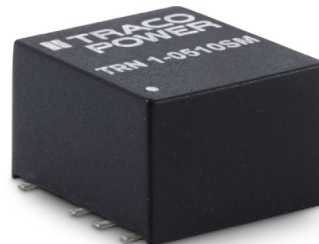


DC/DC Converter

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 to 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 mA _{p-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 EN 61000-4-4, ±2 kV, perf. criteria A (with external input capacitor) EN 61000-4-5, ±1 kV perf. criteria A Nippon chemi-con KY 220 µF/ 100 V – Conducted immunity EN 61000-4-6, 10 V _{rms} , 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 mV _{p-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) – Case temperature – Storage temperature	–40°C to +90°C (without derating) +95°C max. –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

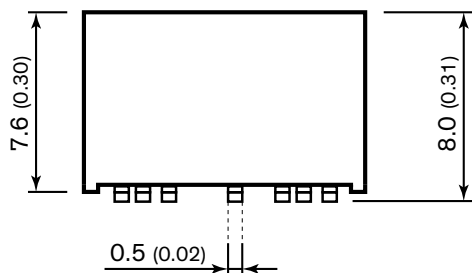
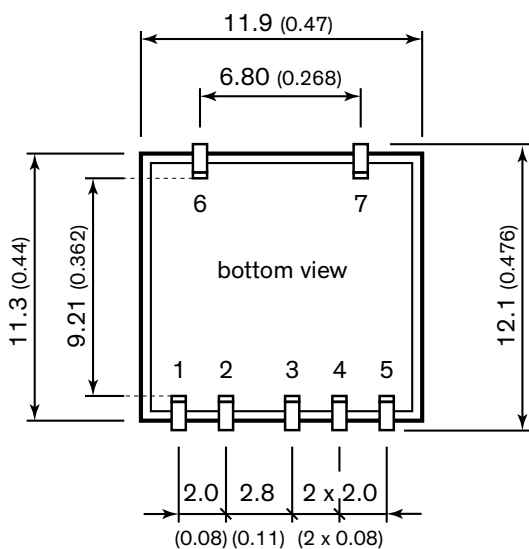
Reliability, calculated MTBF (MIL-HDBK-217F at +25°C, ground benign)	7'400'000 h
Switching frequency	100 kHz min. Pulse frequency modulation.
Thermal shock & vibration	MIL-STD-810F
Safety standards	– Designed to meet (no certification) IEC/EN 62368-1, UL 60950-1
Environmental compliance	– Reach – RoHS 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)

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TRACO Power:

<u>TRN 1-0522SM</u>	<u>TRN 1-0523SM</u>	<u>TRN 1-4811SM</u>	<u>TRN 1-2411SM</u>	<u>TRN 1-4812SM</u>	<u>TRN 1-1212SM</u>	<u>TRN 1-4813SM</u>
<u>TRN 1-0521SM</u>	<u>TRN 1-4821SM</u>	<u>TRN 1-2415SM</u>	<u>TRN 1-4822SM</u>	<u>TRN 1-2423SM</u>	<u>TRN 1-2412SM</u>	<u>TRN 1-1213SM</u>
<u>TRN 1-1215SM</u>	<u>TRN 1-4810SM</u>	<u>TRN 1-0512SM</u>	<u>TRN 1-1221SM</u>	<u>TRN 1-0513SM</u>	<u>TRN 1-1223SM</u>	<u>TRN 1-0510SM</u>
<u>TRN 1-1210SM</u>	<u>TRN 1-2413SM</u>	<u>TRN 1-4815SM</u>	<u>TRN 1-2422SM</u>	<u>TRN 1-1222SM</u>	<u>TRN 1-2410SM</u>	<u>TRN 1-0515SM</u>
<u>TRN 1-1211SM</u>	<u>TRN 1-0511SM</u>	<u>TRN 1-4823SM</u>	<u>TRN 1-2421SM</u>			