



## High-Precision Thin Film Chip Resistor Arrays, Sulfur Resistant



## LINKS TO ADDITIONAL RESOURCES



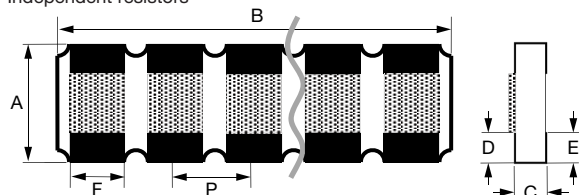
PRA arrays can be used in most applications requiring a matched pair (or set) of resistor elements. The networks provide 1 ppm/°C TCR tracking, a ratio tolerance as tight as 0.01 %, and outstanding stability.

They are available in pitch:

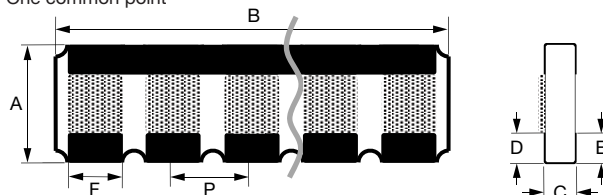
- 0.70 mm for PRA074 (based on case 0402)
- 1.00 mm for PRA100 (based on case 0603)
- 1.35 mm for PRA135 (based on case 0805)
- 1.82 mm for PRA182 (based on case 1206)

## DIMENSIONS

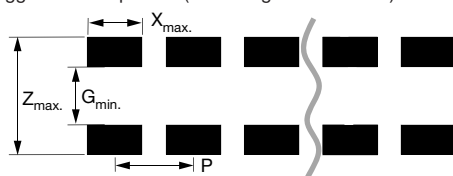
Independent resistors



One common point



Suggested land pattern (according to IPC-7351A)



## FEATURES

- High-stability passivated nichrome resistive layer 0.02 % on ratio, 1000 h at Pn at +70 °C
- Tight TCR (10 ppm/°C) and TCR tracking (to 1 ppm/°C)
- Very low noise < -35 dB and voltage coefficient < 0.01 ppm/V
- Ratio tolerance to 0.01 % ( $R \geq 200R$ )
- High-temperature (230 °C) version, see PRA HT
- ESA-qualified version, see PRA HR
- SMD wraparound chip resistor array
- Thin film technology
- Option to withstand humidity test of AEC-Q200
- Sulfur resistant (per ASTM B809-95 humid vapor test)
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
Available  
**GREEN**  
(5-2008)  
Available

## TYPICAL PERFORMANCE

|      | ABSOLUTE  | TRACKING |
|------|-----------|----------|
| TCR  | 10 ppm/°C | 2 ppm/°C |
|      | ABSOLUTE  | RATIO    |
| TOL. | 0.1 %     | 0.01 %   |

| DIM.              | PRA074<br>(0402 base)                                                         |          | PRA100<br>(0603 base) |          | PRA135<br>(0805 base) |          | PRA182<br>(1206 base) |         |
|-------------------|-------------------------------------------------------------------------------|----------|-----------------------|----------|-----------------------|----------|-----------------------|---------|
|                   | mm                                                                            | mil      | mm                    | mil      | mm                    | mil      | mm                    | mil     |
| A                 | 1.00 ± 0.15                                                                   | 40 ± 6   | 1.52 ± 0.15           | 60 ± 6   | 1.91 ± 0.15           | 75 ± 6   | 3.06 ± 0.15           | 120 ± 6 |
| B                 | $B = N \times P (\pm 0.2 \text{ mm})$<br>$B = N \times P (\pm 8 \text{ mil})$ |          |                       |          |                       |          |                       |         |
| C                 | 0.50 ± 0.13                                                                   | 20 ± 5   | 0.50 ± 0.13           | 20 ± 5   | 0.5 ± 0.13            | 20 ± 5   | 0.50 ± 0.13           | 20 ± 5  |
| D                 | 0.25 ± 0.1                                                                    | 10 ± 4   | 0.38 ± 0.13           | 15 ± 5   | 0.38 ± 0.13           | 15 ± 5   | 0.40 ± 0.13           | 16 ± 5  |
| E                 | 0.25 ± 0.1                                                                    | 10 ± 4   | 0.38 ± 0.13           | 15 ± 5   | 0.38 ± 0.13           | 15 ± 5   | 0.40 ± 0.13           | 16 ± 5  |
| F                 | 0.55 ± 0.1                                                                    | 21.5 ± 4 | 0.70 ± 0.1            | 27.6 ± 4 | 1.05 ± 0.1            | 41.4 ± 4 | 1.525 ± 0.1           | 60 ± 4  |
| P                 | 0.70                                                                          | 27.5     | 1                     | 40       | 1.35                  | 53       | 1.825                 | 72      |
| G <sub>min.</sub> | 0.29                                                                          | 11.4     | 0.49                  | 19.3     | 0.88                  | 34.5     | 1.99                  | 78.3    |
| X <sub>max.</sub> | 0.51                                                                          | 20       | 0.66                  | 26       | 1.01                  | 39.8     | 1.49                  | 58.7    |
| Z <sub>max.</sub> | 2.05                                                                          | 80.7     | 2.57                  | 101.2    | 2.96                  | 116.5    | 4.11                  | 161.8   |

## Note

- N represents number of resistors

GLOBAL PART NUMBER INFORMATION <sup>(1)</sup>

New Global Part Numbering: PRA100I4-5K62BWB T 9 9

|                                      |                             |                         |                      |                        |                                                     |                                                                                                    |                                                                        |                                   |   |   |   |   |   |   |   |   |   |   |
|--------------------------------------|-----------------------------|-------------------------|----------------------|------------------------|-----------------------------------------------------|----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|-----------------------------------|---|---|---|---|---|---|---|---|---|---|
| P                                    | R                           | A                       | 1                    | 0                      | 0                                                   | I                                                                                                  | 4                                                                      | -                                 | 5 | K | 6 | 2 | B | W | B | T | 9 | 9 |
| GLOBAL<br>MODEL                      | CONFIG.                     | NUMBERS OF<br>RESISTORS | VALUE <sup>(2)</sup> | ABS. TOL.              | RATIO TOL.                                          | TERMINATION                                                                                        | PACKAGING                                                              | OPTION                            |   |   |   |   |   |   |   |   |   |   |
| PRA074<br>PRA100<br>PRA135<br>PRA182 | I: independent<br>C: common | 2 to 8                  | Decimal<br>R or K    | B = 0.1 %<br>D = 0.5 % | B = 0.1 %<br>W = 0.05 %<br>P = 0.02 %<br>L = 0.01 % | B: SnPb over<br>nickel barrier<br>N: SnAg over<br>nickel barrier<br>G: gold over<br>nickel barrier | For more<br>information see<br>"Codification<br>of Packaging"<br>table | Leave<br>blank<br>if no<br>option |   |   |   |   |   |   |   |   |   |   |

B: lead bearing version  
N and G: lead (Pb)-free / RoHS version

For different ohmic values on a given network a specific part number is used

|              |           |                                                            |
|--------------|-----------|------------------------------------------------------------|
| CNW          | 1368      | T                                                          |
| GLOBAL MODEL | REFERENCE | For more information see "Codification of Packaging" table |

Historical Part Number Example: PRA100 I 4 5K62 0.1 % 0.05 % TR R0051

|                  |         |                      |             |           |            |           |        |
|------------------|---------|----------------------|-------------|-----------|------------|-----------|--------|
| PRA100           | I       | 4                    | 5K62        | 0.1 %     | 0.05 %     | TR        | R0099  |
| HISTORICAL MODEL | CONFIG. | NUMBERS OF RESISTORS | OHMIC VALUE | ABS. TOL. | RATIO TOL. | PACKAGING | OPTION |

## Notes

- (1) Part number can only have 18 digits. Depending on information needed a compromise has to be found. Consult Vishay  
 (2) When the last digit(s) of the ohmic value is (are) 0, it (they) must be omitted  
 E.g.: PRA100I4-2K20BWN → must be ordered under PRA100I4-2K2BWN  
 PRA100I4-2K00BWN → must be ordered under PRA100I4-2KBWN

## STANDARD ELECTRICAL SPECIFICATIONS

| MODEL  | SIZE | RESISTANCE RANGE<br>$\Omega$ | POWER RATING PER RESISTOR <sup>(1)</sup><br>W | ABSOLUTE TOLERANCE<br>$\pm$ % | RATIO TOLERANCE <sup>(2)</sup><br>% | ABSOLUTE TCR <sup>(3)</sup><br>$\pm$ ppm/°C | RATIO TCR <sup>(4)</sup><br>$\pm$ ppm/°C |
|--------|------|------------------------------|-----------------------------------------------|-------------------------------|-------------------------------------|---------------------------------------------|------------------------------------------|
| PRA074 | 074  | 10 to 100K                   | 0.040                                         | 0.1, 0.5                      | 0.01, 0.02, 0.05, 0.1               | 10                                          | 1, 2                                     |
| PRA100 | 100  | 10 to 250K                   | 0.100                                         | 0.1, 0.5                      | 0.01, 0.02, 0.05, 0.1               | 10                                          | 1, 2                                     |
| PRA135 | 135  | 10 to 500K                   | 0.125                                         | 0.1, 0.5                      | 0.01, 0.02, 0.05, 0.1               | 10                                          | 1, 2                                     |
| PRA182 | 182  | 10 to 2M                     | 0.200                                         | 0.1, 0.5                      | 0.01, 0.02, 0.05, 0.1               | 10                                          | 1, 2                                     |

## Notes

- (1) At +70 °C  
 (2) 0.02 % ( $R \geq 50 \Omega$ ), 0.01 % ( $R \geq 200 \Omega$ )  
 (3) At -40 °C to +125 °C  
 (4) At -40 °C to +125 °C, 1 ppm/°C on request

## CLIMATIC SPECIFICATIONS

|                                            |                   |
|--------------------------------------------|-------------------|
| Operating temperature range <sup>(1)</sup> | -55 °C to +155 °C |
|--------------------------------------------|-------------------|

## Note

- (1) For temperature up to 230 °C, see PRA HT  
[www.vishay.com/doc?53057](http://www.vishay.com/doc?53057) or consult factory

## PERFORMANCE VS. HUMID SULFUR VAPOR

|                 |                                                                                  |
|-----------------|----------------------------------------------------------------------------------|
| Test conditions | 50 °C $\pm$ 2 °C, 85 % $\pm$ 4 % RH, exposure time 500 h                         |
| Test results    | Resistance drift < (0.05 % $R$ + 0.05 $\Omega$ ), no corrosion products observed |

## PERFORMANCES

| TEST                |        | SPECIFICATIONS |
|---------------------|--------|----------------|
| Noise               |        | ≤ -35 dB       |
| Voltage coefficient |        | ≤ 0.01 ppm/V   |
| Limiting voltage    | PRA074 | 40 V           |
|                     | PRA100 | 50 V           |
|                     | PRA135 | 100 V          |
|                     | PRA182 | 150 V          |

**MECHANICAL SPECIFICATIONS**

|              |                                          |
|--------------|------------------------------------------|
| Substrate    | Alumina                                  |
| Technology   | Thin film                                |
| Film         | Nickel chromium with mineral passivation |
| Terminations | <b>B type:</b> SnPb over nickel barrier  |
|              | <b>N type:</b> SnAg over nickel barrier  |
|              | <b>G type:</b> Gold over nickel barrier  |

**SPECIAL FEATURES**

Resistance values can be different on a given network ( $R_{max}/R_{min}$  as high as 300). Tooling charges might be required depending on the ohmic values in the same network. Please, consult Vishay Sfernice for ohmic values, tolerances and also temperature coefficient (e.g.  $\pm 1 \text{ ppm}/^\circ\text{C}$ ) outside the standard range.

**AEC-Q200 OPTION: 0058**

Vishay Sfernice offers a part compliant to AEC-Q200 specification.

**PACKAGING**

Several types of packaging are available: waffle-pack and tape and reel.

| SIZE       | MOQ | NUMBER OF PIECES PER PACKAGE      |                              |      |
|------------|-----|-----------------------------------|------------------------------|------|
|            |     | WAFFLE PACK MAX. QUANTITY PER BOX | TAPE AND REEL <sup>(1)</sup> |      |
|            |     |                                   | MIN.                         | MAX. |
| PRA074 x 2 | 100 | 400                               | 100                          | 5000 |
| PRA074 x 3 |     | 100                               | 100                          | 4000 |
| PRA074 x 4 |     | 140                               | 100                          | 4000 |
| PRA074 x 5 |     | 140                               |                              |      |
| PRA074 x 6 |     | 60                                |                              |      |
| PRA074 x 7 |     | 60                                |                              |      |
| PRA074 x 8 |     | 60                                |                              |      |
| PRA100 x 2 | 100 | 100                               | 100                          | 4000 |
| PRA100 x 3 |     | 140                               | 100                          | 4000 |
| PRA100 x 4 |     | 60                                | 100                          | 4000 |
| PRA100 x 5 |     | 50                                |                              |      |
| PRA100 x 6 |     | 50                                | 100                          | 3000 |
| PRA100 x 7 |     | 50                                |                              |      |
| PRA100 x 8 |     | 28                                | 100                          | 4000 |
| PRA135 x 2 | 100 | 140                               | 100                          | 4000 |
| PRA135 x 3 |     | 60                                |                              |      |
| PRA135 x 4 |     | 60                                | 100                          | 4000 |
| PRA135 x 5 |     | 50                                |                              |      |
| PRA135 x 6 |     | 28                                | 100                          | 4000 |
| PRA135 x 7 |     | 24                                |                              |      |
| PRA135 x 8 |     | 24                                |                              |      |
| PRA182 x 2 | 100 | 60                                | 100                          | 2000 |
| PRA182 x 3 |     | 60                                | 100                          | 4000 |
| PRA182 x 4 |     | 50                                | 100                          | 2000 |
| PRA182 x 5 |     | 21                                | 100                          | 1500 |
| PRA182 x 6 |     | 24                                |                              |      |
| PRA182 x 7 |     | 24                                |                              |      |
| PRA182 x 8 |     | 20                                |                              |      |

**Note**

<sup>(1)</sup> Other sizes upon request

**CODIFICATION OF PACKAGING**

| CODE 18                                       | PACKAGING                                       |
|-----------------------------------------------|-------------------------------------------------|
| <b>WAFFLE PACK</b>                            |                                                 |
| W                                             | 100 min., 1 mult.                               |
| <b>PLASTIC TAPE (Standard for all sizes.)</b> |                                                 |
| T                                             | 100 min., 1 mult.                               |
| TA                                            | 100 min., 100 mult.                             |
| TB                                            | 250 min., 250 mult.                             |
| TC                                            | 500 min., 500 mult.                             |
| TD                                            | 1000 min., 1000 mult.                           |
| TE                                            | 2500 min., 2500 mult.                           |
| TF                                            | Full tape (quantity depending on size of chips) |

## PACKAGING RULES

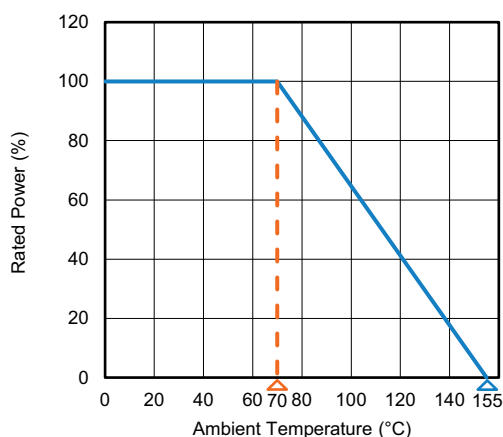
### Waffle Pack

Can be filled up to maximum quantity indicated in the table here above, taking into account the minimum order quantity. When quantity ordered exceeds maximum quantity of a single waffle pack, the waffle packs are stacked up on the top of each other and closed by one single cover. **To get “not stacked up” waffle pack in case of ordered quantity > maximum number of pieces per package: Please consult Vishay Sfernice for specific ordering code.**

### Tape and Reel

Can be filled up to maximum quantity indicated in the table here above, taking into account the minimum order quantity. When quantity ordered is between the MOQ and the maximum reel capacity, only one reel is provided. **When several reels are needed for ordered quantity within MOQ and maximum reel capacity: Please consult Vishay Sfernice for specific ordering code.**

## POWER RATING



### Note

(1) PRA074 is NOT marked. For CNW of size 074, only a “dot” is marked to identify R1

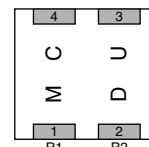
## MARKING (1)

On the primary package, printed information includes Vishay S.A. trademark series and model, schematic number of resistors, ohmic value, absolute tolerance, ratio tolerance, type of termination: B tinned over nickel barrier.

### Marking on parts:

All resistors inside network have same ohmic value:

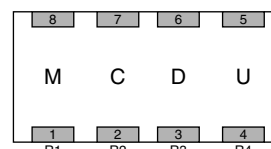
If number of resistors inside network < or = 3



For instance ohmic value 13K:

Coded 1302: M = 1, C = 3, D = 0, U = 2

If number of resistors inside networks > 3

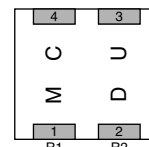


E.g.: 4 resistors in the network:

Ohmic value 13K: Coded 1302: M = 1, C = 3, D = 0, U = 2

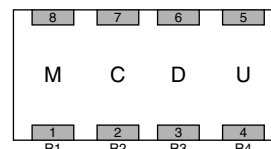
Resistors inside the network have different ohmic value, a CNW number is assigned by Vishay Sfernice

If number of resistors inside network < or = 3



E.g.: CNW1538: M = 1, C = 5, D = 3, U = 8

If number of resistors inside networks > 3



E.g.: 4 resistors in the network:

E.g.: CNW1314: M = 1, C = 3, D = 1, U = 4

## PERFORMANCE

| TESTS                     | CONDITIONS<br>CECC REQUIREMENTS     | DRIFTS                           |           |
|---------------------------|-------------------------------------|----------------------------------|-----------|
|                           |                                     | ABSOLUTE PER<br>(Typical Values) | RATIO     |
| Overload                  | 2.5 Un/2 s                          | 0.05 % Rn + 0.05 Ω               | 0.01 % Rn |
| Climatic sequences        | -55 °C to +155 °C/5 moisture cycles | 0.1 % Rn + 0.05 Ω                | 0.01 % Rn |
| Thermal shock             | -55 °C to +155 °C/5 cycles 30'      | 0.05 % Rn + 0.05 Ω               | 0.01 % Rn |
| Load life                 | 1000 h/Pn at 70 °C                  | 0.1 % Rn + 0.05 Ω                | 0.02 % Rn |
| Resistance to solder heat | 260 °C/10 s                         | 0.05 % Rn + 0.05 Ω               | 0.01 % Rn |
| Moisture resistance       | 0.01 Pn at + 40 °C 93 % RH          | 0.1 % Rn + 0.05 Ω                | 0.01 % Rn |
| High temperature storage  | 1000 h/no load at +155 °C           | 0.1 % Rn + 0.05 Ω                | 0.02 % Rn |

### Note

- Rn: nominal resistance



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