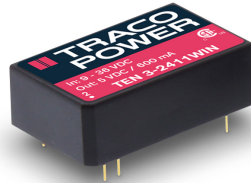




**THE DATASHEET OF  
TEN 3-4821WIN**



- 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<br>(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<br>(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: <b>30 mA typ.</b><br>48 Vin models: <b>20 mA typ.</b>                          |
|                           | - At full load | 24 Vin models: <b>150 mA typ.</b><br>48 Vin models: <b>75 mA typ.</b>                         |
| Surge Voltage             |                | 24 Vin models: <b>50 VDC max.</b> (1 s max.)<br>48 Vin models: <b>100 VDC max.</b> (1 s max.) |
| Under Voltage Lockout     |                | 24 Vin models: <b>8.5 VDC max.</b><br>48 Vin models: <b>17.5 VDC max.</b>                     |
| Reflected Ripple Current  |                | 24 Vin models: <b>15 mAp-p typ.</b><br>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><br>dual output models: <b>1% max.</b>   |  |
|                           | - Load Variation (0 - 100%)          | single output models: <b>1% max.</b><br>dual output models: <b>1% max.</b> (Output 1)<br><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><br>5 Vout models: <b>470 µF max.</b><br>12 Vout models: <b>330 µF max.</b><br>15 Vout models: <b>220 µF max.</b><br>24 Vout models: <b>100 µF max.</b> |  |
|                           |                                      | - dual output  | 5 / -5 Vout models: <b>220 / 220 µF max.</b><br>12 / -12 Vout models: <b>150 / 150 µF max.</b><br>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><br><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

|                       |                             |   |
|-----------------------|-----------------------------|---|
| Standards             | - IT / Multimedia Equipment | <b>CSA-C22.2, No. 60950-1</b><br><b>EN 60950-1</b><br><b>EN 62368-1</b><br><b>IEC 60950-1</b><br><b>IEC 62368-1</b><br><b>UL 60950-1</b><br><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  |                             | EN 55024 (IT Equipment)  |
|               |                             | EN 55035 (Multimedia)  |
|               | - Electrostatic Discharge   | Air: EN 61000-4-2, ±8 kV, perf. criteria A<br>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<br>EN 61000-4-5, ±1 kV, perf. criteria A               |
|               | - Conducted RF Disturbances | Ext. input component: 200 µF, 100 V, ESR 48 mΩ<br>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: <a href="http://www.tracopower.com/overview/ten3win">www.tracopower.com/overview/ten3win</a>   |
| 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)<br>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<br><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 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<br>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><br>REACH SVHC list compliant<br>REACH Annex XVII compliant  |
|                           | - RoHS Declaration              | <a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a><br>Exemptions: 7a<br>(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   |

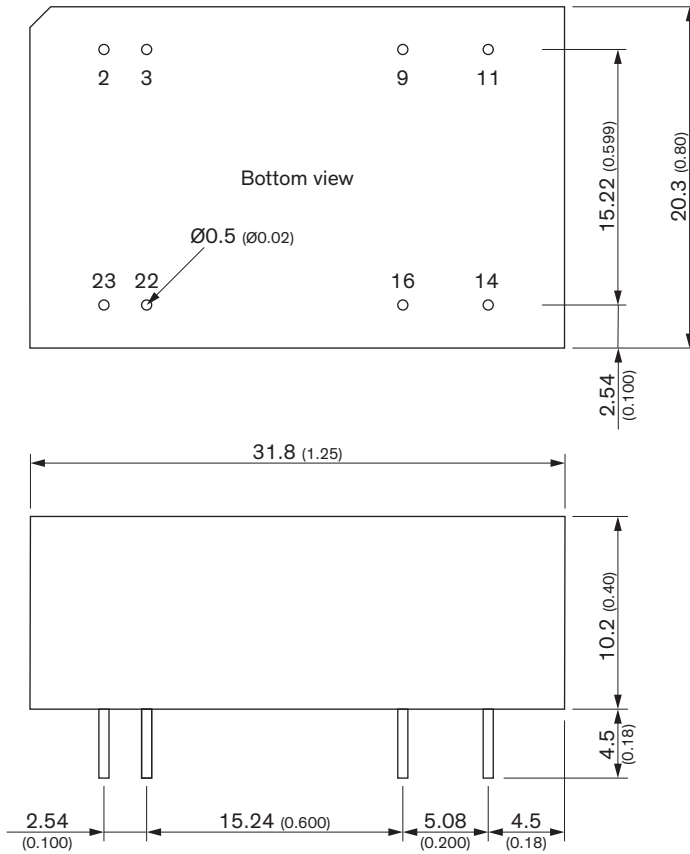
All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

### Supporting Documents

[Overview Link](#) (for additional Documents)

[www.tracopower.com/overview/ten3win](http://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:  $x.x \pm 0.05$  ( $x.xx \pm 0.002$ )

## Looking for pricing, stock, or lifecycle information?

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-  [View TEN 3-4821WIN on WIN SOURCE](#)
-  [Traco Power Information](#)

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