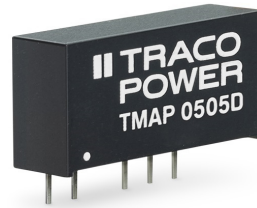


- 1 Watt DC/DC converter in SIP-7-package
- Overload and short circuit protection
- I/O isolation 3'000 VDC (functional)
- Extended operating temperature range -40°C to 85°C without derating
- High efficiency up to 84% typ.
- Industry standard pinout
- 3-year product warranty



The TMAP series is a range of 1 Watt DC/DC converters in compact SIP-7 package with overload and short circuit protection. An excellent efficiency allows these converters to operate up to +85°C without derating. In addition these converters offer a 3'000 VDC I/O isolation. This series is thus suitable for many industrial applications.

Models						
Order Code	Input Voltage Range	Output 1		Output 2		Efficiency typ.
		Vnom	I <sub>max</sub>	Vnom	I <sub>max</sub>	
TMAP 0505S	4.5 - 5.5 VDC (5 VDC nom.)	5 VDC	200 mA			78 %
TMAP 0509S		9 VDC	110 mA			81 %
TMAP 0512S		12 VDC	84 mA			82 %
TMAP 0515S		15 VDC	86 mA			83 %
TMAP 0505D		+5 VDC	100 mA	-5 VDC	100 mA	81 %
TMAP 0512D		+12 VDC	42 mA	-12 VDC	42 mA	81 %
TMAP 0515D		+15 VDC	34 mA	-15 VDC	34 mA	81 %
TMAP 1205S	10.8 - 13.2 VDC (12 VDC nom.)	5 VDC	200 mA			80 %
TMAP 1209S		9 VDC	110 mA			82 %
TMAP 1212S		12 VDC	84 mA			84 %
TMAP 1215S		15 VDC	86 mA			83 %
TMAP 1205D		+5 VDC	100 mA	-5 VDC	100 mA	81 %
TMAP 1212D		+12 VDC	42 mA	-12 VDC	42 mA	82 %
TMAP 1215D		+15 VDC	34 mA	-15 VDC	34 mA	82 %
TMAP 2405S	21.6 - 26.4 VDC (24 VDC nom.)	5 VDC	200 mA			81 %
TMAP 2409S		9 VDC	110 mA			79 %
TMAP 2412S		12 VDC	84 mA			82 %
TMAP 2415S		15 VDC	86 mA			82 %
TMAP 2405D		+5 VDC	100 mA	-5 VDC	100 mA	80 %
TMAP 2412D		+12 VDC	42 mA	-12 VDC	42 mA	81 %
TMAP 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>17 mA typ.</b> 24 Vin models: <b>10 mA typ.</b>
	- At full load	5 Vin models: <b>250 mA typ.</b> 12 Vin models: <b>102 mA typ.</b> 24 Vin models: <b>52 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.) 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) 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>±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/tmap">www.tracopower.com/overview/tmap</a>
	- Voltage Balance (symmetrical load)	dual output models: <b>1% max.</b>
Ripple and Noise	- 20 MHz Bandwidth	<b>100 mVp-p max.</b> <b>60 mVp-p typ.</b>
Capacitive Load	- single output	5 Vout models: <b>200 µF max.</b> 9 Vout models: <b>200 µF max.</b> 12 Vout models: <b>200 µF max.</b> 15 Vout models: <b>200 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		<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	Designed for IEC/EN/UL 62368-1 (not certified)
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### 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:		<a href="http://www.tracopower.com/overview/tmap">www.tracopower.com/overview/tmap</a>

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

EMS Immunity	<ul style="list-style-type: none"> <li>- Electrostatic Discharge</li> <li>- RF Electromagnetic Field</li> <li>- EFT (Burst) / Surge</li> <li>- Conducted RF Disturbances</li> <li>- PF Magnetic Field</li> </ul>	EN 55024 (IT Equipment) EN 55035 (Multimedia) Air: EN 61000-4-2, $\pm 8$ kV, perf. criteria A Contact: EN 61000-4-2, $\pm 6$ kV, perf. criteria A EN 61000-4-3, 10 V/m, perf. criteria A EN 61000-4-4, $\pm 2$ kV, perf. criteria A EN 61000-4-5, $\pm 1$ kV, perf. criteria A Ext. input component: 5 Vin: 100 $\mu$ F / 25 V KY    1.5KE7.5CA TVS 12 Vin: 560 $\mu$ F / 50 V KY    1.5KE18CA TVS 24 Vin: 820 $\mu$ F / 50 V KY EN 61000-4-6, 10 Vrms, perf. criteria A Continuous: EN 61000-4-8, 3 A/m, perf. criteria A
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## General Specifications

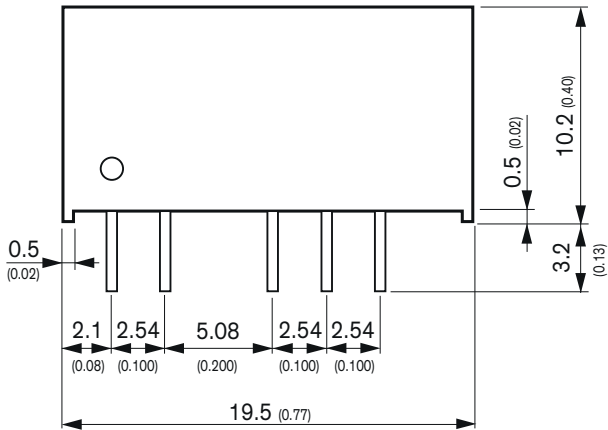
Relative Humidity		95% max. (non condensing)
Temperature Ranges	<ul style="list-style-type: none"> <li>- Operating Temperature</li> <li>- Case Temperature</li> <li>- Storage Temperature</li> </ul>	-40°C to +90°C +95°C max. -50°C to +125°C
Power Derating	<ul style="list-style-type: none"> <li>- High Temperature</li> </ul>	10 %/K above 85°C See application note: <a href="http://www.tracopower.com/overview/tmap">www.tracopower.com/overview/tmap</a>
Cooling System		Natural convection (20 LFM)
Switching Frequency		40 - 110 kHz (PWM) 75 kHz typ. (PWM)
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s	3'000 VDC
Isolation Resistance	- Input to Output, 500 VDC	10'000 M $\Omega$ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	20 pF typ.
Reliability	- Calculated MTBF	3'700'000 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		Silicone (UL 94 V-0 rated)
Pin Material		Nickel-Iron (Alloy 42)
Pin Foundation Plating		Nickel (1 $\mu$ m min.)
Pin Surface Plating		Tin (3 - 5 $\mu$ m), 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		3.1 g
Environmental Compliance	<ul style="list-style-type: none"> <li>- REACH Declaration</li> <li>- RoHS Declaration</li> <li>- SCIP Reference Number</li> </ul>	<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.)) 1696b05b-2b76-4034-bfeb-ac1c83926f44

## Supporting Documents

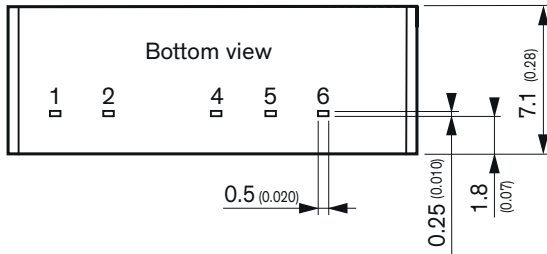
Overview Link (for additional Documents)	<a href="http://www.tracopower.com/overview/tmap">www.tracopower.com/overview/tmap</a>
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All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

**Outline Dimensions**



Pinout		
Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
4	-Vout	-Vout
5	No pin	Common
6	+Vout	+Vout



All dimensions in mm (inches)

Tolerance: X.X ±0.5 (X.XX±0.02)

X.XX ±0.25 (X.XXX±0.01)

Pin tolerance: ±0.05 (±0.002)