
后向短距测距传感器（雷达）

产品介绍



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1 概述/Introduction

1.1 目的/Purpose

北京经纬恒润科技股份有限公司设计生产的后向短距测距雷达产品介绍。

This document introduces the Rear short-range ranging sensor (SRR) that designed and manufactured by Beijing Jinwei Hirain Technologies Co., Inc.

1.2 范围/Scope

本文档仅供北京经纬恒润科技股份有限公司的后向短距测距雷达产品用户参考。

This document is used for reference only to the Rear short-range ranging sensor customers of Beijing Jinwei Hirain Technologies Co., Inc.

1.3 术语/Terminology

SRR: Rear short-range ranging sensor 后向短距测距传感器

BSD: Blind Spot Detection 盲点监测

RCTA: Rear Cross Traffic Alert 后方横向交通预警

DOW: Door Open Warning 车门开启预警

RCW: Rear Collision Warning 后向碰撞报警

2 产品/Product

后向短距测距雷达安装于车身侧方，对目标区域内的障碍物进行检测与参数测量、跟踪以及目标类型识别能力。该雷达主要支撑 L2 及 L2 以上级别自动驾驶系统的 BSD、RCTA、FCTA、DOW、LCA 等功能。

Rear short-range ranging sensor is installed right in the side of the vehicle, intended to detect, measure, track and identify obstacles in the target region. SRR mainly supports the functions of BSD、RCTA、FCTA、DOW、LCA for ADAS with L2 and above.

2.1 雷达原理/Radar Principle

SRR520 uses the pulse doppler (PD) scheme as basic principle for its measurements. Compared with frequency modulated continuous wave (FMCW), it avoids the serious coupling between range and doppler domains, because these are mapped to a 2-dimensional frequency range by two succeeding fast Fourier transformations (FFTs), that are calculated in the processing unit of the sensor.

SRR520 采用了脉冲多普勒(PD)体制作为其测量的基本原理，与调频连续波

(FMCW)相比，避免了 FMCW 严重的距离-多普勒耦合。因为这些信息通过在传感器处理单元中计算的两个快速傅里叶变换（FFT）映射到二维频率距离上。

2.2 天线/Antennas

SRR520 uses 3 Tx antennas and 4 Rx antennas to radiate the microwave signals generated by radio frequency (RF) chip into the air and receive echoes reflected by targets. The gain is 16dBi for both antennas and 13dBi for single antennas.

SRR520 包含了 3 个发射(Tx)天线和 4 个接收(Rx)天线，用于将射频芯片产生的微波信号按照设定的 FOV 辐射到空中，并接收目标反射回来的回波信号。双天线同时发射的增益 16dBi，单天线的 13dBi。

2.3 FOV 范围/FOV

图 1 为乘用车安装后向短距测距雷达后的波束覆盖范围示意。
FIG 1 shows the beam coverage area of passenger car after the Rear short-range ranging sensor.

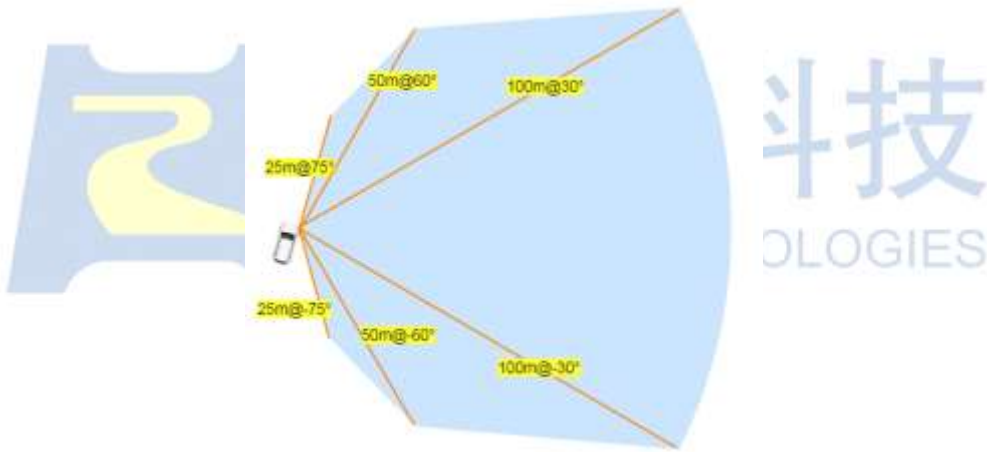


图 1 FOV 示意图

Figure 1 Schematic diagram of FOV

2.4 性能指标/Parameters

表 1 近距毫米波雷达系统性能指标

Table 1 Performance index of Rear short-range ranging sensor system

性能指标/Parameters	指标参数/Value
系统属性/System Characteristics	
频段/Frequency	76~77 GHz
工作电压/Operating voltage	9V~16V
重量/Weight	120g
更新率/Update Rate	50ms

功能安全等级/Functional Safety Level	ASIL B
覆盖范围/Range	
FOV（距离-水平角度平面） /(Range-Azimuth Plane)	$\pm 75^{\circ}$
距离/Range	0.5~100m
速度/Velocitv	-110 m/s ~50 m/s
俯仰角/Elevation	$\pm 10^{\circ}$
目标检测能力/Target Detection Ability	
误报率	< 1 次/500h
多目标分辨能力/Multi-Objects Discrimination Ability	
距离分辨率/Range Resolution	< 0.4 m
速度分辨率/Velocitv Resolution	< 0.14m/s
角度分辨率/Angular Resolution	< 7°
参数测量精度/Parameter Precision	
距离精度/Range Precision	< 0.1 m
速度精度/Velocitv Precision	< 0.05 m/s
方位角精度/Azimuth Precision	< 1°
其他指标要求	
跟踪目标输出个数 Output Number of Tracking Targets	64
点云目标输出个数（可选） Output Number of Point Cloud (Optional)	≤ 200
发射功率/ transmitted power	< 33.9dBm
功耗/Power Consumption	< 5W
额定电压/Nominal Voltage	12V
工作温度/Operating Temperature	-40~ 85 $^{\circ}\text{C}$
存储温度/Storage Temperature	-40~ 105 $^{\circ}\text{C}$
防尘放水等级/ International Protection	IP6K9K
接口/Interface	2xCAN/CAN-FD, 1xEthernet（可选）

2.5 结构/Geometric Structure

后向短距测距雷达尺寸为：70mm * 65mm * 31mm（带接插件尺寸）。

Rear short-range ranging sensor size is: 70mm * 65mm * 31mm (with connector size)



图 2 结构示意图

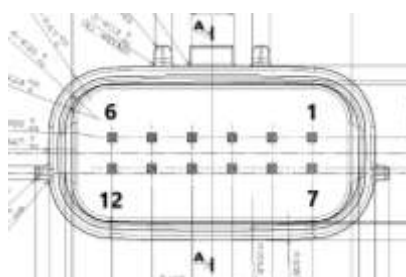
Figure 2 Structure diagram

2.6 接插件/Model No. of Harness Connector

表 2 线束端接插件型号

Table 2 Model No. of Harness Connector

接插件类型/Connector Type	型号/Model No.	供应商/Supplier
12P 连接器（线束端）/12 Pin Connector	6189-8374	Sumitomo 住友
板端/ Terminal	6188-6387	Sumitomo 住友



(a) 板端接插件/Connector in PCB



(b) 线束端接插件/Connector in Harness

图 3 接插件视图

Figure 3 Views of the Connector

2.7 接插件引脚定义/Pin Definition of the Connector

下表中参数为雷达在 12V 工作电压下的测量值。

Table 3 gives the measured pin value of the SRR operating in 12 Voltages.

表 3 接插件引脚定义

Table 3 Pin Definition of the Connector

序号	接口定义	接口含义
1	N.C	未定义
2	POS1	位置编码 1
3	CAN1_L	CAN1 信号
4	CAN2_L	CAN2 信号
5	POS2/ High Side Driver1	位置编码 2/高驱 1
6	POWER	供电正极
7	N.C	未定义
8	GND	供电负极
9	CAN1_H	CAN1 信号
10	CAN2_H	CAN2 信号
11	IGN/High Side Driver2	点火信号/高驱 2
12	High Side Driver3	高驱 3

2.8 Label 标签

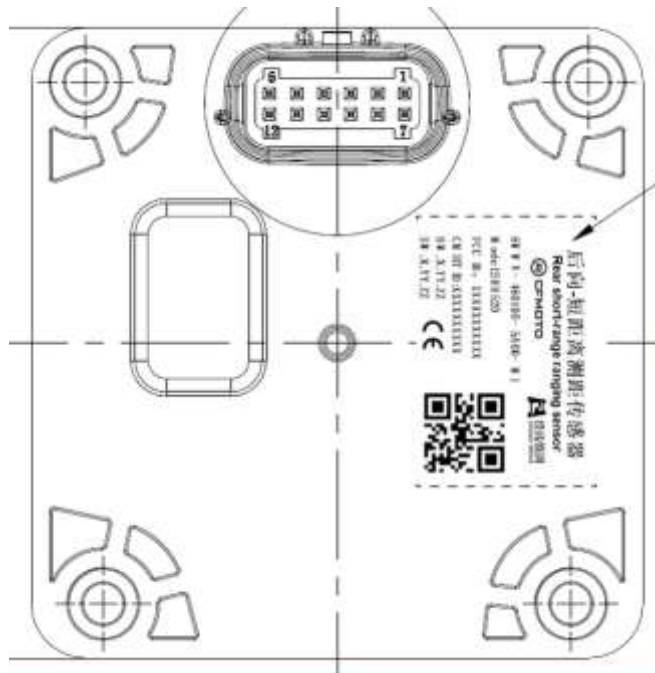
FCC ID: 2A7MKSRR520

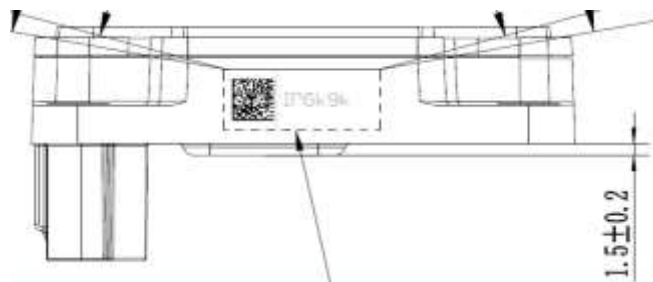
标签尺寸/Label size: 30mm*20mm

软件版本号/ Software version number: sw.1.00.00;

硬件版本号/ hardware version number: hw.1.00.00

IP6K9K





3 雷达功能/ Radar function

3.1 盲区监测 BSD

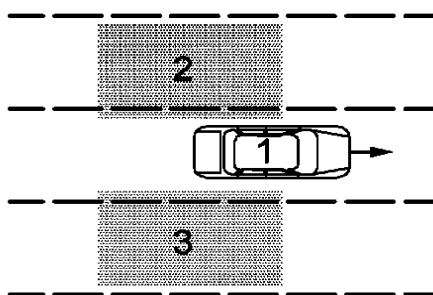
功能定义为实时监测驾驶员视野盲区，并在规定盲区内出现其他道路使用者时发出警告信息。

The function is defined as real-time monitoring of the driver's visual field blind area and warning information when other road users appear in the specified blind area.

盲区监测系统的主要功能是监测驾驶人视野盲区中的其他交通参与者，向驾驶人发出预警。盲区监测功能覆盖左右两侧的相邻区域，目标车辆为普通大批量生产的车辆或者摩托车。系统功能通过判断以下信息来实现：

The main function of the blind area monitoring system is to monitor other traffic participants in the blind area of the driver's visual field, and to give early warning to the driver. The blind spot monitoring function covers adjacent areas on the left and right sides, and the target vehicles are ordinary mass-produced vehicles or motorcycles. System functions are realized by judging the following information:

- 1) 自车与其他交通参与者的相对距离；
 - 2) 自车与其他交通参与者的相对速度；
 - 3) 其他交通参与者是否位于盲区监测范围内。
- 1) The relative distance between the car and other traffic participants;
 - 2) The relative speed of the car and other traffic participants;
 - 3) Whether other traffic participants are located in the blind area monitoring range.



3.2 车门开启提示 DOW

功能定义为在停车状态即将开启车门时，监测车辆后方可能危及到安全的状况，并在可能因车门开启而发生碰撞危险时发出警告信息。

The function definition is to monitor the rear of the vehicle which may endanger the safety when the door is about to be opened in the parking state, and to issue warning information when the risk of collision may occur due to the door opening.

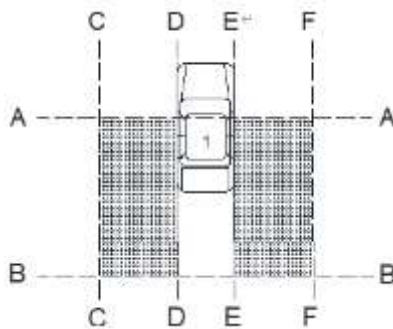
车门开启提醒系统具有报警功能，若驾乘人员开启车门时存在和其他交通参与者发生碰撞的风险，则系统会对驾乘人员发出报警。系统功能通过判断以下信息来实现：

The door opening reminder system has an alarm function. If there is a risk of collision with other traffic participants when the driver and passenger open the door, the system will send an alarm to the driver and passenger. System functions are realized by judging the following information:

- 1) 自车车速
 - 2) 自车与其他交通参与者的相对速度
 - 3) 其他交通参与者是否位于 DOW 报警区域
 - 4) 自车与其他交通参与者的相对距离
- 1) Vehicle speed
 - 2) The relative speed between the car and other traffic participants
 - 3) Whether other traffic participants are located in the DOW alarm area
 - 4) The relative distance between the car and other traffic participants

基于上述信息，根据发生碰撞的风险大小向驾乘人员发出报警。

Based on the above information, an alarm is issued to the driver and passenger according to the risk of collision.



3.3 后方横向交通预警 RCTA

功能定义为在倒车状态下，监测车辆后方横向可能危及到安全的状况，并在可能发生碰撞危险时发出警告信息。

The function is defined as monitoring the situation that may endanger the safety in the rear lateral of the vehicle under the state of reversing, and issuing warning information when the risk of collision may occur.

车辆后方横向交通预警系统的主要功能是自车与横向来车存在潜在冲突危险时，向驾驶人发出报警。系统功能通过判断以下信息来实现：

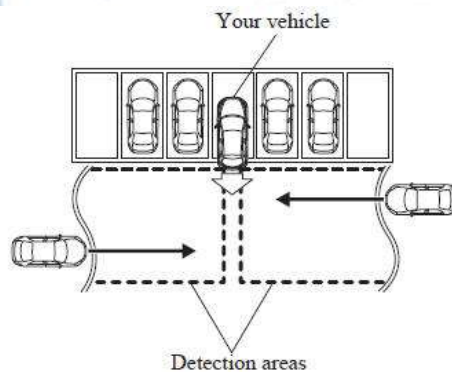
The main function of the vehicle rear lateral traffic warning system is to send an alarm to the driver when there is potential conflict danger between the vehicle and the vehicle. System functions are realized by judging the following information:

- 1) 自车与来车的相对距离；
- 2) 自车与来车的相对速度；
- 3) 自车是否位于来车的前方轨迹上。

- 1) The relative distance between the car and the coming car;
- 2) The relative speed between the car and the car;
- 3) Whether the autonomous vehicle is located on the front track of the incoming vehicle.

基于上述信息，控制器根据行车危险程度向驾驶人发出报警。

Based on the above information, the controller sends an alarm to the driver according to the degree of driving danger.



4 MANUFACTURER INFORMATION

Manufacturer: Beijing Jingwei Hirain Technologies Co., Inc.

Mailing Address: 4F, Block 1, No.14 Jiuxianqiao Road, Chaoyang District, Beijing, P.R.China

5 NOTICE

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

To maintain compliance with the RF exposure requirement, a separation distance of 20 cm between the device and the human should be maintained.

