

## AC/DC Power Supply

## TMM 40 Series, 40 Watt

Not recommended for new designs

- Fully encapsulated low profile plastic casing in PCB 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
- Ready to meet ErP directive <0.3 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 40 Series of fully encapsulated 40 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

| Order Code  | Output Power | Output 1 |                  | Output 2 |                  | Efficiency typ. |
|-------------|--------------|----------|------------------|----------|------------------|-----------------|
|             |              | Vnom     | I <sub>max</sub> | Vnom     | I <sub>max</sub> |                 |
| TMM 40105 * | 40 W         | 5 VDC    | 8'000 mA         |          |                  | 81 %            |
| TMM 40112 * |              | 12 VDC   | 3'330 mA         |          |                  | 84 %            |
| TMM 40115 * |              | 15 VDC   | 2'660 mA         |          |                  | 85 %            |
| TMM 40124 * |              | 24 VDC   | 1'660 mA         |          |                  | 84 %            |
| TMM 40212 * |              | +12 VDC  | 1'660 mA         | -12 VDC  | 1'660 mA         | 84 %            |
| TMM 40215 * |              | +15 VDC  | 1'330 mA         | -15 VDC  | 1'330 mA         | 85 %            |

Note \* Not recommended for new designs

## Input Specifications

|                        |                             |                                                                                                     |
|------------------------|-----------------------------|-----------------------------------------------------------------------------------------------------|
| Input Voltage          | - AC Range                  | Operational Range: 85 - 264 VAC (Full Range)<br>Rated Range: 100 - 240 VAC (Full Range)             |
|                        | - DC Range                  | Operational Range: 120 - 370 VDC (Designed for, no certification)<br>Polarity: irrelevant           |
| Input Frequency        |                             | Operational Range: 47 - 440 Hz                                                                      |
|                        |                             | Certified: 50/60 Hz                                                                                 |
| Power Consumption      | - No load & Vin = 230 VAC   | 750 mW max.                                                                                         |
|                        | - No load & Vin = 115 VAC   | 300 mW max.                                                                                         |
| Input Current          | - Full load & Vin = 230 VAC | 5 VDC model: 430 mA max.                                                                            |
|                        |                             | 12 VDC model: 415 mA max.                                                                           |
|                        |                             | 15 VDC model: 410 mA max.                                                                           |
|                        |                             | 24 VDC model: 415 mA max.                                                                           |
|                        |                             | 12 / -12 VDC model: 415 mA max.                                                                     |
|                        | - Full load & Vin = 115 VAC | 15 / -15 VDC model: 410 mA max.                                                                     |
|                        |                             | 5 VDC model: 720 mA max.                                                                            |
|                        |                             | 12 VDC model: 690 mA max.                                                                           |
|                        |                             | 15 VDC model: 680 mA max.                                                                           |
|                        |                             | 24 VDC model: 690 mA max.                                                                           |
| Input Inrush Current   | - At 230 VAC                | 60 A max.                                                                                           |
|                        | - At 115 VAC                | 30 A max.                                                                                           |
| Input Protection       |                             | T 2 A / 250 VAC (Internal Fuse in L & N)                                                            |
| Recommended Input Fuse |                             | 3'000 mA (slow blow)<br>(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) | single output models: 0.5% max.                              |
|                                        |                                 | dual output models: 0.5% max.                                |
|                                        | - Load Variation (0 - 100%)     | single output models: 1% max.                                |
|                                        |                                 | dual output models: 2% max. (Output 1)<br>2% max. (Output 2) |
| Ripple and Noise<br>(20 MHz Bandwidth) | - single output                 | 5 VDC model: 90 mVp-p max.                                   |
|                                        |                                 | 12 VDC model: 155 mVp-p max.                                 |
|                                        |                                 | 15 VDC model: 195 mVp-p max.                                 |
|                                        |                                 | 24 VDC model: 310 mVp-p max.                                 |
|                                        | - dual output                   | 12 / -12 VDC model: 155 / 155 mVp-p max.                     |
|                                        |                                 | 15 / -15 VDC model: 195 / 195 mVp-p max.                     |
|                                        | - single output                 | 5 VDC model: 80 mVp-p typ.                                   |
|                                        |                                 | 12 VDC model: 120 mVp-p typ.                                 |
|                                        |                                 | 15 VDC model: 150 mVp-p typ.                                 |
|                                        |                                 | 24 VDC model: 240 mVp-p typ.                                 |
| Capacitive Load                        | - single output                 | 12 / -12 VDC model: 120 / 120 mVp-p typ.                     |
|                                        |                                 | 15 / -15 VDC model: 150 / 150 mVp-p typ.                     |
|                                        | - dual output                   | 5 VDC model: 8'000 µF max.                                   |
|                                        |                                 | 12 VDC model: 3'900 µF max.                                  |
|                                        | - dual output                   | 15 VDC model: 3'900 µF max.                                  |
|                                        |                                 | 24 VDC model: 680 µF max.                                    |
| Minimum Load                           |                                 | 12 / -12 VDC model: 1'500 / 1'500 µF max.                    |
|                                        |                                 | 15 / -15 VDC model: 1'000 / 1'000 µF max.                    |
| Temperature Coefficient                |                                 | Not required                                                 |
|                                        |                                 | ±0.02 %/K max.                                               |

All specifications valid at 230 VAC, resistive full load and +25°C after warm-up time, unless otherwise stated.

|                            |              |                                                     |
|----------------------------|--------------|-----------------------------------------------------|
| 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 I <sub>out</sub> max.                  |
| Overvoltage Protection     |              | 120% typ. of V <sub>out</sub> nom. (By Zener diode) |

## Safety Specifications

|                       |                                |                                                                                                                                    |
|-----------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Standards             | - IT / Multimedia Equipment    | EN 60950-1<br>EN 62368-1<br>IEC 60950-1<br>IEC 62368-1<br>UL 60950-1<br>UL 62368-1                                                 |
|                       | - Industrial Control Equipment | UL 508                                                                                                                             |
|                       | - Medical Equipment            | EN 60601-1<br>IEC 60601-1<br>ANSI/AAMI ES 60601-1<br>CSA-C22.2, No 60601-1                                                         |
|                       | - Certification Documents      | 2 x MOPP (Means Of Patient Protection)<br><a href="http://www.tracopower.com/overview/tmm40">www.tracopower.com/overview/tmm40</a> |
| Protection Class      |                                | Class I & II (Prepared): Reinforced Insulation                                                                                     |
| Pollution Degree      |                                | PD 2                                                                                                                               |
| Over Voltage Category |                                | OVC II                                                                                                                             |

## EMC Specifications

|                     |                                |                                                                                                                                                                                       |
|---------------------|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EMI (Emissions)     |                                | EN 61000-6-3 (Generic Residential)<br>EN 61000-6-4 (Generic Industrial)                                                                                                               |
|                     | - Conducted Emissions          | EN 55011 class B (internal filter)<br>EN 55032 class B (internal filter)<br>FCC 47 Part 15 class B (internal filter)                                                                  |
|                     | - Radiated Emissions           | EN 55011 class B (internal filter)<br>EN 55032 class B (internal filter)<br>FCC 47 Part 15 class B (internal filter)                                                                  |
|                     |                                |                                                                                                                                                                                       |
| EMS (Immunity)      |                                | EN 61000-6-1 (Generic Residential)<br>EN 61000-6-2 (Generic Industrial)<br>EN 60601-1-2 edition 4 (Medical Devices)<br>EN 55024 (IT Equipment)<br>EN 55035 (Multimedia)               |
|                     | - Electrostatic Discharge      | Air: EN 61000-4-2, $\pm 15$ kV, perf. criteria A<br>Contact: EN 61000-4-2, $\pm 8$ kV, perf. criteria A                                                                               |
|                     | - RF Electromagnetic Field     | EN 61000-4-3, 10 V/m, perf. criteria A                                                                                                                                                |
|                     | - EFT (Burst) / Surge          | EN 61000-4-4, $\pm 2$ kV, perf. criteria A                                                                                                                                            |
|                     |                                | L to L: EN 61000-4-5, $\pm 1$ kV, perf. criteria A                                                                                                                                    |
|                     | - Conducted RF Disturbances    | EN 61000-4-6, 10 Vrms, perf. criteria A                                                                                                                                               |
|                     | - PF Magnetic Field            | Continuous: EN 61000-4-8, 30 A/m, perf. criteria A                                                                                                                                    |
|                     | - Voltage Dips & Interruptions | 230 VAC / 50 Hz: EN 61000-4-11<br>30%, 25 periods, perf. criteria A<br>>95%, 0.5 periods, perf. criteria A<br>>95%, 1 period, perf. criteria A<br>>95%, 250 periods, perf. criteria B |
|                     |                                |                                                                                                                                                                                       |
|                     |                                |                                                                                                                                                                                       |
|                     |                                |                                                                                                                                                                                       |
|                     |                                |                                                                                                                                                                                       |
|                     |                                |                                                                                                                                                                                       |
|                     |                                |                                                                                                                                                                                       |
| EMC / Environmental | - Certification Documents      | <a href="http://www.tracopower.com/overview/tmm40">www.tracopower.com/overview/tmm40</a>                                                                                              |

## General Specifications

|                    |                         |                           |
|--------------------|-------------------------|---------------------------|
| Relative Humidity  |                         | 95% max. (non condensing) |
| Temperature Ranges | - Operating Temperature | -40°C to +80°C            |
|                    | - Storage Temperature   | -40°C to +95°C            |

All specifications valid at 230 VAC, resistive full load and +25°C after warm-up time, unless otherwise stated.

|                                                                                                                |                            |                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------------------------------------------------------------------------------|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power Derating                                                                                                 | - High Temperature         | 3.75 %/K above 60°C                                                                                                                                                                                                                                                                                                       |
| See application note: <a href="http://www.tracopower.com/overview/tmm40">www.tracopower.com/overview/tmm40</a> |                            |                                                                                                                                                                                                                                                                                                                           |
| Over Temperature                                                                                               | - Protection Mode          | 142°C typ. (Automatic recovery at 67°C typ.)                                                                                                                                                                                                                                                                              |
| Protection Switch Off                                                                                          | - Measurement Point        | Internal IC temperature                                                                                                                                                                                                                                                                                                   |
| Cooling System                                                                                                 |                            | Natural convection (20 LFM)                                                                                                                                                                                                                                                                                               |
| Altitude During Operation                                                                                      |                            | 5'000 m max.                                                                                                                                                                                                                                                                                                              |
| Switching Frequency                                                                                            |                            | 130 kHz typ. (PWM)                                                                                                                                                                                                                                                                                                        |
| Insulation System                                                                                              |                            | Reinforced Insulation                                                                                                                                                                                                                                                                                                     |
| Working Voltage (rated)                                                                                        |                            | 240 VAC                                                                                                                                                                                                                                                                                                                   |
| Isolation Test Voltage                                                                                         | - Input to Output, 60 s    | 4'000 VAC                                                                                                                                                                                                                                                                                                                 |
| Isolation Resistance                                                                                           | - Input to Output, 500 VDC | 1'000 MΩ min.                                                                                                                                                                                                                                                                                                             |
| Leakage Current                                                                                                | - Touch Current            | 100 µA max.                                                                                                                                                                                                                                                                                                               |
| Reliability                                                                                                    | - Calculated MTBF          | 200'000 h (MIL-HDBK-217F, ground benign)                                                                                                                                                                                                                                                                                  |
| Washing Process                                                                                                |                            | Not allowed                                                                                                                                                                                                                                                                                                               |
| Housing Material                                                                                               |                            | Plastic resin (UL 94 V-0 rated)                                                                                                                                                                                                                                                                                           |
| Potting Material                                                                                               |                            | Silicone (UL 94 V-0 rated)                                                                                                                                                                                                                                                                                                |
| Pin Material                                                                                                   |                            | Copper Alloy (C6801)                                                                                                                                                                                                                                                                                                      |
| Pin Foundation Plating                                                                                         |                            | Nickel (2 - 4 µm)                                                                                                                                                                                                                                                                                                         |
| Pin Surface Plating                                                                                            |                            | Tin (3 - 5 µm), matte                                                                                                                                                                                                                                                                                                     |
| Housing Type                                                                                                   |                            | Plastic Case                                                                                                                                                                                                                                                                                                              |
| Mounting Type                                                                                                  |                            | PCB Mount                                                                                                                                                                                                                                                                                                                 |
| Connection Type                                                                                                |                            | THD (Through-Hole Device)                                                                                                                                                                                                                                                                                                 |
| Soldering Profile                                                                                              |                            | Lead-Free Wave Soldering<br>260°C / 10 s max.                                                                                                                                                                                                                                                                             |
| Weight                                                                                                         |                            | 310 g                                                                                                                                                                                                                                                                                                                     |
| Environmental Compliance                                                                                       | - REACH Declaration        | <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a>                                                                                                                                                                                                          |
|                                                                                                                | - RoHS Declaration         | REACH SVHC list compliant<br>REACH Annex XVII compliant<br><a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a><br>Exemptions: 7(a)<br>(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).) |
|                                                                                                                | - SCIP Reference Number    | fadb5307-b3f5-476e-a12d-7e37a33a0fc8                                                                                                                                                                                                                                                                                      |

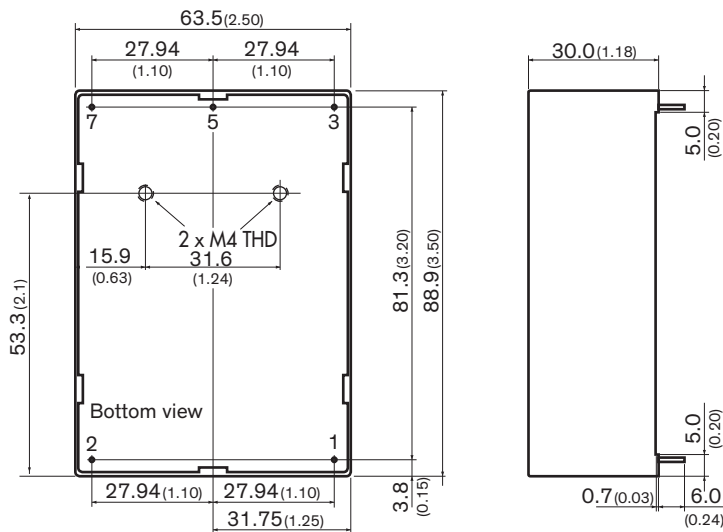
## Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/tmm40](http://www.tracopower.com/overview/tmm40)

All specifications valid at 230 VAC, resistive full load and +25°C after warm-up time, unless otherwise stated.

## Outline Dimensions



Dimensions in mm (inch)  
Tolerances  $\pm 0.5$  ( $\pm 0.02$ )  
Pin  $\varnothing 1.0 \pm 0.1$  ( $0.04 \pm 0.004$ )  
Pin pitch tolerances  $\pm 0.25$  ( $\pm 0.01$ )

| Pinout |               |             |
|--------|---------------|-------------|
| Pin    | Single Output | Dual Output |
| 1      | AC (N)        | AC (N)      |
| 2      | AC (L)        | AC (L)      |
| 3      | +Vout         | +Vout       |
| 5      | −Vout         | Common      |
| 7      | NC            | −Vout       |

NC: Not connected