

#### 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.
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	continuous (automatic recovery)	
Over load protection	150 % of lout max typ. foldback	
Over voltage protection	3.3 VDC models:	3.9 V
	5.0 VDC models:	6.2 V
	12 VDC models:	15 V
	15 VDC models:	18 V
Capacitive load	3.3 VDC models:	10'200 µF max.
	5 VDC models:	7'050 µF max.
	12 VDC models:	1'035 µF max.
	15 VDC models:	750 µF max.
	±5 VDC models:	±1'020 µF max.
	±12 VDC models:	±495 µF max.
	±15 VDC models:	±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)		>2.3 Mio h
Isolation Test Voltage (Input/Output, 60s)		1'600 VDC
Insulation System		Functional
Isolation Capacitance (Input/Output)		300 pF max.
Isolation Resistance (Input/Output)		>1 G Ohm
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 UL 62368-1
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/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> RoHS directive 2011/65/EU

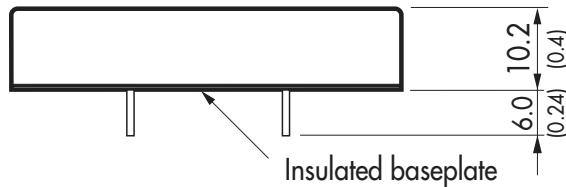
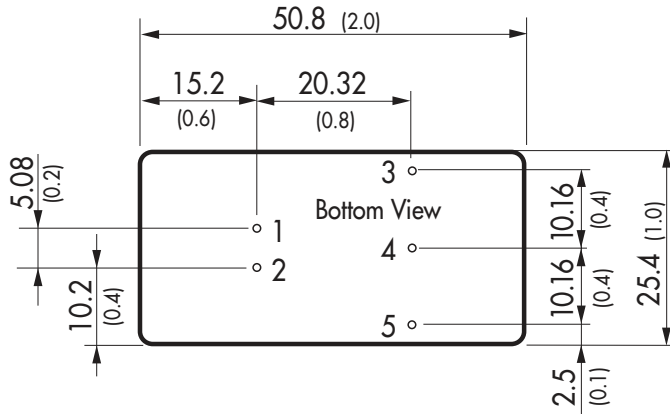
## Physical Specifications

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

**Supporting documents :** [www.tracopower.com/overview/ten15](http://www.tracopower.com/overview/ten15)

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

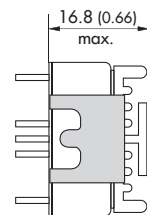
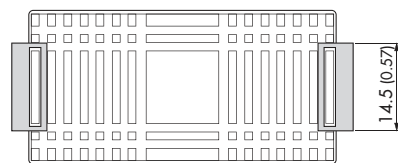
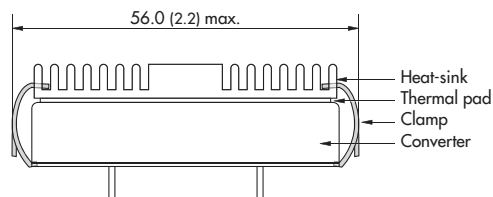
Dimensions in [mm], ( ) = Inch  
 Pin diameter: 1.0 ±0.05 (0.02 ±0.002)  
 Pin pitch tolerances: ±0.25 (±0.01)  
 Casing tolerances: ±0.5 (±0.02)

**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 without notice! Make sure you are using the latest documentation, downloadable at [www.tracopower.com](http://www.tracopower.com)