



- 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 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  $\mu$ 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  
UL 62368-1 IEC 62368-1

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 edition 3.2 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 voltage</li> <li>- Optional models with Remote On/Off 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 single and dual output models)<br>(Only for optional models with adjustable output)<br>(By external trim resistor)<br>See application note: <a href="http://www.tracopower.com/thm10wi-adj">www.tracopower.com/thm10wi-adj</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, resistive 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 max</sub> .  |
| Overvoltage Protection    | 112 - 152% of V <sub>out nom.</sub> (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

|                       |                             |   |
|-----------------------|-----------------------------|---|
| Standards             | - IT / Multimedia Equipment | EN 60950-1<br>EN 62368-1<br>IEC 60950-1<br>IEC 62368-1<br>UL 60950-1<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)<br><a href="http://www.tracopower.com/thm10wi-safety-cert">www.tracopower.com/thm10wi-safety-cert</a> |
|                       | - Certification Documents   |   |
| Energy Source         | - Output, acc. to 62368-1   | ES1   |
| Power Source          | - Output, acc. to 62368-1   | PS3   |
| Pollution Degree      |                             | PD 2  |
| Over Voltage Category |                             | Not mains connected   |

### 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 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/thm10wi-emc-filter">www.tracopower.com/thm10wi-emc-filter</a>  |

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

|                     |  |  |
|---------------------|--|--|
| EMS (Immunity)      | <ul style="list-style-type: none"> <li>- Electrostatic Discharge</li> <li>- RF Electromagnetic Field</li> <li>- EFT (Burst) / Surge</li> <li>- Conducted RF Disturbances</li> <li>- PF Magnetic Field</li> </ul> | EN 60601-1-2 edition 4 (Medical Devices)<br>Air: EN 61000-4-2, $\pm 15$ kV, perf. criteria A<br>Contact: EN 61000-4-2, $\pm 8$ kV, perf. criteria A<br>EN 61000-4-3, 10 V/m, perf. criteria A<br>EN 61000-4-4, $\pm 2$ kV, perf. criteria A<br>EN 61000-4-5, $\pm 2$ kV, perf. criteria A<br>Ext. input component: 5 Vin models: KY 1000 $\mu$ F / 25V    V10P45<br>24 Vin models: KY 470 $\mu$ F / 50 V<br>48 Vin models: KY 330 $\mu$ F / 100 V<br>EN 61000-4-6, 10 Vrms, perf. criteria A<br>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/thm10wi-emc-cert">www.tracopower.com/thm10wi-emc-cert</a>   |

## General Specifications

|                           |  |  |
|---------------------------|--|--|
| Relative Humidity         |  | 95% max. (non condensing)  |
| Temperature Ranges        | <ul style="list-style-type: none"> <li>- Operating Temperature</li> <li>- Approved Ambient Temp.</li> <li>- Case Temperature</li> <li>- Storage Temperature</li> </ul> | -40°C to +90°C<br>60601-1: +50°C max.<br>+105°C max.<br>-55°C to +125°C  |
| Power Derating            | - High Temperature   | 3.33 %/K above 75°C<br>See application note: <a href="http://www.tracopower.com/thm10wi-cc">www.tracopower.com/thm10wi-cc</a>  |
| Cooling System            |  | Natural convection (20 LFM)  |
| Remote Control            | <ul style="list-style-type: none"> <li>- Voltage Controlled Remote (passive = on)</li> <li>- Off Idle Input Current</li> <li>- Remote Pin Input Current</li> </ul>     | 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  |
| Working Voltage (rated)   |  | 250 VAC  |
| Isolation Test Voltage    | <ul style="list-style-type: none"> <li>- Input to Output, 60 s</li> <li>- Input to Output, 1 s</li> </ul>  | 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  | 12 pF typ.<br>17 pF max.   |
| Leakage Current           | - Touch Current  | 2 $\mu$ A max. (240 VAC, 60 Hz)  |
| Reliability               | - Calculated MTBF  | 3'850'000 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               | <ul style="list-style-type: none"> <li>- Vibration</li> <li>- Thermal Shock</li> </ul>   | 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 $\mu$ m)   |
| Pin Surface Plating       |  | Tin (3 - 5 $\mu$ m), matte   |
| Housing Type              |  | Plastic Case   |
| Mounting Type             |  | PCB Mount  |
| Connection Type           |  | THD (Through-Hole Device)  |
| Footprint Type            |  | DIP24  |

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

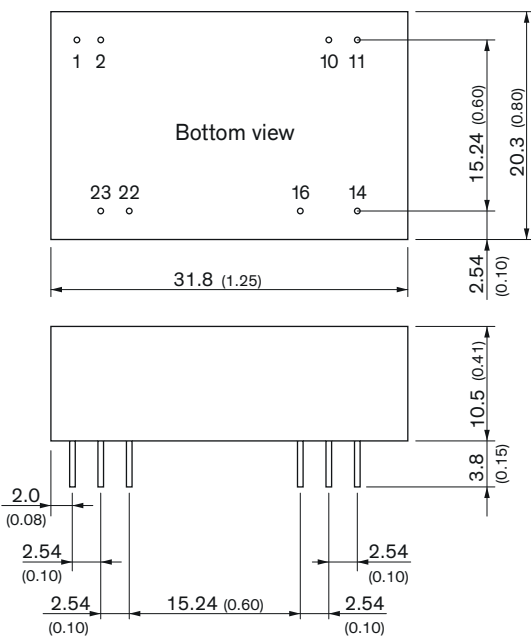
|  |   |
|--|---|
| Soldering Profile                            | Lead-Free Wave Soldering<br>265°C / 10 s max.   |
| Weight                                       | 14 g  |
| Thermal Impedance - Case to Ambient          | 18.0 K/W typ.   |
| Environmental Compliance - REACH Declaration | <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a><br>REACH SVHC list compliant<br>REACH Annex XVII compliant   |
| - RoHS Declaration                           | <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)) |
| - SCIP Reference Number                      | a53cd013-e331-4cc1-ba63-e41c24e4d017  |

### Additional Information

|                            |  |
|----------------------------|--|
| Supporting Documents       | <a href="http://www.tracopower.com/overview/thm10wi">www.tracopower.com/overview/thm10wi</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> |

### Outline Dimensions

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



Dimensions in mm (inch)  
Tolerances  $\pm 0.5$  ( $\pm 0.02$ )  
Pin  $\varnothing 0.6 \pm 0.1$  ( $0.024 \pm 0.004$ )  
Pin pitch tolerances  $\pm 0.25$  ( $\pm 0.01$ )

### 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)     |

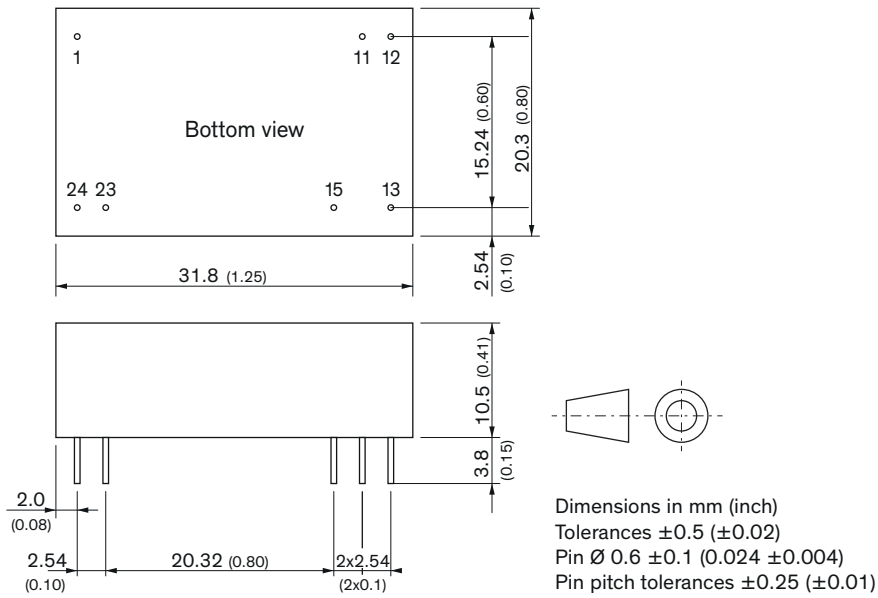
NC: Not connected

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

\*\*If Trim is selected there is no pin on corresponding number

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

### Optional models with alternative 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 alternative 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)

## Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

-  [View THM 10-2412WI on WIN SOURCE](#)
-  [Traco Power Information](#)

## Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management