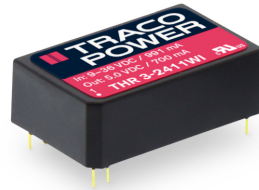


- Reinforced I/O-isolation 3000 VAC
- Shock and vibration resistance according to EN 61373
- Wide 4:1 input voltage range: 9-36, 18-75, 40-160 VDC
- Operating temperature range -40 to +92°C
- Internal EN 55032 class A filter
- High efficiency up to 85%
- Protection against overload, overvoltage and short circuit
- 3-year product warranty



The THR 3WI is 3 Watt DC/DC converters series with reinforced isolation (3000 VAC). These regulated DC/DC converters come in either a DIP-24 package and also feature increased resistance against shock and vibration according to EN 61373. The THR 3WI offers an internal input filter to comply with EN 55032 class A. High efficiencies up to 85% allow safe operation from -40°C to +92°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 3WI 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 <sub>max</sub> | Vnom     | I <sub>max</sub> |                 |
| THR 3-2411WI | 9 - 36 VDC<br>(24 VDC nom.)    | 5 VDC    | 600 mA           |          |                  | 80 %            |
| THR 3-2412WI |                                | 12 VDC   | 250 mA           |          |                  | 84 %            |
| THR 3-2413WI |                                | 15 VDC   | 200 mA           |          |                  | 85 %            |
| THR 3-2422WI |                                | +12 VDC  | 125 mA           | -12 VDC  | 125 mA           | 83 %            |
| THR 3-2423WI |                                | +15 VDC  | 100 mA           | -15 VDC  | 100 mA           | 84 %            |
| THR 3-4811WI | 18 - 75 VDC<br>(48 VDC nom.)   | 5 VDC    | 600 mA           |          |                  | 80 %            |
| THR 3-4812WI |                                | 12 VDC   | 250 mA           |          |                  | 83 %            |
| THR 3-4813WI |                                | 15 VDC   | 200 mA           |          |                  | 84 %            |
| THR 3-4822WI |                                | +12 VDC  | 125 mA           | -12 VDC  | 125 mA           | 83 %            |
| THR 3-4823WI |                                | +15 VDC  | 100 mA           | -15 VDC  | 100 mA           | 83 %            |
| THR 3-7211WI | 40 - 160 VDC<br>(110 VDC nom.) | 5 VDC    | 600 mA           |          |                  | 80 %            |
| THR 3-7212WI |                                | 12 VDC   | 250 mA           |          |                  | 84 %            |
| THR 3-7213WI |                                | 15 VDC   | 200 mA           |          |                  | 84 %            |
| THR 3-7222WI |                                | +12 VDC  | 125 mA           | -12 VDC  | 125 mA           | 83 %            |
| THR 3-7223WI |                                | +15 VDC  | 100 mA           | -15 VDC  | 100 mA           | 85 %            |

### Input Specifications

|                        |                |  |
|------------------------|----------------|--|
| Input Current          | - At no load   | 24 Vin models: <b>9 mA typ.</b><br>48 Vin models: <b>5 mA typ.</b><br>110 Vin models: <b>3 mA typ.</b>   |
|                        | - At full load | 24 Vin models: <b>150 mA typ.</b><br>48 Vin models: <b>75 mA typ.</b><br>110 Vin models: <b>33 mA typ.</b>   |
| Surge Voltage          |                | 24 Vin models: <b>50 VDC max.</b> (1 s max.)<br>48 Vin models: <b>100 VDC max.</b> (1 s max.)<br>110 Vin models: <b>170 VDC max.</b> (1 s max.)  |
| Under Voltage Lockout  |                | 24 Vin models: <b>7.5 VDC typ.</b><br>48 Vin models: <b>16 VDC typ.</b><br>110 Vin models: <b>37 VDC typ.</b>  |
| Recommended Input Fuse |                | 24 Vin models: <b>500 mA</b> (slow blow)<br>48 Vin models: <b>250 mA</b> (slow blow)<br>110 Vin models: <b>100 mA</b> (slow blow)<br><br>(The need of an external fuse has to be assessed in the final application.) |
| Input Filter           |                | <b>Internal Pi-Type</b>  |

### Output Specifications

|  |  |   |
|--|--|---|
| Voltage Set Accuracy                   |  | <b>±1% max.</b>   |
| Regulation                             | - Input Variation (Vmin - Vmax)            | single output models: <b>0.5% max.</b><br>dual output models: <b>0.5% max.</b>  |
|  | - Load Variation (0 - 100%)                | single output models: <b>1% max.</b><br>dual output models: <b>1% max.</b> (Output 1)<br><b>1% max.</b> (Output 2)  |
|  | - Voltage Balance (symmetrical load)       | dual output models: <b>2% max.</b>  |
|  | - Cross Regulation (25% / 100% asym. load) | dual output models: <b>5% max.</b>  |
| Ripple and Noise<br>(20 MHz Bandwidth) | - single output                            | 5 Vout models: <b>50 mVp-p typ.</b> (w/ 10 µF, 25 V MLCC)<br>12 Vout models: <b>75 mVp-p typ.</b> (w/ 10 µF, 25 V MLCC)<br>15 Vout models: <b>75 mVp-p typ.</b> (w/ 10 µF, 25 V MLCC) |
|  | - dual output                              | 12 / -12 Vout models: <b>75 / 75 mVp-p typ.</b> (w/ 10 µF, 25 V MLCC)<br>15 / -15 Vout models: <b>75 / 75 mVp-p typ.</b> (w/ 10 µF, 25 V MLCC)  |
| Capacitive Load                        | - single output                            | 5 Vout models: <b>680 µF max.</b><br>12 Vout models: <b>330 µF max.</b><br>15 Vout models: <b>220 µF max.</b>   |
|  | - dual output                              | 12 / -12 Vout models: <b>220 / 220 µF max.</b><br>15 / -15 Vout models: <b>220 / 220 µF max.</b>  |
| Minimum Load                           |  | <b>Not required</b>   |
| Temperature Coefficient                |  | <b>±0.02 %/K max.</b>   |
| Start-up Time                          |  | <b>60 ms max.</b>   |
| Short Circuit Protection               |  | <b>Continuous, Automatic recovery</b>   |
| Output Current Limitation              |  | <b>150% typ. of Iout max.</b>   |
| Transient Response                     | - Response Deviation                       | <b>3% typ. / 5% max.</b> (75% to 100% Load Step)  |
|  | - Response Time                            | <b>500 µs max.</b> (75% to 100% Load Step)  |

### Safety Specifications

|                  |                             |  |
|------------------|-----------------------------|--|
| Standards        | - IT / Multimedia Equipment | <b>EN 62368-1</b><br><b>IEC 62368-1</b><br><b>UL 62368-1</b>                               |
|                  | - Certification Documents   | <a href="http://www.tracopower.com/overview/thr3wi">www.tracopower.com/overview/thr3wi</a> |
| Pollution Degree |                             | <b>PD 2</b>  |

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

## EMC Specifications

|                     |                             |  |
|---------------------|-----------------------------|--|
| EMI (Emissions)     | - Conducted Emissions       | EN 55011 class A (internal filter)<br>EN 55032 class A (internal filter)<br>FCC 47 Part 15 class A (internal filter)   |
|                     | - Radiated Emissions        | EN 55011 class A (internal filter)<br>EN 55032 class A (internal filter)<br>FCC 47 Part 15 class A (internal filter)   |
| EMS (Immunity)      | - Electrostatic Discharge   | EN 55024 (IT Equipment)<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, 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   |
|                     | - Conducted RF Disturbances | Ext. input component: 24 Vin models: 470 µF chemi-con KY<br>48 Vin models: 330 µF chemi-con KY<br>110 Vin models: 220 µF chemi-con KY<br>EN 61000-4-6, 10 Vrms, 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   |
| EMC / Environmental | - Certification Documents   | <a href="http://www.tracopower.com/overview/thr3wi">www.tracopower.com/overview/thr3wi</a>   |

## General Specifications

|                           |                                 |   |
|---------------------------|---------------------------------|---|
| Relative Humidity         |                                 | 95% max. (non condensing)   |
| Temperature Ranges        | - Operating Temperature         | -40°C to +92°C  |
|                           | - Case Temperature              | +105°C max.   |
|                           | - Storage Temperature           | -50°C to +125°C   |
| Power Derating            | - High Temperature              | 4 %/K above 80°C  |
|                           |                                 | See application note: <a href="http://www.tracopower.com/overview/thr3wi">www.tracopower.com/overview/thr3wi</a>                  |
| Cooling System            |                                 | Natural convection (20 LFM)   |
| Altitude During Operation |                                 | 5'000 m max.  |
| Regulator Topology        |                                 | Flyback Converter   |
| Switching Frequency       |                                 | 150 - 190 kHz (PWM) (110 Vin models)<br>260 - 310 kHz (PWM) (other models)  |
| Insulation System         |                                 | Reinforced Insulation   |
| Working Voltage (rated)   |                                 | 250 VAC   |
| Isolation Test Voltage    | - Input to Output, 60 s         | 3'000 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               | 3'360'000 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                     | EN 61373  |
|                           | - Mechanical Shock              | EN 61373  |
| Housing Material          |                                 | Non-conductive Plastic (UL 94 V-0 rated)  |
| Base 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              |                                 | Plastic Case  |
| Mounting Type             |                                 | PCB Mount   |
| Connection Type           |                                 | THD (Through-Hole Device)   |
| Footprint Type            |                                 | DIP24   |
| Soldering Profile         |                                 | Lead-Free Wave Soldering<br>260°C / 10 s max.   |

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

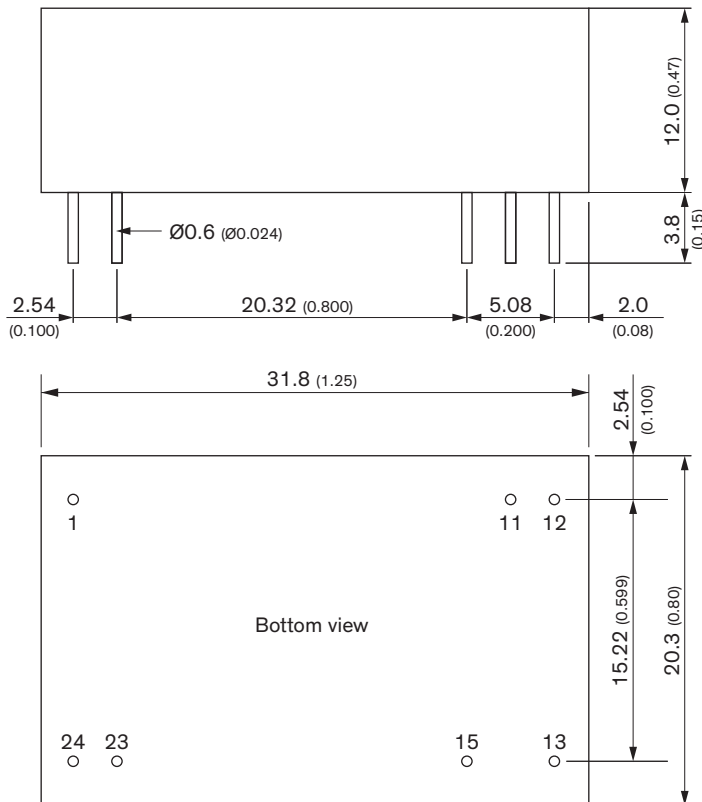
|  |   |
|--|---|
| Weight                                       | 15.4 g  |
| Environmental Compliance - REACH Declaration | <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a><br>REACH SVHC list compliant<br>REACH Annex XVII compliant   |
| - RoHS Declaration                           | <a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a><br>Exemptions: 7a<br>(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule)) |
| - SCIP Reference Number                      | 349433b6-2631-490a-8f38-b235a83230ea  |

### Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/thr3wi](http://www.tracopower.com/overview/thr3wi)

### Outline Dimensions



| Pinout |            |            |
|--------|------------|------------|
| Pin    | Single     | Dual       |
| 1      | +Vin (Vcc) | +Vin (Vcc) |
| 11     | No pin     | Common     |
| 12     | -Vout      | No pin     |
| 13     | +Vout      | -Vout      |
| 15     | No pin     | +Vout      |
| 23     | -Vin (GND) | -Vin (GND) |
| 24     | -Vin (GND) | -Vin (GND) |

Dimensions in mm (inch)  
Tolerances: x.x  $\pm 0.5$  ( $\pm 0.02$ )  
x.xx  $\pm 0.25$  ( $\pm 0.01$ )  
Pin diameter tolerances: x.x  $\pm 0.05$  (x.xx  $\pm 0.002$ )