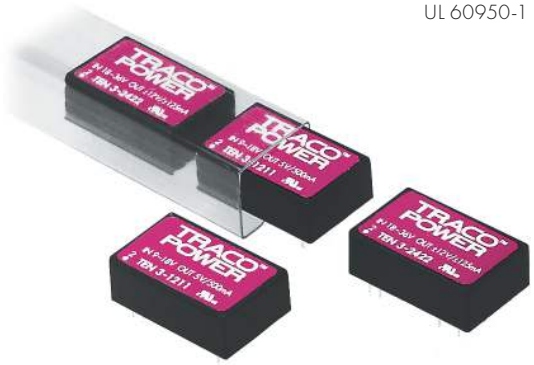
DC/DC Converters

TEN 3 Series, 3 Watt

UL 60950-1

Features

- Wide 2 : 1 input range
- High efficiency up to 84%
- Full SMD-design
- Short circuit protection
- Extended operating temperature range –40°C to 85°C
- I/O isolation 1'500 VDC
- Input filter to meet EN 55022, Class A and FCC, level A without external components
- 24-pin DIP with industry standard pinout
- High reliability, MTBF >1.1 Mio. h
- 3-year product warranty



The TEN 3 series of DC/DC converters, comprising 28 models, has been designed for a wide range of applications in industrial and communication systems. High efficiency allows an operating temperature range of –40°C to +85°C. Other features of these converters are internal filtering according to EN 55022-A and FCC, level A. Full SMD-design guarantees a high reliability of this product.

Models

Ordercode	Input voltage range	Output voltage	Output current max.	Efficiency typ.
TEN 3-0510	4.5 – 9.0 VDC (nominal 5 VDC)	3.3 VDC	600 mA	70 %
TEN 3-0511		5 VDC	500 mA	73 %
TEN 3-0512		12 VDC	250 mA	77 %
TEN 3-0513		15 VDC	200 mA	77 %
TEN 3-0521		±5 VDC	±250 mA	72 %
TEN 3-0522		±12 VDC	±125 mA	75 %
TEN 3-0523		±15 VDC	±100 mA	75 %
TEN 3-1210	9 – 18 VDC (nominal 12 VDC)	3.3 VDC	600 mA	74 %
TEN 3-1211		5 VDC	500 mA	78 %
TEN 3-1212		12 VDC	250 mA	82 %
TEN 3-1213		15 VDC	200 mA	82 %
TEN 3-1221		±5 VDC	±250 mA	77 %
TEN 3-1222		±12 VDC	±125 mA	80 %
TEN 3-1223		±15 VDC	±100 mA	80 %
TEN 3-2410	18 – 36 VDC (nominal 24 VDC)	3.3 VDC	600 mA	76 %
TEN 3-2411		5 VDC	500 mA	79 %
TEN 3-2412		12 VDC	250 mA	84 %
TEN 3-2413		15 VDC	200 mA	84 %
TEN 3-2421		±5 VDC	±250 mA	79 %
TEN 3-2422		±12 VDC	±125 mA	82 %
TEN 3-2423		±15 VDC	±100 mA	82 %
TEN 3-4810	36 – 75 VDC (nominal 48 VDC)	3.3 VDC	600 mA	76 %
TEN 3-4811		5 VDC	500 mA	79 %
TEN 3-4812		12 VDC	250 mA	84 %
TEN 3-4813		15 VDC	200 mA	84 %
TEN 3-4821		±5 VDC	±250 mA	80 %
TEN 3-4822		±12 VDC	±125 mA	84 %
TEN 3-4823		±15 VDC	±100 mA	84 %

Input Specifications

Input current no load / full load		5 Vin models	**40 mA / 800 mA typ.**
		12 Vin models	**20 mA / 300 mA typ.**
		24 Vin models	**5 mA / 150 mA typ.**
		48 Vin models	**3 mA / 75 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 (1 sec. 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)		(5 V input models excluded)	**EN 55022 level A, FCC part 15, level A**

Output Specifications

Voltage set accuracy			**±1 %**
Regulation	– Input variation Vin min. to Vin max. – Load variation 10 – 100 %		**0.5 % max.**
		single output models	**0.5 % max.**
		dual output models balanced load	**1.0 % max.**
		dual output models unbalanced load	**2.0 % max.**
Ripple and noise (20 MHz Bandwidth)			**60 mVpk-pk max**
Transiente response (25% load step change)	– Recovery time – Deviation		**500 µs max.** **5 % max.**
Temperature coefficient			**±0.02 %/K**
Current limitation			**>110 % of Iout max., constant current**
Short circuit protection			**indefinite, automatic recovery**
Capacitive load		single output models	**4000 µF max.**
		dual output models	**1000 µF max.** (each output)

General Specifications

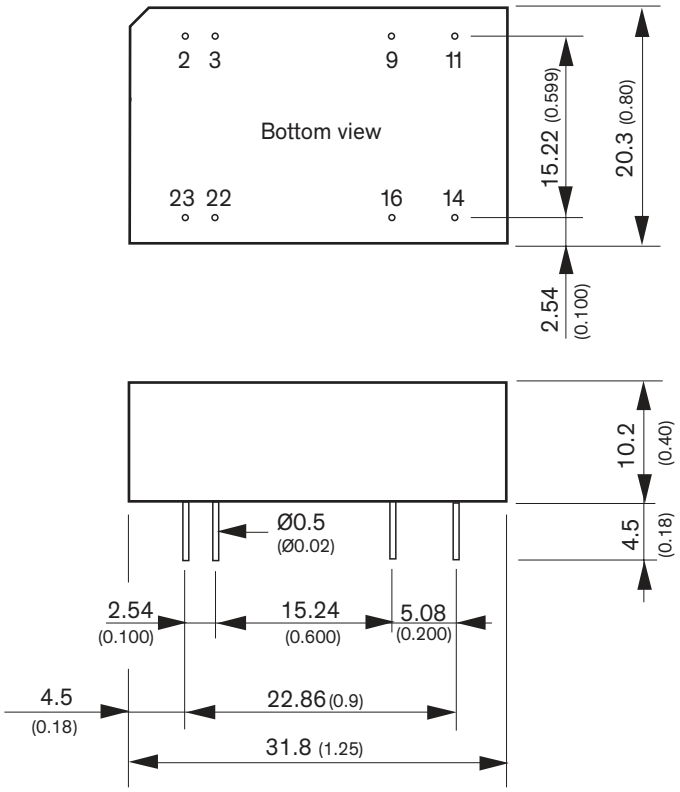
Temperature ranges	– Operating – Case temperature – Storage	**–40°C to +85°C** **+100°C max.** **–55°C to +125°C**
Derating		**3 %/K above 70°C**
Humidity (non condensing)		**95 % rel H max.**
Reliability, calculated MTBF (MIL-HDBK-217 F, at +25°C, ground benign)		**>1.1 Mio. h**
Isolation voltage (60 sec.)	– Input/Output	**1'500 VDC**
Isolation capacitance	– Input/Output	**65 pF typ**
Isolation resistance	– Input/Output (500 VDC)	**>1'000 M Ohm**
Switching frequency		**300 kHz typ.** (Pulse frequency modulation PFM)
Safety standards		**cUL/UL 60950-1, IEC/EN 60950-1**
Environmental compliance	– Reach – RoHS	www.tracopower.com/info/reach-declaration.pdf 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 (UL 94V-0 rated)
Weight	12.4 g (0.44 oz)
Soldering temperature	max. 265°C / 10 sec.

Outline Dimensions



Pin-Out		
Pin	**Single**	**Dual**
2	–Vin (GND)	–Vin (GND)
3	–Vin (GND)	–Vin (GND)
9	No pin	Common
11	NC	–Vout
14	+Vout	+Vout
16	–Vout	Common
22	+Vin (Vcc)	+Vin (Vcc)
23	+Vin (Vcc)	+Vin (Vcc)

NC = Not connected

Dimensions in [mm], () = Inch
Tolerances: x.x ±0.25 (x.xx ±0.01)
x.xx ±0.13 (x.xxx ±0.005)
Pin diameter tolerances: x.x ±0.5 (x.xx ±0.002)