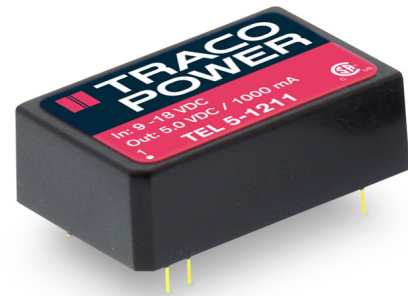


Features

- ◆ Wide 2:1 input range
- ◆ Cost efficient SMD-design
- ◆ High power density
- ◆ High efficiency up to 86%
- ◆ Regulated outputs
- ◆ I/O isolation 1'500 VDC
- ◆ Input filter to meet EN 55022, Class A and FCC, level A without external components
- ◆ Indefinite short-circuit protection
- ◆ 24-pin DIP with industry standard pinout
- ◆ High reliability, MTBF >1 Mio. h
- ◆ Lead free design, RoHS compliant
- ◆ 3-year product warranty



The TEL 5 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 excellent cost /performance ratio. High efficiency allows an operating temperature range of -40°C to $+85^{\circ}\text{C}$ at full load. This product series 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 5-1210	9 – 18 VDC (nominal 12 VDC)	3.3 VDC	1200 mA	77 %
TEL 5-1211		5 VDC	1000 mA	81 %
TEL 5-1212		12 VDC	500 mA	84 %
TEL 5-1222		± 12 VDC	± 250 mA	84 %
TEL 5-1223		± 15 VDC	± 200 mA	84 %
TEL 5-2410	18 – 36 VDC (nominal 24 VDC)	3.3 VDC	1200 mA	79 %
TEL 5-2411		5 VDC	1000 mA	83 %
TEL 5-2412		12 VDC	500 mA	86 %
TEL 5-2422		± 12 VDC	± 250 mA	86 %
TEL 5-2423		± 15 VDC	± 200 mA	86 %

Input Specifications

Input current no load /full load	12 Vin models: 20 mA / 590 mA typ. 24 Vin models: 5 mA / 290 mA typ.
Start-up voltage / under voltage shut down	12 Vin models: 8.0 VDC / 8.0 VDC 24 Vin models: 16.0 VDC / 16.0 VDC
Surge voltage (1 sec. max.)	12 Vin models: 25 V max. 24 Vin models: 50 V max.
Reverse voltage protection	1.0 A max.
Conducted noise (input)	EN 55022 class A, FCC part 15 level A

Output Specifications

Voltage set accuracy	±1 %
Regulation	– Input variation Vin min. to Vin max. – Load variation 20 – 100 %
	single output models 1 % max dual output models balanced load 2 % max.
Minimum load	5 % of rated max current (operating at lower load condition is safe but the modules may not meet all specifications listed)
Ripple and noise (20 MHz Bandwidth)	75 mVpk-pk max.
Temperature coefficient	±0.02 %/K
Output current limitation	>120 % of Iout max., constant current
Short circuit protection	continuous (automatic recovery)
Capacitive load	single output models: 6800 µF max. dual output models: 1000 µF max. (each output)

General Specifications

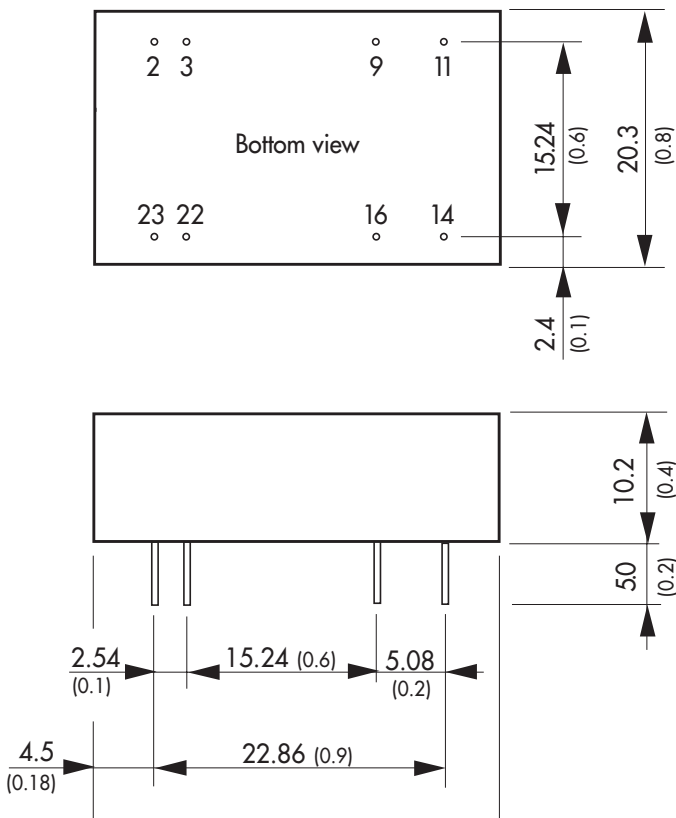
Temperature ranges	– Operating – Case temperature – Storage	–40°C to +85°C +90°C –40°C to +125°C
Derating (convection cooling)		3.3 %/K above 70°C
Humidity (non condensing)		95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217F at +25°C, ground benign)		>1 Mio. h
Isolation voltage (60 sec.)	– Input/Output	1'500 VDC
Isolation capacitance	– Input/Output	380 pF typ.
Isolation resistance	– Input/Output (500 VDC)	>1'000 M Ohm
Switching frequency		300 kHz typ.
Safety standards		UL/cUL 60950-1, IEC/EN 60950-1
Environmental compliance	– Reach – RoHs	www.tracopower.com/info/reach-declaration.pdf RoHS directive 2011/65/EU

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

Physical Specifications

Casing material	non conductive plastic (UL 94V-0 rated)
Weight	17 g (0.60 oz)
Soldering temperature	max. 265°C / 10 sec.

Outline Dimensions



Pin-Out		
Pin	Single	Dual
2	-Vin (GND)	-Vin (GND)
3	-Vin (GND)	-Vin (GND)
9	No pin	Common
11	No con.	-Vout
14	+Vout	+Vout
16	-Vout	Common
22	+Vin (Vcc)	+Vin (Vcc)
23	+Vin (Vcc)	+Vin (Vcc)

Dimensions in [mm], () = Inch
 Pin diameter $\varnothing 0.5 \pm 0.05$ (0.02 \pm 0.002)
 Tolerances ± 0.25 (± 0.01)
 Pin pitch tolerances ± 0.13 (± 0.005)

Specifications can be changed without notice! Make sure you are using the latest documentation, downloadable at www.tracopower.com

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[TEL 5-1210](#)