TRACO POWER

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°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
		Vnom	Imax	Vnom	Imax	typ.
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:	**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

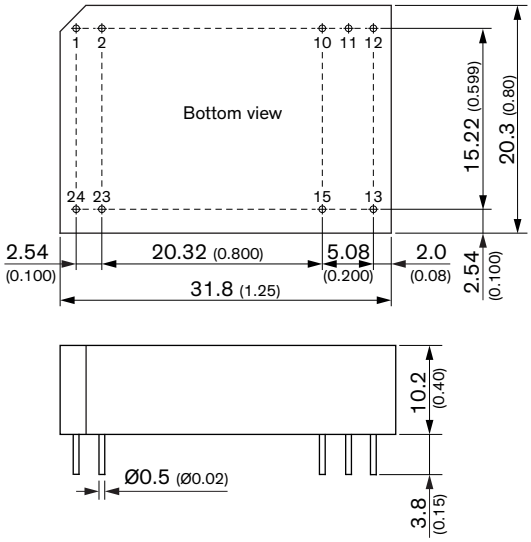
Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	–25°C to +75°C
	- Case Temperature	+95°C max.
	- Storage Temperature	–50°C to +125°C
Power Derating	- High Temperature	2.85 %/K above 60°C
	See application note:	www.tracopower.com/overview/thi2
Cooling System		Natural 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: 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)	www.tracopower.com/overview/thi2

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

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)	

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