



XDY

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# **BMS CAN PROTOCOL OF XDY V2.3**

**2013-02-20**

## 1. Communication norm

- 250Kbps
- Intel specification

IDENTIFIER 11BITS											S R R	I D E	IDENTIFIER EXTENSION 18BITS																	
PRIORITY			R	DP	PDU FORMAT(PF)						S R R	I D E	PF		PDU SPECIFIC(PS)								SOURCE ADDRESS(SA)							
3	2	1	1	1	8	7	6	5	4	3			2	1	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1
28	27	26	25	24	23	22	21	20	19	18			17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

## 3. BMS message

### 3.1 message1: 0x18c0eff4

OUT	IN	ID: 0x18c0eff4				Cycles (ms)
BMS	VMS	P	R	DP	PF	100
		6	0	0	C0(192)	
data						
location	Data name			Description		
BYTE1	Pack voltage（Low byte is BYTE1，			1V/bit; offset: 0; limit: 0 V～200V		



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BYTE2	High byte is BYTE2)		
BYTE3	Pack current (Low byte is BYTE3, High byte is BYTE4)		0.1A/bit; offset: -350; limit: -350A~500A
BYTE4			Negative: discharge Positive: charge
BYTE5	BIT1	PP STATE	0: PP not connect 1: PP is connect
	BIT2	KEY ON STATE	0: KEY_ON not connect 1: KEY_ON is connect
	BIT3	KS STATE	0: KS not connect (cut off) 1: KS is connect (closed)
	BIT4	KM STATE	0: KM not connect (cut off) 1: KM is connect (closed)
	BIT5	CHARGER COMMUNICATION ON	0: COMMUNICATION OFF 1: COMMUNICATION ON
	BIT6	END OF BALANCE	0: BATTERY PACK NOT BALANCED 1: BALANCE OF BATTERY PACK FINISHED
	BIT7	ONLY CHARGE IS POSSIBLE	0: DISCHARGE PERMITTED 1: IS POSSIBLE ONLY TO CHARGE
	BIT8	reserved	
BYTE6	SOC		1%/bit; offset: 0; limit: 0%~100%
BYTE7	Status1		Pack attention information
BYTE8	Status2		Cell attention information; Pack alarm information (will open relay)



Status 1

Bit	Value	Description
0	Pack state	00: static; 01: discharge; 11: charger charging
1		
2	0-1(0: normal; 1: abnormal)	Insulated low (Leakage attention) (<500 $\Omega$ /V)
3	0-1(0: normal; 1: abnormal)	Pack temperature low (attention) (<-20℃, can be set)
4	0-1(0: normal; 1: abnormal)	Pack temperature high (attention) (can be set)
5	0-1(0: normal; 1: abnormal)	SOC low (attention) (<25%, can be set)
6	0-1(0: normal; 1: abnormal)	Pack discharge current is too large (attention) (>200A, can be set)
7	0-1(0: normal; 1: abnormal)	Pack fault (attention) (Internal self-test failure、communication with charger failure and so on)

Status 2

Bit	Value	Description
0	0-1(0: normal; 1: abnormal)	Cell voltage low (attention) (can be set)
1	0-1(0: normal; 1: abnormal)	Cell unbalance (attention) (can be set)
2	0-1(0: normal; 1: abnormal)	Cell voltage high (attention) (can be set)
3	reserved	
4	0-1(0: normal; 1: abnormal)	Cell voltage too high (alarm) (can be set)
5	0-1(0: normal; 1: abnormal)	Pack temperature too high (alarm) (can be set)
6	0-1(0: normal; 1: abnormal)	Cell voltage too low (alarm) (can be set)



7	0-1(0: normal; 1: abnormal)	Insulated too low (Leakage alarm) (<100 Ω/V)
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说明:

- 1、Status1 和 Status2 中的所有 attention 信息, 需经程序的预处理, 如果是瞬时出现 (<2s), 则不对外 attention; 如果该数值持续时间较长 (≥2s), 则置该数值为 1, 对外 attention。

The attention signal from Status1 and Status2 should be filter by the BMS software. If the value is only appeared for a very short time, then this signal is normal, or else, the value appeared for several second, then this signal is abnormal.

- 2、BMS 在上电时先判断总电压是否超低 (电池串数\* cell voltage 超低对应的数值, 例如: 串数=20; 单体超低设置值=2.8V, 总电压=20\*2.8=56V) 时, 并且判断 bit4~bit7 是否 normal, 这两个条件 normal 则接通接触器。

BMS should detect the battery pack voltage and bit4~bit7 from status2 is normal, if they are all ok, then closed the relay KS, or else remain relay KS open.

- 3、Status 2 含电池组三个红色 alarm 信息 (最后三位)。在电池组任意三个红色 alarm 状态下或总电压超低 (电池串数\* cell voltage 超低对应的数值, 例如: 串数=20; 单体超低设置值=2.8V, 总电压=20\*2.8=56V) 时, VMS 发送继电器断开指令, 若在 3 秒内未收到 VMS 发出的接触器断开指令, 则由 BMS 在计时到达 3 秒时且该 alarm 现象依然存在, 主动断开接触器; 若在 3 秒内收到 VMS 继电器切断命令, BMS 则立即断开接触器。该动作不可恢复, 除非重新上电。

The waiting time from VMS (open relay command from VMS) is changed to 3 seconds.

There are three alarms information in status2 (bit5 to bit7), if any of the information is alarm, or the battery pack voltage is too low, VMS send the command of cutting off relay. If BMS does not receive command of cutting off relay from VMS within 3 second, BMS detect the 3 second time is arrived and now the alarm information is already the same, then BMS cut off the relay. If BMS receive this command, relay will be cut off immediately.

- 4、充电保护: 充电过程中只要出现 Byte8 的 Bit4 该故障, 除了给 VMS 发送报警信息外, 若在 3 秒内未收到 VMS 发出的接触器断开指令, 则由 BMS 在计时到达 3 秒时先停止充电机输出, 再主动断开包内接触器 KS 停止充电; 若在 3 秒内收到 VMS 接触器切断命令, BMS 则先立即停止充电机输出, 再断开包内接触器 KS 停止充电。

If there is an alarm in bit4 from status2 during the charging process, VMS send the command of cutting off relay. If BMS does not receive command of cutting off relay from VMS within 3 second, BMS detect the 3 second time is arrived and now the alarm information is already the same, then BMS send the information of charging stop command to the charger, after that, BMS control the relay KS opened. If BMS receive this command, BMS send the information of charging stop command to the charger and then control the relay KS opened.

All the parameters in this CAN message we suggest are in the following.



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Battery pack supplier	WSD
Cell voltage low (attention)	<2.95V
Cell voltage too low (alarm)	<2.9V
Cell voltage high (attention)	>3.65V
Cell voltage too high (alarm)	>3.7V
Pack temperature high (attention)	>60℃
Pack temperature too high (alarm)	>65℃
Pack temperature low (attention)	<-20℃
Cell unbalance (attention)	>0.8V

### 3.2 message2: 0x18c0eef4

OUT	IN	ID: 0x18c0eef4				Cycles(ms)
BMS	VMS	P	R	DP	PF	100
		6	0	0	C0(192)	
Data						
location	Date name				Description	
BYTE1	Highest cell voltage（Low byte is BYTE1,				0.001V/bit, offset: 0 limit: 0 V~4.5V	



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BYTE2	High byte is BYTE2)	
BYTE3	The number of highest cell voltage	offset: 0 limit: 0~24
BYTE4	Lowest cell voltage (Low byte is BYTE4, High byte is BYTE5)	0.001V/bit, offset: 0 limit: 0 V~4.5V
BYTE5		
BYTE6	The number of lowest cell voltage	offset: 0 limit: 0~24
BYTE7	Pack highest temperature	1°C/bit offset: -40°C limit: -40°C~210°C
BYTE8	The number of highest temperature	offset: 0 limit: 0~24

### 3.3 message3: 0x18c0f4ef

OUT	IN	ID: 0x18c0f4ef				Cycles(ms)
VMS	BMS	P	R	DP	PF	100
		6	0	0	C0(192)	
Data						
Location	Data name					
BYTE1	Relay control command			0x A5: open the relay; others: no action		

### 3.4 message4: cell voltage information ID 0x10C000F4 (other 3 message ID is 0x14C000F4, 0x18C000F4, 0x1CC000F4.)

OUT	IN	ID: 0x10C000F4				Cycles(ms)
BMS	VMS	P	R	DP	PF	100
		4	0	0	C0(192)	
Data						
Location		Data name			Description	
BYTE1	Bit1	1# cell voltage			0.01V/bit, offset: 0, limit: 0~5V	



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	Bit2		
	Bit3		
	Bit4		
	Bit5		
	Bit6		
	Bit7		
	Bit8		
BYTE2	Bit1	2# cell voltage	0.01V/bit, offset: 0, limit: 0~5V
	Bit2		
	Bit3		
	Bit4		
	Bit5		
	Bit6		
	Bit7		
BYTE3	Bit8	3# cell voltage	0.01V/bit, offset: 0, limit: 0~5V
	Bit1		
	Bit2		
	Bit3		
	Bit4		
	Bit5		
	Bit6		
	Bit7		
	Bit8		





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BYTE4	Bit1		
	Bit2		
	Bit3		
	Bit4	4# cell voltage	0.01V/bit, offset: 0, limit: 0~5V
	Bit5		
	Bit6		
	Bit7		
	Bit8		
BYTE5	Bit1		
	Bit2		
	Bit3		
	Bit4		
	Bit5	5# cell voltage	0.01V/bit, offset: 0, limit: 0~5V
	Bit6		
	Bit7		
	Bit8		
BYTE6	Bit1	5# cell voltage	0.01V/bit, offset: 0, limit: 0~5V
	Bit2		
	Bit3		
	Bit4		
	Bit5		
	Bit6	6# cell voltage	0.01V/bit, offset: 0, limit: 0~5V
	Bit7		



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	Bit8		
BYTE7	Bit1		
	Bit2		
	Bit3		
	Bit4		
	Bit5		
	Bit6		
	Bit7		
	Bit8		
BYTE8	Bit1	7# cell voltage	0.01V/bit, offset: 0, limit: 0~5V
	Bit2		
	Bit3		
	Bit4		
	Bit5		
	Bit6		
	Bit7		
	Bit8	reserved	

### 3.5 message5: 0x14C000F4

Cell number follow item of 3.4 message4

### 3.6 message6: 0x18C000F4

Cell number follow item of 3.5 message5

### 3.7 message7: 0x1CC000F4



Cell number follow item of 3.6 message6

### 3.8 message8: module temperature information ID 0x04C000F4

OUT	IN	ID: 0x04C000F4				Cycles(ms)
BMS	VMS	P	R	DP	PF	1000
		1	0	0	C0(192)	
Data						
Location	Data name			Description		
BYTE1	1# sensor temperature			1℃/bit, offset: -40℃, limit: -40℃～210℃		
BYTE2	2# sensor temperature			1℃/bit, offset: -40℃, limit: -40℃～210℃		
BYTE3	3# sensor temperature			1℃/bit, offset: -40℃, limit: -40℃～210℃		
BYTE4	4# sensor temperature			1℃/bit, offset: -40℃, limit: -40℃～210℃		
BYTE5	5# sensor temperature			1℃/bit, offset: -40℃, limit: -40℃～210℃		
BYTE6	6# sensor temperature			1℃/bit, offset: -40℃, limit: -40℃～210℃		
BYTE7	7# sensor temperature			1℃/bit, offset: -40℃, limit: -40℃～210℃		
BYTE8	8# sensor temperature			1℃/bit, offset: -40℃, limit: -40℃～210℃		

### 3.9 message9: module temperature information ID 0x08C000F4

OUT	IN	ID: 0x08C000F4				Cycles(ms)
BMS	VMS	P	R	DP	PF	1000
		6	0	0	C0(192)	
Data						
Location	Data name			Description		



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BYTE1	9# sensor temperature	1℃/bit, offset: -40℃, limit: -40℃～210℃
BYTE2	10# sensor temperature	1℃/bit, offset: -40℃, limit: -40℃～210℃
BYTE3	11# sensor temperature	1℃/bit, offset: -40℃, limit: -40℃～210℃
BYTE4	12# sensor temperature	1℃/bit, offset: -40℃, limit: -40℃～210℃
BYTE5	reserved	
BYTE6	reserved	
BYTE7	reserved	
BYTE8	BMS Alarm code	0: No BMS Alarm 1-255: BMS Fault code (will be defined)

#### 4. software update through CAN

reserved

#### 5. charger message

##### 5.1 message1: ID: 0x1806E5F4

Out	In	ID(0x1806E5F4)				Cycles
BMS	charger		PGN			
		P	R	DP	PF	
		6	0	0	6	
Byte	data					
1	Maximum allowable charge voltage (Low		0.1V/bit		offset: 0	



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2	byte is BYTE1, High byte is BYTE2)	
3	Maximum allowable charge current (Low	0.1A/bit      offset: 0
4	byte is BYTE3, High byte is BYTE4)	
5	Charge control command	0: charger begin to charge。 1: Pack protect, charger close output。

## 5.2message2: (ID: 0x18FF50E5)

Out	In	(ID: 0x18FF50E5)				Cycles
charger	BMS		PGN			
		P	R	DP	PF	1000ms
		6	0	0	0xFF	
Byte	数据					
1	Output voltage (Low byte is BYTE1, High byte is BYTE2)		0.1V/bit      offset: 0			
2						
3	Output current (Low byte is BYTE3, High byte is BYTE4)		0.1A/bit      offset: 0			
4						
5	Charger status					

## Charger status

Bit	Data name	Description
Bit0	Hardware fault	0: Normal. 1: Hardware fault
Bit1	Temperature of charger	0: Normal. 1: Temperature is too high, charger protect



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Bit2	Input voltage	0: Input voltage normal. 1: Input voltage fault, charge stop
Bit3	Start state	0: charger detect pack voltage, begin to start 1: Charger closed if polarity of pack is wrong.
Bit4	Communication state	0: Communication normal. 1: Communication between charger and BMS is timeout.
Bit5	Charger is ready	0: Charger is not ready 1: Charger is ready

Charge process should follow the following orders one after another:

1. 充电机交流输入时，先输出12V电源，并发送CAN message;

Charger detect AC input, first output 12V power, and transmit CAN message;

2. BMS充电messageID: 0x1806E5F4在接收到充电机message后才开始发送;

After receive the CAN message from the charger, BMS begin to transmit the CAN message with ID 0x1806E5F4.

3. 当充电机本身无故障（Byte5 Bit0、Bit1、Bit2normal，12V电源输出normal），置Byte5 Bit5为1，此时充电机准备就绪；

When charger have no fault (message ID 0x18FF50E5 Byte5 Bit0、Bit1、Bit2 are all normal, and 12V power output normal), the signal of Byte5 Bit5 (Charger is ready) from charger will be ok, then charger is ready.

4. BMS接收到充电机Byte5 Bit5充电准备就绪信号后，BMS控制包内高压接触器KS闭合；

BMS receive the signal of charger is ready, then BMS control relay KS close, or else remain relay KS open.

5. 包内接触器KS闭合后，BMS发送充电机开启充电和目标充电电流和目标充电电压指令，充电机接收到信息以后根据message数据的电压电流设置来工作。如果5秒接收不到message，则进入通信错误状态，关闭输出。

After the relay KS is closed, BMS transmit the charge control command and the target charge voltage and charge current.

Charger receive the message (charge control command and the target charge voltage and charge current) from BMS, then charger output high voltage to battery pack. If charger is not receive the message from BMS in 5 second, charger enter into Communication timeout state.