# TRACO POWER

## DC/DC Converter

## TMR 1SM Series, 1 Watt

- **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°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°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 |
|---|---|---|---|---|---|---|
| | | Vnom | Imax | Vnom | Imax | typ. |
| **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 mAp-p typ. |
| | | 12 Vin models: | 40 mAp-p typ. |
| | | 24 Vin models: | 30 mAp-p typ. |
| | | 48 Vin models: | 20 mAp-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 (Vmin - Vmax) | 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 mVp-p max. |
| Capacitive Load | - single output | 5 Vout models: | 1'680 µF max. |
| | | 12 Vout models: | 820 µF max. |
| | | 15 Vout models: | 680 µF max. |
| | - dual output | 12 / -12 Vout models: | 470 / 470 µF max. |
| | | 15 / -15 Vout 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 Iout max. |
| | | | 130% typ. of Iout 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 47 Part 15 class A (with external filter) |
| | External filter proposal: | www.tracopower.com/overview/tmr1sm |

## General Specifications

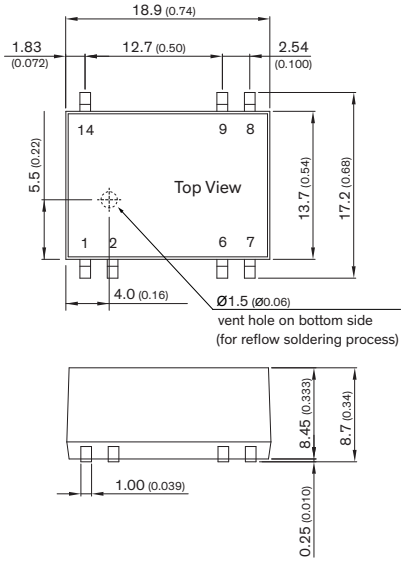
| | | |
|---|---|---|
| Relative Humidity | | 95% max. (non condensing) |
| Temperature Ranges | - Operating Temperature | –40°C to +85°C |
| | - Case Temperature | +95°C max. |
| | - Storage Temperature | –55°C to +125°C |
| Power Derating | - High Temperature | 5 %/K above 75°C |
| | See application note: | www.tracopower.com/overview/tmr1sm |
| Cooling System | | Natural convection (20 LFM) |
| Remote Control | - Voltage Controlled Remote (passive = on) | On: < 0.6 VDC or open circuit<br>Off: 3 to 15 VDC<br>Refers to 'Remote' and '-Vin' Pin |
| | - Current Controlled Remote (passive = on) | On: open circuit<br>Off: 2 to 4 mA current |
| | - Off Idle Input 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 | www.tracopower.com/info/reach-declaration.pdf<br>REACH SVHC list compliant<br>REACH Annex XVII compliant |
| | - RoHS Declaration | www.tracopower.com/info/rohs-declaration.pdf<br>Exemptions: 7a<br>(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).) |
| | - SCIP Reference Number | bdd04b85-62c3-4e4e-abcc-acf49c9007d6 |

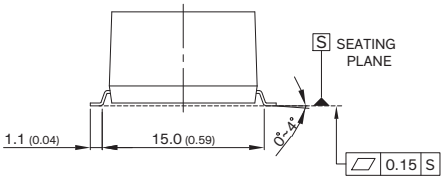
## Supporting Documents

| | |
|---|---|
| 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



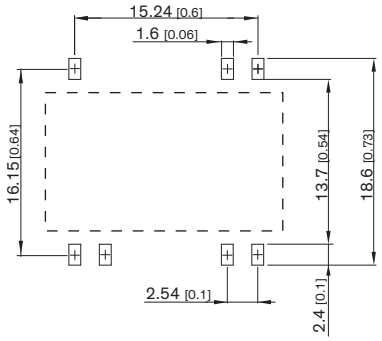




Dimensions in mm (inch)
Tolerances: x.x±0.5 (x.xx±0.02)
x.xx±0.25 (x.xxx±0.01)
Pin tolerances: x.x±0.05 (±0.002)

| 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]

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