

## Surface Mount Miniature Trimmers Single-Turn Cermet Sealed



**FEATURES**

- 0.25 W at 70 °C
- For PCB version see T53Y series
- Wide ohmic range (10 Ω to 1 MΩ)
- Small size for optimum packing density
- Suitable for both manual or automatic operation
- RoHS compliant since data code 0445



**RoHS**  
COMPLIANT

The TS53 trimming potentiometer has been designed for surface mount applications and offers volumetric efficiency (5 x 5 x 2.7 mm) with high performance and stability.

The TS53 design is suitable for both manual or automatic operation, and can withstand wave, and reflow soldering techniques.

| <b>DIMENSIONS</b> in millimeters ( $\pm 0.25$ mm)  |               |   |               |
|--|---------------|---|---------------|
| <b>TS53YL</b>  | <b>TS53YJ</b> | <b>RECOMMENDED SOLDERING AREAS</b>                                    |               |
| <b>TS53YL</b>  | <b>TS53YJ</b> | <b>TS53YL</b>   | <b>TS53YJ</b> |
|  |               |   |               |
|  |               | <p>Tolerances unless otherwise specified <math>\pm 0.25</math> mm</p> |               |
| <p><b>Cruciform screwdriver slot</b><br/> <math>\text{Ø } 2.5</math>, width 0.5<br/>                     Deep: 0.55<br/>                     Max. deep (center): 0.7</p> |               |   |               |



| ELECTRICAL SPECIFICATIONS             |  |                          |                  |   |      |    |      |    |      |    |      |    |      |    |      |     |      |     |      |     |      |
|---------------------------------------|--|--------------------------|------------------|---|------|----|------|----|------|----|------|----|------|----|------|-----|------|-----|------|-----|------|
| Resistive Element                     | Cermet   |                          |                  |   |      |    |      |    |      |    |      |    |      |    |      |     |      |     |      |     |      |
| Electrical Travel                     | 220° ± 15°   |                          |                  |   |      |    |      |    |      |    |      |    |      |    |      |     |      |     |      |     |      |
| Resistance Range                      | 10 Ω to 1 MΩ   |                          |                  |   |      |    |      |    |      |    |      |    |      |    |      |     |      |     |      |     |      |
| Standard Series                       | 1 - 2 - 5  |                          |                  |   |      |    |      |    |      |    |      |    |      |    |      |     |      |     |      |     |      |
| Tolerance Standard                    | ± 20 %   |                          |                  |   |      |    |      |    |      |    |      |    |      |    |      |     |      |     |      |     |      |
| Variation Law                         | <p><b>CIRCUIT DIAGRAM</b></p> <p>linear</p>  |                          |                  |   |      |    |      |    |      |    |      |    |      |    |      |     |      |     |      |     |      |
| Power Rating                          | <p>0.25 W at 70 °C</p> <table border="1"> <caption>Power Rating vs Ambient Temperature</caption> <thead> <tr> <th>Ambient Temperature (°C)</th> <th>Power Rating (W)</th> </tr> </thead> <tbody> <tr><td>0</td><td>0.25</td></tr> <tr><td>20</td><td>0.25</td></tr> <tr><td>40</td><td>0.25</td></tr> <tr><td>60</td><td>0.25</td></tr> <tr><td>70</td><td>0.25</td></tr> <tr><td>80</td><td>0.20</td></tr> <tr><td>100</td><td>0.10</td></tr> <tr><td>120</td><td>0.00</td></tr> <tr><td>125</td><td>0.00</td></tr> </tbody> </table> | Ambient Temperature (°C) | Power Rating (W) | 0 | 0.25 | 20 | 0.25 | 40 | 0.25 | 60 | 0.25 | 70 | 0.25 | 80 | 0.20 | 100 | 0.10 | 120 | 0.00 | 125 | 0.00 |
| Ambient Temperature (°C)              | Power Rating (W)   |                          |                  |   |      |    |      |    |      |    |      |    |      |    |      |     |      |     |      |     |      |
| 0                                     | 0.25   |                          |                  |   |      |    |      |    |      |    |      |    |      |    |      |     |      |     |      |     |      |
| 20                                    | 0.25   |                          |                  |   |      |    |      |    |      |    |      |    |      |    |      |     |      |     |      |     |      |
| 40                                    | 0.25   |                          |                  |   |      |    |      |    |      |    |      |    |      |    |      |     |      |     |      |     |      |
| 60                                    | 0.25   |                          |                  |   |      |    |      |    |      |    |      |    |      |    |      |     |      |     |      |     |      |
| 70                                    | 0.25   |                          |                  |   |      |    |      |    |      |    |      |    |      |    |      |     |      |     |      |     |      |
| 80                                    | 0.20   |                          |                  |   |      |    |      |    |      |    |      |    |      |    |      |     |      |     |      |     |      |
| 100                                   | 0.10   |                          |                  |   |      |    |      |    |      |    |      |    |      |    |      |     |      |     |      |     |      |
| 120                                   | 0.00   |                          |                  |   |      |    |      |    |      |    |      |    |      |    |      |     |      |     |      |     |      |
| 125                                   | 0.00   |                          |                  |   |      |    |      |    |      |    |      |    |      |    |      |     |      |     |      |     |      |
| Temperature Coefficient               | See Standard Resistance Element Data   |                          |                  |   |      |    |      |    |      |    |      |    |      |    |      |     |      |     |      |     |      |
| Limiting Element Voltage (Linear Law) | 200 V  |                          |                  |   |      |    |      |    |      |    |      |    |      |    |      |     |      |     |      |     |      |
| Contact Resistance Variation          | 1 % or 3 Ω   |                          |                  |   |      |    |      |    |      |    |      |    |      |    |      |     |      |     |      |     |      |
| End Resistance (Typical)              | 0.1 % or 3 Ω   |                          |                  |   |      |    |      |    |      |    |      |    |      |    |      |     |      |     |      |     |      |
| Dielectric Strength (RMS)             | 1000 V   |                          |                  |   |      |    |      |    |      |    |      |    |      |    |      |     |      |     |      |     |      |
| Insulation Resistance                 | 1 GΩ   |                          |                  |   |      |    |      |    |      |    |      |    |      |    |      |     |      |     |      |     |      |

| MECHANICAL SPECIFICATIONS   |              |
|-----------------------------|--------------|
| Mechanical Travel           | 270° ± 10°   |
| Operating Torque (max. Ncm) | 1.5          |
| End Stop Torque (max. Ncm)  | 3.5          |
| Net Weight (max. g)         | 0.15         |
| Terminals                   | Pure Sn (e3) |

| ENVIRONMENTAL SPECIFICATIONS |                       |
|------------------------------|-----------------------|
| Temperature Range            | - 55 °C to + 125 °C   |
| Climatic Category            | 55/125/56             |
| Sealing                      | Sealed container IP67 |
| MSL Level                    | 4                     |



| PERFORMANCE                                 |  |   |  |
|---|--|---|--|
| TESTS                                       | CONDITIONS   | TYPICAL VALUES AND DRIFTS   |  |
|   |  | $\frac{\Delta RT}{RT}$ (%)  | $\frac{\Delta R_{1-2}}{R_{1-2}}$ (%)           |
| Load Life                                   | 1000 hours at rated power<br>90'/30' - ambient temperature + 70 °C                                 | ± 2 %<br>Contact resistance variation: $\Delta R < 1 \% R_n$                            | ± 3 %  |
| 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 %  |
| Long Term Damp Heat                         | Temperature 40 °C - RH 93 %<br>56 days   | ± 2 %<br>Dielectric strength: 1000 V RMS<br>Insulation resistance: > 10 <sup>4</sup> MΩ | ± 3 %  |
| Thermal Shock                               | 55 °C to + 125 °C - 5 cycles   | ± 1 %   | $\frac{\Delta V_{1-2}}{V_{1-3}} \leq \pm 2 \%$ |
| Rotational Life (Electrical and Mechanical) | 100 cycles - rated power   | ± (3 % + 5 Ω)   |  |
| Shock                                       | 50 g - 11 ms<br>3 successive shocks in 3 directions  | ± 1 %   | $\frac{\Delta V_{1-2}}{V_{1-3}} \leq \pm 1 \%$ |
| Vibration                                   | 10 - 55 Hz<br>0.75 mm or 10 g - 6 hours  | ± 1 %   | $\frac{\Delta V_{1-2}}{V_{1-3}} \leq \pm 1 \%$ |

| STANDARD RESISTANCE ELEMENT DATA |                     |                      |                           |                                    |
|----------------------------------|---------------------|----------------------|---------------------------|------------------------------------|
| STANDARD RESISTANCE VALUES       | LINEAR LAW          |                      |                           | TYPICAL TCR<br>- 55 °C<br>+ 125 °C |
|                                  | MAX. POWER AT 70 °C | MAX. WORKING VOLTAGE | MAX. CUR. THROUGH ELEMENT |                                    |
| Ω                                | W                   | V                    | mA                        | ppm/°C                             |
| 10                               | 0.25                | 1.58                 | 158                       | ± 100                              |
| 20                               | ↓                   | 2.24                 | 112                       |                                    |
| 50                               |                     | 3.54                 | 71                        |                                    |
| 100                              |                     | 5.00                 | 50                        |                                    |
| 200                              |                     | 7.07                 | 35                        |                                    |
| 500                              |                     | 11.2                 | 22                        |                                    |
| 1K                               |                     | 15.8                 | 16                        |                                    |
| 2K                               |                     | 22.4                 | 11                        |                                    |
| 5K                               |                     | 35.4                 | 7                         |                                    |
| 10K                              |                     | 50.0                 | 5                         |                                    |
| 20K                              |                     | 70.7                 | 3.5                       |                                    |
| 50K                              | 112                 | 2.2                  |                           |                                    |
| 100K                             | 0.25                | 158                  | 1.6                       |                                    |
| 200K                             | 0.20                | 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

**SOLDERING RECOMMENDATIONS**

See Application notes

**CAUTION**

Reflow soldering must be done within 72 h while stored under a max. temperature of 30 °C, 60 % RH after opening the dry pack envelope.

**RECOMMENDED METHOD OF STORAGE**

Dry box storage is recommended as soon as the hermetic bag has been opened to prevent moisture absorption. The following conditions should be observed, if dry boxes are not available:

- Storage temperature 10 °C to 30 °C
- Storage humidity ≤ 60 % RH max.

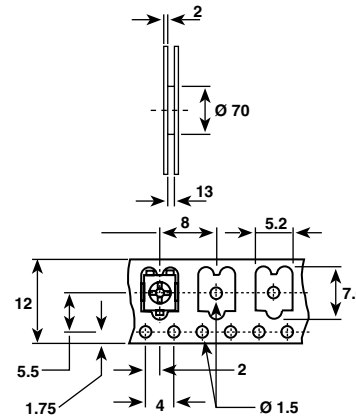
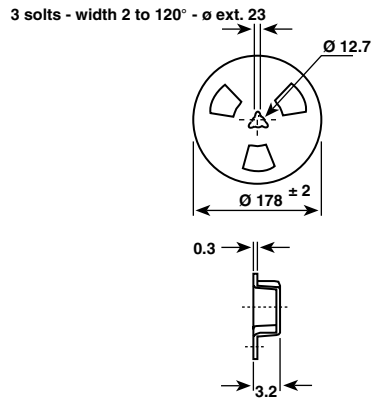
After more than 72 h under these conditions, moisture content will be too high for reflow soldering.

In case of moisture absorption, the devices will recover to the former condition by drying under the following condition:

- 192 h at 40 °C + 5 °C/- 0 °C and < 5 % RH (dry air/nitrogen) or
- 96 h at 60 °C + 5 °C and < 5 % RH for all device containers (not suitable for reel) or
- 24 h at 125 °C + 5 °C (not suitable for reel)

**PACKAGING**

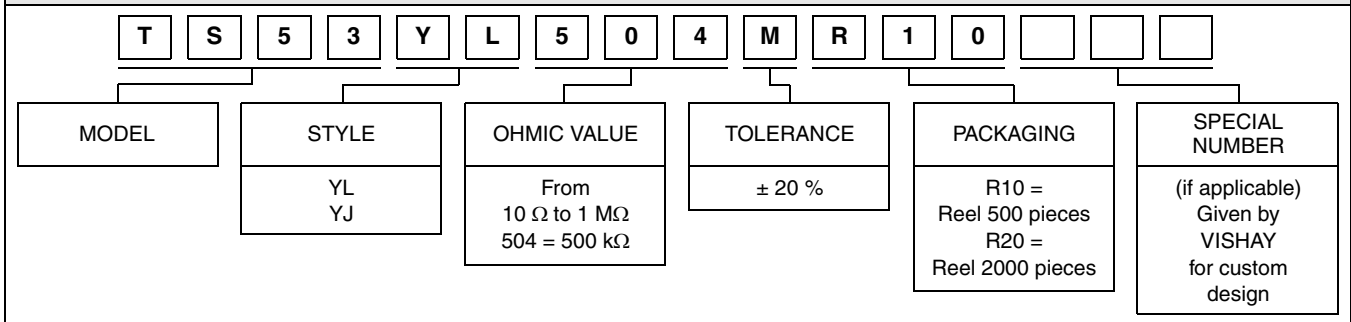
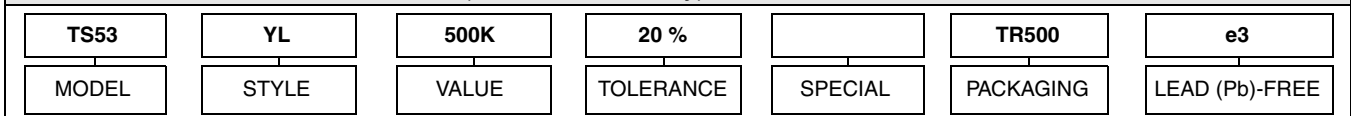
On tape and reel of 500 pieces, code R10 (TR500) and 2000 pieces, code R20 (TR2000)



Cover tape panel strength specifications EIA 481 A and CEI 60286-3.

**DRYPACK**

Devices are packed in moisture barrier bags to prevent the products from moisture absorption during transportation and storage. Each bag contains a desiccant.

**SAP ORDERING INFORMATION** (Part Number 15 digits)

**PART NUMBER DESCRIPTION** (for information only)




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