



# MBC180 Series

Ultra Low Profile  
Open Frame Power Supplies  
Medical

The MBC180 Series of ultra low open frame medical power supplies feature a wide universal AC input range of 85 V – 264 VAC, offering output power 180 W with 13 CFM of forced air cooling or up to 120 W with natural convection cooling. They are available in a variety of isolated 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 & Class II applications.

These power supplies are ideal for medical, telecom, datacom, industrial equipment and other applications.



### Key Features & Benefits

- 4 x 2 x 0.75 Inches Form factor
- 180 Watts with Forced Air Cooling
- Approved to EN/IEC 60601-1
- Efficiencies up to 92%
- -40 to 70°C degree operating temperature
- Dual Fusing
- 12 V / 0.5 A Fan Output, Thermal Shut-Down feature
- 3.37 million Hours, Telcordia -SR332-issue 3 MTBF
- Standby Power < 0.5 W
- Medical (BF) Safety Approvals

### Applications

- Diagnostic
- Drug Pump
- Monitoring
- Dialysis
- Home Health Care
- Portable Equipment



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## 1. MODEL SELECTION

| MODEL NUMBER <sup>1</sup>  | CONNECTOR                 | VOLTAGE | MAX. LOAD<br>(CONVECTION)<br>112.5 W @ 50°C | MAX. LOAD<br>(CONVECTION)<br>120 W @ 40°C | MAX. LOAD<br>(13 CFM) | MIN.<br>LOAD | RIPPLE &<br>NOISE <sup>2</sup> |
|----------------------------|---------------------------|---------|---|---|-----------------------|--------------|--------------------------------|
| MBC180-1T12L               | Screw Terminal            | 12 V    | 9.37 A                                      | 10 A                                      | 15 A                  | 0.0 A        | 2%                             |
| MBC180-1012L               | Molex Connector           |         |   |   |                       |              |                                |
| MBC180-1T15L               | Screw Terminal            | 15 V    | 7.5 A                                       | 8 A                                       | 12 A                  | 0.0 A        | 2%                             |
| MBC180-1015L               | Molex Connector           |         |   |   |                       |              |                                |
| MBC180-1T24L               | Screw Terminal            | 24 V    | 4.68 A                                      | 5 A                                       | 7.5 A                 | 0.0 A        | 1%                             |
| MBC180-1024L               | Molex Connector           |         |   |   |                       |              |                                |
| MBC180-1T30L               | Screw Terminal            | 30 V    | 3.75 A                                      | 4 A                                       | 6 A                   | 0.0 A        | 1%                             |
| MBC180-1030L               | Molex Connector           |         |   |   |                       |              |                                |
| MBC180-1T48L               | Screw Terminal            | 48 V    | 2.34 A                                      | 2.5 A                                     | 3.75 A                | 0.0 A        | 1%                             |
| MBC180-1048L               | Molex Connector           |         |   |   |                       |              |                                |
| MBC180-1T58L               | Screw Terminal            | 58 V    | 1.94 A                                      | 2.07 A                                    | 3.1 A                 | 0.0 A        | 1%                             |
| MBC180-1058L               | Molex Connector           |         |   |   |                       |              |                                |
| COVER-180-XBC <sup>3</sup> | metal cover kit accessory |         |   |   |                       |              |                                |

## 2. INPUT SPECIFICATIONS

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

| PARAMETER           | DESCRIPTION / CONDITION  | SPECIFICATION                 |
|---------------------|--|-------------------------------|
| Input Voltage       | Universal<br>(Derate from 100% at 100 VAC to 77% at 80 VAC)                  | 80 - 264 VAC / 390 VDC        |
| Input Frequency     |  | 47 - 63 Hz                    |
| Input Current       | 115 VAC:<br>230 VAC:   | 2.2 A max.<br>1.1 A max.      |
| No Load Power       | Typical for MBC180-1XXX<br>Typical for MBC180-1XXX-PGPF                      | < 0.5 W<br>< 0.85 W           |
| Inrush Current      | 115 VAC:<br>230 VAC:<br>264 VAC:   | 25 A<br>45 A<br>75 A          |
| Leakage Current     | Typical (N.A. For Class II Option- without input Earth pin)<br>Touch current | 300 µA<br>< 100 µA            |
| Power Factor        | 115 VAC:<br>230 VAC:   | > 0.95<br>0.90                |
| Switching Frequency | PFC<br>PWM   | 70 to 130 kHz<br>50 to 80 kHz |

<sup>1</sup> For Class II Option (without input Earth pin) add suffix: -2 (e.g.: MBC180-1012L-2).

<sup>2</sup> Ripple is peak to peak with 20 MHz bandwidth and 10 µF (Tantalum capacitor) in parallel with a 0.1 µF capacitor at rated line voltage and load ranges

<sup>3</sup> When used in Cover Kit, de-rate output power to 70 % under all operating conditions.

### 3. OUTPUT SPECIFICATIONS

| PARAMETER                                | DESCRIPTION / CONDITION   | SPECIFICATION        |
|--|---|----------------------|
| Output Power <sup>4</sup>                | With 13 CFM forced air cooling  | 180 W                |
|  | With natural convection cooling at 100 to 264 VAC                       | up to 120 W          |
| Efficiency (typical @ 230 VAC full load) | 48 V, 58 V:   | 92%                  |
|  | 24 V, 30 V:   | 90%                  |
|  | 12 V, 15 V:   | 88%                  |
| Hold-up Time                             | At 180 W:   | 10 ms                |
|  | At 120 W:   | 16 ms                |
| Line Regulation                          |   | +/-0.5%              |
| Load Regulation                          |   | +/-1%                |
| Transient Response                       | 25% step load change, at 0.1 A/uS slew rate, 50% duty cycle, 50 Hz = 4% | recovery time < 5 ms |
| Voltage Adjustment <sup>5</sup>          |   | +/-3%                |
| Rise Time                                | Typical   | 55 ms                |
| Set Point Tolerance <sup>6</sup>         |   | +/-1%                |
| Over Current Protection                  |   | > 110%               |
| Over Voltage Protection                  |   | 110 to 140%          |
| Short Circuit Protection                 | Hiccup mode   |                      |

### 4. ENVIRONMENTAL SPECIFICATIONS

| PARAMETER                          | DESCRIPTION / CONDITION                 | SPECIFICATION      |
|------------------------------------|---|--------------------|
| Operating Temperature <sup>7</sup> |   | -40 to +70°C       |
|                                    | Startup guaranteed with spec. deviation | -40 to 0°C         |
| Storage Temperature                |   | -40 to +85°C       |
| Relative Humidity                  | Non-condensing                          | 5% to 95%          |
| Altitude                           | Operating:                              | 16,000 ft          |
|                                    | Non-operating:                          | 40,000 ft.         |
| MTBF                               | Telcordia -SR332-issue 3                | 3.37 million hours |

### 5. EMC SPECIFICATIONS

| PARAMETER                          | DESCRIPTION / CONDITION   | SPECIFICATION        |
|------------------------------------|---|----------------------|
| Conducted Emissions                | EN 55011-B, CISPR22-B, FCC PART15-B                             | Pass                 |
| Radiated Emissions                 | EN 55011 A;   | Pass                 |
|                                    | with external core (King core K5B RC 25x12x15-M in input cable) | Level B              |
| 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 B          |

<sup>4</sup> Combined output power of main output, fan supply shall not exceed max. Power rating.

<sup>5</sup> Adjustment potentiometer is located on the SMT side of the PCB.

<sup>6</sup> Fan supply output voltage tolerance including set point accuracy, line & load regulation is +/-10% and Ripple & noise is less than 10%.

<sup>7</sup> Output ripple can be more than 10% of the output voltage.

## 6. SAFETY SPECIFICATIONS

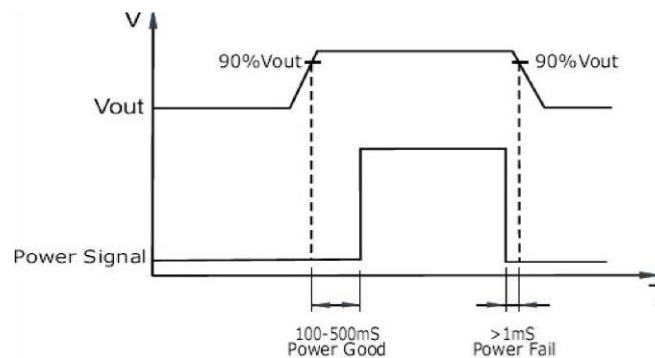
| PARAMETER          | DESCRIPTION / CONDITION  | SPECIFICATION       |
|--------------------|--|---------------------|
| Isolation Voltage  | Input to Output: (Medical applications)  | 4000 VAC            |
|                    | Input to GND: (Not Applicable For Class II Option)   | 1500 VAC            |
|                    | Output to GND: for type BF<br>(for type B (N/A for Class II Option))                                   | 1500 VAC<br>500 VAC |
| Safety Standard(s) | Approved to the latest edition of the following standards:<br>CSA/UL60601-1, EN60601-1 and IEC60601-1. |                     |
| Agency Approvals   | Nemko, UL, C-UL  |                     |
| CE mark            | Complies with LVD Directive  |                     |

## 7. CONNECTOR & PIN DESCRIPTION

| CONNECTOR                  | PIN | DESCRIPTION / CONDITION | MANUFACTURER / PN |
|----------------------------|-----|-------------------------|-------------------|
| AC Input Connector         | J1  | Pin 1                   | AC Line           |
|                            |     | Pin 2                   | Not Fitted        |
|                            |     | Pin 3                   | AC Neutral        |
| DC Output Connector        | J2  | Pin 1, 2, 3             | V1 +VE            |
|                            |     | Pin 4, 5, 6             | V1 -VE            |
| Aux (Fan) Output           | J3  | Pin 1                   | FAN +VE           |
|                            |     | Pin 2                   | FAN -VE           |
| Signal Output <sup>8</sup> | J4  | Pin 1                   | Vs                |
|                            |     | Pin 2                   | PGPF              |
|                            |     | Pin 3                   | GDN               |

## 8. MECHANICAL SPECIFICATIONS

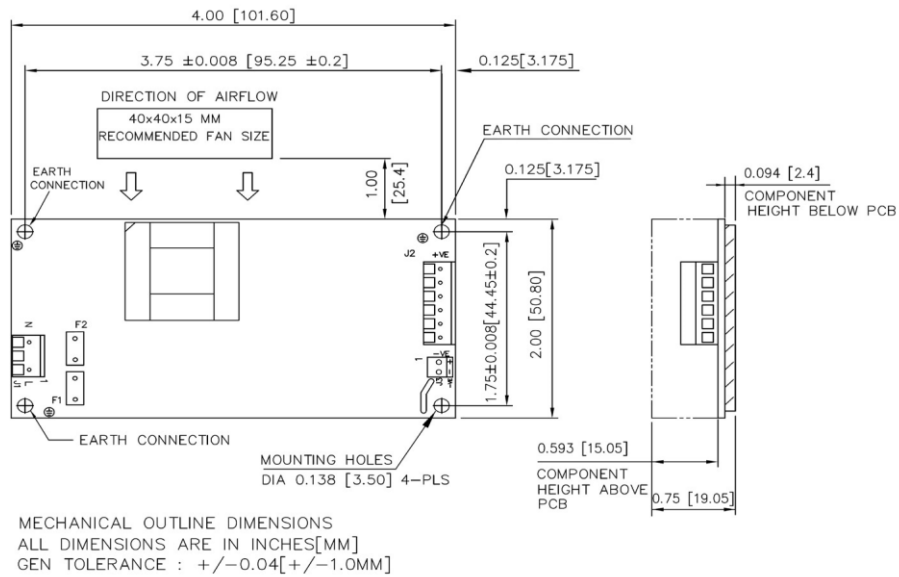
| PARAMETER            | DESCRIPTION / CONDITION   |
|----------------------|---|
| Weight               | approx. 200 g   |
| Dimensions           | 101.6 x 50.8 x 19.05 mm (4 x 2 x 0.75 inches)   |
| Cooling <sup>9</sup> | 180 W with 13 CFM forced air cooling (refer to Mechanical Drawing)<br>Up to 120 W with natural convection cooling (refer to Derating Curve) |



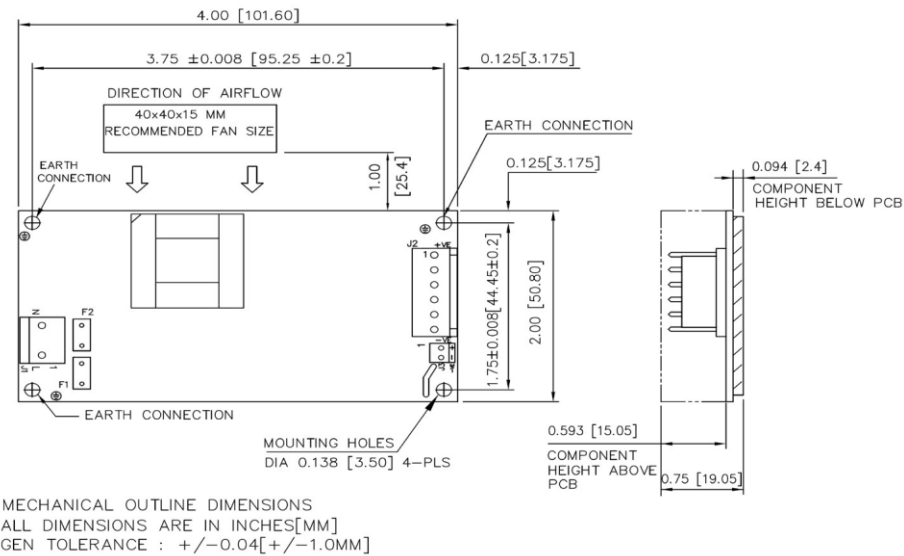
Power good / AC fail signal specs

<sup>8</sup> A TTL signal is available at pin 2 of J4 which goes high 100-500mS after output voltage reaches 90% of set value. It goes low a minimum of 1 ms before output falls below 90% of the set value, when input AC is switched off.

<sup>9</sup> 180 W with 13CFM forced air cooling and 120 W with natural convection cooling at 100 to 264 VAC.



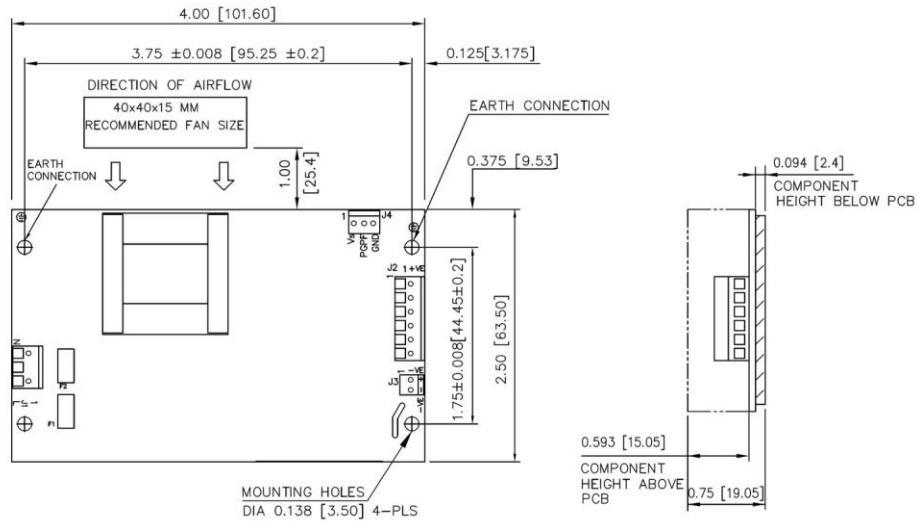
*Mechanical Drawing – Option 1 without PGPF*



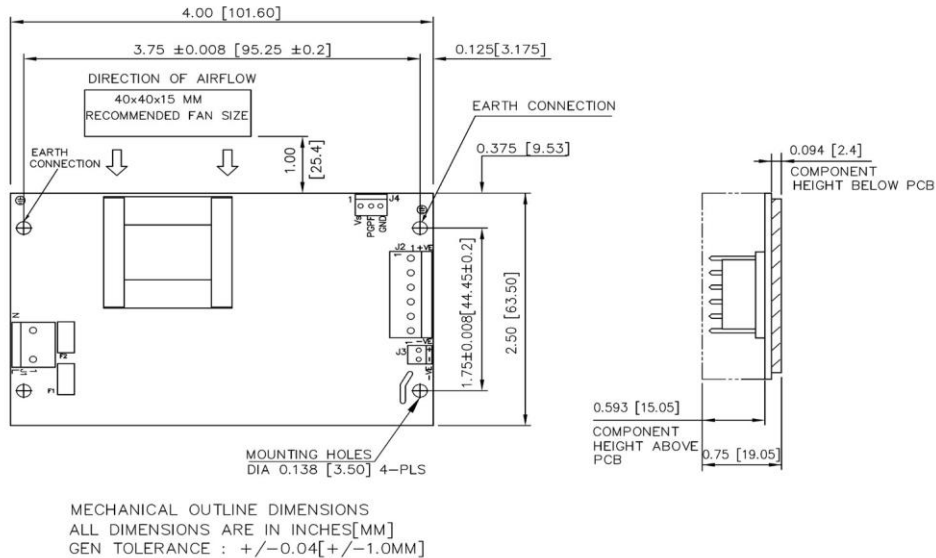
*Mechanical Drawing – Option 2 without PGPF*

**NOTES:** In case the PCB is mounted in a metal enclosure, using metal hardware ensure the following:

- 1 Stand off, used to mount PCB has OD of 5.4 mm max.
- 2 Screws, used to fix PCB on stand off, have head dia of 6.0 mm max.
- 3 Washer, if used, to have dia of 6.5 mm max.



*Mechanical Drawing – Option 1 with PGPF*

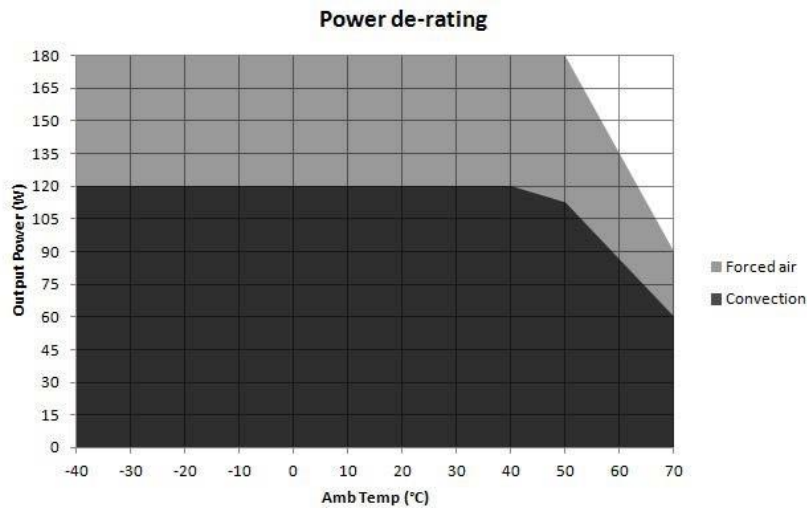


*Mechanical Drawing – Option 2 with PGPF*

**NOTES:** In case the PCB is mounted in a metal enclosure, using metal hardware ensure the following:

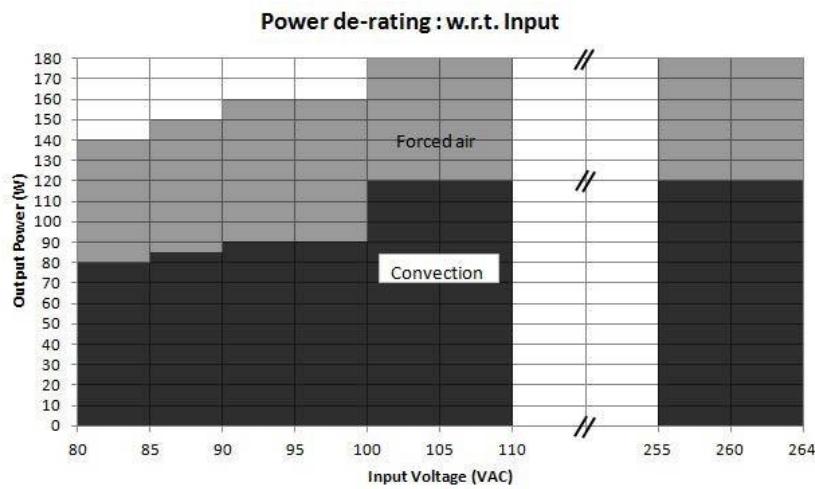
- 1 Stand off, used to mount PCB has OD of 5.4 mm max.
- 2 Screws, used to fix PCB on stand off, have head dia of 6.0 mm max.
- 3 Washer, if used, to have dia of 6.5 mm max.

## DERATING CURVES



Convection load: 120 W up to 40 °C  
 De-rate between 40-50 °C @ 0.625% per °C  
 De-rate above 50 °C @ 2.33% per °C

Forced air cooled load: 180 W up to 50°C  
 De-rate above 50 °C @ 2.5% per °C



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**NUCLEAR AND MEDICAL APPLICATIONS** - Products are not designed or intended for use as critical components in life support systems, equipment used in hazardous environments, or nuclear control systems.

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Asia-Pacific  
 +86 755 298 85888

Europe, Middle East  
 +353 61 225 977

North America  
 +1 408 785 5200