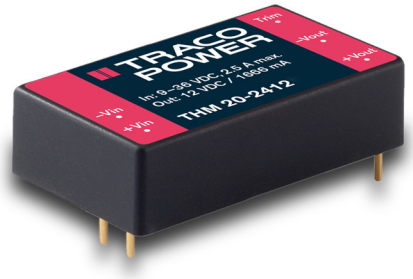
TRACO POWER

DC/DC Converter

THM 20 Series, 20 Watt

- **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**



CB Scheme IEC 60601-1

cULus ES 60601-1

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	88.5 %
THM 20-1212		12 VDC	1670 mA	88.5 %
THM 20-1213		15 VDC	1330 mA	89.0 %
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	88.5 %
THM 20-4813		15 VDC	1330 mA	89.0 %
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	89.0 %

Input Specifications

Input current no load		12 Vin models:	11 mA typ.
		24 Vin models:	9 mA typ.
		48 Vin models:	9 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 suppression		EN 55011 limits to IEC 60601-1-2 4th editon EN55032 class A (internal filter) EN55032 class B with external components
	– Filter proposal		www.tracopower.com/overview/thm20
EMC immunity	– Generic for Medical equipment		IEC/EN 60601-1-2 4th edition
	– ESD (electrostatic discharge)		EN 61000-4-2, air ±15 kV, contact ±8 kV, perf. criteria A
	– Radiated immunity		EN 61000-4-3, 10 V/m, perf. criteria A
	– Fast transient / surge		EN 61000-4-4, ±2 kV, perf. criteria A
	(with external input capacitor / diode)		EN 61000-4-5, ±2 kV perf. criteria A
		12 Vin models:	2 pcs. Nippon chemi-con KY 220 µF / 100 V 1 pcs. TVS - SMDJ36A, 36V, 3000 W)
		24 Vin models:	2 pcs. Nippon chemi-con KY 220 µF / 100 V 1 pcs. TVS - SMDJ58A, 58V, 3000 W)
		48 Vin models:	2 pcs. Nippon chemi-con KY 220 µF / 100 V 1 pcs. TVS - SMDJ120A, 120V, 3000 W)
	– Conducted immunity		EN 61000-4-6, 10 Vrms, perf. criteria A
	– Magnetic field immunity		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	single output:	0.2 % max.
		dual output:	0.5 % max.
	– Load variation 0 – 100 %	single output:	0.2 % max.
		dual output:	1.0 % max.
	– Cross regulation	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/25 V X7R MLCC
		(±)12 VDC models:	75 mVp-p typ. with cap. 10 µF/25 V X7R MLCC
		(±)15 VDC models:	75 mVp-p typ. with cap. 10 µF/25 V X7R MLCC
		24 VDC models:	100 mVp-p typ. with cap. 4.7 µF/50 V X7R MLCC
Transient response	– Recovery time (25% load step change)		250 µs typ.

Output Specifications (continued)

Over current limitation			at 150 % typ. of Iout rated (hiccup mode) at 185 % max. of Iout rated (hiccup mode)
Short circuit protection			Continuous, automatic recovery
Overvoltage protection		(±)5.0 VDC models:	6.2 VDC typ.
		(±)12 VDC models:	15 VDC typ.
		(±)15 VDC models:	20 VDC typ.
		24 VDC models:	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)

General Specifications

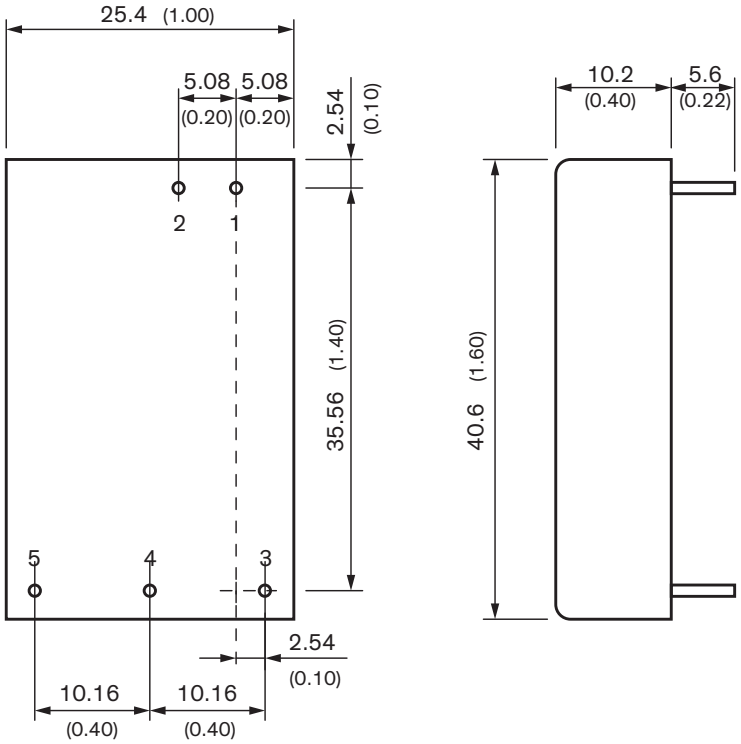
Temperature ranges	– Operating	–40°C to +80°C
	– Case temperature	+105°C max.
	– Storage temperature	–55°C to +125°C
Derating		2 %/K above 55°C
Overtemperature protection		at 115°C typ.
Thermal impedance		14.4 K/W typ.
Humidity (non condensing)		5 % to 95 % rel H max.
Isolation voltage (50 Hz, 60 s)		5000 VACrms, reinforced
Clearance/creepage		8 mm min.
Leakage current (at 240 VAC, 60 Hz)		2.5 µA max.
Isolation capacitance (input/output)		20 pF typ.
Altitude during operation		5000 m
Reliability, calculated MTBF (MIL-HDBK-217F at +25°C, ground benign)		1‘712‘000 h
Switching frequency		225 – 285 kHz (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	www.tracopower.com/overview/thm20
Environmental compliance	– Reach	www.tracopower.com/products/reach-declaration.pdf
	– 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 ±0.5 (±0.02)
±0.25 (±0.01)
Pin pitch tolerances ±0.25 (±0.01)
Pin ø 1.0 ±0.1 (0.04 ±0.004)