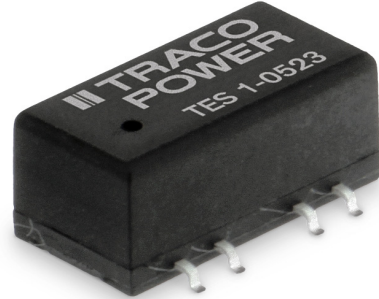


Features

- ◆ Small SMD package with standard footprint
- ◆ I/O isolation 1500 VDC
- ◆ Unregulated device
- ◆ Single and dual output models
- ◆ Input voltage 5, 12 and 24 VDC
- ◆ High efficiency up to 80%
- ◆ Operating temperature range -40°C to +90°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 1-0510 | 5 VDC ±10% (nominal 5 VDC) | 3.3 VDC | 300 mA | 73 % |
| TES 1-0511 | | 5 VDC | 200 mA | 78 % |
| TES 1-0519 | | 9 VDC | 110 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% (nominal 12 VDC) | 5 VDC | 200 mA | 76 % |
| TES 1-1219 | | 9 VDC | 110 mA | 78 % |
| 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% (nominal 24 VDC) | 5 VDC | 200 mA | 78 % |
| TES 1-2419 | | 9 VDC | 110 mA | 77 % |
| 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

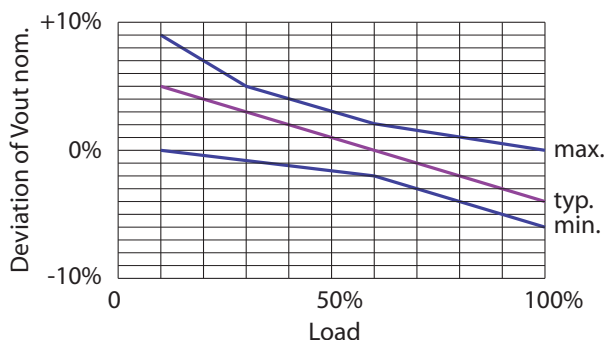
| | |
|---|---|
| Voltage set accuracy | - 5 VDC models: $\pm 2\%$ at 60 % load - other models: $\pm 2\%$ at 100 % load |
| Voltage balance (dual output models, balanced load) | $\pm 1\%$ max. |
| Regulation | - Input variation - Load variation |
| Ripple and noise (20 MHz Bandwidth) | 120 mVpp max. |
| Temperature coefficient | $\pm 0.02\%/K$ |
| Short circuit protection | limited 0.5 sec. max. |
| Capacitive load | 33 μ F max. (each output) |

General Specifications

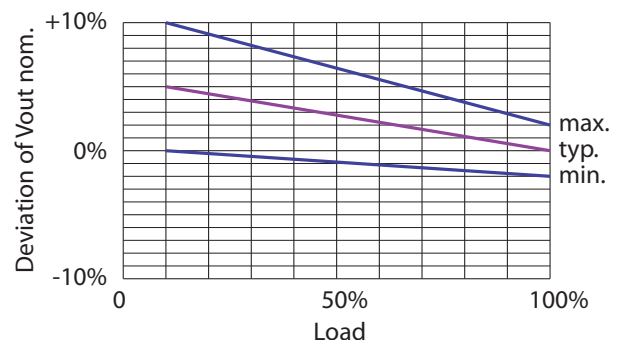
| | | |
|---|------------------------------------|---|
| Temperature ranges | - Operating - Storage - Case | -40°C to +90°C -50°C to +125°C +105°C max. |
| Derating (convection cooling) | | 3.3 %/K above +75°C |
| Humidity (non condensing) | | 95 % rel. H max. |
| Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign) | | >2'000'000 h |
| Isolation voltage (60sec.) | - Input/Output | 1'500 VDC |
| Isolation capacitance | - 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 | | $\pm 30\%$ |
| Environmental compliance | - Reach - RoHS | www.tracopower.com/overview/tes1 RoHS directive 2011/65/EU |

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.

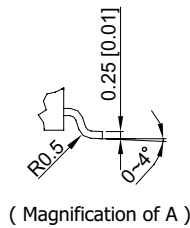
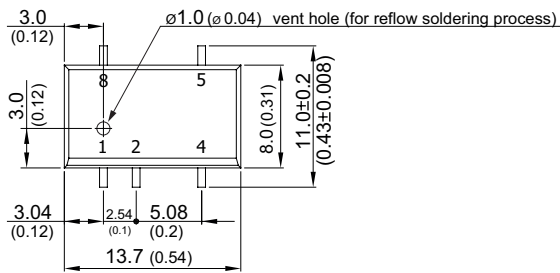
Physical Specifications

| | | |
|---------------------------------|---|--------------|
| Casing material | plastic (UL94V-0 rated) | |
| Weight | single output models: 1.7 g (0.06oz) dual output models: 2.0 g (0.08oz) | |
| Lead-free reflow solder process | as per J-STD-020D.1 (to find at: www.jedec.org - free registration required) | |
| | Peak package body temperature: | 245°C |
| Moisture sensivity level (MSL) | level 2 as per J-STD-033B.1 (to find at: www.jedec.org - free registration required) | |
| Washing process | not recommended. Product non-hermetical | |

Supporting documents: www.tracopower.com/overview/tes1

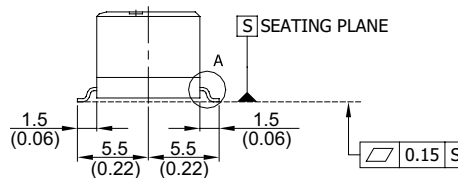
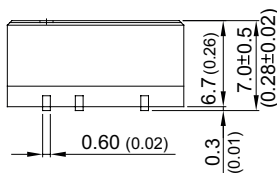
Outline and Solder Pad Dimensions

TES 1 Single Output Models

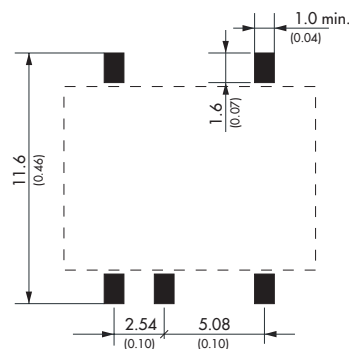


| Pin-Out | |
|---------|------------|
| Pin | Single |
| 1 | -Vin (GND) |
| 2 | +Vin (Vcc) |
| 4 | -Vout |
| 5 | +Vout |
| 8 | *NC |

* Pin to be isolated from circuitry



Solder Pad Dimension



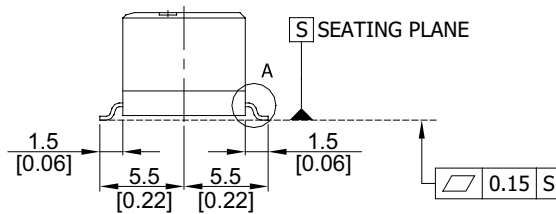
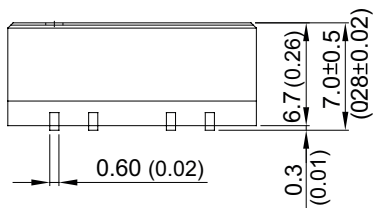
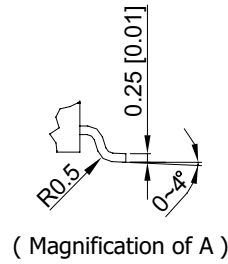
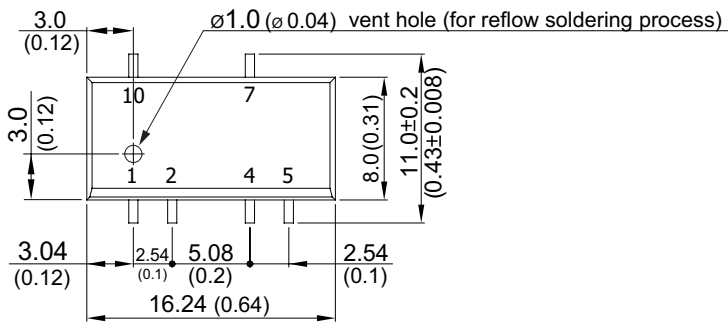
Dimensions in [mm], () = Inch
Pin pitch tolerances: ±0.10 (±0.004)
Other tolerances: ±0.25 (±0.01)

Outline and Solder Pad Dimensions

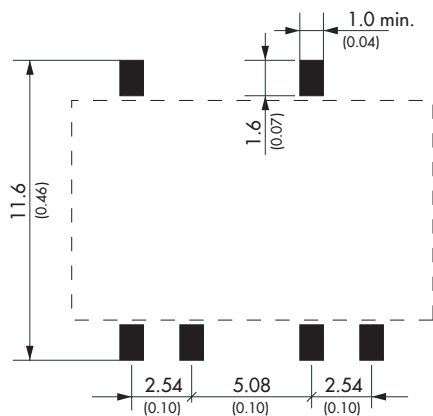
TES 1 Dual Output Models

| Pin-Out | |
|---------|------------|
| Pin | Dual |
| 1 | -Vin (GND) |
| 2 | +Vin (Vcc) |
| 4 | Common |
| 5 | -Vout |
| 7 | +Vout |
| 10 | *NC |

* Pin to be isolated from circuitry



Solder Pad Dimension



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

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