

Surface Mount Type

FP series **V** type

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



Features

- Endurance : 105 °C 2000 h
- Low ESR (30 % to 50 % less than FK series)
- Vibration-proof product (30G guaranteed) is available upon request ($\phi 6.3 \leq$)
- AEC-Q200 compliant
- RoHS compliant

Specifications

Category temp. range	-55 °C to +105 °C							
Rated voltage range	6.3 V to 50 V							
Capacitance range	10 µF to 1800 µF							
Capacitance tolerance	±20 % (120 Hz / +20 °C)							
Leakage current	I ≤ 0.01 CV or 3 (µA) After 2 minutes (Whichever is greater)							
Dissipation factor (tan δ)	Please see the attached characteristics list							
Characteristics at low temperature	Rated voltage (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 for 2000 hours at +105 °C ± 2 °C and then being stabilized at +20 °C, capacitors shall meet the following limits.							
	Capacitance change		Within ±30 % of the initial value					
	Dissipation factor (tan δ)		≤ 200 % of the initial limit					
	Leakage current		Within the initial limit					
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		Within ±10 % of the initial value					
	Dissipation factor (tan δ)		Within the initial limit					
	Leakage current		Within the initial limit					

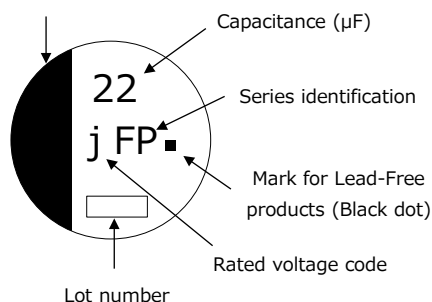
Frequency correction factor for ripple current

Cap. (μ F)	Freq. (Hz)	120	1 k	10 k	100 k to
10 to 470		0.65	0.85	0.95	1.00
560 to 1800		0.70	0.90	0.95	1.00

Marking

Example : 6.3 V 22 μ F
Marking color : BLACK

Negative polarity marking (-)

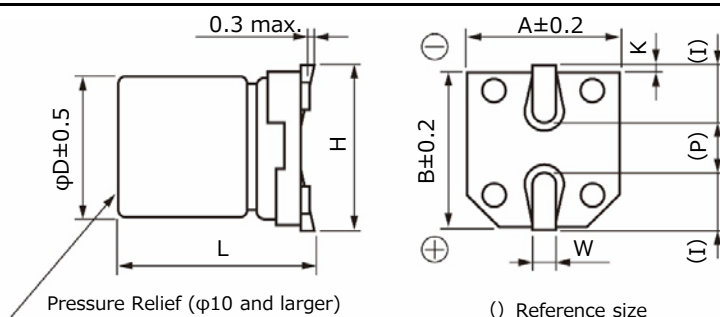


R.voltage code

Unit : V

j	6.3	E	25
A	10	V	35
C	16	H	50

Dimensions



Unit : mm

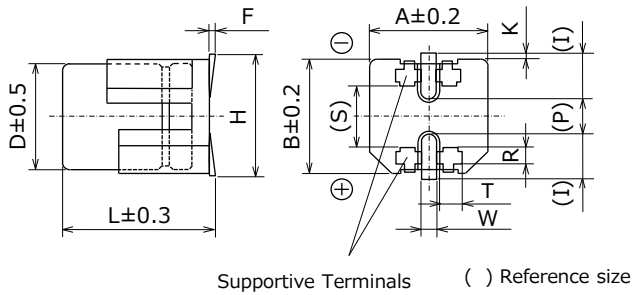
Size code	ϕD	L	A, B	H	I	W	P	K
B	4.0	5.8 $\pm$ 0.3	4.3	5.5 max.	1.8	0.65 $\pm$ 0.1	1.0	0.35 $^{+0.15}_{-0.20}$
C	5.0	5.8 $\pm$ 0.3	5.3	6.5 max.	2.2	0.65 $\pm$ 0.1	1.5	0.35 $^{+0.15}_{-0.20}$
D	6.3	5.8 $\pm$ 0.3	6.6	7.8 max.	2.6	0.65 $\pm$ 0.1	1.8	0.35 $^{+0.15}_{-0.20}$
D8	6.3	7.7 $\pm$ 0.3	6.6	7.8 max.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

*The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Dimensions (Vibration-proof products)

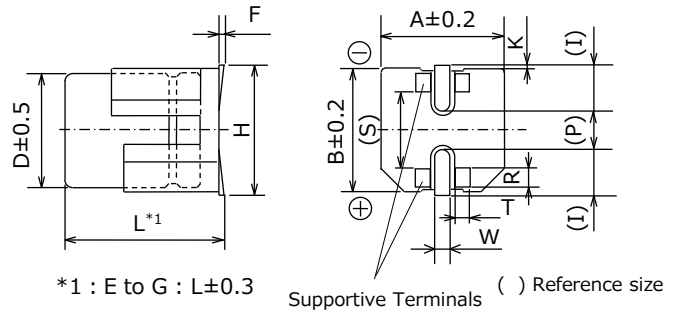
* The size and shape are different from standard products. Please inquire details of our company.

< Size code : D, D8 >



Supportive Terminals () Reference size

< Size code : E, F, G, H13, J16, K16, K21 >



*1 : E to G : L±0.3
H13 to K21 : L±0.5

Supportive Terminals () Reference size

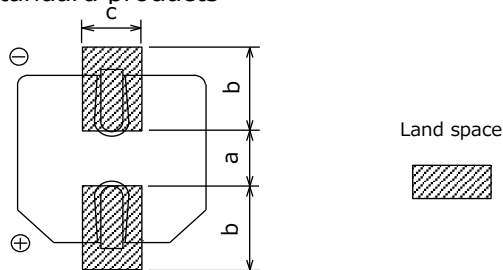
Unit : mm

Size code	φD	L	A, B	H max.	F	I	W	P	K	R	S	T
D	6.3	6.1	6.6	7.8	0 to +0.15	2.4	0.65±0.1	2.2	0.35 ^{+0.15/-0.20}	1.1±0.2	3.3	1.05±0.2
D8	6.3	8.0	6.6	7.8	0 to +0.15	2.4	0.65±0.1	2.2	0.35 ^{+0.15/-0.20}	1.1±0.2	3.3	1.05±0.2
E	8.0	6.5	8.3	9.5	0 to +0.15	3.4	0.7±0.1	2.2	0.35 ^{+0.15/-0.20}	0.70±0.2	5.3	1.7±0.2
F	8.0	10.5	8.3	10.0	0 to +0.15	3.4	1.2±0.2	3.1	0.70±0.2	0.70±0.2	5.3	1.3±0.2
G	10.0	10.5	10.3	12.0	0 to +0.15	3.5	1.2±0.2	4.6	0.70±0.2	0.70±0.2	6.9	1.3±0.2
H13	12.5	13.8	13.5	15.0	-0.1 to +0.15	4.7	1.2±0.2	4.4	0.70±0.3	2.2±0.2	7.1	2.4±0.2
J16	16.0	16.8	17.0	19.0	-0.1 to +0.15	5.5	1.4±0.2	6.7	0.70±0.3	3.0±0.2	9.0	1.9±0.2
K16	18.0	16.8	19.0	21.0	-0.1 to +0.15	6.7	1.4±0.2	6.7	0.70±0.3	3.0±0.2	11.0	1.9±0.2
K21	18.0	21.8	19.0	21.0	-0.1 to +0.15	6.7	1.4±0.2	6.7	0.70±0.3	3.0±0.2	11.0	1.9±0.2

Land / Pad pattern

The circuit board land/pad pattern size for chip capacitors is specified in the following table.
The land pitch influences installation strength and consider it.

● Standard products

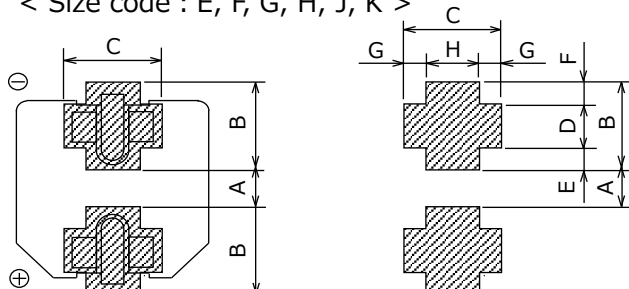


● Vibration-proof products

< Size code : D, D8 >



< Size code : E, F, G, H, J, K >



(Table of board land size vs. capacitor size)

Unit : mm

Size code	a	b	c
B (φ4)	1.0	2.5	1.6
C (φ5)	1.5	2.8	1.6
D (φ6.3)	1.8	3.2	1.6
D8 (φ6.3x7.7L)	1.8	3.2	1.6
E (φ8x6.2L)	2.2	4.0	1.6
F (φ8x10.2L)	3.1	4.0	2.0
G (φ10x10.2L)	4.6	4.1	2.0
H (φ12.5)	4.0	5.7	2.0
J (φ16)	6.0	6.5	2.5
K (φ18)	6.0	7.5	2.5

When size "a" is wide, back fillet can be made, decreasing fitting strength.

(Table of board land size vs. capacitor size)

Unit : mm

Size code	A	B	C	D	E	F	G	H
D (φ6.3xL6.1)	1.2	3.6	3.2	2.0	0.95	0.65	1.0	1.2
D8 (φ6.3xL8.0)	1.2	3.6	3.2	2.0	0.95	0.65	1.0	1.2
E (φ8x6.5L)	1.8	4.2	5.0	1.3	1.5	1.4	1.5	2.0
F (φ8x10.5L)	2.7	4.0	4.7	1.3	1.0	1.7	1.1	2.5
G (φ10)	3.9	4.4	4.7	1.3	1.2	1.9	1.1	2.5
H (φ12.5)	3.9	6.0	6.9	2.8	1.3	1.9	2.2	2.5
J (φ16)	5.8	6.8	6.2	3.6	1.3	1.9	1.7	2.8
K (φ18)	5.8	7.3	6.2	3.6	1.8	1.9	1.7	2.8

When size "A" is wide, back fillet can be made, decreasing fitting strength.

* Take mounting conditions, solderability and fitting strength into consideration when selecting parts for your company's design.

* The vibration-proof capacitors of size φ6.3 has support terminals extending from the bottom side to the lead edge. Then, make sure to find appropriate soldering conditions to form fillet on the support terminals if required for appearance inspection.

Characteristics list

Endurance : 105 °C 2000 h

Rated voltage (V)	Capacitance (±20 %) (μF)	Case size (mm)			Size code *1	Specification			Part No.		Reflow	Min. Packaging Q'ty
		φD	L			Ripple current *2 (mA rms)	ESR *3 (Ω)	tan δ *4	Standard Product	Vibration-proof product		Taping (pcs)
			Standard	Vibration -proof								
6.3	22	4.0	5.8	—	B	160	0.85	0.26	EEEFPOJ220AR	—	(5)	2000
	47	4.0	5.8	—	(B)	160	0.85	0.26	EEEFPJ470UAR	—	(5)	2000
		5.0	5.8	—	C	240	0.36	0.26	EEEFPOJ470AR	—	(5)	1000
	100	5.0	5.8	—	(C)	240	0.36	0.26	EEEFPJ101UAR	—	(5)	1000
		6.3	5.8	6.1	D	300	0.26	0.26	EEEFPOJ101AP	EEEFPOJ101AV	(5)	1000
	220	6.3	5.8	6.1	D	300	0.26	0.26	EEEFPOJ221AP	EEEFPOJ221AV	(5)	1000
	330	6.3	7.7	8.0	D8	600	0.16	0.26	EEEFPJ331XAP	EEEFPJ331XAV	(5)	900
		8.0	6.2	6.5	E	500	0.18	0.26	EEEFPOJ331AP	EEEFPOJ331AV	(6)	1000
	470	8.0	10.2	10.5	F	850	0.08	0.26	EEEFPOJ471AP	EEEFPOJ471AV	(6)	500
	1000	8.0	10.2	10.5	F	850	0.08	0.26	EEEFPOJ102AP	EEEFPOJ102AV	(6)	500
1500	10.0	10.2	10.5	G	1190	0.06	0.26	EEEFPOJ152AP	EEEFPOJ152AV	(6)	500	
1800	10.0	10.2	10.5	(G)	850	0.08	0.26	EEEFPJ182UAP	EEEFPJ182UAV	(6)	500	
10	22	4.0	5.8	—	B	160	0.85	0.19	EEEFPA220AR	—	(5)	2000
	33	4.0	5.8	—	(B)	160	0.85	0.19	EEEFPA330UAR	—	(5)	2000
		5.0	5.8	—	C	240	0.36	0.19	EEEFPA330AR	—	(5)	1000
	150	6.3	5.8	6.1	D	300	0.26	0.19	EEEFPA1A151AP	EEEFPA1A151AV	(5)	1000
	220	6.3	7.7	8.0	D8	600	0.16	0.19	EEEFPA221XAP	EEEFPA221XAV	(5)	900
		8.0	6.2	6.5	E	500	0.18	0.19	EEEFPA221AP	EEEFPA221AV	(6)	1000
	330	8.0	10.2	10.5	F	850	0.08	0.19	EEEFPA331AP	EEEFPA331AV	(6)	500
	470	8.0	10.2	10.5	F	850	0.08	0.19	EEEFPA471AP	EEEFPA471AV	(6)	500
	680	8.0	10.2	10.5	F	850	0.08	0.19	EEEFPA681AP	EEEFPA681AV	(6)	500
	1000	10.0	10.2	10.5	G	1190	0.06	0.19	EEEFPA1A102AP	EEEFPA1A102AV	(6)	500
1200	10.0	10.2	10.5	(G)	850	0.08	0.19	EEEFPA122UAP	EEEFPA122UAV	(6)	500	
16	10	4.0	5.8	—	B	160	0.85	0.16	EEEFPC100AR	—	(5)	2000
	22	4.0	5.8	—	(B)	160	0.85	0.16	EEEFPC220UAR	—	(5)	2000
		5.0	5.8	—	C	240	0.36	0.16	EEEFPC220AR	—	(5)	1000
	47	5.0	5.8	—	(C)	240	0.36	0.16	EEEFPC470UAR	—	(5)	1000
		6.3	5.8	6.1	D	300	0.26	0.16	EEEFPC470AP	EEEFPC470AV	(5)	1000
	68	6.3	5.8	6.1	D	300	0.26	0.16	EEEFPC680AP	EEEFPC680AV	(5)	1000
	100	6.3	5.8	6.1	D	300	0.26	0.16	EEEFPC101AP	EEEFPC101AV	(5)	1000
		6.3	7.7	8.0	D8	600	0.16	0.16	EEEFPC101XAP	EEEFPC101XAV	(5)	900
	150	6.3	7.7	8.0	D8	600	0.16	0.16	EEEFPC151XAP	EEEFPC151XAV	(5)	900
	220	6.3	7.7	8.0	D8	600	0.16	0.16	EEEFPC221XAP	EEEFPC221XAV	(5)	900
8.0		6.2	6.5	E	500	0.18	0.16	EEEFPC221AP	EEEFPC221AV	(6)	1000	
330	8.0	10.2	10.5	F	850	0.08	0.16	EEEFPC331AP	EEEFPC331AV	(6)	500	
470	8.0	10.2	10.5	F	850	0.08	0.16	EEEFPC471AP	EEEFPC471AV	(6)	500	
680	10.0	10.2	10.5	G	1190	0.06	0.16	EEEFPC681AP	EEEFPC681AV	(6)	500	
820	10.0	10.2	10.5	(G)	850	0.08	0.16	EEEFPC821UAP	EEEFPC821UAV	(6)	500	
25	10	4.0	5.8	—	B	160	0.85	0.14	EEEFPE100AR	—	(5)	2000
	22	5.0	5.8	—	C	240	0.36	0.14	EEEFPE220AR	—	(5)	1000
	33	5.0	5.8	—	(C)	240	0.36	0.14	EEEFPE330UAR	—	(5)	1000
		6.3	5.8	6.1	D	300	0.26	0.14	EEEFPE330AP	EEEFPE330AV	(5)	1000
	47	6.3	5.8	6.1	D	300	0.26	0.14	EEEFPE470AP	EEEFPE470AV	(5)	1000
	68	6.3	5.8	6.1	D	300	0.26	0.14	EEEFPE680AP	EEEFPE680AV	(5)	1000
	100	6.3	7.7	8.0	D8	600	0.16	0.14	EEEFPE101XAP	EEEFPE101XAV	(5)	900
		8.0	6.2	6.5	E	500	0.18	0.14	EEEFPE101AP	EEEFPE101AV	(6)	1000
	150	8.0	10.2	10.5	F	850	0.08	0.14	EEEFPE151AP	EEEFPE151AV	(6)	500
	220	8.0	10.2	10.5	F	850	0.08	0.14	EEEFPE221AP	EEEFPE221AV	(6)	500
330	8.0	10.2	10.5	F	850	0.08	0.14	EEEFPE331AP	EEEFPE331AV	(6)	500	
470	10.0	10.2	10.5	G	1190	0.06	0.14	EEEFPE471AP	EEEFPE471AV	(6)	500	
560	10.0	10.2	10.5	(G)	850	0.08	0.14	EEEFPE561UAP	EEEFPE561UAV	(6)	500	

*1: Size code (): Miniaturization product

*2: Ripple current (100 kHz / +105 °C)

*3: ESR (100 kHz / +20 °C)

*4: tan δ (120 Hz / +20 °C)

• If Part number exceeds 12 digits, voltage code is abbreviated as follows; 0J → J, 1A → A, 1C → C, 1E → E

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