

To.

DATE : 200



SPECIFICATION

PRODUCT : STARCAP

MODEL : DR SERIES

(DR2R3206R)

WRITTEN	CHECKED	APPROVED

Taiwan Agent:Component Plus Inc.

Contact Person:Ray Jeng, Email:ray.jeng@seed.net.tw, Mobile:0916-205145

Tel : 886-2-2898-4050

Fax : 886-2-2896-9157

1. SCOPE

These are the specifications of STARCAP(Electric Double Layer Capacitor) which you are using.

Please review this document and approve it.

2. General Specification

1) Applications

This capacitor, Electric Double Layer Capacitor(EDLC), is applied to electronic circuits such as memory back up, motor driving, toys, and etc.

2) General test conditions

- Temperature range : 5~35 °C
- Humidity range : 45~85 %RH

In special case, temperature range of 20 ± 3 °C and humidity range of 65 ± 5 %RH can be accepted.

3) Standard test methods

The standard test methods are based on JIS-C-5102.

3. Structure and Shape

1) Structure

- Inside structure : Wound anode and cathode electrodes with two separators
- Outer structure : Aluminum-can case and rubber cover

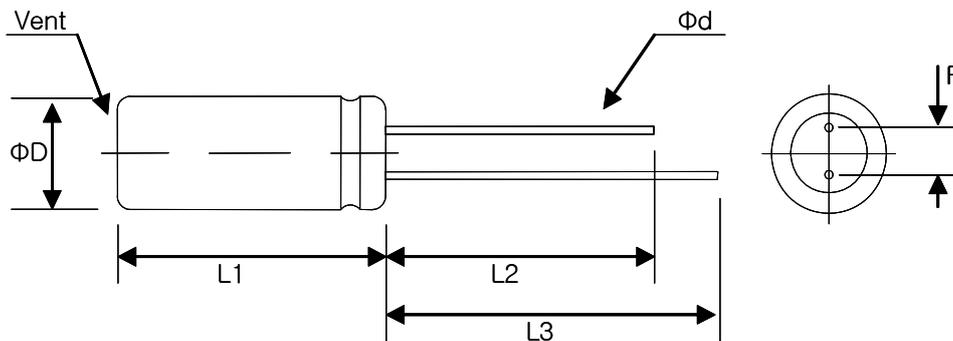
2) Shape

Cylindrical and both positive(+) and negative(-) leads are extracted in one-direction

4. General Characteristics

ITEM	VALUE
Operating voltage	DC 2.3 V
Operating Temp.	-25 ~+60 °C
Rated Capacitance	20 F
Cap. Tolerance (20°C)	-20 % ~ +40 %
Equivalent Series Resistance (1KHz)	≤ 50mΩ
Size (Ø × L)	Ø 10 × 25 mm (L)
Weight	3.1g
Volume	1.96 ml
Stored Energy	52.9 J (0.0147 Wh)

5. Construction and Dimensions (Unit : mm)

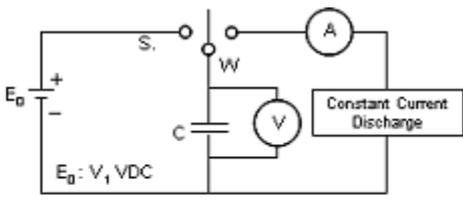
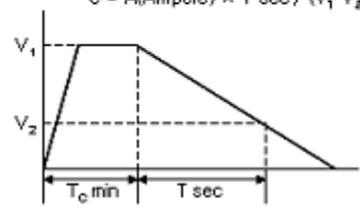
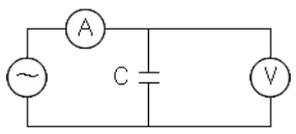


Size	ΦD	Φd	L1	L2	L3	F
Ø10×25 (L)	10+0.5max	0.6±0.05	25±2.0max	21±1.5	27±1.5	5.5±0.5

6. Specifications and Test method

ITEM		SPECIFICATION		CONDITION												
Temp. Character-istics	Capacitance	Step2	70%↑ of Initial Value	<table border="1"> <tr> <td>Step</td> <td>Temp,</td> </tr> <tr> <td>1</td> <td>20±2℃</td> </tr> <tr> <td>2</td> <td>-25±2℃</td> </tr> <tr> <td>3</td> <td>20±2℃</td> </tr> <tr> <td>4</td> <td>60±2℃</td> </tr> <tr> <td>5</td> <td>20±2℃</td> </tr> </table>	Step	Temp,	1	20±2℃	2	-25±2℃	3	20±2℃	4	60±2℃	5	20±2℃
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Capacitance	Step4	130%↓ of Initial Value														
ESR		Spec. Value														
Capacitance	Step5	Within ±30% of Initial Value														
ESR		Spec. Value														
Vibration resistance	Capacitance	Spec. Value		Amplitude : 1.5mm Frequency : 10~55Hz Direction: X,Y,Z 3direction Test Time : 6 Hrs												
	ESR	Spec. Value														
	Appearance	No Marked Defect														
Cycle Temp.	Capacitance	Spec. Value		Temp : -25℃ →20℃ →60℃→20℃ Cycle : 5 cycle												
	ESR	Spec. Value														
	Appearance	No Marked Defect														
Humidity	Capacitance	Within ±20% of Initial Value		Temp : 40±2℃ Humidity : 90~95%RH Test Time : 240±8hours												
	ESR	200%↓ of Spec. Value														
	Appearance	No Marked Defect														
High Temp. Loading	Capacitance	Within ±30% of Initial Value		Temp : 60±2℃ Voltage : 2.3VDC Resistance : 0 Ω Test Time : 1,000 hours												
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	Appearance	No Marked Defect														
Shelf Life	Capacitance	Within ±30% of Initial Value		Temp : 60±2℃ Resistance : 0Ω Test Time : 1,000hours												
	ESR	200%↓ of Spec. Value														
	Appearance	No Marked Defect														
Cycle Life	Capacitance	Within ±30% of Initial Value		1Cycle : Charge(40sec)→ CV(10sec) →CC(1/2Vw, 40sec) → Rest(10sec), 50,000Cycles												
	ESR	200%↓ of Spec. Value														

7. Measuring Method Of Characteristics

<p>Capacitance</p>	<ol style="list-style-type: none"> 1) CHARGE THE STARCAP WITH CONSTANT CURRENT $100 \pm 0.1 \text{mA}$ TO OPERATION VOLTAGE(V_1) FOR 60 MIN. 2) DISCHARGE THE STARCAP WITH CONSTANT CURRENT(A) $1 \pm 0.1 \text{mA/F}$ TO THE VOLTAGE OF V_2 WHILE MEASURE THE DISCHARGE TIME(T). 3) CALCULATE CAPACITANCE USING THE FOLLOWING FORMULA.  $C = A(\text{Ampere}) \times T \text{ sec} / (V_1 - V_2) \text{ [F]}$ 
<p>Equivalent Series Resistance (ESR @1kHz)</p>	<ul style="list-style-type: none"> ● MEASURE ESR BY THE LCR METER. (Frequency:1kHz, Bias Voltage : $0^{+0.05} \text{V}$) or ● CALCULATE ESR USING THE FOLLOWING FORMULA.  $R[\Omega] = V[V] / I[A] \quad * \quad i[\text{mA}] = I[A] \times 10^{-3}$ <p> R : Internal resistance(ESR)[Ω] V : Measured voltage between the terminal[V] i : Current 1mA ~ 10mA(A.C.) </p>
<p>☞ THE STARCAP SHOULD BE DISCHARGED WITH RESISTOR FOR 12 HOURS OR MORE BEFORE EACH MEASUREMENT OF CAPACITANCE OR ESR.</p>	

8. Packing

Part number	Quantity (EA)			Size (W × L × H mm)		Weight (Kg)
	Vinyl Bag	Inner Box	Outer Box	Inner Box	Outer Box	
DR2R3206R	100	500	1,000	240×220×100	460×260×125	4.0

9. Cautions for use

Please be careful for following points when you use STARCAP.

1) Do not apply more than rated voltage.

If you apply more than rated voltage, STARCAP's electrolyte will be electrolyzed and its ESR increase. At the worst, it may be broken.

2) Do not use STARCAP for ripple absorption.

3) Polarity

The STARCAP is non-polar fundamentally, however STARCAP gets polarity through aging process before it is packed. Please mount it in accordance with its polarity to maintain the best condition.

4) Operating temperature and life

Generally, STARCAP has a lower leakage current, longer back-up time and longer life in the low temperature i.e. the room temperature. But it has a higher leakage current, shorter back-up time and shorter life in the high temperature.

Please design to keep STARCAP away from calorific parts.

5) Cleaning

Some detergent or high temperature drying causes deterioration of STARCAP. If you wash STARCAP, Consult us.

6) Storage

In long term storage, please store STARCAP in following condition;

- ① TEMP. : 15 ~ 35 °C
- ② HUMIDITY : 45 ~ 75 %RH
- ③ NON-DUST

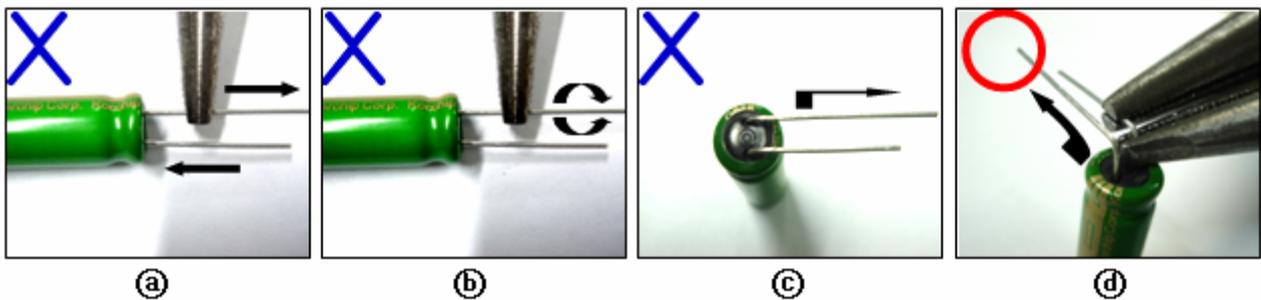
7) Do not disassemble STARCAP. It contains electrolyte.

- 8) IMPORTANT! DO NOT pull(PictureⒶ), twist(PictureⒷ) or deform(PictureⒸ) the terminals or lead wires.

The terminals or lead wires are attached to the electrodes in the interior of the aluminum case and are tightly embedded in the sealing rubber-plug.

Repeated or forceful bending, pulling or twisting of the lead wire may create a path opening alongside the wire in the rubber-plug for electrolyte to leak out.

The electrolyte leakage may not only shorten the useful life of the STARCAP, it may also cause corrosion and/or short-circuiting of neighboring circuitry. If deforming of the lead wire is unavoidable or essential to the assembly process, then please use a needle-nose plier to bend the lead wire while clinching the base of the same using another needle-nose plier (Picture Ⓓ below) so that the force applied to the wire is not transmitted to the rubber-plug.



- 9) Avoid mechanical impacts such as dropping on the floor or touching with a hard blade. Also avoid tearing of sleeves and waving of lead wire.

- 10) Please contact KORCHIP if you want to subject STARCAP to severe vibrating conditions exceeding rated specification or use under mechanical and electrical stress conditions.

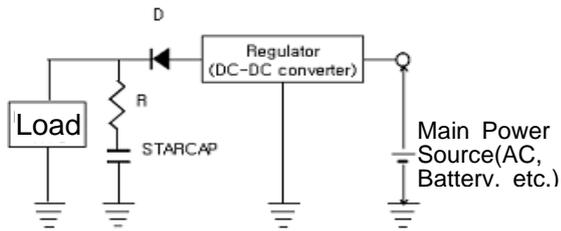
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When you solder STARCAP on PCB using a solder iron, Please do it quickly within 3 sec., below 350 °C.

Please don't touch the metal case of STARCAP with the solder iron.

- 12) Please maintain minimum distance of 5 mm between the surface of STARCAP and the housing in order to allow for unimpeded venting of gas through the safety vent if and when such need arise.

13) Following figure shows the general back-up circuit



D : Diode to prevent reverse-current

R : Resistor to control charging current

14) Short-circuit STARCAP

You can short-circuit between terminals of STARCAP without resistor. However when you short-circuit frequently, please consult us.

15) Series connection of STARCAP

Over-rated voltage may be applied to a single STARCAP in series connection due to the deviation of capacitance and ESR of each STARCAP. Please inform us if you are using STARCAP in series connection and please design so as not to apply over-rated voltage to each STARCAP, and use STARCAPs from same lot.

10. Environmental management

All STARCAP products are RoHS compliant and environment friendly.

By changing the solder plating from leaded solder to lead-free solder, and the outer tube from Polyvinyl Chloride(PVC) to Polyethylene Terephthalate(PET), our new STARCAP has become even more friendly to the environment.

Series	RoHS directive Pb, Cr+6, Hg, Cd, PBB,PBDE	ELV directive Pb, Cr+6, Hg, Cd	PVC	etc.
DR	N.D.	N.D.	N.D.	

* N.D. : Not detected

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(DR2R3706)

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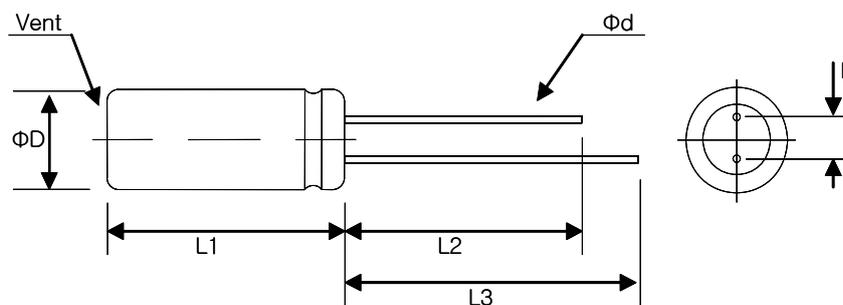
2) Shape

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4. General Characteristics

ITEM	VALUE
	DR2R3306
Operating voltage	DC 2.3 V
Operating Temp.	-25 ~+60 °C
Rated Capacitance	30 F
Cap. Tolerance (20°C)	-20 % ~ +40 %
Equivalent Series Resistance (1KHz)	≤ 35mΩ
Size (Ø × L)	Ø 12.5 × 25 mm (L)
Weight	4.7g
Volume	3.07 ml
Stored Energy	79.35 J (0.0220 Wh)

5. Construction and Dimensions (Unit : mm)

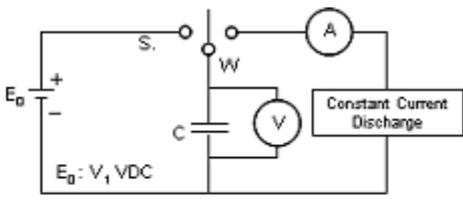
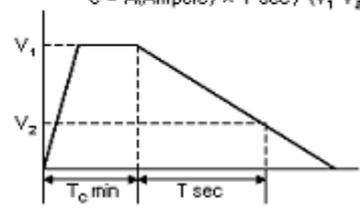
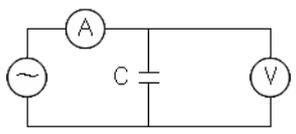


Size	ϕD	ϕd	L1	L2	L3	F
$\phi 16 \times 35$ (L)	12.5+0.5max	0.6±0.05	25±2.0max	21±1.5	27±1.5	5.5±0.5

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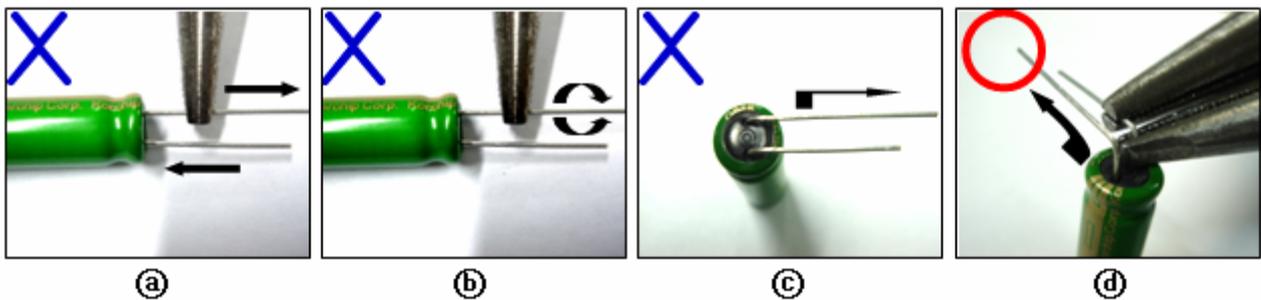
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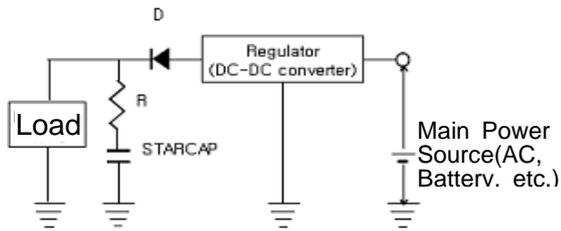
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DR	N.D.	N.D.	N.D.	

* N.D. : Not detected

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MODEL : DR SERIES
(DR2R3506R)

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Taiwan Agent : Component Plus Inc.

Contact Person:Ray Jeng, Email:ray.jeng@seed.net.tw, Mobile:0916-205145

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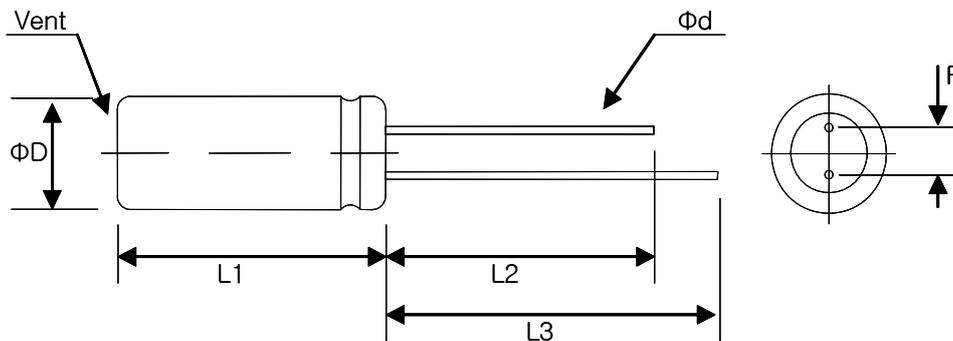
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4. General Characteristics

ITEM	VALUE
Operating voltage	DC 2.3 V
Operating Temp.	-25 ~+60 °C
Rated Capacitance	50 F
Cap. Tolerance (20°C)	-20 % ~ +40 %
Equivalent Series Resistance (1KHz)	≤ 25mΩ
Size (Ø × L)	Ø 16 × 25 mm (L)
Weight	7.0g
Volume	5.02 ml
Stored Energy	132.2 J (0.0367 Wh)

5. Construction and Dimensions (Unit : mm)

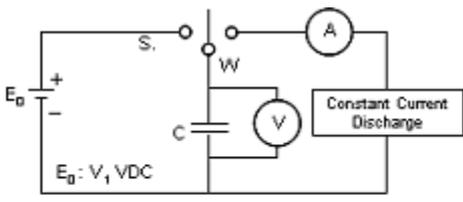
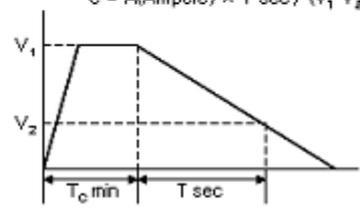
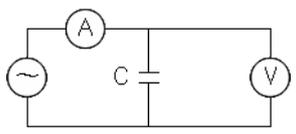


Size	ΦD	Φd	L1	L2	L3	F
Ø16×25 (L)	16+0.5max	0.8±0.05	25±2.0max	21±1.5	28±1.5	8.0±0.5

6. Specifications and Test method

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Humidity	Capacitance	Within ±20% of Initial Value		Temp : 40±2℃ Humidity : 90~95%RH Test Time : 240±8hours												
	ESR	200%↓ of Spec. Value														
	Appearance	No Marked Defect														
High Temp. Loading	Capacitance	Within ±30% of Initial Value		Temp : 60±2℃ Voltage : 2.3VDC Resistance : 0 Ω Test Time : 1,000 hours												
	ESR	200%↓ of Spec. Value														
	Appearance	No Marked Defect														
Shelf Life	Capacitance	Within ±30% of Initial Value		Temp : 60±2℃ Resistance : 0Ω Test Time : 1,000hours												
	ESR	200%↓ of Spec. Value														
	Appearance	No Marked Defect														
Cycle Life	Capacitance	Within ±30% of Initial Value		1Cycle : Charge(40sec)→ CV(10sec) →CC(1/2Vw, 40sec) → Rest(10sec), 50,000Cycles												
	ESR	200%↓ of Spec. Value														

7. Measuring Method Of Characteristics

<p>Capacitance</p>	<ol style="list-style-type: none"> 1) CHARGE THE STARCAP WITH CONSTANT CURRENT $100 \pm 0.1 \text{mA}$ TO OPERATION VOLTAGE(V_1) FOR 90 MIN. 2) DISCHARGE THE STARCAP WITH CONSTANT CURRENT(A) $1 \pm 0.1 \text{mA/F}$ TO THE VOLTAGE OF V_2 WHILE MEASURE THE DISCHARGE TIME(T). 3) CALCULATE CAPACITANCE USING THE FOLLOWING FORMULA.  $C = A(\text{Ampere}) \times T \text{ sec} / (V_1 - V_2) \text{ [F]}$ 
<p>Equivalent Series Resistance (ESR @1kHz)</p>	<ul style="list-style-type: none"> ● MEASURE ESR BY THE LCR METER. (Frequency:1kHz, Bias Voltage : $0^{+0.05} \text{V}$) or ● CALCULATE ESR USING THE FOLLOWING FORMULA. $R[\Omega] = V[V] / I[A] \quad * i[\text{mA}] = I[A] \times 10^{-3}$ <p>R : Internal resistance(ESR)[Ω] V : Measured voltage between the terminal[V] i : Current 1mA ~ 10mA(A.C.)</p>  $\text{ESR}[\Omega] = V / i$
<p>☞ THE STARCAP SHOULD BE DISCHARGED WITH RESISTOR FOR 12 HOURS OR MORE BEFORE EACH MEASUREMENT OF CAPACITANCE OR ESR.</p>	

8. Packing

Part number	Quantity (EA)		Size (W × L × H mm)		Weight (Kg)
	Inner Box	Outer Box	Inner Box	Outer Box	
DR2R3506R	250	1,000	310×310×110	640×330×250	10

9. Cautions for use

Please be careful for following points when you use STARCAP.

1) Do not apply more than rated voltage.

If you apply more than rated voltage, STARCAP's electrolyte will be electrolyzed and its ESR increase. At the worst, it may be broken.

2) Do not use STARCAP for ripple absorption.

3) Polarity

The STARCAP is non-polar fundamentally, however STARCAP gets polarity through aging process before it is packed. Please mount it in accordance with its polarity to maintain the best condition.

4) Operating temperature and life

Generally, STARCAP has a lower leakage current, longer back-up time and longer life in the low temperature i.e. the room temperature. But it has a higher leakage current, shorter back-up time and shorter life in the high temperature.

Please design to keep STARCAP away from calorific parts.

5) Cleaning

Some detergent or high temperature drying causes deterioration of STARCAP. If you wash STARCAP, Consult us.

6) Storage

In long term storage, please store STARCAP in following condition;

- ① TEMP. : 15 ~ 35 °C
- ② HUMIDITY : 45 ~ 75 %RH
- ③ NON-DUST

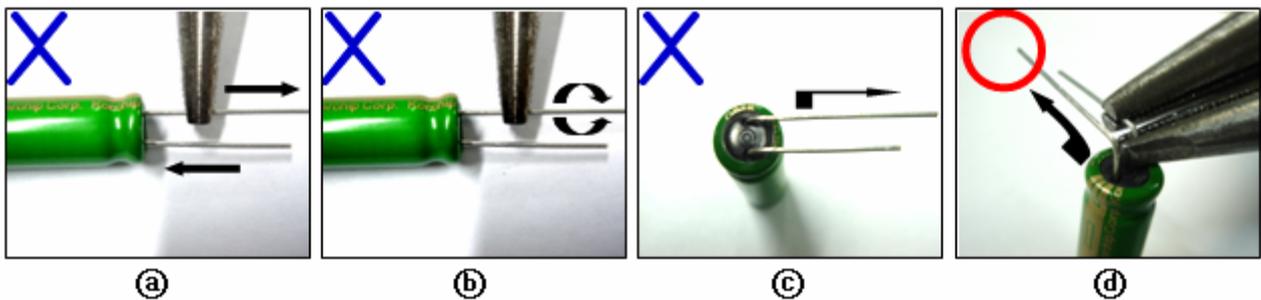
7) Do not disassemble STARCAP. It contains electrolyte.

- 8) IMPORTANT! DO NOT pull(PictureⒶ), twist(PictureⒷ) or deform(PictureⒸ) the terminals or lead wires.

The terminals or lead wires are attached to the electrodes in the interior of the aluminum case and are tightly embedded in the sealing rubber-plug.

Repeated or forceful bending, pulling or twisting of the lead wire may create a path opening alongside the wire in the rubber-plug for electrolyte to leak out.

The electrolyte leakage may not only shorten the useful life of the STARCAP, it may also cause corrosion and/or short-circuiting of neighboring circuitry. If deforming of the lead wire is unavoidable or essential to the assembly process, then please use a needle-nose plier to bend the lead wire while clinching the base of the same using another needle-nose plier (Picture Ⓓ below) so that the force applied to the wire is not transmitted to the rubber-plug.



- 9) Avoid mechanical impacts such as dropping on the floor or touching with a hard blade. Also avoid tearing of sleeves and waving of lead wire.

- 10) Please contact KORCHIP if you want to subject STARCAP to severe vibrating conditions exceeding rated specification or use under mechanical and electrical stress conditions.

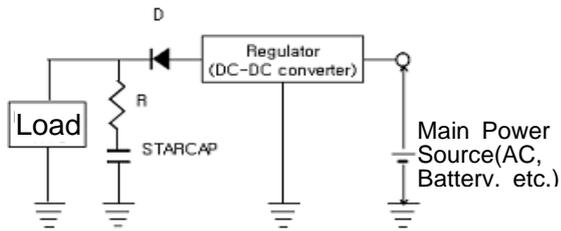
11) Manual Soldering

When you solder STARCAP on PCB using a solder iron, Please do it quickly within 3 sec., below 350 °C.

Please don't touch the metal case of STARCAP with the solder iron.

- 12) Please maintain minimum distance of 5 mm between the surface of STARCAP and the housing in order to allow for unimpeded venting of gas through the safety vent if and when such need arise.

13) Following figure shows the general back-up circuit



D : Diode to prevent reverse-current

R : Resistor to control charging current

14) Short-circuit STARCAP

You can short-circuit between terminals of STARCAP without resistor. However when you short-circuit frequently, please consult us.

15) Series connection of STARCAP

Over-rated voltage may be applied to a single STARCAP in series connection due to the deviation of capacitance and ESR of each STARCAP. Please inform us if you are using STARCAP in series connection and please design so as not to apply over-rated voltage to each STARCAP, and use STARCAPs from same lot.

10. Environmental management

All STARCAP products are RoHS compliant and environment friendly.

By changing the solder plating from leaded solder to lead-free solder, and the outer tube from Polyvinyl Chloride(PVC) to Polyethylene Terephthalate(PET), our new STARCAP has become even more friendly to the environment.

Series	RoHS directive Pb, Cr+6, Hg, Cd, PBB,PBDE	ELV directive Pb, Cr+6, Hg, Cd	PVC	etc.
DR	N.D.	N.D.	N.D.	

* N.D. : Not detected

To.

DATE : 200



SPECIFICATION

PRODUCT : STARCAP

MODEL : DR SERIES

(DR2R3706)

WRITTEN	CHECKED	APPROVED

Taiwan Agent : Component Plus Inc.

Contact Person: Ray Jeng, Email: ray.jeng@seed.net.tw, Mobile: 0916-205145

Tel : 886-2-2898-4050

Fax : 886-2-2896-9157

1. SCOPE

These are the specifications of STARCAP(Electric Double Layer Capacitor) which you are using.

Please review this document and approve it.

2. General Specification

1) Applications

This capacitor, Electric Double Layer Capacitor(EDLC), is applied to electronic circuits such as memory back up, motor driving, toys, and etc.

2) General test conditions

- Temperature range : 5~35 °C
- Humidity range : 45~85 %RH

In special case, temperature range of 20 ± 3 °C and humidity range of 65 ± 5 %RH can be accepted.

3) Standard test methods

The standard test methods are based on JIS-C-5102.

3. Structure and Shape

1) Structure

- Inside structure : Wound anode and cathode electrodes with two separators
- Outer structure : Aluminum-can case and rubber cover

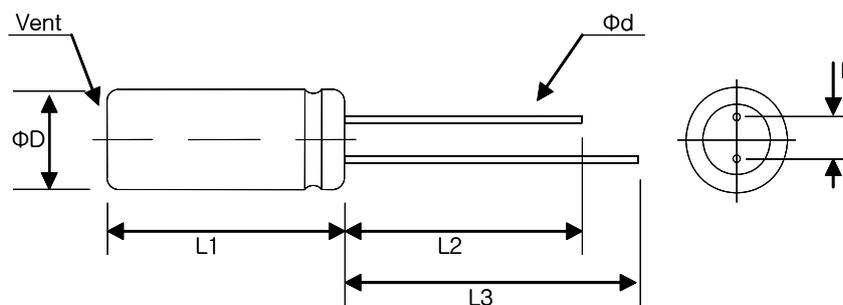
2) Shape

Cylindrical and both positive(+) and negative(-) leads are extracted in one-direction

4. General Characteristics

ITEM	VALUE
	DR2R3706
Operating voltage	DC 2.3 V
Operating Temp.	-25 ~+60 °C
Rated Capacitance	70 F
Cap. Tolerance (20°C)	-20 % ~ +40 %
Equivalent Series Resistance (1KHz)	≤ 22mΩ
Size (Ø × L)	Ø 16 × 35 mm (L)
Weight	10.7g
Volume	7.03 ml
Stored Energy	109.38 J (0.0304 Wh)

5. Construction and Dimensions (Unit : mm)

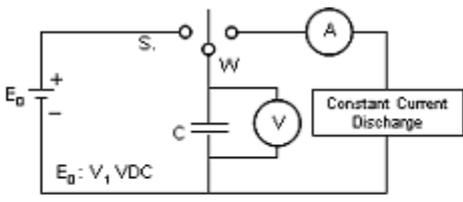
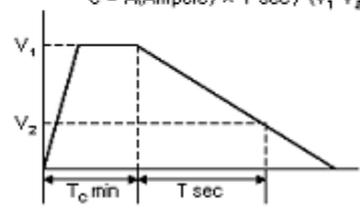
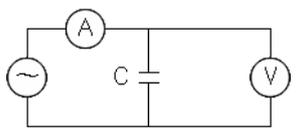


Size	ϕD	ϕd	L1	L2	L3	F
Ø16×35 (L)	16+0.5max	0.8±0.05	35±2.0max	21±1.5	28±1.5	8.0±0.5

6. Specifications and Test method

ITEM		SPECIFICATION		CONDITION												
Temp. Character-istics	Capacitance	Step2	70%↑ of Initial Value	<table border="1"> <tr> <th>Step</th> <th>Temp,</th> </tr> <tr> <td>1</td> <td>20±2℃</td> </tr> <tr> <td>2</td> <td>-25±2℃</td> </tr> <tr> <td>3</td> <td>20±2℃</td> </tr> <tr> <td>4</td> <td>60±2℃</td> </tr> <tr> <td>5</td> <td>20±2℃</td> </tr> </table>	Step	Temp,	1	20±2℃	2	-25±2℃	3	20±2℃	4	60±2℃	5	20±2℃
	Step		Temp,													
	1	20±2℃														
	2	-25±2℃														
	3	20±2℃														
	4	60±2℃														
5	20±2℃															
ESR	400%↓ of Spec. Value															
Capacitance	Step4	130%↓ of Initial Value														
ESR		Spec. Value														
Capacitance	Step5	Within ±30% of Initial Value														
ESR		Spec. Value														
Vibration resistance	Capacitance	Spec. Value		Amplitude : 1.5mm Frequency : 10~55Hz Direction: X,Y,Z 3direction Test Time : 6 Hrs												
	ESR	Spec. Value														
	Appearance	No Marked Defect														
Cycle Temp.	Capacitance	Spec. Value		Temp : -25℃ →20℃ →60℃→20℃ Cycle : 5 cycle												
	ESR	Spec. Value														
	Appearance	No Marked Defect														
Humidity	Capacitance	Within ±20% of Initial Value		Temp : 40±2℃ Humidity : 90~95%RH Test Time : 240±8hours												
	ESR	200%↓ of Spec. Value														
	Appearance	No Marked Defect														
High Temp. Loading	Capacitance	Within ±30% of Initial Value		Temp : 60±2℃ Voltage : 2.3VDC Resistance : 0 Ω Test Time : 1,000 hours												
	ESR	200%↓ of Spec. Value														
	Appearance	No Marked Defect														
Shelf Life	Capacitance	Within ±30% of Initial Value		Temp : 60±2℃ Resistance : 0Ω Test Time : 1,000hours												
	ESR	200%↓ of Spec. Value														
	Appearance	No Marked Defect														
Cycle Life	Capacitance	Within ±30% of Initial Value		1Cycle : Charge(20sec)→ CV(10sec) →CC(1/2Vw, 20sec) → Rest(10sec), 100,000Cycles												
	ESR	200%↓ of Spec. Value														

7. Measuring Method Of Characteristics

<p>Capacitance</p>	<ol style="list-style-type: none"> 1) CHARGE THE STARCAP WITH CONSTANT CURRENT $100 \pm 0.1 \text{mA}$ TO OPERATION VOLTAGE (V_1) FOR 60 MIN. 2) DISCHARGE THE STARCAP WITH CONSTANT CURRENT (A) $1 \pm 0.1 \text{mA/F}$ TO THE VOLTAGE OF V_2 WHILE MEASURE THE DISCHARGE TIME (T). 3) CALCULATE CAPACITANCE USING THE FOLLOWING FORMULA.  <p style="text-align: center;">$C = A(\text{Ampere}) \times T \text{ sec} / (V_1 - V_2) \text{ [F]}$</p> 
<p>Equivalent Series Resistance (ESR @1kHz)</p>	<ul style="list-style-type: none"> ● MEASURE ESR BY THE LCR METER. (Frequency:1kHz, Bias Voltage : $0^{+0.05} \text{V}$) or ● CALCULATE ESR USING THE FOLLOWING FORMULA. <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  <p style="text-align: center;">$\text{ESR}[\Omega] = V / i$</p> </div> <div style="width: 45%;"> <p>$R[\Omega] = V[V] / I[A] \quad * \quad i[\text{mA}] = I[A] \times 10^{-3}$</p> <p>R : Internal resistance(ESR)[Ω]</p> <p>V : Measured voltage between the terminal[V]</p> <p>i : Current 1mA ~ 10mA(A.C.)</p> </div> </div>
<p>☞ THE STARCAP SHOULD BE DISCHARGED WITH RESISTOR FOR 12 HOURS OR MORE BEFORE EACH MEASUREMENT OF CAPACITANCE OR ESR.</p>	

8. Packing

Part number	Quantity (EA)		Size (W × L × H mm)		Weight (Kg)
	Inner Box	Outer Box	Inner Box	Outer Box	
DR2R3706	250	1,000	310×310×110	640×330×250	13.5

9. Cautions for use

Please be careful for following points when you use STARCAP.

1) Do not apply more than rated voltage.

If you apply more than rated voltage, STARCAP's electrolyte will be electrolyzed and its ESR increase. At the worst, it may be broken.

2) Do not use STARCAP for ripple absorption.

3) Polarity

The STARCAP is non-polar fundamentally, however STARCAP gets polarity through aging process before it is packed. Please mount it in accordance with its polarity to maintain the best condition.

4) Operating temperature and life

Generally, STARCAP has a lower leakage current, longer back-up time and longer life in the low temperature i.e. the room temperature. But it has a higher leakage current, shorter back-up time and shorter life in the high temperature.

Please design to keep STARCAP away from calorific parts.

5) Cleaning

Some detergent or high temperature drying causes deterioration of STARCAP. If you wash STARCAP, Consult us.

6) Storage

In long term storage, please store STARCAP in following condition;

- ① TEMP. : 15 ~ 35 °C
- ② HUMIDITY : 45 ~ 75 %RH
- ③ NON-DUST

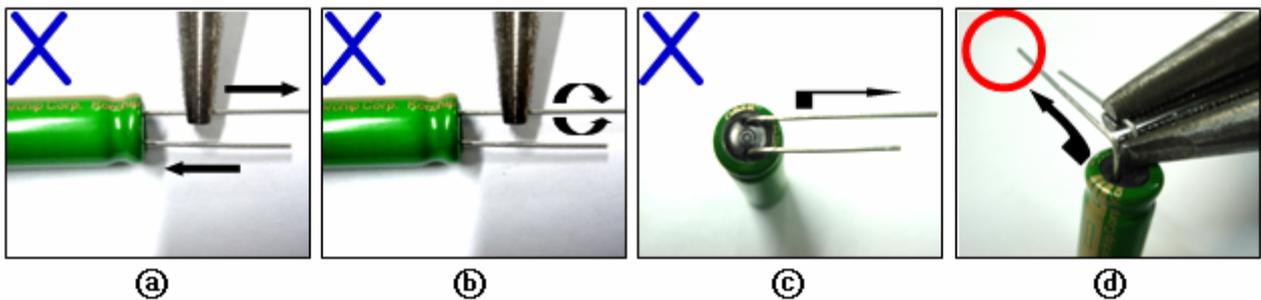
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The terminals or lead wires are attached to the electrodes in the interior of the aluminum case and are tightly embedded in the sealing rubber-plug.

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- 9) Avoid mechanical impacts such as dropping on the floor or touching with a hard blade. Also avoid tearing of sleeves and waving of lead wire.

- 10) Please contact KORCHIP if you want to subject STARCAP to severe vibrating conditions exceeding rated specification or use under mechanical and electrical stress conditions.

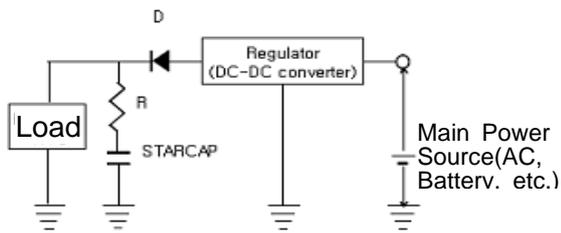
11) Manual Soldering

When you solder STARCAP on PCB using a solder iron, Please do it quickly within 3 sec., below 350 °C.

Please don't touch the metal case of STARCAP with the solder iron.

- 12) Please maintain minimum distance of 5 mm between the surface of STARCAP and the housing in order to allow for unimpeded venting of gas through the safety vent if and when such need arise.

13) Following figure shows the general back-up circuit



D : Diode to prevent reverse-current

R : Resistor to control charging current

14) Short-circuit STARCAP

You can short-circuit between terminals of STARCAP without resistor. However when you short-circuit frequently, please consult us.

15) Series connection of STARCAP

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10. Environmental management

All STARCAP products are RoHS compliant and environment friendly.

By changing the solder plating from leaded solder to lead-free solder, and the outer tube from Polyvinyl Chloride(PVC) to Polyethylene Terephthalate(PET), our new STARCAP has become even more friendly to the environment.

Series	RoHS directive Pb, Cr+6, Hg, Cd, PBB,PBDE	ELV directive Pb, Cr+6, Hg, Cd	PVC	etc.
DR	N.D.	N.D.	N.D.	

* N.D. : Not detected

To.

DATE : 200



SPECIFICATION

PRODUCT : STARCAP
MODEL : DR SERIES
(DR2R3127R)

WRITTEN	CHECKED	APPROVED

Taiwan agent : Component Plus Inc.

Contact person:Ray Jeng, E-Mail:ray.jeng@seed.net.tw, Mobile:0916-205145

TEL : 886 - 2 - 2898-4050

FAX : 886 - 2 - 2896-9157

1. SCOPE

These are the specifications of STARCAP(Electric Double Layer Capacitor) which you are using.

Please review this document and approve it.

2. General Specification

1) Applications

This capacitor, Electric Double Layer Capacitor(EDLC), is applied to electronic circuits such as memory back up, motor driving, toys, and etc.

2) General test conditions

- Temperature range : 5~35 °C
- Humidity range : 45~85 %RH

In special case, temperature range of 20 ± 3 °C and humidity range of 65 ± 5 %RH can be accepted.

3) Standard test methods

The standard test methods are based on JIS-C-5102.

3. Structure and Shape

1) Structure

- Inside structure : Wound anode and cathode electrodes with two separators
- Outer structure : Aluminum-can case and rubber cover

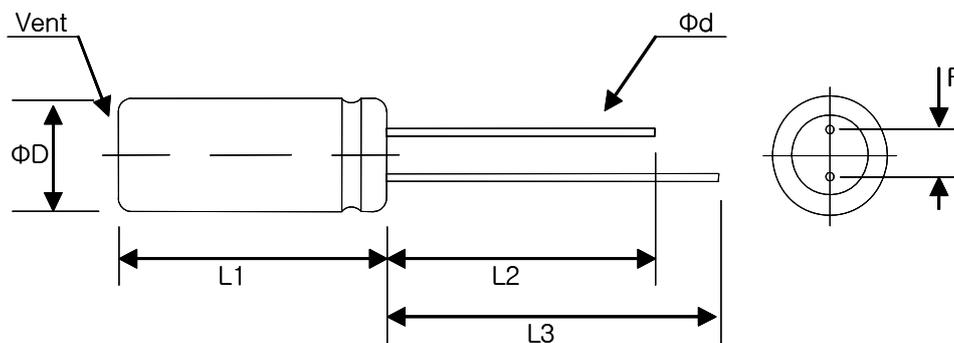
2) Shape

Cylindrical and both positive(+) and negative(-) leads are extracted in one-direction

4. General Characteristics

ITEM	VALUE
Operating voltage	DC 2.3 V
Operating Temp.	-25 ~+60 °C
Rated Capacitance	120 F
Cap. Tolerance (20°C)	-20 % ~ +40 %
Equivalent Series Resistance (1KHz)	≤ 20mΩ
Size (Ø × L)	Ø 18 × 40 mm (L)
Weight	14.1g
Volume	10.17 ml
Stored Energy	317.4 J (0.0882 Wh)

5. Construction and Dimensions (Unit : mm)

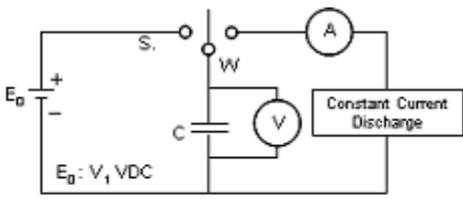
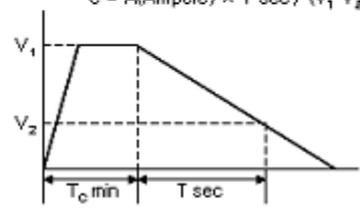
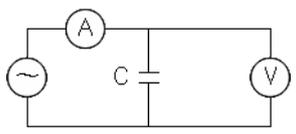


Size	ØD	Ød	L1	L2	L3	F
Ø18×40 (L)	18+0.5max	0.8±0.05	40±2.0max	21±1.5	28±1.5	8.0±0.5

6. Specifications and Test method

ITEM		SPECIFICATION		CONDITION												
Temp. Character-istics	Capacitance	Step2	70%↑ of Initial Value	<table border="1"> <tr> <th>Step</th> <th>Temp,</th> </tr> <tr> <td>1</td> <td>20±2℃</td> </tr> <tr> <td>2</td> <td>-25±2℃</td> </tr> <tr> <td>3</td> <td>20±2℃</td> </tr> <tr> <td>4</td> <td>60±2℃</td> </tr> <tr> <td>5</td> <td>20±2℃</td> </tr> </table>	Step	Temp,	1	20±2℃	2	-25±2℃	3	20±2℃	4	60±2℃	5	20±2℃
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Capacitance	Step4	130%↓ of Initial Value														
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ESR		Spec. Value														
Vibration resistance	Capacitance	Spec. Value		Amplitude : 1.5mm Frequency : 10~55Hz Direction: X,Y,Z 3direction Test Time : 6 Hrs												
	ESR	Spec. Value														
	Appearance	No Marked Defect														
Cycle Temp.	Capacitance	Spec. Value		Temp : -25℃ →20℃ →60℃→20℃ Cycle : 5 cycle												
	ESR	Spec. Value														
	Appearance	No Marked Defect														
Humidity	Capacitance	Within ±20% of Initial Value		Temp : 40±2℃ Humidity : 90~95%RH Test Time : 240±8hours												
	ESR	200%↓ of Spec. Value														
	Appearance	No Marked Defect														
High Temp. Loading	Capacitance	Within ±30% of Initial Value		Temp : 60±2℃ Voltage : 2.3VDC Resistance : 0 Ω Test Time : 1,000 hours												
	ESR	200%↓ of Spec. Value														
	Appearance	No Marked Defect														
Shelf Life	Capacitance	Within ±30% of Initial Value		Temp : 60±2℃ Resistance : 0Ω Test Time : 1,000hours												
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7. Measuring Method Of Characteristics

<p>Capacitance</p>	<ol style="list-style-type: none"> 1) CHARGE THE STARCAP WITH CONSTANT CURRENT $100 \pm 0.1 \text{mA}$ TO OPERATION VOLTAGE(V_1) FOR 90 MIN. 2) DISCHARGE THE STARCAP WITH CONSTANT CURRENT(A) $1 \pm 0.1 \text{mA/F}$ TO THE VOLTAGE OF V_2 WHILE MEASURE THE DISCHARGE TIME(T). 3) CALCULATE CAPACITANCE USING THE FOLLOWING FORMULA.  $C = A(\text{Ampere}) \times T \text{ sec} / (V_1 - V_2) \text{ [F]}$ 
<p>Equivalent Series Resistance (ESR @1kHz)</p>	<ul style="list-style-type: none"> ● MEASURE ESR BY THE LCR METER. (Frequency:1kHz, Bias Voltage : $0^{+0.05} \text{V}$) or ● CALCULATE ESR USING THE FOLLOWING FORMULA.  $R[\Omega] = V[V] / I[A] \quad * \quad i[\text{mA}] = I[A] \times 10^{-3}$ <p>R : Internal resistance(ESR)[Ω] V : Measured voltage between the terminal[V] i : Current 1mA ~ 10mA(A.C.)</p>
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8. Packing

Part number	Quantity (EA)		Size (W × L × H mm)		Weight (Kg)
	Inner Box	Outer Box	Inner Box	Outer Box	
DR2R3127R	250	1,000	310×310×110	640×330×250	17.5

9. Cautions for use

Please be careful for following points when you use STARCAP.

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2) Do not use STARCAP for ripple absorption.

3) Polarity

The STARCAP is non-polar fundamentally, however STARCAP gets polarity through aging process before it is packed. Please mount it in accordance with its polarity to maintain the best condition.

4) Operating temperature and life

Generally, STARCAP has a lower leakage current, longer back-up time and longer life in the low temperature i.e. the room temperature. But it has a higher leakage current, shorter back-up time and shorter life in the high temperature.

Please design to keep STARCAP away from calorific parts.

5) Cleaning

Some detergent or high temperature drying causes deterioration of STARCAP. If you wash STARCAP, Consult us.

6) Storage

In long term storage, please store STARCAP in following condition;

- ① TEMP. : 15 ~ 35 °C
- ② HUMIDITY : 45 ~ 75 %RH
- ③ NON-DUST

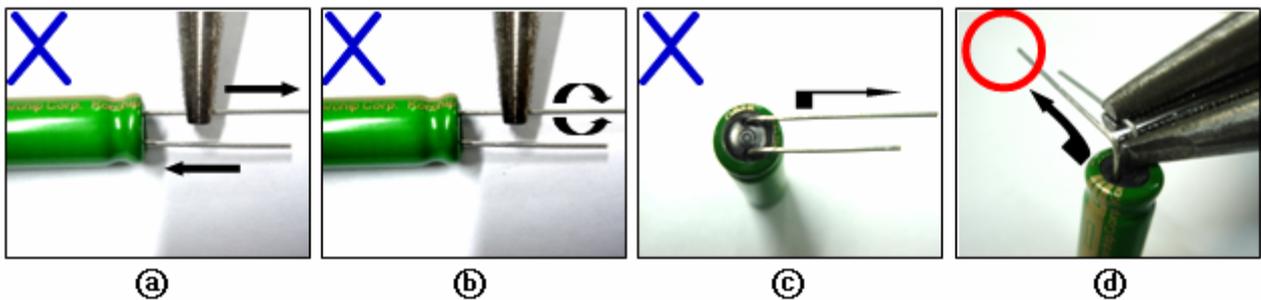
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The terminals or lead wires are attached to the electrodes in the interior of the aluminum case and are tightly embedded in the sealing rubber-plug.

Repeated or forceful bending, pulling or twisting of the lead wire may create a path opening alongside the wire in the rubber-plug for electrolyte to leak out.

The electrolyte leakage may not only shorten the useful life of the STARCAP, it may also cause corrosion and/or short-circuiting of neighboring circuitry. If deforming of the lead wire is unavoidable or essential to the assembly process, then please use a needle-nose plier to bend the lead wire while clinching the base of the same using another needle-nose plier (Picture Ⓓ below) so that the force applied to the wire is not transmitted to the rubber-plug.



- 9) Avoid mechanical impacts such as dropping on the floor or touching with a hard blade. Also avoid tearing of sleeves and waving of lead wire.

- 10) Please contact KORCHIP if you want to subject STARCAP to severe vibrating conditions exceeding rated specification or use under mechanical and electrical stress conditions.

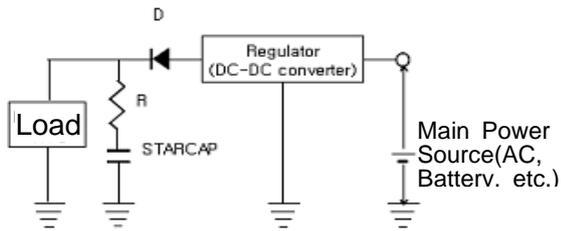
11) Manual Soldering

When you solder STARCAP on PCB using a solder iron, Please do it quickly within 3 sec., below 350 °C.

Please don't touch the metal case of STARCAP with the solder iron.

- 12) Please maintain minimum distance of 5 mm between the surface of STARCAP and the housing in order to allow for unimpeded venting of gas through the safety vent if and when such need arise.

13) Following figure shows the general back-up circuit



D : Diode to prevent reverse-current

R : Resistor to control charging current

14) Short-circuit STARCAP

You can short-circuit between terminals of STARCAP without resistor. However when you short-circuit frequently, please consult us.

15) Series connection of STARCAP

Over-rated voltage may be applied to a single STARCAP in series connection due to the deviation of capacitance and ESR of each STARCAP. Please inform us if you are using STARCAP in series connection and please design so as not to apply over-rated voltage to each STARCAP, and use STARCAPs from same lot.

10. Environmental management

All STARCAP products are RoHS compliant and environment friendly.

By changing the solder plating from leaded solder to lead-free solder, and the outer tube from Polyvinyl Chloride(PVC) to Polyethylene Terephthalate(PET), our new STARCAP has become even more friendly to the environment.

Series	RoHS directive Pb, Cr+6, Hg, Cd, PBB,PBDE	ELV directive Pb, Cr+6, Hg, Cd	PVC	etc.
DR	N.D.	N.D.	N.D.	

* N.D. : Not detected