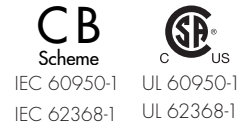


### Features

- ◆ Wide 2 : 1 input range
- ◆ Input filter to meet EN 55022, class A and FCC, level A without external components
- ◆ Extended operating temperature range -40°C to +85°C
- ◆ Models with 1'500 VDC and 3'000 VDC I/O isolation (functional insulation)
- ◆ High reliability, MTBF >1.0 Mio. h
- ◆ 3-year product warranty



The TEN 3N Series is a drop in replacement of the prevalent TEN 3 Series. The up-to-date design enables a cost reduction without any compromise to reliability and function. They come with an internal filter to meet EN55022 class A without external components. Increased EMC immunity and extended operating temperature range of -40°C to +85°C make these converters an ideal solution for cost critical but demanding applications. With the standard pinning it is a drop in replacement for common 3 Watt converters in DIP-24 package.

Models						
1500 VDC	Ordercode	3000 VDC	Input voltage range	Output voltage	Output current max.	Efficiency typ.
TEN 3-0510N			4.5 – 9.0 VDC (nominal 5 VDC)	3.3 VDC	750 mA	77 %
TEN 3-0511N	TEN 3-0511N-HI			5.0 VDC	600 mA	80 %
TEN 3-0512N	TEN 3-0512N-HI			12 VDC	250 mA	82 %
TEN 3-0513N	TEN 3-0513N-HI			15 VDC	200 mA	82 %
TEN 3-0515N	TEN 3-0515N-HI			24 VDC	125 mA	81 %
TEN 3-0521N	TEN 3-0521N-HI			±5.0 VDC	±250 mA	80 %
TEN 3-0522N	TEN 3-0522N-HI			±12 VDC	±125 mA	82 %
TEN 3-0523N	TEN 3-0523N-HI			±15 VDC	±100 mA	82 %
TEN 3-1210N				9 – 18 VDC (nominal 12 VDC)	3.3 VDC	750 mA
TEN 3-1211N			5.0 VDC		600 mA	81 %
TEN 3-1212N			12 VDC		250 mA	85 %
TEN 3-1213N			15 VDC		200 mA	85 %
TEN 3-1215N			24 VDC		125 mA	84 %
TEN 3-1221N			±5.0 VDC		±250 mA	80 %
TEN 3-1222N			±12 VDC		±125 mA	84 %
TEN 3-1223N			±15 VDC		±100 mA	84 %
TEN 3-2410N			18 – 36 VDC (nominal 24 VDC)	3.3 VDC	750 mA	79 %
TEN 3-2411N				5.0 VDC	600 mA	81 %
TEN 3-2412N				12 VDC	250 mA	85 %
TEN 3-2413N				15 VDC	200 mA	85 %
TEN 3-2415N				24 VDC	125 mA	84 %
TEN 3-2421N				±5.0 VDC	±250 mA	80 %
TEN 3-2422N				±12 VDC	±125 mA	84 %
TEN 3-2423N				±15 VDC	±100 mA	84 %
TEN 3-4810N			36 – 75 VDC (nominal 48 VDC)	3.3 VDC	750 mA	79 %
TEN 3-4811N				5.0 VDC	600 mA	81 %
TEN 3-4812N				12 VDC	250 mA	85 %
TEN 3-4813N				15 VDC	200 mA	85 %
TEN 3-4815N				24 VDC	125 mA	84 %
TEN 3-4821N				±5.0 VDC	±250 mA	80 %
TEN 3-4822N				±12 VDC	±125 mA	84 %
TEN 3-4823N				±15 VDC	±100 mA	84 %

Models with high isolation available from TEN 3WIN series:  
[www.tracopower.com/overview/ten3win](http://www.tracopower.com/overview/ten3win)

### Input Specifications

Input current no load	5 Vin models 12 Vin models 24 Vin models 48 Vin models	65 mA typ. 35 mA typ. 20 mA typ. 15 mA typ.
Start-up voltage	5 Vin models: 12 Vin models: 24 Vin models: 48 Vin models:	4.5 VDC (or lower) 9 VDC (or lower) 18 VDC (or lower) 36 VDC (or lower)
Under voltage shut down (lock-out circuit)	5 Vin models: 12 Vin models: 24 Vin models: 48 Vin models:	4.0 VDC max. 8.5 VDC max. 17.5 VDC max. 35.5 VDC max.
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.
Reflected ripple current	5 Vin models 12 Vin models 24 Vin models 48 Vin models	100 mA typ 30 mA typ. 15 mA typ. 10 mA typ.
Conducted noise		EN 55022 class A without external components
EMC immunity	<ul style="list-style-type: none"> <li>- ESD (electrostatic discharge)</li> <li>- Radiated immunity</li> <li>- Fast transient / surge</li> <li>- Conducted immunity</li> </ul>	EN 55024 EN 61000-4-2, air ±8 kV, contact ±6 kV, perf. criteria A EN 61000-4-3, 10 V/m, perf. criteria A EN 61000-4-4, ±2 kV, perf. criteria A EN 61000-4-5, ±1 kV, perf. criteria A 200 µF, 100 V, ESR 48 mOhm EN 61000-4-6, 10 Vrms, perf. criteria A
Short circuit input power		2000 mW max.
Internal power dissipation		1200 mW max.

### Output Specifications

Voltage set accuracy		±2 % max.
Regulation	<ul style="list-style-type: none"> <li>- Input variation Vin min. to Vin max.</li> <li>- Load variation 0 – 100 %</li> </ul>	1.0 % max.  single output models 1.0 % max. dual output models balanced load 2.0 % max.
Minimum load		not required
Ripple and noise (20 MHz bandwidth)		70 mVpk-pk max
Transient response time (25% load step change)		500 µs max.
Transient response deviation (25% load step change)		±5 % max.
Temperature coefficient		±0.02 %/K
Current limitation		>120 % of Iout max., constant current
Short circuit protection		continuous, automatic recovery

**Output Specifications (continued)**

Capacitive load	3.3 VDC models:	680 $\mu$ F max.
	5.0 VDC models:	470 $\mu$ F max.
	12 VDC models:	330 $\mu$ F max.
	15 VDC models:	220 $\mu$ F max.
	24 VDC models:	100 $\mu$ F max.
	$\pm$ 5.0 VDC models:	220 $\mu$ F max. (each output)
	$\pm$ 12 VDC models:	150 $\mu$ F max. (each output)
	$\pm$ 15 VDC models:	100 $\mu$ F max. (each output)

**General Specifications**

Temperature ranges	– Operating (natural convection cooling 20 LFM) – Case temperature – Storage	–40°C to +85°C +100°C max. –55°C to +125°C
Derating		3.3 %/K above 70°C
Humidity (non condensing)		95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217 F, at +25°C, ground benign)		>1 Mio. h
Isolation voltage (60 sec.)	– Input/Output	1'500 VDC or 3'000 VDC
Isolation capacitance	– Input/Output	300 pF max.
Isolation resistance	– Input/Output (500 VDC)	>1'000 M Ohm
Altitude during operation		6'000 m max.
Switching frequency		90 kHz min. (pulse frequency modulation PFM)
Safety standards		cUL/UL 60950-1, IEC/EN 60950-1
Safety approvals	– CSA certificate of compliance – CB test certificate – Certification documents	CAN/CSA-C22.2 No 60950-1-07, Am 1:2011 ANSI/UL Std No 60950-1, 2nd Ed, AM 1:2011 IEC 60950-1:2005 2nd Ed, Am 1:2009 IEC/EN 62368-1, UL 62368-1 <a href="http://www.tracopower.com/overview/ten3n">www.tracopower.com/overview/ten3n</a>
Environmental compliance	– Reach – RoHS	<a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> RoHS directive 2011/65/EU

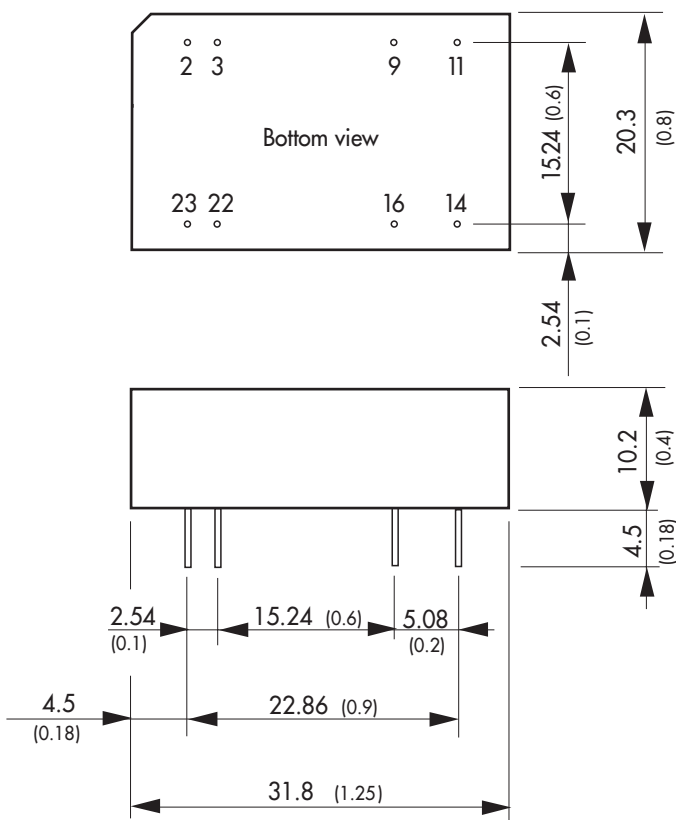
**Supporting documents:** [www.tracopower.com/overview/ten3n](http://www.tracopower.com/overview/ten3n)

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

**Physical Specifications**

Casing material	non conductive FR4
Potting material	epoxy (UL 94V-0 rated)
Pin material	copper alloy with gold plated subplate
Weight	12.8 g (0.45oz)
Soldering temperature	max. 260°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	ntc	-Vout
14	+Vout	+Vout
16	-Vout	Common
22	+Vin (Vcc)	+Vin (Vcc)
23	+Vin (Vcc)	+Vin (Vcc)

ntc = not to connect

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