



**THE DATASHEET OF  
TEL 15-2411**



#### Features

- ◆ High efficiency up to 86 %
- ◆ Operating temperature range  
-40°C to +80°C
- ◆ Indefinite short-circuit protection
- ◆ I/O isolation 1500 VDC
- ◆ Industry standard pinout
- ◆ Cost optimized design
- ◆ Lead free design, RoHS compliant
- ◆ 3-year product warranty



The TEL 15 series is a range of DC/DC-converter modules with wide input range of 2:1. State of the art SMD-technology guarantees a product with very high reliability and good cost /performance ratio. High efficiency allows an operating temperature range of -40°C to +80°C at full load. This product serie provides an economical solution for many cost critical applications in industrial and consumer electronics.

#### Models

Ordercode	Input voltage range	Output voltage	Output current max.	Efficiency typ.
TEL 15-1210	<b>9 – 18 VDC</b> (nominal 12 VDC)	3.3 VDC	3'000 mA	78 %
TEL 15-1211		5.1 VDC	3'000 mA	81 %
TEL 15-1212		12 VDC	1'250 mA	86 %
TEL 15-1213		15 VDC	1'000 mA	86 %
TEL 15-1222		±12 VDC	±625 mA	86 %
TEL 15-1223		±15 VDC	±500 mA	86 %
TEL 15-2410	<b>18 – 36 VDC</b> (nominal 24 VDC)	3.3 VDC	3'000 mA	78 %
TEL 15-2411		5.1 VDC	3'000 mA	81 %
TEL 15-2412		12 VDC	1'250 mA	86 %
TEL 15-2413		15 VDC	1'000 mA	86 %
TEL 15-2422		±12 VDC	±625 mA	86 %
TEL 15-2423		±15 VDC	±500 mA	86 %
TEL 15-4810	<b>36 – 75 VDC</b> (nominal 48 VDC)	3.3 VDC	3'000 mA	78 %
TEL 15-4811		5.1 VDC	3'000 mA	81 %
TEL 15-4812		12 VDC	1'250 mA	86 %
TEL 15-4813		15 VDC	1'000 mA	86 %
TEL 15-4822		±12 VDC	±625 mA	86 %
TEL 15-4823		±15 VDC	±500 mA	86 %

### Input Specifications

<b>Input current no load</b>		12 Vin models: <b>30 mA typ.</b> 24 Vin models: <b>20 mA typ.</b> 48 Vin models: <b>10 mA typ.</b>
<b>Input current (full load)</b>	12 Vin; 12 Vin; 24 Vin; 24 Vin; 48 Vin; 48 Vin;	3.3 Vout models: <b>1050 mA typ.</b> other output models: <b>1500 mA typ.</b> 3.3 Vout models: <b>550 mA typ.</b> other output models: <b>750 mA typ.</b> 3.3 Vout models: <b>250 mA typ.</b> other output models: <b>350 mA typ.</b>
<b>Start-up voltage / under voltage shut down</b>		12 Vin models: <b>8.5 VDC / 8.0 VDC typ.</b> 24 Vin models: <b>17 VDC / 15 VDC typ.</b> 48 Vin models: <b>33 VDC / 29 VDC typ.</b>
<b>Surge voltage</b> (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>

### Output Specifications

<b>Voltage set accuracy</b>		<b>±1 %</b>
<b>Regulation</b>	– Input variation Vin min. to Vin max. – Load variation 10 – 100 %	<b>1 % max.</b> single output models: <b>0.5 % max.</b> dual output models balanced load: <b>1 % max.</b> dual output models unbalanced load: <b>3 % max. / Minimum load 10 %</b>
<b>Ripple and noise</b> (20 MHz Bandwidth)		single output models: <b>50 mVpk-pk max.</b> dual output models: <b>75 mVpk-pk max</b>
<b>Temperature coefficient</b>		<b>±0.02 %/K</b>
<b>Output current limitation</b>		<b>&gt;120 % of Iout max., foldback</b>
<b>Short circuit protection</b>		<b>indefinite</b> (automatic recovery)
<b>Capacitive load</b>		single output models: <b>470 µF max.</b> dual output models: <b>220 µF max.</b> (per output)

### General Specifications

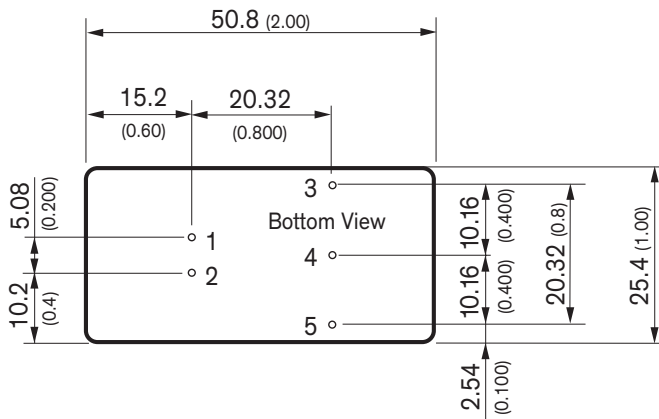
<b>Temperature ranges</b>	– Operating – Case temperature – Storage	<b>–40°C to +80°C</b> (without load derating) <b>+100°C max.</b> <b>–55°C to +125°C</b>
<b>Power derating</b>	– Natural convection – Natural convection with heat sink (optional)	<b>2.5 %/K above +60°C</b> <b>1.0 %/K above +70°C</b>
<b>Humidity</b> (non condensing)		<b>95 % rel H max.</b>
<b>Reliability, calculated MTBF</b> (MIL-HDBK-217F, at +25°C, ground benign)		<b>&gt;700'000 h</b>
<b>Isolation voltage</b> (60 sec.)	– Input/Output	<b>1500 VDC</b>
<b>Isolation capacitance</b>	– Input/Output	<b>1200 pF typ.</b>
<b>Isolation resistance</b>	– Input/Output (500 VDC)	<b>&gt;1000 M Ohm</b>
<b>Switching frequency</b> (fixed)		<b>330 kHz typ.</b> (Pulse width modulation PWM)
<b>Safety standards</b>		<b>UL/cUL 60950-1, IEC/EN 60950-1</b> (Compliance up to 60 VDC input voltage (SELV limit))
<b>Thermal Impedance</b>		<b>12.2 K/W typ.</b> <b>9.2 K/W typ.</b> (with Heatsink)
<b>Environmental compliance</b>	– Reach – RoHS	<a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> <b>RoHS directive 2011/65/EU</b>

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

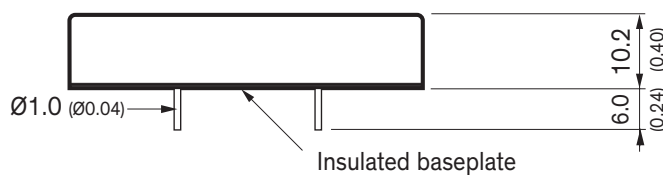
**Physical Specifications**

Casing material	copper nickel plated
Baseplate	non conductive FR4
Potting material	epoxy (UL 94V-0 rated)
Weight	32 g (1.13oz)
Soldering temperature	max. 265°C / 10 sec.

**Outline Dimensions**



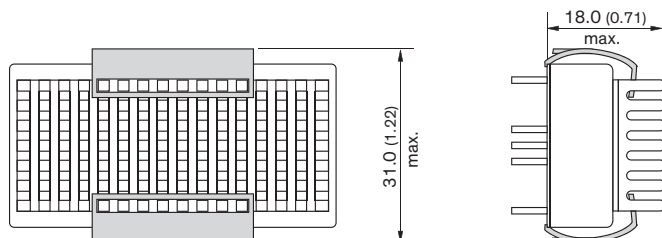
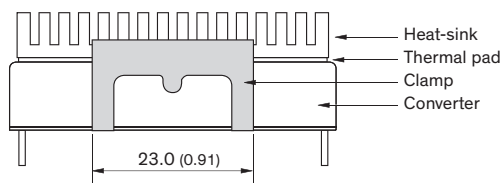
Pin-Out		
Pin	Single	Dual
1	+Vin (Vcc)	+Vin (Vcc)
2	-Vin (GND)	-Vin (GND)
3	+Vout	+Vout
4	No pin	Common
5	-Vout	-Vout



Dimensions in [mm], ( ) = Inch  
 Pin diameter: 1.0 ±0.05 (0.02 ±0.002)  
 Pin pitch tolerances: ±0.13 (±0.005)  
 Case tolerances: ±0.50 (±0.197)

**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)

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