

## Surface Mount Type

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



### Features

- Endurance : 105 °C 2000 h
- Low impedance (40 % to 60 % less than FC series)  
 Miniaturized (30 % to 50 % less than FC series)
- Vibration-proof product is available upon request. ( $\phi 8$  mm and larger)
- RoHS compliant

### Specifications

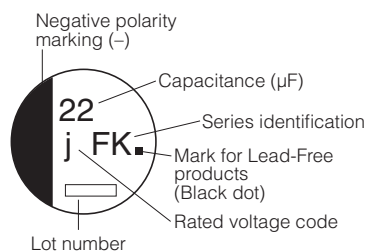
|                                    |   |  |    |    |    |    |                             |
|------------------------------------|---|--|----|----|----|----|-----------------------------|
| Category temperature range         | -55 °C to +105 °C   |  |    |    |    |    |                             |
| Rated voltage range                | 6.3 V.DC to 35 V.DC   |  |    |    |    |    |                             |
| Capacitance range                  | 4.7 $\mu$ 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 | (Impedance ratio at 120 Hz) |
|                                    | Z(-25 °C)/Z(+20 °C)   | 2                                      | 2  | 2  | 2  | 2  |                             |
|                                    | Z(-40 °C)/Z(+20 °C)   | 3                                      | 3  | 3  | 3  | 3  |                             |
|                                    | Z(-55 °C)/Z(+20 °C)   | 4                                      | 4  | 4  | 3  | 3  |                             |
| Endurance                          | After applying rated working voltage for 2000 hours at +105 °C $\pm 2$ °C and then being stabilized at +20 °C, Capacitors shall meet the following limits.  |  |    |    |    |    |                             |
|                                    | Capacitance change  | Within $\pm 30$ % of the initial value |    |    |    |    |                             |
|                                    | tan $\delta$  | $\leq 200$ % of the initial limit      |    |    |    |    |                             |
|                                    | DC leakage current  | Within 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) |  |    |    |    |    |                             |
| Resistance to soldering heat       | After reflow soldering and then being stabilized at +20 °C, capacitor shall meet the following limits.  |  |    |    |    |    |                             |
|                                    | 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

| Capacitance ( $\mu$ F) | Frequency (Hz) |      |      |          |
|------------------------|----------------|------|------|----------|
|                        | 120            | 1 k  | 10 k | 100 k to |
| 4.7 to 470             | 0.65           | 0.85 | 0.95 | 1.00     |
| 680 to 1500            | 0.70           | 0.90 | 0.95 | 1.00     |

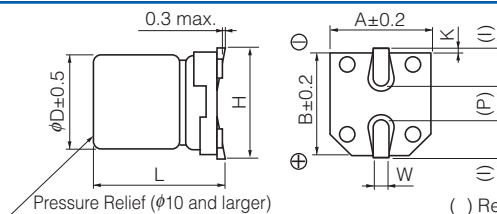
### Marking

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



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

### Dimensions



| Size code | $\phi D$ | L              | A, B | H         | I   | W              | P   | K                       |
|-----------|----------|----------------|------|-----------|-----|----------------|-----|-------------------------|
| B         | 4.0      | 5.8 $\pm 0.3$  | 4.3  | 5.5 max.  | 1.8 | 0.65 $\pm 0.1$ | 1.0 | 0.35 $^{+0.15}_{-0.20}$ |
| C         | 5.0      | 5.8 $\pm 0.3$  | 5.3  | 6.5 max.  | 2.2 | 0.65 $\pm 0.1$ | 1.5 | 0.35 $^{+0.15}_{-0.20}$ |
| D         | 6.3      | 5.8 $\pm 0.3$  | 6.6  | 7.8 max.  | 2.6 | 0.65 $\pm 0.1$ | 1.8 | 0.35 $^{+0.15}_{-0.20}$ |
| D8        | 6.3      | 7.7 $\pm 0.3$  | 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 $\pm 0.20$         |
| G         | 10.0     | 10.2 $\pm 0.3$ | 10.3 | 12.0 max. | 3.5 | 0.90 $\pm 0.2$ | 4.6 | 0.70 $\pm 0.20$         |

## Characteristics list

Endurance : 105 °C 2000 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              | 5.8  | B          | 90   | 1.35                             | 0.26                    | EEEFK0J220AR | (5)          | 2000               |      |
|                      | 47                | 4              | 5.8  | (B)        | 90   | 1.35                             | 0.26                    | EEEFKJ470UAR | (5)          | 2000               |      |
|                      |                   | 5              | 5.8  | C          | 160  | 0.70                             | 0.26                    | EEEFK0J470AR | (5)          | 1000               |      |
|                      | 100               | 5              | 5.8  | (C)        | 160  | 0.70                             | 0.26                    | EEEFKJ101UAR | (5)          | 1000               |      |
|                      |                   | 6.3            | 5.8  | D          | 240  | 0.36                             | 0.26                    | EEEFK0J101AP | (5)          | 1000               |      |
|                      | 220               | 6.3            | 5.8  | D          | 240  | 0.36                             | 0.26                    | EEEFK0J221AP | (5)          | 1000               |      |
|                      | 330               | 6.3            | 7.7  | D8         | 280  | 0.34                             | 0.26                    | EEEFKJ331XAP | (5)          | 900                |      |
|                      |                   | 8              | 6.2  | E          | 300  | 0.26                             | 0.26                    | EEEFK0J331AP | (6)          | 1000               |      |
|                      | 470               | 8              | 10.2 | F          | 600  | 0.16                             | 0.26                    | EEEFK0J471AP | (6)          | 500                |      |
| 1000                 | 8                 | 10.2           | F    | 600        | 0.16   | 0.26                             | EEEFK0J102AP            | (6)          | 500          |                    |      |
| 1500                 | 10                | 10.2           | G    | 850        | 0.08   | 0.26                             | EEEFK0J152AP            | (6)          | 500          |                    |      |
| 10                   | 22                | 4              | 5.8  | B          | 90   | 1.35                             | 0.19                    | EEEFK1A220AR | (5)          | 2000               |      |
|                      | 33                | 4              | 5.8  | (B)        | 90   | 1.35                             | 0.19                    | EEEFKA330UAR | (5)          | 2000               |      |
|                      |                   | 5              | 5.8  | C          | 160  | 0.70                             | 0.19                    | EEEFK1A330AR | (5)          | 1000               |      |
|                      | 150               | 6.3            | 5.8  | D          | 240  | 0.36                             | 0.19                    | EEEFK1A151AP | (5)          | 1000               |      |
|                      | 220               | 6.3            | 7.7  | D8         | 280  | 0.34                             | 0.19                    | EEEFKA221XAP | (5)          | 900                |      |
|                      |                   | 8              | 6.2  | E          | 300  | 0.26                             | 0.19                    | EEEFK1A221AP | (6)          | 1000               |      |
|                      | 330               | 8              | 10.2 | F          | 600  | 0.16                             | 0.19                    | EEEFK1A331AP | (6)          | 500                |      |
|                      | 470               | 8              | 10.2 | F          | 600  | 0.16                             | 0.19                    | EEEFK1A471AP | (6)          | 500                |      |
|                      | 680               | 8              | 10.2 | F          | 600  | 0.16                             | 0.19                    | EEEFK1A681AP | (6)          | 500                |      |
| 1000                 | 10                | 10.2           | G    | 850        | 0.08   | 0.19                             | EEEFK1A102AP            | (6)          | 500          |                    |      |
| 16                   | 10                | 4              | 5.8  | B          | 90   | 1.35                             | 0.16                    | EEEFK1C100AR | (5)          | 2000               |      |
|                      | 22                | 4              | 5.8  | (B)        | 90   | 1.35                             | 0.16                    | EEEFKC220UAR | (5)          | 2000               |      |
|                      |                   | 5              | 5.8  | C          | 160  | 0.70                             | 0.16                    | EEEFK1C220AR | (5)          | 1000               |      |
|                      | 47                | 5              | 5.8  | (C)        | 160  | 0.70                             | 0.16                    | EEEFKC470UAR | (5)          | 1000               |      |
|                      |                   | 6.3            | 5.8  | D          | 240  | 0.36                             | 0.16                    | EEEFK1C470AP | (5)          | 1000               |      |
|                      | 68                | 6.3            | 5.8  | D          | 240  | 0.36                             | 0.16                    | EEEFK1C680AP | (5)          | 1000               |      |
|                      | 100               | 6.3            | 5.8  | D          | 240  | 0.36                             | 0.16                    | EEEFK1C101AP | (5)          | 1000               |      |
|                      | 150               | 6.3            | 7.7  | D8         | 280  | 0.34                             | 0.16                    | EEEFKC151XAP | (5)          | 900                |      |
|                      | 220               | 6.3            | 7.7  | D8         | 280  | 0.34                             | 0.16                    | EEEFKC221XAP | (5)          | 900                |      |
|                      |                   | 8              | 6.2  | E          | 300  | 0.26                             | 0.16                    | EEEFK1C221AP | (6)          | 1000               |      |
|                      | 330               | 8              | 10.2 | F          | 600  | 0.16                             | 0.16                    | EEEFK1C331AP | (6)          | 500                |      |
|                      | 470               | 8              | 10.2 | F          | 600  | 0.16                             | 0.16                    | EEEFK1C471AP | (6)          | 500                |      |
| 680                  | 10                | 10.2           | G    | 850        | 0.08   | 0.16                             | EEEFK1C681AP            | (6)          | 500          |                    |      |
| 25                   | 10                | 4              | 5.8  | B          | 90   | 1.35                             | 0.14                    | EEEFK1E100AR | (5)          | 2000               |      |
|                      | 22                | 5              | 5.8  | C          | 160  | 0.70                             | 0.14                    | EEEFK1E220AR | (5)          | 1000               |      |
|                      |                   | 5              | 5.8  | (C)        | 160  | 0.70                             | 0.14                    | EEEFKE330UAR | (5)          | 1000               |      |
|                      | 33                | 6.3            | 5.8  | D          | 240  | 0.36                             | 0.14                    | EEEFK1E330AP | (5)          | 1000               |      |
|                      |                   | 47             | 6.3  | 5.8        | D  | 240                              | 0.36                    | 0.14         | EEEFK1E470AP | (5)                | 1000 |
|                      | 68                | 6.3            | 5.8  | D          | 240  | 0.36                             | 0.14                    | EEEFK1E680AP | (5)          | 1000               |      |
|                      | 100               | 6.3            | 7.7  | D8         | 280  | 0.34                             | 0.14                    | EEEFKE101XAP | (5)          | 900                |      |
|                      |                   | 8              | 6.2  | E          | 300  | 0.26                             | 0.14                    | EEEFK1E101AP | (6)          | 1000               |      |
|                      | 150               | 8              | 10.2 | F          | 600  | 0.16                             | 0.14                    | EEEFK1E151AP | (6)          | 500                |      |
|                      | 220               | 8              | 10.2 | F          | 600  | 0.16                             | 0.14                    | EEEFK1E221AP | (6)          | 500                |      |
|                      | 330               | 8              | 10.2 | F          | 600  | 0.16                             | 0.14                    | EEEFK1E331AP | (6)          | 500                |      |
|                      | 470               | 10             | 10.2 | G          | 850  | 0.08                             | 0.14                    | EEEFK1E471AP | (6)          | 500                |      |
|                      | 35                | 4.7            | 4    | 5.8        | B  | 90                               | 1.35                    | 0.12         | EEEFK1V4R7AR | (5)                | 2000 |
|                      |                   | 10             | 4    | 5.8        | (B)  | 90                               | 1.35                    | 0.12         | EEEFKV100UAR | (5)                | 2000 |
| 5                    |                   |                | 5.8  | C          | 160  | 0.70                             | 0.12                    | EEEFK1V100AR | (5)          | 1000               |      |
| 22                   |                   | 5              | 5.8  | C          | 160  | 0.70                             | 0.12                    | EEEFK1V220AR | (5)          | 1000               |      |
| 33                   |                   | 6.3            | 5.8  | D          | 240  | 0.36                             | 0.12                    | EEEFK1V330AP | (5)          | 1000               |      |
| 47                   |                   | 6.3            | 5.8  | D          | 240  | 0.36                             | 0.12                    | EEEFK1V470AP | (5)          | 1000               |      |
| 68                   |                   | 6.3            | 7.7  | D8         | 280  | 0.34                             | 0.12                    | EEEFKV680XAP | (5)          | 900                |      |
| 100                  |                   | 6.3            | 7.7  | D8         | 280  | 0.34                             | 0.12                    | EEEFKV101XAP | (5)          | 900                |      |
|                      |                   | 8              | 10.2 | F          | 600  | 0.16                             | 0.12                    | EEEFK1V101AP | (6)          | 500                |      |
| 150                  |                   | 8              | 10.2 | F          | 600  | 0.16                             | 0.12                    | EEEFK1V151AP | (6)          | 500                |      |
| 220                  |                   | 8              | 10.2 | F          | 600  | 0.16                             | 0.12                    | EEEFK1V221AP | (6)          | 500                |      |
| 330                  |                   | 10             | 10.2 | G          | 850  | 0.08                             | 0.12                    | EEEFK1V331AP | (6)          | 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

· Please refer to the page of "Reflow Profile" and "The Taping Dimensions".

· When requesting vibration-proof product, please put the last "V" instead of "P"