

Surface Mount Type

Series: **FK** Type: **V**



■ Features

- Endurance: 2000 h to 5000 h at 105 °C
- Low impedance (40 % to 60 % less than FC series)
Miniaturized (30 % to 50 % less than FC series)
- Vibration-proof product is available upon request. ($\phi 8 \leq$)
- RoHS directive compliant

■ Specifications

| | | | | | | | | | | | |
|------------------------------------|--|---|----|----|----|----|----|----|----|-----|-----------------------------|
| Category Temp. Range | -55 °C to +105 °C | | | | | | | | | | |
| Rated W.V.Range | 6.3 V.DC to 100 V.DC | | | | | | | | | | |
| Nominal Cap.Range | 3.3 μ F to 1500 μ F | | | | | | | | | | |
| Capacitance Tolerance | ± 20 % (120 Hz/+20 °C) | | | | | | | | | | |
| DC Leakage Current | $I \leq 0.01$ CV or 3 (μ A) After 2 minutes (Whichever is greater) | | | | | | | | | | |
| $\tan \delta$ | Please see the attached standard products list | | | | | | | | | | |
| Characteristics at Low Temperature | W.V. (V) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 | (Impedance ratio at 120 Hz) |
| | Z(-25 °C)/Z(+20 °C) | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | |
| | Z(-40 °C)/Z(+20 °C) | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| | Z(-55 °C)/Z(+20 °C) | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Endurance | After applying rated working voltage for 2000 hours at +105 °C ± 2 °C and then being stabilized at +20 °C, Capacitors shall meet the following limits. (suffix "G" in $\phi 8 \times 10.2$, $\phi 10 \times 10.2$ are 5000 hours) | | | | | | | | | | |
| | Capacitance change | ± 30 % of initial measured value (Suffix "G" is 35 %) | | | | | | | | | |
| | $\tan \delta$ | ≤ 200 % of initial specified value (Suffix "G" is 300 %) | | | | | | | | | |
| | DC leakage current | \leq 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 | | | | | | | | | |
| | $\tan \delta$ | \leq initial specified value | | | | | | | | | |
| | DC leakage current | \leq initial specified value | | | | | | | | | |

■ Marking

Example: 6.3 V 22 μ F
Marking color : BLACK

| Rated Voltage Mark | |
|--------------------|-------|
| j | 6.3 V |
| A | 10 V |
| C | 16 V |
| E | 25 V |
| V | 35 V |
| H | 50 V |
| J | 63 V |
| K | 80 V |
| 2A | 100 V |

■ Dimensions in mm (not to scale)

| Size code | D | L | A,B | H max. | I | W | P | K |
|-----------|------|------|------|--------|-----|----------------|-----|--------------------|
| B | 4.0 | 5.8 | 4.3 | 5.5 | 1.8 | 0.65 ± 0.1 | 1.0 | 0.35-0.20 to +0.15 |
| C | 5.0 | 5.8 | 5.3 | 6.5 | 2.2 | 0.65 ± 0.1 | 1.5 | 0.35-0.20 to +0.15 |
| D | 6.3 | 5.8 | 6.6 | 7.8 | 2.6 | 0.65 ± 0.1 | 1.8 | 0.35-0.20 to +0.15 |
| D8 | 6.3 | 7.7 | 6.6 | 7.8 | 2.6 | 0.65 ± 0.1 | 1.8 | 0.35-0.20 to +0.15 |
| E | 8.0 | 6.2 | 8.3 | 9.5 | 3.4 | 0.65 ± 0.1 | 2.2 | 0.35-0.20 to +0.15 |
| F | 8.0 | 10.2 | 8.3 | 10.0 | 3.4 | 0.90 ± 0.2 | 3.1 | 0.70 ± 0.2 |
| G | 10.0 | 10.2 | 10.3 | 12.0 | 3.5 | 0.90 ± 0.2 | 4.6 | 0.70 ± 0.2 |

Standard Products

Endurance : 105 °C 2000 h ($\phi 12.5 \geq$: 5000 h)

| W.V. | Cap. ($\pm 20\%$) | Case size | | | Specification | | | Part No. (RoHS:compliant) | Reflow | Min. Packaging Q'ty |
|------|------------------------|-----------|--------|---------------|--|--|---------------------------------------|------------------------------|-------------|------------------------|
| | | Dia. | Length | *Size Code | Ripple Current (100 kHz (+105 °C) (mA r.m.s.)) | Impedance (100 kHz (+20 °C) (Ω)) | $\tan \delta$ (120 Hz (+20 °C)) | | | Taping |
| (V) | (μ F) | (mm) | (mm) | | | | | | (pcs) | |
| 6.3 | 22 | 4 | 5.8 | B | 90 | 1.35 | 0.26 | EEEFK0J220R | (1) | 2000 |
| | 47 | 4 | 5.8 | (B) | 90 | 1.35 | 0.26 | EEEFK0J470UR | (1) | 2000 |
| | | 5 | 5.8 | C | 160 | 0.70 | 0.26 | EEEFK0J470R | (1) | 1000 |
| | 100 | 5 | 5.8 | (C) | 160 | 0.70 | 0.26 | EEEFK0J101UR | (1) | 1000 |
| | | 6.3 | 5.8 | D | 240 | 0.36 | 0.26 | EEEFK0J101P | (1) | 1000 |
| | 220 | 6.3 | 5.8 | D | 240 | 0.36 | 0.26 | EEEFK0J221P | (1) | 1000 |
| | 330 | 6.3 | 7.7 | D8 | 280 | 0.34 | 0.26 | EEEFK0J331XP | (1) | 900 |
| | | 8 | 6.2 | E | 300 | 0.26 | 0.26 | EEEFK0J331P | (2) | 1000 |
| | 470 | 8 | 10.2 | F | 600 | 0.16 | 0.26 | EEEFK0J471P | (2) | 500 |
| | 1000 | 8 | 10.2 | F | 600 | 0.16 | 0.26 | EEEFK0J102P | (2) | 500 |
| 1500 | 10 | 10.2 | G | 850 | 0.08 | 0.26 | EEEFK0J152P | (2) | 500 | |
| 10 | 22 | 4 | 5.8 | B | 90 | 1.35 | 0.19 | EEEFK1A220R | (1) | 2000 |
| | 33 | 4 | 5.8 | (B) | 90 | 1.35 | 0.19 | EEEFK1A330UR | (1) | 2000 |
| | | 5 | 5.8 | C | 160 | 0.70 | 0.19 | EEEFK1A330R | (1) | 1000 |
| | 150 | 6.3 | 5.8 | D | 240 | 0.36 | 0.19 | EEEFK1A151P | (1) | 1000 |
| | 220 | 6.3 | 7.7 | D8 | 280 | 0.34 | 0.19 | EEEFK1A221XP | (1) | 900 |
| | | 8 | 6.2 | E | 300 | 0.26 | 0.19 | EEEFK1A221P | (2) | 1000 |
| | 330 | 8 | 10.2 | F | 600 | 0.16 | 0.19 | EEEFK1A331P | (2) | 500 |
| | 470 | 8 | 10.2 | F | 600 | 0.16 | 0.19 | EEEFK1A471P | (2) | 500 |
| | 680 | 8 | 10.2 | F | 600 | 0.16 | 0.19 | EEEFK1A681P | (2) | 500 |
| | 1000 | 10 | 10.2 | G | 850 | 0.08 | 0.19 | EEEFK1A102P | (2) | 500 |
| 16 | 10 | 4 | 5.8 | B | 90 | 1.35 | 0.16 | EEEFK1C100R | (1) | 2000 |
| | 22 | 4 | 5.8 | (B) | 90 | 1.35 | 0.16 | EEEFK1C220UR | (1) | 2000 |
| | | 5 | 5.8 | C | 160 | 0.70 | 0.16 | EEEFK1C220R | (1) | 1000 |
| | 47 | 5 | 5.8 | (C) | 160 | 0.70 | 0.16 | EEEFK1C470UR | (1) | 1000 |
| | | 6.3 | 5.8 | D | 240 | 0.36 | 0.16 | EEEFK1C470P | (1) | 1000 |
| | 68 | 6.3 | 5.8 | D | 240 | 0.36 | 0.16 | EEEFK1C680P | (1) | 1000 |
| | 100 | 6.3 | 5.8 | D | 240 | 0.36 | 0.16 | EEEFK1C101P | (1) | 1000 |
| | 150 | 6.3 | 7.7 | D8 | 280 | 0.34 | 0.16 | EEEFK1C151XP | (1) | 900 |
| | 220 | 6.3 | 7.7 | D8 | 280 | 0.34 | 0.16 | EEEFK1C221XP | (1) | 900 |
| | | 8 | 6.2 | E | 300 | 0.26 | 0.16 | EEEFK1C221P | (2) | 1000 |
| 330 | 8 | 10.2 | F | 600 | 0.16 | 0.16 | EEEFK1C331P | (2) | 500 | |
| 470 | 8 | 10.2 | F | 600 | 0.16 | 0.16 | EEEFK1C471P | (2) | 500 | |
| 680 | 10 | 10.2 | G | 850 | 0.08 | 0.16 | EEEFK1C681P | (2) | 500 | |
| 25 | 10 | 4 | 5.8 | B | 90 | 1.35 | 0.14 | EEEFK1E100R | (1) | 2000 |
| | 22 | 5 | 5.8 | C | 160 | 0.70 | 0.14 | EEEFK1E220R | (1) | 1000 |
| | | 5 | 5.8 | (C) | 160 | 0.70 | 0.14 | EEEFK1E330UR | (1) | 1000 |
| | 33 | 6.3 | 5.8 | D | 240 | 0.36 | 0.14 | EEEFK1E330P | (1) | 1000 |
| | | 47 | 6.3 | 5.8 | D | 240 | 0.36 | 0.14 | EEEFK1E470P | (1) |
| | 68 | 6.3 | 5.8 | D | 240 | 0.36 | 0.14 | EEEFK1E680P | (1) | 1000 |
| | 100 | 6.3 | 7.7 | D8 | 280 | 0.34 | 0.14 | EEEFK1E101XP | (1) | 900 |
| | | 8 | 6.2 | E | 300 | 0.26 | 0.14 | EEEFK1E101P | (2) | 1000 |
| | 150 | 8 | 10.2 | F | 600 | 0.16 | 0.14 | EEEFK1E151P | (2) | 500 |
| | 220 | 8 | 10.2 | F | 600 | 0.16 | 0.14 | EEEFK1E221P | (2) | 500 |
| 330 | 8 | 10.2 | F | 600 | 0.16 | 0.14 | EEEFK1E331P | (2) | 500 | |
| 470 | 10 | 10.2 | G | 850 | 0.08 | 0.14 | EEEFK1E471P | (2) | 500 | |

* Size code(): Miniaturization product

The taping dimensions are explained on p.177 of our Catalog. Please use it as a reference guide.
Reflow Profile(Fig-1 to Fig-8) listed on p.175 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.

Standard Products

Endurance : 105 °C 2000 h ($\phi 12.5 \geq$: 5000 h)

| W.V. | Cap. ($\pm 20\%$) | Case size | | | Specification | | | Part No. (RoHS:compliant) | Reflow | Min. Packaging Q'ty |
|------|------------------------|-----------|--------|------------|---|--|--------------------------------------|------------------------------|--------|------------------------|
| | | Dia. | Length | *Size Code | Ripple Current (100 kHz) (+105 °C) (mA r.m.s.) | Impedance (100 kHz) (+20 °C) (Ω) | tan δ (120 Hz) (+20 °C) | | | Taping |
| (V) | (μ F) | (mm) | (mm) | | | | | | (pcs) | |
| 35 | 4.7 | 4 | 5.8 | B | 90 | 1.35 | 0.12 | EEEFK1V4R7R | (1) | 2000 |
| | 10 | 4 | 5.8 | (B) | 90 | 1.35 | 0.12 | EEEFK1V100UR | (1) | 2000 |
| | | 5 | 5.8 | C | 160 | 0.70 | 0.12 | EEEFK1V100R | (1) | 1000 |
| | 22 | 5 | 5.8 | C | 160 | 0.70 | 0.12 | EEEFK1V220R | (1) | 1000 |
| | 33 | 6.3 | 5.8 | D | 240 | 0.36 | 0.12 | EEEFK1V330P | (1) | 1000 |
| | 47 | 6.3 | 5.8 | D | 240 | 0.36 | 0.12 | EEEFK1V470P | (1) | 1000 |
| | 68 | 6.3 | 7.7 | D8 | 280 | 0.34 | 0.12 | EEEFK1V680XP | (1) | 900 |
| | 100 | 6.3 | 7.7 | D8 | 280 | 0.34 | 0.12 | EEEFK1V101XP | (1) | 900 |
| | | 8 | 10.2 | F | 600 | 0.16 | 0.12 | EEEFK1V101P | (2) | 500 |
| | 150 | 8 | 10.2 | F | 600 | 0.16 | 0.12 | EEEFK1V151P | (2) | 500 |
| 220 | 8 | 10.2 | F | 600 | 0.16 | 0.12 | EEEFK1V221P | (2) | 500 | |
| 330 | 10 | 10.2 | G | 850 | 0.08 | 0.12 | EEEFK1V331P | (2) | 500 | |
| 50 | 4.7 | 4 | 5.8 | B | 60 | 2.90 | 0.10 | EEEFK1H4R7R | (1) | 2000 |
| | 10 | 5 | 5.8 | (C) | 85 | 1.52 | 0.10 | EEEFK1H100UR | (1) | 1000 |
| | | 6.3 | 5.8 | D | 165 | 0.88 | 0.10 | EEEFK1H100P | (1) | 1000 |
| | 22 | 6.3 | 5.8 | D | 165 | 0.88 | 0.10 | EEEFK1H220P | (1) | 1000 |
| | 33 | 6.3 | 7.7 | D8 | 195 | 0.68 | 0.10 | EEEFK1H330XP | (1) | 900 |
| | | 8 | 6.2 | E | 195 | 0.68 | 0.10 | EEEFK1H330P | (2) | 1000 |
| | 47 | 6.3 | 7.7 | D8 | 195 | 0.68 | 0.10 | EEEFK1H470XP | (1) | 900 |
| | | 8 | 6.2 | E | 195 | 0.68 | 0.10 | EEEFK1H470P | (2) | 1000 |
| | 100 | 8 | 10.2 | F | 350 | 0.34 | 0.10 | EEEFK1H101P | (2) | 500 |
| 150 | 10 | 10.2 | G | 670 | 0.18 | 0.10 | EEEFK1H151P | (2) | 500 | |
| 220 | 10 | 10.2 | G | 670 | 0.18 | 0.10 | EEEFK1H221P | (2) | 500 | |
| 63 | 4.7 | 5 | 5.8 | C | 50 | 3.00 | 0.08 | EEEFK1J4R7R | (1) | 1000 |
| | 10 | 6.3 | 5.8 | D | 80 | 1.50 | 0.08 | EEEFK1J100P | (1) | 1000 |
| | 22 | 6.3 | 7.7 | D8 | 120 | 1.20 | 0.08 | EEEFK1J220XP | (1) | 900 |
| | | 8 | 6.2 | E | 120 | 1.20 | 0.08 | EEEFK1J220P | (2) | 1000 |
| | 33 | 8 | 10.2 | F | 250 | 0.65 | 0.08 | EEEFK1J330P | (2) | 500 |
| | 47 | 8 | 10.2 | F | 250 | 0.65 | 0.08 | EEEFK1J470P | (2) | 500 |
| | 68 | 8 | 10.2 | (F) | 250 | 0.65 | 0.08 | EEEFK1J680UP | (2) | 500 |
| | 100 | 10 | 10.2 | G | 400 | 0.35 | 0.08 | EEEFK1J101P | (2) | 500 |
| 80 | 3.3 | 5 | 5.8 | C | 25 | 5.00 | 0.08 | EEEFK1K3R3R | (1) | 1000 |
| | 4.7 | 6.3 | 5.8 | D | 40 | 3.00 | 0.08 | EEEFK1K4R7P | (1) | 1000 |
| | 10 | 6.3 | 7.7 | D8 | 60 | 2.40 | 0.08 | EEEFK1K100XP | (1) | 900 |
| | | 8 | 6.2 | E | 60 | 2.40 | 0.08 | EEEFK1K100P | (2) | 1000 |
| | 22 | 8 | 10.2 | F | 130 | 1.30 | 0.08 | EEEFK1K220P | (2) | 500 |
| | 33 | 8 | 10.2 | F | 130 | 1.30 | 0.08 | EEEFK1K330P | (2) | 500 |
| | 47 | 10 | 10.2 | G | 200 | 0.70 | 0.08 | EEEFK1K470P | (2) | 500 |
| 100 | 22 | 8 | 10.2 | F | 130 | 1.30 | 0.07 | EEEFK2A220P | (2) | 500 |
| | 33 | 10 | 10.2 | G | 200 | 0.70 | 0.07 | EEEFK2A330P | (2) | 500 |

* Size code():Miniaturization product

The taping dimensions are explained on p.177 of our Catalog. Please use it as a reference guide.
Reflow Profile(Fig-1 to Fig-8) listed on p.175 of our Catalog.

■ Endurance 5000 h Products

Endurance : 105 °C 5000 h

| W.V. | Cap. (±20 %) | Case size | | | Specification | | | Part No. (RoHS:compliant) | Reflow | Min. Packaging Q'ty |
|------|-----------------|-----------|--------|--------------|--|---|-------------------------------|------------------------------|--------|------------------------|
| | | Dia. | Length | Size Code | Ripple Current (100 kHz) (+105 °C) (mA r.m.s.) | Impedance (100 kHz) (+20 °C) (Ω) | tan δ (120 Hz) (+20 °C) | | | Taping (pcs) |
| (V) | (μF) | (mm) | (mm) | | | | | | | |
| 6.3 | 470 | 8 | 10.2 | F | 600 | 0.16 | 0.26 | EEEFK0J471GP | (2) | 500 |
| | 1000 | 8 | 10.2 | F | 600 | 0.16 | 0.26 | EEEFK0J102GP | (2) | 500 |
| | 1500 | 10 | 10.2 | G | 850 | 0.08 | 0.26 | EEEFK0J152GP | (2) | 500 |
| 10 | 330 | 8 | 10.2 | F | 600 | 0.16 | 0.19 | EEEFK1A331GP | (2) | 500 |
| | 470 | 8 | 10.2 | F | 600 | 0.16 | 0.19 | EEEFK1A471GP | (2) | 500 |
| | 680 | 8 | 10.2 | F | 600 | 0.16 | 0.19 | EEEFK1A681GP | (2) | 500 |
| | 1000 | 10 | 10.2 | G | 850 | 0.08 | 0.19 | EEEFK1A102GP | (2) | 500 |
| 16 | 330 | 8 | 10.2 | F | 600 | 0.16 | 0.16 | EEEFK1C331GP | (2) | 500 |
| | 470 | 8 | 10.2 | F | 600 | 0.16 | 0.16 | EEEFK1C471GP | (2) | 500 |
| | 680 | 10 | 10.2 | G | 850 | 0.08 | 0.16 | EEEFK1C681GP | (2) | 500 |
| 25 | 150 | 8 | 10.2 | F | 600 | 0.16 | 0.14 | EEEFK1E151GP | (2) | 500 |
| | 220 | 8 | 10.2 | F | 600 | 0.16 | 0.14 | EEEFK1E221GP | (2) | 500 |
| | 330 | 8 | 10.2 | F | 600 | 0.16 | 0.14 | EEEFK1E331GP | (2) | 500 |
| | 470 | 10 | 10.2 | G | 850 | 0.08 | 0.14 | EEEFK1E471GP | (2) | 500 |
| 35 | 100 | 8 | 10.2 | F | 600 | 0.16 | 0.12 | EEEFK1V101GP | (2) | 500 |
| | 150 | 8 | 10.2 | F | 600 | 0.16 | 0.12 | EEEFK1V151GP | (2) | 500 |
| | 220 | 8 | 10.2 | F | 600 | 0.16 | 0.12 | EEEFK1V221GP | (2) | 500 |
| | 330 | 10 | 10.2 | G | 850 | 0.08 | 0.12 | EEEFK1V331GP | (2) | 500 |
| 50 | 100 | 8 | 10.2 | F | 350 | 0.34 | 0.10 | EEEFK1H101GP | (2) | 500 |
| | 150 | 10 | 10.2 | G | 670 | 0.18 | 0.10 | EEEFK1H151GP | (2) | 500 |
| | 220 | 10 | 10.2 | G | 670 | 0.18 | 0.10 | EEEFK1H221GP | (2) | 500 |

The taping dimensions are explained on p.177 of our Catalog. Please use it as a reference guide.
Reflow Profile(Fig-1 to Fig-8) listed on p.175 of our Catalog.