DC/DC Converters

THB 3 Series, 3 Watt

CB Scheme IEC 60950-1 IEC 60601-1 | c SP us UL 60950-1 UL 60601-1 | c UL us UL 60950-1

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 specifyed 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.

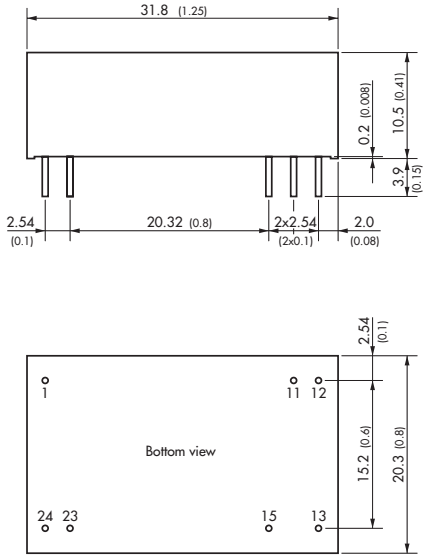
General Specifications

Safety approvals	– CB test certificate according IEC 60950-1	www.tracopower.com/products/thb3-cb60950.pdf
	– CB test certificate according IEC 60601-1(3rd edition)	www.tracopower.com/products/thb3-cb60601.pdf
	– CSA certificate according UL 60950-1	www.tracopower.com/products/thb3-csa60950.pdf
	– CSA certificate according UL 60601-1	www.tracopower.com/products/thb3-csa60601.pdf
	– UL certificate according UL 60950-1	www.ul.com File E188913, copy: e188913qqgq2.pdf
Temperature ranges	– Operating	–40°C to +71°C
	– Casing	+95°C max.
	– Storage	–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	– Reach	www.tracopower.com/products/thb3-reach.pdf
	– RoHS	according RoHS directive 2011/65/EU

Application note : 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 ø 0.6 ±0.05 (0.024 ±0.002)
Tolerances ±0.25 (±0.001)
Pin pich tolerances ±0.13 (±0.005)