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.

<table>
<thead>
<tr>
<th>Order Code</th>
<th>Input Voltage Range</th>
<th>Output 1 Vnom</th>
<th>Imax</th>
<th>Output 2 Vnom</th>
<th>Imax</th>
<th>Efficiency typ.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMV 0505EN</td>
<td>4.5 - 5.5 VDC</td>
<td>5 VDC</td>
<td>200 mA</td>
<td>5 VDC</td>
<td>200 mA</td>
<td>66 %</td>
</tr>
<tr>
<td>TMV 0512EN</td>
<td>12 VDC</td>
<td>12 VDC</td>
<td>80 mA</td>
<td>12 VDC</td>
<td>80 mA</td>
<td>66 %</td>
</tr>
<tr>
<td>TMV 0515EN</td>
<td>15 VDC</td>
<td>15 VDC</td>
<td>65 mA</td>
<td>15 VDC</td>
<td>65 mA</td>
<td>66 %</td>
</tr>
<tr>
<td>TMV 0505DEN</td>
<td>+5 VDC</td>
<td>+5 VDC</td>
<td>100 mA</td>
<td>-5 VDC</td>
<td>100 mA</td>
<td>66 %</td>
</tr>
<tr>
<td>TMV 0512DEN</td>
<td>+12 VDC</td>
<td>+12 VDC</td>
<td>40 mA</td>
<td>-12 VDC</td>
<td>40 mA</td>
<td>72 %</td>
</tr>
<tr>
<td>TMV 0515DEN</td>
<td>+15 VDC</td>
<td>+15 VDC</td>
<td>35 mA</td>
<td>-15 VDC</td>
<td>35 mA</td>
<td>73 %</td>
</tr>
<tr>
<td>TMV 1205EN</td>
<td>10.8 - 13.2 VDC</td>
<td>5 VDC</td>
<td>200 mA</td>
<td></td>
<td></td>
<td>66 %</td>
</tr>
<tr>
<td>TMV 1212EN</td>
<td>12 VDC</td>
<td>12 VDC</td>
<td>80 mA</td>
<td></td>
<td></td>
<td>66 %</td>
</tr>
<tr>
<td>TMV 1215EN</td>
<td>15 VDC</td>
<td>15 VDC</td>
<td>65 mA</td>
<td></td>
<td></td>
<td>66 %</td>
</tr>
<tr>
<td>TMV 1205DEN</td>
<td>+5 VDC</td>
<td>+5 VDC</td>
<td>100 mA</td>
<td>-5 VDC</td>
<td>100 mA</td>
<td>66 %</td>
</tr>
<tr>
<td>TMV 1212DEN</td>
<td>+12 VDC</td>
<td>+12 VDC</td>
<td>40 mA</td>
<td>-12 VDC</td>
<td>40 mA</td>
<td>74 %</td>
</tr>
<tr>
<td>TMV 1215DEN</td>
<td>+15 VDC</td>
<td>+15 VDC</td>
<td>35 mA</td>
<td>-15 VDC</td>
<td>35 mA</td>
<td>75 %</td>
</tr>
</tbody>
</table>
### Input Specifications

**Input Current**

<table>
<thead>
<tr>
<th>Voltage Level</th>
<th>Current (mA typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>At no load</td>
<td>5 Vin models: 55</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>At full load</td>
<td>5 Vin models: 303</td>
</tr>
<tr>
<td></td>
<td>(5 Vout models)</td>
</tr>
<tr>
<td></td>
<td>295 mA typ.</td>
</tr>
<tr>
<td></td>
<td>(15 Vout models)</td>
</tr>
<tr>
<td></td>
<td>267 mA typ.</td>
</tr>
<tr>
<td></td>
<td>(12 / -12 Vout models)</td>
</tr>
<tr>
<td></td>
<td>291 mA typ.</td>
</tr>
<tr>
<td></td>
<td>(12 / -12 Vout models)</td>
</tr>
</tbody>
</table>

**Surge Voltage**

<table>
<thead>
<tr>
<th>Voltage Level</th>
<th>Voltage (VDC max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Vin models:</td>
<td>9 VDC max. (1 s max)</td>
</tr>
<tr>
<td>12 Vin models:</td>
<td>29 VDC max. (1 s max)</td>
</tr>
</tbody>
</table>

**Recommended Input Fuse**

<table>
<thead>
<tr>
<th>Voltage Level</th>
<th>Current (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Vin models:</td>
<td>500 mA (slow blow)</td>
</tr>
<tr>
<td>12 Vin models:</td>
<td>200 mA (slow blow)</td>
</tr>
</tbody>
</table>

(The need of an external fuse has to be assessed in the final application.)

**Input Filter**

Internal LC-Type

### Output Specifications

**Voltage Set Accuracy**

±3\% max.

**Regulation**

- Input Variation (1\% Vin step)
  - Single output models: 1.5\% max.
  - Dual output models: 1.5\% max.
- Load Variation
  - Voltage Balance (symmetrical load)
  - See application note: [www.tracopower.com/overview/tmv-en](http://www.tracopower.com/overview/tmv-en)
  - Dual output models: 1\% max.

**Ripple and Noise**

- 20 MHz Bandwidth
  - 150 mVp-p max.
  - (To further reduce Ripple and Noise, a capacitor with 1.5 \( \mu \)F X7R is recommended)

**Capacitive Load**

- Single output
  - 5 Vout models: 680 \( \mu \)F max.
  - 12 Vout models: 680 \( \mu \)F max.
  - 15 Vout models: 680 \( \mu \)F max.
- Dual output
  - 5 / -5 Vout models: 220 / 220 \( \mu \)F max.
  - 12 / -12 Vout models: 220 / 220 \( \mu \)F max.
  - 15 / -15 Vout models: 220 / 220 \( \mu \)F max.

**Minimum Load**

3 \% of Iout max.

(For operation at lower load, it will not damage the converter but it may not meet all specifications)

**Temperature Coefficient**

±0.02 \%/K max.

**Start-up Time**

270 ms max.

**Short Circuit Protection**

Limited 0.5 s max., Automatic recovery

### Safety Specifications

**Safety 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/tmv-en](http://www.tracopower.com/overview/tmv-en)

**Pollution Degree**

PD 2

**Over Voltage Category**

Not mains connected

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

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

Cooling System
- Natural convection (20 LFM)

Altitude During Operation
- 5000 m max.

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
  3000 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.

Reliability
- Calculated MTBF
  2,000,000 h (MIL-HDBK-217F, ground benign)

Washing Process
- Allowed (hermetical product)


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
- Wave Soldering
  260°C / 10 s max.

Weight
- 3.9 g

Thermal Impedance
- Case to Ambient
  65 K/W typ.

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
  (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).
  The SCIP number is provided on request.)

Supporting Documents

Overview Link (for additional Documents)
- www.tracopower.com/overview/tmv-en

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

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)

Pinout

<table>
<thead>
<tr>
<th>Pin</th>
<th>Single</th>
<th>Dual</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+Vin (Vcc)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>–Vin (GND)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>–Vout</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>No Pin</td>
<td>Common</td>
</tr>
<tr>
<td>7</td>
<td>+Vout</td>
<td></td>
</tr>
</tbody>
</table>

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www.tracopower.com

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