



Features

- ◆ Compact low Profile SMD Package
- ◆ Wide 2:1 Input Voltage Range
- ◆ I/O Isolation 1500VDC
- ◆ Operating Temp. Range -40°C to 85°C max.
- ◆ Short Circuit Protection
- ◆ Remote On/Off
- ◆ High Accuracy of Pin Co-Planarity
- ◆ Lead free Design – RoHS compliant
- ◆ 3 Years Product Warranty



The TES-5 series is a new range of high performance 5W dc-dc converter modules in low profile SMD package with compact dimensions of only 33.4 x 20.6 x 10.2 mm. The 18 available models feature wide 2:1 input voltage range and tightly regulated output voltage. High efficiency allows operating temperatures up to 71°C at full load.

Further features are built-in EMI-filter to meet EN 55022, class A and FCC, level A without additional components and remote On/Off control. The products are qualified for soldering in a high temperature lead-free reflow solder process. Typical applications for these converters are battery powered equipment, instrumentation, communication systems and industrial controls.

Models

| Ordercode | Input voltage range | Output voltage | Output current max. | Efficiency typ. |
|------------|---------------------------------|----------------|---------------------|-----------------|
| TES 5-1210 | 9 – 18 VDC (12 VDC nominal) | 3.3 VDC | 1200 mA | 76 % |
| TES 5-1211 | | 5 VDC | 1000 mA | 80 % |
| TES 5-1212 | | 12 VDC | 420 mA | 83 % |
| TES 5-1213 | | 15 VDC | 335 mA | 83 % |
| TES 5-1221 | | ± 5 VDC | ± 500 mA | 80 % |
| TES 5-1222 | | ± 12 VDC | ± 210 mA | 83 % |
| TES 5-1223 | | ± 15 VDC | ± 165 mA | 83 % |
| TES 5-2410 | 18 – 36 VDC (24 VDC nominal) | 3.3 VDC | 1200 mA | 78 % |
| TES 5-2411 | | 5 VDC | 1000 mA | 82 % |
| TES 5-2412 | | 12 VDC | 420 mA | 85 % |
| TES 5-2413 | | 15 VDC | 335 mA | 85 % |
| TES 5-2421 | | ± 5 VDC | ± 500 mA | 82 % |
| TES 5-2422 | | ± 12 VDC | ± 210 mA | 85 % |
| TES 5-2423 | | ± 15 VDC | ± 165 mA | 85 % |
| TES 5-4810 | 36 – 75 VDC (48 VDC nominal) | 3.3 VDC | 1200 mA | 78 % |
| TES 5-4811 | | 5 VDC | 1000 mA | 82 % |
| TES 5-4812 | | 12 VDC | 420 mA | 85 % |
| TES 5-4813 | | 15 VDC | 335 mA | 85 % |
| TES 5-4821 | | ± 5 VDC | ± 500 mA | 82 % |
| TES 5-4822 | | ± 12 VDC | ± 210 mA | 85 % |
| TES 5-4823 | | ± 15 VDC | ± 165 mA | 85 % |

Input Specifications

| | | |
|---|--|----------------------|
| Input current no load | 12 Vin models | 20 mA |
| | 24 Vin models | 5 mA |
| | 48 Vin models | 3 mA |
| Input current full load | 12 Vin models | 500 mA typ. |
| | 24 Vin models | 250 mA typ. |
| | 48 Vin models | 125 mA typ. |
| Start-up voltage / under voltage shut down | 12 Vin models | 8 VDC / 7 VDC typ. |
| | 24 Vin models | 16 VDC / 15 VDC typ. |
| | 48 Vin models | 33 VDC / 31 VDC typ. |
| Surge voltage (1 sec. max.) | 12 Vin models | 25 V max. |
| | 24 Vin models | 50 V max. |
| | 48 Vin models | 100 V max. |
| Reverse voltage protection | 1.0 A max. | |
| Conducted noise (input) | EN 55022 level A, FCC part 15, class A | |

Output Specifications

| | | |
|-------------------------------------|---|-----------------------------|
| Voltage set accuracy | ± 1 % | |
| Regulation | – Input variation Vin min. to Vin max. | 0.3 % max. |
| | – Load variation 20 – 100 % single output models | 1 % max. |
| | dual output models balanced load | 2 % max. |
| Ripple and noise (20 MHz Bandwidth) | 85 mVpk-pk max. | |
| Temperature coefficient | ± 0.02 % / °C | |
| Output current limitation | >115 % of I _{out} max., constant current | |
| Short circuit protection | indefinite, automatic recovery | |
| Capacitive load | single output models | 680 µF max. |
| | dual output models | 100 µF max. (esched output) |

General Specifications

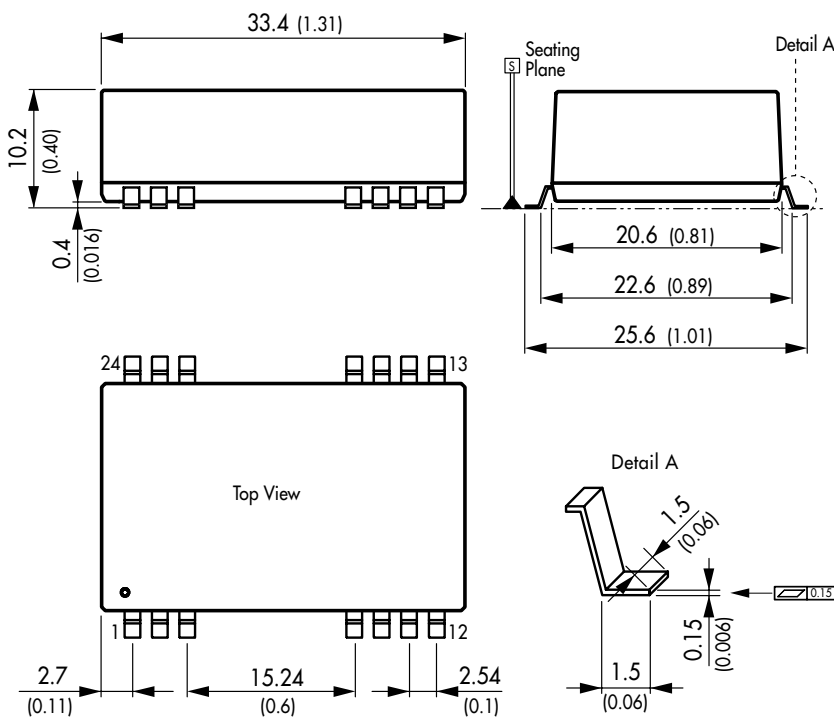
| | | |
|--|--------------------------------------|--|
| Temperature ranges | – Operating | – 40°C ... + 85 °C |
| | – Case temperature | + 100°C max. |
| | – Storage | – 40°C ... + 125 °C |
| Derating | 3.5%/K above 70°C | |
| Humidity (non condensing) | 95 % rel H max. | |
| Reliability, calculated MTBF (MIL-HDBK-217F ground benign) | >1 Mio. h @ + 25 °C | |
| Isolation voltage (60sec.) | – Input/Output | 1'500 VDC |
| Isolation capacity | – Input/Output | 650 pF typ. |
| Isolation resistance | – Input/Output (500 VDC) | >1'000 MΩhm |
| Switching frequency | 260 kHz typ. | |
| Safety standards | UL 60950-1 , IEC 60950-1, EN 60950-1 | |
| Safety approvals | CSA (pending) | |
| Remote On/Off | – On: | 2.5 ... 5.5 VDC or open circuit |
| | – Off: | -0.7 ... 0.8 VDC or short circuit pin 1 and 2(1/3) |
| | – Off idle current: | 10 mA |

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

Physical Specifications

| | |
|--------------------------|--|
| Case material | non conductive plastic |
| Potting material | epoxy (UL 94V-0 rated) |
| Weight | 14 g (0.55 oz) |
| Reflow soldering profile | as per IPC/JEDEC J-STD-020C peak temp. 245°C (+0°C) for 20sec. max. |

Outline Dimensions

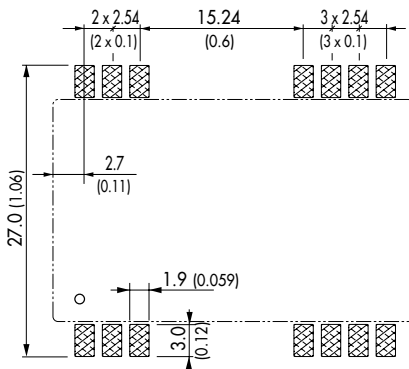


Pin-Out

| Pin | Single | Dual |
|-----|---------------|---------------|
| 1 | Remote On/Off | Remote On/Off |
| 2 | -Vin (GND) | -Vin (GND) |
| 3 | -Vin (GND) | -Vin (GND) |
| 9 | No con. | Common |
| 10 | No con. | No con. |
| 11 | No con. | -Vout |
| 12 | No con. | No con. |
| 13 | No con. | No con. |
| 14 | +Vout | +Vout |
| 15 | No con. | No con. |
| 16 | -Vout | Common |
| 22 | +Vin (Vcc) | +Vin (Vcc) |
| 23 | +Vin (Vcc) | +Vin (Vcc) |
| 24 | No con. | No con. |

Dimensions in [mm], () = Inch
Tolerances ±0.25 (0.02)
Pin pitch tolerances ±0.13 (0.005)

Pin Patterns:



Specifications can be changed any time without notice