

# HVR-Series

## High Voltage Resistors

Sizes: HVR 20, HVR 25, HVR 30, HVR 40, HVR 50, HVR 75, HVR 100

### Features:

- High Voltage Resistors in thick film technology
- Resistance values up to 10 Tera-Ohm
- Low values of TCR and VCR
- Non-magnetic
- Climatic protection by Silicone coating (conformal coating, standard version)
- Different lead versions available
- Standard version with radial wire leads / variable lead spacing by bending
- Various wire diameters available
- Pin type with single-in-line (SIL) pins available
- Axial type with wire leads as special version (not with Silicone conformal coating)
- Alternatively, glass passivation of resistive element (no conformal coating)
- Unleaded version with solder pads available (with glass passivation only)
- Customized sizes are possible

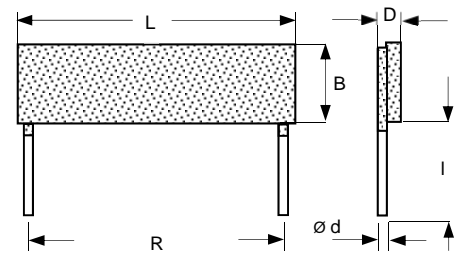


### Dimensions: (in mm)

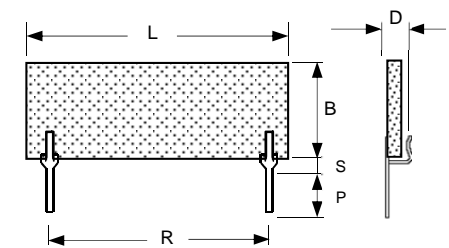
| Size    | Length L |      | Width B | Pitch R |        |
|---------|----------|------|---------|---------|--------|
| HVR 20  | 20.0     |      | 5.0     | 17.0    |        |
| HVR 25  | 25.0     | (1") | 9.0     | 22.9    | (0.9") |
| HVR 30  | 30.0     |      | 6.0     | 27.5    |        |
| HVR 40  | 40.0     |      | 6.0     | 37.8    |        |
| HVR 50  | 50.0     | (2") | 12.5    | 47.8    | (1.9") |
| HVR 75  | 75.0     | (3") | 9.0     | 72.8    | (2.9") |
| HVR 100 | 100.0    | (4") | 12.5    | 97.8    | (3.9") |

|            |  |                  |                            |                                      |
|------------|--|------------------|----------------------------|--------------------------------------|
| Wire Leads | Material: Cu / Surface finish: 100% Sn             |                  |                            |                                      |
|            | Wire diameter (standard)                           | on stock         | d                          | 0.40 ±0.05 mm                        |
|            |  | new              | d                          | 0.60 ±0.05 mm                        |
|            | Applicable wire diameter                           |                  | d                          | 0.3; 0.4; 0.5; 0.6; 0.7; 0.8; 1.0 mm |
|            | Thickness  |                  | D <sub>max</sub>           | 1.3 mm + d                           |
|            | Wire length (radial; standard)                     | on stock         | l                          | 20 <sup>+0/-2</sup> mm               |
| new        |  | l                | 25 <sup>+0/-2</sup> mm     |                                      |
| SIL-Pin    | Material: CuSn6 (2.1020) / Surface finish: 100% Sn |                  |                            |                                      |
|            | Stand off  | S                | 1 ±0.4 mm                  |                                      |
|            | Pin length   | P                | 9 ±1 mm                    |                                      |
|            | Pin cross section                                  | A                | 0.5 * 0.25 mm <sup>2</sup> |                                      |
| Thickness  |  | D <sub>max</sub> | 2 mm                       |                                      |

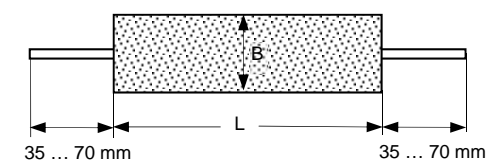
Standard Type (radial)



SIL-Type



Special Type (axial, no conformal coating)



Tolerance of dimensions (if not specified): ± 0.5 mm

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#### Packaging:

Cardboard boxes with foam spacer (small amounts: bulk in plastic bags or cardboard boxes)

The labeling is made at the packing unit only.

The components are not marked (only on request at individual cases).

#### Ordering data:

| Type | Size | Value | Tolerance | TCR | Coating  | Termination          | Wire diameter | Style                    | Specials |
|------|------|-------|-----------|-----|--|----------------------|---------------|--------------------------|----------|
| HVR  | 20   |       |           |     | L – Silicone<br>conformal coating                    | D – Wire             | 3 – 0,3 mm    | R – radial               |          |
|      | 25   |       |           |     |  | P – SIL Pin          | 4 – 0,4 mm    | A – axial (no L version) |          |
|      | 30   |       |           |     | G – Glass passivation<br>of the resistive<br>element | F – Solder pad       | 5 – 0,5 mm    |                          |          |
|      | 40   |       |           |     |  |                      | 6 – 0,6 mm    |                          |          |
|      | 50   |       |           |     |  |                      | 7 – 0,7 mm    |                          |          |
|      | 75   |       |           |     | B – Bare /<br>no passivation                         |                      | 8 – 0,8 mm    |                          |          |
|      | 100  |       |           |     |  |                      | 1 – 1,0 mm    |                          |          |
|      |      |       |           |     |  | 0 – pin / solder pad |               |                          |          |

#### Examples:

*HVR 25 10M 10% TK100 L D6 R* HVR 25 with Silicone coating and radial 0.6 mm wires (Standard)

*HVR 30 1G 20% TK250 B F0* HVR 30 blank, bare, without leads

*HVR 50 10G 5% TK100 G D4 A* HVR 50 with glazing (green) and axial 0.4 mm wires

If no requirement for TCR is given, the standard value (highest value in table) will be supplied. Standard measuring voltage is 10V (50V for values >1G). Different voltages on request and agreement (specify explicitly).

Standard versions are LD6R and LD4R (Silicone coating; 0.6/0.4 mm wire; radial).

#### General technical data:

|  |   |      |
|--|---|------|
| Operating temperature range              | -55°C ... +150°C  |      |
| Climatic category to IEC 60068-1         | 55/150/56   |      |
| Climatic protection of resistive element | Silicone conformal coating <sup>1)</sup> or Glass Passivation |      |
| Solderability acc. to IEC 60068-2-20     | 245°C, 3s   |      |
| Max. soldering temperature               | 260°C, 10s, max. 3 cycles                                     |      |
| Long term stability                      | ≤10G  | >10G |
| Storage 125°C/1000h                      | <1%   | <2%  |
| Max. voltage /1000h                      | <1%   | <2%  |

<sup>1)</sup> The Silicone coating is resistant to most solvents. For cleaning the use of isopropyl alcohol (IPA) is recommended. The use of acetone and methylene chloride is **not** allowed. Some cleaning agents can cause discolorations or bleaching at the surface without any influence on the resistor element. The thickness of the coating is not specified. In the area of the resistor element only, a closed surface is required and the coating has to be free of pin holes. Coating voids in the area of the internal interconnections are no quality issues. Mechanical stress to coating should be avoided, no use of high pressure cleaning.

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Technical data – depending on size:

| Size  | HVR 20 | HVR 25 | HVR 30 | HVR 40 | HVR 50 | HVR 75 | HVR 100 |
|---|--------|--------|--------|--------|--------|--------|---------|
| Power rating<br>$P_{70}$ (W)<br>( $P_{125} = 0W$ )  | 1.0    | 1.0    | 1.0    | 1.2    | 3.0    | 4.5    | 6.0     |
| Operating voltage<br>$U_{-}, U_{eff}$ <sup>2)</sup> | 10 kV  | 15 kV  | 10 kV  | 20 kV  | 30 kV  | 45 kV  | 65 kV   |

| Resistance Value Range | Tolerance / TK <sup>3)</sup> / VCR <sup>4)</sup> |  |  |  |   |   |   |
|------------------------|--|--|--|--|---|---|---|
| 1M – 100M              | 0.25/.../10%<br>TK 25/50/100<br>5 ppm/V          | 0.25/.../10%<br>TK 25/50/100<br>1 ppm/V  | 0.25/.../10%<br>TK 25/50/100<br>2 ppm/V  | 0.25/.../10%<br>TK 25/50/100<br>1 ppm/V  | 0.25/.../10%<br>TK 25/50/100<br>1 ppm/V | 0.25/.../10%<br>TK 25/50/100<br>1 ppm/V | 0.25/.../10%<br>TK 25/50/100<br>1 ppm/V |
| >100M – 1G             | 1/2/5/10/20%<br>TK 50/100/250<br>10 ppm/V        | 1/2/5/10/20%<br>TK 50/100/250<br>2 ppm/V | 1/2/5/10/20%<br>TK 50/100/250<br>5 ppm/V | 1/2/5/10/20%<br>TK 50/100/250<br>2 ppm/V | 1/2/5/10/20%<br>TK 25/50/100<br>1 ppm/V | 1/2/5/10/20%<br>TK 25/50/100<br>1 ppm/V | 1/2/5/10/20%<br>TK 25/50/100<br>1 ppm/V |
| >1G – 100G             | 5/10/20/30%<br>TK 250/500<br>50 ppm/V            | 5/10/20/30%<br>TK 250/500<br>10 ppm/V    | 5/10/20/30%<br>TK 250/500<br>20 ppm/V    | 5/10/20/30%<br>TK 250/500<br>10 ppm/V    | 5/10/20/30%<br>TK 100/250<br>5 ppm/V    | 5/10/20/30%<br>TK 100/250<br>5 ppm/V    | 5/10/20/30%<br>TK 50/250<br>2 ppm/V     |
| >100G – 1T             | 5/10/20/30%<br>TK 500/1000<br>100 ppm/V          | 5/10/20/30%<br>TK 500/1000<br>50 ppm/V   | 5/10/20/30%<br>TK 500/1000<br>100 ppm/V  | 5/10/20/30%<br>TK 500/1000<br>50 ppm/V   | 5/10/20/30%<br>TK 250/500<br>25 ppm/V   | 5/10/20/30%<br>TK 250/500<br>25 ppm/V   | 5/10/20/30%<br>TK 100/500<br>10 ppm/V   |
| >1T – 10T              | –  | –  | –  | –  | 10/20/30%<br>TK / VCR<br>auf Anfrage    | 10/20/30%<br>TK / VCR<br>auf Anfrage    | 10/20/30%<br>TK / VCR<br>auf Anfrage    |

<sup>2)</sup> Max. continuous operating voltage:  $U = \sqrt{P \cdot R}$

<sup>3)</sup> TCR: in ppm/K; temperature range + 25°C...+ 125°C;  
temperature range for TCR25/50 or values above 1G: +25°C...+85°C

<sup>4)</sup> VCR: typical values

Closer values of tolerance, TCR and VCR, other dimensions as well as other resistance values on request and agreement.

### Recommended wave soldering profile:

