

- Compact 1.0" x 1.0" x 0.4" standard package
- Ultra-wide 4:1 input voltage range 9–36, 18–75, 36–160 VDC
- EN 50155 and EN 61373 approval for railway applications
- Qualification for fire behaviour according to EN 45545-2
- 3000 VDC I/O-isolation
- High efficiency up to 91%
- Operating temperature range –40°C to +90°C
- Under-voltage lock out circuit
- Adjustable output voltage & Remote On/Off
- 3-year product warranty



The THN 15WIR series is a family of ruggedized 15 W DC/DC converters for highest reliability in harsh environments. The converters have an increased resistance against electromagnetic interference, shock/vibration and thermal shock. The approvals according to standards EN 50155 and EN 61373 qualify them for railway and transportation systems. The qualification for the fire behaviour of components according to EN 45545-2 and the safety approval according to IEC/EN 60950-1, UL60950-1 support a potential compliance test of the application. Built-in EMI 55022 class A filter, input under-voltage-lockout, short circuit protection, remote On/Off and output voltage trim are further features which facilitate the design in.

| Models | | | | | | |
|----------------|--------------------------------|------------------------------|------------------|----------|------------------|-----------------|
| Order Code | Input Voltage Range | Output 1 | | Output 2 | | Efficiency typ. |
| | | Vnom | I _{max} | Vnom | I _{max} | |
| THN 15-2410WIR | 9 - 36 VDC (24 VDC nom.) | 3.3 VDC | 4'500 mA | | | 88 % |
| THN 15-2411WIR | | 5 VDC | 3'000 mA | | | 90 % |
| THN 15-2412WIR | | 12 VDC | 1'300 mA | | | 89 % |
| THN 15-2413WIR | | 15 VDC | 1'000 mA | | | 90 % |
| THN 15-2415WIR | | 24 VDC | 625 mA | | | 91 % |
| THN 15-2421WIR | | +5 VDC | 1'500 mA | -5 VDC | 1'500 mA | 87 % |
| THN 15-2422WIR | | +12 VDC | 625 mA | -12 VDC | 625 mA | 90 % |
| THN 15-2423WIR | | +15 VDC | 500 mA | -15 VDC | 500 mA | 90 % |
| THN 15-2425WIR | | +24 VDC | 315 mA | -24 VDC | 315 mA | 91 % |
| THN 15-4810WIR | | 18 - 75 VDC (48 VDC nom.) | 3.3 VDC | 4'500 mA | | |
| THN 15-4811WIR | 5 VDC | | 3'000 mA | | | 90 % |
| THN 15-4812WIR | 12 VDC | | 1'300 mA | | | 89 % |
| THN 15-4813WIR | 15 VDC | | 1'000 mA | | | 90 % |
| THN 15-4815WIR | 24 VDC | | 625 mA | | | 91 % |
| THN 15-4821WIR | +5 VDC | | 1'500 mA | -5 VDC | 1'500 mA | 87 % |
| THN 15-4822WIR | +12 VDC | | 625 mA | -12 VDC | 625 mA | 90 % |
| THN 15-4823WIR | +15 VDC | | 500 mA | -15 VDC | 500 mA | 90 % |
| THN 15-4825WIR | +24 VDC | | 315 mA | -24 VDC | 315 mA | 90 % |
| THN 15-7210WIR | 36 - 160 VDC (110 VDC nom.) | | 3.3 VDC | 4'500 mA | | |
| THN 15-7211WIR | | 5 VDC | 3'000 mA | | | 89 % |
| THN 15-7212WIR | | 12 VDC | 1'300 mA | | | 89 % |
| THN 15-7213WIR | | 15 VDC | 1'000 mA | | | 89 % |
| THN 15-7215WIR | | 24 VDC | 625 mA | | | 90 % |
| THN 15-7221WIR | | +5 VDC | 1'500 mA | -5 VDC | 1'500 mA | 86 % |
| THN 15-7222WIR | | +12 VDC | 625 mA | -12 VDC | 625 mA | 89 % |
| THN 15-7223WIR | | +15 VDC | 500 mA | -15 VDC | 500 mA | 89 % |
| THN 15-7225WIR | | +24 VDC | 315 mA | -24 VDC | 315 mA | 90 % |

| Options | |
|--|--|
| THN-HS2 | - Optional Heat Sink: www.tracopower.com/products/thn-hs2.pdf |
| on demand (backorder with MOQ non stocking item) | - Optional Heat Sink: www.tracopower.com/products/thn-hs3.pdf - Optional Heat Sink: www.tracopower.com/products/thn-hs4.pdf |

| Input Specifications | |
|--------------------------|--|
| Input Current | - At no load 24 Vin models: 12 mA typ. 48 Vin models: 10 mA typ. 110 Vin models: 8 mA typ. |
| Surge Voltage | 24 Vin models: 50 VDC max. (1 s max.) 48 Vin models: 100 VDC max. (1 s max.) 110 Vin models: 185 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. 110 Vin models: 32 VDC min. / 34 VDC typ. / 35.5 VDC max. |
| Reflected Ripple Current | 30 mA_{p-p} typ. |
| Recommended Input Fuse | 24 Vin models: 3'150 mA (slow blow) 48 Vin models: 1'600 mA (slow blow) 110 Vin models: 1'000 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% (15 & 24 VDC single models) ±10% (other single models) (By external trim resistor) See application note: www.tracopower.com/overview/thn15wir Output power must not exceed rated power! |
| Voltage Set Accuracy | ±1% max. |
| Regulation | - Input Variation (V _{min} - V _{max}) 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 V _{out} models: 75 mV_{p-p} typ. (w/ 10 µF, 6.3 V X7R) 5 V _{out} models: 75 mV_{p-p} typ. (w/ 10 µF, 6.3 V X7R) 12 V _{out} models: 100 mV_{p-p} typ. (w/ 1 µF, 25 V X7R) 15 V _{out} models: 100 mV_{p-p} typ. (w/ 1 µF, 25 V X7R) 24 V _{out} models: 125 mV_{p-p} typ. (w/ 2.2 µF, 50 V X7R) - dual output 5 / -5 V _{out} models: 75 / 75 mV_{p-p} typ. (w/ 10 µF, 6.3 V X7R) 12 / -12 V _{out} models: 100 / 100 mV_{p-p} typ. (w/ 1 µF, 25 V X7R) 15 / -15 V _{out} models: 100 / 100 mV_{p-p} typ. (w/ 1 µF, 25 V X7R) 24 / -24 V _{out} models: 125 / 125 mV_{p-p} typ. (w/ 2.2 µF, 50 V X7R) |
| Capacitive Load | - single output 3.3 V _{out} models: 5'200 µF max. 5 V _{out} models: 3'600 µF max. 12 V _{out} models: 600 µF max. 15 V _{out} models: 500 µF max. 24 V _{out} models: 200 µF max. - dual output 5 / -5 V _{out} models: 1'500 / 1'500 µF max. 12 / -12 V _{out} models: 360 / 360 µF max. 15 / -15 V _{out} models: 250 / 250 µF max. 24 / -24 V _{out} models: 100 / 100 µF max. |

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

| | |
|------------------------------------|---|
| Minimum Load | Not required |
| Temperature Coefficient | ±0.02 %/K max. |
| Start-up Time | 30 ms typ. / 40 ms max. |
| Short Circuit Protection | Continuous, Automatic recovery |
| Output Current Limitation | 145 - 212% of I _{out} max. 170% typ. of I _{out} max. |
| Overvoltage Protection | 112 - 164% of V _{out} nom. |
| Transient Response - Response Time | 250 µs typ. (25% Load Step) |

Safety Specifications

| | | |
|------------------|---|--|
| Safety Standards | - IT / Multimedia Equipment | EN 60950-1 EN 62368-1 IEC 60950-1 IEC 62368-1 UL 60950-1 UL 62368-1 |
| | - Railway Applications - Certification Documents | EN 50155 www.tracopower.com/overview/thn15wir |
| Pollution Degree | | PD 2 |

EMC Specifications

| | | |
|---------------|-----------------------------|--|
| EMI Emissions | - Conducted Emissions | EN 55011 class A (internal filter) EN 55011 class B (with external filter) EN 55032 class A (internal filter) EN 55032 class B (with external filter) |
| | - Radiated Emissions | EN 55011 class A (internal filter) EN 55011 class B (with external filter) EN 55032 class A (internal filter) EN 55032 class B (with external filter) |
| | | External filter proposal: www.tracopower.com/overview/thn15wir |
| EMS Immunity | - Electrostatic Discharge | EN 50155 (Railway Applications) Air: EN 61000-4-2, ±8 kV, perf. criteria A |
| | - RF Electromagnetic Field | Contact: EN 61000-4-2, ±6 kV, perf. criteria A |
| | - EFT (Burst) / Surge | EN 61000-4-3, 20 V/m, perf. criteria A EN 61000-4-4, ±2 kV, perf. criteria A EN 61000-4-5, ±2 kV, perf. criteria A |
| | | Ext. input component: 24 Vin models: 220 µF, 100 V // TVS SMDJ58A 48 Vin models: 220 µF, 100 V 110 Vin models: 150 µF, 200 V // TVS SMDJ300A |
| | - Conducted RF Disturbances | EN 61000-4-6, 10 V _{rms} , 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 +90°C -40°C to +93°C (with Heat Sink) |
| | - Case Temperature | +105°C max. |
| | - Storage Temperature | -55°C to +125°C |
| Power Derating | - High Temperature | 3.3 %/K above 75°C 4 %/K above 80°C (with Heat Sink) |
| Cooling System | | Natural convection (20 LFM) |

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

| | | |
|---------------------------|---|---|
| Remote Control | - Voltage Controlled Remote - Off Idle Input Current - Remote Pin Input Current | On: 3.0 to 15 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 1.0 mA |
| Altitude During Operation | | 5'000 m max. |
| Switching Frequency | | 245 kHz typ. (PWM) ($\pm 10\%$, 3.3 & 5 Vout model) 300 kHz typ. (PWM) ($\pm 10\%$, other models) |
| Insulation System | | Functional Insulation |
| Isolation Test Voltage | - Input to Output, 60 s - Input to Case, 60 s - Output to Case, 60 s | 3'000 VDC 1'600 VDC 1'600 VDC |
| Isolation Resistance | - Input to Output, 500 VDC | 1'000 M Ω min. |
| Isolation Capacitance | - Input to Output, 100 kHz, 1 V | 2'000 pF max. |
| Reliability | - Calculated MTBF | 1'600'000 h (MIL-HDBK-217F, ground benign) |
| Washing Process | | Allowed (hermetical product) |
| | See Cleaning Guideline: | www.tracopower.com/info/cleaning.pdf |
| Environment | - Vibration - Mechanical Shock - Thermal Shock | MIL-STD-810F EN 61373 MIL-STD-810F EN 61373 MIL-STD-810F EN 50155 |
| Housing Material | | Copper |
| 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 | | 260°C / 10 s max. |
| Weight | | 16.5 g |
| Thermal Impedance | - Case to Ambient | 17 K/W typ. (without heatsink) 12.9 K/W typ. (with THN-HS2) 10.9 K/W typ. (with THN-HS3) 9.3 K/W typ. (with THN-HS4) |
| Environmental Compliance | - REACH Declaration - RoHS Declaration - Flammability (EN 45545-2) | www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant www.tracopower.com/info/rohs-declaration.pdf Exemptions: 7a, 7c-I (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.) www.tracopower.com/info/en45545-declaration.pdf |

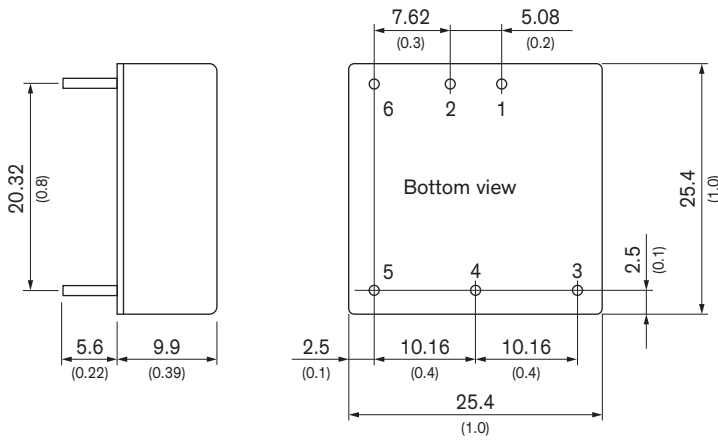
Supporting Documents

Overview Link (for additional Documents)

www.tracopower.com/overview/thn15wir

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

Outline Dimensions



Dimensions in mm (inch)
 Tolerances: ± 0.5 (± 0.02)
 Pin pitch tolerances ± 0.25 (± 0.01)
 Pin diameter $\varnothing 1.0$ (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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