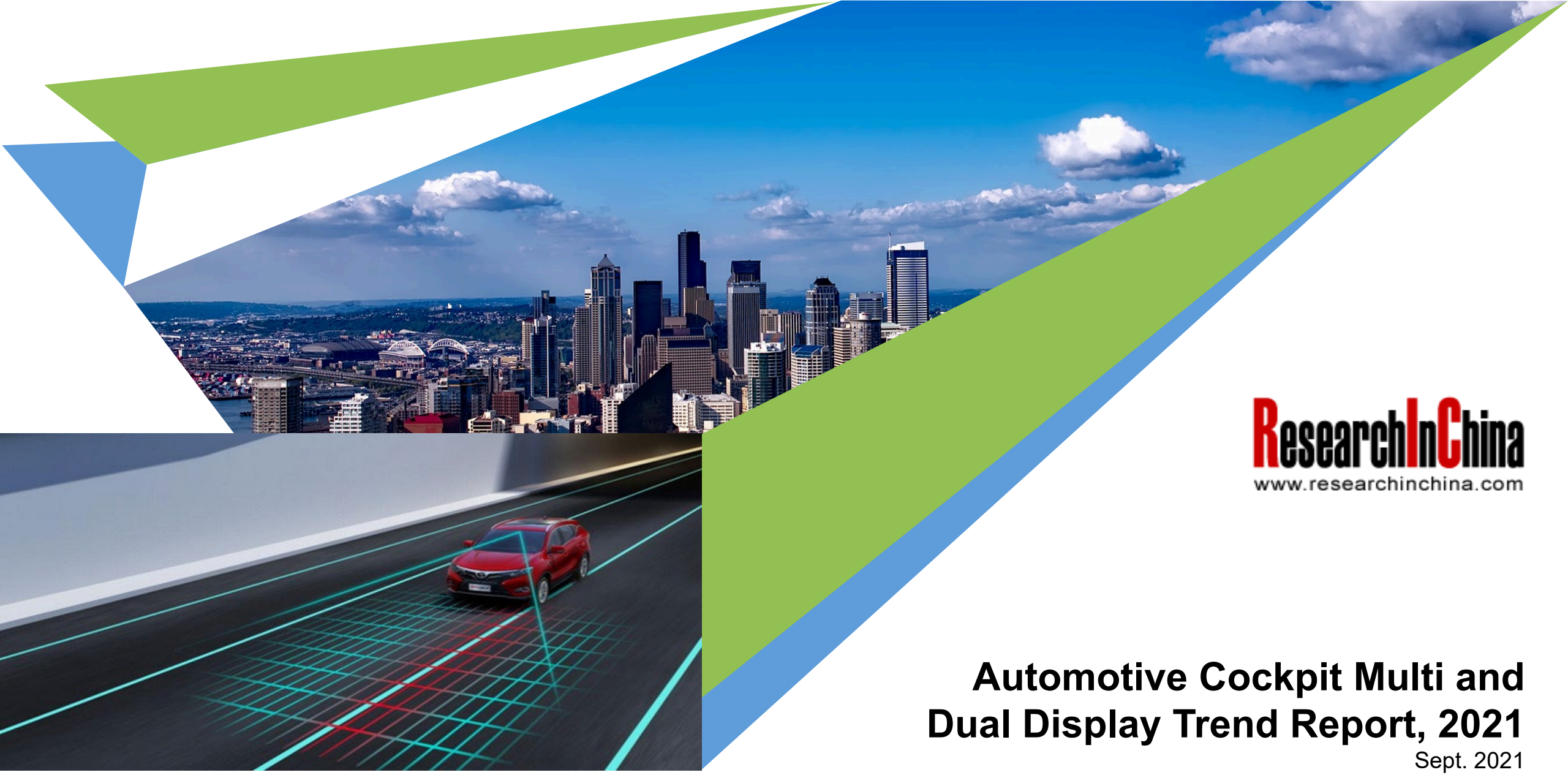

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Automotive Cockpit Multi and Dual Display Trend Report, 2021

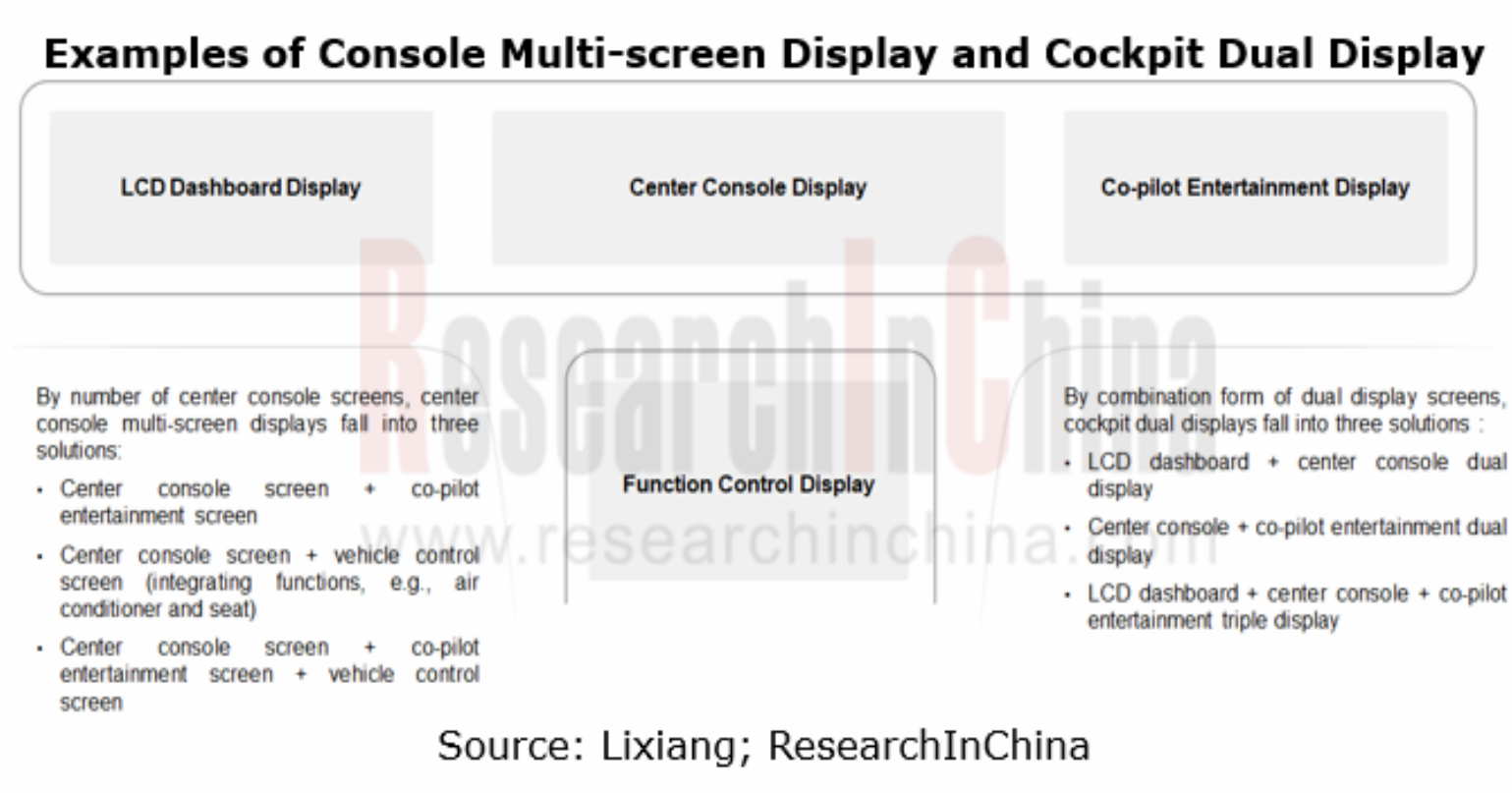
Sept. 2021

Console Multi-screen Display and Cockpit Dual Display

In 2021H1, the sales of vehicle models with console multi and dual display surged by 61% and 155% on a like-on-like basis, respectively

Our Automotive Cockpit Multi and Dual Display Trend Report, 2021 combs through the passenger car models with console multi and dual displays during 2020-2021H1, and discusses the relationship between chip, display and system.

“Console multi-screen display”, a functional description of center console, refers to center console display with two or more screens, for example, center console screen + co-pilot entertainment screen, function control screen, etc.
“Cockpit dual display”, a functional description of cockpit, refers to the abreast layout of in-vehicle displays, that is, integrated design or approximate design, for example, integrated display solutions like “LCD dashboard screen + console screen dual display” and “LCD dashboard screen + console screen display + co-pilot entertainment screen triple display”.

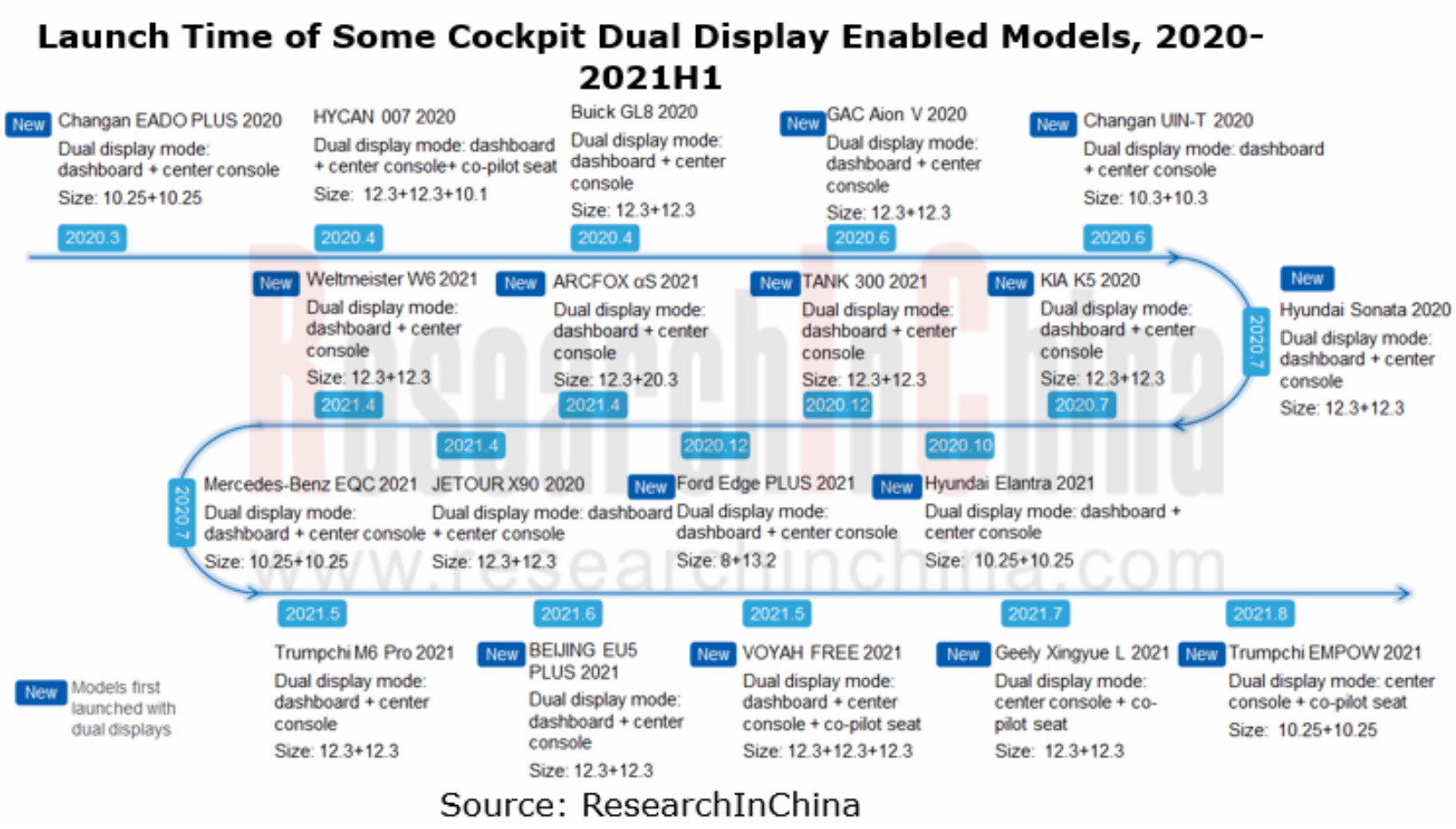


The pace of launching models with multi and dual displays quickens

In 2021H1, a total of 136 auto brands were scrambling for the Chinese passenger car market. In the fairly fierce competition, Chinese and foreign brands kept updating their products from within.

On the face of it, users can directly see how in-vehicle screens are deployed and how many they are. In a connotative view, cockpit software systems implement new hardware and software architectures via high-performance computing chips, thus providing better user experience in actual use. Quite a few automakers make in-depth improvements based on intelligent cockpits, and accelerate the roll-out of models that pack integrated displays, multi-screen displays, and one-chip, multi-screen, dual-system solutions.

In the case of cockpit dual display, several auto brands including Chinese, German, American and Korean ones have launched their mass-produced models that carry dual/triple displays on market during 2020-2021H1.



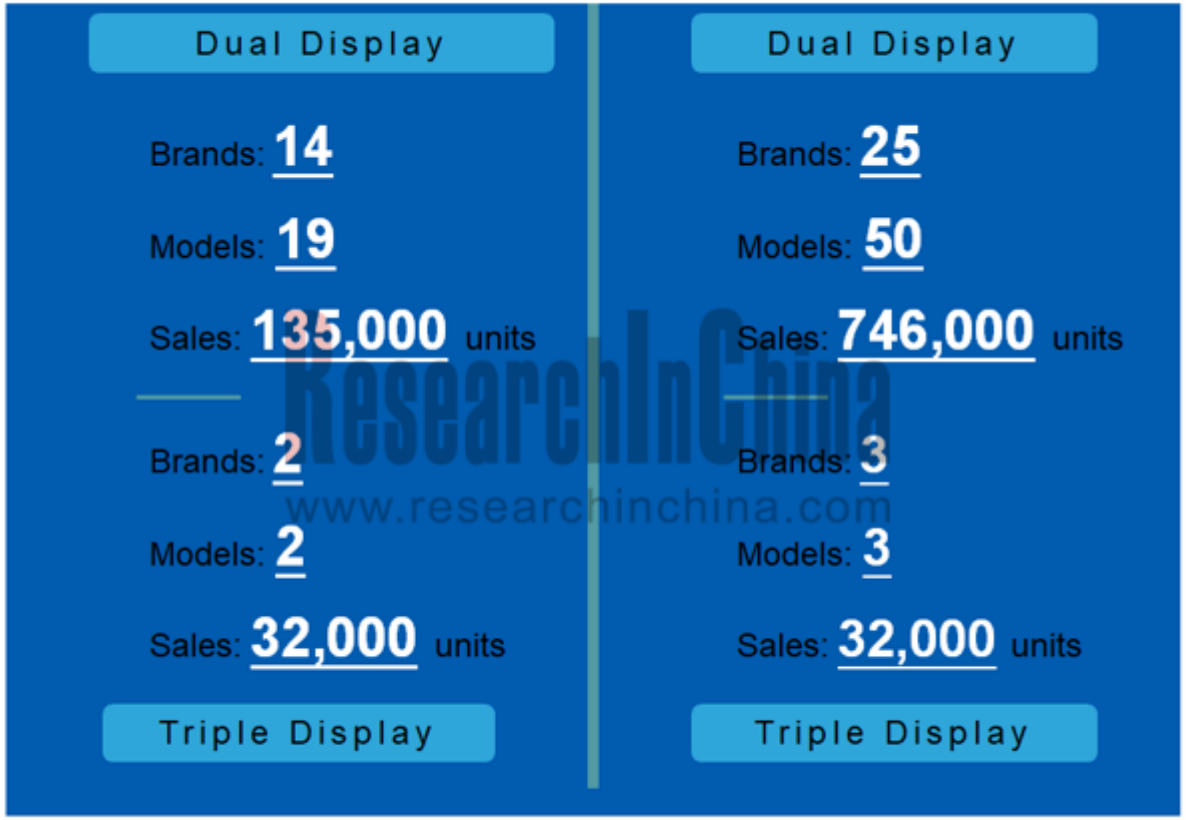
Passenger Car OEMs in Multi-screen/Dual Display market

In 2021H1, the sales of models with console multi and dual displays surged by 61% and 155% on a like-on-like basis, respectively.

In spite of the downturn in overall passenger car sales in China, models with multi and dual displays bucked the trend and showed an aggressive growth in 2021H1. The sales of models with console multi-screen displays and cockpit dual displays shot up by 61% and 155% from the prior-year period, separately.

The booming sales of such models indicate how determined automakers are in cockpit disruption, and are also an evidence of their high acceptance in market. The positive effects given by automakers and the market have created an active and effective closed loop, which will make the sales of models with multi-screen and dual displays sustain rapid growth.

Overview of Passenger Car OEMs in Multi-screen/Dual Display Market, 2021H1



Console Multi-screen Displays **Cockpit Multi-screen Displays**

Source: ResearchInChina

Chinese brands hold a more positive, more open attitude towards cockpit dual displays

Still take cockpit dual display as an example. Homegrown brands in China have become the main drivers of cockpit dual display solutions in the first half of 2021, with a market share of 62.3%, among which Changan Auto is the most typical player followed by Hongqi and Jetour. In the joint venture brands, Hyundai, Ford and SOL have introduced several dual display-enabled models during 2020-2021H1.

TOP10 Passenger Car Models with Dual Displays by Sales and Their Shares

Source: ResearchInChina

Chery EXEED XL Cockpit Dual Display

Chery is one of the earliest homegrown brands deploying dual displays and using one-chip, dual-display, dual-system solutions.

In October 2019, EXEED, a high-end brand under Chery introduced EXEED LX, its second model equipped with i-Connect@Lion 3.0 and 12.3-inch dashboard + 12.3-inch console dual-screen display. Differing from the previous versions, i-Connect@Lion 3.0 co-developed by Neusoft, Baidu and Intel enables a one-chip, dual-display, dual-system solution via ACRN hypervisor that runs on the Intel Apollo Lake processor.

This solution has become available to the full range of EXEED models, making the auto brand one of the few thorough implementers of dual displays and one-chip, dual-display, dual-system solutions in the auto industry.

EXEED XL Cockpit dual Display

EXEED LX

- Cockpit features: dashboard + console dual-screen display, one-chip, dual-display, dual-system
- Cockpit solution: Neusoft C4 Pro Intelligent Cockpit System
- One-chip: Intel Apollo Lake Processor
- Dual-display: 12.3-inch dashboard + 12.3-inch center console display
- Dual-system: dashboard - Clear Linux, center console - Android 9.0
- Sales: 11,000 units (Jan. 2021 – Jun. 2021)

Chip vendors and Tier1 cockpit solution suppliers are strong advocates of one-chip, multi-display, multi-system solutions

Simple technology upgrade is not enough to make cockpits intelligent in a substantial way. High performance chips such as Qualcomm, Renesas and Intel bring in a possibility for multiple operating systems to run on one chip, and also support several screens including LCD dashboard screen, center console screen and co-pilot entertainment screen.

Take Qualcomm SA8155 as an example: as the world's first mass-produced 7nm automotive digital cockpit chip, the octa-core chip supports 4 2K screens or 3 4K screens, with the computing forces of CPU and GPU up to 80K DMIPS and 1142G FLOPS, respectively. Qualcomm SA8155 has provided one-chip, multi-display solution enablers for mass-produced models like AION LX, WEY Mocha and Xingyue L.

Automotive E/E architecture is shifting to a domain centralized one, which allows Tier1 cockpit suppliers to integrate different operating systems into the cockpit domain controller through hardware isolation or hypervisor technology, so as to realize the one-chip multi-system function on a single hardware platform for higher computational efficiency and lower cost.

One example is SmartCore, Visteon's latest cockpit domain controller which enables HMI seamless connection in multiple display domains such as digital cluster, infotainment and rear seat infotainment. On the strength of its powerful computing force, the Hypervisor-based SmartCore architecture running on two systems allows SmartCore solution to simultaneously drive digital cluster system, infotainment system, and body control system. SmartCore domain controller has provided one-chip, dual-system solution support for mass-produced models like Mercedes-Benz A-Class, AION LX and Xingyue L.

Globally, Tier1 cockpit suppliers both inside and outside China are racing to launch one-chip, multi-display, multi-system cockpit solutions based on high performance chip and cockpit domain controller.

Example of Multi-display Solutions of Tier 1 Cockpit Suppliers

Examples of Mass-produced One-chip, Multi-display, Multi-system Solutions of Some Tier1 Cockpit Suppliers

Supplier	Visteon	Harman	Marelli
Cockpit Picture			
Example of Solution (Chip-Display-OS)	One-chip, triple-display, dual-system Center console + co-pilot seat dual display Geely Xingyue L Domain Controller: SmartCore Chip: Qualcomm 8155A Systems: Linux (dashboard); Android (center console+ co-pilot seat)	One-chip, dual-display, dual-system Dashboard + center console dual display ARCFOX αT Domain Controller: Harman Chip: Intel Apollo Lake Systems: QNX (dashboard + vehicle control); Android (center console)	One-chip, dual-display, dual-system Dashboard + center console dual display GAC Aion V Domain Controller: Cockpit Domain Controller Chip: Qualcomm 820A Systems: QNX (instrument); Android (center console)
Shipment	- (Launched on market in Jul. 2021)	500 sets (Oct. 2020 – Jun. 2021)	14,000 sets (Jun. 2020 – Jun. 2021)

Supplier	Desay SV	Neusoft	NOBO
Cockpit Picture			
Example of Solution (Chip-Display-OS)	Dual-chip, quadruple-display, dual-system Dashboard + center console + co-pilot seat triple display Center console + co-pilot seat + vehicle control triple display Lixiang ONE Domain Controller: Cockpit Domain Controller Chips: TI J6 + Qualcomm 820A Systems: Linux (dashboard + vehicle control); Android (center console + co-pilot seat)	One-chip, dual-display, dual-system Dashboard + center console dual display Hongqi HS5 Domain Controller: C4 Pro Chip: Intel Apollo Lake Systems: Linux (dashboard); Android (center console)	One-chip, dual-display, dual-system Haval H6S Domain Controller: IN 9.0 Chip: Qualcomm 8155A Systems: QNX (dashboard); Android (center console)
Shipment	64,000 sets (Jan. 2020 – Jun. 2021)	146,000 sets (Jan. 2020 – Jun. 2021)	- (Pre-sold in Aug. 2021)

Source: ResearchInChina

Challenges and Trends

Multi-screen and dual displays provide substantially better occupant experience in multiple aspects: in usability, both displays improve the interaction efficiency between people and vehicles to some extent and make it cheaper for users to obtain vehicle information and functions; in scalability, both of them expand the information load capacity of a cockpit and add more driving information and entertainment content.

Meanwhile, the upgrade of current cockpit industry chain technologies including chip, operating system, cockpit domain controller and display will leave more scope for OEMs to conceive and implement multi-screen and dual displays, helping to reshape cockpits technologically.

As concerns whether it is necessary to introduce multi-screen/dual display or one-chip, multi-display, multi-system solution into a car or not, automakers need to take into account a combination of factors such as product orientation, user needs, R&D costs and competitive pattern. As for cockpit interior structure, it is not the use or re-layout of displays that poses technical and cost challenges to OEMs, but how to improve user experience with multi-screen/dual displays of limited number and size, that are introduced into a cockpit based on redesigned software and hardware architecture, in an age of intelligent cockpits. This is really worth OEMs thinking about.

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