THE DATASHEET OF

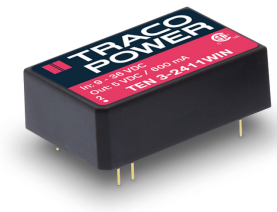
TEN 3-4813WIN

TRACO POWER

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
		Vnom	Imax	Vnom	Imax	typ.
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.
	- dual output	5 / -5 Vout models:	220 / 220 µF max.
		12 / -12 Vout models:	150 / 150 µF max.
		15 / -15 Vout models:	100 / 100 µF max.
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 µF, 100 V, ESR 48 mΩ
	- Conducted RF Disturbances		EN 61000-4-6, 10 Vrms, perf. criteria A

General Specifications

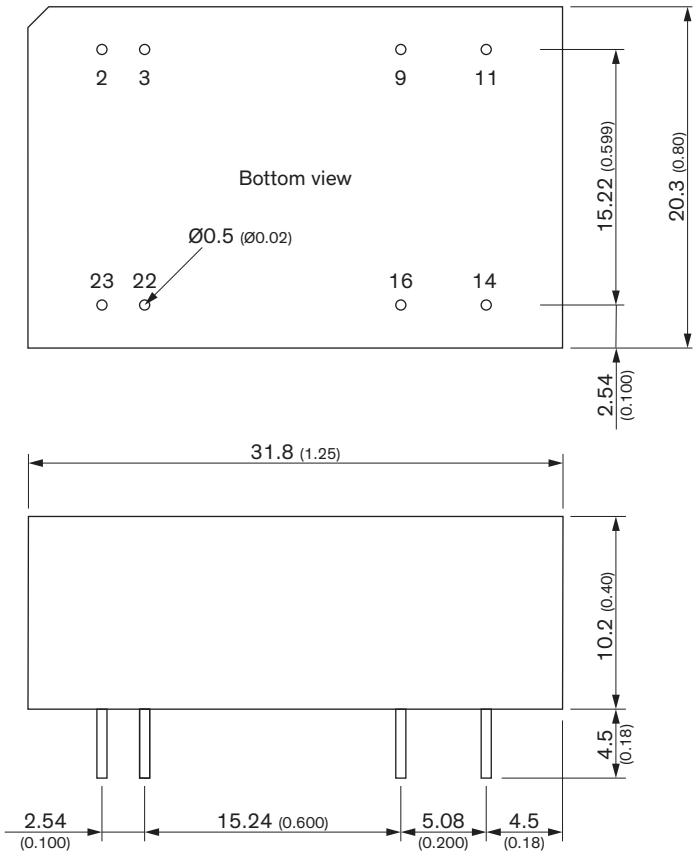
Relative Humidity			95% max. (non condensing)
Temperature Ranges	- Operating Temperature		–40°C to +85°C
	- Case Temperature		+100°C max.
	- Storage Temperature		–55°C to +125°C
Power Derating	- High Temperature		3.3 %/K above 70°C
		See application note:	www.tracopower.com/overview/ten3win
Cooling System			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 MΩ 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 µm 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: 7a (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.

Supporting Documents

Overview Link (for additional Documents) www.tracopower.com/overview/ten3win

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)

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- Obsolete Management
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- Shortage Management
- Alternative Solution
- Excess Inventory Management