

## 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



UL 62368-1 IEC 62368-1

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

| Models     |                                  |                     |                     |                 |
|------------|----------------------------------|---------------------|---------------------|-----------------|
| Order Code | Input Voltage Range              | Output Voltage nom. | Output Current max. | Efficiency typ. |
| TRA 3-0511 | 4.5 - 5.5 VDC<br>(5 VDC nom.)    | 5 VDC               | 600 mA              | 83 %            |
| TRA 3-0519 |                                  | 9 VDC               | 333 mA              | 87 %            |
| TRA 3-0512 |                                  | 12 VDC              | 250 mA              | 86 %            |
| TRA 3-0513 |                                  | 15 VDC              | 200 mA              | 88 %            |
| TRA 3-1211 | 10.8 - 13.2 VDC<br>(12 VDC nom.) | 5 VDC               | 600 mA              | 84 %            |
| TRA 3-1219 |                                  | 9 VDC               | 333 mA              | 88 %            |
| TRA 3-1212 |                                  | 12 VDC              | 250 mA              | 88 %            |
| TRA 3-1213 |                                  | 15 VDC              | 200 mA              | 89 %            |
| TRA 3-2411 | 21.6 - 26.4 VDC<br>(24 VDC nom.) | 5 VDC               | 600 mA              | 82 %            |
| TRA 3-2419 |                                  | 9 VDC               | 333 mA              | 85 %            |
| TRA 3-2412 |                                  | 12 VDC              | 250 mA              | 86 %            |
| TRA 3-2413 |                                  | 15 VDC              | 200 mA              | 85 %            |

## Input Specifications

|                        |                |                                                                                                                                                                                               |
|------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input Current          | - At no load   | 5 Vin models: 50 mA typ.<br>12 Vin models: 40 mA typ.<br>24 Vin models: 30 mA typ.                                                                                                            |
|                        | - At full load | 5 Vin models: 700 mA max.<br>12 Vin models: 285 mA max.<br>24 Vin models: 150 mA max.                                                                                                         |
| Surge Voltage          |                | 5 Vin models: 9 VDC max. (1 s max.)<br>12 Vin models: 18 VDC max. (1 s max.)<br>24 Vin models: 30 VDC max. (1 s max.)                                                                         |
| Recommended Input Fuse |                | 5 Vin models: 2'000 mA (slow blow)<br>12 Vin models: 1'000 mA (slow blow)<br>24 Vin models: 500 mA (slow blow)<br>(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. (at 80% load)                                                                                              |
| Regulation               | - Input Variation (1% Vin step) | 1.2% max.                                                                                                           |
|                          | - Load Variation                | See application note: <a href="http://www.tracopower.com/overview/tra3">www.tracopower.com/overview/tra3</a>        |
| Ripple and Noise         | - 20 MHz Bandwidth              | 100 mVp-p max.                                                                                                      |
| Capacitive Load          |                                 | 220 µF max.                                                                                                         |
| Minimum Load             |                                 | 2 % of Iout max.<br>(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<br>EN 60950-1<br>EN 62368-1<br>IEC 60950-1<br>IEC 62368-1<br>UL 60950-1<br>UL 62368-1 |
|                       | - Certification Documents   | <a href="http://www.tracopower.com/overview/tra3">www.tracopower.com/overview/tra3</a>                       |
| 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            | - High Temperature         | 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 | 60 pF typ.<br>120 pF max.                                                                                                                                                                                                                                                                                     |
| Reliability              | - Calculated MTBF               | 2'000'000 h (MIL-HDBK-217F, ground benign)                                                                                                                                                                                                                                                                    |
| Washing Process          | See Cleaning Guideline:         | Allowed (hermetical product)<br><a href="http://www.tracopower.com/info/cleaning.pdf">www.tracopower.com/info/cleaning.pdf</a>                                                                                                                                                                                |
| Housing Material         |                                 | Non-conductive Plastic (UL 94 V-0 rated)                                                                                                                                                                                                                                                                      |
| Potting Material         |                                 | Silicone (UL 94 V-0 rated)                                                                                                                                                                                                                                                                                    |
| Pin Material             |                                 | Nickel-Iron (Alloy 42)                                                                                                                                                                                                                                                                                        |
| 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           |                                 | SIP7                                                                                                                                                                                                                                                                                                          |
| Soldering Profile        |                                 | Wave Soldering<br>260°C / 10 s max.                                                                                                                                                                                                                                                                           |
| Weight                   |                                 | 2.2 g                                                                                                                                                                                                                                                                                                         |
| Environmental Compliance | - REACH Declaration             | <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a><br>REACH SVHC list compliant<br>REACH Annex XVII compliant                                                                                                                                   |
|                          | - RoHS Declaration              | <a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a><br>Exemptions: 7a, 7c-I<br>(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).<br>The SCIP number is provided on request.) |

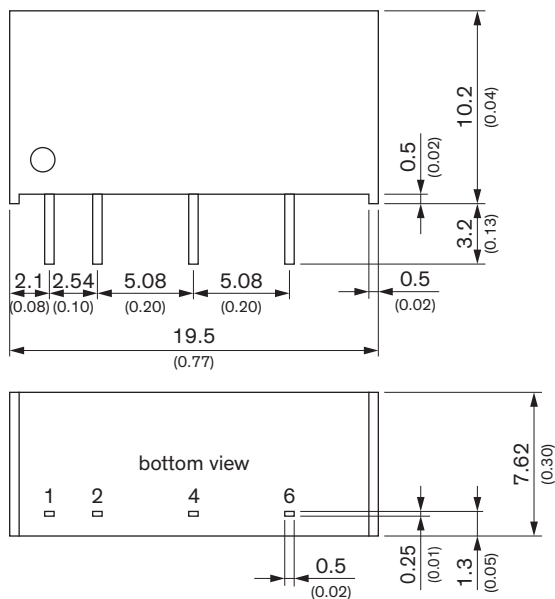
## Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/tra3](http://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



| Pinout |            |
|--------|------------|
| Pin    | Function   |
| 1      | +Vin (Vcc) |
| 2      | -Vin (GND) |
| 4      | -Vout      |
| 6      | +Vout      |

Dimensions in mm (inch)

Tolerance: x.x  $\pm 0.25$  (x.xx  $\pm 0.01$ )

x.xx  $\pm 0.13$  (x.xxx  $\pm 0.005$ )

Pins:  $\pm 0.05$  ( $\pm 0.002$ )