



**THE DATASHEET OF
TDL 2-1211**



- Compact 2W Converter in DIP package
- I/O-isolation 1'500 VDC
- Fully regulated outputs
- Wide 2 : 1 input voltage range
- Operating temperature range -40°C to +80°C
- Short circuit protection
- 3-year product warranty



The TDL 2 series with 2:1 input voltage range is a selection of 2 Watt regulated dc/dc-converters. They come in a very compact DIP package (0.55 × 0.55 × 0.31 inch).

Models				
Order code	Input voltage	Output voltage	Output current max.	Efficiency typ.
TDL 2-0510	4.5 – 10 VDC (5 VDC nominal)	3.3 VDC	400 mA	79 %
TDL 2-0511		5.0 VDC	400 mA	81 %
TDL 2-0512		12 VDC	167 mA	85 %
TDL 2-0513		15 VDC	134 mA	87 %
TDL 2-0521		±5.0 VDC	±200 mA	83 %
TDL 2-0522		±12 VDC	±83 mA	85 %
TDL 2-0523		±15 VDC	±67 mA	85 %
TDL 2-1210	9 – 18 VDC (12 VDC nominal)	3.3 VDC	400 mA	80 %
TDL 2-1211		5.0 VDC	400 mA	83 %
TDL 2-1212		12 VDC	167 mA	87 %
TDL 2-1213		15 VDC	134 mA	87 %
TDL 2-1221		±5.0 VDC	±200 mA	84 %
TDL 2-1222		±12 VDC	±83 mA	86 %
TDL 2-1223		±15 VDC	±67 mA	86 %
TDL 2-2410	18 – 36 VDC (24 VDC nominal)	3.3 VDC	400 mA	79 %
TDL 2-2411		5.0 VDC	400 mA	84 %
TDL 2-2412		12 VDC	167 mA	86 %
TDL 2-2413		15 VDC	134 mA	87 %
TDL 2-2421		±5.0 VDC	±200 mA	84 %
TDL 2-2422		±12 VDC	±83 mA	86 %
TDL 2-2423		±15 VDC	±67 mA	86 %
TDL 2-4810	36 – 75 VDC (48 VDC nominal)	3.3 VDC	400 mA	79 %
TDL 2-4811		5.0 VDC	400 mA	83 %
TDL 2-4812		12 VDC	167 mA	85 %
TDL 2-4813		15 VDC	134 mA	86 %
TDL 2-4821		±5.0 VDC	±200 mA	82 %
TDL 2-4822		±12 VDC	±83 mA	84 %
TDL 2-4823		±15 VDC	±67 mA	84 %

Input Specifications

Input current no load	5 Vin models: 40 mA typ. 12 Vin models: 27 mA typ. 24 Vin models: 15 mA typ. 48 Vin models: 8 mA typ.
Surge voltage (1 sec. max.)	5 Vin models: 12 V max. 12 Vin models: 25 V max. 24 Vin models: 50 V max. 48 Vin models: 100 V max.
Input filter	internal capacitor
Conducted noise	EN 55022 class A, B (with external components)
ESD (electrostatic discharge)	EN 61000-4-2, ± 8 kV / ± 6 kV, perf. criteria A
Radiated immunity	EN 61000-4-3, 10 V/m, perf. criteria A
Fast transient / surge (with external input capacitor)	EN 61000-4-4, ± 2 kV, perf. criteria A EN 61000-4-5, ± 1 kV perf. criteria A
– external input capacitor	all models: 220 μ F/100V
Conducted immunity	EN 61000-4-6, 10 Vrms, perf. criteria A
Magnetic field immunity	EN 61000-4-8, 3 A/m, perf. criteria A

Output Specifications

Voltage set accuracy	± 1.5 % max.
Regulation	– Input variation: 0.2 % max. – Load variation 0 – 100 %: 1 % max. dual output: 2 % max. (balanced load) cross regulation - dual output: 5 % max. (asymmetrical load 25 % / 100 %)
Minimum load	no minimum load required
Ripple and noise (20 MHz Bandwidth)	70 mVp-p typ.
Transient response	– Recovery time (25% load step change): 500 μ s typ. – Response deviation (25% load step change): 5 % max.
Current limitation	at 180% of nominal Iout typ., foldback
Short circuit protection	continuous, automatic recovery
Capacitive load	– Single output: all models: 100 μ F max. – Dual output: all models: 100 μ F max. (each output)

General Specifications

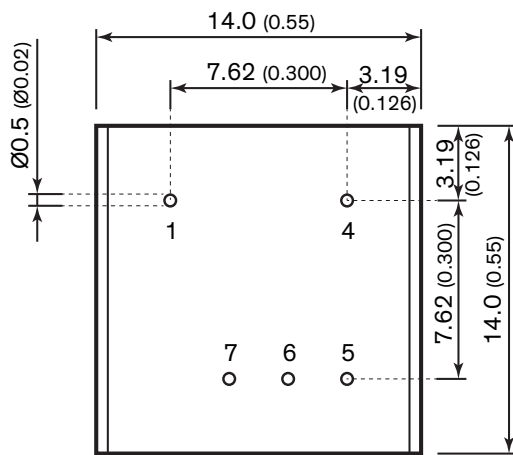
Temperature ranges	– Operating (convection cooling 20LFM, 0,1m/s): -40°C to $+70^{\circ}\text{C}$ (without derating) – Case temperature: $+90^{\circ}\text{C}$ max. – Storage temperature: -50°C to $+125^{\circ}\text{C}$
Derating	4.0%/K above 70°C
Humidity (non condensing)	95 % rel H max.
Isolation voltage	– I/O isolation voltage (60 sec.): 1'500 VDC
Isolation capacitance (input/output)	100 pF typ.
Isolation resistance (input/output)	>1 Gohm
Altitude during operation	5'000 m
Temperature coefficient	± 0.02 %/K typ.
Reliability, calculated MTBF (MIL-HDBK-217F at $+25^{\circ}\text{C}$, ground benign)	$>4'226'000$ h
Switching frequency	100 kHz min. (PFM)
Safety standards	UL 60950-1 IEC/EN 60950-1 www.tracopower.com/overview/tdl2
– Certification documents	
Environmental compliance	– Reach: www.tracopower.com/products/reach-declaration.pdf – RoHS: RoHS directive 2011/65/EU

All specifications valid at nominal input voltage, full load and $+25^{\circ}\text{C}$ after warm-up time unless otherwise stated.

Physical Specifications

Casing material	Non-conducting Plastic (UL 94V-0 rated)
Potting material	Epoxy (UL 94 V-0 rated)
Pin material	tinned copper
Package weight	3.9 g (0.137 oz)
Soldering temperature	max. 260°C / 10 sec.

Outline Dimensions



bottom view



Pin-Out		
Pin	Single	Dual
1	-Vin (GND)	-Vin (GND)
4	+Vin (Vcc)	+Vin (Vcc)
5	+Vout	+Vout
6	no pin	Common
7	-Vout	-Vout

Dimensions in mm (inch)



Tolerances: x.x ±0.5 (x.xx ±0.02)

x.xx ±0.25 (x.xxx ±0.01)

Pin diameter tolerance: x.x ±0.05 (x.xx ±0.002)

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