# MBC450 Series

## AC-DC Open Frame Power Supplies
## Medical

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Please refer to exact equivalent product series
**MWLT450**

The MBC450 Series of open-frame medical power supplies, with its wide universal 90-264 VAC input range, is available at 450 W of output power and a variety of single output voltages.

The MBC series is designed and approved to the latest Medical standards (EN/IEC 60601-1), providing 2 x MOPP isolation for Class I applications.

These medical power supplies are ideal for monitoring, home health equipment as well as surgical devices.

RoHS Compliant

### Key Features & Benefits

- 4 x 6.5 x 1.61 inches
- Approved to EN/IEC 60601-1
- Dual Fusing
- Peak Power Capability
- Class B EMI & Medical (BF) Safety Approvals
- Side Fan or Top Fan Mounting Option
- Current Sharing Option
- Class B EMI & Medical (BF) Safety Approvals
- RoHS Compliant
- CE marked

### Applications

- Diagnostic
- Drug Pump
- Dialysis
- Hospital Beds
- Home Health Care
- Monitoring
- Imaging
- Therapy Devices

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## 1. MODEL SELECTION

| MODEL [1] | OUTPUT VOLTAGE | MAX LOAD | | MINIMUM LOAD | RIPPLE & NOISE [2] | POWER |
|---|---|---|---|---|---|---|
| | | CONVECTION | 420 LFM | | | |
| MBC450-1T05G | 5 VDC | 31.0 A | 55.0 A | 0.0 A | 2% | 275 W |
| MBC450-1T12G | 12 VDC | 20.83 A | 37.5 A | 0.0 A | 2% | 450 W |
| MBC450-1T15G | 15 VDC | 16.66 A | 30.0 A | 0.0 A | 2% | 450 W |
| MBC450-1T24G | 24 VDC | 12.30 A | 18.75 A | 0.0 A | 2% | 450 W |
| MBC450-1T30G | 30 VDC | 10.0 A | 15.0 A | 0.0 A | 2% | 450 W |
| MBC450-1T48G | 48 VDC | 6.25 A | 9.37 A | 0.0 A | 2% | 450 W |

[1] For Side Fan Mounting option, add suffix -S to the part number (e.g.: MBC450-1T12G-S)
For Top Fan Mounting option add suffix -T to the part number (e.g.: MBC450-1T24G-T)
For Current Sharing option, add suffix -I to the part number (e.g.: MBC450-1T48G-I or MBC450-1T48G-I-T or MBC450-1T48G-I-S)

[2] Ripple is peak to peak with 20 MHz bandwidth and 10 µF (Electrolytic capacitor) in parallel with a 0.1 µF capacitor at rated line voltage and load ranges. Please contact factory/ sales representative for minimum load required for ripple to be within specification.

## 2. INPUT SPECIFICATIONS

Specifications are for nominal input voltage, 25°C unless otherwise stated.

| PARAMETER | DESCRIPTION / CONDITION | SPECIFICATIONS |
|---|---|---|
| Input Voltage | Universal | 90 – 264 VAC / 120 – 390 VDC |
| Input Frequency | | 47 – 63 Hz |
| Input Current | 120 VAC:<br>230 VAC: | 4.5 A max.<br>2.3 A max. |
| No Load Power | 120 VAC:<br>230 VAC: | 0.4 W<br>0.8 W |
| Inrush Current | 120 VAC:<br>230 VAC: | 40 A max.<br>75 A max. |
| Leakage Current | Earth Leakage Current<br>Touch Leakage Current | 270 µA<br>45 µA @ 120 VAC / 63 Hz |
| Input Protection | Dual fusing, in Live & Neutral | T8A / 250 V |
| No Load Power | 120 VAC:<br>230 VAC: | 0.4<br>0.3 |
| Switching Frequency | PFC converter: Variable<br>Resonant converter: Variable | 45 – 160 kHz typical<br>35 – 250 kHz, 90 kHz typical |

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## 3. OUTPUT SPECIFICATIONS

| PARAMETER | DESCRIPTION / CONDITION | | SPECIFICATIONS |
|---|---|---|---|
| Output Voltage | | | 5 to 48 V |
| Output Power [3, 4] | 475 W for 24 V, 30 V models &<br>500 W for 48 V model only for 5 seconds max. | | 155 to 450 W |
| Standby Output [5] | | | 5 VDC |
| Fan Output [6] | | | 12 V |
| Efficiency (Full Load) | 120 VAC | 24, 30 & 48 V models<br>12 & 15 V models<br>5 V model | 88%<br>86%<br>83% typical |
| | 230 VAC | 24, 30 & 48 V models | 90% |
| Hold Up Time | 120 / 230 VAC | | 10 ms |
| Power Factor | 120 VAC<br>230 VAC | | 0.98<br>0.95 |
| Line Regulation | | | ± 0.5% |
| Load Regulation | | | ± 3% |
| Transient Response | <10%, 50% to 100% load change, 50 Hz, 50% duty cycle, 0.1 A/µs | | Recovery time < 5 ms |
| Rise Time | | | < 100 ms |
| Set Point Tolerance | | | ± 1% |
| Output Voltage Adjustment | V1 | | ± 3 % |
| Over Voltage Protection | Latch Type | | >114% |
| Over Current Protection | Hiccup type | | 120 to 150% |
| Short Circuit Protection | Short term, auto recovery | | |
| Over Temperature Protection | Automatic recovery | | 130°C primary heat sink |
| Current Share | Up to 2 supplies connected in parallel (optional) | | |
| Cooling | Convection | 5 V model<br>12 & 15 V models<br>24, 30 & 48 V models | 155 W<br>250 W<br>300 W |
| | With 420 LFM | 5 V model<br>12 & 15 V models<br>24, 30 & 48 V models | 275 W<br>450 W<br>450 W |

[3] Combined output power of main output, fan supply and standby supply shall not exceed max. power rating.
[4] Derate output power linearly to 80% from 90 VAC to 80 VAC input.
[5] Standby output voltage 5 V / 1.5 A (convection) / 2 A (420 LFM) with tolerance including set point accuracy, line & load regulation is +/-10%. Ripple and noise is less than 5%.
[6] Fan supply output voltage 12V / 500 mA with tolerance including set point accuracy, line and load regulation is +/-30% and needs min. 1% load on main output to be within regulation band. Ripple and noise is less than 10%.

## 4. SIGNALS

| PARAMETER | DESCRIPTION / CONDITION |
|---|---|
| Power Good Signal | TTL signal goes high after main output is within regulation band, delay is 0.1 to 0.3 s |
| Remote Sense | Compensates for 200 mV drop |
| Remote on/off | To turn on PSU short remote pin to ground |



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## 5. EMC SPECIFICATIONS

| PARAMETER | DESCRIPTION / CONDITION | SPECIFICATION |
|---|---|---|
| Conducted Emissions | EN 55011-B, CISPR22-B, FCC PART15-B | Pass |
| Radiated Emissions | EN 55011 B | Pass |
| Input Current Harmonics | EN 61000-3-2 | Class D |
| Voltage Fluctuation and Flicker | EN 61000-3-3 | Pass |
| ESD Immunity | EN 61000-4-2 | Level 4, Criterion A |
| Radiated Field Immunity | EN 61000-4-3 | Level 3, Criterion A |
| Electrical Fast Transient Immunity | EN 61000-4-4 | Level 3, Criterion A |
| Surge Immunity | EN 61000-4-5 | Level 3, Criterion A |
| Conducted Immunity | EN 61000-4-6 | Level 3, Criterion A |
| Magnetic Field Immunity | EN 61000-4-8 | Level 4, Criterion A |
| Voltage Dips, Interruptions | EN 61000-4-11 | Criterion A & B |

## 6. SAFETY SPECIFICATIONS

| PARAMETER | DESCRIPTION / CONDITION | SPECIFICATION |
|---|---|---|
| Isolation Voltage | Input to Output, 2MOPP<br>Input to Earth,1MOPP<br>Output to GDN for type BF | 5940 VDC<br>2121 VDC<br>1500 VAC |
| Safety Standards | EN 60601-1, IEC 60601-1 (ed.3), ANSI / AAMI ES 60601 - 1, CSA C22.2 No. 60601-1 | |
| Agency Approvals | Nemko, UL, C-UL | |
| CE mark | Complies with LVD Directive | |

## 7. ENVIRONMENTAL SPECIFICATIONS

| PARAMETER | DESCRIPTION / CONDITION | SPECIFICATIONS |
|---|---|---|
| Operating Temperature | Refer to derating curves<br>-20 to 0°C, start-up is guaranteed | 0 to +70°C |
| Storage Temperature | | -40 to 85° C |
| Humidity | Non-Condensing | 95% HR |
| Altitude | Operating:<br>Non-Operating: | 10,000 ft.<br>40,000 ft. |
| Reliability | MTBF according to Telcordia -SR332-Issue 3 | 1.28 million hours |

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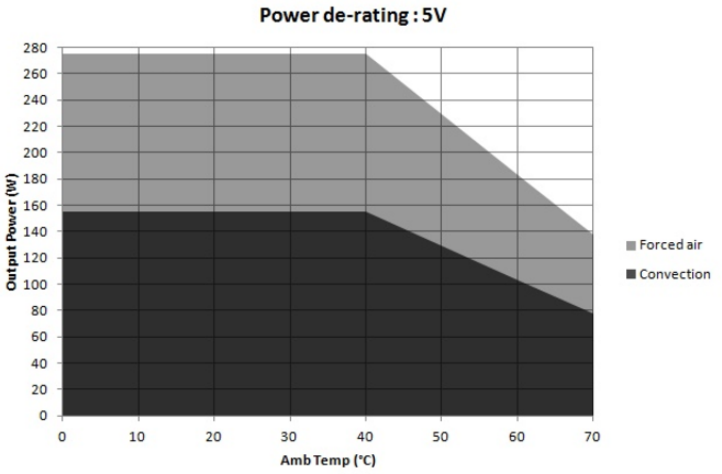
## DERATING CURVES

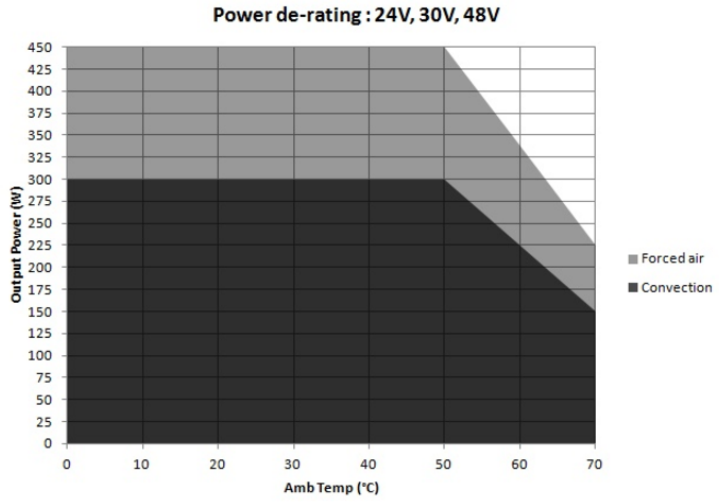



Convection load: 155 W up to 40 °C
De-rate above 40 °C @ 1.67% per °C

Forced air cooled load: 275 W up to 40°C
De-rate above 40 °C @ 1.67% per °C

Convection load: 250 W up to 40 °C
De-rate above 40 °C @ 1.67% per °C

Forced air cooled load: 450 W up to 40°C
De-rate above 40 °C @ 1.67% per °C




Convection load: 300 W up to 50 °C
De-rate above 50 °C @ 2.5% per °C

Forced air cooled load: 450 W up to 50°C
De-rate above 50 °C @ 2.5% per °C

*Figure 1. Derating Curves*

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## 8. CONNECTOR & PIN DESCRIPTION

| CONNECTOR | PIN | DESCRIPTION / CONDITION | | MANUFACTURER / PN |
|---|---|---|---|---|
| AC Input Connector | J1 | Pin 1<br>Pin 3<br>Pin 5 | AC line<br>AC neutral<br>Earth | Tyco: 1-1123724-3<br>Mating: 1-1123722-5 |
| DC Output Connector | J2 | Lug 1<br>Lug 2 | +V1<br>RTN | 6-32 inches Screw Pan HD<br>Mating: Designed to accept Ring Tongue Terminal AMP: 8-31886-1, wherein one 16 AWG (max) wire can be crimped.<br>Note: One Ring Tongue Terminal with 16 AWG is recommended for current up to 11 A only.<br>Use multiple tongue terminals with wire for more current. |
| Signals [7] | J3 | Pin 1<br>Pin 2<br>Pin 3<br>Pin 4<br>Pin 5<br>Pin 6<br>Pin 7<br>Pin 8<br>Pin 9<br>Pin 10 | NC<br>Power Fail<br>Power Good<br>DC Return<br>+5Vstby<br>+VE Remote Sense<br>-VE Remote Sense<br>CS<br>DC Return<br>Remote On/Off | Molex: 22-23-2101<br>Mating: 22-01-2107; Pins 08-50-0113 |
| Fan | J4 | Pin 1<br>Pin 2 | +VE<br>-VE | Mating Connector: Molex 22-01-2025<br>Pins = 08-50-0113 |
| Earth (Spade Connector) [8] | J5 | | | Molex: 19705-4301<br>Mating: 190030001 |

[7] PSU is supplied with J3 housing, pin-9 and pin-10 shorted to enable main output without remote on/off feature.

[8] The J5 (Earth) spade connector can be used for U-Channel option products only. When fan options are required the earth connection provided in the input AC connector should be used (Pin 5 – J1)

## 9. MECHANICAL SPECIFICATIONS

| PARAMETER | DESCRIPTION / CONDITION |
|---|---|
| Weight | 900 g (1.98 lbs) |
| Dimensions | 101.6 x 165.0 x 41.0 mm (4.0 x 6.5 x 1.6 in) |

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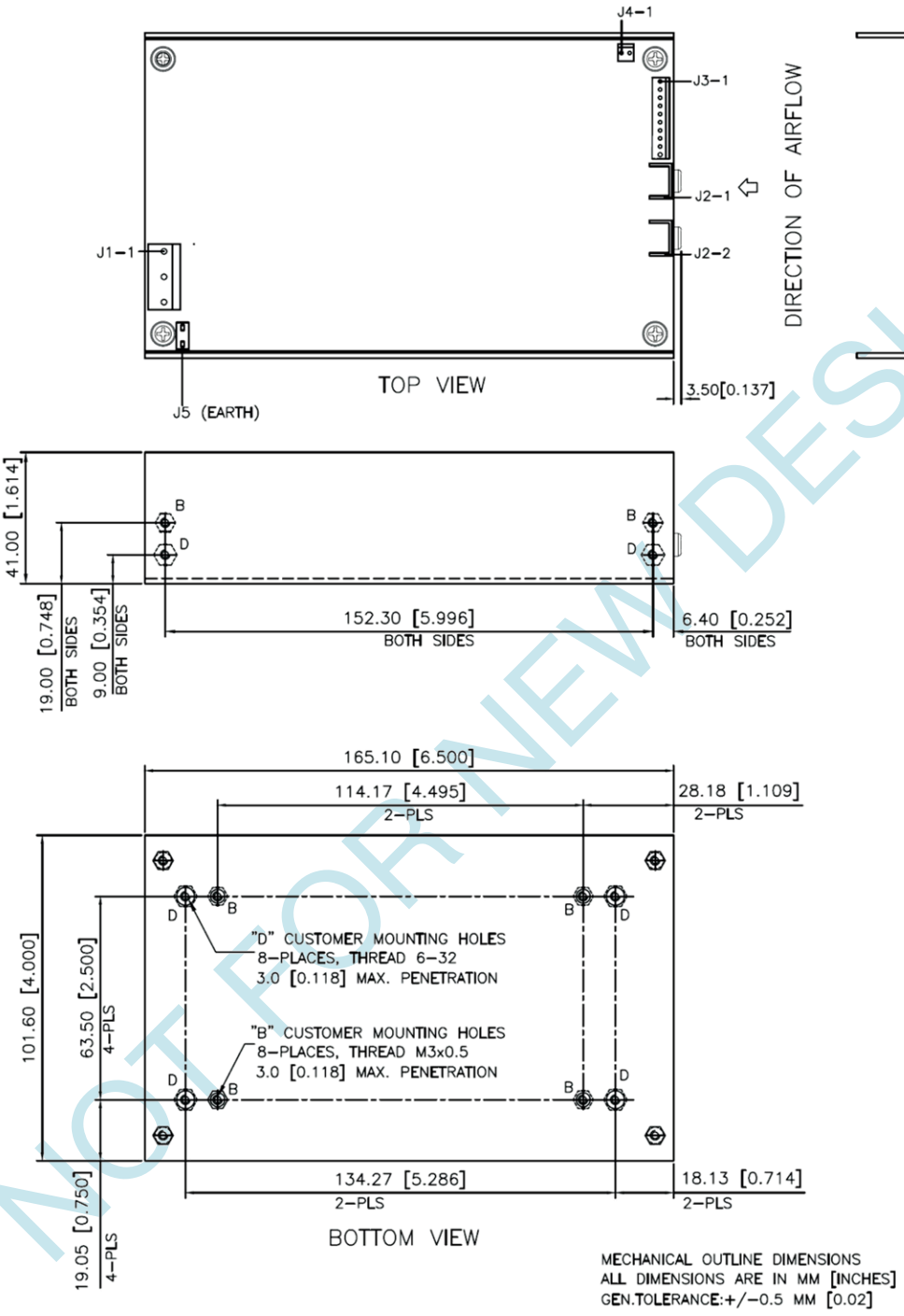


*Figure 2. Mechanical Drawing (Without Fan Mounting)*

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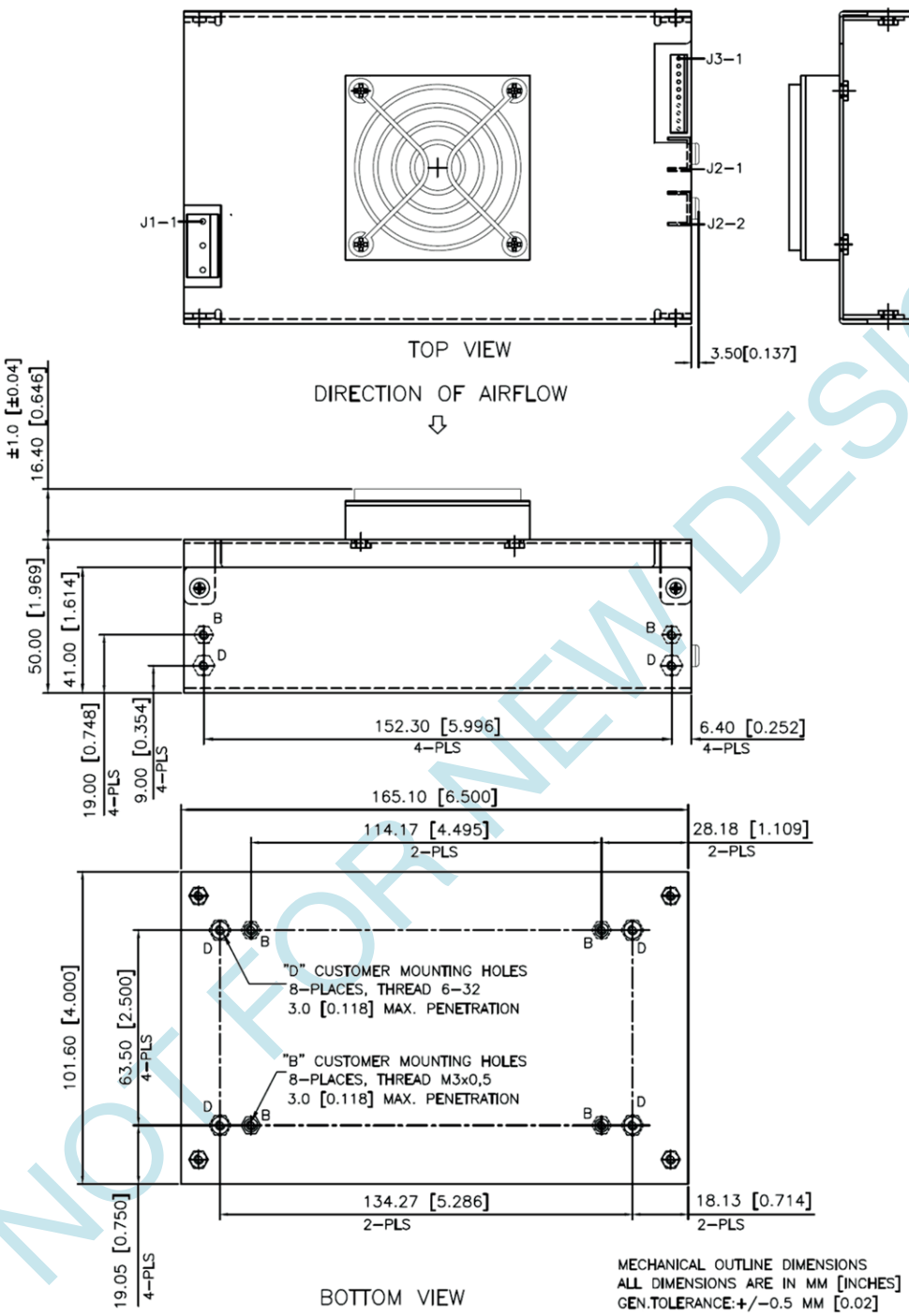


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*Figure 3. Mechanical Drawing (With Top Fan Mounting)*

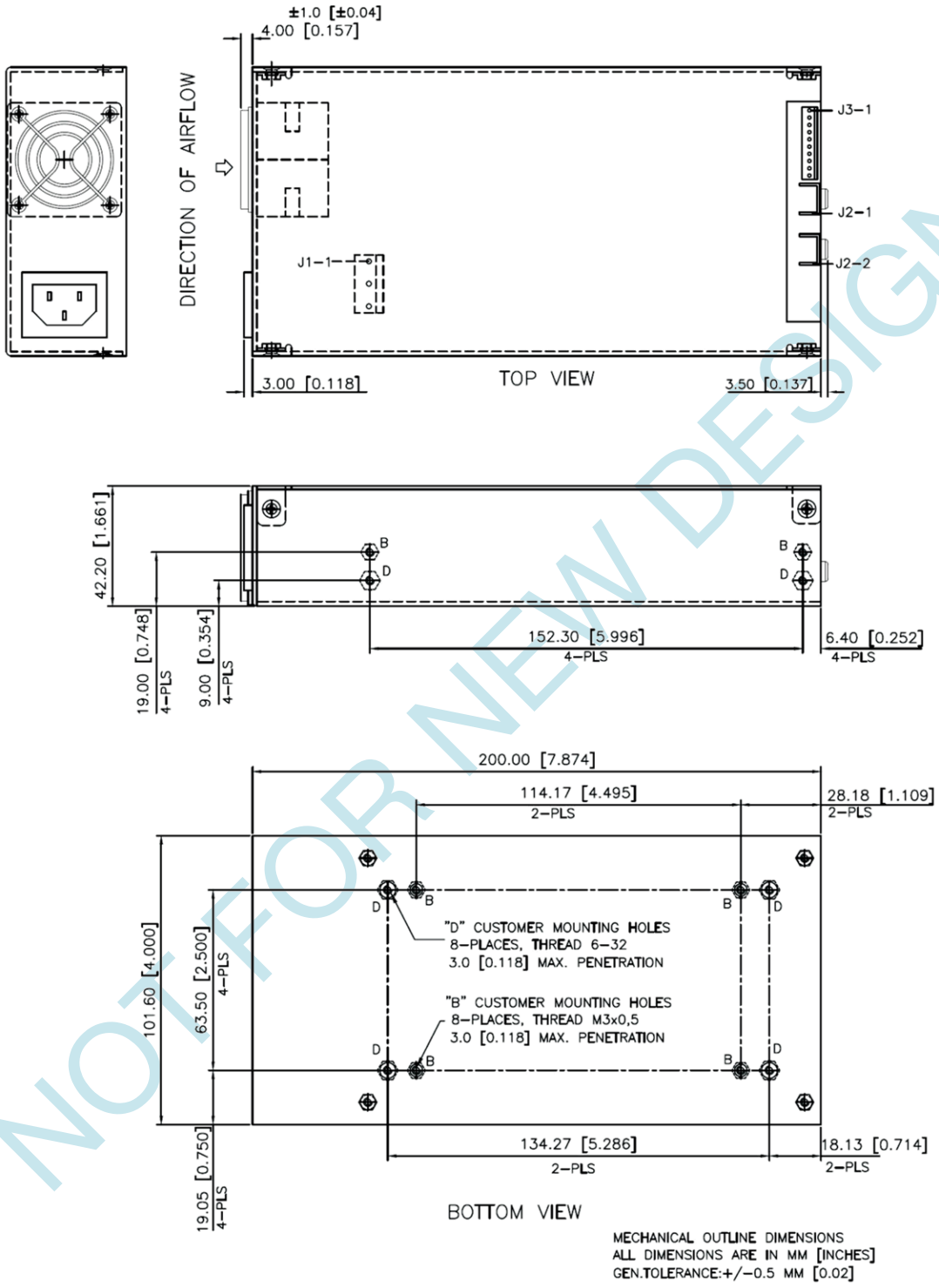


*Figure 4. Mechanical Drawing (With Side Fan Mounting)*

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## 10. INSTALLATION INSTRUCTION FOR CURRENT SHARING

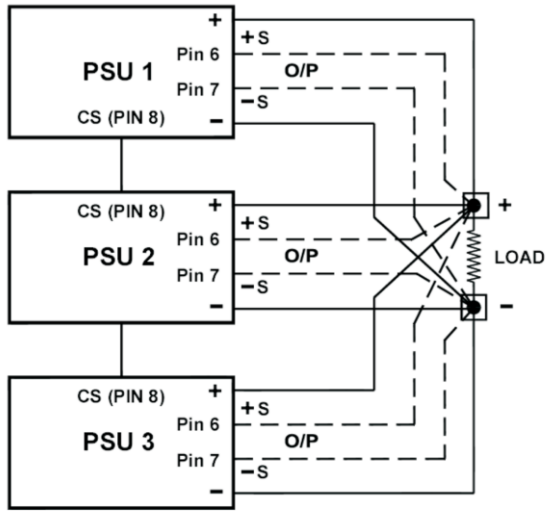
During the installation and setup of parallel supplies in a system it is important that a single remote sense point be used for all the supplies.
The remote sense voltage between the supplies must be adjusted to within 2% to ensure the supplies are inside the 3% capture window.
If the supplies are not initially adjusted inside the capture window the supplies will not current share.

**NOTE:**
"CURRENT SHARING "facility is inclusive with the unit only with ordering of the " CURRENT SHARING " option by adding suffix -I to the part number, i.e. MBC450-1XXX-I or MBC450-1XXX-I.

**SET-UP PROCEDURE:**

1. Connect load cables to the outputs of each supply.
2. Connect the remote sense lines to the load in twisted style. (A common remote sense point must be used for all the supplies in parallel).
3. Connect all the "current share" pins on the J3 connector between the supplies.
4. Adjust remote sense voltage of each supply to within 1% of rated output voltage or readjust to required set point. (Adjustment to be done with all other parallel supplies off).
5. Current sharing between the supplies can be verified by monitoring the output current of each supply with a hall effect DC current probe. The supplies should share to within 10% of the total load current.
6. The current share circuit has a capture window voltage of +/- 3% of the rated output voltage. If the output remote sense voltage of one of the supplies is adjusted outside the 3% window the supplies will not current share.

**CURRENT SHARING BLOCK DIAGRAM**

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**For more information on these products consult: tech.support@psbel.com**

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