

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



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

- For Pulse Diagrams see AC.. Series (www.vishay.com/doc?28730)
- ⁽¹⁾ PAC02 WSZ: $P_{25\text{ }^\circ\text{C}} = 1.8$ W
- ⁽²⁾ Resistance value to be selected for ± 1 % tolerance from E24 and E96

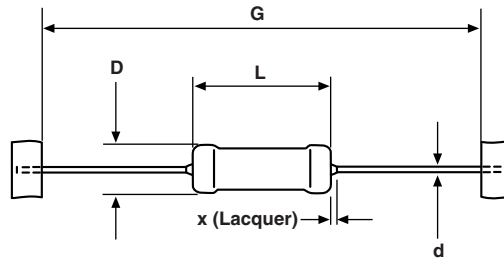


| PART NUMBER AND PRODUCT DESCRIPTION | | | | | | |
|--|---|--|----------------------------|---|----------------|---------------------------|
| Part Number: PAC30004701FAC000 | | | | | | |
| P | A | C | 3 | 0 | 0 | 0 |
| MODEL | | VARIANT | TCR/MATERIAL | VALUE | TOLERANCE CODE | PACKAGING CODE |
| PAC100 = 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"

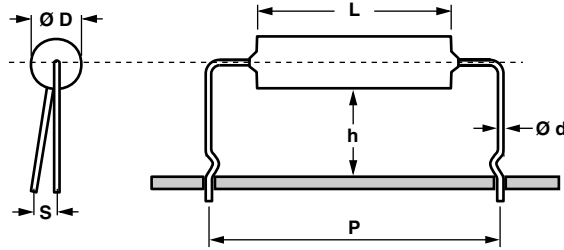
| PACKAGING TABLE | | | | | | | | | |
|-----------------|--------|-----------|-------------|--------|-----------|-------------|---------|-----------|-------------|
| MODEL | AMMO | | | LOOSE | | | BLISTER | | |
| | PIECES | PACK CODE | PACK. DESC. | PIECES | PACK CODE | PACK. DESC. | PIECES | PACK CODE | 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]


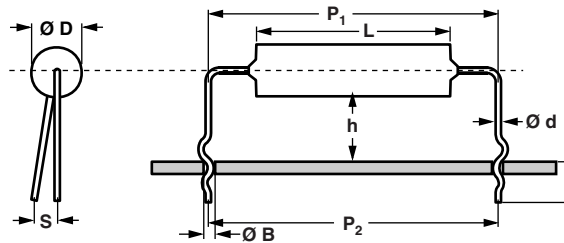
| MODEL | $D_{max.}$ | $L_{max.}$ | d | $X_{max.}$ | G | WEIGHT g PER UNIT |
|-------|-------------|--------------|-------------------------------|------------|------------------------|-------------------|
| PAC01 | 4.3 [0.169] | 11 [0.433] | 0.8 ± 0.03 [0.031 ± 0.001] | 2 | 63 ± 1 [2.480 ± 0.039] | 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

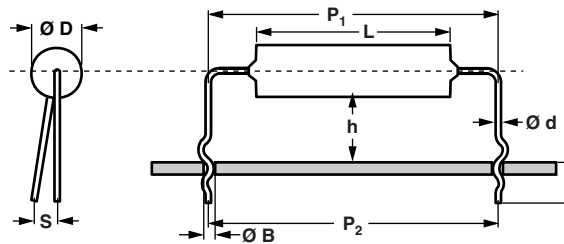
- For packaging dimensions see: www.vishay.com/doc?28721

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


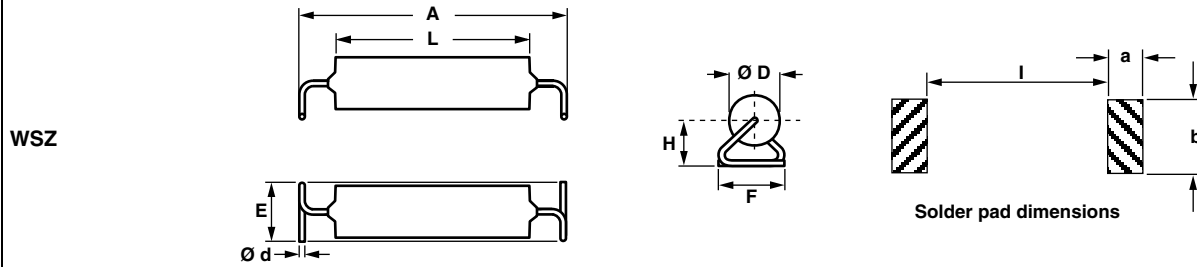
| TYPE | Ø D | Ø D _{max.} | L | h ± 1 | P ₁ ± 1 | P ₂ ± 3 | S _{max.} | Ø B | c |
|---------------|-----|---------------------|-----|-------|--------------------|--------------------|-------------------|-----------|---------|
| PAC01 | 0.8 | (1) | (1) | 8 | 19.8 | 17.8 | 2 | 1.0 ± 0.1 | 4.5 ± 1 |
|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

DOUBLE KINK LP = DK LP


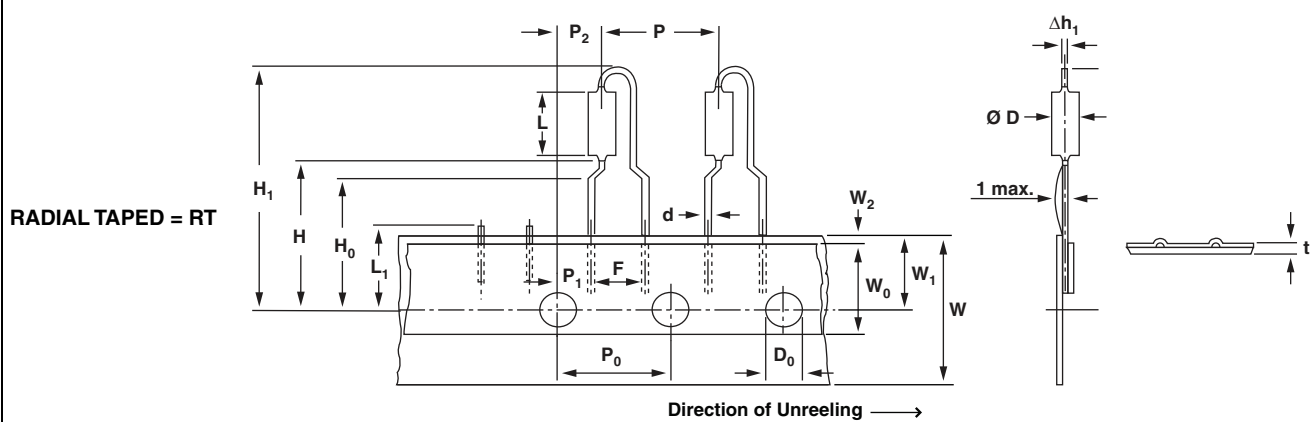
| TYPE | Ø D | Ø D _{max.} | L | h ± 1 | P ₁ ± 1 | P ₂ ± 3 | S _{max.} | Ø B | c |
|---------------|-----|---------------------|-----|-------|--------------------|--------------------|-------------------|-----------|---------|
| PAC01 - PAC02 | 0.8 | (1) | (1) | 8 | 17.8 | 17.8 | 2 | 1.0 ± 0.1 | 4.5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

Note

(1) See table DIMENSIONS

BENDING FORMS


| 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 |


TYPE PAC01

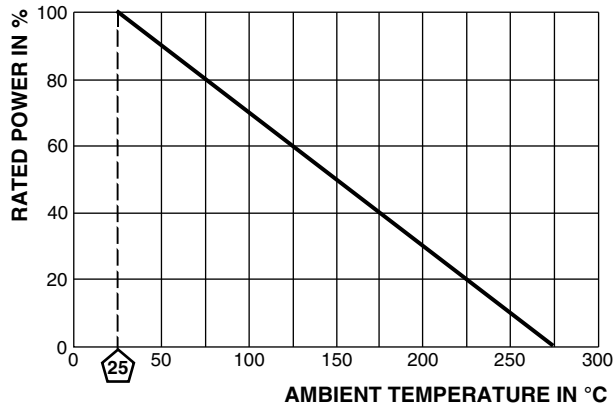
| | | |
|--|-----------------|------------------|
| Lead Ø | Ø d | 0.8 |
| Diameter | Ø D | (1) |
| Length | L | (1) |
| Pitch of components | P | 12.7 ± 1.0 |
| Pitch of spocket holes (2) | P ₀ | 12.7 ± 0.3 |
| Distance between hole center and resistor center | P ₁ | 3.85 ± 0.7 |
| Distance between 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 kΩ | 2 |
| 10 to 12 kΩ | 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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