



Features

- ◆ Small SMD package with standard footprint
- ◆ I/O- isolation 1500 VDC
- ◆ Single and dual output models
- ◆ Input voltage 5, 12 and 24 VDC
- ◆ High efficiency up to 80%
- ◆ Operating temperature range -40 to +85°C
- ◆ High accuracy of pin co-planarity
- ◆ Qualified for leadfree reflow solder process according IPC/JEDEC J-STD-020C
- ◆ Available in tape and reel package
- ◆ 3 year product warranty



With their small footprint these 1Watt DC/DC converters are an ideal and economical solution for many applications where an isolated voltage is required. Typical applications are ground loop elimination, noise reduction, voltage isolation in digital interfaces and voltage conversion in distributed power systems. With a new package design these converters are qualified for the higher temperatures requested by lead-free reflow solder processes. For automated SMD production lines the devices can be supplied in standard tape and reel package.

Models

| Order code | Input voltage | Output voltage | Output current max. | Efficiency typ. |
|------------|---------------|----------------|---------------------|-----------------|
| TES 1-0511 | 5 VDC ±10% | 5 VDC | 200 mA | 78 % |
| TES 1-0512 | | 12 VDC | 85 mA | 78 % |
| TES 1-0513 | | 15 VDC | 65 mA | 79 % |
| TES 1-0521 | | ±5 VDC | ±100 mA | 74 % |
| TES 1-0522 | | ±12 VDC | ± 40 mA | 78 % |
| TES 1-0523 | | ±15 VDC | ± 35 mA | 78 % |
| TES 1-1211 | 12 VDC ±10% | 5 VDC | 200 mA | 76 % |
| TES 1-1212 | | 12 VDC | 85 mA | 79 % |
| TES 1-1213 | | 15 VDC | 65 mA | 80 % |
| TES 1-1221 | | ±5 VDC | ±100 mA | 74 % |
| TES 1-1222 | | ±12 VDC | ± 40 mA | 78 % |
| TES 1-1223 | | ±15 VDC | ± 35 mA | 79 % |
| TES 1-2411 | 24 VDC ±10% | 5 VDC | 200 mA | 78 % |
| TES 1-2412 | | 12 VDC | 85 mA | 77 % |
| TES 1-2413 | | 15 VDC | 65 mA | 79 % |
| TES 1-2421 | | ± 5 VDC | ±100 mA | 73 % |
| TES 1-2422 | | ±12 VDC | ± 40 mA | 78 % |
| TES 1-2423 | | ±15 VDC | ± 35 mA | 78 % |

Input Specifications

| | |
|----------------------------------|---|
| Input current no load /full load | 5 Vin models: 30 mA / 260 mA typ. 12 Vin models: 15 mA / 110 mA typ. 24 Vin models: 8 mA / 55 mA typ. |
| Surge voltage (1 sec. max.) | 5 Vin models: 9 V max. 12 Vin models: 18 V max. 24 Vin models: 30 V max. |
| Reverse voltage protection | 0.3 A max. |
| Input filter | internal capacitors |

Output Specifications

| | |
|---|---|
| Voltage set accuracy | ±2 % (at 60% load) |
| Voltage balance (dual output models) | ±1 % max. |
| Regulation – Input variation – Load variation | 1.2 % / 1 % change Vin see graph below |
| Ripple and noise (20 MHz Bandwidth) | 120 mVpk-pk max. |
| Temperature coefficient | ± 0.02 % / °C |
| Short circuit protection | limited 0.5 sec. max. |
| Capacitive load | 33 µF max. |

General Specifications

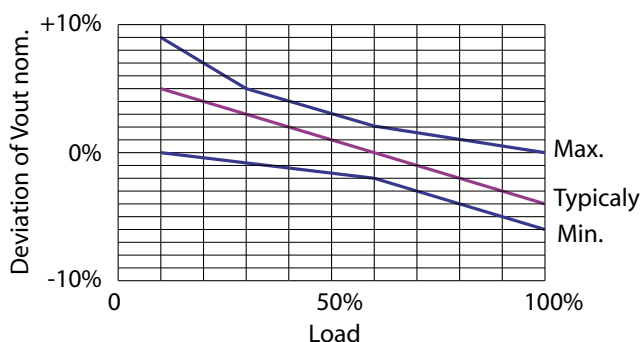
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|---|---|
| Temperature ranges – Operating (see also enclosed derating curve) – Storage | –40 °C ... +85 °C (no derating) –55 °C ... +125 °C |
| Humidity (non condensing) | 95 % rel H max. |
| Reliability, calculated MTBF (MIL-HDBK-217E) | >2'000'000 h @ 25 °C |
| Isolation voltage (60sec) – Input/Output | 1'500 VDC |
| Isolation capacity – Input/Output | 40 pF typ. |
| Isolation resistance – Input/Output | >1'000 Mohm |
| Switching frequency | 100 kHz typ. (frequency modulation) |
| Frequency change over line and load | ± 30 % |

Physical Specifications

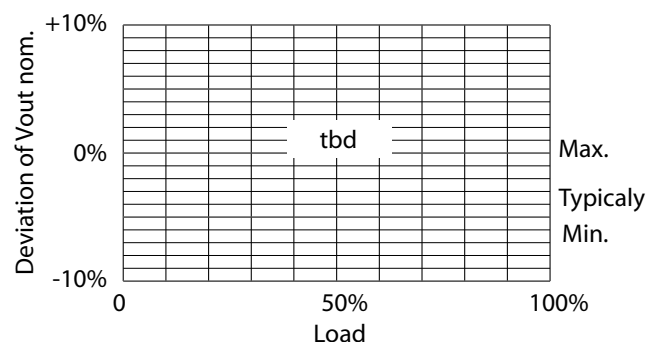
| | |
|--------------------------|--|
| Case material | epoxy molding compound (flammability to UL 94V-0 rated) |
| Package weight | single output models: 1.7 g (0.04 oz) dual output models: 2.0 g (0.05 oz) |
| Reflow soldering profile | as per IPC/JEDEC J-STD-020C |

Output voltage variation dependent on load (at nominal input voltage)

5 VDC models:



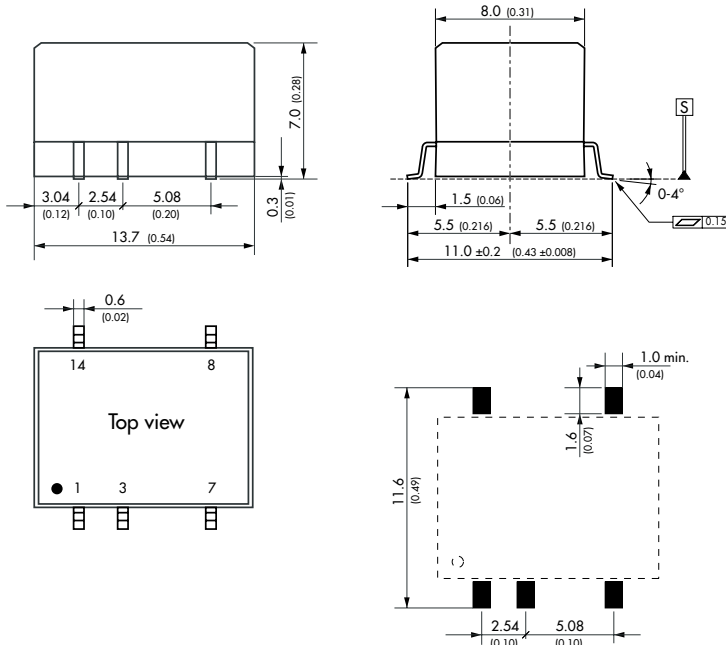
other models:



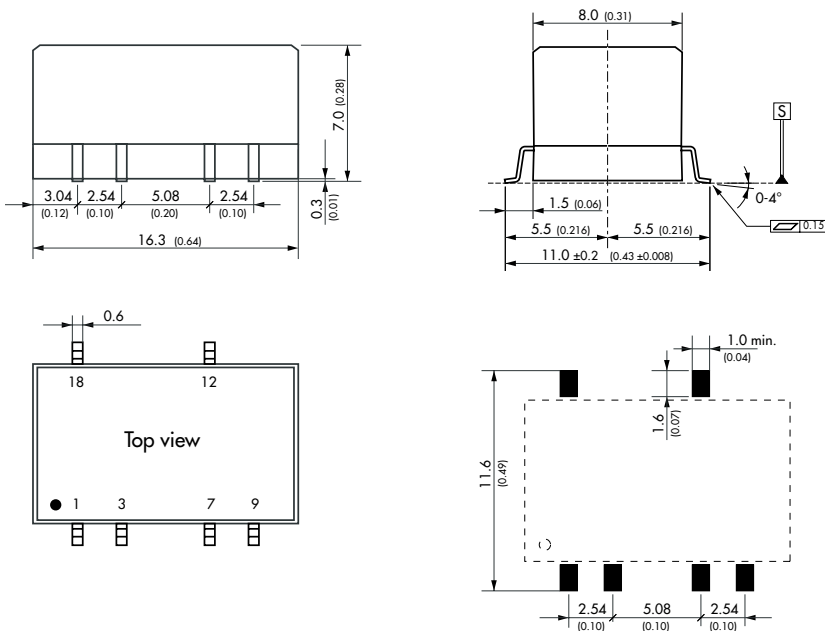
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

Outline and Solder Pad Dimensions

TES 1 Single Output Models



TES 1 Dual Output Models



| Pin-Out | |
|---------|------------|
| Pin | Single |
| 1 | -Vin (GND) |
| 3 | +Vin (Vcc) |
| 7 | -Vout |
| 8 | +Vout |
| 14 | *NC |

* Pin to be isolated from circuitry

| Pin-Out | |
|---------|------------|
| Pin | Dual |
| 1 | -Vin (GND) |
| 3 | +Vin (Vcc) |
| 7 | Common |
| 9 | -Vout |
| 12 | +Vout |
| 18 | *NC |

* Pin to be isolated from circuitry

Dimensions in [mm], () = Inch
Pin pitch tolerances: ±0.10 (±0.004)
Other tolerances: ±0.25 (±0.01)

Specifications can be changed any time without notice