

#### Features

- ◆ Semi-regulated output (load)
- ◆ Industry standard pinout
- ◆ High efficiency up to 87%
- ◆ I/O isolation voltage 3000 VDC
- ◆ Operationally reliable up to 5'000m altitude
- ◆ Operating temperature range -40°C to +85°C
- ◆ 3-year product warranty



The TRV-1 series are ultra miniature, 1 Watt DC/DC-converters with high 3000VDC I/O-isolation and 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

| Ordercode  | Input voltage | Output voltage | Output current max. | Efficiency typ. |
|------------|---------------|----------------|---------------------|-----------------|
| TRV 1-0511 | 5 VDC ±10%    | 5 VDC          | 200 mA              | 84 %            |
| TRV 1-0519 |               | 9 VDC          | 110 mA              | 86.5 %          |
| TRV 1-0512 |               | 12 VDC         | 84 mA               | 87 %            |
| TRV 1-0513 |               | 15 VDC         | 67 mA               | 87.5 %          |
| TRV 1-1211 | 12 VDC ±10%   | 5 VDC          | 200 mA              | 84 %            |
| TRV 1-1219 |               | 9 VDC          | 110 mA              | 86 %            |
| TRV 1-1212 |               | 12 VDC         | 84 mA               | 88 %            |
| TRV 1-1213 |               | 15 VDC         | 67 mA               | 88 %            |
| TRV 1-2411 | 24 VDC ±10%   | 5 VDC          | 200 mA              | 84 %            |
| TRV 1-2419 |               | 9 VDC          | 110 mA              | 86.5 %          |
| TRV 1-2412 |               | 12 VDC         | 84 mA               | 87.5 %          |
| TRV 1-2413 |               | 15 VDC         | 67 mA               | 87.5 %          |

### Input Specifications

|   |  |
|---|--|
| Input current no load / full load       | 5 Vin models: 30 mA / 230 mA typ.<br>12 Vin models: 12 mA / 100 mA typ.<br>24 Vin models: 11 mA / 50 mA typ. |
| Surge voltage (1 sec. max.)             | 5 Vin models: 9 V max.<br>12 Vin models: 18 V max.<br>24 Vin models: 30 V max.                               |
| Reflected input ripple current          | 5 Vin models: 11 mA typ.<br>other models: 5 mA typ.  |
| Input filter                            | internal capacitors  |
| Recommended input fuse (slow blow type) | 5 Vin models: 500 mA<br>12 Vin models: 200 mA<br>24 Vin models: 100 mA                                       |

### Output Specifications

|                                     |                                       |   |
|-------------------------------------|---------------------------------------|---|
| Regulation                          | - Input variation<br>- Load variation | 1.2 % / 1 % change Vin<br>see graph 1 on page 3 |
| Ripple and noise (20 MHz Bandwidth) |                                       | 60 mV pk-pk max.                                |
| Temperature coefficient             |                                       | ±0.02 %/K                                       |
| Short circuit protection            |                                       | limited 0.5 sec. max.                           |
| Capacitive load                     |                                       | 220 µF max.                                     |

### General Specifications

|   |  |  |
|---|--|--|
| Temperature ranges  | - Operating<br>- Case temperature<br>- Storage | -40°C to +85°C (without derating)<br>+105°C max.<br>-50°C to +125°C  |
| Humidity (non condensing)   |  | 95 % rel H max.  |
| Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign) |  | >2'000'000 h   |
| Isolation voltage (60 sec.)   | - Input/Output                                 | 3'000 VDC  |
| Isolation capacitance   | - Input/Output                                 | 60 pF typ.   |
| Isolation resistance  | - Input/Output                                 | >1'000 Mohm  |
| Switching frequency   |  | 100 kHz typ. (frequency modulation)  |
| Frequency change over line and load                                   |  | -50 / +20 kHz max.   |
| Altitude during operation   |  | up to 5'000 m (16'400 ft) approved   |
| Safety approvals  |  | IEC 60950-1:2005 (2nd edition) + Am 1:2009<br>EN 60950-1:2006 + Am 1:2010 + Am 11:2009<br><a href="http://www.tracopower.com/overview/trv1">www.tracopower.com/overview/trv1</a> |
|   | - Certification documents                      |  |

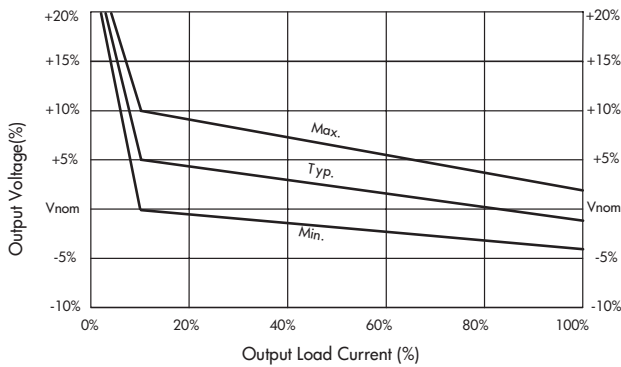
**Supporting documents:** [www.tracopower.com/overview/trv1](http://www.tracopower.com/overview/trv1)

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

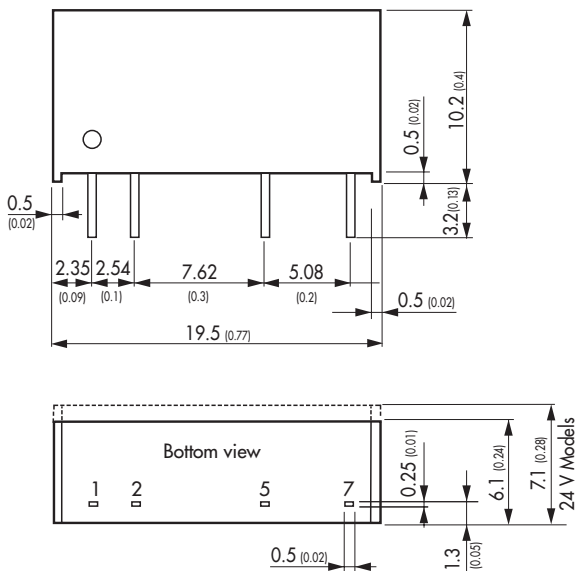
**Physical Specifications**

|                          |  |   |
|--------------------------|--|---|
| Casing material          |  | non conductive plastic (UL 94V-0 rated)   |
| Weight                   | - 5 & 12 Vin models<br>- 24 Vin models | 2.2 g (0.07 oz)<br>2.6 g (0.09 oz)  |
| Soldering temperature    |  | max. 260°C, 10 sec, 1.5 mm from case  |
| Environmental compliance | - Reach<br>- RoHS                      | <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a><br>RoHS directive 2011/65/EU |

Graph 1: Load regulation



**Outline Dimensions**



| Pin-Out |            |
|---------|------------|
| Pin     |            |
| 1       | +Vin (Vcc) |
| 2       | -Vin (GND) |
| 5       | -Vout      |
| 7       | +Vout      |

Dimensions in [mm], ( ) = Inch  
Pin pitch tolerances:  $\pm 0.13$  ( $\pm 0.005$ )  
Case tolerances:  $\pm 0.25$  ( $\pm 0.01$ )

Specifications can be changed without notice! Make sure you are using the latest documentation, downloadable at [www.tracopower.com](http://www.tracopower.com)

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