

DATA SHEET

PRODUCTS	Green-Cap (Electric Double Layer Capacitor)
ITEM	DH 2.7V 3400F (Ø60.4 × L138) Part No. DH5U348W60138WD
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.

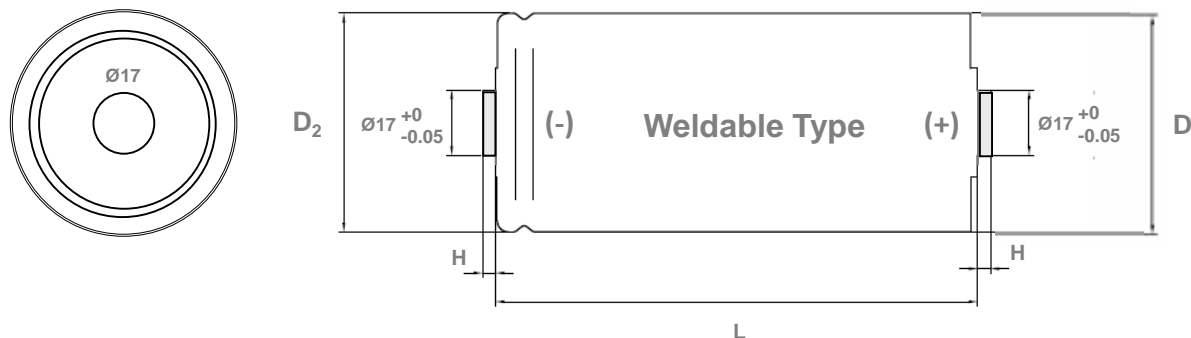
DH5U348W60138WD

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 ₁ (±0.2)	D ₂ (±0.5)
138.0	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	3400	0.25	0.28	9.18	6.50	8.71	5,895	7,901	530	395	60.4 × 138

PRODUCTS CHARACTERISTIC

CAPACITANCE		
Nominal Capacitance		3400F
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)		< 0.25 mΩ
DC ESR		< 0.28 mΩ
CURRENT		
Maximum continuous current		219.1 A
Maximum peak current (1 sec.)		2351 A
SIZE		
Weight (g)		530
Dimension (ΦDxL) (mm)		60.4 x 138

ENDURANCE	
Endurance 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
Life test 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" style="margin-left: auto; margin-right: auto;"> <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"> • Capacitance change within $\pm 5\%$ of initial value • Internal resistance change $\leq 100\%$ of initial value • Leakage current \leq specified value
STEP	TEMPERATURE(°C)	TIME																
1	20 ± 2																	
2	-40 ± 2	2hr																
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PERFORMANCE

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

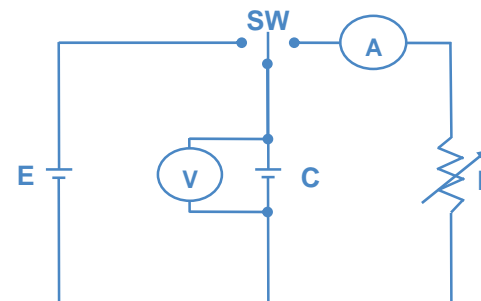
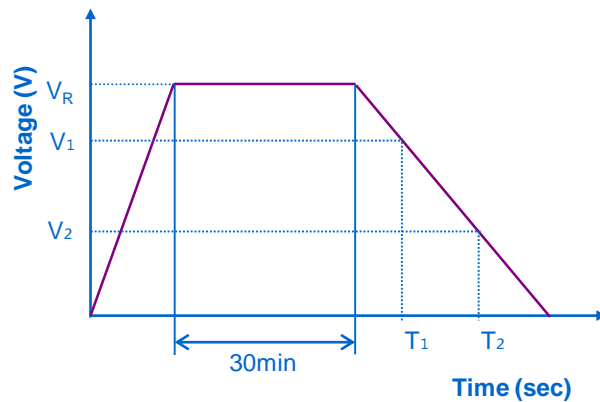
No	ITEM	TEST CONDITION	SPECIFICATION															
5	Endurance	<ul style="list-style-type: none"> • Temperature : $65^\circ\text{C} \pm 2^\circ\text{C}$ • Applied voltage : rated voltage • Duration : 1500 +72/-0 hours 	<ul style="list-style-type: none"> • No visible damage • Capacitance change within $\pm 20\%$ of specified value • Internal resistance change $\leq 100\%$ of specified value • Leakage current \leq specified value 															
6	Shelf life	<ul style="list-style-type: none"> • Temperature : $65^\circ\text{C} \pm 2^\circ\text{C}$ • Duration : 1500 +72/-0 hours 	<ul style="list-style-type: none"> • No visible damage • Capacitance change within $\pm 20\%$ of specified value • Internal resistance change $\leq 100\%$ of specified value • Leakage current \leq specified value 															
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>20 ± 1</td> </tr> <tr> <td>2</td> <td>Rest to Rated Voltage</td> <td>10 ± 0.5</td> </tr> <tr> <td>3</td> <td>Discharge to Rated Voltage $\times 1/2$</td> <td>about(20 ± 1)</td> </tr> <tr> <td>4</td> <td>Rest to Rated Voltage $\times 1/2$</td> <td>10 ± 0.5</td> </tr> </tbody> </table> <ul style="list-style-type: none"> • Cycle : 1,000,000 cycles 	STEP	VOLTAGE(V)	TIME (sec.)	1	Charge to Rated Voltage	20 ± 1	2	Rest to Rated Voltage	10 ± 0.5	3	Discharge to Rated Voltage $\times 1/2$	about(20 ± 1)	4	Rest to Rated Voltage $\times 1/2$	10 ± 0.5	<ul style="list-style-type: none"> • No visible damage • Capacitance change within $\pm 20\%$ of specified value • Internal resistance change $\leq 100\%$ of specified value • Leakage current \leq specified value
STEP	VOLTAGE(V)	TIME (sec.)																
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2	Rest to Rated Voltage	10 ± 0.5																
3	Discharge to Rated Voltage $\times 1/2$	about(20 ± 1)																
4	Rest to Rated Voltage $\times 1/2$	10 ± 0.5																
8	Damp heat (steady state)	<ul style="list-style-type: none"> • Temperature : $40 \pm 2^\circ\text{C}$ • Relative humidity : 90%~95% • Duration : 240 ± 8 hours 	<ul style="list-style-type: none"> • No visible damage • Capacitance change within $\pm 20\%$ of specified value • Internal resistance change $\leq 100\%$ of specified value • Leakage current \leq specified value 															

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.