

- 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 60950-1
- 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



UL 508

ES 60601-1
UL 60950-1

IEC 60601-1
IEC 60950-1

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 while it goes up to 75°C with 50% 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. (adjustable)	Output Current max.	Efficiency typ.
TMM 60105	51 W	5.1 VDC (0 - 0)	10'000 mA	84 %
TMM 60112	60 W	12 VDC (0 - 0)	5'000 mA	87 %
TMM 60115		15 VDC (0 - 0)	4'000 mA	87 %
TMM 60124		24 VDC (0 - 0)	2'500 mA	87 %
TMM 60148		48 VDC (0 - 0)	1'250 mA	88 %

Input Specifications

Input Voltage	- AC Range	85 - 264 VAC
	- DC Range	120 - 370 VDC (Designed for, no certification)
Input Frequency		47 - 440 Hz
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.
		48 VDC model: 600 mA max.
	- Full Load & Vin = 115 VAC	5.1 VDC model: 880 mA max.
		12 VDC model: 1'000 mA max.
		15 VDC model: 1'000 mA max.
		24 VDC model: 1'000 mA max.
		48 VDC model: 990 mA max.
Power Consumption	- At no load	500 mW max. (Ready to meet ErP directive)
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)

Output Specifications

Voltage Set Accuracy		±2% max.
Regulation	- Input Variation (Vmin - Vmax)	1% max.
	- Load Variation (0 - 100%)	1% max.
	dual output models:	1% max. (Output 1)
		1% max. (Output 2)
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.
	24 VDC model:	240 mVp-p typ.
	48 VDC model:	480 mVp-p typ.
Capacitive Load	5.1 VDC model:	8'000 µF max.
	12 VDC model:	3'900 µF max.
	15 VDC model:	3'300 µF max.
	24 VDC model:	1'500 µF max.
	48 VDC model:	680 µF max.
Minimum Load		Not required
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 nominal voltage, full load and +25°C after warm-up time unless otherwise stated.

Safety Specifications

Safety Standards	- IT / Multimedia Equipment	IEC 60950-1 EN 60950-1 UL 60950-1
	- Industrial Control Equipment - Medical Equipment	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
	- Certification Documents	
Protection Class		Class II (Prepared): Reinforced Insulation
Pollution Degree		PD 2
Over Voltage Category		OVC II

EMC Specifications

EMI Emissions	- Conducted 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 Part 15, class B
	- Radiated Emissions	EN 55011 class B (internal filter) EN 55032 class B (internal filter) FCC Part 15, class B
EMS Immunity	- Electrostatic Discharge	EN 55024 (IT Equipment) EN 61000-6-1 (Generic Residential) EN 61000-6-2 (Generic Industrial) EN 60601-1-2 edition 4 (Medical Devices)
	- RF Electromagnetic Field - EFT (Burst) / Surge	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
	- Conducted RF Disturbances - PF Magnetic Field - Voltage Dips & Interruptions	Continuous: EN 61000-4-8, 30 A/m, perf. criteria A 230 VAC / 50 Hz: 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

General Specifications

Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	-40°C to +75°C
	- Storage Temperature	-40°C to +95°C
Power Derating	- High Temperature	3.8 %/K above 60°C
Cooling System		Natural convection (20 LFM)
Altitude During Operation		5'000 m max.
Switching Frequency		100 kHz typ. (PWM)
Insulation System		Reinforced Insulation
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 MOhm min.
Leakage Current	- Touch Current	100 μ A max.
Reliability	- Calculated MTBF	125'000 h (MIL-HDBK-217F, ground benign)
Housing Material		Plastic resin (UL 94 V-0 rated)
Pin Material		Copper alloy w. gold plate over nickel subplate

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

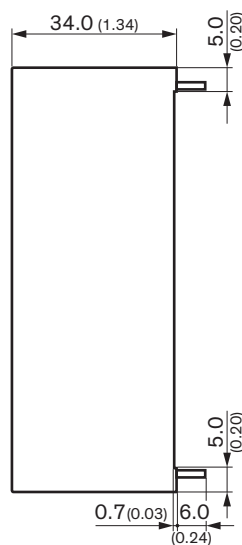
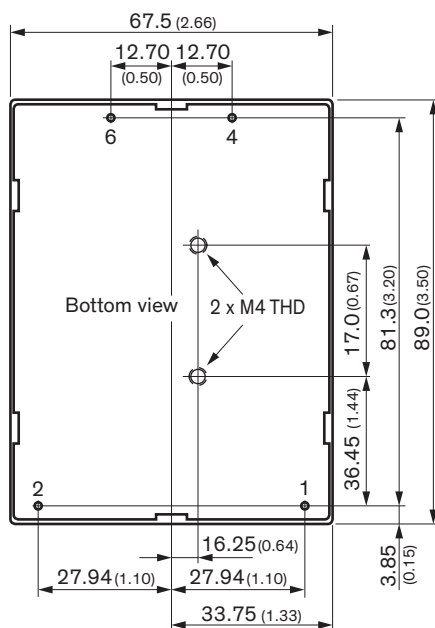
Soldering Profile	Wave Soldering (1.5mm from casing) 260°C / 10 s
Connection Type	THD (Through-Hole Device)
Weight	360 g
Environmental Compliance	- Reach - RoHS www.tracopower.com/info/reach-declaration.pdf www.tracopower.com/info/rohs-declaration.pdf

Supporting Documents

Overview Link (for additional Documents)

www.tracopower.com/overview/tmm60

Outline Dimensions



Dimensions in mm (inch)
Tolerances ± 0.5 (± 0.02)
Pin $\varnothing 1.0 \pm 0.1$ (0.04 ± 0.004)
Pin pitch tolerances ± 0.25 (± 0.01)

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