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

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.

<table>
<thead>
<tr>
<th>Models</th>
<th>Order Code</th>
<th>Input Voltage Range</th>
<th>Output 1</th>
<th>Output 2</th>
<th>Efficiency typ.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Vnom</td>
<td>Imax</td>
<td>Vnom</td>
</tr>
<tr>
<td>THM 20-2411WI</td>
<td>THM 20-2412WI</td>
<td>THM 20-2413WI</td>
<td>THM 20-2415WI</td>
<td>THM 20-2421WI</td>
<td>THM 20-2422WI</td>
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<td>THM 20-2421WI</td>
<td>THM 20-2422WI</td>
</tr>
</tbody>
</table>

| Options | on demand (backorder with MOQ non stocking item) | - Optional models with Remote On/Off function
- Optional models with inverse Remote On/Off function (passive = off) |
### Input Specifications

<table>
<thead>
<tr>
<th></th>
<th>24 Vin models</th>
<th>48 Vin models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Current</td>
<td>10 mA typ.</td>
<td>9 mA typ.</td>
</tr>
<tr>
<td>Surge Voltage</td>
<td>50 VDC max. (3 s max)</td>
<td>100 VDC max. (3 s max)</td>
</tr>
<tr>
<td>Under Voltage Lockout</td>
<td>7.8 VDC min. / 8 VDC typ. / 8.6 VDC max.</td>
<td>15.8 VDC min. / 16 VDC typ. / 17.4 VDC max.</td>
</tr>
<tr>
<td>Recommended Input Fuse</td>
<td>4'000 mA (slow blow)</td>
<td>2'000 mA (slow blow)</td>
</tr>
<tr>
<td>(The need of an external fuse has to be assessed in the final application)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Output Specifications

#### Output Voltage Adjustment

- **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. (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)
  - dual output
    - 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

- **(20 MHz Bandwidth)**
  - 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.
- 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
  - Medical Equipment: EN 60601-1
  - Certification Documents: ANSI/AAMI ES 60601-1

Pollution Degree
- Pollution Degree: PD 2

Over Voltage Category
- Over Voltage Category: OVC II

EMC Specifications
EMI Emissions
- Conducted Emissions: EN 60601-1-2 edition 4 (Medical Devices)
  - Class A (internal filter)
  - Class B (with external filter)

- Radiated Emissions: EN 60601-1-2 edition 4 (Medical Devices)
  - Class A (internal filter)
  - Class B (with external filter)

EMS Immunity
- 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
  - EFT (Burst) / Surge: 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

- Conducted RF Disturbances
  - Ext. input component: 24 Vin models: 2 x KV 220 µF || TVS SMDJ58A
    - 48 Vin models: 2 x KY 220 µF || TVS SMDJ120A
  - Continuous: EN 61000-4-6, 10 Vrms, 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
  See application note: www.tracopower.com/overview/thm20wi

All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.
### Over Temperature Protection Switch Off
- Protection Mode
- Measurement Point

### Cooling System
- Natural convection (20 LFM)

### Remote Control
- Voltage Controlled Remote
- Off Idle Input Current
- Remote Pin Input Current

### 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
1'712'000 h (MIL-HDBK-217F, ground benign)

### Washing Process
According to 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
Lead-Free Wave Soldering
265°C / 10 s max.

### Weight
24 g

### Thermal Impedance
- Case to Ambient
14.4 K/W typ.

### Environmental Compliance
- REACH Declaration
www.tracopower.com/info/reach-declaration.pdf
- RoHS Declaration
www.tracopower.com/info/rohs-declaration.pdf
- SCIP Reference Number
f59e6a9c-dffc-47cf-b04a-7210d54cc4d6

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**Supporting Documents**

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

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

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

Pinout

<table>
<thead>
<tr>
<th>Pin</th>
<th>Single Output</th>
<th>Dual Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+Vin (Vcc)</td>
<td>+Vin (Vcc)</td>
</tr>
<tr>
<td>2</td>
<td>−Vin (GND)</td>
<td>−Vin (GND)</td>
</tr>
<tr>
<td>3</td>
<td>+Vout</td>
<td>+Vout</td>
</tr>
<tr>
<td>4</td>
<td>−Vout</td>
<td>Common</td>
</tr>
<tr>
<td>5</td>
<td>Trim</td>
<td>−Vout</td>
</tr>
<tr>
<td>6</td>
<td>No pin*/Remote</td>
<td>No pin*/Remote</td>
</tr>
</tbody>
</table>

*If remote is not selected there will be no pin.