

DC/DC Converter

THI 2 Series, 2 Watt

- DIP-24 Package
- Regulated output
- I/O isolation voltage 6000 VDC
- Operating temp. range -40°C to $+75^{\circ}\text{C}$
- 3-year product warranty



The THI 2 series is a family of DC/DC converter with very high I/O isolation specification. SMD technology and a 100 % production test of the safety barrier ensure a very high reliability of this product.

Models						
Order Code	Input Voltage Range	Output 1		Output 2		Efficiency typ.
		Vnom	I _{max}	Vnom	I _{max}	
THI 0511	4.5 - 5.5 VDC (5 VDC nom.)	5 VDC	400 mA	-5 VDC -12 VDC -15 VDC	100 mA 83 mA 66 mA	62 %
THI 0512		12 VDC	165 mA			63 %
THI 0513		15 VDC	133 mA			64 %
THI 0520		+5 VDC	100 mA			42 %
THI 0521		+12 VDC	83 mA			57 %
THI 0522		+15 VDC	66 mA			57 %
THI 1211	10.8 - 13.2 VDC (12 VDC nom.)	5 VDC	400 mA	-5 VDC -12 VDC -15 VDC	100 mA 83 mA 66 mA	62 %
THI 1212		12 VDC	165 mA			63 %
THI 1213		15 VDC	133 mA			64 %
THI 1220		+5 VDC	100 mA			45 %
THI 1221		+12 VDC	83 mA			59 %
THI 1222		+15 VDC	66 mA			59 %
THI 2411	21.6 - 26.4 VDC (24 VDC nom.)	5 VDC	400 mA	-5 VDC -12 VDC -15 VDC	100 mA 83 mA 66 mA	62 %
THI 2412		12 VDC	165 mA			63 %
THI 2413		15 VDC	133 mA			64 %
THI 2420		+5 VDC	100 mA			45 %
THI 2421		+12 VDC	83 mA			58 %
THI 2422		+15 VDC	66 mA			58 %

Input Specifications

Input Current	- At no load	5 Vin models: 100 mA typ. 12 Vin models: 50 mA typ. 24 Vin models: 30 mA typ.
	- At full load	5 Vin models: 645 mA typ. (5 Vout model) 629 mA typ. (12 Vout model) 623 mA typ. (15 Vout model) 476 mA typ. (5 / -5 Vout model) 699 mA typ. (12 / -12 Vout model) 695 mA typ. (15 / -15 Vout model) 12 Vin models: 269 mA typ. (5 Vout model) 262 mA typ. (12 Vout model) 260 mA typ. (15 Vout model) 185 mA typ. (5 / -5 Vout model) 281 mA typ. (12 / -12 Vout model) 280 mA typ. (15 / -15 Vout model) 24 Vin models: 134 mA typ. (5 Vout model) 131 mA typ. (12 Vout model) 130 mA typ. (15 Vout model) 93 mA typ. (5 / -5 Vout model) 143 mA typ. (12 / -12 Vout model) 142 mA typ. (15 / -15 Vout model)
Surge Voltage		5 Vin models: 7.5 VDC max. (1 s max.) 12 Vin models: 15 VDC max. (1 s max.) 24 Vin models: 30 VDC max. (1 s max.)
Reflected Ripple Current		5 Vin models: 15 mA typ. 12 Vin models: 8 mA typ. 24 Vin models: 3 mA typ.
Recommended Input Fuse		5 Vin models: 1'000 mA (slow blow) 12 Vin models: 500 mA (slow blow) 24 Vin models: 250 mA (slow blow) (The need of an external fuse has to be assessed in the final application.)
Input Filter		Internal Pi-Type
Short Circuit Input Power		2 W max.

Output Specifications

Voltage Set Accuracy		±4% max. (at 50% load)
Regulation	- Input Variation (Vmin - Vmax)	single output models: 0.5% max. dual output models: 0.5% max.
	- Load Variation (10 - 100%)	single output models: 1% max. dual output models: 1% max. (Output 1) 1% max. (Output 2)
	- Voltage Balance (symmetrical load)	dual output models: 4% max.
Ripple and Noise	- 20 MHz Bandwidth	50 mVp-p max. 30 mVp-p typ.
Capacitive Load	- single output	5 Vout models: 680 µF max. 12 Vout models: 680 µF max. 15 Vout models: 680 µF max.
	- dual output	5 / -5 Vout models: 270 / 270 µF max. 12 / -12 Vout models: 270 / 270 µF max. 15 / -15 Vout models: 270 / 270 µF max.
Minimum Load		Not required
Temperature Coefficient		±0.02 %/K max.

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

Start-up Time	0.13 ms max.
Short Circuit Protection	Continuous, Automatic recovery

EMC Specifications

EMI (Emissions)	- Conducted Emissions	EN 55032 class A (internal filter)
	- Radiated Emissions	EN 55032 class A (internal filter)

General Specifications

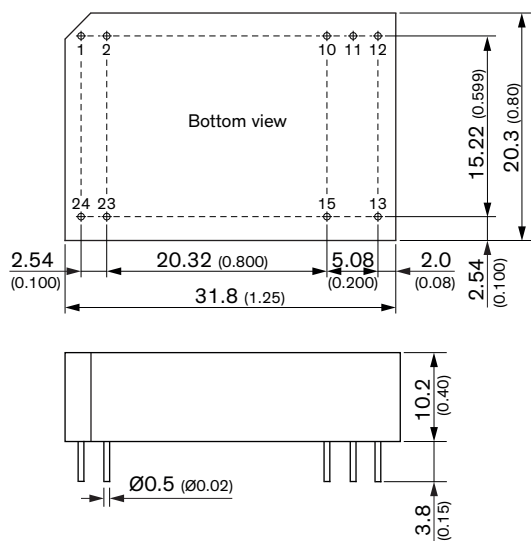
Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	-25°C to +75°C
	- Case Temperature	+95°C max.
	- Storage Temperature	-50°C to +125°C
Power Derating	- High Temperature	2.85 %/K above 60°C
	See application note: www.tracopower.com/overview/thi2	
Cooling System		Natural convection (20 LFM)
Regulator Topology		Push-Pull Converter
Switching Frequency		25 - 80 kHz (PFM)
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s	6'000 VDC
	- Input to Output, 1 s	8'000 VDC
Isolation Resistance	- Input to Output, 500 VDC	10'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	20 pF typ. 30 pF max.
Leakage Current	- Touch Current	2 μA max.
Reliability	- Calculated MTBF	600'000 h (MIL-HDBK-217F, ground benign)
Washing Process		According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf
Housing Material		Non-conductive Plastic (UL 94 V-0 rated)
Base Material		Non-conductive Plastic (UL 94 V-0 rated)
Potting Material		Epoxy (UL 94 V-0 rated)
Pin Material		Copper-Clad Steel
Pin Foundation Plating		Nickel (2.5 μm min.)
Pin Surface Plating		Gold (75 - 125 nm), glossy
Housing Type		Plastic Case
Mounting Type		PCB Mount
Connection Type		THD (Through-Hole Device)
Footprint Type		DIP24
Soldering Profile		Lead-Free Wave Soldering 260°C / 10 s max.
Weight		12.4 g
Thermal Impedance	- Case to Ambient	21.53 K/W typ.
Environmental Compliance	- REACH Declaration	www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant
	- RoHS Declaration	www.tracopower.com/info/rohs-declaration.pdf Exemptions: 7(a) (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)
	- SCIP Reference Number	4e2532ac-b1ff-48a4-bc56-c01fa854c4d8

Additional Information

Supporting Documents	www.tracopower.com/overview/thi2
Frequently Asked Questions	www.tracopower.com/glossary-faq
Glossary	www.tracopower.com/info/glossary.pdf

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Outline Dimensions



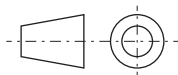
Dimensions in mm (inch)

Tolerance: x.x ±0.25 (x.xx ±0.01)

x.xx ±0.13 (x.xxx ±0.005)

Pin pitch tolerance: ±0.25 (±0.01)

Pin diameter tolerance: x.x ±0.05 (x.xx ±0.002)



Pinout		
Pin	Single	Dual
1	+Vin (Vcc)	
2	+Vin (Vcc)	
10	No pin	Common
11	No pin	Common
12	–Vout	No pin
13	+Vout	–Vout
15	No pin	+Vout
23	–Vin (GND)	
24	–Vin (GND)	