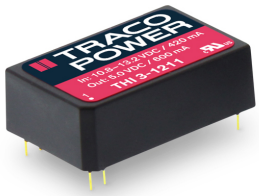
TRACO POWER

DC/DC Converter

THI 3 Series, 3 Watt

- **Standard DIP-24 Package**
- **I/O isolation 4000 VACrms rated for 300 VACrms working voltage**
- **2 x MOOP Medical safety according to AAMI/ANSI ES 60601-1:2005(R) and IEC/EN 60601-1 3rd edition**
- **Industrial safety to IEC/EN/UL 62368-1**
- **Operating temperature range -40°C to 75°C**
- **Fully regulated output voltage**
- **Input filter meets EN 55032, class A**
- **Short circuit protection**
- **3-years product warranty**



ES 60601-1 IEC 60601-1
UL 62368-1 IEC 62368-1

The THI 3 series is a new range of high isolation DC/DC converters with a reinforced insulation system. The I/O- isolation voltage is specified for 4000 VACrms. The circuit is encapsulated in a DIP-24 package. There are 15 models available for 5, 12 and 24 VDC input voltage and single or dual output voltage. The THI 3 DC/DC converters offer a cost effective solution for applications in industrial controls and medical instrumentation requiring a certified supplementary or reinforced insulation system to comply with industrial or latest medical safety standards.

Models

Order Code	Input Voltage Range	Output 1		Output 2		Efficiency
		Vnom	Imax	Vnom	Imax	typ.
THI 3-0511	4.5 - 5.5 VDC (5 VDC nom.)	5 VDC	600 mA			60 %
THI 3-0512		12 VDC	250 mA			62 %
THI 3-0513		15 VDC	200 mA			62 %
THI 3-0522		+12 VDC	125 mA	−12 VDC	125 mA	60 %
THI 3-0523		+15 VDC	100 mA	−15 VDC	100 mA	60 %
THI 3-1211	10.8 - 13.2 VDC (12 VDC nom.)	5 VDC	600 mA			60 %
THI 3-1212		12 VDC	250 mA			62 %
THI 3-1213		15 VDC	200 mA			62 %
THI 3-1222		+12 VDC	125 mA	−12 VDC	125 mA	60 %
THI 3-1223		+15 VDC	100 mA	−15 VDC	100 mA	60 %
THI 3-2411	21.6 - 26.4 VDC (24 VDC nom.)	5 VDC	600 mA			60 %
THI 3-2412		12 VDC	250 mA			64 %
THI 3-2413		15 VDC	200 mA			64 %
THI 3-2422		+12 VDC	125 mA	−12 VDC	125 mA	60 %
THI 3-2423		+15 VDC	100 mA	−15 VDC	100 mA	60 %

Input Specifications

Input Current	- At no load	5 Vin models:	130 mA typ.
		12 Vin models:	60 mA typ.
		24 Vin models:	40 mA typ.
	- At full load	5 Vin models:	1'000 mA typ.
		12 Vin models:	420 mA typ.
		24 Vin models:	210 mA typ.
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.)
Recommended Input Fuse		5 Vin models:	2'000 mA (slow blow)
		12 Vin models:	1'000 mA (slow blow)
		24 Vin models:	500 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			2.5 W max.

Output Specifications

Voltage Set Accuracy			±4% max.
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.
			(To further reduce Ripple and Noise, a capacitor with 1.5 µF X7R is recommended.)
Capacitive Load	- single output	5 Vout models:	470 µF max.
		12 Vout models:	470 µF max.
		15 Vout models:	470 µF max.
	- dual output	12 / -12 Vout models:	220 / 220 µF max.
		15 / -15 Vout models:	220 / 220 µF max.
Minimum Load			Not required
Temperature Coefficient			±0.02 %/K max.
Start-up Time			18 ms max.
Short Circuit Protection			Continuous, Automatic recovery

Safety Specifications

Safety Standards	- IT / Multimedia Equipment	CSA-C22.2, No. 60950-1
		EN 60950-1
		EN 62368-1
		IEC 60950-1
		IEC 62368-1
		UL 60950-1
		UL 62368-1
	- Medical Equipment	EN 60601-1
		IEC 60601-1
		ANSI/AAMI ES 60601-1
		CSA-C22.2, No 60601-1
		2 x MOOP (Means Of Operator Protection)
	- Certification Documents	www.tracopower.com/overview/thi3
Pollution Degree		PD 2
Over Voltage Category		OVC II

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

EMC Specifications

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

General Specifications

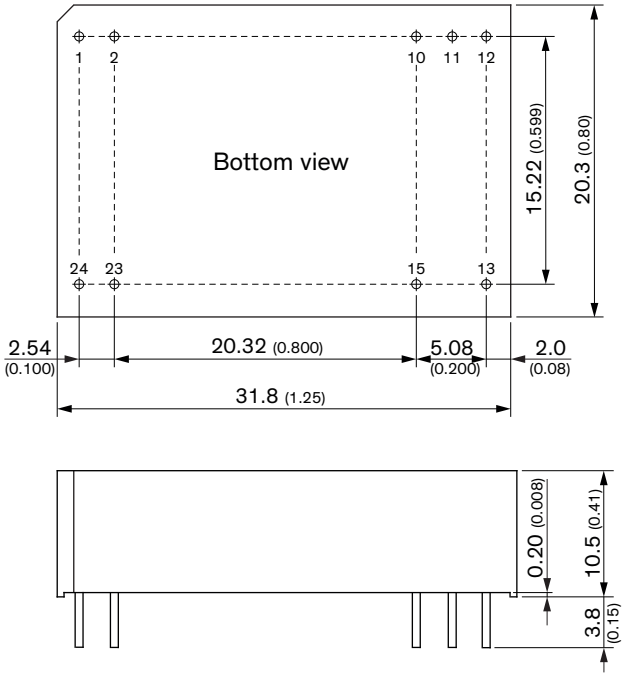
Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	–40°C to +75°C
	- Case Temperature	+95°C max.
	- Storage Temperature	–50°C to +125°C
Power Derating	- High Temperature	2.85 %/K above 60°C
	See application note:	www.tracopower.com/overview/thi3
Cooling System		Natural convection (20 LFM)
Altitude During Operation		4'000 m max. (acc. to IEC/EN/UL 60601-1) 5'000 m max. (acc. to IEC/EN/UL 62368-1)
Switching Frequency		25 - 75 kHz (PFM) 60 kHz typ. (PFM)
Insulation System		Reinforced Insulation
Working Voltage (rated)		300 VAC
Isolation Test Voltage	- Input to Output, 60 s	4'000 VAC (acc. to IEC/EN 60601-1) 3'000 VAC (acc. to IEC/EN/UL 62368-1)
Isolation Resistance	- Input to Output, 500 VDC	10'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	20 pF typ.
Leakage Current	- Touch Current	2 µA max. (240 VAC, 60 Hz)
Reliability	- Calculated MTBF	1'000'000 h (MIL-HDBK-217F, ground benign)
Washing Process		According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf
Housing Material		Plastic resin (UL 94 V-0 rated)
Base Material		Non-conductive Plastic (UL 94 V-0 rated)
Potting Material		Silicone (UL 94 V-0 rated)
Pin Material		Copper Alloy (C6801)
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	16.3 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). The SCIP number is provided on request.)

Supporting Documents

	Weight
Overview Link (for additional Documents)	www.tracopower.com/overview/thi3

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)
Pin diameter: 0.5 ±0.05 (0.02 ±0.002)
Tolerance: x.x ±0.25 (x.xx ±0.01)
x.xx ±0.13 (x.xxx ±0.005)

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)	