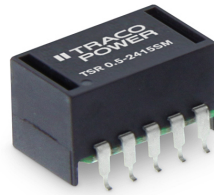




**THE DATASHEET OF
TSR 0.5-2450SM**



- 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 and short circuit protection
- Remote On/Off input
- Adjustable output voltage
- Moisture sensitivity level 2 as per IPC J-STD-033C
- 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 $+80^{\circ}\text{C}$ ($+90^{\circ}\text{C}$ with 50% load) ambient temperature without the need of forced air cooling. Excellent output voltage accuracy and low standby current are other features that distinguish switching regulators from linear regulators.

| Models | | | | |
|-----------------|---------------------|-----------------------------|----------------------------------|-------------------------|
| Order Code | Output Current max. | Input Voltage Range | Output Voltage nom. (adjustable) | Efficiency typ. |
| TSR 0.5-2415SM | 500 mA | 4.75 - 32 VDC (24 VDC nom.) | 1.5 VDC (1.4 - 2.5 VDC) | 73 % (at V_{in} min.) |
| TSR 0.5-2418SM | | | 1.8 VDC (1.5 - 3.0 VDC) | 82 % (at V_{in} min.) |
| TSR 0.5-2425SM | | | 2.5 VDC (1.5 - 3.0 VDC) | 87 % (at V_{in} min.) |
| TSR 0.5-2433SM | | | 3.3 VDC (3.0 - 5.5 VDC) | 91 % (at V_{in} min.) |
| TSR 0.5-2450SM | | | 5 VDC (3.0 - 8.0 VDC) | 94 % (at V_{in} min.) |
| TSR 0.5-2465SM | | | 6.5 VDC (3.3 - 11.0 VDC) | 95 % (at V_{in} min.) |
| TSR 0.5-2490SM | | | 9 VDC (4.5 - 12.6 VDC) | 96 % (at V_{in} min.) |
| TSR 0.5-24120SM | | | 12 VDC (4.5 - 13.5 VDC) | 97 % (at V_{in} min.) |
| TSR 0.5-24150SM | | | 15 VDC (4.5 - 15.5 VDC) | 97 % (at V_{in} min.) |

Note - For input voltage higher 28 VDC an input capacitor of 22 μF is required

Input Specifications

| | | |
|---------------------------|--------------|---|
| Input Current | - At no load | 5 mA typ. |
| Surge Voltage | | 34 VDC max. (1 s max.) |
| Recommended Input Fuse | | (The need of an external fuse has to be assessed in the final application.) |
| Input Filter | | Internal Capacitor |
| Short Circuit Input Power | | 1.5 W max. |

Output Specifications

| | | |
|--|---------------------------------|---|
| Output Voltage Adjustment | | 1.5 Vout models: 1.4 - 2.5 VDC 1.8 Vout models: 1.5 - 3.0 VDC 2.5 Vout models: 1.5 - 3.0 VDC 3.3 Vout models: 3.0 - 5.5 VDC 5 Vout models: 3.0 - 8.0 VDC 6.5 Vout models: 3.3 - 11.0 VDC 9 Vout models: 4.5 - 12.6 VDC 12 Vout models: 4.5 - 13.5 VDC 15 Vout models: 4.5 - 15.5 VDC (By external trim resistor) See application note: www.tracopower.com/overview/tsr0-5sm |
| Voltage Set Accuracy | | ±3% max. |
| Regulation | - Input Variation (Vmin - Vmax) | 0.2% max. (9, 12 & 15 Vout models) 0.4% max. (other models) |
| | - Load Variation (10 - 100%) | 0.4% max. (9, 12 & 15 Vout models) 0.6% max. (other models) |
| Ripple and Noise (20 MHz Bandwidth) | | 1.5 Vout models: 30 mVp-p max. 1.8 Vout models: 30 mVp-p max. 2.5 Vout models: 30 mVp-p max. 3.3 Vout models: 30 mVp-p max. 5 Vout models: 30 mVp-p max. 6.5 Vout models: 30 mVp-p max. 9 Vout models: 40 mVp-p max. 12 Vout models: 40 mVp-p max. 15 Vout models: 40 mVp-p max. |
| Capacitive Load | | 220 µF max. |
| Minimum Load | | Not required |
| Temperature Coefficient | | ±0.015 %/K max. |
| Short Circuit Protection | | Continuous, Automatic recovery |
| Transient Response | - Response Deviation | 2% max. (50% Load Step) |
| | - Response Time | 100 µs max. (50% Load Step) |

EMC Specifications

| | | |
|---------------|-----------------------------|--|
| EMI Emissions | - Conducted Emissions | EN 55032 class B (with external filter) FCC Part 15 class B (with external filter) |
| | - Radiated Emissions | EN 55032 class B (internal filter) FCC Part 15 class B (internal filter) |
| | | External filter proposal: www.tracopower.com/overview/tsr0-5sm |
| EMS Immunity | - Electrostatic Discharge | Air: EN 61000-4-2, ±8 kV, perf. criteria A |
| | - RF Electromagnetic Field | EN 61000-4-3, 3 V/m, perf. criteria A |
| | - EFT (Burst) | EN 61000-4-4, ±0.5 kV, perf. criteria A |
| | | Ext. input component: Nippon chemi-con KY 330 µF, 100 V |
| | - Conducted RF Disturbances | EN 61000-4-6, 3 Vrms, perf. criteria A |
| | - PF Magnetic Field | Continuous: EN 61000-4-8, 3 A/m, perf. criteria A |

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

General Specifications

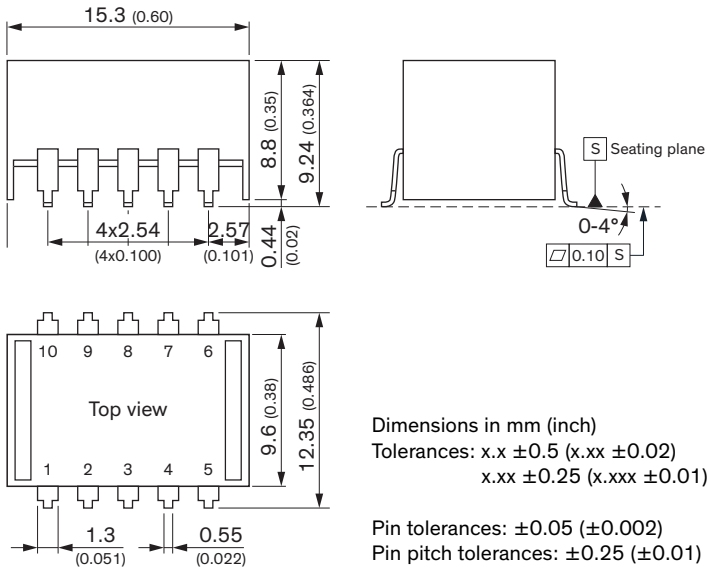
| | | |
|--|--|---|
| Relative Humidity | | 95% max. (non condensing) |
| Temperature Ranges | - Operating Temperature - Case Temperature - Storage Temperature | -40°C to +90°C +100°C max. -55°C to +125°C |
| Power Derating | - High Temperature | 5 %/K above 80°C See application note: www.tracopower.com/overview/tsr0-5sm |
| Over Temperature Protection Switch Off | - Protection Mode - Measurement Point | 160°C typ. (Automatic recovery) Internal IC temperature |
| Cooling System | | Natural convection (20 LFM) |
| Remote Control | - Voltage Controlled Remote (passive = on) - Off Idle Input Current | On: 2.4 to 5.0 VDC or open circuit Off: 0 to 1.6 VDC or short circuit Refers to 'Remote' and 'GND' Pin 0.035 mA max. |
| Switching Frequency | | 280 - 380 kHz (PWM) 330 kHz typ. (PWM) |
| Insulation System | | Non-isolated |
| Reliability | - Calculated MTBF | 2'000'000 h (MIL-HDBK-217F, ground benign) |
| Moisture Sensitivity (MSL) | | Level 2 (J-STD-033C) |
| Washing Process | | According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf |
| Housing Material | | Non-conductive Plastic (UL 94 V-0 rated) |
| Pin Material | | Phosphor Bronze (C5191) |
| Pin Foundation Plating | | Copper (1 - 3 µm) |
| Pin Surface Plating | | Tin (7.5 µm min.), matte |
| Housing Type | | Plastic Case |
| Mounting Type | | PCB Mount |
| Connection Type | | SMD (Surface-Mount Device) |
| Footprint Type | | SMD10 |
| Soldering Profile | | Lead-Free Reflow Soldering (acc. J-STD-020E) See application note: www.tracopower.com/info/reflow-soldering.pdf |
| Weight | | 1.7 g |
| Environmental Compliance | - REACH Declaration - RoHS Declaration - SCIP Reference Number | www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant www.tracopower.com/info/rohs-declaration.pdf Exemptions: 7a (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule.)) e0a18ff4-ad10-4a4c-9291-ed6dcd37c4d5 |

Supporting Documents

| | |
|--|--|
| Overview Link (for additional Documents) | www.tracopower.com/overview/tsr0-5sm |
|--|--|

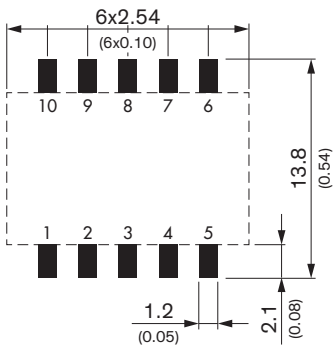
All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

Outline Dimensions





| Pinout | |
|--------|---------------|
| Pin | Function |
| 1 | +Vin |
| 2 | +Vin |
| 3 | GND |
| 4 | +Vout |
| 5 | +Vout |
| 6 | Trim |
| 7 | GND |
| 8 | GND |
| 9 | GND |
| 10 | Remote On/Off |

Recommended Solder Pad Layout



Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

-  [View TSR 0.5-2450SM on WIN SOURCE](#)
-  [Traco Power Information](#)

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-  Shortage Management
-  Alternative Solution
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