

- Ultra-wide 4:1 input range
- SIP-9 package
- Temperature range  $-40$  to  $+85^{\circ}\text{C}$
- High efficiency
- Excellent load and line regulation
- Indefinite short-circuit protection
- I/O isolation 1500 VDC
- Remote On/Off control
- Fully RoHS compliant
- 3-year product warranty



The TMR 2WI series is a new family of isolated 2W DC/DC converter modules with regulated output, featuring ultra-wide 4:1 input voltage ranges of 9-36 VDC or 18-75 VDC. The product comes in a ultra-compact SIP-9 plastic package.

An excellent efficiency up to 84% allows  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  operation temperatures at full load. Further features include remote On/Off control and continuous short circuit protection. Typical applications for these ultra-compact converters are battery operated equipment and distributed power architectures in communication, instrumentation and industrial electronics, everywhere where space on the PCB is critical.

Models						
Order Code	Input Voltage Range	Output 1		Output 2		Efficiency typ.
		Vnom	I <sub>max</sub>	Vnom	I <sub>max</sub>	
TMR 2-2410WI	9 - 36 VDC (24 VDC nom.)	3.3 VDC	500 mA			71 %
TMR 2-2411WI		5 VDC	400 mA			76 %
TMR 2-2412WI		12 VDC	167 mA			79 %
TMR 2-2413WI		15 VDC	134 mA			80 %
TMR 2-2421WI		+5 VDC	200 mA	-5 VDC	200 mA	73 %
TMR 2-2422WI		+12 VDC	83 mA	-12 VDC	83 mA	77 %
TMR 2-2423WI		+15 VDC	67 mA	-15 VDC	67 mA	79 %
TMR 2-4810WI	18 - 75 VDC (48 VDC nom.)	3.3 VDC	500 mA			70 %
TMR 2-4811WI		5 VDC	400 mA			72 %
TMR 2-4812WI		12 VDC	167 mA			78 %
TMR 2-4813WI		15 VDC	134 mA			78 %
TMR 2-4821WI		+5 VDC	200 mA	-5 VDC	200 mA	70 %
TMR 2-4822WI		+12 VDC	83 mA	-12 VDC	83 mA	76 %
TMR 2-4823WI		+15 VDC	67 mA	-15 VDC	67 mA	76 %

### Input Specifications

Input Current	- At no load	24 Vin models: <b>20 mA typ.</b> 48 Vin models: <b>15 mA typ.</b>
	- At full load	24 Vin models: <b>110 mA typ.</b> 48 Vin models: <b>55 mA typ.</b>
Surge Voltage		24 Vin models: <b>50 VDC max.</b> (1 s max.) 48 Vin models: <b>100 VDC max.</b> (1 s max.)
Start-up Voltage		24 Vin models: <b>6 VDC typ.</b> 48 Vin models: <b>12 VDC typ.</b>
Under Voltage Lockout		24 Vin models: <b>8 VDC max.</b> 48 Vin models: <b>16 VDC max.</b>
Reflected Ripple Current		24 Vin models: <b>300 mA<sub>p-p</sub> typ.</b> 48 Vin models: <b>600 mA<sub>p-p</sub> typ.</b>
Recommended Input Fuse		24 Vin models: <b>350 mA</b> (slow blow) 48 Vin models: <b>135 mA</b> (slow blow) (The need of an external fuse has to be assessed in the final application.)
Input Filter		<b>Internal Capacitor</b>
Short Circuit Input Power		<b>1.5 W max.</b>

### Output Specifications

Voltage Set Accuracy		<b>±2% max.</b>	
Regulation	- Input Variation (Vmin - Vmax)	single output models: <b>0.5% max.</b> dual output models: <b>0.5% max.</b>	
	- Load Variation (25 - 100%)	single output models: <b>0.75% max.</b> dual output models: <b>0.75% max.</b> (Output 1) <b>0.75% max.</b> (Output 2)	
	- Voltage Balance (symmetrical load)	dual output models: <b>2% max.</b>	
Ripple and Noise	- 20 MHz Bandwidth	<b>30 mV<sub>p-p</sub> typ.</b> <b>50 mV<sub>p-p</sub> max.</b>	
Capacitive Load	- single output	3.3 Vout models: <b>2'200 µF max.</b> 5 Vout models: <b>1'000 µF max.</b> 12 Vout models: <b>170 µF max.</b> 15 Vout models: <b>110 µF max.</b>	
		- dual output	5 / -5 Vout models: <b>470 / 470 µF max.</b> 12 / -12 Vout models: <b>100 / 100 µF max.</b> 15 / -15 Vout models: <b>47 / 47 µF max.</b>
	Minimum Load		<b>25 % of Iout max.</b> (operation at lower load condition is safe but a higher output ripple will be experienced)
	Temperature Coefficient		<b>±0.02 %/K max.</b>
Start-up Time		<b>1 ms max.</b>	
Short Circuit Protection		<b>Continuous, Automatic recovery</b>	
Transient Response	- Response Deviation	<b>5% max.</b> (75% to 100% Load Step)	
	- Response Time	<b>100 µs typ. / 300 µs max.</b> (75% to 100% Load Step)	

### Safety Specifications

Safety Standards	- IT / Multimedia Equipment	<b>Designed for EN 60950-1</b> (no certification)
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### EMC Specifications

EMI Emissions	- Conducted Emissions	<b>EN 55032 class A</b> (with external filter)
	- Radiated Emissions	<b>EN 55032 class A</b> (with external filter)
	External filter proposal:	<a href="http://www.tracopower.com/overview/tmr2wi">www.tracopower.com/overview/tmr2wi</a>

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

## General Specifications

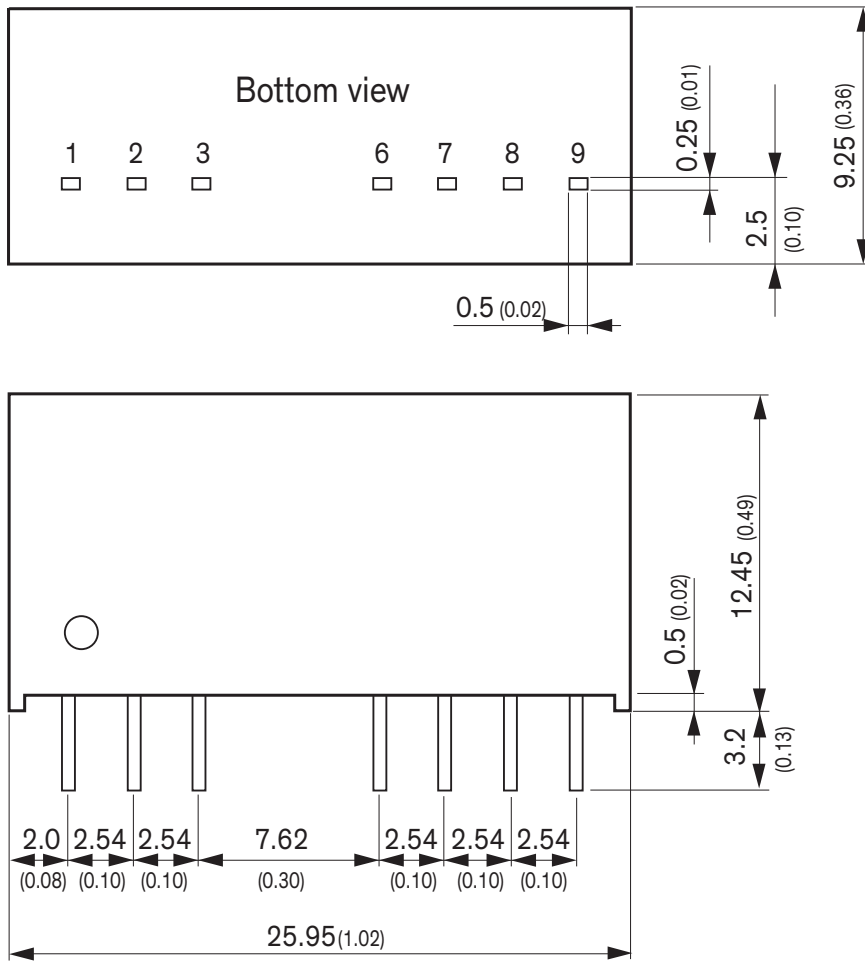
Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature - Case Temperature - Storage Temperature	-40°C to +85°C +90°C max. -55°C to +105°C
Power Derating	- High Temperature	2.86 %/K above 65°C
Cooling System		Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote  - Off Idle Input Current - Remote Pin Input Current	On: < 0.6 VDC or open circuit Off: 2.9 to 15 VDC 3 mA max. -1.0 to 1.0 mA
Switching Frequency		100 - 650 kHz (PFM) 300 kHz typ. (PFM)
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s	1'500 VAC
Isolation Resistance	- Input to Output, 500 VDC	1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	250 pF typ. 500 pF max.
Reliability	- Calculated MTBF	1'000'000 h (MIL-HDBK-217F, ground benign)
Housing Material		Non-conductive Plastic (UL94 V-0 rated)
Potting Material		Epoxy (UL 94 V-0 rated)
Pin Material		Nickel-Iron (Alloy 42)
Pin Foundation Plating		Nickel (1.5 μm min.) Copper (1 - 1.5 μm)
Pin Surface Plating		Tin (3 - 5 μm), matte
Soldering Profile		Wave Soldering 260°C / 10 s max.
Connection Type		THD (Through-Hole Device)
Weight		6.5 g
Environmental Compliance	- Reach - RoHS	<a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> <a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a>

## Supporting Documents

Overview Link (for additional Documents)	<a href="http://www.tracopower.com/overview/tmr2wi">www.tracopower.com/overview/tmr2wi</a>
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### Outline Dimensions



Pinout		
Pin	Single Output	Dual Output
1	-Vin (GND)	-Vin (GND)
2	+Vin (Vcc)	+Vin (Vcc)
3	Remote	Remote
6	+Vout	+Vout
7	NC	Common
8	NC	NC
9	-Vout	-Vout

NC: No Connection

Dimensions in mm (inch)  
 Pin diameter  $\varnothing 0.5 \pm 0.05$  (0.02  $\pm 0.002$ )  
 Tolerances  $\pm 0.5$  ( $\pm 0.02$ )  
 Pin pitch tolerance  $\pm 0.2$  ( $\pm 0.008$ )