



# Li-ion Battery Specification Data Sheet

Model Name 型号: Li-ion Battery 36V17.5Ah

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|----------------|---------------------|-----------------------|---------------------|-----------------------|----------------|
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## 1. Scope 适用范围

This specification is applicable to the Lithium-ion rechargeable battery 36V17.5Ah.  
本规格书适用于M5power 电池有限公司生产的36V17.5Ah电池组.

## 2. Model型号: Li-ion Battery 36V17.5Ah

## 3. Specification description 规格描述

| No.序号 | Items 项目   | Specification description 规格   |
|-------|--|--|
| 3.1   | Appearance 外观                                    | The surface is clear and is free of scratch, mechanical cuts and match well with the host.<br>电池外表面清洁, 无擦伤, 无机械损伤, 与主机配合良好   |
| 3.2   | Charge voltage 充电电压                              | 42V  |
| 3.3   | Nominal voltage 标称电压                             | 36V  |
| 3.4   | Nominal capacity 标称容量                            | 17.5Ah (at 0.2C rate discharge after standard charge)<br>按标准充电后以 0.2C 倍率放电   |
| 3.5   | Minimum capacity 最小容量                            | 17Ah (at 0.2C rate discharge after standard charge)<br>按标准充电后以 0.5C 倍率放电   |
| 3.6   | Standard Charge method 标准充电方式                    | 0.2C CC(constant current) charge to 42V, then CV(constant voltage 42V) charge till charge current decline to $\leq 0.05C$ 以 0.2C 恒流充电到 42V, 然后以 42V 恒压充电至终止电流为 0.05C |
| 3.7   | 截至电压 Cut-off voltage                             | 26.5V  |
| 3.8   | 外形 Outline Size                                  | L360*W110*T90mm  |
| 3.9   | Max. charge current 最大充电电流                       | 5A   |
| 3.10  | Max. discharge current 最大放电电流                    | 25A (continuous discharge current / 持续放电)  |
|       |  | 50A (pulse discharge current / 脉冲放电)   |
| 3.11  | Operating temperature 工作温度                       | Charging 充电: $0^{\circ}C \sim 45^{\circ}C$<br>Discharging 放电: $-20^{\circ}C \sim 65^{\circ}C$  |
| 3.12  | Storage Temperature and Humidity Range 储存温度与湿度范围 | 1 month: $-10^{\circ}C \sim 50^{\circ}C$   |
|       |  | 3 month: $-10^{\circ}C \sim 45^{\circ}C$<br>1 year: $-10^{\circ}C \sim 25^{\circ}C$<br>Humidity: $45\% \sim 60\% RH$   |
|       |  | The battery should be charged in every three months. Recommended storage temperature is $25 \pm 5^{\circ}C$ of SOC 50%~60%. 电池每三个月循环一次.                              |
| 3.13  | Cycle Life 循环寿命                                  | $\geq 800$ cycles, more than 80% at 0.2C charge and 0.2C discharge<br>800 次循环后, 以 0.2C 充放电可恢复容量 $\geq 80\%$  |
| 3.14  | Initial Internal Impedance 电池初始内阻                | $\leq 120m\Omega$ (50% SOC, Measure the AC impedance t 1kHz)   |
| 3.15  | Pack weight 电池重量                                 | Approx 3Kg   |
| 3.16  | Delivery voltage 出货电压                            | $\geq 36V$   |



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## 4. Safety Performance 安全性能

| No 序号 | Items 项目                           | Test Method and Condition 测试方法   | Criteria 判定  |
|-------|------------------------------------|--|--|
| 4.1   | Over-Charge Protection<br>过充电保护    | At 20±5°C conditions, after full-charging the battery with 0.2C and set the constant current and voltage supplier with 2times of the nominal voltage and current, then load it to the battery for 8h. 在环境温度 20±5°C 条件下, 电池按 0.2C 充满电后, 再将横流恒压源设定为两倍电压、电流, 然后加载于电池上 8 小时。   | The battery should be no leakage, deformation, smoking and explosion during the test processes. 试验过程中, 电池不漏液、变形、冒烟和爆炸。 |
| 4.2   | Over-Discharge Protection<br>过放电保护 | At 20±5°C conditions, discharge battery to 26.5V with 0.2C constant current, then discharge with 30Ω loading for 24 hours. Check the appearance of battery. 在环境温度 20±5°C 条件下, 电池以 0.2C 的恒流放电到 26.5V, 然后外接 30Ω 负载放电 24h, 再检查电池外观。   | The appearance is normal, no explosion, no fire, no smoking, no leakage. 电池外观正常、不爆炸、不起火、不冒烟及不漏液。                       |
| 4.3   | Short-Circuit Protection<br>短路保护   | After fast-charging, use a cable of 0.1Ω resistance to short the battery for 1 hour. Then check the appearance of battery. Cut circuit of resistance; test the battery's voltage after charging with 1C constant current for 5 seconds. 电池快速充电结束后, 将正负极用 0.1Ω 电阻短路 1 小时后, 检查电池外观。将正负极连接电阻断开, 电池以 1C 恒流瞬时充电 5S 后, 用电压表测量电池开路电压。 | The appearance is normal, no explosion, no fire, no smoking, no leakage. 电池外观正常、不爆炸、不起火、不冒烟及不漏液。                       |

## 5. Temperature Applicability 温度测试

### 5.1 Discharge Performance at High Temperature 高温放电性能

At 50±2°C conditions, keep the battery for 2hrs, discharge the battery to 26.5V with 0.2C constant current, After keep the battery 2hrs at 20±5°C, then check the appearance of battery. The discharge capacity is above 80% of original capacity. The appearance is no distortion, no explosion and no leakage.

电池在环境温度为 50±2°C 的条件下放置 2 小时后, 以 0.2C 电流恒流放电至 26.5V, 再放在 20±5°C 环温下 2 小时后, 检查电池外观。要求放电容量是原始容量的 80% 以上, 外观应无变形、无爆炸、无漏液。

### 5.2 Discharge Performance at Low Temperature 低温放电性能

At -10±2 °C conditions, keep the battery for 2hrs, discharge the battery to 26.5V with 0.2C constant current, After keep the battery 2hrs at 20±5°C, then check the appearance of battery.

The discharge capacity is above 60% of original capacity. The appearance is no distortion, no explosion, no leakage.

池在环境温度为-10±2°C 的条件下放置 5 小时后, 以 0.2C 电流恒流放电至 26.5V, 再放在 20±5°C 环温下 2 小时后, 检查电池外观。要求放电容量是原始容量的 60% 以上, 外观应无变形、无爆炸、无漏液。



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## 6. ESD静电防护

At direct discharge against the pins with  $\pm 4\text{kv}$  and over the housing with  $\pm 8\text{kv}$ . No damages are allowed.  
接触放电 $\pm 4\text{kv}$ ，空气放电 $\pm 8\text{kv}$ ，不允许有损坏现象。

## 7. Warranty and product liability 保质期与产品责任

Warranty period of this product is 12months from delivery date.

本产品保固期为 12 个月，从交货日期开始计算。

(When the customer using it in the device, need charge it as bellow 8.13 requirement)

(当客户将电池装入主机，需要遵从 8.13 要求充电)

You are kindly requested to use the battery, which is delivered from M5power Battery Co., Ltd. in strict accordance with the specification, and remarks include at the end of the document. Due to improper usage of the battery, an accident or a fire may occur due to the battery generating heat, catching fire or rupture, smoke. M5power will not guarantee against any accidents occurring due outside those written in this specification.

请严格依照规格书使用 M5power 电池有限公司所交付的电池。由于不恰当的使用、意外事故或投入火源等而导致电池发热、着火、破裂及冒烟，M5power 电池有限公司将不负有法律责任。

## 8. Caution 警告

In order to prevent the battery possibly occurs leaks, over heat, swollen, please note the preventive measure.  
为了预防电池可能发生的漏液、过热、膨胀，请谨记预防措施。

### Handling Precautions and Guideline 预防措施指南:

8.1 Strictly prohibits inverting the cathode use battery.

严格禁止置换极性使用电池

8.2 Strictly prohibits directly connect battery to power source plug

严格禁止直接连接电源

8.3 Please do not throw the battery to water or put into heater

请勿把电池丢进水中或火中

8.4 Strictly prohibits plunging the battery in sea water or water, when battery do not use, please store battery in the cool-dry environment.

禁止将电池浸入海水或水中，电池不用时，请在干燥环境中保存。

8.5 The prohibition in strong static electricity and strong magnetic field place use, otherwise is easy to destroy the battery PCBA.

禁止在强静电及强磁场中使用，否则很容易损坏保护板。

8.6 The prohibition puts the battery nearby the hot high temperature source, like the fire, the heater and so on use and leaves alone

禁止将电池单独放在高温源如明火、热源等附近。

8.7 The prohibition directly connects the battery cathode with the metal to short-circuit.

禁止用金属类物质直接短路电池。

8.8 The prohibition rap or throws, steps on the battery and so on

禁止重碰重跌重压电池。

8.9 Forbids directly to weld the battery and pierces the battery with the nail or other sharp weapons



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禁止直接焊接电池及使用钉子等其它利器在电池上打孔。

8.10 If the battery sends out the unusual smell, gives off heat, the distortion or appears any exceptionally,

immediately moves the battery from the installment or the battery charger to and stops using.

如果电池散发异味、发热、变形或出现其它异常，请立即移除电池或充电器停止使用。

8.11 If the battery occurs leaks, the electrolyte enters eye, please do not have to rub scratches, the application clear water flushing eye, and delivers the medical treatment otherwise to be able immediately to injure the eye

如果电池漏液，电解液进入眼睛，请不要擦揉，应立即用清水冲洗眼睛后就医治疗，否则有可能伤害眼睛。

8.12 When battery in long-term storage, or assembly in the host, suggested recharged in every 3 months

电池在长期的贮存、或装入主机时，建议客户每 3 个月对其进行充放电一次，之后充到半带电状态（36-42V/电）（充电方法：采用 0.2C 倍率电流进行充放电）。

8.13 Abandon the battery to wrap up the electrode using the insulating paper, prevented the battery short-circuits.

遗弃电池时用绝缘纸包裹住正负极，以预防电池短路。

8.14 Abandon battery processing to be supposed to follow the local government the laws and regulations.

遗弃电池应该遵循当地的法律法规要求进行处理。

8.15 Do not decompose the battery.

请勿拆解电池。



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### 9. Outline Drawing&cells configuration 产品外形图 (Size: MM)





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## 10. BMS Specification BMS规格

### 10.1 Scope 范围

The specification is applied to protection single lithium-ion cell from overcharge、over discharge、over current and short-circuit.

本规格适用于单节锂离子电池的过充保护，过放保护，过流保护及短路保护等。

### 10.2 Model: Li-ion Battery 36V17.5Ah

### 10.3 Electricity parameter (Environment temperature 25°C) 电子参数 (环境温度 25°C)

| Item 项目          | Name 名称   | Criteria 标准 |         |      |       |
|------------------|---|-------------|---------|------|-------|
|                  |   | Min         | Typical | Max  | Units |
| Voltage<br>电压    | Over charge detection voltage<br>过充电保护电压          | 4.2         | 4.25    | 4.27 | V     |
|                  | Over charge protection delay time<br>过充电保护延迟时间    | 0.5         | 1.0     | 1.5  | s     |
|                  | Over discharge detection voltage<br>过放电保护电压       | 2.65        | 2.68    | 2.7  | V     |
|                  | Over discharge protection delay time<br>过放电保护延迟时间 | -           | -       | 15   | ms    |
| Current<br>电流    | Static estate current<br>静态电流                     | -           | -       | 20   | μA    |
|                  | Over discharge current detection<br>过放电保护电流       | 25          | 26      | 27   | A     |
|                  | Over current protection delay time<br>过放电保护延迟时间   | .5          | 10      | 15   | ms    |
|                  |   | -           |         |      |       |
| Other<br>其它      | Short circuit protection n<br>短路保护                | YES         |         |      |       |
|                  | Over charge current protection<br>充电过流保护          | YES         |         |      |       |
|                  | Over temperature protection<br>温度保护               | 80° C       |         |      |       |
|                  | Balance function<br>均衡功能                          | YES         |         |      |       |
|                  | 零伏充电功能<br>0V battery charger function             | YES         |         |      |       |
| Resistance<br>内阻 | PCM Resistance<br>PCM 内阻                          | ≤15         |         |      | mΩ    |



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## 11. Cell Specifications 电芯规格

11.1 Cell Model (电芯型号) : Panasonic 18650-3500mAh

11.2 Cell specifications (电芯规格)

| No.序号   | Items 项目   | Specifications 规格参数  | Remark 备注  |
|---------|--|--|--|
| 14.2.1  | Rated capacity<br>额定容量                           | Type. 3500mAh<br>Min. 3400mAh  | Standard discharge<br>标准放电   |
| 14.2.2  | Nominal voltage<br>标称电压                          | 3.6V   |  |
| 14.2.3  | Charge Cut-off Voltage<br>充电截止电压                 | 4.2V   |  |
| 14.2.4  | Discharge Cut-off Voltage<br>放电截止电压              | 2.75V  |  |
| 14.2.5  | Standard Charge<br>标准充电                          | Step 1: 0.2C charge to 4.2V;<br>Step 2: CV (constant voltage 4.2V) charge till charge current decline to 0.02C .<br>第 1 步: 0.5C 恒流充电到 4.25V;<br>第 2 步: 4.2V 恒压充电到电流减小到 0.02C 截止. | Temperature: 25±5°C<br>温度: 25±5°C  |
| 14.2.6  | Standard Discharge<br>标准放电                       | 0.2C constant current discharge to the cut-off Voltage<br>0.2C 恒流放电到截止电压   | Temperature: 25±3°C<br>温度: 25±3°C  |
| 14.2.7  | Maximum continuous Charge current<br>最大持续充电电流    | 1.0C   | Temperature: 25±5°C<br>温度: 25±5°C  |
| 14.2.8  | Maximum continuous Discharge current<br>最大持续放电电流 | 3C   | Temperature: 25±5°C<br>温度: 25±5°C  |
| 14.2.9  | Initial Impedance<br>初始内阻                        | ≤40mΩ  | Measure cells using the alternate current impedance meter at 1KHz at 25±5°C.<br>在 25±5°C 下, 用交流电阻抗仪测量电芯内阻, 频率: 1KHz。 |
| 14.2.10 | Weight 重量  | Approx 50g   |  |





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|         |                    |   |  |
|---------|--------------------|---|--|
| 14.2.11 | Cycle Life<br>循环寿命 | Residual capacity:<br>≥80% of $C_{min}$<br>剩余容量: ≥80% $C_{min}$ | 0.2C Charge and 0.2C discharge,<br>800 Cycles at 25±5°C.<br>在 25±5°C 下, 以 0.2C 充放电,<br>循环 800 周。 |
|---------|--------------------|---|--|