

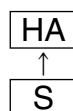
## Surface Mount Type

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

### ■ Features

- Endurance: 105 °C 1000 h
- Vibration-proof product is available upon request.  
(ø8 mm and larger)
- RoHS directive compliant

Hight-temperature  
assuranceize



### ■ Specifications

|                                    |                                                                                                                                                                                             |                                                                 |    |    |    |    |    |    |     |                             |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|----|----|----|----|----|----|-----|-----------------------------|
| Category Temp. Range               | -40 °C to +105 °C                                                                                                                                                                           |                                                                 |    |    |    |    |    |    |     |                             |
| Rated W.V. Range                   | 6.3 V.DC to 100 V.DC                                                                                                                                                                        |                                                                 |    |    |    |    |    |    |     |                             |
| Nominal Cap. Range                 | 0.1 µF to 1500 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 standard 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)                                                                                                                                                                         | 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                                                                                                                                                                          | ±20 % of initial measured value (6.3 W.V. of miniature : ±30 %) |    |    |    |    |    |    |     |                             |
|                                    | tan δ                                                                                                                                                                                       | ≤ 200 % 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) |                                                                 |    |    |    |    |    |    |     |                             |
| Resistance to Soldering Heat       | After reflow soldering and then being stabilized at +20 °C, capacitor shall meet the following limits.                                                                                      |                                                                 |    |    |    |    |    |    |     |                             |
|                                    | Capacitance change                                                                                                                                                                          | ±10 % of initial measured value                                 |    |    |    |    |    |    |     |                             |
|                                    | tan δ                                                                                                                                                                                       | ≤ initial specified value                                       |    |    |    |    |    |    |     |                             |
|                                    | DC leakage current                                                                                                                                                                          | ≤ initial specified value                                       |    |    |    |    |    |    |     |                             |

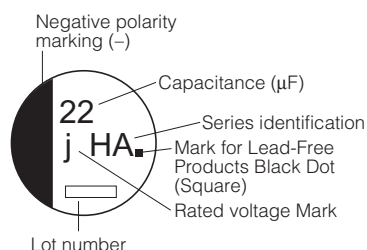
### ■ Frequency correction factor for ripple current

|                   | 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 22 µF (Polarized)

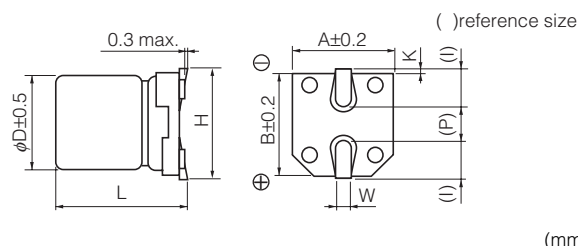
Marking color : BLACK



#### Rated Voltage Mark

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

### ■ Dimensions in mm (not to scale)



| 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±0.20                              |
| G         | 10.0 | 10.2±0.3                            | 10.3 | 12.0 max. | 3.5 | 0.90±0.2 | 4.6 | 0.70±0.20                              |

■ Standard Products

Endurance : 105 °C 1000 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         | 5.4    | 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         | 5.4    | C             | 46                                                      | 0.30                          | EEEHA0J470R                  | (1)    | 1000                   |
|      | 100             | 5         | 5.4    | (C)           | 47                                                      | 0.35                          | EEEHA0J101WR                 | (1)    | 1000                   |
|      |                 | 6.3       | 5.4    | 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         | 10.2   | 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              | 10.2      | 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         | 5.4    | 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         | 6.2    | E             | 110                                                     | 0.26                          | EEEHA1A101P                  | (2)    | 1000                   |
|      | 220             | 6.3       | 7.7    | D8            | 105                                                     | 0.22                          | EEEHA1A221XP                 | (1)    | 900                    |
|      |                 | 8         | 10.2   | F             | 160                                                     | 0.26                          | EEEHA1A221P                  | (2)    | 500                    |
|      | 470             | 8         | 10.2   | (F)           | 200                                                     | 0.26                          | EEEHA1A471UP                 | (2)    | 500                    |
|      |                 | 10        | 10.2   | 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         | 5.4    | 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       | 5.4    | D             | 70                                                      | 0.16                          | EEEHA1C470P                  | (1)    | 1000                   |
|      | 100             | 6.3       | 5.4    | (D)           | 70                                                      | 0.26                          | EEEHA1C101WP                 | (1)    | 1000                   |
|      | 220             | 6.3       | 7.7    | D8            | 105                                                     | 0.16                          | EEEHA1C221XP                 | (1)    | 900                    |
|      |                 | 8         | 10.2   | (F)           | 150                                                     | 0.20                          | EEEHA1C221UP                 | (2)    | 500                    |
|      |                 | 10        | 10.2   | G             | 210                                                     | 0.20                          | EEEHA1C221P                  | (2)    | 500                    |
|      | 330             | 8         | 10.2   | (F)           | 170                                                     | 0.20                          | EEEHA1C331UP                 | (2)    | 500                    |
|      |                 | 10        | 10.2   | G             | 230                                                     | 0.20                          | EEEHA1C331P                  | (2)    | 500                    |
|      | 470             | 8         | 10.2   | (F)           | 340                                                     | 0.20                          | EEEHA1C471UP                 | (2)    | 500                    |
|      |                 | 10        | 10.2   | G             | 340                                                     | 0.20                          | EEEHA1C471P                  | (2)    | 500                    |
|      | 680             | 10        | 10.2   | G             | 380                                                     | 0.20                          | EEEHA1C681P                  | (2)    | 500                    |

\* Size code( ):Miniaturization product

The taping dimensions are explained on EE188 of our Catalog. Please use it as a reference guide.  
Reflow Profile(Fig-1 to Fig-11) listed on EE186 of our Catalog.

■ Standard Products

Endurance : 105 °C 1000 h

| W.V.<br>(V) | Cap.<br>(±20 %)<br>(μF) | Case size    |                |               | Specification                                            |                               | Part No.<br>(RoHS:compliant) | Reflow | Min.<br>Packaging Q'ty |
|-------------|-------------------------|--------------|----------------|---------------|----------------------------------------------------------|-------------------------------|------------------------------|--------|------------------------|
|             |                         | Dia.<br>(mm) | Length<br>(mm) | *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>(pcs)        |
| 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                    |
| 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          | 0.1                     | 4            | 5.4            | B             | 1                                                        | 0.12                          | EEEHA1HR10R                  | (1)    | 2000                   |
|             | 0.22                    | 4            | 5.4            | B             | 2                                                        | 0.12                          | EEEHA1HR22R                  | (1)    | 2000                   |
|             | 0.33                    | 4            | 5.4            | B             | 3                                                        | 0.12                          | EEEHA1HR33R                  | (1)    | 2000                   |
|             | 0.47                    | 4            | 5.4            | B             | 5                                                        | 0.12                          | EEEHA1HR47R                  | (1)    | 2000                   |
|             | 1                       | 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                   |
|             | 33                      | 6.3          | 7.7            | D8            | 70                                                       | 0.12                          | EEEHA1H330XP                 | (1)    | 900                    |
|             |                         | 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                    |

\* Size code( ):Miniaturization product

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

Reflow Profile(Fig-1 to Fig-11) listed on EE186 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.

00 Sep. 2010

■ Standard Products

Endurance : 105 °C 1000 h

| W.V.<br>(V) | Cap.<br>(±20 %)<br>(μF) | Case size    |                |               | Specification                                            |                               | Part No.<br>(RoHS:compliant) | Reflow | Min.<br>Packaging Q'ty |
|-------------|-------------------------|--------------|----------------|---------------|----------------------------------------------------------|-------------------------------|------------------------------|--------|------------------------|
|             |                         | Dia.<br>(mm) | Length<br>(mm) | *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>(pcs)        |
| 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         | 3.3                     | 8            | 6.2            | E             | 30                                                       | 0.18                          | EEEHA2A3R3P                  | (2)    | 1000                   |
|             | 4.7                     | 8            | 6.2            | (E)           | 30                                                       | 0.18                          | EEEHA2A4R7UP                 | (2)    | 1000                   |
|             |                         | 8            | 10.2           | F             | 50                                                       | 0.18                          | EEEHA2A4R7P                  | (2)    | 500                    |
|             | 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                    |

\* Size code( ):Miniaturization product

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

Reflow Profile(Fig-1 to Fig-11) listed on EE186 of our Catalog.