

- Compact 1.0" x 1.0" x 0.4" standard package
- Ultra-wide 4:1 input voltage range 9–36, 18–75, 36–160 VDC
- EN 50155 and EN 61373 approval for railway applications
- Qualification for fire behaviour according to EN 45545-2
- 3000 VDC I/O-isolation
- High efficiency up to 91%
- Operating temperature range –40°C to +90°C
- Under-voltage lock out circuit
- Adjustable output voltage & Remote On/Off
- 3-year product warranty



The THN 15WIR series is a family of ruggedized 15 W DC/DC converters for highest reliability in harsh environments. The converters have an increased resistance against electromagnetic interference, shock/vibration and thermal shock. The approvals according to standards EN 50155 and EN 61373 qualify them for railway and transportation systems. The qualification for the fire behaviour of components according to EN 45545-2 and the safety approval according IEC/EN 60950-1, UL60950-1 support a potential compliance test of the application. Built-in EMI 55022 class A filter, input under-voltage-lockout, short circuit protection, remote On/Off and output voltage trim are further features which facilitate the design in.

Models						
Order Code	Input Voltage Range	Output 1		Output 2		Efficiency typ.
		Vnom	I <sub>max</sub>	Vnom	I <sub>max</sub>	
THN 15-2410WIR	9 - 36 VDC (24 VDC nom.)	3.3 VDC	4'500 mA			88 %
THN 15-2411WIR		5 VDC	3'000 mA			90 %
THN 15-2412WIR		12 VDC	1'300 mA			89 %
THN 15-2413WIR		15 VDC	1'000 mA			90 %
THN 15-2415WIR		24 VDC	625 mA			91 %
THN 15-2421WIR		+5 VDC	1'500 mA	-5 VDC	1'500 mA	87 %
THN 15-2422WIR		+12 VDC	625 mA	-12 VDC	625 mA	90 %
THN 15-2423WIR		+15 VDC	500 mA	-15 VDC	500 mA	90 %
THN 15-2425WIR		+24 VDC	315 mA	-24 VDC	315 mA	91 %
THN 15-4810WIR		18 - 75 VDC (48 VDC nom.)	3.3 VDC	4'500 mA		
THN 15-4811WIR	5 VDC		3'000 mA			90 %
THN 15-4812WIR	12 VDC		1'300 mA			89 %
THN 15-4813WIR	15 VDC		1'000 mA			90 %
THN 15-4815WIR	24 VDC		625 mA			91 %
THN 15-4821WIR	+5 VDC		1'500 mA	-5 VDC	1'500 mA	87 %
THN 15-4822WIR	+12 VDC		625 mA	-12 VDC	625 mA	90 %
THN 15-4823WIR	+15 VDC		500 mA	-15 VDC	500 mA	90 %
THN 15-4825WIR	+24 VDC		315 mA	-24 VDC	315 mA	90 %
THN 15-7210WIR	36 - 160 VDC (110 VDC nom.)		3.3 VDC	4'500 mA		
THN 15-7211WIR		5 VDC	3'000 mA			89 %
THN 15-7212WIR		12 VDC	1'300 mA			89 %
THN 15-7213WIR		15 VDC	1'000 mA			89 %
THN 15-7215WIR		24 VDC	625 mA			90 %
THN 15-7221WIR		+5 VDC	1'500 mA	-5 VDC	1'500 mA	86 %
THN 15-7222WIR		+12 VDC	625 mA	-12 VDC	625 mA	89 %
THN 15-7223WIR		+15 VDC	500 mA	-15 VDC	500 mA	89 %
THN 15-7225WIR		+24 VDC	315 mA	-24 VDC	315 mA	90 %

## Options

**THN-HS1**

 - Optional Heat Sink: [www.tracopower.com/products/thn-hs1.pdf](http://www.tracopower.com/products/thn-hs1.pdf)

## Input Specifications

Input Current	- At no load	24 Vin models: <b>12 mA typ.</b> 48 Vin models: <b>10 mA typ.</b> 110 Vin models: <b>8 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.)
Under Voltage Lockout		24 Vin models: <b>7.5 VDC min. / 8 VDC typ. / 8.8 VDC max.</b> 48 Vin models: <b>15.5 VDC min. / 16 VDC typ. / 17.5 VDC max.</b> 110 Vin models: <b>32 VDC min. / 34 VDC typ. / 35.5 VDC max.</b>
Reflected Ripple Current		24 Vin models: <b>30 mA<sub>p-p</sub> typ.</b> 48 Vin models: <b>30 mA<sub>p-p</sub> typ.</b> 110 Vin models: <b>30 mA<sub>p-p</sub> typ.</b>
Recommended Input Fuse		24 Vin models: <b>3'150 mA</b> (slow blow) 48 Vin models: <b>1'600 mA</b> (slow blow) 110 Vin models: <b>1'000 mA</b> (slow blow) (The need of an external fuse has to be assessed in the final application.)
Input Filter		<b>Internal Pi-Type</b>

## Output Specifications

Output Voltage Adjustment		-10% to +20% (15 & 24 VDC single models) ±10% (other single models) (By external trim resistor) See application note: <a href="http://www.tracopower.com/overview/thn15wir">www.tracopower.com/overview/thn15wir</a> Output power must not exceed rated power!
Voltage Set Accuracy		<b>±1% max.</b>
Regulation	- Input Variation (V <sub>min</sub> - V <sub>max</sub> )	single output models: <b>0.2% max.</b> dual output models: <b>0.5% max.</b>
	- Load Variation (0 - 100%)	single output models: <b>0.2% 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)	- single output	3.3 V <sub>out</sub> models: <b>75 mV<sub>p-p</sub> typ.</b> (w/ 10 µF, 6.3 V X7R) 5 V <sub>out</sub> models: <b>75 mV<sub>p-p</sub> typ.</b> (w/ 10 µF, 6.3 V X7R) 12 V <sub>out</sub> models: <b>100 mV<sub>p-p</sub> typ.</b> (w/ 1 µF, 25 V X7R) 15 V <sub>out</sub> models: <b>100 mV<sub>p-p</sub> typ.</b> (w/ 1 µF, 25 V X7R) 24 V <sub>out</sub> models: <b>125 mV<sub>p-p</sub> typ.</b> (w/ 2.2 µF, 50 V X7R)
	- dual output	5 / -5 V <sub>out</sub> models: <b>75 / 75 mV<sub>p-p</sub> typ.</b> (w/ 10 µF, 6.3 V X7R) 12 / -12 V <sub>out</sub> models: <b>100 / 100 mV<sub>p-p</sub> typ.</b> (w/ 1 µF, 25 V X7R) 15 / -15 V <sub>out</sub> models: <b>100 / 100 mV<sub>p-p</sub> typ.</b> (w/ 1 µF, 25 V X7R) 24 / -24 V <sub>out</sub> models: <b>125 / 125 mV<sub>p-p</sub> typ.</b> (w/ 2.2 µF, 50 V X7R)
Capacitive Load	- single output	3.3 V <sub>out</sub> models: <b>5'200 µF max.</b> 5 V <sub>out</sub> models: <b>3'600 µF max.</b> 12 V <sub>out</sub> models: <b>600 µF max.</b> 15 V <sub>out</sub> models: <b>500 µF max.</b> 24 V <sub>out</sub> models: <b>200 µF max.</b>
	- dual output	5 / -5 V <sub>out</sub> models: <b>1'500 / 1'500 µF max.</b> 12 / -12 V <sub>out</sub> models: <b>360 / 360 µF max.</b> 15 / -15 V <sub>out</sub> models: <b>250 / 250 µF max.</b> 24 / -24 V <sub>out</sub> models: <b>100 / 100 µF max.</b>
Minimum Load		<b>Not required</b>

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

Temperature Coefficient		±0.02 %/K max.
Start-up Time		30 ms typ. / 40 ms max.
Short Circuit Protection		Continuous, Automatic recovery
Output Current Limitation		145 - 212% of I <sub>out</sub> max. 170% typ. of I <sub>out</sub> max.
Overvoltage Protection		112 - 164% of V <sub>out</sub> nom.
Transient Response	- Response Time	250 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
	- Railway Applications	EN 50155
	- Certification Documents	<a href="http://www.tracopower.com/overview/thn15wir">www.tracopower.com/overview/thn15wir</a>
	Pollution Degree	PD 2

### EMC Specifications

EMI Emissions	- Conducted Emissions	EN 55011 class A (internal filter) EN 55011 class B (with external filter) EN 55032 class A (internal filter) EN 55032 class B (with external filter)
	- Radiated Emissions	EN 55011 class A (internal filter) EN 55011 class B (with external filter) EN 55032 class A (internal filter) EN 55032 class B (with external filter)
EMS Immunity	- Electrostatic Discharge	EN 50155 (Railway Applications) 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, 20 V/m, perf. criteria A
	- EFT (Burst) / Surge	EN 61000-4-4, ±2 kV, perf. criteria A EN 61000-4-5, ±2 kV, perf. criteria A
	- Conducted RF Disturbances	Ext. input component: 24 V <sub>in</sub> models: 220 µF, 100 V // TVS SMDJ58A 48 V <sub>in</sub> models: 220 µF, 100 V 110 V <sub>in</sub> models: 150 µF, 200 V // TVS SMDJ300A
	- PF Magnetic Field	Continuous: EN 61000-4-6, 10 V <sub>rms</sub> , perf. criteria A 1 s: 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	-40°C to +93°C (with Heat Sink)
	- Storage Temperature	+105°C max. -55°C to +125°C
Power Derating	- High Temperature	3.3 %/K above 75°C 4 %/K above 80°C (with Heat Sink)
	Cooling System	Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote	On: 3.0 to 15 VDC or open circuit Off: 0 to 1.2 VDC or short circuit Refers to 'Remote' and '-Vin' Pin
	- Off Idle Input Current	2.5 mA typ.
	- Remote Pin Input Current	-0.5 to 1.0 mA

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

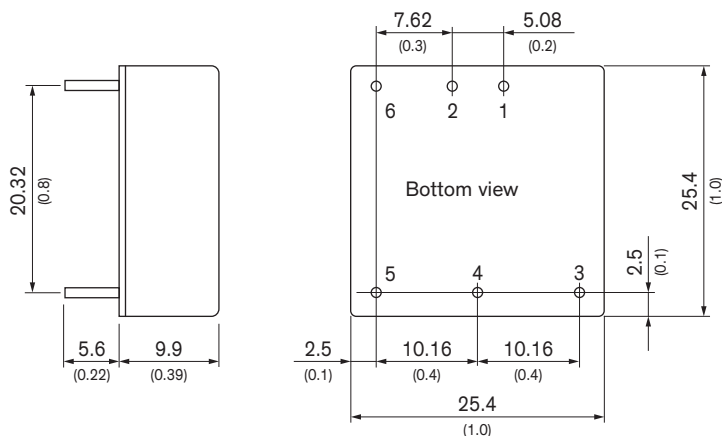
Altitude During Operation		2'000 m max.
Switching Frequency		245 kHz typ. (PWM) ( $\pm 10\%$ , 3.3 & 5 Vout model) 300 kHz typ. (PWM) ( $\pm 10\%$ , other models)
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s - Input to Case, 60 s - Output to Case, 60 s	3'000 VDC 1'600 VDC 1'600 VDC
Isolation Resistance	- Input to Output, 500 VDC	1'000 M $\Omega$ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	2'000 pF max.
Reliability	- Calculated MTBF	1'600'000 h (MIL-HDBK-217F, ground benign)
Environment	- Vibration  - Mechanical Shock  - Thermal Shock	MIL-STD-810F EN 61373 MIL-STD-810F EN 61373 MIL-STD-810F
Housing Material		Copper
Base Material		Non-conductive FR4 (UL94 V-0 rated)
Potting Material		Silicone (UL 94 V-0 rated)
Pin Material		Copper
Pin Foundation Plating		Nickel (2 - 3 $\mu\text{m}$ )
Pin Surface Plating		Tin (3 - 5 $\mu\text{m}$ ), matte
Soldering Profile		260°C / 10 s max.
Connection Type		THD (Through-Hole Device)
Weight		16.5 g
Thermal Impedance		17 K/W 15.3 K/W (with Heat Sink)
Environmental Compliance	- Reach - RoHS - Flammability (EN 45545-2)	<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> <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/thn15wir](http://www.tracopower.com/overview/thn15wir)

### Outline Dimensions



Dimensions in mm (inch)  
Tolerances:  $\pm 0.5$  ( $\pm 0.02$ )  
Pin pitch tolerances  $\pm 0.25$  ( $\pm 0.01$ )  
Pin diameter  $\varnothing 1.0$  (0.04)

Pinout		
Pin	Single	Dual
1	+Vin (Vcc)	+Vin (Vcc)
2	-Vin (GND)	-Vin (GND)
3	+Vout	+Vout
4	Trim	Common
5	-Vout	-Vout
6	Remote On/Off	Remote On/Off