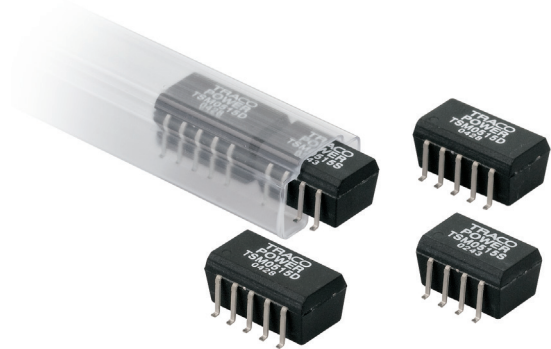


#### Features

- ◆ SMD package (SOIC-14/18)
- ◆ Construction in lead frame technology
- ◆ Isolated single and dual output
- ◆ I/O isolation 1'000 VDC
- ◆ High efficiency
- ◆ 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



The TSM series are isolated DC/DC converters with 1W output power implemented in a molded plastic package with a pin accuracy suitable for automated SMD-production. The devices can be soldered without any problems in a high temperature lead free solder process. With their small footprint these converters are the economical 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.
TSM 0505S	5 VDC $\pm 10\%$	5 VDC	200 mA	80 %
TSM 0509S		9 VDC	110 mA	78 %
TSM 0512S		12 VDC	80 mA	80 %
TSM 0515S		15 VDC	65 mA	81 %
TSM 0505D		$\pm 5$ VDC	$\pm 100$ mA	75 %
TSM 0512D		$\pm 12$ VDC	$\pm 40$ mA	79 %
TSM 0515D		$\pm 15$ VDC	$\pm 30$ mA	79 %
TSM 1205S	12 VDC $\pm 10\%$	5 VDC	200 mA	81 %
TSM 1209S		9 VDC	110 mA	78 %
TSM 1212S		12 VDC	80 mA	81 %
TSM 1215S		15 VDC	65 mA	82 %
TSM 1205D		$\pm 5$ VDC	$\pm 100$ mA	75 %
TSM 1212D		$\pm 12$ VDC	$\pm 40$ mA	80 %
TSM 1215D		$\pm 15$ VDC	$\pm 30$ mA	80 %
TSM 2405S	24 VDC $\pm 10\%$	5 VDC	200 mA	81 %
TSM 2409S		9 VDC	110 mA	78 %
TSM 2412S		12 VDC	80 mA	81 %
TSM 2415S		15 VDC	65 mA	82 %
TSM 2405D		$\pm 5$ VDC	$\pm 100$ mA	75 %
TSM 2412D		$\pm 12$ VDC	$\pm 40$ mA	80 %
TSM 2415D		$\pm 15$ VDC	$\pm 30$ mA	80 %

### Input Specifications

Input current no load / full load	5 Vin models: 30 mA / 260 mA typ. 12 Vin models: 15 mA / 110 mA typ. 24 Vin models: 8 mA / 55 mA typ.
Surge voltage (1 sec. max.)	5 Vin models: 9 V max. 12 Vin models: 18 V max. 24 Vin models: 30 V max.
Reflected input ripple current	can be reduced by ext. 1–2.2 $\mu$ F polyester film capacitor
Input filter	internal capacitors

### Output Specifications

Voltage set accuracy	$\pm 3$ %
Voltage balance (dual output models)	$\pm 1$ % max.
Regulation	– Input variation 1.2 % / 1 % change Vin – Load variation 20 – 100 % 10 % max.
Ripple and noise (20 MHz Bandwidth)	120 mVpk-pk max.
Temperature coefficient	$\pm 0.02$ %/°C
Short circuit protection	limited 1 sec. max.
Capacitive load	single output models: 22 $\mu$ F max. dual output models: 10 $\mu$ F max.

### General Specifications

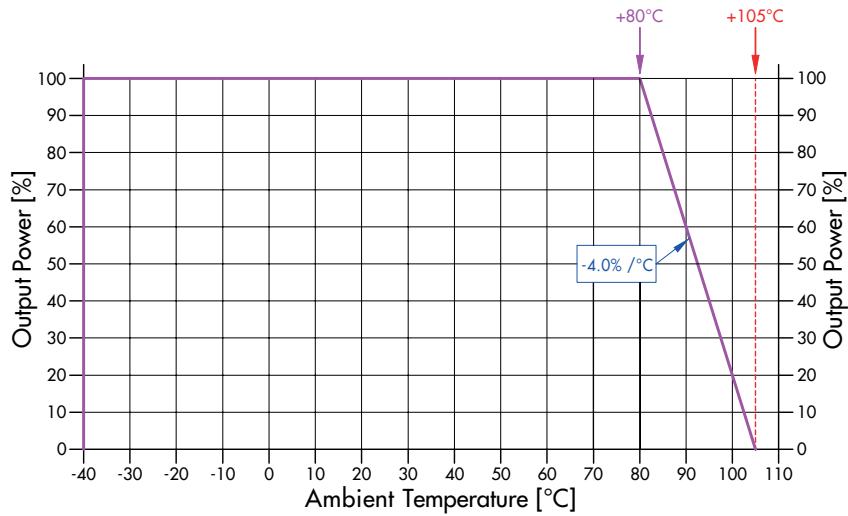
Temperature ranges	– Operating (see also enclosed derating curve) – Case temperature – Storage	–40°C to +85°C (no derating) +105°C max. –55°C to +125°C
Humidity (non condensing)		95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)		>2'000'000 h
Isolation voltage (60 sec.)	– Input/Output	1'000 VDC
Isolation capacity	– Input/Output	40 pF typ.
Isolation resistance	– Input/Output	>1'000 Mohm
Switching frequency		100 kHz typ. (frequency modulation)
Frequency change over line and load		$\pm 30$ %
Environmental compliance	– Reach – RoHS	<a href="http://www.tracopower.com/products/reach-declaration.pdf">www.tracopower.com/products/reach-declaration.pdf</a> RoHS directive 2011/65/EU

### Physical Specifications

Casing material		epoxy molding compound (flammability to UL 94V-0 rated)
Package weight	single output models: dual output models:	1.5 g (0.053 oz), 1.8 g (0.064 oz) for 24 Vin 1.8 g (0.064 oz), 2.2 g (0.078 oz) for 24 Vin
Moisture sensitivity		level 3
Reflow soldering profile (IPC/JEDEC J-STD-020D)		peak temp. 245°C (10 sec. max.) 217°C for 90 sec. max. Convection reflow solder process is recommended
Packaging		<a href="http://www.tracopower.com/overview/tsm">www.tracopower.com/overview/tsm</a>

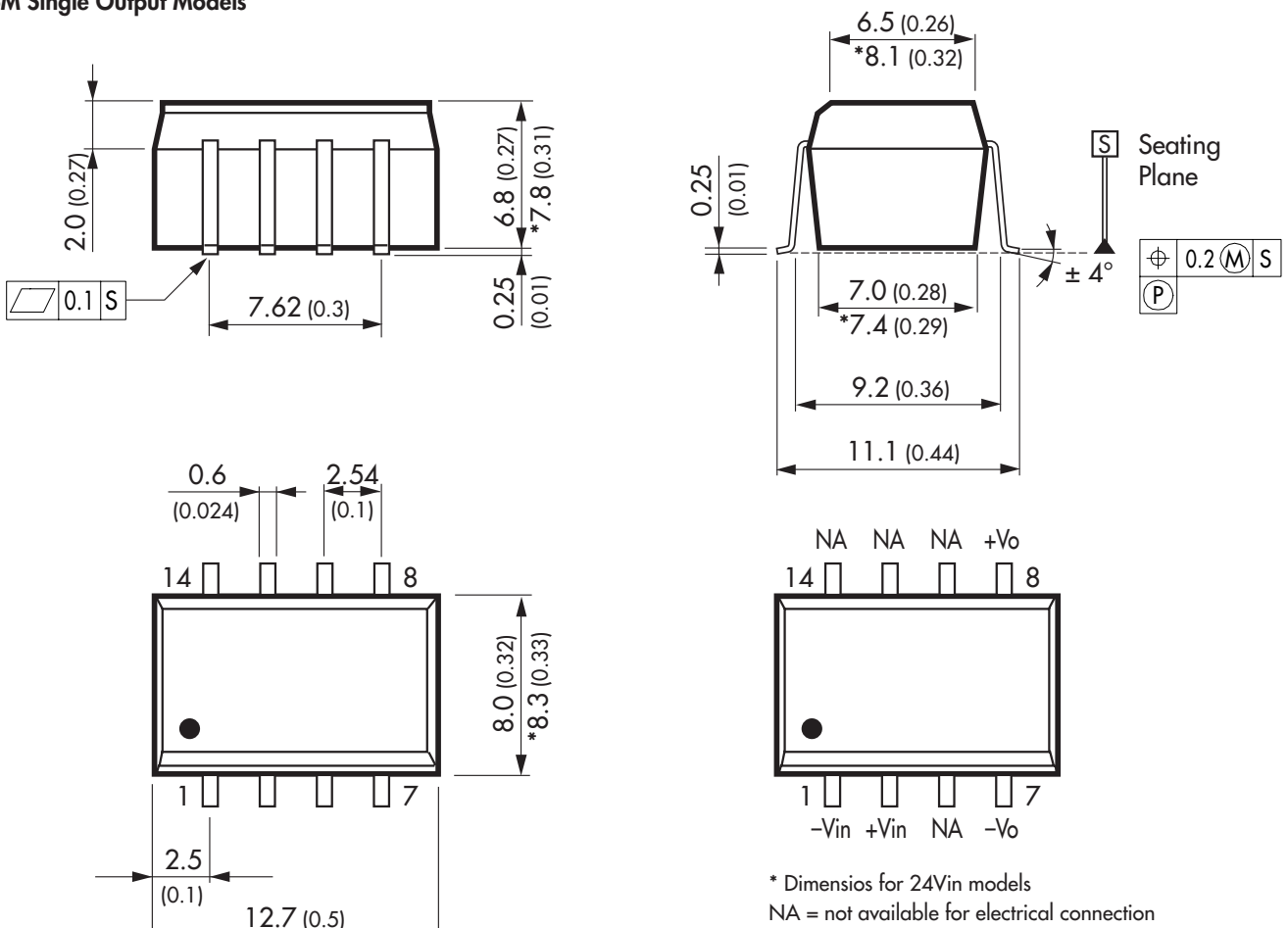
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

**Derating all TSM Models**



**Outline Dimensions**

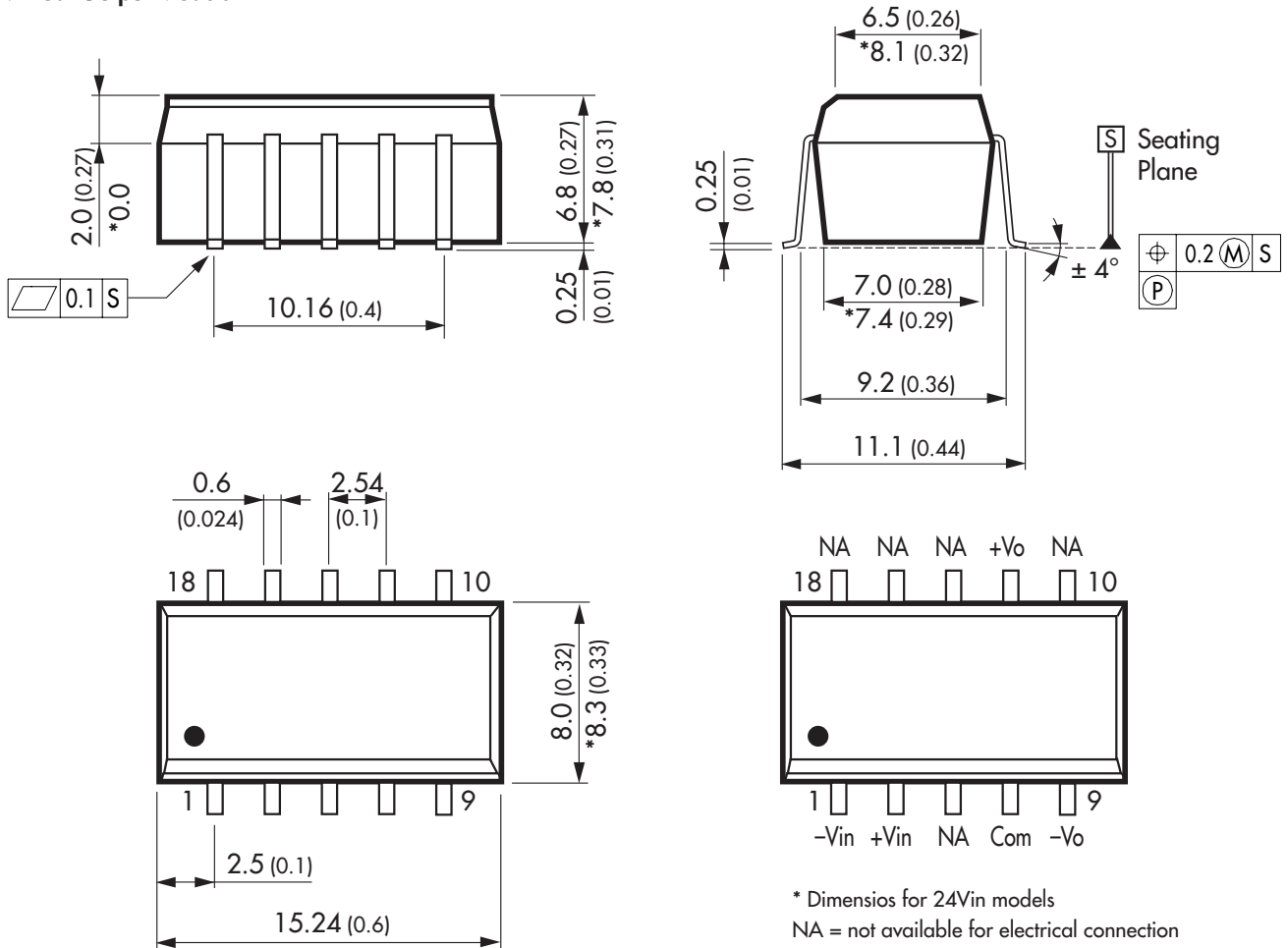
TSM Single Output Models



Dimensions in [mm], ( ) = Inch  
 Pin pitch tolerances: ±0.13 (±0.0051)  
 Other tolerances: ±0.25 (±0.01)

**Outline Dimensions**

TSM Dual Output Models

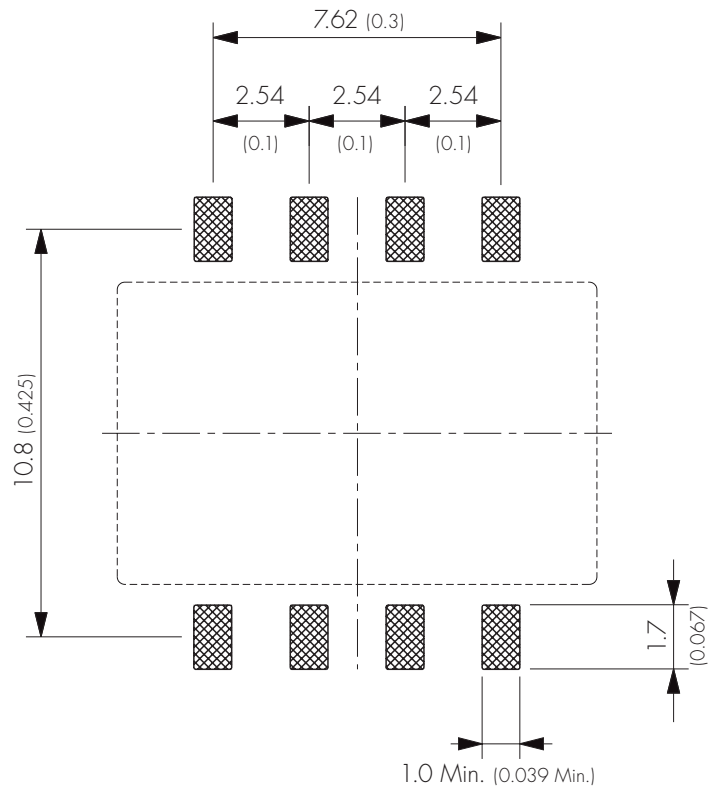


\* Dimensios for 24V<sub>in</sub> models  
NA = not available for electrical connection

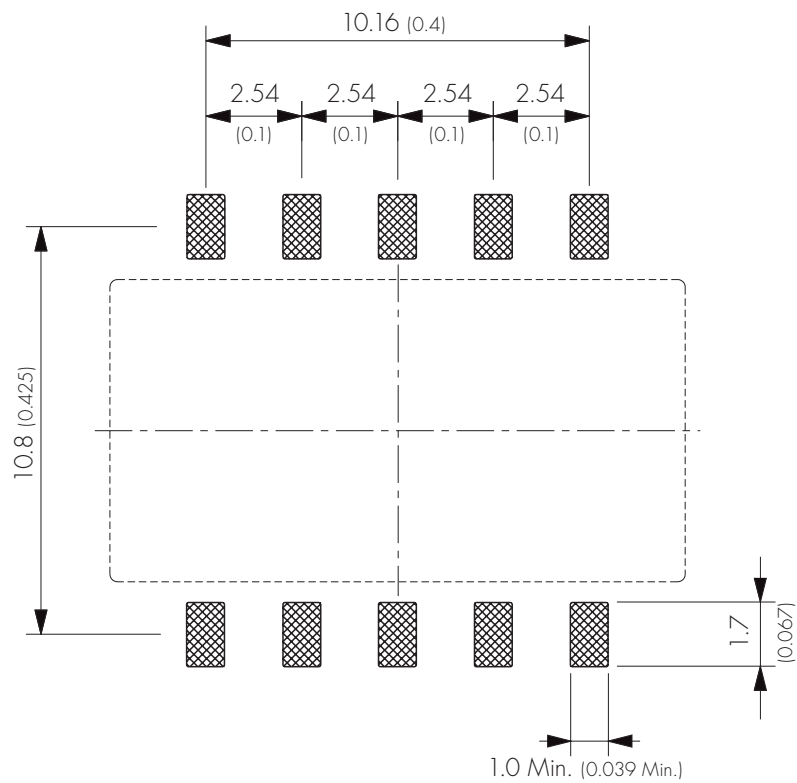
Dimensions in [mm], ( ) = Inch  
Pin pitch tolerances: ±0.13 (±0.0051)  
Other tolerances: ±0.25 (±0.01)

**Solder Pad Dimensions mm (inches)**

**TSM Single Output Models**



**TSM Dual Output Models**



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

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[TSM 0505D](#) [TSM 2405S](#) [TSM 1205S](#) [TSM 1212S](#) [TSM 0515S](#) [TSM 2415D](#) [TSM 2409S](#) [TSM 2412D](#) [TSM 2412S](#)  
[TSM 2405D](#) [TSM 1215S](#) [TSM 2415S](#) [TSM 0505S-TR](#)