



AE-BID-CTP-C52-3V2A

Datasheet

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Zhuhai Virtual Power Plant Technology Co., Ltd

Declaration

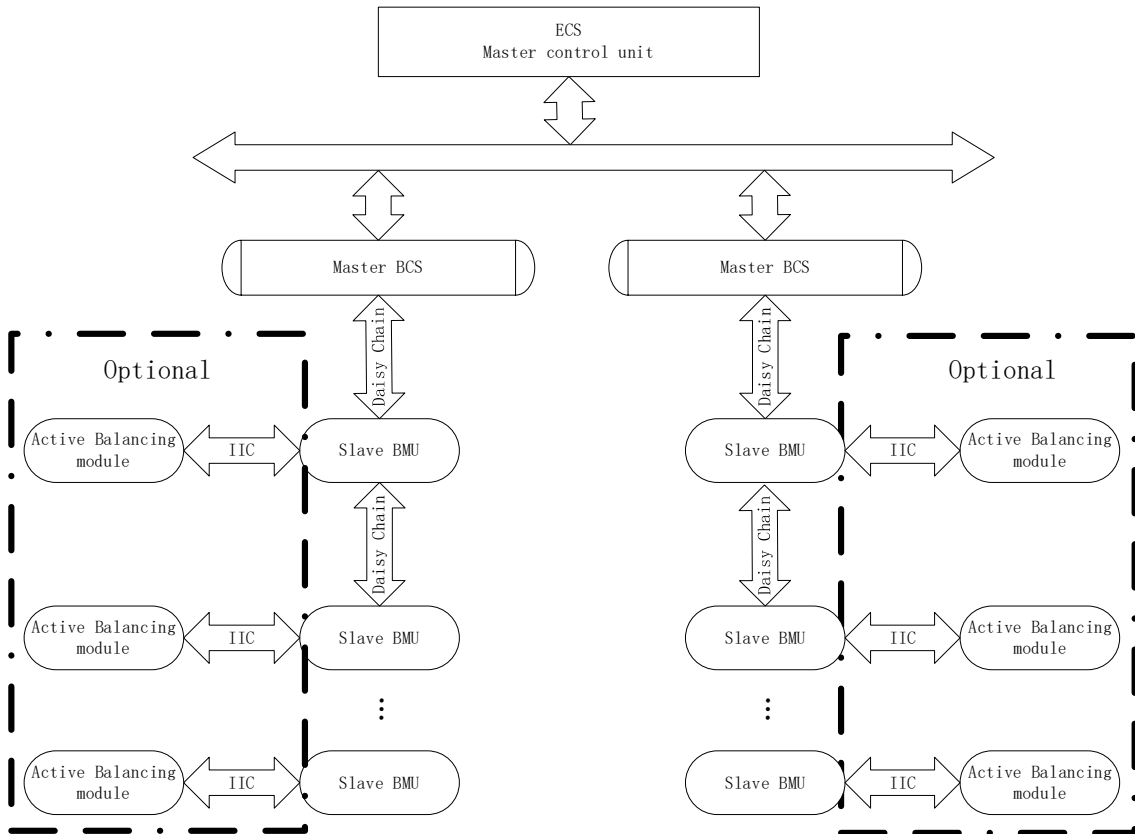
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1 System Overview

1.1 System Architecture



1.2 System Functions and Features

1. The system operates at a rated voltage of 24V, with a working voltage range of 18V to 36V, meeting the requirements of various energy storage applications.
2. The system supports both individual cell voltage and battery pack terminal voltage acquisition, featuring high accuracy and speed. Reliability is ensured through comparison between cumulative cell voltages and pack terminal measurements.
3. The system provides temperature and current acquisition capabilities, allowing flexible configuration of temperature sensor quantities and current measurement methods (shunt or Hall sensor). All acquisitions are characterized by high precision and reliability.

4. The system includes accurate insulation detection to ensure the safety and reliability of the battery system.
5. Using proprietary integrated algorithms based on collected battery data, the system calculates State of Charge (SOC) and State of Health (SOH) in real-time, delivering high accuracy under both dynamic and static conditions.
6. The active balancing system employs a self-developed balancing algorithm capable of high-current balancing. It offers high efficiency, high reliability, ultra-low standby power consumption, and supports cascading and easy expansion.
7. Based on collected and computed battery data, the system monitors the operating status and fault levels of the battery pack in real-time, enabling alarm and protection functions.
8. The system features a wide range of interfaces to support various application scenarios, facilitating charge/discharge control and thermal management of the battery pack.
9. The system is equipped with multiple CAN and RS485 communication interfaces for data exchange and control with devices such as PCS and ECS, as well as communication with display modules. It also supports 4G, GPS, Bluetooth, and Wi-Fi for remote monitoring, control, and system upgrades.
10. The system uses high-reliability components and incorporates multiple redundant protection measures. It is designed to withstand harsh electromagnetic environments, high temperatures, and vibrations, ensuring high reliability, stability, and strong anti-interference performance.
11. The system is suitable for various energy storage applications, including power plant storage, residential energy storage, and echelon utilization, offering excellent scalability and adaptability.

2 Active Balancing Module

2.1 Product Description of Active Balancing Module

The active balancing module is of great significance to energy storage battery management systems (BMS). Active balancing is a key technology to overcome the "bucket effect" in battery packs, maximizing the performance, safety, and economy of the energy storage system. It breaks through the limitations of traditional passive balancing by directly transferring energy from high-voltage (high SOC) cells to low-voltage (low SOC) cells.

The active balancing module adopts a stacked-board design, allowing users to decide whether to install it based on their needs. It supports active balancing for up to 52 cells within a PACK, with a maximum continuous balancing current of 2A.

2.2 Functions and Features of Active Balancing Module

The module includes, but is not limited to, the following functions:

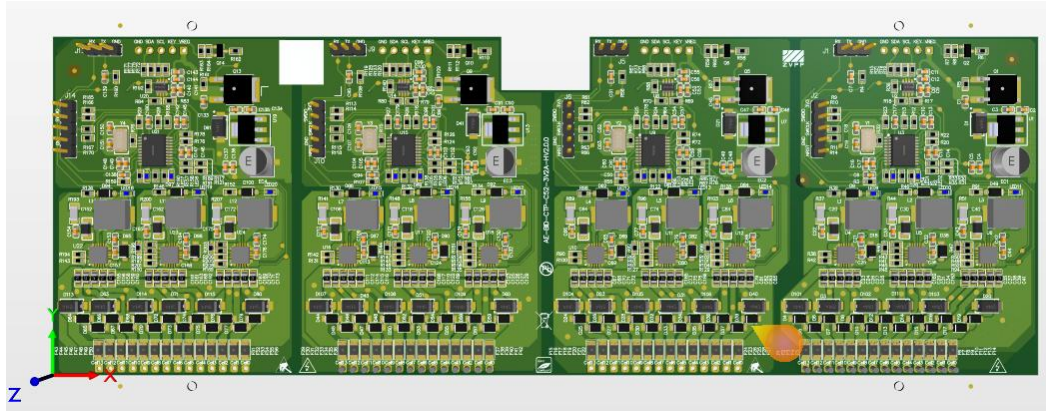
1. **Minimized Size:** By increasing the switching frequency, the size of the active balancing module is minimized as much as possible.
2. **Balancing Direction:** Programmable balancing direction allows energy to flow freely between 1 to 52 cells, enabling targeted charging or discharging.
3. **Safety:** The balancing current can be adaptively adjusted based on the temperature and humidity of the system, enhancing overall safety and preventing thermal runaway.
4. **Stacked-Board Design:** Users can choose whether to install the active balancing module, saving space while maintaining flexibility.
5. **Balancing Current:** The module provides a maximum continuous balancing current of 2A.
6. **Communication:** Uses IIC communication with the slave control unit, enabling convenient reporting of the current balancing status to the user interface.
7. **Material Safety:** All materials comply with the UL-94V0 flame retardant rating.
8. **Safety Compliance:** Meets 1500V safety requirements and supports UL certification for 1500V systems.

2.3 Electrical Characteristics

Parameters		Min	Typ	Max	Unit	Comments
Cell voltage	Voltage range	0	-	5	V	-
Working temperature	Temperature range	40	-	85	°C	
Active balancing	Current	-	2000	3750	mA	-
Productiveness	Efficiency in balance	-	92%	-		
Insulation and voltage	Insulation resistance	100	-	-	MΩ	Voltage sampling terminal, casing,

						and digital interface terminal
	Rated operational voltage	-	-	1500	V	-

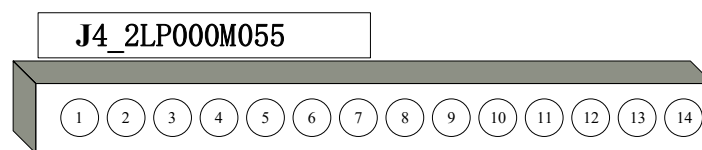
2.4 Dimensional Drawing



Note: The socket numbers correspond to the following pin definitions

2.5 Terminal Interface Definition

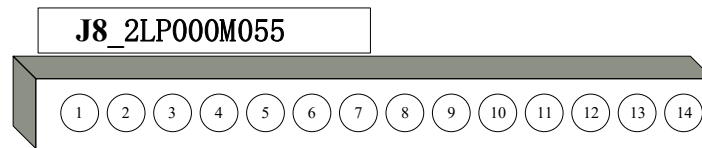
• J4_2LP000M055



Pin	Definition	Description
J4-1	A_Cell13	Battery sampling cell 13 positive
J4-2	A_Cell12	Battery sampling cell 12 positive
J4-3	A_Cell11	Battery sampling cell 11 positive
J4-4	A_Cell10	Battery sampling cell 10 positive
J4-5	A_Cell9	Battery sampling cell 9 positive
J4-6	A_Cell8	Battery sampling cell 8 positive
J4-7	A_Cell7	Battery sampling cell 7 positive

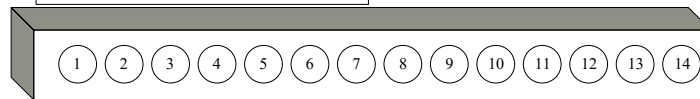
J4-8	A_Cell6	Battery sampling cell 6 positive
J4-9	A_Cell5	Battery sampling cell 5 positive
J4-10	A_Cell4	Battery sampling cell 4 positive
J4-11	A_Cell3	Battery sampling cell 3 positive
J4-12	A_Cell2	Battery sampling cell 2 positive
J4-13	A_Cell1	Battery sampling cell 1 positive
J4-14	A_Cell0	Battery sampling power supply negative

• **J8_2LP000M055**

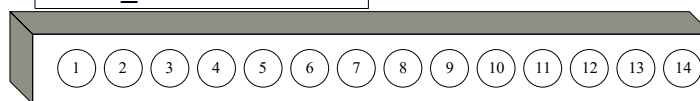


Pin	Definition	Description
J8-1	B_Cell13	Battery sampling cell 13 positive
J8-2	B_Cell12	Battery sampling cell 12 positive
J8-3	B_Cell11	Battery sampling cell 11 positive
J8-4	B_Cell10	Battery sampling cell 10 positive
J8-5	B_Cell9	Battery sampling cell 9 positive
J8-6	B_Cell8	Battery sampling cell 8 positive
J8-7	B_Cell7	Battery sampling cell 7 positive
J8-8	B_Cell6	Battery sampling cell 6 positive
J8-9	B_Cell5	Battery sampling cell 5 positive
J8-10	B_Cell4	Battery sampling cell 4 positive
J8-11	B_Cell3	Battery sampling cell 3 positive
J8-12	B_Cell2	Battery sampling cell 2 positive
J8-13	B_Cell1	Battery sampling cell 1 positive
J8-14	B_Cell0	Battery sampling power supply negative

• **J12_2LP000M055**

J12_2LP000M055


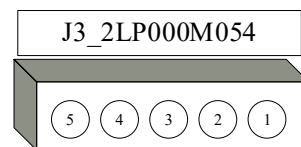
Pin	Definition	Description
J12-1	C_Cell13	Battery sampling cell 13 positive
J12-2	C_Cell12	Battery sampling cell 12 positive
J12-3	C_Cell11	Battery sampling cell 11 positive
J12-4	C_Cell10	Battery sampling cell 10 positive
J12-5	C_Cell9	Battery sampling cell 9 positive
J12-6	C_Cell8	Battery sampling cell 8 positive
J12-7	C_Cell7	Battery sampling cell 7 positive
J12-8	C_Cell6	Battery sampling cell 6 positive
J12-9	C_Cell5	Battery sampling cell 5 positive
J12-10	C_Cell4	Battery sampling cell 4 positive
J12-11	C_Cell3	Battery sampling cell 3 positive
J12-12	C_Cell2	Battery sampling cell 2 positive
J12-13	C_Cell1	Battery sampling cell 1 positive
J12-14	C_Cell0	Battery sampling power supply negative

• J16_2LP000M055
J16_2LP000M055


Pin	Definition	Description
J16-1	D_Cell13	Battery sampling cell 13 positive
J16-2	D_Cell12	Battery sampling cell 12 positive
J16-3	D_Cell11	Battery sampling cell 11 positive
J16-4	D_Cell10	Battery sampling cell 10 positive
J16-5	D_Cell9	Battery sampling cell 9 positive
J16-6	D_Cell8	Battery sampling cell 8 positive

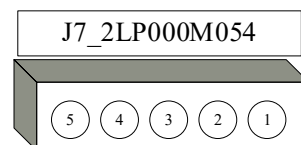
J16-7	D_Cell7	Battery sampling cell 7 positive
J16-8	D_Cell6	Battery sampling cell 6 positive
J16-9	D_Cell5	Battery sampling cell 5 positive
J16-10	D_Cell4	Battery sampling cell 4 positive
J16-11	D_Cell3	Battery sampling cell 3 positive
J16-12	D_Cell2	Battery sampling cell 2 positive
J16-13	D_Cell1	Battery sampling cell 1 positive
J16-14	D_Cell0	Battery sampling power supply negative

• **J3_2LP000M054**



Pin	Definition	Description
J3-1	A_VREG	AFE generated 5V power supply output positive
J3-2	A_KEY	AFE GPIO3
J3-3	A_SCL	AFE IIC communication SCL
J3-4	A_SDA	AFE IIC communication SDA
J3-5	A_GND	AFE power ground

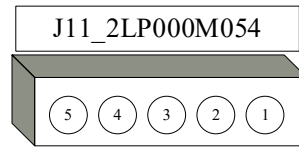
• **J7_2LP000M054**



Pin	Definition	Description
J7-1	B_VREG	AFE generated 5V power supply output positive
J7-2	B_KEY	AFE GPIO3
J7-3	B_SCL	AFE IIC communication SCL
J7-4	B_SDA	AFE IIC communication SDA

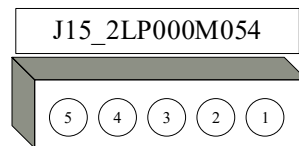
J7-5	B_GND	AFE power ground
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• J11_2LP000M054



Pin	Definition	Description
J11-1	C_VREG	AFE generated 5V power supply output positive
J11-2	C_KEY	AFE GPIO3
J11-3	C_SCL	AFE IIC communication SCL
J11-4	C_SDA	AFE IIC communication SDA
J11-5	C_GND	AFE power ground

• J15_2LP000M054



Pin	Definition	Description
J15-1	D_VREG	AFE generated 5V power supply output positive
J15-2	D_KEY	AFE GPIO3
J15-3	D_SCL	AFE IIC communication SCL
J15-4	D_SDA	AFE IIC communication SDA
J15-5	D_GND	AFE power ground