

- 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
- Isolation test voltage 6000 Vpk
- Wide 2:1 input voltage ranges
- Extended operating temperature range -40°C to 85°C max.
- Input filter meets EN55022, class A
- Continuous short-circuit protection
- High reliability
- 3-year product warranty



ES 60601-1 IEC 60601-1
UL 60950-1 IEC 60950-1

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 +85°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 1		Output 2		Efficiency typ.
		Vnom	I _{max}	Vnom	I _{max}	
THB 3-0511	4.5 - 9 VDC (5 VDC nom.)	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	-12 VDC	125 mA	75 %
THB 3-0523		+15 VDC	100 mA	-15 VDC	100 mA	75 %
THB 3-1211	9 - 18 VDC (12 VDC nom.)	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	-12 VDC	125 mA	80 %
THB 3-1223		+15 VDC	100 mA	-15 VDC	100 mA	80 %
THB 3-2411	18 - 36 VDC (24 VDC nom.)	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	-12 VDC	125 mA	83 %
THB 3-2423		+15 VDC	100 mA	-15 VDC	100 mA	83 %
THB 3-4811	36 - 75 VDC (48 VDC nom.)	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	-12 VDC	125 mA	83 %
THB 3-4823		+15 VDC	100 mA	-15 VDC	100 mA	83 %

Input Specifications

Input Current	- At no load	5 Vin models: 40 mA typ. 12 Vin models: 30 mA typ. 24 Vin models: 20 mA typ. 48 Vin models: 10 mA typ.
	- At full load	5 Vin models: 825 mA typ. 12 Vin models: 325 mA typ. 24 Vin models: 150 mA typ. 48 Vin models: 75 mA typ.
Surge Voltage		5 Vin models: 11 VDC max. (1 s max.) 12 Vin models: 25 VDC max. (1 s max.) 24 Vin models: 50 VDC max. (1 s max.) 48 Vin models: 100 VDC max. (1 s max.)
Start-up Voltage		5 Vin models: 3.7 VDC min. / 4 VDC typ. / 4.5 VDC max. 12 Vin models: 8 VDC min. / 8.5 VDC typ. / 9 VDC max. 24 Vin models: 15 VDC min. / 17 VDC typ. / 18 VDC max. 48 Vin models: 30 VDC min. / 33 VDC typ. / 36 VDC max.
Under Voltage Lockout		5 Vin models: 4 VDC max. 12 Vin models: 8.5 VDC max. 24 Vin models: 17 VDC max. 48 Vin models: 34 VDC max.
Reflected Ripple Current		5 Vin models: 60 mA typ. 12 Vin models: 30 mA typ. 24 Vin models: 15 mA typ. 48 Vin models: 10 mA typ.
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) 48 Vin models: 250 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 W max.

Output Specifications

Voltage Set Accuracy		±1% max.
Regulation	- Input Variation (Vmin - Vmax)	single output models: 0.5% max. dual output models: 0.5% max.
	- Load Variation (25 - 100%)	single output models: 1% max. dual output models: 2% max. (Output 1) 2% max. (Output 2)
Ripple and Noise (20 MHz Bandwidth)	- single output	5 Vout models: 75 mVp-p typ. 12 Vout models: 100 mVp-p typ. 24 Vout models: 100 mVp-p typ.
	- dual output	12 / -12 Vout models: 100 / 100 mVp-p typ. 15 / -15 Vout models: 100 / 100 mVp-p typ.
	- single output	5 Vout models: 100 mVp-p max. 12 Vout models: 150 mVp-p max. 24 Vout models: 150 mVp-p max.
	- dual output	12 / -12 Vout models: 150 / 150 mVp-p max. 15 / -15 Vout models: 150 / 150 mVp-p max.
Capacitive Load	- single output	5 Vout models: 1'000 µF max. 12 Vout models: 470 µF max. 24 Vout models: 470 µF max.
	- dual output	12 / -12 Vout models: 220 / 220 µF max. 15 / -15 Vout models: 220 / 220 µF max.

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

Minimum Load		15 % of lout max. (Operation at lower load will not damage the converter, but it may not meet all specifications)
Temperature Coefficient		±0.05 %/K max.
Short Circuit Protection		Continuous, Automatic recovery
Overload Protection		Foldback Mode
Output Current Limitation		120% min. of lout max. 150% typ. of lout max.
Transient Response	- Response Deviation - Response Time	3% typ. / 6% max. (75% to 100% Load Step) 150 µs typ. / 500 µs max. (75% to 100% Load Step)

Safety Specifications

Safety Standards	- IT / Multimedia Equipment - Medical Equipment - Certification Documents	CSA-C22.2, No. 60950-1 Designed for EN 62368-1 (no certification) EN 60950-1 IEC 60950-1 UL 60950-1 EN 60601-1 IEC 60601-1 ANSI/AAMI ES 60601-1 CSA-C22.2, No 60601-1 2 x MOOP (Means Of Operator Protection) MOPP (Means Of Patient Protection) www.tracopower.com/overview/thb3
Pollution Degree		PD 2
Over Voltage Category		OVC II

EMC Specifications

EMI Emissions	- Conducted Emissions - Radiated Emissions	EN 60601-1-2 edition 4 (Medical Devices) EN 55032 class A (internal filter) EN 55032 class B (with external filter) FCC Part 15 class A (internal filter) FCC Part 15 class B (with external filter) EN 55032 class A (internal filter) EN 55032 class B (with external filter) FCC Part 15 class A (internal filter) FCC Part 15 class B (with external filter) External filter proposal: www.tracopower.com/overview/thb3
EMS Immunity		EN 60601-1-2 edition 4 (Medical Devices)

General Specifications

Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature - Case Temperature - Storage Temperature	-40°C to +85°C +100°C max. -50°C to +125°C
Power Derating	- High Temperature	3.3 %/K above 70°C
Cooling System		Natural convection (20 LFM)
Altitude During Operation		5'000 m max.
Switching Frequency		150 kHz typ. (PWM)
Insulation System		Reinforced Insulation
Working Voltage (rated)		1'000 VAC
Isolation Test Voltage	- Input to Output, 60 s	4'000 VDC
Isolation Resistance	- Input to Output, 500 VDC	10'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	7 pF typ. 13 pF max.

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

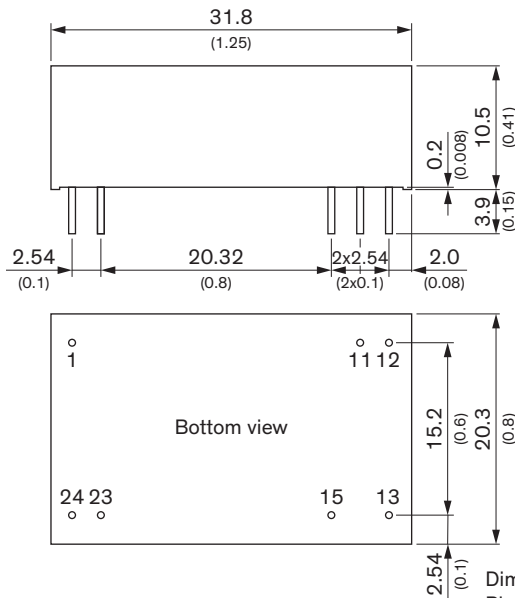
Leakage Current	- Earth Leakage Current	2 μ A max.
Reliability	- Calculated MTBF	1'000'000 h (MIL-HDBK-217F, ground benign)
Washing Process		Allowed (hermetical product)
	See Cleaning Guideline:	www.tracopower.com/info/cleaning.pdf
Housing Material		Non-conductive Plastic (UL 94 V-0 rated)
Potting Material		Silicone (UL 94 V-0 rated)
Pin Material		Copper Alloy (C6801)
Pin Foundation Plating		Nickel (2.5 μ m 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 / 6 s max.
Weight		13 g
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

Overview Link (for additional Documents)

www.tracopower.com/overview/thb3

Outline Dimensions



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)

Pinout		
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)