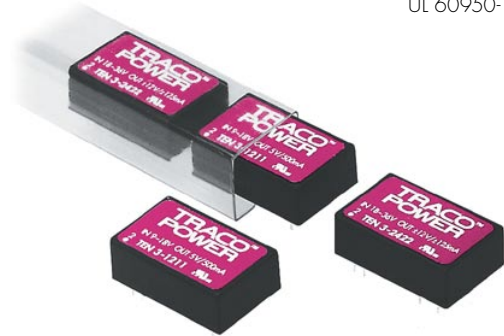




UL 60950-1

#### 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	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	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	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 – 72 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 12 Vin models 24 Vin models 48 Vin models	40 mA / 800 mA typ. 20 mA / 300 mA typ. 5 mA / 150 mA typ. 3 mA / 75 mA typ.
Start-up voltage / under voltage shut down	5 Vin models 12 Vin models 24 Vin models 48 Vin models	4 VDC / 3.5 VDC typ. 7 VDC / 6.5 VDC typ. 12 VDC / 11 VDC typ. 24 VDC / 22 VDC typ
Surge voltage (1 sec. max.)	5 Vin models 12 Vin models 24 Vin models 48 Vin models	11 V max. 25 V max. 50 V max. 100 V max.
Reverse voltage protection		1.0 A 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 dual output models balanced load dual output models unbalanced load	0.5 % max. 1.0 % max. 2.0 % max.
Ripple and noise (20 MHz Bandwidth)		50 mVpk-pk 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 dual output models	4000 µF max. 1000 µF max.

**General Specifications**

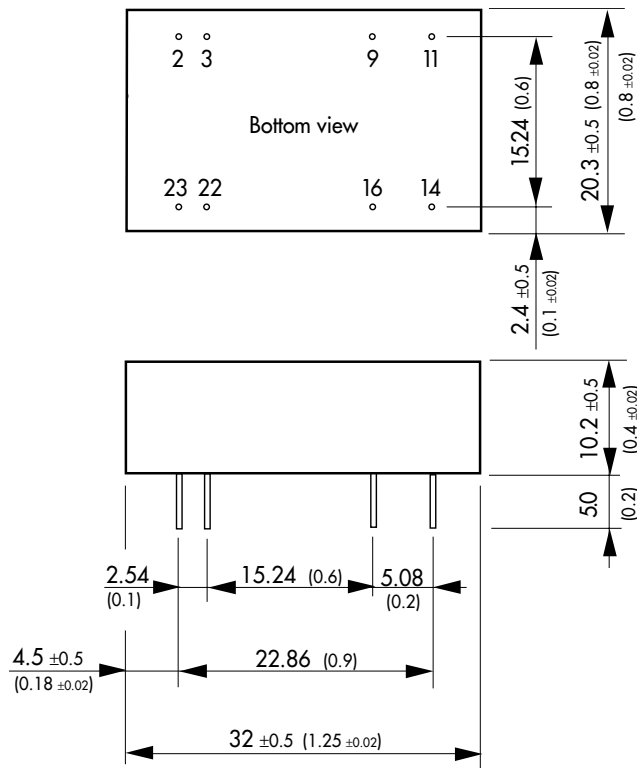
Temperature ranges	– Operating – Case temperature – Storage	– 40 °C ... + 85 °C + 100 °C max. – 55 °C ... +125°C
Derating		3% /K above 70°C
Humidity (non condensing)		95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217E ground benign)		>1.1 Mio. h @ + 25 °C
Isolation voltage (60 sec.)	– Input/Output	1'500 VDC
Isolation capacity	– 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		UL 60950-1, IEC 60950-1, EN 60950-1
Safety approval		CSA File No. 226037 <a href="http://directories.csa-international.org">http://directories.csa-international.org</a>

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

**Physical Specifications**

Case material	non conductive FR4
Potting material	epoxy (UL 94V-0 rated)
Weight	12 g (0.42 oz)
Soldering temperature	max. 265 °C / 10 sec.

**Outline Dimensions mm (inches)**



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

Pin diameter  $\varnothing 0.5 \pm 0.05$  (0.02) ±0.002  
Tolerances  $\pm 0.5$  (0.02)

Specifications can be changed any time without notice