

- Compact SIP-8 metal case
- EN 50155 railway approval
- Ultra wide 4:1 Input: 9–36, 18–75 and 43–160 VDC
- I/O-isolation 3'000 VDC
- Fully regulated outputs
- Operating temperature range –40°C to +90°C
- Short circuit protection and current limitation
- Remote On/Off
- 3-year product warranty



The TMR 3WIR series is a set of 3 Watt DC/DC converters in a SIP-8 metal case. They operate up to 78°C environment temperature at full load and up to 90°C with a 50% load derating. With EN 50155 and UL 60950-1 certification, 3'000 VDC I/O-isolation voltage, external On/Off, current limitation and short circuit protection they cover a wide range of application when space is limited. The input of the converters is designed for a wide voltage range (4:1) and minimum load is not required.

Models						
Order Code	Input Voltage Range	Output 1		Output 2		Efficiency typ.
		Vnom	I <sub>max</sub>	Vnom	I <sub>max</sub>	
TMR 3-2410WIR	9 - 36 VDC (24 VDC nom.)	3.3 VDC	700 mA			76 %
TMR 3-2411WIR		5 VDC	600 mA			81 %
TMR 3-2419WIR		9 VDC	333 mA			81 %
TMR 3-2412WIR		12 VDC	250 mA			83 %
TMR 3-2413WIR		15 VDC	200 mA			83 %
TMR 3-2415WIR		24 VDC	125 mA			82 %
TMR 3-2421WIR		+5 VDC	300 mA	-5 VDC	300 mA	80 %
TMR 3-2422WIR		+12 VDC	125 mA	-12 VDC	125 mA	82 %
TMR 3-2423WIR		+15 VDC	100 mA	-15 VDC	100 mA	82 %
TMR 3-4810WIR	18 - 75 VDC (48 VDC nom.)	3.3 VDC	700 mA			75 %
TMR 3-4811WIR		5 VDC	600 mA			81 %
TMR 3-4819WIR		9 VDC	333 mA			81 %
TMR 3-4812WIR		12 VDC	250 mA			82 %
TMR 3-4813WIR		15 VDC	200 mA			82 %
TMR 3-4815WIR		24 VDC	125 mA			82 %
TMR 3-4821WIR		+5 VDC	300 mA	-5 VDC	300 mA	80 %
TMR 3-4822WIR		+12 VDC	125 mA	-12 VDC	125 mA	82 %
TMR 3-4823WIR		+15 VDC	100 mA	-15 VDC	100 mA	82 %
TMR 3-7210WIR	43 - 160 VDC (110 VDC nom.)	3.3 VDC	700 mA			76 %
TMR 3-7211WIR		5 VDC	600 mA			80 %
TMR 3-7219WIR		9 VDC	333 mA			81 %
TMR 3-7212WIR		12 VDC	250 mA			82 %
TMR 3-7213WIR		15 VDC	200 mA			83 %
TMR 3-7215WIR		24 VDC	125 mA			83 %
TMR 3-7221WIR		+5 VDC	300 mA	-5 VDC	300 mA	80 %
TMR 3-7222WIR		+12 VDC	125 mA	-12 VDC	125 mA	83 %
TMR 3-7223WIR		+15 VDC	100 mA	-15 VDC	100 mA	81 %

### Input Specifications

Input Current	- At no load	24 Vin models: <b>4 mA typ.</b> 48 Vin models: <b>4 mA typ.</b> 110 Vin models: <b>2 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.) 110 Vin models: <b>185 VDC max.</b> (1 s max.)
Recommended Input Fuse		24 Vin models: <b>800 mA</b> (slow blow) 48 Vin models: <b>500 mA</b> (slow blow) 110 Vin models: <b>160 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) - Load Variation (0 - 100%) - Cross Regulation (25% / 100% asym. load)	single output models: <b>0.2% max.</b> dual output models: <b>0.2% max.</b> single output models: <b>0.5% max.</b> dual output models: <b>1% max.</b> (Output 1) <b>1% max.</b> (Output 2) dual output models: <b>5% max.</b>
Ripple and Noise	- 20 MHz Bandwidth	<b>50 mVp-p typ.</b> (w/ 1 µF) <b>75 mVp-p max.</b> (w/ 1 µF)
Capacitive Load	- single output  - dual output	3.3 Vout models: <b>1'100 µF max.</b> 5 Vout models: <b>550 µF max.</b> 9 Vout models: <b>340 µF max.</b> 12 Vout models: <b>240 µF max.</b> 15 Vout models: <b>240 µF max.</b> 24 Vout models: <b>90 µF max.</b> 5 / -5 Vout models: <b>340 / 340 µF max.</b> 12 / -12 Vout models: <b>170 / 170 µF max.</b> 15 / -15 Vout models: <b>90 / 90 µF max.</b>
Minimum Load		<b>Not required</b>
Temperature Coefficient		<b>±0.02 %/K max.</b>
Start-up Time		<b>75 ms max.</b>
Short Circuit Protection		<b>Continuous, Automatic recovery</b>
Output Current Limitation		<b>180% typ.</b> of Iout max.
Transient Response	- Response Time	<b>250 µs typ.</b> (25% Load Step)

### Safety Specifications

Safety Standards	- IT / Multimedia Equipment  - Railway Applications - Certification Documents	EN 62368-1 IEC 62368-1 UL 62368-1 EN 50155 <a href="http://www.tracopower.com/overview/tmr3wir">www.tracopower.com/overview/tmr3wir</a>
Pollution Degree		<b>PD 2</b>

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

## EMC Specifications

EMI Emissions	- Conducted Emissions	EN 55011 class A (with external filter) EN 55011 class B (with external filter) EN 55032 class A (with external filter) EN 55032 class B (with external filter)
	- Radiated Emissions	EN 55011 class A (with external filter) EN 55011 class B (with external filter) EN 55032 class A (with external filter) EN 55032 class B (with external filter)
External filter proposal: <a href="http://www.tracopower.com/overview/tmr3wir">www.tracopower.com/overview/tmr3wir</a>		
EMS Immunity	- Electrostatic Discharge	EN 50155 (Railway Applications) 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, 20 V/m, perf. criteria A
	- EFT (Burst) / Surge	EN 61000-4-4, $\pm 2$ kV, perf. criteria A EN 61000-4-5, $\pm 2$ kV, perf. criteria A
	- Conducted RF Disturbances	Ext. input component: 24 Vin models: KY 220 $\mu$ F // TVS SMDJ70A 48 Vin models: KY 220 $\mu$ F // TVS SMDJ120A 110 Vin models: KY 150 $\mu$ F // TVS SMDJ250A EN 61000-4-6, 10 Vrms, perf. criteria A
	- PF Magnetic Field	Continuous: EN 61000-4-8, 100 A/m, perf. criteria A 1 s: EN 61000-4-8, 1000 A/m, perf. criteria A

## General Specifications

Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	-40°C to +90°C
	- Case Temperature	+100°C max.
	- Storage Temperature	-55°C to +125°C
Power Derating	- High Temperature	4.55 %/K above 78°C
Cooling System		Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote	On: 0 to 0.5 VDC or open circuit Off: 3 to 12 VDC Refers to 'Remote' and '-Vin' Pin
	- Current Controlled Remote	On: open circuit Off: 2 to 4 mA current
	- Off Idle Input Current	2.5 mA typ.
Altitude During Operation		5'000 m max.
Switching Frequency		270 - 330 kHz (PWM) (110 Vin model)
		360 - 440 kHz (PWM) (other input models)
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s	3'000 VDC
	- Input to Case, 60 s	1'500 VDC
	- Output to Case, 60 s	1'500 VDC
Isolation Resistance	- Input to Output, 500 VDC	1'000 M $\Omega$ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	100 pF max.
Reliability	- Calculated MTBF	5'535'000 h (MIL-HDBK-217F, ground benign)
Environment	- Vibration	MIL-STD-810F EN 61373
	- Mechanical Shock	MIL-STD-810F EN 61373
	- Thermal Shock	MIL-STD-810F EN 50155
Housing Material		Copper
Potting Material		Silicone (UL 94 V-0 rated)
Pin Material		Copper
Pin Foundation Plating		Nickel (1 - 2 $\mu$ m)
Pin Surface Plating		Tin (3 - 5 $\mu$ m), matte

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

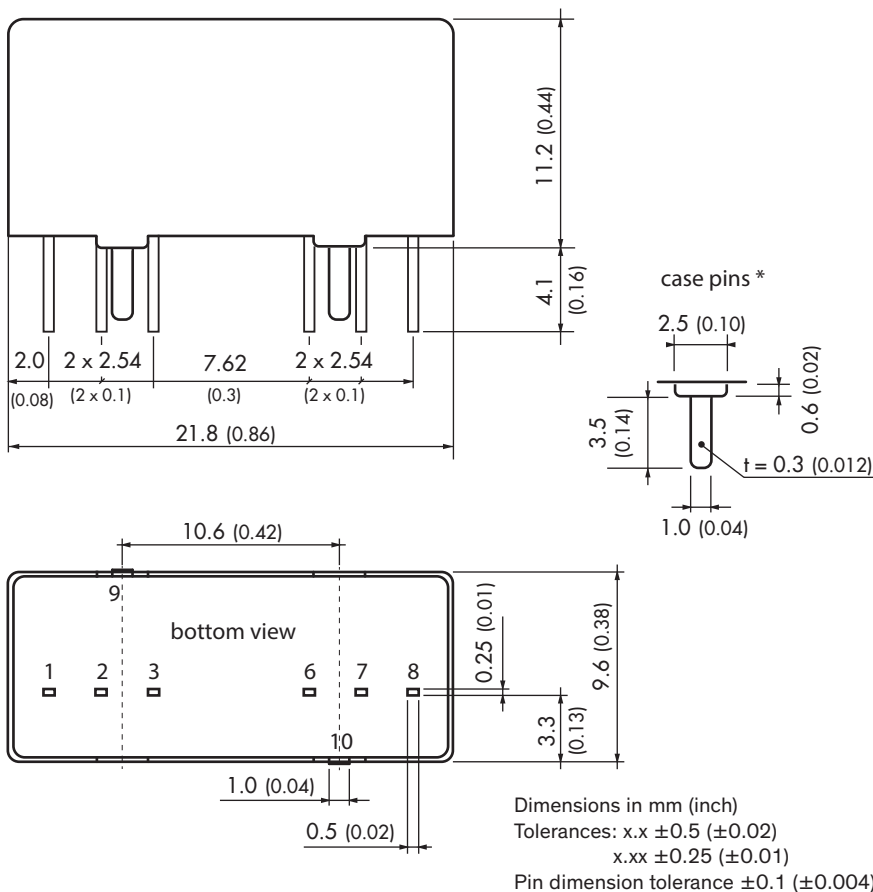
Soldering Profile	265°C / 10 s max.
Connection Type	THD (Through-Hole Device)
Weight	5.9 g
Environmental Compliance	- REACH Declaration <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> REACH SVHC list compliant REACH Annex XVII compliant
	- RoHS Declaration <a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a> Exemptions: 7a, 7c-I
	- Flammability (EN 45545-2) <a href="http://www.tracopower.com/info/en45545-declaration.pdf">www.tracopower.com/info/en45545-declaration.pdf</a>

### Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/tmr3wir](http://www.tracopower.com/overview/tmr3wir)

### 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	-Vout	Common
8	NC	-Vout
9, 10	Case	Case

NC: No Connection