The THD 12WI series is a range of high performance, isolated 12W DC/DC converter modules featuring ultra wide 4:1 input voltage ranges in a DIP-24 package with industry-standard footprint. Overload and overvoltage protection as well as remote On/Off are included as standard. Built-in filters for both input and output minimizes the need of external filtering. Full SMD-design with exclusive use of ceramic capacitors guarantees a high reliability and long product lifetime. Typical applications for these converters are industrial electronics, instrumentation, data communication systems and battery operated equipment with limited space available on the PCB.

Models

<table>
<thead>
<tr>
<th>Order Code</th>
<th>Input Voltage Range</th>
<th>Output 1</th>
<th>Output 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vnom</td>
<td>Imax</td>
<td>Vnom</td>
</tr>
<tr>
<td>THD 12-2410WI</td>
<td>3.3 VDC</td>
<td>3'500 mA</td>
<td></td>
</tr>
<tr>
<td>THD 12-2411WI</td>
<td>5.1 VDC</td>
<td>2'400 mA</td>
<td></td>
</tr>
<tr>
<td>THD 12-2412WI</td>
<td>12 VDC</td>
<td>1'000 mA</td>
<td></td>
</tr>
<tr>
<td>THD 12-2413WI</td>
<td>15 VDC</td>
<td>800 mA</td>
<td></td>
</tr>
<tr>
<td>THD 12-2421WI</td>
<td>+5 VDC</td>
<td>1'200 mA</td>
<td></td>
</tr>
<tr>
<td>THD 12-2422WI</td>
<td>+12 VDC</td>
<td>500 mA</td>
<td></td>
</tr>
<tr>
<td>THD 12-2423WI</td>
<td>+15 VDC</td>
<td>400 mA</td>
<td></td>
</tr>
<tr>
<td>THD 12-4810WI</td>
<td>3.3 VDC</td>
<td>3'500 mA</td>
<td></td>
</tr>
<tr>
<td>THD 12-4811WI</td>
<td>5.1 VDC</td>
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<td>THD 12-4823WI</td>
<td>+15 VDC</td>
<td>400 mA</td>
<td></td>
</tr>
</tbody>
</table>
### Input Specifications

#### Input Current
- **At no load**
  - 24 Vin models: 55 mA typ. (3.3 Vout model)
  - 55 mA typ. (5.1 Vout model)
  - 15 mA typ. (12 Vout model)
  - 15 mA typ. (15 Vout model)
  - 15 mA typ. (5 / -5 Vout model)
  - 15 mA typ. (12 / -12 Vout model)
  - 15 mA typ. (15 / -15 Vout model)
- **At full load**
  - 24 Vin models: 20 mA typ. (3.3 Vout model)
  - 20 mA typ. (5.1 Vout model)
  - 7 mA typ. (12 Vout model)
  - 7 mA typ. (15 Vout model)
  - 7 mA typ. (5 / -5 Vout model)
  - 7 mA typ. (12 / -12 Vout model)
  - 7 mA typ. (15 / -15 Vout model)

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

#### Under Voltage Lockout
- 24 Vin models: 7 VDC min. / 8 VDC typ. / 8.8 VDC max.
- 48 Vin models: 15 VDC min. / 16 VDC typ. / 17.5 VDC max.

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

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

### Output Specifications

#### Voltage Set Accuracy
<table>
<thead>
<tr>
<th>Voltage Set Accuracy</th>
<th>±1.2% max.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Regulation</strong></td>
<td></td>
</tr>
<tr>
<td>- Input Variation (Vmin - Vmax)</td>
<td>single output models: 0.2% max.</td>
</tr>
<tr>
<td></td>
<td>dual output models: 0.2% max.</td>
</tr>
<tr>
<td>- Load Variation (0 - 100%)</td>
<td>single output models: 0.5% max.</td>
</tr>
<tr>
<td></td>
<td>dual output models: 1% max. (Output 1)</td>
</tr>
<tr>
<td></td>
<td>1% max. (Output 2)</td>
</tr>
<tr>
<td>- Cross Regulation (25% / 100% asym. load)</td>
<td>dual output models: 5% max.</td>
</tr>
<tr>
<td><strong>Ripple and Noise</strong></td>
<td></td>
</tr>
<tr>
<td>- 20 MHz Bandwidth</td>
<td>85 mVp-p typ.</td>
</tr>
</tbody>
</table>

#### Capacitive Load
- **Single output**
  - 3.3 Vout models: 2'000 µF max.
  - 5.1 Vout models: 2'000 µF max.
  - 12 Vout models: 430 µF max.
  - 15 Vout models: 300 µF max.
- **Dual output**
  - 5 / -5 Vout models: 1'250 / 1'250 µF max.
  - 12 / -12 Vout models: 200 / 200 µF max.
  - 15 / -15 Vout models: 120 / 120 µF max.

#### Minimum Load
- Not required

#### Temperature Coefficient
- ±0.02 %/K max.

#### Start-up Time
- 450 ms typ. (Power On)
- 5 ms typ. (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)

All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.
- Transient Response
  - Response Deviation: 5% max. (75% to 100% Load Step)
  - Response Time: 250 µs typ. (75% to 100% Load Step)

### 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/thd12wi

**Pollution Degree**
- PD 2

**Over Voltage Category**
- Not mains connected

### 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)

**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
  - EFT (Burst) / Surge
  - 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
- Conducted RF Disturbances
  - Continuous: EN 61000-4-6, 10 Vrms, perf. criteria A
  - Ext. input component: Nippon chemi-con KY 220 µF, 100 V
- PF Magnetic Field
  - Ext. input component: Nippon chemi-con KY 220 µF, 100 V

**General Specifications**

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

**Temperature Ranges**
- Operating Temperature
  - -40°C to +85°C
- Case Temperature
  - +105°C max.
- Storage Temperature
  - -55°C to +125°C

**Power Derating**
- High Temperature
  - 2.2 %/K above 60°C (3.3 & 5.1 Vout models)
  - 2.5 %/K above 65°C (other models)

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

**Remote Control**
- Voltage Controlled Remote
- Off Idle Input Current
  - 2.5 mA typ.
- Remote Pin Input Current
  - -0.5 to 0.5 mA

**Altitude During Operation**
- 4'000 m max.

**Switching Frequency**
- 360 - 440 kHz (PWM)
- 400 kHz typ. (PWM)

**Insulation System**
- Functional Insulation

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

**Isolation Resistance**
- Input to Output, 500 VDC
  - 1'000 MΩ min.

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

**Reliability**
- Calculated MTBF
  - 2'090'000 h (MIL-HDBK-217F, ground benign)

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

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

**Base Material**
Non-conductive FR4 (UL 94 V-0 rated)

**Potting Material**
Epoxy (UL 94 V-0 rated)

**Pin Material**
Copper

**Pin Foundation Plating**
Nickel (2 – 3 µm)

**Pin Surface Plating**
Tin (3 – 5 µm), matte

**Housing Type**
Metal Case

**Mounting Type**
PCB Mount

**Connection Type**
THD (Through-Hole Device)

**Footprint Type**
DIP24

**Soldering Profile**
245°C / 10 s max.

**Weight**
18 g

**Thermal Impedance**
20 K/W

**Environmental Compliance**
- REACH Declaration
  [www.tracopower.com/info/reach-declaration.pdf](http://www.tracopower.com/info/reach-declaration.pdf)
- RoHS Declaration

Exemptions: '7a, 7c-4
(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule). The SCIP number is provided on request.)

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**Supporting Documents**

**Overview Link** (for additional Documents)
[www.tracopower.com/overview/thd12wi](http://www.tracopower.com/overview/thd12wi)

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**Outline Dimensions**

![Outline Dimensions Diagram](image)

**Pinout**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Single</th>
<th>Dual</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remote On/Off</td>
<td>Remote On/Off</td>
</tr>
<tr>
<td>2</td>
<td>–Vin (GND)</td>
<td>–Vin (GND)</td>
</tr>
<tr>
<td>3</td>
<td>–Vin (GND)</td>
<td>–Vin (GND)</td>
</tr>
<tr>
<td>9</td>
<td>NC</td>
<td>Common</td>
</tr>
<tr>
<td>11</td>
<td>NC</td>
<td>–Vout</td>
</tr>
<tr>
<td>14</td>
<td>+Vout</td>
<td>+Vout</td>
</tr>
<tr>
<td>16</td>
<td>–Vout</td>
<td>Common</td>
</tr>
<tr>
<td>22</td>
<td>+Vin (Vcc)</td>
<td>+Vin (Vcc)</td>
</tr>
<tr>
<td>23</td>
<td>+Vin (Vcc)</td>
<td>+Vin (Vcc)</td>
</tr>
</tbody>
</table>

**Pinout Details**
- NC: Not Connected

**Dimensions in mm (inch)**
- Insulated baseplate
  - 3.8 (0.15)
  - 10.22 (0.40)

- Bottom view
  - 2.54 (0.10)
  - 15.24 (0.6)
  - 20.32 (0.8)

**Tolerances:**
- ±0.5 (±0.02)
- ±0.25 (±0.01)
- Pin Ø 0.5 ±0.1 (0.02 ±0.004)

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