Type 251 T Series

(P- 251T- E001)

We developed low profile series of type 251 which is widely used in portable information and telecommunication equipments such as mobile phone, smartphone and portable AV equipments such as digital video camera, digital still camera and portable audio. Type 251 T series will considerably contribute to ultra-miniaturization, ultra-low profile and improvement of performance of the portable multimedia devices.

FEATURES

1. Using the face-down terminal structure makes it possible to design the land in almost the same size as the terminal. As the result of this, parts can be downsized, and the mounting area can be reduced to 1/2 to 1/3 of that required by conventional structures.
2. Ultra low profile height 0.6mm and 0.8mm is applicable.
3. Type 251 T series in size from 1608L to 3216L are applicable to a wide capacitance range from 0.68 to 68 µF.
4. This type of capacitors is suitable for ultra miniaturized, such as DVC, DSC and PCMCIA cards, and high-function compact portable devices, such as mobile phone and smartphone.
5. Case M (face-down terminal type 1608) and case S (face-down terminal type 2012) of this type are listed in the Surface Mounting Device-Outline Registration System of Electronic Device Registration Center of JEITA.
6. Lead-free and RoHS Compliant.

RATING

Item	Rating
Category temperature range (Operating temperature)	-55 ~ +125°C
Rated Temperature (Maximum operating temperature for DC rated Voltage)	+85°C
DC rated voltage range［U_R］	See CATALOG NUMBERS AND RATING OF STANDARD PRODUCTS
Rated capacitance (Nominal capacitance range［C_R］)	
Rated capacitance tolerance	
Failure rate level	1%/1000 h

Note(1): For operation 125℃,derate voltage linearly to 67% of 85℃ voltage rating.

ORDERING INFORMATION

251	T	6301	106	M	R	06M
TYPE	SERIES	RATED VOLTAGE	CAPACITANCE	CAPACITANCE TOLERANCE	STYLE OF REELED PACKAGE	CASE CODE

Marking	Rated Voltage
4001	4VDC
6301	6.3VDC
1002	10VDC
2502	25VDC

Marking	Capacitance
684	0.68 µF
155	1.5 µF
225	2.2 µF
335	3.3 µF
475	4.7 µF
106	10 µF
156	15 µF
226	22 µF
336	33 µF
476	47 µF
686	68 µF

Marking	Capacitance Tolerance
M	±20%

(Taping specification)

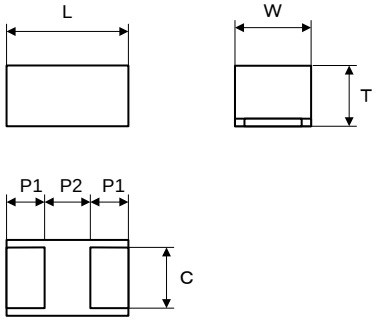
Code	Reel Size	Anode Notation
R	φ180	Feed hole:-

Case code	max. height (mm)	EIA Code
06M	0.6	1608
06S	0.6	2012
08S	0.8	2012
06A	0.6	3216

DIMENSIONS

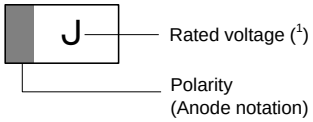
(mm)

Case Code	Max. height of component	L±0.1	W±0.1	T±0.1	P1±0.1	P2±0.1	C±0.1
06M	0.6	1.6	0.85	0.5	0.5	0.65	0.7
06S	0.6	2.0	1.25	0.5	0.5	1.05	0.9
08S	0.8	2.0	1.25	0.7	0.5	1.05	0.9
06A	0.6	3.2	1.6	0.5	0.8	1.65	1.2

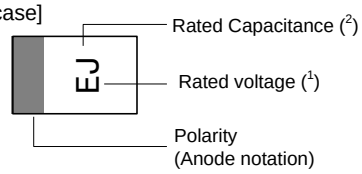


MARKING

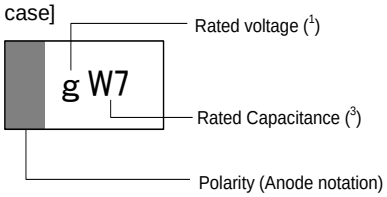
[06M case]



[06S、08S case]



[06A case]



Note(1): Rated voltage is indicated with one alphabetic letter.

Rated voltage (VDC)	4	6.3	10	25
Rated voltage code	G	J	A	E

＊The rated voltage of case 06A is indicated with a small letter g (4 V) or j (6.3 V).

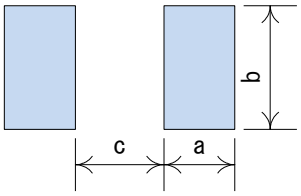
Note(2): Rated Capacitance is indicated with one alphabetic letter or the alphabetic letter with an overbar or underbar as below.

Rated capacitance (μF)	0.68	1.5	2.2	3.3	4.7	10	15	22	33	47	68
Code	W	E	J	N	S	A	E	J	N	S	W

Note(3): Rated Capacitance is indicated with one alphabetic letter and one numeral.

Code	A6	E6	J6	N6	S6	W6
Rated capacitance (μF)	1.0	1.5	2.2	3.3	4.7	6.8
Code	A7	E7	J7	N7	S7	W7
Rated capacitance (μF)	10	15	22	33	47	68

RECOMMENDED SOLDER PAD LAYOUT

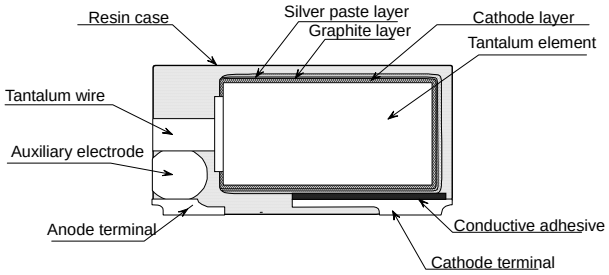


(mm)

Case Size	a	b	c	Mask Thickness
06M	more than 0.50	0.65	0.65	≦100 μm
06S, 08S	more than 0.50	0.8	1.05	≦100 μm
06A	more than 0.80	1.1	1.65	≦100 μm

In order to expect the self alignment effect, it is recommended that land width is almost the same size as terminal of capacitor,and space between lands (c) nearly equal to the space between terminals for appropriate soldering.

STRUCTURE (TYPICAL)



STANDARD RATING

R.V.(VDC) / Cap.(mF)	4	6.3	10	25
0.68				06M
1.5				06S
2.2				08S
3.3				06A
4.7			06M	
10		06M	06S	
15	06M		08S	
22		06S	06A	
33	06S	08S		
47	08S	06A		
68	06A			

PERFORMANCE

No.	Item	Performance	Test method
1	Leakage Current (μA)	Shall not exceed 0.01 CV or 0.5 whichever is greater.	JIS C 5101-1, 4.9 Applied Voltage : Rated Voltage for 5 min. Temperature : 20°C
2	Capacitance (μF)	Shall be within tolerance of the nominal value specified.	JIS C 5101-1, 4.7 Frequency : 120 Hz± 20% Voltage : 0.5Vrms+1.5 ~2VDC Temperature : 20°C
3	Dissipation Factor	Shall not exceed the values shown in CATALOG NUMBERS AND RATING OF STANDARD PRODUCTS.	JIS C 5101-1, 4.8 Frequency : 120 Hz± 20% Voltage : 0.5Vrms+1.5 ~2VDC Temperature : 20°C
4	ESR (Equivalent series resistance)	Shall not exceed the values shown in CATALOG NUMBERS AND RATING OF STANDARD PRODUCTS.	Frequency : 100kHz Temperature : 20°C
5	Characteristics at High and Low Temperature		JIS C 5101-1, 4.29
	Step 1 Leakage Current Capacitance Dissipation Factor	Shall not exceed the value in No.1. Shall be within the specified tolerance. Shall not exceed the value in No.3.	Measuring temperature : 20 ± 2°C
	Step 2 Capacitance Change Dissipation Factor	Shall be within any of the following ranges and specified according to CATALOGNUMBERS AND RATING OF STANDARD PRODUCTS. ・Within $^{0}_{-15}$ % of the value at Step 1 ・Within $^{0}_{-30}$ % of the value at Step 1 Shall not exceed the values shown in CATALOG NUMBERS AND RATING OF STANDARD PRODUCTS.	Measuring temperature : -55±3 °C
	Step 3 Leakage Current Capacitance Change Dissipation Factor	Shall not exceed the value in No.1. Shall be within ± 2% of the value at Step 1. Shall not exceed the value in No.3.	Measuring temperature : 20 ± 2°C
	Step 4 Leakage Current Capacitance Change Dissipation Factor	Shall be within any of the following ranges and specified according to CATALOG NUMBERS AND RATING OF STANDARD PRODUCTS. • Larger value of 0.1 CV or 5 μA • 0.2 CV or less Shall be within any of the following ranges and specified according to CATALOG NUMBERS AND RATING OF STANDARD PRODUCTS. • Within $^{+10}_{0}$ % of the value at Step 1 • Within $^{+20}_{0}$ % of the value at Step 1 Shall not exceed the values shown in CATALOG NUMBERS AND RATING OF STANDARD PRODUCTS.	Measuring temperature : 85±2°C
	Step 5 Leakage Current Capacitance Change Dissipation Factor	Shall be within any of the following ranges and specified according to CATALOG NUMBERS AND RATING OF STANDARD PRODUCTS. • Larger value of 0.125 CV or 6.3 μA • 0.25 CV or less Shall be within any of the following ranges and specified according to CATALOG NUMBERS AND RATING OF STANDARD PRODUCTS. • Within $^{+15}_{0}$ % of the value at Step 1 • Within $^{+20}_{0}$ % of the value at Step 1 Shall not exceed the values shown in CATALOG NUMBERS AND RATING OF STANDARD PRODUCTS.	Measuring temperature : 125±2°C Measuring voltage : Derated voltage at 125°C
	Step 6 Leakage Current Capacitance Change Dissipation Factor	Shall not exceed the value in No.1. Shall be within ± 2% of the value at Step 1. Shall not exceed the value in No.3.	Measuring temperature : 20 ± 2°C
6	Surge Leakage Current Capacitance Change Dissipation Factor Appearance	Shall be within any of the following ranges and specified according to CATALOG NUMBERS AND RATING OF STANDARD PRODUCTS. • Not exceeding the value in No.1 : Leakage current code A • Not exceeding twice the value in No.1 : Leakage current code B Shall be within any of the following ranges and specified according to CATALOG NUMBERS AND RATING OF STANDARD PRODUCTS. • Within ± 15% of the value before test • Within ± 20% of the value before test Shall not exceed the value in No.3. There shall be no evidence of mechanical damage.	JIS C 5101-1, 4.26 Test temperature and applied voltage : To each half of specimens ・ 85 ± 2°C, rated voltage × 1.15 ・ 125 ± 2°C, 2/3 × rated voltage × 1.15 Series protective resistance : 1000 Ω Discharge resistance : 1000 Ω
7	Shear Test	There shall be no evidence of mechanical damage.	JIS C 5101-1, 4.34 Capacitors mounted under conditions JIS C 5101-1, 4.33 are used as specimens. ・Soldering : Indirect heating ・Temperature : 240 ± 10°C ・Duration : 10s or less Applied pressure : 5N Duration : 10 ± 1 s

No.	Item		Performance	Test method
8	Substrate Bending Test	Capacitance Appearance	Initial value to remain steady during measurement. There shall be no evidence of mechanical damage.	JIS C 5101-1, 4.35 Bending : 1 mm
9	Vibration	Capacitance Appearance	Initial value to remain steady during measurement. There shall be no evidence of mechanical damage.	JIS C 5101-1, 4.17 Frequency range :10 ~ 55 Hz Swing width : 1.5 mm Vibration direction : 3 directions with mutually right-angled Duration : 2 hours in each of these mutually perpendicular directions (total 6 hours) Mounting : Solder terminal to the printed board
10	Shock		There shall be no intermittent contact of 0.5 ms or greater, short, or open. Nor shall there be any spark discharge, insulation breakdown, or evidence of mechanical damage.	JIS C 5101-1, 4.19 Peak acceleration : 490 m/s^2 Duration : 11 ms Wave form : Half-sine
11	Solderability		The terminal surface shall be completely covered with solder (there shall be no pin-holes, no-wetting or solder repelling).	JIS C 5101-1, 4.15 Solder temperature : 235 ± 5°C Dipping time : 2 to 0.5 s Dipping depth : Terminal shall be dipped into melted solder.
12	Resistance to Soldering Heat	Leakage Current Capacitance Change Dissipation Factor Appearance	Shall be within any of the following ranges and specified according to CATALOG NUMBERS AND RATING OF STANDARD PRODUCTS. · Not exceeding the value in No.1 : Leakage current code A · Not exceeding twice the value in No.1 : Leakage current code B Shall be within any of the following ranges and specified according to CATALOG NUMBERS AND RATING OF STANDARD PRODUCTS. ·Within ± 15% of the value before test ·Within ± 20% of the value before test Shall not exceed the value in No.3. There shall be no evidence of mechanical damage.	IR reflow method Preheating : 130 ~ 160°C for about 60 sec. Reflow : 200°C, less than 60 sec. Peak: 260°C max. Number of cycles : 2
13	Component solvent resistance	Leakage Current Capacitance Change Dissipation Factor	Shall not exceed the value in No.1. Shall be within ± 15% of initial value. Shall not exceed the value in No.3.	JIS C 5101-1, 4.31 Temperature : 23 ± 5°C Dipping time : 5 ± 0.5 min. Conditioning : JIS C 0052 method 2 Solvent : 2-propanol (Isopropyl alcohol)
14	Solvent resistance of marking	Visual examination	After the test the marking shall be legible.	JIS C 5101-1, 4.32 Temperature : 23 ± 5°C Dipping time : 5 ± 0.5 min. Conditioning : JIS C 0052 method 1 Solvent : 2-propanol (Isopropyl alcohol) Rubbing material : cotton wool
15	Rapid Change of Temperature	Leakage Current Capacitance Change Dissipation Factor Appearance	Shall not exceed twice the value in No.1 Shall be within any of the following ranges and specified according to CATALOG NUMBERS AND RATING OF STANDARD PRODUCTS. ·Within ± 15% of the value before test ·Within ± 20% of the value before test Shall not exceed 150% of the value in No.3. There shall be no evidence of mechanical damage.	JIS C 5101-1, 4.16 Step 1 : -55 ± 3°C, 30 ± 3 min. Step 2 : 25 $^{+10}_{-5}$ °C, 3 min. max. Step 3 : 125 ± 2°C, 30 ± 3 min. Step 4 : 25 $^{+10}_{-5}$ °C, 3 min. max. Number of cycles : 5
16	Damp heat, Steady state	Leakage Current Capacitance Change Dissipation Factor Appearance	Shall not exceed twice the value in No.1 Shall be within any of the following ranges and specified according to CATALOG NUMBERS AND RATING OF STANDARD PRODUCTS. ·Within ± 15% of the value before test ·Within ± 20% of the value before test Shall not exceed 150% of the value in No.3. There shall be no evidence of mechanical damage.	JIS C 5101-1, 4.22 Temperature : 40 ± 2°C Moisture : 90 ~ 95%RH Duration : 500 $^{+24}_{0}$ h
17	Endurance	Leakage Current Capacitance Change Dissipation Factor Appearance	Shall not exceed twice the value in No.1 Shall be within any of the following ranges and specified according to CATALOG NUMBERS AND RATING OF STANDARD PRODUCTS. ·Within ± 15% of the value before test ·Within ± 30% of the value before test Shall not exceed 150% of the value in No.3. There shall be no evidence of mechanical damage.	JIS C 5101-1, 4.23 Test temperature and applied voltage : 85 ± 2°C and rated voltage or 125 ± 3°C and 2/3 × rated voltage Duration : 2000 $^{+72}_{0}$ h Power supply impedance : 3 Ω or less

CATALOG NUMBERS AND RATING OF STANDARD PRODUCTS

October, 2012

Catalog number(1)	Rated voltage	Surge voltage VDC		Capacitance	Tolerance	Case code	Lct. μA			Capacitance change (ΔC/C)%			Max. Dissipation factor				ESR Ω	Surge		Resistance to Soldering heat		Rapid change of temperature /Damp heat	Endurance
	VDC	85℃	125℃	μF	±%		20℃	85℃	125℃	-55℃	85℃	125℃	-55℃	20℃	85℃	125℃	100kHz	Lct(2)	ΔC/C%	Lct(2)	ΔC/C%	ΔC/C%	ΔC/C%
251 T 4001 156 M_1 06 M	4	4.6	3	15	20	06M	0.6	12	15	-30/0	0/+20	0/+20	0.30	0.15	0.30	0.30	15	B	±20	B	±20	±20	±30
251 T 4001 336 M_1 06 S	4	4.6	3	33	20	06S	1.3	26	33	-30/0	0/+20	0/+20	0.30	0.15	0.30	0.30	3	B	±20	B	±20	±20	±30
251 T 4001 476 M_1 08 S	4	4.6	3	47	20	08S	1.9	38	47	-30/0	0/+20	0/+20	0.40	0.20	0.40	0.40	4	B	±20	B	±20	±20	±30
251 T 4001 686 M_1 06 A	4	4.6	3	68	20	06A	2.7	54	68	-30/0	0/+20	0/+20	0.36	0.18	0.30	0.30	2	B	±20	B	±20	±20	±30
251 T 6301 106 M_1 06 M	6.3	7.2	4.8	10	20	06M	0.6	13	16	-30/0	0/+20	0/+20	0.30	0.15	0.30	0.30	15	B	±20	B	±20	±20	±30
251 T 6301 226 M_1 06 S	6.3	7.2	4.8	22	20	06S	1.4	28	35	-30/0	0/+20	0/+20	0.30	0.15	0.30	0.30	3	B	±20	B	±20	±20	±30
251 T 6301 336 M_1 08 S	6.3	7.2	4.8	33	20	08S	2.1	42	52	-30/0	0/+20	0/+20	0.40	0.20	0.40	0.40	4	B	±20	B	±20	±20	±30
251 T 6301 476 M_1 06 A	6.3	7.2	4.8	47	20	06A	3.0	59	74	-30/0	0/+20	0/+20	0.32	0.16	0.32	0.32	2	B	±20	B	±20	±20	±30
251 T 1002 475 M_1 06 M	10	11.5	7.6	4.7	20	06M	0.5	10	13	-30/0	0/+20	0/+20	0.24	0.12	0.24	0.24	15	B	±20	B	±20	±20	±30
251 T 1002 106 M_1 06 S	10	11.5	7.6	10	20	06S	1.0	20	25	-30/0	0/+20	0/+20	0.16	0.08	0.16	0.16	3	B	±20	B	±20	±20	±30
251 T 1002 156 M_1 08 S	10	11.5	7.6	15	20	08S	1.5	30	38	-30/0	0/+20	0/+20	0.30	0.15	0.30	0.30	4	B	±20	B	±20	±20	±30
251 T 1002 226 M_1 06 A	10	11.5	7.6	22	20	06A	2.2	44	55	-30/0	0/+20	0/+20	0.24	0.12	0.24	0.24	2	B	±20	B	±20	±20	±30
251 T 2502 684 M_1 06 M	25	28.7	19.1	0.68	20	06M	0.5	5	6.3	-15/0	0/+10	0/+15	0.16	0.08	0.08	0.08	15	B	±15	B	±15	±15	±15
251 T 2502 155 M_1 06 S	25	28.7	19.1	1.5	20	06S	0.5	5	6.3	-15/0	0/+10	0/+15	0.12	0.06	0.12	0.12	8	B	±15	B	±15	±15	±15
251 T 2502 225 M_1 08 S	25	28.7	19.1	2.2	20	08S	0.6	5.5	6.9	-15/0	0/+10	0/+15	0.12	0.06	0.12	0.12	6	B	±15	B	±15	±15	±15
251 T 2502 335 M_1 06 A	25	28.7	19.1	3.3	20	06A	0.8	8.0	10	-15/0	0/+10	0/+15	0.12	0.06	0.12	0.12	6	B	±15	B	±15	±15	±15

Note (1): No code for single item. “R” for taping specification into _1.

(2): Lct. Code … A: Not exceeding the value of initial specification B: Not exceeding twice the value of initial specification

Application Notes for Tantalum Solid Electrolytic Capacitor

1. Operating Voltage

Tantalum Solid Electrolytic Capacitor shall be operated at the rated voltage or lower.
Rated voltage: The "rated voltage" refers to the maximum DC voltage that is allowed to be continuously applied between the capacitor terminals at the rated temperature.
Surge voltage: The "surge voltage" refers to the voltage that is allowed to be instantaneously applied to the capacitor at the rated temperature or the maximum working temperature. The capacitor shall withstand the voltage when a 30-second cycle of application of the voltage through a 1000 Ω series resistance is repeated 1000 times in 6-minute periods.
When designing the circuit, the equipment's required reliability must be considered and appropriate voltage derating must be performed.

2. Application that contain AC Voltage

Special attention to the following 3 items.
(1) The sum of the DC bias voltage and the positive peak value of the AC voltage should not exceed the rated voltage.
(2) Reverse voltage should not exceed the allowable values of the negative peak AC voltage.
(3) Ripple current should not exceed the allowable values.

3. Reverse Voltage

Tantalum solid electrolytic capacitor is polarity. Please do not impress reverse voltage. As well, please confirm the potential of the tester beforehand when both ends of the capacitor are checked with the tester etc.

4. Permissible Ripple Current

The permissible ripple current and voltage at about 100 kHz or higher can be determined by the following formula from the permissible power loss (Pmax value)shown in Table 1 and the specified ESR value. However, when the expected operating temperature is higher than room temperature, determine the permissible values multiplying the Pmax value by the specified multiplier (Table 2). For the permissible values at different frequencies, consult our Sales Department.

$P=I^2 \times ESR$ or $P=\frac{E^2 \times ESR}{Z^2}$

Permissible ripple current $Imax=\sqrt{\frac{P\max}{ESR}}$ (Arms)

Permissible ripple voltage $Emax=\sqrt{\frac{P\,max}{ESR}} \times Z$

$= Imax \times Z$ (Vrms)

Imax : Permissible ripple current at regulated frequency (Arms : RMS value)
Emax : Permissible ripple voltage at regulated frequency (Vrms : RMS value)
Pmax : Permissible power loss (W)
ESR : Specified ESR value at regulated frequency (Ω)
Z : Impedance at regulated frequency (Ω)

Table 1 Permissible power loss

Case size	Pmax（W）
06M	0.050
06S	0.065
08S	0.065
06A	0.078

Table 2 Pmax multiplier at each operating temperature

Operating temperature (℃)	Multiplier
25	1.0
55	0.9
85	0.8
125	0.4

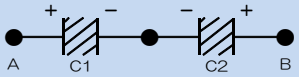
Note: Above values are measured at 0.8t glass epoxy board mounting in free air and may be changed depending on the kind of board, packing density, and air convection condition. Please consult us if calculated power loss value is different from above list of P max value.

5. Application on low-impedance circuit

The failure rate of low impedance circuit at 0.1Ω/V is about five times greater than that of a 1Ω/V circuit. To curtail this higher failure rate, tantalum capacitors used in low impedance circuits, such as filters for power supplies, particularly switching power supplies, or for noise by-passing, require that operating voltage be derated to less than half of the rated voltage. Actually, less than 1/3 of the rated voltage is recommended.

6. Non Polar Application(BACK TO BACK)

Tantalum capacitors can be used as a non-polar unit if two capacitors are connected "BACK-TO-BACK" when reserve voltage is applied at a more than permissible value, or in a purely AC circuit. The two capacitors should both be of the same rated voltage and capacitance tolerance, and they should both be twice the required capacitance value.



Ripple Voltage: Permissible Ripple Voltage shall not exceed the value allowed for either C1 or C2 (This will be the same, as the capacitors should be identical.)
Capacitance: (C1 × C2) / (C1 + C2)
Leakage Current: If terminal A is (+), the Leakage Current will be equal to C1's Leakage Current.
If terminal B is (+), the Leakage Current will be equal to C2's Leakage Current.

7. Soldering

7.1. Preheating

To obtain optimal reliability and solderability conditions, capacitors should be pre-heated at 130 to 200 °C for approximately 60 to 120 seconds.

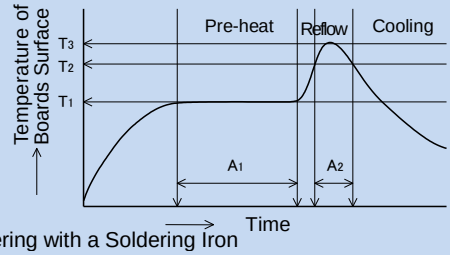
7.2. Soldering

The body of the capacitor shall not exceed 260 °C during soldering.
(1) Reflow Soldering
Reflow soldering is a process in which the capacitors are mounted on a printed board with solder paste. There are two methods of Reflow Soldering: Direct and Atmospheric Heat.
· Direct Heat (Hot plate)
During the Direct Heat method, the capacitor has been positioned on a printed board, which is then placed upon a hot plate. The capacitor maintains a lower temperature than the substrate, which in turn stays at a lower temperature than the hot plate.
· Atmospheric Heat

a) VPS (Vapor Phase Soldering)
During VPS,the substrate is heated by an inert liquid with a high boiling point. The temperature of the capacitor's body and the temperature of the substrate are about the same as the atmosphere. This temperature should be below 240°C.

b) Near and Far IR Ray
Due to the heat absorption of the capacitor's body, the internal temperature of the capacitors may be 20 ~ 30°C higher than the setting temperature and may exceed 260°C.
Temperature control is crucial in maintaining a temperature of 260 °C or lower.

c) Convention Oven
An infrared ray is the main source of heat in this process. The temperature of the substrate and the capacitors can be maintained at a similar level by the circulation of heated air, or an inert gas.



Temperature	Time
T1=130℃～200℃	A1= 60～120sec.
T2=220℃～230℃	A2＜60sec.
T3=～260℃	10 sec. or less than 10

Number of times：2 times max..

(2) Soldering with a Soldering Iron
Soldering with a soldering iron cannot be recommended due to the lack of consistency in maintaining temperatures and process times. If this method should be necessary, the iron should never touch the capacitor's terminals, and the temperature of the soldering iron should never exceed 350°C. The application of the iron should not exceed 5 seconds.
(3) Please consult us for other methods.

8. Cleaning
Cleaning by organic solvent may damage capacitor's appearance and performance.However, our capacitors are not effected even when soaked at 20 ~ 30°C 2-propanol for 5 minutes. When introducing new cleaning methods or changing the cleaning term, please consult us.

9. Protective Resin Coating
After components are assembled to substrate, a protective resin coating is sometimes applied. As this resin coating cures, it gives mechanical and thermal stress to Tantalum capacitors. This stress can cause damage to the capacitors, which affects their reliability. Before using a resin coating, proper research must be done in regards to the material and process to insure that excessive stress will not be applied to capacitors and other components.

10. Vibration
Approximately 300 G shall be applied to a capacitor, when dropped from 1 meter to a concrete floor.
Although capacitors are made to withstand this drop test, stress from shock due to falling or striking does cause damage to the capacitors and increases failure rates. Do not subject capacitors to this type of mechanical stress.

11. Ultrasonic cleaning
Matsuo does not recommend Ultrasonic cleaning. This may cause damage to the capacitors, and may even cause broken terminals. If the Ultrasonic cleaning process will be used, please note the following:
(1)The solvent should not be boiled. (Lower the ultrasonic wave output or use solvent with The high boiling point.)
(2)The recommended wattage is less than 0.5 watts per cm^2.
(3)The cleaning time should be kept to a minimum. Also, samples must be swang in the solvlent. Please consult us.

12. Additional Notes
· When more than one capacitor is connected in series, a resistor that can distribute the voltage equally to the capacitors shall be connected in parallel.
· The capacitor cases shall not be cut even if the mounting space is insufficient.
· During a customers aging process, voltage should remain under the rated voltage at all times.
· Capacitors should never be touched or manipulated while operating.
· Capacitors are not meant to be dismantled.
· When testing capacitors, please examine the power source before conducting test to insure the tester's polarity and applied voltage.
· In the event of a capacitor burning, smoking, or emitting an offensive smell during operation, please turn the circuit "off" and keep hands and face away from the burning capacitor.
· If a capacitor be electrical shorted, it becomes hot, and the capacitor element may ignite. In this case, the printed board may be burnt out.
· Capacitors should be stored at room temperature under low humidity. Capacitors should never be stored under direct sunlight, and should never be stored in an environment containing dust.
· If the capacitors will be operated in a humid environment, they should be sealed with a compound under proper conditions.
· Capacitors should not be stored or operated in environments containing acids, alkalis or active gasses.
· When capacitors are disposed of as "scrap" or waste, they should be treated as Industria Waste since they contain various metals and polymers.
· Capacitors submitted as samples should not be used for production purposes.

These application notes are prepared based on "Guideline of notabilia for fixed tantalum electrolytic capacitors with solid electrolyte for use in electronic equipment" (EIAJ RCR-2368) issued by Japan Electronics and Information Technology Industries Association (JEITA). For the details of the instructions (explanation, reasons and concrete examples), please refer to this guideline, or consult our Sales Department.

MATSUO ELECTRIC CO., LTD.

Please feel free to ask our Sales Department for more information on Tantalum Solid Electrolytic Capacitor .

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