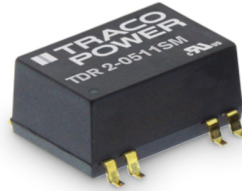


- Compact design in SMD package
- Wide 2:1 input voltage range
- Fully regulated outputs
- Low ripple and noise
- Temperature range -40°C to $+85^{\circ}\text{C}$ without derating
- I/O isolation 1600 VDC
- Continuous short-circuit protection
- Remote On/Off control
- Fully RoHS compliant
- 3-year product warranty



The TDR 2SM series is a family of compact 2 W DC/DC-converters with 2:1 input voltage ranges and tightly regulated output voltages even under no load conditions. The product is available in SMD-package. They work with high efficiency over the full load range and come with a remote On/Off input. The usability in temperature ranges of up to 85°C without power derating, continuous short circuit protection and excellent immunity against environmental influences make these converters very reliable. A TDR 2SM converter is the ideal solution for space critical high end applications in communication equipment, instrumentation and industrial electronics.

Models

Order Code	Input Voltage Range	Output 1		Output 2		Efficiency typ.
		Vnom	I _{max}	Vnom	I _{max}	
TDR 2-0511SM	4.5 - 9 VDC (5 VDC nom.)	5 VDC	400 mA			80 %
TDR 2-0512SM		12 VDC	167 mA			81 %
TDR 2-0513SM		15 VDC	134 mA			83 %
TDR 2-0522SM		+12 VDC	83 mA	-12 VDC	83 mA	81 %
TDR 2-0523SM		+15 VDC	67 mA	-15 VDC	67 mA	82 %
TDR 2-1211SM	9 - 18 VDC (12 VDC nom.)	5 VDC	400 mA			81 %
TDR 2-1212SM		12 VDC	167 mA			81 %
TDR 2-1213SM		15 VDC	134 mA			84 %
TDR 2-1222SM		+12 VDC	83 mA	-12 VDC	83 mA	83 %
TDR 2-1223SM		+15 VDC	67 mA	-15 VDC	67 mA	82 %
TDR 2-2411SM	18 - 36 VDC (24 VDC nom.)	5 VDC	400 mA			81 %
TDR 2-2412SM		12 VDC	167 mA			84 %
TDR 2-2413SM		15 VDC	134 mA			84 %
TDR 2-2422SM		+12 VDC	83 mA	-12 VDC	83 mA	84 %
TDR 2-2423SM		+15 VDC	67 mA	-15 VDC	67 mA	84 %
TDR 2-4811SM	36 - 75 VDC (48 VDC nom.)	5 VDC	400 mA			81 %
TDR 2-4812SM		12 VDC	167 mA			82 %
TDR 2-4813SM		15 VDC	134 mA			82 %
TDR 2-4822SM		+12 VDC	83 mA	-12 VDC	83 mA	83 %
TDR 2-4823SM		+15 VDC	67 mA	-15 VDC	67 mA	83 %

Input Specifications

Input Current	- At no load	5 Vin models: 40 mA typ. 12 Vin models: 20 mA typ. 24 Vin models: 10 mA typ. 48 Vin models: 7 mA typ.
	- At full load	5 Vin models: 520 mA max. 12 Vin models: 215 mA max. 24 Vin models: 105 mA max. 48 Vin models: 55 mA max.
Surge Voltage		5 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.)
Reflected Ripple Current		5 Vin models: 80 mAp-p typ. 12 Vin models: 40 mAp-p typ. 24 Vin models: 30 mAp-p typ. 48 Vin models: 20 mAp-p typ.
Recommended Input Fuse		5 Vin models: 2'000 mA (slow blow) 12 Vin models: 1'500 mA (slow blow) 24 Vin models: 1'000 mA (slow blow) 48 Vin models: 1'000 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. dual 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	30 mVp-p typ.
Capacitive Load	- single output	5 Vout models: 1'680 µF max. 12 Vout models: 820 µF max. 15 Vout models: 680 µF max.
	- dual output	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.
Short Circuit Protection		Continuous, Automatic recovery
Transient Response	- Response Time	250 µs typ. (25% Load Step)

Safety Specifications

Safety Standards	- IT / Multimedia Equipment	EN 60950-1 EN 62368-1 IEC 60950-1 IEC 62368-1 UL 60950-1 UL 62368-1
	- Certification Documents	www.tracopower.com/overview/tdr2sm
Pollution Degree		PD 2

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

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/tdr2sm
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
	- Conducted RF Disturbances	Ext. input component: 220 μ F / 100 V 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 +85°C (without derating)
	- Case Temperature	+100°C max.
	- Storage Temperature	-55°C to +125°C
Power Derating	- High Temperature	6.67 %/K above 85°C
		See application note: www.tracopower.com/overview/tdr2sm
Cooling System		Natural convection (20 LFM)
Remote Control	- Current Controlled Remote	On: open circuit Off: 2 to 4 mA current (internal 1 k Ω resistor)
	- Off Idle Input Current	External circuit proposal: www.tracopower.com/info/current-remote.pdf 2.5 mA max.
Altitude During Operation		5'000 m max.
Switching Frequency		100 - 1300 kHz (RCC)
Insulation System		Basic 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	50 pF max.
Reliability	- Calculated MTBF	7'100'000 h (MIL-HDBK-217F, ground benign)
Moisture Sensitivity (MSL)		Level 2a (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 (40 - 120 μ m)
Pin Surface Plating		Gold (25 - 75 nm), matte
Housing Type		Overmold
Mounting Type		PCB Mount
Connection Type		SMD (Surface-Mount Device)
Footprint Type		SMD14
Soldering Profile		Reflow Soldering (J-STD-020E)
Weight		4.5 g

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

Environmental Compliance - REACH Declaration

www.tracopower.com/info/reach-declaration.pdf

- RoHS Declaration

REACH SVHC list compliant

REACH Annex XVII compliant

www.tracopower.com/info/rohs-declaration.pdf

Exemptions: 7a, 7c-I

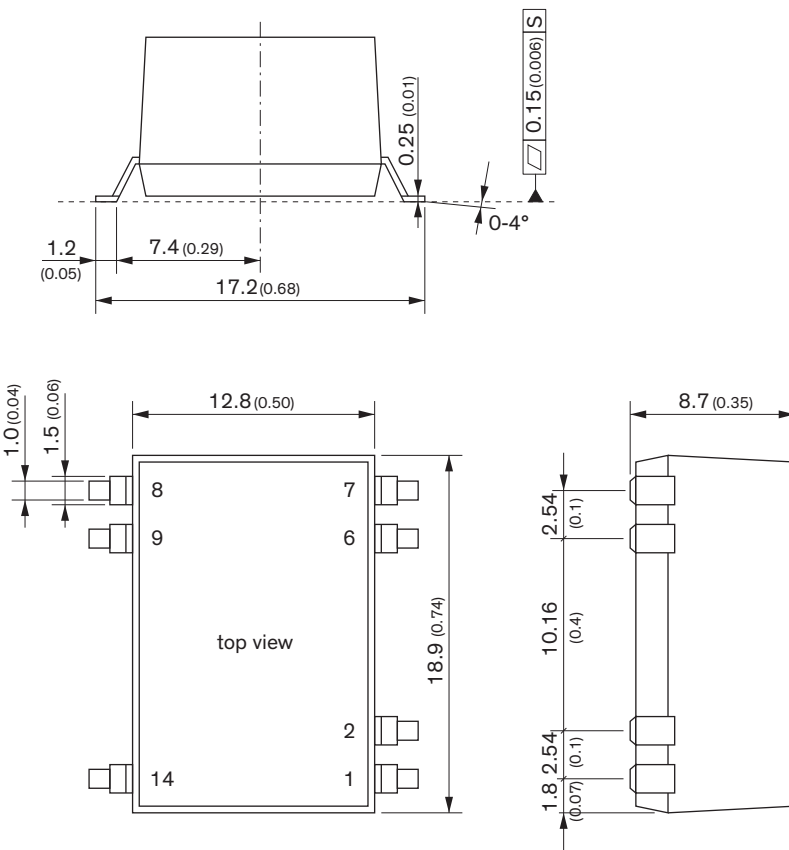
(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).
The SCIP number is provided on request.)

Supporting Documents

Overview Link (for additional Documents)

www.tracopower.com/overview/tdr2sm

Outline Dimensions



Dimensions in mm (inch)
Tolerances: ± 0.5 (± 0.02)
Pin pitch tolerances ± 0.25 (± 0.01)

Pinout		
Pin	Single	Dual
1	-Vin (GND)	-Vin (GND)
2	Remote On/Off	Remote On/Off
6	NC	Common
7	NC	-Vout
8	+Vout	+Vout
9	-Vout	Common
14	+Vin (Vcc)	+Vin (Vcc)

NC: Not connected

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

Recommended Solder Pad Layout

