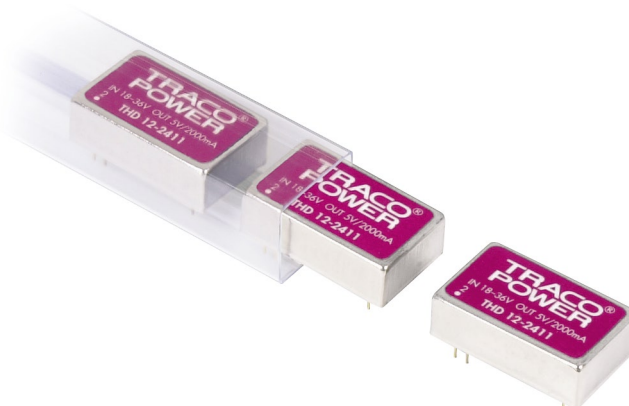




### Features

- ◆ Highest Power Density: 12W in DIL-24 Package!
- ◆ Wide 2:1 Input Range
- ◆ Very high Efficiency up to 88%
- ◆ I/O-Isolation 1500V
- ◆ Input Filter meets EN 55022A without ext. Components
- ◆ Remote On/Off
- ◆ Shielded Metal Case with insulated Baseplate
- ◆ Continuous Short-Circuit Protection
- ◆ Operating Temp. Range -40°C to +85°C (with Derating)
- ◆ Lead free Design, RoHS compliant
- ◆ 3 Year Product Warranty



The THD-12 series is a range of high performance, isolated 12W dc/dc converters. They come in a low profile, DIL-24 package with standard industry pin-out. 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 voltage | Output current max. | Efficiency typ. |
|-------------|---------------------|----------------|---------------------|-----------------|
| THD 12-1209 | 9 – 18 VDC          | 2.5 VDC        | 3'500 mA            | 82 %            |
| THD 12-1210 |                     | 3.3 VDC        | 3'500 mA            | 84 %            |
| THD 12-1211 |                     | 5.1 VDC        | 2'400 mA            | 86 %            |
| THD 12-1212 |                     | 12 VDC         | 1'000 mA            | 86 %            |
| THD 12-1213 |                     | 15 VDC         | 800 mA              | 86 %            |
| THD 12-1221 |                     | ±5 VDC         | ±1'200 mA           | 82 %            |
| THD 12-1222 |                     | ±12 VDC        | ±500 mA             | 87 %            |
| THD 12-1223 |                     | ±15 VDC        | ±400 mA             | 87 %            |
| THD 12-2409 | 18 – 36 VDC         | 2.5 VDC        | 3'500 mA            | 83 %            |
| THD 12-2410 |                     | 3.3 VDC        | 3'500 mA            | 85 %            |
| THD 12-2411 |                     | 5.1 VDC        | 2'400 mA            | 87 %            |
| THD 12-2412 |                     | 12 VDC         | 1'000 mA            | 87 %            |
| THD 12-2413 |                     | 15 VDC         | 800 mA              | 87 %            |
| THD 12-2421 |                     | ±5 VDC         | ±1'200 mA           | 83 %            |
| THD 12-2422 |                     | ±12 VDC        | ±500 mA             | 88 %            |
| THD 12-2423 |                     | ±15 VDC        | ±400 mA             | 88 %            |
| THD 12-2409 | 36 – 75 VDC         | 2.5 VDC        | 3'500 mA            | 83 %            |
| THD 12-2410 |                     | 3.3 VDC        | 3'500 mA            | 85 %            |
| THD 12-2411 |                     | 5.1 VDC        | 2'400 mA            | 87 %            |
| THD 12-2412 |                     | 12 VDC         | 1'000 mA            | 87 %            |
| THD 12-2413 |                     | 15 VDC         | 800 mA              | 87 %            |
| THD 12-2421 |                     | ±5 VDC         | ±1'200 mA           | 83 %            |
| THD 12-2422 |                     | ±12 VDC        | ±500 mA             | 88 %            |
| THD 12-2423 |                     | ±15 VDC        | ±400 mA             | 88 %            |

## Input Specifications

|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input current (no load)                  | 12 Vin models: t.b.a.<br>24 Vin models: t.b.a.<br>48 Vin models: t.b.a.                                                                                                                                                                                                                                                                                                                                                                                                             |
| Input current (full load)                | 12 Vin; 2.5/ 3.3 & $\pm 5$ Vout models: 1'670 mA typ.<br>12 Vin; other single output models: 1'605 mA typ.<br>12 Vin; other dual output models: 1'630 mA typ.<br>24 Vin; 2.5/ 3.3 & $\pm 5$ Vout models: 840 mA typ.<br>24 Vin; other single output models: 800 mA typ.<br>24 Vin; other dual output models: 810 mA typ.<br>48 Vin; 2.5/ 3.3 & $\pm 5$ Vout models: 420 mA typ.<br>48 Vin; other single output models: 400 mA typ.<br>48 Vin; other dual output models: 405 mA typ. |
| Input voltage variation (dv/dt)          | 5 V / ms, max.<br>(complies ETS 300 132 part. 4.4)                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Start-up voltage / under voltage lockout | 12 Vin models: 9 VDC / 8 VDC typ.<br>24 Vin models: 18 VDC / 16 VDC typ.<br>48 Vin models: 36 VDC / 33 VDC typ.                                                                                                                                                                                                                                                                                                                                                                     |
| Surge voltage (100 msec. max.)           | 12 Vin models: 36 V max.<br>24 Vin models: 50 V max.<br>48 Vin models: 100 V max.                                                                                                                                                                                                                                                                                                                                                                                                   |
| Conducted noise (input)                  | EN 55022 level A, FCC part 15, level A                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| ESD (input)                              | EN 61000-4-2, Perf. Criteria B                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Fast Transient (input)                   | EN 61000-4-4, Perf. Criteria B                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Surge (input)                            | EN 61000-4-5, Perf. Criteria B                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

## Output Specifications

|                                                        |                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Voltage set accuracy                                   | $\pm 1.2$ %                                                                                                                                                                                                                                                                          |
| Regulation                                             | – Input variation Vin min. to Vin max. $\pm 0.5$ % max.<br>– Load variation 10 – 100 %<br>single output models: 1.0 % max. (1.5% max. for 2.5 Vout models)<br>dual output models balanced load: 1.2 % max.<br>dual output models unbalanced load: 5.0 % max.                         |
| Transient response setting time (25% load step change) | 300 $\mu$ s                                                                                                                                                                                                                                                                          |
| Ripple and noise (20 MHz Bandwidth)                    | 85 mVpk-pk max.                                                                                                                                                                                                                                                                      |
| Temperature coefficient                                | $\pm 0.02$ % /K                                                                                                                                                                                                                                                                      |
| Output current limitation                              | 150% typ. of Iout max., constant current                                                                                                                                                                                                                                             |
| Short circuit protection                               | indefinite (automatic recovery)                                                                                                                                                                                                                                                      |
| Minimum load                                           | 10% of rated max current (operation at lower load condition will not damage these converters, however, they may not meet all listed specifications)                                                                                                                                  |
| Capacitive load                                        | 2.5 Vout & 3.3 Vout models: 2000 $\mu$ F max.<br>5 Vout / $\pm 5$ Vout models: 2000 $\mu$ F max. / $\pm 1250$ $\mu$ F max.<br>12 Vout / $\pm 12$ Vout models: 430 $\mu$ F max. / $\pm 200$ $\mu$ F max.<br>15 Vout / $\pm 15$ Vout models: 300 $\mu$ F max. / $\pm 120$ $\mu$ F max. |

## General Specifications

|                           |                                                                                                  |
|---------------------------|--------------------------------------------------------------------------------------------------|
| Temperature ranges        | – Operating –40 °C ... +85 °C<br>– Case temperature +100 °C max.<br>– Storage –55 °C ... +105 °C |
| Derating                  | 2.5%/K above 60°C                                                                                |
| Humidity (non condensing) | 95 % rel H max.                                                                                  |

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

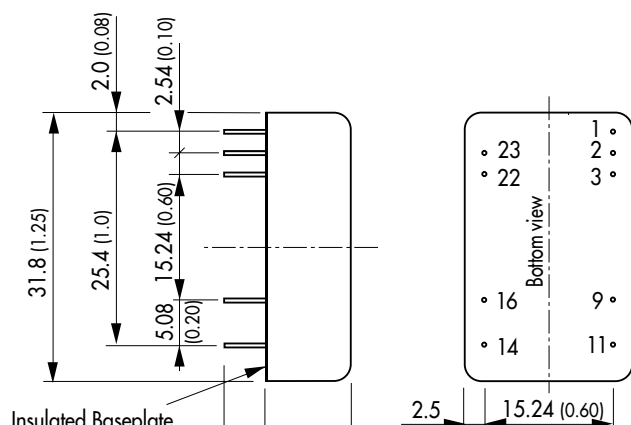
## General Specifications

|                                           |                                                                                                                                                                                                                                          |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reliability, calculated MTBF              | >2.75 Mio. h @ 40 °C<br>(BELLCORE TR-MWVT-000332 Case I: 50% Stress)                                                                                                                                                                     |
| Thermal shock                             | MIL-STB-810D                                                                                                                                                                                                                             |
| Isolation voltage Input/Output            | 1'500 VDC                                                                                                                                                                                                                                |
| Isolation capacity Input/Output           | 1'200 pF max.                                                                                                                                                                                                                            |
| Switching frequency (fixed)               | 400 kHz typ. (Pulse width modulation PWM)                                                                                                                                                                                                |
| Safety standards (Operational Insulation) | UL 60950, EN 60950, IEC 60950                                                                                                                                                                                                            |
| Safety approvals                          | UL/cUL File: E188913                                                                                                                                                                                                                     |
| Remote On/Off                             | <div> <div>- ON:</div> <div>- OFF:</div> <div>- OFF idle current:</div> </div> <div> <div>3.0 ... 12 VDC or open circuit (referenced to -Vin)</div> <div>0 ... 1.2 VDC or short circuit pin 1 and pin 2/3</div> <div>2.5 mA</div> </div> |

## Physical Specifications

|                       |                       |
|-----------------------|-----------------------|
| Case material         | copper, nickel plated |
| Baseplate material    | non conductive FR4    |
| Potting material      | epoxy (UL94V-0 rated) |
| Weight                | 18 g (0.62 oz)        |
| Soldering temperature | max. 265 °C / 10 sec. |

## Outline Dimensions



| Pin-Out |               |               |
|---------|---------------|---------------|
| Pin     | Single        | Dual          |
| 1       | Remote On/Off | Remote On/Off |
| 2       | -Vin (GND)    | -Vin (GND)    |
| 3       | -Vin (GND)    | -Vin (GND)    |
| 9       | No pin        | Common        |
| 11      | No con.       | -Vout         |
| 14      | +Vout         | +Vout         |
| 16      | -Vout         | Common        |
| 22      | +Vin (Vcc)    | +Vin (Vcc)    |
| 23      | +Vin (Vcc)    | +Vin (Vcc)    |

Dimensions in [mm], ( ) = Inch  
 Pin diameter  $\varnothing 0.5 \pm 0.05$  ( $0.02 \pm 0.002$ )  
 Tolerances  $\pm 0.5$  (0.02)  
 Pin pitch tolerances  $\pm 0.35$  (0.014)

Specifications can be changed without notice