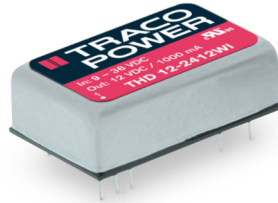


- Ultra-wide 4:1 input range
- High efficiency up to 85%
- I/O isolation 1500V
- Remote On/Off
- Under voltage lock-out circuit
- Shielded metal case with insulated Baseplate
- Continuous short-circuit protection
- Operating temp. range  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- 3-year product warranty



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

| Order Code    | Input Voltage Range          | Output 1 |                  | Output 2 |                  | Efficiency typ. |
|---------------|------------------------------|----------|------------------|----------|------------------|-----------------|
|               |                              | Vnom     | I <sub>max</sub> | Vnom     | I <sub>max</sub> |                 |
| THD 12-2410WI | 9 - 36 VDC<br>(24 VDC nom.)  | 3.3 VDC  | 3'500 mA         |          |                  | 84 %            |
| THD 12-2411WI |                              | 5.1 VDC  | 2'400 mA         |          |                  | 87 %            |
| THD 12-2412WI |                              | 12 VDC   | 1'000 mA         |          |                  | 87 %            |
| THD 12-2413WI |                              | 15 VDC   | 800 mA           |          |                  | 87 %            |
| THD 12-2421WI |                              | +5 VDC   | 1'200 mA         | -5 VDC   | 1'200 mA         | 84 %            |
| THD 12-2422WI |                              | +12 VDC  | 500 mA           | -12 VDC  | 500 mA           | 87 %            |
| THD 12-2423WI |                              | +15 VDC  | 400 mA           | -15 VDC  | 400 mA           | 87 %            |
| THD 12-4810WI | 18 - 75 VDC<br>(48 VDC nom.) | 3.3 VDC  | 3'500 mA         |          |                  | 84 %            |
| THD 12-4811WI |                              | 5.1 VDC  | 2'400 mA         |          |                  | 87 %            |
| THD 12-4812WI |                              | 12 VDC   | 1'000 mA         |          |                  | 87 %            |
| THD 12-4813WI |                              | 15 VDC   | 800 mA           |          |                  | 88 %            |
| THD 12-4821WI |                              | +5 VDC   | 1'200 mA         | -5 VDC   | 1'200 mA         | 85 %            |
| THD 12-4822WI |                              | +12 VDC  | 500 mA           | -12 VDC  | 500 mA           | 87 %            |
| THD 12-4823WI |                              | +15 VDC  | 400 mA           | -15 VDC  | 400 mA           | 87 %            |

## Input Specifications

|                        |                |                                                                                                                                                                                                                                                 |
|------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input Current          | - At no load   | 24 Vin models: 55 mA typ. (3.3 Vout model)<br>55 mA typ. (5.1 Vout model)<br>15 mA typ. (12 Vout model)<br>15 mA typ. (15 Vout model)<br>15 mA typ. (5 / -5 Vout model)<br>15 mA typ. (12 / -12 Vout model)<br>15 mA typ. (15 / -15 Vout model) |
|                        | - At full load | 48 Vin models: 20 mA typ. (3.3 Vout model)<br>20 mA typ. (5.1 Vout model)<br>7 mA typ. (12 Vout model)<br>7 mA typ. (15 Vout model)<br>7 mA typ. (5 / -5 Vout model)<br>7 mA typ. (12 / -12 Vout model)<br>7 mA typ. (15 / -15 Vout model)      |
| Surge Voltage          |                | 24 Vin models: 50 VDC max. (100 ms max.)<br>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.<br>48 Vin models: 15 VDC min. / 16 VDC typ. / 17.5 VDC max.                                                                                                                               |
| Recommended Input Fuse |                | 24 Vin models: 2'500 mA (slow blow)<br>48 Vin models: 1'250 mA (slow blow)<br>(The need of an external fuse has to be assessed in the final application.)                                                                                       |
| Input Filter           |                | Internal Pi-Type                                                                                                                                                                                                                                |

## Output Specifications

|                           |                                            |                                                                                                                                                                                  |
|---------------------------|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Voltage Set Accuracy      |                                            | ±1.2% max.                                                                                                                                                                       |
| Regulation                | - Input Variation (Vmin - Vmax)            | single output models: 0.2% max.<br>dual output models: 0.2% max.                                                                                                                 |
|                           | - Load Variation (0 - 100%)                | single output models: 0.5% max.<br>dual output models: 1% max. (Output 1)<br>1% max. (Output 2)                                                                                  |
|                           | - Cross Regulation (25% / 100% asym. load) | dual output models: 5% max.                                                                                                                                                      |
| Ripple and Noise          | - 20 MHz Bandwidth                         | 85 mVp-p typ.                                                                                                                                                                    |
| Capacitive Load           | - single output                            | 3.3 Vout models: 2'000 µF max.<br>5.1 Vout models: 2'000 µF max.<br>12 Vout models: 430 µF max.<br>15 Vout models: 300 µF max.                                                   |
|                           | - dual output                              | 5 / -5 Vout models: 1'250 / 1'250 µF max.<br>12 / -12 Vout models: 200 / 200 µF max.<br>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)<br>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)<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) |

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 $\mu$ s typ. (75% to 100% Load Step) |

## Safety Specifications

|                       |                             |                                                                                                      |
|-----------------------|-----------------------------|------------------------------------------------------------------------------------------------------|
| Standards             | - IT / Multimedia Equipment | EN 60950-1<br>EN 62368-1<br>IEC 60950-1<br>IEC 62368-1<br>UL 60950-1<br>UL 62368-1                   |
|                       | - Certification Documents   | <a href="http://www.tracopower.com/thd12wi-safety-cert/">www.tracopower.com/thd12wi-safety-cert/</a> |
| Energy Source         | - Output, acc. to 62368-1   | ES1                                                                                                  |
| Power Source          | - Output, acc. to 62368-1   | PS1                                                                                                  |
| Pollution Degree      |                             | PD 2                                                                                                 |
| Over Voltage Category |                             | Not mains connected                                                                                  |

## EMC Specifications

|                 |                             |                                                                                                        |
|-----------------|-----------------------------|--------------------------------------------------------------------------------------------------------|
| EMI (Emissions) | - Conducted Emissions       | EN 55032 class A (with external filter)<br>EN 55032 class B (with external filter)                     |
|                 | - Radiated Emissions        | EN 55032 class A (with external filter)<br>EN 55032 class B (with external filter)                     |
|                 | External filter proposal:   | <a href="http://www.tracopower.com/thd12wi-emc-filter/">www.tracopower.com/thd12wi-emc-filter/</a>     |
| EMS (Immunity)  |                             | EN 55024 (IT Equipment)<br>EN 55035 (Multimedia)                                                       |
|                 | - Electrostatic Discharge   | Air: EN 61000-4-2, $\pm 8$ kV, perf. criteria A<br>Contact: EN 61000-4-2, $\pm 6$ kV, perf. criteria A |
|                 | - RF Electromagnetic Field  | EN 61000-4-3, 10 V/m, perf. criteria A                                                                 |
|                 | - EFT (Burst) / Surge       | EN 61000-4-4, $\pm 2$ kV, perf. criteria A<br>EN 61000-4-5, $\pm 1$ kV, perf. criteria A               |
|                 | Ext. input component:       | Nippon chemi-con KY 220 $\mu$ F, 100 V                                                                 |
|                 | - Conducted RF Disturbances | EN 61000-4-6, 10 Vrms, perf. criteria A                                                                |
|                 | - PF Magnetic Field         | Continuous: EN 61000-4-8, 100 A/m, perf. criteria A<br>1 s: EN 61000-4-8, 1000 A/m, perf. criteria A   |

## 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                         | Depending on model                                                                                           |
|                           | See application note:                      | <a href="http://www.tracopower.com/thd12wi-cc/">www.tracopower.com/thd12wi-cc/</a>                           |
| Cooling System            |                                            | Natural convection (20 LFM)                                                                                  |
| Remote Control            | - Voltage Controlled Remote (passive = on) | On: 3.0 to 12 VDC or open circuit<br>Off: 0 to 1.2 VDC or short circuit<br>Refers to 'Remote' and '-Vin' Pin |
|                           | - 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.                                                                                                 |
| Regulator Topology        |                                            | Flyback Converter                                                                                            |
| 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 M $\Omega$ min.                                                                                        |

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

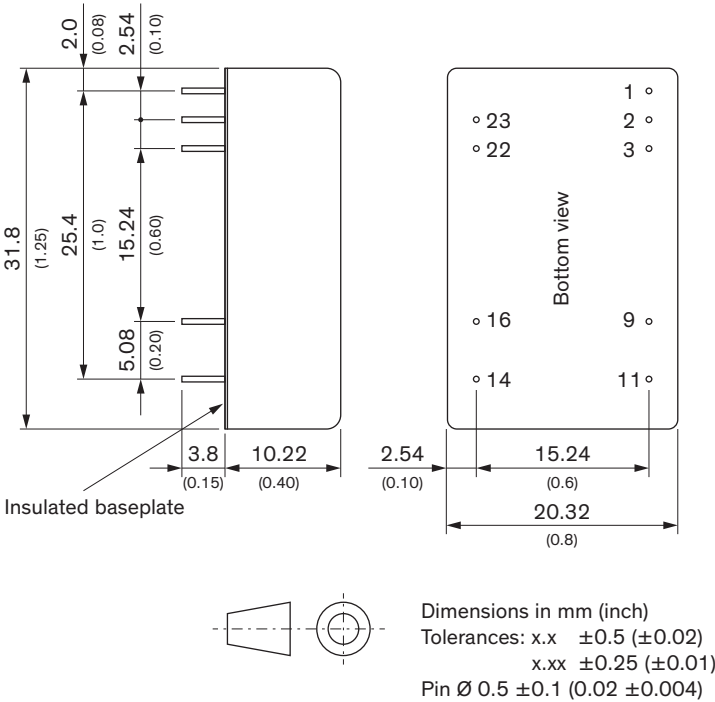
|                          |                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------|------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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)                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Washing Process          |                                                                              | According to Cleaning Guideline<br><a href="http://www.tracopower.com/info/cleaning.pdf">www.tracopower.com/info/cleaning.pdf</a>                                                                                                                                                                                                                                                                                                                                                             |
| Environment              | - Vibration<br>- Thermal Shock                                               | MIL-STD-810F<br>MIL-STD-810F                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 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        |                                                                              | Lead-Free Wave Soldering<br>245°C / 10 s max.                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Weight                   |                                                                              | 18 g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Thermal Impedance        | - Case to Ambient                                                            | 20.0 K/W typ.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Environmental Compliance | - REACH Declaration<br><br>- RoHS Declaration<br><br>- SCIP Reference Number | <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<br><a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a><br>Exemptions: 7(a), 7(c)-I<br>(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)<br>952e6754-9097-4042-a284-2f13a33dbf55 |

## Additional Information

|                            |                                                                                                |
|----------------------------|------------------------------------------------------------------------------------------------|
| Supporting Documents       | <a href="http://www.tracopower.com/overview/thd12wi">www.tracopower.com/overview/thd12wi</a>   |
| Frequently Asked Questions | <a href="http://www.tracopower.com/glossary-faq">www.tracopower.com/glossary-faq</a>           |
| Glossary                   | <a href="http://www.tracopower.com/info/glossary.pdf">www.tracopower.com/info/glossary.pdf</a> |
| Service Portal             | <a href="http://www.tracoserviceportal.com">www.tracoserviceportal.com</a>                     |

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

**Outline Dimensions**



| Pinout |               |               |
|--------|---------------|---------------|
| Pin    | Single        | Dual          |
| 1      | Remote On/Off | Remote On/Off |
| 2      | -Vin (GND)    | -Vin (GND)    |
| 3      | -Vin (GND)    | -Vin (GND)    |
| 9      | NC            | Common        |
| 11     | NC            | -Vout         |
| 14     | +Vout         | +Vout         |
| 16     | -Vout         | Common        |
| 22     | +Vin (Vcc)    | +Vin (Vcc)    |
| 23     | +Vin (Vcc)    | +Vin (Vcc)    |

NC: Not connected

Avoid routing PCB traces under the converter.