

## DC/DC Converter

## TMA Series, 1 Watt

- Industry standard pinout
- Non-regulated output
- 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<br>(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<br>(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<br>(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<br>(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: 30 mA typ.<br>12 Vin models: 12 mA typ.<br>15 Vin models: 11 mA typ.<br>24 Vin models: 7 mA typ.                                                 |
|                        | - At full load | 5 Vin models: 270 mA typ.<br>12 Vin models: 110 mA typ.<br>15 Vin models: 90 mA typ.<br>24 Vin models: 55 mA typ.                                              |
| Surge Voltage          |                | 5 Vin models: 9 VDC max. (1 s max.)<br>12 Vin models: 18 VDC max. (1 s max.)<br>15 Vin models: 18 VDC max. (1 s max.)<br>24 Vin models: 30 VDC max. (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     |                                      | ±3% max.                                                                                                                    |
| Regulation               | - Input Variation (1% Vin step)      | single output models: 1.5% max.<br>dual output models: 1.5% max.                                                            |
|                          | - 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: 1% max.                                                                                                 |
|                          |                                      |                                                                                                                             |
| Ripple and Noise         | - 20 MHz Bandwidth                   | 75 mVp-p max.<br>50 mVp-p typ.                                                                                              |
| Capacitive Load          | - single output                      | 5 Vout models: 220 µF max.<br>12 Vout models: 220 µF max.<br>15 Vout models: 220 µF max.                                    |
|                          | - dual output                        | 5 / -5 Vout models: 100 / 100 µF max.<br>12 / -12 Vout models: 100 / 100 µF max.<br>15 / -15 Vout models: 100 / 100 µF max. |
| Minimum Load             |                                      | 2 % of Iout max.<br>(Operation at lower load will not damage the converter, but it may not meet all specifications)         |
| Temperature Coefficient  |                                      | ±0.02 %/K max.                                                                                                              |
| 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) |
|-----------|-----------------------------|------------------------------------------------|

## 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/tma">www.tracopower.com/overview/tma</a> |

## 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                                                                                            |
| Power Derating     | - High Temperature      | 4 %/K above 75°C (5 & ±5 Vout models)<br>4 %/K above 80°C (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)<br>100 kHz typ. (PFM)                                                                                                                                                                                                                                                                                                                                |
| Insulation System        | Functional Insulation                                                                                                                                                                                                                                                                                                                                                   |
| Isolation Test Voltage   | - Input to Output, 60 s<br>1'000 VDC                                                                                                                                                                                                                                                                                                                                    |
| Isolation Resistance     | - Input to Output, 500 VDC<br>1'000 MΩ min.                                                                                                                                                                                                                                                                                                                             |
| Isolation Capacitance    | - Input to Output, 100 kHz, 1 V<br>60 pF typ.<br>100 pF max.                                                                                                                                                                                                                                                                                                            |
| Reliability              | - Calculated MTBF<br>5'000'000 h (3.3 & 5 Vout models)<br>4'000'000 h (9 Vout models)<br>2'300'000 h (other models)<br>(MIL-HDBK-217F, ground benign)                                                                                                                                                                                                                   |
| Washing Process          | According to Cleaning Guideline<br><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<br>260°C / 10 s max.                                                                                                                                                                                                                                                                                                                           |
| Weight                   | 5 Vin models: 2.2 g<br>12 Vin models: 2.2 g<br>15 Vin models: 2.6 g<br>24 Vin models: 2.6 g                                                                                                                                                                                                                                                                             |
| Environmental Compliance | - REACH Declaration<br><a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a><br>REACH SVHC list compliant<br>REACH Annex XVII compliant<br>- RoHS Declaration<br><a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a><br>Exemptions: No Exemptions |

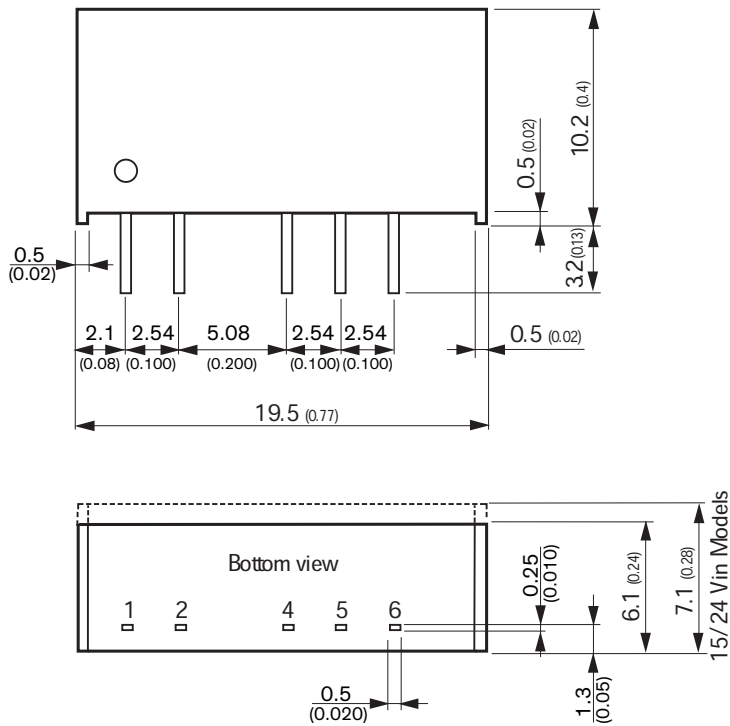
## Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/tma](http://www.tracopower.com/overview/tma)

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)