



**THE DATASHEET OF
THN 15-7225WIR**



- 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 to 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 _{max}	Vnom	I _{max}	
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-HS2	- Optional Heat Sink: www.tracopower.com/products/thn-hs2.pdf
on demand (backorder with MOQ non stocking item)	- Optional Heat Sink: www.tracopower.com/products/thn-hs3.pdf - Optional Heat Sink: www.tracopower.com/products/thn-hs4.pdf

Input Specifications	
Input Current	- At no load 24 Vin models: 12 mA typ. 48 Vin models: 10 mA typ. 110 Vin models: 8 mA typ.
Surge Voltage	24 Vin models: 50 VDC max. (1 s max.) 48 Vin models: 100 VDC max. (1 s max.) 110 Vin models: 185 VDC max. (1 s max.)
Under Voltage Lockout	24 Vin models: 7.5 VDC min. / 8 VDC typ. / 8.8 VDC max. 48 Vin models: 15.5 VDC min. / 16 VDC typ. / 17.5 VDC max. 110 Vin models: 32 VDC min. / 34 VDC typ. / 35.5 VDC max.
Reflected Ripple Current	30 mA_{p-p} typ.
Recommended Input Fuse	24 Vin models: 3'150 mA (slow blow) 48 Vin models: 1'600 mA (slow blow) 110 Vin models: 1'000 mA (slow blow) (The need of an external fuse has to be assessed in the final application.)
Input Filter	Internal Pi-Type

Output Specifications		
Output Voltage Adjustment	-10% to +20% (15 & 24 VDC models) ±10% (other models) (single output models only) (By external trim resistor) See application note: www.tracopower.com/overview/thn15wir Output power must not exceed rated power!	
Voltage Set Accuracy	±1% max.	
Regulation	- Input Variation (V _{min} - V _{max}) - Load Variation (0 - 100%) - Cross Regulation (25% / 100% asym. load)	single output models: 0.2% max. dual output models: 0.5% max. single output models: 0.2% max. dual output models: 1% max. (Output 1) 1% max. (Output 2) dual output models: 5% max.
Ripple and Noise (20 MHz Bandwidth)	- single output - dual output	3.3 V _{out} models: 75 mV_{p-p} typ. (w/ 10 µF, 6.3 V X7R) 5 V _{out} models: 75 mV_{p-p} typ. (w/ 10 µF, 6.3 V X7R) 12 V _{out} models: 100 mV_{p-p} typ. (w/ 1 µF, 25 V X7R) 15 V _{out} models: 100 mV_{p-p} typ. (w/ 1 µF, 25 V X7R) 24 V _{out} models: 125 mV_{p-p} typ. (w/ 2.2 µF, 50 V X7R) 5 / -5 V _{out} models: 75 / 75 mV_{p-p} typ. (w/ 10 µF, 6.3 V X7R) 12 / -12 V _{out} models: 100 / 100 mV_{p-p} typ. (w/ 1 µF, 25 V X7R) 15 / -15 V _{out} models: 100 / 100 mV_{p-p} typ. (w/ 1 µF, 25 V X7R) 24 / -24 V _{out} models: 125 / 125 mV_{p-p} typ. (w/ 2.2 µF, 50 V X7R)

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

Capacitive Load	- single output	3.3 Vout models: 5'200 µF max. 5 Vout models: 3'600 µF max. 12 Vout models: 600 µF max. 15 Vout models: 500 µF max. 24 Vout models: 200 µF max.
	- dual output	5 / -5 Vout models: 1'500 / 1'500 µF max. 12 / -12 Vout models: 360 / 360 µF max. 15 / -15 Vout models: 250 / 250 µF max. 24 / -24 Vout models: 100 / 100 µF max.
Minimum Load		Not required
Temperature Coefficient		±0.02 %/K max.
Hold-up Time		10 ms min. (acc. to EN 50155 Class S2, see application note for ext. capacitor calculation: www.tracopower.com/info/holdup_en50155.pdf)
Start-up Time		30 ms typ. / 40 ms max.
Short Circuit Protection		Continuous, Automatic recovery
Output Current Limitation		145 - 212% of Iout max. 170% typ. of Iout max.
Oversvoltage Protection		112 - 164% of Vout nom.
Transient Response	- Response Time	250 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
	- Railway Applications - Certification Documents	EN 50155 www.tracopower.com/overview/thn15wir
Pollution Degree		PD 2

EMC Specifications

EMI Emissions	- Conducted Emissions	EN 50121-3-2 (EMC for Rolling Stock) 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)
		External filter proposal: www.tracopower.com/overview/thn15wir
EMS Immunity	- Electrostatic Discharge	Air: EN 50121-3-2 (EMC for Rolling Stock) EN 61000-4-2, ±8 kV, perf. criteria A Contact: EN 61000-4-2, ±6 kV, perf. criteria A
	- RF Electromagnetic Field - EFT (Burst) / Surge	EN 61000-4-3, 20 V/m, perf. criteria A EN 61000-4-4, ±2 kV, perf. criteria A EN 61000-4-5, ±2 kV, perf. criteria A
		Ext. input component: 24 Vin models: 220 µF, 100 V TVS SMDJ58A 48 Vin models: 220 µF, 100 V 110 Vin models: 150 µF, 200 V TVS SMDJ300A
	- Conducted RF Disturbances - PF Magnetic Field	Continuous: EN 61000-4-6, 10 Vrms, perf. criteria A EN 61000-4-8, 100 A/m, perf. criteria A 1 s: EN 61000-4-8, 1000 A/m, perf. criteria A

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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)
		See application note: www.tracopower.com/overview/thn15wir
Cooling System		Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote (passive = on)	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
Altitude During Operation		5'000 m max.
Regulator Topology		Flyback Converter
Switching Frequency		245 kHz typ. (PWM) (±10%, 3.3 & 5 Vout model)
		300 kHz typ. (PWM) (±10%, other models)
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s	3'000 VDC
	- Input to Case, 60 s	1'600 VDC
	- Output to Case, 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	2'000 pF max.
Reliability	- Calculated MTBF	1'600'000 h (MIL-HDBK-217F, ground benign)
Washing Process		According to Cleaning Guideline
		www.tracopower.com/info/cleaning.pdf
Environment	- Vibration	MIL-STD-810F
		EN 61373
	- Mechanical Shock	MIL-STD-810F
		EN 61373
	- Thermal Shock	MIL-STD-810F
	- Flammability	EN 45545-2
		www.tracopower.com/info/en45545-declaration.pdf
Housing Material		Copper
Base Material		Non-conductive FR4 (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		Metal Case
Mounting Type		PCB Mount
Connection Type		THD (Through-Hole Device)
Footprint Type		1" x 1"
Soldering Profile		Lead-Free Wave Soldering
		260°C / 10 s max.
Weight		16.5 g
Thermal Impedance	- Case to Ambient	17 K/W typ. (without heatsink)
		12.9 K/W typ. (with heatsink THN-HS2)
		10.9 K/W typ. (with heatsink THN-HS3)
		9.3 K/W typ. (with heatsink THN-HS4)

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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

2c3c7a28-9e94-434a-8f6a-2b37ff9fb2ae

Supporting Documents

Overview Link (for additional Documents)

www.tracopower.com/overview/thn15wir

Outline Dimensions





Dimensions in mm (inch)
 Tolerances: ± 0.5 (± 0.02)
 Pin pitch tolerances ± 0.25 (± 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

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