TRACO POWER

AC/DC Medical Power Supply

TMF 10 Series, 10 Watt

- **Fully encapsulated power supplies in plasic 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**

ES 60601-1 IEC 60601-1

The TMF 10 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 10105	10 W	5 VDC	2'000 mA	79 %
TMF 10112		12 VDC	833 mA	84 %
TMF 10115		15 VDC	666 mA	84 %
TMF 10124		24 VDC	417 mA	84 %

Input Specifications

Input Voltage	- AC Range	90 - 264 VAC (Full Range)
	- DC Range	120 - 370 VDC (Designed for, no certification)
Input Frequency		47 - 63 Hz
Input Current	- Full Load & Vin = 230 VAC	120 mA max.
	- Full Load & Vin = 115 VAC	230 mA max.
Power Consumption	- At no load	150 mW max. (Ready to meet ErP directive)
Input Inrush Current	- At 230 VAC	25 A max.
	- At 115 VAC	12 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:	13'000 µF max.
		12 VDC model:	2'600 µF max.
		15 VDC model:	2'600 µF max.
		24 VDC model:	600 µF max.
Minimum Load			Not required
Temperature Coefficient			±0.05 %/K max.
Hold-up Time	- At 230 VAC		70 ms min.
	- At 115 VAC		12 ms min.
Short Circuit Protection			Continuous, Automatic recovery
Output Current Limitation			150 - 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)
	- Certification Documents	www.tracopower.com/overview/tmf10
Protection Class		Class 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, 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

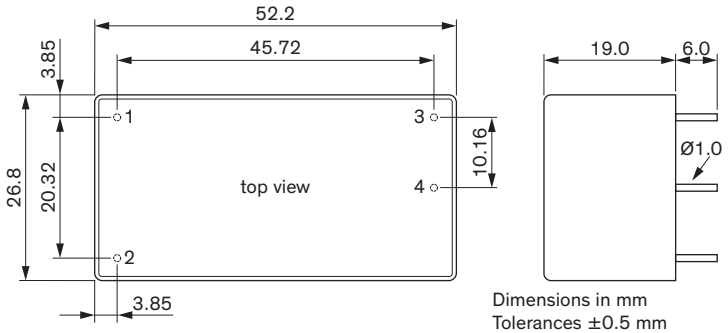
Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	–25°C to +70°C
	- Storage Temperature	–40°C to +85°C
Power Derating	- High Temperature	4 %/K above 55°C
	- Low Input Voltage	2 %/V below 100 VAC
Cooling System		Natural convection (20 LFM)
Altitude During Operation		5'000 m max.
Atmospheric Pressure		54 - 106 kPa
Switching Frequency		40 - 140 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	400'000 h (MIL-HDBK-217F, ground benign)
Housing Material		Plastic resin (UL 94 V-0 rated)
Pin Material		Brass
Pin Surface Plating		Tin (120 µm min.), matte
Connection Type		THD (Through-Hole Device)
Weight		47 g
Environmental Compliance	- Reach	www.tracopower.com/info/reach-declaration.pdf
	- RoHS	www.tracopower.com/info/rohs-declaration.pdf

Supporting Documents

Overview Link (for additional Documents)	www.tracopower.com/overview/tmf10

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

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