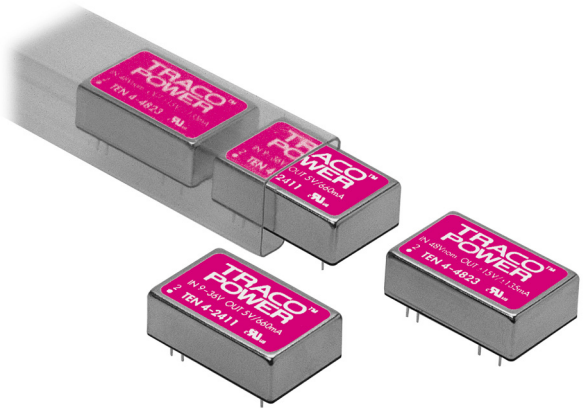
DC/DC Converters

TEN 4 Series, 4 Watt

not recommended for new designs

Features

- Ultra-wide 4:1 input range 9 – 36 VDC or 18 – 75 VDC
- Full SMD design
- High efficiency up to 85 %
- Indefinite short circuit protection
- I/O isolation 1'500 VDC
- Input filter meets EN 55022, Class A and FCC, Level A without external components
- Shielded metal case with insulated baseplate
- 24-pin DIP with industry standard pinout
- MTTF >1 Mio. h
- 3-year product warranty



The TEN 4 series DC/DC converter is designed for applications requiring very wide operating voltage range. Typical applications are tele-and data communication systems, mobile battery powered equipments and industrial process control systems with operation from different input voltages i.e. 12/24 VDC or 24/48 VDC battery voltages. High efficiency allows operation up to +75°C at full load. Input filtering according to EN 55022-A and FCC, level A. Low output ripple minisme design-in time and cost.

Models

Ordercode	Input voltage range	Output voltage	Output current max.	Efficiency typ.
TEN 4-2410	**9 – 36 VDC** (24 VDC nominal)	3.3 VDC	900 mA	77 %
TEN 4-2411		5 VDC	660 mA	81 %
TEN 4-2412		12 VDC	330 mA	83 %
TEN 4-2413		15 VDC	265 mA	83 %
TEN 4-2421		±5 VDC	±300 mA	80 %
TEN 4-2422		±12 VDC	±165 mA	83 %
TEN 4-2423		±15 VDC	±130 mA	83 %
TEN 4-4810	**18 – 75 VDC** (48 VDC nominal)	3.3 VDC	900 mA	78 %
TEN 4-4811		5 VDC	660 mA	82 %
TEN 4-4812		12 VDC	330 mA	85 %
TEN 4-4813		15 VDC	265 mA	85 %
TEN 4-4821		±5 VDC	±300 mA	82 %
TEN 4-4822		±12 VDC	±165 mA	85 %
TEN 4-4823		±15 VDC	±130 mA	85 %

Input Specifications

Input current no load / full load		24 Vin models	**20 mA typ. / 400 mA typ. (at 12 VDC Vin)** **20 mA typ. / 200 mA typ. (at 24 VDC Vin)**
		48 Vin models	**6 mA typ. / 200 mA typ. (at 24 VDC Vin)** **6 mA typ. / 100 mA typ. (at 48 VDC Vin)**
Start-up voltage / under voltage shut down		24 Vin models	**8.5 VDC / 8.0 VDC typ.**
		48 Vin models	**17 VDC / 16 VDC typ.**
Surge voltage (1 sec. max.)		24 Vin models	**50 V max.**
		48 Vin models	**100 V max.**
Conducted noise (input)			**EN 55022 level A, FCC part 15, level A**

Output Specifications

Voltage set accuracy			**±1.0 %**
Regulation	– Input variation Vin min. to Vin max. – Load variation 10 – 100 %		**0.3 % max.**
		single output models	**1.0 % max.**
		dual output models	**1.0 % max.** balanced load **3.0 % max.** unbalanced load
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			**Hiccup mode, indefinite** (automatic recovery)
Capacitive load	– Single output models – Dual output models		**3000 µF max.** **680 µF max.**

General Specifications

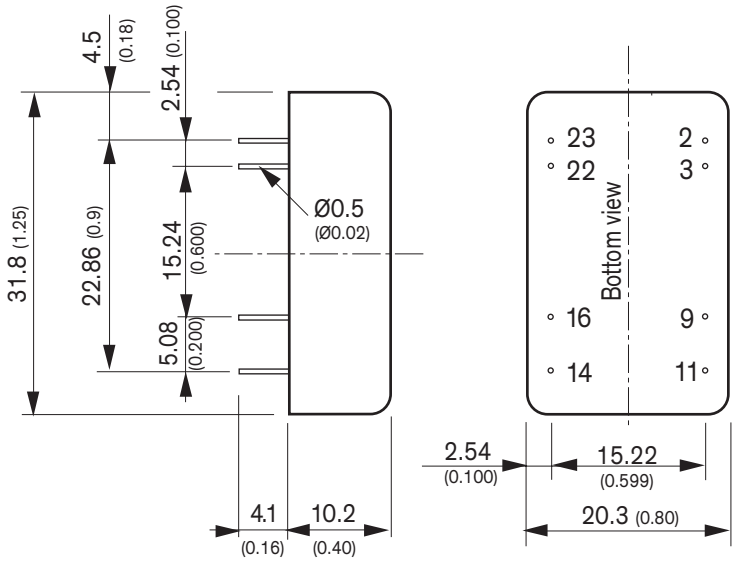
Temperature ranges	– Operating – Casing temperature – Storage	**–40°C to +75°C** **+95°C max.** **–40°C to +125°C**
Humidity (non condensing)		**95 % rel H max.**
Reliability, calculated MTTF (MIL-HDBK-217F @ +25°C, ground benign)		**>1 Mio. h**
Isolation voltage (60 sec.)	– Input/Output	**1'500 VDC**
Isolation capacity	– Input/Output	**380 pF typ.**
Isolation resistance	– Input/Output (500 VDC)	**>1'000 M Ohm**
Switching frequency		**350 kHz typ.** (Pulse frequency modulation PFM)
Safety standards		**UL 1950 , IEC/EN 60950** Compliance up to 60 VDC input voltage (SELV limit)
Safety approvals	– UL/cUL	www.ul.com **> 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

Casing material	Steel chrome-nickel plated
Baseplate material	Epoxy
Potting material	Epoxy (UL 94 V-0 rated)
Weight	16.2 g (0.57 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)