

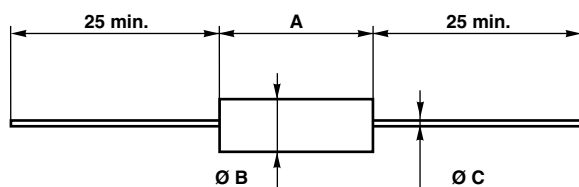
## Molded Metal Film Very High Stability (< 0.25 % After 1000 h) and Precision (up to 0.1 %) Resistors

### FEATURES

- 0.1 W to 2 W at 70 °C
- EN140-201
- According to CECC 4101-803
- Very high stability: drift < 0.25 % after 1000 h
- Reduced total excursion: high initial precision (to  $\pm 0.1$  %) with low temperature coefficient (down to  $\pm 15$  ppm/°C)
- Wide range ohmic values 1  $\Omega$  to 5 M $\Omega$
- Accurate dimensions, high insulation and great mechanical strength
- High climatic performances: -65 °C / +155 °C / 56 days
- Matching tolerance: 0.1 %
- Tracking TCR: 5 ppm/°C
- Termination: pure matte tin
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT


### DIMENSIONS in millimeters



| SERIES | A max. | Ø B max. | Ø C | WEIGHT in g |
|--------|--------|----------|-----|-------------|
| RCMA02 | 6.7    | 2.5      | 0.6 | 0.26        |
| RCMA05 | 10.4   | 4.2      | 0.6 | 0.46        |
| RCMA08 | 16.5   | 6.4      | 0.8 | 1.3         |
| RCMA1  | 19.3   | 6.4      | 0.8 | 1.5         |
| RCMA2  | 29     | 10.2     | 0.8 | 4.4         |
| RCMA4  | 54     | 10.2     | 0.8 | 13          |

### STANDARD ELECTRICAL SPECIFICATIONS

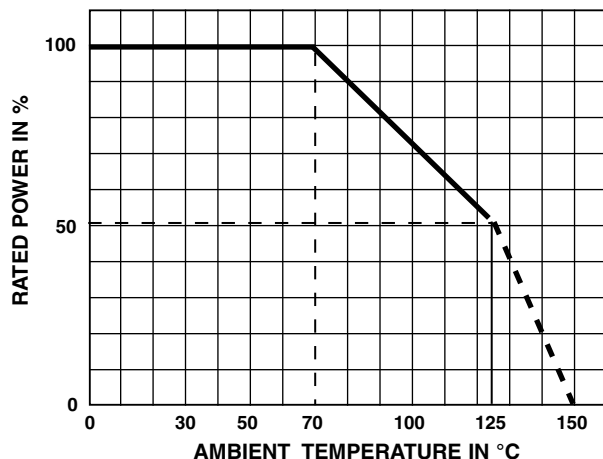
| MODEL  | RESISTANCE RANGE $\Omega$ | RATED POWER $P_{70\text{ }^{\circ}\text{C}}$ W | LIMITING ELEMENT VOLTAGE V | TOLERANCE $\pm$ % | TEMPERATURE COEFFICIENT $\pm$ ppm/°C |
|--------|---------------------------|------------------------------------------------|----------------------------|-------------------|--------------------------------------|
| RCMA02 | 1 to 1M                   | 0.125                                          | 300                        | 0.1, 0.2, 0.5, 1  | 15, 50                               |
| RCMA05 | 1 to 1M                   | 0.250                                          | 350                        | 0.1, 0.2, 0.5, 1  | 15, 50                               |
| RCMA08 | 1 to 1.5M                 | 0.500                                          | 400                        | 0.1, 0.2, 0.5, 1  | 15, 50                               |
| RCMA1  | 1 to 2M                   | 0.75                                           | 500                        | 0.1, 0.2, 0.5, 1  | 15, 25                               |
| RCMA2  | 1 to 2.5M                 | 1.0                                            | 600                        | 0.1, 0.2, 0.5, 1  | 15, 25                               |
| RCMA4  | 1 to 5M                   | 2.0                                            | 800                        | 0.1, 0.2, 0.5, 1  | 15, 25                               |



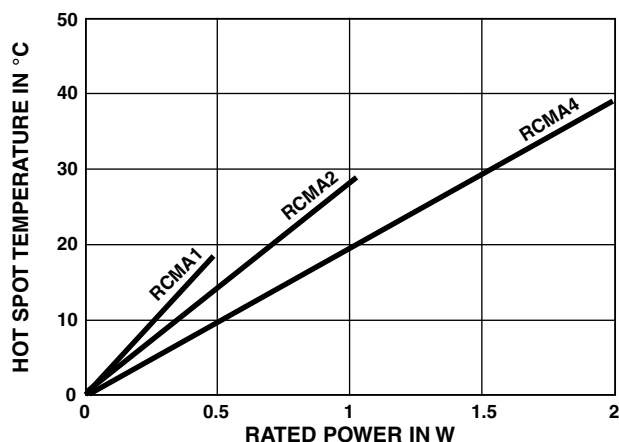
| TECHNICAL SPECIFICATIONS                                                          |                                         |                            |                |                |                  |                |                |
|-----------------------------------------------------------------------------------|-----------------------------------------|----------------------------|----------------|----------------|------------------|----------------|----------------|
| VISHAY SFERNICE SERIES                                                            |                                         | RCMA02                     | RCMA05         | RCMA08         | RCMA1            | RCMA2          | RCMA4          |
| NF C 83-230 (for information)                                                     |                                         | K4<br>RS58P                | K4<br>RS63P    | RS68P          | -                | -              | -              |
| Power rating at 70 °C                                                             |                                         | 0.125 W                    | 0.250 W        | 0.500 W        | 0.75 W           | 1 W            | 2 W            |
| Resistance value range in relation to<br>- tolerance<br>- temperature coefficient | K3                                      | ± 0.2 %                    | 10 Ω to 332 kΩ | 10 Ω to 332 kΩ | 10 Ω to 1 MΩ     | 10 Ω to 1 MΩ   | 10 Ω to 1 MΩ   |
|                                                                                   |                                         | ± 0.5 % ± 1 %              | 1 Ω to 1 MΩ    | 1 Ω to 1 MΩ    | 1 Ω to 1.5 MΩ    | 1 Ω to 2 MΩ    | 1 Ω to 2.5 MΩ  |
|                                                                                   | K4                                      | ± 0.1 % ± 0.2 %            | 10 Ω to 332 kΩ | 10 Ω to 332 kΩ | 10 Ω to 1 MΩ     | 10 Ω to 1 MΩ   | 10 Ω to 1 MΩ   |
|                                                                                   |                                         | ± 0.5 % ± 1 %              | 1 Ω to 1 MΩ    | 1 Ω to 1 MΩ    | 1 Ω to 1.5 MΩ    | 1 Ω to 2 MΩ    | 1 Ω to 2.5 MΩ  |
|                                                                                   | K5                                      | ± 0.1 % ± 0.2 %            | 10 Ω to 332 kΩ | 10 Ω to 332 kΩ | 10 Ω to 750 kΩ   | 10 Ω to 750 kΩ | 10 Ω to 100 kΩ |
|                                                                                   |                                         | ± 0.5 % ± 1 %              | 10 Ω to 1 MΩ   | 10 Ω to 1 MΩ   | 10 Ω to 1.5 MΩ   | 10 Ω to 2 MΩ   |                |
| Maximum voltage                                                                   |                                         | 300 V                      | 350 V          | 400 V          | 500 V            | 600 V          | 800 V          |
| Critical resistance                                                               |                                         | 720 kΩ                     | 490 kΩ         | 320 kΩ         | 333 kΩ           | 360 kΩ         | 320 kΩ         |
| Temperature coefficient                                                           | Rated in the range<br>-55 °C to +155 °C | K3 ≤ ± 50 ppm/°C           |                |                | K4 ≤ ± 25 ppm/°C |                |                |
|                                                                                   | Typical in the range<br>0 °C to +155 °C | K5 ≤ ± 15 ppm/°C           |                |                |                  |                |                |
| Insulation resistance                                                             |                                         | > 10 <sup>7</sup> MΩ       |                |                |                  |                |                |
| Voltage coefficient                                                               |                                         | 0.0001 %/V                 |                |                |                  |                |                |
| Environmental specifications                                                      |                                         | -65 °C / +155 °C / 56 days |                |                |                  |                |                |

| PERFORMANCE                               |                                           |                                                                           |                                                                           |
|-------------------------------------------|-------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|
| TESTS                                     | CONDITIONS                                | REQUIREMENTS                                                              | TYPICAL VALUES AND DRIFTS                                                 |
| Load life at maximum category temperature | 1000 h at 125 °C 50 % of $P_n$            | $\leq \pm 1 \%$<br>Insulation resistance $> 1$ G $\Omega$                 | $\pm 0.25 \%$ or 0.05 $\Omega$                                            |
| Short time overload                       | 2.5 $U_n$ / 5 s<br>Limited to 2 $U_m$     | $\leq \pm (0.25 \% + 0.05 \Omega)$                                        | $\pm 0.1 \%$ or 0.05 $\Omega$                                             |
| Damp heat humidity (steady state)         | 56 days<br>with low load                  | $\leq \pm (1 \% + 0.05 \Omega)$<br>Insulation resistance $> 1$ G $\Omega$ | $\pm 0.2 \%$ or 0.05 $\Omega$                                             |
| Rapid temperature change                  | -55 °C to +155 °C                         | $\leq \pm (0.25 \% + 0.05 \Omega)$                                        | $\pm 0.1 \%$ or 0.05 $\Omega$                                             |
| Climatic sequence                         | -65 °C to +155 °C                         | $\leq \pm (1 \% + 0.05 \Omega)$<br>Insulation resistance $> 1$ G $\Omega$ | $\pm 0.25 \%$ or 0.05 $\Omega$<br>Insulation resistance $10^6$ M $\Omega$ |
| Terminal strength                         | Pull - twist - 2 bends                    | $\leq \pm (0.25 \% + 0.05 \Omega)$                                        | $\pm 0.05 \%$ or 0.05 $\Omega$                                            |
| Vibration                                 | 10 Hz to 500 Hz                           | $\leq \pm (0.25 \% + 0.05 \Omega)$                                        | $\pm 0.05 \%$ or 0.05 $\Omega$                                            |
| Soldering (thermal shock)                 | +260 °C 10 s                              | $\leq \pm (0.25 \% + 0.05 \Omega)$                                        | $\pm 0.05 \%$ or 0.05 $\Omega$                                            |
| Load life                                 | Cycle 90°/30°<br>1000 h at $P_n$ at 70 °C | $\leq \pm (1 \% + 0.05 \Omega)$<br>Insulation resistance $> 1$ G $\Omega$ | $\pm 0.1 \%$ or 0.05 $\Omega$                                             |
| Shelf life                                | 1 year<br>ambient temperature             | -                                                                         | $\pm 0.1 \%$ or 0.05 $\Omega$                                             |

## POWER RATING



## TEMPERATURE RISE



## PRACTICAL OPERATING TOLERANCES

Table 2 and 3 show the basic characteristics and maximum values under different stresses. In fact, the values and drifts are maintained to within narrower limits.

|                                                          |                                                    |              |
|----------------------------------------------------------|----------------------------------------------------|--------------|
| Temperature coefficient<br>between -10 °C and +70 °C     | K5 $\leq \pm 10$ ppm/°C<br>K4 $\leq \pm 15$ ppm/°C |              |
| LONG LIFE<br>90'/30' cycles<br>ambient temperature 70 °C | 1000 h at $P_r$                                    | $\pm 0.05$ % |
|                                                          | 10 000 h at $P_r$                                  | $\pm 0.15$ % |

So, in operation under the specified conditions ( $P_r$  at 70 °C) the total drift (load life + TCR) of a RCMA K4 does not exceed  $\pm 0.25$  %.

## SPECIAL APPLICATIONS

Temperature coefficient tracking to 5 ppm/°C.

Tolerance matching to 0.05 %.

Selection of positive or negative TCR in temperature range of -20 °C to +125 °C.

For these applications and other requirements consult Vishay Sfernice.

## MARKING

Printed: Vishay Sfernice trademark, style (due to lack of space RCMA02 is printed MA02), ohmic value (in  $\Omega$ ), tolerance (in %), temperature coefficient, manufacturing date.

## GLOBAL PART NUMBER INFORMATION

|              |                                  |                               |                                                                                                                                                                                                                                          |          |          |  |                                                |                                                          |          |          |          |                                                                          |          |          |          |                    |
|--------------|----------------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|--|------------------------------------------------|----------------------------------------------------------|----------|----------|----------|--------------------------------------------------------------------------|----------|----------|----------|--------------------|
| <b>R</b>     | <b>C</b>                         | <b>M</b>                      | <b>A</b>                                                                                                                                                                                                                                 | <b>0</b> | <b>2</b> |  | <b>1</b>                                       | <b>3</b>                                                 | <b>0</b> | <b>0</b> | <b>1</b> | <b>F</b>                                                                 | <b>H</b> | <b>S</b> | <b>1</b> | <b>4</b>           |
| GLOBAL MODEL | SIZE                             | SPECIAL                       | OHMIC VALUE                                                                                                                                                                                                                              |          |          |  | TOLERANCE                                      | TEMPERATURE COEFFICIENT                                  |          |          |          | PACKAGING                                                                |          |          |          |                    |
| RCMA         | 02<br>05<br>08<br>10<br>20<br>40 | As applicable.<br>Contact us. | The first four digits are significant figures and the last digit specifies the number of zeros to follow. R designates decimal point.<br>13001 = 13 k $\Omega$<br>33001 = 33 k $\Omega$<br>220R0 = 220 $\Omega$<br>1R220 = 1.22 $\Omega$ |          |          |  | B = 0.1 %<br>A = 0.2 %<br>D = 0.5 %<br>F = 1 % | H = K3, 50 ppm/K<br>E = K4, 25 ppm/K<br>D = K5, 15 ppm/K |          |          |          | AM500 = A20<br>BAG100 = S14<br>BAG50 = S09<br>BAG10 = S03<br>BO50* = B25 |          |          |          | *: possible in N/A |



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