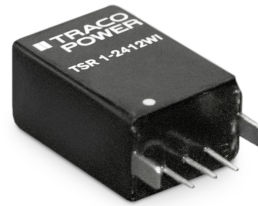


- **Ultra wide 8:1 input voltage range: 9-72 VDC**
- **Covers a majority of standard bus- and battery voltages**
- **Up to 93% efficiency - No heatsink required**
- **Pin compatible with LMxx linear regulators (SIP-3)**
- **Operating temperature range -40 to +80°C**
- **Low standby current**
- **Excellent line/load regulation**
- **Protection against short circuit, overvoltage and overtemperature**
- **3-year product warranty**



The TSR 1WI is a non-isolated POL converter series with an ultra wide 8:1 input voltage range which comes in a standard SIP-3 package. Covering the majority of standard bus- and battery voltages this POL converter is a versatile solution for many applications in distributed power systems where different input voltages have to be handled. Being able to use the same converter in many different situations effectively reduces the bill of material (BOM) of a given application. A high efficiency of up to 93% allows for an operating temperature range of -40 to +80°C (up to 50°C without derating) and makes them excellent drop-in replacements for less efficient LMxx linear regulators. With 0.6A max. output current and standard features such as low standby current, precise regulation and protection against short circuit, overvoltage and overload the TSR 1WI is suitable for many battery and distributed power applications.

Models

| Order Code | Output Current max. | Input Voltage Range | Output Voltage nom. | Efficiency typ. |
|---------------|---------------------|---------------------------|---------------------|------------------|
| TSR 1-4833WI | 1'000 mA | 9 - 72 VDC (48 VDC nom.) | 3.3 VDC | 83 % (at 24 Vin) |
| TSR 1-4850WI | | | 5 VDC | 87 % (at 24 Vin) |
| TSR 1-4865WI | | | 6.5 VDC | 88 % (at 24 Vin) |
| TSR 1-4890WI | | | 9 VDC | 90 % (at 24 Vin) |
| TSR 1-48120WI | | | 12 VDC | 93 % (at 24 Vin) |
| TSR 1-48150WI | | | 15 VDC | 93 % (at 24 Vin) |
| TSR 1-48240WI | 700 mA | 33 - 72 VDC (48 VDC nom.) | 24 VDC | 92 % (at 48 Vin) |

Options

| | |
|--|--|
| on demand (backorder with MOQ non stocking item) | - Horizontal mounting (see outline dimensions) |
|--|--|

Input Specifications

| | | |
|------------------------|-----------------------|--|
| Input Current | - At no load | 12 mA typ. |
| Recommended Input Fuse | | 3.3 Vout models: 1'000 mA (slow blow) 5 Vout models: 1'250 mA (slow blow) 6.5 Vout models: 1'600 mA (slow blow) 9 Vout models: 1'600 mA (slow blow) 12 Vout models: 1'600 mA (slow blow) 15 Vout models: 1'600 mA (slow blow) 24 Vout models: 1'250 mA (slow blow) |
| Input Filter | See application note: | www.tracopower.com/overview/tsr1wi (Recommended external input filter proposal) |

Output Specifications

| | | |
|--|--|---|
| Voltage Set Accuracy | | ±2% max. |
| Regulation | - Input Variation (Vmin - Vmax) - Load Variation (0 - 100%) | 0.5% max. 0.6% max. |
| Ripple and Noise (20 MHz Bandwidth) | | 3.3 Vout models: 50 mVp-p typ. (with 10 µF X7R) 5 Vout models: 50 mVp-p typ. (with 10 µF X7R) 6.5 Vout models: 50 mVp-p typ. (with 10 µF X7R) 9 Vout models: 50 mVp-p typ. (with 10 µF X7R) 12 Vout models: 50 mVp-p typ. (with 10 µF X7R) 15 Vout models: 50 mVp-p typ. (with 10 µF X7R) 24 Vout models: 75 mVp-p typ. (with 4.7 µF X7R) |
| Capacitive Load | | 3.3 Vout models: 2'400 µF max. 5 Vout models: 1'580 µF max. 6.5 Vout models: 1'200 µF max. 9 Vout models: 880 µF max. 12 Vout models: 660 µF max. 15 Vout models: 530 µF max. 24 Vout models: 330 µF max. |
| Minimum Load | | Not required |
| Temperature Coefficient | | ±0.02 %/K max. |
| Start-up Time | | 25 ms typ. |
| Short Circuit Protection | | Continuous, Automatic recovery |
| Output Current Limitation | | 180% typ. of Iout max. |
| Transient Response | - Peak Variation | 125 mV typ. / 250 mV max. (50% Load Step) (24 Vout model, with external 4.7 µF X7R) 90 mV typ. / 180 mV max. (50% Load Step) (other models, with external 10 µF X7R) |
| | - Response Time | 200 µs typ. / 250 µs max. (50% Load Step) |

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/overview/tsr1wi |

General Specifications

| | | |
|--------------------|--|--|
| Relative Humidity | | 95% max. (non condensing) |
| Temperature Ranges | - Operating Temperature - Case Temperature - Storage Temperature | -40°C to +80°C +105°C max. -55°C to +125°C |
| Power Derating | - High Temperature | See application note: www.tracopower.com/overview/tsr1wi |

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

| | | |
|--------------------------|--|---|
| Over Temperature | - Protection Mode | 165°C typ. (Automatic recovery) |
| Protection Switch Off | - Measurement Point | Internal IC temperature |
| Cooling System | | Natural convection (20 LFM) |
| Switching Frequency | | 143 - 238 kHz (PWM) (3.3 Vout model) 150 - 250 kHz (PWM) (5 Vout model) 188 - 313 kHz (PWM) (6.5 Vout model) 225 - 375 kHz (PWM) (9 Vout model) 263 - 438 kHz (PWM) (12 Vout model) 300 - 500 kHz (PWM) (15 Vout model) 413 - 688 kHz (PWM) (24 Vout model) |
| Insulation System | | Non-isolated |
| Reliability | - Calculated MTBF | 8'215'000 h (MIL-HDBK-217F, ground benign) |
| Environment | - Vibration - Mechanical Shock - Thermal Shock | MIL-STD-810F MIL-STD-810F MIL-STD-810F |
| Housing Material | | Metal |
| Potting Material | | Epoxy (UL 94 V-0 rated) |
| Connection Type | | THD (Through-Hole Device) |
| Weight | | 5.5 g |
| Thermal Impedance | | 35 K/W |
| Environmental Compliance | - Reach - RoHS | www.tracopower.com/info/reach-declaration.pdf www.tracopower.com/info/rohs-declaration.pdf |

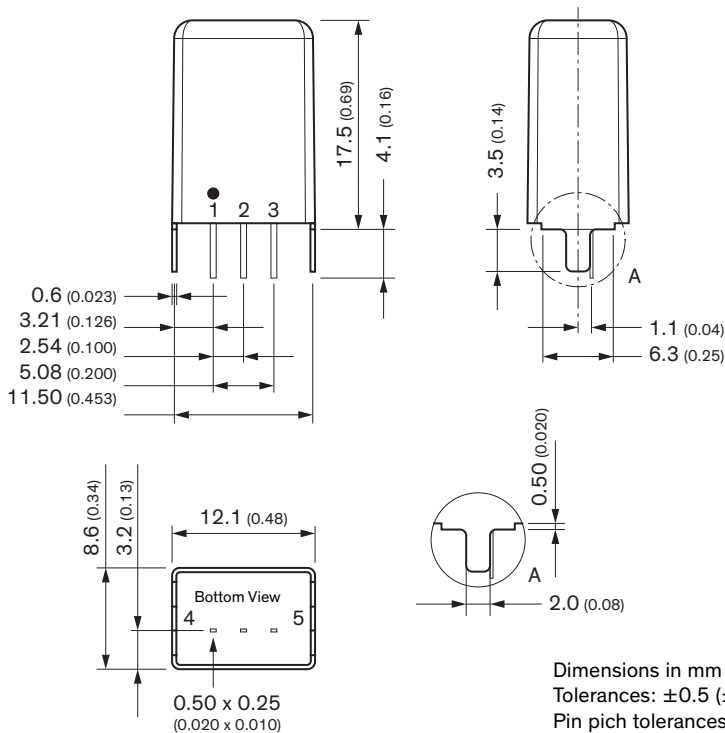
Supporting Documents

Overview Link (for additional Documents)

www.tracopower.com/overview/tsr1wi

Outline Dimensions

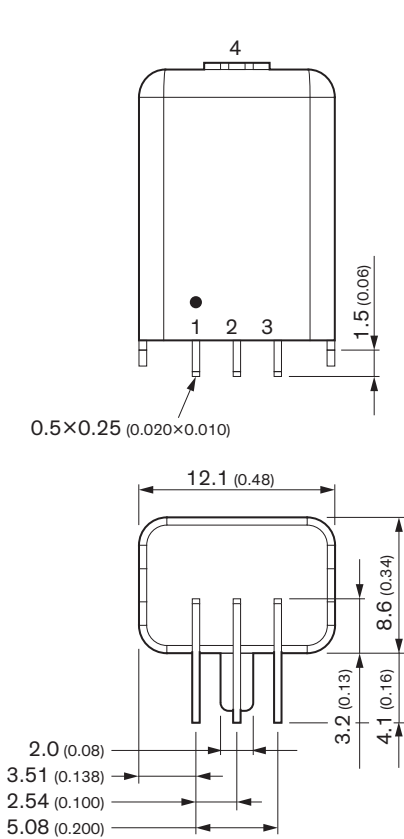
Standard: Vertical mounting



| Pinout | |
|--------|----------|
| 1 | +Vin |
| 2 | GND |
| 3 | +Vout |
| 4 | Case pin |
| 5 | Case pin |

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

Optional: Horizontal mounting



| Pinout | |
|--------|----------|
| 1 | +Vin |
| 2 | GND |
| 3 | +Vout |
| 4 | Case pin |

Dimensions in mm (inch)
 Tolerances: x.xx ±0.5 (±0.02)
 Tolerances: x.xxx ±0.25 (±0.01)
 Pin dimension tolerances: ±0.10 (±0.04)