

- Wide 4:1 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-3WI series is a range of medical 3 Watt DC/DC converters in DIP-24 plastic package and with ultra-wide 4:1 input voltage range. They provide a reinforced isolation system for 5000 VACrms isolation and a very low leakage current of less than 2  $\mu$ 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 3-0510WI	4.5 – 9 VDC (5 VDC nominal)	3.3 VDC	1000 mA	81.0 %
THM 3-0511WI		5.0 VDC	600 mA	84.5 %
THM 3-0512WI		12 VDC	250 mA	85.5 %
THM 3-0513WI		15 VDC	200 mA	87.5 %
THM 3-0515WI		24 VDC	125 mA	85.5 %
THM 3-0521WI		$\pm$ 5.0 VDC	$\pm$ 300 mA	83.0 %
THM 3-0522WI		$\pm$ 12 VDC	$\pm$ 125 mA	86.0 %
THM 3-0523WI		$\pm$ 15 VDC	$\pm$ 100 mA	86.0 %
THM 3-2410WI	9.0 – 36 VDC (24 VDC nominal)	3.3 VDC	1000 mA	82.0 %
THM 3-2411WI		5.0 VDC	600 mA	84.5 %
THM 3-2412WI		12 VDC	250 mA	87.0 %
THM 3-2413WI		15 VDC	200 mA	87.0 %
THM 3-2415WI		24 VDC	125 mA	87.0 %
THM 3-2421WI		$\pm$ 5.0 VDC	$\pm$ 300 mA	83.0 %
THM 3-2422WI		$\pm$ 12 VDC	$\pm$ 125 mA	87.5 %
THM 3-2423WI		$\pm$ 15 VDC	$\pm$ 100 mA	86.0 %
THM 3-4810WI	18 – 75 VDC (48 VDC nominal)	3.3 VDC	1000 mA	81.0 %
THM 3-4811WI		5.0 VDC	600 mA	84.0 %
THM 3-4812WI		12 VDC	250 mA	87.0 %
THM 3-4813WI		15 VDC	200 mA	86.5 %
THM 3-4815WI		24 VDC	125 mA	86.5 %
THM 3-4821WI		$\pm$ 5.0 VDC	$\pm$ 300 mA	83.0 %
THM 3-4822WI		$\pm$ 12 VDC	$\pm$ 125 mA	86.0 %
THM 3-4823WI		$\pm$ 15 VDC	$\pm$ 100 mA	86.0 %

## Input Specifications

Input current no load	5 Vin models: 20 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. 24 Vin models: 50 V max. 48 Vin models: 100 V max.
Start-up voltage	5 Vin models: 4.5 VDC (or lower) 24 Vin models: 9 VDC (or lower) 48 Vin models: 18 VDC (or lower)
Startup time	30 ms
Under voltage shut down	5 Vin models: 4 VDC typ. 24 Vin models: 8 VDC typ. 48 Vin models: 16 VDC typ.
Conducted noise	EN55022 class A (internal filter)
EMC immunity	<ul style="list-style-type: none"> <li>– ESD (electrostatic discharge) EN 61000-4-2, air <math>\pm 8</math> kV, contact <math>\pm 6</math> kV, perf. criteria A</li> <li>– Radiated immunity EN 61000-4-3, 10 V/m, perf. criteria A</li> <li>– Fast transient / surge EN 61000-4-4, <math>\pm 2</math> kV, perf. criteria A</li> <li>– (with external input capacitor / diode) EN 61000-4-5, <math>\pm 2</math> kV perf. criteria A</li> <li>5 Vin models: Nippon chemi-con KY 1000 <math>\mu</math>F/ 25 V and reverse diode (Vishay V10P45) in parallel</li> <li>24 Vin models: Nippon chemi-con KY 470 <math>\mu</math>F/ 50 V</li> <li>48 Vin models: Nippon chemi-con KY 330 <math>\mu</math>F/ 100 V</li> <li>– Conducted immunity EN 61000-4-6, 10 Vrms, perf. criteria A</li> <li>– Magnetic field immunity EN 61000-4-8</li> </ul>
External input fuse required (recommended values, slow blow type)	5 Vin models: 2.5 A 24 Vin models: 1.5 A 48 Vin models: 1 A

## Output Specifications

Voltage set accuracy	$\pm 1$ % max.
Regulation	<ul style="list-style-type: none"> <li>– Input variation single output: 0.2% max. dual output: 0.5% max.</li> <li>– Load variation 0 – 100 % single output: 0.2% max. dual output: 1.0% max.</li> <li>– Cross regulation dual output: 5.0% max. (asymmetrical load 25/100%)</li> </ul>
Minimum load	not required
Ripple and noise (20 MHz Bandwidth)	3.3 & 5.0 VDC models: 30 mVp-p typ. with cap. 10 $\mu$ F/25V X7R MLCC 12 & 15 VDC models: 40 mVp-p typ. with cap. 10 $\mu$ F/25V X7R MLCC 24 VDC 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	<ul style="list-style-type: none"> <li>–Single 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</li> <li>–Dual output <math>\pm 5</math> VDC models: 5.6 – 7.0 VDC <math>\pm 12</math> VDC models: 13.5 – 18.2 VDC <math>\pm 15</math> VDC models: 17.0 – 22.0 VDC</li> </ul>

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: 1'050 µF max. 5.0 VDC models: 750 µF max. 12 VDC models: 130 µF max. 15 VDC models: 100 µF max.
	-Dual output	24 VDC models: 39 µF max. ±5 VDC models: 430 µF max. (each output) ±12 VDC models: 75 µF max. (each output) ±15 VDC models: 56 µF max. (each output)
Temperature ranges	- Operating (designed for) - Rated according to IEC/EN 60601-1 - Case temperature - Storage temperature	-40°C to +90°C (without derating) -40°C to +80°C (without derating) +105°C max. -55°C to +125°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)		6'400'000 h
Switching frequency		150 kHz ±15 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/products/overview/thm3wi">www.tracopower.com/products/overview/thm3wi</a>
Environmental compliance - Reach		<a href="http://www.tracopower.com/products/reach-declaration.pdf">www.tracopower.com/products/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 (0.48oz)
Soldering temperature	max. 265°C / 10 sec

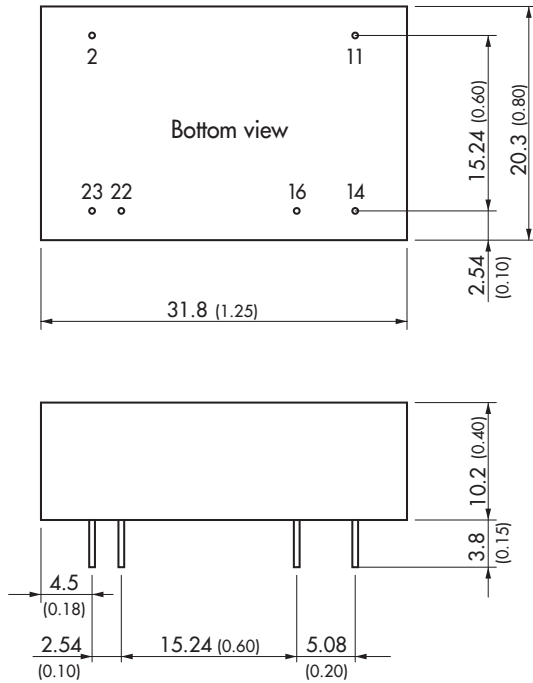


- The component is not be used in an oxygen rich environment.
- The component is not to be used in conjunction with flammable anaesthetics and agents.
- The component has to be disposed appropriately. Please refer to local regulations (Waste Electrical and Electronic Equipment).
- A modification of the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

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

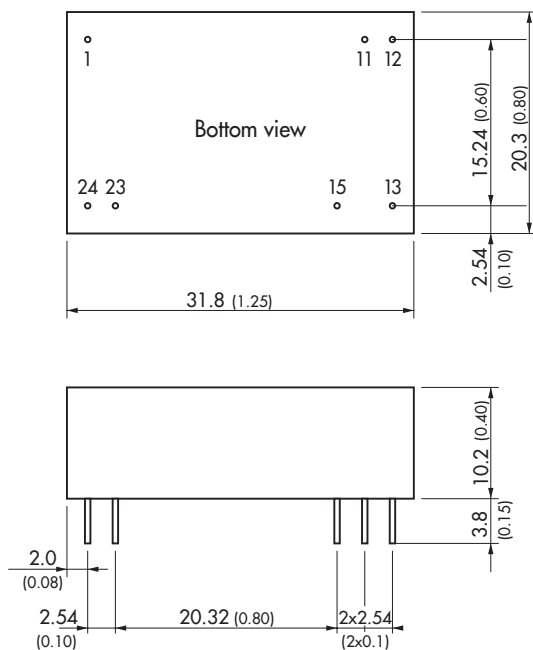
### Outline Dimensions

Standard pinning



Standard Pinout		
Pin	Single	Dual
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)

Optional pinning: suffix **-A1**



Optional 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)

Remark: No suffix **-A1** for 5 Vin models. Corresponding parts are with THM 3 series by default. see [www.tracopower.com/overview/thm3](http://www.tracopower.com/overview/thm3)

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  $\pm 0.25$  ( $\pm 0.01$ )