

### Features

- ◆ High power density
- ◆ DIP-24 metal package
- ◆ Wide 2:1 input range
- ◆ Very high efficiency up to 88%
- ◆ I/O isolation 1500V
- ◆ Input filter to meet EN 55022, class A
- ◆ 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  $+85^{\circ}\text{C}$  (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, DIP-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 (nominal 12 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 12-1222		$\pm 12$ VDC	$\pm 500$ mA	87 %
THD 12-1223		$\pm 15$ VDC	$\pm 400$ mA	87 %
THD 12-2409	18 – 36 VDC (nominal 24 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 12-2422		$\pm 12$ VDC	$\pm 500$ mA	88 %
THD 12-2423		$\pm 15$ VDC	$\pm 400$ mA	88 %
THD 12-4809	36 – 75 VDC (nominal 48 VDC)	2.5 VDC	3'500 mA	83 %
THD 12-4810		3.3 VDC	3'500 mA	85 %
THD 12-4811		5.1 VDC	2'400 mA	87 %
THD 12-4812		12 VDC	1'000 mA	87 %
THD 12-4822		$\pm 12$ VDC	$\pm 500$ mA	88 %
THD 12-4823		$\pm 15$ VDC	$\pm 400$ mA	88 %

### Input Specifications

Input current (no load)	12 Vin; 2.5/ 3.3 / 5.1 Vout models: 55 mA typ. 12 Vin other models: 20 mA typ. 24 Vin; 2.5/ 3.3 / 5.1 Vout models: 35 mA typ. 24 Vin other models: 15 mA typ. 48 Vin; 2.5/ 3.3 / 5.1 Vout models: 20 mA typ. 24 Vin other models: 6 mA typ.
Input current (full load)	12 Vin; 2.5 Vout models: 935 mA typ. 12 Vin other models: 1250 mA typ. 24 Vin; 2.5 Vout models: 460 mA typ. 24 Vin other models: 600 mA typ. 48 Vin; 2.5 Vout models: 230 mA typ. 48 Vin other models: 300 mA typ.
Start-up voltage	12 Vin models: 9 VDC (or lower) 24 Vin models: 18 VDC (or lower) 48 Vin models: 36 VDC (or lower)
Under voltage shut down (lock-out circuit)	12 Vin models: 8 VDC typ. 24 Vin models: 16 VDC typ. 48 Vin models: 33 VDC typ.
Surge voltage (100 msec. max.)	12 Vin models: 36 V max. 24 Vin models: 50 V max. 48 Vin models: 100 V max.
Conducted noise (input)	EN 55022 level A, FCC part 15, level A with external capacitor
ESD (electrostatic discharge)	EN 61000-4-2, air $\pm 8$ kV, contact $\pm 6$ kV, perf. criteria A
Radiated immunity	EN 61000-4-3 10 V/m, perf. criteriy A
Fast transient / Surge	EN 61000-4-4, $\pm 2$ kV, perf. criteria A EN 61000-4-5, $\pm 1$ kV perf. criteria A with external input capacitor e.g. Nippon chemi-con KY 220 $\mu$ F, 100 V, ESR 48 mOhm
Conducted immunity	EN 61000-4-6, 10 Vrms, perf. criteria A
Reflected ripple current	20 mA <sub>p-p</sub> typ.

### Output Specifications

Voltage set accuracy	$\pm 1.2$ %
Regulation	– Input variation single output models: $\pm 0.2$ % max. (Vin min. to Vin max) dual output models: $\pm 0.5$ % max. (Vin min. to Vin max) – Load variation 0 – 100 % dual output models balanced load: 0.5 % max. (1.0% max. for 2.5 Vout models) – Load cross regulation 25/100% 1.0 % max. 5.0 % max. (dual output models)
Minimum load	not required
Ripple and noise (20 MHz Bandwidth)	85 mV <sub>p-p</sub> typ.
Temperature coefficient	$\pm 0.02$ %/K
Output current limitation	150 % typ. of I <sub>out</sub> max.
Short circuit protection	continuous, automatic recovery
Start up time (nominal Vin and constant resistive load)	450 ms typ.
Transient response setting time (25% load step change)	250 $\mu$ s
Over voltage protection (single output models only)	2.5 & 3.3 VDC models: 3.9 VDC 5.1 VDC models: 6.2 VDC 12 VDC models: 15 VDC 15 VDC models: 18 VDC
Capacitive load	2.5/ 3.3/ 5.1 Vout models: 2000 $\mu$ F max. 12 Vout models: 430 $\mu$ F max. $\pm 12$ Vout models: $\pm 200$ $\mu$ F max. $\pm 15$ Vout models: $\pm 120$ $\mu$ F max.

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

**General Specifications**

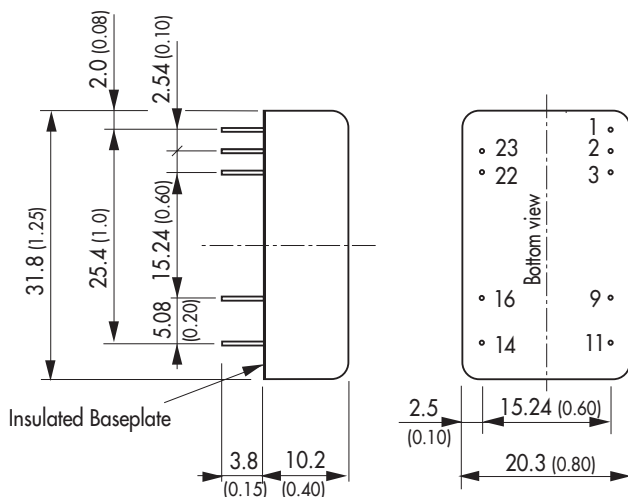
Temperature ranges	- Operating - Case temperature - Storage	-40°C to +85°C +100°C max. -55°C to +105°C
Derating		2.5 %/K above 65°C
Thermal impedance	- Natural convection	20°C/W
Humidity (non condensing)		5 % to 95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)		>2.0 Mio h
Thermal shock & vibration		MIL-STD-810F
Isolation voltage (60sec.)	- Input/Output	1'500 VDC
Isolation capacity	- Input/Output	1'200 pF typ.
Isolation resistance	- Input/Output (500 VDC)	>1'000 MOhm
Switching frequency		400 kHz typ. (pulse width modulation PWM)
Safety approvals (operational Insulation)	- Certification documents	UL 60950-1, EN 60950-1, IEC 60950-1 <a href="http://www.tracopower.com/overview/thd12">www.tracopower.com/overview/thd12</a>
Remote On/Off	- On: - Off: - Off idle current:	3.0 ... 12 VDC or open circuit (referenced to -Vin) 0 ... 1.2 VDC or short circuit pin 1 and pin 2/3 2.5 mA

**Physical Specifications**

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

Supporting documents: [www.tracopower.com/overview/thd12](http://www.tracopower.com/overview/thd12)

**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	ntc.	Common
11	ntc.	-Vout
14	+Vout	+Vout
16	-Vout	Common
22	+Vin (Vcc)	+Vin (Vcc)
23	+Vin (Vcc)	+Vin (Vcc)

ntc. = not to connect

Dimensions in [mm], ( ) = Inch  
Pin diameter  $\varnothing 0.5 \pm 0.1$  (0.02  $\pm$  0.004)  
Tolerances  $\pm 0.5$  ( $\pm 0.02$ )  
Pin pitch tolerances  $\pm 0.25$  ( $\pm 0.01$ )

Specifications can be changed without notice! Make sure you are using the latest documentation, downloadable at [www.tracopower.com](http://www.tracopower.com)