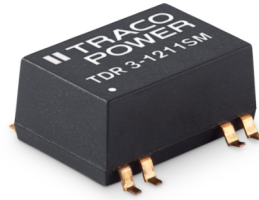


- Compact design in SMD package
- Wide 2:1 input voltage range
- Fully regulated outputs
- Low ripple and noise
- Temperature range -40°C to $+85^{\circ}\text{C}$ without derating
- I/O isolation 1600 VDC
- Continuous short-circuit protection
- Remote On/Off control
- Fully RoHS compliant
- 3-year product warranty



The TDR 3SM series is a family of compact 3 W DC/DC-converters with 2:1 input voltage ranges and tightly regulated output voltages even under no load conditions. The product is available in SMD-package. They work with high efficiency over the full load range and come with a remote On/Off input. The usability in temperature ranges of up to 85°C , continuous short circuit protection and excellent immunity against environmental influences make these converters very reliable. A TDR 3SM converter is the ideal solution for space critical high end applications in communication equipment, instrumentation and industrial electronics.

Models

| Order Code | Input Voltage Range | Output 1 | | Output 2 | | Efficiency typ. |
|--|------------------------------|---|--|----------|------------------|--------------------------------------|
| | | Vnom | I _{max} | Vnom | I _{max} | |
| TDR 3-0511SM TDR 3-0512SM TDR 3-0513SM TDR 3-0522SM TDR 3-0523SM | 4.5 - 9 VDC (5 VDC nom.) | 5 VDC 12 VDC 15 VDC +12 VDC +15 VDC | 600 mA 250 mA 200 mA 125 mA 100 mA | | | 79 % 80 % 81 % 80 % 81 % |
| TDR 3-1211SM TDR 3-1212SM TDR 3-1213SM TDR 3-1222SM TDR 3-1223SM | 9 - 18 VDC (12 VDC nom.) | 5 VDC 12 VDC 15 VDC +12 VDC +15 VDC | 600 mA 250 mA 200 mA 125 mA 100 mA | | | 81 % 82 % 82 % 82 % 83 % |
| TDR 3-2411SM TDR 3-2412SM TDR 3-2413SM TDR 3-2422SM TDR 3-2423SM | 18 - 36 VDC (24 VDC nom.) | 5 VDC 12 VDC 15 VDC +12 VDC +15 VDC | 600 mA 250 mA 200 mA 125 mA 100 mA | | | 81 % 82 % 83 % 83 % 83 % |
| TDR 3-4811SM TDR 3-4812SM TDR 3-4813SM TDR 3-4822SM TDR 3-4823SM | 36 - 75 VDC (48 VDC nom.) | 5 VDC 12 VDC 15 VDC +12 VDC +15 VDC | 600 mA 250 mA 200 mA 125 mA 100 mA | | | 81 % 82 % 82 % 83 % 83 % |

Input Specifications

| | | |
|--------------------------|----------------|--|
| Input Current | - At no load | 5 Vin models: 50 mA typ. 12 Vin models: 30 mA typ. 24 Vin models: 13 mA typ. 48 Vin models: 10 mA typ. |
| | - At full load | 5 Vin models: 790 mA max. 12 Vin models: 320 mA max. 24 Vin models: 160 mA max. 48 Vin models: 80 mA max. |
| Surge Voltage | | 5 Vin models: 15 VDC max. (1 s max.) 12 Vin models: 25 VDC max. (1 s max.) 24 Vin models: 50 VDC max. (1 s max.) 48 Vin models: 100 VDC max. (1 s max.) |
| Reflected Ripple Current | | 5 Vin models: 80 mAp-p typ. 12 Vin models: 40 mAp-p typ. 24 Vin models: 30 mAp-p typ. 48 Vin models: 20 mAp-p typ. |
| Recommended Input Fuse | | 5 Vin models: 3'000 mA (slow blow) 12 Vin models: 3'000 mA (slow blow) 24 Vin models: 1'500 mA (slow blow) 48 Vin models: 1'500 mA (slow blow) (The need of an external fuse has to be assessed in the final application.) |
| Input Filter | | Internal Capacitor |

Output Specifications

| | | |
|--------------------------|---|--|
| Voltage Set Accuracy | | ±1% max. |
| Regulation | - Input Variation (Vmin - Vmax) | single output models: 0.2% max. dual output models: 0.2% max. |
| | - Load Variation (0 - 100%) | single output models: 1% max. dual output models: 1% max. (Output 1) 1% max. (Output 2) |
| | - Cross Regulation (25% / 100% asym. load) | dual output models: 5% max. |
| Ripple and Noise | - 20 MHz Bandwidth | 30 mVp-p typ. |
| Capacitive Load | - single output | 5 Vout models: 1'680 µF max. 12 Vout models: 820 µF max. 15 Vout models: 680 µF max. |
| | - dual output | 12 / -12 Vout models: 470 / 470 µF max. 15 / -15 Vout models: 330 / 330 µF max. |
| Minimum Load | | Not required |
| Temperature Coefficient | | ±0.02 %/K max. |
| Start-up Time | | 5 ms typ. |
| Short Circuit Protection | | Continuous, Automatic recovery |
| Transient Response | - Response Time | 250 µs typ. (25% Load Step) |

Safety Specifications

| | | |
|------------------|-----------------------------|--|
| Standards | - IT / Multimedia Equipment | EN 60950-1 EN 62368-1 IEC 60950-1 IEC 62368-1 UL 60950-1 UL 62368-1 |
| | - Certification Documents | www.tracopower.com/overview/tdr3sm |
| Pollution Degree | | PD 2 |

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

EMC Specifications

| | | |
|-----------------|-----------------------------|--|
| EMI (Emissions) | - Conducted Emissions | EN 55032 class A (with external filter) EN 55032 class B (with external filter) |
| | - Radiated Emissions | EN 55032 class A (with external filter) EN 55032 class B (with external filter) |
| | | External filter proposal: www.tracopower.com/overview/tdr3sm |
| EMS (Immunity) | - Electrostatic Discharge | Air: EN 61000-4-2, ±8 kV, perf. criteria A Contact: EN 61000-4-2, ±6 kV, perf. criteria A |
| | - RF Electromagnetic Field | EN 61000-4-3, 10 V/m, perf. criteria A |
| | - EFT (Burst) / Surge | EN 61000-4-4, ±2 kV, perf. criteria A EN 61000-4-5, ±1 kV, perf. criteria A |
| | - Conducted RF Disturbances | Ext. input component: 220 µF / 100 V EN 61000-4-6, 10 Vrms, perf. criteria A |
| | - PF Magnetic Field | Continuous: EN 61000-4-8, 100 A/m, perf. criteria A 1 s: EN 61000-4-8, 1000 A/m, perf. criteria A |

General Specifications

| | | |
|----------------------------|--|--|
| Relative Humidity | | 95% max. (non condensing) |
| Temperature Ranges | - Operating Temperature | -40°C to +85°C |
| | - Case Temperature | +100°C max. |
| | - Storage Temperature | -55°C to +125°C |
| Power Derating | - High Temperature | 3.3 %/K above 70°C |
| | | See application note: www.tracopower.com/overview/tdr3sm |
| Cooling System | | Natural convection (20 LFM) |
| Remote Control | - Current Controlled Remote (passive = on) | On: open circuit Off: 2 to 4 mA current (internal 1 kΩ resistor) Refers to 'Remote' and '-Vin' Pin |
| | - Off Idle Input Current | External circuit proposal: www.tracopower.com/info/current-remote.pdf 2.5 mA max. |
| Altitude During Operation | | 5'000 m max. |
| Regulator Topology | | Flyback Converter |
| Switching Frequency | | 100 kHz min. (RCC) |
| Insulation System | | Basic Insulation |
| Isolation Test Voltage | - Input to Output, 60 s | 1'600 VDC |
| Isolation Resistance | - Input to Output, 500 VDC | 1'000 MΩ min. |
| Isolation Capacitance | - Input to Output, 100 kHz, 1 V | 50 pF max. |
| Reliability | - Calculated MTBF | 6'200'000 h (MIL-HDBK-217F, ground benign) |
| Moisture Sensitivity (MSL) | | Level 2a (J-STD-033C) |
| Washing Process | | According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf |
| Environment | - Vibration | MIL-STD-810F |
| | - Thermal Shock | MIL-STD-810F |
| Housing Material | | Non-conductive Plastic (UL 94 V-0 rated) |
| Potting Material | | Epoxy (UL 94 V-0 rated) |
| Pin Material | | Copper |
| Pin Foundation Plating | | Nickel (40 - 120 µm) |
| Pin Surface Plating | | Gold (25 - 75 nm), matte |
| Housing Type | | Overmold |
| Mounting Type | | PCB Mount |
| Connection Type | | SMD (Surface-Mount Device) |
| Footprint Type | | SMD14 |
| Soldering Profile | | Lead-Free Reflow Soldering (acc. J-STD-020E) 245°C max. (Tp) |
| | | 10 s max. (tp, at Tp - 5°C) |
| | | 85 s max. (tL, time above 217°C) |
| | | See application note: www.tracopower.com/info/reflow-soldering.pdf |

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

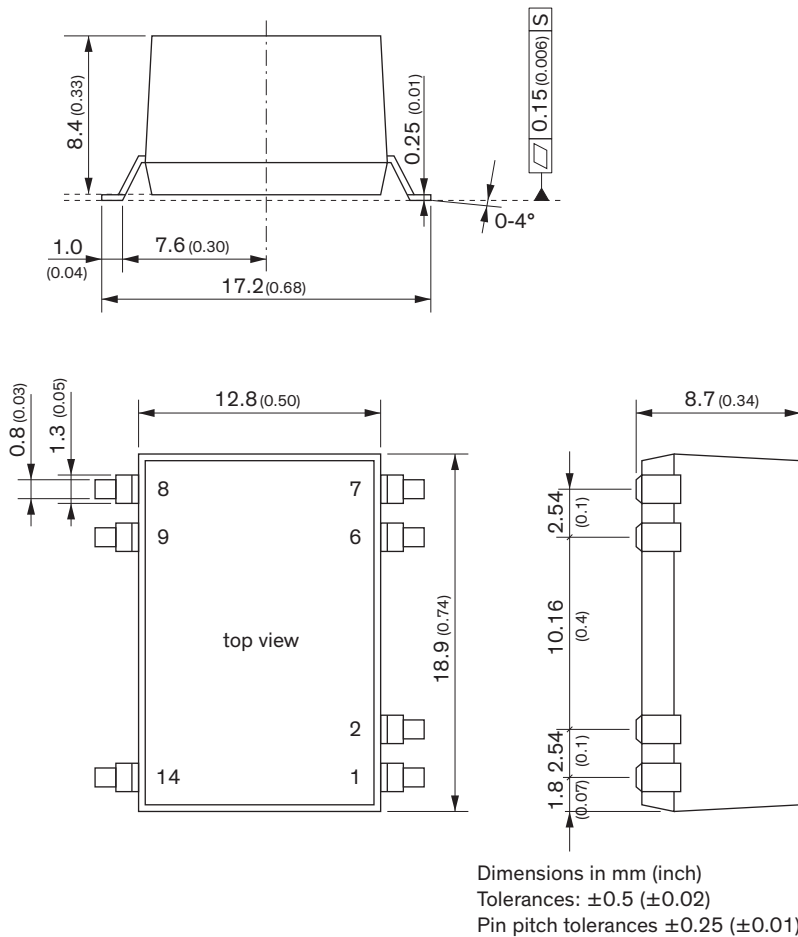
| | |
|--|--|
| Weight | 4.5 g |
| Environmental Compliance - REACH Declaration | www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant |
| - RoHS Declaration | www.tracopower.com/info/rohs-declaration.pdf Exemptions: 7a, 7c-l (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).) |
| - SCIP Reference Number | d87a4994-8fd1-43bc-8d68-640b44a933b6 |

Supporting Documents

Overview Link (for additional Documents)

www.tracopower.com/overview/tr3sm

Outline Dimensions



| Pinout | | |
|--------|---------------|---------------|
| Pin | Single | Dual |
| 1 | -Vin (GND) | -Vin (GND) |
| 2 | Remote On/Off | Remote On/Off |
| 6 | NC | Common |
| 7 | NC | -Vout |
| 8 | +Vout | +Vout |
| 9 | -Vout | Common |
| 14 | +Vin (Vcc) | +Vin (Vcc) |

NC: Not connected

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

Recommended Solder Pad Layout

