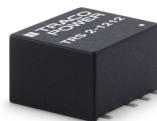


- Most compact 2 Watt SMD DC/DC converter: 11.9 mm x 11.3 mm x 8 mm (0.47 x 0.44 x 0.31 inch)
- 1600 VDC I/O isolation (functional)
- High efficiency for low thermal loss
- Operating temp. range -40°C to +90°C
- Designed to meet UL 62368-1
- Protection against short circuit
- 3-year product warranty



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		Output 2		Efficiency typ.
		Vnom	I _{max}	Vnom	I _{max}	
TRS 2-0910	4.5 - 13.2 VDC (9 VDC nom.)	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		12 VDC	167 mA			83 %
TRS 2-0913		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	9 - 18 VDC (12 VDC nom.)	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		12 VDC	167 mA			84 %
TRS 2-1213		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	18 - 36 VDC (24 VDC nom.)	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		12 VDC	167 mA			84 %
TRS 2-2413		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	36 - 75 VDC (48 VDC nom.)	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		12 VDC	167 mA			83 %
TRS 2-4813		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) - Load Variation (0 - 100%) - Cross Regulation (25% / 100% asym. load)	single output models: 0.2% max. single output models: 1% max. dual output models: 1% max. (Output 1) 1% max. (Output 2) dual output models: 5% max.
Ripple and Noise	- 20 MHz Bandwidth	50 mVp-p typ.
Capacitive Load	- single output - dual 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. 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
Output Current Limitation		190% typ. of Iout max.
Transient Response	- Response Deviation - Response Time	3% typ. (25% Load Step) 500 µs typ. (25% Load Step)

Safety Specifications

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

EMI Emissions	- Conducted Emissions - Radiated Emissions	EN 55032 class A (with external filter) EN 55032 class B (with external filter) 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, resistive 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 μ F, 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

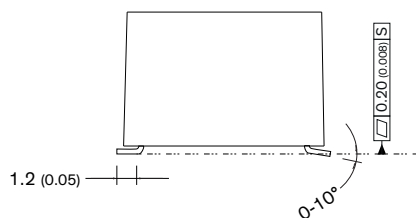
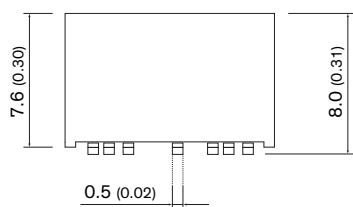
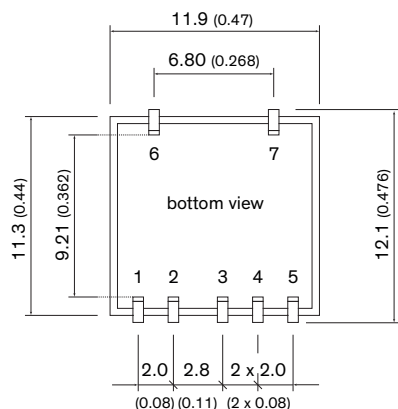
Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	-40°C to +90°C
	- Case Temperature	+105°C max.
	- Storage Temperature	-55°C to +125°C
Power Derating	- High Temperature	3.33 %/K above 75°C
Cooling System		Natural convection (20 LFM)
Switching Frequency		100 kHz 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 M Ω 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)
Washing Process		Allowed (hermetical product)
	See Cleaning Guideline:	www.tracopower.com/info/cleaning.pdf
Environment	- Vibration	MIL-STD-810F
	- Thermal Shock	MIL-STD-810F
Housing Material		Non-conductive Plastic (UL 94 V-0 rated)
Potting Material		Epoxy (UL 94 V-0 rated)
Pin Material		Copper
Pin Foundation Plating		Nickel (0.3 - 0.9 μ m)
Pin Surface Plating		Tin (5 - 6 μ m), matte
Housing Type		Plastic Case
Mounting Type		PCB Mount
Connection Type		SMD (Surface-Mount Device)
Soldering Profile		Reflow Soldering (J-STD-020E)
Weight		2.1 g
Environmental Compliance	- REACH Declaration	www.tracopower.com/info/reach-declaration.pdf
		REACH SVHC list compliant
		REACH Annex XVII compliant
	- RoHS Declaration	www.tracopower.com/info/rohs-declaration.pdf
		Exemptions: 7a, 7c-I
		(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule). The SCIP number is provided on request.)

Supporting Documents

Overview Link (for additional Documents)	www.tracopower.com/overview/trs2
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All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

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

