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	600 mA	9 - 72 VDC (48 VDC nom.)	3.3 VDC	85 % (at 24 Vin)
TSR 0.6-4850WI			5 VDC	89 % (at 24 Vin)
TSR 0.6-4865WI			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 with angular pins (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		Depending on model
		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)

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

Washing Process		According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf
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		Lead-Free Wave Soldering 260°C / 6 s max.
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).)
	- SCIP Reference Number	3e078cc2-b0c3-438b-9f92-f8124306021b

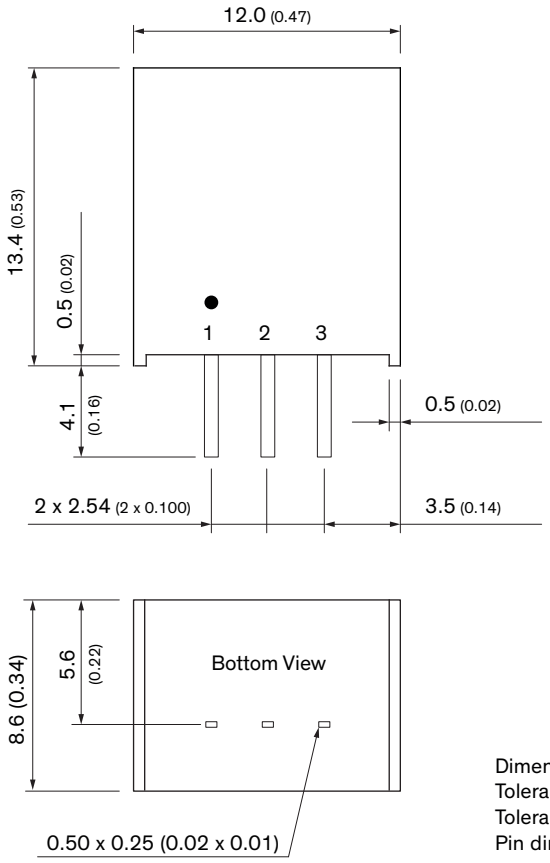
Supporting Documents

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.

Outline Dimensions

Straight pin version

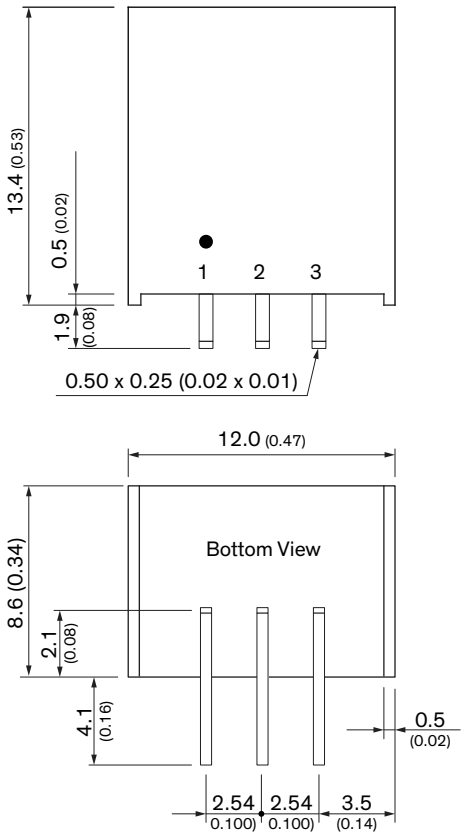


Pinout	
Pin	**Function**
1	+Vin
2	GND
3	+Vout

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)

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

Angular pin version



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

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)

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