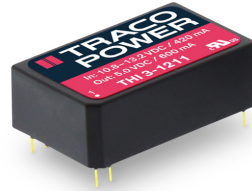


- Standard DIP-24 Package
- I/O isolation 4000 VACrms rated for 300 VACrms working voltage
- 2 x MOOP Medical safety according to AAMI/ANSI ES 60601-1:2005(R) and IEC/EN 60601-1 3rd edition
- Industrial safety to IEC/EN/UL 62368-1
- Operating temperature range -40°C to 75°C
- Fully regulated output voltage
- Input filter meets EN 55032, class A
- Short circuit protection
- 3-year product warranty



The THI 3 series is a new range of high isolation DC/DC converters with a reinforced insulation system. The I/O- isolation voltage is specified for 4000 VACrms. The circuit is encapsulated in a DIP-24 package. There are 15 models available for 5, 12 and 24 VDC input voltage and single or dual output voltage. The THI 3 DC/DC converters offer a cost effective solution for applications in industrial controls and medical instrumentation requiring a certified supplementary or reinforced insulation system to comply with industrial or latest medical safety standards.

| Models     |                                  |          |                  |          |                  |                 |
|------------|----------------------------------|----------|------------------|----------|------------------|-----------------|
| Order Code | Input Voltage Range              | Output 1 |                  | Output 2 |                  | Efficiency typ. |
|            |                                  | Vnom     | I <sub>max</sub> | Vnom     | I <sub>max</sub> |                 |
| THI 3-0511 | 4.5 - 5.5 VDC<br>(5 VDC nom.)    | 5 VDC    | 600 mA           |          |                  | 60 %            |
| THI 3-0512 |                                  | 12 VDC   | 250 mA           |          |                  | 62 %            |
| THI 3-0513 |                                  | 15 VDC   | 200 mA           |          |                  | 62 %            |
| THI 3-0522 |                                  | +12 VDC  | 125 mA           | -12 VDC  | 125 mA           | 60 %            |
| THI 3-0523 |                                  | +15 VDC  | 100 mA           | -15 VDC  | 100 mA           | 60 %            |
| THI 3-1211 | 10.8 - 13.2 VDC<br>(12 VDC nom.) | 5 VDC    | 600 mA           |          |                  | 60 %            |
| THI 3-1212 |                                  | 12 VDC   | 250 mA           |          |                  | 62 %            |
| THI 3-1213 |                                  | 15 VDC   | 200 mA           |          |                  | 62 %            |
| THI 3-1222 |                                  | +12 VDC  | 125 mA           | -12 VDC  | 125 mA           | 60 %            |
| THI 3-1223 |                                  | +15 VDC  | 100 mA           | -15 VDC  | 100 mA           | 60 %            |
| THI 3-2411 | 21.6 - 26.4 VDC<br>(24 VDC nom.) | 5 VDC    | 600 mA           |          |                  | 60 %            |
| THI 3-2412 |                                  | 12 VDC   | 250 mA           |          |                  | 64 %            |
| THI 3-2413 |                                  | 15 VDC   | 200 mA           |          |                  | 64 %            |
| THI 3-2422 |                                  | +12 VDC  | 125 mA           | -12 VDC  | 125 mA           | 60 %            |
| THI 3-2423 |                                  | +15 VDC  | 100 mA           | -15 VDC  | 100 mA           | 60 %            |

### Input Specifications

|                           |                |  |
|---------------------------|----------------|--|
| Input Current             | - At no load   | 5 Vin models: <b>130 mA typ.</b><br>12 Vin models: <b>60 mA typ.</b><br>24 Vin models: <b>40 mA typ.</b>   |
|                           | - At full load | 5 Vin models: <b>1'000 mA typ.</b><br>12 Vin models: <b>420 mA typ.</b><br>24 Vin models: <b>210 mA typ.</b>   |
| Surge Voltage             |                | 5 Vin models: <b>7.5 VDC max.</b> (1 s max.)<br>12 Vin models: <b>15 VDC max.</b> (1 s max.)<br>24 Vin models: <b>30 VDC max.</b> (1 s max.)   |
| Recommended Input Fuse    |                | 5 Vin models: <b>2'000 mA</b> (slow blow)<br>12 Vin models: <b>1'000 mA</b> (slow blow)<br>24 Vin models: <b>500 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>  |
| Short Circuit Input Power |                | <b>2.5 W max.</b>  |

### Output Specifications

|                          |                                      |  |
|--------------------------|--------------------------------------|--|
| Voltage Set Accuracy     |                                      | <b>±4% 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 (10 - 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>4% max.</b>   |
|                          | Ripple and Noise                     | - 20 MHz Bandwidth   |
| Capacitive Load          | - single output                      | 5 Vout models: <b>470 µF max.</b><br>12 Vout models: <b>470 µF max.</b><br>15 Vout models: <b>470 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>18 ms max.</b>  |
| Short Circuit Protection |                                      | <b>Continuous, Automatic recovery</b>  |

### Safety Specifications

|                       |                             |  |
|-----------------------|-----------------------------|--|
| Standards             | - IT / Multimedia Equipment | <b>CSA-C22.2, No. 60950-1</b><br><b>EN 60950-1</b><br><b>EN 62368-1</b><br><b>IEC 60950-1</b><br><b>IEC 62368-1</b><br><b>UL 60950-1</b><br><b>UL 62368-1</b>  |
|                       | - Medical Equipment         | <b>EN 60601-1</b><br><b>IEC 60601-1</b><br><b>ANSI/AAMI ES 60601-1</b><br><b>CSA-C22.2, No 60601-1</b><br><b>2 x MOOP</b> (Means Of Operator Protection)<br><a href="http://www.tracopower.com/overview/thi3">www.tracopower.com/overview/thi3</a> |
|                       | - Certification Documents   |  |
| Pollution Degree      |                             | <b>PD 2</b>  |
| Over Voltage Category |                             | <b>OVC II</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 55032 class A (internal filter) |
|               | - Radiated Emissions  | EN 55032 class A (internal filter) |

### General Specifications

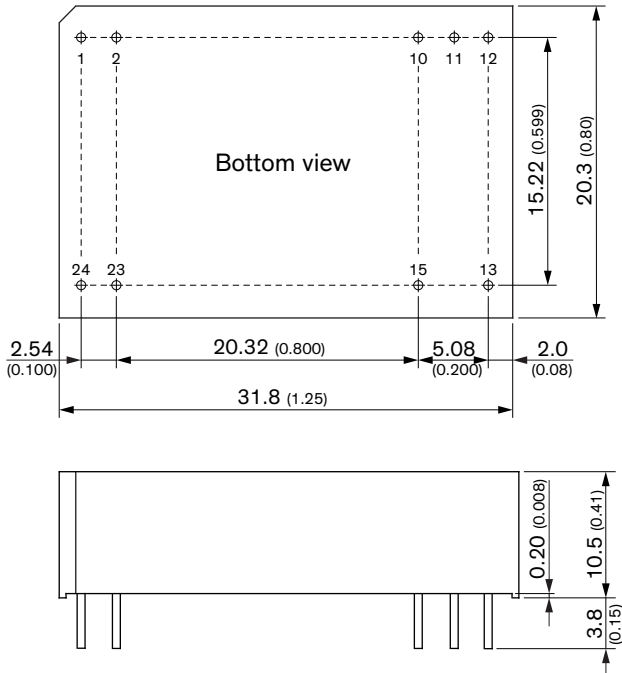
|                           |                                 |  |
|---------------------------|---------------------------------|--|
| Relative Humidity         |                                 | 95% max. (non condensing)  |
| Temperature Ranges        | - Operating Temperature         | -40°C to +75°C   |
|                           | - Case Temperature              | +95°C max.   |
|                           | - Storage Temperature           | -50°C to +125°C  |
| Power Derating            | - High Temperature              | 2.85 %/K above 60°C  |
|                           | See application note:           | <a href="http://www.tracopower.com/overview/thi3">www.tracopower.com/overview/thi3</a>   |
| Cooling System            |                                 | Natural convection (20 LFM)  |
| Altitude During Operation |                                 | 4'000 m max. (acc. to IEC/EN/UL 60601-1)<br>5'000 m max. (acc. to IEC/EN/UL 62368-1)   |
| Regulator Topology        |                                 | Push-Pull Converter  |
| Switching Frequency       |                                 | 25 - 75 kHz (PFM)<br>60 kHz typ. (PFM)   |
| Insulation System         |                                 | Reinforced Insulation  |
| Working Voltage (rated)   |                                 | 300 VAC  |
| Isolation Test Voltage    | - Input to Output, 60 s         | 4'000 VAC (acc. to IEC/EN 60601-1)<br>3'000 VAC (acc. to IEC/EN/UL 62368-1)  |
| Isolation Resistance      | - Input to Output, 500 VDC      | 10'000 MΩ min.   |
| Isolation Capacitance     | - Input to Output, 100 kHz, 1 V | 20 pF typ.   |
| Leakage Current           | - Touch Current                 | 2 μA max. (240 VAC, 60 Hz)   |
| Reliability               | - Calculated MTBF               | 1'000'000 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>  |
| Housing Material          |                                 | Plastic resin (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 (2.5 μm min.)   |
| Pin Surface Plating       |                                 | Gold (75 - 125 nm), glossy   |
| 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.  |
| Weight                    |                                 | 12.4 g   |
| Thermal Impedance         | - Case to Ambient               | 16.3 K/W typ.  |
| 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         | e5360cbc-6a16-41f4-a0c1-106f7a68dd67   |

### Supporting Documents

|  |  |
|--|--|
| Overview Link (for additional Documents) | <a href="http://www.tracopower.com/overview/thi3">www.tracopower.com/overview/thi3</a> |
|--|--|

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)  
 Pin diameter: 0.5 ±0.05 (0.02 ±0.002)  
 Tolerance: x.x ±0.25 (x.xx ±0.01)  
 x.xx ±0.13 (x.xxx ±0.005)

| Pinout |            |        |
|--------|------------|--------|
| Pin    | Single     | Dual   |
| 1      | +Vin (Vcc) |        |
| 2      | +Vin (Vcc) |        |
| 10     | No pin     | Common |
| 11     | No pin     | Common |
| 12     | -Vout      | No pin |
| 13     | +Vout      | -Vout  |
| 15     | No pin     | +Vout  |
| 23     | -Vin (GND) |        |
| 24     | -Vin (GND) |        |