



**THE DATASHEET OF  
TMV 1212EN**



- Single-in-line package (SIP)
- Industrial safety to IEC/EN/UL 62368-1
- Reinforced insulation rated for 300 VAC working voltage
- I/O isolation voltage 3000 VACrms
- Operating temperature range  $-25\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$
- Unregulated device
- 3-year product warranty



The TMV-EN series is a range of 1 Watt non-regulated DC/DC converters with high I/O isolation. This product features an isolation barrier which is approved for supplementary an reinforced insulation. SMD construction and a special designed toroidal transformer made it possible to built these converters in a standard SIP package with a very small footprint. These features making the TMV-EN series an economical solution in many DC/DC converter applications requiring safety agency approval.

### Models

| Order Code  | Input Voltage Range              | Output 1 |                  | Output 2 |                  | Efficiency typ. |
|-------------|----------------------------------|----------|------------------|----------|------------------|-----------------|
|             |                                  | Vnom     | I <sub>max</sub> | Vnom     | I <sub>max</sub> |                 |
| TMV 0505EN  | 4.5 - 5.5 VDC<br>(5 VDC nom.)    | 5 VDC    | 200 mA           |          |                  | 66 %            |
| TMV 0512EN  |                                  | 12 VDC   | 80 mA            |          |                  | 66 %            |
| TMV 0515EN  |                                  | 15 VDC   | 65 mA            |          |                  | 66 %            |
| TMV 0505DEN |                                  | +5 VDC   | 100 mA           | -5 VDC   | 100 mA           | 66 %            |
| TMV 0512DEN |                                  | +12 VDC  | 40 mA            | -12 VDC  | 40 mA            | 72 %            |
| TMV 0515DEN |                                  | +15 VDC  | 35 mA            | -15 VDC  | 35 mA            | 73 %            |
| TMV 1205EN  | 10.8 - 13.2 VDC<br>(12 VDC nom.) | 5 VDC    | 200 mA           |          |                  | 66 %            |
| TMV 1212EN  |                                  | 12 VDC   | 80 mA            |          |                  | 66 %            |
| TMV 1215EN  |                                  | 15 VDC   | 65 mA            |          |                  | 66 %            |
| TMV 1205DEN |                                  | +5 VDC   | 100 mA           | -5 VDC   | 100 mA           | 66 %            |
| TMV 1212DEN |                                  | +12 VDC  | 40 mA            | -12 VDC  | 40 mA            | 74 %            |
| TMV 1215DEN |                                  | +15 VDC  | 35 mA            | -15 VDC  | 35 mA            | 75 %            |

### Input Specifications

|                        |                |   |
|------------------------|----------------|---|
| Input Current          | - At no load   | 5 Vin models: <b>55 mA typ.</b><br>12 Vin models: <b>30 mA typ.</b>   |
|                        | - At full load | 5 Vin models: <b>303 mA typ.</b> (5 Vout model)<br><b>291 mA typ.</b> (12 Vout model)<br><b>295 mA typ.</b> (15 Vout model)<br><b>303 mA typ.</b> (5 / -5 Vout model)<br><b>267 mA typ.</b> (12 / -12 Vout model)<br><b>287 mA typ.</b> (15 / -15 Vout model)<br>12 Vin models: <b>126 mA typ.</b> (5 Vout model)<br><b>121 mA typ.</b> (12 Vout model)<br><b>123 mA typ.</b> (15 Vout model)<br><b>126 mA typ.</b> (5 / -5 Vout model)<br><b>108 mA typ.</b> (12 / -12 Vout model)<br><b>117 mA typ.</b> (15 / -15 Vout model) |
| Surge Voltage          |                | 5 Vin models: <b>9 VDC max.</b> (1 s max.)<br>12 Vin models: <b>29 VDC max.</b> (1 s max.)  |
| Recommended Input Fuse |                | 5 Vin models: <b>500 mA</b> (slow blow)<br>12 Vin models: <b>200 mA</b> (slow blow)<br>(The need of an external fuse has to be assessed in the final application.)  |
| Input Filter           |                | <b>Internal LC-Type</b>   |

### Output Specifications

|                          |   |  |
|--------------------------|---|--|
| Voltage Set Accuracy     |   | <b>±3% max.</b>  |
| Regulation               | - Input Variation (1% Vin step)                             | single output models: <b>1.5% max.</b><br>dual output models: <b>1.5% max.</b>   |
|                          | - Load Variation<br>- Voltage Balance<br>(symmetrical load) | See application note: <a href="http://www.tracopower.com/overview/tmv-en">www.tracopower.com/overview/tmv-en</a><br>dual output models: <b>1% max.</b> |
| Ripple and Noise         | - 20 MHz Bandwidth  | <b>150 mVp-p max.</b><br>(To further reduce Ripple and Noise, a capacitor with 1.5 µF X7R is recommended.)   |
| Capacitive Load          | - single output   | 5 Vout models: <b>680 µF max.</b><br>12 Vout models: <b>680 µF max.</b><br>15 Vout models: <b>680 µF max.</b>  |
|                          | - dual output   | 5 / -5 Vout models: <b>220 / 220 µF max.</b><br>12 / -12 Vout models: <b>220 / 220 µF max.</b><br>15 / -15 Vout models: <b>220 / 220 µF max.</b>       |
| Minimum Load             |   | <b>3 % of Iout max.</b><br>(Operation at lower load will not damage the converter, but it may not meet all specifications)                             |
| Temperature Coefficient  |   | <b>±0.02 %/K max.</b>  |
| Start-up Time            |   | <b>270 ms max.</b>   |
| Short Circuit Protection |   | <b>Limited 0.5 s max., Automatic recovery</b>  |

### Safety Specifications

|                       |                             |  |
|-----------------------|-----------------------------|--|
| Standards             | - IT / Multimedia Equipment | <b>EN 60950-1</b><br><b>EN 62368-1</b><br><b>IEC 60950-1</b><br><b>IEC 62368-1</b><br><b>UL 60950-1</b><br><b>UL 62368-1</b> |
|                       | - Certification Documents   | <a href="http://www.tracopower.com/overview/tmv-en">www.tracopower.com/overview/tmv-en</a>                                   |
| Pollution Degree      |                             | <b>PD 2</b>  |
| Over Voltage Category |                             | <b>Not mains connected</b>   |

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) |
|               | - Radiated Emissions  | EN 55032 class A (internal filter)      |

External filter proposal: [www.tracopower.com/overview/tmv-en](http://www.tracopower.com/overview/tmv-en)

## General Specifications

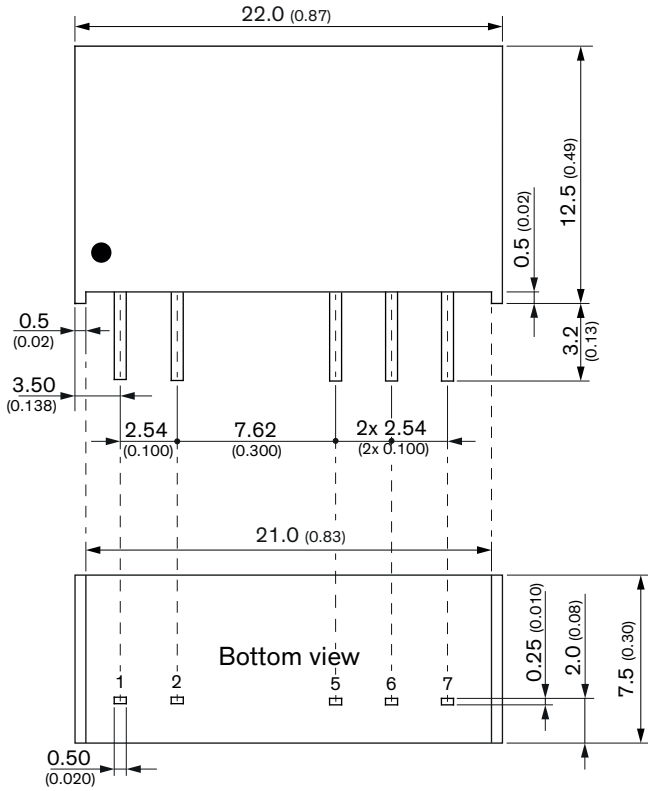
|                            |                                 |  |
|----------------------------|---------------------------------|--|
| Relative Humidity          |                                 | 95% max. (non condensing)  |
| Temperature Ranges         | - Operating Temperature         | -25°C to +85°C   |
|                            | - Case Temperature              | +105°C max.  |
|                            | - Storage Temperature           | -50°C to +125°C  |
| Power Derating             | - High Temperature              | 2.85 %/K above 70°C  |
|                            |                                 | See application note: <a href="http://www.tracopower.com/overview/tmv-en">www.tracopower.com/overview/tmv-en</a>   |
| Cooling System             |                                 | Natural convection (20 LFM)  |
| Altitude During Operation  |                                 | 5'000 m max.   |
| Regulator Topology         |                                 | Push-Pull Converter  |
| Switching Frequency        |                                 | 50 - 100 kHz (PFM)   |
|                            |                                 | 80 kHz typ. (PFM)  |
| Insulation System          |                                 | Reinforced Insulation  |
| Working Voltage (rated)    |                                 | 300 VAC  |
| Isolation Test Voltage     | - Input to Output, 60 s         | 3'000 VAC  |
| Isolation Resistance       | - Input to Output, 500 VDC      | 10'000 MΩ min.   |
| Isolation Capacitance      | - Input to Output, 100 kHz, 1 V | 15 pF typ.   |
|                            |                                 | 20 pF max.   |
| Distance Through Isolation |                                 | 2 mm   |
| Reliability                | - Calculated MTBF               | 2'000'000 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>  |
| Housing Material           |                                 | Non-conductive Plastic (UL 94 V-0 rated)   |
| Base Material              |                                 | Non-conductive Plastic (UL 94 V-0 rated)   |
| Potting Material           |                                 | Silicone (UL 94 V-0 rated)   |
| Pin Material               |                                 | Nickel-Iron (Alloy 42)   |
| Pin Foundation Plating     |                                 | Nickel (1 μm min.)   |
| Pin Surface Plating        |                                 | Tin (3 - 5 μm), matte  |
| Housing Type               |                                 | Plastic Case   |
| Mounting Type              |                                 | PCB Mount  |
| Connection Type            |                                 | THD (Through-Hole Device)  |
| Footprint Type             |                                 | SIP7   |
| Soldering Profile          |                                 | Lead-Free Wave Soldering   |
|                            |                                 | 260°C / 10 s max.  |
| Weight                     |                                 | 3.9 g  |
| Thermal Impedance          | - Case to Ambient               | 65 K/W typ.  |
| Environmental Compliance   | - REACH Declaration             | <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a><br>REACH SVHC list compliant<br>REACH Annex XVII compliant  |
|                            | - RoHS Declaration              | <a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a><br>Exemptions: 7a<br>(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).) |
|                            | - SCIP Reference Number         | 8abcc5bc-907a-45fc-8026-2239f71e59cc   |

## Supporting Documents

|  |  |
|--|--|
| Overview Link (for additional Documents) | <a href="http://www.tracopower.com/overview/tmv-en">www.tracopower.com/overview/tmv-en</a> |
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All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

**Outline Dimensions**





| Pinout |            |        |
|--------|------------|--------|
| Pin    | Single     | Dual   |
| 1      | +Vin (Vcc) |        |
| 2      | -Vin (GND) |        |
| 5      | -Vout      |        |
| 6      | No pin     | Common |
| 7      | +Vout      |        |

Dimensions in mm (inch)  
 Tolerance: x.x ±0.5 (x.xx ±0.02)  
 x.xx ±0.13 (x.xxx ±0.005)  
 Pin tolerance: ±0.05 (±0.002)

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