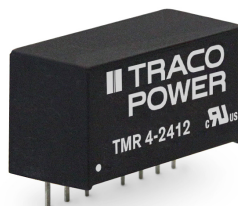


- Compact SIP-8 package
- Wide 2:1 input voltage range
- Temperature range  $-40^{\circ}$  to  $+70^{\circ}\text{C}$  without derating
- High efficiency up to 87%
- I/O isolation 1600 VDC
- Protection against short-circuit and over load
- Fully regulated outputs
- Remote On/Off control
- 3-year product warranty



The TMR 4 is a regulated 4 Watt DC/DC converter series with 2:1 input voltage range. It comes in a compact SIP-8 package featuring single and dual output models, I/O isolation voltage of 1600 VDC and protection against short-circuit and over load. Being a 4 Watt converter this series acts as an excellent gap closer between the more common 3 & 6 Watt converters. It offers a cost-efficient alternative to 5 and 6 Watt converters in applications where a 3 Watt converter would operate at the absolute technical limits (e.g. output power). The intelligent design provides efficiencies up to 87% and a temperature range of  $-40^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  without derating which enables an unrestricted use of this converter series in applications with demanding temperature requirements. Additionally, the integrated remote On/Off function offers a convenient way to control your application. Certified according to the latest IEC/EN/UL 62368-1 industrial standard the TMR 4 is designed to deliver a high quality, cost efficient and compact solution for many applications.

| Models     |                              |          |                  |          |                  |                 |
|------------|------------------------------|----------|------------------|----------|------------------|-----------------|
| Order Code | Input Voltage Range          | Output 1 |                  | Output 2 |                  | Efficiency typ. |
|            |                              | Vnom     | I <sub>max</sub> | Vnom     | I <sub>max</sub> |                 |
| TMR 4-1211 | 9 - 18 VDC<br>(12 VDC nom.)  | 5 VDC    | 800 mA           |          |                  | 82 %            |
| TMR 4-1212 |                              | 12 VDC   | 333 mA           |          |                  | 87 %            |
| TMR 4-1213 |                              | 15 VDC   | 266 mA           |          |                  | 86 %            |
| TMR 4-1215 |                              | 24 VDC   | 166 mA           |          |                  | 86 %            |
| TMR 4-1222 |                              | +12 VDC  | 166 mA           | -12 VDC  | 166 mA           | 85 %            |
| TMR 4-1223 |                              | +15 VDC  | 133 mA           | -15 VDC  | 133 mA           | 86 %            |
| TMR 4-2411 | 18 - 36 VDC<br>(24 VDC nom.) | 5 VDC    | 800 mA           |          |                  | 81 %            |
| TMR 4-2412 |                              | 12 VDC   | 333 mA           |          |                  | 86 %            |
| TMR 4-2413 |                              | 15 VDC   | 266 mA           |          |                  | 86 %            |
| TMR 4-2415 |                              | 24 VDC   | 166 mA           |          |                  | 86 %            |
| TMR 4-2422 |                              | +12 VDC  | 166 mA           | -12 VDC  | 166 mA           | 86 %            |
| TMR 4-2423 |                              | +15 VDC  | 133 mA           | -15 VDC  | 133 mA           | 85 %            |
| TMR 4-4811 | 36 - 75 VDC<br>(48 VDC nom.) | 5 VDC    | 800 mA           |          |                  | 80 %            |
| TMR 4-4812 |                              | 12 VDC   | 333 mA           |          |                  | 85 %            |
| TMR 4-4813 |                              | 15 VDC   | 266 mA           |          |                  | 83 %            |
| TMR 4-4815 |                              | 24 VDC   | 166 mA           |          |                  | 86 %            |
| TMR 4-4822 |                              | +12 VDC  | 166 mA           | -12 VDC  | 166 mA           | 84 %            |
| TMR 4-4823 |                              | +15 VDC  | 133 mA           | -15 VDC  | 133 mA           | 85 %            |

## Input Specifications

|                        |                |                                                                                                                          |
|------------------------|----------------|--------------------------------------------------------------------------------------------------------------------------|
| Input Current          | - At no load   | 12 Vin models: 30 mA typ.<br>24 Vin models: 15 mA typ.<br>48 Vin models: 10 mA typ.                                      |
|                        | - At full load | 12 Vin models: 409 mA typ.<br>24 Vin models: 202 mA typ.<br>48 Vin models: 102 mA typ.                                   |
| Surge Voltage          |                | 12 Vin models: 25 VDC max. (1 s max.)<br>24 Vin models: 50 VDC max. (1 s max.)<br>48 Vin models: 100 VDC max. (1 s max.) |
| Recommended Input Fuse |                | (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: 0.5% max.<br>dual output models: 0.5% max.                                                            |
|                           | - Load Variation (0 - 100%)                | single output models: 1% max.<br>dual output models: 1% max. (Output 1)<br>1% max. (Output 2)                               |
|                           | - Voltage Balance (symmetrical load)       | dual output models: 2% max.                                                                                                 |
|                           | - Cross Regulation (25% / 100% asym. load) | dual output models: 5% max.                                                                                                 |
| Ripple and Noise          | - 20 MHz Bandwidth                         | 80 mVp-p max.                                                                                                               |
| Capacitive Load           | - single output                            | 5 Vout models: 1'800 µF max.<br>12 Vout models: 1'000 µF max.<br>15 Vout models: 820 µF max.<br>24 Vout models: 470 µF max. |
|                           | - dual output                              | 12 / -12 Vout models: 560 / 560 µF max.<br>15 / -15 Vout models: 390 / 390 µF max.                                          |
| Minimum Load              |                                            | Not required                                                                                                                |
| Temperature Coefficient   |                                            | ±0.02 %/K max.                                                                                                              |
| Start-up Time             |                                            | 10 ms typ.                                                                                                                  |
| Short Circuit Protection  |                                            | Continuous, Automatic recovery                                                                                              |
| Overload Protection       |                                            | Foldback Mode                                                                                                               |
| Output Current Limitation |                                            | 160% typ. of Iout max.                                                                                                      |
| Transient Response        | - Response Deviation                       | 3% typ. / 5% max. (25% Load Step)                                                                                           |
|                           | - Response Time                            | 250 µs typ. (25% Load Step)                                                                                                 |

## Safety Specifications

|                  |                             |                                                                                        |
|------------------|-----------------------------|----------------------------------------------------------------------------------------|
| Safety Standards | - IT / Multimedia Equipment | EN 62368-1<br>IEC 62368-1<br>UL 62368-1                                                |
|                  | - Certification Documents   | <a href="http://www.tracopower.com/overview/tmr4">www.tracopower.com/overview/tmr4</a> |
| Pollution Degree |                             | PD 3                                                                                   |

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)<br>EN 55032 class B (with external filter)<br>FCC Part 15 class A (with external filter)<br>FCC Part 15 class B (with external filter) |
|                                                                                                                  | - Radiated Emissions                                | EN 55032 class A (with external filter)<br>EN 55032 class B (with external filter)<br>FCC Part 15 class A (with external filter)<br>FCC Part 15 class B (with external filter) |
| External filter proposal: <a href="http://www.tracopower.com/overview/tmr4">www.tracopower.com/overview/tmr4</a> |                                                     |                                                                                                                                                                                |
| EMS Immunity                                                                                                     | - Electrostatic Discharge                           | Air: EN 55024 (IT Equipment)<br>EN 55035 (Multimedia)<br>Contact: EN 61000-4-2, $\pm 8$ kV, perf. criteria A<br>EN 61000-4-2, $\pm 6$ kV, perf. criteria A                     |
|                                                                                                                  | - RF Electromagnetic Field<br>- EFT (Burst) / Surge | EN 61000-4-3, 10 V/m, perf. criteria A<br>EN 61000-4-4, $\pm 2$ kV, perf. criteria A<br>EN 61000-4-5, $\pm 1$ kV, perf. criteria A                                             |
| External filter proposal: <a href="http://www.tracopower.com/overview/tmr4">www.tracopower.com/overview/tmr4</a> |                                                     |                                                                                                                                                                                |
|                                                                                                                  | - 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<br>1 s: EN 61000-4-8, 1000 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              | 3.33 %/K above 70°C                                                                            |
| Cooling System            |                                 | Natural convection (20 LFM)                                                                    |
| Remote Control            | - Voltage Controlled Remote     | On: < 0.6 VDC or open circuit<br>Off: 6 to 15 VDC<br>Refers to 'Remote' and '-Vin' Pin         |
|                           | - Off Idle Input Current        | 2.5 mA typ.                                                                                    |
| Altitude During Operation |                                 | 6'000 m max.                                                                                   |
| Switching Frequency       |                                 | 100 kHz min. (PFM)                                                                             |
| Insulation System         |                                 | Functional Insulation                                                                          |
| Isolation Test Voltage    | - Input to Output, 60 s         | 1'600 VDC                                                                                      |
|                           | - Input to Output, 1 s          | 1'920 VDC                                                                                      |
| Isolation Resistance      | - Input to Output, 500 VDC      | 1'000 M $\Omega$ min.                                                                          |
| Isolation Capacitance     | - Input to Output, 100 kHz, 1 V | 200 pF typ.                                                                                    |
| Reliability               | - Calculated MTBF               | 3'390'000 h (MIL-HDBK-217F, ground benign)                                                     |
| Washing Process           |                                 | Allowed (hermetical product)                                                                   |
|                           | See Cleaning Guideline:         | <a href="http://www.tracopower.com/info/cleaning.pdf">www.tracopower.com/info/cleaning.pdf</a> |
| Housing Material          |                                 | Non-conductive Plastic (UL 94 V-0 rated)                                                       |
| Potting Material          |                                 | Epoxy (UL 94 V-0 rated)                                                                        |
| Pin Material              |                                 | Phosphor Bronze (C5191)                                                                        |
| Pin Foundation Plating    |                                 | Nickel (1 $\mu$ m min.)                                                                        |
| Pin Surface Plating       |                                 | Tin (3 - 5 $\mu$ m), matte                                                                     |
| Housing Type              |                                 | Plastic Case                                                                                   |
| Mounting Type             |                                 | PCB Mount                                                                                      |
| Connection Type           |                                 | THD (Through-Hole Device)                                                                      |
| Footprint Type            |                                 | SIP8                                                                                           |
| Soldering Profile         |                                 | Wave Soldering                                                                                 |
| Weight                    |                                 | 4.8 g                                                                                          |

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

Environmental Compliance - REACH Declaration

[www.tracopower.com/info/reach-declaration.pdf](http://www.tracopower.com/info/reach-declaration.pdf)

REACH SVHC list compliant

REACH Annex XVII compliant

- RoHS Declaration

[www.tracopower.com/info/rohs-declaration.pdf](http://www.tracopower.com/info/rohs-declaration.pdf)

Exemptions: 7a

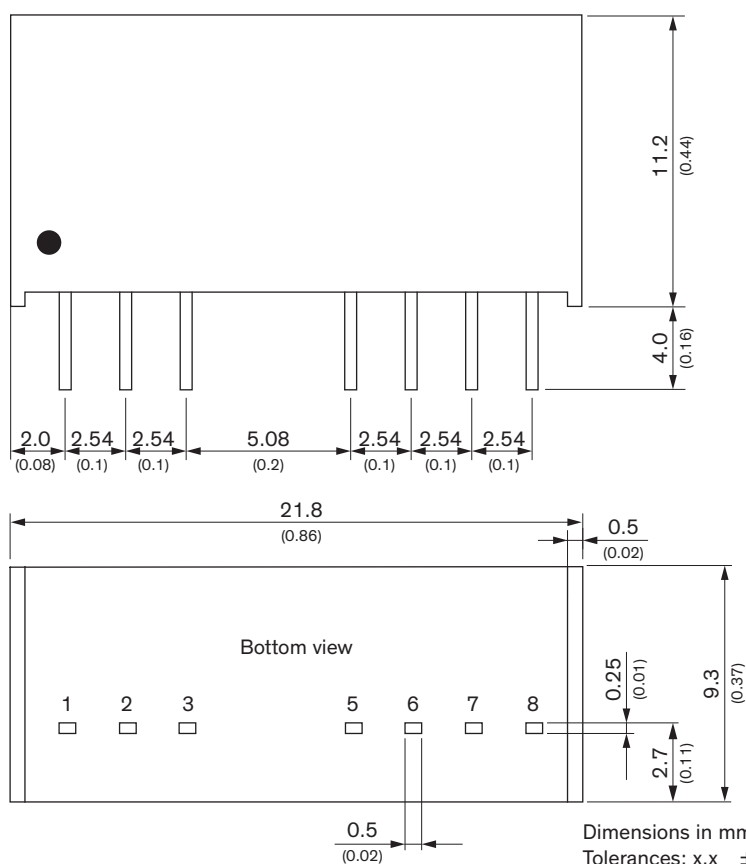
(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule). The SCIP number is provided on request.)

## Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/tmr4](http://www.tracopower.com/overview/tmr4)

## Outline Dimensions



### Pinout

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

NC: Not connected