

### 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, MTTF >1 Mio. h
- ◆ 3-year product warranty



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	9 – 18 VDC (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		18 – 36 VDC (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	36 – 75 VDC (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 I <sub>out</sub> max., constant current
Short circuit protection	continuous (automatic recovery)
Capacitive load	single output models: 2200 µF max. dual output models: 470 µF max.

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

### General Specifications

Temperature ranges	<ul style="list-style-type: none"> <li>- Operating</li> <li>- Case temperature</li> <li>- Storage</li> </ul>	<ul style="list-style-type: none"> <li>-40°C to +85°C</li> <li>+100°C max.</li> <li>-40°C to +125°C</li> </ul>
Derating (convection cooling)		3.3 %/K above 70°C
Humidity (non condensing)		95 % rel H max.
Reliability, calculated MTTF (MIL-HDBK-217F, at 25°C, ground benign)		>1 Mio h
Isolation (Input/Output)	<ul style="list-style-type: none"> <li>- Voltage</li> <li>- Capacity</li> <li>- Resistance</li> </ul>	<ul style="list-style-type: none"> <li>1'500 VDC</li> <li>120 pF max.</li> <li>&gt;1'000 M Ohm</li> </ul>
Switching frequency	<ul style="list-style-type: none"> <li>single output models:</li> <li>dual output models:</li> </ul>	<ul style="list-style-type: none"> <li>500 kHz typ. (pulse width modulation)</li> <li>300 kHz typ. (pulse width modulation)</li> </ul>
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>	<ul style="list-style-type: none"> <li>EN 61000-4-2    8 kV / 6 kV, criteria B</li> <li>EN 61000-4-3    10 V/m, criteria A</li> <li>EN 61000-4-4    ±2 kV, criteria B</li> <li>EN 61000-4-5    ±1 kV, criteria B</li> <li>EN 61000-4-6    10 Vrms, criteria A</li> </ul>
Vibration		acc. MIL-STD-810F
Thermal shock		acc. MIL-STD-810F
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

### Physical Specifications

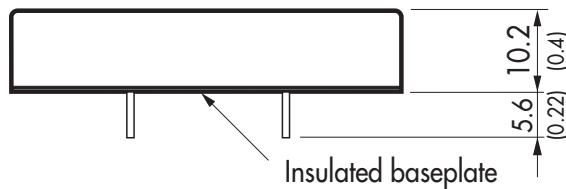
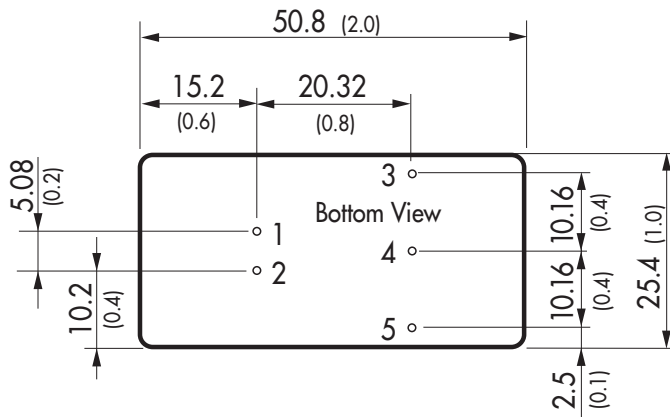
Casing material	Steel chrome-nickel plated
Baseplate material	Epoxy
Potting material	Silicon rubber TES (UL 94V-0 rated)
Weight	30 g (1.2 oz)
Soldering temperature	max. 265°C / 10 sec.

### Application note

Download: [www.tracopower.com/products/ten10-application.pdf](http://www.tracopower.com/products/ten10-application.pdf)

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

**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

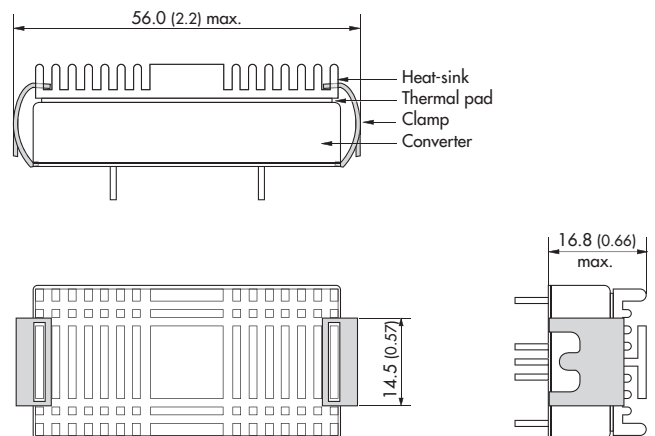
Dimensions in [mm], ( ) = Inch  
 Pin diameter: 1.0 ±0.05 (0.02 ±0.002)  
 Pin pitch tolerances: ±0.25 (±0.01)  
 Casing tolerances: ±0.5 (±0.02)

**Heat-Sink (Option)**

**Order code:** TEN-HS1  
 (cont.: heat-sink, thermal pad, 2 clamps)  
**Material:** Aluminum  
**Finish:** Anodic treatment (black)  
**Weight:** 17g (0.60oz) without converter  
 Thermal impedance after assembling: 10 K/W



**Note:**  
 The product label on converter has to be removed before mounting the heat-sink.  
 For volume orders converters will be supplied with heat-sinks already mounted. Please contact factory for quotation.  
 Separate heat-sinks are only available for prototypes and small quantity orders.



Specifications can be changed any time without notice.