



# THE DATASHEET OF TME 1212S

- Unregulated outputs
- I/O isolation voltage 1'000VDC
- Efficiency up to 80%
- Operating temperature range -40 °C to +85 °C
- 3-year product warranty



The TME series is a range of sub-miniature, isolated DC/DC-converters in a SIP-package, which requires only 0.7 cm<sup>2</sup> of board space. They provide a cost effective solution to generate supplementary, isolated voltages. Full SMD-design and a 100% production test of parameters ensure a high reliability of this product.

| Models     |                                   |                     |                     |                 |
|------------|-----------------------------------|---------------------|---------------------|-----------------|
| Order Code | Input Voltage Range               | Output Voltage nom. | Output Current max. | Efficiency typ. |
| TME 0303S  | 2.97 - 3.63 VDC<br>(3.3 VDC nom.) | 3.3 VDC             | 260 mA              | 74 %            |
| TME 0305S  |                                   | 5 VDC               | 200 mA              | 77 %            |
| TME 0503S  | 4.5 - 5.5 VDC<br>(5 VDC nom.)     | 3.3 VDC             | 260 mA              | 72 %            |
| TME 0505S  |                                   | 5 VDC               | 200 mA              | 69 %            |
| TME 0509S  |                                   | 9 VDC               | 110 mA              | 76 %            |
| TME 0512S  |                                   | 12 VDC              | 84 mA               | 77 %            |
| TME 0515S  |                                   | 15 VDC              | 67 mA               | 78 %            |
| TME 1205S  | 10.8 - 13.2 VDC<br>(12 VDC nom.)  | 5 VDC               | 200 mA              | 71 %            |
| TME 1209S  |                                   | 9 VDC               | 110 mA              | 77 %            |
| TME 1212S  |                                   | 12 VDC              | 84 mA               | 79 %            |
| TME 1215S  |                                   | 15 VDC              | 67 mA               | 80 %            |
| TME 2405S  | 21.6 - 26.4 VDC<br>(24 VDC nom.)  | 5 VDC               | 200 mA              | 70 %            |
| TME 2409S  |                                   | 9 VDC               | 110 mA              | 76 %            |
| TME 2412S  |                                   | 12 VDC              | 84 mA               | 79 %            |
| TME 2415S  |                                   | 15 VDC              | 67 mA               | 79 %            |

## Input Specifications

|                        |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input Current          | - At no load   | 3.3 Vin models: <b>35 mA typ.</b><br>5 Vin models: <b>30 mA typ.</b><br>12 Vin models: <b>13 mA typ.</b><br>24 Vin models: <b>7 mA typ.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                        | - At full load | 3.3 Vin models: <b>351 mA typ.</b> (3.3 Vout model)<br><b>394 mA typ.</b> (5 Vout model)<br>5 Vin models: <b>238 mA typ.</b> (3.3 Vout model)<br><b>290 mA typ.</b> (5 Vout model)<br><b>260 mA typ.</b> (9 Vout model)<br><b>262 mA typ.</b> (12 Vout model)<br><b>258 mA typ.</b> (15 Vout model)<br>12 Vin models: <b>117 mA typ.</b> (5 Vout model)<br><b>107 mA typ.</b> (9 Vout model)<br><b>106 mA typ.</b> (12 Vout model)<br><b>105 mA typ.</b> (15 Vout model)<br>24 Vin models: <b>60 mA typ.</b> (5 Vout model)<br><b>54 mA typ.</b> (9 Vout model)<br><b>53 mA typ.</b> (12 Vout model)<br><b>53 mA typ.</b> (15 Vout model) |
| Surge Voltage          |                | 3.3 Vin models: <b>6 VDC max.</b> (1 s max.)<br>5 Vin models: <b>9 VDC max.</b> (1 s max.)<br>12 Vin models: <b>18 VDC max.</b> (1 s max.)<br>24 Vin models: <b>30 VDC max.</b> (1 s max.)                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Recommended Input Fuse |                | 3.3 Vin models: <b>750 mA</b> (slow blow)<br>5 Vin models: <b>750 mA</b> (slow blow)<br>12 Vin models: <b>750 mA</b> (slow blow)<br>24 Vin models: <b>750 mA</b> (slow blow)<br>(The need of an external fuse has to be assessed in the final application.)                                                                                                                                                                                                                                                                                                                                                                               |
| Input Filter           |                | <b>Internal Capacitor</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## Output Specifications

|                          |                                                     |                                                                                                                                |
|--------------------------|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Voltage Set Accuracy     |                                                     | <b>±3% max.</b>                                                                                                                |
| Regulation               | - Input Variation (1% Vin step)<br>- Load Variation | <b>1.5% max.</b><br>See application note: <a href="http://www.tracopower.com/overview/tme">www.tracopower.com/overview/tme</a> |
| Ripple and Noise         | - 20 MHz Bandwidth                                  | <b>150 mVp-p max.</b><br><b>100 mVp-p typ.</b>                                                                                 |
| Capacitive Load          |                                                     | <b>33 µF max.</b>                                                                                                              |
| Minimum Load             |                                                     | <b>2.5 % of Iout max.</b><br>(Operation at lower load will not damage the converter, but it may not meet all specifications)   |
| Temperature Coefficient  |                                                     | <b>±0.02 %/K max.</b>                                                                                                          |
| Start-up Time            |                                                     | <b>2.9 ms max.</b>                                                                                                             |
| Short Circuit Protection |                                                     | <b>Limited 0.5 s max., Automatic recovery</b>                                                                                  |

## General Specifications

|                    |                                                                        |                                                                                                                                                                                                    |
|--------------------|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Relative Humidity  |                                                                        | <b>95% max.</b> (non condensing)                                                                                                                                                                   |
| Temperature Ranges | - Operating Temperature<br>- Case Temperature<br>- Storage Temperature | <b>-40°C to +85°C</b><br><b>+105°C max.</b><br><b>-50°C to +125°C</b>                                                                                                                              |
| Power Derating     | - High Temperature                                                     | <b>3.33 %/K above 70°C</b> (5 Vout models)<br><b>4 %/K above 75°C</b> (other models)<br>See application note: <a href="http://www.tracopower.com/overview/tme">www.tracopower.com/overview/tme</a> |
| Cooling System     |                                                                        | <b>Natural convection</b> (20 LFM)                                                                                                                                                                 |
| Regulator Topology |                                                                        | <b>Push-Pull Converter</b>                                                                                                                                                                         |

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

|                          |                                                                      |                                                                                                                                                                                                                                                                                                                            |
|--------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Switching Frequency      |                                                                      | 50 - 110 kHz (PFM)<br>90 kHz typ. (PFM)                                                                                                                                                                                                                                                                                    |
| Insulation System        |                                                                      | Functional Insulation                                                                                                                                                                                                                                                                                                      |
| Isolation Test Voltage   | - Input to Output, 60 s<br>- Input to Output, 1 s                    | 1'000 VDC<br>1'200 VDC                                                                                                                                                                                                                                                                                                     |
| Isolation Resistance     | - Input to Output, 500 VDC                                           | 1'000 MΩ min.                                                                                                                                                                                                                                                                                                              |
| Isolation Capacitance    | - Input to Output, 100 kHz, 1 V                                      | 60 pF typ.<br>100 pF max.                                                                                                                                                                                                                                                                                                  |
| Reliability              | - Calculated MTBF                                                    | 2'000'000 h (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)                                                                                                                                                                                                                                                                                   |
| Base 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           |                                                                      | SIP4                                                                                                                                                                                                                                                                                                                       |
| Soldering Profile        |                                                                      | Lead-Free Wave Soldering<br>260°C / 10 s max.                                                                                                                                                                                                                                                                              |
| Weight                   | 3.3 Vin models:<br>5 Vin models:<br>12 Vin models:<br>24 Vin models: | 1.3 g<br>1.3 g<br>1.3 g<br>1.7 g                                                                                                                                                                                                                                                                                           |
| Thermal Impedance        | - Case to Ambient                                                    | 78 K/W typ.                                                                                                                                                                                                                                                                                                                |
| Environmental Compliance | - REACH Declaration<br><br>- RoHS Declaration                        | <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><a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a><br>Exemptions: No Exemptions |

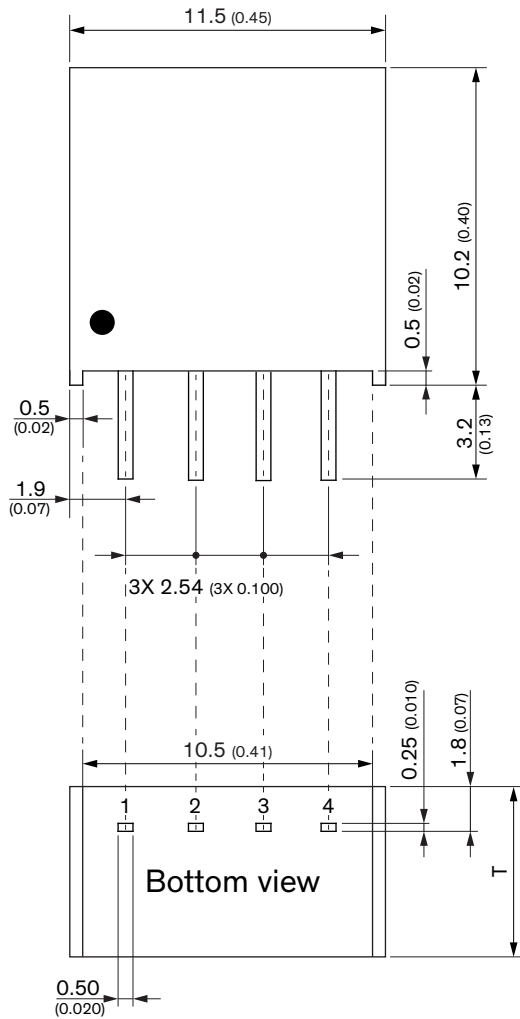
## Supporting Documents

Overview Link (for additional Documents)

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

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

## Outline Dimensions



| Pinout |            |
|--------|------------|
| Pin    | Single     |
| 1      | -Vin (GND) |
| 2      | +Vin (Vcc) |
| 3      | -Vout      |
| 4      | +Vout      |

T: 6.1 (0.24) for 3.3Vin & 5Vin & 12Vin Models  
T: 7.1 (0.28) for 24Vin 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)

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