supercapacitor

specification

MODEL NUMBER	GDB02R7K367DG3561
Client Name	
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version	V3.5

formulate	audits	Client approval
		

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1 SUM

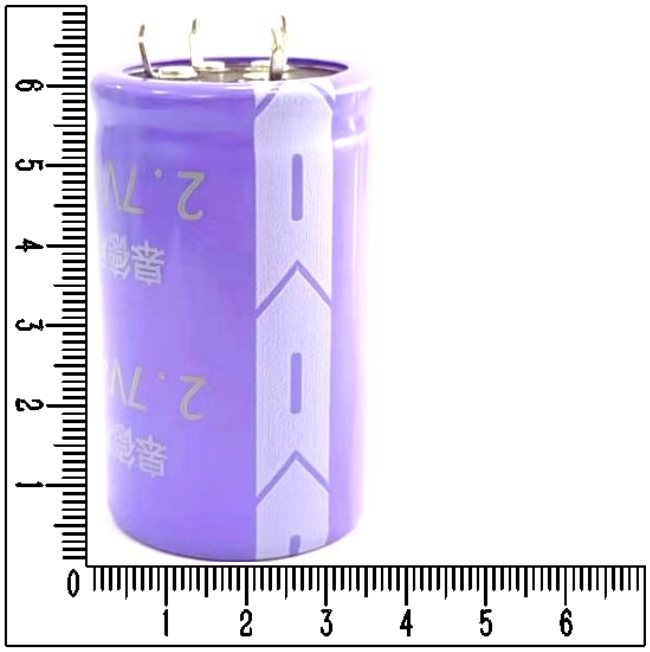
This product specification specifies the marking, performance, test methods, use and precautions of the double-layer supercapacitor products developed by Gaode Technology (Zhejiang) Limited, and serves as the basis for technical confirmation.

2 PRODUCT

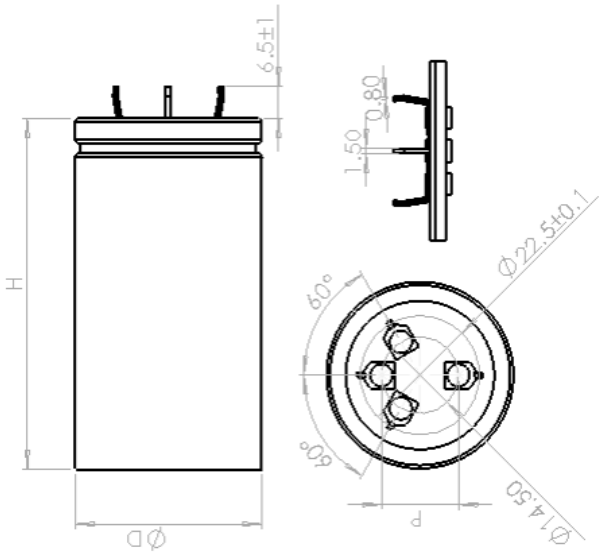
2.1 Product structure

This product is a cylindrical monobloc two casing modules in series, monobloc based on the adsorption principle of charge bilayer work, with activated carbon as the positive and negative active materials, the two poles are separated by a diaphragm, the electrolyte is filled in the internal space of the unit, and the aluminum casing shell is sealed with a rubber plug. Module encapsulation adopts the outer casing method, with positive and negative electrodes being leaded out by guide pins.

2.2 Product structure



2.3 Product structure



name	size mm
H	61+2
ΦD	35± 1.0
P	14.5± 0.5

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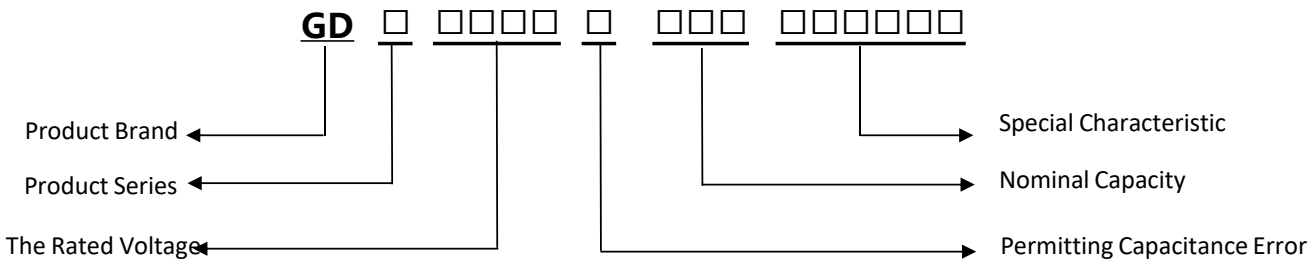
>>> Coding principle

PB	+	PS	+	RV	+	PCE	+	NC	+	SC
(2bit)		(1bit)		(4bit)		(1bit)		(3bit)		(1~6bit)



GD ——"皋德"

Product series

D—Monomer conventional series
W—Monomer high temperature series
H—Monomer 3.0V series
B—Single cover plate series

The Rated voltage

02R7——2.7V
03R0——3.0V
05R5——5.5V
06R0——6.0V
10R8——10.8V

Capacity deviation

K—— -10~+30%
Q—— -10~+20%
F—— 0~+30%
U—— -10~+10%
R—— -20~+50%
S—— -10~+80%

Nominal capacity

105—— 1.0F
155—— 1.5F
355—— 3.5F
106—— 10F
256—— 25F

Special performance requirements for monomer

□	□	□□□□
hich leads to the wa	packaging	size
L-needle N-two foot cover plate Y-Long pin cover plate D-four foot cover	D-bags X-blister tray B-the braid G-partition arrangement	0612 0812 0820 1020 1220

For example:
Monomer 2.7V 3.3F:
GDD02R7K335LD0820
GDW02R7K335LD0820
GDE02R7K335LD0820
Module 5.5V 1.5F:
GDM05R5K155TRLDA
GDM05R5K155SGLDAC

Module specific performance requirements

□	□	□	□	□	□
Performance	ncapsulati	nichleadstothew	packaging	Function code	rnal identification
D-conventional T-hightemperature H-high pressure B-cover plate S-high temperature and humidity	G-glue R-casing	L-ends M-middle X-wire D-terminal P-bonding pad	D---bags X---blister tray B---the braid G---partition arrangement	A——empty PCB B——cut-off protection circuit C——passive pressure equalization D——active pressure equalization	No code - Regular size C/E -- Special size

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4 Technical indicators

4.1 Basic Characteristics

	name		performance indicators		note
4.1.1	model number		GDB02R7K367DG3561		
4.1.2	nominal capacity		360	F	@25℃
4.1.3	capacity deviation		-10%~+30%		@25℃
4.1.4	nominal voltage		2.7	V	
4.1.5	surge voltage		2.85	V	
4.1.6	peak current		174	A	1s
4.1.7	ESR	DC @25℃	≤5	mΩ	
		AC 1kHz@25℃	≤4	mΩ	2-3mΩ
4.1.8	72hrs leakge	@25°C	950	μA	600-850μA
4.1.9	weight		75.7	g	±0.2
4.1.10	temperature		-40~ +65	℃	@2.7V

4.2 Environmental Characterization

	name	Specifications/Conditions
4.2.1	temperature characteristic	when+85℃ | △C/C | ≤30%, ESR≤initial value(25℃) when-40℃ | △C/C | ≤30%, ESR≤4Xinitial value (25℃)
4.2.2	High temperature load	+70℃ plus a 5.5V after1500h, | △C/C | ≤30%, ESR≤4Xspecified value +85℃ plus≤5.0V after1000h , | △C/C | ≤30%, ESR≤4Xspecified value
4.2.3	High temperature storage	+85℃, after1000±4h , | △C/C | ≤30%, ESR≤2Xspecified value
4.2.4	steady state humidity and heat	+40℃, 90--95%RH, 240h, | △C/C | ≤30%, ESR≤4Xspecified value
4.2.5	Cyclic durability	Add the rated voltage, room temperature cycle charging and discharging test 500,000 times. | △C/C | ≤30% ESR≤4Xspecified value(25℃)

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5 Test

5.1 Test conditions

The standard test conditions of this product specification are: temperature 25ｔ and relative humidity less than 60% under standard atmospheric pressure.

5.2 Based on criteria

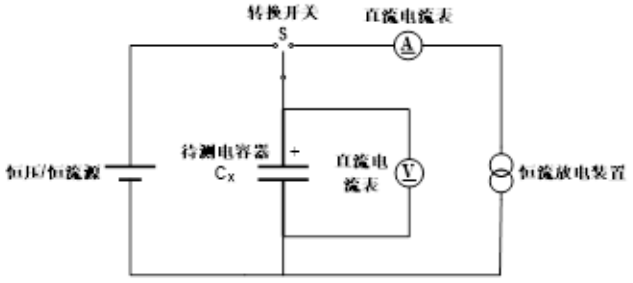
IEC62391《Fixed double layer capacitors for electrical equipment》

QC/T 741-2014《Automotive Supercapacitors》

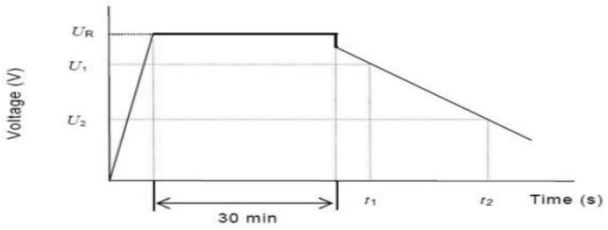
5.3 Test Methods

5.3.1 capacity:

The constant current discharge method is used to measure the discharge capacity and the circuit diagram is as follows



P1



P2

1) DC voltage of the constant voltage/constant current source is set to the rated voltage（U_R）

2) According to the rated capacity C_X of the capacitor to be measured, set the charging or discharging current I, and the current is set to $4*C_X*U_R$.

3) Switch S to DC power supply, start constant current charging of the capacitor to be measured, and after the voltage at both ends of the capacitor is charged to the rated voltage UR, continue to keep charging for 30min.

4) After the end of charging and holding for 30min, switch S to constant current discharger to discharge with constant current to0.1V；

5) Measure and record the time t1 and t2 for the voltage at the ends of the capacitor to go from U1 to U2 as shown in P2, and calculate the value of the capacitance according to the following equation:

$$C=\frac{I\times(t_2-t_1)}{U_1-U_2}$$

C (F) ;

I (A) ;

U_1 (V) , $0.8U_R$; (initial voltage)

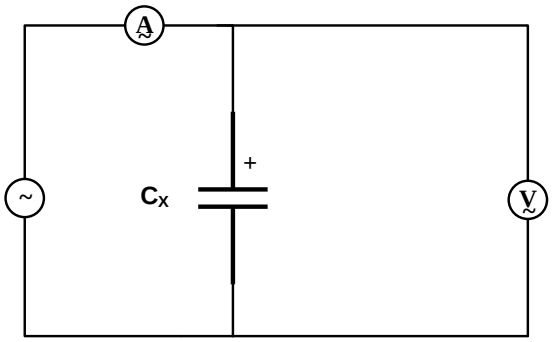
U_2 (V) , $0.4U_R$; (End Voltage)

t_1 v to U_1 (s) ;

t_2 v to U_2 (s) ;

5.3.2 ESR

Test the circuit schematic:



P3

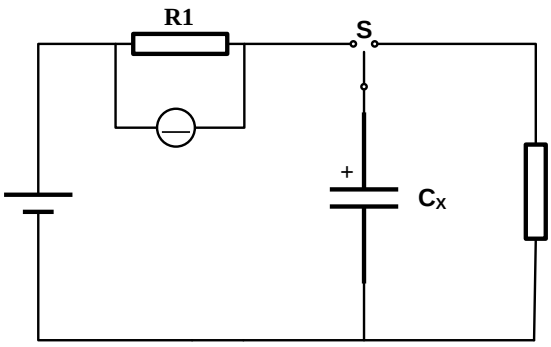
The capacitor AC internal resistance ESRAC is calculated using the following equation:

$$ESR_{AC}=\frac{U_{AC}}{I_{AC}}$$

Eq:
ESRAC AC internal resistance (Ω);
UAC AC voltage rms value (V r.m.s);
IAC AC current rms value (A r.m.s);
test voltage frequency should be 1kHz;
The test AC current shall be 1mA~10mA;

5.3.3 leakage current

Leakage current test schematic, as in P4;



P4

1) Switch S to the side of the discharge resistor R2 and discharge the capacitor to be measured C_X through R2. In order to realize complete discharge, the discharge time is not less than 1h, and the discharge resistor R2 is selected with reference to the following formula:

$$R2 \leqslant \frac{3600}{5C_R}$$

2)DC voltage of constant voltage/current source set to rated voltageUR;

3)After the capacitor CX to be tested is completely discharged, switch S to the side of R1 (R1≤1000Ω) and the constant voltage/constant current power supply starts charging the capacitor to be tested through R1;

4) To be measured after the capacitor voltage is charged to UR continue to keep charging for 72h, measure and record the voltage UR1 at both ends of R1, according to the following

Calculate the leakage current using the formula:

$$I_R = \frac{U_{R1}}{R1}$$

5.3.4 self-discharge

1) Before testing, the supercapacitor should be fully discharged and short-circuited for more than 12h;

2)The DC voltage of the constant voltage/constant current source is set to the nominal voltage UR;

3)Set the charging constant voltage/constant current source current value I with current 4*CX*U ;

4)Constant voltage/constant current source charges the capacitor at constant current to the nominal voltage UR, and constant voltage charging is maintained for 30min;

5) constant voltage charging 30min after the end of the constant voltage/constant current power supply from both ends of the capacitor is disconnected, the capacitor is placed under standard test conditions 72h

6)At the end of 72h, measure the voltage value U at both ends of the capacitor, U > 0.

8UR。

6 Guidelines and precautions for use

6.1 Welding Information

Overheating can result in degradation of the capacitor's electrical properties, leakage, or increased internal pressure. The following specific information should be observed for soldering:
Do not immerse the capacitor in dissolved solder;
Adhere solder to the lead pins only;
Ensure that the capacitor sleeves do not come into direct contact with the PCB or other components; excessive soldering temperatures can cause the sleeves to shrink or rupture;
Avoid working with electrical appliances under exposed circuit boards to prevent short circuits from occurring;

6.1.1 hand soldering

Do not allow the capacitor's outer casing to come into contact with the soldering rod or the casing will melt or break. The recommended soldering nozzle temperature is less than350°C and a soldering duration of less than 4 seconds. The contact time between the soldering iron and the capacitor's lead pin should be as short as possible, as overheating of the lead pin will increase the ESR.

6.1.2 wave soldering

Preheat the PCB for a maximum of 60 seconds for immersion tin up to 0.8mm or thicker. The maximum preheating temperature should not exceed 100°C. Soldering time and temperature should be according to the following table:

solderingtemp℃	Recommended soldering time (s)
220	7
240	7
250	5
260	3

6.2 Storage & Transportation

6.2.1 Long-term storage:

Long-term storage in the following environments is prohibited:

- Storage at high temperatures and high humidity;
- Direct contact with water, salt water, oil or other chemicals;
- direct contact with corrosive materials;
- Direct sunlight;
- Dusty environments;
- Shock or vibration, strong electromagnetic environment;

6.2.2 Transportation:

When the capacitor is transported, the charge state should be lower than 50% UR, and shall not be subjected to violent mechanical impact, sun screen, rain during transportation, and shall be gently carried and put away.

6.3 precautionary

- Supercapacitors should not be used at temperatures exceeding the specified operating temperature range;
- Supercapacitors should be used at rated voltage;
- Please confirm the positive/negative polarity of the supercapacitor before use, and prohibit reverse charging. If the positive/negative polarity of the supercapacitor is reversed, it will affect the life of the capacitor and the equivalent series resistance; meanwhile, reverse charging will lead to heat generation or leakage;
- Ensure that the positive/negative terminals are clean before using the supercapacitor to avoid excessive contact resistance and reduce the performance of the supercapacitor.
- It is prohibited to put supercapacitors into fire or to heat them under high pressure;
- Prohibition of crushing, pinning and dismantling of supercapacitors;
- During use, charging or storage, if you find that the ultracapacitor becomes hot, emits an odor, is deformed or has any other abnormalities, stop using it and move it to a safe isolation area

- Do not dispose of the supercapacitor after it fails, but leave it to a professional industrial waste gas treatment provider.

Please contact us if you have any questions about supercapacitors.