TSR20 Traffic Speed Radar

White Paper

V1.0

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Version History

Date	Version	Version Description
2019-11-05	1.0	TSR20 1st version white paper

Content

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Summary： TSR20 is a 24GHz high-performance traffic speed radar that accurately measures vehicle speed and other information by using the frequency difference between the emitted radio waves and the echo. The TSR20 uses a microstrip array antenna design with accurate speed measurement and can distinguish between coming and going vehicles. Installed at the road side, it can automatically measure the driving speed of vehicles in 1 to 4 lanes.

Keywords： TSR20，Speed radar detector，Speed feedback sign

1 Speed radar market demands

with the rapid development of city road traffic, it has cause a lot of traffic problems and hidden dangers. So the traffic management department of the public security increased investment in off-site punishment facilities. At present, the following methods are mainly used in the traffic speed measurement system:

(1)Loop coil sensor coupled with the camera forensics system, in this way speed measurement accuracy can be guaranteed, the disadvantage is that this way needs to destroy the road surface, high maintenance cost;

(2)Video image virtual coil and camera forensics system is also adopted. Due to the inconsistent installation of this method, measurement method cannot be "calibrated", so the ministry of public security has clearly announced that it is banned.

(3)Laser speed radar and camera forensics system, which has high measurement accuracy. However, the equipment cost is very high, and it is difficult to be widely used at present.

2 TSR20 Speed radar description

2.1 Speed radar features

TSR20 is a very cost-effective k-band millimeter-wave radar sensor system with a detection range of up to 300 meters. It adopts the CW modulation mode to detect the speed and direction of moving targets, with high speed measurement accuracy.

2.2 Speed Radar Parameter

The TSR20 uses advanced SiGe MMIC technology to measure the speed and direction of a moving vehicles.

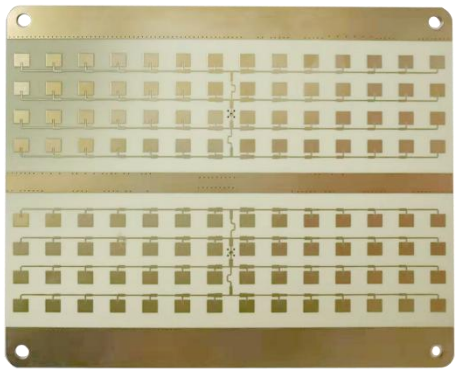


Figure 1 TSR20 Appearance

TSR20 uses low sidelobe array antenna design technology to effectively avoid additional interference caused by beam divergence. The azimuth plane -3dB beam width is about 6.7 °, and the elevation plane -3dB beam width is about 27 °. The TSR20 radar system direction characteristic chart is as follows

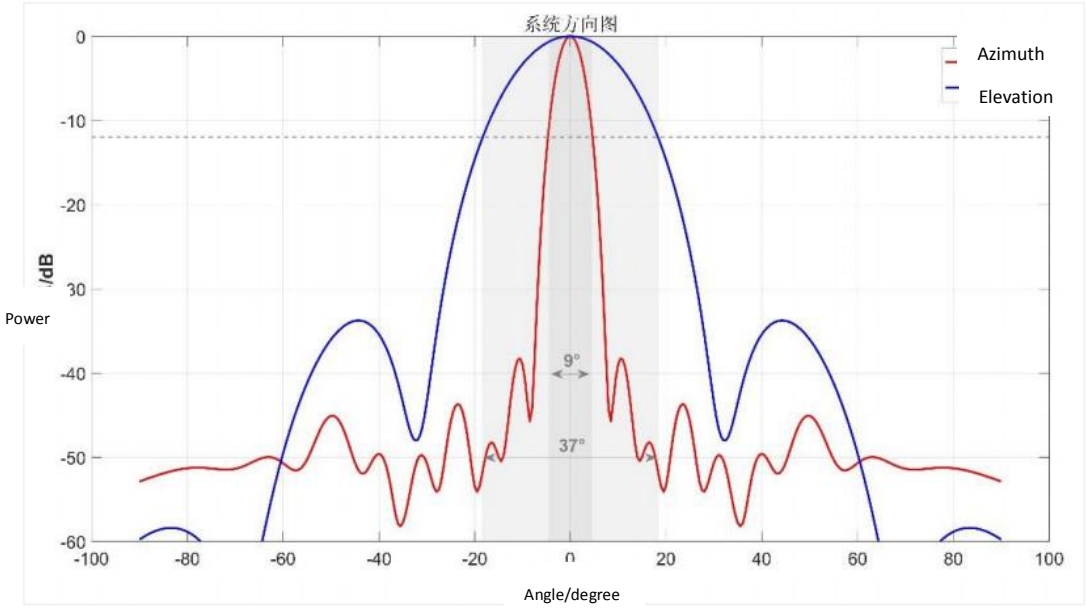


Figure 2 TSR20 Radar system directional characteristic diagram

Table 1 TSR20 performance parameter

Parameter	Condition	MIN	TYP	MIN	Unit
System performance					
Transmit frequency		24.00	24.15	24.25	GHz
Transmit power（EIRP）			20		dBm
Refresh time			20		ms
Transmit frequency error		-40		40	MHz
Power			1.6		W
Communication interface		RS485/RS232/Switch			
Speed measurement characteristic					
Speed range		5		300	km/h
Speed accuracy		-1		0	km/h
Direction		Distinguish car coming and going			
Detection range	Vehicle		200	300	m
Antenna					
Beam width/TX	Azimuth(-3dB)		6.7		deg
	Elevation(-3dB)		27		deg
Other characteristic					
Working voltage		9	12	16	V DC
Working current			0.13		A
Working temperature		-40		85	℃
Working humidity		5%		95%	RH
Size		105*85.5*13			mm

PCB drawing：

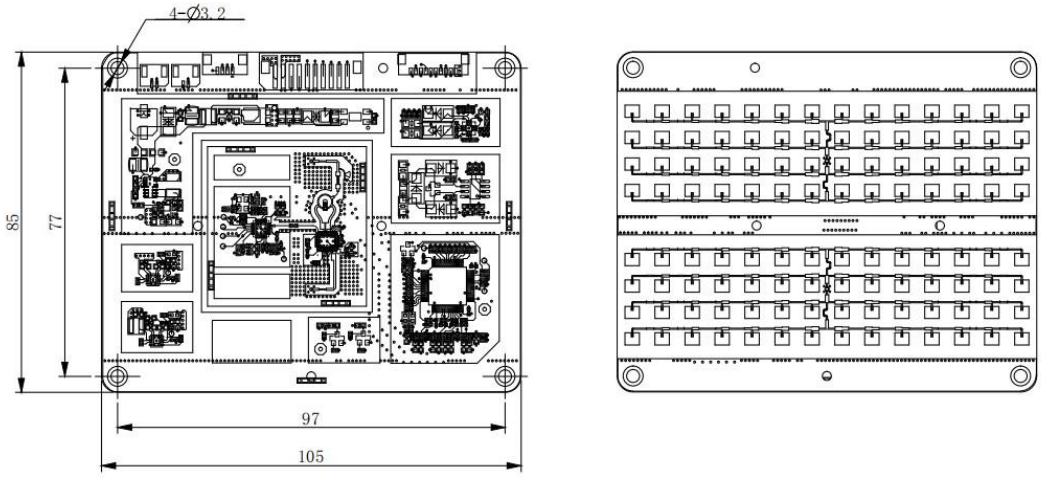


Figure 3 TSR20 PCB Size

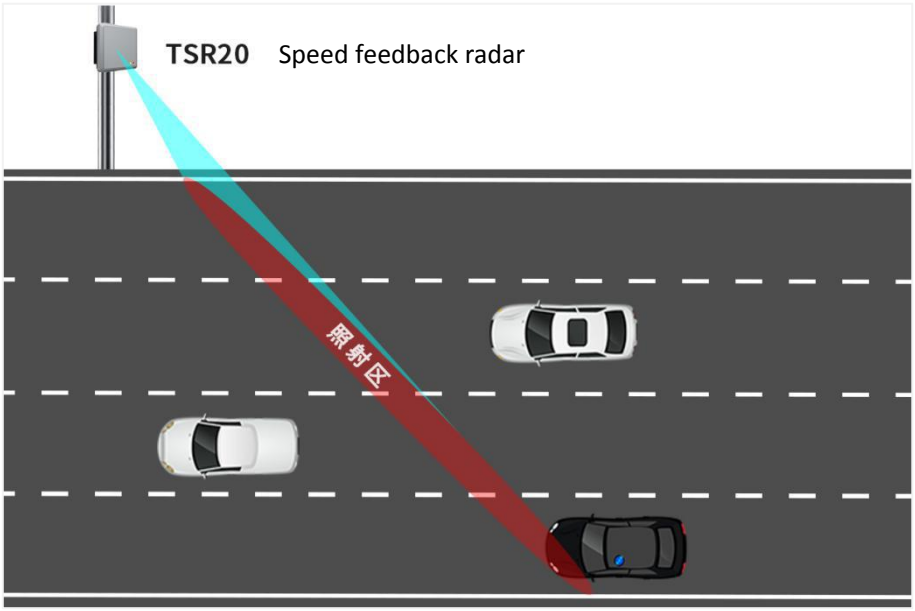
2.3 Speed radar application

- Traffic speed monitoring
- Speed feedback
- Bend warning
- Crossing warning

3 Cases on installation

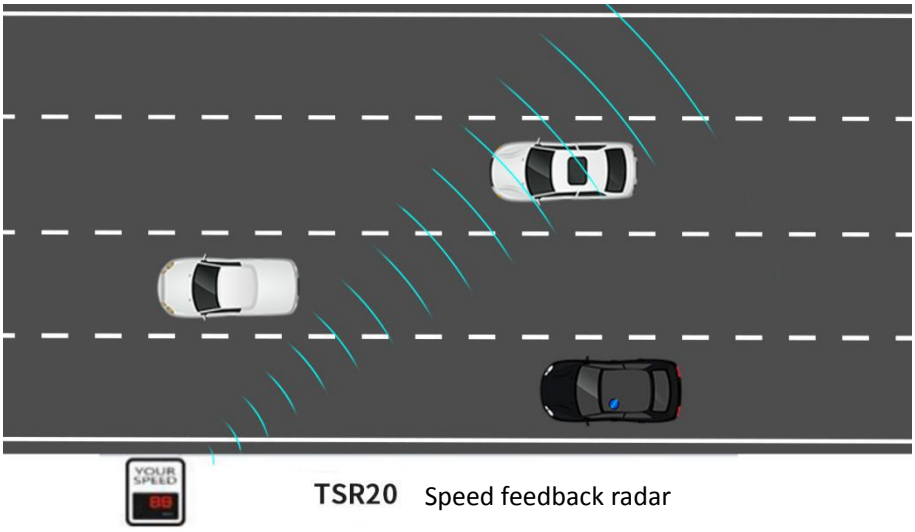
3.1 Portable or fixed install for over speed capture

One single radar can cover multiple lanes by oblique irradiation, avoiding interference from vehicles outside the beam. The short response time enables real-time, automatic measurement of the vehicle speed in the monitoring lane, and distinguishes between coming and going vehicles, so as to perform direction screening and illegal speed capture.



3.2 Speed feedback sign

When the speed measured by radar exceeds the set value, the speed feedback device will warn the driver through LED flashing (or changing color), to timely remind the driver to pay attention to reduce the speed of driving, so as to effectively reduce road traffic accidents caused by over speed.



4 Conclusion

TSR20 is a multi-lanes single object speed radar, it adopts advanced MMIC and signal processing technology, with high capture rate, accurate speed measuring, stable performance, and can be widely used in road traffic speed measuring system and other fields.The product can help reduce drivers' speeding violations and avoid road traffic accidents caused by over speed driving.

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