

# High Voltage (up to 0.5 kV) Thick Film Chip Resistors



## FEATURES

- High operating voltage (up to 500 V)
- Pure tin solder contacts on Ni barrier layer provides compatibility with lead (Pb)-free and lead containing soldering processes
- Metal glaze on high quality ceramic
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## STANDARD ELECTRICAL SPECIFICATIONS

| MODEL      | CASE SIZE INCH | CASE SIZE METRIC | POWER RATING $P_{70}$ W | LIMITING ELEMENT VOLTAGE $U_{MAX}$ AC RMS/DC V | TEMPERATURE COEFFICIENT $\pm$ ppm/K | TOLERANCE $\pm$ % | RESISTANCE RANGE $\Omega$ | SERIES   |
|------------|----------------|------------------|-------------------------|------------------------------------------------|-------------------------------------|-------------------|---------------------------|----------|
| RCV0805 e3 | 0805           | RR 2012M         | 0.125                   | 400                                            | 100                                 | 1                 | 100K to 10M               | E24; E96 |
|            |                |                  |                         |                                                | 200                                 | 5                 |                           | E24      |
| RCV1206 e3 | 1206           | RR 3216M         | 0.25                    | 500                                            | 100                                 | 1                 | 100K to 10M               | E24; E96 |
|            |                |                  |                         |                                                | 200                                 | 5                 |                           | E24      |

### Notes

- These resistors do not feature a lifetime limitation when operated within the limits of rated dissipation, permissible operating voltage and permissible film temperature. However, the resistance typically increases due to the resistor's film temperature over operating time, generally known as drift. The drift may exceed the stability requirements of an individual application circuit and thereby limits the functional lifetime.
- No marking.
- Power rating depends on the max. temperature at the solder point, the component placement density and the substrate material.

## TECHNICAL SPECIFICATIONS

| PARAMETER                                    | UNIT         | RCV0805       | RCV1206 |
|----------------------------------------------|--------------|---------------|---------|
| Rated dissipation $P_{70}$ <sup>(1)</sup>    | W            | 0.125         | 0.25    |
| Limiting element voltage $U_{max}$ AC RMS/DC | V            | 400           | 500     |
| Insulation voltage $U_{ins.}$ (1 min)        | V            | > 500         |         |
| Voltage coefficient of resistance chart      | ppm/V        | 25            |         |
| Insulation resistance                        | $\Omega$     | > $10^9$      |         |
| Operating temperature range                  | $^{\circ}$ C | - 55 to + 155 |         |
| Weight                                       | mg           | 5.5           | 10      |

### Note

- <sup>(1)</sup> The power dissipation on the resistors 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  $^{\circ}$ C is not exceeded.

## PART NUMBER AND PRODUCT DESCRIPTION

Part Number: RCV1206100KFKEA

R C V 1 2 0 6 1 0 0 K F K E A

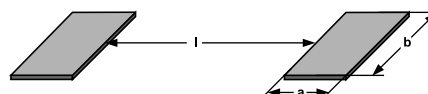
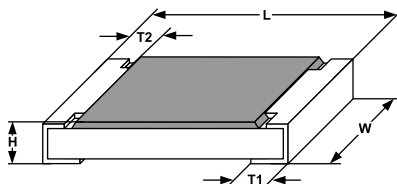
| MODEL              | RESISTANCE                  | TOLERANCE                      | TCR                                        | PACKAGING  |
|--------------------|-----------------------------|--------------------------------|--------------------------------------------|------------|
| RCV0805<br>RCV1206 | K = Thousand<br>M = Million | F = $\pm$ 1 %<br>J = $\pm$ 5 % | K = $\pm$ 100 ppm/K<br>N = $\pm$ 200 ppm/K | EA, EB, EC |

Product Description: RCV1206 100 100K 1 % ET1 e3

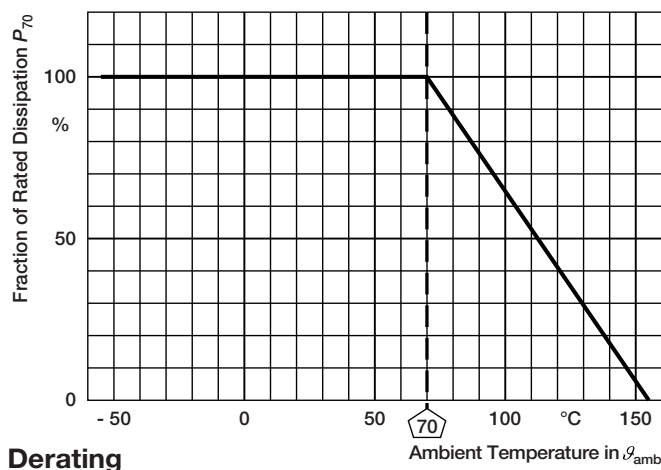
| RCV1206            | 100                                | 100K                                         | 1 %                    | ET1           | e3                               |
|--------------------|------------------------------------|----------------------------------------------|------------------------|---------------|----------------------------------|
| MODEL              | TCR                                | RESISTANCE                                   | TOLERANCE              | PACKAGING     | LEAD (Pb)-FREE                   |
| RCV0805<br>RCV1206 | $\pm$ 100 ppm/K<br>$\pm$ 200 ppm/K | 100K = 100 k $\Omega$<br>10M = 10 M $\Omega$ | $\pm$ 1 %<br>$\pm$ 5 % | ET1, ET5, ET6 | e3 = Pure tin termination finish |

**PACKAGING**

| MODEL   | CODE     | QUANTITY | CARRIER TAPE                          | WIDTH | PITCH | REEL DIAMETER |
|---------|----------|----------|---------------------------------------|-------|-------|---------------|
| RCV0805 | EA = ET1 | 5000     | Paper tape acc. to IEC 60068-3 Type I | 8 mm  | 4 mm  | 180 mm/7"     |
|         | EB = ET5 | 10 000   |                                       |       |       | 285 mm/11.25" |
|         | EC = ET6 | 20 000   |                                       |       |       | 330 mm/13"    |
| RCV1206 | EA = ET1 | 5000     |                                       |       |       | 180 mm/7"     |
|         | EB = ET5 | 10 000   |                                       |       |       | 285 mm/11.25" |
|         | EC = ET6 | 20 000   |                                       |       |       | 330 mm/13"    |

**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   |
| 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 |

**FUNCTIONAL PERFORMANCE**


| TEST PROCEDURES AND REQUIREMENTS |                            |                                         |                                                                                                               |                                                                                        |                                |
|----------------------------------|----------------------------|-----------------------------------------|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|--------------------------------|
| EN 60115-1<br>CLAUSE             | IEC 60068-2<br>TEST METHOD | TEST                                    | PROCEDURE                                                                                                     | REQUIREMENTS<br>PERMISSIBLE CHANGE ( $\Delta R$ )                                      |                                |
|                                  |                            |                                         | Stability for product types:                                                                                  | 100 k $\Omega$ to 10 M $\Omega$                                                        |                                |
|                                  |                            |                                         | <b>RCV e3</b>                                                                                                 |                                                                                        |                                |
| 4.5                              | -                          | Resistance                              | -                                                                                                             | $\pm 1 \%$                                                                             | $\pm 5 \%$                     |
| 4.13                             | -                          | Short time overload                     | $U = 2.5 \times \sqrt{P_{70} \times R}$<br>$\leq 2 \times U_{max.}$<br>5 s                                    | $\pm (0.25 \% R + 0.05 \Omega)$                                                        | $\pm (0.5 \% R + 0.05 \Omega)$ |
| 4.17.2                           | 58 (Td)                    | Solderability                           | Solder bath method;<br>Sn60Pb40<br>non-activated flux;<br>(235 $\pm$ 5) $^{\circ}$ C<br>(2 $\pm$ 0.2) s       | Good tinning<br>( $\geq 95 \%$ covered);<br>no visible damage                          |                                |
|                                  |                            |                                         | Solder bath method;<br>Sn96.5Ag3Cu0.5<br>non-activated flux;<br>(245 $\pm$ 5) $^{\circ}$ C<br>(3 $\pm$ 0.3) s | Good tinning<br>( $\geq 95 \%$ covered);<br>no visible damage                          |                                |
| 4.8.4.2                          | -                          | Temperature coefficient                 | (20/- 55/20) $^{\circ}$ C and<br>(20/155/20) $^{\circ}$ C                                                     | $\pm 100$ ppm/K                                                                        | $\pm 200$ ppm/K                |
| 4.32                             | 21 (Uu <sub>3</sub> )      | Shear (adhesion)                        | 205 N                                                                                                         | No visible damage                                                                      |                                |
| 4.33                             | 21 (Uu <sub>1</sub> )      | Substrate bending                       | Depth 2 mm;<br>3 times                                                                                        | No visible damage, no open circuit in bent position<br>$\pm (0.25 \% R + 0.05 \Omega)$ |                                |
| 4.19                             | 14 (Na)                    | Rapid change of temperature             | 30 min. at - 55 $^{\circ}$ C;<br>30 min. at 125 $^{\circ}$ C                                                  |                                                                                        |                                |
|                                  |                            |                                         | 5 cycles                                                                                                      | $\pm (0.25 \% R + 0.05 \Omega)$                                                        | $\pm (0.5 \% R + 0.05 \Omega)$ |
|                                  |                            |                                         | 1000 cycles                                                                                                   | $\pm (1 \% R + 0.05 \Omega)$                                                           | $\pm (1 \% R + 0.05 \Omega)$   |
| 4.23                             | -                          | Climatic sequence:                      | -                                                                                                             |                                                                                        |                                |
| 4.23.2                           | 2 (Ba)                     | Dry heat                                | 125 $^{\circ}$ C; 16 h                                                                                        |                                                                                        |                                |
| 4.23.3                           | 30 (Db)                    | Damp heat, cyclic                       | 55 $^{\circ}$ C; $\geq 90 \%$ RH<br>24 h; 1 cycle                                                             |                                                                                        |                                |
| 4.23.4                           | 1 (Aa)                     | Cold                                    | - 55 $^{\circ}$ C; 2 h                                                                                        | $\pm (1 \% R + 0.05 \Omega)$                                                           | $\pm (2 \% R + 0.1 \Omega)$    |
| 4.23.5                           | 13 (M)                     | Low air pressure                        | 1 kPa; (25 $\pm$ 10) $^{\circ}$ C; 1 h                                                                        |                                                                                        |                                |
| 4.23.6                           | 30 (Db)                    | Damp heat, cyclic                       | 55 $^{\circ}$ C; $\geq 90 \%$ RH<br>24 h; 5 cycle                                                             |                                                                                        |                                |
| 4.23.7                           | -                          | DC load                                 | $U = \sqrt{P_{70} \times R}$                                                                                  |                                                                                        |                                |
| 4.25.1                           | -                          | Endurance at 70 $^{\circ}$ C            | $U = \sqrt{P_{70} \times R} \leq U_{max.}$<br>1.5 h on; 0.5 h off;                                            |                                                                                        |                                |
|                                  |                            |                                         | 70 $^{\circ}$ C; 1000 h                                                                                       | $\pm (1 \% R + 0.05 \Omega)$                                                           | $\pm (2 \% R + 0.1 \Omega)$    |
|                                  |                            |                                         | 70 $^{\circ}$ C; 8000 h                                                                                       | $\pm (2 \% R + 0.1 \Omega)$                                                            | $\pm (4 \% R + 0.1 \Omega)$    |
| 4.18.2                           | 58 (Td)                    | Resistance to soldering heat            | Solder bath method<br>(260 $\pm$ 5) $^{\circ}$ C;<br>(10 $\pm$ 1) s                                           | $\pm (0.25 \% R + 0.05 \Omega)$                                                        | $\pm (0.5 \% R + 0.05 \Omega)$ |
| 4.24                             | 78 (Cab)                   | Damp heat, steady state                 | (40 $\pm$ 2) $^{\circ}$ C;<br>(93 $\pm$ 3) % RH;<br>56 days                                                   | $\pm (1 \% R + 0.05 \Omega)$                                                           | $\pm (2 \% R + 0.05 \Omega)$   |
| 4.25.3                           | -                          | Endurance at upper category temperature | 155 $^{\circ}$ C; 1000 h                                                                                      | $\pm (1 \% R + 0.05 \Omega)$                                                           | $\pm (2 \% R + 0.05 \Omega)$   |

| TEST PROCEDURES AND REQUIREMENTS |                            |                                                               |                                                                                                              |                                                   |                                |
|----------------------------------|----------------------------|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------|--------------------------------|
| EN 60115-1<br>CLAUSE             | IEC 60068-2<br>TEST METHOD | TEST                                                          | PROCEDURE                                                                                                    | REQUIREMENTS<br>PERMISSIBLE CHANGE ( $\Delta R$ ) |                                |
|                                  |                            |                                                               | Stability for product types:                                                                                 | 100 k $\Omega$ to 10 M $\Omega$                   |                                |
|                                  |                            |                                                               | <b>RCV e3</b>                                                                                                |                                                   |                                |
| 4.40                             | -                          | Electrostatic discharge (human body model)                    | IEC 61340-3-1;<br>3 pos. + 3 neg. discharges;<br>ESD voltage acc. to style                                   | $\pm (1 \% R + 0.05 \Omega)$                      |                                |
| 4.29                             | 45 (XA)                    | Component solvent resistance                                  | Isopropyl alcohol;<br>50 °C; method 2                                                                        | No visible damage                                 |                                |
| 4.30                             | 45 (XA)                    | Solvent resistance of marking                                 | Isopropyl alcohol;<br>50 °C; method 1, toothbrush                                                            | Marking legible, no visible damage                |                                |
| 4.22                             | 6 (Fc)                     | Vibration, endurance by sweeping                              | f = 10 Hz to 2000 Hz;<br>x, y, z $\leq$ 1.5 mm;<br>A $\leq$ 200 m/s <sup>2</sup> ;<br>10 sweeps per axis     | $\pm (0.25 \% R + 0.05 \Omega)$                   | $\pm (0.5 \% R + 0.05 \Omega)$ |
| 4.37                             | -                          | Periodic electric overload                                    | $U = \sqrt{15 \times P_{70} \times R}$<br>$\leq 2 \times U_{\max.}$ ;<br>0.1 s on; 2.5 s off;<br>1000 cycles | $\pm (1 \% R + 0.05 \Omega)$                      |                                |
| 4.27                             | -                          | Single pulse high voltage overload,<br>10 $\mu$ s/700 $\mu$ s | $\dot{U} = 10 \times \sqrt{P_{70} \times R}$<br>$\leq 2 \times U_{\max.}$ ;<br>10 pulses                     | $\pm (1 \% R + 0.05 \Omega)$                      |                                |

All tests are carried out in accordance with the following specifications:

- EN 60115-1, generic specification
- EN 140400, sectional specification
- EN 140401-802, detail specification
- IEC 60068-2-x, environmental test procedures



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