

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 %
- Compatible with "Restriction of the use of Hazardous Substances" (RoHS) directive 2002/95/EC (issue 2004)



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 "MIL-STD-202E, method 215" and "IEC 60068-2-45".

STANDARD ELECTRICAL SPECIFICATIONS

GLOBAL MODEL	HISTORICAL MODEL	$P_{25^\circ\text{C}}$ W	TOLERANCE E24/E96 series \pm %	LIMITING VOLTAGE V	RESISTANCE RANGE Ω TCR ± 100 ppm/K
PAC100	PAC01	1	1	$\sqrt{P \times R}$	R10 - 2K2
PAC200	PAC02 ⁽¹⁾	2	1	$\sqrt{P \times R}$	R10 - 3K6
PAC300	PAC03	3	1	$\sqrt{P \times R}$	R10 - 4K7
PAC400	PAC04	4	1	$\sqrt{P \times R}$	R10 - 8K2
PAC500	PAC05	5	1	$\sqrt{P \times R}$	R10 - 10K
PAC600	PAC06	6	1	$\sqrt{P \times R}$	R10 - 12K

Notes

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

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

GLOBAL PART NUMBER INFORMATION

New Global Part Numbering: PAC300004641FAC000 (preferred part number format)

P			A			C			3			0			0			0			0			4			7			0			1			F			A			C			0			0			0		
MODEL			SPECIAL CHARACTER			TCR/MATERIAL			VALUE			TOLERANCE			PACKAGING			SPECIAL																																			
(See Standard Electrical Specifications table)			0 = Neutral 1 = SWI = Special winding (2) 2 = RT 3 = DK SP 20 mm 4 = DK LP 33 mm (3) 5 = DK LP 17.8 mm (3) 7 = DK LP 25.4 mm (3) 8 = DK SP 25.4 mm 9 = WSZ 6720 A = E/K 22.5 mm (3) Z = Value overflow (Special)			0 = Standard (100 ppm) K = 90 ppm (2) C = 50 ppm (2) L = 30 ppm (2)			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 0E0 = CECC E0 0E6 = CECC E6																																			
Historical Part Number Example: PAC03 4K7 1 % AC (will continue to be accepted)																																																					
PAC03						4K7						1 %						AC																																			
HISTORICAL MODEL						VALUE						TOLERANCE						PACKAGING																																			

Notes

⁽²⁾ Special winding on request

⁽³⁾ Other dimensions and special character on request

**PACKAGING TABLE**

SAP	DESCRIPTION	TYPE
A1	Bandolier in ammopack straight leads, 1000 pieces	PAC01
AC	Bandolier in ammopack straight leads, 500 pieces	PAC02, PAC03, PAC04, PAC05, PAC06
AE	Bandolier in ammo pack, 2500 pieces radial taped	PAC01RT
LC	Loose 500 pieces double kinked/kink type S	PAC01 - PAC04 DK/EK
LB	Loose 250 pieces double kinked/kink type S	PAC05 - PAC06 DK/EK
BM	Blister 1250 pieces WSZ	PAC02 WSZ

12NC ORDERING CODE INDICATING RESISTOR TYPE AND PACKAGING

TYPE	ORDERING CODE 2306 327		
	BANDOLIER IN AMMOPACK		
	RADIAL	STRAIGHT LEADS	
	2500 units	500 units	1000 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

ORDERING INFORMATION**Ordering Code (12NC)**

- The resistors have a 12-digit ordering code starting with 2306 327
- The subsequent first digit indicates the resistor type and packaging; see the 12NC Ordering Code table.
- The remaining 4 digits indicate the resistance value:
 - The first 3 digits indicate the resistance value.
 - The last digit indicates the resistance decade in accordance with the 12NC Indicating Resistance Decade table.

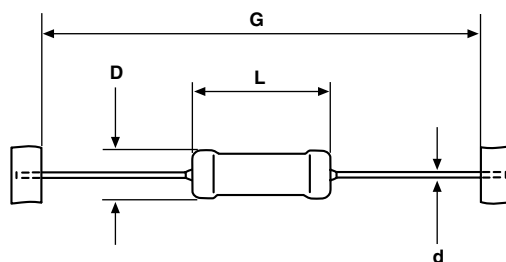
Last Digit of 12NC Indicating Resistance Decade

RESISTANCE DECADE	LAST DIGIT
0.10 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 ammopack of 500 units is: 2306 327 04709.

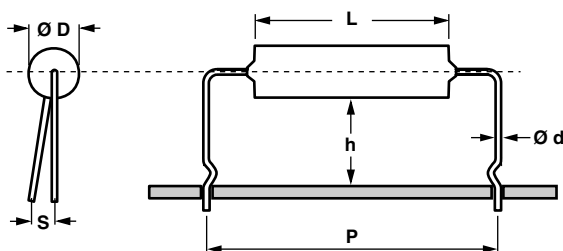
Product specifications deviating from the standard values are available on request.

DIMENSIONS

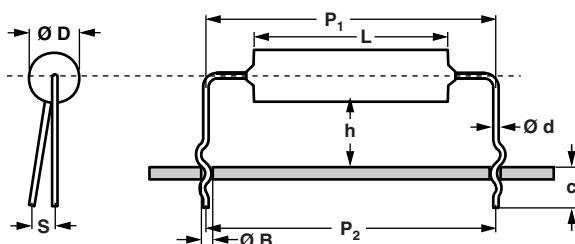
For packaging dimensions see separate packaging dimensions page.

MODEL	DIMENSIONS in millimeters [inches]				
	D _{max.}	L _{max.}	d	G	WEIGHT g per 100 units
PAC01	4.3 [0.169]	11 [0.433]	0.8 ± 0.03 [0.031 ± 0.001]	63 ± 1 [2.480 ± 0.039]	52
PAC02	4.8 [0.189]	13 [0.512]		63 ± 1 [2.480 ± 0.039]	75
PAC03	5.5 [0.217]	16.5 [0.650]		63 ± 1 [2.480 ± 0.039]	110
PAC04	7.5 [0.295]	18 [0.709]		73 ± 1 [2.874 ± 0.039]	190
PAC05	7.5 [0.295]	26 [1.024]		73 ± 1 [2.874 ± 0.039]	260
PAC06	7.5 [0.295]	26 [1.024]		73 ± 1 [2.874 ± 0.039]	260

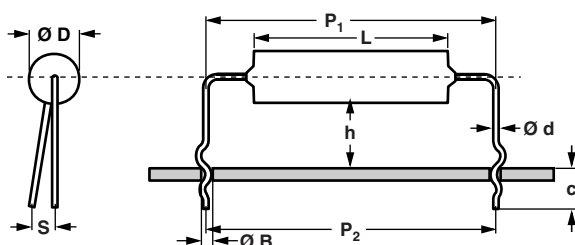
PERFORMANCE	
TEST	TEST RESULTS
Climatic Category	55/200/56
Damp Heat, Steady State 56 Days	$\Delta R = \pm (1.0 \% R + 0.05 \Omega)$
Storage 1000 h, 200 °C, No Load	$\Delta R = \pm (1.0 \% R + 0.05 \Omega)$
Climatic Sequence	$\Delta R = \pm (0.5 \% R + 0.05 \Omega)$
Load Life 1000 h	$\Delta R = \pm (0.5 \% R + 0.05 \Omega)$
Resistance to Soldering Heat	$\Delta R = \pm (0.2 \% R + 0.05 \Omega)$
Robustness of Termination, 10 N	$\Delta R = \pm (0.1 \% R + 0.05 \Omega)$
Short Time Overload, 10 x Rated Power x 5 s	$\Delta R = \pm (0.2 \% R + 0.05 \Omega)$

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


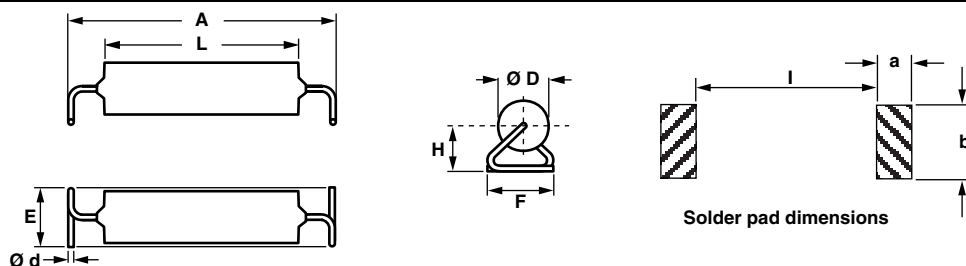
TYPE	Ø d	Ø D _{max.}	L	h ± 1	P ₁ ± 1	P ₂ ± 3	S _{max.}	Ø B	c
PAC01 - PAC02	0.8	(1)	(1)	8	17.8	17.8	2	1.0 ± 0.1	4.5 ± 1
PAC02 - PAC04					25.4	25.4			
PAC05 - PAC06					33.0	33.0			

Note

(1) See table DIMENSIONS

BENDING FORMS

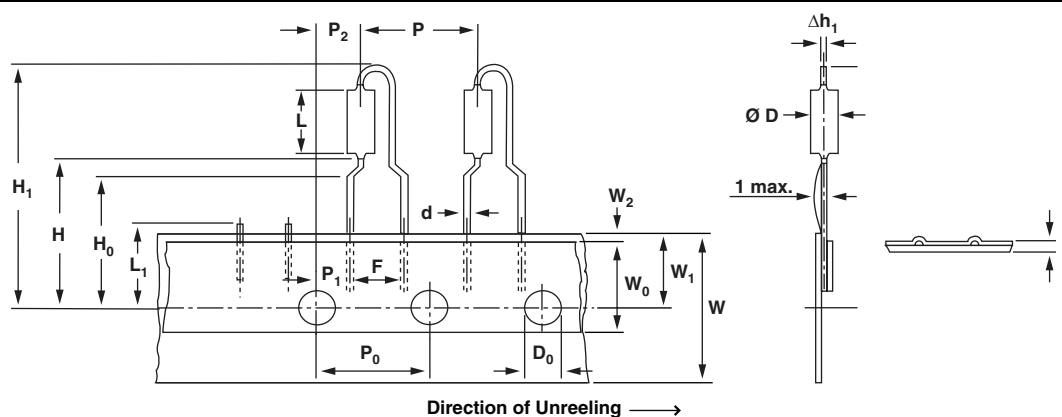
WSZ



Solder pad dimensions

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



Direction of Unreeling →

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

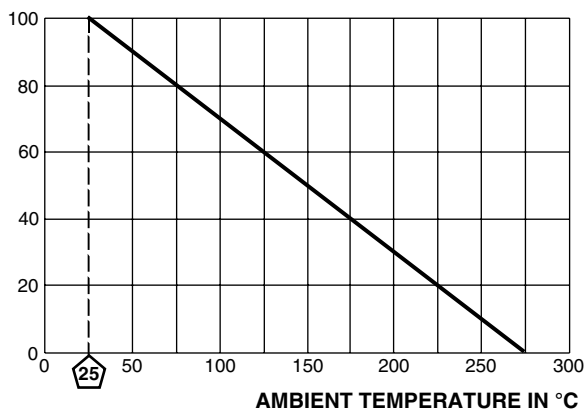
(1) See table DIMENSIONS

(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})



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