



**THE DATASHEET OF
TDL 2-0522**



- 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 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

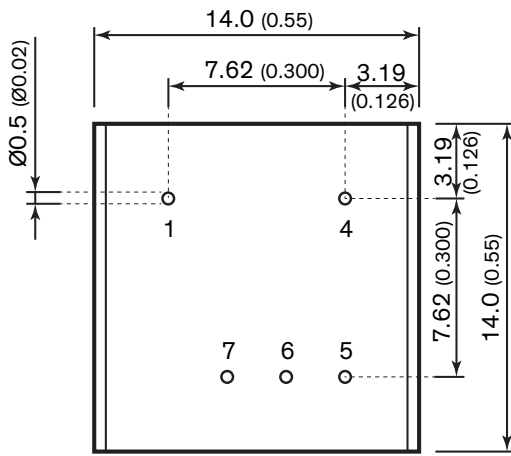
| | |
|--|--|
| Temperature ranges | – Operating (convection cooling 20LFM, 0,1m/s): –40°C to +70°C (without derating) – Case temperature: +90°C max. – Storage temperature: –50°C to +125°C |
| Derating | 4.0%/K above 70°C |
| Humidity (non condensing) | 95 % rel H max. |
| Isolation voltage | – I/O isolation 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 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°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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