

- Industry standard pinout
- Unregulated outputs
- Single and dual output models
- I/O isolation voltage 1000VDC
- High efficiency
- Operating temperature range  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$
- 3-year product warranty



The TMA series are miniature, isolated 1 W DC/DC-converters in a Single-in-Line package (SIP). Requiring only 1.2 cm<sup>2</sup> 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 typ.
		Vnom	I <sub>max</sub>	Vnom	I <sub>max</sub>	
TMA 0505S	4.5 - 5.5 VDC (5 VDC nom.)	5 VDC	200 mA			71 %
TMA 0512S		12 VDC	84 mA			78 %
TMA 0515S		15 VDC	67 mA			78 %
TMA 0505D		+5 VDC	100 mA	-5 VDC	100 mA	72 %
TMA 0512D		+12 VDC	42 mA	-12 VDC	42 mA	78 %
TMA 0515D		+15 VDC	34 mA	-15 VDC	34 mA	79 %
TMA 1205S	10.8 - 13.2 VDC (12 VDC nom.)	5 VDC	200 mA			73 %
TMA 1212S		12 VDC	84 mA			80 %
TMA 1215S		15 VDC	67 mA			80 %
TMA 1205D		+5 VDC	100 mA	-5 VDC	100 mA	74 %
TMA 1212D		+12 VDC	42 mA	-12 VDC	42 mA	81 %
TMA 1215D		+15 VDC	34 mA	-15 VDC	34 mA	81 %
TMA 1505S	13.5 - 16.5 VDC (15 VDC nom.)	5 VDC	200 mA			72 %
TMA 1512S		12 VDC	84 mA			79 %
TMA 1515S		15 VDC	67 mA			79 %
TMA 1505D		+5 VDC	100 mA	-5 VDC	100 mA	72 %
TMA 1512D		+12 VDC	42 mA	-12 VDC	42 mA	80 %
TMA 1515D		+15 VDC	34 mA	-15 VDC	34 mA	80 %
TMA 2405S	21.6 - 26.4 VDC (24 VDC nom.)	5 VDC	200 mA			71 %
TMA 2412S		12 VDC	84 mA			78 %
TMA 2415S		15 VDC	67 mA			79 %
TMA 2405D		+5 VDC	100 mA	-5 VDC	100 mA	72 %
TMA 2412D		+12 VDC	42 mA	-12 VDC	42 mA	79 %
TMA 2415D		+15 VDC	34 mA	-15 VDC	34 mA	80 %

### Input Specifications

Input Current	- At no load	5 Vin models: <b>30 mA typ.</b> 12 Vin models: <b>12 mA typ.</b> 15 Vin models: <b>11 mA typ.</b> 24 Vin models: <b>7 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>55 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>18 VDC max.</b> (1 s max.) 24 Vin models: <b>30 VDC max.</b> (1 s max.)
Recommended Input Fuse		(The need of an external fuse has to be assessed in the final application.)
Input Filter		Internal Capacitor

### Output Specifications

Voltage Set Accuracy		<b>±3% max.</b>
Regulation (Unregulated)	- Input Variation (1% Vin step)	single output models: <b>1.5% max.</b> dual output models: <b>1.5% max.</b>
	- Load Variation	See application note: <a href="http://www.tracopower.com/overview/tma">www.tracopower.com/overview/tma</a>
	- Voltage Balance (symmetrical load)	dual output models: <b>1% max.</b>
Ripple and Noise	- 20 MHz Bandwidth	<b>75 mVp-p max.</b> <b>50 mVp-p typ.</b>
Capacitive Load	- single output	5 Vout models: <b>220 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>100 / 100 µF max.</b> 12 / -12 Vout models: <b>100 / 100 µF max.</b> 15 / -15 Vout models: <b>100 / 100 µF max.</b>
Minimum Load		See application note: <a href="http://www.tracopower.com/overview/tma">www.tracopower.com/overview/tma</a> (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		Limited 0.5 s max., Automatic recovery

### Safety Specifications

Standards	- IT / Multimedia Equipment	Designed for IEC/EN/UL 62368-1 (not certified)
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### EMC Specifications

EMI (Emissions)	- Conducted Emissions	<b>EN 55032 class A</b> (with external filter)
	- Radiated Emissions	<b>EN 55032 class A</b> (with external filter)
	External filter proposal:	<a href="http://www.tracopower.com/overview/tma">www.tracopower.com/overview/tma</a>

### General Specifications

Relative Humidity		<b>95% max.</b> (non condensing)
Temperature Ranges	- Operating Temperature	<b>-40°C to +85°C</b>
	- Case Temperature	<b>+105°C max.</b>
	- Storage Temperature	<b>-50°C to +125°C</b>
Power Derating	- High Temperature	<b>4 %/K above 75°C</b> (5 & ±5 Vout models) <b>4 %/K above 80°C</b> (other models)
		See application note: <a href="http://www.tracopower.com/overview/tma">www.tracopower.com/overview/tma</a>
Cooling System		Natural convection (20 LFM)

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

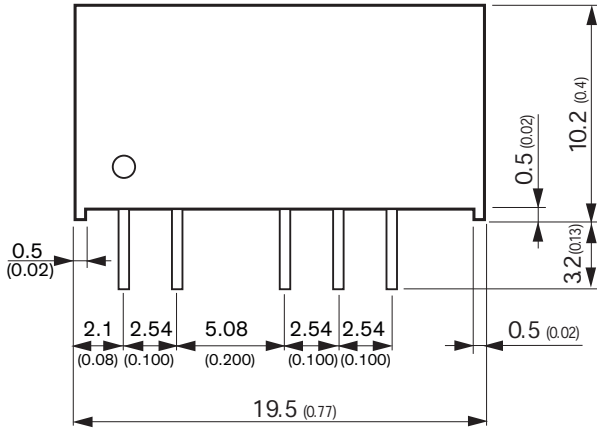
Switching Frequency		70 - 120 kHz (PFM) 100 kHz typ. (PFM)
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s	1'000 VDC
Isolation Resistance	- Input to Output, 500 VDC	1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	60 pF typ. 100 pF max.
Reliability	- Calculated MTBF	5'000'000 h (3.3 & 5 Vout models) 4'000'000 h (9 Vout models) 2'300'000 h (other models) (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	5 Vin models: 12 Vin models: 15 Vin models: 24 Vin models:	2.2 g 2.2 g 2.6 g 2.6 g
Environmental Compliance	- REACH Declaration  - RoHS Declaration	<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: No Exemptions

## Additional Information

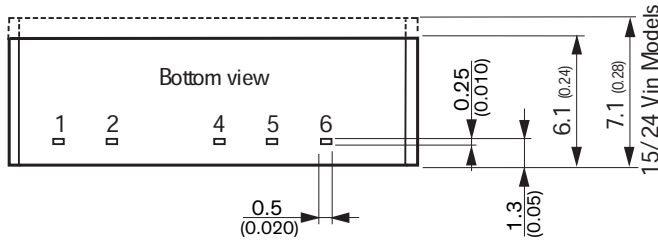
Supporting Documents	<a href="http://www.tracopower.com/overview/tma">www.tracopower.com/overview/tma</a>
Frequently Asked Questions	<a href="http://www.tracopower.com/glossary-faq">www.tracopower.com/glossary-faq</a>
Glossary	<a href="http://www.tracopower.com/info/glossary.pdf">www.tracopower.com/info/glossary.pdf</a>

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)	+Vin (Vcc)
2	-Vin (GND)	-Vin (GND)
4	-Vout	-Vout
5	No pin	Common
6	+Vout	+Vout



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)

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