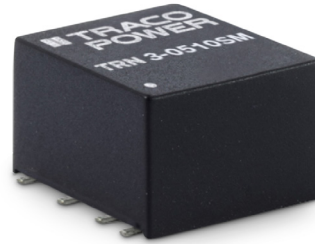


## DC/DC Converter

## TRN 3SM Series, 3 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 +85°C
- Short circuit protection
- 3-year product warranty
- Designed to meet UL 62368-1  
(UL 60950-1)



The TRN 3SM Series comprises 3 Watt fully regulated, high performance DC/DC converters. They come in a compact cubical package of only 1.07 cm<sup>3</sup>. Full load operation is reliable up to 65°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 3-0510SM	4.5 – 13.2 VDC (9 VDC nominal)	3.3 VDC	700 mA	75 %
TRN 3-0511SM		5.0 VDC	600 mA	78 %
TRN 3-0512SM		12 VDC	250 mA	82 %
TRN 3-0513SM		15 VDC	200 mA	80 %
TRN 3-0515SM		24 VDC	125 mA	80 %
TRN 3-0521SM		± 5.0 VDC	±300 mA	77 %
TRN 3-0522SM		±12 VDC	±125 mA	80 %
TRN 3-0523SM		±15 VDC	±100 mA	80 %
TRN 3-1210SM	9 – 18 VDC (12 VDC nominal)	3.3 VDC	700 mA	76 %
TRN 3-1211SM		5.0 VDC	600 mA	79 %
TRN 3-1212SM		12 VDC	250 mA	84 %
TRN 3-1213SM		15 VDC	200 mA	83 %
TRN 3-1215SM		24 VDC	125 mA	82 %
TRN 3-1221SM		± 5.0 VDC	±300 mA	78 %
TRN 3-1222SM		±12 VDC	±125 mA	82 %
TRN 3-1223SM		±15 VDC	±100 mA	81 %
TRN 3-2410SM	18 – 36 VDC (24 VDC nominal)	3.3 VDC	700 mA	76 %
TRN 3-2411SM		5.0 VDC	600 mA	78 %
TRN 3-2412SM		12 VDC	250 mA	84 %
TRN 3-2413SM		15 VDC	200 mA	84 %
TRN 3-2415SM		24 VDC	125 mA	83 %
TRN 3-2421SM		± 5.0 VDC	±300 mA	79 %
TRN 3-2422SM		±12 VDC	±125 mA	83 %
TRN 3-2423SM		±15 VDC	±100 mA	82 %
TRN 3-4810SM	36 – 75 VDC (48 VDC nominal)	3.3 VDC	700 mA	75 %
TRN 3-4811SM		5.0 VDC	600 mA	79 %
TRN 3-4812SM		12 VDC	250 mA	83 %
TRN 3-4813SM		15 VDC	200 mA	83 %
TRN 3-4815SM		24 VDC	125 mA	82 %
TRN 3-4821SM		± 5.0 VDC	±300 mA	77 %
TRN 3-4822SM		±12 VDC	±125 mA	82 %
TRN 3-4823SM		±15 VDC	±100 mA	80 %

## Input Specifications

Input current no load	9 Vin models: 75 mA max. 12 Vin models: 40 mA max. 24 Vin models: 20 mA max. 48 Vin models: 12 mA max.
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	9 Vin models: 100 mAp-p typ. 12 & 24 Vin models: 75 mAp-p typ. 48 Vin models: 50 mAp-p typ.
Conducted noise	– Conducted input emission EN 55032 class A or B with external components
EMC immunity	– ESD (electrostatic discharge) – Radiated immunity – Fast transient / surge (with external input capacitor) – Conducted immunity – Magnetic field immunity EN 61000-4-2, air $\pm 8$ kV, contact $\pm 6$ kV, perf. criteria A EN 61000-4-3, 10 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 Nippon chemi-con KY 220 $\mu$ F/ 100 V EN 61000-4-6, 10 Vrms, perf. criteria A 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	$\pm 1$ % max.
Regulation	– Input variation – Load variation 0 – 100 % – Cross regulation - dual output: 0.2 % max. 1 % max. 5 % max. (asymmetrical load 25 % / 100 %)
Temperature coefficient	$\pm 0.02$ %/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 $\mu$ s typ.
Short circuit protection	continuous, automatic recovery
Capacitive load	– Single output – Dual output 3.3 VDC models: 4400 $\mu$ F max. 5.0 VDC models: 2200 $\mu$ F max. 12 VDC models: 1000 $\mu$ F max. 15 VDC models: 820 $\mu$ F max. 24 VDC models: 330 $\mu$ F max. $\pm 5.0$ VDC models: 1200 $\mu$ F max. (each output) $\pm 12$ VDC models: 520 $\mu$ F max. (each output) $\pm 15$ VDC models: 440 $\mu$ F max. (each output)

## General Specifications

Temperature ranges	– Operating (convection cooling 20 LFM, 0.1 m/s) – Case temperature – Storage temperature –40°C to +85°C +95°C max. –55°C to +125°C
Derating	2.5%/K above 65°C
Humidity (non condensing)	5 – 95 % rel H max.
Isolation voltage	– I/O isolation voltage (60 s) 1'600 VDC
Isolation capacitance	75 pF max.
Isolation resistance (@ 500 VDC)	>1 GOhm

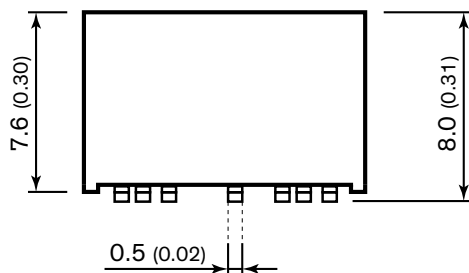
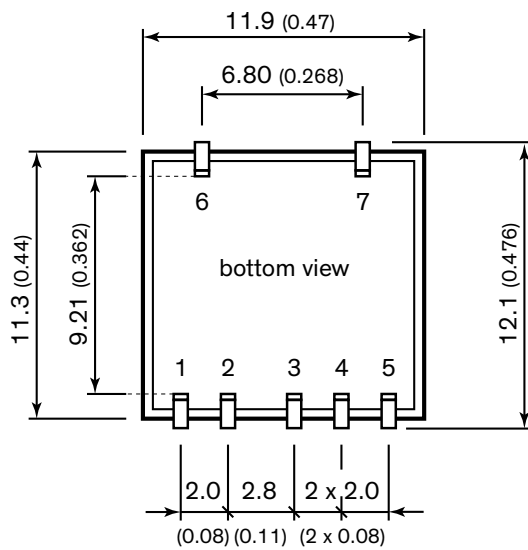
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

### General Specifications (continued)

Moisture sensitivity level (MSL)	IPC J-STD-033C Level 2a
Reliability, calculated MTBF (MIL-HDBK-217F at +25°C, ground benign)	4'400'000 h
Switching frequency	100 kHz min. Pulse frequency modulation.
Thermal shock & vibration	MIL-STD-810F
Safety standards	- Designed to meet (no certification) IEC/EN/UL 62368-1, UL 60950-1
Environmental compliance	- Reach - RoHS RoHS directive 2011/65/EU

### Physical Specifications

Casing material	non-conductive black plastic
Potting material	silicone (UL 94V-0 rated)
Package weight	2.1 g (0.07 oz)
Lead-free reflow solder process	IPC J-STD-020E



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)