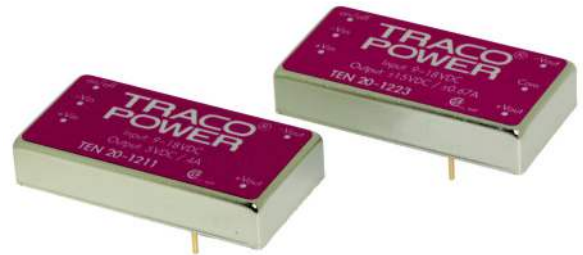


#### Features

- ◆ Wide 2:1 input range
- ◆ High efficiency up to 89 %
- ◆ Extended operating temperature range  
-40°C to +85°C
- ◆ Indefinite short circuit protection
- ◆ I/O isolation 1500VDC
- ◆ Remote On/Off
- ◆ Input filter meets EN 55022, Class A and FCC, level A without external components
- ◆ Industry standard pinout
- ◆ Shielded metal case with insulated baseplate
- ◆ 3-year product warranty



The TEN 20 series of DC/DC converters, comprising 18 different models, has been designed for a wide range of applications including communications, industrial systems and battery powered equipments. Full SMD-design with use of ceramic chip capacitors guarantees a high reliability and a long lifetime. Other features of this converters are internal filter to meet EN 55022, class A and FCC, level A and an extended temperature range of -40°C to +85°C.

#### Models

Order code	Input voltage range	Output voltage	Output current max.	Efficiency typ.
TEN 20-1210	<b>9 – 18 VDC</b> (12 VDC nominal)	3,3 VDC	4'000 mA	81 %
TEN 20-1211		5 VDC	4'000 mA	84 %
TEN 20-1212		12 VDC	1'670 mA	88 %
TEN 20-1213		15 VDC	1'340 mA	88 %
TEN 20-1222		±12 VDC	±835 mA	88 %
TEN 20-1223		±15 VDC	±670 mA	88 %
TEN 20-2410	<b>18 – 36 VDC</b> (24 VDC nominal)	3,3 VDC	4'000 mA	82 %
TEN 20-2411		5 VDC	4'000 mA	85 %
TEN 20-2412		12 VDC	1'670 mA	89 %
TEN 20-2413		15 VDC	1'340 mA	89 %
TEN 20-2422		±12 VDC	±835 mA	89 %
TEN 20-2423		±15 VDC	±670 mA	89 %
TEN 20-4810	<b>36 – 75 VDC</b> (48 VDC nominal)	3,3 VDC	4'000 mA	82 %
TEN 20-4811		5 VDC	4'000 mA	85 %
TEN 20-4812		12 VDC	1'670 mA	89 %
TEN 20-4813		15 VDC	1'340 mA	89 %
TEN 20-4822		±12 VDC	±835 mA	89 %
TEN 20-4823		±15 VDC	±670 mA	89 %

## Input Specifications

Input current no load	12 Vin models: <b>30 mA typ.</b> 24 Vin models: <b>17 mA typ.</b> 48 Vin models: <b>10 mA typ.</b>
Surge voltage (100 msec. max.)	12 Vin models: <b>25 V max.</b> 24 Vin models: <b>50 V max.</b> 48 Vin models: <b>100 V max.</b>
Conducted noise (input)	EN 55022 Class A, FCC part 15, level A

## Output Specifications

Voltage set accuracy	<b>±1 %</b>
Regulation	<b>0.3 % max.</b> <b>0.5 % max.</b> <b>1.0 % max. for 3.3 VDC output models</b>
Ripple and noise (20 MHz Bandwidth)	<b>80 mVpk-pk max.</b>
Temperature coefficient	<b>±0.02 %/K</b>
Output current limitation	<b>110–160 % of Iout max., constant current</b>
Short circuit protection	<b>indefinite (automatic recovery)</b>
Minimum load	<b>10 % of rated max. current</b> (operation at lower load condition is safe but output ripple will increase)
Capacitive load	3.3 / 5 VDC models: <b>6'800 µF max.</b> 12 / 15 VDC models: <b>680 µF max.</b> ±12 / ±15 VDC models: <b>270 µF max.</b>

## General Specifications

Temperature ranges	– Operating – Case temperature – Storage	<b>–40°C to +85°C</b> <b>+105°C max.</b> <b>–55°C to +125°C</b>
Load derating	– without heatsink – with heatsink	<b>2.3 %/K above 60°C</b> <b>2.9 %/K above 70°C</b>
Humidity (non condensing)		<b>95 % rel H max.</b>
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)		<b>&gt;1 Mio h</b>
Isolation voltage (60 sec.)	– Input/Output	<b>1'500 VDC</b>
Isolation capacitance	– Input/Output	<b>1'200 pF typ.</b>
Isolation resistance	– Input/Output (500 VDC)	<b>&gt;1'000 MOhm</b>
Switching frequency (fixed)		<b>330 kHz typ.</b> (pulse width modulation PWM)
Remote On/Off:	– On: – Off: – Off standby input current: – Control common: – Start-up delay:	<b>2.5 ... 100 VDC or open circuit.</b> <b>–1 ... 1.0 VDC or short circuit pin 2 and pin 6</b> <b>5 mA max.</b> <b>referenced to negativ input</b> <b>15 ms</b>
Safety approvals	– Certification documents	<b>UL 60950-1, IEC/EN 60950-1</b> Compliance up <b>UL 62368-1</b> to 60 VDC input voltage (SELV limit) <a href="http://www.tracopower.com/overview/ten20">www.tracopower.com/overview/ten20</a>

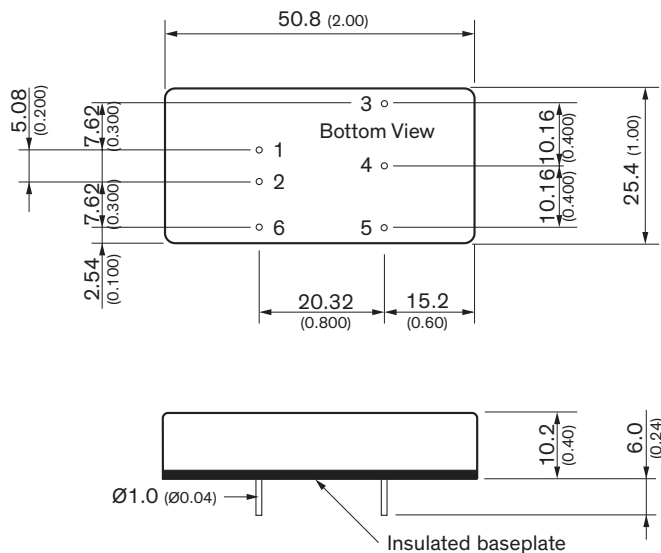
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

**Physical Specifications**

Casing material	copper, nickel plated
Baseplate material	non conductive FR4
Potting material	silicon rubber TSE (UL 94V-0 rated)
Weight	30 g (1.05 oz)
Soldering temperature	max. 260°C / 10 sec.
Thermal Impedance	13.2 K/W typ. 11.0 K/W typ. (with Heatsink)
Environmental compliance	- Reach - RoHS <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> RoHS directive 2011/65/EU

**Application note:** [www.tracopower.com/overview/ten20](http://www.tracopower.com/overview/ten20)

**Outline Dimensions**

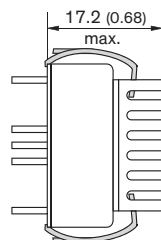
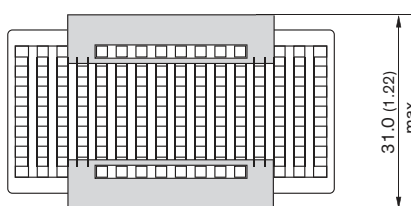
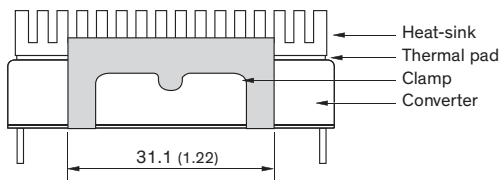


Pin-Out		
Pin	Single	Dual
1	+Vin (Vcc)	+Vin (Vcc)
2	-Vin (GND)	-Vin (GND)
3	+Vout	+Vout
4	No pin	Common
5	-Vout	-Vout
6	Remote On/Off	

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

**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

**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.

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