
NAME: Wireless Charging Module

PRODUCT MODEL: PAH-3725200

PRODUCTCODE: 21531

CUSTOMER NAME: BYD Automobile Company

FILE TYPE: ☐HW ☐SW ☐STRU☒OTHER
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1 Overview

1.1 background

The content described in this document applies to BYD Automobile PAH-3725200 project.

1.2 Product function description

This product can provide charging service for wireless charger receiver that supports Qi standard and Huawei Fast Charge Protocol.

1.3 Product index function parameter

Num.	Technical index function	Design parameter value identification	Remark
1	input voltage	12-16V	
2	Input current	5.5A(max)@13.5V	
3	output voltage	20V/12V/5V	Output voltage: The output voltage at the receiving end
4	output current	2.5A (20V)	
		1.25A (12V)	
		1A (5V)	
5	output power	50W(max)	Compatible with 5/15 w
6	Standby current	$\leq 110\text{mA}$ (average current)	You can charge your phone by putting it on
7	Sleep current	$< 0.1\text{mA}$	
8	static current	NA	
9	System conversion efficiency	$\geq 70\%$	Coil distance 6mm test
10	Effective charging distance	3~10mm	The distance is the distance between the transmitter coil and the receiver coil
11	Effective charging range	45*20mm	(Distance between transmitting and receiving coils 7mm)
12	Working frequency	$127.7 \pm 20\text{KHZ}$	65.96dB $\mu\text{A/m}$ @10m
13	Working temperature	$-35^{\circ}\text{C} \sim +85^{\circ}\text{C}$	
14	Storage temperature	$-40^{\circ}\text{C} \sim +90^{\circ}\text{C}$	
15	Protection grade	IP52	
16	Qi certification	Qi 1.2.4	
17	Protection function	Overtemperature protection, overcurrent protection,	

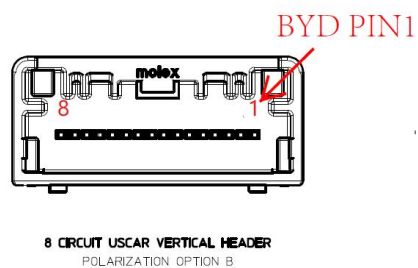
	overvoltage protection and undervoltage protection and other protection functions	
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1.4 Connector model and interface definition

PCBConnector model	brand	Type of wire end connector	Brand
34792-0080	Molex	34791-0180	Molex

PINNum.	definition	Operating voltage	Operating current	Input/output	signal source
1	BAT+	9 ~ 16V	5.2A	Input	car
2	BAT+	9 ~ 16V		Input	car
3	NA	/			
4	NA	/			
5	BAT-	GND	5.2A	Input	car
6	BAT-	GND		Input	car
7	CAN_L	0.5 ~ 3.0V	0.1A	Input	car
8	CAN_H	2 ~ 4.5V	0.1A	Input	car

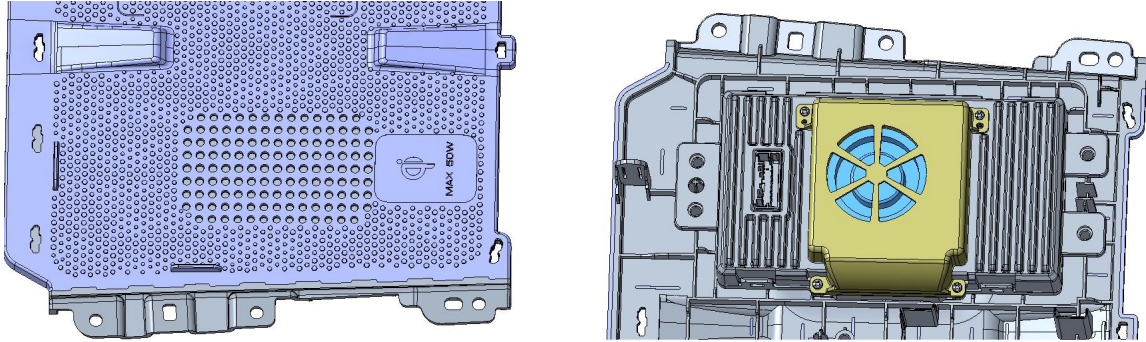
Connector diagram



2 Product function description

2.1 Description of product structure

2.1.1 Appearance and requirements



The appearance should be clean and tidy, and there should be no dents, obvious scratches, cracks, deformations, burrs, mildew and other defects on the surface. Surface coating should not bubble, crack, fall off; Parts should be fastened without looseness.

2.1.2 Structural dimension/material/weight composition

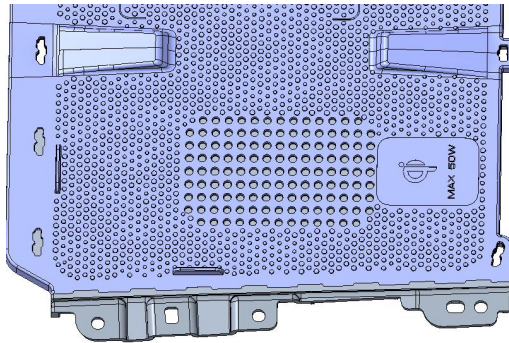
The main size of the wireless charging module (excluding the mounting foot and connector bulge) : 163*77*30mm (length * width * height); Overall size (including mounting feet and connector protrations) : 206*136*62mm (length * width * height);

The material, weight and quantity of materials used in the structure are shown in the following table:

NO.	name	material	weight (g)	quantity
1	On the cover	PC+ABS/TPU		1
2	The lower shell	ADC12		1
3	PCBAcomponent	components		1
4	Self-tapping screws	C1018		3
5	Screws	C1018		12
6	Shield	AL5052		1
7	Fan housing	PC+ABS		1
8	FAN	component		1
Total weight	About320g			

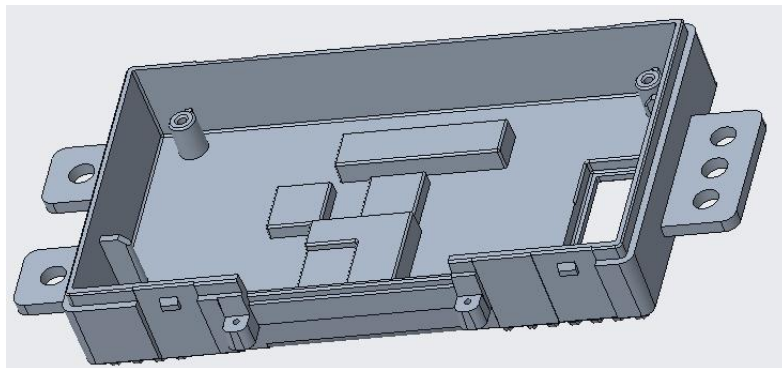
2.1.3 On the cover

PC+ABS/TPU material, matched with the lower shell to protect the internal structure of wireless charging.



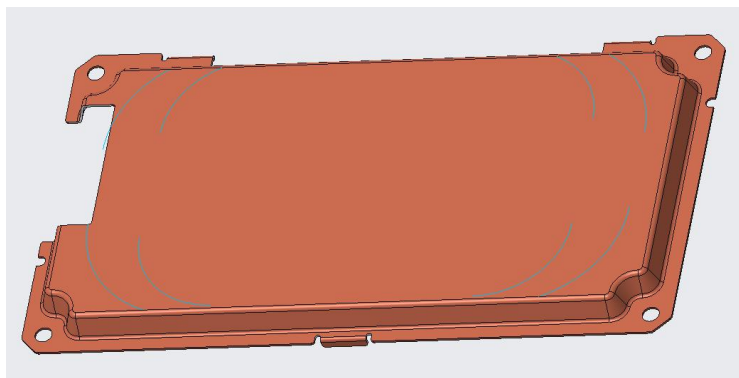
2.1.4 The lower shell

ADC12 material is used to protect the wireless charging internal structure with the lower cover. It provides the installation frame, heat dissipation of the whole machine, IP protection for PCBA, and completes the coordination with the interior of the vehicle



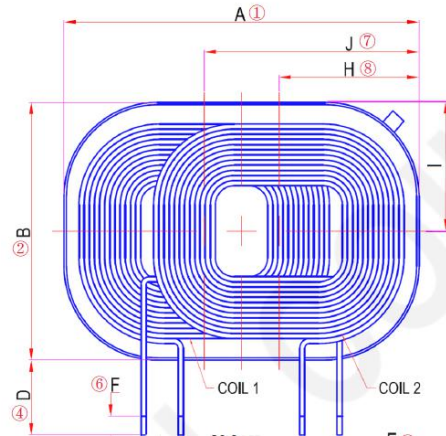
2.1.5 The shield

Provide support and paste surface for coil and strip separation disk assembly.



2.1.6 Coil with separation plate assembly

Function, material, molding process, performance, MP-A13 coil.



Project	Parameter
Charging area	20*45MM
Inductance	10-12.5uH
Coil impedance	65mΩ Max
Switching frequency	127.7±20KHz
Resonance capacitance	0.1uF/100V*4

2.1.7 Description of waterproof and dustproof module

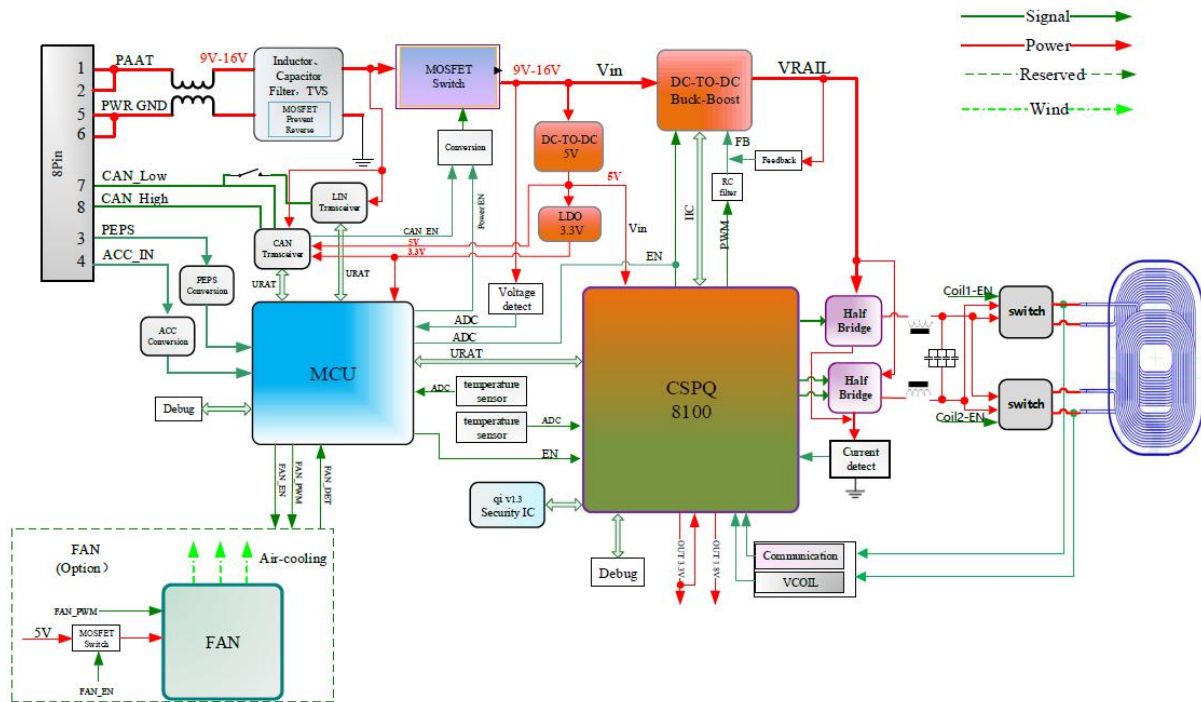
The flat upper cover and the lower shell are bonded by silicone structure, and the upper cover and the lower shell contact face to face, which plays a certain dust-proof and water-proof role.

2.1.8 Module installation instructions

After the module is located by four positioning columns on the interior panel, the remaining 11 holes are fastened by screwing in self-tapping screws.

2.2 Detailed description of product hardware

2.2.1 PAH-3725200 Block Diagram



Main Function Introduce:

1. Micro Control Unit;
2. Fast Charging Private Protocol Control Unit;
3. BUCK-BOOST Circuit Module;
4. Full Bridge Circuit Module;
5. Coil Selection Circuit;
6. LC Resonant Network;
7. Fan Control Unit.

2.2.2 Description of realization method of product software protection function

Various protection functions and methods implemented by the software are as follows:

1. Overvoltage protection: Stop charging when the input voltage of the power supply is greater than the overvoltage threshold set in the software;
2. Overvoltage recovery: when the power supply voltage returns to the normal working voltage set in the software from the overvoltage state, restart the wireless charging;
3. Undervoltage protection: Stop charging when the input voltage of the power supply is less than the undervoltage threshold set in the software;
4. Undervoltage recovery: when the power supply voltage returns to the normal operating voltage set in the software from the undervoltage state, restart the wireless charging;

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- 5.Overtemperature protection: When it is detected that the temperature of the temperature sensor on the PCB board is higher than the threshold temperature set in the software, stop charging;
 - 6.Overtemperature recovery: when it is detected that the temperature of the temperature sensor on the PCB board is restored to the normal working temperature set in the software, wireless charging can be started again;
 - 7.Overcurrent protection: When the power input current or coil output current is detected to be greater than the threshold current set in the software, the wireless charging shall be stopped;
 - 8.Overpower protection: When it is detected that the input power of the power supply is greater than the threshold power set in the software, stop the wireless charging;
 - 9.FOD (Metal foreign body) detection protection:

The wireless charging Qi standard does not specify the detection of foreign matter on the charging plate. With the increase of wireless devices compatible with this international standard, the problem of system application security is becoming more and more serious. The purpose of foreign body detection (FOD) is to prevent metal and other objects from being heated near the launching platform and causing personal and property safety.

3 EU declaration of conformity

Hereby, Hefei Invispower Co.,Ltd declares that the radio equipment Wireless Charging Module (model: PAH-3725200) is in compliance with Directive 2014/53/EU.

4 FCC statement

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and(2) This device must accept any interference received, including interference that may cause undesired operation.

Any changed or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

FCC RF Radiation Exposure Statement: This equipment complies with FCC RF Radiation exposure limits set forth for an uncontrolled environment. This device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and your body.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.