

- Fully encapsulated power supplies in plastic casing for PCB mount
- Certification according to IEC/EN/ES 60601-1 3rd edition for 2xMOPP
- Risk management process according to ISO 14971 incl. risk management file
- Acceptance criteria for electronic assemblies acc. to IPC-A-610 Level 3
- Low leakage current <100 µA rated for BF applications
- Operating temperature range: -25°C to +70°C max.
- Protection against short-circuit, over load and over voltage
- Protection class II prepared
- 5-year product warranty



The TMF 20 Series AC/DC power supply modules are designed and manufactured based on workmanship standards and risk management to comply with the requirements for quality, reliability and safety of medical equipment. The units are approved to IEC/EN/ES 60601-1 edition 3.1 for 2 x MOPP (Means Of Patient Protection) and come along with an ISO 14971 risk management file. These fully encapsulated modules are for PCB mount. They are designed for protection class II applications (no earth connection) and feature a low leakage current (<100 µA). A compact design and excellent EMC considerations facilitate the design in. The thermal management enables an operation within a wide temperature range of -25 to +70°C and the isolation system is designed and approved for an altitude of 5000 m (AMSL). This makes the power supplies suitable not only for stationary applications but also for transportable medical equipment.

| Models | | | | |
|------------|----------------------|------------------------|------------------------|--------------------|
| Order Code | Output Power max. | Output Voltage nom. | Output Current max. | Efficiency typ. |
| TMF 20105 | 18 W | 5 VDC | 3'600 mA | 78 % |
| TMF 20112 | 20 W | 12 VDC | 1'667 mA | 84 % |
| TMF 20115 | | 15 VDC | 1'333 mA | 84 % |
| TMF 20124 | | 24 VDC | 833 mA | 84 % |

Input Specifications

| | | |
|------------------------|-----------------------------|---|
| Input Voltage | - AC Range | Operational Range: 90 - 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 | 250 mA max. |
| | - Full Load & Vin = 115 VAC | 450 mA max. |
| Power Consumption | - No load & Vin = 230 VAC | 150 mW max. (Ready to meet ErP directive) |
| | - No load & Vin = 115 VAC | 150 mW max. |
| Input Inrush Current | - At 230 VAC | 40 A max. |
| | - At 115 VAC | 20 A max. |
| 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) | 0.5% max. |
| | - Load Variation (0 - 100%) | 1% max. |
| Ripple and Noise (20 MHz Bandwidth) | 5 VDC model: | 100 mVp-p max. |
| | 12 VDC model: | 120 mVp-p max. |
| | 15 VDC model: | 150 mVp-p max. |
| | 24 VDC model: | 240 mVp-p max. |
| Capacitive Load | 5 VDC model: | 5'000 µF max. |
| | 12 VDC model: | 1'500 µF max. |
| | 15 VDC model: | 1'000 µF max. |
| | 24 VDC model: | 560 µF max. |
| Minimum Load | | Not required |
| Temperature Coefficient | | ±0.05 %/K max. |
| Hold-up Time | - At 230 VAC | 36 ms min. |
| | - At 115 VAC | 10 ms min. |
| Short Circuit Protection | | Continuous, Automatic recovery |
| Output Current Limitation | | 160 - 240% of Iout max. |
| Overvoltage Protection | | 105 - 145% of Vout nom. (By Zener diode) |

Safety Specifications

| | | |
|-----------------------|---------------------------|--|
| Safety Standards | - Medical Equipment | EN 60601-1 IEC 60601-1 ANSI/AAMI ES 60601-1 CSA-C22.2, No 60601-1 2 x MOPP (Means Of Patient Protection) www.tracopower.com/overview/tmf20 |
| | - Certification Documents | |
| Protection Class | | Class I & II (Prepared): Reinforced Insulation |
| Pollution Degree | | PD 2 |
| Over Voltage Category | | OVC II |

EMC Specifications

| | | |
|---------------|-----------------------|--|
| EMI Emissions | | EN 60601-1-2 edition 4 (Medical Devices) |
| | - Conducted Emissions | EN 55011 class B (internal filter) |
| | - Radiated Emissions | EN 55011 class B (internal filter) |

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

| | | |
|--------------------------------|------------------|--|
| EMS Immunity | | EN 61000-6-2 (Generic Industrial) EN 60601-1-2 edition 4 (Medical Devices) |
| - Electrostatic Discharge | Air: | EN 61000-4-2, ± 15 kV, perf. criteria A |
| | Contact: | EN 61000-4-2, ± 8 kV, perf. criteria A |
| - RF Electromagnetic Field | | EN 61000-4-3, 3 V/m, perf. criteria A |
| - EFT (Burst) / Surge | | EN 61000-4-4, ± 2 kV, perf. criteria A |
| | L to L: | EN 61000-4-5, ± 1 kV, perf. criteria A |
| | L to PE: | EN 61000-4-5, ± 2 kV, perf. criteria A |
| - Conducted RF Disturbances | | EN 61000-4-6, 3 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 30%, 25 periods, perf. criteria A >95%, 0.5 periods, perf. criteria A >95%, 1 period, perf. criteria A >95%, 250 periods, perf. criteria A |
| | 115 VAC / 60 Hz: | EN 61000-4-11 30%, 25 periods, perf. criteria A >95%, 0.5 periods, perf. criteria A >95%, 1 period, perf. criteria A >95%, 250 periods, perf. criteria A |

| General Specifications | | |
|-------------------------------|-------------------------|---|
| Relative Humidity | | 95% max. (non condensing) |
| Temperature Ranges | - Operating Temperature | -25°C to +70°C |
| | - Storage Temperature | -40°C to +85°C |
| Power Derating | - High Temperature | 3 %/K above 50°C |
| | - Low Input Voltage | 2 %/V below 100 VAC |
| | | See application note: www.tracopower.com/overview/tmf20 |
| Cooling System | | Natural convection (20 LFM) |
| Altitude During Operation | | 5'000 m max. |
| Switching Frequency | | 40 - 73 kHz (PWM) |
| | | 66 kHz typ. (PWM) |
| Insulation System | | Reinforced Insulation |
| Working Voltage (rated) | | 250 VAC |
| Isolation Test Voltage | - Input to Output, 60 s | 4'000 VAC |
| Leakage Current | - Touch Current | 100 μ A max. |
| Reliability | - Calculated MTBF | 350'000 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) (Hermetical sealed structure, dust-proof only non water-proof) |
| Pin Material | | Brass |
| Pin Surface Plating | | Tin (120 μ m min.), matte |
| Housing Type | | Plastic Case |
| Mounting Type | | PCB Mount |
| Connection Type | | THD (Through-Hole Device) |
| Weight | | 100 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: 7c-I (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule). The SCIP number is provided on request.) |

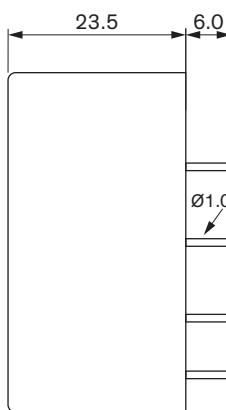
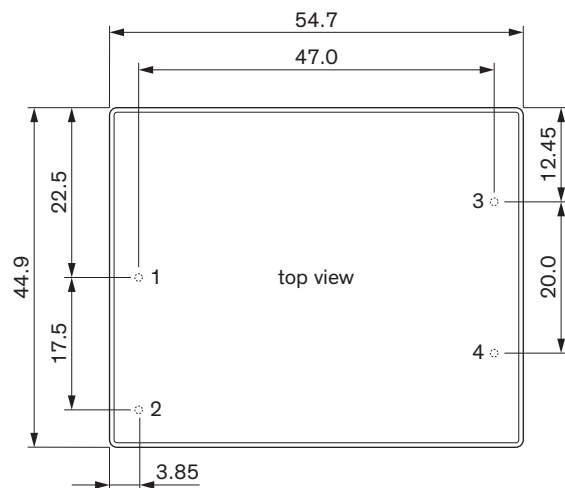
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Supporting Documents

[Overview Link](#) (for additional Documents)

www.tracopower.com/overview/tmf20

Outline Dimensions



Dimensions in mm
Tolerances ± 0.5 mm
Pin tolerances ± 0.1 mm

| Pinout | |
|--------|----------|
| Pin | Function |
| 1 | AC (N) |
| 2 | AC (L) |
| 3 | -Vout |
| 4 | +Vout |