TRACO POWER

Unregulated DC/DC Converter

TMV Series, 1 Watt

- **Industry standard pinout**
- **Unregulated outputs**
- **I/O isolation voltage 3000 VDC**
- **Operating temperature range –40 °C to +85 °C**
- **Efficiency up to 81 %**
- **3-year product warranty**

The TMV series are miniature, isolated 1 W DC/DC-converters with high isolation in a single-in-line package (SIP). Requiring only 1.2 cm² board space they offer the ideal solution in many space critical applications for board level power distribution. The use of SMD-technology makes it possible to offer a product with high performance at low cost

Models

Order Code	Input Voltage Range	Output 1		Output 2		Efficiency
		Vnom	Imax	Vnom	Imax	typ.
TMV 0505S	4.5 - 5.5 VDC (5 VDC nom.)	5 VDC	200 mA			71 %
TMV 0509S		9 VDC	110 mA			76 %
TMV 0512S		12 VDC	84 mA			78 %
TMV 0515S		15 VDC	67 mA			78 %
TMV 0505D		+5 VDC	100 mA	–5 VDC	100 mA	72 %
TMV 0512D		+12 VDC	42 mA	–12 VDC	42 mA	78 %
TMV 0515D		+15 VDC	34 mA	–15 VDC	34 mA	79 %
TMV 1205S	10.8 - 13.2 VDC (12 VDC nom.)	5 VDC	200 mA			73 %
TMV 1212S		12 VDC	84 mA			80 %
TMV 1215S		15 VDC	67 mA			80 %
TMV 1205D		+5 VDC	100 mA	–5 VDC	100 mA	74 %
TMV 1212D		+12 VDC	42 mA	–12 VDC	42 mA	81 %
TMV 1215D		+15 VDC	34 mA	–15 VDC	34 mA	81 %
TMV 2405S	21.6 - 26.4 VDC (24 VDC nom.)	5 VDC	200 mA			71 %
TMV 2412S		12 VDC	84 mA			78 %
TMV 2415S		15 VDC	67 mA			79 %
TMV 2405D		+5 VDC	100 mA	–5 VDC	100 mA	72 %
TMV 2412D		+12 VDC	42 mA	–12 VDC	42 mA	79 %
TMV 2415D		+15 VDC	34 mA	–15 VDC	34 mA	80 %

Input Specifications

Input Current	- At no load	5 Vin models:	30 mA typ.
		12 Vin models:	12 mA typ.
		24 Vin models:	7 mA typ.
	- At full load	5 Vin models:	270 mA typ.
		12 Vin models:	110 mA typ.
		24 Vin models:	55 mA typ.
Surge Voltage		5 Vin models:	9 VDC max. (1 s max.)
		12 Vin models:	18 VDC max. (1 s max.)
		24 Vin models:	30 VDC max. (1 s max.)
Recommended Input Fuse		5 Vin models:	500 mA (slow blow)
		12 Vin models:	200 mA (slow blow)
		24 Vin models:	100 mA (slow blow)
			(The need of an external fuse has to be assessed in the final application.)
Input Filter			Internal Capacitor

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/tmv-cc
	- Voltage Balance (symmetrical load)	dual output models:	1% max.
Ripple and Noise	- 20 MHz Bandwidth		100 mVp-p max.
			65 mVp-p typ.
			(To further reduce Ripple and Noise, a capacitor with 1.0 µF X7R is recommended.)
Capacitive Load	- single output	5 Vout models:	220 µF max.
		9 Vout models:	220 µF max.
		12 Vout models:	220 µF max.
		15 Vout models:	220 µF max.
	- dual output	5 / -5 Vout models:	100 / 100 µF max.
		12 / -12 Vout models:	100 / 100 µF max.
		15 / -15 Vout models:	100 / 100 µF max.
Minimum Load		See application note:	www.tracopower.com/tmv-cc
			(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			230 ms max.
Short Circuit Protection			Limited 0.5 s max., Automatic recovery

Safety Specifications

Over Voltage Category		Not mains connected

EMC Specifications

EMI (Emissions)	- Conducted Emissions		EN 55032 class A (with external filter)
	- Radiated Emissions		EN 55032 class A (with external filter)
		External filter proposal:	www.tracopower.com/tmv-emc-filter

General Specifications

Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	-40°C to +85°C
	- Case Temperature	+105°C max.
	- Storage Temperature	-50°C to +125°C

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

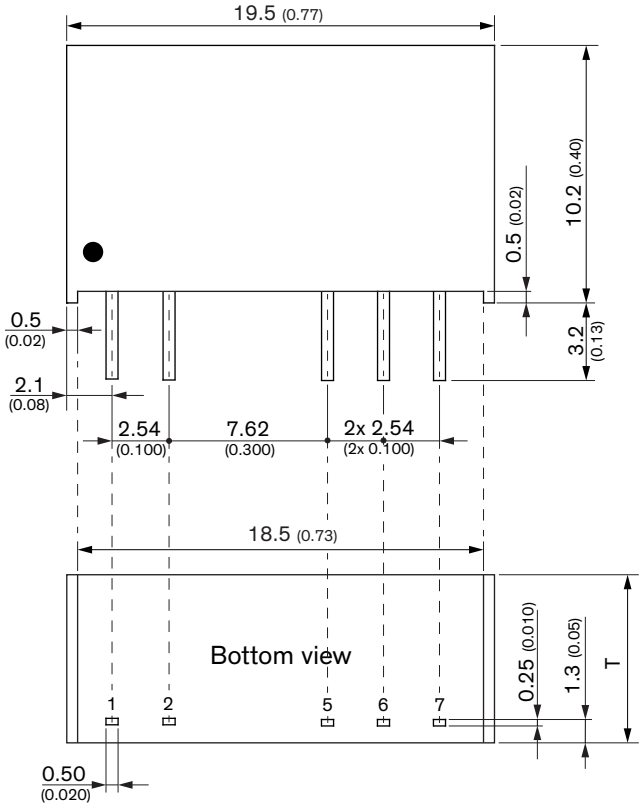
Power Derating	- High Temperature		4.0 %/K above 75°C (5 & ±5 Vout models) 4.0 %/K above 80°C (other models)
		See application note:	www.tracopower.com/tmv-cc
Cooling System			Natural convection (20 LFM)
Regulator Topology			Push-Pull Converter
Switching Frequency			70 - 120 kHz (PFM) 100 kHz typ. (PFM)
Insulation System			Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s		3'000 VDC
Isolation Resistance	- Input to Output, 500 VDC		10'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V		60 pF typ. 100 pF max.
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)
Potting Material			Epoxy (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		5 Vin models:	2.2 g
		12 Vin models:	2.2 g
		24 Vin models:	2.6 g
Thermal Impedance	- Case to Ambient		61.2 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: 7(a) (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)
	- SCIP Reference Number		ab1a3185-a9a1-432f-ae3c-de2d13eba41b

Additional Information

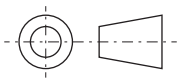
Supporting Documents	www.tracopower.com/overview/tmv
Frequently Asked Questions	www.tracopower.com/glossary-faq
Glossary	www.tracopower.com/info/glossary.pdf

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

Outline Dimensions



T: 6.1 (0.24) for 5 Vin & 12 Vin Models
T: 7.1 (0.28) for 24 Vin Models



Dimensions in mm (inch)
Tolerance: x.x ±0.25 (x.xx ±0.01)
x.xx ±0.13 (x.xxx ±0.005)
Pin tolerance: ±0.05 (±0.002)

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