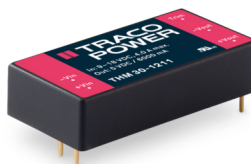


- Wide 2:1 input voltage 30 W DC/DC converter in a 2 x 1 " plastic case
- I/O isolation 5000 VAC rated for 250 VAC working voltage
- Certification according to IEC/EN/ES 60601-1 edition 3.2 for 2 x MOPP
- Risk management process according to ISO 14971 incl. risk management file
- Acceptance criteria for electronic assemblies acc. to IPC-A-610 Level 3
- Low leakage current <2.5  $\mu$ A
- Operating temperature -40°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



ES 60601-1 IEC 60601-1  
UL 62368-1 IEC 62368-1

The THM 30 series is a range of medical 30 Watt DC/DC converters in 2.0" 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  $\mu$ A. The units are approved to IEC/EN/ES 60601-1 edition 3.2 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 +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 typ. |
|             |                              | Vnom     | I <sub>max</sub> | Vnom     | I <sub>max</sub> |                 |
| THM 30-1211 | 9 - 18 VDC<br>(12 VDC nom.)  | 5 VDC    | 6'000 mA         |          |                  | 89 %            |
| THM 30-1212 |                              | 12 VDC   | 2'500 mA         |          |                  | 89 %            |
| THM 30-1213 |                              | 15 VDC   | 2'000 mA         |          |                  | 90 %            |
| THM 30-1215 |                              | 24 VDC   | 1'250 mA         |          |                  | 89 %            |
| THM 30-1221 |                              | +5 VDC   | 3'000 mA         | -5 VDC   | 3'000 mA         | 86 %            |
| THM 30-1222 |                              | +12 VDC  | 1'250 mA         | -12 VDC  | 1'250 mA         | 89 %            |
| THM 30-1223 |                              | +15 VDC  | 1'000 mA         | -15 VDC  | 1'000 mA         | 89 %            |
| THM 30-2411 | 18 - 36 VDC<br>(24 VDC nom.) | 5 VDC    | 6'000 mA         |          |                  | 89 %            |
| THM 30-2412 |                              | 12 VDC   | 2'500 mA         |          |                  | 89 %            |
| THM 30-2413 |                              | 15 VDC   | 2'000 mA         |          |                  | 91 %            |
| THM 30-2415 |                              | 24 VDC   | 1'250 mA         |          |                  | 90 %            |
| THM 30-2421 |                              | +5 VDC   | 3'000 mA         | -5 VDC   | 3'000 mA         | 86 %            |
| THM 30-2422 |                              | +12 VDC  | 1'250 mA         | -12 VDC  | 1'250 mA         | 90 %            |
| THM 30-2423 |                              | +15 VDC  | 1'000 mA         | -15 VDC  | 1'000 mA         | 90 %            |
| THM 30-4811 | 36 - 75 VDC<br>(48 VDC nom.) | 5 VDC    | 6'000 mA         |          |                  | 89 %            |
| THM 30-4812 |                              | 12 VDC   | 2'500 mA         |          |                  | 89 %            |
| THM 30-4813 |                              | 15 VDC   | 2'000 mA         |          |                  | 90 %            |
| THM 30-4815 |                              | 24 VDC   | 1'250 mA         |          |                  | 89 %            |
| THM 30-4821 |                              | +5 VDC   | 3'000 mA         | -5 VDC   | 3'000 mA         | 87 %            |
| THM 30-4822 |                              | +12 VDC  | 1'250 mA         | -12 VDC  | 1'250 mA         | 90 %            |
| THM 30-4823 |                              | +15 VDC  | 1'000 mA         | -15 VDC  | 1'000 mA         | 90 %            |

| Options                                                |                                                                                                                                                                                |
|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| on demand<br>(backorder with MOQ<br>non stocking item) | <ul style="list-style-type: none"> <li>- Optional models with Remote On/Off function</li> <li>- Optional models with inverse Remote On/Off function (passive = off)</li> </ul> |

## Input Specifications

|                        |              |                                                                                                                                                                                                                       |
|------------------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input Current          | - At no load | 12 Vin models: <b>11 mA typ.</b><br>24 Vin models: <b>9 mA typ.</b><br>48 Vin models: <b>9 mA typ.</b>                                                                                                                |
| Surge Voltage          |              | 12 Vin models: <b>25 VDC max.</b> (3 s max.)<br>24 Vin models: <b>50 VDC max.</b> (3 s max.)<br>48 Vin models: <b>100 VDC max.</b> (3 s max.)                                                                         |
| Under Voltage Lockout  |              | 12 Vin models: <b>7.8 VDC min. / 8 VDC typ. / 8.6 VDC max.</b><br>24 Vin models: <b>15.8 VDC min. / 16 VDC typ. / 17.4 VDC max.</b><br>48 Vin models: <b>32 VDC min. / 33 VDC typ. / 34 VDC max.</b>                  |
| Recommended Input Fuse |              | 12 Vin models: <b>6'300 mA</b> (slow blow)<br>24 Vin models: <b>3'150 mA</b> (slow blow)<br>48 Vin models: <b>1'600 mA</b> (slow blow)<br>(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 models)<br>±10% (other models)<br>(single output models only)<br>(By external trim resistor)<br>See application note: <a href="http://www.tracopower.com/overview/thm30">www.tracopower.com/overview/thm30</a><br>Output power must not exceed rated power!                                                                                                                                         |
| Voltage Set Accuracy                   |                                                                                                              | <b>±1% max.</b>                                                                                                                                                                                                                                                                                                                                                                                                                |
| Regulation                             | - Input Variation (Vmin - Vmax)<br>- Load Variation (0 - 100%)<br>- Cross Regulation (25% / 100% asym. load) | single output models: <b>0.2% max.</b><br>dual output models: <b>0.5% max.</b><br>single output models: <b>0.2% max.</b><br>dual output models: <b>1% max. (Output 1)</b><br><b>1% max. (Output 2)</b><br>dual output models: <b>5% max.</b>                                                                                                                                                                                   |
| Ripple and Noise<br>(20 MHz Bandwidth) | - single output<br>- dual output                                                                             | 5 Vout models: <b>50 mVp-p typ.</b> (w/ 10 µF X7R)<br>12 Vout models: <b>75 mVp-p typ.</b> (w/ 10 µF X7R)<br>15 Vout models: <b>100 mVp-p typ.</b> (w/ 10 µF X7R)<br>24 Vout models: <b>100 mVp-p typ.</b> (w/ 4.7 µF X7R)<br>5 / -5 Vout models: <b>50 / 50 mVp-p typ.</b> (w/ 10 µF X7R)<br>12 / -12 Vout models: <b>75 / 75 mVp-p typ.</b> (w/ 10 µF X7R)<br>15 / -15 Vout models: <b>75 / 75 mVp-p typ.</b> (w/ 10 µF X7R) |
| Capacitive Load                        | - single output<br>- dual output                                                                             | 5 Vout models: <b>7'200 µF max.</b><br>12 Vout models: <b>1'200 µF max.</b><br>15 Vout models: <b>1'000 µF max.</b><br>24 Vout models: <b>375 µF max.</b><br>5 / -5 Vout models: <b>3'600 / 3'600 µF max.</b><br>12 / -12 Vout models: <b>750 / 750 µF max.</b><br>15 / -15 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><br><b>150% typ. of Iout max.</b>                                                                                                                                                                                                                                                                                                                                                                 |

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)<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)                                                                                                                                                                                                                                      |

## Safety Specifications

|                       |                             |                                                                                             |
|-----------------------|-----------------------------|---------------------------------------------------------------------------------------------|
| 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   | <a href="http://www.tracopower.com/overview/thm30">www.tracopower.com/overview/thm30</a>    |
| 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 47 Part 18 class A (internal filter)<br>FCC 47 Part 18 class B (with external filter) |
|                     | - 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 47 Part 18 class A (internal filter)<br>FCC 47 Part 18 class B (with external filter) |
|                     |                             | External filter proposal: <a href="http://www.tracopower.com/overview/thm30">www.tracopower.com/overview/thm30</a>                                                                                                                                          |
| EMS (Immunity)      |                             | EN 60601-1-2 edition 4 (Medical Devices)                                                                                                                                                                                                                    |
|                     | - Electrostatic Discharge   | Air: EN 61000-4-2, ±15 kV, perf. criteria A<br>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: 12 Vin models: 2 x KY 220 µF    TVS SMDJ36A<br>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<br>1 s: EN 61000-4-8, 1000 A/m, perf. criteria A                                                                                                                                                        |
| EMC / Environmental | - Certification Documents   | <a href="http://www.tracopower.com/overview/thm30">www.tracopower.com/overview/thm30</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           |

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

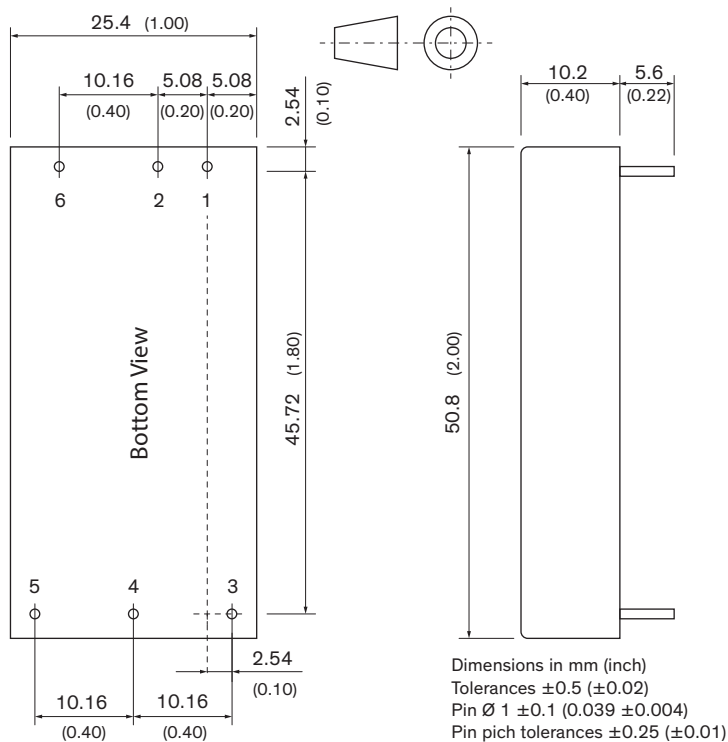
|                                        |                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power Derating                         | - High Temperature                                                                                       | Depending on model<br>See application note: <a href="http://www.tracopower.com/overview/thm30">www.tracopower.com/overview/thm30</a>                                                                                                                                                                                                                                                                                                                                                          |
| Over Temperature Protection Switch Off | - Protection Mode<br>- Measurement Point                                                                 | 115°C typ. (Automatic recovery)<br>Case                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Cooling System                         |                                                                                                          | Natural convection (20 LFM)                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Remote Control                         | - Voltage Controlled Remote (passive = on)<br><br>- Off Idle Input Current<br>- Remote Pin Input Current | 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<br>2.5 mA typ.<br>-0.5 to 1.0 mA<br>(Optional models with inverse Remote On/Off function (passive = off))                                                                                                                                                                                                                                                                        |
| Altitude During Operation              |                                                                                                          | 5'000 m max.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Switching Frequency                    |                                                                                                          | 225 - 285 kHz (PWM)<br>250 kHz typ. (PWM)                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Insulation System                      |                                                                                                          | Reinforced Insulation                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Working Voltage (rated)                |                                                                                                          | 250 VAC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Isolation Test Voltage                 | - Input to Output, 60 s<br>- Input to Output, 1 s                                                        | 5'000 VAC<br>10'000 VDC                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 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                                                                                        | 1'140'000 h (MIL-HDBK-217F, ground benign)                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Washing Process                        |                                                                                                          | According to Cleaning Guideline<br><a href="http://www.tracopower.com/info/cleaning.pdf">www.tracopower.com/info/cleaning.pdf</a>                                                                                                                                                                                                                                                                                                                                                             |
| Environment                            | - Vibration<br>- Thermal Shock                                                                           | MIL-STD-810F<br>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                         |                                                                                                          | 2" x 1"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Soldering Profile                      |                                                                                                          | Lead-Free Wave Soldering<br>265°C / 10 s max.                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Weight                                 |                                                                                                          | 32 g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Thermal Impedance                      | - Case to Ambient                                                                                        | 12.9 K/W typ.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Environmental Compliance               | - REACH Declaration<br><br>- RoHS Declaration<br><br>- SCIP Reference Number                             | <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a><br>REACH SVHC list compliant<br>REACH Annex XVII compliant<br><a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a><br>Exemptions: 7(a), 7(c)-I<br>(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)<br>06ca58e7-a740-4f31-a81d-c4af720b99d6 |

## Additional Information

|                            |                                                                                                |
|----------------------------|------------------------------------------------------------------------------------------------|
| Supporting Documents       | <a href="http://www.tracopower.com/overview/thm30">www.tracopower.com/overview/thm30</a>       |
| Frequently Asked Questions | <a href="http://www.tracopower.com/glossary-faq">www.tracopower.com/glossary-faq</a>           |
| Glossary                   | <a href="http://www.tracopower.com/info/glossary.pdf">www.tracopower.com/info/glossary.pdf</a> |

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

## Outline Dimensions



| 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.