

- 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-years 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 _{max}	Vnom	I _{max}	
TMV 0505EN	4.5 - 5.5 VDC (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 (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: 55 mA typ. 12 Vin models: 30 mA typ.
	- At full load	5 Vin models: 303 mA typ. (5 Vout model) 291 mA typ. (12 Vout model) 295 mA typ. (15 Vout model) 303 mA typ. (5 / -5 Vout model) 267 mA typ. (12 / -12 Vout model) 287 mA typ. (15 / -15 Vout model) 12 Vin models: 126 mA typ. (5 Vout model) 121 mA typ. (12 Vout model) 123 mA typ. (15 Vout model) 126 mA typ. (5 / -5 Vout model) 108 mA typ. (12 / -12 Vout model) 117 mA typ. (15 / -15 Vout model)
Surge Voltage		5 Vin models: 9 VDC max. (1 s max.) 12 Vin models: 29 VDC max. (1 s max.)
Recommended Input Fuse		5 Vin models: 500 mA (slow blow) 12 Vin models: 200 mA (slow blow) (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 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 µF X7R is recommended.)
Capacitive Load	- single output	5 Vout models: 680 µF max. 12 Vout models: 680 µF max. 15 Vout models: 680 µF max.
	- dual output	5 / -5 Vout models: 220 / 220 µF max. 12 / -12 Vout models: 220 / 220 µF max. 15 / -15 Vout models: 220 / 220 µF max.
Minimum Load		3 % of Iout max. (Operation at lower load 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
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

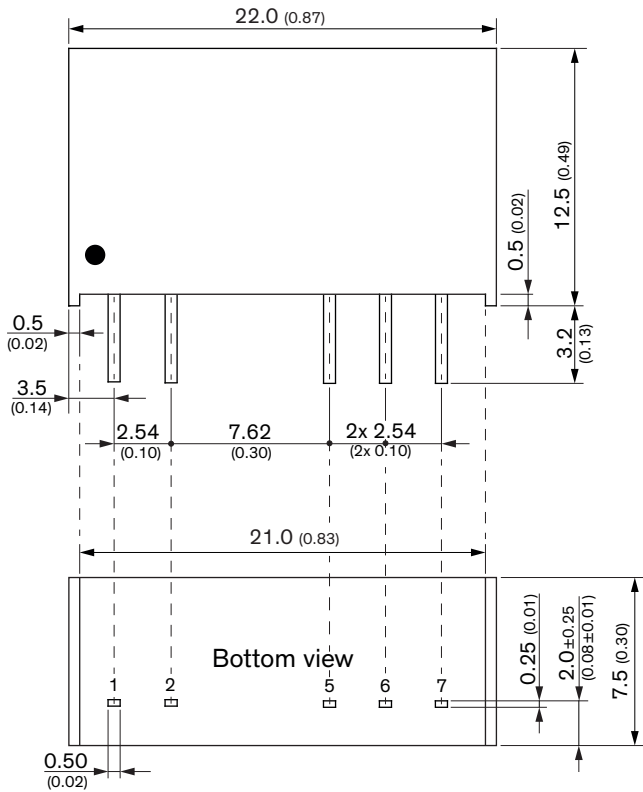
Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	-25°C to +85°C
	- Case Temperature	+105°C max.
	- Storage Temperature	-50°C to +125°C
Power Derating	- High Temperature	2.85 %/K above 70°C
		See application note: www.tracopower.com/overview/tmv-en
Cooling System		Natural convection (20 LFM)
Altitude During Operation		5'000 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	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		Allowed (hermetical product)
		See Cleaning Guideline: www.tracopower.com/info/cleaning.pdf
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
		www.tracopower.com/info/rohs-declaration.pdf Exemptions: 7a
	- RoHS Declaration	(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
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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)