Notice for TAIYO YUDEN products

Please read this notice before using the TAIYO YUDEN products.

⚠ REMINDERS

- Product information in this catalog is as of October 2013. All of the contents specified herein are subject to change without notice due to technical improvements, etc. Therefore, please check for the latest information carefully before practical application or usage of the Products.

  Please note that TAIYO YUDEN CO., LTD. shall not be responsible for any defects in products or equipment incorporating such products, which are caused under the conditions other than those specified in this catalog or individual specification.

- Please contact TAIYO YUDEN CO., LTD. for further details of product specifications as the individual specification is available.

- Please conduct validation and verification of products in actual condition of mounting and operating environment before commercial shipment of the equipment.

- All electronic components or functional modules listed in this catalog are developed, designed and intended for use in general electronics equipment.(for AV, office automation, household, office supply, information service, telecommunications, (such as mobile phone or PC) etc.). Before incorporating the components or devices into any equipment in the field such as transportation,(automotive control, train control, ship control), transportation signal, disaster prevention, medical, public information network (telephone exchange, base station) etc. which may have direct influence to harm or injure a human body, please contact TAIYO YUDEN CO., LTD. for more detail in advance.
  Do not incorporate the products into any equipment in fields such as aerospace, aviation, nuclear control, submarine system, military, etc. where higher safety and reliability are especially required.

  In addition, even electronic components or functional modules that are used for the general electronic equipment, if the equipment or the electric circuit require high safety or reliability function or performances, a sufficient reliability evaluation check for safety shall be performed before commercial shipment and moreover, due consideration to install a protective circuit is strongly recommended at customer's design stage.

- The contents of this catalog are applicable to the products which are purchased from our sales offices or distributors (so called "TAIYO YUDEN's official sales channel").
  It is only applicable to the products purchased from any of TAIYO YUDEN's official sales channel.

- Please note that TAIYO YUDEN CO., LTD. shall have no responsibility for any controversies or disputes that may occur in connection with a third party's intellectual property rights and other related rights arising from your usage of products in this catalog. TAIYO YUDEN CO., LTD. grants no license for such rights.

- Caution for export
  Certain items in this catalog may require specific procedures for export according to "Foreign Exchange and Foreign Trade Control Law" of Japan, "U.S. Export Administration Regulations", and other applicable regulations. Should you have any question or inquiry on this matter, please contact our sales staff.

CYLINDER TYPE LITHIUM ION CAPACITORS

Manual Soldering

FEATURES

- Lithium Ion Capacitor (LIC) is one of the Hybrid Capacitors to which the reaction of EDLC and that of lithium-ion battery are adopted.
- LIC applies the reaction of lithium-ion battery with anode, therefore it has extremely large capacitance. (about twice as large as conventional EDLC)
- The technique of doping lithium-ions to the anode previously (pre-doping) makes a cell voltage of 3.8V attainable.
- In spite of a high output voltage, damages to the electrodes can be repressed because of low electrode's potential due to pre-doping technique. Therefore LIC shows excellent performance of cycle life.
- LIC is environmentally friendly power source, which does not contain any heavy metals such as Cd, Hg and Pb. (RoHS compliant)

APPLICATIONS

- Storage power source combined with solar cell, fuel cell, generator, and so on.
- Main power source for small devices (machine tools, measuring equipments, toys, and so on).
- Load charge leveling (life lengthening of main power source such as dry battery, Lithium primary battery)

ORDERING CODE

L I C 2 5 4 0 R △ 3 R 8 2 0 7

❶Type	
LIC	Lithium Ion Capacitors

❷Dimensions/ φD [mm]	
12	12.5
18	18
25	25

❸Dimensions/ L [mm]	
35	35
40	40

❹Shape	
R△	Cylinder type

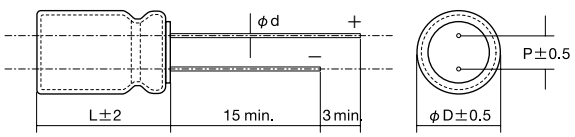
△=Blank space

❺Maximum Usable Voltage (V)	
3R8	3.8

※R=decimal point

❻Nominal Capacitance (F)	
406	40
107	100
207	200
277	270

EXTERNAL DIMENSIONS



Part Number	φD	L	φd	P
LIC1235R 3R8406	12.5	35.0	0.8	5.0
LIC1840R 3R8107	18.0	40.0	0.8	8.0
LIC2540R 3R8207	25.0	40.0	1.0	13.0
LIC2540R 3R8277				

Unit : mm

PART NUMBERS

Part Number	Voltage Range (V)	Min. Voltage (V)	Nominal Capacitance (F)	Internal Resistance (mΩ)
LIC1235R 3R8406	3.8	2.2	40	150
LIC1840R 3R8107			100	100
LIC2540R 3R8207			200	50
LIC2540R 3R8277			270	50

SPECIFICATIONS

Part Number	Operating Temp. Range (℃)	Max.Usable Voltage (V)	Min.Operating voltage (V)	Initial Capacitance (F)	Initial Internal Resistance (mΩ)	High Temp. Load Test
LIC1235R 3R8406	−25～+70(85)	3.8 (3.5)	2.2	40±20%	Under 150	Lowest temperature(−25℃) Capacitance : Over 60% of initial spec. Internal Resistance : Within 10times of initial spec. Highest temperature70℃ (85℃) Capacitance,Internal Resistance : Within initial spec.
LIC1840R 3R8107				100±20%	Under 100	
LIC2540R 3R8207				200±20%	Under 50	
LIC2540R 3R8277	−25～+60			270±20%	Under 50	

RELIABILITY DATA

Items	Specifications	Test Conditions, Remark
1. Operating Temperature range	−25～+70℃(LIC2540R 3R8277 : −25～+60℃)	
2. Max. Usable Voltage	3.8V	
3. Min. Operating Voltage	2.2V	
4. Floating Charge Characteristics	Capacitance : Over 70% of initial spec. Internal Resistance : Within 2times of initial spec. Appearance : No noticeable abnormality	Apply a max.usable voltage to capacitor for 1000hours at max. operating temp. and measure the floating charge characteristics after returning to normal temperature and humidity.
5. Charge/Discharge Cycle Characteristics	Capacitance : Over 70% of initial spec. Internal Resistance : Within 2times of initial spec. Appearance : No noticeable abnormality	Measure the charge/discharge cycle characteristics after 10000 charge/discharge cycle at 25±5℃ with under mentioned charge/discharge cycle test condition.
6. Thermal Durability	Capacitance : Over 70% of initial spec. Internal Resistance : Within 2times of initial spec. Appearance : No noticeable abnormality	Leave the capacitor in an atmosphere of 70℃±2℃ (LIC2540R 3R8277 : −25～+60 ℃) and −25±2 ℃ consecutively for 96 hours each, and return to normal temperature and humidity.
7. Humidity Durability	Capacitance : Over 70% of initial spec. Internal Resistance : Within 2times of initial spec. Appearance : No noticeable abnormality	Temperature : 40±2℃, Humidity : 90～95%RH Leave the capacitor for 500 hours, and return to normal temperature and humidity.
8. Impact Durability	No exterior abnormality observed : initial spec. values retained	According to JIS C 0041, Half-sine wave A=294
9. Vibration Durability	No exterior abnormality observed : initial spec. values retained	Apply a sine wave vibration with 1.5mm of amplitude and 10−55Hz of frequency for 2 hours per each of 3 directions (X, Y, Z), (totally 6hours).
10. Soldering	Capacitance : Within initial spec. Internal Resistance : Within initial spec. Appearance : No noticeable abnormality	Material:Sn-3Ag-0.5Cu Solder bath temperature : 235±5℃ Dipping time : 2±0.5 sec. Depth of Immersion : Up to 1.5−2.0mm from the lower end of cell body

- Charge/Discharge Cycle Test Condition

Part Number	LIC1235R 3R8406	LIC1840R 3R8107	LIC2540R 3R8207	LIC2540R 3R8277
Charging Voltage (V)	3.8	3.8	3.8	3.8
Charging Time (s)	1	1	1	1
Max. Charging Current (A)	2	2	5	5
Discharging Current (A)	2	2	5	5
Cut off Voltage (V)	2.2	2.2	2.2	2.2

▶ This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification. For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (http://www.ty-top.com/) .

CYLINDER TYPE LITHIUM ION CAPACITOR

■RELIABILITY DATA

1. Operating Temperature range	
Specified Value	−25～＋60℃

2. Max. Usable Voltage	
Specified Value	3.8V

3. Min. Operating Voltage	
Specified Value	2.2V

4. Floating Charge Characteristics	
Specified Value	Capacitance : Over 70% of initial spec. Internal Resistance : Within 2times of initial spec. Appearance : No noticeable abnormality
Test Methods and Remarks	Apply a max.usable voltage to capacitor for 1000hours at max. operating temp. and measure the floating charge characteristics after returning to normal temperature and humidity.

5. Charge/Discharge Cycle Characteristics	
Specified Value	Capacitance : Over 70% of initial spec. Internal Resistance : Within 2times of initial spec. Appearance : No noticeable abnormality
Test Methods and Remarks	Measure the charge/discharge cycle characteristics after 10000 charge/discharge cycle at 25 ± 5 ℃ with under mentioned charge/discharge cycle test condition.

Charge/Discharge Cycle Test Condition

Part Number	LIC1235R 3R8406	LIC1840R 3R8107	LIC2540R 3R8207
Charging Voltage (V)	3.8	3.8	3.8
Charging Time (s)	1	1	1
Max. Charging Current (A)	2	2	5
Discharging Current (A)	2	2	5
Cut off Voltage (V)	2.2	2.2	2.2

6. Thermal Durability	
Specified Value	Capacitance : Over 70% of initial spec. Internal Resistance : Within 2times of initial spec. Appearance : No noticeable abnormality
Test Methods and Remarks	Leave the capacitor in an atmosphere of 60℃±2℃ and −25±2℃ consecutively for 96 hours each, and return to normal temperature and humidity.

7. Humidity Durability	
Specified Value	Capacitance : Over 70% of initial spec. Internal Resistance : Within 2times of initial spec. Appearance : No noticeable abnormality
Test Methods and Remarks	Temperature : 40±2℃, Humidity : 90～95%RH Leave the capacitor for 500 hours, and return to normal temperature and humidity.

8. Impact Durability	
Specified Value	No exterior abnormality observed : initial spec. values retained
Test Methods and Remarks	According to JIS C 0041 Half-sine wave A=294

9. Vibration Durability	
Specified Value	No exterior abnormality observed : initial spec. values retained
Test Methods and Remarks	Apply a sine wave vibration with 1.5mm of amplitude and 10—55Hz of frequency for 2 hours per each of 3 directions (X, Y, Z), (totally 6hours).

10. Resistance to Soldering Heat		
Specified Value	Capacitance	: Within initial spec.
	Internal Resistance	: Within initial spec.
	Appearance	: No noticeable abnormality
Test Methods and Remarks	Material	:Sn-3Ag-0.5Cu
	Solder bath temperature	: 260±5℃
	Dipping time	: 10±1 sec.
	Depth of Immersion	: Up to 1.5—2.0mm from the lower end of cell body

CYLINDER TYPE LITHIUM ION CAPACITOR

■PRECAUTIONS

1. Use within the rated voltage (2.2–3.8V)
   If over rated voltage is applied, it might cause abnormal current flow, which shorten lifetime, cell heating, leakage and sometimes damage Lithium Ion Capacitor.

2. Use under maximum operating temperature
   Not only shorter life time but also leakage and damage will happen by increasing internal pressure if Lithium ion Capacitor use in over max operating temperature.

3. Limited life time
   Lifetime of Lithium Ion Capacitor is greatly affected by surrounding temperature.
   10℃ drop in temperature extend its expected lifetime approximately twice as much. Design a circuit under consideration of deterioration of electrical characteristics after long time usage, decreasing in capacitance and increasing in internal resistance.

4. The electrical characteristics of capacitors vary with respect to temperature
   The electrical characteristics of Lithium Ion Capacitor temporarily vary with respect to temperature separately from secular change mentioned above. Design a circuit under consideration of temperature characteristics.

5. Lithium Ion Capacitor has polarity
   Lithium Ion Capacitor has polarity. Please check the polarity before use. It will be damaged if it is reversely charged.

6. Don't short-circuit positive (+) and negative (−) terminals
   Direct contact with positive (+) and negative (−) terminals or connection with metal or other conductive materials may cause short-circuit and excessive current flow, which may cause heating and leakage.

7. Mind with high ripple current or rapid charge / discharge
   In circuit with high ripple current or required rapid and very frequent charge / discharge, the lifetime of Lithium Ion Capacitors might be shortened by self-heating.

8. Mind voltage drop when discharging
   When discharging start, the voltage drop that originates in internal resistance happens if discharging current is high

9. Series connection
   In case of using Lithium Ion Capacitor in series connection, the voltage of each capacitor is not always equal and it may be occurred excessive voltage in a part of capacitor, which may lead to shortening lifetime and breakdown. Take a margin against a rated voltage or add a balancing resister

10. Lithium Ion Capacitor has the pressure release vent
    In case of inside pressure of capacitor excessively rising, the pressure release vent will be opened in order to release inner gas. Following clearance (Diameter< ϕ18 : over 2mm, Diameter≧ϕ18 : over 3mm) should be made above the pressure release vent.
    Don't set up wiring or a pattern in the upper part of the pressure release vent, so that the high temperature gas is gushed when the pressure release vent open.
    The product which open the pressure release vent can not use.

11. The sleeve of the Lithium Ion Capacitor is not guaranteed insulation
    Short circuit might happen if circuit pattern is set underneath of Lithium Ion Capacitor or it fixed by a metal or it contact with other component.

12. Environmental of usage
    In case Lithium Ion Capacitor is used in the high humidity, alkaline or acid air, it may cause deterioration of its performance, electrolyte leak and short circuit by corrosion of outer can or lead terminal.
    In addition, used in sudden temperature change or high humidity, it may cause deteriorating of its performance and electrolyte leak by dew condensation.

13. Don't apply shock and vibration or pressure
    Lithium Ion Capacitor is sensitive to shock.
    Don't drop Lithium Ion Capacitor and not apply strong pressure to a body, terminals and lead. Soldering part or lead terminal might be damaged if applying vibration, shock and stress such as pinch, tip, push and twist after installed.

14. Soldering
    If next each item is not minded, it may cause deteriorating of its performance, leakage, shortening lifetime.
    - Don't contact solder iron to a cell body.
    - Don't solder over solder conditions in the spec. sheet.

15. Cleaning condition when cleaning circuit-board after soldering.
    Cleaning may affect Lithium Ion Capacitor. Consult us about cleaning conditions beforehand. Some cleaning conditions cause detrimental influence.

16. Storage of Lithium Ion Capacitor

Keep the following cautions for storage of Lithium Ion Capacitor.

- Don't store in the high temperature, the high humidity condition and a place where receiving direct sunlight. Store in the room condition of 10℃ – 35℃ and less than 65% relative humidity is recommended.
- Sudden temperature change or high humidity may cause deteriorating of its characteristics and soldering.
- Don't store PAS capacitor near water, salt water or oil, and it the dew condensation, gasified oil or salinity filled place.
- Don't store it the hazardous gas (hydrogen sulfide, sulfurous, chlorine, ammonia, bromine, methyl bromine and etc).
- Don't fumigant by halogen fumigant
- Don't sore near acid or alkaline solvent.
- Don't store in a place where expose to ozone, ultraviolet or x-ray
- Don't store in a place where vibration and shock might occur in.

17. Disposal

To insulate a positive terminal and a negative terminal by covering such as a tape to avoid short circuit and dispose in accordance with local and country rules and regulations.

18. Usage

Lithium ion capacitor is produced for usage of information & communication equipment, home electronics, audio & visual equipment, office equipment and etc. Consult us about using reliability and safe required products such as medical equipment, transportation equipment, industrial equipment, flight/space equipment and emergency equipment.

19. Failure mode

Usage in following condition may cause deteriorating of characteristics or failure.

1) Overcharging

If applying load current continuously over rated upper limit voltage 3.8V, electrolyte will be degrade in accordance with rising voltage and its temperature may rise. At the same time, its internal pressure will rise due to gas evolve by electrolyte degradation.

Lithium ion capacitor has a pressure vent to release gas from its body in case of abnormal internal pressure rising.

Gas will be released by opening a pressure vent when internal pressure exceeds a certain value.

(To be able to function effectively, it should be installed with 3mm interspaces above a pressure vent.)

2) Over discharging

If discharging under rated lower limit voltage, it will accelerate deterioration such as capacitance degradation, internal resistance rising and etc.

3) External short circuit

If a positive terminal and a negative terminal are contacted each other or connected by induction tools, Lithium ion capacitor will be short circuit and excessive current will be drained.

As a result, internal temperature will rise, internal pressure will rise and in some case gas may be released by opening a pressure valve.

Following actions will cause external short circuit

- To trim two terminals by a nipper at once.
- To measure a distance of two terminals by a metal slide gauge .
- To mount on a circuit board by flow soldering.

20. Other Notice

- Don't heat or throw into fire.
- Don't short.
- Don't solder directly to a cell body.
- Don't dismantle.
- Don't deform.
- Don't apply pressure.

Mouser Electronics

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