TRACO POWER

DC/DC Converter

THR 40WI Series, 40 Watt

- **Reinforced I/O-isolation 3000 VAC**
- **Shock and vibration resistance according to EN 61373**
- **Wide 4:1 input voltage range: 36-160 VDC**
- **Operating temperature range -40 to +80°C**
- **High efficiency up to 90%**
- **Protection against overload, overvoltage and short circuit**
- **3-year product warranty**

UL 62368-1 IEC 62368-1

The THR 40WI is 40 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. High efficiencies up to 90% allow safe operation from –40°C to +70°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 40WI 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 40-7211WI	36 - 160 VDC (110 VDC nom.)	5 VDC	8'000 mA			88 %
THR 40-7212WI		12 VDC	3'330 mA			89 %
THR 40-7213WI		15 VDC	2'670 mA			89 %
THR 40-7215WI		24 VDC	1'670 mA			89 %
THR 40-72154WI		54 VDC	741 mA			90 %
THR 40-7222WI		+12 VDC	1'670 mA	–12 VDC	1'670 mA	89 %
THR 40-7223WI		+15 VDC	1'330 mA	–15 VDC	1'330 mA	89 %

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 pre-assembled heatsink

Input Specifications

Input Current	- At no load		40 mA typ.
	- At full load		409 mA typ.
Surge Voltage			170 VDC max. (100 ms max.)
Under Voltage Lockout			30 VDC min. / 33 VDC typ. / 35.5 VDC max.
Recommended Input Fuse			2'500 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			−15% to +5% (54 Vout model) ±10% (other single output models) (By external trim resistor) See application note: www.tracopower.com/overview/thr40wi 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:	75 mVp-p typ. (w/ 1 µF, 100 V MLCC)
		12 Vout models:	125 mVp-p typ. (w/ 1 µF, 100 V MLCC)
		15 Vout models:	125 mVp-p typ. (w/ 1 µF, 100 V MLCC)
		24 Vout models:	150 mVp-p typ. (w/ 1 µF, 100 V MLCC)
		54 Vout models:	250 mVp-p typ. (w/ 1 µF, 100 V MLCC)
	- dual output	12 / -12 Vout models:	125 / 125 mVp-p typ. (w/ 1 µF, 100 V MLCC)
		15 / -15 Vout models:	125 / 125 mVp-p typ. (w/ 1 µF, 100 V MLCC)
	- single output	5 Vout models:	85 mVp-p max. (w/ 1 µF, 100 V MLCC)
		12 Vout models:	140 mVp-p max. (w/ 1 µF, 100 V MLCC)
		15 Vout models:	140 mVp-p max. (w/ 1 µF, 100 V MLCC)
		24 Vout models:	170 mVp-p max. (w/ 1 µF, 100 V MLCC)
		54 Vout models:	280 mVp-p max. (w/ 1 µF, 100 V MLCC)
	- dual output	12 / -12 Vout models:	140 / 140 mVp-p max. (w/ 1 µF, 100 V MLCC)
		15 / -15 Vout models:	140 / 140 mVp-p max. (w/ 1 µF, 100 V MLCC)
Capacitive Load	- single output	5 Vout models:	13'600 µF max.
		12 Vout models:	2'400 µF max.
		15 Vout models:	1'500 µF max.
		24 Vout models:	600 µF max.
		54 Vout models:	130 µF max.
	- dual output	12 / -12 Vout models:	1'200 / 1'200 µF max.
		15 / -15 Vout models:	750 / 750 µF max.
Minimum Load			Not required
Temperature Coefficient			±0.02 %/K max.
Start-up Time			30 ms typ. / 100 ms max.
Short Circuit Protection			Continuous, Automatic recovery
Output Current Limitation			110 - 185% of Iout max. 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		250 µs typ. (75% to 100% Load Step)

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

Safety Specifications

Safety Standards	- IT / Multimedia Equipment		EN 62368-1 IEC 62368-1 UL 62368-1
	- Certification Documents		www.tracopower.com/overview/thr40wi
Pollution Degree			PD 2

EMC Specifications

EMI Emissions	- Conducted Emissions		EN 55032 class A (with external filter) EN 55032 class B (with external filter) FCC Part 15 class A (with external filter)
	- Radiated Emissions		EN 55032 class A (with external filter) EN 55032 class B (with external filter) FCC Part 15 class A (with external filter)
		External filter proposal:	www.tracopower.com/overview/thr40wi
EMS Immunity			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, 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
		External filter proposal:	www.tracopower.com/overview/thr40wi
	- 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 +70°C −40°C to +80°C (with Heat Sink)
	- Case Temperature		+105°C max.
	- Storage Temperature		−50°C to +125°C
Power Derating	- High Temperature		Depending on model Depending on model (with Heat Sink)
		See application note:	www.tracopower.com/overview/thr40wi
Over Temperature Protection Switch Off	- Protection Mode		115°C typ. (Automatic recovery at 100°C typ.)
	- Measurement Point		Case
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
Altitude During Operation			4'000 m max.
Switching Frequency			220 - 310 kHz (PWM) 265 kHz typ. (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.
Reliability	- Calculated MTBF		900'000 h (MIL-HDBK-217F, ground benign)

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Washing Process		Allowed (hermetical product)
	See Cleaning Guideline:	www.tracopower.com/info/cleaning.pdf
Environment	- Vibration	EN 61373
	- Mechanical Shock	EN 61373
Housing Material		Plastic base-plate w. metal case
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		51.5 g
Thermal Impedance	- Case to Ambient	12 K/W typ. (without Heatsink) 10.9 K/W typ. (with Heatsink THR-HS1) 9.3 K/W typ. (with Heatsink THR-HS2) 8.9 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/thr40wi

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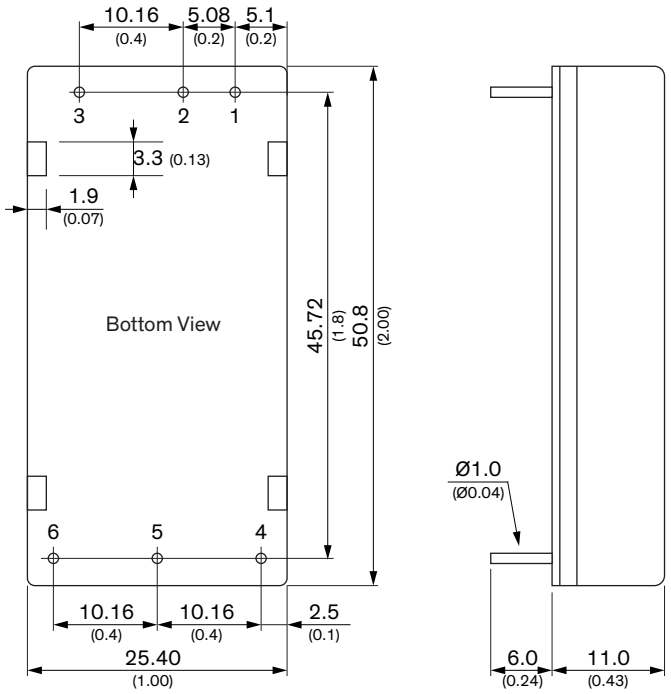
Outline Dimensions



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