DC/DC Medical Converter

- Ultra wide 4:1 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

Models

<table>
<thead>
<tr>
<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>Vnom</td>
<td>Imax</td>
<td>Vnom</td>
<td>Imax</td>
</tr>
<tr>
<td>THM 15-2411WI</td>
<td>9 - 36 VDC (24 VDC nom.)</td>
<td>5 VDC</td>
<td>3'000 mA</td>
<td>5 VDC</td>
</tr>
<tr>
<td>THM 15-2412WI</td>
<td>9 - 36 VDC (24 VDC nom.)</td>
<td>12 VDC</td>
<td>1'250 mA</td>
<td>12 VDC</td>
</tr>
<tr>
<td>THM 15-2413WI</td>
<td>9 - 36 VDC (24 VDC nom.)</td>
<td>15 VDC</td>
<td>1'000 mA</td>
<td>15 VDC</td>
</tr>
<tr>
<td>THM 15-2415WI</td>
<td>9 - 36 VDC (24 VDC nom.)</td>
<td>24 VDC</td>
<td>625 mA</td>
<td>24 VDC</td>
</tr>
<tr>
<td>THM 15-2421WI</td>
<td>18 - 75 VDC (48 VDC nom.)</td>
<td>+5 VDC</td>
<td>1'500 mA</td>
<td>+5 VDC</td>
</tr>
<tr>
<td>THM 15-2422WI</td>
<td>18 - 75 VDC (48 VDC nom.)</td>
<td>+12 VDC</td>
<td>625 mA</td>
<td>+12 VDC</td>
</tr>
<tr>
<td>THM 15-2423WI</td>
<td>18 - 75 VDC (48 VDC nom.)</td>
<td>+15 VDC</td>
<td>500 mA</td>
<td>+15 VDC</td>
</tr>
</tbody>
</table>

Options

- Optional models with remote-control function
- Optional models with remote-control function with inverse logic

The THM 15WI 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.
### Input Specifications

<table>
<thead>
<tr>
<th>Specification</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>3.150 mA (Slow blow)</td>
<td>1'600 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>
<tr>
<td>Input Filter</td>
<td>Internal Pi-Type</td>
<td></td>
</tr>
</tbody>
</table>

### Output Specifications

#### Output Voltage Adjustment

<table>
<thead>
<tr>
<th>Voltage Set Accuracy</th>
<th>±1% max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulation</td>
<td></td>
</tr>
<tr>
<td>- Input Variation (Vmin - Vmax)</td>
<td>single output models: 0.2% max.</td>
</tr>
<tr>
<td>- Load Variation (0 - 100%)</td>
<td>single output models: 0.2% max.</td>
</tr>
<tr>
<td>- Cross Regulation (25% / 100% asym. load)</td>
<td>dual output models: 5% max.</td>
</tr>
</tbody>
</table>

#### Ripple and Noise (20 MHz Bandwidth)

<table>
<thead>
<tr>
<th>Capacitive Load</th>
<th>5 Vout models: 50 mVp-p typ. (w/ 10 µF X7R)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- single output</td>
<td>12 Vout models: 75 mVp-p typ. (w/ 10 µF X7R)</td>
</tr>
<tr>
<td></td>
<td>15 Vout models: 75 mVp-p typ. (w/ 10 µF X7R)</td>
</tr>
<tr>
<td></td>
<td>24 Vout models: 100 mVp-p typ. (w/ 4.7 µF X7R)</td>
</tr>
<tr>
<td>- dual output</td>
<td>5 / -5 Vout models: 50 / 50 mVp-p typ. (w/ 10 µF X7R)</td>
</tr>
<tr>
<td></td>
<td>12 / -12 Vout models: 75 / 75 mVp-p typ. (w/ 10 µF X7R)</td>
</tr>
<tr>
<td></td>
<td>15 / -15 Vout models: 75 / 75 mVp-p typ. (w/ 10 µF X7R)</td>
</tr>
</tbody>
</table>

#### 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, 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. (6 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
- Certification Documents: www.tracopower.com/overview/thm15wi

**Pollution Degree**
- PD 2

**Over Voltage Category**
- OVC

### 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)

**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
  - 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
- EFT (Burst) / Surge
- Conducted RF Disturbances
- PF Magnetic Field

**External filter proposal**: www.tracopower.com/overview/thm15wi

**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

**Power Derating**
- High Temperature: 2.5%/K above 65°C

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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**: Off
- **Measurement Point**: Case

### Cooling System
- **Type**: Natural convection (20 LFM)

### Remote Control
- **Voltage Controlled Remote**: 
  - On: 3.5 to 12 VDC or open circuit
  - Off: 0 to 1.2 VDC or short circuit
- **Off Idle Input Current**: 2.5 mA typ.
- **Remote Pin Input Current**: -0.5 to 1.0 mA
  (Only for optional models with remote-control, Inverse models available.)

### Altitude During Operation
- **Maximum**: 5,000 m

### Switching Frequency
- **Rated**: 250 kHz (PWM)
- **Typical**: 250 kHz

### Insulation System
- **Type**: Reinforced Insulation

### Isolation Test Voltage
- **Input to Output**: 5,000 VAC
- **Duration**: 60 s

### Creepage
- **Input to Output**: 8 mm

### Clearance
- **Input to Output**: 8 mm

### Isolation Capacitance
- **Input to Output**: 20 pF

### Leakage Current
- **Touch Current**: 2.5 µA max. (240 VAC, 60 Hz)

### Reliability
- **Calculated MTBF**: 2,080,000 h
  (MIL-HDBK-217F, ground benign)

### Environment
- **Vibration**: MIL-STD-810F
- **Thermal Shock**: MIL-STD-810F

### Housing Material
- **Type**: Non-conductive Plastic
  - **Material**: (UL 94 V-0 rated)

### Base Material
- **Type**: Non-conductive Plastic
  - **Material**: (UL 94 V-0 rated)

### Potting Material
- **Type**: Silicone
  - **Material**: (UL 94 V-0 rated)

### Pin Material
- **Type**: Copper

### Pin Foundation Plating
- **Type**: Nickel
  - **Material**: (2 - 3 µm)

### Pin Surface Plating
- **Type**: Tin
  - **Material**: (3 - 5 µm), matte

### Soldering Profile
- **Temperature**: 265°C / 10 s max.

### Connection Type
- **Type**: THD (Through-Hole Device)

### Weight
- **Value**: 24 g

### Thermal Impedance
- **Value**: 15.3 K/W

### Environmental Compliance
- **Reach**: www.tracopower.com/info/reach-declaration.pdf

### Supporting Documents
**Overview Link** (for additional Documents) www.tracopower.com/overview/thm15wi

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All specifications valid at nominal voltage, 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)

Bottom View

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.