THE DATASHEET OF

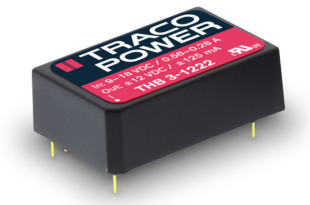
THB 3-0511

TRACO POWER

DC/DC Converter

THB 3 Series, 3 Watt

- **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
		Vnom	Imax	Vnom	Imax	typ.
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:	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.
	- 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.
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 Iout 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 Iout max. 150% typ. of Iout max.
Transient Response	- Response Deviation	3% typ. / 6% max. (75% to 100% Load Step)
	- Response Time	150 µs typ. / 500 µs max. (75% to 100% Load Step)

Safety Specifications

Standards	- IT / Multimedia Equipment	CSA-C22.2, No. 60950-1 Designed for IEC/EN/UL 62368-1 (not certified) EN 60950-1 IEC 60950-1 UL 60950-1
	- Medical Equipment	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)
	- Certification Documents	www.tracopower.com/overview/thb3
Pollution Degree		PD 2
Over Voltage Category		OVC II

EMC Specifications

EMI Emissions		EN 60601-1-2 edition 4 (Medical Devices)
	- Conducted Emissions	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)
	- Radiated Emissions	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	–40°C to +85°C
	- Case Temperature	+100°C max.
	- Storage Temperature	–50°C to +125°C
Power Derating	- High Temperature	3.3 %/K above 70°C
	See application note:	www.tracopower.com/overview/thb3
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.

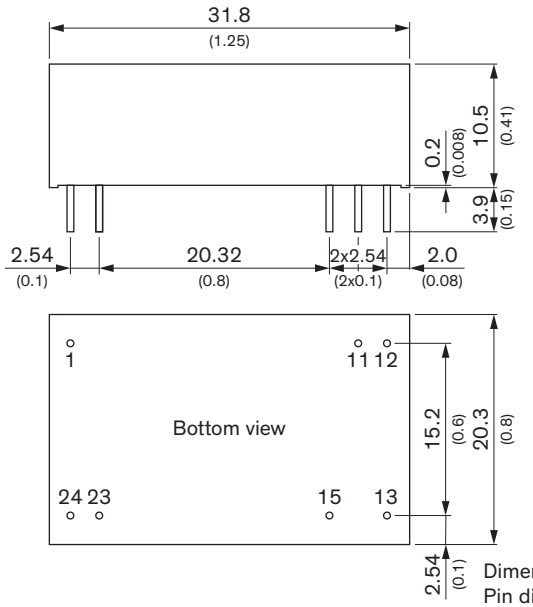
All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

Isolation Capacitance	- Input to Output, 100 kHz, 1 V	7 pF typ. 13 pF max.
Leakage Current	- Earth Leakage Current	2 µA max.
Reliability	- Calculated MTBF	1'000'000 h (MIL-HDBK-217F, ground benign)
Washing Process		According to 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 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		Lead-Free 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).)
	- SCIP Reference Number	bfebbff7-4ff9-4d1b-bd08-c85cccdbc535

Supporting Documents

Overview Link (for additional Documents)	www.tracopower.com/overview/thb3

Outline Dimensions



Dimensions in mm (inch)
Pin diameter Ø 0.6 ±0.05 (0.024 ±0.002)
Tolerances ±0.25 (±0.01)
Pin pitch tolerances ±0.13 (±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)

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