

## Surface Mount Type

Series : **HB** Type : **V**  
**High temperature**  
**Lead-Free reflow (suffix : A\*)**



### Features

- Endurance : 105 °C 2000 h
- Vibration-proof product is available upon request. (φ8 mm and larger)
- RoHS compliant

### Specifications

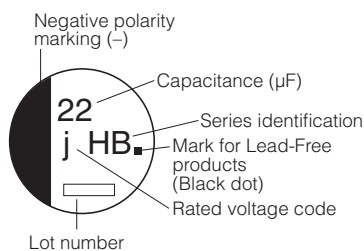
|                                    |   |  |     |    |    |    |    |    |                             |
|------------------------------------|---|--|-----|----|----|----|----|----|-----------------------------|
| Category temperature range         | -40 °C to +105 °C   |  |     |    |    |    |    |    |                             |
| Rated voltage range                | 6.3 V.DC to 50 V.DC   |  |     |    |    |    |    |    |                             |
| Capacitance range                  | 1 µF to 1500 µF   |  |     |    |    |    |    |    |                             |
| Capacitance tolerance              | ±20 % (120 Hz/ +20 °C)  |  |     |    |    |    |    |    |                             |
| Leakage current                    | I ≤ 0.01 CV or 3 (µA) After 2 minutes (Whichever is greater)  |  |     |    |    |    |    |    |                             |
| Dissipation factor (tan δ)         | Please see the attached characteristics list  |  |     |    |    |    |    |    |                             |
| Characteristics at low temperature | Standard  | V.DC   | 6.3 | 10 | 16 | 25 | 35 | 50 | (Impedance ratio at 120 Hz) |
|                                    |   | Z(-25 °C)/Z(+20 °C)  | 4   | 3  | 2  | 2  | 2  | 2  |                             |
|                                    | Z(-40 °C)/Z(+20 °C)   | 8  | 6   | 4  | 4  | 3  | 3  |    |                             |
|                                    | Miniaturization product   | Z(-25 °C)/Z(+20 °C)  | 4   | 3  | 2  | 2  | 2  | 2  |                             |
|                                    |   | Z(-40 °C)/Z(+20 °C)  | 10  | 8  | 6  | 6  | 4  | 4  |                             |
| Endurance                          | After applying rated working voltage for 2000 hours at +105 °C±2 °C and then being stabilized at +20 °C, capacitors shall meet the following limits.  |  |     |    |    |    |    |    |                             |
|                                    | Capacitance change  | Within ±20 % of the initial value (16 V.DC or less : Within ±25 %, Miniaturization product : Within ±35 %) |     |    |    |    |    |    |                             |
|                                    | tan δ   | ≤200 % of the initial limit  |     |    |    |    |    |    |                             |
|                                    | DC leakage current  | Within the initial limit   |     |    |    |    |    |    |                             |
| Shelf life                         | After storage for 1000 hours at +105 °C±2 °C with no voltage applied and then being stabilized at +20 °C, capacitors shall meet the limits specified in Endurance. (With voltage treatment) |  |     |    |    |    |    |    |                             |
| Resistance to soldering heat       | After reflow soldering and then being stabilized at +20 °C, capacitors shall meet the following limits.   |  |     |    |    |    |    |    |                             |
|                                    | Capacitance change  | Within ±10 % of the initial value  |     |    |    |    |    |    |                             |
|                                    | tan δ   | Within the initial limit   |     |    |    |    |    |    |                             |
|                                    | DC leakage current  | Within the initial limit   |     |    |    |    |    |    |                             |
| AEC-Q200                           | AEC-Q200 compliant  |  |     |    |    |    |    |    |                             |

### Frequency correction factor for ripple current

|                   |        |      |      |         |
|-------------------|--------|------|------|---------|
| Frequency (Hz)    | 50, 60 | 120  | 1 k  | 10 k to |
| Correction factor | 0.70   | 1.00 | 1.30 | 1.70    |

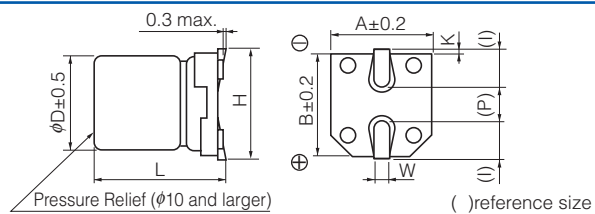
### Marking

Example : 6.3 V.DC 22 µF  
 Marking color : BLACK



|                   |     |    |    |    |    |    |
|-------------------|-----|----|----|----|----|----|
| R. Voltage (V.DC) | 6.3 | 10 | 16 | 25 | 35 | 50 |
| Code              | j   | A  | C  | E  | V  | H  |

### Dimensions



| Size code | φD   | L        | A, B | H         | I   | W        | P   | K                                      |
|-----------|------|----------|------|-----------|-----|----------|-----|--|
| B         | 4.0  | 5.8±0.3  | 4.3  | 5.5 max.  | 1.8 | 0.65±0.1 | 1.0 | 0.35 <sup>+0.15</sup> <sub>-0.20</sub> |
| C         | 5.0  | 5.8±0.3  | 5.3  | 6.5 max.  | 2.2 | 0.65±0.1 | 1.5 | 0.35 <sup>+0.15</sup> <sub>-0.20</sub> |
| D         | 6.3  | 5.8±0.3  | 6.6  | 7.8 max.  | 2.6 | 0.65±0.1 | 1.8 | 0.35 <sup>+0.15</sup> <sub>-0.20</sub> |
| D8        | 6.3  | 7.7±0.3  | 6.6  | 7.8 max.  | 2.6 | 0.65±0.1 | 1.8 | 0.35 <sup>+0.15</sup> <sub>-0.20</sub> |
| E         | 8.0  | 6.2±0.3  | 8.3  | 9.5 max.  | 3.4 | 0.65±0.1 | 2.2 | 0.35 <sup>+0.15</sup> <sub>-0.20</sub> |
| F         | 8.0  | 10.2±0.3 | 8.3  | 10.0 max. | 3.4 | 0.90±0.2 | 3.1 | 0.70±0.20                              |
| G         | 10.0 | 10.2±0.3 | 10.3 | 12.0 max. | 3.5 | 0.90±0.2 | 4.6 | 0.70±0.20                              |

## Characteristics list

Endurance : 105 °C 2000 h

| Rated voltage (V.DC) | Cap. (±20 %) (μF) | Case size (mm) |      | Size* code | Specification                                 |                         | Part No.     | Reflow | Min. Packaging Q'ty |
|----------------------|-------------------|----------------|------|------------|---|-------------------------|--------------|--------|---------------------|
|                      |                   | φD             | L    |            | Ripple current (120 Hz) (+105 °C) (mA r.m.s.) | tan δ (120 Hz) (+20 °C) |              |        | Taping (pcs)        |
| 6.3                  | 22                | 4              | 5.8  | B          | 26  | 0.30                    | EEEHBJ220AR  | (5)    | 2000                |
|                      | 33                | 4              | 5.8  | B          | 29  | 0.30                    | EEEHBJ330AR  | (5)    | 2000                |
|                      | 47                | 4              | 5.8  | (B)        | 26  | 0.50                    | EEEHBJ470UAR | (5)    | 2000                |
|                      |                   | 5              | 5.8  | C          | 46  | 0.30                    | EEEHBJ470AR  | (5)    | 1000                |
|                      | 100               | 5              | 5.8  | (C)        | 42  | 0.50                    | EEEHBJ101UAR | (5)    | 1000                |
|                      |                   | 6.3            | 5.8  | D          | 71  | 0.30                    | EEEHBJ101AP  | (5)    | 1000                |
|                      | 220               | 6.3            | 5.8  | (D)        | 80  | 0.50                    | EEEHBJ221UAP | (5)    | 1000                |
|                      |                   | 8              | 10.2 | F          | 150   | 0.35                    | EEEHBJ221AP  | (7)    | 500                 |
|                      | 330               | 8              | 6.2  | (E)        | 180   | 0.50                    | EEEHBJ331UAP | (7)    | 1000                |
|                      |                   | 8              | 10.2 | F          | 230   | 0.35                    | EEEHBJ331AP  | (7)    | 500                 |
| 470                  | 8                 | 10.2           | (F)  | 230        | 0.50  | EEEHBJ471UAP            | (7)          | 500    |                     |
| 1500                 | 10                | 10.2           | (G)  | 290        | 0.50  | EEEHBJ152UAP            | (7)          | 500    |                     |
| 10                   | 33                | 4              | 5.8  | (B)        | 23  | 0.30                    | EEEHBA330UAR | (5)    | 2000                |
|                      |                   | 5              | 5.8  | C          | 43  | 0.26                    | EEEHBA330AR  | (5)    | 1000                |
|                      | 68                | 6.3            | 5.8  | D          | 70  | 0.22                    | EEEHBA680AP  | (5)    | 1000                |
|                      | 100               | 6.3            | 5.8  | (D)        | 71  | 0.30                    | EEEHBA101UAP | (5)    | 1000                |
|                      |                   | 8              | 6.2  | E          | 110   | 0.26                    | EEEHBA101AP  | (7)    | 1000                |
|                      | 150               | 6.3            | 5.8  | (D)        | 64  | 0.50                    | EEEHBA151UAP | (5)    | 1000                |
|                      | 220               | 8              | 6.2  | (E)        | 110   | 0.30                    | EEEHBA221UAP | (7)    | 1000                |
|                      |                   | 8              | 10.2 | F          | 160   | 0.26                    | EEEHBA221AP  | (7)    | 500                 |
|                      | 470               | 8              | 10.2 | (F)        | 220   | 0.35                    | EEEHBA471UAP | (7)    | 500                 |
|                      |                   | 10             | 10.2 | G          | 270   | 0.26                    | EEEHBA471AP  | (7)    | 500                 |
| 16                   | 10                | 4              | 5.8  | B          | 28  | 0.16                    | EEEHB1C100AR | (5)    | 2000                |
|                      | 22                | 4              | 5.8  | (B)        | 29.5  | 0.26                    | EEEHBC220UAR | (5)    | 2000                |
|                      |                   | 5              | 5.8  | C          | 39  | 0.16                    | EEEHB1C220AR | (5)    | 1000                |
|                      | 33                | 6.3            | 5.8  | D          | 65  | 0.16                    | EEEHB1C330AP | (5)    | 1000                |
|                      | 47                | 5              | 5.8  | (C)        | 39  | 0.26                    | EEEHBC470UAR | (5)    | 1000                |
|                      |                   | 6.3            | 5.8  | D          | 70  | 0.16                    | EEEHB1C470AP | (5)    | 1000                |
|                      | 6.3               | 7.7            | D8   | 84         | 0.16  | EEEHBC470XAP            | (5)          | 900    |                     |
|                      |                   | 6.3            | 5.8  | (D)        | 70  | 0.26                    | EEEHBC101UAP | (5)    | 1000                |
|                      | 100               | 8              | 10.2 | F          | 120   | 0.20                    | EEEHB1C101AP | (7)    | 500                 |
|                      |                   | 8              | 10.2 | (F)        | 150   | 0.20                    | EEEHBC221UAP | (7)    | 500                 |
|                      | 220               | 10             | 10.2 | G          | 210   | 0.20                    | EEEHB1C221AP | (7)    | 500                 |
|                      |                   | 10             | 10.2 | G          | 230   | 0.20                    | EEEHB1C331AP | (7)    | 500                 |
|                      | 470               | 8              | 10.2 | (F)        | 240   | 0.40                    | EEEHBC471UAP | (7)    | 500                 |
|                      |                   | 10             | 10.2 | G          | 340   | 0.20                    | EEEHB1C471AP | (7)    | 500                 |
| 25                   | 4.7               | 4              | 5.8  | B          | 22  | 0.14                    | EEEHB1E4R7AR | (5)    | 2000                |
|                      | 6.8               | 4              | 5.8  | B          | 25  | 0.14                    | EEEHB1E6R8AR | (5)    | 2000                |
|                      | 10                | 4              | 5.8  | (B)        | 28  | 0.16                    | EEEHBE100UAR | (5)    | 2000                |
|                      |                   | 5              | 5.8  | C          | 28  | 0.14                    | EEEHB1E100AR | (5)    | 1000                |
|                      | 22                | 6.3            | 5.8  | D          | 55  | 0.14                    | EEEHB1E220AP | (5)    | 1000                |
|                      | 33                | 5              | 5.8  | (C)        | 50  | 0.20                    | EEEHBE330UAR | (5)    | 1000                |
|                      |                   | 6.3            | 5.8  | D          | 65  | 0.14                    | EEEHB1E330AP | (5)    | 1000                |
|                      | 47                | 6.3            | 5.8  | (D)        | 65  | 0.20                    | EEEHBE470UAR | (5)    | 1000                |
|                      |                   | 8              | 6.2  | E          | 91  | 0.16                    | EEEHB1E470AP | (7)    | 1000                |
|                      | 100               | 8              | 6.2  | (E)        | 100   | 0.16                    | EEEHBE101UAP | (7)    | 1000                |
|                      |                   | 8              | 10.2 | F          | 130   | 0.16                    | EEEHB1E101AP | (7)    | 500                 |
|                      | 220               | 8              | 10.2 | (F)        | 130   | 0.30                    | EEEHBE221UAP | (7)    | 500                 |
|                      |                   | 10             | 10.2 | G          | 190   | 0.16                    | EEEHB1E221AP | (7)    | 500                 |
|                      | 330               | 8              | 10.2 | (F)        | 130   | 0.30                    | EEEHBE331UAP | (7)    | 500                 |
|                      |                   | 10             | 10.2 | G          | 220   | 0.16                    | EEEHB1E331AP | (7)    | 500                 |
|                      | 470               | 10             | 10.2 | (G)        | 230   | 0.30                    | EEEHBE471UAP | (7)    | 500                 |

\* Size code( ) : Miniaturization product

If Part number exceeds 12 digits, voltage code is abbreviated as follows; 0J → J, 1A → A, 1C → C, 1E → E, 1V → V

· Please refer to the page of "Reflow Profile" and "The Taping Dimensions".

· When requesting vibration-proof product, please put the last "V" instead to "P"

## Characteristics list

Endurance : 105 °C 2000 h

| Rated voltage (V.DC) | Cap. (±20 %) (μF) | Case size (mm) |      | Size* code | Specification                                 |                         | Part No.     | Reflow | Min. Packaging Q'ty |
|----------------------|-------------------|----------------|------|------------|---|-------------------------|--------------|--------|---------------------|
|                      |                   | φD             | L    |            | Ripple current (120 Hz) (+105 °C) (mA r.m.s.) | tan δ (120 Hz) (+20 °C) |              |        | Taping (pcs)        |
| 35                   | 4.7               | 4              | 5.8  | B          | 21  | 0.12                    | EEEHB1V4R7AR | (5)    | 2000                |
|                      | 6.8               | 4              | 5.8  | (B)        | 25  | 0.12                    | EEEHBV6R8UAR | (5)    | 2000                |
|                      | 10                | 5              | 5.8  | C          | 28  | 0.12                    | EEEHB1V100AR | (5)    | 1000                |
|                      | 22                | 6.3            | 5.8  | D          | 55  | 0.12                    | EEEHB1V220AP | (5)    | 1000                |
|                      | 33                | 8              | 6.2  | E          | 84  | 0.14                    | EEEHB1V330AP | (7)    | 1000                |
|                      | 47                | 6.3            | 7.7  | D8         | 98  | 0.20                    | EEEHBV470YAP | (5)    | 900                 |
|                      |                   | 8              | 6.2  | (E)        | 91  | 0.18                    | EEEHBV470UAP | (7)    | 1000                |
|                      |                   | 8              | 10.2 | F          | 98  | 0.14                    | EEEHB1V470AP | (7)    | 500                 |
|                      | 100               | 8              | 10.2 | (F)        | 98  | 0.20                    | EEEHBV101UAP | (7)    | 500                 |
|                      |                   | 10             | 10.2 | G          | 160   | 0.14                    | EEEHB1V101AP | (7)    | 500                 |
| 220                  | 10                | 10.2           | (G)  | 180        | 0.14  | EEEHBV221UAP            | (7)          | 500    |                     |
| 50                   | 1                 | 4              | 5.8  | B          | 10  | 0.12                    | EEEHB1H1R0AR | (5)    | 2000                |
|                      | 2.2               | 4              | 5.8  | B          | 16  | 0.12                    | EEEHB1H2R2AR | (5)    | 2000                |
|                      | 3.3               | 4              | 5.8  | B          | 16  | 0.12                    | EEEHB1H3R3AR | (5)    | 2000                |
|                      | 4.7               | 5              | 5.8  | C          | 23  | 0.12                    | EEEHB1H4R7AR | (5)    | 1000                |
|                      | 6.8               | 5              | 5.8  | C          | 23  | 0.12                    | EEEHB1H6R8AR | (5)    | 1000                |
|                      | 10                | 6.3            | 5.8  | D          | 35  | 0.12                    | EEEHB1H100AP | (5)    | 1000                |
|                      | 22                | 6.3            | 5.8  | (D)        | 35  | 0.14                    | EEEHBH220UAP | (5)    | 1000                |
|                      |                   | 8              | 6.2  | E          | 70  | 0.12                    | EEEHB1H220AP | (7)    | 1000                |
|                      | 33                | 8              | 10.2 | F          | 91  | 0.12                    | EEEHB1H330AP | (7)    | 500                 |
|                      | 47                | 6.3            | 7.7  | D8         | 63  | 0.12                    | EEEHBH470YAP | (5)    | 900                 |
|                      |                   | 8              | 10.2 | (F)        | 95  | 0.12                    | EEEHBH470UAP | (7)    | 500                 |
|                      |                   | 10             | 10.2 | G          | 100   | 0.12                    | EEEHB1H470AP | (7)    | 500                 |
|                      | 100               | 10             | 10.2 | (G)        | 250   | 0.12                    | EEEHBH101UAP | (7)    | 500                 |
| 220                  | 10                | 10.2           | (G)  | 270        | 0.18  | EEEHBH221UAP            | (7)          | 500    |                     |

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· Please refer to the page of "Reflow Profile" and "The Taping Dimensions".

· When requesting vibration-proof product, please put the last "V" instead to "P"