



# THE DATASHEET OF TMV 2405SHI



- Ultra compact SIP-7 package
- Very high 5200 VDC I/O-isolation
- Unregulated outputs
- Dedicated for IGBT applications
- Operating temperature range  $-40\text{ }^{\circ}\text{C}$  to  $+95\text{ }^{\circ}\text{C}$
- 3-year product warranty



UL 62368-1 IEC 62368-1

The TMV-HI series is a range of 1 Watt unregulated dc/dc-converters with very high I/O-isolation. They come in a very compact SIP-7 package.

### Models

Order Code	Input Voltage Range	Output 1		Output 2		Efficiency typ.
		Vnom	I <sub>max</sub>	Vnom	I <sub>max</sub>	
TMV 0503SHI	4.5 - 5.5 VDC (5 VDC nom.)	3.3 VDC	303 mA			70 %
TMV 0505SHI		5 VDC	200 mA			70 %
TMV 0509SHI		9 VDC	111 mA			75 %
TMV 0512SHI		12 VDC	84 mA			77 %
TMV 0515SHI		15 VDC	66 mA			78 %
TMV 0505DHI		+5 VDC	100 mA	-5 VDC	100 mA	71 %
TMV 0509DHI		+9 VDC	56 mA	-9 VDC	56 mA	75 %
TMV 0512DHI		+12 VDC	42 mA	-12 VDC	42 mA	77 %
TMV 0515DHI		+15 VDC	33 mA	-15 VDC	33 mA	78 %
TMV 05159HI		+15 VDC	33 mA	-9 VDC	55 mA	76 %
TMV 1203SHI	10.8 - 13.2 VDC (12 VDC nom.)	3.3 VDC	303 mA			71 %
TMV 1205SHI		5 VDC	200 mA			71 %
TMV 1209SHI		9 VDC	111 mA			76 %
TMV 1212SHI		12 VDC	84 mA			78 %
TMV 1215SHI		15 VDC	66 mA			79 %
TMV 1205DHI		+5 VDC	100 mA	-5 VDC	100 mA	72 %
TMV 1209DHI		+9 VDC	56 mA	-9 VDC	56 mA	76 %
TMV 1212DHI		+12 VDC	42 mA	-12 VDC	42 mA	78 %
TMV 1215DHI		+15 VDC	33 mA	-15 VDC	33 mA	79 %
TMV 12159HI		+15 VDC	33 mA	-9 VDC	55 mA	77 %
TMV 1503SHI	13.5 - 16.5 VDC (15 VDC nom.)	3.3 VDC	303 mA			70 %
TMV 1505SHI		5 VDC	200 mA			70 %
TMV 1509SHI		9 VDC	111 mA			75 %
TMV 1512SHI		12 VDC	84 mA			75 %
TMV 1515SHI		15 VDC	66 mA			79 %
TMV 1505DHI		+5 VDC	100 mA	-5 VDC	100 mA	71 %
TMV 1509DHI		+9 VDC	56 mA	-9 VDC	56 mA	75 %
TMV 1512DHI		+12 VDC	42 mA	-12 VDC	42 mA	78 %
TMV 1515DHI		+15 VDC	33 mA	-15 VDC	33 mA	79 %
TMV 15159HI		+15 VDC	33 mA	-9 VDC	55 mA	76 %
TMV 2403SHI	21.6 - 26.4 VDC (24 VDC nom.)	3.3 VDC	303 mA			70 %
TMV 2405SHI		5 VDC	200 mA			70 %
TMV 2409SHI		9 VDC	111 mA			75 %
TMV 2412SHI		12 VDC	84 mA			78 %
TMV 2415SHI		15 VDC	66 mA			80 %
TMV 2405DHI		+5 VDC	100 mA	-5 VDC	100 mA	71 %
TMV 2409DHI		+9 VDC	56 mA	-9 VDC	56 mA	75 %
TMV 2412DHI		+12 VDC	42 mA	-12 VDC	42 mA	77 %
TMV 2415DHI		+15 VDC	33 mA	-15 VDC	33 mA	78 %
TMV 24159HI		+15 VDC	33 mA	-9 VDC	55 mA	75 %

### Input Specifications

Input Current	- At no load	5 Vin models: <b>35 mA typ.</b> 12 Vin models: <b>17 mA typ.</b> 15 Vin models: <b>16 mA typ.</b> 24 Vin models: <b>12 mA typ.</b>
	- At full load	5 Vin models: <b>270 mA typ.</b> 12 Vin models: <b>110 mA typ.</b> 15 Vin models: <b>90 mA typ.</b> 24 Vin models: <b>60 mA typ.</b>
Surge Voltage		5 Vin models: <b>9 VDC max.</b> (1 s max.) 12 Vin models: <b>18 VDC max.</b> (1 s max.) 15 Vin models: <b>20 VDC max.</b> (1 s max.) 24 Vin models: <b>30 VDC max.</b> (1 s max.)
Recommended Input Fuse		5 Vin models: <b>500 mA</b> (slow blow) 12 Vin models: <b>200 mA</b> (slow blow) 15 Vin models: <b>150 mA</b> (slow blow) 24 Vin models: <b>100 mA</b> (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		<b>±5% max.</b>
Regulation (Unregulated)	- Input Variation (1% Vin step)	single output models: <b>1.2% max.</b> dual output models: <b>1.2% max.</b>
	- Load Variation - Voltage Balance (symmetrical load)	See application note: <a href="http://www.tracopower.com/overview/tmv-hi">www.tracopower.com/overview/tmv-hi</a> dual output models: <b>1% max.</b>
Ripple and Noise	- 20 MHz Bandwidth	<b>100 mVp-p max.</b>
Capacitive Load	- single output	3.3 Vout models: <b>1'000 µF max.</b> 5 Vout models: <b>470 µF max.</b> 9 Vout models: <b>470 µF max.</b> 12 Vout models: <b>220 µF max.</b> 15 Vout models: <b>220 µF max.</b>
	- dual output	5 / -5 Vout models: <b>220 / 220 µF max.</b> 9 / -9 Vout models: <b>220 / 220 µF max.</b> 12 / -12 Vout models: <b>100 / 100 µF max.</b> 15 / -15 Vout models: <b>100 / 100 µF max.</b> 15 / -9 Vout models: <b>100 / 220 µF max.</b>
Minimum Load		<b>2 % of Iout max.</b>  (Operation at lower load will not damage the converter, but it may not meet all specifications)
Temperature Coefficient		<b>±0.02 %/K max.</b>
Short Circuit Protection		Continuous, 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	<a href="http://www.tracopower.com/overview/tmv-hi">www.tracopower.com/overview/tmv-hi</a>
Pollution Degree		PD 2

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

## General Specifications

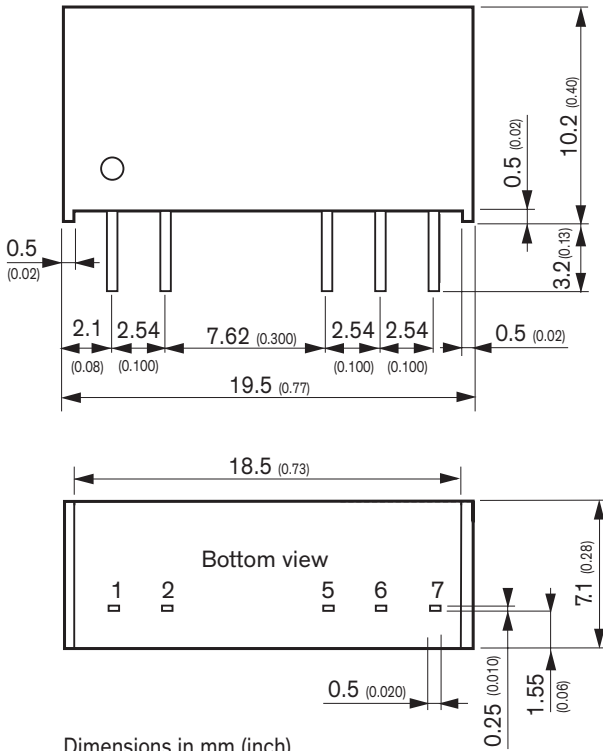
Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature - Case Temperature - Storage Temperature	-40°C to +95°C +100°C max. -55°C to +125°C
Power Derating	- High Temperature	6.7 %/K above 85°C
Cooling System		Natural convection (20 LFM)
Altitude During Operation		6'000 m max.
Switching Frequency		100 kHz typ. (PFM)
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s - Input to Output, 1 s	5'200 VDC 5'700 VDC
Isolation Resistance	- Input to Output, 500 VDC	10'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	7 pF typ.
Common Mode Transient Immunity		15 kV/μs min.
Reliability	- Calculated MTBF	2'000'000 h (MIL-HDBK-217F, ground benign)
Washing Process		According to Cleaning Guideline <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)
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		2.4 g
Environmental Compliance	- REACH Declaration  - RoHS Declaration  - SCIP Reference Number	<a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> REACH SVHC list compliant REACH Annex XVII compliant <a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a> Exemptions: 7a, 7c-I (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).) e9f91836-9388-4d22-a8b0-eacd0f555b58

## Supporting Documents

Overview Link (for additional Documents)	<a href="http://www.tracopower.com/overview/tmv-hi">www.tracopower.com/overview/tmv-hi</a>
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**Outline Dimensions**





Dimensions in mm (inch)  
 Tolerances:  $x.x \pm 0.5$  ( $x.xx \pm 0.02$ )  
 $x.xx \pm 0.25$  ( $x.xxx \pm 0.01$ )  
 Pin tolerances:  $\pm 0.05$  ( $\pm 0.002$ )

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

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