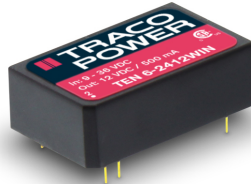




**THE DATASHEET OF
TEN 6-4811WIN**



- Wide 4:1 input voltage range
- High efficiency
- Operating temperature range -40°C to $+85^{\circ}\text{C}$
- Models with 1'500 VDC and 3'000 VDC I/O isolation (functional insulation)
- Input filter meets EN 55022, class A
- Overload protection
- DIP-24 plastic package
- Industry standard pinout
- 3-year product warranty



UL 62368-1 IEC 62368-1

The TEN 6WIN series is designed for an optimized cost/performance ratio of DC/DC converters with output power of 6 Watt.

General features like no minimum load requirement, overload protection, internal filter for EN55022 class A and high efficiency make these converters easy to design in. With the popular DIP-24 standard package they are also a drop in replacement for many cost critical applications.

| Models | | | | | | | |
|---------------|-----------------------------|------------------------------|------------------|----------|------------------|-----------------|------|
| Order Code | Input Voltage Range | Output 1 | | Output 2 | | Efficiency typ. | |
| | | Vnom | I _{max} | Vnom | I _{max} | | |
| TEN 6-2410WIN | 9 - 36 VDC (24 VDC nom.) | 3.3 VDC | 1'200 mA | | | 77 % | |
| TEN 6-2411WIN | | 5 VDC | 1'200 mA | | | 80 % | |
| TEN 6-2412WIN | | 12 VDC | 500 mA | | | 84 % | |
| TEN 6-2413WIN | | 15 VDC | 400 mA | | | 84 % | |
| TEN 6-2415WIN | | 24 VDC | 250 mA | | | 84 % | |
| TEN 6-2421WIN | | +5 VDC | 500 mA | -5 VDC | 500 mA | 80 % | |
| TEN 6-2422WIN | | +12 VDC | 250 mA | -12 VDC | 250 mA | 84 % | |
| TEN 6-2423WIN | | +15 VDC | 200 mA | -15 VDC | 200 mA | 84 % | |
| TEN 6-4810WIN | | 18 - 75 VDC (48 VDC nom.) | 3.3 VDC | 1'200 mA | | | 77 % |
| TEN 6-4811WIN | | | 5 VDC | 1'200 mA | | | 80 % |
| TEN 6-4812WIN | 12 VDC | | 500 mA | | | 84 % | |
| TEN 6-4813WIN | 15 VDC | | 400 mA | | | 84 % | |
| TEN 6-4815WIN | 24 VDC | | 250 mA | | | 84 % | |
| TEN 6-4821WIN | +5 VDC | | 500 mA | -5 VDC | 500 mA | 80 % | |
| TEN 6-4822WIN | +12 VDC | | 250 mA | -12 VDC | 250 mA | 84 % | |
| TEN 6-4823WIN | +15 VDC | | 200 mA | -15 VDC | 200 mA | 84 % | |

| Options | |
|------------|--|
| Suffix -HI | - Optional models with high isolation (3000 VDC) |

Input Specifications

| | | |
|---------------------------|----------------|--|
| Input Current | - At no load | 24 Vin models: 20 mA typ. 48 Vin models: 10 mA typ. |
| | - At full load | 24 Vin models: 215 mA max. (3.3 Vout model) 300 mA max. (5 Vout model) 300 mA max. (12 Vout model) 300 mA max. (15 Vout model) 300 mA max. (24 Vout model) 260 mA max. (5 / -5 Vout model) 300 mA max. (12 / -12 Vout model) 300 mA max. (15 / -15 Vout model) 48 Vin models: 110 mA max. (3.3 Vout model) 150 mA max. (5 Vout model) 150 mA max. (12 Vout model) 150 mA max. (15 Vout model) 150 mA max. (24 Vout model) 130 mA max. (5 / -5 Vout model) 150 mA max. (12 / -12 Vout model) 150 mA max. (15 / -15 Vout model) |
| Surge Voltage | | 24 Vin models: 50 VDC max. (1 s max.) 48 Vin models: 100 VDC max. (1 s max.) |
| Start-up Voltage | | 24 Vin models: 7 VDC min. / 8 VDC typ. / 9 VDC max. 48 Vin models: 14 VDC min. / 16 VDC typ. / 18 VDC max. |
| Under Voltage Lockout | | 24 Vin models: 8.5 VDC max. 48 Vin models: 16 VDC max. |
| Reflected Ripple Current | | 24 Vin models: 20 mA typ. 48 Vin models: 15 mA typ. |
| Recommended Input Fuse | | 24 Vin models: 1'500 mA (slow blow) 48 Vin models: 800 mA (slow blow) (The need of an external fuse has to be assessed in the final application.) |
| Input Filter | | Internal Pi-Type |
| Short Circuit Input Power | | 3 W max. |

Output Specifications

| | | | | |
|----------------------|--------------------------------------|---|--|-----------------------|
| Voltage Set Accuracy | | ±2% max. | | |
| Regulation | - Input Variation (Vmin - Vmax) | single output models: 0.5% max. dual output models: 0.5% max. | | |
| | - Load Variation (0 - 100%) | single output models: 1.2% max. dual output models: 1.2% max. (Output 1) 1.2% max. (Output 2) | | |
| | - Voltage Balance (symmetrical load) | dual output models: 2% max. | | |
| | - 20 MHz Bandwidth | 80 mVp-p max. | | |
| Capacitive Load | - single output | 3.3 Vout models: 470 µF max. 5 Vout models: 470 µF max. 12 Vout models: 100 µF max. 15 Vout models: 100 µF max. 24 Vout models: 47 µF max. | | |
| | | - dual output | 5 / -5 Vout models: 100 / 100 µF max. 12 / -12 Vout models: 100 / 100 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 | |

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

| | | |
|---------------------------|---|--|
| Output Current Limitation | | 110% min. of I _{out} max. 145% typ. of I _{out} max. |
| Transient Response | - Response Deviation - Response Time | 3% typ. / 5% max. (75% to 100% Load Step) 300 μs typ. / 600 μs max. (75% to 100% Load Step) |

Safety Specifications

| | | |
|-----------------------|--|--|
| Standards | - IT / Multimedia Equipment - Certification Documents | CSA-C22.2, No. 60950-1 EN 60950-1 EN 62368-1 IEC 60950-1 IEC 62368-1 UL 60950-1 UL 62368-1 www.tracopower.com/overview/ten6win |
| Pollution Degree | | PD 3 |
| Over Voltage Category | | Not mains connected |

EMC Specifications

| | | |
|---------------|---|---|
| EMI Emissions | - Conducted Emissions - Radiated Emissions | EN 55032 class A (internal filter) EN 55032 class A (with external filter) External filter proposal: www.tracopower.com/overview/ten6win |
|---------------|---|---|

General Specifications

| | | |
|---------------------------|--|---|
| Relative Humidity | | 95% max. (non condensing) |
| Temperature Ranges | - Operating Temperature - Case Temperature - Storage Temperature | -40°C to +85°C +100°C max. -50°C to +125°C |
| Power Derating | - High Temperature | 2.5 %/K above 60°C (3.3 & 5.0 V _{out} models) 3.3 %/K above 70°C (other models) See application note: www.tracopower.com/overview/ten6win |
| Cooling System | | Natural convection (20 LFM) |
| Altitude During Operation | | 6'000 m max. |
| Switching Frequency | | 290 - 370 kHz (PWM) 330 kHz typ. (PWM) |
| Insulation System | | Functional Insulation |
| Isolation Test Voltage | - Input to Output, 60 s - Input to Output, 1 s | 1'500 VDC (Standard models) 3'000 VDC (suffix -HI) 1'800 VDC |
| Isolation Resistance | - Input to Output, 500 VDC | 1'000 MΩ min. |
| Isolation Capacitance | - Input to Output, 100 kHz, 1 V | 1'000 pF typ. |
| Reliability | - Calculated MTBF | 800'000 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. |

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

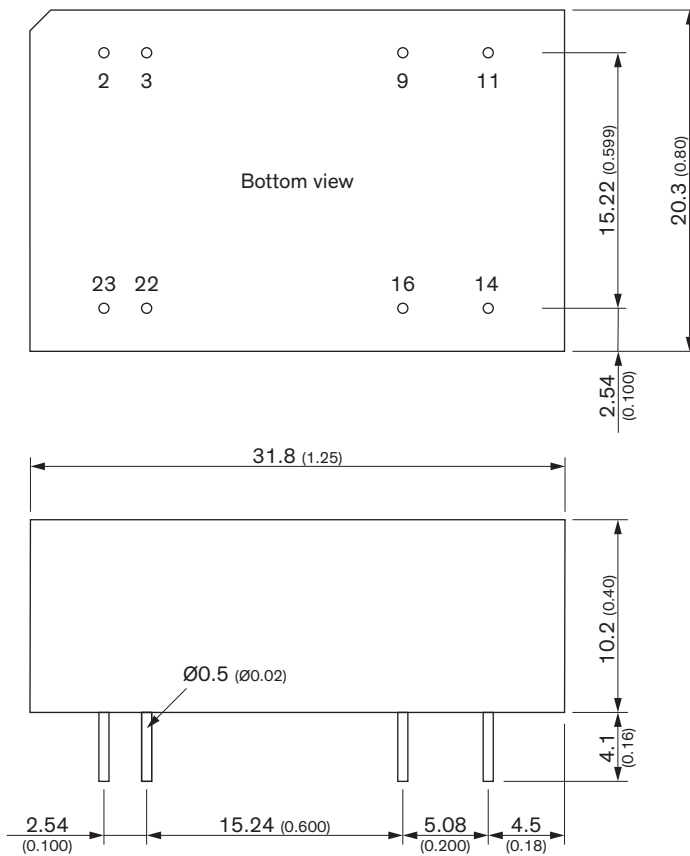
| | |
|--|---|
| Weight | 12.7 g |
| Environmental Compliance - REACH Declaration | www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant |
| - RoHS Declaration | www.tracopower.com/info/rohs-declaration.pdf Exemptions: 7a (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule)) |
| - SCIP Reference Number | 77b7bf46-53a4-4eaf-b810-bc9e8a874f69 |

Supporting Documents

Overview Link (for additional Documents)

www.tracopower.com/overview/ten6win

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 $x.x \pm 0.25$ ($x.xx \pm 0.01$)
 $x.xx \pm 0.13$ ($x.xxx \pm 0.005$)
 Pin diameter tolerance: $x.x \pm 0.05$ ($x.xx \pm 0.002$)

Looking for pricing, stock, or lifecycle information?

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-  [View TEN 6-4811WIN on WIN SOURCE](#)
-  [Traco Power Information](#)

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