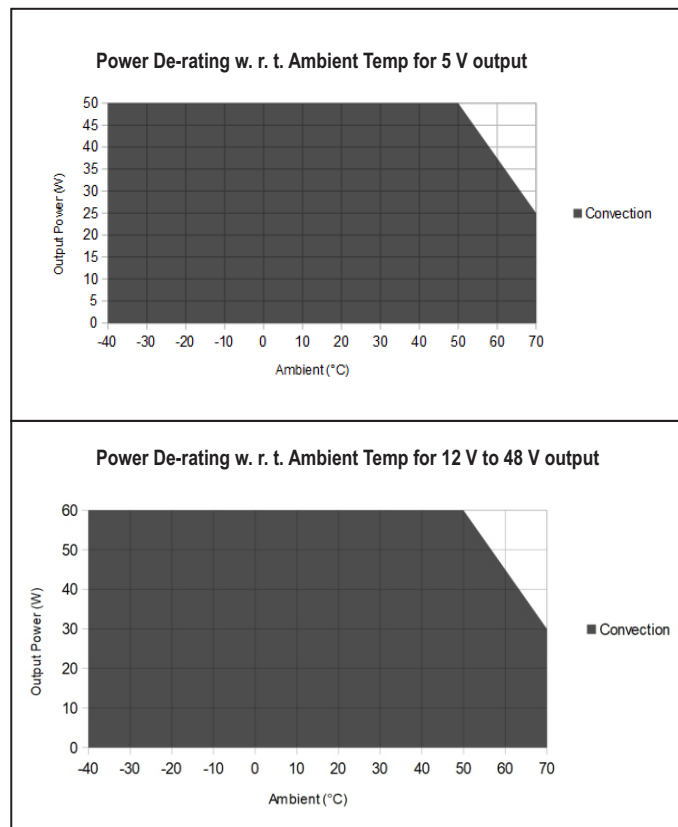
## Mechanical dimensions



### 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 |    |