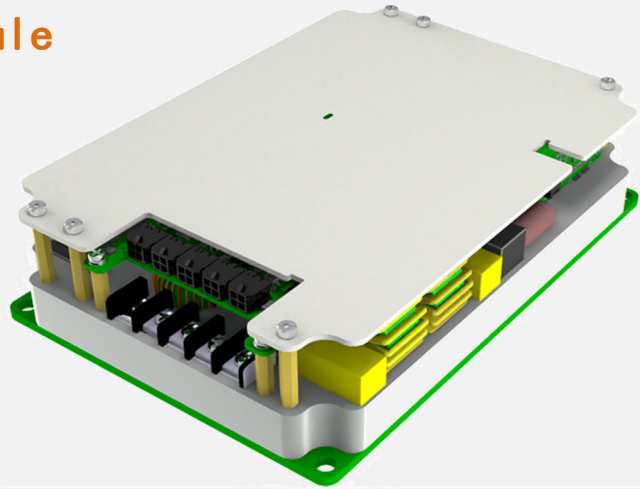


## TR1000 Serials integrated 3.3KW

### Vehicle AC-DC charge module



### Specification Content

1. Product Introduction.....	2
Overview: .....	2
2. Electrical Characteristics.....	3
2.1. Electrical Characteristics .....	3
2.2. System Block Diagram.....	4
2.3. Characteristic Curve .....	5
3. Dimensions and Weight .....	8
3.1. Product size .....	8
3.2. Product Weight.....	8
4. Define Connectors and Connection Terminals .....	9
4.1. Power Port Definition.....	9
4.2. Signal Port definition .....	10
4.3. Schematic diagram of signal interface.....	12
5. Operating Guide .....	13
5.2. Product installation .....	13
5.3. Thermal Design Guidelines .....	14
5.4. CAN Communication Protocol .....	15
5.5. Indicator Language Definition .....	15
5.6. Parallel operation of multiple machines.....	16
5.7. Background Debugging Software Description.....	16
5.8. Troubleshooting and confirmation .....	16
6. User Notices and Cautions.....	17
7. Reference standards and specifications.....	错误!未定义书签。
8. Package & Transportation & Storage.....	18
9. Version update record .....	19

## 1. Product Introduction

**TR1000** series vehicle AC-DC charger is designed for new lithium electric vehicles, logistics vehicles, and other new energy models research and development of a high-power dense and high-efficiency charger, using modular, standardized, universal ideas to design and develop.

The module is designed with full digital control technology, which has flexible and intelligent control, good protection characteristics and strong system robustness. Its own microprocessor communicates with the monitoring unit, and the parameters in the machine CAN be set or adjusted by the upper monitoring unit through the CAN interface.

It has multiple protection functions such as input over-voltage protection, output over-current protection, output over-voltage protection, output short-circuit protection, and over-temperature protection.

### Main specification:

Type	Input	Rated Pout	Rated Vout	Output range	3D
<a href="#">TR1001</a>	<a href="#">90~265VAC</a>	<a href="#">3.3KW</a>	<a href="#">540VDC</a>	<a href="#">0~720V/0~6A</a>	<a href="#">TYPE A, TYPE B</a> <a href="#">901.10020000.00.stp</a>
<a href="#">TR1002</a>	<a href="#">90~265VAC</a>	<a href="#">3.3KW</a>	<a href="#">360VDC</a>	<a href="#">0~500V/0~10A</a>	
<a href="#">TR1003</a>	<a href="#">90~265VAC</a>	<a href="#">3.3KW</a>	<a href="#">144VDC</a>	<a href="#">0~190V/0~22A</a>	<a href="#">TYPE A, TYPE B</a> <a href="#">901.10060000.00.stp</a>
<a href="#">TR1004</a>	<a href="#">90~265VAC</a>	<a href="#">3.3KW</a>	<a href="#">108VDC</a>	<a href="#">0~140V/0~30A</a>	
<a href="#">TR1005</a>	<a href="#">90~265VAC</a>	<a href="#">3.3KW</a>	<a href="#">72VDC</a>	<a href="#">0~95V/0~45A</a>	<a href="#">TYPE C</a> <a href="#">901.10060000.02.stp</a>
<a href="#">TR1006</a>	<a href="#">90~265VAC</a>	<a href="#">3.3KW</a>	<a href="#">48VDC</a>	<a href="#">0~68V/0~60A</a>	
<a href="#">TR1007</a>	<a href="#">90~265VAC</a>	<a href="#">3.3KW</a>	<a href="#">24VDC</a>	<a href="#">0~36V/0~100A</a>	<a href="#">TYPE A, TYPE B</a> <a href="#">901.10070000.00.stp</a> <a href="#">TYPE C</a> <a href="#">901.10070000.02.stp</a>

### Overview:

Type	TYPE A	TYPE A	TYPE A
Describe	<a href="#">Basic</a>	<a href="#">30W aux power</a>	<a href="#">Work with dc station</a>
Control board color	<a href="#">Back</a>	<a href="#">Yellow</a>	<a href="#">Red</a>
S.N.	<a href="#">901.100*0000.00</a>	<a href="#">901.100*0000.01</a>	<a href="#">901.100*0000.02</a>
	<a href="#">CAN bus</a>	<a href="#">YES</a>	<a href="#">YES</a>
	<a href="#">CAN bus isolate</a>	<a href="#">NO</a>	<a href="#">YES</a>
	<a href="#">485 com</a>	<a href="#">YES</a>	<a href="#">NO</a>
	<a href="#">TTL serial com</a>	<a href="#">NO</a>	<a href="#">NO</a>
	<a href="#">CC check and wake up</a>	<a href="#">YES</a>	<a href="#">YES</a>
	<a href="#">CC check and wake up</a>	<a href="#">YES</a>	<a href="#">YES</a>
	<a href="#">12V0.3A fan driver</a>	<a href="#">YES</a>	<a href="#">YES</a>
	<a href="#">12V3A aux power output</a>	<a href="#">NO</a>	<a href="#">YES</a>

Dual color LED driver	YES	YES	YES
GB/T27930 support	NO	YES	NO
Work with dc station	NO	NO	YES

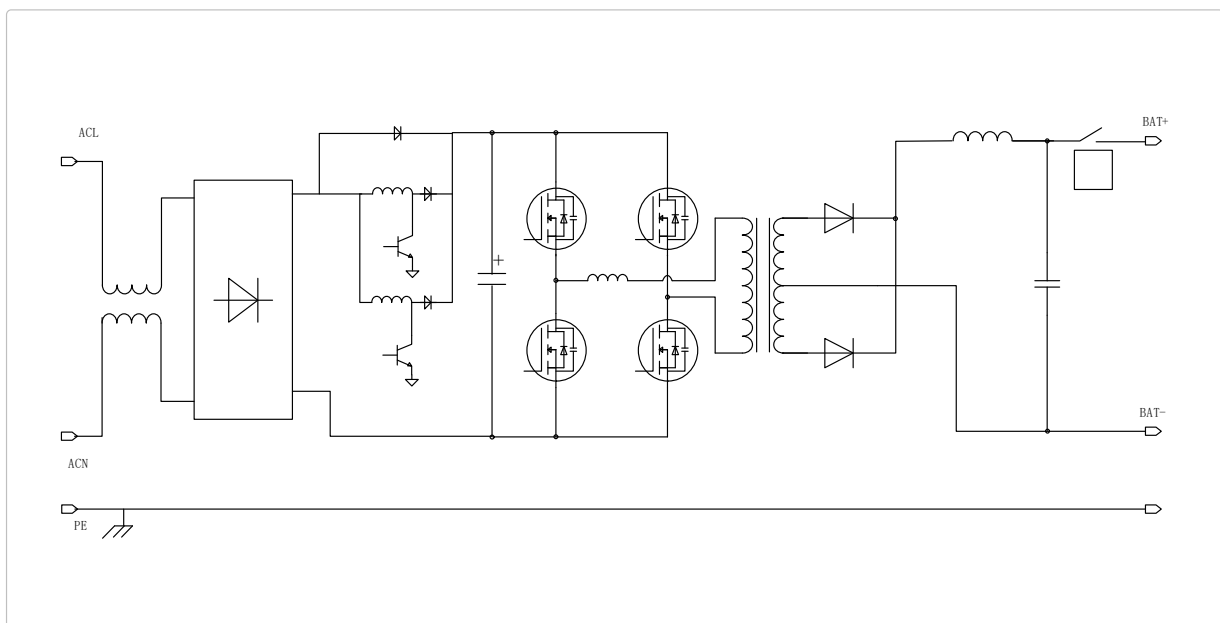
## 2. Electrical Characteristics

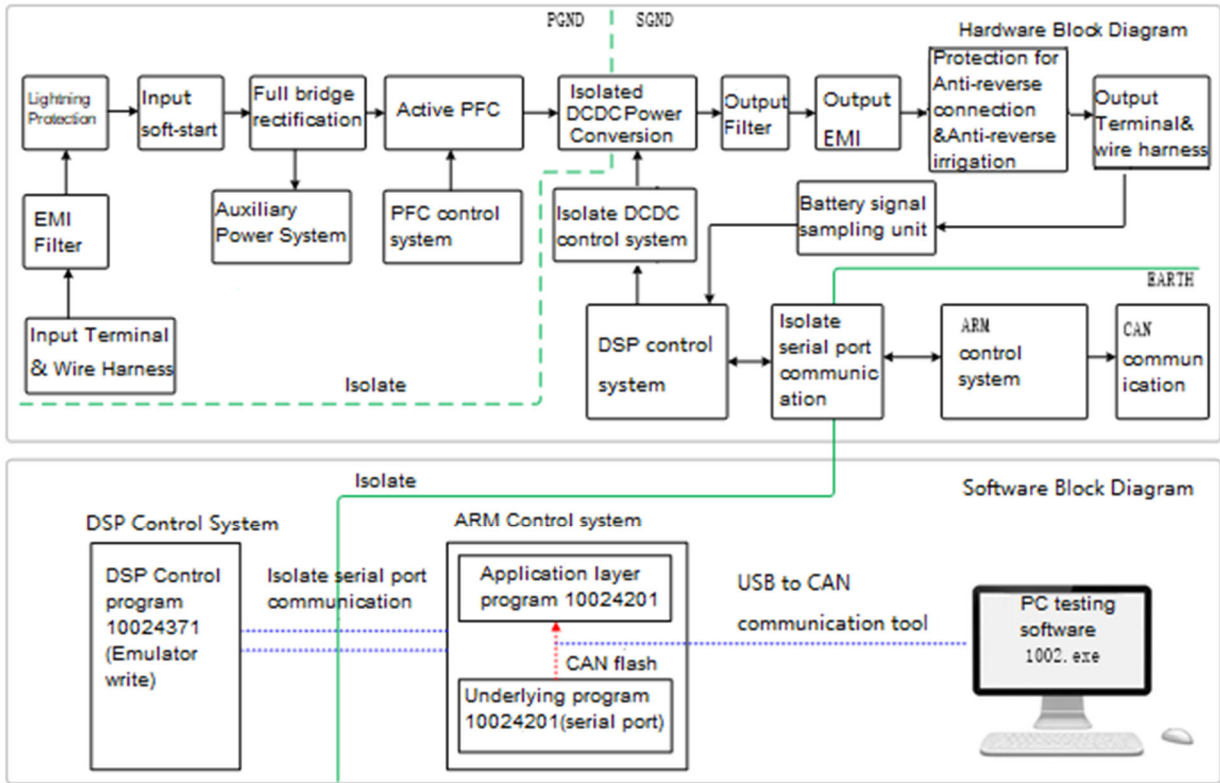
### 2.1. Electrical Characteristics

Model Number							
Vehicle Power Supply	Vehicle AC-DC charge module						
Model Number	TR1001	TR1002	TR1003	TR1004	TR1005	TR1006	TR1007
Type	A/B	A/B	A/B/C	A/B/C	A/B/C	A/B/C	A/B/C
Input Characteristic							
Rated Input Voltage	220VAC						
Input Voltage Range	90 ~ 265VAC						
Rated input voltage frequency	50Hz						
Input frequency range	45 ~ 65Hz						
Starting Impulse Current	≤16A						
Input power factor	≥0.99 (@220Vin,Pomax)						
Output Characteristic							
Rated Output Power	3.3KW						
Rated Output Voltage	540	360	144	108	72	48	24
Output Voltage Range	0 ~ 720	0 ~ 500	0~190	0~140	0~95	0~68	0~36
Output Current Range	0 ~ 6	0 ~ 10	0~22	0~30	0~45	0~60	0~100
Voltage regulation accuracy	±1%						
Current regulation accuracy	±0.5A (Io≤10A) & ≤±5% (Io>10A)						
ripple coefficient of voltage	≤1%						
Output Response Time	≤200mS						
Typical Efficiency	≥94%	≥94%	≥94%	≥93%	≥93%	≥92%	≥91%
Operating Noise	-						
Protective Characteristic							
Over and Under Voltage Protection	Input over and under voltage shutdown can be self-recovery, output over and under voltage shutdown can be self-recovery.						
Output Reverse Connection and Short Circuit Protection	Output short circuit and reverse connection shutdown can be self-recovery						
Over Temperature Protection	When the heat sink temperature is higher than 75 ° C, it will reduce the output power. And it will disconnect the circuit when the temperature is higher than 95 ° C. It will restore the output when the charging temperature is lower than 85 ° C.						
Environmental Condition							

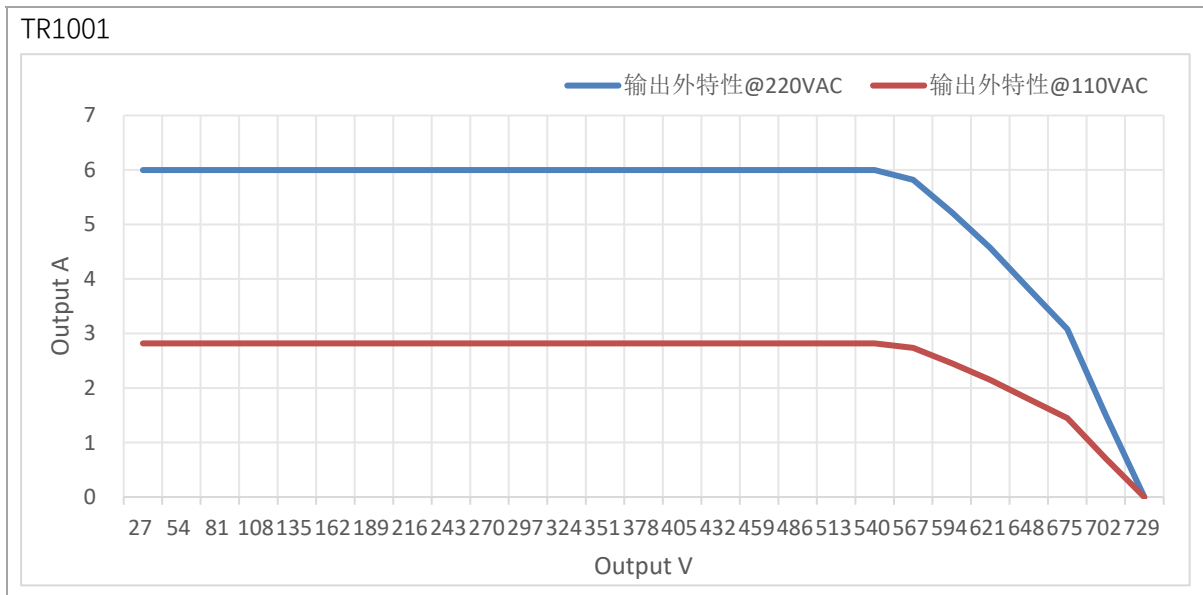
Operating Ambient Temperature	<b>-40°C ~ +85°C(internal temperature of integrated system cavity); Water cooling system liquid temperature ≤65°C</b>	
Storage temperature	<b>-40 ~ 95°C</b>	
Humidness	-	
IP Grade	-	
Cooling Function	Modular design, water cooling or air cooling housing/substrate is required	
Communication Function	CAN network	
Charging Function	Receive charging instructions to charge normally; No command charger is in standby state	
<b>Safety Characteristic</b>		
Dielectric strength	<b>Primary side - secondary side 2000VAC</b>	<b>Original side - Housing 1500VAC</b>
Insulation resistance	Primary side - secondary side ≥50MΩ	
Harmonic current	Meet the requirements of 6.7.3.1 in GB17625.1-2003	
Vibration Resistance	After X,Y,Z three directions of sweep frequency vibration testing, no damage for parts , no loose for fastening piece	
Impact Resistance	See Requirements 6.5 in GB/T15139-1994	
Resistance to Industrial solvents	Metal parts have a good corrosion protection layer	
Salt Spray Resistance	See GB/T 2423.17	
Durability	Not less than GB/T 24347-2009	
<b>EMC characteristics</b>		
Electromagnetic immunity	Meet the requirements of 11.3.1 in GB/T 18487.3	
Electromagnetic disturbance	Meets the requirements of 11.3.2 in GB/T 18487.3	

## 2.2. System Block Diagram

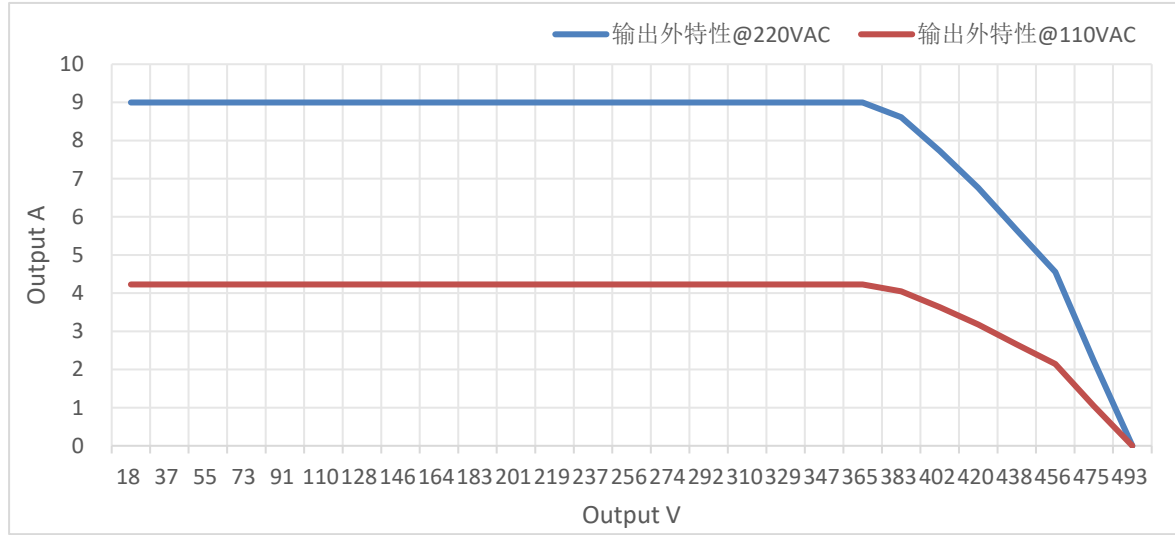




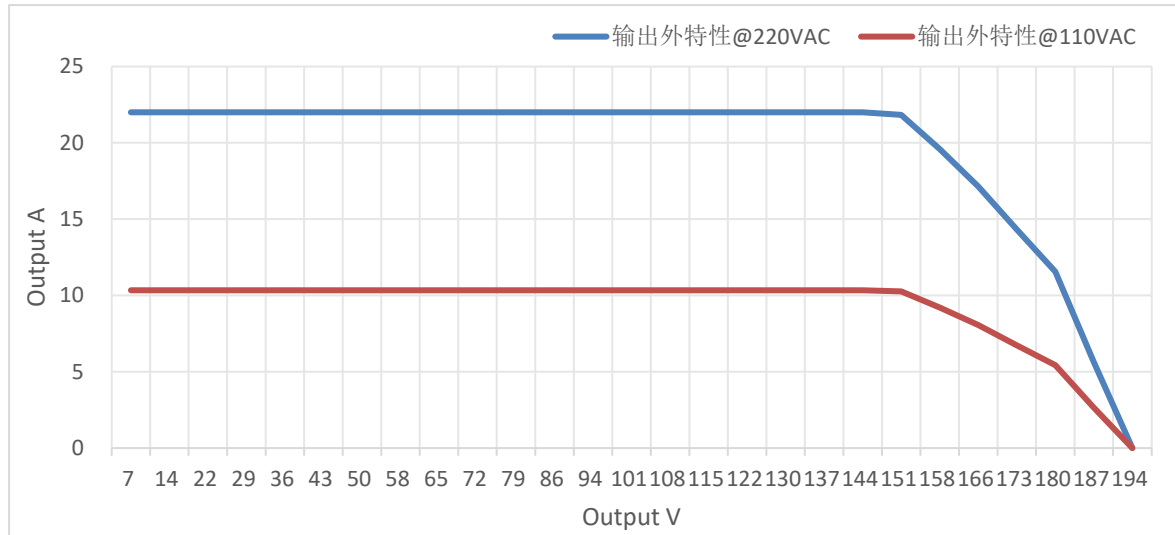
### 2.3. Characteristic Curve



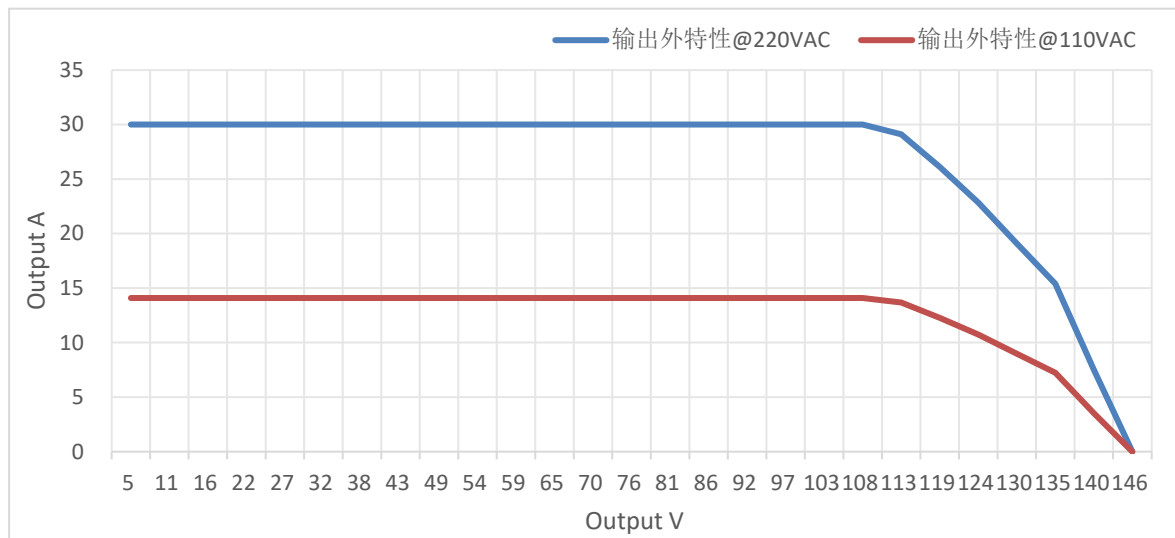
TR1002



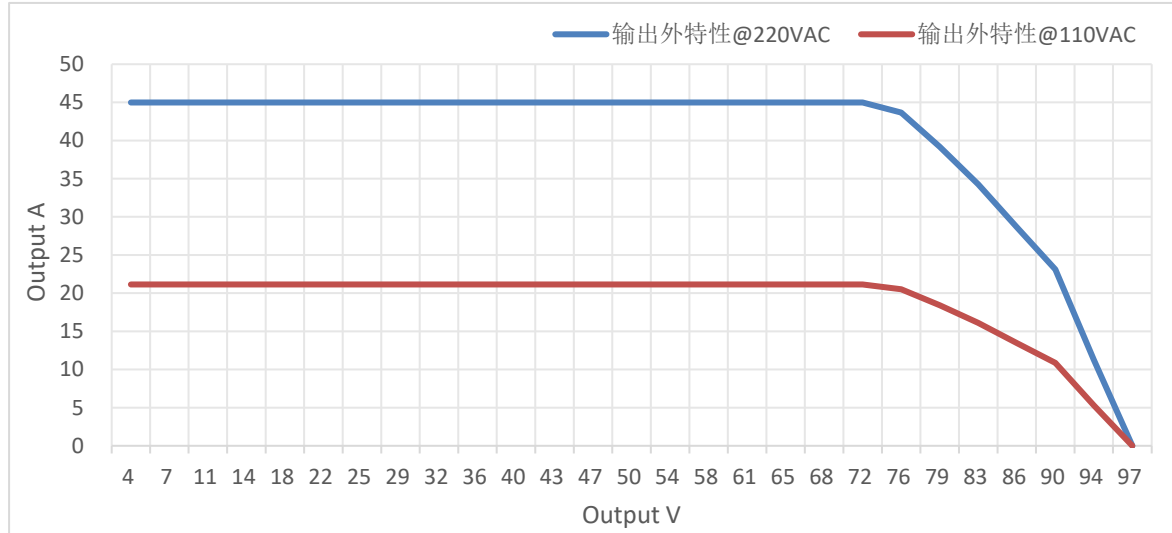
TR1003



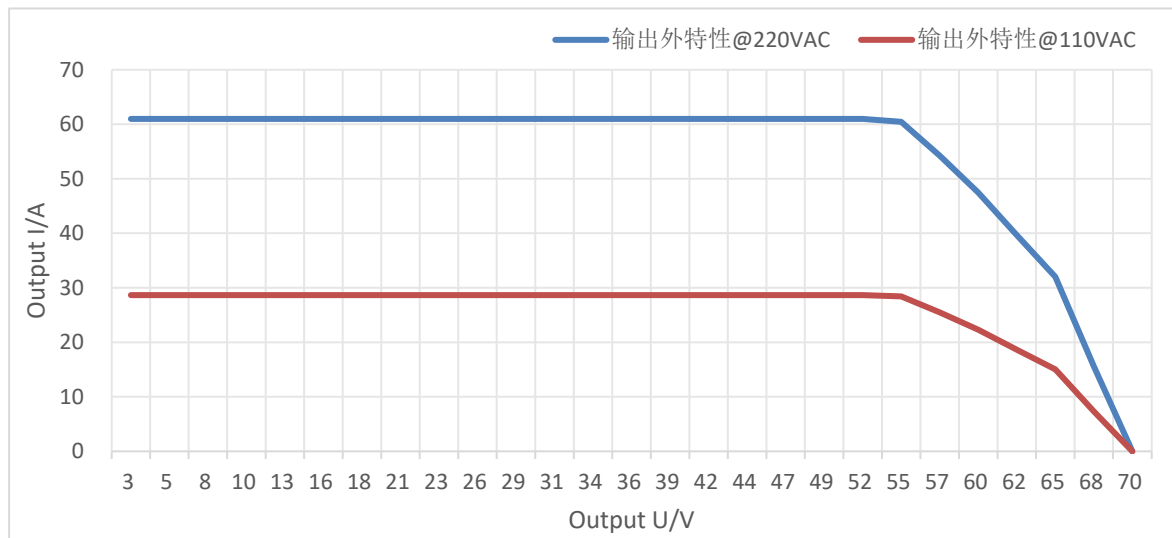
TR1004



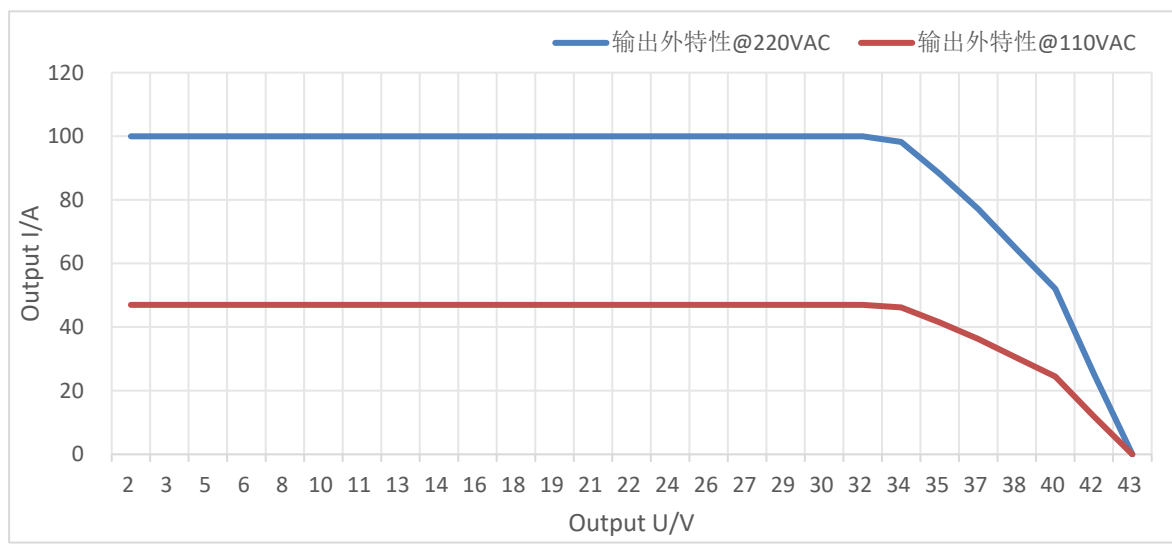
TR1005



TR1006



TR1007



### 3. Dimensions and Weight

#### 3.1. Product size

Top View
Front View
Side View

#### 3.2. Product Weight

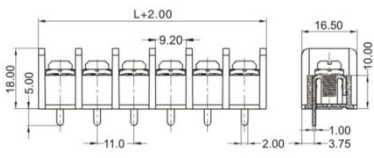

**2.5Kg±0.3Kg**



## 4. Define Connectors and Connection Terminals

### 4.1. Power Port Definition




	No.	Name	Define	Parameter	CONNECT	
TR1001 TR1002	①	VO+	output positive		Center Space : 11.00 mm Wire Range : 18-10 AWG Screw Type : M4 Screw Torque : 13 lbf-in	
	②	VO-	output negative			OT
	③	PE	Earth			OT
	④	L	Charger input live wire			
	⑤	N	Charger input Neutral wire			
TR1003 TR1004 TR1005 TR1006	①	VO+	output positive		Center Space: 5.00mm M4 Screw Torque: 13 lbf-in	
	②	VO-	output negative			OT
	③ ④ ⑤	PE	Earth		Center Space:9.5mm 22-12AWG 4.0mm <sup>2</sup> Screw Torque: 12.24kff-cm/1.2Nm/10.6Lbin	
		L	Charger input live wire			OT
		N	Charger input Neutral wire			
TR1007	①	VO+	output positive		Center Space: 10.00mm M6 Screw Torque: 18 lbf-in	
	②	VO-	output negative			BUS
	③ ④ ⑤	PE	Earth		Center Space:9.5mm 22-12AWG 4.0mm <sup>2</sup> Screw Torque: 12.24kff-cm/1.2Nm/10.6Lbin	
		L	Charger input live wire			OT
		N	Charger input Neutral wire			

Power Port Definition				
No.	Definition	Pin Specification	Fence connector specification	Connection recommendation
1	VO+	Charger output positive terminal	 <p>Center Space : 11.00 mm Wire Range : 18-10 AWG Screw Type : M4 Screw Torque : 13 lbf·in</p>	 OT4-4
2	VO-	charger output negative terminal		
3	PE	Earth		
4	L	Charger input live wire		
5	N	Charger input Neutral wire		

#### 4.2. Signal Port definition

Signal Port definition				
Lead	Definition	Pin specification	Reuse function	
①	1	CAN-L	CANL signal	
	3	CAN-H	CANH signal	
	2	GND	12V Output earth	
	4	12V2A Output	12V Output positive (current $\neq 2A$ )	Wake-up output
②	1	FAN- 12V0.5A	12V/0.5A fan 1 driver port -	
	3	FAN+ 12V0.5A	12V/0.5A fan 1 driver port +	
	2	FAN- 12V0.5A	12V/0.5A fan 2 driver port -	
	4	FAN+ 12V0.5A	12V/0.5A fan 2 driver port +	

③	1	+5V0	+5V Low voltage electrical output	
	3	Red Led Control +	Red Led Control	Thermistor A-1 ★
	2	GND	common cathode LED GND	Thermistor common negative electrode
	4	Green Led Control +	Green Led Control	Thermistor B-1 ★
④	1	Connection Pilot	CP(connect guidance) signal	
	3	Connection Confirm	CC (connect confirm) signal	
	2	GND	Normally electric ground (vehicle ground)	
	4	12V Battery	12V Normal current input	
⑤	1	485A	485 communication -A	
	3	485B	485 communication -B	
	2	CCout signal	CCout signal output	
	4	Wake up signal input+	Wake up signal input	
Remark	★ The temperature detection function and LED control are selected according to the software and cannot be used at the same time.			
	★ The application layer program needs to be customized according to the type and parameters of the thermistor to perform temperature detection			

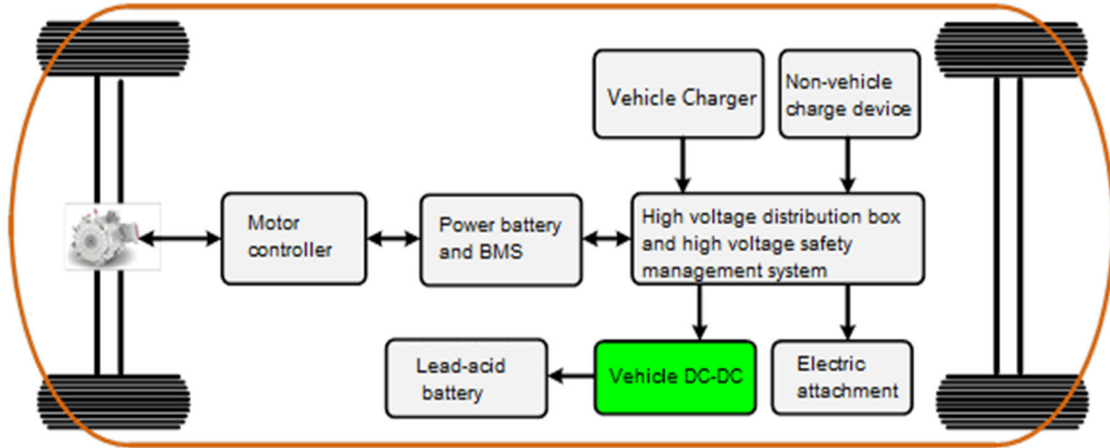
Signal connector definition and selection		
Default Signal Connector Selection [MOLEX]		
Signal connector type MOLEX 0430450400	Signal connector type MOLEX 0430450400	Signal connector type MOLEX 0430450400
		
Domestic replacement model 【 Dongguan Yuliang Electronics Co., LTD. 】		
Signal connector type YL009-047-004	Signal connector type YL009-047-004	Signal connector type YL009-047-004
Domestic replacement model 【 Dongguan Kangdao New Energy Technology Co., LTD. 】		
Signal connector type 23001W90-2*2PA-A1-SN	Signal connector type 23001W90-2*2PA-A1-SN	Signal connector type 23001W90-2*2PA-A1-SN
Domestic replacement model 【 Zhejiang Hongxing Electric Industry Co., LTD. 】		
Signal connector type HX30002-4WA	Signal connector type HX30002-4WA	Signal connector type HX30002-4WA

### 4.3. Schematic diagram of signal interface

Signal specification	
CAN Communication	
CC/CP circuit	
Fan Driver	
Lock Driver	
Electronic lock position signal detection	

## 5. Operating Guide

### 5.1. Electrical Connection Diagram



### 5.2. Product installation

Product Type	Vehicle charger module	
Mounting Screw	Mounting hole aperture	Φ6.0
	number	4
	Screw model recommendation	M5*12 hex socket assembly screws

Install and fix the product

Align the mounting holes, tighten the screws, and fix the power supply.

Tighten torque requirements.

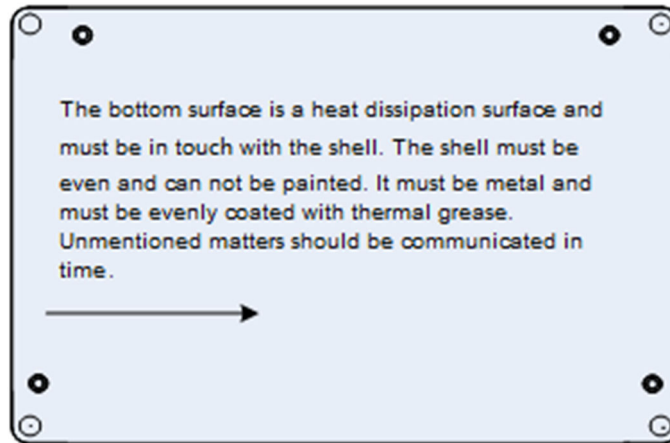
Install with appropriate torque according to screw size, connection mode, etc. Refer to the following table for details:

Specification and model		Tightening torque (torque range: ±10%)/(Unit: Kgf.cm)						
Sub Category	Plastic - Plastic	Sub Category	Plastic - Plastic	General Connection		High Density Connection		
				Steel-Steel	Copper - Cast Aluminum Steel-Aluminum Profiles Steel-Copper	Steel-Steel	Copper - Cast Aluminum Steel-Aluminum Profiles Steel-Copper	Steel-Aluminum Profiles
Hexagon socket screw	M2		0.8	1.5	1.5	2.5	2.5	1.5
	M2.5		1.6	3	3	5.5	4.5	3
	M3	1.5	3	5.5	5	10	8	6
	M4		6	12	10	16	14	12
	M5		10	20	13	30	28	20
	M6		15	30	28	50	48	30
	M8					80	80	-

### 5.3. Thermal Design Guidelines


Heat distribution map (top view)

Installation suggestion



- ① The system integrator can make theoretical calculation or thermal simulation, but the final measurement is based on the point temperature meter.
- ② When rated input and rated output, the maximum temperature of each point on the radiator surface minus the ambient temperature should be less than or equal to 40°C after 1 hour
- ③ The contact surface between the radiator and the module should be smooth, and free of foreign bodies and oil. When placed naturally, the contact surface should be seamless (if the radiator is cast aluminum, the contact surface between the radiator and the aluminum groove of the module must be reworked to ensure good contact).
- ④ The contact surface between the radiator and the module should be coated with silicone grease. When coating on one side, the thickness of silicone grease coating is determined by not seeing the background color.
- ⑤ For the contact surface between the heat sink and the aluminum groove of the module: the thickness of the heat sink is  $\geq 4\text{mm}$ .

### 5.4. CAN Communication Protocol

Item	Technical Indicator	Remark
Crystal vibration Tolerance	± 0.15%	Within the operating temperature range
Communication rate	<b>You can use the background software to ensure that the configuration is not lost after power failure</b>	Tolerance ±0.375 Kbit/s
Sampling point	The sampling point should be set near but not later than 7/8 of the bit time	
Transceiver	The maximum transceiver "loop delay" (from send to receive) is 300 ns	CAN transceivers shall conform to ISO 11898-2
Terminal resistance	<b>The DC-DC CAN communication circuit has a 120 ohm terminal resistance by default</b>	
<b>Default CAN communication protocol</b>	 车载充电机默认CAN控制通讯协议 V1.2.pdf	

### 5.5. Indicator Language Definition

The charging part is equipped with LED indicator control port (driving voltage 5V, internal standard current-limiting resistance 1K), and can judge its normal working status according to the indicator. Indicator selection: Red and green two-color common negative LED indicator.

Indicator signal		Cycle period 4S On/Off frequency 1Hz							
No.	State	0s-0.5s	0.5s-1s	1s-1.5s	1.5s-2s	2s-2.5s	2.5s-3s	3s-3.5s	3.5s-4s
1	standby	red	red	red	red	red	red	red	red
2	charging	red	-	red	-	red	-	red	-
3	fully charged	green	green	green	green	green	green	green	green
4	no-load	red	-	green	-	red	-	green	-
5	communication failure	red	-	red	-	green	-	-	-
6	Input abnormal	red	-	green	-	green	-	-	-
7	Output overvoltage	red	-	green	-	green	-	green	-
8	Internal overheating	red	-	red	-	green	-	green	-

Note:

Blinking priority: AC input exception > Output overvoltage > No-load > Communication fault > Internal overheat

Because the three conditions of output short circuit, output reverse connection and output undervoltage cannot be strictly distinguished under the good closed-loop current limiting protection state of the charger, the output undervoltage fault indication includes two states of output reverse connection and output short circuit. In this case, check the output voltage of the charger.



The indicator cycles every 4 seconds. "-" indicates that all color indicators are off.

### 5.6. Parallel operation of multiple machines

Charging module with CAN bus flow sharing logic, can achieve up to 8 units of no master/slave flow sharing. The current balancing module must be of the same model, and the address must be assigned by the DIP switch on the module. Dip switch position and address allocation table is as follows:

Dip switch position	Dip switch status	address code	Dip switch status	address code
		0		4
		1		5
		2		6
		3		7

### 5.7. Background Debugging Software Description

Product Model	Vehicle charger module	
Background software coding	1002 Setup V2.0	
Background software communication method	CAN communication	Baud rate 125K/250K/500K adjustable
Installation and use help	 上位机使用说明.pdf	
CAN box support Brand 1	1. Beijing ATai USBCAN-2I 2. Beijing Aitai USBCAN-I	 USBCAN Driver for Windows 10-amd64-1.0.1.exe
CAN box support Brand 2	TBD	

### 5.8. Troubleshooting and confirmation

Fault Phenomenon	Common failure causes	Troubleshooting



The charger is not powered on	AC gun has no AC input	Check the input circuit breaker or socket
	The AC connector is not inserted properly	Unplug and plug the connector
	Charge guidance signal connector is not plugged in	Unplug and plug the signal connector
Charger No message	The signal connector is not connected properly	Unplug and plug the signal connector
	CAN cables are connected inversely	Adjust the CAN line sequence
	The communication protocol does not match	Check whether protocols match each other
	The baud rate does not match	Check whether the baud rate match
No high voltage output	The high voltage output is not connected well to the battery	Check the high voltage connectors and cable harnesses
	The charger did not receive the BMS command	Check message
	The positive and negative battery terminals are connected in reverse	Check the high voltage connectors and cable harnesses
Overtemperature fault	Air-cooled machine: The fan is blocked or the air duct is blocked	Check fans and air ducts
	Water-cooled machine: no coolant or coolant's temperature is too high	Check if the coolant is normal

## 6. User Notices and Cautions

**Please note the Warnings and cautions section before using the product. Incorrect operation may cause damage to the power supply or cause a fire. Make sure you have read the warnings and cautions before using the product.**

Warning:

It is strictly forbidden to disassemble the product for maintenance, debugging and modification;

When powered on, keep hands and face away from the product to avoid accidental injury;

There are high voltage and high temperature inside the product, please do not touch the internal components, may cause electric shock or burn;

During use, if the power supply has abnormal sound or odor, please turn off the input immediately;

Use compliant connectors to ensure that plugs and sockets are tightly connected. Loose connectors may cause part heat and fire.

Please use the power supply according to technical parameters, if it is used wrong power supply, it may cause product damage;

When the battery is charging normally, keep away from fire sources and inflammable and explosive materials;

Please avoid placing the product in a rain for a long time;

Ac power supply should choose a three-core cable with a ground wire, and install the ground wire correctly;

Before installation, ensure that the shell is kept well. If it is damaged, replace it immediately or contact the manufacturer.

**Note:**

Confirm that the product input/output terminal and signal terminal are connected correctly according to the product instructions; When connecting cables, please cut off the input power supply and do not plug or unplug the connector with power on.

The input/output of the power supply should be supplemented with a blown fuse or other overcurrent protection device;

The possible electrical hazards at the output end of the product must be considered to ensure that the end product user will touch the product; The manufacturer of the terminal equipment must design the appropriate protection scheme to ensure that the operation will not cause danger due to accidental touching the terminal of power supply;

Once the safety protection of the equipment is damaged, the equipment must stop working and refer to the relevant maintenance regulations.

When the power supply device is switched from a cold environment to a warm environment, condensation may cause leakage hazards, so the grounding requirements must be strictly implemented.

Only a qualified person can connect the equipment to the power supply.

The power supply must be shut down for five minutes, so that the capacitor has sufficient discharge time before repairing power supply equipment.

Pay attention to the use of safety: do not touching safety warning signs and high pressure signs, to avoid electric shock, burns.

**7. Package & Transportation & Storage**

**Package**

Product packaging information:

Packing Quantity and Carton Information	The net weight of one module : Kg	<b>2.5Kg</b>
	Carton size: mm	<b>412*512*227</b>
	Qty/Carton	<b>12</b>
	Total weight of product and carton : Kg	<b>30Kg</b>

The product name, model and the name of the manufacturer are shown on the packing carton; The technical documents including certificate of product are supplied in the carton.

The product should be firmly packed when transported, and the external use of the carton should be in accordance with the relevant national standards and should be marked "handle with care" and "maintain dryness". Containers containing products are allowed to be transported by various of transport. Direct rain and snow and mechanical impact should be avoided during transportation. Transport marks should be attached, as shown in pictures 7-2 below:



Transport Mark

**Storage**

Products should be stored in the packing carton when not in use, the ambient temperature of the

warehouse is -10-40 °C and the relative humidity is not more than 80%, harmful gases, flammable, explosive products and corrosive chemicals are not allowed in the warehouse, and there is no strong mechanical vibration, impact and strong magnetic field, the packing carton should be padded at least 20cm high from the ground. At least 50cm away from the wall, heat source, window or air inlet, the storage period under these conditions is generally 2 years, if more than 2 years the products should be re-tested.

Products should be stored in a ventilated, dry place. At the same time, to avoid high temperature sources, fire sources and chemicals. Store neatly to avoid throwing.

## 8. Version update record

Date	Edition	Reason for change	Remark
2018/10/29	V1.0		
2019/3/24	V1.1	Update the input frequency parameter	
2019/11/20	V1.2	Update the signal connector definition	
2020/5/16	V1.3	Update the signal connector definition	
2021/1/11	V1.4	Change model	
2022/1/7	V1.5	Update the dielectric constant, update the working environment temperature	
2023/8/6	V1.6	Update format to add User Notices and other sections	
2023/9/23	V2.0	Add instructions for parallel operation of multiple machines	
2023/10/6	V2.1	Update signal port description Add electronic lock part circuit	
2024/2/8	V2.2		
2024/3/20	V2.3	Add TR1001 540V parameter	
2024/5/17	V2.4	Add type B define	
2024/7/16	V2.5	Add type C define	
2024/8/19	V2.6		