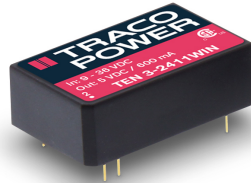


- Ultra wide 4:1 input range
- Input filter to meet EN 55032, Class A and FCC, level A without external components
- Extended operating temperature range -40°C to 85°C
- Models with 1'500 VDC and 3'000 VDC I/O isolation (functional insulation)
- DIP-24 package
- High reliability, MTBF >1.0 Mio. h
- 3-year product warranty



UL 62368-1 IEC 62368-1

The TEN 3WIN Series is a drop in replacement of the prevalent TEN 3WI 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 EN55032 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 DIP24 package.

### Models

Order Code	Input Voltage Range	Output 1		Output 2		Efficiency typ.
		Vnom	I <sub>max</sub>	Vnom	I <sub>max</sub>	
TEN 3-2410WIN	9 - 36 VDC (24 VDC nom.)	3.3 VDC	750 mA			77 %
TEN 3-2411WIN		5 VDC	600 mA			79 %
TEN 3-2412WIN		12 VDC	250 mA			82 %
TEN 3-2413WIN		15 VDC	200 mA			83 %
TEN 3-2415WIN		24 VDC	125 mA			81 %
TEN 3-2421WIN		+5 VDC	250 mA	-5 VDC	250 mA	80 %
TEN 3-2422WIN		+12 VDC	125 mA	-12 VDC	125 mA	82 %
TEN 3-2423WIN		+15 VDC	100 mA	-15 VDC	100 mA	82 %
TEN 3-4810WIN	18 - 75 VDC (48 VDC nom.)	3.3 VDC	750 mA			77 %
TEN 3-4811WIN		5 VDC	600 mA			80 %
TEN 3-4812WIN		12 VDC	250 mA			83 %
TEN 3-4813WIN		15 VDC	200 mA			84 %
TEN 3-4815WIN		24 VDC	125 mA			82 %
TEN 3-4821WIN		+5 VDC	250 mA	-5 VDC	250 mA	80 %
TEN 3-4822WIN		+12 VDC	125 mA	-12 VDC	125 mA	82 %
TEN 3-4823WIN		+15 VDC	100 mA	-15 VDC	100 mA	82 %

### Options

<b>Suffix -HI</b>	- Models with high isolation (3000 VDC), except 3.3 Vout models
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### Input Specifications

Input Current	- At no load	24 Vin models: <b>30 mA typ.</b> 48 Vin models: <b>20 mA typ.</b>
	- At full load	24 Vin models: <b>150 mA typ.</b> 48 Vin models: <b>75 mA typ.</b>
Surge Voltage		24 Vin models: <b>50 VDC max.</b> (1 s max.) 48 Vin models: <b>100 VDC max.</b> (1 s max.)
Under Voltage Lockout		24 Vin models: <b>8.5 VDC max.</b> 48 Vin models: <b>17.5 VDC max.</b>
Reflected Ripple Current		24 Vin models: <b>15 mAp-p typ.</b> 48 Vin models: <b>10 mAp-p typ.</b>
Recommended Input Fuse		(The need of an external fuse has to be assessed in the final application.)
Input Filter		<b>Internal Pi-Type</b>
Short Circuit Input Power		<b>2 W max.</b>

### Output Specifications

Voltage Set Accuracy		<b>±2% max.</b>	
Regulation	- Input Variation (Vmin - Vmax)	single output models: <b>1% max.</b> dual output models: <b>1% max.</b>	
	- Load Variation (0 - 100%)	single output models: <b>1% max.</b> dual output models: <b>1% max.</b> (Output 1) <b>1% max.</b> (Output 2)	
	- Voltage Balance (symmetrical load)	dual output models: <b>2% max.</b>	
Ripple and Noise	- 20 MHz Bandwidth	<b>70 mVp-p max.</b>	
Capacitive Load	- single output	3.3 Vout models: <b>680 µF max.</b> 5 Vout models: <b>470 µF max.</b> 12 Vout models: <b>330 µF max.</b> 15 Vout models: <b>220 µF max.</b> 24 Vout models: <b>100 µF max.</b>	
		- dual output	5 / -5 Vout models: <b>220 / 220 µF max.</b> 12 / -12 Vout models: <b>150 / 150 µF max.</b> 15 / -15 Vout models: <b>100 / 100 µF max.</b>
	Minimum Load		<b>Not required</b>
	Temperature Coefficient		<b>±0.02 %/K max.</b>
Short Circuit Protection		<b>Continuous, Automatic recovery</b>	
Overload Protection		<b>Foldback Mode</b>	
Output Current Limitation		<b>120% min. of Iout max.</b> <b>150% typ. of Iout max.</b>	
Transient Response	- Response Deviation	<b>3% typ. / 5% max.</b> (75% to 100% Load Step)	
	- Response Time	<b>200 µs typ. / 500 µs max.</b> (75% to 100% Load Step)	

### Safety Specifications

Safety Standards	- IT / Multimedia Equipment	<b>CSA-C22.2, No. 60950-1</b> <b>EN 60950-1</b> <b>EN 62368-1</b> <b>IEC 60950-1</b> <b>IEC 62368-1</b> <b>UL 60950-1</b> <b>UL 62368-1</b>
	- Certification Documents	<a href="http://www.tracopower.com/overview/ten3win">www.tracopower.com/overview/ten3win</a>
Pollution Degree		<b>PD 3</b>
Over Voltage Category		<b>Not mains connected</b>

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

## EMC Specifications

EMI Emissions	- Conducted Emissions	EN 55032 class A (internal filter)
	- Radiated Emissions	EN 55032 class A (internal filter)
EMS Immunity	- Electrostatic Discharge	Air: EN 61000-4-2, $\pm 8$ kV, perf. criteria A Contact: EN 61000-4-2, $\pm 6$ kV, perf. criteria A
	- RF Electromagnetic Field	EN 61000-4-3, 10 V/m, perf. criteria A
	- EFT (Burst) / Surge	EN 61000-4-4, $\pm 2$ kV, perf. criteria A
		EN 61000-4-5, $\pm 1$ kV, perf. criteria A
		Ext. input component: 200 $\mu$ F, 100 V, ESR 48 m $\Omega$
	- Conducted RF Disturbances	EN 61000-4-6, 10 Vrms, perf. criteria A

## General Specifications

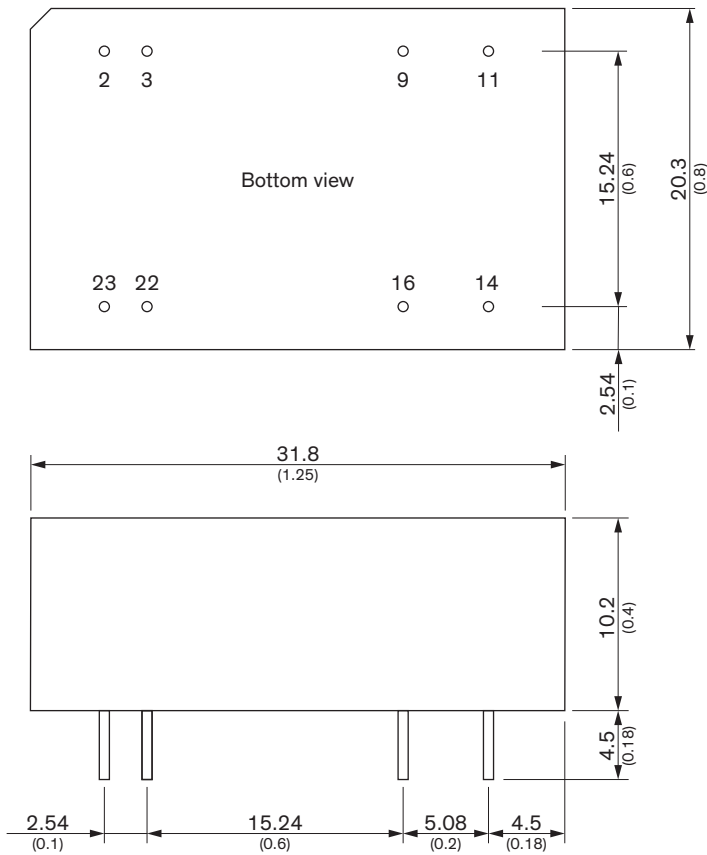
Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	-40°C to +85°C
	- Case Temperature	+100°C max.
	- Storage Temperature	-55°C to +125°C
Power Derating	- High Temperature	3.3 %/K above 70°C
Cooling System		Natural convection (20 LFM)
Altitude During Operation		6'000 m max.
Switching Frequency		90 kHz min. (PFM)
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s	1'500 VDC (Standard models)
		3'000 VDC (suffix -HI, except 3.3 Vout models)
	- Input to Output, 1 s	1'800 VDC
Isolation Resistance	- Input to Output, 500 VDC	1'000 M $\Omega$ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	300 pF max.
Reliability	- Calculated MTBF	1'000'000 h (MIL-HDBK-217F, ground benign)
Washing Process		Allowed (hermetical product)
	See Cleaning Guideline:	<a href="http://www.tracopower.com/info/cleaning.pdf">www.tracopower.com/info/cleaning.pdf</a>
Housing Material		Non-conductive Plastic (UL 94 V-0 rated)
Potting Material		Epoxy (UL 94 V-0 rated)
Pin Material		Copper Alloy (C6801)
Pin Foundation Plating		Nickel (2.5 $\mu$ m min.)
Pin Surface Plating		Gold (75 - 125 nm), glossy
Housing Type		Plastic Case
Mounting Type		PCB Mount
Connection Type		THD (Through-Hole Device)
Footprint Type		DIP24
Soldering Profile		Wave Soldering 260°C / 10 s max.
Weight		12.8 g
Environmental Compliance	- REACH Declaration	<a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> REACH SVHC list compliant REACH Annex XVII compliant
	- RoHS Declaration	<a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a> Exemptions: 7a (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule). The SCIP number is provided on request.)

## Supporting Documents

Overview Link (for additional Documents)	<a href="http://www.tracopower.com/overview/ten3win">www.tracopower.com/overview/ten3win</a>
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All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

### Outline Dimensions



Dimensions in mm (inch)  
 Pin diameter  $\varnothing 0.5 \pm 0.05$  ( $\varnothing 0.02 \pm 0.002$ )  
 Tolerances  $x.x \pm 0.5$  ( $x.xx \pm 0.02$ )  
 $x.xx \pm 0.25$  ( $x.xxx \pm 0.01$ )

Pinout		
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

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