

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 $+85^{\circ}\text{C}$
- ◆ 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 $+85^{\circ}\text{C}$ 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/products/ten-3win.pdf

Input Specifications

Input current no load	5 Vin models	65 mA typ.
	12 Vin models	35 mA typ.
	24 Vin models	20 mA typ.
	48 Vin models	15 mA typ.
Start-up voltage	5 Vin models:	4.5 VDC (or lower)
	12 Vin models:	9 VDC (or lower)
	24 Vin models:	18 VDC (or lower)
	48 Vin models:	36 VDC (or lower)
Under voltage shut down (lock-out circuit)	5 Vin models:	4.0 VDC max.
	12 Vin models:	8.5 VDC max.
	24 Vin models:	17.5 VDC max.
	48 Vin models:	35.5 VDC max.
Surge voltage (1 sec. max.)	5 Vin models	11 V max.
	12 Vin models	25 V max.
	24 Vin models	50 V max.
	48 Vin models	100 V max.
Reflected ripple current	5 Vin models	100 mA typ.
	12 Vin models	30 mA typ.
	24 Vin models	15 mA typ.
	48 Vin models	10 mA typ.
Conducted noise	EN 55022 class A without external components	
ESD (electrostatic discharge)	EN 61000-4-2, air ± 8 kV, contact ± 6 kV, perf. criteria A	
Radiated immunity	EN 61000-4-3, 10 V/m, perf. criteria A	
Fast transient / surge (with external input capacitor)	EN 61000-4-4, ± 2 kV, perf. criteria A	
	EN 61000-4-5, ± 1 kV perf. criteria A Nippon chemi-con KY 220 μ F, 100 V, ESR 48 mOhm	
Conducted immunity	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	- Input variation Vin min. to Vin max.	1.0 % max.
	- Load variation 0 – 100 %	
	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 μ s 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	

Output Specifications (continued)

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

General Specifications

Temperature ranges	- Operating (natural convection cooling 20 LFM)	-40°C to +85°C
	- Case temperature	+100°C max.
	- Storage	-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
Switching frequency		90 kHz min. (pulse frequency modulation PFM)
Safety standards		cUL/UL 60950-1, IEC/EN 60950-1
Safety approval		CSA file no. 226037 http://directories.csa-international.org
Environmental compliance	- Reach	www.tracopower.com/products/reach-declaration.pdf
	- RoHS	RoHS directive 2011/65/EU

Application note: www.tracopower.com/products/ten3n-application.pdf

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

