

- 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 60 Series of fully encapsulated 60 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 max.	Output Voltage nom.	Output Current max.	Efficiency typ.
TMM 60105	51 W	5.1 VDC	10'000 mA	84 %
TMM 60112	60 W	12 VDC	5'000 mA	87 %
TMM 60115		15 VDC	4'000 mA	87 %
TMM 60124		24 VDC	2'500 mA	87 %
TMM 60148		48 VDC	1'250 mA	88 %

Input Specifications

Input Voltage	- AC Range	Operational Range: 85 - 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
Power Consumption	- No load & Vin = 230 VAC	750 mW max.
	- No load & Vin = 115 VAC	500 mW max.
Input Current	- Full load & Vin = 230 VAC	5.1 VDC model: 530 mA max.
		12 VDC model: 600 mA max.
		15 VDC model: 600 mA max.
		24 VDC model: 600 mA max.
	- Full load & Vin = 115 VAC	48 VDC model: 600 mA max.
		5.1 VDC model: 880 mA max.
		12 VDC model: 1'000 mA max.
		15 VDC model: 1'000 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		(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)	1% max.
	- Load Variation (0 - 100%)	1% max.
Ripple and Noise (20 MHz Bandwidth)	5.1 VDC model:	160 mVp-p max.
	12 VDC model:	180 mVp-p max.
	15 VDC model:	230 mVp-p max.
	24 VDC model:	360 mVp-p max.
	48 VDC model:	720 mVp-p max.
	5.1 VDC model:	110 mVp-p typ.
	12 VDC model:	120 mVp-p typ.
	15 VDC model:	150 mVp-p typ.
Capacitive Load	24 VDC model:	240 mVp-p typ.
	48 VDC model:	480 mVp-p typ.
	5.1 VDC model:	8'000 µF max.
	12 VDC model:	3'900 µF max.
	15 VDC model:	3'300 µF max.
Minimum Load	24 VDC model:	1'500 µF max.
	48 VDC model:	680 µF max.
Temperature Coefficient		±0.02 %/K max.
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 Iout max.
Overvoltage Protection		120% typ. of Vout nom. (By Zener diode)

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

Safety Specifications

Standards	- IT / Multimedia Equipment - Industrial Control Equipment - Medical Equipment - Certification Documents	EN 60950-1 EN 62368-1 IEC 60950-1 IEC 62368-1 UL 60950-1 UL 62368-1 UL 508 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/tmm60
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 61000-6-3 (Generic Residential) EN 61000-6-4 (Generic Industrial) EN 55011 class B (internal filter) EN 55032 class B (internal filter) FCC 47 Part 15 class B (internal filter) EN 55011 class B (internal filter) EN 55032 class B (internal filter) FCC 47 Part 15 class B (internal filter)
EMS (Immunity)	- Electrostatic Discharge - RF Electromagnetic Field - EFT (Burst) / Surge - Conducted RF Disturbances - PF Magnetic Field - Voltage Dips & Interruptions	Air: EN 61000-4-2, ± 15 kV, perf. criteria A Contact: EN 61000-4-2, ± 8 kV, perf. criteria A EN 61000-4-3, 10 V/m, perf. criteria A EN 61000-4-4, ± 2 kV, perf. criteria A L to L: EN 61000-4-5, ± 1 kV, perf. criteria A EN 61000-4-6, 10 Vrms, perf. criteria A Continuous: EN 61000-4-8, 30 A/m, perf. criteria A 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 B
EMC / Environmental	- Certification Documents	www.tracopower.com/overview/tmm60

General Specifications

Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature - Storage Temperature	-40°C to +80°C -40°C to +95°C
Power Derating	- High Temperature	4.5 %/K above 60°C (5 Vin model) 3.8 %/K above 60°C (other models) See application note: www.tracopower.com/overview/tmm60
Cooling System		Natural convection (20 LFM)
Altitude During Operation		5'000 m max.
Switching Frequency		100 kHz typ. (PWM)
Insulation System		Reinforced Insulation

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

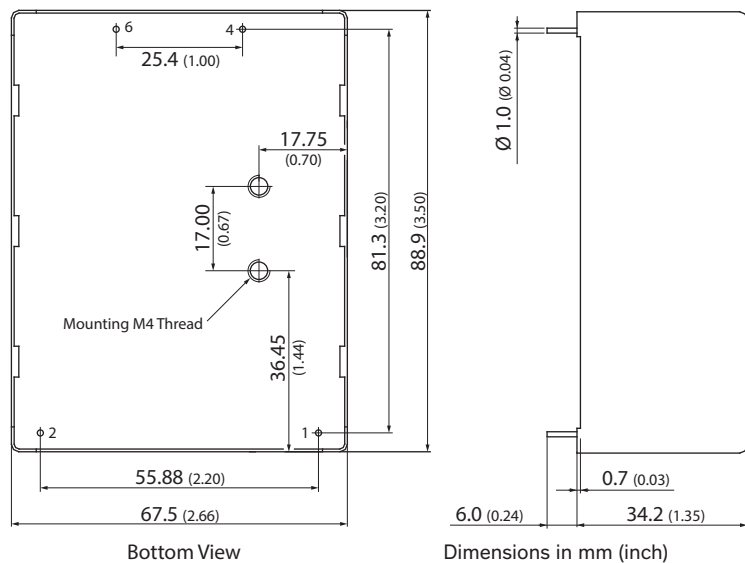
Working Voltage (rated)	240 VAC
Isolation Test Voltage	- Input to Output, 60 s 4'000 VAC
Isolation Resistance	- Input to Output, 500 VDC 1'000 MΩ min.
Leakage Current	- Touch Current 100 µA max.
Reliability	- Calculated MTBF 125'000 h (MIL-HDBK-217F, ground benign)
Washing Process	Not allowed
Housing 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 260°C / 10 s max.
Weight	360 g
Environmental Compliance	- REACH Declaration www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant www.tracopower.com/info/rohs-declaration.pdf Exemptions: 7a (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (Q5A rule)) - RoHS Declaration - SCIP Reference Number c6ed53f0-fc95-4fa6-bfd5-e2418d84fcd9

Supporting Documents

Overview Link (for additional Documents)

www.tracopower.com/overview/tmm60

Outline Dimensions



Pinout

Pin	Function
1	AC (N)
2	AC (L)
4	+Vout
6	-Vout

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