SR73F Millimeter Wave Radar

White Paper

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Version History

Date	Version	Version history
2019-4-1	1.0	The 1st white paper version of SR73F

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White paper on SR73F millimeter wave radar

Abstract: SR73-F is a compact 77GHz short range radar, it can accurately detect target and information distance, speed, angle by the difference between the radio wave and the echo. This product come with 0.2~40m measurement distance, small size(96×58×24mm), integrated peripheral interface (CAN interface), which can be used for front collision of slow speed heavy equipment. It can meet the rapid growth of heavy equipment forward or backward driving safety assistance needs.

Key words:SR73F，multiple transceiver and receiver，SRR millimeter wave radar，competitive price

1 Application requirements for automotive short-range radar

1.1 The development of Advanced Driving Assistance System

Nowadays, cars have become much more popular and have played a vital roles in driving. A variety of sensors installed on the cars help the ADAS system with surrounding sensing, data collection, static and dynamic object identification, detection and tracking, system operation and analysis combined with map navigation data, which assist drivers to avoid the potential dangers and effectively increase the comfort and safety of driving.

In recent years, the growth of the ADAS market, gradually from the high-end market into the low-end market is rapid. The improved millimeter-wave radar technology for system deployment will create new opportunities and strategies.

1.2 Application requirements for short - range radar

The traditional driving assistance system is mainly composed of laser radar, visual system, GPS and other modules, which do not accurately detect the surrounding obstacles under bad weather conditions, it often leads to serious traffic accidents, and the working environment of the visual system is demanding. Due to the constraints of the technology, processing technology, material costs and physical size, radar is mainly used in high-end vehicles and forward radar field.

2. Overview on short-range radar SR73F

2.1 Features

CAR28F is a very cost-effective short-range K-band millimeter-wave radar sensor system, monitoring distance of 30 meters, with high complexity FMCW modulation mode, can detect the moving target distance, speed, angle, with relatively long range and good accuracy .

- Movement target
- Velocity
- Range
- Direction
- Angle

CAR28F with the function of heavy equipment front/rear collision warning. The product function diagram is as below:

Figure 1 SR73F Functions Diagram

CAN network interface of SR738F sensor follows the ISO11898-2 specification, the communication rate of 500Kb/s. Universal external communication interface makes it easy to integrate with PC or other ADAS modules.

2.2 Parameter

SR73F parameter as below table.

Table 1 Radar Parameter

Measuring performance		**to natural targets (non-reflector targets)**
Modulation		FMCW
Distance Rang		0.20~40m(120°)
Distance Resolution	spot target, none tracking	0.2m
Distance Accuracy	spot target, none tracking	±0.10m
FOV		120°
Angle Resolution	spot target, none tracking	±0.5°
Velocity Range		±18m/s(-leaving object, +approximation)
Velocity Resolution	spot target, none tracking	±0.58m/s
Velocity Accuracy	spot target, none tracking	±0.3 m/s
Antenna Channels		2TX/4RX=8 channels
Cycle Time		33ms
Elevation beam	-6dB	14°
Azimuth beam	-6dB	112°
SR73F Dual beams (mid-range and short-range) work simultaneously and can not be switched. The detected targets are output in order of distance or RCS. By default, they are output by distance from near to far.		
Operation Condition		
Transmit frequency	ETSI&FCC	76…77GHz
Transmit capacity	average/peak EIRP	29.8dBm
Power		+6.0V~32VDC
Consumption		2.5W
Working Temp		-40℃…+85℃
Storage Temp		-40℃…+90℃
Protection class		IP66
Interface		
Interface		1xCAN- High speed 500kbit/s
Cover		
Dimension	W*L*H	58*96*24mm
Weight		70g
Material	front/back	PBT+GF30

SR73F adopts 2T 4R antenna, which has good performance for azimuth angle identification. A narrow beam is used on the azimuth plane radiation pattern of the transceiver antenna to improve the target noise ratio, and the receiving channel adopts a long baseline to improve the angle measurement accuracy. At the same time, the low sidelobe technology is used to design the elevation plane pattern of the transceiver antennas, which can effectively suppress ground clutter interference. The system pattern of SR73F radar is as below figure.

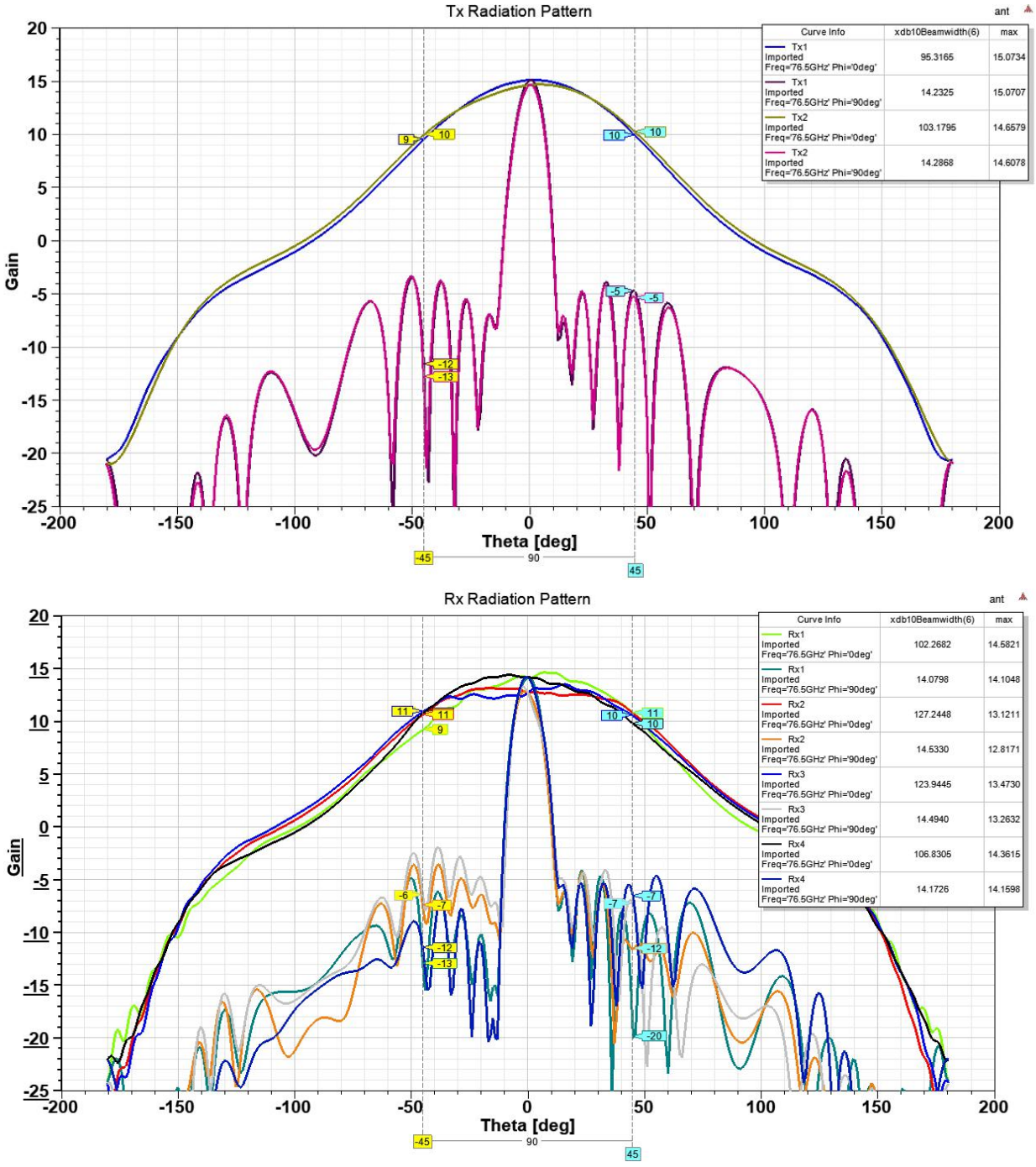


Figure 2 The system pattern of SR73F radar

SR73F Outline:

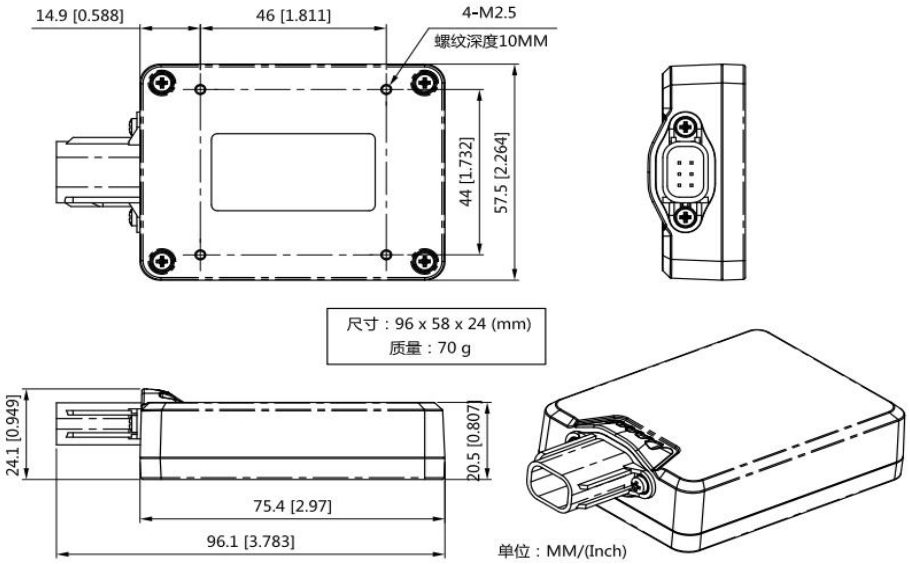


Figure 3 SR73F Outline

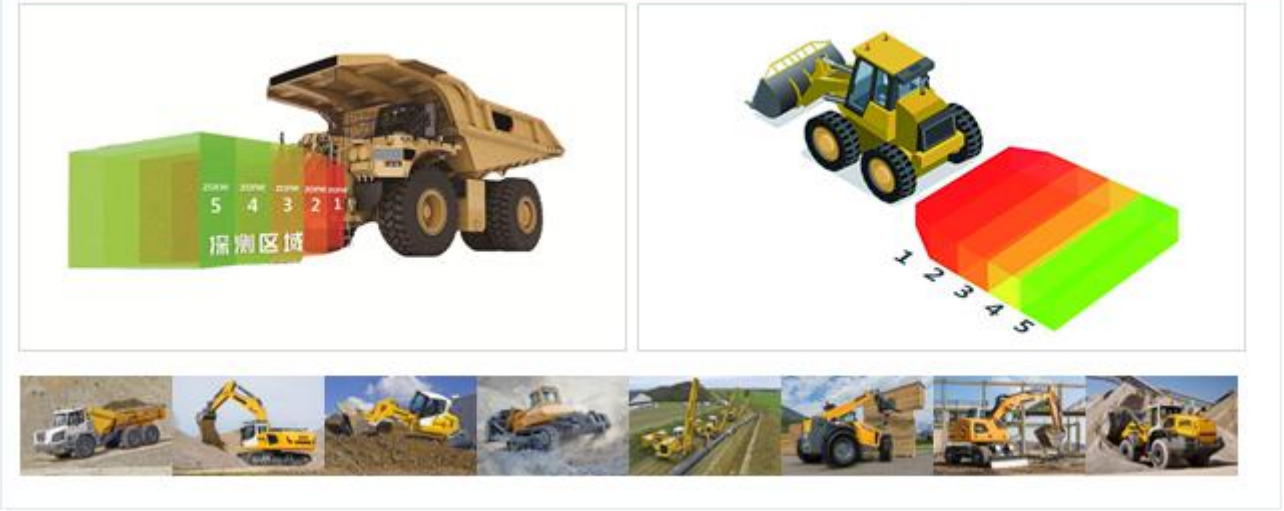
2.3 Applications

- Front Collision Warning（FCW）
- Rear Collision Warning（RCW）
- Multi Sensory Fusion
- Research and Study

3 Application Cases

3.1 Learner-driven vehicle collision warning system and heavy equipment collision warning System

Both Learner-driven vehicle collision warning system and heavy equipment collision warning System adopt SR73F millimeter wave radar sensor to monitor the environment behind or in front of the car, output and send the target's distance, speed and angle information to the main control box, which will analyze radar detection data and vehicle current situation to control warning or trigger automatic braking function.



The Advantages of CAR28F:

1) Compact package, solid state technology;

2) Cost-effective, long detection distance;

3) High detection accuracy;

4) Leading performance and durability

4 Conclusion

SR73F is a short range automotive millimeter-wave radar developed by Nanoradar. The product adopts advanced MMIC technology and signal processing technology. Featured with long range detection, accurate velocity measurement and the stable performance, SR73F can be widely used on low speed vehicle for front and rear collision warning, which can significantly improve the vehicle safety and relieve driver's pressure.

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