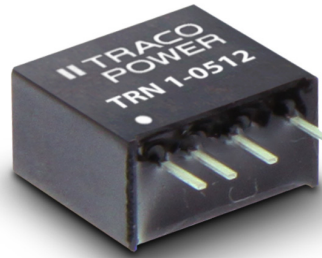


- **Compact SIP package**  
11,9 × 7,7 × 11,0 mm
- **Fully regulated outputs**
- **Input Voltage range**  
4.5-13.2, 9-18, 18-36, 36-75 VDC
- **I/O-isolation 1'600 VDC**
- **Operating temperature range**  
-40°C to +90°C without derating
- **Short circuit protection**
- **3-year product warranty**
- **Designed to meet UL 62368-1 (UL 60950-1)**



The TRN 1 Series comprises 1 Watt fully regulated, high performance DC/DC converters. They come in a compact cubical package of only 1.00 cm<sup>3</sup>. Full load operation is reliable up to 90°C environment temperature. With 1'600 VDC I/O-isolation voltage, and short current protection they cover a wide range of application when space is limited. The input of the converters is designed for a wide voltage range (2:1) and minimum load is not required. The functional I/O-isolation system is designed to meet IEC/EN 62368-1 with a test voltage (60 s) of 1600 VDC.

| Models     |                                   |                |                     |                 |
|------------|-----------------------------------|----------------|---------------------|-----------------|
| Order code | Input voltage                     | Output voltage | Output current max. | Efficiency typ. |
| TRN 1-0510 | 4.5 – 13.2 VDC<br>(9 VDC nominal) | 3.3 VDC        | 300 mA              | 77 %            |
| TRN 1-0511 |                                   | 5.0 VDC        | 200 mA              | 79 %            |
| TRN 1-0512 |                                   | 12 VDC         | 90 mA               | 81 %            |
| TRN 1-0513 |                                   | 15 VDC         | 70 mA               | 82 %            |
| TRN 1-0515 |                                   | 24 VDC         | 45 mA               | 83 %            |
| TRN 1-0521 |                                   | ± 5.0 VDC      | ±100 mA             | 79 %            |
| TRN 1-0522 |                                   | ±12 VDC        | ±45 mA              | 83 %            |
| TRN 1-0523 |                                   | ±15 VDC        | ±35 mA              | 80 %            |
| TRN 1-1210 | 9 – 18 VDC<br>(12 VDC nominal)    | 3.3 VDC        | 300 mA              | 77 %            |
| TRN 1-1211 |                                   | 5.0 VDC        | 200 mA              | 80 %            |
| TRN 1-1212 |                                   | 12 VDC         | 90 mA               | 81 %            |
| TRN 1-1213 |                                   | 15 VDC         | 70 mA               | 83 %            |
| TRN 1-1215 |                                   | 24 VDC         | 45 mA               | 83 %            |
| TRN 1-1221 |                                   | ± 5.0 VDC      | ±100 mA             | 79 %            |
| TRN 1-1222 |                                   | ±12 VDC        | ±45 mA              | 83 %            |
| TRN 1-1223 |                                   | ±15 VDC        | ±35 mA              | 80 %            |
| TRN 1-2410 | 18 – 36 VDC<br>(24 VDC nominal)   | 3.3 VDC        | 300 mA              | 77 %            |
| TRN 1-2411 |                                   | 5.0 VDC        | 200 mA              | 81 %            |
| TRN 1-2412 |                                   | 12 VDC         | 90 mA               | 82 %            |
| TRN 1-2413 |                                   | 15 VDC         | 70 mA               | 83 %            |
| TRN 1-2415 |                                   | 24 VDC         | 45 mA               | 82 %            |
| TRN 1-2421 |                                   | ± 5.0 VDC      | ±100 mA             | 79 %            |
| TRN 1-2422 |                                   | ±12 VDC        | ±45 mA              | 82 %            |
| TRN 1-2423 |                                   | ±15 VDC        | ±35 mA              | 80 %            |
| TRN 1-4810 | 36 – 75 VDC<br>(48 VDC nominal)   | 3.3 VDC        | 300 mA              | 77 %            |
| TRN 1-4811 |                                   | 5.0 VDC        | 200 mA              | 78 %            |
| TRN 1-4812 |                                   | 12 VDC         | 90 mA               | 80 %            |
| TRN 1-4813 |                                   | 15 VDC         | 70 mA               | 81 %            |
| TRN 1-4815 |                                   | 24 VDC         | 45 mA               | 81 %            |
| TRN 1-4821 |                                   | ± 5.0 VDC      | ±100 mA             | 78 %            |
| TRN 1-4822 |                                   | ±12 VDC        | ±45 mA              | 81 %            |
| TRN 1-4823 |                                   | ±15 VDC        | ±35 mA              | 79 %            |

## Input Specifications

|                          |                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input current no load    |                                                                                                                                                                         | 9 Vin models: 35 mA typ<br>12 Vin models: 20 mA typ.<br>24 Vin models: 10 mA typ.<br>48 Vin models: 5 mA typ.                                                                                                                                                                                                                                                                   |
| Surge voltage (1 s max.) |                                                                                                                                                                         | 9 Vin models: 15 V max.<br>12 Vin models: 25 V max.<br>24 Vin models: 50 V max.<br>48 Vin models: 100 V max.                                                                                                                                                                                                                                                                    |
| Reflected ripple current |                                                                                                                                                                         | 30 mA <sub>p-p</sub> typ.                                                                                                                                                                                                                                                                                                                                                       |
| Conducted noise          | – conducted input emission                                                                                                                                              | EN 55032 class A or B with external components                                                                                                                                                                                                                                                                                                                                  |
| EMC immunity             | – ESD (electrostatic discharge)<br>– Radiated immunity<br>– Fast transient / surge (with external input capacitor)<br>– Conducted immunity<br>– Magnetic field immunity | EN 61000-4-2, air ±8 kV, contact ±6 kV, perf. criteria A<br>EN 61000-4-3, 10 V/m, perf. criteria A<br>EN 61000-4-4, ±2 kV, perf. criteria A<br>EN 61000-4-5, ±1 kV perf. criteria A<br>Nippon chemi-con KY 220 µF/ 100 V<br>EN 61000-4-6, 10 V <sub>rms</sub> , perf. criteria A<br>EN 61000-4-8<br>100 A/m, continuous, perf. criteria A<br>1000 A/m, 1 sec., perf. criteria A |
| Input filter             |                                                                                                                                                                         | capacitor type                                                                                                                                                                                                                                                                                                                                                                  |

## Output Specifications

|                                           |                                                                                      |                                                                                                                                                                                                                                                                                               |
|-------------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Voltage set accuracy                      |                                                                                      | ±1 % max.                                                                                                                                                                                                                                                                                     |
| Regulation                                | – Input variation<br>– Load variation 0 – 100 %<br>– Cross regulation - dual output: | 0.2 % max.<br>1 % max.<br>5 % max. (asymmetrical load 25 % / 100 %)                                                                                                                                                                                                                           |
| Temperature coefficient                   |                                                                                      | ±0.02 %/K typ.                                                                                                                                                                                                                                                                                |
| Ripple and noise (20 MHz Bandwidth)       |                                                                                      | 50 mV <sub>p-p</sub> typ.                                                                                                                                                                                                                                                                     |
| Start-up time                             |                                                                                      | 15 ms max. (5 ms typ.)                                                                                                                                                                                                                                                                        |
| Transient response (25% load step change) |                                                                                      | 500 µs typ.                                                                                                                                                                                                                                                                                   |
| Short circuit protection                  |                                                                                      | continuous, automatic recovery                                                                                                                                                                                                                                                                |
| Capacitive load                           | – Single output<br>– Dual output                                                     | 3.3 VDC models: 1680 µF max.<br>5.0 VDC models: 820 µF max.<br>12 VDC models: 470 µF max.<br>15 VDC models: 330 µF max.<br>24 VDC models: 160 µF max.<br>±5.0 VDC models: 470 µF max. (each output)<br>±12 VDC models: 330 µF max. (each output)<br>+15 VDC models: 220 µF max. (each output) |

## General Specifications

|                                  |                                                                                               |                                                                    |
|----------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Temperature ranges               | – Operating (convection cooling 20LFM, 0.1m/s)<br>– Case temperature<br>– Storage temperature | –40°C to +90°C (without derating)<br>+95°C max.<br>–55°C to +125°C |
| Derating                         |                                                                                               | 6.7%/K above 90°C                                                  |
| Humidity (non condensing)        |                                                                                               | 5 – 95 % rel H max.                                                |
| Isolation voltage                | – I/O isolation voltage (60 s)                                                                | 1'600 VDC                                                          |
| Isolation capacitance            |                                                                                               | 75 pF max.                                                         |
| Isolation resistance (@ 500 VDC) |                                                                                               | >1 Gohm                                                            |

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

### General Specifications

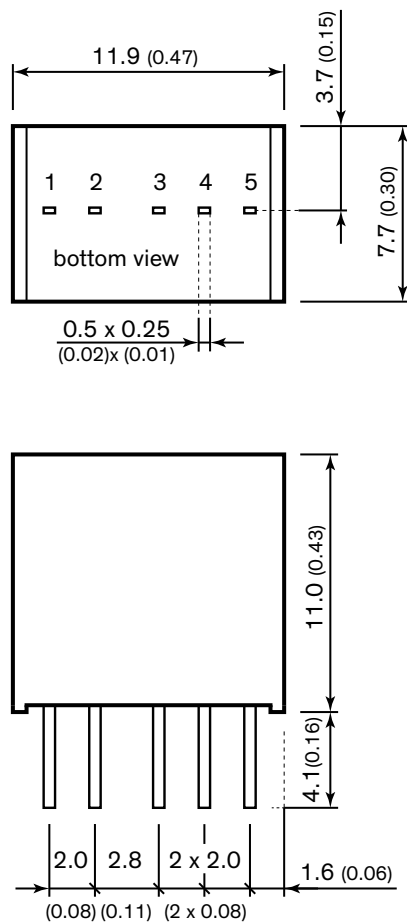
|                                                                      |                                                                                                                                                                      |
|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reliability, calculated MTBF (MIL-HDBK-217F at +25°C, ground benign) | 7'400'000 h                                                                                                                                                          |
| Switching frequency                                                  | 100 kHz min. Pulse frequency modulation.                                                                                                                             |
| Thermal shock & vibration                                            | MIL-STD-810F                                                                                                                                                         |
| Safety standards                                                     | - Designed to meet (no certification) IEC/EN/UL 62368-1, UL 60950-1                                                                                                  |
| Environmental compliance                                             | - Reach <a href="http://www.tracopower.com/products/reach-declaration.pdf">www.tracopower.com/products/reach-declaration.pdf</a><br>- RoHS RoHS directive 2011/65/EU |

### Physical Specifications

|                       |                              |
|-----------------------|------------------------------|
| Casing material       | non-conductive black plastic |
| Potting material      | silicone (UL 94V-0 rated)    |
| Package weight        | 2.1 g (0.07 oz)              |
| Soldering temperature | 260°C / 6 s max.             |

**Supporting Documents:** [www.tracopower.com/overview/trn1](http://www.tracopower.com/overview/trn1)

### Outline Dimensions



| Pin-Out |            |            |
|---------|------------|------------|
| Pin     | Single     | Dual       |
| 1       | -Vin (GND) | -Vin (GND) |
| 2       | +Vin (Vcc) | +Vin (Vcc) |
| 3       | +Vout      | +Vout      |
| 4       | no pin     | common     |
| 5       | -Vout      | -Vout      |

Dimensions in [mm], () = Inch

|                         |               |
|-------------------------|---------------|
| Tolerances: x.x         | ±0.5 (±0.02)  |
| x.xx                    | ±0.25 (±0.01) |
| Pin pitch tolerances    | ±0.25 (±0.01) |
| Pin dimension tolerance | ±0.1 (±0.004) |



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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