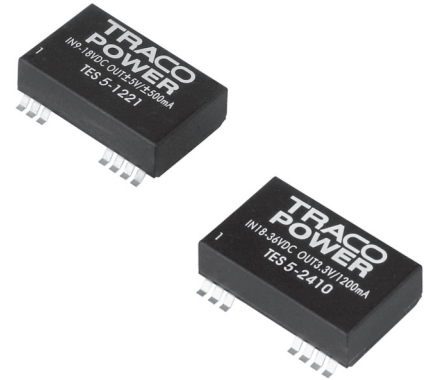


*not recommended for new designs*



### 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	<b>9 – 18 VDC</b> (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	<b>18 – 36 VDC</b> (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	<b>36 – 75 VDC</b> (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.
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 Iout max., constant current	
Short circuit protection	indefinite, automatic recovery	
Capacitive load	single output models	680 µF max.
	dual output models	100 µF max. (each output)

### General Specifications

Temperature ranges	- Operating	-40°C to +85°C
	- Case temperature	+100°C max.
	- Storage	-40°C to +125°C
Derating	3.5 %/K above 70°C	
Humidity (non condensing)	95 % rel H max.	
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)	>1 Mio. h	
Isolation voltage (60sec.)	- Input/Output	1'500 VDC
Isolation capacitance	- Input/Output	650 pF typ.
Isolation resistance	- Input/Output (500 VDC)	>1'000 MOhm
Switching frequency	260 kHz typ.	
Safety standards	UL 60950-1, IEC/EN 60950-1	
Environmental compliance	- Reach	<a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a>
	- RoHS	RoHS directive 2011/65/EU
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(/3)
	- Off idle current:	10 mA

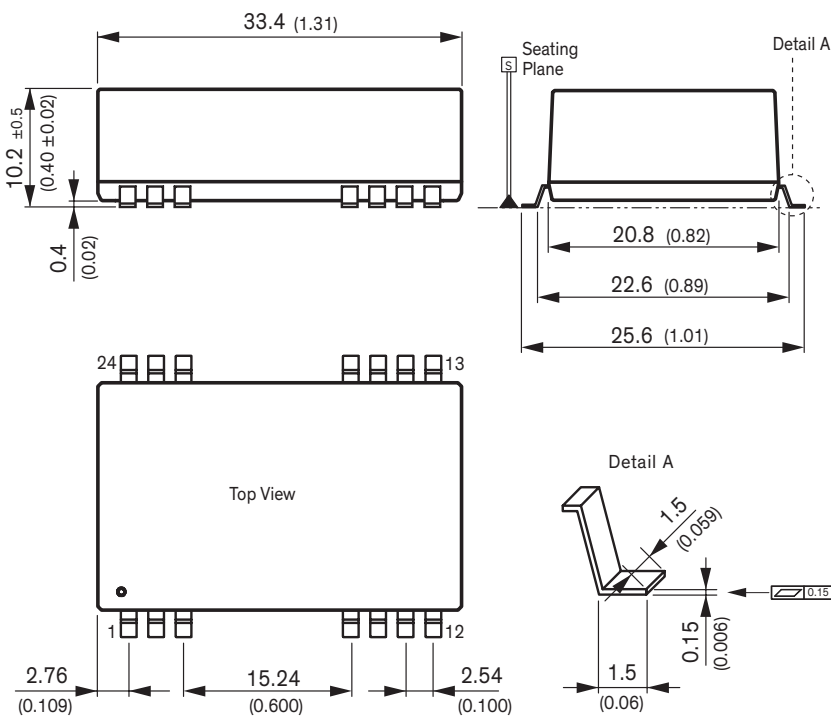
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

**Physical Specifications**

Casing material	non conductive plastic
Weight	14 g (0.55oz)
Moisture sensivity level (MSL)	level 2 as per J-STD-020D.1 (to find at: <a href="http://www.jedec.org">www.jedec.org</a> - free registration required)

**Supporting documents:** [www.tracopower.com/overview/tes5](http://www.tracopower.com/overview/tes5)

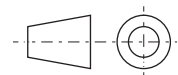
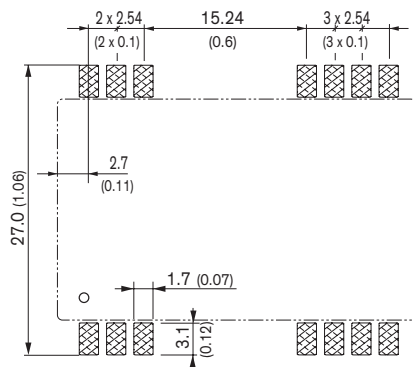
**Outline Dimensions**



Pin-Out		
Pin	Single	Dual
1	Remote On/Off	Remote On/Off
2	-Vin (GND)	-Vin (GND)
3	-Vin (GND)	-Vin (GND)
9	NC	Common
10	NC	NC
11	NC	-Vout
12	NC	NC
13	NC	NC
14	+Vout	+Vout
15	NC	NC
16	-Vout	Common
22	+Vin (Vcc)	+Vin (Vcc)
23	+Vin (Vcc)	+Vin (Vcc)
24	NC	NC

NC = Not connected

Pin Patterns:



Dimensions in mm (inch)  
Tolerances  $\pm 0.25$  ( $\pm 0.02$ )  
Pin pitch tolerances  $\pm 0.13$  ( $\pm 0.005$ )

Specifications can be changed without notice! Make sure you are using the latest documentation, downloadable at [www.tracopower.com](http://www.tracopower.com)