

Features

- ◆ Compact SMD package
- ◆ Very high efficiency up to 97%
- ◆ Excellent line / load regulation
- ◆ Low standby current
- ◆ Operating temperature range -40 to 90°C
- ◆ Over-temperature protection
- ◆ Remote On/Off input
- ◆ Adjustable output voltage
- ◆ Short circuit protection
- ◆ Moisture sensitivity level 2 as per IPC J-STD-020D.1
- ◆ 3-year product warranty



TSR-0.5SM is a series of step-down non-isolated switching regulators in compact SIP package. These converters are an ideal alternative to LM78 linear regulators when energy efficiency is a parameter of the design. The high efficiency up to 97 % allows full load operation up to +80°C (+90°C with 50% load) ambient temperature without the need of forced aircooling.

Excellent output voltage accuracy and low standby current are other features that distinguish switching regulators from linear regulators.

Models

| Order code | Input voltage range ¹⁾ | Output voltage | | Output current max. | Efficiency typ. | |
|-----------------|-----------------------------------|----------------|--------------------------|------------------------|-----------------|-------------|
| | | nominal | trim range ²⁾ | | @ Vin min. | @ Vin 32VDC |
| TSR 0.5-2415SM | 4.75 – 32 VDC | 1.5 VDC | 1.4 – 2.5 VDC | 0.5 A | 73 % | 63 % |
| TSR 0.5-2418SM | | 1.8 VDC | 1.5 – 3.0 VDC | | 82 % | 71 % |
| TSR 0.5-2425SM | | 2.5 VDC | 1.5 – 3.0 VDC | | 87 % | 77 % |
| TSR 0.5-2433SM | | 3.3 VDC | 3.0 – 5.5 VDC | | 91 % | 81 % |
| TSR 0.5-2450SM | 6.5 – 32 VDC | 5.0 VDC | 3.0 – 8.0 VDC | | 94 % | 86 % |
| TSR 0.5-2465SM | 8 – 32 VDC | 6.5 VDC | 3.3 – 11.0 VDC | | 95 % | 88 % |
| TSR 0.5-2490SM | 11 – 32 VDC | 9.0 VDC | 4.5 – 12.6 VDC | | 96 % | 92 % |
| TSR 0.5-24120SM | 15 – 32 VDC | 12 VDC | 4.5 – 13.5 VDC | | 97 % | 94 % |
| TSR 0.5-24150SM | 18 – 32 VDC | 15 VDC | 4.5 – 15.5 VDC | | 97 % | 95 % |

1) For input voltage higher 24 VDC an input capacitor 22 µF/ 50 V is required

2) Input voltage must be higher than output voltage set: >1.5 V for 3.3–5.0V and >3 V for 6.5–15.0V

Input Specifications

| | |
|----------------------------------|--|
| No load input current (at 24Vin) | 5 mA typ. |
| Short circuit input power | 1.5 W max. |
| Surge voltage | -0.3 / 34 VDC max. |
| Input filter | internal capacitor, see filter suggestion page 3 for to meet EN55022 class A, class B |
| ESD (electrostatic discharge) | EN 61000-4-2, air ± 8 kV, perf. criteria A |
| Radiated immunity | EN 61000-4-3 3 V/m, perf. criteria A |
| Fast transient | EN 61000-4-4, ± 0.5 kV, perf. criteria A with external input capacitor e.g. Nippon chemi-con KY 330 μ F, 100 V |
| Conducted immunity | EN 61000-4-6, 3 Vrms, perf. criteria A |
| Magnetic field immunity | EN 61000-4-8, 3 A/m, perf. criteria A |

Output Specifications

| | |
|-------------------------------------|--|
| Voltage set accuracy | ± 3 % (at full load) |
| Regulation | <ul style="list-style-type: none"> - Input variation 1.5 to 6.5 Vin models: 0.4 % <li style="padding-left: 100px;">other models: 0.2 % - Load variation (10 – 100 %) 1.5 to 6.5 Vin models: 0.6 % <li style="padding-left: 100px;">other models: 0.4 % |
| Minimum load | not required |
| Ripple and noise | <ul style="list-style-type: none"> 1.5 to 6.5 Vin models: 30 mVp-p max. other models: 40 mVp-p max. |
| Temperature coefficient | ± 0.015 %/K max. |
| Dynamic load (50% load step change) | <ul style="list-style-type: none"> - Peak variation ± 2 % max. - Response time 100 μS max. |
| Short circuit protection | continuous, automatic recovery |
| Capacitive load | 220 μ F max. |

General Specifications

| | |
|---|--|
| Temperature ranges | <ul style="list-style-type: none"> - Operating -40°C to +90°C - Case temperature +100°C max. - Storage -55°C to +125°C |
| Derating | - positive output circuit 5 %/K above +80°C |
| Overtemperature protection | at +160°C (on internal IC) |
| Humidity (non condensing) | 95 % rel H max. |
| Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign) | >2'000'000 h |
| Isolation voltage | none |
| Switching frequency | 330 kHz ± 50 kHz (pulse width modulation) |
| Remote On/Off | <ul style="list-style-type: none"> - On: 2.4 – 5.0 VDC (ref. to GND) or open circuit. - Off: 0 – 1.6 VDC (ref. to GND) or connect. to GND - Off idle current (at 24 Vin): 35 μA max. |
| Environmental compliance | <ul style="list-style-type: none"> - Reach www.tracopower.com/products/reach-declaration.pdf - RoHS RoHS directive 2011/65/EU |

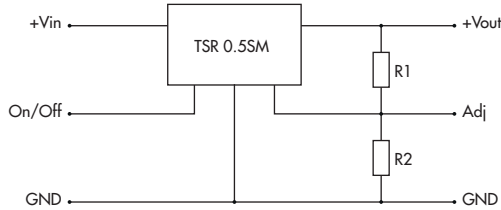
Physical Specifications

| | |
|----------------------------------|---|
| Casing material | non-conductive plastic (UL94V-0 rated) |
| Pin material | phosphor bronze |
| Weight | 1.7 g (0.6 oz) |
| Lead-free reflow solder process | as per J-STD-020D.01 |
| Moisture sensitivity level (MSL) | level 2 as per IPC J-STD-020D.1 (to find at: www.jedec.org - free registration required) |
| Washing | baking after washing: 100°C for 30 min. |
| Packaging | www.tracopower.com/products/tsr0.5sm-pack.pdf |

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

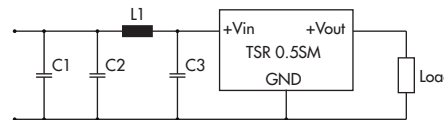
Applications notes

Output voltage adjustment



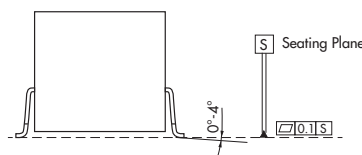
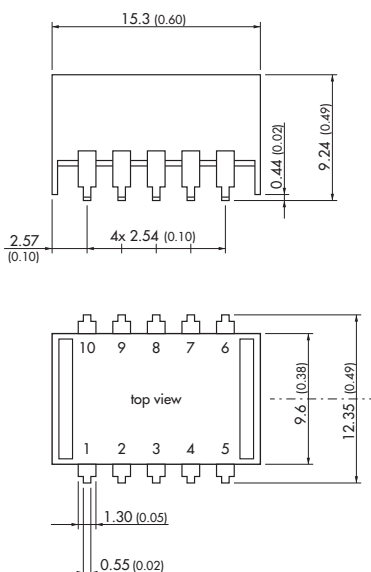
| | R1 [KOhm] | open | | | R2 [KOhm] |
|-----------------|--------------|---------|---------|----------|--------------|
| | | Min. | Nominal | Max. | |
| TSR 0.5-2415SM | 1.0 | 1.4 VDC | 1.5 VDC | 2.5 VDC | 0.47 |
| TSR 0.5-2418SM | 3 | 1.5 VDC | 1.8 VDC | 3.0 VDC | 4.64 |
| TSR 0.5-2425SM | 0.2 | 1.5 VDC | 2.5 VDC | 3.0 VDC | 44.2 |
| TSR 0.5-2433SM | 88.4 | 3.0 VDC | 3.3 VDC | 5.5 VDC | 3.9 |
| TSR 0.5-2450SM | 17 | 3.0 VDC | 5.0 VDC | 8.0 VDC | 2.32 |
| TSR 0.5-2465SM | 15 | 3.3 VDC | 6.5 VDC | 11 VDC | 0.825 |
| TSR 0.5-2490SM | 26 | 4.5 VDC | 9.0 VDC | 12.6 VDC | 0 |
| TSR 0.5-24120SM | 17 | 4.5 VDC | 12 VDC | 13.5 VDC | 57.6 |
| TSR 0.5-24150SM | 10.5 | 4.5 VDC | 15 VDC | 15.5 VDC | 300 |

EMI filter for EN 55022 class A & B

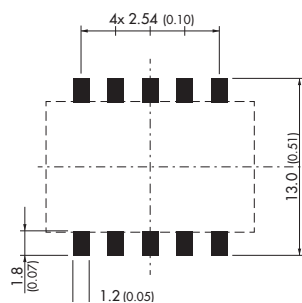


| Class | C1 | C2 & C3 | L1 value | order code (SMD type) | datasheet: |
|-------|-------------------------|-------------------------|-------------|--------------------------|--|
| A | - | 4.7 µF / 50 V 1206 MLCC | 3.3 µH | TCK-044 | www.tracopower.com/products/tck044.pdf |
| B | 4.7 µF / 50 V 1206 MLCC | | 10 µH | TCK-047 | www.tracopower.com/products/tck047.pdf |

Outline Dimensions



Recommended solder pad:



| Pinout | |
|--------|--------|
| 1 | +Vin |
| 2 | +Vin |
| 3 | GND |
| 4 | +Vout |
| 5 | +Vout |
| 6 | adj. |
| 7 | GND |
| 8 | GND |
| 9 | GND |
| 10 | On/Off |

Dimensions in [mm], () = Inch
Tolerances: ±0.5 (±0.02)
Pin pitch tolerances: ±0.25 (±0.01)

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



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- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
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- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



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