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TRACO POWER

DC/DC Railway Converter

THN 30WIR Series, 30 Watt

- **Encapsulated in 1”x1” metal package**
- **EN 50155 and EN 61373 certified**
- **Wide 4:1 input voltage range: 9-36, 18-75, 36-160 VDC**
- **-40°C up to +65°C without derating**
- **Up to 92% efficiency**
- **Up to 3000 VDC I/O-isolation**
- **EN 45545-2 fire behavior**
- **Remote on/off and trim function**
- **Undervoltage lockout (UVLO), short-circuit protection (SCP), overvoltage protection (OVP) and overtemperature protection (OTP)**
- **3-year product warranty**



UL 62368-1 IEC 62368-1

The THN 30WIR is a series of DC/DC converters designed for highest reliability in harsh environments. With an output power of 30 Watts, this series expands our portfolio of EN 50155 railway certified wide input voltage range 1”x1" DC/DC converters. The THN 30WIR is shielded by a metal enclosure on all six sides for lowest susceptibility to electromagnetic interference. Its full encapsulation guarantees highest resistance to thermal shocks as well as mechanical shocks and vibration. Thanks to its power conversion efficiency of up to 92%, the THN 30WIR can operate at ambient temperatures between -40°C and +65°C without derating and without the need for additional cooling (depending on the model). The THN 30WIR is EN 61373 certified for mechanical shock and vibration and EN 45545-2 certified for fire behavior. It comes with IEC/-EN/UL 62368-1 safety approvals.

Models

Order Code	Input Voltage Range	Output 1		Output 2		Efficiency
		Vnom	Imax	Vnom	Imax	typ.
THN 30-2410WIR	9 - 36 VDC (24 VDC nom.)	3.3 VDC	7'000 mA			88 %
THN 30-2411WIR		5.1 VDC	6'000 mA			89 %
THN 30-2412WIR		12 VDC	2'500 mA			89 %
THN 30-2413WIR		15 VDC	2'000 mA			89 %
THN 30-2415WIR		24 VDC	1'250 mA			90 %
THN 30-2422WIR		+12 VDC	1'250 mA	−12 VDC	1'250 mA	89 %
THN 30-2423WIR		+15 VDC	1'000 mA	−15 VDC	1'000 mA	91 %
THN 30-2425WIR		+24 VDC	625 mA	−24 VDC	625 mA	91 %
THN 30-4810WIR	18 - 75 VDC (48 VDC nom.)	3.3 VDC	7'000 mA			88 %
THN 30-4811WIR		5.1 VDC	6'000 mA			90 %
THN 30-4812WIR		12 VDC	2'500 mA			90 %
THN 30-4813WIR		15 VDC	2'000 mA			91 %
THN 30-4815WIR		24 VDC	1'250 mA			92 %
THN 30-4822WIR		+12 VDC	1'250 mA	−12 VDC	1'250 mA	91 %
THN 30-4823WIR		+15 VDC	1'000 mA	−15 VDC	1'000 mA	91 %
THN 30-4825WIR		+24 VDC	625 mA	−24 VDC	625 mA	92 %
THN 30-7210WIR	36 - 160 VDC (110 VDC nom.)	3.3 VDC	7'000 mA			88 %
THN 30-7211WIR		5.1 VDC	6'000 mA			90 %
THN 30-7212WIR		12 VDC	2'500 mA			90 %
THN 30-7213WIR		15 VDC	2'000 mA			90 %
THN 30-7215WIR		24 VDC	1'250 mA			91 %
THN 30-7222WIR		+12 VDC	1'250 mA	−12 VDC	1'250 mA	90 %
THN 30-7223WIR		+15 VDC	1'000 mA	−15 VDC	1'000 mA	90 %
THN 30-7225WIR		+24 VDC	625 mA	−24 VDC	625 mA	91 %

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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 - Optional model with 5 VDC / 6'000 mA Output and 9 - 36 VDC Input - Optional model with 54 VDC / 556 mA Output and 9 - 36 VDC Input - Optional model with 5 VDC / 6'000 mA Output and 18 - 75 VDC Input - Optional model with 54 VDC / 556 mA Output and 18 - 75 VDC Input - Optional model with 5 VDC / 6'000 mA Output and 36 - 160 VDC Input - Optional model with 54 VDC / 556 mA Output and 36 - 160 VDC Input

Input Specifications

Input Current	- At no load	110 Vin models:	**7 mA typ.**
		24 Vin models:	**10 mA typ.** (3.3 Vout model)
			10 mA typ. (5 Vout model)
			10 mA typ. (5.1 Vout model)
			10 mA typ. (12 Vout model)
			10 mA typ. (15 Vout model)
			10 mA typ. (24 Vout model)
			14 mA typ. (54 Vout model)
			10 mA typ. (12 / -12 Vout model)
			10 mA typ. (15 / -15 Vout model)
			12 mA typ. (24 / -24 Vout model)
		48 Vin models:	**10 mA typ.** (3.3 Vout model)
			10 mA typ. (5 Vout model)
			10 mA typ. (5.1 Vout model)
			8 mA typ. (12 Vout model)
			8 mA typ. (15 Vout model)
			8 mA typ. (24 Vout model)
			12 mA typ. (54 Vout model)
			8 mA typ. (12 / -12 Vout model)
			8 mA typ. (15 / -15 Vout model)
			7 mA typ. (24 / -24 Vout model)
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.**
Recommended Input Fuse		24 Vin models:	**6'000 mA** (slow blow)
		48 Vin models:	**3'000 mA** (slow blow)
		110 Vin models:	**1'500 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 Vout models) **-20 to +6%** (54 Vout models) **±10%** (other single models) (By external trim resistor)
	See application note:	www.tracopower.com/overview/thn30wir Output power must not exceed rated power!
Voltage Set Accuracy		**±1% max.**

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

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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)
	- Voltage Balance (symmetrical load)	dual output models:	2% max.
	- 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/ 22 µF)
		5 Vout models:	75 mVp-p typ. (w/ 22 µF)
		5.1 Vout models:	75 mVp-p typ. (w/ 22 µF)
		12 Vout models:	100 mVp-p typ. (w/ 22 µF || 22 µF)
		15 Vout models:	100 mVp-p typ. (w/ 22 µF || 22 µF)
		24 Vout models:	100 mVp-p typ. (w/ 6.8 µF || 6.8 µF)
		54 Vout models:	125 mVp-p typ. (w/ 2.2 µF || 2.2 µF)
	- dual output	12 / -12 Vout models:	100 / 100 mVp-p typ. (w/ 10 µF)
		15 / -15 Vout models:	100 / 100 mVp-p typ. (w/ 10 µF)
		24 / -24 Vout models:	100 / 100 mVp-p typ. (w/ 4.7 µF)
Capacitive Load	- single output	3.3 Vout models:	10'000 µF max.
		5 Vout models:	7'200 µF max.
		5.1 Vout models:	7'200 µF max.
		12 Vout models:	1'200 µF max.
		15 Vout models:	1'000 µF max.
		24 Vout models:	375 µF max.
		54 Vout models:	75 µF max.
	- dual output	12 / -12 Vout models:	750 / 750 µF max.
		15 / -15 Vout models:	500 / 500 µF max.
		24 / -24 Vout models:	180 / 180 µF max.
Minimum Load			Not required
Temperature Coefficient			±0.02 %/K max.
Hold-up Time			200 µs min.
Start-up Time			30 ms typ. / 40 ms max.
Short Circuit Protection			Continuous, Automatic recovery
Output Current Limitation			210% max. of Iout max. 170% typ. of Iout max.
Overvoltage Protection			(depending on model) 3.7 VDC typ. / 5.4 VDC max. (3.3 Vo models) 6.3 VDC typ. / 7.4 VDC max. (5 Vo models) 6.3 VDC typ. / 7.4 VDC max. (5.1 Vo models) 13.5 VDC typ. / 19.6 VDC max. (12 Vo models) 18.3 VDC typ. / 22.0 VDC max. (15 Vo models) 29.1 VDC typ. / 32.5 VDC max. (24 Vo models) 58.5 VDC typ. / 65.5 VDC max. (54 Vo models) 13.5 VDC typ. / 19.6 VDC max. (±12 Vo models) 18.3 VDC typ. / 22.0 VDC max. (±15 Vo models) 29.1 VDC typ. / 32.5 VDC max. (±24 Vo models)
Transient Response	- Response Time		250 µs typ. (25% Load Step)

Safety Specifications

Safety Standards	- IT / Multimedia Equipment	EN 62368-1 IEC 62368-1 UL 62368-1
	- Railway Applications	EN 50155
	- Certification Documents	www.tracopower.com/overview/thn30wir

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Pollution Degree		PD 2
Over Voltage Category		OVC II

EMC Specifications

EMI Emissions		EN 50121-3-2 (EMC for Rolling Stock)
	- Conducted Emissions	EN 55032 class A (with external filter) EN 55032 class B (with external filter)
	- Radiated Emissions	EN 55032 class A (with external filter) EN 55032 class B (with external filter)
	External filter proposal:	www.tracopower.com/overview/thn30wir
EMS Immunity		EN 50155 (Railway Applications) EN 50121-3-2 (EMC for Rolling Stock) EN 55024 (IT Equipment) EN 55035 (Multimedia)
	- Electrostatic Discharge — Air:	EN 61000-4-2, ±8 kV, perf. criteria A
	- Electrostatic Discharge — 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 / 54 Vout model: 470 µF / 50 V + TVS diode SMBJ58A 24 & 48 Vin models: 220 µF / 110 V, KY series 110 Vin models: 150 µF / 200 V ‖ 150 µF / 200 V, KXJ series + TVS diode SMBJ220A
	- 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
	- PF Magnetic Field — 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 +80°C –40°C to +85°C (with Heat Sink)
	- 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/overview/thn30wir
Over Temperature Protection Switch Off	- Protection Mode	115°C typ. (Automatic recovery)
	- Measurement Point	Case
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
Altitude During Operation		5'000 m max.
Switching Frequency		210 - 370 kHz (PWM) (depending on model) 230 kHz min. / 270 kHz typ. / 310 kHz max. (24 & 48 Vin, 3.3 & 5 & 5.1 Vout models) 290 kHz min. / 330 kHz typ. / 370 kHz max. (24 & 48 Vin, other models) 210 kHz min. / 240 kHz typ. / 270 kHz max. (110 Vin, 3.3 & 5 & 5.1 Vout models) 270 kHz min. / 300 kHz typ. / 330 kHz max. (110 Vin, other models)
Insulation System		Functional Insulation

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Isolation Test Voltage	- Input to Output, 60 s	2'250 VDC (24 & 48 Vin models) 3'000 VDC (110 Vin models)
	- Input to Case, 60 s	1'600 VDC (24 & 48 Vin models) 2'250 VDC (110 Vin models)
	- Output to Case, 60 s	1'600 VDC (24 & 48 Vin models) 2'250 VDC (110 Vin models)
Creepage	- Input to Output	1.5 mm min.
Clearance	- Input to Output	1.5 mm min.
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	1'259'000 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 7.6 g, 3 axis, 60 min, 20-2000 Hz
	- Mechanical Shock	MIL-STD-810F EN 61373 50 g, 3 axis, 11 ms
	- Thermal Shock	MIL-STD-810F -55°C to +125°C, 72 cycles, 30 min each EN 50155
Housing Material		Copper
Base Material		Non-conductive FR4 (UL 94 V-0 rated)
Isolation Frame Material		Non-conductive Plastic (UL 94 V-0 rated)
Potting Material		Silicone (UL 94 V-0 rated)
Pin Material		Tinned 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		Wave Soldering 260°C / 6 s max.
Weight		18 g
Thermal Impedance	- Case to Ambient	15 K/W typ. (without heatsink) 11.1 K/W typ. (with heatsink THN-HS2) 9.6 K/W typ. (with heatsink THN-HS3) 8.2 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: 7a, 7c-I (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule). The SCIP number is provided on request.)
	- Flammability (EN 45545-2)	www.tracopower.com/info/en45545-declaration.pdf

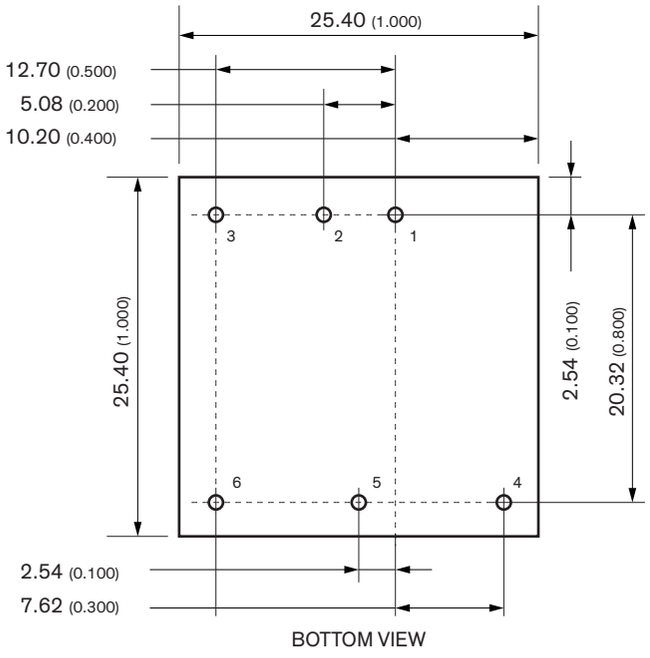
Supporting Documents

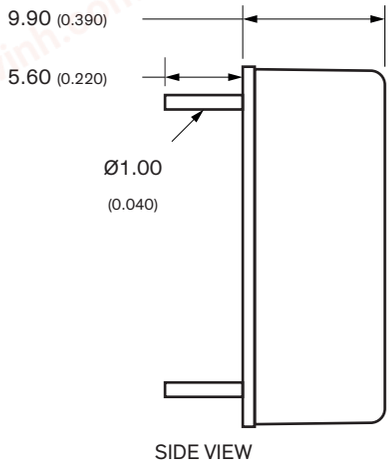
Overview Link (for additional Documents)	www.tracopower.com/overview/thn30wir

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Outline Dimensions





All dimensions in mm (inch)
Tolerance: X.X ±0.5 (X.XX ±0.02)
X.XX ±.025 (X.XXX ±0.010)
Pin dimension tolerance: ±0.10 (±0.004)

Pinout		
Pin	**Single**	**Dual**
1	+Vin	+Vin
2	–Vin	–Vin
3	Remote On/Off	Remote On/Off
4	+Vout	+Vout
5	Trim	Common
6	–Vout	–Vout

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