DC/DC Converters

TES 2H Series, 2 Watt

Features

- Small SMD package with standard footprint
- I/O isolation voltage 1500 VDC
- Single and dual output models
- Input voltage 5, 12 and 24 VDC
- High efficiency up to 80 %
- Operating temperature range –40 to +85°C
- High accuracy of pin co-planarity
- Qualified for leadfree reflow solder process according IPC/JEDEC J-STD-020D
- Available in tape and reel package
- 3-year product warranty

With their small footprint these 2 Watt DC/DC converters are an ideal and economical solution for many applications where an isolated voltage is required. Typical applications are ground loop elimination, noise reduction, voltage isolation in digital interfaces and voltage conversion in distributed power systems. With a new package design these converters are qualified for the higher temperatures requested by lead-free reflow solder processes. For automated SMD production lines the devices can be supplied in standard tape and reel package.

Models

Ordercode	Input voltage	Output voltage	Output current max.	Efficiency typ.
TES 2-0510H	5 VDC ±10% (5 VDC nominal)	3.3 VDC	500 mA	70 %
TES 2-0511H		5 VDC	400 mA	73 %
TES 2-0512H		12 VDC	165 mA	77 %
TES 2-0521H		±5 VDC	±200 mA	74 %
TES 2-0522H		±12 VDC	±83 mA	76 %
TES 2-0523H		±15 VDC	±66 mA	76 %
TES 2-1210H	12 VDC ±10% (12 VDC nominal)	3.3 VDC	500 mA	72 %
TES 2-1211H		5 VDC	400 mA	75 %
TES 2-1212H		12 VDC	165 mA	79 %
TES 2-1222H		±12 VDC	±83 mA	80 %
TES 2-1223H		±15 VDC	±66 mA	80 %
TES 2-2410H	24 VDC ±10% (24 VDC nominal)	3.3 VDC	500 mA	72 %
TES 2-2411H		5 VDC	400 mA	75 %
TES 2-2412H		12 VDC	165 mA	79 %
TES 2-2422H		±12 VDC	±83 mA	79 %
TES 2-2423H		±15 VDC	±66 mA	79 %

Input Specifications

Input current no load / full load	5 Vin; 3.3 VDC model:	60 mA / 470 mA typ.
	5 Vin; other models:	60 mA / 540 mA typ.
	12 Vin; 3.3 VDC model:	30 mA / 190 mA typ.
	12 Vin; other models:	30 mA / 210 mA typ.
	24 Vin; 3.3 VDC model:	15 mA / 95 mA typ.
	24 Vin; other models:	15 mA / 110 mA typ.
Surge voltage (1 sec. max.)	5 Vin models:	9 V max.
	12 Vin models:	18 V max.
	24 Vin models:	30 V max.
Reverse voltage protection		0.3 A max.
Input filter		internal capacitor

Output Specifications

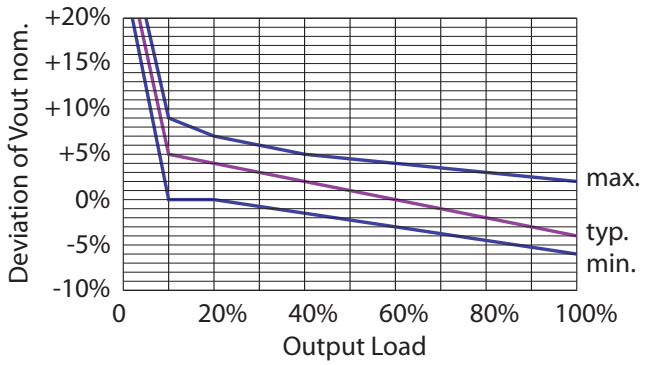
Voltage set accuracy		see graphs below
Voltage balance (dual output models, balanced load)		1 % max.
Regulation	– Input variation	1.2 % / 1 % change Vin
	– Load variation	see graphs below
Ripple and noise (20 MHz Bandwidth)		120 mVpp max.
Temperature coefficient		±0.02 %/K max.
Short circuit protection		limited 0.5 sec. max.
Capacitive load	3.3 & 5.0 VDC models:	47 µF max.
	12 & ±5 VDC models:	10 µF max. (each output)
	±12 & ±15 VDC models:	4.7 µF max. (each output)

General Specifications

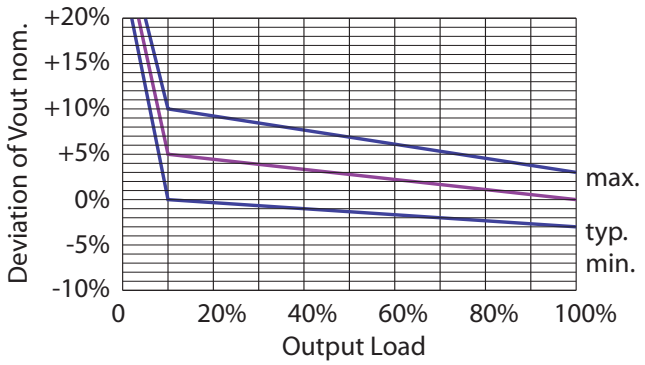
Temperature ranges	– Operating	–40°C to +85°C
	– Storage	–40°C to +125°C
	– Case	95°C max.
Derating (convection cooling)		4 %/K above 75°C
Humidity (non condensing)		95 % rel. H max.
Reliability, calculated MTTF (MIL-HDBK-217F, @ +25°C, ground benign)		>2'000'000 h
I/O-isolation voltage (60 sec)		1500 VDC
I/O-isolation capacity (100 kHz, 1 V)		60 pF typ.
I/O-isolation resistance (500 VDC)		>10 Gohm
Switching frequency		50 to 120 kHz (depending on load)

Output voltage variation dependent on load (at nominal input voltage)

3.3 & 5.0 VDC models:



other models:



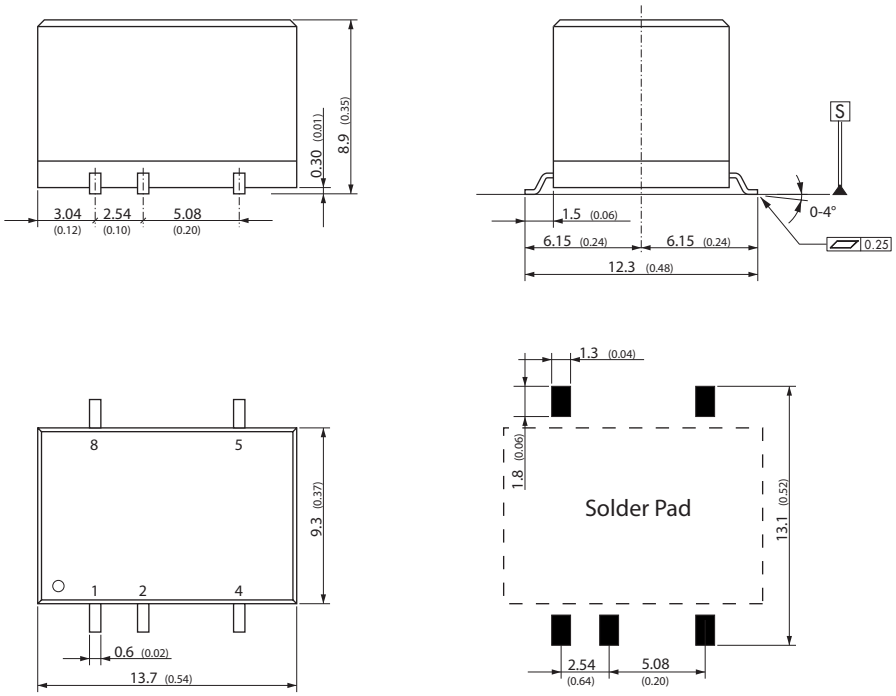
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

Physical Specifications

Casing material		plastic (UL94V-0 rated)
Weight	single output models: dual output models:	1.5 g (0.05 oz) 2.2 g (0.08 oz)
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/tes2h-pack.pdf

Outline Dimensions

Single Output Models



Pin-Out	
Pin	**Single**
1	–Vin (GND)
2	+Vin (Vcc)
4	–Vout
5	+Vout
8	No con.

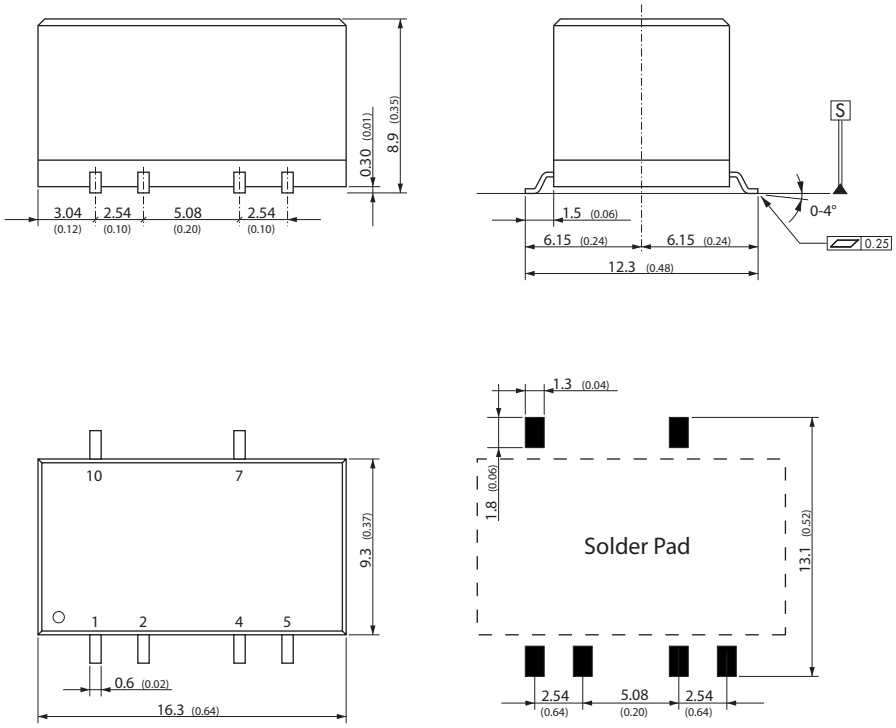
No con. = Pin to be isolated from circuitry

Dimensions in [mm], () = Inch
Pin pitch tolerances: ±0.13 (±0.005)
Other tolerances: ±0.25 (±0.01)

Specifications can be changed any time without notice.

Outline Dimensions

Dual Output Models



Pin-Out	
Pin	**Dual**
1	–Vin (GND)
2	+Vin (Vcc)
4	Common
5	–Vout
7	+Vout
10	No con.

No con. = Pin to be isolated from circuitry

Dimensions in [mm], () = Inch
Pin pitch tolerances: ±0.13 (±0.005)
Other tolerances: ±0.25 (±0.01)

Specifications can be changed any time without notice.