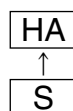


## Surface Mount Type

Series: **HA** Type: **V**  
HA High temperature Lead-Free reflow (suffix:A\*)

High-temperature  
assurance



### Features

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

### Specifications

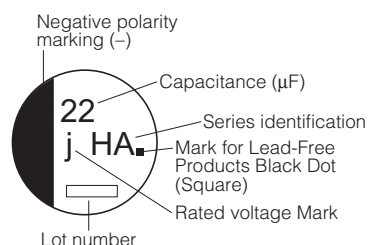
|                                    |                                                                                                                                                                                             |                                    |    |    |    |    |    |                             |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|----|----|----|----|----|-----------------------------|
| Category Temp. Range               | -40 °C to +105 °C                                                                                                                                                                           |                                    |    |    |    |    |    |                             |
| Rated W.V. Range                   | 6.3 V.DC to 50 V.DC                                                                                                                                                                         |                                    |    |    |    |    |    |                             |
| Nominal Cap. Range                 | 0.1 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 High temperature lead-free reflow products list.                                                                                                                    |                                    |    |    |    |    |    |                             |
| Characteristics at Low Temperature | W.V. (V)                                                                                                                                                                                    | 6.3                                | 10 | 16 | 25 | 35 | 50 | (Impedance ratio at 120 Hz) |
|                                    | Z(-25 °C)/Z(+20 °C)                                                                                                                                                                         | 4                                  | 3  | 2  | 2  | 2  | 2  |                             |
|                                    | Z(-40 °C)/Z(+20 °C)                                                                                                                                                                         | 8                                  | 6  | 4  | 4  | 3  | 3  |                             |
| 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                                                                                                                                                                          | ±30 % of initial measured value    |    |    |    |    |    |                             |
|                                    | 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, capacitors 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  
Marking color: BLACK

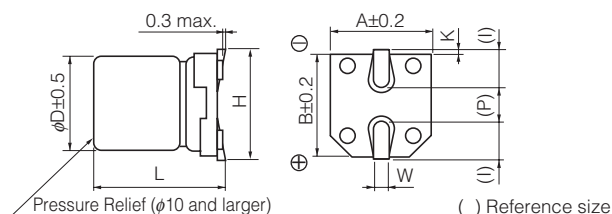


#### Rated Voltage Mark

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

### Dimensions in mm(not to scale)

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

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 Nov. 2012

■ High temperature Lead-Free reflow 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                          | EEEHA0J220AR                 | (5)    | 2000                   |
|      | 33              | 4         | 5.4    | (B)           | 29                                                       | 0.35                          | EEEHAJ330WAR                 | (5)    | 2000                   |
|      | 47              | 5         | 5.4    | C             | 46                                                       | 0.30                          | EEEHA0J470AR                 | (5)    | 1000                   |
|      | 100             | 5         | 5.4    | (C)           | 47                                                       | 0.40                          | EEEHAJ101WAR                 | (5)    | 1000                   |
|      |                 | 6.3       | 5.4    | D             | 71                                                       | 0.30                          | EEEHA0J101AP                 | (5)    | 1000                   |
|      | 330             | 6.3       | 7.7    | D8            | 105                                                      | 0.30                          | EEEHAJ331XAP                 | (5)    | 900                    |
|      |                 | 8         | 6.2    | (E)           | 180                                                      | 0.35                          | EEEHAJ331UAP                 | (7)    | 500                    |
|      |                 | 8         | 10.2   | F             | 230                                                      | 0.35                          | EEEHA0J331AP                 | (7)    | 500                    |
|      | 470             | 8         | 10.2   | (F)           | 300                                                      | 0.35                          | EEEHAJ471UAP                 | (7)    | 500                    |
|      | 1000            | 10        | 10.2   | G             | 400                                                      | 0.35                          | EEEHA0J102AP                 | (7)    | 500                    |
|      | 1500            | 10        | 10.2   | (G)           | 480                                                      | 0.50                          | EEEHAJ152UAP                 | (7)    | 500                    |
| 10   | 22              | 4         | 5.4    | (B)           | 28                                                       | 0.30                          | EEEHAA220WAR                 | (5)    | 2000                   |
|      | 33              | 4         | 5.4    | (B)           | 29                                                       | 0.30                          | EEEHAA330WAR                 | (5)    | 2000                   |
|      |                 | 5         | 5.4    | C             | 43                                                       | 0.22                          | EEEHAA1A330AR                | (5)    | 1000                   |
|      | 47              | 5         | 5.4    | (C)           | 43                                                       | 0.30                          | EEEHAA470WAR                 | (5)    | 1000                   |
|      | 100             | 6.3       | 5.4    | (D)           | 71                                                       | 0.30                          | EEEHAA101WAP                 | (5)    | 1000                   |
|      |                 | 8         | 6.2    | E             | 110                                                      | 0.26                          | EEEHAA1A101AP                | (7)    | 1000                   |
|      | 220             | 6.3       | 7.7    | D8            | 105                                                      | 0.22                          | EEEHAA221XAP                 | (5)    | 900                    |
|      |                 | 8         | 10.2   | F             | 160                                                      | 0.26                          | EEEHAA1A221AP                | (7)    | 500                    |
|      | 470             | 8         | 10.2   | (F)           | 200                                                      | 0.26                          | EEEHAA471UAP                 | (7)    | 500                    |
|      |                 | 10        | 10.2   | G             | 270                                                      | 0.26                          | EEEHAA1A471AP                | (7)    | 500                    |
| 16   | 1000            | 10        | 10.2   | (G)           | 400                                                      | 0.35                          | EEEHAA102UAP                 | (7)    | 500                    |
|      | 10              | 4         | 5.4    | B             | 28                                                       | 0.16                          | EEEHAC100AR                  | (5)    | 2000                   |
|      | 22              | 4         | 5.4    | (B)           | 28                                                       | 0.26                          | EEEHAC220WAR                 | (5)    | 2000                   |
|      |                 | 5         | 5.4    | C             | 39                                                       | 0.16                          | EEEHAC1C220AR                | (5)    | 1000                   |
|      | 33              | 5         | 5.4    | (C)           | 35                                                       | 0.26                          | EEEHAC330WAR                 | (5)    | 1000                   |
|      | 47              | 5         | 5.4    | (C)           | 39                                                       | 0.26                          | EEEHAC470WAR                 | (5)    | 1000                   |
|      |                 | 6.3       | 5.4    | D             | 70                                                       | 0.16                          | EEEHAC1C470AP                | (5)    | 1000                   |
|      | 100             | 6.3       | 5.4    | (D)           | 70                                                       | 0.26                          | EEEHAC101WAP                 | (5)    | 1000                   |
|      | 220             | 6.3       | 7.7    | D8            | 105                                                      | 0.20                          | EEEHAC221XAP                 | (5)    | 900                    |
|      |                 | 8         | 10.2   | (F)           | 150                                                      | 0.20                          | EEEHAC221UAP                 | (7)    | 500                    |
|      |                 | 10        | 10.2   | G             | 210                                                      | 0.20                          | EEEHAC1C221AP                | (7)    | 500                    |
|      | 330             | 8         | 10.2   | (F)           | 170                                                      | 0.20                          | EEEHAC331UAP                 | (7)    | 500                    |
|      |                 | 10        | 10.2   | G             | 230                                                      | 0.20                          | EEEHAC1C331AP                | (7)    | 500                    |
|      | 470             | 8         | 10.2   | (F)           | 340                                                      | 0.26                          | EEEHAC471UAP                 | (7)    | 500                    |
|      |                 | 10        | 10.2   | G             | 340                                                      | 0.20                          | EEEHAC1C471AP                | (7)    | 500                    |
|      | 680             | 10        | 10.2   | (G)           | 380                                                      | 0.26                          | EEEHAC681UAP                 | (7)    | 500                    |

\* Size code( ):Miniaturization product

If Part number exceeds 12 digits, voltage code is abbreviated as follows; 0J→J, 1A→A, 1C→C, 1E→E, 1V→V, 1H→H

· 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"

## ■ High temperature Lead-Free reflow 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.) | $\tan \delta$<br>(120 Hz)<br>(+20 °C) |                              |        | Taping<br>(pcs)        |
| 25          | 4.7                     | 4            | 5.4            | B             | 22                                                       | 0.14                                  | EEEHA1E4R7AR                 | (5)    | 2000                   |
|             | 10                      | 4            | 5.4            | (B)           | 22                                                       | 0.20                                  | EEEHAE100WAR                 | (5)    | 2000                   |
|             |                         | 5            | 5.4            | C             | 28                                                       | 0.14                                  | EEEHA1E100AR                 | (5)    | 1000                   |
|             | 22                      | 5            | 5.4            | (C)           | 35                                                       | 0.20                                  | EEEHAE220WAR                 | (5)    | 1000                   |
|             |                         | 6.3          | 5.4            | D             | 55                                                       | 0.14                                  | EEEHA1E220AP                 | (5)    | 1000                   |
|             | 33                      | 5            | 5.4            | (C)           | 45                                                       | 0.20                                  | EEEHAE330WAR                 | (5)    | 1000                   |
|             |                         | 6.3          | 5.4            | D             | 65                                                       | 0.14                                  | EEEHA1E330AP                 | (5)    | 1000                   |
|             | 47                      | 6.3          | 5.4            | (D)           | 70                                                       | 0.20                                  | EEEHAE470WAP                 | (5)    | 1000                   |
|             |                         | 8            | 6.2            | E             | 91                                                       | 0.16                                  | EEEHA1E470AP                 | (7)    | 1000                   |
|             | 100                     | 8            | 6.2            | (E)           | 91                                                       | 0.16                                  | EEEHAE101UAP                 | (7)    | 1000                   |
|             |                         | 6.3          | 7.7            | D8            | 91                                                       | 0.16                                  | EEEHAE101XAP                 | (5)    | 900                    |
|             | 220                     | 8            | 10.2           | F             | 130                                                      | 0.16                                  | EEEHA1E101AP                 | (7)    | 500                    |
|             |                         | 10           | 10.2           | (F)           | 160                                                      | 0.20                                  | EEEHAE221UAP                 | (7)    | 500                    |
|             | 330                     | 8            | 10.2           | (F)           | 180                                                      | 0.20                                  | EEEHAE331UAP                 | (7)    | 500                    |
|             |                         | 10           | 10.2           | G             | 340                                                      | 0.16                                  | EEEHA1E331AP                 | (7)    | 500                    |
|             | 470                     | 10           | 10.2           | (G)           | 360                                                      | 0.25                                  | EEEHAE471UAP                 | (7)    | 500                    |
| 35          | 4.7                     | 4            | 5.4            | B             | 22                                                       | 0.12                                  | EEEHA1V4R7AR                 | (5)    | 2000                   |
|             | 10                      | 4            | 5.4            | (B)           | 22                                                       | 0.16                                  | EEEHAV100WAR                 | (5)    | 2000                   |
|             |                         | 5            | 5.4            | C             | 30                                                       | 0.12                                  | EEEHA1V100AR                 | (5)    | 1000                   |
|             | 22                      | 5            | 5.4            | (C)           | 35                                                       | 0.16                                  | EEEHAV220WAR                 | (5)    | 1000                   |
|             |                         | 6.3          | 5.4            | D             | 60                                                       | 0.12                                  | EEEHA1V220AP                 | (5)    | 1000                   |
|             | 33                      | 6.3          | 5.4            | (D)           | 42                                                       | 0.16                                  | EEEHAV330WAP                 | (5)    | 1000                   |
|             |                         | 8            | 6.2            | E             | 84                                                       | 0.14                                  | EEEHA1V330AP                 | (7)    | 1000                   |
|             | 47                      | 8            | 6.2            | (E)           | 84                                                       | 0.14                                  | EEEHAV470UAP                 | (7)    | 1000                   |
|             |                         | 8            | 10.2           | F             | 98                                                       | 0.14                                  | EEEHA1V470AP                 | (7)    | 500                    |
|             | 100                     | 6.3          | 7.7            | D8            | 84                                                       | 0.14                                  | EEEHAV101XAP                 | (5)    | 900                    |
|             |                         | 8            | 10.2           | (F)           | 120                                                      | 0.14                                  | EEEHAV101UAP                 | (7)    | 500                    |
|             | 220                     | 10           | 10.2           | G             | 160                                                      | 0.14                                  | EEEHA1V101AP                 | (7)    | 500                    |
|             |                         | 8            | 10.2           | (F)           | 170                                                      | 0.14                                  | EEEHAV221UAP                 | (7)    | 500                    |
|             | 330                     | 10           | 10.2           | G             | 210                                                      | 0.14                                  | EEEHA1V221AP                 | (7)    | 500                    |
|             |                         | 10           | 10.2           | (G)           | 250                                                      | 0.30                                  | EEEHAV331UAP                 | (7)    | 500                    |
| 50          | 0.1                     | 4            | 5.4            | B             | 1                                                        | 0.12                                  | EEEHA1HR10AR                 | (5)    | 2000                   |
|             | 0.22                    | 4            | 5.4            | B             | 2                                                        | 0.12                                  | EEEHA1HR22AR                 | (5)    | 2000                   |
|             | 0.33                    | 4            | 5.4            | B             | 3                                                        | 0.12                                  | EEEHA1HR33AR                 | (5)    | 2000                   |
|             | 0.47                    | 4            | 5.4            | B             | 5                                                        | 0.12                                  | EEEHA1HR47AR                 | (5)    | 2000                   |
|             | 1                       | 4            | 5.4            | B             | 10                                                       | 0.12                                  | EEEHA1H1R0AR                 | (5)    | 2000                   |
|             | 2.2                     | 4            | 5.4            | B             | 16                                                       | 0.12                                  | EEEHA1H2R2AR                 | (5)    | 2000                   |
|             | 3.3                     | 4            | 5.4            | B             | 16                                                       | 0.12                                  | EEEHA1H3R3AR                 | (5)    | 2000                   |
|             | 4.7                     | 5            | 5.4            | C             | 23                                                       | 0.12                                  | EEEHA1H4R7AR                 | (5)    | 1000                   |
|             | 10                      | 6.3          | 5.4            | D             | 35                                                       | 0.12                                  | EEEHA1H100AP                 | (5)    | 1000                   |
|             | 22                      | 8            | 6.2            | E             | 70                                                       | 0.12                                  | EEEHA1H220AP                 | (7)    | 1000                   |
|             | 33                      | 6.3          | 7.7            | D8            | 70                                                       | 0.14                                  | EEEHAH330XAP                 | (5)    | 900                    |
|             |                         | 8            | 6.2            | (E)           | 70                                                       | 0.12                                  | EEEHAH330UAP                 | (7)    | 1000                   |
|             |                         | 8            | 10.2           | F             | 91                                                       | 0.12                                  | EEEHA1H330AP                 | (7)    | 500                    |
|             | 47                      | 6.3          | 7.7            | D8            | 63                                                       | 0.14                                  | EEEHAH470XAP                 | (5)    | 900                    |
|             |                         | 8            | 10.2           | (F)           | 95                                                       | 0.12                                  | EEEHAH470UAP                 | (7)    | 500                    |
|             |                         | 10           | 10.2           | G             | 100                                                      | 0.12                                  | EEEHA1H470AP                 | (7)    | 500                    |
|             | 100                     | 8            | 10.2           | (F)           | 110                                                      | 0.18                                  | EEEHAH101UAP                 | (7)    | 500                    |
|             |                         | 10           | 10.2           | G             | 120                                                      | 0.12                                  | EEEHA1H101AP                 | (7)    | 500                    |
|             | 220                     | 10           | 10.2           | (G)           | 150                                                      | 0.18                                  | EEEHAH221UAP                 | (7)    | 500                    |

\* Size code( ):Miniaturization product

If Part number exceeds 12 digits, voltage code is abbreviated as follows; 0J→J, 1A→A, 1C→C, 1E→E, 1V→V, 1H→H

· 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"