DC/DC Converter

TRA 3 Series, 3 Watt

- Semi-regulated output (load)
- Highest power density 3W SIP-Converter
- Industry standard pinout
- High efficiency up to 89%
- I/O isolation voltage 1000 VDC
- Operating temperature range -40°C to +95°C
- 3-year product warranty

The TRA 3 series are miniature, I/O-isolated 3W DC/DC-converters with a semi load regulation. They are the ideal solution to power drivers and circuits where unregulated DC/DC converters do not meet the input voltage range at load change.

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<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>TRA 3-0511</td>
<td>4.5 - 5.5 VDC (5 VDC nom.)</td>
<td>5 VDC</td>
<td>600 mA</td>
<td>83 %</td>
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<tr>
<td></td>
<td>TRA 3-0519</td>
<td>9 VDC</td>
<td>333 mA</td>
<td></td>
<td>87 %</td>
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<tr>
<td></td>
<td>TRA 3-0512</td>
<td>12 VDC</td>
<td>250 mA</td>
<td></td>
<td>86 %</td>
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<tr>
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<td>TRA 3-0513</td>
<td>15 VDC</td>
<td>200 mA</td>
<td></td>
<td>88 %</td>
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<td>TRA 3-1211</td>
<td>10.8 - 13.2 VDC (12 VDC nom.)</td>
<td>5 VDC</td>
<td>600 mA</td>
<td>84 %</td>
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<td>TRA 3-1219</td>
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<td>89 %</td>
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<tr>
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<td>TRA 3-2411</td>
<td>21.6 - 26.4 VDC (24 VDC nom.)</td>
<td>5 VDC</td>
<td>600 mA</td>
<td>82 %</td>
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<tr>
<td></td>
<td>TRA 3-2419</td>
<td>9 VDC</td>
<td>333 mA</td>
<td></td>
<td>85 %</td>
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<tr>
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<td>TRA 3-2412</td>
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<td>85 %</td>
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## Input Specifications

### Input Current
- **At no load**
  - 5 Vin models: 50 mA typ.
  - 12 Vin models: 40 mA typ.
  - 24 Vin models: 30 mA typ.
- **At full load**
  - 5 Vin models: 700 mA max.
  - 12 Vin models: 285 mA max.
  - 24 Vin models: 150 mA max.

### Surge Voltage
- **At no load**
  - 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.)
- **At full load**
  - 5 Vin models: 2'000 mA (slow blow)
  - 12 Vin models: 1'000 mA (slow blow)
  - 24 Vin models: 500 mA (slow blow)

(The need of an external fuse has to be assessed in the final application.)

### Recommended Input Fuse
- **At no load**
  - 5 Vin models: 2'000 mA (slow blow)
  - 12 Vin models: 1'000 mA (slow blow)
  - 24 Vin models: 500 mA (slow blow)

### Input Filter
Internal Capacitor

## Output Specifications

### Voltage Set Accuracy
±3% max. (at 80% load)

### Regulation
- **Input Variation (1% Vin step)**: 1.2% max.
- **Load Variation**: See application note [www.tracopower.com/overview/tra3](http://www.tracopower.com/overview/tra3)

### Ripple and Noise
- **20 MHz Bandwidth**: 100 mVp-p max.

### Capacitive Load
220 µF max.

### Minimum Load
2 % of Iout max.
( Operation at lower load will not damage the converter, but it may not meet all specifications)

### Temperature Coefficient
±0.02 %/K max.

### Short Circuit Protection
Limited 0.5 s max., Automatic recovery

## Safety Specifications

### Safety Standards
- **IT / Multimedia Equipment**
  - CSA-C22.2, No. 60950-1
  - EN 60950-1
  - IEC 60950-1
  - IEC 62368-1
  - UL 60950-1
  - UL 62368-1
- **Certification Documents**
  - [www.tracopower.com/overview/tra3](http://www.tracopower.com/overview/tra3)

### Pollution Degree
PD 3

### Over Voltage Category
Not mains connected

## General Specifications

### Relative Humidity
95% max. (non condensing)

### Temperature Ranges
- **Operating Temperature**: –40°C to +95°C
- **Case Temperature**: +100°C max.
- **Storage Temperature**: –50°C to +125°C

### Power Derating
5 %/K above 85°C

### Cooling System
Natural convection (20 LFM)

### Altitude During Operation
6'000 m max.

### Switching Frequency
60 kHz min. (PWM)

### Insulation System
Functional Insulation

### Isolation Test Voltage
- **Input to Output, 60 s**: 1'000 VDC
- **Input to Output, 1 s**: 1'200 VDC

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

All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.
Isolation Capacitance - Input to Output, 100 kHz, 1 V

- Input to Output, 100 kHz, 1 V
- 60 pF typ.
- 120 pF max.

Reliability - Calculated MTBF

- Calculated MTBF
- 2,000,000 h (MIL-HDBK-217F, ground benign)

Washing Process

- Washing Process

Washing Process Allowed (hermetical product)

Housing Material

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

Potting Material

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

Pin Material

- Pin Material
- Nickel-Iron (Alloy 42)

Pin Foundation Plating

- Pin Foundation Plating
- Nickel (1 µm min)

Pin Surface Plating

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

Housing Type

- Housing Type
- Plastic Case

Mounting Type

- Mounting Type
- PCB Mount

Connection Type

- Connection Type
- THD (Through-Hole Device)

Footprint Type

- Footprint Type
- SIP7

Soldering Profile

- Soldering Profile
- Wave Soldering
- 260°C / 10 s max.

Weight

- Weight
- 2.2 g

Environmental Compliance - REACH Declaration

- REACH Declaration
- www.tracopower.com/info/reach-declaration.pdf
- REACH SVHC list compliant
- REACH Annex XVII compliant

Environmental Compliance - RoHS Declaration

- RoHS Declaration
- www.tracopower.com/info/rohs-declaration.pdf
- Exemptions: 7a, 7c-I

Supporting Documents

Overview Link (for additional Documents)

- www.tracopower.com/overview/tra3

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)
Tolerance: x.x ±0.25 (x.xx ±0.01)
     x.xx ±0.13 (x.xxx ±0.005)
Pins: ±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 (Vcc)</td>
</tr>
<tr>
<td>2</td>
<td>–Vin (GND)</td>
</tr>
<tr>
<td>4</td>
<td>–Vout</td>
</tr>
<tr>
<td>6</td>
<td>+Vout</td>
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