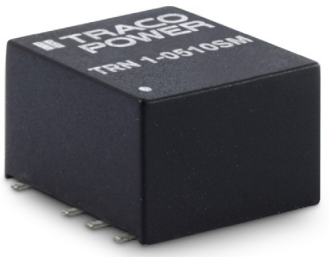
TRACO POWER

DC/DC Converter

TRN 1SM Series, 1 Watt

- **Compact SMD package 11,9 × 11,3 × 8,0 mm**
- **Fully regulated outputs**
- **Input Voltage range 4.5-13.2, 9-18, 18-36, 36-75 VDC**
- **I/O-isolation 1‘600 VDC**
- **Operating temperature range −40°C to +90°C without derating**
- **Short circuit protection**
- **3-year product warranty**
- **Designed to meet UL 62368-1 (UL 60950-1)**



The TRN 1SM Series comprises 1 Watt fully regulated, high performance DC/DC converters. They come in a compact cubical package of only 1.07 cm³. Full load operation is reliable up tp 90°C environment temperature. With 1’600 VDC I/O-isolation voltage, and short current protection they cover a wide range of application when space is limited. The input of the converters is designed for a wide voltage range (2:1) and minimum load is not required. The functional I/O-isolation system is designed to meet IEC/EN 62368-1 with a test voltage (60 s) of 1600 VDC.

Models

Order code	Input voltage	Output voltage	Output current max.	Efficiency typ.
TRN 1-0510SM	**4.5 – 13.2 VDC** (9 VDC nominal)	3.3 VDC	300 mA	77 %
TRN 1-0511SM		5.0 VDC	200 mA	79 %
TRN 1-0512SM		12 VDC	90 mA	81 %
TRN 1-0513SM		15 VDC	70 mA	82 %
TRN 1-0515SM		24 VDC	45 mA	83 %
TRN 1-0521SM		± 5.0 VDC	±100 mA	79 %
TRN 1-0522SM		±12 VDC	±45 mA	83 %
TRN 1-0523SM		±15 VDC	±35 mA	80 %
TRN 1-1210SM	**9 – 18 VDC** (12 VDC nominal)	3.3 VDC	300 mA	77 %
TRN 1-1211SM		5.0 VDC	200 mA	80 %
TRN 1-1212SM		12 VDC	90 mA	81 %
TRN 1-1213SM		15 VDC	70 mA	83 %
TRN 1-1215SM		24 VDC	45 mA	83 %
TRN 1-1221SM		± 5.0 VDC	±100 mA	79 %
TRN 1-1222SM		±12 VDC	±45 mA	83 %
TRN 1-1223SM		±15 VDC	±35 mA	80 %
TRN 1-2410SM	**18 – 36 VDC** (24 VDC nominal)	3.3 VDC	300 mA	77 %
TRN 1-2411SM		5.0 VDC	200 mA	81 %
TRN 1-2412SM		12 VDC	90 mA	82 %
TRN 1-2413SM		15 VDC	70 mA	83 %
TRN 1-2415SM		24 VDC	45 mA	82 %
TRN 1-2421SM		± 5.0 VDC	±100 mA	79 %
TRN 1-2422SM		±12 VDC	±45 mA	82 %
TRN 1-2423SM		±15 VDC	±35 mA	80 %
TRN 1-4810SM	**36 – 75 VDC** (48 VDC nominal)	3.3 VDC	300 mA	77 %
TRN 1-4811SM		5.0 VDC	200 mA	78 %
TRN 1-4812SM		12 VDC	90 mA	80 %
TRN 1-4813SM		15 VDC	70 mA	81 %
TRN 1-4815SM		24 VDC	45 mA	81 %
TRN 1-4821SM		± 5.0 VDC	±100 mA	78 %
TRN 1-4822SM		±12 VDC	±45 mA	81 %
TRN 1-4823SM		±15 VDC	±35 mA	79 %

Input Specifications

Input current no load		9 Vin models:	35 mA typ
		12 Vin models:	20 mA typ.
		24 Vin models:	10 mA typ.
		48 Vin models:	5 mA typ.
Surge voltage (1 s max.)		9 Vin models:	15 V max.
		12 Vin models:	25 V max.
		24 Vin models:	50 V max.
		48 Vin models:	100 V max.
Reflected ripple current			30 mAp-p typ.
Conducted noise	– conducted input emission		EN 55032 class A or B with external components
EMC immunity	– ESD (electrostatic discharge)		EN 61000-4-2, air ±8 kV, contact ±6 kV, perf. criteria A
	– Radiated immunity		EN 61000-4-3, 10 V/m, perf. criteria A
	– Fast transient / surge (with external input capacitor)		EN 61000-4-4, ±2 kV, perf. criteria A EN 61000-4-5, ±1 kV perf. criteria A Nippon chemi-con KY 220 µF/ 100 V
	– Conducted immunity		EN 61000-4-6, 10 Vrms, perf. criteria A
	– Magnetic field immunity		EN 61000-4-8 100 A/m, continuous, perf. criteria A 1000 A/m, 1 sec., perf. criteria A
Input filter			capacitor type

Output Specifications

Voltage set accuracy			±1 % max.
Regulation	– Input variation		0.2 % max.
	– Load variation 0 – 100 %		1 % max.
	– Cross regulation - dual output:		5 % max. (asymmetrical load 25 % / 100 %)
Temperature coefficient			±0.02 %/K typ.
Ripple and noise (20 MHz Bandwidth)			50 mVp-p typ.
Start-up time			15 ms max. (5 ms typ.)
Transient response (25% load step change)			500 µs typ.
Short circuit protection			continuous, automatic recovery
Capacitive load	– Single output	3.3 VDC models:	1680 µF max.
		5.0 VDC models:	820 µF max.
		12 VDC models:	470 µF max.
		15 VDC models:	330 µF max.
		24 VDC models:	160 µF max.
	– Dual output	±5.0 VDC models:	470 µF max. (each output)
		±12 VDC models:	330 µF max. (each output)
		+15 VDC models:	220 µF max. (each output)

General Specifications

Temperature ranges	– Operating (convection cooling 20 LFM, 0.1m/s)	–40°C to +90°C (without derating)
	– Case temperature	+95°C max.
	– Storage temperature	–55°C to +125°C
Derating		6.7%/K above 90°C
Humidity (non condensing)		5 – 95 % rel H max.
Moisture sensitivity level (MSL)		IPC J-STD-033C Level 2
Isolation voltage	– I/O isolation voltage (60 s)	1’600 VDC
Isolation capacitance		75 pF max.
Isolation resistance (@ 500 VDC)		>1 GOhm

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

General Specifications

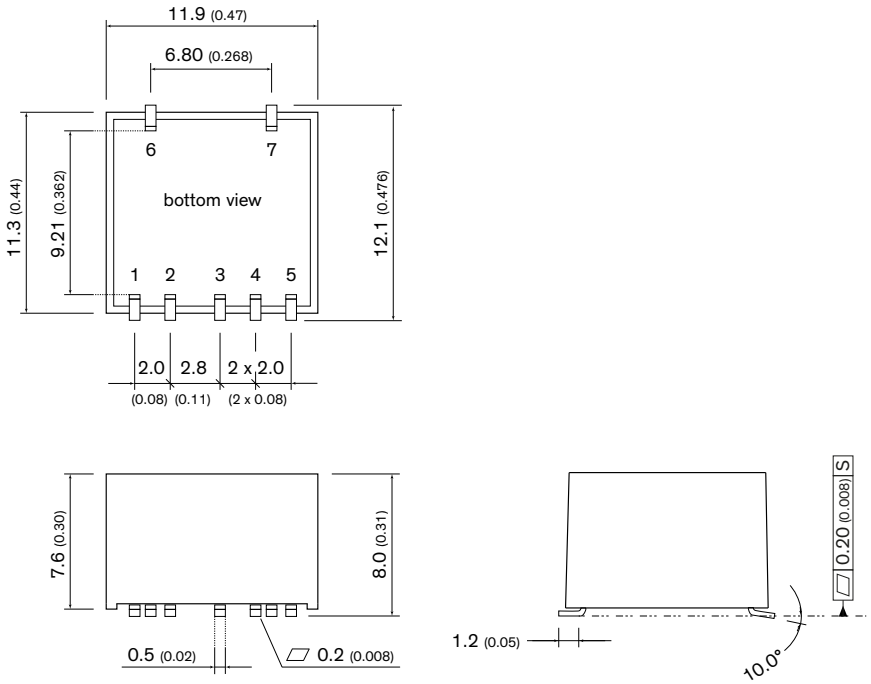
Reliability, calculated MTBF (MIL-HDBK-217F at +25°C, ground benign)		7‘400‘000 h
Switching frequency		100 kHz min. Pulse frequency modulation.
Thermal shock & vibration		MIL-STD-810F
Safety standards	– Desgined to meet (no certification)	IEC/EN 62368-1, UL 60950-1
Environmental compliance	– Reach – RoHS	www.tracopower.com/products/reach-declaration.pdf RoHS directive 2011/65/EU

Physical Specifications

Casing material	non-conductive black plastic
Potting material	Epoxy (UL 94V-0 rated)
Package weight	2.0 g (0.07 oz)
Lead-free reflow solder process	IPC J-STD-020E

Supporting Documents: www.tracopower.com/overview/trn1sm

Outline Dimensions



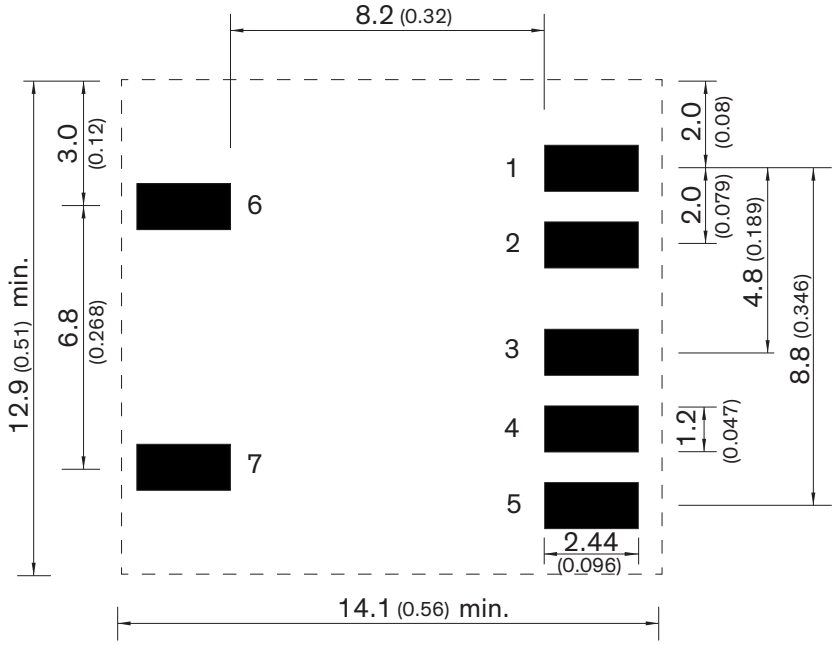
Pin-Out		
Pin	**Single**	**Dual**
1	–Vin (GND)	–Vin (GND)
2	+Vin (Vcc)	+Vin (Vcc)
3	+Vout	+Vout
4	no pin	common
5	–Vout	–Vout
6	NC	NC
7	NC	NC

Dimensions in [mm], () = Inch

Tolerances: x.x	±0.5 (±0.02)
x.xx	±0.25 (±0.01)
Pin pitch tolerances	±0.25 (±0.01)
Pin dimension tolerance	±0.1 (±0.004)

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

Recommended Solder Pad Layout



Dimensions in mm (inch)

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