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With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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- Wide 2:1 input voltage 6 W DC/DC converter in a compact DIP-24 plastic case
- 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 < 2µA
- Extended operating temperature range -40°C to 90°C.
- EMC compliance to IEC 60601-1-2 4th edition and EN55032 class A
- Operating up to 5000m altitude
- 5 year product warranty



The THM-6 series is a range of medical 6 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 µA. 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 89% 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 6-0510	4.5 – 9 VDC (5 VDC nominal)	3.3 VDC	1800 mA	81.5 %
THM 6-0511		5.0 VDC	1200 mA	86.0 %
THM 6-0512		12 VDC	500 mA	86.0 %
THM 6-0513		15 VDC	400 mA	87.5 %
THM 6-0515		24 VDC	250 mA	87.0 %
THM 6-0521		±5.0 VDC	±600 mA	84.0 %
THM 6-0522		±12 VDC	±250 mA	86.5 %
THM 6-0523		±15 VDC	±200 mA	87.5 %
THM 6-1210	9.0 – 18 VDC (12 VDC nominal)	3.3 VDC	1800 mA	83.5 %
THM 6-1211		5.0 VDC	1200 mA	86.0 %
THM 6-1212		12 VDC	500 mA	89.0 %
THM 6-1213		15 VDC	400 mA	88.5 %
THM 6-1215		24 VDC	250 mA	88.5 %
THM 6-1221		±5.0 VDC	±600 mA	85.0 %
THM 6-1222		±12 VDC	±250 mA	89.0 %
THM 6-1223		±15 VDC	±200 mA	88.0 %
THM 6-2410	18 – 36 VDC (24 VDC nominal)	3.3 VDC	1800 mA	83.0 %
THM 6-2411		5.0 VDC	1200 mA	86.0 %
THM 6-2412		12 VDC	500 mA	89.0 %
THM 6-2413		15 VDC	400 mA	89.0 %
THM 6-2415		24 VDC	250 mA	88.5 %
THM 6-2421		±5.0 VDC	±600 mA	85.0 %
THM 6-2422		±12 VDC	±250 mA	88.5 %
THM 6-2423		±15 VDC	±200 mA	88.5 %
THM 6-4810	36 – 75 VDC (48 VDC nominal)	3.3 VDC	1800 mA	82.5 %
THM 6-4811		5.0 VDC	1200 mA	86.5 %
THM 6-4812		12 VDC	500 mA	88.0 %
THM 6-4813		15 VDC	400 mA	88.5 %
THM 6-4815		24 VDC	250 mA	88.0 %
THM 6-4821		±5.0 VDC	±600 mA	85.0 %
THM 6-4822		±12 VDC	±250 mA	88.0 %
THM 6-4823		±15 VDC	±200 mA	87.0 %

## 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 s 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.
EMC emissions	– Conducted & Radiated input suppression – Application note for filter class B proposal EN 55011 limits to IEC 60601-1-2 4th edition EN 55032 class A (internal filter) <a href="http://www.tracopower.com/overview/thm6">www.tracopower.com/overview/thm6</a>
EMC immunity	– Generic for Medical equipment – ESD (electrostatic discharge) – Radiated immunity – Fast transient / surge (with external input capacitor / diode) – Conducted immunity – Magnetic field immunity IEC/EN 60601-1-2 4th edition EN 61000-4-2, air $\pm 8$ kV, contact $\pm 6$ kV, perf. criteria A EN 61000-4-3, 10 V/m, perf. criteria A EN 61000-4-4, $\pm 2$ kV, perf. criteria A EN 61000-4-5, $\pm 2$ kV perf. criteria A 5 Vin models: Nippon chemi-con KY 1000 $\mu$ F/ 25 V and reverse diode (Vishay V10P45) in parallel 12 & 24 Vin models: Nippon chemi-con KY 470 $\mu$ F/ 50 V 48 Vin models: Nippon chemi-con KY 330 $\mu$ 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	$\pm 1$ % max.
Regulation	– 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 Vout models: 30 mVp-p typ. with cap. 10 $\mu$ F/25V X7R MLCC 12 & 15 Vout models: 40 mVp-p typ. with cap. 10 $\mu$ F/25V X7R MLCC 24 Vout models: 50 mVp-p typ. with cap. 4.7 $\mu$ F/50V X7R MLCC
Transient response	– Recovery time (25% load step change) 250 $\mu$ s typ.
Over load protection	at 150 % typ. of lout rated (hiccup mode)
Short circuit protection	Continuous, automatic recovery
Over voltage protection	– Single output – Dual output 3.3 Vout models: 3.7 – 5.0 VDC 5.0 Vout models: 5.6 – 7.0 VDC 12 Vout models: 13.5 – 16.0 VDC 15 Vout models: 18.3 – 22.0 VDC 24 Vout models: 29.1 – 34.5 VDC $\pm 5$ Vout models: 5.6 – 7.0 VDC $\pm 12$ Vout models: 13.5 – 18.2 VDC $\pm 15$ Vout models: 17.0 – 22.0 VDC

### General Specifications

Capacitive load	– Single output	3.3 Vout models:	2'100 µF max.
		5.0 Vout models:	1'500 µF max.
		12 Vout models:	260 µF max.
		15 Vout models:	210 µF max.
		24 Vout models:	75 µF max.
– Dual output	±5 Vout models:	860 µF max. (each output)	
	±12 Vout models:	150 µF max. (each output)	
	±15 Vout models:	110 µF max. (each output)	
Temperature ranges	– Operating (designed for)	–40°C to +88°C (without derating)	
	– Rated according to IEC/EN 60601-1	–40°C to +70°C (without derating)	
	– Case temperature	+105°C max.	
	– Storage temperature	–55°C to +125°C	
Thermal impedance		18 K/W	
Humidity (non condensing)		5 % to 95 % rel H max.	
Isolation voltage (50 Hz, 60 s)	– to meet ES/IEC/EN 60601-1	5000 VACrms, rated for 250 VACrms working voltage, 2 × MOPP	
Clearance/creepage		8 mm min.	
Leakage current (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)		4'700'000 h	
Switching frequency		250 kHz ±25 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	<a href="http://www.tracopower.com/overview/thm6">www.tracopower.com/overview/thm6</a>	
Environmental compliance	– Reach	<a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a>	
	– RoHS	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 (0.48 oz)
Soldering temperature	265°C / 10 s max.

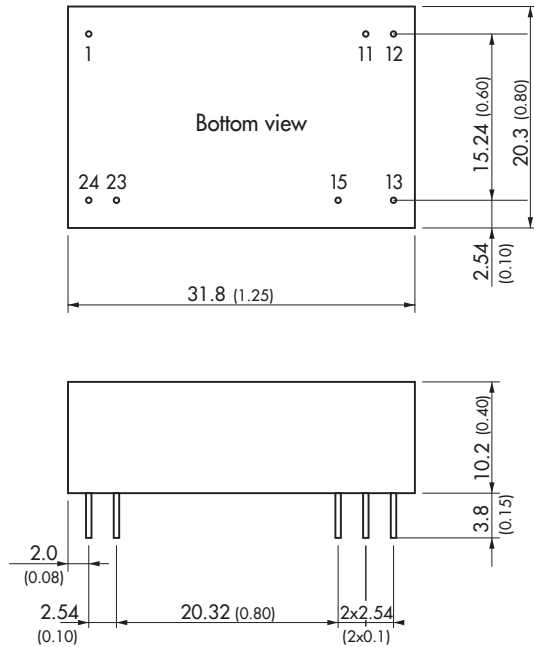


- The component is not be used in an oxygen rich environment.
- The component is not to be used in conjunction with flammable anaesthetics and agents.
- The component has to be disposed appropriately. Please refer to local regulations (Waste Electrical and Electronic Equipment).
- A modification of the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

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

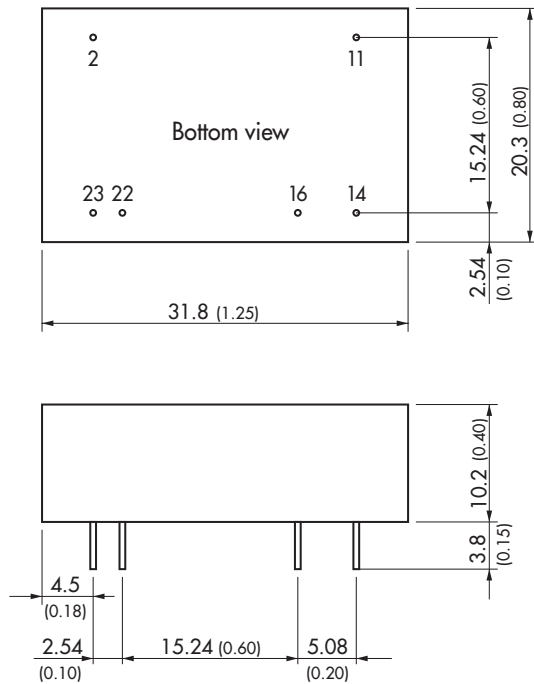
### Outline Dimensions

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)

Remark: No suffix **-B1** for 5 Vin models. Corresponding parts are with THM 6WI series by default. see [www.tracopower.com/overview/thm6wi](http://www.tracopower.com/overview/thm6wi)

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