

- Ultra low ripple and noise 10mVp-p typ.
- DIP-24 Package
- Regulated
- I/O isolation 1600 VDC functional
- Operating temperature range -40 to +90°C
- Remote On/Off
- 3-year product warranty



The TVN 5WI series is a ultra low ripple and noise 5 Watt DC/DC converter featuring wide 4:1 input voltage ranges in a DIP-24 package. Standard features include remote On/Off, over voltage protection, under voltage lockout and short circuit protection. High efficiency across load range and low input current characteristics at no load make these converters the ideal solution for many operations which require low ripple and noise characteristics.

| Models       |                              |          |                  |          |                  |                 |
|--------------|------------------------------|----------|------------------|----------|------------------|-----------------|
| Order Code   | Input Voltage Range          | Output 1 |                  | Output 2 |                  | Efficiency typ. |
|              |                              | Vnom     | I <sub>max</sub> | Vnom     | I <sub>max</sub> |                 |
| TVN 5-0910WI | 4.5 - 12 VDC<br>(9 VDC nom.) | 3.3 VDC  | 1'515 mA         |          |                  | 79 %            |
| TVN 5-0911WI |                              | 5 VDC    | 1'000 mA         |          |                  | 82 %            |
| TVN 5-0912WI |                              | 12 VDC   | 416 mA           |          |                  | 87 %            |
| TVN 5-0913WI |                              | 15 VDC   | 333 mA           |          |                  | 87 %            |
| TVN 5-0915WI |                              | 24 VDC   | 208 mA           |          |                  | 88 %            |
| TVN 5-0921WI |                              | +5 VDC   | 500 mA           | -5 VDC   | 500 mA           | 84 %            |
| TVN 5-0922WI |                              | +12 VDC  | 208 mA           | -12 VDC  | 208 mA           | 85 %            |
| TVN 5-0923WI |                              | +15 VDC  | 166 mA           | -15 VDC  | 166 mA           | 86 %            |
| TVN 5-0925WI |                              | +24 VDC  | 104 mA           | -24 VDC  | 104 mA           | 87 %            |
| TVN 5-2410WI | 9 - 36 VDC<br>(24 VDC nom.)  | 3.3 VDC  | 1'515 mA         |          |                  | 81 %            |
| TVN 5-2411WI |                              | 5 VDC    | 1'000 mA         |          |                  | 83 %            |
| TVN 5-2412WI |                              | 12 VDC   | 416 mA           |          |                  | 88 %            |
| TVN 5-2413WI |                              | 15 VDC   | 333 mA           |          |                  | 88 %            |
| TVN 5-2415WI |                              | 24 VDC   | 208 mA           |          |                  | 89 %            |
| TVN 5-2421WI |                              | +5 VDC   | 500 mA           | -5 VDC   | 500 mA           | 84 %            |
| TVN 5-2422WI |                              | +12 VDC  | 208 mA           | -12 VDC  | 208 mA           | 85 %            |
| TVN 5-2423WI |                              | +15 VDC  | 166 mA           | -15 VDC  | 166 mA           | 86 %            |
| TVN 5-2425WI |                              | +24 VDC  | 104 mA           | -24 VDC  | 104 mA           | 87 %            |
| TVN 5-4810WI | 18 - 75 VDC<br>(48 VDC nom.) | 3.3 VDC  | 1'515 mA         |          |                  | 80 %            |
| TVN 5-4811WI |                              | 5 VDC    | 1'000 mA         |          |                  | 83 %            |
| TVN 5-4812WI |                              | 12 VDC   | 416 mA           |          |                  | 86 %            |
| TVN 5-4813WI |                              | 15 VDC   | 333 mA           |          |                  | 87 %            |
| TVN 5-4815WI |                              | 24 VDC   | 208 mA           |          |                  | 88 %            |
| TVN 5-4821WI |                              | +5 VDC   | 500 mA           | -5 VDC   | 500 mA           | 83 %            |
| TVN 5-4822WI |                              | +12 VDC  | 208 mA           | -12 VDC  | 208 mA           | 85 %            |
| TVN 5-4823WI |                              | +15 VDC  | 166 mA           | -15 VDC  | 166 mA           | 86 %            |
| TVN 5-4825WI |                              | +24 VDC  | 104 mA           | -24 VDC  | 104 mA           | 87 %            |

## Input Specifications

|                        |              |   |
|------------------------|--------------|---|
| Input Current          | - At no load | 9 Vin models: <b>35 mA typ.</b><br>24 Vin models: <b>8 mA typ.</b><br>48 Vin models: <b>5 mA typ.</b>   |
| Surge Voltage          |              | 9 Vin models: <b>16 VDC max.</b> (1 s max.)<br>24 Vin models: <b>50 VDC max.</b> (1 s max.)<br>48 Vin models: <b>100 VDC max.</b> (1 s max.)  |
| Under Voltage Lockout  |              | 9 Vin models: <b>3 VDC min. / 4 VDC typ. / 4.4 VDC max.</b><br>24 Vin models: <b>7 VDC min. / 8 VDC typ. / 8.8 VDC max.</b><br>48 Vin models: <b>15 VDC min. / 16 VDC typ. / 17.5 VDC max.</b>                                      |
| Recommended Input Fuse |              | 9 Vin models: <b>2'500 mA</b> (slow blow)<br>24 Vin models: <b>1'250 mA</b> (slow blow)<br>48 Vin models: <b>1'600 mA</b> (slow blow)<br><small>(The need of an external fuse has to be assessed in the final application.)</small> |
| Input Filter           |              | <b>Internal Pi-Type</b> (5 Vin models)<br><b>Common Choke</b> (other models)  |

## Output Specifications

|                           |  |  |
|---------------------------|--|--|
| Output Voltage Adjustment |  | -10% to +20% (single models)<br>±10% (dual models)<br>(By external trim resistor)<br>See application note: <a href="http://www.tracopower.com/overview/tvn5wi">www.tracopower.com/overview/tvn5wi</a><br>Output power must not exceed rated power!   |
| Voltage Set Accuracy      |  | ±1% max.   |
| Regulation                | - Input Variation (Vmin - Vmax)<br>- Load Variation (0 - 100%)<br>- Cross Regulation (25% / 100% asym. load) | single output models: <b>0.2% max.</b><br>dual output models: <b>0.2% max.</b><br>single output models: <b>0.5% max.</b><br>dual output models: <b>1% max.</b> (Output 1)<br><b>1% max.</b> (Output 2)<br>dual output models: <b>3% max.</b>   |
| Ripple and Noise          | - 20 MHz Bandwidth   | <b>10 mVp-p typ.</b><br><b>15 mVp-p max.</b>   |
| Capacitive Load           | - single output<br><br>- dual output   | 3.3 Vout models: <b>2'200 µF max.</b><br>5 Vout models: <b>1'000 µF max.</b><br>12 Vout models: <b>220 µF max.</b><br>15 Vout models: <b>150 µF max.</b><br>24 Vout models: <b>100 µF max.</b><br>5 / -5 Vout models: <b>680 / 680 µF max.</b><br>12 / -12 Vout models: <b>150 / 150 µF max.</b><br>15 / -15 Vout models: <b>150 / 150 µF max.</b><br>24 / -24 Vout models: <b>100 / 100 µF max.</b> |
| Minimum Load              |  | Not required   |
| Temperature Coefficient   |  | ±0.02 %/K max.   |
| Start-up Time             |  | 50 ms typ. / 75 ms max.  |
| Short Circuit Protection  |  | Continuous, Automatic recovery   |
| Output Current Limitation |  | 170% typ. of Iout max.   |
| Oversvoltage Protection   |  | 135% typ. of Vout nom.   |
| Transient Response        | - Response Time  | 250 µs typ. (50% Load Step)  |

## Safety Specifications

|                  |                             |  |
|------------------|-----------------------------|--|
| Safety Standards | - IT / Multimedia Equipment | Designed for EN 62368-1 (no certification) |
|------------------|-----------------------------|--|

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 (internal filter)<br>EN 55032 class B (internal filter)   |
|               | - Radiated Emissions        | EN 55032 class A (internal filter)<br>EN 55032 class B (internal filter)   |
|               |                             | External filter proposal: <a href="http://www.tracopower.com/overview/tvn5wi">www.tracopower.com/overview/tvn5wi</a><br>(48 Vin models: Filter proposal for class B) |
| EMS Immunity  | - Electrostatic Discharge   | Air: EN 61000-4-2, ±8 kV, perf. criteria A<br>Contact: EN 61000-4-2, ±6 kV, perf. criteria A   |
|               | - RF Electromagnetic Field  | EN 61000-4-3, 20 V/m, perf. criteria A   |
|               | - EFT (Burst) / Surge       | EN 61000-4-4, ±2 kV, perf. criteria A<br>EN 61000-4-5, ±2 kV, perf. criteria A   |
|               | - Conducted RF Disturbances | Ext. input component: 220 µF, 100 V    SMDJ70A (9 & 24 Vin models)<br>220 µF, 100 V    SMDJ120A (48 Vin models)  |
|               | - PF Magnetic Field         | Continuous: EN 61000-4-6, 10 Vrms, perf. criteria A<br>1 s: EN 61000-4-8, 100 A/m, perf. criteria A<br>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 +90°C  |
|                        | - Case Temperature   | +105°C max.   |
|                        | - Storage Temperature  | -55°C to +125°C   |
| Power Derating         | - High Temperature   | 6.67 %/K above 85°C   |
|                        | See application note: <a href="http://www.tracopower.com/overview/tvn5wi">www.tracopower.com/overview/tvn5wi</a> |   |
| Cooling System         |  | Natural convection (20 LFM)   |
| Remote Control         | - Voltage Controlled Remote  | On: 3.0 to 12 VDC or open circuit<br>Off: 0 to 1.2 VDC or short circuit<br>Refers to 'Remote' and '-Vin' Pin                      |
|                        | - Off Idle Input Current   | 3 mA typ.   |
|                        | - Remote Pin Input Current   | -0.5 to 1.0 mA  |
| Switching Frequency    |  | 300 kHz typ. (PWM)  |
| Insulation System      |  | Functional Insulation   |
| Isolation Test Voltage | - Input to Output, 60 s  | 1'600 VDC   |
|                        | - Input to Case, 60 s  | 1'600 VDC   |
|                        | - Output to Case, 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  | 1'200 pF max.   |
| Reliability            | - Calculated MTBF  | 4'400'000 h (MIL-HDBK-217F, ground benign)  |
| Washing Process        |  | According to Cleaning Guideline<br><a href="http://www.tracopower.com/info/cleaning.pdf">www.tracopower.com/info/cleaning.pdf</a> |
| Environment            | - Vibration  | MIL-STD-810F  |
|                        | - Thermal Shock  | MIL-STD-810F  |
| Housing Material       |  | Copper  |
| Base Material          |  | Non-conductive FR4 (UL 94 V-0 rated)  |
| Potting Material       |  | Epoxy (UL 94 V-0 rated)   |
| Pin Material           |  | Copper  |
| Pin Foundation Plating |  | Nickel (2 - 3 µm)   |
| Pin Surface Plating    |  | Tin (3 - 5 µm), matte   |
| Housing Type           |  | Metal Case  |
| Mounting Type          |  | PCB Mount   |
| Connection Type        |  | THD (Through-Hole Device)   |
| Footprint Type         |  | DIP24   |
| Soldering Profile      |  | 265°C / 10 s max.   |
| Weight                 |  | 15.3 g  |
| Thermal Impedance      | - Case to Ambient  | 20 K/W typ.   |

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

Environmental Compliance - REACH Declaration

[www.tracopower.com/info/reach-declaration.pdf](http://www.tracopower.com/info/reach-declaration.pdf)

- RoHS Declaration

REACH SVHC list compliant

REACH Annex XVII compliant

[www.tracopower.com/info/rohs-declaration.pdf](http://www.tracopower.com/info/rohs-declaration.pdf)

Exemptions: 7a, 7c-I

(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule))

- SCIP Reference Number

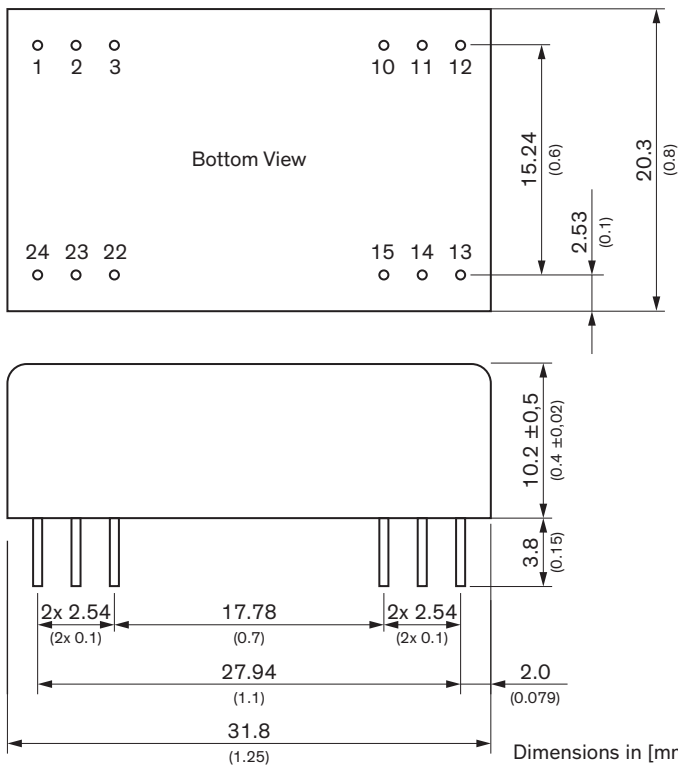
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### Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/tvn5wi](http://www.tracopower.com/overview/tvn5wi)

### Outline Dimensions



Dimensions in [mm], () = Inch  
 Pin diameter: 0.6 (±0.024)  
 Tolerances: x.x ±0.5 (±0.02)  
 Tolerances: x.xx ±0.25 (±0.01)  
 Pin pitch tolerances ±0.25 (±0.01)  
 Pin dimension tolerance ±0.1 (±0.004)

### Pinout

| Pin | Single        | Dual          |
|-----|---------------|---------------|
| 1   | +Vin (VCC)    | +Vin (VCC)    |
| 2   | +Vin (VCC)    | +Vin (VCC)    |
| 3   | Case          | Case          |
| 10  | No pin        | Common        |
| 11  | No pin        | +Vout 1       |
| 12  | Case          | Case          |
| 13  | Trim          | Trim          |
| 14  | -Vout         | -Vout 2       |
| 15  | +Vout         | Common        |
| 22  | Remote On/Off | Remote On/Off |
| 23  | -Vin (GND)    | -Vin (GND)    |
| 24  | -Vin (GND)    | -Vin (GND)    |

NC: Not connected