DC/DC Converter

- Compact design in THD Package
- Wide 2:1 input voltage range
- Fully regulated outputs
- Low ripple and noise
- Temperature range -40°C to +85°C without derating
- I/O isolation 1600 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 THD-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.

<table>
<thead>
<tr>
<th>Models</th>
<th>Input Voltage Range</th>
<th>Output 1</th>
<th>Output 2</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Range</td>
<td>Vnom</td>
<td>Imax</td>
<td>Vnom</td>
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<tr>
<td>TDR 3-0511</td>
<td>4.5 - 9 VDC</td>
<td>5 VDC</td>
<td>600 mA</td>
<td>–12 VDC</td>
</tr>
<tr>
<td>TDR 3-0512</td>
<td></td>
<td>12 VDC</td>
<td>250 mA</td>
<td>–12 VDC</td>
</tr>
<tr>
<td>TDR 3-0513</td>
<td></td>
<td>15 VDC</td>
<td>200 mA</td>
<td>–12 VDC</td>
</tr>
<tr>
<td>TDR 3-0522</td>
<td>+12 VDC</td>
<td>15 VDC</td>
<td>100 mA</td>
<td>–15 VDC</td>
</tr>
<tr>
<td>TDR 3-0523</td>
<td>+15 VDC</td>
<td>12 VDC</td>
<td>125 mA</td>
<td>–15 VDC</td>
</tr>
<tr>
<td>TDR 3-1211</td>
<td>9 - 18 VDC</td>
<td>5 VDC</td>
<td>600 mA</td>
<td>–12 VDC</td>
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<tr>
<td>TDR 3-1212</td>
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<td>250 mA</td>
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<tr>
<td>TDR 3-1222</td>
<td>+12 VDC</td>
<td>15 VDC</td>
<td>100 mA</td>
<td>–15 VDC</td>
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<tr>
<td>TDR 3-1223</td>
<td>+15 VDC</td>
<td>12 VDC</td>
<td>125 mA</td>
<td>–15 VDC</td>
</tr>
<tr>
<td>TDR 3-2411</td>
<td>18 - 36 VDC</td>
<td>5 VDC</td>
<td>600 mA</td>
<td>–12 VDC</td>
</tr>
<tr>
<td>TDR 3-2412</td>
<td></td>
<td>12 VDC</td>
<td>250 mA</td>
<td>–12 VDC</td>
</tr>
<tr>
<td>TDR 3-2413</td>
<td></td>
<td>15 VDC</td>
<td>200 mA</td>
<td>–12 VDC</td>
</tr>
<tr>
<td>TDR 3-2422</td>
<td>+12 VDC</td>
<td>15 VDC</td>
<td>100 mA</td>
<td>–15 VDC</td>
</tr>
<tr>
<td>TDR 3-2423</td>
<td>+15 VDC</td>
<td>12 VDC</td>
<td>125 mA</td>
<td>–15 VDC</td>
</tr>
<tr>
<td>TDR 3-4811</td>
<td>36 - 75 VDC</td>
<td>5 VDC</td>
<td>600 mA</td>
<td>–12 VDC</td>
</tr>
<tr>
<td>TDR 3-4812</td>
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<td>12 VDC</td>
<td>250 mA</td>
<td>–12 VDC</td>
</tr>
<tr>
<td>TDR 3-4813</td>
<td></td>
<td>15 VDC</td>
<td>200 mA</td>
<td>–12 VDC</td>
</tr>
<tr>
<td>TDR 3-4822</td>
<td>+12 VDC</td>
<td>15 VDC</td>
<td>100 mA</td>
<td>–15 VDC</td>
</tr>
<tr>
<td>TDR 3-4823</td>
<td>+15 VDC</td>
<td>12 VDC</td>
<td>125 mA</td>
<td>–15 VDC</td>
</tr>
</tbody>
</table>
## Input Specifications

| Input Current | - At no load | 5 Vin models: 50 mA typ.  
12 Vin models: 30 mA typ.  
24 Vin models: 13 mA typ.  
48 Vin models: 10 mA typ.  
- At full load | 5 Vin models: 790 mA max.  
12 Vin models: 320 mA max.  
24 Vin models: 160 mA max.  
48 Vin models: 80 mA max.  
|
| Surge Voltage | 5 Vin models: 15 VDC max. (1 s max.)  
12 Vin models: 25 VDC max. (1 s max.)  
24 Vin models: 50 VDC max. (1 s max.)  
48 Vin models: 100 VDC max. (1 s max.)  
|
| Reflected Ripple Current | 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.  
|
| Recommended Input Fuse | 5 Vin models: 3'000 mA (Slow blow)  
12 Vin models: 3'000 mA (Slow blow)  
24 Vin models: 1'500 mA (Slow blow)  
48 Vin models: 1'500 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 | ±1% max.  
|
| Regulation | - Input Variation (Vmin - Vmax)  
- Load Variation (0 - 100%)  
- Cross Regulation (25% / 100% asym. load)  
| single output models: 0.2% max.  
single output models: 1% max.  
dual output models: 1% max. (Output 1)  
dual output models: 5% max.  
|
| Ripple and Noise | - 20 MHz Bandwidth  
30 mVp-p typ.  
|
| Capacitive Load | - single output  
5 Vout models: 1'680 µF max.  
12 Vout models: 820 µF max.  
15 Vout models: 680 µF max.  
- dual output  
12 / -12 Vout models: 470 / 470 µF max.  
15 / -15 Vout models: 330 / 330 µF max.  
|
| Minimum Load | Not required  
|
| Temperature Coefficient | ±0.02 %/K max.  
|
| Start-up Time | 5 ms typ.  
|
| Short Circuit Protection | Continuous, Automatic recovery  
|
| Transient Response | - Response Time  
250 µs typ. (25% Load Step)  

## Safety Specifications

| Safety Standards | - IT / Multimedia Equipment  
EN 60950-1  
IEC 60950-1  
UL 60950-1  
- Certification Documents  
www.tracopower.com/overview/tdr3  
|
| Pollution Degree | PD 2  

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

EMI Emissions
- Conducted Emissions
  EN 55032 class A (with external filter)
  EN 55032 class B (with external filter)
- Radiated Emissions
  EN 55032 class A (with external filter)
  EN 55032 class B (with external filter)
  External filter proposal: www.tracopower.com/overview/tdr3

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
  - EFT (Burst) / Surge
    - Conducted RF Disturbances
      - Continuous: EN 61000-4-6, 10 Vrms, perf. criteria A
      - 1 s: EN 61000-4-8, 1000 A/m, perf. criteria A
    - Conducted RF Disturbances
      - Continuous: EN 61000-4-6, 10 Vrms, perf. criteria A
      - 1 s: EN 61000-4-8, 1000 A/m, perf. criteria A

General Specifications

Relative Humidity
95% max. (non-condensing)

Temperature Ranges
- Operating Temperature: -40°C to +85°C
- Case Temperature: +100°C max.
- Storage Temperature: -55°C to +125°C

Power Derating
3.3 %/K above 70°C

Cooling System
Natural convection (20 LFM)

Remote Control
- Current Controlled Remote
  On: open circuit
  Off: 2 to 4 mA current (internal 1 kΩ resistor)
  2.5 mA max.

Altitude During Operation
2'000 m max.

Switching Frequency
100 kHz min. (RCC)

Insulation System
Basic Insulation

Isolation Test Voltage
- Input to Output, 60 s: 1'600 VDC
- Input to Output, 500 VDC: 1'000 MΩ min.
- Input to Output, 100 kHz, 1 V: 50 pF max.

Reliability
- Calculated MTBF: 6'200'000 h (MIL-HDBK-217F, ground benign)

Environment
- Vibration
- Thermal Shock
  MIL-STD-810F
  MIL-STD-810F

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

Pin Material
Copper

Pin Foundation Plating
Nickel (40 - 120 µm)

Pin Surface Plating
Gold (25 - 75 nm), matte

Soldering Profile
Wave Soldering
265°C / 10 s max.

Connection Type
THD (Through-Hole Device)

Weight
4.5 g

Environmental Compliance
- Reach
  www.tracopower.com/info/reach-declaration.pdf
- RoHS
  www.tracopower.com/info/rohs-declaration.pdf

Supporting Documents

Overview Link (for additional Documents)
www.tracopower.com/overview/tdr3

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

Dimensions in mm (inch)
Tolerances: ±0.5 (±0.02)
Pin pitch tolerances ±0.25 (±0.01)

<table>
<thead>
<tr>
<th>Pin</th>
<th>Single</th>
<th>Dual</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>−Vin (GND)</td>
<td>−Vin (GND)</td>
</tr>
<tr>
<td>2</td>
<td>Remote On/Off</td>
<td>Remote On/Off</td>
</tr>
<tr>
<td>6</td>
<td>NC</td>
<td>Common</td>
</tr>
<tr>
<td>7</td>
<td>NC</td>
<td>−Vout</td>
</tr>
<tr>
<td>8</td>
<td>+Vout</td>
<td>+Vout</td>
</tr>
<tr>
<td>9</td>
<td>−Vout</td>
<td>Common</td>
</tr>
<tr>
<td>14</td>
<td>+Vin (Vcc)</td>
<td>+Vin (Vcc)</td>
</tr>
</tbody>
</table>

NC: Not connected

Specifications can be changed without notice.

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