

## Surface Mount Type

Series : **HD** Type : **V**

✳ 6.3 V.DC to 35 V.DC : High temperature Lead-Free reflow (suffix : A\*)  
50 V.DC to 100 V.DC : Standard Lead-Free reflow



### Features

- Endurance : 105 °C 5000 h
- Vibration-proof product is available upon request. (φ8 mm and larger)
- RoHS compliant

### Specifications

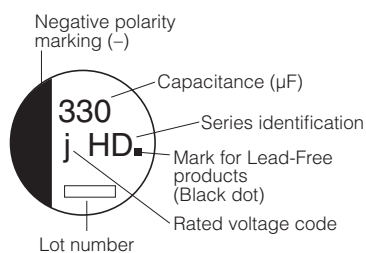
|                                    |   |                                   |    |    |    |    |    |    |     |                             |
|------------------------------------|---|-----------------------------------|----|----|----|----|----|----|-----|-----------------------------|
| Category temperature range         | -40 °C to +105 °C   |                                   |    |    |    |    |    |    |     |                             |
| Rated voltage range                | 6.3 V.DC to 100 V.DC  |                                   |    |    |    |    |    |    |     |                             |
| Capacitance range                  | 1 μF to 1000 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 | V.DC  | 6.3                               | 10 | 16 | 25 | 35 | 50 | 63 | 100 | (Impedance ratio at 120 Hz) |
|                                    | Z(-25 °C)/Z(+20 °C)   | 3                                 | 3  | 2  | 2  | 2  | 2  | 2  | 2   |                             |
|                                    | Z(-40 °C)/Z(+20 °C)   | 4                                 | 4  | 3  | 3  | 3  | 3  | 3  | 3   |                             |
| Endurance                          | After applying rated working voltage for 5000 hours at +105 °C±2 °C and then being stabilized at +20 °C, capacitors shall meet the following limits.  |                                   |    |    |    |    |    |    |     |                             |
|                                    | Capacitance change  | Within ±30 % of the initial value |    |    |    |    |    |    |     |                             |
|                                    | tan δ   | ≤ 300 % of 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) |                                   |    |    |    |    |    |    |     |                             |
|                                    | Capacitance change  | Within ±20 % of the initial value |    |    |    |    |    |    |     |                             |
|                                    | tan δ   | ≤ 200 % of the initial limit      |    |    |    |    |    |    |     |                             |
| 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          |    |    |    |    |    |    |     |                             |
| 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    |

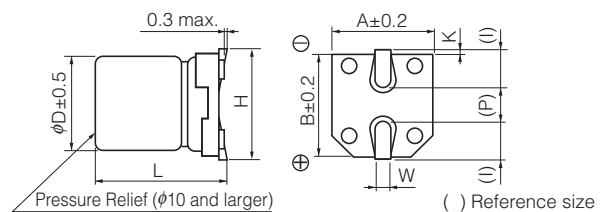
### Marking

Example : 6.3 V.DC 330 μF  
Marking color : BLACK



|                   |     |    |    |    |    |    |    |     |
|-------------------|-----|----|----|----|----|----|----|-----|
| R. Voltage (V.DC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 |
| Code              | j   | A  | C  | E  | V  | H  | J  | 2A  |

### Dimensions



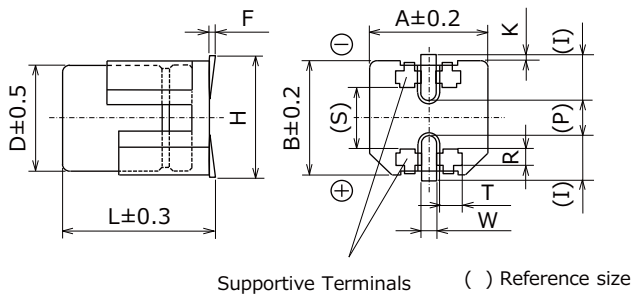
(Unit : mm)

| 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                              |

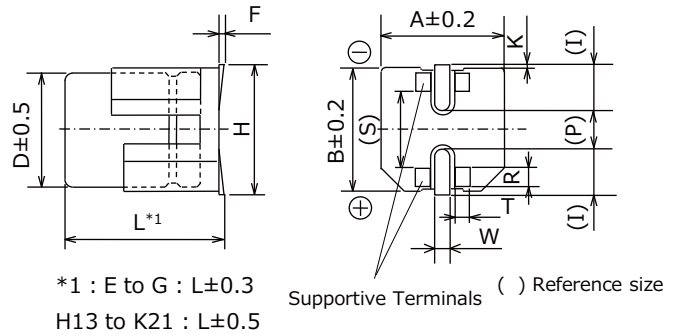
### Dimensions (Vibration-proof products)

\* The size and shape are different from standard products. Please inquire details of our company.

< Size code : D, D8 >



< Size code : E, F, G, H13, J16, K16, K21 >



Supportive Terminals ( ) Reference size

\*1 : E to G : L±0.3  
H13 to K21 : L±0.5

Supportive Terminals ( ) Reference size

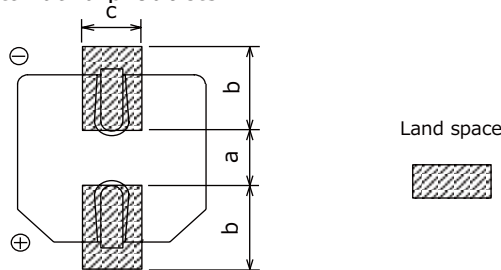
Unit : mm

| Size code | φD   | L    | A, B | H max. | F             | I   | W        | P   | K                                      | R        | S        | T        |
|-----------|------|------|------|--------|---------------|-----|----------|-----|--|----------|----------|----------|
| D         | 6.3  | 6.1  | 6.6  | 7.8    | 0 to +0.15    | 2.4 | 0.65±0.1 | 2.2 | 0.35 <sup>+0.15</sup> <sub>-0.20</sub> | 1.1±0.2  | 3.3±0.2  | 1.05±0.2 |
| D8        | 6.3  | 8.0  | 6.6  | 7.8    | 0 to +0.15    | 2.4 | 0.65±0.1 | 2.2 | 0.35 <sup>+0.15</sup> <sub>-0.20</sub> | 1.1±0.2  | 3.3±0.2  | 1.05±0.2 |
| E         | 8.0  | 6.5  | 8.3  | 9.5    | 0 to +0.15    | 3.4 | 0.7±0.1  | 2.2 | 0.35 <sup>+0.15</sup> <sub>-0.20</sub> | 0.70±0.2 | 5.3±0.2  | 1.7±0.2  |
| F         | 8.0  | 10.5 | 8.3  | 10.0   | 0 to +0.15    | 3.4 | 1.2±0.2  | 3.1 | 0.70±0.2                               | 0.70±0.2 | 5.3±0.2  | 1.3±0.2  |
| G         | 10.0 | 10.5 | 10.3 | 12.0   | 0 to +0.15    | 3.5 | 1.2±0.2  | 4.6 | 0.70±0.2                               | 0.70±0.2 | 6.9±0.2  | 1.3±0.2  |
| H13       | 12.5 | 13.8 | 13.5 | 15.0   | -0.1 to +0.15 | 4.7 | 1.2±0.2  | 4.4 | 0.70±0.3                               | 2.2±0.2  | 7.1±0.2  | 2.4±0.2  |
| J16       | 16.0 | 16.8 | 17.0 | 19.0   | -0.1 to +0.15 | 5.5 | 1.4±0.2  | 6.7 | 0.70±0.3                               | 3.0±0.2  | 9.0±0.2  | 1.9±0.2  |
| K16       | 18.0 | 16.8 | 19.0 | 21.0   | -0.1 to +0.15 | 6.7 | 1.4±0.2  | 6.7 | 0.70±0.3                               | 3.0±0.2  | 11.0±0.2 | 1.9±0.2  |
| K21       | 18.0 | 21.8 | 19.0 | 21.0   | -0.1 to +0.15 | 6.7 | 1.4±0.2  | 6.7 | 0.70±0.3                               | 3.0±0.2  | 11.0±0.2 | 1.9±0.2  |

### Land / Pad pattern

The circuit board land/pad pattern size for chip capacitors is specified in the following table. The land pitch influences installation strength and consider it.

#### ● Standard products



(Table of board land size vs. capacitor size)

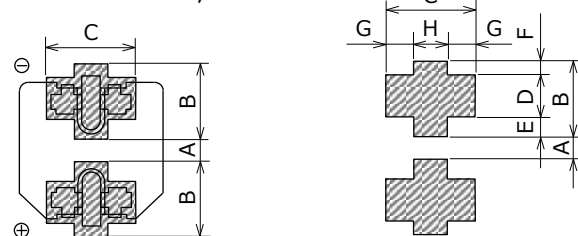
| Size code      | a   | b   | c   |
|----------------|-----|-----|-----|
| B (φ4)         | 1.0 | 2.5 | 1.6 |
| C (φ5)         | 1.5 | 2.8 | 1.6 |
| D (φ6.3)       | 1.8 | 3.2 | 1.6 |
| D8 (φ6.3x7.7L) | 1.8 | 3.2 | 1.6 |
| E (φ8x6.2L)    | 2.2 | 4.0 | 1.6 |
| F (φ8x10.2L)   | 3.1 | 4.0 | 2.0 |
| G (φ10x10.2L)  | 4.6 | 4.1 | 2.0 |
| H (φ12.5)      | 4.0 | 5.7 | 2.0 |
| J (φ16)        | 6.0 | 6.5 | 2.5 |
| K (φ18)        | 6.0 | 7.5 | 2.5 |

Unit : mm

When size "a" is wide, back fillet can be made, decreasing fitting strength.

#### ● Vibration-proof products

< Size code : D, D8 >



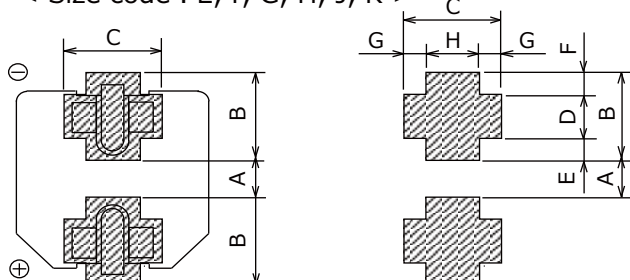
(Table of board land size vs. capacitor size)

| Size code      | A   | B   | C   | D   | E    | F    | G   | H   |
|----------------|-----|-----|-----|-----|------|------|-----|-----|
| D (φ6.3xL6.1)  | 1.2 | 3.6 | 3.2 | 2.0 | 0.95 | 0.65 | 1.0 | 1.2 |
| D8 (φ6.3xL8.0) | 1.2 | 3.6 | 3.2 | 2.0 | 0.95 | 0.65 | 1.0 | 1.2 |
| E (φ8x6.5L)    | 1.8 | 4.2 | 5.0 | 1.3 | 1.5  | 1.4  | 1.5 | 2.0 |
| F (φ8x10.5L)   | 2.7 | 4.0 | 4.7 | 1.3 | 1.0  | 1.7  | 1.1 | 2.5 |
| G (φ10)        | 3.9 | 4.4 | 4.7 | 1.3 | 1.2  | 1.9  | 1.1 | 2.5 |
| H (φ12.5)      | 3.9 | 6.0 | 6.9 | 2.8 | 1.3  | 1.9  | 2.2 | 2.5 |
| J (φ16)        | 5.8 | 6.8 | 6.2 | 3.6 | 1.3  | 1.9  | 1.7 | 2.8 |
| K (φ18)        | 5.8 | 7.3 | 6.2 | 3.6 | 1.8  | 1.9  | 1.7 | 2.8 |

Unit : mm

When size "A" is wide, back fillet can be made, decreasing fitting strength.

< Size code : E, F, G, H, J, K >



\* Take mounting conditions, solderability and fitting strength into consideration when selecting parts for your company's design.

\* The vibration-proof capacitors of size φ6.3 has support terminals extending from the bottom side to the lead edge. Then, make sure to find appropriate soldering conditions to form fillet on the support terminals if required for appearance inspection.

## Characteristics list (6.3 V.DC to 35 V.DC)

Endurance : 105 °C 5000 h

| Rated voltage (V.DC) | Cap. (±20 %) (μF) | Case size (mm) |      | Size code | Specification                                 |                                  |                         | Part No.     | Reflow | Min. Packaging Qty |  |
|----------------------|-------------------|----------------|------|-----------|---|----------------------------------|-------------------------|--------------|--------|--------------------|--|
|                      |                   | φD             | L    |           | Ripple current (120 Hz) (+105 °C) (mA r.m.s.) | Impedance (100 kHz) (+20 °C) (Ω) | tan δ (120 Hz) (+20 °C) |              |        | Taping (pcs)       |  |
| 6.3                  | 330               | 8              | 10.2 | F         | 230   | 1.5                              | 0.30                    | EEEHD0J331AP | (7)    | 500                |  |
|                      | 1000              | 10             | 10.2 | G         | 313   | 0.8                              | 0.50                    | EEEHD0J102AP | (7)    | 500                |  |
| 10                   | 100               | 8              | 6.2  | E         | 62  | 2.0                              | 0.30                    | EEEHD1A101AP | (7)    | 1000               |  |
|                      | 220               | 8              | 10.2 | F         | 160   | 1.5                              | 0.30                    | EEEHD1A221AP | (7)    | 500                |  |
|                      | 330               | 8              | 10.2 | F         | 160   | 1.5                              | 0.30                    | EEEHD1A331AP | (7)    | 500                |  |
| 16                   | 10                | 4.0            | 5.8  | B         | 28  | 12.0                             | 0.20                    | EEEHD1C100AR | (5)    | 2000               |  |
|                      | 22                | 5.0            | 5.8  | C         | 39  | 7.2                              | 0.20                    | EEEHD1C220AR | (5)    | 1000               |  |
|                      | 47                | 6.3            | 5.8  | D         | 70  | 4.0                              | 0.20                    | EEEHD1C470AP | (5)    | 1000               |  |
|                      | 100               | 8              | 10.2 | F         | 130   | 1.5                              | 0.20                    | EEEHD1C101AP | (7)    | 500                |  |
|                      | 220               | 10             | 10.2 | G         | 220   | 0.8                              | 0.20                    | EEEHD1C221AP | (7)    | 500                |  |
|                      | 470               | 10             | 10.2 | G         | 340   | 0.8                              | 0.20                    | EEEHD1C471AP | (7)    | 500                |  |
| 25                   | 4.7               | 4              | 5.8  | B         | 17  | 12.0                             | 0.16                    | EEEHD1E4R7AR | (5)    | 2000               |  |
|                      | 10                | 5              | 5.8  | C         | 28  | 7.2                              | 0.16                    | EEEHD1E100AR | (5)    | 1000               |  |
|                      | 22                | 6.3            | 5.8  | D         | 55  | 4.0                              | 0.16                    | EEEHD1E220AP | (5)    | 1000               |  |
|                      | 33                | 6.3            | 5.8  | D         | 55  | 4.0                              | 0.16                    | EEEHD1E330AP | (5)    | 1000               |  |
|                      | 47                | 8              | 6.2  | E         | 56  | 2.0                              | 0.18                    | EEEHD1E470AP | (7)    | 1000               |  |
|                      | 100               | 8              | 10.2 | F         | 130   | 1.5                              | 0.16                    | EEEHD1E101AP | (7)    | 500                |  |
|                      | 330               | 10             | 10.2 | G         | 238   | 0.8                              | 0.16                    | EEEHD1E331AP | (7)    | 500                |  |
| 35                   | 4.7               | 4              | 5.8  | B         | 17  | 12.0                             | 0.13                    | EEEHD1V4R7AR | (5)    | 2000               |  |
|                      | 10                | 5              | 5.8  | C         | 28  | 7.2                              | 0.13                    | EEEHD1V100AR | (5)    | 1000               |  |
|                      | 22                | 6.3            | 5.8  | D         | 55  | 4.0                              | 0.13                    | EEEHD1V220AP | (5)    | 1000               |  |
|                      | 33                | 8              | 6.2  | E         | 53  | 2.0                              | 0.16                    | EEEHD1V330AP | (7)    | 1000               |  |
|                      |                   | 6.3            | 7.7  | D8        | 57  | 2.0                              | 0.13                    | EEEHDV330XAP | (5)    | 900                |  |
|                      | 47                | 6.3            | 7.7  | D8        | 57  | 2.0                              | 0.14                    | EEEHDV470XAP | (5)    | 900                |  |
|                      |                   | 8              | 10.2 | F         | 79  | 1.5                              | 0.14                    | EEEHD1V470AP | (7)    | 500                |  |
|                      | 100               | 10             | 10.2 | G         | 101   | 0.8                              | 0.14                    | EEEHD1V101AP | (7)    | 500                |  |
|                      | 220               | 10             | 10.2 | G         | 220   | 0.8                              | 0.14                    | EEEHD1V221AP | (7)    | 500                |  |

## Characteristics list (50 V.DC to 100 V.DC)

Endurance : 105 °C 5000 h

| Rated voltage (V.DC) | Cap. (±20 %) (μF) | Case size (mm) |      | Size code | Specification                                 |                                  |                         | Part No.    | Reflow | Min. Packaging Qty |  |
|----------------------|-------------------|----------------|------|-----------|---|----------------------------------|-------------------------|-------------|--------|--------------------|--|
|                      |                   | φD             | L    |           | Ripple current (120 Hz) (+105 °C) (mA r.m.s.) | Impedance (100 kHz) (+20 °C) (Ω) | tan δ (120 Hz) (+20 °C) |             |        | Taping (pcs)       |  |
| 50                   | 1                 | 4              | 5.8  | B         | 7   | 12.0                             | 0.12                    | EEEHD1H1R0R | (1)    | 2000               |  |
|                      | 2.2               | 4              | 5.8  | B         | 12  | 12.0                             | 0.12                    | EEEHD1H2R2R | (1)    | 2000               |  |
|                      | 3.3               | 4              | 5.8  | B         | 16  | 12.0                             | 0.12                    | EEEHD1H3R3R | (1)    | 2000               |  |
|                      | 4.7               | 5              | 5.8  | C         | 21  | 7.2                              | 0.12                    | EEEHD1H4R7R | (1)    | 1000               |  |
|                      | 10                | 6.3            | 5.8  | D         | 33  | 4.0                              | 0.12                    | EEEHD1H100P | (1)    | 1000               |  |
|                      | 22                | 8              | 6.2  | E         | 50  | 2.0                              | 0.14                    | EEEHD1H220P | (2)    | 1000               |  |
|                      | 33                | 8              | 10.2 | F         | 74  | 1.5                              | 0.14                    | EEEHD1H330P | (2)    | 500                |  |
|                      | 47                | 10             | 10.2 | G         | 94  | 0.8                              | 0.14                    | EEEHD1H470P | (2)    | 500                |  |
| 63                   | 100               | 10             | 10.2 | G         | 94  | 0.8                              | 0.14                    | EEEHD1H101P | (2)    | 500                |  |
|                      | 10                | 8              | 6.2  | E         | 45  | 2.0                              | 0.18                    | EEEHD1J100P | (2)    | 1000               |  |
|                      | 22                | 8              | 10.2 | F         | 65  | 1.5                              | 0.18                    | EEEHD1J220P | (2)    | 500                |  |
| 100                  | 33                | 10             | 10.2 | G         | 80  | 0.8                              | 0.18                    | EEEHD1J330P | (2)    | 500                |  |
|                      | 10                | 8              | 10.2 | F         | 55  | 1.5                              | 0.18                    | EEEHD2A100P | (2)    | 500                |  |
|                      | 22                | 10             | 10.2 | G         | 70  | 0.8                              | 0.18                    | EEEHD2A220P | (2)    | 500                |  |

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 of "P"

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- The switchover date for compliance with the RoHS Directive/REACH Regulations varies depending on the part number or series of our products.
- When you use the inventory of our products for which it is unclear whether those products are compliant with the RoHS Directive/REACH Regulation, please select "Sales Inquiry" in the website inquiry form and contact us.

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