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# SPECIFICATION

PRODUCT : STARCAP

MODEL : DCST series

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

# Index

Page No.	ITEM	etc.
1	Cover Page	
2	Index	
3	1. Scope	
	2. Part Number System	
	3. Product Model Name	
	4. Photo	
	5. Nominal Specifications	
4	6. Product Construction And Dimension (V-type)	
5	6. Product Construction And Dimension (H-type)	
6	6. Product Construction And Dimension (C-type)	
7	7. Packing Specifications	
8	8. Specifications And Test Method	
9	9. Measuring Method Of Characteristics	
10	10. Mounting	
11	11. Cautions For Use	
12	12. Environmental Management	

**1. Scope**

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

**2. Part Number System**

DCST   3R6   224   V   F   (Example)  
 ①        ②        ③        ④        ⑤

- ① Series Name : DC(Coin type double layer capacitor), S(Small size), T(Temperature)
- ② Rated Voltage : 3.6VDC
- ③ Capacitance : 0.22 F (224 =  $47 \times 10^{+4}$  uF)
- ④ Terminal Type : V-type
- ⑤ Pb-Free

**3. Product Model Name**

- 1) Product : Electric Double Layer Capacitor
- 2) Model name : DCST 3R6 224(334) V, H, C

**4. Photo (Example)**



**V-TYPE**



**H-TYPE**

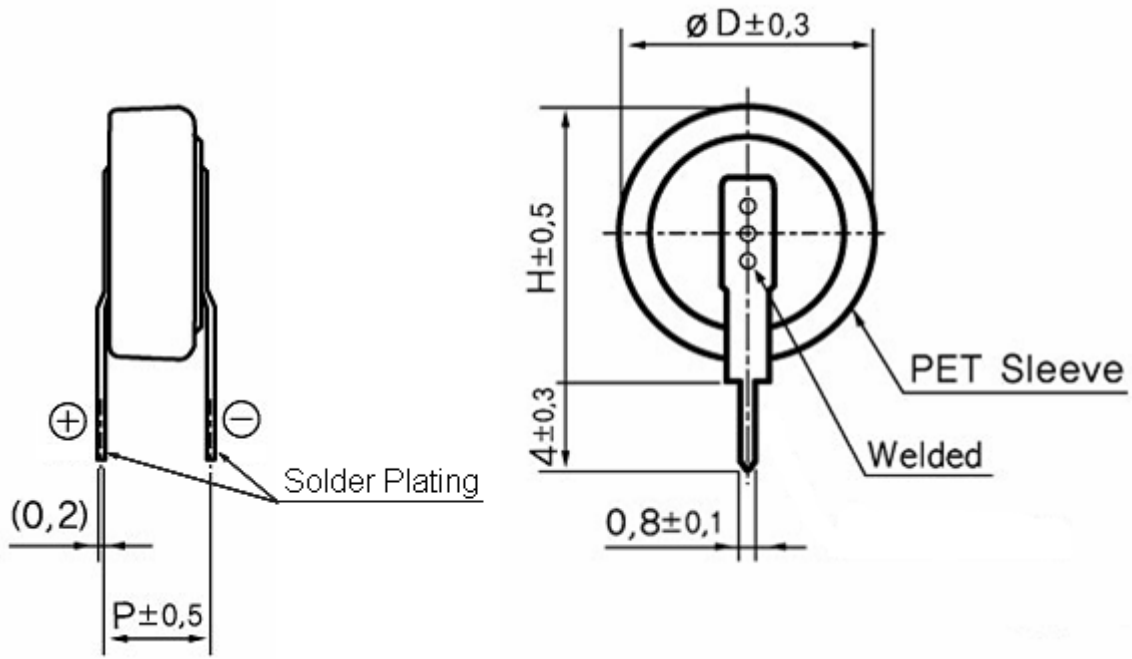


**C-TYPE**

**5. Nominal Specifications**

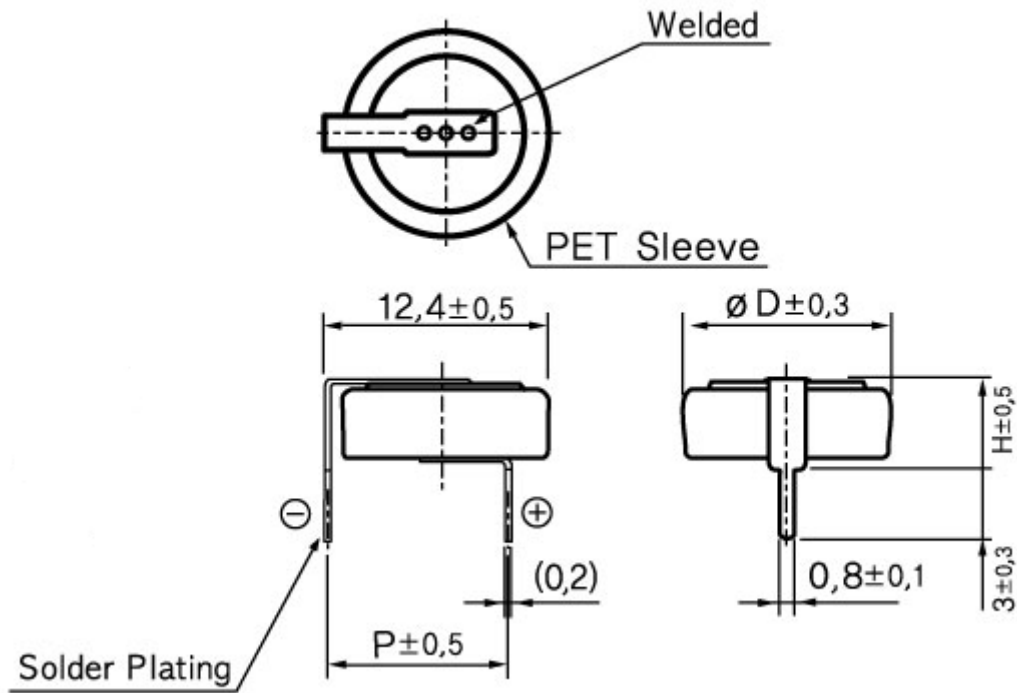
Items	DCST 3R6 224	DCST 3R6 334
OPERATING TEMPERATURE	-25 ~ +85 °C	-25 ~ +85 °C
RATED VOLTAGE	3.6 VDC	3.6 VDC
ELECTROSTATIC CAPACITANCE (F)	0.22 F	0.33 F
CAPACITANCE TOLERANCE	-20 ~ 80 %	-20 ~ 80 %
EQUIVALENT SERIES RESISTANCE (ESR)	LESS THAN 75 Ω	LESS THAN 50 Ω
LEAKAGE CURRENT (LC)	LESS THAN 330 μA	LESS THAN 500 μA

6. Product Construction And Dimension (V-type)



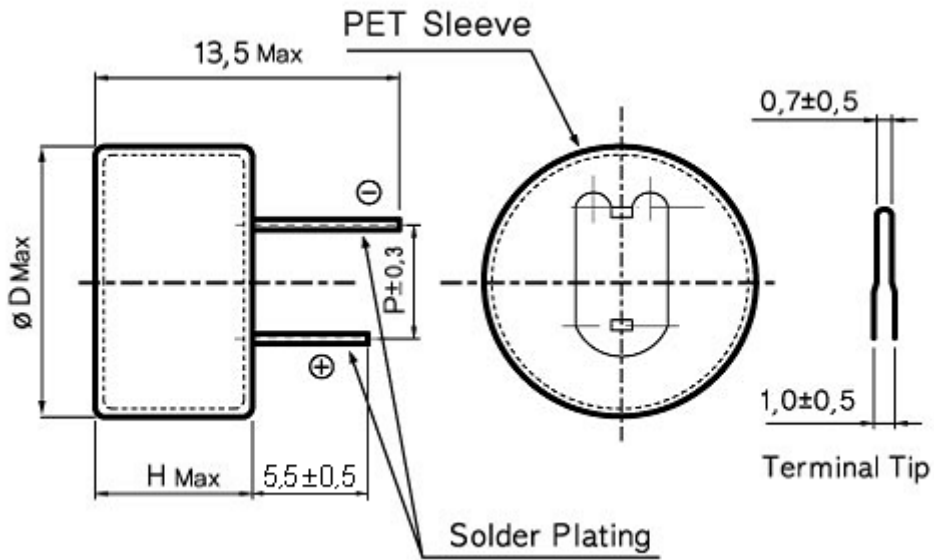
Part No.	Dimensions (mm)		
	$\varnothing D$	H	P
DCST 3R6 224 V	11.5	12.5	5.0
DCST 3R6 334 V	11.5	12.5	5.0

6. Product Construction And Dimension (H-type)



Part No.	Dimensions (mm)		
	ØD	H	P
DCST 3R6 224 H	11.5	5.5	10.0
DCST 3R6 334 H	11.5	5.5	10.0

6. Product Construction And Dimension (C-type)



Part No.	Dimensions (mm)		
	ØD	H	P
DCST 3R6 224 C	13.5	6.5	5.0
DCST 3R6 334 C	13.5	6.5	5.0

## 7. Packing Specification

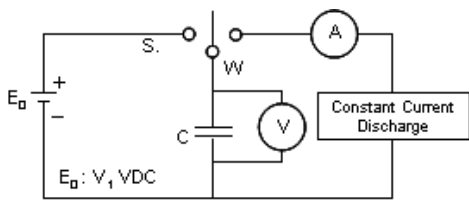
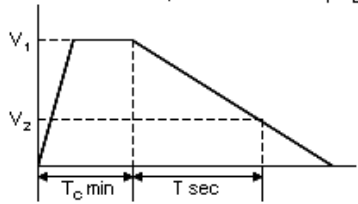
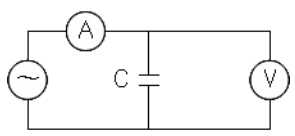
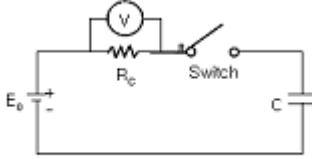
PRODUCT	QUANTITY(PCS)			SIZE(W×L×H mm)		Type
	Vinyl Bag	Inner Box	Outer Box	Inner Box	Outer Box	
DCST 3R6 224 (V,H)	500	2,000	4,000	295×230×140	485×310×310	Bulk
DCST 3R6 334 (V,H)	500	2,000	4,000	295×230×140	485×310×310	Bulk
DCST 3R6 224 C	500	1,500	3,000	295×230×140	485×310×310	Bulk
DCST 3R6 334 C	500	1,500	3,000	295×230×140	485×310×310	Bulk

### 8. Specifications And Test Method

Items.		Specification	Test Condition (EIAJ RC-2377)												
OPERATING TEMP. RANGE		-25℃ ~ +85℃													
RATED VOLTAGE		3.6 Vdc													
CAPACITANCE		0.22 ~ 0.33 F	SEE MEASURING METHOD												
CAPACITANCE TOLERANCE		+80% , -20%													
EQUIV. SERIES. RES. (ESR)		See Nominal Specifications	SEE MEASURING METHOD												
LEAKAGE CURRENT (30MIN)		See Nominal Specifications	SEE MEASURING METHOD												
TEMPERATURE CHARACTERISTICS	CAPACITANCE	STAGE 2 ± 30% OF INI. VAL	Measure electrical characteristics after exposing STARCAP Capacitor to each temperature atmosphere for 1 hour <table border="1" style="margin-left: 20px;"><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>-25± 2℃</td></tr><tr><td>3</td><td>20± 2℃</td></tr><tr><td>4</td><td>70± 2℃</td></tr><tr><td>5</td><td>20± 2℃</td></tr></tbody></table>	STAGE	TEMPERATURE	1	20± 2℃	2	-25± 2℃	3	20± 2℃	4	70± 2℃	5	20± 2℃
	STAGE	TEMPERATURE													
	1	20± 2℃													
	2	-25± 2℃													
	3	20± 2℃													
	4	70± 2℃													
	5	20± 2℃													
ESR	5TIMES ↓ OF INI. VAL														
CAPACITANCE	STAGE 4 ± 30% OF INI. VAL														
ESR	4TIMES ↓ OF INI. VAL														
LC	4TIMES ↓ OF INI. VAL														
CAPACITANCE	STAGE 5 ± 10% OF INI. VAL														
ESR	SPEC. VALUE														
LC	SPEC. VALUE														
HUMIDITY RESISTANCE	CAPACITANCE	90% ↑ OF INI. VAL	TEMP. : 40± 2℃ HUMIDITY : 90 ~ 95%RH TIME : 240± 8 HOURS <b>NO VOLTAGE APPLIED</b>												
	ESR	3TIMES ↓ OF INI. V													
	LC	2TIMES ↓ OF INI. V													
	APPEARANCE	NO MARKED DEFECT													
SELF DISCHARGE CHARACTERISTICS	VOLTAGE	MORE THAN 2.8V	CHARGING CONDITION VOLTAGE : 3.6V RESISTANCE : 10Ω CHARGE TIME : 24 HOURS												
			STORAGE CONDITION STORAGE FOR 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 3DIRECTIONS TEST TIME : 6 HOURS												
	ESR	SPEC. VALUE													
	LC	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	± 30% OF INI. VAL	TEMP. : 85± 2℃ HUMIDITY : 60-65%RH TEST TIME : 1,000(+24,-0) HOURS APPLIED VOLTAGE : 3.6Vdc												
	ESR	4TIMES ↓ OF INI. V													
	LC	3TIMES ↓ OF INI. V													
	APPEARANCE	NO MARKED DEFECT													
CYCLE CHARACTERISTICS	CAPACITANCE	± 30% OF SPEC. VAL	TEMP. : 25± 2℃ Cycle NUMBER : 10,000 CHARGE VOLTAGE : 3.6Vdc RESISTANCE : 100Ω, TIME : 9min. DISCHARGE RESISTANCE:100Ω, TIME:1min.												
	ESR	4TIMES ↓ OF SPE. V													
	LC(30MIN)	300uA or less													
	APPEARANCE	NO MARKED DEFECT													



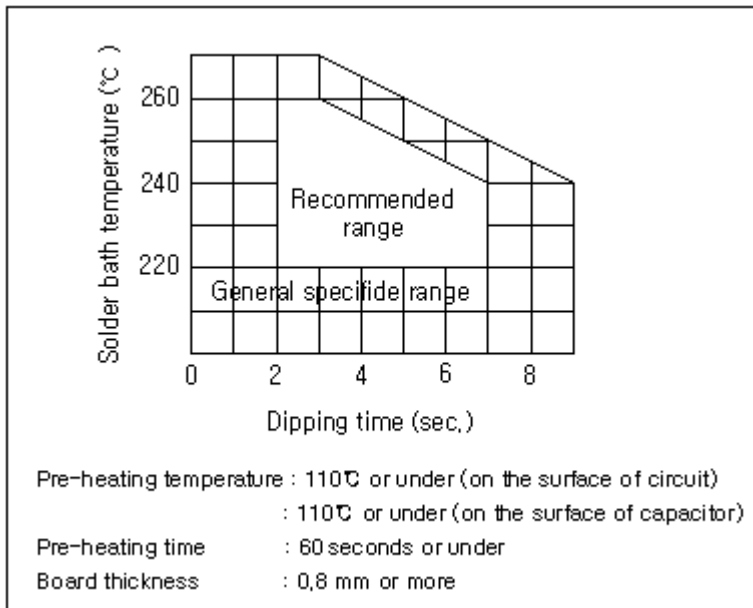
### 9. Measuring Method Of Characteristics

<p>Capacitance</p>	<ol style="list-style-type: none"> <li>1) CHARGE THE STARCAP WITH <math>50 \pm 0.1 \text{mA}</math> TO OPERATION VOLTAGE(<math>V_1</math>) FOR 30 Min.</li> <li>2) DISCHARGE THE STARCAP WITH CONSTANT CURRENT(A) Max <math>2 \pm 0.1 \text{mA}</math> TO THE VOLTAGE OF <math>V_2</math>(NORMALLY 1.5V) WHILE MEASURE THE DISCHARGE TIME(T). (Standard Operating Current for DCS Series STARCAP is 2mA)</li> <li>3) CALCULATE CAPACITANCE USING THE FOLLOWING FORMULA.</li> </ol>  <p style="text-align: center;"><math>C = A(\text{Ampere}) \times T \text{ sec} / (V_1 - V_2) \text{V [F]}</math></p> 
<p>Equivalent Series Resistance (ESR @1kHz)</p>	<ul style="list-style-type: none"> <li>● MEASURE ESR BY THE LCR METER. (Frequency:1kHz, Bias Voltage : <math>0^{+0.05} \text{V}</math>)</li> <li>or</li> <li>● CALCULATE ESR USING THE FOLLOWING FORMULA.</li> </ul>  <p style="text-align: center;"><math>\text{ESR}[\Omega] = V / i</math></p> <p style="text-align: center;"><math>R[\Omega] = V[V] / I[A] \quad * i[\text{mA}] = I[A] \times 10^{-3}</math></p> <p>R : Internal resistance(ESR) [<math>\Omega</math>]  V : Measured voltage between terminals [V]  i : Current 1mA(A.C.)</p>
<p>Leakage Current</p>	<ol style="list-style-type: none"> <li>1) APPLY <math>3.6 \pm 0.1 \text{V}</math> TO THE STARCAP.</li> <li>2) MEASURE <math>V_R</math> AFTER <math>30 \pm 0.5 \text{MIN}</math>.</li> <li>3) CALCULATE CURRENT USING THE FOLLOWING FORMULA.</li> </ol>  <p style="text-align: center;"><math>\text{LC} = (V_R / R_C) \times 10^3 [\text{mA}]</math></p> <p><math>E_0 : \text{Vdc}</math>  <math>R_C : 1000\Omega (0.047\text{F})</math>  <math>100\Omega (0.1\text{F} \sim 0.47\text{F})</math></p>
<p>☞ THE STARCAP SHOULD BE SHORTED BEFORE EACH MEASUREMENT AS FOLLOWS ;  CAPACITANCE : 60 MIN. , ESR : 15 MIN. , LC : 15 MIN.</p>	

## 10. 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.

### ① Recommended condition of flow soldering



### ② Recommended condition of manual soldering

- Soldering Tip Temp. : 350°C 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.

### 11. 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

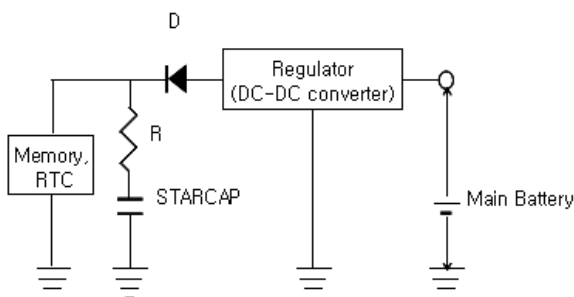
Generally, STARCAP has a lower leakage current, longer back-up time and longer life in the low temperature i.e. the room temperature. But it has a higher leakage current, shorter back-up time and shorter life in the high temperature.

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

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. 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.
DCS	N.D.	N.D.	N.D.	

\* N.D. : Not detected