

### Features

- ◆ Supplementary and reinforced insulation
- ◆ I/O isolation 4800 VACrms rated for 1000 Vrms (1410 Vpk) working voltage
- ◆ Medical safety to ES 60601-1 and IEC/EN 60601-1 3rd edition, 2 x MOOP
- ◆ Industrial safety to IEC/EN/UL 60950-1
- ◆ Isolation test voltage 6000 Vpk
- ◆ Wide 2:1 input voltage ranges
- ◆ Extended operating temperature range -40°C to 71°C max.
- ◆ Input filter meets EN55022, class A
- ◆ Continuous short-circuit protection
- ◆ High reliability
- ◆ 3-year product warranty



The THB-3 series is a range of high performance, regulated DC/DC converters in a DIP-24 plastic package. A reinforced I/O-isolation system and a wide 2:1 input voltage range make this product the best choice for many demanding applications like transportation systems, industrial controls, medical equipments, instrumentations, everywhere where high basic-, supplementary- or reinforced insulation is required to meet requested safety standards.

A high efficiency allows safe operation in a temperature range of -40°C to +71°C. Other features of this product are over voltage protection and internal EMI-input filter to meet EN 55022, class A without additional components. Full SMD-design with exclusive use of ceramic capacitors ensure a very high reliability and a long product lifetime.

### Models

Order code	Input voltage range	Output voltage	Output current max.	Efficiency typ.
THB 3-0511	4.5 – 9 VDC (5 VDC nominal)	5 VDC	600 mA	70 %
THB 3-0512		12 VDC	250 mA	75 %
THB 3-0515		24 VDC	125 mA	76 %
THB 3-0522		±12 VDC	±125 mA	75 %
THB 3-0523		±15 VDC	±100 mA	75 %
THB 3-1211	9 – 18 VDC (12 VDC nominal)	5 VDC	600 mA	74 %
THB 3-1212		12 VDC	250 mA	80 %
THB 3-1215		24 VDC	125 mA	81 %
THB 3-1222		±12 VDC	±125 mA	80 %
THB 3-1223		±15 VDC	±100 mA	80 %
THB 3-2411	18 – 36 VDC (24 VDC nominal)	5 VDC	600 mA	78 %
THB 3-2412		12 VDC	250 mA	83 %
THB 3-2415		24 VDC	125 mA	84 %
THB 3-2422		±12 VDC	±125 mA	83 %
THB 3-2423		±15 VDC	±100 mA	83 %
THB 3-4811	36 – 75 VDC (48 VDC nominal)	5 VDC	600 mA	78 %
THB 3-4812		12 VDC	250 mA	83 %
THB 3-4815		24 VDC	125 mA	84 %
THB 3-4822		±12 VDC	±125 mA	83 %
THB 3-4823		±15 VDC	±100 mA	83 %

### Input Specifications

Input current at no load / full load	5 Vin models: 40 mA typ. / 880 mA typ. 12 Vin models: 30 mA typ. / 320 mA typ. 24 Vin models: 20 mA typ. / 155 mA typ. 48 Vin models: 10 mA typ. / 95 mA typ.
Start-up voltage / under voltage shut down	5 Vin models: 4.5 VDC / 4.0 VDC 12 Vin models: 9 VDC / 8.5 VDC 24 Vin models: 18 VDC / 17 VDC 48 Vin models: 36 VDC / 34 VDC
Recommended external input fuse (slow blow)	5 Vin models: 2.0 A 12 Vin models: 1.0 A 24 Vin models: 0.5 A 48 Vin models: 0.25 A
Surge voltage (1 sec. max.)	5 Vin models: 11 VDC max. 12 Vin models: 25 VDC max. 24 Vin models: 50 VDC max. 48 Vin models: 100 VDC max.
Reverse voltage protection	0.3 A max.
Input filter	EN 55022 class A, FCC part 15, class A

### Output Specifications

Voltage set accuracy	±1 %
Regulation	– Input variation Vin min. to Vin max. 0.5 % max. – Load variation 25 – 100 %: single output models: 1.0 % max.. dual output models: 2.0 % max. balanced load
Minimum load	15 % of rated max. output current. (Operation at lower load is safe but major deviations to specified data may occur)
Ripple and noise (20 MHz Bandwidth)	5 VDC models: 100 mVpk-pk max. other models: 150 mVpk-pk max.
Transient response (25% load step change)	150 µs typ.
Current limitation	>120 % Iout max.
Short circuit protection	indefinite (automatic recovery)
Capacitive load	5 VDC output models: 1000 µF max. other single output models: 470 µF max. dual output models: 220 µF max. (each output)

### Isolation / Safety Standards

Isolation test voltage (end of line flash test 1 sec.)	6000 Vpk
I/O isolation voltage (50Hz, 60sec.)	– according IEC/EN 60601-1 3000 VACrms, rated for 300 Vrms working voltage, 2 x MOOP – according IEC/EN 60950-1 4800 VACrms, rated for 1000 Vrms (1410 Vpk) working voltage
Leakage current	2 µA (at 240VAC, 60Hz)
Isolation capacitance – Input/Output	13 pF max.. (at 100KHz, 1V)
Isolation resistance – Input/Output	>1000 Mohm (at 500VDC)
Safety standards	IEC 60950-1:2005 (2nd ed.) +A1:2009 and/or EN 60950-1:2006 +A1:2010 +A11:2009 +12:2011, UL 60950-1 (2nd ed.) CSA C22.2 No. 60950-1-03 IEC 60601-1 3rd edition, 2 x MOOP, EN 60601-1 + A11:2011 ES 60601-1, CSA C22.2 No. 601.1

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

### General Specifications

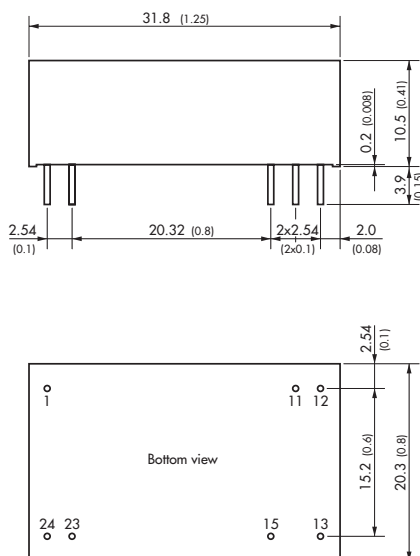
Safety approvals	<ul style="list-style-type: none"> <li>- CB test certificate according IEC 60950-1</li> <li>- CB test certificate according IEC 60601-1(3rd edition)</li> <li>- CSA certificate according UL 60950-1</li> <li>- CSA certificate according UL 60601-1</li> <li>- UL certificate according UL 60950-1</li> </ul>	<a href="http://www.tracopower.com/products/thb3-cb60950.pdf">www.tracopower.com/products/thb3-cb60950.pdf</a> <a href="http://www.tracopower.com/products/thb3-cb60601.pdf">www.tracopower.com/products/thb3-cb60601.pdf</a> <a href="http://www.tracopower.com/products/thb3-csa60950.pdf">www.tracopower.com/products/thb3-csa60950.pdf</a> <a href="http://www.tracopower.com/products/thb3-csa60601.pdf">www.tracopower.com/products/thb3-csa60601.pdf</a> <a href="http://www.ul.com">www.ul.com</a> File E188913, copy: e188913qqgq2.pdf
Temperature ranges	<ul style="list-style-type: none"> <li>- Operating</li> <li>- Casing</li> <li>- Storage</li> </ul>	-40°C to +71°C +95°C max. -40°C to +125°C
Derating		3.0 %/K above 60°C
Humidity (non condensing)		95 % rel H max.
Temperature coefficient		±0.02 %/K typ.
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)		>1 Mio. h
Switching frequency		150 kHz typ. (puls width modulation)
Casing material		non conductive plastic (UL 94V-0-rated)
Potting material		Silicon TSE 3331 (UL 94V-0-rated)
Weight		16.2 g (0.57 oz)
Soldering temperature		max. 265°C / 10 sec.
Altitude during operation		up to 5'000 m (16'400 ft) approved
Environmental compliance	<ul style="list-style-type: none"> <li>- Reach</li> <li>- RoHS</li> </ul>	<a href="http://www.tracopower.com/products/thb3-reach.pdf">www.tracopower.com/products/thb3-reach.pdf</a> according RoHS directive 2011/65/EU

**Application note :** [www.tracopower.com/products/thb3-application.pdf](http://www.tracopower.com/products/thb3-application.pdf)



- The component is not be used in an oxygen rich environment.
- The component is not to be used in conjunction with flammable anaesthetics and agents.
- The component has to be disposed appropriately. Please refer to local regulations (Waste Electrical and Electronic Equipment).
- A modification of the component is not allowed.

### Outline Dimensions



Pin-Out		
Pin	Single	Dual
1	+Vin (Vcc)	+Vin (Vcc)
11	No pin	Common
12	-Vout	No pin
13	+Vout	-Vout
15	No pin	+Vout
23	-Vin (GND)	-Vin (GND)
24	-Vin (GND)	-Vin (GND)

Dimensions in [mm], ( ) = Inch  
 Pin diameter  $\varnothing 0.6 \pm 0.05$  (0.024  $\pm 0.002$ )  
 Tolerances  $\pm 0.25$  ( $\pm 0.001$ )  
 Pin pitch tolerances  $\pm 0.13$  ( $\pm 0.005$ )

Specifications can be changed without notice! Make sure you are using the latest documentation, downloadable at [www.tracopower.com](http://www.tracopower.com)