



Product Specification

Customer Name	
Part Number	
Customer Model	
Parts Name	
Product Model	CD- T (800V) 6.6 kW bidirectional +2.5 kW
Applicable models	
release date	20250 623
Current version	A.0

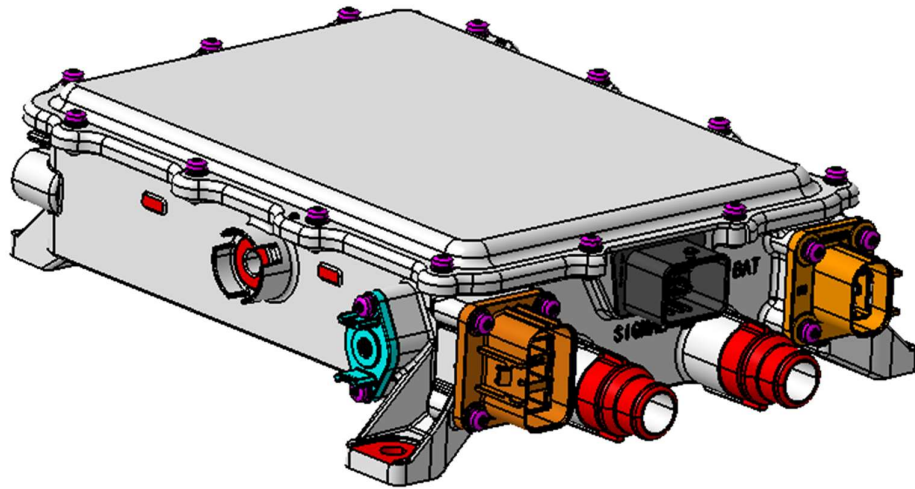
Contents

1. Overview	2
1.1 Summary	2
1.2 Industry terminology	3
1.3 Introduction to the main functions of the system	3
2. Reference Standard	4
3. Environmental requirements	5
4. Technical Specifications	6
4.1.OBC electrical performance requirements	6
4.2.DC electrical performance requirements	9
4.3. Low voltage electrical performance requirements	10
4.4. Safety performance and other	10
4.5 Electromagnetic compatibility	11
4.6 CAN network system	12
4.7 Assembly principle block diagram	13
5. Interface Requirements	13
5.1 General requirements for interfaces	13
5.2 Vehicle charger low voltage connector information	13
5.3 High voltage connector assembly interface definition	14
6. Software requirements	15
7. Mechanical parameters	16
7.1 Installation dimensions and specifications	16
7.2 Appearance	16
7.3 Weight	16
8. Nameplate, packaging, transportation, storage	16
8.1. Nameplate barcode (nameplate label should be traceable)	16
8.2. Packaging, packaging diagram	17
8.3. Transport	17
9. Safety Guidelines	18

1. Overview

1.1 Summary

This product is a two-in-one on-board charging and distribution bidirectional assembly developed for new energy vehicles, with the characteristics of high integration and high power density. The on-board charger (OBC) obtains energy from the 220V AC power supply to charge the high-voltage power battery in the car. During the charging process, the power battery management system monitors the charging status in real time. OBC responds to the voltage and current commands given by the BMS, and provides status feedback to achieve self-diagnosis. The main function of DC/DC is to convert the high-voltage DC power of the power battery pack into 13.8V low-voltage DC power to power the vehicle accessory system.



Product digital model

1.2 Industry Terminology

No.	Terms or abbreviations	Description
1	BMS	Battery Management System
2	SOC	Battery State of Charge
3	CAN	CAN communication network (Controller Area Network)
4	ECU	Electronic Control Unit
5	EV	Electric Vehicle
6	OBC	On Board Charger
7	DCDC	DC-DC Converter
8	HV	High Voltage
9	LV	Low Voltage
10	CC	Constant Current
11	CV	Constant Voltage
12	MCU	Motor Control Unit
13	VCU	Vehicle Control Unit
14	CAN	Controller Area Network
15	UDS	Unified Diagnostic Services
16	ASIL	Automotive Safety Integrity Level
17	HVI	High Voltage Interlock Loop
18	PDU	High voltage power distribution unit

1.3 Introduction to the main functions of the system

1.3.1 OBC module functions

According to the BMS instruction requirements, the battery is charged with constant current and constant voltage under different conditions within the adjustable range;

According to the BMS instruction requirements, the pure resistive load is supplied with different power requirements within the adjustable range to achieve battery heating;

According to the BMS instruction requirements, AC inverter output is carried out within a certain

voltage range to supply AC load;

The OBC module can be used for diagnosis, self-checking and protection according to the vehicle's CAN information and self-monitoring information;

1.3.2 DC-DC Converter Function

The DCDC converter receives the control signal from the vehicle controller and converts the high voltage of the power battery into a low voltage 14V output to meet the charging and load requirements of the subsequent on-board battery. At the same time, it can realize feedback on its own status and load status.

1.3.3 PDU Function

Vehicle power distribution system: It contains fuses and relays of the main circuits;

1.3. 4 CAN communication function

OBC and DC/DC control the output voltage and output current through the CAN bus, and realize information exchange with BMS and VCU and feedback of working status through CAN communication.

1.3.5 UDS Diagnosis

It can realize the functional diagnosis of OBC and DCDC and report to the whole vehicle system. It can also realize offline burning through remote flashing program to reduce after-sales maintenance costs.

1.3.6 Self-diagnosis and multiple protection functions

With self-diagnosis, input and output over-voltage, under-voltage protection, output short circuit protection, hardware fault protection, whole machine over-temperature protection and recovery functions;

1.3.7 Cooling method:

Liquid Cooling

2 . Reference Standards

The reference standards of this technical requirement include but are not limited to the following standards. Regardless of whether the following standard documents are marked with a date, their latest versions (including all amendments) apply to this technical requirement.

No.	Standard/Document No.	Standard/File Name
1	GBT 40432-2021	Conductive on-board charger for electric vehicles
2	GB 18384-2020	Safety requirements for electric vehicles
3	18487.1-2023	GB/T Electric vehicle conductive charging system Part 1: General requirements
4	GB/T 2423.1	Environmental testing for electrical and electronic products Part 2: Test methods Experiment A: Low temperature
5	GB/T 2423.2	Environmental testing for electrical and electronic products Part 2: Test methods Experiment B: High temperature
8	GB/T 2423.10	Environmental testing for electrical and electronic products Part 2: Test methods Experiment Fc: Vibration (sinusoidal)
9	GB/T 2423.17	Environmental testing for electrical and electronic products Part 2: Test methods Experiment Ka: Salt spray
10	GB/T 2423.22	Environmental testing for electrical and electronic products Part 2: Test method Experiment N: Temperature change
11	GB/T 28046.2	Environmental conditions and testing for electrical and electronic equipment in road vehicles - Part 2: Electrical loads
12	GB/T 18387-2017	Limits and measurement methods for electromagnetic field emission intensity of electric vehicles
13	GB 34660-2017	Road vehicles electromagnetic compatibility requirements and test methods
14	GB/T 40428-2021	Electromagnetic compatibility requirements and test methods for conductive charging of electric vehicles
15	QC/T 413-2002	Basic technical requirements for automotive electrical

		equipment
16	EN 62477-1	Power electronic converter systems and equipment: general safety requirements Power electronic converter systems and equipment: general safety requirements
17	GBT 24347-2021	Electric vehicle DCDC converter Electric vehicle DElectric vehicle DCDC converter
18	AEC-Q200	Automotive single component test-Q200: Main power transformer, power inductor, PFC filter electrolytic capacitor requirements and specifications
19	AEC-Q101	Automotive single device test-Q101: Power level MOSFET, power level diode, TV requirements and specifications
20	AEC-Q100	Automotive single device testing-Q100: Main control chip, single chip microcomputer requirements and specifications

3. Environmental requirements

The operating environment conditions of the assembly are as follows:

No.	Description	Technical indicators	Unit	Remark
1	Operating temperature	-40~85	°C	Internal power reduction when temperature exceeds 85°C
2	Storage temperature	-40~105	°C	The power supply is not on
3	Relative humidity	5~95	%RH	No condensation, no frost
4	Protection level	IP67		
5	Cooling method	Liquid Cooling		
6	Vibration level	Meet GB/T 40432-2021		

7	Noise Level	65	dB	Meet GB/T 40432-2021
8	Salt spray level	Meet QC/T2423.17-2011		
9	Altitude	4000	m	
10	Temperature and humidity resistance	Meet GB/T 2423.22		
11	fall	Wiring harness according to QC/T417.1-2001 Housing according to GB/T 2423.8-1995		Appearance, structure and performance are normal

4. Technical Specification

4.1.OBC electrical performance requirement

Description		Mini mum	Typi cal	Maxi mum	Unit	Condition
OBC electrical characteristics (AC /DC)						
1. Input characteristics						
Rated input voltage		-	220	-	Vac	
Input voltage range		90	-	264	Vac	Normal operating voltage range
Maximum input current		-	-	32	A	Input voltage changes, input current does not exceed 32A
AC input voltage frequency		4 5	50	6 5	Hz	Rated 50 Hz
Power Factor (PF)		0.9 9 0.9 7	-	-	-	@50%~100% load> 0.9 9 @15%~50% load> 0.9 7
2. Output characteristics						
High voltage Output	Rated output voltage	600			Vdc	When the input is 110Vac, the output will automatically reduce the power. Output can run at full power when input is 220Vac
	Output voltage range	350		850	Vdc	
	Output current range		13		A	
	Output rated power		6.6		KW	

	Output ripple and noise		± 5		%Vo	
	Start-up time		4		S	After OBC receives the charging request from BMS, the output voltage rises from 10% to 90%
	Output Fall Time		300		msD	The time it takes for the output current to drop to 0A after the OBC receives the BMS shutdown command
	Output constant voltage accuracy			1	%	Maximum is no more than $\pm 1\%$
	Output current accuracy			5	%	Maximum not exceeding $\pm 0.5A$
	Static current consumption			1	mA	Sleep mode without gun plugged in, consuming KL30 normal current
	Overall efficiency	94	-		%	Output voltage below 600V , efficiency $\geq 93\%$ Output voltage 600V or above, efficiency $\geq 94\%$
3. Protection characteristics						
	Input over-voltage protection	265	270	275	Vac	Turn off the output,
	Input over-voltage recovery	255	260	265	Vac	Hysteresis $\geq 5V_{ac}$
	Input under-voltage protection	80	85	90	Vac	Turn off output
	Input under-voltage recovery	90	95	95	Vac	Hysteresis $\geq 5V_{ac}$
	Input over-current protection			32	A	The input current is maintained at no more than 32A and the output power is automatically adjusted.
High	Output over-voltage	855	860	865	Vdc	Turn off high voltage output and

voltage output	protection					restore after troubleshooting
	Output under-voltage protection	335	340	345	Vdc	Turn off high voltage output, and it can be restored after troubleshooting (battery voltage and output voltage must be synchronized)
	Output over-current protection			14	A	
	Output short circuit protection	Yes			-	Before entering the charging process, if the output short circuit is detected, charging will not start. If the output short circuit occurs during the charging process, the high voltage output will be turned off immediately.
	Output reverse polarity protection	Yes			-	Output is reversed, high voltage output does not start, after trouble- shooting, normal operation resumes
Communication fault protection		Yes			-	If the charger does not receive BMS instructions for 5 consecutive seconds, or a communication failure occurs during the charger operation, the charger will shut down the output.
Over temperature protection	OBC MCU	95		100	°C	The OBC temperature derating range is 95 ~ 100 °C . Linear derating from 95°C to 100°C, shutdown at 100°C

4.2.DC electrical performance requirements

Description		Min	Typical	Max	Unit	Condition
DC/DC Electrical Performance						
1. Input characteristics						
Input voltage range		350	-	850	Vdc	
2. Output characteristics						
Output voltage range		9	13.8	16	Vdc	
Rated output current		-	178	-	A	
Peak output current		-	214	-	A	
Output Power		-	2500	-	W	Peak power: 3000W
DC weighted conversion efficiency		92	-	-	%	Rated input, load>30% weighted efficiency, peak efficiency
3. Protection characteristics						
Input over-voltage protection point		855	860	865	Vdc	Turn off the output,
Input over-voltage recovery point		845	850	855	Vdc	Hysteresis $\geq 5VDC$
Input under-voltage protection point		335	340	345	Vdc	Turn off output
Input under-voltage recovery point		345	350	355	Vdc	Hysteresis $\geq 5VDC$
Output over-voltage protection point			16		Vdc	
Output under-voltage protection point			8		Vdc	
Over temperature	MCU	100		109	°C	The MCU temperature derating range is 100~109. The MOS tube temperature derating range is 115~124. Compare the
	MOS	115		124	°C	

protection						difference between the MCU temperature and the MOS tube temperature and the starting derating, and the one with the larger difference will be derated; the MOS tube will shut down at 125°C
Output over-current protection		> 220			A	The software output is adjustable, and this value is the hardware current limit value
Communication fault protection		have			-	If the charger does not receive BMS instructions for 5 consecutive seconds, or a communication failure occurs during operation, the charger will shut down the output.

4.3 . Inverter performance requirements

Project	Minimum	typical	maximum	unit	condition
DC/AC Electrical Performance					
1. Input characteristics					
Input voltage range	450	-	850	Vdc	
2. Output characteristics					
Output voltage	AC198	AC220	AC242	V	Pure sine wave
Rated output power	-	6000	-	VA	600V-800V input full load output; 450V-600V derating output; Stop discharging below 450V;
Output frequency	-	50/60	-	Hz	
Discharge efficiency		93		%	
Output voltage accuracy		±5		%	

Voltage Regulation		±2		%	
Distortion		0.5		%	
AC voltage ripple		250		mVP-P	

4.4 . Low voltage electrical performance requirements

Signal interface						
KL30	Thermistor	CC/CP	Communication	Electronic lock	Baud rate	High voltage interlock
12V	1 0K	support	CAN	support	500Kbps	support

4.5 . Safety performance and others

Safety features				
project		Technical indicators	unit	Remark
voltage resistance	Input to housing	2000 VAC, 3s, leakage current $\leq 20\text{mA}$	mA	No breakdown or arcing
	Output to housing	2000 VAC, 3s, leakage current $\leq 12\text{mA}$	mA	No breakdown or arcing
	Input to Output	2000 VAC, 3s, leakage current $\leq 28\text{mA}$	mA	No breakdown or arcing
Insulation resistance	DC high voltage-DC low voltage (shell ground)	Resistance $\geq 100\text{ M}\Omega$, test voltage 500VDC	M Ω	No breakdown or arcing
Ground resistance	Ground wire to shell - DC low voltage (shell ground)	≤ 0.1	Ω	The resistance between the ground point and the radiator is less than 100 milliohms, and the test current is 25A AC
Creepage clearance		$\geq 4\text{mm}$	mm	Meet the requirements of GB/T18488.1-2001 standard table 3
Electrical clearance		$\geq 3\text{mm}$	mm	Meet the requirements of GB/T 18488.1-2001 Table 3
MTBF		150000H	h	Ambient temperature 25°C

4.6 Electromagnetic compatibility

Test items	Reference Standards	Performance Indicators	Criteria	Remark
1. EMI test				
Conducted disturbance (CE)	GB/T 18487.3-2001			Only for OBC test
Radiated disturbance (RE)	GB/T18487.3-2001			
Conductive Electromagnetic Contact (CE)	GB/T 18655-2010	Level 3		For DCDC test only
Fallout (RE)	GB/T 18655-2010	Level 3		
2. EMS test □				
Surge	GB/T18487.3-2001 GB/T 17626.5-2008	Input differential mode 1KV 1.2/50us Input common mode 2KV 1.2/50us	B	Only for OBC test
EFT	GB/T18487.3-2001 GB/T 17626.4-2008	2KV/5KHz/1min	B	
ESD	GB/T18487.3-2001 GB/T 17626.1-1998	Contact 4KV/Air 8KV	B	
CS		10LIVE3 0.15-80MHz	A	
RS	GB/T 18487.3-2001 GB/T	3V/m 80-1000MHz	A	

	17626.3-2006			
		10V/m 80-1000MHz	B	
DIP	GB/T 18487.3-2001	Drop to 70% U(T), time 10ms; Drop to 50% U(T), time 100ms; Fall to 95% U(T), time 5000ms;	B	
Voltage fluctuation and flicker		Voltage fluctuation and flicker limits for Class A products		
Current harmonic emission	GB/T 18487.3-2001	Harmonic current limit for Class A products		
Electrostatic Disturbance (ESD)	GB/T 19951-2005	Whole machine (power on) contact discharge: $\pm 6\text{KV}$ air discharge: $\pm 8\text{KV}$	B	
		Whole machine (not powered on) Contact discharge: $\pm 6\text{KV}$ Air discharge: $\pm 15\text{KV}$	C	
Radiated electromagnetic field immunity free field method (RS)	GB/T 17619-1998		A	
Radiated electromagnetic field immunity Bulk current injection (BCI)	GB/T 17619-1998		A	
Immunity to electrical transient	GB/T 21437.2-2008 (ISO	level 4	Pulse1, Pulse2b is D,	

conducted disturbances along power supply lines (CS)	7637-2)		Pulse 2a, Pulse 3a/3b is A	
Electrical Fast Transient (EFT) Immunity	GB/T 17626.4-2008 (IEC 61000-4-4)	$\pm 4\text{KV}$, 5KHz/100KHz	B	

Criteria definition:

A: The test process indicators are within the specification range.

B: After the test is completed, they can be automatically restored to the specification range.

C: After the test is completed, they can be manually restored to the specification range.

4.6 CAN network system

4.6.1 With CAN wake-up function, meet UDS diagnosis, offline program burning

4.6.2 CAN network compatibility

The CAN circuit is as follows:

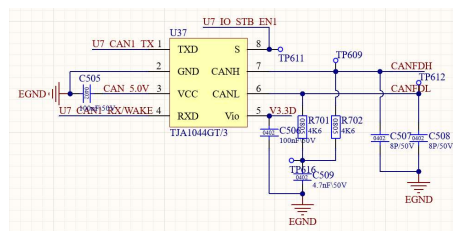
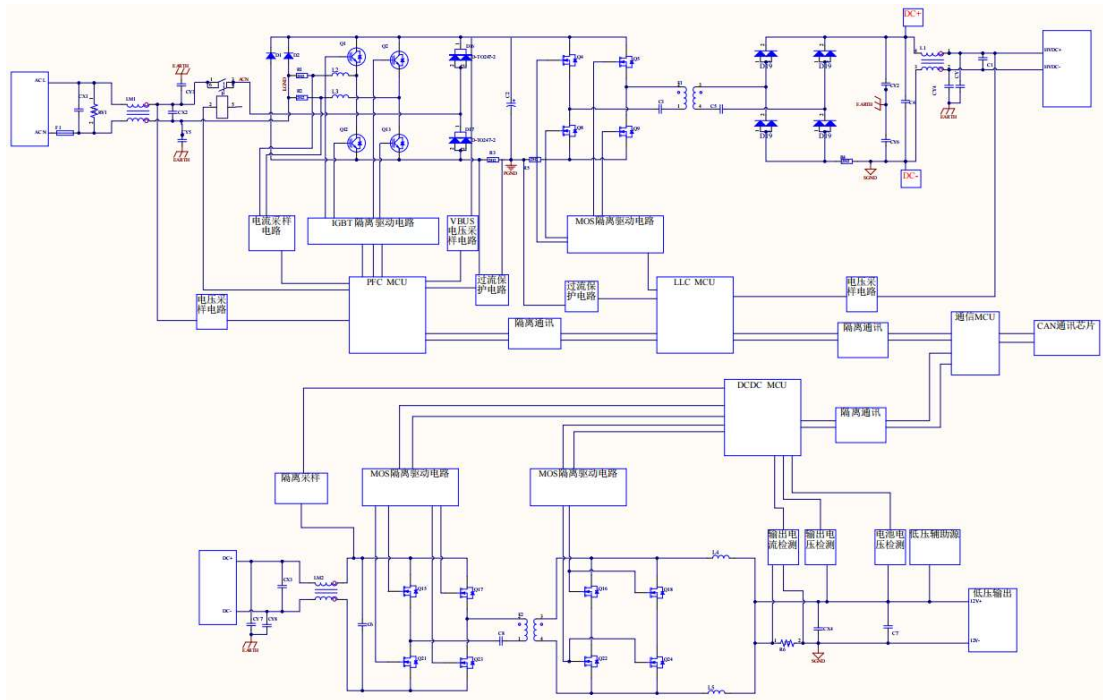


Figure 6: CAN network schematic diagram

4.7 Assembly principle block diagram



5. Interface requirements

5.1 General interface requirements

The power distribution assembly, vehicle and battery pack mainly include low-voltage interface and high-voltage interface. The model and position of the interface connector on the part are defined according to the vehicle layout.

5.2 Car charger low voltage connector information

5.2.1 Viewing direction of low voltage signal connector (component end):

Connector Name	Component end plug-in Part Side Connector		Mating Connector (wiring harness)		Remark
	P/N	Supplier	P/N	Supplier	
Low voltage signal plug-in	0643340100	Molex	/	Molex	

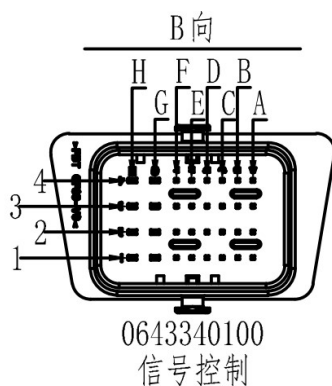


Figure 7 Low voltage signal connector viewing direction

5.2.2 The pin definitions of the low voltage signal plug-in assembly are shown in the following table

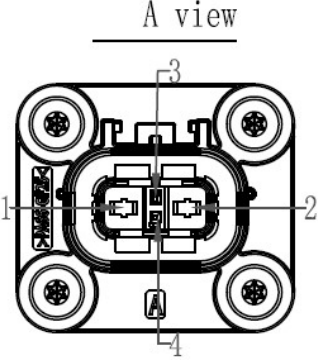
brand	Serial number	Signal bit number	name	Function Function	Remark
	1	1G	Relay power supply positive	PTC	
	2	1H	KL30	Normal power input positive	
	3	2A	12V0.2A	Output wakeup	
	4	2B	L_TEMP+	Thermistor 1 -1	
	5	2C	Hardwire wake-up (ACC)	6 -16 v	
	6	2D	L_TEMP -	Thermistor 1 -2	
	7	2E	N_TEMP+	Thermistor 2-1	
	8	2 F	N_TEMP -	Thermistor 2-2	
	9	2G	Relay power supply negative 2	PTC2	
	10	3 A	C C		
	11	3 B	C P		
	12	3G	Relay power supply negative 1	PTC1	
	13	3 H	Electronic lock	Power positive	
	14	4 A	C AN_H		
	15	4 B	C AN_L		
	16	4 C	H VIL+	High voltage interlock	
	17	4D	H VIL-	High voltage interlock	
	18	4 E	Electronic lock	Electronic lock feedback- (K/E)	

	19	4F	Electronic lock	Electronic lock feedback + (C)	
	20	4G	KL31		
	21	4H	Electronic lock	power supply Negative	
	22	others	NC		

Connector Name	Component end plug-in		Matching end plug-in (wiring harness end)		Remark
	Part Number	supplier	Part Number	supplier	
DC output positive terminal	GH33-F200-1NNB-T01	/		/	Install bolt M8*14. Torque 9-11N.m
DC output negative terminal					Shell connection

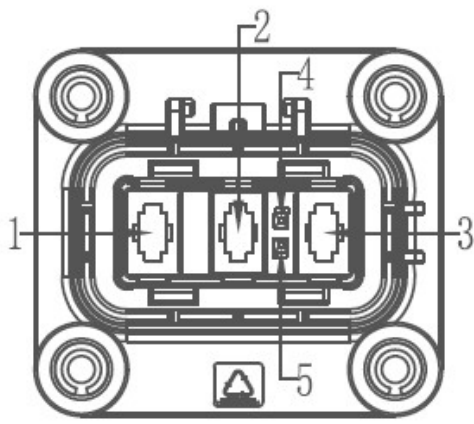
5.3 High voltage connector assembly interface definition

Table 5.3.1 High voltage DC section interface

Connector name	Battery		Connectors model	socket	HFEV280-2Z-A (Zhilv)
				plug	HFEV280-2T-A (Zhilv)
Terminal number	Wire diameter	Line Type	Function Definition		
1	4mm2	High voltage cables	positive electrode	 <p>A view</p>	
2	4 mm2	High voltage cables	negative electrode		
3	22AWG	Interlock signal	HVIL+		
4	22AWG	Interlock	HVIL-		

		signal		
--	--	--------	--	--

Table 5.3.2 High voltage AC section interface

Connector name	OBC Input		Connect or Model	socket	HFEV530-3Z-A-6 (Sichuan Huafeng)
				plug	HFEV530-3T-A-6 (Sichuan Huafeng)
Terminal number	Wire diameter	Line Type	Function definition	<p>C view</p> 	
1	6mm2	High voltage cables	PE		
2	6mm2	High voltage cables	N		
3	6mm2	High voltage cables	L		
4	Black 22AWG	Interlock signal	HVIL+		
5	Black 22AWG	Interlock signal	HVIL-		

6. Software requirements

CAN communication

No.	Items	Technical indicators	Notes
1	Baud rate	500 Kbit/s	/
2	CAN bus communication protocol	Comply with CAN2.0B specification	/
3	Terminal resistance	No terminating resistor	/

7. Mechanical parameters

7.1 Installation dimensions and specifications

See the last page for details: Engineering drawings

7.2 Appearance

The surface of the parts should be smooth, without any defects such as peeling, rust, cracks, spots, burrs, deformation, or bumps that can be touched by hand. The connectors should be complete, and the parts should be securely fastened without any defects or damage such as rust, burrs, and cracks. The connector sheath and pins should be intact and undamaged, and all parts should be tightly connected.

7.3 Weight

No.	Parts Name	Parts code	weight (kg)	Remark
1	Charging module assembly		≤ 11	

8. Nameplate , packaging, transportation, storage

8.1. Nameplate barcode (nameplate label should be traceable)

The following format is for reference:



Figure 9 High voltage label

8.2. Packaging, packaging diagram

The packaging box contains the product name, model, manufacturer's logo, the manufacturer's quality department's inspection certificate, manufacturing date, etc.; the packaging box contains a list of accessories:

No.	Name	Quantity	Unit	Remark
1	Charging and distribution system assembly	1	PCS	
2	Test Report	1	page	

8.3. Transportation

The product should be transported in a solid packaging box. The outside of the box should comply with the relevant national standards and should have signs such as "Handle with Care" and "Moisture-Proof". The packaging box containing the product can be transported by various means of transportation. It should be protected from direct rain, snow and mechanical impact during transportation.

8.4. Storage

When the product is not in use, it should be stored in the packaging box. The warehouse environment temperature should be -10-40°C and the relative humidity should not be greater than 80%. Noxious gases, flammable, explosive products and corrosive chemicals are not allowed in the warehouse, and there should be no strong mechanical vibration, impact and strong magnetic field. The packaging box should be padded at least 20cm above the ground and at least 50cm away from the wall, heat source, window or air inlet. The storage period under the specified conditions is generally 2 years, and re-inspection should be carried out after more than 2 years.

The product should be stored in a ventilated and dry place. At the same time, it must be kept away from high temperature sources, fire sources and chemicals. Store neatly and avoid throwing or smashing.

9. Safety Guidelines

Warning: remind users that the operation is dangerous

- * ☐ It is strictly forbidden to disassemble and modify the on-board charger for repair or debugging without authorization ☐ ☐
- * ☐ Do not place the parts in the rain ☐ ☐
- * ☐ Please make sure the shell is intact before installation. If it is damaged, please replace it immediately or contact after-sales service ☐ ☐
- * ☐ All plugs and sockets should be connected tightly. If they are damaged or loose, please

replace them immediately

- * It is strictly forbidden to plug or unplug the connector while the product is powered on, otherwise it may cause personal injury
- * It is strictly forbidden to open the product shell when the product is powered on, otherwise it may cause personal injury.
- * ☐ It is strictly forbidden to touch the high-voltage live parts of the product with bare hands. Please wear insulating gloves, insulating shoes, Insulating clothing, maintenance and testing under power is strictly prohibited
- * When replacing fuses and contactors, it is strictly forbidden to use rough operations to avoid damaging the product and causing safety hazards
- * ☐ Use a three-core cable with a grounding wire for AC power supply, and install the grounding wire correctly.
- * ☐ If there is any abnormal sound or smell during the operation of the charger, please unplug the power plug.
- * ☐ When the battery is charging normally, please stay away from fire and flammable and explosive items
- * Do not charge a damaged or non-chargeable battery.

Note: Remind the user that the following operations are important operations of this product ☐ ☐

- * ☐ Do not block the air inlet and outlet of the charger to prevent overheating ☐ ☐
- * ☐ Please make sure the output cable is not too long to avoid the impact of line voltage drop on charging ☐ ☐
- * ☐ Disconnect the power cord and charging plug when moving the charger ☐ ☐
- * ☐ The battery voltage must match the nominal voltage of the charger ☐ ☐
- * ☐ Avoid collision , voltage , pulling , twisting or shaking the charging cable ☐ ☐
- * ☐ The product should be placed in a safe, ventilated, dust-free and rain-free environment ☐ ☐
- * ☐ Please package and store it if not in use for a long time