

To. :

DATE : 200



SPECIFICATION

PRODUCT : STARCAP

MODEL : DMS series

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. Part Number System

DMS 3R3 204 R (Example)
 ① ② ③ ④

- ① Series Name
- ② Rated Voltage : 3.3VDC
- ③ Capacitance : 0.20 F (204 = $20 \times 10^{+4}$ uF)
- ④ Terminal Type : R-type

3. Product Model Name

- 1) Product : Electric Double Layer Capacitor
- 2) Model name : DMS3R3204R, DMS3R3224R

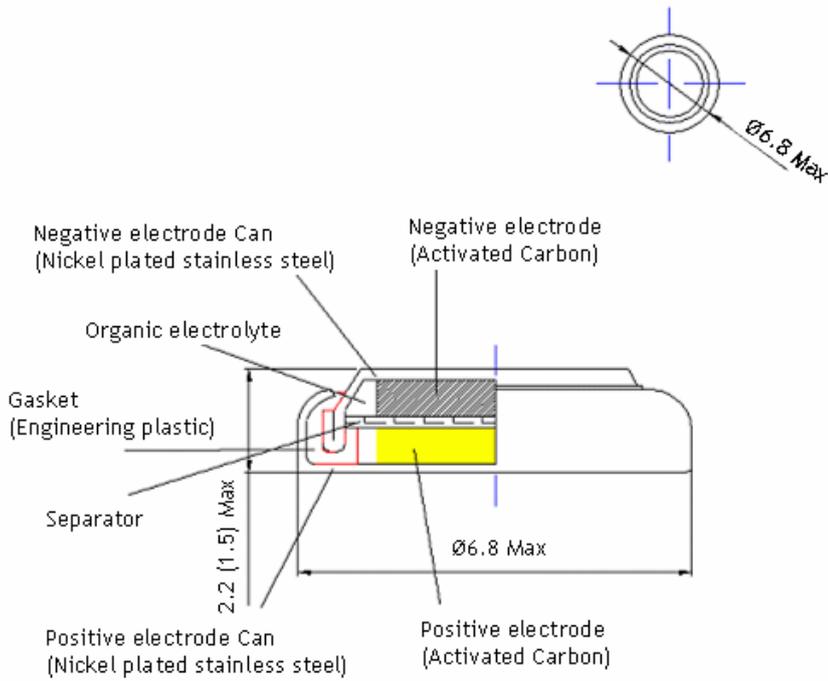
4. Photo



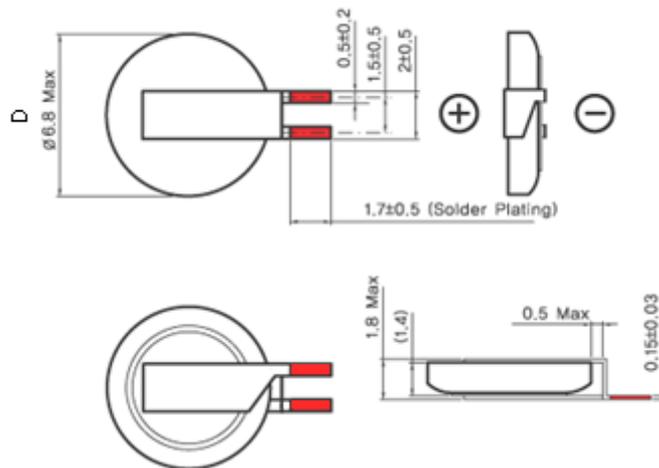
5. Nominal Specifications

Items	DM 3R3 204 R	DMS 3R3 224 R
Cell Size	Ø6.8 × 1.4mm	Ø6.8 × 1.4mm
OPERATING TEMPERATURE	-10 ~ +60 °C	-10 ~ +60 °C
RATED VOLTAGE	3.3 VDC	3.3 VDC
ELECTROSTATIC CAPACITANCE (F)	0.20 F	0.22 F
CAPACITANCE TOLERANCE	-20 ~ 80 %	-20 ~ 80 %
EQUIVALENT SERIES RESISTANCE (ESR)	LESS THAN 200Ω	LESS THAN 200Ω
LEAKAGE CURRENT (LC)	LESS THAN 150µA	LESS THAN 150µA

6. Cell Structure



7. Product Construction And Dimension



Part Number	Dimension (mm)	
	ØD	H
DMS 3R3 204 R	6.8 Max	1.8 Max
DMS 3R3 224 R	6.8 Max	1.8 Max

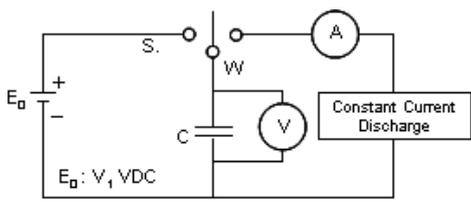
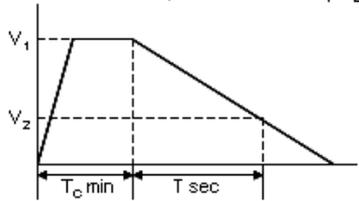
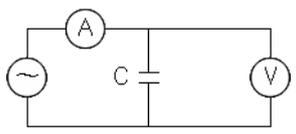
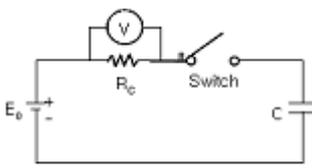
8. Packing Specification

PRODUCT	QUANTITY(PCS)			SIZE(WxLxH mm)		Weight(Kg)
	Tray	Inner Box	Outer Box	Inner Box	Outer Box	
DMS 3R3 204 R	100	1,000	16,000	180×170×75	375×340×350	≈ 9
DMS 3R3 224 R	100	1,000	16,000	180×170×75	375×340×350	≈ 9

9. Specifications And Test Method

ITEMS		SPECIFICATIONS	TEST CONDITION													
OPERATING TEMP. RANGE		-10℃ ~ +60℃														
RATED VOLTAGE		3.3 Vdc														
CAPACITANCE		0.20 F (0.22F)	See Measuring Method of Characteristics													
CAPACITANCE TOLERANCE		+80% , -20%	See Measuring Method of Characteristics													
EQUIV. SERIES. RES. (ESR)		See Nominal Specifications	FRE. : 1kHz, 1mA													
LEAKAGE CURRENT (30MIN)		See Nominal Specifications	VOLTAGE : 2.5V(2.8V, 3.3V) RESISTANCE : 100Ω See Measuring Method of Characteristics													
TEMPERATURE CHARACTERISTICS	STAGE 2	CAPACITANCE	± 30% OF INI. VAL													
		ESR	10 TIMES OF INI. VAL													
	STAGE 4	CAPACITANCE	± 50% OF INI. VAL	Measure electrical characteristics after exposing Double-Layer Capacitor to each temperature atmosphere for 1 hour <table border="1" data-bbox="1029 810 1345 999"> <thead> <tr> <th>STAGE</th> <th>TEMPERATURE</th> </tr> </thead> <tbody> <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> </tbody> </table>	STAGE	TEMPERATURE	1	20± 2℃	2	-10± 2℃	3	20± 2℃	4	60± 2℃	5	20± 2℃
		STAGE	TEMPERATURE													
		1	20± 2℃													
	2	-10± 2℃														
	3	20± 2℃														
	4	60± 2℃														
	5	20± 2℃														
	ESR	200ohm or less														
LC (30MIN)	SPEC. VALUE															
STAGE 5	CAPACITANCE	± 30% OF INI. VAL														
	ESR	200ohm or less														
	LC (30MIN)	SPEC. VALUE														
TERMINAL STRENGTH		TERMINALS SHALL NOT BE SEPARATED	LOAD 1kg, 10±1SEC													
TERMINAL BEND STRENGTH			LOAD:1kg, ANGLE 90°, 1CYCLE													
VIBRATION RESISTANCE	CAPACITANCE	SPEC. VALUE	AMPLITUDE: 1.5mm FREQUENCY: 10-55Hz DIRECTION: X, Y, Z 3DIRECTIONS TEST TIME: 6HOURS													
	ESR	200ohm or less														
	LC(30MIN)	SPEC. VALUE														
	APPEARANCE	NO MARKED DEFECT														
SOLDERABILITY		TERMINAL TO BE COVERED WITH SOLDER	SOLDER BATH TEMP:350± 5℃ IMMERSION TIME: Less than 3 sec. Caution : Do not touch the cell body with solder during test													
HUMIDITY	CAPACITANCE	90%↑ OF SPEC. VAL	TEMP:40± 2℃ HUMIDITY:90 - 95%RH TEST TIME:240± 8HOURS NO VOLTAGE APPLIED													
	ESR	1.2TIMES ↓ OF SPE. V														
	LC(30MIN)	1.2TIMES ↓ OF SPE. V														
	APPEARANCE	NO MARKED DEFECT														
CYCLE CHARACTERISTICS	CAPACITANCE	± 30% OF SPEC. VAL	TEMP. : 25± 2℃ Cycle NUMBER : 10,000 CHARGE VOLTAGE : 2.5(2.8, 3.3)Vdc RESISTANCE : 150Ω, TIME : 9min. DISCHARGE RESISTANCE:150Ω, TIME:1min.													
	ESR	4TIMES ↓ OF SPE. V														
	LC(30MIN)	300uA or less														
	APPEARANCE	NO MARKED DEFECT														
ENDURANCE	CAPACITANCE	± 30% OF SPEC. VAL	TEMP:70(60)± 2℃ TEST TIME : 1000± 24HOURS APPLIED VOLTAGE : 2.5(2.8, 3.3)Vdc													
	ESR	4TIMES ↓ OF SPE. V														
	LC(30MIN)	300uA or less														
	APPEARANCE	NO MARKED DEFECT														

10. Measuring Method Of Characteristics

<p>Capacitance</p>	<ol style="list-style-type: none"> 1) CHARGE THE STARCAP WITH $1 \pm 0.1 \text{mA}$ TO OPERATION VOLTAGE(V1) FOR 1 HOUR. 2) DISCHARGE THE STARCAP WITH CONSTANT CURRENT(A) $0.1 \pm 0.01 \text{mA}$ TO THE VOLTAGE OF V2(NORMALLY 2V) WHILE MEASURE THE DISCHARGE TIME(T). 3) CALCULATE CAPACITANCE USING THE FOLLOWING FORMULA.  $C = A(\text{Ampere}) \times T \text{ sec} / (V_1 - V_2) \text{V [F]}$ 
<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 terminals [V] i : Current 1mA(A.C.)</p>  $\text{ESR}[\Omega] = V / i$
<p>Leakage Current</p>	<ol style="list-style-type: none"> 1) APPLY $2.5(2.8, 3.3) \pm 0.1 \text{V}$ TO THE STARCAP. 2) MEASURE V_R AFTER $30 \pm 0.5 \text{MIN}$. 3) CALCULATE CURRENT USING THE FOLLOWING FORMULA.  <p>$E_0 : \text{Vdc}$ $R_c : 100\Omega$</p> $\text{LC} = (V_R / R_c) \times 10^3 [\text{mA}]$
<p>☞ THE STARCAP SHOULD BE SHORTED BEFORE EACH MEASUREMENT AS FOLLOWS ; CAPACITANCE : 60 MIN. , ESR : 15 MIN. , LC : 15 MIN.</p>	

11. Mounting And Soldering

When you solder DMS series 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.

① Recommended condition of mounting

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°C or below
- Hardening Time of Resin : 10 min. or less

② Recommended condition of soldering

- Soldering Tip Temp. : 350°C or below
- 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 flow or 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 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

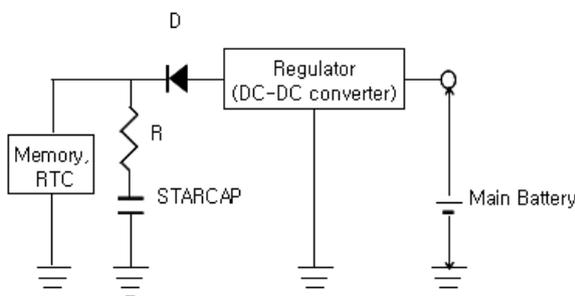
Generally, STARCAP has a lower leakage current, longer back-up time and longer life in the low temperature i.e. the room temperature. But it has a higher leakage current, shorter back-up time and shorter life in the high temperature.

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) 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

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

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 ENVIRONMENT

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.

13. Environmental Management

All STARCAP products are RoHS compliant and environment friendly.

By changing the solder plating from leaded solder to lead-free solder, 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.
DMS	N.D.	N.D.	N.D.	

* N.D. : Not detected