

### Surface Mount Type

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

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



#### Features

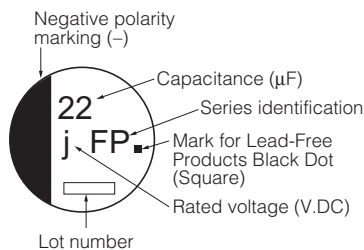
- Low ESR (30 % to 50 % less than FK series)
- Endurance: 2000 h at 105 °C
- RoHS directive compliant

#### Specifications

Category Temp. Range	-55 °C to +105 °C						
Rated W.V. Range	6.3 V.DC to 35 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 application of rated working voltage at + 20 % (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	(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 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)						
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					

#### Marking

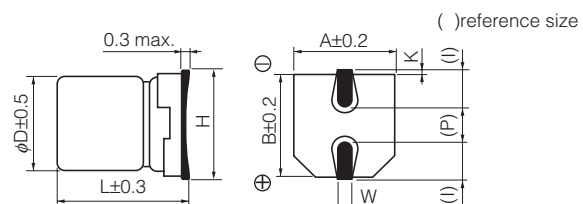
Example: 6.3 V 22 μF  
Marking color: BLACK



#### Rated Voltage Mark

j	6.3 V
A	10 V
C	16 V
E	25 V
V	35 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±0.20
G	10.0	10.2	10.3	12.0	3.5	0.90±0.2	4.6	0.70±0.20

**NEW**

■ High temperature Lead-Free reflow 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	EEEF0J220AR	(5)	2000
	47	4	5.8	(B)	160	0.85	0.26	EEEFJ470UAR	(5)	2000
		5	5.8	C	240	0.36	0.26	EEEF0J470AR	(5)	1000
	100	5	5.8	(C)	240	0.36	0.26	EEEFJ101UAR	(5)	1000
		6.3	5.8	D	300	0.26	0.26	EEEF0J101AP	(5)	1000
	220	6.3	5.8	D	300	0.26	0.26	EEEF0J221AP	(5)	1000
	330	6.3	7.7	D8	600	0.16	0.26	EEEFJ331XAP	(5)	900
		8	6.2	E	500	0.18	0.26	EEEF0J331AP	(6)	1000
	470	8	10.2	F	850	0.08	0.26	EEEF0J471AP	(6)	500
	1000	8	10.2	F	850	0.08	0.26	EEEF0J102AP	(6)	500
1500	10	10.2	G	1190	0.06	0.26	EEEF0J152AP	(6)	500	
1800	10	10.2	(G)	850	0.08	0.26	EEEFJ182UAP	(6)	500	
10	22	4	5.8	B	160	0.85	0.19	EEEF1A220AR	(5)	2000
	33	4	5.8	(B)	160	0.85	0.19	EEEFPA330UAR	(5)	2000
		5	5.8	C	240	0.36	0.19	EEEF1A330AR	(5)	1000
	150	6.3	5.8	D	300	0.26	0.19	EEEF1A151AP	(5)	1000
	220	6.3	7.7	D8	600	0.16	0.19	EEEFPA221XAP	(5)	900
		8	6.2	E	500	0.18	0.19	EEEF1A221AP	(6)	1000
	330	8	10.2	F	850	0.08	0.19	EEEF1A331AP	(6)	500
	470	8	10.2	F	850	0.08	0.19	EEEF1A471AP	(6)	500
	680	8	10.2	F	850	0.08	0.19	EEEF1A681AP	(6)	500
	1000	10	10.2	G	1190	0.06	0.19	EEEF1A102AP	(6)	500
1200	10	10.2	(G)	850	0.08	0.19	EEEFPA122UAP	(6)	500	
16	10	4	5.8	B	160	0.85	0.16	EEEF1C100AR	(5)	2000
	22	4	5.8	(B)	160	0.85	0.16	EEEFPC220UAR	(5)	2000
		5	5.8	C	240	0.36	0.16	EEEF1C220AR	(5)	1000
	47	5	5.8	(C)	240	0.36	0.16	EEEFPC470UAR	(5)	1000
		6.3	5.8	D	300	0.26	0.16	EEEF1C470AP	(5)	1000
	68	6.3	5.8	D	300	0.26	0.16	EEEF1C680AP	(5)	1000
	100	6.3	5.8	D	300	0.26	0.16	EEEF1C101AP	(5)	1000
		6.3	7.7	D8	600	0.16	0.16	EEEFPC101XAP	(5)	900
	150	6.3	7.7	D8	600	0.16	0.16	EEEFPC151XAP	(5)	900
	220	6.3	7.7	D8	600	0.16	0.16	EEEFPC221XAP	(5)	900
		8	6.2	E	500	0.18	0.16	EEEF1C221AP	(6)	1000
	330	8	10.2	F	850	0.08	0.16	EEEF1C331AP	(6)	500
	470	8	10.2	F	850	0.08	0.16	EEEF1C471AP	(6)	500
	680	10	10.2	G	1190	0.06	0.16	EEEF1C681AP	(6)	500
820	10	10.2	(G)	850	0.08	0.16	EEEFPC821UAP	(6)	500	
25	10	4	5.8	B	160	0.85	0.14	EEEF1E100AR	(5)	2000
	22	5	5.8	C	240	0.36	0.14	EEEF1E220AR	(5)	1000
		5	5.8	(C)	240	0.36	0.14	EEEFPE330UAR	(5)	1000
	33	6.3	5.8	D	300	0.26	0.14	EEEF1E330AP	(5)	1000
		6.3	5.8	D	300	0.26	0.14	EEEF1E470AP	(5)	1000
	68	6.3	5.8	D	300	0.26	0.14	EEEF1E680AP	(5)	1000
	100	6.3	7.7	D8	600	0.16	0.14	EEEFPE101XAP	(5)	900
		8	6.2	E	500	0.18	0.14	EEEF1E101AP	(6)	1000
	150	8	10.2	F	850	0.08	0.14	EEEF1E151AP	(6)	500
	220	8	10.2	F	850	0.08	0.14	EEEF1E221AP	(6)	500
	330	8	10.2	F	850	0.08	0.14	EEEF1E331AP	(6)	500
	470	10	10.2	G	1190	0.06	0.14	EEEF1E471AP	(6)	500
	560	10	10.2	(G)	850	0.08	0.14	EEEFPE561UAP	(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

The taping dimensions are explained on p.195 of our Catalog. Please use it as a reference guide.

Reflow Profile(Fig-1 to Fig-11) listed on p.193 of our Catalog.

### High temperature Lead-Free reflow Products

Endurance : 105 °C 2000 h

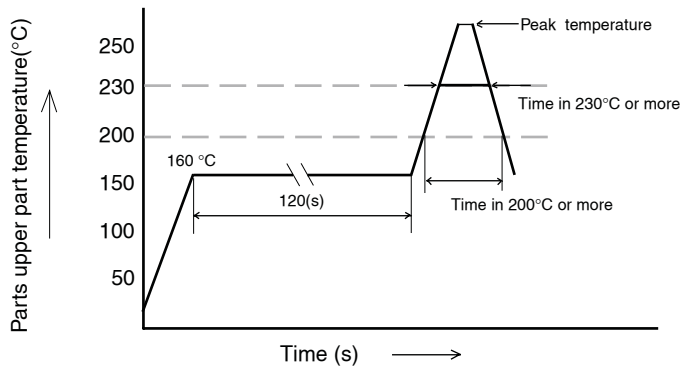
W.V.	Cap. (±20 %)	Case size			Specification			Part No. (RoHS:compliant)	Reflow	Min. Packaging Q'ty
		Dia.	Length	*Size Code	Ripple Current (100 kHz) (+105 °C) (mA r.m.s.)	E.S.R. (100 kHz) (+20 °C) (Ω)	tan δ (120 Hz) (+20 °C)			Taping  (pcs.)
(V)	(μF)	(mm)	(mm)							
35	10	4	5.8	(B)	160	0.85	0.12	EEEFV100UAR	(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	

\* 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

### Reflow guaranteed condition

#### ● RoHS compliant



### High temperature Lead-Free reflow

Reflow No.	Fig. (5)	Fig. (6)	
Category	φ4 to φ6.3	φ8 to φ10	
Peak temperature	260 °C (255 °C)	245 °C	260 °C
Time in peak temperature	≥250 °C 5 s (10 s)	≥240 °C 10 s	≥250 °C 5 s
Time in (*1) °C or more	≥230 °C 30 s	≥230 °C 30 s	≥230 °C 30 s
	≥217 °C 40 s	≥217 °C 40 s	≥217 °C 40 s
	≥200 °C 70 s	≥200 °C 70 s	≥200 °C 70 s
Time in 200 °C or more	70 s	70 s	70 s
Time of reflow	2 times	2 times	1 time

\* For reflow, use a thermal condition system such as infrared radiation (IR) or hot blast.

\* Vapor heat transfer systems (VPS) are not recommended.