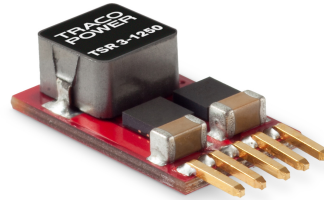


- High performance 3 Amp. switching regulator
- Suitable for positive & negative output circuit
- High efficiency up to 95 %
- Adjustable output voltages
- Wide input voltage ranges 2.5–5.5, 4.5–14 and 10–30 VDC
- Short circuit protection
- Remote On/Off input
- Low output ripple & noise
- 3-year product warranty



The TSR 3 models are non isolated step down switching regulators. Since production May 2013 they can also be operated with negative output voltage. They come in a very compact open frame package of 15.5 x 9.4 x 6.2mm. The high efficiency of up to 95% admits a full load operation up to 50°C and up to 85°C with 50% current reduction. A low standby current, a very wider input range and no requirement for heatsink give these switching regulators a significant advantage over linear regulators. Together with a remote On/Off input and protection against short circuit the TSR 3 Series models are ideal point of load regulators for high reliable and energy critical applications.

Models

| Order Code | Output Current max. | Input Voltage Range | Output Voltage nom. (adjustable) | Efficiency typ. |
|-------------|---------------------|----------------------------|----------------------------------|--------------------|
| TSR 3-0533 | 3'000 mA | 2.5 - 5.5 VDC (5 VDC nom.) | 0.6 VDC (0.6 - 3.3 VDC) | 95 % (at 2.5 Vout) |
| TSR 3-1250 | | 4.5 - 14 VDC (12 VDC nom.) | 0.6 VDC (0.6 - 6.0 VDC) | 93 % (at 3.3 Vout) |
| TSR 3-2450 | | 10 - 30 VDC (24 VDC nom.) | 3 VDC (3.0 - 6.0 VDC) | 91 % (at 5.0 Vout) |
| TSR 3-24150 | | | 5 VDC (5.0 - 15.0 VDC) | 95 % (at 12 Vout) |

Options

| | |
|-----------------|--|
| Suffix A | - Optional models with angular pins (see outline dimensions) |
|-----------------|--|

Note - TSR 3-1250: max. 9 Vin if Vout < 0.9 VDC
 - For external circuit proposal for negative output voltage, refer to application note

Input Specifications

| | | |
|--------------------------|----------------|--|
| Input Current | - At no load | 5 Vin models: 20 mA typ. 12 Vin models: 25 mA typ. 24 Vin models: 25 mA typ. (at Vin nom.) |
| | - At full load | 5 Vin models: 3'000 mA max. 12 Vin models: 2'600 mA max. 24 Vin models: 2'200 mA max. (3 Vout model) 3'000 mA max. (5 Vout model) (at Vin min.) |
| Reflected Ripple Current | | 5 Vin models: 30 mAp-p typ. 12 Vin models: 30 mAp-p typ. 24 Vin models: 30 mAp-p typ. (24 Vin models: Ext. filter, see application note) |
| Recommended Input Fuse | | 5 Vin models: 5'000 mA (slow blow) 12 Vin models: 5'000 mA (slow blow) 24 Vin models: 5'000 mA (slow blow) (The need of an external fuse has to be assessed in the final application.) |
| Input Filter | | Internal Capacitor |

Output Specifications

| | | |
|--|--|---|
| Output Voltage Adjustment | | 0.6 Vout models: 0.6 - 3.3 VDC 0.6 - 6.0 VDC 3 Vout models: 3.0 - 6.0 VDC 5 Vout models: 5.0 - 15.0 VDC (By external trim resistor) See application note: www.tracopower.com/overview/tsr3 (TSR 3-0533: Vin at least 0.5 V higher than Vout TSR 3-1250: Vin at least 2 V higher than Vout TSR 3-24150: Vin at least 3 V higher than Vout) |
| Voltage Set Accuracy | | ±2% max. |
| Regulation | - Input Variation (Vmin - Vmax) - Load Variation (10 - 90%) | 0.2% max. (Vout >2.5 VDC) 5 mV typ. (Vout <2.5 VDC) 0.8% max. (Vout >2.5 VDC) 15 mV typ. (Vout <2.5 VDC) |
| Ripple and Noise (20 MHz Bandwidth) | | 5 Vin models: 50 mVp-p typ. 12 Vin models: 50 mVp-p typ. 3 Vout models: 75 mVp-p typ. 5 Vout models: 150 mVp-p typ. |
| Capacitive Load | | 0.6 Vout models: 1'000 µF max. 3 Vout models: 1'000 µF max. 5 Vout models: 500 µF max. (ESR >1 mOhm) |
| Minimum Load | | Not required |
| Temperature Coefficient | | ±1 %/K max. |
| Start-up Overshoot Voltage | | 1% max. |
| Short Circuit Protection | | Continuous, Automatic recovery |
| Output Current Limitation | | 280% typ. of Iout max. (5 Vin models) 220% typ. of Iout max. (other models) |
| Transient Response | - Peak Variation - Response Time | 250 mV typ. / 500 mV max. (50% Load Step) (5,0 Vout model) 150 mV typ. / 250 mV max. (50% Load Step) (other models) 120 µs typ. / 220 µs max. (50% Load Step) |

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

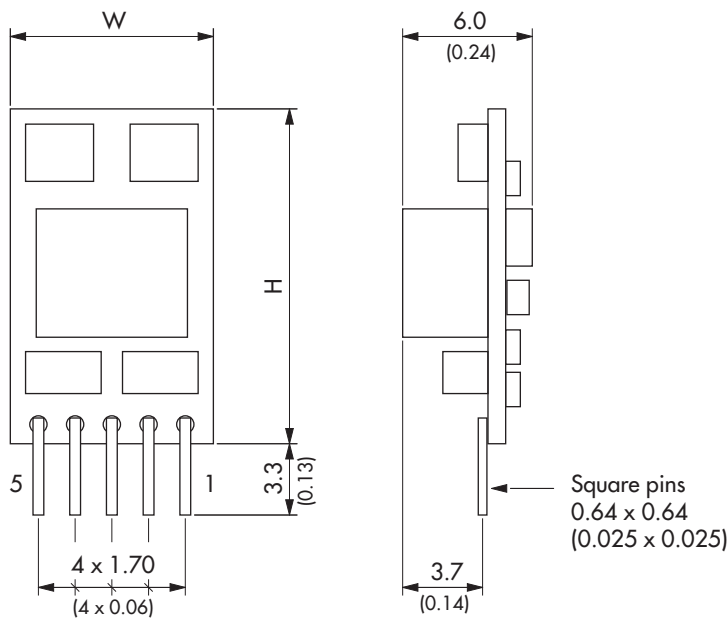
| General Specifications | | |
|-------------------------------|-----------------------------|--|
| Relative Humidity | | 95% max. (non condensing) |
| Temperature Ranges | - Operating Temperature | -40°C to +85°C |
| | - Storage Temperature | -55°C to +125°C |
| Power Derating | - High Temperature | See application note: www.tracopower.com/overview/tsr3 |
| Cooling System | | Natural convection (20 LFM) |
| Remote Control | - Voltage Controlled Remote | On: 1 to 12 VDC or open circuit Off: 0 to 0.3 VDC Refers to 'Remote' and 'GND' Pin |
| | - Off Idle Input Current | 1.5 mA typ. (0.6 Vout models) 6 mA typ. (other models) (5 Vin model: 5.5 V or open circuit for On-state) |
| Switching Frequency | | 540 - 660 kHz (5 Vin & 12 Vin models) 270 - 330 kHz (24 Vin models) |
| Insulation System | | Non-isolated |
| Reliability | - Calculated MTBF | 4'500'000 h (MIL-HDBK-217F, ground benign) |
| Environment | - Thermal Shock | MIL-STD-810F |
| Pin Material | | Copper |
| Pin Foundation Plating | | Nickel (3 - 5 µm) |
| Pin Surface Plating | | Gold (50 - 75 nm), matte |
| Housing Type | | Open Frame |
| Mounting Type | | PCB Mount |
| Connection Type | | THD (Through-Hole Device) |
| Footprint Type | | SIP5 |
| Weight | 5 Vin models: | 1.7 g |
| | 12 Vin models: | 1.7 g |
| | 24 Vin models: | 2.1 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). The SCIP number is provided on request.) |

| Supporting Documents | |
|--|--|
| Overview Link (for additional Documents) | www.tracopower.com/overview/tsr3 |

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

Outline Dimensions

Standard version



| Pinout | | |
|--------|---------------|----------|
| Pin | positive | negative |
| 1 | Remote On/Off | |
| 2 | +Vin (Vcc) | |
| 3 | GND | -Vout |
| 4 | +Vout | GND |
| 5 | Trim | |

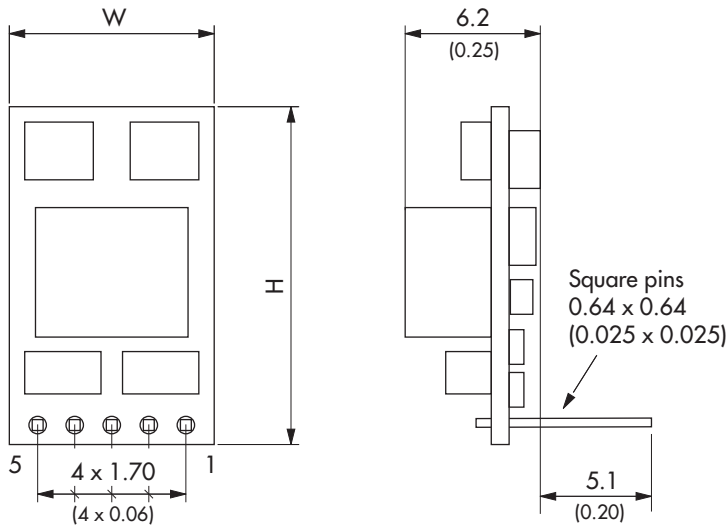
TSR 3-0533 & TSR 3-1250: W=9.4 (0.37) H=15.5 (0.61)
 TSR 3-2450 & TSR 3-24150: W=10.4 (0.41) H=16.5 (0.65)

(Component allocation is model specific)

Dimensions in mm (inch)
 Tolerances: ± 0.5 (± 0.02)
 Pin pitch Tolerance ± 0.25 (± 0.01)
 Pin profile Tolerance ± 0.1 (± 0.004)

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

Optional version with angular pins (Suffix A)



| Pinout | | |
|--------|---------------|----------|
| Pin | positive | negative |
| 1 | Remote On/Off | |
| 2 | +Vin (Vcc) | |
| 3 | GND | -Vout |
| 4 | +Vout | GND |
| 5 | Trim | |

TSR 3-0533 & TSR 3-1250: W=9.4 (0.37) H=15.5 (0.61)

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(Component allocation is model specific)

Dimensions in mm (inch)

Tolerances: ± 0.5 (± 0.02)

Pin pitch Tolerance ± 0.25 (± 0.01)

Pin profile Tolerance ± 0.1 (± 0.004)

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[M](#) [10C24-N250-I5](#) [10C24-P125](#) [10C24-P250-I5](#) [6A24-P20-I10-F-M-25PPM](#) [1A24-P30-F-M-C](#) [TSR 1-24150SM](#) [1/2AA24-N30-I10](#) [1C24-](#)
[N125](#) [12C24-N250](#) [V7806-1500](#) [PTV12020LAH](#) [PTV05010WAH](#) [PTN04050CAZT](#) [PTH12020WAD](#) [PTH12020LAS](#) [PTH05050YAH](#)
[PTH05T210WAH](#)