ResearchInChina
www.researchinchina.com

Global and China Automotive Cluster and Center Console Industry Report, 2022

Jan.2023

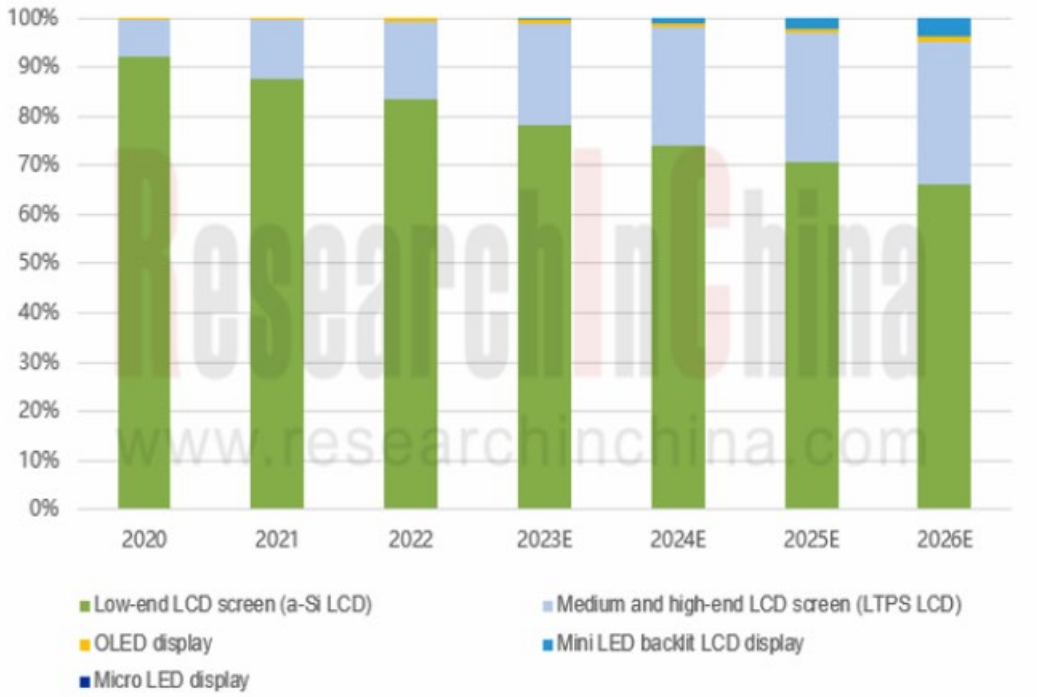
Automotive Display Research: Penetration Rate of OLED, Mini LED and Other Innovative Display Technology Increased Rapidly

With the penetration of new energy and intelligent driving vehicles, the trend of large-screen and multi-screen displays in vehicles is becoming more and more obvious. In addition to the central control and instrument screens, new products such as HUD, passenger display, rear entertainment display, electronic rearview mirrors and transparent A-pillars have also been added in the cabin, and the installation volume of automotive display screens has ushered in rapid growth.

OLED, Mini LED, Micro-LED is the evolution direction of automotive display technology

At present, the market penetration rate of the mainstream technology a-Si LCD in the automotive display market continues to decline. On the one hand, OEMs deploy LTPS-LCD in high-end models, and on the other hand, they step up the deployment of innovative technologies such as OLED, Mini-LED, and Micro-LED for mass production and installation.

Forecast of Global Automotive Display (by Technology) Penetration Rate



Source: ResearchInChina

Compared with LCD, although OLED priors in strong ductility, wide color gamut, high brightness, pure color, and mature technology, the penetration rate in the automotive display market is still less than 1%. Due to the influence of OLED luminescence characteristics, in addition to cost issues, there are technical difficulties such as yield, burn-in and service life, which hinder the rapid development of OLED screens in the vehicle field.

Parameter Comparison of Partial Vehicle OLED Displays

				
Manufacturer	Samsung	BOE	BOE	BOE
Release time	Jun.2022	May 2022	Sept. 2022	May 2022
Adopted models	Li Auto L9	/	Rising Auto R7	/
Dimension	15.7 "	14 "	15.05 "Central Control Screen	12.5 "
Resolution	3456 × 2160 (3K)	4K	2560 × 1600 (2.5K)	/
Other screen parameters	Can achieve 16 million colors, and the NTCS color gamut is 94.3%	The range of 3D images in and out of the screen can reach ± 15 cm, and the effective viewing distance is 0.4m ~ 1.0 m	180 ° ultra-wide viewing angle; Color gamut NTCS: 100%; Contrast ratio: 1 million: 1	Display transmittance up to 45%
Refresh rate	60Hz	/	60hz	/
PPI (pixel density)	260PPI	/	200PPI	80PPI
Brightness	0 -389nit (max)	/	Max brightness: 800 nit	Up to 700nits

Source: ResearchInChina

Mini LED

Generally, in the automotive display market, Mini LEDs use direct-type backlights, which combine the advantages of OLED and LCD, such as long service life and do not have the burn-in problem. Compared with OLED, Mini LED backlights have higher yield, lower cost, and obvious advantages in mass production. In terms of display performance, Mini LED's overall brightness, contrast, power consumption, and curved display are better than traditional side-entry backlight displays. Mini LED backlight displays have higher cost-effective advantages, so they are widely recognized by OEMs, and the willingness of OEMs to use Mini LED backlight displays is becoming stronger and stronger.

Parameter Comparison of Partial Car Mini LED Displays

BOE Double 12.3 "Mini LED Display

Supplier: BOE
Release time: Apr.2022
Dimension: 12.3"+ 12.3"
Technical solution: adopt ADS + Mini LED technology, integrated cold bending forming technology, and the surface of the cover plate is AG/AR/AF treated, and the backlight adopts the latest Mini LED local dimming technology.
Contrast ratio: 1,000,000:1
Gamut NTSC: 105%
Surface radius: R200
Backlight zoning: up to 144 zones

Cadillac LYRIQ33 Mini LED Backlit Screen

Supplier: Innolux Display
Release time: Nov.2022
Dimension: 33 "
Resolution: 8960x1320 (9k)
Pixel Density: 271PPI
Contrast ratio: 100,000:1 (dynamic contrast)
Gamut NTSC: 110%
Backlight partitions: 3375 backlight partitions
Other screen parameters: 10bit display color depth

BOE 21.6 inch 4K curved display

Supplier: BOE
Release time: 2022.4
Dimension: 21.6 inches
Technical solution: LTPS 4K curved display screen with Mini LED technology, and the New COA design is used to solve the problem of curved color string.
Contrast ratio: 1,000,000:1
Curvature: R2000

Desay SV Dual 23.6-inch Mini LED Curved Linkage Screen

Supplier: Longli Technology (Backlight Module)
Release time: Sept.2022
Dimension: Double 23.6 inches
Contrast ratio: 100,000:1 (dynamic contrast)
Curvature: R2200
Backlight partitions: 1536 backlight partitions

Source: ResearchInChina

Micro LED integrates the advantages of LCD and OLED, with high image quality, low energy consumption and long life. However, its manufacturing process is difficult, the production cost is high, and the technology is not yet mature. Although it appeared at the exhibition at high frequency, it is far from meeting the mass production requirements. Therefore, it can only be used as a reserve technology for Automotive Display in the short term, and it still needs to be developed and broken through.

Parameter Comparison of Partial Onboard Micro LED Displays

				
Manufacturer	Tianma	AUO Corporation	AUO Corporation	TCL CSOT
Release time	Jul.2022	April 2022	April 2022	Nov. 2021
Dimension	9.38 "	14.6 "	17.3 "	6.24"
Resolution	960 * 480	2K	1280X720	/
Technical solution	/	Combining Micro LED components with high-precision massive transfer technology, as well as flexible surface panels and mechanism design	/	/
Other screen parameters	Pixel density: 114PPI; Transmittance > 70%; Pixel pitch 222um.	Pixel density: 202PPI; Storage radius of curvature: 40mm.	Over 60% of Transparency; Max brightness up to 2000 nits; Support 120Hz high refresh rate and dynamic frequency conversion display function.	Pixel density: 118PPI; Color gamut NTSC: 120%; Brightness: > 10000nits.

Source: ResearchInChina

AR-HUD leads a new mode of in-cabin display interaction

The core of the development of intelligent cockpit is how to realize natural and reasonable human-vehicle interaction. After the intelligent car enters the stage of human-machine co-driving, AR-HUD will become a bridge for the interaction between people and vehicles.

New Solution for In-Cabin Display Interaction

Interactive Mode	Model	Display Interaction Design Solution
"3D + large screen" human-machine interaction	Enovate ME7	**Enovate ME7 Magic-3D Interactive Interface:** The Enovate ME7 car-machine interface is equipped with a Magic-3D interactive interface, which uses the newly upgraded Kanzi platform PBR technology from Righ0002, Finland.
	Xpeng G9	**Xpeng G9 is the industry's first mass-produced full 3D HMI system:** jointly developed by Unity and Xpeng, the system allows users to realize car control via 3D interaction.
	Lotus	**Lotus Hyper OS 3D real-time rendering function**: Lotus 3D interaction has many similarities with the Xpeng G9 system, including maps, music and air conditioning. At the same time, Lotus Hyper OS can also control car components in 3D, such as vehicles with rear wings, which can be adjusted in 3D through the large screen interface.
AR-HUD + small information interaction screen	Li Auto L9	In the L9 cockpit design, the driver's seat cancels traditional instruments, and instead uses a large-area AR HUD and a small touch interactive screen on the steering wheel.
	Volvo	In the conceptual graph design of the cockpit of Volvo cars, the driver position also cancels the traditional instruments, and instead uses a large-area HUD and a small touch interactive screen on the steering wheel.
AR-HUD + Natural Interaction	Mercedes-Benz MBUX, Chang'an UNI-K, GAC AION, etc	The intelligent interaction pattern for L3 autonomous driving, including the combination of voice + gesture + eye tracking + AR-HUD interactive interface, the industry's leading OEMs have begun to deploy
AR-HUD + Meta Universe Entrance	Rising Auto R7	The Huawei AR-HUD system on Rising Auto R7 can superimpose map POI information with real scenes through AR technology
Window holographic film material	/	Holographic projection technology (holographic film material), turning glass into a smart screen
Medium-free imaging AID holographic projection	Geely Auto ICON, VW Zhong: UX Prototype Cockpit	Prism Holography is currently the world's first holographic display Tier1 supplier that has reached the vehicle-level mass production standard. The cockpit is equipped with its core patented technology product: AID (Aerial Holo Intelligent Display) holographic aerial intelligent display system. AID is based on no-medium holographic display technology. It is a real "unbounded" display technology, which effectively replaces the cockpit display screen and creates a screenless era

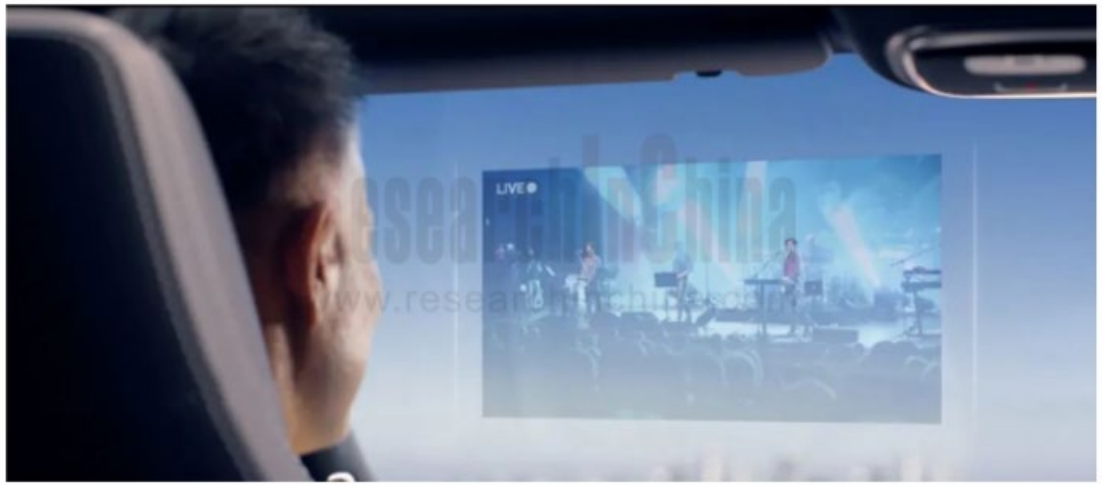
Source: ResearchInChina

Rising Auto R7"AR-HUD + Parking Theater" Interaction Design

The Rising Auto R7, launched in Sept. 2022, adopts an in-cabin display that combines a triple screen and AR-HUD. The triple screen is integrated by a 10.25-inch Mini LED full LCD instrument, a 15.05-inch AMOLED flexible center control screen and a 12.3-inch Mini LED co-pilot entertainment screen, which can realize multi-screen linkage. For example, the co-pilot entertainment screen mainly provides entertainment applications for the co-pilot user, but during the trip, the co-pilot user can also set the navigation on the co-pilot screen to avoid the driver's distraction. After the navigation setting is successful, the display screen in the middle will automatically display the corresponding map navigation, and the AR-HUD will also absorb the navigation information to make road instructions at the same time.

The AR-HUD of Rising Auto R7 provides immersive experience of giant-screen cinema when parked and charging. Through the video application software in the automotive Infotainment, the AR projection screen can project the video content into the AR-HUD for viewing. At present, this equivalent 70-inch large frame size currently only supports the main driver. A user needs to park the car in viewing mode, and adjusts the seat height at the same time.

Rising Auto R7 "AR-HUD + Parking Theater" Interaction Design



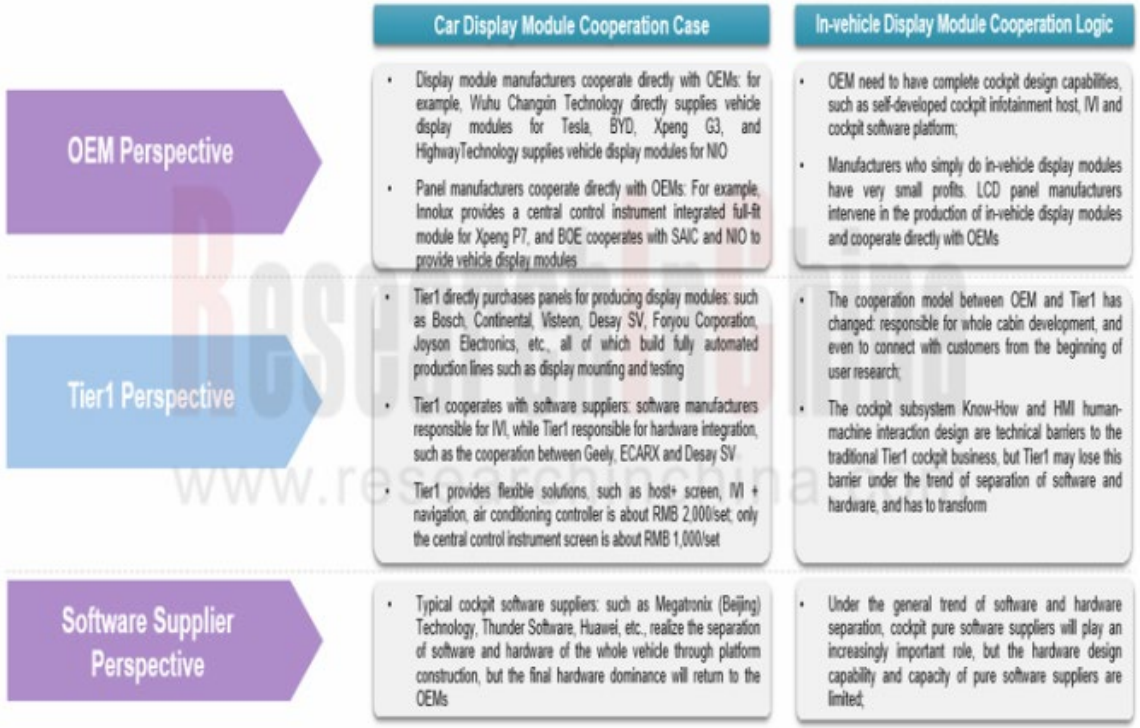
New supply model for OEM + panel (module) manufacturers

With the improvement of the software capabilities of the OEMs, the trend of separation of software and hardware is becoming more and more obvious. OEMs has begun to develop its own cockpit main engine, IVI and software platform. The business model of in-vehicle panel and module supply will change, and gradually form a new supply model of "OEM + panel (module) manufacturer". Therefore, Tier1 offering the traditional cockpit display will face challenges.

Panel (module) manufacturers will gradually play the role of on-board display module Tier1. Typical manufacturers include Tianma, BOE Varitronix, Truly International, Innolux Display, etc. Panel manufacturers can directly provide OEMs with integrated packaging module products. In addition to traditional central control instruments, panel (module) manufacturers and OEMs will further cooperate to explore transparent window display, very narrow frame on-board display, flexible OLED, 3D curved display technology, AR-HUD, OLED tail lights, etc.

For example, AUO Corporation and Innolux Display directly provide full mini LED backlight display modules to American OEMs; Samsung Display works closely with Audi to develop OLED products; Tesla leads the procurement of key display components and designates display module manufacturers for packaging. In the next step, panel suppliers will strengthen their partnerships with automakers and provide next-generation display technologies.

Under the trend of separation of software and hardware, the in-Automotive Display supply chain has ushered in a change



Source: ResearchInChina

Table of Content (1)

Table of Content (2)

Table of Content (3)

Table of Content (4)

Table of Content (5)

Table of Content (6)

Table of Content (7)

Contact

Beijing Headquarters
TEL: 010-82601561, 82863481
Mobile: 137 1884 5418
Email: report@researchinchina.com

Website:
www.researchinchina.com

WeChat: zuosiqiche

zuosiqiche

Chengdu Branch

TEL: 028-68738514
FAX: 028-86930659