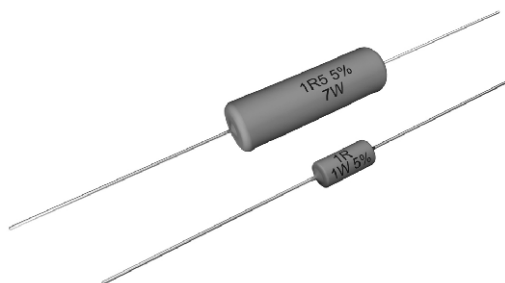


## Cemented Wirewound Resistors



### FEATURES

- All welded construction
- Ceramic core
- Non-flammable cement coating
- Tinned copper-clad iron leads (for axial parts)
- High power dissipation in small volume
- Ideal for pulse application
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



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

### STANDARD ELECTRICAL SPECIFICATIONS

| MODEL               | POWER RATING<br>$P_{40^{\circ}\text{C}}$<br>W | POWER RATING<br>$P_{70^{\circ}\text{C}}$<br>W | LIMITING VOLTAGE<br>$U_{\text{max}}$ | RESISTANCE RANGE $\Omega$<br>TCR =<br>- 10 ppm/K to - 80 ppm/K | RESISTANCE RANGE $\Omega$<br>TCR =<br>100 ppm/K to 180 ppm/K | RESISTANCE RANGE $\Omega$<br>TCR= $\pm$ 100 ppm/K | TOLERANCE<br>$\pm$ % |
|---------------------|-----------------------------------------------|-----------------------------------------------|--------------------------------------|----------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------|----------------------|
| AC01                | 1                                             | 0.9                                           | $\sqrt{P \times R}$                  | 0.10 to 33                                                     | 36 to 2.4K                                                   | n/a                                               | 5                    |
| AC03 <sup>(2)</sup> | 3                                             | 2.5                                           | $\sqrt{P \times R}$                  | 0.10 to 390                                                    | 430 to 3.3K                                                  | 3.6K to 5.1K                                      | 5                    |
| AC04                | 4                                             | 3.5                                           | $\sqrt{P \times R}$                  | 0.10 to 620                                                    | 680 to 6.8K                                                  | n/a                                               | 5                    |
| AC05                | 5                                             | 4.7                                           | $\sqrt{P \times R}$                  | 0.10 to 910                                                    | 1K to 10K                                                    | n/a                                               | 5                    |
| AC07                | 7                                             | 5.8                                           | $\sqrt{P \times R}$                  | 0.10 to 1.5K                                                   | 1.6K to 15K                                                  | n/a                                               | 5                    |
| AC10                | 10                                            | 8.4                                           | $\sqrt{P \times R}$                  | 0.22 to 560                                                    | 620 to 27K                                                   | n/a                                               | 5                    |

#### Notes

- (1) Resistance value to be selected for  $\pm$  5 % from E24  
(2) AC03 WSZ:  $P_{40^{\circ}\text{C}}$  = 1.8 W;  $P_{70^{\circ}\text{C}}$  = 1.5 W

### PART NUMBER AND PRODUCT DESCRIPTION

Part Number: AC03000001509JAC00

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | C | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 0 | 9 | J | A | C | 0 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| MODEL                                                                                                                                              | VARIANT                                                                                                                                                                                                                                                                                                                                                                                                                                                 | TCR/MATERIAL        | VALUE                                                                                                                                                                                                                          | TOLERANCE CODE         | PACKAGING CODE        | SPECIAL                                                                                                                                                                                                                           |
|----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>AC01000</b> = AC01<br><b>AC03000</b> = AC03<br><b>AC04000</b> = AC04<br><b>AC05000</b> = AC05<br><b>AC07000</b> = AC07<br><b>AC10000</b> = AC10 | <b>0</b> = Neutral<br><b>1</b> = RT<br><b>2</b> = SWI =<br>Special winding <sup>(3)</sup><br><b>3</b> = DK SP 20 mm <sup>(4)</sup><br><b>4</b> = DK LP 33 mm <sup>(4)</sup><br><b>5</b> = DK LP 17.8 mm <sup>(4)</sup><br><b>6</b> = NI = Non inductive <sup>(7)</sup><br><b>7</b> = DK LP 25.4 mm <sup>(4)</sup><br><b>9</b> = WSZ 6720<br><b>8</b> = DK SP 25.4 mm<br><b>Z</b> = Value overflow<br>(Special)<br><b>C</b> = E/K 25.4 mm <sup>(4)</sup> | <b>0</b> = Standard | <b>3 digit value</b><br><b>1 digit multiplier</b><br><b>MULTIPLIER</b><br>7 = $\times 10^{-3}$<br>8 = $\times 10^{-2}$<br>9 = $\times 10^{-1}$<br>0 = $\times 10^0$<br>1 = $\times 10^1$<br>2 = $\times 10^2$<br>5 = $10^{-4}$ | <b>J</b> = $\pm$ 5.0 % | (See Packaging table) | The 5 digit BV number will be encoded using a 36 character code. This code contains numbers 0...9 and letters A...Z (36 characters total) and allows to encode at least 46 655 five digit BV numbers.<br><br><b>00</b> = Standard |

Product Description: AC03 15R 5 % AC

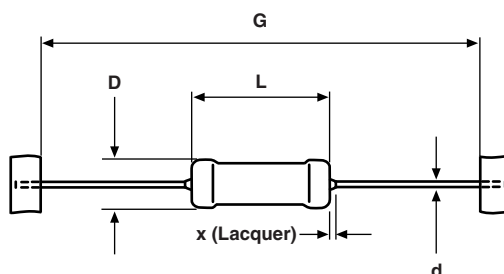
|                      |                      |                               |                                      |
|----------------------|----------------------|-------------------------------|--------------------------------------|
| AC03                 | 15R                  | 5 %                           | AC                                   |
| MODEL <sup>(5)</sup> | VALUE <sup>(5)</sup> | TOLERANCE CODE <sup>(5)</sup> | PACKAGING DESCRIPTION <sup>(6)</sup> |

#### Notes

- (3) Special winding on request  
(4) Other dimensions and variants on request  
(5) See "Part Number and Product Description"  
(6) See "Packaging Table"  
(7) Resistance range on request

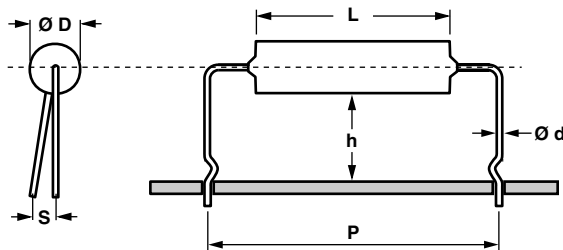
| PACKAGING TABLE |        |            |             |         |            |             |         |            |             |
|-----------------|--------|------------|-------------|---------|------------|-------------|---------|------------|-------------|
| MODEL           | AMMO   |            |             | LOOSE   |            |             | BLISTER |            |             |
|                 | PIECES | PACK. CODE | PACK. DESC. | PIECES  | PACK. CODE | PACK. DESC. | PIECES  | PACK. CODE | PACK. DESC. |
| AC01            | 1000   | A1         | A1          | 500LCLC |            |             |         |            |             |
| AC01 DK/EK      |        |            |             |         |            |             |         |            |             |
| AC01RT          | 2500   | AE         | AE          |         |            |             |         |            |             |
| AC03            | 500    | AC         | AC          | 500LCLC |            |             |         |            |             |
| AC03 DK/EK      |        |            |             |         |            |             |         |            |             |
| AC03 WSZ        |        |            |             |         |            |             | 1250    | BM         | BM          |
| AC04            | 500    | AC         | AC          | 500LCLC |            |             |         |            |             |
| AC04 DK/EK      |        |            |             |         |            |             |         |            |             |
| AC05            | 500    | AC         | AC          | 500LCLC |            |             |         |            |             |
| AC05 DK/EK      |        |            |             |         |            |             |         |            |             |
| AC07            | 500    | AC         | AC          | 250LBBB |            |             |         |            |             |
| AC07 DK/EK      |        |            |             |         |            |             |         |            |             |
| AC10            | 250    | AB         | AB          |         |            |             |         |            |             |

## DIMENSIONS

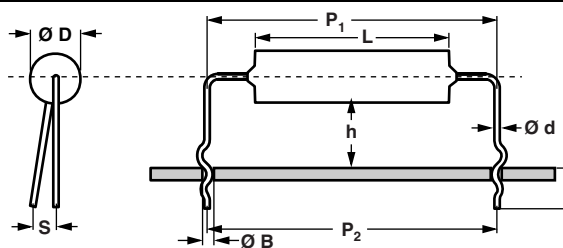


For packaging dimensions see: [www.vishay.com/doc?28721](http://www.vishay.com/doc?28721)

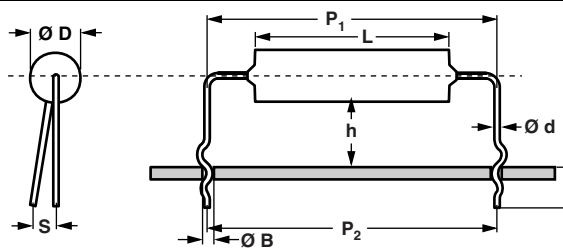
| DIMENSIONS - Resistor types, mass and relevant physical dimensions |                                    |                   |                               |                   |                        |                   |
|--------------------------------------------------------------------|------------------------------------|-------------------|-------------------------------|-------------------|------------------------|-------------------|
| MODEL                                                              | DIMENSIONS in millimeters [inches] |                   |                               |                   |                        |                   |
|                                                                    | D <sub>max.</sub>                  | L <sub>max.</sub> | d                             | x <sub>max.</sub> | G                      | WEIGHT g PER UNIT |
| AC01                                                               | 4.3 [0.169]                        | 11 [0.433]        | 0.8 ± 0.03<br>[0.031 ± 0.001] | 2                 | 63 ± 1 [2.480 ± 0.039] | 0.52              |
| AC03                                                               | 4.8 [0.189]                        | 13 [0.512]        |                               | 2                 | 63 ± 1 [2.480 ± 0.039] | 0.75              |
| AC04                                                               | 5.5 [0.217]                        | 16.5 [0.650]      |                               | 3                 | 63 ± 1 [2.480 ± 0.039] | 1.10              |
| AC05                                                               | 7.5 [0.295]                        | 18 [0.709]        |                               | 3                 | 63 ± 1 [2.480 ± 0.039] | 1.90              |
| AC07                                                               | 7.5 [0.295]                        | 26 [1.024]        |                               | 3                 | 73 ± 1 [2.874 ± 0.039] | 2.60              |
| AC10                                                               | 8.0 [0.315]                        | 44 [1.732]        |                               | 3                 | 88 ± 1 [3.465 ± 0.039] | 4.50              |

**BENDING FORMS**
**KINK TYPE S = EK**


| TYPE        | Ø d | Ø D <sub>max.</sub> | L   | h ± 1 | P ± 1 | S <sub>max.</sub> |
|-------------|-----|---------------------|-----|-------|-------|-------------------|
| AC01        | 0.8 | (1)                 | (1) | 8     | 17.8  | 2                 |
| AC03 - AC05 |     |                     |     |       | 25.4  |                   |
| AC07        |     |                     |     |       | 33.0  |                   |

**DOUBLE KINK SP = DK SP**


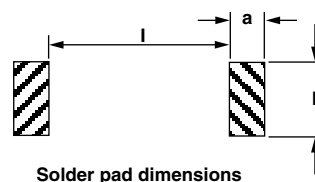
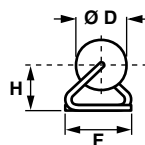
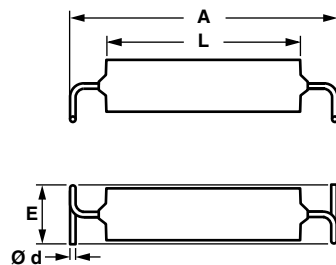
| TYPE        | Ø d | Ø D <sub>max.</sub> | L   | h ± 1 | P <sub>1</sub> ± 1 | P <sub>2</sub> ± 3 | S <sub>max.</sub> | Ø B       | c       |
|-------------|-----|---------------------|-----|-------|--------------------|--------------------|-------------------|-----------|---------|
| AC01        | 0.8 | (1)                 | (1) | 8     | 19.8               | 17.8               | 2                 | 1.0 ± 0.1 | 4.5 ± 1 |
| AC03 - AC05 |     |                     |     |       | 22.0               | 20.0               |                   |           |         |
|             |     |                     |     |       | 27.4               | 25.4               |                   |           |         |
| AC07        |     |                     |     |       | 35.0               | 33.0               |                   |           |         |

**DOUBLE KINK LP = DK LP**


| TYPE        | Ø d | Ø D <sub>max.</sub> | L   | h ± 1 | P <sub>1</sub> ± 1 | P <sub>2</sub> ± 3 | S <sub>max.</sub> | Ø B       | c       |
|-------------|-----|---------------------|-----|-------|--------------------|--------------------|-------------------|-----------|---------|
| AC01 - AC03 | 0.8 | (1)                 | (1) | 8     | 17.8               | 17.8               | 2                 | 1.0 ± 0.1 | 4.5 ± 1 |
| AC03 - AC05 |     |                     |     |       | 25.4               | 25.4               |                   |           |         |
| AC07        |     |                     |     |       | 33.0               | 33.0               |                   |           |         |

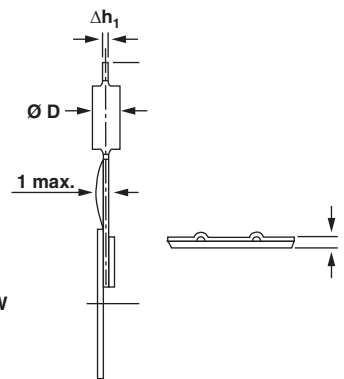
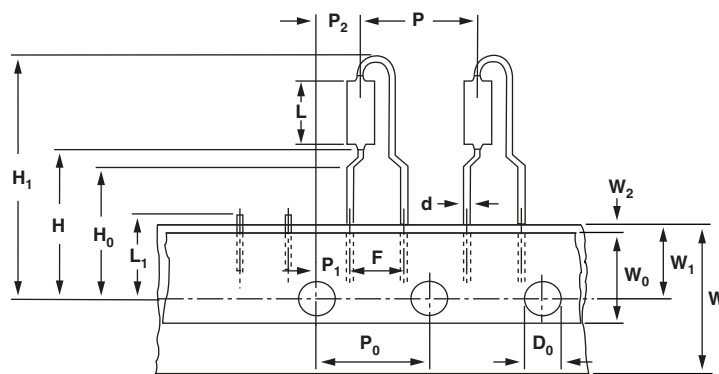
**Note**

(1) See table DIMENSIONS

**BENDING FORMS**
**WSZ**


Solder pad dimensions

| TYPE     | Ø d | Ø D <sub>max.</sub> | A        | L       | F         | H         | E         | a   | b   | l    |
|----------|-----|---------------------|----------|---------|-----------|-----------|-----------|-----|-----|------|
| AC03 WSZ | 0.8 | (1)                 | 17 ± 0.5 | 11 - 12 | 4.8 ± 0.5 | 3.6 ± 0.5 | 5.0 ± 0.5 | 2.5 | 5.5 | 14.5 |

**RADIAL TAPED = RT**


Direction of Unreeling →

**TYPE AC01**

|                                                  |                 |                  |
|--------------------------------------------------|-----------------|------------------|
| Lead Ø                                           | Ø d             | 0.8              |
| Diameter                                         | Ø D             | (1)              |
| Length                                           | L               | (1)              |
| Pitch of components                              | P               | 12.7 ± 1.0       |
| Pitch of spocket holes (2)                       | P <sub>0</sub>  | 12.7 ± 0.3       |
| Distance between hole center and resistor center | P <sub>1</sub>  | 3.85 ± 0.7       |
| Distance between hole center and lead center     | P <sub>2</sub>  | 6.35 ± 1.0       |
| Lead spacing                                     | F               | 5.0 + 0.6, - 0.1 |
| Angle of insertion                               | Δh <sub>1</sub> | 2 max.           |
| Width of carrier tape                            | W               | 18.0 ± 0.5       |
| Width of adhesive tape                           | W <sub>0</sub>  | 12.0 ± 0.5       |
| Position of holes                                | W <sub>1</sub>  | 9.0 ± 0.5        |
| Position of adhesive tape                        | W <sub>2</sub>  | 0.5 max.         |
| Body to hole center                              | H               | 19.5 ± 1.0       |
| Lead crimp to hole center (3)                    | H <sub>0</sub>  | 16.0 ± 0.5       |
| Hole Ø                                           | D <sub>0</sub>  | 4.0 ± 0.2        |
| Thickness of tape (4)                            | t               | 0.9 max.         |
| Height for cutting                               | L <sub>1</sub>  | 11 max.          |
| Height for insertion                             | H <sub>1</sub>  | 32 max.          |

**Notes**

(1) See table DIMENSIONS

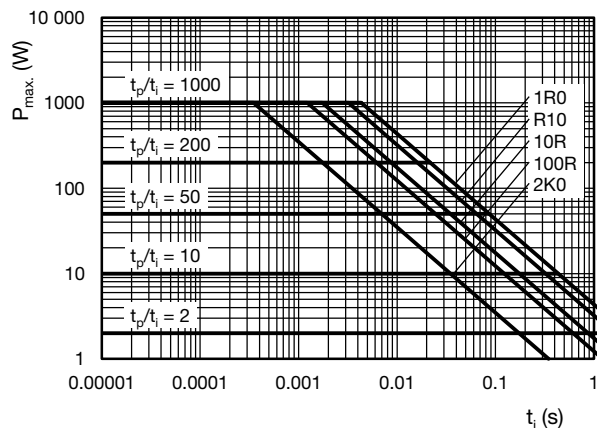
(2) Test over 10 holes - 9 intervals P<sub>0</sub> 12.7 x 9 = 114.3 ± 0.5

(3) Parallelism, &lt; 0.5 mm

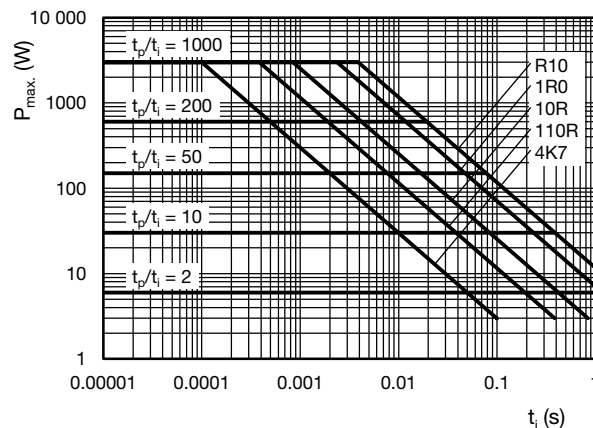
(4) Thickness of carrier tape: 0.55 mm ± 0.1



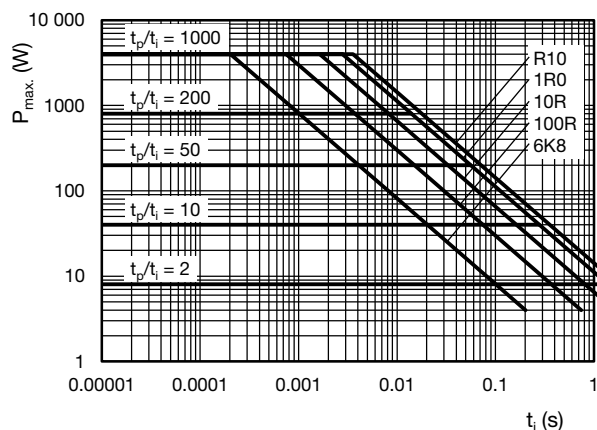
## PULSE DIAGRAMS



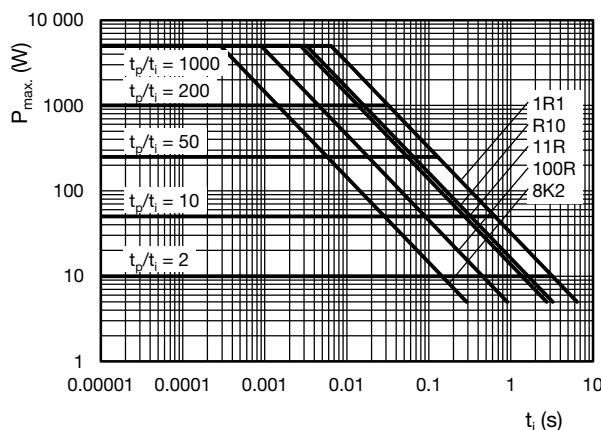
**AC01** Pulse on a regular basis; maximum permissible peak pulse power ( $\hat{P}_{max.}$ ) as a function of pulse duration ( $t_i$ )



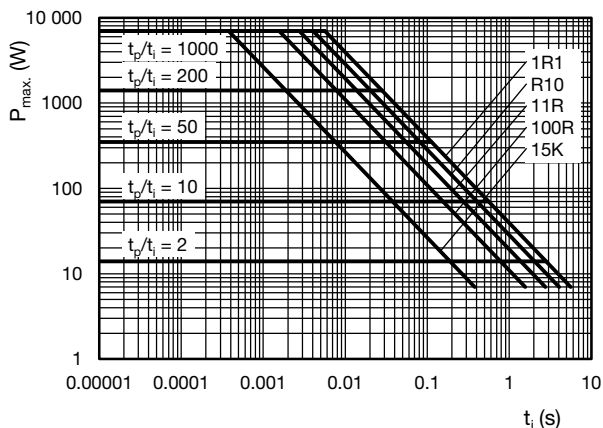
**AC03** Pulse on a regular basis; maximum permissible peak pulse power ( $\hat{P}_{max.}$ ) as a function of pulse duration ( $t_i$ )



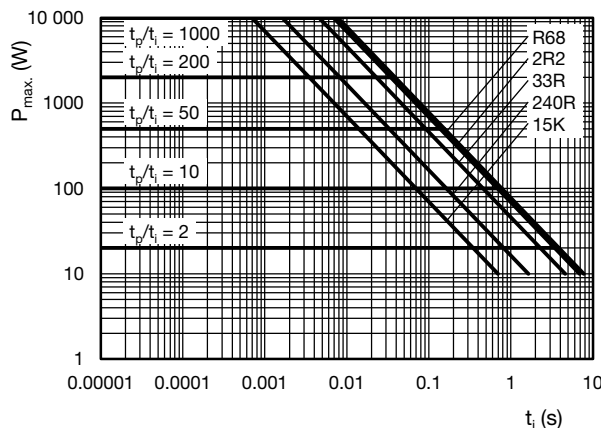
**AC04** Pulse on a regular basis; maximum permissible peak pulse power ( $\hat{P}_{max.}$ ) as a function of pulse duration ( $t_i$ )



**AC05** Pulse on a regular basis; maximum permissible peak pulse power ( $\hat{P}_{max.}$ ) as a function of pulse duration ( $t_i$ )



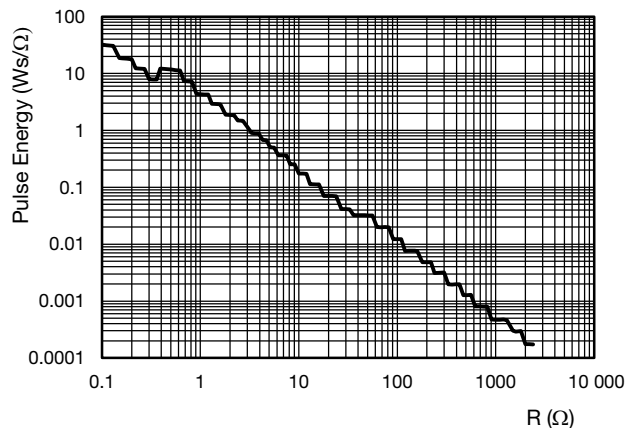
**AC07** Pulse on a regular basis; maximum permissible peak pulse power ( $\hat{P}_{max.}$ ) as a function of pulse duration ( $t_i$ )



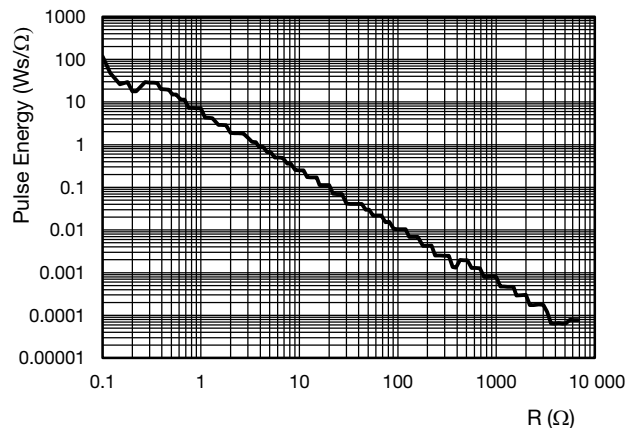
**AC10** Pulse on a regular basis; maximum permissible peak pulse power ( $\hat{P}_{max.}$ ) as a function of pulse duration ( $t_i$ )



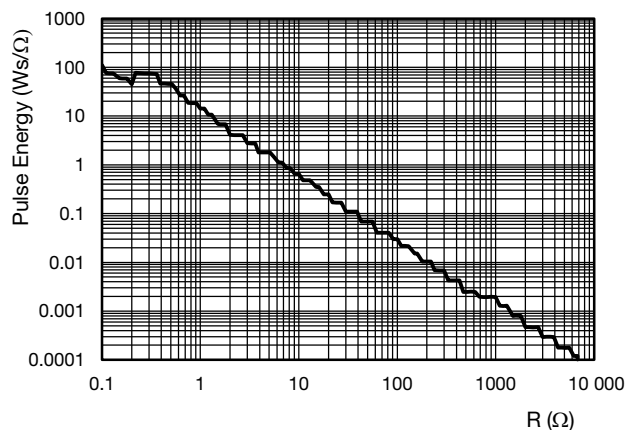
PULSE DIAGRAMS



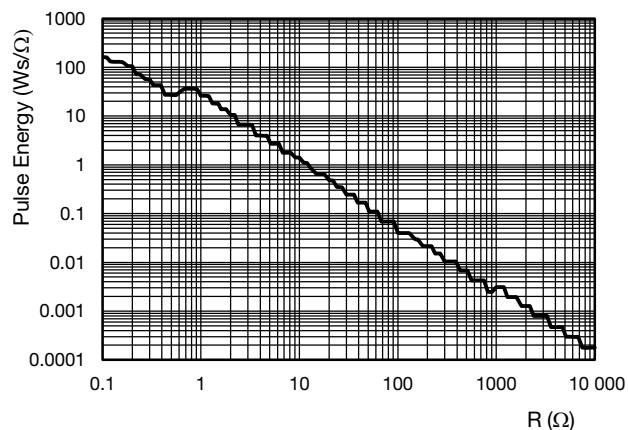
AC01 Pulse capability; E (Ws) as a function of R (Ω)



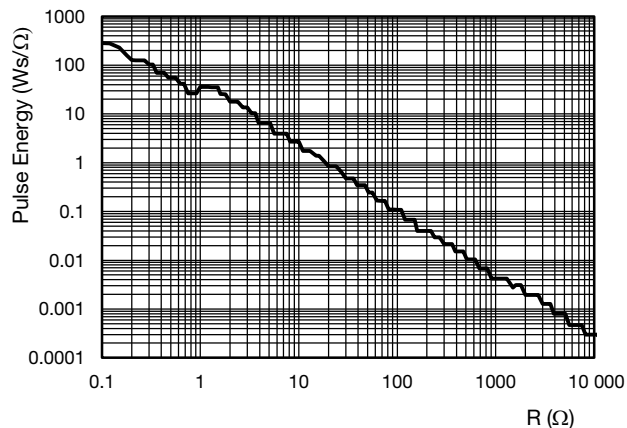
AC03 Pulse capability; E (Ws) as a function of R (Ω)



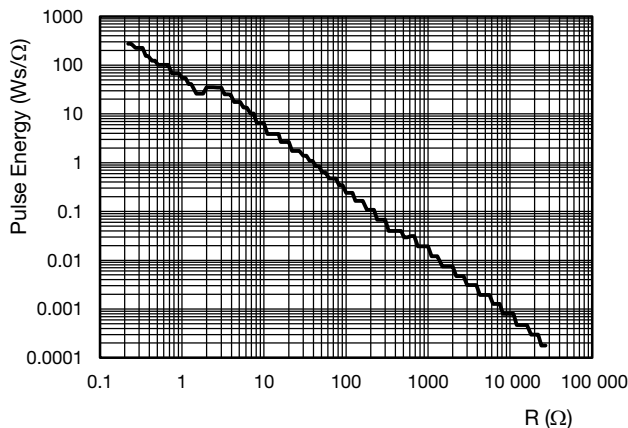
AC04 Pulse capability; E (Ws) as a function of R (Ω)



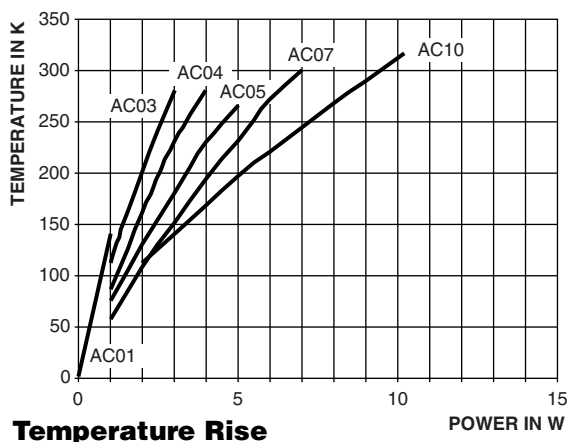
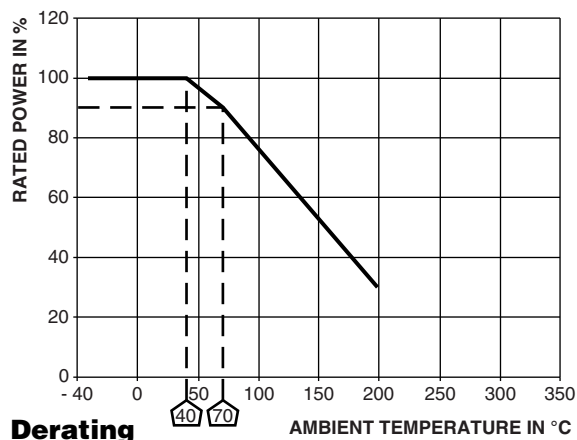
AC05 Pulse capability; E (Ws) as a function of R (Ω)



AC07 Pulse capability; E (Ws) as a function of R (Ω)



AC10 Pulse capability; E (Ws) as a function of R (Ω)

**FUNCTIONAL PERFORMANCE**

| PERFORMANCE                                                                       |                                           |
|-----------------------------------------------------------------------------------|-------------------------------------------|
| TEST                                                                              | PERMISSIBLE CHANGE                        |
| Climatic Category (LCT/UCT/Days)                                                  | 40/200/56                                 |
| Climatic Sequence, IEC 60115-1, 4.23                                              | $\Delta R = \pm (1 \% R + 0.05 \Omega)$   |
| Damp Heat, Steady State, IEC 60115-1, 4.24<br>(40 ± 2) °C, 56 days, (93 ± 3) % RH | $\Delta R = \pm (5 \% R + 0.1 \Omega)$    |
| Endurance at room temperature (116 % P70), 1000 h, IEC 60115-1, 4.25.2            | $\Delta R = \pm (5 \% R + 0.1 \Omega)$    |
| Endurance at UCT, 200 °C (30 % P70), 1000 h, IEC 60115-1, 4.25.3                  | $\Delta R = \pm (5 \% R + 0.1 \Omega)$    |
| Resistance to Soldering Heat, IEC 60115-1, 4.18<br>(260 ± 5) °C, (10 ± 1) s       | $\Delta R = \pm (0.5 \% R + 0.05 \Omega)$ |
| Robustness of Termination, IEC 60115-1, 4.16<br>10N                               | $\Delta R = \pm (0.5 \% R + 0.05 \Omega)$ |
| Short Time Overload, IEC 60115-1, 4.13<br>10 x Rated Power for 5 s                | $\Delta R = \pm (2 \% R + 0.1 \Omega)$    |

**HISTORICAL 12NC INFORMATION**

- The resistors had a 12-digit ordering code starting with 23.
- The subsequent 7 digits indicated the resistor type, specification and packaging.
- The remaining 3 digits indicated the resistance value:
  - The first 2 digits indicated the resistance value.
  - The last digit indicated the resistance decade in accordance with resistance decade table.

**Resistance Decade**

| RESISTANCE DECADE              | LAST DIGIT |
|--------------------------------|------------|
| 0.1 $\Omega$ to 0.91 $\Omega$  | 7          |
| 1 $\Omega$ to 9.1 $\Omega$     | 8          |
| 10 $\Omega$ to 91 $\Omega$     | 9          |
| 100 $\Omega$ to 910 $\Omega$   | 1          |
| 1 k $\Omega$ to 9.1 k $\Omega$ | 2          |
| 10 k $\Omega$ to 56 k $\Omega$ | 3          |

**12NC Example**

The 12NC code of an AC01 resistor, value 47  $\Omega$  supplied in ammpack of 1000 units was: 2306 328 33479.

**HISTORICAL 12NC - Resistor type and packaging**

| TYPE                | 23.. ... ..                 |                |              |              |
|---------------------|-----------------------------|----------------|--------------|--------------|
|                     | BANDOLIER IN AMMOPACK       |                |              |              |
|                     | RADIAL                      | STRAIGHT LEADS |              |              |
|                     | 2500 units                  | 250 units      | 500 units    | 1000 units   |
| AC01                | 06 328 90... <sup>(2)</sup> | -              | -            | 06 328 33... |
| AC03 <sup>(1)</sup> | -                           | -              | 22 329 03... | -            |
| AC04 <sup>(1)</sup> | -                           | -              | 22 329 04... | -            |
| AC05 <sup>(1)</sup> | -                           | -              | 22 329 05... | -            |
| AC07 <sup>(1)</sup> | -                           | -              | 22 329 07... | -            |
| AC10                | -                           | -              | -            | -            |

**Notes**

- <sup>(1)</sup> Products with bent leads and bulk packaging (100 pieces) are available on request  
<sup>(2)</sup> Radial parts with tin plated copper leads





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**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.**

**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.**