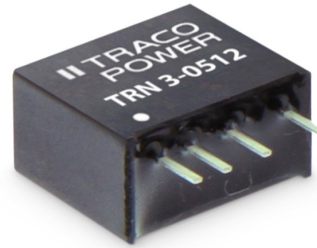


- Compact SIP package  
11,9 × 7,7 × 11,0 mm
- Fully regulated outputs
- Input Voltage range  
4.5-13.2, 9-18, 18-36, 36-75 VDC
- I/O-isolation 1'600 VDC
- Operating temperature range  
-40°C to +85°C
- Short circuit protection
- 3-year product warranty
- Designed to meet UL 62368-1  
(UL 60950-1)



The TRN 3 Series comprises 3 Watt fully regulated, high performance DC/DC converters. They come in a compact cubical package of only 1.00 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 3-0510	4.5 – 13.2 VDC (9 VDC nominal)	3.3 VDC	700 mA	75 %
TRN 3-0511		5.0 VDC	600 mA	78 %
TRN 3-0512		12 VDC	250 mA	82 %
TRN 3-0513		15 VDC	200 mA	80 %
TRN 3-0515		24 VDC	125 mA	80 %
TRN 3-0521		± 5.0 VDC	±300 mA	77 %
TRN 3-0522		±12 VDC	±125 mA	80 %
TRN 3-0523		±15 VDC	±100 mA	80 %
TRN 3-1210	9 – 18 VDC (12 VDC nominal)	3.3 VDC	700 mA	76 %
TRN 3-1211		5.0 VDC	600 mA	79 %
TRN 3-1212		12 VDC	250 mA	84 %
TRN 3-1213		15 VDC	200 mA	83 %
TRN 3-1215		24 VDC	125 mA	82 %
TRN 3-1221		± 5.0 VDC	±300 mA	78 %
TRN 3-1222		±12 VDC	±125 mA	82 %
TRN 3-1223		±15 VDC	±100 mA	81 %
TRN 3-2410	18 – 36 VDC (24 VDC nominal)	3.3 VDC	700 mA	76 %
TRN 3-2411		5.0 VDC	600 mA	78 %
TRN 3-2412		12 VDC	250 mA	84 %
TRN 3-2413		15 VDC	200 mA	84 %
TRN 3-2415		24 VDC	125 mA	83 %
TRN 3-2421		± 5.0 VDC	±300 mA	79 %
TRN 3-2422		±12 VDC	±125 mA	83 %
TRN 3-2423		±15 VDC	±100 mA	82 %
TRN 3-4810	36 – 75 VDC (48 VDC nominal)	3.3 VDC	700 mA	75 %
TRN 3-4811		5.0 VDC	600 mA	79 %
TRN 3-4812		12 VDC	250 mA	83 %
TRN 3-4813		15 VDC	200 mA	83 %
TRN 3-4815		24 VDC	125 mA	82 %
TRN 3-4821		± 5.0 VDC	±300 mA	77 %
TRN 3-4822		±12 VDC	±125 mA	82 %
TRN 3-4823		±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 mA <sub>p-p</sub> typ. 12 & 24 Vin models: 75 mA <sub>p-p</sub> typ. 48 Vin models: 50 mA <sub>p-p</sub> 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 ±8 kV, contact ±6 kV, perf. criteria A EN 61000-4-3, 10 V/m, perf. criteria A 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 EN 61000-4-6, 10 V <sub>rms</sub> , 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		±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		±0.02 %/K typ.
Ripple and noise (20 MHz Bandwidth)		50 mV <sub>p-p</sub> 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  – Dual output	3.3 VDC models: 4400 µF max. 5.0 VDC models: 2200 µF max. 12 VDC models: 1000 µF max. 15 VDC models: 820 µF max. 24 VDC models: 330 µF max. ±5.0 VDC models: 1200 µF max. (each output) ±12 VDC models: 520 µF max. (each output) +15 VDC models: 440 µF 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

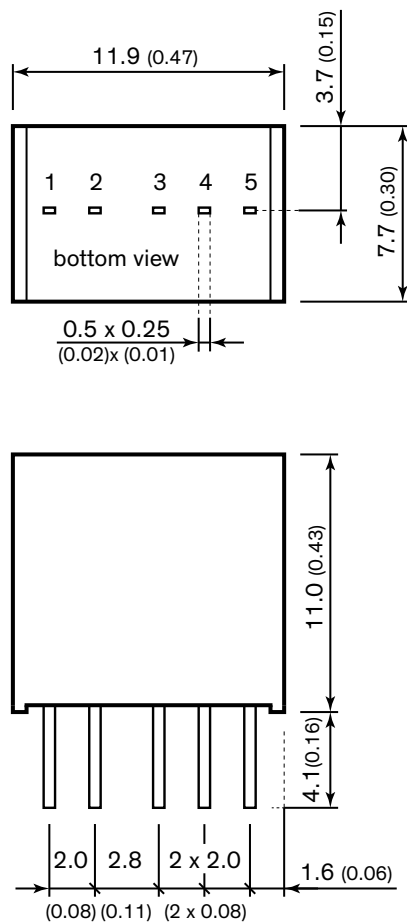
Reliability, calculated MTBF (MIL-HDBK-217F at +25°C, ground benign)	4'400'000 h
Switching frequency	100 kHz min. Pulse frequency modulation.
Thermal shock & vibration	MIL-STD-810F
Safety standards	- Designed to meet (no certification) IEC/EN/UL 62368-1, UL 60950-1
Environmental compliance	- Reach <a href="http://www.tracopower.com/products/reach-declaration.pdf">www.tracopower.com/products/reach-declaration.pdf</a> - 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)
Soldering temperature	260°C / 6 s max.

**Supporting Documents:** [www.tracopower.com/overview/trn3](http://www.tracopower.com/overview/trn3)

### 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

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)