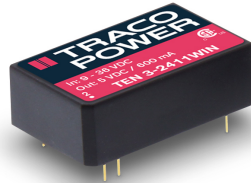


- Ultra wide 4:1 input range
- Input filter to meet EN 55032, Class A and FCC, level A without external components
- Extended operating temperature range -40°C to 85°C
- Models with 1'500 VDC and 3'000 VDC I/O isolation (functional insulation)
- DIP-24 package
- High reliability, MTBF >1.0 Mio. h
- 3-year 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. | |
| | | - 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 |
| | - Conducted RF Disturbances | Ext. input component: 200 µF, 100 V, ESR 48 mΩ 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 |

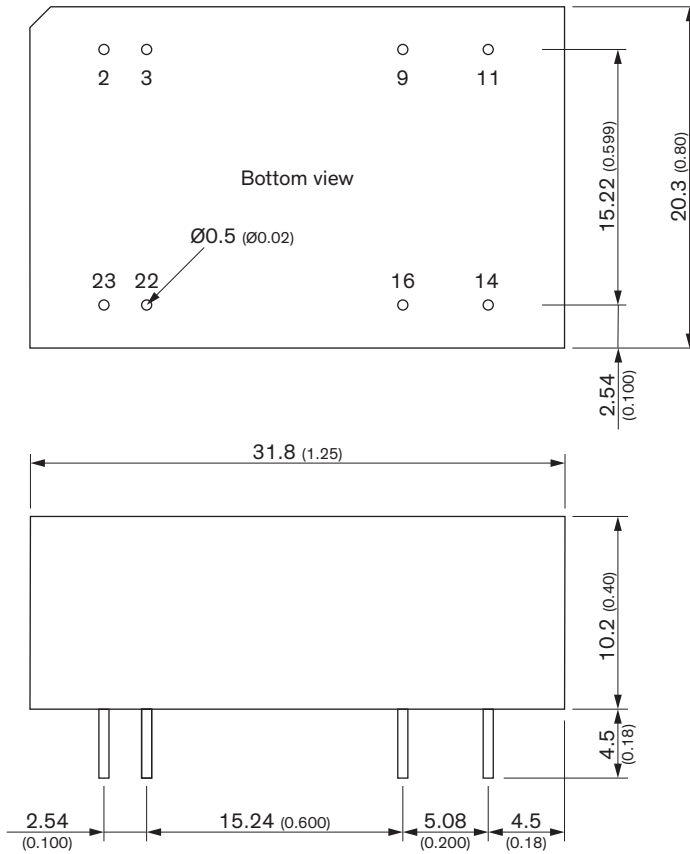
All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

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 $x.x \pm 0.5$ ($x.xx \pm 0.02$)

$x.xx \pm 0.25$ ($x.xxx \pm 0.01$)

Pin tolerances: $x.x \pm 0.05$ ($x.xx \pm 0.002$)