

### Features

- ◆ Wide 2:1 input range
- ◆ High efficiency up to 88%
- ◆ Extended 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 footprint
- ◆ Shielded metal case with insulated baseplate
- ◆ 3-year product warranty

*not recommended for new design in*



The TEN 15 series is a family of high performance 15W 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 15-1210	9 – 18 VDC (12 VDC nominal)	3.3 VDC	4'000 mA	79 %
TEN 15-1211		5 VDC	3'000 mA	82 %
TEN 15-1212		12 VDC	1'250 mA	86 %
TEN 15-1213		15 VDC	1'000 mA	86 %
TEN 15-1221		±5 VDC	±1500 mA	83 %
TEN 15-1222		±12 VDC	±625 mA	86 %
TEN 15-1223		±15 VDC	±500 mA	84 %
TEN 15-2410	18 – 36 VDC (24 VDC nominal)	3.3 VDC	4'000 mA	80 %
TEN 15-2411		5 VDC	3'000 mA	84 %
TEN 15-2412		12 VDC	1'250 mA	85 %
TEN 15-2413		15 VDC	1'000 mA	85 %
TEN 15-2421		±5 VDC	±1'500 mA	84 %
TEN 15-2422		±12 VDC	±625 mA	86 %
TEN 15-2423		±15 VDC	±500 mA	86 %
TEN 15-4810	36 – 75 VDC (48 VDC nominal)	3.3 VDC	4'000 mA	81 %
TEN 15-4811		5 VDC	3'000 mA	83 %
TEN 15-4812		12 VDC	1'250 mA	87 %
TEN 15-4813		15 VDC	1'000 mA	86 %
TEN 15-4821		±5 VDC	±1'500 mA	85 %
TEN 15-4822		±12 VDC	±625 mA	88 %
TEN 15-4823		±15 VDC	±500 mA	87 %

### Input Specifications

Input current at no load	12 Vin models: 30 mA typ. 24 Vin models: 20 mA typ. 48 Vin models: 15 mA typ.
Input current at full load	12 Vin; 3.3 VDC models: 1470 mA typ. 12 Vin; other models: 1550 mA typ. 24 Vin; 3.3 VDC models: 730 mA typ. 24 Vin; other models: 780 mA typ. 48 Vin; 3.3 VDC models: 360 mA typ. 48 Vin; other models: 380 mA typ.
Surge voltage (100 msec. max.)	12 Vin models: 36 V max. 24 Vin models: 50 V max. 48 Vin models: 100 V 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. 0.5 % max. – Load variation 2 % – 100 % single output models: 0.5 % max. dual output models: 1 % max. (balanced load) 5 % max. (load cross variation 25 % / 100 %)
Minimum load	2 % of rated max. output current. (Operation at lower load is safe but major deviations to specified data may occur)
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
Start up time (nominal Vin and constant resistive load)	20 ms typ.
Transient response (25 % load step change)	250 µs typ.
Short circuit protection	indefinite (automatic recovery)
Over load protection	150 % of lout max typ. foldback
Over voltage protection	3.3 / 5.0 VDC models: 3.9 / 6.2 V 12 / 15 VDC models: 15 / 18 V
Capacitive load	3.3 VDC models: 10'200 µF max. 5 VDC / ±5 VDC models: 7'050 µF max. / ±1'020 µF max. 12 VDC / ±12 VDC models: 1'035 µF max. / ±495 µF max. 15 VDC / ±15 VDC models: 750 µF max. / ±165 µF max.

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

### General Specifications

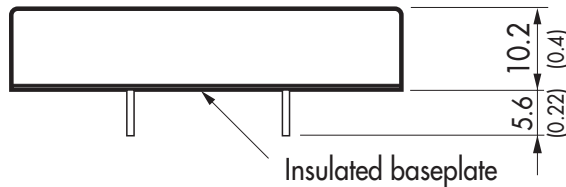
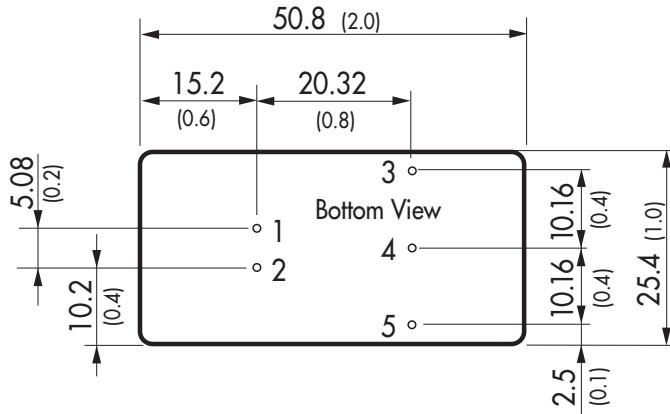
Temperature ranges	<ul style="list-style-type: none"> <li>- Operating</li> <li>- Casing temperature</li> <li>- Storage</li> </ul>	<ul style="list-style-type: none"> <li>- 40°C to +85°C</li> <li>+100°C max.</li> <li>-55°C to +105°C</li> </ul>
Derating	3.3 / 5.0 VDC models:	2.5 %/K above 60°C
	other models:	3.3 %/K above 70°C
Thermal impedance	<ul style="list-style-type: none"> <li>- Natural convection</li> <li>- Natural convection with heatsink</li> </ul>	<ul style="list-style-type: none"> <li>12°C/W</li> <li>10°C/W</li> </ul>
Humidity (non condensing)		95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)		>1 Mio h
Isolation (Input/Output)	<ul style="list-style-type: none"> <li>- Voltage</li> <li>- Capacitance</li> <li>- Resistance</li> </ul>	<ul style="list-style-type: none"> <li>1'500 VDC</li> <li>300 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, EN 60950-1, IEC 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/products/ten15-reach.pdf">www.tracopower.com/products/ten15-reach.pdf</a> RoHS directive 2011/65/EU

### Physical Specifications

Casing material	copper, nickel plated
Baseplate material	non conductive FR4
Potting material	epoxy (UL 94V-0 rated)
Weight	27 g (09.5 oz)
Soldering temperature	max. +265°C / 10 sec.

**Application note :** [www.tracopower.com/products/ten15-application.pdf](http://www.tracopower.com/products/ten15-application.pdf)

**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

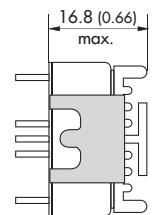
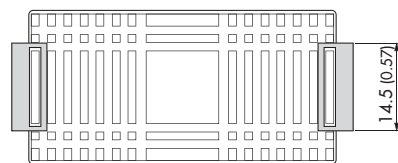
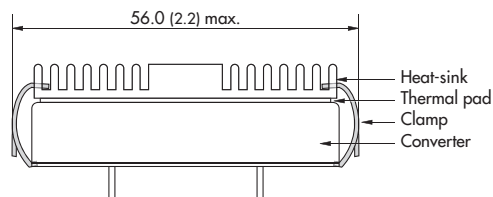
Dimensions in [mm], ( ) = Inch  
 Pin diameter: 1.0 ±0.05 (0.02 ±0.002)  
 Pin pitch tolerances: ±0.25 (±0.01)  
 Casing tolerances: ±0.5 (±0.02)

**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.