

## Data Sheet

**Customer:**

**Product:** Supercapacitor

**Size.:** 5V5

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## Supercapacitor

### Features

- Various structures of type C, V and H, optional for installation
- Comply with ROHS standards, no pollutants such as Cd and Pb
- Long charge and discharge cycle life
- Low leakage current, suitable for clock chip data retention

### Applications

- Working current  $\mu\text{A}$ ~10mA, working time seconds to months
- Can be used for hand-cranked flashlights, electric meters, clock keeping, home appliance controllers, toys, etc.



### Product Identification

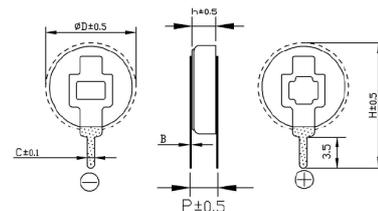
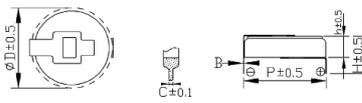
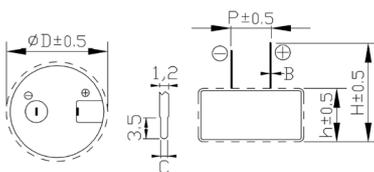
SC	5V5	C	105	M
Product Type	Rated Voltage	Shape Type	Capacitance	Capacitance Tolerance
	5V5: 5.5V	C: Coin & C Type H: Coin & H Type V: Coin & V Type	104:0.1F 224:0.22F 334:0.33F 474:0.47F 105:1.0F 155:1.5F	M: $\pm 20\%$ Z: $-20/+80\%$

### Outline and Dimensions

**C Type**

**H Type**

**V Type**



Part No.	B (mm)	C (mm)	$\phi D$ (mm)	H (mm)	h (mm)	P (mm)
SC5V5C104Z	$0.5 \pm 0.1$	$0.9 \pm 0.15$	$13.2 \pm 0.5$	$13 \pm 0.5$	$7 \pm 0.5$	$5 \pm 0.5$
SC5V5C105M	-	$0.9 \pm 0.1$	$20.5 \pm 1.0$	$14 \pm 1.0$	$7.5 \pm 1.0$	$5 \pm 0.5$
SC5V5C224Z	$0.5 \pm 0.1$	$0.9 \pm 0.15$	$13.2 \pm 0.5$	$13 \pm 0.5$	$7 \pm 0.5$	$5 \pm 0.5$
SC5V5C474Z	$0.5 \pm 0.1$	$0.9 \pm 0.15$	$13.2 \pm 0.5$	$13 \pm 0.5$	$7 \pm 0.5$	$5 \pm 0.5$
SC5V5H155Z	$0.25 \pm 0.05$	$1.0 \pm 0.1$	$19.2 \pm 0.5$	$9.5 \pm 1.0$	$4.8 \pm 0.5$	$19.5 \pm 0.5$
SC5V5H224M	$0.2 \pm 0.05$	$0.8 \pm 0.1$	$12 \pm 0.5$	$10.2 \pm 0.5$	$5 \pm 0.5$	$10 \pm 0.5$
SC5V5H334Z	$0.25 \pm 0.05$	$0.8 \pm 0.1$	$12 \pm 0.5$	$10 \pm 1.0$	$4.8 \pm 0.5$	$10 \pm 0.5$
SC5V5H474Z	$0.25 \pm 0.05$	$0.8 \pm 0.1$	$12 \pm 0.5$	$10 \pm 1.0$	$4.8 \pm 0.5$	$10 \pm 0.5$
SC5V5V224Z	$0.25 \pm 0.05$	$0.8 \pm 0.1$	$12 \pm 0.5$	$16.2 \pm 0.5$	$4.8 \pm 0.5$	$5 \pm 0.5$
SC5V5V474Z	$0.25 \pm 0.05$	$0.8 \pm 0.1$	$12 \pm 0.5$	$16.2 \pm 0.5$	$4.8 \pm 0.5$	$5 \pm 0.5$

■ The actual size and tolerance shall be subject to the parameter table.

**Specifications**

Part No.	Rated Voltage DC(V)	Capacitance (F)	Permitting Capacitance error	Max ESR ( $\Omega$ )	Max. stored energy (mWh)	Nominal current (A)	Leakage Current (25°C 24h, mA)
SC5V5C104Z	5.5	0.1	-20%/+80%	60,1KHz	0.42	-	0.05
SC5V5C105M	5.5	1.0	$\pm 20\%$	15 <sub>(Note1, Note2)</sub>	4.20	0.053	-
SC5V5C224Z	5.5	0.22	-20%/+80%	50,1KHz	0.92	-	0.005
SC5V5C474Z	5.5	0.47	-20%/+80%	40,1KHz	1.97	-	0.010
SC5V5H155Z	5.5	1.5	-20%/+80%	12,1KHz	6.3	-	0.015
SC5V5H224M	5.5	0.22	$\pm 20\%$	40,1KHz	0.92	0.015 <sub>(Note3)</sub>	0.005
SC5V5H334Z	5.5	0.33	-20%/+80%	40,1KHz	1.39	-	0.008
SC5V5H474Z	5.5	0.47	-20%/+80%	40,1KHz	1.97	-	0.010
SC5V5V224Z	5.5	0.22	-20%/+80%	50,1KHz	0.92	-	0.005
SC5V5V474Z	5.5	0.47	-20%/+80%	40,1KHz	1.97	-	0.010

**Note1:Rated current: Charging to rated voltage U0.5s Discharge to 1/2U0 current value**

**Note2:Capacitance, Max ESR: Tested with Maxwell's six-step method with a test current of 10 mA.**

**Note3:Nominal Current: Is the current taking 5 sec. to discharge form  $U_R$  to  $1/2 U_R$ .**

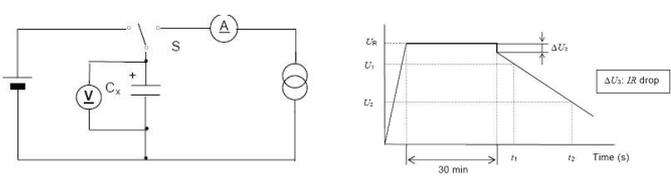
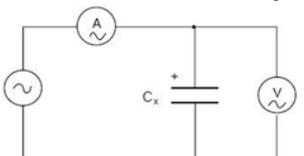
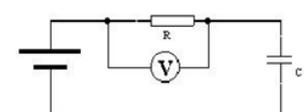
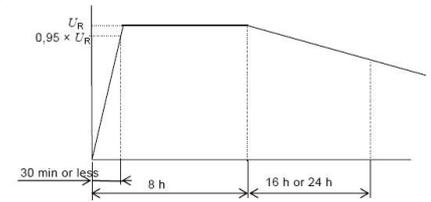
Supercapacitor

■ Environmental Characteristics

Item	Requirement		Test Condition	
Category temperature range	-25℃~+70℃			
Rated operating voltage	5.5VDC			
Characteristics in different temperature	Step 2	△C	Less than or equal to 30% of the initial value	Step 1 : +25±2℃ Step 2 : -25±2℃ Step 3 : +70±2℃ Step 4 : +25±2℃
		ESR	Less than or equal to 400% of the initial value	
	Step 3	△C	Less than or equal to 30% of the initial value	
		ESR	Less than or equal to the initial value	
		LC	Less than or equal to 4 times the initial value	
	Step 4	△C	Satisfies the range of 20% of the initial rating	
		ESR	Satisfies the initial value	
		LC	Satisfies the initial value	
Endurance	△C	Less than or equal to 30% of the initial value	Applied voltage: 5.5V Temperature: +70℃±2℃ Time: 1000h	
	ESR	Less than or equal to 4 times the initial value		
	LC	Less than or equal to the initial measurement		
	Appearance	No leakage or mechanical damage		
Cycle life	△C	Less than or equal to 30% of the initial value	Capacitors cycles 500000 times between rated voltage and half rated voltage under constant current at 25℃	
	ESR	Less than or equal to 4 times the initial value		
Lead strength	No damage to the outlet			
Solder ability	More than 3/4 of the terminal surface is covered by a tin layer			
Temperature cycle	C	Satisfies the initial value	Temperature cycle: -25℃±2℃ →normal temperature →+70℃±2℃→normal temperature Cycles: 5	
	ESR	Satisfies the initial value		
	LC	Satisfies the initial value		
	Appearance	No mechanical damage or leakage		
Shelf life	C	Satisfies the range of 20% of the initial rating	Applied voltage: 0V Temperature: +70℃±2℃ Time: 1000h	
	ESR	Less than or equal to 3 times the initial value		
	LC	Less than or equal to the initial measurement		
	Appearance	No leakage or mechanical damage		
Humidity Characteristics	△C	Satisfies the range of 30% of the initial rating	Temperature: +40℃±2℃ Relative humidity: 90~95%RH Test time: 240h	
	ESR	Less than or equal to 2 times the initial value		
	LC	Less than or equal to 4 times the initial value		
	Appearance	No leakage or mechanical damage		
Self discharge characteristics (voltage holding characteristics)	SC5V5C104Z,SC5V5C224Z,SC5V5C474C,SC5V5H334Z,SC5V5H474Z,SC5V5V224Z,SC5V5V474Z,SC5V5H155Z: Voltage between positive and negative poles≥4.4V		SC5V5C104Z,SC5V5C224Z,SC5V5C474Z,SC5V5H334Z,SC5V5H474Z,SC5V5V224Z,SC5V5V474Z,SC5V5H155Z: Charging process: normal temperature, no load, rated voltage charge 8h.	
	SC5V5C105M,SC5V5H224M: Voltage between positive and negative poles≥4.2V		SC5V5C105M,SC5V5C224M: Charging process: normal temperature, no load, rated voltage charge 24h.  Placement process: temperature less than or equal to 25℃, relative humidity less than 60% RH, open 24 h	

## Supercapacitor

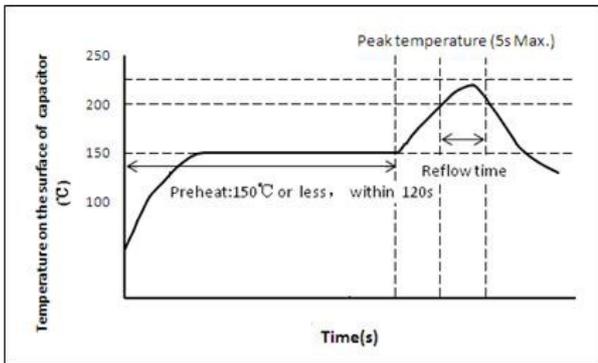
### Measuring Method

<p>Capacitance</p>	<p>Measurement by Permanent electrotransport:</p> <ol style="list-style-type: none"> <li>1.DC voltage of constant current/constant voltage source is set as rated voltage (UR).</li> <li>2.Set the constant current value of the constant current discharge device.</li> <li>3.Switch the switch S to dc power supply, and charge at constant voltage for 30min after the constant current/constant voltage source reaches the rated voltage.</li> <li>4.After charging for 30min, switch S is changed to the constant exile device to discharge with constant current.</li> <li>5.Measure the time t1 and t2 of the voltage from U1 to U2 at both ends of the capacitor, as shown in the figure, and calculate the capacitance value according to the following equation</li> </ol>  $C = \frac{I \times (t_2 - t_1)}{U_1 - U_2}$
<p>Resistance</p>	<p>AC impedance measurement The circuit as shown in the figure below is used for measurement</p>  <p>Capacitor resistance Ra shall be computed by the type:</p> $R_a = \frac{U}{I}$ <p>Ra ac impedance (Ω); Effective value of U ac voltage (V R.M.S); Effective value of I ac current (V R.M.S).</p>
<p>Leakage Current</p>	<p>DC leakage current measurement principle is as follows</p>  <ol style="list-style-type: none"> <li>1.Discharge: before the measurement begins, the capacitor should be fully discharged. The discharge process lasts from 1h to 24h.</li> <li>2.Leakage current shall be measured at rated temperature and rated voltage (UR).The charging voltage reached 95% after the maximum 30min charging time. The charging time was selected from 30min (≤1F), 1h (≥ 1F), 2h (≥ 10F), 4h (≥ 20F), and 72h (≥ 120F).</li> <li>3.Stable power supply, such as dc stabilized power supply, should be used.</li> <li>4.through the protection under 1000 Ω resistance to capacitor voltage.</li> </ol>
<p>Self discharge</p>	<p>Before the measurement begins, the capacitor should be fully discharged. The discharge process lasts from 1h to 24h. The rated voltage U should be directly applied at both ends of the capacitor, without protection resistance. Capacitors should be placed at standard ambient temperature and pressure for 24 hours. DC voltmeter internal resistance should be greater than 1 MΩ.</p> 

## Supercapacitor

### ■ Soldering Condition

The welding condition of the proposed product is flow welding, as shown below:



Care should be taken when welding:

1. Carry out low-temperature welding in accordance with the above welding conditions within a short time.
2. When the voltage is above 0.3V, do not backflow welding
3. Please consult us for more conditions of reflow soldering.

### ■ Cautions For Use

#### 1. Polarity problem of supercapacitor

Unlike ordinary electrolytic capacitors or batteries, the anode and cathode of supercapacitors are made of the same material, so there is no polarity in theory. However, the polarity indicated by super capacitors is formulated by the manufacturer in the production process. When the capacitor is used carelessly in the short-term reverse operation, it will not cause substantial damage to the capacitor. If adjusted to a positive direction, it can be guaranteed to be used, but it cannot be used in the long-term reverse operation, which will result in the rapid attenuation of capacitor life characteristics.

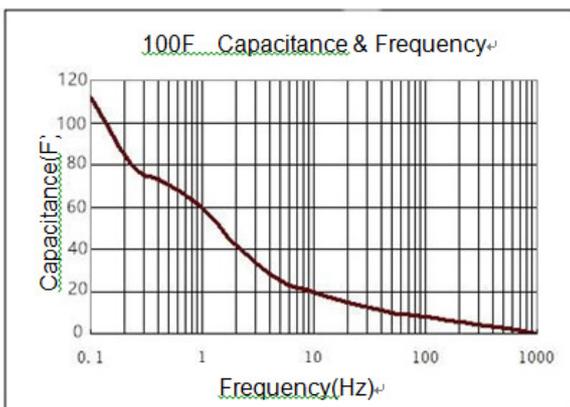
#### 2. On the issue of supercapacitor charging

Charging of supercapacitors requires dc voltage which does not exceed rated voltage, and various charging methods such as current limit, constant current, constant power and constant voltage can be adopted. Supercapacitors can be charged by lowering the voltage of the charging power supply until the capacitors are full enough to maintain voltage balance.

#### 3. The problem of internal resistance and capacity of supercapacitors

In the process of charging and discharging, super capacitor resistance caused by the IR drop, lose efficiency of capacitor charging and discharging, so the size of capacitor resistance to a certain extent, determines the actor bad of character of capacitor, due to the internal resistance of the super capacitor than normal capacitors, in the process of communication charge and discharge circuit or high frequency, capacitor will fever, cause life decay quickly, which is the cause of the super capacitor only commonly used in dc.

Compared with ordinary capacitors, supercapacitors have a larger time constant, so the charge-discharge time is relatively long, and because of this, it is not suitable for continuous large current to work frequently, which will cause rapid attenuation of the heating performance. The frequency characteristic of supercapacitors is that the response time of positive and negative ions in the micro pores of carbon electrode is long at high frequency. Instead of measuring capacitors' ac capacity, the mAh method based on battery measurement is used.



#### 4. Transport and storage

Should prevent products be affected with damp be affected with damp in product transportation, storage temperature should be - 30 °C to 50 °C, relative humidity less than 60%, the maximum humidity no more than 85%, otherwise it will cause capacitance performance degradation of be affected with damp be affected with damp or rust.

#### 5. Short circuit judgment of supercapacitor

The short circuit capacitance shall not be charged or discharged. The dc voltage shall be applied between the positive and negative terminals of the capacitance. The capacitance voltage shall not be increased When charging, it is normal to use ohm gauge (short circuit block) indicator as short circuit state. Capacitance is short circuit and it cannot be determined. It should be observed whether the resistance value increases or not.

**Supercapacitor**

**6. Series and parallel operation problem**

When the same super capacitor is used in series, the total voltage = series number \* monomer withstand voltage; Total capacity = unit capacity Total energy = series number x monomer capacity, total internal resistance = series number x monomer resistance.

There is a problem of voltage balancing between three or more monomers in series, so it is necessary to consider adopting equalizing circuit to ensure that the capacitance cannot be used over voltage during long-term use, thus causing capacitor life attenuation and damage.

Supercapacitors of different specifications cannot be used in series.

When the super capacitors are used in parallel, they can be connected in parallel with different capacitance values and charged by the same voltage. However, it is necessary to pay attention to the current balance between the capacitors and to isolate each other, so as to avoid reverse charging due to the potential difference after discharge.

7. For other problems in use, please consult the manufacturer or refer to the relevant technical data of the instructions for the use of supercapacitors.

**8. Handling of leakage situation**

Skin contact: rinse skin thoroughly with soap and water;

Eye contact: flush with flowing water or normal saline and seek medical advice; Absorb: immediately rinse with water and seek medical advice;

If the supercapacitor is found to be overheating or smelling, the power supply and load connected to the supercapacitor should be disconnected immediately to cool it, and the supercapacitor should be treated properly so that no face or hand contact with the supercapacitor is allowed.

**■ Package**

Type	Plastic Tray (pcs)	Inner Box (pcs)
SC5V5C104Z	168	1848
SC5V5C105M	70	490
SC5V5C224Z	168	1848
SC5V5C474Z	168	1848
SC5V5H155Z	80	720
SC5V5H224M	168	1848
SC5V5H334Z	168	1848
SC5V5H474Z	168	1848
SC5V5V224Z	196	4116
SC5V5V474Z	196	4116