

Charger Module CAN Communication Protocol V1.06



CONTENT

1. SUMMARIZE	3
1.1 BOTTOM LEVEL PROTOCOL	3
1.2 COMMUNICATION PROCEDURE.....	3
1.3 DATA TYPE	3
1.3.1 <i>FIXED POINT NUMBER</i>	3
1.3.2 <i>FLOATING POINT NUMBER</i>	4
2. APPLICATION FRAME FORMAT & DATA DEFINITION	4
2.1 FRAME FORMAT	4
2.2 IDENTIFIER	5
2.3 DATA FIELD DESCRIPTION	6
2.4 REFERENCE.....	9

1. SUMMARIZE

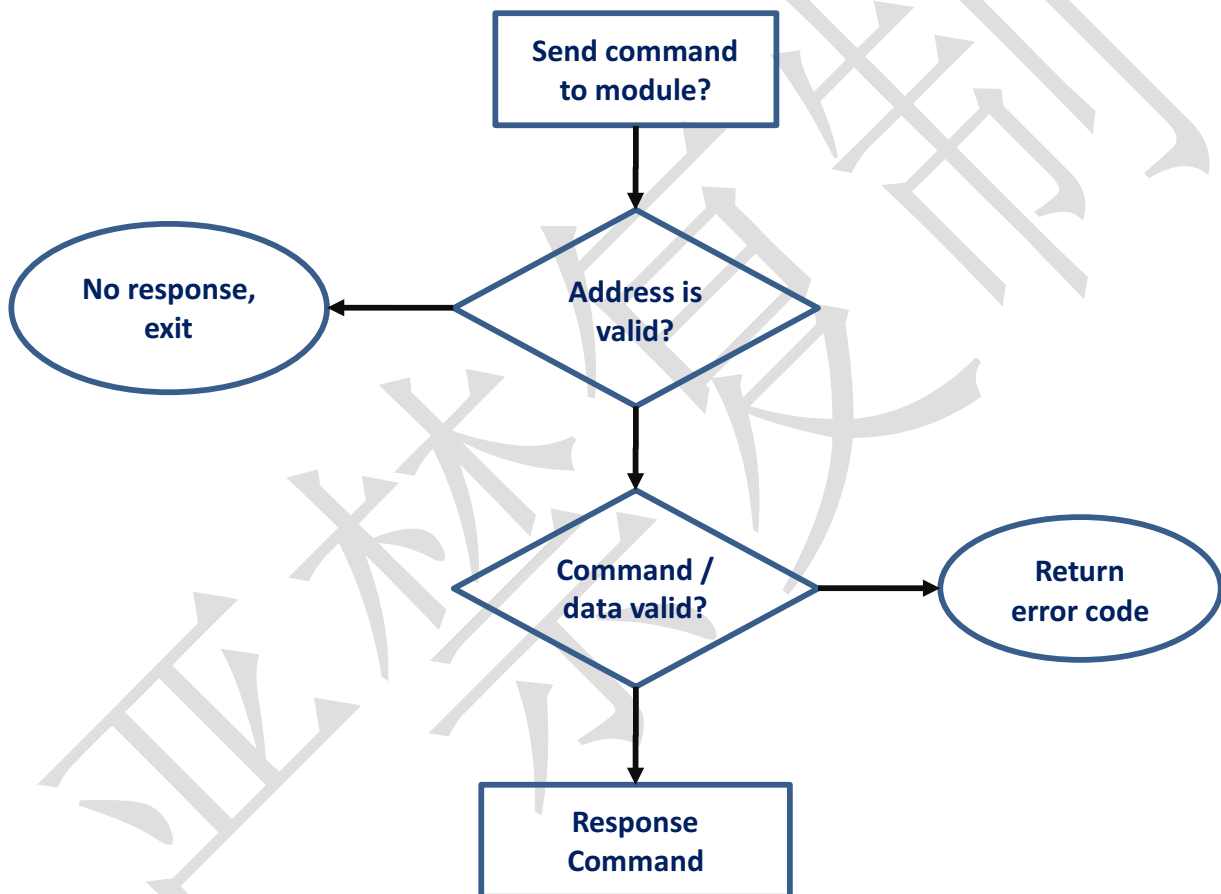
1.1 Bottom Level Protocol

It adopts the extended frame mode of the CAN bus, CAN2.0B.

The system BAUD rate is 125K.

CAN bus uses a linear bus terminated at each end with 120 Ω resistance.

1.2 Communication Procedure



1.3 DATA TYPE

The higher bits will be transmitted first and followed by lower bits. Data type includes fixed point number and floating point number.

1.3.1 FIXED POINT NUMBER

1~4 bytes, detail format and send sequence refer to 2.3.

1.3.2 FLOATING POINT NUMBER

The storage format of floating point number is 4-byte and the number will be sent after it is converted into HEX-ASCII code. The number is sending according to the sequence of sign bit, code, high bit of mantissa and low bit of mantissa. The floating point number uses IEEE 32-bit standard floating point number format (standard floating point number format of C language), the length is 32-bit, and the format is as shown below:

D31	D30—D23	D22—D16	D15—D8	D7—D0
Sign of floating point number	code	high bit of mantissa	middle bit of mantissa	low bit of mantissa

If the code is E, mantissa is M, then: floating point number = $\pm (1 + M \times 2^{-23}) \cdot 2^{E-127}$.

Whether the floating point number is positive or negative is dependent on the value of sign bit (S). S=1 means the floating point number is negative, and S=0 means the floating point number is positive.

For example, if the 32-bit floating point number is 43H, FAH, 00H, and 00H (S=0, E=135, M=0x7A0000=61×2¹⁷), the value of the floating point number is $(1 + 61 \times 2^{17} \times 2^{-23}) \cdot 2^{135-127} = 500$

If the floating point number is 40, the 4-byte ASCII code is 42, 20, 00, 00, and the sending sequence is 42, 20, 00, 00.

If the floating point number is 2.4, the 4-byte ASCII code is 40, 19, 99, 9A, and the sending sequence is 40, 19, 99, 9A.

2. APPLICATION FRAME FORMAT & DATA DEFINITION

2.1 Frame Format

Frame is the basic unit of the information. The frame format is shown as the table below.

Description	Code
Start of frame	sof(1bit)
Arbitration field	Identifier (11bits)
	SRR
	IDE
	Identifier (18bits)
	RTR
Control field	reserved(1 bit)

	Data Len(4 bits)
Data field	Data(0~8bytes)
CRC field	CRC(16bits)
Ack field	Ack(2bits)
End of frame	(7bits)

The data length is 8 in this protocol. The controllable part is identifier field and data field:

Identifier	Data			
29 bits	Byte 1	Byte 2	Byte 8
Identifier	Data (8 Bytes)			

2.2 Identifier

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
Error code (3 bits)			Device No(4 bits)				Command No(6 bits)						Destination Address (8 bits)								Source Address(8 bits)							

Error code: Message error reason

Error code	Description
0x00	Normal
0x01	/
0x02	Command invalid
0x03	Data invalid
/	/
0x07	In start processing

Device No.:

Device No	Description
0x0A	Protocol between controller and module
0x0B	Protocol between controller and module group

Command No: Detailed info refers to sector 2.3.

Destination address/Source Address:

It is a broadcast message if the charger module address in destination /sourceaddress is 0x3F, broadcast message don't need answer except 0x01 and 0x02 command.

	destination/source address							
	Bit7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
module	Reserved(0, 0)		Module address :00~0x3E Broadcast address:3F					
Controller	Controller address :0xF0~0xF8, default address:0xF0							

Supports up to 60 modules in parallel.

The charger module will get the automatic allocated address after power on. The group number is determined by the dial on the panel.

2.3 Data field description

Command No	Description	Data information							
		Byte0	Byte1	Byte2	Byte3	Byte 4	Byte 5	Byte 6	Byte 7
0x01	Read system information	Null Note: Device No is 0x0A, the destination address is broadcast address 0x3F; Device No is 0x0B 时, the destination address is group No.							
	answer	Output voltage(float)				Total output current(float)			
		Note: Device No is 0x0A, module answer the total current of the system, the source address is 0x3F; Device No is 0x0B, module answer the total current of the group, the source address is group No. ;							
	case	Ctrl Tx: 02 81 3F F0 00 00 00 00 00 00 00: Read system information Mdl Ans: 02 81 F0 3F 43 FA 00 00 42 80 00 00: Answer Vo 500V, Io_total 50A Ctrl Tx: 02 C1 01 F0 00 00 00 00 00 00 00: Read group 1# information Mdl Ans: 02 C1 F0 01 43 FA 00 00 40 A0 00 00: Answer Vo_group1 500V, Io_group1 5A							
0x02	Read system information	Null Note: Device No is 0x0A, the destination address is broadcast address 0x3F; Device No is 0x0B 时, the destination address is group No.							
	answer	0	0	Mdl number	0	0	0	0	0

Command No	Description	Data information							
		Byte0	Byte1	Byte2	Byte3	Byte 4	Byte 5	Byte 6	Byte 7
		Note: Device No is 0x0A,module answer the charger module number of the system, the source address is 0x3F; Device No is 0x0B,module answer the charger module number of the group, the source address is group No. ;							
	case	Ctrl Tx: 02 82 3F F0 00 00 00 00 00 00 00: read mdl number of the system Mdl Ans: 02 82 F0 3F 00 00 07 00 00 00 00: 7 mdls in system Ctrl Tx: 02 C2 01 F0 00 00 00 00 00 00 00: read mdl number of the group 1 Mdl Ans: 02 C2 F0 01 00 00 03 00 00 00 00: 3 mdls in group 1							
0x03	Read mdl N# information	Null Note: N is the destination address.							
	answer	Mdl #N output voltage(float)				Mdl #N output current(float)			
	case	Ctrl Tx: 02 83 00 F0 00 00 00 00 00 00 00: read mdl #0 information Mdl Ans: 02 83 F0 00 43 FA 00 00 40 60 00 00: mdl #0 Vo 500V, Io 3.5A							
0x04	Read mdl N# information	Null Note: N is the destination address.							
	answer	0	0	Mdl group#	0	Mdl Ambient temperature	Mdl state 2	Mdl state 1	Mdl state 0
		Note: module ambient temperature is signed char, 8bits, -128℃--127℃.							
	case	Ctrl Tx: 02 84 01 F0 00 00 00 00 00 00 00: read mdl #1 information Mdl Ans: 02 84 F0 01 00 00 02 00 1B 00 40 00: mdl #1 belongs to group #2, 27℃, walkin enable							
0x06	Read mdl N# information	Null Note: N is the destination address.							
	answer	VAB high byte	VAB low byte	VBC high byte	VBC low byte	VCA high byte	VCA low byte	0	0
		Note: 3 phase voltage, unit is 0.1V							
	case	Ctrl Tx: 02 86 01 F0 00 00 00 00 00 00 00: read mdl #1 information Mdl Ans: 02 86 F0 01 0F B4 0F A5 0F A7 00 00: mdl #1 AB 402V BC 400.5V CA 400.7V							
0x1A	Set on/off	On/off	0	0	0	0	0	0	0
		1:off,0: on Note: 0x1A is broadcast command, no answer frame. The destination address is 0x3F if the device No.is 0x0A. The destination address is group No.if the device No.is 0x0B.							
	answer	null							

Command No	Description	Data information							
		Byte0	Byte1	Byte2	Byte3	Byte 4	Byte 5	Byte 6	Byte 7
	case	Ctrl Tx: 02 9A 3F F0 01 00 00 00 00 00 00: set off to all mdls Ctrl Tx: 02 DA 02 F0 01 00 00 00 00 00 00 00: set off to mdls of group#2							
0x1B	Set output voltage and total current	Output voltage(mV)				Total output current(mA)			
		MSB			LSB	MSB			LSB
		Note: 0x1B is broadcast command, no answer frame. The destination address is 0x3F if the device No.is 0x0A. The destination address is group No.if the device No.is 0x0B.							
	Answer	null							
	case	Ctrl Tx: 02 9B 3F F0 00 04 93 E0 00 00 27 10: set all mdls to Vo 300V Io_total 10A Ctrl Tx: 02 DB 02 F0 00 03 0D 40 00 00 13 88: set group #2 to Vo 200V Io_group2total 5A							
0x1C	Set output voltage and total current	Output voltage(mV)				Output current(mA)			
		MSB			LSB	MSB			LSB
		Note: If send broadcast command, no answer frame. The destination address is 0x3F if the device No.is 0x0A. The destination address is group No.if the device No.is 0x0B.							
	Answer	null							
	case	Ctrl Tx: 02 9C 3F F0 00 04 93 E0 00 00 27 10: set all mdls to Vo 300V, Io 10A Ctrl Tx: 02 DC 02 F0 00 03 0D 40 00 00 13 88: set group #2 to Vo 200V, Io_group2 5A							

		Mdl N state list 2	Mdl N state list 1	Mdl N state list 0
	Bit7	1: mdl PFC side is off	1: communication interrupt ⁽¹⁾	
	Bit6	1: input over voltage	1: WALK-IN enable	
	Bit5	1: input under voltage	1: output over voltage	
	Bit4	1: input unbalance	1: over temperature	
	Bit3	1: input phase lost	1: fan fault	
	Bit2	1: load unsharing	1: mdl protect	
	Bit1	1: mdl ID repetition	1: mdl fault	
	Bit0	1: power limit	1: mdl off state	1: output short

Note:

(1)Communication interrupt: If the charger module did not receive the message for 10 seconds from the controller, the charger module will off.

2.4 Reference

Recommended power sequence:

Poewr on

Set the output voltage and output current to the charger module

Close the system relay

Set on to the charger module

Recommended shutdown sequence:

Set off to the charger module

Open the system relay

Can bus frame reference:

for controller and 3 charger modules:

Direction	ID	DATA	Description
Mdl Rx	02 9A 3F F0	01 00 00 00 00 00 00 00	Set off to all modules
Mdl Rx	02 9C 3F F0	00 0B 71 B0 00 00 3A 98	Set 750V 15A
Mdl Rx	02 9A 3F F0	00 00 00 00 00 00 00 00	Set on to all modulese Begin to charg
Mdl Rx	02 81 3F F0	00 00 00 00 00 00 00 00	
Mdl Tx	02 81 F0 3F	44 3B 80 00 41 6F 33 33	750V 14.95A
Mdl Rx	02 82 01 F0	00 00 00 00 00 00 00 00	
Mdl Tx	02 82 F0 01	00 00 03 00 00 00 00 00	3 mlds in system
Mdl Rx	02 9C 3F F0	00 0B 71 B0 00 00 3A 98	Set 750V 15A
Mdl Rx	02 9A 3F F0	00 00 00 00 00 00 00 00	Set on to all modulese
Mdl Rx	02 84 00 F0	00 00 00 00 00 00 00 00	
Mdl Tx	02 84 F0 00	00 00 00 00 16 00 40 00	Mdl #0 22°C, walkin enable
Mdl Rx	02 84 01 F0	00 00 00 00 00 00 00 00	
Mdl Tx	02 84 F0 01	00 00 00 00 18 00 40 00	Mdl #1 24°C, walkin enable
Mdl Rx	02 84 02 F0	00 00 00 00 00 00 00 00	
Mdl Tx	02 84 F0 02	00 00 00 00 17 00 40 00	Mdl #2 23°C, walkin enable
Mdl Rx	02 9C 3F F0	00 0B 71 B0 00 00 3A 98	Set 750V 15A

Direction	ID	DATA	Description
Mdl Rx	02 9A 3F F0	00 00 00 00 00 00 00 00	Set on to all modulese
.....	Set and get information continually
Mdl Rx	02 9A 3F F0	01 00 00 00 00 00 00 00	Set off to all modulese Charge end