



DATA SHEET

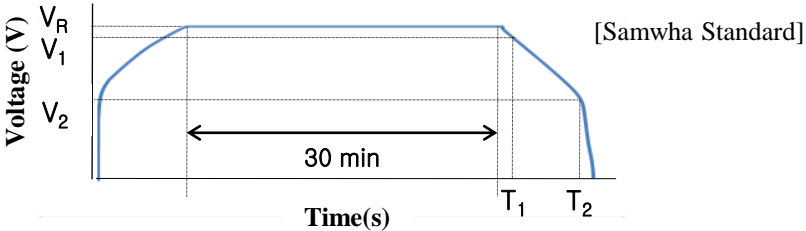
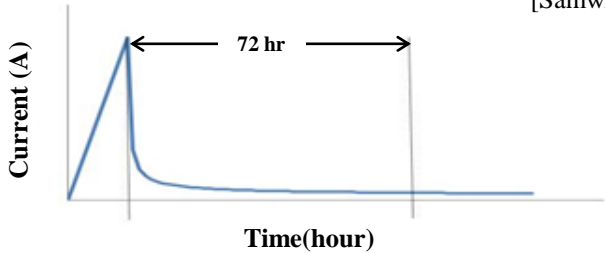
NAME	HYBRID CAPACITOR
ITEM	2.8V 1,000F(Ø35 × L60) Part No. CL2R8108W35060SNBLT
APPLICATION	-
REMARK	-
COMPANY	SAMWHA CAPACITOR
TEL	82 31 330 5922
ADDRESS	227, Gyeonggidong-ro, Namsa-myeon, Cheoin-gu, Youngin-si, Gyeonggi-do, Korea

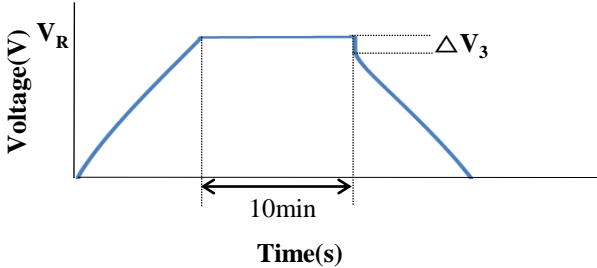
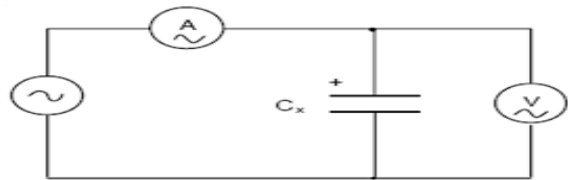


CL2R8108W35060SNBLT

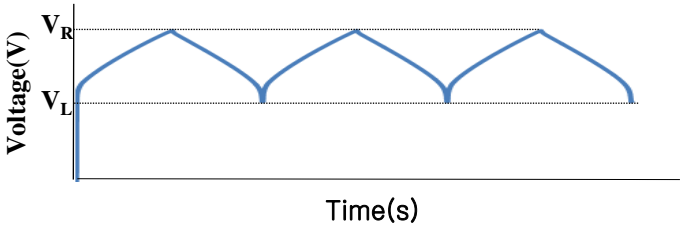
Item	Unit	Specification
Capacitance (25℃)	F	1,000
Capacity(25℃, 2.8~1.6V)	Ah	0.35
Usable Energy Density(25℃, 2.8~1.6V)	Wh	0.73
Rated Voltage, V _R	V	2.8
Max. Current	A	10
ESR (DC / AC,1kHz)	mΩ	<6 / <3.5
Usable Specific Power(P _d)	W/kg	2370
Dimensions	mm	35Φ x 60mm
Weight	kg	0.066
Operating Temperature Range	℃	-20 ~ +40
Capacitance Change	%	Within ±40% of initial value
Internal Resistance Change	%	Less than 200% of initial value
Max. Leakage Current, L _C (after 72h)	mA	<5
Cycle Life(25℃)	cycle	50,000

1. Electrical Performance

No	Item	Unit	Specification	Test Conditions and Methods
1	Capacitance at 20°C	F	1,000	 <p style="text-align: right;">[Samwha Standard]</p> $C = \frac{I \times (T_2 - T_1)}{V_1 - V_2} \quad (F)$ <ol style="list-style-type: none"> 1) Charging is performed by constant current followed by constant voltage charging. 2) Charging is performed for duration of 30 minutes a 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.
2	Capacitance Tolerance at 20°C	%	-10 / +20	-
3	Rated voltage	V	2.8	-
4	Leakage current after 72 hour	mA	<5	 <p style="text-align: right;">[Samwha Standard]</p> <p>The hybrid capacitor is charged with the rated voltage for 72hours. Then, leakage current is measured by current measurement equipment.</p>

No	Item		Unit	Specification	Test Conditions and Methods
5	Internal resistance (ESR)	DC	mΩ	<6	<p>[Samwha Standard]</p>  <p style="text-align: right;">$R_D = \frac{\Delta V_3}{I}$</p>
		AC 1kHz	mΩ	<3.5	<p>[IEC 62391-1]</p>  <p style="text-align: right;">$R_A = \frac{\Delta V}{I}$</p> <ol style="list-style-type: none"> 1) The internal resistance Ra of a capacitor shall be calculated by the above formula. 2) The frequency of the measuring voltage shall be 1kHz. 3) The AC current shall be from 1mA to 10mA.
6	Operating temperature		°C	-20 ~ +40	Operating temperature range shall be -20 ~ +40°C.
7	Energy density	Gravimetric	Wh/kg	11.1	2.8~1.6V
8	Power density	Gravimetric	W/kg	2370	-

2. Reliability

No	Item		Unit	Specification	Test Conditions and Methods										
1	Temperature Characteristic	Capacitance change	%	Within $\pm 40\%$ of initial specified value at $+20^\circ\text{C}$	<p style="text-align: right;">[Samwha Standard]</p> <table border="1" data-bbox="1078 294 1769 525"> <thead> <tr> <th>Temperature($^\circ\text{C}$)</th> <th>Keep Time</th> </tr> </thead> <tbody> <tr> <td>$+ 20 \pm 2$</td> <td>-</td> </tr> <tr> <td>$- 20 \pm 2$</td> <td>2 hr</td> </tr> <tr> <td>$+ 20 \pm 2$</td> <td>15 min</td> </tr> <tr> <td>$+ 40 \pm 2$</td> <td>2 hr</td> </tr> </tbody> </table> <p>Measure electrical characteristics after exposing capacitor to each temperature atmosphere for 2 hours or 15min.</p>	Temperature($^\circ\text{C}$)	Keep Time	$+ 20 \pm 2$	-	$- 20 \pm 2$	2 hr	$+ 20 \pm 2$	15 min	$+ 40 \pm 2$	2 hr
		Temperature($^\circ\text{C}$)	Keep Time												
$+ 20 \pm 2$	-														
$- 20 \pm 2$	2 hr														
$+ 20 \pm 2$	15 min														
$+ 40 \pm 2$	2 hr														
Internal resistance change	%	Less than 200 % of initial specified value at $+20^\circ\text{C}$													
2	Shelf life after 1000 hours no load test same as endurance		%	Same as endurance	<p style="text-align: right;">[Samwha Standard]</p> <p>Temperature : $40 \pm 2^\circ\text{C}$ Duration : 1000 $+72/-0$ hour</p>										
3	Cycle life (at 25°C)	Cycle	Cycle	50,000	<p style="text-align: right;">[Samwha Standard]</p>  <p>where V_R is the rated voltage of 2.8V V_L is the low voltage of 1.6V</p> <p>Condition the capacitor at $25 \pm 3^\circ\text{C}$ until thermal equilibrium is reached. Initialize the voltage on the capacitor at V_L (1.6V). Then charge the capacitor at a current 40A to V_R. Maintain voltage V_R on the capacitor for 10 ± 0.50 s. Then discharge the capacitor to V_L at current 40A. Hold at V_L for 10 ± 0.50 s. This defines a cycle(see Figure). Repeat this cycle throughout the testing.</p>										
		Capacitance change	%	Within $\pm 30\%$ of initial specified value											
		Internal resistance change	%	Less than 200 % of initial specified value											

No	Item		Unit	Specification	Test Conditions and Methods
4	Damp heat	Capacitance change	%	Within $\pm 30\%$ of initial specified value	[Samwha Standard] Temperature : $40 \pm 2^\circ\text{C}$ Relative humidity : 90%~95% Duration : 240 ± 8 hours
		Internal resistance change	%	Within $\pm 200\%$ of initial specified value	

3. Dimensions

Part number	Capacitance (F)	Dimension(mm)				
		D (± 1)	L (± 2)	g (± 0.2)	t (± 0.1)	i (± 0.1)
CL2R8108W35060SNBLT	1,000F	35	60	10	0.8	1.5

