引线型超级电容规格书

Lead Type Supercapacitor Specification

WIN13202R7E106RPJ

（2.7V/10F）

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1、产品编码说明

1 2 3	4 5 6 7	8 9 10	11	12 13 14	15 16	17
W I N	1 3 2 0	2 R 7	E	1 0 6	R P	J

大类别	
WIN	超级电容器
LIC	锂离子电容器

尺寸规格/mm	
0812	φ8*12
0816	φ8*16
0820	φ8*20
0825	φ8*25
1020	φ10*20
1025	φ10*25
1320	φ12.5*20
1325	φ12.5*25
1625	φ16*25
1840	φ18*40

代码	电压/V
2R7	2.7
3R0	3.0
3R8	3.8

代码	容量偏差/%
E	-10%～30%
M	±20%
Z	0～20%

代码	容量/F
105	1
205	2
335	3.3
505	5
705	7
106	10
156	15
186	18
206	20
256	25
606	60

代码	产品类型
RP	常规型
HT	高温型
HP	高压型

代码	产品类型
J	卷绕引线型
K	扣式
N	牛角型

2、外观尺寸 External Dimension

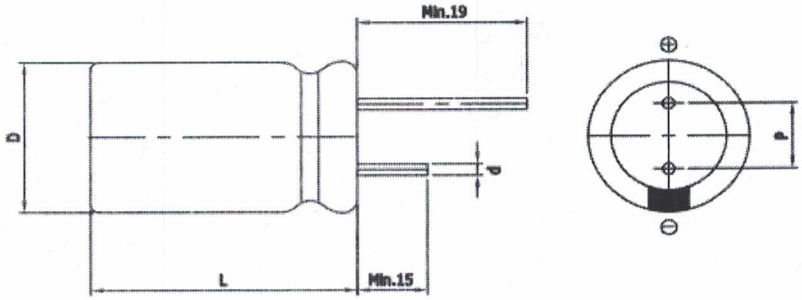


表 1 Table 1

尺寸 Dimension/mm			
D+1.0	总高 L±1.5	d±0.03	P±0.5
12.5	20	0.6	5.3

3、产品技术规格 Product Specification

3.1 参数性能 Characteristics

表 2 Table 2

型号 Model Number	额定电压 Rated Voltage (V)	标称容量 Nominal Capacitance (F)	交流内阻 AC ESR 1KHz (mΩ)	最大工作电流 Maximum Current (A)	最大脉冲电流 Maximum pulse current (A)	漏电流 Leakage Current (mA)
WIN13202R7E106RPJ	2.7	10	≤ 35	1.35	7.7	0.030

备注：漏电流是在 25℃和额定电压下 72 小时后测的值。

Remark: Leakage Current: After 72hours at rated voltage and 25℃

表 3 Table 3

项目 Item	参数 characteristics	备注 Remark
容量偏差 Capacitance Tolerance	-10~30%	
工作温度范围 Operating Temperature Range (Tmin ~Tmax)	-40~70℃	
储存温度范围 Storage Temperature Range	-10~50℃	
保质期 Shelf Life	2 年 2 years	最大温度下不带电，容量变化≤25℃下初始值的 10%；交流内阻变化≤25℃下内阻值的 1 倍 Without electrical charge under Tmax, |Δcap| ≤ 10% of initial value at 25℃; |ΔESR| ≤ 1 times of specified value at 25℃

3.2 产品可靠性测试 Product Reliability Test

表 4 Table 4

项目 Item	合格标准 Acceptable Quality Level		测试条件 Test Condition
70℃高温负荷寿命 High Temperature Load Time	容量变化 |Δcap|	≤25℃下初始值的 30% ≤ 30% of initial value at 25℃	温度 Temperature：T_{max}±2℃ 电压 Voltage：额定电压 rated voltage 测试时长 Duration of testing: 1,000(+48)hours
	交流内阻变化 |ΔESR|	≤25℃下内阻值的 2 倍 ≤ 2 times of specified value at 25℃	
	外观变化 Appearance	无显著变化 No remarkable change	
循环寿命 Cycle Life	容量变化 |Δcap|	≤25℃下初始值的 30% ≤ 30% of initial value at 25℃	在 25℃恒流下从额定电压到半额定电压间循环充放电，500,000 次 Cycles from rated voltage to ½ •rated voltage under constant current at 25℃, 500,000 cycles
	交流内阻变化 |ΔESR|	≤25℃下内阻值的 2 倍 ≤ 2 times of specified value at 25℃	
	外观变化 Appearance	无显著变化 No remarkable change	
温度特性（高温） Temperature Characteristics	容量变化 |Δcap|	≤25℃下初始值的 10% ≤ 10% of initial value at 25℃	存储时长 Duration of storage：12 小时 12hours 无负载 Non-loaded 温度 Temperature：25℃、70℃
	交流内阻变化 |ΔESR|	≤25℃下内阻值的 120% ≤ 120% of specified value at 25℃	
	外观变化 Appearance	无显著变化 No remarkable change	

温度特性（低温） Temperature Characteristics	容量变化 |Δcap|	≤25℃下初始值的30% ≤ 30% of initial value at 25℃	存储时长Duration of storage:12小时12hours 无负载 Non-loaded 温度 Temperature：-25℃，-40℃
	交流内阻变化 |ΔESR|	≤25℃下内阻值的2倍 ≤ 2 times of specified value at 25℃	
	外观变化 Appearance	无显著变化 No remarkable change	
抗振性 Vibration Resistance	容量变化 |Δcap|	≤25℃下初始值的30% ≤ 30% of initial value at 25℃	振幅 Amplitude：1.5mm 频率 Frequency：10~55Hz 方向 Direction：X,Y,Z(2hours) 测试时长 Duration of testing：6小时6hours
	交流内阻变化 |ΔESR|	≤25℃下内阻值的2倍 ≤ 2 times of specified value at 25℃	
	外观变化 Appearance	无显著变化 No remarkable change	
湿热特性 Humidity Characteristics	容量变化 |Δcap|	≤25℃下初始值的10% ≤ 30% of initial value at 25℃	电压 Voltage：额定电压 rated voltage 相对湿度 Relative Humidity：90~95% 测试时长 Duration of testing：240小时240hours： 温度 Temperature：40±2℃
	交流内阻变化 |ΔESR|	≤25℃下内阻值的2倍 ≤ 2 times of specified value at 25℃	电压 Voltage：额定电压 rated voltage 相对湿度 Relative Humidity：90~95% 测试时长 Duration of testing：240小时240hours： 温度 Temperature：40±2℃
	外观变化 Appearance	无显著变化 No remarkable change	电压 Voltage：额定电压 rated voltage 相对湿度 Relative Humidity：90~95% 测试时长 Duration of testing：240小时240hours： 温度 Temperature：40±2℃

3.3 规格书参数测试方法 Specification parameter test method

3.3.1 容量、内阻测试 Capacity and internal resistance test

1）容量测试方法 Capacity test method：

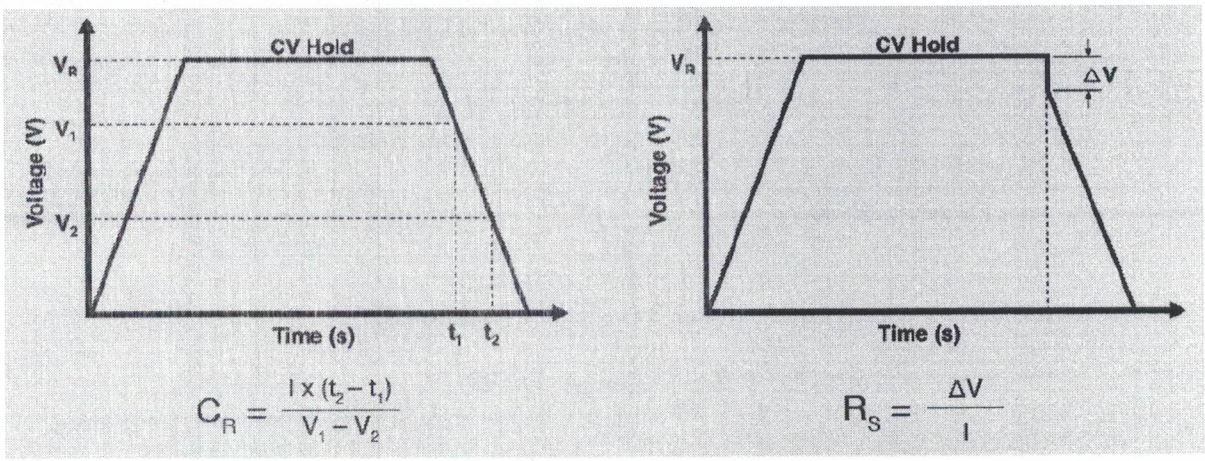
以10mA/F电流充电至额定电压V_R，恒压30min，后以10mA/F电流放电至0.1V，按下面公式计算产品容量值

Charge to the rated voltage V_R with 10mA/F current, constant voltage for 30min, then discharge to 0.1V with 10mA/F current, calculate the product capacity value according to the following formula

2）DCR测试方法 DCR test method：

以10mA/F电流充电至额定电压V_R，恒压30min，然后以$40*C_R*V_R$（mA）电流放电至0.1V，按下面公式计算产品DCR值

Charge to the rated voltage V_R with 10mA/F current, constant voltage for 30min, then discharge to 0.1V with $40*C_R*V_R$ (mA) current, calculate the product DCR value according to the following formula



说明： C_R：产品容量值(F) Product capacity value;

I：放电电流的绝对值(A) Absolute value of discharge current;

V_R：额定电压(V) Rated voltage;

V_1 =0.8 * V_R (V)（额定电压的80%，80% of rated voltage）;

V_2 =0.4 * V_R (V)（额定电压的40%，40% of rated voltage）;

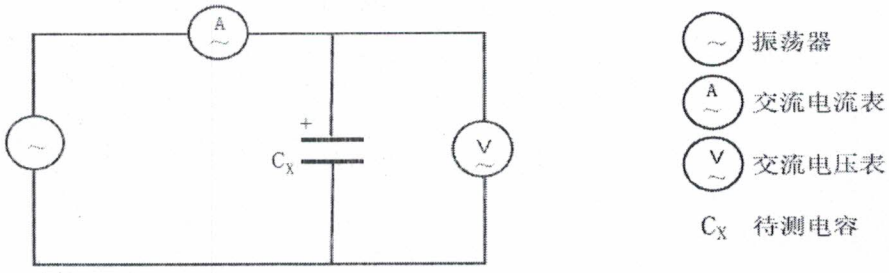
t_1：放电开始到V_1的时间(s) Time from discharge start to V_1;

t_2：放电开始到V_2的时间(s) Time from discharge start to V_2;

R_S：等效直流内阻(Ω) Equivalent DC internal resistance;

ΔV：放电开始10ms的瞬时压降(V) 10ms instantaneous voltage drop at the beginning of discharge.

3.3.2 交流内阻测试方法 AC internal resistance test method



内阻计算公式： $R_{AC} = \frac{U}{I}$

说明：U：交流电压有效值（V r.m.s）AC voltage effective value

I：交流电流有效值（V r.m.s）AC current effective value

频率Frequency：1KHZ

电流值Current value：1～10mA

3.3.3 漏电流测试 Leakage current test

测量开始之前产品应充分放电24H以上，25℃条件下恒流充电至V_R，然后V_R恒压72H，其电流值即为漏电流。

Before the measurement starts, the product should be fully discharged for 24H or more, charged to V_R at a constant current at 25° C, then V_R at a constant voltage of 72H, and the current value recorded is the leakage current.

漏电流值会随温度变化，模块产品的漏电流是电芯漏电流与平衡电路产生的旁路电流之和。

The leakage current value changes with temperature. The leakage current of the module product is the sum of the leakage current of the cell and the bypass current generated by the balance circuit.

4、注意事项 Announcements

4.1 运输 Transportation

超级电容器在运输中不得受剧烈机械冲撞，暴晒，雨淋。在装卸过程中应轻搬轻放，严防摔掷，翻滚，重压。超级电容器未受到US DOT（运输部）和IATA的规定；正确的国际运输描述是“电子产品-电容器”。

The supercapacitor shall not be subjected to severe mechanical impact, exposure to the sun, rain or inverted during transportation. In the process of loading and unloading, the cell should be moved and put gently to prevent throwing, tumbling and heavy weight. Supercapacitor is not US DOT(Department of Transportation) and IATA regulations subject, and the right international shipping description is “Electronic Products-Capacitor”.

4.2 储存 Storage

不要在以下环境中贮存超级电容器：

（1） 高温/高湿环境；

（2） 阳光直射，粉尘环境；

（3） 直接与水、盐水、油或其它化学品接触；

（4） 直接与腐蚀性材料、酸、碱金属或有毒气体接触；

（5） 冲击或振动环境。

Do not store the supercapacitor in the following environments:

(1) High temperature / high humidity environments.

(2) Direct sunlight, dust environment.

(3) Direct contact with the water, salt, oil or other chemicals.

(4) Direct contact with corrosive materials, acids, alkalis or toxic gases.

(5) Shock or vibration environments.

4.3 使用 Usage

（1）使用超级电容器时建议保持极性。如果在一方向上长期充电后再进行反向充电，超级电容的寿命将会大大的缩短。

（2）一般来说，环境温度每提升10℃，其寿命缩减一半。因此，建议尽可能降低温度使用。在恶劣环境中使用，为达到最长的使用寿命则需要添加一些空气对流设备。

（3）超级电容器可用多种方法进行充电，包括恒定电流、恒定电压、恒定功率或与能量储存器进行并联。如果与电池并联，加一个低阻值串联电阻会提示电池寿命。

（4）单个超级电容器单体的电压有限，必须串联超级电容器以达到要求的电压。由于每个超级电容器在电容和阻抗上有轻微的公差，必须均衡或防止单个超级电容器超过额定电压。

（5）超级电容器在使用或测试完后，需将其电压放电至0.1V以下，以避免短路产生安全隐患。

（6）焊接应遵循以下具体指引：不能把超级电容器浸入已熔解的焊锡中，只能在其导针上粘上焊剂；确保超级电容器套管不直接与PCB或其它组件接触，过高的焊锡温度会导致套管收缩或破裂；避免超级电容器在裸露的电路板上工作，以防止发生短路。

手工焊接：

不可让超级电容器外部套管与烙铁接触，否则套管会熔化或破裂；焊嘴温度建议低于350℃，焊接持续时间少于4秒钟；应使烙铁与超级电容器导针直接接触时间最小化，因为导针的过热会对其工作特性产生负面影响。

波峰焊：

最多给 PCB 预热 60 秒钟，浸锡达 0.8mm 或更厚；预热温度极限应低于 100℃；（以下表格信息只用于引线型产品的波峰焊接）

(1) It is recommended to keep right polarity. It will greatly shorten the life of supercapacitor when charge it in one polarity and then reverse charge.

(2) Generally the ambient temperature every raise by 10℃, the life for supercapacitor will shorten by half. Therefore, it is recommended to use in low temperature environment. In some extreme environment, it needs to be equipped with some air convection devices to get maximum lifespan.

(3) Supercapacitor could be charged by several ways, including constant current, constant voltage, constant power, or parallel connection with energy storage devices. It will improve battery lifetime when parallel connect supercapacitor with battery with a low resistance resistor.

(4) Single supercapacitor voltage is too low, so it needs connect in series to get the needed voltage. Since each single supercapacitor with slight tolerance on capacitance & resistance, the connected supercapacitor shall have equivalent voltage or prevent a single supercapacitor exceeds the rated voltage.

(5) To avoid short circuit, after usage or test, supercapacitor voltage needs to discharge to below 0.1V.

(6) It is advised to follow these guidelines: Do not immerse supercapacitor into the melted soldering tin, please put the soldering tin onto its lead terminals. Make sure the supercapacitor casing not directly touch PCB board or other components, too high temperature will cause casing shrink or crack. Avoid supercapacitor works on bare circuit board to prevent short circuits.

Hand soldering:

Keep supercapacitor casing away from soldering iron, otherwise the casing will melt or crack; It is recommended that keep welding tip temperature lower than 350℃, and keep welding time less than 4s. Minimize the direct contact time for soldering iron & supercapacitor lead terminals, because too high temperature of lead terminals will make negative impact for its work performance.

Wave soldering:

Preheat PCB board 60s at most and make sure soldering tin is 0.8mm or thicker, while keep preheat temperature lower than 100℃. (The followed form is only applied for wave soldering for lead type supercapacitor.)

焊锡温度（℃） Solder temperature（℃）	建议焊锡时间（秒） Suggested solder time(s)	最大焊接时间（秒） Maximum solder time(s)
220	7	9
240	7	9
250	5	7
260	3	5

4.4 禁止事项 Prohibition

请勿将电容器长期置于高温、高电压下。如果长期置于高温、高电压下，将会导致寿命缩短，极端情况下，电压引起的产品失效会导致单体漏液或气体泄漏。禁止超级电容器过度充电、反向充电、焚烧或高于 150℃加热，因为有可能发生防爆阀爆裂；不要挤压、损伤、拆解超级电容器，滥用可能导致铝壳升上高温（烫伤或烧伤）。

Do not keep the supercapacitors under high temperature and voltage for a long time. If put supercapacitors in high temperature & high voltages environment, it will shorten the lifetime of

supercapacitors. In the extreme case, it will lead to cell leakage or gas leakage when product failure caused by voltage. If you overcharge ,reverse charge, burn or heat higher than 150℃, supercapacitor explosion-proof valve may break. Do not press, damage, disassemble the supercapacitor. Abuse supercapacitor may cause scald or burn due to high temperature on aluminum housing.

4.5 紧急事故应用程序 Emergency Applications

如果发现超级电容器过热或是闻到气味，应立即断开与超级电容器连接的电源和负载，让其降温，然后进行正确处理，不可让脸或手接触过热的超级电容器。

漏液情况处理：

（1） 皮肤处理：用肥皂水和清水彻底冲洗皮肤。

（2） 眼睛接触：用流动清水或生理盐水冲洗，就医。

（3） 吸取：立即用水漱口，就医。

Disconnect the power supply & load connected with supercapacitor, once supercapacitor overheat or smells. Lower its temperature, avoid direct face or hands touch for overheat supercapacitor.

Leakage case:

(1) Skin contact: Use soap and water thoroughly wash skin.

(2) Eye contact: Flush with flowing water or saline, and immediately ask for medical treatment.

(3) Draw: Immediately wash with water and ask for medical treatment.

4.6 请不要超出本规格书范围使用超级电容器

Please do not exceed the specification range using the supercapacitor.

4.7 本说明书未包括事项应由双方协议确定

Any other items which are not covered in this specification shall be agreed by both parties.