

To. :

DATE : 200



SPECIFICATION

PRODUCT : STARCAP

MODEL : DCS 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

DCS 5R5 474 V F
 ① ② ③ ④ ⑤

- ① Series Name
- ② Rated Voltage : 5.5VDC
- ③ Capacitance : 0.47 F (474 = 47 × 10⁺⁴ uF)
- ④ Lead Type : V-type
- ⑤ Pb-Free

3. Product model name

- 1) Product : Electric Double Layer Capacitor
- 2) Model name : DCS 5R5 474(334, 224, 104, 473) V, H, C

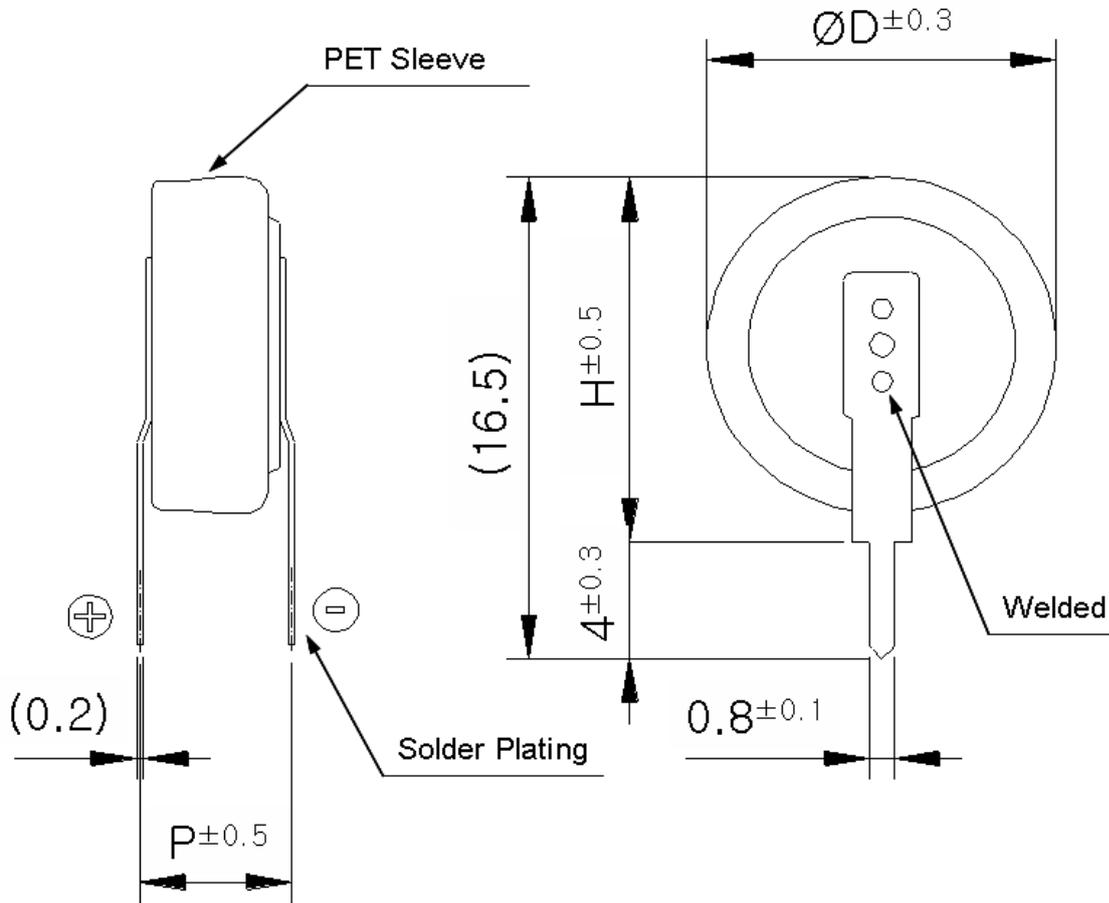
4. Photo



5. Nominal Specifications

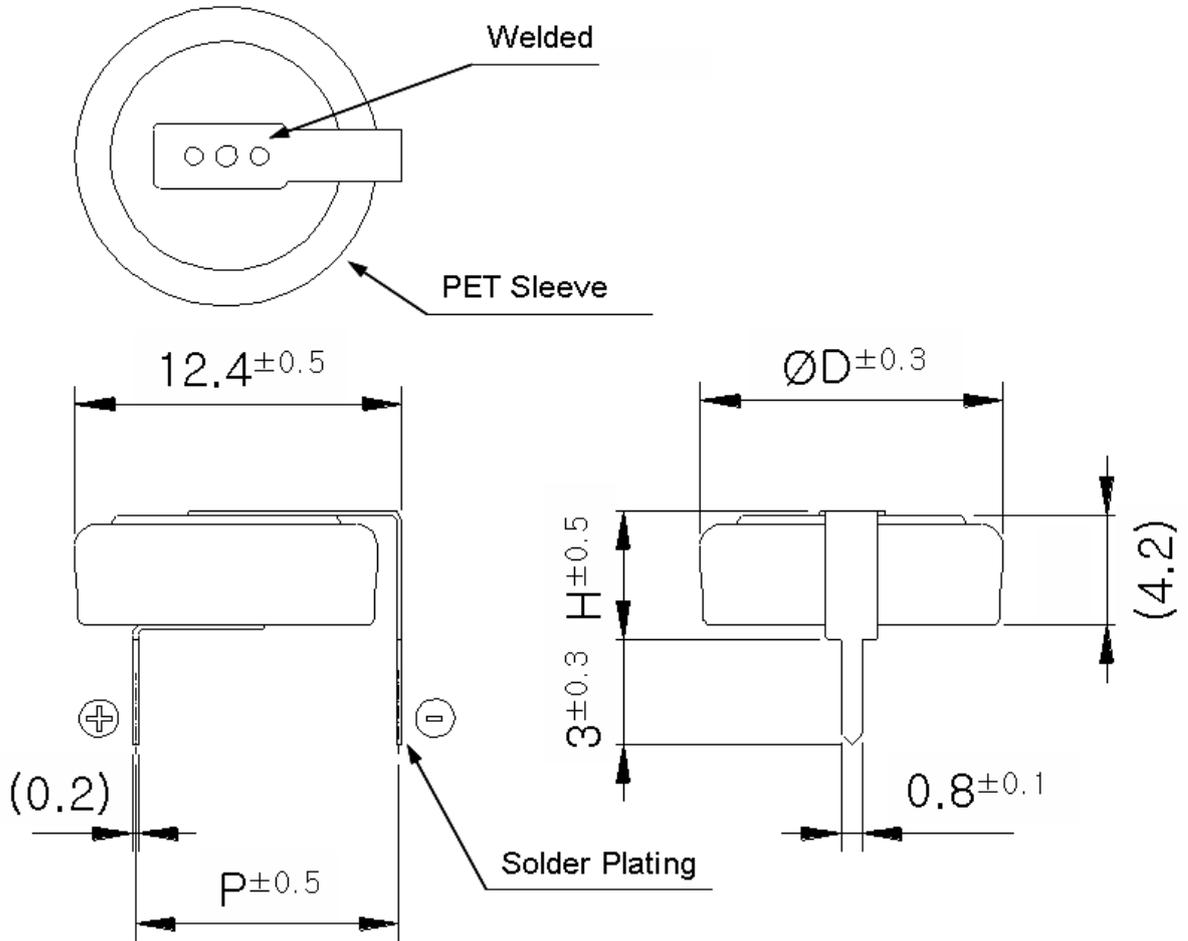
Items	DCS 5R5 473	DCS 5R5 104(224)	DCS 5R5 334(474)
OPERATING TEMPERATURE	-25 ~ +70 °C	-25 ~ +70 °C	-25 ~ +70 °C
RATED VOLTAGE	5.5 VDC	5.5 VDC	5.5 VDC
ELECTROSTATIC CAPACITANCE (F)	0.047 F	0.10(0.22) F	0.33(0.47) F
CAPACITANCE TOLERANCE	-20 ~ 80 %	-20 ~ 80 %	-20 ~ 80 %
EQUIVALENT SERIES RESISTANCE (ESR)	LESS THAN 120Ω	LESS THAN 75Ω	LESS THAN 50Ω
LEAKAGE CURRENT (LC)	LESS THAN 200μA	LESS THAN 330μA	LESS THAN 500μA

6. Product Construction And Dimension (V-type)



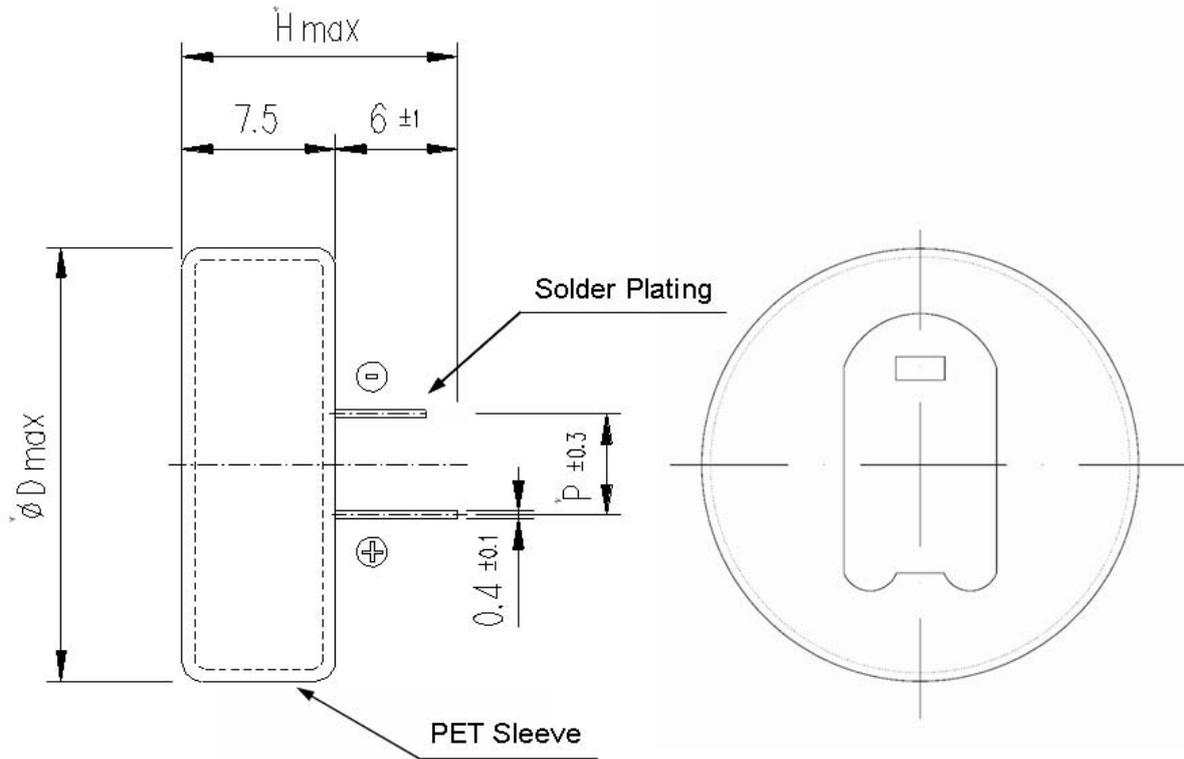
No.	Type	Rated Voltage	Capacitance	Capacitance Tolerance	Measurement (mm)		
					ØD	H	P
1	DCS 5R5 473 V	5.5VDC	0.047 F	-20 ~ 80%	11.5	12.5	5.0
2	DCS 5R5 104 V	5.5VDC	0.10 F	-20 ~ 80%	11.5	12.5	5.0
3	DCS 5R5 224 V	5.5VDC	0.22 F	-20 ~ 80%	11.5	12.5	5.0
4	DCS 5R5 334 V	5.5VDC	0.33 F	-20 ~ 80%	11.5	12.5	5.0
5	DCS 5R5 474 V	5.5VDC	0.47 F	-20 ~ 80%	11.5	12.5	5.0

6. Product Construction And Dimension (H-type)



No.	Type	Rated Voltage	Capacitance	Capacitance Tolerance	Measurement (mm)		
					ØD	H	P
1	DCS 5R5 473 H	5.5VDC	0.047 F	-20 ~ 80%	11.5	5.5	10.0
2	DCS 5R5 104 H	5.5VDC	0.10 F	-20 ~ 80%	11.5	5.5	10.0
3	DCS 5R5 224 H	5.5VDC	0.22 F	-20 ~ 80%	11.5	5.5	10.0
4	DCS 5R5 334 H	5.5VDC	0.33 F	-20 ~ 80%	11.5	5.5	10.0
5	DCS 5R5 474 H	5.5VDC	0.47 F	-20 ~ 80%	11.5	5.5	10.0

6. Product Construction And Dimension (C-type)



No.	Type	Rated Voltage	Capacitance	Capacitance Tolerance	Measurement (mm)		
					$\varnothing D$	H	P
1	DCS 5R5 473 C	5.5VDC	0.047 F	-20 ~ 80%	13.5	6.5	5.0
2	DCS 5R5 104 C	5.5VDC	0.10 F	-20 ~ 80%	13.5	6.5	5.0
3	DCS 5R5 224 C	5.5VDC	0.22 F	-20 ~ 80%	13.5	6.5	5.0
4	DCS 5R5 334 C	5.5VDC	0.33 F	-20 ~ 80%	13.5	6.5	5.0
5	DCS 5R5 474 C	5.5VDC	0.47 F	-20 ~ 80%	13.5	6.5	5.0

7. Packing specification

PRODUCT	QUANTITY(PCS)			SIZE(W×H×T)		Type
	Tray	Inner Box	Outer Box	Inner Box(mm)	Outer Box(mm)	
DCS 5R5 473 (V,H,C)	100	800	3,200	295×230×140	485×310×310	Tray
DCS 5R5 104 (V,H,C)	100	800	3,200	295×230×140	485×310×310	Tray
DCS 5R5 224 (V,H,C)	100	800	3,200	295×230×140	485×310×310	Tray
DCS 5R5 334 (V,H,C)	100	800	3,200	295×230×140	485×310×310	Tray
DCS 5R5 474 (V,H,C)	100	800	3,200	295×230×140	485×310×310	Tray

8. Specifications And Test Method

Items.		Specification		Test Condition (JISC5102)															
OPERATING TEMP. RANGE		-25°C ~ +70°C																	
RATED VOLTAGE		5.5 Vdc																	
CAPACITANCE		0.047 ~ 0.47 F		TO SEE MEASURE METHOD															
CAPACITANCE TOLERANCE		+80% , -20%																	
EQUIV. SERIES. RES. (ESR)		To See Nominal Specifications		TO SEE MEASURE METHOD															
LEAKAGE CURRENT (30MIN)		To See Nominal Specifications		TO SEE MEASURE METHOD															
TEMPERATURE CHARACTERISTICS	CAPACITANCE	STAGE 2	± 30% OF INI. VAL	Measure electrical characteristics after exposing Double-Layer Capacitor to each temperature atmosphere for 1 hours															
	ESR		4TIMES ↓ OF INI. VAL																
	CAPACITANCE	STAGE 4	± 30% OF INI. VAL			<table border="1"> <thead> <tr> <th>STAGE</th> <th>TEMPERATURE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>20± 2°C</td> </tr> <tr> <td>2</td> <td>-25± 2°C</td> </tr> <tr> <td>3</td> <td>20± 2°C</td> </tr> <tr> <td>4</td> <td>70± 2°C</td> </tr> <tr> <td>5</td> <td>20± 2°C</td> </tr> </tbody> </table>		STAGE	TEMPERATURE	1	20± 2°C	2	-25± 2°C	3	20± 2°C	4	70± 2°C	5	20± 2°C
	STAGE		TEMPERATURE																
	1		20± 2°C																
	2	-25± 2°C																	
	3	20± 2°C																	
4	70± 2°C																		
5	20± 2°C																		
ESR	SPEC. VALUE																		
LC	SPEC. VALUE																		
CAPACITANCE	STAGE 5	± 30% OF INI. VAL																	
ESR		SPEC. VALUE																	
LC		SPEC. VALUE																	
SOLDER ABILITY	CAPACITANCE	SPEC. VALUE		SOLDER TEMP. : MAX. 350± 5°C IMMERSION TIME : 3± 0.5sec. DIP LENGTH : TO 1.6mm FROM BOTTOM OF THE CELL BODY															
	ESR	SPEC. VALUE																	
	LC	SPEC. VALUE																	
	APPEARANCE	NO MARKED DEFECT																	
HUMIDITY RESISTANCE	CAPACITANCE	90% ↑ OF SPEC. VAL		TEMP. : 40± 2°C HUMIDITY : 90 ~ 95%RH TIME : 240± 8 HOURS NO VOLTAGE APPLIED															
	ESR	1.2TIMES ↓ OF SPE. V																	
	LC	1.2TIMES ↓ OF SPE. V																	
	APPEARANCE	NO MARKED DEFECT																	
SELF DISCHARGE CHARACTERISTICS	VOLTAGE	MORE THAN 4.2V	CHARGING CONDITION	VOLTAGE : 5.0V RESISTANCE : 10Ω CHARGE TIME : 24 HOURS															
			NEGLIGENCE CONDITION	24 HOURS NEGLIGENCE TEMP. : LESS THAN 25°C HUMIDITY : LESS THAN 70%RH															
VIBRATION RESISTANCE	CAPACITANCE	SPEC. VALUE		AMPLITUDE : 1.5mm FREQUENCY : 10 ~ 55Hz DIRECTION : X, Y, Z 3DIRECTIONS TEST TIME : 6 HOURS															
	ESR	SPEC. VALUE																	
	LC	SPEC. VALUE																	
	APPEARANCE	NO MARKED DEFECT																	
LEAD STRENGTH	APPEARANCE	LEAD TERMINAL SHALL NOT BE SEPARATED	LOAD 1kg , 10± 1 SEC																
LEAD BEND STRENGTH			LOAD 1kg , ANGLE 90° , 1Cycle																
ENDURANCE	CAPACITANCE	± 30% OF SPEC. VAL		TEMP. : 70± 2°C TEST TIME : 1,000(+24,-0) HOURS APPLIED VOLTAGE : 5.5Vdc															
	ESR	4TIMES ↓ OF SPE. V																	
	LC	3TIMES ↓ OF SPE. V																	
	APPEARANCE	NO MARKED DEFECT																	

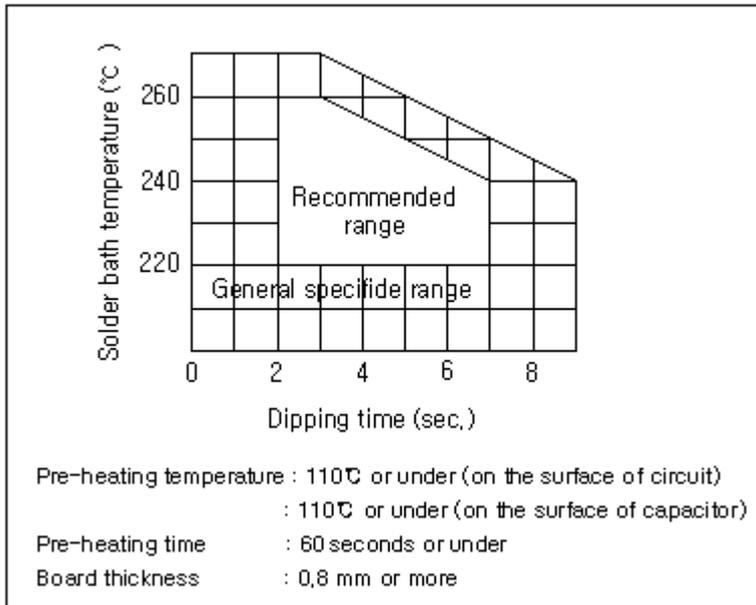
9. Measuring Method Of Characteristics

<p>Capacitance</p>	<ol style="list-style-type: none"> 1) CHARGE THE STARCAP WITH $50 \pm 0.1\text{mA}$ 2) READ THE TIME TAKEN FOR THE VOLTAGE TO RISE FROM $V_2 \pm 0.05\text{V}$ TO $V_1 \pm 0.05\text{V}$. THE TIME MEASURED IS INDICATED BY "T". 3) DISCHARGE THE STARCAP WITH $2 \pm 0.1\text{mA}$ (Standard Operating Current 2mA) 4) CALCULATE CAPACITANCE USING THE FOLLOWING FORMULA. <p style="text-align: center;">$C = A(\text{Ampere}) \times T \text{ sec} / (V_1 - V_2)V [\text{F}]$</p>								
<p>Equivalent Series Resistance</p>	<ol style="list-style-type: none"> 1. MEASURE ESR BY THE LCR METER. (Frequency: 1kHz, Base Voltage : $0^{+0.05}\text{V}$) 2. CALCULATE CURRENT USING THE FOLLOWING FORMULA. $R[\Omega] = V[V] / I[A] \quad * i[\text{mA}] = I[A] \times 10^{-3}$ <p style="text-align: right;">R : Internal resistance$[\Omega]$</p> <p style="text-align: right;">V : Measured voltage between the terminal[V]</p> <p style="text-align: right;">i : Current 1mA(A.C)</p> <p style="text-align: center;">$\text{ESR}[\Omega] = V_c / i$</p>								
<p>Leakage Current</p>	<ol style="list-style-type: none"> 1) APPLY $5.0 \pm 0.1\text{V}$ TO THE STARCAP. 2) MEASURE V_r AFTER $30 \pm 0.5 \text{ MIN}$. 3) CALCULATE CURRENT USING THE FOLLOWING FORMULA. <p style="text-align: center;">$\text{LC} = (V_r / R_c) \times 10^3 [\text{mA}]$</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Capacitance</th> <th>R_c</th> </tr> </thead> <tbody> <tr> <td>$\sim 0,047\text{F}$</td> <td>1000Ω</td> </tr> <tr> <td>$0,1\text{F} \sim 0,47\text{F}$</td> <td>$100\Omega$</td> </tr> <tr> <td>$1,0\text{F}$</td> <td>$10\Omega$</td> </tr> </tbody> </table> <p style="text-align: right;">$E_0 : V_w \text{VDC}$ R_c: See the right table</p>	Capacitance	R_c	$\sim 0,047\text{F}$	1000Ω	$0,1\text{F} \sim 0,47\text{F}$	100Ω	$1,0\text{F}$	10Ω
Capacitance	R_c								
$\sim 0,047\text{F}$	1000Ω								
$0,1\text{F} \sim 0,47\text{F}$	100Ω								
$1,0\text{F}$	10Ω								
<p>☞ THE STARCAP SHOULD BE SHORTED BEFORE EACH MEASUREMENT AS FOLLOWS ; CAPACITANCE : 60 MIN. , ESR : 15 MIN. , LC : 15 MIN.</p>									

10. Mounting

When soldering a capacitor to a printed circuit board, excessive thermal stress could cause the capacitor's electrical characteristics to deteriorate. compromise the integrity of the seal or cause the electrolyte to leak due to increased internal pressure.

① Flow soldering temperature and time



- ② Do not touch the capacitor body with a soldering iron. Solder the capacitor using a soldering tip temperature of 350°C or less for three seconds or less. Solder a capacitor three times or less at intervals of 9 seconds or more.
- ③ The lead wires and terminals are plated for good solderability. Rasping lead wires or terminals may damage the plating layer and degrade the solderability. Do not apply a large force to the lead wires or terminals. Otherwise, they may break or come off or the capacitor characteristics may be deteriorated.
- ④ Reflow soldering or dip soldering where capacitors are immersed in a solder bath cannot be used.
- ⑤ If capacitors are pre-heated or fixing resin is hardened using a UV curing furnace, then the product surface temperature must be 100°C or less and the duration 60 seconds or less. The peak temperature must be 105°C or less
- ⑥ For reflow-solderable capacitors, check the individual specifications.

11. Caution For Use

Please be careful following point when you use STARCAP.

1) Don't apply more than rated voltage.

If you apply more than rated voltage, STARCAP's electrolyte is electrolyzed. And its ESR gets higher. At the worst, it is broken.

2) Don't use for ripple current absorption.

3) Polarity

The STARCAP is non-polar fundamentally. However STARCAP is made polarity, when it is packed.

Please mount it in accordance with its polarity for the maintaining best condition.

4) Operating temperature and life

Generally speaking, STARCAP has a lower leakage current, longer back-up time and longer life in the low temp.

But, it has a higher leakage current, shorter back-up time and shorter life in the high temp.

Please design to keep STARCAP away a calorific parts.

5) Cleaning

Some detergent or high temperature drying cause deteriorates of STARCAP. If wash STARCAP, Consult us.

6) Soldering

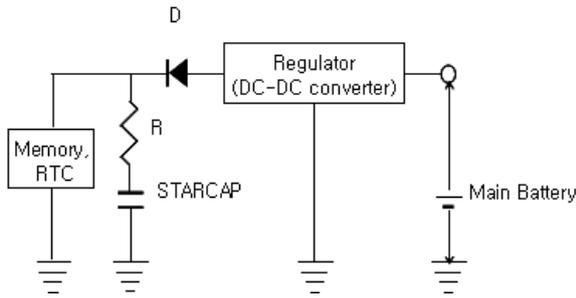
When you solder by solder iron, please do quickly it within 3sec.

Please don't touch the resin case of STARCAP by solder iron.

Because the resin may be melted by it's heat.

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

7) Following Figure Show The General Back-up Circuit.



D : Diode for protection of counter
 R : Resistor for protection of electric power source

8) Short Circuit STARCAP

You can short-circuit between terminals without resistor.

However when you short circuit frequently, please let us know.

We think that frequently condition is as follows ;

Charge : 30 Sec., Discharge : 30 Sec., Cycle : 1000 Cycle, Temp.: 85°C

9) Storage

Please store STARCAP in following condition ;

Temp. : 15 ~ 35°C, Humidity : 45 ~ 75%RH, Non-dust

10) Please don't disassemble STARCAP. Because its electrolyte is organic solvent.

11) When you use bond cure skin, please contact us for its condition.

12) Series connection of STARCAP causes a difference of applied voltage for each STARCAP, because of dispersion of capacitance and ESR.

As a result, it's possible to apply over-rated voltage.

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 in same lot.

12. Environmental management

By changing the solder plating from leaded solder to lead-free solder, and the outer tube material of cased conventional Starcap from polyvinyl chloride to Polyethylene Terephthalate(PET), our new Starcap has become even more friendlier to the environment.

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

* N.D : Not detected