

DC/DC Medical Converter

THM 60WI Series, 60 Watt

- Wide 4:1 input voltage 60 W DC/DC converter in a compact 2.3 x 1.45 " plastic case
- I/O isolation 5000 VAC rated for 250 VAC working voltage
- Certification according to IEC/EN/ES 60601-1 edition 3.2 for 2 x MOPP
- Risk management process according to ISO 14971
- Acceptance criteria for electronic assemblies acc. to IPC-A-610 Level 3
- Low leakage current <4.5 μ A
- Operating temperature range: -40 to +75°C
- EMC compliance according to IEC 60601-1-2 4th edition
- Operating up to 5000m altitude
- 5-year product warranty



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

The THM 60WI series is a range of medical 60 Watt DC/DC converters in a compact 2.3" x 1.45" plastic package and with wide 4:1 input voltage range. They provide a reinforced isolation system (5000 VAC) and a very low leakage current of less than 4.5 μ A. With a high efficiency of up to 92% and highest-grade components the converters can reliably operate in an ambient temperature range of -40°C up to +75°C with derating. For more demanding applications regarding temperature, Traco also offers a special heatsink which will greatly increase the thermal capabilities for natural convection conditions. The units are approved according to IEC/EN/ES 60601-1 edition 3.2 for 2 x MOPP as well as IEC/EN/UL 62368-1 and come along with an ISO 14971 risk management file. Design and production conform to the quality management system ISO 13485. The THM 60WI constitutes a reliable solution not only for medical equipment but also for demanding ranges of application such as control & measurement and transportation.

Models

Order Code	Input Voltage Range	Output 1		Output 2		Efficiency typ.
		Vnom	I _{max}	Vnom	I _{max}	
THM 60-2411WI	9 - 36 VDC (24 VDC nom.)	5.1 VDC	12'000 mA			90 %
THM 60-2412WI		12 VDC	5'000 mA			92 %
THM 60-2413WI		15 VDC	4'000 mA			90 %
THM 60-2415WI		24 VDC	2'500 mA			89 %
THM 60-2422WI		+12 VDC	2'500 mA	-12 VDC	2'500 mA	89 %
THM 60-2423WI		+15 VDC	2'000 mA	-15 VDC	2'000 mA	90 %
THM 60-4811WI	18 - 75 VDC (48 VDC nom.)	5.1 VDC	12'000 mA			90 %
THM 60-4812WI		12 VDC	5'000 mA			92 %
THM 60-4813WI		15 VDC	4'000 mA			93 %
THM 60-4815WI		24 VDC	2'500 mA			90 %
THM 60-4822WI		+12 VDC	2'500 mA	-12 VDC	2'500 mA	90 %
THM 60-4823WI		+15 VDC	2'000 mA	-15 VDC	2'000 mA	90 %

Options

THM-HS1	- Optional Heat Sink: www.tracopower.com/overview/thm-hs1
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Input Specifications

Input Current	- At no load	24 Vin models: 15 mA typ. 48 Vin models: 12 mA typ.
Surge Voltage		24 Vin models: 50 VDC max. (3 s max.) 48 Vin models: 100 VDC max. (3 s max.)
Under Voltage Lockout		24 Vin models: 7.8 VDC min. / 8 VDC typ. / 8.6 VDC max. 48 Vin models: 15.8 VDC min. / 16 VDC typ. / 17.4 VDC max.
Recommended Input Fuse		24 Vin models: 10'000 mA (fast acting) 48 Vin models: 6'300 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% (5.1 & 12 Vout models) -10% to +20% (other models) (single output models only) (By external trim resistor) See application note: www.tracopower.com/overview/thm60wi Output power must not exceed rated power!
Voltage Set Accuracy		±1% max.
Regulation	- Input Variation (Vmin - Vmax)	single output models: 0.2% max. dual output models: 0.5% max.
	- Load Variation (0 - 100%)	single output models: 0.2% max. dual output models: 1% max. (Output 1) 1% max. (Output 2)
	- Cross Regulation (25% / 100% asym. load)	dual output models: 5% max.
Ripple and Noise (20 MHz Bandwidth)	- single output	5.1 Vout models: 75 mVp-p typ. (w/ 10 µF, 25 V, X7R) 12 Vout models: 100 mVp-p typ. (w/ 10 µF, 25 V, X7R) 15 Vout models: 100 mVp-p typ. (w/ 10 µF, 25 V, X7R) 24 Vout models: 150 mVp-p typ. (w/ 4.7 µF, 50 V, X7R)
	- dual output	12 / -12 Vout models: 100 / 100 mVp-p typ. (w/ 10 µF, 25 V, X7R) 15 / -15 Vout models: 100 / 100 mVp-p typ. (w/ 10 µF, 25 V, X7R)
Capacitive Load	- single output	5.1 Vout models: 17'000 µF max. 12 Vout models: 3'000 µF max. 15 Vout models: 1'900 µF max. 24 Vout models: 730 µF max.
	- dual output	12 / -12 Vout models: 1'500 / 1'500 µF max. 15 / -15 Vout models: 940 / 940 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		195% max. of Iout max. 150% typ. of Iout max.
Overvoltage Protection		130% typ. of Vout nom. (15 and 24 Vout models) 120% typ. of Vout nom. (5.1, 12, ±12 and ±15 Vout models)
Transient Response	- Response Time	250 µs typ. (25% Load Step)

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

Safety Specifications

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
	- Certification Documents	2 x MOPP (Means Of Patient Protection) www.tracopower.com/overview/thm60wi
Pollution Degree		PD 2

EMC Specifications

EMI (Emissions)	- Conducted Emissions	EN 60601-1-2 edition 4 (Medical Devices) EN 55011 class A (with external filter) EN 55011 class B (with external filter) EN 55032 class A (with external filter) EN 55032 class B (with external filter) FCC 47 Part 15 class A (with external filter) FCC 47 Part 15 class B (with external filter) FCC 47 Part 18 class A (with external filter) FCC 47 Part 18 class B (with external filter)
	- Radiated Emissions	EN 55011 class A (with external filter) EN 55011 class B (with external filter) EN 55032 class A (with external filter) EN 55032 class B (with external filter) FCC 47 Part 15 class A (with external filter) FCC 47 Part 15 class B (with external filter) FCC 47 Part 18 class A (with external filter) FCC 47 Part 18 class B (with external filter)
		External filter proposal: www.tracopower.com/overview/thm60wi
EMS (Immunity)	- Electrostatic Discharge	EN 60601-1-2 edition 4 (Medical Devices) EN 55024 (IT Equipment) EN 55035 (Multimedia)
	- RF Electromagnetic Field	Air: EN 61000-4-2, ± 15 kV, perf. criteria A
	- EFT (Burst) / Surge	Contact: EN 61000-4-2, ± 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
		Ext. input component: 24 Vin models: 2 x 220 μ F, 100 V TVS SMDJ58A 48 Vin models: 2 x 220 μ F, 100 V TVS SMDJ120A
	- Conducted RF Disturbances	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
EMC / Environmental	- Certification Documents	www.tracopower.com/overview/thm60wi

General Specifications

Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	-40°C to +75°C
	- Case Temperature	+105°C max.
	- Storage Temperature	-55°C to +125°C
Power Derating	- High Temperature	Depending on model
		See application note: www.tracopower.com/overview/thm60wi
Over Temperature Protection Switch Off	- Protection Mode	108°C min. / 115°C typ. / 125°C max.
	- Measurement Point	(Automatic recovery at 100°C typ.) Case

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Cooling System		Natural convection (20 LFM)
Sense Function		10% max. of Vout nom. (If sense function is not used, sense pins must be connected to corresponding polarity output pins.)
Remote Control	- Voltage Controlled Remote (passive = on) - Off Idle Input Current - Remote Pin Input Current	On: 3.0 to 12 VDC or open circuit Off: 0 to 1.2 VDC or short circuit Refers to 'Remote' and '-Vin' Pin 3 mA typ. -0.5 to 0.5 mA
Altitude During Operation		5'000 m max.
Regulator Topology		Flyback Converter
Switching Frequency		225 - 275 kHz (PWM) 250 kHz typ. (PWM)
Insulation System		Reinforced Insulation
Working Voltage (rated)		250 VAC
Isolation Test Voltage	- Input to Output, 60 s - Input to Output, 1 s	5'000 VAC 10'000 VDC
Creepage	- Input to Output	8 mm min.
Clearance	- Input to Output	8 mm min.
Isolation Resistance	- Input to Output, 500 VDC	10'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	40 pF typ.
Leakage Current	- Touch Current	4.5 μA max. (at 264 VAC / 60 Hz)
Reliability	- Calculated MTBF	1'064'000 h (MIL-HDBK-217F, ground benign)
Washing Process		According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf
Environment	- Vibration - Mechanical Shock - Thermal Shock	MIL-STD-810F 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		Quarter-Brick
Soldering Profile		Lead-Free Wave Soldering 260°C / 6 s max.
Weight		51 g
Thermal Impedance	- Case to Ambient	9.7 K/W typ. 5.5 K/W typ. (with Heat Sink)
Environmental Compliance	- REACH Declaration - RoHS Declaration - SCIP Reference Number	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).) def32d06-c714-4d68-8ada-db1c2c331fea

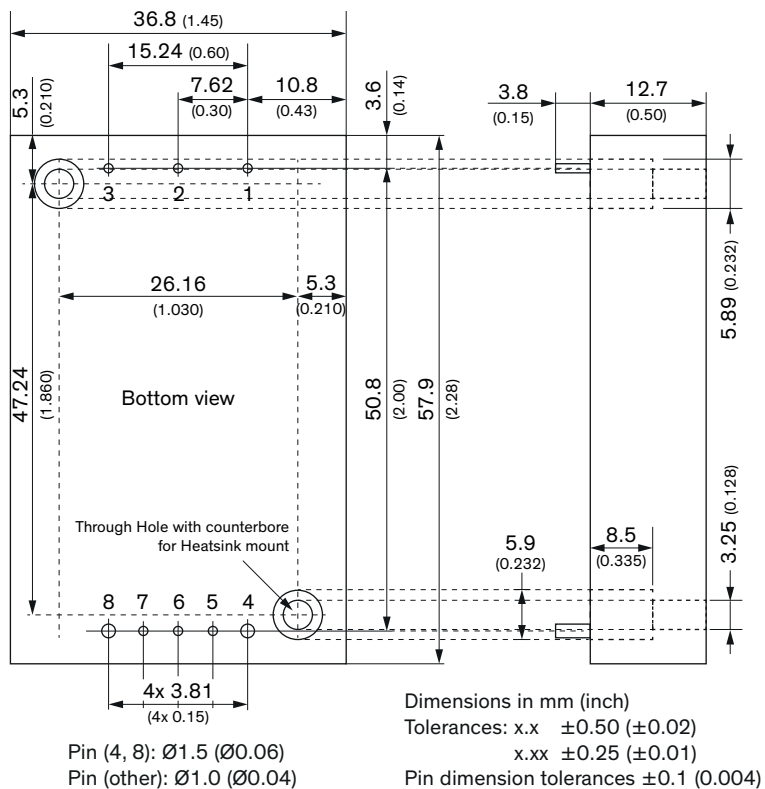
Supporting Documents

Overview Link (for additional Documents)

www.tracopower.com/overview/thm60wi

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Outline Dimensions



Pinout

Pin	Single	Dual
1	–Vin (GND)	–Vin (GND)
2	Remote On/Off	Remote On/Off
3	+Vin (Vcc)	+Vin (Vcc)
4	–Vout	–Vout
5	–Sense	–Sense
6	Trim	Common
7	+Sense	+Sense
8	+Vout	+Vout