

# DATA SHEET

## WIREWOUND RESISTORS

High Power

PNP Series

$\pm 1\%$ ,  $\pm 5\%$

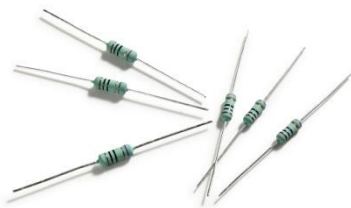
1W to 4W

RoHS compliant & Halogen Free



Product specification – August 3, 2022 V.1





**ORDERING INFORMATION**

Part number of the high power wirewound resistor are identified by the series, power rating, tolerance, packing, temperature coefficient, forming and resistance value.

**PART NUMBER**

|            |            |          |          |          |            |            |
|------------|------------|----------|----------|----------|------------|------------|
| <u>PNP</u> | <u>200</u> | <u>F</u> | <u>I</u> | <u>F</u> | <u>73-</u> | <u>10R</u> |
| (1)        | (2)        | (3)      | (4)      | (5)      | (6)        | (7)        |

**APPLICATIONS**

- Power applications
- Home appliance
- Industry

**FEATURES**

- Ultra miniature size
- Wide resistance range
- Stable performance and high reliability
- Flameproof coating equivalent to UL-94V-0
- RoHS compliant & halogen free

**(1) SERIES**

PNP Series

**(2) POWER RATING**

|          |          |
|----------|----------|
| 100 = 1W | 300 = 3W |
| 200 = 2W | 400 = 4W |

**(3) TOLERANCE**

|         |         |
|---------|---------|
| F = ±1% | J = ±5% |
|---------|---------|

**(4) PACKAGING TYPE**

|               |         |
|---------------|---------|
| R = Reel Pack | B= Bulk |
| T= Box Pack   |         |

**(5) TEMPERATURE COEFFICIENT OF RESISTANCE**

|              |                    |
|--------------|--------------------|
| F=±100ppm/°C | - = Based on spec. |
|--------------|--------------------|

**(6) FORMING**

|                    |                      |
|--------------------|----------------------|
| 52- = 52.4mm       | FFK = F-form Kink    |
| 73- = 73mm         | FKK = FKK Type       |
| M = M-Type Forming | FT = FT Type Forming |
| MB = M-form W/flat | PN = PANAsert        |
| F = F Type         | AV = AVIsert         |
| FK = FK Type       |                      |

**(7) RESISTANCE VALUE**

E24 & E96 Series  
 Example:  
 1R = 1Ω, 10R = 10Ω, 100R = 100Ω

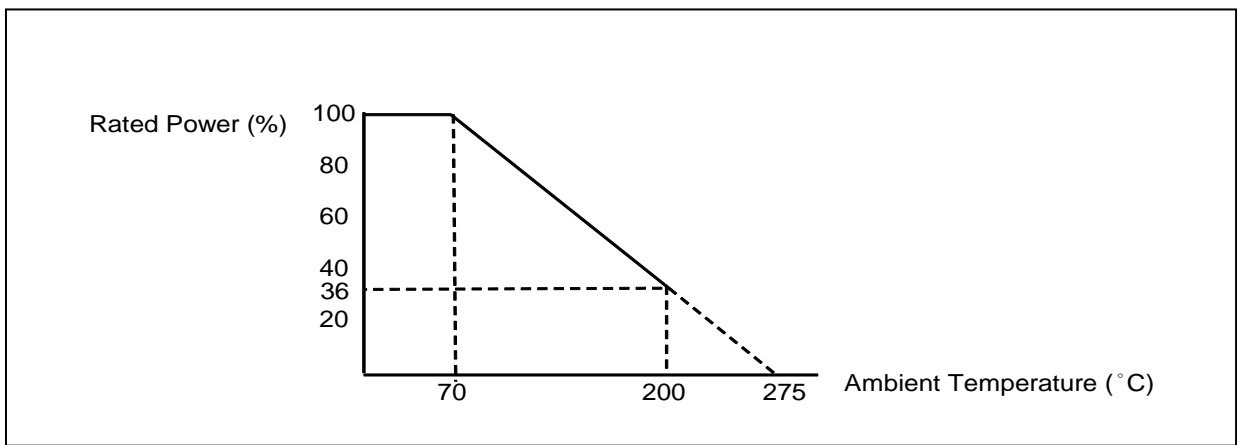
**DIMENSIONS**

Unit: mm



| Ultra Miniature | L          | ψD        | H        | ψd          |
|-----------------|------------|-----------|----------|-------------|
| PNP100          | 6.3 ± 0.5  | 2.5 ± 0.3 | 28 ± 2.0 | 0.55 ± 0.05 |
| PNP200          | 9.0 ± 0.5  | 3.5 ± 0.3 | 26 ± 2.0 | 0.55 ± 0.05 |
| PNP300          | 11.5 ± 1.0 | 4.6 ± 0.5 | 35 ± 2.0 | 0.8 ± 0.05  |
| PNP400          | 15.5 ± 1.0 | 5.2 ± 0.5 | 33 ± 2.0 | 0.8 ± 0.05  |

**DERATING CURVE**



**ELECTRICAL CHARACTERISTICS**

| CHARACTERISTICS             | PNP100           | PNP200    | PNP300     | PNP400     |
|-----------------------------|------------------|-----------|------------|------------|
| Power Rating at 70 °C       | 1W               | 2W        | 3W         | 4W         |
| Resistance Range (±1%)      | 0.22Ω~130Ω       | 0.1Ω~820Ω | 0.1Ω~2.2KΩ | 0.1Ω~2.8KΩ |
| Resistance Range (±5%)      | 0.1Ω~130Ω        | 0.1Ω~820Ω | 0.1Ω~2.2KΩ | 0.1Ω~2.8KΩ |
| Voltage Proof on Insulation | 300V             |           |            |            |
| Maximum working voltage     | √(P X R)         |           |            |            |
| Operating Temp. Range       | - 40°C to +200°C |           |            |            |
| Temperature Coefficient     | ±100ppm/°C       |           |            |            |

Note: For resistance value out of above range is by request.

**TEST AND REQUIREMENTS**

| TEST                          | TEST METHOD      | PROCEDURE  | APPRAISE                                  |
|-------------------------------|------------------|--|---|
| Short Time Overload           | IEC 60115-1 4.13 | 10 times rated power for 5 Sec.  | ±2%+0.05Ω                                 |
| Voltage Proof on Insulation   | IEC 60115-1 4.7  | In V-Block for 60 sec. test voltage as above table                                 | No Breakdown                              |
| Temperature Coefficient       | IEC 60115-1 4.8  | Between -40°C to +155°C  | By Type                                   |
| Insulation Resistance         | IEC 60115-1 4.6  | In V-Block for 60 sec.   | >100MΩ                                    |
| Solderability                 | IEC 60115-1 4.17 | 245±5°C for 3±0.5 Sec.   | 95% Min. coverage                         |
| Solvent Resistance of Marking | IEC 60115-1 4.30 | IPA for 5±0.5 Min. with ultrasonic   | No deterioration of coatings and markings |
| Robustness of Terminations    | IEC 60115-1 4.16 | Direct load for 10 Sec. in the direction of the terminal leads                     | ≥2.5Kg(24.5N)                             |
| Damp Heat Steady State        | IEC 60115-1 4.24 | 40±2°C,90-95% RH for 56 days, loaded with 0.1 times RCWV(or Umax., whichever less) | ±5.0%+0.05Ω                               |
| Endurance at 70°C             | IEC 60115-1 4.25 | 70±2°C at RCWV(or Umax., whichever less) for 1,000 Hr.(1.5 Hr.on,0.5 Hr. off)      | ±5.0%+0.05Ω                               |
| Temperature Cycling           | IEC 60115-1 4.19 | -55°C → Room Temp. → +200°C → Room Temp.(5 cycles)                                 | ±1.0%+0.05Ω                               |
| Resistance to Soldering Heat  | IEC 60115-1 4.18 | 260±3°C for 10±1 Sec., immersed to a point 3±0.5mm from the body                   | ±1.0%+0.05Ω                               |
| Accidental Overload Test      | IEC 60115-1 4.26 | 4 times RCWV for 1 Min.  | No evidence of flaming or arcing          |

Note:.

**RCWV (Rated Continuous Working Voltage ):**

The DC or AC (rms) continuous working voltage corresponding to the rated power is determined by the following formula:

$$V=\sqrt{P \times R}$$

or max. working voltage whichever is less

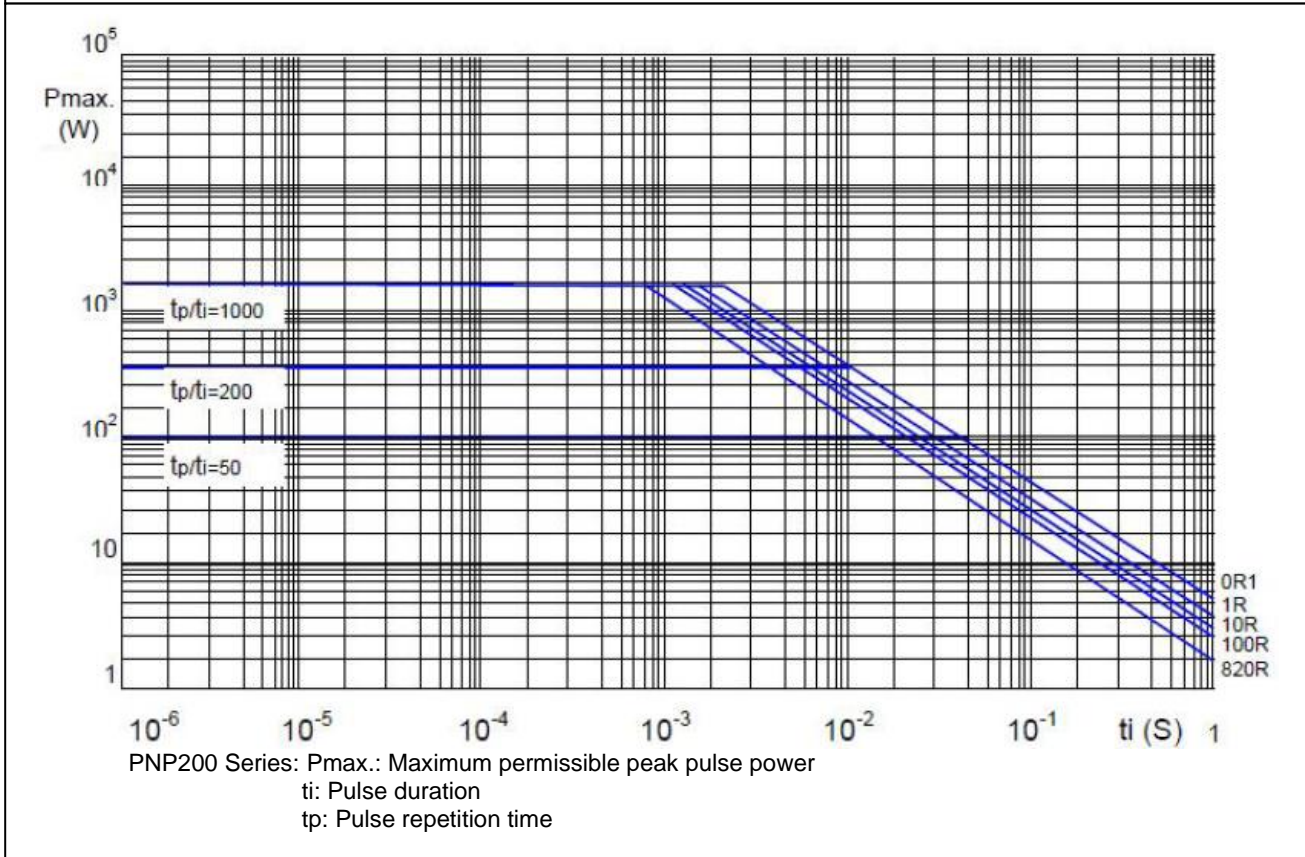
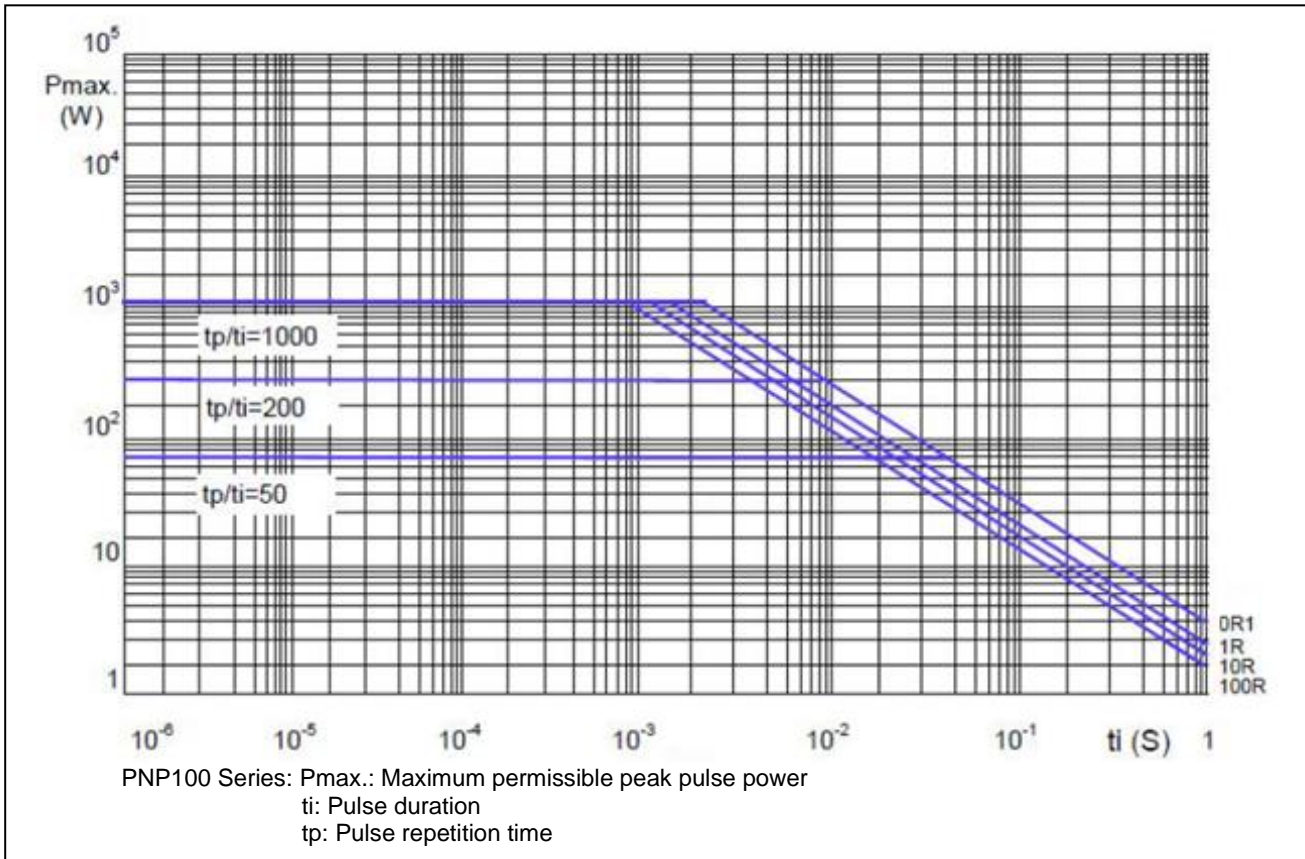
Where

V=Continuous rated DC or AC (rms) working voltage (V)

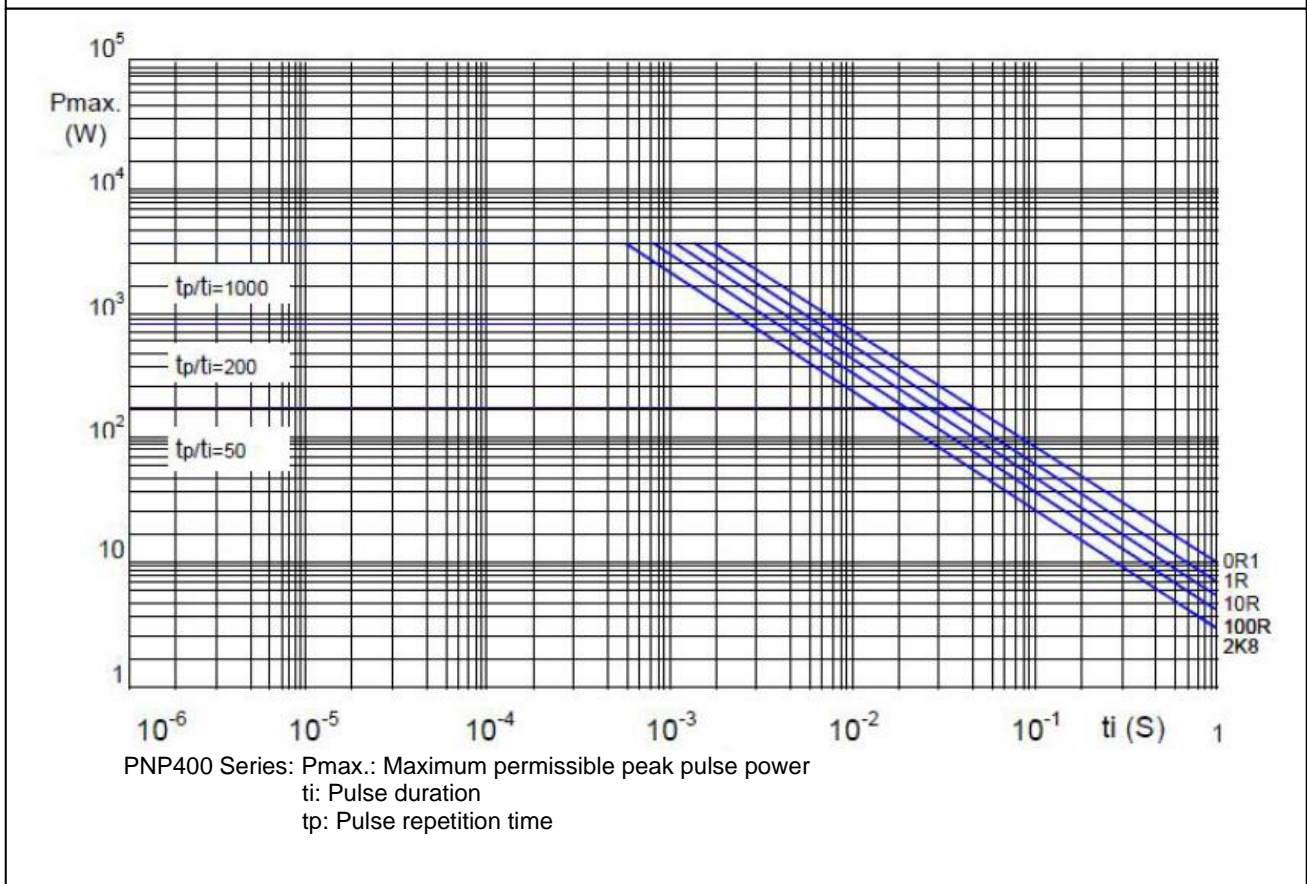
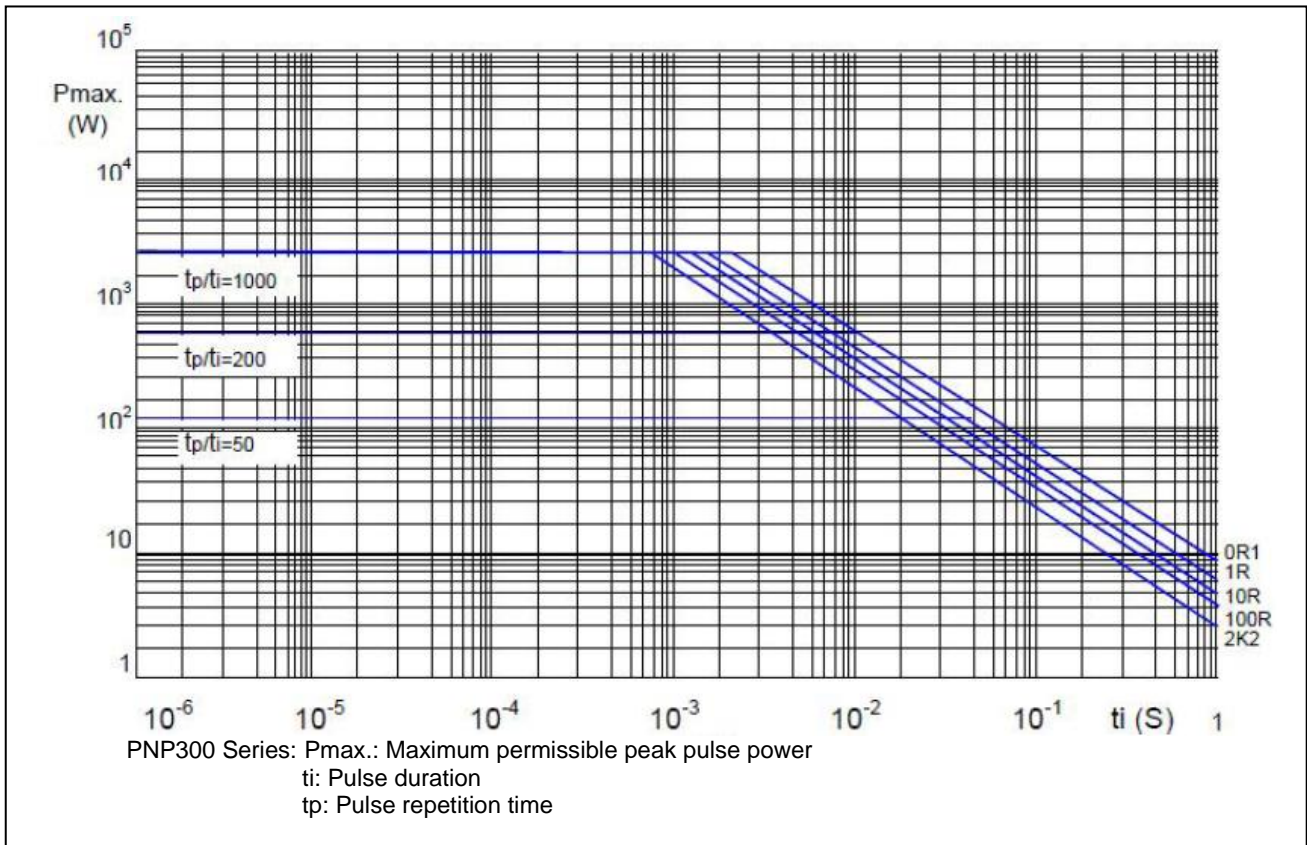
P=Rated power (W)

R=Resistance value (Ω)

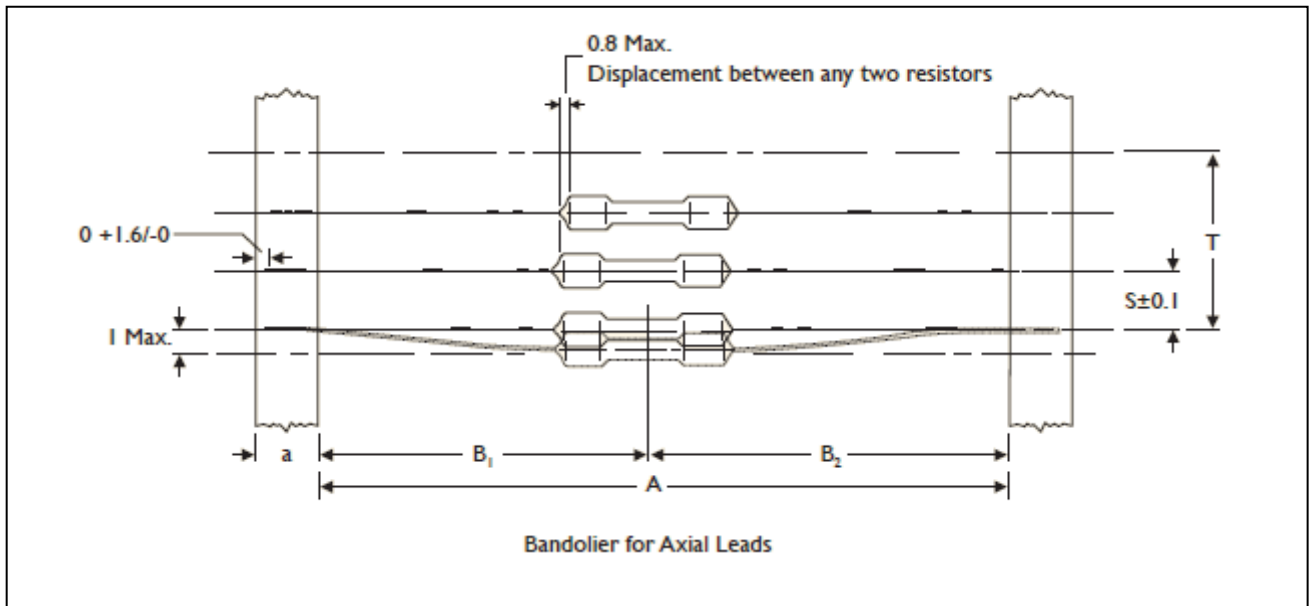
**PULSE DIAGRAMS**







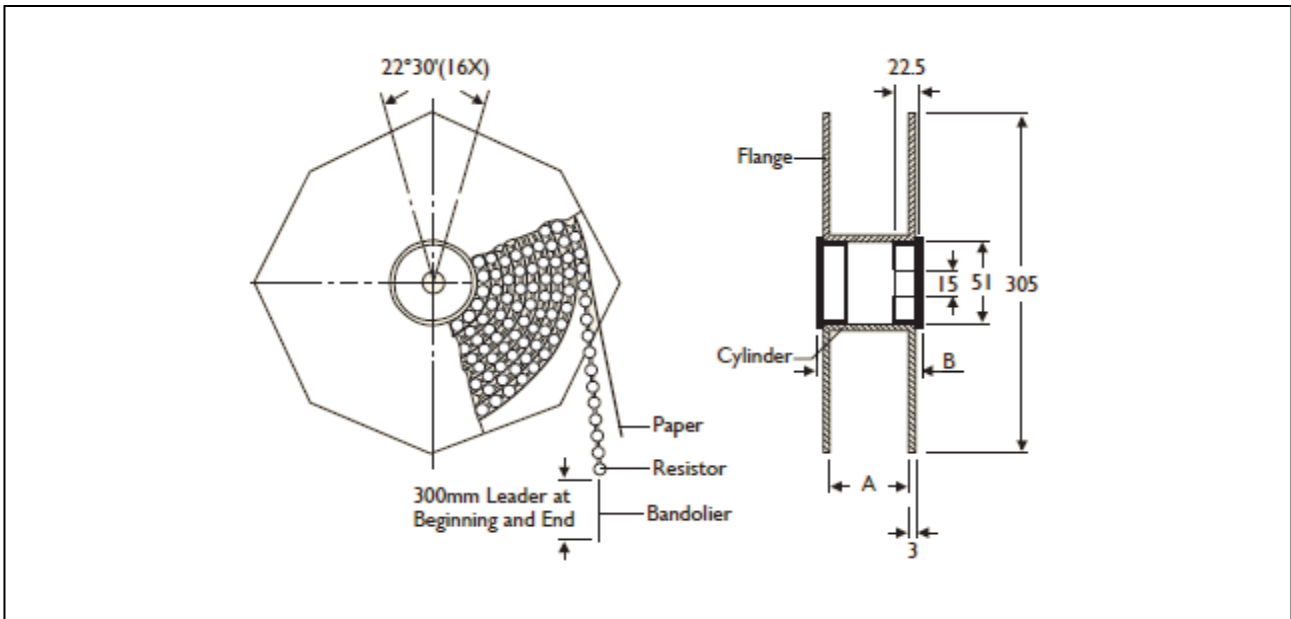
**AXIAL / REEL TAPE SPECIFICATION**



Unit: mm

| Ultra Miniature | a           | A              | B1-B2 (Max.) | S (spacing) | T (max. deviation of spacing)                |
|-----------------|-------------|----------------|--------------|-------------|--|
| PNP100          | $6 \pm 0.5$ | $52.4 \pm 1.5$ | 1.2          | 5           |  |
| PNP200          | $6 \pm 0.5$ | $52.4 \pm 1.5$ | 1.2          | 5           |  |
| PNP300          | $6 \pm 0.5$ | $73.0 \pm 1.5$ | 1.5          | 5           | 1 mm per 10 spacing,<br>0.5 mm per 5 spacing |
|                 |             | $52.4 \pm 1.5$ | 1.2          |             |  |
| PNP400          | $6 \pm 0.5$ | $73.0 \pm 1.5$ | 1.5          | 10          |  |
|                 |             | $52.4 \pm 1.5$ | 1.2          |             |  |

**TAPE ON REEL PACKING**



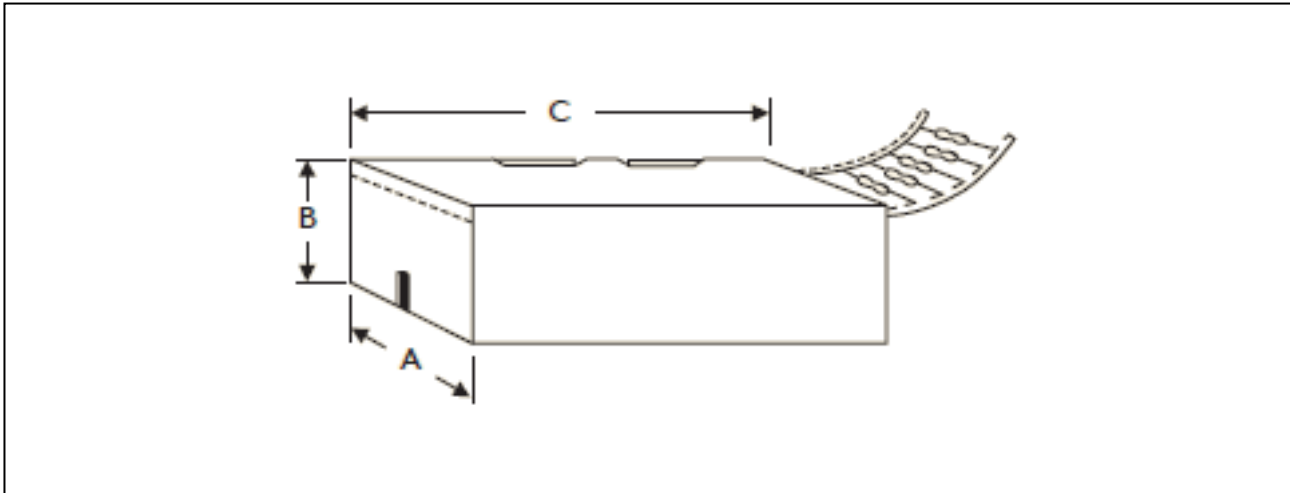
TYPE

Unit: mm/piece

| Ultra Miniature | Across Flange(A) | B    | Quantity Per Reel |
|-----------------|------------------|------|-------------------|
| PNP100          | 66.5             | 75.5 | 5,000             |
| PNP200          | 66.5             | 75.5 | 2,500             |
| PNP300          | 87               | 96   | 2,000             |
| PNP400          | 87               | 96   | 1,000             |



**TAPE ON BOX PACKING**



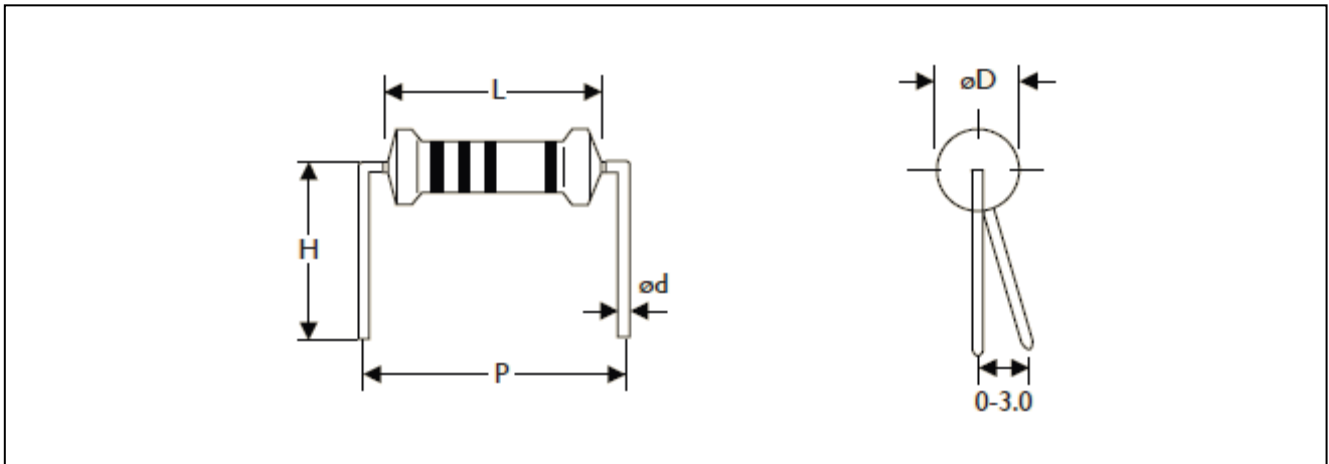
| TYPE            | DIMENSIONS |     |     | Unit: mm/piece   |
|-----------------|------------|-----|-----|------------------|
|                 | A          | B   | C   | Quantity Per Box |
| Ultra Miniature |            |     |     |                  |
| PNP100          | 81         | 104 | 260 | 5,000            |
| PNP200          | 73         | 45  | 258 | 1,000            |
| PNP300          | 81         | 91  | 260 | 1,000            |
| PNP300          | 103        | 78  | 260 | 1,000            |
| PNP400          | 81         | 91  | 260 | 1,000            |
| PNP400          | 103        | 94  | 260 | 1,000            |

**BULK PACKING**

| Ultra Miniature | Piece/Per Inner Box | Bag/Per Inner Box | Piece Per Bag |
|-----------------|---------------------|-------------------|---------------|
| PNP100          | 10,000              | 10                | 1,000         |
| PNP200          | 5,000               | 5                 | 1,000         |
| PNP300          | 2,000               | 4                 | 500           |
| PNP400          | 1,000               | 2                 | 500           |

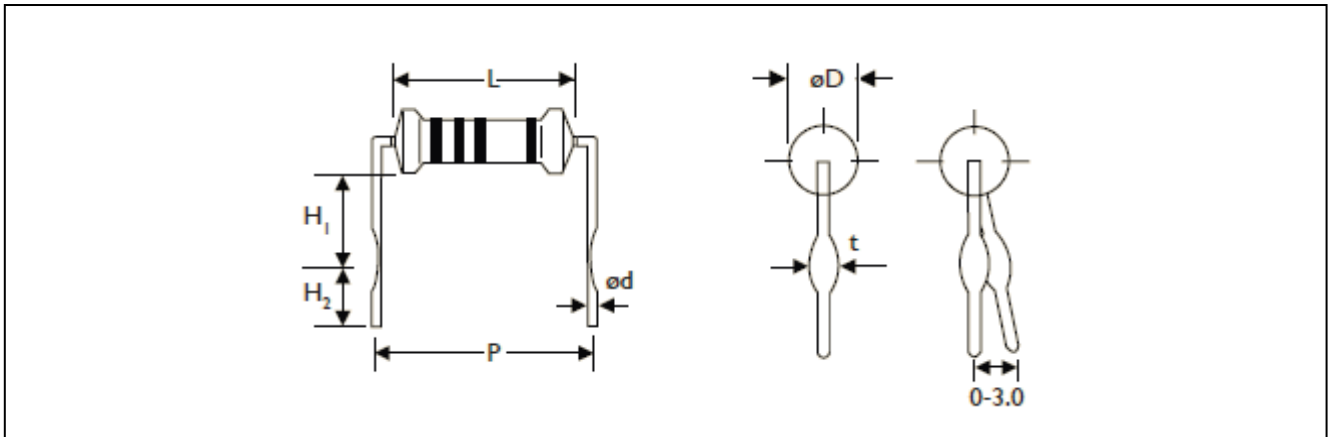
**FORMING**

**M TYPE**



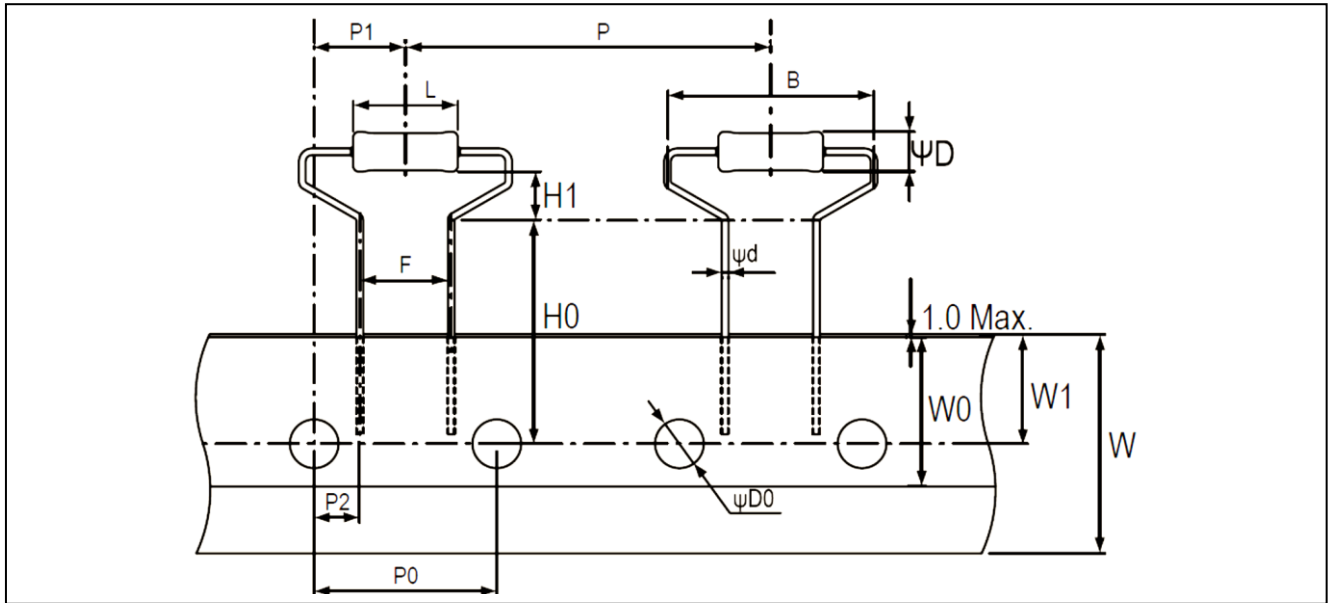
| TYPE            | DIMENSIONS |           |             |          |          | Unit: mm |
|-----------------|------------|-----------|-------------|----------|----------|----------|
| Ultra Miniature | L          | ψD        | ψd          | P        | H        |          |
| PNP100          | 6.3 ± 0.5  | 2.5 ± 0.3 | 0.55 ± 0.05 | 10.0 ± 1 | 10.0 ± 1 |          |
| PNP200          | 9.0 ± 0.5  | 3.5 ± 0.3 | 0.55 ± 0.05 | 12.5 ± 1 | 10.0 ± 1 |          |
| PNP300          | 11.5 ± 1.0 | 4.6 ± 0.5 | 0.8 ± 0.05  | 15.0 ± 1 | 12.5 ± 1 |          |
| PNP400          | 15.5 ± 1.0 | 5.2 ± 0.5 | 0.8 ± 0.05  | 20.0 ± 1 | 15.0 ± 1 |          |

**MB TYPE**



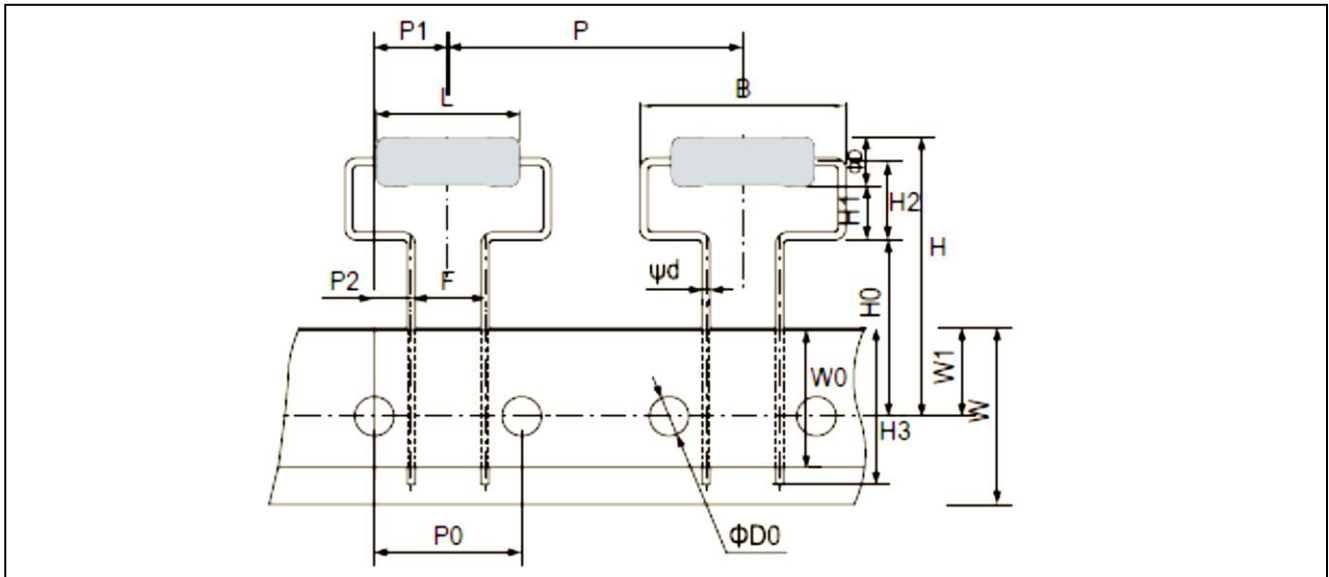
| TYPE            | DIMENSIONS |           |             |          |          |         |           | Unit: mm |
|-----------------|------------|-----------|-------------|----------|----------|---------|-----------|----------|
| Ultra Miniature | L          | ψD        | ψd          | P        | H1       | H2      | t         |          |
| PNP100          | 6.3 ± 0.5  | 2.5 ± 0.3 | 0.55 ± 0.05 | 10.0 ± 1 | 6.0 ± 1  | 5.0 ± 1 | 1.2 ± 0.2 |          |
| PNP200          | 9.0 ± 0.5  | 3.5 ± 0.3 | 0.8 ± 0.05  | 12.5 ± 1 | 6.0 ± 1  | 5.0 ± 1 | 1.4 ± 0.2 |          |
| PNP300          | 11.5 ± 1.0 | 4.6 ± 0.5 | 0.8 ± 0.05  | 15.0 ± 1 | 6.0 ± 1  | 5.0 ± 1 | 1.4 ± 0.2 |          |
| PNP400          | 15.5 ± 1.0 | 5.2 ± 0.5 | 0.8 ± 0.05  | 20.0 ± 1 | 10.0 ± 1 | 5.0 ± 1 | 1.4 ± 0.2 |          |

**MHA TYPE**



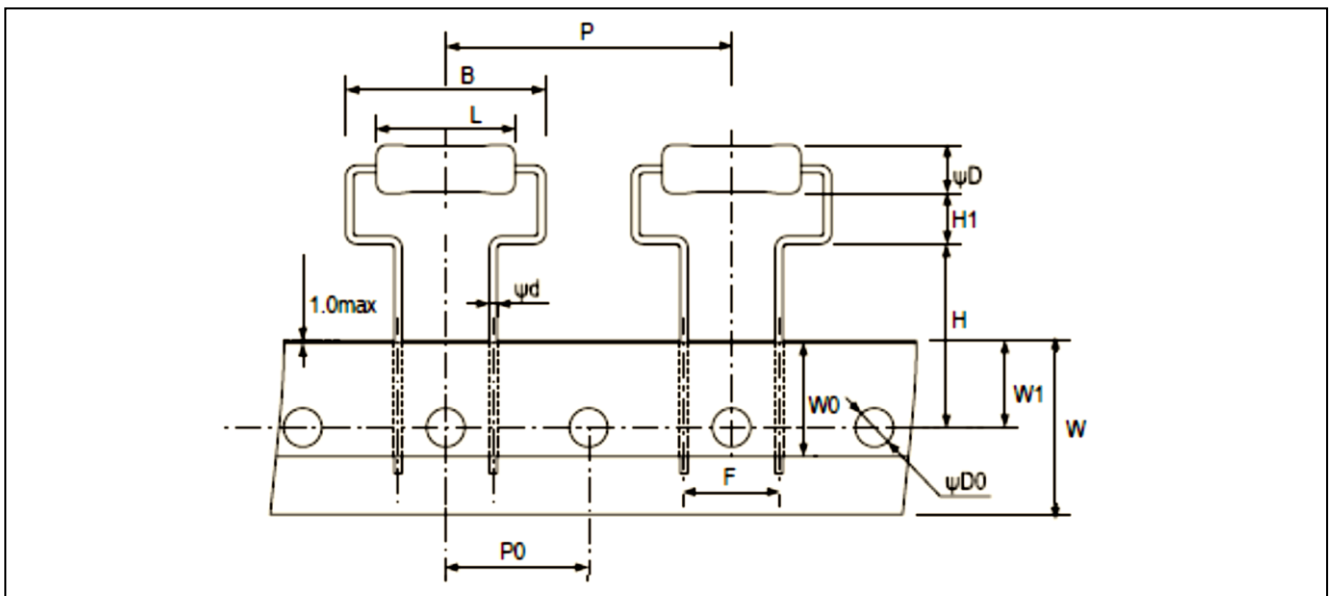
| TYPE             | DIMENSIONS |                            |                            |          |           |           |                             |           | Unit: mm |
|------------------|------------|----------------------------|----------------------------|----------|-----------|-----------|-----------------------------|-----------|----------|
| <b>Miniature</b> | <b>L</b>   | <b><math>\psi D</math></b> | <b><math>\psi d</math></b> | <b>B</b> | <b>H0</b> | <b>H1</b> | <b>P</b>                    | <b>P0</b> |          |
|                  | 9.0±0.5    | 3.5±0.3                    | 0.55±0.05                  | 17.5Max  | 19.0±1.0  | 4.0±1.0   | 30.0±1.0                    | 15.0±0.3  |          |
| <b>PNP200</b>    | <b>P1</b>  | <b>P2</b>                  | <b>F</b>                   | <b>W</b> | <b>W0</b> | <b>W1</b> | <b><math>\psi D0</math></b> |           |          |
|                  | 7.5±1.0    | 3.75±0.5                   | 7.5±0.5                    | 18.0±0.5 | 5.0Min    | 9.0±0.5   | 4.0±0.2                     |           |          |

**MHB TYPE**



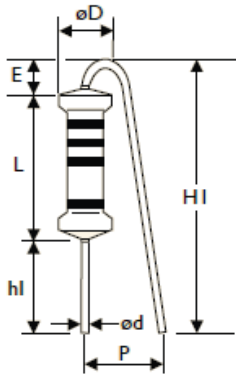
| TYPE      | DIMENSIONS |           |           |           |          |           |           |           |            | Unit: mm |
|-----------|------------|-----------|-----------|-----------|----------|-----------|-----------|-----------|------------|----------|
| Miniature | <b>L</b>   | <b>ψD</b> | <b>ψd</b> | <b>B</b>  | <b>H</b> | <b>H0</b> | <b>H1</b> | <b>H2</b> | <b>H3</b>  |          |
|           | 15.5±1.0   | 5.2±0.5   | 0.8±0.05  | 21.0Max.  | 30Max.   | 18.0±1.0  | 5.5(Ref.) | 8.0±1.5   | 16Max.     |          |
| PNP400    | <b>P</b>   | <b>P0</b> | <b>P1</b> | <b>P2</b> | <b>F</b> | <b>W</b>  | <b>W0</b> | <b>W1</b> | <b>ψD0</b> |          |
|           | 30.0±1.0   | 15.0±0.3  | 7.5±1.0   | 3.75±0.8  | 7.5±0.5  | 18.0±0.5  | 5.0Min.   | 9.0±0.5   | 4.0±0.3    |          |

**MHC TYPE**

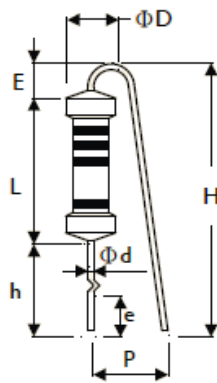


| TYPE      | DIMENSIONS |           |           |           |            |           |          |           |  | Unit: mm |
|-----------|------------|-----------|-----------|-----------|------------|-----------|----------|-----------|--|----------|
| Miniature | <b>L</b>   | <b>ψD</b> | <b>ψd</b> | <b>B</b>  | <b>H</b>   | <b>H1</b> | <b>P</b> | <b>P0</b> |  |          |
|           | 15.5±1.0   | 5.2±0.5   | 0.8±0.05  | 21.0Max.  | 19.0±1.0   | 5.25±1.0  | 30.0±1.0 | 15.0±0.3  |  |          |
| PNP400    | <b>F</b>   | <b>W</b>  | <b>W0</b> | <b>W1</b> | <b>ψD0</b> |           |          |           |  |          |
|           | 10.0±0.5   | 18.0±0.5  | 5.0Min.   | 9.0±0.5   | 4.0±0.2    |           |          |           |  |          |

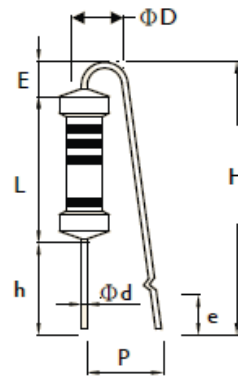
**F TYPE**



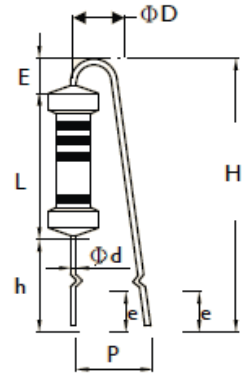
**FK TYPE**



**FFK TYPE**

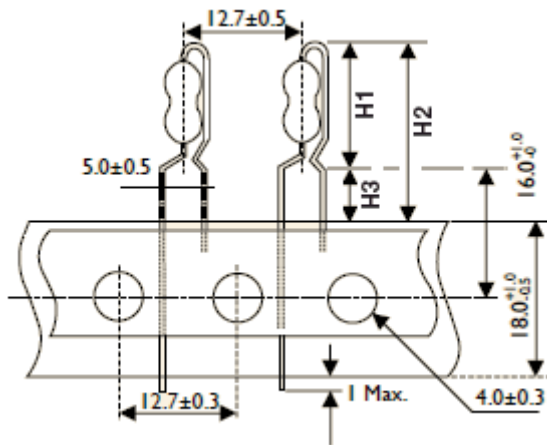


**FKK TYPE**

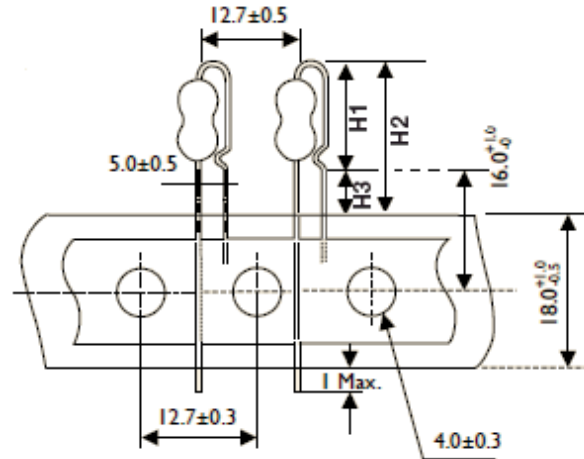


| TYPE            | DIMENSIONS |          |           |     |     |        |     |         |        |       | Unit: mm |
|-----------------|------------|----------|-----------|-----|-----|--------|-----|---------|--------|-------|----------|
| Ultra Miniature | L          | $\psi D$ | $\psi d$  | P   | h   | H Max. | hl  | HI Max. | E Max. | e     |          |
| PNP200          | 9.0±0.5    | 3.5±0.3  | 0.55±0.05 | 6±1 | 8±1 | 22     | 5±1 | 18.5    | 3.5    | 3.5±1 |          |
| PNP300          | 11.5±1     | 4.6±0.5  | 0.8±0.05  | 6±1 | 8±1 | 24     | 5±1 | 20      | 3.5    | 3.5±1 |          |
| PNP400          | 15.5±1     | 5.2±0.5  | 0.8±0.05  | 8±1 | 8±1 | 28     | 5±1 | 25      | 3.5    | 3.5±1 |          |

**PN TYPE (Taping Pack)**



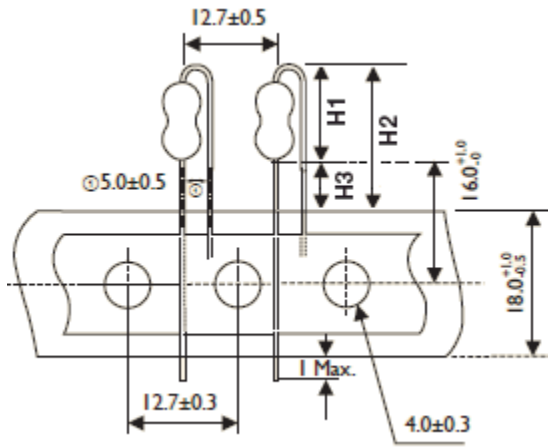
**AV TYPE (Taping Pack)**



| TYPE            | DIMENSIONS |         |         | Unit: mm |
|-----------------|------------|---------|---------|----------|
| Ultra Miniature | H1 Max.    | H2 Max. | H3 Max. |          |
| PNP100          | 13         | 21.5    | 8.5     |          |
| PNP200          | 17         | 25.5    | 8.5     |          |
| PNP300          | 19         | 27.5    | 8.5     |          |

| TYPE            | DIMENSIONS |         |         | Unit: mm |
|-----------------|------------|---------|---------|----------|
| Ultra Miniature | H1 Max.    | H2 Max. | H3 Max. |          |
| PNP100          | 11.5       | 20      | 8.5     |          |
| PNP200          | 14.5       | 23      | 8.5     |          |
| PNP300          | 17.5       | 26      | 8.5     |          |

**FT TYPE (Taping Pack)**



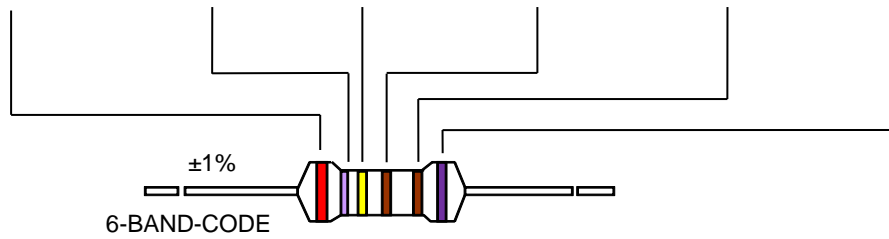
| TYPE   | DIMENSIONS |            |            | Unit: mm |
|--------|------------|------------|------------|----------|
|        | H1<br>Max. | H2<br>Max. | H3<br>Max. |          |
| PNP100 | 10         | 18.5       | 8.5        |          |
| PNP200 | 13         | 21.5       | 8.5        |          |
| PNP300 | 16         | 24.5       | 8.5        |          |



**MARKING**



| COLOR  | 1st BAND | 2nd BAND | 3rd BAND | MULTIPLIER | TOLERANCE   |
|--------|----------|----------|----------|------------|-------------|
| BLACK  | 0        | 0        | 0        | 1Ω         |             |
| BROWN  | 1        | 1        | 1        | 10Ω        | ± 1 % ( F ) |
| RED    | 2        | 2        | 2        | 100Ω       |             |
| ORANGE | 3        | 3        | 3        | 1KΩ        |             |
| YELLOW | 4        | 4        | 4        | 10KΩ       |             |
| GREEN  | 5        | 5        | 5        | 100KΩ      |             |
| BLUE   | 6        | 6        | 6        | 1MΩ        |             |
| VIOLET | 7        | 7        | 7        | 10MΩ       | PNP Series  |
| GREY   | 8        | 8        | 8        |            |             |
| WHITE  | 9        | 9        | 9        |            |             |
| GOLD   |          |          |          | 0.1Ω       | ± 5 % ( J ) |
| SILVER |          |          |          | 0.01Ω      |             |



**REVISION HISTORY**

| REVISION  | DATE        | CHANGE NOTIFICATION | DESCRIPTION                               |
|-----------|-------------|---------------------|---|
| Version 0 | Aug.2, 2021 | -                   | - First issue of this specification       |
| Version 1 | Aug.3, 2022 | -                   | - Update the resistance value description |

*“ Yageo reserves all the rights for revising the content of this datasheet without further notification, as long as the products itse If are unchanged. Any product change will be announced by PCN.”*

## **LEGAL DISCLAIMER**

Yageo, its distributors and agents (collectively, "Yageo"), hereby disclaims any and all liabilities for any errors, inaccuracies or incompleteness contained in any product related information, including but not limited to product specifications, datasheets, pictures and/or graphics. Yageo may make changes, modifications and/or improvements to product related information at any time and without notice.

Yageo makes no representation, warranty, and/or guarantee about the fitness of its products for any particular purpose or the continuing production of any of its products. To the maximum extent permitted by law, Yageo disclaims (i) any and all liability arising out of the application or use of any Yageo 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 a particular purpose, non-infringement and merchantability.

Yageo statements regarding the suitability of products for certain types of applications are based on Yageo's knowledge of typical operating conditions for such types of applications in a generic nature. Such statements are neither binding statements of Yageo nor intended to constitute any warranty concerning the suitability for a specific customer application or use. They are intended for use only by customers with requisite knowledge and experience for determining whether Yageo products are the correct products for their application or use. In addition, unpredictable and isolated cases of product failure may still occur, therefore, customer application or use of Yageo products which requires higher degree of reliability or safety, shall employ additional protective safeguard measures to ensure that product failure would not result in personal injury or property damage.

Yageo products are not designed for application or use in medical, life-saving, or life-sustaining devices or for any other application or use in which the failure of Yageo products could result in personal injury or death. Customers using or selling Yageo products not expressly indicated for above-mentioned purposes shall do so at their own risk and agree to fully indemnify Yageo and hold Yageo harmless.

Information provided here is intended to indicate product specifications only. Yageo reserves all the rights for revising this content without further notification, as long as products are unchanged. Any product change will be announced by PCN.