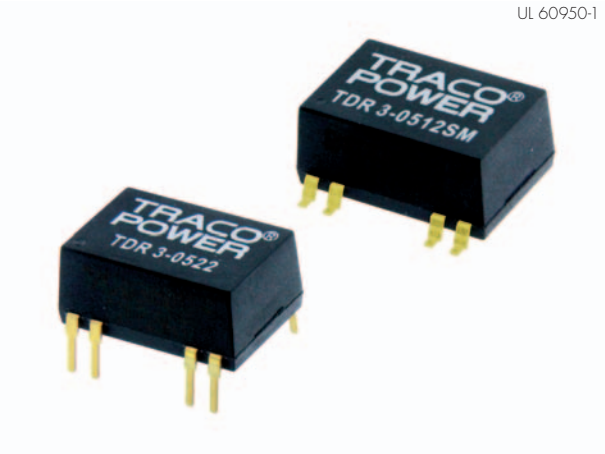
DC/DC Converters

TDR 3 Series, 3 Watt

UL 60950-1

Features

- Compact design in SMD or DIP package
- Wide 2:1 input voltage range
- Fully regulated outputs
- Low ripple and noise
- No minimum load required
- Temperature range –40°C to +85°C
- I/O isolation 1500 VDC
- Continuous short-circuit protection
- Remote On/Off control
- Fully RoHS compliant
- 3-year product warranty



The TDR-3 series is a family of compact 3 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 or in DIP-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, continuous short circuit protection and excellent immunity against environmental influences make these converters very reliable.
A TDR-3 converter is the ideal solution for space critical high end applications in communication equipment, instrumentation and industrial electronics.

Models

Order code DIP models	Order code SMD models	Input voltage range	Output voltage	Output current max.	Efficiency typ.
TDR 3-0511	TDR 3-0511SM	4.5 – 9.0 VDC (5 VDC nominal)	5.0 VDC	600 mA	79 %
TDR 3-0512	TDR 3-0512SM		12 VDC	250 mA	80 %
TDR 3-0513	TDR 3-0513SM		15 VDC	200 mA	81 %
TDR 3-0522	TDR 3-0522SM		±12 VDC	±125 mA	80 %
TDR 3-0523	TDR 3-0523SM		±15 VDC	±100 mA	81 %
TDR 3-1211	TDR 3-1211SM	9 – 18 VDC (12 VDC nominal)	5.0 VDC	600 mA	81 %
TDR 3-1212	TDR 3-1212SM		12 VDC	250 mA	82 %
TDR 3-1213	TDR 3-1213SM		15 VDC	200 mA	82 %
TDR 3-1222	TDR 3-1222SM		±12 VDC	±125 mA	82 %
TDR 3-1223	TDR 3-1223SM		±15 VDC	±100 mA	83 %
TDR 3-2411	TDR 3-2411SM	18 – 36 VDC (24 VDC nominal)	5.0 VDC	600 mA	81 %
TDR 3-2412	TDR 3-2412SM		12 VDC	250 mA	82 %
TDR 3-2413	TDR 3-2413SM		15 VDC	200 mA	83 %
TDR 3-2422	TDR 3-2422SM		±12 VDC	±125 mA	83 %
TDR 3-2423	TDR 3-2423SM		±15 VDC	±100 mA	83 %
TDR 3-4811	TDR 3-4811SM	36 – 75 VDC (48 VDC nominal)	5.0 VDC	600 mA	81 %
TDR 3-4812	TDR 3-4812SM		12 VDC	250 mA	82 %
TDR 3-4813	TDR 3-4813SM		15 VDC	200 mA	82 %
TDR 3-4822	TDR 3-4822SM		±12 VDC	±125 mA	83 %
TDR 3-4823	TDR 3-4823SM		±15 VDC	±100 mA	83 %

Input Specifications

Input current at no load (nominal input voltage)	5 Vin models:	50 mA typ.
	12 Vin models:	30 mA typ.
	24 Vin models:	13 mA typ.
	48 Vin models:	10 mA typ.
Input current at full load (nominal input voltage)	5 Vin models:	790 mA typ.
	12 Vin models:	320 mA typ.
	24 Vin models:	160 mA typ.
	48 Vin models:	80 mA typ.
Surge voltage (1 sec. max.)	5 Vin models:	15 V max.
	12 Vin models:	25 V max.
	24 Vin models:	50 V max.
	48 Vin models:	100 V max.
Input filter		**capacitor type** (see EMC considerations page 3 for compliance to EN 55022 class A/B)
ESD (electrostatic discharge)		EN 61000-4-2, air ±8 kV, contact ±6 kV, perf. criteria A
Radiated immunity		EN 61000-4-3 10 V/m, perf. criteria A
Fast transient / Surge		EN 61000-4-4, ±2 kV, perf. criteria A EN 61000-4-5, ±1 kV perf. criteria A with external input capacitor e.g. Nippon chemi-con KY 220 µF, 100 V, ESR 48 mOhm
Conducted immunity		EN 61000-4-6, 10 Vrms, perf. criteria A
Reflected ripple current (measured with input filter according class A)	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.

Output Specifications

Voltage set accuracy			±1 % max
Regulation	– Input variation Vin min. to Vin max.		0.2 % max.
	– Load variation 0 – 100 %	single output models:	1.0 % max.
		dual output models:	1.0 % max. balanced load
	– Load variation 10 – 90 %	single output models:	0.5 % max.
		dual output models:	0.8 % max. balanced load
	– Load cross regulation 25/100 %		5.0 % max. (dual output models)
Minimum load			0 % of rated max. load
Temperature coefficient			±0.02 %/K
Ripple and noise (20 MHz bandwidth)			30 mVp-p typ.
Start up time (constant resistive load)	– Power On		5 ms typ.
	– Remote On		5 ms typ.
Transient response setting time (25 % load step change)			250 µs typ.
Short circuit protection			continuous, automatic recovery
Capacitive load		5 VDC models:	1680 µF max.
		12 VDC models:	820 µF max.
		15 VDC models:	680 µF max.
		±12 VDC models:	±470 µF max.
		±15 VDC models:	±330 µF max.

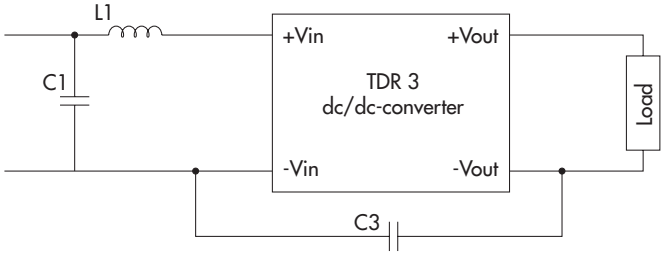
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

General Specifications

Temperature ranges	– Operating – Storage – Case temperature	–40°C to +85°C –55°C to +125°C tba.
Load derating		3.3 %/K above +70°C
Humidity (non condensing)		5 % to 90 % rel. H max.
Thermal shock		acc. MIL-STD-810F
Vibration		acc. MIL-STD-810F
Reliability, calculated MTBF (MIL-HDBK-217F, at+25°C, ground benign)		>2.4 Mio h
Isolation voltage (60 sec.)	– Input/Output	1500 VDC
Isolation capacitance	– Input/Output	50 pF max.
Isolation resistance	– Input/Output (500 VDC)	>10 GOhm
Altitude during operation		tba.
Safety standard (designed to meet)		IEC/EN 60950-1, UL 60950-1
Safety approvals	– UL/cUL	www.ul.com -> certifications -> File e188913
Switching frequency		100 kHz (PWM)
Remote On/Off	– On: – Off: – Off stand by input current	open or high impedance 2...4 mA current applied via 1KOhm resistor 2.5 mA max.

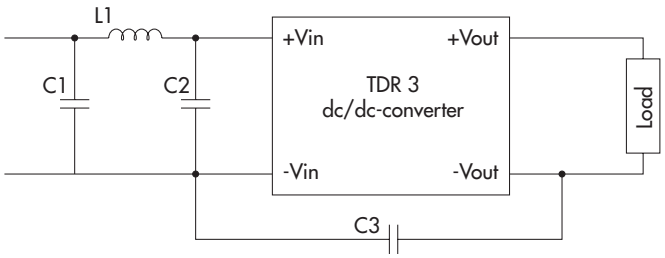
EMC Consideration

Recommended filter for
EN 55022 class A compliance



Input models	C1	C3	L1 value	L1 order code	L1 datasheet
5 VDC	4.7 µF / 25 V 1812 MLCC	220pF / 3 kV 1808 MLCC	10 µH	TCK-047	www.tracopower.com/products/tck047.pdf
12 VDC	6.8 µF / 50 V 1812 MLCC		12 µH	TCK-062	www.tracopower.com/products/tck062.pdf
24 VDC	4.7 µF / 50 V 1812 MLCC		10 µH	TCK-047	www.tracopower.com/products/tck047.pdf
48 VDC	4.7 µF / 100 V 1812 MLCC		10 µH		

Recommended filter for
EN 55022 class B compliance



Input models	C1 & C2	C3	L1 value	L1 order code (SMD type)	L1 datasheet
5 VDC	6.8 µF / 25 V 1812 MLCC	220pF / 3 kV 1808 MLCC	10 µH	TCK-047	www.tracopower.com/products/tck047.pdf
12 VDC	4.7 µF / 50 V 1812 MLCC		12 µH	TCK-062	www.tracopower.com/products/tck062.pdf
24 VDC			18 µH	TCK-046	www.tracopower.com/products/tck046.pdf
48 VDC	4.7 µF / 100 V 1812 MLCC		18 µH	TCK-046	

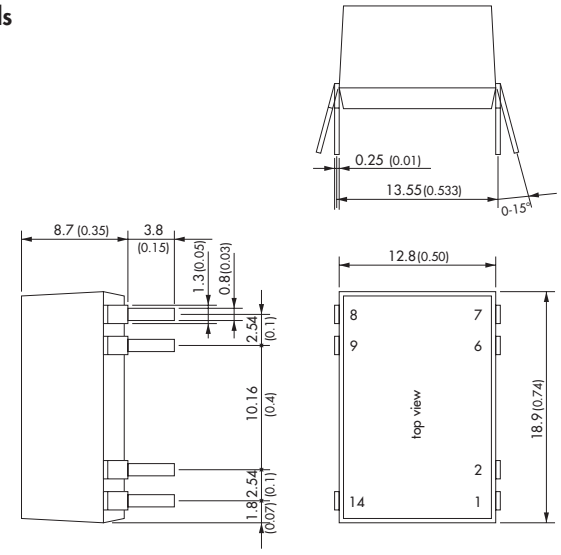
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

Pysical Specifications

Casing material		non-conductive plastic (UL94V-0 rated)
Package weight		4.5 g (0.16 oz)
Soldering profile for DIP-package models		max. 265°C / 10 sec. (wave soldering)
Lead-free reflow solder process for SMD-package models		as per J-STD-020D.01 (to find at: www.jedec.org - free registration required)
Moisture sensivity level (for SMD-package models)		level 2a as per J-STD-033B.01 (to find at: www.jedec.org - free registration required)
Environmental compliance	– Reach – RoHS	www.tracopower.com/products/tdr3-reach.pdf RoHS directive 2011/65/EU
Packaging	– Tube – Tape & Reel (only SMD models, add suffix –TR)	10 pcs packing unit 200 pcs packing unit

Outline Dimensions

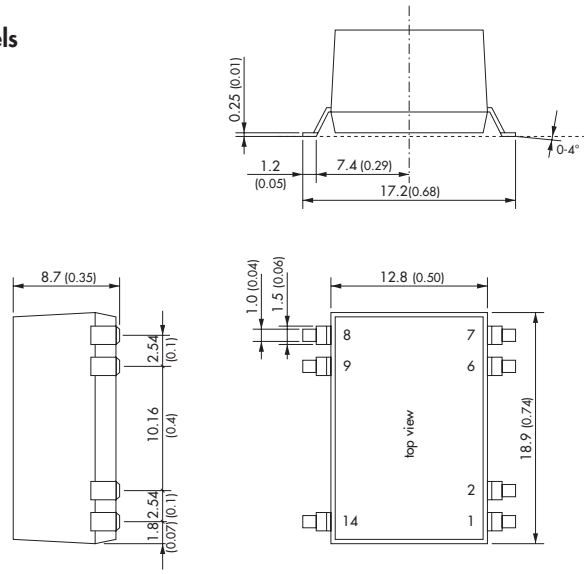
DIP-Models



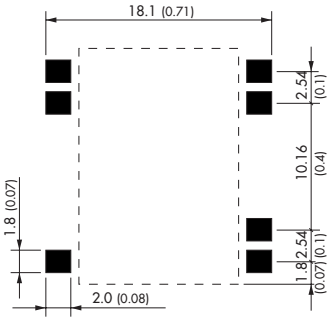
Pin-Out		
Pin	**Single**	**Dual**
1	–Vin (GND)	–Vin (GND)
2	Remote On/Off	Remote On/Off
6	NC	Common
7	NC	–Vout
8	+Vout	+Vout
9	–Vout	Common
14	+Vin (Vcc)	+Vin (Vcc)

NC = not to connect

SMD-Models



Recommended Solder Pad Dimension:



Dimensions in [mm], () = Inch
Tolerances: ±0.5 (±0.02)
Pin pich tolerances: ±0.25 (±0.01)