
Tantalum Capacitor

■ FEATURE AND APPLICATION

● Feature

The product is a standard type that has been most widely used among tantalum chip capacitors.

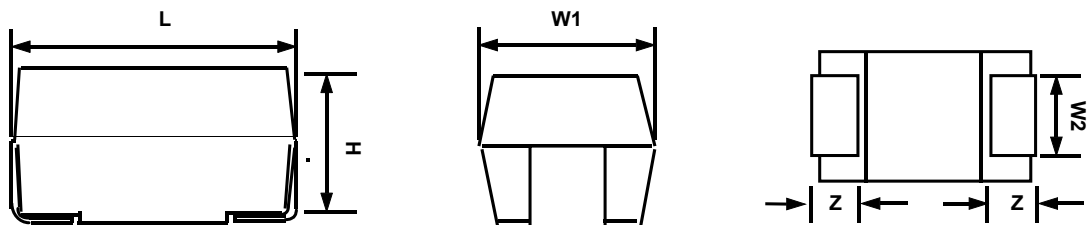
- Molded Case available in six case codes.
- Compatible with automatic pick and place equipment.
- Meets or Exceeds EIA standard 535BAAC .

● Application

- General electronic equipment
- Smoothing Circuit of DC-DC Converters & Output side of AC-DC Converters
- De-Coupling Circuit of High Speed ICs & MPUs
- Various Other High Frequency Circuit Applications

Tantalum Capacitor

■ APPEARANCE AND DIMENSION



Code	EIA Code	DIMENSION (mm)				
		L	W ₁	W ₂	H	Z
J	1608	16+0.15 -0.1	0.85+0.15 -0.1	0.6±0.1	0.85+0.15 -0.1	0.4±0.1
P	2012	2012	2.0 ±0.2	1.25 ±0.2	0.9 ±0.1	1.2 MAX
A	3216	3.2 ±0.2	1.6 ±0.2	1.2 ±0.1	1.6 ±0.2	0.8 ±0.3
B	3528	3.5 ±0.2	2.8 ±0.2	2.2 ±0.1	1.9 ±0.2	0.8 ±0.3
C	6032	6.0 ±0.3	3.2 ±0.3	2.2 ±0.1	2.5 ±0.3	1.3 ±0.3
D	7343	7.3 ±0.3	4.3 ±0.3	2.4 ±0.1	2.8 ±0.3	1.3 ±0.3

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■ PART NUMBERING

TC	SCN	0J	106	M	B	A	R
①	②	③	④	⑤	⑥	⑦	⑧

- ① Abbriation of Tantalum Capacitor
- ② Type of Series
- ③ Rated Voltage Code
- ④ Capacitance Code
- ⑤ Capacitance Tolerance Code
- ⑥ Case size Code
- ⑦ Packing Code
- ⑧ Packing polarity Code

① Tantalum Capacitor

The symbol shows a simplified character of the tantalum capacitor.

② Type of Series

The symbol shows the type of the capacitor. (SCN, SCS)

- SCN : Samsung Capacitor Normal - Standard series
- SVN : Samsung enVironmental capacitor Normal - Pb-free series

③ Rated Voltage Code

Symbol	DC Rated Voltage	Symbol	DC Rated Voltage
0E	2.5	1C	16
0G	4	1D	20
0J	6.3	1E	25
1A	10	1V	35

④ Capacitance Code

Symbol	Capacitance (μF)	Pico Farad (pF)	Symbol	Capacitance (μF)	PicoFarad (pF)
105	1.0	10×10^5	685	6.8	68×10^5
106	10.0	10×10^6	476	47	47×10^6
107	100.0	10×10^7	477	470	47×10^7

⑤ Capacitance tolerance Code

Symbol	Tolerance(%)	Symbol	Tolerance(%)
K	± 10	M	± 20

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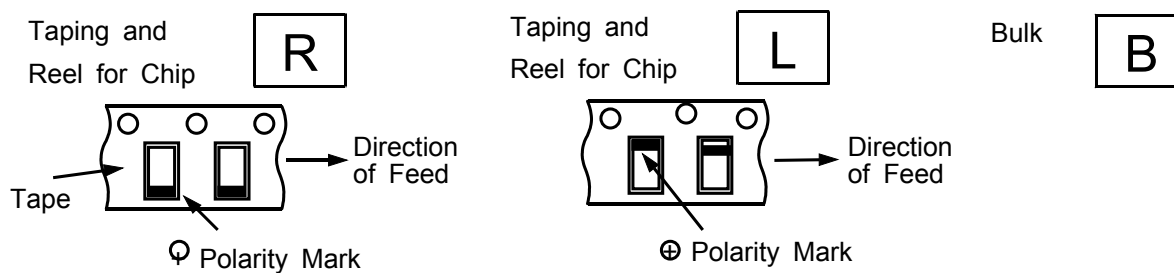
⑥ Case size Code

Case	EIA Code	Case	EIA Code
J	1608	C	6032
P	2012	D	7343
A	3216		
B	3528		

⑦ Packing Code

Symbol	Packing Code
A	7 inch
C	13 inch

⑧ Packing polarity Code



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■ PACKAGING

● Marking

▶ J Case

J case 4.7 μ F 6.3V

+



————— Polarity (White Stripe)

————— Capacitance & Working voltage Code

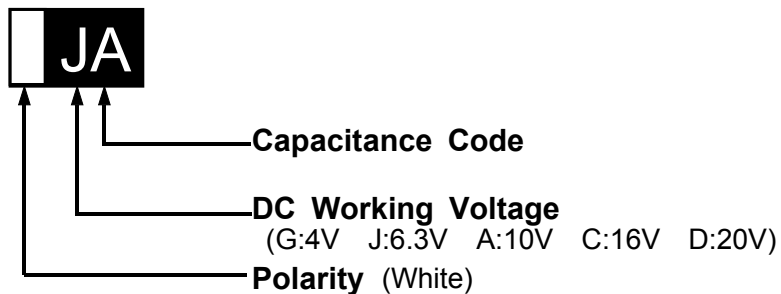
Marking (6.3V basis)	CAP.	1.0	1.5	2.2	3.3	4.7	6.8	10
	Code	a	E	J	N	S	W	A

【Code Reference】

μ F \ V	4	6.3	10	16
1.0		a	B	C
1.5	D	E	F	G
2.2	I	J	K	L
3.3	M	N	O	P
4.7	R	S	T	U
6.8	V	W	X	Y
10	Z	A		

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► P Case



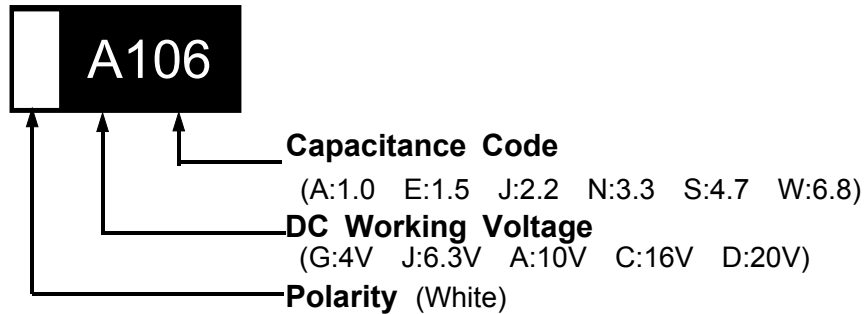
Capacitance Range	1 DIGIT	2 DIGIT
$< 1.0\mu F$	A Small Letter	A Small Letter
$1.0\mu F \leq \text{Cap.} < 10\mu F$	A Capital Letter	A Small Letter
$\geq 10\mu F$	A Capital Letter	A Capital Letter

【Code Reference】

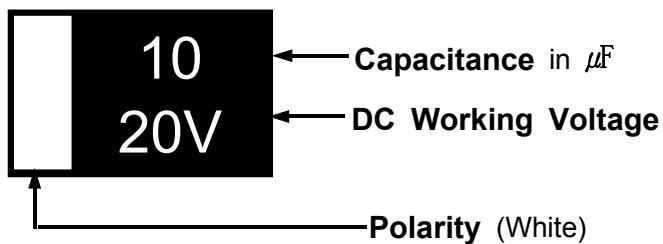
$\mu F \backslash V$	4	6.3	10	16	20
0.22	gj	jj	aj	cj	
0.33					
0.47	gs	js	as	cs	ds
0.68	gw	jw	aw	cw	dw
1.0	Ga	Ja	Aa	Ca	
1.5					
2.2	Gj	Jj	Aj		
3.3	Gn	Jn	An		
4.7	Gs	Js	As		
6.8	Gw	Jw			
10	GA	JA	AA		
15					
22	GJ				

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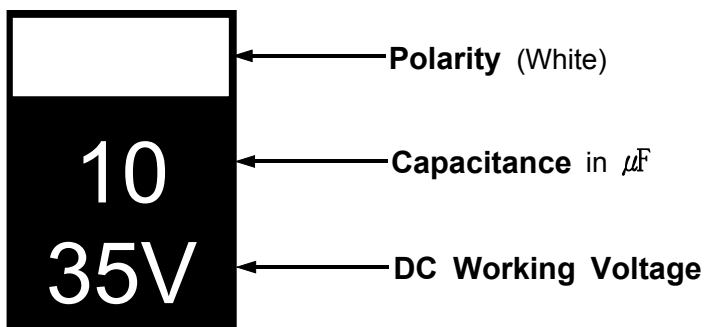
► A Case



► B Case



► C,D Case

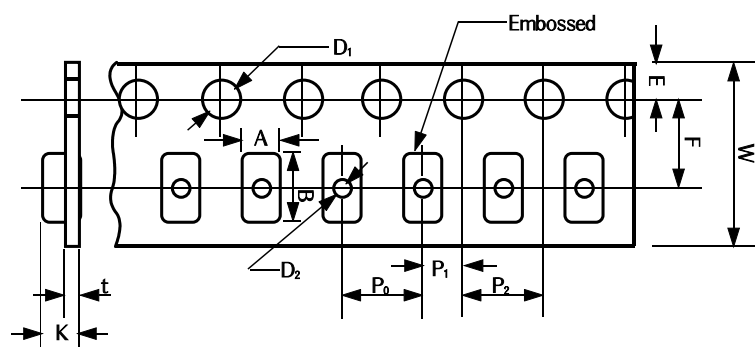
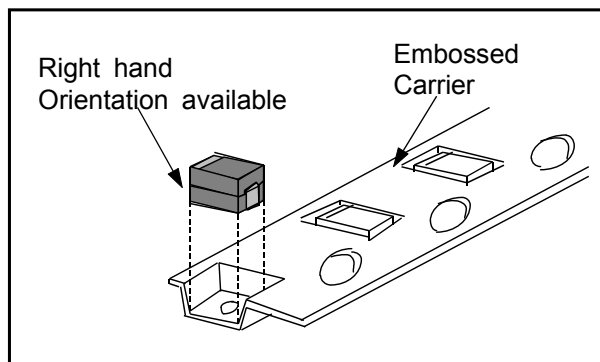


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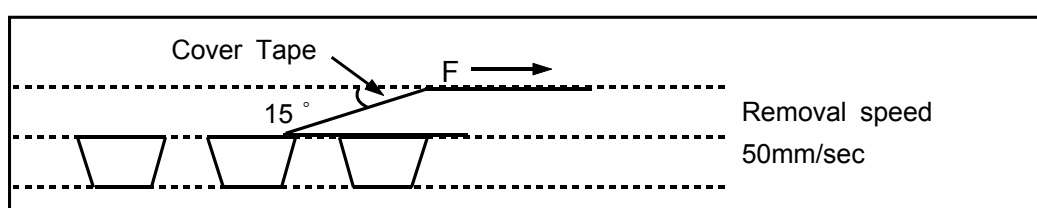
● Embossed Plastic Type

The tantalum chip capacitors shall be packaged in tape and reel form for effective use.

- Tape : Semitransparent embossed plastic
- Cover tape : Attached with press, polyester
- The tension of removing the cover tape,
F=10~70g

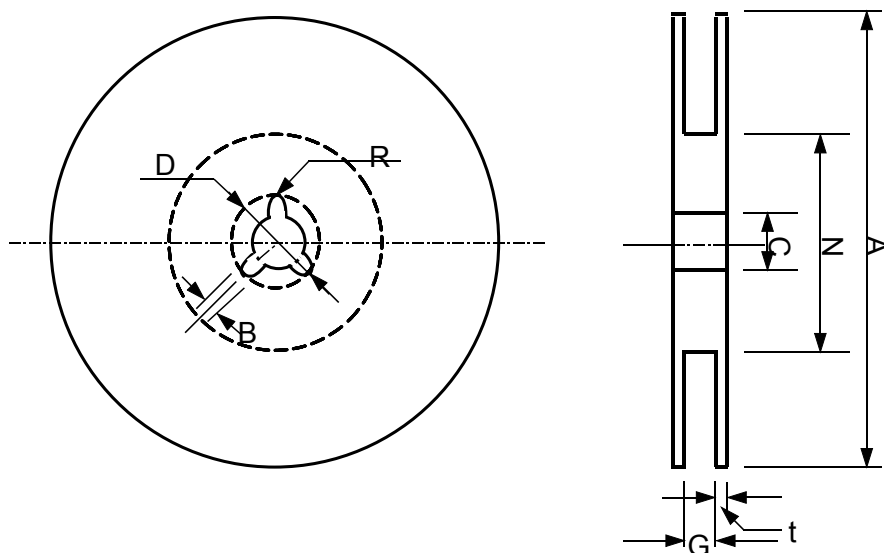


Case Code	W±0.3 (± 0.012)	F±0.1 (± 0.004)	E±0.1 (± 0.004)	P ₀ ±0.1 (± 0.004)	P ₁ ±0.1 (± 0.004)	P ₂ ±0.1 (± 0.004)	D ₁ +0.1 (+0.00 4)	D ₂ Min.	t	A±0.2 (± 0.008)	B±0.2 (± 0.008)	K±0.2 (± 0.008)
J*	8 (0.315)	3.5 (0.138)	1.75 (0.069)	4 (0.157)	2 (0.079)	4 (0.157)	ø1.5 (0.059)	ø0.6 (0.024)	0.25 (0.0098)	0.98 (0.039)	1.80 (0.071)	1.0 (0.039)
P*								ø1.0 (0.039)	0.2 (0.008)	1.4 (0.055)	2.3 (0.091)	1.4 (0.055)
A										1.9 (0.075)	3.5 (0.138)	1.9 (0.075)
B										3.3 (0.130)	3.8 (0.150)	2.1 (0.083)
C	12 (0.472)	5.5 (0.217)		8 (0.315)				ø1.5 (0.059)	0.3 (0.012)	3.7 (0.146)	6.4 (0.252)	3.0 (0.118)
D										4.8 (0.189)	7.7 (0.303)	3.3 (0.130)



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● Reel Demension



Tape Width	A±2 (±0.079)	N Min.	C±0.5 (±0.020)	D±0.5 (±0.020)	B±0.51 (±0.020)		t±0.5 (±0.020)	R
8mm	ø178 (7)	ø70 (2.756)	ø13 (0.512)	ø21 (0.827)	2 (0.079)	10 (0.394)	2 (0.079)	0.99 (0.039)
12mm		ø60 (2.362)				14 (0.551)		
8mm	ø330 (13)	ø80 (3.150)	ø13 (0.512)	ø21 (0.827)	2 (0.079)	10 (0.394)	2 (0.079)	0.99 (0.039)
12mm						14 (0.551)		

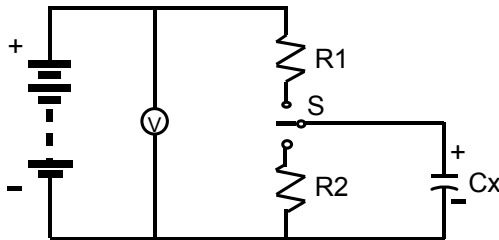
Case Size reference	180mm(7") reel	330mm(13") reel
J	4,000pcs	-
P	3,000pcs	-
A , B	2,000pcs	8,000pcs
C , D	500pcs	2,500pcs

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■ RELIABILITY TEST DATA

NO	ITEMS	TEST CONDITION	PERFORMANCE
1	RATED DC VOLTAGE	-55℃ ~ +85℃	2.5 ~ 35V
2	CAPACITANCE	MEASURING FREQUENCY : 120±12Hz MEASURING VOLTAGE : 0.5Vrms + 0.5~2V DC MEASURING CIRCUITS : EQUIVALENT SERIES CIRCUIT	CAPACITANCE RANGE 0.15~470μF TOLERANCE ON CAP. ±10%, ±20%
3	TANGENT OF LOSS ANGLE	MEASUREMENT SHALL BE MADE UNDER THE SAME CONDITIONS AS THOSE GIVEN FOR THE MEASUREMENT OF CAPACITANCE.	
4	LEAKAGE CURRENT	<p>THE RATED DC VOLTAGE SHALL BE APPLIED TO TERMINALS ACROSS THE TEST CAPACITOR C_x, BY THE METHOD AS SHOWN BELOW. THE LEAKAGE CURRENT SHALL THEN BE MEASURED AFTER CHARGE FOR 5 MIN.</p> <p><u>MEASURING CIRCUITS</u></p> <p>WHERE R_s : STANDARD RESISTOR(PROTECTIVE R :1KΩ) Ⓥ : DC VOLTMETER OR ELECTRONIC VOLTMETER S1 : DC POWER SUPPLY SWITCH S2 : PROTECTIVE SWITCH FOR A AMMETER C_x : TEST CAPACITOR ⓐ : DC AM-METER FOR LEAKAGE CURRENT</p>	0.01CV or 0.5μA WHICHEVER IS GREATER
5	IMPEDENCE	<p>AC VOLTAGE(0.5Vrms OR LESS) OF A FREQUENCY SPECIFIED ON NEXT PAGE SHALL BE APPLIED AND THE VOLTAGE DROP ACROSS CAPACITOR TERMINALS SHALL BE MEASURED</p> <p>THE IMPEDANCE SHALL BE CALCULATED BY THE FOLLOWING EQUATION.</p> $\text{Impedance } Z = \frac{E}{I}$ <p>WHERE E : VOLTAGE DROP ACROSS THE CAPACITOR TERMINALS I : CURRENT FLOWING THROUGH THE CAPACITOR (FREQUENCY : 100±10kHz)</p>	

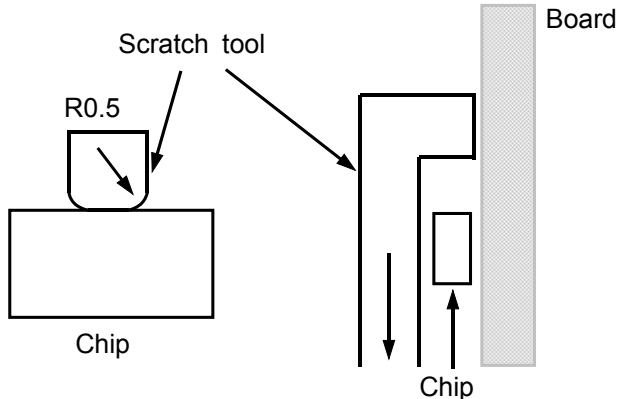
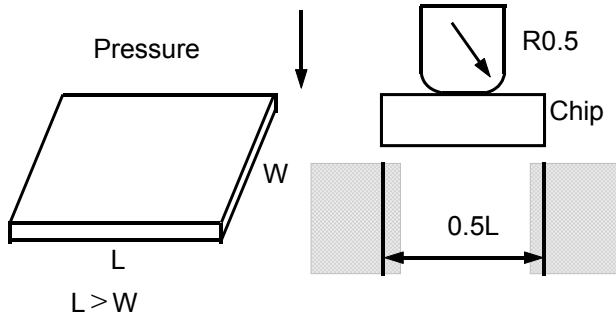
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NO	ITEMS	TEST CONDITION					PERFORMANCE		
6	TEMPERATURE STABILITY	THE CAPACITOR SHALL BE SUBJECTED IN TURN TO PROCEDURES SPECIFIED BELOW							
		STEP	TEMP.	DURATION	CHANGE IN CAPACITANCE (Δ C)	TANGENT OF LOSS ANGLE (D.F.)	LEAKAGE CURRENT		
		1	25±2℃		WITHIN SPECIFIED TOLERANCE	TABLE 1 ON PAGE 13	WITHIN ORIGINAL LIMIT		
		2	-55 ⁰ ₋₃ ℃	2 HOURS.	- 10 TO 0% OF INITIAL VALUE	TABLE 1 ON PAGE 13	N/A		
		3	25±2℃	25 MIN.					
		4	+85 ⁺³ ₀ ℃	2 HOURS.	0 TO +10% OF INITIAL VALUE	TABLE 1 ON PAGE 13	WITHIN 10X ORIGINAL LIMIT		
		5	+125 ⁺³ ₀ ℃	2 HOURS.	0 TO +12% OF INITIAL VALUE	TABLE 1 ON PAGE 13	WITHIN 12.5X ORIGINAL LIMIT		
7	SURGE TEST	THE CAPACITOR SHALL BE SUBJECTED TO THE SURGE VOLTAGE AS SPECIFIED ON NEXT PAGE IN A CYCLE OF 6± 0.5 MIN. WHICH CONSISTS OF 30±5 SEC. FOLLOWED BY A DISCHARGE PERIOD OF APPROX. 5 MIN 30 SEC. AT A TEMPERATURE OF +85℃ FOR 1,000 CYCLES. AND THE CAPACITOR SHALL BE STORED UNDER STANDARD ATMOSPHERIC CONDITIONS TO OBTAIN THERMAL EQUILIBRIUM AFTER MEASUREMENT.							
		<u>MEASURING CIRCUIT</u>							
									
		WHERE R1 : PROTECTIVE SERIES RESISTOR (33Ω) R2 : DISCHARGE RESISTOR(33Ω) Cx : TEST CAPACITOR V : DC VOLTAGE S : SWITCH							
RATED VOLTAGE		2.5V	4V	6.3V	10V	16V	20V	25V	35V
SURGE VOLTAGE		3.1V	5V	8V	13V	20V	26V	32V	45V

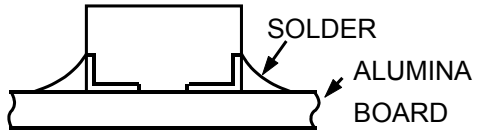
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NO	ITEMS	TEST CONDITION	PERFORMANCE
8	DERATING VOLTAGE	<p>WHEN OPERATING AT HIGH TEMPERATURE RANGE FROM 85℃ to 125℃, THE OPERATION SHALL BE CARRIED OUT AT A DERATED VOLTAGE OR LESS DERATING VOLTAGE V_t AT ANY TEMPERATURE BETWEEN 85℃ AND 125℃ SHALL BE CALCULATED BY THE FOLLOWING EQUATION</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">VOLTAGE DERATING %</div> </div> <p style="text-align: center;">OPERATING TEMPERATURE</p> $V_t = V_r - \frac{V_r - V_d}{40}(T - 85)$ <p>WHERE V_t : DERATED VOLTAGE AT ANY TEMP. BETWEEN 85℃ to 125℃ V_r : RATED VOLTAGE V_d : DERATED VOLTAGE AT 125℃</p>	
9	ELECTRODE (TERMINAL STRENGTH)	<p>APPLY PRESSURE IN THE DIRECTION OF THE ARROW AT A RATE OF ABOUT 0.5MM/SEC. UNTIL IT REACHES A BENT WIDTH OF 3MM AND HOLD FOR 30 SEC. THE TEST BOARD SHALL BE IEC 40(S) 541. FOR OTHER PROCEDURES REFER TO IEC 40(S) 541.</p> <div style="text-align: center;"> </div>	<p>THERE SHALL BE NO EVIDENCE OF MECHANICAL DAMAGE. ELECTRICAL CHARACTERISTICS SHALL SATISFY THE INITIAL REQUIREMENT. IF THERE ARE ELECTRODES ON BOTH SURFACES, IT SHALL SATISFY THE ABOVE REQUIREMENT ON WHICHEVER SURFACE IT MAY BE FIXATED ON.</p>

Tantalum Capacitor

NO	ITEMS	TEST CONDITION	PERFORMANCE
10	ADHESION (ELECTRODE PEELING STRENGTH)	<p>A STATIC LAOD OF 19.6N USING A R0.5 SCRATCH TOLL SHALL BE APPLIED ON THE CORE OF THE COMPONENT AND IN THE DIRECTION OF THE ARROW AND HOLD FOR 5 SEC. THE TEST BOARD SHALL BE IEC 40(S)541. HOWEVER THE BASE MATERIAL SHALL BE G-10 or FR-4 (ANSI GRADE)</p> 	<p>THERE SHALL BE NO EVIDENCE OF MECHANICAL DAMAGE. ELECTRICAL CHARACTERISTICS SHALL SATISFY THE INITIAL REQUIREMENT. IF THERE ARE ELECTRODES ON BOTH SURFACES, IT SHALL SATISFY THE ABOVE REQUIREMENT ON WHICHEVER SURFACE IT MAY BE FIXATED ON.</p>
11	CORE BODY STRENGTH	<p>A ROD OF 9.8N USING A R0.5 PRESSURE ROD SHALL BE APPLIED TH THE CENTER IN THE DIRECTION OF THE ARROW AND HOLD FOR 10 SEC</p> 	<p>THERE SHALL BE NO EVIDENCE OF MECHANICAL DAMAGE. ELECTRICAL CHARACTERISTICS SHALL SATISFY THE INITIAL REQUIREMENT.</p>

Tantalum Capacitor

NO	ITEMS	TEST CONDITION	PERFORMANCE
12	SOLDERABILITY [Pb-free]	SOLDER TEMPERATURE : $245 \pm 5^{\circ}\text{C}$ DIP TIME : 3 ± 0.5 SEC. SOLDER : Sn-3Ag-0.5Cu FLUX : ROSIN(KSM2951)+Solvent(ISA) (ROSIN 25WT%)	MORE THAN 75% OF THE TERMINAL SURFACE MUST BE SOLDERED NEWLY.
13	RESISTANCE TO SOLDERING HEAT	PREHEAT : $100 \sim 110^{\circ}\text{C}$ FOR 30 SEC. TEMPERATURE : $260 \pm 5^{\circ}\text{C}$ DIP TIME : 10 ± 1 SEC ALL SAMPLES SHALL BE DIPPED IN SOLDER BATH. MEASUREMENT SHALL BE MADE AT ROOM TEMPERATURE AFTER 1~2 HOURS OF COOLING TIME.	CHANGE IN CAPACITANCE : $\pm 5\%$ OF INITIAL VALUE TANGENT OF LOSS ANGLE : LEAKAGE CURRENT : APPEARANCE : THERE SHALL BE NO EVIDENCE OF MECHANICAL DAMAGE. .
		<u>CONVECTION REFLOW</u> PREHEAT : $150 \sim 190^{\circ}\text{C}$ FOR 130 SEC. PEAK TEMPERATURE : $245 \pm 5^{\circ}\text{C}$ FOR 10 SEC. METHOD : SAMPLES SHALL BE PASSED REFLOW 2 TIMES. MEASUREMENT SHALL BE MADE AT ROOM TEMPERATURE AFTER 3~4 HOURS OF COOLING TIME.	Change in capacitance: $\pm 10\%$ of initial value Tangent of loss angle: Leakage Current :
14	RESISTANCE TO CLEAN TEST	<u>IMMERSION CLEANING</u> THE CAPACITOR SHALL BE CLEANED AT ROOM TEMPERATURE FOR 60sec. USING ISOPROPYL ALCOHOL	THERE SHALL BE NO EVIDENCE OF MECHANICAL DAMAGE. AND MARKING SHALL BE LEGIBLE. ELECTRICAL CHARACTERISTICS SHALL SATISFY THE INITIAL REQUIREMENT.
15	VIBRATION	FREQUENCY : 10 to 55 to 10Hz (in 1 min.) MAX AMPLITUDE : 1.5 mm. DIRECTION OF VIBRATION : IN DIRECTION OF X,Y AND Z AXES TIME : 2 HOURS EACH DIRECTION AND 6 HOURS IN TOTAL DURING THE LAST 30 min. OF VIBRATION IN EACH DIRECTION, THE CAPACITANCE SHALL BE MEASURED 3 TO 5 TIMES. FOR OTHER PROCEDURES REFER TO IEC Pub. 68-2-6. <u>MOUNTING METHOD</u> 	CHANGE IN CAPACITANCE : WITHIN : $\pm 5\%$ OF THE INITIAL VALUE TANGENT OF LOSS ANGLE : LEAKAGE CURRENT : APPEARANCE : THERE SHALL BE NO EVIDENCE OF MECHANICAL DAMAGE. .

Tantalum Capacitor

NO	ITEMS	TEST CONDITION			PERFORMANCE
16	MOISTURE RESISTANCE	THE CAPACITOR SHALL BE STORED AT A TEMPERATURE OF 40±2℃ AND RELATIVE HUMIDITY OF 90% TO 95% FOR 500±8 HOURS. ELECTRICAL MEASUREMENTS SHALL BE MADE AFTER BEING BOARD AT ROOM TEMPERATURE FOR 1~2 HOURS. FOR OTHER PROCEDURES REFER TO IEC Pub. 68-2-2.			CHANGE IN CAPACITANCE : WITHIN : ±10% OF THE INITIAL VALUE TANGENT OF LOSS ANGLE : LEAKAGE CURRENT :
17	LOAD LIFE				CHANGE IN CAPACITANCE : WITHIN : ±10% OF THE INITIAL VALUE TANGENT OF LOSS ANGLE : LEAKAGE CURRENT :
		TEMPERATURE	VOLTAGE	TIME	
		85℃	RATED VOLTAGE	2,000 HOURS	
		125℃	DERATED VOLTAGE	2,000 HOURS	
		THE CAPACITOR SHALL BE PLACED IN A CIRCULATING AIR OVEN AT AN AMBIENT. ELECTRICAL MEASUREMENTS SHALL BE MADE AFTER BEING STORED AT ROOM TEMPERATURE FOR 1~2 HOURS.			
18	STORAGE AT LOW TEMPERATURE	THE CAPACITOR SHALL BE STORED AT A TEMPERATURE OF -55±2℃ FOR 240±8 HOURS WITHOUT LOAD. ELECTRICAL MEASUREMENTS SHALL BE MADE AFTER BEING STORED AT ROOM TEMPERATURE FOR 1~2 HOURS			ELECTRICAL CHARACTERISTICS SHALL SATISFY THE INITIAL REQUIREMENT.
19	Thermal Shock				CHANGE IN CAPACITANCE : WITHIN : ±10% OF THE INITIAL VALUE TANGENT OF LOSS ANGLE : LEAKAGE CURRENT :
		STEP	TEMPERATURE	TIME	
		1	-55 0 -3 ℃	30 ±3 MIN	
		2	25 ± 5℃	15 ±2 MIN	
		3	125 0 -3 ℃	30 ±3 MIN	
		4	25 ± 5℃	15 ±2 MIN	
		THE CAPACITOR SHALL BE SUBJECTED TO EACH SPECIFIED TEMPERATURE FOR EACH SPECIFIED TIME IN THE TABLE ABOVE THESE 4 STEP CONSTITUTES ONE CYCLES SHALL BE PERFORMED CONTINUOUSLY			