

#### Features

- Wide 2 : 1 Input Range
- High Efficiency up to 84%
- Full SMD-Design
- Indefinite Short-Circuit Protection
- 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
- 2 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 + 75°C without derating. 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 TEN 3-0511 TEN 3-0512 TEN 3-0513 TEN 3-0521 TEN 3-0522 TEN 3-0523	4.5 – 9.0 VDC	3.3 VDC 5 VDC 12 VDC 15 VDC ± 5 VDC ± 12 VDC ± 15 VDC	600 mA 500 mA 250 mA 200 mA ± 250 mA ± 125 mA ± 100 mA	70 % 73 % 77 % 77 % 72 % 75 % 75 %
TEN 3-1210 TEN 3-1211 TEN 3-1212 TEN 3-1213 TEN 3-1221 TEN 3-1222 TEN 3-1223	9 – 18 VDC	3.3 VDC 5 VDC 12 VDC 15 VDC ± 5 VDC ± 12 VDC ± 15 VDC	600 mA 500 mA 250 mA 200 mA ± 250 mA ± 125 mA ± 100 mA	74 % 78 % 82 % 82 % 77 % 80 % 80 %
TEN 3-2410 TEN 3-2411 TEN 3-2412 TEN 3-2413 TEN 3-2421 TEN 3-2422 TEN 3-2423	18 – 36 VDC	3.3 VDC 5 VDC 12 VDC 15 VDC ± 5 VDC ± 12 VDC ± 15 VDC	600 mA 500 mA 250 mA 200 mA ± 250 mA ± 125 mA ± 100 mA	76 % 79 % 84 % 84 % 79 % 82 % 82 %
TEN 3-4810 TEN 3-4811 TEN 3-4812 TEN 3-4813 TEN 3-2421 TEN 3-4822 TEN 3-4823	36 – 72 VDC	3.3 VDC 5 VDC 12 VDC 15 VDC ± 5 VDC ± 12 VDC ± 15 VDC	600 mA 500 mA 250 mA 200 mA ± 250 mA ± 125 mA ± 100 mA	76 % 79 % 84 % 84 % 80 % 84 % 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 % – single output models – dual output models balanced load – dual output models unbalanced load	± 0.5 % max.  ± 0.5 % max. ± 1.0 % max. ± 2.0 % max.
Ripple and noise (20 MHz Bandwidth)		50 mVpk-pk max
Temperature coefficient		± 0.02 % / °C
Current limitation		> 110% of Iout max., constant current
Short circuit protection		Hiccup mode, indefinite (no automatic recovery)
Capacitive load	– single output models – dual output models	400 µF max. 100 µF max.

### General Specifications

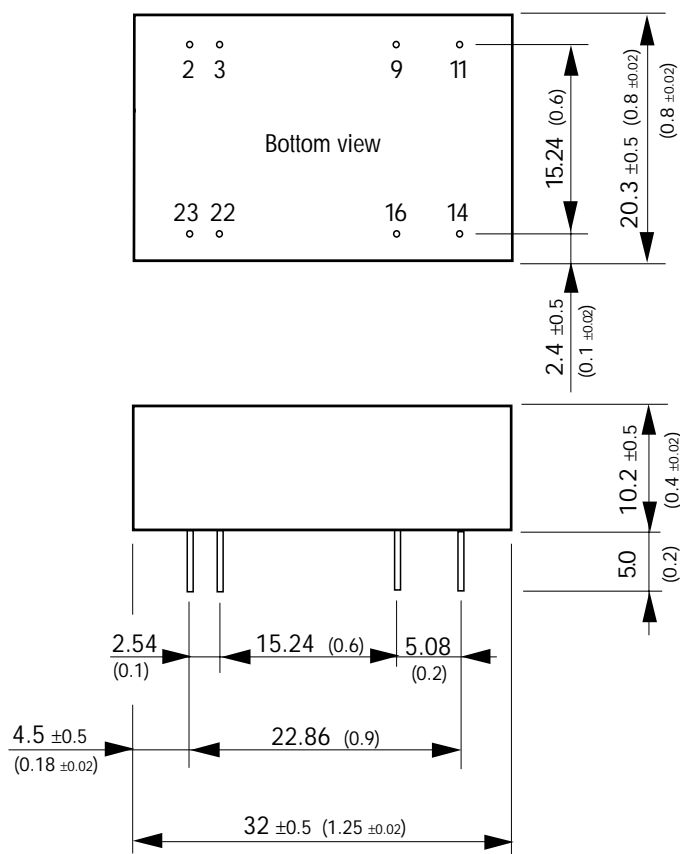
Temperature ranges	– Operating – Case temperature – Storage	– 40 °C ... + 75 °C (no derating) + 95 °C max. – 40 °C ... + 125 °C
Humidity (non condensing)		95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217 E)		>1.1 Mio. h @ + 25 °C
Isolation voltage	Input/Output	1'500 VDC
Isolation capacity	Input/Output	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 1950 , IEC 60950, EN 60950 Compliance up to 60 VDC input voltage (SELV limit)
Safety approval		cUL / UL (File no. E188913)

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 black plastic (flammability to UL 94V-0)
Weight	12 g (0.42 oz)
Soldering temperature	max. 260 °C / 10 sec.

## Outline Dimensions mm (inches)



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

## Pin-Out

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

Specifications can be changed without notice