

- Wide 2:1 input voltage
- I/O isolation 5000 VACrms rated for 250 VACrms working voltage
- 2 x MOPP Medical safety according to AAMI/ANSI ES 60601-1:2005(R) and IEC/EN 60601-1 3rd edition
- Low leakage current <2 μ A
- Very high efficiency up to 89%
- Extended operating temperature range -40°C to 85°C.
- Input filter to meet EN55022 class A
- 3-year product warranty



The THM-10 series is a range of high performance, regulated 10 Watt DC/DC converters in a DIP-24 plastic package. The reinforced I/O-isolation system complies with the medical safety requirements for MOPP (Means Of Patient Protection). Together with a wide 2:1 input voltage range, and an internal EMI filter to meet EN55022 class A the converters constitute also a reliable solution for many demanding applications such as transportation systems, industrial control equipments, measurement equipments, and some IGBT driver applications. With A high efficiency of up to 89% and highest grade components the converters can reliably operate in an ambient temperature range of -40 up to +85°C.

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		\pm 5.0 VDC	\pm 1000 mA	83.0 %
THM 10-0522		\pm 12 VDC	\pm 416 mA	85.5 %
THM 10-0523		\pm 15 VDC	\pm 333 mA	86.5 %
THM 10-1210		9.0 – 18 VDC (12 VDC nominal)	3.3 VDC	2500 mA
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	\pm 5.0 VDC		\pm 1000 mA	84.0 %
THM 10-1222	\pm 12 VDC		\pm 416 mA	89.0 %
THM 10-1223	\pm 15 VDC		\pm 333 mA	88.0 %
THM 10-2410	18 – 36 VDC (24 VDC nominal)		3.3 VDC	2500 mA
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		\pm 5.0 VDC	\pm 1000 mA	85.0 %
THM 10-2422		\pm 12 VDC	\pm 416 mA	89.0 %
THM 10-2423		\pm 15 VDC	\pm 333 mA	88.0 %
THM 10-4810		36 – 75 VDC (48 VDC nominal)	3.3 VDC	2500 mA
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	\pm 5.0 VDC		\pm 1000 mA	85.0 %
THM 10-4822	\pm 12 VDC		\pm 416 mA	88.0 %
THM 10-4823	\pm 15 VDC		\pm 333 mA	88.0 %

Input Specifications

Input current no load	5 Vin models: 20 mA typ. 12 Vin models: 10 mA typ. 24 Vin models: 6 mA typ. 48 Vin models: 4 mA typ.
Surge voltage (3 sec. max.)	5 Vin models: 16 V max. 12 Vin models: 25 V max. 24 Vin models: 50 V max. 48 Vin models: 100 V max.
Start-up voltage	5 Vin models: 4.5 VDC (or lower) 12 Vin models: 9 VDC (or lower) 24 Vin models: 18 VDC (or lower) 48 Vin models: 36 VDC (or lower)
Startup time	30 ms
Under voltage shut down	5 Vin models: 4 VDC typ. 12 Vin models: 8 VDC typ. 24 Vin models: 16 VDC typ. 48 Vin models: 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: 30 mVp-p typ. with cap. 10 μ F/25V X7R MLCC 12 & 15 VDC models: 40 mVp-p typ. with cap. 10 μ F/25V X7R MLCC 24 VDC models: 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.

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 - Case temperature - Storage temperature	-40°C to +77°C (without derating) +105°C max. -55°C to +125°C
Derating		3.6 %/K above 77°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)		3'849'000 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	ANSI/AAMI ES60601-1:2005/(R)2012, IEC/EN60601-1 3rd edition
	- Certification documents	tba
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

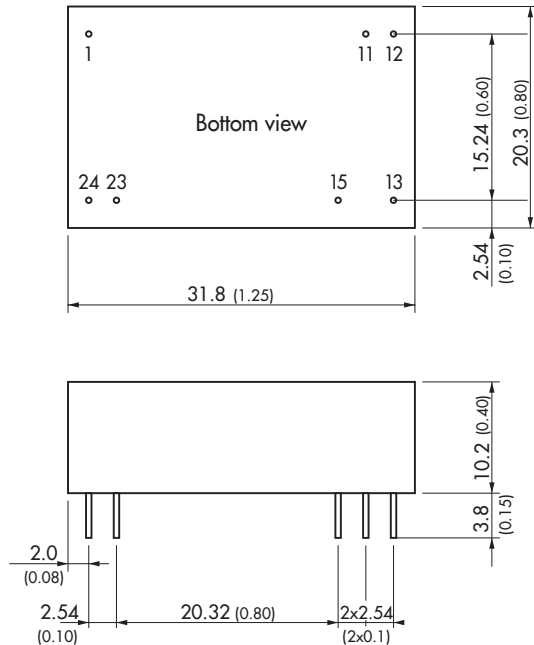


- The component is not be used in an oxygen rich environment.
- The component is not to be used in conjunction with flammable anaesthetics and agents.
- The component has to be disposed appropriately. Please refer to local regulations (Waste Electrical and Electronic Equipment).
- A modification of the component is not allowed.

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

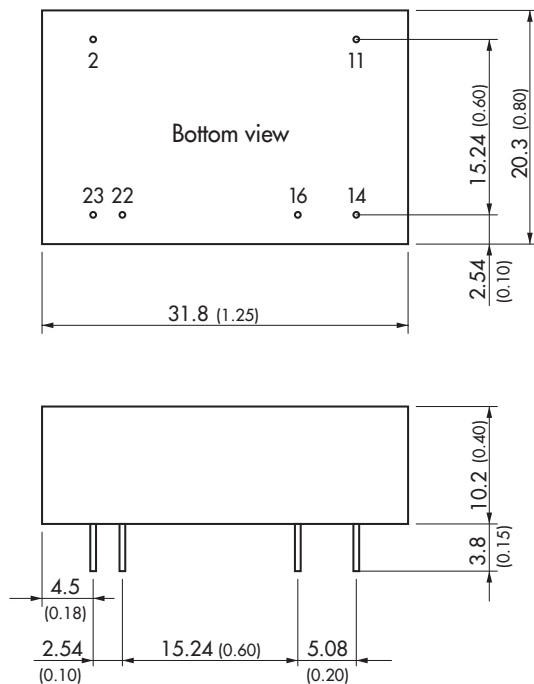
Outline Dimensions

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)

Dimensions in [mm], () = 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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