

To. :

DATE : 20 . . .

RoHS 1,3	Halogen Free
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# SPECIFICATION

PRODUCT : STARCAP

MODEL : DMS series

WRITTEN	CHECKED	APPROVED

**KORCHIP CORP.**

KORCHIP B/D, 359, Manan-ro, Manan-gu, Anyang-si, Gyeonggi-do, KOREA

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## Revision History

[illegible]

## Manufacturer Information

Manufacturer : Korchip Corporation

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## 1. Scope

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

## 2. Part Number System

DMS	3R3	224	R
①	②	③	④

- ① Series Name : DMS
- ② Rated Voltage : 3.3VDC
- ③ Capacitance : 0.22 F (224 =  $22 \times 10^{+4}$  uF)
- ④ Terminal Type Identification Code

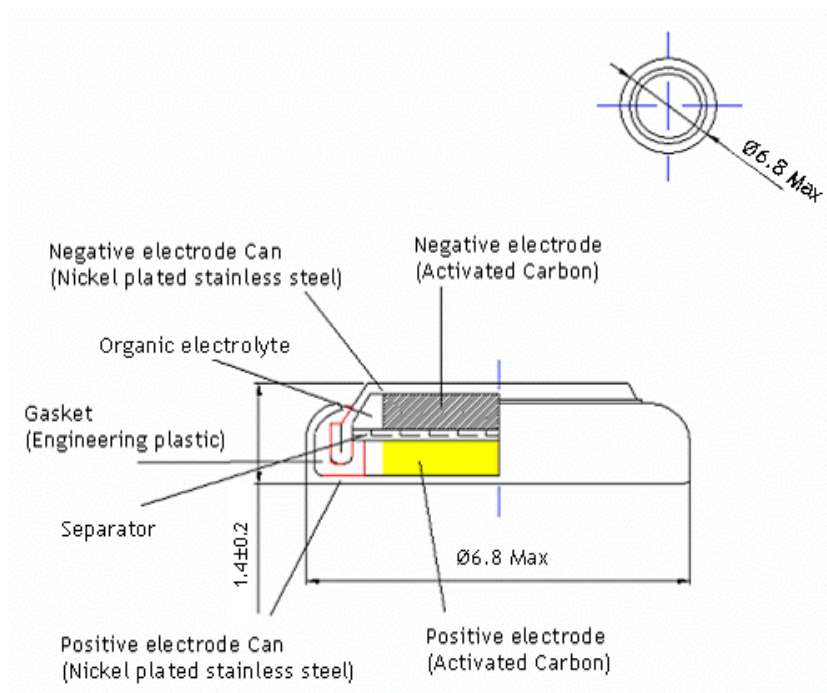
## 3. Photo



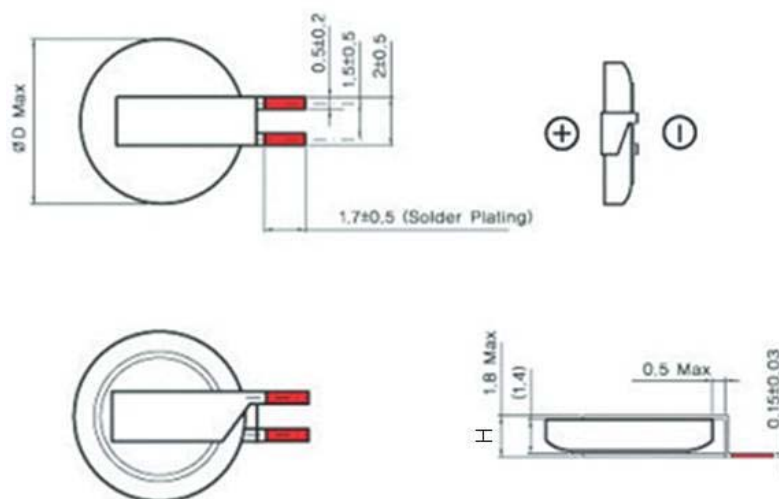
## 4. General Specifications

ITEMS	VALUE
Rated Voltage	3.3 VDC
Operating Temp.	-10 ~ +60 °C
Capacitance (F)	0.22 F
Capacitance Tolerance	-20 ~ 80 %
Equivalent Series Resistance (ESR)	Less than 200Ω

## 5. Cell Structure



## 6. Product Construction and Dimensions



Dimensions (mm)	
ØD	H
6.8	1.8

## 7. Reliability Specifications

Item		Specification		Test Condition													
Temperature Characteristics	Capacitance Change	Step 2	Within ± 30% of Initial Value	Measure electrical characteristics after exposing STARCAP Capacitor to each temperature atmosphere for one(1) hour <table><tr><td>Step</td><td>Temperature</td></tr><tr><td>1</td><td>20±2℃</td></tr><tr><td>2</td><td>-10±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	Temperature	1	20±2℃	2	-10±2℃	3	20±2℃	4	60±2℃	5	20±2℃
	Step		Temperature														
	1	20±2℃															
	2	-10±2℃															
	3	20±2℃															
	4	60±2℃															
5	20±2℃																
ESR	5Times or less than Initial Value																
Capacitance Change	Step 4	Within ± 30% of Initial Value															
ESR		200Ω or less															
Capacitance Change	Step 5	Within ± 10% of Initial Value															
ESR Change		200Ω or less															
Humidity Resistance	Capacitance Change	± 30% of Initial Value		Temp. : 40±2℃ Humidity : 90 ~ 95%RH Time : 500±8 Hours <b>No Voltage Applied</b>													
	ESR	2KΩ or less															
	Appearance	No Marked Defect															
Self Discharge Characteristics	Voltage	More than 2.0Vdc	Charging Condition	Voltage : 3.3Vdc Current : 20mA Charge Time : 24 Hours													
			Self Discharge Condition	Duration : 24 Hours Temp. : Less than 25℃ Humidity : Less than 70%RH													
Vibration Resistance	Capacitance	Spec. Value		Amplitude : 1.5mm Frequency : 10 ~ 55Hz Direction : X, Y, Z 3 Directions Test Time : 6 Hours													
	ESR	Spec. Value															
	Appearance	No Marked Defect															
Terminal Strength	Appearance	Terminals shall not be separated	Load 1kg , 10±1 Sec.														
Terminal Bend Strength			Load 1kg , Angle 90° , 1Cycle														
Endurance	Capacitance Change	Within ± 30% of Initial Value		Temp. : 60±2℃ Test Time : 1,000(+24,-0) Hours Applied Voltage : 3.3Vdc													
	ESR	2KΩ or less															
	Appearance	No Marked Defect															
Shelf Life	Capacitance Change	Within ± 30% of Initial Value		Temp. : 60±2℃ Test Time : 1,000(+24,-0) Hours <b>No Voltage Applied</b>													
	ESR	2KΩ or less															
	Appearance	No Marked Defect															

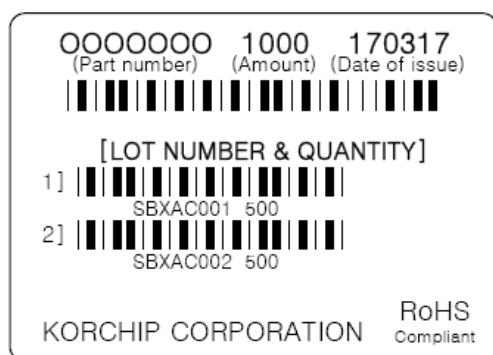
## 8. Packing Specifications

Part No.	Quantity (PCS)			Size (W × L × H mm)		Weight (Kg)
	Vinyl Bag	Inner Box	Outer Box	Inner Box	Outer Box	
DMS3R3224R	200	2,000	32,000	180×170×75	375×340×350	≈ 10

\* Vinyl bag is vacuum sealed with 200 pieces of capacitors set on paper sheet.

\* Please keep the storage condition on page 11.

## 9. Labeling Standards



← (Example)

### Lot No. System

Ex.) S E X A C 002

① ② ③ ④ ⑤ ⑥

① Product Code : S (STARCAP)

② Production Year Code : A (2016), B (2017), C (2018), D (2019), E (2020)...

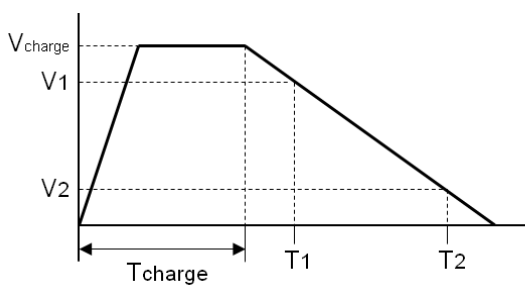
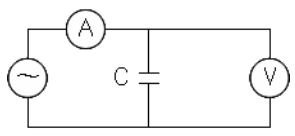

③ Factory Identification Code : X (Factory X)

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)...

## 10. Measuring Method of Characteristics

Capacitance	<p>1) Charge the STARCAP with constant current <math>I_{\text{charge}} (=1 \pm 0.1 \text{ mA})</math> to <math>V_{\text{charge}} (=3.3 \text{ V})</math> then keep charging for <math>T_{\text{charge}} (=3000 \text{ sec.})</math></p> <p>2) Discharge the STARCAP with constant current <math>I_{\text{disch}} (=0.5 \text{ mA})</math> while measure the discharge time <math>T_1, T_2</math> between <math>V_1 (=2.64 \text{ V})</math> and <math>V_2 (=1.32 \text{ V})</math>.</p> <p>3) Calculate capacitance using the following formula.</p> <div data-bbox="534 705 1316 996">  <math display="block">C = \frac{I_{\text{disch}} \times (T_1 - T_2)}{V_1 - V_2}</math> </div>
Equivalent Series Resistance (ESR @1kHz)	<ul style="list-style-type: none"> <li>● Measure ESR by the LCR meter. (Frequency:1kHz, Bias Voltage : <math>0^{+0.05} \text{ V}</math>) or</li> <li>● Calculate ESR using the following formula.</li> </ul> <div data-bbox="446 1243 742 1422">  <math display="block">\text{ESR}[\Omega] = V / i</math> </div> <div data-bbox="782 1209 1380 1400"> <math display="block">R[\Omega] = V[V] / I[A] \quad * \quad i[\text{mA}] = I[A] \times 10^{-3}</math> <p><math>R</math> : Internal resistance(ESR) [<math>\Omega</math>]  <math>V</math> : Measured voltage between terminals [V]  <math>i</math> : Current 1mA(A.C.)</p> </div>
<p> The STARCAP should be shorted before each measurement as follows ;          Capacitance : 60 min. , ESR : 15 min. , LC : 15 min.</p>	



## 11. Mounting

When you solder STARCAP to a printed circuit board, excessive thermal stress could cause the STARCAP's electrical characteristics to deteriorate, compromise the integrity of the seal or cause the electrolyte to leak due to increased internal pressure. Do not touch the capacitor body with the iron tip during soldering. And prevent the heated solder material from bridging the cap and the case of capacitor cell over terminals.

### ① Recommended condition of flow soldering

If you want to set or mount DMS series STARCAP on a PCB with resin before soldering for ease of soldering process, follow the thermal condition below.

- Hardening Temp. of Resin : 80℃ or below
- Hardening Time of Resin : 10 min. or less

### ② Recommended condition of manual soldering

- Soldering Tip Temp. : 350℃ or less
- Soldering Time : 3 sec. or less
- Times : Three times or less at intervals of 9 sec. or more
- ※ Do not touch the metal case of STARCAP with a soldering iron.

### ③ It is not allowed to go through reflow (IR, Atmosphere heating methods etc.) process.

### ④ The terminals are plated for good solderability. Rasping terminals may damage the plating layer and degrade the solderability.

Do not apply a large force to the terminals. Otherwise, they may break or come off or the STARCAP characteristics may be deteriorated.

## 12. 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 environment and lifetime

STARCAP shows faster deterioration in high temperature operation. The lifetime of STARCAP follows the general lifetime acceleration rule of double or half per every 10°C of ambient temperature decrease or increase respectively. A large temperature difference in one day or humid operating environment results in dew condensation on the surface of STARCAP and it may cause fast deterioration or electrolyte leakage of STARCAP.

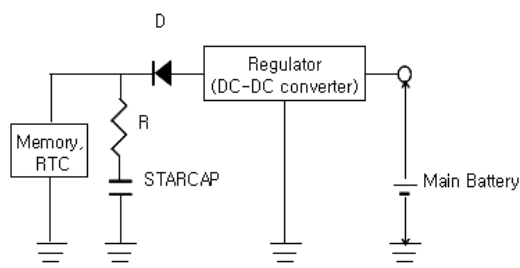
If STARCAP capacitor is used in an electronic or electrical device over a long period of time especially in high temperature or high humidity environment, please check it periodically and replace it when necessary.

### 5) Cleaning

Some detergent or high temperature drying causes deterioration of STARCAP.

If you wash STARCAP, Consult us.

### 6) Following figure shows the general back-up circuit.



D : Diode to prevent the reverse current  
R : Resistor to control the charging current

7) Short-circuit STARCAP

DO NOT short-circuit between terminals of STARCAP without resistor.

8) 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.

9) Do not disassemble STARCAP. It contains electrolyte.

10) 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.

11) The tips of STARCAP terminals are very sharp. Please handle with care.

12) Industrial Application

Some industrial applications require a very high level of reliability to its parts including EDLCs. Therefore if the EDLC is to be used in an industrial application such as factory machinery, heavy electricity, etc. periodic inspection of EDLC is necessary. If there found any problem with the EDLC, please replace it.

### 13. Environmental Management

All STARCAP products are RoHS 1 and 3 compliant, Halogen Free and environment friendly.

Series	RoHS 1 directive (Pb, Cr+6, Hg, Cd, PBB, PBDE)	ELV directive (Pb, Cr+6, Hg, Cd)	PVC	Halogen Flame Retardant Free (Cl, Br)	RoHS 3 directive (DEHP, BBP, DBP, DIBP)	etc.
DMS	N.D.	N.D.	N.D.	N.D.	N.D.	

\* N.D. : Not Detected or Within Permitted Range