

- 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



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 typ.
		Vnom	I <sub>max</sub>	Vnom	I <sub>max</sub>	
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: <b>130 mA typ.</b> 12 Vin models: <b>60 mA typ.</b> 24 Vin models: <b>40 mA typ.</b>
	- At full load	5 Vin models: <b>1'000 mA typ.</b> 12 Vin models: <b>420 mA typ.</b> 24 Vin models: <b>210 mA typ.</b>
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.)
Recommended Input Fuse		5 Vin models: <b>2'000 mA</b> (slow blow) 12 Vin models: <b>1'000 mA</b> (slow blow) 24 Vin models: <b>500 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>2.5 W max.</b>

### Output Specifications

Voltage Set Accuracy		<b>±4% max.</b>
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>50 mVp-p max.</b> (To further reduce Ripple and Noise, a capacitor with 1.5 µF X7R is recommended.)
Capacitive Load	- single output	5 Vout models: <b>470 µF max.</b> 12 Vout models: <b>470 µF max.</b> 15 Vout models: <b>470 µF max.</b>
	- dual output	12 / -12 Vout models: <b>220 / 220 µF max.</b> 15 / -15 Vout models: <b>220 / 220 µF max.</b>
Minimum Load		<b>Not required</b>
Temperature Coefficient		<b>±0.02 %/K max.</b>
Start-up Time		<b>18 ms max.</b>
Short Circuit Protection		<b>Continuous, Automatic recovery</b>

### Safety Specifications

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

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

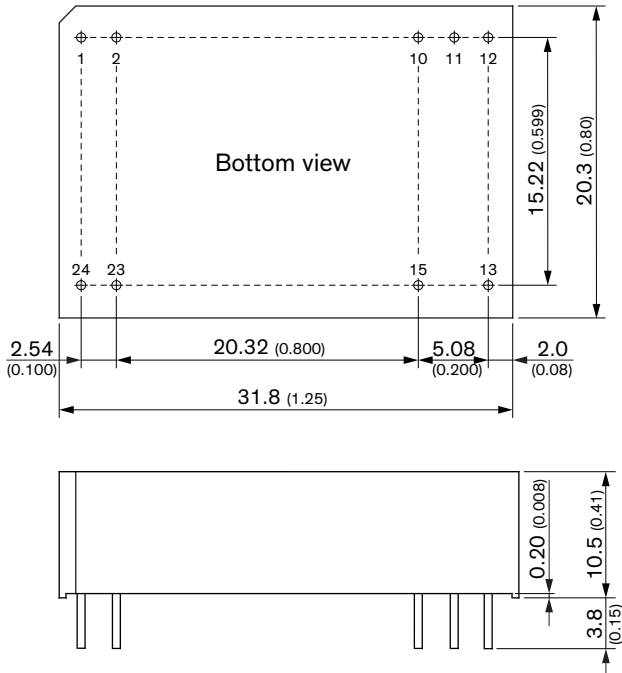
Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	-40°C to +75°C
	- Case Temperature	+95°C max.
	- Storage Temperature	-50°C to +125°C
Power Derating	- High Temperature	2.85 %/K above 60°C
		See application note: <a href="http://www.tracopower.com/overview/thi3">www.tracopower.com/overview/thi3</a>
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 <a href="http://www.tracopower.com/info/cleaning.pdf">www.tracopower.com/info/cleaning.pdf</a>
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	<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	e5360cbc-6a16-41f4-a0c1-106f7a68dd67

### Supporting Documents

Overview Link (for additional Documents)	<a href="http://www.tracopower.com/overview/thi3">www.tracopower.com/overview/thi3</a>
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**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)	