

- Fully encapsulated power supplies in plastic casing for PCB mount
- Certification according to IEC/EN/ES 60601-1 3rd edition for 2XMOOPP
- Risk management process according to ISO 14971 including risk management file
- Acceptance criteria for electronic assemblies according 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 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 × MOOPP (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	Output Current (max.)	Efficiency (typ.)
TMF 05105	5 W	5.0 VDC	1000 mA	77 %
TMF 05112	5 W	12 VDC	417 mA	82 %
TMF 05115	5 W	15 VDC	333 mA	82 %
TMF 05124	5 W	24 VDC	208 mA	82 %
TMF 10105	10 W	5.0 VDC	2000 mA	79 %
TMF 10112	10 W	12 VDC	833 mA	84 %
TMF 10115	10 W	15 VDC	666 mA	84 %
TMF 10124	10 W	24 VDC	417 mA	84 %
TMF 20105	18 W	5.0 VDC	3600 mA	78 %
TMF 20112	20 W	12 VDC	1667 mA	84 %
TMF 20115	20 W	15 VDC	1333 mA	84 %
TMF 20124	20 W	24 VDC	833 mA	84 %
TMF 30105	25 W	5.0 VDC	5000 mA	82 %
TMF 30112	30 W	12 VDC	2500 mA	88 %
TMF 30115	30 W	15 VDC	2000 mA	86 %
TMF 30124	30 W	24 VDC	1250 mA	85 %

## Input Specifications

Input voltage	– AC Input	90 – 264 VAC
	– DC Input	derating of 2%/V below 100 VAC required 120 – 370 VDC
Input frequency		47 – 63 Hz
Leakage current (touch current)		< 0.1 mA (at 264 VAC)
Inrush current	5 W models:	10/20 A max. (115/230 VAC)
	10 W models:	12/25 A max. (115/230 VAC)
	20 W models:	20/40 A max. (115/230 VAC)
	30 W models:	30/60 A max. (115/230 VAC)
No-load power consumption		< 0.15 W

## Output Specifications

Voltage accuracy		± 2 % typ.
Regulation	– Input variation	0.5 % typ.
	– Load variation (0–100 %)	1.0 % typ.
Minimum load		not required
Hold-up time	5 W models:	20/90 ms min. (115/230 VAC)
	10 W models:	12/70 ms min. (115/230 VAC)
	20 W models:	10/36 ms min. (115/230 VAC)
	30 W models:	14/45 ms min. (115/230 VAC)
Ripple and Noise (20MHz bandwidth)	5 VDC models:	100 mVp-p max.
	other models:	1 % of Vout max.
Overload protection (current limit)		hiccup, auto recovery
Short circuit current		hiccup, indefinite
Output overvoltage protection		zener diode

Max. capacitive load [µF]	Model series			
	TMF 05	TMF 10	TMF 20	TMF 30
Output				
5.0 VDC	8000	13'000	5000	6800
12 VDC	1200	2600	1500	1600
15 VDC	820	2600	1000	1200
24 VDC	330	600	560	470

## General Specifications

Temperature ranges	– operational (natural convection 20 LFM)	–25 °C to +70 °C max.
	– Storage temperature	–40 °C to +85 °C max.
Power derating	5 & 10 Watt models:	derating above +55°C : 4%/K
	20 & 30 Watt models:	derating above +50°C : 3%/K
Temperature coefficient		0.05 %/K
Cooling		convection cooling, no internal fan
Humidity (non condensing)		95 % rel. H max.
Atmospheric pressure		54 kPa – 106 kPa
Altitude during operation		5000 m max.
Switching frequency (at 230 VAC)	5 & 10 W models:	40 kHz - 140 kHz
	20 & 30 W models:	40 kHz - 73 kHz
Isolation		4000 VAC
MTBF (MIL-HDBK-217F, at 25 °C ground benign)	5 W models:	> 450'000 h
	10 W models:	> 400'000 h
	20 W models:	> 350'000 h
	30 W models:	> 300'000 h

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

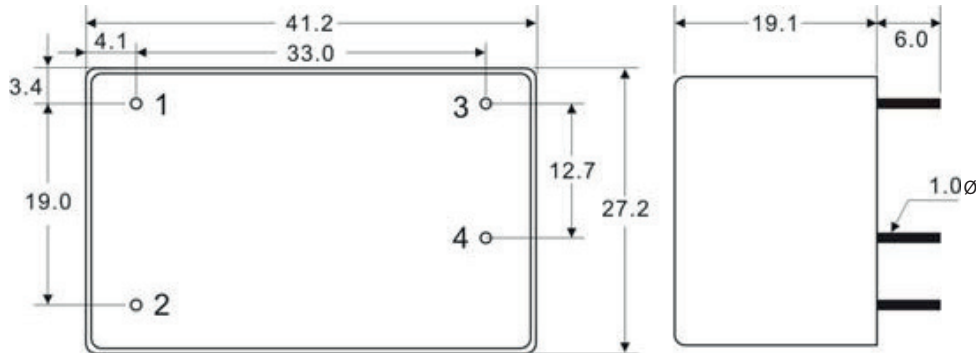
**General Specifications** (continued)

Protection class	class II prepared
Safety standards	IEC 60601-1:2005 (3rd Ed.)+ A1:2012, ANSI/AAMI ES60601-1:2005/(R)2012, CSA CAN/CSA-C22.2 NO. 60601-1:14 EN 60601-1:2006 + A1:2013 + A12:2014 <a href="http://www.tracopower.com/overview/tmf">www.tracopower.com/overview/tmf</a>
– Certification documents	
<b>Electromagnetic compatibility (EMC), Emissions</b>	EN 55011 limits to IEC 60601-1-2 4th edition
– Conducted & Radiated input suppression	
<b>Electromagnetic compatibility (EMC), Immunity</b>	
– Electrostatic discharge (ESD)	IEC/EN 61000-4-2 4 kV / 8 kV criteria A
– Radiated RF field immunity	IEC/EN 61000-4-3 10V/m criteria A
– Electrical fast transient / burst immunity	IEC/EN 61000-4-4 2 kV criteria A
– Surge immunity*	IEC/EN 61000-4-5 1 kV criteria A
– Immunity to conducted RF disturbances	IEC/EN 61000-4-6 10V criteria A
– Magnetic field immunity	IEC/EN 61000-4-8 30 A/m criteria A
– Mains voltage dips and interruptions	IEC/EN 61000-4-11 30% / 10ms criteria B 95% / 5000ms criteria B
<b>Case material</b>	plastic (UL94V-0 rated)
<b>Environmental compliance</b>	<a href="http://www.tracopower.com/overview/tmf">www.tracopower.com/overview/tmf</a> RoHS directive 2011/65/EU
– Reach	
– RoHS	

\* For the 5 & 10 W models an external Varistor has to be integrated in the circuit at the converter input (in parallel).  
Varistor recommendation: 14S471K

**Outline Dimensions**

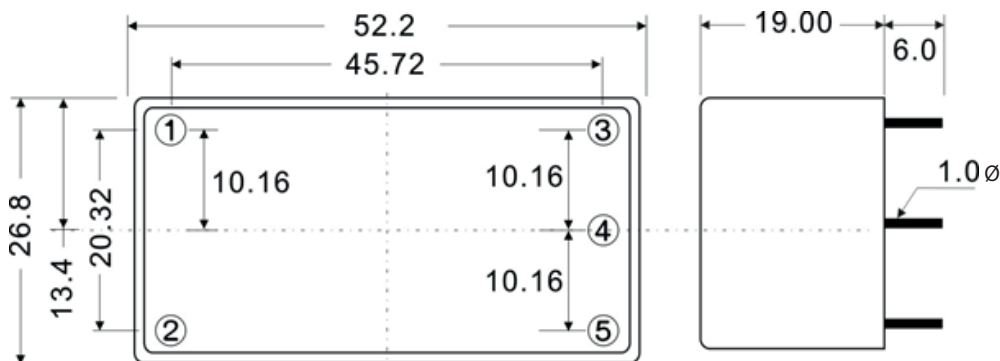
**TMF 05 xxx:**



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

Weight: 30 g (1.06 oz)

**TMF 10 xxx:**



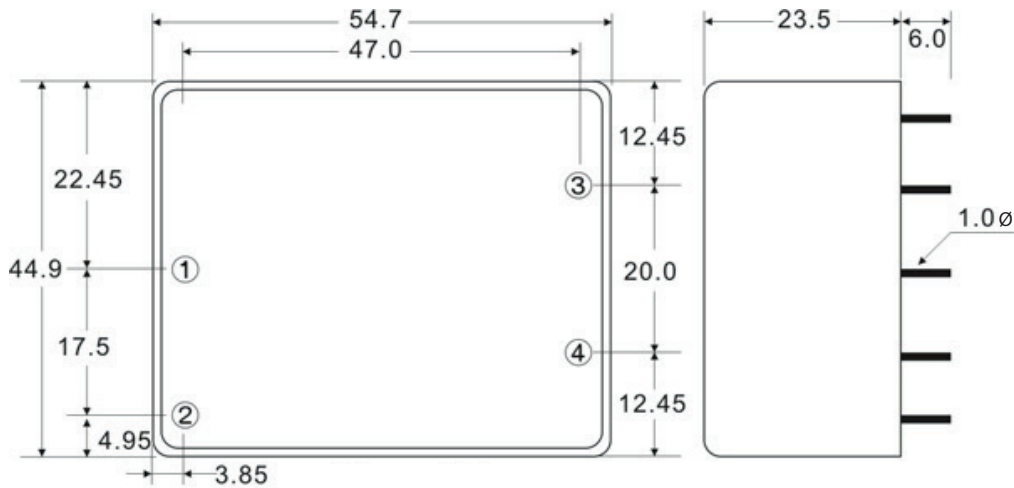
Pinout	
Pin	Single
1	AC (N)
2	AC (L)
3	+Vout
4	-Vout
5	No Pin

Weight: 47 g (1.66 oz)

Dimensions in [mm]  
 Tolerances:  $\pm 0.5$  mm  
 Pin tolerances:  $\pm 0.1$  mm

**Outline Dimensions** (continued)

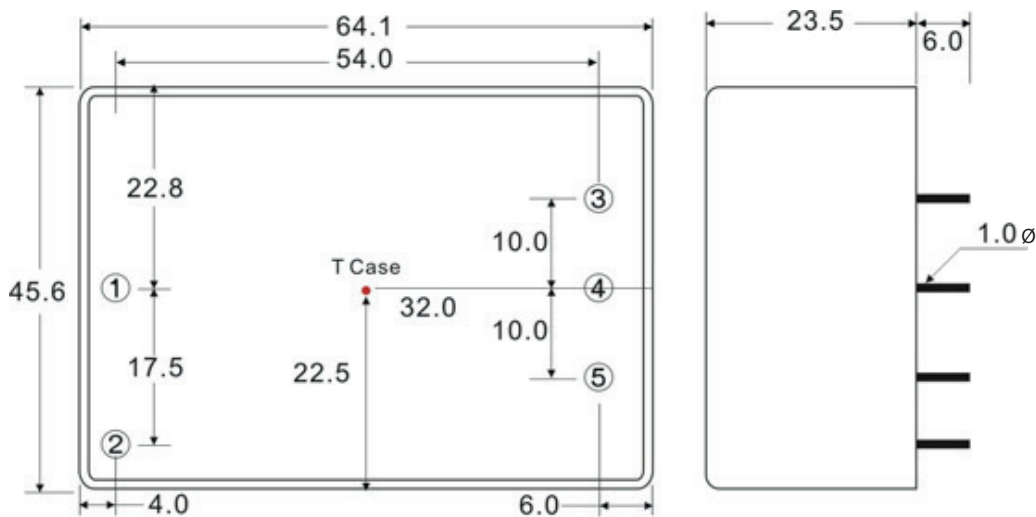
**TMF 20 xxx:**



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

Weight: 100 g (3.53 oz)

**TMF 30 xxx:**



Pinout	
Pin	Single
1	AC (N)
2	AC (L)
3	-Vout
4	No Pin
5	+Vout

Weight: 135 g (4.76 oz)

Dimensions in [mm]  
 Tolerances: ±0.5 mm  
 Pin tolerances: ±0.1 mm