

# DATA SHEET

PRODUCTS	<b>Green-Cap</b> (Electric Double Layer Capacitor)
ITEM	DH 2.7V 2000F (Ø60.4 × L102) Part No. DH5U208W60102WD
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.

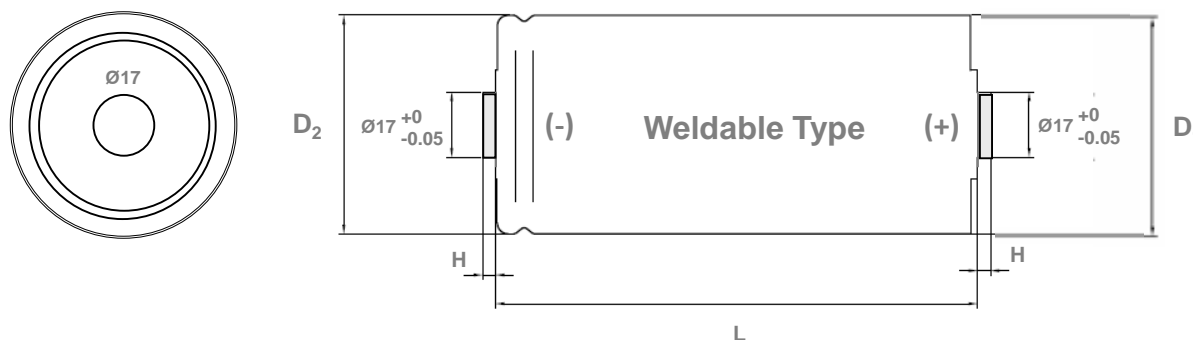
## DH5U208W60102WD

Threaded Terminal Type  
Standard Series

### FEATURE

- High Power Density
- Suitable for Electric Power Storage
- Charge and Discharge efficiency are higher than regular batteries

### DIMENSIONS



Size (mm)			
L (±1.0)	H (±0.2)	D <sub>1</sub> (±0.2)	D <sub>2</sub> (±0.5)
102.0	3.0	Ø 60.4	Ø 60.7

### PRODUCTS SPECIFICATION

Rated Voltage (DC)	Capacitance (F)	ESR, 1kHz (mΩ)	ESR, DC (mΩ)	L/C(72hr) (mA Max.)	Energy density		Power density		Weight (g)	Volume (mℓ)	Dimension Ø D × L (mm)
					(Wh/kg)	(Wh/L)	(W/kg)	(W/L)			
2.7	2000	0.24	0.27	4.0	5.06	6.93	8,100	11,086	400	292	60.4 × 102

## PRODUCTS CHARACTERISTIC

CAPACITANCE		
Nominal Capacitance		2000F
Capacitance tolerance		0 ~ +20%
VOLTAGE		
Rated voltage		2.7 V
Surge voltage		2.85 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	±100% (at 20°C)
INTERNAL RESISTANCE		
AC ESR (1KHz)		< 0.24 mΩ
DC ESR		< 0.27 mΩ
CURRENT		
Maximum continuous current		131.5 A
Maximum peak current (1 sec.)		1753 A
SIZE		
Weight (g)		400
Dimension (ΦDxL) (mm)		60.4 x 102

ENDURANCE	
<b>Endurance</b> After 1,500hr application of rated voltage at 65°C	
Capacitance change	Within ±20% of specified value
Internal resistance change	Within 100% of specified value
<b>Life test</b> After 10 years at rated voltage and 25°C	
Capacitance change	< 20%
Internal resistance change	< 100%
CYCLES	
Capacitors cycles between rated voltage under constant current at 25°C (Over 1,000,000cycle)	
Capacitance change	< 20%
Internal resistance change	< 100%

## 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															
1	Rated voltage		See the table "PRODUCTS CHARACTERISTIC"															
2	Capacitance (tolerance)	To see measure method (See No. 9)	See the table "PRODUCTS CHARACTERISTIC"															
3	Internal resistance	To see measure method (See No. 10)	See the table "PRODUCTS CHARACTERISTIC"															
4	Temperature characteristics	<table border="1" data-bbox="639 619 1203 811"> <thead> <tr> <th>STEP</th> <th>TEMPERATURE(°C)</th> <th>TIME</th> </tr> </thead> <tbody> <tr> <td>1</td> <td><math>20 \pm 2</math></td> <td></td> </tr> <tr> <td>2</td> <td><math>-40 \pm 2</math></td> <td>2hr</td> </tr> <tr> <td>3</td> <td><math>20 \pm 2</math></td> <td>15 min</td> </tr> <tr> <td>4</td> <td><math>65 \pm 2</math></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	$20 \pm 2$		2	$-40 \pm 2$	2hr	3	$20 \pm 2$	15 min	4	$65 \pm 2$	2 hr	<ul style="list-style-type: none"> <li>• Capacitance change within <math>\pm 5\%</math> of initial value</li> <li>• Internal resistance change <math>\leq 100\%</math> of initial value</li> <li>• Leakage current <math>\leq</math> specified value</li> </ul>
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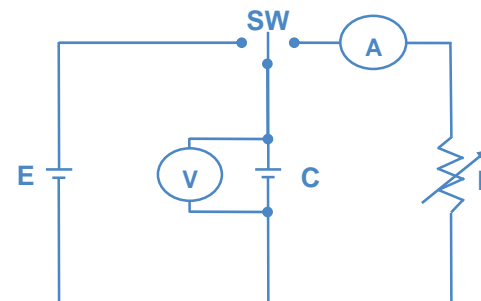
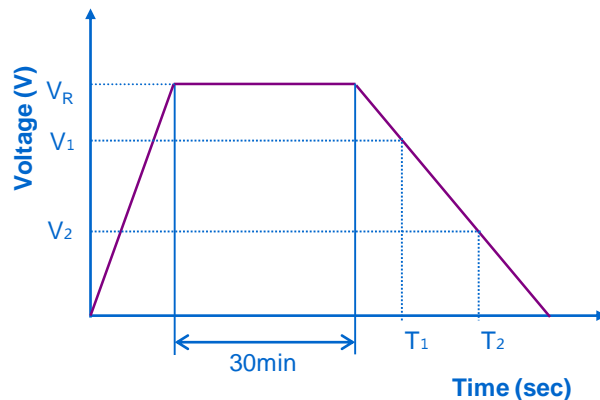
No	ITEM	TEST CONDITION	SPECIFICATION															
5	Endurance	<ul style="list-style-type: none"> <li>• Temperature : <math>65^\circ\text{C} \pm 2^\circ\text{C}</math></li> <li>• Applied voltage : rated voltage</li> <li>• Duration : 1500 +72/-0 hours</li> </ul>	<ul style="list-style-type: none"> <li>• No visible damage</li> <li>• Capacitance change within <math>\pm 20\%</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>															
6	Shelf life	<ul style="list-style-type: none"> <li>• Temperature : <math>65^\circ\text{C} \pm 2^\circ\text{C}</math></li> <li>• Duration : 1500 +72/-0 hours</li> </ul>	<ul style="list-style-type: none"> <li>• No visible damage</li> <li>• Capacitance change within <math>\pm 20\%</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>															
7	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 : 1,000,000 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 20\%</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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8	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 20\%</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

9 Capacitance

- 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  $V_1$  to  $V_2$  upon discharge at 1mA/F. ( $V_1 = 0.8 \times V_R$ ,  $V_2 = 0.4 \times V_R$ )
- 4) The capacitance can be obtained by the following equation.

$$C = \frac{I \times (T_2 - T_1)}{V_1 - V_2} \text{ (F)}$$



10 ESR

- The AC Resistance is used.
- 1) The Frequency of the measuring voltage shall be 1kHz.
  - 2) The AC current shall be from 1 to 10mA.