Global and China Automotive Millimeter-wave (MMW) Radar Industry Report, 2019-2020

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STUDY GOAL AND OBJECTIVES

This report provides the industry executives with strategically significant competitor information, analysis, insight and projection on the competitive pattern and key companies in the industry, crucial to the development and implementation of effective business, marketing and R&D programs.

REPORT OBJECTIVES

- To establish a comprehensive, factual, annually updated and cost-effective information base on market size, competition patterns, market segments, goals and strategies of the leading players in the market, reviews and forecasts.
- To assist potential market entrants in evaluating prospective acquisition and joint venture candidates.
- To complement the organizations' internal competitor information gathering efforts with strategic analysis, data interpretation and insight.
- To suggest for concerned investors in line with the current development of this industry as well as the development tendency.
- To help company to succeed in a competitive market, and

METHODOLOGY

Both primary and secondary research methodologies were used in preparing this study. Initially, a comprehensive and exhaustive search of the literature on this industry was conducted. These sources included related books and journals, trade literature, marketing literature, other product/promotional literature, annual reports, security analyst reports, and other publications. Subsequently, telephone interviews or email correspondence was conducted with marketing executives etc. Other sources included related magazines, academics, and consulting companies.

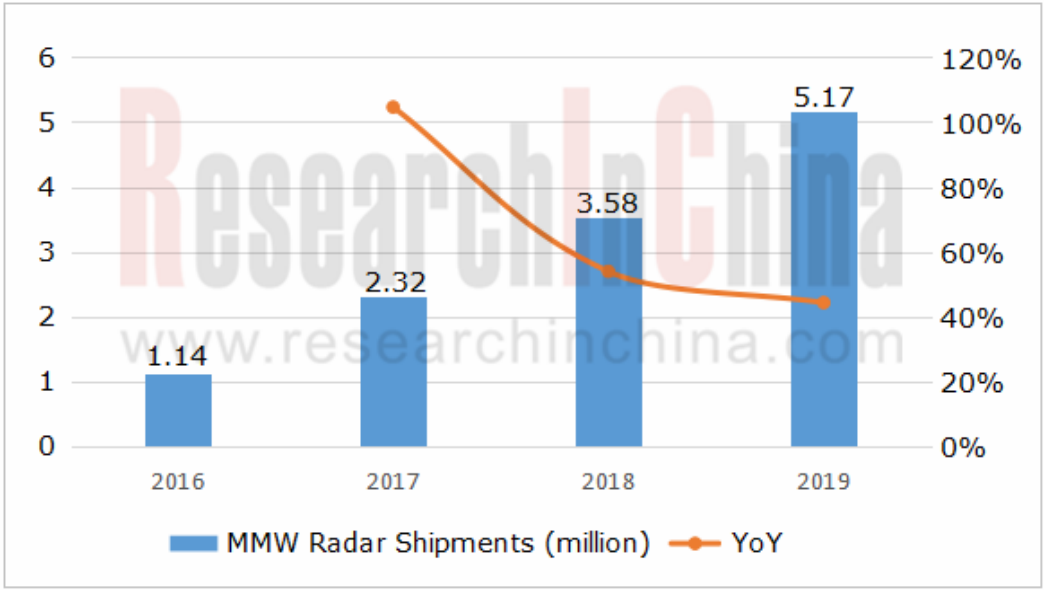
INFORMATION SOURCES

The primary information sources include Company Reports, and National Bureau of Statistics of China etc.

Abstract

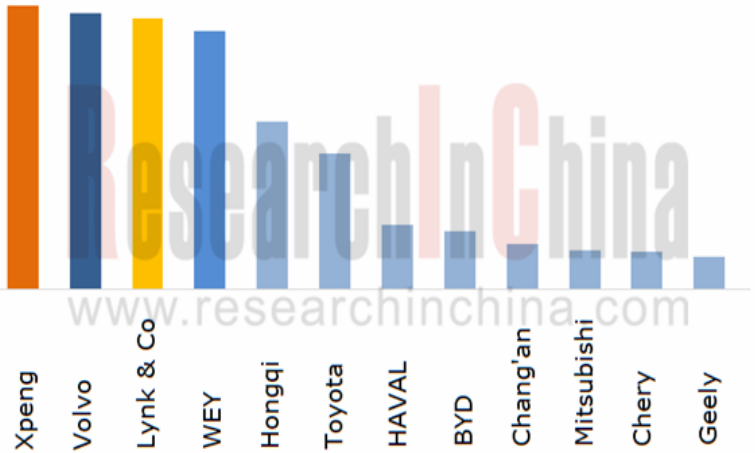
Millimeter wave radar installations soared by 44.37% year-on-year in 2019 and were available in more scenarios, encroaching on Lidar and ultrasonic.

Automotive radar wins popularity and gets increasingly installed. In 2019, 5.17 million mm-wave radars were installed in passenger cars in the Chinese market with an annualized spurt of 44.37%, particularly 77GHz radar installations with an upsurge of 69.3% from a year earlier.



Chinese carmakers have more radar installations than joint venture brands. For the newly launched models, Geely Geometry, WM Motor, BAIC ARCFOX, Chang'an, SAIC Roewe / MAXUS, FAW Hongqi, Xpeng and other homegrown brands all emphasize L2 / L2.5 / L3 autonomous driving technology and install more sensors including mm-wave radar.

Top 12 Brands in China by 77GHz Radar Installations to New Cars, 2019



Well-known radar suppliers are promoting 77GHz radar vigorously, like the latest generation of medium- and long-range 77GHz radar launched by Bosch and Continental, and at the same time famous radar chip makers are mostly rolling out the 77GHz-centric chip generally in favor of the high modulation bandwidth 2GHz and with 3 transmitters and 4 receivers to detect farther.

The upcoming RXS816xPL is a highly integrated device that addresses the needs of 77-79 GHz radar for all safety-critical applications from automatic emergency-braking (AEB) to high-resolution radar in automated driving and that performs all functions of a radar front-end in a single device – from FMCW signal conditioning to generation of digital receive data output. It resorts to high modulation bandwidth 2 GHz to realize precise distance measurement and simultaneous transmitter operation for MIMO, capable of detecting and identifying objects within 300 meters.

Texas Instruments plans to launch the 77GHz AWR2243, an integrated single-chip FMCW transceiver working in the 76- to 81-GHz band. The device has a tiny footprint and unprecedented integration and supports 5G bandwidth. Simple programming model changes enable a wide variety of sensor implementation (short, medium, long range). Additionally, the device is provided as a complete platform solution to reduce development costs.

MMW radar chip vendors have released suitable chips for more applications, especially in ultra-short range and short range.

Comparison of Some Ultra-short-range and Short-range MMW Radars

Type	Chip Makers and Products	Performance	Applications
Ultra-short-range Radar	MediaTek Autus R10	Detection range: 10 cm to 20 m	Blind Spot Detection (BSD), Automated Parking Assistance (APA) and Parking Assist System (PAS)
	TI AWR1642	4 receivers; 2 transmitters. RF, MCU and DSP integrated	BSD, rear collision warning, lane change assistance, intersection traffic warning, 360-degree view, parking assist
	NXP TEF810X	Fully integrated RF CMOS radar transceiver for 76-81GHz radar. 4 receivers; 3 transmitters.	Emergency braking, BSD, intersection alarm and APA
	Calterah Semiconductor ALPS SoC	77GHz; 4 receivers; 4 transmitters. High-speed ADC, radar signal processing baseband and high-performance CPU core integrated	Ultrasonic Radar Alternative
Short-range Radar	TI AWR1843	4 receivers; 3 transmitters. MCU and DSP integrated on a chip	Occupant and object monitoring in the cockpit
	TI AWR1443	RF and MCU integrated	Occupant detection, body sensor, gesture recognition in the cab, driver monitoring
	Vayyar 4D Radar Imaging Sensor	60GHz automotive-grade MIMO radar chip; 48 transceivers and an integrated high-performance DSP; High-resolution 4D point-cloud images	In-car occupants' location, occupant size, vital sign and posture analysis. APA, BSD, lane change assist.

Radar finds wider applications in scenarios like cockpit and occupant monitoring, automated parking, collaborative vehicle infrastructure system (CVIS) and intelligent transportation with the help of radar chips.

Cockpit and Occupant Monitoring

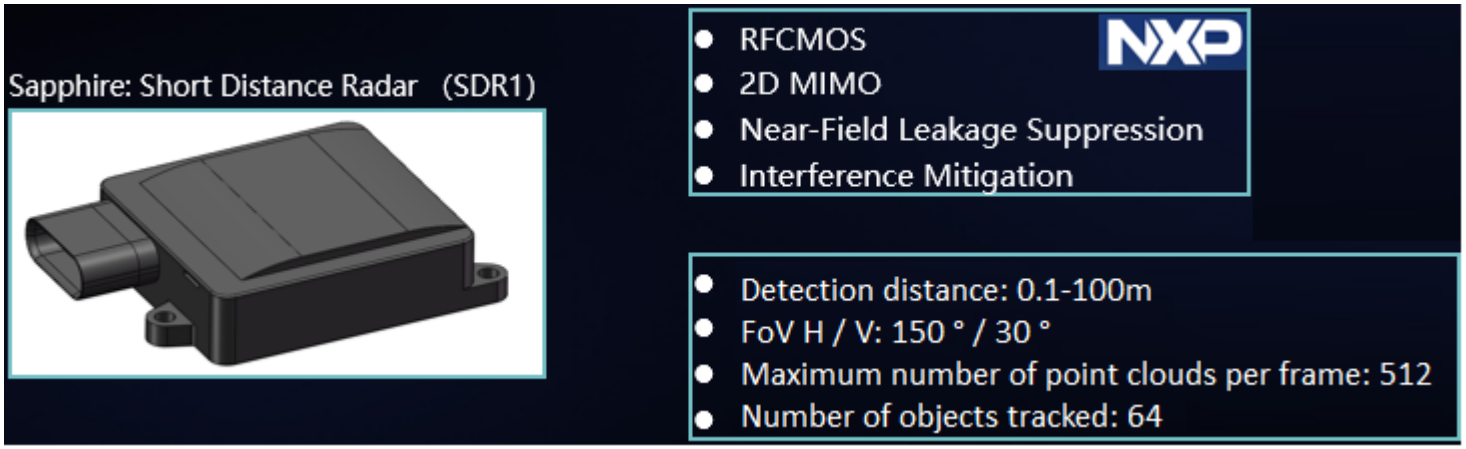
Vayyar Imaging, an Israeli provider of radar imaging sensor technology, said in November 2019 it raised $109 million in a Series D funding led by Koch Disruptive Technologies, bringing its total raised to-date to $188 million. In the automotive domain, Vayyar claims its chip enables in-cabin passenger location and classification, occupant size, vital sign and posture analysis, as well as 360° exterior mapping, including monitoring cars, objects and pedestrians around a vehicle, in all lighting and weather conditions, and in real time. At the 2018 Paris Motor Show, Valeo indeed announced it was integrating Vayyar's radar sensors with its products to monitor infants' breathing and trigger an alert in case of emergency. Brose and Vayyar collaborate on sensor technology for new door and interior functions. Sensors recognize occupancy in the interior at all times to ensure the necessary level of safety in the interaction of mechanical and electronic systems. These sensors will also make it possible for side doors to open and close automatically and if other vehicles or obstacles are in the way, the movement ends before the door comes into contact with any object.

For L2, L3 and L4 autonomous driving, occupant monitoring is of growing importance. Autonomous vehicle interiors are fairly flexible, like sliding seats, screens and consoles, suitable for work and relaxation. The short-range radar and visual sensors work together to identify the situation in the car in real time, and the mechanical and electronic systems interact to ensure the safety.

Automated Parking

In December 2019, ZongMu Technology released in Xiamen city the second-generation autonomous parking product -- AVP Gen.2 that has main sensors including four fisheye cameras, 12 ultrasonic sensors, and four 4D MMW radars.

When all of four surround-view cameras are blocked and only mm-wave radar is available, AVP Gen. 2 can still fully implement AVP because the radar can deliver the dense point cloud information comparable to that of Lidar and clearly outline the surrounding buildings to achieve high-precision localization based on radar point clouds.



The radar used by AVP Gen.2 is called SDR1, which gets specially optimized in the typical parking scenarios (underground / ground parking lots, parks, etc.) on the basis of traditional angle radar ADAS functions to perfectly meet all parking needs. SDR1 takes into account both of low-speed parking scenarios and high-speed ADAS, and can work under extreme conditions such as wind, heavy snow, night, etc. The product will be spawned in the fourth quarter of 2020.

CVIS and Intelligent Transportation

In April 2020, Muniu Tech rolled out three WAYV-branded radars: WAYV Air, WAYV and WAYV Pro. WAYV includes T300 and S300, which are used in intelligent transportation and intelligent security respectively. WAYV Pro breaks the detection distance limit of video and infrared sensors to reach 1,000 meters, ideal for highway accident monitoring and large-area security.

With a detection range of 300 meters, Wayv T300 covers 8 lanes, detects and tracks 128 objects simultaneously, mainly serving urban traffic data perception and planning. Wayv T1000 works at a maximum distance of 1,000 meters, suitable for long-distance and highway deployment. It can detect and track 256 objects on 10 lanes simultaneously.

Wayv T300

Urban traffic control

- Adaptive control of traffic lights at intersections
- Urban road guidance & release system
- Road network traffic monitoring
- Traffic information release

Expressways / urban highway management

- Traffic flow information collection system
- Traffic accident detection system
- Traffic information release
- Traffic guidance & release system

Wayv T1000

V2X intelligent connectivity

- Real-time traffic data collection
- Real-time perception of roadside pedestrians and vehicles

Market Shares of Lidar and Ultrasonic Radar Are Squeezed

Millimeter-wave radar is developing radically, with the imaging radar as an alternative to Lidar and the ultra-short-range radar as a substitute for ultrasonic.

The thriving angle radar has lured mm-wave radar vendors to develop ultra-short-range solutions for parking, AEB and short-range blind spot detection as the alternative of traditional ultrasonic sensors.

With far better performance than ultrasonic sensors on the market, the Autus R10 chip of MediaTek offers a wider detection range. Other than distance information, it can also provide speed information while ultrasonic does not. The Autus R10 chip can be used for multiple applications including blind spot detection (BSD), parking assist system (PAS), automatic parking assistance (APA), rear automatic emergency braking, cross-traffic alerts, door opening alerts and ultra-short-range BSD.

The most cost-effective ultrasonic sensor has a slow response to object detection, and it cannot classify objects into human and non-human, while mm-wave radar can perform object classification and biometric monitoring.

Many chip vendors, including traditional radar chip giants such as NXP, TI and Infineon, have launched solutions that shore up high-resolution radar. High-resolution imaging radar will outperform Lidar in terms of cost and performance. In some cases, imaging radar may identify objects such as bicycles, pedestrians, or small obstacles on the road and it also can deal with severe weather conditions.

Lidar will be replaced by Camera + imaging MMW Radar + V2X, said by Lars Reger, CTO of the NXP Semiconductors Automotive Division. The focus of the collaboration between NXP and HawkEye Technology is to create high-resolution imaging radar.

MMW Radar Boosts the Plasticization of Automotive Exterior Parts

Radars are generally fixed behind the car logo or the grille, and integrated into the lights, roof, etc. Millimeter wave radar detects the object, distance, speed and position by emitting electromagnetic waves, which are extremely sensitive to metals, and detecting echoes. In the traditional design, car head and door panels mostly made of metal cannot hide the radar.

Radars must come with plastic peripheral parts whose electrolyte conductivity should be low, especially the materials cannot contain carbon fiber or metals with electronic shielding effect. Covestro, BASF, Lotte, Orinko, Sumitomo, Mitsubishi and the like have developed wave-transparent materials PC, PP, ABS and so on for automotive exterior parts.

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