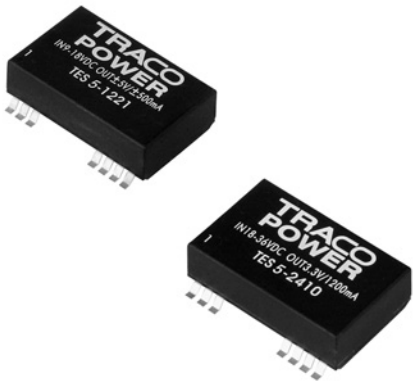
DC/DC Converters

TES 5 Series, 5 Watt

CB Scheme c SP us UL 60950-1

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	**9 – 18 VDC** (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	**18 – 36 VDC** (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	**36 – 75 VDC** (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.
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 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. (esch output)

General Specifications

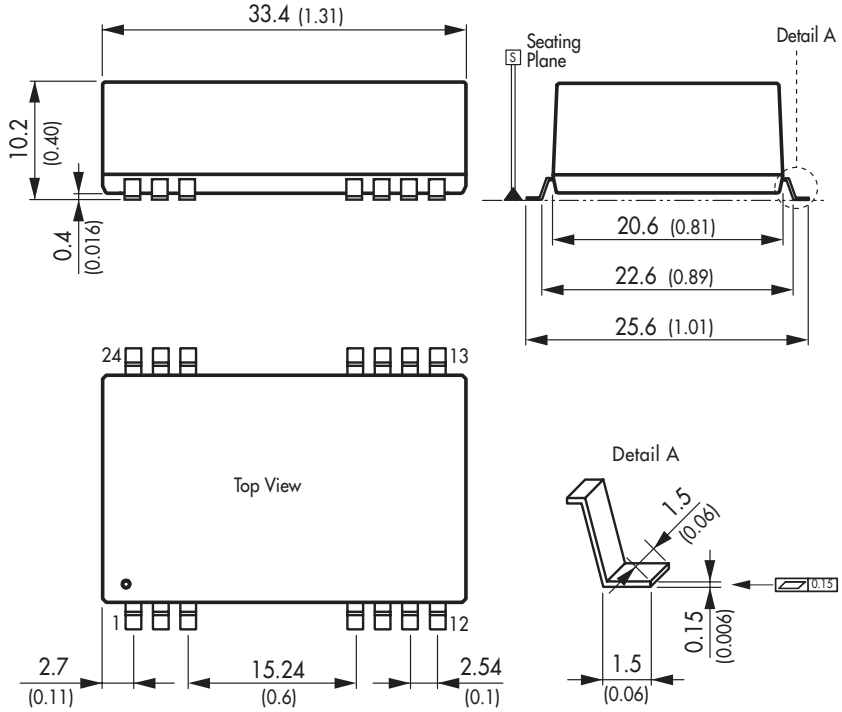
Temperature ranges	– Operating	–40°C to +85°C
	– Case temperature	+100°C max.
	– Storage	–40°C to +125°C
Derating		3.5 %/K above 70°C
Humidity (non condensing)		95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)		>1 Mio. h
Isolation voltage (60sec.)	– Input/Output	1'500 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
Safety approvals	– CSA certificate according UL 60950-1	www.tracopower.com/products/tes5-csa60950.pdf
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.

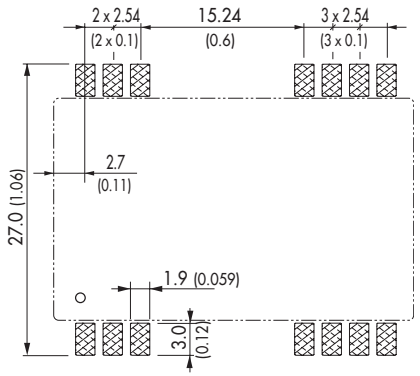
Physical Specifications

Casing material	non conductive plastic
Potting material	epoxy (UL 94V-0 rated)
Weight	14 g (0.55oz)
Lead-free reflow solder process	as per J-STD-020D.01 (to find at: www.jedec.org - free registration required)
Moisture sensivity level (MSL)	level 2 as per J-STD-033B.01 (to find at: www.jedec.org - free registration required)
Washing process	www.tracopower.com/products/smd-wash.pdf
Packaging	www.tracopower.com/products/tes5-pack.pdf

Outline Dimensions



Pin Patterns:



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

Dimensions in [mm], () = Inch
Tolerances ±0.25 (±0.02)
Pin pich tolerances ±0.13 (±0.005)

Specifications can be changed any time without notice.

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