

DATA SHEET

METAL OXIDE FILM RESISTORS

General Purpose, Flameproof

RSF Series

±2%, ±5%

1/4W to 5W

RoHS compliant & Halogen Free





APPLICATIONS

- All general purpose applications
- Power applications

FEATURES

- Wide resistance range
- High stability
- Flameproof coating equivalent to UL-94V-0
- RoHS compliant and halogen free

ORDERING INFORMATION

Part number of the metal oxide film resistor is identified by the series, power rating, tolerance, packing, temperature coefficient, forming and resistance value.

PART NUMBER

| | | | | | | |
|------------|------------|----------|----------|----------|------------|-------------|
| <u>RSF</u> | <u>100</u> | <u>J</u> | <u>I</u> | <u>-</u> | <u>73-</u> | <u>100R</u> |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) |

(1) SERIES

RSF Series

(2) POWER RATING

-50 = 1/2W

3WS = 3W

1WS = 1W

300 = 3W

100 = 1W

5WS = 5W

2WS = 2W

5SS = 5W

200 = 2W

500 = 5W

3WM = 3W

(3) TOLERANCE

G = $\pm 2\%$

J = $\pm 5\%$

(4) PACKAGING

R = Reel Pack

B = Bulk

T = Box Pack

(5) TEMPERATURE COEFFICIENT OF RESISTANCE

- = Based on spec.

(6) FORMING

26- = 26mm

FFK = F-form Kink

52- = 52.4mm

FKK = FKK Type

73- = 73mm

FT = FT Type Forming

91- = 91mm

MT = MT Type Forming

M = M-Type Forming

PN = PANAsert

MB = M-form W/flat

AV = AVIsert

F = F Type

FK = FK Type

(7) RESISTANCE VALUE

E24 Series

Example:

1R=1 Ω , 100R= 100 Ω , 1K = 1,000 Ω

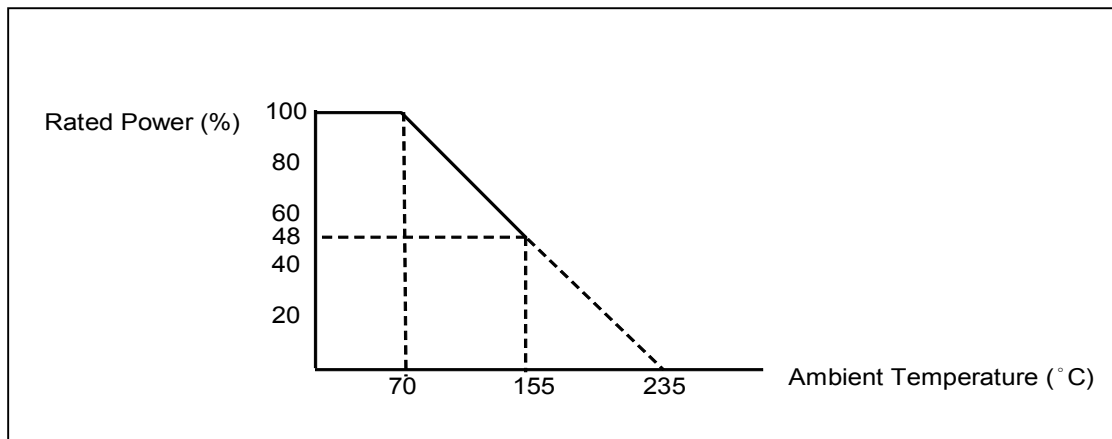
DIMENSIONS

Unit: mm



| Normal | Miniature | L | ψD | H | φd |
|--------|-----------|------------|-----------|----------|-------------|
| RSF-50 | RSF1WS | 9.0 ± 0.5 | 3.3 ± 0.3 | 26 ± 2.0 | 0.55 ± 0.05 |
| RSF100 | RSF2WS | 11.5 ± 1.0 | 4.5 ± 0.5 | 35 ± 2.0 | 0.8 ± 0.05 |
| RSF200 | RSF3WS | 15.5 ± 1.0 | 5.0 ± 0.5 | 33 ± 2.0 | 0.8 ± 0.05 |
| RSF3WM | RSF5SS | 17.5 ± 1.0 | 6.5 ± 1.0 | 32 ± 2.0 | 0.8 ± 0.05 |
| RSF300 | RSF5WS | 24.5 ± 1.0 | 8.5 ± 1.0 | 38 ± 2.0 | 0.8 ± 0.05 |
| RSF500 | - | 24.5 ± 1.0 | 8.5 ± 1.0 | 38 ± 2.0 | 0.8 ± 0.05 |

DERATING CURVE



ELECTRICAL CHARACTERISTICS

| CHARACTERISTICS | RSF-50 | RSF100 | RSF200 | RSF3WM | RSF300 | RSF500 |
|-----------------------------|-------------------------------|--------|--------|--------|--------|--------|
| Power Rating at 70 °C | 1/2W | 1W | 2W | 3W | 3W | 5W |
| Maximum working voltage | 250V | 350V | 350V | 450V | 500V | 750V |
| Maximum overload voltage | 400V | 600V | 600V | 700V | 800V | 1000V |
| Voltage Proof on Insulation | 350V | 500V | 500V | 500V | 500V | 500V |
| Resistance Range | 1Ω – 1MΩ for E24 series value | | | | | |
| Operating Temp. Range | - 55°C to +155°C | | | | | |
| Temperature Coefficient | ±300ppm/°C | | | | | |

Note: For resistance value out of above range is by request. Below 10Ω and over 100K(excluded) are using alloy film.

| CHARACTERISTICS | RSF1WS | RSF2WS | RSF3WS | RSF5SS | RSF5WS |
|-----------------------------|-------------------------------|--------|--------|--------|--------|
| Power Rating at 70 °C | 1W | 2W | 3W | 5W | 5W |
| Maximum working voltage | 300V | 350V | 350V | 500V | 700V |
| Maximum overload voltage | 500V | 600V | 600V | 800V | 900V |
| Voltage Proof on Insulation | 400V | 500V | 500V | 500V | 500V |
| Resistance Range | 1Ω – 1MΩ for E24 series value | | | | |
| Operating Temp. Range | - 55°C to +155°C | | | | |
| Temperature Coefficient | ±300ppm/°C | | | | |

Note: For resistance value out of above range is by request. Below 10Ω and over 100K(excluded) are using alloy film.

TEST AND REQUIREMENTS

| TEST | TEST METHOD | PROCEDURE | APPRAISE |
|-------------------------------|------------------|--|---|
| Short Time Overload | IEC 60115-1 4.13 | 2.5 times RCWV for 5 sec. (Not more than maximum overload voltage) | ±1%+0.05Ω for normal style ±2%+0.05Ω for miniature style |
| 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 -55°C to +155°C | By Type |
| Insulation Resistance | IEC 60115-1 4.6 | In V-Block for 60 sec. | >1,000MΩ |
| 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) |
| Periodic-pulse Overload | IEC 60115-1 4.39 | 4 times RCWV 10,000 cycles (1 Sec. on, 25 Sec. off) | ±2.0%+0.05Ω |
| Damp Heat Steady State | IEC 60115-1 4.24 | 40±2°C, 90-95% RH for 56 days, loaded with 0.1 times RCWV | ±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. → +155°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

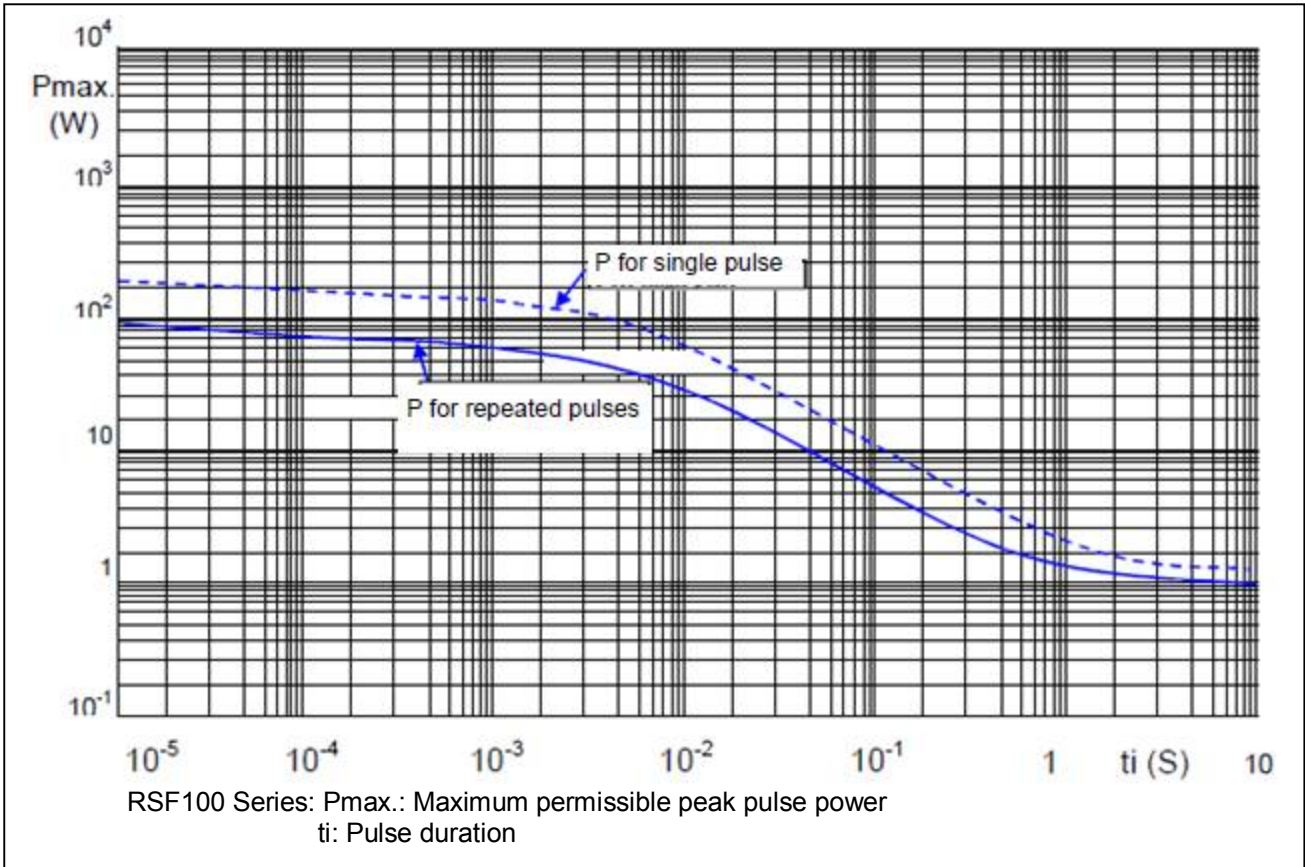
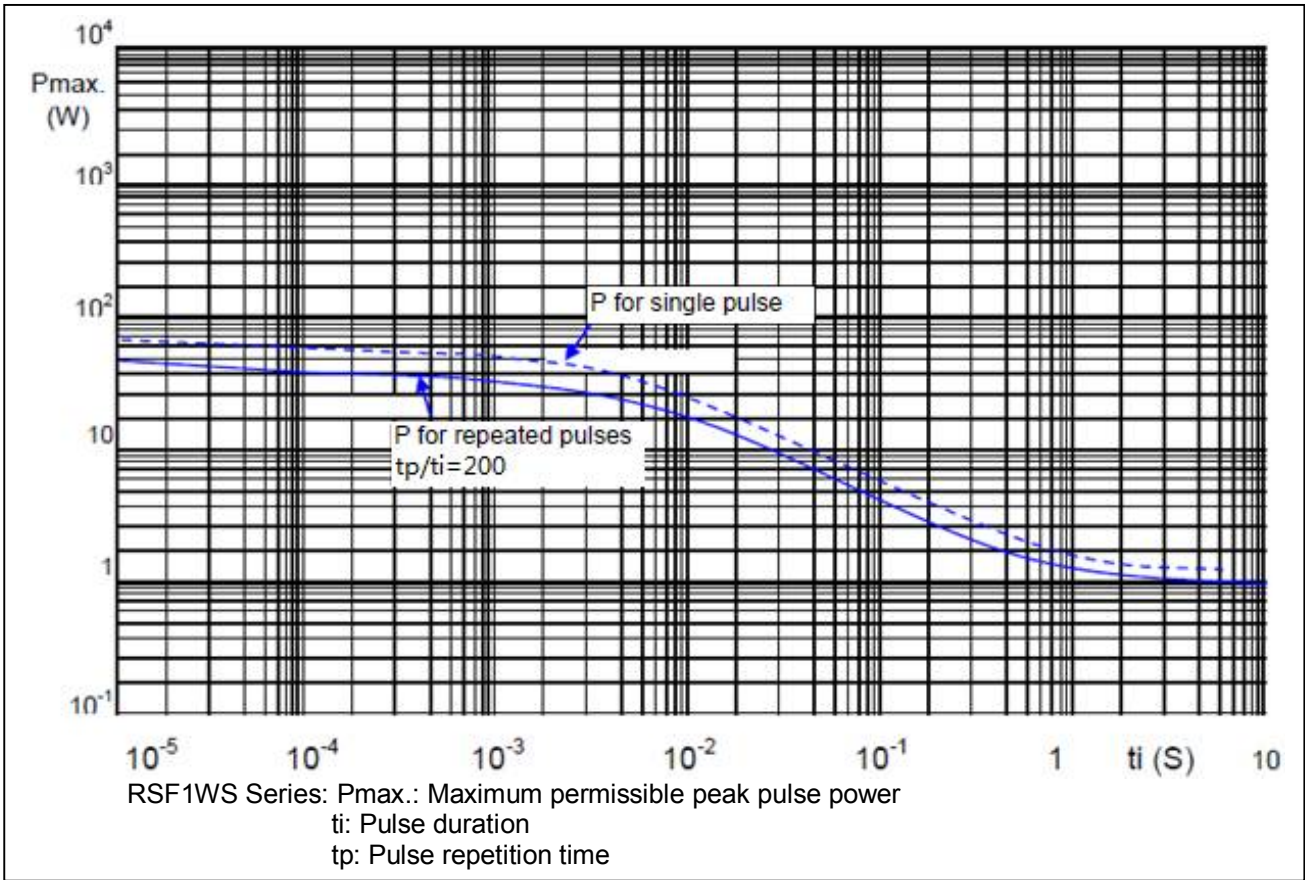
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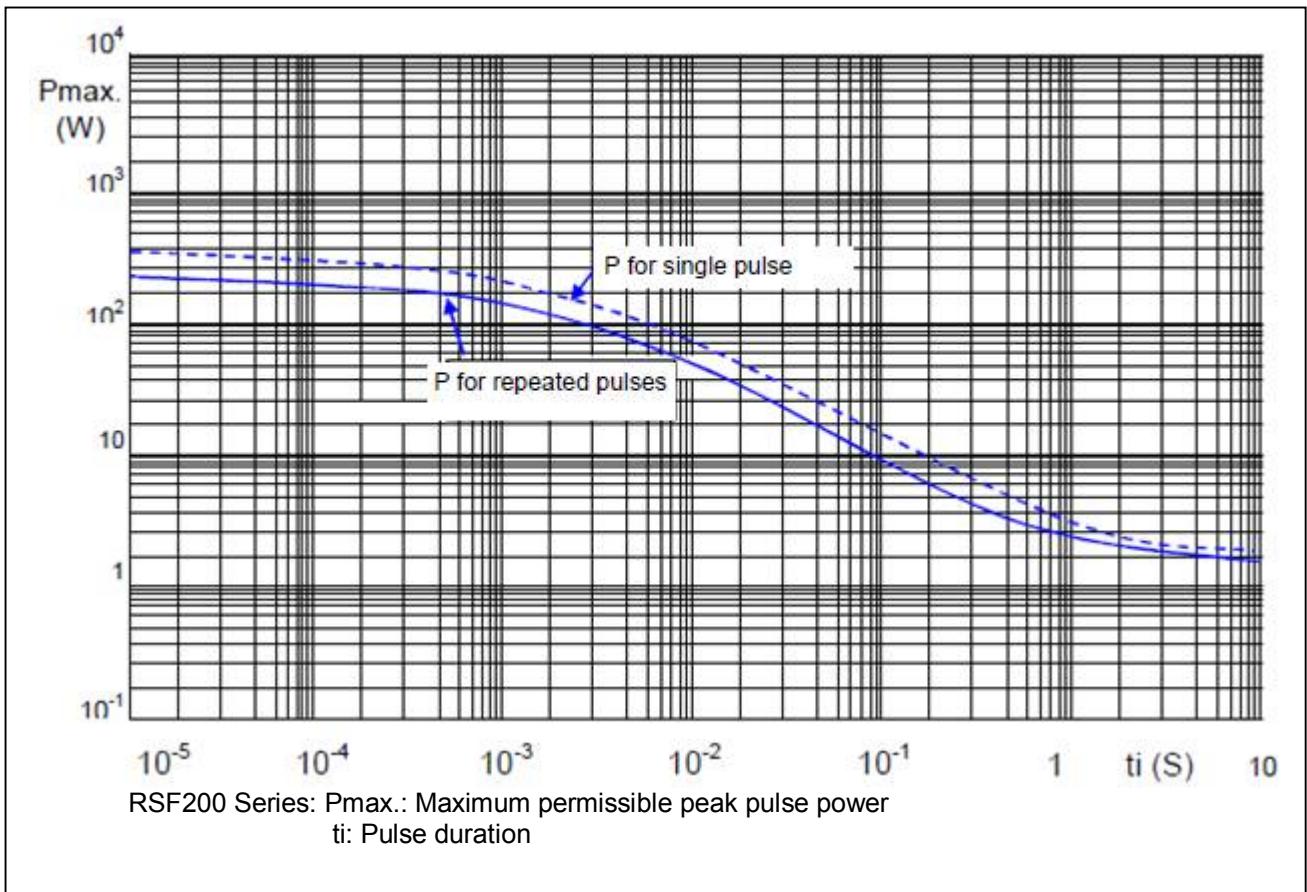
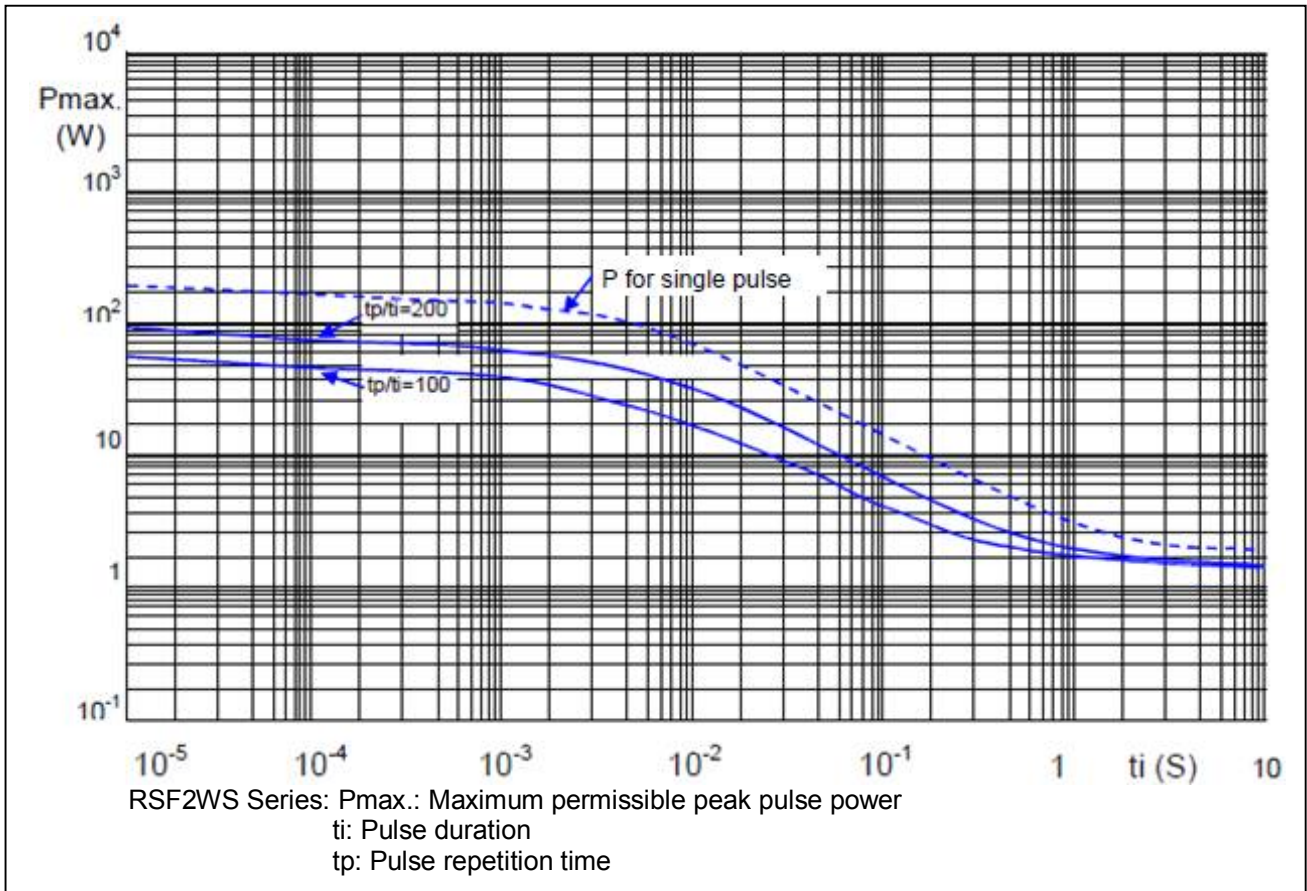
V=Continuous rated DC or
AC (rms) working voltage (V)

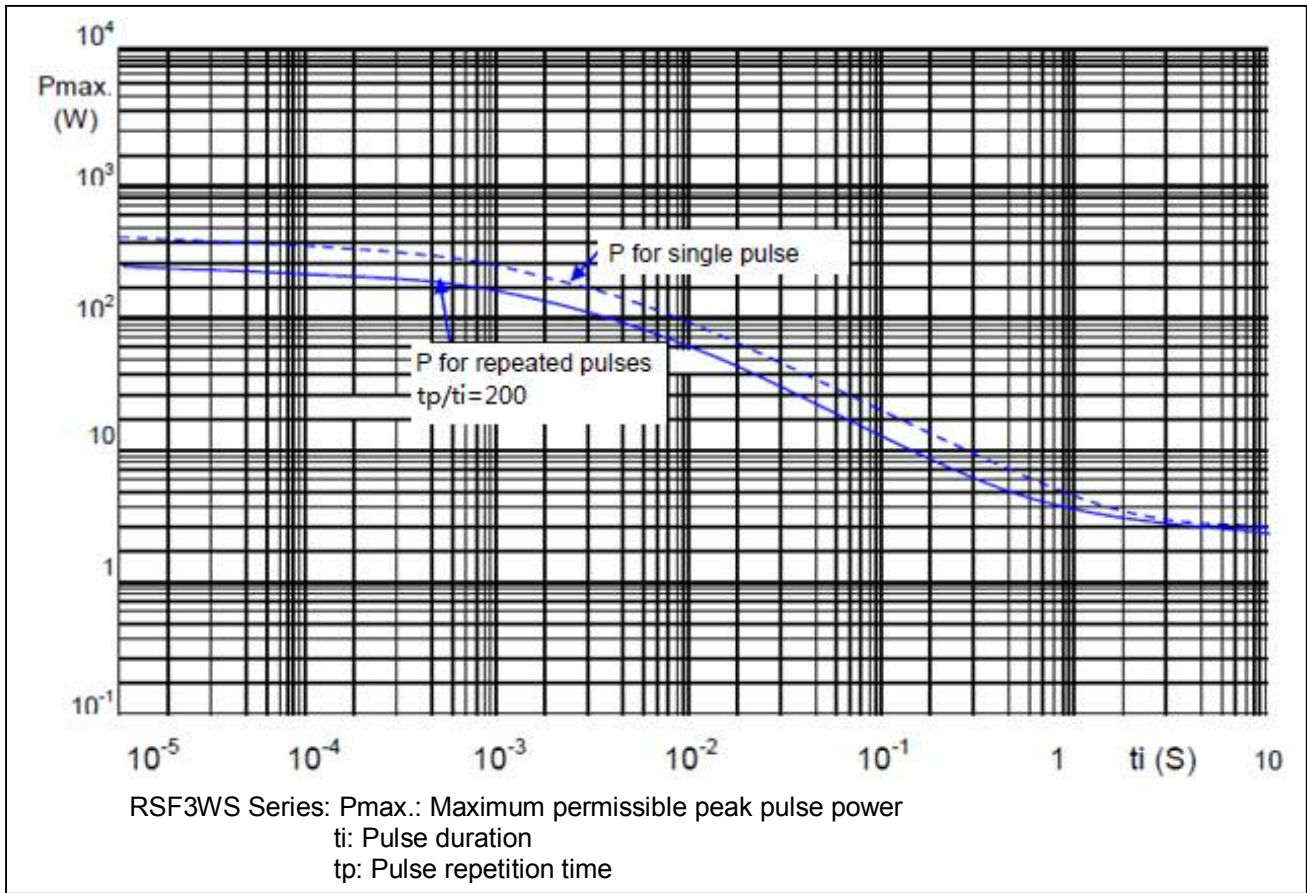
P=Rated power (W)

R=Resistance value (Ω)

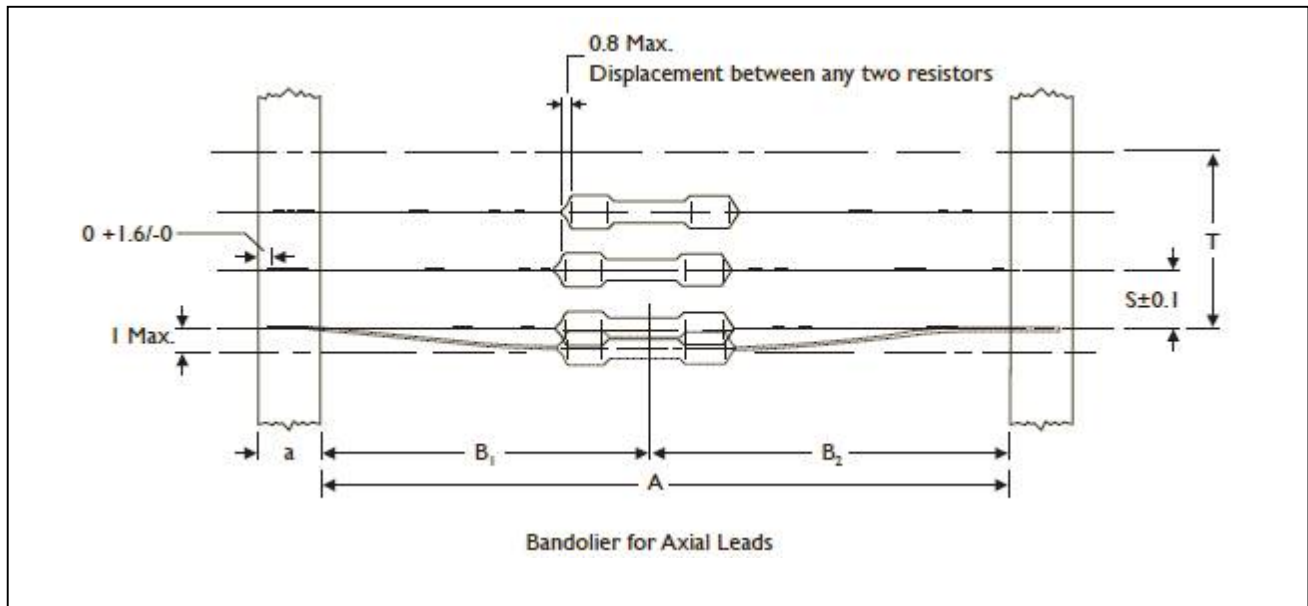
PULSE DIAGRAMS







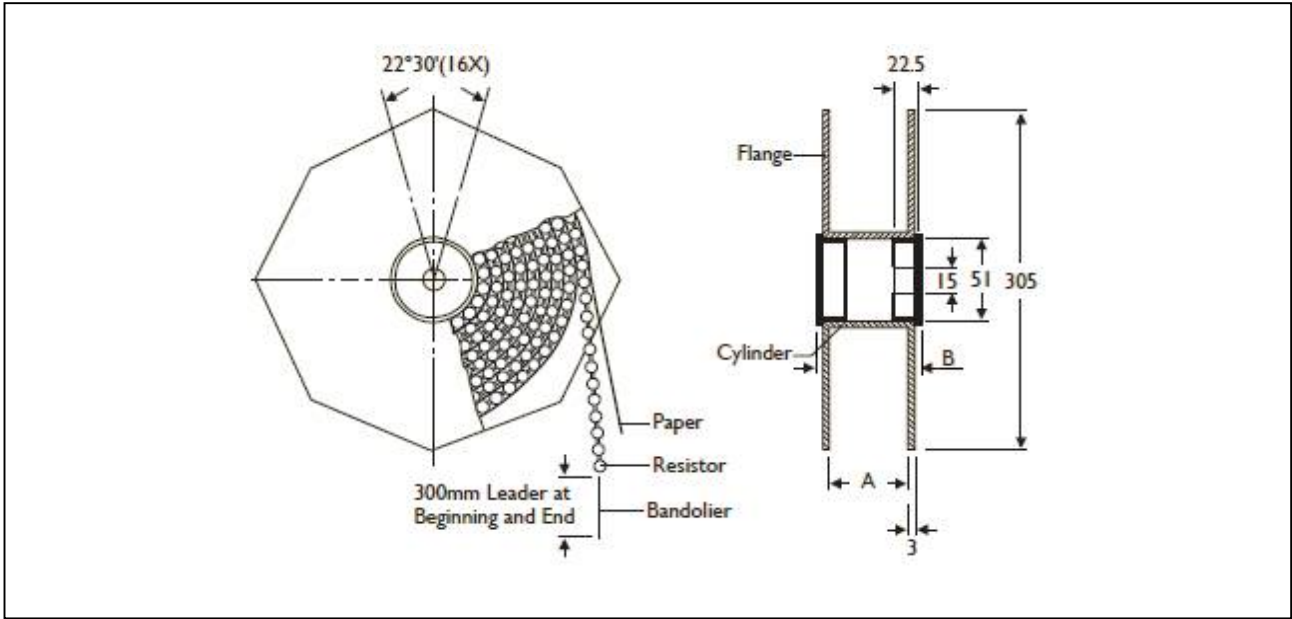
AXIAL / REEL TAPE SPECIFICATION



Unit: mm

| Normal | Miniature | a | A | B1-B2 (Max.) | S (spacing) | T (max. deviation of spacing) |
|--------|-----------|---------|------------|--------------|-------------|--|
| RSF-50 | RSF1WS | 6 ± 0.5 | 52.4 ± 1.5 | 1.2 | 5 | 1 mm per 10 spacing, 0.5 mm per 5 spacing |
| RSF100 | RSF2WS | 6 ± 0.5 | 73.0 ± 1.5 | 1.5 | 5 | |
| RSF200 | RSF3WS | 6 ± 0.5 | 52.4 ± 1.5 | 1.2 | 10 | |
| RSF3WM | RSF5SS | 6 ± 0.5 | 73.0 ± 1.5 | 1.5 | 10 | |
| RSF300 | RSF5WS | 6 ± 0.5 | 91.0 ± 1.5 | 1.5 | 10 | |
| RSF500 | - | 6 ± 0.5 | 91.0 ± 1.5 | 1.5 | 10 | |

TAPE ON REEL PACKING

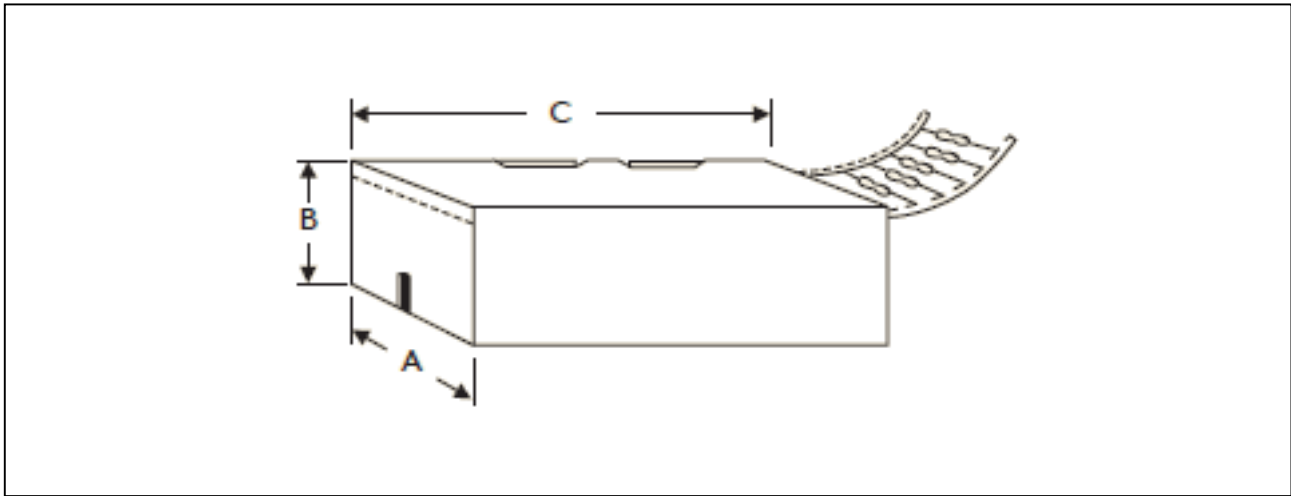


TYPE

Unit: mm/piece

| Normal | Miniature | Across Flange(A) | B | Quantity Per Reel |
|--------|-----------|------------------|------|-------------------|
| RSF-50 | RSF1WS | 66.5 | 75.5 | 2,500 |
| RSF100 | RSF2WS | 87 | 96 | 2,000 |
| RSF200 | RSF3WS | 87 | 96 | 1,000 |
| RSF3WM | RSF5SS | 87 | 96 | 1,000 |

TAPE ON BOX PACKING



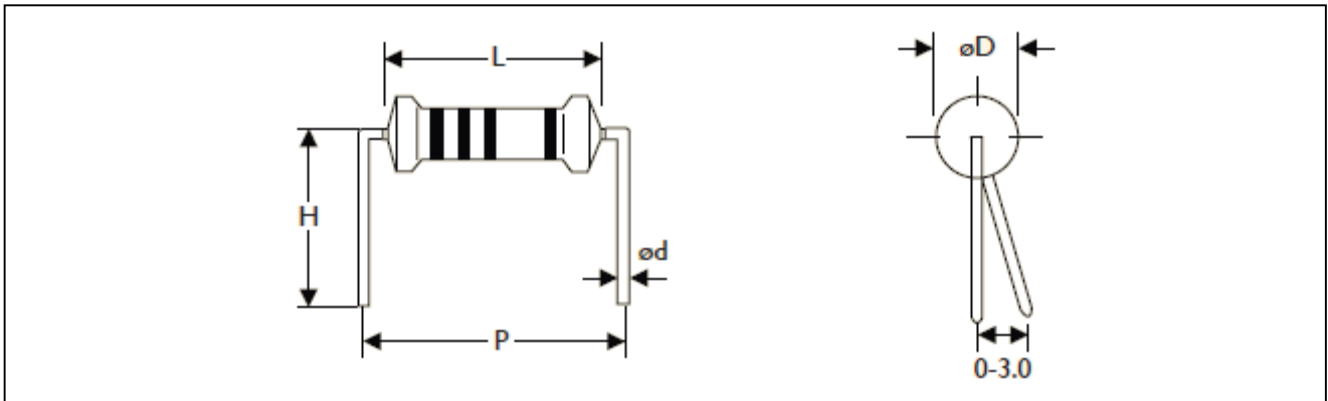
| TYPE | | DIMENSIONS | | | Unit: mm/piece |
|--------|-----------|------------|----|-----|------------------|
| Normal | Miniature | A | B | C | Quantity Per Box |
| RSF-50 | RSF1WS | 73 | 45 | 258 | 1,000 |
| RSF100 | RSF2WS | 81 | 91 | 260 | 1,000 |
| RSF100 | RSF2WS | 103 | 78 | 260 | 1,000 |
| RSF200 | RSF3WS | 81 | 91 | 260 | 1,000 |
| RSF200 | RSF3WS | 103 | 94 | 260 | 1,000 |
| RSF3WM | RSF5SS | 103 | 78 | 260 | 500 |
| RSF300 | RSF5WS | 116 | 79 | 255 | 250 |
| RSF500 | - | 116 | 79 | 255 | 250 |

BULK PACKING

| Normal | Miniature | Piece/Per Inner Box | Bag/Per Inner Box | Piece Per Bag |
|--------|-----------|---------------------|-------------------|---------------|
| RSF-50 | RSF1WS | 5,000 | 5 | 1,000 |
| RSF100 | RSF2WS | 2,000 | 4 | 500 |
| RSF200 | RSF3WS | 1,000 | 2 | 500 |
| RSF3WM | RSF5SS | 1,000 | 2 | 500 |
| RSF300 | RSF5WS | 500 | 10 | 50 |
| RSF500 | - | 500 | 10 | 50 |

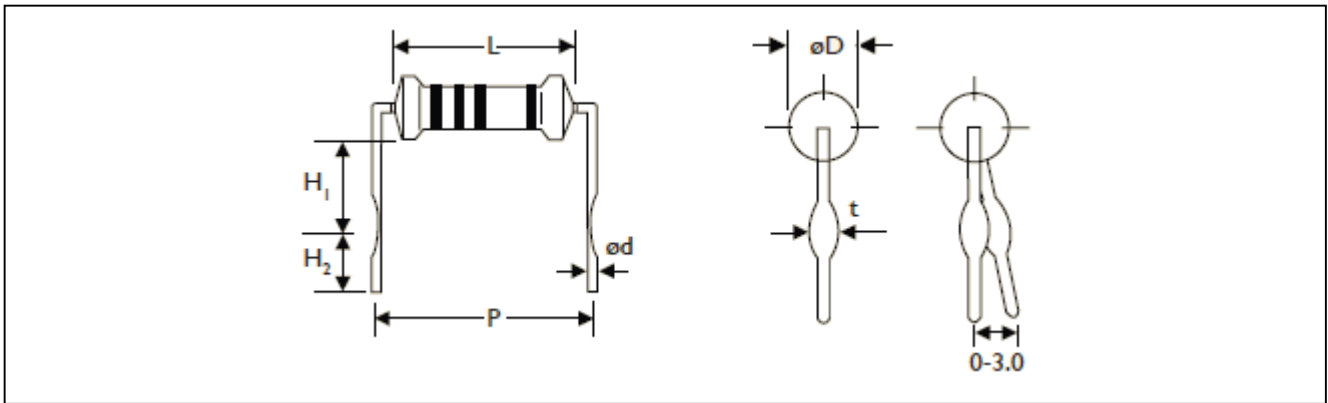
FORMING

M TYPE



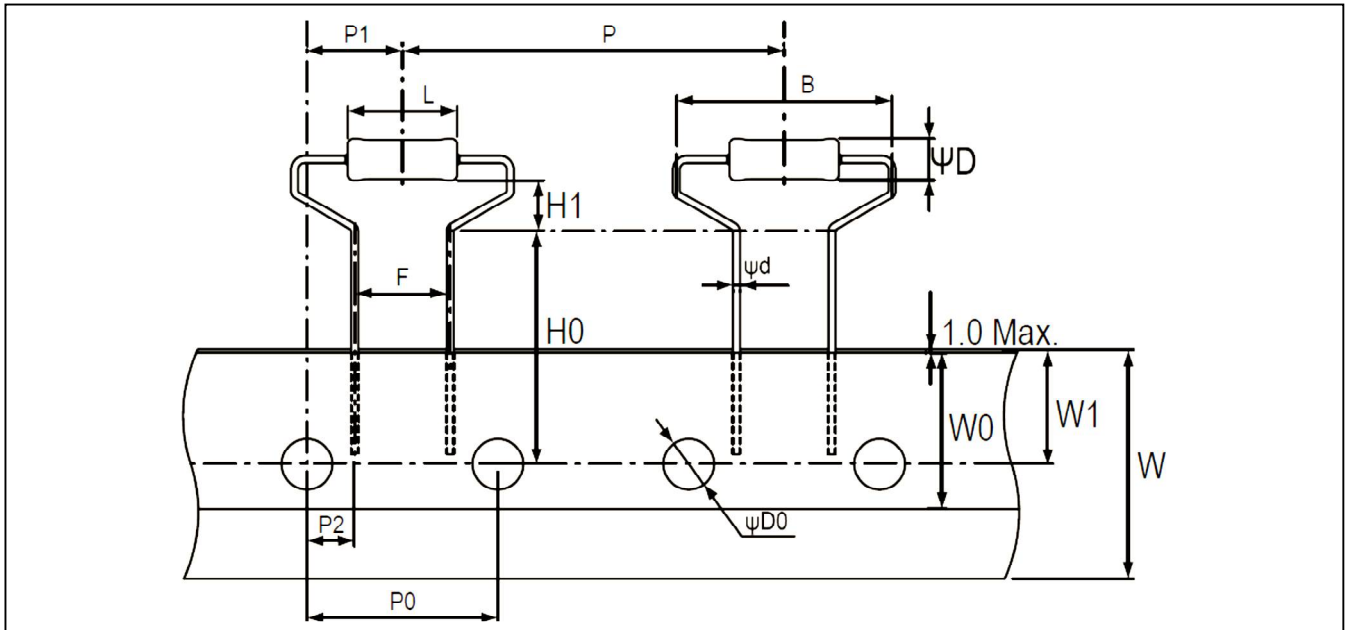
| TYPE | | DIMENSIONS | | | | | Unit: mm |
|--------|-----------|----------------|---------------|-----------------|--------------|--------------|----------|
| Normal | Miniature | L | ψD | ψd | P | H | |
| RSF-50 | RSF1WS | 9.0 ± 0.5 | 3.3 ± 0.3 | 0.55 ± 0.05 | 12.5 ± 1 | 10.0 ± 1 | |
| RSF100 | RSF2WS | 11.5 ± 1.0 | 4.5 ± 0.5 | 0.8 ± 0.05 | 15.0 ± 1 | 12.5 ± 1 | |
| RSF200 | RSF3WS | 15.5 ± 1.0 | 5.0 ± 0.5 | 0.8 ± 0.05 | 20.0 ± 1 | 15.0 ± 1 | |
| RSF3WM | RSF5SS | 17.5 ± 1.0 | 6.5 ± 1.0 | 0.8 ± 0.05 | 25.0 ± 1 | 15.0 ± 1 | |
| RSF300 | RSF5WS | 24.5 ± 1.0 | 8.5 ± 1.0 | 0.8 ± 0.05 | 30.0 ± 1 | 15.0 ± 1 | |

MB TYPE



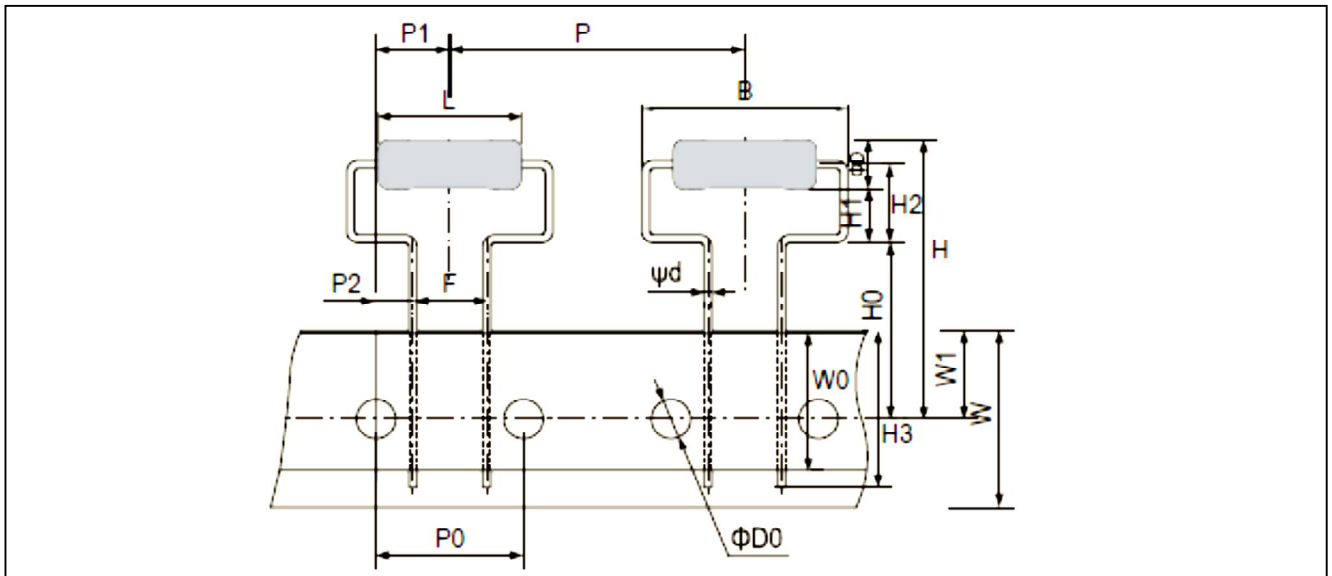
| TYPE | | DIMENSIONS | | | | | | | Unit: mm |
|--------|-----------|------------|-----------|-------------|----------|----------|---------|-----------|----------|
| Normal | Miniature | L | ψD | ψd | P | H1 | H2 | t | |
| RSF-50 | - | 9.0 ± 0.5 | 3.3 ± 0.3 | 0.55 ± 0.05 | 12.5 ± 1 | 6.0 ± 1 | 5.0 ± 1 | 1.2 ± 0.2 | |
| - | RSF1WS | 9.0 ± 0.5 | 3.3 ± 0.3 | 0.8 ± 0.05 | 12.5 ± 1 | 6.0 ± 1 | 5.0 ± 1 | 1.4 ± 0.2 | |
| RSF100 | RSF2WS | 11.5 ± 1.0 | 4.5 ± 0.5 | 0.8 ± 0.05 | 15.0 ± 1 | 6.0 ± 1 | 5.0 ± 1 | 1.4 ± 0.2 | |
| RSF200 | RSF3WS | 15.5 ± 1.0 | 5.0 ± 0.5 | 0.8 ± 0.05 | 20.0 ± 1 | 10.0 ± 1 | 5.0 ± 1 | 1.4 ± 0.2 | |
| RSF3WM | RSF5SS | 17.5 ± 1.0 | 6.5 ± 1.0 | 0.8 ± 0.05 | 25.0 ± 1 | 10.0 ± 1 | 5.0 ± 1 | 1.4 ± 0.2 | |
| RSF300 | RSF5WS | 24.5 ± 1.0 | 8.5 ± 1.0 | 0.8 ± 0.05 | 30.0 ± 1 | 15.0 ± 1 | 5.0 ± 1 | 1.4 ± 0.2 | |
| RSF500 | - | 24.5 ± 1.0 | 8.5 ± 1.0 | 0.8 ± 0.05 | 30.0 ± 1 | 15.0 ± 1 | 5.0 ± 1 | 1.4 ± 0.2 | |

MHA TYPE



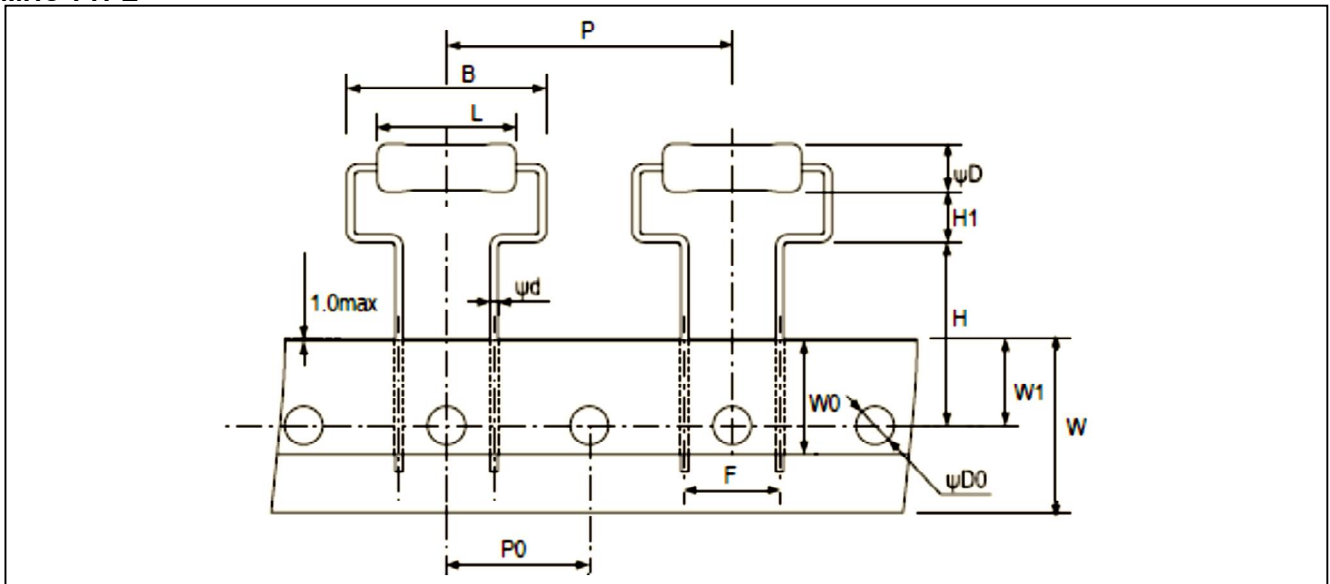
| TYPE | | DIMENSIONS | | | | | | | | Unit: mm |
|---------------|------------------|------------|----------------------------|----------------------------|----------|-----------|-----------|-----------------------------|-----------|----------|
| Normal | Miniature | L | ψD | ψd | B | H0 | H1 | P | P0 | |
| | | 9.0±0.5 | 3.3±0.3 | 0.55±0.05 | 17.5Max | 19.0±1.0 | 4.0±1.0 | 30.0±1.0 | 15.0±0.3 | |
| RSF-50 | RSF1WS | P1 | P2 | F | W | W0 | W1 | $\psi D0$ | | |
| | | 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 |
|---------------|------------------|------------|----------------------------|----------------------------|-----------|----------|-----------|-----------|-----------|-----------------------------|----------|
| Normal | Miniature | L | ψD | ψd | B | H | H0 | H1 | H2 | H3 | |
| | | 15.5±1.0 | 5.0±0.5 | 0.8±0.05 | 21.0Max. | 30Max. | 18.0±1.0 | 5.5(Ref.) | 8.0±1.5 | 16Max. | |
| RSF200 | RSF3WS | P | P0 | P1 | P2 | F | W | W0 | W1 | $\psi D0$ | |
| | | 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



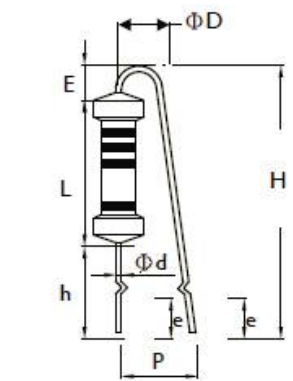
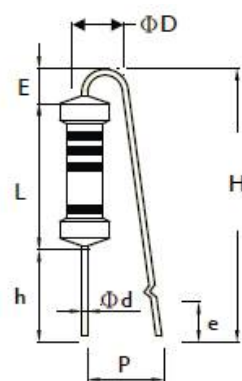
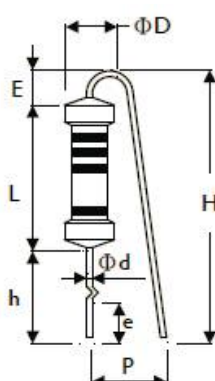
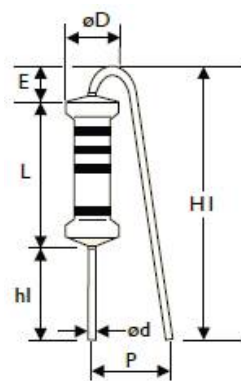
| TYPE | | DIMENSIONS | | | | | | | | Unit: mm |
|---------------|------------------|------------|-----------|-----------|-----------|------------|-----------|----------|-----------|----------|
| Normal | Miniature | L | ψD | ψd | B | H | H1 | P | P0 | |
| | | 15.5±1.0 | 5.0±0.5 | 0.8±0.05 | 21.0Max. | 19.0±1.0 | 5.25±1.0 | 30.0±1.0 | 15.0±0.3 | |
| RSF200 | RSF3WS | F | W | W0 | W1 | ψD0 | | | | |
| | | 10.0±0.5 | 18.0±0.5 | 5.0Min. | 9.0±0.5 | 4.0±0.2 | | | | |

F TYPE

FK TYPE

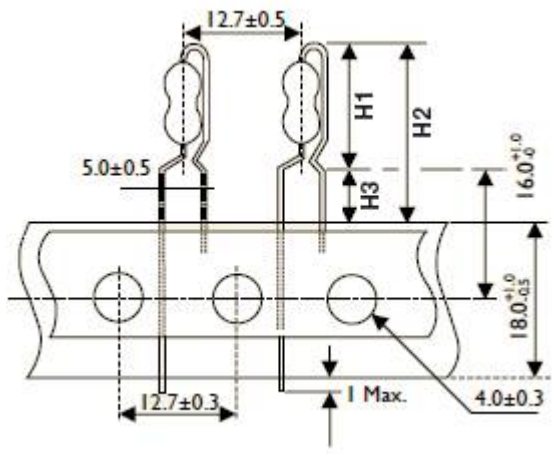
FFK TYPE

FKK TYPE

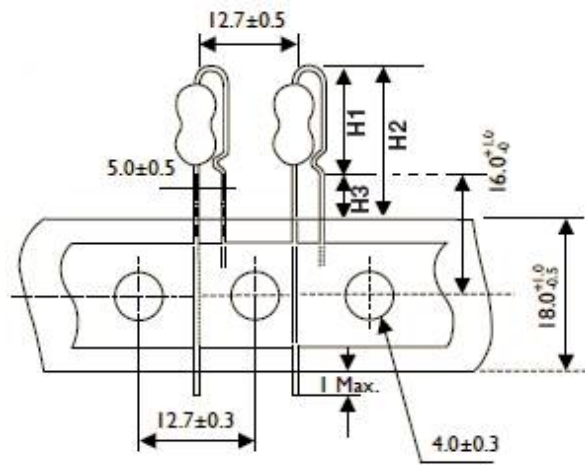


| TYPE | | DIMENSIONS | | | | | | | | | | Unit: mm |
|---------------|------------------|------------|-----------|-----------|----------|----------|---------------|-----------|----------------|---------------|----------|----------|
| Normal | Miniature | L | ψD | ψd | P | h | H Max. | h1 | H1 Max. | E Max. | e | |
| RSF-50 | RSF1WS | 9.0±0.5 | 3.3±0.3 | 0.55±0.05 | 6±1 | 8±1 | 22 | 5±1 | 18.5 | 3.5 | 3.5±1 | |
| RSF100 | RSF2WS | 11.5±1 | 4.5±0.5 | 0.8±0.05 | 6±1 | 8±1 | 24 | 5±1 | 20 | 3.5 | 3.5±1 | |
| RSF200 | RSF3WS | 15.5±1 | 5.0±0.5 | 0.8±0.05 | 8±1 | 8±1 | 28 | 5±1 | 25 | 3.5 | 3.5±1 | |

PN TYPE (Taping Pack)



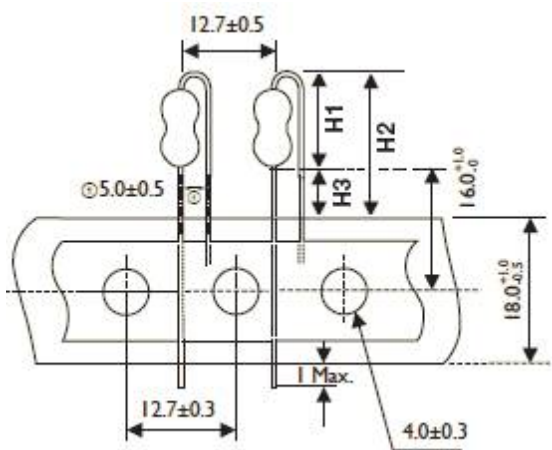
AV TYPE (Taping Pack)



| TYPE | | DIMENSIONS | | | Unit: mm |
|--------|-----------|------------|------------|------------|----------|
| Normal | Miniature | H1 Max. | H2 Max. | H3 Max. | |
| RSF-50 | RSF1WS | 17 | 25.5 | 8.5 | |
| RSF100 | RSF2WS | 19 | 27.5 | 8.5 | |

| TYPE | | DIMENSIONS | | | Unit: mm |
|--------|-----------|------------|------------|------------|----------|
| Normal | Miniature | H1 Max. | H2 Max. | H3 Max. | |
| RSF-50 | RSF1WS | 14.5 | 23 | 8.5 | |
| RSF100 | RSF2WS | 17.5 | 26 | 8.5 | |

FT TYPE (Taping Pack)



| TYPE | | DIMENSIONS | | | Unit: mm |
|--------|-----------|------------|------------|------------|----------|
| Normal | Miniature | H1 Max. | H2 Max. | H3 Max. | |
| RSF-50 | RSF1WS | 13 | 21.5 | 8.5 | |
| RSF100 | RSF2WS | 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 | |
| RED | 2 | 2 | 2 | 100Ω | ± 2% (G) |
| ORANGE | 3 | 3 | 3 | 1KΩ | |
| YELLOW | 4 | 4 | 4 | 10KΩ | |
| GREEN | 5 | 5 | 5 | 100K | |
| BLUE | 6 | 6 | 6 | 1MΩ | |
| VIOLET | 7 | 7 | 7 | 10MΩ | |
| GREY | 8 | 8 | 8 | 0.001Ω | |
| WHITE | 9 | 9 | 9 | 0.0001Ω | |
| GOLD | | | | 0.1Ω | ± 5% (J) |
| SILVER | | | | 0.01Ω | |

REVISION HISTORY

| REVISION | DATE | CHANGE NOTIFICATION | DESCRIPTION |
|-----------|---------------|---------------------|-------------------------------------|
| Version 0 | Aug.16 , 2021 | - | - First issue of this specification |

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[009260C](#) [FA87/180R/5%](#) [RSF2JT9K10](#) [SBL4R010J](#) [R0229](#) [M012CT52R220J](#) [434529B](#) [WMO5S-100KJA05](#) [054084X](#) [054211G](#) [054220E](#)
[095734G](#) [WK202070A1003JD500](#) [RSF5SSJR-73-250R](#) [WR404140A2208JFE00](#) [RSF2JT1K60](#) [MOSX1CT528R2R20F](#) [2W218-BULK](#)
[2W320-BULK](#) [RSF5SSJT-73-170R](#) [RSF1WSJT-52-400K](#) [RSF-25JT-52-330RW](#) [RSF200JT-73-0R52](#) [ROX2SJ4K3](#) [ROX5SJ120R](#)
[ROX3SJR10](#) [ROX2SJ200K](#) [RSF200JT-73-0R27](#) [RSF1WSJT-52-140R](#) [RSF50SJT-52-0R1](#) [RSF50SJT-52-0R39](#) [RSF100JT-73-8R2](#)
[RSF50SJT-52-200K](#) [RSF-50JT-52-2M](#) [RSF50SJT-52-820K](#) [RSF-50JT-52-2R2](#) [ROX05SJ8K2](#) [ROX05SJ13K](#) [ROX05SJ15K](#) [ROX05SJ16K](#)
[ROX05SJ18K](#) [ROX05SJ30K](#) [ROX05SJ36K](#) [ROX05SJ43K](#) [ROX5SSJ36K](#) [6-1676123-0](#) [6-1676123-3](#) [1-1625892-3](#) [3-1625892-4](#) [2176415-7](#)