

To. :

DATE : 20 . . .

RoHS 1,2 and 3	Halogen Free
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SPECIFICATION

PRODUCT : STARCAP
MODEL : DMS3R3224RS

WRITTEN	CHECKED	APPROVED

KORCHIP CORP.

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Revision History

No.	Documentation	Check	Description of Revision	Approval	Date
1	S.H. Jeon (R&D)	K.B. Chung (Q.A.)	Initial Release	B.I. Lim (R&D)	Feb. 16, 2022

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

<u>DMS</u>	<u>3R3</u>	<u>224</u>	<u>RS</u>
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 Product Identification Code

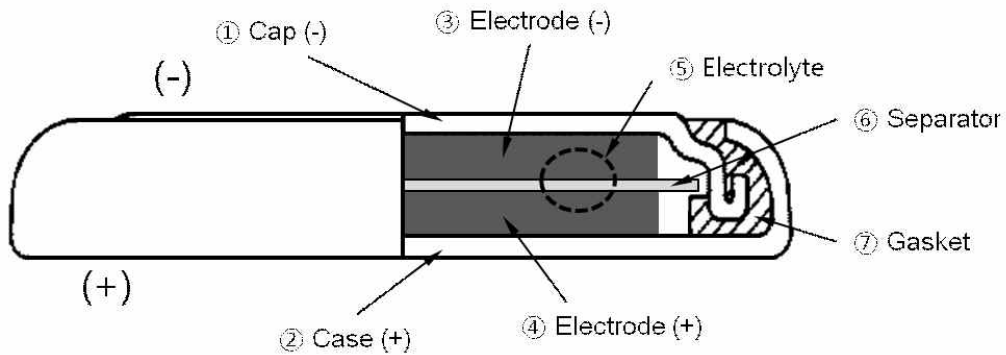
3. Photo



4. General Specifications

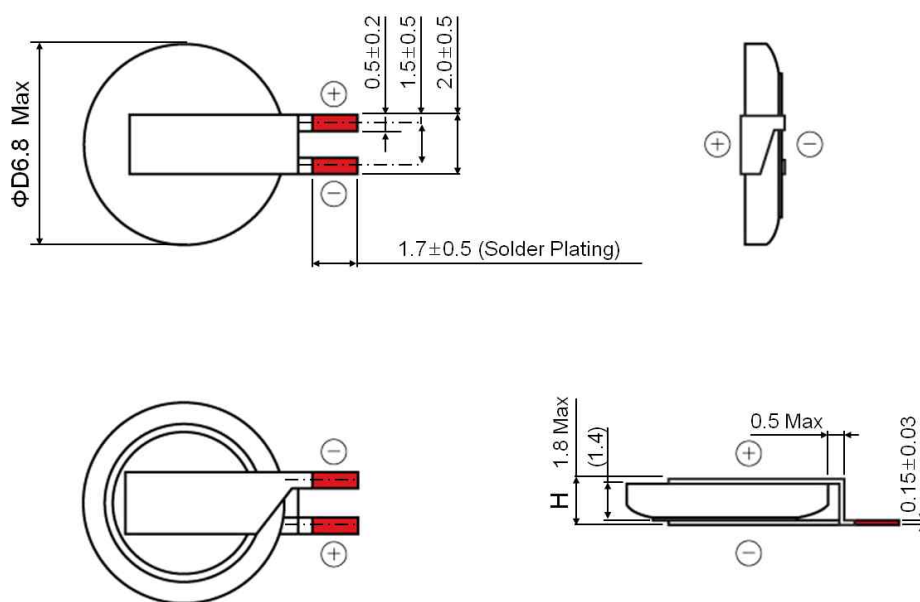
ITEMS	VALUE
Rated Voltage	3.3 VDC
Operating Temp.	-10 ~ +60 °C
Capacitance (F)	0.22 F
Capacitance Tolerance	-20 ~ 80 %
Equivalent Series Resistance (ESR)	Less than 200Ω

5. Cell Structure

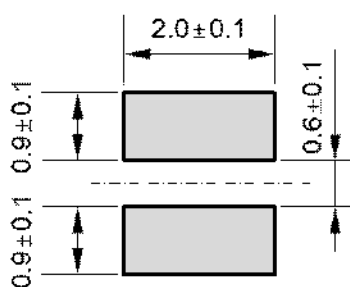


Part Name	Material
① Cap (-)	Stainless Steel
② Case (+)	Stainless Steel
③ Electrode (-)	Activated Carbon
④ Electrode (+)	Activated Carbon
⑤ Electrolyte	Organic Electrolyte
⑥ Separator	Glass Fiber
⑦ Gasket	Engineering Plastic

6. Product Dimensions



Recommendable PCB Layout (Unit : mm)

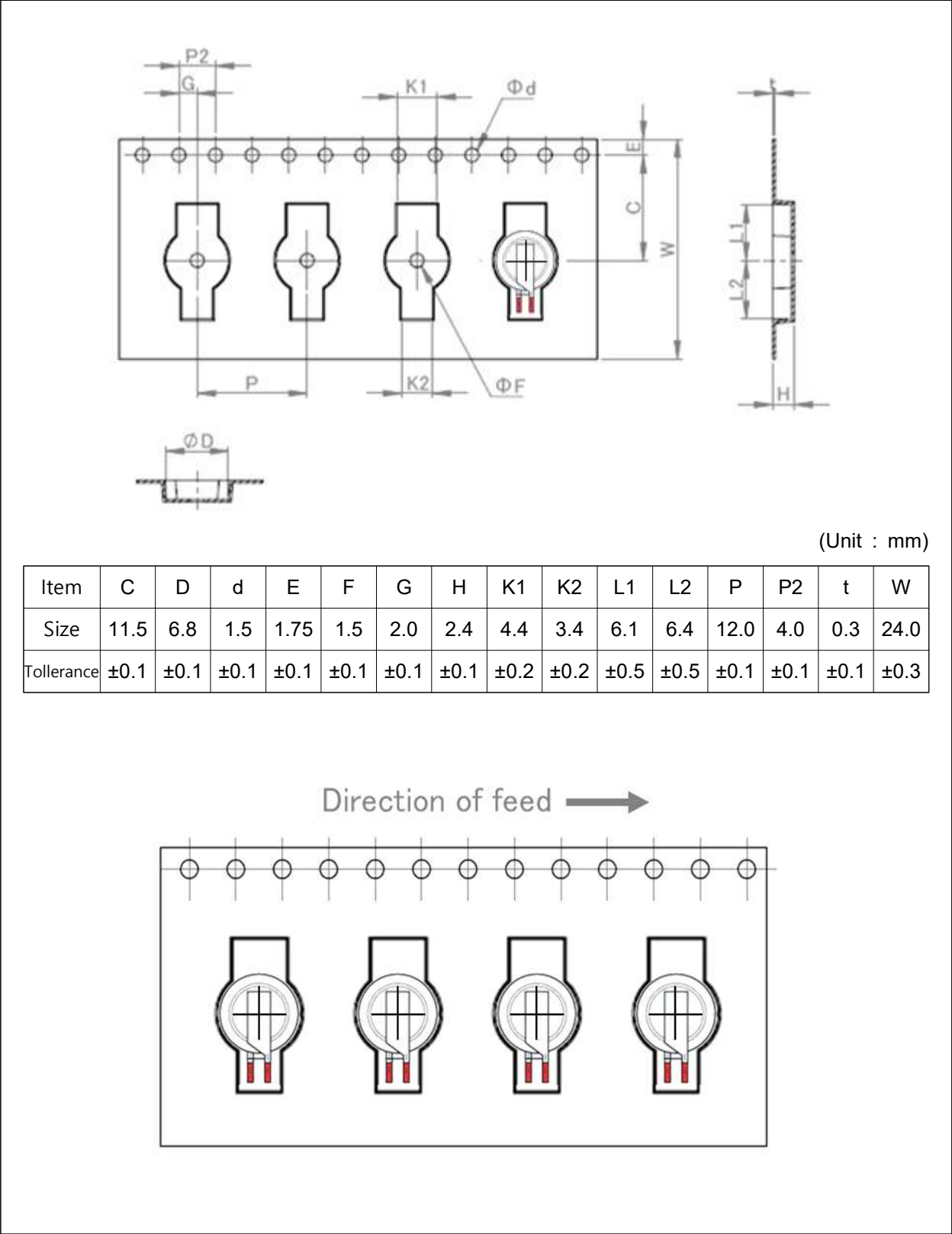


7. Reliability Specifications

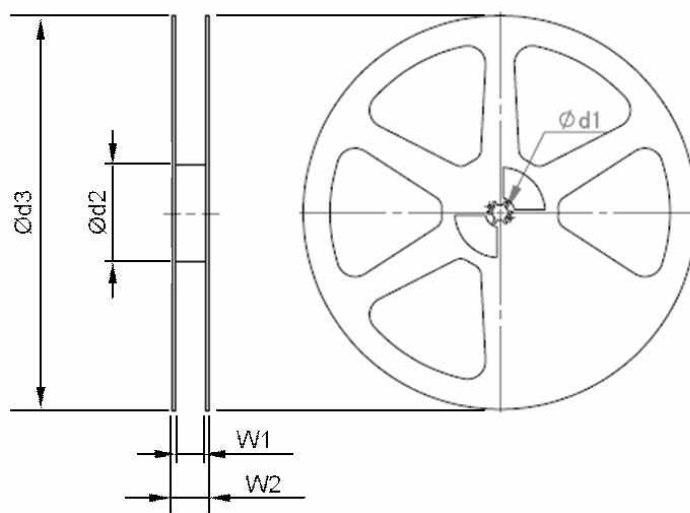
Item		Specification		Test Condition	
Temperature Characteristics	Capacitance Change	Step 2	Within ± 30% of Initial Value	Measure electrical characteristics after exposing STARCAP Capacitor to each temperature atmosphere for one(1) hour	
	ESR		5Times or less than Initial Value		
	Capacitance Change	Step 4	Within ± 30% of Initial Value	Step	Temperature
	ESR		200Ω or less	1	20±2℃
	Capacitance Change	Step 5	Within ± 10% of Initial Value	2	-10±2℃
			ESR Change	200Ω or less	3
			4	60±2℃	
			5	20±2℃	
Reflow Soldering Effect	Capacitance	Spec. Value		Pb-Free Reflow Solder Peak Temp. : 260± 5℃ Duration at Peak Temp. : 5±0.5℃	
	Appearance	No Marked Defect			
Humidity Resistance	Capacitance Change	± 30% of Initial Value		Temp. : 40±2℃ Humidity : 90 ~ 95%RH Time : 500±8 Hours No Voltage Applied	
	ESR	2KΩ or less			
	Appearance	No Marked Defect			
Self Discharge Characteristics	Voltage	More than 1.8Vdc	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 10N , 10±1 Sec.		
Terminal Bend Strength			Load 5N , 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 No Voltage Applied	
	ESR	2KΩ or less			
	Appearance	No Marked Defect			

8. Packing Specifications

1) Carrier Tape

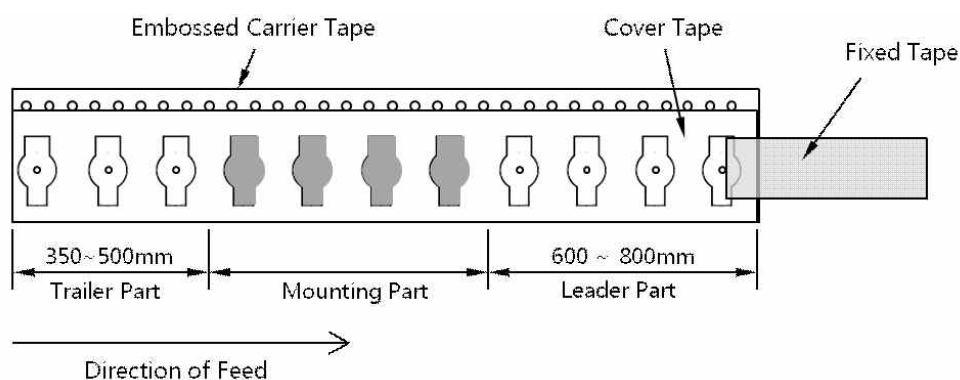
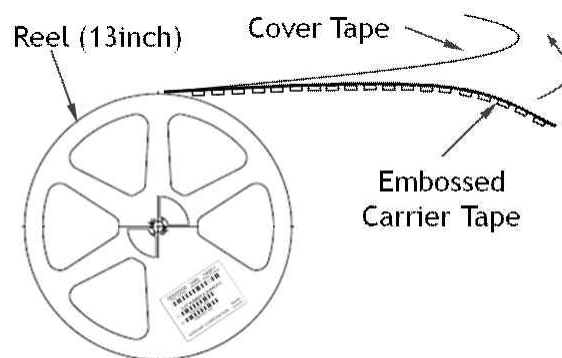


2) Reel

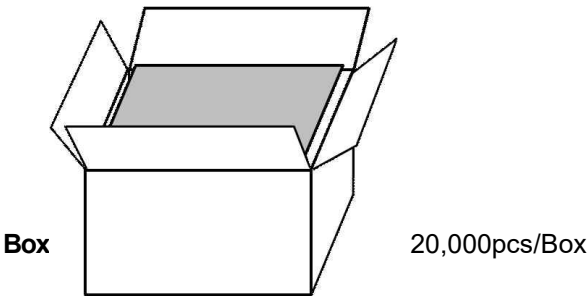
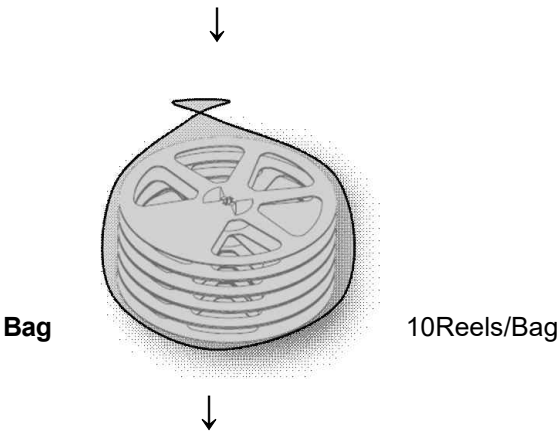
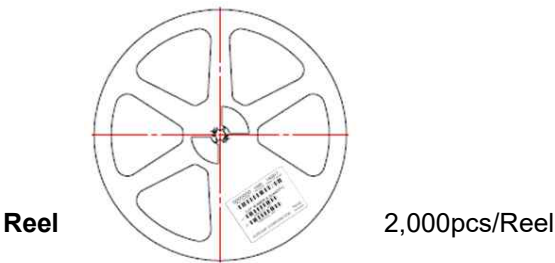


(Unit : mm)

W1	W2	Ød1	Ød2	Ød3
25±0.5	(29.5±1)	13±0.5	80±1	330±1 (13inch)

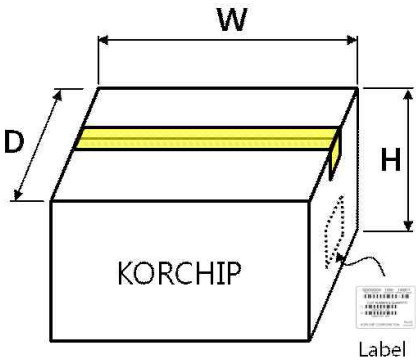


3) Box



	Unit	Reel	Bag	Box
Weight	0.22g	0.90kg	9.0kg	10kg
Qty. (pcs)	1	2,000	20,000	20,000

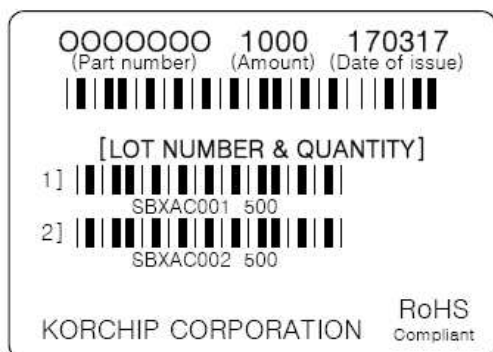
<Weight Information>



W	D	H
350mm	350mm	370mm

<Box Dimension>

9. Labeling Standards



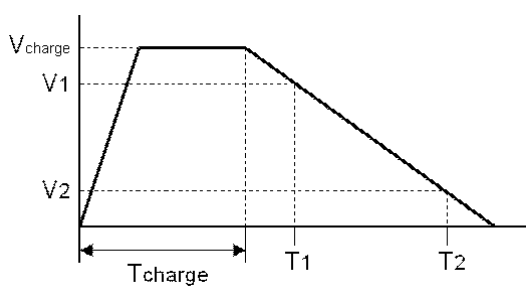
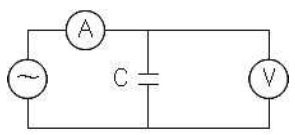
← (Example)

Lot No. System

Ex.) S G 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), ... ,F (2021), G (2022)...
- 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

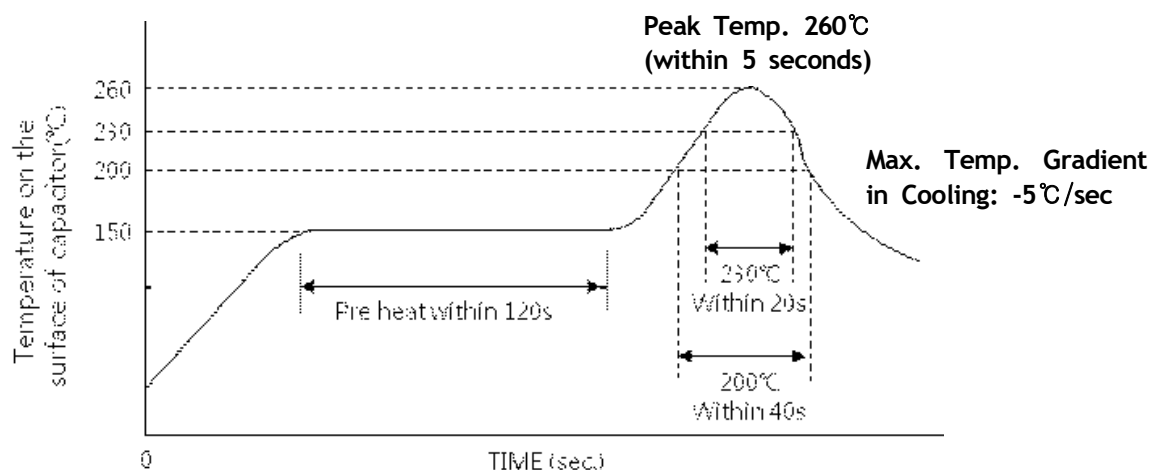
Capacitance	1) Charge the STARCAP with constant current $I_{\text{charge}} (=1 \pm 0.1 \text{ mA})$ to $V_{\text{charge}} (=3.3 \text{ V})$ then keep charging for $T_{\text{charge}} (=3000 \text{ sec.})$ 2) Discharge the STARCAP with constant current $I_{\text{disch}} (=0.5 \text{ mA})$ while measure the discharge time T_1, T_2 between $V_1 (=2.64 \text{ V})$ and $V_2 (=1.32 \text{ V})$. 3) Calculate capacitance using the following formula.  $C = \frac{I_{\text{disch}} \times (T_1 - T_2)}{V_1 - V_2}$
Equivalent Series Resistance (ESR @1kHz)	● Measure ESR by the LCR meter. (Frequency:1kHz, Bias Voltage : $0^{+0.05} \text{ V}$) or ● Calculate ESR using the following formula.  $\text{ESR} [\Omega] = V / i$ $R [\Omega] = V [\text{V}] / I [\text{A}] \quad * i [\text{mA}] = I [\text{A}] \times 10^{-3}$ R : Internal resistance (ESR) [Ω] V : Measured voltage between terminals [V] i : Current 1mA (A.C.)
 The STARCAP should be shorted before each measurement as follows ; Capacitance : 60 min. , ESR : 15 min. , LC : 15 min.	

11. Mounting

1) Reflow Soldering

Excessive heat stress may result in the deterioration of the electrical characteristics of the capacitor and electrolyte leakage due to the rise in internal pressure.

Use the general reference chart then set soldering temperature and time.



The time of repeated reflow soldering must be two times or less.

Do not use reflow soldering when the cell voltage is above 0.3V.

2) Manual Soldering

For use of a soldering iron, it should not touch the cell body.

Temperature of the soldering iron should be less than 360°C.

Soldering time for terminals should be less than 3(-0/+1) seconds.

12. Cautions for Use

Please be careful for following points when you use Korchip's EDLC.

1) Do not apply more than rated voltage.

If you apply more than rated voltage, electrolyte in EDLC will be decomposed and its ESR increase. At the worst, it may be broken.

2) Do not use EDLC for ripple absorption.

3) Polarity

Please mount it in accordance with its polarity.

4) Operating environment and lifetime

EDLC shows faster deterioration in high temperature operation. The lifetime of EDLC 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 EDLC and it may cause fast deterioration or electrolyte leakage of EDLC.

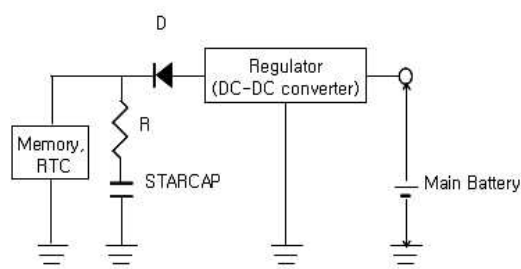
If the EDLC is used in an electronic or electrical device over a long period of time especially in high temperature or high humidity environment, please check it periodically and replace it when necessary.

5) Cleaning

Some detergent or high temperature drying causes deterioration of EDLC.

If you wash EDLCs, 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

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

8) Storage

In long term storage, please store EDLCs in following condition;

- ① TEMP. : 15 ~ 35 °C
- ② HUMIDITY : Less than 60%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 an EDLC is stored in the above condition. Storage in improper condition may cause some damage on terminal surface or on outer tube of the EDLC.

If the storage period exceed one(1) year in the customer's warehouse, please contact the manufacturer.

9) Do not disassemble the EDLC. It contains electrolyte.

10) Series connection of EDLCs

Over-rated voltage may be applied to a single EDLC in series connection due to the deviation of capacitance and ESR of each EDLC. Please inform us if you are using EDLCs in series connection and please design so as not to apply over-rated voltage to each EDLC, and use EDLCs from a same lot.

11) The tips or edges of an EDLC 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) Use of Functional Coating Chemicals

Some solvents of functional coating chemicals which applied on the same PCB with the STARCAP EDLC may cause undesired effects on the EDLC such as surface oxidation or electrolyte leakage. When apply those chemicals, be careful of not coating the EDLC's surface.

13. Environmental Management

All STARCAP products are RoHS 1, 2 and 3 compliant, Halogen Free and environment friendly.

Series	RoHS 1,2 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