

Surface Mount Type

Series: **FP** Type: **V**

FP High temperature Lead-Free reflow (suffix:A*)



■ Features

- Low ESR (30 % to 50 % less than FK series)
- Endurance: 2000 h at 105 °C
- Vibration-proof product is available upon request. (φ8 mm and larger)
- AEC-Q200 qualified*
- RoHS directive compliant

■ Specifications

| | | | | | | | | |
|------------------------------------|---|------------------------------------|----|----|----|----|----|-----------------------------|
| Category Temp. Range | -55 °C to +105 °C | | | | | | | |
| Rated W.V. Range | 6.3 V.DC to 50 V.DC | | | | | | | |
| Nominal Cap. Range | 10 μF to 1800 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 | (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 | |
| | Z(-55 °C)/Z(+20 °C) | 4 | 4 | 4 | 3 | 3 | 3 | |
| Endurance | After applying rated working voltage at +105 °C ± 2 °C for 2000 hours the capacitors shall meet the limits specified below. Post-test requirement at +20 °C | | | | | | | |
| | 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) | | | | | | | |
| | After reflow soldering and then being stabilized at +20 °C, capacitors shall meet the following limits. | | | | | | | |
| 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

| Cap (μF) | Frequency (Hz) | | | |
|-------------|----------------|------|------|----------|
| | 120 | 1 k | 10 k | 100 k to |
| 10 to 470 | 0.65 | 0.85 | 0.95 | 1.00 |
| 560 to 1800 | 0.75 | 0.90 | 0.95 | 1.00 |

■ 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 | 5.8±0.30 | 4.3 | 5.5 max. | 1.8 | 0.65±0.1 | 1.0 | 0.35 ^{+0.15} _{-0.20} |
| C | 5.0 | 5.8±0.30 | 5.3 | 6.5 max. | 2.2 | 0.65±0.1 | 1.5 | 0.35 ^{+0.15} _{-0.20} |
| D | 6.3 | 5.8±0.30 | 6.6 | 7.8 max. | 2.6 | 0.65±0.1 | 1.8 | 0.35 ^{+0.15} _{-0.20} |
| D8 | 6.3 | 7.7±0.30 | 6.6 | 7.8 max. | 2.6 | 0.65±0.1 | 1.8 | 0.35 ^{+0.15} _{-0.20} |
| E | 8.0 | 6.2±0.30 | 8.3 | 9.5 max. | 3.4 | 0.65±0.1 | 2.2 | 0.35 ^{+0.15} _{-0.20} |
| F | 8.0 | 10.2±0.30 | 8.3 | 10.0 max. | 3.4 | 0.90±0.2 | 3.1 | 0.70±0.20 |
| G | 10.0 | 10.2±0.30 | 10.3 | 12.0 max. | 3.5 | 0.90±0.2 | 4.6 | 0.70±0.20 |

* This product qualify for AEC-Q200, but it has some deviations.

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

| 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.) | E.S.R. (100 kHz) (+20 °C) (Ω) | tan δ (120 Hz) (+20 °C) | | | Taping |
| (V) | (μF) | (mm) | (mm) | | | | | | (pcs) | |
| 6.3 | 22 | 4 | 5.8 | B | 160 | 0.85 | 0.26 | EEEEFP0J220AR | (5) | 2000 |
| | 47 | 4 | 5.8 | (B) | 160 | 0.85 | 0.26 | EEEEFPJ470UAR | (5) | 2000 |
| | | 5 | 5.8 | C | 240 | 0.36 | 0.26 | EEEEFP0J470AR | (5) | 1000 |
| | 100 | 5 | 5.8 | (C) | 240 | 0.36 | 0.26 | EEEEFPJ101UAR | (5) | 1000 |
| | | 6.3 | 5.8 | D | 300 | 0.26 | 0.26 | EEEEFP0J101AP | (5) | 1000 |
| | 220 | 6.3 | 5.8 | D | 300 | 0.26 | 0.26 | EEEEFP0J221AP | (5) | 1000 |
| | 330 | 6.3 | 7.7 | D8 | 600 | 0.16 | 0.26 | EEEEFPJ331XAP | (5) | 900 |
| | | 8 | 6.2 | E | 500 | 0.18 | 0.26 | EEEEFP0J331AP | (6) | 1000 |
| | 470 | 8 | 10.2 | F | 850 | 0.08 | 0.26 | EEEEFP0J471AP | (6) | 500 |
| | 1000 | 8 | 10.2 | F | 850 | 0.08 | 0.26 | EEEEFP0J102AP | (6) | 500 |
| 1500 | 10 | 10.2 | G | 1190 | 0.06 | 0.26 | EEEEFP0J152AP | (6) | 500 | |
| 1800 | 10 | 10.2 | (G) | 850 | 0.08 | 0.26 | EEEEFPJ182UAP | (6) | 500 | |
| 10 | 22 | 4 | 5.8 | B | 160 | 0.85 | 0.19 | EEEEFP1A220AR | (5) | 2000 |
| | 33 | 4 | 5.8 | (B) | 160 | 0.85 | 0.19 | EEEEPA330UAR | (5) | 2000 |
| | | 5 | 5.8 | C | 240 | 0.36 | 0.19 | EEEEFP1A330AR | (5) | 1000 |
| | 150 | 6.3 | 5.8 | D | 300 | 0.26 | 0.19 | EEEEFP1A151AP | (5) | 1000 |
| | 220 | 6.3 | 7.7 | D8 | 600 | 0.16 | 0.19 | EEEEPA221XAP | (5) | 900 |
| | | 8 | 6.2 | E | 500 | 0.18 | 0.19 | EEEEFP1A221AP | (6) | 1000 |
| | 330 | 8 | 10.2 | F | 850 | 0.08 | 0.19 | EEEEFP1A331AP | (6) | 500 |
| | 470 | 8 | 10.2 | F | 850 | 0.08 | 0.19 | EEEEFP1A471AP | (6) | 500 |
| | 680 | 8 | 10.2 | F | 850 | 0.08 | 0.19 | EEEEFP1A681AP | (6) | 500 |
| | 1000 | 10 | 10.2 | G | 1190 | 0.06 | 0.19 | EEEEFP1A102AP | (6) | 500 |
| 1200 | 10 | 10.2 | (G) | 850 | 0.08 | 0.19 | EEEEPA122UAP | (6) | 500 | |
| 16 | 10 | 4 | 5.8 | B | 160 | 0.85 | 0.16 | EEEEFP1C100AR | (5) | 2000 |
| | 22 | 4 | 5.8 | (B) | 160 | 0.85 | 0.16 | EEEEPC220UAR | (5) | 2000 |
| | | 5 | 5.8 | C | 240 | 0.36 | 0.16 | EEEEFP1C220AR | (5) | 1000 |
| | 47 | 5 | 5.8 | (C) | 240 | 0.36 | 0.16 | EEEEPC470UAR | (5) | 1000 |
| | | 6.3 | 5.8 | D | 300 | 0.26 | 0.16 | EEEEFP1C470AP | (5) | 1000 |
| | 68 | 6.3 | 5.8 | D | 300 | 0.26 | 0.16 | EEEEFP1C680AP | (5) | 1000 |
| | | 6.3 | 5.8 | D | 300 | 0.26 | 0.16 | EEEEFP1C101AP | (5) | 1000 |
| | 100 | 6.3 | 7.7 | D8 | 600 | 0.16 | 0.16 | EEEEPC101XAP | (5) | 900 |
| | | 6.3 | 7.7 | D8 | 600 | 0.16 | 0.16 | EEEEPC151XAP | (5) | 900 |
| | 220 | 6.3 | 7.7 | D8 | 600 | 0.16 | 0.16 | EEEEPC221XAP | (5) | 900 |
| | | 8 | 6.2 | E | 500 | 0.18 | 0.16 | EEEEFP1C221AP | (6) | 1000 |
| | 330 | 8 | 10.2 | F | 850 | 0.08 | 0.16 | EEEEFP1C331AP | (6) | 500 |
| | 470 | 8 | 10.2 | F | 850 | 0.08 | 0.16 | EEEEFP1C471AP | (6) | 500 |
| | 680 | 10 | 10.2 | G | 1190 | 0.06 | 0.16 | EEEEFP1C681AP | (6) | 500 |
| 820 | 10 | 10.2 | (G) | 850 | 0.08 | 0.16 | EEEEPC821UAP | (6) | 500 | |
| 25 | 10 | 4 | 5.8 | B | 160 | 0.85 | 0.14 | EEEEFP1E100AR | (5) | 2000 |
| | 22 | 5 | 5.8 | C | 240 | 0.36 | 0.14 | EEEEFP1E220AR | (5) | 1000 |
| | | 5 | 5.8 | (C) | 240 | 0.36 | 0.14 | EEEEPE330UAR | (5) | 1000 |
| | 33 | 6.3 | 5.8 | D | 300 | 0.26 | 0.14 | EEEEFP1E330AP | (5) | 1000 |
| | | 6.3 | 5.8 | D | 300 | 0.26 | 0.14 | EEEEFP1E470AP | (5) | 1000 |
| | 47 | 6.3 | 5.8 | D | 300 | 0.26 | 0.14 | EEEEFP1E680AP | (5) | 1000 |
| | 100 | 6.3 | 7.7 | D8 | 600 | 0.16 | 0.14 | EEEEPE101XAP | (5) | 900 |
| | | 8 | 6.2 | E | 500 | 0.18 | 0.14 | EEEEFP1E101AP | (6) | 1000 |
| | 150 | 8 | 10.2 | F | 850 | 0.08 | 0.14 | EEEEFP1E151AP | (6) | 500 |
| | 220 | 8 | 10.2 | F | 850 | 0.08 | 0.14 | EEEEFP1E221AP | (6) | 500 |
| | 330 | 8 | 10.2 | F | 850 | 0.08 | 0.14 | EEEEFP1E331AP | (6) | 500 |
| | 470 | 10 | 10.2 | G | 1190 | 0.06 | 0.14 | EEEEFP1E471AP | (6) | 500 |
| | 560 | 10 | 10.2 | (G) | 850 | 0.08 | 0.14 | EEEEPE561UAP | (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 to "P"

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

| 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.)) | E.S.R. (100 kHz) (+20 °C) (Ω) | tan δ (120 Hz) (+20 °C) | | | Taping (pcs) |
| (V) | (μF) | (mm) | (mm) | | | | | | | |
| 35 | 10 | 4 | 5.8 | (B) | 160 | 0.85 | 0.12 | EEEFV100UAR | (5) | 2000 |
| | 22 | 5 | 5.8 | C | 240 | 0.36 | 0.12 | EEEFV1V220AR | (5) | 1000 |
| | 33 | 6.3 | 5.8 | D | 300 | 0.26 | 0.12 | EEEFV1V330AP | (5) | 1000 |
| | 47 | 6.3 | 5.8 | D | 300 | 0.26 | 0.12 | EEEFV1V470AP | (5) | 1000 |
| | 68 | 6.3 | 7.7 | D8 | 600 | 0.16 | 0.12 | EEEFV680XAP | (5) | 900 |
| | 100 | 6.3 | 7.7 | D8 | 600 | 0.16 | 0.12 | EEEFV101XAP | (5) | 900 |
| | | 8 | 10.2 | F | 850 | 0.08 | 0.12 | EEEFV1V101AP | (6) | 500 |
| | 150 | 8 | 10.2 | F | 850 | 0.08 | 0.12 | EEEFV1V151AP | (6) | 500 |
| | 220 | 8 | 10.2 | F | 850 | 0.08 | 0.12 | EEEFV1V221AP | (6) | 500 |
| | 330 | 10 | 10.2 | G | 1190 | 0.06 | 0.12 | EEEFV1V331AP | (6) | 500 |
| 390 | 10 | 10.2 | (G) | 850 | 0.08 | 0.12 | EEEFV391UAP | (6) | 500 | |
| 50 | 100 | 8 | 10.2 | F | 670 | 0.18 | 0.10 | EEEFV1H101AP | (6) | 500 |
| | 220 | 10 | 10.2 | G | 900 | 0.12 | 0.10 | EEEFV1H221AP | (6) | 500 |

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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 to "P"

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