

Features

- Surface Mount DIL-Package
- 15 Standard Models
- Regulated Output Voltage
- Wide 2 :1 Input Range
- High Efficiency up to 83 %
- I/O-Isolation 1500 VDC
- Operating Temperature -40 to +75 °C
- Short Circuit Protection
- High Accuracy of Pin Co-Planarity
- Reflow Soldering to CECC00 802, Issue 2
- 2 Year Product Warranty



The TES 3 converter series is intended for all applications where PCB's are assembled on an automated SMD production line. The smaller size DIL-package and the light weight allows easy handling by pick-and-place machines. With their small footprint these converters are the state-of-the-art solution for all on-board power applications demanding an isolated and regulated output voltage.

Models

| Ordercode | Input voltage range | Output voltage | Output current max. | Efficiency typ. |
|--|---------------------|--|--|--------------------------------------|
| TES 3-1210 TES 3-1211 TES 3-1212 TES 3-1222 TES 3-1223 | 9 – 18 VDC | 3.3 VDC 5 VDC 12 VDC ± 12 VDC ± 15 VDC | 700 mA 600 mA 250 mA ± 125 mA ± 100 mA | 75 % 79 % 82 % 81 % 81 % |
| TES 3-2410 TES 3-2411 TES 3-2412 TES 3-2422 TES 3-2423 | 18 – 36 VDC | 3.3 VDC 5 VDC 12 VDC ± 12 VDC ± 15 VDC | 700 mA 600 mA 250 mA ± 125 mA ± 100 mA | 76 % 80 % 83 % 82 % 82 % |
| TES 3-4810 TES 3-4811 TES 3-4812 TES 3-4822 TES 3-4823 | 36 – 75 VDC | 3.3 VDC 5 VDC 12 VDC ± 12 VDC ± 15 VDC | 700 mA 600 mA 250 mA ± 125 mA ± 100 mA | 76 % 80 % 83 % 82 % 82 % |



Input Specifications

| | | |
|---|---|--|
| Input current no load /full load | 12 Vin models 24 Vin models 48 Vin models | 20 mA / 300 mA typ. 5 mA / 150 mA typ. 3 mA / 75 mA typ. |
| Start-up voltage / under voltage shut down | 12 Vin models 24 Vin models 48 Vin models | 6 VDC / 8 VDC typ. 12 VDC / 16 VDC typ. 24 VDC / 32 VDC typ. |
| Surge voltage (1 sec. max.) | 12 Vin models 24 Vin models 48 Vin models | 25 V max. 50 V max. 100 V max. |
| Reverse voltage protection | | 0.5 A max. |
| Reflected input ripple current | | Can be reduced by ext. 1–2.2 µF polyester film capacitor |
| Input filter | | Pi filter |

Output Specifications

| | | |
|--------------------------|---|--|
| Voltage set accuracy | | ± 1 % |
| Regulation | – Input variation Vin min. to Vin max. – Load variation 10 – 100 % – single output models – dual output models balanced load – dual output models unbalanced load | ± 0.3 % max. ± 1.0 % max. ± 1.0 % max. ± 2.0 % max. |
| Ripple and noise | | 50 mVpk-pk max. |
| Temperature coefficient | | ± 0.02 % / °C |
| Current limitation | | > 110% of Iout max., foldback |
| Short circuit protection | | Hiccup mode, indefinite (no automatic recovery) |
| Capacitive load | – single output models – dual output models | 470 µF 180 µF |

General Specifications

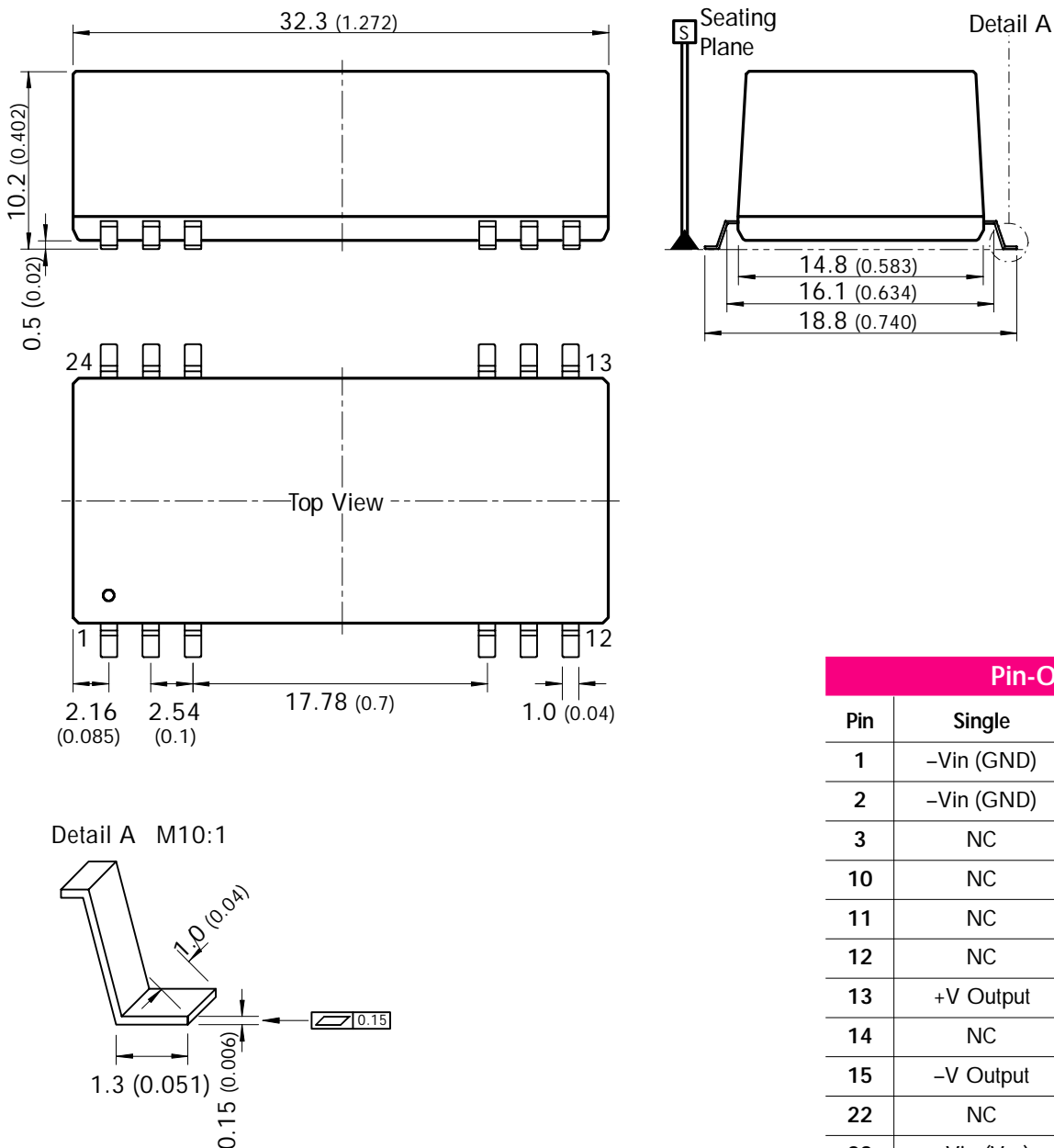
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|---|--|---|
| Temperature ranges | – Operating – Case temperature – Storage | – 40 °C ... +75 °C + 100 °C max. – 40 °C ... +125 °C |
| Humidity (non condensing) | | 95 % rel H max. |
| Reliability, calculated MTBF (MIL-HDBK-217 E) | | > 1'000'000 h @ 25 °C |
| Isolation voltage | Input/Output | 1'500 VDC |
| Isolation capacity | Input/Output | 65 pF typ. |
| Isolation resistance | Input/Output | >1'000 Mohm |
| Switching frequency | | 300 kHz typ. (Frequency modulation PFM) |
| Safety standards | | UL 1950, EN 60950, IEC 60950 Compliance up to 60 VDC input voltage (SELV limit) |
| Safety approvals | | UL/cUL File E188913 |

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

Physical Specifications

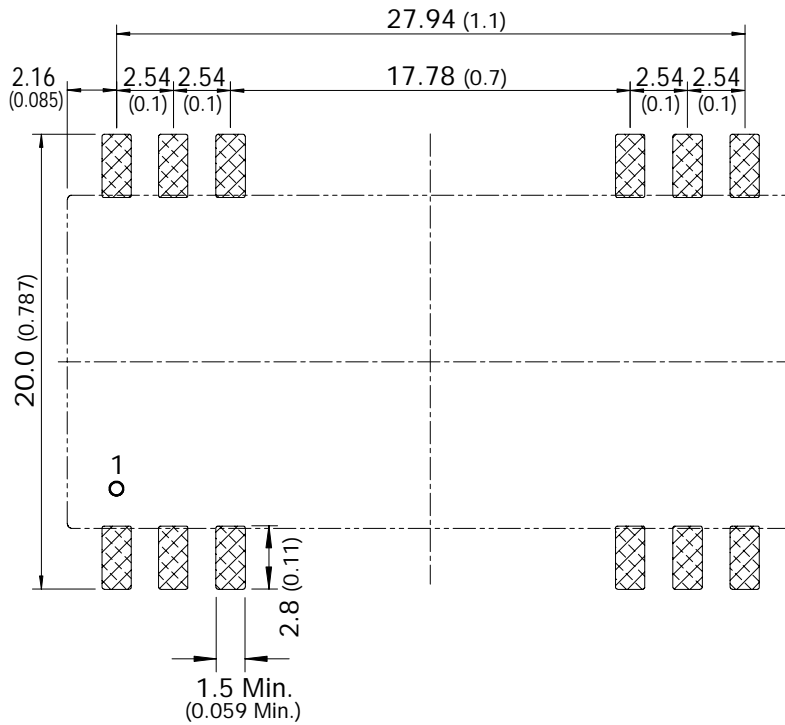
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|--------------------------|--|
| Case material | non conductive black plastic (flammability to UL 94-V0) |
| Package weight | 10 g (0.35 oz) |
| Reflow soldering profile | Peak temp. 230°C (10 sec max.) 185°C for 90 sec max. Convection reflow solder process is recommended |

Outline Dimensions mm (inches)



| Pin-Out | | |
|---------|------------|------------|
| Pin | Single | Dual |
| 1 | -Vin (GND) | -Vin (GND) |
| 2 | -Vin (GND) | -Vin (GND) |
| 3 | NC | NC |
| 10 | NC | Common |
| 11 | NC | NC |
| 12 | NC | -V Output |
| 13 | +V Output | + V Output |
| 14 | NC | NC |
| 15 | -V Output | Common |
| 22 | NC | NC |
| 23 | +Vin (Vcc) | +Vin (Vcc) |
| 24 | +Vin (Vcc) | +Vin (Vcc) |

Solder Pad Dimensions mm (inches)



Specifications can be changed without notice