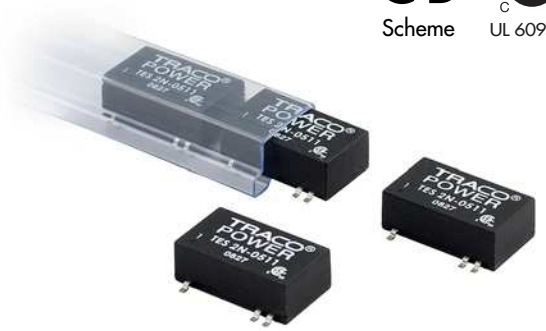
DC/DC Converters

TES 2N Series, 2 Watt

CB Scheme

C US UL 60950-1



Features

- Low profile SMD-package
- Wide 2:1 input voltage range
- I/O isolation 1500 VDC
- Input filter meets EN55022, class A
- Operating temperature range –40°C to +85°C
- Short-circuit protection
- Qualified for leadfree reflow solder process according IPC J-STD-020D.1
- Available in tape and reel package
- Bears washing process
- 3-year product warranty

The TES-2N series is a family of high performance 2W DC/DC converter modules featuring wide 2:1 input voltage ranges. The 28 models come in a low profile SMD package which requires just 3 cm^2 space on the PCB. A high efficiency allows an operating temperature range of –40°C to +85°C. A built-in EMI input filter complies with EN 55022, class A. Typical applications for these converters are battery operated equipment, instrumentation, communication and industrial electronics, everywhere where isolated, tightly regulated voltages are required.

Models

Ordercode	Input voltage range	Output voltage	Output current max.	Efficiency typ.
TES 2N-0510	4.5 – 9.0 VDC (nominal 5 VDC)	3.3 VDC	500 mA	70 %
TES 2N-0511		5 VDC	400 mA	73 %
TES 2N-0512		12VDC	165 mA	75 %
TES 2N-0513		15 VDC	135 mA	73 %
TES 2N-0521		± 5 VDC	±200 mA	64 %
TES 2N-0522		±12 VDC	±85 mA	69 %
TES 2N-0523		±15 VDC	±65 mA	71 %
TES 2N-1210	9 – 18 VDC (nominal 12 VDC)	3.3 VDC	500 mA	73 %
TES 2N-1211		5 VDC	400 mA	77 %
TES 2N-1212		12 VDC	165 mA	80 %
TES 2N-1213		15 VDC	135 mA	80 %
TES 2N-1221		±5 VDC	±200 mA	73 %
TES 2N-1222		±12 VDC	±85 mA	78 %
TES 2N-1223		±15 VDC	±65 mA	78 %
TES 2N-2410	18 – 36 VDC (nominal 24 VDC)	3.3 VDC	500 mA	72 %
TES 2N-2411		5 VDC	400 mA	77 %
TES 2N-2412		12 VDC	165 mA	80 %
TES 2N-2413		15 VDC	135 mA	81 %
TES 2N-2421		±5 VDC	±200 mA	74 %
TES 2N-2422		±12 VDC	±85 mA	78 %
TES 2N-2423		±15 VDC	±65 mA	80 %
TES 2N-4810	36 – 75 VDC (nominal 48 VDC)	3.3 VDC	500 mA	71 %
TES 2N-4811		5 VDC	400 mA	73 %
TES 2N-4812		12 VDC	165 mA	79 %
TES 2N-4813		15 VDC	135 mA	79 %
TES 2N-4821		± 5 VDC	±200 mA	71 %
TES 2N-4822		±12 VDC	±85 mA	77 %
TES 2N-4823		±15 VDC	±65 mA	77 %

Input Specifications

Input current at full load (nominal input)	5 Vin models:	600 mA typ.
	12 Vin models:	220 mA typ.
	24 Vin models:	110 mA typ.
	48 Vin models:	55 mA typ.
Surge voltage (100 msec. max.)	5 Vin models:	11 V 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, level A
Input fuse		recommended, required for compliance with CB
	– recommended min. fuse rating 5 V models:	500 mA
	12 V models:	200 mA

Output Specifications

Voltage set accuracy		±2 %
Regulation	– Input variation Vin min. to Vin max.	0.5 % max.
	– Load variation 25 – 100 %	0.75 % max.
	dual output models:	2.0 % (balanced load)
Ripple and noise (20 MHz Bandwidth)		50 mVpk-pk max.
Temperature coefficient		±0.02 %/K
Short circuit protection		indefinite, automatic recovery
Minimum load		25 % of rated max current (operation at lower load condition is safe but a higher output ripple will be experienced)
Capacitive load	3.3 VDC output models:	2200 µF max.
	5 VDC output models:	1000 µF max.
	12 VDC output models:	170 µF max.
	15 VDC output models:	110 µF max.
	±5 VDC output models:	470 µF max.
	±12 VDC output models:	100 µF max.
	±15 VDC output models:	47 µF max.

General Specifications

Temperature ranges	– Operating	–40°C to +85°C
	– Case temperatures	+90°C
	– Storage	–50°C to +125°C
Derating		3.5 %/K above +71°C
Humidity (non condensing)		95 % rel. H max.
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)		>1.0 Mio h
Isolation voltage (60sec.)	– Input/Output	1500 VDC
Isolation capacitance	– Input/Output	250 pF
Isolation resistance	– Input/Output (500 VDC)	>1000 M Ohm
Switching frequency		300 kHz (PFM)
Safety standards		UL 60950-1, IEC/EN 60950-1
Safety approvals and certifications	– CB certificate (IEC 60950-1)	www.tracopower.com/products/tes2n-cb.pdf
	– CSA (File No. 226037)	http:directories.csa-international.org
Environmental compliance	– Reach	www.tracopower.com/products/reach-declaration.pdf
	– RoHS	RoHS directive 2011/65/EU

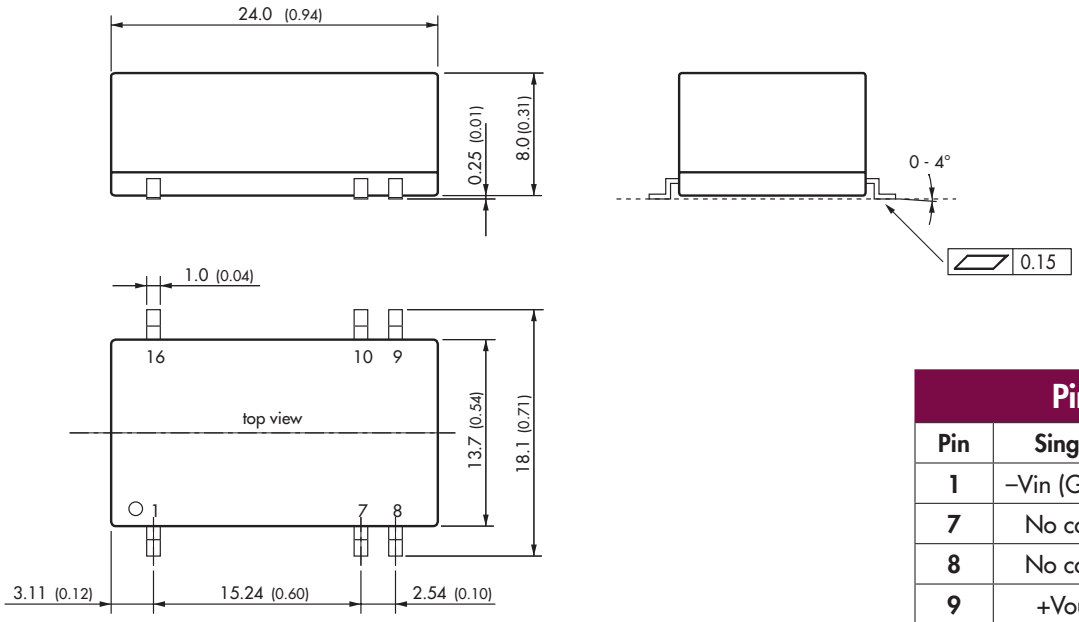
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

Physical Specifications

Casing material	DAP (UL94V-0 rated)
Weight	5.1 g (0.17oz)
Moisture sensivity level (MSL)	level 2 as per J-STD-020D.1 (to find at: www.jedec.org - free registration required)
Washing process	applicable
Packaging	www.tracopower.com/products/tes2n-pack.pdf
Soldering temperature	max. 260°C / 10 sec.

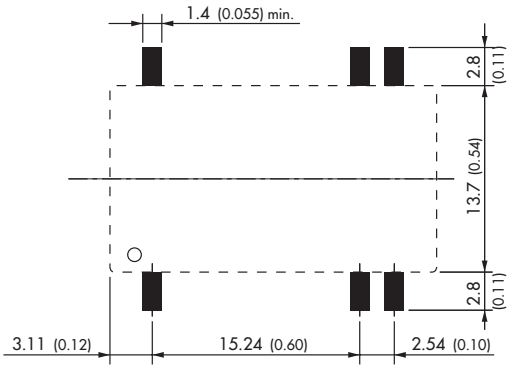
Application note: www.tracopower.com/products/tes2n-application.pdf

Outline Dimensions



Pin-Out		
Pin	**Single**	**Dual**
1	–Vin (GND)	–Vin (GND)
7	No con.	No con.
8	No con.	Common
9	+Vout	+Vout
10	–Vout	–Vout
16	+Vin	+Vin

Solder Pad Dimension



Dimensions in [mm], () = Inch
Tolerances ±0.25 (±0.01)
Pin pitch tolerances ±0.05 (±0.002)