

## Surface Mount Type

Series : **FC** Type : **V**

Low impedance



### Features

- Endurance : 105 °C 1000 h
- Low impedance (1/2 for HA series)
- Vibration-proof product is available upon request. ( $\phi 8$  mm and larger)
- RoHS compliant

### Specifications

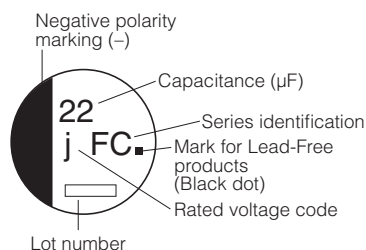
|                                    |  |  |    |    |    |    |    |                             |
|------------------------------------|--|--|----|----|----|----|----|-----------------------------|
| Category temperature range         | -40 °C to +105 °C  |  |    |    |    |    |    |                             |
| Rated voltage range                | 6.3 V.DC to 50 V.DC  |  |    |    |    |    |    |                             |
| Capacitance range                  | 1 $\mu$ F to 1500 $\mu$ F  |  |    |    |    |    |    |                             |
| Capacitance tolerance              | $\pm 20$ % (120 Hz/+20 °C)   |  |    |    |    |    |    |                             |
| Leakage current                    | $I \leq 0.01$ CV or 3 ( $\mu$ A) After 2 minutes (Whichever is greater)  |  |    |    |    |    |    |                             |
| Dissipation factor (tan $\delta$ ) | Please see the attached characteristics list   |  |    |    |    |    |    |                             |
| Characteristics at low temperature | V.DC   | 6.3                                    | 10 | 16 | 25 | 35 | 50 | (Impedance ratio at 120 Hz) |
|                                    | Z(-25 °C) / Z(+20 °C)  | 2                                      | 2  | 2  | 2  | 2  | 2  |                             |
|                                    | Z(-40 °C) / Z(+20 °C)  | 3                                      | 3  | 3  | 3  | 3  | 3  |                             |
| Endurance                          | After applying rated working voltage for 1000 hours at +105 °C $\pm 2$ °C and then being stabilized at +20 °C, Capacitors shall meet the following limits.                                       |  |    |    |    |    |    |                             |
|                                    | Capacitance change   | Within $\pm 20$ % of the initial value |    |    |    |    |    |                             |
|                                    | tan $\delta$   | $\leq 200$ % of the initial limit      |    |    |    |    |    |                             |
| Shelf life                         | After storage for 1000 hours at +105 °C $\pm 2$ °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, capacitor shall meet the following limits.   |  |    |    |    |    |    |                             |
| Resistance to soldering heat       | Capacitance change   | Within $\pm 10$ % of the initial value |    |    |    |    |    |                             |
|                                    | tan $\delta$   | Within the initial limit               |    |    |    |    |    |                             |
|                                    | DC leakage current   | Within the initial limit               |    |    |    |    |    |                             |
| AEC-Q200                           | AEC-Q200 compliant   |  |    |    |    |    |    |                             |

### Frequency correction factor for ripple current

|                   |        |      |      |      |          |
|-------------------|--------|------|------|------|----------|
| Frequency (Hz)    | 50, 60 | 120  | 1 k  | 10 k | 100 k to |
| Correction factor | 0.70   | 0.75 | 0.90 | 0.95 | 1.00     |

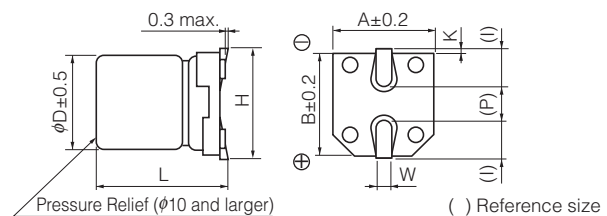
### Marking

Example : 6.3 V.DC 22  $\mu$ F  
Marking color : BLACK



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

### Dimensions



( ) Reference size  
(Unit : mm)

| Size code | $\phi D$ | L                   | A, B | H         | I   | W              | P   | K                      |
|-----------|----------|---------------------|------|-----------|-----|----------------|-----|------------------------|
| B         | 4.0      | $5.4^{+0.1}_{-0.2}$ | 4.3  | 5.5 max.  | 1.8 | $0.65 \pm 0.1$ | 1.0 | $0.35^{+0.15}_{-0.20}$ |
| C         | 5.0      | $5.4^{+0.1}_{-0.2}$ | 5.3  | 6.5 max.  | 2.2 | $0.65 \pm 0.1$ | 1.5 | $0.35^{+0.15}_{-0.20}$ |
| D         | 6.3      | $5.4^{+0.1}_{-0.2}$ | 6.6  | 7.8 max.  | 2.6 | $0.65 \pm 0.1$ | 1.8 | $0.35^{+0.15}_{-0.20}$ |
| E         | 8.0      | $6.2 \pm 0.3$       | 8.3  | 9.5 max.  | 3.4 | $0.65 \pm 0.1$ | 2.2 | $0.35^{+0.15}_{-0.20}$ |
| F         | 8.0      | $10.2 \pm 0.3$      | 8.3  | 10.0 max. | 3.4 | $0.90 \pm 0.2$ | 3.1 | $0.70 \pm 0.2$         |
| G         | 10.0     | $10.2 \pm 0.3$      | 10.3 | 12.0 max. | 3.5 | $0.90 \pm 0.2$ | 4.6 | $0.70 \pm 0.2$         |

**Characteristics list**

Endurance : 105 °C 1000 h

| Rated voltage (V.DC) | Cap. (±20 %) (μF) | Case size (mm) |      | Size code | Specification                                  |                                  |                         | Part No.   | Reflow | Min. Packaging Qty |  |
|----------------------|-------------------|----------------|------|-----------|--|----------------------------------|-------------------------|------------|--------|--------------------|--|
|                      |                   | φD             | L    |           | Ripple current (100 kHz) (+105 °C) (mA r.m.s.) | Impedance (100 kHz) (+20 °C) (Ω) | tan δ (120 Hz) (+20 °C) |            |        | Taping (pcs)       |  |
| 6.3                  | 22                | 4              | 5.4  | B         | 60   | 3.00                             | 0.26                    | EEEF0J220R | (1)    | 2000               |  |
|                      | 47                | 5              | 5.4  | C         | 95   | 1.80                             | 0.26                    | EEEF0J470R | (1)    | 1000               |  |
|                      | 68                | 6.3            | 5.4  | D         | 140  | 1.00                             | 0.26                    | EEEF0J680P | (1)    | 1000               |  |
|                      | 100               | 6.3            | 5.4  | D         | 140  | 1.00                             | 0.26                    | EEEF0J101P | (1)    | 1000               |  |
|                      | 220               | 8              | 6.2  | E         | 230  | 0.40                             | 0.26                    | EEEF0J221P | (2)    | 1000               |  |
|                      | 330               | 8              | 10.2 | F         | 450  | 0.30                             | 0.26                    | EEEF0J331P | (2)    | 500                |  |
|                      | 1000              | 10             | 10.2 | G         | 670  | 0.15                             | 0.26                    | EEEF0J102P | (2)    | 500                |  |
|                      | 1500              | 10             | 10.2 | G         | 670  | 0.15                             | 0.26                    | EEEF0J152P | (2)    | 500                |  |
| 10                   | 33                | 5              | 5.4  | C         | 95   | 1.80                             | 0.19                    | EEEF1A330R | (1)    | 1000               |  |
|                      | 100               | 8              | 6.2  | E         | 230  | 0.40                             | 0.19                    | EEEF1A101P | (2)    | 1000               |  |
|                      | 150               | 8              | 6.2  | E         | 230  | 0.40                             | 0.19                    | EEEF1A151P | (2)    | 1000               |  |
|                      | 220               | 8              | 10.2 | F         | 450  | 0.30                             | 0.19                    | EEEF1A221P | (2)    | 500                |  |
|                      | 470               | 10             | 10.2 | G         | 670  | 0.15                             | 0.19                    | EEEF1A471P | (2)    | 500                |  |
|                      | 1000              | 10             | 10.2 | G         | 670  | 0.15                             | 0.19                    | EEEF1A102P | (2)    | 500                |  |
| 16                   | 10                | 4              | 5.4  | B         | 60   | 3.00                             | 0.16                    | EEEF1C100R | (1)    | 2000               |  |
|                      | 22                | 5              | 5.4  | C         | 95   | 1.80                             | 0.16                    | EEEF1C220R | (1)    | 1000               |  |
|                      | 47                | 6.3            | 5.4  | D         | 140  | 1.00                             | 0.16                    | EEEF1C470P | (1)    | 1000               |  |
|                      | 68                | 8              | 6.2  | E         | 230  | 0.40                             | 0.16                    | EEEF1C680P | (2)    | 1000               |  |
|                      | 100               | 8              | 6.2  | E         | 230  | 0.40                             | 0.16                    | EEEF1C101P | (2)    | 1000               |  |
|                      | 220               | 10             | 10.2 | G         | 670  | 0.15                             | 0.16                    | EEEF1C221P | (2)    | 500                |  |
|                      | 330               | 10             | 10.2 | G         | 670  | 0.15                             | 0.16                    | EEEF1C331P | (2)    | 500                |  |
|                      | 470               | 10             | 10.2 | G         | 670  | 0.15                             | 0.16                    | EEEF1C471P | (2)    | 500                |  |
|                      | 680               | 10             | 10.2 | G         | 670  | 0.15                             | 0.16                    | EEEF1C681P | (2)    | 500                |  |
| 25                   | 6.8               | 4              | 5.4  | B         | 60   | 3.00                             | 0.14                    | EEEF1E68R  | (1)    | 2000               |  |
|                      | 22                | 6.3            | 5.4  | D         | 140  | 1.00                             | 0.14                    | EEEF1E220P | (1)    | 1000               |  |
|                      | 33                | 6.3            | 5.4  | D         | 140  | 1.00                             | 0.14                    | EEEF1E330P | (1)    | 1000               |  |
|                      | 47                | 8              | 6.2  | E         | 230  | 0.40                             | 0.14                    | EEEF1E470P | (2)    | 1000               |  |
|                      | 68                | 8              | 10.2 | F         | 450  | 0.30                             | 0.14                    | EEEF1E680P | (2)    | 500                |  |
|                      | 100               | 8              | 10.2 | F         | 450  | 0.30                             | 0.14                    | EEEF1E101P | (2)    | 500                |  |
|                      | 220               | 10             | 10.2 | G         | 670  | 0.15                             | 0.14                    | EEEF1E221P | (2)    | 500                |  |
|                      | 330               | 10             | 10.2 | G         | 670  | 0.15                             | 0.14                    | EEEF1E331P | (2)    | 500                |  |
|                      | 470               | 10             | 10.2 | G         | 670  | 0.15                             | 0.14                    | EEEF1E471P | (2)    | 500                |  |
| 35                   | 1                 | 4              | 5.4  | B         | 60   | 3.00                             | 0.12                    | EEEF1V1R0R | (1)    | 2000               |  |
|                      | 2.2               | 4              | 5.4  | B         | 60   | 3.00                             | 0.12                    | EEEF1V2R2R | (1)    | 2000               |  |
|                      | 3.3               | 4              | 5.4  | B         | 60   | 3.00                             | 0.12                    | EEEF1V3R3R | (1)    | 2000               |  |
|                      | 4.7               | 4              | 5.4  | B         | 60   | 3.00                             | 0.12                    | EEEF1V4R7R | (1)    | 2000               |  |
|                      | 6.8               | 5              | 5.4  | C         | 95   | 1.80                             | 0.12                    | EEEF1V6R8R | (1)    | 1000               |  |
|                      | 10                | 5              | 5.4  | C         | 95   | 1.80                             | 0.12                    | EEEF1V100R | (1)    | 1000               |  |
|                      | 22                | 6.3            | 5.4  | D         | 140  | 1.00                             | 0.12                    | EEEF1V220P | (1)    | 1000               |  |
|                      | 33                | 8              | 6.2  | E         | 230  | 0.40                             | 0.12                    | EEEF1V330P | (2)    | 1000               |  |
|                      | 47                | 8              | 6.2  | E         | 230  | 0.40                             | 0.12                    | EEEF1V470P | (2)    | 1000               |  |
|                      | 100               | 10             | 10.2 | G         | 670  | 0.15                             | 0.12                    | EEEF1V101P | (2)    | 500                |  |
|                      | 220               | 10             | 10.2 | G         | 670  | 0.15                             | 0.12                    | EEEF1V221P | (2)    | 500                |  |
|                      | 330               | 10             | 10.2 | G         | 670  | 0.15                             | 0.12                    | EEEF1V331P | (2)    | 500                |  |
| 50                   | 1                 | 4              | 5.4  | B         | 30   | 5.00                             | 0.12                    | EEEF1H1R0R | (1)    | 2000               |  |
|                      | 2.2               | 4              | 5.4  | B         | 30   | 5.00                             | 0.12                    | EEEF1H2R2R | (1)    | 2000               |  |
|                      | 3.3               | 4              | 5.4  | B         | 30   | 5.00                             | 0.12                    | EEEF1H3R3R | (1)    | 2000               |  |
|                      | 4.7               | 5              | 5.4  | C         | 50   | 3.00                             | 0.12                    | EEEF1H4R7R | (1)    | 1000               |  |
|                      | 10                | 6.3            | 5.4  | D         | 70   | 2.00                             | 0.12                    | EEEF1H100P | (1)    | 1000               |  |
|                      | 22                | 8              | 6.2  | E         | 120  | 0.70                             | 0.12                    | EEEF1H220P | (2)    | 1000               |  |
|                      | 33                | 8              | 10.2 | F         | 300  | 0.60                             | 0.12                    | EEEF1H330P | (2)    | 500                |  |
|                      | 47                | 10             | 10.2 | G         | 500  | 0.30                             | 0.12                    | EEEF1H470P | (2)    | 500                |  |
|                      | 100               | 10             | 10.2 | G         | 500  | 0.30                             | 0.12                    | EEEF1H101P | (2)    | 500                |  |
|                      | 220               | 10             | 10.2 | G         | 500  | 0.30                             | 0.12                    | EEEF1H221P | (2)    | 500                |  |

- 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"

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