

DC/DC Converter**TMR 6 Series, 6 Watt**

- Ultra-compact SIP-8 package
- Wide 2:1 input voltage range
- Continuous short-circuit protection
- Temperature range -40° to $+78^{\circ}\text{C}$
- High efficiency up to 86%
- I/O isolation 1600 VDC
- Remote On/Off control
- 3-year product warranty



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 typ.
		Vnom	I _{max}	Vnom	I _{max}	
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 %

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

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/tmr6
Pollution Degree		PD 2

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)
	- Radiated Emissions	EN 55032 class B (with external filter)
External filter proposal:		EN 55032 class A (with external filter)
		EN 55032 class B (with external filter)
		www.tracopower.com/overview/tmr6
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 μ F
	- Conducted RF Disturbances	Other models: Nippon chemi-con KY 220 μ F
	- PF Magnetic Field	EN 61000-4-6, 10 Vrms, perf. criteria A
		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	See application note: www.tracopower.com/overview/tmr6
Cooling System		Natural convection (20 LFM)
Remote Control	- Current Controlled Remote	On: open circuit
		Off: 2 to 4 mA current (internal 1 k Ω resistor)
	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.
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 M Ω 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		Allowed (hermetical product)
	See 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 μ m)
Pin Surface Plating		Tin (3 - 5 μ m), matte
Housing Type		Plastic Case
Mounting Type		PCB Mount
Connection Type		THD (Through-Hole Device)
Footprint Type		SIP8
Weight		4.8 g

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

Environmental Compliance - REACH Declaration

- RoHS Declaration

www.tracopower.com/info/reach-declaration.pdf

REACH SVHC list compliant

REACH Annex XVII compliant

www.tracopower.com/info/rohs-declaration.pdf

Exemptions: 7a, 7c-l

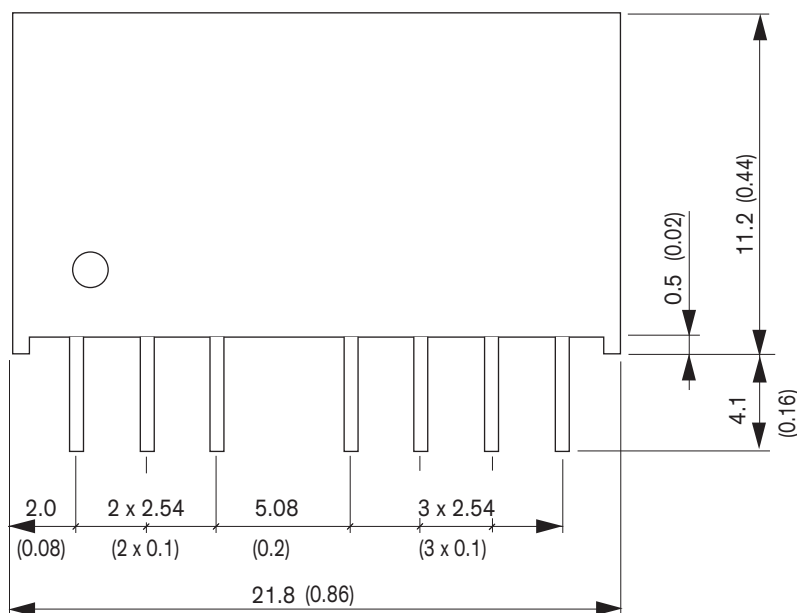
(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule). The SCIP number is provided on request.)

Supporting Documents

Overview Link (for additional Documents)

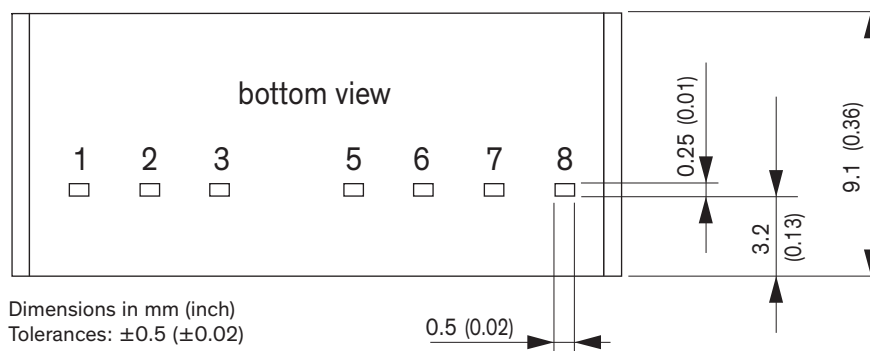
www.tracopower.com/overview/tmr6

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: Not connected



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