

- 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 +85°C
- Internal EN 55032 class A filter
- High efficiency up to 88%
- Protection against overload, overvoltage and short circuit
- 3-year product warranty



The THR 20WI is 20 Watt DC/DC converters series with reinforced isolation (3-000 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 20WI offers an internal input filter to comply with EN 550-32 class A. High efficiencies up to 88% allow safe operation from -40°C to +80°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 20WI 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 20-2411WI | 9 - 36 VDC (24 VDC nom.) | 5 VDC | 4'000 mA | | | 87 % |
| THR 20-2412WI | | 12 VDC | 1'670 mA | | | 87 % |
| THR 20-2413WI | | 15 VDC | 1'330 mA | | | 87 % |
| THR 20-2415WI | | 24 VDC | 833 mA | | | 87 % |
| THR 20-2422WI | | +12 VDC | 833 mA | -12 VDC | 833 mA | 86 % |
| THR 20-2423WI | | +15 VDC | 667 mA | -15 VDC | 667 mA | 86 % |
| THR 20-4811WI | 18 - 75 VDC (48 VDC nom.) | 5 VDC | 4'000 mA | | | 87 % |
| THR 20-4812WI | | 12 VDC | 1'670 mA | | | 88 % |
| THR 20-4813WI | | 15 VDC | 1'330 mA | | | 88 % |
| THR 20-4815WI | | 24 VDC | 833 mA | | | 88 % |
| THR 20-4822WI | | +12 VDC | 833 mA | -12 VDC | 833 mA | 87 % |
| THR 20-4823WI | | +15 VDC | 667 mA | -15 VDC | 667 mA | 87 % |
| THR 20-7211WI | 40 - 160 VDC (110 VDC nom.) | 5 VDC | 4'000 mA | | | 84 % |
| THR 20-7212WI | | 12 VDC | 1'670 mA | | | 86 % |
| THR 20-7213WI | | 15 VDC | 1'330 mA | | | 86 % |
| THR 20-7215WI | | 24 VDC | 833 mA | | | 86 % |
| THR 20-7222WI | | +12 VDC | 833 mA | -12 VDC | 833 mA | 86 % |
| THR 20-7223WI | | +15 VDC | 667 mA | -15 VDC | 667 mA | 86 % |

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 alternative pinning - Optional models with pre-assembled heatsink |

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: 961 mA typ. 48 Vin models: 476 mA typ. 110 Vin models: 212 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: 5'000 mA (slow blow) 48 Vin models: 2'500 mA (slow blow) 110 Vin models: 1'250 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/thr20wi 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: 6'800 µF max. 12 Vout models: 1'200 µF max. 15 Vout models: 750 µF max. 24 Vout models: 300 µF max. |
| | - dual output | 12 / -12 Vout models: 600 / 600 µF max. 15 / -15 Vout models: 380 / 380 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. |
| Oversoltage 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.

Safety Specifications

| | | |
|------------------|-----------------------------|--|
| Standards | - IT / Multimedia Equipment | EN 62368-1 IEC 62368-1 UL 62368-1 |
| | - Certification Documents | www.tracopower.com/overview/thr20wi |
| Pollution Degree | | PD 2 |

EMC Specifications

| | | |
|---------------------|--|--|
| EMI (Emissions) | - Conducted Emissions | EN 55011 class A (internal filter) EN 55032 class A (internal filter) FCC 47 Part 15 class A (internal filter) |
| | - Radiated Emissions | EN 55011 class A (with external filter) EN 55032 class A (with external filter) FCC 47 Part 15 class A (with external filter) |
| | External filter proposal: | www.tracopower.com/overview/thr20wi |
| 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 |
| | - Conducted RF Disturbances - PF Magnetic Field | Ext. input component: 24 Vin models: 390 μ F chemi-con KY 48 Vin models: 330 μ F chemi-con KY 110 Vin models: 390 μ F chemi-con KXJ EN 61000-4-6, 10 Vrms, perf. criteria A 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/thr20wi |

General Specifications

| | | |
|--|--|--|
| Relative Humidity | | 95% max. (non condensing) |
| Temperature Ranges | - Operating Temperature | -40°C to +80°C -40°C to +90°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/thr20wi |
| Over Temperature Protection Switch Off | - Protection Mode - Measurement Point | 115°C typ. (Automatic recovery at 100°C typ.) 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 |
| Regulator Topology | | Flyback Converter |
| Switching Frequency | | 260 - 310 kHz (PWM) 280 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. |

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

| | | |
|--------------------------|-----------------------------------|--|
| Reliability | - Calculated MTBF | 665'000 h (MIL-HDBK-217F, ground benign) |
| Washing Process | | According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf |
| Environment | - Vibration - Mechanical Shock | EN 61373 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 | | Lead-Free 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).) |
| | - SCIP Reference Number | 2af2841c-3288-4e4f-8a7c-759da8c670cf |

Supporting Documents

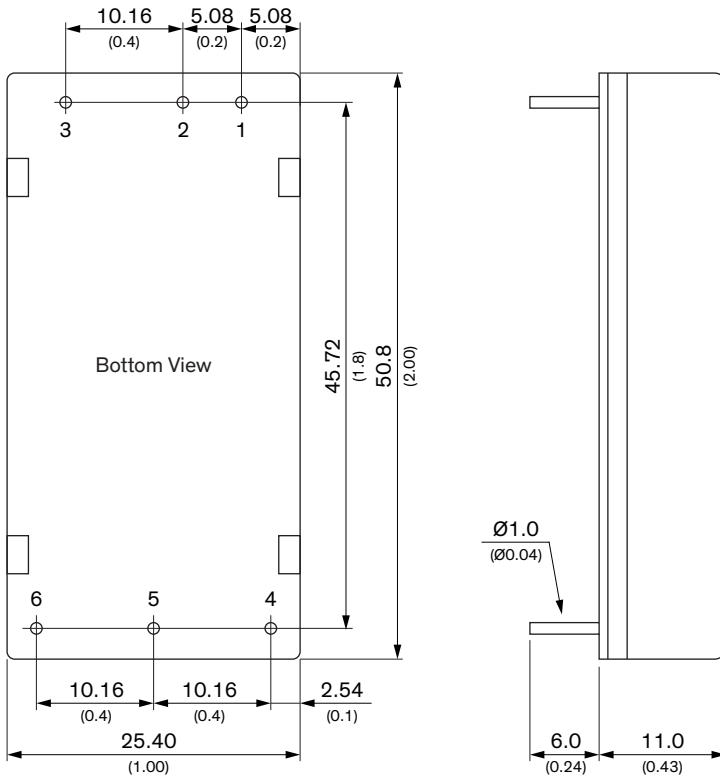
Overview Link (for additional Documents)

www.tracopower.com/overview/thr20wi

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

Outline Dimensions

Standard version

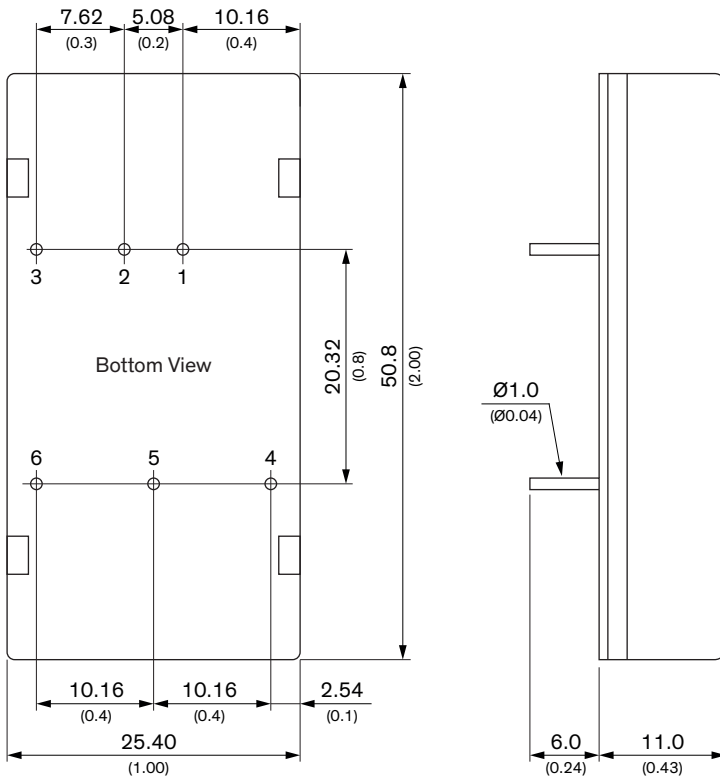


| Pinout | | |
|--------|---------------|---------------|
| Pin | Single | Dual |
| 1 | +Vin (Vcc) | +Vin (Vcc) |
| 2 | -Vin (GND) | -Vin (GND) |
| 3 | Remote On/Off | Remote On/Off |
| 4 | +Vout | +Vout |
| 5 | -Vout | Common |
| 6 | Trim | -Vout |

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

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

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 |