



**THE DATASHEET OF  
TDL 2-1213**



- 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	<b>4.5 – 10 VDC</b> (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	<b>9 – 18 VDC</b> (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	<b>18 – 36 VDC</b> (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	<b>36 – 75 VDC</b> (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 µF/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 µs 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 µF max. – Dual output: all models: 100 µF max. (each output)

## General Specifications

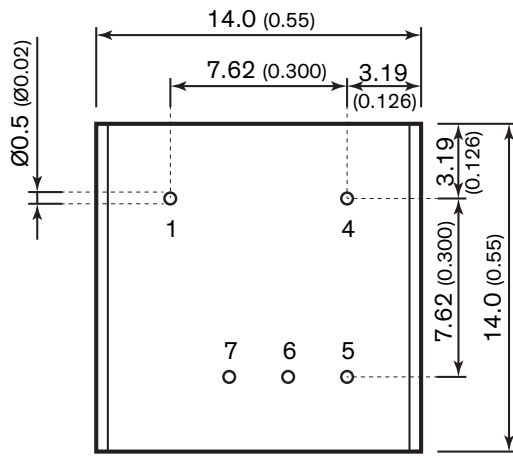
Temperature ranges	– Operating (convection cooling 20LFM, 0,1m/s): –40°C to +70°C (without derating) – Case temperature: +90°C max. – Storage temperature: –50°C to +125°C
Derating	4.0%/K above 70°C
Humidity (non condensing)	95 % rel H max.
Isolation voltage	– I/O isolation voltage (60 sec.): 1'500 VDC
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°C, ground benign)	>4'226'000 h
Switching frequency	100 kHz min. (PFM)
Safety standards	UL 60950-1 IEC/EN 60950-1 <a href="http://www.tracopower.com/overview/tdl2">www.tracopower.com/overview/tdl2</a>
Environmental compliance	– Reach: <a href="http://www.tracopower.com/products/reach-declaration.pdf">www.tracopower.com/products/reach-declaration.pdf</a> – RoHS: RoHS directive 2011/65/EU

All specifications valid at nominal input voltage, full load and +25°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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