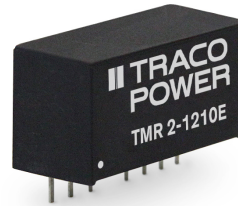


- Wide 2:1 input voltage range
- Compact SIP-8 package
- Cost optimized design
- Temperature range  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- I/O isolation 1000 VDC
- Remote On/Off control
- Fully RoHS compliant
- 3-year product warranty



The TMR 2E series is a family of isolated 2 W DC/DC converter modules with regulated output, featuring wide 2:1 input voltage ranges. The product comes in a compact SIP-8 plastic package with small footprint occupying only 2.0 cm<sup>2</sup> (0.3 square in.) of board space.

An excellent efficiency allows  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  operation temperature. Further features include remote On/Off control and continuous short circuit protection. The compact dimensions and cost optimized design make this converters an ideal solution for applications in communication equipment, instrumentation and industrial electronics.

| Models      |                              |                     |                     |                 |
|-------------|------------------------------|---------------------|---------------------|-----------------|
| Order Code  | Input Voltage Range          | Output Voltage nom. | Output Current max. | Efficiency typ. |
| TMR 2-0510E | 4.5 - 9 VDC<br>(5 VDC nom.)  | 3.3 VDC             | 500 mA              | 70 %            |
| TMR 2-0511E |                              | 5 VDC               | 400 mA              | 73 %            |
| TMR 2-0512E |                              | 12 VDC              | 167 mA              | 75 %            |
| TMR 2-1210E | 9 - 18 VDC<br>(12 VDC nom.)  | 3.3 VDC             | 500 mA              | 73 %            |
| TMR 2-1211E |                              | 5 VDC               | 400 mA              | 77 %            |
| TMR 2-1212E |                              | 12 VDC              | 167 mA              | 80 %            |
| TMR 2-2410E | 18 - 36 VDC<br>(24 VDC nom.) | 3.3 VDC             | 500 mA              | 72 %            |
| TMR 2-2411E |                              | 5 VDC               | 400 mA              | 77 %            |
| TMR 2-2412E |                              | 12 VDC              | 167 mA              | 81 %            |
| TMR 2-4810E | 36 - 75 VDC<br>(48 VDC nom.) | 3.3 VDC             | 500 mA              | 71 %            |
| TMR 2-4811E |                              | 5 VDC               | 400 mA              | 73 %            |
| TMR 2-4812E |                              | 12 VDC              | 167 mA              | 79 %            |

## Input Specifications

|                          |                |  |
|--------------------------|----------------|--|
| Input Current            | - At no load   | 5 Vin models: 40 mA typ.<br>12 Vin models: 20 mA typ.<br>24 Vin models: 10 mA typ.<br>48 Vin models: 8 mA typ.   |
|                          | - At full load | 5 Vin models: 520 mA typ.<br>12 Vin models: 200 mA typ.<br>24 Vin models: 100 mA typ.<br>48 Vin models: 50 mA typ.   |
| Surge Voltage            |                | 5 Vin models: 15 VDC max. (1 s max.)<br>12 Vin models: 25 VDC max. (1 s max.)<br>24 Vin models: 50 VDC max. (1 s max.)<br>48 Vin models: 100 VDC max. (1 s max.)   |
| Start-up Voltage         |                | 5 Vin models: 3.5 VDC min. / 4 VDC typ. / 4.5 VDC max.<br>12 Vin models: 4.5 VDC min. / 7 VDC typ. / 9 VDC max.<br>24 Vin models: 8 VDC min. / 12 VDC typ. / 18 VDC max.<br>48 Vin models: 16 VDC min. / 24 VDC typ. / 36 VDC max. |
| Under Voltage Lockout    |                | 5 Vin models: 3.5 VDC typ. / 4 VDC max.<br>12 Vin models: 6.5 VDC typ. / 8.5 VDC max.<br>24 Vin models: 11 VDC typ. / 17 VDC max.<br>48 Vin models: 22 VDC typ. / 34 VDC max.  |
| Reflected Ripple Current |                | 5 Vin models: 400 mA <sub>p-p</sub> typ.<br>12 Vin models: 300 mA <sub>p-p</sub> typ.<br>24 Vin models: 200 mA <sub>p-p</sub> typ.<br>48 Vin models: 500 mA <sub>p-p</sub> typ.  |
| Recommended Input Fuse   |                | (The need of an external fuse has to be assessed in the final application.)  |
| Input Filter             |                | Internal Capacitor   |

## Output Specifications

|                          |  |   |
|--------------------------|--|---|
| Voltage Set Accuracy     |  | ±2% max.  |
| Regulation               | - Input Variation (V <sub>min</sub> - V <sub>max</sub> ) | 0.5% max.   |
|                          | - Load Variation (25 - 100%)                             | 0.75% max.  |
| Ripple and Noise         | - 20 MHz Bandwidth                                       | 30 mV <sub>p-p</sub> typ.                         |
|                          |  | 50 mV <sub>p-p</sub> max.                         |
| Capacitive Load          | 3.3 V <sub>out</sub> models:                             | 2'200 µF max.                                     |
|                          | 5 V <sub>out</sub> models:                               | 1'000 µF max.                                     |
|                          | 12 V <sub>out</sub> models:                              | 170 µF max.                                       |
| Minimum Load             |  | 25 % of I <sub>out</sub> max.                     |
| Temperature Coefficient  |  | ±0.02 %/K max.                                    |
| Short Circuit Protection |  | Continuous, Automatic recovery                    |
| Transient Response       | - Response Deviation                                     | 5% max. (75% to 100% Load Step)                   |
|                          | - Response Time  | 100 µs typ. / 300 µs max. (75% to 100% Load Step) |

## Safety Specifications

|                  |                             |  |
|------------------|-----------------------------|--|
| Safety Standards | - IT / Multimedia Equipment | Designed for EN 62368-1 (no certification) |
|------------------|-----------------------------|--|

## EMC Specifications

|               |                       |  |
|---------------|-----------------------|--|
| EMI Emissions | - Conducted Emissions | EN 55032 class A (with external filter)<br>FCC Part 15 class A (with external filter)                              |
|               | - Radiated Emissions  | EN 55032 class A (with external filter)<br>FCC Part 15 class A (with external filter)                              |
|               |                       | External filter proposal: <a href="http://www.tracopower.com/overview/tmr2e">www.tracopower.com/overview/tmr2e</a> |

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

## General Specifications

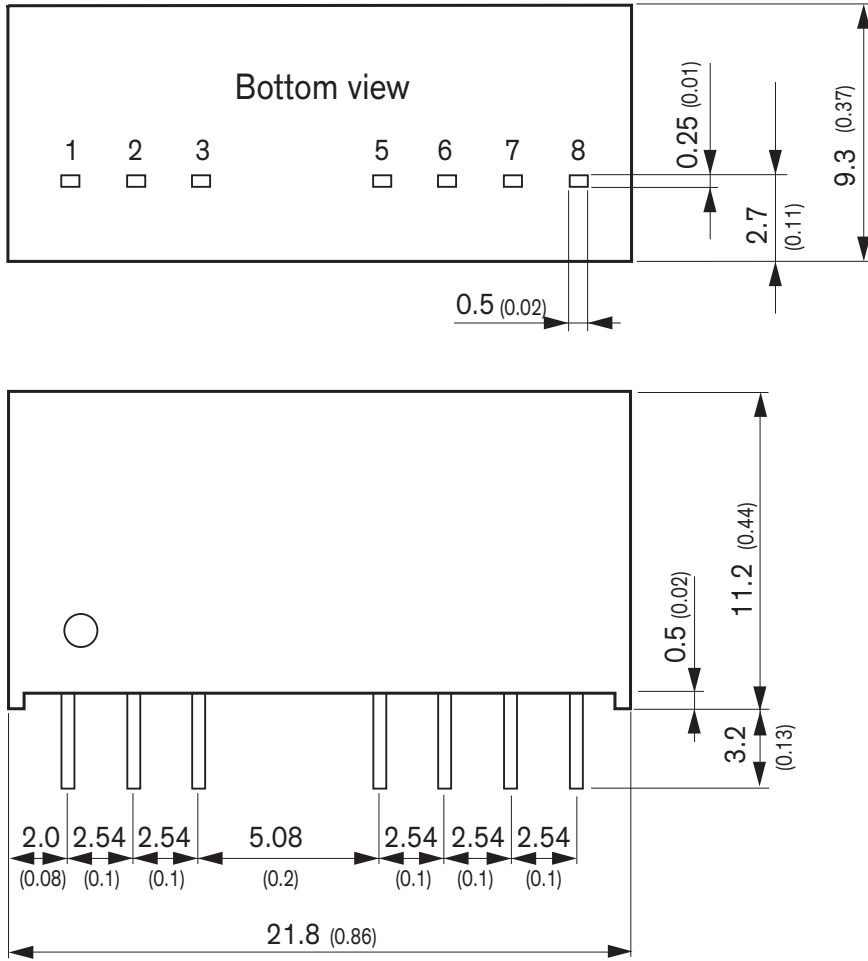
|                          |   |   |
|--------------------------|---|---|
| Relative Humidity        |   | 95% max. (non condensing)   |
| Temperature Ranges       | - Operating Temperature<br>- Case Temperature<br>- Storage Temperature                    | -40°C to +85°C<br>+90°C max.<br>-55°C to +105°C   |
| Power Derating           | - High Temperature  | 2.86 %/K above 65°C<br>See application note: <a href="http://www.tracopower.com/overview/tmr2e">www.tracopower.com/overview/tmr2e</a>   |
| Cooling System           |   | Natural convection (20 LFM)   |
| Remote Control           | - Voltage Controlled Remote<br><br>- Off Idle Input Current<br>- Remote Pin Input Current | On: < 0.6 VDC or open circuit<br>Off: 2.7 to 15 VDC<br>Refers to 'Remote' and '-Vin' Pin<br>0.2 mA max.<br>-0.4 to 1.0 mA   |
| Switching Frequency      |   | 100 - 650 kHz (RCC)<br>300 kHz typ. (RCC)   |
| Insulation System        |   | Functional Insulation   |
| Isolation Test Voltage   | - Input to Output, 60 s<br>- Input to Output, 1 s   | 1'000 VDC<br>1'200 VDC  |
| Isolation Resistance     | - Input to Output, 500 VDC  | 1'000 MΩ min.   |
| Isolation Capacitance    | - Input to Output, 100 kHz, 1 V   | 65 pF typ.<br>120 pF max.   |
| Reliability              | - Calculated MTBF   | 1'000'000 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>   |
| Housing Material         |   | Non-conductive Plastic (UL 94 V-0 rated)  |
| Potting Material         |   | Epoxy (UL 94 V-0 rated)   |
| Pin Material             |   | Nickel-Iron (Alloy 42)  |
| Pin Foundation Plating   |   | Nickel (1 μm min.)  |
| Pin Surface Plating      |   | Tin (3 - 5 μm), matte   |
| Housing Type             |   | Plastic Case  |
| Mounting Type            |   | PCB Mount   |
| Connection Type          |   | THD (Through-Hole Device)   |
| Footprint Type           |   | SIP8  |
| Soldering Profile        |   | 260°C / 10 s max.   |
| Weight                   |   | 4.8 g   |
| 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: 7a<br>(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)<br>11b88fa2-0d4d-4b9e-8438-504c6688a2da |

## Supporting Documents

|  |  |
|--|--|
| Overview Link (for additional Documents) | <a href="http://www.tracopower.com/overview/tmr2e">www.tracopower.com/overview/tmr2e</a> |
|--|--|

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**Outline Dimensions**



| Pinout |            |
|--------|------------|
| Pin    | Function   |
| 1      | -Vin (GND) |
| 2      | +Vin (Vcc) |
| 3      | Remote     |
| 5      | NC         |
| 6      | +Vout      |
| 7      | -Vout      |
| 8      | NC         |

NC: Not connected

Dimensions in mm (inch)  
 Tolerances: ±0.5 (±0.02)  
 Pin pitch Tolerance ±0.25 (±0.01)