

MS-V224 Multi-lane Speed Detection Radar

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Version history

date	versions	versions
2024-03-07	1.0	first edition
2025-3-26	1.1	Customer customized requirements

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Overview: The MS-V224 multi-lane speed radar employs internationally advanced microwave radar technology, with optimized designs for radar architecture, signal processing, and target recognition algorithms. It features multi-target identification and tracking capabilities, enabling simultaneous monitoring of 1-4 lanes while capturing vehicle speeds, distances, and lane information within its coverage area. Designed for highly integrated speed

1.1 Speed radar application requirements

1.2 Development of traffic speed control system

In recent years, the rapid development of China's road transportation, particularly the surge in urban motor vehicles, has led to numerous traffic issues and safety hazards. To address this, public security traffic authorities have increased investment in non-on-site penalty facilities. Currently, there are three main methods in traffic speed measurement systems: (1) Using loop coil sensors for speed detection combined with camera evidence systems, which ensures measurement accuracy but requires road closures and incurs high maintenance costs; (2) Employing virtual loop detection via video image technology paired with camera evidence systems, though this method has seen reduced use due to inconsistent installation standards and the inability to calibrate measurement methods; (3) Utilizing laser speed radar systems integrated with camera evidence systems, which offer higher measurement precision but face significant equipment costs, making widespread adoption still challenging.

1.3 Gate speed radar application requirements

With the rapid development of national highway infrastructure and the widespread adoption of motor vehicles, road networks have expanded significantly while road conditions remain highly variable. High-speed driving reduces drivers' reaction time to road hazards, approaching vehicles, pedestrians, and other road conditions. Additionally, accelerated speeds

increase emergency braking distances, often resulting in minor incidents like rear-end collisions that cause vehicle damage and significant social and economic losses. In this context, enhancing urban traffic management through advanced technologies has become a critical challenge for public security authorities. These technologies aim to curb traffic accidents, address speeding violations, and ensure strict adherence to speed limits. The Intelligent Road Vehicle Monitoring System (commonly known as the checkpoint monitoring system) serves as a vital component of intelligent transportation systems. Utilizing cutting-edge technologies including vehicle detection, communication networks, computer control, image processing, and data analytics, this system automatically collects and processes vehicle information such as passage timing, location, speed, direction, license plate numbers, color patterns, and images. Through continuous monitoring and analysis of vehicle composition, traffic flow patterns, and violation records, it provides essential operational data for traffic planning, management, and road maintenance departments. The radar checkpoint speed monitoring system primarily achieves three objectives: capturing vehicle images, collecting license plate recognition data, and deploying surveillance for alerting and dispatching police for interception. It continuously records road speed violations year-round, providing crucial technical support and evidence for swift enforcement actions. This system plays a vital role in urban public security and traffic management, offering significant solutions to address insufficient police resources while enhancing the efficiency of traffic law enforcement.

2 Overview of MS-V224 multi-lane speed radar

2.1 Product features

The MS-V224 Multi-Lane Speed Radar is a cost-effective short-range K-band millimeter-wave radar sensor. When paired with vehicle capture equipment, it enables simultaneous monitoring of multiple lanes (1-4) while

capturing distance and speed data for vehicles in each lane. With detection ranges of 20-50 meters and over 99% capture accuracy, this radar supports both front-mount and side-mount installation methods, significantly enhancing its

adaptability to various
application scenarios.

2.2Product Parameter

classify	describe	index	remark
function	Modulation	FMCW	
	Frequency	24~24.25GHz	
	Center frequency deviation error	$\leq \pm 45\text{MHz}$	
	Emission power (EIRP)	10dBm	Power adjustable
	response time	50ms	
	Triggering consistency	$\leq \pm 0.5\text{m}$	
	Frame rate	>99%	
	Capture distance	1-50m	
	Measurement range	5~320km/h	
	rate accuracy	(-2~0) km/h	
	Covering the driveway	4	
	Beam width (azimuthal surface /Tx)	64°	
	Beam width (pitch face /Tx)	16°	
electric source	electric source	9~28V DC	
	power	$\leq 4.5\text{W}$	
datum	Antenna panel materials	ABS+PC	
	Base shell material	ADC12	
peripheral interface	indicator light	Three (red is the power light, green is the status light, blue is the network light)	
environmental suitability	levels of protection	IP67	
	Corrosion resistance rating	IEC 60068-2-11	
	working temperature	-40°C~85°C	
	Humidity at work	5%RH~95%RH	
install,	way to install	Front and side mounting	
	mounting height	6m (4-10m)	
	accessory	Horizontal bubble (not assembled)	

The TSC224 antenna uses a microstrip serial feed standing wave array to detect the speed and direction of movement of moving targets. The radar's transmit/receive antenna system is directional as follows:

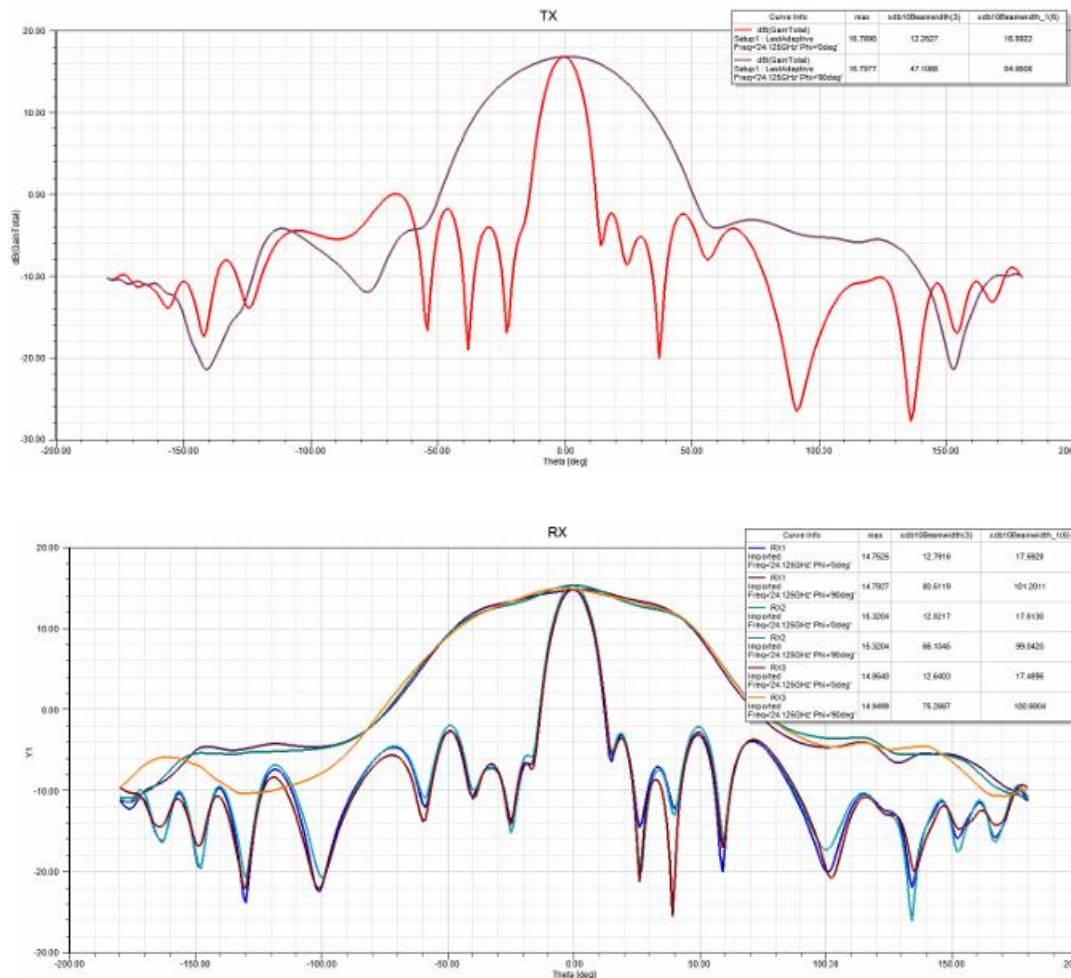


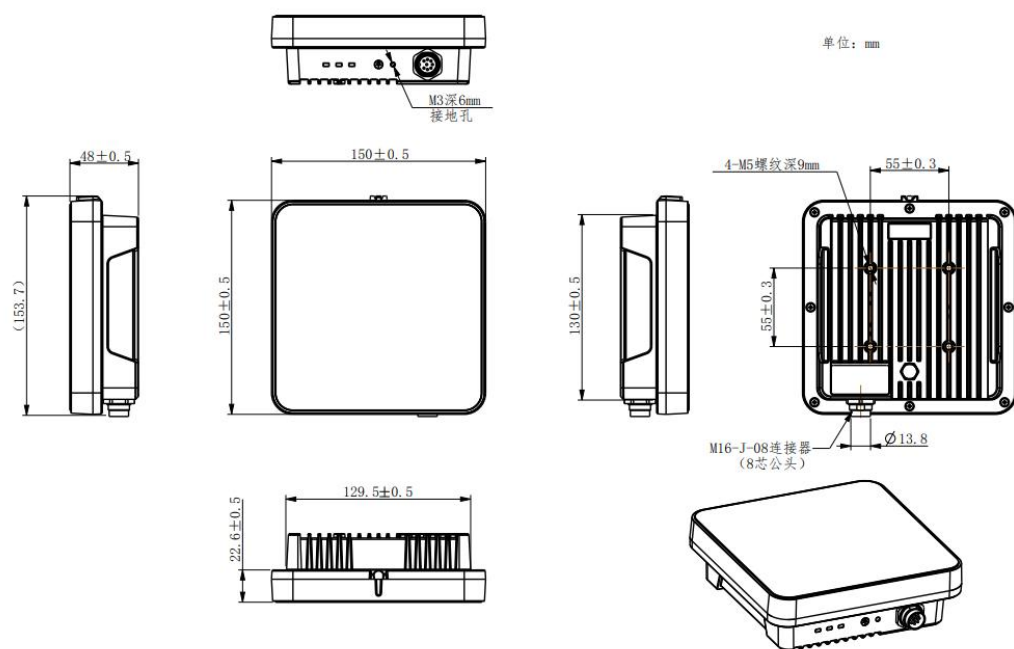
Figure 2 Radar system direction diagram

2.3 Product features

Multi-lane speed radar is a device that can measure and record the speed of vehicles in multiple lanes simultaneously through radar technology. The use of multi-lane speed radar has the following advantages:

- Covering 1 to 4 lanes
- High capture rate: capture rate $\geq 99\%$
- Precise positioning: vehicle capture positioning accuracy $\pm 0.5\text{m}$
- The vehicle capture position is set within 20~50m
- Support three types of capture in both direction: incoming and outgoing

The product outline is as follows:



TSC224整机尺寸图

The appearance of the product is as follows:



Figure 4. Exterior view





8-core interface with dust-proof cover

2.4 Product application areas

- Traffic speed control points
- Flow monitoring
- Reversing traffic violations

3 Typical application cases

3.1 Traffic speed control system

When vehicles enter the radar detection zone, the camera triggers to capture images of passing vehicles with 99% accuracy rate and consistent triggering positions (± 0.5 meters). The front-end subsystem of the radar checkpoint mainly consists of the following functional units: Vehicle speed measurement unit: Radar; Image acquisition and recognition processing unit: Includes checkpoint capture module and lighting system; Front-end data processing and upload unit: Contains terminal server; Network transmission unit: Includes intersection switch and fiber optic transceiver.

4 Scenario description:

4.1 Highway monitoring

Highway multi-lane speed detection systems are widely deployed to monitor vehicle speeds and traffic flow. These radars, typically mounted on elevated structures or utility poles, provide comprehensive coverage across multiple lanes. By tracking real-time vehicle speeds, traffic authorities can promptly detect speeding violations and implement appropriate penalties. Additionally, these systems help identify congestion patterns, enabling timely adjustments to road conditions and traffic management strategies.

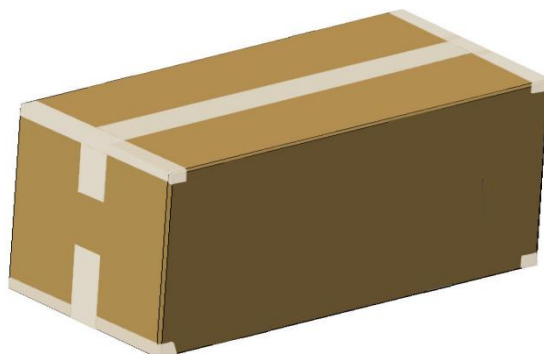
4.2 Urban road monitoring

On urban roads, multi-lane speed detection radars are typically installed on busy sections or intersections to monitor vehicle speeds and driving conditions. These systems enable traffic authorities to track real-time traffic flow, promptly identify violations like red-light running and illegal lane changes, and implement appropriate penalties. Additionally, they help optimize traffic light control systems, effectively reducing congestion and accident risks in the process.

5 Supplementary information on radar configuration:

5.2 Product shipping carton and label are as follows: :

The packaging box adopts neutral five-layer BE tile open box, with a length of 330* width of 220* height of 130mm. One machine is equipped with one carton





Note: The label size is (40*20) mm

FCC warning

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 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

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.

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

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body