# TRACO POWER

## DC/DC Medical Converter

## THM 20WI Series, 20 Watt

- **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 µA**
- **Operating temperature –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**

2MOPP c UL us CB Scheme

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 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 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 1 | | Output 2 | | Efficiency |
|---|---|---|---|---|---|---|
| | | Vnom | Imax | Vnom | Imax | typ. |
| **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 | | | 90 % |
| **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<br>- Optional models with remote-control function with inverse logic |

## Input Specifications

| | | | |
|---|---|---|---|
| Input Current | - At no load | 24 Vin models: | 10 mA typ. |
| | | 48 Vin models: | 9 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: | 4'000 mA (slow blow) |
| | | 48 Vin models: | 2'000 mA (slow blow) |
| Input Filter | | | Internal Pi-Type |

## Output Specifications

| | | | |
|---|---|---|---|
| Output Voltage Adjustment | | | −10% to +20% (By external trim resistor) (15 & 24 VDC single output models)<br>±10% (By external trim resistor) (other models) |
| | | See application note: | www.tracopower.com/overview/thm20wi<br>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 Vout models: | 50 mVp-p typ. (with 10 µF X7R) |
| | | 12 Vout models: | 75 mVp-p typ. (with 10 µF X7R) |
| | | 15 Vout models: | 75 mVp-p typ. (with 10 µF X7R) |
| | | 24 Vout models: | 100 mVp-p typ. (with 4.7 µF X7R) |
| | - dual output | 5 / -5 Vout models: | 50 / 50 mVp-p typ. (with 10 µF X7R) |
| | | 12 / -12 Vout models: | 75 / 75 mVp-p typ. (with 10 µF X7R) |
| | | 15 / -15 Vout models: | 75 / 75 mVp-p typ. (with 10 µF X7R) |
| Capacitive Load | - single output | 5 Vout models: | 5'000 µF max. |
| | | 12 Vout models: | 850 µF max. |
| | | 15 Vout models: | 700 µF max. |
| | | 24 Vout models: | 220 µF max. |
| | - dual output | 12 / -12 Vout models: | 500 / 500 µF max. |
| | | 15 / -15 Vout models: | 350 / 350 µF max. |
| | - 24 Vin input | 5 / -5 Vout models: | 2'500 / 2'500 µF max. |
| | - 48 Vin input | 5 / -5 Vout models: | 500 / 500 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.<br>150% typ. of Iout max. |
| Overvoltage Protection | | | 125% typ. of Vout nom.<br>(depending on model)<br>6.2 VDC typ. (5 VDC model)<br>15 VDC typ. (12 VDC model)<br>20 VDC typ. (15 VDC model)<br>30 VDC typ. (24 VDC model)<br>6.2 VDC typ. (±5 VDC model)<br>15 VDC typ (±12 VDC model)<br>20 VDC typ. (±15 VDC model) |
| Transient Response | - Response Time | | 250 µs typ. (25% Load Step) |

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

## Safety Specifications

| | | |
|---|---|---|
| Safety Standards | - IT / Multimedia Equipment | EN 62368-1<br>IEC 62368-1<br>UL 62368-1 |
| | - Medical Equipment | EN 60601-1<br>IEC 60601-1<br>ANSI/AAMI ES 60601-1<br>2 x MOPP (Means Of Patient Protection) |
| | - Certification Documents | www.tracopower.com/overview/thm20wi |
| Pollution Degree | | PD 2 |
| Over Voltage Category | | OVC II |

## EMC Specifications

| | | | |
|---|---|---|---|
| EMI Emissions | | | EN 60601-1-2 edition 4 (Medical Devices) |
| | - Conducted Emissions | | EN 55011 class A (internal filter)<br>EN 55011 class B (with external filter)<br>EN 55032 class A (internal filter)<br>EN 55032 class B (with external filter)<br>FCC Part 18, class A<br>FCC Part 18, class B |
| | - Radiated Emissions | | EN 55011 class A (internal filter)<br>EN 55011 class B (with external filter)<br>EN 55032 class A (internal filter)<br>EN 55032 class B (with external filter)<br>FCC Part 18, class A<br>FCC Part 18, class B |
| | | External filter proposal: | www.tracopower.com/overview/thm20wi |
| EMS Immunity | | | EN 60601-1-2 edition 4 (Medical Devices) |
| | - Electrostatic Discharge | 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<br>EN 61000-4-5, ±2 kV, perf. criteria A |
| | | Ext. input component: | 24 Vin models: 2 x KY 220 µF // TVS SMDJ58A<br>48 Vin models: 2 x KY 220 µF // 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 |

## 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 |
| Over Temperature Protection Switch Off | - Protection Mode | 115°C typ. (Automatic recovery) |
| | - Measurement Point | Case |
| Cooling System | | Natural convection (20 LFM) |
| Remote Control | - Voltage Controlled Remote | On: 3.5 to 12 VDC or open circuit<br>Off: 0 to 1.2 VDC or short circuit<br>Refers to 'Remote' and '-Vin' Pin |
| | - Off Idle Input Current | 2.5 mA typ. |
| | - Remote Pin Input Current | -0.5 to 1.0 mA<br>(Only for optional models with remote-control. Inverse models available.) |
| Altitude During Operation | | 5'000 m max. |

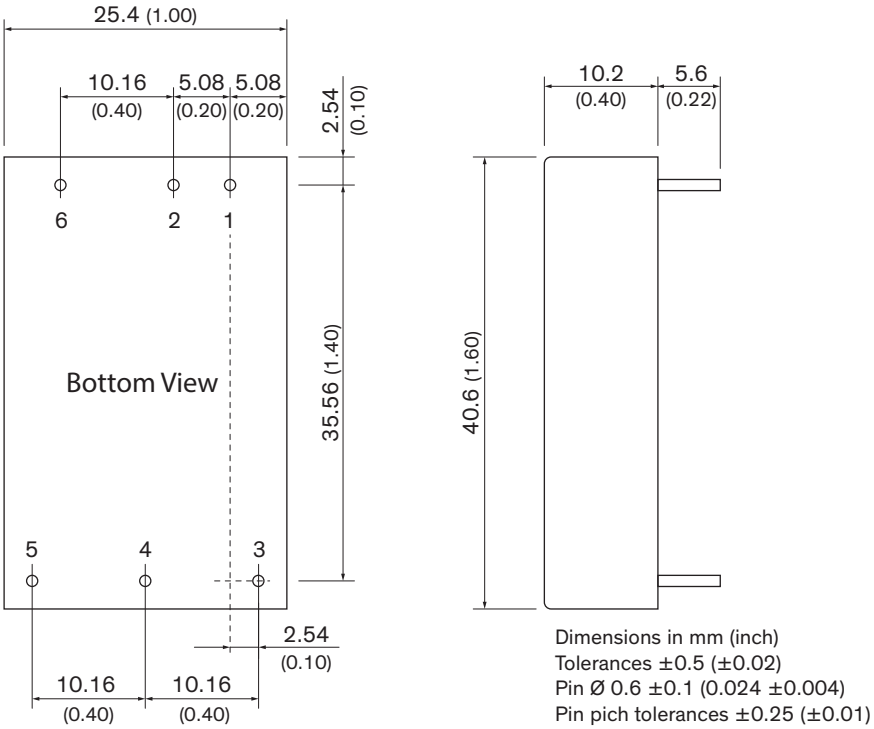
All specifications valid at nominal voltage, full load and +25°C after warm-up time unless otherwise stated.

| | | |
|---|---|---|
| Switching Frequency | | 225 - 285 kHz (PWM)<br>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 | - Earth Leakage Current | 2.5 µA max. (240 VAC, 60 Hz) |
| Reliability | - Calculated MTBF | 1'712'000 h (MIL-HDBK-217F, ground benign) |
| Environment | - Vibration<br>- Thermal Shock | MIL-STD-810F<br>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) |
| 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<br>- RoHS | www.tracopower.com/info/reach-declaration.pdf<br>www.tracopower.com/info/rohs-declaration.pdf |

## Supporting Documents

| | |
|---|---|
| Overview Link (for additional Documents) | www.tracopower.com/overview/thm20wi |

## Outline Dimensions




Dimensions in mm (inch)
Tolerances ±0.5 (±0.02)
Pin Ø 0.6 ±0.1 (0.024 ±0.004)
Pin pich 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.

© Copyright 2019 Traco Electronic AG
Specifications can be changed without notice.