

# DATA SHEET

PRODUCTS	<b>Green-Cap</b> (Electric Double Layer Capacitor)
ITEM	DS 3.0V 5F (Ø10 × L20) Part No. DS0U505W10020BB
REMARK	
COMPANY	SAMWHA ELECTRIC
TEL	82-43-261-0200
ADDRESS	3, Bongmyeong-ro, Heungdeok-gu, Cheongju-si, Chungcheongbuk-do, Korea

Approved by *k. c. Eom*



Technical team manager

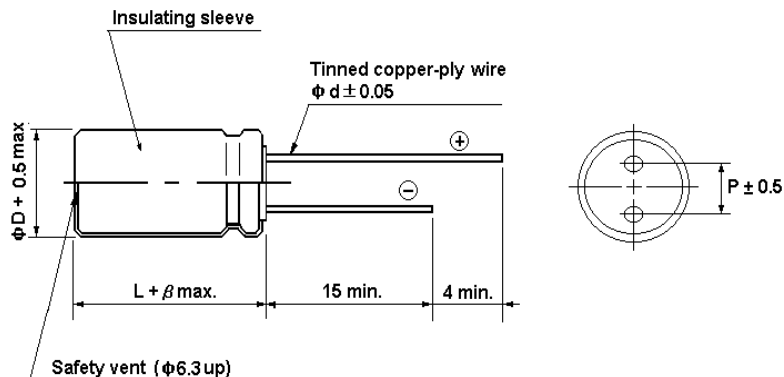
- Green-Cap is brand of SAMWHA's electric double layer capacitor(EDLC).
- Electric double layer capacitor(EDLC) is a next generation energy storage device.

## DS0U505W10020BB

### FEATURE

- Endurance : 3.0V 65°C 1000hours
- The small size and high capacitance, low resistance
- Charge and discharge efficiency are higher than in batteries

### DIMENSIONS



$\phi D$	L	P	$\phi d$	$\beta$
10	20	5.0	0.6	1.5

### PRODUCTS SPECIFICATION

Rated Voltage	Capacitance (F)	ESR, 1kHz (m $\Omega$ )	ESR, DC (m $\Omega$ )	L/C(72hr) (mA Max.)	Specific Energy		Weight (g)	Volume (m $\ell$ )	Dimension $\phi D \times L$ (mm)
					(Wh/kg)	(Wh/L)			
3.0	5	50	90	0.015	2.84	3.98	2.2	1.6	10 $\times$ 20

## PRODUCTS CHARACTERISTIC

CAPACITANCE	
Nominal Capacitance	5 F
Capacitance tolerance	0 ~ +20%
VOLTAGE	
Rated voltage	3.0 V
Surge voltage	3.15 V
TEMPERATURE	
Operating temperature range	-40~+65°C
Storage temperature range	-40~+65°C
Temperature characteristics	
Capacitance change	±5% (at 20°C)
Internal resistance change	±50% (at 20°C)
RESISTANCE	
AC ESR(1KHz)	50 mΩ
DC ESR	90 mΩ
CURRENT	
Leakage current After 72hr at 25°C. Initial leakage current can be higher.	0.015 mA
Maximum continuous current	0.4 A
Maximum peak current (1 sec.)	5.2 A

ENDURANCE	
Endurance After 1,000hr application of rated voltage at 65°C	
Capacitance change	Within ±30% of specified value
Internal resistance change	Within 100% of specified value
Life test After 10 years at rated voltage and 25°C	
Capacitance change	< 30%
Internal resistance change	< 100%
CYCLES	
Capacitors cycles between rated voltage under constant current at 25°C (500,000cycles)	
Capacitance change	< 30%
Internal resistance change	< 100%
MARKING	
SAMWHA trade mark & series identification	
Rated voltage	
Capacitance value (Marking)	
Sleeve color : Black	
Print color : Gold	

## PERFORMANCE

Test environmental conditions

- Ambient temperature : 25±2°C, Relative humidity : 60~70%, Air pressure : 86~106kPa

No	ITEM	TEST CONDITION	SPECIFICATION															
1	Rated voltage		See the table "PRODUCTS CHARACTERISTIC"															
2	Capacitance (tolerance)	To see measure method (See No. 11)	See the table "PRODUCTS CHARACTERISTIC"															
3	Internal resistance	To see measure method (See No. 12)	See the table "PRODUCTS CHARACTERISTIC"															
4	Leakage current (After 72hr at 25°C)	To see measure method (See No. 13)	See the table "PRODUCTS CHARACTERISTIC"															
5	Temperature characteristics	<table border="1"> <thead> <tr> <th>STEP</th> <th>TEMPERATURE(°C)</th> <th>TIME</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>20 ±2</td> <td></td> </tr> <tr> <td>2</td> <td>-40 ±2</td> <td>2hr</td> </tr> <tr> <td>3</td> <td>20 ±2</td> <td>15 min</td> </tr> <tr> <td>4</td> <td>65 ±2</td> <td>2 hr</td> </tr> </tbody> </table> <p>Step-1 Capacitance, ESR and leakage current shall be measured.</p> <p>Step-2, 4 After the capacitor being stored for 2hours, capacitance and ESR and leakage current shall be measured.</p> <p>Step-3 After the capacitor being stored for 15min, capacitance and ESR and leakage current shall be measured.</p>	STEP	TEMPERATURE(°C)	TIME	1	20 ±2		2	-40 ±2	2hr	3	20 ±2	15 min	4	65 ±2	2 hr	<ul style="list-style-type: none"> <li>• Capacitance change within ±5% of initial value</li> <li>• Internal resistance change ≤ 50% of initial value</li> <li>• Leakage current ≤ specified value</li> </ul>
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1	20 ±2																	
2	-40 ±2	2hr																
3	20 ±2	15 min																
4	65 ±2	2 hr																
6	Resistance to soldering heat	<ul style="list-style-type: none"> <li>• Solder : HSE-02 SR-34</li> <li>• Flux : 25% by weight of rosin in methanol</li> <li>• Solder temperature : 260±5°C</li> <li>• Immersion depth : 2.0 mm</li> <li>• Immersion speed : 25±2.5 mm/sec.</li> </ul>	<ul style="list-style-type: none"> <li>• No visible damage</li> <li>• Capacitance change within ±10% of initial value</li> <li>• Internal resistance change ≤ 20% of initial value</li> <li>• Leakage current ≤ specified value</li> </ul>															

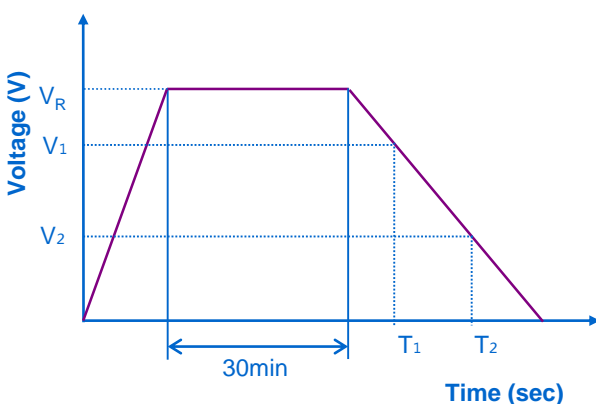
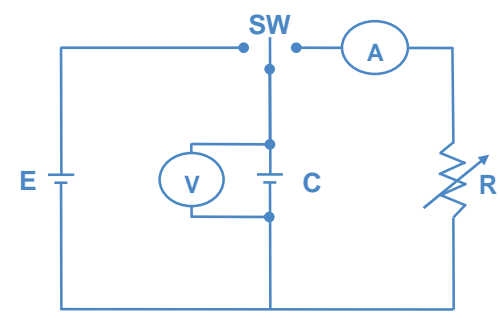
## PERFORMANCE

### Test environmental conditions

- Ambient temperature :  $25 \pm 2^\circ\text{C}$ , Relative humidity : 60~70%, Air pressure : 86~106kPa

No	ITEM	TEST CONDITION	SPECIFICATION															
7	Endurance	<ul style="list-style-type: none"> <li>• Temperature : <math>65^\circ\text{C} \pm 2^\circ\text{C}</math></li> <li>• Applied voltage : rated voltage</li> <li>• Duration : 1000 +72/-0 hours</li> </ul>	<ul style="list-style-type: none"> <li>• No visible damage</li> <li>• Capacitance change within <math>\pm 30\%</math> of specified value</li> <li>• Internal resistance change <math>\leq 100\%</math> of specified value</li> <li>• Leakage current <math>\leq</math> specified value</li> </ul>															
8	Shelf life	<ul style="list-style-type: none"> <li>• Temperature : <math>65^\circ\text{C} \pm 2^\circ\text{C}</math></li> <li>• Duration : 1000 +72/-0 hours</li> </ul>	<ul style="list-style-type: none"> <li>• No visible damage</li> <li>• Capacitance change within <math>\pm 30\%</math> of specified value</li> <li>• Internal resistance change <math>\leq 100\%</math> of specified value</li> <li>• Leakage current <math>\leq</math> specified value</li> </ul>															
9	Cycle life	<table border="1"> <thead> <tr> <th>STEP</th> <th>VOLTAGE(V)</th> <th>TIME (sec.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Charge to Rated Voltage</td> <td><math>20 \pm 1</math></td> </tr> <tr> <td>2</td> <td>Rest to Rated Voltage</td> <td><math>10 \pm 0.5</math></td> </tr> <tr> <td>3</td> <td>Discharge to Rated Voltage <math>\times 1/2</math></td> <td>about(<math>20 \pm 1</math>)</td> </tr> <tr> <td>4</td> <td>Rest to Rated Voltage <math>\times 1/2</math></td> <td><math>10 \pm 0.5</math></td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>• Cycle : 500,000 cycles</li> </ul>	STEP	VOLTAGE(V)	TIME (sec.)	1	Charge to Rated Voltage	$20 \pm 1$	2	Rest to Rated Voltage	$10 \pm 0.5$	3	Discharge to Rated Voltage $\times 1/2$	about( $20 \pm 1$ )	4	Rest to Rated Voltage $\times 1/2$	$10 \pm 0.5$	<ul style="list-style-type: none"> <li>• No visible damage</li> <li>• Capacitance change within <math>\pm 30\%</math> of specified value</li> <li>• Internal resistance change <math>\leq 100\%</math> of specified value</li> <li>• Leakage current <math>\leq</math> specified value</li> </ul>
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4	Rest to Rated Voltage $\times 1/2$	$10 \pm 0.5$																
10	Damp heat (steady state)	<ul style="list-style-type: none"> <li>• Temperature : <math>40 \pm 2^\circ\text{C}</math></li> <li>• Relative humidity : 90%~95%</li> <li>• Duration : <math>240 \pm 8</math> hours</li> </ul>	<ul style="list-style-type: none"> <li>• No visible damage</li> <li>• Capacitance change within <math>\pm 30\%</math> of specified value</li> <li>• Internal resistance change <math>\leq 100\%</math> of specified value</li> <li>• Leakage current <math>\leq</math> specified value</li> </ul>															

## Measuring Method Of Characteristics

11	Capacitance	<p>1) Charging is performed by constant current followed by constant voltage charging.                  2) Charging is performed for duration of 30 minutes at rated voltage.                  3) Discharge use a constant current load device and measure the time for the terminal voltage to drop from <math>V_1</math> to <math>V_2</math> upon discharge at 1mA/F. (<math>V_1 = 0.8 \times V_R</math>, <math>V_2 = 0.4 \times V_R</math>)                  4) The capacitance can be obtained by the following equation.</p> $C = \frac{I \times (T_2 - T_1)}{V_1 - V_2} \text{ (F)}$  
12	ESR	<p>The AC Resistance is used.</p> <ol style="list-style-type: none"> <li>1) The Frequency of the measuring voltage shall be 1kHz.</li> <li>2) The AC current shall be from 1 to 10mA.</li> </ol>
13	Leakage current	<ol style="list-style-type: none"> <li>1) Charging is performed by constant current followed by constant voltage charging</li> <li>2) Charging is performed for duration of 72 hours at rated voltage.</li> <li>3) Then, Leakage current is measured by current measurement equipment.</li> </ol>

• Please contact SAMWHA Green-Cap directly for any technical specifications critical to application.