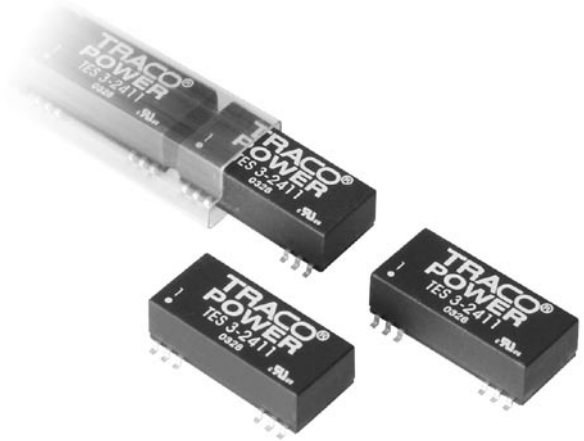




#### Features

- ◆ SMD Package
- ◆ Wide 2:1 Input Voltage Range
- ◆ I/O Isolation 1500VDC
- ◆ Under Voltage lockout
- ◆ Operating Temp. Range -40°C to 71°C
- ◆ Short Circuit Protection
- ◆ High Accuracy of Pin Co-Planarity
- ◆ Lead free Design – RoHS compliant
- ◆ 3 Years Product Warranty



The TES-3 series is a family of high performance 3W dc-dc converter modules featuring wide 2:1 input voltage ranges. The 15 models come in a low profile molded SMD package with dimensions of 32.3 x 14.8 x 10.2 mm. A high efficiency allows an operating temperature range of -40°C to 71°C at full load. This product is qualified for soldering in a high temperature lead-free reflow solder process. Typical applications for the converters are battery operated equipment, instrumentation, communication and industrial electronics, everywhere where an isolated, tightly regulated voltage is required.

#### Models

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

### Input Specifications

Input current no load /full load	12 Vin models: 20 mA / 300 mA typ. 24 Vin models: 5 mA / 150 mA typ. 48 Vin models: 3 mA / 75 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	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: 1.0 % max. dual output models balanced load: 1.0 % max. dual output models unbalanced load: 2.0 % max.
Ripple and noise	50 mVpk-pk max.
Temperature coefficient	± 0.02 % / °C
Current limitation	> 110% of Iout max., continuous
Short circuit protection	hiccup mode, indefinite (no automatic recovery)
Capacitive load	– single output models 470 µF – dual output models 180 µF

### General Specifications

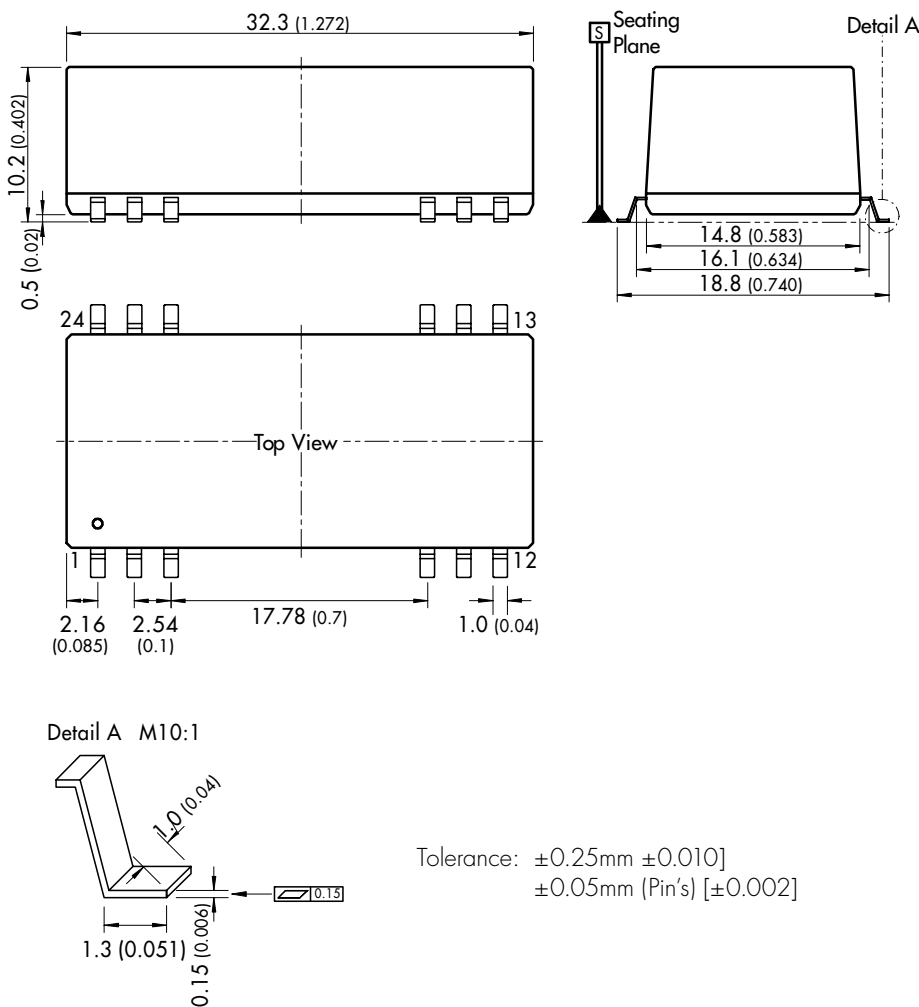
Temperature ranges	– Operating –40 °C ... +71 °C – Case temperature +100 °C max. – Storage –40 °C ... +125 °C
Humidity (non condensing)	95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217E ground benign)	>1'000'000 h @ 25 °C
Isolation voltage (60 sec.)	– Input/Output 1'500 VDC
Isolation capacity	– Input/Output 65 pF typ.
Isolation resistance	– Input/Output >1'000 Mohm
Switching frequency	300 kHz typ. (frequency modulation PFM)
Safety standards	UL 60950-1, EN 60950-1, IEC 60950-1
Safety approvals	CSA File No. 226037 <a href="http://directories.csa-international.org">http://directories.csa-international.org</a>

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

**Physical Specifications**

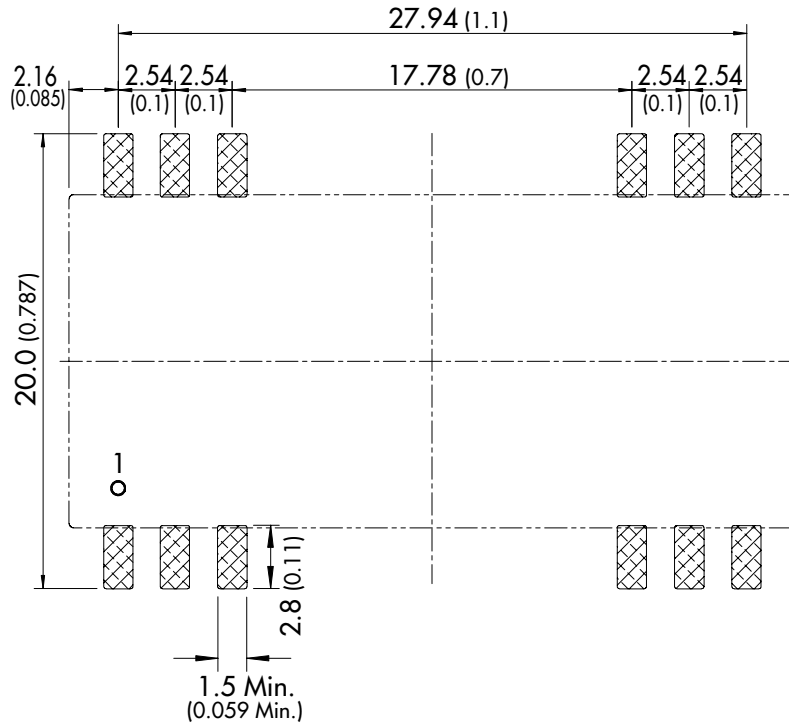
Case material	non conductive black plastic (flammability to UL 94-V0)
Package weight	6 g (0.21 oz)
Reflow soldering profile	peak temp. 245°C (10 sec max.) 217°C for 90 sec. max. convection reflow solder process is recommended

**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 any time without notice.