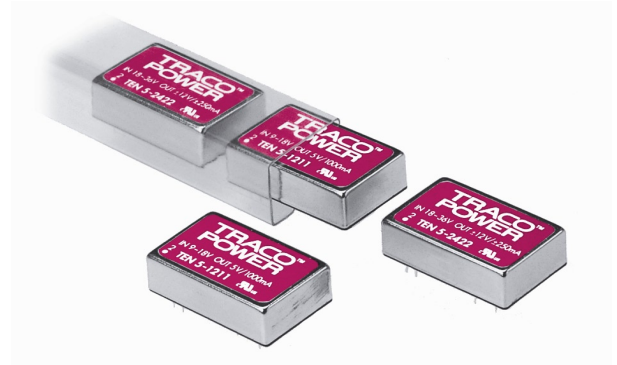


#### Features

- ◆ Wide 2:1 Input Range
- ◆ Full SMD-Design
- ◆ High Efficiency up to 86%
- ◆ Extended Operating Temperature
- ◆ Range -40°C to 85°C
- ◆ I/O-isolation 1'500 VDC
- ◆ Indefinite Short-Circuit Protection
- ◆ 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
- ◆ High Reliability, MTBF >1 Mio. h
- ◆ 3 Year Product Warranty



The TEN 5 Series is a range of DC/DC-converter modules with wide input range of 2:1. State of the art SMD-technology guarantees a product with very high reliability and good cost /performance ratio. High efficiency allows an operating temperature range of -40°C to +85°C without derating. I/O-isolation of 1'500 VDC together with conducted noise compliance to EN 55022-A and FCC, level A makes these converters ideal for a wide range of applications in communications, mobile battery powered equipments and industrial systems.

#### Models

Ordercode	Input voltage range	Output voltage	Output current max.	Efficiency typ.
TEN 5-0510	4.5 – 7 VDC	3.3 VDC	1200 mA	75 %
TEN 5-0511		5 VDC	1000 mA	79 %
TEN 5-0512		12 VDC	500 mA	82 %
TEN 5-0513		15 VDC	400 mA	82 %
TEN 5-0521		± 5 VDC	± 500 mA	79 %
TEN 5-0522		± 12 VDC	± 250 mA	82 %
TEN 5-0523		± 15 VDC	± 200 mA	82 %
TEN 5-1210	9 – 18 VDC	3.3 VDC	1200 mA	77 %
TEN 5-1211		5 VDC	1000 mA	81 %
TEN 5-1212		12 VDC	500 mA	84 %
TEN 5-1213		15 VDC	400 mA	84 %
TEN 5-1221		± 5 VDC	± 500 mA	81 %
TEN 5-1222		± 12 VDC	± 250 mA	84 %
TEN 5-1223		± 15 VDC	± 200 mA	84 %
TEN 5-2410	18 – 36 VDC	3.3 VDC	1200 mA	79 %
TEN 5-2411		5 VDC	1000 mA	83 %
TEN 5-2412		12 VDC	500 mA	86 %
TEN 5-2413		15 VDC	400 mA	86 %
TEN 5-2421		± 5 VDC	± 500 mA	83 %
TEN 5-2422		± 12 VDC	± 250 mA	86 %
TEN 5-2423		± 15 VDC	± 200 mA	86 %
TEN 5-4810	36 – 75 VDC	3.3 VDC	1200 mA	79 %
TEN 5-4811		5 VDC	1000 mA	83 %
TEN 5-4812		12 VDC	500 mA	86 %
TEN 5-4813		15 VDC	400 mA	86 %
TEN 5-4821		± 5 VDC	± 500 mA	83 %
TEN 5-4822		± 12 VDC	± 250 mA	86 %
TEN 5-4823		± 15 VDC	± 200 mA	86 %

### Input Specifications

Input current no load /full load	5 Vin models	50 mA / 1460 mA typ.
	12 Vin models	20 mA / 590 mA typ.
	24 Vin models	5 mA / 290 mA typ.
	48 Vin models	3 mA / 145 mA typ.
Start-up voltage / under voltage shut down	5 Vin models	4.4 VDC / 4.0 VDC
	12 Vin models	8.0 VDC / 8.0 VDC
	24 Vin models	16.0 VDC / 16.0 VDC
	48 Vin models	32.0 VDC / 32.0 VDC
Surge voltage (1 sec. max.)	5 Vin models	10 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 55022 level A, FCC part 15, level A

### Output Specifications

Voltage set accuracy		1 %
Regulation	– Input variation Vin min. to Vin max.	0.3 % max.
	– Load variation 10 – 100 %	
	– single output models	1 % max.
	– dual output models balanced load	1 % max.
	– dual output models unbalanced load	3 % max.
Ripple and noise (20 MHz Bandwidth)		50 mVpk-pk max.
Temperature coefficient		± 0.02 % /K
Output current limitation		>120 % of Iout max., constant current
Short-circuit protection		indefinite (automatic recovery)
Capacitive load	– single output models	6800 µF max.
	– dual output models	1000 µF max. (each output)

### General Specifications

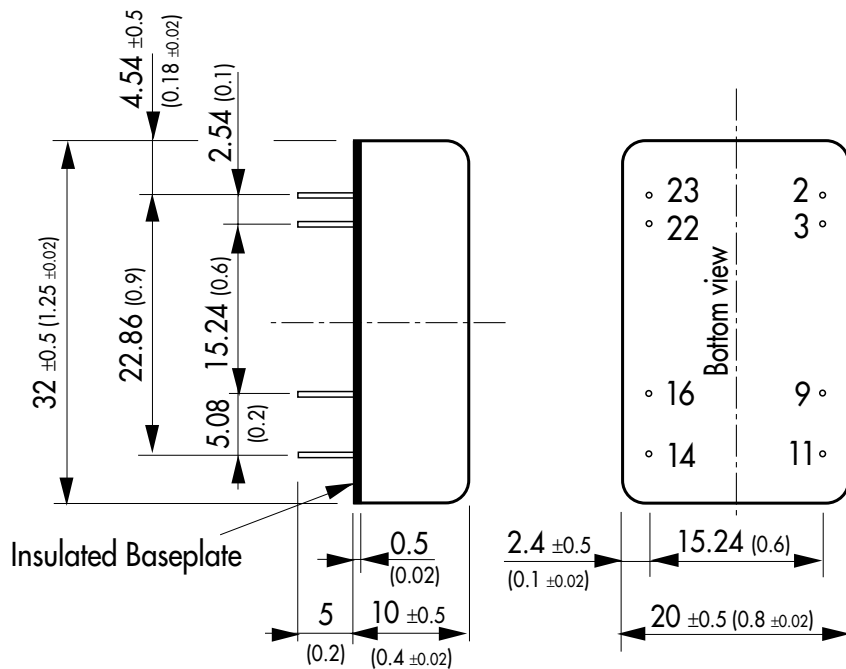
Temperature ranges	– Operating	– 40 °C ... + 85 °C
	– Case temperature	+ 100 °C max.
	– Storage	– 55 °C ... + 125 °C
Derating		3.5% /K above 70°C
Humidity (non condensing)		95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217 E)		>1 Mio. h @ + 25 °C
Isolation voltage	Input/Output	1'500 VDC
Isolation capacity	Input/Output	380 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, IEC 60950, EN 60950 Compliance up to 60 VDC input voltage (SELV limit)
Safety approval		UL /cUL File E188913 (5Vin models pending)

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

**Physical Specifications**

Case material	steel, Nickel plated
Baseplate material	non conductive FR4
Potting material	epoxy (UL 94V-0 rated)
Weight	14 g (0.55 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  $\pm 0.002$ )  
Tolerances  $\pm 0.5$  (0.02)

Specifications can be changed without notice

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