

DC/DC Converter

TSR 2 Series, 2 A

- ◆ Ultra compact SIP package
0.55 × 0.30 × 0.40 inch
- ◆ Up to 96 % efficiency
– No heat-sink required
- ◆ Pin compatible with LMxx
linear regulators
- ◆ Built in filter capacitors
- ◆ Operating temperature range
-40°C to +85°C
- ◆ Excellent line / load regulation
- ◆ Short circuit protection
- ◆ 3-year product warranty



The new TSR 2 series step-down switching regulators are drop-in replacement for inefficient LMxx linear regulators. A high efficiency up to 96 % allows full load operation up to +67°C ambient temperature without the need of any heat-sink or forced cooling.

The TSR 2 switching regulators provide other significant features over linear regulators, i.e. better output accuracy ($\pm 2\%$), lower standby current of 2 mA and no requirement of external capacitors. The high efficiency and low standby power consumption makes these regulators an ideal solution for many battery powered applications.

| Models | | | | | | |
|-------------|---------------------|----------------|---------------------|-----------------|------------|----------------------|
| Order code | Input voltage range | Output voltage | Output current max. | Efficiency typ. | | Capacitive Load max. |
| | | | | @ Vin min. | @ Vin max. | |
| TSR 2-0512 | 3.0 - 5.5 VDC | 1.2 VDC | 2.0 A | 90 % | 86 % | 2500 μ F |
| TSR 2-0515 | 3.0 - 5.5 VDC | 1.5 VDC | | 91 % | 88 % | 2000 μ F |
| TSR 2-0518 | 3.0 - 5.5 VDC | 1.8 VDC | | 92 % | 90 % | 1600 μ F |
| TSR 2-0525 | 3.8 - 5.5 VDC | 2.5 VDC | | 95 % | 92 % | 1200 μ F |
| TSR 2-2412 | 4.6 - 36 VDC* | 1.2 VDC | | 84 % | 75 % | 2500 μ F |
| TSR 2-2415 | 4.6 - 36 VDC* | 1.5 VDC | | 86 % | 77 % | 2000 μ F |
| TSR 2-2418 | 4.6 - 36 VDC* | 1.8 VDC | | 87 % | 79 % | 1600 μ F |
| TSR 2-2425 | 4.6 - 36 VDC* | 2.5 VDC | | 89 % | 83 % | 1200 μ F |
| TSR 2-2433 | 4.75 - 36 VDC* | 3.3 VDC | | 91 % | 86 % | 900 μ F |
| TSR 2-2450 | 6.5 - 36 VDC* | 5 VDC | | 94 % | 89 % | 600 μ F |
| TSR 2-2465 | 9.0 - 36 VDC* | 6.5 VDC | | 94 % | 91 % | 470 μ F |
| TSR 2-2490 | 12 - 36 VDC* | 9 VDC | | 95 % | 92 % | 330 μ F |
| TSR 2-24120 | 15 - 36 VDC* | 12 VDC | | 95 % | 93 % | 270 μ F |
| TSR 2-24150 | 18 - 36 VDC* | 15 VDC | | 96 % | 94 % | 200 μ F |

* For input voltage higher than 20 VDC an input capacitor 22 μ F / 50 V is recommended, to prevent damage due to power-on voltage peaks.

Input Specifications

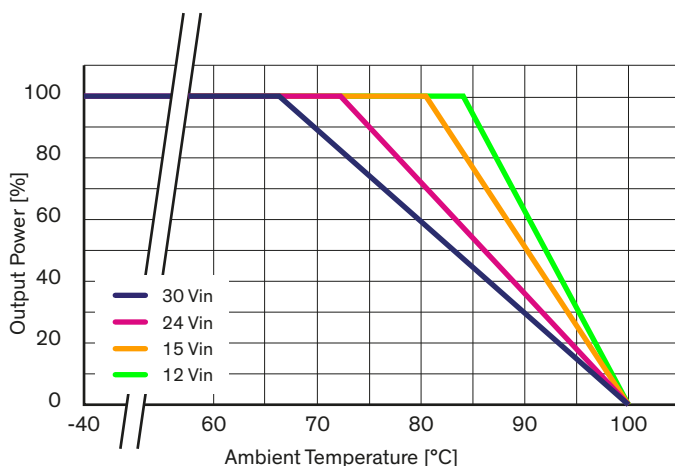
| | |
|-----------------------|--------------------|
| Input current no load | 1 mA typ. |
| Input filter | internal capacitor |

Output Specifications

| | | |
|--|----------------------------|--|
| Voltage set accuracy | | ±2 % max. |
| Regulation | – Input variation | 0.5 % max. |
| | – Load variation 0 – 100 % | 1 % max. |
| Ripple and noise (20 MHz Bandwidth) | | 50 mVp-p typ. for Vout ≤ 6.5 VDC 75 mVp-p typ. for Vout ≥ 9.0 VDC |
| Start up time (constant resistive load) | | 5 ms typ. |
| Dynamic load response (50% load step change) | 9, 12 & 15 VDC models: | 150 μs typ. response time |
| | | 300 mV typ. peak deviation |
| | other models: | 150 mV typ. peak deviation |
| Short circuit protection | | continuous, automatic recovery |
| Overload protection (hiccup mode) | 5 Vin models: | 8.0 A |
| | other models: | 3.6 A |

General Specifications

| | | |
|--|--|--|
| Temperature ranges | <div>– Operating (convection cooling 20LFM, 0,1m/s)</div> <div>– Case temperature</div> <div>– Storage temperature</div> | <div>–40°C to +85°C</div> <div>+105°C max.</div> <div>–55°C to +125°C</div> |
| Derating | | see graph below |
| Humidity (non condensing) | | 5 - 95 % rel H max. |
| Shock and vibration | | acc MIL-STD-810F |
| Temperature coefficient | | ±0.02 %/K typ. |
| Reliability, calculated MTBF (MIL-HDBK-217F at +25°C, ground benign) | | 13'520'000 h |
| Switching frequency (Pulse frequency modulation) | <div>5 Vin models:</div> <div>other models:</div> | <div>1200 kHz typ.</div> <div>410 kHz typ.</div> |
| Environmental compliance | <div>– Reach</div> <div>– RoHS</div> | <div>www.tracopower.com/overview/tsr2</div> <div>RoHS directive 2011/65/EU</div> |

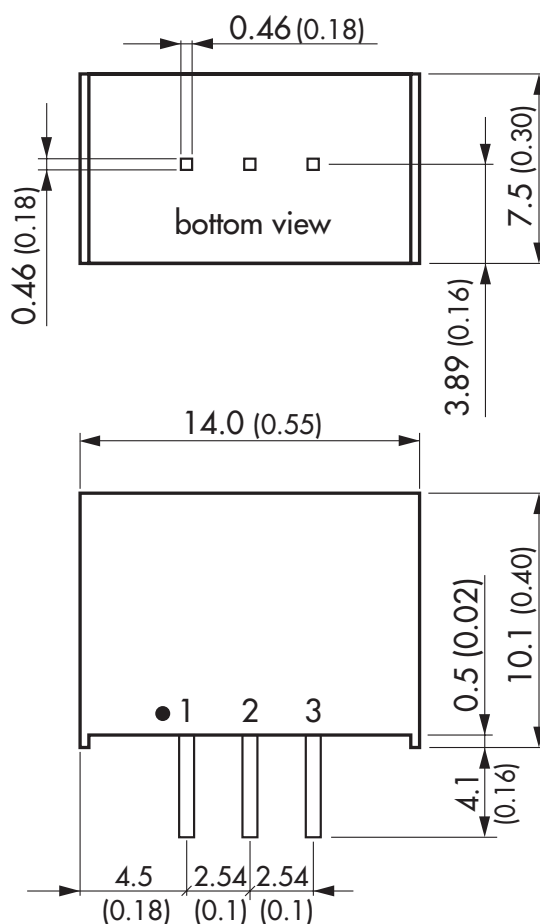


All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

Physical Specifications

| | |
|-----------------------|---------------------------|
| Casing material | plastic, non-conducting |
| Potting material | Silicone (UL 94V-0 rated) |
| Package weight | 2.6g (0.092oz) |
| Soldering temperature | max. 260°C / 10 sec. |

Outline Dimensions



| Pin-Out | |
|---------|--------|
| Pin | Single |
| 1 | +Vin |
| 2 | GND |
| 3 | +Vout |

Dimensions in [mm], () = Inch

Tolerances: x.xx ±0.5 (±0.02)

x.xxx ±0.25 (±0.01)

Pin pitch tolerances ±0.25 (±0.01)

pin dimension tolerance ±0.1 (±0.004)

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TRACO Power:

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