

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

## FEATURES

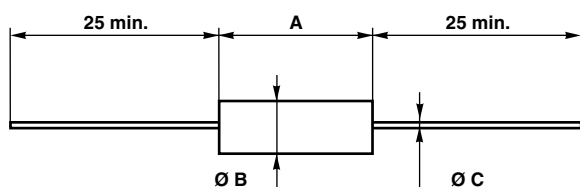
- 0.1 W to 2 W at 70 °C
- EN140-201
- CECC 40 100
- Very high stability: drift < 0.25 % after 1000 h
- Reduced total excursion: high initial precision (to  $\pm 0.1$  %) with low temperature coefficient (down to  $\pm 15$  ppm/°C)
- The models in this series are the first ones qualified by the CNES for spatial applications (certificate N°4 dated October 22, 1972)
- 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 $P_{70\text{ °C}}$ 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                               |

### Note

-  Undergoes European Quality Insurance System (CECC)

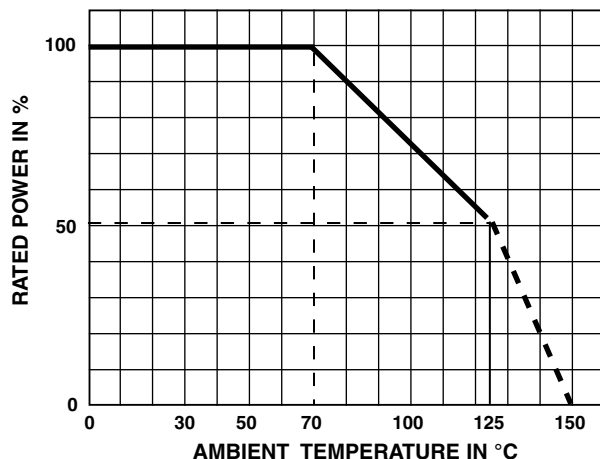
| TECHNICAL SPECIFICATIONS                                                          |                                           |                                                                                               |                                                                                               |                                                                                         |                  |                |                |                |
|-----------------------------------------------------------------------------------|-------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------|----------------|----------------|----------------|
| VISHAY SFERNICE SERIES                                                            |                                           | RCMA02                                                                                        | RCMA05                                                                                        | RCMA08                                                                                  | RCMA1            | RCMA2          | RCMA4          |                |
| NF C 83-230                                                                       |                                           |  K4<br>RS58P |  K4<br>RS63P |  RS68P | -                | -              | -              |                |
| CECC 40 100-803                                                                   |                                           | BE                                                                                            | CE                                                                                            | DE                                                                                      | -                | -              | -              |                |
| 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   | 10 Ω to 2.5 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  | 1 W to 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   | 10 Ω to 2.5 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  | 1Ω to 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 | 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                                                                      |                                                                                               |                                                                                         |                  |                |                |                |

**Note**

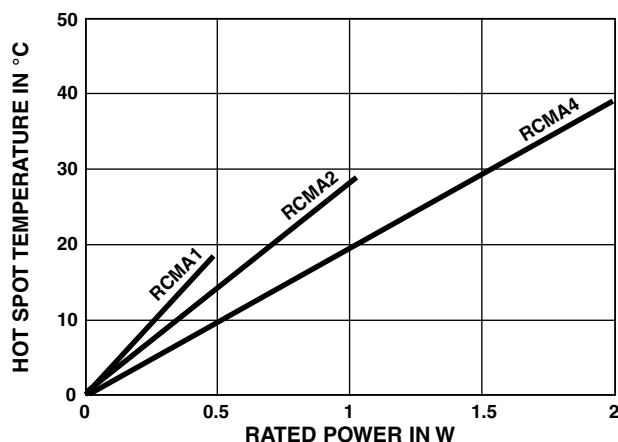
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| PERFORMANCE                               |                                           |                                                    |                                                                |
|-------------------------------------------|-------------------------------------------|----------------------------------------------------|----------------------------------------------------------------|
| CECC 40 100                               |                                           | EN 140-201                                         | TYPICAL VALUES AND DRIFTS                                      |
| TESTS                                     | CONDITIONS STD 202                        | REQUIREMENTS                                       |                                                                |
| Load Life at Maximum Category Temperature | 1000 h at 125 °C 50 % of $P_n$            | ≤ ± 1 %<br>Insulation resistance > 1 GΩ            | ± 0.25 % or 0.05 Ω                                             |
| Short Time Overload                       | 2.5 $U_m/5$ s<br>limited to 2 $U_n$       | ≤ ± (0.25 % + 0.05 Ω)                              | ± 0.1 % or 0.05 Ω                                              |
| Damp Heat Humidity (Steady State)         | 56 days<br>with low load                  | ≤ ± (1 % + 0.05 Ω)<br>Insulation resistance > 1 GΩ | ± 0.2 % or 0.05 Ω                                              |
| Rapid Temperature Change                  | - 55 °C to + 155 °C                       | ≤ ± (0.25 % + 0.05 Ω)                              | ± 0.1 % or 0.05 Ω                                              |
| Climatic Sequence                         | - 65 °C to + 155 °C                       | ≤ ± (1 % + 0.05 Ω)<br>Insulation resistance > 1 GΩ | ± 0.25 % or 0.05 Ω<br>Insulation resistance 10 <sup>6</sup> MΩ |
| Terminal Strength                         | Pull - twist - 2 bends                    | ≤ ± (0.25 % + 0.05 Ω)                              | ± 0.05 % or 0.05 Ω                                             |
| Vibration                                 | 10 Hz to 500 Hz                           | ≤ ± (0.25 % + 0.05 Ω)                              | ± 0.05 % or 0.05 Ω                                             |
| Soldering (Thermal Shock)                 | + 260 °C 10 s                             | ≤ ± (0.25 % + 0.05 Ω)                              | ± 0.05 % or 0.05 Ω                                             |
| Load Life                                 | Cycle 90'/30'<br>1000 h at $P_n$ at 70 °C | ≤ ± (1 % + 0.05 Ω)<br>Insulation resistance > 1 GΩ | ± 0.1 % or 0.05 Ω                                              |
| Shelf Life                                | 1 year<br>ambient temperature             | -                                                  | ± 0.1 % or 0.05 Ω                                              |

## 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 ≤ ± 10 ppm/°C<br>K4 ≤ ± 15 ppm/°C |          |
| LONG LIFE<br>90'/30' cycles<br>ambient temperature 70 °C | 1000 h at $P_r$                      | ± 0.05 % |
|                                                          | 10 000 h at $P_r$                    | ± 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 ± 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, series, style (due to lack of space RCMA02 is printed MA02), ohmic value (in Ω), 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.<br>R designates decimal point.<br>13001 = 13 kΩ<br>33001 = 33 kΩ<br>220R0 = 220 Ω<br>1R220 = 1.22 Ω |          |          |  | 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<br><br>*: possible in N/A |          |          |          |          |          |



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