

# 5 mm Square Surface Mount Miniature Trimmers Multi-Turn Cermet Sealed



The TSM4 trimming potentiometer has been designed for surface mount applications and offers volumetric efficiency 5 mm x 5 mm x 3.7 mm with high performance and stability.

The TSM4 design is suitable for both manual or automatic operation, and can withstand vapor phase and reflow soldering techniques.

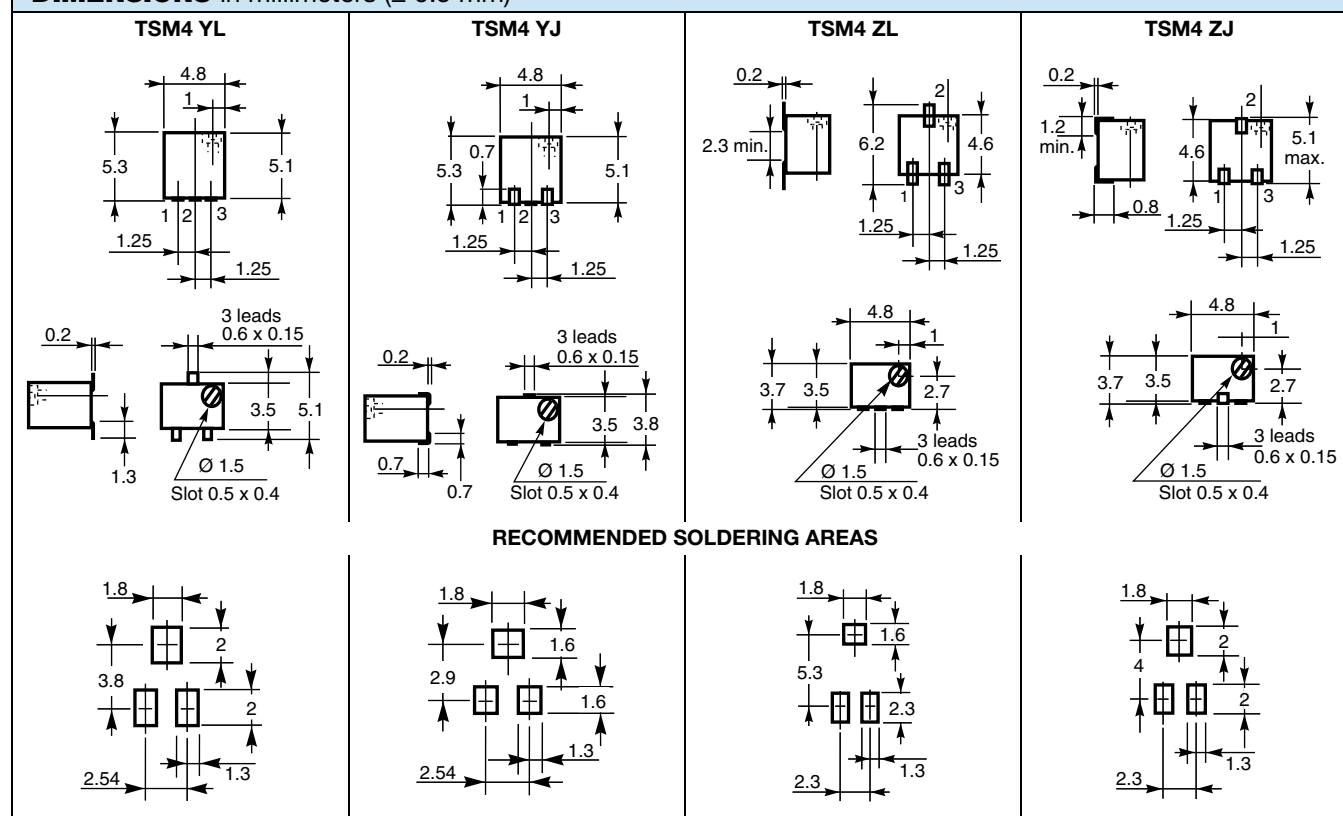
## FEATURES

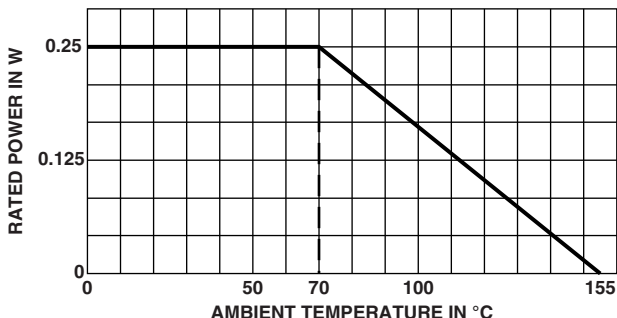
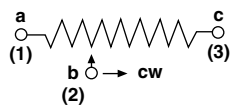
- 0.25 W at 70 °C
- Professional and industrial grade
- Wide ohmic range (10  $\Omega$  to 1 M $\Omega$ )
- Low contact resistance variation (2 % or 3  $\Omega$ )
- Small size for optimum packaging density
- Tests according to CECC 41000 or IEC 60393-1
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT

## DIMENSIONS in millimeters ( $\pm 0.5$ mm)



| <b>ELECTRICAL SPECIFICATIONS</b>             |                                                                                                                                 |
|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Resistive element                            | Cermet                                                                                                                          |
| Electrical travel                            | 11 turns $\pm$ 2                                                                                                                |
| Resistance range                             | 10 $\Omega$ to 1 M $\Omega$                                                                                                     |
| Standard series                              | 1 - 2 - 5                                                                                                                       |
| Tolerance standard                           | $\pm$ 10 %                                                                                                                      |
| Power rating                                 | <div>Linear</div> <div>0.25 W at 70 °C</div>  |
| Circuit diagram                              |                                               |
| Temperature coefficient                      | See Standard Resistance Element table                                                                                           |
| Limiting element voltage (linear law)        | 200 V                                                                                                                           |
| Contact resistance variation (typical)       | 2 % or 3 $\Omega$                                                                                                               |
| End resistance (typical)                     | 1 $\Omega$                                                                                                                      |
| Dielectric strength (RMS)                    | 600 V                                                                                                                           |
| Insulation resistance (500 V <sub>DC</sub> ) | 10 <sup>6</sup> M $\Omega$                                                                                                      |

| <b>MECHANICAL SPECIFICATIONS</b> |                              |
|----------------------------------|------------------------------|
| Mechanical travel                | 13 turns $\pm$ 2             |
| Operating torque (max. Ncm)      | 1                            |
| End stop torque (Ncm)            | Clutch action (2 turns max.) |
| Unit weight (max. g)             | 0.15                         |
| Wiper (actual travel)            | Positioned at approx. 50 %   |

| <b>ENVIRONMENTAL SPECIFICATIONS</b> |                       |
|-------------------------------------|-----------------------|
| Temperature range                   | -55 °C to +125 °C     |
| Climatic category                   | 55/125/56             |
| Sealing                             | Sealed container IP67 |
| MSL level                           | 1                     |

| <b>SOLDERING RECOMMENDATIONS</b>                                                                                          |  |
|---------------------------------------------------------------------------------------------------------------------------|--|
| Recommended reflow profile 2, see Application Note <a href="http://www.vishay.com/doc?52029">www.vishay.com/doc?52029</a> |  |

**PERFORMANCES**

| TESTS                   | CONDITIONS                                                                                         | TYPICAL VALUES AND DRIFTS |                          |                                                                                 |
|-------------------------|----------------------------------------------------------------------------------------------------|---------------------------|--------------------------|---------------------------------------------------------------------------------|
|                         |                                                                                                    | $\Delta R_T/R_T$          | $\Delta R_{1-2}/R_{1-2}$ | OTHER                                                                           |
| Electrical endurance    | 1000 h at rated power<br>90'/30' - ambient temp. +70 °C                                            | ± 2 %                     | ± 3 %                    | Contact res. variation: $\Delta < 1 \%$ Rn                                      |
| Climatic sequence       | Phase A dry heat 125 °C<br>Phase B damp heat<br>Phase C cold - 55 °C<br>Phase D damp heat 5 cycles | ± 2 %                     | ± 3 %                    | Dielectric strength: 600 V <sub>RMS</sub><br>Insulation resistance: $> 10^4$ MΩ |
| Damp heat, steady state | Temperature 40 °C - RH 93 %<br>56 days                                                             | ± 2 %                     | ± 3 %                    | Dielectric strength: 600 V <sub>RMS</sub><br>Insulation resistance: $> 10^4$ MΩ |
| Charge of temperature   | -55 °C to +125 °C<br>5 cycles                                                                      | ± 1 %                     |                          | $\Delta V_{1-2}/\Delta V_{1-3} \leq \pm 2 \%$                                   |
| Mechanical endurance    | 100 cycles - rated power                                                                           | ± (3 % + 3 Ω)             |                          |                                                                                 |
| Shock                   | 50 g - 11 ms<br>3 successive shocks in 3 directions                                                | ± 1 %                     |                          | $\Delta V_{1-2}/\Delta V_{1-3} \leq \pm 1 \%$                                   |
| Vibration               | 10 Hz to 55 Hz<br>0.75 mm or 10 g - 6 h                                                            | ± 1 %                     |                          | $\Delta V_{1-2}/\Delta V_{1-3} \leq \pm 1 \%$                                   |

**STANDARD RESISTANCE ELEMENT DATA**

| STANDARD<br>RESISTANCE<br>VALUES | LINEAR LAW             |                         |                                 | TYPICAL<br>TCR<br>-55 °C<br>+125 °C |
|----------------------------------|------------------------|-------------------------|---------------------------------|-------------------------------------|
|                                  | MAX. POWER<br>AT 70 °C | MAX. WORKING<br>VOLTAGE | MAX. CURRENT<br>THROUGH ELEMENT |                                     |
| Ω                                | W                      | V                       | mA                              | ppm/°C                              |
| 10                               | 0.25                   | 1.58                    | 158                             | ± 100                               |
| 20                               | 0.25                   | 2.23                    | 112                             |                                     |
| 50                               | 0.25                   | 3.53                    | 77                              |                                     |
| 100                              | 0.25                   | 5.00                    | 50                              |                                     |
| 200                              | 0.25                   | 7.07                    | 35                              |                                     |
| 500                              | 0.25                   | 11.2                    | 22                              |                                     |
| 1K                               | 0.25                   | 15.8                    | 15.8                            |                                     |
| 2K                               | 0.25                   | 22.3                    | 11.2                            |                                     |
| 5K                               | 0.25                   | 35.3                    | 7.1                             |                                     |
| 10K                              | 0.25                   | 50.0                    | 5.0                             |                                     |
| 20K                              | 0.25                   | 70.7                    | 3.5                             |                                     |
| 50K                              | 0.25                   | 112                     | 2.2                             |                                     |
| 100K                             | 0.25                   | 158                     | 1.6                             |                                     |
| 200K                             | 0.25                   | 200                     | 1.0                             |                                     |
| 500K                             | 0.08                   | 200                     | 0.4                             |                                     |
| 1M                               | 0.04                   | 200                     | 0.2                             |                                     |

**MARKING**

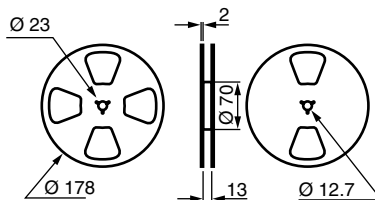
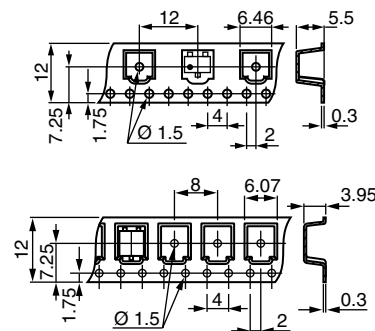
Vishay trademark, ohmic value, manufacturing date

The ohmic value is indicated by a 3 figure code, the first two are significant figures, the third one is the multiplier.

Example: 100 = 10 Ω  
 101 = 100 Ω  
 102 = 1000 Ω  
 503 = 50 000 Ω

**PACKAGING** in millimeters

On tape and reel, by 500 pieces for Z version: Code TR500, or 250 pieces for Y version: Code TR250.  
In bulk on request (plastic box of 50 pieces): Code BO50.

**Version Y**

**Version Z**

**ORDERING INFORMATION** (part number)

|       |   |                      |   |   |                                      |   |   |           |   |                                                                                                                                   |   |   |                                                               |  |  |  |
|-------|---|----------------------|---|---|--------------------------------------|---|---|-----------|---|-----------------------------------------------------------------------------------------------------------------------------------|---|---|---------------------------------------------------------------|--|--|--|
| T     | S | M                    | 4 | Y | L                                    | 5 | 0 | 4         | K | R                                                                                                                                 | 0 | 5 |                                                               |  |  |  |
| MODEL |   | STYLE                |   |   | OHMIC VALUE                          |   |   | TOLERANCE |   | PACKAGING                                                                                                                         |   |   | SPECIAL NUMBER                                                |  |  |  |
| TSM4  |   | YJ<br>YL<br>ZJ<br>ZL |   |   | From<br>10 Ω to 1 MΩ<br>504 = 500 kΩ |   |   | K = 10 %  |   | R10 =<br>Reel 500 pieces<br>for ZJ and ZL<br>R05 =<br>Reel 250 pieces<br>for YJ and YL<br>On request<br>B25 =<br>Box of 50 pieces |   |   | (If applicable)<br>Given by<br>Vishay<br>for custom<br>design |  |  |  |

**DESCRIPTION** (for information only)

|       |       |       |           |         |           |                |
|-------|-------|-------|-----------|---------|-----------|----------------|
| TSM4  | YL    | 500K  | 10 %      |         | TR        | e3             |
| MODEL | STYLE | VALUE | TOLERANCE | SPECIAL | PACKAGING | LEAD (Pb)-FREE |



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