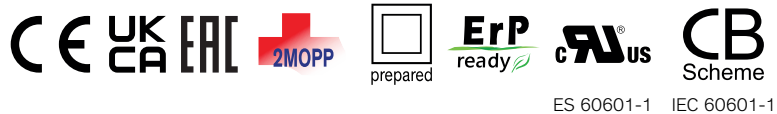


- Fully encapsulated power supplies in plastic casing for PCB mount
- Certification according to IEC/EN/ES 60601-1 3rd edition for 2xMOPP
- Risk management process according to ISO 14971 incl. risk management file
- Acceptance criteria for electronic assemblies acc. to IPC-A-610 Level 3
- Low leakage 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	Output Voltage	Output Current	Efficiency
	max.	nom.	max.	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 - Full Load & Vin = 115 VAC	250 mA max. 450 mA max.
Power Consumption	- No load & Vin = 230 VAC - No load & Vin = 115 VAC	150 mW max. (Ready to meet ErP directive) 150 mW max.
Input Inrush Current	- At 230 VAC - At 115 VAC	40 A max. 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) - Load Variation (0 - 100%)	0.5% max. 1% max.
Ripple and Noise (20 MHz Bandwidth)	5 VDC model: 12 VDC model: 15 VDC model: 24 VDC model:	100 mVp-p max. 120 mVp-p max. 150 mVp-p max. 240 mVp-p max.
Capacitive Load	5 VDC model: 12 VDC model: 15 VDC model: 24 VDC model:	5'000 µF max. 1'500 µF max. 1'000 µF max. 560 µF max.
Minimum Load		Not required
Temperature Coefficient		±0.05 %/K max.
Hold-up Time	- At 230 VAC - At 115 VAC	36 ms min. 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	- Conducted Emissions - Radiated Emissions	EN 60601-1-2 edition 4 (Medical Devices) EN 55011 class B (internal filter) EN 55011 class B (internal filter)
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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 EN 61000-4-3, 3 V/m, perf. criteria A EN 61000-4-4, ±2 kV, perf. criteria A
- RF Electromagnetic Field	L to L:	EN 61000-4-5, ±1 kV, perf. criteria A
- EFT (Burst) / Surge	L to PE:	EN 61000-4-5, ±2 kV, perf. criteria A EN 61000-4-6, 3 Vrms, perf. criteria A
- Conducted RF Disturbances	Continuous:	EN 61000-4-8, 30 A/m, perf. criteria A
- PF Magnetic Field	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
- Voltage Dips & Interruptions	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 µA 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 µm 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.)

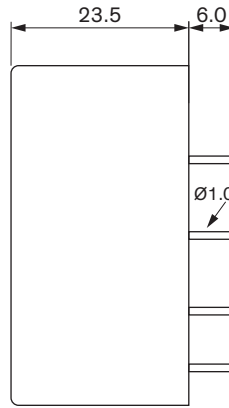
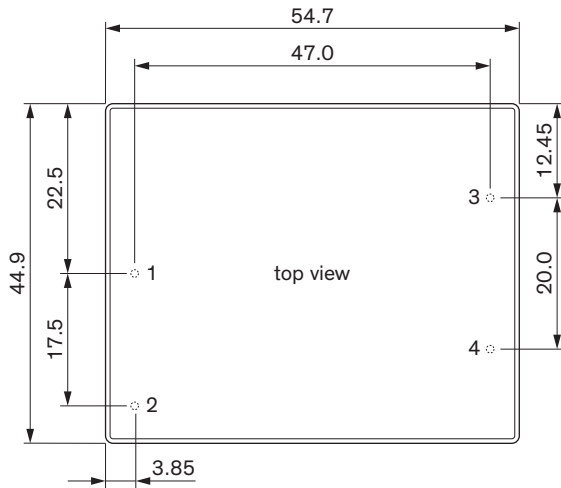
All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

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