

- **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**



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

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

| Order Code  | Input Voltage Range          | Output 1 |                  | Output 2 |                  | Efficiency typ. |
|-------------|------------------------------|----------|------------------|----------|------------------|-----------------|
|             |                              | Vnom     | I <sub>max</sub> | Vnom     | I <sub>max</sub> |                 |
| THM 15-1211 | 9 - 18 VDC<br>(12 VDC nom.)  | 5 VDC    | 3'000 mA         |          |                  | 89 %            |
| THM 15-1212 |                              | 12 VDC   | 1'250 mA         |          |                  | 89 %            |
| THM 15-1213 |                              | 15 VDC   | 1'000 mA         |          |                  | 89 %            |
| THM 15-1215 |                              | 24 VDC   | 625 mA           |          |                  | 89 %            |
| THM 15-1221 |                              | +5 VDC   | 1'500 mA         | -5 VDC   | 1'500 mA         | 86 %            |
| THM 15-1222 |                              | +12 VDC  | 625 mA           | -12 VDC  | 625 mA           | 89 %            |
| THM 15-1223 |                              | +15 VDC  | 500 mA           | -15 VDC  | 500 mA           | 89 %            |
| THM 15-2411 | 18 - 36 VDC<br>(24 VDC nom.) | 5 VDC    | 3'000 mA         |          |                  | 90 %            |
| THM 15-2412 |                              | 12 VDC   | 1'250 mA         |          |                  | 90 %            |
| THM 15-2413 |                              | 15 VDC   | 1'000 mA         |          |                  | 90 %            |
| THM 15-2415 |                              | 24 VDC   | 625 mA           |          |                  | 90 %            |
| THM 15-2421 |                              | +5 VDC   | 1'500 mA         | -5 VDC   | 1'500 mA         | 86 %            |
| THM 15-2422 |                              | +12 VDC  | 625 mA           | -12 VDC  | 625 mA           | 90 %            |
| THM 15-2423 |                              | +15 VDC  | 500 mA           | -15 VDC  | 500 mA           | 90 %            |
| THM 15-4811 | 36 - 75 VDC<br>(48 VDC nom.) | 5 VDC    | 3'000 mA         |          |                  | 90 %            |
| THM 15-4812 |                              | 12 VDC   | 1'250 mA         |          |                  | 88 %            |
| THM 15-4813 |                              | 15 VDC   | 1'000 mA         |          |                  | 89 %            |
| THM 15-4815 |                              | 24 VDC   | 625 mA           |          |                  | 89 %            |
| THM 15-4821 |                              | +5 VDC   | 1'500 mA         | -5 VDC   | 1'500 mA         | 86 %            |
| THM 15-4822 |                              | +12 VDC  | 625 mA           | -12 VDC  | 625 mA           | 89 %            |
| THM 15-4823 |                              | +15 VDC  | 500 mA           | -15 VDC  | 500 mA           | 89 %            |

### Options

|  |   |
|--|---|
| <b>on demand</b><br>(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 | 12 Vin models: <b>12 mA typ.</b><br>24 Vin models: <b>10 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>3'150 mA</b> (slow blow)<br>24 Vin models: <b>1'600 mA</b> (slow blow)<br>48 Vin models: <b>800 mA</b> (slow blow)   |
| Input Filter           |              | <b>Internal Pi-Type</b>  |

## 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 single output models)<br>See application note: <a href="http://www.tracopower.com/overview/thm15">www.tracopower.com/overview/thm15</a><br>Output power must not exceed rated power!   |
| Voltage Set Accuracy                |  | ±1% max.  |
| 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.</b> (Output 1)<br><b>1% max.</b> (Output 2)<br>dual output models: <b>5% max.</b>  |
| Ripple and Noise (20 MHz Bandwidth) | - single output<br>- dual output   | 5 Vout models: <b>50 mVp-p typ.</b> (with 10 µF X7R)<br>12 Vout models: <b>75 mVp-p typ.</b> (with 10 µF X7R)<br>15 Vout models: <b>75 mVp-p typ.</b> (with 10 µF X7R)<br>24 Vout models: <b>100 mVp-p typ.</b> (with 4.7 µF X7R)<br>5 / -5 Vout models: <b>50 / 50 mVp-p typ.</b> (with 10 µF X7R)<br>12 / -12 Vout models: <b>75 / 75 mVp-p typ.</b> (with 10 µF X7R)<br>15 / -15 Vout models: <b>75 / 75 mVp-p typ.</b> (with 10 µF X7R) |
| Capacitive Load                     | - single output<br>- dual output   | 5 Vout models: <b>3'800 µF max.</b><br>12 Vout models: <b>650 µF max.</b><br>15 Vout models: <b>530 µF max.</b><br>24 Vout models: <b>190 µF max.</b><br>5 / -5 Vout models: <b>1'900 / 1'900 µF max.</b><br>12 / -12 Vout models: <b>380 / 380 µF max.</b><br>15 / -15 Vout models: <b>270 / 270 µF max.</b>   |
| 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.  |

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.<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)   |

### 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   | <a href="http://www.tracopower.com/overview/thm15">www.tracopower.com/overview/thm15</a>    |
| Pollution Degree      |                             | PD 2  |
| Over Voltage Category |                             | OVC II  |

### EMC Specifications

|               |                             |  |
|---------------|-----------------------------|--|
| EMI Emissions | - Conducted Emissions       | EN 60601-1-2 edition 4 (Medical Devices)<br>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: <a href="http://www.tracopower.com/overview/thm15">www.tracopower.com/overview/thm15</a>   |
| EMS Immunity  | - Electrostatic Discharge   | EN 60601-1-2 edition 4 (Medical Devices)<br>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   |
|               | - Conducted RF Disturbances | 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<br>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   |

### 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        |

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<br>- Measurement Point  | 115°C typ. (Automatic recovery)<br>Case  |
| Cooling System                         |   | Natural convection (20 LFM)  |
| Remote Control                         | - Voltage Controlled Remote<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>(Only for optional models with remote-control. Inverse models available.)         |
| Altitude During Operation              |   | 5'000 m max.   |
| 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                        | - Touch Current   | 2.5 µA max. (240 VAC, 60 Hz)   |
| Reliability                            | - Calculated MTBF   | 2'080'000 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                      |   | 15.3 K/W   |
| Environmental Compliance               | - Reach<br>- RoHS   | <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a><br><a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a> |

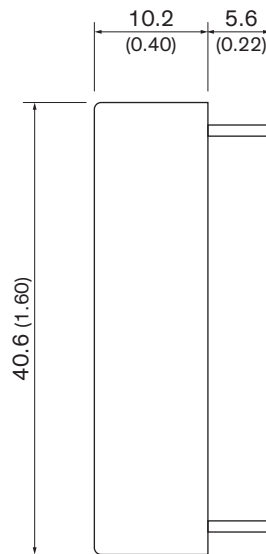
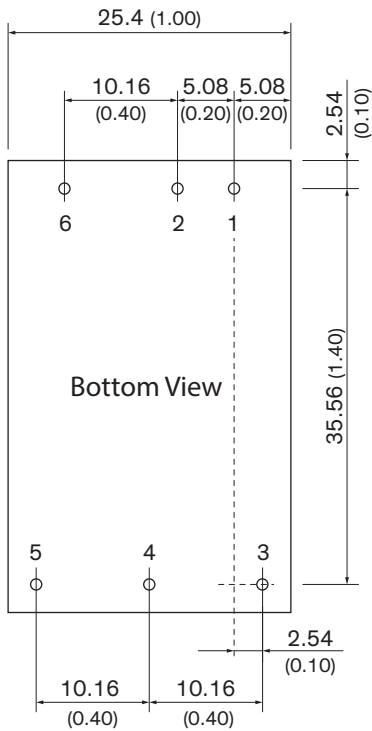
## Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/thm15](http://www.tracopower.com/overview/thm15)

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  $\pm 0.5$  ( $\pm 0.02$ )  
 Pin  $\varnothing$  1.0  $\pm 0.1$  (0.039  $\pm 0.004$ )  
 Pin pitch tolerances  $\pm 0.25$  ( $\pm 0.01$ )

### 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.



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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