DC/DC Converter TMR 2WIN Series, 2 Watt

- Ultra-wide 4:1 input range
- Compact SIP-8 package
- Temperature range –40 to +90°C (up to +75°C at full load)
- High efficiency of 82%
- Excellent load and line regulation
- Continuous short-circuit protection
- Overload protection
- I/O isolation 1500 VDC
- Remote On/Off control
- 3-year product warranty

The TMR 2WIN series is a family of isolated 2 W DC/DC converter modules with accurately regulated output voltages and ultra-wide 4:1 input voltage ranges. They require no minimum load and are protected against overload and short circuit. An excellent efficiency along with the use of high grade components allows a compact construction in SIP-8 package; even the converters can reliably operate in an ambient temperature of –40°C to +75°C at full load and up to 90°C with 50% power derating. Typical applications for these converters are distributed power architectures in communication, instrumentation and industrial electronics, everywhere where space on the PCB is critical.

### Models

<table>
<thead>
<tr>
<th>Order Code</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>I_{max}</td>
<td>Vnom</td>
<td>I_{max}</td>
</tr>
</tbody>
</table>
| TMR 2-1210WIN | 4.5 - 18 VDC
(12 VDC nom) | 3.3 VDC | 500 mA | 3.3 VDC | 500 mA | 75 % |
| TMR 2-1211WIN | 5 VDC | 400 mA | -5 VDC | 200 mA | 80 % |
| TMR 2-1212WIN | 12 VDC | 167 mA | -12 VDC | 83 mA | 82 % |
| TMR 2-1213WIN | 15 VDC | 134 mA | -15 VDC | 67 mA | 82 % |
| TMR 2-1221WIN | +5 VDC | 200 mA | -5 VDC | 200 mA | 80 % |
| TMR 2-1222WIN | +12 VDC | 83 mA | -12 VDC | 83 mA | 82 % |
| TMR 2-1223WIN | +15 VDC | 67 mA | -15 VDC | 67 mA | 82 % |
| TMR 2-2410WIN | 9 - 36 VDC
(24 VDC nom) | 3.3 VDC | 500 mA | 3.3 VDC | 500 mA | 75 % |
| TMR 2-2411WIN | 5 VDC | 400 mA | -5 VDC | 200 mA | 80 % |
| TMR 2-2412WIN | 12 VDC | 167 mA | -12 VDC | 83 mA | 82 % |
| TMR 2-2413WIN | 15 VDC | 134 mA | -15 VDC | 67 mA | 82 % |
| TMR 2-2421WIN | +5 VDC | 200 mA | -5 VDC | 200 mA | 80 % |
| TMR 2-2422WIN | +12 VDC | 83 mA | -12 VDC | 83 mA | 82 % |
| TMR 2-2423WIN | +15 VDC | 67 mA | -15 VDC | 67 mA | 82 % |
| TMR 2-4810WIN | 18 - 75 VDC
(48 VDC nom) | 3.3 VDC | 500 mA | 3.3 VDC | 500 mA | 74 % |
| TMR 2-4811WIN | 5 VDC | 400 mA | -5 VDC | 200 mA | 80 % |
| TMR 2-4812WIN | 12 VDC | 167 mA | -12 VDC | 83 mA | 82 % |
| TMR 2-4813WIN | 15 VDC | 134 mA | -15 VDC | 67 mA | 82 % |
| TMR 2-4821WIN | +5 VDC | 200 mA | -5 VDC | 200 mA | 80 % |
| TMR 2-4822WIN | +12 VDC | 83 mA | -12 VDC | 83 mA | 82 % |
| TMR 2-4823WIN | +15 VDC | 67 mA | -15 VDC | 67 mA | 82 % |
Input Current

- At no load
  - 12 Vin models: 60 mA typ.
  - 24 Vin models: 30 mA typ.
  - 48 Vin models: 20 mA typ.

- At full load
  - 12 Vin models: 200 mA typ.
  - 24 Vin models: 100 mA typ.
  - 48 Vin models: 50 mA typ.

Surge Voltage

- 12 Vin models: 25 VDC max. (1 s max.)
- 24 Vin models: 50 VDC max. (1 s max.)
- 48 Vin models: 100 VDC max. (1 s max.)

Start-up Voltage

- 12 Vin models: 4 VDC typ.
- 24 Vin models: 6 VDC typ.
- 48 Vin models: 12 VDC typ.

Under Voltage Lockout

- 12 Vin models: 4 VDC max.
- 24 Vin models: 8 VDC max.
- 48 Vin models: 16 VDC max.

Recommended Input Fuse

- 12 Vin models: 1'000 mA (slow blow)
- 24 Vin models: 500 mA (slow blow)
- 48 Vin models: 250 mA (slow blow)

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

Input Filter

Internal Capacitor

Short Circuit Input Power

1.5 W max.

Output Specifications

Voltage Set Accuracy

±2% max.

Regulation

- Input Variation (Vmin - Vmax)
  - single output models: 0.5% max.
  - dual output models: 0.5% max.
- Load Variation (0 - 100%)
  - single output models: 1% max.
  - dual output models: 1% max. (Output 1)
  - dual output models: 1% max. (Output 2)
- Voltage Balance (symmetrical load)
  - dual output models: 2% max.

Ripple and Noise

- 20 MHz Bandwidth
  - 100 mVp-p max.

Capacitive Load

- single output
  - 3.3 Vout models: 1'000 µF max.
  - 5 Vout models: 1'000 µF max.
  - 12 Vout models: 170 µF max.
  - 15 Vout models: 110 µF max.
- dual output
  - 5 / -5 Vout models: 470 / 470 µF max.
  - 12 / -12 Vout models: 100 / 100 µF max.
  - 15 / -15 Vout models: 47 / 47 µF max.

Minimum Load

Not required

Temperature Coefficient

±0.02 %/K max.

Short Circuit Protection

Automatic recovery

Overload Protection

Foldback Mode

Output Current Limitation

110% min. of Iout max.

140% typ. of Iout max.

Transient Response

- Response Deviation
  - 5% max. (75% to 100% Load Step)
- Response Time
  - 300 µs typ. / 500 µs max. (75% to 100% Load Step)

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

<table>
<thead>
<tr>
<th>Safety Standards</th>
<th>CSA-C22.2, No 60950-1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EN 60950-1</td>
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<tr>
<td></td>
<td>IEC 60950-1</td>
</tr>
<tr>
<td></td>
<td>UL 60950-1</td>
</tr>
</tbody>
</table>

- Certification Documents
  - www.tracopower.com/overview/tmr2win

### General Specifications

#### Relative Humidity
95% max. (non-condensing)

#### Temperature Ranges
- **Operating Temperature** -40°C to +90°C
- **Case Temperature** +105°C max.
- **Storage Temperature** −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**
  - On: open circuit
  - Off: 6 to 9 VDC (via 1 kΩm resistor)
  - Refers to ‘Remote’ and ‘Vin’ Pin
- **Current Controlled Remote**
  - On: open circuit
  - Off: 2 to 4 mA current
  - 3 mA max.

#### Altitude During Operation
4'000 m max.

#### Switching Frequency
300 kHz typ. (PFM)

#### Insulation System
Functional Insulation

#### Isolation Test Voltage
- **Input to Output, 60 s** 1'500 VDC
- **Input to Output, 1 s** 1'800 VDC

#### Isolation Resistance
- **Input to Output, 500 VDC** 1'000 MΩ min.

#### Isolation Capacitance
- **Input to Output, 100 kHz, 1 V**
  - 250 pF typ.
  - 500 pF max.

#### Reliability
- **Calculated MTBF**
  - 3'430'000 h (MIL-HDBK-217F, ground benign)

#### Housing Material
Non-conductive Plastic (UL94 V-0 rated)

#### Potting Material
Silicone (UL94 V-0 rated)

#### Pin Material
Nickel-Iron (Alloy 42)

#### Pin Foundation Plating
Nickel (1.5 μm min.)
Copper (1 - 1.5 μm)

#### Pin Surface Plating
Tin (3 – 5 μm), matte

#### Soldering Profile
Wave Soldering
260°C / 10 s max.

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

#### Weight
4.66 g

#### Environmental Compliance
- **Reach**
  - www.tracopower.com/info/reach-declaration.pdf
- **RoHS**
  - www.tracopower.com/info/rohs-declaration.pdf

### Supporting Documents

| Overview Link (for additional Documents) | www.tracopower.com/overview/tmr2win |

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

Dimensions in mm (inch)
Tolerances
±0.5 (±0.02)
Pin pitch tolerance   ±0.25 (±0.01)
bottom view
2.5 (0.10)
0.5  (0.02)
3.2
2 x 2.54
(2 x 0.1)
(0.86)
(0.13)
9.3  (0.37)
1 2 3 5 6 7 8

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>5</td>
<td>NC</td>
<td>NC</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>
</tbody>
</table>

NC: No Connection

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