

- Ultra wide 4:1 input voltage 3 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 2×MOPP
- 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-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 µA. The units are approved to IEC/EN/ES 60601-1 3rd edition for 2 × 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		±5.0 VDC	±300 mA	83.0 %
THM 3-0522WI		±12 VDC	±125 mA	86.0 %
THM 3-0523WI		±15 VDC	±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		±5.0 VDC	±300 mA	83.0 %
THM 3-2422WI		±12 VDC	±125 mA	87.5 %
THM 3-2423WI		±15 VDC	±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		±5.0 VDC	±300 mA	83.0 %
THM 3-4822WI		±12 VDC	±125 mA	86.0 %
THM 3-4823WI		±15 VDC	±100 mA	86.0 %

Input Specifications

Input current no load	5 Vin models: 24 Vin models: 48 Vin models:	20 mA typ. 6 mA typ. 4 mA typ.
Surge voltage (3 s max.)	5 Vin models: 24 Vin models: 48 Vin models:	16 V max. 50 V max. 100 V max.
Start-up voltage	5 Vin models: 24 Vin models: 48 Vin models:	4.5 VDC (or lower) 9 VDC (or lower) 18 VDC (or lower)
Startup time		30 ms
Under voltage shut down	5 Vin models: 24 Vin models: 48 Vin models:	4 VDC typ. 8 VDC typ. 16 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) www.tracopower.com/overview/thm3wi
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 ± 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 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
External input fuse required (recommended values, slow blow type)	5 Vin models: 24 Vin models: 48 Vin models:	2.5 A 1.5 A 1 A

Output Specifications

Voltage set accuracy		± 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: 12 & 15 Vout models: 24 Vout 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	– Recovery time (25% load step change)	250 μ s typ.
Over load protection		at 150 % typ. of Iout 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 ± 5 Vout models: 5.6 – 7.0 VDC ± 12 Vout models: 13.5 – 18.2 VDC ± 15 Vout models: 17.0 – 22.0 VDC

General Specifications

Capacitive load	– Single output	3.3 Vout models:	1'050 µF max.
		5.0 Vout models:	750 µF max.
		12 Vout models:	130 µF max.
	– Dual output	15 Vout models:	100 µF max.
		24 Vout models:	39 µF max.
		±5 Vout models:	430 µF max. (each output)
	±12 Vout models:	75 µF max. (each output)	
	±15 Vout models:	56 µF max. (each output)	
Temperature ranges	– Operating (designed for)	–40°C to +90°C (without derating)	
	– Rated according to IEC/EN 60601-1	–40°C to +80°C (without derating)	
	– Case temperature	+105°C max.	
	– Storage temperature	–55°C to +125°C	
Thermal impedance		18°C/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.	
Leakagecurrent (at 240 VAC, 60 Hz)		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	www.tracopower.com/overview/thm3wi	
Environmental compliance	– Reach	www.tracopower.com/info/reach-declaration.pdf	
	– RoHS	RoHS directive 2011/65/EU	

Physical Specifications

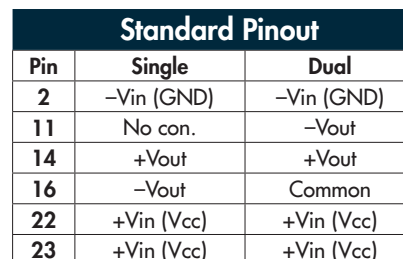
Casing material	non-conductive black plastic
Base material	non-conductive black plastic
Potting material	silicone (UL94 V-0 rated)
Package weight	14 g (0.48 oz)
Soldering temperature	265°C / 10 s max.



- 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.

Standard pinning



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)

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)