TRACO POWER

DC/DC Converter

TEC 3 Series, 3 Watt

- **Compact SIP-8 package**
- **I/O-isolation voltage 1‘600 VDC**
- **Fully regulated outputs**
- **Operating temperature range –40°C to +90°C**
- **Continuous short circuit protection**
- **Remote On/Off**
- **Designed to meet IEC/EN/UL 62368-1 (not certified)**
- **3-year product warranty**



TEC 3 is a new series with the design purpose to improve the prevalent 3 Watt SIP-8 DC/DC converters in terms of cost, efficiency and performance. The latest technology and components effectuate a high efficiency for a low thermal loss. This enables an operating temperature range from -40°C up to +90°C. The converters are fully regulated over 0 - 100% load. The low input range input is extended from 4.5 to 13.2 VDC while models are also available with the standard 2:1 input ranges of 9-18, 18-36 and 36-75 VDC (see TEC 3WI series
for 4:1 input ranges). The functional I/O-isolation system is designed to meet IEC/EN/UL 62368-1 (not certified) with a test voltage (60 s) of 1600 VDC.

Models

Order Code	Input Voltage Range	Output 1		Output 2		Efficiency
		Vnom	Imax	Vnom	Imax	typ.
TEC 3-0910	4.5 - 13.2 VDC (9 VDC nom.)	3.3 VDC	700 mA			75 %
TEC 3-0911		5 VDC	600 mA			78 %
TEC 3-0919		9 VDC	333 mA			81 %
TEC 3-0912		12 VDC	250 mA			83 %
TEC 3-0913		15 VDC	200 mA			84 %
TEC 3-0915		24 VDC	125 mA			82 %
TEC 3-0921		+5 VDC	300 mA	–5 VDC	300 mA	79 %
TEC 3-0922		+12 VDC	125 mA	–12 VDC	125 mA	82 %
TEC 3-0923		+15 VDC	100 mA	–15 VDC	100 mA	82 %
TEC 3-1210	9 - 18 VDC (12 VDC nom.)	3.3 VDC	700 mA			77 %
TEC 3-1211		5 VDC	600 mA			81 %
TEC 3-1219		9 VDC	333 mA			82 %
TEC 3-1212		12 VDC	250 mA			84 %
TEC 3-1213		15 VDC	200 mA			85 %
TEC 3-1215		24 VDC	125 mA			85 %
TEC 3-1221		+5 VDC	300 mA	–5 VDC	300 mA	81 %
TEC 3-1222		+12 VDC	125 mA	–12 VDC	125 mA	85 %
TEC 3-1223		+15 VDC	100 mA	–15 VDC	100 mA	83 %
TEC 3-2410	18 - 36 VDC (24 VDC nom.)	3.3 VDC	700 mA			77 %
TEC 3-2411		5 VDC	600 mA			82 %
TEC 3-2419		9 VDC	333 mA			83 %
TEC 3-2412		12 VDC	250 mA			85 %
TEC 3-2413		15 VDC	200 mA			86 %
TEC 3-2415		24 VDC	125 mA			84 %
TEC 3-2421		+5 VDC	300 mA	–5 VDC	300 mA	82 %
TEC 3-2422		+12 VDC	125 mA	–12 VDC	125 mA	84 %
TEC 3-2423		+15 VDC	100 mA	–15 VDC	100 mA	85 %
TEC 3-4810	36 - 75 VDC (48 VDC nom.)	3.3 VDC	700 mA			75 %
TEC 3-4811		5 VDC	600 mA			80 %
TEC 3-4819		9 VDC	333 mA			82 %
TEC 3-4812		12 VDC	250 mA			84 %
TEC 3-4813		15 VDC	200 mA			85 %
TEC 3-4815		24 VDC	125 mA			86 %
TEC 3-4821		+5 VDC	300 mA	–5 VDC	300 mA	80 %
TEC 3-4822		+12 VDC	125 mA	–12 VDC	125 mA	86 %
TEC 3-4823		+15 VDC	100 mA	–15 VDC	100 mA	83 %

Input Specifications

Input Current	- At no load	9 Vin models:	55 mA typ.
		12 Vin models:	30 mA typ.
		48 Vin models:	8 mA typ.
		24 Vin models:	12 mA typ. (3.3 Vout model)
			12 mA typ. (5 Vout model)
			12 mA typ. (9 Vout model)
			12 mA typ. (12 Vout model)
			12 mA typ. (15 Vout model)
			12 mA typ. (24 Vout model)
			12 mA typ. (5 / -5 Vout model)
			12 mA typ. (12 / -12 Vout model)
			15 mA typ. (15 / -15 Vout model)
Surge Voltage		9 Vin models:	15 VDC max. (1 s max.)
		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.)
Under Voltage Lockout		9 Vin models:	2 VDC min. / 3 VDC typ. / 4 VDC max.
		12 Vin models:	6 VDC min. / 7 VDC typ. / 8 VDC max.
		24 Vin models:	13 VDC min. / 15 VDC typ. / 17 VDC max.
		48 Vin models:	29 VDC min. / 32 VDC typ. / 35 VDC max.
Recommended Input Fuse		9 Vin models:	1'600 mA (slow blow)
		12 Vin models:	800 mA (slow blow)
		24 Vin models:	500 mA (slow blow)
		48 Vin models:	315 mA (slow blow)
			(The need of an external fuse has to be assessed in the final application.)
Input Filter			Internal Capacitor

Output Specifications

Voltage Set Accuracy			±1% max.
Regulation	- Input Variation (Vmin - Vmax)	single output models:	0.2% max.
		dual output models:	0.2% max.
	- Load Variation (0 - 100%)	single output models:	1% max.
		dual output models:	1% max. (Output 1)
			1% max. (Output 2)
	- Cross Regulation (25% / 100% asym. load)	dual output models:	5% max.
Ripple and Noise	- 20 MHz Bandwidth		55 mVp-p max.
Capacitive Load	- single output	3.3 Vout models:	4'400 µF max.
		5 Vout models:	2'200 µF max.
		9 Vout models:	1'300 µF max.
		12 Vout models:	1'000 µF max.
		15 Vout models:	820 µF max.
		24 Vout models:	470 µF max.
	- dual output	5 / -5 Vout models:	1'200 / 1'200 µF max.
		12 / -12 Vout models:	520 / 520 µF max.
		15 / -15 Vout models:	440 / 440 µF max.
Minimum Load			Not required
Temperature Coefficient			±0.02 %/K max.
Start-up Time			10 ms typ. / 20 ms max.
Short Circuit Protection			Continuous, Automatic recovery
Output Current Limitation			140 - 240% of Iout max.
			180% typ. of Iout max.
Transient Response	- Response Time		500 µs typ. (25% Load Step)

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

Safety Specifications

Standards	- IT / Multimedia Equipment		Designed for IEC/EN/UL 62368-1 (not certified)
Over Voltage Category			Not mains connected

EMC Specifications

EMI (Emissions)	- Conducted Emissions		EN 55032 class A (with external filter)
			EN 55032 class B (with external filter)
	- Radiated Emissions		EN 55032 class A (with external filter)
			EN 55032 class B (with external filter)
		External filter proposal:	www.tracopower.com/tec3-emc-filter
EMS (Immunity)	- 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, 10 V/m, perf. criteria A
	- EFT (Burst) / Surge		EN 61000-4-4, ±2 kV, perf. criteria A
			EN 61000-4-5, ±1 kV, perf. criteria A
		Ext. input component:	KY 220 µF / 100 V
	- 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 +90°C
	- Case Temperature		+105°C max.
	- Storage Temperature		–55°C to +125°C
Power Derating	- High Temperature		3.4 %/K above 75°C
		See application note:	www.tracopower.com/tec3-cc
Cooling System			Natural convection (20 LFM)
Remote Control	- Current Controlled Remote (passive = on)		On: open circuit
			Off: 2 to 4 mA current (internal 1 kΩ resistor)
			Refers to 'Remote' and '-Vin' Pin
		External circuit proposal:	www.tracopower.com/info/current-remote.pdf
	- Off Idle Input Current		2.5 mA typ.
Regulator Topology			RCC Converter
Switching Frequency			100 kHz min. (PFM)
Insulation System			Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s		1'600 VDC
Isolation Resistance	- Input to Output, 500 VDC		1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V		50 pF max.
Reliability	- Calculated MTBF		5'124'000 h (MIL-HDBK-217F, ground benign)
Washing Process			According to Cleaning Guideline
			www.tracopower.com/info/cleaning.pdf
Environment	- Vibration		MIL-STD-810F
	- Mechanical Shock		MIL-STD-810F
	- Thermal Shock		MIL-STD-810F
Housing Material			Non-conductive Plastic (UL 94 V-0 rated)
Potting Material			Silicone (UL 94 V-0 rated)
Pin Material			Copper
Pin Foundation Plating			Nickel (1 - 2 µm)
Pin Surface Plating			Tin (3 - 5 µm), matte
Housing Type			Plastic Case
Mounting Type			PCB Mount
Connection Type			THD (Through-Hole Device)
Footprint Type			SIP8

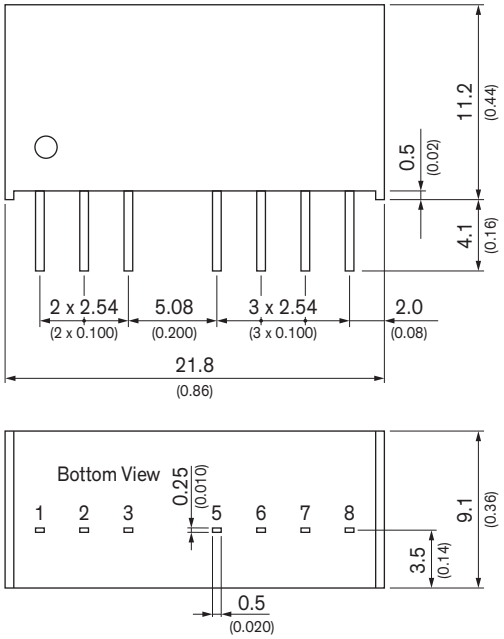
All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

Soldering Profile		Lead-Free Wave Soldering 260°C / 10 s max.
Weight		4.5 g
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: 7(a), 7(c)-I (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)
	- SCIP Reference Number	e0986e5b-0522-4adb-9f26-096d17c4d764

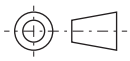
Additional Information

Supporting Documents	www.tracopower.com/overview/tec3
Frequently Asked Questions	www.tracopower.com/glossary-faq
Glossary	www.tracopower.com/info/glossary.pdf

Outline Dimensions



Dimensions in mm (inch)
Tolerances: x.x ±0.5 (x.xx ±0.02)
x.xx ±0.25 (x.xxx ±0.01)
Pin dimension tolerance ±0.1 (0.004)



Pinout		
Pin	**Single**	**Dual**
1	–Vin (GND)	
2	+Vin (Vcc)	
3	Remote On/Off	
5	NC	
6	+Vout	
7	–Vout	Common
8	NC	–Vout

NC: Not connected

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