TRACO POWER

Unregulated DC/DC Converter

TMV-EN Series, 1 Watt

- **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 °C to +85 °C**
- **Unregulated outputs**
- **3-year product warranty**



UL 62368-1 IEC 62368-1

The TMV-EN series is a range of 1 Watt unregulated 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
		Vnom	Imax	Vnom	Imax	typ.
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 (Unregulated)	- Input Variation (1% Vin step)	single output models:	1.5% max.
		dual output models:	1.5% max.
	- Load Variation	See application note:	www.tracopower.com/overview/tmv-en
	- Voltage Balance (symmetrical load)	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

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

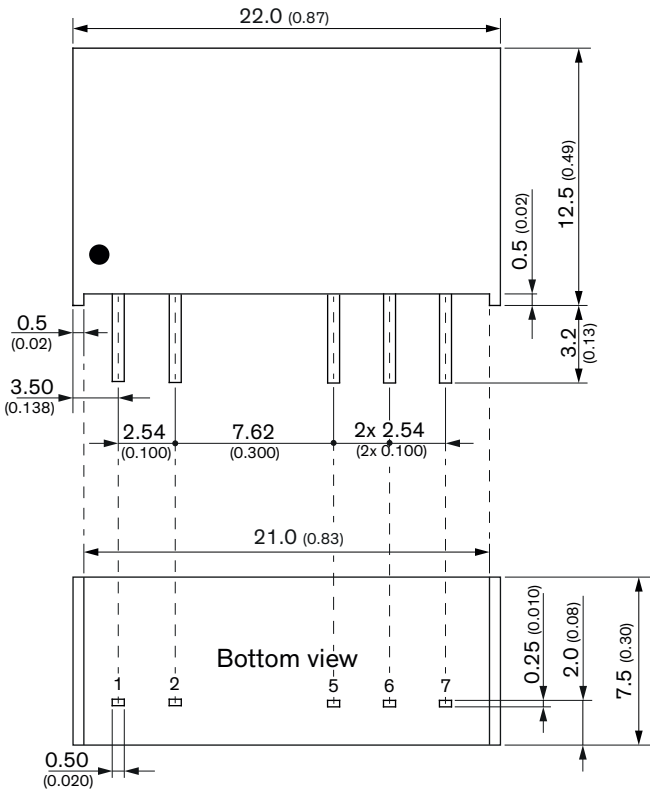
Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	–25°C to +85°C
	- Case Temperature	+105°C max.
	- Storage Temperature	–50°C to +125°C
Power Derating	- High Temperature	2.85 %/K above 70°C
	See application note:	www.tracopower.com/overview/tmv-en
Cooling System		Natural convection (20 LFM)
Altitude During Operation		5'000 m max.
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 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		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	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).)
	- SCIP Reference Number	8abcc5bc-907a-45fc-8026-2239f71e59cc

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



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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