

Features

- ◆ Semi-regulated output (load)
- ◆ Industry standard pinout
- ◆ High efficiency up to 88%
- ◆ Single and dual output models
- ◆ I/O isolation voltage 1000 VDC
- ◆ Operationally reliable up to 5'000m altitude
- ◆ Operating temperature range
-40°C to +85°C
- ◆ 3-year product warranty



The TRA 1 series are miniature, I/O-isolated 1W 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 | Output voltage | Output current max. | Load regulation max. | Efficiency typ. |
|-------------|---------------|----------------|------------------------|-------------------------|-----------------|
| TRA 1- 0511 | 5 VDC ±10% | 5 VDC | 200 mA | 6.5 % | 84 % |
| TRA 1- 0519 | | 9 VDC | 110 mA | 5 % | 87 % |
| TRA 1- 0512 | | 12 VDC | 84 mA | 5.2 % | 87 % |
| TRA 1- 0513 | | 15 VDC | 67 mA | 5 % | 87 % |
| TRA 1- 0521 | | ±5 VDC | ±100 mA | 5.2 % | 84 % |
| TRA 1- 0522 | | ±12 VDC | ±42 mA | 4.6 % | 86 % |
| TRA 1- 0523 | | ±15 VDC | ±34 mA | 4.5 % | 86 % |
| TRA 1- 1211 | 12 VDC ±10% | 5 VDC | 200 mA | 5 % | 84 % |
| TRA 1- 1219 | | 9 VDC | 110 mA | 3.4 % | 86 % |
| TRA 1- 1212 | | 12 VDC | 84 mA | 3.4 % | 88 % |
| TRA 1- 1213 | | 15 VDC | 67 mA | 2.7 % | 88 % |
| TRA 1- 1221 | | ±5 VDC | ±100 mA | 3.9 % | 84 % |
| TRA 1- 1222 | | ±12 VDC | ±42 mA | 2.9 % | 88 % |
| TRA 1- 1223 | | ±15 VDC | ±34 mA | 2.6 % | 87 % |
| TRA 1- 2411 | 24 VDC ±10% | 5 VDC | 200 mA | 3.7 % | 84 % |
| TRA 1- 2419 | | 9 VDC | 110 mA | 2.5 % | 86 % |
| TRA 1- 2412 | | 12 VDC | 84 mA | 2.4 % | 87 % |
| TRA 1- 2413 | | 15 VDC | 67 mA | 2.3 % | 87 % |
| TRA 1- 2421 | | ±5 VDC | ±100 mA | 3.7 % | 83 % |
| TRA 1- 2422 | | ±12 VDC | ±42 mA | 2.4 % | 87 % |
| TRA 1- 2423 | | ±15 VDC | ±34 mA | 2.3 % | 87 % |

Input Specifications

| | | |
|---|--------------------|---------------------|
| Input current no load / full load | 5 Vin models | 30 mA / 240 mA typ. |
| | 12 Vin models | 12 mA / 100 mA typ. |
| | 24 Vin models | 11 mA / 50 mA typ. |
| Surge voltage (1 sec. max.) | 5 Vin models | 9 V max. |
| | 12 Vin models | 18 V max. |
| | 24 Vin models | 30 V max. |
| Reflected input ripple current | 12 Vin models | 4 mA typ. |
| | other models | 8 mA typ. |
| Input filter | internal capacitor | |
| Reverse voltage protection | 0.3 A max. | |
| Recommended input fuse (slow blow type) | 5 Vin models: | 500 mA |
| | 12 Vin models: | 200 mA |
| | 24 Vin models: | 100 mA |

Output Specifications

| | | |
|--------------------------------------|-----------------------|---|
| Voltage balance (dual output models) | 1 % max. | |
| Regulation | - Input variation | 1.05 % / 1 % change of Vin see graph 1 on page 3 |
| | - Load variation | |
| Ripple and noise (20 MHz Bandwidth) | 60 mV pk-pk max. | |
| Temperature coefficient | ± 0.02 %/K | |
| Short circuit | limited 0.5 sec. max. | |
| Capacitive load | single output models: | 220 µF max. |
| | dual output models: | 100 µF max. (each output) |

General Specifications

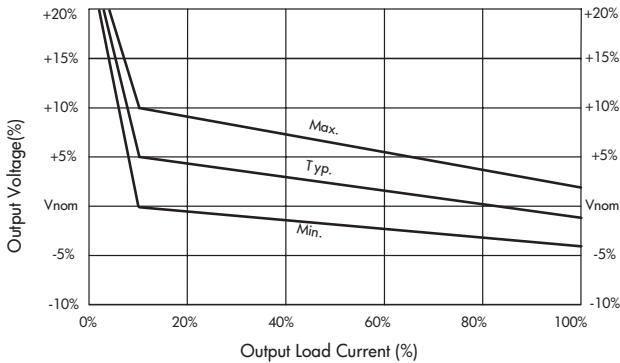
| | | |
|---|--|--|
| Temperature ranges | - Operating | -40°C to +85°C (without derating) +105°C max. -50°C to +125°C |
| | - Case temperature | |
| | - Storage | |
| Humidity (non condensing) | 95 % rel H max. | |
| Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign) | >2'000'000 h | |
| Isolation voltage (60 sec.) | Input/Output | 1'000 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 standards | IEC 60950-1:2005 (2nd edition) + Am 1:2009 EN 60950-1:2006 + Am 1:2010 + Am 11:2009 | |
| Safety approvals | - CB scheme (IEC 60950-1) | www.tracopower.com/products/tra-cb.pdf www.tracopower.com/products/tra-csa.pdf |
| | - CSA certification (UL 60950-1, CSA 60950-1-07) | |

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

Physical Specifications

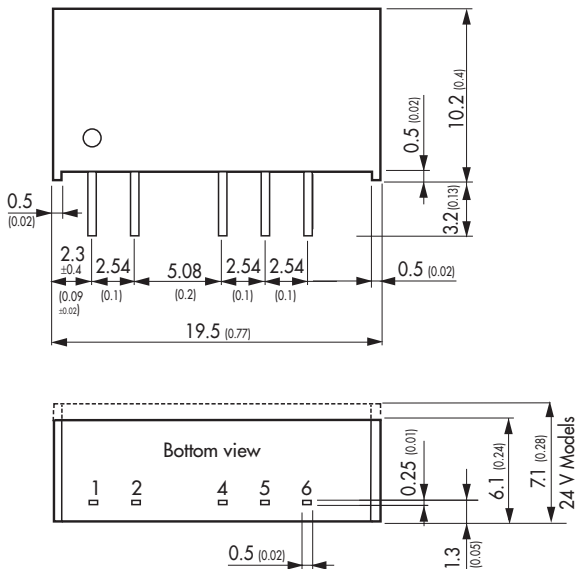
| | | |
|--------------------------|--|---|
| Casing material | | non conductive plastic (UL 94V-0 rated) |
| Weight | - 5 & 12 VDC models - 24 VDC models | 2.2 g (0.07 oz) 2.6 g (0.09 oz) |
| Soldering temperature | | max. 260°C, 10 sec, 1.5 mm from case |
| Environmental compliance | - Reach - RoHS | www.tracopower.com/products/tra1-reach.pdf RoHS directive 2002/95/EC |

Graph 1: Load regulation



Application note: www.tracopower.com/products/tra1-application.pdf

Outline Dimensions



| Pin-Out | | |
|---------|------------|------------|
| Pin | Single | Dual |
| 1 | +Vin (Vcc) | +Vin (Vcc) |
| 2 | -Vin (GND) | -Vin (GND) |
| 4 | -Vout | -Vout |
| 5 | No pin | Common |
| 6 | +Vout | +Vout |

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

Specifications can be changed any time without notice.