AC/DC Power Supply TMM 60C Series, 60 Watt

- Fully encapsulated low profile plastic casing in chassis mount version
- 2 x MOPP Medical safety according to AAMI/ANSI ES 60601-1:2005(R) and IEC/EN 60601-1 3rd edition
- IT and industrial safety according to IEC/EN/UL 62368-1 and UL 508
- Ready to meet ErP directive <0.5 W no load power consumption
- −40°C start-up temperature
- Safety class II prepared
- Protection against over-temperature, overload and short circuit
- 3-year product warranty

The TMM 60C Series of fully encapsulated 60 Watt AC/DC power supply modules feature a reinforced/double I/O isolation system according to latest medical safety standards 60601-3 3rd edition for 2 x MOPP (Means Of Patient Protection).

The high efficiency and the use of highest grade components make the units suitable for an operating temperature range of −40°C to +60°C without load derating. EMI/EMC characteristics and the safety approval package qualify these modules not only for medical devices but also for demanding applications in transportation systems and for equipment in industrial and commercial environment.

### Models

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>TMM 60105C</td>
<td>51 W</td>
<td>5.1 VDC</td>
<td>10'000 mA</td>
<td>84 %</td>
</tr>
<tr>
<td>TMM 60112C</td>
<td>60 W</td>
<td>12 VDC</td>
<td>5'000 mA</td>
<td>87 %</td>
</tr>
<tr>
<td>TMM 60115C</td>
<td></td>
<td>15 VDC</td>
<td>4'000 mA</td>
<td>87 %</td>
</tr>
<tr>
<td>TMM 60124C</td>
<td></td>
<td>24 VDC</td>
<td>2'500 mA</td>
<td>87 %</td>
</tr>
<tr>
<td>TMM 60148C</td>
<td></td>
<td>48 VDC</td>
<td>1'250 mA</td>
<td>88 %</td>
</tr>
</tbody>
</table>

### Options

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
<th>URL</th>
</tr>
</thead>
</table>

www.tracopower.com August 31, 2023
## Input Specifications

### Input Voltage
- **AC Range**
  - Operational Range: 85 - 264 VAC (Full Range)
  - Rated Range: 100 - 240 VAC (Full Range)
- **DC Range**
  - Operational Range: 120 - 370 VDC (Designed for, no certification)
  - Polarity: irrelevant

### Input Frequency
- Operational Range: 47 - 440 Hz
- Certified: 50/60 Hz

### Input Current
- **Full Load & Vin = 230 VAC**
  - 5.1 VDC model: 530 mA max.
  - 12 VDC model: 600 mA max.
  - 15 VDC model: 600 mA max.
  - 24 VDC model: 600 mA max.
  - 48 VDC model: 600 mA max.
- **Full Load & Vin = 115 VAC**
  - 5.1 VDC model: 880 mA max.
  - 12 VDC model: 1000 mA max.
  - 15 VDC model: 1000 mA max.
  - 24 VDC model: 1000 mA max.
  - 48 VDC model: 990 mA max.

### Power Consumption
- **No load & Vin = 230 VAC**
  - 750 mW max.
- **No load & Vin = 115 VAC**
  - 500 mW max.

### Input Inrush Current
- **At 230 VAC**
  - 60 A max.
- **At 115 VAC**
  - 30 A max.

### Input Protection
- T2 2 A / 250 VAC (Internal Fuse in L & N)

### Recommended Input Fuse
(The need of an external fuse has to be assessed in the final application.)

## Output Specifications

### Voltage Set Accuracy
- ±2% max.

### Regulation
- **Input Variation (Vmin - Vmax)**
  - 1% max.
- **Load Variation (0 - 100%)**
  - 1% max.

### Ripple and Noise
- (20 MHz Bandwidth)
  - 5.1 VDC model: 160 mVp-p max.
  - 12 VDC model: 180 mVp-p max.
  - 15 VDC model: 230 mVp-p max.
  - 24 VDC model: 360 mVp-p max.
  - 48 VDC model: 720 mVp-p max.
  - 5.1 VDC model: 110 mVp-p typ.
  - 12 VDC model: 120 mVp-p typ.
  - 15 VDC model: 150 mVp-p typ.
  - 24 VDC model: 240 mVp-p typ.
  - 48 VDC model: 480 mVp-p typ.

### Capacitive Load
- 5.1 VDC model: 8000 µF max.
- 12 VDC model: 3900 µF max.
- 15 VDC model: 3300 µF max.
- 24 VDC model: 1500 µF max.
- 48 VDC model: 680 µF max.

### Minimum Load
- Not required

### Temperature Coefficient
- ±0.02 %/K max.

### Hold-up Time
- **At 230 VAC**
  - 50 ms min.
- **At 115 VAC**
  - 10 ms min.

### Start-up Overshoot Voltage
- 5% max.

### Short Circuit Protection
- Continuous, Automatic recovery

### Output Current Limitation
- 105% min. of Iout max.

### Overvoltage Protection
- 120% typ. of Vout nom.
  (By Zener diode)

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All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.
## Safety Specifications

<table>
<thead>
<tr>
<th>Safety Standards</th>
<th>EN 60950-1</th>
<th>EN 62368-1</th>
<th>IEC 60950-1</th>
<th>IEC 62368-1</th>
<th>UL 60950-1</th>
<th>UL 62368-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>- IT / Multimedia Equipment</td>
<td>- Industrial Control Equipment</td>
<td>- Medical Equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Protection Class</th>
<th>Class I &amp; II (Prepared: Reinforced Insulation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pollution Degree</td>
<td>PD 2</td>
</tr>
<tr>
<td>Over Voltage Category</td>
<td>OVC II</td>
</tr>
</tbody>
</table>

## EMC Specifications

<table>
<thead>
<tr>
<th>EMI Emissions</th>
<th>EN 61000-6-3 (Generic Residential)</th>
<th>EN 61000-6-4 (Generic Industrial)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Conducted Emissions</td>
<td>EN 55011 class B (internal filter)</td>
<td>EN 55032 class B (internal filter)</td>
</tr>
<tr>
<td>- Radiated Emissions</td>
<td>EN 55011 class B (internal filter)</td>
<td>EN 55032 class B (internal filter)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EMS Immunity</th>
<th>EN 55024 (IT Equipment)</th>
<th>EN 55035 (Multimedia)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Electrostatic Discharge</td>
<td>EN 61000-4-2, ±15 kV, perf. criteria A</td>
<td></td>
</tr>
<tr>
<td>- RF Electromagnetic Field</td>
<td>EN 61000-4-2, ±8 kV, perf. criteria A</td>
<td></td>
</tr>
<tr>
<td>- EFT (Burst) / Surge</td>
<td>EN 61000-4-3, 10 V/m, perf. criteria A</td>
<td></td>
</tr>
<tr>
<td>- Conducted RF Disturbances</td>
<td>EN 61000-4-4, ±2 kV, perf. criteria A</td>
<td></td>
</tr>
<tr>
<td>- PF Magnetic Field</td>
<td>EN 61000-4-5, ±1 kV, perf. criteria A</td>
<td></td>
</tr>
<tr>
<td>- Voltage Dips &amp; Interruptions</td>
<td>EN 61000-4-6, 10 Vrms, perf. criteria A</td>
<td></td>
</tr>
</tbody>
</table>

## General Specifications

<table>
<thead>
<tr>
<th>Relative Humidity</th>
<th>95% max. (non-condensing)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Ranges</td>
<td>- Operating Temperature: -40°C to +80°C</td>
</tr>
<tr>
<td></td>
<td>- Storage Temperature: -40°C to +95°C</td>
</tr>
<tr>
<td>Power Derating</td>
<td>- High Temperature: 4.5 %/K above 60°C (Vin model)</td>
</tr>
<tr>
<td></td>
<td>- 3.8 %/K above 80°C (other models)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cooling System</th>
<th>Natural convection (20 LFM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altitude During Operation</td>
<td>5'000 m max.</td>
</tr>
<tr>
<td>Switching Frequency</td>
<td>100 kHz typ. (PWM)</td>
</tr>
<tr>
<td>Insulation System</td>
<td>Reinforced Insulation</td>
</tr>
<tr>
<td>Working Voltage (rated)</td>
<td>240 VAC</td>
</tr>
<tr>
<td>Isolation Test Voltage</td>
<td>- Input to Output, 60 s: 4'000 VAC</td>
</tr>
</tbody>
</table>

All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.
Isolation Resistance - Input to Output, 500 VDC 1'000 MΩ min.
Leakage Current - Touch Current 100 µA max.
Reliability - Calculated MTBF 125'000 h (MIL-HDBK-217F, ground benign)
Housing Material Plastic resin (UL 94 V-0 rated)
Potting Material Silicone (UL 94 V-0 rated)
Housing Type Plastic Case
Mounting Type Chassis Mount
Connection Type Screw Terminal
Weight 380 g

Environmental Compliance - REACH Declaration www.tracopower.com/info/reach-declaration.pdf
REACH SVHC list compliant
REACH Annex XVII compliant
- RoHS Declaration www.tracopower.com/info/rohs-declaration.pdf
Exemptions: 6c, 7a
(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule)).
- SCIP Reference Number 1ea9b5b6-1577-41c2-94c4-7ff00365fca8

Supporting Documents
Overview Link (for additional Documents) www.tracopower.com/overview/tmm60c

Outline Dimensions

Dimensions in mm (inch)
Tolerances ±0.5 (±0.02)
Pin Ø 1.0 ±0.1 (0.04 ±0.004)
Pin pitch tolerances ±0.25 (±0.01)
Mounting screw locked torque: max. 0.49 Nm (5.0 kgfcm)

Pinout

<table>
<thead>
<tr>
<th>Pin</th>
<th>Single Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AC (N)</td>
</tr>
<tr>
<td>2</td>
<td>AC (L)</td>
</tr>
<tr>
<td>3</td>
<td>NC</td>
</tr>
<tr>
<td>4</td>
<td>+Vout</td>
</tr>
<tr>
<td>5</td>
<td>NC</td>
</tr>
<tr>
<td>6</td>
<td>–Vout</td>
</tr>
<tr>
<td>7</td>
<td>NC</td>
</tr>
</tbody>
</table>

NC: Not connected
Terminal screw locked torque: 0.5 Nm max.