

- **Wide 2:1 input voltage 15 W DC/DC converter in a 1.6 x 1" plastic case**
- **I/O isolation 5000 VAC rated for 250 VAC working voltage**
- **Certification according to IEC/EN/ES 60601-1 3rd edition for 2 x MOPP**
- **Risk management process according to ISO 14971 incl. risk management file**
- **Acceptance criteria for electronic assemblies acc. to IPC-A-610 Level 3**
- **Low leakage current <2.5 µA**
- **Operating temperature -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**



ES 60601-1 IEC 60601-1
UL 62368-1 IEC 62368-1

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 VAC 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 x MOPP 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 1		Output 2		Efficiency typ.
		Vnom	I _{max}	Vnom	I _{max}	
THM 15-1211	9 - 18 VDC (12 VDC nom.)	5 VDC	3'000 mA			89 %
THM 15-1212		12 VDC	1'250 mA			89 %
THM 15-1213		15 VDC	1'000 mA			89 %
THM 15-1215		24 VDC	625 mA			89 %
THM 15-1221		+5 VDC	1'500 mA	-5 VDC	1'500 mA	86 %
THM 15-1222		+12 VDC	625 mA	-12 VDC	625 mA	89 %
THM 15-1223		+15 VDC	500 mA	-15 VDC	500 mA	89 %
THM 15-2411	18 - 36 VDC (24 VDC nom.)	5 VDC	3'000 mA			90 %
THM 15-2412		12 VDC	1'250 mA			90 %
THM 15-2413		15 VDC	1'000 mA			90 %
THM 15-2415		24 VDC	625 mA			90 %
THM 15-2421		+5 VDC	1'500 mA	-5 VDC	1'500 mA	86 %
THM 15-2422		+12 VDC	625 mA	-12 VDC	625 mA	90 %
THM 15-2423		+15 VDC	500 mA	-15 VDC	500 mA	90 %
THM 15-4811	36 - 75 VDC (48 VDC nom.)	5 VDC	3'000 mA			90 %
THM 15-4812		12 VDC	1'250 mA			88 %
THM 15-4813		15 VDC	1'000 mA			89 %
THM 15-4815		24 VDC	625 mA			89 %
THM 15-4821		+5 VDC	1'500 mA	-5 VDC	1'500 mA	86 %
THM 15-4822		+12 VDC	625 mA	-12 VDC	625 mA	89 %
THM 15-4823		+15 VDC	500 mA	-15 VDC	500 mA	89 %

Options

on demand (backorder with MOQ non stocking item)	- Optional models with remote-control function - Optional models with remote-control function with inverse logic
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Input Specifications

Input Current	- At no load	12 Vin models: 12 mA typ. 24 Vin models: 10 mA typ. 48 Vin models: 9 mA typ.
Surge Voltage		12 Vin models: 25 VDC max. (3 s max.) 24 Vin models: 50 VDC max. (3 s max.) 48 Vin models: 100 VDC max. (3 s max.)
Under Voltage Lockout		12 Vin models: 7.8 VDC min. / 8 VDC typ. / 8.6 VDC max. 24 Vin models: 15.8 VDC min. / 16 VDC typ. / 17.4 VDC max. 48 Vin models: 32 VDC min. / 33 VDC typ. / 34 VDC max.
Recommended Input Fuse		12 Vin models: 3'150 mA (slow blow) 24 Vin models: 1'600 mA (slow blow) 48 Vin models: 800 mA (slow blow) (The need of an external fuse has to be assessed in the final application.)
Input Filter		Internal Pi-Type

Output Specifications

Output Voltage Adjustment		-10% to +20% (15 & 24 Vout single models) ±10% (other single output models) (By external trim resistor) See application note: www.tracopower.com/overview/thm15 Output power must not exceed rated power!
Voltage Set Accuracy		±1% max.
Regulation	- Input Variation (Vmin - Vmax) - Load Variation (0 - 100%) - Cross Regulation (25% / 100% asym. load)	single output models: 0.2% max. dual output models: 0.5% max. single output models: 0.2% max. dual output models: 1% max. (Output 1) 1% max. (Output 2) dual output models: 5% max.
Ripple and Noise (20 MHz Bandwidth)	- single output - dual output	5 Vout models: 50 mVp-p typ. (w/ 10 µF X7R) 12 Vout models: 75 mVp-p typ. (w/ 10 µF X7R) 15 Vout models: 75 mVp-p typ. (w/ 10 µF X7R) 24 Vout models: 100 mVp-p typ. (w/ 4.7 µF X7R) 5 / -5 Vout models: 50 / 50 mVp-p typ. (w/ 10 µF X7R) 12 / -12 Vout models: 75 / 75 mVp-p typ. (w/ 10 µF X7R) 15 / -15 Vout models: 75 / 75 mVp-p typ. (w/ 10 µF X7R)
Capacitive Load	- single output - dual output	5 Vout models: 3'800 µF max. 12 Vout models: 650 µF max. 15 Vout models: 530 µF max. 24 Vout models: 190 µF max. 5 / -5 Vout models: 1'900 / 1'900 µF max. 12 / -12 Vout models: 380 / 380 µF max. 15 / -15 Vout models: 270 / 270 µF max.
Minimum Load		Not required
Temperature Coefficient		±0.02 %/K max.
Start-up Time		30 ms typ. / 60 ms max.
Short Circuit Protection		Continuous, Automatic recovery
Output Current Limitation		185% max. of Iout max. 150% typ. of Iout max.

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

Overvoltage Protection		125% typ. of Vout nom. (depending on model) 6.2 VDC typ. (5 VDC model) 15 VDC typ. (12 VDC model) 20 VDC typ. (15 VDC model) 30 VDC typ. (24 VDC model) 6.2 VDC typ. (±5 VDC model) 15 VDC typ. (±12 VDC model) 20 VDC typ. (±15 VDC model)
Transient Response	- Response Time	250 µs typ. (25% Load Step)

Safety Specifications

Safety Standards	- IT / Multimedia Equipment	EN 62368-1 IEC 62368-1 UL 62368-1
	- Medical Equipment	EN 60601-1 IEC 60601-1 ANSI/AAMI ES 60601-1 2 x MOPP (Means Of Patient Protection)
	- Certification Documents	www.tracopower.com/overview/thm15
Pollution Degree		PD 2
Over Voltage Category		OVC II

EMC Specifications

EMI Emissions	- Conducted Emissions	EN 60601-1-2 edition 4 (Medical Devices) EN 55011 class A (internal filter) EN 55011 class B (with external filter) EN 55032 class A (internal filter) EN 55032 class B (with external filter) FCC Part 18 class A (internal filter) FCC Part 18 class B (with external filter)
	- Radiated Emissions	EN 55011 class A (internal filter) EN 55011 class B (with external filter) EN 55032 class A (internal filter) EN 55032 class B (with external filter) FCC Part 18 class A (internal filter) FCC Part 18 class B (with external filter)
		External filter proposal: www.tracopower.com/overview/thm15
EMS Immunity	- Electrostatic Discharge	EN 60601-1-2 edition 4 (Medical Devices) Air: EN 61000-4-2, ±15 kV, perf. criteria A Contact: EN 61000-4-2, ±8 kV, perf. criteria A
	- RF Electromagnetic Field	EN 61000-4-3, 10 V/m, perf. criteria A
	- EFT (Burst) / Surge	EN 61000-4-4, ±2 kV, perf. criteria A EN 61000-4-5, ±2 kV, perf. criteria A
	- Conducted RF Disturbances	Ext. input component: 12 Vin models: 2 x KY 220 µF // TVS SMDJ36A 24 Vin models: 2 x KY 220 µF // TVS SMDJ58A 48 Vin models: 2 x KY 220 µF // TVS SMDJ120A EN 61000-4-6, 10 Vrms, perf. criteria A
	- PF Magnetic Field	Continuous: EN 61000-4-8, 100 A/m, perf. criteria A 1 s: EN 61000-4-8, 1000 A/m, perf. criteria A

General Specifications

Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	-40°C to +85°C
	- Case Temperature	+105°C max.
	- Storage Temperature	-55°C to +125°C

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

Power Derating	- High Temperature	2.5 %/K above 65°C See application note: www.tracopower.com/overview/thm15
Over Temperature Protection Switch Off	- Protection Mode - Measurement Point	115°C typ. (Automatic recovery) Case
Cooling System		Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote - Off Idle Input Current - Remote Pin Input Current	On: 3.5 to 12 VDC or open circuit Off: 0 to 1.2 VDC or short circuit Refers to 'Remote' and '-Vin' Pin 2.5 mA typ. -0.5 to 1.0 mA (Only for optional models with remote-control. Inverse models available.)
Altitude During Operation		5'000 m max.
Switching Frequency		225 - 285 kHz (PWM) 250 kHz typ. (PWM)
Insulation System		Reinforced Insulation
Working Voltage (rated)		250 VAC
Isolation Test Voltage	- Input to Output, 60 s	5'000 VAC
Creepage	- Input to Output	8 mm min.
Clearance	- Input to Output	8 mm min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	20 pF typ.
Leakage Current	- Touch Current	2.5 µA max. (240 VAC, 60 Hz)
Reliability	- Calculated MTBF	2'080'000 h (MIL-HDBK-217F, ground benign)
Washing Process		Allowed (hermetical product) See Cleaning Guideline: www.tracopower.com/info/cleaning.pdf
Environment	- Vibration - Thermal Shock	MIL-STD-810F MIL-STD-810F
Housing Material		Non-conductive Plastic (UL 94 V-0 rated)
Base Material		Non-conductive Plastic (UL 94 V-0 rated)
Potting Material		Silicone (UL 94 V-0 rated)
Pin Material		Copper
Pin Foundation Plating		Nickel (2 - 3 µm)
Pin Surface Plating		Tin (3 - 5 µm), matte
Housing Type		Plastic Case
Mounting Type		PCB Mount
Connection Type		THD (Through-Hole Device)
Footprint Type		1.6" x 1"
Soldering Profile		265°C / 10 s max.
Weight		24 g
Thermal Impedance	- Case to Ambient	15.3 K/W typ.
Environmental Compliance	- REACH Declaration - RoHS Declaration	www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant www.tracopower.com/info/rohs-declaration.pdf Exemptions: 7a, 7c-I (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule). The SCIP number is provided on request.)

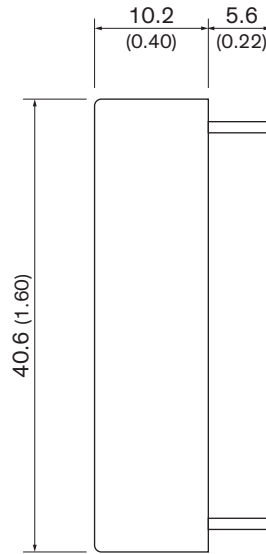
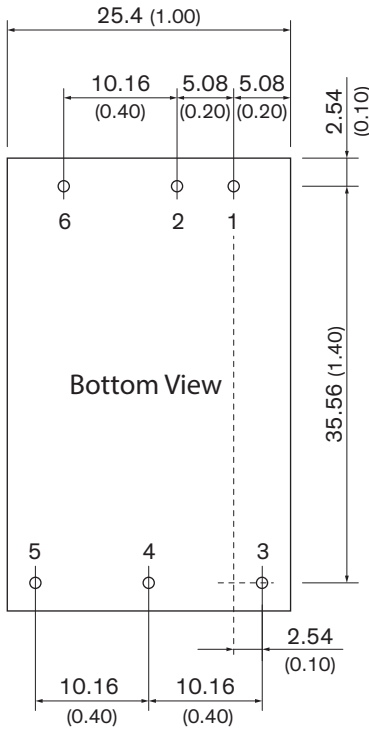
Supporting Documents

Overview Link (for additional Documents)

www.tracopower.com/overview/thm15

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Outline Dimensions



Dimensions in mm (inch)
 Tolerances ± 0.5 (± 0.02)
 Pin \varnothing 1.0 ± 0.1 (0.039 ± 0.004)
 Pin pitch tolerances ± 0.25 (± 0.01)

Pinout		
Pin	Single Output	Dual Output
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.