chanhvinh.com

# TRACO POWER

## DC/DC Converter

## THR 20WI Series, 20 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 +85°C**
- **Internal EN 55032 class A filter**
- **High efficiency up to 88%**
- **Protection against overload, overvoltage and short circuit**
- **3-year product warranty**




UL 62368-1 IEC 62368-1

The THR 20WI is 20 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 20WI offers an internal input filter to comply with EN 55032 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 |
|---|---|---|---|---|---|---|
| | | Vnom | Imax | Vnom | Imax | typ. |
| **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/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<br>- Optional Heat Sink with Height = 1.0": www.tracopower.com/products/thr-hs3.pdf<br>- Optional models with alternative pinning<br>- Optional models with pre-assembled heatsink |

chanhvinh.com



## 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. |
| 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.

chanhvinh.com



## Safety Specifications

| | | |
|---|---|---|
| Safety Standards | - IT / Multimedia Equipment | EN 62368-1<br>IEC 62368-1<br>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)<br>EN 55032 class A (internal filter)<br>FCC Part 15 class A (internal filter) |
| | - Radiated Emissions | | EN 55011 class A (with external filter)<br>EN 55032 class A (with external filter)<br>FCC Part 15 class A (with external filter) |
| | | External filter proposal: | www.tracopower.com/overview/thr20wi |
| EMS Immunity | | | EN 55024 (IT Equipment)<br>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<br>EN 61000-4-5, ±2 kV, perf. criteria A |
| | | Ext. input component: | 24 Vin models: 390 µF chemi-con KY<br>48 Vin models: 330 µF chemi-con KY<br>110 Vin models: 390 µF chemi-con KXJ |
| | - 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 +80°C<br>–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 | | 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<br>Off: 0 to 1.2 VDC or short circuit<br>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)<br>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 MΩ min. |
| Isolation Capacitance | - Input to Output, 100 kHz, 1 V | | 1'500 pF typ. |
| Reliability | - Calculated MTBF | | 665'000 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.

chanhvinh.com



| | | |
|---|---|---|
| Washing Process | | According to Cleaning Guideline<br>www.tracopower.com/info/cleaning.pdf |
| Environment | - Vibration<br>- Mechanical Shock | EN 61373<br>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<br>260°C / 10 s max. |
| Weight | | 40.5 g |
| Thermal Impedance | - Case to Ambient | 12.1 K/W typ. (without Heatsink)<br>9.2 K/W typ. (with Heatsink THR-HS1)<br>8.5 K/W typ. (with Heatsink THR-HS2)<br>7.8 K/W typ. (with Heatsink THR-HS3) |
| Environmental Compliance | - REACH Declaration | www.tracopower.com/info/reach-declaration.pdf<br>REACH SVHC list compliant<br>REACH Annex XVII compliant |
| | - RoHS Declaration | www.tracopower.com/info/rohs-declaration.pdf<br>Exemptions: 7a<br>(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).<br>The SCIP number is provided on request.) |

## Supporting Documents

| | |
|---|---|
| Overview Link (for additional Documents) | www.tracopower.com/overview/thr20wi |

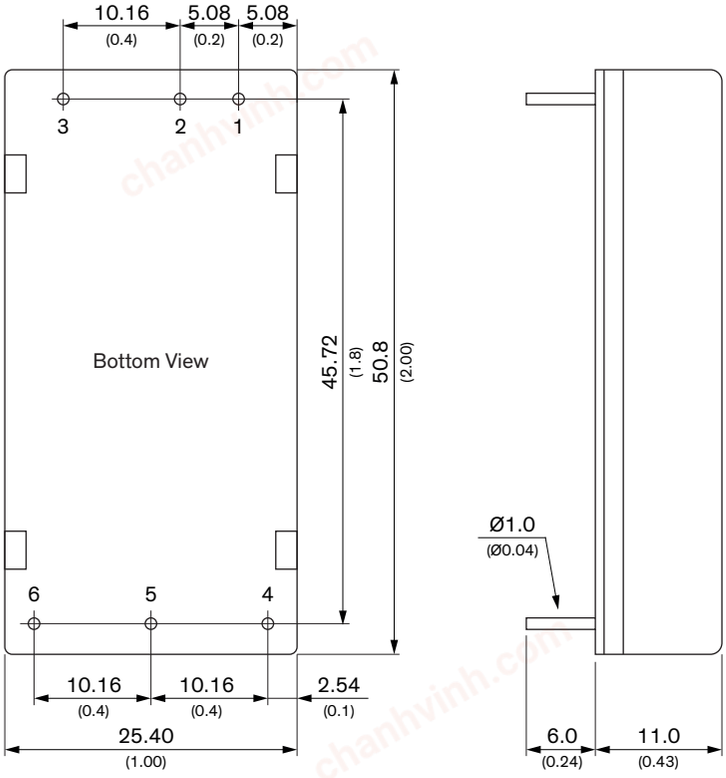
All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

chanhvinh.com



## 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)

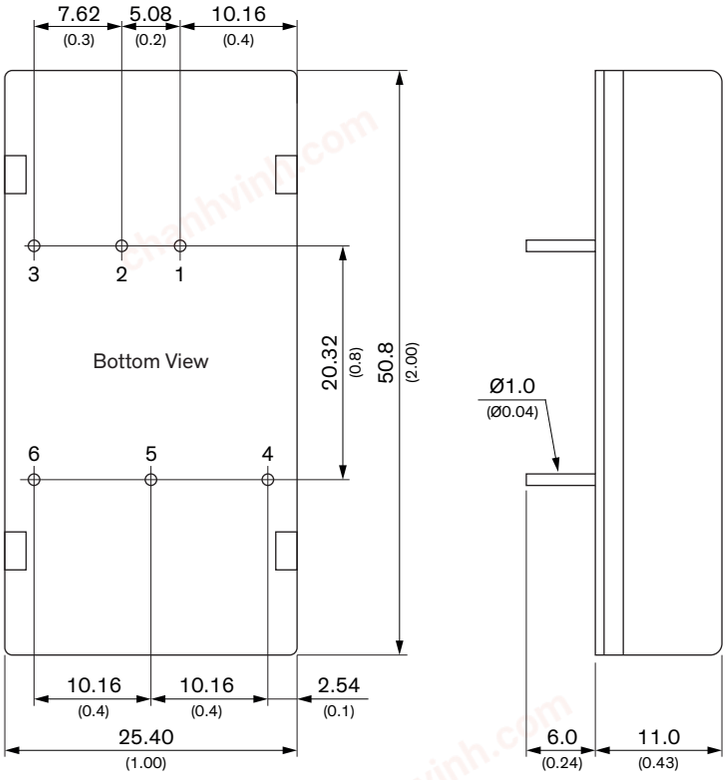
| Pinout | | |
|---|---|---|
| **Pin** | **Single** | **Dual** |
| **1** | +Vin (Vcc) | +Vin (Vcc) |
| **2** | –Vin (GND) | –Vin (GND) |
| **3** | Remote On/Off | Remote On/Off |
| **4** | +Vout | +Vout |
| **5** | –Vout | Common |
| **6** | Trim | –Vout |

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

chanhvinh.com



**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 |

© Copyright 2023 Traco Electronic AG Specifications can be changed without notice.