

Cemented Wirewound Precision Resistors



FEATURES

- High power dissipation in small volume
- Ideal for pulse application
- TCR ± 100 ppm/K
- Maximum permissible hot spot temperature is 275 °C
- Lead (Pb)-free
- Tolerance 1 %
- Compliant to RoHS Directive 2002/95/EC


RoHS
COMPLIANT

GREEN
(5-2009)**

The resistor element is a resistive wire which is wound in a single layer on a ceramic rod. Metal caps are pressed over the ends of the rod. The ends of the resistance wire and the leads are connected to the caps by welding. Tinned copper-clad iron leads with poor heat conductivity are employed permitting the use of relatively short leads to obtain stable mounting without overheating the solder joint.

The resistor is coated with a green silicon cement which is not resistant to aggressive fluxes. The coating is non-inflammable, will not drip even at high overloads and is resistant to most commonly used cleaning solvents, in accordance with IEC 60068-2-45.

STANDARD ELECTRICAL SPECIFICATIONS

MODEL	POWER RATING $P_{25\text{ °C}}$	LIMITING VOLTAGE $U_{\text{max.}}$	RESISTANCE RANGE ⁽²⁾	TOLERANCE
PAC01	1 W	$\sqrt{P \times R}$	0.10 Ω to 2.2 k Ω	$\pm 1\%$
PAC02 ⁽¹⁾	2 W	$\sqrt{P \times R}$	0.10 Ω to 3.6 k Ω	$\pm 1\%$
PAC03	3 W	$\sqrt{P \times R}$	0.10 Ω to 4.7 k Ω	$\pm 1\%$
PAC04	4 W	$\sqrt{P \times R}$	0.10 Ω to 8.2 k Ω	$\pm 1\%$
PAC05	5 W	$\sqrt{P \times R}$	0.10 Ω to 10 k Ω	$\pm 1\%$
PAC06	6 W	$\sqrt{P \times R}$	0.10 Ω to 12 k Ω	$\pm 1\%$

Notes

⁽¹⁾ PAC02 WSZ: $P_{25\text{ °C}} = 1.8\text{ W}$

⁽²⁾ Resistance value to be selected for $\pm 1\%$ tolerance from E24 and E96

- For Pulse Diagrams see AC..series (www.vishay.com/doc?28730)

** Please see document "Please see document "Vishay Material Category Policy":": www.vishay.com/doc?99902

**PART NUMBER AND PRODUCT DESCRIPTION**

Part Number: PAC300004701FAC000

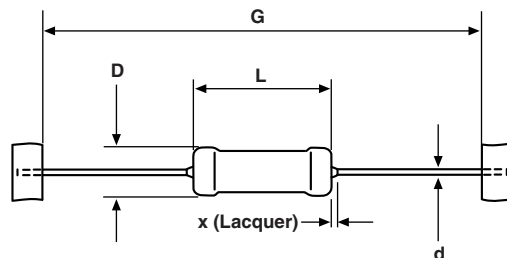
P	A	C	3	0	0	0	0	4	7	0	1	F	A	C	0	0	0	
MODEL			VARIANT				TCR/MATERIAL		VALUE			TOLERANCE CODE		PACKAGING CODE		SPECIAL		
PAC100 = PAC01 PAC200 = PAC02 PAC300 = PAC03 PAC400 = PAC04 PAC500 = PAC05 PAC600 = PAC06			0 = Neutral 1 = SWI = Special winding ⁽¹⁾ 2 = RT 3 = DK SP 20 mm 4 = DK LP 33 mm ⁽²⁾ 5 = DK LP 17.8 mm ⁽²⁾ 7 = DK LP 25.4 mm ⁽²⁾ 8 = DK SP 25.4 mm 9 = WSZ 6720 C = E/K 22.4 mm ⁽²⁾ Z = Value overflow (special)				0 = Standard (± 100 ppm/K)		3 digit value 1 digit multiplier MULTIPLIER 7 = *10 ⁻³ 8 = *10 ⁻² 9 = *10 ⁻¹ 0 = *10 ⁰ 1 = *10 ¹ 2 = *10 ² 3 = *10 ³ 4 = *10 ⁴ 5 = *10 ⁵			F = ± 1.0 %		(See Packaging table)		The 3 digits are used for all special part styles. To encode the non standard specifications all special parts of one series are listed in a cross reference table. 000 = Standard		
Product Description: PAC03 4K7 1 % AC																		
PAC03			4K7				1 %			AC								
MODEL ⁽³⁾			VALUE ⁽³⁾				TOLERANCE CODE ⁽³⁾			PACKAGING DESCRIPTION ⁽⁴⁾								

Notes

- (1) Special winding on request
(2) Other dimensions on request
(3) See "Part Number and Product Description"
(4) See "Packaging Table"

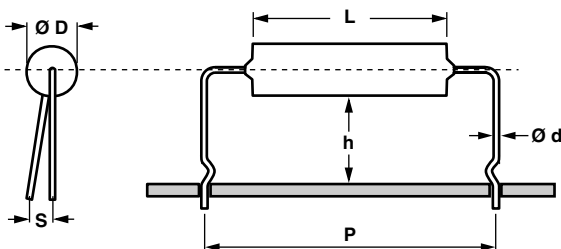
PACKAGING TABLE

MODEL	AMMO			LOOSE			BLISTER		
	PIECES	PACK. CODE	PACK. DESC.	PIECES	PACK. CODE	PACK. DESC.	PIECES	PACK. CODE	PACK. DESC.
PAC01	1000	A1	A1						
PAC01 DK/EK				500	LC	LC			
PAC01RT	2500	AE	AE						
PAC02	500	AC	AC						
PAC02 DK/EK				500	LC	LC			
PAC02 WSZ							1250	BM	BM
PAC03	500	AC	AC						
PAC03 DK/EK				500	LC	LC			
PAC04	500	AC	AC						
PAC04 DK/EK				500	LC	LC			
PAC05	500	AC	AC						
PAC05 DK/EK				250	LB	LB			
PAC06	500	AC	AC						
PAC06 DK/EK				250	LB	LB			

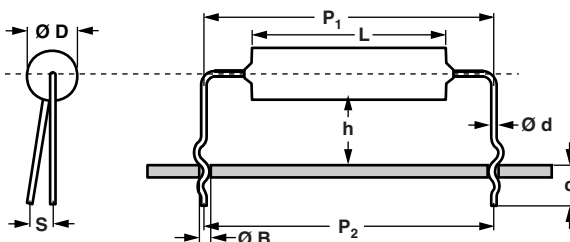
DIMENSIONS

For packaging dimensions see: www.vishay.com/doc?28721

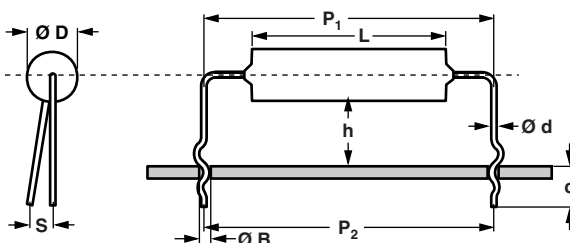
MODEL	DIMENSIONS in millimeters (inches)					
	D _{max.}	L _{max.}	d	x _{max.}	G	WEIGHT g PER UNIT
PAC01	4.3 [0.169]	11 [0.433]	0.8 ± 0.03 [0.031 ± 0.001]	2	63 ± 1 [2.480 ± 0.039]	0.52
PAC02	4.8 [0.189]	13 [0.512]		2	63 ± 1 [2.480 ± 0.039]	0.75
PAC03	5.5 [0.217]	16.5 [0.650]		3	63 ± 1 [2.480 ± 0.039]	1.10
PAC04	7.5 [0.295]	18 [0.709]		3	73 ± 1 [2.874 ± 0.039]	1.90
PAC05	7.5 [0.295]	26 [1.024]		3	73 ± 1 [2.874 ± 0.039]	2.60
PAC06	7.5 [0.295]	26 [1.024]		3	73 ± 1 [2.874 ± 0.039]	2.60

BENDING FORMS
KINK TYPE S = EK


TYPE	Ø d	Ø D _{max.}	L	h ± 1	P ± 1	S _{max.}
PAC01	0.8	(1)	(1)	8	17.8	2
PAC02 - PAC04					25.4	
PAC05 - PAC06					33.0	

DOUBLE KINK SP = DK SP


TYPE	Ø d	Ø D _{max.}	L	h ± 1	P ₁ ± 1	P ₂ ± 3	S _{max.}	Ø B	c
PAC01	0.8	(1)	(1)	8	19.8	17.8	2	1.0 ± 0.1	4.5 ± 1
PAC02 - PAC04					22.0	20.0			
					27.4	25.4			
PAC05 - PAC06					35.0	33.0			

DOUBLE KINK LP = DK LP


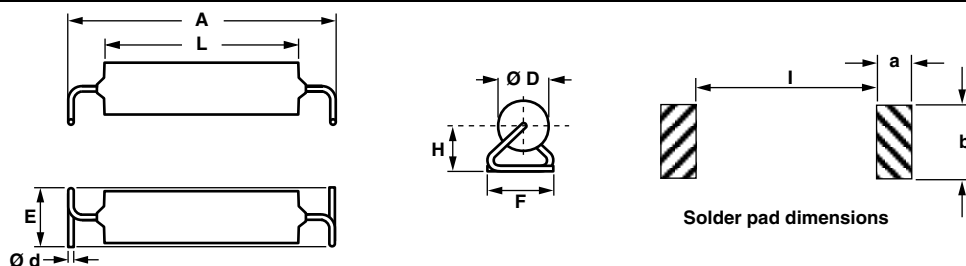
TYPE	Ø d	Ø D _{max.}	L	h ± 1	P ₁ ± 1	P ₂ ± 3	S _{max.}	Ø B	c
PAC01 - PAC02	0.8	(1)	(1)	8	17.8	17.8	2	1.0 ± 0.1	4.5 ± 1
PAC02 - PAC04					25.4	25.4			
PAC05 - PAC06					33.0	33.0			

Note

(1) See table DIMENSIONS

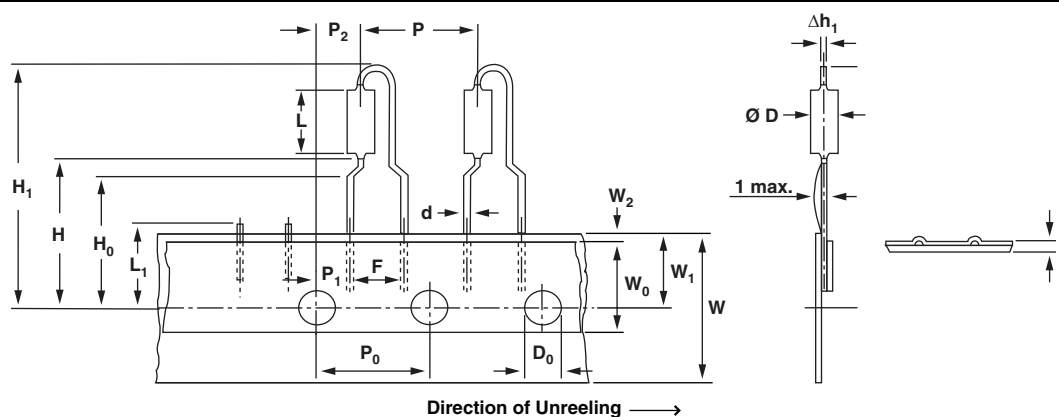
BENDING FORMS

WSZ



TYPE	Ø d	Ø D _{max.}	A	L	F	H	E	a	b	l
PAC02 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 PAC01**

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

Notes

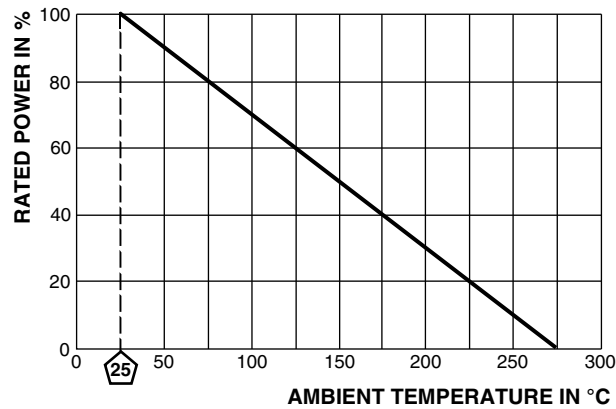
(1) See table DIMENSIONS

(2) Test over 10 holes - 9 intervals P₀ 12.7 x 9 = 114.3 ± 0.5

(3) Parallelism, < 0.5 mm

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

DERATING



Maximum dissipation ($P_{max.}$) as a function of the ambient temperature (T_{amb})

PERFORMANCE	
TEST	PERMISSIBLE CHANGE
Climatic category (LCT/UCT/Days)	55/200/56
Climatic Sequence IEC 60115-1 4.23	$\Delta R = \pm (0.5 \% R + 0.05 \Omega)$
Damp Heat, Steady State, IEC 60115-1, 4.24 (40 ± 2) °C, 56 days, (93 ± 3) % RH	$\Delta R = \pm (1.0 \% R + 0.05 \Omega)$
Endurance at room temperature (116 % P_{70}), 1000 h, IEC 60115-1, 4.25.2	$\Delta R = \pm (0.5 \% R + 0.05 \Omega)$
Storage, UCT, IEC 60115-1, 4.25.3 1000 h, 200 °C, no load	$\Delta R = \pm (1.0 \% R + 0.05 \Omega)$
Resistance to Soldering Heat, IEC 60115-1, 4.18 (260 ± 5) °C, (10 ± 1) s	$\Delta R = \pm (0.2 \% R + 0.05 \Omega)$
Robustness of Termination, IEC 60115-1, 4.16 10N	$\Delta R = \pm (0.1 \% R + 0.05 \Omega)$
Short Time Overload, IEC 60115-1, 4.13 10 x Rated Power for 5 s	$\Delta R = \pm (0.2 \% R + 0.05 \Omega)$

HISTORICAL 12NC INFORMATION

- The resistors had a 12-digit ordering code starting with 2306 327
- The subsequent first digit indicated the resistor type and packaging.
- The remaining 4 digits indicated the resistance value:
 - The first 3 digits indicated the resistance value.
 - The last digit indicated the resistance decade in accordance with Resistance Decade table.

Resistance Decade

RESISTANCE DECADE	LAST DIGIT
0.10 to 0.976 Ω	7
1 to 9.76 Ω	8
10 to 97.6 Ω	9
100 to 976 Ω	1
1 to 9.76 k Ω	2
10 to 12 k Ω	3

Ordering Example

The ordering code for an PAC02, resistor value 47 Ω with $\pm 1\%$ tolerance, supplied in ammpack of 500 units was: 2306 327 04709.

HISTORICAL 12NC - Resistor type and packaging

TYPE	2306 327		
	BANDOLIER IN AMMOPACK		
	RADIAL	STRAIGHT LEADS	
	2500 units	500 units	1 000 units
PAC01	RT ⁽¹⁾	-	2306 327 5....
PAC02	-	2306 327 0....	-
PAC03	-	2306 327 1....	-
PAC04	-	2306 327 2....	-
PAC05	-	2306 327 3....	-
PAC06	-	2306 327 4....	-

Note

⁽¹⁾ Radial parts with tin plated copper leads



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