

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



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 typ.
		Vnom	I _{max}	Vnom	I _{max}	
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/overview/thr-hs1
on demand (backorder with MOQ non stocking item)	- Optional Heat Sink with Height = 0.5": www.tracopower.com/overview/thr-hs2
	- Optional Heat Sink with Height = 1.0": www.tracopower.com/overview/thr-hs3
	- 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 models)
		(single output models only)
		(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)
	- Voltage Balance (symmetrical load)	1% max. (Output 2)
		dual output models: 2% max.
Ripple and Noise (20 MHz Bandwidth)	- 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)
	- 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)
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

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 47 Part 15 class A (with external filter)
	- Radiated Emissions	EN 55032 class A (with external filter) EN 55032 class B (with external filter) FCC 47 Part 15 class A (with external filter)
	External filter proposal:	www.tracopower.com/overview/thr40wi
EMS (Immunity)	- Electrostatic Discharge	EN 55035 (Multimedia) 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
EMC / Environmental	- Certification Documents	www.tracopower.com/overview/thr40wi

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
	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 (passive = on)	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.
Regulator Topology		Flyback Converter
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 M Ω 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)

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

Washing Process		According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf
Environment	- Vibration - Mechanical Shock	EN 61373 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		Lead-Free 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 - RoHS Declaration - SCIP Reference Number	www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant 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).) fda9a647-5082-4f8d-8a9d-c1c4a64790fb

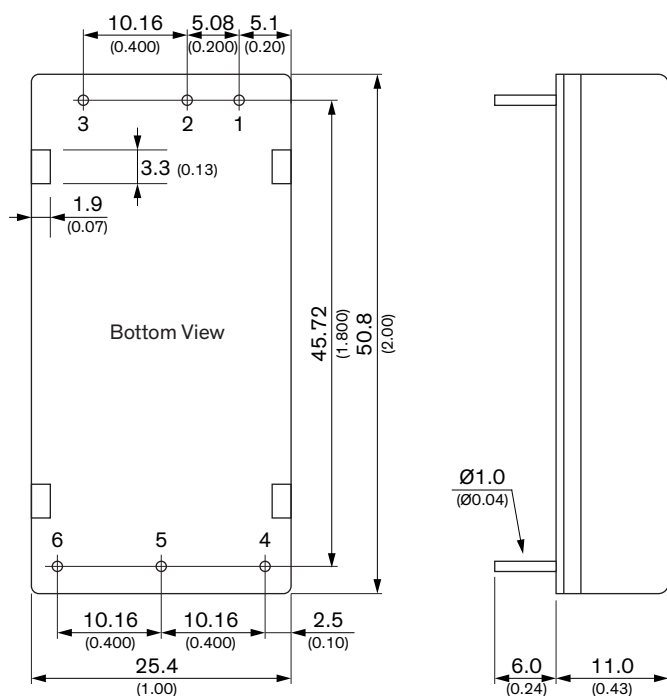
Supporting Documents

Overview Link (for additional Documents)

www.tracopower.com/overview/thr40wi

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Outline Dimensions



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

Dimensions in mm (inch)

Tolerances: x.x ± 0.75 (x.xx ± 0.03)

x.xx ± 0.25 (x.xxx ± 0.01)

Pin diameter tolerance: ± 0.05 (± 0.002)