

- Wide 2:1 input voltage
- I/O isolation 5000 VACrms rated for 250 VACrms working voltage
- Certification according to IEC/EN/ES 60601-1 3rd edition for 2xMOPP
- Risk management process according to ISO 14971 including risk management file
- Acceptance criteria for electronic assemblies according to IPC-A-610 Level 3
- Low leakage current
- Extended operating temperature range -40°C to 90°C.
- Input filter to meet EN55022 class A
- Operating up to 5000m altitude
- 5 year product warranty A



The THM-10 series is a range of medical 10 Watt DC/DC converters in DIP-24 plastic package and with wide 2:1 input voltage range. They provide a reinforced isolation system for 5000 VACrms isolation and a very low leakage current of less than 2 μ A. The units are approved to IEC/EN/ES 60601-1 3rd edition for 2 x MOPP (Means Of Patient Protection) and come along with an ISO 14971 risk management file. Design and production conform to the quality management system ISO 13485. With a high efficiency of up to 87% and highest grade components the converters can reliably operate in an ambient temperature range of -40°C up to +90°C. They constitute a reliable solution not only for medical equipment but also for demanding ranges of application such as transportation, control & measurement or IGBT drivers.

Models				
Order code	Input voltage range	Output voltage	Output current max.	Efficiency typ.
THM 10-0510	4.5 – 9 VDC (5 VDC nominal)	3.3 VDC	2500 mA	80.0 %
THM 10-0511		5.0 VDC	2000 mA	84.0 %
THM 10-0512		12 VDC	830 mA	86.5 %
THM 10-0513		15 VDC	670 mA	87.0 %
THM 10-0515		24 VDC	416 mA	85.5 %
THM 10-0521		± 5.0 VDC	± 1000 mA	83.0 %
THM 10-0522		± 12 VDC	± 416 mA	85.5 %
THM 10-0523		± 15 VDC	± 333 mA	86.5 %
THM 10-1210	9.0 – 18 VDC (12 VDC nominal)	3.3 VDC	2500 mA	83.0 %
THM 10-1211		5.0 VDC	2000 mA	85.5 %
THM 10-1212		12 VDC	830 mA	88.0 %
THM 10-1213		15 VDC	670 mA	89.0 %
THM 10-1215		24 VDC	416 mA	89.0 %
THM 10-1221		± 5.0 VDC	± 1000 mA	84.0 %
THM 10-1222		± 12 VDC	± 416 mA	89.0 %
THM 10-1223		± 15 VDC	± 333 mA	88.0 %
THM 10-2410	18 – 36 VDC (24 VDC nominal)	3.3 VDC	2500 mA	83.0 %
THM 10-2411		5.0 VDC	2000 mA	86.5 %
THM 10-2412		12 VDC	830 mA	89.0 %
THM 10-2413		15 VDC	670 mA	89.0 %
THM 10-2415		24 VDC	416 mA	89.0 %
THM 10-2421		± 5.0 VDC	± 1000 mA	85.0 %
THM 10-2422		± 12 VDC	± 416 mA	89.0 %
THM 10-2423		± 15 VDC	± 333 mA	88.0 %
THM 10-4810	36 – 75 VDC (48 VDC nominal)	3.3 VDC	2500 mA	82.5 %
THM 10-4811		5.0 VDC	2000 mA	86.5 %
THM 10-4812		12 VDC	830 mA	89.0 %
THM 10-4813		15 VDC	670 mA	89.0 %
THM 10-4815		24 VDC	416 mA	88.5 %
THM 10-4821		± 5.0 VDC	± 1000 mA	85.0 %
THM 10-4822		± 12 VDC	± 416 mA	88.0 %
THM 10-4823		± 15 VDC	± 333 mA	88.0 %

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Input Specifications

Input current no load	5 Vin models: 12 Vin models: 24 Vin models: 48 Vin models:	20 mA typ. 10 mA typ. 6 mA typ. 4 mA typ.
Surge voltage (3 sec. max.)	5 Vin models: 12 Vin models: 24 Vin models: 48 Vin models:	16 V max. 25 V max. 50 V max. 100 V max.
Start-up voltage	5 Vin models: 12 Vin models: 24 Vin models: 48 Vin models:	4.5 VDC (or lower) 9 VDC (or lower) 18 VDC (or lower) 36 VDC (or lower)
Startup time		30 ms
Under voltage shut down	5 Vin models: 12 Vin models: 24 Vin models: 48 Vin models:	4 VDC typ. 8 VDC typ. 16 VDC typ. 33 VDC typ.
Conducted noise		EN55022 class A (internal filter)
EMC immunity	<ul style="list-style-type: none"> – ESD (electrostatic discharge) – Radiated immunity – Fast transient / surge (with external input capacitor / diode) – Conducted immunity – Magnetic field immunity 	EN 61000-4-2, air ± 8 kV, contact ± 6 kV, perf. criteria A EN 61000-4-3, 10 V/m, perf. criteria A EN 61000-4-4, ± 2 kV, perf. criteria A EN 61000-4-5, ± 2 kV perf. criteria A 5 Vin models: Nippon chemi-con KY 1000 μ F/ 25 V and reverse diode (Vishay V10P45) in parallel 12 & 24 Vin models: Nippon chemi-con KY 470 μ F/ 50 V 48 Vin models: Nippon chemi-con KY 330 μ F/ 100 V EN 61000-4-6, 10 Vrms, perf. criteria A EN 61000-4-8 100 A/m, continuous, perf. criteria A 1000 A/m, 1 sec., perf. criteria A

Output Specifications

Voltage set accuracy		± 1 % max.
Regulation	<ul style="list-style-type: none"> – Input variation – Load variation 0 – 100 % – Cross regulation 	single output: 0.2% max. dual output: 0.5% max. single output: 0.2% max. dual output: 1.0% max. dual output: 5.0% max. (asymmetrical load 25/100%)
Minimum load		not required
Ripple and noise (20 MHz Bandwidth)	3.3 & 5.0 VDC models: 12 & 15 VDC models: 24 VDC models:	30 mVp-p typ. with cap. 10 μ F/25V X7R MLCC 40 mVp-p typ. with cap. 10 μ F/25V X7R MLCC 50 mVp-p typ. with cap. 4.7 μ F/50V X7R MLCC
Transient response (25% load step change)	– Recovery time	250 μ s typ.
Over load protection		at 150 % typ. of lout rated (hiccup mode)
Short circuit protection		Continuous, automatic recovery
Over voltage protection	<ul style="list-style-type: none"> –Single output –Dual output 	3.3 VDC models: 3.7 – 5.0 VDC 5.0 VDC models: 5.6 – 7.0 VDC 12 VDC models: 13.5 – 16.0 VDC 15 VDC models: 18.3 – 22.0 VDC 24 VDC models: 29.1 – 34.5 VDC ± 5 VDC models: 5.6 – 7.0 VDC ± 12 VDC models: 13.5 – 18.2 VDC ± 15 VDC models: 17.0 – 22.0 VDC

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

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General Specifications

Capacitive load	-Single output	3.3 VDC models: 3'000 µF max. 5.0 VDC models: 2'500 µF max. 12 VDC models: 430 µF max. 15 VDC models: 350 µF max. 24 VDC models: 125 µF max.
	-Dual output	±5 VDC models: 1'440 µF max. (each output) ±12 VDC models: 250 µF max. (each output) ±15 VDC models: 180 µF max. (each output)
Temperature ranges	- Operating - Rated according to IEC/EN 60601-1 - Case temperature - Storage temperature	-40°C to +90°C (with derating) -40°C to +50°C (without derating) +105°C max. -55°C to +125°C
Derating		3.5 %/K above 75°C
Thermal impedance		18°C/W
Humidity (non condensing)		5 % to 95 % rel H max.
Isolation voltage (50Hz, 60sec)	- to meet ES/IEC/EN 60601-1	5000 VACrms, rated for 250 VACrms working voltage, 2 × MOPP
Clearance/creepage		8 mm min.
Leakagecurrent (at 240VAC, 60Hz)		2 µA max.
Isolation capacitance (input/output)		17 pF max.
Altitude during operation		5000 m
Temperature coefficient		±0.02 %/K typ.
Reliability, calculated MTBF (MIL-HDBK-217F at +25°C, ground benign)		3'800'000 h
Switching frequency		300 kHz ±30 kHz (pulse width modulation)
Vibration and thermal shock resistance		according to MIL-STD-810F
Safety standards/approvals	- Medical equipment - Certification documents	ANSI/AAMI ES60601-1:2005/(R)2012, IEC/EN60601-1 3rd edition www.tracopower.com/products/overview/thm10
Environmental compliance	- Reach - RoHS	www.tracopower.com/products/reach-declaration.pdf RoHS directive 2011/65/EU

Physical Specifications

Casing material	non-conductive black plastic
Base material	non-conductive black plastic
Potting material	silicone (UL94 V-0 rated)
Package weight	14 g (0.48oz)
Soldering temperature	max. 265°C / 10 sec



- 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.

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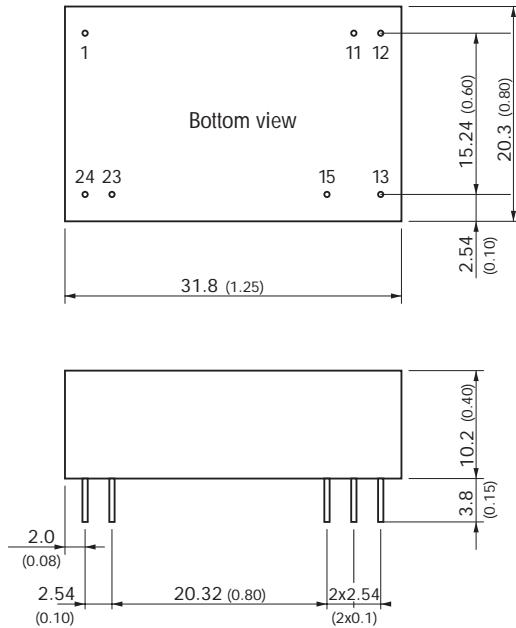
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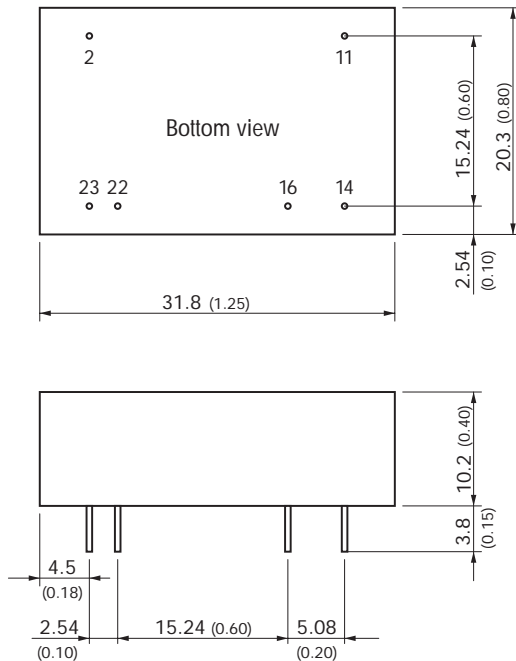
Outline Dimensions

Standard pinning



Standard 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)

Optional pinning: suffix **-B1**



Optional Pinout		
Pin	Single	Dual
2	-Vin (GND)	-Vin (GND)
11	No con.	-Vout
14	+Vout	+Vout
16	-Vout	Common
22	+Vin (Vcc)	+Vin (Vcc)
23	+Vin (Vcc)	+Vin (Vcc)

Remark: No suffix **-B1** for 5 Vin models. Corresponding parts are with THM 10WI series by default. see www.tracopower.com/overview/thm10wi

Dimensions in [mm], (l) = Inch
 Tolerances ± 0.5 (± 0.02)
 Pin $\varnothing 0.6 \pm 0.1$ (0.024 ± 0.004)
 Pin pitch tolerances ± 0.25 (± 0.01)

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