DC/DC Converter

TDU 1 Series, 1 Watt

- Compact 1 Watt converter in DIP-8 package
- Continuous short circuit protection
- Unregulated outputs
- Operating temperature range -40 to +85 °C without derating
- I/O isolation 1'500 VDC
- Input voltage ranges (±10%): 5, 12, 24 VDC
- Efficiency up to 83%
- 3-year product warranty

The TDU 1 series consists of a set of isolated 1 Watt DC/DC converters with unregulated outputs in a compact DIP-8 package. They are designed to offer a compact low-cost alternative to regulated series with no concession on quality and lifetime. They feature a continuous short circuit protection circuit, I/O-isolation of 1500 VDC and an operating temperature range from -40°C to 85°C without derating. The compact dimensions of these converters make them an ideal solution for many space critical applications in communication equipment, instrumentation and industrial electronics.

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<thead>
<tr>
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<tbody>
<tr>
<td>TDU 1-0511</td>
<td>4.5 - 5.5 VDC (5 VDC nom.)</td>
<td>5 VDC</td>
<td>200 mA</td>
<td>80 %</td>
</tr>
<tr>
<td>TDU 1-0512</td>
<td>12 VDC</td>
<td>84 mA</td>
<td>82 %</td>
<td></td>
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<tr>
<td>TDU 1-0513</td>
<td>15 VDC</td>
<td>67 mA</td>
<td>83 %</td>
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<tr>
<td>TDU 1-1211</td>
<td>10.8 - 13.2 VDC (12 VDC nom.)</td>
<td>5 VDC</td>
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<td>79 %</td>
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<tr>
<td>TDU 1-1212</td>
<td>12 VDC</td>
<td>84 mA</td>
<td>81 %</td>
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<tr>
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<td>15 VDC</td>
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<tr>
<td>TDU 1-2411</td>
<td>21.6 - 26.4 VDC (24 VDC nom.)</td>
<td>5 VDC</td>
<td>200 mA</td>
<td>78 %</td>
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<tr>
<td>TDU 1-2412</td>
<td>12 VDC</td>
<td>84 mA</td>
<td>80 %</td>
<td></td>
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<tr>
<td>TDU 1-2413</td>
<td>15 VDC</td>
<td>67 mA</td>
<td>81 %</td>
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Input Specifications

| Input Current | - At no load | 5 Vin models: 30 mA typ. / 45 mA max. |
|              | 12 Vin models: 17 mA typ. / 25 mA max. |
|              | 24 Vin models: 10 mA typ. / 15 mA max. |
|              | - At full load | 5 Vin models: 256 mA max. (5 Vout model) |
|              | 12 Vin models: 250 mA max. (12 Vout model) |
|              | 24 Vin models: 247 mA max. (15 Vout model) |

Surge Voltage

| - 5 Vin models: 9 VDC max. (1 s max) |
| - 12 Vin models: 18 VDC max. (1 s max) |
| - 24 Vin models: 30 VDC max. (1 s max) |

Recommended Input Fuse

| - 5 Vin models: 600 mA (slow blow) |
| - 12 Vin models: 250 mA (slow blow) |
| - 24 Vin models: 150 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 | ±3% max. |
| Regulation | - Input Variation (1% Vin step) See application note: www.tracopower.com/overview/tdu1 |
| - Load Variation | 1.5% max. |

Ripple and Noise

- 20 MHz Bandwidth 100 mVp-p max.

Capacitive Load

220 pF max.

Minimum Load

2 % of Iout max.

Temperature Coefficient

±0.02 %/K max.

Short Circuit Protection

Continuous, Automatic recovery

EMC Specifications

EMI Emissions

- Conducted Emissions EN 55032 class B (with external filter)
- Radiated Emissions EN 55032 class B (with external filter)

External filter proposal: www.tracopower.com/overview/tdu1

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

External filter proposal: www.tracopower.com/overview/tdu1

- Conducted RF Disturbances EN 61000-4-6, 10 Vrms, perf. criteria A
- PF Magnetic Field Continuous: EN 61000-4-8, 30 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 +95°C max.
- Storage Temperature -50°C to +125°C

Cooling System

Natural convection (20 LFM)

All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.
### Switching Frequency
- 20 - 95 kHz (Royer)
- 50 kHz typ. (Royer)

### Insulation System
- Functional Insulation

### Isolation Test Voltage
- Input to Output, 60 s: 1'500 VDC
- Input to Output, 1 s: 1'800 VDC

### Creepage
- Input to Output: 1.38 mm min.

### Clearance
- Input to Output: 1.38 mm min.

### Isolation Resistance
- Input to Output, 500 VDC: 1'000 MΩ min.

### Isolation Capacitance
- Input to Output, 100 kHz, 1 V: 20 pF typ.

### Reliability
- Calculated MTBF: 5'000’000 h (MIL-HDBK-217F, ground benign)

### Washing Process
According to Cleaning Guideline
- www.tracopower.com/info/cleaning.pdf

### Environment
- Vibration: IPC-9592B
- Mechanical Shock: IPC-9592B
- Thermal Shock: IPC-9592B

### Housing Material
- Non-conductive Plastic (UL 94 V-0 rated)

### Base Material
- Non-conductive Plastic (UL 94 V-0 rated)

### Potting Material
- Silicone (UL 94 V-0 rated)

### Pin Material
- Phosphor Bronze (C5191)

### Pin Foundation Plating
- Nickel (1 µm min.)

### Pin Surface Plating
- Tin (3 - 5 µm), matte

### Housing Type
- Plastic Case

### Mounting Type
- PCB Mount

### Connection Type
- THD (Through-Hole Device)

### Footprint Type
- DIP8

### Soldering Profile
- Lead-Free Wave Soldering
- 260°C / 4 s max.

### Weight
- 2.1 g

### Environmental Compliance
- REACH Declaration
  - www.tracopower.com/info/reach-declaration.pdf
  - REACH SVHC list compliant
  - REACH Annex XVII compliant
  - www.tracopower.com/info/rohs-declaration.pdf
  - Exemptions: No Exemptions

### Supporting Documents
**Overview Link** (for additional Documents)
- www.tracopower.com/overview/tdu1

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

Dimensions in mm (inch)
Tolerances: x.x ±0.5 (±0.02)
           x.xx ±0.25 (±0.01)
Pin tolerances: ±0.05 (±0.002)

Pinout

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
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<tbody>
<tr>
<td>1</td>
<td>−Vin</td>
</tr>
<tr>
<td>4</td>
<td>+Vin</td>
</tr>
<tr>
<td>5</td>
<td>+Vout</td>
</tr>
<tr>
<td>7</td>
<td>−Vout</td>
</tr>
</tbody>
</table>

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