

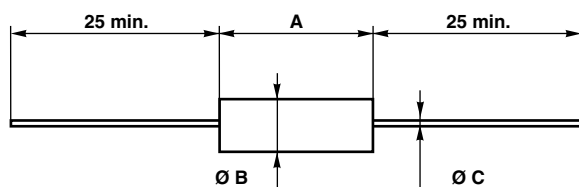
# Molded Metal Film Very High Stability (< 0.25 % After 1000 h) and Precision (up to 0.1 %) Resistors

## 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          |

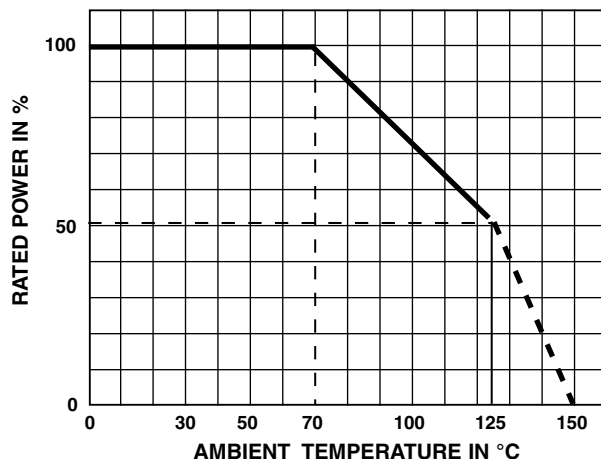
## STANDARD ELECTRICAL SPECIFICATIONS

| 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                               |

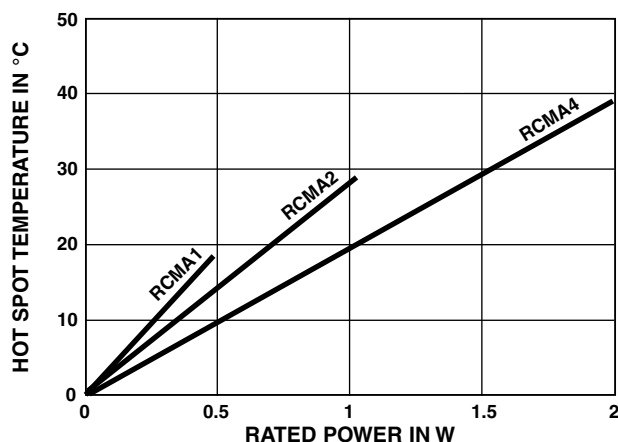
| TECHNICAL SPECIFICATIONS                                                          |                                         |                            |                |                |                  |                |                |
|-----------------------------------------------------------------------------------|-----------------------------------------|----------------------------|----------------|----------------|------------------|----------------|----------------|
| 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 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 |



## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.