DC/DC Railway Converter TMR 6WIR Series, 6 Watt

- Compact SIP-8 metal case
- EN 50155 railway approval
- Ultra wide 4:1 Input: 9–36, 18–75 and 43–160 VDC
- I/O-isolation 3'000 VDC
- Fully regulated outputs
- Operating temperature range –40°C to +80°C
- Short circuit protection and current limitation
- Remote On/Off
- 3-year product warranty

The TMR 6WIR series is a set of 6 Watt DC/DC converters in a SIP-8 metal case. They operate up to 60°C environment temperature at full load and up to 80°C with a 50% load derating. With EN 50155 and UL 60950-1 certification, 3'000 VDC I/O-isolation voltage, external On/Off, current limitation and short circuit protection they cover a wide range of application when space is limited. The input of the converters is designed for a wide voltage range (4:1) and minimum load is not required.

**Models**

<table>
<thead>
<tr>
<th>Order Code</th>
<th>Input Voltage Range</th>
<th>Output 1 Vnom</th>
<th>Imax</th>
<th>Output 2 Vnom</th>
<th>Imax</th>
<th>Efficiency typ.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMR 6-2410WIR</td>
<td>9 - 36 VDC (24 VDC nom.)</td>
<td>3.3 VDC</td>
<td>1'500 mA</td>
<td>3.3 VDC</td>
<td>1'500 mA</td>
<td>81 %</td>
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<tr>
<td>TMR 6-2411WIR</td>
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<td>5 VDC</td>
<td>1'200 mA</td>
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<td>84 %</td>
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<td>TMR 6-2419WIR</td>
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<td>666 mA</td>
<td></td>
<td></td>
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<td>12 VDC</td>
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<td>87 %</td>
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<tr>
<td>TMR 6-2413WIR</td>
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<td>15 VDC</td>
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<td></td>
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<td>+5 VDC</td>
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<td>600 mA</td>
<td>84 %</td>
</tr>
<tr>
<td>TMR 6-2422WIR</td>
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<td>–12 VDC</td>
<td>250 mA</td>
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</tr>
<tr>
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<td>+15 VDC</td>
<td>200 mA</td>
<td>–15 VDC</td>
<td>200 mA</td>
<td>87 %</td>
</tr>
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<td>TMR 6-4810WIR</td>
<td>18 - 75 VDC (48 VDC nom.)</td>
<td>3.3 VDC</td>
<td>1'500 mA</td>
<td>3.3 VDC</td>
<td>1'500 mA</td>
<td>81 %</td>
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<tr>
<td>TMR 6-4811WIR</td>
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<td>5 VDC</td>
<td>1'200 mA</td>
<td></td>
<td></td>
<td>84 %</td>
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<tr>
<td>TMR 6-4819WIR</td>
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<td></td>
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<td>85 %</td>
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<tr>
<td>TMR 6-4812WIR</td>
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<td>12 VDC</td>
<td>500 mA</td>
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<td></td>
<td>87 %</td>
</tr>
<tr>
<td>TMR 6-4813WIR</td>
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<td>15 VDC</td>
<td>400 mA</td>
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<td></td>
<td>87 %</td>
</tr>
<tr>
<td>TMR 6-4815WIR</td>
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<td>24 VDC</td>
<td>250 mA</td>
<td></td>
<td></td>
<td>87 %</td>
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<tr>
<td>TMR 6-4821WIR</td>
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<td>+5 VDC</td>
<td>600 mA</td>
<td>–5 VDC</td>
<td>600 mA</td>
<td>84 %</td>
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<tr>
<td>TMR 6-4822WIR</td>
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<td>+12 VDC</td>
<td>250 mA</td>
<td>–12 VDC</td>
<td>250 mA</td>
<td>87 %</td>
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<tr>
<td>TMR 6-4823WIR</td>
<td></td>
<td>+15 VDC</td>
<td>200 mA</td>
<td>–15 VDC</td>
<td>200 mA</td>
<td>87 %</td>
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<tr>
<td>TMR 6-7210WIR</td>
<td>43 - 160 VDC (110 VDC nom.)</td>
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<td>1'500 mA</td>
<td>3.3 VDC</td>
<td>1'500 mA</td>
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<td>5 VDC</td>
<td>1'200 mA</td>
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<td>83 %</td>
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<tr>
<td>TMR 6-7219WIR</td>
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<td></td>
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<td>85 %</td>
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<td>12 VDC</td>
<td>500 mA</td>
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<td>86 %</td>
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<tr>
<td>TMR 6-7213WIR</td>
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<td>15 VDC</td>
<td>400 mA</td>
<td></td>
<td></td>
<td>86 %</td>
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<tr>
<td>TMR 6-7215WIR</td>
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<td>24 VDC</td>
<td>250 mA</td>
<td></td>
<td></td>
<td>86 %</td>
</tr>
<tr>
<td>TMR 6-7221WIR</td>
<td></td>
<td>+5 VDC</td>
<td>600 mA</td>
<td>–5 VDC</td>
<td>600 mA</td>
<td>83 %</td>
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<tr>
<td>TMR 6-7222WIR</td>
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<td>+12 VDC</td>
<td>250 mA</td>
<td>–12 VDC</td>
<td>250 mA</td>
<td>86 %</td>
</tr>
<tr>
<td>TMR 6-7223WIR</td>
<td></td>
<td>+15 VDC</td>
<td>200 mA</td>
<td>–15 VDC</td>
<td>200 mA</td>
<td>86 %</td>
</tr>
</tbody>
</table>
### Input Specifications

**Input Current**

- At no load
  - 24 Vin models: 6 mA typ.
  - 48 Vin models: 6 mA typ.
  - 110 Vin models: 2 mA typ.

**Surge Voltage**

- 24 Vin models: 50 VDC max. (1 s max.)
- 48 Vin models: 100 VDC max. (1 s max.)
- 110 Vin models: 185 VDC max. (1 s max.)

**Recommended Input Fuse**

- 24 Vin models: 1,250 mA (slow blow)
- 48 Vin models: 630 mA (slow blow)
- 110 Vin models: 315 mA (slow blow)

(The need of an external fuse has to be assessed in the final application.)

### Output Specifications

**Voltage Set Accuracy**

±1% max.

**Regulation**

- Input Variation (Vmin - Vmax)
  - single output models: 0.2% max.
  - dual output models: 0.2% max.
- Load Variation (0 - 100%)
  - single output models: 0.5% max.
  - dual output models: 1% max. (Output 1)
  - 1% max. (Output 2)
- Cross Regulation (25% / 100% asym. load)
  - dual output models: 5% max.

**Ripple and Noise**

- 20 MHz Bandwidth
  - 50 mVp-p typ.
  - 75 mVp-p max.

**Capacitive Load**

- single output
  - 3.3 Vout models: 2'200 µF max.
  - 5 Vout models: 1'100 µF max.
  - 9 Vout models: 680 µF max.
  - 12 Vout models: 470 µF max.
  - 15 Vout models: 470 µF max.
  - 24 Vout models: 180 µF max.
- dual output
  - 12 / -12 Vout models: 330 / 330 µF max.
  - 15 / -15 Vout models: 180 / 180 µF max.

**Minimum Load**

Not required

**Temperature Coefficient**

±0.02 %/K max.

**Start-up Time**

50 ms typ. / 75 ms max.

**Short Circuit Protection**

Continuous, Automatic recovery

**Output Current Limitation**

180% typ. of Iout max.

**Transient Response**

- Response Time
  - 250 µs typ. (25% Load Step)

### Safety Specifications

**Safety Standards**

- IT / Multimedia Equipment
  - EN 62368-1
  - IEC 62368-1
  - UL 62368-1

- Railway Applications
  - EN 50155
  - Certification Documents
  - www.tracopower.com/overview/tmr6wir

**Pollution Degree**

PD 2

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

| EMI Emissions                  | Continuously: 2.5 (1'500 – 55) THD | Conducted Emissions: EN 55011 class A (with external filter)  
| Radiated Emissions             | EN 55011 class A (with external filter)  
| - Conducted Emissions          | EN 55011 class B (with external filter)  
| - Radiated Emissions           | EN 55011 class B (with external filter)  
| - Conducted RF Disturbances    | EN 55011 class A (with external filter)  
| - PF Magnetic Field            | EN 55011 class B (with external filter)  
| External filter proposal:     | www.tracopower.com/overview/tmr6wir  

# General Specifications

| Relative Humidity              | 95% max. (non condensing)  
| Temperature Ranges            | - Operating Temperature: -40°C to +80°C  
| | - Case Temperature: +100°C max.  
| | - Storage Temperature: -55°C to +125°C  
| Power Derating                | 2.5 %/K above 60°C  
| Cooling System                | Natural convection (20 LFM)  
| Remote Control                | - Voltage Controlled Remote: On: 0 to 0.5 VDC or open circuit  
| | Off: 3 to 12 VDC  
| Altitude During Operation     | 5’000 m max.  
| Switching Frequency           | - Input to Output, 60 s: 270 - 330 kHz (PWM) (110 Vin model)  
| | - Input to Case, 60 s: 520 - 640 kHz (PWM) (other input models)  
| Insulation System             | Functional Insulation  
| Isolation Test Voltage        | - Input to Output, 60 s: 3’000 VDC  
| | - Input to Case, 60 s: 1’500 VDC  
| Isolation Resistance          | - Input to Output, 500 VDC: 1’000 MΩ min.  
| Isolation Capacitance         | - Input to Output, 100 kHz, 1 V: 100 pF max.  
| Reliability                   | - Calculated MTBF: 2’950’000 h (MIL-HDBK-217F, ground benign)  
| Environment                   | - Vibration: MIL-STD-810F  
| | - Mechanical Shock: MIL-STD-810F  
| | - Thermal Shock: MIL-STD-810F  
| Housing Material              | Copper  
| Potting Material              | Silicone (UL 94 V-0 rated)  
| Pin Material                  | Copper  
| Pin Foundation Plating        | Nickel (1 – 2 µm)  
| Pin Surface Plating           | Tin (3 – 5 µm), matte  
| Soldering Profile             | 265°C / 10 s max.  
| Connection Type               | THD (Through-Hole Device)  
| Weight                        | 5.9 g  

All specifications valid at nominal voltage, full load and +25°C after warm-up time unless otherwise stated.
Environmental Compliance - REACH Declaration www.tracopower.com/info/reach-declaration.pdf
- REACH SVHC list compliant
- Flammability (EN 45545-2)

Supporting Documents
Overview Link (for additional Documents) www.tracopower.com/overview/tmr6wir

Outline Dimensions

Dimensions in mm (inch)

Tolerances: ±x.x ±0.5 (±0.02)
    x.xx ±0.25 (±0.01)
Pin pitch Tolerance ±0.25 (±0.01)
Pin dimension tolerance ±0.1 (±0.004)

Pinout

<table>
<thead>
<tr>
<th>Pin</th>
<th>Single Output</th>
<th>Dual Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>–Vin (GND)</td>
<td>–Vin (GND)</td>
</tr>
<tr>
<td>2</td>
<td>+Vin (Vcc)</td>
<td>+Vin (Vcc)</td>
</tr>
<tr>
<td>3</td>
<td>Remote</td>
<td>Remote</td>
</tr>
<tr>
<td>6</td>
<td>+Vout</td>
<td>+Vout</td>
</tr>
<tr>
<td>7</td>
<td>–Vout</td>
<td>Common</td>
</tr>
<tr>
<td>8</td>
<td>NC</td>
<td>–Vout</td>
</tr>
<tr>
<td>9, 10</td>
<td>Case</td>
<td>Case</td>
</tr>
</tbody>
</table>

NC: No Connection

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