

LIAONING BROTHER ELECTRONIC TECHNOLOGY CO., LTD

BIGCAP® PRODUCT SPECIFICATION

Product Type : Button series

Product Model : BCE005R5V105FS

Release Date : 2021-12-07

Address: Chaoyang City, Liaoning Province, high-tech park phase 2 no.3

Phone: 0421-7188822

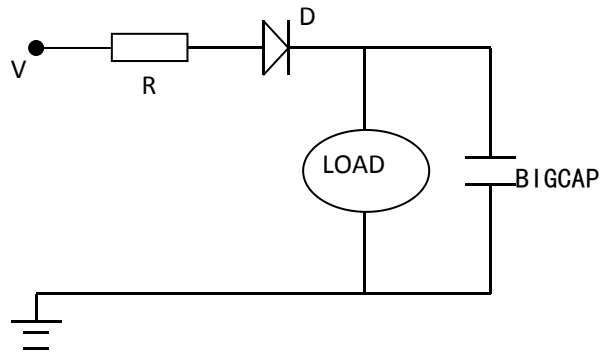
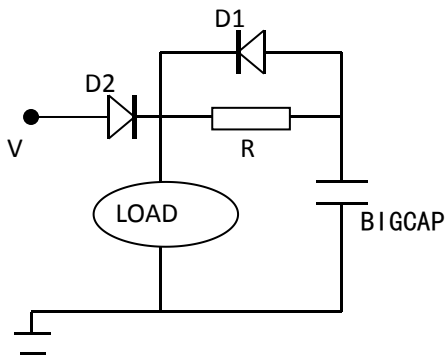
Fax: 0421-7188778

Website: [www.bigcap.net](http://www.bigcap.net)

◆ Features

- Circular design, product structure is stable, performance more reliable;
- Comply with ROHS standards no Cd Pb and other pollutants;
- Long - term charging reliability is high;
- Low leakage current, suitable for keeping the clock chip data.

◆ BIGCAP® Typical Application Circuit



Description: the above circuit is for reference only.

◆ BIGCAP® Standard Test Conditions

The standard test conditions in this product specification are as follows: under normal pressure; the temperature at 25°C and the relative humidity less than 60%RH.

◆ **BIGCAP® Part Number System**

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Series

□ □ □ R □ □

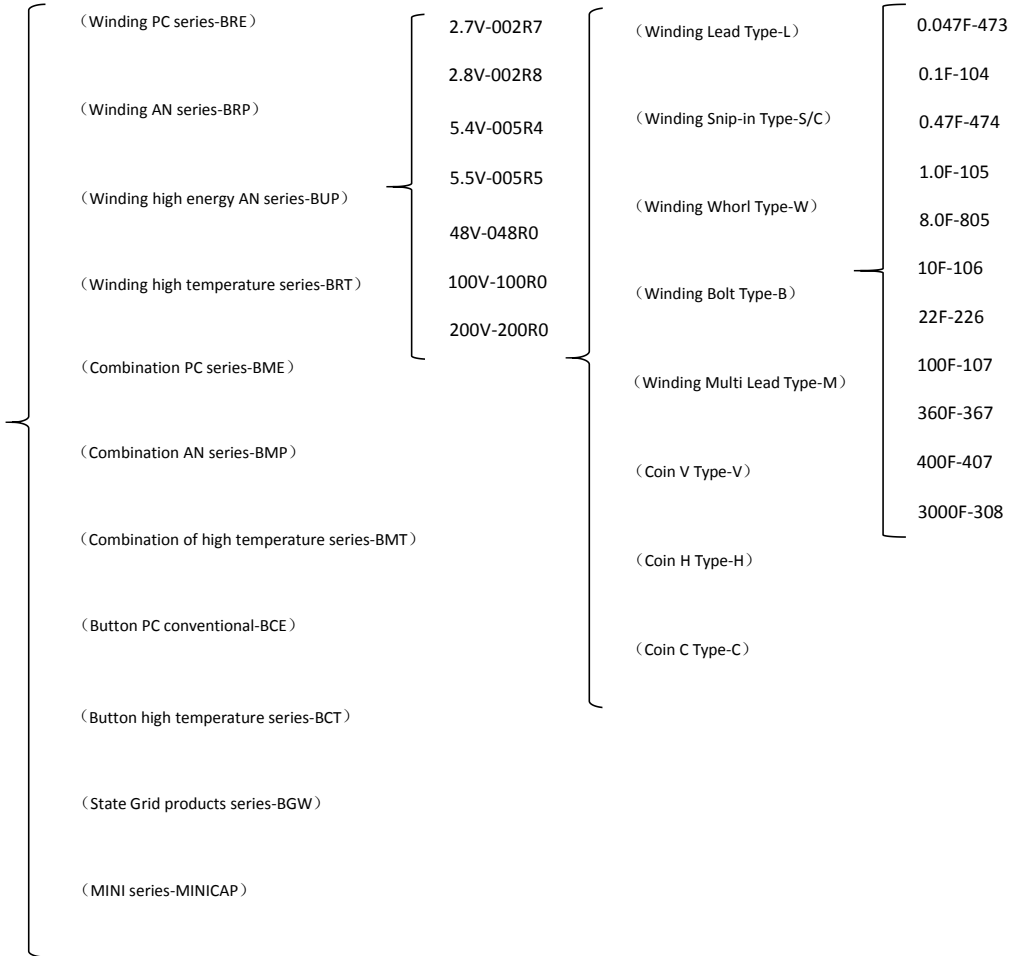
Rated Voltage

Structure Type

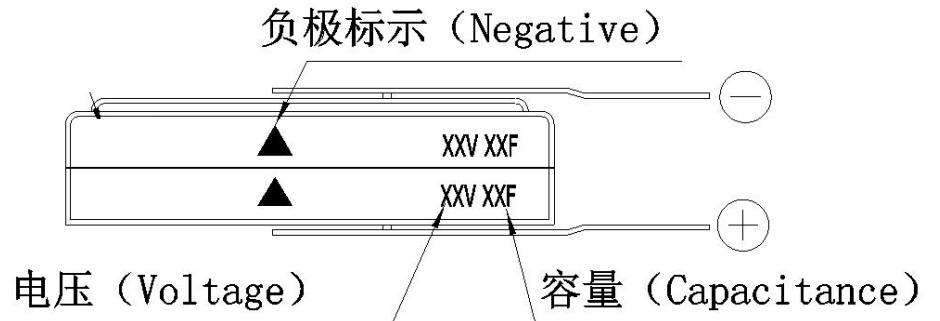
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Capacitance

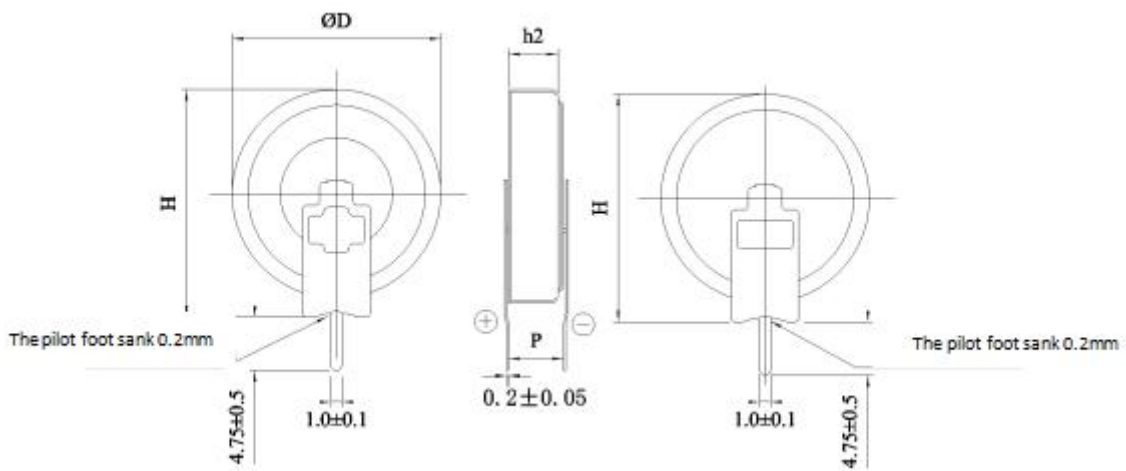
Internal Control



◆ BIGCAP® Markings



◆ BIGCAP® Shape of Standard Product



Part Number	$\Phi D \pm 1.0$ (mm)	$H \pm 1.0$ (mm)	$P \pm 0.5$ (mm)
BCE005R5V105FS	19	20.5	5

◆ BIGCAP® Standard Product Specification

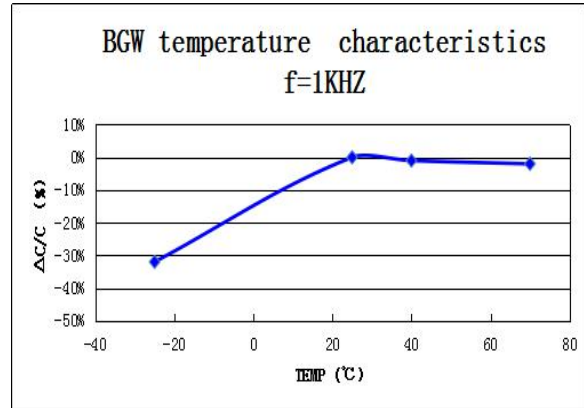
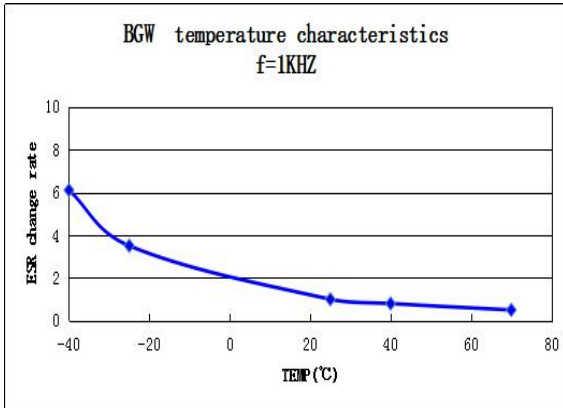
Project	BCE005R5V105FS		Test Condition
Product Standard	According to IEC 62391-1, GB/T2693—2001, Q/BIG001—2013 test standard		
Category Temperature Range	-40°C~+70°C		
Storage Temperature Range (at 0V)	-40°C~+70°C		
Rated Operating Voltage (25°C) U <sub>0</sub>	5.5VDC		
Rated Capacitance (25°C)	1.0F		25°C ΔV=4.0-2.0 I=10mA
Permitting Capacitance Error	-20%~+80%		
Nominal Current (25°C)	0.071A		Charge to rated voltage U <sub>0</sub> , 5S discharge to 1/2U <sub>0</sub>
Max Current (25°C)	0.175A		Charge to rated voltage U <sub>0</sub> , 1S discharge to 1/2U <sub>0</sub>
Leakage Current at 72h (25°C)	<3uA		
Max. Stored Energy (at U <sub>0</sub> ) E	4.20mWh		$E = \frac{1/2 * CV^2}{3600} * 1000$
Weight m	4.5g		
Volume (without terminals) v	1.4mL		
The Maximum Resistance	AC@1kHz	10 Ω	
	DC	15 Ω	
Energy Density (at U <sub>0</sub> )	Gravimetric	0.93Wh/kg	$E_{Max} = \frac{1/2 * CV^2}{3600 * m}$ $E_{Max} = \frac{1/2 * CV^2}{3600 * v}$
	Volumetric	3.00Wh/L	
Power Density (at U <sub>0</sub> )	Gravimetric	0.11kW/kg	$P_{max} = \frac{V^2}{4 * ESR_{DC} * m}$ $P_{max} = \frac{V^2}{4 * ESR_{DC} * v}$
	Volumetric	0.36kW/L	

◆ BIGCAP® Typical Characteristics

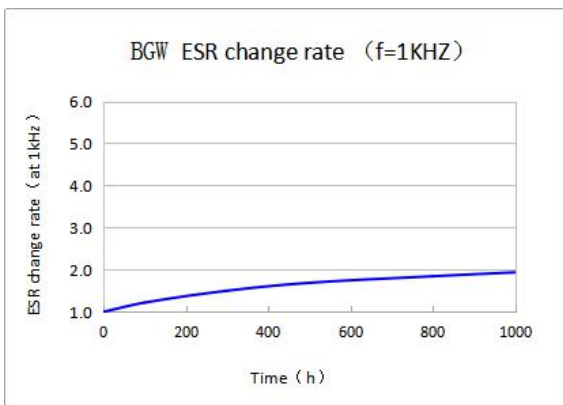
Product Standard	According to IEC 62391-1, GB/T2693—2001, Q/BIG001—2013 test standard	
Temperature Characteristics	-25℃	Compared with the initial value, $ \Delta C/C  \leq 50\%$ , $ESR \leq 4$ initial specified value
	+70℃	Compared with the initial value, $ \Delta C/C  \leq 30\%$ , $ESR \leq$ initial specified value
	-40℃ (Working current I=1mA)	Compared with the initial value, $ \Delta C/C  \leq 50\%$ , $ESR \leq 7$ initial specified value
Humidity Characteristics (at $40 \pm 2^\circ\text{C}$ , 90~95%RH)	240h	Compared with the initial value, $ \Delta C/C  \leq 30\%$ , $ESR \leq 2$ initial specified value, no leaked electrolyte or other mechanical damage
High Temperature Life (at 5.0V, $70 \pm 2^\circ\text{C}$ )	1000h	Compared with the initial value, $ \Delta C/C  \leq 30\%$ , $ESR \leq 4$ Initial specified value, no leaked electrolyte or other mechanical damage
Cycle Life (at $U_0$ , $25 \pm 2^\circ\text{C}$ )	500000 次	
Shelf Life (at 0V, $70 \pm 2^\circ\text{C}$ )	1000h	Compared with the initial value, $ \Delta C/C  \leq 20\%$ , $ESR \leq 3$ Initial specified value, no leaked electrolyte or other mechanical damage
Self Discharge Characteristics (Voltage holding characteristics) (at 25℃)	The voltage between the positive and negative electrode $\geq 4.2\text{V}$	Charging process: normal temperature, non-loaded, charge at rated voltage for 24h Lay aside process: temperature less than 25℃, relative humidity less than 60%RH, lay aside 24h at open circuit

◆ **BIGCAP® Characteristic Curve**

(1) Characteristics in Different Temperature



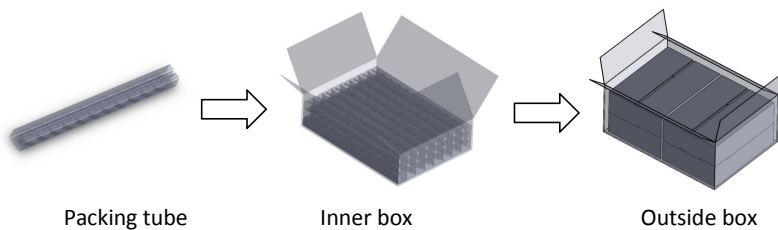
(2) Endurance (5.0V 70±2°C)



\*The above characteristic curves are trend charts. Please contact the manufacturer's technical support for the specific data of each model.

◆ **BIGCAP® Packing Specification**

Part Number	Quantity (PCS)		Dimension (L×W×H)mm		Total Weight (Kg)
	Inner	Outer	Inner	Outer	
BCE005R5V105FS	720	2880	263×188×70	400×280×170	15.1



◆ **BIGCAP® Measuring Method Of BIGCAP**

Table 1

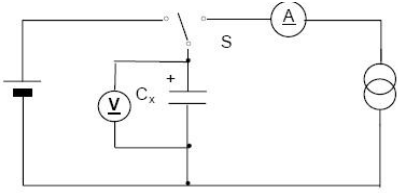
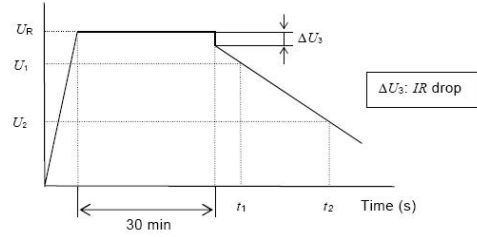
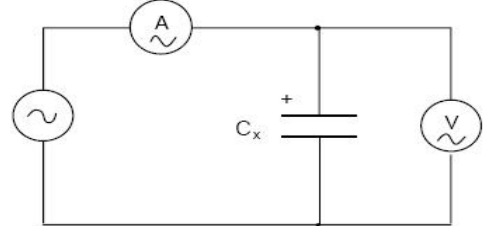
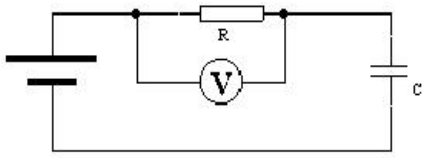
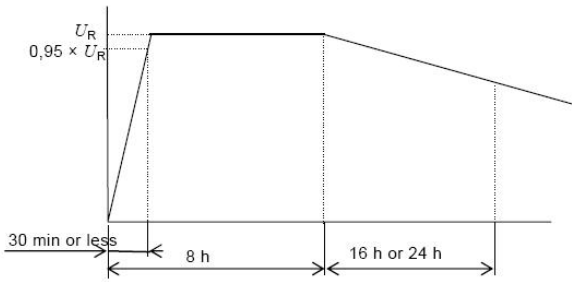
<p>(Capacitance)</p>	<p>Constant current discharge of measure</p> <ol style="list-style-type: none"> <li>1、 Set the DC voltage source to the rated voltage (<math>U_R</math>).</li> <li>2、 Sets constant current values of a specified constant current discharge device.</li> <li>3、 Switch the switch S to DC power supply, constant voltage charge for 30min after the voltage reaches to rated voltage.</li> <li>4、 After charging 30min, transform the switch S to constant current discharge device, to discharge at constant current.</li> <li>5、 Measure the discharge time from <math>U_1</math> to <math>U_2</math> (<math>t_1, t_2</math>), calculate capacitance using the following formula:</li> </ol>  $C = \frac{I \times (t_2 - t_1)}{U_1 - U_2}$ 
<p>(Resistance)</p>	<p>Equivalent series resistance: ESR shall be measured from the circuit below:</p>  <p>ESR <math>R_a</math> can be calculated from the formula <math>R_a = \frac{U}{I}</math></p> <p><math>R_a</math> Equivalent series resistance (<math>m\Omega / \Omega</math>)</p> <p><math>U</math> U Ac voltage valid values (V r.m.s)</p> <p><math>I</math> I Ac current valid values (V r.m.s)</p>



Table 2

<p>(Leakage Current)</p>	<p>Leakage current shall be measured from the circuit below:</p>  <ol style="list-style-type: none"> <li>1、 Discharge: Before the start of the measurement, super-capacitor should be fully discharge .</li> <li>2、 Leakage current measurement shall be carried out under the temperature (25℃) and voltage rating (<math>U_R</math>). The capacitor is continues to charge for 72h at the rated voltage <math>U_R</math>, record the terminal current as leakage current .</li> </ol>
<p>(Self discharge)</p>	<p>Before the start of the measurement, super capacitor should be fully discharge. Charge the super capacitor to rated voltage without protection resistance, charging time for 8h (include the voltage of product reached 95% rated voltage after the biggest charging time for 30min ). Disconnect the super capacitor from the power supply. Super capacitor should be placed in the standard atmospheric pressure conditions for 24 h. DC voltmeter internal resistance should be greater than <math>1\text{ m}\Omega</math> .</p> 

## ◆ Cautions For Use

### (1) The polarity of super capacitor

Unlike ordinary electrolytic capacitor or battery, the material of positive and negative polarity of super capacitor is same, so theoretically super capacitor has no polarity; the polarities marked on super capacitor are established by manufacturers in the production process, when the polarities are used reversely in short-term, it won't cause substantial damage on capacitor, and it can be used normally after adjusting to the right polarities. But if reversely use for a long time, the life of super capacitor will decay .

### (2) Super capacitor charging information

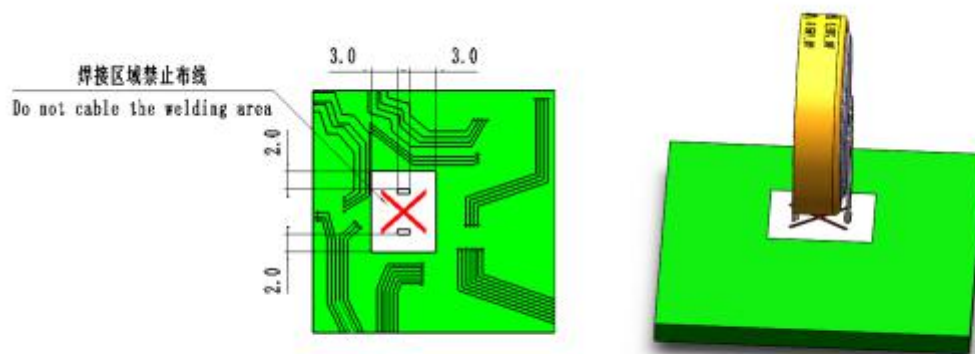
To charge a super capacitor requires DC voltage that no more than the rated voltage. It can be charged by a variety of methods such as current limit, constant current, constant power, constant voltage; when charging, the super capacitor may lower the voltage of charging power supply until the capacitor is full to maintain voltage balance.

### (3) Operating temperature and product

Generally, when BIGCAP<sup>®</sup> supercapacitors work at rated voltage and low temperatures, the leakage current will be less ,the standby time and life will be longer. On the contrary, under the condition of rated voltage and higher temperature, the leakage current increases, the standby time is shortened, and the life is shortened. When the operating temperature is certain, the life will increase when working at the rated voltage.

### (4) Installation and welding

When super capacitors are used for double-sided circuit boards, must pay attention the joint should not contact the capacitor, otherwise it will lead to short circuit, over-voltage and damage of capacitor. During the process of installation and after installation, do not twist or tilted the capacitor, do not be forcibly pull the wires. Capacitors should be welded after cutting off and bending the leads. In the welding process, pay attention to avoid overheating of the capacitor ( for a 1.6 mm thickness printed circuit board, the welding temperature should be 260℃, time is not more than 5 s), circuit board and the capacitor should be clean after welding.



(5) Use in series and parallel

When same super capacitors used in series, the total voltage = capacitor number x capacitor voltage; the total capacitance = single capacitor capacitance / capacitor number; Total energy = capacitor number x single capacitor's energy; total resistance = capacitor number x single capacitor's resistance.

There is a voltage balance problem when 3 pcs or above capacitors used in series, so an equalization circuit is required to ensure the capacitor will not over-voltage in long term use process, as over-voltage will cause decay and damage of capacitor. When customers use the product in series by themselves, we recommend that using the same batch of products, and don't mix up different batches of products.

Super capacitors in different capacitance value can be used in parallel, these capacitors should be charged by the same voltage, but should pay attention to the current balance problem between the capacitors and mutual isolation, to avoid potential difference happened after discharge.

(6) If there is any change in the specification without prior notice, our company reserves the right to make any possible change, and the final interpretation right belongs to liaoning brother electronic technology co., LTD.