Radial Super Capacitor

Application

The products using as a back-up source can be applied in the field of electronic devices such as RAM, intelligent instrument, motor drive, clock circuit and toys

PART NUMBER

Example: RND 150HP-2R7-J805VYJ09

RND 150HP	2R7	J	805	V	Y	J	09
Series	Rated Voltage	Type	Capacitance	Tolerance	Terminal	Shape	Internal Code
	2R7 = 2.7 V 5R5 = 5.5 V	J = Radial D = Coin	104 = 0.1 F 224 = 0.22 F 334 = 0.33 F 474 = 0.47 F 105 = 1F 155 = 1.5 F 205 = 2F 335 = 3.3 F 805 = 8 F	V = 0%-30% U = -10%-20% T = ±20%	Y = Leaded N = Bolt Type L = Stud Type	H = Horizontal V = Vertical C(J) = Cylindrical	

Standard test conditions:

Test should be done at a condition of standard atmospheric press, 5~35℃, temperature and a relative humidity of less than 85%; the test situation adopted by this specification is standard atmospheric, 25℃ and relative humidity less than 60%

Product structure

The product, using electrolyte and separator to separate the electrodes that made by activated carbon and sealed the Aluminum case by rubber plug is base on the principal of electric double layer capacitors. The leads are at the same side of the products.

General specification

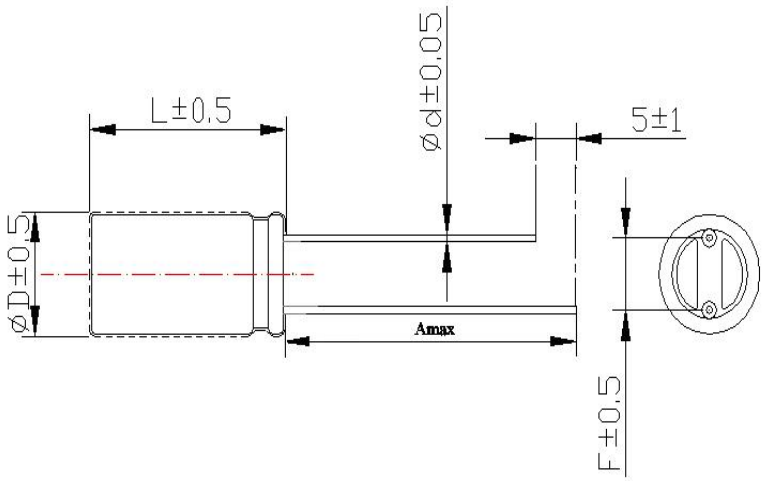
Rated discharge capacity(F 25℃) ΔV＝1.5V-1.25V	8 F
Capacity tolerance	0 ... 30 %
Rated Voltage	2.7 V
Operating Temperature Min.	-40 °C
Operating Temperature Max.	70 °C
Maximum equivalent series resistance ESR (1KHz)	50 mΩ

Performance index

Temperature characteristics	+70℃ ｜△C/C｜≤30%, ESR ≤ specified value(25℃) -40℃ ｜△C/C｜≤50%, ESR ≤ 4 times initial value (25℃)
High temperature load	+70℃ charging nominal voltage after 1000h, ｜△C/C｜≤30%, 4 times the specified value
High temperature without load	+70℃, after 1000±4h, ｜△C/C｜≤30%, ESR≤2 times the specified value
Humidity Resistance	+40℃, 90--95%RH, 240h, ｜△C/C｜≤30% ,IL≤2, times of specified value,ESR≤4 times of specified value
Cycle life Expectancy	After nominal voltage, 500,000 times charge-discharge circle △C/C｜≤30%, ESR ≤4 times initial value(25℃)

Radial Super Capacitor

Drawing



Size (mm ΦD×L)	12.5×21 mm
Lead spacing (mm F)	5.0±0.5 mm
Lead diameter (mm Φd)	0.6±0.05 mm

Performance testing method

1) According to standard

QC/T 741-2014 – Vehicle super capacitor
DL/T 1652-2016 – Technical specifications for supercapacitors for electric energy metering

2) Test method capacitance

1. Constant current discharge method
2. Measuring circuit

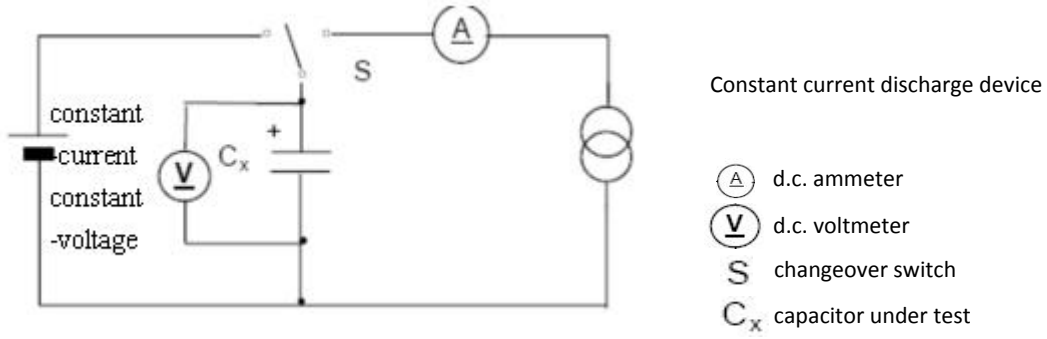


Figure 1 – Circuit for constant current discharge method

Measuring method

a) Setting the direct current voltage of constant current/constant voltage power supply as rated voltage (U_R)
b) Setting the constant current value of the constant current discharge device , according to Table 2 specified
c) Turn the switch S to the d.c. power supply, and unless otherwise specified in the individual standards, apply voltage and charge for 30 min after the constant current/ constant voltage power supply has achieved the rated voltage
d) After charging for 30 min has finished, change over the switch S to the constant current discharge device , and discharge with a constant current
e) Unless otherwise specified in the individual standards, measure the time t1 and t2 where the voltage between capacitor terminals at the time of discharge reduces from U1 to U2 as shown in Figure 2, and calculate the capacitance value by the following formula

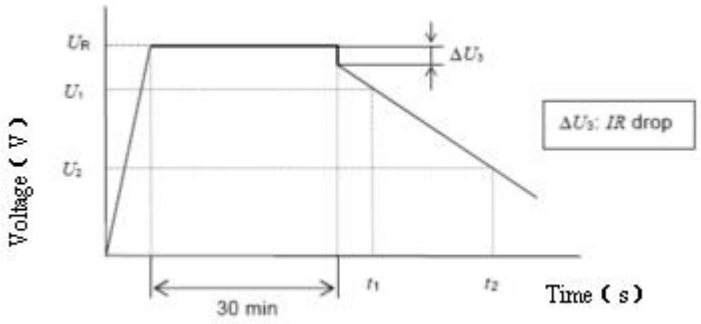


Figure 2 – Voltage characteristic between capacitor terminals

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

C is the capacitance (F);
I is the discharge current (A);
U1 is the measurement starting voltage (V);
U2 is the measurement end voltage (V);
t1 is the time from discharge start to reach U1 (s);
t2 is the time from discharge start to reach U2 (s).

Discharge current I and decrease in voltage of discharge voltage U1, U2 , according to table 1

Discharge conditions

Table 1 – Discharge conditions

Classification	HT、HV、X	SE、HE	SP、 MK	LR、 HP、 HEV、 LEV
Application	Memory backup	Energy storage	Power	Instantaneous power
Charge time	30min	30min	30min	30min
I（mA）	1×C	0.4×CUR	4×CUR	40×CUR
U1	The value to be 80 % of the charging voltage (0.8×UR)			
U2	The value to be 40 % of the charging voltage (0.4×UR)			
NOTE C is the rated capacitance in F (Farad), and UR is the rated voltage in V (Volt).				

NOTE : The discharge current I shall be chosen according to the following condition :

a) If ΔU3 exceeds 5 % (0.05 × UR) of the charging voltage in the initial characteristics, the current value may be reduced by one half, one fifth or one tenth.

b) The number of significant digit for the discharge current value of 10 A or less shall be one digit; the second digit of the calculated value should be rounded

c) The number of significant figures for the discharge current value exceeding 10 A shall be two digits; the third digit of the calculated value should be rounded down.

Equipment

1) ARBIN super capacitor test system
2) Linear DC stabilized voltage power supply
3) Constant current discharging device
4) Voltage recording device

Internal resistance

AC impedance method

Measuring circuit

As shown in the measurement circuit for testing.

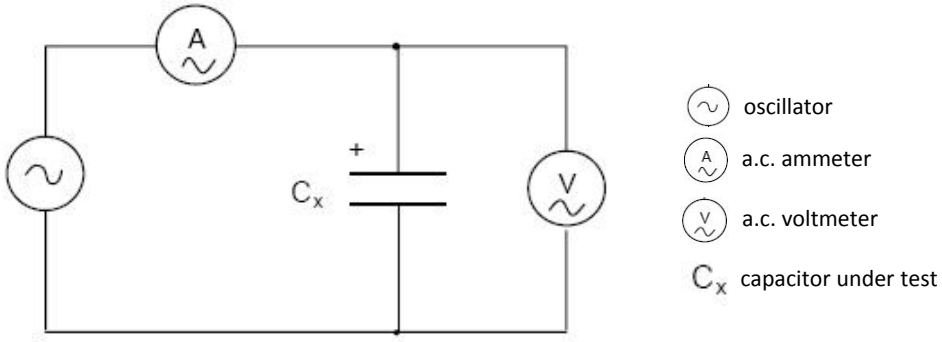


Figure 4–Circuit for a.c. resistance method

Measuring method
The internal resistance Ra of a capacitor shall be calculated by the following formula:

$$R_a = \frac{U}{I}$$

Ra is the a.c. internal resistance (Ω)
U is the effective value of a.c. voltage (V r.m.s.)
I is the effective value of a.c. current (V r.m.s.)
The frequency of the measuring voltage shall be 1 kHz The a.c. current shall be from 1 mA to 10 mA, equipment: Multi frequency LCR Bridge

B、DC impedance method

Measuring method
The measuring circuit taking constant current discharging method ,, with rated voltage ,measuring capacitor terminal voltage with voltage recorder .switch S shift to DC supply power ,apply voltage charging for 30 min after constant voltage supply power reach to rated voltage
After charging for 30 minutes, turn the switch S to the d.c. power supply, discharging as rated current according as figure 3 .record the terminal voltage of capacitor with voltage recorder .
Calculate inter resistance Rd according formula as below :

$$R_d = \frac{\Delta U_3}{I}$$

Rd DC inner resistance（Ω）;

ΔU3 voltage drop（V）;

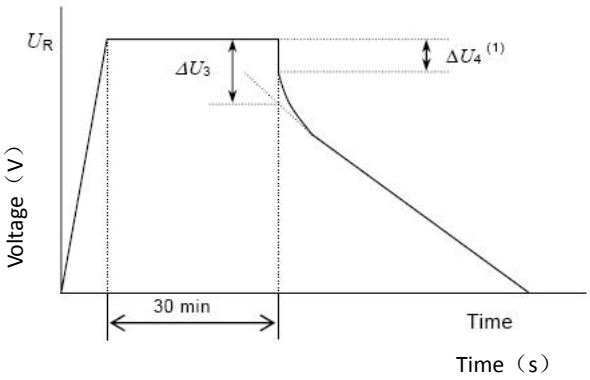
I discharging current（A）。

Charging current I based on figure 3

Figure 3– charging current

classification	HT、HV、X	SE、HE	SP、MK	LR、HP、HEV、LEV
I（mA）	10×C	4×CUR	40×CUR	400×CUR
Noted: C is rated capacitance， F is farad ， UR is rated voltage， unit is V（voltage）				

a) If ΔU3 exceeds 20 % (0.2 × UR) of the charging voltage in the initial characteristics, the current value may be reduced by one half, one fifth or one tenth.
b) The number of significant digit for the discharge current value of 10 A or less shall be one digit; the second digit of the calculated value should be rounded
c) The number of significant figures for the discharge current value exceeding 10 A shall be two digits; the third digit of the calculated value should be rounded down.



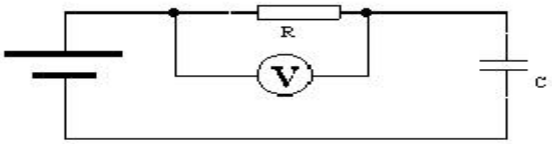
From discharge voltage drop does not represent the starting point of continuous voltage landing Δ U4, but from straight line part of the curve as the auxiliary line extended to the starting point and discharge cross get Δ U4.

Figure 5 –the terminal voltage feature of capacitor

Equipment: test equipment with the capacity.

（8)Leakage current

DC current measuring method：



A、Discharging

The capacitor should have been fully discharged for 1h to 24h before measuring

B, The leakage current measurement should be rated temperature and rated voltage (UR).Reached 95% after maximum 30 min charge time charging voltage and charging time from 30 min (1 f) or less, 1 h (1 f) or higher, 2 h (10 f or higher), 4 h (20 f) or higher, 72 h (120 f) or higher in the choice.

C.Stable power supply, such as dc regulated power supply should be used.

D.Through the protection under 1000 Ω resistance to capacitor voltage.

E、Equipment：resistance multimeter

Self-discharging

A, Measuring method（refer to figure 7）

Before this measurement is made, the capacitors shall be fully discharged . Discharge procedure shall take 1 h to 24 h . Apply the rated voltage UR directly to the capacitor terminals, without using a protective resistor. Unless otherwise specified by the relevant specifications, charging time shall be 8 h, including maximum 30 min charge-up time to reach 95 % of the applied voltage.

Disconnect the capacitor terminals from the voltage source. Unless otherwise specified in the detail specification, the capacitor shall be kept under standard conditions for 24 h. The internal resistance of the d.c. voltmeter used shall have a value of at least 1 MΩ.

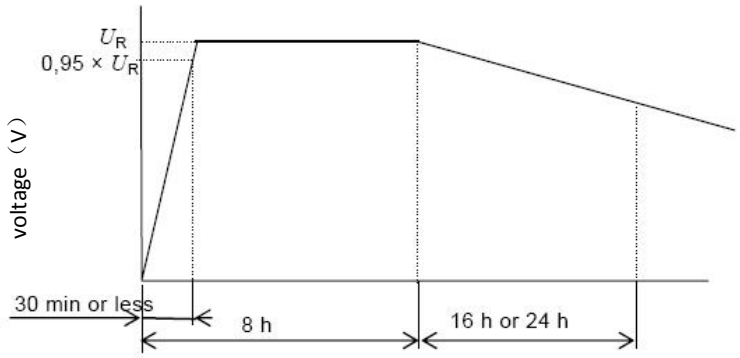


Figure 7 – Self-discharge test diagram

B、equipment ： multimeter

Precautions for use

1. The supercapacitors have fixed polarity.
2. The supercapacitors should be used under the condition of nominal voltage.
3. Using in high frequency charge & discharge circuit is strictly forbidden.
4. The ambient temperature will have influence on the lifetime of supercapacitors
5. A voltage drop will appear at the moment of discharge: ΔV=IR
6. It is strictly forbidden to store the supercapacitors at a place where the relative humidity is greater than 85% or with toxic gas.
7. The supercapacitors should be stored in a place where the temperature is between -30℃ and 50℃ and the relative humidity is less than 60%.
8. When using in the two-side circuit board, pay attention that the juncture part should not go through the area that the supercapacitor can reach.
9. After installation, cannot forced twist or tilted capacitor
10. Avoid overheat of supercapacitors during welding.(For the printed circuit board of 1.6mm, the temperature should be controlled at 260℃ and the welding time within 5 seconds)
11. The supercapacitor and circuit board must been cleaned after welding.
12. When using in series, there's a voltage balancing problem among units

Art. Nr.
RND 150HP-2R7-J805VYJ09