

# MBC550 Series

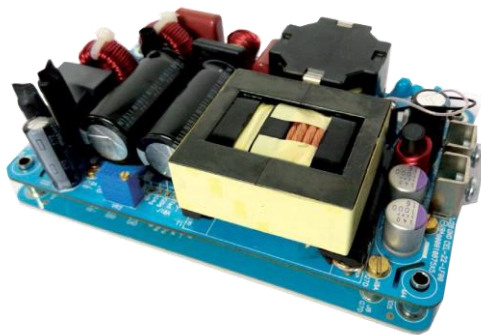
## Open Frame Power Supplies

### Medical

The MBC550 Series of open frame medical power supplies feature a wide universal AC input range of 90 – 264 VAC, offering up to 550 W of output power with forced air cooling, or 250 W with conduction cooling in a compact footprint, with 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 (Means of Patient Protection) isolation for Class I & Class II applications.

The MBC550 range is ideally suited to a wide variety of medical applications, and also where airflow is limited or not available.



#### Key Features & Benefits

- 5 x 3 x 1.5 Inch Form Factor
- Up to 550 Watts with Forced Air Cooling
- Efficiencies up to 92%
- -40 to 70°C Operating Temperature
- 12 V / 0.5 A Fan Output, Thermal Shut-Down Feature
- Approved to EN/IEC 60601-1
- Medical (BF) Safety Approvals
- MTBF >3 million hours as per Telcordia SR-332, Issue 3
- RoHS Compliant
- CE Marked

#### Applications

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

## 1. MODEL SELECTION

| MODEL NUMBER | VOLTAGE | MAX. LOAD (CONVECTION) | MAX. LOAD <sup>1</sup> (CONDUCTION) | MAX. LOAD (400 LFM) | MIN. LOAD | RIPPLE & NOISE <sup>2</sup> |
|--------------|---------|------------------------|-------------------------------------|---------------------|-----------|-----------------------------|
| MBC550-1T12  | 12 V    | 9.17 A                 | 16.67 A                             | 41.67 A             | 0.0 A     | 2%                          |
| MBC550-1T15  | 15 V    | 7.33 A                 | 13.33 A                             | 33.33 A             | 0.0 A     | 2%                          |
| MBC550-1T24  | 24 V    | 6.25 A                 | 10.42 A                             | 22.92 A             | 0.0 A     | 1%                          |
| MBC550-1T30  | 30 V    | 5.00 A                 | 8.33 A                              | 18.33 A             | 0.0 A     | 1%                          |
| MBC550-1T48  | 48 V    | 3.13 A                 | 5.21 A                              | 11.46 A             | 0.0 A     | 1%                          |
| MBC550-1T58  | 58 V    | 2.59 A                 | 4.31 A                              | 9.48 A              | 0.0 A     | 1%                          |

## 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 115 VAC to 78% at 90 VAC) | 90-264 VAC / 390 VDC                            |
| Input Frequency     |                                                             | 47-63 Hz                                        |
| Input Current       | 115 VAC:<br>230 VAC:                                        | 6 A max.<br>3 A max.                            |
| No Load Power       | 115 VAC:<br>230 VAC:                                        | < 0.5 W<br>< 0.7 W                              |
| Inrush Current      | 115 VAC:<br>230 VAC:<br>264 VAC:                            | 25 A<br>45 A<br>75 A                            |
| Leakage Current     | 115 VAC:<br>230 VAC:<br>Touch current                       | < 200 $\mu$ A<br>< 400 $\mu$ A<br>< 100 $\mu$ A |
| Power Factor        | @ Full Load                                                 | > 0.95                                          |
| Switching Frequency | PFC<br>Resonant                                             | 70 to 130 KHz<br>68 to 80 KHz                   |

## 3. OUTPUT SPECIFICATIONS

| PARAMETER                                | DESCRIPTION / CONDITION                                                             | SPECIFICATION                             |
|------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------|
| Output Power <sup>3</sup>                | Forced air cooled:<br>Conduction cooled:<br>Convection cooled:                      | up to 550 W<br>up to 250 W<br>up to 150 W |
| Efficiency (typical @ 230 VAC full load) | 48 V:<br>24 V:<br>12 V, 15 V:<br>Full Load                                          | 92%<br>91%<br>90%<br>> 16 ms              |
| Hold-up Time (typical)                   | Convection Load<br>Conduction Load                                                  | > 55 ms<br>> 30ms                         |
| Line Regulation                          |                                                                                     | +/-0.5%                                   |
| Load Regulation                          |                                                                                     | +/-1%                                     |
| Transient Response                       | 50-100% step load change, at 0.1A/ $\mu$ s slew rate,<br>50% duty cycle, 50 Hz = 5% | recovery time < 5 ms                      |

<sup>1</sup> Refer Recommended Conduction Plate & Clearance on Page 8.

<sup>2</sup> Ripple is peak to peak with 20 MHz bandwidth and 10  $\mu$ F (Tantalum capacitor) in parallel with a 0.1  $\mu$ F capacitor at rated line voltage and load ranges. Output ripple can be more than 10% of the output voltage.

<sup>3</sup> Combined output power of main output, fan supply shall not exceed max. Power rating.

|                                  |                             |             |
|----------------------------------|-----------------------------|-------------|
| Voltage Adjustment               |                             | +/-3%       |
| Rise Time                        | Typical                     | 55 ms       |
| Set Point Tolerance <sup>4</sup> |                             | +/-1%       |
| Over Current Protection          | Hiccup mode / Auto recovery | > 110%      |
| Over Voltage Protection          | Hiccup mode / Auto recovery | 110 to 140% |
| Short Circuit Protection         | Hiccup mode / Auto recovery |             |

#### 4. ENVIRONMENTAL SPECIFICATIONS

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

#### 5. EMC SPECIFICATIONS

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

#### 6. SAFETY SPECIFICATIONS

| PARAMETER          | DESCRIPTION / CONDITION                                                                                                  | SPECIFICATION                               |
|--------------------|--------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| Isolation Voltage  | Input to Output: (for medical applications)<br>Input to GND:<br>Output to GND: for type BF<br>for type B                 | 4000 VAC<br>1500 VAC<br>1500 VAC<br>500 VAC |
| Safety Standard(s) | Approved to the latest edition of the following standards: CSA/UL60601-1, EN60601-1, IEC60601-1, ANSI / AAMI ES 60601-1. |                                             |
| Agency Approvals   | Nemko, UL, C-UL                                                                                                          |                                             |
| CE mark            | Complies with LVD Directive                                                                                              |                                             |

<sup>4</sup> Fan supply output voltage tolerance incl. set point accuracy, line and load regulation is +/-10% and Ripple and noise is less than 10%.

<sup>5</sup> Thermal shutdown feature: The power supply goes in hiccup mode when the temperature of Substrate PCB exceeds 110 °C (+/-10 °C).

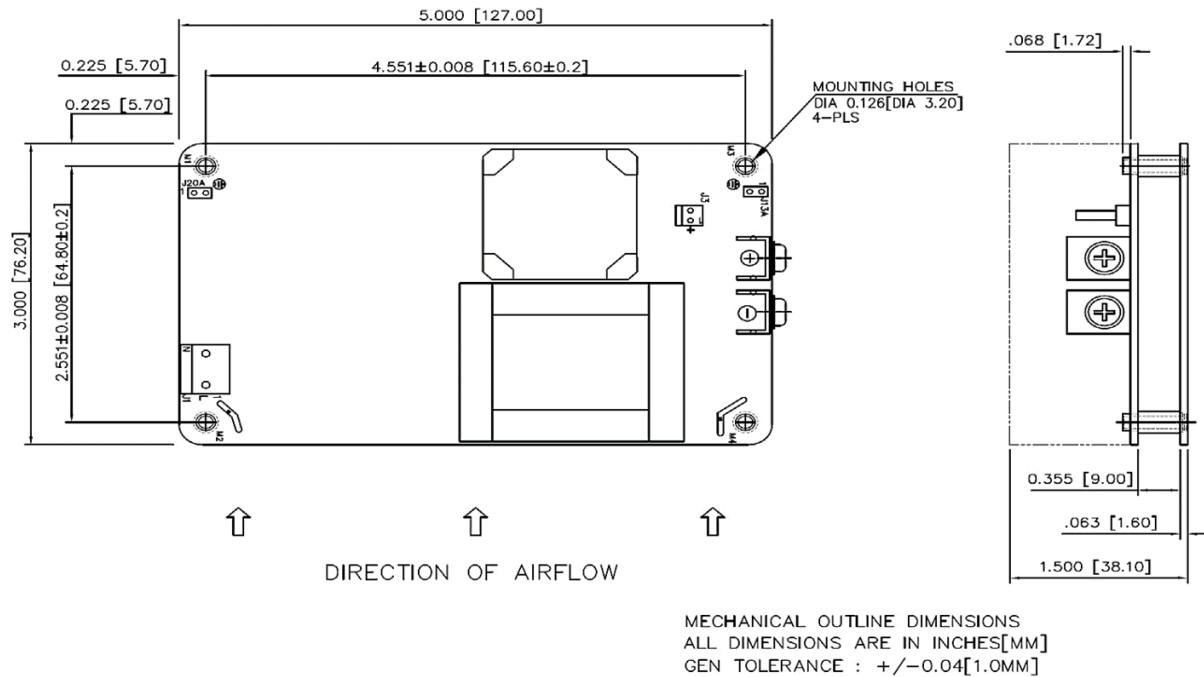
## 7. CONNECTOR & PIN DESCRIPTION

| CONNECTOR                               | PIN | DESCRIPTION / CONDITION | MANUFACTURER / PN                   |
|-----------------------------------------|-----|-------------------------|-------------------------------------|
| AC Input Connector                      | J1  | Pin 1<br>Pin 2<br>Pin 3 | AC Line<br>Not Fitted<br>AC Neutral |
| DC Output Connector<br>(Screw Terminal) | J2  | Pin 1<br>Pin 2          | V1 +VE<br>V1 -VE                    |
| Aux (Fan) Output                        | J3  | Pin 1<br>Pin 2          | FAN +VE<br>FAN -VE                  |
| Earth                                   | J4  |                         |                                     |

6-32 inches Screw Pan HD  
Mating: Designed to accept Ring Tongue Terminal AMP: 8-31886-1, wherein one 16 AWG (max) wire can be crimped.  
Note: One Ring Tongue Terminal with 16 AWG is recommended for current up to 11A only.  
Use multiple tongue terminals with wire for more current.  
AMP: 640456-2  
Mating: 640440-2  
Molex: 19705-4301  
Mating: 19003-0001

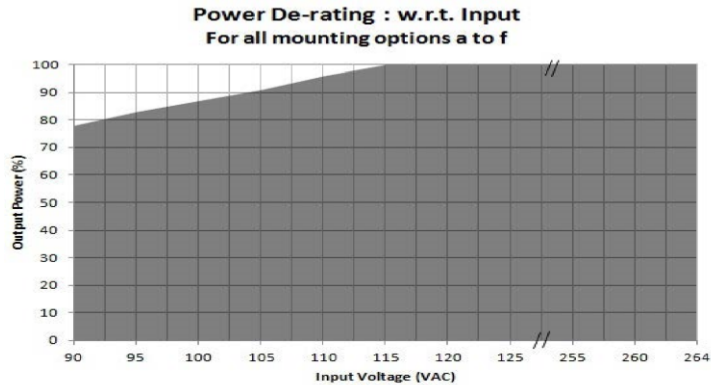
## 8. MECHANICAL SPECIFICATIONS

| PARAMETER  | DESCRIPTION / CONDITION                   |
|------------|-------------------------------------------|
| Weight     | approx. 500 g                             |
| Dimensions | 127 x 76.2 x 38.1 mm (5 x 3 x 1.5 inches) |

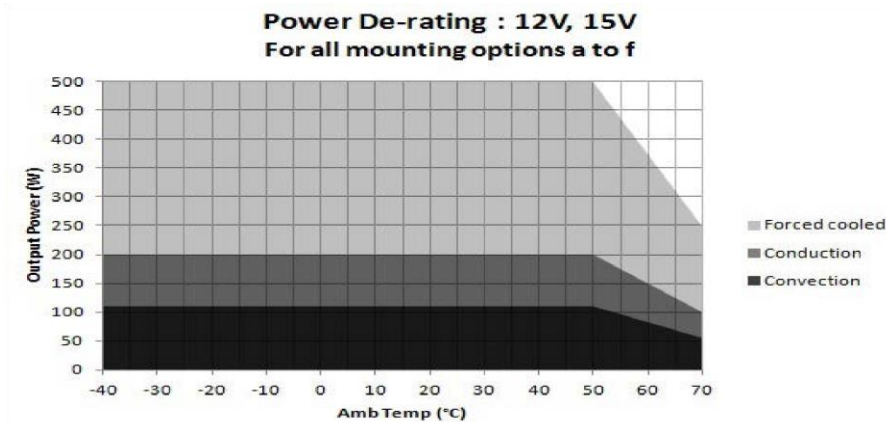


Mechanical Drawing

## DERATING CURVES



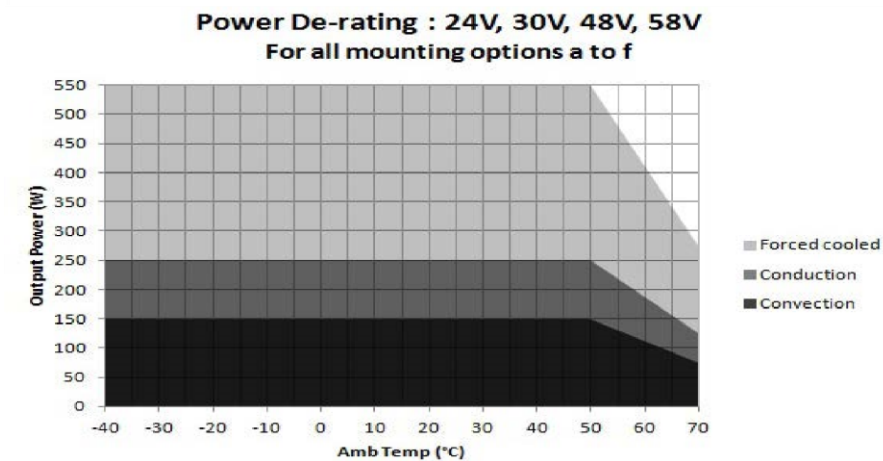
De-rate linearly from 100% at 110 VAC to 78% at 90 VAC



Convection load: 110 W up to 50 °C  
De-rate above 50 °C @ 2.5% per °C

Conduction load: 200 W up to 50 °C  
De-rate above 50 °C @ 2.5% per °C

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



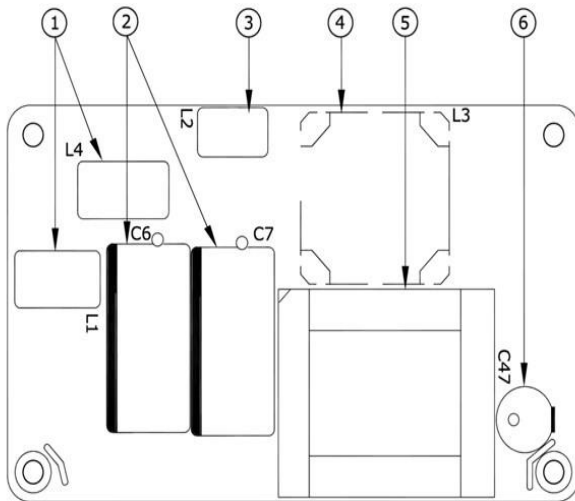
Convection load: 150 W up to 50 °C  
De-rate above 50 °C @ 2.5% per °C

Conduction load: 250 W up to 50 °C  
De-rate above 50 °C @ 2.5% per °C

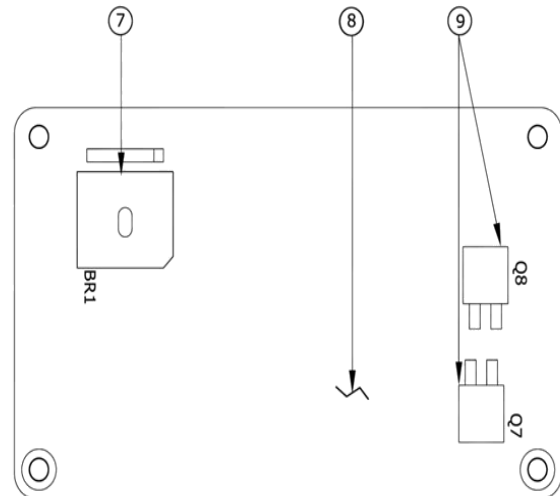
Forced air cooled load:  
550 W up to 50 °C  
De-rate above 50 °C @ 2.5% per °C

## MAXIMUM OPERATING TEMPERATURE

For reliable and safe operation, please make sure the maximum component temperatures given in table below is not exceeded.



TOP PCB



BOTTOM PCB

| IDENT NO | DESCRIPTION           | MAXIMUM TEMP. ALLOWED (°C)                                |
|----------|-----------------------|-----------------------------------------------------------|
| 1        | Common mode chokes    | 95                                                        |
| 2        | Input Bulk Capacitors | 90                                                        |
| 3        | Differential choke    | 110                                                       |
| 4        | Boost Choke           | 110                                                       |
| 5        | Output Transformer    | 125 (for 12 V & 15 V)<br>110 (for 24 V, 30 V, 48 V, 58 V) |
| 6        | Output Capacitor      | 90                                                        |
| 7        | Bridge Rectifier      | 120                                                       |
| 8        | Aluminum Clad PCB     | 105                                                       |
| 9        | Output Rectifiers     | 110                                                       |

## MOUNTING OPTIONS

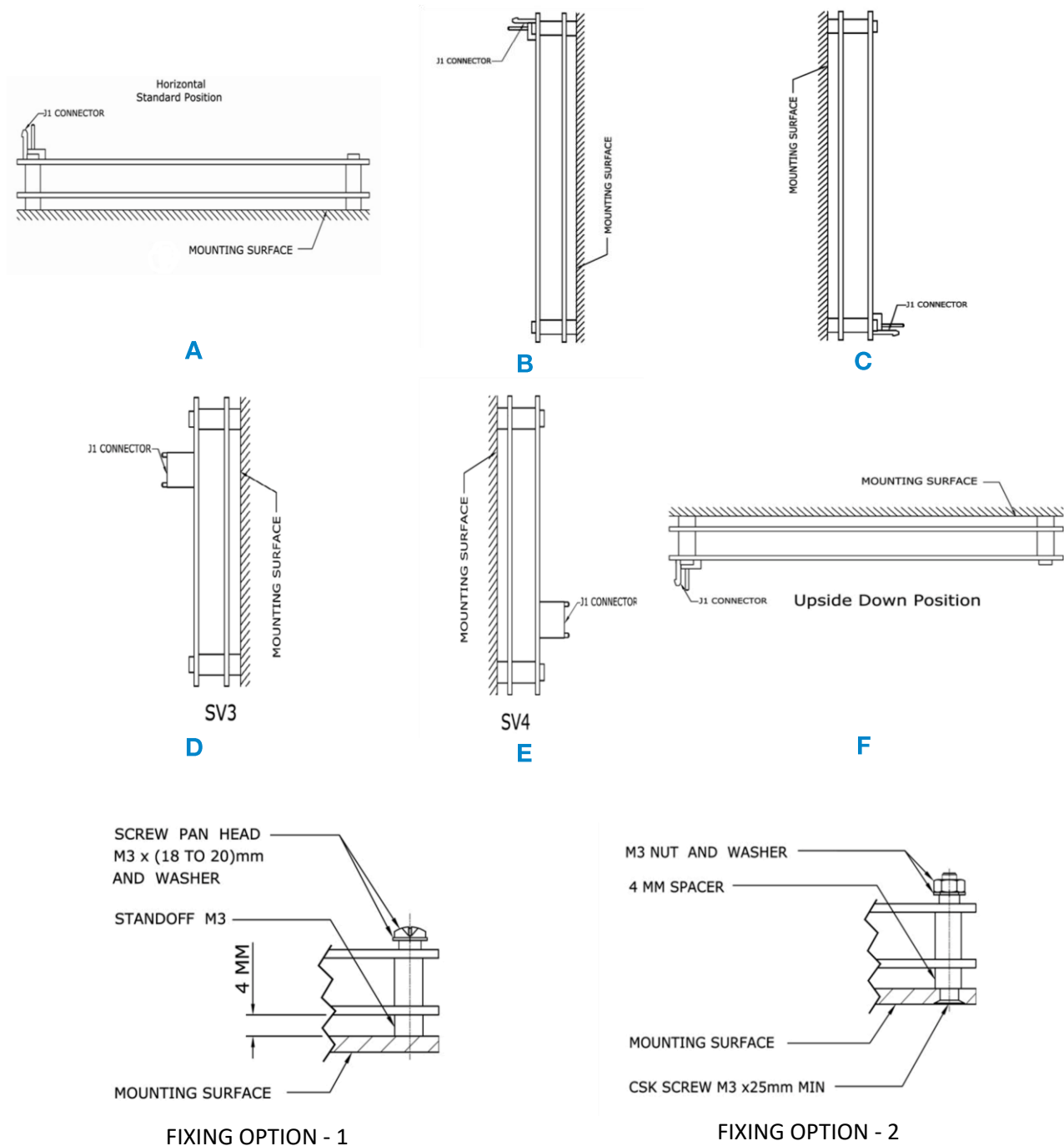
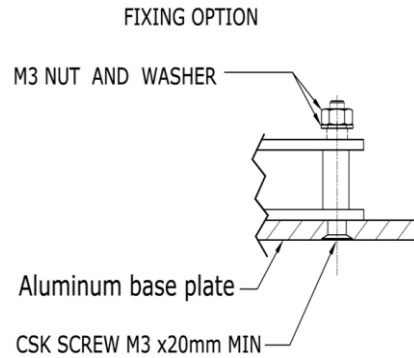
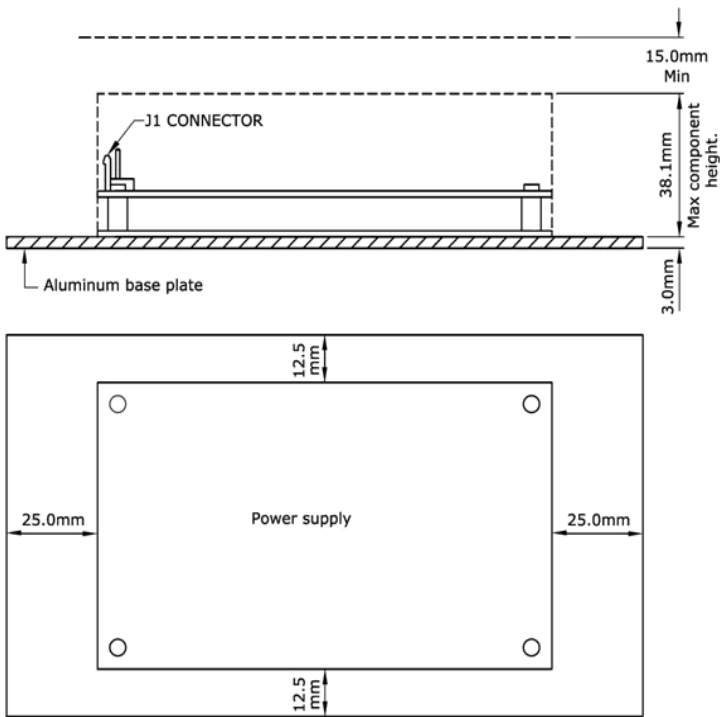


Figure 2. Mounting Options

## RECOMMENDED CONDUCTION PLATE & CLEARANCE

Conduction power rating mentioned in the table is with additional aluminum base plate of 3 mm thickness with 177.8 mm (7 in) length & 101.6 mm (4 in) width.

Clearance of minimum 15 mm above the component height is recommended for better thermal management.



**For more information on these products consult: [tech.support@psbel.com](mailto:tech.support@psbel.com)**

**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.

**TECHNICAL REVISIONS** - The appearance of products, including safety agency certifications pictured on labels, may change depending on the date manufactured. Specifications are subject to change without notice.



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- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
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- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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