

- Ultra wide 4:1 input voltage 10 W DC/DC converter in a compact DIP-24 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  $\mu$ A
- Operating temperature  $-40^{\circ}\text{C}$  to  $90^{\circ}\text{C}$
- 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

The THM 10WI series is a range of medical 10 Watt DC/DC converters in DIP-24 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  $\mu$ A. The units are approved to IEC/EN/ES 60601-1 3rd edition for 2 x MOPP (Means Of Patient Protection) 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 87% and highest grade components the converters can reliably operate in an ambient temperature range of  $-40^{\circ}\text{C}$  up to  $+90^{\circ}\text{C}$ . 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 10-0510WI | 4.5 - 9 VDC<br>(5 VDC nom.)  | 3.3 VDC  | 2'500 mA         |          |                  | 80 %            |
| THM 10-0511WI |                              | 5 VDC    | 2'000 mA         |          |                  | 84 %            |
| THM 10-0512WI |                              | 12 VDC   | 830 mA           |          |                  | 87 %            |
| THM 10-0513WI |                              | 15 VDC   | 670 mA           |          |                  | 87 %            |
| THM 10-0515WI |                              | 24 VDC   | 416 mA           |          |                  | 86 %            |
| THM 10-0521WI |                              | +5 VDC   | 1'000 mA         | -5 VDC   | 1'000 mA         | 83 %            |
| THM 10-0522WI |                              | +12 VDC  | 416 mA           | -12 VDC  | 416 mA           | 86 %            |
| THM 10-0523WI |                              | +15 VDC  | 333 mA           | -15 VDC  | 333 mA           | 87 %            |
| THM 10-2410WI | 9 - 36 VDC<br>(24 VDC nom.)  | 3.3 VDC  | 2'500 mA         |          |                  | 83 %            |
| THM 10-2411WI |                              | 5 VDC    | 2'000 mA         |          |                  | 87 %            |
| THM 10-2412WI |                              | 12 VDC   | 830 mA           |          |                  | 89 %            |
| THM 10-2413WI |                              | 15 VDC   | 670 mA           |          |                  | 89 %            |
| THM 10-2415WI |                              | 24 VDC   | 416 mA           |          |                  | 89 %            |
| THM 10-2421WI |                              | +5 VDC   | 1'000 mA         | -5 VDC   | 1'000 mA         | 85 %            |
| THM 10-2422WI |                              | +12 VDC  | 416 mA           | -12 VDC  | 416 mA           | 89 %            |
| THM 10-2423WI |                              | +15 VDC  | 333 mA           | -15 VDC  | 333 mA           | 88 %            |
| THM 10-4810WI | 18 - 75 VDC<br>(48 VDC nom.) | 3.3 VDC  | 2'500 mA         |          |                  | 83 %            |
| THM 10-4811WI |                              | 5 VDC    | 2'000 mA         |          |                  | 87 %            |
| THM 10-4812WI |                              | 12 VDC   | 830 mA           |          |                  | 89 %            |
| THM 10-4813WI |                              | 15 VDC   | 670 mA           |          |                  | 89 %            |
| THM 10-4815WI |                              | 24 VDC   | 416 mA           |          |                  | 89 %            |
| THM 10-4821WI |                              | +5 VDC   | 1'000 mA         | -5 VDC   | 1'000 mA         | 85 %            |
| THM 10-4822WI |                              | +12 VDC  | 416 mA           | -12 VDC  | 416 mA           | 88 %            |
| THM 10-4823WI |                              | +15 VDC  | 333 mA           | -15 VDC  | 333 mA           | 88 %            |

### Options

|   |  |
|---|--|
| <b>on demand</b><br>(backorder with MOQ<br>non stocking item) | <ul style="list-style-type: none"> <li>- Optional models with alternative pinning</li> <li>- Optional models with adjustable output</li> <li>- Optional models with remote-control function</li> <li>- Optional models with adjustable output and remote-control function</li> </ul> |
|---|--|

### Input Specifications

|                        |              |  |
|------------------------|--------------|--|
| Input Current          | - At no load | 5 Vin models: <b>20 mA typ.</b><br>24 Vin models: <b>6 mA typ.</b><br>48 Vin models: <b>4 mA typ.</b>  |
| Surge Voltage          |              | 5 Vin models: <b>16 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  |              | 5 Vin models: <b>3 VDC min. / 4 VDC typ. / 4.4 VDC max.</b><br>24 Vin models: <b>7 VDC min. / 8 VDC typ. / 8.8 VDC max.</b><br>48 Vin models: <b>15 VDC min. / 16 VDC typ. / 17.5 VDC max.</b>                       |
| Recommended Input Fuse |              | 5 Vin models: <b>5'000 mA</b> (slow blow)<br>24 Vin models: <b>2'000 mA</b> (slow blow)<br>48 Vin models: <b>1'000 mA</b> (slow blow)<br>(The need of an external fuse has to be assessed in the final application.) |
| Input Filter           |              | Internal Pi-Type   |

### Output Specifications

|  |   |  |
|--|---|--|
| Output Voltage Adjustment              |   | <b>-10% to +20%</b> (15 & 24 Vout single models)<br><b>±10%</b> (other models)<br>(Only for optional models with adjustable output)<br>(By external trim resistor)<br>See application note: <a href="http://www.tracopower.com/overview/thm10wi">www.tracopower.com/overview/thm10wi</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<br>(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<br>(20 MHz Bandwidth) | - single output<br>- dual output  | 3.3 Vout models: <b>30 mVp-p typ.</b> (w/ 10 µF X7R)<br>5 Vout models: <b>30 mVp-p typ.</b> (w/ 10 µF X7R)<br>12 Vout models: <b>40 mVp-p typ.</b> (w/ 10 µF X7R)<br>15 Vout models: <b>40 mVp-p typ.</b> (w/ 10 µF X7R)<br>24 Vout models: <b>50 mVp-p typ.</b> (w/ 4.7 µF X7R)<br>5 / -5 Vout models: <b>30 / 30 mVp-p typ.</b> (w/ 10 µF X7R)<br>12 / -12 Vout models: <b>40 / 40 mVp-p typ.</b> (w/ 10 µF X7R)<br>15 / -15 Vout models: <b>40 / 40 mVp-p typ.</b> (w/ 10 µF X7R) |
| Capacitive Load                        | - single output<br>- dual output  | 3.3 Vout models: <b>3'000 µF max.</b><br>5 Vout models: <b>2'500 µF max.</b><br>12 Vout models: <b>430 µF max.</b><br>15 Vout models: <b>350 µF max.</b><br>24 Vout models: <b>125 µF max.</b><br>5 / -5 Vout models: <b>1'440 / 1'440 µF max.</b><br>12 / -12 Vout models: <b>550 / 550 µF max.</b><br>15 / -15 Vout models: <b>180 / 180 µF max.</b>   |
| Minimum Load                           |   | <b>Not required</b>  |
| Temperature Coefficient                |   | <b>±0.02 %/K max.</b>  |

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

|                           |   |
|---------------------------|---|
| Start-up Time             | 30 ms typ.  |
| Short Circuit Protection  | Continuous, Automatic recovery  |
| Output Current Limitation | 150% typ. of I <sub>out</sub> max.  |
| Overvoltage Protection    | 112 - 152% of V <sub>out</sub> nom.<br>(depending on model)<br>3.7 - 5 VDC (3.3 VDC model)<br>5.6 - 7 VDC (5 VDC model)<br>13.5 - 16 VDC (12 VDC model)<br>18.3 - 22 VDC (15 VDC model)<br>29.1 - 34.5 VDC (24 VDC model)<br>5.6 - 7 VDC (±5 VDC model)<br>13.5 - 18.2 VDC (±12 VDC model)<br>17 - 22 VDC (±15 VDC model) |
| Transient Response        | - Response Time   |
|                           | 250 μs typ. (25% Load Step)   |

### Safety Specifications

|                       |                           |  |
|-----------------------|---------------------------|--|
| Safety Standards      | - 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/thm10wi">www.tracopower.com/overview/thm10wi</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 (internal filter)<br>FCC 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 Part 18 class A (internal filter)<br>FCC Part 18 class B (with external filter)   |
|               |                             | External filter proposal: <a href="http://www.tracopower.com/overview/thm10wi">www.tracopower.com/overview/thm10wi</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  |
|               |                             | Ext. input component: 5 V <sub>in</sub> models: KY 1000 μF // Vishay V10P45<br>24 V <sub>in</sub> models: KY 470 μF<br>48 V <sub>in</sub> models: KY 330 μF   |
|               | - Conducted RF Disturbances | EN 61000-4-6, 10 V <sub>rms</sub> , 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) |
|-------------------|---------------------------|

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

|                           |  |  |
|---------------------------|--|--|
| Temperature Ranges        | - Operating Temperature<br>- Approved Ambient Temp.<br>- Case Temperature<br>- Storage Temperature | -40°C to +90°C<br>+50°C max. (to comply with EN 60601-1)<br>+105°C max.<br>-55°C to +125°C   |
| Power Derating            | - High Temperature   | 3.33 %/K above 75°C  |
| Cooling System            |  | Natural convection (20 LFM)  |
| Remote Control            | - Voltage Controlled Remote<br><br>- Off Idle Input Current<br>- Remote Pin Input Current          | On: 0 to 1.2 VDC or open circuit<br>Off: 2.2 to 12 VDC<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)   |
| Altitude During Operation |  | 5'000 m max.   |
| Switching Frequency       |  | 270 - 330 kHz (PWM)<br>300 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  | 12 pF typ.<br>17 pF max.   |
| Leakage Current           | - Touch Current  | 2 µA max. (240 VAC, 60 Hz)   |
| Reliability               | - Calculated MTBF  | 3'850'000 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)   |
| Pin Material              |  | Copper   |
| Pin Foundation Plating    |  | Nickel (2 - 3 µm)  |
| Pin Surface Plating       |  | Tin (3 - 5 µm), matte  |
| Soldering Profile         |  | 265°C / 10 s max.  |
| Connection Type           |  | THD (Through-Hole Device)  |
| Weight                    |  | 14 g   |
| Thermal Impedance         |  | 18 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

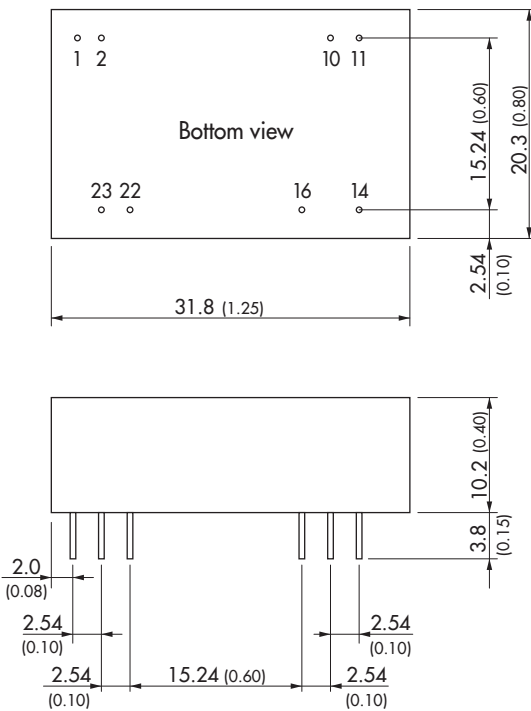
Overview Link (for additional Documents)

[www.tracopower.com/overview/thm10wi](http://www.tracopower.com/overview/thm10wi)

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

### Outline Dimensions

Standard pinning with options: With adjustable output and/or remote-control function

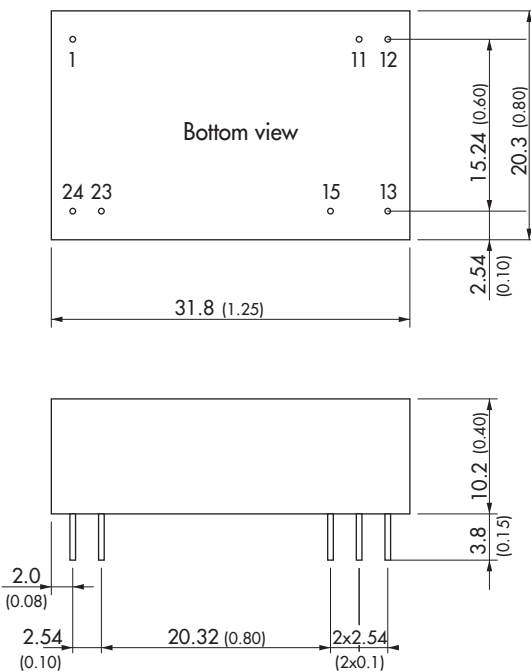


| Pinout |                |                |
|--------|----------------|----------------|
| Pin    | Single Output  | Dual Output    |
| 1      | No pin*/Remote | No pin*/Remote |
| 2      | -Vin (GND)     | -Vin (GND)     |
| 10     | No pin*/Trim   | No pin*/Trim   |
| 11     | NC             | -Vout          |
| 14     | +Vout          | +Vout          |
| 16     | -Vout          | Common         |
| 22     | +Vin (Vcc)     | +Vin (Vcc)     |
| 23     | +Vin (Vcc)     | +Vin (Vcc)     |

NC: No connection

\*If Remote or Trim is not selected there is no pin on corresponding number.

### Optional pinning



| Pinout |               |             |
|--------|---------------|-------------|
| Pin    | Single Output | Dual Output |
| 1      | +Vin (Vcc)    | +Vin (Vcc)  |
| 11     | No pin        | Common      |
| 12     | -Vout         | No pin      |
| 13     | +Vout         | -Vout       |
| 15     | No pin        | +Vout       |
| 23     | -Vin (GND)    | -Vin (GND)  |
| 24     | -Vin (GND)    | -Vin (GND)  |

Remark:

No optional pinning for 5 Vin models. Corresponding parts are with THM 10 series by default.

see [www.tracopower.com/overview/thm10](http://www.tracopower.com/overview/thm10)



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

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- 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;
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- Экспресс доставка в любую точку России;
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- 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.);

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- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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