

DC/DC Converter

TEN 3WIN Series, 3 Watt

- 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 _{max}	Vnom	I _{max}	
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

Suffix HI	- Optional models with high isolation (3000 VDC), except 3.3 Vout models
-----------	--

Input Specifications

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

Output Specifications

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

Safety Specifications

Standards	- IT / Multimedia Equipment	CSA-C22.2, No. 60950-1 EN 60950-1 EN 62368-1 IEC 60950-1 IEC 62368-1 UL 60950-1 UL 62368-1
	- Certification Documents	www.tracopower.com/overview/ten3win
Pollution Degree		PD 3
Over Voltage Category		Not mains connected

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)		EN 55024 (IT Equipment)
		EN 55035 (Multimedia)
	- Electrostatic Discharge	Air: EN 61000-4-2, ± 8 kV, perf. criteria A
		Contact: EN 61000-4-2, ± 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, ± 2 kV, perf. criteria A
		EN 61000-4-5, ± 1 kV, perf. criteria A
		Ext. input component: 200 μ F, 100 V, ESR 48 m Ω
	- 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
		See application note: www.tracopower.com/overview/ten3win
Cooling System		Natural convection (20 LFM)
Altitude During Operation		6'000 m max.
Regulator Topology		RCC Converter
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 Ω 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		According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf
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 μ 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		Lead-Free Wave Soldering 260°C / 10 s max.
Weight		12.8 g
Environmental Compliance	- REACH Declaration	www.tracopower.com/info/reach-declaration.pdf
		REACH SVHC list compliant
		REACH Annex XVII compliant
	- RoHS Declaration	www.tracopower.com/info/rohs-declaration.pdf
		Exemptions: 7(a) (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)
	- SCIP Reference Number	eb513e5b-8662-47d4-8669-273b9c3680e1

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

Additional Information

Supporting Documents

www.tracopower.com/overview/ten3win

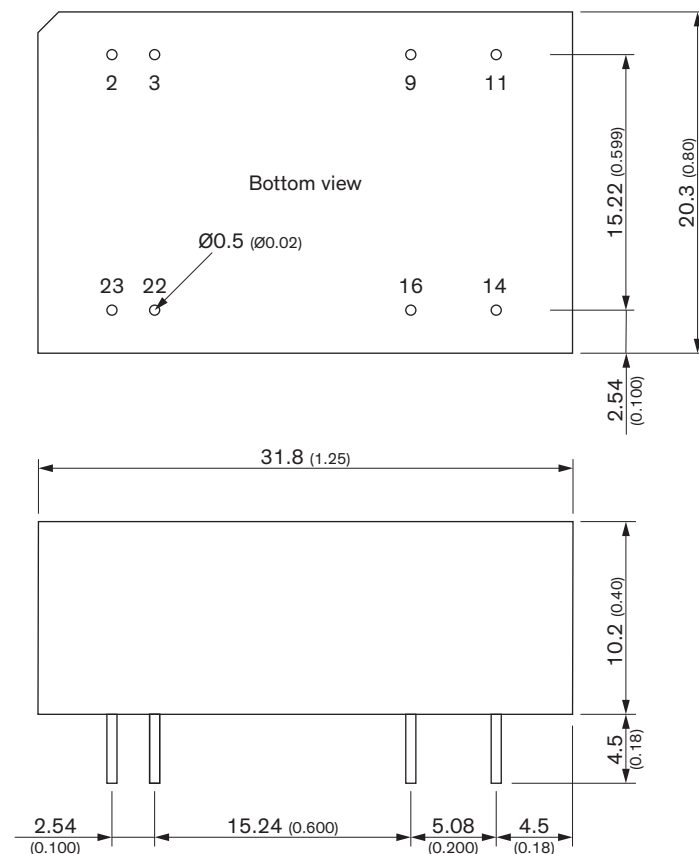
Frequently Asked Questions

www.tracopower.com/glossary-faq

Glossary

www.tracopower.com/info/glossary.pdf

Outline Dimensions



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

Dimensions in mm (inch)

Tolerances x.x ±0.5 (x.xx ±0.02)

x.xx ±0.25 (x.xxx ±0.01)

Pin tolerances: x.x ±0.05 (x.xx ±0.002)

