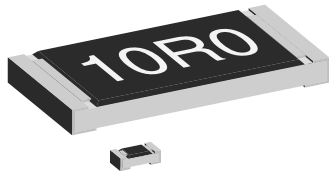


## Thick Film, Rectangular Chip Resistors



### FEATURES

- Metal glaze on high quality ceramic
- Protective overglaze
- Lead bearing (90 % Sn/10 % Pb) solder contacts
- Excellent stability ( $\Delta R/R \leq \pm 0.5\%$  for 1000 h at 70 °C) in different environmental conditions
- High volume product suitable for commercial and special applications

### STANDARD ELECTRICAL SPECIFICATIONS

| MODEL                                                                                     | SIZE |        | POWER RATING $P_{70\text{ }^{\circ}\text{C}}$<br>W | LIMITING<br>ELEMENT<br>VOLTAGE<br>MAX $V_{\Sigma}$ | TEMPERATURE<br>COEFFICIENT<br>ppm/K       | TOLERANCE<br>%                | RESISTANCE<br>RANGE<br>$\Omega$      | E-SERIES                 |
|-------------------------------------------------------------------------------------------|------|--------|----------------------------------------------------|----------------------------------------------------|-------------------------------------------|-------------------------------|--------------------------------------|--------------------------|
|                                                                                           | INCH | METRIC | CECC 40401-802/EIA-575                             |                                                    |                                           |                               |                                      |                          |
| D10<br>— — —<br>CRCW0402                                                                  | 0402 | 1005   | 0.063                                              | 50                                                 | $\pm 200^{(1)}$<br>$\pm 100$<br>$\pm 200$ | $\pm 1$<br>$\pm 1$<br>$\pm 5$ | 1R0 - 9R76<br>10R - 10M<br>1R0 - 10M | 24 + 96<br>24 + 96<br>24 |
| Zero-Ohm-Resistor: $R_{\text{max}} = 20\text{ m}\Omega$ , $I_{\text{max}} = 1\text{ A}$   |      |        |                                                    |                                                    |                                           |                               |                                      |                          |
| D11<br>— — —<br>CRCW0603                                                                  | 0603 | 1608   | 0.10                                               | 75                                                 | $\pm 200^{(1)}$<br>$\pm 100$<br>$\pm 200$ | $\pm 1$<br>$\pm 1$<br>$\pm 5$ | 1R0 - 9R76<br>10R - 10M<br>1R0 - 10M | 24 + 96<br>24 + 96<br>24 |
| Zero-Ohm-Resistor: $R_{\text{max}} = 20\text{ m}\Omega$ , $I_{\text{max}} = 1.5\text{ A}$ |      |        |                                                    |                                                    |                                           |                               |                                      |                          |
| D12<br>— — —<br>CRCW0805                                                                  | 0805 | 2012   | 0.125                                              | 150                                                | $\pm 200^{(1)}$<br>$\pm 100$<br>$\pm 200$ | $\pm 1$<br>$\pm 1$<br>$\pm 5$ | 1R0 - 9R76<br>10R - 10M<br>1R0 - 10M | 24 + 96<br>24 + 96<br>24 |
| Zero-Ohm-Resistor: $R_{\text{max}} = 20\text{ m}\Omega$ , $I_{\text{max}} = 2\text{ A}$   |      |        |                                                    |                                                    |                                           |                               |                                      |                          |
| D25<br>— — —<br>CRCW1206                                                                  | 1206 | 3216   | 0.25                                               | 200                                                | $\pm 200^{(1)}$<br>$\pm 100$<br>$\pm 200$ | $\pm 1$<br>$\pm 1$<br>$\pm 5$ | 1R0 - 9R76<br>10R - 10M<br>1R0 - 10M | 24 + 96<br>24 + 96<br>24 |
| Zero-Ohm-Resistor: $R_{\text{max}} = 20\text{ m}\Omega$ , $I_{\text{max}} = 2.5\text{ A}$ |      |        |                                                    |                                                    |                                           |                               |                                      |                          |
| CRCW1210                                                                                  | 1210 | 3225   | 0.33                                               | 200                                                | $\pm 200^{(1)}$<br>$\pm 100$<br>$\pm 200$ | $\pm 1$<br>$\pm 1$<br>$\pm 5$ | 1R0 - 9R76<br>10R - 1M0<br>1R0 - 10M | 24 + 96<br>24 + 96<br>24 |
| Zero-Ohm-Resistor: $R_{\text{max}} = 20\text{ m}\Omega$ , $I_{\text{max}} = 2.5\text{ A}$ |      |        |                                                    |                                                    |                                           |                               |                                      |                          |
| CRCW1218                                                                                  | 1218 | 3246   | 1.0                                                | 200                                                | $\pm 200^{(1)}$<br>$\pm 100$<br>$\pm 200$ | $\pm 1$<br>$\pm 1$<br>$\pm 5$ | 1R0 - 9R76<br>10R - 2M2<br>1R0 - 2M2 | 24 + 96<br>24 + 96<br>24 |
| Zero-Ohm-Resistor: $R_{\text{max}} = 20\text{ m}\Omega$ , $I_{\text{max}} = 4\text{ A}$   |      |        |                                                    |                                                    |                                           |                               |                                      |                          |
| CRCW2010                                                                                  | 2010 | 5025   | 0.5                                                | 400                                                | $\pm 200^{(1)}$<br>$\pm 100$<br>$\pm 200$ | $\pm 1$<br>$\pm 1$<br>$\pm 5$ | 1R0 - 9R76<br>10R - 10M<br>1R0 - 10M | 24 + 96<br>24 + 96<br>24 |
| Zero-Ohm-Resistor: $R_{\text{max}} = 20\text{ m}\Omega$ , $I_{\text{max}} = 3\text{ A}$   |      |        |                                                    |                                                    |                                           |                               |                                      |                          |
| CRCW2512                                                                                  | 2512 | 6332   | 1.0                                                | 500                                                | $\pm 200^{(1)}$<br>$\pm 100$<br>$\pm 200$ | $\pm 1$<br>$\pm 1$<br>$\pm 5$ | 1R0 - 9R76<br>10R - 10M<br>1R0 - 10M | 24 + 96<br>24 + 96<br>24 |
| Zero-Ohm-Resistor: $R_{\text{max}} = 20\text{ m}\Omega$ , $I_{\text{max}} = 4\text{ A}$   |      |        |                                                    |                                                    |                                           |                               |                                      |                          |

#### Notes

1. 100 ppm/K on request
- Ask about further value ranges
- For low values see Thick Film rectangular low value resistors
- For high values see Thick Film rectangular high values
- Marking and packaging: see appropriate catalog or web pages
- For precision Thick Film CRCW see Thick Film rectangular Precision Resistors
- Power rating depends on the max. temperature at the solder point, the component placement density and the substrate material
- AgPd or Pd terminations for conductive adhesive attachment on request

### TECHNICAL SPECIFICATIONS

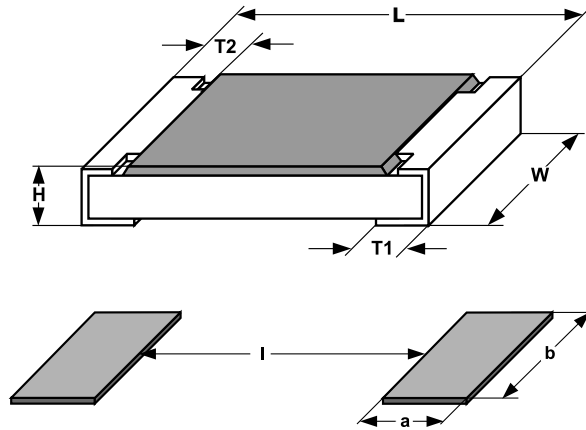
| PARAMETER                                            | UNIT               | D10<br>CRCW0402      | D11<br>CRCW0603  | D12<br>CRCW0805  | D25<br>CRCW1206  | CRCW1210         | CRCW1218        | CRCW2010        | CRCW2512        |
|------------------------------------------------------|--------------------|----------------------|------------------|------------------|------------------|------------------|-----------------|-----------------|-----------------|
| Rated Dissipation at 70 °C<br>(CECC 40401   EIA 575) | W                  | 0.063                | 0.10             | 0.125            | 0.25             | 0.33             | 1.0             | 0.5             | 1.0             |
| Limiting Element Voltage <sup>(2)</sup>              | $V_{\Sigma}$       | 50                   | 75               | 150              | 200              | 200              | 200             | 400             | 500             |
| Insulation Voltage (1 min)                           | $V_{\text{peak}}$  | > 75                 | > 100            | > 200            | > 300            | > 300            | > 300           | > 300           | > 300           |
| Thermal Resistance                                   | K/W                | $\leq 870^{(1)}$     | $\leq 550^{(1)}$ | $\leq 440^{(1)}$ | $\leq 220^{(1)}$ | $\leq 140^{(3)}$ | $\leq 65^{(3)}$ | $\leq 88^{(3)}$ | $\leq 65^{(3)}$ |
| Insulation Resistance                                | $\Omega$           | $> 10^9$             |                  |                  |                  |                  |                 |                 |                 |
| Category Temperature                                 | $^{\circ}\text{C}$ | - 55/+ 125 (+ 155)   |                  |                  |                  |                  |                 |                 |                 |
| Failure Rate                                         | $\text{h}^{-1}$    | $0.3 \times 10^{-9}$ |                  |                  |                  |                  |                 |                 |                 |
| Weight/1000 pcs                                      | g                  | 0.65                 | 2                | 5.5              | 10               | 16               | 29.5            | 25.5            | 40.5            |

#### Notes

1. Measuring conditions in acc. to CECC 4040
2. Rated voltage:  $\sqrt{P \times R}$
3. Depending on solder pad dimensions



## DIMENSIONS



| SIZE |        | DIMENSIONS [in millimeters]            |             |             |                                       |           |
|------|--------|----------------------------------------|-------------|-------------|---------------------------------------|-----------|
| INCH | METRIC | L                                      | W           | H           | T1                                    | T2        |
| 0402 | 1005   | 1.0 ± 0.05                             | 0.5 ± 0.05  | 0.35 ± 0.05 | 0.25 ± 0.05                           | 0.2 ± 0.1 |
| 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 |
| 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 |
| 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 |
| 1210 | 3225   | 3.2 ± 0.2                              | 2.5 ± 0.2   | 0.55 ± 0.05 | 0.45 ± 0.2                            | 0.4 ± 0.2 |
| 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 |
| 2010 | 5025   | 5.0 ± 0.15                             | 2.5 ± 0.15  | 0.6 ± 0.1   | 0.6 ± 0.2                             | 0.6 ± 0.2 |
| 2512 | 6332   | 6.3 ± 0.2                              | 3.15 ± 0.15 | 0.6 ± 0.1   | 0.6 ± 0.2                             | 0.6 ± 0.2 |

| SIZE |        | SOLDER PAD DIMENSIONS [in millimeters] |     |     |                |     |     |
|------|--------|----------------------------------------|-----|-----|----------------|-----|-----|
| INCH | METRIC | REFLOW SOLDERING                       |     |     | WAVE SOLDERING |     |     |
|      |        | a                                      | b   | l   | a              | b   | l   |
| 0402 | 1005   | 0.4                                    | 0.6 | 0.5 |                |     |     |
| 0603 | 1608   | 0.5                                    | 0.9 | 1.0 | 0.9            | 0.9 | 1.0 |
| 0805 | 2012   | 0.7                                    | 1.3 | 1.2 | 0.9            | 1.3 | 1.3 |
| 1206 | 3216   | 0.9                                    | 1.7 | 2.0 | 1.1            | 1.7 | 2.3 |
| 1210 | 3225   | 0.9                                    | 2.5 | 2.0 | 1.1            | 2.5 | 2.2 |
| 1218 | 3246   | 1.05                                   | 4.9 | 1.9 | 1.25           | 4.8 | 1.9 |
| 2010 | 5025   | 1.0                                    | 2.5 | 3.9 | 1.2            | 2.5 | 3.9 |
| 2512 | 6332   | 1.0                                    | 3.2 | 5.2 | 1.2            | 3.2 | 5.2 |

PART NUMBER AND PRODUCT DESCRIPTION<sup>1)</sup>

PART NUMBER: D1208050B5620FP0

| MODEL/SIZE                               | SPECIAL CHARACTER | TCR                                              | VALUE                                                                                                                                                                                                                                                                                                      | TOLERANCE              | PACKAGING <sup>2)</sup>                | SPECIAL        |
|------------------------------------------|-------------------|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|----------------------------------------|----------------|
| D100402<br>D110603<br>D120805<br>D251206 | 0 = neutral       | B = ± 100 ppm/K<br>A = ± 200 ppm/K<br>0 = Jumper | 3 digit value<br>1 digit multiplier<br><br>MULTIPLIER<br>7 = *10 <sup>-3</sup> 2 = *10 <sup>2</sup><br>8 = *10 <sup>-2</sup> 3 = *10 <sup>3</sup><br>9 = *10 <sup>-1</sup> 4 = *10 <sup>4</sup><br>0 = *10 <sup>0</sup> 5 = *10 <sup>5</sup><br>1 = *10 <sup>1</sup> 6 = *10 <sup>6</sup><br>0000 = Jumper | F = ± 1 %<br>J = ± 5 % | P0 M0<br>P5 PZ<br>PN B5<br>MZ BN<br>MU | up to 2 digits |

PRODUCT DESCRIPTION: D12 100 562R 1% P5

|                          |                            |                                               |                |                                        |
|--------------------------|----------------------------|-----------------------------------------------|----------------|----------------------------------------|
| D12                      | 100                        | 562R                                          | 1 %            | P5                                     |
| MODEL                    | TCR                        | RESISTANCE VALUE                              | TOLERANCE      | PACKAGING <sup>2)</sup>                |
| D10<br>D11<br>D12<br>D25 | ± 100 ppm/K<br>± 200 ppm/K | 49K9 = 49.9 kΩ<br>5R1 = 5.1 Ω<br>0R0 = Jumper | ± 1 %<br>± 5 % | P0 M0<br>P5 PZ<br>PN B5<br>MZ BN<br>MU |

PART NUMBER: CRCW0805562RFKTA

| MODEL/SIZE                                                                                   | VALUE                                                       | TOLERANCE                                     | TCR                                                         | PACKAGING <sup>2)</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<br>0000 = Jumper | F = ± 1 %<br>J = ± 5 %<br>Z = Zero Ohm Jumper | K = ± 100 ppm/K<br>N = ± 200 ppm/K<br>S = Jumper or Special | TA = RT1<br>TB = RT5<br>TC = RT6<br>TD = RT7<br>TF = R02<br>TG = R67<br>TH = R82<br>TK = RT9<br>BA = B27 | up to 2 digits<br>TR = Customer Trimmable |

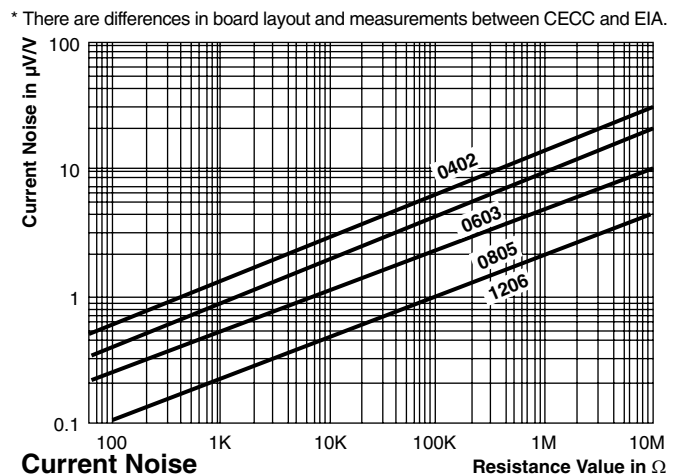
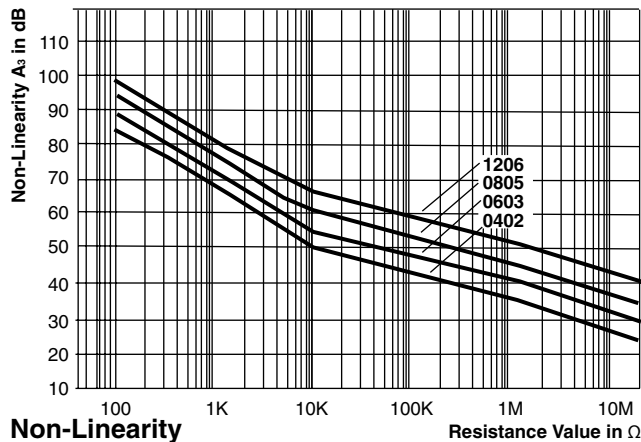
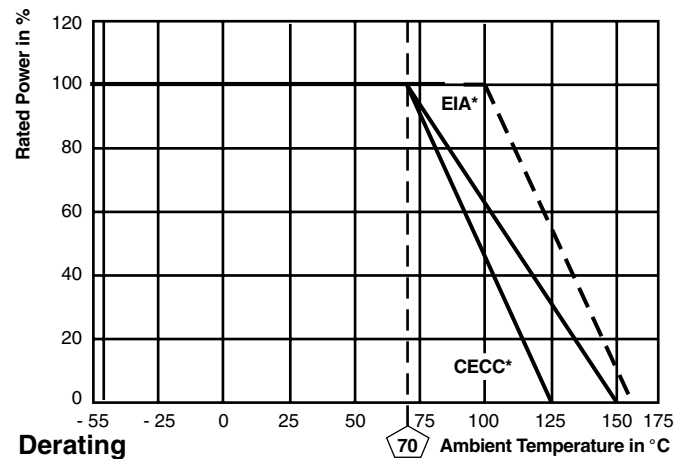
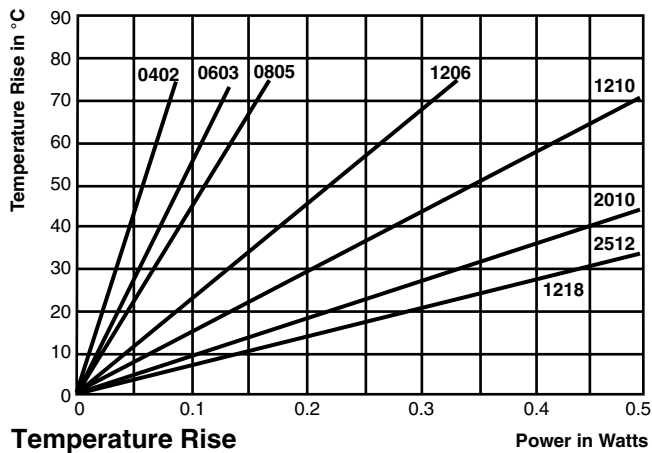
PRODUCT DESCRIPTION: CRCW 0805 5620 F 100 RT1

|       |                                                  |                              |                                               |                            |                                                 |
|-------|--------------------------------------------------|------------------------------|-----------------------------------------------|----------------------------|-------------------------------------------------|
| CRCW  | 0805                                             | 5620                         | F                                             | 100                        | RT1                                             |
| MODEL | SIZE                                             | RESISTANCE VALUE             | TOLERANCE                                     | TCR                        | PACKAGING <sup>2)</sup>                         |
| CRCW  | 0402 1201<br>0603 1218<br>0805 2010<br>1206 2512 | 685 = 6.8 MΩ<br>224 = 220 kΩ | F = ± 1 %<br>J = ± 5 %<br>Z = Zero Ohm Jumper | ± 100 ppm/K<br>± 200 ppm/K | RT1 R67<br>RT5 R82<br>RT6 RT9<br>RT7 B27<br>R02 |

± 1 % = 3 sig.digits, plus multiplier  
± 5 % = 2 sig.digits, plus multiplier

## Notes

1. Preferred way for ordering products is by use of the PART NUMBER. 2. Please refer to table PACKAGING, page 116.



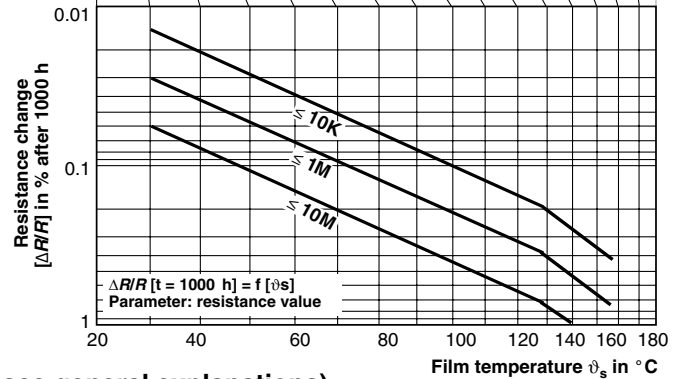
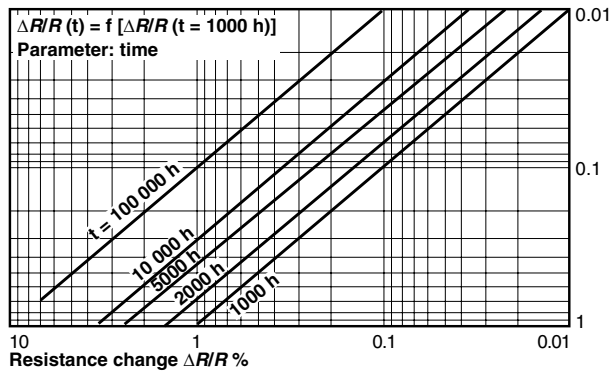
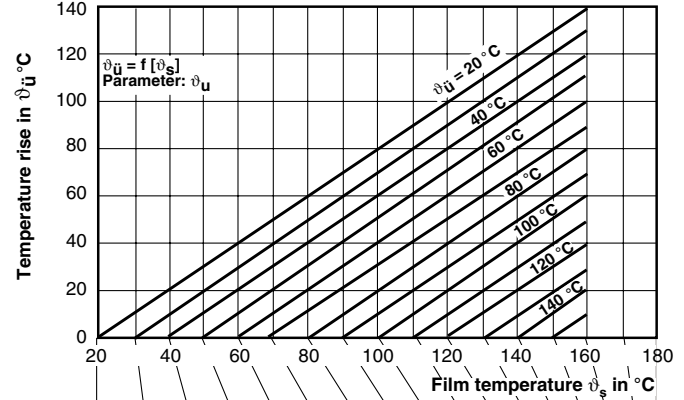
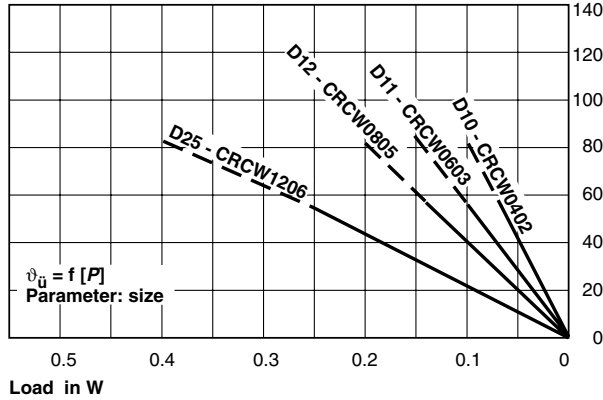
\* There are differences in board layout and measurements between CECC and EIA.

| PACKAGING       |            |            |             |       |                     |                       |                       |                    |
|-----------------|------------|------------|-------------|-------|---------------------|-----------------------|-----------------------|--------------------|
| MODEL           | REEL       |            |             |       | BULK                |                       |                       |                    |
|                 | TAPE WIDTH | DIAMETER   | PIECES/REEL | PITCH | PACKAGING CODE      |                       | BULK FEEDING MAGAZINE |                    |
|                 |            |            |             |       | PAPER <sup>1)</sup> | BLISTER <sup>2)</sup> | PIECES <sup>1)</sup>  | CODE <sup>2)</sup> |
| D10<br>CRCW0402 | 8 mm       | 180 mm/7"  | 10 000      | 2 mm  | P0/TD               |                       | 50 000                | MZ/BA              |
|                 |            | 330 mm/13" | 50 000      | 2 mm  | PZ/TE               |                       |                       |                    |
| D11<br>CRCW0603 | 8 mm       | 180 mm/7"  | 5000        | 4 mm  | P5/TA               | B5/na                 | 25 000                | MU/BA              |
|                 |            | 255 mm/10" | 10 000      | 4 mm  | P0/TB               |                       |                       |                    |
|                 |            | 330 mm/13" | 20 000      | 4 mm  | PN/TC               | BN/na                 |                       |                    |
| D12<br>CRCW0805 | 8 mm       | 180 mm/7"  | 5000        | 4 mm  | P5/TA               | B5/na                 | 10 000                | MO/BA              |
|                 |            | 255 mm/10" | 10 000      | 4 mm  | P0/TB               |                       |                       |                    |
|                 |            | 330 mm/13" | 20 000      | 4 mm  | PN/TC               | BN/na                 |                       |                    |
| D25<br>CRCW1206 | 8 mm       | 180 mm/7"  | 5000        | 4 mm  | P5/TA               | B5/na                 |                       |                    |
|                 |            | 255 mm/10" | 10 000      | 4 mm  | P0/TB               |                       |                       |                    |
|                 |            | 330 mm/13" | 20 000      | 4 mm  | PN/TC               | BN/na                 |                       |                    |
| CRCW1210        | 8 mm       | 180 mm/7"  | 5000        | 4 mm  | P5/TA               | B5/RG1                |                       |                    |
|                 |            | 330 mm/13" | 20 000      | 4 mm  | PN/TC               | BN/na                 |                       |                    |
| CRCW1218        | 12 mm      | 180 mm/7"  | 4000        | 4 mm  |                     | TK                    |                       |                    |
| CRCW2010        | 12 mm      | 180 mm/7"  | 4000        | 4 mm  |                     | TF                    |                       |                    |
| CRCW2512        | 12 mm      | 180 mm/7"  | 2000        | 8 mm  |                     | B2/TG                 |                       |                    |
|                 |            |            | 4000        | 4 mm  |                     | TH                    |                       |                    |

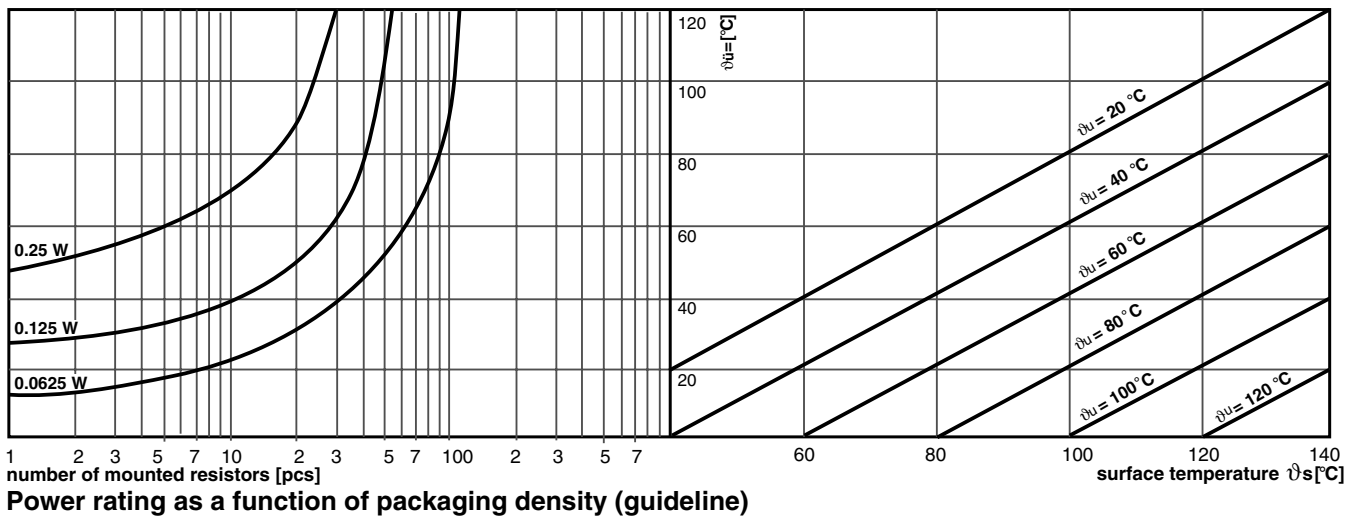
## Notes

- On request
- European/N.American packaging codes: na = NOT AVAILABLE

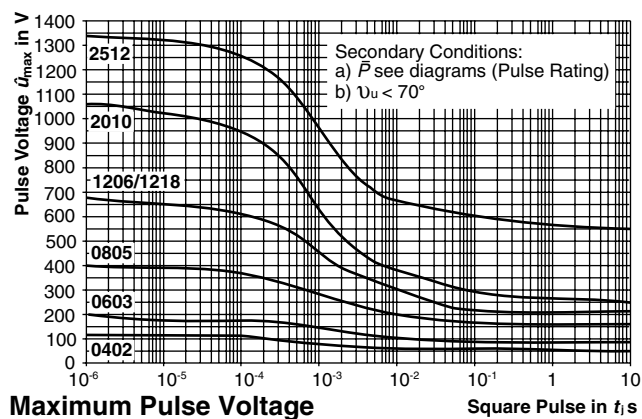
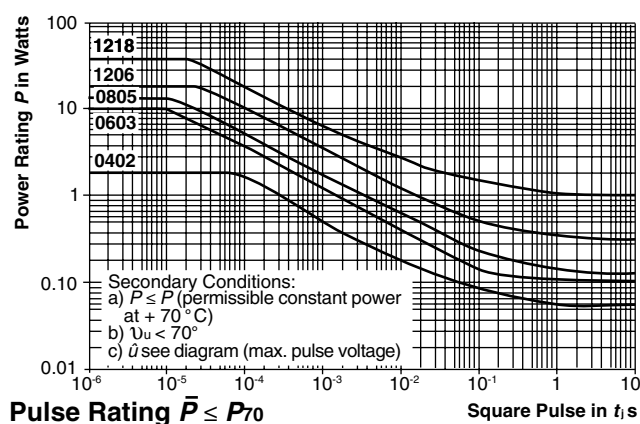
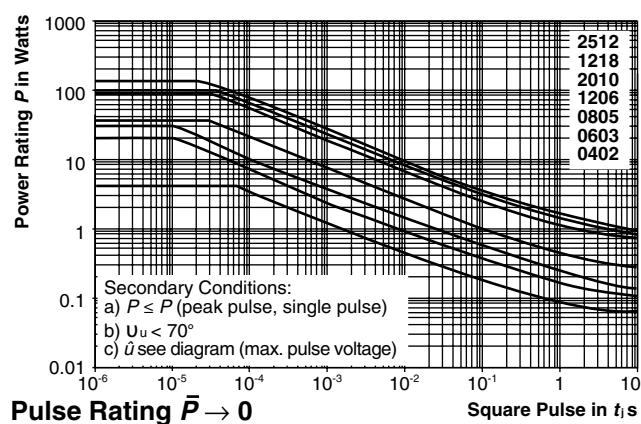
- Further information about packaging: see appropriate catalog or web page.



Stability nomogram typical values (for handling see general explanations)



Power rating as a function of packaging density (guideline)





| <b>PERFORMANCE</b>                                                           |                                                                           |                                       |                               |                               |
|------------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------|-------------------------------|-------------------------------|
| <b>TEST</b>                                                                  | <b>CONDITIONS OF TEST</b>                                                 | <b>REQUIREMENTS IN %<sup>1)</sup></b> |                               |                               |
|                                                                              |                                                                           | <b>0402<br/>0603</b>                  | <b>0805<br/>1206<br/>1210</b> | <b>1218<br/>2010<br/>2512</b> |
| Endurance Test at 70 °C<br>IEC 60115-1 4.25.1; EIA-575                       | 1000 hours at 70 °C, 1.5 hours "ON", 0.5 hours "OFF"                      | ≤ ± 1.0                               | ≤ ± 0.5                       | ≤ ± 1.0                       |
| Endurance at UCT<br>IEC 60115-1 4.25.3                                       | 1000 hours at 125 °C without load                                         | ≤ ± 1.0                               | ≤ ± 0.5                       | ≤ ± 1.0                       |
| Overload Test<br>IEC 60115-1 4.13; EIA-575                                   | Short time overload, 2.5 x rated voltage or 2 x limiting element voltage. | ≤ ± 0.25                              | ≤ ± 0.25                      | ≤ ± 0.5                       |
| Thermal Shock<br>IEC 60115-1 4.19; IEC 60068-2-14;<br>EIA-575                | Rapid change between upper and lower category temperature                 | ≤ ± 0.25                              | ≤ ± 0.25                      | ≤ ± 0.5                       |
| Damp Heat Steady State<br>IEC 60115-1 4.24; IEC 60068-2-3                    | 56 days at 40 °C and 93 % relative humidity                               | ≤ ± 1.0                               | ≤ ± 0.5                       | ≤ ± 1.0                       |
| Resistance to Soldering Heat<br>IEC 60115-1 4.18; IEC 60068-2-20;<br>EIA-575 | 10 seconds at 260 °C solder bath temperature                              | ≤ ± 0.25                              | ≤ ± 0.25                      | ≤ ± 0.5                       |

**Note**

1. Limits for change of resistance at test acc. to CECC

| <b>APPLICABLE SPECIFICATIONS</b>                                                                                                            |
|---------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>• CECC40000/40400/40401-004,-006,-007,-802</li><li>• EN140400/IEC 60115-1</li><li>• EIA-575</li></ul> |



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