DC/DC Railway Converter

TMR 3WIR Series, 3 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 +90°C
- Short circuit protection and current limitation
- Remote On/Off
- 3-year product warranty

The TMR 3WIR series is a set of 3 Watt DC/DC converters in a SIP-8 metal case. They operate up to 78°C environment temperature at full load and up to 90°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.

<table>
<thead>
<tr>
<th>Models</th>
<th>Input Voltage Range</th>
<th>Output 1</th>
<th>Output 2</th>
<th>Efficiency typ.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vnom</td>
<td>Imax</td>
<td>Vnom</td>
<td>Imax</td>
</tr>
<tr>
<td>TMR 3-2410WIR</td>
<td>3.3 VDC</td>
<td>700 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TMR 3-2411WIR</td>
<td>5 VDC</td>
<td>600 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TMR 3-2419WIR</td>
<td>9 VDC</td>
<td>333 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TMR 3-2412WIR</td>
<td>12 VDC</td>
<td>250 mA</td>
<td></td>
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</tr>
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<td>24 VDC</td>
<td>125 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TMR 3-2421WIR</td>
<td>+5 VDC</td>
<td>300 mA</td>
<td>–5 VDC</td>
<td>300 mA</td>
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<tr>
<td>TMR 3-2422WIR</td>
<td>+12 VDC</td>
<td>125 mA</td>
<td>–12 VDC</td>
<td>125 mA</td>
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<tr>
<td>TMR 3-2423WIR</td>
<td>+15 VDC</td>
<td>100 mA</td>
<td>–15 VDC</td>
<td>100 mA</td>
</tr>
<tr>
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<td>+15 VDC</td>
<td>100 mA</td>
<td>–15 VDC</td>
<td>100 mA</td>
</tr>
<tr>
<td>TMR 3-7210WIR</td>
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<tr>
<td>TMR 3-7215WIR</td>
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<td>125 mA</td>
<td></td>
<td></td>
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<tr>
<td>TMR 3-7221WIR</td>
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<td>125 mA</td>
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<tr>
<td>TMR 3-7223WIR</td>
<td>+15 VDC</td>
<td>100 mA</td>
<td>–15 VDC</td>
<td>100 mA</td>
</tr>
</tbody>
</table>
# Input Specifications

**Input Current**
- At no load: 24 Vin models: 4 mA typ.
- 48 Vin models: 4 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: 800 mA (slow blow)
- 48 Vin models: 500 mA (slow blow)
- 110 Vin models: 160 mA (slow blow)

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

**Input Filter**
- Internal Capacitor

# Output Specifications

**Voltage Set Accuracy**
\[ \pm 1\% \text{ max.} \]

**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. (w/ 1 µF)
  - 75 mVp-p max. (w/ 1 µF)

**Capacitive Load**
- Single output
  - 3.3 Vout models: 1'100 µF max.
  - 5 Vout models: 550 µF max.
  - 9 Vout models: 340 µF max.
  - 12 Vout models: 240 µF max.
  - 15 Vout models: 240 µF max.
  - 24 Vout models: 90 µF max.
- Dual output
  - 12 / -12 Vout models: 170 / 170 µF max.
  - 15 / -15 Vout models: 90 / 90 µF max.

**Minimum Load**
- Not required

**Temperature Coefficient**
- ±0.02 %/K max.

**Start-up Time**
- 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/tmr3wir

**Pollution Degree**
- PD 2

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

- **EMI Emissions**  
  - Conducted Emissions: EN 55011 class A (with external filter)
  - Conducted Emissions: EN 55011 class B (with external filter)
  - Conducted Emissions: EN 55032 class A (with external filter)
  - Conducted Emissions: EN 55032 class B (with external filter)

- **Radiated Emissions**  
  - Radiated Emissions: EN 55011 class A (with external filter)
  - Radiated Emissions: EN 55011 class B (with external filter)
  - Radiated Emissions: EN 55032 class A (with external filter)
  - Radiated Emissions: EN 55032 class B (with external filter)


- **EMS Immunity**  
  - Electrostatic Discharge  
    - Air: EN 61000-4-2, ±8 kV, perf. criteria A
    - Contact: EN 61000-4-2, ±6 kV, perf. criteria A
  - RF Electromagnetic Field  
    - Ext. input component: EN 61000-4-3, 20 V/m, perf. criteria A
  - EFT (Burst) / Surge  
    - Ext. input component: EN 61000-4-4, ±2 kV, perf. criteria A
  - Conducted RF Disturbances  
    - Continuous: EN 61000-4-6, 10 Vrms, perf. criteria A
  - PF Magnetic Field  
    - Continuous: EN 61000-4-8, 100 A/m, perf. criteria A

- **Power Derating**  
  - High Temperature: 4.55 %/K above 78°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
    - Refers to 'Remote' and '-Vin' Pin
  - Current Controlled Remote  
    - On: open circuit
    - Off: 2 to 4 mA current
  - Off Idle Input Current  
    - 2.5 mA typ.

- **Altitude During Operation**  
  - 5'000 m max.

- **Switching Frequency**  
  - 270 - 330 kHz (PWM) (110 Vin model)
  - 360 - 440 kHz (PWM) (other input models)

- **Isolation Test Voltage**  
  - Input to Output, 60 s: 3'000 VDC
  - Input to Case, 60 s: 1'500 VDC
  - Output 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: 5'535'000 h (MIL-HDBK-217F, ground benign)

- **Washing Process**  

- **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]

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

[www.tracopower.com](http://www.tracopower.com)  
March 10, 2022
**Pin Material**
Copper

**Pin Foundation Plating**
Nickel (1 - 2 µm)

**Pin Surface Plating**
Tin (3 - 5 µm), matte

**Housing Type**
Metal Case

**Mounting Type**
PCB Mount

**Connection Type**
THD (Through-Hole Device)

**Footprint Type**
SIP8

**Soldering Profile**
265°C / 10 s max.

**Weight**
5.9 g

**Environmental Compliance**
- REACH Declaration
  - REACH SVHC list compliant
  - REACH Annex XVII compliant
  - www.tracopower.com/info/reach-declaration.pdf
- RoHS Declaration
  - RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).
  - The SCIP number is provided on request.
  - www.tracopower.com/info/rohs-declaration.pdf
- Flammability (EN 45545-2)

**Supporting Documents**
Overview Link (for additional Documents)
  - www.tracopower.com/overview/tmr3wir

**Outline Dimensions**

**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

**Dimensions in mm (inch)**
- 11.2 (0.44)
- 4.1 (0.16)
- 21.8 (0.86)
- 7.62 (0.3)
- 2.0 (0.08)
- 2 x 2.54 (2 x 0.1)
- case pins *
- 2.5 (0.1)
- 3.6 (0.14)
- 0.6 (0.02)
- 3 x 6 (0.13 x 0.24)
- 0.25 (0.01)
- 1.0 (0.04)
- 0.5 (0.02)
- 2.5 x 2.54 (2 x 0.1)

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

Specifications can be changed without notice.

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