

- Compact SIP-8 package
- Wide 2:1 input voltage range
- Temperature range -40° to $+70^{\circ}\text{C}$ 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



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 $+70^{\circ}\text{C}$ 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 typ.
		Vnom	I _{max}	Vnom	I _{max}	
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 %

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

Safety Standards	- IT / Multimedia Equipment	EN 62368-1 IEC 62368-1 UL 62368-1
	- Certification Documents	www.tracopower.com/overview/tmr4
Pollution Degree		PD 3

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

EMC Specifications

EMI Emissions	- Conducted Emissions	EN 55032 class A (with external filter) EN 55032 class B (with external filter) FCC Part 15 class A (with external filter) FCC Part 15 class B (with external filter)
	- Radiated Emissions	EN 55032 class A (with external filter) EN 55032 class B (with external filter) FCC Part 15 class A (with external filter) FCC Part 15 class B (with external filter)
External filter proposal: www.tracopower.com/overview/tmr4		
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
	- Conducted RF Disturbances - PF Magnetic Field	External filter proposal: www.tracopower.com/overview/tmr4 EN 61000-4-6, 10 Vrms, perf. criteria A Continuous: EN 61000-4-8, 100 A/m, perf. criteria A 1 s: EN 61000-4-8, 1000 A/m, perf. criteria A

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/overview/tmr4		
Cooling System		Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote	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		Wave Soldering
		260°C / 10 s max.
Weight		4.8 g

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

