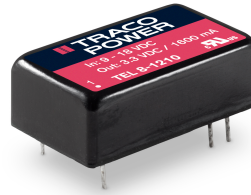




**THE DATASHEET OF  
TEL 8-2413**



- Ultra compact 8 W converter in DIP-16 metal casing
- Operating temperature range -40°C to +80°C
- Wide 2:1 input range
- Built-in EN 55032 class A filter
- Protection against short circuit
- 3-year product warranty



The TEL 8 series is a range of isolated 8 Watt converters which come in a very compact DIP-16 metal package. They offer a 2:1 input voltage range and feature a high efficiency of up to 86% which allows an operation temperature of up to +70°C at full load. An input filter makes the converters comply with conducted emission EN 55032 class A.

The TEL 8 Series models are an economical solution for space critical and cost sensitive applications in instrumentation, IT and industrial electronics.

Models							
Order Code	Input Voltage Range	Output 1		Output 2		Efficiency typ.	
		Vnom	I <sub>max</sub>	Vnom	I <sub>max</sub>		
TEL 8-1210	9 - 18 VDC (12 VDC nom.)	3.3 VDC	1'600 mA			78 %	
TEL 8-1211		5 VDC	1'600 mA			81 %	
TEL 8-1212		12 VDC	665 mA			84 %	
TEL 8-1213		15 VDC	535 mA			84 %	
TEL 8-1215		24 VDC	335 mA			85 %	
TEL 8-1222		+12 VDC	335 mA		-12 VDC	335 mA	85 %
TEL 8-1223		+15 VDC	265 mA		-15 VDC	265 mA	84 %
TEL 8-2410	18 - 36 VDC (24 VDC nom.)	3.3 VDC	1'600 mA			78 %	
TEL 8-2411		5 VDC	1'600 mA			82 %	
TEL 8-2412		12 VDC	665 mA			85 %	
TEL 8-2413		15 VDC	535 mA			85 %	
TEL 8-2415		24 VDC	335 mA			86 %	
TEL 8-2422		+12 VDC	335 mA		-12 VDC	335 mA	85 %
TEL 8-2423		+15 VDC	265 mA		-15 VDC	265 mA	86 %
TEL 8-4810	36 - 75 VDC (48 VDC nom.)	3.3 VDC	1'600 mA			78 %	
TEL 8-4811		5 VDC	1'600 mA			81 %	
TEL 8-4812		12 VDC	665 mA			85 %	
TEL 8-4813		15 VDC	535 mA			85 %	
TEL 8-4815		24 VDC	335 mA			86 %	
TEL 8-4822		+12 VDC	335 mA		-12 VDC	335 mA	86 %
TEL 8-4823		+15 VDC	265 mA		-15 VDC	265 mA	86 %

### Input Specifications

Input Current	- At no load	12 Vin models: <b>10 mA typ.</b> 24 Vin models: <b>10 mA typ.</b> 48 Vin models: <b>8 mA typ.</b>
	- At full load	12 Vin models: <b>760 mA typ.</b> 24 Vin models: <b>380 mA typ.</b> 48 Vin models: <b>190 mA typ.</b>
Surge Voltage		12 Vin models: <b>25 VDC max.</b> (1 s max.) 24 Vin models: <b>50 VDC max.</b> (1 s max.) 48 Vin models: <b>100 VDC max.</b> (1 s max.)
Under Voltage Lockout		12 Vin models: <b>8 VDC typ.</b> 24 Vin models: <b>16 VDC typ.</b> 48 Vin models: <b>34 VDC typ.</b>
Recommended Input Fuse		(The need of an external fuse has to be assessed in the final application.)
Input Filter		Internal Pi-Type

### Output Specifications

Voltage Set Accuracy		<b>±2% max.</b>
Regulation	- Input Variation (Vmin - Vmax)	single output models: <b>0.8% max.</b> dual output models: <b>0.8% max.</b>
	- Load Variation (0 - 100%)	single output models: <b>1% max.</b> dual output models: <b>2% max.</b> (Output 1) <b>2% max.</b> (Output 2)
Ripple and Noise	- 20 MHz Bandwidth	<b>55 mVp-p max.</b>
Capacitive Load	- single output	3.3 Vout models: <b>680 µF max.</b> 5 Vout models: <b>680 µF max.</b> 12 Vout models: <b>330 µF max.</b> 15 Vout models: <b>330 µF max.</b> 24 Vout models: <b>150 µF max.</b>
	- dual output	12 / -12 Vout models: <b>150 / 150 µF max.</b> 15 / -15 Vout models: <b>150 / 150 µF max.</b>
Minimum Load		Not required
Temperature Coefficient		<b>±0.02 %/K max.</b>
Short Circuit Protection		Continuous, Automatic recovery
Output Current Limitation		<b>150% typ. of Iout max.</b>
Transient Response	- Response Deviation	<b>5% max.</b> (25% Load Step)
	- Response Time	<b>500 µs max.</b> (25% Load Step)

### Safety Specifications

Standards	- IT / Multimedia Equipment	EN 62368-1 IEC 62368-1 UL 62368-1
	- Certification Documents	<a href="http://www.tracopower.com/overview/tel8">www.tracopower.com/overview/tel8</a>
Pollution Degree		PD 2

### EMC Specifications

EMI Emissions	- Conducted Emissions	EN 55032 class A (internal filter)
	- Radiated Emissions	EN 55032 class A (with external filter)
	External filter proposal:	<a href="http://www.tracopower.com/overview/tel8">www.tracopower.com/overview/tel8</a>

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

EMS Immunity		EN 55024 (IT Equipment) EN 55035 (Multimedia)
	- Electrostatic Discharge	Air: EN 61000-4-2, $\pm 8$ kV, perf. criteria A
	- RF Electromagnetic Field	Contact: EN 61000-4-2, $\pm 6$ kV, perf. criteria A
	- EFT (Burst) / Surge	EN 61000-4-3, 20 V/m, perf. criteria A
		EN 61000-4-4, $\pm 2$ kV, perf. criteria A
		EN 61000-4-5, $\pm 1$ kV, perf. criteria A
		Ext. input component: KY 220 $\mu$ F
	- Conducted RF Disturbances	EN 61000-4-6, 10 Vrms, perf. criteria A
	- PF Magnetic Field	Continuous: EN 61000-4-8, 100 A/m, perf. criteria A
		1 s: EN 61000-4-8, 1000 A/m, perf. criteria A

### General Specifications

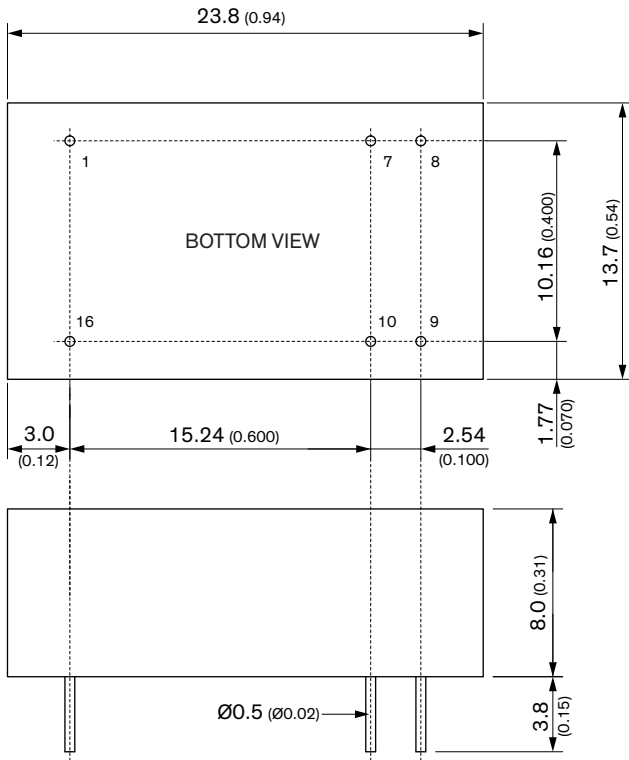
Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	-40°C to +80°C
	- Case Temperature	+105°C max.
	- Storage Temperature	-50°C to +125°C
Power Derating	- High Temperature	5 %/K above 70°C
		See application note: <a href="http://www.tracopower.com/overview/tel8">www.tracopower.com/overview/tel8</a>
Cooling System		Natural convection (20 LFM)
Altitude During Operation		6'000 m max.
Switching Frequency		370 kHz typ. (PWM)
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s	1'500 VDC
	- Input to Output, 1 s	1'800 VDC
Isolation Resistance	- Input to Output, 500 VDC	1'000 M $\Omega$ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	500 pF typ.
Reliability	- Calculated MTBF	1'000'000 h (MIL-HDBK-217F, ground benign)
Washing Process		According to Cleaning Guideline <a href="http://www.tracopower.com/info/cleaning.pdf">www.tracopower.com/info/cleaning.pdf</a>
Housing Material		Alu alloy, black anodized coating
Potting Material		Epoxy (UL 94 V-0 rated)
Pin Material		Copper Alloy (C6801)
Pin Foundation Plating		Nickel (2 - 4 $\mu$ m)
Pin Surface Plating		Tin (3 - 5 $\mu$ m), matte
Housing Type		Metal Case
Mounting Type		PCB Mount
Connection Type		THD (Through-Hole Device)
Footprint Type		DIP16
Soldering Profile		Lead-Free Wave Soldering 260°C / 10 s max.
Weight		6.1 g
Environmental Compliance	- REACH Declaration	<a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> REACH SVHC list compliant REACH Annex XVII compliant
	- RoHS Declaration	<a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a> Exemptions: 7a (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule.))
	- SCIP Reference Number	acb7a2a8-642b-4cb3-846a-35a2f5870898

### Supporting Documents

Overview Link (for additional Documents)	<a href="http://www.tracopower.com/overview/tel8">www.tracopower.com/overview/tel8</a>
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All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

**Outline Dimensions**





Dimensions in mm (inch)  
 Tolerances: x.x ±0.5 (x.xx ±0.02)  
               x.xx ±0.25 (x.xxx ±0.01)  
 Pin diameter tolerances: x.x ±0.05 (x.xx ±0.002)

Pinout		
Pin	Single	Dual
1	-Vin (GND)	-Vin (GND)
7	NC	NC
8	NC	Common
9	+Vout	+Vout
10	-Vout	-Vout
16	+Vin (Vcc)	+Vin (Vcc)

NC: Not connected

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