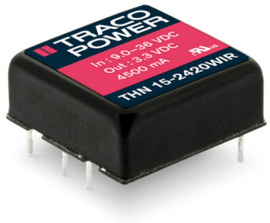
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TRACO POWER

DC/DC Railway Converter

THN 15WIR Series, 15 Watt

- **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**



UL 62368-1 IEC 62368-1

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
		Vnom	Imax	Vnom	Imax	typ.
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			88 %
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			88 %
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 %

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Options

THN-HS2	- Optional Heat Sink: www.tracopower.com/overview/thn-hs2
on demand (backorder with MOQ non stocking item)	- Optional Heat Sink: www.tracopower.com/overview/thn-hs3 - Optional Heat Sink: www.tracopower.com/overview/thn-hs4

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 mAp-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/thn15wir-adj/ Output power must not exceed rated power!
Voltage Set Accuracy			**±1% max.**
Regulation	- Input Variation (Vmin - Vmax)	single output models:	**0.2% max.**
		dual output models:	**0.5% max.**
	- Load Variation (0 - 100%)	single output models:	**0.2% max.**
		dual output models:	**1% max.** (Output 1)
			1% max. (Output 2)
	- Cross Regulation (25% / 100% asym. load)	dual output models:	**5% max.**
Ripple and Noise (20 MHz Bandwidth)	- single output	3.3 Vout models:	**75 mVp-p typ.** (w/ 10 µF, 6.3 V X7R)
		5 Vout models:	**75 mVp-p typ.** (w/ 10 µF, 6.3 V X7R)
		12 Vout models:	**100 mVp-p typ.** (w/ 1 µF, 25 V X7R)
		15 Vout models:	**100 mVp-p typ.** (w/ 1 µF, 25 V X7R)
		24 Vout models:	**125 mVp-p typ.** (w/ 2.2 µF, 50 V X7R)
	- dual output	5 / -5 Vout models:	**75 / 75 mVp-p typ.** (w/ 10 µF, 6.3 V X7R)
		12 / -12 Vout models:	**100 / 100 mVp-p typ.** (w/ 1 µF, 25 V X7R)
		15 / -15 Vout models:	**100 / 100 mVp-p typ.** (w/ 1 µF, 25 V X7R)
		24 / -24 Vout models:	**125 / 125 mVp-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.

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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.
Overvoltage 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	EN 50155
	- Certification Documents	www.tracopower.com/thn15wir-safety-cert/
Energy Source	- Output, acc. to 62368-1	ES1
Power Source	- Output, acc. to 62368-1	PS2
Pollution Degree		PD 2
Over Voltage Category		Not mains connected

EMC Specifications

EMI (Emissions)		EN 50121-3-2 (EMC for Rolling Stock)
	- 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)
	External filter proposal:	www.tracopower.com/thn15wir-emc-filter/

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

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EMS (Immunity)			EN 50121-3-2 (EMC for Rolling Stock)
	- Electrostatic Discharge	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
		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		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
EMC / Environmental	- Certification Documents		www.tracopower.com/thn15wir-emc-cert/

General Specifications

Relative Humidity			95% max. (non condensing)
Temperature Ranges	- Operating Temperature		–40°C to +90°C
			–40°C to +94°C (with heatsink THN-HS2)
			–40°C to +96°C (with heatsink THN-HS3)
			–40°C to +97°C (with heatsink THN-HS4)
	- Case Temperature		+105°C max.
	- Storage Temperature		–55°C to +125°C
Power Derating	- High Temperature		Depending on model
		See application note:	www.tracopower.com/thn15wir-cc/
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

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

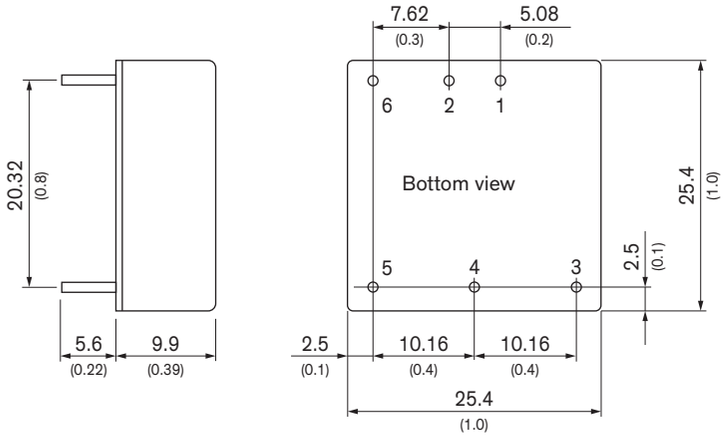
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Mounting Type		PCB Mount
Connection Type		THD (Through-Hole Device)
Footprint Type		1" x 1"
Soldering Profile		Lead-Free Wave Soldering 260°C / 10 s max.
Weight		16.5 g
Thermal Impedance	- Case to Ambient	17.0 K/W typ. 12.9 K/W typ. (with heatsink THN-HS2) 10.9 K/W typ. (with heatsink THN-HS3) 9.3 K/W typ. (with heatsink THN-HS4)
Environmental Compliance	- REACH Declaration	www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant
	- RoHS Declaration	www.tracopower.com/info/rohs-declaration.pdf 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	2c3c7a28-9e94-434a-8f6a-2b37ff9fb2ae

Additional Information

Supporting Documents	www.tracopower.com/overview/thn15wir
Frequently Asked Questions	www.tracopower.com/glossary-faq
Glossary	www.tracopower.com/info/glossary.pdf
Service Portal	www.tracoserviceportal.com

Outline Dimensions



Dimensions in mm (inch)
Tolerances: ±0.5 (±0.02)
Pin pitch tolerances ±0.25 (±0.01)
Pin diameter Ø 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

Avoid routing PCB traces under the converter.

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