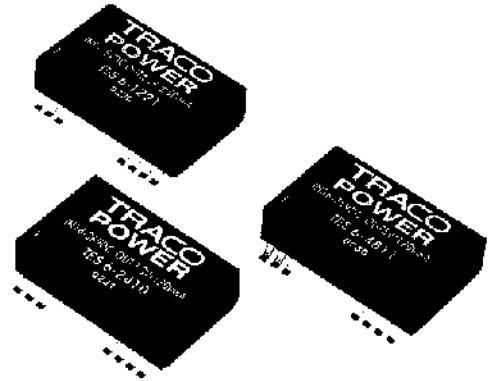


Features

- ◆ Surface Mount DIL-Package
- ◆ Wide 2:1 Input Range
- ◆ 21 Standard Models
- ◆ High Efficiency up to 85%
- ◆ I/O-Isolation 1'500 VDC
- ◆ Indefinite Short-Circuit Protection
- ◆ Input Filter meets EN 55022, Class A and FCC, Level A without external Components
- ◆ High Accuracy of Pin Co-Planarity
- ◆ High Reliability, MTBF >1 Mio. h
- ◆ 3 Year Product Warranty



The TES 6 converter series is intended for all applications where PCB's are assembled on an automated SMD production line. The light weight DIL-package allows easy handling by pick and place machines. High efficiency allows an operating temperature range of -40°C to +71°C without derating. I/O-isolation of 1'500 VDC together with conducted noise compliance to EN 55022-A and FCC, level A makes these converters ideal for a wide range of applications in communications, mobile battery powered equipments and industrial systems.

Models

| Ordercode | Input voltage range | Output voltage | Output current max. | Efficiency typ. |
|------------|---------------------|----------------|---------------------|-----------------|
| TES 6-1210 | 9 – 18 VDC | 3.3 VDC | 1200 mA | 77 % |
| TES 6-1211 | | 5 VDC | 1200 mA | 81 % |
| TES 6-1212 | | 12 VDC | 625 mA | 83 % |
| TES 6-1213 | | 15 VDC | 500 mA | 83 % |
| TES 6-1221 | | ± 5 VDC | ± 500 mA | 81 % |
| TES 6-1222 | | ± 12 VDC | ± 310 mA | 83 % |
| TES 6-1223 | | ± 15 VDC | ± 250 mA | 83 % |
| TES 6-2410 | 18 – 36 VDC | 3.3 VDC | 1200 mA | 79 % |
| TES 6-2411 | | 5 VDC | 1200 mA | 83 % |
| TES 6-2412 | | 12 VDC | 625 mA | 85 % |
| TES 6-2413 | | 15 VDC | 500 mA | 85 % |
| TES 6-2421 | | ± 5 VDC | ± 500 mA | 83 % |
| TES 6-2422 | | ± 12 VDC | ± 310 mA | 85 % |
| TES 6-2423 | | ± 15 VDC | ± 250 mA | 85 % |
| TES 6-4810 | 36 – 75 VDC | 3.3 VDC | 1200 mA | 79 % |
| TES 6-4811 | | 5 VDC | 1200 mA | 83 % |
| TES 6-4812 | | 12 VDC | 625 mA | 85 % |
| TES 6-4813 | | 15 VDC | 500 mA | 85 % |
| TES 6-4821 | | ± 5 VDC | ± 500 mA | 83 % |
| TES 6-4822 | | ± 12 VDC | ± 310 mA | 85 % |
| TES 6-4823 | | ± 15 VDC | ± 250 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 with 3.3/±5 Vout | 430 mA / 510 mA typ. |
| | 12 Vin models with other outputs | 600 mA typ. |
| | 24 Vin models with 3.3/±5 Vout | 210 mA / 250 mA typ. |
| | 24 Vin models with other outputs | 600 mA typ. |
| | 48 Vin models with 3.3/±5 Vout | 100 mA / 130 mA typ. |
| | 48 Vin models with other outputs | 150 mA typ. |
| Start-up voltage / under voltage shut down | 12 Vin models | 6 VDC / 8 VDC typ. |
| | 24 Vin models | 12 VDC / 16 VDC typ. |
| | 48 Vin models | 24 VDC / 32 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 10 – 100 % | |
| | – single output models | 1 % max. |
| | – dual output models balanced load | 1 % max. |
| | – dual output models unbalanced load | 2.5 % max. |
| Ripple and noise (20 MHz Bandwidth) | | 75 mVpk-pk max. |
| Temperature coefficient | | ± 0.02 % / °C |
| Output current limitation | | >120 % of Iout max., constant current |
| Short circuit protection | | fold back, automatic recovery |
| Capacitive load | 3.3 VDC output models | 680 µF max. |
| | 5 VDC single output models | 1'500 µF max. |
| | other models | 100 µF max. |

General Specifications

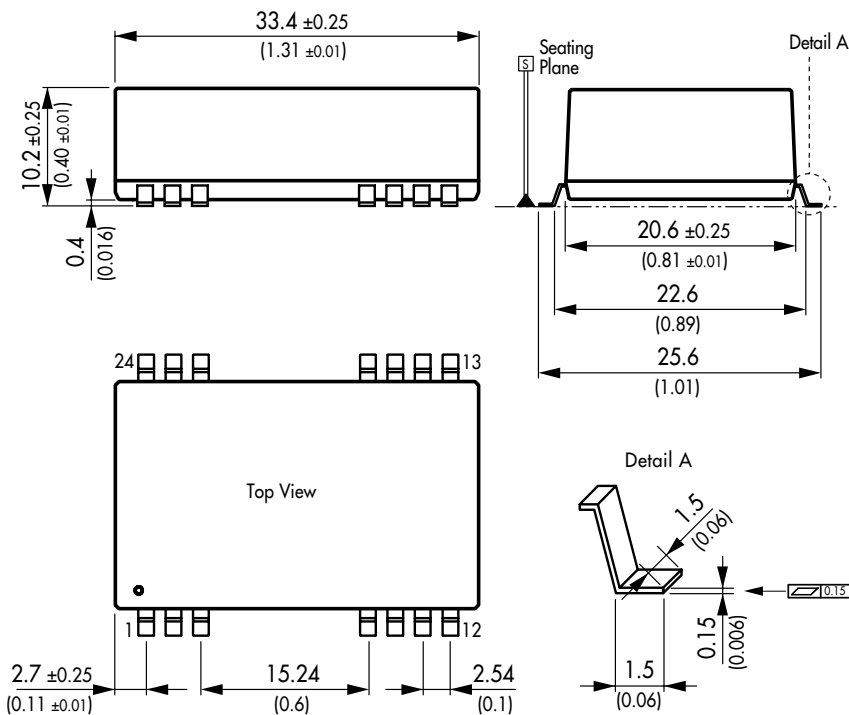
| | | |
|---|------------------------|----------------------------------|
| Temperature ranges | – Operating | – 40°C ... + 71 °C (no derating) |
| | – Case temperature | + 105°C max. |
| | – Storage | – 40°C ... + 125 °C |
| Derating | | 4 %/K above 71 °C |
| Humidity (non condensing) | | 95 % rel H max. |
| Reliability, calculated MTBF (MIL-HDBK-217 E) | | >1 Mio. h @ + 25 °C |
| Isolation voltage | Input/Output | 1'500 VDC |
| Isolation capacity | Input/Output | 380 pF typ. |
| Isolation resistance | Input/Output (500 VDC) | > 1'000 MOhm |
| | Switching frequency | 300 kHz |
| Safety standards | | IEC / EN 60950, UL 60950 |

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

Physical Specifications

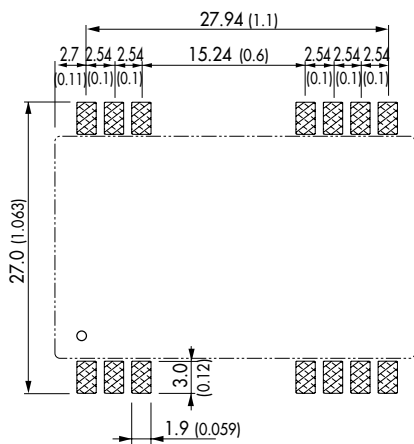
| | |
|-----------------------|---|
| Case material | non conductive black plastic |
| Potting material | Epoxy (UL 94V-0 rated) |
| Weight | 14 g (0.55 oz) |
| Soldering temperature | Peak temp. 230°C (10 sec max.) 185°C for 90 sec max. Convection reflow solder process is recommended |

Outline Dimensions mm (inches)



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

Connecting Pin Patterns:



() = inches
Tolerances: ±0.1mm (0.04 Inches)

Specifications can be changed without notice