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# 350m Wide-Area Detection Radar White Paper

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## Contents





1. Product Introduction .....	1
2. Product Features .....	1
3. Installation Instructions .....	2
4. Usage Instructions .....	3
4.1 Road Section Traffic Flow and Event Detection .....	3
5. Product Parameter Table .....	4
6. Hardware interface and dimensions .....	5

## 1. Product Introduction

The DTAM D39-V Radar-Video Fusion Microwave Detector is a microwave vehicle detector independently developed by our company. It features a wide detection range, high detection accuracy, and stable detection performance. It can cover 8 lanes in both directions, with a maximum detection length of 350 meters. It adopts the most advanced traffic target tracking algorithm in the industry, enabling accurate tracking of 256 targets in the area. Even in high-density and low-speed environments, it can still maintain excellent detection results.

In addition, this radar integrates a video module, which can overlay and display all target information detected by the radar on the video image in real-time. Through the in-depth integration of radar and video sensors, it dynamically perceives the entire traffic information, and collects in real-time various types of application data, including real-time traffic operation status data, traffic flow data, passing vehicle data, traffic emergencies, and vehicle types. This enriches high-precision data resources, builds a high-speed integrated multi-sensor perception system, and supports the dynamic management of highway traffic.

## 2. Product Features

MIMO radar front-end technology	FMCW waveform design	Vehicle trajectory tracking algorithm	Radar-Video Fusion Detection Algorithm
			
<b>Wide area multi-target detection</b>	<b>Holographic multi-dimensional perception</b>	<b>Multi-sensor fusion Multi-target radar</b>	<b>High-precision, all-weather suitability</b>
8 lanes horizontally, 350 meters vertically, 256 objects tracking detection	Accurately locate vehicle trajectory information, Multi-section + regional information perception	tracking, video forensics, Coordinate matching and data fusion	High-precision all-weather data collection, Not affected by weather and light

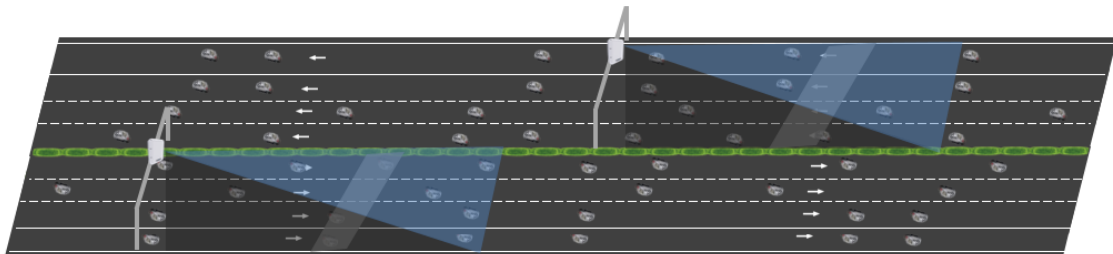
- Supports multi-lane and large-area object detection, capable of accurately outputting information such as speed and position. It provides horizontal coverage for up to 8 lanes and longitudinal coverage from 25 to 350 meters.

- Integrates radar and video in a unified design. The multi-sensor fusion mode enables multi-object radar tracking, coordinate matching, and data fusion.
- Incorporates the functions of traditional microwave vehicle detectors, offering data such as vehicle speed, traffic volume, headway time, vehicle classification, queuing, and space occupancy rate.
- Detection accuracy: traffic flow accuracy  $\geq 95\%$ ; queue length accuracy  $\geq 90\%$ ; event detection accuracy  $\geq 90\%$ , based on typical traffic scenarios.
- Supports the detection of pedestrians, non-motor vehicles, large and small vehicles.
- Radar supports NTP time synchronization and manual time setting.
- The radar operates reliably under all weather and lighting conditions, unaffected by rain, snow, fog, or ambient light.

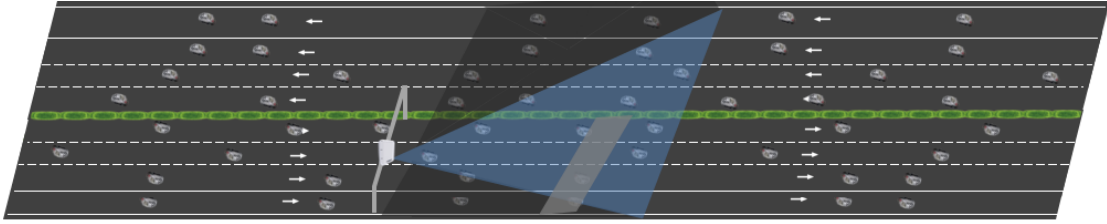
### 3. Installation Instructions

The road section scenarios are usually divided into front-mounted and side-mounted. The front-mounted installation is usually on the gantry, and the side-mounted installation can be on the side pole of the gantry or the L-shaped pole by the roadside. It is recommended that the installation height be 8 - 12m, and the installation be horizontal.

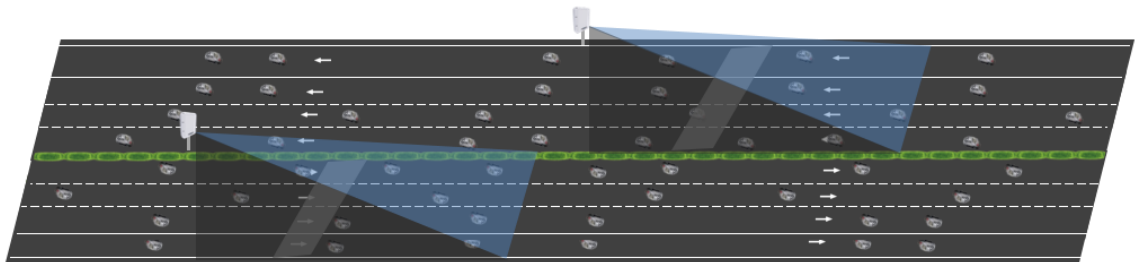
#### Method 1: Installation on the gantry covering one-way lanes



### Method 2: Installation on the gantry covering two-way lanes



### Method 3: Installation on the roadside covering one-way lanes



## 4. Application Instructions

As a typical representative of the new generation of long-distance microwave detectors, the DTAM D39-V provides a new solution for systems such as road section information collection, traffic event detection, and vehicle-road collaboration, thanks to its wide-area multi-target detection, multi-mode behavior tracking, and multi-dimensional data mining technologies.

### 4.1 Road Section Traffic Flow and Event Detection

Through radar-video fusion, it tracks vehicles in a large area in real-time around the clock and accurately locates them. By matching and calculating with lanes, it detects various traffic events such as abnormal stops, abnormal lane changes, and slow-moving congestion, and uploads the alarm information to the platform, providing accurate event early-warning information for traffic management departments and ensuring the accuracy of events. Compared with video event detection, the DTAM D39-V has a farther coverage range for detecting abnormal stops; it responds more flexibly and processes more efficiently in lane change detection, and can quickly analyze

multiple lane change events in the area simultaneously; it can accurately classify the congestion level for slow-moving congestion and report it in real-time within seconds.

**Table 1: Traffic Datas**

Number	Data Items	Data Composition
1	Real-Time Data	ID, Px, Py, Vx, Vy, Object Type
2	Passing Vehicle Data	Section ID, Lane ID, Entry Time, Exit Time, Presence Duration, Entry Speed, Exit Speed, Object Type
3	Statistical Data	Statistic Time, Statistic Interval, Section ID, Lane ID, Vehicle Volume, Average Speed, Headway (Time Headway), 85th Percentile Speed
4	Incident Data	Time, Lane ID, Incident Type (High-Speed / Low-Speed, Abnormal Stop, Reverse Drive, Congestion, Pedestrian Intrusion, Illegal Lane-Changing, etc.)

## 5. Product Parameter Table

**Table 2: Radar Parameters**

No	Specifications	Parameters
1	Frequency Band	77GHz
2	Coverage	8 lanes in both directions
3	Simultaneous Detection	Up to 256 objects
4	Maximum Detection Range	25 ~ 350m
5	Range Accuracy	0.4m
6	Range Separation	0.8m
7	Range of Speed Coverage	-200km/h~+200 km/h
8	Speed Accuracy	0.1m/s
9	Speed Separation	≤±0.25m/s
10	FOV	Near beam 90° (horizontal)/18° (vertical) Far beam 18° (horizontal)/18° (vertical)
11	Angle Accuracy	0.2°
12	Angle Separation	Far Range: 3.3°; Near Range: 6.6°

**Table 3: Video Parameters**

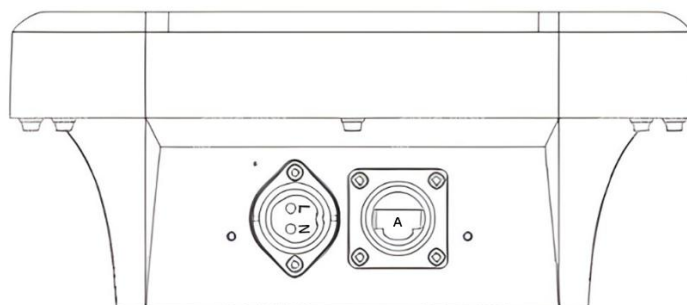
No	Specifications	Parameters
1	Sensor	1/2.5 inch CMOS
2	lens	12mm fixed focus lens

3	Pixel	2592*1944 px
4	Video FOV	26°
5	Image format	JPEG
6	Video protocol	Supports docking with ONVIF protocol and national standard GB/T 28181 protocol
7	Network protocols	Supports TCP/IP, HTTP, RTSP and FTP transfer
8	Max resolution	2592*1944px
9	Compression standards	H.265/H.264/MJPEG
10	Video frame rate	Mainstream:2592*1944 2560*1440 1920*1080 1-20 fps Sub-stream:1280*720 704*576 640*480 352*288 1-20 fps
11	Output bit rate	16kbps~20Mbps adjustable

**Table 4: Other radar parameters**

No	Specifications	Parameters
1	Operating temperature	-40°C~+70°C
2	Working voltage	DC 24V (Wide voltage range: 20~28V)
3	Working humidity	0~95%
4	Power Consumption	≤12 W
5	Installation height	8~12 meters
6	IP rating	IP67

## 6. Hardware interface and dimensions

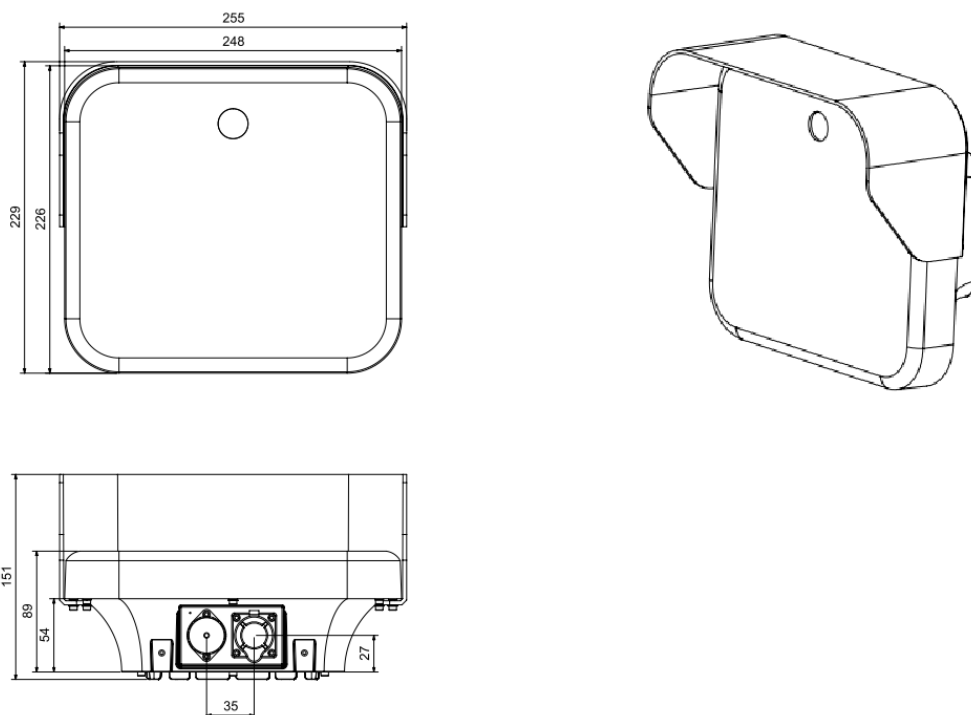


**Table 5: Functions corresponding to each interface**

Mark	Name	Description
L	V+	DC 24V
N	V-	GND
A	RJ45	Interface

Notes:

- ✧ It is strictly forbidden to use AC 220V voltage to directly power the radar.
- ✧ When selecting the installation point, avoid placing the radar too far away from the power supply or transmission node. If the radar data transmission exceeds 80 meters, optical fiber must be used for link access.



DTAM D39-V Layout

**Table 6: Product dimensions**

No.	Parameter name	Description
1	Dimensions	255mm×229mm×151mm(Length * Width * Height)
2	Weight	1600g
3	Material	PC