TRACO POWER

DC/DC Converter

TMR 6 Series, 6 Watt

- **Ultra-compact SIP-8 package**
- **Wide 2:1 input voltage range**
- **Continuous shor-circuit protection**
- **Temperature range –40° to +78°C**
- **High efficiency up to 86%**
- **I/O isolation 1600 VDC**
- **Remote On/Off control**
- **3-year product warranty**



UL 62368-1 IEC 62368-1

The TMR-6 series is a new family of isolated 6W DC/DC converter modules with regulated output, featuring wide 2:1 input voltage ranges. The product comes in a ultra-compact SIP-8 plastic package with a small footprint occupying only 2.0 cm² of board space. Further features include remote On/Off control and continuous short circuit protection. The very compact dimensions of these converters make them an ideal solution for space critical applications.

Models

Order Code	Input Voltage Range	Output 1		Output 2		Efficiency
		Vnom	Imax	Vnom	Imax	typ.
TMR 6-0510	4.5 - 9 VDC (5 VDC nom.)	3.3 VDC	1'300 mA			77 %
TMR 6-0511		5 VDC	1'200 mA			81 %
TMR 6-0519		9 VDC	666 mA			83 %
TMR 6-0512		12 VDC	500 mA			84 %
TMR 6-0513		15 VDC	400 mA			84 %
TMR 6-0515		24 VDC	250 mA			84 %
TMR 6-0521		+5 VDC	600 mA	–5 VDC	600 mA	81 %
TMR 6-0522		+12 VDC	250 mA	–12 VDC	250 mA	84 %
TMR 6-0523		+15 VDC	200 mA	–15 VDC	200 mA	84 %
TMR 6-1210	9 - 18 VDC (12 VDC nom.)	3.3 VDC	1'300 mA			78 %
TMR 6-1211		5 VDC	1'200 mA			83 %
TMR 6-1219		9 VDC	666 mA			85 %
TMR 6-1212		12 VDC	500 mA			85 %
TMR 6-1213		15 VDC	400 mA			85 %
TMR 6-1215		24 VDC	250 mA			84 %
TMR 6-1221		+5 VDC	600 mA	–5 VDC	600 mA	82 %
TMR 6-1222		+12 VDC	250 mA	–12 VDC	250 mA	84 %
TMR 6-1223		+15 VDC	200 mA	–15 VDC	200 mA	85 %
TMR 6-2410	18 - 36 VDC (24 VDC nom.)	3.3 VDC	1'300 mA			78 %
TMR 6-2411		5 VDC	1'200 mA			83 %
TMR 6-2419		9 VDC	666 mA			85 %
TMR 6-2412		12 VDC	500 mA			86 %
TMR 6-2413		15 VDC	400 mA			86 %
TMR 6-2415		24 VDC	250 mA			85 %
TMR 6-2421		+5 VDC	600 mA	–5 VDC	600 mA	82 %
TMR 6-2422		+12 VDC	250 mA	–12 VDC	250 mA	85 %
TMR 6-2423		+15 VDC	200 mA	–15 VDC	200 mA	85 %
TMR 6-4810	36 - 75 VDC (48 VDC nom.)	3.3 VDC	1'300 mA			78 %
TMR 6-4811		5 VDC	1'200 mA			82 %
TMR 6-4819		9 VDC	666 mA			84 %
TMR 6-4812		12 VDC	500 mA			85 %
TMR 6-4813		15 VDC	400 mA			86 %
TMR 6-4815		24 VDC	250 mA			84 %
TMR 6-4821		+5 VDC	600 mA	–5 VDC	600 mA	82 %
TMR 6-4822		+12 VDC	250 mA	–12 VDC	250 mA	84 %
TMR 6-4823		+15 VDC	200 mA	–15 VDC	200 mA	85 %

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Input Specifications

Input Current	- At no load	5 Vin models:	105 mA typ.
		12 Vin models:	55 mA typ.
		24 Vin models:	28 mA typ.
		48 Vin models:	14 mA typ.
Surge Voltage		5 Vin models:	15 VDC max. (1 s max.)
		12 Vin models:	36 VDC max. (1 s max.)
		24 Vin models:	50 VDC max. (1 s max.)
		48 Vin models:	100 VDC max. (1 s max.)
Under Voltage Lockout		5 Vin models:	2 VDC min. / 3.5 VDC typ. / 4 VDC max.
		12 Vin models:	5 VDC min. / 7 VDC typ. / 8 VDC max.
		24 Vin models:	12 VDC min. / 15 VDC typ. / 17 VDC max.
		48 Vin models:	26 VDC min. / 33 VDC typ. / 35 VDC max.
Recommended Input Fuse		5 Vin models:	3'000 mA (slow blow)
		12 Vin models:	1'600 mA (slow blow)
		24 Vin models:	1'000 mA (slow blow)
		48 Vin models:	500 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 (0 - 100%)	single output models:	1% max.
		dual output models:	1% max. (Output 1)
			1% 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:	6'600 µF max.
		5 Vout models:	3'300 µF max.
		9 Vout models:	2'000 µF max.
		12 Vout models:	1'600 µF max.
		15 Vout models:	1'400 µF max.
		24 Vout models:	680 µF max.
	- dual output	5 / -5 Vout models:	2'000 / 2'000 µF max.
		12 / -12 Vout models:	900 / 900 µF max.
		15 / -15 Vout models:	600 / 600 µF max.
Minimum Load			Not required
Temperature Coefficient			±0.02 %/K max.
Start-up Time			5 ms typ. / 10 ms max.
Short Circuit Protection			Continuous, Automatic recovery
Transient Response	- Response Time		500 µs typ. (25% Load Step)

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/tmr6-safety-cert
Energy Source	- Output, acc. to 62368-1	ES1
Power Source	- Output, acc. to 62368-1	PS1

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

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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/tmr6-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:	5 Vin models: Nippon chemi-con KY 330 µF Other models: Nippon chemi-con KY 220 µF
	- 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

General Specifications

Relative Humidity			95% max. (non condensing)
Temperature Ranges	- Operating Temperature		–40°C to +78°C
	- Case Temperature		+105°C max.
	- Storage Temperature		–55°C to +125°C
Power Derating	- High Temperature		Depending on model
		See application note:	www.tracopower.com/tmr6-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.
		See application note:	www.tracopower.com/tmr6-remote
Altitude During Operation			5'000 m max.
Regulator Topology			Flyback Converter
Switching Frequency			100 kHz min. (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		50 pF max.
Reliability	- Calculated MTBF		2'135'000 h (MIL-HDBK-217F, ground benign)
Washing Process			According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf
Environment	- Vibration		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)
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.

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

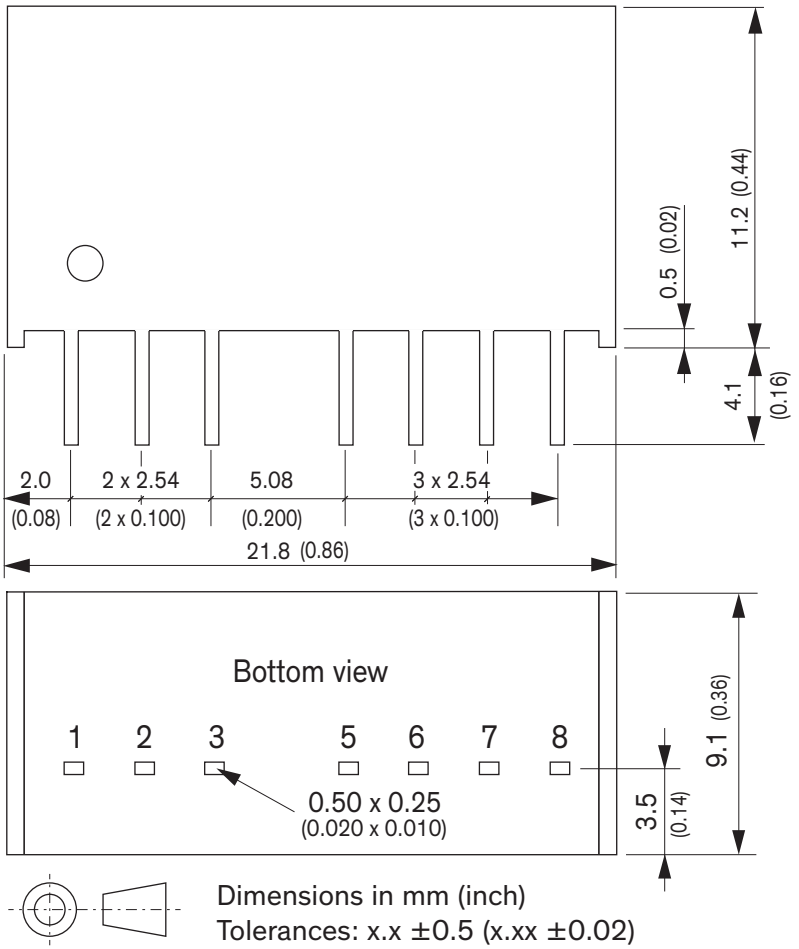
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Weight		4.8 g
Environmental Compliance	- REACH Declaration	www.tracopower.com/info/reach-declaration.pdf
		REACH SVHC list compliant
		REACH Annex XVII compliant
	- RoHS Declaration	www.tracopower.com/info/rohs-declaration.pdf
		Exemptions: 7(a), 7(c)-I
		(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)
	- SCIP Reference Number	83a65577-1d00-4340-8642-87de0c778ffd

Additional Information

Supporting Documents	www.tracopower.com/overview/tmr6
Frequently Asked Questions	www.tracopower.com/glossary-faq
Glossary	www.tracopower.com/info/glossary.pdf

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

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