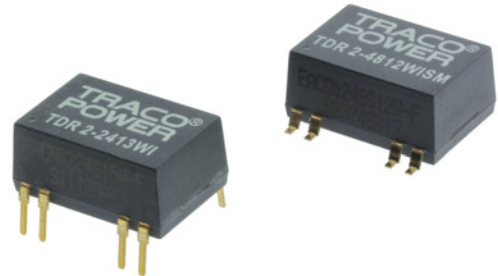


### Features

- ◆ Compact design in SMD or DIP package
- ◆ Ultra wide 4:1 input voltage range
- ◆ Fully regulated outputs
- ◆ Low ripple and noise 30mV pk-pk
- ◆ No minimum load required
- ◆ Temperature range -40°C to +85°C without derating
- ◆ I/O isolation 1500 VDC
- ◆ Continuous short-circuit protection
- ◆ Remote On/Off control
- ◆ Fully RoHS compliant
- ◆ 3-year product warranty



The TDR-2WI series is a family of compact 2 W dc/dc-converters with 4:1 input voltage ranges and tightly regulated output voltages even under no load conditions. The product is available in SMD-package or in DIP-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 without power derating, continuous short circuit protection and excellent immunity against environmental influences make these converters very reliable.

A TDR-2WI converter is the ideal solution for space critical high end applications in communication equipment, instrumentation and industrial electronics.

### Models

| Order code<br>DIP models | Order code<br>SMD models | Input voltage range              | Output voltage | Output current<br>max. | Efficiency typ. |
|--------------------------|--------------------------|----------------------------------|----------------|------------------------|-----------------|
| TDR 2-1211WI             | TDR 2-1211WISM           | 4.5 – 18 VDC<br>(12 VDC nominal) | 5.0 VDC        | 400 mA                 | 79 %            |
| TDR 2-1212WI             | TDR 2-1212WISM           |                                  | 12 VDC         | 167 mA                 | 80 %            |
| TDR 2-1213WI             | TDR 2-1213WISM           |                                  | 15 VDC         | 134 mA                 | 81 %            |
| TDR 2-1222WI             | TDR 2-1222WISM           |                                  | ±12 VDC        | ±83 mA                 | 81 %            |
| TDR 2-1223WI             | TDR 2-1223WISM           |                                  | ±15 VDC        | ±67 mA                 | 81 %            |
| TDR 2-2411WI             | TDR 2-2411WISM           | 9 – 36 VDC<br>(24 VDC nominal)   | 5.0 VDC        | 400 mA                 | 79 %            |
| TDR 2-2412WI             | TDR 2-2412WISM           |                                  | 12 VDC         | 167 mA                 | 80 %            |
| TDR 2-2413WI             | TDR 2-2413WISM           |                                  | 15 VDC         | 134 mA                 | 82 %            |
| TDR 2-2422WI             | TDR 2-2422WISM           |                                  | ±12 VDC        | ±83 mA                 | 80 %            |
| TDR 2-2423WI             | TDR 2-2423WISM           |                                  | ±15 VDC        | ±67 mA                 | 81 %            |
| TDR 2-4811WI             | TDR 2-4811WISM           | 18 – 75 VDC<br>(48 VDC nominal)  | 5.0 VDC        | 400 mA                 | 78 %            |
| TDR 2-4812WI             | TDR 2-4812WISM           |                                  | 12 VDC         | 167 mA                 | 81 %            |
| TDR 2-4813WI             | TDR 2-4813WISM           |                                  | 15 VDC         | 134 mA                 | 82 %            |
| TDR 2-4822WI             | TDR 2-4822WISM           |                                  | ±12 VDC        | ±83 mA                 | 81 %            |
| TDR 2-4823WI             | TDR 2-4823WISM           |                                  | ±15 VDC        | ±67 mA                 | 81 %            |

## Input Specifications

|                                                                            |                                                                                                                                                                                   |
|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input current at no load (nominal input voltage)                           | 12 Vin models: 35 mA typ.<br>24 Vin models: 20 mA typ.<br>48 Vin models: 10 mA typ.                                                                                               |
| Input current at full load (nominal input voltage)                         | 12 Vin models: 215 mA typ.<br>24 Vin models: 110 mA typ.<br>48 Vin models: 55 mA typ.                                                                                             |
| Surge voltage (1 sec. max.)                                                | 12 Vin models: 25 V max.<br>24 Vin models: 50 V max.<br>48 Vin models: 100 V max.                                                                                                 |
| Input filter                                                               | capacitor type (see EMC considerations page 3 for compliance to EN 55022 class A/B)                                                                                               |
| ESD (electrostatic discharge)                                              | EN 61000-4-2, air $\pm 8$ kV, contact $\pm 6$ kV, perf. criteria A                                                                                                                |
| Radiated immunity                                                          | EN 61000-4-3 10 V/m, perf. criteria A                                                                                                                                             |
| Fast transient / Surge                                                     | EN 61000-4-4, $\pm 2$ kV, perf. criteria A<br>EN 61000-4-5, $\pm 1$ kV perf. criteria A<br>with external input capacitor e.g. Nippon chemi-con KY 220 $\mu$ F, 100 V, ESR 48 mOhm |
| Conducted immunity                                                         | EN 61000-4-6, 10 Vrms, perf. criteria A                                                                                                                                           |
| Reflected ripple current<br>(measured with input filter according class A) | 12 Vin models: 80 mA-p-p typ.<br>24 Vin models: 40 mA-p-p typ.<br>48 Vin models: 30 mA-p-p typ.                                                                                   |

## Output Specifications

|                                                         |                                                                                                                                                                                                                                            |                                                                                                                                                                                                                       |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Voltage set accuracy                                    |                                                                                                                                                                                                                                            | ±1 % max                                                                                                                                                                                                              |
| Regulation                                              | <ul style="list-style-type: none"> <li>– Input variation <math>V_{in}</math> min. to <math>V_{in}</math> max.</li> <li>– Load variation 0 – 100 %</li> <li>– Load variation 10 – 90 %</li> <li>– Load cross regulation 25/100 %</li> </ul> | 0.2 % max.<br>single output models: 1.0 % max.<br>dual output models: 1.0 % max. balanced load<br>single output models: 0.5 % max.<br>dual output models: 0.8 % max. balanced load<br>5.0 % max. (dual output models) |
| Minimum load                                            |                                                                                                                                                                                                                                            | 0 % of rated max. load                                                                                                                                                                                                |
| Temperature coefficient                                 |                                                                                                                                                                                                                                            | ±0.02 %/K                                                                                                                                                                                                             |
| Ripple and noise (20 MHz bandwidth)                     |                                                                                                                                                                                                                                            | 30 mV pk-pk typ.                                                                                                                                                                                                      |
| Start up time<br>(constant resistive load)              | <ul style="list-style-type: none"> <li>– Power On</li> <li>– Remote On</li> </ul>                                                                                                                                                          | 5 ms typ.<br>5 ms typ.                                                                                                                                                                                                |
| Transient response setting time (25 % load step change) |                                                                                                                                                                                                                                            | 250 µs typ.                                                                                                                                                                                                           |
| Short circuit protection                                |                                                                                                                                                                                                                                            | indefinite, automatic recovery                                                                                                                                                                                        |
| Capacitive load                                         | 5 VDC models:<br>12 VDC models:<br>15 VDC models:<br>±12 VDC models:<br>±15 VDC models:                                                                                                                                                    | 1680 µF max.<br>820 µF max.<br>680 µF max.<br>±470 µF max.<br>±330 µF max.                                                                                                                                            |

## General Specifications

|                           |                                                                                                               |                                                                                                                          |
|---------------------------|---------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Temperature ranges        | <ul style="list-style-type: none"><li>– Operating</li><li>– Storage</li><li>– Case temperature max.</li></ul> | <ul style="list-style-type: none"><li>–40°C to +85°C (with no derating)</li><li>–55°C to +125°C</li><li>+100°C</li></ul> |
| Humidity (non condensing) |                                                                                                               | 5 % to 90 % rel. H max.                                                                                                  |

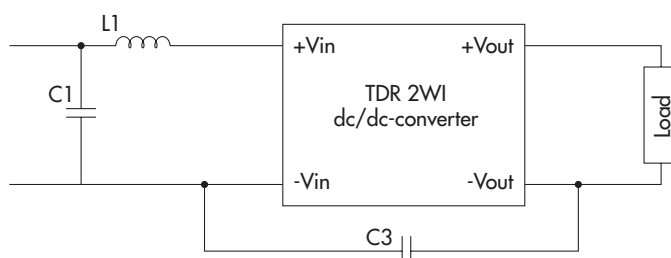
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

## General Specifications

|                                                                                          |                                                                                                                                                           |
|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Thermal shock, mechanical shock & vibration<br>– Test conditions                         | EN 61373, MIL-STD-810F<br><a href="http://www.tracopower.com/products/mil810.pdf">www.tracopower.com/products/mil810.pdf</a>                              |
| Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)                    | >6.6 Mio h                                                                                                                                                |
| Isolation voltage (60 sec.) – Input/Output                                               | 1500 VDC                                                                                                                                                  |
| Isolation capacitance – Input/Output                                                     | 50 pF max.                                                                                                                                                |
| Isolation resistance – Input/Output (500 VDC)                                            | >10 GOhm                                                                                                                                                  |
| Altitude during operation                                                                | tba.                                                                                                                                                      |
| Safety standard (designed to meet)                                                       | IEC/EN 60950-1, UL 60950-1                                                                                                                                |
| Safety approvals<br>– UL/cUL<br>– engineering considerations/conditions of acceptability | <a href="http://www.ul.com">www.ul.com</a> -> certifications -> File e188913<br>on request: <a href="mailto:mailto:TRACO">mailto:TRACO</a> (enter series) |
| Switching frequency                                                                      | 100 kHz (PWM)                                                                                                                                             |
| Remote On/Off<br>– On:<br>– Off:<br>– Off stand by input current                         | open or high impedance<br>2...4 mA current applied via 1KOhm resistor<br>2.5 mA max.                                                                      |
| Environmental compliance<br>– Reach<br>– RoHS                                            | <a href="http://www.tracopower.com/products/tdr2wi-reach.pdf">www.tracopower.com/products/tdr2wi-reach.pdf</a><br>RoHS directive 2011/65/EU               |

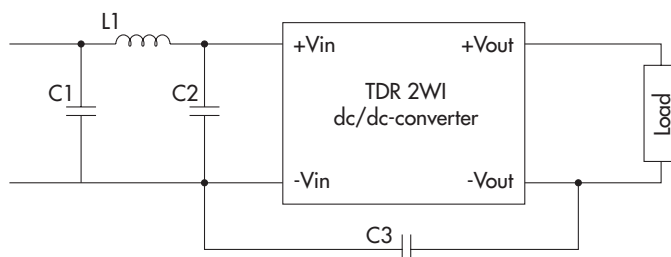
## EMC Consideration

Recommended filter for  
**EN 55022 class A** compliance



| Input models | C1                       | C3                     | L1<br>value | order code<br>(SMD type) | datasheet:                                                                                         |
|--------------|--------------------------|------------------------|-------------|--------------------------|----------------------------------------------------------------------------------------------------|
| 12 VDC       | 10 µF / 25 V 1812 MLCC   | 220pF / 3 kV 1808 MLCC | 2.2 µH      | <b>TCK-059</b>           | <a href="http://www.tracopower.com/products/tck059.pdf">www.tracopower.com/products/tck059.pdf</a> |
| 24 VDC       | 6.8 µF / 50 V 1812 MLCC  |                        | 18 µH       | <b>TCK-046</b>           | <a href="http://www.tracopower.com/products/tck046.pdf">www.tracopower.com/products/tck046.pdf</a> |
| 48 VDC       | 4.7 µF / 100 V 1812 MLCC |                        |             |                          |                                                                                                    |

Recommended filter for  
**EN 55022 class B** compliance



| Input models | C1 & C2                  | C3                     | L1<br>value | order code<br>(SMD type) | datasheet                                                                                          |
|--------------|--------------------------|------------------------|-------------|--------------------------|----------------------------------------------------------------------------------------------------|
| 12 VDC       | 10 µF / 25 V 1812 MLCC   | 220pF / 3 kV 1808 MLCC | 2.2 µH      | <b>TCK-059</b>           | <a href="http://www.tracopower.com/products/tck059.pdf">www.tracopower.com/products/tck059.pdf</a> |
| 24 VDC       | 2.2 µF / 50 V 1812 MLCC  |                        | 18 µH       | <b>TCK-046</b>           | <a href="http://www.tracopower.com/products/tck046.pdf">www.tracopower.com/products/tck046.pdf</a> |
| 48 VDC       | 2.2 µF / 100 V 1812 MLCC |                        | 27 µH       | <b>TCK-063</b>           | <a href="http://www.tracopower.com/products/tck063.pdf">www.tracopower.com/products/tck063.pdf</a> |

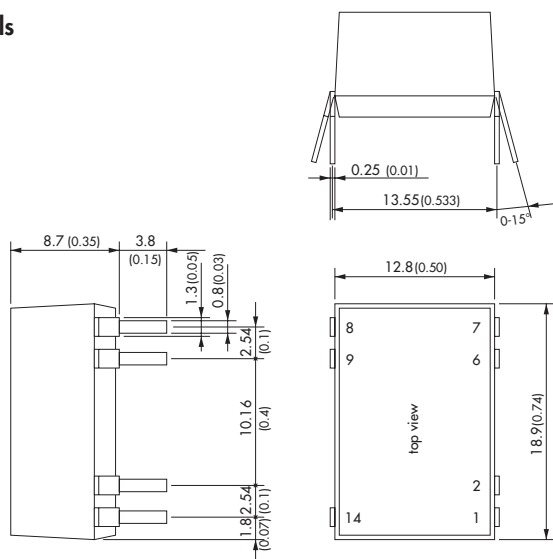
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

## Physical Specifications

|                                                        |                                                                                                                                                                           |
|--------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Casing material                                        | non-conductive plastic (UL94V-0 rated)                                                                                                                                    |
| Package weight                                         | 4.5 g (0.16oz)                                                                                                                                                            |
| Soldering profile for DIP-package models               | max. 265°C / 10 sec. (wave soldering)                                                                                                                                     |
| Lead-free reflow solder process for SMD-package models | as per J-STD-020D.01 (to find at:<br><a href="http://www.jedec.org">www.jedec.org</a> - free registration required)                                                       |
| Moisture sensitivity level (for SMD-package models)    | level 2a as per J-STD-033B.01 (to find at:<br><a href="http://www.jedec.org">www.jedec.org</a> - free registration required)                                              |
| Packaging                                              | <div> <div>– Tube</div> <div>– Tape &amp; Reel (only SMD models, add suffix –TR)</div> </div> <div> <div>10 pcs packing unit</div> <div>200 pcs packing unit</div> </div> |

## Outline Dimensions

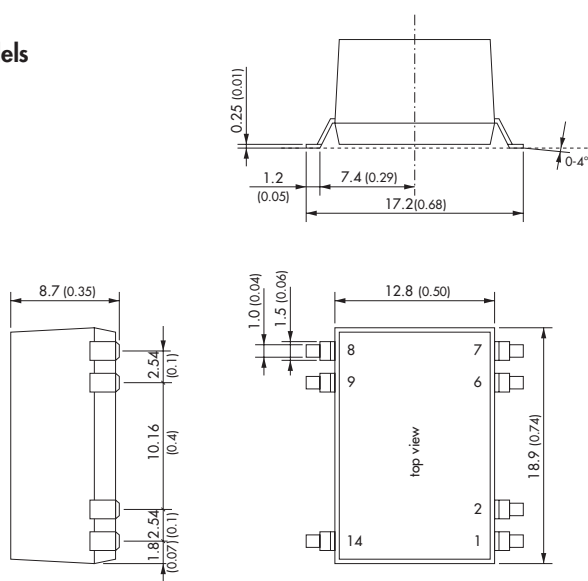
### DIP-Models



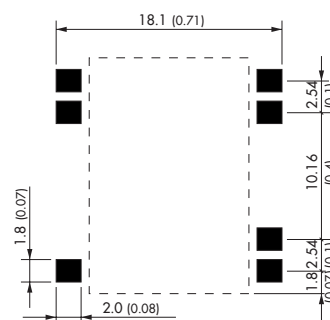
| Pin-Out |               |               |
|---------|---------------|---------------|
| Pin     | Single        | Dual          |
| 1       | –Vin (GND)    | –Vin (GND)    |
| 2       | Remote On/Off | Remote On/Off |
| 6       | NC            | Common        |
| 7       | NC            | –Vout   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

NC = not to connect

### SMD-Models



### Recommended Solder Pad Dimension:



Dimensions in [mm], ( ) = Inch  
Tolerances:  $\pm 0.5$  ( $\pm 0.02$ )  
Pin pitch 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)