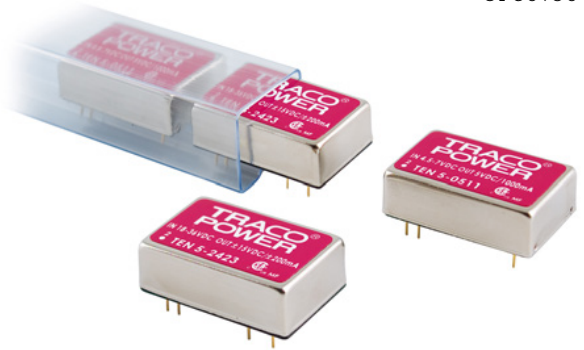


Features

- ◆ Wide 2:1 input range
- ◆ Full SMD-design
- ◆ High efficiency up to 86%
- ◆ Extended operating temperature range -40°C to 85°C
- ◆ I/O isolation 1'500 VDC
- ◆ Indefinite short circuit protection
- ◆ Input filter to meet EN 55022, class A and FCC, level A without external components
- ◆ Shielded metal case with insulated baseplate
- ◆ 24-pin DIP with industry standard pinout
- ◆ High reliability, MTBF >1 Mio. h
- ◆ 3-year product warranty



The TEN 5 Series is a range of DC/DC-converter modules with wide input range of 2:1. State of the art SMD-technology guarantees a product with very high reliability and good cost /performance ratio. I/O-isolation of 1'500 VDC together with conducted noise compliance to EN 55022-A and FCC level A makes these converters ideal for a wide range of applications in communications, mobile battery powered equipments and industrial systems.

Models

| Ordercode | Input voltage range | Output voltage | Output current max. | Efficiency typ. |
|------------|---------------------------------|----------------|---------------------|-----------------|
| TEN 5-0510 | 4.5 – 7 VDC (5 VDC nominal) | 3.3 VDC | 1200 mA | 75 % |
| TEN 5-0511 | | 5 VDC | 1000 mA | 79 % |
| TEN 5-0512 | | 12 VDC | 500 mA | 82 % |
| TEN 5-0513 | | 15 VDC | 400 mA | 82 % |
| TEN 5-0521 | | ±5 VDC | ±500 mA | 79 % |
| TEN 5-0522 | | ±12 VDC | ±250 mA | 82 % |
| TEN 5-0523 | | ±15 VDC | ±200 mA | 82 % |
| TEN 5-1210 | 9 – 18 VDC (12 VDC nominal) | 3.3 VDC | 1200 mA | 77 % |
| TEN 5-1211 | | 5 VDC | 1000 mA | 81 % |
| TEN 5-1212 | | 12 VDC | 500 mA | 84 % |
| TEN 5-1213 | | 15 VDC | 400 mA | 84 % |
| TEN 5-1221 | | ±5 VDC | ±500 mA | 81 % |
| TEN 5-1222 | | ±12 VDC | ±250 mA | 84 % |
| TEN 5-1223 | | ±15 VDC | ±200 mA | 84 % |
| TEN 5-2410 | 18 – 36 VDC (24 VDC nominal) | 3.3 VDC | 1200 mA | 79 % |
| TEN 5-2411 | | 5 VDC | 1000 mA | 83 % |
| TEN 5-2412 | | 12 VDC | 500 mA | 86 % |
| TEN 5-2413 | | 15 VDC | 400 mA | 86 % |
| TEN 5-2421 | | ±5 VDC | ±500 mA | 83 % |
| TEN 5-2422 | | ±12 VDC | ±250 mA | 86 % |
| TEN 5-2423 | | ±15 VDC | ±200 mA | 86 % |
| TEN 5-4810 | 36 – 75 VDC (48 VDC nominal) | 3.3 VDC | 1200 mA | 79 % |
| TEN 5-4811 | | 5 VDC | 1000 mA | 83 % |
| TEN 5-4812 | | 12 VDC | 500 mA | 86 % |
| TEN 5-4813 | | 15 VDC | 400 mA | 86 % |
| TEN 5-4821 | | ±5 VDC | ±500 mA | 83 % |
| TEN 5-4822 | | ±12 VDC | ±250 mA | 86 % |
| TEN 5-4823 | | ±15 VDC | ±200 mA | 86 % |

Input Specifications

| | |
|---|--|
| Input current no load | 5 Vin models: 80 mA typ. 12 Vin models: 30 mA typ. 24 Vin models: 15 mA typ. 48 Vin models: 8 mA typ. |
| Start-up voltage / under voltage shut down | 5 Vin models: 4.4 VDC / 4.0 VDC (or lower) 12 Vin models: 8.0 VDC / 8.0 VDC (or lower) 24 Vin models: 16.0 VDC / 16.0 VDC (or lower) 48 Vin models: 32.0 VDC / 32.0 VDC (or lower) long term operation at undervoltage will damage the converter! |
| Surge voltage (1 sec. max.) | 5 Vin models: 10 V max. 12 Vin models: 25 V max. 24 Vin models: 50 V max. 48 Vin models: 100 V max. |
| Reverse voltage protection | 1.0 A max. |
| Conducted noise (input) | EN 55022 class A, FCC part 15, level A |

Output Specifications

| | |
|---|--|
| Voltage set accuracy | 1.0 % |
| Regulation | – Input variation Vin min. to Vin max. – Load variation 20 – 100 % single output models: 1.0 % max. dual output models balanced load: 2.0 % max. dual output models unbalanced load: 5.0 % max. (25 % / 100 %) |
| Minimum load | 5 % of rated max current (operation at lower load condition is safe but a higher output ripple will be experienced) |
| Ripple and noise (20 MHz Bandwidth) | 50 mVpk-pk typ., 75 mVpk-pk max. |
| Temperature coefficient | ±0.02 %/K |
| Output current limitation | >120 % of Iout max., foldback |
| Short-circuit protection | indefinite (automatic recovery) |
| Start up time (nominal Vin and constant resistive load) | 10 ms typ. (for power on and remote on) |
| Capacitive load | single output models: 6800 µF max. dual output models: 1000 µF max. (each output) |

General Specifications

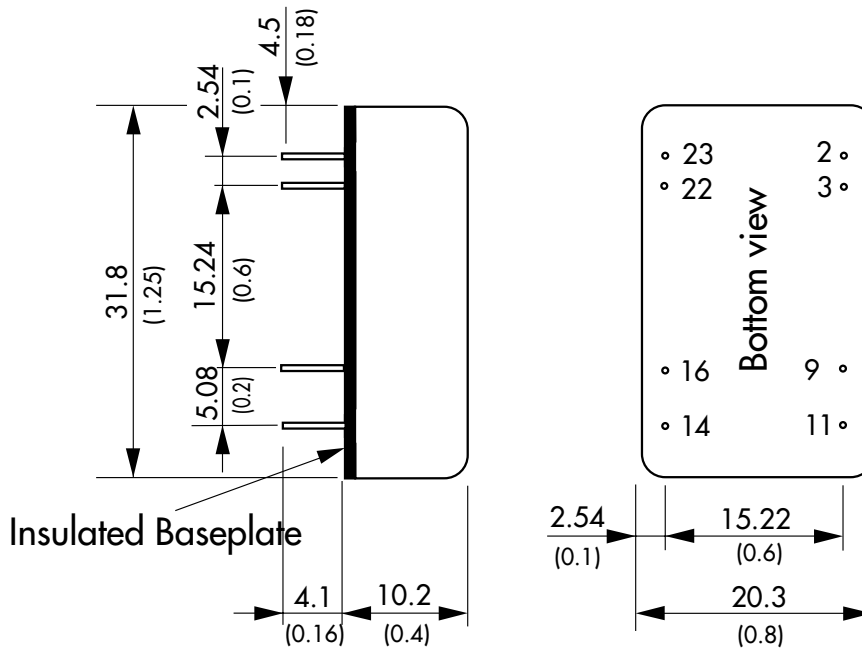
| | | |
|---|--|--|
| Temperature ranges | – Operating – Case temperature – Storage | –40°C to +85°C +90°C max. –50°C to +125°C |
| Derating | | 3.3 %/K above 70°C |
| Humidity (non condensing) | | 95 % rel H max. |
| Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign) | | >1 Mio. h |
| Isolation voltage (60 sec.) | – Input/Output | 1'500 VDC |
| Isolation capacitance | – Input/Output | 380 pF typ. |
| Isolation resistance | – Input/Output | >1'000 M Ohm (500 VDC) |
| Switching frequency | | 300 kHz typ. (Pulse frequency modulation PFM) |
| Safety standards | | UL 60950-1, IEC/EN 60950-1 |
| Safety approval | | CSA File No. 226037 http://directories.csa-international.org |
| Environmental compliance | – Reach – RoHS | directive 2011/65/EU |

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

Physical Specifications

| | |
|-----------------------|------------------------|
| Casing material | steel, metal |
| Baseplate material | non conductive FR4 |
| Potting material | epoxy (UL 94V-0 rated) |
| Weight | 16.9 g (0.59 oz) |
| Soldering temperature | max. 260°C / 10 sec. |

Outline Dimensions



| Pin-Out | | |
|---------|------------|------------|
| Pin | Single | Dual |
| 2 | -Vin (GND) | -Vin (GND) |
| 3 | -Vin (GND) | -Vin (GND) |
| 9 | No pin | Common |
| 11 | No con. | -Vout |
| 14 | +Vout | +Vout |
| 16 | -Vout | Common |
| 22 | +Vin (Vcc) | +Vin (Vcc) |
| 23 | +Vin (Vcc) | +Vin (Vcc) |

Dimensions in [mm], () = Inch
 Pin diameter $\varnothing 0.5 \pm 0.05$ (0.02 \pm 0.002)
 Tolerances ± 0.25 (± 0.01)
 Pin pitch tolerances ± 0.13 (± 0.005)