

# CS Series

## Solid Electrolyte Tantalum Chip Capacitor



**RoHS  
Compliant**



### Features:

- General purpose surface mount type
- Compact size & wide CV range
- High Solderability & stable characteristics for soldering
- Compatible with all popular automatic pick and place equipment

### Electrical and Reliable Performance

Items	Performance characteristics	Conditions of test
Operating temperature range	-55°C to +125°C	-
Rated temperature	+85°C	-
Rated voltage (V)	6.3 10 16 20 25 35 50	-
De-rated voltage (V)	4 6.3 10 13 16 23 33	+125°C
Surge voltage (V)	8 13 20 26 32 46 65	-
Leakage Current	Not more than 0.01CV (μA) or 0.5μA whichever is greater	Series protective resistor : 1,000Ω Measuring voltage : Rated Voltage Measuring time : 1 minutes
Capacitance	±20%, ±10%	Measurement circuit : Equivalent series circuit Measuring frequency : 120Hz ±10% Measuring voltage max. : 0.5Vrms+1.5V DC
Tangent of loss angle (tan δ)	0.04 max. for ≤ 1μF 0.06 max. for 1.5μF to 68μF 0.08 max. for 100μF to 470μF	
Equivalent series resistance (ESR)	See table below	Measurement circuit : Equivalent series circuit Measuring frequency : 100kHz ±1%

Items	Step	Performance characteristics	Conditions of test	
Characteristics at high and low temperature	1	Change in cap.	Relative to the value item 7 -10%	
		Tangent of loss angle (tan δ)	U <sub>R</sub> ≥ 10V : <12% U <sub>R</sub> < 10V : <15%	
	2	Change in cap.	Relative to the value item 7 ±5%	Step temp. °C dur. 1. +25 ±2 - 2. -55 ±2 30min. 3. +25 ±2 30min. 4. +85 ±2 30min. 5. +125 ±2 30min. 6. +25 ±2 -
		Tangent of loss (tan δ)	Item 8 max	
		Leakage current	Item 6 max	
	3	Change in cap.	Relative to the value item 7 +10%	
		Tangent of loss(tan δ)	U <sub>R</sub> ≥ 10V : <12% U <sub>R</sub> < 10V : <15%	
		Leakage current	0.01CV (μA) or 0.5μA whichever is greater	
	4	Change in cap.	Relative to the value item 7 +12%	
		Tangent of loss (tan δ)	U <sub>R</sub> ≥ 10V : <15% U <sub>R</sub> < 10V : <15%	
		Leakage current	0.12CV (μA) or 0.6μA whichever is greater	
	5	Change in cap.	Relative to the value item 7 ±5%	
		Tangent of loss (tan δ)	Item 8 max	
		Leakage current	Item 6 max	



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Items	Performance characteristics		Conditions of test
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) : $33\Omega$ Cycle : 1,000 Discharging time : 5min. 30s Measuring Voltage : Surge voltage $85^\circ\text{C}$ : 1.3UR
	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.	
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 : $5 \pm 0.5$ 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.	
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
Rapid change of temperature	Change in cap.	Relative to the value before test $\pm 5\%$	- $55^\circ\text{C}$ , 30min., + $125^\circ\text{C}$ , 30min. As a 5 cycle
	Tangent of loss ( $\tan \delta$ )	Item 8 max.	
	Leakage current	Item 6 max.	
	Appearance	No visible damage	
Damp heat	Change in cap.	Relative to the value before test $\pm 10\%$	Test temp : $40 \pm 2^\circ\text{C}$ Humidity : 90-95% R.H Test time : 56 days No Voltage applied Recovery : 1 - 2 hours
	Tangent of loss ( $\tan \delta$ )	Less than 1.2 times of item 8	
	Leakage current	Item 6 max.	
	Appearance	No visible damage, The marking shall be legible.	
Electrical endurance	Change in cap.	Relative to the value before test $\pm 10\%$	Test temp : $85^\circ\text{C} \pm 2^\circ\text{C}$ Test time : 2,000h Voltage : Rated voltage Test temp. : $125^\circ\text{C} \pm 2^\circ\text{C}$ Test time : 2,000h Voltage : De-rated voltage Recovery : 1 - 2hours D.V. R.V.
	Tangent of loss ( $\tan \delta$ )	Less than 1.5 times of item 8	
	Leakage current	6 Item 6 max. 200% (max.)	
	Appearance	No visible damage, The marking shall be legible.	

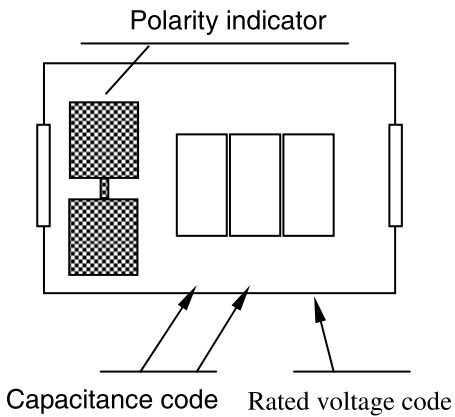
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### Marking

#### CS (S & A case)



#### Rated Voltage Code

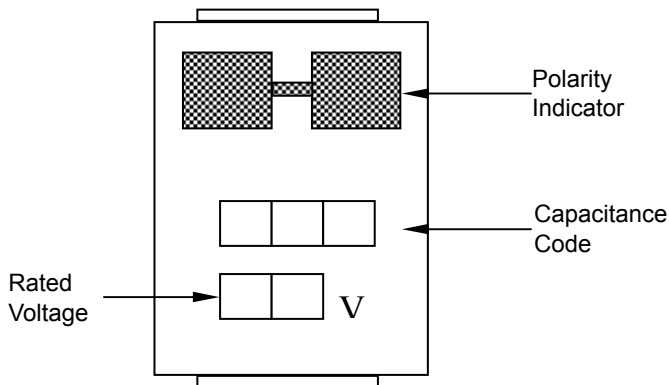
Rated Voltage (V)	6.3	10	16	20	25	35	50
Rated Voltage Code	J	A	C	D	E	V	H

#### Capacitance code

Capacitance ( $\mu\text{F}$ )	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

#### CS (B, C & D case)

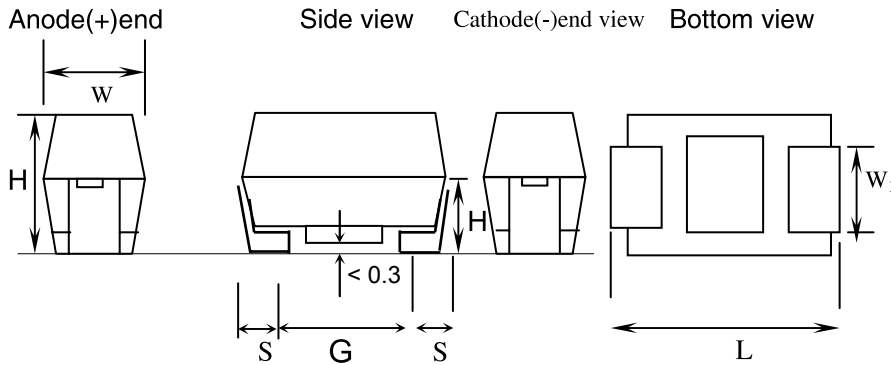


# CS Series

## Solid Electrolyte Tantalum Chip Capacitor



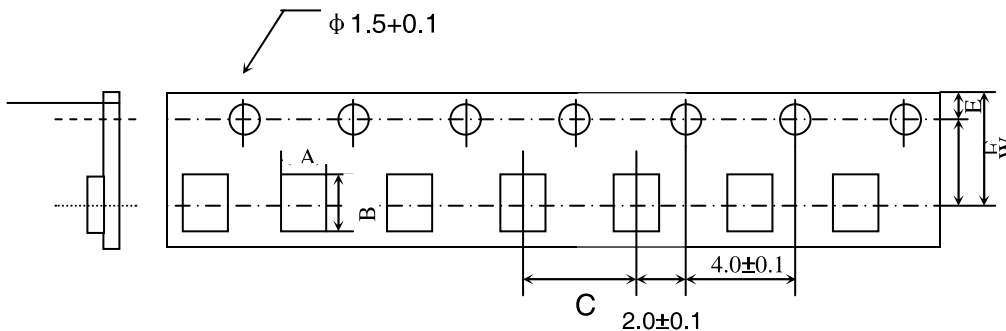
### Dimensions



Case size	L	W	H	W <sub>1</sub>	S	H <sub>1</sub> min.	G min.
S	2 ±0.2	1.2 ±0.2	1.2 ±0.2	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 ±0.3	3.2 ±0.3	2.5 ±0.3	2.2 ±0.1	1.3 ±0.3	1	2.5
D	7.3 ±0.3	4.3 ±0.3	2.8 ±0.3	2.4 ±0.1	1.3 ±0.3	1	3.8
E	7.3 ±0.3	4.3 ±0.3	4 ±0.3	2.4 ±0.1	1.3 ±0.3	1	3.8

Dimensions : Millimetres

### Tape Dimension



Case	A ±0.2	B ±0.2	C ±0.2	E ±0.2	F ±0.2	W ±0.2	Q'TY per reel
S	1.6	2.4	4	1.75	3.5	8	2,500 pcs.
A	1.9	3.5	4	1.75	3.5	8	2,000 pcs.
B	3.3	3.9	4	1.75	3.5	8	2,000 pcs.
C	3.7	6.4	8	1.75	5.5	12	500 pcs.
D	4.8	7.7	8	1.75	5.5	12	500 pcs.
E	4.8	7.7	8	1.75	5.5	12	500 pcs.

Dimensions : Millimetres



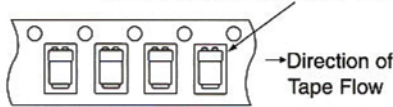
# CS Series Solid Electrolyte Tantalum Chip Capacitor



## Inserting Direction (Polarity Orientation)

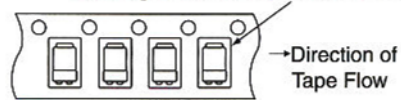
Polarity L : To be inserted with

the positive side to the feed hole.

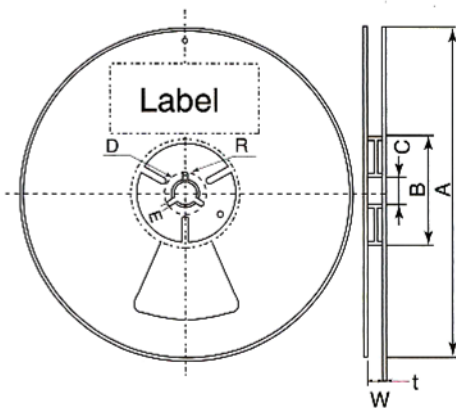


Polarity R : To be inserted with

the negative side to the feed hole.



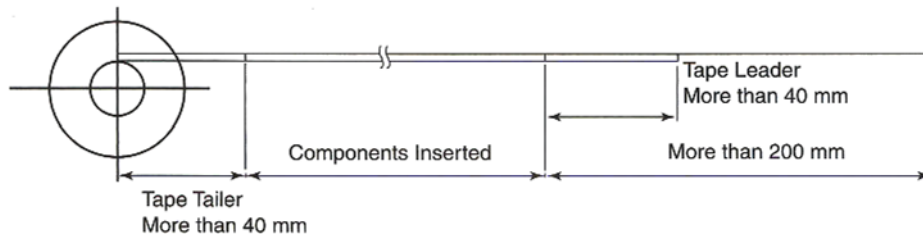
## Reel Dimensions



Tape width	8	12
$A_{-3}^0$	Ø 180	←
$B_0^{+1}$	Ø 60	←
$C \pm 0.2$	Ø 13	←
$D \pm 0.8$	Ø 21	←
$E \pm 0.5$	2	←
$W \pm 0.3$	9	13
$t \pm 0.4$	1.3	←
$R \pm 0.4$	10.5	←

Dimensions : Millimetres

## Tape Leader and Tailer



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### Part Number Table

Capacitance (uF)	Case Size	DC Leakage (uA@ =25°C Max.)	DF (%) @ +25°C @120Hz Max.	ESR (Ω) @ +25°C @100KHz Max.	Ripple current (A) @100kHz Max			Ripple current (A) @100kHz Max			Part Number
					+25°C	+85°C	+125°C	+25°C	+85°C	+125°C	
<b>6.3V Rating at +85°C (4V Rating at +125°C)</b>											
10	A	0.6	6	4	0.132	0.125	0.084	0.07	0.063	0.028	CSA0J106MTR
47	A	2.9	12	3.5	0.141	0.134	0.089	0.07	0.063	0.028	CSA0J476KTR
100	B	6	15	3	0.163	0.155	0.103	0.08	0.072	0.032	CSB0J107KTR
22	B	1.4	6	3.5	0.151	0.143	0.096	0.08	0.072	0.032	CSB0J226MTR
47	B	2.9	6	2	0.2	0.19	0.126	0.08	0.072	0.032	CSB0J476MTR
47	C	2.9	6	1.6	0.262	0.249	0.166	0.11	0.099	0.044	CSC0J476KTR
<b>10V Rating at +85°C (7V Rating at +125°C)</b>											
22	A	2.2	10	6	0.108	0.102	0.068	0.07	0.063	0.028	CSA1A226KTR
4.7	A	0.5	6	5	0.118	0.112	0.075	0.07	0.063	0.028	CSA1A475KTR
4.7	A	0.5	6	5	0.118	0.112	0.075	0.07	0.063	0.028	CSA1A475MTR
10	B	1	6	3.5	0.151	0.143	0.096	0.08	0.072	0.032	CSB1A106KTR
47	C	4.7	6	1	0.332	0.315	0.21	0.11	0.099	0.044	CSC1A476MTR
47	D	4.7	6	0.8	0.433	0.411	0.274	0.15	0.135	0.06	CSD1A476KTR
47	D	4.7	6	0.8	0.433	0.411	0.274	0.15	0.135	0.06	CSD1A476MTR
<b>16V Rating at +85°C (10V Rating at +125°C)</b>											
1.5	A	0.5	6	8	0.094	0.089	0.059	0.07	0.063	0.028	CSA1C155MTR
10	B	1.6	6	2.8	0.169	0.16	0.107	0.08	0.072	0.032	CSB1C106MTR
10	C	1.6	6	1.8	0.247	0.235	0.156	0.11	0.099	0.044	CSC1C106MTR
22	C	3.6	6	1.6	0.262	0.249	0.166	0.11	0.099	0.044	CSC1C226MTR
47	C	7.5	6	1.2	0.303	0.287	0.191	0.11	0.099	0.044	CSC1C476MTR
<b>20V Rating at +85°C (13V Rating at +125°C)</b>											
1	A	0.5	4	9	0.088	0.084	0.056	0.07	0.063	0.028	CSA1D105KTR
1.5	A	0.5	4	6.5	0.104	0.098	0.066	0.07	0.063	0.028	CSA1D155KTR
2.2	A	0.5	6	7	0.1	0.095	0.063	0.07	0.063	0.028	CSA1D225MTR
15	C	3	6	1.7	0.254	0.241	0.161	0.11	0.099	0.044	CSC1D156KTR
33	C	6.6	6	1.2	0.303	0.287	0.191	0.11	0.099	0.044	CSC1D336KTR
<b>25V Rating at +85°C (17V Rating at +125°C)</b>											
1	A	0.5	4	8	0.094	0.089	0.059	0.07	0.063	0.028	CSA1E105KTR
1	A	0.5	4	8	0.094	0.089	0.059	0.07	0.063	0.028	CSA1E105MTR
3.3	A	0.9	6	4.5	0.125	0.118	0.079	0.07	0.063	0.028	CSA1E335KTR
22	C	5.5	6	1.4	0.28	0.266	0.177	0.11	0.099	0.044	CSC1E226KTR
3.3	C	0.9	6	2.5	0.21	0.199	0.133	0.11	0.099	0.044	CSC1E335KTR
4.7	C	1.2	6	1.5	0.271	0.257	0.171	0.11	0.099	0.044	CSC1E475MTR
15	D	3.8	6	1	0.387	0.367	0.245	0.15	0.135	0.06	CSD1E156KTR
47	D	11.8	10	0.7	0.463	0.439	0.293	0.15	0.135	0.06	CSD1E476KTR

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### Part Number Table

Capacitance (uF)	Case Size	DC Leakage (uA@=25°C Max.)	DF (%) @ +25°C @120Hz Max.	ESR (Ω) @ +25°C @100KHz Max.	Ripple current (A) @100kHz Max			Ripple current (A) @100kHz Max			Part Number
					+25°C	+85°C	+125°C	+25°C	+85°C	+125°C	
<b>35V Rating at +85°C (23V Rating at +125°C)</b>											
0.1	A	0.5	4	20	0.059	0.056	0.037	0.07	0.063	0.028	CSA1V104KTR
1	A	0.5	4	7.5	0.097	0.092	0.061	0.07	0.063	0.028	CSA1V105MTR
0.33	A	0.5	4	15	0.068	0.065	0.043	0.07	0.063	0.028	CSA1V334KTR
2.2	B	0.8	6	4	0.141	0.134	0.089	0.08	0.072	0.032	CSB1V225KTR
2.2	C	0.8	6	3.5	0.177	0.168	0.112	0.11	0.099	0.044	CSC1V225MTR
6.8	C	2.4	6	1.8	0.247	0.235	0.156	0.11	0.099	0.044	CSC1V685KTR
10	D	3.5	6	1	0.387	0.367	0.245	0.15	0.135	0.06	CSD1V106MTR
4.7	D	1.7	6	1.5	0.316	0.3	0.2	0.15	0.135	0.06	CSD1V475MTR
6.8	D	2.4	6	1.3	0.34	0.322	0.215	0.15	0.135	0.06	CSD1V685MTR
<b>50V Rating at +85°C (33V Rating at +125°C)</b>											
1	B	0.5	4	7	0.107	0.101	0.068	0.08	0.072	0.032	CSB1H105KTR
1	C	0.5	4	5.5	0.141	0.134	0.089	0.11	0.099	0.044	CSC1H105KTR
2.2	D	1.1	6	2.5	0.245	0.232	0.155	0.15	0.135	0.06	CSD1H225KTR
3.3	D	1.7	6	2	0.274	0.26	0.173	0.15	0.135	0.06	CSD1H335KTR

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