

## 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 Ω to 1 MΩ)
- Low contact resistance variation (2 % or 3 Ω)
- 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



| <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                                 | Linear<br>0.25 W at 70 °C<br>         |
| 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: $\Delta < 1 \% R_n$  |
| 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 <sup>4</sup> 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 <sup>4</sup> 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   | $\pm (3 \% + 3 \Omega)$   |                          |  |
| 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 RESISTANCE VALUES       | LINEAR LAW          |                      |                              | TYPICAL TCR<br>-55 °C<br>+125 °C<br>ppm/°C |
|                                  | MAX. POWER AT 70 °C | MAX. WORKING VOLTAGE | MAX. CURRENT THROUGH ELEMENT |  |
| Ω                                | W                   | V                    | mA                           |  |
| 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  |
|--|
| <p>Vishay trademark, ohmic value, manufacturing date</p> <p>The ohmic value is indicated by a 3 figure code, the first two are significant figures, the third one is the multiplier.</p> <p>Example: 100 = 10 Ω<br/>           101 = 100 Ω<br/>           102 = 1000 Ω<br/>           503 = 50 000 Ω</p> |

**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)



|       |                      |                                      |           |   |   |
|-------|----------------------|--------------------------------------|-----------|---|---|
| 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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