

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	
on demand (backorder with MOQ non stocking item)	- Optional models with 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		(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.
	- 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)
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: 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.
	- dual output	12 / -12 Vout models: 1'200 / 1'200 µF max. 15 / -15 Vout models: 750 / 750 µF max.
Capacitive Load		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.
Minimum Load		Not required
Temperature Coefficient		±0.02 %/K max.
Start-up Time		30 ms typ.
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

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	- 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

General Specifications

Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature - Case Temperature - Storage Temperature	-40°C to +70°C +105°C max. -50°C to +125°C
Power Derating	- High Temperature	See application note: www.tracopower.com/overview/thr40wi
Cooling System		Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote - Off Idle Input Current - Remote Pin Input Current	On: 3.5 to 12 VDC or open circuit Off: 0 to 1.2 VDC or short circuit Refers to 'Remote' and '-Vin' Pin 2.5 mA typ. -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 - Input to Case, 60 s - Output to Case, 60 s	3'000 VAC 1'500 VAC 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)
Washing Process		Allowed (hermetical product)
	See 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)

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

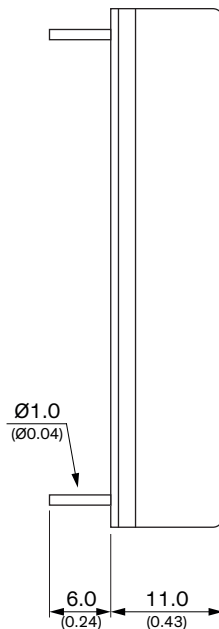
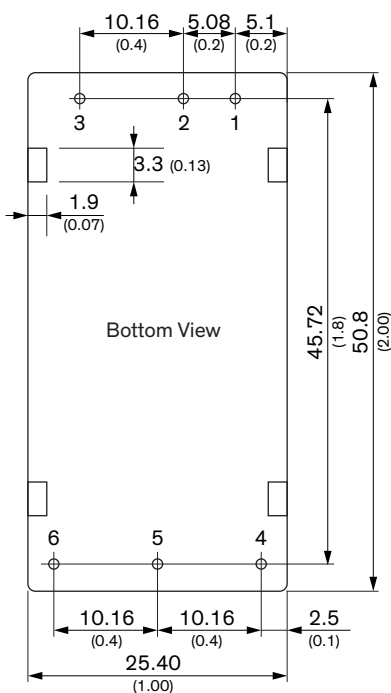
Potting Material	Silicone (UL 94 V-0 rated)
Pin Material	Copper Alloy (C6801)
Pin Foundation Plating	Nickel (2 - 4 μm)
Pin Surface Plating	Tin (3 - 5 μm), matte
Housing Type	Metal Case
Mounting Type	PCB Mount
Connection Type	THD (Through-Hole Device)
Footprint Type	2" x 1"
Soldering Profile	260°C / 10 s max.
Weight	51.5 g
Thermal Impedance	7.5 K/W
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

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 (± 0.03)
x.xx ± 0.25 (± 0.01)
Pin diameter ± 0.05 (± 0.002)