

### Surface Mount Type

Series: **HB** Type: **V**

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



#### ■ Features

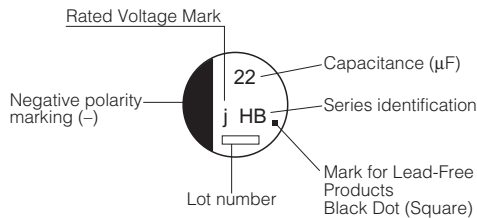
- Endurance: 105 °C 2000 h
- Vibration-proof product is available upon request. ( $\phi 8 \leq$ )
- RoHS directive compliant

#### ■ Specifications

|                                    |   |   |     |    |    |    |    |    |
|------------------------------------|---|---|-----|----|----|----|----|----|
| Category Temp. Range               | -40 °C to +105 °C   |   |     |    |    |    |    |    |
| Rated W.V. Range                   | 6.3 V.DC to 50 V.DC   |   |     |    |    |    |    |    |
| Nominal Cap. Range                 | 0.1 $\mu$ F to 1500 $\mu$ F   |   |     |    |    |    |    |    |
| Capacitance Tolerance              | $\pm 20\%$ (120 Hz/ +20 °C)   |   |     |    |    |    |    |    |
| DC Leakage Current                 | $I \leq 0.01 CV$ or 3 ( $\mu$ A) After 2 minutes (Whichever is greater)   |   |     |    |    |    |    |    |
| $\tan \delta$                      | Please see the attached High temperature lead-free reflow products list.  |   |     |    |    |    |    |    |
| Characteristics at Low Temperature | Standard  | W.V.(V)   | 6.3 | 10 | 16 | 25 | 35 | 50 |
|                                    |   | Z(-25 °C)/Z(+20 °C)   | 4   | 3  | 2  | 2  | 2  | 2  |
|                                    | Miniaturization product   | Z(-25 °C)/Z(+21 °C)   | 4   | 3  | 2  | 2  | 2  | 2  |
|                                    |   | Z(-40 °C)/Z(+21 °C)   | 10  | 8  | 6  | 6  | 4  | 4  |
| Endurance                          | After applying rated working voltage for 2000 hours at +105 °C $\pm 2$ °C and then being stabilized at +20 °C, capacitors shall meet the following limits.  |   |     |    |    |    |    |    |
|                                    | Capacitance change  | $\pm 20\%$ of initial measured value (16 V.DC or less : Within $\pm 25\%$ , Miniaturization product : Within $\pm 35\%$ ) |     |    |    |    |    |    |
|                                    | $\tan \delta$   | $\leq 200\%$ of initial specified value   |     |    |    |    |    |    |
|                                    | DC leakage current  | $\leq$ initial specified value  |     |    |    |    |    |    |
| Shelf Life                         | After storage for 1000 hours at +105 °C $\pm 2$ °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  | $\pm 10\%$ of initial measured value  |     |    |    |    |    |    |
|                                    | $\tan \delta$   | $\leq$ initial specified value  |     |    |    |    |    |    |
|                                    | DC leakage current  | $\leq$ initial specified value  |     |    |    |    |    |    |

#### ■ Marking

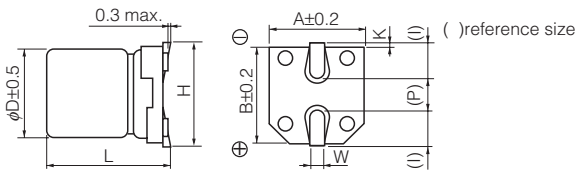
Example : 6.3 V 22  $\mu$ F (Polarized)  
Marking color : BLACK



##### Rated Voltage Mark

|   |       |
|---|-------|
| j | 6.3 V |
| A | 10 V  |
| C | 16 V  |
| E | 25 V  |
| V | 35 V  |
| H | 50 V  |

#### ■ Dimensions in mm (not to scale)



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

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Should a safety concern arise regarding this product, please be sure to contact us immediately.

00 Sep. 2010

■ High temperate Lead-Free reflow Products

Endurance : 105 °C 2000 h

| W.V. | Cap.<br>(±20 %) | Case size |        |               | Specification  |                               | Part No.<br>(RoHS:compliant) | Reflow | Min.<br>Packaging Q'ty |
|------|-----------------|-----------|--------|---------------|--|-------------------------------|------------------------------|--------|------------------------|
|      |                 | Dia.      | Length | *Size<br>Code | Ripple<br>Current<br>(120 Hz)<br>(+105°C)<br>(mA r.m.s.) | tan δ<br>(120 Hz)<br>(+20 °C) |                              |        | Taping                 |
| (V)  | (μF)            | (mm)      | (mm)   |               |  |                               |                              | (pcs)  |                        |
| 6.3  | 22              | 4         | 5.8    | B             | 26   | 0.30                          | EEEHB0J220AR                 | (5)    | 2000                   |
|      | 33              | 4         | 5.8    | B             | 29   | 0.30                          | EEEHB0J330AR                 | (5)    | 2000                   |
|      | 47              | 4         | 5.8    | (B)           | 26   | 0.50                          | EEEHB0J470UAR                | (5)    | 2000                   |
|      |                 | 5         | 5.8    | C             | 46   | 0.30                          | EEEHB0J470AR                 | (5)    | 1000                   |
|      | 100             | 5         | 5.8    | (C)           | 42   | 0.50                          | EEEHB0J101UAR                | (5)    | 1000                   |
|      |                 | 6.3       | 5.8    | D             | 71   | 0.30                          | EEEHB0J101AP                 | (5)    | 1000                   |
|      | 220             | 6.3       | 5.8    | (D)           | 80   | 0.50                          | EEEHB0J221UAP                | (5)    | 1000                   |
|      |                 | 8         | 10.2   | F             | 150  | 0.35                          | EEEHB0J221AP                 | (7)    | 500                    |
|      | 330             | 8         | 6.2    | (E)           | 180  | 0.50                          | EEEHB0J331UAP                | (7)    | 1000                   |
|      |                 | 8         | 10.2   | F             | 230  | 0.35                          | EEEHB0J331AP                 | (7)    | 500                    |
| 470  | 8               | 10.2      | (F)    | 230           | 0.50   | EEEHB0J471UAP                 | (7)                          | 500    |                        |
| 1500 | 10              | 10.2      | (G)    | 290           | 0.50   | EEEHB0J152UAP                 | (7)                          | 500    |                        |
| 10   | 33              | 4         | 5.8    | (B)           | 23   | 0.30                          | EEEHBA330UAR                 | (5)    | 2000                   |
|      |                 | 5         | 5.8    | C             | 43   | 0.26                          | EEEHBA1A330AR                | (5)    | 1000                   |
|      | 68              | 6.3       | 5.8    | D             | 70   | 0.22                          | EEEHBA1A680AP                | (5)    | 1000                   |
|      |                 | 6.3       | 5.8    | (D)           | 71   | 0.30                          | EEEHBA101UAR                 | (5)    | 1000                   |
|      | 100             | 8         | 6.2    | E             | 110  | 0.26                          | EEEHBA1A101AP                | (7)    | 1000                   |
|      |                 | 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                          | EEEHBA1A221AP                | (7)    | 500                    |
|      | 470             | 8         | 10.2   | (F)           | 220  | 0.35                          | EEEHBA471UAP                 | (7)    | 500                    |
|      |                 | 10        | 10.2   | G             | 270  | 0.26                          | EEEHBA1A471AP                | (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                   |
|      |                 | 5         | 5.8    | (C)           | 39   | 0.26                          | EEEHBC470UAR                 | (5)    | 1000                   |
|      | 47              | 6.3       | 5.8    | D             | 70   | 0.16                          | EEEHB1C470AP                 | (5)    | 1000                   |
|      |                 | 6.3       | 7.7    | D8            | 84   | 0.16                          | EEEHBC470XAP                 | (5)    | 900                    |
|      | 100             | 6.3       | 5.8    | (D)           | 70   | 0.26                          | EEEHBC101UAR                 | (5)    | 1000                   |
|      |                 | 8         | 10.2   | F             | 120  | 0.20                          | EEEHB1C101AP                 | (7)    | 500                    |
|      | 220             | 8         | 10.2   | (F)           | 150  | 0.20                          | EEEHBC221UAP                 | (7)    | 500                    |
| 10   |                 | 10.2      | G      | 210           | 0.20   | EEEHB1C221AP                  | (7)                          | 500    |                        |
| 330  | 10              | 10.2      | G      | 230           | 0.20   | EEEHB1C331AP                  | (7)                          | 500    |                        |
| 470  | 8               | 10.2      | (F)    | 240           | 0.40   | EEEHBC471UAR                  | (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                          | EEEHBE470UAP                 | (5)    | 1000                   |
|      |                 | 8         | 6.2    | E             | 91   | 0.16                          | EEEHB1E470AP                 | (7)    | 1000                   |
|      | 100             | 8         | 6.2    | (E)           | 100  | 0.16                          | EEEHBE101UAR                 | (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

The taping dimensions are explained on EE188 of our Catalog. Please use it as a reference guide.

Reflow Profile (Fig-1 to Fig-6) listed on EE186 of our Catalog.

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### High temperate Lead-Free reflow Products

Endurance : 105 °C 2000 h

| W.V. | Cap.<br>(±20 %) | Case size |        |               | Specification  |                               | Part No.<br>(RoHS:compliant) | Reflow | Min.<br>Packaging Q'ty |
|------|-----------------|-----------|--------|---------------|--|-------------------------------|------------------------------|--------|------------------------|
|      |                 | Dia.      | Length | *Size<br>Code | Ripple<br>Current<br>(120 Hz)<br>(+105°C)<br>(mA r.m.s.) | tan δ<br>(120 Hz)<br>(+20 °C) |                              |        | Taping<br><br>(pcs)    |
| (V)  | (μF)            | (mm)      | (mm)   |               |  |                               |                              |        |                        |
| 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      | (E)           | 91   | 0.18                          | EEEHBV470UAP                 | (7)    | 1000                   |
|      |                 |           | 10.2   | F             | 98   | 0.14                          | EEEHB1V470AP                 | (7)    | 500                    |
|      | 100             | 8         | 10.2   | (F)           | 98   | 0.20                          | EEEHBV101UAP                 | (7)    | 500                    |
|      |                 |           | 10     | G             | 160  | 0.14                          | EEEHB1V101AP                 | (7)    | 500                    |
| 220  | 10              | 10.2      | (G)    | 180           | 0.14   | EEEHBV221UAP                  | (7)                          | 500    |                        |
| 50   | 0.1             | 4         | 5.8    | B             | 1  | 0.12                          | EEEHB1HR10AR                 | (5)    | 2000                   |
|      | 0.22            | 4         | 5.8    | B             | 2  | 0.12                          | EEEHB1HR22AR                 | (5)    | 2000                   |
|      | 0.33            | 4         | 5.8    | B             | 3  | 0.12                          | EEEHB1HR33AR                 | (5)    | 2000                   |
|      | 0.47            | 4         | 5.8    | B             | 5  | 0.12                          | EEEHB1HR47AR                 | (5)    | 2000                   |
|      | 0.68            | 4         | 5.8    | B             | 7  | 0.12                          | EEEHB1HR68AR                 | (5)    | 2000                   |
|      | 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                   |
|      |                 |           | 6.3    | (D)           | 35   | 0.14                          | EEEHBH220UAP                 | (5)    | 1000                   |
|      | 22              | 8         | 6.2    | E             | 70   | 0.12                          | EEEHB1H220AP                 | (7)    | 1000                   |
|      |                 |           | 10.2   | F             | 91   | 0.12                          | EEEHB1H330AP                 | (7)    | 500                    |
|      | 47              | 6.3       | 7.7    | D8            | 63   | 0.12                          | EEEHBH470YAP                 | (5)    | 900                    |
|      |                 |           | 8      | (F)           | 95   | 0.12                          | EEEHBH470UAP                 | (7)    | 500                    |
|      |                 |           | 10     | 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    |                        |

\*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

The taping dimensions are explained on EE188 of our Catalog. Please use it as a reference guide.

Reflow Profile (Fig-1 to Fig-6) listed on EE186 of our Catalog.