# TRACO POWER

## Non-Isolated DC/DC Converter (POL)  TSR 0.6WI Series, 0.6 A

- **Ultra wide 8:1 input voltage range: 9-72 VDC**
- **Covers a majority of standard bus- and battery voltages**
- **Up to 94% efficiency - No heatsink required**
- **Pin compatible with LMxx linear regulators (SIP-3)**
- **Operating temperature range -40 to +85°C**
- **Low standby current**
- **Excellent line/load regulation**
- **Protection against short circuit, overvoltage and overtemperature**
- **3-year product warranty**

The TSR 0.6WI 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 94% allows for an operating temperature range of -40 to +85°C (up to 80°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 0.6WI is suitable for many battery and distributed power applications.

## Models

| Order Code | Output Current max. | Input Voltage Range | Output Voltage nom. | Efficiency typ. |
|---|---|---|---|---|
| **TSR 0.6-4833WI** | | | 3.3 VDC | 85 % (at 24 Vin) |
| **TSR 0.6-4850WI** | | 9 - 72 VDC (48 VDC nom.) | 5 VDC | 89 % (at 24 Vin) |
| **TSR 0.6-4865WI** | 600 mA | | 6.5 VDC | 91 % (at 24 Vin) |
| **TSR 0.6-4890WI** | | 14 - 72 VDC (48 VDC nom.) | 9 VDC | 92 % (at 24 Vin) |
| **TSR 0.6-48120WI** | | 17 - 72 VDC (48 VDC nom.) | 12 VDC | 93 % (at 24 Vin) |
| **TSR 0.6-48150WI** | | 20 - 72 VDC (48 VDC nom.) | 15 VDC | 94 % (at 24 Vin) |
| **TSR 0.6-48240WI** | 400 mA | 33 - 72 VDC (48 VDC nom.) | 24 VDC | 94 % (at 48 Vin) |

## Options

| | |
|---|---|
| **on demand** (backorder with MOQ non stocking item) | - Optional models for horizontal mounting (see outline dimensions) |

Note    - It is recommended to use an external input filter, please refer to application note: www.tracopower.com/overview/tsr0-6wi

## Input Specifications

| | | | |
|---|---|---|---|
| Input Current | - At no load | | 3 mA typ. |
| Recommended Input Fuse | | 3.3 Vout models: | 800 mA (slow blow) |
| | | 5 Vout models: | 800 mA (slow blow) |
| | | 6.5 Vout models: | 1'000 mA (slow blow) |
| | | 9 Vout models: | 1'000 mA (slow blow) |
| | | 12 Vout models: | 1'000 mA (slow blow) |
| | | 15 Vout models: | 1'000 mA (slow blow) |
| | | 24 Vout models: | 800 mA (slow blow) |
| | | | (The need of an external fuse has to be assessed in the final application.) |
| Input Filter | | See application note: | www.tracopower.com/overview/tsr0-6wi |
| | | | (Recommended external input filter proposal) |

## Output Specifications

| | | | |
|---|---|---|---|
| Voltage Set Accuracy | | | ±2.5% max. |
| Regulation | - Input Variation (Vmin - Vmax) | | 0.9% max. |
| | - Load Variation (10 - 100%) | | 0.6% max. |
| Ripple and Noise (20 MHz Bandwidth) | | 3.3 Vout models: | 50 mVp-p typ. |
| | | 5 Vout models: | 50 mVp-p typ. |
| | | 6.5 Vout models: | 50 mVp-p typ. |
| | | 9 Vout models: | 50 mVp-p typ. |
| | | 12 Vout models: | 50 mVp-p typ. |
| | | 15 Vout models: | 50 mVp-p typ. |
| | | 24 Vout models: | 75 mVp-p typ. |
| Capacitive Load | | | 100 µF max. |
| Minimum Load | | | Not required |
| Temperature Coefficient | | | ±0.02 %/K max. |
| Start-up Time | | | 50 ms typ. (24 Vout model) |
| | | | 25 ms typ. (other models) |
| Short Circuit Protection | | | Continuous, Automatic recovery |
| Output Current Limitation | | | 200% typ. of Iout max. |
| Transient Response | - Peak Variation | | 90 mV typ. / 180 mV max. (50% Load Step) |
| | - Response Time | | 150 µs typ. / 250 µs max. (50% Load Step) |

## General Specifications

| | | | |
|---|---|---|---|
| Relative Humidity | | | 95% max. (non condensing) |
| Temperature Ranges | - Operating Temperature | | −40°C to +85°C |
| | - Case Temperature | | +105°C max. |
| | - Storage Temperature | | −55°C to +125°C |
| Power Derating | - High Temperature | See application note: | www.tracopower.com/overview/tsr0-6wi |
| Over Temperature Protection Switch Off | - Protection Mode | | 165°C typ. (Automatic recovery) |
| | - Measurement Point | | Internal IC temperature |
| Cooling System | | | Natural convection (20 LFM) |
| Switching Frequency | | | 117 - 243 kHz (PWM) (3.3 Vout model) |
| | | | 130 - 270 kHz (PWM) (5 Vout model) |
| | | | 163 - 338 kHz (PWM) (6.5 Vout model) |
| | | | 195 - 405 kHz (PWM) (9 Vout model) |
| | | | 247 - 513 kHz (PWM) (12 Vout model) |
| | | | 293 - 608 kHz (PWM) (15 Vout model) |
| | | | 416 - 864 kHz (PWM) (24 Vout model) |
| Insulation System | | | Non-isolated |
| Reliability | - Calculated MTBF | | 18'160'000 h (MIL-HDBK-217F, ground benign) |
| Washing Process | | | Allowed (hermetical product) |
| | | See Cleaning Guideline: | www.tracopower.com/info/cleaning.pdf |

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

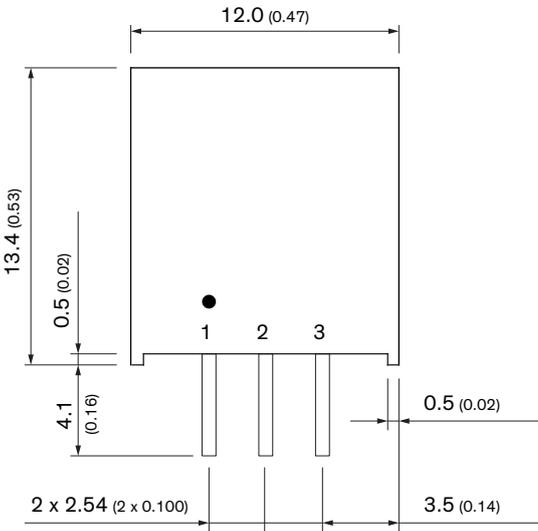| | | |
|---|---|---|
| Environment | - Vibration | MIL-STD-810F |
| | - Mechanical Shock | MIL-STD-810F |
| | - Thermal Shock | MIL-STD-810F |
| Housing Material | | Non-conductive Plastic (UL 94 V-0 rated) |
| Potting Material | | Epoxy (UL 94 V-0 rated) |
| Pin Material | | Brass |
| Pin Foundation Plating | | Nickel (1 - 2 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 | | SIP3 |
| Soldering Profile | | Wave Soldering |
| Weight | | 3 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: 7a, 7c-I |
| | | (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

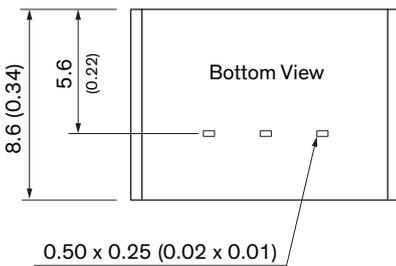| | |
|---|---|
| **Overview Link** (for additional Documents) | www.tracopower.com/overview/tsr0-6wi |

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

**TRACO POWER**

## Outline Dimensions

**Standard: Vertical mounting**

12.0 (0.47)

13.4 (0.53)

0.5 (0.02)

1   2   3

4.1 (0.16)

0.5 (0.02)

2 x 2.54 (2 x 0.100)

3.5 (0.14)

8.6 (0.34)

5.6 (0.22)

Bottom View

0.50 x 0.25 (0.02 x 0.01)

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)

| Pinout | |
|---|---|
| **Pin** | **Function** |
| **1** | +Vin |
| **2** | GND |
| **3** | +Vout |

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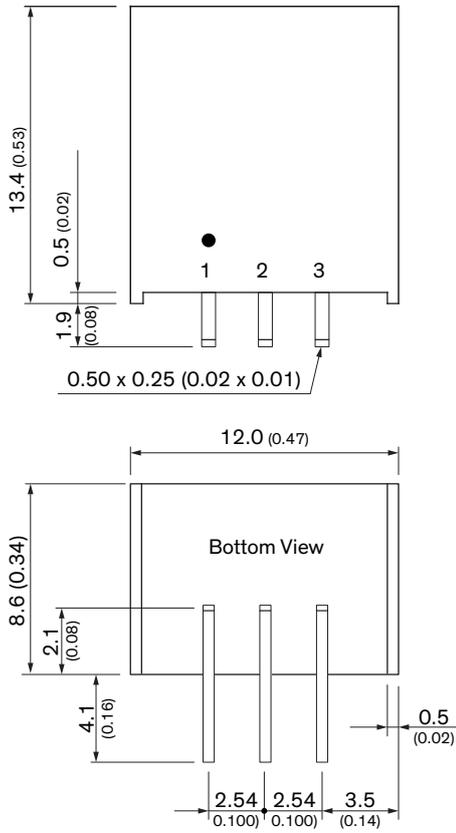
**Optional: Horizontal mounting**

13.4 (0.53)
0.5 (0.02)
1.9 (0.08)

1 2 3

0.50 x 0.25 (0.02 x 0.01)

12.0 (0.47)

Bottom View

8.6 (0.34)
2.1 (0.08)
4.1 (0.16)

0.5 (0.02)

2.54 (0.100)  2.54 (0.100)  3.5 (0.14)

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)

| Pinout | |
|---|---|
| **Pin** | **Function** |
| **1** | +Vin |
| **2** | GND |
| **3** | +Vout |

Specifications can be changed without notice.