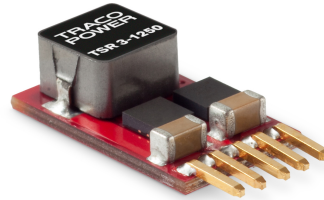


- High performance 3 Amp. switching regulator
- Suitable for positive & negative output circuit
- High efficiency up to 95 %
- Adjustable output voltages
- Wide input voltage ranges 2.5–5.5, 4.5–14 and 10–30 VDC
- Short circuit protection
- Remote On/Off input
- Low output ripple & noise
- 3-year product 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   |  |
|---|--|
| on demand<br>(backorder with MOQ non stocking item) | - 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: <b>20 mA typ.</b><br>12 Vin models: <b>25 mA typ.</b><br>24 Vin models: <b>25 mA typ.</b><br>(at Vin nom.)  |
|                          | - At full load | 5 Vin models: <b>3'000 mA max.</b><br>12 Vin models: <b>2'600 mA max.</b><br>24 Vin models: <b>2'200 mA max.</b> (3 Vout model)<br><b>3'000 mA max.</b> (5 Vout model)<br>(at Vin min.) |
| Reflected Ripple Current |                | 5 Vin models: <b>30 mAp-p typ.</b><br>12 Vin models: <b>30 mAp-p typ.</b><br>24 Vin models: <b>30 mAp-p typ.</b><br>(24 Vin models: Ext. filter, see application note)                  |
| Recommended Input Fuse   |                | 5 Vin models: <b>5'000 mA</b> (slow blow)<br>12 Vin models: <b>5'000 mA</b> (slow blow)<br>24 Vin models: <b>5'000 mA</b> (slow blow)   |
| Input Filter             |                | <b>Internal Capacitor</b>   |

## Output Specifications

|  |  |   |
|--|--|---|
| Output Voltage Adjustment              |  | 0,6 Vout models: <b>0.6 - 3.3 VDC</b><br><b>0.6 - 6.0 VDC</b><br>3 Vout models: <b>3.0 - 6.0 VDC</b><br>5 Vout models: <b>5.0 - 15.0 VDC</b><br>(By external trim resistor)<br>See application note: <a href="http://www.tracopower.com/overview/tsr3">www.tracopower.com/overview/tsr3</a><br>(TSR 3-0533: Vin at least 0.5 V higher than Vout<br>TSR 3-1250: Vin at least 2 V higher than Vout<br>TSR 3-24150: Vin at least 3 V higher than Vout) |
| Voltage Set Accuracy                   |  | <b>±2% max.</b>   |
| Regulation                             | - Input Variation (Vmin - Vmax)<br><br>- Load Variation (10 - 90%) | <b>0.2% max.</b> (Vout >2.5 VDC)<br><b>5 mV typ.</b> (Vout <2.5 VDC)<br><b>0.8% max.</b> (Vout >2.5 VDC)<br><b>15 mV typ.</b> (Vout <2.5 VDC)   |
| Ripple and Noise<br>(20 MHz Bandwidth) |  | 0,6 Vout models: <b>50 mVp-p typ.</b><br>3 Vout models: <b>75 mVp-p typ.</b><br>5 Vout models: <b>150 mVp-p typ.</b>  |
| Capacitive Load                        |  | 0,6 Vout models: <b>1'000 µF max.</b><br>3 Vout models: <b>1'000 µF max.</b><br>5 Vout models: <b>500 µF max.</b><br>(ESR >1 mOhm)  |
| Minimum Load                           |  | <b>Not required</b>   |
| Temperature Coefficient                |  | <b>±1 %/K max.</b>  |
| Start-up Overshoot Voltage             |  | <b>1% max.</b>  |
| Short Circuit Protection               |  | <b>Continuous, Automatic recovery</b>   |
| Output Current Limitation              |  | <b>280% typ. of Iout max.</b><br>(5 Vin models)<br><b>220% typ. of Iout max.</b> (other models)   |
| Transient Response                     | - Peak Variation<br><br>- Response Time                            | <b>250 mV typ. / 500 mV max.</b> (50% Load Step)<br>(5,0 Vout model)<br><b>150 mV typ. / 250 mV max.</b> (50% Load Step)<br>(other models)<br><b>120 µs typ. / 220 µs max.</b> (50% Load Step)  |

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

## General Specifications

|                          |   |  |
|--------------------------|---|--|
| Relative Humidity        |   | 95% max. (non condensing)  |
| Temperature Ranges       | - Operating Temperature<br>- Storage Temperature            | -40°C to +85°C<br>-55°C to +125°C  |
| Power Derating           | - High Temperature  | 1.57 %/K above 50°C  |
| Cooling System           |   | Natural convection (20 LFM)  |
| Remote Control           | - Voltage Controlled Remote<br><br>- Off Idle Input Current | On: 1 to 12 VDC or open circuit<br>Off: 0 to 0.3 VDC<br>Refers to 'Remote' and 'GND' Pin<br>1.5 mA typ. (0.6 Vout models)<br>6 mA typ. (other models)<br>(5 Vin model: 5.5 V or open circuit for On-state)                         |
| Switching Frequency      |   | 540 - 660 kHz (5 Vin & 12 Vin models)<br>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   |
| Connection Type          |   | THD (Through-Hole Device)  |
| Weight                   | - 5 Vin input<br>- 12 Vin input<br>- 24 Vin input           | 0.6 Vout models: 1.7 g<br>0.6 Vout models: 1.7 g<br>3 Vout models: 2.1 g<br>5 Vout models: 2.1 g   |
| Environmental Compliance | - Reach<br>- RoHS   | <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a><br><a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a> |

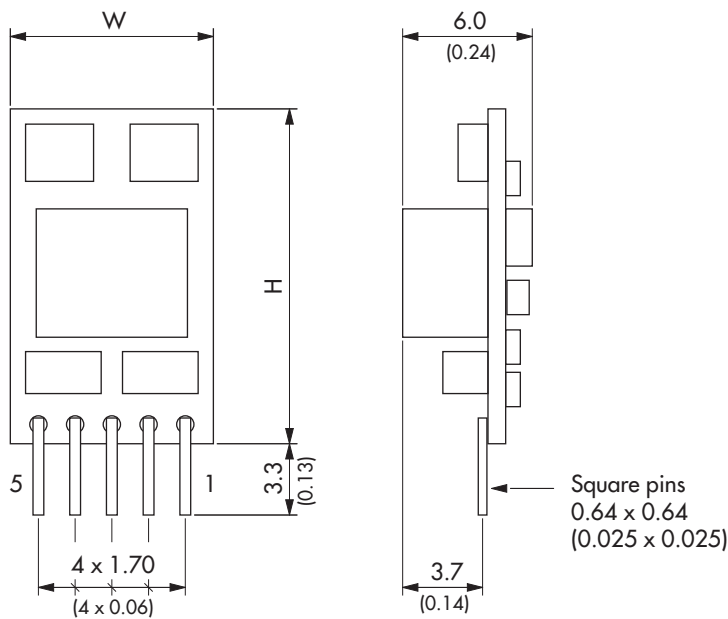
## Supporting Documents

|  |  |
|--|--|
| Overview Link (for additional Documents) | <a href="http://www.tracopower.com/overview/tsr3">www.tracopower.com/overview/tsr3</a> |
|--|--|

All specifications valid at nominal voltage, 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          |          |

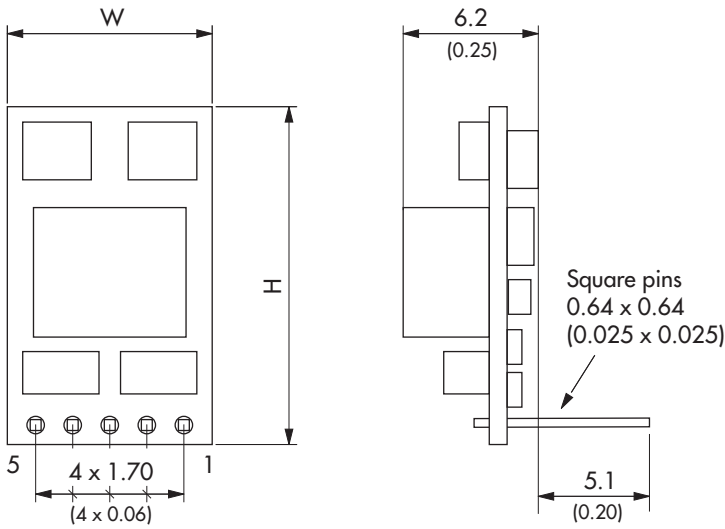
TSR 3-0533 & TSR 3-1250: W=9.4 (0.37) H=15.5 (0.61)  
 TSR 3-2450 & TSR 3-24150: W=10.4 (0.41) H=16.5 (0.65)

(Component allocation is model specific)

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

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

### Optional version with angular pins



| 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:  $\pm 0.5$  ( $\pm 0.02$ )

Pin pitch Tolerance  $\pm 0.25$  ( $\pm 0.01$ )

Pin profile Tolerance  $\pm 0.1$  ( $\pm 0.004$ )

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