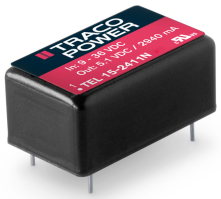
TRACO POWER

DC/DC Converter

TEL 15N Series, 15 Watt

- **Ultra compact 15 Watt converter in DIP-16 metal casing**
- **Highest power density of 4.51 W/cm3**
- **Operating temperature range -40°C to +85°C**
- **Wide 2:1 input voltage ranges: 9-18, 18-36, 36-75 VDC**
- **High efficiency (up to 87%) for low thermal loss**
- **6-side shielded metal case with insulated baseplate**
- **Built-In EN 55032 class A filter (conducted)**
- **Protection against short circuit**
- **3-year product warranty**



UL 62368-1 IEC 62368-1

The TEL 15N is a series of isolated 15 Watt converters which come in an ultra compact DIP-16 metal package. The design purpose of this series was to miniaturized low power DC/DC converters to the maximum without sacrificing high efficiency. It solidifies the new standard for power density with 4.51 W/-cm3 and effectively doubles the power density compared to 15 Watt converters in DIP-24 packages. The TEL 15N offers a wide 2:1 input voltage range and features a high efficiency of up to 87% which enables an operation temperature of up to +55°C at full load and up to 85°C with 50% load. The converters also have an internal input filter to comply with conducted emission standard EN 55032 class A. It's 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
		Vnom	Imax	Vnom	Imax	typ.
TEL 15-1211N	9 - 18 VDC (12 VDC nom.)	5.1 VDC	2'940 mA			86 %
TEL 15-1212N		12 VDC	1'250 mA			87 %
TEL 15-1213N		15 VDC	1'000 mA			87 %
TEL 15-1215N		24 VDC	625 mA			87 %
TEL 15-1222N		+12 VDC	625 mA	−12 VDC	625 mA	87 %
TEL 15-1223N		+15 VDC	500 mA	−15 VDC	500 mA	87 %
TEL 15-2411N	18 - 36 VDC (24 VDC nom.)	5.1 VDC	2'940 mA			86 %
TEL 15-2412N		12 VDC	1'250 mA			87 %
TEL 15-2413N		15 VDC	1'000 mA			87 %
TEL 15-2415N		24 VDC	625 mA			87 %
TEL 15-2422N		+12 VDC	625 mA	−12 VDC	625 mA	87 %
TEL 15-2423N		+15 VDC	500 mA	−15 VDC	500 mA	87 %
TEL 15-4811N	36 - 75 VDC (48 VDC nom.)	5.1 VDC	2'940 mA			86 %
TEL 15-4812N		12 VDC	1'250 mA			87 %
TEL 15-4813N		15 VDC	1'000 mA			87 %
TEL 15-4815N		24 VDC	625 mA			87 %
TEL 15-4822N		+12 VDC	625 mA	−12 VDC	625 mA	87 %
TEL 15-4823N		+15 VDC	500 mA	−15 VDC	500 mA	87 %

Note - 48 Vin models: If the input will be switched electromechanically, use an external 27 µF / 200 V / KXY capacitor to avoid voltage transient.

Input Specifications

Input Current	- At no load	12 Vin models:	20 mA typ.
		24 Vin models:	10 mA typ.
		48 Vin models:	7 mA typ.
	- At full load	12 Vin models:	1'450 mA typ.
		24 Vin models:	720 mA typ.
		48 Vin models:	360 mA typ.
Surge Voltage		12 Vin models:	25 VDC max. (1 s max.)
		24 Vin models:	50 VDC max. (1 s max.)
		48 Vin models:	100 VDC max. (1 s max.)
Input Inrush Current			28.6 A typ. (12 Vin models)
			38.8 A typ. (24 Vin models)
			51.6 A typ. (48 Vin models)
Under Voltage Lockout		12 Vin models:	8 VDC typ.
		24 Vin models:	16 VDC typ.
		48 Vin models:	34 VDC typ.
Recommended Input Fuse		12 Vin models:	3'000 mA (slow blow)
		24 Vin models:	1'500 mA (slow blow)
		48 Vin models:	1'000 mA (slow blow)
			(The need of an external fuse has to be assessed in the final application.)
Input Filter			Internal Pi-Type

Output Specifications

Voltage Set Accuracy			±1% max.
Regulation	- Input Variation (Vmin - Vmax)	single output models:	0.8% max.
		dual output models:	0.8% max.
	- Load Variation (0 - 100%)	single output models:	1% max.
		dual output models:	1% max. (Output 1)
			1% max. (Output 2)
	- Voltage Balance (symmetrical load)	dual output models:	2% max.
	- Cross Regulation (25% / 100% asym. load)	dual output models:	5% max.
Ripple and Noise	- 20 MHz Bandwidth		70 mVp-p typ. (w/ 2.2 µF / 50 V MLCC)
Capacitive Load	- single output	5.1 Vout models:	1'800 µF max.
		12 Vout models:	820 µF max.
		15 Vout models:	820 µF max.
		24 Vout models:	270 µF max.
	- dual output	12 / -12 Vout models:	560 / 560 µF max.
		15 / -15 Vout models:	270 / 270 µF max.
Minimum Load			Not required
Temperature Coefficient			±0.02 %/K max.
Start-up Time			30 ms typ.
Short Circuit Protection			Continuous, Automatic recovery (Hiccup Mode, Automatic Recovery)
Output Current Limitation			110% min. of Iout max.
			160% typ. of Iout max.
Transient Response	- Response Deviation		3% typ. / 5% max. (75% to 100% Load Step)
	- Response Time		500 µs max. (75% to 100% Load Step)

Safety Specifications

Safety Standards	- IT / Multimedia Equipment	EN 62368-1
		IEC 62368-1
		UL 62368-1
	- Certification Documents	www.tracopower.com/overview/tel15n

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

Pollution Degree			PD 3
Over Voltage Category			Not mains connected

EMC Specifications

EMI Emissions	- Conducted Emissions		EN 55032 class A (internal filter)
			EN 55032 class B (internal filter)
	- Radiated Emissions		EN 55032 class A (with external filter)
			EN 55032 class B (with external filter)
		External filter proposal:	www.tracopower.com/overview/tel15n
EMS Immunity			EN 55024 (IT Equipment)
			EN 55035 (Multimedia)
	- Electrostatic Discharge	Air:	EN 61000-4-2, ±8 kV, perf. criteria A
		Contact:	EN 61000-4-2, ±6 kV, perf. criteria A
	- RF Electromagnetic Field		EN 61000-4-3, 20 V/m, perf. criteria A
	- EFT (Burst) / Surge		EN 61000-4-4, ±2 kV, perf. criteria A
			EN 61000-4-5, ±2 kV, perf. criteria A
		External filter proposal:	www.tracopower.com/overview/tel15n
	- Conducted RF Disturbances		EN 61000-4-6, 10 Vrms, perf. criteria A
	- PF Magnetic Field	Continuous:	EN 61000-4-8, 30 A/m, perf. criteria A

General Specifications

Relative Humidity			95% max. (non condensing)
Temperature Ranges	- Operating Temperature		–40°C to +80°C
	- Case Temperature		+110°C max.
	- Storage Temperature		–50°C to +125°C
Power Derating	- High Temperature	See application note:	www.tracopower.com/overview/tel15n
Cooling System			Natural convection (20 LFM)
Altitude During Operation			6'000 m max.
Switching Frequency			480 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
	- Input to Case, 60 s		1'000 VDC
	- Output to Case, 60 s		1'000 VDC
Isolation Resistance	- Input to Output, 500 VDC		1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V		2'200 pF max.
Reliability	- Calculated MTBF		2'150'000 h (MIL-HDBK-217F, ground benign)
Washing Process			Allowed (hermetical product)
		See Cleaning Guideline:	www.tracopower.com/info/cleaning.pdf
Environment	- Vibration		2.4 g, 3 axis, random waveform, 30 min
	- Mechanical Shock		30 g, 3 axis, half sine, 11 ms
	- Thermal Shock		IPC-9592B
Housing Material			Aluminum
Potting Material			Silicone (UL 94 V-0 rated)
Pin Material			Copper Alloy (C6801)
Pin Foundation Plating			Nickel (2 - 4 µm)
Pin Surface Plating			Tin (3 - 5 µm), matte
Housing Type			Metal Case
Mounting Type			PCB Mount
Connection Type			THD (Through-Hole Device)
Footprint Type			DIP16
Soldering Profile			Wave Soldering 260°C / 10 s max.
Weight			8.8 g
Thermal Impedance	- Case to Ambient		24.6 K/W typ.

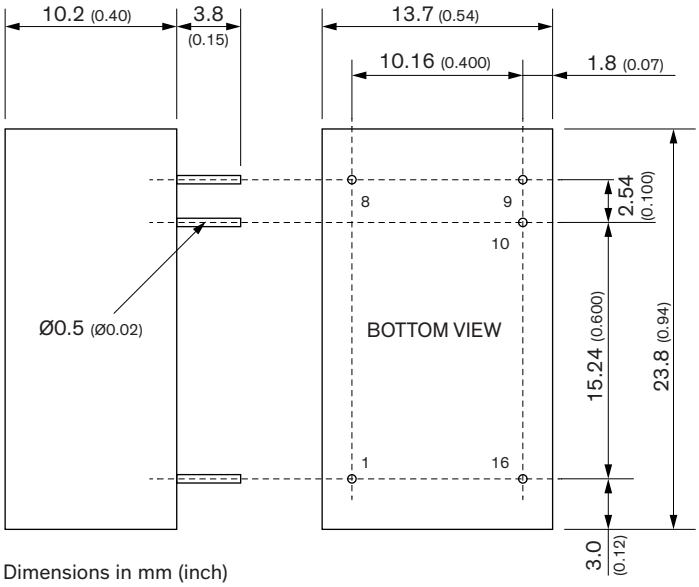
All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

Environmental Compliance	- REACH Declaration	www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant
	- RoHS Declaration	www.tracopower.com/info/rohs-declaration.pdf Exemptions: 7a (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule). The SCIP number is provided on request.)

Supporting Documents

Overview Link (for additional Documents)	www.tracopower.com/overview/tel15n

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	
8	NC	Common
9	+Vout	
10	–Vout	
16	+Vin	

NC: Not connected