

### Features

- ◆ I/O isolation 3000 VACrms rated for 300 Vrms working voltage
- ◆ Medical safety to UL 60601-1 and IEC/EN 60601-1 3rd edition, 2 x MOOP
- ◆ Industrial safety to IEC/EN/UL 60950-1
- ◆ Ultra compact DIP-24 package
- ◆ Wide 2:1 input voltage ranges
- ◆ Operating temperature range -40°C to +71°C
- ◆ Low leakage current
- ◆ Short circuit protection
- ◆ Input filter to meet EN 55022, Class A
- ◆ 3-year product warranty



The THB 6 series is a new 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 equipment, instrumentation, 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 ensures a very high reliability and a long product lifetime.

### Models

Order code	Input voltage range	Output voltage	Output current max.	Efficiency typ.
THB 6-1211	9 - 18 VDC (12 VDC nominal)	5 VDC	1000 mA	75 %
THB 6-1212		12 VDC	500 mA	78 %
THB 6-1222		±12 VDC	±250 mA	78 %
THB 6-1223		±15 VDC	±200 mA	78 %
THB 6-2411	18 - 36 VDC (24 VDC nominal)	5 VDC	1000 mA	77 %
THB 6-2412		12 VDC	500 mA	80 %
THB 6-2422		±12 VDC	±250 mA	80 %
THB 6-2423		±15 VDC	±200 mA	80 %
THB 6-4811	36 - 75 VDC (48 VDC nominal)	5 VDC	1000 mA	77 %
THB 6-4812		12 VDC	500 mA	80 %
THB 6-4822		±12 VDC	±250 mA	80 %
THB 6-4823		±15 VDC	±200 mA	80 %

### Input Specifications

Input current at no load / full load	12 Vin; 5 VDC model: 30 mA typ. / 570 mA typ. 12 Vin; other models: 30 mA typ. / 640 mA typ. 24 Vin; 5 VDC model: 20 mA typ. / 280 mA typ. 24 Vin; other models: 20 mA typ. / 315 mA typ. 48 Vin; 5 VDC model: 10 mA typ. / 140 mA typ. 48 Vin; other models: 10 mA typ. / 155 mA typ.
Start-up voltage / under voltage shut down	12 Vin models: 9 VDC / 8.5 VDC typ. 24 Vin models: 18 VDC / 16 VDC typ. 48 Vin models: 36 VDC / 34 VDC typ.
Recommended external input fuse (slow blow)	12 Vin models: 1.2 A 24 Vin models: 0.6 A 48 Vin models: 0.3 A
Surge voltage (1 sec. max.)	12 Vin models: 25 VDC max. 24 Vin models: 50 VDC max. 48 Vin models: 100 VDC max.
Input filter	EN 55022 class A

### Output Specifications

Voltage set accuracy	±1.0 %
Regulation	– Input variation Vin min. to Vin max. 1.0 % max. – Load variation 25 – 100 %: single output models: 1.0 % max. dual output models: 2.0 % max. balanced load
Minimum load	20 % 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 mVp-p max. other models: 150 mVp-p max.
Transient Response (25% load step change)	500 µs max.
Current limitation	>120 % Iout max.
Short circuit protection	indefinite (automatic recovery)
Capacitive load	5 VDC output models: 1000 µF max. 12 VDC output models: 470 µF max. dual output models: 220 µF max. (each output)

### Isolation / Safety Standards

Isolation test voltage (flash tested 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 300 Vrms working voltage
Leakage current (at 240VAC, 60Hz)	2 µA
I/O isolation capacity (at 100KHz, 1V)	7 pF typ.
I/O isolation resistance (at 500VDC)	>1000 Mohm
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 CSA C22.2 No. 60950-1-03 IEC/EN 60601-1 3rd edition, 2 x MOOP, UL 60601-1, CSA C22.2 No. 601.1
Safety approvals	– CB test certificate according IEC 60950-1 <a href="http://www.tracopower.com/products/thb6-cb60950.pdf">www.tracopower.com/products/thb6-cb60950.pdf</a> – CB test certificate according IEC 60601-1(3rd edition) <a href="http://www.tracopower.com/products/thb6-cb60601.pdf">www.tracopower.com/products/thb6-cb60601.pdf</a> – CSA certificate according UL 60950-1/60601-1 <a href="http://www.tracopower.com/products/thb6-csa.pdf">www.tracopower.com/products/thb6-csa.pdf</a> – UL certificate to UL 60950-1 <b>File E188913</b> cond.: reinforced insulation rated for 55°C max. with power de-rating 3%/K above 45°C ambient. File copy: <a href="http://www.tracopower.com/files/E188913qggq2.pdf">e188913qggq2.pdf</a>

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

**General Specifications**

Temperature ranges	- Operating - Case - Storage	-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)		>700'000 h
Switching frequency		150 kHz typ. (puls width modulation)
Altitude during operation		up to 5'000 m (16'400 ft) approved
Environmental compliance	- Reach - RoHS	<a href="http://www.tracopower.com/products/thb6-reach.pdf">www.tracopower.com/products/thb6-reach.pdf</a> RoHS directive 2011/65/EU

**Physical Specifications**

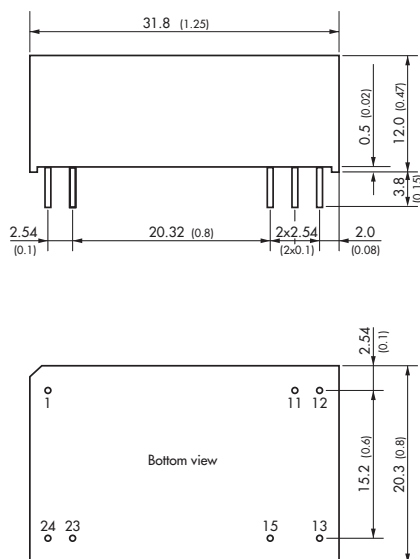
Casing material		non conductive plastic (UL 94V-0-rated)
Potting material		silicon TSE 3331 (UL 94V-0-rated)
Weight		18 g (0.63 oz)
Soldering temperature		max. 265°C / 10 sec.

**Application note :** [www.tracopower.com/products/thb6-application.pdf](http://www.tracopower.com/products/thb6-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  $\pm 0.25$  ( $\pm 0.01$ )  
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)