

#### 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	700 mA	75 %
		5 VDC	600 mA	79 %
		12 VDC	250 mA	82 %
		± 12 VDC	± 125 mA	81 %
		± 15 VDC	± 100 mA	81 %
TES 3-2410 TES 3-2411 TES 3-2412 TES 3-2422 TES 3-2423	18 – 36 VDC	3.3 VDC	700 mA	76 %
		5 VDC	600 mA	80 %
		12 VDC	250 mA	83 %
		± 12 VDC	± 125 mA	82 %
		± 15 VDC	± 100 mA	82 %
TES 3-4810 TES 3-4811 TES 3-4812 TES 3-4822 TES 3-4823	36 – 75 VDC	3.3 VDC	700 mA	76 %
		5 VDC	600 mA	80 %
		12 VDC	250 mA	83 %
		± 12 VDC	± 125 mA	82 %
		± 15 VDC	± 100 mA	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

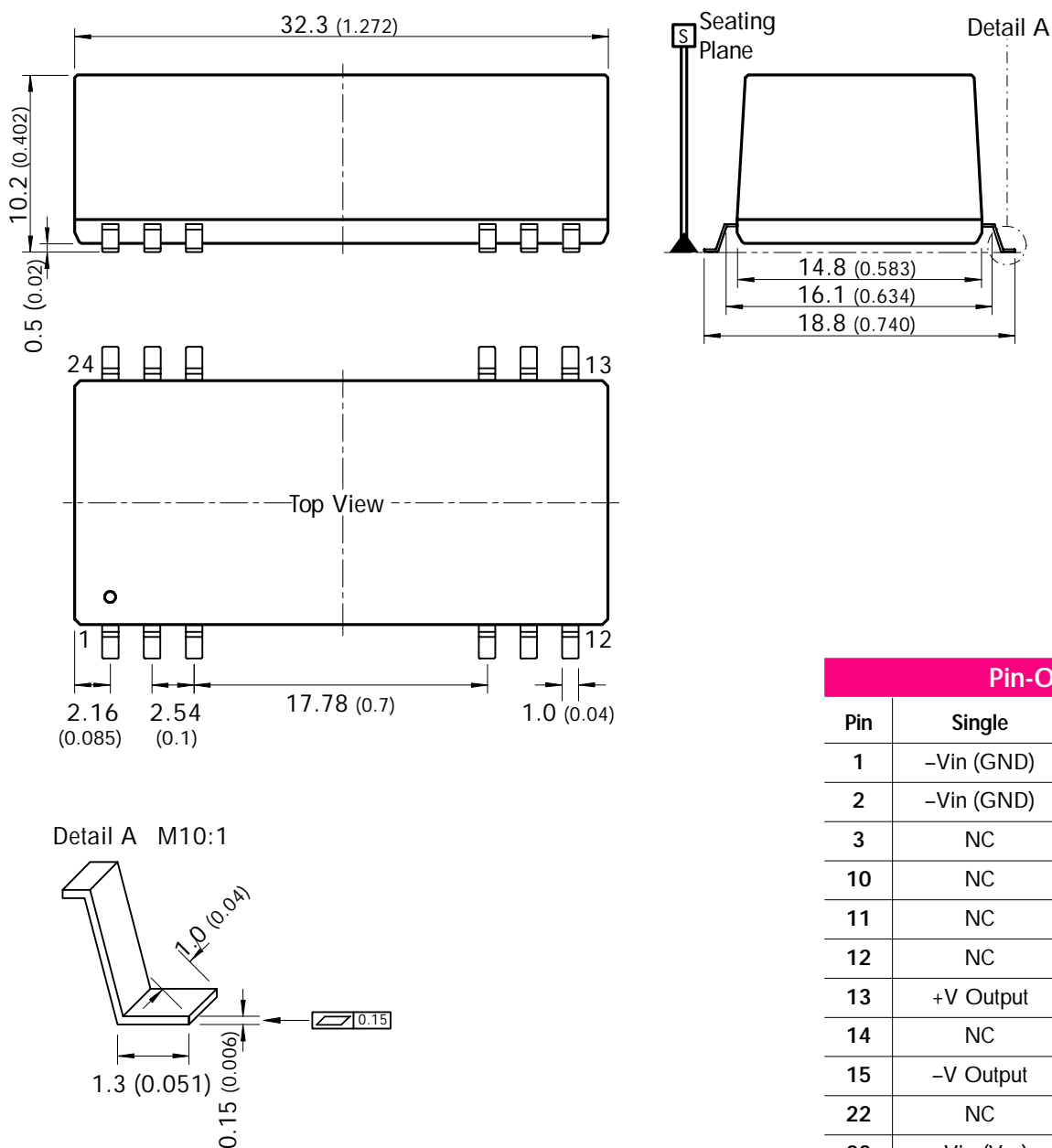
Temperature ranges	– Operating – Case temperature – Storage	– 40 °C ... +75 °C + 100 °C max. – 40 °C ... +125 °C
Humidity (non condensing)		95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217 E)		> 1'000'000 h @ 25 °C
Isolation voltage	Input/Output	1'500 VDC
Isolation capacity	Input/Output	65 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**

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)

