

Features

- Step-down Switching Regulator with very high Efficiency
- Adjustable Output 1.8 – 3.3 VDC or 3.0 – 5.0 VDC
- Remote ON/OFF
- Overload Protection
- Low Output Noise
- Standby Current only 100 μ A
- Small SIL- or DIL-Package
- 3 Year Product Warranty



This new generation of step-down converters provides designers with a cost-effective solution for converting a 5, 12 or 24 VDC voltage. To achieve highest efficiency, these dc/dc converters are using newest technologies, as amorphous ferrite, solid aluminum capacitors and a synchronous commutation IC. A very high efficiency allows operation without additional heatsink. This product finds many applications in distributed powersystems where a voltage conversion at the point of load is an required.

| Models | | | | | |
|---------------|---------------------|----------------|---------------------|-----------------|---------|
| Ordercode | Input voltage range | Output voltage | Output current max. | Efficiency typ. | Package |
| TSI 10N-0510 | 4.75 – 13.6 VDC | * + 3.3 VDC | 2000 mA | 92.0 % | SIP |
| TSI 10N-0510D | 4.75 – 13.6 VDC | * + 3.3 VDC | 2000 mA | 92.0 % | DIP |
| TSI 10N-1211 | 6.0 – 16.5 VDC | ** + 5 VDC | 2000 mA | 93.0 % | SIP |
| TSI 10N-1211D | 6.0 – 16.5 VDC | ** + 5 VDC | 2000 mA | 93.0 % | DIP |
| TSI 10N-2410 | 16.0 – 28.0 VDC | * + 3.3 VDC | 2000 mA | 83.0 % | SIP |
| TSI 10N-2410D | | * + 3.3 VDC | 2000 mA | 83.0 % | DIP |
| TSI 10N-2411 | | ** + 5 VDC | 2000 mA | 85.0 % | SIP |
| TSI 10N-2411D | | ** + 5 VDC | 2000 mA | 85.0 % | DIP |

* Output adjustable 1.8 to 3.3 VDC

** Output adjustable 3.0 to 5.0 VDC

Input Specifications

| | | |
|-----------------------|--------------|---------------------|
| Input current | TSI 10N-0510 | 21mA / 1435 mA typ. |
| (no load / full load) | TSI 10N-1211 | 27 mA / 895 mA typ. |
| | TSI 10-N2410 | 45 mA / 330 mA typ. |
| | TSI 10N-2411 | 45 mA / 485 mA typ. |

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| Surge voltage (1 sec max.) | 5 Vin models | 16 V max. |
| | 12 Vin models | 25 V max. |
| | 24 Vin models | 30 V max. |

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| Stand-by current | 100 µA typ. |
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Output Specifications

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| Voltage adjustment | TSI 10N-0510 & TSI 10N-2410 TSI 10N-1211 & TSI 10N-2411 | +1.8 VDC to +3.3 VDC +3.0 VDC to +5.0 VDC |
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| Regulation | - Input variation | 0.5 % |
| | - Load variation 10 – 100 % | < 1.5 % |

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| Ripple and noise (20 MHz Bandwidth) | 50 mVpk-pk max. (with 2.2µF capacitor on output) |
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| Transient response time (50% Load change) | 100 µsec typ. |
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| Temperature coefficient | ± 0.02 % / °C |
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| Short circuit protection | indefinite foldback |
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| Remote ON/OFF control | ON=Pin 1 (ON/OFF Pin) to pin 3 (GND) open (3 – 5 VDC) OFF=Pin 1 (ON/OFF Pin) to pin 3 (GND) short (– 0.3 – 1.2 VDC) |
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General Specifications

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| Temperature ranges | - Operating | - 25 °C ... + 70 °C |
| | - Storage | - 25 °C ... +125 °C |

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| Humidity (non condensing) | 95 % rel H max. |
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| Reliability, calculated MTBF (MIL-HDBK-217 E) | >1'500'000 h @ 25 °C |
|---|----------------------|

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|------------------------|------|
| Isolation Input/Output | none |
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|---------------------|-------------------------------|
| Switching frequency | 300 kHz typ. (PWM modulation) |
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Physical Specifications

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|---------------------------|--|
| Vibration (IEC 60068-3-6) | 5 to 10 Hz amplitude 10 mm pk-pk 10 to 55 Hz acceleration 2 G |
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|-----------------------|-----------------------------------|
| Shock (IEC 6068-2-27) | acceleration 20 G max. time 11 ms |
|-----------------------|-----------------------------------|

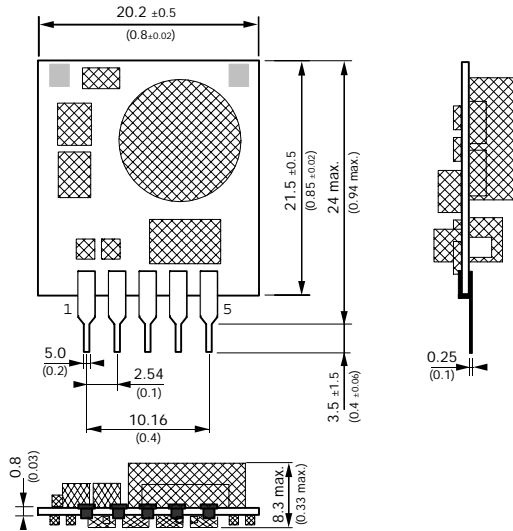
| | |
|----------------|---------------|
| Package weight | 4 g (0.14 oz) |
|----------------|---------------|

| | |
|-----------------------|----------------------|
| Soldering temperature | 235°C max. / 10 sec. |
|-----------------------|----------------------|

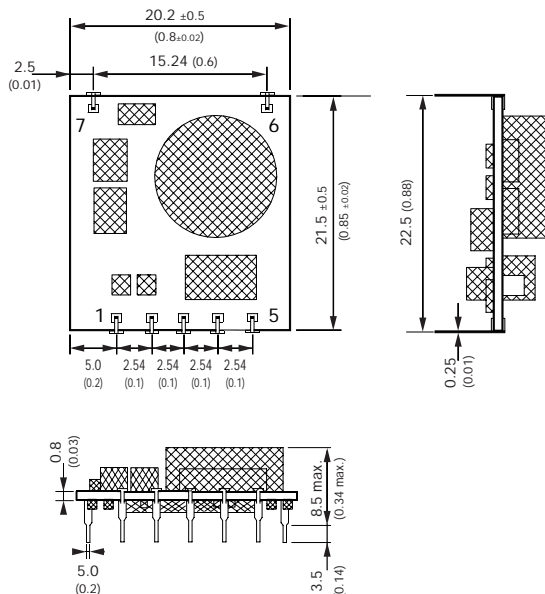
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

Outline Dimensions mm (inches)

SIP Package



DIP Package

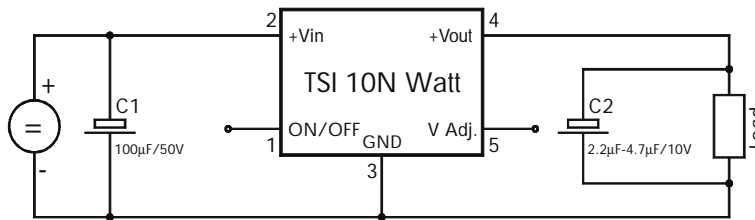


Pin-Out

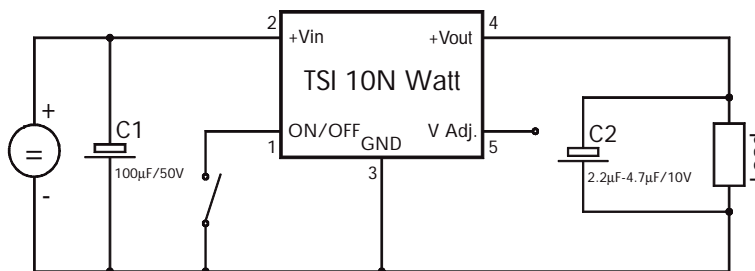
| Pin | SIP | DIP |
|-----|-----------------------------|-----------------------------|
| 1 | Remote on/off | Remote on/off |
| 2 | +V Input (Vcc) | +V Input (Vcc) |
| 3 | -V Input (GND) -V Output | -V Input (GND) -V Output |
| 4 | +V Output | +V Output |
| 5 | V Output adj. | V Output adj. |
| 6 | | No Con. |
| 7 | | No Con. |

Connections

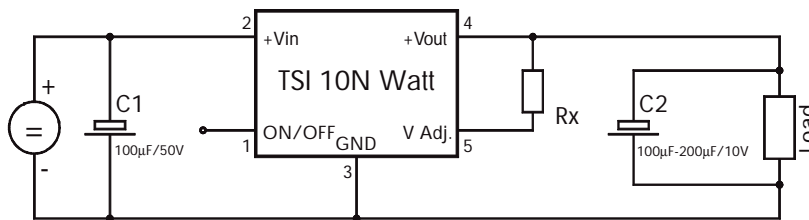
Normal Connection (Standard)



Remote ON/OFF Connection



Output Voltage Adjustment Connection



$$R_x = \frac{R_1 \cdot 1200 \cdot (V_{out} - 1.195)}{R_1 \cdot 1.195 - 1200 \cdot (V_{out} - 1.195)}$$

TSI 10N-xx10 ==> R1 = 2130 Ohm
Output Voltage (Vout) = 1.8 - 3.3VDC

TSI 10N-xx11 ==> R1 = 3840 Ohm
Output Voltage (Vout) = 3.0 - 5.0VDC

Vout = adjusted output voltage

Specifications can be changed without notice