DC/DC Converter

THN 30WI Series, 30 Watt

- Highest power density 30 W Converter!
  Ultra compact size: 1.0" x 1.0" x 0.4"
- Shielded metal case with isolated baseplate
- Ultrawide 4:1 input voltage range
- Very high efficiency across full load range up to 92%
- Over temperature protection
- Operating temp. range: -40°C to +80°C and up to 85°C with heat sink
- Ultra low no load input current
- Remote On/Off control and output voltage adjustable
- I/O isolation voltage 1600 VDC
- 3-year product warrenty

The THN 30WI series is the latest generation of high performance DC/DC converter modules with highest power density. The product achieves 30 W output power while it comes in a metal case with dimensions of only 1.0" x 1.0" x 0.4". All models have an ultra wide 4:1 input voltage range and precisely regulated output voltages, even under no load conditions. Highest efficiency across full load range makes this product very reliable and applicable in temperature ranges of up to 85°C. With a low input current at minimal load and remote On/-Off control these converters are the ideal solution for battery-operated systems. 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</th>
<th>Output 2</th>
<th>Efficiency typ.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vnom</td>
<td>Imax</td>
<td>Vnom</td>
<td>Imax</td>
</tr>
<tr>
<td>THN 30-2410WI</td>
<td>3.3 VDC</td>
<td>7'000 mA</td>
<td>-12 VDC</td>
<td>1'250 mA</td>
</tr>
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<td>THN 30-2411WI</td>
<td>3.3 VDC</td>
<td>7'000 mA</td>
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</tr>
<tr>
<td>THN 30-2411WI-A1</td>
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<td>-12 VDC</td>
<td>1'250 mA</td>
</tr>
<tr>
<td>THN 30-2412WI</td>
<td>5 VDC</td>
<td>6'000 mA</td>
<td>-12 VDC</td>
<td>1'250 mA</td>
</tr>
<tr>
<td>THN 30-2413WI</td>
<td>5 VDC</td>
<td>6'000 mA</td>
<td>-12 VDC</td>
<td>1'250 mA</td>
</tr>
<tr>
<td>THN 30-2415WI</td>
<td>12 VDC</td>
<td>2'500 mA</td>
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</tr>
<tr>
<td>THN 30-2422WI</td>
<td>12 VDC</td>
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</tr>
<tr>
<td>THN 30-2423WI</td>
<td>15 VDC</td>
<td>2'000 mA</td>
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</tr>
<tr>
<td>THN 30-2425WI</td>
<td>24 VDC</td>
<td>1'250 mA</td>
<td>1'250 mA</td>
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</tr>
<tr>
<td>THN 30-4810WI</td>
<td>18 - 75 VDC (48 VDC nom.)</td>
<td>3.3 VDC</td>
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</tbody>
</table>

### Options

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
</table>

Note:
- **Suffix -A1**: Adjustable output up to 6 VDC, suitable for low ripple & noise applications in conjunction with an LDO regulator.
- **±24 Vout models**: The output can also be used in serial circuit for single 48 VDC operation.
### Input Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>24 Vin models</th>
<th>48 Vin models</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input Current</strong></td>
<td>10 mA typ.</td>
<td>8 mA typ.</td>
</tr>
<tr>
<td><strong>Surge Voltage</strong></td>
<td>50 VDC max. (1 s max)</td>
<td>100 VDC max. (1 s max)</td>
</tr>
<tr>
<td><strong>Under Voltage Lockout</strong></td>
<td>7.5 VDC min. / 8 VDC typ. / 8.8 VDC max.</td>
<td>15.5 VDC min. / 16 VDC typ. / 17.5 VDC max.</td>
</tr>
<tr>
<td><strong>Reflected Ripple Current</strong></td>
<td>30 mAp-p typ.</td>
<td>30 mAp-p typ.</td>
</tr>
<tr>
<td><strong>Recommended Input Fuse</strong></td>
<td>6'000 mA (Slow blow)</td>
<td>3'000 mA (Slow blow)</td>
</tr>
</tbody>
</table>

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

### Output Specifications

**Voltage Set Accuracy**

<table>
<thead>
<tr>
<th>Regulation</th>
<th>single output</th>
<th>dual output</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input Variation (Vmin - Vmax)</strong></td>
<td>0.2% max.</td>
<td>0.5% max.</td>
</tr>
<tr>
<td><strong>Load Variation (0 - 100%)</strong></td>
<td>0.2% max.</td>
<td>1% max. (Output 1)</td>
</tr>
<tr>
<td><strong>Cross Regulation</strong></td>
<td>5% max.</td>
<td></td>
</tr>
</tbody>
</table>

(25% / 100% asym. load)

**Ripple and Noise**

(20 MHz Bandwidth)

<table>
<thead>
<tr>
<th>Vout models</th>
<th>AC Ripple Noise (20 MHz Bandwidth)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.3 Vout</td>
<td>75 mVp-p typ. (w/ 22 µF, 25 V, X7R)</td>
</tr>
<tr>
<td>5 Vout</td>
<td>75 mVp-p typ. (w/ 22 µF, 25 V, X7R)</td>
</tr>
<tr>
<td>12 Vout</td>
<td>75 mVp-p typ. (w/ 2x 22 µF, 25 V, X7R)</td>
</tr>
<tr>
<td>15 Vout</td>
<td>75 mVp-p typ. (w/ 2x 22 µF, 25 V, X7R)</td>
</tr>
<tr>
<td>24 Vout</td>
<td>75 mVp-p typ. (w/ 2x 6.8 µF, 50 V, X7R)</td>
</tr>
</tbody>
</table>

**Capacitive Load**

<table>
<thead>
<tr>
<th>Vout models</th>
<th>Flux Capacitance (µF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.3 Vout</td>
<td>10'000 µF max.</td>
</tr>
<tr>
<td>5 Vout</td>
<td>7'200 µF max.</td>
</tr>
<tr>
<td>12 Vout</td>
<td>1'200 µF max.</td>
</tr>
<tr>
<td>15 Vout</td>
<td>1'000 µF max.</td>
</tr>
<tr>
<td>24 Vout</td>
<td>375 µF max.</td>
</tr>
</tbody>
</table>

**Minimum Load**

Not required

**Temperature Coefficient**

±0.02 %/K max.

**Start-up Time**

30 ms max.

**Short Circuit Protection**

Continuous, Automatic recovery

**Output Current Limitation**

150 - 205% of Iout max.

170% typ. of Iout max.

**Overvoltage Protection**

112 - 164% of Vout nom.

**Transient Response**

- Response Time: 250 µs typ. (25% Load Step)

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

**Safety Standards**
- IT / Multimedia Equipment
  - EN 60950-1
  - EN 62368-1
  - IEC 60950-1
  - IEC 62368-1
  - UL 60950-1
  - UL 62368-1
- Certification Documents
  - www.tracopower.com/overview/thn30wi

**Pollution Degree**
- PD 2

**Over Voltage Category**
- OVC I

**EMC Specifications**

**EMI Emissions**
- Conducted Emissions
  - EN 55032 class A (with external filter)
  - EN 55032 class B (with external filter)
- Radiated Emissions
  - EN 55032 class A (with external filter)
  - EN 55032 class B (with external filter)
  - External filter proposal: www.tracopower.com/overview/thn30wi

**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
  - EFT (Burst) / Surge
  - EN 61000-4-4, ±2 kV, perf. criteria A
  - EN 61000-4-5, ±2 kV, perf. criteria A
  - Ext. input component: 24 Vin models: 220 µF, 100 V // TVS SMDJ58A
    - 48 Vin models: 220 µF, 100 V
  - Conducted RF Disturbances
  - PF Magnetic Field
    - Continuous: EN 61000-4-6, 10 Vrms, perf. criteria A
    - 1 s: EN 61000-4-8, 100 A/m, perf. criteria A

**General Specifications**

**Relative Humidity**
- 95% max. (non condensing)

**Temperature Ranges**
- Operating Temperature
  - −40°C to +80°C
- Case Temperature
  - +105°C max.
- Storage Temperature
  - −55°C to +125°C

**Power Derating**
- High Temperature
  - 2.2 %/K above 55°C
  - 2.5 %/K above 60°C (with Heat Sink)

**Over Temperature Protection Switch Off**
- Protection Mode
  - 105°C min. / 130°C typ. / 115°C max. (Automatic recovery at 100°C typ.)
  - Case

**Cooling System**
- Natural convection (20 LFM)

**Remote Control**
- Voltage Controlled Remote
  - On: 3.0 to 15 VDC or open circuit
  - Off: 0 to 1.2 VDC or short circuit
  - Refers to 'Remote' and '-'Vin' Pin
  - 2 mA max.
  - Remote pin input current
    - −0.5 to 1.0 mA

**Altitude During Operation**
- 5000 m max.

**Switching Frequency**
- 275 kHz typ. (PWM) (+10%, 3.3 & 5 Vout model)
- 330 kHz typ. (PWM) (+10%, other models)

**Insulation System**
- Functional insulation

**Isolation Test Voltage**
- Input to Output, 60 s
  - 1'600 VDC
  - Input to Case, 60 s
  - 1'000 VDC
  - Output to Case, 60 s
  - 1'000 VDC

**Isolation Resistance**
- Input to Output, 600 VDC
  - 1'000 MΩ min.

**Isolation Capacitance**
- Input to Output, 100 kHz, 1 V
  - 1'500 pF max.

**Reliability**
- Calculated MTBF
  - 1'200'000 h (MIL-HDBK-217F, ground benign)

**Environment**
- Vibration
- Thermal Shock
  - MIL-STD-810F
  - MIL-STD-810F

All specifications valid at nominal voltage, full load and +25°C after warm-up time unless otherwise stated.
THN 30WI Series, 30 Watt

Housing Material: Copper
Base Material: Non-conductive FR4 (UL94 V-0 rated)
Potting Material: Silicone (UL 94 V-0 rated)
Pin Material: Copper

Pin Foundation Plating: Nickel (2 – 3 µm)
Pin Surface Plating: Tin (3 – 5 µm), matte
Soldering Profile: 265°C / 10 s max.
Connection Type: THD (Through-Hole Device)

Weight: 16.5 g
Thermal Impedance: 15 K/W
13.8 K/W (with Heat Sink)

Environmental Compliance
- REACH Declaration: www.tracopower.com/info/reach-declaration.pdf
- RoHS Declaration: www.tracopower.com/info/rohs-declaration.pdf
Exemptions: 7a
(REACH SVHC list compliant
REACH Annex XVII compliant
(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (OEAA rule).
The SCIP number is provided on request.)

Supporting Documents
Overview Link (for additional Documents): www.tracopower.com/overview/thn30wi

Outline Dimensions

Dimensions in mm (inch)
Tolerances: ±0.5 (±0.02)
Pin pitch tolerances ±0.25 (±0.01)
Pin diameter Ø 1.0 (0.04)

Pinout

<table>
<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>