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DATE : 20

RoHS	Halogen Free
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SPECIFICATION

PRODUCT : STARCAP

MODEL : DR Series

(DR2R7105R)

WRITTEN	CHECKED	APPROVED

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1. Scope

This specification applies to STARCAP(Electric Double Layer Capacitor), submitted to specified customer in cover page.

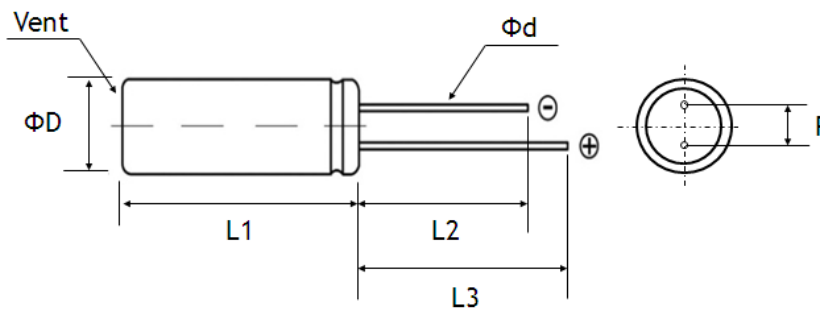
2. Construction and Dimensions (Unit : mm)

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



Size	ΦD	Φd	L1	L2	L3	P
$\Phi 08 \times 13$ (L)	$8 \pm 0.5 \text{max}$	0.6 ± 0.05	13 ± 1.5	21 ± 1.5	27 ± 1.5	3.5 ± 0.5

3. Part Number System

DR 2R7 105 R
 ① ② ③ ④

- ① Series Name : DR (Radial type EDLC)
- ② Rated Voltage : 2.7VDC
- ③ Capacitance : 1 F ($105 = 1 \times 10^{+5}$ uF)
- ④ Size Identification Code

4. General Specifications

ITEM	VALUE
Operating voltage	DC 2.7 V
Operating Temp.	-40 ~+65 °C
Rated Capacitance	1 F
Cap. Tolerance (20°C)	-20 % ~ +40 %
Equivalent Series Resistance (1KHz)	≤ 200 mΩ
Size (Ø × L)	Ø 8 × 13 mm (L)
Weight	≈ 1.0 g
Volume	0.65 ml
Stored Energy	3.65 J (0.0010 Wh)
High Temp. Derating Condition at 85°C	2.3V (for 1,000 hrs)

5. Reliability Specifications

Item		Specification		Test Condition													
Temperature Characteristics	Capacitance Change	Step2	Within $\pm 30\%$ of Initial Value	Measure electrical characteristics after exposing STARCAP Capacitor to each temperature atmosphere for one(1) hour <table border="1"> <thead> <tr> <th>Step</th> <th>Temp.</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>20\pm2$^{\circ}$C</td> </tr> <tr> <td>2</td> <td>-40\pm2$^{\circ}$C</td> </tr> <tr> <td>3</td> <td>20\pm2$^{\circ}$C</td> </tr> <tr> <td>4</td> <td>65\pm2$^{\circ}$C</td> </tr> <tr> <td>5</td> <td>20\pm2$^{\circ}$C</td> </tr> </tbody> </table>		Step	Temp.	1	20 \pm 2 $^{\circ}$ C	2	-40 \pm 2 $^{\circ}$ C	3	20 \pm 2 $^{\circ}$ C	4	65 \pm 2 $^{\circ}$ C	5	20 \pm 2 $^{\circ}$ C
	Step		Temp.														
	1	20 \pm 2 $^{\circ}$ C															
	2	-40 \pm 2 $^{\circ}$ C															
	3	20 \pm 2 $^{\circ}$ C															
	4	65 \pm 2 $^{\circ}$ C															
5	20 \pm 2 $^{\circ}$ C																
ESR	4 Times or less than Initial Value																
Capacitance Change	Step4	Within $\pm 30\%$ of Initial Value															
ESR		Spec. Value															
Capacitance Change	Step5	Within $\pm 30\%$ 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															
Humidity	Capacitance Change	Within $\pm 30\%$ of Initial Value		Temp : 40 \pm 2 $^{\circ}$ C Humidity : 90-95%RH Test Time : 240 \pm 8hours <u>No Load Applied</u>													
	ESR	4 Times or less than Initial Value															
	Appearance	No Marked Defect															
High Temp. Loading	Capacitance Change	Within $\pm 30\%$ of Initial Value		Temp : 65(85) \pm 2 $^{\circ}$ C Voltage : 2.7(2.3)VDC Test Time : 1,000 hours													
	ESR	4 Times or less than Initial Value															
	Appearance	No Marked Defect															
Shelf Life	Capacitance Change	Within $\pm 30\%$ of Initial Value		Temp : 65(85) \pm 2 $^{\circ}$ C Test Time : 1,000hours <u>No Load Applied</u>													
	ESR	4 Times or less than Initial Value															
	Appearance	No Marked Defect															
Cycle Life	Capacitance Change	Within $\pm 30\%$ of Initial Value		1Cycle : Charge(20sec) \rightarrow CV(10sec) \rightarrow CC(1/2Vw, 20sec) \rightarrow Rest(10sec), 100,000Cycles													
	ESR	4 Times or less than Initial Value															
	Appearance	No Marked Defect															

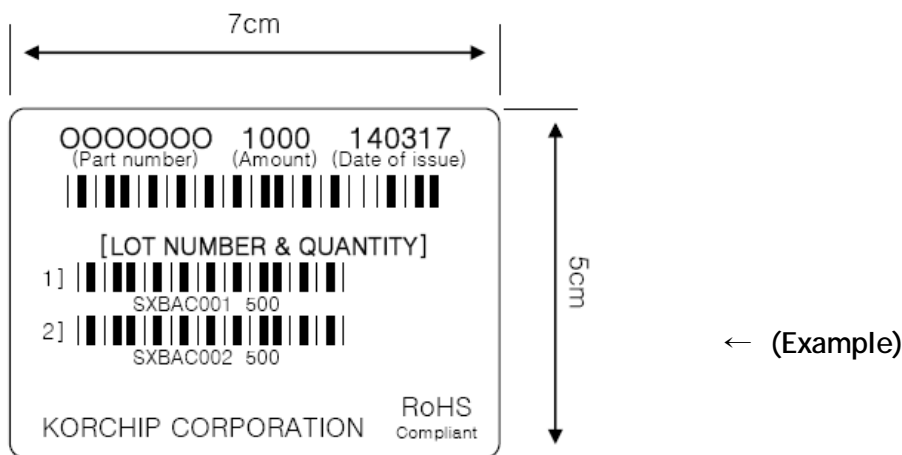
6. Measuring Method of Characteristics

<p>Capacitance</p>	<ol style="list-style-type: none"> 1) Charge the STARCAP with constant current $100 \pm 0.1 \text{ mA}$ to the voltage of $V_1 (=2.2 \text{ V})$ for 40 min. 2) Discharge the STARCAP with constant current(A) $1 \pm 0.1 \text{ mA/F}$ to the voltage of $V_2 (=1.0 \text{ V})$ while measure the discharge time(T). 3) Calculate capacitance using the following formula. <div style="text-align: center;"> <p>$E_0: V_1 \text{ VDC}$</p> <p>$C = A(\text{Ampere}) \times T \text{ sec} / (V_1 - V_2) \text{ [F]}$</p> </div>
<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; align-items: center;"> <div style="flex: 1;"> <p>$ESR[\Omega] = V / i$</p> </div> <div style="flex: 2;"> <p>$R[\Omega] = V[V] / I[A] \quad * i[\text{mA}] = I[A] \times 10^{-3}$</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>	

7. Packing Specifications

Part No.	Quantity (EA)			Size (W × L × H mm)		Weight (Kg)
	Vinyl Bag	Inner Box	Outer Box	Inner Box	Outer Box	
DR2R7105R	200	1,000	2,000	240×220×100	460×260×125	≈ 2.8

8. Labeling Standards



Lot No. System

Ex.) S X B A C 002
 ① ② ③ ④ ⑤ ⑥

- ① Product Code : S (STARCAP)
- ② Production Year Code : X (2013), Y (2014), Z (2015)...
- ③ Factory Identification Code : B (Factory 2)
- ④ Production Month Code : A (Jan.), B (Feb.), ... , J (Oct.), K (Nov.), L (Dec.)
- ⑤ Production Date Code : 1 (1st), 2 (2nd), ... , 9 (9th), A (10th), B (11th), C (12th) ...
 Q (26th), R (27th), S (28th), ... , V (31th)
- ⑥ Lot Issuing Serial Code : 001 (First lot of a specific day), 002 (Second lot of a specific day), 003 (Third lot of a specific day)...

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 decomposed and its ESR increase. At the worst, it may be broken.

2) Do not use STARCAP for ripple absorption.

3) Polarity

Please mount it in accordance with its polarity.

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, non-acidic and/or non-alkaline atmosphere
- ④ Avoid direct sun light, strong magnetic field

Storage period limit is one(1) year when a STARCAP is stored in the above condition. Storage in improper condition may cause some damage on terminal surface or on outer tube of STARCAP.

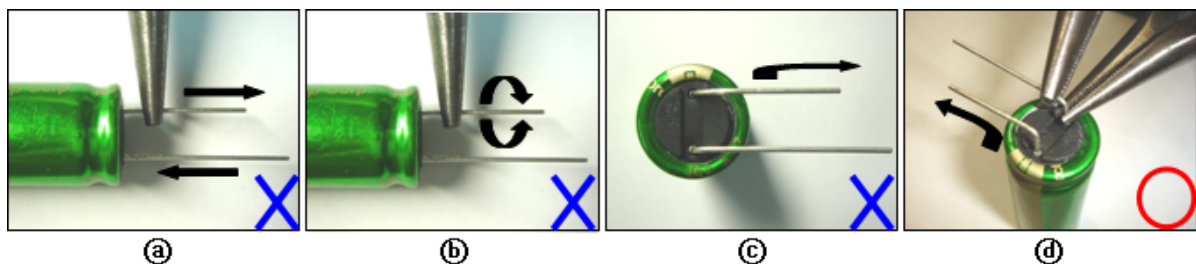
7) Do not disassemble STARCAP. It contains electrolyte.

- 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.

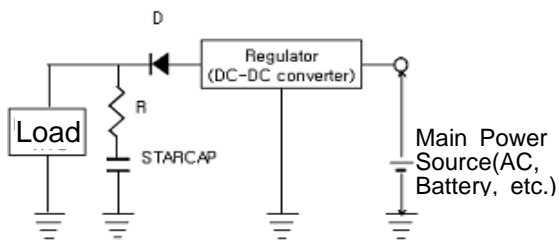
11) Manual Soldering

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

Do not short-circuit between terminals of STARCAP without resistor.

15) Series connection of STARCAP

Over-rated voltage may be applied to a single STARCAP in series connection due to the deviation of electrical characteristics such as capacitance, LC and ESR of each STARCAP. Please inform us if you are using STARCAPs 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, Halogen Free and environment friendly.

Series	RoHS directive (Pb, Cr+6, Hg, Cd, PBB,PBDE)	ELV directive (Pb, Cr+6, Hg, Cd)	PVC	Halogen Flame Retardant Free (Cl, Br)	etc.
DR	N.D.	N.D.	N.D.	N.D.	

* N.D. : Not detected