AA Portable Power Corp
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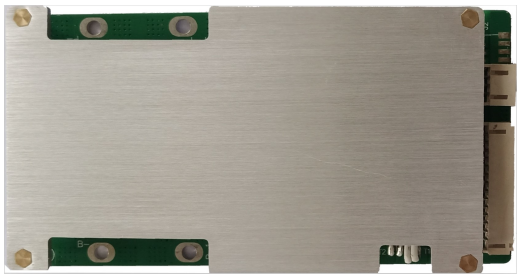
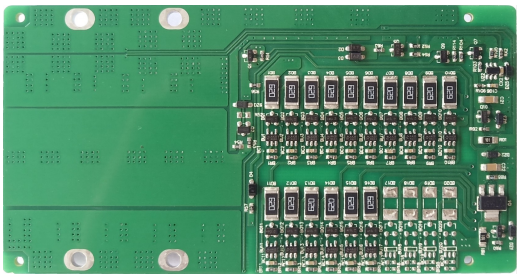
# Product Name: LiFePO4 16S Series BMS

# Product Model: PCM-LFP16S20A

## Brief Introduction





**Features：**

- It has multifunctional safety protection of over charge, over discharge, over current, short-circuited, temperature (detailed as below parameters);
- It has balancing function under the state of charging;
- The FET temperature is lower than 90℃ after discharging for over 1 hours at 20A under ambient temperature 30℃;
- System power consumption：

1. Working ≤100uA （+25℃）

- Nominal parameters：

| Item | Terminals | Nominal value | Unit |
|---|---|---|---|
| Battery design capacity | | N/A | **mAH** |
| Charge voltage | B+, P- | 57.6 | **V** |
| Continue charge current | B+, P- | <21 | **A** |
| Continue discharge current | B+, P- | <21 | **A** |
| Input voltage for terminals | B1,B2,B3,B4,B5,…. B20 | 5 | **V** |
| Internal resistance | B-, P- | <5 | **mΩ** |
| Work temperature | - | -20 ~ +90 | **℃** |

| | | | |
|---|---|---|---|
| Storage temperature | - | -40 ~ +125 | ℃ |
| work humidity | - | <75 | %RH |
| Storage humidity | - | <85 | %RH |

# Detailed parameters

- **Cell Overvoltage Protection**

| Safety level | Min | Typical | Max | Delay | Protected Mode | Release Mode |
|---|---|---|---|---|---|---|
| Overvoltage | 3850mV | 3900mV | 3950mV | 0.8-2S | turn off the Charging FET | - |
| Overvoltage release | 3700mV | 3800mV | 3900mV | 5S | - | turn on the Charging FET |

- **Cell Undervoltage Protection**

| Safety level | Min | Typical | Max | Delay | Protected Mode | Release Mode |
|---|---|---|---|---|---|---|
| Undervoltage | 1950mV | 2000mV | 2050mV | 10-200mS | turn off the Discharging FET | - |
| Undervoltage release | 2200mV | 2300mV | 2400mV | 5S | - | turn on the Discharging FET |

- **Overcurrent in Charge Protection**

| 安全等级<br>Safety level | 最小值<br>Min | 典型值<br>Typical | 最大值<br>Max | 延时<br>Delay | 保护模式<br>Protected Mode | 恢复模式<br>Release Mode |
|---|---|---|---|---|---|---|
| Overcurrent charge | - | - | - | - | - | - |
| Overcurrent release | - | - | - | - | - | - |

- **Overcurrent in Discharge Protection**

| Safety level | Min | Typical | Max | Delay | Protected Mode | Release Mode |
|---|---|---|---|---|---|---|
| 1st Level Overcurrent Discharge | 55A | 65A | 75A | 250-350mS | turn off the Discharging FET | - |
| 1st Level Overcurrent release | - | - | - | - | - | Cut Load ,Auto release |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2nd Level Overcurrent Discharge | 100A | 120A | 140A | 10-150mS | turn off the Discharging FET | - |
| 2nd Level Overcurrent release | - | - | - | - | - | Cut Load ,Auto release |

## ● Short Circuit in Discharge Protection

Test conditions: 16 series 20A battery pack, external short circuit (B+, P-)

| Safety level | Min | Max | Delay | Protected Mode | Release Mode |
|---|---|---|---|---|---|
| Short circuit protection | 400A | - | ≤ 800uS | turn off the Discharging FET | - |
| Short circuit release | - | - | - | - | short circuit Release, Auto recovery |

## • Temperature protection

### 1、Overtemperature in Charge Protection

| Safety level | Min | Typical | Max | Delay | Protected Mode | Release Mode |
|---|---|---|---|---|---|---|
| 1st Level Over temperature (Battery) | 72℃ | 75℃ | 78℃ | 5S | turn off the Charging FET | - |
| 1st Level Over temperature release | 52℃ | 55℃ | 58℃ | 10S | - | turn on the Charging FET |
| 2nd Level Over temperature (Battery) | - | - | - | - | - | - |
| 2nd Level Overtemperature release | - | - | - | - | - | - |
| 3rd Level Over temperature (Battery) | - | - | - | - | - | - |
| 3rd Level Over temperature release | - | - | - | - | - | - |
| 4st Level Over temperature (FET) | 85℃ | 90℃ | 95℃ | 5S | turn off the Charging FET | - |
| 4st Level Over temperature release | 55℃ | 60℃ | 65℃ | 10S | - | turn on the Charging FET |

### 2、Under temperature in Charge Protection

| Safety level | Min | Typical | Max | Delay | Protected Mode | Release Mode |
|---|---|---|---|---|---|---|
| Under temperature | - | - | - | - | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| Under temperature release | - | - | - | - | - | - |

## 3、Overtemperature in Discharge Protection

| Safety level | Min | Typical | Max | Delay | Protected Mode | Release Mode |
|---|---|---|---|---|---|---|
| 1st Level Over temperature (Battery) | 72℃ | 75℃ | 78℃ | 5S | turn off the Discharging FET | - |
| 1st Level Overtemperature release | 52℃ | 55℃ | 58℃ | 10S | - | turn on the Discharging FET |
| 2nd Level Over temperature (Battery) | - | - | - | - | - | - |
| 2nd Level Overtemperature release | - | - | - | - | - | - |
| 3rd Level Over temperature (Battery) | - | - | - | - | - | - |
| 3rd Level Overtemperature release | - | - | - | - | - | - |
| 4st Level Over temperature (FET) | 85℃ | 90℃ | 95℃ | 5S | turn off the Discharging FET | - |
| 4st Level Overtemperature release | 55℃ | 60℃ | 65℃ | 10S | - | turn on the Discharging FET |

## 4、Under temperature in Discharge Protection

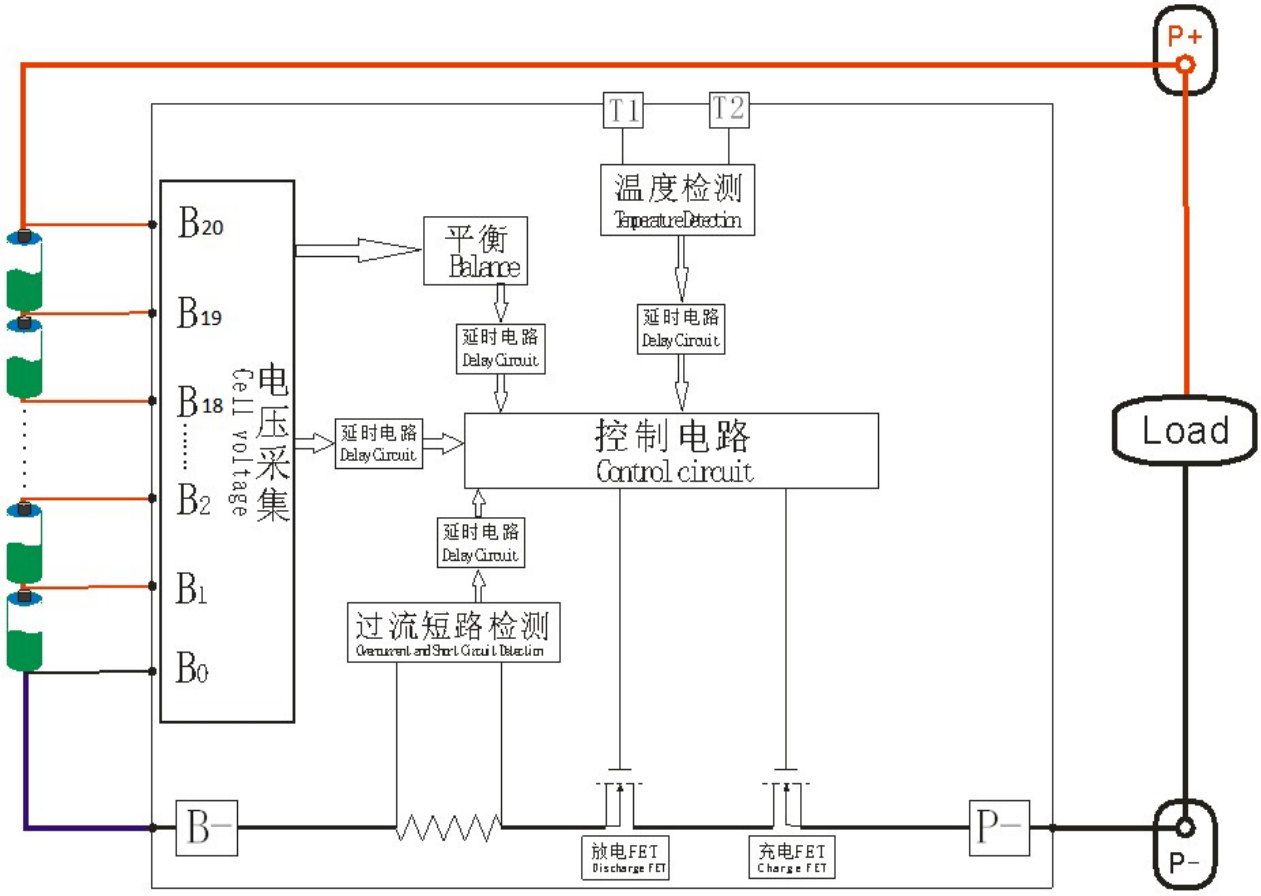
| Safety level | Min | Typical | Max | Delay | Protected Mode | Release Mode |
|---|---|---|---|---|---|---|
| Under temperature | - | - | - | - | - | - |
| Under temperature release | - | - | - | - | - | - |

- **Cell Balancing**

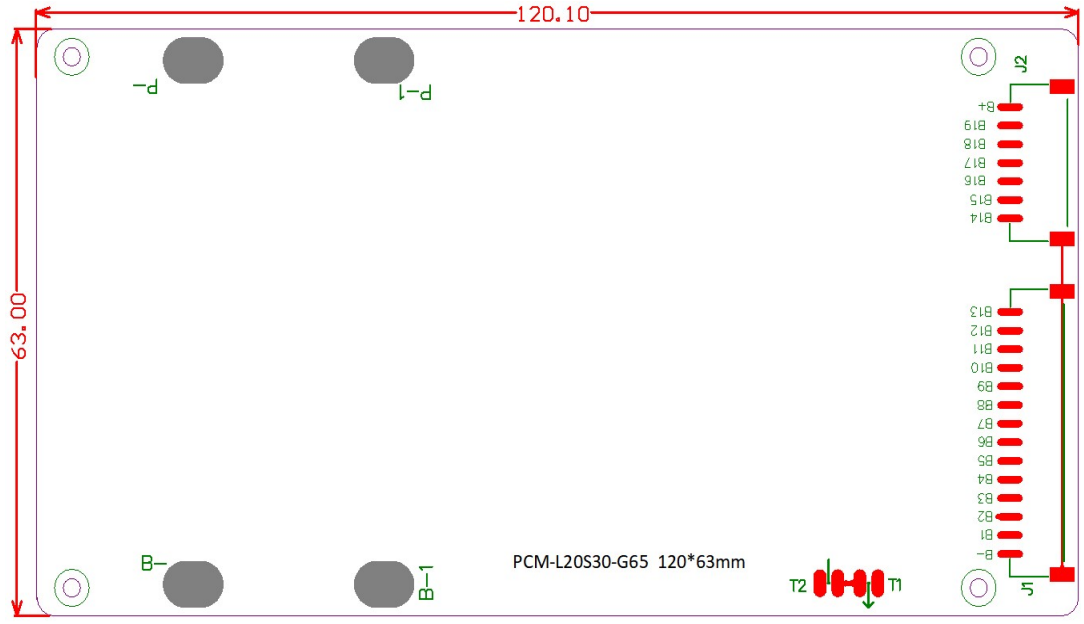
Charge balancing function should be started only when cells voltage difference reached setting value. It will discharge higher voltage cell and balancing function will stop when cells voltage difference lower than setting value.

| Name | Cell Balance Threshold | Cell Balance Window | Cell Balance Min | Cell Balance current | Cell Balance Interval |
|---|---|---|---|---|---|
| Charge Algorithm | voltage≥3600mV | 50mV | 25mV | 58±10mA | - |

- **Schematic block diagram**



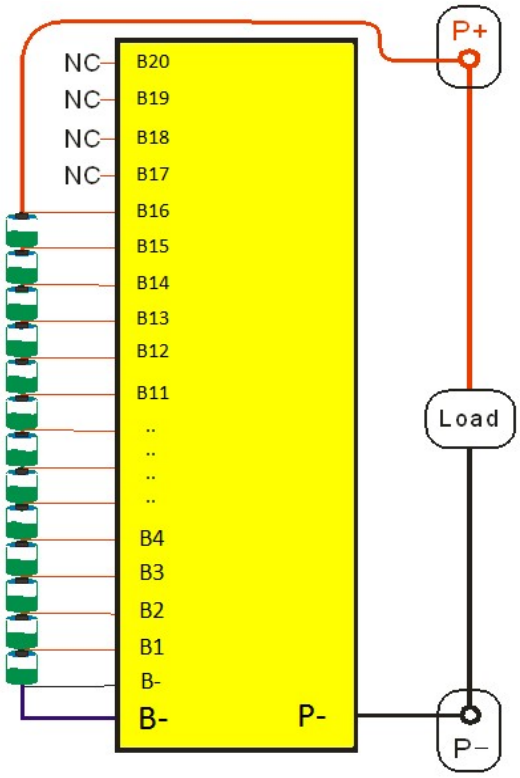

- **PCB Port distribution and definition**



| Terminal No | Descriptions |
|---|---|
| B-.B-1 | Negative pole for main circuit to be connected with negative pole of Cell1 |
| B0 | Negative terminal for cell1 |
| B1 | Positive terminal for Cell1 and negative terminal for cell2 |
| B2 | Positive terminal for cell2 and negative terminal for cell3 |
| B3 | Positive terminal for cell3 and negative terminal for cell4 |
| B4 | Positive terminal for cell4 and negative terminal for cell5 |
| B5 | Positive terminal for cell5 and negative terminal for cell6 |
| B6 | Positive terminal for cell6 and negative terminal for cell7 |
| B7 | Positive terminal for cell7 and negative terminal for cell8 |
| B8 | Positive terminal for cell8 and negative terminal for cell9 |
| B9 | Positive terminal for cell9 and negative terminal for cell10 |
| B10 | Positive terminal for cell10 and negative terminal for cell11 |
| B11 | Positive terminal for cell11 and negative terminal for cell12 |
| B12 | Positive terminal for cell12 and negative terminal for cell13 |
| B13 | Positive terminal for cell13 and negative terminal for cell14 |
| B14 | Positive terminal for cell14 and negative terminal for cell15 |
| B15 | Positive terminal for cell15 and negative terminal for cell16 |
| B+ | Positive terminal for cell16 |
| P-.P-1 | Negative terminals for discharge |
| J1.J2 | Terminals for battery voltage detection |
| T2 | Terminal for MOSFET temperature detection device |
| T1 | terminal for battery temperature detection device |

- **Example diagram and physical diagram of battery connection**

Example of 16S battery connection diagram




**Note:** the connection between cells and PCB should be followed this order:
**B-→B1→B2→B3→B4→B5→B6→B7→B8→B9→→→→→→→→→→→→B15→B16,**
Or It will cause potential damage to the BMS if not go by this connection order

## Warranty

The warranty period of this product is 12 months, during which, any damage under normal usage should be within warranty service by AA Portable Power Corp. Any damage caused by below abnormal conditions should be not covered by the Warranty policy.

1. Incorrect operation or use
2. The use of environmental conditions exceeds the specifications
3. Unauthorized disassembly and maintenance
4. Deliberate destruction
5. Water or dampness
6. Irresistible natural factors