

- Wide 2:1 input range
- Very high efficiency up to 88%
- I/O isolation 1500V
- Input filter meets EN 55032, class A
- Remote On/Off
- Under voltage lock-out circuit
- Shielded metal case with insulated Baseplate
- Continuous short-circuit protection
- Operating temp. range -40°C to $+85^{\circ}\text{C}$ (with derating)
- 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 1		Output 2		Efficiency typ.
		Vnom	I _{max}	Vnom	I _{max}	
THD 12-1209	9 - 18 VDC (12 VDC nom.)	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		+12 VDC	500 mA	-12 VDC	500 mA	87 %
THD 12-1223		+15 VDC	400 mA	-15 VDC	400 mA	87 %
THD 12-2409	18 - 36 VDC (24 VDC nom.)	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		+12 VDC	500 mA	-12 VDC	500 mA	88 %
THD 12-2423		+15 VDC	400 mA	-15 VDC	400 mA	88 %
THD 12-4809	36 - 75 VDC (48 VDC nom.)	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		+12 VDC	500 mA	-12 VDC	500 mA	88 %
THD 12-4823		+15 VDC	400 mA	-15 VDC	400 mA	88 %

Input Specifications

Input Current	- At no load	12 Vin models: 55 mA typ. (2.5 Vout model) 55 mA typ. (3.3 Vout model) 55 mA typ. (5.1 Vout model) 20 mA typ. (12 Vout model) 20 mA typ. (12 / -12 Vout model) 20 mA typ. (15 / -15 Vout model)
		24 Vin models: 35 mA typ. (2.5 Vout model) 35 mA typ. (3.3 Vout model) 35 mA typ. (5.1 Vout model) 15 mA typ. (12 Vout model) 15 mA typ. (12 / -12 Vout model) 15 mA typ. (15 / -15 Vout model)
		48 Vin models: 20 mA typ. (2.5 Vout model) 20 mA typ. (3.3 Vout model) 20 mA typ. (5.1 Vout model) 6 mA typ. (12 Vout model) 6 mA typ. (12 / -12 Vout model) 6 mA typ. (15 / -15 Vout model)
	- At full load	12 Vin models: 935 mA typ. (2.5 Vout model) 1'250 mA typ. (3.3 Vout model) 1'250 mA typ. (5.1 Vout model) 1'250 mA typ. (12 Vout model) 1'250 mA typ. (12 / -12 Vout model) 1'250 mA typ. (15 / -15 Vout model)
		24 Vin models: 460 mA typ. (2.5 Vout model) 600 mA typ. (3.3 Vout model) 600 mA typ. (5.1 Vout model) 600 mA typ. (12 Vout model) 600 mA typ. (12 / -12 Vout model) 600 mA typ. (15 / -15 Vout model)
		48 Vin models: 230 mA typ. (2.5 Vout model) 300 mA typ. (3.3 Vout model) 300 mA typ. (5.1 Vout model) 300 mA typ. (12 Vout model) 300 mA typ. (12 / -12 Vout model) 300 mA typ. (15 / -15 Vout model)
Surge Voltage		12 Vin models: 36 VDC max. (100 ms max.) 24 Vin models: 50 VDC max. (100 ms max.) 48 Vin models: 100 VDC max. (100 ms max.)
Under Voltage Lockout		12 Vin models: 7 VDC min. / 8 VDC typ. / 8.8 VDC max. 24 Vin models: 15 VDC min. / 16 VDC typ. / 17.5 VDC max. 48 Vin models: 32 VDC min. / 33.5 VDC typ. / 35 VDC max.
Reflected Ripple Current		20 mAp-p typ.
Recommended Input Fuse		12 Vin models: 2'500 mA (slow blow) 24 Vin models: 1'250 mA (slow blow) 48 Vin models: 800 mA (slow blow) (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.
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All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

Regulation	- Input Variation (Vmin - Vmax)	single output models: 0.2% max. dual output models: 0.5% max.
	- Load Variation (0 - 100%)	single output models: 1% max. (2.5 Vout models) 0.5% max. (other models) dual output models: 1% max. (Output 1) 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	2.5 Vout models: 2'000 µF max. 3.3 Vout models: 2'000 µF max. 5.1 Vout models: 2'000 µF max. 12 Vout models: 430 µF max.
		12 / -12 Vout models: 200 / 200 µF max.
		15 / -15 Vout models: 120 / 120 µF max.
	- dual output	
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 - 156% of Vout nom. (depending on model)
		3.9 VDC typ. (2.5 & 3.3 Vout models)
		6.2 VDC typ. (5.1 Vout models)
		15 VDC typ. (12 Vout models)
		18 VDC typ. (15 Vout models)
Transient Response	- Response Time	250 µs typ. (75% to 100% Load Step)

Safety Specifications

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/thd12-safety-cert/
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) 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/thd12-emc-filter/

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

EMS (Immunity)		EN 55024 (IT Equipment)
		EN 55035 (Multimedia)
- Electrostatic Discharge - RF Electromagnetic Field - EFT (Burst) / Surge	Air:	EN 61000-4-2, ± 8 kV, perf. criteria A
	Contact:	EN 61000-4-2, ± 6 kV, perf. criteria A
		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 - PF Magnetic Field	Ext. input component:	Nippon chemi-con KY 220 μ F, 100 V
	Continuous:	EN 61000-4-6, 10 Vrms, perf. criteria A
	1 s:	EN 61000-4-8, 100 A/m, perf. criteria A
		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	+100°C max.
	- Storage Temperature	-55°C to +125°C
Power Derating	- High Temperature	Depending on model
	See application note: www.tracopower.com/thd12-cc/	
Cooling System		Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote (passive = on)	On: 3.0 to 12 VDC or open circuit
		Off: 0 to 1.2 VDC or short circuit
		Refers to 'Remote' and '-Vin' Pin
	- Off Idle Input Current	2.5 mA max.
	- 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		1'000 M Ω min.
Isolation Capacitance		1'200 pF max.
Reliability		2'060'000 h (MIL-HDBK-217F, ground benign)
Washing Process		According to Cleaning Guideline
		www.tracopower.com/info/cleaning.pdf
Environment	- Vibration	MIL-STD-810F
	- Thermal Shock	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 μ m)
Pin Surface Plating		Tin (3 - 5 μ m), matte
Housing Type		Metal Case
Mounting Type		PCB Mount
Connection Type		THD (Through-Hole Device)
Footprint Type		DIP24
Soldering Profile		Lead-Free Wave Soldering
		245°C / 10 s max.
Weight		18 g
Thermal Impedance		20.0 K/W typ.

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Environmental Compliance - REACH Declaration

www.tracopower.com/info/reach-declaration.pdf

- RoHS Declaration

REACH SVHC list compliant

REACH Annex XVII compliant

www.tracopower.com/info/rohs-declaration.pdf

Exemptions: 7(a), 7(c)-I

(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)

- SCIP Reference Number

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Additional Information

Supporting Documents

www.tracopower.com/overview/thd12

Frequently Asked Questions

www.tracopower.com/glossary-faq

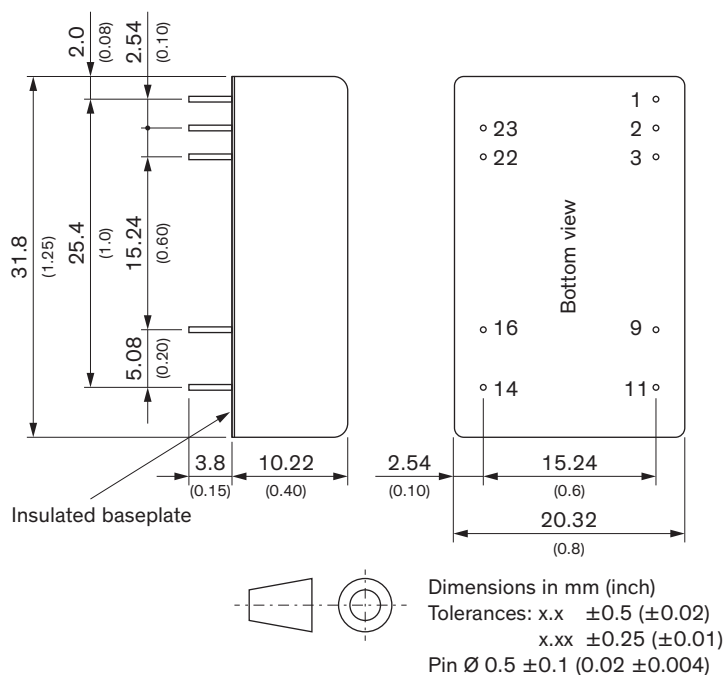
Glossary

www.tracopower.com/info/glossary.pdf

Service Portal

www.tracoserviceportal.com

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.