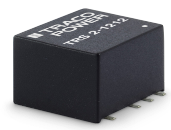
TRACO POWER

DC/DC Converter

TRS 2 Series, 2 Watt

- **Most compact 2 Watt SMD DC/DC converter: 11.9 mm x 11.3 mm x 8 mm (0.47 x 0.44 x 0.31 inch)**
- **1600 VDC I/O isolation (functional)**
- **High efficiency for low thermal loss**
- **Operating temp. range -40°C to +90°C**
- **Designed to meet UL 62368-1**
- **Protection against short circuit**
- **3-year product warranty**



TRS 2 Series is a new series with the design purpose to improve the prevalent 2 Watt SMD DC/DC converters in terms of size, cost, efficiency and performance. The main intended uses for the TRS 2 Series are IT applications, industrial control systems and measurement equipment. With the reduction of thermal loss, the operating temperature range can be expanded from -40°C to +90°C. The converters are fully regulated over 0 - 100% load (no minimum load). The low input range is extended from 4.5 to 13.2 VDC (to include 12V battery applications) while models are also available with the standard 2:1 input ranges of 9-18, 18-36 and 36-75 VDC. 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 Range	Output 1 Vnom	Output 1 Imax	Output 2 Vnom	Output 2 Imax	Efficiency typ.
TRS 2-0910		3.3 VDC	500 mA			77 %
TRS 2-0911		5 VDC	400 mA			80 %
TRS 2-0919		9 VDC	222 mA			80 %
TRS 2-0912	4.5 - 13.2 VDC	12 VDC	167 mA			83 %
TRS 2-0913	(9 VDC nom.)	15 VDC	134 mA			82 %
TRS 2-0915		24 VDC	83 mA			82 %
TRS 2-0921		+5 VDC	200 mA	–5 VDC	200 mA	78 %
TRS 2-0922		+12 VDC	83 mA	–12 VDC	83 mA	82 %
TRS 2-0923		+15 VDC	67 mA	–15 VDC	67 mA	80 %
TRS 2-1210		3.3 VDC	500 mA			77 %
TRS 2-1211		5 VDC	400 mA			80 %
TRS 2-1219		9 VDC	222 mA			80 %
TRS 2-1212	9 - 18 VDC	12 VDC	167 mA			84 %
TRS 2-1213	(12 VDC nom.)	15 VDC	134 mA			83 %
TRS 2-1215		24 VDC	83 mA			83 %
TRS 2-1221		+5 VDC	200 mA	–5 VDC	200 mA	79 %
TRS 2-1222		+12 VDC	83 mA	–12 VDC	83 mA	83 %
TRS 2-1223		+15 VDC	67 mA	–15 VDC	67 mA	81 %
TRS 2-2410		3.3 VDC	500 mA			77 %
TRS 2-2411		5 VDC	400 mA			78 %
TRS 2-2419		9 VDC	222 mA			80 %
TRS 2-2412	18 - 36 VDC	12 VDC	167 mA			84 %
TRS 2-2413	(24 VDC nom.)	15 VDC	134 mA			84 %
TRS 2-2415		24 VDC	83 mA			82 %
TRS 2-2421		+5 VDC	200 mA	–5 VDC	200 mA	80 %
TRS 2-2422		+12 VDC	83 mA	–12 VDC	83 mA	83 %
TRS 2-2423		+15 VDC	67 mA	–15 VDC	67 mA	82 %
TRS 2-4810		3.3 VDC	500 mA			76 %
TRS 2-4811		5 VDC	400 mA			79 %
TRS 2-4819		9 VDC	222 mA			80 %
TRS 2-4812	36 - 75 VDC	12 VDC	167 mA			83 %
TRS 2-4813	(48 VDC nom.)	15 VDC	134 mA			83 %
TRS 2-4815		24 VDC	83 mA			82 %
TRS 2-4821		+5 VDC	200 mA	–5 VDC	200 mA	78 %
TRS 2-4822		+12 VDC	83 mA	–12 VDC	83 mA	82 %
TRS 2-4823		+15 VDC	67 mA	–15 VDC	67 mA	80 %

Input Specifications

Input Current	- At no load	9 Vin models:	**60 mA typ.**
		12 Vin models:	**30 mA typ.**
		24 Vin models:	**15 mA typ.**
		48 Vin models:	**8 mA typ.**
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.)
Recommended Input Fuse		9 Vin models:	**1'000 mA** (slow blow)
		12 Vin models:	**500 mA** (slow blow)
		24 Vin models:	**315 mA** (slow blow)
		48 Vin models:	**160 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.**
	- 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		**50 mVp-p typ.**
Capacitive Load	- single output	3.3 Vout models:	**3'300 µF max.**
		5 Vout models:	**1'680 µF max.**
		9 Vout models:	**1'000 µF max.**
		12 Vout models:	**820 µF max.**
		15 Vout models:	**680 µF max.**
		24 Vout models:	**220 µF max.**
	- dual output	5 / -5 Vout models:	**1'000 / 1'000 µF max.**
		12 / -12 Vout models:	**470 / 470 µF max.**
		15 / -15 Vout models:	**330 / 330 µF max.**
Minimum Load			Not required
Temperature Coefficient			±0.02 %/K max.
Start-up Time			5 ms typ. / 15 ms max.
Short Circuit Protection			Continuous, Automatic recovery
Transient Response	- Response Time		**500 µs typ.** (25% Load Step)

Safety Specifications

Safety Standards	- IT / Multimedia Equipment		**Designed for EN 62368-1** (no certification)

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/overview/trs2

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

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:	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	3.33 %/K above 75°C
Cooling System		Natural convection (20 LFM)
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	75 pF max.
Reliability	- Calculated MTBF	5'735'000 h (MIL-HDBK-217F, ground benign)
Moisture Sensitivity (MSL)		Level 2 (J-STD-033C)
Environment	- Vibration	MIL-STD-810F
	- Thermal Shock	MIL-STD-810F
Housing Material		Non-conductive Plastic (UL94 V-0 rated)
Potting Material		Epoxy (UL 94 V-0 rated)
Pin Material		Copper
Pin Foundation Plating		Nickel (0.3 - 0.9 µm)
Pin Surface Plating		Tin (5 - 6 µm), matte
Soldering Profile		Reflow Soldering (J-STD-020E)
Connection Type		SMD (Surface-Mount Device)
Weight		2.1 g
Environmental Compliance	- Reach	www.tracopower.com/info/reach-declaration.pdf
	- RoHS	www.tracopower.com/info/rohs-declaration.pdf

Supporting Documents

Overview Link (for additional Documents)	www.tracopower.com/overview/trs2

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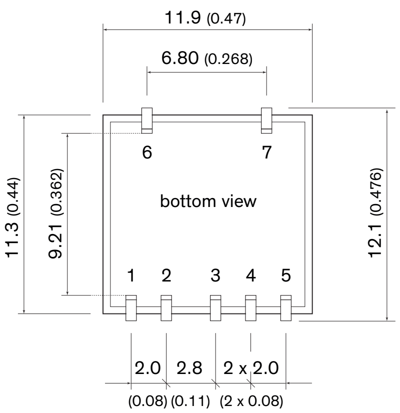
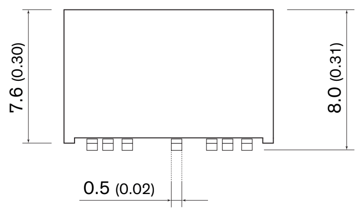
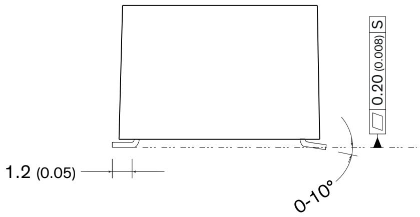
Outline Dimensions



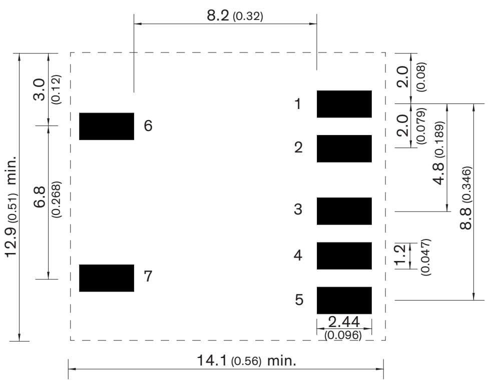




Pinout		
Pin	**Single**	**Dual**
1	–Vin (GND)	–Vin (GND)
2	+Vin (VCC)	+Vin (VCC)
3	+Vout	+Vout
4	No Pin	Common
5	–Vout	–Vout
6	NC	NC
7	NC	NC

NC: No connection

Recommended Solder Pad Layout



Dimensions in mm (inch)