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TRACO POWER

AC/DC Power Supply

TMM 24 Series, 24 Watt

- **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**



UL 508 ES 60601-1 IEC 60601-1
UL 62368-1 IEC 62368-1

The TMM 24 Series of fully encapsulated 24 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 +65°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 an commercial environment.

Models

Order Code	Output Power	Output 1		Output 2		Efficiency
		Vnom	Imax	Vnom	Imax	
TMM 24105	15 W	5 VDC	3'000 mA			77 %
TMM 24112		12 VDC	2'000 mA			83 %
TMM 24115		15 VDC	1'600 mA			82 %
TMM 24124	24 W	24 VDC	1'000 mA			85 %
TMM 24212		+12 VDC	1'000 mA	–12 VDC	1'000 mA	84 %
TMM 24215		+15 VDC	800 mA	–15 VDC	800 mA	84 %

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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
Input Current	- Full Load & Vin = 230 VAC	5 VDC model:	170 mA max.
		12 VDC model:	255 mA max.
		15 VDC model:	255 mA max.
		24 VDC model:	250 mA max.
		dual output models:	250 mA max.
	- Full Load & Vin = 115 VAC	5 VDC model:	285 mA max.
		12 VDC model:	420 mA max.
		15 VDC model:	425 mA max.
		24 VDC model:	410 mA max.
		dual output models:	415 mA max.
Power Consumption	- No load & Vin = 230 VAC		750 mW max.
	- No load & Vin = 115 VAC		300 mW max.
Input Inrush Current	- At 230 VAC		40 A max.
	- At 115 VAC		20 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)	single output models:	0.5% max.
		dual output models:	0.5% max.
	- Load Variation (0 - 100%)	single output models:	1% max.
		dual output models:	3% max. (Output 1)
			3% max. (Output 2)
Ripple and Noise (20 MHz Bandwidth)	- single output	5 VDC model:	90 mVp-p max.
		12 VDC model:	155 mVp-p max.
		15 VDC model:	195 mVp-p max.
		24 VDC model:	310 mVp-p max.
	- dual output	12 / -12 VDC model:	155 / 155 mVp-p max.
		15 / -15 VDC model:	195 / 195 mVp-p max.
	- single output	5 VDC model:	80 mVp-p typ.
		12 VDC model:	120 mVp-p typ.
		15 VDC model:	150 mVp-p typ.
		24 VDC model:	240 mVp-p typ.
	- dual output	12 / -12 VDC model:	120 / 120 mVp-p typ.
		15 / -15 VDC model:	150 / 150 mVp-p typ.
Capacitive Load	- single output	5 VDC model:	2'200 µF max.
		12 VDC model:	1'000 µF max.
		15 VDC model:	680 µF max.
		24 VDC model:	470 µF max.
	- dual output	12 / -12 VDC model:	470 / 470 µF max.
		15 / -15 VDC model:	330 / 330 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

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

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Output Current Limitation		105% min. of Iout max.
Overvoltage Protection		120% typ. of Vout nom. (By Zener diode)

Safety Specifications

Safety Standards	- IT / Multimedia Equipment	EN 60950-1 EN 62368-1 IEC 60950-1 IEC 62368-1 UL 60950-1 UL 62368-1
	- Industrial Control Equipment	UL 508
	- 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/tmm24
Protection Class		Class I & II (Prepared): Reinforced Insulation
Pollution Degree		PD 2
Over Voltage Category		OVC II

EMC Specifications

EMI Emissions			EN 61000-6-3 (Generic Residential) EN 61000-6-4 (Generic Industrial)
	- Conducted Emissions		EN 55011 class B (internal filter) EN 55032 class B (internal filter) FCC Part 15 class B (internal filter)
	- Radiated Emissions		EN 55011 class B (internal filter) EN 55032 class B (internal filter) FCC Part 15 class B (internal filter)
EMS Immunity			EN 55024 (IT Equipment) EN 55035 (Multimedia) EN 61000-6-1 (Generic Residential) 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, 10 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, ±1 kV, perf. criteria A
	- Conducted RF Disturbances		EN 61000-4-6, 10 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:	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 +80°C
	- Storage Temperature		–40°C to +95°C
Power Derating	- High Temperature		5 %/K above 65°C
		See application note:	www.tracopower.com/overview/tmm24
Over Temperature Protection Switch Off	- Protection Mode		142°C typ. (Automatic recovery at 67°C typ.)
	- Measurement Point		Internal IC temperature

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Cooling System		Natural convection (20 LFM)
Altitude During Operation		5'000 m max.
Switching Frequency		132 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 MΩ min.
Leakage Current	- Touch Current	100 µA max.
Reliability	- Calculated MTBF	400'000 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		Wave Soldering 260°C / 10 s
Weight		137 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: 7a (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)
	- SCIP Reference Number	00fa944a-42c8-4d91-b61b-9fa1247d6557

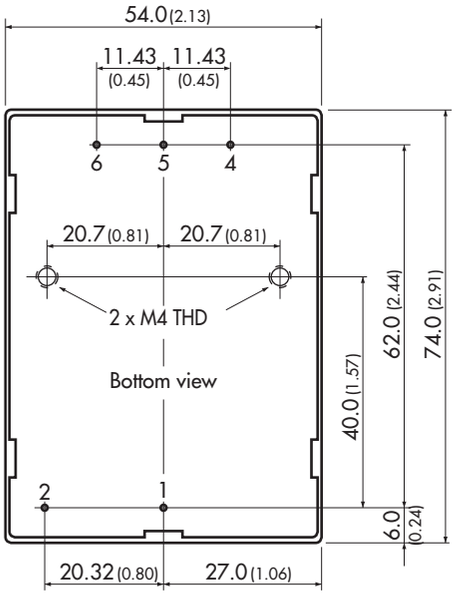
Supporting Documents

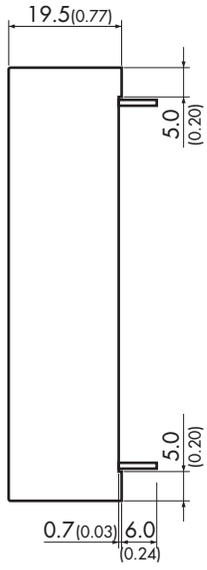
Overview Link (for additional Documents)	www.tracopower.com/overview/tmm24

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Outline Dimensions





Dimensions in mm (inch)
Tolerances ±0.5 (±0.02)
Pin Ø 1.0 ±0.1 (0.04 ±0.004)
Pin pich tolerances ±0.25 (±0.01)

Pinout		
Pin	**Single Output**	**Dual Output**
1	AC (N)	AC (N)
2	AC (L)	AC (L)
4	–Vout	–Vout
5	No pin	Common
6	+Vout	+Vout

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