

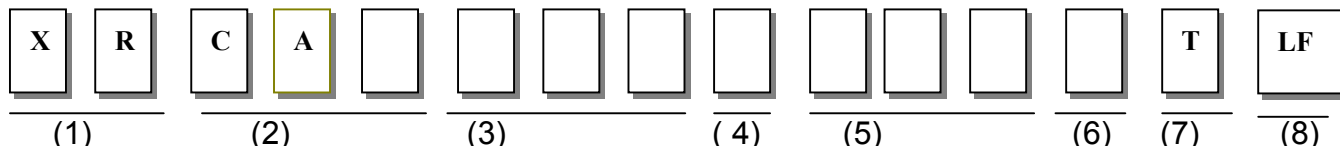
# Solid Electrolytic Tantalum Chip Capacitor(Lead Free)

CA45 specification

## 1. Scope

This specification applies to the \_\_\_\_\_ solid electrolyte tantalum chip capacitor(lead free).

## 2. Product Identification



Note:

- (1) company logo
- (2) series: For type recognition, series is expressed by three digits, that is: the first letters CA represent tantalum capacitors, 3rd digit represents series No., in case of no 3rd digit for specific product series, it is expressed by symbol "-".
- (3) capacitance code: Capacitance code: expressed in Pico farad, 1st two digits represent significant figures and 3rd digit represents multiplier (number of zeros to follow)
- (4) capacitance tolerance: Capacitance tolerance code is listed as follows:

Allowable Tolerance Code of the Capacitance

Allowable Tolerance%	Tolerance Code
±5	J
±10	K
±20	M

- (5) rated DC voltage: Rated DC voltage Code is expressed in three digits, if voltage value is only two digits, 1st digit is expressed in "0".
- (6) case size: Case Code is specified in specification sheets of the individual product series.
- (7) packing style (B: Bulk ; T: tape & reel): Packaging Code : B-Bulk. T: Tape and Reel. A: Ammo.

EX: Series CA45Δc/c±20%, 35V10μF, Taped and Reeled, XRCA45106M035DT

Series CAΔc/c±20%, 10V10μF, Bulk, XRCA-106M0102B

Series CA301Δc/c±20%, 100V10μF, Bulk, XRCA301106M1001B

For special order, other part number can be specified by users.

- (8) Lead Free

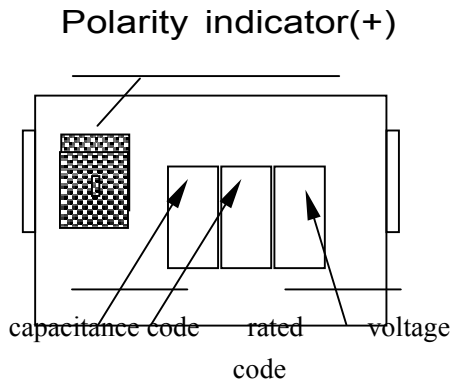
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## 3. Marking

### 3.1 CA45(S&A case)



#### (1) rated voltage code

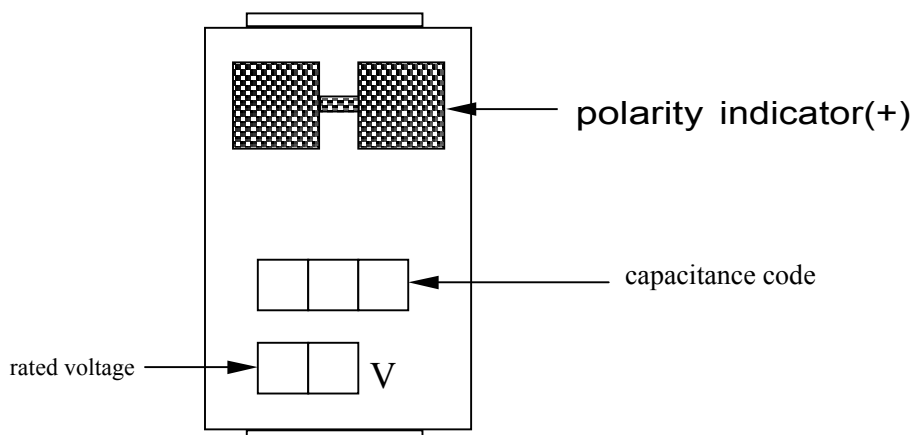
rated voltage	4	6.3	10	16	20	25	35	50
rated voltage code	G	J	A	C	D	E	V	H

#### (2) capacitance code

capacitance( $\mu$ F)	1	1.5	2.2	3.3	4.7	6.8
capacitance code	A	E	J	N	S	W

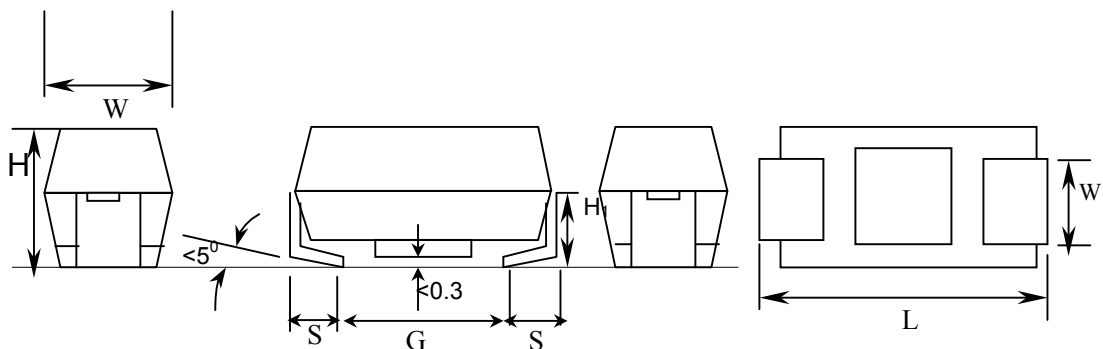
multiplier	$10^4$	$10^5$	$10^6$	$10^7$
second digit	4	5	6	7

### 3.2 CA45( B,C,D&E case)



capacitance code: Capacitance designation is used in PF, the first two digits represent valid digits of capacitance, third digit represents number of zero to follow.

## 4. Outline & Dimensions



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# Solid Electrolytic Tantalum Chip Capacitor(Lead Free)

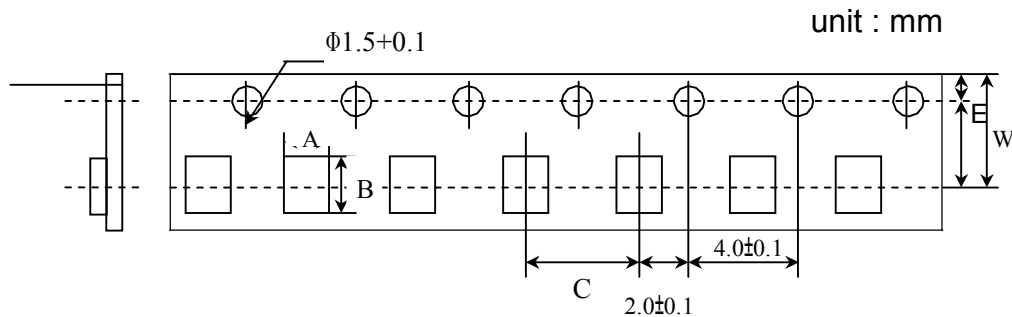
CA45 specification

unit :mm

Case size	L	W	H	W <sub>1</sub>	S	H <sub>1</sub> min	G min.
S	2.0±0.2	1.3±0.2	1.2Max.	1.2±0.1	0.5±0.3	0.3	0.3
A	3.2±0.2	1.6±0.2	1.6±0.2	1.2±0.1	0.8±0.3	0.7	0.8
B	3.5±0.2	2.8±0.2	1.9±0.2	2.2±0.1	0.8±0.3	0.7	1.1
C	6.0±0.3	3.2±0.3	2.5±0.3	2.2±0.1	1.3±0.3	1.0	2.5
D	7.3±0.3	4.3±0.3	2.8±0.3	2.4±0.1	1.3±0.3	1.0	3.8
E	7.3±0.3	4.3±0.3	4.0±0.3	2.4±0.1	1.3±0.3	1.0	3.8

## 5. Taping

### 5.1 tape dimension



Case size	A±0.2	B±0.2	C±0.1	E±0.1	F±0.1	W±0.3
S	1.6	2.4	4.0	1.75	3.5	8.0
A	1.9	3.5	4.0	1.75	3.5	8.0
B	3.3	3.9	4.0	1.75	3.5	8.0
C	3.7	6.4	8.0	1.75	5.5	12.0
D	4.8	7.7	8.0	1.75	5.5	12.0
E	4.8	7.7	8.0	1.75	5.5	12.0

case size	Qty.per reel
S	2500 pcs
A,B	2000 pcs
C,D	500 pcs
E	500 pcs

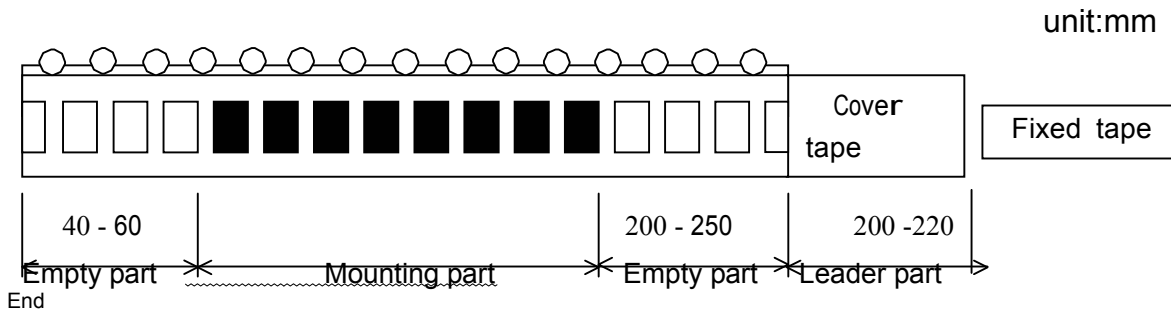
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# Solid Electrolytic Tantalum Chip Capacitor(Lead Free)

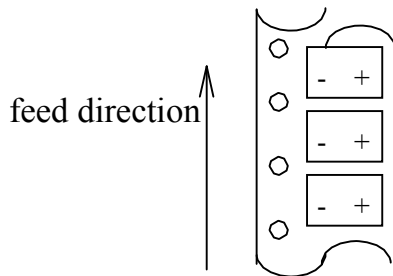
CA45 specification

## 5.2 taping specification

### 1) taping specification



### 2) Polarity



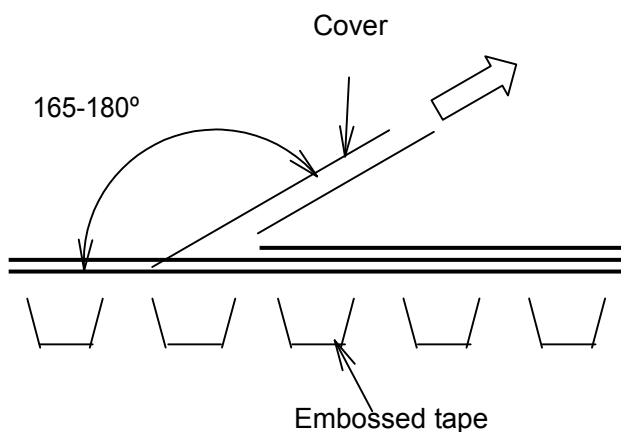
### 3) Peel method and force of the cover tape

Peel angle:165-180 °

Peel speed:300mm±10mm/min

Peel force:0.1N - 1N(10-100g) for 8mm carrier tape

0.1N - 1.3N(10-130g) for 12mm carrier tape

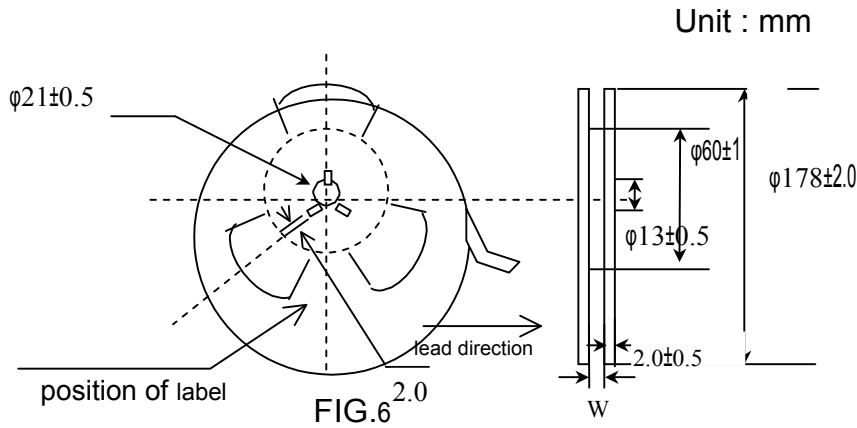


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# Solid Electrolytic Tantalum Chip Capacitor(Lead Free)

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## 6.Reel and Dimension



Case size	w(mm)
S,A,B	8.4 <sup>+1.50</sup> <sub>-0.00</sub>
C,D,E	12.4 <sup>+2.00</sup> <sub>-0.00</sub>

## 7. Electrical and Reliable Performance

NO.	Items	Performance characteristics								Conditions of test
1	operating temperature range	-55~+125°C								
2	rated temperature	+85°C								
3	rated voltage(v)	4	6.3	10	16	20	25	35	50	
4	derated voltage(v)	2.5	4	6.3	10	13	16	23	33	+125°C
5	surge voltage(v)	5	8	13	20	26	32	46	65	
6	leakage current	0.01C <sub>R</sub> V <sub>R</sub> or 0.5 uA (whichever is greater)								Series protective resistor:1000Ω Measuring voltage: rated voltage Measuring time:1minutes

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# Solid Electrolytic Tantalum Chip Capacitor(Lead Free)

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7	Capacitance	$\pm 20\%, \pm 10\%$	Measurement circuit: Equivalent series circuit Measuring frequency: 120Hz $\pm 10\%$ Measuring voltage max.: 0.5Vrms, +1.5Vdc.
8	Tangent of loss angle (tan $\delta$ )	$\leq 1.0\mu\text{F} : \leq 0.04$ $1.5 \sim 68\mu\text{F} : \leq 0.06$ $\geq 100\mu\text{F} : \leq 0.08$	
9	equivalent series resistance ( ESR)	see table 1	Measurement circuit: Equivalent series circuit Measuring frequency: 100kHz $\pm 1\%$

NO.	Items	Performance characteristics		Conditions of test	
10	Characteristics at high and low temperature	Ste 1	Performance characteristics		Step temp. °C dur. 1 +25 $\pm 2$ - 2 -55 $\pm 2$ 30min. 3 +25 $\pm 2$ 30min. 4 +85 $\pm 2$ 30min. 5 +125 $\pm 2$ 30min 6 +25 $\pm 2$
			Change in cap.	Relative to the value item 7 -10%	
			Tangent of loss angle (tan $\delta$ )	$U_R \geq 10\text{V} < 12\%$ $U_R < 10\text{V} < 15\%$	
		Ste 2	Change in cap.	Relative to the value item 7 $\pm 5\%$	
			Tangent of loss (tan $\delta$ )	Item 8 max	
			leakage current	Item 6 max	
		Ste 3	Change in cap.	Relative to the value item 7 +10%	
			Tangent of loss (tan $\delta$ )	$U_R \geq 10\text{V} : < 12\%$ $U_R < 10\text{V} : < 15\%$	
			leakage current	max. 0.1CV or 5 $\mu\text{A}$ ( whichever is greater)	
		Ste 4	Change in cap.	Relative to the value item 7 +12%	
			Tangent of loss (tan $\delta$ )	$U_R \geq 10\text{V} : < 15\%$ $U_R < 10\text{V} : < 15\%$	
			leakage current	max. 0.12CV or 6.0 $\mu\text{A}$ ( whichever is greater)	

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# Solid Electrolytic Tantalum Chip Capacitor(Lead Free)

CA45 specification

		5	Change in cap.	Relative to the value item 7 $\pm 5\%$	
			Tangent of loss( $\tan\delta$ )	Item 8 max	
			leakage current	Item 6 max	
11	Surge test		Change in cap.	Relative to the value before test $\pm 10\%$	test Temperature: $85\pm 2^{\circ}\text{C}$ protective series resistor (charge resistor):: $33\Omega$ cycles:1000 charge time: $30\pm 5\text{s}$ discharge time: $5\text{min}.30\text{s}$ measuring voltage: surge voltage $85^{\circ}\text{C}:1.3\text{UR}$
			Tangent of loss( $\tan\delta$ )	Item 8 max	
			leakage current	Item 6 max	
			appearance	There shall be no such mechanical damage as terminal damage etc.	
12	Resistance to soldering heat		Change in cap.	Relative to the value before test $\pm 3\%$	Conditioning of solder dip: Solder temperature:: $260\pm 5^{\circ}\text{C}$ Dip duration: $5\pm 0.5\text{s}$ depth of immersion: under surface 10mm
			Tangent of loss( $\tan\delta$ )	Item 8 max	
			leakage current	Item 6 max	
			Appearance	no visible damage, The marking shall be legible.	
13	Solder ability		Solder wetting time shall be 3s or less, A new uniform coating of solder shall cover a minimum of 90% of the surface being immersed		Conditioning of solder dip Solder temperature: $235\pm 5^{\circ}\text{C}$ Dip duration: $2\pm 0.5\text{s}$ depth of immersion: under surface 10mm

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# Solid Electrolytic Tantalum Chip Capacitor(Lead Free)

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14	rapid change of temperature	Change in cap.	Relative to the value before test $\pm 5\%$	-55°C, 30 min., +125°C, 30min. as a cycle; 5 cycles
		Tangent of loss( $\tan\delta$ )	Item 8 max	
		leakage current	Item 6 max	
		Appearance	No visible damage	
15	Damp heat	Change in cap.	Relative to the value before test $\pm 10\%$	Test temp:40 $\pm$ 2°C Humidity:90-95% R.H Test time:56days No voltage applied Recovery:1-2hours
		Tangent of loss( $\tan\delta$ )	less than 1.2times of item 8	
		leakage current	Item 6 max	
		Appearance	no visible damage, The marking shall be legible.	
16	Electrical endurance	Change in cap.	Relative to the value before test $\pm 10\%$	1) Test temp:85°C $\pm$ 2°C Test time:2000hr Voltage: Rated voltage 2) Test temp:125°C $\pm$ 2°C Test time:2000h Voltage:Derated voltage Recovery:1-2h D.V.- Derated voltage R.V.- Rated voltage
		Tangent of loss( $\tan\delta$ )	less than 1.5times of item 8	
		leakage current	6 max $\times$ 200%(max.)	
		Appearance	no visible damage, The marking shall be legible.	

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# Solid Electrolytic Tantalum Chip Capacitor(Lead Free)

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**Table 1:** ESR Of Capacitor

unit:  $\Omega$

Rated voltage	4	6.3	10	16	20	25	35	50
Capacitance	<b>Maxium ESR at 100KHz (Standard/Extended case size)</b>							
0.1					25		24	22
0.15					25		21	17/15
0.22					25		18	14
0.33					25		15	12
0.47				25	25	14	10/12	8
0.68			30	25	12/25	10	8/10	7
1.0		14/25	13/25	11/20	9	7/8	6.5/10	5.5
1.5	30	12/25	10/10	8/12	5/6.5	5	4.5/5.2	4/4.5
2.2	25	9/20	7/15	5.5/6.5	3.5/5.3	4.5	3.5/4.0	2.5/3.5
3.3	9/20	7/12	5.0/5.5	5/6.0	2.5/3/7	2.8/4.0	2.0/2.5/3.5	2.0
4.7	7.5/10	5/6	4/5/10	3.5/4	2.5/3.0/6.0	2.4/3.5	1.5/2.2	1.4/1.5
6.8	6/6.5	4/5/15	3/4	2.5/3.5/5	1.8/2/3.5	1.4/2	1.3/2.0	0.9
10	4/6	3/4/10	2.5/3	2/2.8/5	1.3/1.8/3.0	1.2/1.8	1/1.2	0.8
15	3.5/4	2.5/3.2	2.2/2.8/6	1.8/3.0	1.1/1.7	1/1.2	0.9	
22	2.5/3.2	2/2.5	1.8/2.4	1.1/1.6	0.9/1.2	0.9	0.9	
33	2.2/2.8	1.3/1.8	1.1/1.6	0.9/1.5	0.9	0.9/0.7		
47	1.3/1.8	1.6/2	0.9/1.2/1	0.9/1.4	0.9/0.9	0.6		
68	1.1/1.6/2.5	0.9/1.6/1	0.9	0.9	0.9/0.7			
100	0.9/1.3/2.5	0.9/1.4	0.9/1.3	0.9	0.5			
150	0.9	0.9	0.9	0.9				
220	0.9/1.2	0.9/0.7	0.9 /0.5	0.9				
330	0.9	0.9/0.7	0.9					
470	0.9							

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# Solid Electrolytic Tantalum Chip Capacitor(Lead Free)

CA45 specification

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## 8. Note in use

8.1. For circuits with low resistance circuit, make the use voltage be 1/3 or under of the rated voltage, in general circuit, make the use voltage be 1/2 or under of the rated voltage.

8.2 In case of circuits with large instantaneous rush current or rapid charging/discharging circuits, connect the protection resistor of  $3\Omega/v$  or more in series to the capacitor to limit the current to 300mA or less. when the protection resistor can not be inserted, lower the use voltage to 1/3 or under of the rated voltage .

8.3 Use the capacitors within the permissible ripple voltage specified independently. Use in the range that the sum of the DC voltage value and the peak value of ripple voltage does not exceed the rated voltage. Design not to apply over voltage made by fluctuation of superimposed DC voltage or reverse voltage to the capacitors.

8.4 Use the capacitors within the specified use temperature range. In case use temperature exceeds  $+85^{\circ}C$ , apply the reduced voltage shown in the below figure as the rated voltage.

### 8.5 environmental conditions

do not use the equipment fit with the capacitor in the below environment.

- Environment where capacitors are directly splashed with water, salt water and oil.
- Environment where capacitors are directly exposed to sunlight.
- Environment in high temperature and humidity causing dewing on capacitor surface.
- Environment where capacitors touch various active gases.
- Acid and alkaline atmosphere.
- Environment with high frequency induction.
- Environment with excessive vibration and shock.

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# Solid Electrolytic Tantalum Chip Capacitor(Lead Free)

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## 9. Product size table

Rated voltage (V)	4	6.3	10	16	20	25	35	50
Capacitance(uf)	Case size(Standard/Extended)							
0.1					S	S	A/S	A
0.15					S	S	A	B/A
0.22					S		A	B
0.33					S		A	B
0.47				S	S	A	B/A	C/B
0.68			S	S	A/S	A	B/A	C/B
1.0		A/S	A/S	A/S	A/S	B/A	B/A	D/C/B
1.5	S	A/S	A/S	A/S	B/A	B/A	C/B/A	D/C
2.2	S	A/S	A/S	B/A	B/A	B/A	C/B	D/C
3.3	A/S	A/S	A/S	B/A	C/B/A	C/B/A	D/C/B	D
4.7	A/S	A/S	B/A/S	B/A	D/C/B/A	C/B	D/C	E/D
6.8	A/S	B/A/S	B/A/S	C/B/A	D/C/B	D/C/B	D/C	E
10	B/A/S	B/A/S	B/A	C/B/A	D/C/B	D/C/B	D/C	E
15	B/A	B/A	C/B/A	C/B	D/C	D/C	D	
22	B/A	B/A	C/B/A	D/C/B	D/C	D/C	E/D	
33	C/B	C/B	D/C/B	D/C	D	E/D		
47	C/B	C/B	D/C/B	D/C	E/D	E/D		
68	D/C/B	D/C/B	D/C	D	E/D			
100	D/C/B	D/C/B	D/C	D	E			
150	D/C	D/C	E/D	E/D				
220	D/C	E/D/C	E/D					
330	E/D	E/D						
470	E/D	E/D						

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# Solid Electrolytic Tantalum Chip Capacitor(Lead Free)

CA45 specification

## 10. Storage

### 10.1 storage condition

environmental temperature:-10°C ~+40°C;

relative humidity: no more than 70%;

### 10.2 storing period

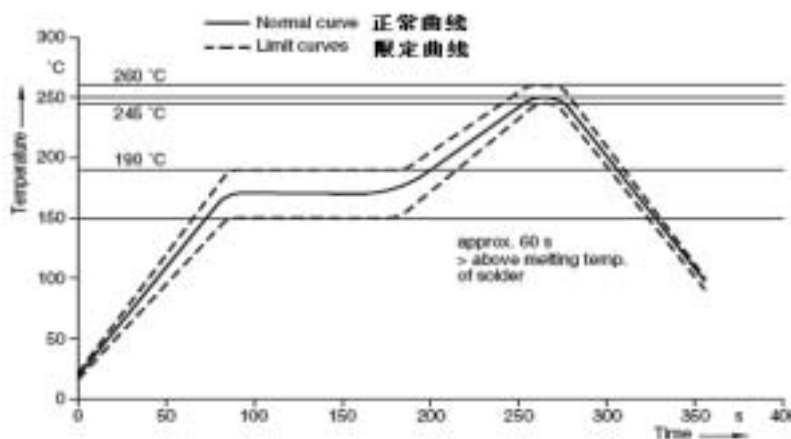
No more than one and half year since date of stocking.

## 11. Recommended Soldering condition

Flow method or reflow method whichever is applied for chip type capacitors, high-activated flux with string acid will not be used to prevent permeation, corrosion and diffusion from incomplete cleaning, thereby resulting in decreasing reliability.

chip type capacitors can be applied to reflow method. take the conditions below shown:

Reflow method(Atmosphere heating method)



- If the land is excessively larger than the size of the terminal surface, dislocation may occur when solder melts.

## 12. Information about ODS and PBB<sub>s</sub> and PBBO<sub>s</sub>

1. If exist Ozone Depleting Substances (ODS): no CCL<sub>4</sub>, HCFC, etc.
2. If exist nonflammable material such as Poly brominated Biphenyls and Poly brominated Biphenyl Oxides (PBBS and PBBOS): no PBBS and PBBOS, etc.
3. If exist heavy metal: yes( lead and its compounds: ≤0.15%/ pcs.,)

## 13. Product change notification

Our company will notice the customers ahead of time, when the product was changed in specification, material, process and management system.

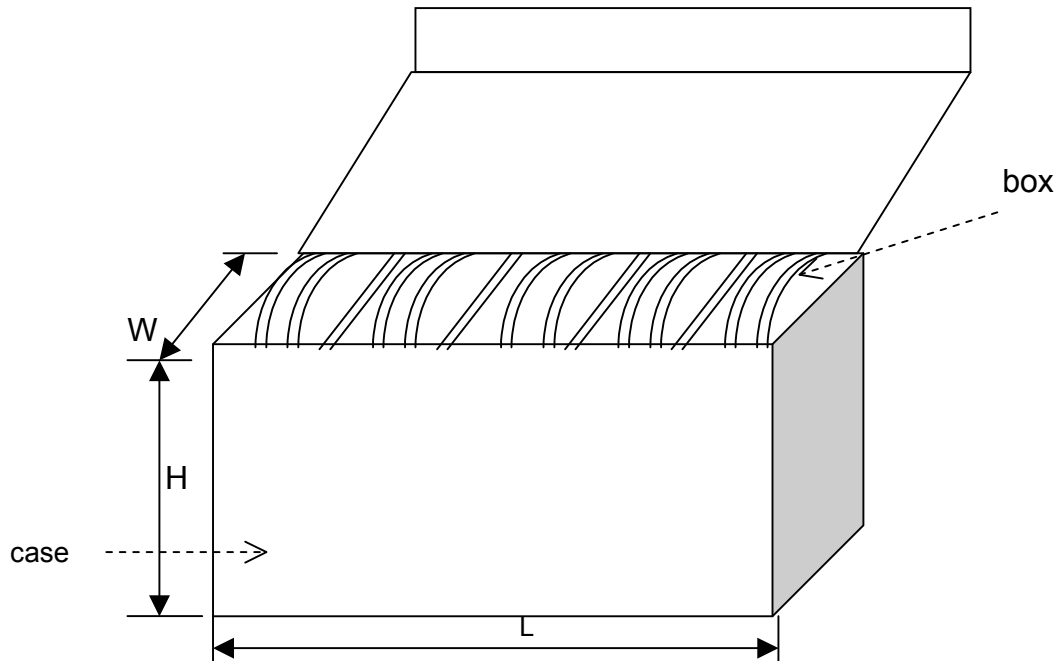
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# Solid Electrolytic Tantalum Chip Capacitor(Lead Free)

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## 14. Packaging figure of product

Box and case dimensions (unit :mm)



Type	L(±2)	W(±2)	H(±2)
box1	180	185	70
box2	180	160	190
case1	400	205	205
case2	410	210	375

a.5 reels of S/A/B or 4 reels of C/D/E in a box1.

b.10 reels of C/D/E in a box2.

c.5 boxes1 or 2 boxes2 in a case1.

d.10 boxes1 or 4 boxes2 in a case2.

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