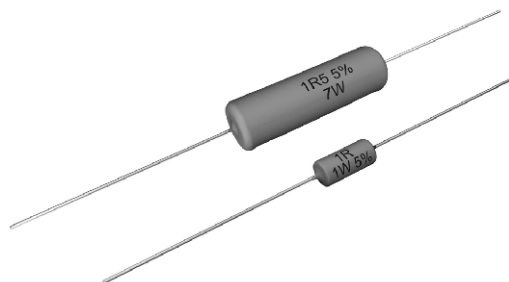


## Cemented Wirewound Resistors



### FEATURES

- All welded construction
- Ceramic core
- Non-flammable cement coating
- Tinned copper-clad iron leads (see note 3 in the 12NC Ordering Code table)
- High power dissipation in small volume
- Ideal for pulse application
- Lead (Pb)-free
- Compliant to RoHS directive 2002/95/EC



**RoHS**  
COMPLIANT  
**GREEN**  
(5-2008)\*\*

### STANDARD ELECTRICAL SPECIFICATIONS

| MODEL               | POWER RATING           |                        | TOLERANCE | LIMITING VOLTAGE    | RESISTANCE RANGE<br>E12 = $\pm 10\%$ Tol., E24 = $\pm 5\%$ Tol.<br>DIN 41432 |                                 |                                 |
|---------------------|------------------------|------------------------|-----------|---------------------|------------------------------------------------------------------------------|---------------------------------|---------------------------------|
|                     | $P_{40^\circ\text{C}}$ | $P_{70^\circ\text{C}}$ |           |                     | TCR =<br>- 10 ... - 80 ppm/K                                                 | TCR =<br>100 ... 180 ppm/K      | TCR =<br>$\pm 100$ ppm/K        |
| AC01                | 1 W                    | 0.9 W                  | $\pm 5\%$ | $\sqrt{P \times R}$ | 0.10 $\Omega$ to 33 $\Omega$                                                 | 36 $\Omega$ to 2.4 k $\Omega$   | -                               |
| AC03 <sup>(1)</sup> | 3 W                    | 2.5 W                  | $\pm 5\%$ | $\sqrt{P \times R}$ | 0.10 $\Omega$ to 390 $\Omega$                                                | 430 $\Omega$ to 3.3 k $\Omega$  | 3.6 k $\Omega$ - 5.1 k $\Omega$ |
| AC04                | 4 W                    | 3.5 W                  | $\pm 5\%$ | $\sqrt{P \times R}$ | 0.10 $\Omega$ to 620 $\Omega$                                                | 680 $\Omega$ to 6.8 k $\Omega$  | -                               |
| AC05                | 5 W                    | 4.7 W                  | $\pm 5\%$ | $\sqrt{P \times R}$ | 0.10 $\Omega$ to 910 $\Omega$                                                | 1 k $\Omega$ to 10 k $\Omega$   | -                               |
| AC07                | 7 W                    | 5.8 W                  | $\pm 5\%$ | $\sqrt{P \times R}$ | 0.10 $\Omega$ to 1.5 k $\Omega$                                              | 1.6 k $\Omega$ to 15 k $\Omega$ | -                               |
| AC10                | 10 W                   | 8.4 W                  | $\pm 5\%$ | $\sqrt{P \times R}$ | 0.22 $\Omega$ to 560 $\Omega$                                                | 620 $\Omega$ to 27 k $\Omega$   | -                               |

#### Note

<sup>(1)</sup> 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                                                                                                    | SPECIAL CHARACTER                                                                                                                                                                                                                                                                                                                                    | TCR/MATERIAL                  | VALUE                                                                                                                                                                                                     | TOLERANCE CODE  | PACKAGING CODE        | SPECIAL                                                                                                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AC01000 = AC01<br>AC03000 = AC03<br>AC04000 = AC04<br>AC05000 = AC05<br>AC07000 = AC07<br>AC10000 = AC10 | 0 = Neutral<br>1 = RT<br>2 = SWI =<br>Special winding <sup>(2)</sup><br>3 = DK SP 20 mm <sup>(3)</sup><br>4 = DK LP 33 mm <sup>(3)</sup><br>5 = DK LP 17.8 mm <sup>(3)</sup><br>6 = NI = Non inductive<br>7 = DK LP 25.4 mm <sup>(3)</sup><br>9 = WSZ 6720<br>8 = DK SP 25.4 mm<br>Z = Value overflow<br>(Special)<br>A = E/K 22.5 mm <sup>(3)</sup> | 0 = Standard                  | 3 digit value<br>1 digit multiplier<br>MULTIPLIER<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 = $10^{-4}$ | J = $\pm 5.0\%$ | (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>00 = Standard<br>E0 = CECC E0<br>E6 = CECC E6 |
| Product Description: AC03 15R 5% AC                                                                      |                                                                                                                                                                                                                                                                                                                                                      |                               |                                                                                                                                                                                                           |                 |                       |                                                                                                                                                                                                                                                            |
| AC03                                                                                                     | 15R                                                                                                                                                                                                                                                                                                                                                  | 5%                            | AC                                                                                                                                                                                                        |                 |                       |                                                                                                                                                                                                                                                            |
| MODEL <sup>(4)</sup>                                                                                     | VALUE <sup>(4)</sup>                                                                                                                                                                                                                                                                                                                                 | TOLERANCE CODE <sup>(4)</sup> | PACKAGING DESCRIPTION <sup>(5)</sup>                                                                                                                                                                      |                 |                       |                                                                                                                                                                                                                                                            |

#### Notes

<sup>(2)</sup> Special winding on request

<sup>(3)</sup> Other dimensions and special character on request

<sup>(4)</sup> See "Part Number and Product Description"

<sup>(5)</sup> See "Packaging Table"

\*\* Please see document "Vishay Green and Halogen-Free Definitions (5-2008)": [www.vishay.com/doc?99902](http://www.vishay.com/doc?99902)

**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          |        |            |             |         |            |             |
| AC01 DK/EK |        |            |             | 500    | LC         | LC          |         |            |             |
| AC01RT     | 2500   | AE         | AE          |        |            |             |         |            |             |
| AC03       | 500    | AC         | AC          |        |            |             |         |            |             |
| AC03 DK/EK |        |            |             | 500    | LC         | LC          |         |            |             |
| AC03 WSZ   |        |            |             |        |            |             |         |            |             |
| AC04       | 500    | AC         | AC          |        |            |             |         |            |             |
| AC04 DK/EK |        |            |             | 500    | LC         | LC          |         |            |             |
| AC05       | 500    | AC         | AC          |        |            |             |         |            |             |
| AC05 DK/EK |        |            |             | 500    | LC         | LC          |         |            |             |
| AC07       | 500    | AC         | AC          |        |            |             |         |            |             |
| AC07 DK/EK |        |            |             | 250    | LB         | LB          |         |            |             |
| AC10       | 250    | AB         | AB          |        |            |             |         |            |             |

**12NC (HISTORICAL CODING REFERENCE) INDICATING RESISTOR TYPE AND PACKAGING**

| TYPE     | ORDERING CODE 23.. ... .. |                       |              |              |
|----------|---------------------------|-----------------------|--------------|--------------|
|          | BANDOLIER IN AMMOPACK     |                       |              |              |
|          | RADIAL                    | STRAIGHT LEADS        |              |              |
|          | 2500 units                | 250 units             | 500 units    | 1000 units   |
| AC01     | 06 328 90... (2) (3)      | -                     | -            | 06 328 33... |
| AC03 (1) | -                         | -                     | 22 329 03... | -            |
| AC04 (1) | -                         | -                     | 22 329 04... | -            |
| AC05 (1) | -                         | -                     | 22 329 05... | -            |
| AC07 (1) | -                         | -                     | 22 329 07... | -            |
| AC10     | -                         | Global part numbering | -            | -            |

**Notes**

- (1) Products with bent leads and bulk packaging (100 pieces) are available on request
- (2) Last 3 digits available on request
- (3) Radial parts with tin plated copper leads

**12NC INFORMATION**

- The resistors have a 12-digit ordering code starting with 23.
- The subsequent 7 digits indicate the resistor type, specification and packaging; see the 12NC Ordering Code table.
- The remaining 3 digits indicate the resistance value:
  - The first 2 digits indicate the resistance value.
  - The last digit indicates the resistance decade in accordance with the 12NC Indicating Resistance Decade table.

## Last Digit of 12NC Indicating Resistance Decade

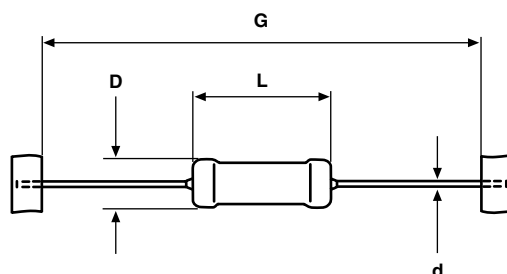
| RESISTANCE DECADE              | LAST DIGIT |
|--------------------------------|------------|
| 0.1 $\Omega$ to 0.91 $\Omega$  | 7          |
| 1 $\Omega$ to 9.1 $\Omega$     | 8          |
| 10 $\Omega$ to 91 $\Omega$     | 9          |
| 100 $\Omega$ to 910 $\Omega$   | 1          |
| 1 k $\Omega$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

## Ordering Example

The ordering code of an AC01 resistor, value 47 k $\Omega$  supplied in ammpack of 1000 units is: 2306 328 33473.

Product specifications deviating from the standard values are available on request.

## DIMENSIONS



For packaging dimensions see separate packaging dimensions page.

## DIMENSIONS - resistor types, mass and relevant physical dimensions

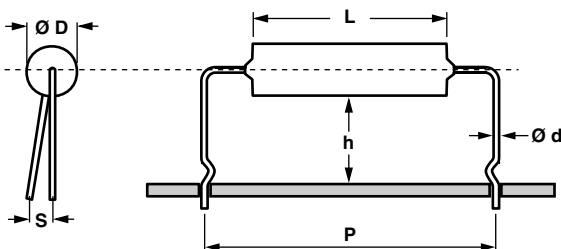
| MODEL | DIMENSIONS in millimeters [inches] |                   |                               |                        |                           |
|-------|------------------------------------|-------------------|-------------------------------|------------------------|---------------------------|
|       | D <sub>max.</sub>                  | L <sub>max.</sub> | d                             | G                      | WEIGHT g<br>PER 100 UNITS |
| AC01  | 4.3 [0.169]                        | 11 [0.433]        | 0.8 ± 0.03<br>[0.031 ± 0.001] | 63 ± 1 [2.480 ± 0.039] | 52                        |
| AC03  | 4.8 [0.189]                        | 13 [0.512]        |                               | 63 ± 1 [2.480 ± 0.039] | 75                        |
| AC04  | 5.5 [0.217]                        | 16.5 [0.650]      |                               | 63 ± 1 [2.480 ± 0.039] | 110                       |
| AC05  | 7.5 [0.295]                        | 18 [0.709]        |                               | 63 ± 1 [2.480 ± 0.039] | 190                       |
| AC07  | 7.5 [0.295]                        | 26 [1.024]        |                               | 73 ± 1 [2.874 ± 0.039] | 260                       |
| AC10  | 8.0 [0.315]                        | 44 [1.732]        |                               | 88 ± 1 [3.465 ± 0.039] | 450                       |

## PERFORMANCE

| TEST                                                           | TEST RESULTS                             |
|----------------------------------------------------------------|------------------------------------------|
| Climatic Category                                              | 40/200/56                                |
| Damp Heat, Steady State<br>(40 ± 2) °C, 56 days, (93 ± 3) % RH | $\Delta R: \pm (5 \% R + 0.1 \Omega)$    |
| Storage<br>1000 h, 200 °C, no load                             | $\Delta R: \pm (5 \% R + 0.1 \Omega)$    |
| Climatic Sequence<br>IEC 60115-1 4.23                          | $\Delta R: \pm (1 \% R + 0.05 \Omega)$   |
| Load Life<br>1000 h                                            | $\Delta R: \pm (5 \% R + 0.1 \Omega)$    |
| Resistance to Soldering Heat<br>(260 ± 5) °C, (10 ± 1) s       | $\Delta R: \pm (0.5 \% R + 0.05 \Omega)$ |
| Robustness of Termination<br>10N                               | $\Delta R: \pm (0.5 \% R + 0.05 \Omega)$ |
| Short Time Overload<br>10 x Rated Power for 5 s                | $\Delta R: \pm (2 \% R + 0.1 \Omega)$    |

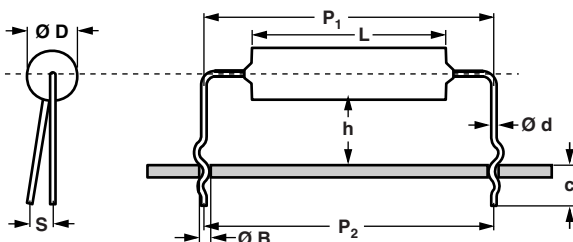
### BENDING FORMS

#### KINK TYPE S = EK



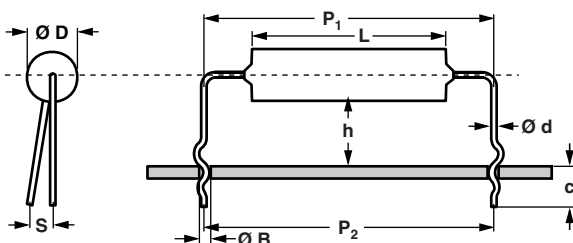
| TYPE        | Ø d | Ø D <sub>max.</sub> | L   | h ± 1 | P ± 1 | S <sub>max.</sub> |
|-------------|-----|---------------------|-----|-------|-------|-------------------|
| AC01        | 0.8 | (1)                 | (1) | 8     | 17.8  | 2                 |
| AC03 - AC05 |     |                     |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



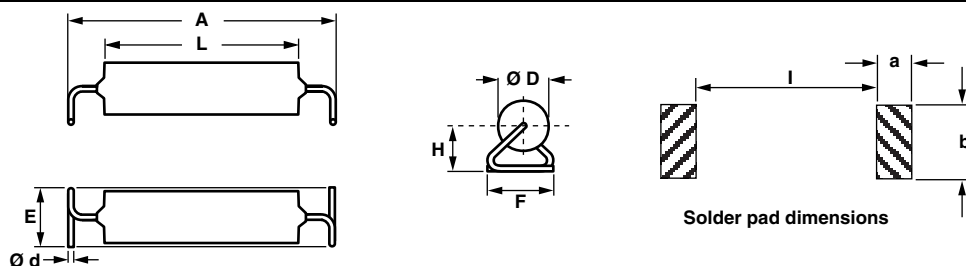
| TYPE        | Ø d | Ø D <sub>max.</sub> | L   | h ± 1 | P <sub>1</sub> ± 1 | P <sub>2</sub> ± 3 | S <sub>max.</sub> | Ø B       | c       |
|-------------|-----|---------------------|-----|-------|--------------------|--------------------|-------------------|-----------|---------|
| AC01 - AC03 | 0.8 | (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

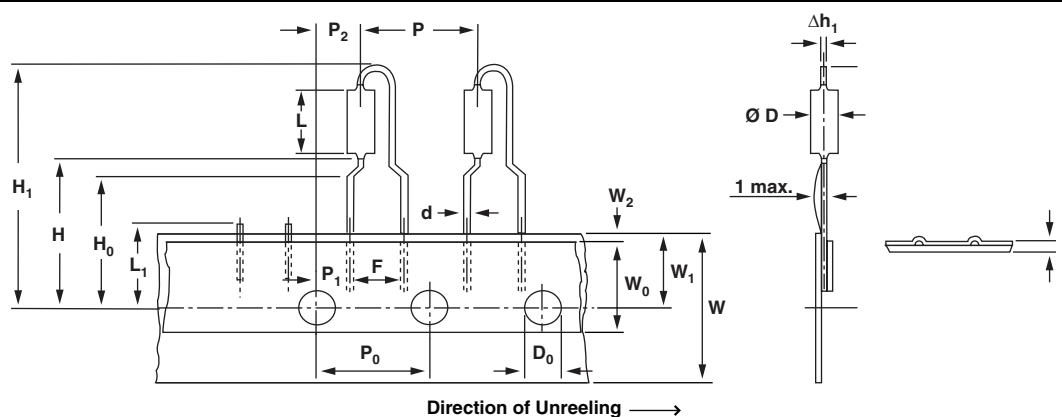
**BENDING FORMS**

WSZ



| 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

**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**

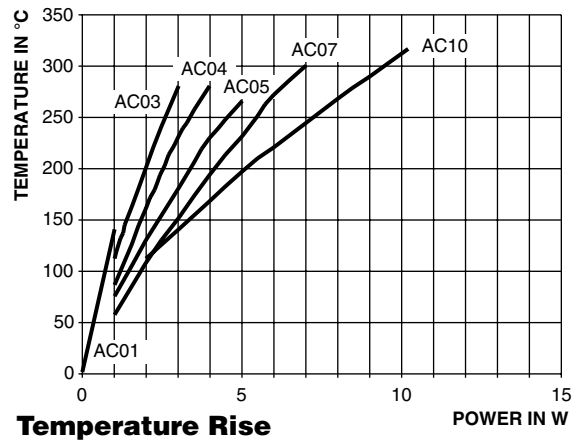
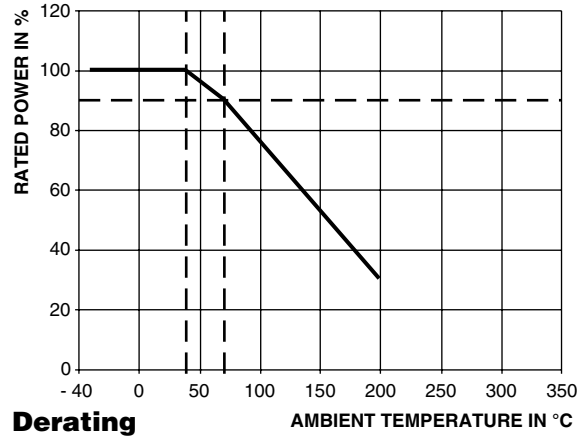
(1) See table DIMENSIONS

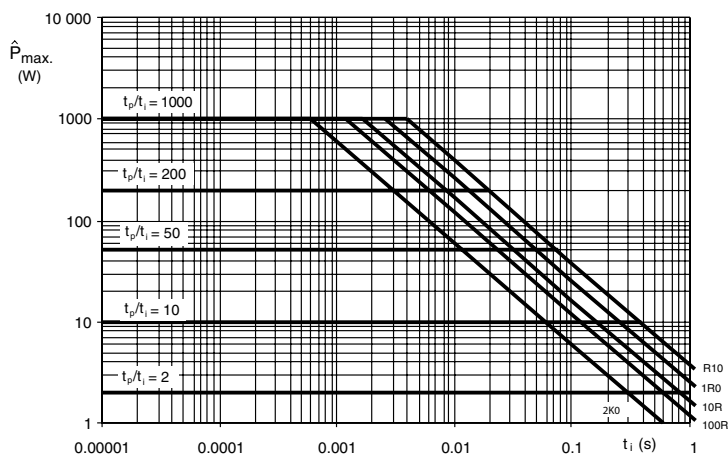
(2) Test over 10 holes - 9 intervals P<sub>0</sub> 12.7 x 9 = 114.3 ± 0.5

(3) Parallelism, &lt; 0.5 mm

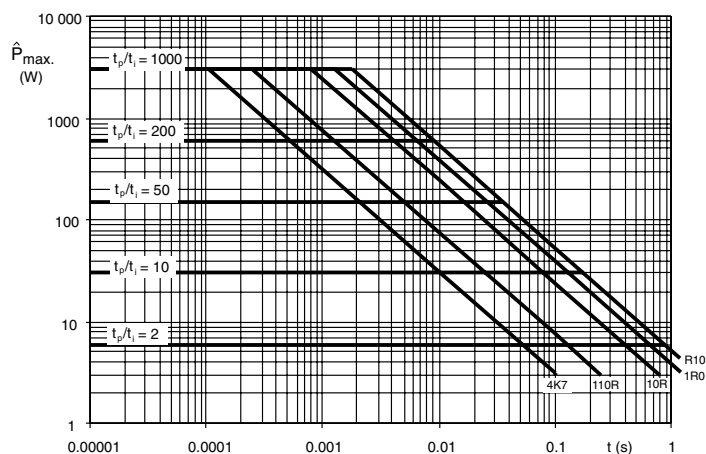
(4) Thickness of carrier tape: 0.55 mm ± 0.1

## FUNCTIONAL PERFORMANCE

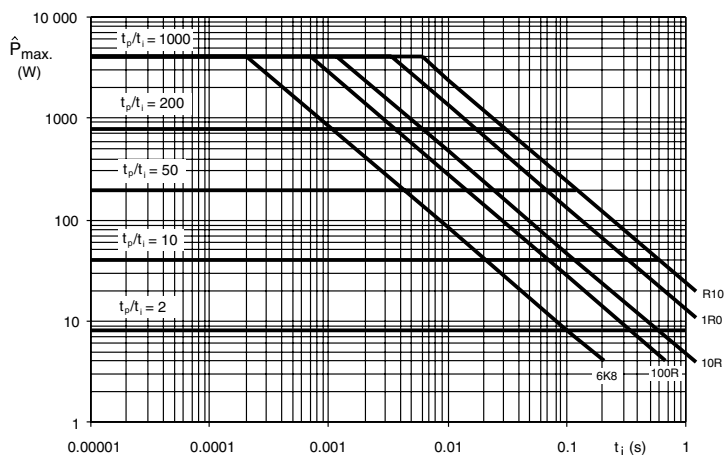




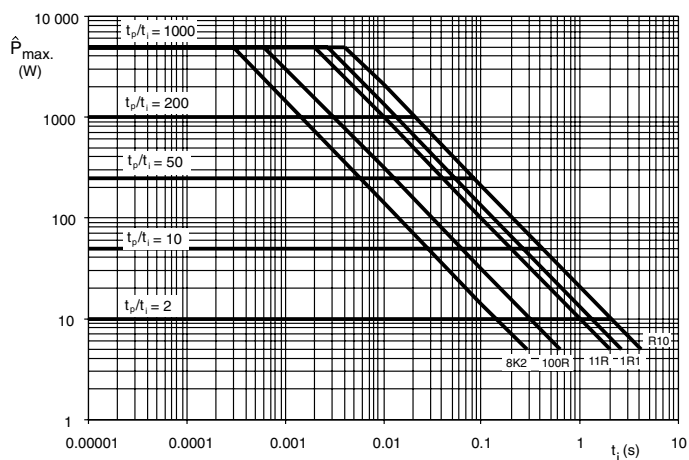
**AC01** Pulse on a regular basis; maximum permissible peak pulse power ( $\hat{P}_{max.}$ ) as a function of pulse duration ( $t_i$ )



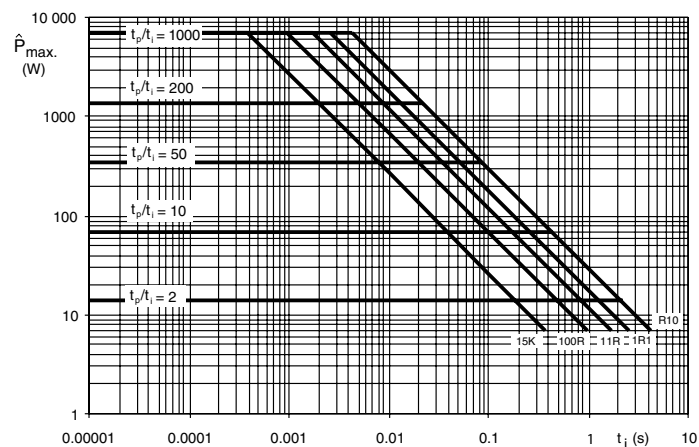
**AC03** Pulse on a regular basis; maximum permissible peak pulse power ( $\hat{P}_{max.}$ ) as a function of pulse duration ( $t_i$ )



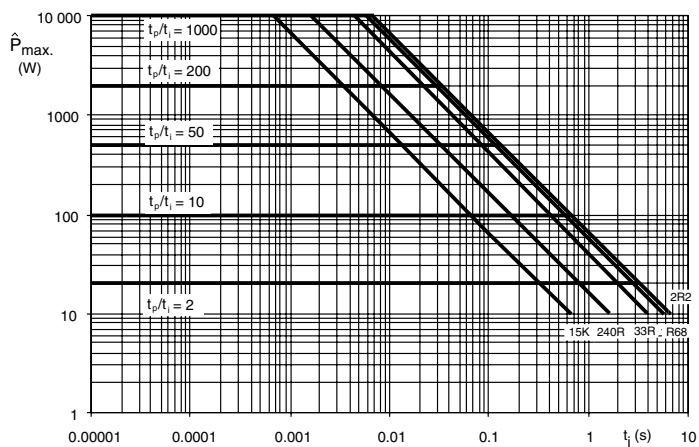
**AC04** Pulse on a regular basis; maximum permissible peak pulse power ( $\hat{P}_{max.}$ ) as a function of pulse duration ( $t_i$ )



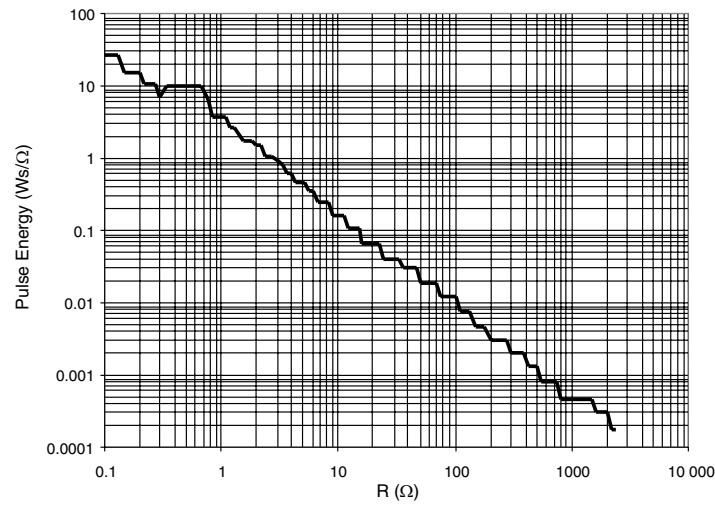
**AC05** Pulse on a regular basis; maximum permissible peak pulse power ( $\hat{P}_{max}$ ) as a function of pulse duration ( $t_i$ )



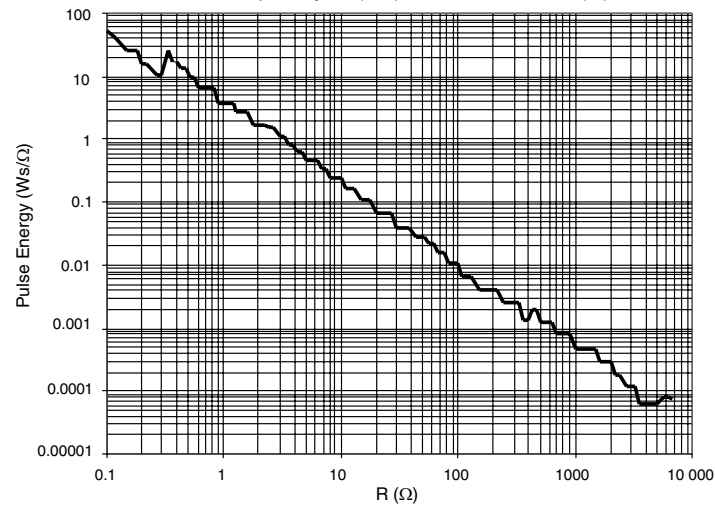
**AC07** Pulse on a regular basis; maximum permissible peak pulse power ( $\hat{P}_{max}$ ) as a function of pulse duration ( $t_i$ )



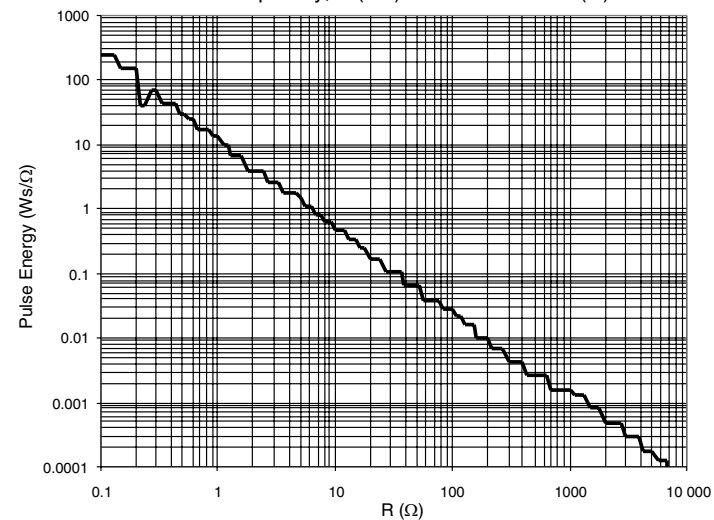
**AC10** Pulse on a regular basis; maximum permissible peak pulse power ( $\hat{P}_{max}$ ) as a function of pulse duration ( $t_i$ )



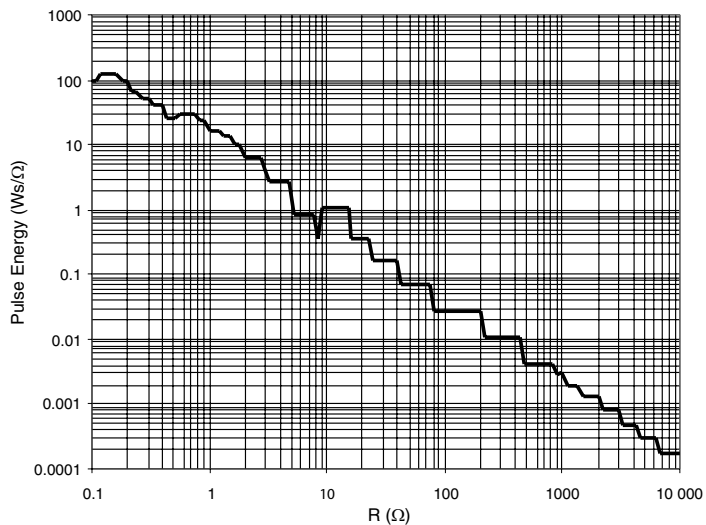
**AC01** Pulse capability; E (Ws) as a function of R (Ω)



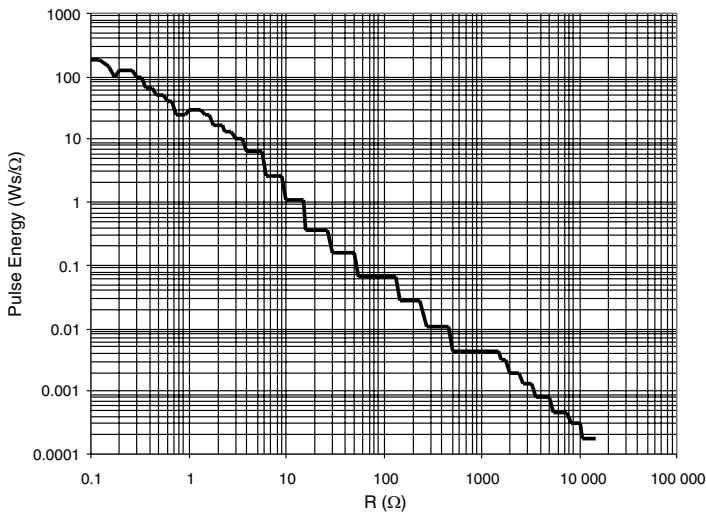
**AC03** Pulse capability; E (Ws) as a function of R (Ω)



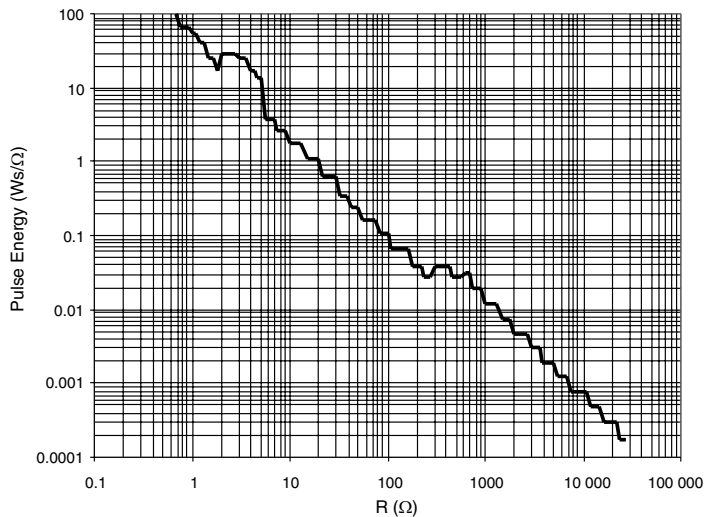
**AC04** Pulse capability; E (Ws) as a function of R (Ω)



**AC05** Pulse capability; E (Ws) as a function of R ( $\Omega$ )



**AC07** Pulse capability; E (Ws) as a function of R ( $\Omega$ )



**AC10** Pulse capability; E (Ws) as a function of R ( $\Omega$ )



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