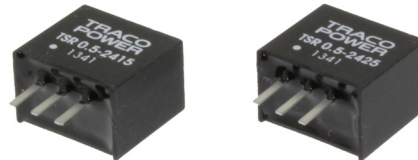


Features

- ◆ Compact SIP 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



TSR-0.5 is a series of step-down non-isolated switching regulators in compact SIP package. These converters are an ideal drop-in replacement 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 0.5-2415 | 4.75 – 32 VDC | 1.5 VDC | – | 0.5 A | 73 % | 63 % |
| TSR 0.5-2418 | | 1.8 VDC | 1.5 – 3.0 VDC | | 82 % | 71 % |
| TSR 0.5-2425 | | 2.5 VDC | 1.5 – 3.0 VDC | | 87 % | 77 % |
| TSR 0.5-2433 | | 3.3 VDC | 3.0 – 5.5 VDC | | 91 % | 81 % |
| TSR 0.5-2450 | 6.5 – 32 VDC | 5.0 VDC | 3.0 – 8.0 VDC | | 94 % | 86 % |
| TSR 0.5-2465 | 8 – 32 VDC | 6.5 VDC | 3.3 – 11 VDC | | 95 % | 88 % |
| TSR 0.5-2490 | 11 – 32 VDC | 9.0 VDC | 4.5 – 12.6 VDC | | 96 % | 92 % |
| TSR 0.5-24120 | 15 – 32 VDC | 12 VDC | 4.5 – 15 VDC | | 97 % | 94 % |
| TSR 0.5-24150 | 18 – 32 VDC | 15 VDC | – | | 97 % | 95 % |

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

Input Specifications

| | |
|---|---|
| No load input current (at 24V _{in}) | 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 |

Output Specifications

| | | | | | | | | | |
|--|--|------------------------------------|--|-----------------|---------------------|-------------------------------|--|--|---------------------|
| Voltage set accuracy | ±3 % (at full load) | | | | | | | | |
| Regulation | <table> <tr> <td>- Input variation</td> <td>1.5 to 6.5 V_{in} models: 0.4 %</td> </tr> <tr> <td></td> <td>other models: 0.2 %</td> </tr> <tr> <td>- Load variation (10 – 100 %)</td> <td>1.5 to 6.5 V_{in} models: 0.6 %</td> </tr> <tr> <td></td> <td>other models: 0.4 %</td> </tr> </table> | - Input variation | 1.5 to 6.5 V _{in} models: 0.4 % | | other models: 0.2 % | - Load variation (10 – 100 %) | 1.5 to 6.5 V _{in} models: 0.6 % | | other models: 0.4 % |
| - Input variation | 1.5 to 6.5 V _{in} models: 0.4 % | | | | | | | | |
| | other models: 0.2 % | | | | | | | | |
| - Load variation (10 – 100 %) | 1.5 to 6.5 V _{in} models: 0.6 % | | | | | | | | |
| | other models: 0.4 % | | | | | | | | |
| Minimum load | not required | | | | | | | | |
| Ripple and noise | <table> <tr> <td>1.5 to 6.5 V_{in} models:</td> <td>30 mVp-p max.</td> </tr> <tr> <td>other models:</td> <td>40 mVp-p max.</td> </tr> </table> | 1.5 to 6.5 V _{in} models: | 30 mVp-p max. | other models: | 40 mVp-p max. | | | | |
| 1.5 to 6.5 V _{in} models: | 30 mVp-p max. | | | | | | | | |
| other models: | 40 mVp-p max. | | | | | | | | |
| Temperature coefficient | ±0.015 %/K max. | | | | | | | | |
| Dynamic load (50% load step change) | <table> <tr> <td>- Peak variation</td> <td>±2 % max.</td> </tr> <tr> <td>- Response time</td> <td>100 μS max.</td> </tr> </table> | - Peak variation | ±2 % max. | - Response time | 100 μS max. | | | | |
| - Peak variation | ±2 % max. | | | | | | | | |
| - Response time | 100 μS max. | | | | | | | | |
| Short circuit protection | continuous, automatic recovery | | | | | | | | |
| Current limitation | 1.0 A max. | | | | | | | | |
| Capacitive load | 220 μF max. | | | | | | | | |

General Specifications

| | | | | | | | |
|---|--|-------------|--|--------------------|---------------------------|-----------|-----------------|
| Temperature ranges | <table> <tr> <td>- Operating</td> <td>-40°C to +90°C</td> </tr> <tr> <td>- Case temperature</td> <td>+100°C. max.</td> </tr> <tr> <td>- Storage</td> <td>-55°C to +125°C</td> </tr> </table> | - Operating | -40°C to +90°C | - Case temperature | +100°C. max. | - Storage | -55°C to +125°C |
| - 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) | | | | | | |
| Environmental compliance | <table> <tr> <td>- Reach</td> <td>www.tracopower.com/products/reach-declaration.pdf</td> </tr> <tr> <td>- RoHS</td> <td>RoHS directive 2011/65/EU</td> </tr> </table> | - Reach | www.tracopower.com/products/reach-declaration.pdf | - RoHS | RoHS directive 2011/65/EU | | |
| - 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 | alloy 42 |
| Weight | 1.95 g (0.69 oz) |
| Lead temperature | 260°C |
| Washing | baking after washing: 100°C for 30 min. |

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

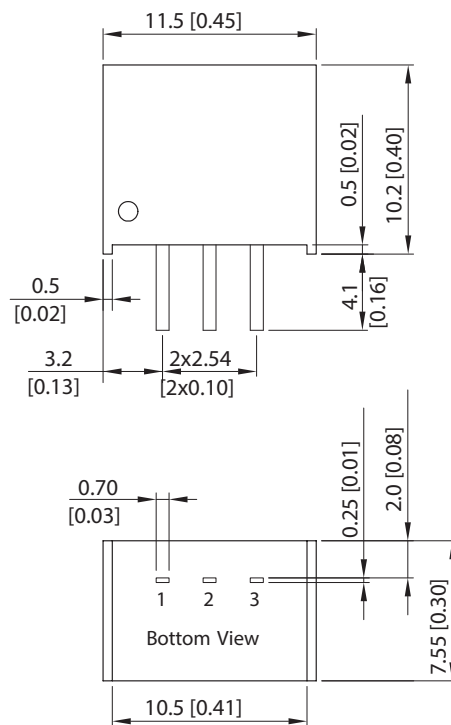
Applications notes

EMI filter for EN 55022 class A & B



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

Outline Dimensions



| Pinout | |
|--------|-------|
| 1 | +Vin |
| 2 | GND |
| 3 | +Vout |

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