Software board common protocol V8

Table of contents

1. Physical interface

This protocol supports Jiabaida software boardRS485/RS232/UARTGeneral interface protocol, consistent with the host computer protocol,baud rate9600BPSOr other customer-customized rates.all16Bit data is all in big-endian mode, with the high byte in front and the low byte in the back. (Note that there are examples at the end of the agreement)
Since the protection boards all have sleep mode, the first piece of data cannot be responded to in sleep mode and needs to happen again. deliver.

two,.frame structure

The host sends instructions:

start bit	read bit	command code	length	Data content	check	Stop bit	CALLBACK_ID
0xDD	0xA5-read 0x5A-Write	Register address	Indicates the data length, excluding itself	Data content, length is0When, this is empty, skip	is the content of the data segment+Length bytes+The checksum of the command code bytes is then inverted and added.1,High position in front, low position in back	0x77	The maximum length is 4BYTE and can be empty. The slave will reply to what the master sends.

BMSresponse:

start bit	command code	status bit	length	Data content	check	Stop bit	CALLBACK_ID

0xDD	Register address	00 indicates successful reading, 0x80 indicates failure	Indicates the data length, excluding itself	Data content, please see the analysis below for specific content.	is the content of the data segment+Length bytes+The checksum of the status code byte is then inverted and added.1,High position in front, low position in back	0x77	The maximum length is 4BYTE and can be empty. The slave will reply to what the master sends.

The agreement mainlyCommand code:

read03Read basic information and status, including capacity, total voltage, current, temperature, protection status and other chips

read04Read battery cell voltageContains the cell voltage of each string of batteries

read05Read the protection board hardware version number -Read the version information of the board

readAARead protection boardProtection board historical protection times –Read history protection times

The status bit is increased, the response fails and the command code is added to distinguish: 0x00 - indicates that the execution operation is successful; 0x80 - the command code does not exist;

0x81-Operation error and invalid operation (if there is no factory mode setting parameter or the internal password does not match, the password function is for Bluetooth);

0x82—Verification error (in principle, verification errors are not returned, so that error data will be returned when used in parallel with other devices)

0x83 - Password pairing error returned during password operation.

3. Command explanation

3.1Basic information0x03instruction

The host sends and reads basic information0x03instruction

0xDD	0xA5	0x03	0	--(empty if not available)	checksum	0x77

BMSResponse to read basic information0x03instruction

0xDD	0x03	state,0Table is correct	Indicates the data length, excluding itself. The length of the response when writing is0	Data content, length is0When, skip here	checksum	0x77
		Return on error0x80	0		checksum	0x77

Example:

Host sends: DD A5 03 00 FF FD 77

BMSresponse:DD 03 00 1B 17 00 00 00 02 D0 03 E8 00 00 20 78 00 00 00 00 00 00 10 48 03 0F 02 0B 76 0B 82 AA BB CC FB FF 77

Red is the byte being checked, which is the sum of all bytes; what follows2is the verification result, which is the inversion of the sum of all previous verifications.+1the result of

Data content explanation

Data content	Byte size	illustrate
total voltage	2BYTE,unit10mV, high byte first, the same below.	The value in the routine is = 0x1700
current	2BYTE, default unit10mA, if the highest bit of FET control status is 1, the unit is 100mA	Signed type 16base number,The charging and discharging status of the battery is judged by the current. Charging is positive and discharging is negative.For example charging1A, the transmission value is0x0064,discharge1AThe transmission value is0X10000 -0X0064 = 0xff9c;
The remaining capacity	2BYTE, default unit10mAh, if the highest bit of FET control status is 1, the unit is 100mAh	=0x02d0
Nominal capacity	2BYTE, default unit10mAh, if the highest bit of FET control status is 1, the unit is 100mAh	=0x03e8

Cycles	2BYTE	= 0000
Production Date	2BYTE	use2Bytes are transferred such as0x2078,The date is the lowest5for:0x2078&0x1f = 24Represents date;month(0x2078>>5）&0x0f= 0x03express3moon;The year is2000+ (0x2078>>9) = 2000 + 0x10 =2016; =
equilibrium state	2BYTE	EverybitIt means that each string is balanced,0To close,1means open1~16string
equilibrium state_high	2BYTE	EverybitIt means that each string is balanced,0To close,1means open17~32String, highest support32stringV0Increased based on version
protection status	2BYTE	EverybitIndicates a state of protection,0for unprotected,1occurrence protectionSee note for details1：
Software version	1byte	0x10express1.0Version
RSOC	1byte	Indicates the remaining capacity percentage =0x48=80%
DONEcontrol state	1byte	notindicates status,bit0Indicates charging MOS,bit1Represents discharge MOS,0expressnotclosure,1means open =0x03 means they are all open BIT2Indicates whether the current limiting module is turned on,1 is open, 0 isto close Bit3: Indicates whether heating is on,1 means heating, 0 means off. Among them BIT7used to expressCurrent capacity unit. If the highest bit is 1, it means the current capacity unit is 0..1A/0.1Ah V9 added, not used yet
Number of battery strings	1byte	Number of battery strings =0x0f = 15 strings
NTCnumberN	1byte	NTCNumber = 2 temperature controls

NindivualNTCcontent	2*N,unit0.1K, high in front	Using absolute temperature transmission,2731+(actual temperature*10),0Every time = 2731 25Every time = 2731+25*10 = 2981 Temperature 1 = 0x0b76 = 2934, actual value = 2934 -2731 = 20.3℃, Temperature 2= 0xb82= 2946 – 2731 = 21.5℃
humidity	1BYTE	Unit, 1%
Alarm status	2BYTE	See note 2, not used normally
full charge capacity	2BYTE	10mAH
The remaining capacity	2BYTE	10mAH
Balanced current	2BYTE	mA

Note1: Protection status description
bit0Single unit overvoltage protection
bit1Single unit under voltage protection
bit2Whole group overvoltage protection
bit3The whole group undervoltage protection
bit4Charging over-temperature protection
bit5Charging low temperature protection
bit6Discharge over temperature protection
bit7Discharge low temperature protection
bit8Charging overcurrent protection
bit9Discharge overcurrent protection
bit10Short circuit protection
bit11Front-end detectionICmistake
bit12software locknot
bit13 charging MOS breakdown flag
bit14 discharge MOS breakdown flag
bit15 reserved

Note2:Alarm status description
bit0Single high voltageAlarm
bit1monomerLowpressAlarm
bit2whole grouphighpressAlarm
bit3whole groupLowpressAlarm
bit4ChargehightemperatureAlarm
bit5Charging low temperatureAlarm
bit6dischargetelltemperatureAlarm
bit7Discharge low temperature protection
bit8ChargeHigh current alarm
bit9dischargeHigh current alarm
bit10Large unit pressure difference alarm
bit11Low capacity alarm
bit12reserved
bit13 reserved
bit14 reserved

3.2 Cell voltage0x04instruction

Command details

0xDD	0xA5	0x04	0	--(empty if not available)	checksum	0x77

BMSResponse to read basic information0x04instruction

0xDD	0x04	state,0Table is correct	Indicates the data length, excluding itself. The length of the response when writing is0	Data content, length is0When, skip here	checksum	0x77
		Return on error0x80	0		checksum	0x77

Host sends:DD A5 04 00 FF FC 77

BMSresponse:DD 04 00 1E 0F 66 0F 63 0F 63 0F 64 0F 3E 0F 63 0F 37 0F 5B 0F 65 0F 3B 0F 63 0F 63 0F 3C 0F 66 0F 3D F9 F9 77

Red is the byte being checked, which is the sum of all bytes; what follows2is the verification result, which is the inversion of the sum of all previous verifications.+1the result of

Data content explanation

Data length	The data length is the number of battery stringsNmultiply by2
The voltage of the first string of cells	2Byte,unitmV, high position first
Second string cell voltage	2Byte,unitmV, high position first
The third string cell voltage	2Byte,unitmV, high position first
No.NString cell voltage	2Byte,unitmV, high position first

3.3 Hardware version number 05 command

The host sends the hardware version number of the reading protection board0x05command, longest supported31characters, write the model through the device model of the host computer

0xDD	0xA5	0x05	0	--(empty if not available)	checksum	0x77

BMSResponse to read basic information0x05instruction

0xDD	0x05	state,0Table is correct	Indicates the data length, excluding itself. The length of the response when writing is0	Data content, length is0When, skip here	checksum	0x77
		Return on error0x80	0		checksum	0x77

Data content explanation

Data lengthN	Device type name length
BYTE0	first character ofASCIIcode (for example, the hardware version isLH-XXXX, then the length is7, byte0 = 'L')
BYTE(N-1)	

Host sends:DD A5 05 00 FF FB 77

BMSresponse:DD 05 **00 0A 30 31 32 33 34 35 36 37 38 39** FD E9 77 --Represents its hardware version number0123456789

Red is the byte being checked, which is the sum of all bytes; what follows2is the verification result, which is the inversion of the sum of all previous verifications.+1the result of

3.4 Number of protection statistics:

send:send:DD A5 AA 00 FF 56 77
take over:read:DD AA 00 1800 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 00FF E8 77

Data content	Byte size	Description (both bytes are high-order bit first)
Short circuit protection times	2BYTE	like00 01 Calculation:00&0xff << 8 + 01&0xff

Number of charging overcurrents	2BYTE	As above
Discharge overcurrent times	2BYTE	
Number of monomer overvoltages	2BYTE	
Number of times of single unit undervoltage	2BYTE	
High temperature charging times	2BYTE	
Number of low temperature charges	2BYTE	
Discharge high temperature times	2BYTE	
Discharge low temperature times	2BYTE	
Overall number of overvoltages	2BYTE	
Overall undervoltage times	2BYTE	

Number of system restarts	2BYTE	

Note that in order to be compatible with older versions, the return length is determined here. When the data length is 22, there is no system restart count, and when the data length is 24, there is a system restart count.

4. ControlnotCommand(FB)

Host send controlnotinstruction

start bit	status bit	command code	length	Data content	check	Stop bit
0xDD	0X5A	0XFB	0X02	YYXX	CHECKSUM_H CHECKSUM_L	0X77

BMSresponsewriteBasic Information0xfbinstruction

0xDD	0xFB	0x00	0x00	--	Checksum_HChecksum_L	0x77

Note: The verification calculation method is consistent with other methods. inXXExpress controlnotstatus,YY represents the MOS tube type

BIT0: Charging switch control: 1 turns off the charging switch; 0 turns on the charging switch.

BIT1: Discharge switch control: 1 turns off the discharge switch; 0 turns on the discharge switch.

For specific value definitions, please refer to the following list:

YYvalue (priority level)	XXvalue	notActions
YY	0X00	Discharge MOS
	0x01	Charging MOS
	0x03	Pre-discharge MOS
	0x0A	Charge and discharge MOS
XX	0X00	Unlock software shutdownnottube action
	0X01	Software closesnottube action,

For example: if the host sends DD5AFB020101FF0177, it means that the terminal client software turns off the charging MOS;
BMS returns: DD FB 00 00 00 00 77

five, Parameter reading and setting mode (0xfA)

5.1 Read parameters:

To send read parameters, directly send the corresponding parameter serial number for reading.

start bit	status bit	command code	length	Data content	check	Stop bit
0xDD	0XA5	0XFA	0X03	Parameter number (2BYTE) + length(1BYTE), see list	CHECKSUM_H CHECKSUM_L	0X77

BMSresponseRead parameters command

0xDD	0xFA	0x00-response code	ONLY= 2*N+3	BYTE0, BYTE1BYTE2…BYTEn_1	Checksum_HChecksum_L	0x77

Among them BYTE0~BYTE1Indicates the serial number of the parameter, and reads the corresponding register data according to the length N. For example, the length LEN = 5, byte0 =0x00, BYTE1 = 0X01, BYTE2 = 0x01, BYTE3 =0x0A, BYTE4 =0x0B means that the reading parameter 1 is the starting 1. The value of a register, the return result is 0X0A0B, the specific conversion unit is subject to the actual instructions.
A maximum of 95 registers can be queried at a time.
For example: DD A5 FA 03 00 01 02 FF 00 77//Indicates reading the values of 2 registers starting from register 0001
Return: DD FA 00 07 00 01 02 0F A0 10 36 FF 01 77//Return: Starting from the 0001 register, the values of 2 registers
The value of the first register is 0FA0 and the value of the second register is 1036
For example: DD A5 FA 03 00 38 10 FE BB 77//Read the manufacturer's data
Return: DD FA 00 23 00 38 10 05 44 47 4A 42 44 68 6A 6B 6C 7A 78 63 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 FB 37 77
//0x0038 register, returns the register number 0x10, the content is: 05 44.. . . . This means that there are 5 valid strings in the manufacturer register, corresponding content: 0x44 47 4a 42 44 = "DGJBD"
Write parameters: To write parameters, you need to enter the factory mode first, and then write the corresponding serial number. After the writing is completed, exit the factory mode.
Enter factory mode instructions:

start bit	status bit	command	length	Data content	check	Stop bit

		code				
0xDD	0X5A	0X00	0X02	0x5678	CHECKSUM_H CHECKSUM_L	0X77

Response to enter factory command:

start bit	status bit	command code	length	Data content	check	Stop bit
0xDD	0x00	0X00	0X00	null	CHECKSUM_H CHECKSUM_L	0X77

Send write command:

start bit	status bit	command code	length	Data content	check	Stop bit
0xDD	0X5A	0XFA	2N+3	BYTE0, BYTE1, BYTE2…BYTEn_1	CHECKSUM_H CHECKSUM_L	0X77

Among them BYTE0~BYTE1Indicates the serial number of the parameter, and writes the corresponding content data according to the length. For example, length LEN = 5, byte0 =0x00, BYTE1= 0X01, BYTE2 =0x01, BYTE3 = 0x0A, BYTE4=0X0B means writing to the address starting from parameter 1. Enter the value of a register, and the written value is 0X0A0B. The specific conversion unit is subject to the actual instructions.

Respond to write commands:

start bit	status bit	command code	length	Data content	check	Stop bit
0xDD	0xBUT	0X00	0X03	BYTE0, BYTE1, BYTE2 Among them, 0~1 are the starting address bits, BYTE2 is the length.	CHECKSUM_H CHECKSUM_L	0X77

Exit factory mode command:

start bit	status bit	command code	length	Data content	check	Stop bit
0xDD	0X5A	0X01	0X02	0x2828	CHECKSUM_H CHECKSUM_L	0X77

Respond to the exit factory command:

start bit	status bit	command code	length	Data content	check	Stop bit
0xDD	0x01	0X00	0X00	null	CHECKSUM_H CHECKSUM_L	0X77

Parameter serial number table:

Parameter number	Parameter content	length	illustrate
0	**Nominal capacity**	2BYTE	**The unit is 0.01AH. For example, the transmission value is 100, which is expressed as 1.00AH.**
1	**cycle capacity**	2BYTE	**The unit is 0.01AH. For example, the transmission value is 100, which is expressed as 1.00AH.**
2	**full voltage**	2BYTE	**Unit mV**
3	**Vent voltage**	2BYTE	**Unit mV**
4	**System power consumption**	2BYTE	**unitmA**
5	**Production Date**	2BYTE	use2Bytes are transferred such as0x2078,The date is the lowest5for:0x2078&0x1f = 24Represents date;month(0x2078>>5)&0x0f= 0x03express3moon;The year is2000+ (0x2078>>9) = 2000 + 0x10 =2016; =
6	**serial number**	2BYTE	**Unitless**
7	**Cycles**	2BYTE	**Unit times**
8	**Charging high temperature protection value**	2BYTE	Using absolute temperature transmission,2731+(actual temperature*10),0Every time = 2731 25Every time = 2731+25*10 = 2981 Temperature 1 = 0x0b76 = 2934, actual value = 2934 -2731 = 20.3℃, Temperature 2= 0xb82= 2946 – 2731 = 21.5℃
9	**Charging high temperature release value**	2BYTE	Using absolute temperature transmission,2731+(actual temperature*10),0Every time = 2731 25Every time = 2731+25*10 = 2981 Temperature 1 = 0x0b76 = 2934, actual value = 2934 -2731 = 20.3℃, Temperature 2= 0xb82= 2946 – 2731 = 21.5℃
10	**Charging low temperature protection value**	2BYTE	Using absolute temperature transmission,2731+(actual temperature*10),0Every time = 2731 25Every time = 2731+25*10 = 2981 Temperature 1 = 0x0b76 = 2934, actual value = 2934 -2731 = 20.3℃, Temperature 2= 0xb82= 2946 – 2731 = 21.5℃
11	**Charging low temperature release value**	2BYTE	Using absolute temperature transmission,2731+(actual temperature*10),0Every time = 2731 25Every time = 2731+25*10 = 2981 Temperature 1 = 0x0b76 = 2934, actual value = 2934 -2731 = 20.3℃, Temperature 2= 0xb82= 2946 – 2731 =

			21.5℃
12	**Discharge high temperature protection value**	2BYTE	Using absolute temperature transmission,2731+(actual temperature*10),0Every time = 2731 25Every time = 2731+25*10 = 2981 Temperature 1 = 0x0b76 = 2934, actual value = 2934 -2731 = 20.3℃, Temperature 2= 0xb82= 2946 – 2731 = 21.5℃
13	**Discharge high temperature release value**	2BYTE	Using absolute temperature transmission,2731+(actual temperature*10),0Every time = 2731 25Every time = 2731+25*10 = 2981 Temperature 1 = 0x0b76 = 2934, actual value = 2934 -2731 = 20.3℃, Temperature 2= 0xb82= 2946 – 2731 = 21.5℃
14	**Discharge low temperature protection value**	2BYTE	Using absolute temperature transmission,2731+(actual temperature*10),0Every time = 2731 25Every time = 2731+25*10 = 2981 Temperature 1 = 0x0b76 = 2934, actual value = 2934 -2731 = 20.3℃, Temperature 2= 0xb82= 2946 – 2731 = 21.5℃
15	**Discharge low temperature release value**	2BYTE	Using absolute temperature transmission,2731+(actual temperature*10),0Every time = 2731 25Every time = 2731+25*10 = 2981 Temperature 1 = 0x0b76 = 2934, actual value = 2934 -2731 = 20.3℃, Temperature 2= 0xb82= 2946 – 2731 = 21.5℃
16	**Total voltage overvoltage protection value**	2BYTE	**unit10mV, the transmission value is100, then it means 1000mV= 1.00V**
17	**Total pressure overpressure release value**	2BYTE	**unit10mV, the transmission value is100, then it means 1000mV= 1.00V**
18	**Total pressure low voltage protection value**	2BYTE	**unit10mV, the transmission value is100, then it means 1000mV= 1.00V**
19	**Total pressure low pressure release value**	2BYTE	**unit10mV, the transmission value is100, then it means 1000mV= 1.00V**
20	**Single unit overvoltage protection value**	2BYTE	**The unit is mV, the transmission value is1000, it means 1000mV= 1.000V**
21	**Monomer overpressure release value**	2BYTE	**The unit is mV, the transmission value is1000, it means 1000mV= 1.000V**
22	**Single unit undervoltage protection value**	2BYTE	**The unit is mV, the transmission value is1000, it means 1000mV= 1.000V**

23	**Single unit undervoltage release value**	2BYTE	**The unit is mV, the transmission value is1000, it means 1000mV= 1.000V**
24	**Charging overcurrent protection value**	2BYTE	**unit10mA, for example, the transmission value is100means1000mA= 1.00A**
25	**Discharge overcurrent protection value**	2BYTE	**unit10mA, transmitted in complement form, assuming the setting value is 1A, the current value is 100, and the transmitted value is (65536)0x10000 – 100 = 65436**
26	**Balanced turn-on voltage**	2BYTE	**Unit mV**
27	**Equilibrium opening pressure difference**	2BYTE	**Unit mV**
28	**Sense resistor value**	2BYTE	**The unit is identified based on the highest bit. If it is 0, the unit is0.1mR; if it is 1, the unit is 0.01mR;** **For example, the transmission value is 10 = 1.0mR. If the transmission value is 0x800a and the highest bit is 1, it means the unit is 0.01, which means the current sensing resistance is 0.1mR.**
29	**Function configuration**	2BYTE	**See description**
30	**Temperature probe configuration**	2BYTE	**See description**
31	**Number of battery strings**	2BYTE	**Unitless**
32	**Switch control time**	2BYTE	**unitS**
33	**LEDoperating hours**	2BYTE	**unitS**
34	**VOL-80%voltage point**	2BYTE	**Unit mV**
35	**VOL-60%voltage point**	2BYTE	**Unit mV**
36	**VOL_40%voltage point**	2BYTE	**Unit mV**
37	**VOL_20%voltage point**	2BYTE	**Unit mV**
38	**Hardware overvoltage protection value**	2BYTE	**Unit mV**
39	**Hardware undervoltage**	2BYTE	**Unit mV**

	protection value		
40	Secondary overcurrent protection settings	2BYTE	See description
41	Short circuit protection settings	2BYTE	See description
42	Hardware over and under voltage delay	2BYTE	See description
43	Short circuit release delay	2BYTE	unitS
44	Charging low temperature delay	2BYTE	unitS
45	Charging high temperature delay	2BYTE	unitS
46	Discharge low temperature delay	2BYTE	unitS
47	Discharge high temperature delay	2BYTE	unitS
48	Total pressure low pressure delay	2BYTE	unitS
49	total pressure high pressure delay	2BYTE	unitS
50	Single unit undervoltage delay	2BYTE	unitS
51	Single unit overvoltage delay	2BYTE	unitS
52	Charging overcurrent delay	2BYTE	unitS
53	Charge overcurrent release delay	2BYTE	unitS
54	Discharge overcurrent delay	2BYTE	unitS
55	Discharge overcurrent release delay	2BYTE	unitS
56~71	Manufacturer	32BYTE	useASCIIcode transmission, the first byte of the content indicates the length. For example, “123”

	information		needs to be transmitted, the length value is =4, and the transmission content is 03 '1' '2' '3'
72~87	BMS-encoded information	32BYTE	useASCIIcode transmission, the first byte of the content indicates the length. For example, "123" needs to be transmitted, the length value is =4, and the transmission content is 03 '1' '2' '3'
88~103	barcode information	32BYTE	useASCIIcode transmission, the first byte of the content indicates the length. For example, "123" needs to be transmitted, the length value is =4, and the transmission content is 03 '1' '2' '3'
104	GPS shutdown voltage	2BYTE	Unit mV
105	GPS shutdown delay	2BYTE	unitS
106	VOL-90%	2BYTE	Unit mV
107	VOL-70%	2BYTE	Unit mV
108	VOL-50%	2BYTE	Unit mV
109	VOL-30%	2BYTE	Unit mV
110	VOL-10%	2BYTE	Unit mV
111	VOL-100%	2BYTE	Unit mV
112	learning capacity	2BYTE	The unit is 0.01AH. For example, the transmission value is 100, which is expressed as 1.00AH.
113	correction interval	2BYTE	unitS, the default is 6 hours. When it is 0, it means no correction.
114	Rated voltage	2BYTE	0.1V
115	Rated current	2BYTE	A
116	Maximum power	2BYTE	IN
117	Rated charging voltage	2BYTE	0.1V
118	Rated discharge current	2BYTE	A
119	Rated charging current	2BYTE	A
120	Rated discharge power	2BYTE	IN

121	Minimum identification current	2BYTE	mA
122	sleep time	2BYTE	S
123~157	Reserved alarm parameters	35*2BYTE	
158~169	battery model	24BYTE	useASCIICode transmission, the first byte of the content indicates the length, for example, "123" needs to be transmitted, the length value is =4, the transmission content is 03 '1' '2' '3', which is converted to 05 command content
170~175	Unique ID code	12BYTE	12indivual16base number
176~183	Hardware name	8BYTE	useASCIIcode transmission, the first byte of the content indicates the length. For example, “123” needs to be transmitted, the length value is =4, and the transmission content is 03 ‘1’ ‘2’ ‘3’

illustrate:

1 Temperature value data format: The actual temperature is ℃, the data transmission is in Kelvin unit, the unit is 0.1K, the specific data corresponds

0℃ =2731 -10℃ = 2731-100=2631 10℃ = 2731+100=2831

2. Function configuration

There are 16 bits in 2 bytes. Each bit indicates the enablement of a function. A value of 1 indicates that the function is enabled, and a value of 0 indicates that it is not enabled.

Bite0: weak current switch function
Bite1: Short circuit load detection function
Bite2 equalization function
Bite3 charge equalization
Bite4 LED enable
Bite5 LED quantity
Bite6 FCC restrictions please note below.
Bite7 RTC enable
Bite8 charging handshake enable
Bite9 GPS function
Bite10 buzzer function
Beat 11Start battery mode
Bite12: Current capacity unit identification,

Current capacity unit description: In order to be compatible with the unit exceeding the range, the unit is adjusted as follows:

parameter name	Bite12 = 0	Bite12 = 1
The remaining capacity	10mAh	100mAh
full charge capacity	10mAh	100mAh
cycle capacity	10mAh	100mAh

Nominal capacity	10mAh	100mAh
Current value	10mA	100mA
Charging overcurrent value	10mA	100mA
Discharge overcurrent value	10mA	100mA
Sense resistor	0.1mR	0.01mR

3.NTC configuration

There are 16 bits in 2 bytes. Each bit indicates that a corresponding temperature probe is enabled. 1 indicates that the function is enabled, and 0 indicates that it is not enabled.

For example: bit0 is set, which means that the temperature probe position 1 is valid.

4. Short circuit protection delay description**And the setting of secondary overcurrent protection value**Will be based on IC**The type is different, the content is different,**IC**For the classification of type reading, please see Chapter9Description**

A.IC type is 0, indicating TI solution:

BIT	7	6	5	4	3	2	1	0
NAME	RSNS	SCD_T2	SCD_T1	SCD_T0	-	-	SCD_D1	SCD_D0

RSNS: Indicates that the overcurrent and short circuit values are doubled..

SCD_D (Short circuit delay setting: bit1~bit0) SCD_T (Short circuit delay setting: bit2~bit0)

Code	(in µs)
0x0	70
0x1	100
0x2	200
0x3	400

Code	RSNS = 1 (in mV)	RSNS = 0 (in mV)
0x0	44	22
0x1	67	33
0x2	89	44
0x3	111	56
0x4	133	67
0x5	155	78
0x6	178	89
0x7	200	100

Short circuit protection and delay

BIT	7	6	5	4	3	2	1	0

NAME	RSNS	SCD_T2	SCD_T1	SCD_T0	-	-	SCD_D1	SCD_D0

Secondary overcurrent protection and time delay

BIT	7	6	5	4	3	2	1	0
NAME	OCD_T3	OCD_T2	OCD_T1	OCD_T0	-	OCD_D2	OCD_D1	OCD_D0

OCD_D2:0(Bits 2:0)**Discharge overcurrent delay setting OCD_T3:T0 discharge overcurrent value setting**

Code	(in ms)
0x0	8
0x1	20
0x2	40
0x3	80
0x4	160
0x5	320
0x6	640
0x7	1280

Code	RSNS = 1 (in mV)	(RSNS = 0 (in mV)
0x0	17	8
0x1	22	11
0x2	28	14
0x3	33	17
0x4	39	19
0x5	44	22
0x6	50	25
0x7	56	28
0x8	61	31
0x9	67	33
0xA	72	36
0xB	78	39
0xC	83	42
0xD	89	44
0xE	94	47
0xF	100	50

B. The chip types are 1 (Bump 7717), 2 (Panasonic 49522), 3 (Zhongying 309) 4 (Zhongying 303) 5 (Jiche DC10XX). The register distribution is as follows

Short circuit protection value and its delay

BIT	7	6	5	4	3	2	1	0
NAME	SCD_T3	SCD_T2	SCD_T1	SCD_T0	SCD_D3	SCD_D2	SCD_D1	SCD_D0

Concave-convex chip - chip type 1: 16 levels of short-circuit value, SCD_T3: The value of 0 is equal to SCD_T, the minimum is 0, the maximum is 15, and the final corresponding short-circuit voltage value (mV) is 20*SCD_T+20

The short circuit value is delayed by 16 levels. SCD_D3: The value of 0 is equal to SCD_D. The minimum is 0 and the maximum is 15. The final corresponding short circuit delay value (uS) is 62.5*SCD_D+62.5

Panasonic chip - chip type 2: short circuit value 16 levels, SCD_T3: the value of 0 is equal to SCD_T, the minimum is 0, the maximum is 15, the final corresponding short circuit voltage value (mV) 40*SCD_T+20

The short circuit value is delayed by 16 levels. SCD_D3: The value of 0 is equal to SCD_D. The minimum is 0 and the maximum is 15. The final corresponding short circuit delay value (uS) is 62.5*SCD_D+31.25

Zhongying chip (309-chip type 3): 16 levels of short-circuit value, SCD_T3: The value of 0 is equal to SCD_T, the minimum is 0, the maximum is 15, and the final corresponding short-circuit voltage value (mV)

SCD_T	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Corresponding short circuit value (mV)	50	80	110	140	170	200	230	260	290	320	350	400	500	600	800	1000

The short-circuit value delay is 16 levels. SCD_D3: The value of 0 is equal to SCD_D. The minimum is 0 and the maximum is 15. The final corresponding short-circuit delay value (uS) is 64*SCD_D

(JiChe DC10XX = chip type 5)

Short circuit protection value: 16 levels correspond to the following, unit mV:

SCD_T	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Corresponding short circuit value (mV)	19	30	41	53	64	75	87	98	110	120	132	143	155	166	177	190

Short circuit protection delay: corresponding4th gear, Unit uS

SCD_D	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Corresponding short circuit value (mV)	560	800	1600	3200	\	\	\	\	\	\	\	\	\	\	\	\

(OZ3714 = chip type 6)

Short circuit protection value: 16 levels correspond to the following, unit mV:

SCD_T	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Corresponding short circuit value (mV)	40	80	120	160	200	240	280	320	360	400	440	480	520	560	600	640

Short circuit protection delay: corresponding16 gears, Unit uS; calculation method 62.5*(i+1)uS

Secondary overcurrent protection and time delay

BIT	7	6	5	4	3	2	1	0
NAME	OCD_T3	OCD_T2	OCD_T1	OCD_T0	OCD_D3	OCD_D2	OCD_D1	OCD_D0

Concave-convex chip - Chip type 1: Secondary overcurrent value 16 levels, OCD_T3: The value of 0 is equal to OCD_T, the minimum is 0, the maximum is 15; the final corresponding overcurrent voltage value (mV) is 10*OCD_T+5
There are 16 levels of secondary overcurrent delay, OCD_D3: The value of 0 is equal to OCD_D, the minimum is 0, the maximum is 15; the final corresponding overcurrent delay value (mS)

Panasonic chip - chip type 2: secondary overcurrent value 16 levels, OCD_T3: the value of 0 is equal to OCD_T, the minimum is 0, the maximum is 15; the final corresponding overcurrent voltage value (mV) 20*OCD_T+10
There are 16 levels of secondary overcurrent delay, OCD_D3: The value of 0 is equal to OCD_D, the minimum is 0, the maximum is 15; the final corresponding overcurrent delay value (mS) is 20*OCD_D+10
Zhongying chip (309 chip type 3): secondary overcurrent value 16 levels, OCD_T3: the value of 0 is equal to OCD_T, the minimum is 0, the maximum is 15

OCD_T	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Corresponding overcurrent value (mV)	20	30	40	50	60	70	80	90	100	110	120	130	140	160	180	200
OCD_D	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Corresponding overcurrent delay value (mS)	50	100	200	400	600	800	1000	2000	4000	6000	8000	10S	15S	20S	30S	40S

Jiche chip (DC10XX, chip type 5): Secondary overcurrent value 16 levels, OCD_T3: The value of 0 is equal to OCD_T, the minimum is 0, the maximum is 15

OCD_T	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Corresponding overcurrent value (mV)	4	10	16	21	28	33	38	44	50	55	61	67	73	78	84	90
OCD_D	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Corresponding overcurrent delay value (mS)	32	80	160	320	640	1280	2560	5120	\	\	\	\	\	\	\	\

OZ3714 = Chip type 6: Secondary overcurrent value 16 levels, OCD_T3: The value of 0 is equal to OCD_T, the minimum is 0, the maximum is 15

OCD_T	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Corresponding overcurrent value (mV)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160

OCD_D	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Corresponding overcurrent delay value (mS)	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32

6: Control command description:

6.1 Control command (0x0A command)

start bit	status bit	command code	length	Data content	check	Stop bit
0Xdd	0X5A	0X0A	0X02	0 YES0xBB	CHECKSUM_H CHECKSUM_L	0X77

BMSresponse controlmodelInstruction, if the operation is successful, it will contain the response content length, if it is unsuccessful, it will respond with an error code.

0Xdd	0x0A	0x00-response code	0x01	0 YES	Checksum_HChecksum_L	0x77

Example: DD 5A 0A 02 01 00 FF F3 77 Return: DD 0A 00 00 00 00 77, indicating the reset capacity command

Function code serial number (0xAABB)	**Function Description**	**illustrate**
0100	**reset capacity**	**Reset capacity and re-estimate capacity based on voltage parameters**
0200	**Clear History**	**Clear history protection times**

0300	reset	Reset the microcontroller once
0400	Clear protection status	Clear protection status and alarm status
0500	Go to sleep	The protection board enters sleep state
0600	Enter power-down mode	Enters ultra-low power consumption and needs to be charged to wake up.
0700	automatic equalization	Automatic equalization mode, send this command to automatically turn on the equalization
0800	Enter storage and transportation mode	After sending the command, enter the storage and transportation mode.
0900	Set SOC-20% switch function	Duplex version, after setting it to 1, the discharge will be turned off if it is lower than 20%.
0A00	Forced to open command below 20%	When the SOC_20% function is valid and SOC<20%, you can send this command to force it to open.
0B00	Force start-start mode	Force start output when starting battery mode
0C00	forced heating	Automatically stops when heated to 15°C

7. Increase battery internal resistance command (F6) -Not added yet

Read internal resistance command details

start bit	status bit	command code	length	Data content	check	Stop bit
0xDD	0xA5	0Xf6	0	--(empty if not available)	checksum	0x77

BMSResponse to read basic information0xf6instruction

0xDD	0xf6	state,0Table is correct	Represents the data length, the data length is 0x1E	Data content, length is0When, skip here	checksum	0x77
		Return on error0x80			checksum	0x77

Host sends:DD A5 F6 00 FF 0A 77

BMSresponse:DD F600 1E 0005 00 0400 0000 0000 0000 0000 0000 0000 0000 0000 00 00 0000 0000 0000 0000 F9 F9 77

Red is the byte being checked, which is the sum of all bytes; what follows2is the verification result, which is the inversion of the sum of all previous verifications.+1the result of

Data content explanation

Data length	The data length is the number of battery stringsNmultiply by2
The internal resistance value of the first string of cells	2Byte,unit0.1mR, high-order bit first, signed type, with positive and negative values
The internal resistance value of the second string of monomers	2Byte,unit0.1mR, high-order bit first, signed type, with positive and negative values
The internal resistance value of the third string of cells	2Byte,unit0.1mR, high-order bit first, signed type, with positive and negative values
。。。	。。。
No.NThe internal resistance value of the string cell	2Byte,unit0.1mR, high-order bit first, signed type, with positive and negative values

The length is temporarily fixed, up to 30 strings, and all internal resistances need to be uploaded.

Data analysis, for example: the internal resistance value is 0x0064 =100, which means that 10mR is built into the string. If the value is 0xfffb = -5, it means that the internal resistance value is -0.5mR.

Regarding the calculation method: When the built-in value is positive: the voltage during charging is the measured voltage minus the current multiplied by the internal resistance. If the actual battery voltage is still too high, you need to continue to increase this value.

The final voltage during discharge is the measured voltage + current multiplied by the internal resistance.

If the internal resistance is negative, addition occurs during charging and subtraction occurs during discharging.

Write internal resistance command details

start bit	status bit	command code	length	Data content	check	Stop bit
0xDD	0x5a	0Xf6	60 (decimal)	The internal resistance value of each string of 30 strings, 2 bytes per string	checksum	0x77

BMSResponse to read internal resistance0xf6instruction

0xDD	0xf6	state,0Table is correct	Indicates the data length, excluding itself. The length of the response when writing is0	Data content, length is0When, skip here	checksum	0x77
		Return on error0x81	0		checksum	0x77

Time parameter description: A total of 6 bytes, representing the static reporting interval, charging reporting interval, and discharging reporting interval.
Every 2 bytes represents a time parameter, the unit is S

Eight: Bluetooth password protocol

8. 1:**Password pairing**

Password pairing instruction details

start bit	status bit	command code	length	Data content	check	Stop bit
0xDD	0x5a	0X06	7	6+6BYTE	checksum	0x77

For example, set the password: 765828: the actual command is DD 5A 06 07 06 07 06 05 08 02 08 FF C9 77

BMSresponsePassword pairinginstruction

0xDD	0x06	state,0Table is correct	Indicates the data length, excluding itself. The length of the response when writing is0	Data content, length is0When, skip here	checksum	0x77
		Return on error0x83	0		checksum	0x77

8. 1:**change Password**

Password pairing instruction details

start bit	status bit	command code	length	Data content	check	Stop bit
0xDD	0x5a	0X07	13	12+old password (6 digits)+new password (6 digits)	checksum	0x77

For example, set password: 765828-> 123456: Actual command: DD 5A 07 0D 0C 07 06 05 08 02 08 01 02 03 04 05 06 FF A7 77

BMSresponsePassword pairinginstruction

0xDD	0x07	state,0Table is correct	Indicates the data length, excluding itself. The length of the response when writing is0	Data content, length is0When, skip here	checksum	0x77
		Return on error0x83	0		checksum	0x77

8.3：重置蓝牙密码

置蓝牙密码配对指令详情

起始位	状态位	命令码	长度	数据内容	校验	停止位
0xDD	0x5A	0X08	03	奇数位截取，再偶数位截取 例如：036c4d	checksum	0x77

BMS 响应重置蓝牙密码配对指令

0xDD	0x08	状态，0 表正确	表示数据长度，不包括本身，响应写时长度为 0	数据内容，长度为 0 时，此处跳过	checksum	0x77
		错误则返回 0x83	0		checksum	0x77

Nine, Chip type reading instructions:

. Read chip type

Password pairing instruction details

start bit	status bit	command code	length	Data content	check	Stop bit
0xDD	0Xa5	0X00	0X00	null	checksum	0x77

BMSresponsePassword pairinginstruction

0xDD	0x00	state,0Table is correct	Indicates the data length, excluding itself. The	Data content	checksum	0x77

			length of the response when writing is0			
		Return on error0x83	0x02	0x00 xx	checksum	0x77

whenXX = 0Or when sending this command without reply, the default BMS solution is the TI solution. When XX = 1, it is the concave and convex solution. When XX = 2, it is the Xintang Panasonic solution.
When XX = 3, it is Zhongying 309 solution. When XX = 4, it is Zhongying 303 solution. XX = 5 is Jiche chip.

ten, controlheatingCommand(FC)

The host sends heating control instructions

10.3 Schedule heating time command

start bit	status bit	command code	length	Data content	check	Stop bit
0xDD	0X5A	0XFC	0X05	XX HH MM ZZ WW	CHECKSUM_H CHECKSUM_L	0X77

XX is the command code 01 is to start heating, 02 is to turn off heating, HH is the hour value 0~255, MM is the minute 0~60; ZZ is the start temperature -127~127, WW is the heating stop temperature ~127~127.
The temperature is expressed using direct positive and negative values. If the time is 00, it means immediate start. If the time is non-0, it means delayed start.

BMSresponsewriteBasic Information0xfcinstruction

0xDD	0xFC	0x00	0x00	--	Checksum_HChecksum_L	0x77

Example: DD 5A FC 05 01 00 00 05CHECKSUM_H CHECKSUM_L **77, return: DD FC 00 00 00 00 77, indicating that the command was sent successfully.**

eleven, Actual example analysis:

The host sends and reads the cell voltage0x04instruction,BMSReturn data description:

DD –Frame header, starting byte
04 --Command code, read cell voltage
00 --status code, not0is an error, 0for correct

22 --The short length of data is34data, indicating that the battery pack has17string, string2data
0EC8 -No. 1cell voltage3784
0EC8 -No. 2cell voltage
0ECB –No. 3cell voltage
0ECF –No. 4cell voltage
0ECA –No. 5cell voltage
0EC7 -No. 6cell voltage
0ECA –No. 7cell voltage
0ECD –No. 8cell voltage
0EC9 –No. 9cell voltage
0ECA –No. 10cell voltage
0ECB –No. 11cell voltage
0ECB –No. 12cell voltage
0EC8 -No. 13cell voltage
0ECC –No. 14cell voltage
0EC8 -No. 15cell voltage
0EC9 –No. 16cell voltage
0EC9 –No. 17cell voltage
F187 –Check code
77 --end code

The host sends and reads basic information0x03instruction,BMSReturn data description:
DD –start
03 –naming code
00 –status code
1F –Data length
19DF – total voltage= 6623 = 66.23V, the unit is10Mv
F824 –total current = 63524, the highest bit is1, is the discharge, current value= 65536-63524 = 2012, the unit is10Ma, so the final current is-20.12A,If the highest is not1is charging
direct conversion
0DA5 –The remaining capacity = 3493,unit10Mah, the final remaining capacity value is34930Mah
0FA0 –Nominal capacity =4000, because the unit is10Mah, all final capacities are40000Mah
0002 –Cycles. 2Second-rate
2491 –Production Date
0000 –Balanced low
0000 –Balanced high

0000 –protection status
12 --Software version
57 --remaining capacity percentage 87
03 -- DON'Tstate
11 --Number of battery strings 17
04 --Number of temperature probes
0B98--first temperature 2968 -2731 =247,Unit is0.1℃ = 24.7℃
0BA9--No. 2temperature
0B96 --No. 3temperature
0B97--No. 4temperature
F89A--Check code
77 --end code

12. Revision History

version name	illustrate
V0Version	first draft
V1 version	Modify the 0XE1 instruction to the 0XFB instruction,
V2 version	Modify the error and modify the error type of the parameter list
V3 version	Add callback_id in the frame protocol format. When the host sends something at the end character 0X77, the slave will reply. The length is fixed at 4BYTE and can be empty.
V4 version	Added procedures to read chip type and readjust hardware overcurrent short circuit value.
V5 version	Added heating function control command 0xFC and forced start function command.
V6 version	Added the short circuit value list of discharge overcurrent 2 with chip type 5
V7 version	Optimize the overcurrent value list of chip 3
V8 version	at 0AAdd storage and transportation command mode to the control command to enter deep sleep (pages 17~28)

V9 version	Add current and capacity unit identification, the default is 0, see P15 for detailsFunction configuration in the pageBITE12
V10 version	at 0AA forced start button is added inside to create startup mode.
V11 version	Added discharge overcurrent 2 and short circuit value list for chip type 6. As well as some command examples and descriptions for changing passwords