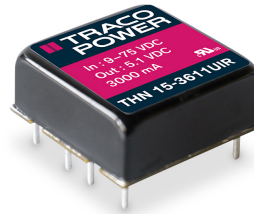


- Compact 1"x1" housing
- Ultra-wide 12:1 input voltage range: 9–75, 14–160 VDC
- –40°C up to +70°C natural convection cooling without derating
- EN 50155, EN 45545-2 and EN 61373 certified
- Dedicated holdup capacitor connection
- Fully encapsulated
- Reinforced 3000VAC I/O isolation
- Remote on/off and trim function
- Protection against short-circuit (SCP), overvoltage (OVP) and overtemperature (OTP)
- 3-year product warranty



The THN 15UIR is a series of high-performance DC/DC converters with an ultra-wide 12:1 input voltage range and a power output of 15 watt. The THN 15UIR comes in a compact, fully encapsulated 1"x1" housing for highest reliability and effective cooling. Thanks to its dedicated holdup capacitor connection, the THN 15UIR meets extended holdup-time requirements without the need for bulky input capacitors. The THN 15UIR is EN 50155 certified for rolling stock applications, EN 61373 certified for resistance against mechanical shock and vibration and EN 45545-2 certified for fire behavior. The THN 15UIR also comes with IEC/EN/UL 62368-1 safety approvals for use in a wide range of demanding industrial applications.

| Models         |                               |          |                  |          |                  |                 |
|----------------|-------------------------------|----------|------------------|----------|------------------|-----------------|
| Order Code     | Input Voltage Range           | Output 1 |                  | Output 2 |                  | Efficiency typ. |
|                |                               | Vnom     | I <sub>max</sub> | Vnom     | I <sub>max</sub> |                 |
| THN 15-3611UIR | 9 - 75 VDC<br>(36 VDC nom.)   | 5.1 VDC  | 3'000 mA         |          |                  | 87 %            |
| THN 15-3612UIR |                               | 12 VDC   | 1'250 mA         |          |                  | 88 %            |
| THN 15-3613UIR |                               | 15 VDC   | 1'000 mA         |          |                  | 88 %            |
| THN 15-3615UIR |                               | 24 VDC   | 625 mA           |          |                  | 88 %            |
| THN 15-3622UIR |                               | +12 VDC  | 625 mA           | -12 VDC  | 625 mA           | 87 %            |
| THN 15-3623UIR |                               | +15 VDC  | 500 mA           | -15 VDC  | 500 mA           | 88 %            |
| THN 15-7211UIR | 14 - 160 VDC<br>(72 VDC nom.) | 5.1 VDC  | 3'000 mA         |          |                  | 87 %            |
| THN 15-7212UIR |                               | 12 VDC   | 1'250 mA         |          |                  | 88 %            |
| THN 15-7213UIR |                               | 15 VDC   | 1'000 mA         |          |                  | 87 %            |
| THN 15-7215UIR |                               | 24 VDC   | 625 mA           |          |                  | 87 %            |
| THN 15-7222UIR |                               | +12 VDC  | 625 mA           | -12 VDC  | 625 mA           | 87 %            |
| THN 15-7223UIR |                               | +15 VDC  | 500 mA           | -15 VDC  | 500 mA           | 87 %            |

| Options   |  |
|---|--|
| THN-HS2   | - Optional Heat Sink: <a href="http://www.tracopower.com/products/thn-hs2.pdf">www.tracopower.com/products/thn-hs2.pdf</a> |
| on demand<br>(backorder with MOQ non stocking item) | - Optional Heat Sink: <a href="http://www.tracopower.com/products/thn-hs3.pdf">www.tracopower.com/products/thn-hs3.pdf</a> |
|   | - Optional Heat Sink: <a href="http://www.tracopower.com/products/thn-hs4.pdf">www.tracopower.com/products/thn-hs4.pdf</a> |
|   | - Optional model with 5 VDC / 3'000 mA Output and 9 - 75 VDC Input   |
|   | - Optional model with 5 VDC / 3'000 mA Output and 14 - 160 VDC Input   |
|   | - Optional models with inverse Remote On/Off function (passive = off)  |
|   | - Optional models without adjustable UVLO and without BUS pin  |
|   | - Optional models with adjustable UVLO but without BUS pin   |

Note - 72 Vin models: If the input voltage exceeds 110 VDC, use an external 100 µF / 200 V capacitor between +Vin and -Vin to reduce voltage transient.

## Input Specifications

|                        |              |   |
|------------------------|--------------|---|
| Input Current          | - At no load | 72 Vin models: <b>8 mA typ.</b><br>36 Vin models: <b>15 mA typ.</b> (5 Vout model)<br><b>15 mA typ.</b> (5.1 Vout model)<br><b>12 mA typ.</b> (12 Vout model)<br><b>12 mA typ.</b> (15 Vout model)<br><b>12 mA typ.</b> (24 Vout model)<br><b>12 mA typ.</b> (12 / -12 Vout model)<br><b>12 mA typ.</b> (15 / -15 Vout model) |
| Surge Voltage          |              | 36 Vin models: <b>100 VDC max.</b> (1 s max.)<br>72 Vin models: <b>200 VDC max.</b> (1 s max.)  |
| Under Voltage Lockout  |              | 36 Vin models: <b>7.3 VDC min. / 7.7 VDC typ. / 8.1 VDC max.</b><br>72 Vin models: <b>10 VDC min. / 11 VDC typ. / 12 VDC max.</b>   |
| Recommended Input Fuse |              | 36 Vin models: <b>3'150 mA</b> (slow blow)<br>72 Vin models: <b>2'000 mA</b> (slow blow)<br>(The need of an external fuse has to be assessed in the final application.)   |
| Input Filter           |              | <b>Internal Pi-Type</b>   |

## Output Specifications

|                                     |  |   |
|-------------------------------------|--|---|
| Output Voltage Adjustment           |  | <b>±10%</b> (12 Vout models)<br><b>-10% to +20%</b> (other models)<br>(single output models only)<br>(By external trim resistor)<br>See application note: <a href="http://www.tracopower.com/overview/thn15uir">www.tracopower.com/overview/thn15uir</a><br>Output power must not exceed rated power!   |
| Voltage Set Accuracy                |  | <b>±1% max.</b>   |
| Regulation                          | - Input Variation (Vmin - Vmax)<br>- Load Variation (0 - 100%)<br>- Voltage Balance (symmetrical load)<br>- Cross Regulation (25% / 100% asym. load) | single output models: <b>0.2% max.</b><br>dual output models: <b>0.5% max.</b><br>single output models: <b>0.2% max.</b><br>dual output models: <b>1% max.</b> (Output 1)<br><b>1% max.</b> (Output 2)<br>dual output models: <b>2% max.</b><br>dual output models: <b>5% max.</b>  |
| Ripple and Noise (20 MHz Bandwidth) | - single output<br>- dual output   | 5 Vout models: <b>75 mVp-p typ.</b> (w/ 22 µF)<br>5.1 Vout models: <b>75 mVp-p typ.</b> (w/ 22 µF)<br>12 Vout models: <b>100 mVp-p typ.</b> (w/ 22 µF)<br>15 Vout models: <b>100 mVp-p typ.</b> (w/ 22 µF)<br>24 Vout models: <b>125 mVp-p typ.</b> (w/ 4.7 µF)<br>12 / -12 Vout models: <b>100 / 100 mVp-p typ.</b> (w/ 10 µF)<br>15 / -15 Vout models: <b>100 / 100 mVp-p typ.</b> (w/ 10 µF) |
| Capacitive Load                     | - single output<br>- dual output   | 5 Vout models: <b>3'600 µF max.</b><br>5.1 Vout models: <b>3'600 µF max.</b><br>12 Vout models: <b>600 µF max.</b><br>15 Vout models: <b>500 µF max.</b><br>24 Vout models: <b>200 µF max.</b><br>12 / -12 Vout models: <b>360 / 360 µF max.</b><br>15 / -15 Vout models: <b>250 / 250 µF max.</b>  |
| Minimum Load                        |  | <b>Not required</b>   |
| Temperature Coefficient             |  | <b>±0.02 %/K max.</b>   |
| Hold-up Time                        |  | <b>10 ms min.</b> (acc. to EN 50155 Class S2, see application note for BUS connection:<br><a href="http://www.tracopower.com/overview/thn15uir">www.tracopower.com/overview/thn15uir</a> )  |
| Start-up Time                       |  | <b>30 ms typ. / 40 ms max.</b>  |
| Short Circuit Protection            |  | <b>Continuous, Automatic recovery</b>   |

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

|                           |                      |   |
|---------------------------|----------------------|---|
| Output Current Limitation |                      | 155% typ. of I <sub>out</sub> max.  |
| Overvoltage Protection    |                      | 113 - 164% of V <sub>out</sub> nom.<br>(depending on model)<br>6.3 - 7.4 VDC (5 V <sub>out</sub> , 5.1 V <sub>out</sub> model)<br>13.5 - 19.6 VDC (12 V <sub>out</sub> model)<br>18.3 - 22 VDC (15 V <sub>out</sub> model)<br>29.1 - 32.5 VDC (24 V <sub>out</sub> model) |
| Transient Response        | - Response Deviation | 4% typ. (25% Load Step)   |
|                           | - Response Time      | 250 μs typ. (25% Load Step)   |

### Safety Specifications

|                       |   |  |
|-----------------------|---|--|
| Standards             | - IT / Multimedia Equipment                         | EN 62368-1<br>IEC 62368-1<br>UL 62368-1  |
|                       | - Railway Applications<br>- Certification Documents | EN 50155<br><a href="http://www.tracopower.com/overview/thn15uir">www.tracopower.com/overview/thn15uir</a><br>(A BUS capacitor must be connected to meet EN 50155 requirements. See application note.) |
| Pollution Degree      |   | PD 2   |
| Over Voltage Category |   | OVC II   |

### EMC Specifications

|               |                             |  |
|---------------|-----------------------------|--|
| EMI Emissions | - Conducted Emissions       | EN 50121-3-2 (EMC for Rolling Stock)<br>EN 55032 class A (with external filter)<br>EN 55032 class B (with external filter)   |
|               | - Radiated Emissions        | EN 55032 class A (with external filter)<br>EN 55032 class B (with external filter)<br>External filter proposal: <a href="http://www.tracopower.com/overview/thn15uir">www.tracopower.com/overview/thn15uir</a> |
| EMS Immunity  | - Electrostatic Discharge   | EN 50121-3-2 (EMC for Rolling Stock)<br>EN 55035 (Multimedia)<br>Air: EN 61000-4-2, ±8 kV, perf. criteria A<br>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<br>EN 61000-4-5, ±2 kV, perf. criteria A   |
|               | - Conducted RF Disturbances | Ext. input component: 220μF, 100V, KY    TVS SMDJ120A (36 V <sub>in</sub> )<br>150μF, 200V, KXJ    TVS SMBJ220A (72 V <sub>in</sub> )<br>EN 61000-4-6, 10 V <sub>rms</sub> , perf. criteria A                  |
|               | - PF Magnetic Field         | Continuous: EN 61000-4-8, 100 A/m, perf. criteria A<br>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 +105°C<br>-40°C to +105°C (with Heat Sink)  |
|  | - Case Temperature                       | +105°C max.  |
|  | - Storage Temperature                    | -55°C to +125°C  |
| Power Derating                         | - High Temperature                       | Depending on model<br>See application note: <a href="http://www.tracopower.com/overview/thn15uir">www.tracopower.com/overview/thn15uir</a> |
| Over Temperature Protection Switch Off | - Protection Mode<br>- Measurement Point | 115°C typ. (Automatic recovery at 103°C typ.)<br>Case  |
| 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<br><br>- Off Idle Input Current<br>- Remote Pin Input Current | 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<br>2.5 mA typ.<br>-0.5 to 1.0 mA<br>(Optional models with inverse Remote On/Off function (passive = off))   |
| Altitude During Operation |   | 5'000 m max.   |
| Switching Frequency       |   | 190 - 250 kHz (PWM)<br>220 kHz typ. (PWM)  |
| Insulation System         |   | Functional Insulation  |
| Working Voltage (rated)   |   | 75 VDC (36 Vin models)<br>113 VDC (72 Vin models)  |
| Isolation Test Voltage    | - Input to Output, 60 s<br>- Input to Case, 60 s<br>- Output to Case, 60 s                | 3'000 VDC<br>2'250 VDC<br>2'250 VDC  |
| Creepage                  | - Input to Output   | 2 mm min.  |
| Clearance                 | - Input to Output   | 2 mm min.  |
| Isolation Resistance      | - Input to Output, 500 VDC  | 1'000 MΩ min.  |
| Isolation Capacitance     | - Input to Output, 100 kHz, 1 V   | 2'000 pF max.  |
| Reliability               | - Calculated MTBF   | 1'510'000 h (MIL-HDBK-217F, ground benign)   |
| Washing Process           |   | According to Cleaning Guideline<br><a href="http://www.tracopower.com/info/cleaning.pdf">www.tracopower.com/info/cleaning.pdf</a>  |
| Environment               | - Vibration<br><br>- Mechanical Shock<br><br>- Thermal Shock<br>- Flammability            | MIL-STD-810F<br>EN 61373<br>MIL-STD-810F<br>EN 61373<br>MIL-STD-810F<br>EN 45545-2<br><a href="http://www.tracopower.com/info/en45545-declaration.pdf">www.tracopower.com/info/en45545-declaration.pdf</a>   |
| 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              |   | Tinned 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>260°C / 6 s max.   |
| Weight                    |   | 17 g   |
| Thermal Impedance         | - Case to Ambient   | 15.5 K/W typ. (without Heatsink)<br>12.0 K/W typ. (with Heatsink THN-HS2)<br>10.4 K/W typ. (with Heatsink THN-HS3)<br>8.8 K/W typ. (with Heatsink THN-HS4)   |
| Environmental Compliance  | - REACH Declaration<br><br>- RoHS Declaration<br><br>- SCIP Reference Number              | <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a><br>REACH SVHC list compliant<br>REACH Annex XVII compliant<br><a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a><br>Exemptions: 7a, 7c-1<br>(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule))<br>e8c77501-f5e8-4c14-b6f5-b63b90842bc7 |

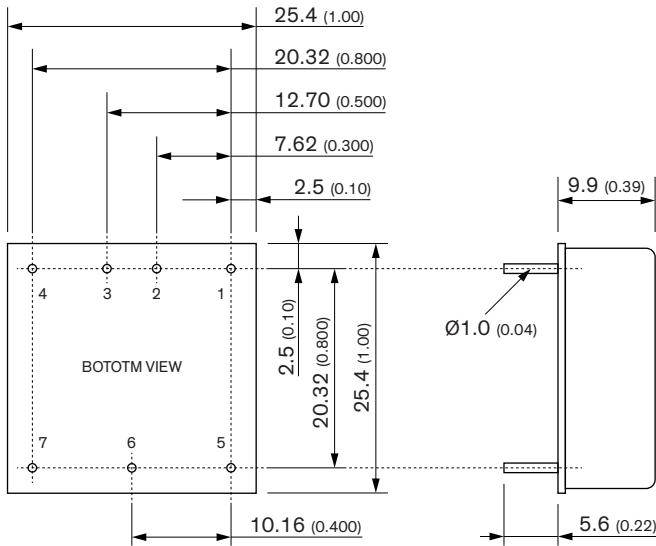
All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

### Supporting Documents

[Overview Link](#) (for additional Documents)

[www.tracopower.com/overview/thn15uir](http://www.tracopower.com/overview/thn15uir)

### Outline Dimensions



| Pinout |                        |        |
|--------|------------------------|--------|
| Pin    | Single                 | Dual   |
| 1      | No pin* / BUS / UVLO** |        |
| 2      | +Vin                   |        |
| 3      | -Vin                   |        |
| 4      | Remote On/Off          |        |
| 5      | +Vout                  |        |
| 6      | Trim                   | Common |
| 7      | -Vout                  |        |

\* If neither BUS nor UVLO is present

\*\* UVLO function is optional

Dimensions in mm (inch)

Tolerances: x.x ±0.5 (x.xx ±0.02)

x.xx ±0.25 (x.xxx ±0.01)

Pin diameter tolerance: ±0.10 (±0.004)

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