自主研发 / 自主创新 / 自主技术

INDEPNDENT RESEARCH / SELF INNOVATION / SELF-OWNED TECHNOLOGY

HEGA
成都和佳

科技创新
引领未来

Scientific and technological
innovation leads the future

合作·共赢

cooperation and win-win

成都和佳高分子材料有限公司

Chengdu Hejia Polymer Material Co.,Ltd

公司简介 COMPANY PROFILE

成都和佳高分子材料有限公司，是一家专注于新材料、新能源行业并集研发、生产、销售于一体的高新技术企业。公司主要有超级电容器和锂离子电容器。其中超级电容器由拥有十多年经验的专业研发、产品设计开发、和先进的生产管理团队组成。公司主要人员承担过国内军工、新能源汽车车用超级电容器等多个大型项目的研发、生产。经过多年对国家重点项目的研究试验，结合国内外市场的需求，现已具备生产卷绕型2.7V/3.0V/3.8V/4.2V系列、组合型5.5V/6.0V系列，以及大容量13.5V、16V、48V、80V、90V、100V、200V、300V、400V等系列的超级电容、锂离子电容、超级电容模组、模块等一百多个规格型号的能力，产品的性能指标均达到了国内外同期产品水平。

公司高度重视产、学、研的结合，与国内多家高校、科研院所建立了长期紧密的合作关系。公司面向新兴能源产业提供新型储能产品、技术、解决方案和服务，长期致力于从事超级电容器和锂离子电容器的储能技术及储能信息技术的工程化、产业化和商业化运营。公司在新型储能材料和新型储能产品关键技术领域拥有自主知识产权，公司目前可以提供多种规格的超级电容（包括单体、模组、系统）锂离子电容器、汽车动力电池等产品；同时面向新能源汽车（HEV/PEV)动力电源、风电变桨系统后备电源、智能电网电能质量调节（UPS/DVR)、轨道交通制动能量回收、军用功率电源、电动工具等市场应用，提供优质储能技术解决方案、储能产品和专业化技术服务。

主要产品：

一、水表/气表用5.5V:0.1F,0.22F,0.33F,0.47F,1.0F,1.5F

二、控制器类/小家电5.5V:0.1F,0.22F,0.33F,0.47F,1.0F

三、大电流放电产品2.7V:1F,2F,3.3F,5F,10F,20F,30F,50F,100F,120F,200F,400F,500F,1500F,3000F

四、超级电容模组、模块系列，定做各行业13.5V,16V,48V,80V,90V,100V,200V,300V,400V系列模组、模块、锂离子电容器。

成都和佳高分子材料有限公司，凭着“自主研发、自主创新、自主技术、诚信为本、精诚合作、追求卓越”和“敢为人先”的进取精神，植根于新能源、新技术领域，坚持以市场为导向，以客户满意为目标，在专业化、标准化的道路上不断创新。在未来的发展中，成都和佳高分子材料有限公司将继续紧扣时代脉搏，秉持低碳环保的经营理念。推动新能源行业的消费、供给、技术革命，努力发展为最具科技创新能力和全球影响力的企业，为实现伟大的中国梦贡献自己的力量！

Chengdu Hejia Polymer Materials Co., Ltd. is a high-tech enterprise focusing on new materials and new energy industries and integrating R&D, production and sales. The company mainly has super capacitors and lithium-ion capacitors. Among them, super capacitors are composed of professional R&D, product design and development, and advanced production management teams with more than ten years of experience. The main personnel of the company have undertaken the research and development and production of many large-scale projects such as domestic military industry and super capacitors for new energy vehicles. After years of research and testing on national key projects, combined with the needs of domestic and foreign markets, it has now produced winding 2.7V/3.0V/3.8V/4.2V series, combined 5.5V/6.0V series, and large-capacity 13.5V， 16V, 48V, 80V, 90V, 100V, 200V, 300V, 400V and other series of supercapacitors, lithium-ion capacitors, supercapacitor modules, modules and other more than 100 specifications and models, the performance indicators of the products have reached The level of domestic and foreign products in the same period.

The company attaches great importance to the combination of production, learning and research, and has established long-term and close cooperative relations with many domestic universities and research institutes. The company provides new energy storage products, technologies, solutions and services for the emerging energy industry, and has long been committed to the engineering, industrialization and commercial operation of energy storage technology for supercapacitors and lithium-ion capacitors and energy storage information technology. The company has independent intellectual property rights in the key technical fields of new energy storage materials and new energy storage products. The company can currently provide various specifications of super capacitors (including monomers, modules, systems) lithium-ion capacitors, automotive power batteries and other products; Provide high-quality storage for new energy vehicle (HEV/PEV) power supply, wind power pitch system backup power supply, smart grid power quality regulation (UPS/DVR), rail transit braking energy recovery, military power supply, power tools and other market applications Energy technology solutions, energy storage products and specialized technical services.

main products:

1. 5.5V for water/gas meter: 0.1F, 0.22F, 0.33F, 0.47F, 1.0F, 1.5F

2. Controllers/small appliances 5.5V: 0.1F, 0.22F, 0.33F, 0.47F, 1.0F

3. High current discharge products 2.7V: 1F, 2F, 3.3F, 5F, 10F, 20F, 30F, 50F, 100F, 120F, 200F, 400F, 500F, 1500F, 3000F

4. Super capacitor modules, module series, customized 13.5V, 16V, 48V, 80V, 90V, 100V, 200V, 300V, 400V series of modules, modules, lithium-ion capacitors in various industries.

Chengdu Hejia Polymer Materials Co., Ltd., with the enterprising spirit of "independent research and development, independent innovation, independent technology, integrity-based, sincere cooperation, pursuit of excellence" and "dare to be the first", is rooted in the fields of new energy and new technologies. , adhere to the market-oriented, customer satisfaction as the goal, and continue to innovate on the road of specialization and standardization. In the future development, Chengdu Hejia Polymer Materials Co., Ltd. will continue to closely follow the pulse of the times and adhere to the business philosophy of low carbon and environmental protection. Promote the consumption, supply and technological revolution of the new energy industry, strive to develop into an enterprise with the most technological innovation and global influence, and contribute to the realization of the great Chinese dream.

企业文化 COMPANY CULTURE

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超级电容器 Super Capacitor

性能与优势 Features and Benefits

- 低内阻、高功率
- 免维护(1,000,000次循环充放电，10年使用寿命)
- 定制各类尺寸单体及模组
- 定制各类耐高温、耐高压、超低ESR、超低自放电、超长寿命的单体。
- 提供完整的系统解决方案
- 绿色环保

- Low ESR, high power
- Maintenance-free (1,000,000 cycles of charge and discharge, ten years of service life)
- Customized dimensions of products are available.
- Customized special performance, such as high temperature, high voltage, ultra-low ESR,ultra-low self discharge and longer life are available.
- Offer integrated system solution.
- Green(RoHS compliant & REACH certificated)

应用类型 Application Types

- 脉冲电源 Pulse power supply
- 辅助电源 Accessory power supply
- 主电源 Main power
- 存储器备份电源 Memory backup power

应用领域 Application Areas

- 工业 Industry
- 消费类电子产品 Consumer electronics
- 医疗 Medical Treatment
- 交通运输 Traffic
- 军事 Military
- 物联网 Internet of things
- 智能仪表 Intelligent instrumemts

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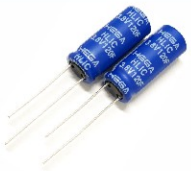
产品一览表 Series Table

系列 Series	特性 Fearures	温度范围 Temp. Range		容量 Capacitance	最大工作电压 Max Operating Voltage	尺寸 Size	产品图片 Product Photo
		Min	Max				
HSP	高能量、大功率 High energy, high power type	-40℃	+70℃	1~5000F	2.7V.DC	Φ6.3~60	
HSD	高能量、大功率、高电压 High energy, high power type, High Voltage	-40℃	+65℃	1~3000F	3.0V.DC	Φ8~60	
HLIC	高能量、高电压、低自放电 High energy, High Voltage, Low Self-discharge	-40℃	65℃	10~1200F	3.8V.DC 4.0V.DC 4.2V.DC	Φ6.3-18	
HM	低漏电，长寿命 Low leakage current, long life	-40℃	+65℃	0.22~50F	5.5V.DC 6.0V.DC 7.5V.DC 8.1V.DC 9.0V.DC	Φ8~18 2串/3串 2 or 3 series	
HM	满足客户需求 Meet customer request	-40℃	+65℃	根据客户需求定制 Customized according to customer requirements			

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产品编码系统 Part Number System

单体编码 Cell P/N

HSP | 2R7 | S | 106 | DS | 10 | 25 | HB

系列 Series
HSP
HSD
HLIC

代码 Code	电压 Voltage (V)
2R7	2.7
3R0	3.0
3R8	3.8
4R0	4.0
4R2	4.2

容量偏差 Cap.Tol.	
R	0%~+20%
J	±5%
V	-10%~+30%
M	±20%
S	-20%~+50%
N	-20%~+80%
A	0%~+50%

代码 Code	标称容量 Cap.(F)
254	0.25
205	2
335	3.3
505	5
106	10
156	15
256	25
506	50
107	100
367	360
128	1200
158	1500
308	3000

代码 Code	端子类型 Terminal Type
DS	导针型散装 Lead type bulk
DP	导针型排列装 Lead type, Tray package
DX	导针型,吸塑盒装 Lead type, parellel package
ZA	导针型折弯剪脚 Lead type,leads bent & trimmed
GP	两针盖板型 2-leg Solder pin
GB	两L片盖板型 2 Copper plate Type
GA	四针盖板型 4-leg Solder pin
MP	螺柱两端引出 Two ends with screw
JP	光柱两端引出 Two ends without screw

代码 Code	外径 Dia (mm)
6C	6.3
08	8
10	10
1B	12.5
16	16
18	18
22	22
30	30
35	35
60	60

代码 Code	高度 Height (mm)
12	12.0
16	16.0
20	20.0
25	25.0
30	30.0
40	40.0
50	50.0
62	62.0
68	68.0
1A	138.0

热缩套管颜色区分 Sleeve color distinction
和佳蓝底白字 HEJIA Blue and white

模组编码 Module P/N

HM | 05R5 | S | 04R7 | DS | R | △* | A | HA

模组 Module

代码 Code	电压 Voltage (V)
05R5	5.5
0006	6.0
07R5	7.5
0009	9.0
0010	10.0
0800	800.0

容量偏差 Cap.Tol.	
R	0%~+20%
J	±5%
V	-10%~+30%
M	±20%
S	-20%~+50%
N	-20%~+80%
A	0%~+50%

代码 Code	标称容量 Cap.(F)
04R7	0.47
0001	1
01R5	1.5
0010	10
0100	100

代码 Code	引出方式 Outgoing Type
DA	导针两端引出 Lead at two end
DB	导针中间引出 Lead in middle
DC	导线底部引出 Wire, lead out from the bottom
DX	导线两端引线引出 Wire at two end
XZ	焊线座引出 Connection box
LZ	导线+插座/插针引出 Wire+Connection box
NA	线路板不焊引线 Without wire from PCB

代码 Code	封装方式 package
R	塑料热缩 PET heat shrink tube
S	塑料灌胶 Plastic shell with expoxy filling
J	金属外壳 metal shell
P	塑料外壳 Plastic case
K	无外壳（空） Without case

线路板信息: △以字母代码表示线路板功能 * 以数字表示线路板版本号 PCBA information: △PCBA functions * PCBA version	
A	空板 Bare board
B	带电阻 With resistors
C	带电阻和运放 With resistors and power amplifier
D	简单限压 Simple voltage limiting
E	高级限压、无信号输出 Advanced voltage limiting without signal output
F	高级限压、仅电压信号输出 Advanced voltage limiting only voltage signal output
G	高级限压有电压和温度输出信息 Advanced voltage limiting voltage and temperature singnal output
H	带扩展功能可监测每并单体电压 Extended function can monitor voltage of ever parallel cell

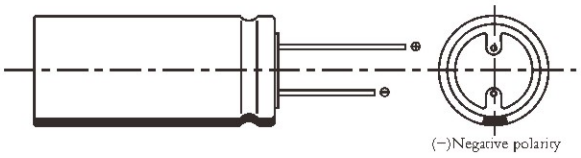
产品尺寸不同标识码 Product size different identification code

代码 Code	热缩套管印字或塑料灌胶印字区分 The casing pringting color is differentia
HA	塑料灌胶 印蓝底黑字 Plastic potting, blue background with black words
HB	塑料热缩印 蓝底白字 Shrink wrap, blue background with black words

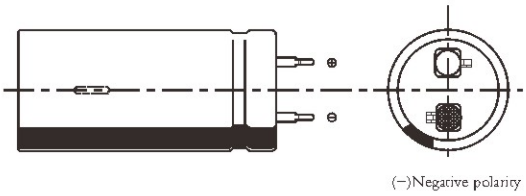
端子类型 Terminal Type

尺寸图示 Dimentions (mm)

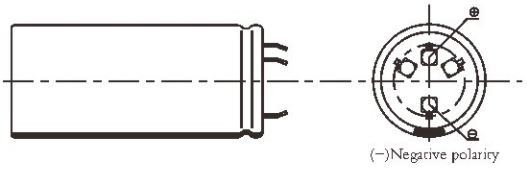
导针型/DS Type:



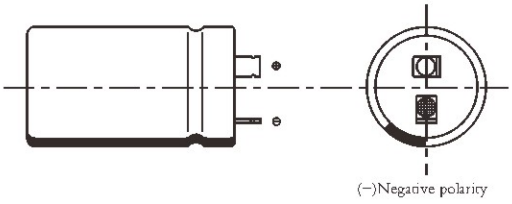
两针盖板型/GP Type:



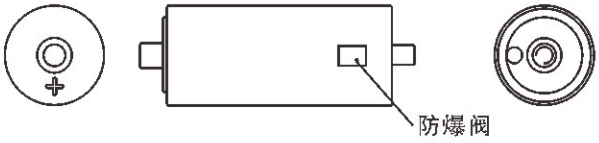
四针盖板型/GA Type:



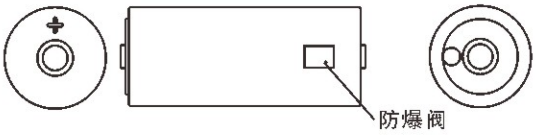
两L片型/GB Type:



螺柱两端引出型/MP Type:



光柱两端引出型/JP Type



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HSP(2.7V)系列-导针型 series

应用范围 Applied Range

◆ 智能仪表、RMA、汽车记录仪、玩具、马达驱动、UPS、通信设备、安防设备、小家电等。
Smart meters, RMA, car recorders, toys, motor drives, UPS, communication equipment, security equipment, small appliances, etc.

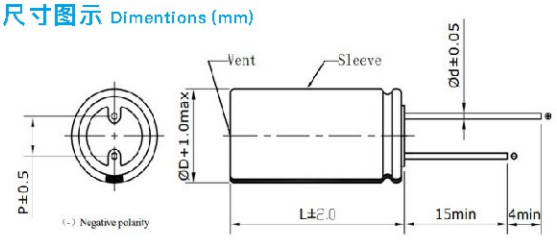
特 点 Features

◆ 高能量、大功率、充放电循环寿命长、免维护、环保。
High energy, high power, long charge-discharge cycle life, maintenance-free and environmentally friendly.

性能参数 Performance Parameter

项目 Item	性能参数 performance parameter
额定电压 Rated Voltage	2.7 V.DC
浪涌电压 Surge Voltage	2.85 V.DC
容量范围 Nominal Cap. Range	1F ～ 120F
工作温度范围 Operating Temperature Range	-40℃ ～ +70℃
产品寿命 Product Life	常温循环寿命：在25℃下，用恒定电流使电容器在规格电压和半额定电压间循环充放电100万次。 容量衰减≤30%，内阻变化≤2倍 Life Cycle:Capacitors ate cycled between rated voltage and half-rated voltage under constant current at +25℃ for1,000,000 cycles. Capacitance change:≤30%of initial value;ESR ≤2 times of initial value.
	高温耐久寿命：在+70℃条件下，施加额定电压1000小时。 容量衰减≤30%，内阻变化≤2倍 High Temperaterature Characteristics:Temperature:+70℃.Voltage:Rated Voltage.Test Duration:1,000 hours. Capacitance change:≤30%of initial value;ESR ≤2 times of initial value.

尺寸图示 Dimentions (mm)



ϕD+1.0	6.3	8	10	12.5	16	18
P±0.5	2.5	3.5	5.0	5.0	7.5	7.5
ϕd±0.05	0.6	0.6	0.6	0.6	0.8	0.8

规格参数 Specification parameter

规格型号 Part number	额定电压 Rated Voltage (V)	标称容量 Rated Cap. (F)	尺寸 Size (mm) 外径 (ϕD)	尺寸 Size (mm) 高度 (L)	交流内阻 Max.ESR$_{AC}$ (1kHz/mΩ)	最大工作电流 Maximum Continuous Current(A) (△T=15℃)	最大峰值电流 Maximum Peak Current(A)	最大漏电流 Maximum Leakage Current (72hrs/mA)	最大能量 Maximum Energy (Wh)	能量密度 Energy Density (Wh/kg)	功率密度 Power Density (kW/kg)
HSP2R7S105DS6C11HB	2.7	1	6.3	11	200	0.18	0.61	0.003	0.0010	1.35	0.97
HSP2R7S105DS0812HB	2.7	1	8	12	180	0.26	0.75	0.005	0.0010	1.13	1.22
HSP2R7S205DS0816HB	2.7	2	8	16	100	0.43	1.57	0.008	0.0020	1.76	2.11
HSP2R7V335DS0816HB	2.7	3.3	8	16	100	0.43	2.04	0.010	0.0033	2.78	2.03
HSP2R7S335DS0820HB	2.7	3.3	8	20	95	0.54	2.32	0.010	0.0033	2.39	2.23
HSP2R7V505DS0820HB	2.7	5	8	20	85	0.59	3.07	0.012	0.0051	3.27	2.35
HSP2R7V505DS1020HB	2.7	5	10	20	70	0.77	3.55	0.015	0.0051	2.30	2.21
HSP2R7V705DS0825HB	2.7	7	8	25	70	0.75	4.18	0.015	0.0071	3.38	2.31
HSP2R7V705DS1020HB	2.7	7	10	20	60	0.81	4.46	0.018	0.0071	2.95	2.28
HSP2R7V106DS1025HB	2.7	10	10	25	40	1.27	7.50	0.020	0.0101	3.62	3.91
HSP2R7V106DS1B20HB	2.7	10	12.5	20	40	1.35	7.71	0.025	0.0101	2.89	3.33
HSP2R7V156DS1B20HB	2.7	15	12.5	20	40	1.35	9.53	0.030	0.0152	4.10	3.15
HSP2R7V156DS1B25HB	2.7	15	12.5	25	35	1.54	9.88	0.035	0.0152	3.53	2.91
HSP2R7V206DS1B25HB	2.7	20	12.5	25	35	1.60	11.74	0.045	0.0203	4.50	2.99
HSP2R7V206DS1B30HB	2.7	20	12.5	30	25	1.97	13.50	0.050	0.0203	4.05	3.50
HSP2R7V256DS1625HB	2.7	25	16	25	25	2.20	15.88	0.070	0.0253	3.38	2.59
HSP2R7V306DS1630HB	2.7	30	16	30	20	2.53	18.41	0.080	0.0304	3.62	2.60
HSP2R7V506DS1840HB	2.7	50	18	40	15	4.34	33.75	0.100	0.0506	3.89	3.36
HSP2R7V107DS1860HB	2.7	100	18	60	12	5.85	51.92	0.260	0.1013	4.82	2.60
HSP2R7V127DS1860HB	2.7	120	18	60	12	5.85	55.48	0.260	0.1215	5.79	2.60

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HSD(3.0V)系列-导针型 series

应用范围 Applied Range

◆ 智能仪表、RMA、汽车记录仪、玩具、马达驱动、UPS、通信设备、安防设备、小家电等。
Smart meters, RMA, car recorders, toys, motor drives, UPS, communication equipment, security equipment, small appliances, etc.

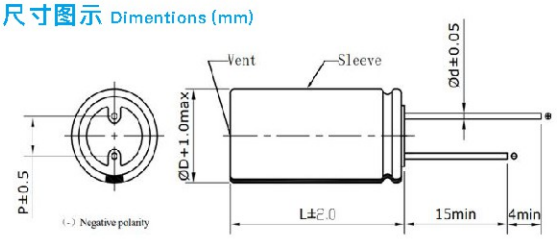
特 点 Features

◆ 高能量、大功率、充放电循环寿命长、免维护、环保。
High energy, high power, long charge-discharge cycle life, maintenance-free and environmentally friendly.

性能参数 Performance Parameter

项目 Item	性能参数 performance parameter
额定电压 Rated Voltage	3.0 V.DC
浪涌电压 Surge Voltage	3.15 V.DC
容量范围 Nominal Cap. Range	1F ～ 120F
工作温度范围 Operating Temperature Range	-40℃ ～ +65℃
产品寿命 Product Life	常温循环寿命：在25℃下，用恒定电流使电容器在规格电压和半额定电压间循环充放电50万次。 容量衰减≤30%，内阻变化≤4倍 Life Cycle:Capacitors ate cycled between rated voltage and half-rated voltage under constant current at +25℃ for500,000 cycles. Capacitance change:≤30%of initial value;ESR ≤4 times of initial value.
	高温耐久寿命：在+65℃条件下，施加额定电压1000小时。 容量衰减≤30%，内阻变化≤4倍 High Temperaterature Characteristics:Temperature:+65℃.Voltage:Rated Voltage.Test Duration:1,000 hours. Capacitance change:≤30%of initial value;ESR ≤4 times of initial value.

尺寸图示 Dimentions (mm)



ϕD+1.0	6.3	8	10	12.5	16	18
P±0.5	2.5	3.5	5.0	5.0	7.5	7.5
ϕd±0.05	0.6	0.6	0.6	0.6	0.8	0.8

规格参数 Specification parameter

规格型号 Part number	额定电压 Rated Voltage (V)	标称容量 Rated Cap. (F)	尺寸 Size (mm) 外径 (ϕD)	尺寸 Size (mm) 高度 (L)	交流内阻 Max.ESR$_{AC}$ (1kHz/mΩ)	最大工作电流 Maximum Continuous Current(A) (△T=15℃)	最大峰值电流 Maximum Peak Current(A)	最大漏电流 Maximum Leakage Current (72hrs/mA)	最大能量 Maximum Energy (Wh)	能量密度 Energy Density (Wh/kg)	功率密度 Power Density (kW/kg)
HSD3R0S105DS0812HB	3.0	1	8	12	180	0.26	0.83	0.005	0.0013	1.39	1.50
HSD3R0S205DS0816HB	3.0	2	8	16	100	0.43	1.74	0.008	0.0025	2.17	2.61
HSD3R0S335DS0820HB	3.0	3.3	8	20	95	0.54	2.57	0.010	0.0041	2.95	2.76
HSD3R0S505DS1020HB	3.0	5	10	20	70	0.77	3.95	0.015	0.0063	2.84	2.73
HSD3R0V705DS1020HB	3.0	7	10	20	60	0.81	4.95	0.018	0.0088	3.65	2.81
HSD3R0V106DS1025HB	3.0	10	10	25	40	1.27	8.33	0.020	0.0125	4.46	4.82
HSD3R0V106DS1B20HB	3.0	10	12.5	20	40	1.35	8.57	0.025	0.0125	3.57	4.11
HSD3R0V156DS1B20HB	3.0	15	12.5	20	40	1.35	10.59	0.030	0.0188	5.07	3.89
HSD3R0V156DS1B25HB	3.0	15	12.5	25	35	1.54	10.98	0.035	0.0188	4.36	3.59
HSD3R0V206DS1B25HB	3.0	20	12.5	25	35	1.60	13.04	0.045	0.0250	5.56	3.69
HSD3R0V206DS1B30HB	3.0	20	12.5	30	25	1.97	15.00	0.050	0.0250	5.00	4.32
HSD3R0V256DS1625HB	3.0	25	16	25	25	2.20	17.65	0.070	0.0313	4.17	3.20
HSD3R0V306DS1630HB	3.0	30	16	30	20	2.53	20.45	0.080	0.0375	4.46	3.21
HSD3R0V506DS1840HB	3.0	50	18	40	15	4.34	37.50	0.100	0.0625	4.81	4.15
HSD3R0V107DS1860HB	3.0	100	18	60	12	5.85	57.69	0.260	0.1250	5.95	3.21
HSD3R0V127DS1860HB	3.0	120	18	60	12	5.85	61.64	0.260	0.1500	7.14	3.21

HEGA
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HLIC(4.2V)系列-导针型高容量产品series

应用范围 Applied Range

◆ 智能仪表、GPS跟踪/RF和通信电源、NB通信/脉冲功率电源、电动工具/ETC及其它快充电源、电子烟。
Smart meters, GPS tracking/RF and communication power supplies, NB communication/pulse power supplies, power tools/ETC and other fast charging sources, electronic cigarettes.

特 点 Features

◆ 低自放电、高电压、高容量（同体积EDLC10倍）、绿色环保、免维护。
Low self-discharge, high voltage, high capacity (10 times the same volume of EDLC), green, and maintenance-free.

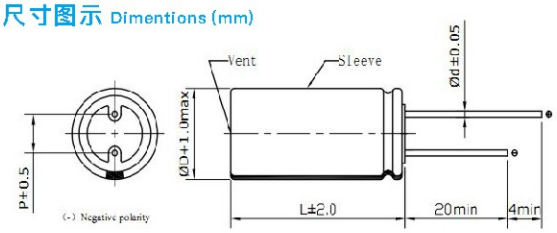
性能参数 Performance Parameter

项目 Item	性能参数 performance parameter
额定电压 Rated Voltage	2.5 ～ 4.2 V.DC
最大充电电压 Maximum Charging Voltage	4.2 V.DC
容量范围 Nominal Cap. Range	150F ～ 1200F
工作温度范围 Operating Temperature Range	-40℃ ～ +65℃
产品寿命 Product Life	常温循环寿命： 在常温条件下，用5C的电流将单体充至4.2V,紧接着将其该电流放电至2.5V循环充放电8000次。 容量衰减≤30%，内阻变化≤4倍 Life Cycle:Charge the cell to4.2V under 5C-rate at room temperature,and then discharge it to 2.5V at the same current, cycling 8,000times. Capacitance change:≤30%of initial value;ESR ≤4 times of initial value.
	高温高湿存储特性：常温条件下,将单体在表1电流条件下充电至3.6V并恒压充电1h,后将其放置在60±2℃、90±2% RH的条件下存储1000h。 容量衰减≤30%，内阻变化≤2倍 High temperature and high humidity storage characteristics:Charge the cell to 3.6V at Table 1's current, and the charge 1h at constant voltage condition at room temperature. After this, put the cell to 60±2℃、 90±2% RH conditions to storage 1000h. Capacitance change:≤30%of initial value;ESR ≤2 times of initial value.

表1 容量测试过程的充电电流: Table1 The discharge current for different products during the Capacitance Test

产品型号 Part number	充放电电流 Charge and discharge current(mA)	产品型号 Part number	充放电电流 Charge and discharge current(mA)
HLIC4R2N157DX0825HB	50	HLIC4R2N557DX1B40HB	280
HLIC4R2N257DX1B20HB	120	HLIC4R2N507DX1620HB	230
HLIC4R2N407DX1B30HB	200	HLIC4R2N128DX1840HB	600

尺寸图示 Dimentions (mm)



ϕD+1.0	8	12.5	16	18
P±0.5	3.5	5.0	7.5	7.5
ϕd±0.05	0.6	0.6	0.8	0.8

规格参数 Specification parameter

规格型号 Part number	额定电压 Rated Voltage (V)	标称容量 Rated Cap. (F)	标称容量 Rated Cap. (mAh)	尺寸 Size (mm) 外径 (ϕD)	尺寸 Size (mm) 高度 (L)	交流内阻 Max.ESR$_{AC}$ (1kHz/mΩ)	最大工作电流 Maximum Continuous Current 连续放电 Continuous discharge(A)	最大工作电流 Maximum Continuous Current 脉冲 pulse 1sec(A)	最大充电电压 Maximum charging voltage(V)	最大充电电流 Maximum charging current(A)
HLIC4R2N157DX0825HB	4.2	150	50	8	25	600	0.2	1	4.2	0.2
HLIC4R2N257DX1B20HB	4.2	250	120	12.5	20	100	0.1	2	4.2	0.6
HLIC4R2N407DX1B30HB	4.2	400	200	1.25	30	90	1.5	20	4.2	4
HLIC4R2N557DX1B40HB	4.2	550	280	1.25	40	50	4.0	28	4.2	3
HLIC4R2N507DX1620HB	4.2	500	230	16	20	50	2.0	15	4.2	4
HLIC4R2N128DX1840HB	4.2	1200	600	18	40	25	6.0	40	4.2	6

HEGA
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HLIC(3.8V)系列-导针型series

应用范围 Applied Range

◆ 智能仪表、GPS跟踪/RF和通信电源、NB通信/脉冲功率电源、电动工具/ETC及其它快充电源、电子烟。
Smart meters, GPS tracking/RF and communication power supplies, NB communication/pulse power supplies, power tools/ETC and other fast charging sources, electronic cigarettes.

特 点 Features

◆ 低自放电、高电压、高容量（同体积EDLC10倍）、绿色环保、免维护。
Low self-discharge, high voltage, high capacity (10 times the same volume of EDLC), green, and maintenance-free.

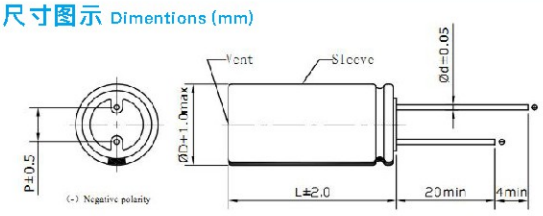
性能参数 Performance Parameter

项目 Item	性能参数 performance parameter
额定电压 Rated Voltage	2.5 ～ 3.8 V.DC
最大充电电压 Maximum Charging Voltage	4.0 V.DC
容量范围 Nominal Cap. Range	10F ～ 750F
工作温度范围 Operating Temperature Range	-40℃ ～ +65℃
产品寿命 Product Life	常温循环寿命： 在常温条件下,用表1的电流将单体充至3.7V,紧接着将其该电流放电至3.1V循环充放电10万次。 容量衰减≤30%，内阻变化≤4倍 Life Cycle:According to Table1' srequirements,chargthe cell to3.7V at room temperature,and the discharge it to 3.1V at the same current.Once cycling 10,0000times. Capacitance change:≤30%of initial value;ESR ≤4 times of initial value.
	高温高湿存储特性：常温条件下,将单体在表1电流条件下充电至3.6V并恒压充电1h,后将其放置在60±2℃、90±2% RH的条件下存储1000h。 容量衰减≤30%，内阻变化≤2倍 High temperature and high humidity storage characteristics:Charge the cell to 3.6V at Table 1's current, and the charge 1h at constant voltage condition at room temperature. After this, put the cell to 60±2℃、 90±2% RH conditions to storage 1000h. Capacitance change:≤30%of initial value;ESR ≤2 times of initial value.

表1 容量测试过程的充电电流: Table1 The discharge current for different products during the Capacitance Test

产品型号 Part number	充放电电流 Charge and discharge current(mA)	产品型号 Part number	充放电电流 Charge and discharge current(mA)
HLIC3R8N106DX6C13HB	3.5	HLIC3R8N706DX1B13HB	30
HLIC3R8N206DX0813HB	7.5	HLIC3R8N127DX1B20HB	45
HLIC3R8N406DX0820HB	15	HLIC3R8N257DX1620HB	90
HLIC3R8N306DX1013HB	11	HLIC3R8N507DX1640HB	180
HLIC3R8N806DX1020HB	29	HLIC3R8N757DX1840HB	300
HLIC3R8N127DX1030HB	45		

尺寸图示 Dimentions (mm)



ϕD+1.0	6.3	8	12.5	16	18
P±0.5	2.5	3.5	5.0	7.5	7.5
ϕd±0.05	0.6	0.6	0.6	0.8	0.8

规格参数 Specification parameter

规格型号 Part number	额定电压 Rated Voltage (V)	标称容量 Rated Cap. (F)	标称容量 Rated Cap. (mAh)	尺寸 Size (mm) 外径 (ϕD)	尺寸 Size (mm) 高度 (L)	交流内阻 Max.ESR$_{AC}$ (1kHz/mΩ)	最大工作电流 Maximum Continuous Current 连续放电 Continuous discharge(A)	最大工作电流 Maximum Continuous Current 脉冲 pulse 1sec(A)	最大充电电压 Maximum charging voltage(V)	最大充电电流 Maximum charging current(A)
HLIC3R8N106DX6C13HB	3.8	10	3.5	6.3	13	1500	0.20	0.3	4.0	0.10
HLIC3R8N206DX0813HB	3.8	20	7.5	8	13	500	0.10	0.5	4.0	0.20
HLIC3R8N406DX0820HB	3.8	40	15	8	20	200	0.20	1.0	4.0	0.30
HLIC3R8N306DX1013HB	3.8	30	11	10	13	250	0.15	0.7	4.0	0.35
HLIC3R8N806DX1020HB	3.8	80	29	10	20	150	0.25	3.0	4.0	0.50
HLIC3R8N127DX1030HB	3.8	120	45	10	30	100	0.50	5.0	4.0	1.00
HLIC3R8N706DX1B13HB	3.8	70	30	12.5	13	175	0.25	3.0	4.0	0.50
HLIC3R8N127DX1B20HB	3.8	120	45	12.5	20	100	0.50	5.0	4.0	1.00
HLIC3R8N257DX1620HB	3.8	250	90	16	20	50	0.75	10.0	4.0	2.00
HLIC3R8N507DX1640HB	3.8	500	180	16	40	35	2.00	20.0	4.0	3.00
HLIC3R8N757DX1840HB	3.8	750	300	18	40	25	3.00	30.0	4.0	3.00

HEGA
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HM(5.5V)系列-套管 series

应用范围 Applied Range

◆ 智能仪表、RMA、汽车记录仪、玩具、马达驱动、UPS、通信设备、安防设备、小家电等。
Smart meters, RMA, car recorders, toys, motor drives, UPS, communication equipment, security equipment, small appliances, etc.

特 点 Features

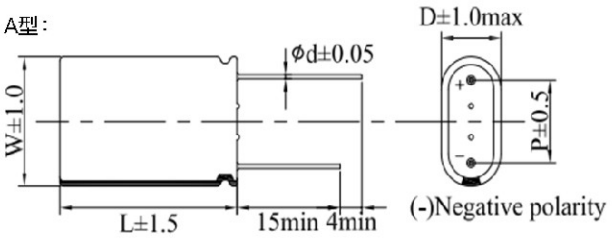
◆ 高能量、大功率、充放电循环寿命长、免维护、环保。
High energy, high power, long charge-discharge cycle life, maintenance-free and environmentally friendly.

性能参数 Performance Parameter

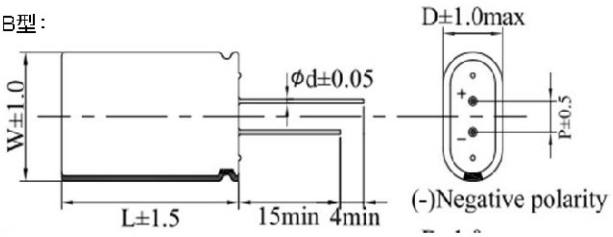
项目 Item	性能参数 performance parameter
额定电压 Rated Voltage	5.5 V.DC
浪涌电压 Surge Voltage	5.7 V.DC
容量范围 Nominal Cap. Range	0.47F ～ 5.0F
工作温度范围 Operating Temperature Range	-40℃ ～ +70℃
产品寿命 Product Life	常温循环寿命：在25℃下，用恒定电流使电容器在规格电压和半额定电压间循环充放电50万次。 容量衰减≤30%，内阻变化≤4倍 Life Cycle:Capacitors ate cycled between rated voltage and half-rated voltage under constant current at +25℃ for500,000 cycles. Capacitance change:≤30%of initial value;ESR ≤4 times of initial value.
	高温耐久寿命：在+70℃条件下，施加额定电压1000小时。 容量衰减≤30%，内阻变化≤4倍 High Temperaterature Characteristics:Temperature:+70℃.Voltage:Rated Voltage.Test Duration:1,000 hours. Capacitance change:≤30%of initial value;ESR ≤4 times of initial value.

尺寸图示 Dimentions (mm)

A型:



B型:



单体直径	W+1.0	D+1.0	P±0.5		φd±0.05
			A型	B型	
φ6.3	12.6	6.3	9.0	/	0.6
φ8	16	8	11.8	4.8	0.6
φ10	20	10	15.5	5.0	0.6
φ12.5	25	12.5	18.0	7.5	0.6

规格参数 Specification parameter

规格型号 Part number	额定电压 Rated Voltage (V)	标称容量 Rated Cap. (F)	尺寸 Size (mm) 长度 (W)	宽度 (D)	高度 (L)	交流内阻 Max.ESR$_{AC}$ (1kHz/mΩ)	最大工作电流 Maximum Continuous Current(A) (△T=15℃)	最大峰值电流 Maximum Peak Current(A)	最大漏电流 Maximum Leakage Current (72hrs/mA)	最大能量 Maximum Energy (Wh)	能量密度 Energy Density (Wh/kg)	功率密度 Power Density (kW/kg)
HM05R5S0R47DARA0BHB	5.5	0.47	12.6	6.3	14	400	0.18	0.61	0.003	0.0020	1.23	1.13
HM05R5S0R47DARA0AHB	5.5	0.47	16	8	14	360	0.26	0.75	0.005	0.0020	0.94	1.15
HM05R5S0001DARA0AHB	5.5	1	16	8	18	240	0.43	1.57	0.008	0.0042	1.83	2.25
HM05R5S01R5DARA0AHB	5.5	1.5	16	8	22	190	0.54	2.32	0.010	0.0063	1.85	2.14
HM05R5S02R5DARA0AHB	5.5	2.5	20	10	22	180	0.77	3.55	0.015	0.0105	2.33	2.37
HM05R5S0005DARA0AHB	5.5	5	20	10	27	80	1.27	7.50	0.020	0.0210	3.50	3.78
HM05R5M0005DARA0BHB	5.5	5	25	12.5	22	80	1.35	7.71	0.025	0.0210	2.69	2.91

HEGA
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HM(6.0V)系列-套管 series

应用范围 Applied Range

◆ 智能仪表、RMA、汽车记录仪、玩具、马达驱动、UPS、通信设备、安防设备、小家电等。
Smart meters, RMA, car recorders, toys, motor drives, UPS, communication equipment, security equipment, small appliances, etc.

特 点 Features

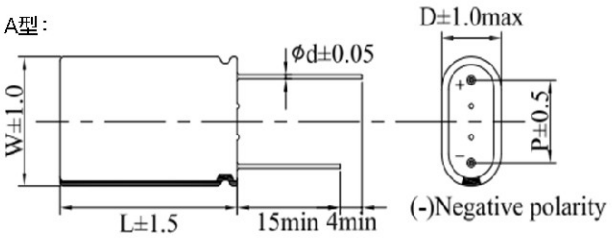
◆ 高能量、大功率、充放电循环寿命长、免维护、环保。
High energy, high power, long charge-discharge cycle life, maintenance-free and environmentally friendly.

性能参数 Performance Parameter

项目 Item	性能参数 performance parameter
额定电压 Rated Voltage	6.0 V.DC
浪涌电压 Surge Voltage	6.3 V.DC
容量范围 Nominal Cap. Range	0.47F ～ 5.0F
工作温度范围 Operating Temperature Range	-40℃ ～ +65℃
产品寿命 Product Life	常温循环寿命：在25℃下，用恒定电流使电容器在规格电压和半额定电压间循环充放电50万次。 容量衰减≤30%，内阻变化≤4倍 Life Cycle:Capacitors ate cycled between rated voltage and half-rated voltage under constant current at +25℃ for500,000 cycles. Capacitance change:≤30%of initial value;ESR ≤4 times of initial value.
	高温耐久寿命：在+65℃条件下，施加额定电压1000小时。 容量衰减≤30%，内阻变化≤4倍 High Temperaterature Characteristics:Temperature:+65℃.Voltage:Rated Voltage.Test Duration:1,000 hours. Capacitance change:≤30%of initial value;ESR ≤4 times of initial value.

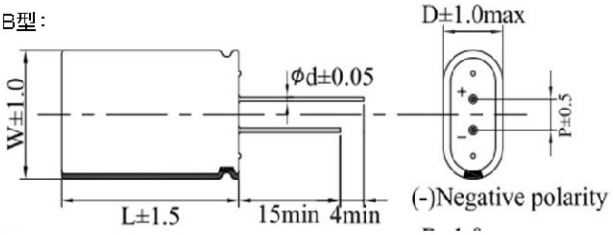
尺寸图示 Dimentions (mm)

A型：



单体直径	W+1.0	D+1.0	P±0.5		φd±0.05
			A型	B型	
φ8	16	8	11.8	4.8	0.6
φ10	20	10	15.5	5.0	0.6
φ12.5	25	12.5	18.0	7.5	0.6

B型：



规格参数 Specification parameter

规格型号 Part number	额定电压 Rated Voltage (V)	标称容量 Rated Cap. (F)	尺寸 Size (mm) 长度 (W)	宽度 (D)	高度 (L)	交流内阻 Max.ESR$_{AC}$ (1kHz/mΩ)	最大工作电流 Maximum Continuous Current(A) (△T=15℃)	最大峰值电流 Maximum Peak Current(A)	最大漏电流 Maximum Leakage Current (72hrs/mA)	最大能量 Maximum Energy (Wh)	能量密度 Energy Density (Wh/kg)	功率密度 Power Density (kW/kg)
HM0006S0R47DARA0AHB	6.0	0.47	16	8	14	360	0.26	0.83	0.005	0.0024	1.12	1.37
HM0006S0001DARA0AHB	6.0	1	16	8	18	240	0.43	1.74	0.008	0.0050	2.17	2.68
HM0006S01R5DARA0AHB	6.0	1.5	16	8	22	190	0.54	2.57	0.010	0.0075	2.21	2.54
HM0006S02R5DARA0AHB	6.0	2.5	20	10	22	180	0.77	3.95	0.015	0.0125	2.78	2.82
HM0006S0005DARA0AHB	6.0	5	20	10	27	80	1.27	8.33	0.020	0.0250	4.17	4.50
HM0006M0005DARA0BHB	6.0	5	25	12.5	22	80	1.35	8.57	0.025	0.0250	3.21	3.46

HEGA
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HM(5.5V)系列-灌胶 series

应用范围 Applied Range

◆ 智能仪表、RMA、汽车记录仪、玩具、马达驱动、UPS、通信设备、安防设备、小家电等。
Smart meters, RMA, car recorders, toys, motor drives, UPS, communication equipment, security equipment, small appliances, etc.

特 点 Features

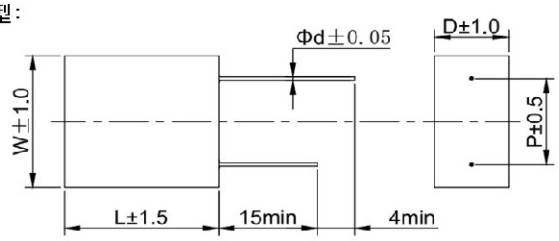
◆ 高能量、大功率、充放电循环寿命长、免维护、环保。
High energy, high power, long charge-discharge cycle life, maintenance-free and environmentally friendly.

性能参数 Performance Parameter

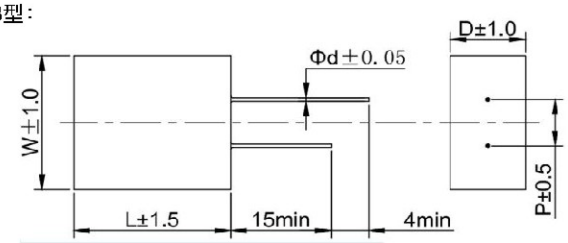
项目 Item	性能参数 performance parameter
额定电压 Rated Voltage	5.5 V.DC
浪涌电压 Surge Voltage	5.7 V.DC
容量范围 Nominal Cap. Range	0.47F ～ 5.0F
工作温度范围 Operating Temperature Range	-40℃ ～ +70℃
产品寿命 Product Life	常温循环寿命： 在25℃下，用恒定电流使电容器在规格电压和半额定电压间循环充放电50万次。 容量衰减≤30%，内阻变化≤4倍 Life Cycle:Capacitors ate cycled between rated voltage and half-rated voltage under constant current at +25℃ for500,000 cycles. Capacitance change:≤30%of initial value;ESR ≤4 times of initial value.
	高温耐久寿命：在+70℃条件下，施加额定电压1000小时。 容量衰减≤30%，内阻变化≤4倍 High Temperaterature Characteristics:Temperature:+70℃.Voltage:Rated Voltage.Test Duration:1,000 hours. Capacitance change:≤30%of initial value;ESR ≤4 times of initial value.

尺寸图示 Dimentions (mm)

A型：



B型：



单体直径	W+1.0	D+1.0	P±0.5		Φd±0.05
			A型	B型	
Φ6.3	15	8	9.0	/	0.6
Φ8	18	9	11.8	4.8	0.6
Φ10	23	12	15.5	5.0	0.6
Φ12.5	27	14	18.0	7.5	0.6

规格参数 Specification parameter

规格型号 Part number	额定电压 Rated Voltage (V)	标称容量 Rated Cap. (F)	尺寸 Size (mm) 长度 (W)	宽度 (D)	高度 (L)	交流内阻 Max.ESR$_{AC}$ (1kHz/mΩ)	最大工作电流 Maximum Continuous Current(A) (△T=15℃)	最大峰值电流 Maximum Peak Current(A)	最大漏电流 Maximum Leakage Current (72hrs/mA)	最大能量 Maximum Energy (Wh)	能量密度 Energy Density (Wh/kg)	功率密度 Power Density (kW/kg)
HM05R5S0R47DASA0BHA	5.5	0.47	15	8	16	500	0.18	0.61	0.003	0.0020	0.71	0.65
HM05R5S0R47DASA0AHA	5.5	0.47	18	9	16	360	0.26	0.75	0.005	0.0020	0.62	0.76
HM05R5S0001DASA0AHA	5.5	1	18	9	20	240	0.43	1.57	0.008	0.0042	0.98	0.94
HM05R5S01R5DASA0AHA	5.5	1.5	18	9	24	190	0.54	2.32	0.010	0.0063	1.02	1.17
HM05R5S02R5DASA0AHA	5.5	2.5	23	12	25	180	0.77	3.55	0.015	0.0105	1.16	1.18
HM05R5S0005DASA0AHA	5.5	5	23	12	30	80	1.27	7.50	0.020	0.0210	2.21	2.39
HM05R5M0005DASA0BHA	5.5	5	27	14	26	80	1.35	7.71	0.025	0.0210	1.91	2.06

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HM(6.0V)系列-灌胶 series

应用范围 Applied Range

◆ 智能仪表、RMA、汽车记录仪、玩具、马达驱动、UPS、通信设备、安防设备、小家电等。
Smart meters, RMA, car recorders, toys, motor drives, UPS, communication equipment, security equipment, small appliances, etc.

特 点 Features

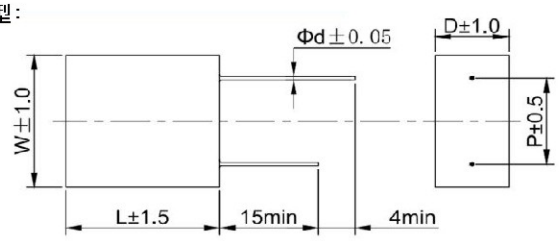
◆ 高能量、大功率、充放电循环寿命长、免维护、环保。
High energy, high power, long charge-discharge cycle life, maintenance-free and environmentally friendly.

性能参数 Performance Parameter

项目 Item	性能参数 performance parameter
额定电压 Rated Voltage	6.0 V.DC
浪涌电压 Surge Voltage	6.3 V.DC
容量范围 Nominal Cap. Range	0.47F ～ 5.0F
工作温度范围 Operating Temperature Range	-40℃ ～ +65℃
产品寿命 Product Life	常温循环寿命：在25℃下，用恒定电流使电容器在规格电压和半额定电压间循环充放电50万次。 容量衰减≤30%，内阻变化≤4倍 Life Cycle:Capacitors ate cycled between rated voltage and half-rated voltage under constant current at +25℃ for500,000 cycles. Capacitance change:≤30%of initial value;ESR ≤4 times of initial value.
	高温耐久寿命：在+65℃条件下，施加额定电压1000小时。 容量衰减≤30%，内阻变化≤4倍 High Temperaterature Characteristics:Temperature:+65℃.Voltage:Rated Voltage.Test Duration:1,000 hours. Capacitance change:≤30%of initial value;ESR ≤4 times of initial value.

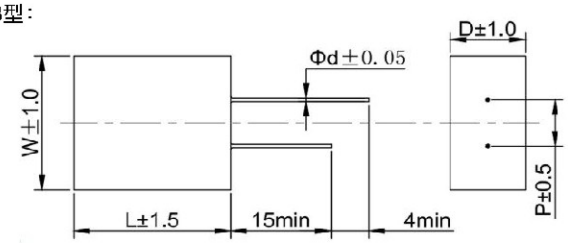
尺寸图示 Dimentions (mm)

A型：



单体直径	W+1.0	D+1.0	P±0.5		Φd±0.05
			A型	B型	
Φ8	18	9	11.8	4.8	0.6
Φ10	23	12	15.5	5.0	0.6
Φ12.5	27	14	18.0	7.5	0.6

B型：



规格参数 Specification parameter

规格型号 Part number	额定电压 Rated Voltage (V)	标称容量 Rated Cap. (F)	尺寸 Size (mm) 长度 (W)	宽度 (D)	高度 (L)	交流内阻 Max.ESR$_{AC}$ (1kHz/mΩ)	最大工作电流 Maximum Continuous Current(A) (△T=15℃)	最大峰值电流 Maximum Peak Current(A)	最大漏电流 Maximum Leakage Current (72hrs/mA)	最大能量 Maximum Energy (Wh)	能量密度 Energy Density (Wh/kg)	功率密度 Power Density (kW/kg)
HM0006S0R47DASA0AHA	6.0	0.47	18	9	16	360	0.26	0.83	0.005	0.0024	0.73	0.90
HM0006S0001DASA0AHA	6.0	1	18	9	20	240	0.43	1.74	0.008	0.0050	1.16	1.12
HM0006S01R5DASA0AHA	6.0	1.5	18	9	24	190	0.54	2.57	0.010	0.0075	1.21	1.39
HM0006S02R5DASA0AHA	6.0	2.5	23	12	25	180	0.77	3.95	0.015	0.0125	1.38	1.40
HM0006S0005DASA0AHA	6.0	5	23	12	30	80	1.27	8.33	0.020	0.0250	2.63	2.84
HM0006M0005DASA0BHA	6.0	5	27	14	26	80	1.35	8.57	0.025	0.0250	2.27	2.45

HM系列 Module Series

模组设计案例 Designed module examples

金属外壳型模组（2.7V360F单体）
Module With Metal Case(Cell of 2.7V360F)

项目 Item / 产品编码 Code	HM0100V0009XZJE0	HM0090V09R6XZJG0	HM0080V0022XZJH0
额定容量 Rated Capacity	9F	9.6F	22F
额定电压 Rated Voltage	100V	90V	80V
ESR_{DC}	≤200mΩ	≤180mΩ	≤60mΩ
最大峰值电流 Maximum Peak Current	200A	200A	450A
绝缘耐压特性 Dielectric Voltage withstand	直流DC：1KV，交流AC：2.5KV		
工作温度范围 Operating Temperature Range	-40～65℃		
储存温度范围 Storage Temperature Range	-40～70℃		
防护等级 Level of Protection	IP20	IP30	IP20
均衡方式 Balancing Mode	主动 active		主动+被动 active&passitive
均衡开启电压 Balancing Threshold Voltage	2.65V	2.6～2.7V	2.65V
防反接功能 Anti-Reversed	/	√	√
温度检测功能 Temperature Detection	√		
尺寸 Size	450*92*184mm	305*113*207mm	415*80*300mm
主要应用 Main Application	主要应用于风电变桨、混合动力汽车以及储能系统等 Mainly applied to Pitch System, Hybrid Electric Vehicle and energy storage systems and etc.		

规格若有任何变更将不予通知。如有产品安全或技术问题，请即与我司市场部或代理商联系。
Specifications are subject to change without notice.Should a safety or technical concern arise regarding the product, please be sure to contact our sales offices or agents immediately.

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HM系列 Module Series

金属外壳型模组（2.7V3000F单体）
Module With Metal Case(Cell of 2.7V3000F)

项目 Item / 产品编码 Code	HM0048V0166XZJE0	HM0015V0500XZJG0
额定容量 Rated Capacity	166F	500F
额定电压 Rated Voltage	48V	15V
ESR_{DC}	≤5.8mΩ	≤2.5mΩ
最大峰值电流 Maximum Peak Current	2165.7A	
绝缘耐压特性 Dielectric Voltage withstand	直流DC：1KV，交流AC：2.5KV	
工作温度范围 Operating Temperature Range	-40~65℃	
储存温度范围 Storage Temperature Range	-40～70℃	
防护等级 Level of Protection	IP65 active	
均衡方式 Balancing Mode	主动	
均衡开启电压 Balancing Threshold Voltage	2.7～2.75V	2.6～2.7V
防反接功能 Anti-Reversed	/	√
温度检测功能 Temperature Detection	√	/
尺寸 Size	425*197*185mm	384*74*208mm
主要应用 Main Application	主要应用于风电变桨、轨道交通能量回收以及储能系统等 Mainly applied to Pitch System, Rail transportation energy recovery and energy storage system and etc.	主要应用于汽车怠速启停系统 Mainly applied to Auto Idling Start-stop system

备注：可根据用户需求选择和组合成不同功能或功能相同但性能、规格不同的产品。

NOTE:Customers can select and combine products with different functions or with the same function, but different performance and specification according to the needs of users.

模组设计说明 Description Of Module Design

单体分选 Cells Separation

采用超级电容配组分选系统进行单体分选，以提高超级电容单体配组的精准度，提高模组产品的可靠性及稳定性。

Supercapacitors are sorted by sorting system to improve accuracy of sorting, reliability and stability of modules.

电路设计 Circuit Design

- 功能：根据客户需求专门设计
- 性能：根据客户应用负载特性优化设计
- 均衡：可选择不同均衡方式，包括主动均衡、被动均衡、主动+被动均衡等
- 检测：可选择各种参数检测功能，例如：单体过充检测、过温检测、反充检测等
- 通讯：根据客户需求，可设计SPI、RS232、RS485、CAN、I2C、SMBUS、以太网及光纤通讯等多种通讯方式，以适应不同应用场合。
- PCB：采用适宜厚度的ＰＣＢ，用料扎实，牢固，内阻小、过电流高、散热好
- 附加功能：可定制其它附加功能，如：监测每并模组电压、计算模组剩余容量、甚至每只单体剩余容量及健康状况等

- Function: Design by clients' requirement.
- Property: Design by clients' application load characteristic.
- Balance: Can choose different balance types, as active, passitive and active+passitive.
- Detection: Can select various parameter detection, such as over-charge for cells, over temperature test, reverse charging test, etc.
- Communication: Designed according to client's requirement, such as mode of SPI、RS232、RS485、CAN、I2C、SMBUS and optical fiber communication for different applications.
- PCB: Suitable thickness of board, sturdy, firm, low internal resistance, high overcurrent, good property of heat dissipation.
- Additional functions: Customized, for example, monitoring voltage of every parallel module, calculating surplus capacity of module, and even surplus capacity and conditions of each cell.

结构设计 Physical Design

- 单体与模组互相配合 Cells and module interwork
- 采用CAM三维设计 CAM 3D design
- 结构简单，方便易装 Simple structure, easy for pack
- 牢固结实，强度高，抗破坏性强 Firm, high strength, good property of damage resistance
- 辅助配件精挑细选，保证在恶劣的环境中也能正常使用
  Carefully choose accessories to ensure normal use in hostile environment.

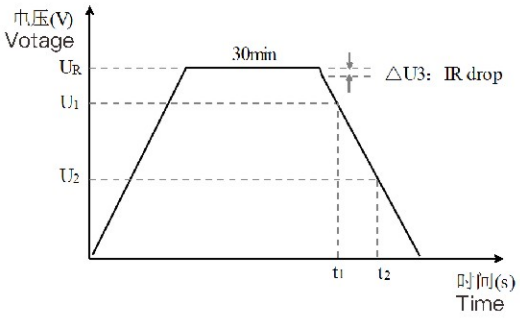
产品可靠性 Product Reliability

产品可靠性测试 Product Reliability Test

项目 Items		合格标准 Acceptable Quality Level	测试条件 Test Condition
循环寿命 Cycle Life Characteristics	容量变化 Capacitance Change	≤初始值的30% ≤30% of initial value	在25℃下，用恒定电流使电容器在规格电压和半额定电压间循环充放电。 Capacitors cycles between specified voltage and half rated voltage under constant current at +25℃ ①HSP：1000000次 ②HSD：500000次 ③HLIC4.2V：8000次 ④HLIC3.8V：100000次 ⑤HM：500000次
	内阻变化 Internal Resistance	HSP: ≤初始值的2倍 HSP: ≤2 times of initial value HSD,HLIC,HM: ≤初始值的4倍 HSD,HLIC,HM: ≤4 times of initial value	
	外观变化 Appearance	无显著变化 No remarkable change	
高温负荷寿命 High Temperature Load Time	容量变化 Capacitance Change	≤初始值的30% ≤30% of initial value	温度：TMax±2℃ 电压：额定电压 测试时长：1,000(+48)hrs temperature：TMax±2℃ voltage：rated voltage duration of testing：1,000(+48)hrs
	内阻变化 Internal Resistance	HSP:≤初始值的2倍 HSP:≤2 times of initial value HSD,HLIC,HM:≤初始值的4倍 HSD,HLIC,HM:≤4 times of initial value	
	外观变化 Appearance	无显著变化 No remarkable change	
温度特性 Temperature Characteristics	容量变化 Capacitance Change	≤初始值的30% ≤30% of initial value	存储时长：12hrs 无负载 温度：-40℃、+25℃、+65℃、/+70℃ duration of storage：12hrs non-loaded temperature：-40℃、+25℃、+65℃、/+70℃
	内阻变化 Internal Resistance	HSP、HM 5.5V-40℃~70℃≤初始值2倍 HSP、HM 5.5V、-40℃~70℃≤2 times of initial value HSD、HM 6.0V、-40℃~65℃≤初始值2倍 HSD、HM 6.0V、-40℃~65℃≤2 times of initial value HLIC 65℃≤初始值2倍 HLIC 65℃≤2times of initial value HLIC-40℃≤初始值20倍 HLIC-40℃≤20 times of initial value	
	外观变化 Appearance	无显著变化 No remarkable change	
抗振性 Vibration Resistance	容量变化 Capacitance Change	≤初始值的30% ≤30% of initial value	振幅：1.5mm 频率：10～55Hz 方向：X,Y,Z(2hrs) 测试时长：6hrs amplitude：1.5mm frequency：10～55Hz direction：X,Y,Z(2hrs) duration of testing：6hrs
	内阻变化 Internal Resistance	≤初始值的2倍 ≤2 times of initial value	
	外观变化 Appearance	无显著变化 No remarkable change	
湿热特性 Humidity Characteristic	容量变化 Capacitance Change	≤初始值的10% ≤30% of initial value	电压：额定电压 相对湿度：90%~95% 测试时长：240hrs 温度：40±2℃ voltage：nominal voltage relative humidity：90%~95% duration of testing：240hrs temperature：40±2℃
	内阻变化 Internal Resistance	≤初始值的2倍 ≤2 times of initial value	
	外观变化 Appearance	无显著变化 No remarkable change	

其他技术信息 Other Technical Information

IEC容量测试方法 IEC Capacitance Test Method



容量计算公式：
fomula for capacity $C=\frac{I\times(t_2-t_1)}{U_1-U_2}$

I：放电电流 discharge current，$4\times C\times U_R(mA)$

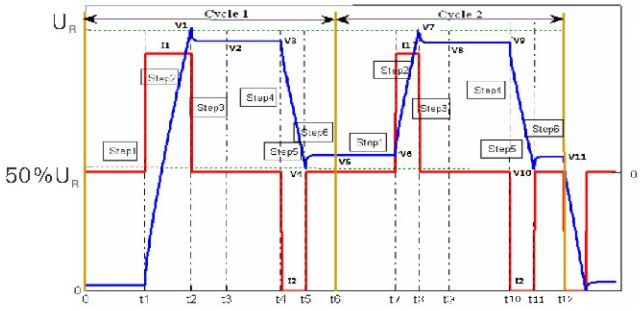
U_1：测量初始电压initial voltage，$0.8\times U_R(V)$；

U_2：测量结束电压finish voltage，$0.4\times U_R(V)$；

t_1：放电开始到测量初始电压U_1的时间(s)；
the time from the beginning of discharge to initial voltage;

t_2：放电开始到测量结束电压U_2的时间(s)；
the time from the beginning of discharge to finish voltage;

六步法容量及ESR_{DC}测试方法 Six-steps Capacity And ESR_{DC} Test Method



六步法 six-steps

容量计算公式：
fomula for capacity $C=(C_{DC1}+C_{DC2})/2$

ESR_{DC}计算公式：
ESR_{DC}fomula $ESR_{DC}=(ESR_{DC1}+ESR_{DC2})/2$

$C_{DC1}=I_2*(t_5-t_4)/(V_3-V_4)$

$C_{DC2}=I_2*(t_{11}-t_{10})/(V_9-V_{10})$

$ESR_{DC1}=(V_5-V_4)/I_2$

$ESR_{DC2}=(V_{11}-V_{10})/I_2$

$I_1=I_2=75mA/F$

其他 Others

最大工作电流：15℃温升时的最大工作电流
最大峰值电流：1秒钟的最大放电电流
漏电流：25℃下恒压72小时后的泄漏电流
最大峰值电流(1秒)=$0.5V/(R_{DC}+1/C)$
功率密度=$(0.12*V^2/R_{DC})/mass$
能量密度=$(0.5CV^2)/(3600*mass)$

Maximum operating current: the maximum current when temperature rised 15℃
Maximum peak current: the maximum current in 1 second.
Leak current: 72 hours later in 25℃
Maximum peak current (1s)=$0.5V/(R_{DC}+1/C)$
Watt density=$(0.12*V^2/R_{DC})/mass$
Energy density=$(0.5CV^2)/(3600*mass)$

应用领域 Application Areas

应用举例 Application Example

应用领域 Areas	应用类型 Application Type	功能 Function	范例 Example
消费电子 Consumer Electronics	电子玩具(电动玩具飞机、电动玩具车等小功率电器) Electronic toys (electronic toy plane, electronic toy car, small power electrical appliances, etc.)	替换电池 Replacement battery	
	便携式电子产品(数码相机、PDA、GPS、手摇收音机、手摇LED灯、收款机内存备份等) Portable electronic products(digital camera, PDA, GPS, self-powered radio, self-powered LED light、POS memory backup, etc.)	脉冲电源 替换电池 Pulse power Replacement battery	
	电动工具 Electric tool	主电源 Main power	 
	音响系统(汽车音响等) Audio system (car audio, etc.)	脉冲电源 Pulse power	
工业 Industries	自动抄表(水、电、燃气表等智能系统) Automatic meter reading(intelligence such as water ,electricity and gas meter)	脉冲功率 替换电池 Pulse power Replacement battery	
	风力发电(储能系统、变浆系统、电力瞬间缓冲等) Wind power (energy storage system, pitch system, instant power buffer, etc.)	脉冲电源 主电源 辅助电源 Pulse power Main power Hold-up power	
	混合动力(混合动力叉车、起重机、挖掘机等) Hybrid power (hybrid forklift, crane, excavator, etc.)	主电源 辅助电源 Main power Hold-up power	
	焊接(储能系统、快速充放电等) Welding (energy storage system, fast charge and discharge, etc.)	脉冲电源 辅助电源 Pulse power Hold-up power	

应用领域 Application Areas

应用举例 Application Example

应用领域 Areas	应用类型 Application Type	功能 Function	范例 Example
交通/牵引 Traffic/ Traction	纯电动汽车、混合动力汽车、燃料电池汽车、牵引车、火车、地铁(发动机启动、电子助力转向、电子控制启动、低温启动、刹车能量回收、辅助动力、电动门开启、电车供电、压降补偿等) Pure electric vehicle, hybrid vehicle, fuel monomer car, tractor、train、ubway(engine starting,electronic power steering, lectronic control start, low temperature start,rake energy recovery, the auxiliary power, electric door open, traction power supply, the pressure drop compensation,etc.)	脉冲功率 替换电池 主电源 冷启动 备用电源 辅助电源 Pulse power Replacement battery Main power Cold start Backup power Hold-up power	 
其它 Others	太阳能(太阳能发电、太阳能地砖灯、太阳能道钉灯、太阳能路灯、航标灯等) Solar (solar power, solar energy lamp, solar spike light, solar street light, beacon light, etc.)	主电源 Main power	
	医疗(便携式医用电器等) Medical (portable medical appliances, etc.)	脉冲电源 主电源 Pulse power Main power	
	军事(坦克、电磁炮、机仓电动门开启等) Military (electric tank, electromagnetic gun, engine room door open, etc.)	主电源 辅助电源 冷启动 备用电源 脉冲功率 Main power Hold-up power Cold start Backup power Pulse power	
	其它(电梯微控制器后备电源、安全门、柴油机启动、野外通迅基站等) Other fields(elevator microcontroller backup power supply, communication base station exit, diesel engine start, ild, etc.)		

使用说明 Instruction

此说明将提供超级电容器基本应用开发指南。若在开发使用过程中遇到问题且在此文件中找不到相关解决方案，请直接与我们联系。

This instruction provides a basic application for super capacitor. When you encounter any problem in your application but cannot find any solutions in this guidance, Please feel free to contact us.

寿 命 Lifetime

超级电容器基本的寿命终止失效模式为容量下降，阻抗增加。业界标准规定的寿命为容量下降30%和/或阻抗增加400%。超级电容器只是在其使用期中性能不断衰减，而非真正报废。当性能不能再保持在应用要求的水平时，超级电容器将报废。

超级电容器的寿命主要受工作电压和温度的联合影响。如果长期置于高温、高电压下，其结果将会导致寿命缩短，极端情况下，电压引起的产品失效将导致单体漏液或气体泄漏。

The lifetime for super capacitors ends when capacitances decrease and resistance increase. The industry standard for super capacitor life is capacitance decrease by 30% and/or resistance increase 400%. The life ending of super capacitors is not really useless but continues to decay in the application, when its performance cannot meet application standard, the super capacitors shall be scrapped.

The life of super capacitor mainly depends on work voltage & temperature.If put super capacitors in high temperature & high voltages environment, it will shorten the lifetime of super capacitors. In the extreme case, it will lead to cell leakage or gas leakage when product failure caused by voltage.

极性/反向电压 Polarity / Reverse Voltage

与电池不同，超级电容器的正、负极由相同材料组成。理论上超级电容器没有真正的极性。出于制造和一致性目的，每一个超级电容都有负极框或符号来标识极性。虽然因某些原因超级电容器被反向充电不会引发灾难性的故障，但保持极性是推荐的做法。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。

Unlike lithium batteries, the materials of positive polarity & negative polarity for super capacitor are same, therefore there's no real positive& negative for super capacitors in theory. For the purpose of manufacturing and products consistency, there's negative polarity sign for each super capacitor. It is recommended to keep right polarity, though it will not cause great failure when reverse charge; it will greatly shorten the life of super capacitors when charge it in one polarity and then reverse charge.

使用说明 Instruction

温度表现 Temperature Performance

超级电容器的标准温度范围为-25℃~+65℃和-40℃~+65℃。高于额定温度上限使用将导致单体的使用特性和寿命严重恶化。恶化程度与超过上限温度多高和持续时间多长成正比。典型影响包括容量快速下降，ESR上升，电解液分解内部产生大量气体，最终导致单体漏液或气体泄漏。

一般来说，环境温度每提升10℃，超级电容器寿命就会缩减一半；因此，建议尽可能降低温度使用。在低温下，因电解液粘性的提升及离子的移动变得缓慢，ESR升高只是一种短暂现象；在高温时ESR的升高会导致超级电容器永久性劣化/电解液分解。

使用时，低内阻会使得低热量的产生；电子产品使用时温度越低，其工作时间越久；大多数使用领域自然空气对流都能提供足够的冷却环境；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。

针对耐热来说，测量产品的R_{th}需要在恒温环境下进行。R_{th}值对确定产品工作极限值是有用的，利用Rth值可计算出任何循环电流工作时的温升；可按以下公式算出：

$\triangle T = I^2 * R_{th} * ESR_{DC}$

其中：

R_{th}= 热阻值(℃/W)

I = 电流

ESR_{DC} = 等效串联电阻(Ohms)

环境温度加上温升应控制在额定上限温度之下，如果使用冷却方法，则产品可允许更大工作电流或增加循环寿命。

Super capacitors standard temperature range is -25℃~ +65℃ and -40℃~ + 60℃. It will greatly damage super capacitor function performance & lifetime when the temperature exceeds rated temperature.The damage intensity for super capacitors is proportional to how much it exceeds the rated temperatures and the duration times. Typical effects include rapid decline in capacitance, ESR increase, and gas generated from decomposition of the electrolyte, finally lead to super capacitor leakage or gas leakage.

Generally, the ambient temperature every raise by 10℃, the life for super capacitors will shorten by half. Therefore, it is recommended to use in low temperature environment. At low temperature, stickiness of electrolyte rise and ion movement become slowly, ESR raise is a temporary phenomenon. At high temperature, ESR raise will cause permanent degradation for super capacitors or decomposition of the electrolyte.

Low internal resistance will bring low heat; the lower work temperature for electronic products, the longer its work life. In most application fields, natural air convection will provide enough cooling environment. In some extreme environment, it needs to be equipped with some air convection devices to get maximum lifespan.

The R_{th} value shall be measured at constant temperature, R_{th} value is useful to get super capacitor 's work limit. It could calculate the temperature rise during circulating current work, here is the formula.

$\triangle T = I^2 * R_{th} * ESR_{DC}$

Where:

R_{th}= thermal resistance (℃ / W)

I = current

ESR_{DC} = equivalent series resistance (Ohms)

Ambient temperature and temperature rise shall not exceed the rated maximum temperature.
When use cooling down method, the product may allow bigger work current or increase cycle life.

使用说明 Instruction

充电方法 Charge Methods

由于超级电容器储存能量的机制不是化学反应，其充放电可用相同的倍率进行。因此超级电容器的额定电流适用于充电和放电。实际上，充放电效率是一样的。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将会提升电池的寿命。

As the energy storage for super capacitor is non-chemical reaction, its charge and discharge process at a same speed. Therefore, super capacitor rated current is applied for charge and discharge, In fact, the charge and discharge efficiency is the same. Super capacitors 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 super capacitors with battery with a low resistance resistor.

串 联 Series Connection

与绝大多数应用相比，单个超级电容器单体的电压有限(2.7V、3.0V)，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。

Single super capacitor voltage is too low (2.7V、3.0V) for most applications, so it needs connect in series to get the needed voltages. Since each single super capacitor with slight tolerance on capacitance & resistance, the connected super capacitors shall have equivalent voltage or prevent a single super capacitor exceeds the rated voltage.

使用说明 Instruction

焊 接 Solder

焊接单体要求加热。施加到单体上的热度和持续时间将负面影响其工作特性，焊接应遵循以下具体指引：

- ◆ 不能把超级电容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导针型产品的波峰焊接）

It needs heating when welds the super capacitor cell, the heating temperature & time will have negative impact for its work performance; it is advised to follow these guidelines:

- ◆ Do not immerse super capacitors into the melted soldering tin, please put the soldering tin onto its lead terminals.
- ◆ Make sure the super capacitors casing not directly touch PCB board or other components, too high temperature will cause casing shrink or crack.
- ◆ Avoid super capacitors work on bare circuit board to prevent short circuits.

Hand soldering:

Keep super capacitor 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 4 seconds. Minimize the direct contact time for soldering iron & super capacitors lead terminals, because too high temperature of lead terminals will make negative impact for its work performance.

Wave soldering:

Preheat PCB board 60 seconds 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 super capacitors)

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

回流焊：

除非超级电容有明确的额定耐回流焊接温度，否则不能使用回流焊接而应使用红外线或传送烤炉加热方法进行焊接。

Reflow:

It shall apply infrared or conveyor oven welding methods to solder but not apply reflow soldering, unless there is a clear rated reflow temperature for super capacitors.

使用说明 Instruction

贮 存 Storage

不要在以下环境中贮存超级电容器：

◆ 高温/高湿环境。
◆ 阳光直射，粉尘环境。
◆ 直接与水、盐水、油或其它化学品接触。
◆ 直接与腐蚀性材料、酸、碱金属或有毒气体接触。
◆ 冲击或振动环境。

Do not store the super capacitors in the following environments:

◆ High temperature / high humidity environments.
◆ Direct sunlight, dust environment.
◆ Direct contact with the water, salt, oil or other chemicals.
◆ Direct contact with corrosive materials, acids, alkalis or toxic gases.
◆ Shock or vibration environments.

运 输 Transportation

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”。

Super capacitor is not US DOT (Department of Transportation) and IATA regulations subject, and the right international shipping description is "Electronic Products – Capacitor."

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；如果超级电容器发生漏液或防爆阀破打开请与我司联系索取材料物质安全资料表。

漏液情况处理：

◆ 皮肤接触：用肥皂水和清水彻底冲洗皮肤。
◆ 眼睛接触：用流动清水或生理盐水冲洗，就医。
◆ 吸取：立即用水漱口，就医。

Disconnect the power supply & load connected with super capacitors, once super capacitors overheat or smells. Lower its temperature, avoid direct face or hands touch for overheat super capacitors. Please contact us to provide material safety data sheet if super capacitors leakage or explosion–proof valve broken.

Leakage case:

◆ Skin contact: Use soap and water thoroughly wash skin.
◆ Eye contact: Flush with flowing water or saline, and immediately ask for medical treatment.
◆ Draw: Immediately wash with water and ask for medical treatment.

一般性安全考虑 General Safety Tips

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。如果过度充电、反向充电、焚烧或高于150℃加热，超级电容器有可能发生防爆阀爆裂；不要压挤、损伤、压钉或拆解超级电容器，滥用可能导致铝壳升上高温（烫伤或烧伤）。

To avoid short circuit, after usage or test, super capacitors voltage needs to discharge to below 0.1V.If you overcharge, reverse charge, burn or heat higher than 150℃,super capacitors explosion–proof valve may break. Do not press, damage, disassemble the super capacitors, abuse super capacitors may cause scald or burn due to high temperature on aluminum housing.