

- ◆ 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.	
				@ Vin min.	@ Vin max.
TSR 2-0512	3.0 - 5.5 VDC	1.2 VDC	2.0 A	90 %	88 %
TSR 2-0515	3.0 - 5.5 VDC	1.5 VDC		91 %	90.5 %
TSR 2-0518	3.0 - 5.5 VDC	1.8 VDC		92 %	90 %
TSR 2-0525	3.8 - 5.5 VDC	2.5 VDC		93.5 %	93 %
TSR 2-2412	4.6 - 36 VDC*	1.2 VDC		84 %	75 %
TSR 2-2415	4.6 - 36 VDC*	1.5 VDC		79 %	67 %
TSR 2-2418	4.6 - 36 VDC*	1.8 VDC		82 %	70 %
TSR 2-2425	4.6 - 36 VDC*	2.5 VDC		87 %	75 %
TSR 2-2433	4.75 - 36 VDC*	3.3 VDC		91 %	86 %
TSR 2-2450	6.5 - 36 VDC*	5 VDC		94 %	89 %
TSR 2-2465	9.0 - 36 VDC*	6.5 VDC		94 %	89 %
TSR 2-2490	12 - 36 VDC*	9 VDC		95 %	90 %
TSR 2-24120	15 - 36 VDC*	12 VDC		95 %	92 %
TSR 2-24150	18 - 36 VDC*	15 VDC		96 %	94 %

* For input voltage higher than 32 VDC an input capacitor 22 μ F / 50 V is required.



Input Specifications

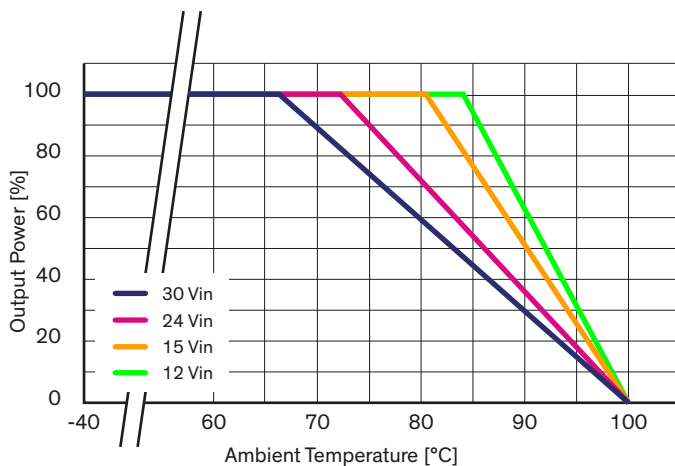
Input current no load	1 mA typ.
Input filter	internal capacitor

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 $V_{out} \leq 6.5$ VDC 75 mVp-p typ. for $V_{out} \geq 9.0$ VDC
Start up time (constant resistive load)	5 ms max.
Dynamic load response (50% load step change)	150 μ s typ. response time 9, 12 & 15 VDC models: 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
Capacitive load	270 μ F max.

General Specifications

Temperature ranges	– Operating (convection cooling 20LFM, 0,1m/s) – Case temperature – Storage temperature	–40°C to +85°C +105°C max. –55°C to +125°C
Derating		see graph below
Over temperature protection		internal
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	5 Vin models: other models:	1200 kHz typ. 410 kHz typ.
Safety standards		UL 60950-1 IEC/EN 60950-1 www.tracopower.com/overview/tsr2
Environmental compliance	– Reach – RoHS	www.tracopower.com/overview/tsr2 RoHS directive 2011/65/EU

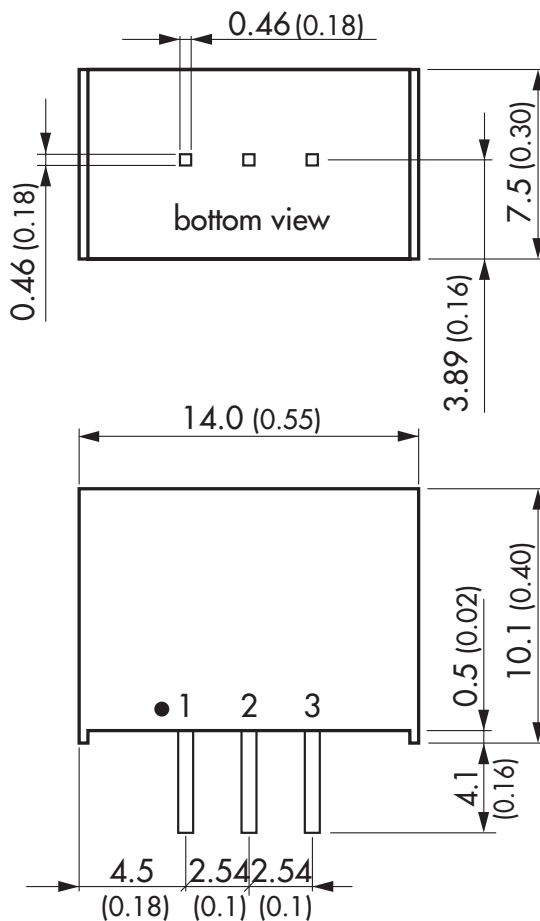


All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

Physical Specifications

Casing material	plastic, non-conducting FR4 (UL 94V-0 rated)
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)

Specifications can be changed without notice! Make sure you are using the latest documentation, downloadable at www.tracopower.com