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# TRACO POWER

## DC/DC Converter

## TMR 6 Series, 6 Watt

- **Ultra-compact SIP-8 package**
- **Wide 2:1 input voltage range**
- **Continuous short-circuit protection**
- **Temperature range –40° to +78°C**
- **High efficiency up to 86%**
- **I/O isolation 1600 VDC**
- **Remote On/Off control**
- **3-year product warranty**




UL 62368-1 IEC 62368-1

The TMR-6 series is a new family of isolated 6W DC/DC converter modules with regulated output, featuring wide 2:1 input voltage ranges. The product comes in a ultra-compact SIP-8 plastic package with a small footprint occupying only 2.0 cm² of board space. Further features include remote On/Off control and continuous short circuit protection. The very compact dimensions of these converters make them an ideal solution for space critical applications.

## Models

| Order Code | Input Voltage Range | Output 1 | | Output 2 | | Efficiency |
|---|---|---|---|---|---|---|
| | | Vnom | Imax | Vnom | Imax | typ. |
| **TMR 6-0510** | 4.5 - 9 VDC (5 VDC nom.) | 3.3 VDC | 1'300 mA | | | 77 % |
| **TMR 6-0511** | | 5 VDC | 1'200 mA | | | 81 % |
| **TMR 6-0519** | | 9 VDC | 666 mA | | | 83 % |
| **TMR 6-0512** | | 12 VDC | 500 mA | | | 84 % |
| **TMR 6-0513** | | 15 VDC | 400 mA | | | 84 % |
| **TMR 6-0515** | | 24 VDC | 250 mA | | | 84 % |
| **TMR 6-0521** | | +5 VDC | 600 mA | –5 VDC | 600 mA | 81 % |
| **TMR 6-0522** | | +12 VDC | 250 mA | –12 VDC | 250 mA | 84 % |
| **TMR 6-0523** | | +15 VDC | 200 mA | –15 VDC | 200 mA | 84 % |
| **TMR 6-1210** | 9 - 18 VDC (12 VDC nom.) | 3.3 VDC | 1'300 mA | | | 78 % |
| **TMR 6-1211** | | 5 VDC | 1'200 mA | | | 83 % |
| **TMR 6-1219** | | 9 VDC | 666 mA | | | 85 % |
| **TMR 6-1212** | | 12 VDC | 500 mA | | | 85 % |
| **TMR 6-1213** | | 15 VDC | 400 mA | | | 85 % |
| **TMR 6-1215** | | 24 VDC | 250 mA | | | 84 % |
| **TMR 6-1221** | | +5 VDC | 600 mA | –5 VDC | 600 mA | 82 % |
| **TMR 6-1222** | | +12 VDC | 250 mA | –12 VDC | 250 mA | 84 % |
| **TMR 6-1223** | | +15 VDC | 200 mA | –15 VDC | 200 mA | 85 % |
| **TMR 6-2410** | 18 - 36 VDC (24 VDC nom.) | 3.3 VDC | 1'300 mA | | | 78 % |
| **TMR 6-2411** | | 5 VDC | 1'200 mA | | | 83 % |
| **TMR 6-2419** | | 9 VDC | 666 mA | | | 85 % |
| **TMR 6-2412** | | 12 VDC | 500 mA | | | 86 % |
| **TMR 6-2413** | | 15 VDC | 400 mA | | | 86 % |
| **TMR 6-2415** | | 24 VDC | 250 mA | | | 85 % |
| **TMR 6-2421** | | +5 VDC | 600 mA | –5 VDC | 600 mA | 82 % |
| **TMR 6-2422** | | +12 VDC | 250 mA | –12 VDC | 250 mA | 85 % |
| **TMR 6-2423** | | +15 VDC | 200 mA | –15 VDC | 200 mA | 85 % |
| **TMR 6-4810** | 36 - 75 VDC (48 VDC nom.) | 3.3 VDC | 1'300 mA | | | 78 % |
| **TMR 6-4811** | | 5 VDC | 1'200 mA | | | 82 % |
| **TMR 6-4819** | | 9 VDC | 666 mA | | | 84 % |
| **TMR 6-4812** | | 12 VDC | 500 mA | | | 85 % |
| **TMR 6-4813** | | 15 VDC | 400 mA | | | 86 % |
| **TMR 6-4815** | | 24 VDC | 250 mA | | | 84 % |
| **TMR 6-4821** | | +5 VDC | 600 mA | –5 VDC | 600 mA | 82 % |
| **TMR 6-4822** | | +12 VDC | 250 mA | –12 VDC | 250 mA | 84 % |
| **TMR 6-4823** | | +15 VDC | 200 mA | –15 VDC | 200 mA | 85 % |

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## Input Specifications

| | | | |
|---|---|---|---|
| Input Current | - At no load | 5 Vin models: | 105 mA typ. |
| | | 12 Vin models: | 55 mA typ. |
| | | 24 Vin models: | 28 mA typ. |
| | | 48 Vin models: | 14 mA typ. |
| Surge Voltage | | 5 Vin models: | 15 VDC max. (1 s max.) |
| | | 12 Vin models: | 36 VDC max. (1 s max.) |
| | | 24 Vin models: | 50 VDC max. (1 s max.) |
| | | 48 Vin models: | 100 VDC max. (1 s max.) |
| Under Voltage Lockout | | 5 Vin models: | 2 VDC min. / 3.5 VDC typ. / 4 VDC max. |
| | | 12 Vin models: | 5 VDC min. / 7 VDC typ. / 8 VDC max. |
| | | 24 Vin models: | 12 VDC min. / 15 VDC typ. / 17 VDC max. |
| | | 48 Vin models: | 26 VDC min. / 33 VDC typ. / 35 VDC max. |
| Recommended Input Fuse | | 5 Vin models: | 3'000 mA (slow blow) |
| | | 12 Vin models: | 1'600 mA (slow blow) |
| | | 24 Vin models: | 1'000 mA (slow blow) |
| | | 48 Vin models: | 500 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 (0 - 100%) | single output models: | 1% 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. |
| Capacitive Load | - single output | 3.3 Vout models: | 6'600 µF max. |
| | | 5 Vout models: | 3'300 µF max. |
| | | 9 Vout models: | 2'000 µF max. |
| | | 12 Vout models: | 1'600 µF max. |
| | | 15 Vout models: | 1'400 µF max. |
| | | 24 Vout models: | 680 µF max. |
| | - dual output | 5 / -5 Vout models: | 2'000 / 2'000 µF max. |
| | | 12 / -12 Vout models: | 900 / 900 µF max. |
| | | 15 / -15 Vout models: | 600 / 600 µF max. |
| Minimum Load | | | Not required |
| Temperature Coefficient | | | ±0.02 %/K max. |
| Start-up Time | | | 5 ms typ. / 10 ms max. |
| Short Circuit Protection | | | Continuous, Automatic recovery |
| Transient Response | - Response Time | | 500 µs typ. (25% Load Step) |

## Safety Specifications

| | | |
|---|---|---|
| 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/tmr6-safety-cert/ |
| Energy Source | - Output, acc. to 62368-1 | ES1 |
| Power Source | - Output, acc. to 62368-1 | PS1 |

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

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| | | | |
|---|---|---|---|
| Pollution Degree | | | PD 2 |
| Over Voltage Category | | | Not mains connected |

## EMC Specifications

| | | | |
|---|---|---|---|
| EMI (Emissions) | - Conducted Emissions | | EN 55032 class A (with external filter) |
| | | | EN 55032 class B (with external filter) |
| | - Radiated Emissions | | EN 55032 class A (with external filter) |
| | | | EN 55032 class B (with external filter) |
| | | External filter proposal: | www.tracopower.com/tmr6-emc-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 | | EN 61000-4-3, 10 V/m, perf. criteria A |
| | - EFT (Burst) / Surge | | EN 61000-4-4, ±2 kV, perf. criteria A |
| | | | EN 61000-4-5, ±1 kV, perf. criteria A |
| | | Ext. input component: | 5 Vin models: Nippon chemi-con KY 330 µF<br>Other models: Nippon chemi-con KY 220 µF |
| | - Conducted RF Disturbances | | EN 61000-4-6, 10 Vrms, perf. criteria A |
| | - PF Magnetic Field | Continuous: | 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 +78°C |
| | - Case Temperature | | +105°C max. |
| | - Storage Temperature | | –55°C to +125°C |
| Power Derating | - High Temperature | | Depending on model |
| | | See application note: | www.tracopower.com/tmr6-cc/ |
| Cooling System | | | Natural convection (20 LFM) |
| Remote Control | - Current Controlled Remote (passive = on) | | On: open circuit<br>Off: 2 to 4 mA current (internal 1 kΩ resistor)<br>Refers to 'Remote' and '-Vin' Pin |
| | | External circuit proposal: | www.tracopower.com/info/current-remote.pdf |
| | - Off Idle Input Current | | 2.5 mA max. |
| | | See application note: | www.tracopower.com/tmr6-remote/ |
| Altitude During Operation | | | 5'000 m max. |
| Regulator Topology | | | Flyback Converter |
| Switching Frequency | | | 100 kHz min. (RCC) |
| Insulation System | | | Functional Insulation |
| Isolation Test Voltage | - Input to Output, 60 s | | 1'600 VDC |
| Isolation Resistance | - Input to Output, 500 VDC | | 1'000 MΩ min. |
| Isolation Capacitance | - Input to Output, 100 kHz, 1 V | | 50 pF max. |
| Reliability | - Calculated MTBF | | 2'135'000 h (MIL-HDBK-217F, ground benign) |
| Washing Process | | | According to Cleaning Guideline<br>www.tracopower.com/info/cleaning.pdf |
| Environment | - Vibration | | MIL-STD-810F |
| | - Thermal Shock | | MIL-STD-810F |
| Housing Material | | | Non-conductive Plastic (UL 94 V-0 rated) |
| Potting Material | | | Silicone (UL 94 V-0 rated) |
| Pin Material | | | Copper |
| Pin Foundation Plating | | | Nickel (2 - 3 µm) |
| 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 | | | Lead-Free Wave Soldering<br>260°C / 6 s max. |

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

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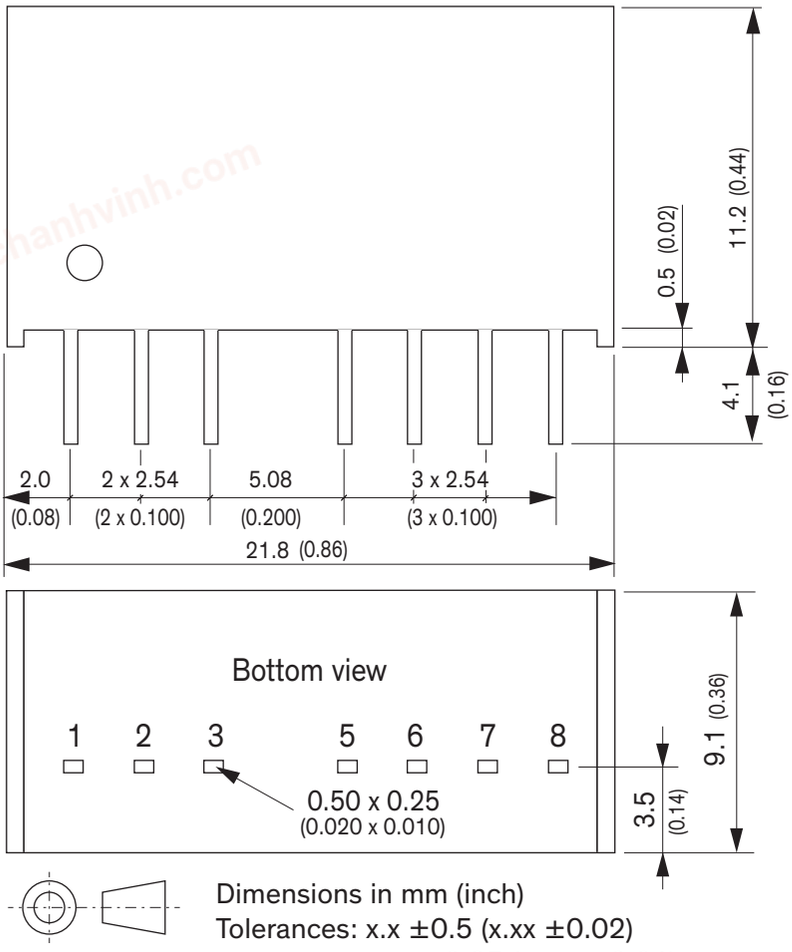


| | | |
|---|---|---|
| Weight | | 4.8 g |
| Environmental Compliance | - REACH Declaration | www.tracopower.com/info/reach-declaration.pdf |
| | | REACH SVHC list compliant |
| | | REACH Annex XVII compliant |
| | - RoHS Declaration | www.tracopower.com/info/rohs-declaration.pdf |
| | | Exemptions: 7(a), 7(c)-I |
| | | (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).) |
| | - SCIP Reference Number | 83a65577-1d00-4340-8642-87de0c778ffd |

## Additional Information

| | |
|---|---|
| Supporting Documents | www.tracopower.com/overview/tmr6 |
| Frequently Asked Questions | www.tracopower.com/glossary-faq |
| Glossary | www.tracopower.com/info/glossary.pdf |
| Service Portal | www.tracoserviceportal.com |

## Outline Dimensions




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

### Pinout

| Pin | Single Output | Dual Output |
|---|---|---|
| 1 | –Vin (GND) | –Vin (GND) |
| 2 | +Vin (Vcc) | +Vin (Vcc) |
| 3 | Remote | Remote |
| 5 | NC | NC |
| 6 | +Vout | +Vout |
| 7 | –Vout | Common |
| 8 | NC | –Vout |

NC: Not connected

Avoid routing PCB traces under the converter.

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