

### Features

- ◆ Wide 2:1 input range
- ◆ High power density
- ◆ Operating temperature range  
-40°C to +85°C
- ◆ Indefinite short circuit protection
- ◆ I/O isolation 1500 VDC
- ◆ Input filter to meet EN 55022, Class A and FCC, level A without external components
- ◆ Industry standard pinout
- ◆ Shielded metal case with insulated baseplate
- ◆ High reliability, MTBF >1 Mio. h
- ◆ 3-year product warranty

*not recommended for new design in*



The TEN 10 series is a family of high performance 10W DC/DC converters in a compact 2" x 1" low profile package with industry standard footprint. A high efficiency allows a wide operating temperature range of -40°C to +85°C. A built-in EMI filter is built in to meet EN 55022, class A without any external components. Further standard features include over voltage protection and short-circuit protection. Typical applications for these converters are battery operated equipment, instrumentation, distributed power architectures in communication and industrial electronics, everywhere where isolated, tightly regulated voltages are required.

### Models

Order code	Input voltage range	Output voltage	Output current max.	Efficiency typ.
TEN 10-1210	<b>9 – 18 VDC</b> (12 VDC nominal)	3.3 VDC	2'400 mA	72 %
TEN 10-1211		5 VDC	2'000 mA	77 %
TEN 10-1212		12 VDC	830 mA	80 %
TEN 10-1213		15 VDC	670 mA	80 %
TEN 10-1215		24 VDC	415 mA	81 %
TEN 10-1221		±5 VDC	±1'000 mA	78 %
TEN 10-1222		±12 VDC	±415 mA	81 %
TEN 10-1223		±15 VDC	±330 mA	80 %
TEN 10-2410		<b>18 – 36 VDC</b> (24 VDC nominal)	3.3 VDC	2'400 mA
TEN 10-2411	5 VDC		2'000 mA	78 %
TEN 10-2412	12 VDC		830 mA	82 %
TEN 10-2413	15 VDC		670 mA	82 %
TEN 10-2415	24 VDC		415 mA	83 %
TEN 10-2421	±5 VDC		±1'000 mA	80 %
TEN 10-2422	±12 VDC		±415 mA	82 %
TEN 10-2423	±15 VDC		±330 mA	82 %
TEN 10-4810	<b>36 – 75 VDC</b> (48 VDC nominal)		3.3 VDC	2'400 mA
TEN 10-4811		5 VDC	2'000 mA	80 %
TEN 10-4812		12 VDC	830 mA	82 %
TEN 10-4813		15 VDC	670 mA	83 %
TEN 10-4815		24 VDC	415 mA	83 %
TEN 10-4821		±5 VDC	±1'000 mA	81 %
TEN 10-4822		±12 VDC	±415 mA	83 %
TEN 10-4823		±15 VDC	±330 mA	83 %

### Input Specifications

Input current at no load	12 Vin models: 30 mA typ. 24 Vin models: 20 mA typ. 48 Vin models: 10 mA typ.
Input current at full load	12 Vin; 3.3 VDC models: 915 mA typ. 12 Vin; 5 & ±5 VDC models: 1080 mA typ. 12 Vin; other output models: 1045 mA typ. 24 Vin; 3.3 VDC models: 435 mA typ. 24 Vin; 5 & ±5 VDC models: 530 mA typ. 24 Vin; other output models: 510 mA typ. 48 Vin; 3.3 VDC models: 215 mA typ. 48 Vin; 5 & ±5 VDC models: 260 mA typ. 48 Vin; other output models: 250 mA typ.
Start-up voltage / under voltage shut down	12 Vin models: 8.5 VDC / 8 VDC 24 Vin models: 16.5 VDC / 16 VDC 48 Vin models: 32.5 VDC / 32 VDC
Surge voltage (1 sec. max.)	12 Vin models: 25 V max. 24 Vin models: 50 V max. 48 Vin models: 100 V max.
Reserve voltage protection	1.0 A max.
Conducted noise (input)	EN 55022 level A, FCC part 15, level A

### Output Specifications

Voltage set accuracy	±1 %
Regulation	– Input variation Vin min. to Vin max. 0.3 % max. – Load variation 10 % – 90 % single output models: 0.5 % max. dual output models: 1 % max. (balanced load) dual output models: 3 % max. (unbalanced load)
Ripple and noise (20 MHz Bandwidth)	single output models: 50 mVpk-pk max. dual output models: 75 mVpk-pk max.
Temperature coefficient	±0.02 %/K
Output current limitation	>110 % of Iout max., constant current
Short circuit protection	continuous (automatic recovery)
Capacitive load	single output models: 2200 µF max. dual output models: 470 µF max.

### General Specifications

Temperature ranges	– Operating –40°C to +85°C – Case temperature +100°C max. – Storage –40°C to +125°C
Derating (convection cooling)	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 (Input/Output)	– Voltage 1'500 VDC – Capacitance 120 pF max. – Resistance >1'000 M Ohm
Switching frequency	single output models: 500 kHz typ. (pulse width modulation) dual output models: 300 kHz typ. (pulse width modulation)

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

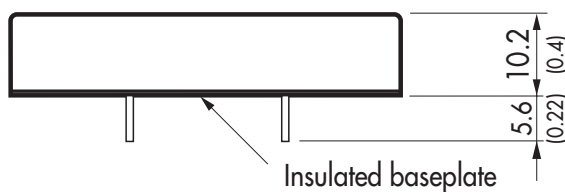
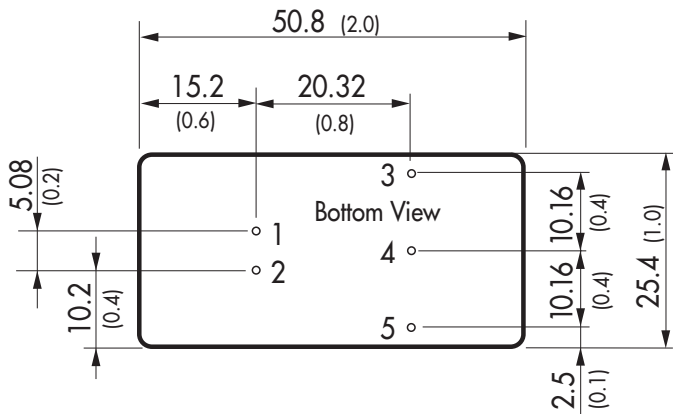
**General Specifications**

EMC immunity	<ul style="list-style-type: none"> <li>- Electrostatic discharge ESD</li> <li>- RF field susceptibility</li> <li>- Electrical fast transient / burst immunity input</li> <li>- Surge immunity</li> <li>- Immunity to conducted RF disturbances</li> </ul>	EN 61000-4-2 8 kV / 6 kV, criteria B EN 61000-4-3 10 V/m, criteria A EN 61000-4-4 ±2 kV, criteria B EN 61000-4-5 ±1 kV, criteria B EN 61000-4-6 10 Vrms, criteria A
Thermal shock, mechanical shock & vibration	- Test conditions	EN 61373, MIL-STD-810F <a href="http://www.tracopower.com/products/mil810.pdf">www.tracopower.com/products/mil810.pdf</a>
Safety standards		UL 60950-1, IEC/EN 60950-1
Safety approvals	- UL/cUL	<a href="http://www.ul.com">www.ul.com</a> -> certifications -> File e188913
Environmental compliance	<ul style="list-style-type: none"> <li>- Reach</li> <li>- RoHS</li> </ul>	<a href="http://www.tracopower.com/overview/ten10">www.tracopower.com/overview/ten10</a> directive 2011/65/EU

**Physical Specifications**

Casing material	Steel chrome-nickel plated
Baseplate material	Epoxy
Potting material	Silicon rubber TES (UL 94V-0 rated)
Weight	30 g (1.2 oz)
Soldering temperature	max. 265°C / 10 sec.

**Outline Dimensions**



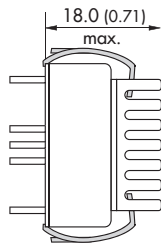
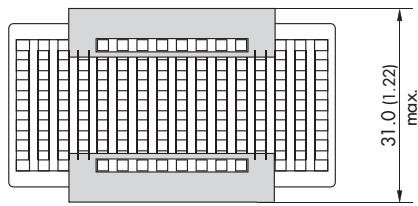
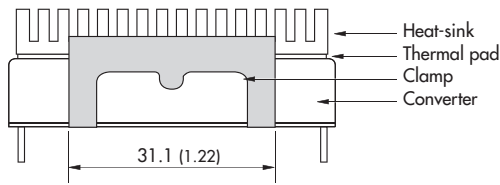
Pin-Out		
Pin	Single	Dual
1	+Vin (Vcc)	+Vin (Vcc)
2	-Vin (GND)	-Vin (GND)
3	+Vout	+Vout
4	No pin	Common
5	-Vout	-Vout

Dimensions in [mm], ( ) = Inch  
 Pin diameter: 1.0 ±0.05 (0.039 ±0.0019)  
 Pin pitch tolerances: ±0.25 (±0.01)  
 Casing tolerances: ±0.5 (±0.02)

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

**Heat-Sink (Option)**

**Heat-sink TEN-HS4 (optional)**



**Order code:** TEN-HS4

(cont.: heat-sink, thermal pad, 2 clamps)

**Material:** Aluminum

**Finish:** Anodic treatment (black)

**Weight:** 9 g (0.31oz) without converter

Thermal impedance after assembling: 10 K/W

**Note:**

Before attaching the heatsink, the product label on converter has to be removed for optimal performance.

For volume orders we can supply the converters with heatsink already mounted. Please contact us for a relative quotation.