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TRACO POWER

DC/DC Converter

THR 10WI Series, 10 Watt

- **Reinforced I/O-isolation 3000 VAC**
- **Shock and vibration resistance according to EN 61373**
- **Wide 4:1 input voltage range: 9-36, 18-75, 40-160 VDC**
- **Operating temperature range -40 to +90°C**
- **Internal EN 55032 class A filter**
- **High efficiency up to 89%**
- **Protection against overload, overvoltage and short circuit**
- **3-year product warranty**



UL 62368-1 IEC 62368-1

The THR 10WI is 10 Watt DC/DC converters series with reinforced isolation (3000 VAC). These regulated DC/DC converters come in either a 2"x1" package and also feature increased resistance against shock and vibration according to EN 61373. The THR 3WI offers an internal input filter to comply with EN 55032 class A. High efficiencies up to 89% allow safe operation from –40°C to +90°C (with derating). All models have a wide 4:1 input voltage range and precisely regulated, isolated output voltages. With the latest IT safety certifications (IEC/EN/UL 62368-1) the THR 10WI series is the perfect choice for many demanding applications in the industrial, transportation and instrumentation sectors.

Models

Order Code	Input Voltage Range	Output 1		Output 2		Efficiency
		Vnom	Imax	Vnom	Imax	typ.
THR 10-2411WI	9 - 36 VDC (24 VDC nom.)	5 VDC	2'000 mA			84 %
THR 10-2412WI		12 VDC	835 mA			86 %
THR 10-2413WI		15 VDC	670 mA			87 %
THR 10-2415WI		24 VDC	417 mA			88 %
THR 10-2422WI		+12 VDC	417 mA	–12 VDC	417 mA	86 %
THR 10-2423WI		+15 VDC	335 mA	–15 VDC	335 mA	87 %
THR 10-4811WI	18 - 75 VDC (48 VDC nom.)	5 VDC	2'000 mA			85 %
THR 10-4812WI		12 VDC	835 mA			87 %
THR 10-4813WI		15 VDC	670 mA			87 %
THR 10-4815WI		24 VDC	417 mA			86 %
THR 10-4822WI		+12 VDC	417 mA	–12 VDC	417 mA	89 %
THR 10-4823WI		+15 VDC	335 mA	–15 VDC	335 mA	88 %
THR 10-7211WI	40 - 160 VDC (110 VDC nom.)	5 VDC	2'000 mA			82 %
THR 10-7212WI		12 VDC	835 mA			85 %
THR 10-7213WI		15 VDC	670 mA			85 %
THR 10-7215WI		24 VDC	417 mA			85 %
THR 10-7222WI		+12 VDC	417 mA	–12 VDC	417 mA	86 %
THR 10-7223WI		+15 VDC	335 mA	–15 VDC	335 mA	86 %

Options

THR-HS1	- Optional Heat Sink with Height = 0.25": www.tracopower.com/products/thr-hs1.pdf
on demand (backorder with MOQ non stocking item)	- Optional Heat Sink with Height = 0.5": www.tracopower.com/products/thr-hs2.pdf - Optional Heat Sink with Height = 1.0": www.tracopower.com/products/thr-hs3.pdf - Optional models with alternative pinning - Optional models with pre-assembled heatsink

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Input Specifications

Input Current	- At no load	24 Vin models:	25 mA typ.
		48 Vin models:	15 mA typ.
		110 Vin models:	10 mA typ.
	- At full load	24 Vin models:	484 mA typ.
		48 Vin models:	240 mA typ.
		110 Vin models:	107 mA typ.
Surge Voltage		24 Vin models:	50 VDC max. (100 ms max.)
		48 Vin models:	100 VDC max. (100 ms max.)
		110 Vin models:	170 VDC max. (100 ms max.)
Under Voltage Lockout		24 Vin models:	7.5 VDC typ.
		48 Vin models:	16 VDC typ.
		110 Vin models:	37 VDC typ.
Recommended Input Fuse		24 Vin models:	2'500 mA (slow blow)
		48 Vin models:	1'250 mA (slow blow)
		110 Vin models:	625 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% (single output models only)
			(By external trim resistor)
		See application note:	www.tracopower.com/overview/thr10wi
			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:	0.2% max.
	- Load Variation (0 - 100%)	single output models:	0.5% max.
		dual output models:	1% max. (Output 1)
			1% max. (Output 2)
	- Voltage Balance (symmetrical load)	dual output models:	2% max.
Ripple and Noise (20 MHz Bandwidth)	- single output	5 Vout models:	50 mVp-p typ. (w/ 10 µF, 25 V MLCC)
		12 Vout models:	100 mVp-p typ. (w/ 10 µF, 25 V MLCC)
		15 Vout models:	100 mVp-p typ. (w/ 10 µF, 25 V MLCC)
		24 Vout models:	150 mVp-p typ. (w/ 4.7 µF, 50 V MLCC)
	- dual output	12 / -12 Vout models:	100 / 100 mVp-p typ. (w/ 10 µF, 25 V MLCC)
		15 / -15 Vout models:	100 / 100 mVp-p typ. (w/ 10 µF, 25 V MLCC)
Capacitive Load	- single output	5 Vout models:	2'200 µF max.
		12 Vout models:	330 µF max.
		15 Vout models:	220 µF max.
		24 Vout models:	100 µF max.
	- dual output	12 / -12 Vout models:	150 / 150 µF max.
		15 / -15 Vout models:	100 / 100 µF max.
Minimum Load			Not required
Temperature Coefficient			±0.02 %/K max.
Start-up Time			30 ms typ. / 50 ms max.
Short Circuit Protection			Continuous, Automatic recovery
Output Current Limitation			150% typ. of Iout max.
Overvoltage Protection			125% typ. of Vout nom.
Transient Response	- Response Deviation		3% typ. / 5% max. (75% to 100% Load Step)
	- Response Time		300 µs max. (75% to 100% Load Step)

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

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Safety Specifications

Safety Standards	- IT / Multimedia Equipment	EN 62368-1 IEC 62368-1 UL 62368-1
	- Certification Documents	www.tracopower.com/overview/thr10wi
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)
			FCC Part 15 class A (internal filter)
			FCC Part 15 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)
			FCC Part 15 class A (with external filter)
			FCC Part 15 class B (with external filter)
		External filter proposal:	www.tracopower.com/overview/thr10wi
EMS Immunity			EN 55024 (IT Equipment)
			EN 55035 (Multimedia)
	- 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, 10 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: 390 µF chemi-con KY
			48 Vin models: 330 µF chemi-con KY
			110 Vin models: 220 µF chemi-con KXG
	- 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

General Specifications

Relative Humidity			95% max. (non condensing)
Temperature Ranges	- Operating Temperature		–40°C to +90°C
			–40°C to +95°C (with Heat Sink)
	- Case Temperature		+105°C max.
	- Storage Temperature		–50°C to +125°C
Power Derating	- High Temperature		Depending on model
		See application note:	www.tracopower.com/overview/thr10wi
Cooling System			Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote		On: 3.5 to 12 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 0.5 mA
Switching Frequency			260 - 310 kHz (PWM)
Insulation System			Reinforced Insulation
Working Voltage (rated)			250 VAC
Isolation Test Voltage	- Input to Output, 60 s		3'000 VAC
	- Input to Case, 60 s		1'500 VAC
	- Output to Case, 60 s		1'500 VAC
Isolation Resistance	- Input to Output, 500 VDC		1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V		1'500 pF typ.

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Reliability	- Calculated MTBF	2'850'000 h (MIL-HDBK-217F, ground benign)
Washing Process		According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf
Environment	- Vibration	EN 61373
	- Mechanical Shock	EN 61373
Housing Material		Red Copper, Powder Coating
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		Copper Alloy (C6801)
Pin Foundation Plating		Nickel (2 - 4 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		2" x 1"
Soldering Profile		Wave Soldering 260°C / 10 s max.
Weight		40.5 g
Thermal Impedance	- Case to Ambient	12.1 K/W typ. (without Heatsink) 9.2 K/W typ. (with Heatsink THR-HS1) 8.5 K/W typ. (with Heatsink THR-HS2) 7.8 K/W typ. (with Heatsink THR-HS3)
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 (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.)

Supporting Documents

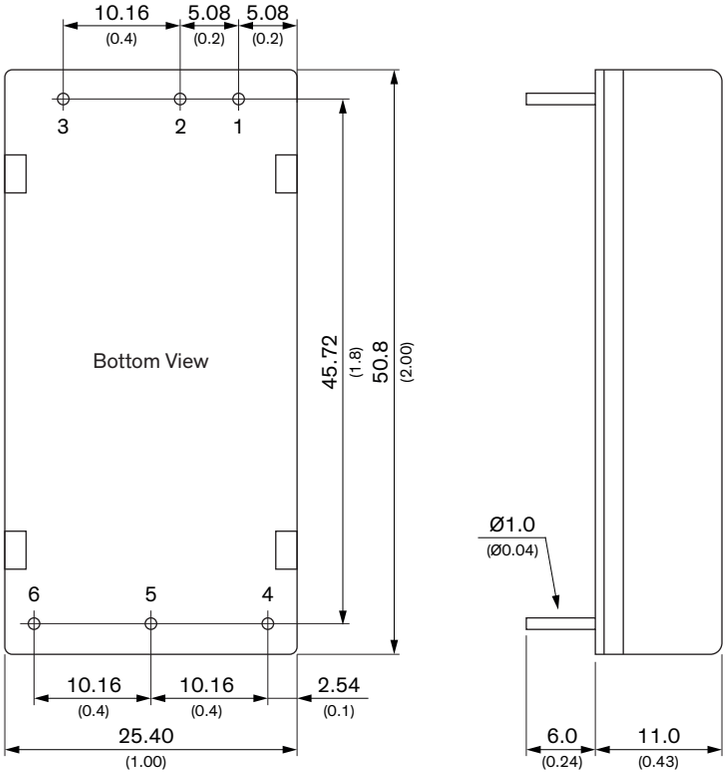
Overview Link (for additional Documents)	www.tracopower.com/overview/thr10wi

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Outline Dimensions

Standard version



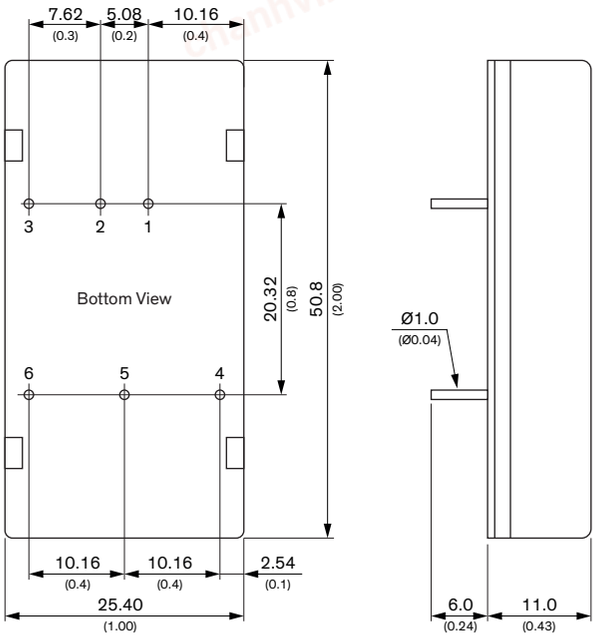
Dimensions in mm (inch)
Tolerances: x.x ±0.75 (±0.03)
x.xx ±0.25 (±0.01)
Pin diameter ±0.05 (±0.002)

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

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

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Alternative Pinning version



Dimensions in mm (inch)
Tolerances: x.x ±0.75 (±0.03)
x.xx ±0.25 (±0.01)
Pin diameter ±0.05 (±0.002)

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

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