

- DIP-24 Package
- Regulated output
- I/O isolation voltage 6000 VDC
- Supplementary insulation rated for working voltage up to 1000 VAC
- Operating temp. range  $-40^{\circ}\text{C}$  to  $+75^{\circ}\text{C}$



The THI 2 series is a family of DC/DC converter with very high I/O isolation specification. They offer a cost effective solution for all industrial and telecom where a supplementary insulation is required. 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 <sub>max</sub>	Vnom	I <sub>max</sub>	
THI 0511	4.5 - 5.5 VDC (5 VDC nom.)	5 VDC	400 mA			62 %
THI 0512		12 VDC	165 mA			63 %
THI 0513		15 VDC	133 mA			64 %
THI 0520		+5 VDC	100 mA	-5 VDC	100 mA	42 %
THI 0521		+12 VDC	83 mA	-12 VDC	83 mA	57 %
THI 0522		+15 VDC	66 mA	-15 VDC	66 mA	57 %
THI 1211	10.8 - 13.2 VDC (12 VDC nom.)	5 VDC	400 mA			62 %
THI 1212		12 VDC	165 mA			63 %
THI 1213		15 VDC	133 mA			64 %
THI 1220		+5 VDC	100 mA	-5 VDC	100 mA	45 %
THI 1221		+12 VDC	83 mA	-12 VDC	83 mA	59 %
THI 1222		+15 VDC	66 mA	-15 VDC	66 mA	59 %
THI 2411	21.6 - 26.4 VDC (24 VDC nom.)	5 VDC	400 mA			62 %
THI 2412		12 VDC	165 mA			63 %
THI 2413		15 VDC	133 mA			64 %
THI 2420		+5 VDC	100 mA	-5 VDC	100 mA	45 %
THI 2421		+12 VDC	83 mA	-12 VDC	83 mA	58 %
THI 2422		+15 VDC	66 mA	-15 VDC	66 mA	58 %

## Input Specifications

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

## Output Specifications

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

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

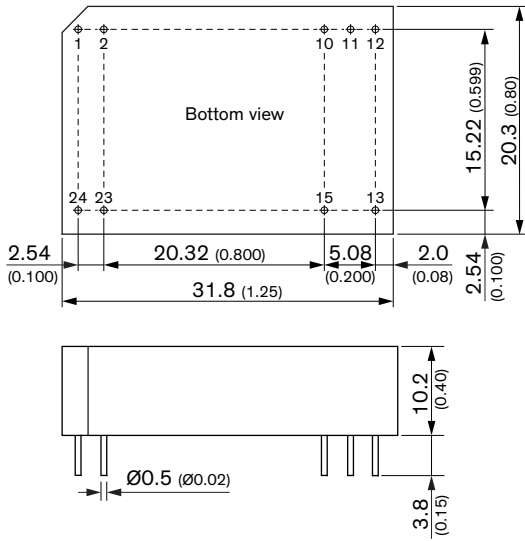
Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	-25°C to +75°C
	- Case Temperature	+95°C max.
	- Storage Temperature	-50°C to +125°C
Power Derating	- High Temperature	2.85 %/K above 60°C
		See application note: <a href="http://www.tracopower.com/overview/thi2">www.tracopower.com/overview/thi2</a>
Cooling System		Natural convection (20 LFM)
Switching Frequency		25 - 80 kHz (PFM)
Insulation System		Reinforced Insulation
Working Voltage (rated)		1'000 VAC
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 <a href="http://www.tracopower.com/info/cleaning.pdf">www.tracopower.com/info/cleaning.pdf</a>
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		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	<a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> REACH SVHC list compliant REACH Annex XVII compliant
	- RoHS Declaration	<a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a> Exemptions: 7a (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

### Supporting Documents

Overview Link (for additional Documents)	<a href="http://www.tracopower.com/overview/thi2">www.tracopower.com/overview/thi2</a>
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### Outline Dimensions



Dimensions in mm (inch)  
 Tolerance: x.x  $\pm 0.25$  (x.xx  $\pm 0.01$ )  
           x.xx  $\pm 0.13$  (x.xxx  $\pm 0.005$ )  
 Pin pitch tolerance:  $\pm 0.25$  ( $\pm 0.01$ )  
 Pin diameter tolerance: x.x  $\pm 0.05$  (x.xx  $\pm 0.002$ )

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)	