



**THE DATASHEET OF  
TLV76133DCYR**



- Ultra-compact SIP-8 package
- Wide 2:1 input voltage range
- Continuous short-circuit protection
- Temperature range  $-40^{\circ}$  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 cm<sup>2</sup> 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 <sub>max</sub>	Vnom	I <sub>max</sub>	
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: <b>105 mA typ.</b> 12 Vin models: <b>55 mA typ.</b> 24 Vin models: <b>28 mA typ.</b> 48 Vin models: <b>14 mA typ.</b>
Surge Voltage		5 Vin models: <b>15 VDC max.</b> (1 s max.) 12 Vin models: <b>36 VDC max.</b> (1 s max.) 24 Vin models: <b>50 VDC max.</b> (1 s max.) 48 Vin models: <b>100 VDC max.</b> (1 s max.)
Under Voltage Lockout		5 Vin models: <b>2 VDC min. / 3.5 VDC typ. / 4 VDC max.</b> 12 Vin models: <b>5 VDC min. / 7 VDC typ. / 8 VDC max.</b> 24 Vin models: <b>12 VDC min. / 15 VDC typ. / 17 VDC max.</b> 48 Vin models: <b>26 VDC min. / 33 VDC typ. / 35 VDC max.</b>
Recommended Input Fuse		5 Vin models: <b>3'000 mA</b> (slow blow) 12 Vin models: <b>1'600 mA</b> (slow blow) 24 Vin models: <b>1'000 mA</b> (slow blow) 48 Vin models: <b>500 mA</b> (slow blow) (The need of an external fuse has to be assessed in the final application.)
Input Filter		<b>Internal Capacitor</b>

## Output Specifications

Voltage Set Accuracy		<b>±1% max.</b>
Regulation	- Input Variation (Vmin - Vmax)	single output models: <b>0.2% max.</b> dual output models: <b>0.2% max.</b>
	- Load Variation (0 - 100%)	single output models: <b>1% max.</b> dual output models: <b>1% max.</b> (Output 1) <b>1% max.</b> (Output 2)
	- Cross Regulation (25% / 100% asym. load)	dual output models: <b>5% max.</b>
Ripple and Noise	- 20 MHz Bandwidth	<b>50 mVp-p typ.</b>
Capacitive Load	- single output	3.3 Vout models: <b>6'600 µF max.</b> 5 Vout models: <b>3'300 µF max.</b> 9 Vout models: <b>2'000 µF max.</b> 12 Vout models: <b>1'600 µF max.</b> 15 Vout models: <b>1'400 µF max.</b> 24 Vout models: <b>680 µF max.</b>
	- dual output	5 / -5 Vout models: <b>2'000 / 2'000 µF max.</b> 12 / -12 Vout models: <b>900 / 900 µF max.</b> 15 / -15 Vout models: <b>600 / 600 µF max.</b>
Minimum Load		<b>Not required</b>
Temperature Coefficient		<b>±0.02 %/K max.</b>
Start-up Time		<b>5 ms typ. / 10 ms max.</b>
Short Circuit Protection		<b>Continuous, Automatic recovery</b>
Transient Response	- Response Time	<b>500 µs typ.</b> (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	<a href="http://www.tracopower.com/tmr6-safety-cert">www.tracopower.com/tmr6-safety-cert</a>
Energy Source	- Output, acc. to 62368-1	<b>ES1</b>
Power Source	- Output, acc. to 62368-1	<b>PS1</b>

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

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: <a href="http://www.tracopower.com/tmr6-emc-filter">www.tracopower.com/tmr6-emc-filter</a>
EMS (Immunity)	- Electrostatic Discharge	Air: EN 61000-4-2, $\pm 8$ kV, perf. criteria A Contact: EN 61000-4-2, $\pm 6$ kV, perf. criteria A
	- RF Electromagnetic Field	EN 61000-4-3, 10 V/m, perf. criteria A
	- EFT (Burst) / Surge	EN 61000-4-4, $\pm 2$ kV, perf. criteria A EN 61000-4-5, $\pm 1$ kV, perf. criteria A
	- Conducted RF Disturbances	Ext. input component: 5 Vin models: Nippon chemi-con KY 330 $\mu$ F Other models: Nippon chemi-con KY 220 $\mu$ F 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: <a href="http://www.tracopower.com/tmr6-cc">www.tracopower.com/tmr6-cc</a>
Cooling System		Natural convection (20 LFM)
Remote Control	- Current Controlled Remote (passive = on)	On: open circuit Off: 2 to 4 mA current (internal 1 k $\Omega$ resistor) Refers to 'Remote' and '-Vin' Pin
	- Off Idle Input Current	External circuit proposal: <a href="http://www.tracopower.com/info/current-remote.pdf">www.tracopower.com/info/current-remote.pdf</a> 2.5 mA max.
		See application note: <a href="http://www.tracopower.com/tmr6-remote">www.tracopower.com/tmr6-remote</a>
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 M $\Omega$ 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 <a href="http://www.tracopower.com/info/cleaning.pdf">www.tracopower.com/info/cleaning.pdf</a>
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 $\mu$ m)
Pin Surface Plating		Tin (3 - 5 $\mu$ m), 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.

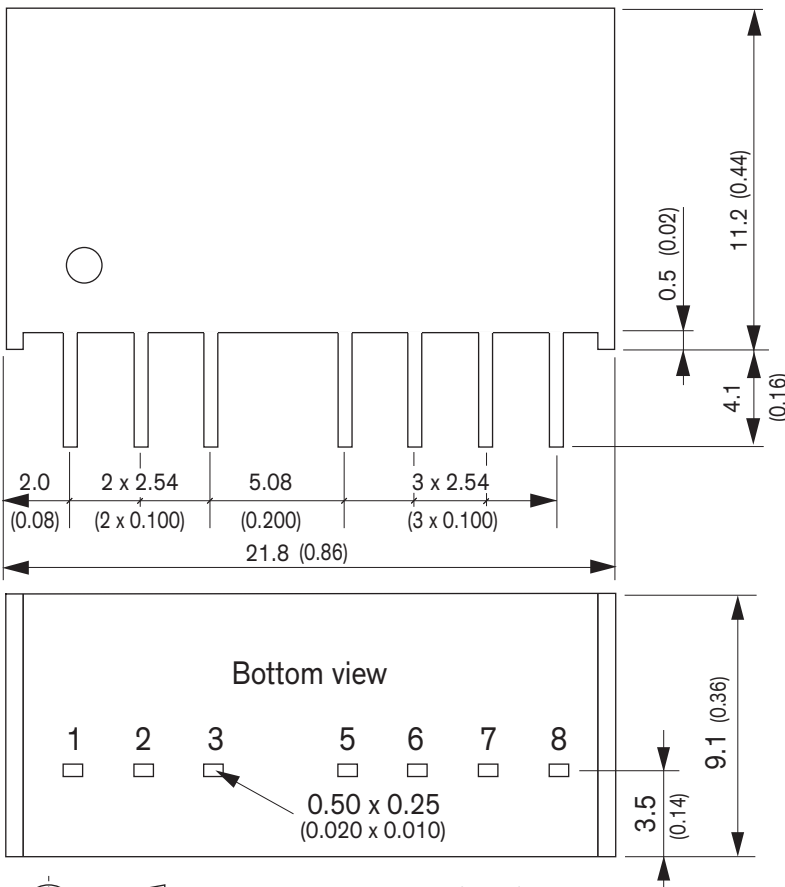
All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

Weight	4.8 g
Environmental Compliance	- REACH Declaration <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> REACH SVHC list compliant REACH Annex XVII compliant
	- RoHS Declaration <a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a> 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

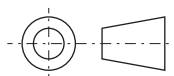
Supporting Documents	<a href="http://www.tracopower.com/overview/tmr6">www.tracopower.com/overview/tmr6</a>
Frequently Asked Questions	<a href="http://www.tracopower.com/glossary-faq">www.tracopower.com/glossary-faq</a>
Glossary	<a href="http://www.tracopower.com/info/glossary.pdf">www.tracopower.com/info/glossary.pdf</a>

### 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 ±0.5 (x.xx ±0.02)  
 x.xx ±0.25 (x.xxx ±0.01)  
 Pin dimension tolerance: ±0.1 (±0.004)

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