



**THE DATASHEET OF
TMR 1-0522SM**



- Wide 2:1 input voltage range
- Compact SMD package
- Fully regulated outputs
- Cost optimised design
- No minimum load required
- Continuous short circuit protection
- Temperature range -40°C to $+85^{\circ}\text{C}$
- I/O isolation 1500 VDC
- Remote On/Off control
- 3-year product warranty



UL 62368-1 IEC 62368-1

The TMR 1SM series is a family of isolated 1 W DC/DC converter modules with regulated output, featuring wide 2:1 input voltage ranges. These products come in a compact SMD package with small footprint.

An excellent efficiency allows -40°C to $+85^{\circ}\text{C}$ operation temperature. Further features include remote On/Off control and continuous short circuit protection. The compact dimensions and cost optimised design make this converters an ideal solution for applications in communication equipment, instrumentation and industrial electronics.

| Models | | | | | | |
|--------------|------------------------------|----------|------------------|----------|------------------|-----------------|
| Order Code | Input Voltage Range | Output 1 | | Output 2 | | Efficiency typ. |
| | | Vnom | I _{max} | Vnom | I _{max} | |
| TMR 1-0511SM | 4.5 - 9 VDC (5 VDC nom.) | 5 VDC | 200 mA | | | 78 % |
| TMR 1-0512SM | | 12 VDC | 83 mA | | | 79 % |
| TMR 1-0513SM | | 15 VDC | 67 mA | | | 81 % |
| TMR 1-0522SM | | +12 VDC | 42 mA | -12 VDC | 42 mA | 79 % |
| TMR 1-0523SM | | +15 VDC | 33 mA | -15 VDC | 33 mA | 80 % |
| TMR 1-1211SM | 9 - 18 VDC (12 VDC nom.) | 5 VDC | 200 mA | | | 79 % |
| TMR 1-1212SM | | 12 VDC | 83 mA | | | 79 % |
| TMR 1-1213SM | | 15 VDC | 67 mA | | | 82 % |
| TMR 1-1222SM | | +12 VDC | 42 mA | -12 VDC | 42 mA | 81 % |
| TMR 1-1223SM | | +15 VDC | 33 mA | -15 VDC | 33 mA | 80 % |
| TMR 1-2411SM | 18 - 36 VDC (24 VDC nom.) | 5 VDC | 200 mA | | | 79 % |
| TMR 1-2412SM | | 12 VDC | 83 mA | | | 82 % |
| TMR 1-2413SM | | 15 VDC | 67 mA | | | 82 % |
| TMR 1-2422SM | | +12 VDC | 42 mA | -12 VDC | 42 mA | 82 % |
| TMR 1-2423SM | | +15 VDC | 33 mA | -15 VDC | 33 mA | 82 % |
| TMR 1-4811SM | 36 - 75 VDC (48 VDC nom.) | 5 VDC | 200 mA | | | 79 % |
| TMR 1-4812SM | | 12 VDC | 83 mA | | | 80 % |
| TMR 1-4813SM | | 15 VDC | 67 mA | | | 80 % |
| TMR 1-4822SM | | +12 VDC | 42 mA | -12 VDC | 42 mA | 81 % |
| TMR 1-4823SM | | +15 VDC | 33 mA | -15 VDC | 33 mA | 81 % |

Input Specifications

| | | |
|--------------------------|--------------|---|
| Input Current | - At no load | 5 Vin models: 40 mA typ. 12 Vin models: 20 mA typ. 24 Vin models: 10 mA typ. 48 Vin models: 7 mA typ. |
| Surge Voltage | | 5 Vin models: 15 VDC max. (1 s max.) 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.) |
| Reflected Ripple Current | | 5 Vin models: 80 mA_{p-p} typ. 12 Vin models: 40 mA_{p-p} typ. 24 Vin models: 30 mA_{p-p} typ. 48 Vin models: 20 mA_{p-p} typ. |
| Recommended Input Fuse | | 5 Vin models: 500 mA (slow blow) 12 Vin models: 250 mA (slow blow) 24 Vin models: 120 mA (slow blow) 48 Vin models: 60 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 (V _{min} - V _{max}) | single output models: 0.2% max. dual output models: 0.2% max. |
| | - Load Variation (10 - 90%) | single output models: 0.5% max. dual output models: 0.8% max. (Output 1) 0.8% max. (Output 2) |
| Ripple and Noise | - 20 MHz Bandwidth | 75 mV_{p-p} max. |
| Capacitive Load | - single output | 5 V _{out} models: 1'680 µF max. 12 V _{out} models: 820 µF max. 15 V _{out} models: 680 µF max. |
| | - dual output | 12 / -12 V _{out} models: 470 / 470 µF max. 15 / -15 V _{out} models: 330 / 330 µF max. |
| Minimum Load | | Not required |
| Temperature Coefficient | | ±0.02 %/K max. |
| Short Circuit Protection | | Automatic recovery |
| Overload Protection | | Foldback Mode |
| Output Current Limitation | | 120% min. of I_{out} max. 130% typ. of I_{out} max. |
| Transient Response | - Response Deviation | 5% max. (25% Load Step) |
| | - Response Time | 250 µs typ. (25% Load Step) |

Safety Specifications

| | | |
|------------------|-----------------------------|--|
| Standards | - IT / Multimedia Equipment | CSA-C22.2, No. 60950-1 EN 60950-1 EN 62368-1 IEC 60950-1 IEC 62368-1 UL 60950-1 UL 62368-1 |
| | - Certification Documents | www.tracopower.com/overview/tmr1sm |
| 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 55032 class A (with external filter) FCC Part 15 class A (with external filter) |
| | | External filter proposal: www.tracopower.com/overview/tmr1sm |

General Specifications

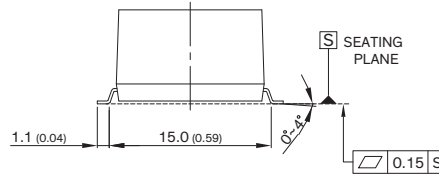
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|----------------------------|--|--|
| Relative Humidity | | 95% max. (non condensing) |
| Temperature Ranges | - Operating Temperature - Case Temperature - Storage Temperature | -40°C to +85°C +95°C max. -55°C to +125°C |
| Power Derating | - High Temperature | 5 %/K above 75°C |
| | | See application note: www.tracopower.com/overview/tmr1sm |
| Cooling System | | Natural convection (20 LFM) |
| Remote Control | - Voltage Controlled Remote (passive = on) - Current Controlled Remote (passive = on) - Off Idle Input Current | On: < 0.6 VDC or open circuit Off: 3 to 15 VDC Refers to 'Remote' and '-Vin' Pin On: open circuit Off: 2 to 4 mA current 3 mA max. |
| Altitude During Operation | | 6'000 m max. |
| Regulator Topology | | RCC Converter |
| Switching Frequency | | 220 kHz typ. (PFM) |
| Insulation System | | Functional Insulation |
| Isolation Test Voltage | - Input to Output, 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 | 50 pF max. |
| Reliability | - Calculated MTBF | 2'800'000 h (MIL-HDBK-217F, ground benign) |
| Moisture Sensitivity (MSL) | | Level 2 (J-STD-033C) |
| Washing Process | | Not allowed |
| Housing Material | | Non-conductive Plastic (UL 94 V-0 rated) |
| Pin Material | | Phosphor Bronze (C5191) |
| Pin Foundation Plating | | Copper (1 - 3 μm) |
| Pin Surface Plating | | Tin (7.5 μm min.), matte |
| Housing Type | | Plastic Case |
| Mounting Type | | PCB Mount |
| Connection Type | | SMD (Surface-Mount Device) |
| Footprint Type | | SMD14 |
| Soldering Profile | | Lead-Free Reflow Soldering (acc. J-STD-020E) |
| | | See application note: www.tracopower.com/info/reflow-soldering.pdf |
| Weight | | 2.9 g |
| Environmental Compliance | - REACH Declaration - RoHS Declaration - SCIP Reference Number | www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant www.tracopower.com/info/rohs-declaration.pdf Exemptions: 7a (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule)) bdd04b85-62c3-4e4e-abcc-acf49c9007d6 |

Supporting Documents

| | |
|--|--|
| Overview Link (for additional Documents) | www.tracopower.com/overview/tmr1sm |
|--|--|

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

Outline Dimensions

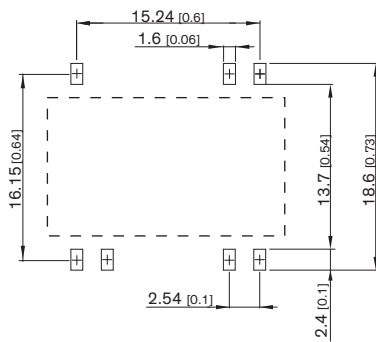


Dimensions in mm (inch)
 Tolerances: x.x±0.5 (x.xx±0.02)
 x.xx±0.25 (x.xxx±0.01)
 Pin tolerances: x.x±0.05 (±0.002)

| Pinout | | |
|--------|---------------|-------------|
| Pin | Single Output | Dual Output |
| 1 | -Vin (GND) | -Vin (GND) |
| 2 | Remote | Remote |
| 6 | NC | Common |
| 7 | NC | -Vout |
| 8 | +Vout | +Vout |
| 9 | -Vout | Common |
| 14 | +Vin (Vcc) | +Vin (Vcc) |

NC: Not connected



Recommended Solder Pad Layout



Dimensions in mm [inch]

Looking for pricing, stock, or lifecycle information?

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