

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 %
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE
GREEN
(5-2008)

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

Notes

- PAC02 WSZ: $P_{25\text{ }^{\circ}\text{C}} = 1.8$ W
- Resistance value to be selected for ± 1 % tolerance from E24 and E96
- For Pulse Diagrams see AC.. Series (www.vishay.com/doc?28730)

**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
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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 25.4 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 in millimeters [inches]


MODEL	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

Note

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

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})

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 ± 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	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



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