Tel: +86 (0)769 8252 3211
Skype: topdiode
Email: info@topdiode.com
Website: www.topdiode.com

Application Guidelines For Tantalum Electroilytic Capacitors

For obtaining the most stable quality and sufficient Performance of the tantalum electrolytic capacitors,appropriate use must be made. Before use, confirm the use conditions and rating performance of the capacitors, and observe conditions specified by the specification. If use conditions you are going to apply are out of the specified range or are not specified,consult us by clarifying the conditions.

Failure rate of capacitors is greatly affected by the ratio of the use voltage and the rated voltage(derating ratio). In designing circuits, reduce voltage appropriately by sufficiently considering required reliability of the equipment.

1.Design of Circuit

1.1 Operating Voltage

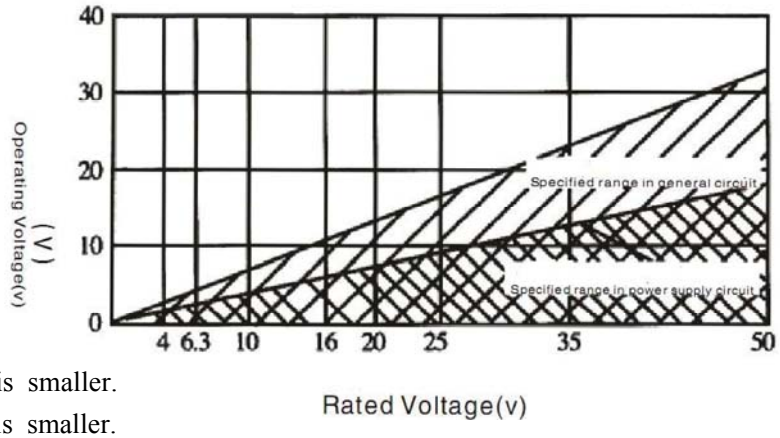
Failure rate of capacitors is greatly affected by the ratio of the use voltage and the rated voltage(derating ratio). In designing circuits, reduce voltage appropriately by sufficiently considering required reliability of the equipment.

- For circuits with low resistance circuit, make the use voltage be 1/3 or under of the rated voltage, in general circuits, make the use voltage be 2/3 or under of the rated voltage, as shown in the below figure.
- In the case of low impedance circuit connected in parallel with a tantalum capacitor, it is likely that the capacitor is at the risk of failure caused by DC surge current, meanwhile please note charge stored in parallel- capacitor shall be discharged through other capacitors.
- In case of circuits with large instantaneous rush current or rapid charging/discharging circuits, connect the protection resistor of 3Ω/Vor 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.

1.2 Reverse voltage

The tantalum capacitors must not be operated and changed in reverse mode. And also the capacitors must not be used in an only AC circuit.

- When using the capacitors in circuit in which a reverse voltage is applied , if the application of an reverse voltage is applied. unavoidably, it must not exceed the following values:



At 25℃: 10% of the rate voltage (U) or 1V, whichever is smaller.
At 85℃: 5% of the rate voltage (U) or 1V, whichever is smaller.

Tel: +86 (0)769 8252 3211
Skype: topdiode
Email: info@topdiode.com
Website: www.topdiode.com

Application Guidelines For Tantalum Electroilytic Capacitors

●In the case of pronged application of the capacitors in circuit where a reverse voltage is applied, it is recommended to select non-polar tantalum capacitors.
●Silver-cased wet tantalum electrolytic capacitors can not withstand reverse voltage.
●In principle, testing a circuit or a tantalum capacitor regardless the polarity is not allowable by using a multimeter.
●During measurement, if a reverse voltage is accidentally applied to the capacitor, the capacitor should be discarded even though all electrical parameters are still acceptable.

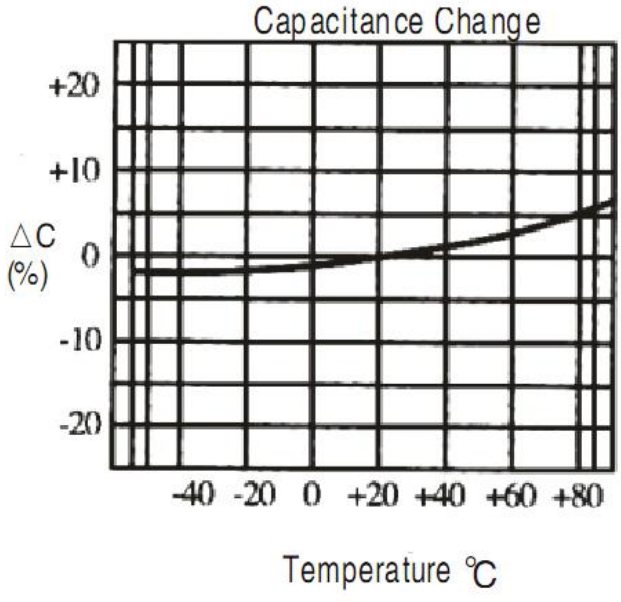
1.3 Ripple voltage

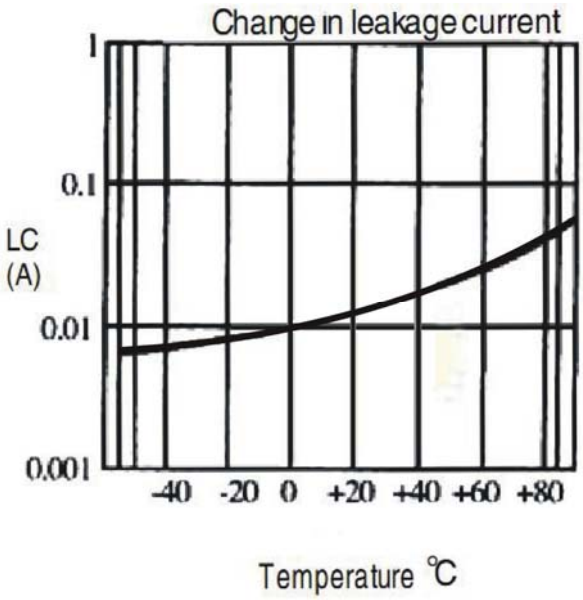
Use the capacitors within the permissible ripple voltage specified independently.

●Use in the range that the sum of the DC voltage values and the peak value of ripple Vortage dose not exceed the rated voltage .
●The sum of the applied DC bias voltage and the negative peak of the AC voltage must not allow a voltage reversal in excess of the "Reverse Voltage ".
●Reverse current causes loss of active power when passing through tantalum capacitor and there by temperature rise in the capacitor itself result in increasing probability of thermal breakdown failure, so it is necessary to limit the ripple current passing through the capacitor or permissible power loss of capacitance.

1.4 Environment temperature

Use the capacitor within the specified use temperature range
●In case use temperature exceeds +85℃, apply the reduced voltage as the rated voltage.
●Since temperature reliability is one of the electric properties of the capacitors, in case of greatly changing use environment temperature, carefully check circuit properties at the upper/lower limits of the use temperature. Typica examples are shown in the blow figure.



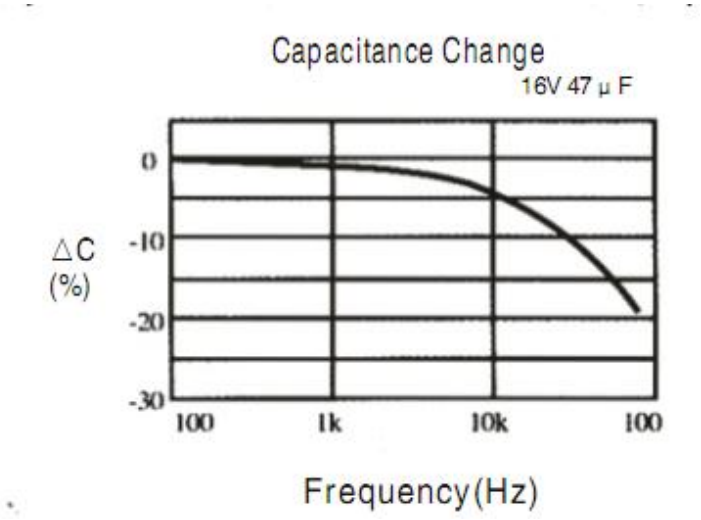


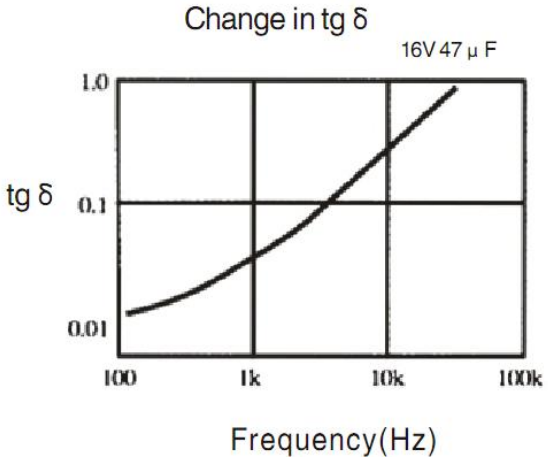
Tel: +86 (0)769 8252 3211
Skype: topdiode
Email: info@topdiode.com
Website: www.topdiode.com

Application Guidelines For Tantalum Electroilytic Capacitors

1.5 Frequency Dependence

In the frequency zone of 10 KHz or more, electric property of the capacitor is changed greatly. In using in high-frequency circuits, carefully check on circuit properties. Typical examples are shown in the below figure.





1.6 Reliability

Failure rate of capacitors differs according to use conditions (ambient temperature, applied voltage,circuit resistance, use circuits, etc) Select capacitors to obtain margin by fully examining use conditions.

●Capacitors are designed with reference to failure rate per 1000 hours in applying rated voltage at +85℃. It is necessary to adopt voltage derating design in actual use to prevent from shock of current inrush and ripple current or other accidental electrical shock . It is recommended to make the voltage be under 65% of the rate voltage.

●Always consider safety when designing equipment and circuits. Plan for worst case failure modes such as short circuits and open circuits which could occur during use.

A. Provide protection circuits and protection devices to allow safe failure modes .

B. Design redundant or secondary circuits where possible to assure continude operation in case of main circuit failure.

2.Capac itor Mount ing Precaut ions

In mounting the capacitor to the circuit boards, in case of loading excessive mechanical stress, heat stress, etc., deterioration of electric, properties short circuit and open circuit will occur. Use after sufficiently checking on mounting conditions .

2.1 Processing and Measurement

● Do not remove or flaw the body of capacitor and plating of the lead wire terminal, and do not apply strong force in using .

Tel: +86 (0)769 8252 3211
Skype: topdiode
Email: info@topdiode.com
Website: www.topdiode.com

Application Guidelines For Tantalum Electroilytic Capacitors

●Do not use dropped capacitors and capacitors mounted once.
●After mounting, do not process the capacitors or bend the terminals.

2.2 Ci rcui t Boar d Cleaning

Surely remove flux used in soldering and wash away acid and alkali. In cleaning, perform within 5 minutes of ultrasonic, vapor and dipping washing at not more than 50℃. In some ultrasonic cleaning conditions, the terminals may be broken .

2.3 Soldering

2.3.1 In case of soldering by soldering iron

In using the soldering iron (30 w or under), solder at the iron tip temperature not more than 350℃ within 4 seconds. Do not touch the iron tip to the body of molded capacitor.

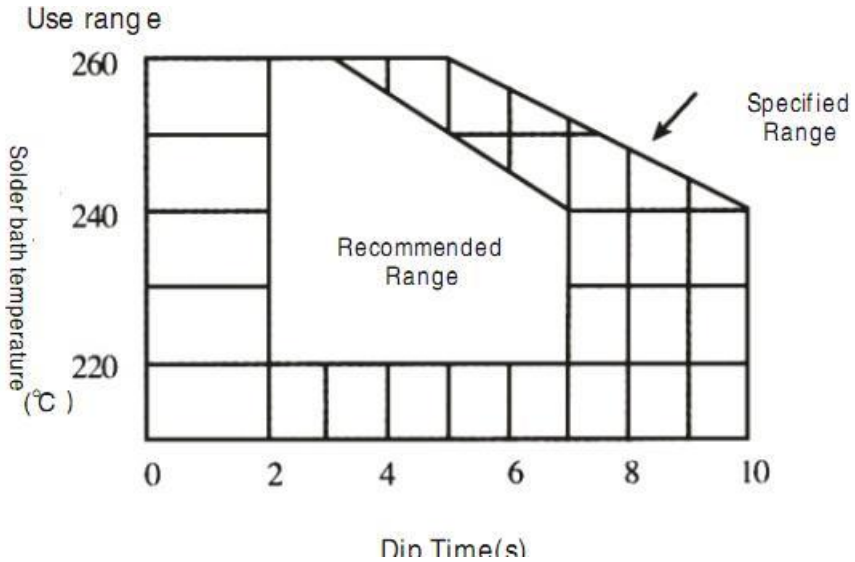
2.3.2 In case of chip type solder ing

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

●Temperature given to the parts may differ according to board type, size, parts mounting density, etc., requiring sufficient checking.
● Chip type capacitors can be appl ied to both flowmethod and reflow method . Take the conditions belowshown .

A. Flow method(solder bat h dippi ng method)

Parts fixed to the board with adhesive, and directly dipped into the solder bath.



Notices:

●When parts mounting density is high, solderabiliity may be decreased. Take notice to degas.
●Perform pre-heat at 160℃max. within 2minutes, Cool after soldering.

Tel: +86 (0)769 8252 3211
Skype: topdiode
Email: info@topdiode.com
Website: www.topdiode.com

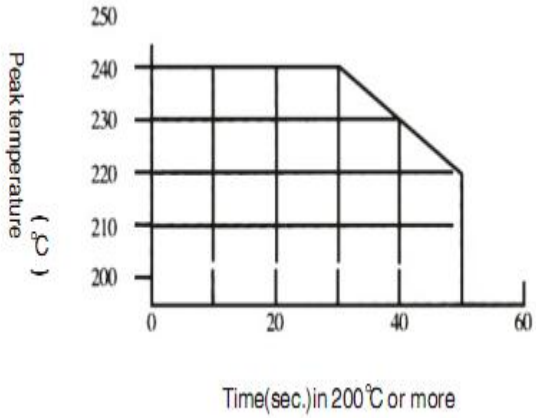
Application Guidelines For Tantalum Electroilytic Capacitors

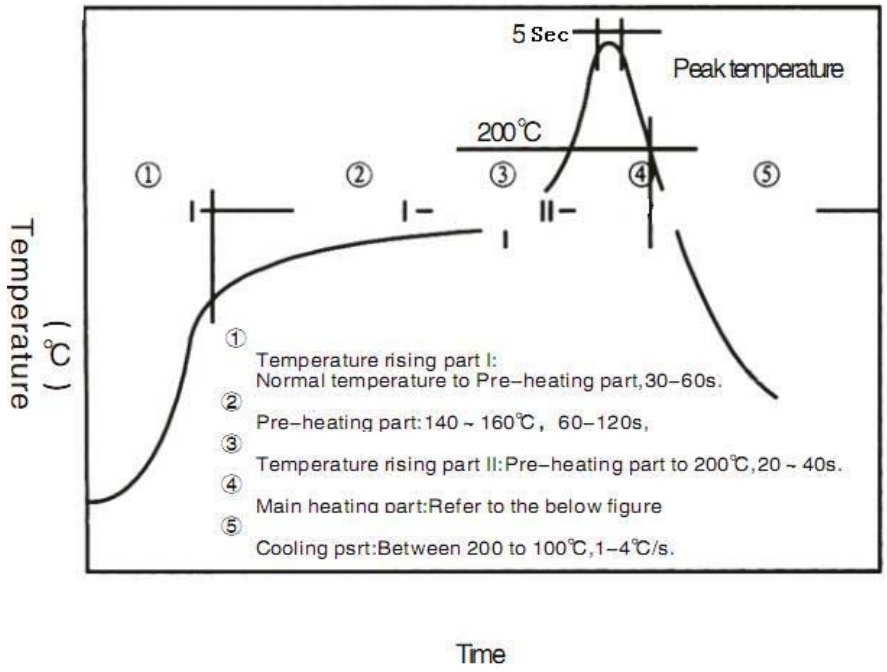
B. Reflow Method (Atmosphere heating method)

Notices

●Measure temperature profi le at the part surface

●Do not perform reflow more than twice





●When performing soldering by the heat source contact method (hot plate method) and vapor phase soldering (VPS) method, consult individually.

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

3. In Using

3.1 Envi ronment al Condi tions

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 exposed to direct sunl ight.

●Environment in high temperature and humidity causing dewing on capacitor surface.

●Environment where capacitors touch various active gases.

●Acid and alkal ine atmosphere.

●Environment with high frequency induction.

●Environment with excessive vibration and shock.

Tel: +86 (0)769 8252 3211
Skype: topdiode
Email: info@topdiode.com
Website: www.topdiode.com

Application Guidelines For Tantalum Electroilytic Capacitors

3.2 Maintena nce/ Inspec tion

When testing the capacitor terminals with the tester, etc., check on potential and polarity of the tester beforehand. If reverse voltage is applied to the capacitor, short circuit may occur. When testing by touching the electrodes during turing ON, do not touch terminals of other parts or do not bend the capacitor terminals.

3.3 Emergency Procedures

When bad smell or smoke are generated during turning ON power supply, immediately turn OFF power supply ,and when burning, do not let face and hands come near the equipment. If the capacitor is short-circuit, the armor resin may emit smoke or tantalum element may.

4. Long Term Storage

Storing period is 10 years after manufacturing , in principle (excluding solder-ability)

●In order to assure use, tantalum capacitors stored for over two years or processed through dipping molten solder prior to using are preferably applied rated voltage while inherent resistance of the power supply is not more than 3Ω(For non-solid tantalum capacitor, connect a protection resistor 1100Ω max.in series to the capacitor). and withstand aging at 85℃ for 4-8 hours, then make measurement. The lead terminals of at non-polar tantalum capacitor are reversed once every one hour and measurement of DC leakage current is also conducted on the two lead terminals respectively.

●Store the capacitors in the package not to be exposed to direct sunlight and dust. Store in the environment holding ordinary temperature (-10~+40℃) and ordinary humidity (60% R.H. or under).

●If left in the atmosphere of high temperature and high humidity for a long time, solder-ability of the terminals is decreased and performance of the capacitors is lowered.