

### Surface Mount Type

Series: **HA** Type: **V**

High-temperature assurance



#### Features

- Endurance : 105 °C 1000 h
- Vibration-proof product is available upon request. (φ8 mm and larger)
- RoHS compliant

#### Specifications

|                                    |  |   |    |    |    |    |    |    |     |                             |
|------------------------------------|--|---|----|----|----|----|----|----|-----|-----------------------------|
| Category temp. range               | -40 °C to +105 °C  |   |    |    |    |    |    |    |     |                             |
| Rated voltage range                | 6.3 V.DC to 100 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 | V.DC   | 6.3   | 10 | 16 | 25 | 35 | 50 | 63 | 100 | (Impedance ratio at 120 Hz) |
|                                    | Z(-25 °C)/Z(+20 °C)  | 4   | 3  | 2  | 2  | 2  | 2  | 3  | 3   |                             |
|                                    | Z(-40 °C)/Z(+20 °C)  | 8   | 6  | 4  | 4  | 3  | 3  | 4  | 4   |                             |
| Endurance                          | After applying rated working voltage for 1000 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 (6.3 V.DC of miniature : ±30 %) |    |    |    |    |    |    |     |                             |
|                                    | tan δ  | ≤ 200 % of the initial limit                                      |    |    |    |    |    |    |     |                             |
| Shelf life                         | After storage for 1000 hours at +85 °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) |   |    |    |    |    |    |    |     |                             |
|                                    | After reflow soldering and then being stabilized at +20 °C, capacitors shall meet the following limits.  |   |    |    |    |    |    |    |     |                             |
|                                    | DC leakage current   | Within 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  |    |    |    |    |    |    |     |                             |
|                                    | DC leakage current   | Within the initial limit  |    |    |    |    |    |    |     |                             |

#### 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

Negative polarity marking (-)

Capacitance (μF)

Series identification

Mark for Lead-Free products (Black dot)

Lot number

Rated voltage mark

|                    |     |    |     |             |
|--------------------|-----|----|-----|-------------|
| Rated voltage mark |     |    |     | Unit : V.DC |
| j                  | 6.3 | V  | 35  |             |
| A                  | 10  | H  | 50  |             |
| C                  | 16  | J  | 63  |             |
| E                  | 25  | 2A | 100 |             |

#### Dimensions

( ) Reference size

|           | Unit : mm |                                     |      |           |     |          |     |  |  |
|-----------|-----------|-------------------------------------|------|-----------|-----|----------|-----|--|--|
| Size code | D         | L                                   | A,B  | H         | I   | W        | P   | K                                      |  |
| B         | 4.0       | 5.4 <sup>+0.1</sup> <sub>-0.2</sub> | 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       | 5.4 <sup>+0.1</sup> <sub>-0.2</sub> | 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       | 5.4 <sup>+0.1</sup> <sub>-0.2</sub> | 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±0.2                               |  |
| G         | 10.0      | 10.2±0.3                            | 10.3 | 12.0 max. | 3.5 | 0.90±0.2 | 4.6 | 0.70±0.2                               |  |

### Characteristics list

Endurance : 105 °C 1000 h

| Rated voltage (V.DC) | Capacitance (±20 %) (μF) | Case size(mm) |      | Size code *1 | Specification                 |              | Part number  | Reflow | Packaging Qty<br>Taping (pcs) |
|----------------------|--------------------------|---------------|------|--------------|-------------------------------|--------------|--------------|--------|-------------------------------|
|                      |                          | φD            | L    |              | Ripple current *2 (mA r.m.s.) | tan δ *3     |              |        |                               |
| 6.3                  | 22                       | 4             | 5.4  | B            | 29                            | 0.30         | EEEHA0J220R  | (1)    | 2000                          |
|                      | 33                       | 4             | 5.4  | (B)          | 29                            | 0.35         | EEEHA0J330WR | (1)    | 2000                          |
|                      | 47                       | 4             | 5.4  | (B)          | 36                            | 0.35         | EEEHA0J470WR | (1)    | 2000                          |
|                      |                          |               | 5    | C            | 46                            | 0.30         | EEEHA0J470R  | (1)    | 1000                          |
|                      | 100                      | 5             | 5.4  | (C)          | 47                            | 0.35         | EEEHA0J101WR | (1)    | 1000                          |
|                      |                          |               | 6.3  | D            | 71                            | 0.30         | EEEHA0J101P  | (1)    | 1000                          |
|                      | 220                      | 6.3           | 5.4  | (D)          | 74                            | 0.35         | EEEHA0J221WP | (1)    | 1000                          |
|                      | 330                      | 6.3           | 7.7  | D8           | 105                           | 0.30         | EEEHA0J331XP | (1)    | 900                           |
|                      |                          |               | 8    | F            | 230                           | 0.35         | EEEHA0J331P  | (2)    | 500                           |
|                      | 470                      | 8             | 10.2 | (F)          | 300                           | 0.35         | EEEHA0J471UP | (2)    | 500                           |
| 1000                 | 8                        | 10.2          | (F)  | 300          | 0.35                          | EEEHA0J102UP | (2)          | 500    |                               |
|                      |                          | 10            | G    | 400          | 0.35                          | EEEHA0J102P  | (2)          | 500    |                               |
| 1500                 | 10                       | 10.2          | G    | 480          | 0.35                          | EEEHA0J152P  | (2)          | 500    |                               |
| 10                   | 22                       | 4             | 5.4  | (B)          | 28                            | 0.30         | EEEHA1A220WR | (1)    | 2000                          |
|                      | 33                       | 4             | 5.4  | (B)          | 29                            | 0.30         | EEEHA1A330WR | (1)    | 2000                          |
|                      |                          |               | 5    | C            | 43                            | 0.22         | EEEHA1A330R  | (1)    | 1000                          |
|                      | 47                       | 5             | 5.4  | (C)          | 43                            | 0.30         | EEEHA1A470WR | (1)    | 1000                          |
|                      | 100                      | 6.3           | 5.4  | (D)          | 71                            | 0.30         | EEEHA1A101WP | (1)    | 1000                          |
|                      |                          |               | 8    | E            | 110                           | 0.26         | EEEHA1A101P  | (2)    | 1000                          |
|                      | 220                      | 6.3           | 7.7  | D8           | 105                           | 0.22         | EEEHA1A221XP | (1)    | 900                           |
|                      |                          |               | 8    | F            | 160                           | 0.26         | EEEHA1A221P  | (2)    | 500                           |
|                      | 470                      | 8             | 10.2 | (F)          | 200                           | 0.26         | EEEHA1A471UP | (2)    | 500                           |
|                      |                          |               | 10   | G            | 270                           | 0.26         | EEEHA1A471P  | (2)    | 500                           |
| 1000                 | 10                       | 10.2          | G    | 400          | 0.26                          | EEEHA1A102P  | (2)          | 500    |                               |
| 16                   | 10                       | 4             | 5.4  | B            | 28                            | 0.16         | EEEHA1C100R  | (1)    | 2000                          |
|                      | 22                       | 4             | 5.4  | (B)          | 28                            | 0.26         | EEEHA1C220WR | (1)    | 2000                          |
|                      |                          |               | 5    | C            | 39                            | 0.16         | EEEHA1C220R  | (1)    | 1000                          |
|                      | 33                       | 5             | 5.4  | (C)          | 35                            | 0.26         | EEEHA1C330WR | (1)    | 1000                          |
|                      | 47                       | 5             | 5.4  | (C)          | 39                            | 0.26         | EEEHA1C470WR | (1)    | 1000                          |
|                      |                          |               | 6.3  | D            | 70                            | 0.16         | EEEHA1C470P  | (1)    | 1000                          |
|                      | 100                      | 6.3           | 5.4  | (D)          | 70                            | 0.26         | EEEHA1C101WP | (1)    | 1000                          |
|                      |                          |               | 8.0  | E            | 91                            | 0.20         | EEEHA1C101UP | (2)    | 1000                          |
|                      | 220                      | 6.3           | 7.7  | D8           | 105                           | 0.16         | EEEHA1C221XP | (1)    | 900                           |
|                      |                          |               | 8    | (F)          | 150                           | 0.20         | EEEHA1C221UP | (2)    | 500                           |
|                      |                          |               | 10   | G            | 210                           | 0.20         | EEEHA1C221P  | (2)    | 500                           |
|                      | 330                      | 8             | 10.2 | (F)          | 170                           | 0.20         | EEEHA1C331UP | (2)    | 500                           |
|                      |                          |               | 10   | G            | 230                           | 0.20         | EEEHA1C331P  | (2)    | 500                           |
|                      | 470                      | 8             | 10.2 | (F)          | 340                           | 0.20         | EEEHA1C471UP | (2)    | 500                           |
|                      |                          |               | 10   | G            | 340                           | 0.20         | EEEHA1C471P  | (2)    | 500                           |
|                      | 680                      | 10            | 10.2 | G            | 380                           | 0.20         | EEEHA1C681P  | (2)    | 500                           |

\*1: Size code ( ) : Miniaturization product

\*2: Ripple current (120 Hz / +105 °C)

\*3: tan δ (120 Hz / +20 °C)

- 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 1000 h

| Rated voltage (V.DC) | Capacitance (±20 %) (μF) | Case size(mm) |      | Size code *1 | Specification                 |              | Part number  | Reflow | Taping (pcs) |
|----------------------|--------------------------|---------------|------|--------------|-------------------------------|--------------|--------------|--------|--------------|
|                      |                          | φD            | L    |              | Ripple current *2 (mA r.m.s.) | tan δ *3     |              |        |              |
| 25                   | 4.7                      | 4             | 5.4  | B            | 22                            | 0.14         | EEEHA1E4R7R  | (1)    | 2000         |
|                      | 10                       | 4             | 5.4  | (B)          | 22                            | 0.20         | EEEHA1E100WR | (1)    | 2000         |
|                      |                          | 5             | 5.4  | C            | 28                            | 0.14         | EEEHA1E100R  | (1)    | 1000         |
|                      | 22                       | 5             | 5.4  | (C)          | 35                            | 0.20         | EEEHA1E220WR | (1)    | 1000         |
|                      |                          | 6.3           | 5.4  | D            | 55                            | 0.14         | EEEHA1E220P  | (1)    | 1000         |
|                      | 33                       | 5             | 5.4  | (C)          | 45                            | 0.20         | EEEHA1E330WR | (1)    | 1000         |
|                      |                          | 6.3           | 5.4  | D            | 65                            | 0.14         | EEEHA1E330P  | (1)    | 1000         |
|                      | 47                       | 6.3           | 5.4  | (D)          | 70                            | 0.20         | EEEHA1E470WP | (1)    | 1000         |
|                      |                          | 8             | 6.2  | E            | 91                            | 0.16         | EEEHA1E470P  | (2)    | 1000         |
|                      | 100                      | 6.3           | 7.7  | D8           | 91                            | 0.14         | EEEHA1E101XP | (1)    | 900          |
|                      |                          | 8             | 6.2  | (E)          | 91                            | 0.16         | EEEHA1E101UP | (2)    | 1000         |
|                      |                          | 8             | 10.2 | F            | 130                           | 0.16         | EEEHA1E101P  | (2)    | 500          |
| 220                  | 8                        | 10.2          | (F)  | 160          | 0.16                          | EEEHA1E221UP | (2)          | 500    |              |
|                      | 10                       | 10.2          | G    | 190          | 0.16                          | EEEHA1E221P  | (2)          | 500    |              |
| 330                  | 8                        | 10.2          | (F)  | 180          | 0.16                          | EEEHA1E331UP | (2)          | 500    |              |
|                      | 10                       | 10.2          | G    | 340          | 0.16                          | EEEHA1E331P  | (2)          | 500    |              |
| 470                  | 10                       | 10.2          | G    | 360          | 0.16                          | EEEHA1E471P  | (2)          | 500    |              |
| 35                   | 4.7                      | 4             | 5.4  | B            | 22                            | 0.12         | EEEHA1V4R7R  | (1)    | 2000         |
|                      | 10                       | 4             | 5.4  | (B)          | 22                            | 0.16         | EEEHA1V100WR | (1)    | 2000         |
|                      |                          | 5             | 5.4  | C            | 30                            | 0.12         | EEEHA1V100R  | (1)    | 1000         |
|                      | 22                       | 5             | 5.4  | (C)          | 35                            | 0.16         | EEEHA1V220WR | (1)    | 1000         |
|                      |                          | 6.3           | 5.4  | D            | 60                            | 0.12         | EEEHA1V220P  | (1)    | 1000         |
|                      | 33                       | 6.3           | 5.4  | (D)          | 42                            | 0.16         | EEEHA1V330WP | (1)    | 1000         |
|                      |                          | 8             | 6.2  | E            | 84                            | 0.14         | EEEHA1V330P  | (2)    | 1000         |
|                      | 47                       | 8             | 6.2  | (E)          | 84                            | 0.14         | EEEHA1V470UP | (2)    | 1000         |
|                      |                          | 8             | 10.2 | F            | 98                            | 0.14         | EEEHA1V470P  | (2)    | 500          |
|                      | 100                      | 6.3           | 7.7  | D8           | 84                            | 0.12         | EEEHA1V101XP | (1)    | 900          |
|                      |                          | 8             | 10.2 | (F)          | 120                           | 0.14         | EEEHA1V101UP | (2)    | 500          |
|                      |                          | 10            | 10.2 | G            | 160                           | 0.14         | EEEHA1V101P  | (2)    | 500          |
| 220                  | 8                        | 10.2          | (F)  | 170          | 0.14                          | EEEHA1V221UP | (2)          | 500    |              |
|                      | 10                       | 10.2          | G    | 210          | 0.14                          | EEEHA1V221P  | (2)          | 500    |              |
| 330                  | 10                       | 10.2          | G    | 250          | 0.14                          | EEEHA1V331P  | (2)          | 500    |              |
| 50                   | 1.0                      | 4             | 5.4  | B            | 10                            | 0.12         | EEEHA1H1R0R  | (1)    | 2000         |
|                      | 2.2                      | 4             | 5.4  | B            | 16                            | 0.12         | EEEHA1H2R2R  | (1)    | 2000         |
|                      | 3.3                      | 4             | 5.4  | B            | 16                            | 0.12         | EEEHA1H3R3R  | (1)    | 2000         |
|                      | 4.7                      | 5             | 5.4  | C            | 23                            | 0.12         | EEEHA1H4R7R  | (1)    | 1000         |
|                      | 10                       | 6.3           | 5.4  | D            | 35                            | 0.12         | EEEHA1H100P  | (1)    | 1000         |
|                      | 22                       | 8             | 6.2  | E            | 70                            | 0.12         | EEEHA1H220P  | (2)    | 1000         |
|                      |                          | 6.3           | 7.7  | D8           | 70                            | 0.12         | EEEHA1H330XP | (1)    | 900          |
|                      | 33                       | 8             | 6.2  | (E)          | 70                            | 0.12         | EEEHA1H330UP | (2)    | 1000         |
|                      |                          | 8             | 10.2 | F            | 91                            | 0.12         | EEEHA1H330P  | (2)    | 500          |
|                      | 47                       | 6.3           | 7.7  | D8           | 63                            | 0.12         | EEEHA1H470XP | (1)    | 900          |
|                      |                          | 8             | 10.2 | (F)          | 95                            | 0.12         | EEEHA1H470UP | (2)    | 500          |
|                      |                          | 10            | 10.2 | G            | 100                           | 0.12         | EEEHA1H470P  | (2)    | 500          |
| 100                  | 8                        | 10.2          | (F)  | 110          | 0.12                          | EEEHA1H101UP | (2)          | 500    |              |
|                      | 10                       | 10.2          | G    | 120          | 0.12                          | EEEHA1H101P  | (2)          | 500    |              |
| 220                  | 10                       | 10.2          | G    | 150          | 0.12                          | EEEHA1H221P  | (2)          | 500    |              |

\*1: Size code ( ) : Miniaturization product

\*2: Ripple current (120 Hz / +105 °C)

\*3: tanδ (120 Hz / +20 °C)

- 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 1000 h

| Rated voltage (V.DC) | Capacitance (±20 %) (μF) | Case size(mm) |      | Size code *1 | Specification                 |          | Part number  | Reflow | Part number |
|----------------------|--------------------------|---------------|------|--------------|-------------------------------|----------|--------------|--------|-------------|
|                      |                          | φD            | L    |              | Ripple current *2 (mA r.m.s.) | tan δ *3 |              |        | Quantity    |
| 63                   | 10                       | 8             | 6.2  | E            | 25                            | 0.18     | EEEHA1J100P  | (2)    | 1000        |
|                      | 22                       | 8             | 6.2  | (E)          | 25                            | 0.18     | EEEHA1J220UP | (2)    | 1000        |
|                      |                          | 8             | 10.2 | F            | 30                            | 0.18     | EEEHA1J220P  | (2)    | 500         |
|                      | 33                       | 10            | 10.2 | G            | 45                            | 0.18     | EEEHA1J330P  | (2)    | 500         |
|                      | 47                       | 8             | 10.2 | (F)          | 45                            | 0.18     | EEEHA1J470UP | (2)    | 500         |
|                      |                          | 10            | 10.2 | G            | 50                            | 0.18     | EEEHA1J470P  | (2)    | 500         |
| 100                  | 4.7                      | 8             | 6.2  | (E)          | 30                            | 0.18     | EEEHA2A4R7UP | (2)    | 1000        |
|                      | 10                       | 8             | 10.2 | F            | 55                            | 0.18     | EEEHA2A100P  | (2)    | 500         |
|                      | 22                       | 8             | 10.2 | (F)          | 55                            | 0.18     | EEEHA2A220UP | (2)    | 500         |
|                      |                          | 10            | 10.2 | G            | 60                            | 0.18     | EEEHA2A220P  | (2)    | 500         |
|                      | 33                       | 10            | 10.2 | G            | 65                            | 0.18     | EEEHA2A330P  | (2)    | 500         |
|                      | 47                       | 10            | 10.2 | (G)          | 65                            | 0.18     | EEEHA2A470UP | (2)    | 500         |

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