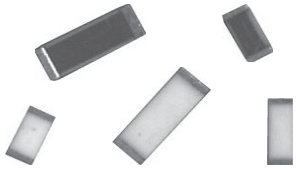
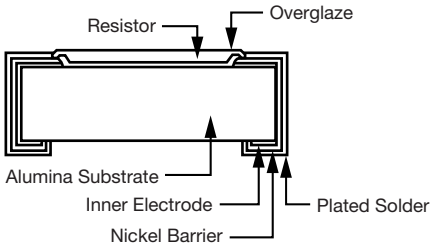
# High Reliability Thick Film Resistor, Surface-Mount Chip



Actual Size
0502

Utilizing proven expertise in thick and thin film resistors to satisfy your manufacturing needs, Vishay provides a high rel chip with the same reliability and stability found in military grade resistors. These chips are available in the widest range of sizes, values, and performance characteristics. And manufactured on the MIL-PRF-55342 qualified controlled production line. All product is 100 % electrical tested for tolerance and after thermal shock testing and typically meet the requirements of group A in MIL-PRF-55342 performance.

## CONSTRUCTION




## FEATURES

Pb-free Available

RoHS* Available

HALOGEN FREE Available

GREEN (5-2008) Available

- High purity alumina substrate for high power dissipation (2 W max.)
- Wraparound terminations featuring a thin film adhesion layer covered with a leach resistant nickel barrier layer for +150 °C operating conditions
- High speed laser trimming for high volume requirements
- Ruthenium based cermet thick film for dependable performance
- Fired-on glass passivation
- Tape and reel packaging standard; static-free waffle pack available
- Active trim and 0 Ω chips
- Sulfur resistant (per ASTM B809-95 humid vapor test)
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

**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 | 100 |
| TOL. | 1 |

## STANDARD ELECTRICAL SPECIFICATIONS

| TEST | SPECIFICATIONS | CONDITIONS |
|---|---|---|
| **Material** | Ruthenium | - |
| **Resistance Range** | 1 Ω to 25 MΩ | - |
| **TCR: Absolute** | ± 100 ppm/°C to ± 300 ppm/°C | -55 °C to +125 °C |
| **Tolerance: Absolute** | ± 0.5 % to ± 10 % | - |
| **Stability: Absolute** | $\Delta R$ ± 0.15 % | - |
| **Stability: Ratio** | - | - |
| **Voltage Coefficient** | - | - |
| **Working Voltage** | 30 V to 200 V | - |
| **Operating Temperature Range** | -65 °C to +155 °C | - |
| **Storage Temperature Range** | -65 °C to +155 °C | - |
| **Noise** | < -35 dB (typical) | - |
| **Shelf Life Stability: Absolute** | - | - |



For technical questions, contact: thinfilm@vishay.com

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| COMPONENT RATINGS | | | | | |
|---|---|---|---|---|---|
| CASE SIZE [1] | POWER RATING (mW) | WORKING VOLTAGE (V) | RESISTANCE RANGE (Ω) | TOLERANCE (± %) | TCR (± ppm/°C) |
| 0402 | 100 | 30 | 1 to 10 | 2, 5, 10 | 200, 300 |
| | | | 10 to 25M | 1, 2, 5, 10 | 100, 200, 300 |
| | | | 10 to 10M | 0.5 | 100, 200, 300 |
| 0502 | 100 | 40 | 1 to 10 | 2, 5, 10 | 200, 300 |
| | | | 10 to 25M | 1, 2, 5, 10 | 100, 200, 300 |
| | | | 10 to 10M | 0.5 | 100, 200, 300 |
| 0504 | 125 | 40 | 1 to 10 | 2, 5, 10 | 200, 300 |
| | | | 10 to 25M | 1, 2, 5, 10 | 100, 200, 300 |
| | | | 10 to 10M | 0.5 | 100, 200, 300 |
| 0505 | 125 | 50 | 1 to 10 | 2, 5, 10 | 200, 300 |
| | | | 10 to 25M | 1, 2, 5, 10 | 100, 200, 300 |
| | | | 10 to 10M | 0.5 | 100, 200, 300 |
| 0603 | 150 | 50 | 1 to 6 | 2, 5, 10 | 200, 300 |
| | | | 6 to 25M | 1, 2, 5, 10 | 100, 200, 300 |
| | | | 5.62 to 10M | 0.5 | 100, 200, 300 |
| 0705 | 200 | 70 | 1 to 6 | 2, 5, 10 | 200, 300 |
| | | | 6 to 25M | 1, 2, 5, 10 | 100, 200, 300 |
| | | | 5.62 to 10M | 0.5 | 100, 200, 300 |
| 0805 | 200 | 70 | 1 to 6 | 2, 5, 10 | 200, 300 |
| | | | 6 to 25M | 1, 2, 5, 10 | 100, 200, 300 |
| | | | 5.62 to 10M | 0.5 | 100, 200, 300 |
| 1005 | 250 | 100 | 1 to 6 | 2, 5, 10 | 200, 300 |
| | | | 6 to 25M | 1, 2, 5, 10 | 100, 200, 300 |
| | | | 5.62 to 10M | 0.5 | 100, 200, 300 |
| 1010 | 500 | 100 | 1 to 6 | 2, 5, 10 | 200, 300 |
| | | | 6 to 25M | 1, 2, 5, 10 | 100, 200, 300 |
| | | | 5.62 to 10M | 0.5 | 100, 200, 300 |
| 1206 | 330 | 100 | 1 to 6 | 2, 5, 10 | 200, 300 |
| | | | 6 to 25M | 1, 2, 5, 10 | 100, 200, 300 |
| | | | 5.62 to 10M | 0.5 | 100, 200, 300 |
| 1505 | 350 | 125 | 1 to 6 | 2, 5, 10 | 200, 300 |
| | | | 6 to 25M | 1, 2, 5, 10 | 100, 200, 300 |
| | | | 5.62 to 10M | 0.5 | 100, 200, 300 |
| 2010 | 1000 | 200 | 1 to 6 | 2, 5, 10 | 200, 300 |
| | | | 6 to 25M | 1, 2, 5, 10 | 100, 200, 300 |
| | | | 5.62 to 10M | 0.5 | 100, 200, 300 |
| 2208 | 750 | 200 | 1 to 6 | 2, 5, 10 | 200, 300 |
| | | | 6 to 25M | 1, 2, 5, 10 | 100, 200, 300 |
| | | | 5.62 to 10M | 0.5 | 100, 200, 300 |
| 2512 | 2000 | 200 | 1 to 6 | 2, 5, 10 | 200, 300 |
| | | | 6 to 25M | 1, 2, 5, 10 | 100, 200, 300 |
| | | | 5.62 to 10M | 0.5 | 100, 200, 300 |

**Notes**

- Consult factory for nominals above 25 MΩ

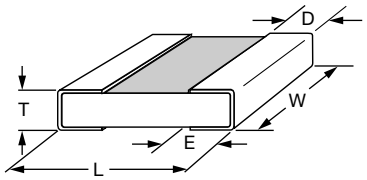
[1] 0705 and 0805 are the same (only use 0805 when ordering)



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## DIMENSIONS in inches




| CASE SIZE | L | W | T | D | E |
|---|---|---|---|---|---|
| 0402 | 0.042 ± 0.006 | 0.022 ± 0.005 | 0.010 to 0.033 | 0.010 ± 0.005 | 0.010 ± 0.005 |
| 0502 | 0.055 ± 0.005 | 0.025 ± 0.005 | 0.020 max. | 0.010 ± 0.005 | 0.015 ± 0.005 |
| 0504 | 0.055 ± 0.005 | 0.040 ± 0.005 | 0.020 ± 0.005 | 0.010 ± 0.005 | 0.010 ± 0.005 |
| 0505 | 0.055 ± 0.006 | 0.050 ± 0.005 | 0.012 to 0.033 | 0.010 ± 0.005 | 0.015 ± 0.005 |
| 0603 | 0.064 ± 0.006 | 0.032 ± 0.005 | 0.010 to 0.033 | 0.012 ± 0.005 | 0.015 ± 0.005 |
| 0705, 0805 (1) | 0.080 ± 0.006 | 0.050 ± 0.005 | 0.015 to 0.033 | 0.015 ± 0.005 | 0.015 ± 0.005 |
| 1005 | 0.105 ± 0.007 | 0.050 ± 0.005 | 0.015 to 0.033 | 0.020 ± 0.005 | 0.020 ± 0.005 |
| 1010 | 0.105 ± 0.007 | 0.100 ± 0.005 | 0.015 to 0.033 | 0.015 ± 0.005 | 0.015 ± 0.005 |
| 1206 | 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 |
| 1505 | 0.155 ± 0.007 | 0.050 ± 0.005 | 0.015 to 0.033 | 0.020 ± 0.005 | 0.020 ± 0.005 |
| 2010 | 0.197 ± 0.006 | 0.098 ± 0.005 | 0.015 to 0.033 | 0.015 ± 0.005 | 0.015 ± 0.005 |
| 2208 | 0.230 ± 0.007 | 0.075 ± 0.005 | 0.015 to 0.033 | 0.015 ± 0.005 | 0.015 ± 0.005 |
| 2512 | 0.250 ± 0.006 | 0.124 ± 0.005 | 0.015 to 0.033 | 0.020 ± 0.005 | 0.020 ± 0.005 |

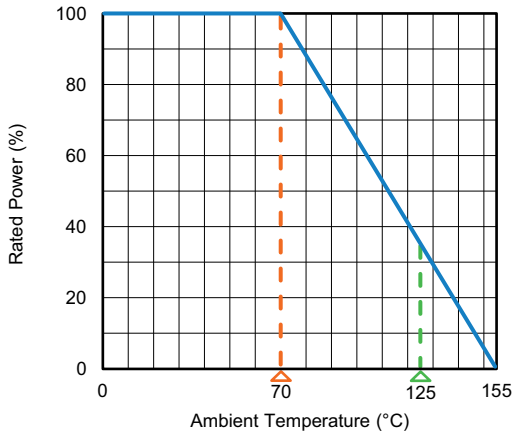
**Note**

(1) 0705 and 0805 are the same (only use 0805 when ordering)

## ENVIRONMENTAL TESTS

| ENVIRONMENTAL TEST | 10 Ω $\Delta R$ ± (%) | 100 kΩ $\Delta R$ ± (%) |
|---|---|---|
| **Thermal Shock** | 0.02 | 0.03 |
| **Short Term Overload** | 0.02 | 0.02 |
| **Low Temperature Operation** | 0.03 | 0.04 |
| **Resistance to Solder Heat** | 0.06 | 0.02 |
| **Moisture Resistance** | 0.10 | 0.08 |
| **High Temperature Exposure** | 0.02 | 0.02 |

## DERATING CURVE






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## GLOBAL PART NUMBER INFORMATION

**New Global Part Numbering: M-1206K5001GBT1**

| M | - | 1 | 2 | 0 | 6 | K | 5 | 0 | 0 | 1 | G | B | T | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| GLOBAL MODEL | CASE SIZE | TCR CHARACTERISTIC | RESISTANCE | TOLERANCE | TERMINATION | PACKAGING |
|---|---|---|---|---|---|---|
| **M-** = high rel cermet thick film wraparound | **0402**<br>**0502**<br>**0504**<br>**0505**<br>**0603**<br>**0805**<br>**1005**<br>**1010**<br>**1206**<br>**1505**<br>**2010**<br>**2208**<br>**2512** | **K** = 100 ppm/°C<br>**L** = 200 ppm/°C<br>**M** = 300 ppm/°C<br>**X** = 0 Ω jumper | First 3 digits are significant figures and the last digit specifies the number of zeros to follow. "R" designates the decimal point.<br><br>Example:<br>10R0 = 10 Ω<br>1002 = 10 kΩ | **D** = ± 0.5 %<br>**F** = ± 1 %<br>**G** = ± 2 %<br>**J** = ± 5 %<br>**K** = ± 10 %<br><br>**N** = not trimmed | **B** = wraparound nickel barrier with plated tin / lead solder<br>**S** = wraparound nickel barrier with plated matte tin lead (Pb)-free solder<br>**G** = epoxy bondable<br>**P** = wraparound palladium silver | **BS** = BULK<br>100 min., 1 mult.<br>**WS** = WAFFLE<br>100 min., 1 mult.<br><br>TAPE AND REEL<br>**T0** = 100 min., 100 mult.<br>**T1** = 1000 min., 1000 mult. (1)<br>**T3** = 300 min., 300 mult.<br>**T5** = 500 min., 500 mult.<br>**TF** = full reel<br>**TP** = 100 min., 1 mult. (package unit single lot date code)<br>**TS** = 100 min., 1 mult.<br>**TI** = 100 min., 1 mult. (sales order item single lot date code) |

**Historical Part Number Example: M0505K1003JBT (for reference purposes only)**

| M | 0505 | K | 1003 | J | B | T |
|---|---|---|---|---|---|---|
| STYLE | CASE SIZE | TCR CHARACTERISTIC | OHMIC VALUE | TOLERANCE | TERMINATION | PACKAGING |

**Note**

(1) Preferred packaging code



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