DC/DC Converter

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°C or up to +85°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

<table>
<thead>
<tr>
<th>Order Code</th>
<th>Input Voltage Range</th>
<th>Output 1 Vnom</th>
<th>Imax</th>
<th>Output 2 Vnom</th>
<th>Imax</th>
<th>Efficiency typ.</th>
</tr>
</thead>
<tbody>
<tr>
<td>THL 25-2410WI</td>
<td>9 - 36 VDC</td>
<td>3.3 VDC</td>
<td>6'000 mA</td>
<td>-12 VDC</td>
<td>-1040 mA</td>
<td>87 %</td>
</tr>
<tr>
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<td>5 VDC</td>
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<td>-15 VDC</td>
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<td>THL 25-2411WI</td>
<td>9 - 36 VDC</td>
<td>3.3 VDC</td>
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<td>THL 25-2412WI</td>
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<tr>
<td>THL 25-2422WI</td>
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<td>THL 25-4810WI</td>
<td>18 - 75 VDC</td>
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<td>6'000 mA</td>
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<td>88 %</td>
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</tbody>
</table>

Options

### Input Specifications

<table>
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<tr>
<th>Input Current</th>
<th>24 Vin models: 80 mA typ.</th>
<th>48 Vin models: 55 mA typ.</th>
</tr>
</thead>
<tbody>
<tr>
<td>- At no load</td>
<td></td>
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<tr>
<td>- At full load</td>
<td>24 Vin models: 950 mA typ. (3.3 Vout model)</td>
<td>1'150 mA typ. (5 Vout model)</td>
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<tr>
<td></td>
<td></td>
<td>1'150 mA typ. (12 Vout model)</td>
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<td>1'150 mA typ. (15 Vout model)</td>
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<td>1'150 mA typ. (12 / -12 Vout model)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1'150 mA typ. (15 / -15 Vout model)</td>
</tr>
<tr>
<td>48 Vin models: 450 mA typ. (3.3 Vout model)</td>
<td>580 mA typ. (5 Vout model)</td>
<td>580 mA typ. (12 Vout model)</td>
</tr>
<tr>
<td></td>
<td>580 mA typ. (15 Vout model)</td>
<td>580 mA typ. (12 / -12 Vout model)</td>
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<tr>
<td></td>
<td>580 mA typ. (15 / -15 Vout model)</td>
<td></td>
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</tbody>
</table>

**Surge Voltage**
- 24 Vin models: 50 VDC max. (100 ms max)
- 48 Vin models: 100 VDC max. (100 ms max)

**Reflected Ripple Current**
- 48 Vin models: 30 mAp-p typ.

**Recommended Input Fuse**
- 24 Vin models: 2'500 mA (slow blow)
- 48 Vin models: 1'250 mA (slow blow)

(The need of an external fuse has to be assessed in the final application.)

**Input Filter**
- Internal LC-Type

### Output Specifications

**Output Voltage Adjustment**
- ±10% (By external trim resistor)
- See application note: www.tracopower.com/overview/thl25wi
- Output power must not exceed rated power!

**Voltage Set Accuracy**
- ±1% max.

**Regulation**
- Input Variation (Vmin – Vmax)
  - single output models: 0.2% max.
  - dual output models: 0.2% max.
- Load Variation (0 - 100%)
  - single output models: 0.2% max.
  - dual output models: 1% max. (Output 1)
  - 1% max. (Output 2)
- Voltage Balance (symmetrical load)
  - dual output models: 2% max.
- Cross Regulation (25% / 100% asym. load)
  - dual output models: 5% max.

**Ripple and Noise**
- single output
  - 3.3 Vout models: 100 mVp-p max. (w/ 1 µF MLCC || 10 µF Tantalum)
  - 5 Vout models: 100 mVp-p max. (w/ 1 µF MLCC || 10 µF Tantalum)
  - 12 Vout models: 150 mVp-p max. (w/ 1 µF MLCC || 10 µF Tantalum)
  - 15 Vout models: 150 mVp-p max. (w/ 1 µF MLCC || 10 µF Tantalum)
- dual output
  - 12 / -12 Vout models: 150 / 150 mVp-p max. (w/ 1 µF MLCC || 10 µF Tantalum)
  - 15 / -15 Vout models: 150 / 150 mVp-p max. (w/ 1 µF MLCC || 10 µF Tantalum)

**Capacitive Load**
- single output
  - 3.3 Vout models: 10’300 µF max.
  - 5 Vout models: 6’800 µF max.
  - 12 Vout models: 1’200 µF max.
  - 15 Vout models: 750 µF max.
- dual output
  - 12 / -12 Vout models: 680 / 680 µF max.
  - 15 / -15 Vout models: 380 / 380 µF max.

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

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Minimum Load
Not required

Temperature Coefficient
±0.02 %/K max.

Start-up Time
30 ms max. (Power On)
30 ms max. (Remote On)

Short Circuit Protection
Continuous, Automatic recovery

Output Current Limitation
150% typ. of Iout max.

Overvoltage Protection
118 - 125% of Vout nom. (depending on model)
3.9 VDC typ. (3.3 Vout models)
6.2 VDC typ. (5.1 Vout models)
15 VDC typ. (12 Vout models)
18 VDC typ. (15 Vout models)

Transient Response
- Response Deviation
3% typ. / 5% max. (75% to 100% Load Step)
- Response Time
250 µs typ. (75% to 100% Load Step)

Safety Specifications

Standards
- IT / Multimedia Equipment
  CSA-C22.2, No. 60950-1
  EN 62368-1
  IEC 62368-1
  UL 62368-1
- Certification Documents
  www.tracopower.com/overview/thl25wi

EMC Specifications

EMI Emissions
- Conducted Emissions
  EN 55032 class A (with external filter)
- Radiated Emissions
  EN 55032 class A (with external filter)
  External filter proposal: www.tracopower.com/overview/thl25wi

EMS Immunity
- Electrostatic Discharge
  Air: EN 61000-4-2, ±8 kV, perf. criteria A
  Contact: EN 61000-4-2, ±6 kV, perf. criteria A
- RF Electromagnetic Field
  EN 61000-4-3, 10 V/m, perf. criteria A
  EN 61000-4-4, ±2 kV, perf. criteria A
  EN 61000-4-5, ±1 kV, perf. criteria A
- EFT (Burst) / Surge
  Ext. input component: KY 220 µF, 100 V, ESR 48 mOhm
- Conducted RF Disturbances
  EN 61000-4-6, 10 Vrms, perf. criteria A
- PF Magnetic Field
  Continuous: EN 61000-4-8, 3 A/m, perf. criteria A

General Specifications

Relative Humidity
95% max. (non condensing)

Temperature Ranges
- Operating Temperature
  -40°C to +80°C
- Case Temperature
  -40°C to +85°C (with Heat Sink)
  +105°C max.
- Storage Temperature
  -50°C to +125°C

Power Derating
- High Temperature
  Depending on model
  See application note: www.tracopower.com/overview/thl25wi

Cooling System
Natural convection (20 LFM)

Remote Control
- Voltage Controlled Remote
  (passive = on)
  On: 3.5 to 12 VDC or open circuit
  Off: 0 to 1.2 VDC or short circuit
  Refers to 'Remote' and '-'Vin' Pin
  3 mA typ. = 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
  1'500 VDC
- Input to Output, 1 s
  1'800 VDC

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

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**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
444'000 h (MIL-HDBK-217F, ground benign)

**Washing Process**
According to Cleaning Guideline
www.tracopower.com/info/cleaning.pdf

**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 Foundation Plating**
Nickel (2.5 µm 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
260°C / 10 s max.

**Weight**
16.5 g

**Thermal Impedance** - Case to Ambient
17.6 K/W typ.
14.8 K/W typ. (with Heat Sink)

**Environmental Compliance** - REACH Declaration
www.tracopower.com/info/reach-declaration.pdf
REACH SVHC list compliant
REACH Annex XVII compliant

- RoHS Declaration
www.tracopower.com/info/rohs-declaration.pdf
Exemptions: 7a
(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

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**Outline Dimensions**

**Pinout**

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<thead>
<tr>
<th>Pin</th>
<th>Single</th>
<th>Dual</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+Vin (Vcc)</td>
<td>+Vin (Vcc)</td>
</tr>
<tr>
<td>2</td>
<td>–Vin (GND)</td>
<td>–Vin (GND)</td>
</tr>
<tr>
<td>3</td>
<td>+Vout</td>
<td>+Vout</td>
</tr>
<tr>
<td>4</td>
<td>Trim</td>
<td>Common</td>
</tr>
<tr>
<td>5</td>
<td>–Vout</td>
<td>–Vout</td>
</tr>
<tr>
<td>6</td>
<td>Remote On/Off</td>
<td>Remote On/Off</td>
</tr>
</tbody>
</table>

Dimensions in mm (inch)
Tolerances: x.x ±0.5 (x.xx ±0.02)

Dimensions in mm (inch)
Tolerances: x.x ±0.25 (x.xxx ±0.01)

Pin tolerances: x.x ±0.05 (x.xx ±0.002)