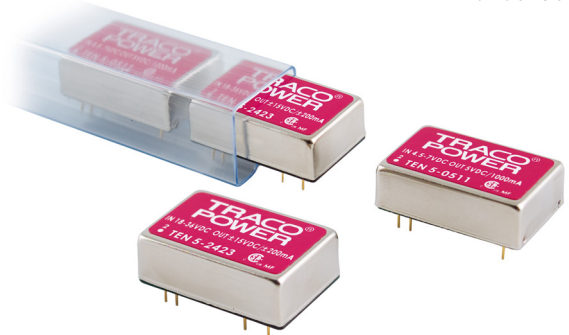


### Features

- ◆ Wide 2:1 input range
- ◆ Full SMD-design
- ◆ High efficiency up to 86%
- ◆ Extended operating temperature range  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
- ◆ I/O isolation 1'500 VDC
- ◆ Indefinite short circuit protection
- ◆ Input filter to meet 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. 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	<b>4.5 – 7 VDC</b> (5 VDC nominal)	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		$\pm 5$ VDC	$\pm 500$ mA	79 %
TEN 5-0522		$\pm 12$ VDC	$\pm 250$ mA	82 %
TEN 5-0523		$\pm 15$ VDC	$\pm 200$ mA	82 %
TEN 5-1210		<b>9 – 18 VDC</b> (12 VDC nominal)	3.3 VDC	1200 mA
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	$\pm 5$ VDC		$\pm 500$ mA	81 %
TEN 5-1222	$\pm 12$ VDC		$\pm 250$ mA	84 %
TEN 5-1223	$\pm 15$ VDC		$\pm 200$ mA	84 %
TEN 5-2410	<b>18 – 36 VDC</b> (24 VDC nominal)		3.3 VDC	1200 mA
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		$\pm 5$ VDC	$\pm 500$ mA	83 %
TEN 5-2422		$\pm 12$ VDC	$\pm 250$ mA	86 %
TEN 5-2423		$\pm 15$ VDC	$\pm 200$ mA	86 %
TEN 5-4810		<b>36 – 75 VDC</b> (48 VDC nominal)	3.3 VDC	1200 mA
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	$\pm 5$ VDC		$\pm 500$ mA	83 %
TEN 5-4822	$\pm 12$ VDC		$\pm 250$ mA	86 %
TEN 5-4823	$\pm 15$ VDC		$\pm 200$ mA	86 %

### Input Specifications

Input current no load	5 Vin models: 80 mA typ. 12 Vin models: 30 mA typ. 24 Vin models: 15 mA typ. 48 Vin models: 8 mA typ.
Start-up voltage / under voltage shut down	5 Vin models: 4.4 VDC / 4.0 VDC (or lower) 12 Vin models: 8.0 VDC / 8.0 VDC (or lower) 24 Vin models: 16.0 VDC / 16.0 VDC (or lower) 48 Vin models: 32.0 VDC / 32.0 VDC (or lower) long term operation at undervoltage will damage the converter!
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.
Conducted noise (input)	EN 55022 class A, FCC part 15, level A

### Output Specifications

Voltage set accuracy	1.0 %
Regulation	– Input variation Vin min. to Vin max.      0.3 % max. – Load variation 20 – 100 % single output models: 1.0 % max. dual output models balanced load: 2.0 % max. dual output models unbalanced load: 5.0 % max. (25 % / 100 %)
Minimum load	5 % of rated max current (operation at lower load condition is safe but a higher output ripple will be experienced)
Ripple and noise (20 MHz Bandwidth)	50 mVpk-pk typ., 75 mVpk-pk max.
Temperature coefficient	±0.02 %/K
Output current limitation	>120 % of Iout max., foldback
Short-circuit protection	indefinite (automatic recovery)
Start up time (nominal Vin and constant resistive load)	10 ms typ. (for power on and remote on)
Capacitive load	single output models: 6800 µF max. dual output models: 1000 µF max. (each output)

### General Specifications

Temperature ranges	– Operating      –40°C to +85°C – Case temperature      +90°C max. – Storage      –50°C to +125°C
Derating	3.3 %/K above 70°C
Humidity (non condensing)	95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)	>1 Mio. h
Isolation voltage (60 sec.)	– Input/Output      1'500 VDC
Isolation capacitance	– Input/Output      380 pF typ.
Isolation resistance	– Input/Output      >1'000 M Ohm (500 VDC)
Switching frequency	300 kHz typ. (Pulse frequency modulation PFM)
Safety standards	UL 60950-1, IEC/EN 60950-1
Environmental compliance	– Reach <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> – RoHS      directive 2011/65/EU

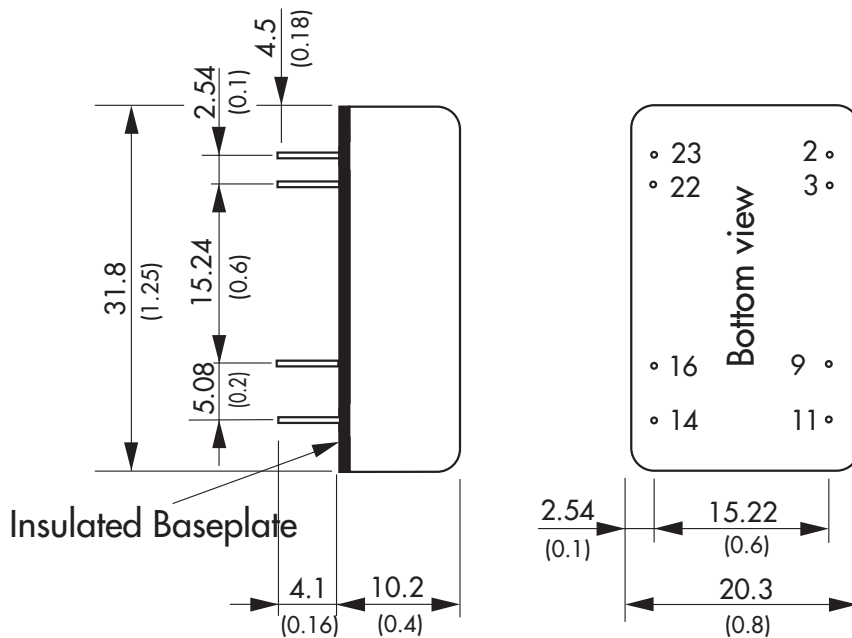
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

**Physical Specifications**

Casing material	steel, metal
Baseplate material	non conductive FR4
Potting material	Silicone (UL 94 V-0 rated)
Weight	16.9 g (0.59 oz)
Soldering temperature	max. 260°C / 10 sec.

**Supporting documents:** [www.tracopower.com/overview/ten5](http://www.tracopower.com/overview/ten5)

**Outline Dimensions**



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)

Dimensions in [mm], ( ) = Inch  
 Pin diameter  $\varnothing 0.5 \pm 0.05$  (0.02  $\pm$  0.002)  
 Tolerances  $\pm 0.25$  ( $\pm 0.01$ )  
 Pin pitch tolerances  $\pm 0.13$  ( $\pm 0.005$ )

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