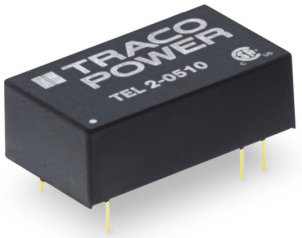
DC/DC Converters

TEL 2 Series, 2 Watt

CB Scheme, cULus UL 60950-1

Features

- Ultracompact DIP-16 plastic package
- Wide 2:1 input range
- Regulated output
- I/O isolation 1500V
- Input filter meets EN55032, class A without ext. components
- Low ripple and noise
- Indefinite shortcircuit protection
- Operating temperature range –40°C to +80°C
- Lead free design, RoHS compliant
- 3-year product warranty



The TEL-2 series, comprising 28 models, is a range of isolated 2 Watt converters in a low profile DIP-16 package. Requiring only 3.25 cm^2 of space on the PCB they provide a complete DC/DC converter without need of any external components. Wide input range and tightly regulated output voltage qualifies these converters for many cost critical applications in industrial and consumer electronics.

Models

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

Input Specifications

Input current at full load / no load (nominal input)	5 Vin models:	600 mA / 40 mA typ.
	12 Vin models:	220 mA / 20 mA typ.
	24 Vin models:	110 mA / 10 mA typ.
	48 Vin models:	55 mA / 8 mA typ.
Start-up voltage / under voltage shut down	5 Vin models:	4 VDC / 3.5 VDC typ.
	12 Vin models.	7 VDC / 6.5 VDC typ.
	24 Vin models:	12 VDC / 11 VDC typ.
	48 Vin models.	24 VDC / 22 VDC typ.
Surge voltage (100 ms 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.
Reverse voltage protection		1.0 A max.
Conducted noise (input)		EN 55032 class A, FCC part 15, level A

Output Specifications

Voltage set accuracy		±2 % max.
Regulation	– Input variation Vin min. to Vin max.	0.5 % max.
	– Load variation 25 – 100 % single output models:	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:	2'200 µF max.
	5 VDC output models:	1'000 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

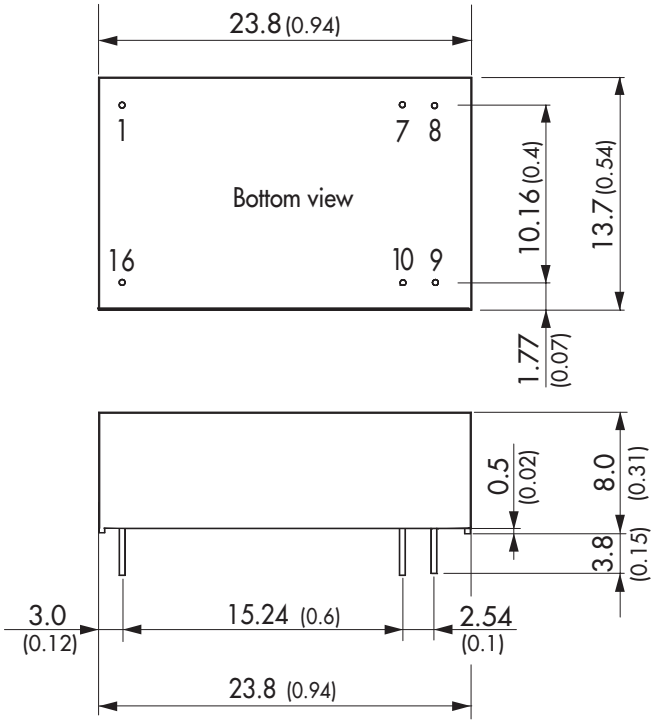
Temperature ranges	– Operating	–40°C to +80°C
	– Case	+90°C max.
	– Storage	–55°C to +105°C
Derating		2.9 %/K above 65°C
Humidity (non condensing)		95 % rel. H max.
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)		>1.2 Mio h
Isolation voltage	Input/Output (60 s)	1'500 VDC
Isolation capacitance	Input/Output	250 pF max.
Isolation resistance	Input/Output (500 VDC)	>1'000 MOhm
Switching frequency		300 kHz (PFM)
Safety standards		UL/cUL 60950-1 , IEC/EN 60950-1
Safety approval		CB 60950-1
	– Certification documents	www.tracopower.com/overview/tel2
Environmental compliance	– Reach	www.tracopower.com/info/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	non conductive FR4
Potting material	epoxy, UL94V-0 - rated
Weight	5.1 g (0.17oz)
Soldering temperature	265°C / 10 s max.

Outline Dimensions mm (inches)



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

Pin diameter ø 0.5 ±0.05 (0.02) ±0.002
Tolerances ±0.25 (±0.01)