# TRACO POWER

## DC/DC Converter — THN 20WI Series, 20 Watt

- **Ultra compact size: 1.0" x 1.0" x 0.4"**
- **Shielded metal casing with isolated baseplate**
- **Ultrawide 4:1 input voltage ranges**
- **Very high efficiency up to 90%**
- **Output voltage adjustable**
- **Remote On/Off control**
- **Operating temp. range –40°C to +75°C and up to 85 °C with heat-sink**
- **I/O isolation voltage 1600 VDC**
- **Input filter meets EN 55032 class A without external components**
- **3-year product warranty**




UL 62368-1 IEC 62368-1

The THN 20WI series models are high performance DC/DC converters. They achieve 20 W output power and come in a small size metal casing (1.0" x 1.0" x 0.4"). The models feature an ultra-wide 4:1 input voltage range while the output voltages are precisely regulated even under no load conditions. Highest efficiency of up to 90% makes this product very reliable and applicable in temperature ranges of up to 85°C. The low no-load input current characteristics and the remote On/Off control make these converters an ideal solution for battery operated systems. Typical applications are in mobile equipment, instrumentation, distributed power architectures in communication and industrial electronics and everywhere where space on the PCB is critical.

## Models

| Order Code | Input Voltage Range | Output 1 | | Output 2 | | Efficiency |
|---|---|---|---|---|---|---|
| | | Vnom | Imax | Vnom | Imax | typ. |
| **THN 20-2410WI** | 9 - 36 VDC (24 VDC nom.) | 3.3 VDC | 4'500 mA | | | 89 % |
| **THN 20-2411WI** | | 5 VDC | 4'000 mA | | | 89 % |
| **THN 20-2411WI-A1** | | 5 VDC | 4'000 mA | | | 88 % |
| **THN 20-2412WI** | | 12 VDC | 1'670 mA | | | 89 % |
| **THN 20-2413WI** | | 15 VDC | 1'330 mA | | | 89 % |
| **THN 20-2415WI** | | 24 VDC | 833 mA | | | 91 % |
| **THN 20-2422WI** | | +12 VDC | 833 mA | –12 VDC | 833 mA | 89 % |
| **THN 20-2423WI** | | +15 VDC | 667 mA | –15 VDC | 667 mA | 90 % |
| **THN 20-2425WI** | | +24 VDC | 417 mA | –24 VDC | 417 mA | 91 % |
| **THN 20-4810WI** | 18 - 75 VDC (48 VDC nom.) | 3.3 VDC | 4'500 mA | | | 90 % |
| **THN 20-4811WI** | | 5 VDC | 4'000 mA | | | 90 % |
| **THN 20-4811WI-A1** | | 5 VDC | 4'000 mA | | | 89 % |
| **THN 20-4812WI** | | 12 VDC | 1'670 mA | | | 89 % |
| **THN 20-4813WI** | | 15 VDC | 1'330 mA | | | 90 % |
| **THN 20-4815WI** | | 24 VDC | 833 mA | | | 91 % |
| **THN 20-4822WI** | | +12 VDC | 833 mA | –12 VDC | 833 mA | 89 % |
| **THN 20-4823WI** | | +15 VDC | 667 mA | –15 VDC | 667 mA | 90 % |
| **THN 20-4825WI** | | +24 VDC | 417 mA | –24 VDC | 417 mA | 91 % |

## Options

| | |
|---|---|
| **Suffix A1** | - Adjustable output up to 6VDC, ideal for low Ripple and Noise with an LDO regulator |
| **THN-HS1** | - Optional Heat Sink: www.tracopower.com/overview/thn-hs1 |

Note - ±24 Vout models: The output can also be used in serial circuit for single 48 VDC operation.

## Input Specifications

| | | | |
|---|---|---|---|
| Input Current | - At no load | 24 Vin models: | 8 mA typ. |
| | | 48 Vin models: | 7 mA typ. |
| Surge Voltage | | 24 Vin models: | 50 VDC max. (1 s max.) |
| | | 48 Vin models: | 100 VDC max. (1 s max.) |
| Under Voltage Lockout | | 24 Vin models: | 7.5 VDC min. / 8 VDC typ. / 8.8 VDC max. |
| | | 48 Vin models: | 15.5 VDC min. / 16 VDC typ. / 17.5 VDC max. |
| Reflected Ripple Current | | | 30 mAp-p typ. |
| Recommended Input Fuse | | 24 Vin models: | 4'000 mA (slow blow) |
| | | 48 Vin models: | 2'000 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% to +20% (A1 & 24 Vout models) |
| | | | ±10% (other models) |
| | | | (single output models only) |
| | | | (By external trim resistor) |
| | | See application note: | www.tracopower.com/thn20wi-adj |
| | | | 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: | 0.5% max. |
| | - Load Variation (0 - 100%) | single output models: | 0.2% max. |
| | | dual output models: | 1% max. (Output 1) |
| | | | 1% max. (Output 2) |
| | - Cross Regulation (25% / 100% asym. load) | dual output models: | 5% max. |
| Ripple and Noise (20 MHz Bandwidth) | - single output | 3.3 Vout models: | 75 mVp-p typ. (w/ 1µF X7R \|\| 10µF TC) |
| | | 5 Vout models: | 75 mVp-p typ. (w/ 1µF X7R \|\| 10µF TC) |
| | | 12 Vout models: | 75 mVp-p typ. (w/ 1µF X7R \|\| 10µF TC) |
| | | 15 Vout models: | 75 mVp-p typ. (w/ 1µF X7R \|\| 10µF TC) |
| | | 24 Vout models: | 75 mVp-p typ. (w/ 6.8µF X7R) |
| | - dual output | 12 / -12 Vout models: | 100 / 100 mVp-p typ. (w/ 1µF X7R \|\| 10µF TC) |
| | | 15 / -15 Vout models: | 100 / 100 mVp-p typ. (w/ 1µF X7R \|\| 10µF TC) |
| | | 24 / -24 Vout models: | 100 / 100 mVp-p typ. (w/ 4.7µF X7R) |
| Capacitive Load | - single output | 3.3 Vout models: | 7'000 µF max. |
| | | 5 Vout models: | 5'000 µF max. |
| | | 12 Vout models: | 850 µF max. |
| | | 15 Vout models: | 700 µF max. |
| | | 24 Vout models: | 220 µF max. |
| | - dual output | 12 / -12 Vout models: | 500 / 500 µF max. |
| | | 15 / -15 Vout models: | 350 / 350 µF max. |
| | | 24 / -24 Vout models: | 100 / 100 µF max. |
| Minimum Load | | | Not required |
| Temperature Coefficient | | | ±0.02 %/K max. |
| Start-up Time | | | 30 ms max. |
| Short Circuit Protection | | | Continuous, Automatic recovery |
| Output Current Limitation | | | 125 - 190% of Iout max. |
| | | | 150% typ. of Iout max. |
| Overvoltage Protection | | | 112 - 164% of Vout nom. |
| Transient Response | - Response Time | | 250 µs typ. (25% 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 60950-1<br>EN 62368-1<br>IEC 60950-1<br>IEC 62368-1<br>UL 60950-1<br>UL 62368-1 |
| | - Certification Documents | | www.tracopower.com/thn20wi-safety-cert |
| Energy Source | - Output, acc. to 62368-1 | | ES1 |
| Power Source | - Output, acc. to 62368-1 | | PS3 |
| Pollution Degree | | | PD 2 |
| Over Voltage Category | | | Not mains connected |

## EMC Specifications

| | | | |
|---|---|---|---|
| EMI (Emissions) | - Conducted Emissions | | EN 55032 class A (internal filter)<br>EN 55032 class B (with external filter) |
| | - Radiated Emissions | | EN 55032 class A (internal filter)<br>EN 55032 class B (with external filter) |
| | | External filter proposal: | www.tracopower.com/thn20wi-emc-filter |
| EMS (Immunity) | - 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: | 220 µF, 100 V |
| | - 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 +75°C<br>–40°C to +85°C (with heatsink THN-HS1) |
| | - Case Temperature | | +105°C max. |
| | - Storage Temperature | | –55°C to +125°C |
| Power Derating | - High Temperature | | Depending on model |
| | | See application note: | www.tracopower.com/thn20wi-cc |
| Cooling System | | | Natural convection (20 LFM) |
| Remote Control | - Voltage Controlled Remote (passive = on) | | On: 3.0 to 15 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 mA typ. |
| | - Remote Pin Input Current | | -0.5 to 1.0 mA |
| Altitude During Operation | | | 5'000 m max. |
| Regulator Topology | | | Flyback Converter |
| Switching Frequency | | | 275 kHz typ. (PWM) (±10%, 3.3 & 5 Vout model)<br>330 kHz typ. (PWM) (±10%, other models) |
| Insulation System | | | Functional Insulation |
| Isolation Test Voltage | - Input to Output, 60 s | | 1'600 VDC |
| | - Input to Case, 60 s | | 1'000 VDC |
| | - Output to Case, 60 s | | 1'000 VDC |
| Isolation Resistance | - Input to Output, 500 VDC | | 1'000 MΩ min. |
| Isolation Capacitance | - Input to Output, 100 kHz, 1 V | | 1'500 pF max. |
| Reliability | - Calculated MTBF | | 1'400'000 h (MIL-HDBK-217F, ground benign) |
| Washing Process | | | According to Cleaning Guideline<br>www.tracopower.com/info/cleaning.pdf |

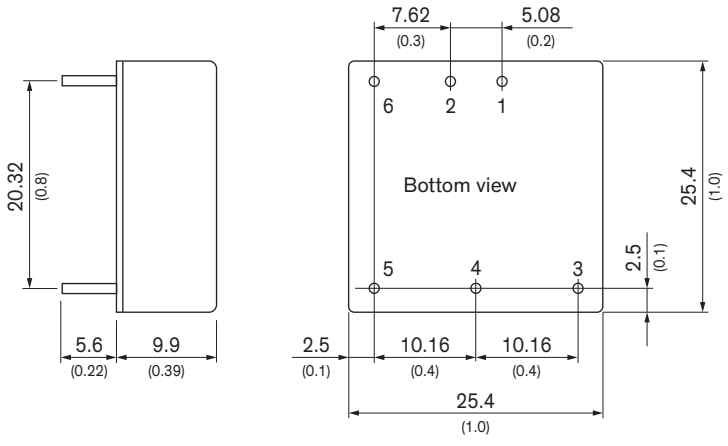
All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

| | | |
|---|---|---|
| Environment | - Vibration | MIL-STD-810F |
| | - Thermal Shock | MIL-STD-810F |
| Housing Material | | Copper, Nickel plated |
| Base Material | | Non-conductive FR4 (UL 94 V-0 rated) |
| Potting Material | | Silicone (UL 94 V-0 rated) |
| Pin Material | | Copper |
| Pin Foundation Plating | | Nickel (2 - 3 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 | | 1" x 1" |
| Soldering Profile | | Lead-Free Wave Soldering<br>265°C / 10 s max. |
| Weight | | 15 g |
| Thermal Impedance | - Case to Ambient | 17.6 K/W typ.<br>14.8 K/W typ. (with heatsink THN-HS1) |
| 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: 7(a), 7(c)-I<br>(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).) |
| | - SCIP Reference Number | b4edc4bb-5f02-48ac-8e5a-36106726a10f |

## Additional Information

| | |
|---|---|
| Supporting Documents | www.tracopower.com/overview/thn20wi |
| Frequently Asked Questions | www.tracopower.com/glossary-faq |
| Glossary | www.tracopower.com/info/glossary.pdf |

## Outline Dimensions




Dimensions in mm (inch)
Tolerances: ±0.5 (±0.02)
Pin pitch tolerances ±0.25 (±0.01)
Pin diameter Ø 1.0 (0.04)

**Pinout**

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

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