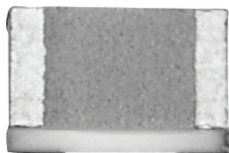
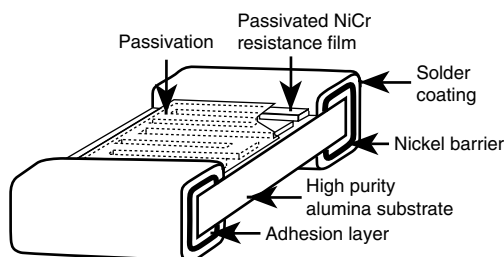


# CECC (E) 40401-010 Qualified Thin Film Chip Resistors



Utilizing proven expertise in Thin Film resistors, VISHAY provides a CECC qualified chip with the same reliability and stability found in QPL resistors. These chips are available in a wide range of sizes, values and performance characteristics.

## CONSTRUCTION



## FEATURES

- Nickel barrier for high temperature operating conditions
- Tight TCR < 10 ppm/°C, and in lot tracking < 5 ppm/°C in (-55 °C, +155 °C temperature range)
- Very low noise < 35 dB and voltage coefficient 0.1 ppm/V
- Non-inductive
- Laser trimmed down to 0.1 %
- Wraparound resistance less than 0.01 Ω
- Antistatic waffle-pack or tape and reel packaging available
- High stability (0.05 % - 1000 h at Pn at +70 °C)
- Withstand moisture resistance test of AEC-Q200
- Conform to EN 140401 804
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



RoHS\*  
Available

### 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.

## STANDARD ELECTRICAL SPECIFICATIONS

| MODEL | SIZE | RESISTANCE RANGE <sup>(1) (2)</sup><br>Ω | RATED POWER<br>P <sub>n</sub><br>W | LIMITING ELEMENT<br>VOLTAGE (UL)<br>V | TOLERANCE<br>± %  | TEMPERATURE<br>COEFFICIENT<br>± ppm/°C |
|-------|------|------------------------------------------|------------------------------------|---------------------------------------|-------------------|----------------------------------------|
| RV E  | 0505 | 100 to 260K                              | 0.125                              | 50                                    | 0.1, 0.5, 1, 2, 5 | 10, 25                                 |
| RV E  | 0603 | 100 to 260K                              | 0.125                              | 50                                    | 0.1, 0.5, 1, 2, 5 | 10, 25                                 |
| RV E  | 0805 | 100 to 300K                              | 0.200                              | 50                                    | 0.1, 0.5, 1, 2, 5 | 10, 25                                 |
| RV E  | 1206 | 100 to 1M                                | 0.330                              | 75                                    | 0.1, 0.5, 1, 2, 5 | 10, 25                                 |

### Notes

<sup>(1)</sup> Extended resistance range on request

<sup>(2)</sup> For ohmic range versus tolerance and TCR, see detailed table

## CLIMATIC SPECIFICATIONS

|                             |                   |
|-----------------------------|-------------------|
| Operating temperature range | -55 °C to +155 °C |
| Storage temperature range   | -55 °C to +155 °C |

## MECHANICAL SPECIFICATIONS

|                                |                                                                    |
|--------------------------------|--------------------------------------------------------------------|
| Resistive material             | Nichrome                                                           |
| Substrate material             | Alumina                                                            |
| Plating                        | Tin lead over nickel or tin silver over nickel or gold over nickel |
| Marking resistance to solvents | Per CECC Specs                                                     |

## OHMIC RANGE VS. TOLERANCE AND TCR

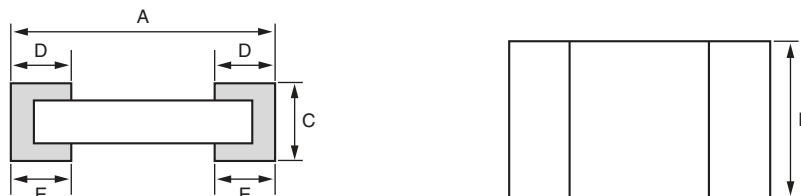
| CASE SIZE | OHMIC RANGE<br>Ω | TOLERANCE<br>%    | TCR<br>ppm/°C |
|-----------|------------------|-------------------|---------------|
| 0505      | 100 < 500        | 0.5; 1; 2; 5      | 10, 25        |
| 0505      | 500 to 260K      | 0.1; 0.5; 1; 2; 5 | 10, 25        |
| 0603      | 100 < 500        | 0.5; 1; 2; 5      | 10, 25        |
| 0603      | 500 to 260K      | 0.1; 0.5; 1; 2; 5 | 10, 25        |
| 0805      | 100 < 500        | 0.5; 1; 2; 5      | 10, 25        |
| 0805      | 500 to 300K      | 0.1; 0.5; 1; 2; 5 | 10, 25        |
| 1206      | 100 < 500        | 0.5; 1; 2; 5      | 10, 25        |
| 1206      | 500 to 1M        | 0.1; 0.5; 1; 2; 5 | 10, 25        |

## TECHNICAL SPECIFICATIONS

| TEST                | SPECIFICATIONS                                                                                | CONDITIONS                      |
|---------------------|-----------------------------------------------------------------------------------------------|---------------------------------|
| Absolute TCR        | E: ± 25 ppm/°C<br>Y: ± 10 ppm/°C                                                              | -55 °C to +155 °C               |
| Absolute tolerance  | ± 0.1 %, ± 0.5 %, ± 1 %, ± 2 %, ± 5 % (R ≥ 500 Ω)<br>± 0.5 %, ± 1 %, ± 2 %, ± 5 % (R ≥ 100 Ω) |                                 |
| Voltage coefficient | 0.1 ppm/V                                                                                     |                                 |
| Noise               | -35 dB typical                                                                                |                                 |
| Thermal EMF         | < 0.1 μV/°C                                                                                   |                                 |
| Load life stability | ± (0.1 % R <sub>n</sub> <sup>(3)</sup> ± 0.05 Ω)                                              | 1000 h P <sub>n</sub> at +70 °C |

### Note

<sup>(3)</sup> R<sub>n</sub>: Nominal resistance

**DIMENSIONS** in millimeters (inches)


| SERIES/<br>CASE SIZES | A                |                  | B                |                  | D/E              |                  | C                |                  |
|-----------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
|                       | Min.             | Max.             | Min.             | Max.             | Min.             | Max.             | Min.             | Max.             |
| RV 0505               | 1.198<br>(0.047) | 1.502<br>(0.059) | 1.143<br>(0.045) | 1.397<br>(0.055) | 0.250<br>(0.010) | 0.510<br>(0.020) | 0.373<br>(0.015) | 0.627<br>(0.025) |
| RV 0603               | 1.368<br>(0.054) | 1.672<br>(0.066) | 0.623<br>(0.025) | 0.877<br>(0.035) | 0.250<br>(0.010) | 0.510<br>(0.020) | 0.373<br>(0.015) | 0.627<br>(0.025) |
| RV 0805               | 1.758<br>(0.069) | 2.062<br>(0.081) | 1.143<br>(0.045) | 1.397<br>(0.055) | 0.250<br>(0.010) | 0.510<br>(0.020) | 0.373<br>(0.015) | 0.627<br>(0.025) |
| RV 1206               | 2.908<br>(0.114) | 3.212<br>(0.126) | 1.473<br>(0.058) | 1.727<br>(0.068) | 0.250<br>(0.010) | 0.510<br>(0.020) | 0.373<br>(0.015) | 0.627<br>(0.025) |

**POPULAR OPTION**

AEC-Q200 moisture resistance

Option to order: 0058: Specific production process to withstand 85 °C/85 % RH at Pn/10

**ENVIRONMENTAL TEST**

| TEST                               | CONDITIONS                                                     | VALUES AND DRIFTS ( $\Delta R/R \pm \%$ ) |                              |
|------------------------------------|----------------------------------------------------------------|-------------------------------------------|------------------------------|
|                                    |                                                                | CECC REQUIREMENTS                         | TYPICAL PERFORMANCE          |
| Overload                           | 6.25 x rated power / 2 s (or 2 UL)                             | 0.05 % Rn <sup>(2)</sup> + 0.05 $\Omega$  | 0.01 % Rn <sup>(2)</sup>     |
| Climatic sequences <sup>(1)</sup>  | -55 °C / +155 °C<br>5 moisture cycles                          | 0.1 % Rn <sup>(2)</sup> + 0.05 $\Omega$   | 0.02 % Rn <sup>(2)</sup>     |
| Thermal shock <sup>(1)</sup>       | -55 °C / +155 °C<br>5 cycles 30 min                            | 0.05 % Rn <sup>(2)</sup> + 0.05 $\Omega$  | 0.02 % Rn <sup>(2)</sup>     |
| Load life <sup>(1)</sup>           | +70 °C/Pn<br>1000 h                                            | 0.1 % Rn <sup>(2)</sup> + 0.05 $\Omega$   | 0.05 % Rn <sup>(2)</sup>     |
| Resistance to solder heat          | +260 °C/ 10 s                                                  | 0.05 % Rn <sup>(2)</sup> + 0.05 $\Omega$  | 0.02 % Rn <sup>(2)</sup>     |
| Moisture resistance <sup>(1)</sup> | +40 °C / 93 % HR<br>Pn / 10                                    | 0.1 % Rn <sup>(2)</sup> + 0.05 $\Omega$   | 0.01 % Rn <sup>(2)</sup>     |
|                                    | AEC-Q200 <sup>(3)</sup><br>85 °C / 85 % RH / Pn / 10<br>1000 h | 0.5 % + 0.05 $\Omega$                     | Max. < 0.3 % + 0.05 $\Omega$ |
| High temperature storage           | 1000 h at + 155 °C                                             | 0.1 % Rn <sup>(2)</sup> + 0.05 $\Omega$   | 0.05 % Rn <sup>(2)</sup>     |
| Bending <sup>(1)</sup>             | 10 bends / 2 mm / 5 s                                          | 0.05 % Rn <sup>(2)</sup> + 0.05 $\Omega$  | 0.02 % Rn <sup>(2)</sup>     |

**SPECIFIC CONDITIONS DUE TO TERMINATION TYPE**

| TEST                   | CONDITIONS                    |                              | VALUES AND DRIFTS                        |                                          |
|------------------------|-------------------------------|------------------------------|------------------------------------------|------------------------------------------|
|                        | B; G                          | N                            | VISHAY REQUIREMENTS                      | TYPICAL PERFORMANCE                      |
| Solderability          | +235 °C/2 s<br>Sn60Pb40 alloy | +245 °C/3 s<br>Sn97Ag3 alloy | VISUAL INSPECTION                        |                                          |
| High T° reflow profile | N/A                           | +255 °C/40 s<br>(on parts)   | 0.02 % Rn <sup>(2)</sup> + 0.05 $\Omega$ | 0.01 % Rn <sup>(2)</sup> + 0.05 $\Omega$ |

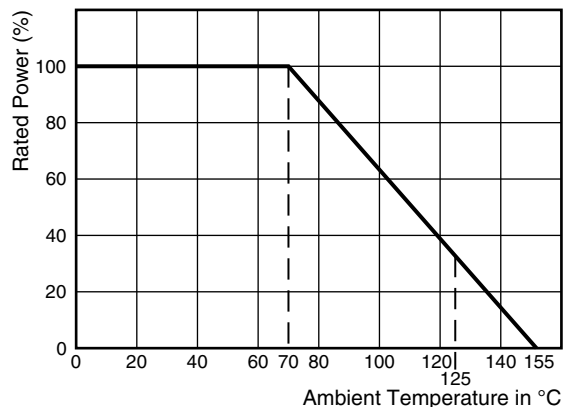
**Notes**
<sup>(1)</sup> Test requiring parts to be mounted on PCB will be performed with the requirement that termination alloy will be the same as solder paste alloy. Gold termination will be tested as B termination

<sup>(2)</sup> Rn: Nominal Resistance  
Pn: Nominal Power

<sup>(3)</sup> Option to order: 0058

**PACKAGING INFORMATION**

| SIZE | NUMBER OF PIECES PER PACKAGE |                            | TAPE WIDTH       |
|------|------------------------------|----------------------------|------------------|
|      | WAFFLE PACK<br>(2" x 2")     | TAPE AND REEL<br>Min. Max. |                  |
| 0505 | 100                          | 100                        | 4000             |
| 0603 |                              |                            | 5000             |
| 0805 | 100                          | 4000                       | 8 mm<br>(0.315") |
| 1206 | 140                          |                            |                  |

**DERATING CURVE****GLOBAL PART NUMBER INFORMATION**

New Global Part Numbering: RV0505E1001DBT0099

|              |                              |                                    |                                                                                                                                                                                                                                                          |                                                                   |                                                                                                    |                                                                           |                             |   |   |   |   |   |   |   |   |   |   |
|--------------|------------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-----------------------------|---|---|---|---|---|---|---|---|---|---|
| R            | V                            | 0                                  | 5                                                                                                                                                                                                                                                        | 0                                                                 | 5                                                                                                  | E                                                                         | 1                           | 0 | 0 | 1 | D | B | T | 0 | 0 | 9 | 9 |
| GLOBAL MODEL | SIZE                         | TCR                                | VALUE                                                                                                                                                                                                                                                    | TOLERANCE                                                         | TERMINATION                                                                                        | PACKAGING                                                                 | OPTION                      |   |   |   |   |   |   |   |   |   |   |
|              | 0505<br>0603<br>0805<br>1206 | E = ± 25 ppm/°C<br>Y = ± 10 ppm/°C | The first 3 digits<br>(2 digits are enough<br>for tolerance G and J)<br>are significant figures<br>and the last digit<br>specifies the number<br>of zeros to follow.<br>R designates<br>decimal point<br><br>10R0 = 10 Ω<br>3901 = 3900 Ω<br>1004 = 1 MΩ | B = ± 0.1 %<br>D = ± 0.5 %<br>F = ± 1 %<br>G = ± 2 %<br>J = ± 5 % | B: SnPb over<br>nickel barrier<br>N: SnAg over<br>nickel barrier<br>G: Gold over<br>nickel barrier | For more<br>information<br>see<br>"Codification<br>of packaging"<br>table | Leave blank<br>if no option |   |   |   |   |   |   |   |   |   |   |

B: Lead bearing version  
N and G: Lead (Pb)-free / RoHS version

Historical Part Number example: RV 0505 25PPM 1K 0.5 % B TR R1016

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

|       |      |        |             |           |             |           |        |
|-------|------|--------|-------------|-----------|-------------|-----------|--------|
| RV    | 0505 | 25 PPM | 1K          | 0.5 %     | B           | TR        | R1016  |
| MODEL | SIZE | TCR    | OHMIC VALUE | TOLERANCE | TERMINATION | PACKAGING | OPTION |



| <b>CODIFICATION OF PACKAGING</b>                                                                        |                                                  |
|---------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| <b>CODE 18</b>                                                                                          | <b>PACKAGING</b>                                 |
| <b>WAFFLE PACK</b>                                                                                      |                                                  |
| W                                                                                                       | 100 min., 1 mult                                 |
| WA                                                                                                      | 100 min., 100 mult (available only in size 1206) |
| <b>PLASTIC TAPE (Standard for all sizes.)</b>                                                           |                                                  |
| T                                                                                                       | 100 min., 1 mult                                 |
| TA                                                                                                      | 100 min., 100 mult                               |
| TB                                                                                                      | 250 min., 250 mult                               |
| TC                                                                                                      | 500 min., 500 mult                               |
| TD                                                                                                      | 1000 min., 1000 mult                             |
| TE                                                                                                      | 2500min., 2500 mult                              |
| TF                                                                                                      | Full tape (quantity depending on size of chips)  |
| <b>PAPER TAPE (Available for 0603, 0805, and 1206. Please consult Vishay Sfernice for other sizes.)</b> |                                                  |
| PT                                                                                                      | 100 min., 1 mult                                 |
| PA                                                                                                      | 100 min., 100 mult                               |
| PB                                                                                                      | 250 min., 250 mult                               |
| PC                                                                                                      | 500 min., 500 mult                               |
| PD                                                                                                      | 1000 min., 1000 mult                             |
| PE                                                                                                      | 2500min., 2500 mult                              |
| PF                                                                                                      | Full tape (quantity depending on size of chips)  |



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