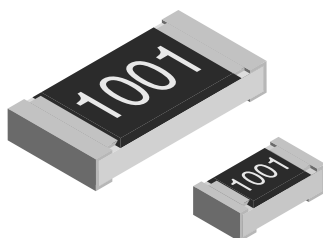


## Lead (Pb)-bearing Thick Film, Rectangular Precision Chip Resistor



### FEATURES

- Low temperature coefficient (25 ppm/K) and tight tolerances ( $\pm 0.25\%$ )
- Excellent stability ( $(|\Delta R/R| \leq \pm 1\%$  for 1000 h at 70 °C)
- SnPb contacts on Ni barrier layer
- Metal glaze on high quality ceramic
- Protective overglaze

### STANDARD ELECTRICAL SPECIFICATIONS

| MODEL          | SIZE |        | POWER RATING<br>$P_{70^\circ\text{C}}$ W | LIMITING ELEMENT VOLTAGE<br>MAX. V $\equiv$ | TEMPERATURE COEFFICIENT<br>ppm/K | TOLERANCE<br>%             | RESISTANCE RANGE<br>$\Omega$ | E-SERIES |
|----------------|------|--------|------------------------------------------|---------------------------------------------|----------------------------------|----------------------------|------------------------------|----------|
|                | INCH | METRIC |                                          |                                             |                                  |                            |                              |          |
| D10/CRCW0402-P | 0402 | 1005   | 0.063                                    | 50                                          | $\pm 100$                        | $\pm 0.5$                  | 10R - 1M0                    | 24 + 96  |
|                |      |        |                                          |                                             | $\pm 50$                         | $\pm 0.25; \pm 0.5; \pm 1$ | 100R - 1M0                   |          |
|                |      |        |                                          |                                             | $\pm 25$                         | $\pm 0.5; \pm 1$           | 1K0 - 10K                    |          |
| D11/CRCW0603-P | 0603 | 1608   | 0.1                                      | 75                                          | $\pm 100$                        | $\pm 0.5$                  | 10R - 10M                    | 24 + 96  |
|                |      |        |                                          |                                             | $\pm 50$                         | $\pm 0.5; \pm 1$           | 100R - 10M                   |          |
|                |      |        |                                          |                                             | $\pm 25$                         | $\pm 0.25$                 | 100R - 1M0                   |          |
| D12/CRCW0805-P | 0805 | 2012   | 0.125                                    | 150                                         | $\pm 100$                        | $\pm 0.5; \pm 1$           | 100R - 10M                   | 24 + 96  |
|                |      |        |                                          |                                             | $\pm 50$                         | $\pm 0.25$                 | 100R - 1M0                   |          |
|                |      |        |                                          |                                             | $\pm 25$                         | $\pm 0.25; \pm 0.5; \pm 1$ | 150R - 10K                   |          |
| D25/CRCW1206-P | 1206 | 3216   | 0.25                                     | 200                                         | $\pm 100$                        | $\pm 0.5$                  | 10R - 10M                    | 24 + 96  |
|                |      |        |                                          |                                             | $\pm 50$                         | $\pm 0.5; \pm 1$           | 100R - 10M                   |          |
|                |      |        |                                          |                                             | $\pm 25$                         | $\pm 0.25$                 | 100R - 1M0                   |          |
| CRCW1210-P     | 1210 | 3225   | 0.33                                     | 200                                         | $\pm 100$                        | $\pm 0.5$                  | 100R - 10M                   | 24 + 96  |
|                |      |        |                                          |                                             | $\pm 50$                         | $\pm 0.5; \pm 1$           | 100R - 1M0                   |          |
|                |      |        |                                          |                                             | $\pm 25$                         | $\pm 0.25; \pm 0.5; \pm 1$ | 150R - 10K                   |          |
| CRCW1218-P     | 1218 | 3246   | 1.0                                      | 200                                         | $\pm 100$                        | $\pm 0.5$                  | 100R - 2M2                   | 24 + 96  |
|                |      |        |                                          |                                             | $\pm 50$                         | $\pm 0.5; \pm 1$           | 100R - 2M2                   |          |
|                |      |        |                                          |                                             | $\pm 25$                         | $\pm 0.25; \pm 0.5; \pm 1$ | 150R - 10K                   |          |
| CRCW2010-P     | 2010 | 5025   | 0.5                                      | 400                                         | $\pm 100$                        | $\pm 0.5$                  | 10R - 10M                    | 24 + 96  |
|                |      |        |                                          |                                             | $\pm 50$                         | $\pm 0.5; \pm 1$           | 100R - 10M                   |          |
|                |      |        |                                          |                                             | $\pm 25$                         | $\pm 0.25; \pm 0.5; \pm 1$ | 150R - 10K                   |          |
| CRCW2512-P     | 2512 | 6332   | 1.0                                      | 500                                         | $\pm 100$                        | $\pm 0.5$                  | 10R - 10M                    | 24 + 96  |
|                |      |        |                                          |                                             | $\pm 50$                         | $\pm 0.5; \pm 1$           | 100R - 10M                   |          |
|                |      |        |                                          |                                             | $\pm 25$                         | $\pm 0.25; \pm 0.5; \pm 1$ | 150R - 10K                   |          |

### Notes

- These resistors do not feature a limited lifetime when operated within the permissible limits. However, resistance value drift increasing over operating time may result in exceeding a limit acceptable to the specific application, thereby establishing a functional lifetime.
- Marking and packaging: see appropriate catalog or web pages
- Power rating depends on the max. temperature at the solder point, the component placement density and the substrate material

**Lead (Pb)-bearing Thick Film, Rectangular  
Precision Chip Resistor****Vishay****TECHNICAL SPECIFICATIONS**

| PARAMETER                                    | UNIT              | D10/<br>CRCW0402-P     | D11/<br>CRCW0603-P | D12/<br>CRCW0805-P | D25/<br>CRCW1206-P | CRCW1210-P | CRCW1218-P | CRCW2010-P | CRCW2512-P |
|----------------------------------------------|-------------------|------------------------|--------------------|--------------------|--------------------|------------|------------|------------|------------|
| Rated Dissipation<br>at 70 °C <sup>(3)</sup> | W                 | 0.063                  | 0.1                | 0.125              | 0.25               | 0.33       | 1          | 0.5        | 1          |
| Limiting Element<br>Voltage <sup>(2)</sup>   | V <sub>≡</sub>    | 50                     | 75                 | 150                | 200                | 200        | 200        | 400        | 500        |
| Insulation Voltage<br>(1 min)                | V <sub>peak</sub> | > 75                   | > 100              | > 200              | > 300              | > 300      | > 300      | > 300      | > 300      |
| Thermal Resistance <sup>(1)</sup>            | K/W               | ≤ 870                  | ≤ 550              | ≤ 440              | ≤ 220              | ≤ 140      | ≤ 65       | ≤ 88       | ≤ 65       |
| Insulation Resistance                        | Ω                 | > 10 <sup>9</sup>      |                    |                    |                    |            |            |            |            |
| Category Temperature<br>Range                | °C                | - 55 to + 155          |                    |                    |                    |            |            |            |            |
| Failure Rate                                 | h <sup>-1</sup>   | 0.3 x 10 <sup>-9</sup> |                    |                    |                    |            |            |            |            |
| Weight/1000 pieces                           | g                 | 0.65                   | 2                  | 5.5                | 10                 | 16         | 29.5       | 25.5       | 40.5       |

**Notes**

<sup>(1)</sup> For sizes 0402 until 1206 the measuring conditions are in acc. to EN 140401-802. For all other sizes the result depends on the solder pad dimensions.

<sup>(2)</sup> Rated voltage:  $\sqrt{P \times R}$

<sup>(3)</sup> The power dissipation on the resistor generates a temperature rise against the local ambient, depending on the heat flow support of the printed-circuit board (thermal resistance). The rated dissipation applies only if the permitted film temperature of 155 °C is not exceeded.

**PART NUMBER AND PRODUCT DESCRIPTION****PART NUMBER: CRCW080525R0DKTAP <sup>(4)</sup>**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|
| C | R | C | W | 0 | 8 | 0 | 5 | 2 | 5 | R | 0 | D | K | T | A | P |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|

| MODEL/SIZE                                                                                   | VALUE                                      | TOLERANCE                                | TCR                                                 | PACKAGING <sup>(5)</sup>                                  | SPECIAL                         |
|----------------------------------------------------------------------------------------------|--------------------------------------------|------------------------------------------|-----------------------------------------------------|-----------------------------------------------------------|---------------------------------|
| CRCW0402<br>CRCW0603<br>CRCW0805<br>CRCW1206<br>CRCW1210<br>CRCW1218<br>CRCW2010<br>CRCW2512 | R = Decimal<br>K = Thousand<br>M = Million | C = ± 0.25 %<br>D = ± 0.5 %<br>F = ± 1 % | E = ± 25 ppm/K<br>H = ± 50 ppm/K<br>K = ± 100 ppm/K | TA, TB,<br>TC, TD,<br>TE, TF,<br>TG, TH,<br>TI, TK,<br>TL | up to 2 digits<br>P = Precision |

**PRODUCT DESCRIPTION: CRCW0805 25R0 D 100 RT1**

| CRCW0805                                                                                     | 25R0                         | D                                        | 100                                     | RT1                                                                 |
|----------------------------------------------------------------------------------------------|------------------------------|------------------------------------------|-----------------------------------------|---------------------------------------------------------------------|
| MODEL                                                                                        | RESISTANCE VALUE             | TOLERANCE                                | TCR                                     | PACKAGING <sup>(5)</sup>                                            |
| CRCW0402<br>CRCW0603<br>CRCW0805<br>CRCW1206<br>CRCW1210<br>CRCW1218<br>CRCW2010<br>CRCW2512 | 49R9 = 49.9 Ω<br>5R1 = 5.1 Ω | C = ± 0.25 %<br>D = ± 0.5 %<br>F = ± 1 % | ± 25 ppm/K<br>± 50 ppm/K<br>± 100 ppm/K | RT1, RT5,<br>RT6, RT7<br>RT4, R02,<br>R67, R82,<br>RG1, RT9,<br>R20 |

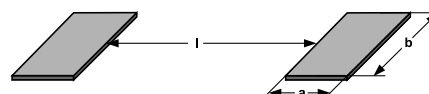
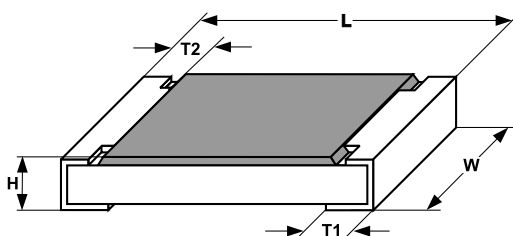
**Notes**

<sup>(4)</sup> Preferred way for ordering products is by use of the PART NUMBER

<sup>(5)</sup> Please refer to table PACKAGING, see next page

**PACKAGING**

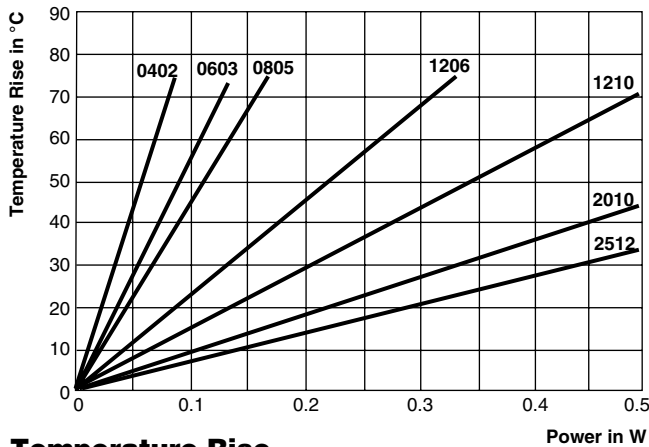
| MODEL            | REEL       |               |       |                 |             | BULK    |               |         |
|------------------|------------|---------------|-------|-----------------|-------------|---------|---------------|---------|
|                  | TAPE WIDTH | DIAMETER      | PITCH | PIECES/<br>REEL | PART NUMBER |         | PRODUCT DESC. |         |
|                  |            |               |       |                 | PAPER       | BLISTER | PAPER         | BLISTER |
| D10/<br>CRCW0402 | 8 mm       | 180 mm/7"     | 2 mm  | 10 000          | TD          |         | RT7           |         |
|                  |            | 330 mm/13"    | 2 mm  | 50 000          | TE          |         | RF4           |         |
| D11/<br>CRCW0603 | 8 mm       | 180 mm/7"     | 4 mm  | 5000            | TA          | TI      | RT1           | RG1     |
|                  |            | 285 mm/11.25" | 4 mm  | 10 000          | TB          |         | RT5           |         |
|                  |            | 330 mm/13"    | 4 mm  | 20 000          | TC          | TL      | RT6           | R20     |
| D12/<br>CRCW0805 | 8 mm       | 180 mm/7"     | 4 mm  | 5000            | TA          | TI      | RT1           | RG1     |
|                  |            | 285 mm/11.25" | 4 mm  | 10 000          | TB          |         | RT5           |         |
|                  |            | 330 mm/13"    | 4 mm  | 20 000          | TC          | TL      | RT6           | R20     |
| D25/<br>CRCW1206 | 8 mm       | 180 mm/7"     | 4 mm  | 5000            | TA          | TI      | RT1           | RG1     |
|                  |            | 285 mm/11.25" | 4 mm  | 10 000          | TB          |         | RT5           |         |
|                  |            | 330 mm/13"    | 4 mm  | 20 000          | TC          | TL      | RT6           | R20     |
| CRCW1210         | 8 mm       | 180 mm/7"     | 4 mm  | 5000            | TA          |         | RT1           |         |
|                  |            | 285 mm/11.25" | 4 mm  | 10 000          | TB          |         | RT5           |         |
|                  |            | 330 mm/13"    | 4 mm  | 20 000          | TC          |         | RT6           |         |
| CRCW1218         | 12 mm      | 180 mm/7"     | 4 mm  | 4000            |             | TK      |               | RT9     |
| CRCW2010         | 12 mm      | 180 mm/7"     | 4 mm  | 4000            |             | TF      |               | R02     |
| CRCW2512         | 12 mm      | 180 mm/7"     | 8 mm  | 2000            |             | TG      |               | R67     |
|                  |            |               | 4 mm  | 4000            |             | TH      |               | R82     |

**DIMENSIONS**

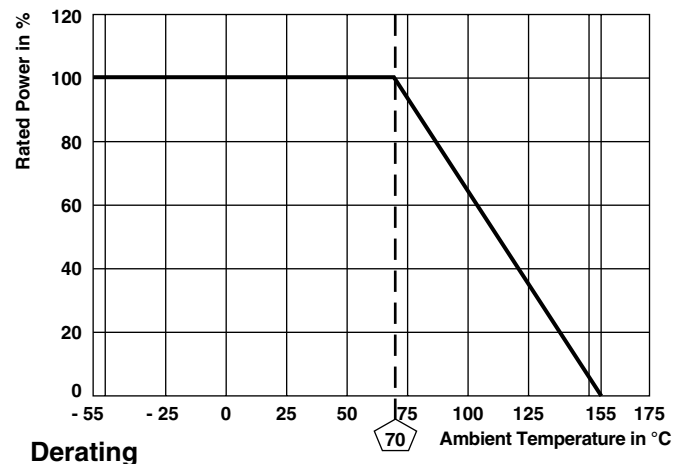
| SIZE |        | DIMENSIONS [in millimeters]            |             |             |                                       |           | SOLDER PAD DIMENSIONS [in millimeters] |     |     |                |     |     |
|------|--------|----------------------------------------|-------------|-------------|---------------------------------------|-----------|----------------------------------------|-----|-----|----------------|-----|-----|
|      |        |                                        |             |             |                                       |           | REFLOW SOLDERING                       |     |     | WAVE SOLDERING |     |     |
| INCH | METRIC | L                                      | W           | H           | T1                                    | T2        | a                                      | b   | l   | a              | b   | l   |
| 0402 | 1005   | 1.0 ± 0.05                             | 0.5 ± 0.05  | 0.35 ± 0.05 | 0.25 ± 0.05                           | 0.2 ± 0.1 | 0.4                                    | 0.6 | 0.5 |                |     |     |
| 0603 | 1608   | 1.55 <sup>+0.10</sup> <sub>-0.05</sub> | 0.85 ± 0.1  | 0.45 ± 0.05 | 0.3 ± 0.2                             | 0.3 ± 0.2 | 0.5                                    | 0.9 | 1.0 | 0.9            | 0.9 | 1.0 |
| 0805 | 2012   | 2.0 <sup>+0.20</sup> <sub>-0.10</sub>  | 1.25 ± 0.15 | 0.45 ± 0.05 | 0.3 <sup>+0.20</sup> <sub>-0.10</sub> | 0.3 ± 0.2 | 0.7                                    | 1.3 | 1.2 | 0.9            | 1.3 | 1.3 |
| 1206 | 3216   | 3.2 <sup>+0.10</sup> <sub>-0.20</sub>  | 1.6 ± 0.15  | 0.55 ± 0.05 | 0.45 ± 0.2                            | 0.4 ± 0.2 | 0.9                                    | 1.7 | 2.0 | 1.1            | 1.7 | 2.3 |
| 1210 | 3225   | 3.2 ± 0.2                              | 2.5 ± 0.2   | 0.55 ± 0.05 | 0.45 ± 0.2                            | 0.4 ± 0.2 | 0.9                                    | 2.5 | 2.0 | 1.1            | 2.5 | 2.2 |
| 1218 | 3246   | 3.2 <sup>+0.10</sup> <sub>-0.20</sub>  | 4.6 ± 0.15  | 0.55 ± 0.05 | 0.45 ± 0.2                            | 0.4 ± 0.2 | 1.05                                   | 4.9 | 1.9 | 1.25           | 4.8 | 1.9 |
| 2010 | 5025   | 5.0 ± 0.15                             | 2.5 ± 0.15  | 0.6 ± 0.1   | 0.6 ± 0.2                             | 0.6 ± 0.2 | 1.0                                    | 2.5 | 3.9 | 1.2            | 2.5 | 3.9 |
| 2512 | 6332   | 6.3 ± 0.2                              | 3.15 ± 0.15 | 0.6 ± 0.1   | 0.6 ± 0.2                             | 0.6 ± 0.2 | 1.0                                    | 3.2 | 5.2 | 1.2            | 3.2 | 5.2 |

Lead (Pb)-bearing Thick Film, Rectangular  
Precision Chip Resistor

Vishay



Temperature Rise



Derating

## TEST PROCEDURES AND REQUIREMENTS

EN 60115-1

| TEST (clause)                                       | CONDITIONS OF TEST                                                                                                                                                                                  | REQUIREMENTS                                                |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
|                                                     |                                                                                                                                                                                                     | PERMISSIBLE CHANGE ( $\Delta R/R$ )                         |
|                                                     |                                                                                                                                                                                                     | STABILITY CLASS 1 OR BETTER                                 |
|                                                     | Stability for product types:                                                                                                                                                                        |                                                             |
|                                                     | D../CRCW....-P                                                                                                                                                                                      | 10R to 10M                                                  |
| Resistance (4.5)                                    | -                                                                                                                                                                                                   | $\pm 1\%$ ; $\pm 0.5\%$ ; $\pm 0.25\%$                      |
| Temperature coefficient (4.8.4.2)                   | 20/- 55/20 °C and<br>20/125/20 °C                                                                                                                                                                   | $\pm 100$ ppm/K; $\pm 50$ ppm/K; $\pm 100$ ppm/K            |
| Overload (4.13)                                     | $U = 2.5 \times (P_{70} \times R)^{1/2}$<br>$\leq 2 \times U_{max.}$ ;<br>Duration: according the style                                                                                             | $\pm (0.25\% R + 0.05 \Omega)$                              |
| Solderability (4.17.5)                              | Aging 4 h at 155 °C, dryheat<br>solder bath method; 235 °C; 2 s<br>visual examination                                                                                                               | Good tinning<br>( $\geq 95\%$ covered)<br>no visible damage |
| Resistance to soldering heat<br>(4.18.2)            | Solder bath method;<br>(260 $\pm$ 5) °C; (10 $\pm$ 1) s                                                                                                                                             | $\pm (0.25\% R + 0.05 \Omega)$                              |
| Rapid change of temperature (4.19)                  | 30 min at LCT = - 55 °C;<br>30 min at UCT = 125 °C; 5 cycles                                                                                                                                        | $\pm (0.25\% R + 0.05 \Omega)$                              |
| Damp heat, steady state (4.24)                      | (40 $\pm$ 2) °C; 56 days;<br>(93 $\pm$ 3) % RH                                                                                                                                                      | $\pm (1\% R + 0.05 \Omega)$                                 |
| Climatic sequence (4.23)                            | 16 h at UCT = 125 °C; 1 cycle at 55 °C;<br>2 h at LCT = - 55 °C;<br>1 h/1 kPa at 15 °C to 35 °C;<br>5 cycles at 55 °C<br>$U = (P_{70} \times R)^{1/2}$<br>$U = U_{max.}$ ; whichever is less severe | $\pm (1\% R + 0.05 \Omega)$                                 |
| Endurance at 70 °C (4.25.1)                         | $U = (P_{70} \times R)^{1/2}$<br>$U = U_{max.}$ ; whichever is less severe<br>1.5 h ON; 0.5 h OFF;<br>70 °C; 1000 h                                                                                 | $\pm (1\% R + 0.05 \Omega)$                                 |
| Extended endurance (4.25.1.8)                       | Duration extended to 8000 h                                                                                                                                                                         | $\pm (2\% R + 0.1 \Omega)$                                  |
| Endurance at upper category<br>temperature (4.25.3) | UCT = 125 °C; 1000 h                                                                                                                                                                                | $\pm (1\% R + 0.05 \Omega)$                                 |

## APPLICABLE SPECIFICATIONS

- EN 60115-1 Generic Specifications
- EN 140400 Sectional Specification
- EN 140401-802 Detail Specifications
- IEC 60068-2-x Variety of environmental test procedures
- IEC 60286-3 Packaging of SMD components



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