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TRACO POWER

DC/DC Converter

TMR 4 Series, 4 Watt

- **Compact SIP-8 package**
- **Wide 2:1 input voltage range**
- **Temperature range –40° to +70°C without derating**
- **High efficiency up to 87%**
- **I/O isolation 1600 VDC**
- **Protection against short-circuit and over load**
- **Fully regulated outputs**
- **Remote On/Off control**
- **3-year product warranty**



UL 62368-1 IEC 62368-1

The TMR 4 is a regulated 4 Watt DC/DC converter series with 2:1 input voltage range. It comes in a compact SIP-8 package featuring single and dual output models, I/O isolation voltage of 1600 VDC and protection against short-circuit and over load. Being a 4 Watt converter this series acts as an excellent gap closer between the more common 3 & 6 Watt converters. It offers a cost-efficient alternative to 5 and 6 Watt converters in applications where a 3 Watt converter would operate at the absolute technical limits (e.g. output power). The intelligent design provides efficiencies up to 87% and a temperature range of -40°C to +70°C without derating which enables an unrestricted use of this converter series in applications with demanding temperature requirements. Additionally, the integrated remote On/Off function offers a convenient way to control your application. Certified according to the latest IEC/EN/UL 62368-1 industrial standard the TMR 4 is designed to deliver a high quality, cost efficient and compact solution for many applications.

Models

Order Code	Input Voltage Range	Output 1		Output 2		Efficiency
		Vnom	Imax	Vnom	Imax	typ.
TMR 4-1211	9 - 18 VDC (12 VDC nom.)	5 VDC	800 mA			82 %
TMR 4-1212		12 VDC	333 mA			87 %
TMR 4-1213		15 VDC	266 mA			86 %
TMR 4-1215		24 VDC	166 mA			86 %
TMR 4-1222		+12 VDC	166 mA	–12 VDC	166 mA	85 %
TMR 4-1223		+15 VDC	133 mA	–15 VDC	133 mA	86 %
TMR 4-2411	18 - 36 VDC (24 VDC nom.)	5 VDC	800 mA			81 %
TMR 4-2412		12 VDC	333 mA			86 %
TMR 4-2413		15 VDC	266 mA			86 %
TMR 4-2415		24 VDC	166 mA			86 %
TMR 4-2422		+12 VDC	166 mA	–12 VDC	166 mA	86 %
TMR 4-2423		+15 VDC	133 mA	–15 VDC	133 mA	85 %
TMR 4-4811	36 - 75 VDC (48 VDC nom.)	5 VDC	800 mA			80 %
TMR 4-4812		12 VDC	333 mA			85 %
TMR 4-4813		15 VDC	266 mA			83 %
TMR 4-4815		24 VDC	166 mA			86 %
TMR 4-4822		+12 VDC	166 mA	–12 VDC	166 mA	84 %
TMR 4-4823		+15 VDC	133 mA	–15 VDC	133 mA	85 %

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Input Specifications

Input Current	- At no load	12 Vin models:	30 mA typ.
		24 Vin models:	15 mA typ.
		48 Vin models:	10 mA typ.
	- At full load	12 Vin models:	409 mA typ.
		24 Vin models:	202 mA typ.
		48 Vin models:	102 mA typ.
Surge Voltage		12 Vin models:	25 VDC max. (1 s max.)
		24 Vin models:	50 VDC max. (1 s max.)
		48 Vin models:	100 VDC max. (1 s max.)
Recommended Input Fuse			(The need of an external fuse has to be assessed in the final application.)
Input Filter			Internal Capacitor

Output Specifications

Voltage Set Accuracy			±1% 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:	1% max. (Output 1)
			1% max. (Output 2)
	- Voltage Balance (symmetrical load)	dual output models:	2% max.
	- Cross Regulation (25% / 100% asym. load)	dual output models:	5% max.
Ripple and Noise	- 20 MHz Bandwidth		80 mVp-p max.
Capacitive Load	- single output	5 Vout models:	1'800 µF max.
		12 Vout models:	1'000 µF max.
		15 Vout models:	820 µF max.
		24 Vout models:	470 µF max.
	- dual output	12 / -12 Vout models:	560 / 560 µF max.
		15 / -15 Vout models:	390 / 390 µF max.
Minimum Load			Not required
Temperature Coefficient			±0.02 %/K max.
Start-up Time			10 ms typ.
Short Circuit Protection			Continuous, Automatic recovery
Overload Protection			Foldback Mode
Output Current Limitation			160% typ. of Iout max.
Transient Response	- Response Deviation		3% typ. / 5% max. (25% Load Step)
	- Response Time		250 µs typ. (25% Load Step)

Safety Specifications

Standards	- IT / Multimedia Equipment	EN 62368-1 IEC 62368-1 UL 62368-1
	- Certification Documents	www.tracopower.com/tmr4-safety-cert/
Energy Source	- Output, acc. to 62368-1	ES1
Power Source	- Output, acc. to 62368-1	PS1
Pollution Degree		PD 3
Over Voltage Category		Not mains connected

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

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EMC Specifications

EMI (Emissions)	- Conducted Emissions		EN 55032 class A (with external filter)
			EN 55032 class B (with external filter)
			FCC 47 Part 15 class A (with external filter)
			FCC 47 Part 15 class B (with external filter)
	- Radiated Emissions		EN 55032 class A (with external filter)
			EN 55032 class B (with external filter)
			FCC 47 Part 15 class A (with external filter)
			FCC 47 Part 15 class B (with external filter)
		External filter proposal:	www.tracopower.com/tmr4-emc-filter/
EMS (Immunity)			EN 55024 (IT Equipment)
			EN 55035 (Multimedia)
	- Electrostatic Discharge	Air:	EN 61000-4-2, ±8 kV, perf. criteria A
		Contact:	EN 61000-4-2, ±6 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
			EN 61000-4-5, ±1 kV, perf. criteria A
		External filter proposal:	www.tracopower.com/tmr4-emc-filter/
	- Conducted RF Disturbances		EN 61000-4-6, 10 Vrms, perf. criteria A
	- PF Magnetic Field	Continuous:	EN 61000-4-8, 100 A/m, perf. criteria A
		1 s:	EN 61000-4-8, 1000 A/m, perf. criteria A
EMC / Environmental	- Certification Documents		www.tracopower.com/tmr4-emc-cert/

General Specifications

Relative Humidity			95% max. (non condensing)
Temperature Ranges	- Operating Temperature		–40°C to +85°C
	- Case Temperature		+100°C max.
	- Storage Temperature		–55°C to +125°C
Power Derating	- High Temperature		3.33 %/K above 70°C
		See application note:	www.tracopower.com/tmr4-cc/
Cooling System			Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote (passive = on)		On: < 0.6 VDC or open circuit
			Off: 6 to 15 VDC
			Refers to 'Remote' and '-Vin' Pin
	- Off Idle Input Current		2.5 mA typ.
Altitude During Operation			6'000 m max.
Switching Frequency			100 kHz min. (PFM)
Insulation System			Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s		1'600 VDC
	- Input to Output, 1 s		1'920 VDC
Isolation Resistance	- Input to Output, 500 VDC		1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V		200 pF typ.
Reliability	- Calculated MTBF		3'390'000 h (MIL-HDBK-217F, ground benign)
Washing Process			According to Cleaning Guideline
			www.tracopower.com/info/cleaning.pdf
Housing Material			Non-conductive Plastic (UL 94 V-0 rated)
Potting Material			Epoxy (UL 94 V-0 rated)
Pin Material			Phosphor Bronze (C5191)
Pin Foundation Plating			Nickel (1 µm min.)
Pin Surface Plating			Tin (3 - 5 µm), matte
Housing Type			Plastic Case
Mounting Type			PCB Mount
Connection Type			THD (Through-Hole Device)
Footprint Type			SIP8
Soldering Profile			Lead-Free Wave Soldering
			260°C / 10 s max.

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

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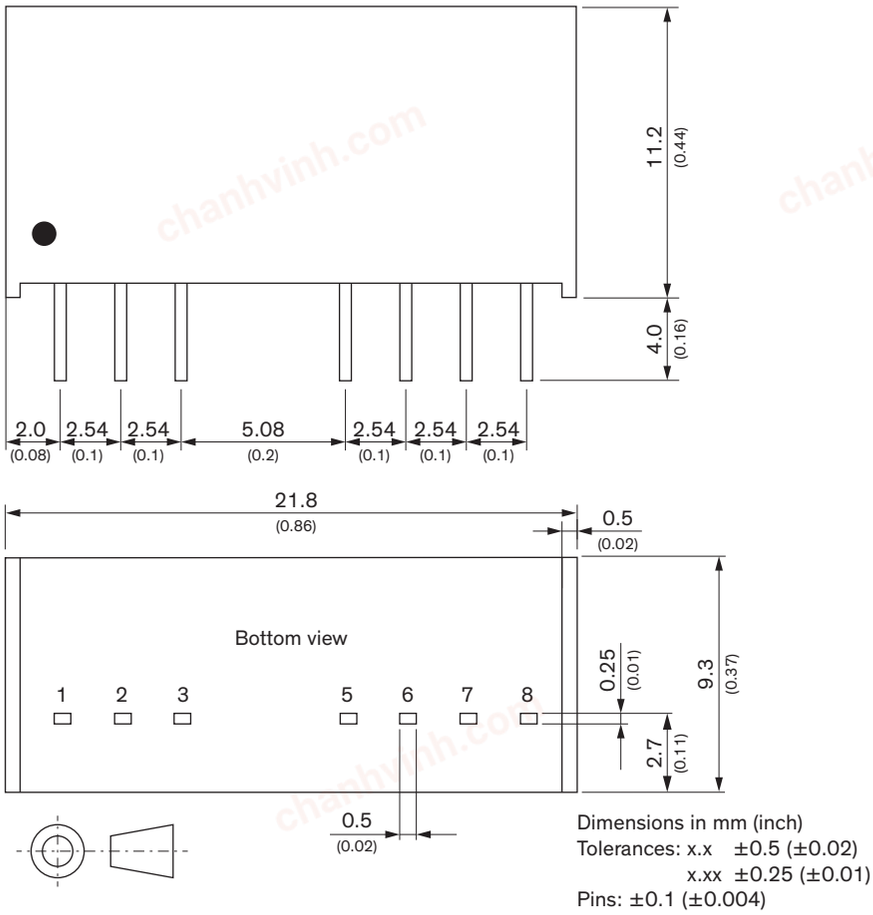
Weight		4.8 g
Environmental Compliance	- REACH Declaration	www.tracopower.com/info/reach-declaration.pdf
		REACH SVHC list compliant
		REACH Annex XVII compliant
	- RoHS Declaration	www.tracopower.com/info/rohs-declaration.pdf
		Exemptions: 7(a)
		(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)
	- SCIP Reference Number	9501e50e-08e1-4a1c-8caa-1e13666ea196

Additional Information

Supporting Documents	www.tracopower.com/overview/tmr4
Frequently Asked Questions	www.tracopower.com/glossary-faq
Glossary	www.tracopower.com/info/glossary.pdf
Service Portal	www.tracoserviceportal.com

Outline Dimensions



Dimensions in mm (inch)
Tolerances: x.x ±0.5 (±0.02)
x.xx ±0.25 (±0.01)
Pins: ±0.1 (±0.004)

Pinout		
Pin	**Single**	**Dual**
1	–Vin (GND)	–Vin (GND)
2	+Vin (Vcc)	+Vin (Vcc)
3	Remote On/Off	Remote On/Off
5	NC	NC
6	+Vout	+Vout
7	–Vout	Common
8	NC	–Vout

NC: Not connected

Avoid routing PCB traces under the converter.

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