



**THE DATASHEET OF
TEN 20-4810WIN**



- 2" x 1" x 0.4" metal package
- Ultra wide 4:1 input range
- Operating temperature range -40°C to +85°C
- I/O isolation 1500 VDC
- Input filter to meet EN 55022 class A
- Adjustable output voltage
- Remote On/Off
- 3-year product warranty



The TEN 20WIN series is a family of high performance 20W DC/DC converter modules featuring ultra wide 4:1 input voltage ranges in a ultra compact 2" x 1" low profile package with industry-standard footprint. A very high efficiency allows an operating temperature range of -40°C to 85°C. Further standard features include remote On/Off, output voltage trimming, over voltage protection and short circuit protection. Typical applications for these converters are battery operated equipment and distributed power architectures in communication and industrial electronics, everywhere where isolated, tightly regulated voltages are required.

| Models | | | | | | |
|----------------|------------------------------|----------|------------------|----------|------------------|-----------------|
| Order Code | Input Voltage Range | Output 1 | | Output 2 | | Efficiency typ. |
| | | Vnom | I _{max} | Vnom | I _{max} | |
| TEN 20-2410WIN | 9 - 36 VDC (24 VDC nom.) | 3.3 VDC | 5'500 mA | | | 85 % |
| TEN 20-2411WIN | | 5 VDC | 4'000 mA | | | 88 % |
| TEN 20-2412WIN | | 12 VDC | 1'670 mA | | | 86 % |
| TEN 20-2413WIN | | 15 VDC | 1'330 mA | | | 86 % |
| TEN 20-2421WIN | | +5 VDC | 2'000 mA | -5 VDC | 2'000 mA | 88 % |
| TEN 20-2422WIN | | +12 VDC | 833 mA | -12 VDC | 833 mA | 87 % |
| TEN 20-2423WIN | | +15 VDC | 667 mA | -15 VDC | 667 mA | 87 % |
| TEN 20-4810WIN | 18 - 75 VDC (48 VDC nom.) | 3.3 VDC | 5'500 mA | | | 85 % |
| TEN 20-4811WIN | | 5 VDC | 4'000 mA | | | 88 % |
| TEN 20-4812WIN | | 12 VDC | 1'670 mA | | | 87 % |
| TEN 20-4813WIN | | 15 VDC | 1'330 mA | | | 87 % |
| TEN 20-4821WIN | | +5 VDC | 2'000 mA | -5 VDC | 2'000 mA | 89 % |
| TEN 20-4822WIN | | +12 VDC | 833 mA | -12 VDC | 833 mA | 88 % |
| TEN 20-4823WIN | | +15 VDC | 667 mA | -15 VDC | 667 mA | 88 % |

| Options | |
|---------|--|
| TEN-HS1 | - Optional Heat Sink with Height = 0.22 inch: www.tracopower.com/products/ten-hs1.pdf |

Input Specifications

| | | |
|--------------------------|----------------|---|
| Input Current | - At no load | 24 Vin models: 50 mA typ. (3.3 Vout model) 65 mA typ. (5 Vout model) 22 mA typ. (12 Vout model) 22 mA typ. (15 Vout model) 55 mA typ. (5 / -5 Vout model) 30 mA typ. (12 / -12 Vout model) 30 mA typ. (15 / -15 Vout model) |
| | - At full load | 48 Vin models: 35 mA typ. (3.3 Vout model) 35 mA typ. (5 Vout model) 15 mA typ. (12 Vout model) 15 mA typ. (15 Vout model) 35 mA typ. (5 / -5 Vout model) 17 mA typ. (12 / -12 Vout model) 17 mA typ. (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: 7 VDC min. / 8 VDC typ. / 8.8 VDC max. 48 Vin models: 14.5 VDC min. / 16 VDC typ. / 17.5 VDC max. |
| Reflected Ripple Current | | 20 mA typ. |
| Recommended Input Fuse | | 24 Vin models: 4'000 mA (slow blow) 48 Vin models: 2'000 mA (slow blow) (The need of an external fuse has to be assessed in the final application.) |
| Input Filter | | Internal Pi-Type |

Output Specifications

| | | |
|-------------------------------------|--|---|
| Output Voltage Adjustment | | ±10% (By external trim resistor) See application note: www.tracopower.com/overview/ten20win Output power must not exceed rated power! |
| Voltage Set Accuracy | | ±1% max. |
| Regulation | - Input Variation (Vmin - Vmax) - Load Variation (0 - 100%) - Cross Regulation (25% / 100% asym. load) | single output models: 0.2% max. dual output models: 0.5% max. single output models: 0.5% max. dual output models: 1% max. (Output 1) 1% max. (Output 2) dual output models: 5% max. |
| Ripple and Noise (20 MHz Bandwidth) | - single output - dual output | 3.3 Vout models: 60 mVp-p typ. (w/ 0.1 µF, 50 V MLCC) 5 Vout models: 75 mVp-p typ. (w/ 0.1 µF, 50 V MLCC) 12 Vout models: 75 mVp-p typ. (w/ 0.1 µF, 50 V MLCC) 15 Vout models: 75 mVp-p typ. (w/ 0.1 µF, 50 V MLCC) 5 / -5 Vout models: 100 / 100 mVp-p typ. (w/ 0.1 µF, 50 V MLCC) 12 / -12 Vout models: 100 / 100 mVp-p typ. (w/ 0.1 µF, 50 V MLCC) 15 / -15 Vout models: 100 / 100 mVp-p typ. (w/ 0.1 µF, 50 V MLCC) |
| Capacitive Load | - single output - dual output | 3.3 Vout models: 18'000 µF max. 5 Vout models: 9'600 µF max. 12 Vout models: 1'650 µF max. 15 Vout models: 1'050 µF max. 5 / -5 Vout models: 4'800 / 4'800 µF max. 12 / -12 Vout models: 825 / 825 µF max. 15 / -15 Vout models: 525 / 525 µF max. |
| Minimum Load | | Not required |
| Temperature Coefficient | | ±0.02 %/K max. |

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

| | | |
|---------------------------|-------------------------------------|---|
| Start-up Time | | 20 ms typ. / 60 ms max. |
| Short Circuit Protection | | Continuous, Automatic recovery |
| Overload Protection | | Indefinite Mode |
| Output Current Limitation | | 125 - 170% of I _{out} max. 150% typ. of I _{out} max. |
| Overvoltage Protection | | 122% typ. of V _{out} nom. (depending on model) 3.9 VDC (3.3 VDC model) 6.2 VDC (5 / ±5 VDC model) 15 VDC (12 / ±12 VDC model) 18 VDC (15 / ±15 VDC model) |
| Transient Response | - Peak Variation - Response Time | 220 mV max. (25% Load Step) 250 µs typ. (25% Load Step) |

Safety Specifications

| | | |
|-----------------------|-----------------------------|--|
| Standards | - IT / Multimedia Equipment | EN 60950-1 EN 62368-1 IEC 60950-1 IEC 62368-1 UL 60950-1 UL 62368-1 |
| | - Certification Documents | www.tracopower.com/overview/ten20win |
| Pollution Degree | | PD 2 |
| Over Voltage Category | | Not mains connected |

EMC Specifications

| | | |
|---------------|--|---|
| EMI Emissions | - Conducted Emissions - Radiated Emissions | EN 61204-3 (Low Voltage Power Supplies) EN 55032 class A (with external filter) EN 55032 class B (with external filter) EN 55032 class A (with external filter) EN 55032 class B (with external filter) |
| | | External filter proposal: www.tracopower.com/overview/ten20win |
| EMS Immunity | - Electrostatic Discharge - RF Electromagnetic Field - EFT (Burst) / Surge - Conducted RF Disturbances - PF Magnetic Field | EN 61204-3 (Low Voltage Power Supplies) Air: EN 61000-4-2, ±8 kV, perf. criteria B Contact: EN 61000-4-2, ±6 kV, perf. criteria B EN 61000-4-3, 10 V/m, perf. criteria A EN 61000-4-4, ±2 kV, perf. criteria B EN 61000-4-5, ±1 kV, perf. criteria A Ext. input component: KY 220 µF / 100 V Continuous: EN 61000-4-6, 10 V _{rms} , perf. criteria A 1 s: EN 61000-4-8, 100 A/m, perf. criteria A 1 s: EN 61000-4-8, 1000 A/m, perf. criteria A |

General Specifications

| | | |
|--------------------|--|---|
| Relative Humidity | | 95% max. (non condensing) |
| Temperature Ranges | - Operating Temperature - Case Temperature - Storage Temperature | -40°C to +85°C +105°C max. -55°C to +125°C |
| Power Derating | - High Temperature | Depending on model |
| | | See application note: www.tracopower.com/overview/ten20win |
| Cooling System | | Natural convection (20 LFM) |
| Remote Control | - Voltage Controlled Remote (passive = on) - Off Idle Input Current - Remote Pin Input Current | On: 3.0 to 12 VDC or open circuit Off: 0 to 1.2 VDC or short circuit Refers to 'Remote' and '-Vin' Pin 2.5 mA typ. -0.5 to 0.5 mA |

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

| | | |
|---------------------------|---------------------------------|--|
| Altitude During Operation | | 5'000 m max. |
| Regulator Topology | | Flyback Converter |
| Switching Frequency | | 360 - 440 kHz (PWM) 400 kHz typ. (PWM) |
| Insulation System | | Functional Insulation |
| Isolation Test Voltage | - Input to Output, 60 s | 1'600 VDC |
| | - Input to Case, 60 s | 1'600 VDC |
| | - Output to Case, 60 s | 1'600 VDC |
| Isolation Resistance | - Input to Output, 500 VDC | 1'000 MΩ min. |
| Isolation Capacitance | - Input to Output, 100 kHz, 1 V | 1'500 pF max. |
| Reliability | - Calculated MTBF | 1'800'000 h (MIL-HDBK-217F, ground benign) |
| Washing Process | | According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf |
| Environment | - Vibration | MIL-STD-810F 7.7 g, 3 axis, random waveform, 60 min |
| | - Mechanical Shock | MIL-STD-810F 40 g, 3 axis, terminal peak sawtooth, 11 ms |
| | - Thermal Shock | MIL-STD-810F -55°C to +125°C, 72 cycles, 30 min each |
| Housing Material | | Copper, Nickel plated |
| Base Material | | Non-conductive FR4 (UL 94 V-0 rated) |
| Potting Material | | Epoxy (UL 94 V-0 rated) |
| Pin Material | | Copper |
| Pin Foundation Plating | | Nickel (2 - 3 μm) |
| Pin Surface Plating | | Tin (3 - 5 μm), matte |
| Housing Type | | Metal Case |
| Mounting Type | | PCB Mount |
| Connection Type | | THD (Through-Hole Device) |
| Footprint Type | | 2" x 1" |
| Soldering Profile | | Lead-Free Wave Soldering 260°C / 6 s max. |
| Weight | | 27 g |
| Thermal Impedance | - Case to Ambient | 12 K/W typ. 10 K/W typ. (with Heat Sink) |
| 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, 7c-I (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule.)) |
| | - SCIP Reference Number | 60396226-142c-440a-8dd3-fb6921d2b8f5 |

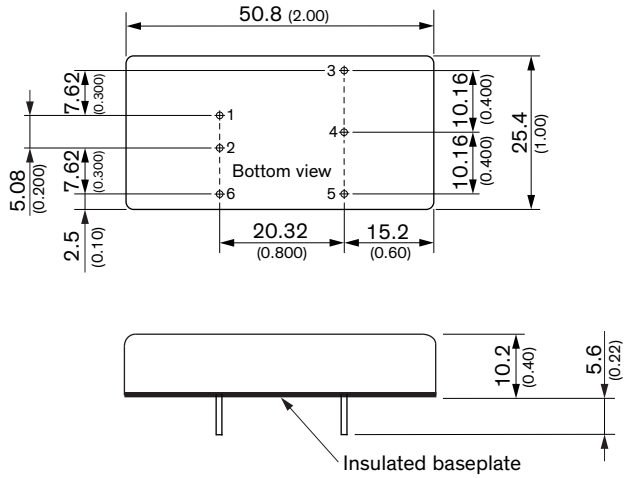
Supporting Documents

Overview Link (for additional Documents)

www.tracopower.com/overview/ten20win

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

Outline Dimensions





Dimensions in mm (inch)
 Pin diameter: 1.0 ±0.1 (0.04 ±0.004)
 Tolerances: x.x ±0.5 (x.xx ±0.02)
 x.xx ±0.25 (x.xxx ±0.01)

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

Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

-  [View TEN 20-4810WIN on WIN SOURCE](#)
-  [Traco Power Information](#)

Optimize Your Supply Chain with WIN SOURCE Solutions

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