DC/DC Converter

- Wide 2:1 input voltage range
- Fully regulated output voltage
- Compact SIP-8 package
- 3000 VDC I/O isolation (functional insulation)
- Small footprint
- Temperature range −40° to +85°C
- High efficiency up to 85%
- Short-circuit protection
- Remote On/Off control
- 3-year product warranty

The TMR 3HI series is a new family of isolated 3 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 a small footprint occupying only 2.0 cm² (0.3 square inch) of board space. An excellent efficiency allows −40° to +85°C operation temperatures. Further features include remote On/Off control and continuous short circuit protection. The compact dimensions of these converters make them an ideal solution for many space critical applications in communication equipment, instrumentation and industrial electronics.

### Models

<table>
<thead>
<tr>
<th>Order Code</th>
<th>Input Voltage Range</th>
<th>Output 1</th>
<th>Output 2</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vnom</td>
<td>Imax</td>
<td>Vnom</td>
<td>Imax</td>
</tr>
<tr>
<td>TMR 3-0510HI</td>
<td>3.3 VDC</td>
<td>700 mA</td>
<td>−5 VDC</td>
<td>300 mA</td>
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<tr>
<td>TMR 3-0511HI</td>
<td>5 VDC</td>
<td>600 mA</td>
<td>−5 VDC</td>
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</tr>
<tr>
<td>TMR 3-0512HI</td>
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<td>250 mA</td>
<td>−12 VDC</td>
<td>125 mA</td>
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<tr>
<td>TMR 3-0513HI</td>
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<td>200 mA</td>
<td>−12 VDC</td>
<td>125 mA</td>
</tr>
<tr>
<td>TMR 3-0521HI</td>
<td>+5 VDC</td>
<td>300 mA</td>
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<tr>
<td>TMR 3-0522HI</td>
<td>+12 VDC</td>
<td>125 mA</td>
<td>−12 VDC</td>
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<tr>
<td>TMR 3-0523HI</td>
<td>+15 VDC</td>
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<td>100 mA</td>
</tr>
<tr>
<td>TMR 3-1210HI</td>
<td>3.3 VDC</td>
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<td>125 mA</td>
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<tr>
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<tr>
<td>TMR 3-1222HI</td>
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</tr>
<tr>
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<td>−5 VDC</td>
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<tr>
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</tr>
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<td>TMR 3-2422HI</td>
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</tr>
<tr>
<td>TMR 3-2423HI</td>
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<tr>
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<td>125 mA</td>
<td>−5 VDC</td>
<td>300 mA</td>
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<tr>
<td>TMR 3-4823HI</td>
<td>+15 VDC</td>
<td>100 mA</td>
<td>−5 VDC</td>
<td>300 mA</td>
</tr>
</tbody>
</table>

www.tracopower.com
## Input Specifications

### Input Current
- At no load
  - 5 Vin models: 45 mA typ. (3.3 Vout model)
  - 45 mA typ. (5 Vout model)
  - 55 mA typ. (12 Vout model)
  - 55 mA typ. (5 Vout model)
  - 60 mA typ. (12 Vout model)
- 12 Vin models: 25 mA typ. (3.3 Vout model)
  - 25 mA typ. (5 Vout model)
  - 30 mA typ. (12 Vout model)
  - 30 mA typ. (15 Vout model)
  - 30 mA typ. (5 Vout model)
- 24 Vin models: 16 mA typ. (3.3 Vout model)
  - 15 mA typ. (5 Vout model)
  - 18 mA typ. (12 Vout model)
  - 15 mA typ. (12 Vout model)
- 48 Vin models: 10 mA typ. (3.3 Vout model)
  - 10 mA typ. (5 Vout model)
  - 12 mA typ. (12 Vout model)
  - 15 mA typ. (12 Vout model)

- At full load
  - 5 Vin models: 810 mA max.
  - 12 Vin models: 330 mA max.
  - 24 Vin models: 160 mA max.
  - 48 Vin models: 85 mA max.

### Surge Voltage
- 5 Vin models: 15 VDC max. (100 ms max.)
- 12 Vin models: 36 VDC max. (100 ms max.)
- 24 Vin models: 50 VDC max. (100 ms max.)
- 48 Vin models: 100 VDC max. (100 ms max.)

### Recommended Input Fuse
- 5 Vin models: 2000 mA (slow blow)
- 12 Vin models: 1600 mA (slow blow)
- 24 Vin models: 1000 mA (slow blow)
- 48 Vin models: 1000 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
- ±1% max.

### Regulation
- Input Variation (Vmin - Vmax)
  - single output models: 0.2% max.
  - dual output models: 0.2% max.
- Load Variation (5 - 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 max.

All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.
### Capacitive Load
- Single output: 3.3 Vout: 3'300 µF max.
- 5 Vout: 1'680 µF max.
- 12 Vout: 820 µF max.
- 15 Vout: 680 µF max.
- Dual output: 5 / -5 Vout: 1'000 / 1'000 µF max.
- 12 / -12 Vout: 470 / 470 µF max.

### Minimum Load
- Not required

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

### Start-up Time
- 30 ms typ.

### Short Circuit Protection
- Continuous, Automatic recovery

### Transient Response
- Response Time 500 µs typ. (25% Load Step)

### Safety Specifications

#### Safety Standards
- IT / Multimedia Equipment: EN 60950-1
- EN 62368-1
- IEC 60950-1
- IEC 62368-1
- UL 60950-1
- UL 62368-1
- Certification Documents: [www.tracopower.com/overview/tmr3hi](www.tracopower.com/overview/tmr3hi)

### EMC Specifications

#### EMI Emissions
- Conducted 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, ±1 kV, perf. criteria A
- RF Electromagnetic Field: EN 61000-4-3, 10 V/m, perf. criteria A
- EFT (Burst) / Surge: EN 61000-4-4, ±2 kV, perf. criteria A
- Ext. input component: Nippon chemi-con KY series, 220 µF / 100 V
- Conducted RF Disturbances: EN 61000-4-6, 10 Vrms, perf. criteria A
- PF Magnetic Field: EN 61000-4-8, 100 A/m, perf. criteria A

### General Specifications

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

#### Temperature Ranges
- Operating Temperature: −40°C to +85°C
- Case Temperature: +100°C max.
- Storage Temperature: −55°C to +125°C

#### Power Derating
- High Temperature: 3.3 %/K above 70°C

#### Cooling System
- Natural convection (20 LFM)

#### Remote Control
- Current Controlled Remote: Off: 2 to 4 mA current (internal 1 kΩ resistor)
- Off Idle Input Current: 2.5 mA max.

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

#### Switching Frequency
- 100 kHz min. (RCC)

#### Insulation System
- Functional Insulation

#### Isolation Test Voltage
- Input to Output, 60 s: 3'000 VDC

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

#### Isolation Capacitance
- Input to Output, 100 kHz, 1 V: 40 pF max.

### Reliability
- Calculated MTBF: 4'870'000 h (MIL-HDBK-217F, ground benign)

All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.
<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Washing Process</td>
<td>Allowed (hermetical product)</td>
</tr>
<tr>
<td>Environment</td>
<td>- Vibration</td>
</tr>
<tr>
<td></td>
<td>- Thermal Shock</td>
</tr>
<tr>
<td></td>
<td>MIL-STD-810F</td>
</tr>
<tr>
<td></td>
<td>MIL-STD-810F</td>
</tr>
<tr>
<td>Housing Material</td>
<td>Non-conductive Plastic (UL 94 V-0 rated)</td>
</tr>
<tr>
<td>Potting Material</td>
<td>Silicone (UL 94 V-0 rated)</td>
</tr>
<tr>
<td>Pin Material</td>
<td>Copper</td>
</tr>
<tr>
<td>Pin Foundation Plating</td>
<td>Nickel (2 - 3 µm)</td>
</tr>
<tr>
<td>Pin Surface Plating</td>
<td>Tin (3 - 5 µm), matte</td>
</tr>
<tr>
<td>Housing Type</td>
<td>Plastic Case</td>
</tr>
<tr>
<td>Mounting Type</td>
<td>PCB Mount</td>
</tr>
<tr>
<td>Connection Type</td>
<td>THD (Through-Hole Device)</td>
</tr>
<tr>
<td>Footprint Type</td>
<td>SIP8</td>
</tr>
<tr>
<td>Weight</td>
<td>4.8 g</td>
</tr>
</tbody>
</table>

Environmental Compliance
- REACH Declaration
  www.tracopower.com/info/reach-declaration.pdf
  REACH SVHC list compliant
  REACH Annex XVII compliant
  www.tracopower.com/info/rohs-declaration.pdf
  Exemptions: 7a, 7c-1 (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.)

Supporting Documents
Overview Link (for additional Documents)
www.tracopower.com/overview/tmr3hi

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

NC: No Connection

Dimensions in mm (inch)
Tolerances: x.x ±0.5 (±0.02)
          x.xx ±0.25 (±0.01)
Pin dimension tolerance ±0.1 (±0.004)