

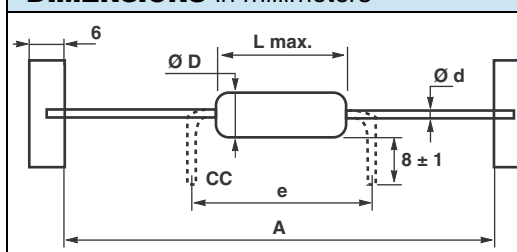
## Precision Metal Film Resistors

### FEATURES

- 0.063 W to 0.5 W at 70 °C
- According to CECC 40101
- Wide ohmic range from 1  $\Omega$  to 4.7 M $\Omega$
- Good initial precision up to  $\pm 0.1$  %
- Operating temperatures:
  - 55 °C to + 155 °C for TCR  $\geq 25$  ppm/°C
  - 25 °C to + 85 °C for TCR  $\leq 15$  ppm/°C
- Epoxy coating
- Termination: Pure matt 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

|  | TYPE    | Ø D max. | L max. | A $\pm 1$ | Ø d | CC <sub>e</sub> | WEIGHT in g |
|------------------------------------------------------------------------------------|---------|----------|--------|-----------|-----|-----------------|-------------|
|                                                                                    | N.. 3.. | 1.8      | 3.9    | 53        | 0.5 | 5.08            | 0.15        |
|                                                                                    | N.. 4.. | 2.5      | 6.2    | 53        | 0.6 | NA              | 0.3         |
|                                                                                    | N.. 5.. | 3.3      | 8.7    | 53        | 0.6 | NA              | 0.5         |

### 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 |
|-------|---------------------------|----------------------------------|----------------------------|-------------------|--------------------------------------|
| NT3S  | 10 to 200K                | 0.125                            | 200                        | 0.1, 0.25, 0.5, 1 | 15                                   |
| NP3S  | 10 to 511K                | 0.250                            | 200                        | 0.1, 0.25, 0.5, 1 | 25                                   |
| NY3   | 1 to 1.5M                 | 0.250                            | 200                        | 0.5, 1            | 50                                   |
| NK3   | 1 to 1.5M                 | 0.250                            | 200                        | 2, 5              | 100                                  |
| NT4S  | 10 to 499K                | 0.250                            | 350                        | 0.1, 0.25, 0.5, 1 | 15                                   |
| NP4S  | 10 to 1M                  | 0.500                            | 350                        | 0.1, 0.25, 0.5, 1 | 25                                   |
| NY4   | 10 to 3.32M               | 0.500                            | 350                        | 0.1, 0.25, 0.5, 1 | 50                                   |
| NK4   | 10 to 3.3M                | 0.500                            | 350                        | 2, 5              | 100                                  |
| NT5S  | 10 to 499K                | 0.500                            | 350                        | 0.1, 0.25, 0.5, 1 | 15                                   |
| NP5S  | 10 to 1M                  | 0.500                            | 350                        | 0.1, 0.25, 0.5, 1 | 25                                   |
| NY5   | 2.67 to 4.7M              | 0.500                            | 350                        | 0.1, 0.25, 0.5, 1 | 50                                   |
| NK5   | 2.7 to 4.4M               | 0.500                            | 350                        | 2, 5              | 100                                  |

**TECHNICAL SPECIFICATIONS**

| MODEL                                                                     |                             |          | NT3S                                          | NP3S   | NY3    | NK3    | NT4S                                          | NP4S   | NY4  | NK4    | NT5S                                          | NP5S  | NY5    | NK5    |         |
|---------------------------------------------------------------------------|-----------------------------|----------|-----------------------------------------------|--------|--------|--------|-----------------------------------------------|--------|------|--------|-----------------------------------------------|-------|--------|--------|---------|
| Power Rating, $P_r$ at + 70 °C                                            |                             |          | 0.125 W                                       | 0.25 W |        |        | 0.25 W                                        | 0.5 W  |      |        | 0.5 W                                         |       |        |        |         |
| Stability Class                                                           |                             |          | 1 %                                           |        |        | 2 %    | 1 %                                           |        |      | 2 %    | 1 %                                           |       |        | 2 %    |         |
| Preferred Standard Ohmic Values Series                                    |                             |          | E192 for<br>0.1 %/0.25 %/0.5 %<br>E96 for 1 % |        |        | E24    | E192 for<br>0.1 %/0.25 %/0.5 %<br>E96 for 1 % |        |      | E24    | E192 for<br>0.1 %/0.25 %/0.5 %<br>E96 for 1 % |       |        | E24    |         |
| Ohmic Value Range in Relation to: Temperature Coefficient, TCR/ Tolerance | ± 15 ppm/°C <sup>(1)</sup>  | ± 0.1 %  | 100 Ω                                         | -      | -      | -      | 49.9 Ω                                        | -      | -    | -      | 100 Ω                                         | -     | -      | -      |         |
|                                                                           |                             | ± 0.25 % | 200 kΩ                                        |        |        |        | 499 kΩ                                        |        |      |        | 499 kΩ                                        |       |        |        |         |
|                                                                           |                             | ± 0.5 %  | 10 Ω                                          | -      | -      | -      | 10 Ω                                          | -      | -    | -      | 10 Ω                                          | -     | -      | -      |         |
|                                                                           |                             | ± 1 %    | 200 kΩ                                        |        |        |        | 499 kΩ                                        |        |      |        | 499 kΩ                                        |       |        |        |         |
|                                                                           | ± 25 ppm/°C <sup>(2)</sup>  | ± 0.1 %  | -                                             | 100 Ω  | -      | -      | -                                             | 10 Ω   | -    | -      | -                                             | 100 Ω | -      | -      | -       |
|                                                                           |                             | ± 0.25 % |                                               | 511 kΩ |        |        |                                               | 1 MΩ   |      |        |                                               | 1 MΩ  |        |        |         |
|                                                                           |                             | ± 0.5 %  | -                                             | 10 Ω   | -      | -      | -                                             | 10 Ω   | -    | -      | -                                             | 10 Ω  | -      | -      |         |
|                                                                           |                             | ± 1 %    |                                               | 511 kΩ |        |        |                                               | 1 MΩ   |      |        |                                               | 1 MΩ  |        |        |         |
|                                                                           | ± 50 ppm/°C <sup>(2)</sup>  | ± 0.1 %  | -                                             | -      | -      | -      | -                                             | -      | 10 Ω | -      | -                                             | -     | -      | 10 Ω   | -       |
|                                                                           |                             | ± 0.25 % |                                               |        |        |        |                                               |        | 1 MΩ |        |                                               |       |        | 1 MΩ   |         |
|                                                                           |                             | ± 0.5 %  | -                                             | -      | 10 Ω   | -      | -                                             | -      | -    | -      | -                                             | -     | 10 Ω   | -      |         |
|                                                                           |                             |          |                                               |        |        |        |                                               |        |      |        |                                               |       | 1.5 MΩ |        | 3.32 MΩ |
|                                                                           |                             | ± 1 %    | -                                             | -      | 1 Ω    | -      | -                                             | -      | -    | -      | -                                             | -     | -      | 2.67 Ω | -       |
|                                                                           |                             |          |                                               |        |        |        |                                               |        |      |        |                                               |       |        | 1.5 MΩ |         |
|                                                                           | ± 100 ppm/°C <sup>(2)</sup> | ± 2 %    | -                                             | -      | -      | 1 Ω    | -                                             | -      | -    | 10 Ω   | -                                             | -     | -      | -      | 2.7 Ω   |
|                                                                           |                             | ± 5 %    |                                               |        |        | 1.5 MΩ |                                               |        |      | 3.3 MΩ |                                               |       |        |        | 4.7 MΩ  |
| Limiting Element Voltage $U_{\max}$ . RMS                                 |                             |          | 200 V                                         |        |        |        | 350 V                                         |        |      |        | 350 V                                         |       |        |        |         |
| Critical Resistance                                                       |                             |          | -                                             | -      | 160 kΩ |        | 490 kΩ                                        | 245 kΩ |      |        | 245 kΩ                                        |       |        |        |         |
| Thermal Resistance                                                        |                             |          | 170 °C/W                                      |        |        |        | 145 °C/W                                      |        |      |        | 110 °C/W                                      |       |        |        |         |

**Notes**

- <sup>(1)</sup> TCR requirement for temperature between - 25 °C and + 85 °C  
<sup>(2)</sup> TCR requirement for temperature between - 55 °C and + 125 °C

**ENVIRONMENTAL SPECIFICATIONS**

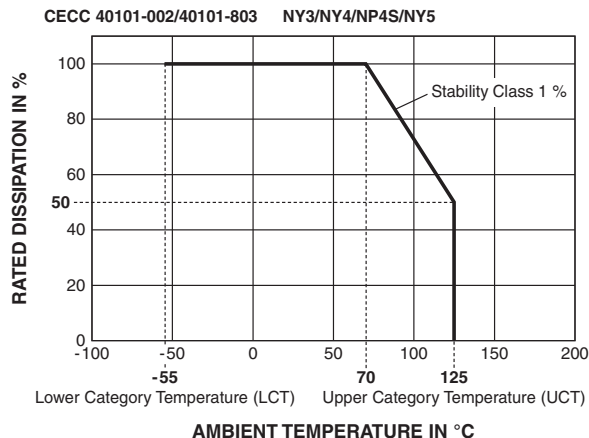
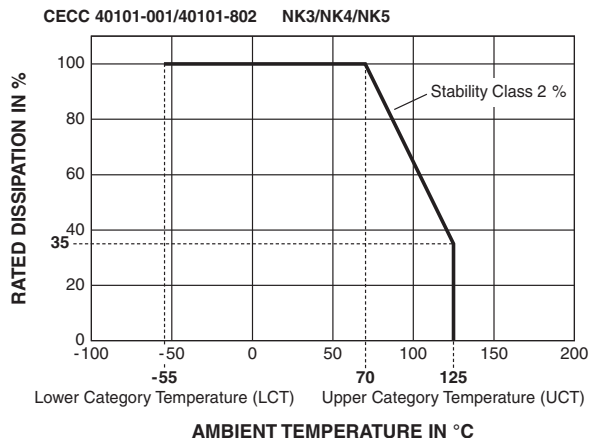
| MODEL                               | NT3S                     | NP3S                | NY3 | NK3 | NT4S                     | NP4S                | NY4 | NK4 | NT5S                     | NP5S                | NY5 | NK5 |
|-------------------------------------|--------------------------|---------------------|-----|-----|--------------------------|---------------------|-----|-----|--------------------------|---------------------|-----|-----|
| Temperature Range                   | - 25 °C<br>to<br>+ 85 °C | - 55 °C to + 155 °C |     |     | - 25 °C<br>to<br>+ 85 °C | - 55 °C to + 155 °C |     |     | - 25 °C<br>to<br>+ 85 °C | - 55 °C to + 155 °C |     |     |
| Climatic Category<br>(LCT/UCT/days) | -                        | 55/125/56           |     |     | -                        | 55/125/56           |     |     | -                        | 55/125/56           |     |     |



| PERFORMANCE                                  |                                 |                                                                                                                                                                                                                                                                    |                                         |                                         |                    |
|----------------------------------------------|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------|--------------------|
| TEST                                         |                                 | CONDITIONS                                                                                                                                                                                                                                                         | REQUIREMENTS                            |                                         | TYPICAL DRIFT      |
|                                              |                                 |                                                                                                                                                                                                                                                                    | STABILITY CLASS 1<br>CECC 40101-002/803 | STABILITY CLASS 2<br>CECC 40101-001/802 |                    |
| Short Time Overload                          |                                 | IEC 60115-1<br>6.25 $P_T$ or 2 $U_{max.}$ , 1 s for 0.063 W/5 s for $\geq 0.125$ W                                                                                                                                                                                 | $\pm (0.25 \% + 0.05 \Omega)$           | $\pm (0.5 \% + 0.05 \Omega)$            | $\leq \pm 0.05 \%$ |
| Load Life                                    |                                 | IEC 60115-1<br>90'/30' cycles, 1000 h at $P_T/70$ °C                                                                                                                                                                                                               | $\pm (1 \% + 0.05 \Omega)$              | $\pm (2 \% + 0.1 \Omega)$               | $\leq \pm 0.25 \%$ |
| Load Life at Maximum<br>Category Temperature |                                 | IEC 60115-1<br>90'/30' cycles, 1000 h at derated $P_T/125$ °C                                                                                                                                                                                                      | $\pm (1 \% + 0.05 \Omega)$              | $\pm (2 \% + 0.1 \Omega)$               | $\leq \pm 0.25 \%$ |
|                                              |                                 | IEC 60115-1<br>1000 h at 155 °C                                                                                                                                                                                                                                    | -                                       | -                                       |                    |
| Sheft Life                                   |                                 | 1 year at ambient temperature                                                                                                                                                                                                                                      | -                                       | -                                       | $\leq \pm 0.1 \%$  |
| Seq.<br>A1                                   | Robustness of<br>Terminations   | IEC 60115-1, IEC 60068-2-21<br>Test Ua1: Traction 10 N/10 s<br>Test U <sub>b</sub> : Bending + 90° → - 90° → 0° with 5 N<br>Test U <sub>c</sub> : Twisting 2 times at 180°                                                                                         | $\pm (0.25 \% + 0.05 \Omega)$           | $\pm (0.5 \% + 0.05 \Omega)$            | $\leq \pm 0.1 \%$  |
| Seq.<br>A2                                   | Resistance to<br>Soldering Heat | IEC 60115-1<br>IEC 60068-2-20 Test Tb<br>Method 1: Solder bath 260 °C/10 s                                                                                                                                                                                         | $\pm (0.25 \% + 0.05 \Omega)$           | $\pm (0.5 \% + 0.05 \Omega)$            | $\leq \pm 0.05 \%$ |
| Seq.<br>B1                                   | Rapid Change<br>of Temperature  | IEC 60115-1, IEC 60068-2-14 Test Na<br>5 cycles (30' at LCT/30' at UCT), - 55 °C/125 °C                                                                                                                                                                            | $\pm (0.25 \% + 0.05 \Omega)$           | $\pm (0.5 \% + 0.05 \Omega)$            | $\leq \pm 0.05 \%$ |
| Seq.<br>B2                                   | Vibration                       | IEC 60115-1, IEC 60068-2-6 Test Fc<br>10 Hz/500 Hz                                                                                                                                                                                                                 | $\pm (0.25 \% + 0.05 \Omega)$           | $\pm (0.5 \% + 0.05 \Omega)$            | $\leq \pm 0.1 \%$  |
| Seq.<br>A + B                                | Climatic<br>Sequence            | IEC 60115-1<br>1. Dry heat at 125 °C/16 h (IEC 60068-2-2)<br>2. Damp heat 55 °C/24 h (IEC 60068-2-30 Test Db)<br>3. Cold at - 55 °C/2 h (IEC 60068-2-1 Test Aa)<br>4. Low pressure 25 °C/1 h (IEC 60068-2-13)<br>5. Damp heat 55 °C/120 h (IEC 60068-2-30 Test Db) | $\pm (1 \% + 0.05 \Omega)$              | $\pm (2 \% + 0.1 \Omega)$               | $\leq \pm 0.25 \%$ |
| Damp Heat,<br>Steady State                   |                                 | IEC 60115-1, IEC 60068-2-78<br>40 °C/93 % RH/56 days                                                                                                                                                                                                               | $\pm (1 \% + 0.05 \Omega)$              | $\pm (2 \% + 0.1 \Omega)$               | $\leq \pm 0.5 \%$  |

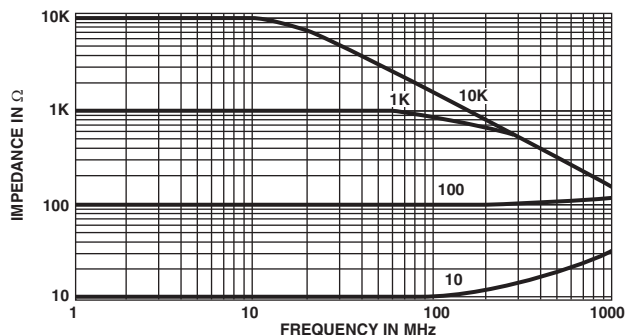


## POWER RATING CHARTS

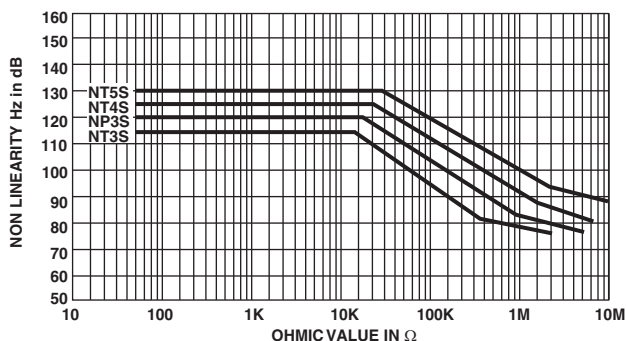


## HIGH FREQUENCY

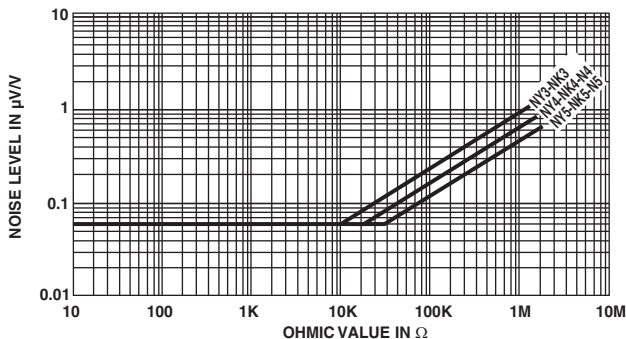
Typical behavior for NK4



## THIRD HARMONIC

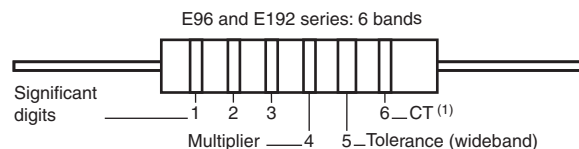


## NOISE



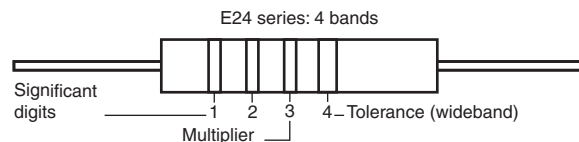
## MARKING

Resistor color code chart 6, 5, or 4 bands.



### Note

(1) Only for  $TCR \leq 25 \text{ ppm/}^\circ\text{C}$



| COLOR  | DIGIT. | MULTIP.          | TOL % | CT ppm/°C |
|--------|--------|------------------|-------|-----------|
| Black  | 0      | 1                |       |           |
| Brown  | 1      | 10               | 1     |           |
| Red    | 2      | 10 <sup>2</sup>  | 2     |           |
| Orange | 3      | 10 <sup>3</sup>  |       | ± 15      |
| Yellow | 4      | 10 <sup>4</sup>  |       | ± 25      |
| Green  | 5      | 10 <sup>5</sup>  | 0.5   |           |
| Blue   | 6      | 10 <sup>6</sup>  | 0.25  | ± 10      |
| Purple | 7      | 10 <sup>7</sup>  | 0.1   | ± 5       |
| Grey   | 8      | 10 <sup>8</sup>  |       |           |
| White  | 9      | 10 <sup>9</sup>  |       |           |
| Silver |        | 10 <sup>-2</sup> |       |           |
| Gold   |        | 10 <sup>-1</sup> | 5     |           |

**TAPE IN REEL**

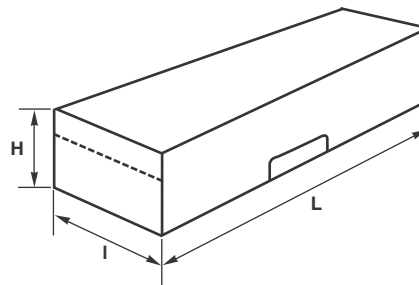
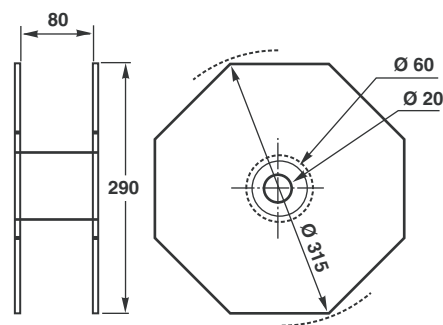
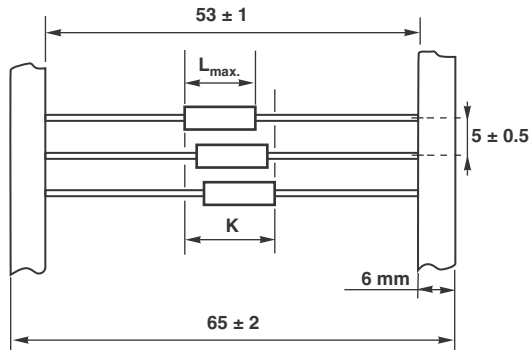
| SERIES AND MODEL | QUANTITY PER REEL |
|------------------|-------------------|
| NT4S/NP4S        | 5000              |
| NK4/NY4          | 5000              |
| SL3              | 5000              |
| SL4              | 5000              |

**TAPED IN AMMOPACK**

| SERIES AND MODEL | QUANTITY PER BOX | BOX DIMENSIONS<br>L x l x H (mm) |
|------------------|------------------|----------------------------------|
| NT3S/NP3S        | 500              | 260 x 80 x 26                    |
| NY3              | 500              |                                  |
| NK3/SL3          | 1000             |                                  |
| NT4S/NP4S        | 500              |                                  |
| NY4              | 500              | 260 x 80 x 37                    |
| NK4/SL4          | 1000             |                                  |
| NT5S/NP5S        | 500              | 260 x 85 x 28                    |
| NK5              | 500              |                                  |

**TAPED IN BAG**

| SERIES AND MODEL | QUANTITY PER BAG | BOX DIMENSIONS<br>(mm) |
|------------------|------------------|------------------------|
| NP3S/NT3S        | 100              | 85 x 140               |
| NP4S/NT4S        |                  |                        |
| NP5S/NT5S        |                  |                        |
| NY3 CC/NK3 CC    | 500              |                        |

**PACKAGING**


The resistors are required to be inside a window which is the K dimension.

K being equal to the maximum body length of the resistor + 1.4 mm and being centered as per IEC 60286-1 and EIA-296 specification to the tape edges.

**ORDERING INFORMATION**

| T3    | XXX           | 100 kΩ      | 1 %       | AM1000    | e3             |
|-------|---------------|-------------|-----------|-----------|----------------|
| MODEL | CUSTOM DESIGN | OHMIC VALUE | TOLERANCE | PACKAGING | LEAD (Pb)-FREE |



## GLOBAL PART NUMBER INFORMATION

|                                                                                       |                                  |                               |                                                                                                                                                                                                                                                                                       |          |          |          |                                                                                                                       |          |                                                                                                              |          |          |          |
|---------------------------------------------------------------------------------------|----------------------------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|----------|-----------------------------------------------------------------------------------------------------------------------|----------|--------------------------------------------------------------------------------------------------------------|----------|----------|----------|
| <b>N</b>                                                                              | <b>Y</b>                         | <b>3</b>                      |                                                                                                                                                                                                                                                                                       | <b>1</b> | <b>0</b> | <b>0</b> | <b>0</b>                                                                                                              | <b>2</b> | <b>F</b>                                                                                                     | <b>A</b> | <b>2</b> | <b>2</b> |
| GLOBAL<br>MODEL                                                                       | SIZE                             | SPECIAL                       | OHMIC VALUE                                                                                                                                                                                                                                                                           |          |          |          | TOLERANCE                                                                                                             |          | PACKAGING                                                                                                    |          |          |          |
| <b>NY</b> (50 ppm)<br><b>NK</b> (100 ppm)<br><b>NT</b> (15 ppm)<br><b>NP</b> (25 ppm) | <b>3</b><br><b>4</b><br><b>5</b> | As applicable.<br>Contact us. | The first four digits are<br>significant figures and the<br>last digit specifies the<br>number of zeros to follow.<br>R designates decimal point.<br><br><b>10002</b> = 100 k $\Omega$<br><b>33001</b> = 33 k $\Omega$<br><b>220R0</b> = 220 $\Omega$<br><b>1R220</b> = 1.22 $\Omega$ |          |          |          | <b>B</b> = 0.1 %<br><b>C</b> = 0.25 %<br><b>D</b> = 0.5 %<br><b>F</b> = 1.0 %<br><b>G</b> = 2.0 %<br><b>J</b> = 5.0 % |          | AM500 = <b>A20</b><br>AM1000 = <b>A22</b><br>BA100 = <b>S14</b><br>BA500 = <b>S22</b><br>TR5000 = <b>R26</b> |          |          |          |



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**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**