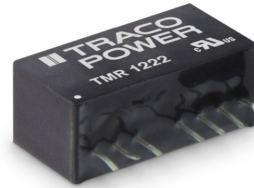


- Wide 2:1 input voltage range
- Compact SIP-8 package
- Small footprint
- Remote On/Off control
- Temperature range -40° to $+85^{\circ}\text{C}$
- High efficiency
- Excellent load and line regulation
- Indefinite short-circuit protection
- I/O isolation 1600 VDC
- 3-year product warranty



The TMR 2 series is a family of isolated 2W DC/DC converter modules with regulated output, featuring wide 2:1 input voltage ranges. The product comes in a compact SIP-8 plastic package with small footprint occupying only 2.0 cm² (0.3 square in.) of board space.

An excellent efficiency allows -40° to $+85^{\circ}\text{C}$ operation temperatures. Further features include remote On/Off control and continuous short circuit protection. The ultra-compact dimensions of these converters make them an ideal solution for many space critical applications in communication equipment, instrumentation and industrial electronics.

Models

Order Code	Input Voltage Range	Output 1		Output 2		Efficiency typ.
		Vnom	I _{max}	Vnom	I _{max}	
TMR 0510	4.5 - 9 VDC (5 VDC nom.)	3.3 VDC	500 mA			76 %
TMR 0511		5 VDC	400 mA			80 %
TMR 0512		12 VDC	167 mA			81 %
TMR 0521		+5 VDC	200 mA	-5 VDC	200 mA	79 %
TMR 0522		+12 VDC	83 mA	-12 VDC	83 mA	82 %
TMR 0523		+15 VDC	67 mA	-15 VDC	67 mA	81 %
TMR 1210	9 - 18 VDC (12 VDC nom.)	3.3 VDC	500 mA			77 %
TMR 1211		5 VDC	400 mA			81 %
TMR 1212		12 VDC	167 mA			83 %
TMR 1221		+5 VDC	200 mA	-5 VDC	200 mA	81 %
TMR 1222		+12 VDC	83 mA	-12 VDC	83 mA	83 %
TMR 1223		+15 VDC	67 mA	-15 VDC	67 mA	84 %
TMR 2410	18 - 36 VDC (24 VDC nom.)	3.3 VDC	500 mA			78 %
TMR 2411		5 VDC	400 mA			81 %
TMR 2412		12 VDC	167 mA			83 %
TMR 2421		+5 VDC	200 mA	-5 VDC	200 mA	80 %
TMR 2422		+12 VDC	83 mA	-12 VDC	83 mA	83 %
TMR 2423		+15 VDC	67 mA	-15 VDC	67 mA	82 %
TMR 4810	36 - 75 VDC (48 VDC nom.)	3.3 VDC	500 mA			76 %
TMR 4811		5 VDC	400 mA			78 %
TMR 4812		12 VDC	167 mA			83 %
TMR 4821		+5 VDC	200 mA	-5 VDC	200 mA	80 %
TMR 4822		+12 VDC	83 mA	-12 VDC	83 mA	81 %
TMR 4823		+15 VDC	67 mA	-15 VDC	67 mA	81 %

Input Specifications

Input Current	- At no load	5 Vin models: 35 mA typ. 12 Vin models: 20 mA typ. 24 Vin models: 15 mA typ. 48 Vin models: 8 mA typ.
	- At full load	5 Vin models: 645 mA max. 12 Vin models: 242 mA max. 24 Vin models: 117 mA max. 48 Vin models: 62 mA max.
Surge Voltage		5 Vin models: 15 VDC max. (100 ms max.) 12 Vin models: 36 VDC max. (100 ms max.) 24 Vin models: 50 VDC max. (100 ms max.) 48 Vin models: 100 VDC max. (100 ms max.)
Recommended Input Fuse		5 Vin models: 1'600 mA (slow blow) 12 Vin models: 1'000 mA (slow blow) 24 Vin models: 1'000 mA (slow blow) 48 Vin models: 1'000 mA (slow blow) (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: 0.2% max. dual output models: 0.2% max.
	- Load Variation (10 - 90%)	single output models: 0.5% max. dual output models: 0.8% max. (Output 1) 0.8% max. (Output 2)
	- Cross Regulation (25% / 100% asym. load)	dual output models: 5% max.
Ripple and Noise	- 20 MHz Bandwidth	50 mVp-p typ.
Capacitive Load	- single output	3.3 Vout models: 2'200 µF max. 5 Vout models: 1'000 µF max. 12 Vout models: 170 µF max.
	- dual output	5 / -5 Vout models: 470 / 470 µF max. 12 / -12 Vout models: 100 / 100 µF max. 15 / -15 Vout models: 47 / 47 µF max.
Minimum Load		Not required
Temperature Coefficient		±0.02 %/K max.
Start-up Time		5 ms typ.
Short Circuit Protection		Continuous, Automatic recovery
Transient Response	- Response Time	500 µs typ. (25% Load Step)

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
	- Certification Documents	www.tracopower.com/overview/tmr2
Pollution Degree		PD 2

All specifications valid at nominal voltage, 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)
	- Radiated Emissions	EN 55032 class A (with external filter) EN 55032 class B (with external filter)
		External filter proposal: www.tracopower.com/overview/tmr2
EMS Immunity	- 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	Ext. input component: Nippon KY 220 µF, 48 mOhm EN 61000-4-6, 10 Vrms, perf. criteria A
	- PF Magnetic Field	Continuous: EN 61000-4-8, 100 A/m, perf. criteria A

General Specifications

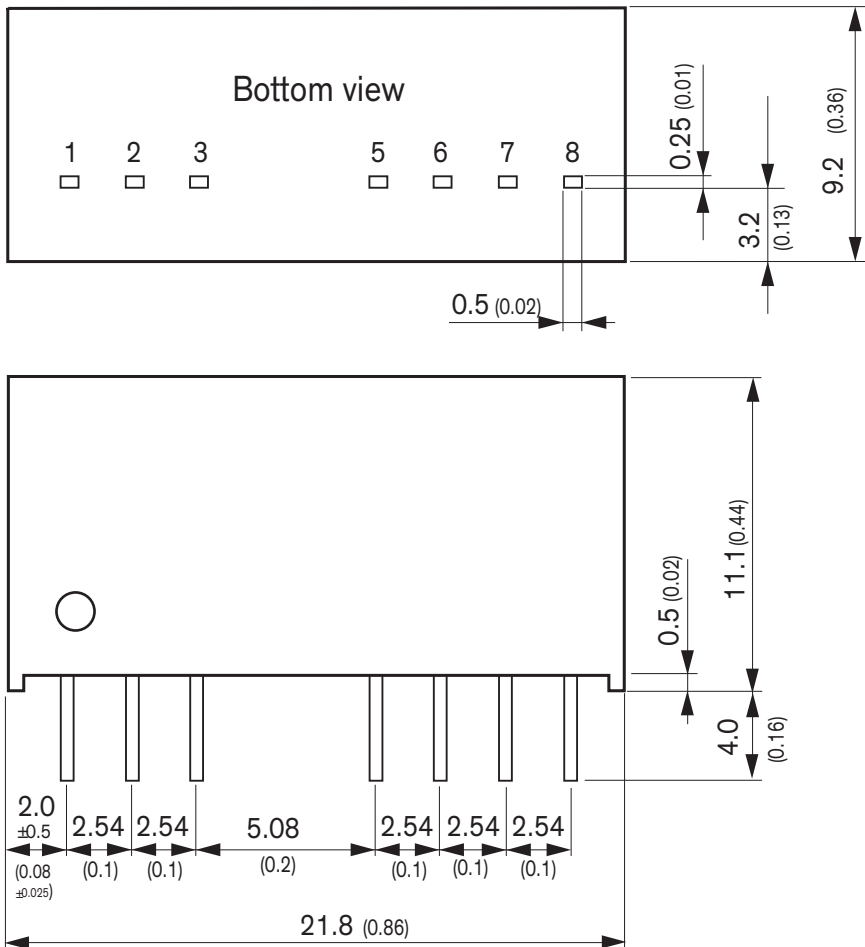
Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	-40°C to +92°C
	- Case Temperature	+100°C max.
	- Storage Temperature	-55°C to +125°C
Power Derating	- High Temperature	6.67 %/K above 85°C
Cooling System		Natural convection (20 LFM)
Remote Control	- Current Controlled Remote	On: open circuit Off: 2 to 4 mA current (internal 1 kΩ resistor)
	- Off Idle Input Current	External circuit proposal: www.tracopower.com/info/current-remote.pdf 2.5 mA max.
Altitude During Operation		5'000 m max. (see altitude test report)
Switching Frequency		100 - 650 kHz (RCC)
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s	1'600 VDC
Isolation Resistance	- Input to Output, 500 VDC	1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	200 pF max.
Reliability	- Calculated MTBF	4'900'000 h (MIL-HDBK-217F, ground benign)
Environment	- Vibration	MIL-STD-810F
	- Mechanical Shock	MIL-STD-810F
	- Thermal Shock	MIL-STD-810F
Housing Material		Non-conductive Plastic (UL94 V-0 rated)
Potting Material		Silicone (UL 94 V-0 rated)
Pin Material		Copper
Pin Foundation Plating		Nickel (2 - 3 µm)
Pin Surface Plating		Tin (3 - 5 µm), matte
Connection Type		THD (Through-Hole Device)
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: 7a, 7c-I (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule). The SCIP number is provided on request.)

Supporting Documents

Overview Link (for additional Documents)	www.tracopower.com/overview/tmr2
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All specifications valid at nominal voltage, full load and +25°C after warm-up time unless otherwise stated.

Outline Dimensions



Pinout		
Pin	Single Output	Dual Output
1	-Vin (GND)	-Vin (GND)
2	+Vin (Vcc)	+Vin (Vcc)
3	Remote	Remote
5	NC	NC
6	+Vout	+Vout
7	-Vout	Common
8	NC	-Vout

NC: No Connection

Dimensions in mm (inch)
 Tolerances: ± 0.5 (± 0.02)
 Pin pitch Tolerance ± 0.25 (± 0.01)

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