Datasheet of
T79 SRR Millimeter-Wave Radar

V2.2

I. General Information

1. Purpose and Scope

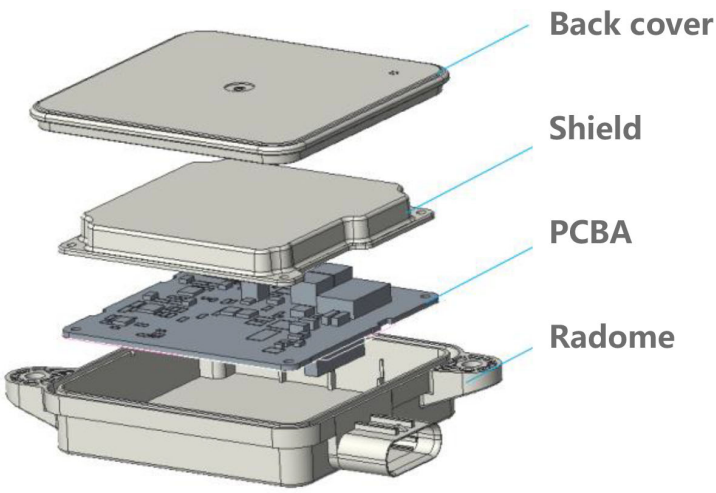
T79 SRR is a millimeter-wave radar designed for the next generation of ADAS and autonomous driving applications. It applies the 79GHz RFCMOS technology with highly integrated hardware design and the advanced radar signal processing algorithms, and provides the system solutions for the 360° full coverage of the automotive intelligent perceptions.

2. Product Features

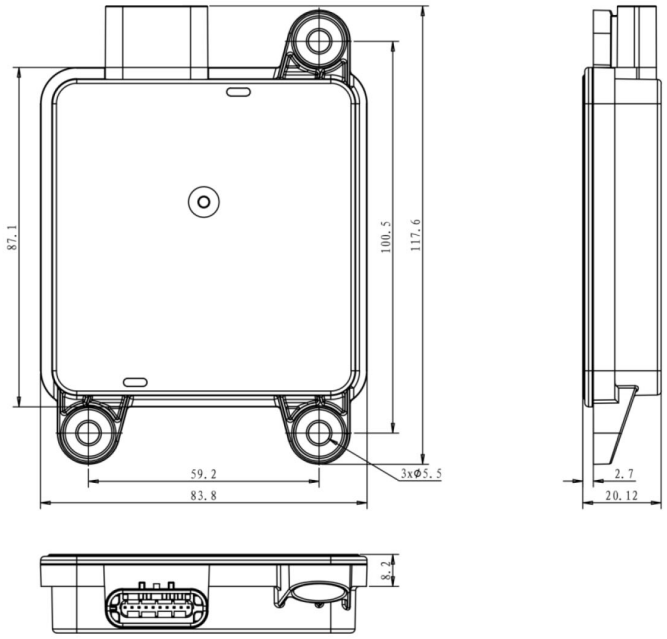
- Featuring the advanced 79GHz RFCMOS technology
- Using the powerful and highly scalable signal processing algorithms and computing platforms

3. Packaging and Dimensions

Top and Bottom Views of Product packaging



Explosion View



Product exterior dimensions

II. Radar Characteristics

Product Characteristics

Specification	Value
Operating Frequency	76~79 GHz
Power Consumption	<4.5 W
Quiescent Current	<1mA
Power Supply Voltage	9~16V
Operating Temperature	-40~85°
Ingress Protection	IP67
Detection Range	0.5~90 m
Range Accuracy	0.4 m
Range Resolution	0.78 m
Unambiguous Velocity	-200 ~ 200 km/h
Velocity Accuracy	0.13 m/s
Velocity Resolution	0.4 m/s
Field of View Azimuth	-60~ 60°
Field of View: Elevation	-4~ 4°
Azimuth Angle Accuracy	0.4°
Update Rate	50 ms
Number of Tracked Targets, max.	32
Azimuth Beamwidth (3dB, 2-way)	±45°
Elevation Beamwidth (6dB, 2-way)	±5°
Angular Auto-Alignment	YES
Number of Channels	2 TXs * 4 RXs

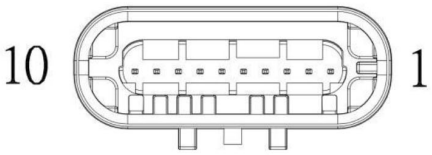
III. Connector

1. Model

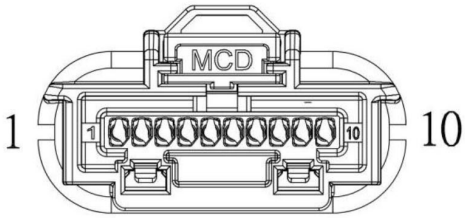
Radar Connector Model #	Manufacturer	Cable Connector Model #
349681801	Molex	34967-1001 (Pins: 34905-2447)

2. Drawing

Radar Connector



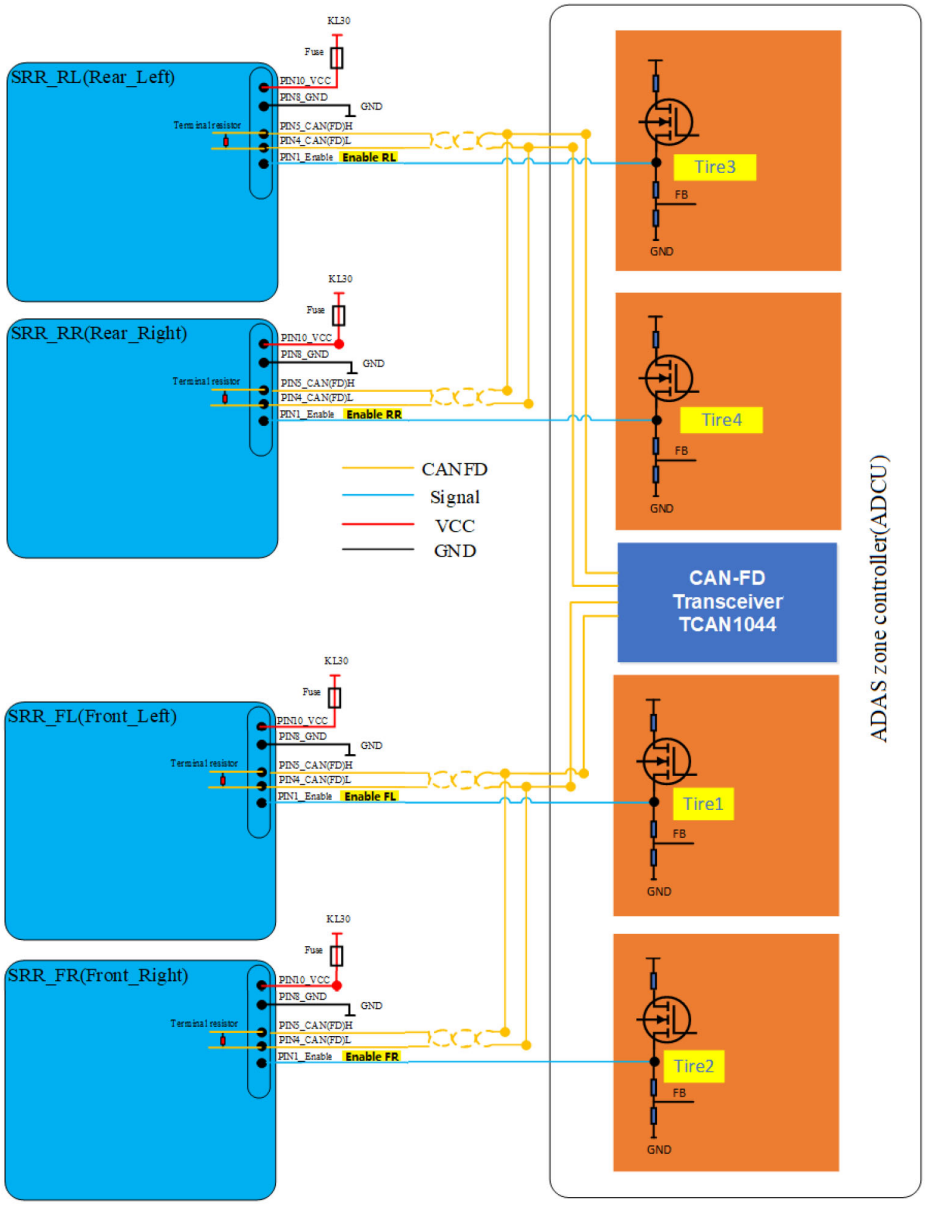
Cable Connector



3. Pin Definition

Pin #	Definition
1	IGNITION
2	---
3	---
4	CANFDL
5	CANFDH
6	---
7	---
8	GND
9	---
10	DC-IN (KL30)

IV. Vehicle Wiring Diagram



V. Power Supply

T79 radar uses nominal 12V DC power supply.

Radar Behaviors in Different Operation Modes

UBATT(12V)	Operation Mode	Behavior
UBATT<6.5V	Safe	- No communication with vehicle - Partial fault monitoring (record undervoltage fault)
6.5V≤UBATT<9V	Undervoltage	- Normal communication with vehicle - Normal hardware monitoring - Partial fault monitoring (record undervoltage fault)

9V≤UBATT<16V	Normal	- Normal communication with vehicle - Normal hardware monitoring - Full fault monitoring and recording
16V<UBATT≤18V	Overvoltage	- Normal communication with vehicle - Normal hardware monitoring - Partial fault monitoring (record overvoltage fault)
18V<UBATT	Safe	- No communication with vehicle - Partial fault monitoring (record overvoltage fault)
Monitor tolerance		±10%

VI. Communication

- Support CAN-FD communication (500K/2M)
- Support ISO 11898
- Support CAN-FD based UDS diagnosis

UDS CANID as below

Controller	CAN ID
SRR1_FL	0x7C4/0x7D4
SRR2_FR	0x7C7/0x7D7
SRR3_RL	0x7C8/0x7D8
SRR4_RR	0x7C9/0x7D9
Functional Address	0x7DF

- Support radar mounting position configuration

CAN ID configuration for radar mounting position as below:

Config Request			Config Response		
0x151	RadarPos	0x4: RR (Rear Right) 0x3: RL (Rear Left) 0x2: FR (Front Right) 0x1: FL (Front Left)	0x141	RadarPosResp	0x4: RR (Rear Right) 0x3: RL (Rear Left) 0x2: FR (Front Right) 0x1: FL (Front Left) 0x0: Virgin
	RequestType	0x1: Config 0x0: Query		RadarCofgResult	0x1: Failure 0x0: Successfully
				RequestTypeResp	0x1: Config 0x0: Query

VII. Requirements to Vehicle Bumper Material for Corner Radar

1. Bumper Material Requirements

Bumper material should behave "transparent" as much as possible to the radiation signal of the radar.

The characteristics of the bumper shall meet the following requirements:

- Surface roughness less than 1/10 wavelength of the operating frequency of the radar, i.e. <400um
- Suggest to use the synthetic material with low signal loss for the 77GHz signal, and therefore to minimize the radar signal propagation attenuation. The required one-way signal propagation attenuation of the

bumper to the 77GHz electromagnetic signal should not greater than 2dB

- Suggest to use the synthetic material with low dielectric constant εr to lower the surface reflection

For the best performance, the optimized overall thickness of the bumper should be used. The recommended overall thicknesses for some typical materials are listed below.

Material	Dielectric Constant εr (*) @77GHz	Optimum Thickness (mm)	Allowed Thickness Tolerance (mm)
Polypropylene	2.35	n×1.292	±0.2mm
Polyamide	2.75	n×1.194	±0.2mm
Polycarbonate	2.80	n×1.183	±0.2mm
PC-PBT	2.90	n×1.163	±0.2mm
ABS	3.12	n×1.121	±0.2mm
ASA	3.80	n×1.016	±0.2mm
PMMA	3.40	n×1.074	±0.2mm

Due to the fact that the signal loss will be higher with larger bumper thickness, the recommended overall bumper thickness should be less than 4mm. For example for the material Polypropylene, the bumper thickness can be design at 1.292±0.2mm，2.584±0.2mm，or 3.876±0.2mm.

2. Other Design Considerations

- (*) Even the same material is used, the actual dielectric constant of the bumper could be different due to the possibly different compound and density from different suppliers. Therefore, the thicknesses listed in the table shown above are for reference only. Some electrical tests for the actual material properties may be required to ensure the satisfactions of the requirements as a necessary process step of the bumper manufacturing
- Evaluation tests are required for Any other materials not listed in the table before use
- In most cases, the bumper has paint layer(s). The paint layers may affect the reflection and attenuation characteristics of the overall bumper structure. It is suggested that the number of paint layers shall not be more than three
- Metal material will block the propagation of the electromagnetic wave, and cannot be used for the bumper material around the radar installation area
- Any use of metal particles in the paint of the bumper shall be evaluated for the radar performance impact
- To ensure sufficient operation performances of the radar, the customer is requested to provide samples of some portions of the bumper or the entire bumper to the radar developer for the reflection coefficients and transmission loss tests. Whether the fascia material and structures, such as the TPO, metallic paint, etc. are suitable for the application, have to be evaluated one by one

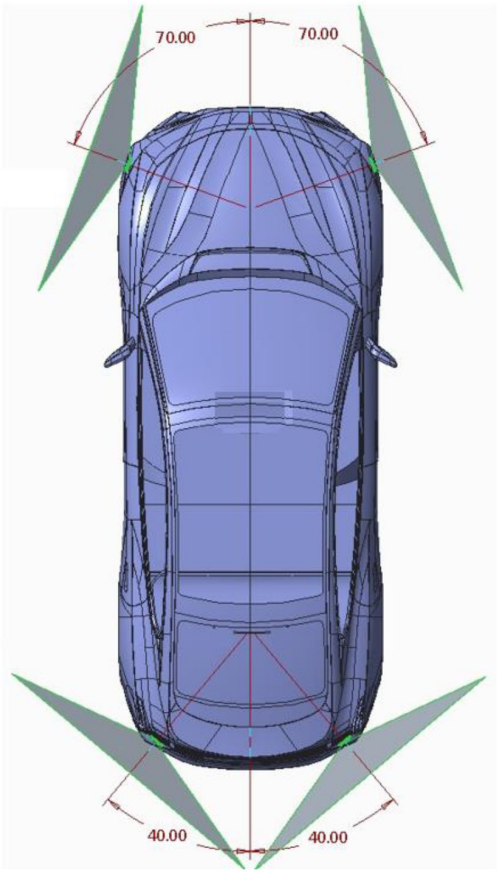
Nevertheless, the smaller dielectric constant the bumper material has, the better radar performance could be achieved. It is highly recommended for <3 dielectric constant

VIII. Installation Guidelines

The mounting positions of four corner radars are shown below. The two normal direction lines of the two front corner radars form up an angle of 70° with the center axis of the vehicle. The normal direction line of the rear

corner radar has a 40° angle to the vehicle center axis. All four corner radars are mounted behind the respective bumper. The front corner radars are installation above the ground for about 360mm, while the rear radars about 320mm. The required mounting tolerances are listed below.

	Tolerance
Azimuth (°)	±3°
Elevation (°)	±1.5°
Rolling Angle (°)	±2°



Mounting Position Diagram of the Corner Radars

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