

# Precision Low TCR Thin Film Resistor, Surface Mount Chip, $\pm 5 \text{ ppm}/^{\circ}\text{C}$ TCR, 0.01 % Tolerance



Actual Size 0603

Vishay's proven precision thin film wraparound resistors will meet your exact requirements. These resistors are ideal for precision applications requiring low noise, stability, ultra low temperature coefficient of resistance, and low voltage coefficient. The chip resistors are available in any resistance ohmic value in the range specified below.

## CONSTRUCTION



## FEATURES

- TCR of  $\pm 5 \text{ ppm}/^{\circ}\text{C}$  standard
- Tolerances to  $\pm 0.01 \%$
- Anti corrosion resistant film with (SPM) special passivation method
- Stable film and performance characteristics ( $\Delta R \pm 0.04 \%$  at  $70^{\circ}\text{C}$ , 10 000 h)
- Non-standard resistance values available
- Very low noise and voltage coefficient ( $< -30 \text{ dB}$ ,  $0.1 \text{ ppm/V}$ )
- UL 94 V-0 flame resistant
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS\***  
Available  
**HALOGEN FREE**

## Note

\* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details

## TYPICAL PERFORMANCE

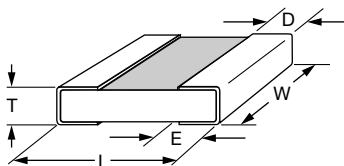
|      | ABSOLUTE |
|------|----------|
| TCR  | 5        |
| TOL. | 0.01     |

## STANDARD ELECTRICAL SPECIFICATIONS

| TEST                           | SPECIFICATIONS                                                                | CONDITIONS                                      |
|--------------------------------|-------------------------------------------------------------------------------|-------------------------------------------------|
| Material                       | Passivated nichrome                                                           | -                                               |
| Resistance Range               | 100 $\Omega$ to 3 M $\Omega$                                                  | -                                               |
| TCR: Absolute                  | $\pm 5 \text{ ppm}/^{\circ}\text{C}$ to $\pm 10 \text{ ppm}/^{\circ}\text{C}$ | $-55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ |
| Tolerance: Absolute            | $\pm 0.1 \%$ to $\pm 0.01 \%$                                                 | $+25^{\circ}\text{C}$                           |
| Stability: Absolute            | $\Delta R \pm 0.02 \%$                                                        | 2000 h at $70^{\circ}\text{C}$                  |
| Stability: Ratio               | -                                                                             | -                                               |
| Voltage Coefficient            | $\pm 0.1 \text{ ppm/V}$ (typical)                                             | -                                               |
| Working Voltage                | 75 V to 200 V                                                                 | -                                               |
| Operating Temperature Range    | $-55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$                               | -                                               |
| Storage Temperature Range      | $-55^{\circ}\text{C}$ to $+150^{\circ}\text{C}$                               | -                                               |
| Noise                          | $< -35 \text{ dB}$ (typical)                                                  | -                                               |
| Shelf Life Stability: Absolute | $\Delta R \pm 0.01 \%$                                                        | 1 year at $+25^{\circ}\text{C}$                 |

## COMPONENT RATINGS

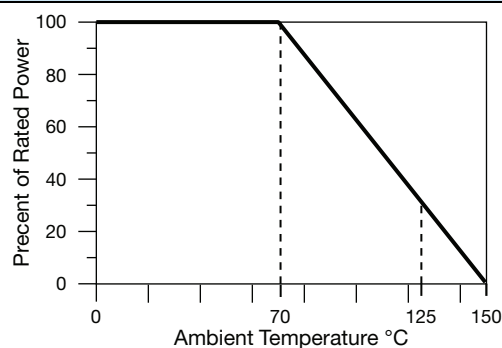
| CASE SIZE | POWER RATING (mW) | WORKING VOLTAGE (V) | RESISTANCE RANGE ( $\Omega$ ) |
|-----------|-------------------|---------------------|-------------------------------|
| 0603      | 150               | 75                  | 100 to 130K                   |
| 0805      | 250               | 100                 | 100 to 260K                   |
| 1206      | 400               | 200                 | 100 to 775K                   |
| 2010      | 800               | 200                 | 150 to 2M                     |
| 2512      | 1000              | 200                 | 200 to 3M                     |

**DIMENSIONS** in inches


| CASE SIZE | TERM | L             | W             | T              | D                     | E                     |
|-----------|------|---------------|---------------|----------------|-----------------------|-----------------------|
| 0603      | B, S | 0.064 ± 0.006 | 0.032 ± 0.005 | 0.020 max.     | 0.012 ± 0.005         | 0.015 ± 0.005         |
| 0805      | B, S | 0.080 ± 0.006 | 0.050 ± 0.005 | 0.015 to 0.033 | 0.016 ± 0.008         | 0.015 ± 0.005         |
| 1206      | B, S | 0.126 ± 0.008 | 0.063 ± 0.005 | 0.015 to 0.033 | 0.020 +0.005 / -0.010 | 0.020 +0.005 / -0.010 |
| 2010      | B, S | 0.209 ± 0.009 | 0.098 ± 0.005 | 0.015 to 0.033 | 0.020 ± 0.005         | 0.020 ± 0.005         |
| 2512      | B, S | 0.259 ± 0.009 | 0.124 ± 0.005 | 0.015 to 0.033 | 0.020 ± 0.005         | 0.020 ± 0.005         |

**ENVIRONMENTAL TESTS - TYPICAL**

| ENVIRONMENTAL TEST           | 10 kΩ ΔR ± (%) | 100 kΩ ΔR ± (%) |
|------------------------------|----------------|-----------------|
| Thermal Shock                | 0.02           | 0.02            |
| Short Time Overload          | 0.01           | 0.01            |
| Low Temperature Operation    | 0.01           | 0.01            |
| Resistance to Solder Heat    | 0.01           | 0.01            |
| Moisture Resistance          | 0.02           | 0.02            |
| High Temperature Exposure    | 0.02           | 0.02            |
| Load Life (10 000 h, +70 °C) | 0.04           | 0.04            |
| TCR                          | ± 5 ppm/°C     | ± 5 ppm/°C      |

**DERATING CURVE**

**GLOBAL PART NUMBER INFORMATION**

| P            | L                                    | T                                 | 0                                                                                                                                                                                                                                                                                                                                                                                                       | 6 | 0                                                                                                                  | 3 | Z                                                                                                                                                                                            | 1 | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0 | 1 | Q | B | T | 1 |
|--------------|--------------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|--------------------------------------------------------------------------------------------------------------------|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|
| GLOBAL MODEL | CASE SIZE                            | TCR CHARACTERISTIC                | RESISTANCE                                                                                                                                                                                                                                                                                                                                                                                              |   | TOLERANCE                                                                                                          |   | TERMINATION                                                                                                                                                                                  |   | PACKAGING                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |   |   |   |   |   |   |
| PLT          | 0603<br>0805<br>1206<br>2010<br>2512 | Z = ± 5 ppm/°C<br>Y = ± 10 ppm/°C | <p>The first 3 digits are significant figures and the last digit specifies the number of zeros to follow. "R" designates the decimal point.</p> <p>Example:<br/>1001 = 1 kΩ<br/>2500 = 250 Ω</p> <p>Special values with more than 4 significant figures, use a R for value below 1 kΩ and a K for values greater than 1 kΩ to signify a decimal point.</p> <p>982R6 = 982.6 Ω<br/>532R41 = 532.41 Ω</p> |   | <p>L = ± 0.01 % <sup>(2)</sup><br/>Q = ± 0.02 %<br/>A = ± 0.05 %<br/>B = ± 0.1 %<br/>D = ± 0.5 %<br/>F = ± 1 %</p> |   | <p>B = wraparound Sn / Pb solder w/ Ni barrier (63 % Sn / 37 % Pb w/ nickel barrier)</p> <p>S = wraparound lead (Pb)-free solder 96.5 % Sn / 3.0 % Ag / 0.5 % Cu<br/>RoHS compliant - e1</p> |   | <p>WS = WAFFLE PACK<br/>WI = 100 min., 1 mult. (item single lot date code)<br/>WP = 100 min., 1 mult. (package unit single lot date code)</p> <p>TAPE AND REEL<br/>T0 = 100 min., 100 mult.<br/>T1 = 1000 min., 1000 mult. <sup>(1)</sup><br/>T3 = 300 min., 300 mult.<br/>T5 = 500 min., 500 mult.<br/>TF = full reel<br/>TS = 100 min., 1 mult.<br/>TI = 100 min., 1 mult. (item single lot date code)<br/>TP = 100 min., 1 mult. (package unit single lot date code)</p> |   |   |   |   |   |   |

**Notes**
<sup>(1)</sup> Preferred packaging code

<sup>(2)</sup> L and Q tolerances are available only for resistance values > 250 Ω



## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.