

### Surface Mount Type

Series: **TC** Type: **V**

High temperature Lead-Free reflow



#### Features

- Endurance: 125 °C 3000 h (D8 size: 2000 h)
- High ripple current (50 % higher than TP series)
- Added ESR specification after the endurance test
- Vibration-proof product (30G guaranteed) is available upon request ( $\phi 6.3 \leq$ )
- RoHS compliant

#### Specifications

Category temp. range	-40 °C to +125 °C			
Rated voltage range	10 V.DC to 35 V.DC			
Capacitance range	47 $\mu$ F to 470 $\mu$ 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 3000 hours (D8 : 2000 h) at +125 °C $\pm$ 2 °C and then being stabilized at +20 °C, capacitors shall meet the following limits.			
	Capacitance change	Within $\pm 30$ % of the initial value		
	Dissipation factor (tan $\delta$ )	$\leq 300$ % of the initial limit		
	Leakage current	Within the initial limit		
ESR after endurance ( $\Omega/100$ kHz)	Size code	D8	F	G
	Initial (20 °C)	0.45	0.20	0.15
	After 2000 h (-40 °C)	40	4.5	3.5
Shelf life	After storage for 1000 hours at +125 °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

Frequency (Hz)	120	1 k	10 k	100 k to
Correction factor	0.65	0.85	0.95	1.00

#### Marking

Example : 10 V.DC 220  $\mu$ F  
Marking color : BLACK

R.voltage code		Unit : V.DC	
A	10	E	25
C	16	V	35

#### Dimensions

Size code	$\phi D$	L	A, B	H	I	W	P	K
D8	6.3	7.7 $\pm$ 0.3	6.6	7.8 max.	2.6	0.65 $\pm$ 0.2	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

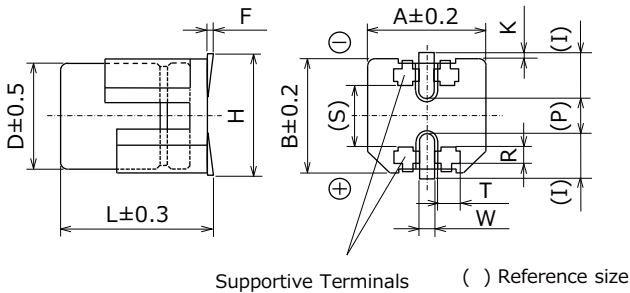
Unit : mm

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

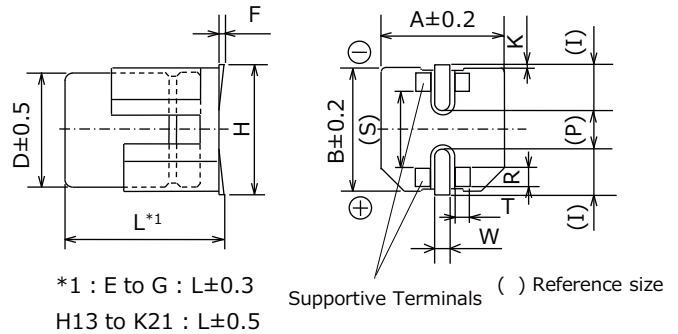
### Dimensions (Vibration-proof products)

\* 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

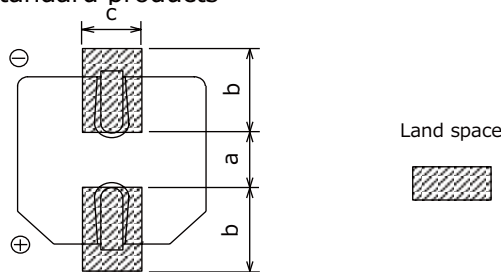
Unit : mm

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)

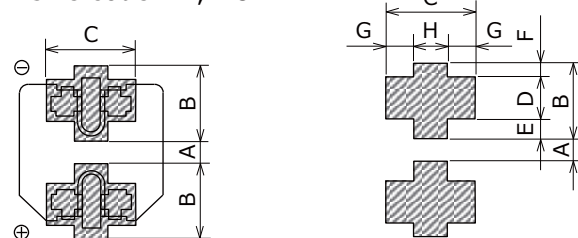
Size code	a	b	c
B (φ4)	1.0	2.5	1.6
C (φ5)	1.5	2.8	1.6
D (φ6.3)	1.8	3.2	1.6
D8 (φ6.3x7.7L)	1.8	3.2	1.6
E (φ8x6.2L)	2.2	4.0	1.6
F (φ8x10.2L)	3.1	4.0	2.0
G (φ10x10.2L)	4.6	4.1	2.0
H (φ12.5)	4.0	5.7	2.0
J (φ16)	6.0	6.5	2.5
K (φ18)	6.0	7.5	2.5

Unit : mm

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

#### ● Vibration-proof products

< Size code : D, D8 >



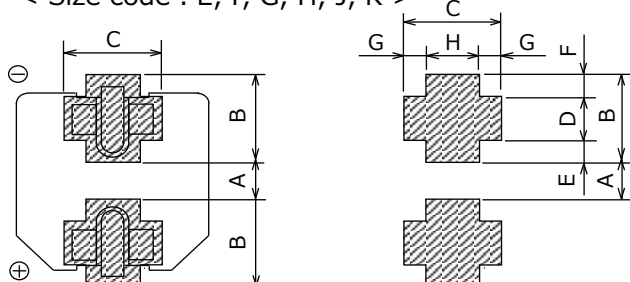
(Table of board land size vs. capacitor size)

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 : 125 °C 3000 h (D8 size : 2000 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 (100 kHz) (Ω)		tan δ*2	Standard	Vibration-proof		
			Standard	Vibration-proof			+20 °C	-40 °C					
10	220	8	10.2	10.5	F	410	0.20	3	0.30	EEETC1A221P	EEETC1A221V	(8)	500
	330	10	10.2	10.5	G	750	0.15	2	0.30	EEETC1A331P	EEETC1A331V	(8)	500
	470	10	10.2	10.5	G	750	0.15	2	0.30	EEETC1A471P	EEETC1A471V	(8)	500
16	100	6.3	7.7	8.0	D8	300	0.45	5	0.23	EEETC1C101XP	EEETC1C101XV	(8)	900
		8	10.2	10.5	F	410	0.20	3	0.23	EEETC1C101P	EEETC1C101V	(8)	500
	220	8	10.2	10.5	F	410	0.20	3	0.23	EEETC1C221P	EEETC1C221V	(8)	500
	330	10	10.2	10.5	G	750	0.15	2	0.23	EEETC1C331P	EEETC1C331V	(8)	500
	470	10	10.2	10.5	G	750	0.15	2	0.23	EEETC1C471P	EEETC1C471V	(8)	500
25	100	8	10.2	10.5	F	410	0.20	3	0.18	EEETC1E101P	EEETC1E101V	(8)	500
	220	10	10.2	10.5	G	750	0.15	2	0.18	EEETC1E221P	EEETC1E221V	(8)	500
	330	10	10.2	10.5	G	750	0.15	2	0.18	EEETC1E331P	EEETC1E331V	(8)	500
35	47	6.3	7.7	8.0	D8	300	0.45	5	0.16	EEETC1V470XP	EEETC1V470XV	(8)	900
		8	10.2	10.5	F	410	0.20	3	0.16	EEETC1V470P	EEETC1V470V	(8)	500
	100	8	10.2	10.5	F	410	0.20	3	0.16	EEETC1V101P	EEETC1V101V	(8)	500
	220	10	10.2	10.5	G	750	0.15	2	0.16	EEETC1V221P	EEETC1V221V	(8)	500

\*1: Ripple current (100 kHz / +125 °C)

\*2: tan δ (120 Hz / +20 °C)

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

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