DC/DC Medical Converter

THM 15 Series, 15 Watt

- Wide 2:1 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

The THM 15 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.

### 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 15-1211</td>
<td>9 - 18 VDC (12 VDC nom.)</td>
<td>5 VDC</td>
<td>3’000 mA</td>
<td>5 VDC</td>
</tr>
<tr>
<td>THM 15-1212</td>
<td>12 VDC</td>
<td>1’250 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>THM 15-1213</td>
<td>15 VDC</td>
<td>1’000 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>THM 15-1215</td>
<td>24 VDC</td>
<td>625 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>THM 15-1221</td>
<td>+5 VDC</td>
<td>1’500 mA</td>
<td>−5 VDC</td>
<td>1’500 mA</td>
</tr>
<tr>
<td>THM 15-1222</td>
<td>+12 VDC</td>
<td>625 mA</td>
<td>−12 VDC</td>
<td>625 mA</td>
</tr>
<tr>
<td>THM 15-1223</td>
<td>+15 VDC</td>
<td>500 mA</td>
<td>−15 VDC</td>
<td>500 mA</td>
</tr>
<tr>
<td>THM 15-2411</td>
<td>18 - 36 VDC (24 VDC nom.)</td>
<td>5 VDC</td>
<td>3’000 mA</td>
<td>5 VDC</td>
</tr>
<tr>
<td>THM 15-2412</td>
<td>12 VDC</td>
<td>1’250 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>THM 15-2413</td>
<td>15 VDC</td>
<td>1’000 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>THM 15-2415</td>
<td>24 VDC</td>
<td>625 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>THM 15-2421</td>
<td>+5 VDC</td>
<td>1’500 mA</td>
<td>−5 VDC</td>
<td>1’500 mA</td>
</tr>
<tr>
<td>THM 15-2422</td>
<td>+12 VDC</td>
<td>625 mA</td>
<td>−12 VDC</td>
<td>625 mA</td>
</tr>
<tr>
<td>THM 15-2423</td>
<td>+15 VDC</td>
<td>500 mA</td>
<td>−15 VDC</td>
<td>500 mA</td>
</tr>
<tr>
<td>THM 15-4811</td>
<td>36 - 75 VDC (48 VDC nom.)</td>
<td>5 VDC</td>
<td>3’000 mA</td>
<td>5 VDC</td>
</tr>
<tr>
<td>THM 15-4812</td>
<td>12 VDC</td>
<td>1’250 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>THM 15-4813</td>
<td>15 VDC</td>
<td>1’000 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>THM 15-4815</td>
<td>24 VDC</td>
<td>625 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>THM 15-4821</td>
<td>+5 VDC</td>
<td>1’500 mA</td>
<td>−5 VDC</td>
<td>1’500 mA</td>
</tr>
<tr>
<td>THM 15-4822</td>
<td>+12 VDC</td>
<td>625 mA</td>
<td>−12 VDC</td>
<td>625 mA</td>
</tr>
<tr>
<td>THM 15-4823</td>
<td>+15 VDC</td>
<td>500 mA</td>
<td>−15 VDC</td>
<td>500 mA</td>
</tr>
</tbody>
</table>

### Options

- Optional models with Remote On/Off function
- Optional models with inverse Remote On/Off function (passive = off)

www.tracopower.com  September 20, 2023  Page 1 / 5
Input Specifications

| Input Current                  | 12 Vin models: 12 mA typ. | 24 Vin models: 10 mA typ. | 48 Vin models: 9 mA typ. |

| Surge Voltage                 | 12 Vin models: 25 VDC max. (3 s max) | 24 Vin models: 50 VDC max. (3 s max) | 48 Vin models: 100 VDC max. (3 s max) |

| Under Voltage Lockout         | 12 Vin models: 7.8 VDC min. / 8 VDC typ. / 8.6 VDC max. | 24 Vin models: 15.8 VDC min. / 16 VDC typ. / 17.4 VDC max. | 48 Vin models: 32 VDC min. / 33 VDC typ. / 34 VDC max. |

| Recommended Input Fuse        | 12 Vin models: 3'150 mA (slow blow) | 24 Vin models: 1'600 mA (slow blow) | 48 Vin models: 800 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

<table>
<thead>
<tr>
<th>Voltage Set Accuracy</th>
<th>±1% max.</th>
</tr>
</thead>
</table>

| Regulation            | single output models: 0.2% max. | dual output models: 0.5% max. |
| - Input Variation (Vmin - Vmax) | single output models: 0.2% max. | dual output models: 0.2% max. |
| - Load Variation (0 - 100%) | single output models: 1% max. (Output 1) | dual output models: 1% max. (Output 2) |

Cross Regulation (25% / 100% asym. load) | dual output models: 5% max.

Ripple and Noise (20 MHz Bandwidth)

| Capacitive Load         | 5 Vout models: 3'800 μF max. | 12 Vout models: 650 μF max. | 24 Vout models: 190 μF max. |
| - single output         | 5/ -5 Vout models: 1'900 / 1'900 μF max. | 12 / -12 Vout models: 380 / 380 μF max. | 15 / -15 Vout models: 270 / 270 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 lout max. / 150% typ. of lout 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
  IEC 62368-1
  UL 62368-1
- Medical Equipment
  EN 60601-1
  IEC 60601-1
  ANSI/AAMI ES 60601-1
- Certification Documents

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: www.tracopower.com/overview/thm15

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
- Conducted RF Disturbances
- PF Magnetic Field

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

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

www.tracopower.com September 20, 2023
## Power Derating
- High Temperature

*Note: See application note: www.tracopower.com/overview/thm15*

## 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

2.5 mA typ.
-0.5 to 1.0 mA

(Optional models with inverse Remote On/Off function (passive = off))

## Over Temperature Protection
- Switch Off
- Protection Mode

115°C typ. (Automatic recovery)

## 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

20'080'000 h (MIL-HDBK-217F, ground benign)

## Washing Process
According to Cleaning Guideline
www.tracopower.com/info/cleaning.pdf

## Environment
- Vibration

MIL-STD-810F
- Thermal Shock

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

15.3 K/W typ.

## Environmental Compliance
- REACH Declaration

www.tracopower.com/info/reach-declaration.pdf

- RoHS Declaration

www.tracopower.com/info/rohs-declaration.pdf

Exemptions: 7a, 7c-4

(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (OEA rule))

- SCIP Reference Number

cd949d48-3360-4cc9-a15d-0cd2ecd88e54

## Supporting Documents

**Overview Link** (for additional Documents) www.tracopower.com/overview/thm15

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

**THM 15 Series, 15 Watt**

**Dimensions in mm (inch)**
- Tolerances ±0.5 (±0.02)
- Pin Ø 1.0 ±0.1 (0.039 ±0.004)
- Pin pich 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.