Cemented Leaded 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

Pb-free
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 $P_{25\,°C}$ W	LIMITING VOLTAGE $U_{max.}$	RESISTANCE RANGE (2) Ω	TOLERANCE ± %
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

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

(1) PAC02 WSZ: $P_{25\,°C}$ = 1.8 W

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

For technical questions, contact: ww1resistors@vishay.com

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

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 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

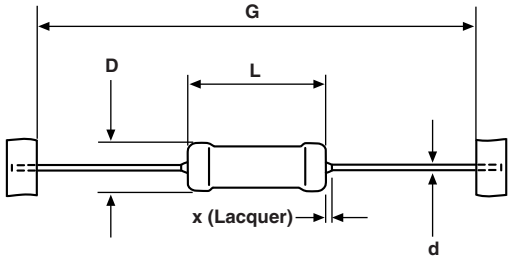
(1) Special winding on request
(2) Other dimensions on request
(3) See “Part Number and Product Description”
(4) See “Packaging Table”

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			

For technical questions, contact: ww1resistors@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

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

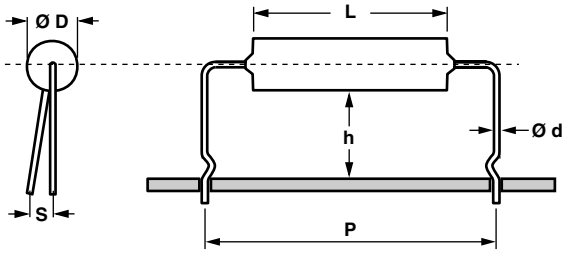
- For packaging dimensions see: www.vishay.com/doc?28721

For technical questions, contact: ww1resistors@vishay.com

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

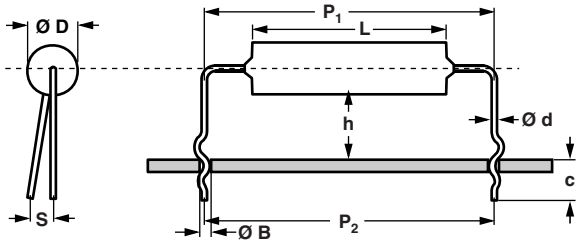
BENDING FORMS

KINK TYPE S = EK



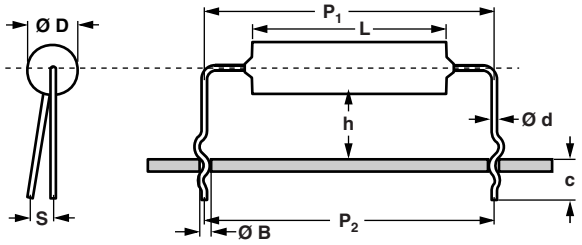
TYPE	Ø d	Ø $D_{max.}$	L	h ± 1	P ± 1	$S_{max.}$
PAC01	0.8	(1)	(1)	8	17.8	2
PAC02 - PAC04					25.4	
PAC05 - PAC06					33.0	

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

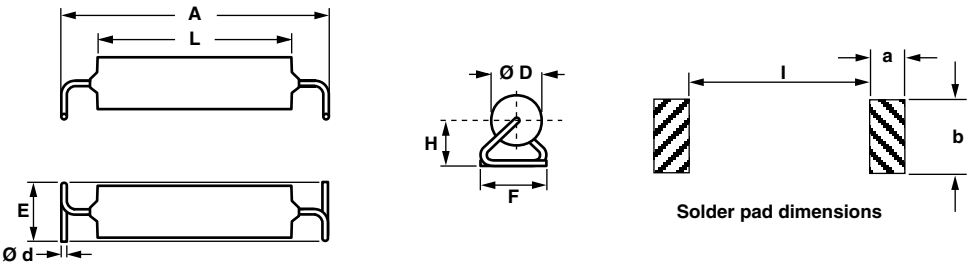
(1) See table DIMENSIONS

For technical questions, contact: ww1resistors@vishay.com

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

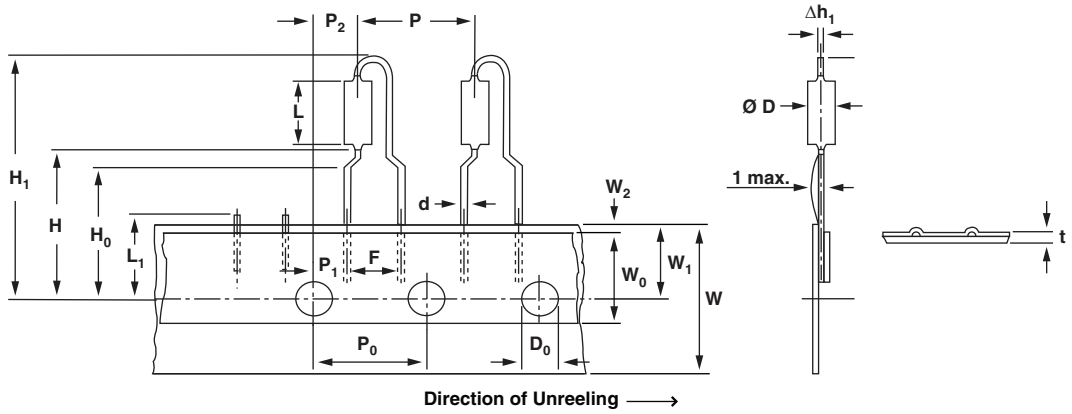
BENDING FORMS

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



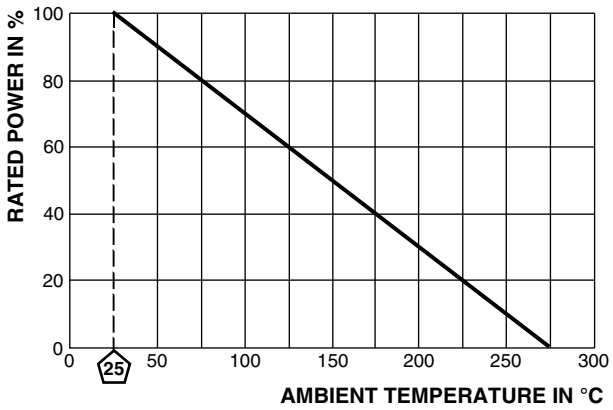
TYPE PAC01		
Lead Ø	Ø d	0.8
Diameter	Ø D	(1)
Length	L	(1)
Pitch of components	P	12.7 ± 1.0
Pitch of spocket holes (2)	P_0	12.7 ± 0.3
Distance between hole center and resistor center	P_1	3.85 ± 0.7
Distance between hole center and lead center	P_2	6.35 ± 1.0
Lead spacing	F	5.0 + 0.6, - 0.1
Angle of insertion	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 P_0 12.7 x 9 = 114.3 ± 0.5
(3) Parallelism, < 0.5 mm
(4) Thickness of carrier tape: 0.55 mm ± 0.1

For technical questions, contact: ww1resistors@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

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	$\Delta R = \pm (0.2\ \%\ R + 0.05\ \Omega)$

For technical questions, contact: ww1resistors@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

HISTORICAL 12NC INFORMATION

- The resistors had a 12-digit ordering code staring 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 kΩ	2
10 to 12 kΩ	3

Ordering Example

The ordering code for an PAC02, resistor value 47 Ω with ± 1 % tolerance, supplied in ammopack 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

For technical questions, contact: ww1resistors@vishay.com

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay’s knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer’s responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer’s technical experts. Product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

© 2021 VISHAY INTERTECHNOLOGY, INC. ALL RIGHTS RESERVED