Innovative Service Around the Globe YAGEO

# DATA SHEET

## METAL GLAZED FILM RESISTORS

High Voltage, High Ohmic

HHV Series

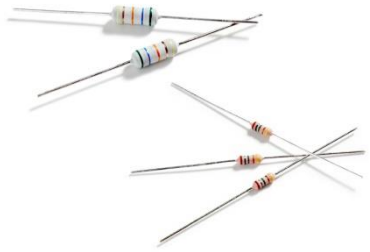
±1%, ±5%

**1/4W to 3W**

**RoHS compliant & Halogen Free**

YAGEO

Product specification – April 3, 2024 V.3



## APPLICATIONS

- Power applications
- Home appliance
- Industry

## FEATURES

- Metal glazed thick film
- Max. resistance up to 68Mohm
- Max. working voltage: 7KV
- Max. overload capability: 14KV
- Resistance to high temperature/humidity
- UL1676, VDE certified
- PPAP ready (HHV1WS)
- Flameproof coating equivalent to UL-94V-0
- RoHS compliant & halogen-free

## ORDERING INFORMATION

Part number of the high voltage, high ohmic metal glaze film resistor are identified by the series, power rating, tolerance, packing, temperature coefficient, forming and resistance value and suffix.

## PART NUMBER

| HHV | 2WS | J | T | - | 73- | 100K | Y |
|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |

### (1) SERIES NAME

HHV Series

### (2) POWER RATING

| | |
|---|---|
| -25 = 1/4W | 1WS = 1W |
| 50S = 1/2W | 2SS = 2W |
| -50 = 1/2W | 2WS = 2W |
| 1SS = 1W | 3SS = 3W |

### (3) TOLERANCE

| | |
|---|---|
| F = ±1% | J = ±5% |

### (4) PACKAGING TYPE

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

### (5) TEMPERATURE COEFFICIENT OF RESISTANCE

- = Based on spec.

### (6) FORMING

| | |
|---|---|
| 26- = 26mm | FK = FK Type |
| 52- = 52.4mm | FFK = F-form Kink |
| 73- = 73mm | FKK = FKK Type |
| M = M-Type Forming | PN = PANAsert |
| MB = M-form W/flat | AV = AVIsert |
| F = F Type | |
| FB-= FB- Type (for -25&50S) | |

Note: 26mm, 52.4mm and 73mm represent dimension A of the axial type, please refer to the category of AXIAL/REEL TAPE SPECIFICATION for the detail.

### (7) RESISTANCE VALUE

E24 & E96 Series
Example:

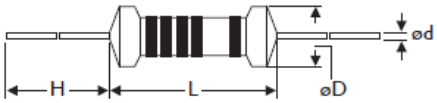
100K = 100,000Ω, 1M = 1,000,000Ω , 10M = 10,000,000Ω

### (8) Suffix

Y = Epoxy coating
Null = Silicone coating

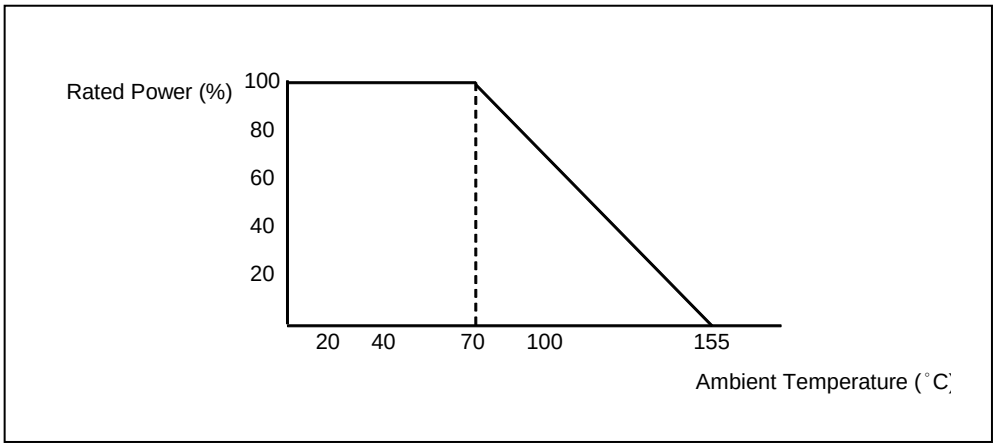
## DIMENSIONS

Unit: mm




| Normal | Miniature | L | ψD | H | ψd |
|---|---|---|---|---|---|
| HHV-25 | HHV50S | 6.3 ± 0.5 | 2.4 ± 0.2 | 28 ± 2.0 | 0.55 ± 0.05 |
| HHV-50 | HHV1SS | 9.0 ± 0.5 | 3.3 ± 0.3 | 26 ± 2.0 | 0.55 ± 0.05 |
| HHV1WS | HHV2SS | 11.5 ± 1.0 | 4.5 ± 0.5 | 35 ± 2.0 | 0.8 ± 0.05 |
| HHV2WS | HHV3SS | 15.5 ± 1.0 | 5.0 ± 0.5 | 33 ± 2.0 | 0.8 ± 0.05 |

## DERATING CURVE




## ELECTRICAL CHARACTERISTICS

| CHARACTERISTICS | HHV-25 | HHV50S | HHV-50 | HHV1SS | HHV1WS | HHV2SS | HHV2WS | HHV3SS |
|---|---|---|---|---|---|---|---|---|
| Power Rating at 70 °C | 1/4W | 1/2W | 1/2W | 1W | 1W | 2W | 2W | 3W |
| Maximum Working Voltage(DC) | 1,600V | 1,600V | 3,500V | 3,500V | 5,000V | 5,000V | 7,000V | 7,000V |
| Maximum Overload Voltage(DC) | 3,000V | 3,000V | 7,000V | 7,000V | 10,000V | 10,000V | 14,000V | 14,000V |
| Voltage Proof on Insulation (Silicone Type) | 300V | 300V | 500V | 500V | 600V | 600V | 600V | 600V |
| Voltage Proof on Insulation (Epoxy Type) | 500V | 500V | 500V | 500V | 700V | 700V | 700V | 700V |
| Resistance Range | 100KΩ ~ 68MΩ for E24 & E96 series value | | | | | | | |
| Operating Temp. Range | - 55°C to +155°C | | | | | | | |
| Temperature Coefficient | ±200ppm/°C | | | | | | | |

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

## TEST AND REQUIRMENTS

| 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) | ±2.0%+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 -55°C to +155°C | By Type |
| Insulation Resistance | IEC 60115-1 4.6 | In V-Block for 60 sec. | >10,000MΩ |
| 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(or Umax., whichever less) 10,000 cycles (1 Sec. on, 25 Sec.off) | ±1.0%+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(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. ➔ +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 (Only for silicone lacquer type) | IEC 60115-1 4.26 | 4 times RCWV(or Umax., whichever less) 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

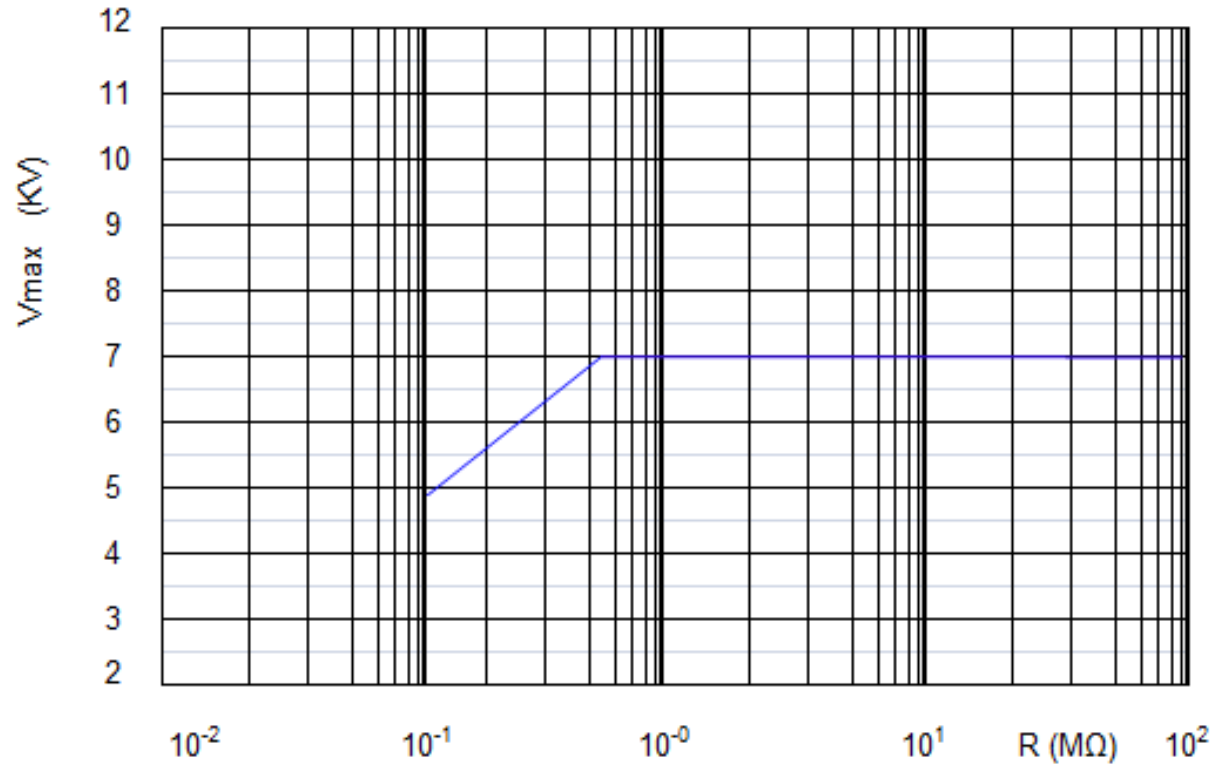
Where

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

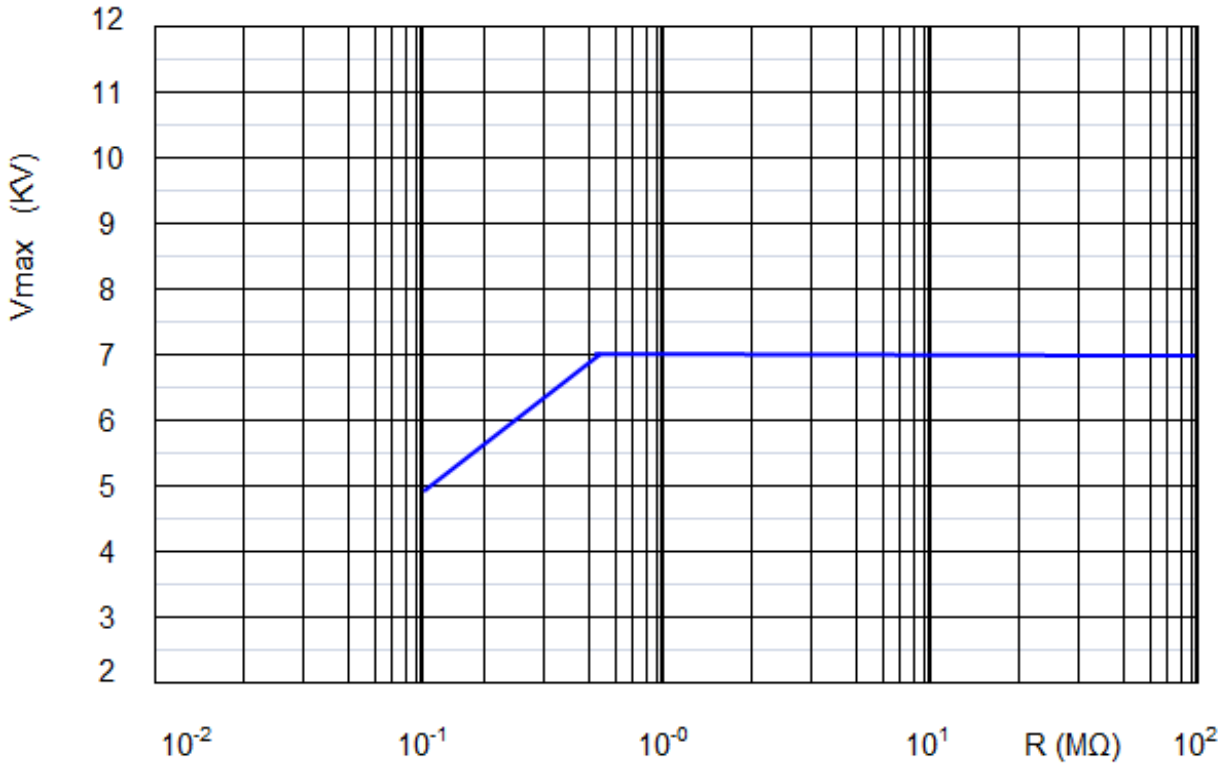
P=Rated power (W)

R=Resistance value (Ω)

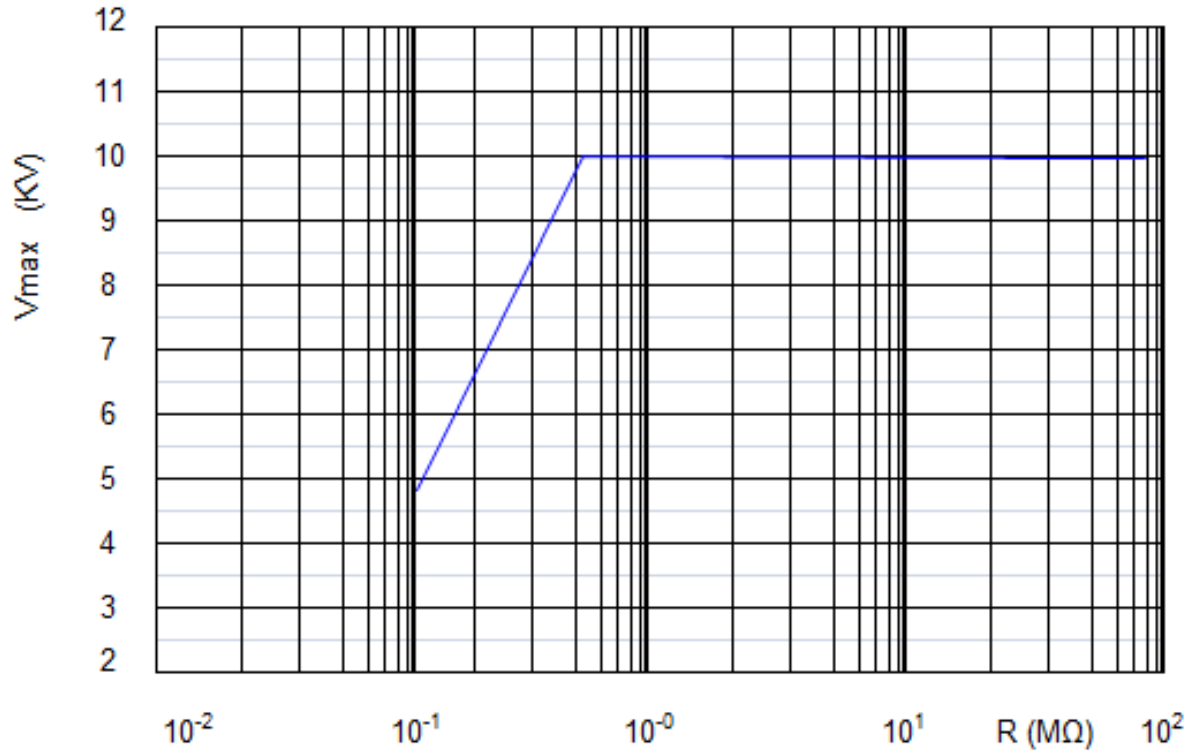
## PULSE DIAGRAMS



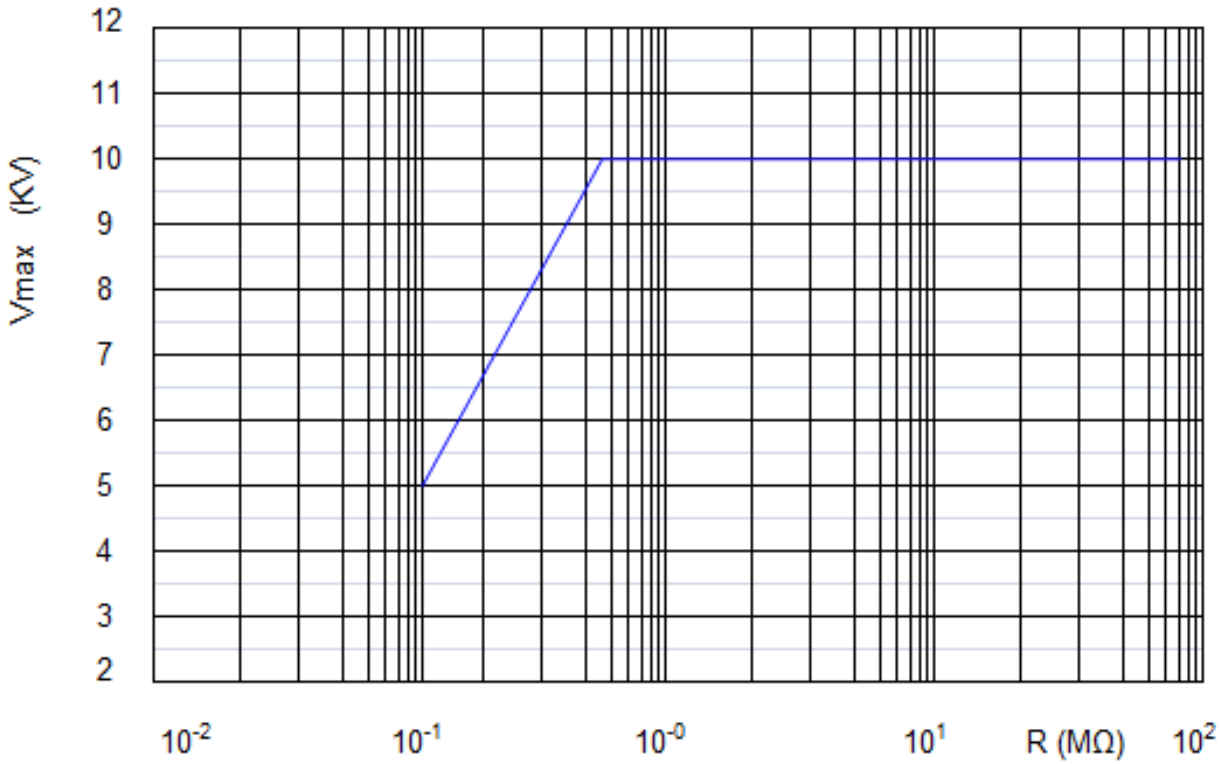

HHV50S Series: In accordance with IEC 60065- 14.1a;
50 discharges from a 1 nF capacitor charged to Umax; 12 discharges/min




HHV-25 Series: In accordance with IEC 60065- 14.1a;
50 discharges from a 1 nF capacitor charged to Umax; 12 discharges/min

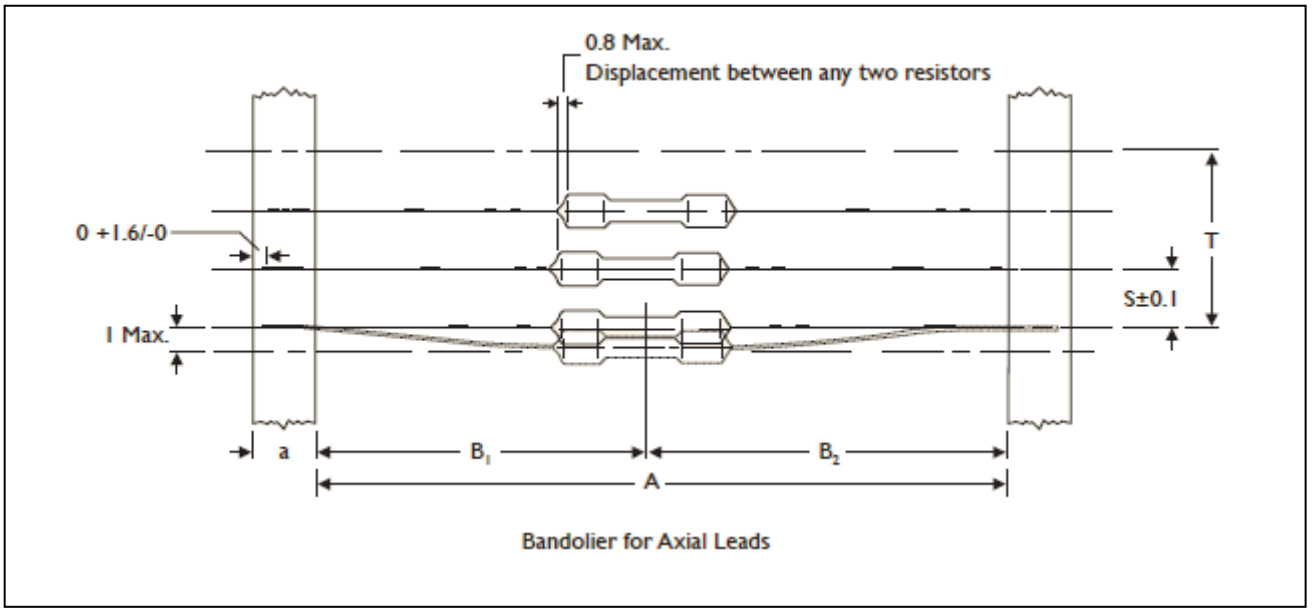



HHV-50 Series: In accordance with IEC 60065- 14.1a;
50 discharges from a 1 nF capacitor charged to Umax; 12 discharges/min




HHV1WS Series: In accordance with IEC 60065- 14.1a;
50 discharges from a 1 nF capacitor charged to Umax; 12 discharges/min

## AXIAL / REEL TAPE SPECIFICATION

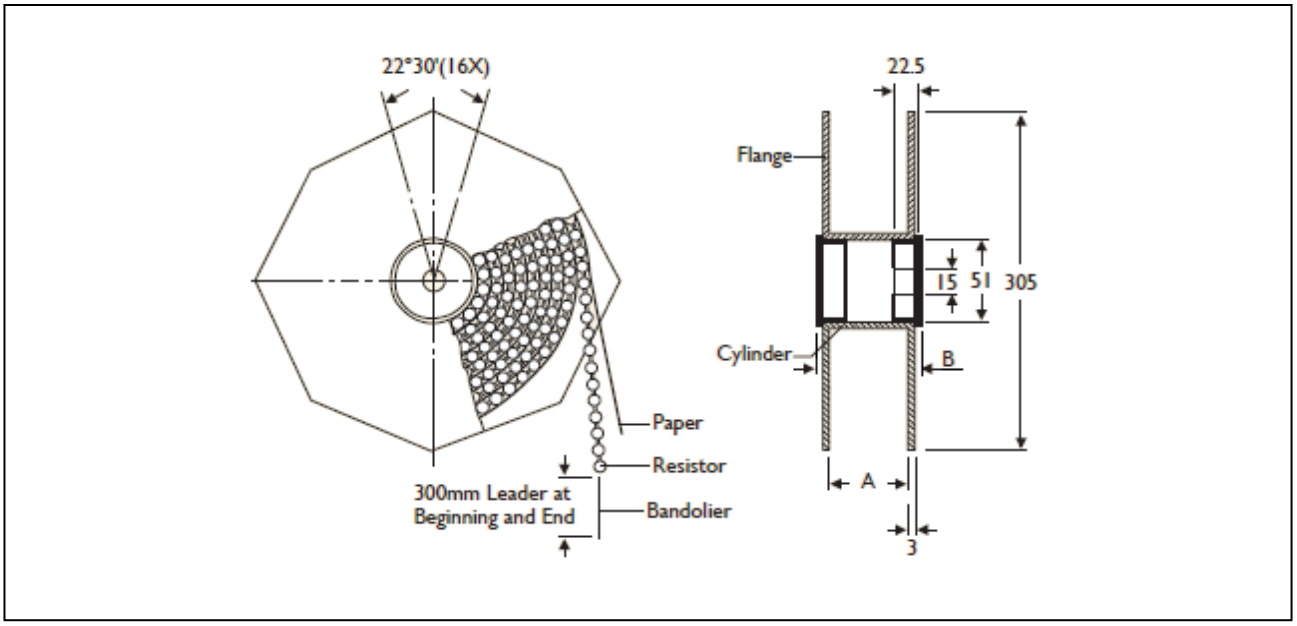



Bandolier for Axial Leads

**Unit: mm**

| Normal | Miniature | a | A | B1-B2 (Max.) | S (spacing) | T (max. deviation of spacing) |
|---|---|---|---|---|---|---|
| HHV-25 | HHV50S | 6 ± 0.5 | 52.4 ± 1.5 | 1.2 | 5 | 1 mm per 10 spacing, 0.5 mm per 5 spacing |
| | | | 26.0 ± 1.5 | 1 | | |
| HHV-50 | HHV1SS | 6 ± 0.5 | 52.4 ± 1.5 | 1.2 | 5 | |
| HHV1WS | HHV2SS | 6 ± 0.5 | 73.0 ± 1.5 | 1.5 | 5 | |
| | | | 52.4 ± 1.5 | 1.2 | | |
| HHV2WS | HHV3SS | 6 ± 0.5 | 73.0 ± 1.5 | 1.5 | 10 | |
| | | | 52.4 ± 1.5 | 1.2 | | |

## TAPE ON REEL PACKING

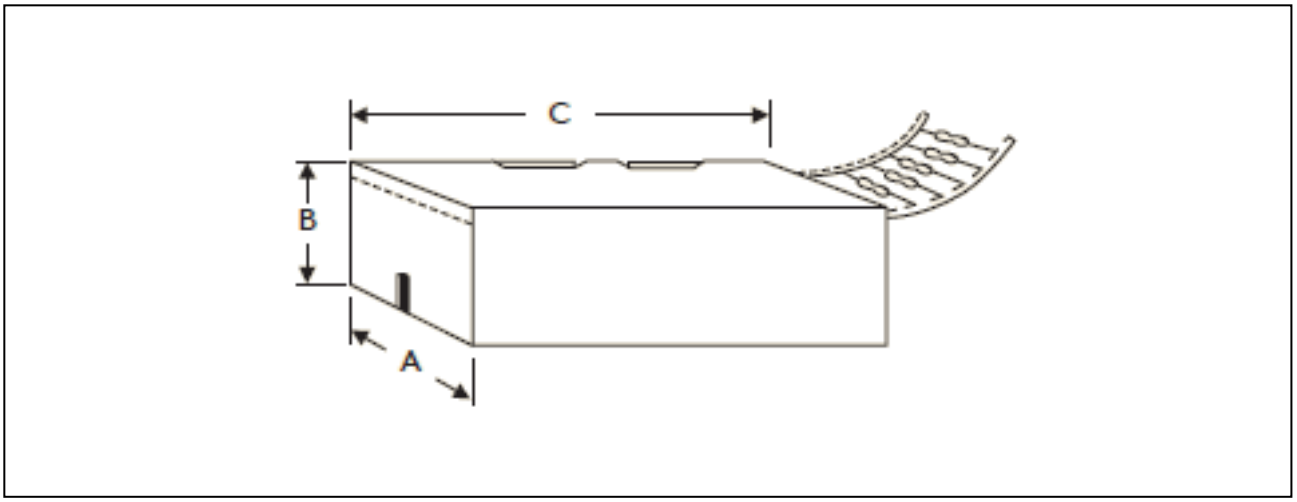



TYPE

Unit: mm/piece

| Normal | Miniature | Across Flange(A) | B | Quantity Per Reel |
|---|---|---|---|---|
| HHV-25 | HHV50S | 40 | 49 | 5,000 |
| HHV-25 | HHV50S | 66.5 | 75.5 | 5,000 |
| HHV-50 | HHV1SS | 66.5 | 75.5 | 2,500 |
| HHV1WS | HHV2SS | 87 | 96 | 2,000 |
| HHV2WS | HHV3SS | 87 | 96 | 1,000 |

## TAPE ON BOX PACKING




TYPE DIMENSIONS Unit: mm/piece

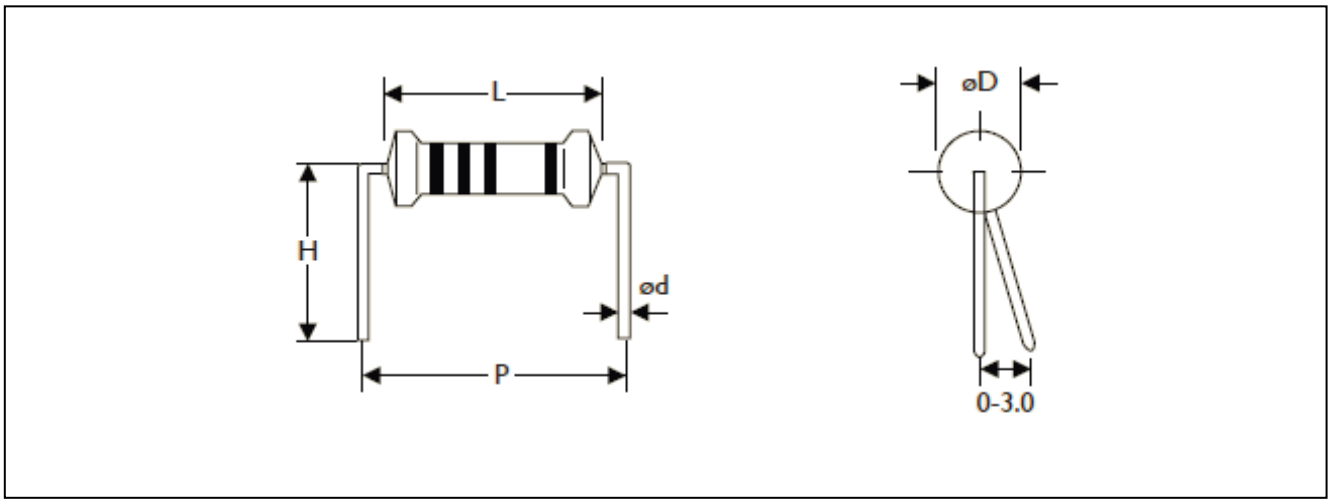
| Normal | Miniature | A | B | C | Quantity Per Box |
|---|---|---|---|---|---|
| HHV-25 | HHV50S | 48 | 102 | 255 | 5,000 |
| HHV-25 | HHV50S | 81 | 104 | 260 | 5,000 |
| HHV-50 | HHV1SS | 73 | 45 | 258 | 1,000 |
| HHV1WS | HHV2SS | 81 | 91 | 260 | 1,000 |
| HHV1WS | HHV2SS | 103 | 78 | 260 | 1,000 |
| HHV2WS | HHV3SS | 81 | 91 | 260 | 1,000 |
| HHV2WS | HHV3SS | 103 | 94 | 260 | 1,000 |

## BULK PACKING

| Normal | Miniature | Piece/Per Inner Box | Bag/Per Inner Box | Piece Per Bag |
|---|---|---|---|---|
| HHV-25 | HHV50S | 10,000 | 10 | 1,000 |
| HHV-50 | HHV1SS | 5,000 | 5 | 1,000 |
| HHV1WS | HHV2SS | 2,000 | 4 | 500 |
| HHV2WS | HHV3SS | 1,000 | 2 | 500 |

## FORMING

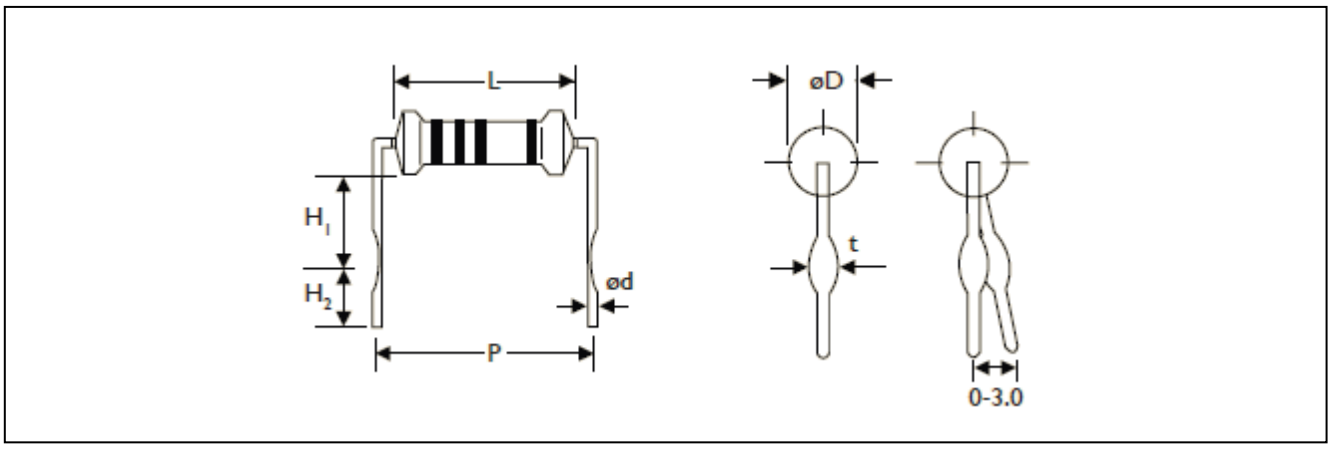
### M TYPE




TYPE DIMENSIONS Unit: mm

| Normal | Miniature | L | ψD | ψd | P | H |
|---|---|---|---|---|---|---|
| HHV-25 | HHV50S | 6.3 ± 0.5 | 2.4 ± 0.2 | 0.55 ± 0.05 | 10.0 ± 1 | 10.0 ± 1 |
| HHV-50 | HHV1SS | 9.0 ± 0.5 | 3.3± 0.3 | 0.55 ± 0.05 | 12.5 ± 1 | 10.0 ± 1 |
| HHV1WS | HHV2SS | 11.5 ± 1.0 | 4.5 ± 0.5 | 0.8 ± 0.05 | 15.0 ± 1 | 12.5 ± 1 |
| HHV2WS | HHV3SS | 15.5 ± 1.0 | 5.0 ± 0.5 | 0.8 ± 0.05 | 20.0 ± 1 | 15.0 ± 1 |

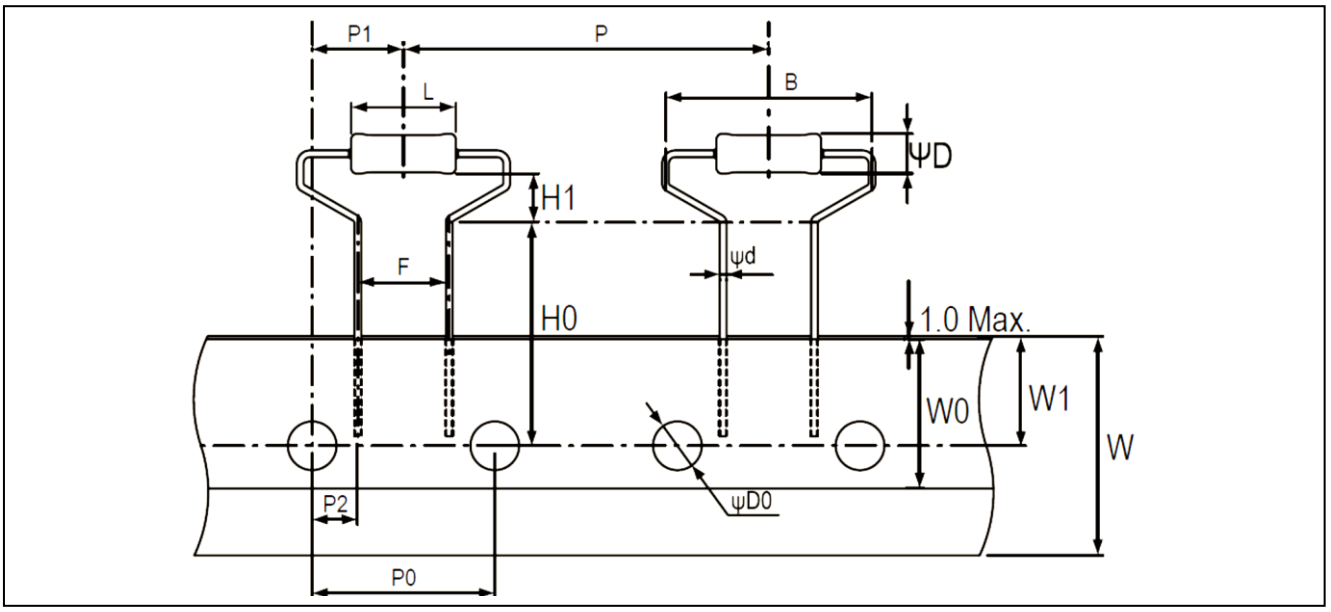
### MB TYPE




TYPE DIMENSIONS Unit: mm

| Normal | Miniature | L | ψD | ψd | P | H1 | H2 | t |
|---|---|---|---|---|---|---|---|---|
| HHV-25 | HHV50S | 6.3 ± 0.5 | 2.4± 0.2 | 0.55 ± 0.05 | 10.0 ± 1 | 6.0 ± 1 | 5.0 ± 1 | 1.2 ± 0.2 |
| HHV-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 |
| - | HHV1SS | 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 |
| HHV1WS | HHV2SS | 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 |
| HHV2WS | HHV3SS | 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 |

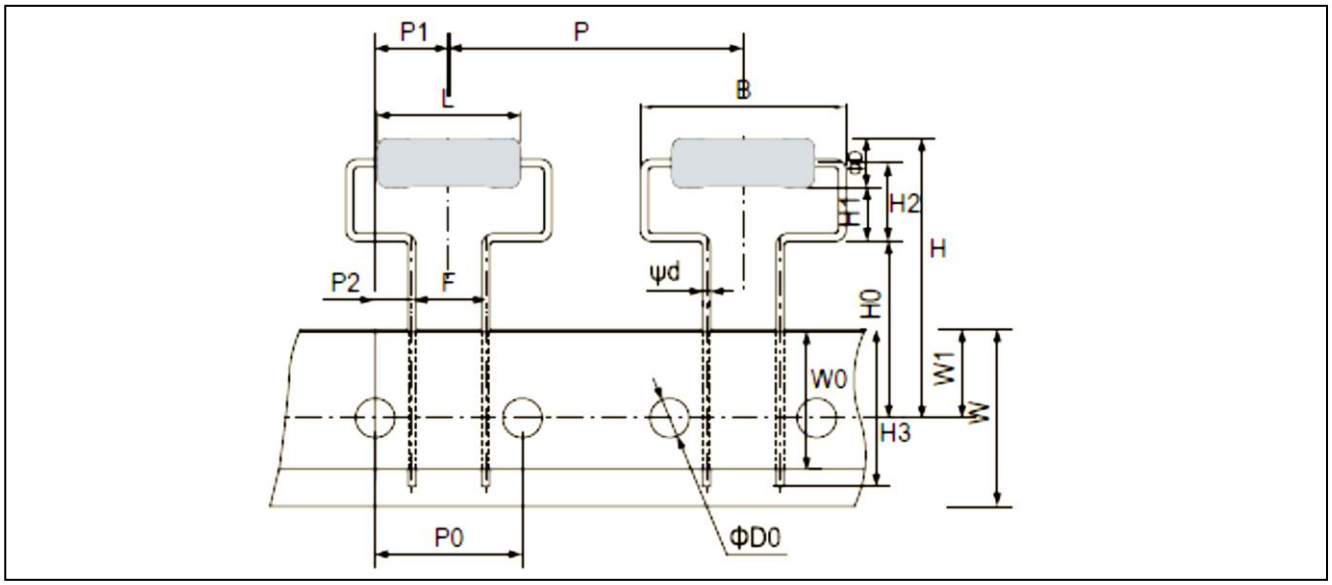
## MHA TYPE




TYPE DIMENSIONS Unit: mm

| Normal | Miniature | L | ψD | ψd | B | H0 | HI | 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 |
| HHV-50 | HHV1SS | **P1** | **P2** | **F** | **W** | **W0** | **W1** | **ΨD0** | |
| | | 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 | |

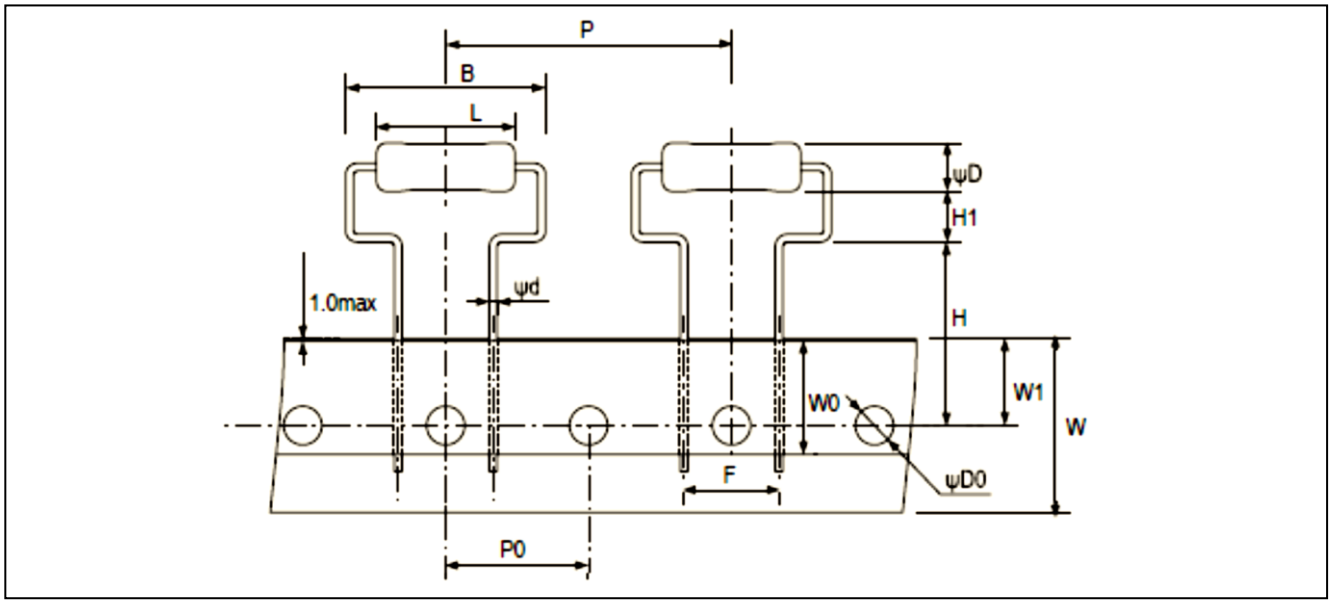
## MHB TYPE




TYPE DIMENSIONS Unit: mm

| Normal | Miniature | L | ψD | ψd | B | H | H0 | HI | 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. |
| HHV2WS | HHV3SS | **P** | **P0** | **PI** | **P2** | **F** | **W** | **W0** | **W1** | **ΨD0** |
| | | 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 |

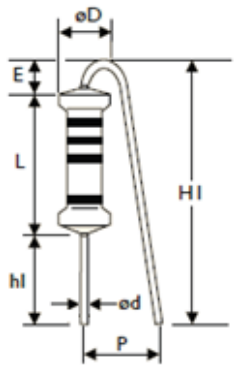
## MHC TYPE



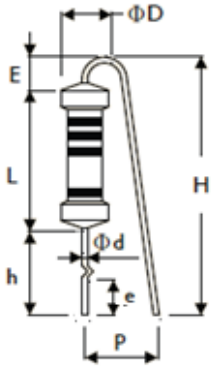

TYPE DIMENSIONS Unit: mm

| Normal | Miniature | L | ψD | ψd | B | H | HI | 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 |
| HHV2WS | HHV3SS | **F** | **W** | **W0** | **W1** | **ΨD0** | | | |
| | | 10.0±0.5 | 18.0±0.5 | 5.0Min. | 9.0±0.5 | 4.0±0.2 | | | |

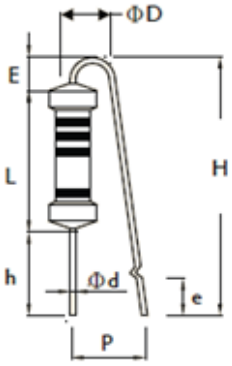
**F TYPE**



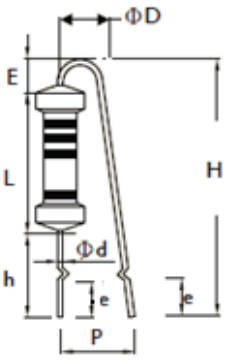

**FK TYPE**




**FFK TYPE**



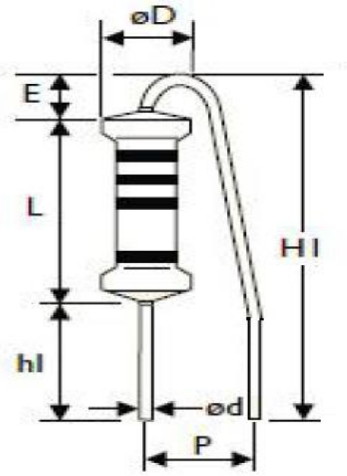

**FKK TYPE**




TYPE DIMENSIONS Unit: mm

| Normal | Miniature | L | ψD | ψd | P | h | H Max. | hl | Hl Max. | E Max. | e |
|---|---|---|---|---|---|---|---|---|---|---|---|
| HHV-50 | HHV1SS | 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 |
| HHV1WS | HHV2SS | 11.5±1 | 4.5±0.5 | 0.8±0.05 | 6±1 | 8±1 | 24 | 5±1 | 20 | 3.5 | 3.5±1 |
| HHV2WS | HHV3SS | 15.5±1 | 5.0±0.5 | 0.8±0.05 | 8±1 | 8±1 | 28 | 5± 1 | 25 | 3.5 | 3.5±1 |

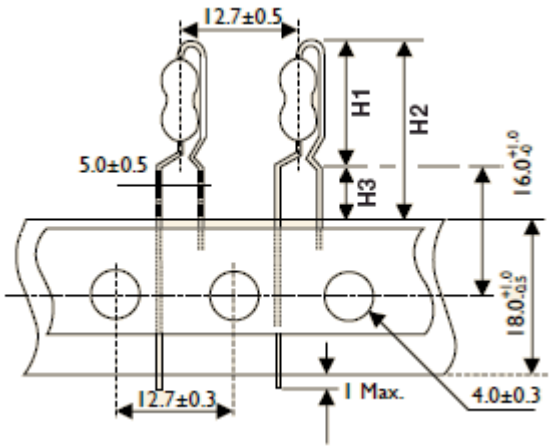
**FB- TYPE (for -25&50S)**




TYPE DIMENSIONS Unit: mm

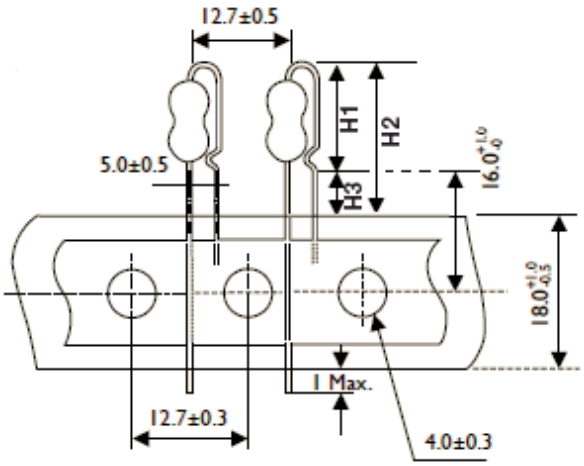
| Normal | Miniature | L | ψD | ψd | P | hl | Hl | E Max. |
|---|---|---|---|---|---|---|---|---|
| HHV-25 | HHV50S | 6.3 ± 0.5 | 2.4 ± 0.2 | 0.55 ± 0.05 | 6±1 | 5.5±0.5 | 13.5±0.5 | 3.5 |

## PN TYPE (Taping Pack)



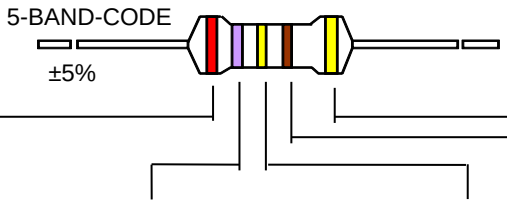

| TYPE | | DIMENSIONS | | Unit: mm |
|---|---|---|---|---|
| **Normal** | **Miniature** | **H1 Max.** | **H2 Max.** | **H3 Max.** |
| HHV-25 | HHV50S | 13 | 21.5 | 8.5 |
| HHV-50 | HHV1SS | 17 | 25.5 | 8.5 |
| HHV1WS | HHV2SS | 19 | 27.5 | 8.5 |

## AV TYPE (Taping Pack)

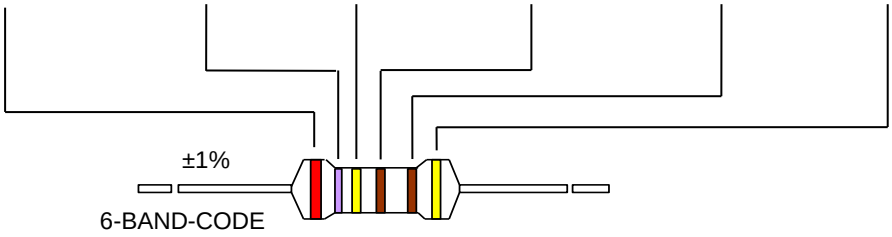



| TYPE | | DIMENSIONS | | Unit: mm |
|---|---|---|---|---|
| **Normal** | **Miniature** | **H1 Max.** | **H2 Max.** | **H3 Max.** |
| HHV-25 | HHV50S | 11.5 | 20 | 8.5 |
| HHV-50 | HHV1SS | 14.5 | 23 | 8.5 |
| HHV1WS | HHV2SS | 17.5 | 26 | 8.5 |

## 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 | HHV Series |
| GREEN | 5 | 5 | 5 | 100KΩ | |
| BLUE | 6 | 6 | 6 | 1MΩ | |
| VIOLET | 7 | 7 | 7 | 10MΩ | |
| GREY | 8 | 8 | 8 | | |
| WHITE | 9 | 9 | 9 | | |
| GOLD | | | | 0.1Ω | ±5 % (J) |
| SILVER | | | | 0.01Ω | |



## REVISION HISTORY

| REVISION | DATE | CHANGE NOTIFICATION | DESCRIPTION |
|---|---|---|---|
| Version 3 | Apr.2, 2024 | - | - Added forming code description for part number |
| Version 2 | Sep.5, 2023 | - | - Update legal disclaimer and footer version numbers |
| Version 1 | Aug.31, 2022 | - | - Add FB- forming code to -25&50S |
| Version 0 | Aug.2, 2021 | - | - First issue of this specification |

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