

- Wide 2:1 input voltage 20 W DC/DC converter in a 1.6 × 1 " 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 < 2.5 µA
- Extended operating temperature range -40°C to 80°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-20 series is a range of medical 20 Watt DC/DC converters in 1.6" x 1.0" 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 2.5 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 89% and highest grade components the converters can reliably operate in an ambient temperature range of -40°C up to +80°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 20-1211	9.0 – 18 VDC (12 VDC nominal)	5.0 VDC	4000 mA	87.0 %
THM 20-1212		12 VDC	1670 mA	88.5 %
THM 20-1213		15 VDC	1330 mA	88.5 %
THM 20-1215		24 VDC	833 mA	89.0 %
THM 20-1221		±5 VDC	±2000 mA	86.0 %
THM 20-1222		±12 VDC	±833 mA	89.0 %
THM 20-1223		±15 VDC	±667 mA	89.0 %
THM 20-2411	18 – 36 VDC (24 VDC nominal)	5.0 VDC	4000 mA	90.0 %
THM 20-2412		12 VDC	1670 mA	90.0 %
THM 20-2413		15 VDC	1330 mA	90.0 %
THM 20-2415		24 VDC	833 mA	90.0 %
THM 20-2421		±5 VDC	±2000 mA	86.0 %
THM 20-2422		±12 VDC	±833 mA	90.0 %
THM 20-2423		±15 VDC	±667 mA	90.0 %
THM 20-4811	36 – 75 VDC (48 VDC nominal)	5.0 VDC	4000 mA	89.5 %
THM 20-4812		12 VDC	1670 mA	88.0 %
THM 20-4813		15 VDC	1330 mA	88.0 %
THM 20-4815		24 VDC	833 mA	88.5 %
THM 20-4821		±5 VDC	±2000 mA	86.0 %
THM 20-4822		±12 VDC	±833 mA	88.5 %
THM 20-4823		±15 VDC	±667 mA	88.0 %

## Input Specifications

Input current no load	12 Vin models: 18 mA typ. 24 Vin models: 13 mA typ. 48 Vin models: 10 mA typ.	
Surge voltage (3 sec. max.)	12 Vin models: 25 V max. 24 Vin models: 50 V max. 48 Vin models: 100 V max.	
Start-up voltage	12 Vin models: 9 VDC (or lower) 24 Vin models: 18VDC (or lower) 48 Vin models: 36 VDC (or lower)	
Startup time	60 ms max. (30 ms typ.)	
Under voltage shut down (lock-out circuit)	12 Vin models: 7.8 - 8.6 VDC 24 Vin models: 15.8 - 17.4 VDC 48 Vin models: 32 - 34 VDC	
Input filter	Pi-type	
Conducted noise	– Conducted & Radiated input surpression – Filter proposal	EN 55011 limits to IEC 60601-1-2 4th edition EN55032 class A (internal filter) EN55032 class B with external components <a href="http://www.tracopower.com/overview/thm20wi">www.tracopower.com/overview/thm20wi</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 ±15 kV, contact ±8 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  12 Vin models: Nippon chemi-con KY 220 µF/ 100 V TVS - SMDJ36A, 36V, 3000 W) 24 Vin models: Nippon chemi-con KY 220 µF/ 100 V TVS - SMDJ58A, 58V, 3000 W) 48 Vin models: Nippon chemi-con KY 220 µF/ 100 V TVS - SMDJ120A, 120V, 3000 W) 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)	12 Vin models: 4 A 24 Vin models: 2 A 48 Vin models: 1 A	

## Output Specifications

Voltage set accuracy	±1 % max.	
Output voltage adjustment range (single output models only)	5 & 12 VDC models: ±10% 15 & 24 VDC models: –10 / +20%	
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%)
Temperature coefficient	±0.02 %/K max.	
Minimum load	not required	
Ripple and noise (20 MHz Bandwidth)	(±)5.0 VDC models: 50 mVp-p typ. with cap. 10 µF/25V X7R MLCC (±)12 VDC models: 75 mVp-p typ. with cap. 10 µF/25V X7R MLCC (±)15 VDC models: 75 mVp-p typ. with cap. 10 µF/25V X7R MLCC 24 VDC models: 100 mVp-p typ. with cap. 4.7 µF/50V X7R MLCC	
Transient response	– Recovery time (25% load step change)	250 µs typ.

## General Specifications

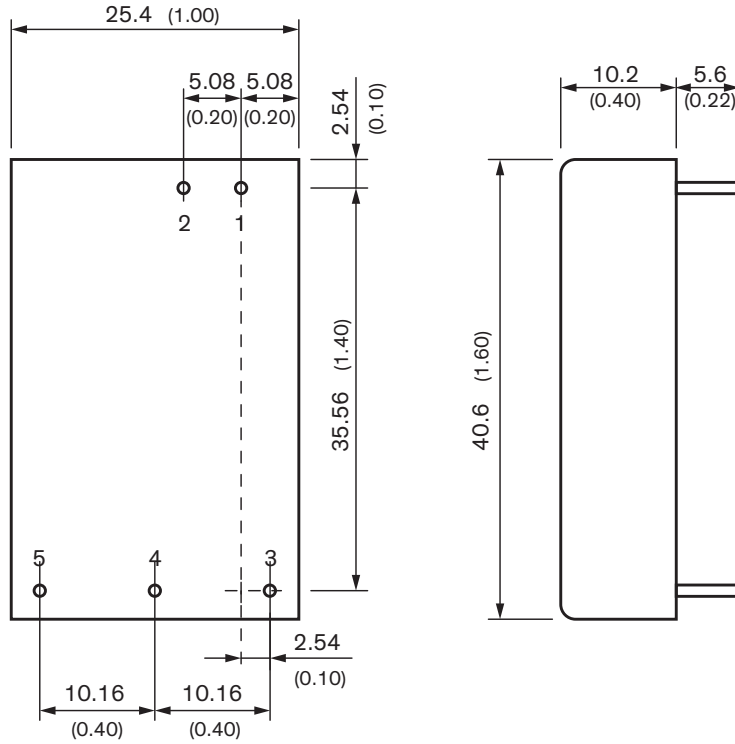
Overload protection		at 150 % typ. of I <sub>out</sub> rated (hiccup mode)
Short-circuit protection		Continuous, automatic recovery
Overvoltage protection	(±)5.0 VDC models: (±)12 VDC models: (±)15 VDC models: 24 VDC models:	6.2 VDC typ. 15 VDC typ. 20 VDC typ. 30 VDC typ.
Capacitive load	– Single output	5.0 VDC models: 5'000 µF max. 12 VDC models: 850 µF max. 15 VDC models: 700 µF max. 24 VDC models: 220 µF max.
	– Dual output	±5 VDC models: 2'500 µF max. (each output) ±12 VDC models: 500 µF max. (each output) ±15 VDC models: 350 µF max. (each output)
Temperature ranges	– Operating	–40°C to +80°C
	– Case temperature	+105°C max.
	– Storage temperature	–55°C to +125°C
Derating		2%/K above 55°C
Overtemperature protection		at 115°C typ.
Thermal impedance		14.36 °C/W
Humidity (non condensing)		5 % to 95 % rel H max.
Isolation voltage (50 Hz, 60 s)		5000 VACrms, reinforced
Clearance/creepage		8 mm min.
Leakage current (at 240VAC, 60Hz)		2.5 µA max.
Isolation capacitance (input/output)		20 pF typ.
Altitude during operation		5000 m
Reliability, calculated MTBF		tbd
Switching frequency		250 kHz typ. (pulse width modulation)
Vibration and thermal shock resistance		according to MIL-STD-810F
Safety standards/approvals	– Medical equipment	ANSI/AAMI ES 60601-1:2005/(R)2012, IEC/EN 60601-1 3rd edition
	– Certification documents	<a href="http://www.tracopower.com/overview/thm20">www.tracopower.com/overview/thm20</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 plastic
Base material	non-conductive plastic
Potting material	silicone (UL94 V-0 rated)
Package weight	24 g (0.85oz)
Soldering temperature	max. 265°C / 10 s

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

**Outline Dimensions**



Pinout		
Pin	Single	Dual
1	+Vin (Vcc)	+Vin (Vcc)
2	-Vin (GND)	-Vin (GND)
3	+Vout	+Vout
4	-Vout	Common
5	Trim	-Vout

Dimensions in [mm], ( ) = Inch  
 Tolerances  $\pm 0.5$  ( $\pm 0.02$ )  
 $\pm 0.25$  ( $\pm 0.01$ )  
 Pin pitch tolerances  $\pm 0.25$  ( $\pm 0.01$ )  
 Pin  $\varnothing$  1.0  $\pm 0.1$  (0.04  $\pm 0.004$ )