

### Surface Mount Type

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

※6.3V to 35V : High temperature Lead-Free reflow (suffix:A\*)

50V to 100V : Standard Lead-Free reflow



#### ■ Features

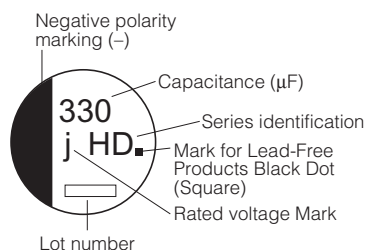
- Endurance: 105 °C 5000 h
- Vibration-proof product is available upon request.(φ8 ≤)
- RoHS directive compliant

#### ■ Specifications

|                                    |                                                                                                                                                                                             |                                    |    |    |    |    |    |    |     |                             |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|----|----|----|----|----|----|-----|-----------------------------|
| Category Temp. Range               | -40 °C to +105 °C                                                                                                                                                                           |                                    |    |    |    |    |    |    |     |                             |
| Rated W.V. Range                   | 6.3 V.DC to 100 V.DC                                                                                                                                                                        |                                    |    |    |    |    |    |    |     |                             |
| Nominal Cap. Range                 | 0.47 μF to 1000 μF                                                                                                                                                                          |                                    |    |    |    |    |    |    |     |                             |
| Capacitance Tolerance              | ±20 % (120 Hz/+20 °C)                                                                                                                                                                       |                                    |    |    |    |    |    |    |     |                             |
| DC Leakage Current                 | I ≤ 0.01 CV or 3 (μA) After 2 minutes (Whichever is greater)                                                                                                                                |                                    |    |    |    |    |    |    |     |                             |
| tan δ                              | Please see the attached High temperature lead-free reflow products list.                                                                                                                    |                                    |    |    |    |    |    |    |     |                             |
| Characteristics at Low Temperature | W.V. (V)                                                                                                                                                                                    | 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                                                                                                                                                                          | ±30 % of initial measured value    |    |    |    |    |    |    |     |                             |
|                                    | tan δ                                                                                                                                                                                       | ≤ 300 % of initial specified value |    |    |    |    |    |    |     |                             |
|                                    | DC leakage current                                                                                                                                                                          | ≤ initial specified value          |    |    |    |    |    |    |     |                             |
| 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                                                                                                                                                                          | ±20 % of initial measured value    |    |    |    |    |    |    |     |                             |
|                                    | tan δ                                                                                                                                                                                       | ≤ 200 % of initial specified value |    |    |    |    |    |    |     |                             |
|                                    | DC leakage current                                                                                                                                                                          | ≤ initial specified value          |    |    |    |    |    |    |     |                             |
| Resistance to Soldering Heat       | After reflow soldering and then being stabilized at +20 °C, capacitors shall meet the following limits.                                                                                     |                                    |    |    |    |    |    |    |     |                             |
|                                    | Capacitance change                                                                                                                                                                          | ±10 % of initial measured value    |    |    |    |    |    |    |     |                             |
|                                    | tan δ                                                                                                                                                                                       | ≤ initial specified value          |    |    |    |    |    |    |     |                             |
|                                    | DC leakage current                                                                                                                                                                          | ≤ initial specified value          |    |    |    |    |    |    |     |                             |

#### ■ Marking

Example: 6.3 V 330 μF  
Marking color: BLACK



##### Rated Voltage Mark

|   |       |    |       |
|---|-------|----|-------|
| j | 6.3 V | H  | 50 V  |
| A | 10 V  | J  | 63 V  |
| C | 16 V  | 2A | 100 V |
| E | 25 V  |    |       |
| V | 35 V  |    |       |

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

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

## ■ High temperature Lead-Free reflow Products(6.3V to 35V)

Endurance : 105 °C 5000 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.) | Impedance<br>(100 kHz)<br>(+20 °C) | $\tan \delta$<br>(120 Hz)<br>(+20 °C) |                              |        | Taping                 |
| (V)  | (μF)            | (mm)      | (mm)   |              |                                                          |                                    |                                       |                              |        | (pcs)                  |
| 6.3  | 330             | 8.0       | 10.2   | F            | 230                                                      | 1.5                                | 0.30                                  | EEEHD0J331AP                 | (7)    | 500                    |
|      | 1000            | 10.0      | 10.2   | G            | 313                                                      | 0.8                                | 0.50                                  | EEEHD0J102AP                 | (7)    | 500                    |
| 10   | 100             | 8.0       | 6.2    | E            | 62                                                       | 2.0                                | 0.30                                  | EEEHD1A101AP                 | (7)    | 1000                   |
|      | 220             | 8.0       | 10.2   | F            | 160                                                      | 1.5                                | 0.30                                  | EEEHD1A221AP                 | (7)    | 500                    |
|      | 330             | 10.0      | 10.2   | G            | 238                                                      | 0.8                                | 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             | 8.0       | 10.2   | F            | 130                                                      | 1.5                                | 0.20                                  | EEEHD1C101AP                 | (7)    | 500                    |
|      | 220             | 10.0      | 10.2   | G            | 220                                                      | 0.8                                | 0.20                                  | EEEHD1C221AP                 | (7)    | 500                    |
|      | 470             | 10.0      | 10.2   | G            | 340                                                      | 0.8                                | 0.20                                  | EEEHD1C471AP                 | (7)    | 500                    |
| 25   | 4.7             | 4.0       | 5.8    | B            | 17                                                       | 12.0                               | 0.16                                  | EEEHD1E4R7AR                 | (5)    | 2000                   |
|      | 10              | 5.0       | 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              | 8.0       | 6.2    | E            | 56                                                       | 2.0                                | 0.18                                  | EEEHD1E470AP                 | (7)    | 1000                   |
|      | 100             | 8.0       | 10.2   | F            | 130                                                      | 1.5                                | 0.16                                  | EEEHD1E101AP                 | (7)    | 500                    |
|      | 330             | 10.0      | 10.2   | G            | 238                                                      | 0.8                                | 0.16                                  | EEEHD1E331AP                 | (7)    | 500                    |
| 35   | 4.7             | 4.0       | 5.8    | B            | 17                                                       | 12.0                               | 0.13                                  | EEEHD1V4R7AR                 | (5)    | 2000                   |
|      | 10              | 5.0       | 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              | 8.0       | 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                    |
|      | 47              | 8.0       | 10.2   | F            | 79                                                       | 1.5                                | 0.14                                  | EEEHD1V470AP                 | (7)    | 500                    |
|      | 100             | 10.0      | 10.2   | G            | 101                                                      | 0.8                                | 0.14                                  | EEEHD1V101AP                 | (7)    | 500                    |
|      | 220             | 10.0      | 10.2   | G            | 220                                                      | 0.8                                | 0.14                                  | EEEHD1V221AP                 | (7)    | 500                    |

## ■ Standard Lead-Free reflow Products(50V to 100V)

Endurance : 105 °C 5000 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.) | Impedance<br>(100 kHz)<br>(+20 °C) | $\tan \delta$<br>(120 Hz)<br>(+20 °C) |                              |        | Taping                 |
| (V)  | (μF)            | (mm)      | (mm)   |              |                                                          |                                    |                                       |                              |        | (pcs)                  |
| 50   | 0.47            | 4.0       | 5.8    | B            | 5                                                        | 12.0                               | 0.12                                  | EEEHD1HR47R                  | (1)    | 2000                   |
|      | 1               | 4.0       | 5.8    | B            | 7                                                        | 12.0                               | 0.12                                  | EEEHD1H1R0R                  | (1)    | 2000                   |
|      | 2.2             | 4.0       | 5.8    | B            | 12                                                       | 12.0                               | 0.12                                  | EEEHD1H2R2R                  | (1)    | 2000                   |
|      | 3.3             | 4.0       | 5.8    | B            | 16                                                       | 12.0                               | 0.12                                  | EEEHD1H3R3R                  | (1)    | 2000                   |
|      | 4.7             | 5.0       | 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              | 8.0       | 6.2    | E            | 50                                                       | 2.0                                | 0.14                                  | EEEHD1H220P                  | (2)    | 1000                   |
|      | 33              | 8.0       | 10.2   | F            | 74                                                       | 1.5                                | 0.14                                  | EEEHD1H330P                  | (2)    | 500                    |
|      | 47              | 10.0      | 10.2   | G            | 94                                                       | 0.8                                | 0.14                                  | EEEHD1H470P                  | (2)    | 500                    |
| 63   | 10              | 8.0       | 6.2    | E            | 45                                                       | 2.0                                | 0.18                                  | EEEHD1J100P                  | (2)    | 1000                   |
|      | 22              | 8.0       | 10.2   | F            | 65                                                       | 1.5                                | 0.18                                  | EEEHD1J220P                  | (2)    | 500                    |
|      | 33              | 10.0      | 10.2   | G            | 80                                                       | 0.8                                | 0.18                                  | EEEHD1J330P                  | (2)    | 500                    |
| 100  | 3.3             | 8.0       | 6.2    | E            | 30                                                       | 2.0                                | 0.18                                  | EEEHD2A3R3P                  | (2)    | 1000                   |
|      | 4.7             | 8.0       | 10.2   | F            | 50                                                       | 1.5                                | 0.18                                  | EEEHD2A4R7P                  | (2)    | 500                    |
|      | 10              | 8.0       | 10.2   | F            | 55                                                       | 1.5                                | 0.18                                  | EEEHD2A100P                  | (2)    | 500                    |
|      | 22              | 10.0      | 10.2   | G            | 70                                                       | 0.8                                | 0.18                                  | EEEHD2A220P                  | (2)    | 500                    |

The taping dimensions are explained on p.177 of our Catalog. Please use it as a reference guide.  
 Reflow Profile(Fig-1 to Fig-11) listed on p.175 of our Catalog.

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.