



**THE DATASHEET OF
TMR 6-1213**



- 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

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) 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/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
	- Conducted RF Disturbances	Ext. input component: 5 Vin models: Nippon chemi-con KY 330 µF Other models: Nippon chemi-con KY 220 µF 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/overview/tmr6
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
	- 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.
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.
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

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

- RoHS Declaration

REACH SVHC list compliant

REACH Annex XVII compliant

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))

- SCIP Reference Number

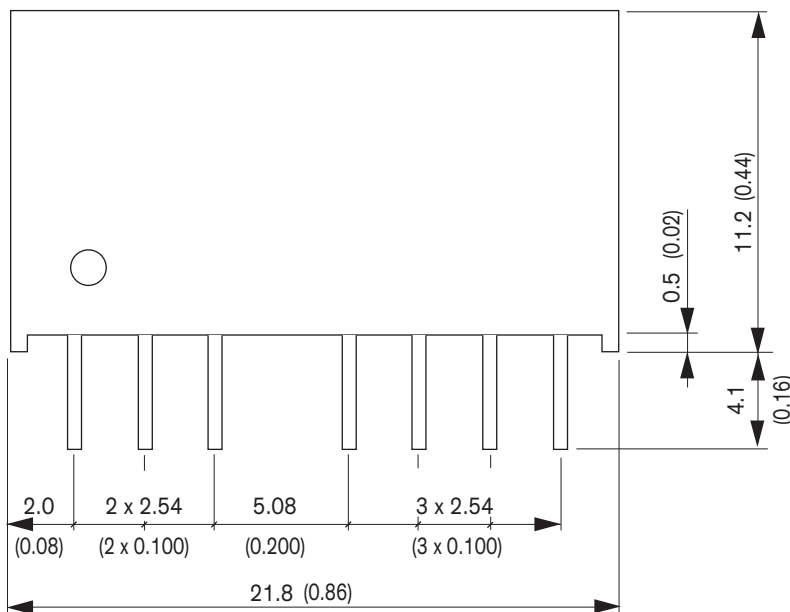
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Supporting Documents

Overview Link (for additional Documents)

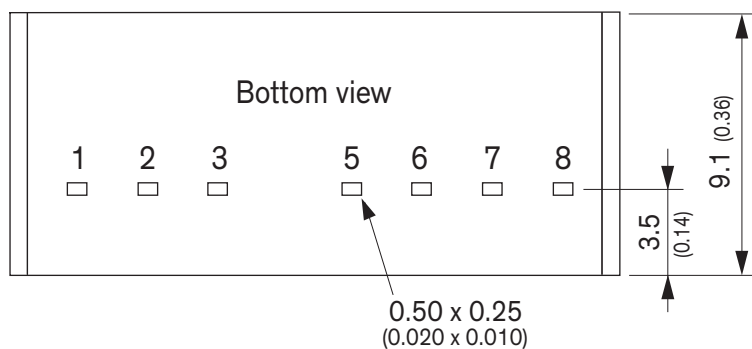
www.tracopower.com/overview/tmr6

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: $x.x \pm 0.5$ ($x.xx \pm 0.02$)

$x.xx \pm 0.25$ ($x.xxx \pm 0.01$)

Pin dimension tolerance: ± 0.1 (± 0.004)

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