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Insight into intelligent driving sensors: “Chip-based” reduces costs, and the pace of installing 3-LiDAR solutions in cars quickens.

LiDARs were installed in 173,000 passenger cars in China in Q1 2024, an annualized upsurge of 144.2%.

According to the statistics from ResearchInChina, LiDARs were installed in 173,000 passenger cars in China in Q1 2024, soaring by 144.2% from the prior-year period, with the installation rate increased from 1.7% to 3.6%, and most were applied by Chinese independent brands. In 2024, in addition to emerging brands like AITO, Xiaomi, and Leapmotor that have launched new cars equipped with LiDAR, Geely's new car Galaxy E8 carried LiDAR for the first time. Models to be launched with LiDAR include WEY Blue Mountain Intelligent Driving Edition (to be launched in June 2024, with 1 unit), 2nd-generation AION V (to be launched in July 2024, with 1 unit), Avatr 07 (to be launched in H2 2024, with 1 unit), Changan NEVO E07 (optional, to be launched in October 2024, with 2 units) and Yangwang U7 (to be launched in H2 2024, with 3 units).

In Q1 2024, single-LiDAR solutions were installed 147,000 passenger cars, 142.7% more than in the same period last year, sweeping 85.2%, with the installation rate rising from 1.5% to 3.1%. They were largely mounted on AITO M7, Li L9 and NIO ES6 among others to support their use of advanced intelligent driving functions such as urban NOA. 3-LiDAR solutions were installed in 14,000 passenger cars compared with 4,000 cars in the same period of the previous year, with a year-on-year growth rate hitting 241.2%, higher than the 1-LiDAR and 2-LiDAR solutions, as a result of a low base last year and the higher sales of brands such as Avatr, Yangwang and ARCFOX.

ARCFOX αS Advance Edition PRO, available on market in April 2024, is priced at RMB256,800. It comes standard with 3 Huawei LiDARs and HUAWEI ADS2.0 advanced intelligent driving solution, supporting such functions as CAS (Collision Avoidance System), smart parking, RPA (Remote Parking Assist), and AVP (Automated Valet Parking). This model has obtained a L3 autonomous driving public road test license in China.

ARCFOX αS Advance Edition PRO Equipped with 3 LiDARs



Source: ARCFOX

Summary of Major LiDAR-Equipped Models and Product Parameters in 2024

Summary of Major LiDAR-Equipped Models and Product Parameters in 2024

Brand	Model	Supplier	LIDAR	Number of vehicles	Installation position	Technical solutions	Wavelength	Distance measurement	Angular resolution	Field of view
AITO	AITO M5, AITO M7	RoboSense	M1 (equivalent to 126 channels)	1	Roof	MEMS 2D Scanning Chip Technology	905nm	150m (@10%)	0.2°*0.1°-0.2° (dynamically adjustable)	120°*25°
	AITO M9	Huawei	192 channels	1	Roof	Unknown	Unknown	250m	Unknown*0.1°	Unknown
ARCFOX	ARCFOX αS	RoboSense	M1 (equivalent to 126 channels)	3	The middle of the front grille and the left and right headlights	MEMS 2D Scanning Chip Technology	905nm	150m (@10%)	0.2°*0.1°-0.2° (dynamically adjustable)	120°*25°
Avatr	Avatr 11, Avatr 12	Huawei	96 channels	3	1 at the lower part of the front of the car + 1 on each side of the front fender	Rotating Mirror	905nm	150m (@10%)	0.25°*0.26°	120°*25°
AION	AION LX	RoboSense	M1 (equivalent to 126 channels)	3	1 on the roof+ 1 on each side of the front fender	MEMS 2D Scanning Chip Technology	905nm	150m (@10%)	0.2°*0.1°-0.2° (dynamically adjustable)	120°*25°
Audi	Audi A6L, Audi A7L	Valeo	SCALA 1	1	Front	Rotating Mirror	unknown	unknown	unknown	unknown
Rising Auto	Rising R7	Luminar	Iris	1	Roof	MEMS + ASIC Chip	1550nm	250m (@10%)	0.05°*0.05°	120°*26°
HIPHI	HIPHI Y, HIPHI Z	Hesai Technology	AT128	1	Roof	1D rotating mirror	905nm	200m (@10%)	0.1°*0.2°	120°*25.4°
Hyper	Hyper GT	RoboSense	M1 (equivalent to 126 channels)	3	1 on the roof+ 1 on each side of the front fender	MEMS 2D Scanning Chip Technology	905nm	150m (@10%)	0.2°*0.1°-0.2° (dynamically adjustable)	120°*25°
Hycan	Hycan V09	Tanwei Technology	Duetto (130 channels)	1	Roof	Hybrid Solid State	905nm	300m, 180m (@10%)	0.09°*0.19°	120°*25°
Geely Galaxy	Galaxy E8	RoboSense	M1 (equivalent to 126 channels)	1	Roof	MEMS 2D Scanning Chip Technology	905nm	150m (@10%)	0.2°*0.1°-0.2° (dynamically adjustable)	120°*25°
ZEEKR	ZEEKR 001, ZEEKR 007	RoboSense	M1 (equivalent to 126 channels)	1	Roof	MEMS 2D Scanning Chip Technology	905nm	150m (@10%)	0.2°*0.1°-0.2° (dynamically adjustable)	120°*25°
Li Auto	Li L7, Li L8, Li L9, Li MEGA	Hesai Technology	AT128	1	Roof	1D rotating mirror	905nm	200m (@10%)	0.1°*0.2°	120°*25.4°
Leapmotor	Leapmotor C10, Leapmotor C11	Hesai Technology	AT128	1	Roof	1D rotating mirror	905nm	200m (@10%)	0.1°*0.2°	120°*25.4°
Neta Auto	Neta S	Huawei	96 channels	2	Both corners of the front bumper	Rotating Mirror	905nm	150m (@10%)	0.25°*0.26°	120°*25°
NIO	NIO ET7, EC6, EC7, ES6, ES7, ES8, ETS, ET5T	Seyond	Falcon	1	Roof	Polygonal prism and 1D galvanometer (MEMS)	1550nm	250m (@10%)	0.18°*0.24° (ROI area is 0.09°*0.08°)	120°*25° (ROI is 40°*4.8°, adjustable)
Xiaomi	Xiaomi SU7	Hesai Technology	AT128	1	Roof	1D rotating mirror	905nm	200m (@10%)	0.1°*0.2°	120°*25.4°
Xpeng	Xpeng G9, Xpeng G6, Xpeng P7	RoboSense	M1 (equivalent to 126 channels)	2	Headlights	MEMS 2D Scanning Chip Technology	905nm	150m (@10%)	0.2°*0.1°-0.2° (dynamically adjustable)	120°*25°
	Xpeng P5	Livox	HAP	2	Both sides of the front bumper	Rotating mirror	905nm	150m (@10%)	0.18°*0.23°	120°*25°
	Xpeng X9	RoboSense	M1 (equivalent to 126 channels)	2	Both sides of the front bumper	MEMS 2D Scanning Chip Technology	905nm	150m (@10%)	0.2°*0.1°-0.2° (dynamically adjustable)	120°*25°
EXEED	STERRA ES	RoboSense	M1 (equivalent to 126 channels)	1	Roof	MEMS 2D Scanning Chip Technology	905nm	150m (@10%)	0.2°*0.1°-0.2° (dynamically adjustable)	120°*25°
Yangwang	Yangwang U8	RoboSense	M1 (equivalent to 126 channels)	3	1 on the roof+ 1 on each side of the front fender	MEMS 2D Scanning Chip Technology	905nm	150m (@10%)	0.2°*0.1°-0.2° (dynamically adjustable)	120°*25°
IM Motors	IM LS6	RoboSense	M1 (equivalent to 126 channels)	1	Roof	MEMS 2D Scanning Chip Technology	905nm	150m (@10%)	0.2°*0.1°-0.2° (dynamically adjustable)	120°*25°
	IM LS7, IM L7	RoboSense	M1 (equivalent to 126 channels)	2	Roof	MEMS 2D Scanning Chip Technology	905nm	150m (@10%)	0.2°*0.1°-0.2° (dynamically adjustable)	120°*25°
Luxeed	Luxeed S7	Huawei	192 channels	1	Roof	Unknown	Unknown	250m	Unknown*0.1°	Unknown

Source: ResearchInChina

With integration into robotaxis and cockpits and headlights, LiDAR has a bright future.

According to Luminar, a listed US LiDAR company, Tesla accounted for more than 10% of the company's revenue for Q1 2024, that is, Tesla contributed more than USD2 million. It is supposed that these LiDARs will be used for testing robotaxis to support robotaxi products Tesla released in August 2024 and Musk's plan to launch robotaxis in China. Chinese robotaxi players such as Baidu Apollo, Pony.ai and WeRide also adopt the technology route of using LiDAR as the main sensor.

Not only Robotaxi, LiDAR can also be integrated into the cockpit and headlights. For example, DJI Automotive demonstrated its solution at the Beijing International Automotive Exhibition. This solution integrates four types of sensors: LiDAR + stereo sensor + mono sensor+ inertial navigation. Among them, stereo sensors provide dense point clouds, and LiDAR is mainly used to make up the ranging accuracy. Compared with the common LiDAR + front camera solution on the market, the LiDAR-vision solution can reduce the cost by 30% to 40%. This solution is scheduled to be mass-produced in late 2025 or early 2026.

At the Beijing International Automotive Exhibition, Hesai Technology and Marelli together demonstrated the integration of Hesai's ATX LiDAR into Marelli's premium automotive lighting solution. This solution maintains the vehicle's sleek aesthetics and aerodynamic profile. It both protects the LiDAR and makes it easier to keep the LiDAR clean without an additional cleaning system.

Marelli Headlamp and Hesai LiDAR Integrated Solution



Source: Hesai Technology

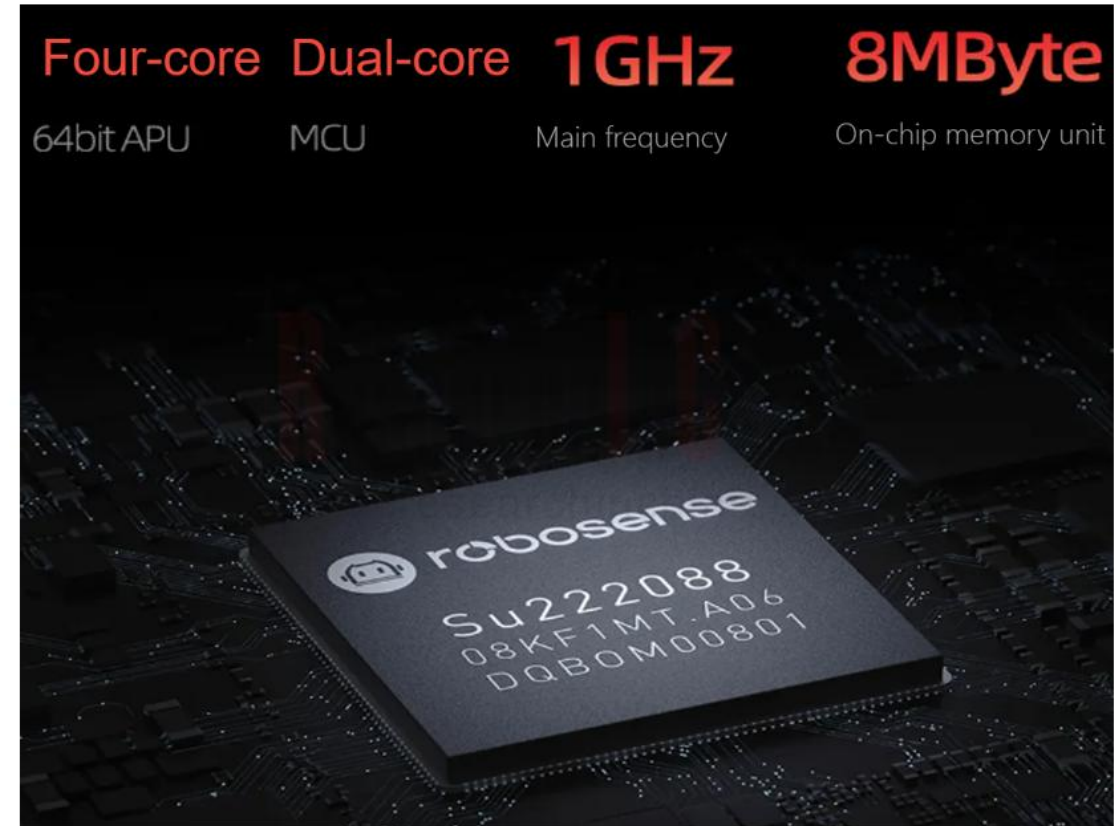
"Chip-based" helps reduce costs, and more "1,000 yuan" LiDARs are launched.

At the Beijing International Automotive Exhibition, multiple LiDAR products featuring "1,000 yuan" and "extreme cost performance" were unveiled.

For example, RoboSense launched MX, a LiDAR based on full-stack chip implementation technology (which uses chip to implement the full-stack system with scanning, processing, and transceiver modules). Using the self-developed dedicated SoC M-Core to integrate the entire backend circuit into a single chip reduces MX's motherboard area by 50%, the power consumption by 40%, and the price to less than USD200. In Q1 2025, the first batch of MX products will be spawned and installed in cars.

Hesai Technology's ATX ultra-wide FOV long-range LiDAR based on the fourth-generation chip architecture features cost performance. It still uses the mature architecture of "chip-based transceiver + 1D scanning" for Hesai AT Series. The higher integration of the transceiver module and the simplified core optical scanning structure enable 60% smaller size, 500g lighter weight, the minimum exposed window height of only 25mm, and only 8W power consumption.

RoboSense's Self-developed SoC: M-Core



Source: RoboSense

Zvision Technologies released ZVISION EZ5, an extremely cost-effective product which is designed on the highly integrated SPAD chip platform design. A single SPAD chip replaces most of the previous discrete components of optoelectronic front-end → amplification link → analog-to-digital conversion → digital signal processing, simplifying architecture and further reducing costs.

WLR-760 LiDAR launched by VanJee Technology adopts the VCSEL+SPAD route. Compared with conventional rotating mirror solutions, it reduces the material types by 60%. It reduces the total number of materials by 80% compared with the conventional semi-solid rotating mirror solution. Thanks to higher integration, the production processes are reduced by up to 30%. By VanJee's estimate, when shipments reach more than 100,000 units, the cost can range at RMB1,000-1,500.

Hesai Technology's 4th-generation Chip Architecture



Source: Hesai Technology

Major "thousand-yuan" LiDAR launched in 2024

Major "thousand-yuan" LiDAR launched in 2024

Vendor	RoboSense	ECARX		Zvision Technologies		VanJee Technology
LiDAR	Mid-range LiDAR MX	Long-range LiDAR	Short-range LiDAR	Long-range LiDAR ZVISION EZ6	ZVISION EZ5	WLR-760
Release	April 2024	March 2024	March 2024	January 2024	April 2024	April 2024
Channel	126 channels (ROI equivalent to 251 channels)	Physics 192 channels	150 channels	192 channels	Up to 192 channels	192 channels
Wavelength	/	905nm	905nm	/	/	/
Detection range	Up to 200m	180m@10%, up to 300m	40m@10%, up to 50m	180m@10%	150m@10%, up to 220m	200m@10%, up to 300m
Resolution	/	666*192	360*150	600*192	550 x 96	/
FoV	120°×25°	120°×50°	120°×50°	120°×20° (-12°~7.5°)	120°x 20°(-12.5°~7.5°)	120°*25°
Price	<USD200	USD100	USD 200	≤RMB2000	/	RMB1000-1500

Monthly Monitoring Report on China Automotive Sensor Technology and Data Trends has 12 issues a year, and costs US\$2,000 per issue, each with different topics.

Source: ResearchInChina

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Trend 2: Several OEMs Exhibit Hydrogen Fuel Cell Models

Trend 3: Traffic Is the Priority, and CEOs Become "Internet Celebrities" for Marketing

Trend 4: Joint Venture OEMs Accelerate the Pace of Local Suppliers to Make Their Car Models More Competitive

Trend 5: OEMs' Strategies Focus on New Energy and Going Overseas

Trend 6: More Models Are Equipped with 800V High-Voltage Fast-Charging Battery System

Trend 7: Independent OEMs Showcase SiC Power Modules

Trend 8: OEMs Enter Electro-Hybrid Technology to Eliminate Mileage Anxiety

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