

### Surface Mount Type

Series: **TP** Type: **V**

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



#### Features

- Endurance : 125 °C 3000 h (D8 size : 2000 h)
- Lower ESR at Low temperature after endurance
- Automotive
- Vibration-proof product (30G guaranteed) is available upon request
- RoHS compliant

#### Specifications

Category temp. 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 ≤ 0.01 CV (μA) After 2 minutes			
Dissipation factor (tan δ)	Please see the attached characteristics list			
Endurance	After the life test with DC rated working voltage at +125 °C ± 2 °C for 3000 hours (D8 : 2000 h) the capacitors shall meet the limits specified below.			
	Capacitance change	Within ±30 % of the initial value		
	Dissipation factor (tan δ)	≤ 300 % of the initial limit		
	Leakage current	Within the initial limit		
	ESR after endurance (Ω/100 kHz)	Size code	D8	F
	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 ± 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		
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 code	Unit : V.DC
A	10
C	16

	Unit : V.DC
E	25
V	35

#### Dimensions

( ) Reference size

Size code	φD	L	A, B	H	I	W	P	K
D8	6.3	7.7±0.3	6.6	7.8 max.	2.6	0.65±0.1	1.8	0.35 <sup>+0.15</sup> <sub>-0.20</sub>
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

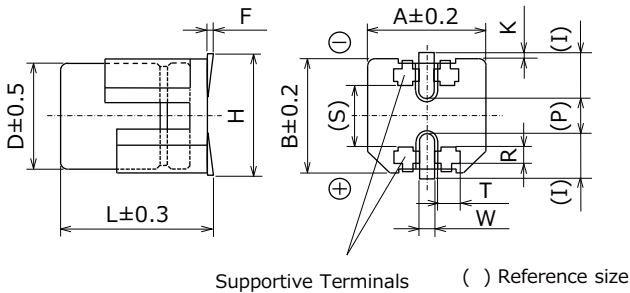
Unit : mm

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

### Dimensions (Vibration-proof products)

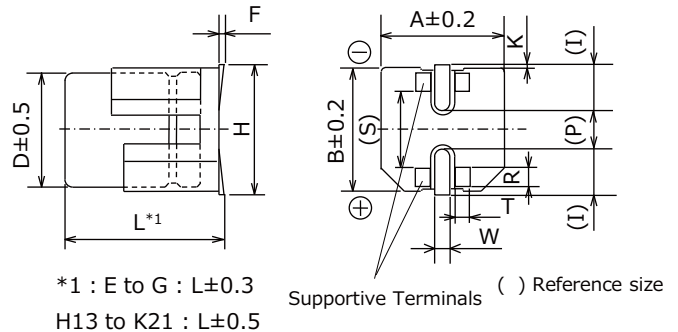
\* The size and shape are different from standard products. Please inquire details of our company.

< Size code : D, D8 >



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

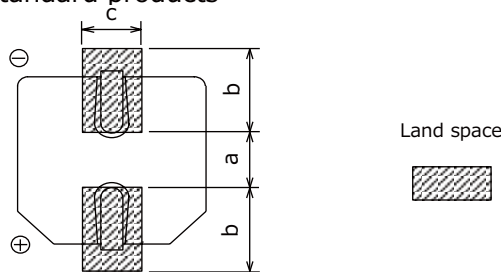
Unit : mm

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 <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

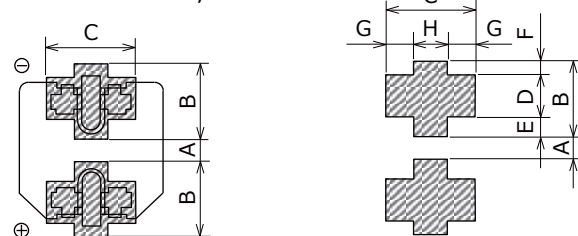
The circuit board land/pad pattern size for chip capacitors is specified in the following table. The land pitch influences installation strength and consider it.

#### ● Standard products

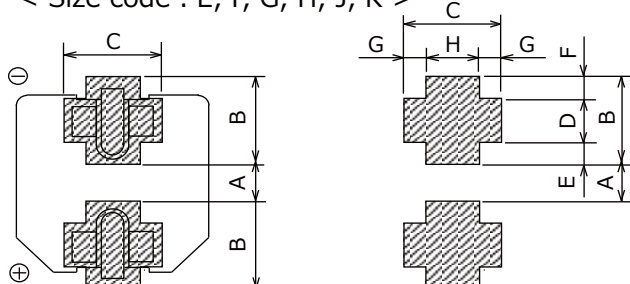


#### ● Vibration-proof products

< 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

Unit : mm

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

Unit : mm

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 (φ6.3×7.7 : 2000 h)

Rated volt. (V.DC)	Cap. (±20 %) (μF)	Case size (mm)			Size code *1	Specification				Part No.		Reflow	Min. Packaging Qty
		φD	L			Ripple current *2 (mA r.m.s.)	ESR (100 kHz) (Ω)		tan δ *3	Standard	Vibration-proof		
			Standard	Vibration-proof			+20 °C	-40 °C					
10	220	8	10.2	10.5	F	270	0.20	3	0.30	EEETP1A221AP	EEETP1A221AV	(8)	500
					(F)	270	0.20	3	0.30	EEETPA331UAP	EEETPA331UAV	(8)	500
	330	10	10.2	10.5	G	500	0.15	2	0.30	EEETP1A331AP	EEETP1A331AV	(8)	500
		10	10.2	10.5	G	500	0.15	2	0.30	EEETP1A471AP	EEETP1A471AV	(8)	500
16	100	6.3	7.7	8.0	D8	197	0.45	5	0.23	EEETPC101XAP	EEETPC101XAV	(8)	900
		8	10.2	10.5	F	270	0.20	3	0.23	EEETP1C101AP	EEETP1C101AV	(8)	500
	220	8	10.2	10.5	F	270	0.20	3	0.23	EEETP1C221AP	EEETP1C221AV	(8)	500
					G	500	0.15	2	0.23	EEETP1C331AP	EEETP1C331AV	(8)	500
					G	500	0.15	2	0.23	EEETP1C471AP	EEETP1C471AV	(8)	500
25	100	8	10.2	10.5	F	270	0.20	3	0.18	EEETP1E101AP	EEETP1E101AV	(8)	500
					G	500	0.15	2	0.18	EEETP1E221AP	EEETP1E221AV	(8)	500
					G	500	0.15	2	0.18	EEETP1E331AP	EEETP1E331AV	(8)	500
35	47	6.3	7.7	8.0	D8	197	0.45	5	0.16	EEETPV470XAP	EEETPV470XAV	(8)	900
		8	10.2	10.5	F	270	0.20	3	0.16	EEETP1V470AP	EEETP1V470AV	(8)	500
	100	8	10.2	10.5	F	270	0.20	3	0.16	EEETP1V101AP	EEETP1V101AV	(8)	500
					G	500	0.15	2	0.16	EEETP1V221AP	EEETP1V221AV	(8)	500

\*1: Size code( ): Miniaturization product

\*2: Ripple current (100 kHz / +125 °C)

\*3: 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

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

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