



Rechargeable Lithium-ion Battery Specification Approval

DOC NO.: ZJ-PS-02500

REV. : A/8

SHEET : 1 OF 33

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For any details and enquiry, please contact VDL ; Tel:0755-29961201,Fax:0755-29961203

VDL SPECIFICATION APPROVAL SHEET

VDL 产品承认书

Customer Name 客户代码: 0844

Customer Product Model 客户产品型号: YLPP621029C160WVDL

Product Model 产品型号: 621029PN3

Product Capacity 产品容量: 160mAh/3.8V

Product Code 产品编码: 1.11.621029.10

Assembly Plant Code 组装厂编码: 412100000041

Terminal Code 终端编码:

| Prepared by 制作 | Checked by 审核 | Approved by 批准 |
|----------------|----------------|----------------|
| 杨勇 | 尹昕(电芯)、胡继东(电子) | 刘圣军 |

| Approved by customer 客户承认 (Stamp) (盖章) | Tested by 测试 | Checked by 审核 | Approved by 批准 |
|--|--------------|---------------|----------------|
| | | | |

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Revision History 版本履历表

| Revision 版本 | Description 内容描述 | Modify 修改人 | Approval 审批人 | Date 日期 |
|----------------|--|---------------|-----------------|------------|
| A/0 | First Issue 新版发行 | 杨勇 | 刘圣军 | 2022-02-11 |
| A/1 | 应客户要求：出货电压改为 3.85~4.0V，增加 IC、NTC、PTC 规格书附件，概述描述更新为聚合物锂离子电池 | 杨勇 | 刘圣军 | 2022-02-18 |
| A/2 | 更新喷码排版，头部厚度尺寸由 Max3.0 改为 Max3.2 PCB 厚度由 0.6mm 改为 0.4mm； 应客户要求：取消 NTC 增加电池本体包胶， 电池厚度由 Max6.2mm 改为 Max6.3mm | 杨勇 | 刘圣军 | 2022-06-07 |
| A/3 | 喷码型号由 621029PN3 改为 YLPP621029C160WVDL | 杨勇 | 刘圣军 | 2022-09-22 |
| A/4 | 增加喷码内容中垃圾桶标志的实物图要求 | 杨勇 | 刘圣军 | 2022-10-14 |
| A/5 | 应客户要求：喷码内容增加 “Red Black” | 杨勇 | 刘圣军 | 2023-01-13 |
| A/6 | 应客户要求装箱数量按 1500PCS/箱，增加包装示意图 | 杨勇 | 刘圣军 | 2023-08-21 |
| A/7 | UL 认证已完成，喷码内容正式体现 UL 标志 | 杨勇 | 刘圣军 | 2023-09-13 |
| A/8 | 根据 UL 法规当 R 标记太小肉眼无法识别时可省略，故更新喷码内容(取消 R 标记) | 杨勇 | 刘圣军 | 2023-12-18 |



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1. Scope 概述

The specification shall be applied to Rechargeable Lithium-ion battery pack manufactured by VDL Electronics Co., LTD. It is the basis for product design, production and inspection. Its purpose is to let the customer know the quality standard and the instruction.

本产品承认书描述重庆市紫建电子股份有限公司设计制造的可充式锂离子电池，它是产品设计、生产和检验的依据。其作用是让客户了解产品的质量标准和正确使用方法。

Reference standard 参考标准：

GB 31241-2022 中华人民共和国国家标准《便携式电子产品用锂离子电池和电池组安全技术规范》

IEC/EN61960 欧盟锂电池标准

UL1642 美国锂电池安全标准

2.Product basic information 产品基本信息：

| No. | Items 项 目 | Parameter 参 数 |
|-----|--|---|
| 1 | Battery model 电池型号 | 621029PN3 |
| 2 | Design scheme 保护电路设计方案 | XB4142J2SZR+ PTC |
| 3 | Minimal capacity 最小容量 | 160mAh (0.2C Standard discharge 0.2C标准放电) |
| 4 | Typical capacity 典型容量 | 163mAh (0.2C Standard discharge 0.2C标准放电) |
| 5 | Nominal voltage 标称电压 | 3.8V |
| 6 | Shipment voltage 出货电压 | 3.85~4.00V (SOC: 45% ~ 70%) |
| 7 | Charge ending voltage 充电限制电压 | 4.35V |
| 8 | Discharge ending voltage 放电终止电压 | 3.0V |
| 9 | Over current protection 过电流保护 | 0.9~2.1A |
| 10 | Short circuit protection 短路保护功能 | 有 Yes |
| 11 | AC Impedance 内阻 | ≤410mΩ (详见9.4项 / Detail in 9.4) |
| 12 | Battery Weight 电池组重量 | About 约 : 3g |
| 13 | Max charge current 最大充电电流(I_{cm}) | 1C (连续充电模式 For continuous charge mode) |
| 14 | Max discharge current 最大放电电流(I_{dm}) | 1C (连续放电模式 For continuous discharge mode) |

3 . Battery protection characteristics 电池保护特性(Ta= 25°C)

| No. | Items 项 目 | Parameter 参 数 | condition 条件 |
|-----|--|----------------|---|
| 1 | Overcharge protection detection voltage 过充保护检测电压 | (4.425±0.025)V | Battery voltage is greater than the protection voltage, and the delay time to reach, then the state of the battery into overcharge protection. 电池电压大于过充保护电压，且延时时间达到，则电池进入过充电保护状态。 |
| 2 | Overcharge release voltage 过充保护恢复电压 | (4.25±0.050)V | |
| 3 | Overcharge protection delay time 过充保护延迟时间 | 120~220ms | |
| 4 | Over discharge protection detection voltage 过放保护检测电压 | (2.800±0.100)V | Battery voltage is less than the protection voltage, and the delay time to reach, then the state of the battery into over discharge protection. 电池电压小于过放保护电压，且延时时间达到，则电池进入过放电保护状态。 |
| 5 | Over discharge release voltage 过放保护恢复电压 | (3.000±0.100)V | |
| 6 | Over discharge protection delay time 过放保护延迟时间 | 20~60ms | |
| 7 | Overcurrent discharge protection current 放电过流保护电流 | 0.9~2.1A | Battery discharge current is greater than the protection current, and the delay time to reach, then the state of the battery into overcurrent protection 电池放电电流大于过流保护，且延时时间达到，则电池进入放电过流保护状态。 |
| 8 | Overcurrent protection delay time 放电过流保护延时时间 | 5~20ms | |
| 9 | Current consumption (Operation) of PCM 保护板的正常状态下静态电流 | ≤2.3μA | |
| 10 | Load resistance of PCM 保护板的空载内阻 | ≤150mΩ (含 PTC) | VDD= 3.6V |
| 11 | 0V charge function 0V充电功能 | Unavailable 禁止 | |
| 12 | Charge overcurrent protection current 充电过流保护电流 | 0.9~2.1A | If shall stop charging for an excessive charge current at Over Current Protection current lasts for delay time 电池充电电流大于充电过流保护电流，且延时时间达到，则电池进入充电过流保护状态。 |
| 13 | Charge overcurrent delay time 充电过流延迟时间 | 5~20ms | |
| 14 | Short current detection delay time 短路侦测延迟时间 | 60~500μS | |

4 . Condition adapting characteristics 环境适应性 (n=1)

| No. | Items 项目 | Test Method 测试方法 | Criteria 标准 |
|-----|--------------------------------------|--|--|
| 1 | High/low Temperature 高/低温性能 | After the cell fully charged at $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$, measure the discharging capacity with discharging current 0.2C till 3.0 (V) cut off voltage at different temperature. (as compared with initial capacity) 在 $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$ 条件下满充电后 ,测量电池在不同温度下用 0.2 C ₅ A 电流放电至 3.0 (V)所放出的容量 (与初始容量作为比较)。 | 在-10℃时 ≥70% At -10℃: ≥70% 在 55℃时 ≥95% At 55℃:≥95% |
| 2 | Invariableness humid and hot 恒定湿热 | After putting the cell in the invariableness humid and hot box of $40^{\circ}\text{C}\pm 2^{\circ}\text{C}$ and relative humidity of 90 ~ 95% for 48 hours. Discharge the cell to 3.0*n(V) cut-off voltage at 0.2C current. 将电池放入 $40^{\circ}\text{C}\pm 2^{\circ}\text{C}$ 及相对湿度为 90 ~ 95% 的恒温恒湿箱中 48 小时后, 再以 0.2C 电流放电至 3.0*n(V)。 | No leakage, no fire, no explosion. The discharging time ≥3h. 无泄漏, 无起火, 无爆炸。 放电时间≥3h。 |
| 3 | Vibration 振动 | The fully charged cell is vibrated from 90 to 100 minutes at three mutually perpendicular planes with excursion of 0.8mm, and change the frequency from 10 to 55 HZ with 1Hz/min speed. 满充电后的电池在三个相互垂直的方向按振幅 0.8mm 的谐振形式进行振动, 频率在 10-55HZ 以 1Hz/min 的速率变化, 往复振动 90 至 100min. | No leakage, no fire, no explosion. 电池无漏液,无冒烟, 无起火, 无爆炸 |
| 4 | Free fall 自由跌落 | The cell free falls from a height of 1m into the cement floor from X,Y,Z front and opposite direction of each direction. Then discharge the cell to 3.0*n(V) cut-off voltage with 1.0C current. 电池将从 1 米高处自由跌落到水泥地板上, 从 X、Y、Z 正反方向每个方向自由跌落一次,再以 1.0C 放电至 3.0 (V) | No leakage, no fire, no explosion. 电池无漏液,无冒烟, 无起火, 无爆炸 |

5 . Safety performance 安全性能 (n=1)

| No. | Items 项目 | Test Method 测试方法 | Criteria 标准 |
|-----|--------------------------|--|---|
| 1 | Forced discharge 强制放电 | Discharge the cell to the cut-off voltage with 0.2C current and then reverse charge the cell for more than 90 mins with 1C current. 电池先以 0.2C 放电至终止电压，再以 1C 电流，对电池进行反向充电，90min 以上 | No fire, no explosion 无起火，无爆炸 |
| 2 | Overcharge 过充电 | After discharged with 0.2C to the cut-off voltage, charge the cell with 3.0C/4.6V for 7.0hrs. 0.2C 放电至截止电压后，电池用 3C / 4.6V 恒流恒压充电 7.0h | No explosion, no fire 无起火、无爆炸 |
| 3 | Low pressure 低气压 | Put the fully charged cell in a vacuum chamber at ambient temperature 20~25°C for 6 hrs. The vacuum environment pressure is set to be less than 11.6kPa, simulating an altitude of 15240m. 电池放在一个模拟真空的空间放置 6 小时，环境温度为 20~25°C，真空环境压力≤11.6kpa，模拟 15240m 高空低压环境 | No leakage, no fire, no explosion 无泄漏，不起火，不爆炸 |
| 4 | Short test 短路测试 | Short circuit the fully charged cell by connecting the positive and negative terminals with resistance load 80±20 mΩ at room temperature 20~25°C. The cell remains on test for 24 hrs or until the surface temperature declines by 20 % of the maximum temperature rise, whichever is the sooner. 在室温 20~25°C 下，把充满电电池的正负极用 80±20 mΩ 的负载连接起来，使电池外部短路。结束条件：测试时间 24 小时或者表面温度下降到最高温度的 20%。 | No fire, no explosion. The temperature of the cell surface not exceeds 150°C. 无起火，无爆炸 电池表面温度不超过 150°C。 |

| | | | |
|---|--------------------|--|--|
| 5 | Soak test 浸泡测试 | Put the fully charged cell into pure water, soaked for 24 hours. 把满充电的电池放进清水中浸泡 24 小时 | No broken, no fire 无破裂，无起火 |
| 6 | Crush test 挤压测试 | A fully charged cell is to be crushed between two flat surfaces. The force for the crushing is to be applied by a hydraulic ram or similar force mechanism. The flat surfaces are to be brought in contact with the cell and the crushing is to be continued until an applied force of $13 \pm 1\text{kN}$ is reached. Once the maximum force has been obtained it is to be released. 满充电电池，放置在两块平面金属板间，持续施压 $13 \pm 1\text{kN}$ 的压力，直到液压油缸施加的压力达到 13kN (17.2Mpa) 时停止。 | No fire, no explosion 无起火，无爆炸 |
| 7 | Shock test 撞击测试 | The cell is to be secured to the testing machine by means of a rigid mount which supports all mounting surfaces of the cell. Each cell shall be subjected to a total of three shocks of equal magnitude. The shocks are to be applied in each of three mutually perpendicular directions unless it has only two axes of symmetry in which case only two directions shall be tested. Each shock is to be applied in a direction normal to the face of the cell. For each shock the cell is to be accelerated in such a manner that during the initial 3ms the minimum average acceleration is 75 g (where g is the local acceleration due to gravity). The peak acceleration shall be between 125 and 175 g. 在环境温度下，将电池分别按三个轴向固定在测试台面上，每个面经受等量的冲击，每一次冲击前 3ms 内平均加速度最少达到 75g (g 为重力加速度)，峰值加速度达 125g 至 175g。 | No leakage, no fire, no explosion 无泄漏，不起火，不爆炸 |

6. Testing requirements 测试要求

6.1 Battery test environment 电池试验环境（无特别注明时，试验环境应符合此项要求）

Temperature 温度：25°C±3°C

Relative humidity 相对湿度：45 ~ 85% RH

Atmospheric pressure 大气压力：86 ~ 106 kPa

6.2 Measuring instrumentation requirements 测量仪表要求

Voltage instrumentation requirements: Measuring the voltage meter accuracy no less than 0.5 magnitude

电压仪表要求：测量电压的仪表的精确度不低于 0.5 级

Current instrumentation requirements: Measuring the current meter accuracy no less than 0.5 magnitude

电流仪表要求：测量电流的仪表精确度不低于 0.5 级

Time instrumentation requirements: Measuring the time meter accuracy no less than 0.1%

时间仪表要求：测量时间的仪表精确度不低于 0.1%

Temperature instrumentation requirements: Measuring the temperature meter accuracy no less than 0.5 °C

温度仪表要求：测量温度的仪表准确度不低于 0.5°C

Impedance instrumentation requirements: Measuring impedance should by sinusoidal alternating (1 KHZ) test

内阻仪表要求：测量内阻应由正弦交变(1KHZ)进行测试

7 . Operation temperature and humidity range 运行温湿度范围

7.1 Charging temperature and the Current requirements 充电环境温度及电流要求:

| Temperature 温度 | Max charge current 允许最大充电电流 | Maximum relative humidity 最大相对湿度 |
|-------------------|--------------------------------|-------------------------------------|
| 0°C≤T≤15°C | 0.2C(截止电压4.35V) | 90% |
| 15°C < T≤45°C | 1.0C(截止电压4.35V) | 90% |

7.2 Discharge temperature 放电环境温度:

-20°C ~ +60°C , Maximum relative humidity : 90%

-20°C ~ +60°C , 最大相对湿度 : 90%

8 . Storage temperature and humidity range(At 50% SOC)存储温湿度范围(在 50% SOC 条件下)



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8.1 Environmental conditions 存放条件 ; ;

Unless otherwise specified , Cells shall to be tested within one month after shipment and not be cycled (charge/discharge) over one time before the test. All tests shall be performed at $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$ and humidity of $65\pm 20\%$ RH.

The lithium iron cell impedance would increase in whole storage process, while the capacity would decrease, cell would be charged in 9.1.1 and discharged in 9.1.2

除非另有规定 ,电池应在装运后一个月进行测试 ,且在测试前一段时间内不得循环(充放电)。所有试验均在 $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$ 、 $65\pm 20\%$ RH 湿度下进行。锂电池在整个存储过程中阻抗会增大 ,容量会减小 ,电池在 9.1.1 条件下进行充电 ,在 9.1.2 条件下进行放电。

| | | | | | | |
|--|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Storage Temperature | 25°C | 25°C | 25°C | 25°C | 60°C | 60°C |
| Storage Duration | 1 Year | 1 Year | 90 Days | 90 Days | 1 Week | 1 Week |
| Storage Charge State | As received | 100% | As received | 100% | As received | 100% |
| Recovered Capacity | 90% | 80% | 95% | 90% | 85% | 80% |
| Recovered Impedance @100% Charge State | 150% | 150% | 120% | 150% | 150% | 160% |

9 . Electrical Characteristics 电气特性

9.1 Battery standard charge/discharge 电池组标准充/放电

9.1.1 standard charge 标准充电

At $25^{\circ}\text{C}\pm 3^{\circ}\text{C}$ conditions, CC 0.5C/ CV 4.35V, when charging current drops to 0.02C charging is terminated, The charging time limited 4hrs.

在 $25^{\circ}\text{C}\pm 3^{\circ}\text{C}$ 条件下 ,以 0.5C 恒电流 , 4.35V 恒电压充电至电流降到 0.02C 截止 , 限时 4 小时。

9.1.2 Standard Discharge 标准放电

Standard discharge current 0.2C for continuous discharge, when the voltage drops to discharge cut-off voltage 3.0V discharge is terminated, shall be full discharged.

以标准放电电流 0.2C 进行持续放电 , 当电压降至放电截止电压 3.0V 时放电被终止 , 即为放空。

9.2 Maximum charge current 最大充电电流

At $25^{\circ}\text{C}\pm 3^{\circ}\text{C}$ conditions, CC 1C/ CV 4.35V, when charging current drops to 0.02C charging is terminated, The charging time limited 2h.

在 $25^{\circ}\text{C}\pm 3^{\circ}\text{C}$ 条件下 ,以 1C 恒电流 , 4.35V 恒压 , 充电至电流降到 0.02C 截止 , 限时 2 小时。

9.3 Maximum discharge current 最大放电电流

At $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$ condition, discharge the cell with 1C.

在 $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$ 条件下 ,以 1C 对电池进行放电。

9.4 Initial impedance 初始内阻

At $25^{\circ}\text{C}\pm 3^{\circ}\text{C}$ ambient temperature, after standard charged battery pack, AC impedance tester (1KHz) measuring the initial impedance should be $\leq 410\text{m}\Omega$.

在 $25^{\circ}\text{C}\pm 3^{\circ}\text{C}$ 环境温度下 , 经过标准充电的电池 , 使用交流阻抗测试仪 (1KHz) 测量初始内阻应 $\leq 410\text{m}\Omega$.



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9.5 Initial capacity 初始容量

The initial capacity is for standard charge to full, in 1 hour, the capacity measured at $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ conditions with discharge current of 0.2C till 3.0V cut-off voltage.

The initial capacity $\geq 160\text{mAh}$.

电池初始容量为电池以标准充电方式满充，1 小时内，在 $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ 条件下以 0.2C 电流放电至 3.0V 截止所放出的容量，初始容量 $\geq 160\text{mAh}$ 。

9.6 Retention Capability 荷电保持能力

After full charging, storing the battery 28 days with $20 \pm 5^{\circ}\text{C}$ condition, and then discharge with discharge current of 0.2C till 3.0V cut-off voltage, discharge time should be $\geq 255\text{min}$

电池满充电后，在 $20 \pm 5^{\circ}\text{C}$ 的环境条件下存放 28 天，然后以 0.2C 电流连续放电至 3.0V 终止电压，放电时间 $\geq 255\text{min}$

9.7 Cycle life 循环寿命

Battery cycle life is tested at $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$. For each cycle test, battery is charged using 0.5C constant current until battery voltage meet 4.35V. Then, battery is charged by constant voltage until battery charging current drop to 0.02C. After that, battery is discharged by 0.5C constant current until battery voltage drop to 3.0V. Repeat until each 50th cycle.

At each 50 cycle, battery capacity will be tested. The test condition is that the battery is charged using 0.5C constant current until the battery voltage meet 4.35V. Then, battery is charged by constant voltage until the charging current drop to 0.02C. After that, battery is discharged by 0.2C constant current until battery voltage drop to 3.0V.

If the discharge time is more than or equal to 4hours (80% of initial battery capacity), battery need to repeat above 50cycles charge/discharge test. If not, cycle life test is completed.

Cycle life should be 500cycles or above. the thickness after swelling will be less than 108%.

电池在温度 $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ 条件下循环测试，以 0.5C 恒流充电到电压 4.35V，然后恒压充电到截止电流 0.02C。再以 0.5C 恒流放电到 3.0V，为 1 个循环周期。这样重复 50 次。

每 50 次做一次容量检测。以 0.5C 恒流充电到 4.35V 然后恒压充电到截止电流 0.02C。再以 0.2C 恒流放电到 3.0V。如果放电时间大于等于 4 小时（80%初始容量），电池必须再重复 50 次充放电测试。否则，循环寿命测试结束。循环寿命应该大于等于 500 次。膨胀后厚度 $\leq 108\%$ 。

9.8 Shipments battery capacity 电池出货容量

Shipments battery capacity is 45% ~ 70%.

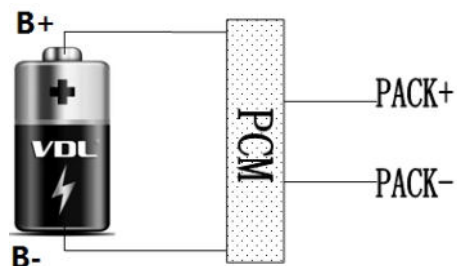
电池的出货容量为 45% ~ 70%。

9.9 Agency approvals 承认机构

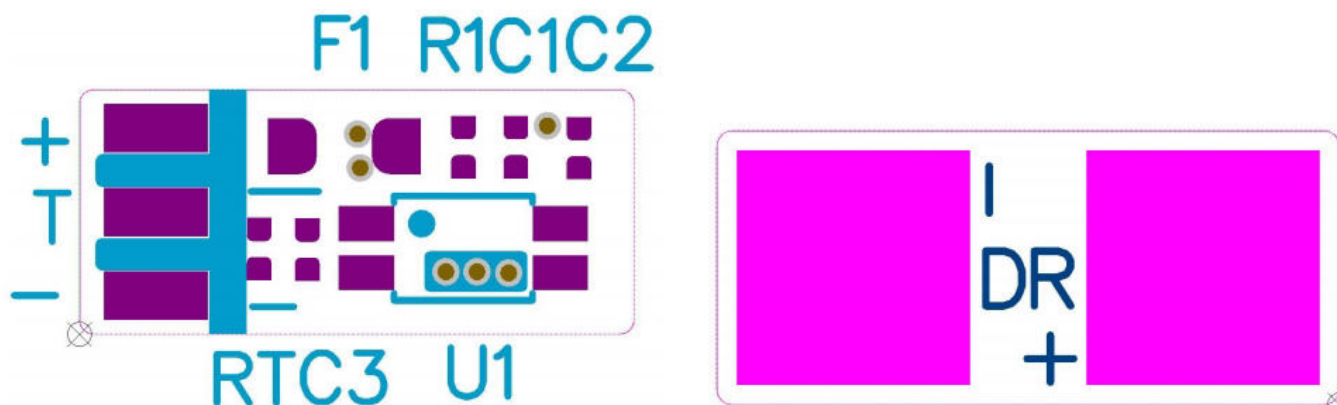
VDL battery safety performance is designed according to UL1642 standard and CE Directive requirement, the product's safety performance is conforming to UL1642 standard and CE Directive requirement.

VDL 电池的安全性能是根据 UL1642 标准和 CE 指令要求制定。产品的安全特性与 UL1642 标准和 CE 指令的要求是一致的。

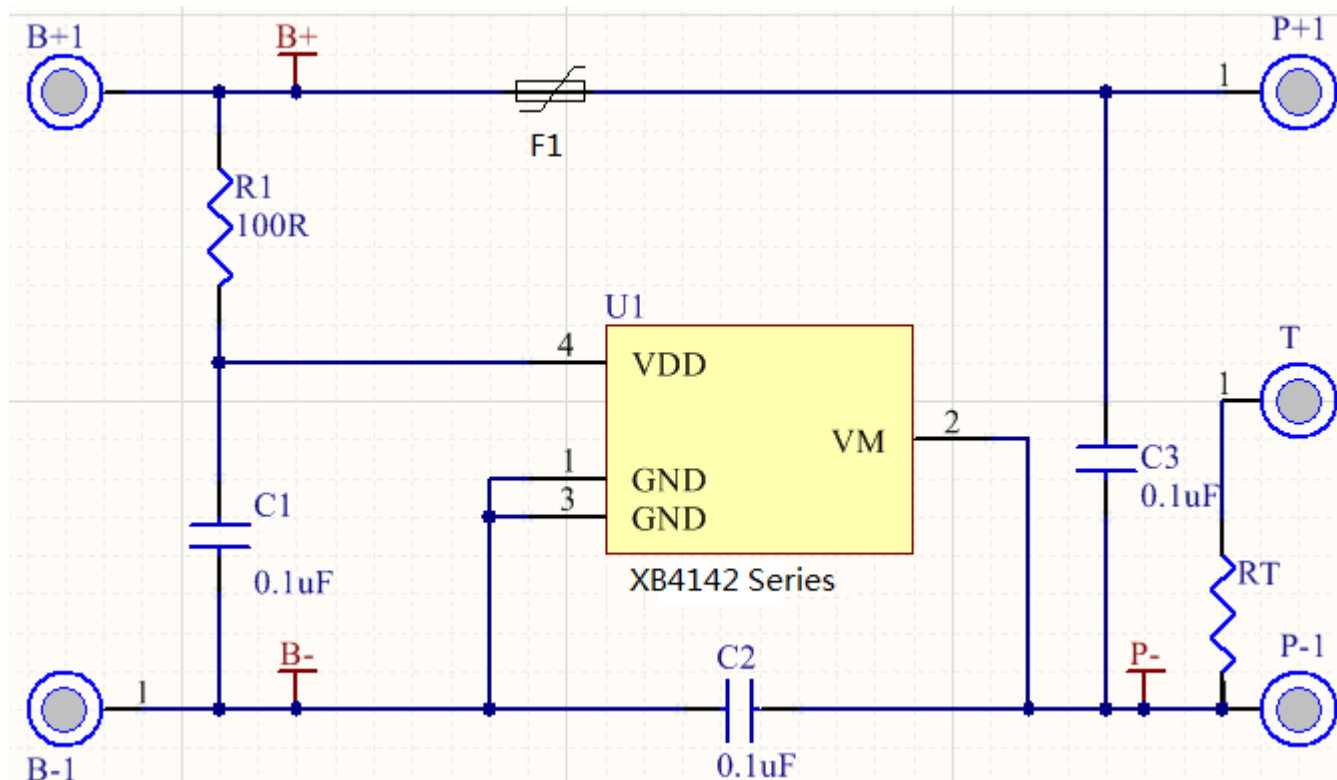
10 . Battery structure diagram 电池架构图(Sketch map 示意图)



11 . PCB Layout PCB 布线图



12 . Schematic circuit diagram 电路原理图

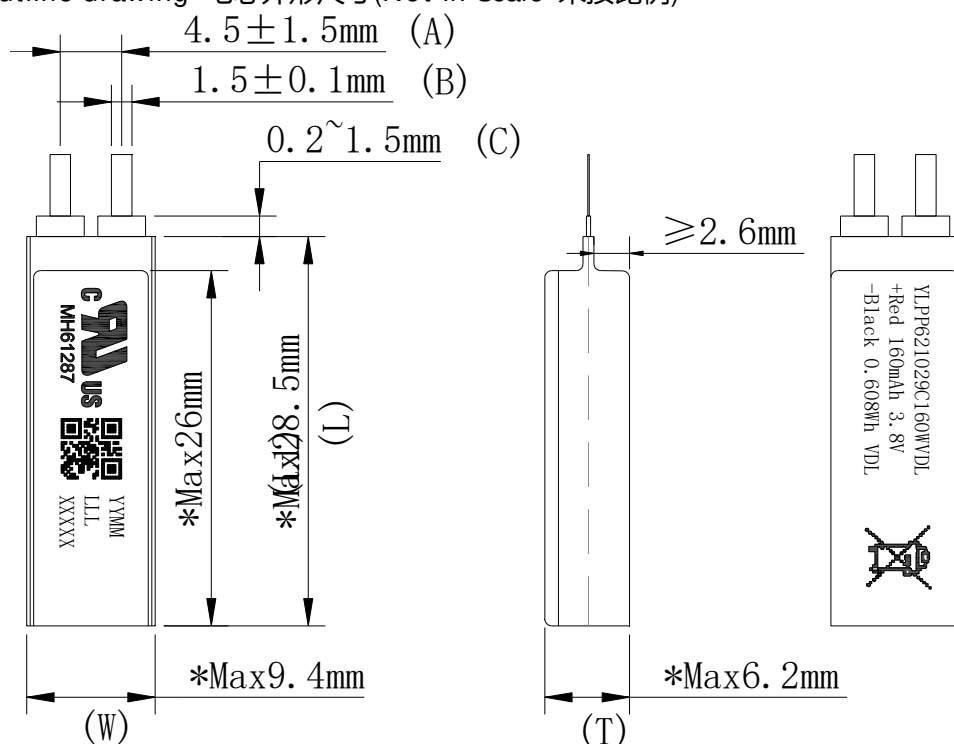


13.Cell 电芯

13.1 Cell Performance parameters 电芯性能参数

| 编号 | 项目 | 规格 | 备注 |
|----|------------------------|--------------------------|--|
| 1 | Initial impedance 初始内阻 | $\leq 230\text{m}\Omega$ | 1kHz AC Impedance 交流阻抗 AC 1kHz |
| 2 | Nominal voltage 标称电压 | 3.8V | / |
| 3 | Dimensions 外形尺寸 | T | 6.2 mm Max Thickness 厚度(受 600gf 力测量) |
| | | W | 9.4 mm Max Width 宽度(受 300gf 力测量) |
| | | L | 28.5 mm Max Cell length(not include Tab sealant) 电芯长度(不含极耳胶) (受 300gf 力测量) |
| | | L1 | 26.0 mm Max Cell body length 电芯主体长度 (受300gf力测量) |
| | | A | $4.5\pm 1.5\text{ mm}$ Tab center distance极耳中心距 |
| | | B | $1.5\pm 0.1\text{ mm}$ Tab width 极耳宽度 |
| | | C | $0.2\sim 1.5\text{ mm}$ Tab exposed size 极耳胶外露尺寸 |

13.2 Cell outline drawing 电芯外形尺寸(Not In Scale 未按比例)



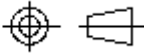
13.3 Spray Content 电池喷码：如上图

注：喷码内容中的垃圾桶实际效果须按下图客户认可的样式

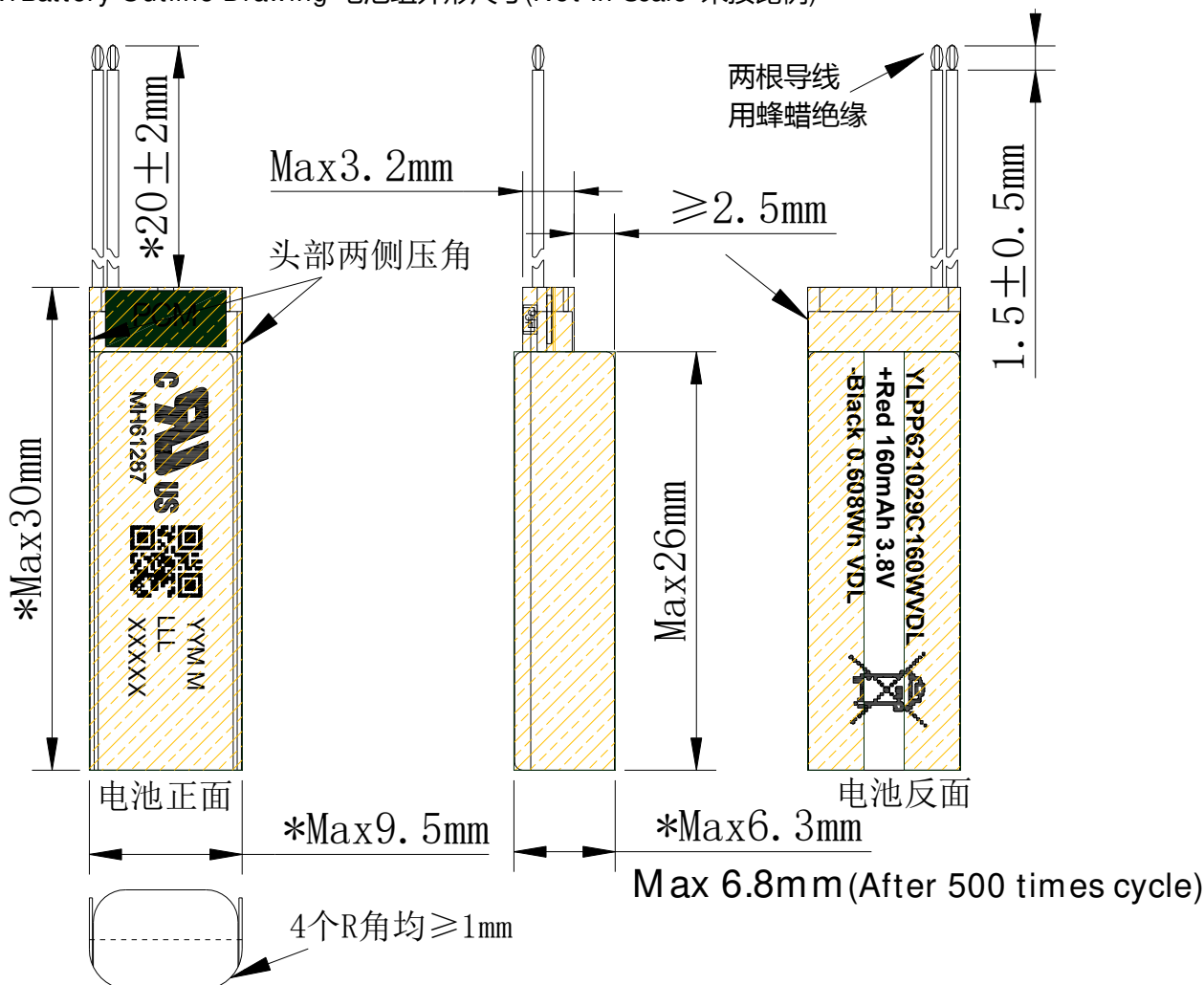


Remark: YYMM (Date 日期), LLL (批次), XXXXX (流水码)
例：220100100001 代表 22 年 01 月 001 批 次 第 1 个 电 池
喷码二维码内容与“YYMM LLL XXXXX”明码内容一致

14 . Battery Outline Drawing 电池组外形尺寸

3rd ANGLE 

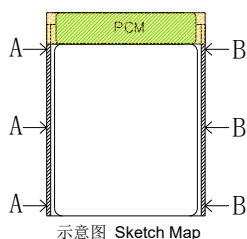
14.1 Battery Outline Drawing 电池组外形尺寸(Not In Scale 未按比例)



14.2 Battery size parameters 电池组尺寸参数

| Wiring method 出线方式 | Positive pole lead 正极出线 |
|--------------------|--|
| Remark 备注 | 1、Resistance welding or laser welding, 保护板电阻焊或激光焊 ; 2、Protect circuit components facing outside ,保护电路元器件朝外 ; 3、The thickness of the finished product is measured by the force of 600gf, and the width and length of the finished product are measured by the force of 300gf. 成品厚度受 600gf 的力测量, 宽度、长度尺寸, 需受 300gf 的力测量。 |

15 . Reminder 关于电池折边面注意事项的温馨提示



温馨提示客户:

电池折边面(图示A&B指示填充区域)严禁与导体接触;
电池包边若已绝缘, 此点可忽略。

Caution:

The folded edge surface of the battery (the filling area indicated by A & B in the figure) is strictly prohibited from contacting with the conductor; If the battery edge is insulated, this point can be ignored.

16. BOM 1(Bill of materials)电池物料清单

| NO.(项次) | Material Name (零件名称) | Specification(规格型号) | Qty (用量) |
|---------|----------------------|-------------------------|----------|
| 1 | Cell 电芯 | 621029PN3/160mAh | 1 |
| 2 | Protection board 保护板 | 4142J2SZR+ PTC | 1 |
| 3 | Red wire 红色导线 | UL3302-30# | 1 |
| 4 | Black wire 黑色导线 | UL3302-30# | 1 |
| 5 | Kapton tape 茶色高温胶 | T=0.05mm | 若干 |
| 6 | Label 标签 | PET | 1 |
| 7 | Beeswax 蜂蜡 | 蜂蜡, 熔点 62~70°C (绝缘导线线头) | 0.0010g |

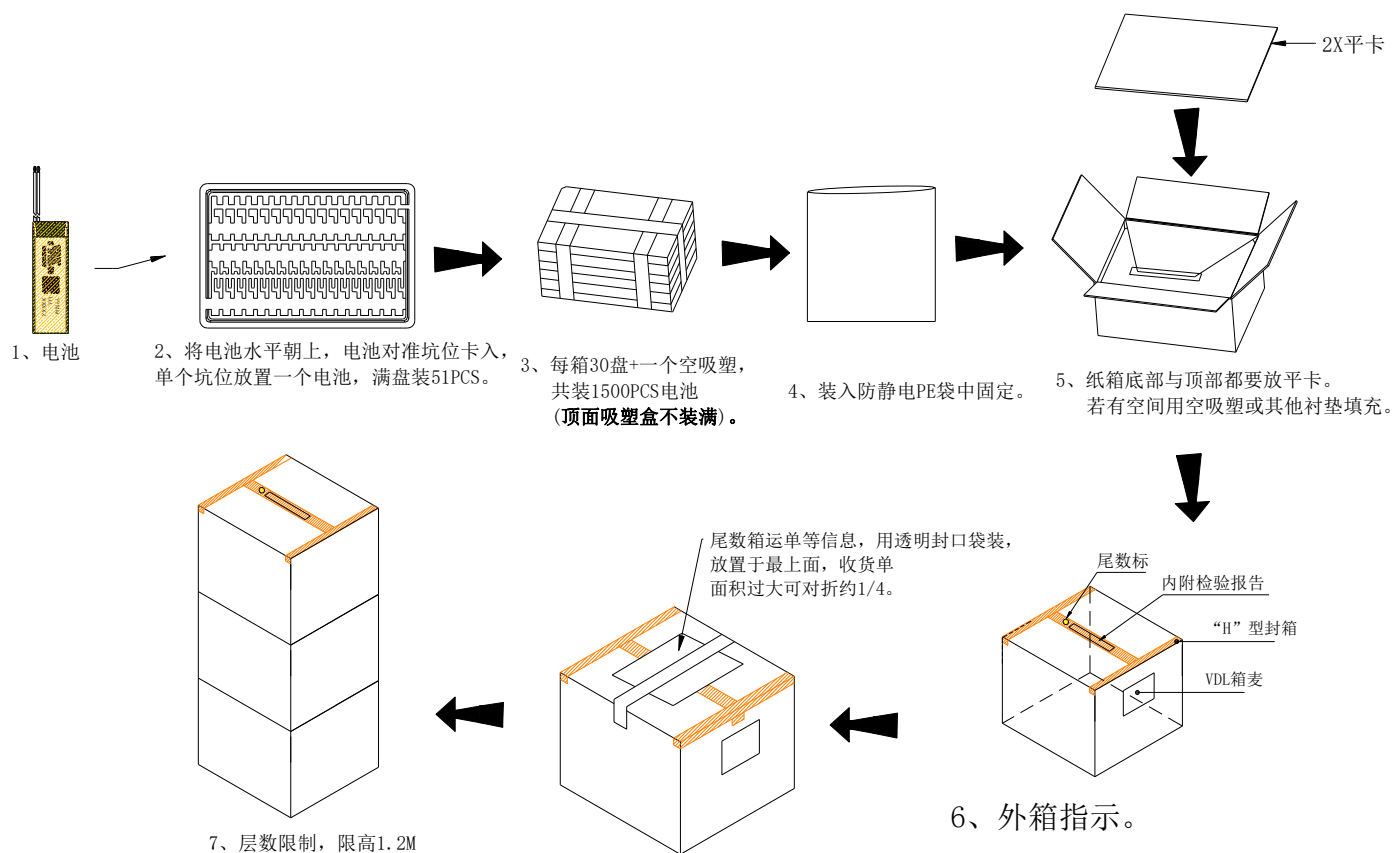
PCM BOM 2

| Material Name (零件名称) | Specification (规格型号) | Position (零件位置) | Qty (用量) |
|-------------------------|---------------------------|--------------------|-------------|
| PCBA | HF3508T-Ni | / | 1 |
| PCB | 0.4*3.5*8mm | / | 1 |
| IC | XB4142J2SZR | U1 | 1 |
| 贴片电阻 Chip resistor | 1k Ω ±5% | R1 | 1 |
| 贴片电容 Chip capacitors | 0.1 μ F/-20%~+80%/16V | C1~C3 | 3 |
| 镍片 | TBD | B+, B- | 2 |
| PTC | LP-TSML200(VD) | F1 | 1 |
| / | NC | RT | 0 |

Note : The battery of materials should be consistent with the requirements of the RoHS&REACH&HF.

注：电池组所使用的材料应符合RoHS& REACH& 无卤的要求.

Package figure 包装示意图:



17 . Battery Precautions and Safety Instructions 电池组使用注意事项及安全说明

Please be sure to comply with the specifications and the following precautions to use with batteries. For any accident caused by operation not following the specifications, VDL Electronics Co., Ltd will not take any responsibility

请您务必遵守本规格书和以下使用注意事项使用电池，对于没有按照规格书进行操作所造成的任何意外事故，重庆市紫建电子股份有限公司将不承担任何责任。

- ◆ Warranty period is 12 months after shipment date.
从出厂代码日起 12 个月内保修。
- ◆ When the battery is stored for 3 months, it should be charged with 0.5C current to 50% SOC.
电池每放置三个月,请预先以 0.5C 充电 1 次,即让电池具备 50%以上的电量。
- ◆ Before using the battery, carefully read the instruction manual and battery labels on the surface.
使用电池前，请仔细阅读使用说明书和电池表面标识。
- ◆ Please use the original battery charger. The battery should be placed in a dry and ventilated place.
电池需使用原装充电器充电，并应放置在干燥通风场所。
- ◆ If the battery is not used for a long time, please charge the battery to 50% SOC status. Remove the battery from the device and place it separately, to avoid the short-circuit and damage caused by contacting metal.
如长期不使用时，请将电池充电至半满电荷状态，把电池从设备中拆除并分开放置，避免金属接触电池，造成短路或损坏现象。
- ◆ When using or during storage, if the battery is hot, with leakage, odor, distortion or other anomalies, please stop using it immediately and stay away from the battery.
在使用或储存期间，如发现电池有出现高温发热、漏液、散发异味、变形及其它异常现象时，请立即停止使用并远离电池。
- ◆ Do not short-circuit the battery positive and negative terminals. Do not damp the battery to avoid any danger.
切勿将电池正负极短路，并注意不可让电池受潮，以免发生危险。
- ◆ Please keep the battery away from heat, high voltage place. Please do not beat or hit the battery.
使用过程中，应远离热源、高压场所，并勿摔打、撞击电池。
- ◆ Remove the battery immediately from the device when the battery life ends. Please dispose the waste battery properly. Do not put it into fire or water.
电池寿命终止应立刻从设备中取出,废弃电池请安全妥善处理，切勿投入火中或水中。
- ◆ Do not allow children to replace batteries without adult supervision ,
Keep small cells and batteries which are considered swallowable out of the reach of children.
- ◆ 不允许儿童在没有成人监督的情况下更换电池，将可被吞咽的小电芯和电池放在儿童取不到的地方。
- ◆ Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion. In case of ingestion of a cell or battery, seek medical assistance promptly.
如果吞咽了电池，应迅速送医院处理，吞咽有可能导致烧伤、软组织穿孔和死亡，摄入后 2 小时内可能发生严重烧伤。
- ◆ In case of ingestion of a cell or battery, seek medical assistance promptly.
如果摄入电芯或电池，应立即寻求医疗援助。



Rechargeable Lithium-ion Battery Specification Approval

DOC NO.: ZJ-PS-02500
REV. : A/8
SHEET : 18 OF 33

18 . Customer Inquiry

客户要求

Model 型号 : 621029PN3/160mAh

1.If the customer approves the specification and samples, please sign the specification back to VDL within 1 week. It is invalid when expires.

如果客户认可本承认书和样品，请于 7 天内回签本承认书给重庆市紫建电子股份有限公司，过期视为无效。

2. If the customer requires more explanation or the operating conditions are different from the specification content, please write down your information and contact VDL Electronics Co., Ltd in advance. VDL Electronics Co., Ltd could design and build products according to your special request.

如果客户需要其他方面的说明或工作条件与规格书内容不一致,请客户提前和重庆市紫建电子股份有限公司联系. 重庆市紫建电子股份有限公司将按照贵公司特殊要求设计和开发产品.特殊要求标准:

| 项 目 序号 | Special Request 特殊要求 | Criteria 标准 |
|-----------|-------------------------|----------------|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |

Company Name : Signature : Date:

公司名称:

签名:

日期:



XB4142 ZR Series

One Cell Lithium-ion/Polymer Battery Protection IC

GENERAL DESCRIPTION

The XB4142 ZR series product is a high integration solution for lithium-ion/polymer battery protection. XB4142 ZR series contains advanced power MOSFET, high-accuracy voltage detection circuits and delay circuits. XB4142 ZR series is put into an ultra-small TSOT4 package and only one external component makes it an ideal solution in limited space of battery pack.

XB4142 ZR series has all the protection functions required in the battery application including overcharging, overdischarging, overcurrent and load short circuiting protection etc. The accurate overcharging detection voltage ensures safe and full utilization of charging. The low standby current drains little current from the cell while in storage.

The device is not only targeted for digital cellular phones, but also for any other Li-Ion and Li-Poly battery-powered information appliances requiring long-term battery life.

- Integrate Advanced Power MOSFET with Equivalent of 52 mΩ $R_{DS(ON)}$
- Ultra-small TSOT4 package
- Only One external Capacitor Required
- Over-temperature Protection
- Overcharge Current Protection
- Two-step Overcurrent Detection:
 - Over-discharge Current
 - Load Short Circuiting
- Charger Detection Function
- <1.15V(typ) Battery Charging Forbidden
- Delay Times are generated inside
- High-accuracy Voltage Detection
- Low Current Consumption
 - Operation Mode: 1.5μA typ.
 - Power-down Mode: 0.1μA max.
- RoHS Compliant and Lead (Pb) Free
- ESD HBM: 6KV

FEATURES

- Protection of Charger Reverse Connection
- Protection of Battery Cell Reverse Connection with external load

APPLICATIONS

One-Cell Lithium-ion Battery Pack
Lithium-Polymer Battery Pack

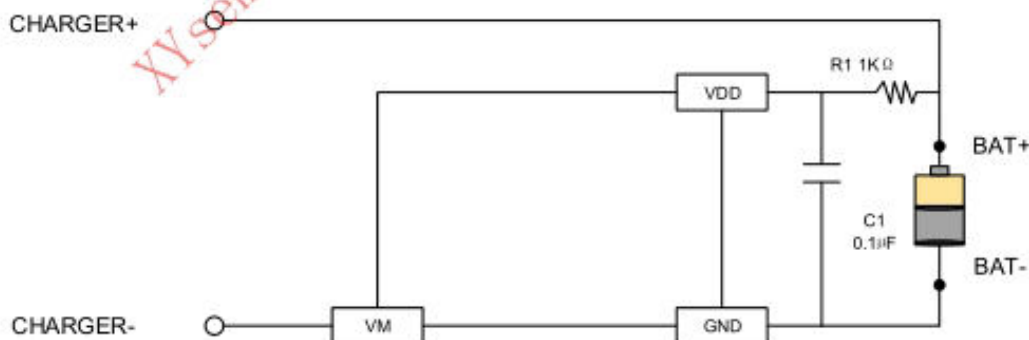


Figure 1. Typical Application Circuit



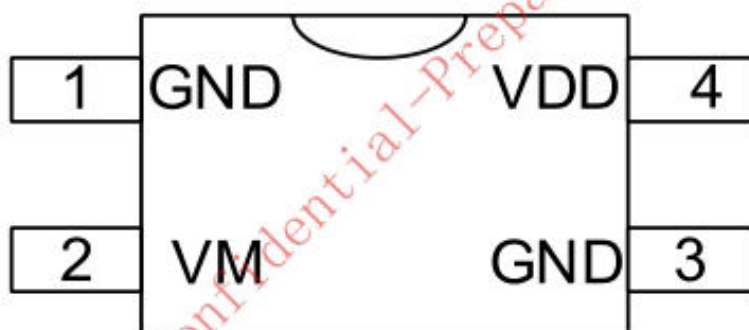
XB4142 ZR Series

ORDERING INFORMATION

| PART NUMBER | OCV [VCU] (V) | OCRV [VCL] (V) | ODV [VDL] (V) | ODRV [VDR] (V) | TOP MARK |
|-------------|---------------|----------------|---------------|----------------|-------------|
| XB4142I2SZR | 4.30±50mV | 4.10±50mV | 2.8±100mV | 3.0±100mV | YWxxx(note) |
| XB4142J2SZR | 4.425±25mV | 4.25±50mV | 2.8±100mV | 3.0±100mV | |
| XB4142M2SZR | 4.475±25mV | 4.30±50mV | 2.8±100mV | 3.0±100mV | |

Note:1). "YWxxx" is manufacture date code, "Y" means the year, "W" means the week.
"xxx" is internal code of Xysemi.

PIN CONFIGURATION



TOP VIEW

Figure 2. PIN Configuration



XB4142 ZR Series

PIN DESCRIPTION

| XB4142 ZR SERIES PIN NUMBER | PIN NAME | PIN DESCRIPTION |
|-----------------------------|----------|--|
| 1,3 | GND | Ground, connect the negative terminal of the battery to these pins. |
| 2 | VM | The internal FET switch connects this terminal to GND. The negative terminal of the battery pack. |
| 4 | VDD | Power Supply. |

ABSOLUTE MAXIMUM RATINGS

(NOTE: DO NOT EXCEED THESE LIMITS TO PREVENT DAMAGE TO THE DEVICE. EXPOSURE TO ABSOLUTE MAXIMUM RATING CONDITIONS FOR LONG PERIODS MAY AFFECT DEVICE RELIABILITY.)

| PARAMETER | VALUE | UNIT |
|--|------------|------|
| VDD input pin voltage | -0.3 to 6 | V |
| VM input pin voltage | -6 to 10 | V |
| Operating Ambient Temperature | -40 to 85 | °C |
| Maximum Junction Temperature | 150 | °C |
| Storage Temperature | -55 to 150 | °C |
| Lead Temperature (Soldering, 10 sec) | 300 | °C |
| Power Dissipation at T=25°C | 0.3 | W |
| Package Thermal Resistance (Junction to Ambient) θ_{JA} | 300 | °C/W |
| Package Thermal Resistance (Junction to Case) θ_{JC} | 130 | °C/W |
| ESD HBM | 6000 | V |



XB4142 ZR Series

ELECTRICAL CHARACTERISTICS

Typical and limits appearing in normal type apply for TA = 25°C, unless otherwise specified.

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--|----------------------|--|------|------|------|------|
| Detection Voltage | | | | | | |
| 0V Battery forbidden charge Battery voltage | *V _{0INH} | 0V Battery forbidden charge | 1.00 | 1.15 | 1.30 | V |
| Detection Current | | | | | | |
| Overdischarge Current Detection | *I _{IOV1} | V _{DD} =3.6V | 1.0 | 1.5 | 2.0 | A |
| Overcharge Current Detection | *I _{CHOC} | V _{DD} =3.6V | 1.0 | 1.5 | 2.0 | A |
| Load Short-Circuiting Detection | *I _{SHORT} | V _{DD} =3.6V | 2.8 | 4.0 | 5.2 | A |
| Current Consumption | | | | | | |
| Current Consumption in Normal Operation | I _{OPE} | V _{DD} =3.6V V _M =0V | | 1.5 | 2.3 | μA |
| Current Consumption in Power Down | I _{PD} | V _{DD} =2.0V V _M pin floating | | | 0.1 | μA |
| VM Internal Resistance | | | | | | |
| Internal Resistance between VM and V _{DD} | R _{VMD} | V _{DD} =2.0V V _M pin floating | 200 | 300 | 400 | kΩ |
| Internal Resistance between VM and GND | R _{VMS} | V _{DD} =3.6V V _M =1.0V | 15 | 25 | 35 | kΩ |
| FET on Resistance | | | | | | |
| Equivalent FET on Resistance | *R _{SS(ON)} | V _{DD} =3.6V I _{VM} =0.2A | | 52 | | mΩ |
| Over Temperature Protection | | | | | | |
| Over Temperature Protection | *T _{SHD+} | | | 150 | | °C |
| Over Temperature Recovery Degree | *T _{SHD-} | | | 110 | | °C |
| Detection Delay Time | | | | | | |
| Overcharge Voltage Detection Delay Time | t _{CU} | | 120 | 170 | 220 | mS |
| Overdischarge Voltage Detection Delay Time | t _{DL} | | 20 | 40 | 60 | mS |
| Overdischarge Current1 Detection Delay Time | t _{IOV1} | V _{DD} =3.6V | 5 | 10 | 20 | mS |
| Overcharge Current Detection Delay Time | t _{CHOC} | V _{DD} =3.6V | 5 | 10 | 20 | mS |
| Load Short-Circuiting Detection Delay Time | *t _{SHORT} | V _{DD} =3.6V | 60 | 200 | 500 | μS |

Note1: *---The parameter is guaranteed by design.



XB4142 ZR Series

FUNCTIONAL BLOCK DIAGRAM

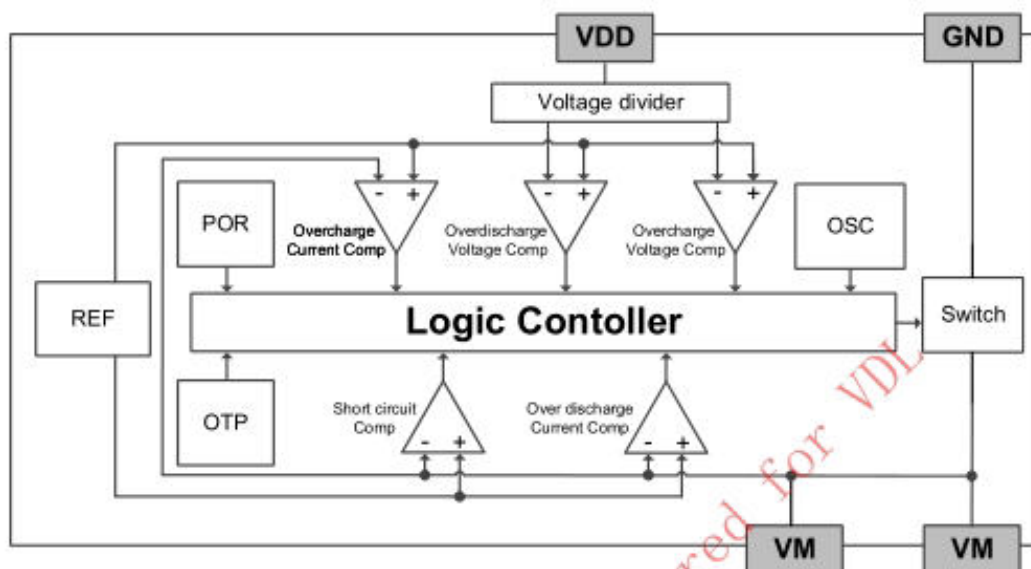


Figure 3. Functional Block Diagram

FUNCTIONAL DESCRIPTION

The XB4142 ZR series monitors the voltage and current of a battery and protects it from being damaged due to overcharge voltage, overdischarge voltage, overdischarge current, and short circuit conditions by disconnecting the battery from the load or charger. These functions are required in order to operate the battery cell within specified limits.

The device requires only one external capacitor. The MOSFET is integrated and its $R_{DS(ON)}$ is as low as 52 mΩ typical.

Normal operating mode

If no exception condition is detected, charging and discharging can be carried out freely. This condition is called the normal operating mode.

Overcharge Condition

When the battery voltage becomes higher than the overcharge detection voltage (V_{CU}) during charging under normal condition and the state continues for the overcharge detection delay time (t_{CU}) or longer, the XB41

42 ZR series turns the charging control FET off to stop charging. This condition is called the overcharge condition. The overcharge condition is released in the following two cases:

- 1, When the battery voltage drops below the overcharge release voltage (V_{CL}), the XB4142 ZR series turns the charging control FET on and returns to the normal condition.

- 2, When a load is connected and discharging starts, the XB4142 ZR series turns the charging control FET on and returns to the normal condition. The release mechanism is as follows: the discharging current flows through an internal parasitic diode of the charging FET immediately after a load is connected and discharging starts, and the VM pin voltage increases about 0.7 V (forward voltage of the diode) from the GND pin voltage momentarily. The XB4142 ZR series detects this voltage and releases the overcharge condition. Consequently, in the case that the battery voltage is equal to or lower than the overcharge detection voltage (V_{CU}), the XB4142 ZR series returns to the normal condition immediately, but in the case the



XB4142 ZR Series

battery voltage is higher than the overcharge detection voltage (V_{CU}), the chip does not return to the normal condition until the battery voltage drops below the overcharge detection voltage (V_{CU}) even if the load is connected. In addition, if the VM pin voltage is equal to or lower than the overcurrent 1 detection voltage when a load is connected and discharging starts, the chip does not return to the normal condition.

Remark :

If the battery is charged to a voltage higher than the overcharge detection voltage (V_{CU}) and the battery voltage does not drop below the overcharge detection voltage (V_{CU}) even when a heavy load, which causes an overcurrent, is connected, the overcurrent do not work until the battery voltage drops below the overcharge detection voltage (V_{CU}). Since an actual battery has, however, an internal impedance of several dozens of mΩ, and the battery voltage drops immediately after a heavy load which causes an overcurrent is connected, the overcurrent work. Detection of load short-circuiting works regardless of the battery voltage.

Overdischarge Condition

When the battery voltage drops below the overdischarge detection voltage (V_{DL}) during discharging under normal condition and it continues for the overdischarge detection delay time (t_{DL}) or longer, the XB4142 ZR series turns the discharging control FET off and stops discharging. This condition is called overdischarge condition. After the discharging control FET is turned off, the VM pin is pulled up by the R_{VMD} resistor between VM and VDD in XB4142 ZR series. Meanwhile when VM is bigger than 1.5V (typ.) (the load short-circuiting detection voltage), the current of the chip is reduced to the power-down current (I_{PDN}). This condition is called power-down condition. The VM and VDD pins are shorted by the R_{VMD} resistor in the IC under the overdischarge and power-down conditions.

The power-down condition is released when a charger is connected and the potential difference between VM and VDD becomes 1.3 V (typ.) or higher (load short-circuiting detection voltage). At this time, the FET i

s still off. When the battery voltage becomes the overdischarge detection voltage (V_{DL}) or higher (see note), the XB4142 ZR series turns the FET on and changes to the normal condition from the overdischarge condition.

Remark :

If the VM pin voltage is no less than the charger detection voltage (V_{CHA}), when the battery under overdischarge condition is connected to a charger, the overdischarge condition is released (the discharging control FET is turned on) as usual, provided that the battery voltage reaches the overdischarge release voltage (V_{DU}) or higher.

Overcurrent Condition

When the discharging current becomes equal to or higher than a specified value (the VM pin voltage is equal to or higher than the overcurrent detection voltage) during discharging under normal condition and the state continues for the overcurrent detection delay time or longer, the XB4142 ZR series turns off the discharging control FET to stop discharging. This condition is called overcurrent condition. (The overcurrent includes overcurrent, or load short-circuiting.)

The VM and GND pins are shorted internally by the R_{VMS} resistor under the overcurrent condition. When a load is connected, the VM pin voltage equals the VDD voltage due to the load.

The overcurrent condition returns to the normal condition when the load is released and the impedance between the B+ and B- pins becomes higher than the automatic recoverable impedance. When the load is removed, the VM pin goes back to the GND potential since the VM pin is shorted to the GND pin with the R_{VMS} resistor. Detecting that the VM pin potential is lower than the overcurrent detection voltage (V_{IOV1}), the IC returns to the normal condition.

Abnormal Charge Current Detection

If the VM pin voltage drops below the charger detection voltage (V_{CHA}) during charging under the normal condition and it conti



XB4142 ZR Series

nues for the overcharge detection delay time (t_{cu}) or longer, the XB4142 ZR series turns the charging control FET off and stops charging. This action is called abnormal charge current detection.

Abnormal charge current detection works when the discharging control FET is on and the VM pin voltage drops below the charger detection voltage (V_{CHA}). When an abnormal charge current flows into a battery in the overdischarge condition, the XB4142 ZR series consequently turns the charging control FET off and stops charging after the battery voltage becomes the overdischarge detection voltage and the overcharge detection delay time (t_{cu}) elapses.

Abnormal charge current detection is released when the voltage difference between VM pin and GND pin becomes lower than the charger detection voltage (V_{CHA}) by separating the charger. Since the 0 V battery charging function has higher priority than the abnormal charge current detection function, abnormal charge current may not be detected by the product with the 0 V battery charging function while the battery voltage is low.

Load Short-circuiting condition

If voltage of VM pin is equal or below short circuiting protection voltage (V_{SHORT}), the XB4142 ZR series will stop discharging and battery is disconnected from load. The maximum delay time to switch current off is t_{SHORT} . This status is released when voltage of VM pin is higher than short protection voltage (V_{SHORT}), such as when disconnecting the load.

Delay Circuits

The detection delay time for overdischarge current 2 and load short-circuiting starts when overdischarge current 1 is detected. As soon as overdischarge current 2 or load short-circuiting is detected over detection delay time for overdischarge current 2 or load short-circuiting, the XB4142 ZR series stops discharging. When battery voltage falls below overdischarge detection voltage due to overdischarge current, the XB4142 Z

R series stop discharging by overdischarge current detection. In this case the recovery of battery voltage is so slow that if battery voltage after overdischarge voltage detection on delay time is still lower than overdischarge detection voltage, the XB4142 ZR series shifts to power-down.

0V Battery Charging Forbidden Function ^{(1) (2) (3)}

when connecting the battery with internal short circuit (0 V battery), prohibit charging function. When the battery voltage is below the battery voltage (V_{0INH}), the gate pole of the FET for charge control is fixed at the BAT- terminal voltage, and charging is prohibited. When the battery voltage is above V_{0INH} , it can be charged.

Note:

There are lithium-ion batteries that are not recommended to be recharged after being fully discharged. This is determined by the characteristics of lithium ion battery, so please confirm the details with the battery manufacturer when you decide to charge the 0 V battery < possible > or < forbidden >.



XB4142 ZR Series

TIMING CHART

1. Overcharge and Overdischarge voltage detection

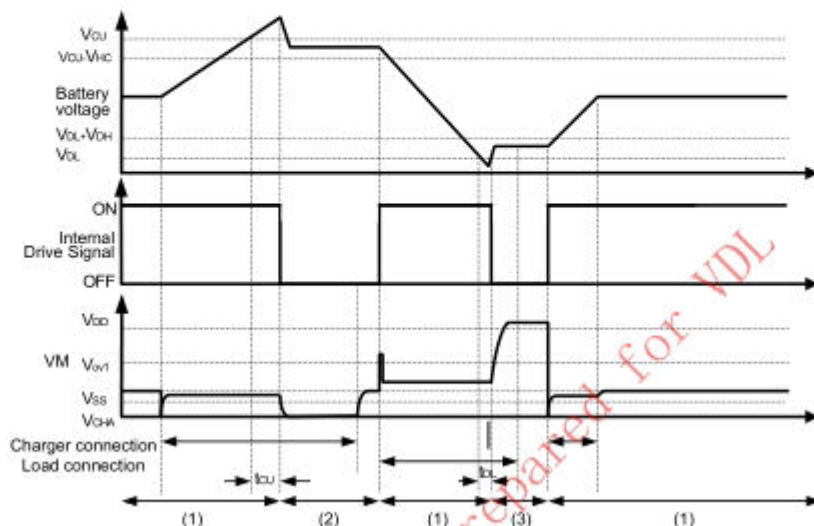


Figure4-1 Overcharge and Overdischarge Voltage Detection

Remark: (1) Normal condition (2) Overcharge voltage condition (3) Overdischarge voltage condition

2. Overdischarge Current and Load Short detection

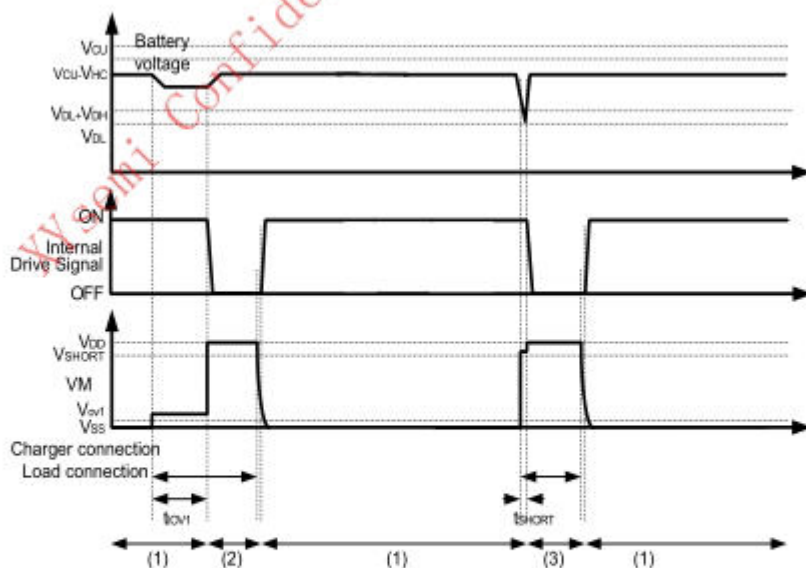


Figure4-2 Overdischarge Current and Short Detection

Remark: (1) Normal condition (2) Overcharge voltage condition (3) Overdischarge voltage condition



XB4142 ZR Series

3. Abnormal Charger Detection

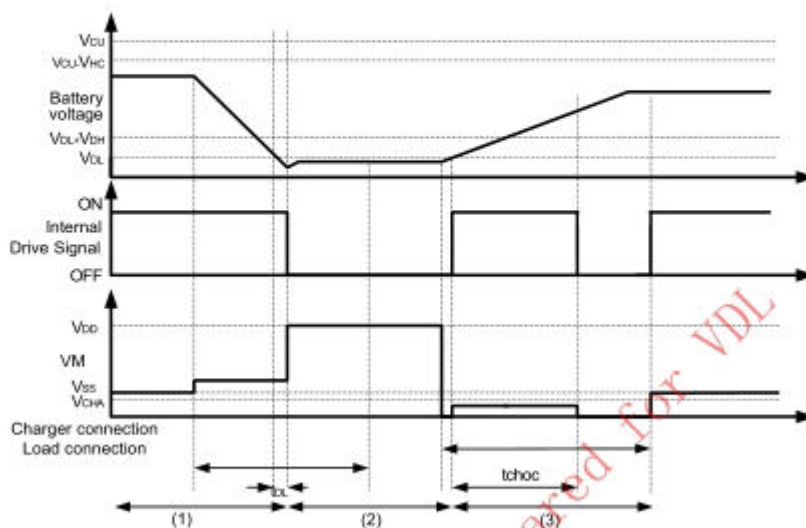


Figure4-3 Abnormal Charger Detection

Remark: (1) Normal condition (2) Overdischarge voltage condition (3) Overcharge voltage condition



XB4142 ZR Series

TYPICAL APPLICATION

As shown in Figure 5, the current path must be kept as short as possible. For thermal management, ensure that these trace widths are adequate. C is a decoupling capacitor which should be placed as close as possible to XB4142 ZR series.

If add one 0.1uF capacitor between VM pin and GND pin closely, the system ESD level and anti-interference capability of circuit will improve greatly.

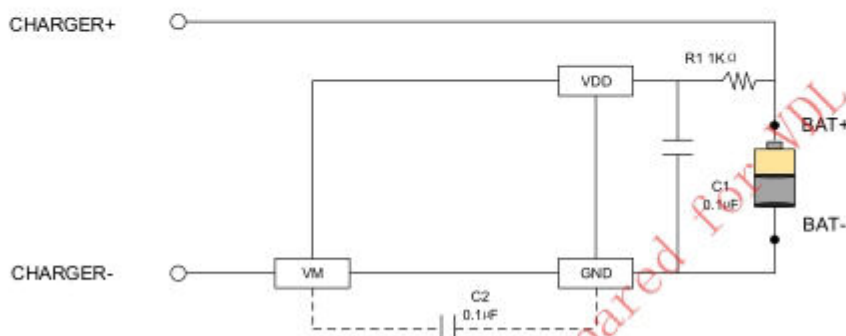


Figure 5 XB4142 ZR SERIES in a Typical Battery Protection Circuit

| Symbol | Typ | Value range | Unit |
|--------|-----|-------------|------|
| R1 | 1 | 0.5~1.5 | KΩ |
| C1 | 0.1 | 0.1~2.2 | μF |

Remark:

- 1.The above parameters may be changed without notice;
- 2.The schematic diagram and parameters of the IC are not used as the basis to ensure the operation of the circuit. Please conduct full measurement on the actual application circuit before setting the parameters.
- 3.If the resistance value is large , the overcharging voltage will be correspondingly larger by several mV.

Precautions

- Pay attention to the operating conditions for input/output voltage and load current so that the power loss in XB4142 ZR series does not exceed the power dissipation of the package.
- Do not apply an electrostatic discharge to this XB4142 ZR series that exceeds the performance ratings of the built-in electrostatic protection circuit.
- If < 50 mAh Li-Battery is shorted, the voltage of battery maybe drop down to 0V~1V quickly so that the short-circuiting protection logic may not work properly. Increasing the value of resistor and capacitor can solve this problem, such as 1K and 1uF.



XB4142 ZR Series

APPLIED MEASUREMENT METHOD

(1).Overcharge characteristic test method:

a. According to the figure6-1, connect the power supply DC1 to the B + and GND pins of the system board and set the voltage to about 3.6V. Connect the power supply from GND to VM to DC2 power supply and set 100mV current limiting 10mA. Observe the waveform.

b. Adjust the power supply voltage V1 and increase it by 0.001V until the output level of VM pin changes from 0 to negative (-100mV). Record the overcharge protection voltage and measure the protection delay.

c. Adjust the power supply voltage V1 to decrease by 0.001V until the output voltage of VM pin is recovered from negative (-100mV) to 0 level, and record the overcharge recovery voltage.

(2).Over discharge characteristic test method:

a. According to the figure6-2, connect the power supply DC1 to the B + and GND pins of the system board and set the voltage to about 3.6V. Connect the DC2 power supply from VM to GND, set the 100mV current limiting 10mA, and observe the waveform.

b. Adjust the power supply voltage V1 and decrease it by 0.001V until the output level of VM pin changes from 0 to positive (100mV). Record the overdischarge protection voltage and measure the protection delay.

c. Adjust the power supply voltage V1 to increase by 0.001 V until the output voltage of VM pin is restored from positive (100 mV) to 0 level, and record the overdischarge recovery voltage.

(3).Discharge over current test method:

a. According to the figure6-3, connect the DC1 power supply to the B + and GND pins of the system board and set the voltage to about 3.0V/3.6V/4.2V. Connect the electronic load from B + to VM and observe the waveform.

b. Adjust the electronic load increase it by 0.1A step, detect that the current from B + to VM is turned off and meet the delay standard (about 10ms), and record the discharge delay time.

(4).Charging over current test method:

a. According to the figure6-4, connect the DC1 power supply to the B + and GND pins of the system board and set the voltage to about 3.0V/3.6V/4.2V, and load DC2 power supply from GND to VM.

b. Adjust the current limiting value of DC2 power supply to increase by 0.1A step, detect that the current from GND to VM is turned off and meet the delay standard (about 10ms), and record the charging over-current delay time.

(5).Iq test method:

a. As shown in the figure6-5, connect the positive pole of DC1 to B +, and the negative pole to GND, and set the voltage to 3.6V;

b. VM grounding, record the current passing through DC1 (Iq).

(6).Isd test method:

a. As shown in the figure6-6, connect the positive pole of DC1 to B + and the negative pole to GND, and set the voltage to 2V;

b. VM is suspended and the current passing through DC1 is recorded as Isd.



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SCHEMATIC DIAGRAM OF TEST METHOD

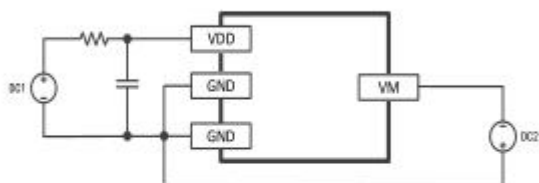


Figure6-1

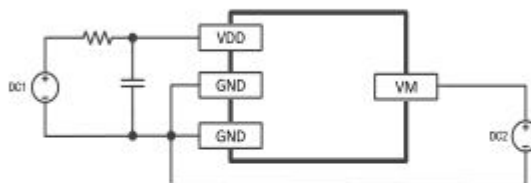


Figure6-2

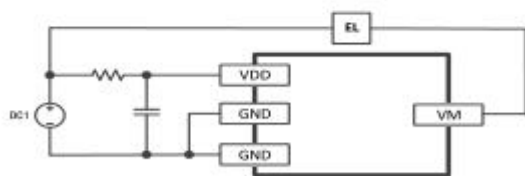


Figure6-3

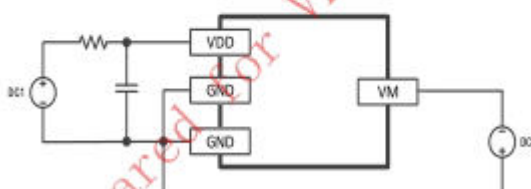


Figure6-4

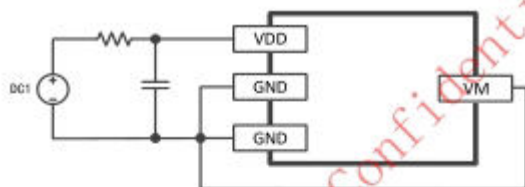


Figure6-5

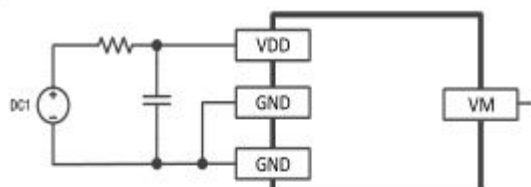
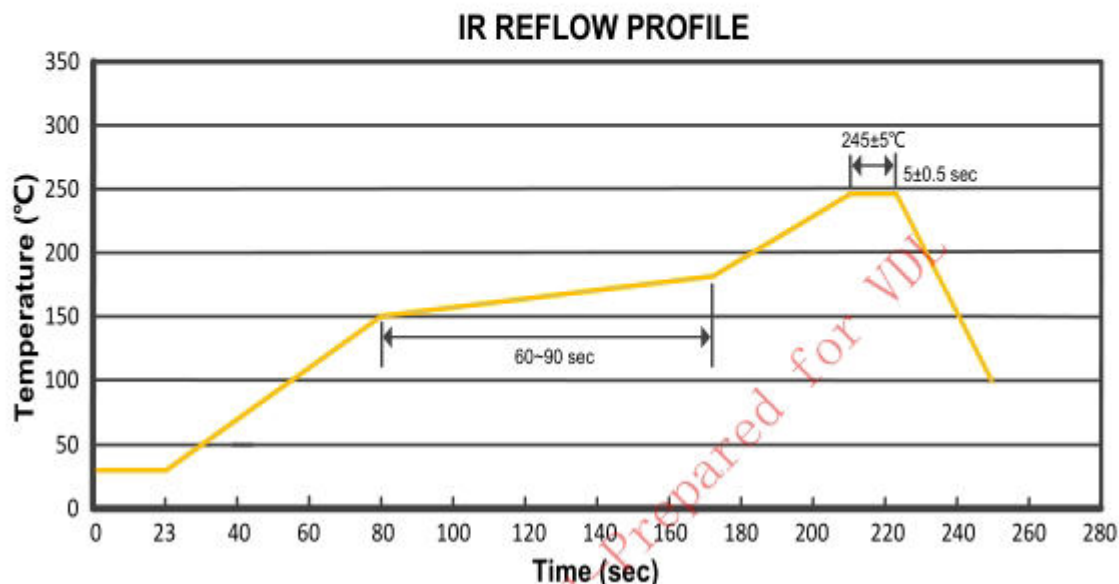


Figure6-6



XB4142 ZR Series

Solderability Curve of Lead-Free Reflow Soldering (applicable to SMT tube)



Explain:

1. Preheating temperature 25~150°C, duration 60~90sec;
2. Peak temperature 245 ± 5 °C, duration 5 ± 0.5 sec;
3. Cooling rate of welding process is 2~10°C/sec.

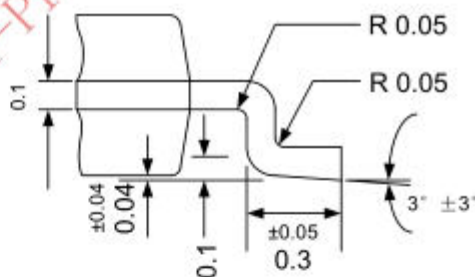
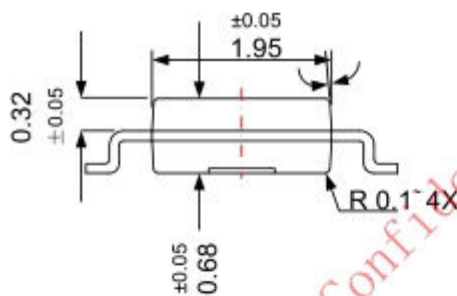
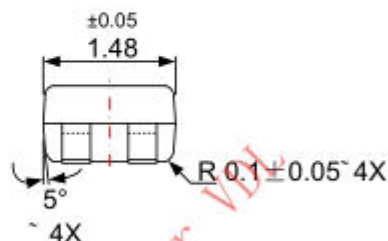
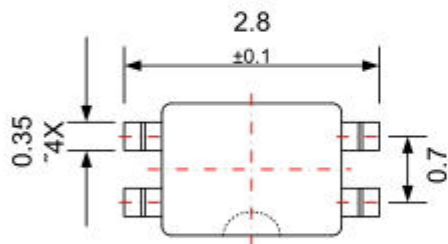
Resistance to welding heat conditions

Temperature: 270 ± 5 °C; Time: 10 ± 1 sec



XB4142 ZR Series

PACKAGE OUTLINE(TSOT4)





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