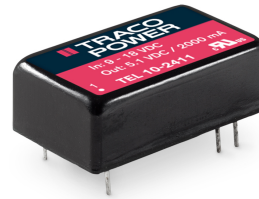


- Most compact 10 Watt converter in DIP-16 metal casing
- Highest power density of 3.83 W/cm³
- 6-side shielded metal case with insulated base plate
- Wide 2:1 input voltage range
- High efficiency for low thermal loss
- Operating temperature range of -40°C to +88°C
- Built-in EN 55032 class A filter
- Current limitation and protection against short circuit
- 3-year product warranty



The TEL 10 series is a range of isolated 10 Watt DC/DC converters which come in a ultra compact DIP-16 metal package. The design purpose of these series was to miniaturized low power DC/DC converters to the maximum without sacrificing high efficiency. The TEL 10 series sets the new standart for power density with 3.83 W/cm³.

The TEL 10 series offers a wide 2:1 input voltage range and features a high efficiency of up to 88% which enables an operation temperature of up to +70°C at full load and up to 85°C with 50% load.

The converters have an internal input filter to comply with conducted emission EN 55032 class A. The TEL 10 Series models feature an overall economical solution for space critical and cost sensitive applications in instrumentation, IT and industrial electronics.

| Models | | | | | | | |
|-------------|------------------------------|----------|------------------|----------|------------------|-----------------|------|
| Order Code | Input Voltage Range | Output 1 | | Output 2 | | Efficiency typ. | |
| | | Vnom | I _{max} | Vnom | I _{max} | | |
| TEL 10-1210 | 9 - 18 VDC (12 VDC nom.) | 3.3 VDC | 2'700 mA | | | 79 % | |
| TEL 10-1211 | | 5.1 VDC | 2'000 mA | | | 82 % | |
| TEL 10-1212 | | 12 VDC | 833 mA | | | 86 % | |
| TEL 10-1213 | | 15 VDC | 666 mA | | | 87 % | |
| TEL 10-1215 | | 24 VDC | 416 mA | | | 87 % | |
| TEL 10-1222 | | +12 VDC | 416 mA | | -12 VDC | 416 mA | 86 % |
| TEL 10-1223 | | +15 VDC | 333 mA | | -15 VDC | 333 mA | 86 % |
| TEL 10-2410 | 18 - 36 VDC (24 VDC nom.) | 3.3 VDC | 2'700 mA | | | 80 % | |
| TEL 10-2411 | | 5.1 VDC | 2'000 mA | | | 83 % | |
| TEL 10-2412 | | 12 VDC | 833 mA | | | 87 % | |
| TEL 10-2413 | | 15 VDC | 666 mA | | | 88 % | |
| TEL 10-2415 | | 24 VDC | 416 mA | | | 88 % | |
| TEL 10-2422 | | +12 VDC | 416 mA | | -12 VDC | 416 mA | 87 % |
| TEL 10-2423 | | +15 VDC | 333 mA | | -15 VDC | 333 mA | 87 % |
| TEL 10-4810 | 36 - 75 VDC (48 VDC nom.) | 3.3 VDC | 2'700 mA | | | 80 % | |
| TEL 10-4811 | | 5.1 VDC | 2'000 mA | | | 83 % | |
| TEL 10-4812 | | 12 VDC | 833 mA | | | 87 % | |
| TEL 10-4813 | | 15 VDC | 666 mA | | | 88 % | |
| TEL 10-4815 | | 24 VDC | 416 mA | | | 88 % | |
| TEL 10-4822 | | +12 VDC | 416 mA | | -12 VDC | 416 mA | 87 % |
| TEL 10-4823 | | +15 VDC | 333 mA | | -15 VDC | 333 mA | 87 % |

Input Specifications

| | | |
|------------------------|----------------|---|
| Input Current | - At no load | 12 Vin models: 20 mA typ. 24 Vin models: 10 mA typ. 48 Vin models: 8 mA typ. |
| | - At full load | 12 Vin models: 970 mA typ. 24 Vin models: 480 mA typ. 48 Vin models: 240 mA typ. |
| Surge Voltage | | 12 Vin models: 25 VDC max. (1 s max.) 24 Vin models: 50 VDC max. (1 s max.) 48 Vin models: 100 VDC max. (1 s max.) |
| Under Voltage Lockout | | 12 Vin models: 7 VDC min. / 8 VDC typ. 24 Vin models: 15 VDC min. / 16 VDC typ. 48 Vin models: 31 VDC min. / 34 VDC typ. |
| Recommended Input Fuse | | 12 Vin models: 2'000 mA (slow blow) 24 Vin models: 1'000 mA (slow blow) 48 Vin models: 500 mA (slow blow) (The need of an external fuse has to be assessed in the final application.) |
| Input Filter | | Internal Pi-Type |

Output Specifications

| | | |
|--|--|--|
| Voltage Set Accuracy | | ±1% max. |
| Regulation | - Input Variation (Vmin - Vmax) | single output models: 0.8% max. dual output models: 0.8% max. |
| | - Load Variation (0 - 100%) | single output models: 1% max. dual output models: 2% max. (Output 1) 2% max. (Output 2) |
| | - Cross Regulation (25% / 100% asym. load) | dual output models: 5% max. |
| Ripple and Noise (20 MHz Bandwidth) | - single output | 3.3 Vout models: 60 mVp-p typ. 5.1 Vout models: 60 mVp-p typ. 12 Vout models: 80 mVp-p typ. 15 Vout models: 80 mVp-p typ. 24 Vout models: 80 mVp-p typ. |
| | - dual output | 12 / -12 Vout models: 80 / 80 mVp-p typ. 15 / -15 Vout models: 80 / 80 mVp-p typ. |
| | - single output | 3.3 Vout models: 72 mVp-p max. 5.1 Vout models: 72 mVp-p max. 12 Vout models: 96 mVp-p max. 15 Vout models: 96 mVp-p max. 24 Vout models: 96 mVp-p max. |
| | - dual output | 12 / -12 Vout models: 96 / 96 mVp-p max. 15 / -15 Vout models: 96 / 96 mVp-p max. |
| | - single output | 3.3 Vout models: 2'600 µF max. 5.1 Vout models: 1'300 µF max. 12 Vout models: 560 µF max. 15 Vout models: 560 µF max. 24 Vout models: 200 µF max. |
| | - dual output | 12 / -12 Vout models: 390 / 390 µF max. 15 / -15 Vout models: 200 / 200 µF max. |
| Capacitive Load | | |
| Minimum Load | | Not required |
| Temperature Coefficient | | ±0.02 %/K max. |
| Start-up Time | | 30 ms typ. / 60 ms max. |
| Short Circuit Protection | | Continuous, Automatic recovery |
| Output Current Limitation | | 192% max. of Iout max. 160% typ. of Iout max. |

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

| | | |
|--------------------|----------------------|-----------------------------|
| Transient Response | - Response Deviation | 5% max. (25% Load Step) |
| | - Response Time | 500 µs max. (25% Load Step) |

Safety Specifications

| | | |
|------------------|-----------------------------|--|
| Safety Standards | - IT / Multimedia Equipment | EN 62368-1 IEC 62368-1 UL 62368-1 |
| | - Certification Documents | www.tracopower.com/overview/tel10 |
| Pollution Degree | | PD 3 |

EMC Specifications

| | | | |
|---------------|-----------------------------|---|--|
| EMI Emissions | - Conducted Emissions | EN 55032 class A (internal filter) EN 55032 class B (with external filter) | |
| | - Radiated Emissions | EN 55032 class A (with external filter) EN 55032 class B (with external filter) | |
| | External filter proposal: | www.tracopower.com/overview/tel10 | |
| 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, 20 V/m, perf. criteria A | |
| | - EFT (Burst) / Surge | EN 61000-4-4, ±2 kV, perf. criteria A EN 61000-4-5, ±2 kV, perf. criteria A | |
| | | External filter proposal: | www.tracopower.com/overview/tel10 |
| | - Conducted RF Disturbances | EN 61000-4-6, 10 Vrms, perf. criteria A | |
| | - PF Magnetic Field | Continuous: 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 | -40°C to +85°C |
| | - Case Temperature | +105°C max. |
| | - Storage Temperature | -50°C to +125°C |
| Power Derating | - High Temperature | Depending on model |
| | | See application note: www.tracopower.com/overview/tel10 |
| Cooling System | | Natural convection (20 LFM) |
| Altitude During Operation | | 6'000 m max. |
| Switching Frequency | | 357 - 483 kHz (PWM) |
| | | 420 kHz typ. (PWM) |
| Insulation System | | Functional Insulation |
| Isolation Test Voltage | - Input to Output, 60 s | 1'500 VDC |
| | - Input to Output, 1 s | 1'800 VDC |
| | - Input to Case, 60 s | 1'000 VDC |
| | - Output to Case, 60 s | 1'000 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 | | Allowed (hermetical product) |
| | | See Cleaning Guideline: www.tracopower.com/info/cleaning.pdf |
| Housing Material | | Alu alloy, black anodized coating |
| Potting Material | | Epoxy (UL 94 V-0 rated) |
| Pin Material | | Copper Alloy (C6801) |
| Pin Foundation Plating | | Nickel (2 - 4 µm) |
| Pin Surface Plating | | Tin (3 - 5 µm), matte |
| Housing Type | | Metal Case |
| Mounting Type | | PCB Mount |

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

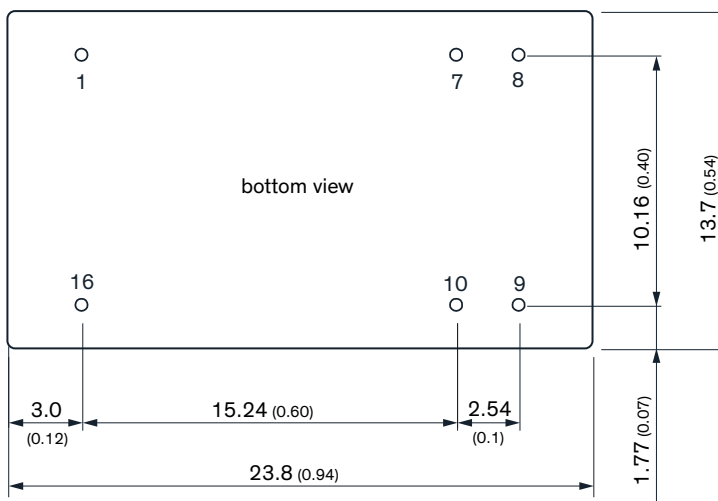
| | |
|--------------------------|---|
| Connection Type | THD (Through-Hole Device) |
| Footprint Type | DIP16 |
| Soldering Profile | Wave Soldering 260°C / 10 s max. |
| Weight | 6.5 g |
| Environmental Compliance | - REACH Declaration www.tracopower.com/info/reach-declaration.pdf REACH SVHC list 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). The SCIP number is provided on request.) |

Supporting Documents

Overview Link (for additional Documents)

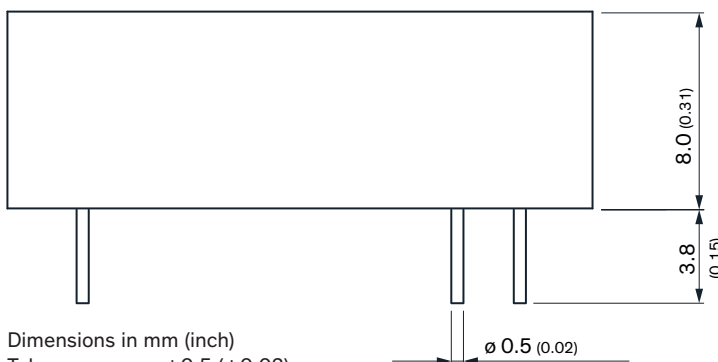
www.tracopower.com/overview/tel10

Outline Dimensions



| Pinout | | |
|--------|------------|------------|
| Pin | Single | Dual |
| 1 | -Vin (GND) | -Vin (GND) |
| 7 | NC | NC |
| 8 | NC | Common |
| 9 | +Vout | +Vout |
| 10 | -Vout | -Vout |
| 16 | +Vin (Vcc) | +Vin (Vcc) |

NC: Not connected



Dimensions in mm (inch)
Tolerances: x.x ±0.5 (±0.02)
 x.xx ±0.25 (±0.01)
Pin diameter 0.5 ±0.05 (0.02 ±0.002)