

- Ultra wide 4:1 input voltage 20 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  $\mu$ A
- Operating temperature  $-40^{\circ}\text{C}$  to  $80^{\circ}\text{C}$
- 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 20WI series is a range of medical 20 Watt DC/DC converters in 1.6" x 1.0" plastic package and with ultra wide 4:1 input voltage range. They provide a reinforced isolation system for 5000 VAC isolation and a very low leakage current of less than 2.5  $\mu$ A. 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 89% and highest grade components the converters can reliably operate in an ambient temperature range of  $-40^{\circ}\text{C}$  up to  $+80^{\circ}\text{C}$ . 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 <sub>max</sub>	Vnom	I <sub>max</sub>	
THM 20-2411WI	9 - 36 VDC (24 VDC nom.)	5 VDC	4'000 mA			89 %
THM 20-2412WI		12 VDC	1'670 mA			89 %
THM 20-2413WI		15 VDC	1'330 mA			89 %
THM 20-2415WI		24 VDC	833 mA			89 %
THM 20-2421WI		+5 VDC	2'000 mA	-5 VDC	2'000 mA	86 %
THM 20-2422WI		+12 VDC	833 mA	-12 VDC	833 mA	89 %
THM 20-2423WI		+15 VDC	667 mA	-15 VDC	667 mA	89 %
THM 20-4811WI		18 - 75 VDC (48 VDC nom.)	5 VDC	4'000 mA		
THM 20-4812WI	12 VDC		1'670 mA			89 %
THM 20-4813WI	15 VDC		1'330 mA			89 %
THM 20-4815WI	24 VDC		833 mA			89 %
THM 20-4821WI	+5 VDC		2'000 mA	-5 VDC	2'000 mA	86 %
THM 20-4822WI	+12 VDC		833 mA	-12 VDC	833 mA	89 %
THM 20-4823WI	+15 VDC		667 mA	-15 VDC	667 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	24 Vin models: <b>10 mA typ.</b> 48 Vin models: <b>9 mA typ.</b>
Surge Voltage		24 Vin models: <b>50 VDC max.</b> (3 s max.) 48 Vin models: <b>100 VDC max.</b> (3 s max.)
Under Voltage Lockout		24 Vin models: <b>7.8 VDC min. / 8 VDC typ. / 8.6 VDC max.</b> 48 Vin models: <b>15.8 VDC min. / 16 VDC typ. / 17.4 VDC max.</b>
Recommended Input Fuse		24 Vin models: <b>4'000 mA</b> (slow blow) 48 Vin models: <b>2'000 mA</b> (slow blow) (The need of an external fuse has to be assessed in the final application.)
Input Filter		<b>Internal Pi-Type</b>

## Output Specifications

Output Voltage Adjustment		-10% to +20% (15 & 24 Vout single models) <b>±10%</b> (other single output models) (By external trim resistor) See application note: <a href="http://www.tracopower.com/overview/thm20wi">www.tracopower.com/overview/thm20wi</a> Output power must not exceed rated power!
Voltage Set Accuracy		<b>±1% max.</b>
Regulation	- Input Variation (Vmin - Vmax)  - Load Variation (0 - 100%)  - Cross Regulation (25% / 100% asym. load)	single output models: <b>0.2% max.</b> dual output models: <b>0.5% max.</b> single output models: <b>0.2% max.</b> dual output models: <b>1% max.</b> (Output 1) <b>1% max.</b> (Output 2) dual output models: <b>5% max.</b>
Ripple and Noise (20 MHz Bandwidth)	- single output  - dual output	5 Vout models: <b>50 mVp-p typ.</b> (w/ 10 µF X7R) 12 Vout models: <b>75 mVp-p typ.</b> (w/ 10 µF X7R) 15 Vout models: <b>75 mVp-p typ.</b> (w/ 10 µF X7R) 24 Vout models: <b>100 mVp-p typ.</b> (w/ 4.7 µF X7R) 5 / -5 Vout models: <b>50 / 50 mVp-p typ.</b> (w/ 10 µF X7R) 12 / -12 Vout models: <b>75 / 75 mVp-p typ.</b> (w/ 10 µF X7R) 15 / -15 Vout models: <b>75 / 75 mVp-p typ.</b> (w/ 10 µF X7R)
Capacitive Load	- single output  - dual output  - 24 Vin input - 48 Vin input	5 Vout models: <b>5'000 µF max.</b> 12 Vout models: <b>850 µF max.</b> 15 Vout models: <b>700 µF max.</b> 24 Vout models: <b>220 µF max.</b> 12 / -12 Vout models: <b>500 / 500 µF max.</b> 15 / -15 Vout models: <b>350 / 350 µF max.</b> 5 / -5 Vout models: <b>2'500 / 2'500 µF max.</b> 5 / -5 Vout models: <b>500 / 500 µF max.</b>
Minimum Load		<b>Not required</b>
Temperature Coefficient		<b>±0.02 %/K max.</b>
Start-up Time		<b>30 ms typ. / 60 ms max.</b>
Short Circuit Protection		<b>Continuous, Automatic recovery</b>
Output Current Limitation		<b>185% max. of Iout max.</b> <b>150% typ. of Iout max.</b>

All specifications valid at nominal voltage, 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. ( $\pm 5$ VDC model) 15 VDC typ. ( $\pm 12$ VDC model) 20 VDC typ. ( $\pm 15$ VDC model)
Transient Response	- Response Time	250 $\mu$ s 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	<a href="http://www.tracopower.com/overview/thm20wi">www.tracopower.com/overview/thm20wi</a>
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: <a href="http://www.tracopower.com/overview/thm20wi">www.tracopower.com/overview/thm20wi</a>
EMS Immunity	- Electrostatic Discharge	EN 60601-1-2 edition 4 (Medical Devices) Air: EN 61000-4-2, $\pm 15$ kV, perf. criteria A Contact: EN 61000-4-2, $\pm 8$ kV, perf. criteria A
	- RF Electromagnetic Field	EN 61000-4-3, 10 V/m, perf. criteria A
	- EFT (Burst) / Surge	EN 61000-4-4, $\pm 2$ kV, perf. criteria A EN 61000-4-5, $\pm 2$ kV, perf. criteria A
	- Conducted RF Disturbances	Ext. input component: 24 Vin models: 2 x KY 220 $\mu$ F // TVS SMDJ58A 48 Vin models: 2 x KY 220 $\mu$ F // 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 +80°C
	- Case Temperature	+105°C max.
	- Storage Temperature	-55°C to +125°C
Power Derating	- High Temperature	2 %/K above 55°C

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

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
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	1'712'000 h (MIL-HDBK-217F, ground benign)
Environment	- Vibration - Thermal Shock	MIL-STD-810F MIL-STD-810F
Housing Material		Non-conductive Plastic (UL94 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
Soldering Profile		265°C / 10 s max.
Connection Type		THD (Through-Hole Device)
Weight		24 g
Thermal Impedance		14.4 K/W
Environmental Compliance	- Reach - RoHS	<a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> <a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a>

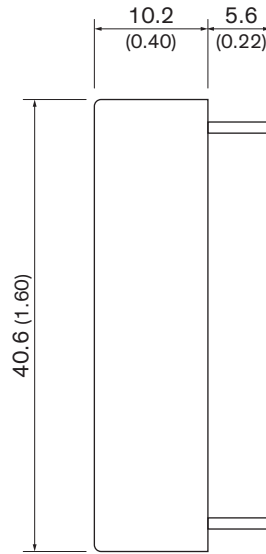
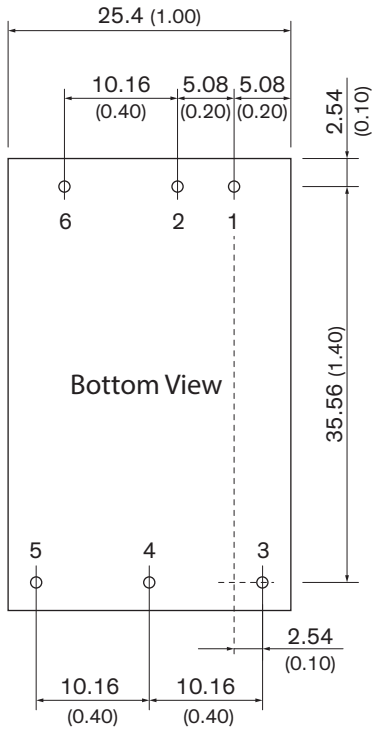
## Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/thm20wi](http://www.tracopower.com/overview/thm20wi)

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**Outline Dimensions**



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

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.