



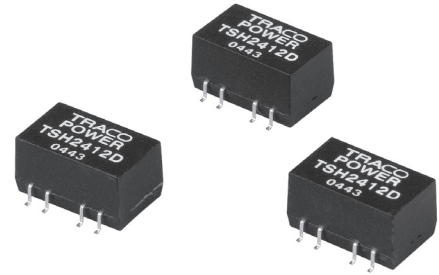
# THE DATASHEET OF TSH 2415D



### Features

- ◆ Ultra compact SMD package (SOIC-14/18)
- ◆ Isolated single and dual output models
- ◆ I/O isolation 1'000 VDC
- ◆ High efficiency up to 82%
- ◆ Operating temperature  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- ◆ Reflow solder temperature up to  $245^{\circ}\text{C}$
- ◆ High accuracy of pin Co-planarity
- ◆ Available in tape and reel package
- ◆ Lead free design, RoHS compliant
- ◆ 3-year product warranty

*not recommended for new design in*



The TSH series are ultra miniature, isolated 2 Watt DC/DC-converters in SMD package. The devices can be soldered without any problems in a high temperature lead free solder process. Requiring only  $1.5\text{ cm}^2$  board space they offer the ideal solution in many space critical applications. These converters are the ideal solution for point of load power conversion, ground loop elimination, noise reduction and digital interface applications.

### Models

| Ordercode | Input voltage     | Output voltage | Output current max. | Efficiency typ. |
|-----------|-------------------|----------------|---------------------|-----------------|
| TSH 0505S | 5 VDC $\pm 10\%$  | 5 VDC          | 400 mA              | 77 %            |
| TSH 0512S |                   | 12 VDC         | 165 mA              | 81 %            |
| TSH 0505D |                   | $\pm 5$ VDC    | $\pm 200$ mA        | 77 %            |
| TSH 0512D |                   | $\pm 12$ VDC   | $\pm 80$ mA         | 79 %            |
| TSH 0515D |                   | $\pm 15$ VDC   | $\pm 65$ mA         | 79 %            |
| TSH 1205S | 12 VDC $\pm 10\%$ | 5 VDC          | 400 mA              | 78 %            |
| TSH 1212S |                   | 12 VDC         | 165 mA              | 82 %            |
| TSH 1212D |                   | $\pm 12$ VDC   | $\pm 80$ mA         | 82 %            |
| TSH 1215D |                   | $\pm 15$ VDC   | $\pm 65$ mA         | 82 %            |
| TSH 2405S | 24 VDC $\pm 10\%$ | 5 VDC          | 400 mA              | 78 %            |
| TSH 2412S |                   | 12 VDC         | 165 mA              | 81 %            |
| TSH 2412D |                   | $\pm 12$ VDC   | $\pm 80$ mA         | 81 %            |
| TSH 2415D |                   | $\pm 15$ VDC   | $\pm 65$ mA         | 82 %            |

### Input Specifications

|                                   |   |
|-----------------------------------|---|
| Input current no load / full load | 5 Vin models: 60 mA / 500 mA typ.<br>12 Vin models: 30 mA / 200 mA typ.<br>24 Vin models: 15 mA / 100 mA typ. |
| Surge voltage (1 sec. max.)       | 5 Vin models: 9 V max.<br>12 Vin models: 18 V max.<br>24 Vin models: 30 V max.                                |
| Reflected input ripple current    | can be reduced by ext. 1–3.3 µF polyester film capacitor  |
| Input filter                      | internal capacitors   |

### Output Specifications

|                                      |   |
|--------------------------------------|---|
| Voltage set accuracy                 | ±4 % max.   |
| Voltage balance (dual output models) | 1 % max.  |
| Regulation                           | – Input variation                      1.2 % / 1% change Vin<br>– Load variation 20 – 100 %        10 % max.  |
| Ripple and noise (20 MHz Bandwidth)  | 75 mV pk-pk max.  |
| Temperature coefficient              | ± 0.02 %/K  |
| Short circuit protection             | limited 1 sec. max.   |
| Capacitive load                      | 5 VDC single output models: 47 µF max.<br>5 VDC dual output model: 10 µF max.<br>12 VDC single output models: 10 µF max.<br>12/15 VDC dual output models: 4.7 µF max. |

### General Specifications

|   |  |
|---|--|
| Temperature ranges  | – Operating                                –40°C to +85°C (no derating)<br>– Case temperature                    +105°C max.<br>– Storage                                    –55°C to +125°C |
| Humidity (non condensing)   | 95 % rel H max.  |
| Reliability, calculated MTTF (MIL-HDBK-217F, @+25°C, ground benign) | >2'000'000 h   |
| Isolation voltage (60 sec.)   | – Input/Output                            1'000 VDC  |
| Isolation capacitance   | – Input/Output                            60 pF typ.   |
| Isolation resistance  | – Input/Output                            >1'000 Mohm (at 500VDC)  |
| Switching frequency   | 100 kHz typ. (frequency modulation)  |
| Frequency change over line and load                                 | ±30 % max.   |

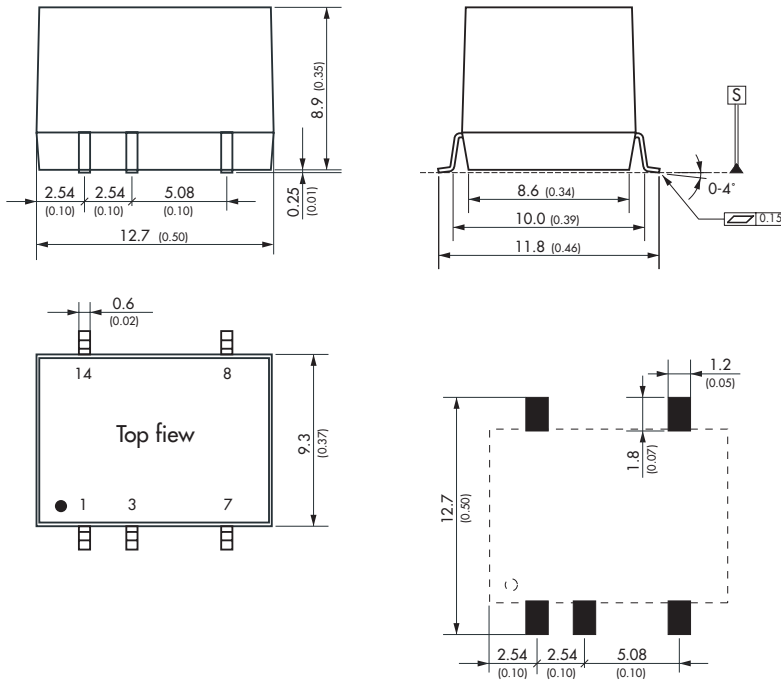
### Physical Specifications

|                                 |  |
|---------------------------------|--|
| Casing material                 | non conductive black plastic (UL 94-V0 rated)                                |
| Package weight                  | single output models: 1.5 g (0.08 oz)<br>dual output models: 2.2 g (0.05 oz) |
| Lead-free reflow solder process | as per IPC/JEDEC J-STD-020C<br>peak temp. 245°C (20 sec. max.)               |

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

**Outline Dimensions**

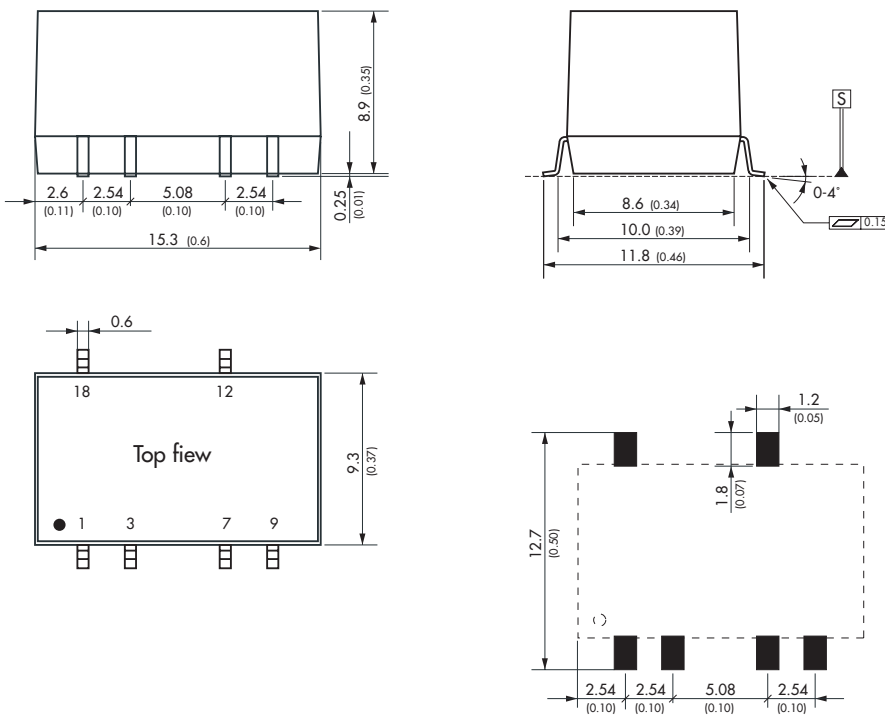
Single Output Models



| Pin-Out |            |
|---------|------------|
| Pin     | Single     |
| 1       | -Vin (GND) |
| 3       | +Vin (Vcc) |
| 7       | -Vout      |
| 8       | +Vout      |
| 14      | Ntc.       |

Ntc. = not to connect

Dual Output Models



| Pin-Out |            |
|---------|------------|
| Pin     | Dual       |
| 1       | -Vin (GND) |
| 3       | +Vin (Vcc) |
| 7       | Common     |
| 9       | -Vout      |
| 12      | +Vout      |
| 18      | Ntc.       |

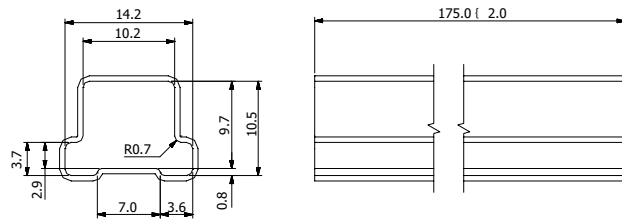
Ntc. = not to connect

Dimensions in [mm], ( ) = Inches  
Tolerances ±0.25 (±0.01), pins ±0.05 (±0.002)

**Packaging: Single Output Models**

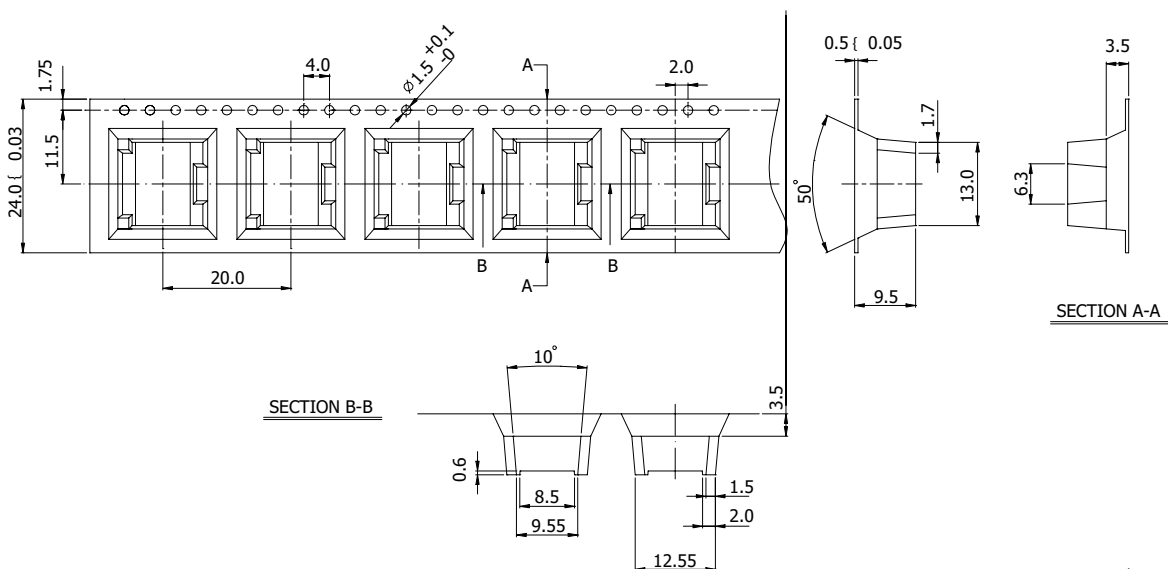
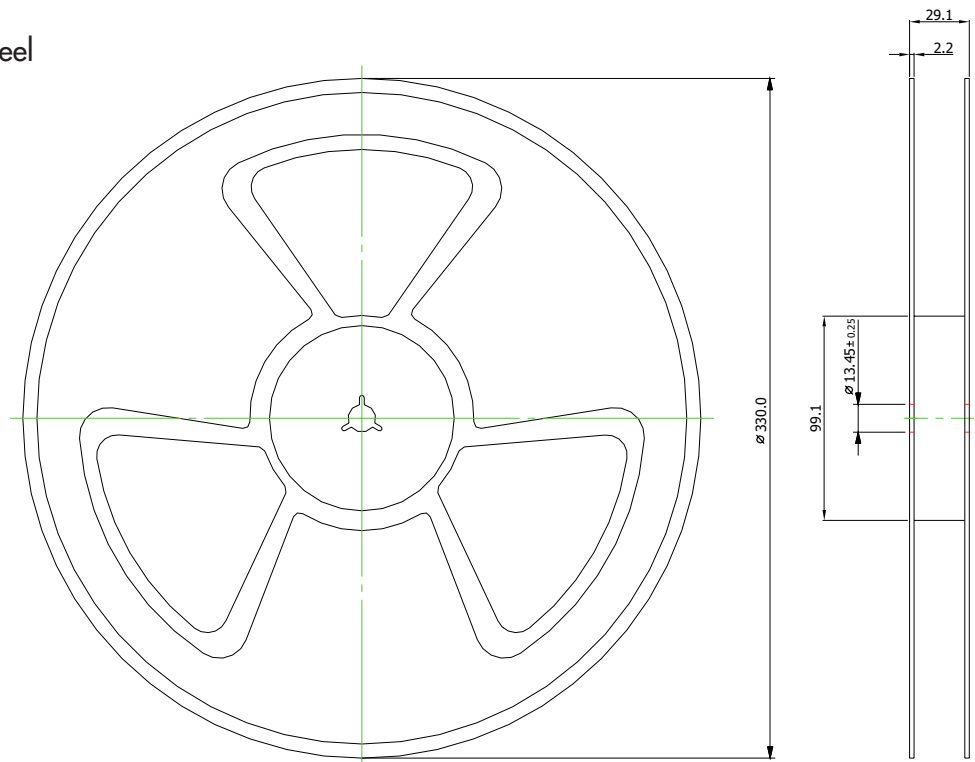
**Standard Packaging - Tube**

- 1 Tube contains 10 converters



**Optional Packaging - Tape & Reel**

- Specifications according IEC 286-3
- 1 Reel contains 300 Converters
- Use appendix «-TR» on order code

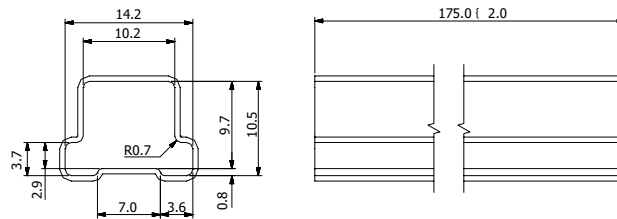


Dimensions in [mm], Tolerance ±0.1mm

**Packaging: Dual Output Models**

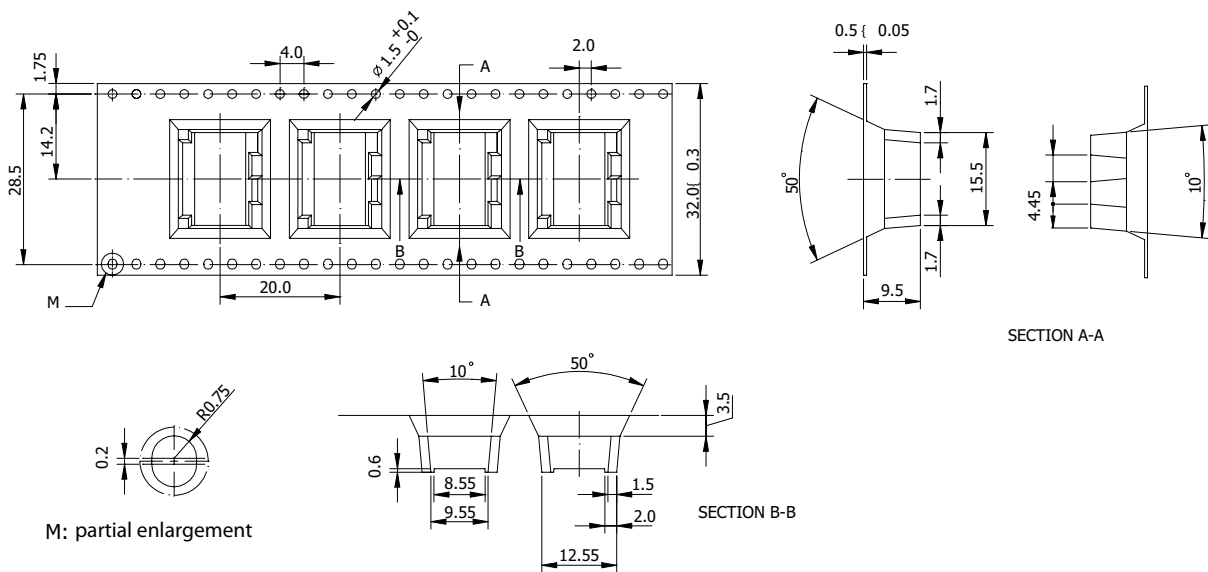
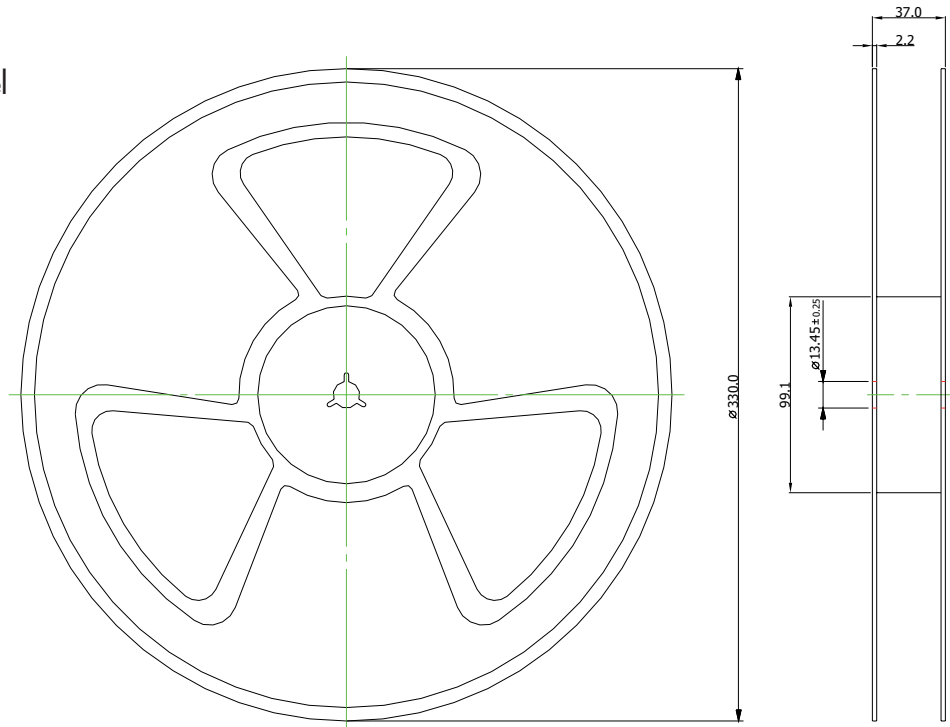
**Standard Packaging - Tube**

1 Tube contains 10 Converters



**Optional Packaging - Tape & Reel**

- Specifications according IEC 286-3
- 1 Reel contains 300 Converters
- Use appendix «-TR» on order code





Specifications can be changed any time without notice.

Dimensions in [mm], Tolerance  $\pm 0.1$ mm

Specifications can be changed without notice! Make sure you are using the latest documentation, downloadable at [www.tracopower.com](http://www.tracopower.com)

## Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

-  [View TSH 2415D on WIN SOURCE](#)
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