

## 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
- Compliant to RoHS Directive 2002/95/EC



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

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

**Note**

<sup>(1)</sup> AC03 WSZ:  $P_{40\text{ }^\circ\text{C}} = 1.8$  W;  $P_{70\text{ }^\circ\text{C}} = 1.5$  W

PART NUMBER AND PRODUCT DESCRIPTION																								
Part Number: AC03000001509JAC00																								
<table border="1" style="width:100%; text-align:center;"> <tr> <td>A</td><td>C</td><td>0</td><td>3</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>5</td><td>0</td><td>9</td><td>J</td><td>A</td><td>C</td><td>0</td><td>0</td> </tr> </table>							A	C	0	3	0	0	0	0	0	1	5	0	9	J	A	C	0	0
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 <b>AC03000</b> = AC03 <b>AC04000</b> = AC04 <b>AC05000</b> = AC05 <b>AC07000</b> = AC07 <b>AC10000</b> = AC10	0 = Neutral 1 = RT 2 = SWI = Special winding <sup>(3)</sup> 3 = DK SP 20 mm <sup>(4)</sup> 4 = DK LP 33 mm <sup>(4)</sup> 5 = DK LP 17.8 mm <sup>(4)</sup> 6 = NI = Non inductive <sup>(7)</sup> 7 = DK LP 25.4 mm <sup>(4)</sup> 9 = WSZ 6720 8 = DK SP 25.4 mm Z = Value overflow (Special) C = E/K 25.4 mm <sup>(4)</sup>	0 = Standard	<b>3 digit value</b> <b>1 digit multiplier</b> <b>MULTIPLIER</b> 7 = $\times 10^{-3}$ 8 = $\times 10^{-2}$ 9 = $\times 10^{-1}$ 0 = $\times 10^0$ 1 = $\times 10^1$ 2 = $\times 10^2$ 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.  00 = 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>																		

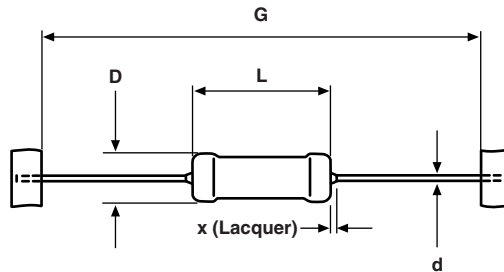
**Notes**

- <sup>(2)</sup> Resistance value to be selected for  $\pm 10\%$  tolerance from E12 and for  $\pm 5\%$  from E24
- <sup>(3)</sup> Special winding on request
- <sup>(4)</sup> Other dimensions and variants on request
- <sup>(5)</sup> See "Part Number and Product Description"
- <sup>(6)</sup> See "Packaging Table"
- <sup>(7)</sup> Resistance range on request

\*\* Please see document "Vishay Material Category Policy": [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							1250	BM	BM
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						

**DIMENSIONS**

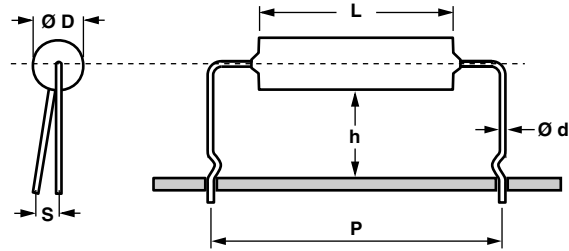


For packaging dimensions see: [www.vishay.com/doc?28721](http://www.vishay.com/doc?28721)

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 [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

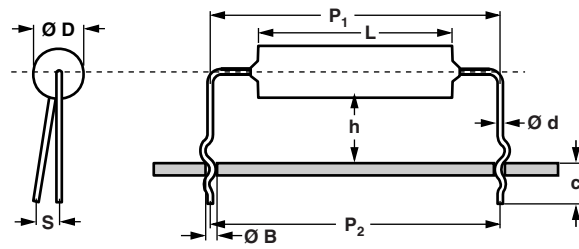
**BENDING FORMS**

**KINK TYPE S = EK**



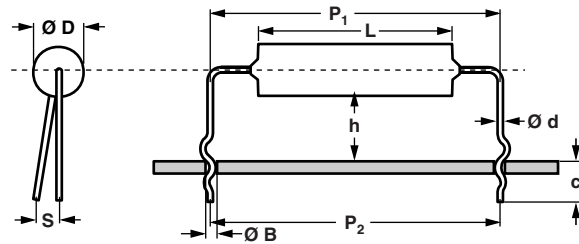
TYPE	Ø d	Ø D <sub>max.</sub>	L	h ± 1	P ± 1	S <sub>max.</sub>
AC01	0.8	(1)	(1)	8	17.8	2
AC03 - AC05					25.4	
AC07					33.0	

**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**



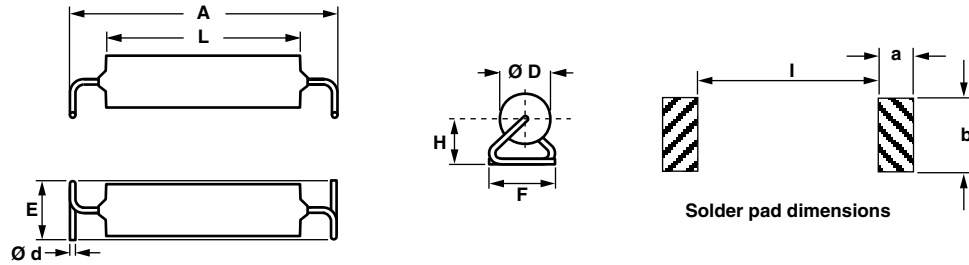
TYPE	Ø d	Ø D <sub>max.</sub>	L	h ± 1	P <sub>1</sub> ± 1	P <sub>2</sub> ± 3	S <sub>max.</sub>	Ø B	c
AC01 - AC03	0.8	(1)	(1)	8	17.8	17.8	2	1.0 ± 0.1	4.5 ± 1
AC03 - AC05					25.4	25.4			
AC07					33.0	33.0			

**Note**

(1) See table DIMENSIONS

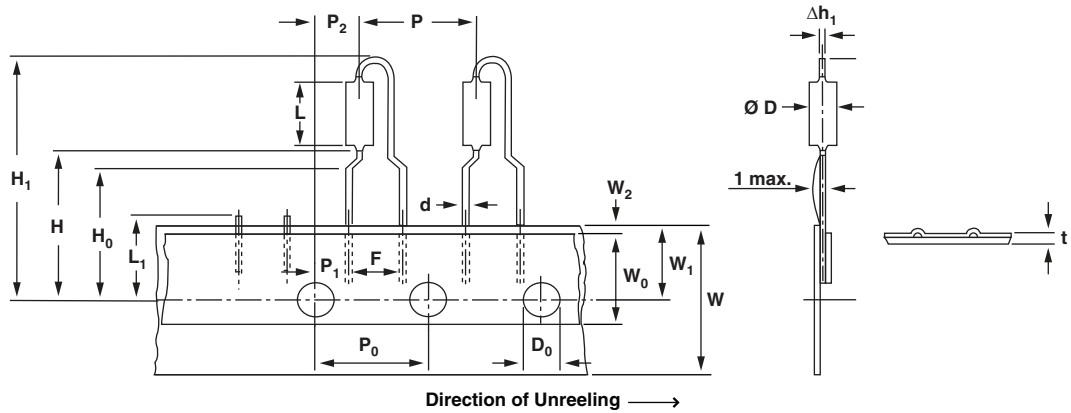
**BENDING FORMS**

WSZ



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

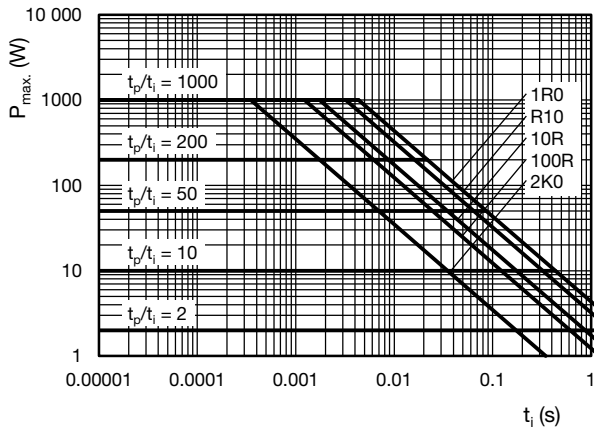


TYPE AC01		
Lead Ø	Ø d	0.8
Diameter	Ø D	(1)
Length	L	(1)
Pitch of components	P	12.7 ± 1.0
Pitch of spocket holes <sup>(2)</sup>	P <sub>0</sub>	12.7 ± 0.3
Distance between hole center and resistor center	P <sub>1</sub>	3.85 ± 0.7
Distance between hole center and lead center	P <sub>2</sub>	6.35 ± 1.0
Lead 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 <sup>(3)</sup>	H <sub>0</sub>	16.0 ± 0.5
Hole Ø	D <sub>0</sub>	4.0 ± 0.2
Thickness of tape <sup>(4)</sup>	t	0.9 max.
Height for cutting	L <sub>1</sub>	11 max.
Height for insertion	H <sub>1</sub>	32 max.

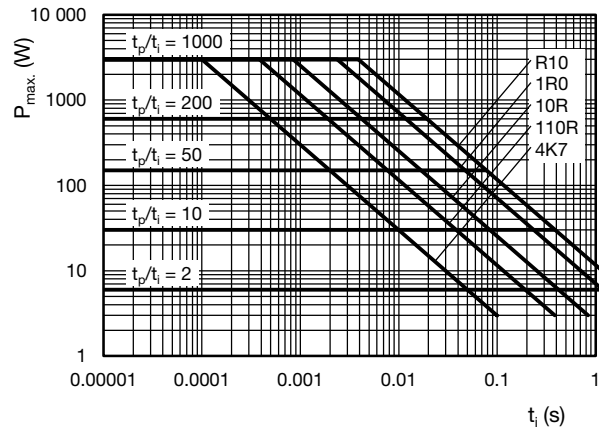
**Notes**

- (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, < 0.5 mm
- (4) Thickness of carrier tape: 0.55 mm ± 0.1

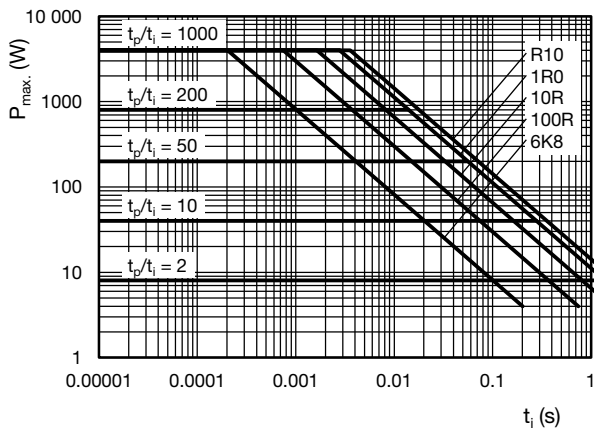
**PULSE DIAGRAMS**



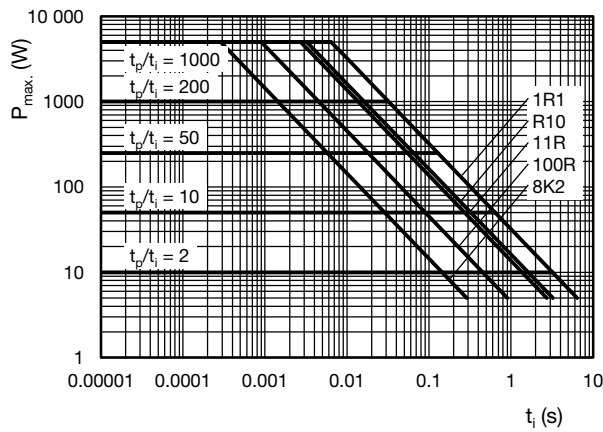
**AC01** Pulse on a regular basis; maximum permissible peak pulse power ( $P_{max}$ ) as a function of pulse duration ( $t_i$ )



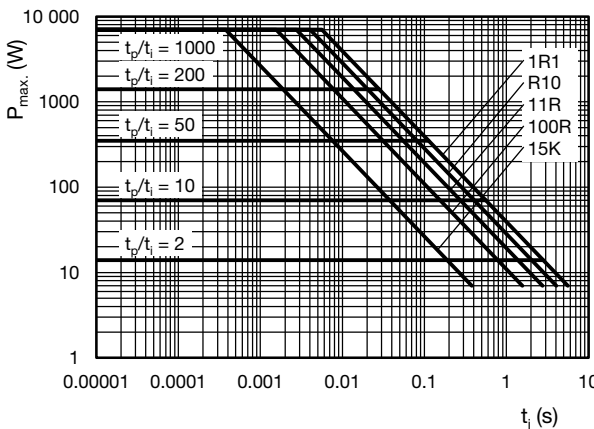
**AC03** Pulse on a regular basis; maximum permissible peak pulse power ( $P_{max}$ ) as a function of pulse duration ( $t_i$ )



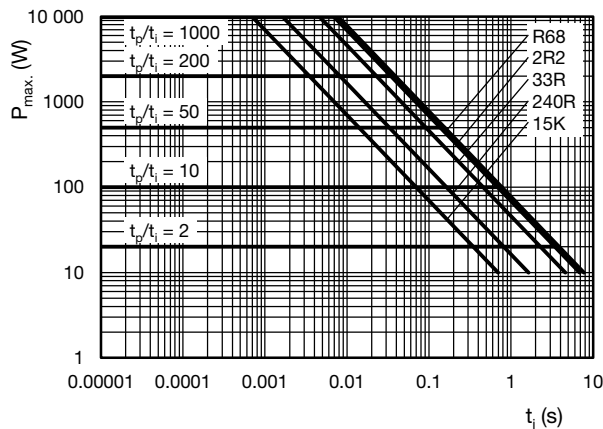
**AC04** Pulse on a regular basis; maximum permissible peak pulse power ( $P_{max}$ ) as a function of pulse duration ( $t_i$ )



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

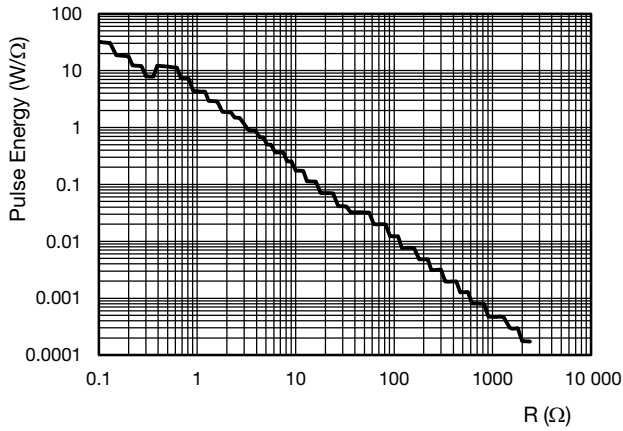


**AC07** Pulse on a regular basis; maximum permissible peak pulse power ( $P_{max}$ ) as a function of pulse duration ( $t_i$ )

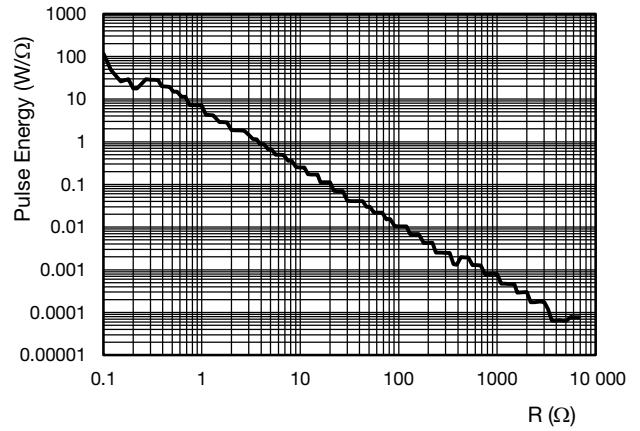


**AC10** Pulse on a regular basis; maximum permissible peak pulse power ( $P_{max}$ ) as a function of pulse duration ( $t_i$ )

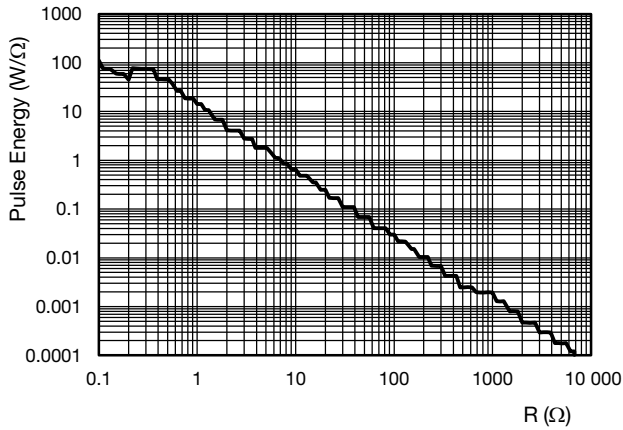
**PULSE DIAGRAMS**



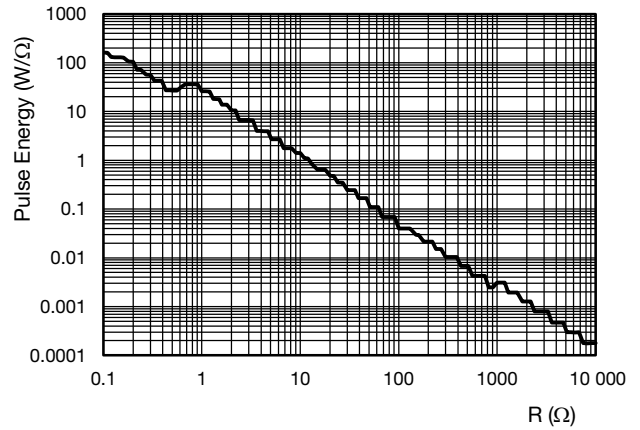
**AC01** Pulse capability; E (Ws) as a function of R ( $\Omega$ )



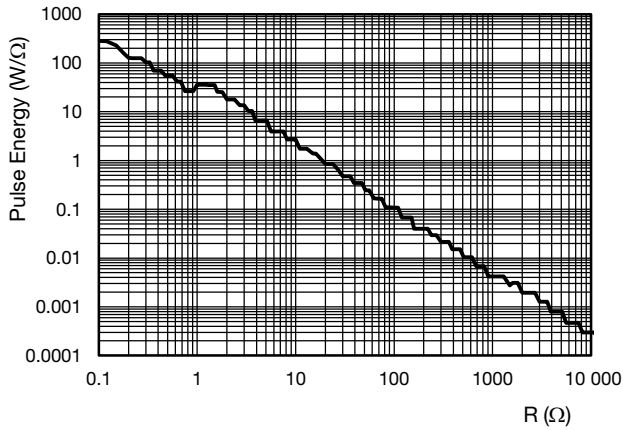
**AC03** Pulse capability; E (Ws) as a function of R ( $\Omega$ )



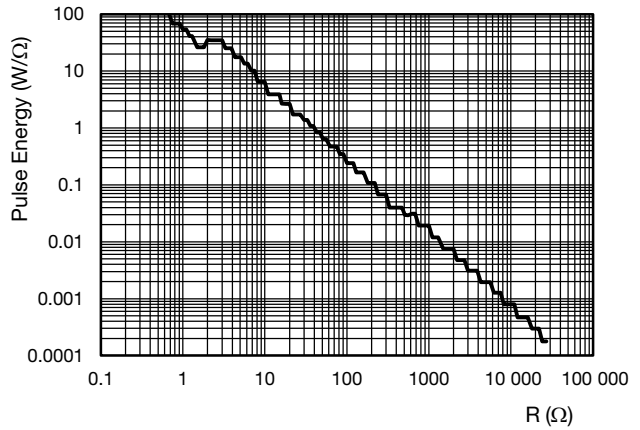
**AC04** Pulse capability; E (Ws) as a function of R ( $\Omega$ )



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

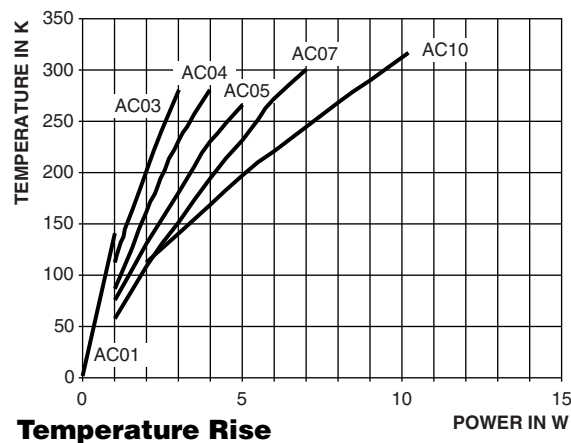
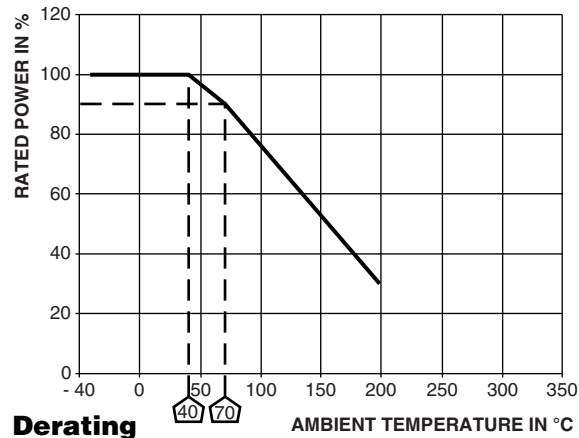


**AC07** Pulse capability; E (Ws) as a function of R ( $\Omega$ )



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

### 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 (40 ± 2) °C, 56 days, (93 ± 3) % RH	$\Delta R = \pm (5 \% R + 0.1 \Omega)$
Endurance at room temperature (116 % $P_{70}$ ), 1000 h, IEC 60115-1, 4.25.2	$\Delta R = \pm (5 \% R + 0.1 \Omega)$
Endurance at UCT, 200 °C (30 % $P_{70}$ ), 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 (260 ± 5) °C, (10 ± 1) s	$\Delta R = \pm (0.5 \% R + 0.05 \Omega)$
Robustness of Termination, IEC 60115-1, 4.16 10N	$\Delta R = \pm (0.5 \% R + 0.05 \Omega)$
Short Time Overload, IEC 60115-1, 4.13 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 Ω to 0.91 Ω	7
1 Ω to 9.1 Ω	8
10 Ω to 91 Ω	9
100 Ω to 910 Ω	1
1 kΩ to 9.1 kΩ	2
10 kΩ to 56 kΩ	3

**12NC Example**

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

<b>HISTORICAL 12NC - Resistor type and packaging</b>				
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



## Disclaimer

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