

DC/DC Converter

THM 15 Series, 15 Watt

- Wide 2:1 input voltage 15 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 85°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 15 series is a range of medical 15 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 90% and highest grade components the converters can reliably operate in an ambient temperature range of –40°C up to +85°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 15-1211	9.0 – 18 VDC (12 VDC nominal)	5.0 VDC	3000 mA	89.0 %
THM 15-1212		12 VDC	1250 mA	88.5 %
THM 15-1213		15 VDC	1000 mA	89.0 %
THM 15-1215		24 VDC	625 mA	89.0 %
THM 15-1221		±5 VDC	±1500 mA	86.0 %
THM 15-1222		±12 VDC	±625 mA	89.0 %
THM 15-1223		±15 VDC	±500 mA	89.0 %
THM 15-2411	18 – 36 VDC (24 VDC nominal)	5.0 VDC	3000 mA	90.0 %
THM 15-2412		12 VDC	1250 mA	90.0 %
THM 15-2413		15 VDC	1000 mA	90.0 %
THM 15-2415		24 VDC	625 mA	90.0 %
THM 15-2421		±5 VDC	±1500 mA	86.0 %
THM 15-2422		±12 VDC	±625 mA	90.0 %
THM 15-2423		±15 VDC	±500 mA	90.0 %
THM 15-4811	36 – 75 VDC (48 VDC nominal)	5.0 VDC	3000 mA	89.5 %
THM 15-4812		12 VDC	1250 mA	88.0 %
THM 15-4813		15 VDC	1000 mA	89.0 %
THM 15-4815		24 VDC	625 mA	88.5 %
THM 15-4821		±5 VDC	±1500 mA	86.0 %
THM 15-4822		±12 VDC	±625 mA	88.5 %
THM 15-4823		±15 VDC	±500 mA	89.0 %

* suffix **-A1** for remote control option with positive logic
suffix **-A2** for remote control option with negative logic

Input Specifications

Input current no load	12 Vin models: 12 mA typ. 24 Vin models: 10 mA typ. 48 Vin models: 9 mA typ.
Surge voltage (3 s 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: 18 VDC (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 edition EN55032 class A (internal filter) EN55032 class B with external components
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: 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) 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: 3.15 A 24 Vin models: 1.6 A 48 Vin models: 0.8 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 typ.
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.

Output Specifications (continued)

Over current limitation		at 150 % typ. of I _{out} rated (hiccup mode) at 185 % max. of I _{out} 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: 3'800 µF max. 12 VDC models: 650 µF max. 15 VDC models: 530 µF max. 24 VDC models: 190 µF max.
	–Dual output	±5 VDC models: 1'900 µF max. (each output) ±12 VDC models: 380 µF max. (each output) ±15 VDC models: 270 µF max. (each output)

General Specifications

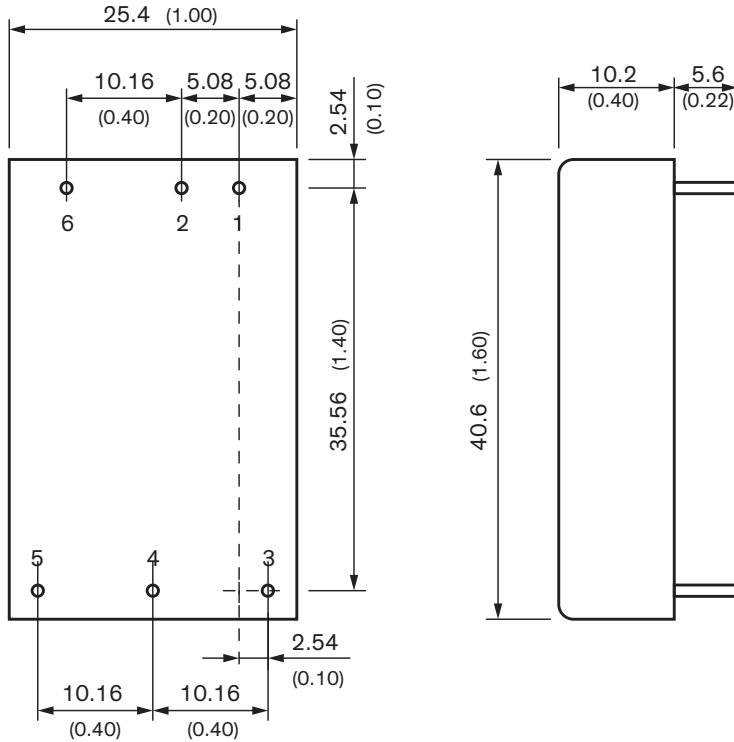
Temperature ranges	– Operating – Case temperature – Storage temperature	–40°C to +85°C +105°C max. –55°C to +125°C
Derating		2.5 %/K above 65°C
Overtemperature protection		at 115°C typ.
Thermal impedance		15.3 K/W typ.
Humidity (non condensing)		5 % to 95 % rel H max.
Isolation voltage (50 Hz, 60 s)		5000 VACrms, reinforced
Clearance/creepage		8 mm min.
Leakage current (at 240VAC, 60Hz)		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)		2'080'000 h
Switching frequency		225 – 285 kHz (pulse width modulation)
Vibration and thermal shock resistance		according to MIL-STD-810F
Remote On/Off (for THM 15 -A1 / -A2 option models only)	– Positive logic (-A1 models) – Negative logic (-A2 models) – Off idle current – Remote pin input current	Off: short circuit or 0 – 1.2 VDC (referred to -Vin pin) On: open circuit or 3.5 – 12 VDC (referred to -Vin pin) Off: open circuit or 3.5 – 12 VDC (referred to -Vin pin) On: short circuit or 0 – 1.2 VDC (referred to -Vin pin) 2.5 mA typ. –0.5 mA min. 1 mA max.
Safety standards/approvals	– Medical equipment	ANSI/AAMI ES 60601-1:2005/(R)2012, IEC/EN 60601-1 3rd edition
Environmental compliance	– Reach – 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
6	No pin* / Remote	No pin* / Remote

*If remote is not selected there will be no pin

Dimensions in [mm], () = Inch

Tolerances ± 0.5 (± 0.02)

± 0.25 (± 0.01)

Pin pitch tolerances ± 0.25 (± 0.01)

Pin \varnothing 1.0 ± 0.1 (0.04 ± 0.004)