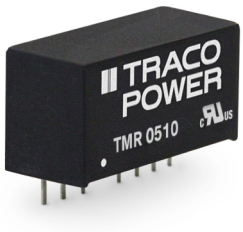
TRACO POWER

DC/DC Converter

TMR 2 Series, 2 Watt

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



UL 62368-1 IEC 62368-1

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°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
		Vnom	Imax	Vnom	Imax	typ.
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	24 Vin models:	**15 mA typ.**
		48 Vin models:	**8 mA typ.**
		5 Vin models:	**35 mA typ.** (3.3 Vout model)
			35 mA typ. (5 Vout model)
			40 mA typ. (12 Vout model)
			40 mA typ. (5 / -5 Vout model)
			40 mA typ. (12 / -12 Vout model)
			40 mA typ. (15 / -15 Vout model)
		12 Vin models:	**20 mA typ.** (3.3 Vout model)
			20 mA typ. (5 Vout model)
			20 mA typ. (12 Vout model)
			30 mA typ. (5 / -5 Vout model)
			30 mA typ. (12 / -12 Vout model)
			30 mA typ. (15 / -15 Vout model)
	- 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)

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

Safety Specifications

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/tmr2-safety-cert/
Energy Source	- Output, acc. to 62368-1		ES1
Power Source	- Output, acc. to 62368-1		PS3
Pollution Degree			PD 2
Over Voltage Category			Not mains connected

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/tmr2-emc-filter/
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
		Ext. input component:	Nippon KY 220 µF, 48 mOhm
	- 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
EMC / Environmental	- Certification Documents		www.tracopower.com/tmr2-emc-cert/

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		Depending on model
		See application note:	www.tracopower.com/tmr2-cc/
Cooling System			Natural convection (20 LFM)
Remote Control	- Current Controlled Remote (passive = on)		On: open circuit Off: 2 to 4 mA current (internal 1 kΩ resistor) Refers to 'Remote' and '-Vin' Pin
		External circuit proposal:	www.tracopower.com/info/current-remote.pdf
	- Off Idle Input Current		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)
Washing Process			According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf
Environment	- Vibration		MIL-STD-810F
	- Mechanical Shock		MIL-STD-810F
	- Thermal Shock		MIL-STD-810F
Housing Material			Non-conductive Plastic (UL 94 V-0 rated)
Potting Material			Silicone (UL 94 V-0 rated)

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

Pin Material		Copper
Pin Foundation Plating		Nickel (2 - 3 µm)
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 / 6 s max.
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), 7(c)-I (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)
	- SCIP Reference Number	25cf7004-2c3a-4f03-8855-1f1b93359928

Additional Information

Supporting Documents	www.tracopower.com/overview/tmr2
Frequently Asked Questions	www.tracopower.com/glossary-faq
Glossary	www.tracopower.com/info/glossary.pdf
Service Portal	www.tracoserviceportal.com

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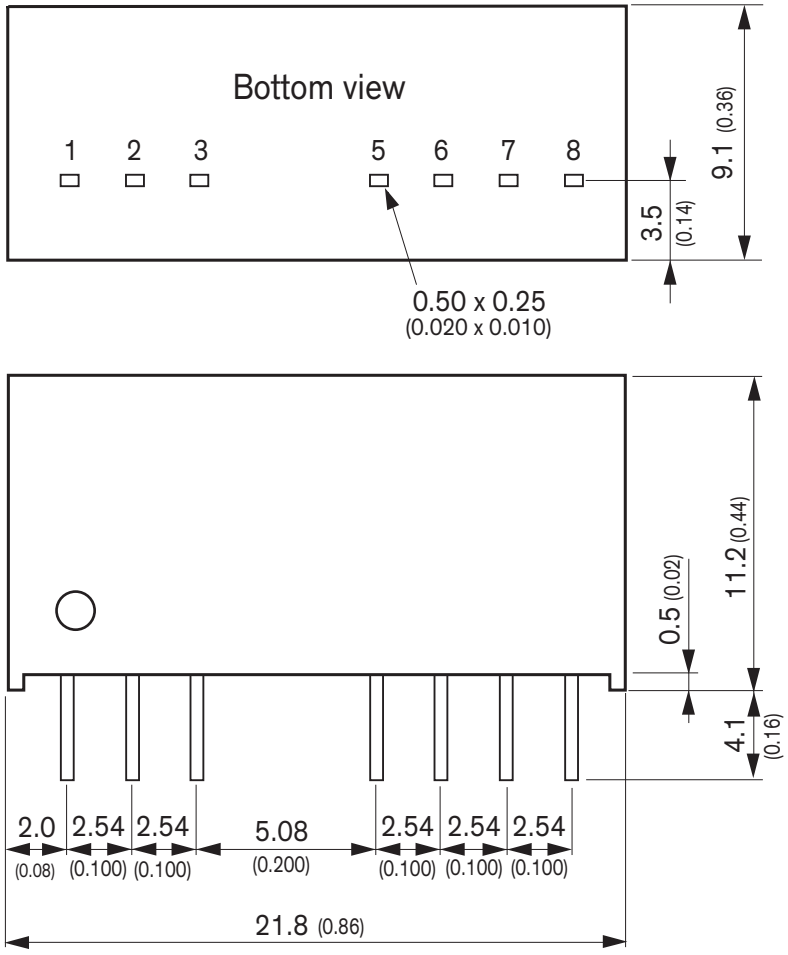
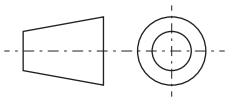
Outline Dimensions





Dimensions in mm (inch)
Tolerances: x.x ±0.5 (x.xx ±0.02)
x.xx ±0.25 (x.xxx ±0.01)
Pin dimension tolerance: ±0.1 (±0.004)

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: Not connected

Avoid routing PCB traces under the converter.

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