

- High power density 25W converter  
Ultra compact design: 1.0" x 1.0" x 0.4"
- Shielded metal case with isolated baseplate
- Ultra wide 4:1 input voltage ranges
- Very high efficiency up to 90%
- Output voltage adjustable
- Remote On/Off control
- Operating temp. range  $-40^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$   
and up to  $+85^{\circ}\text{C}$  with heat-sink
- I/O isolation voltage 1500 VDC
- 3-year product warranty



The THL 25WI series is a generation of DC-DC converter modules with high power density. The product achieves 25 Watt output power and comes in a metal case with small dimensions of only 1.0"x 1.0"x 0.4". All models have a wide 4:1 input voltage range and precisely regulated output voltages. High efficiency of up to 90% makes this product very reliable and applicable in temperature ranges of up to  $+80^{\circ}\text{C}$  or up to  $+85^{\circ}\text{C}$  with optional mounted heat sink. Typical applications are in mobile equipments, 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 typ. |
|---------------|------------------------------|----------|------------------|----------|------------------|-----------------|
|               |                              | Vnom     | I <sub>max</sub> | Vnom     | I <sub>max</sub> |                 |
| THL 25-2410WI | 9 - 36 VDC<br>(24 VDC nom.)  | 3.3 VDC  | 6'000 mA         |          |                  | 87 %            |
| THL 25-2411WI |                              | 5 VDC    | 5'000 mA         |          |                  | 89 %            |
| THL 25-2412WI |                              | 12 VDC   | 2'090 mA         |          |                  | 89 %            |
| THL 25-2413WI |                              | 15 VDC   | 1'670 mA         |          |                  | 90 %            |
| THL 25-2422WI |                              | +12 VDC  | 1'040 mA         | -12 VDC  | 1'040 mA         | 89 %            |
| THL 25-2423WI |                              | +15 VDC  | 840 mA           | -15 VDC  | 840 mA           | 89 %            |
| THL 25-4810WI | 18 - 75 VDC<br>(48 VDC nom.) | 3.3 VDC  | 6'000 mA         |          |                  | 88 %            |
| THL 25-4811WI |                              | 5 VDC    | 5'000 mA         |          |                  | 90 %            |
| THL 25-4812WI |                              | 12 VDC   | 2'090 mA         |          |                  | 90 %            |
| THL 25-4813WI |                              | 15 VDC   | 1'670 mA         |          |                  | 90 %            |
| THL 25-4822WI |                              | +12 VDC  | 1'040 mA         | -12 VDC  | 1'040 mA         | 89 %            |
| THL 25-4823WI |                              | +15 VDC  | 840 mA           | -15 VDC  | 840 mA           | 89 %            |

### Options

|         |  |
|---------|--|
| THL-HS1 | - Optional Heat Sink: <a href="http://www.tracopower.com/overview/thl-hs1">www.tracopower.com/overview/thl-hs1</a> |
|---------|--|

## Input Specifications

|                          |                |  |
|--------------------------|----------------|--|
| Input Current            | - At no load   | 24 Vin models: <b>80 mA typ.</b><br>48 Vin models: <b>55 mA typ.</b>   |
|                          | - At full load | 24 Vin models: <b>950 mA typ.</b> (3.3 Vout model)<br><b>1'150 mA typ.</b> (5 Vout model)<br><b>1'150 mA typ.</b> (12 Vout model)<br><b>1'150 mA typ.</b> (15 Vout model)<br><b>1'150 mA typ.</b> (12 / -12 Vout model)<br><b>1'150 mA typ.</b> (15 / -15 Vout model)<br>48 Vin models: <b>450 mA typ.</b> (3.3 Vout model)<br><b>580 mA typ.</b> (5 Vout model)<br><b>580 mA typ.</b> (12 Vout model)<br><b>580 mA typ.</b> (15 Vout model)<br><b>580 mA typ.</b> (12 / -12 Vout model)<br><b>580 mA typ.</b> (15 / -15 Vout model) |
| Surge Voltage            |                | 24 Vin models: <b>50 VDC max.</b> (100 ms max.)<br>48 Vin models: <b>100 VDC max.</b> (100 ms max.)  |
| Reflected Ripple Current |                | 24 Vin models: <b>50 mA<sub>p-p</sub> typ.</b><br>48 Vin models: <b>30 mA<sub>p-p</sub> typ.</b>   |
| Recommended Input Fuse   |                | 24 Vin models: <b>2'500 mA</b> (slow blow)<br>48 Vin models: <b>1'250 mA</b> (slow blow)<br>(The need of an external fuse has to be assessed in the final application.)  |
| Input Filter             |                | <b>Internal LC-Type</b>  |

## Output Specifications

|  |  |  |
|--|--|--|
| Output Voltage Adjustment              |  | <b>±10%</b> (By external trim resistor)<br>See application note: <a href="http://www.tracopower.com/overview/thl25wi">www.tracopower.com/overview/thl25wi</a><br>Output power must not exceed rated power! |
| Voltage Set Accuracy                   |  | <b>±1% max.</b>  |
| Regulation                             | - Input Variation (Vmin - Vmax)            | single output models: <b>0.2% max.</b><br>dual output models: <b>0.2% max.</b>   |
|  | - Load Variation (0 - 100%)                | 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)   |
|  | - 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                            | 3.3 Vout models: <b>100 mVp-p max.</b> (w/ 1 µF MLCC    10 µF Tantalum)  |
|  |  | 5 Vout models: <b>100 mVp-p max.</b> (w/ 1 µF MLCC    10 µF Tantalum)  |
|  |  | 12 Vout models: <b>150 mVp-p max.</b> (w/ 1 µF MLCC    10 µF Tantalum)   |
|  |  | 15 Vout models: <b>150 mVp-p max.</b> (w/ 1 µF MLCC    10 µF Tantalum)   |
|  | - dual output                              | 12 / -12 Vout models: <b>150 / 150 mVp-p max.</b> (w/ 1 µF MLCC    10 µF Tantalum)   |
|  |  | 15 / -15 Vout models: <b>150 / 150 mVp-p max.</b> (w/ 1 µF MLCC    10 µF Tantalum)   |
| Capacitive Load                        | - single output                            | 3.3 Vout models: <b>10'300 µF max.</b>   |
|  |  | 5 Vout models: <b>6'800 µF max.</b>  |
|  |  | 12 Vout models: <b>1'200 µF max.</b>   |
|  |  | 15 Vout models: <b>750 µF max.</b>   |
|  | - dual output                              | 12 / -12 Vout models: <b>680 / 680 µF max.</b>   |
|  |  | 15 / -15 Vout models: <b>380 / 380 µF max.</b>   |

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 max. (Power On)<br>30 ms max. (Remote On)  |
| Short Circuit Protection  | Continuous, Automatic recovery   |
| Output Current Limitation | 150% typ. of I <sub>out</sub> max.   |
| Overvoltage Protection    | 118 - 125% of V <sub>out</sub> nom. (depending on model)<br>3.9 VDC typ. (3.3 Vout models)<br>6.2 VDC typ. (5.1 Vout models)<br>15 VDC typ. (12 Vout models)<br>18 VDC typ. (15 Vout models) |
| Transient Response        | - Response Deviation<br>- Response Time  |
|                           | 3% typ. / 5% max. (75% to 100% Load Step)<br>250 μs typ. (75% to 100% Load Step)   |

### Safety Specifications

|           |                             |  |
|-----------|-----------------------------|--|
| Standards | - IT / Multimedia Equipment | CSA-C22.2, No. 60950-1<br>EN 62368-1<br>IEC 62368-1<br>UL 62368-1                            |
|           | - Certification Documents   | <a href="http://www.tracopower.com/overview/thl25wi">www.tracopower.com/overview/thl25wi</a> |

### EMC Specifications

|                     |  |  |
|---------------------|--|--|
| EMI (Emissions)     | - Conducted Emissions<br>- Radiated Emissions                                    | EN 55032 class A (with external filter)<br>EN 55032 class A (with external filter)   |
|                     |  | External filter proposal: <a href="http://www.tracopower.com/overview/thl25wi">www.tracopower.com/overview/thl25wi</a>   |
| EMS (Immunity)      | - Electrostatic Discharge<br>- RF Electromagnetic Field<br>- EFT (Burst) / Surge | 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<br>EN 61000-4-3, 10 V/m, perf. criteria A<br>EN 61000-4-4, ±2 kV, perf. criteria A<br>EN 61000-4-5, ±1 kV, perf. criteria A |
|                     | - Conducted RF Disturbances<br>- PF Magnetic Field                               | Ext. input component: KY 220 μF, 100 V, ESR 48 mOhm<br>Continuous: EN 61000-4-6, 10 V <sub>rms</sub> , perf. criteria A<br>EN 61000-4-8, 3 A/m, perf. criteria A   |
| EMC / Environmental | - Certification Documents  | <a href="http://www.tracopower.com/overview/thl25wi">www.tracopower.com/overview/thl25wi</a>   |

### General Specifications

|                           |  |   |
|---------------------------|--|---|
| Relative Humidity         |  | 95% max. (non condensing)   |
| Temperature Ranges        | - Operating Temperature  | -40°C to +80°C<br>-40°C to +85°C (with Heat Sink)   |
|                           | - Case Temperature<br>- Storage Temperature  | +105°C max.<br>-50°C to +125°C  |
| Power Derating            | - High Temperature   | Depending on model  |
|                           |  | See application note: <a href="http://www.tracopower.com/overview/thl25wi">www.tracopower.com/overview/thl25wi</a>                          |
| Cooling System            |  | Natural convection (20 LFM)   |
| Remote Control            | - Voltage Controlled Remote (passive = on)<br>- Off Idle Input Current<br>- Remote Pin Input Current | On: 3.5 to 12 VDC or open circuit<br>Off: 0 to 1.2 VDC or short circuit<br>Refers to 'Remote' and '-Vin' Pin<br>3 mA typ.<br>-0.5 to 0.5 mA |
| Altitude During Operation |  | 6'000 m max.  |
| Switching Frequency       |  | 285 kHz typ. (PWM)  |
| Insulation System         |  | Functional Insulation   |
| Isolation Test Voltage    | - Input to Output, 60 s<br>- Input to Output, 1 s  | 1'500 VDC<br>1'800 VDC  |

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

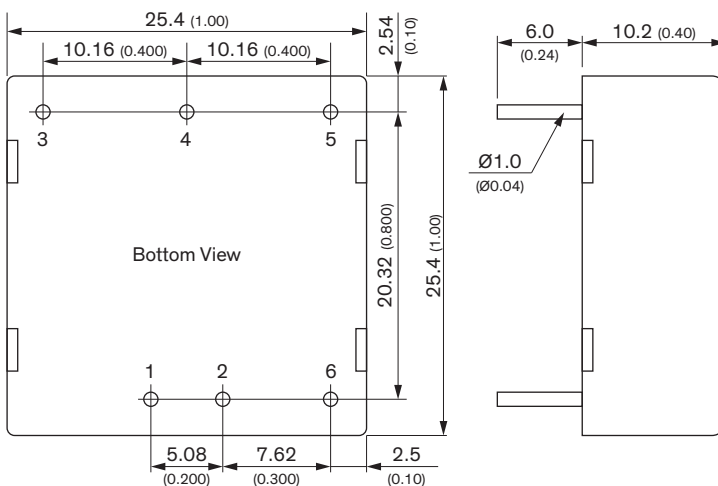
|                          |                                 |   |
|--------------------------|---------------------------------|---|
| Isolation Resistance     | - Input to Output, 500 VDC      | 1'000 M $\Omega$ min.   |
| Isolation Capacitance    | - Input to Output, 100 kHz, 1 V | 2'000 pF max.   |
| Reliability              | - Calculated MTBF               | 444'000 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         |                                 | Alu alloy, black anodized coating   |
| Base Material            |                                 | Non-conductive FR4 (UL 94 V-0 rated)  |
| Potting Material         |                                 | Epoxy (UL 94 V-0 rated)   |
| Pin Material             |                                 | Copper Alloy (C6801)  |
| Pin Foundation Plating   |                                 | Nickel (2.5 $\mu$ m min.)   |
| Pin Surface Plating      |                                 | Gold (75 - 125 nm), glossy  |
| 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 / 10 s max.   |
| Weight                   |                                 | 16.5 g  |
| Thermal Impedance        | - Case to Ambient               | 17.6 K/W typ.<br>14.8 K/W typ. (with Heat Sink)   |
| 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         | 8cb0eff2-677a-444b-b63b-898d682a98b8  |

### Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/thl25wi](http://www.tracopower.com/overview/thl25wi)

### Outline Dimensions



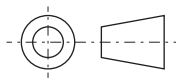
| Pinout |               |               |
|--------|---------------|---------------|
| Pin    | Single        | Dual          |
| 1      | +Vin (Vcc)    | +Vin (Vcc)    |
| 2      | -Vin (GND)    | -Vin (GND)    |
| 3      | +Vout         | +Vout         |
| 4      | Trim          | Common        |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

Dimensions in mm (inch)

Tolerances: x.x  $\pm$  0.5 (x.xx  $\pm$  0.02)

x.xx  $\pm$  0.25 (x.xxx  $\pm$  0.01)

Pin tolerances: x.x  $\pm$  0.05 (x.xx  $\pm$  0.002)



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

