JK-DZ11-B2A24S balancer communication protocol V1.3

1. Overview

This agreement restricts the JK-DZ11-B2A24S balancer board's external communication electrical interface, data format, communication rate and other content.

2. Communication parameters

The communication parameter agreement is shown in Table 1

Table 1

Communication Interface	RS485
Baud rate	9600

3. Communication format

The system uses the master-slave response method for communication and transmission. During communication, the balancer is the slave and the control device is the master. All communication can only be initiated by the host, and the slave performs the corresponding operation after receiving the command, and returns the result to the host within 1S. If the complete response data frame from the slave is not received for more than 1S, it indicates that the data delivery failed. After the host sends a frame of data, it must wait for the slave to send back data or time out before sending the next command.

The communication content is identified by sixteen, and the transmission unit is "frame". It is stipulated that the data transmission from the master to the slave is issued, and the data transmission from the slave to the master is upload.

4.3 Frame format sent by the host

In the frame sent by the host, a frame of data includes 5 data areas such as the frame header, slave address, command code, frame data, and checksum. The frame format is shown in Table 2.

Table 2 Send frame format

Frame header	Slave address	Command code	Frame data	Checksum
2Byte	1Byte	1Byte	2Byte	1Byte

among them:

"Frame header" means the beginning of a frame of data, the length is 2 Bytes, and it is fixed at 0x55 0xAA;

"Slave address" means the number of the slave operated by this instruction, the length is 1 Byte;

"Command" indicates the operation content of the frame;

"Frame data" means the data carried in the frame;

"Check" adopts sum check, which is the accumulation of frame header to frame data;

4.4 Upload frame format from the machine

In the data frame uploaded by the slave, one frame of data contains 6 data areas such as frame header, slave address, command code, frame data, and checksum.

Table 3 Upload frame format

Frame header	Slave address	Command code	Frame data	Checksum
2Byte	1Byte	1Byte	69Byte	1Byte

among them:

"Frame header" means the beginning of a frame of data, the length is 2 Bytes, and it is fixed as 0xEB 0x90;

"Slave address" means the number of the slave operated by this instruction, the length is 1 Byte;

"Command" indicates the content of the issued frame in response to the frame;

"Frame data" means the data carried in the frame;

"Check" adopts addition and check, which is the accumulation of frame header to frame data;

4. Communication process

The following takes the device address 0x01 as an example to describe the communication.

4.1 Request balancer data

1) Host sends data

55 AA 01 FF 00 00 FF The data structure is shown in Table 4.

Table 4

Offset	content	type of data	length	unit	Sample data
0	Frame header	UINT8	2	-	0x55 0xAA
2	Slave address	UINT8	1	-	0x01
3	Command code	UINT8	1	-	0xFF
4	Frame data	UINT16	1	-	0x0000
6	Checksum	UINT8	1	-	0xFF

2) balancer response

EB 90 01 FF 1E D3 0F 69 14 13 02 00 00 00 07 00 00 00 05 03 E8 01 14 0F 69 0F 69 0F 69 0F 69 0F 69 0F 69 0F 69 0F 69 0F 69 0F 69 0F 69 0F 69 0F 69 0F 69 0F 69 0F 69 0F 69 0F 69 0F 69 0F 69 0F 69 0F 69 0F 69 0F 69 00 16 6F

The data structure is shown in Table 5

Table 5

Offset	content	type of data	length	unit	Sample data
0	Frame header	UINT8	2	-	0xEB 0x90
2	Slave address	UINT8	1	-	0x01
3	Command code	UINT8	1	-	0xFF
4	Total battery voltage	UINT16	1	10mV	0x1ED3*10mV=78.910 V
6	Average cell voltage	UINT16	1	mV	0x0F69 * 1mV= 3.995V
8	Identify the number of monomers	UINT8	1	string	0x14 = 20 string
9	Highest monomer	UINT8	1	-	0x13 = 19 string
10	Lowest monomer	UINT8	1	-	0x02 = 2 string
11	Equilibrium	UINT8	1	-	BIT0 means balanced battery charging; BIT1 means balanced battery discharge;

12	Alarm status	UINT8	1	-	The number of BIT0 monomers is set incorrectly;
					BIT1 indicates that the wire resistance is too large;
					BIT2 means battery overvoltage;
13	Maximum voltage difference	UINT16	1	mV	0x0007 = 7mV
15	Balance current	UINT16	1	mA	0x0000 = 0mA
17	Balanced trigger voltage	UINT16	1	mV	0x0005*1mV = 5mV
19	Maximum balance current	UINT16	1	mA	0x03E8*1mA = 1000mA
21	Balance switch	UINT8	1	-	0x01 Balanced on
22	Set the number of monomers	UINT8	1	string	0x14*1 string = 20 string
23	Voltage 0	UINT16	1	mV	0x0F69*1mV =3945mV
25	Voltage 1	UINT16	1	mV	0x0F69*1mV =3945mV
27	Voltage 2	UINT16	1	mV	0x0F69*1mV =3945mV
29	Voltage 3	UINT16	1	mV	0x0F69*1mV =3945mV
31	Voltage 4	UINT16	1	mV	0x0F69*1mV =3945mV
33	Voltage 5	UINT16	1	mV	0x0F69*1mV =3945mV
35	Voltage 6	UINT16	1	mV	0x0F69*1mV =3945mV
37	Voltage 7	UINT16	1	mV	0x0F69*1mV =3945mV
39	Voltage 8	UINT16	1	mV	0x0F69*1mV =3945mV
41	Voltage 9	UINT16	1	mV	0x0F69*1mV =3945mV
43	Voltage 10	UINT16	1	mV	0x0F69*1mV =3945mV
45	Voltage 11	UINT16	1	mV	0x0F69*1mV =3945mV
47	Voltage 12	UINT16	1	mV	0x0F69*1mV =3945mV
49	Voltage 13	UINT16	1	mV	0x0F69*1mV =3945mV
51	Voltage 14	UINT16	1	mV	0x0F69*1mV =3945mV
53	Voltage 15	UINT16	1	mV	0x0F69*1mV =3945mV
55	Voltage 16	UINT16	1	mV	0x0F69*1mV =3945mV
57	Voltage 17	UINT16	1	mV	0x0F69*1mV =3945mV
59	Voltage 18	UINT16	1	mV	0x0F69*1mV =3945mV
61	Voltage 19	UINT16	1	mV	0x0F69*1mV =3945mV
63	Voltage 20	UINT16	1	mV	0x0F69*1mV =3945mV
65	Voltage 21	UINT16	1	mV	0x0F69*1mV =3945mV
67	Voltage 22	UINT16	1	mV	0x0F69*1mV =3945mV
69	Voltage 23	UINT16	1	mV	0x0F69*1mV =3945mV
71	temperature	INT16	1	℃	0x0016*1℃=22℃
73	Checksum	UINT8	1	-	0x6F

4.2 Set the number of monomer strings

1) Host sends data

55 AA 01 F0 00 10 00 The data structure is shown in Table 6

Table 6

Offset	content	type of data	length	unit	Sample data
0	Frame header	UINT8	2	-	0x55 0xAA
2	Slave address	UINT8	1	-	0x01
3	Command code	UINT8	1	-	0xF0
4	Frame data	UINT16	1	string	0x0010 = 16 string
6	Checksum	UINT8	1	-	0x00

Note 1. The range of the number of monomers is 2-24. The balancer will not recognize the out-of-range balancer and return to the internal parameters of the current balancer.

2) balancer response

EB 90 01 F0 00 10 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 7C

The data structure is shown in Table 7

Table 7

Offset	content	type of data	length	unit	Sample data
0	Frame header	UINT8	2	-	0xEB 0x90
2	Slave address	UINT8	1	-	0x01
3	Command code	UINT8	1	-	0xF0
4	Set the number of monomers	UINT16	1	string	0x0010*1 string=16 string
6-72	Keep	UINT8	65	-	-
73	Checksum	UINT8	1	-	0x7C

4.3 Set equalizing trigger voltage difference

1) 1) Host sends data

55 AA 01 F2 00 0A FC   The data structure is shown in Table 8

Table 8

Offset	content	type of data	length	unit	Sample data
0	Frame header	UINT8	2	-	0x55 0xAA
2	Slave address	UINT8	1	-	0x01
3	Command code	UINT8	1	-	0xF2
4	Frame data	UINT16	1	mV	0x000A * 1mV = 10mV
6	Checksum	UINT8	1	-	0xFC

Note 1. The equalization trigger voltage difference range is 2-1000mV. Out of the range, the balancer will not recognize it and return to the current balancer internal parameters.

2) balancer response

EB 90 01 F2 00 0A 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 78

The data structure is shown in Table 9

Table 9

Offset	content	type of data	length	unit	Sample data
0	Frame header	UINT8	2	-	0xEB 0x90
2	Slave address	UINT8	1	-	0x01

3	Command code	UINT8	1	-	0xF2
4	Balanced trigger voltage	UINT16	1	mV	0x000A * 1mV =10mV
6-72	Keep	UINT8	65	-	-
73	Checksum	UINT8	1	-	0x78

4.4 Set the maximum balance current

1) Host sends data

55 AA 01 F4 01 F4 E9 The data structure is shown in Table 10

Table 10

Offset	content	type of data	length	unit	Sample data
0	Frame header	UINT8	2	-	0x55 0xAA
2	Slave address	UINT8	1	-	0x01
3	Command code	UINT8	1	-	0xF4
4	Frame data	UINT16	1	mA	0x01F4 * 1mA = 500mA
6	Checksum	UINT8	1	-	0xE9

Note 1. The maximum equalization current range is 30-1000mA. Out of the range, the balancer will not recognize it, and return to the current internal parameters of the balancer.

2) balancer response

EB 90 01 F4 01 F4 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 65
The data structure is shown in Table 11

Table 11

Offset	content	type of data	length	unit	Sample data
0	Frame header	UINT8	2	-	0xEB 0x90
2	Slave address	UINT8	1	-	0x01
3	Command code	UINT8	1	-	0xF4
4	Maximum balance current	UINT16	1	mA	0x01F4 * 1mA = 500mA
6-72	Keep	UINT8	65	-	-
73	Checksum	UINT8	1	-	0x65

4.5 Setting the balance switch

1) Host sends data

55 AA 01 F6 00 01 F7 The data structure is shown in Table 12

Table 12

Offset	content	type of data	length	unit	Sample data
0	Frame header	UINT8	2	-	0x55 0xAA
2	Slave address	UINT8	1	-	0x01
3	Command code	UINT8	1	-	0xF6
4	Frame data	UINT16	1	-	0x0001 Turn on balance
6	Checksum	UINT8	1	-	0xF7

Note 1. The setting range of the balancer switch is 0-1, 0 means to turn off the balancer; 1 means to turn on the balancer; the balancer will not recognize the out-of-range balancer and return to the current internal parameters of the balancer.

2) balancer response

EB 90 01 F6 00 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 73
The data structure is shown in Table 13

Table 13

Offset	content	type of data	length	unit	Sample data
0	Frame header	UINT8	2	-	0xEB 0x90
2	Slave address	UINT8	1	-	0x01
3	Command code	UINT8	1	-	0xF6
4	Balance switch	UINT16	1	-	0x0001 Balanced on
6-72	Keep	UINT8	65	-	-
73	Checksum	UINT8	1	-	0x73