## **II TRACO POWER**

### **DC/DC Medical 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









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.

Order Code	Input Voltage	Outp	ut 1	Outp	ut 2	Efficiency
	Range	Vnom	Imax	Vnom	Imax	typ.
THB 3-0511		5 VDC	600 mA			70 %
THB 3-0512	4.5 - 9 VDC	12 VDC	250 mA			75 %
THB 3-0515	(5 VDC nom.)	24 VDC	125 mA			76 %
THB 3-0522	(3 VDC HOHL)	+12 VDC	125 mA	-12 VDC	125 mA	75 %
THB 3-0523		+15 VDC	100 mA	-15 VDC	100 mA	75 %
THB 3-1211		5 VDC	600 mA			74 %
THB 3-1212	9 - 18 VDC	12 VDC	250 mA			80 %
THB 3-1215	(12 VDC nom.)	24 VDC	125 mA			81 %
THB 3-1222	(12 VDC HOIII.)	+12 VDC	125 mA	-12 VDC	125 mA	80 %
THB 3-1223		+15 VDC	100 mA	-15 VDC	100 mA	80 %
THB 3-2411		5 VDC	600 mA			78 %
THB 3-2412	18 - 36 VDC	12 VDC	250 mA			83 %
THB 3-2415	(24 VDC nom.)	24 VDC	125 mA			84 %
THB 3-2422	(24 VDC 110111.)	+12 VDC	125 mA	-12 VDC	125 mA	83 %
THB 3-2423		+15 VDC	100 mA	-15 VDC	100 mA	83 %
THB 3-4811		5 VDC	600 mA			78 %
THB 3-4812	36 - 75 VDC	12 VDC	250 mA			83 %
THB 3-4815	(48 VDC nom.)	24 VDC	125 mA			84 %
THB 3-4822	(40 VDC 110111.)	+12 VDC	125 mA	-12 VDC	125 mA	83 %
THB 3-4823		+15 VDC	100 mA	-15 VDC	100 mA	83 %



Input Specificati	ions		
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:	<b>11 VDC max.</b> (1 s max.)
		12 Vin models:	<b>25 VDC max.</b> (1 s max.)
			50 VDC max. (1 s max.)
		48 Vin models:	<b>100 VDC max.</b> (1 s max.)
Start-up Voltage			3.7 VDC min. / 4 VDC typ. / 4.5 VDC max.
		12 Vin models:	8 VDC min. / 8.5 VDC typ. / 9 VDC max.
			15 VDC min. / 17 VDC typ. / 18 VDC max.
			30 VDC min. / 33 VDC typ. / 36 VDC max.
Under Voltage Lockout	Under Voltage Lockout		4 VDC max.
			8.5 VDC max.
		24 Vin models:	
		48 Vin models:	34 VDC max.
Reflected Ripple Currer	nt	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 F	use	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

<b>Output Specifica</b>	tions		
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:	<b>2% max.</b> (Output 1)
			<b>2% max.</b> (Output 2)
Ripple and Noise	- single output		75 mVp-p typ.
(20 MHz Bandwidth)		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 Coefficien	t	±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	<b>3% typ. / 6% max.</b> (75% to 100% Load Step)	
	- Response Time	<b>150 μs typ. / 500 μs max.</b> (75% to 100% Load Step)	

Safety Specifica	tions	
Safety Standards	- IT / Multimedia Equipment	CSA-C22.2, No. 60950-1
		Designed for EN 62368-1 (no certification)
		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

MC Specificat			FN 60601 1 0 adition 1 (Madical Devices)	
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)	

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
Cooling System		Natural convection (20 LFM)
Altitude During Operation	1	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.

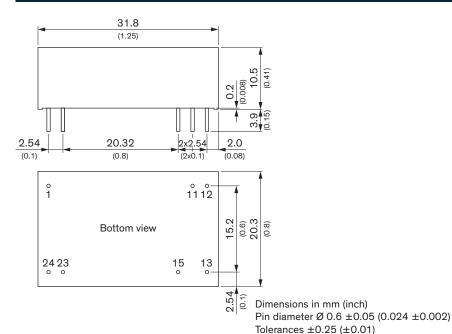
All specifications valid at nominal voltage, resistive full load and  $\pm 25^{\circ}\text{C}$  after warm-up time, unless otherwise stated.

### **III TRACO POWER**

Leakage Current	- Earth Leakage Current		2 μA 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 µm min.)
Pin Surface Plating			<b>Gold</b> (75 - 125 nm) <b>, glossy</b>
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
<b>Environmental Compliance</b>	- 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**



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)			

Pin pich tolerances ±0.13 (±0.005)