

### Surface Mount Type

Series: **FT** Type: **V**

High temperature Lead-Free reflow



#### Features

- Endurance : 105 °C 2000 h to 5000 h
- Miniaturized, Low ESR (1 size smaller than series FK)
- Vibration-proof productt (30G guaranteed) is available upon request ( $\phi 6.3 \leq$ )
- RoHS compliant

#### Specifications

Category temp. range	-55 °C to +105 °C	
Rated voltage range	6.3 V.DC to 50 V.DC	
Capacitance range	10 $\mu$ F to 2200 $\mu$ F	
Capacitance tolerance	$\pm 20$ % (120 Hz / +20 °C)	
Leakage current	$I \leq 0.01 CV$ ( $\mu$ A) After 2 minutes	
Dissipation factor (tan $\delta$ )	Please see the attached characteristics list	
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. (Suffix "G" in 6.3 V.DC : 3000 hours, 10 V.DC to 50 V.DC : 5000 hours)	
	Capacitance change	Within $\pm 30$ % of the initial value (Suffix "G" is $\pm 35$ %)
	Dissipation factor (tan $\delta$ )	$\leq 200$ % of the initial limit (Suffix "G" is $\leq 300$ %)
	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, capacitors shall meet the following limits.	
	Capacitance change	Within $\pm 10$ % of the initial value
	Dissipation factor (tan $\delta$ )	Within the initial limit
	Leakage current	Within the initial limit
AEC-Q200	AEC-Q200 compliant	

#### Frequency correction factor for ripple current

Cap. ( $\mu$ F)	Freq. (Hz)	120	1 k	10 k	100 k to
10 to 470		0.65	0.85	0.95	1.00
	560 to 2200	0.70	0.90	0.95	1.00

#### Marking

Example : 25 V.DC 22  $\mu$ F  
Marking color : BLACK

R.voltage code		Unit : V.DC	
j	6.3	E	25
A	10	V	35
C	16	H	50

#### Dimensions

(I) Reference size

Unit : mm

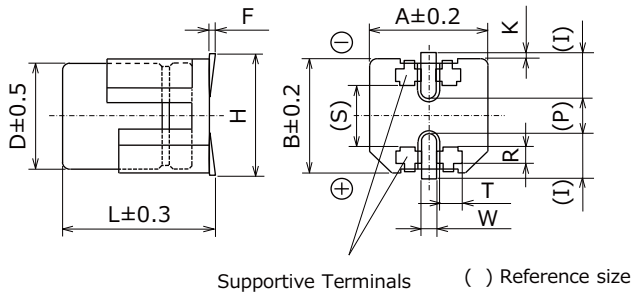
Size code	$\phi D$	L	A, B	H	I	W	P	K
B	4.0	5.8 $\pm$ 0.3	4.3	5.5 max.	1.8	0.65 $\pm$ 0.1	1.0	0.35 <sup>+0.15</sup> <sub>-0.20</sub>
C	5.0	5.8 $\pm$ 0.3	5.3	6.5 max.	2.2	0.65 $\pm$ 0.1	1.5	0.35 <sup>+0.15</sup> <sub>-0.20</sub>
D	6.3	5.8 $\pm$ 0.3	6.6	7.8 max.	2.6	0.65 $\pm$ 0.1	1.8	0.35 <sup>+0.15</sup> <sub>-0.20</sub>
D8	6.3	7.7 $\pm$ 0.3	6.6	7.8 max.	2.6	0.65 $\pm$ 0.1	1.8	0.35 <sup>+0.15</sup> <sub>-0.20</sub>
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.

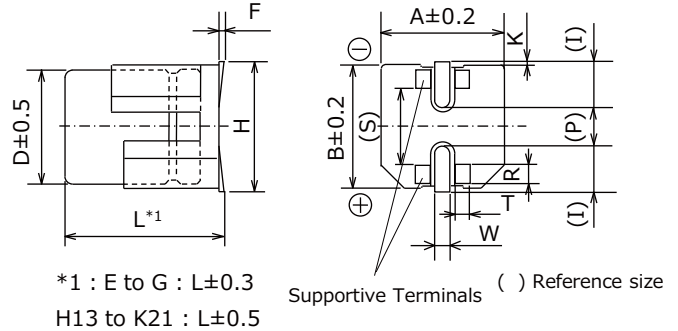
### Dimensions (Vibration-proof products)

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

< Size code : D, D8 >



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



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

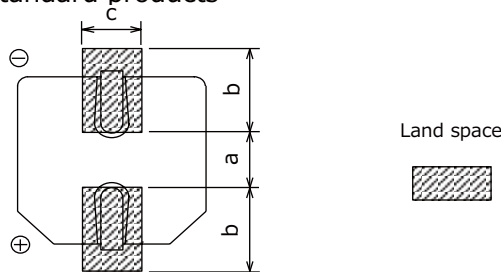
Unit : mm

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 <sup>+0.15</sup> <sub>-0.20</sub>	1.1±0.2	3.3±0.2	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 <sup>+0.15</sup> <sub>-0.20</sub>	1.1±0.2	3.3±0.2	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 <sup>+0.15</sup> <sub>-0.20</sub>	0.70±0.2	5.3±0.2	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±0.2	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±0.2	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±0.2	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±0.2	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±0.2	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±0.2	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



(Table of board land size vs. capacitor size)

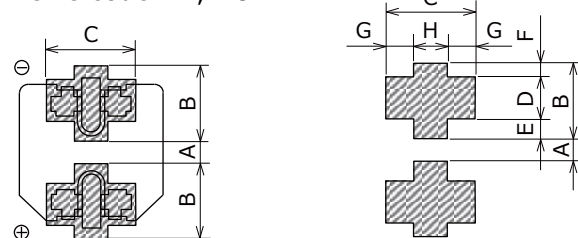
Size code	a	b	c
B (φ4)	1.0	2.5	1.6
C (φ5)	1.5	2.8	1.6
D (φ6.3)	1.8	3.2	1.6
D8 (φ6.3x7.7L)	1.8	3.2	1.6
E (φ8x6.2L)	2.2	4.0	1.6
F (φ8x10.2L)	3.1	4.0	2.0
G (φ10x10.2L)	4.6	4.1	2.0
H (φ12.5)	4.0	5.7	2.0
J (φ16)	6.0	6.5	2.5
K (φ18)	6.0	7.5	2.5

Unit : mm

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

#### ● Vibration-proof products

< Size code : D, D8 >



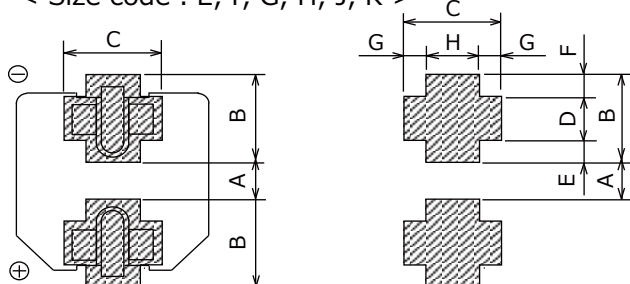
(Table of board land size vs. capacitor size)

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

Unit : mm

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

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



\* 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 volt. (V.DC)	Cap. (±20 %) (μF)	Case size (mm)			Size code *1	Specification			Part No.		Reflow	Min. Packaging Q'ty
		φD	L			Ripple current *2 (mA r.m.s.)	ESR *3 (Ω)	tan δ *4	Standard	Vibration-proof		
			Standard	Vibration-proof								
6.3	100	4	5.8	—	B	160	0.85	0.26	EEEFT0J101AR	—	(5)	2000
	220	5	5.8	—	C	240	0.36	0.26	EEEFT0J221AR	—	(5)	1000
	330	6.3	5.8	6.1	D	300	0.26	0.26	EEEFT0J331AP	EEEFT0J331AV	(5)	1000
	470	6.3	7.7	8.0	D8	600	0.16	0.26	EEEFTJ471XAP	EEEFTJ471XAV	(5)	900
	680	6.3	7.7	8.0	D8	600	0.16	0.26	EEEFTJ681XAP	EEEFTJ681XAV	(5)	900
	1500	8	10.2	10.5	F	850	0.08	0.26	EEEFT0J152AP	EEEFT0J152AV	(6)	500
	2200	10	10.2	10.5	G	1190	0.06	0.28	EEEFT0J222AP	EEEFT0J222AV	(6)	500
10	68	4	5.8	—	B	160	0.85	0.19	EEEFT1A680AR	—	(5)	2000
	150	5	5.8	—	C	240	0.36	0.19	EEEFT1A151AR	—	(5)	1000
	220	6.3	5.8	6.1	D	300	0.26	0.19	EEEFT1A221AP	EEEFT1A221AV	(5)	1000
	330	6.3	7.7	8.0	D8	600	0.16	0.19	EEEF1A331XAP	EEEF1A331XAV	(5)	900
	470	6.3	7.7	8.0	D8	600	0.16	0.19	EEEF1A471XAP	EEEF1A471XAV	(5)	900
	1000	8	10.2	10.5	F	850	0.08	0.19	EEEF1A102AP	EEEF1A102AV	(6)	500
16	1500	10	10.2	10.5	G	1190	0.06	0.19	EEEF1A152AP	EEEF1A152AV	(6)	500
	47	4	5.8	—	B	160	0.85	0.16	EEEFT1C470AR	—	(5)	2000
	68	5	5.8	—	C	240	0.36	0.16	EEEFT1C680AR	—	(5)	1000
	100	5	5.8	—	C	240	0.36	0.16	EEEFT1C101AR	—	(5)	1000
	150	6.3	5.8	6.1	D	300	0.26	0.16	EEEFT1C151AP	EEEFT1C151AV	(5)	1000
	220	6.3	5.8	6.1	D	300	0.26	0.16	EEEFT1C221AP	EEEFT1C221AV	(5)	1000
	330	6.3	7.7	8.0	D8	600	0.16	0.16	EEEF1C331XAP	EEEF1C331XAV	(5)	900
	680	8	10.2	10.5	F	850	0.08	0.16	EEEFT1C681AP	EEEFT1C681AV	(6)	500
	820	8	10.2	10.5	F	850	0.08	0.16	EEEFT1C821UP	EEEFT1C821UV	(6)	500
	1000	10	10.2	10.5	G	1190	0.06	0.16	EEEFT1C102AP	EEEFT1C102AV	(6)	500
25	1200	10	10.2	10.5	G	1190	0.06	0.16	EEEFT1C122UP	EEEFT1C122UV	(6)	500
	22	4	5.8	—	B	160	0.85	0.14	EEEFT1E220AR	—	(5)	2000
	33	4	5.8	—	B	160	0.85	0.14	EEEFT1E330AR	—	(5)	2000
	47	5	5.8	—	C	240	0.36	0.14	EEEFT1E470AR	—	(5)	1000
	68	5	5.8	—	C	240	0.36	0.14	EEEFT1E680AR	—	(5)	1000
	100	6.3	5.8	6.1	D	300	0.26	0.14	EEEFT1E101AP	EEEFT1E101AV	(5)	1000
	150	6.3	7.7	8.0	D8	600	0.16	0.14	EEEF1E151XAP	EEEF1E151XAV	(5)	900
	220	6.3	7.7	8.0	D8	600	0.16	0.14	EEEF1E221XAP	EEEF1E221XAV	(5)	900
	470	8	10.2	10.5	F	850	0.08	0.14	EEEFT1E471AP	EEEFT1E471AV	(6)	500
	560	8	10.2	10.5	F	850	0.08	0.14	EEEFT1E561UP	EEEFT1E561UV	(6)	500
35	820	10	10.2	10.5	G	1190	0.06	0.14	EEEFT1E821AP	EEEFT1E821AV	(6)	500
	1000	10	10.2	10.5	G	1190	0.06	0.14	EEEFT1E102UP	EEEFT1E102UV	(6)	500
	22	4	5.8	—	B	160	0.85	0.12	EEEFT1V220AR	—	(5)	2000
	33	5	5.8	—	C	240	0.36	0.12	EEEFT1V330AR	—	(5)	1000
	47	5	5.8	—	C	240	0.36	0.12	EEEFT1V470AR	—	(5)	1000
	68	6.3	5.8	6.1	D	300	0.26	0.12	EEEFT1V680AP	EEEFT1V680AV	(5)	1000
	100	6.3	5.8	6.1	D	300	0.26	0.12	EEEFT1V101AP	EEEFT1V101AV	(5)	1000
	150	6.3	7.7	8.0	D8	600	0.16	0.12	EEEF1V151XAP	EEEF1V151XAV	(5)	900
	330	8	10.2	10.5	F	850	0.08	0.12	EEEFT1V331AP	EEEFT1V331AV	(6)	500
	390	8	10.2	10.5	F	850	0.08	0.12	EEEFT1V391UP	EEEFT1V391UV	(6)	500
50	560	10	10.2	10.5	G	1190	0.06	0.12	EEEFT1V561AP	EEEFT1V561AV	(6)	500
	680	10	10.2	10.5	G	1190	0.06	0.12	EEEFT1V681UP	EEEFT1V681UV	(6)	500
	10	4	5.8	—	(B)	85	2.30	0.10	EEEF1H100UAR	—	(5)	2000
	22	5	5.8	—	C	165	0.88	0.10	EEEF1H100AR	—	(5)	1000
	22	5	5.8	—	C	165	0.88	0.10	EEEF1H220AR	—	(5)	1000
	47	6.3	5.8	6.1	D	195	0.68	0.10	EEEF1H470AP	EEEF1H470AV	(5)	1000
50	100	6.3	7.7	8.0	D8	350	0.34	0.10	EEEF1H101XAP	EEEF1H101XAV	(5)	900
	220	8	10.2	10.5	F	670	0.18	0.10	EEEF1H221AP	EEEF1H221AV	(6)	500
	330	10	10.2	10.5	G	900	0.12	0.10	EEEF1H331AP	EEEF1H331AV	(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, 1V → V, 1H → H
- Please refer to the page of "Reflow Profile" and "The Taping Dimensions".

### Characteristics list

Endurance : 105 °C 5000 h (6.3 V.DC : 105 °C 3000 h)

Rated volt. (V.DC)	Cap. (±20 %) (μF)	Case size (mm)			Size code	Specification			Part No.		Reflow	Min. Packaging Qty
		φD	L			Ripple current *1 (mA r.m.s.)	ESR *2 (Ω)	tan δ *3	Standard	Vibration-proof		Taping (pcs)
			Standard	Vibration-proof								
6.3	1500	8	10.2	10.5	F	850	0.08	0.26	EEEFT0J152GP	EEEFT0J152GV	(6)	500
	2200	10	10.2	10.5	G	1190	0.06	0.28	EEEFT0J222GP	EEEFT0J222GV	(6)	500
10	1000	8	10.2	10.5	F	850	0.08	0.19	EEEFT1A102GP	EEEFT1A102GV	(6)	500
	1500	10	10.2	10.5	G	1190	0.06	0.19	EEEFT1A152GP	EEEFT1A152GV	(6)	500
16	680	8	10.2	10.5	F	850	0.08	0.16	EEEFT1C681GP	EEEFT1C681GV	(6)	500
	1000	10	10.2	10.5	G	1190	0.06	0.16	EEEFT1C102GP	EEEFT1C102GV	(6)	500
25	470	8	10.2	10.5	F	850	0.08	0.14	EEEFT1E471GP	EEEFT1E471GV	(6)	500
	820	10	10.2	10.5	G	1190	0.06	0.14	EEEFT1E821GP	EEEFT1E821GV	(6)	500
35	330	8	10.2	10.5	F	850	0.08	0.12	EEEFT1V331GP	EEEFT1V331GV	(6)	500
	560	10	10.2	10.5	G	1190	0.06	0.12	EEEFT1V561GP	EEEFT1V561GV	(6)	500
50	220	8	10.2	10.5	F	670	0.18	0.10	EEEFT1H221GP	EEEFT1H221GV	(6)	500
	330	10	10.2	10.5	G	900	0.12	0.10	EEEFT1H331GP	EEEFT1H331GV	(6)	500

\*1: Ripple current (100 kHz / +105 °C)

\*2: ESR (100 kHz / +20 °C)

\*3: tan δ (120 Hz / +20 °C)

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

## Guidelines and precautions regarding the technical information and use of our products described in this online catalog.

- If you want to use our products described in this online catalog for applications requiring special qualities or reliability, or for applications where the failure or malfunction of the products may directly jeopardize human life or potentially cause personal injury (e.g. aircraft and aerospace equipment, traffic and transportation equipment, combustion equipment, medical equipment, accident prevention, anti-crime equipment, and/or safety equipment), it is necessary to verify whether the specifications of our products fit to such applications. Please ensure that you will ask and check with our inquiry desk as to whether the specifications of our products fit to such applications use before you use our products.
- The quality and performance of our products as described in this online catalog only apply to our products when used in isolation. Therefore, please ensure you evaluate and verify our products under the specific circumstances in which our products are assembled in your own products and in which our products will actually be used.
- If you use our products in equipment that requires a high degree of reliability, regardless of the application, it is recommended that you set up protection circuits and redundancy circuits in order to ensure safety of your equipment.
- The products and product specifications described in this online catalog are subject to change for improvement without prior notice. Therefore, please be sure to request and confirm the latest product specifications which explain the specifications of our products in detail, before you finalize the design of your applications, purchase, or use our products.
- The technical information in this online catalog provides examples of our products' typical operations and application circuits. We do not guarantee the non-infringement of third party's intellectual property rights and we do not grant any license, right, or interest in our intellectual property.
- If any of our products, product specifications and/or technical information in this online catalog is to be exported or provided to non-residents, the laws and regulations of the exporting country, especially with regard to security and export control, shall be observed.

## <Regarding the Certificate of Compliance with the EU RoHS Directive/REACH Regulations>

- The switchover date for compliance with the RoHS Directive/REACH Regulations varies depending on the part number or series of our products.
- When you use the inventory of our products for which it is unclear whether those products are compliant with the RoHS Directive/REACH Regulation, please select "Sales Inquiry" in the website inquiry form and contact us.

**We do not take any responsibility for the use of our products outside the scope of the specifications, descriptions, guidelines and precautions described in this online catalog.**

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