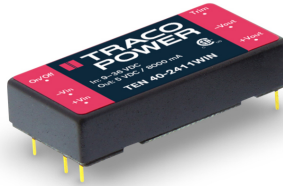


- **Highest power density: 40 W** in 1" x 2" x 0.4" package
- **Ultra wide 4:1 input range**
- **Excellent efficiency up to 90 %**
- **Output voltage adjustable**
- **Remote On/Off**
- **Protection against short circuit and over voltage**
- **I/O isolation 1500 VDC**
- **Operating temperature range -40°C to +75°C**
- **3-year product warranty**



UL 62368-1 IEC 62368-1

The TEN 40WIN Series is a new range of isolated high performance DC/D-C-converter modules. Due to the very high efficiency of up to 90% these 40 W converters come with a footprint of only 1.0" x 2.0". The 12 models have an ultra wide 4:1 input voltage range and a tight output voltage regulation. The output voltage is adjustable by external resistor. Remote On/Off and protection against overpower and over voltage are standard features of these converters. Typical applications are in mobile equipment, instrumentation, distributed power architectures in communication and industrial electronics and everywhere where space on the PCB is limited.

Models

| Order Code | Input Voltage Range | Output 1 | | Output 2 | | Efficiency typ. |
|----------------|------------------------------|----------|------------------|----------|------------------|-----------------|
| | | Vnom | I _{max} | Vnom | I _{max} | |
| TEN 40-2410WIN | 9 - 36 VDC (24 VDC nom.) | 3.3 VDC | 8'000 mA | | | 89 % |
| TEN 40-2411WIN | | 5 VDC | 8'000 mA | | | 90 % |
| TEN 40-2412WIN | | 12 VDC | 3'330 mA | | | 89 % |
| TEN 40-2413WIN | | 15 VDC | 2'670 mA | | | 89 % |
| TEN 40-2415WIN | | 24 VDC | 1'670 mA | | | 91 % |
| TEN 40-2422WIN | | +12 VDC | 1'670 mA | -12 VDC | 1'670 mA | 88 % |
| TEN 40-2423WIN | | +15 VDC | 1'330 mA | -15 VDC | 1'330 mA | 88 % |
| TEN 40-4810WIN | 18 - 75 VDC (48 VDC nom.) | 3.3 VDC | 8'000 mA | | | 89 % |
| TEN 40-4811WIN | | 5 VDC | 8'000 mA | | | 90 % |
| TEN 40-4812WIN | | 12 VDC | 3'330 mA | | | 90 % |
| TEN 40-4813WIN | | 15 VDC | 2'670 mA | | | 90 % |
| TEN 40-4815WIN | | 24 VDC | 1'670 mA | | | 91 % |
| TEN 40-4822WIN | | +12 VDC | 1'670 mA | -12 VDC | 1'670 mA | 88 % |
| TEN 40-4823WIN | | +15 VDC | 1'330 mA | -15 VDC | 1'330 mA | 88 % |

Options

| | |
|---------|--|
| TEN-HS4 | - Optional Heat Sink: www.tracopower.com/products/ten-hs4.pdf |
| TEN-HS6 | - Optional Heat Sink: www.tracopower.com/products/ten-hs6.pdf |

Input Specifications

| | | |
|--------------------------|----------------|---|
| Input Current | - At no load | 24 Vin models: 90 mA typ. (3.3 Vout model) 90 mA typ. (5 Vout model) 95 mA typ. (12 Vout model) 105 mA typ. (15 Vout model) 115 mA typ. (24 Vout model) 65 mA typ. (12 / -12 Vout model) 65 mA typ. (15 / -15 Vout model) |
| | - At full load | 24 Vin models: 1'240 mA max. (3.3 Vout model) 1'850 mA max. (5 Vout model) 1'870 mA max. (12 Vout model) 1'870 mA max. (15 Vout model) 1'835 mA max. (24 Vout model) 1'890 mA max. (12 / -12 Vout model) 1'890 mA max. (15 / -15 Vout model) |
| Surge Voltage | | 24 Vin models: 50 VDC max. (100 ms max.) 48 Vin models: 100 VDC max. (100 ms max.) |
| Under Voltage Lockout | | 24 Vin models: 8.3 VDC typ. 48 Vin models: 16.5 VDC typ. |
| Reflected Ripple Current | | 24 Vin models: 30 mA_{p-p} typ. 48 Vin models: 20 mA_{p-p} typ. |
| Recommended Input Fuse | | 24 Vin models: 8'000 mA (slow blow) 48 Vin models: 4'000 mA (slow blow) (The need of an external fuse has to be assessed in the final application.) |
| Input Filter | | Internal LC-Type |

Output Specifications

| | | |
|---------------------------|--------------------------------------|--|
| Output Voltage Adjustment | | -10% to +20% (24 Vout single models) ±10% (other single models) (By external trim resistor) See application note: www.tracopower.com/overview/ten40win Output power must not exceed rated power! |
| Voltage Set Accuracy | | ±1% 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: 0.5% max. dual output models: 1% max. (Output 1) 1% max. (Output 2) |
| | - Voltage Balance (symmetrical load) | dual output models: 2% max. |

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

| | | |
|---|----------------------|---|
| Ripple and Noise (20 MHz Bandwidth) | - single output | 3.3 Vout models: 100 mVp-p max. (w/ 1µF MC // 10 µF TC) 5 Vout models: 100 mVp-p max. (w/ 1µF MC // 10 µF TC) 12 Vout models: 150 mVp-p max. (w/ 1µF MC // 10 µF TC) 15 Vout models: 150 mVp-p max. (w/ 1µF MC // 10 µF TC) 24 Vout models: 150 mVp-p max. (w/ 1µF MC // 10 µF TC) |
| | - dual output | 12 / -12 Vout models: 150 / 150 mVp-p max. (w/ 1µF MC // 10 µF TC) 15 / -15 Vout models: 150 / 150 mVp-p max. (w/ 1µF MC // 10 µF TC) |
| Capacitive Load | - single output | 3.3 Vout models: 21'000 µF max. 5 Vout models: 13'600 µF max. 12 Vout models: 2'400 µF max. 15 Vout models: 1'500 µF max. 24 Vout models: 600 µF max. |
| | - dual output | 12 / -12 Vout models: 1'200 / 1'200 µF max. 15 / -15 Vout models: 750 / 750 µF max. |
| Minimum Load | single | 3.3 Vout models: 0 % of Iout max. 5 Vout models: 0 % of Iout max. 12 Vout models: 0 % of Iout max. 15 Vout models: 0 % of Iout max. 24 Vout models: 0 % of Iout max. |
| | dual | 12 / -12 Vout models: 9 % of Iout max. 15 / -15 Vout models: 8 % of Iout max. |
| Temperature Coefficient | | ±0.02 %/K max. |
| Start-up Time | | 30 ms max. |
| Short Circuit Protection | | Continuous, Automatic recovery |
| Output Current Limitation | | 150% typ. of Iout max. |
| Transient Response | - Response Deviation | 3% typ. / 5% max. (75% to 100% Load Step) |
| | - Response Time | 250 µs typ. (75% to 100% Load Step) |

Safety Specifications

| | | |
|------------------------------|-----------------------------|---|
| Safety 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/ten40win |
| Pollution Degree | | PD 3 |
| Over Voltage Category | | Not mains connected |

EMC Specifications

| | | |
|----------------------|-----------------------------|--|
| EMI Emissions | - Conducted Emissions | EN 55032 class A (with external filter) FCC Part 15 class A (with external filter) |
| | - Radiated Emissions | EN 55032 class A (with external filter) FCC Part 15 class A (with external filter) |
| | External filter proposal: | www.tracopower.com/overview/ten40win |
| EMS Immunity | - Electrostatic Discharge | EN 55024 (IT Equipment) 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 | EN 61000-4-6, 10 Vrms, perf. criteria A |
| | - PF Magnetic Field | Continuous: EN 61000-4-8, 3 A/m, perf. criteria A |

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

General Specifications

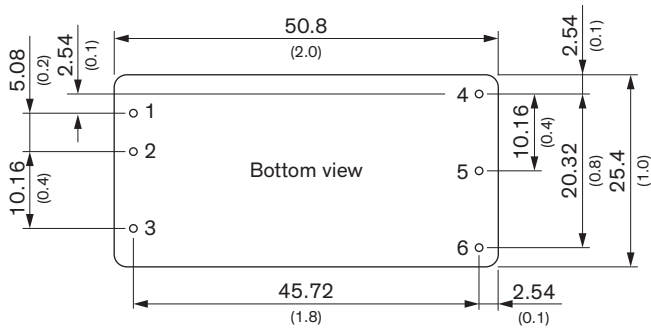
| | | |
|--|---|--|
| Relative Humidity | | 95% max. (non condensing) |
| Temperature Ranges | - Operating Temperature - Case Temperature - Storage Temperature | -40°C to +75°C +105°C max. -50°C to +125°C |
| Power Derating | - High Temperature | See application note: www.tracopower.com/overview/ten40win |
| Over Temperature Protection Switch Off | - Protection Mode | 110°C typ. |
| Cooling System | | Natural convection (20 LFM) |
| Remote Control | - Voltage Controlled Remote - Off Idle Input Current - Remote Pin Input Current | On: 3.5 to 12 VDC or open circuit Off: 0 to 1.2 VDC or short circuit Refers to 'Remote' and '-Vin' Pin 2.5 mA max. -0.5 to 0.5 mA |
| Altitude During Operation | | 6'000 m max. |
| Switching Frequency | | 285 kHz typ. (PWM) (24 Vout models) 320 kHz typ. (PWM) (other models) |
| Insulation System | | Functional Insulation |
| Isolation Test Voltage | - Input to Output, 60 s - Input to Output, 1 s | 1'500 VDC 1'800 VDC |
| Isolation Resistance | - Input to Output, 500 VDC | 1'000 MΩ min. |
| Isolation Capacitance | - Input to Output, 100 kHz, 1 V | 1'500 pF typ. |
| Reliability | - Calculated MTBF | 330'000 h (MIL-HDBK-217F, ground benign) |
| Washing Process | | Allowed (hermetical product) See Cleaning Guideline: www.tracopower.com/info/cleaning.pdf |
| Housing Material | | Alu alloy, black anodized coating |
| Base Material | | Non-conductive FR4 (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 | | Metal Case |
| Mounting Type | | PCB Mount |
| Connection Type | | THD (Through-Hole Device) |
| Footprint Type | | 2" x 1" |
| Soldering Profile | | Wave Soldering 260°C / 10 s max. |
| Weight | | 30 g |
| Thermal Impedance | | 12 K/W 10 K/W (with Heat Sink) |
| Environmental Compliance | - REACH Declaration - RoHS Declaration | www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant 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). The SCIP number is provided on request.) |

Supporting Documents

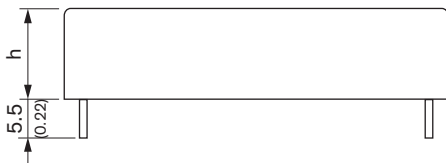
| | |
|--|--|
| Overview Link (for additional Documents) | www.tracopower.com/overview/ten40win |
|--|--|

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

Outline Dimensions



| Pinout | | |
|--------|---------------|---------------|
| Pin | Single | Dual |
| 1 | +Vin (Vcc) | +Vin (Vcc) |
| 2 | -Vin (GND) | -Vin (GND) |
| 3 | Remote On/Off | Remote On/Off |
| 4 | +Vout | +Vout |
| 5 | -Vout | Common |
| 6 | Trim | -Vout |



h=11.0 (0.43) for 24 VDC output models
 h=10.2 (0.40) for other models

Dimensions in mm (inch)
 Pin diameter: 1.0 ±0.05 (0.04 ±0.002)
 Tolerances: x.x ±0.25 (x.xx ±0.01)
 x.xx ±0.13 (x.xxx ±0.005)

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