

## Surface Mount Type

Series : **TK** Type : **V**



### Features

- Endurance : 125 °C 3000 h
- Low ESR at -40 °C (50 % lower than TG series)
- Added ESR specification after the endurance test
- Vibration-proof product is available upon request.
- RoHS compliant

### Specifications

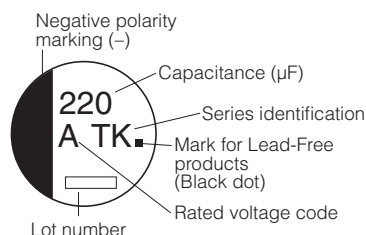
Category temperature range	-40 °C to +125 °C					
Rated voltage range	10 V.DC to 35 V.DC					
Capacitance range	47 μF to 470 μF					
Capacitance tolerance	±20 % (120 Hz/+20 °C)					
Leakage current	$I \leq 0.01 CV$ After 2 minutes					
Dissipation factor (tan δ)	Please see the attached characteristics list					
Characteristics at low temperature	V.DC	10	16	25	35	(Impedance ratio at 120 Hz)
	Z(-25 °C)/Z(+20 °C)	3	2	2	2	
	Z(-40 °C)/Z(+20 °C)	4	3	3	3	
Endurance	After the life test with DC rated working voltage at +125 °C ±2 °C for 3000 hours, the capacitors shall meet the limits specified below.					
	Capacitance change	Within ±30 % of the initial value (code U : ±35 %)				
	tan δ	≤300 % of the initial limit (code U : ±350 %)				
	DC leakage current	Within the initial limit				
Shelf life	After storage for 1000 hours at +125 °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)					
ESR after the life test	After the life test with DC rated working voltage at +125 °C±2 °C for 3000 hours, ESR value shall meet the specified below.					
	After 1000 hours	20 °C	≤ 150 % of the initial limit			
		-40 °C	≤ 200 % of the initial limit			
	After 2000 hours	20 °C	≤ 300 % of the initial limit			
		-40 °C	≤ 400 % of the initial limit			
	After 3000 hours	20 °C	≤ 1000 % of the initial limit			
-40 °C		≤ 1500 % of 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

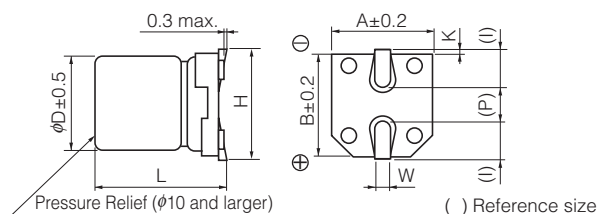
### Marking

Example : 10 V.DC 220 μF  
Marking color : BLACK



R. Voltage (V.DC)	10	16	25	35
Code	A	C	E	V

### Dimensions



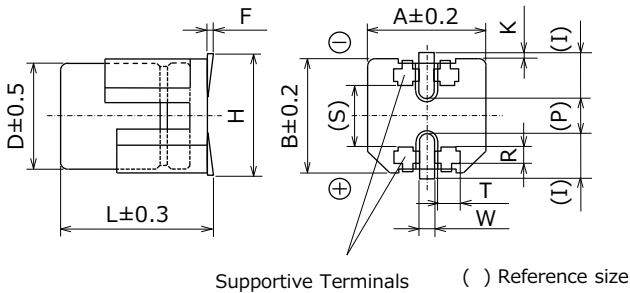
(Unit : mm)

Size code	φD	L	A, B	H	I	W	P	K
F	8.0	10.2±0.3	8.3	10.0 max.	3.4	0.90±0.2	3.1	0.70±0.2
G	10.0	10.2±0.3	10.3	12.0 max.	3.5	0.90±0.2	4.6	0.70±0.2

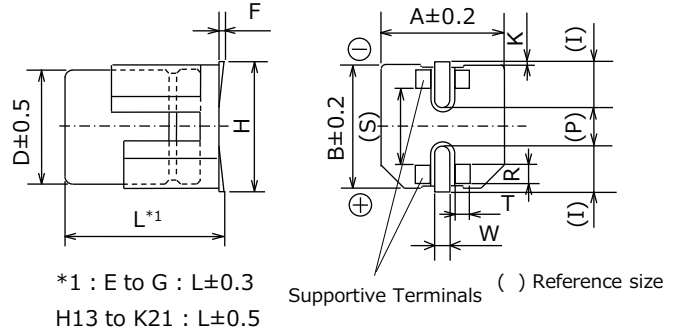
### Dimensions (Vibration-proof products)

\* 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

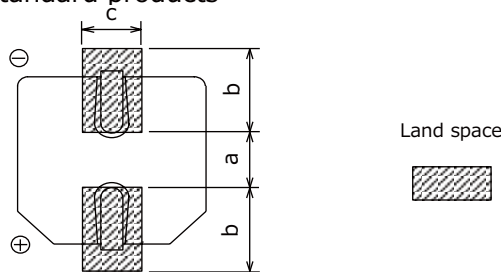
Unit : mm

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

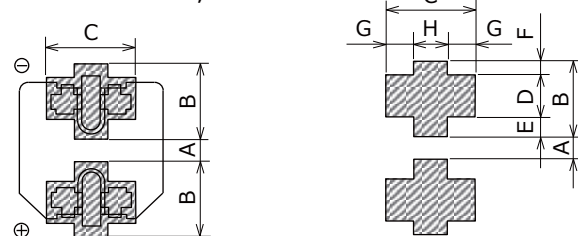
The circuit board land/pad pattern size for chip capacitors is specified in the following table. The land pitch influences installation strength and consider it.

#### ● Standard products

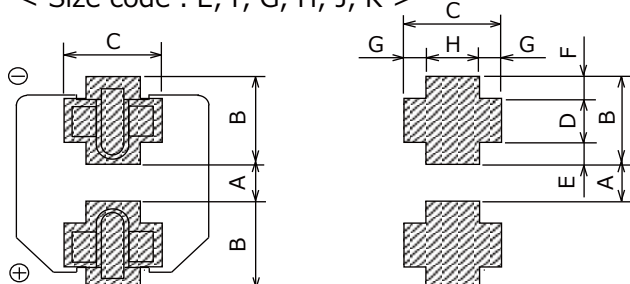


#### ● Vibration-proof products

< Size code : D, D8 >



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



(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

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

(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

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 : 125 °C 3000 h

Rated voltage (V.DC)	Cap. (±20 %) (μF)	Case size (mm)		Size* code	Specification			Part No.	Reflow	Min. Packaging Qty	
		φD	L		Ripple current (100 kHz) (+125 °C) (mA r.m.s.)	ESR (100 kHz) (Ω)				tan δ (120 Hz) (+20 °C)	Taping (pcs)
						+20 °C	-40 °C				
10	220	8	10.2	F	197	0.3	5	0.30	EEETK1A221P	(8)	500
		8	10.2	(F)	197	0.3	5	0.30	EEETK1A331UP	(8)	500
	330	10	10.2	G	270	0.2	3	0.30	EEETK1A331P	(8)	500
		470	10	10.2	(G)	270	0.2	3	0.30	EEETK1A471UP	(8)
16	100	8	10.2	F	197	0.3	5	0.23	EEETK1C101P	(8)	500
	220	8	10.2	(F)	197	0.3	5	0.23	EEETK1C221UP	(8)	500
		10	10.2	G	270	0.2	3	0.23	EEETK1C221P	(8)	500
	330	10	10.2	(G)	270	0.2	3	0.23	EEETK1C331UP	(8)	500
25	100	8	10.2	F	197	0.3	5	0.18	EEETK1E101P	(8)	500
	220	8	10.2	(F)	197	0.3	5	0.18	EEETK1E221UP	(8)	500
		10	10.2	G	270	0.2	3	0.18	EEETK1E221P	(8)	500
	330	10	10.2	(G)	270	0.2	3	0.18	EEETK1E331UP	(8)	500
35	47	8	10.2	F	197	0.3	5	0.16	EEETK1V470P	(8)	500
	100	8	10.2	(F)	197	0.3	5	0.16	EEETK1V101UP	(8)	500
		10	10.2	G	270	0.2	3	0.16	EEETK1V101P	(8)	500
	220	10	10.2	(G)	270	0.2	3	0.16	EEETK1V221UP	(8)	500

\* Size code( ) : Miniaturization product

· 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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