

Event Recap: CES 2024 – January 2024

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Contents

• About CES 2024	3
• Signage displays, industrial displays, and smart displays	6
• TV displays	26
• Monitor displays	67
• Notebook PC displays	94
• Tablet displays	103
• Smartphone displays	105
• Automotive displays	113
• Wearable displays	143
• AR and VR displays	147
• Appendix	165

About CES 2024

- According to CES:
 - “Consumer Electronics Show (CES) is the world’s gathering place for all those who thrive on the business of consumer technologies. It has served as the proving ground for innovators and breakthrough technologies for 50 years—the global stage where next-generation innovations are introduced to the marketplace. Owned and produced by the Consumer Technology Association (CTA), it attracts the world’s business leaders and pioneering thinkers.”
- At CES 2024, there were more than 4,000 exhibitors with digital booths. This report focuses on the display-related products and technologies at CES, including signages, TVs, monitors, notebooks, tablets, smartphones, automotive, and wearables, among others.



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Executive summary (1/2)

- The keywords for CES 2024 are **transparent OLED, transparent Micro LED, Mini LED, high frame rate, 3D, transparent, 8K, quantum dot (QD), automotive, AR/VR, and wearables.**
- This year's CES came back to life; about 4,000 exhibitors exhibited their products and technologies, higher than last year's 2,583 exhibitors.
- In the TV section, panel makers demonstrated the following:
 - Samsung Display focused on promoting QD OLED and was more open about explaining the advantages in QD OLED technology for large-sized applications and low power consumption for IT applications.
 - LG Display once again demonstrated its META Technology 2.0 WOLED for TV and signage applications. However, transparent OLED impressed most of the customers. Opportunities are being sought for how to adopt it in new applications, such as shopping malls and train stations, among others.
 - China Star aggressively promoted 8K, Mini LED, and high-frame-rate technology for its TVs.
 - Chinese TV makers started promoting their Micro LED super-large TVs.
- On the monitor side, most brands launched OLED monitors.
- Laptop manufacturers developed dual OLED, foldable OLED, and gaming notebooks with high resolution and various combinations of office platforms and entertainment that can be applied to a variety of scenarios.

Executive summary (2/2)

- **Automotive displays**

- OLED displays were quite popular at CES 2024. Continental displayed its In2Visible display, which incorporates OLED, while Visteon displayed its wide-format OLED. Samsung Display showcased its Slidable Flex Solo notebook and Rollable Flex for cockpit displays. LG Display exhibited a 32-inch slidable OLED. Visionox also displayed rollable and flexible displays for HMI integration solutions.
- Micro LED displays are on the way. AUO's Smart Cockpit 2024 features Micro LED technology, including an “Interactive Transparent Window” and “Rollable RSE,” which won the Innovation Awards. Sony Honda Mobility's AFEELA prototype showcases a Micro LED display with a customizable media bar. Continental's transparent Micro LED infotainment display is made out of Swarovski crystals.
- Many companies, such as CSOT, Tianma, Harman, CarUX, and GIS, showcased AR HUD and panoramic HUD. LCD-based AR HUDs are now affordable solutions. Panoramic HUDs were demonstrated by Harman, Marelli, AUO, CarUX, Visteon, AGC, and LG Display, among others.
- Under-display cameras were showcased for the instrument cluster at the CarUX, CSOT, Sharp, Continental, and Harman booths.
- Hidden displays can be found in various products made by companies such as AUO, BOE, Continental, CarUX, and Marelli. The displays can be covered by materials such as real wood, film, or glass.

- **Smartphones, wearables, and AR/VR displays**

- Pimax Technology's Pimax Crystal is the only VR headset to be named an honoree in the “XR Technologies & Accessories” category. It offers the highest clarity in consumer VR and has a native resolution of 2880x2880 pixels per eye. Additionally, it has glass aspheric lenses.
- Samsung Display introduced an RGB version of OLEDoS, a high-definition display with small pixel sizes, which will play a crucial role in XR headsets. The new RGB OLEDoS display boasts a pixel density of 3,500 PPI and generates colors without the need for a separate light source.
- Samsung Display also unveiled its new 360° foldable technology at CES 2024. The new generation of products can be easily folded inward and outward, and they also feature rollable and slidable display technologies.

Signage displays, industrial displays, and smart displays

LG Signature OLED T wireless transparent TV (1/2)

- LG Signature unveiled the transparent TV T series based on OLED technology for the first time at CES 2024, featuring 55 – to 77-inch transparent OLEDs as screens. This transparent TV has a 4K resolution and LG wireless audio and video transmission technology. The 77-inch OLED T transparent TV also utilizes LG Display's wireless transmission technology; moreover, content is not transmitted to the Signature OLED T via HDMI cables but via the same box used for wireless transmission in the M-series TVs, thus reducing the need for separate power supply wiring. In terms of performance, the OLED T is supported by LG's new Alpha 11 AI processor, which is 4x the performance of the previous generation's chip. According to LG, the additional performance has increased graphics performance by 70% and processing speed by 30%. The 77-inch OLED T and its innovative transparent display were praised for its seamless coordination with the environment, making the screen almost invisible when turned off, allowing it to blend in with the environment. The OLED T comes in three options: standalone, wall mounted, or against-the-wall, and can be further customized by adding vertical or floating shelves on one or both sides of the screen.

World's first 4K wireless transparent TV and transparent 77-inch OLED 4K



Source: Photos taken by Omdia at CES 2024

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LG Signature OLED T wireless transparent TV (2/2)

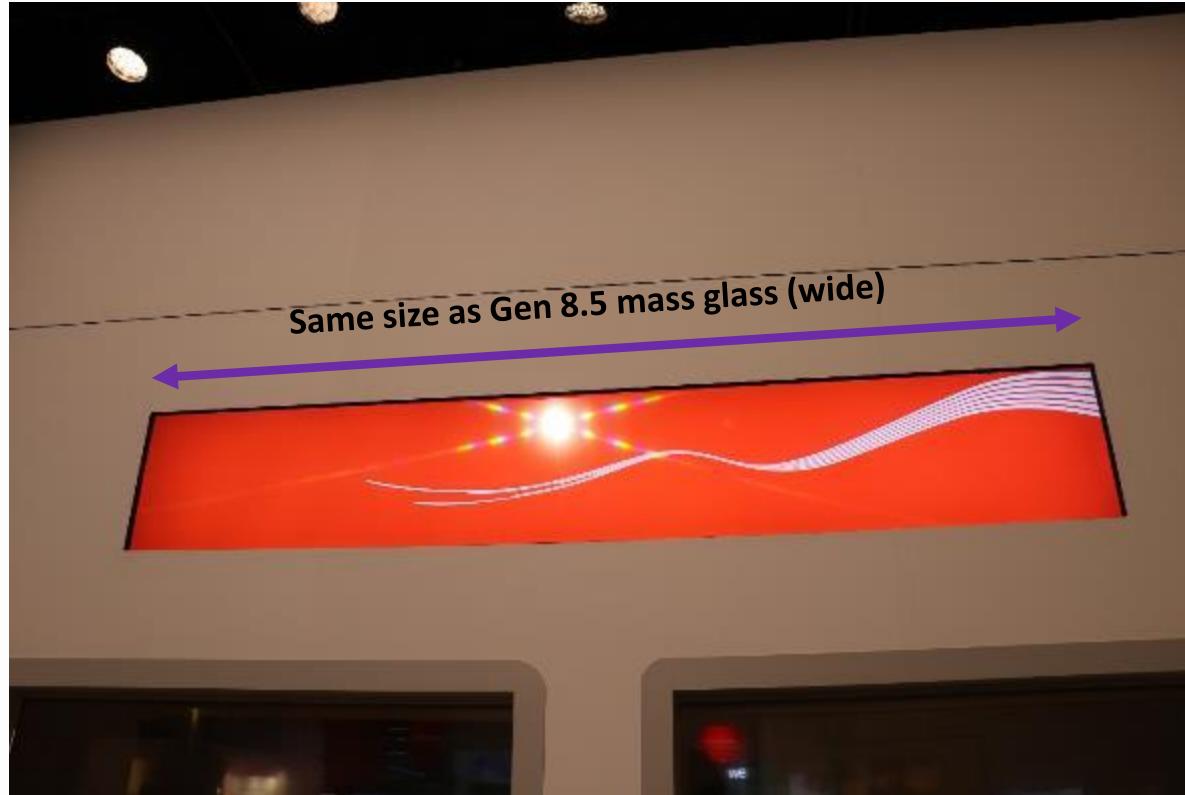
- The LG Signature OLED T is a true technological marvel, combining a transparent 4K OLED screen and LG's wireless video and audio transmission. According to LG, "the transparent display seamlessly harmonizes with its environment. Practically invisible when turned off, it blends into the environment and frees users from the long-standing problem of what to do with the "big black screen." The TV's beautiful see-through screen also helps to make one's space feel larger, providing a sense of openness."



Source: Photos taken by Omdia at CES 2024

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LG's Ultra Stretch signage with transparent OLED signage



Source: Photos taken by Omdia at CES 2024

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LG Display – Transparent OLED for each application – Luxury stores



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Samsung's transparent Micro LED at CES 2024

- Samsung's new transparent Micro LED enables screens to resemble a piece of transparent glass. The screen has an extremely small Micro LED chip and has a precision manufacturing process that removes seams and light refraction, allowing the transparent Micro LED to generate a clear, unobstructed picture for multiple use cases both in the home and in B2B environments.
- Micro LED's modular design allows users to personalize the shape, size, and ratio of screens to fit any space. Samsung's experience and research has created a very effective process that enables LED chip operation circuits to be directly deposited on the glass, therefore minimizing the loss of brightness that users may encounter with regular displays.
- The transparent Micro LED products are supplied by AUO in the form of its Micro LED backplane and module.



Source: Photo taken by Omdia at CES 2024

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AUO's transparent Micro LED

- AUO created 30-inch, 17.3-inch, and 13.5-inch Micro LEDs by combining smaller transparent displays while maintaining high brightness and transparency.
 - The 17.3-inch Micro LED display is integrated with touch panel HMI and a black switch, which provide good ambient contrast ratio performances even with strong sunlight.
 - The 13.5-inch transparent Micro LED display maintains high transparency while increasing the pixel density to 163 PPI and boosting the peak brightness to 5,000 nits.



Size	30-inch
Tech	Micro LED
Resolution	960x540
Pixel pitch	0.69mm
Brightness	600cd/m ²
LED type	RGB/flip chip

Size	17.3-inch
Tech	Micro LED
Resolution	1280x720
Pixel pitch	0.3mm
Brightness	>1,200cd/m ²
Touch	TP cell = 0.5mm, 5 points

Size	13.5-inch
Tech	Micro LED
Resolution	1920x1080
Pixel pitch	<0.3um
Brightness	5,000cd/m ²
Pixel density	163 PPI

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LG MAGNIT – Micro LED TV

- LG announced its chip on board (COB)-type Micro LED 136-inch ultra HD TV. The minimum supplied size will be the 34-inch.
- LG's Micro LED technology allows users to enjoy vivid colors and ultrafine details, giving them a quality viewing experience.
- The pixel pitch can reach 0.78mm, and the maximum brightness can reach 500 nits.
- The product has an embedded system controller and built-in speakers.



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Hisense's Micro LED display

- Hisense announced another hot product—all-in-one 163-inch Micro LED. It currently leads the industry with the first ever SOD + ASIC system Micro LED product, which allows viewers to enjoy seamless visuals at a remarkable 7680Hz high refresh rate, free from scan lines or ripples.
 - AUO supplies the Micro LED backplane and module.



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Konka's Micro LED 8K display

- Konka demonstrated its Micro LED 8K display at CES 2024.



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Skyworth's Micro LED

- Skyworth also exhibited its 165-inch 4K Micro LED TV at CES 2024. The Micro LED backplane is supplied by Wuhan Skyworth Optoelectronics Co., Ltd.
 - Wuhan Skyworth Optoelectronics Co., Ltd. was established in 2021 and is a subsidiary of Skyworth Group. It mainly focuses on the technological development and application market of optoelectronic semiconductors and is committed to new technology fields such as Mini/Micro LED displays, sensing, UV, and automotive lighting.



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MTC's Micro LED TV and Mini LED TV

- MTC is a TV OEM/ODM that provides approximately 10 million units of televisions worldwide in a year. At CES 2024, MTC showcased its own Micro LED TV products with 108-inch, 135-inch, and 162-inch sizes. The smallest module is 27 inches, and different sizes can be selected according to customer requirements.



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Seoul Semiconductor's Micro LED displays – 54-inch HD and 81.5-inch FHD

- Seoul Semiconductor's Micro LED specifications are as follows: pixel – MCO4; pixel pitch – 0.9375mm; module resolution – 160 (H)x180 (V); cabinet resolution – 640 (H) x360 (V); number of cabinets – 3x3 (8.15-inch) and 2x2 (54-inch).



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Seoul Semiconductor's Micro LED chip – WICOP Pixel



Source: Photos taken by Omdia at CES 2024

KTC's OLED/Mini LED gaming monitor

- KTC is a company that specializes in the TV OEM/ODM business, with an annual supply of approximately 7.5 million units of TVs worldwide. It was KTC's first time participating at CES this year. The company showcased its gaming monitor series, which includes 45-inch 21:9 products with 4K OLED, 27-inch 16:9 OLED, and gaming monitors with IPS panels and Mini LED backlighting local dimming technology.



Size	45-inch 21:9
Backlight	OLED
Resolution	3840x2160
Frame rate	240Hz
Brightness	450cd/m ² (SDR) Peak 1,000:1 (HDR)

Size	27-inch Fast IPS Flat
Backlight	Mini -LED (576 zones)
Resolution	3840x2160
Frame rate	160Hz
Brightness	400cd/m ² (SDR) Peak 1,000:1 (HDR)

Size	27-inch 16:9
Backlight	OLED
Resolution	2560x1440
Frame rate	240Hz
Brightness	450cd/m ² (SDR) Peak 1,000:1 (HDR)

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MUXWAVE's holographic LED screen (1/2)



Source: Photos taken by Omdia at CES 2024



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MUXWAVE's holographic LED screen (2/2)

Model	M2	M3	M6	M10	A3-2	A3-4
Pixel pitch (mm)	P6.25/P6.25	P3.91/P3.91	P6.25/P6.25	P10/P10	P3.91/P3.91	P3.91/P3.91
Visual transparency	70%	80%	90%	85%	80%	80%
Pixel density (dot/m ²)	160,000	65,536	25,600	10,000	65,535	65,536
Cabinet size (HxWmm)	1000x125	1000x250 / 1200x250	1200x250/1500x250	1000x250	1000x2000	2000x2000
Cabinet resolution (dot)	400x50	256x64 / 300x64	188x64/236x40	120x25	512x256	512x512
Weight (kg/m ²)	1.63	1.6	1.6	1.2	40	40
Brightness (cd/m ²)	≥1,200	≥3,000	≥5,000	≥4,000	≥3,000	≥3,000
Package form	Light board and driving board integrated package					
Scan mode	Static driving (single pixel, single control)					
LED lifespan	≥100,000 hours					
Maximum power consumption (W/m ²)	800	1,000				
Average power consumption (W/m ²)	300	375				
LED controller	Synchronous / Asynchronous					
Input current	AC 100–240V 50/60Hz					
Module working current	DC 4.2V ± 0.2V					

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Electric vehicle (EV) chargers with monitor and tablet-sized displays

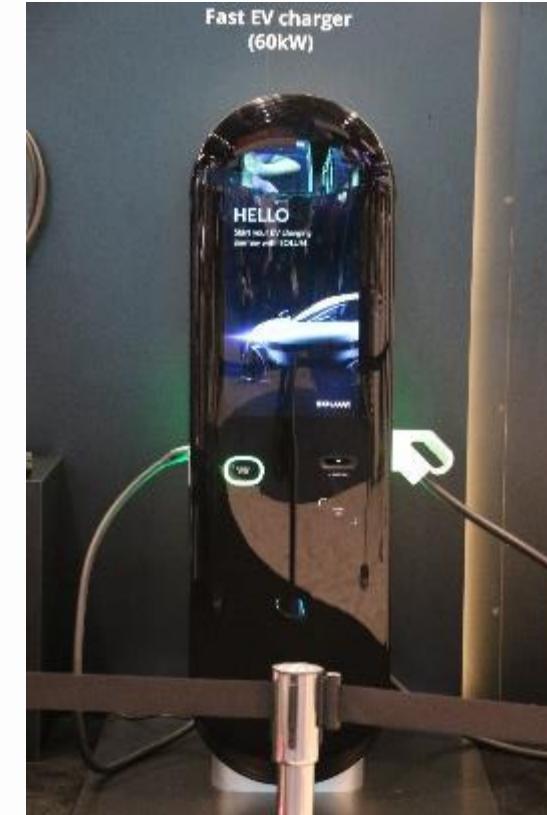
LG EV with monitor



MSI EV with monitor



Solum EV with monitor



Lotte EV with monitor

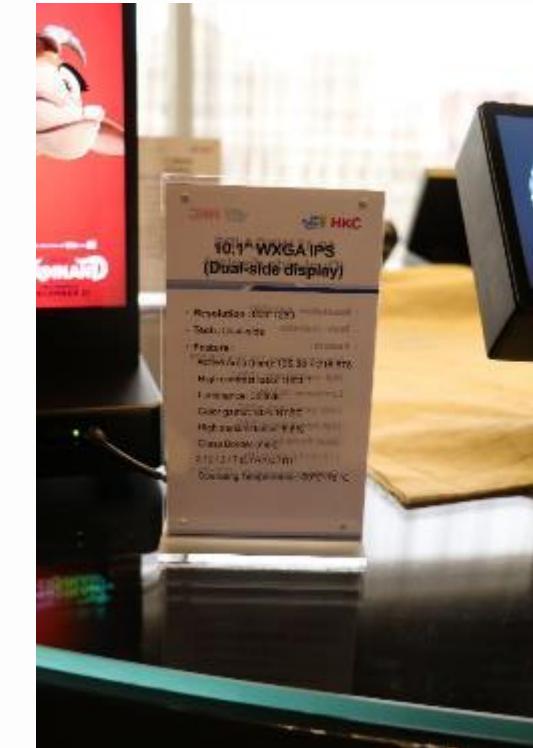
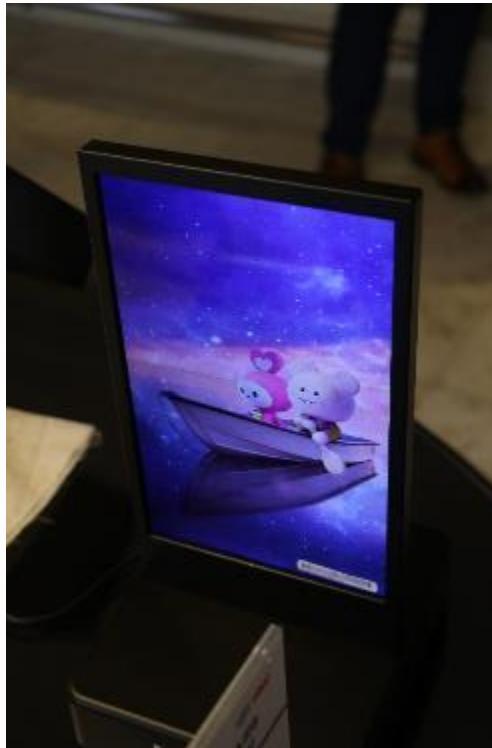


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HKC Display's dual-sided display

- HKC Display announced its dual-sided displays. The display uses two 10.1 WXGA IPS panels, and the resolution will reach 800x1280. The contrast will be 1,000:1 and the brightness will be 350 nits. HKC Display plans to expand this product lineup in the future, targeting restaurants, office name cards, and supermarkets.



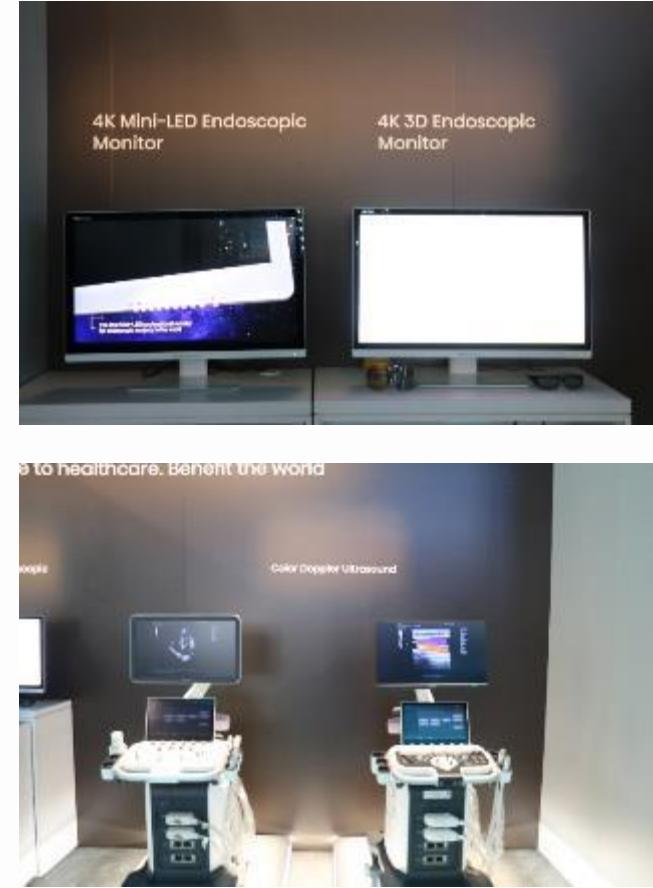
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Hisense's healthcare products



Source: Photos taken by Omdia at CES 2024



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TV displays

Samsung's transparent Micro LED display and Micro LED TV at CES 2024

- Samsung officially released its first transparent Micro LED at CES 2024. Samsung claims that this transparent Micro LED screen uses very small chips and precise manufacturing processes, which are less affected by ambient light, allowing it to provide clear and smooth images for various use cases, such as at home and in B2B environments. In addition, the transparent Micro LED screen adopts a modular design that allows users to customize the shape, size, and proportion of the screen to meet different spatial needs. Another Micro LED technology is also applied to Samsung's TVs. Currently, Samsung can provide a combination of four display ratios—32:9, 16:9, 8:9, and 4:9—and meet the different customer needs.



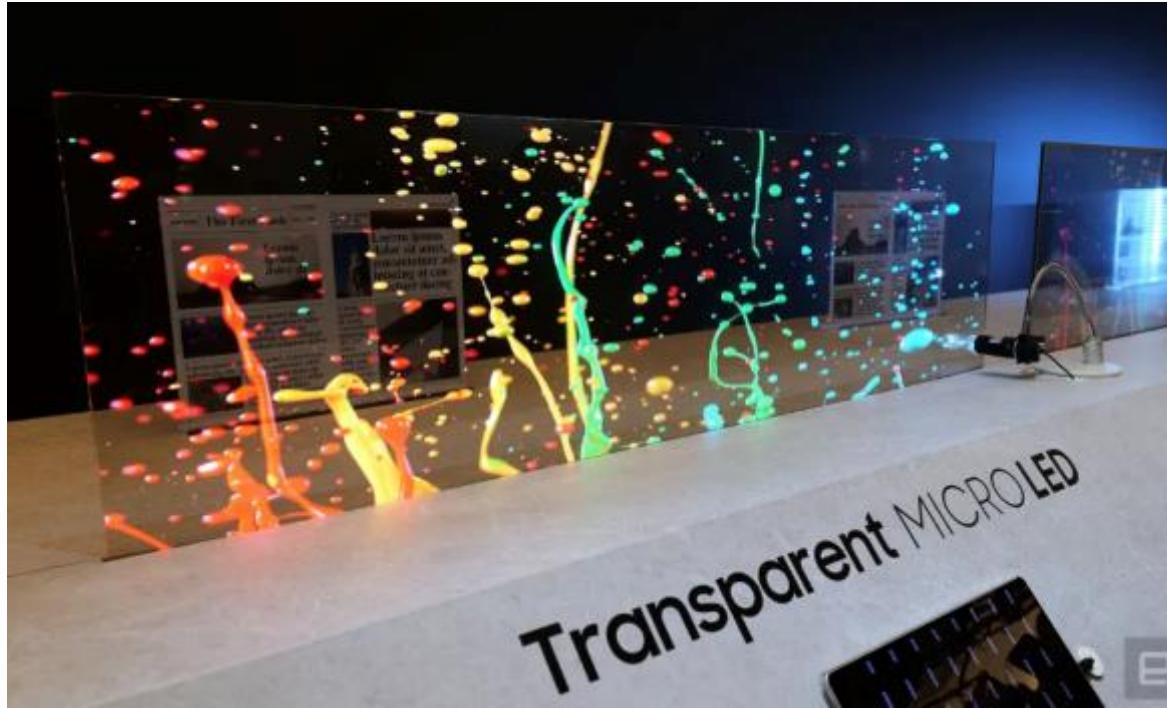
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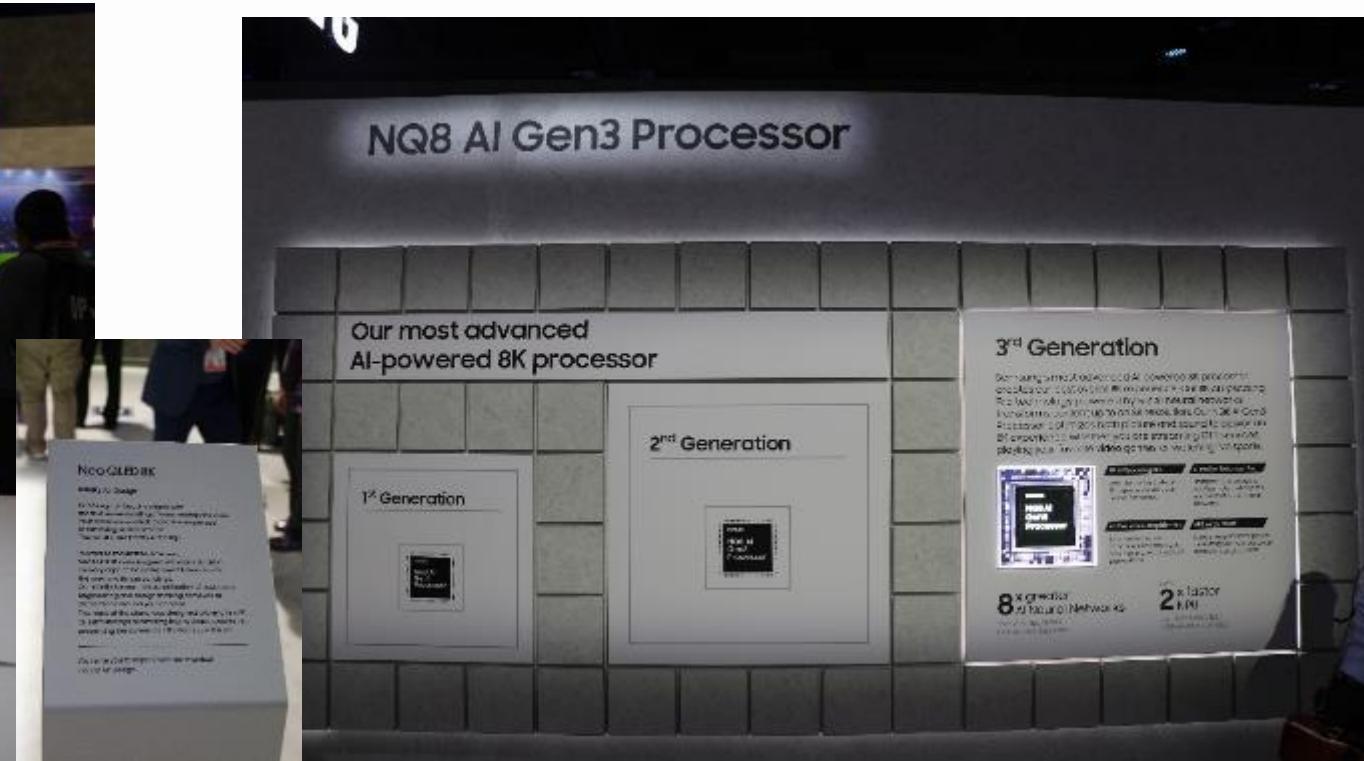
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Samsung's Neo QLED 8K with NQ8 AI Gen3 processor

- Samsung's newest Neo QLED 8K and 4K TVs offer lifelike picture quality, premium audio technology, and an array of apps and services. Samsung's 2024 Neo QLED 8K features its latest and most advanced TV processor yet, NQ8 AI Gen3, which has a neural processing unit (NPU) that is twice as fast as that of its predecessor. The number of neural networks has also increased from 64 to 512, allowing everything on screen to be displayed in detail. Thanks to this advanced processor, the 2024 lineup is equipped with significant performance upgrades.



Source: Photos taken by Omdia at CES 2024

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LG MAGNIT – Micro LED TV

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- The pixel pitch can reach 0.78mm, and the maximum brightness can reach 500 nits.
- The product has an embedded system controller and built-in speakers.



Source: Photo taken by Omdia at CES 2024

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Hisense's Micro LED display

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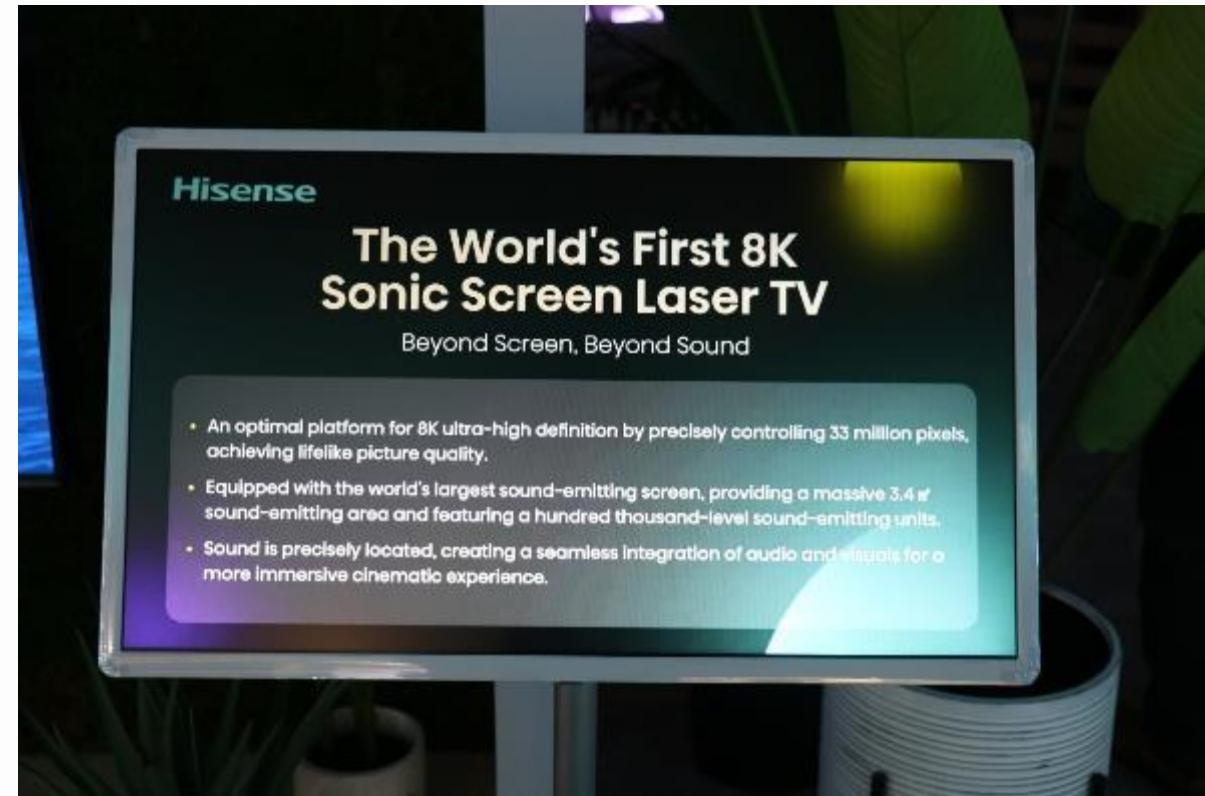
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Hisense's laser TV – 8K Sonic Screen Laser TV

- The following pages show Hisense's laser TV products. Hisense unveiled several of its laser TV products, which have been among the key products to be promoted by the company. Hisense's laser TV adheres to the "Go Green" concept, achieving a symbiosis between the green technology and digital technology from product R&D, manufacturing and production, household use, and recycling. With innovative green technology, it will help to promote the development of the double-carbon industry. At CES 2024, Hisense launched the world's first 8K Sonic Screen Laser TV, rollable laser TV, and many other products.



Source: Photos taken by Omdia at CES 2024



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Hisense's laser TV – Rollable Laser TV



Source: Photos taken by Omdia at CES 2024

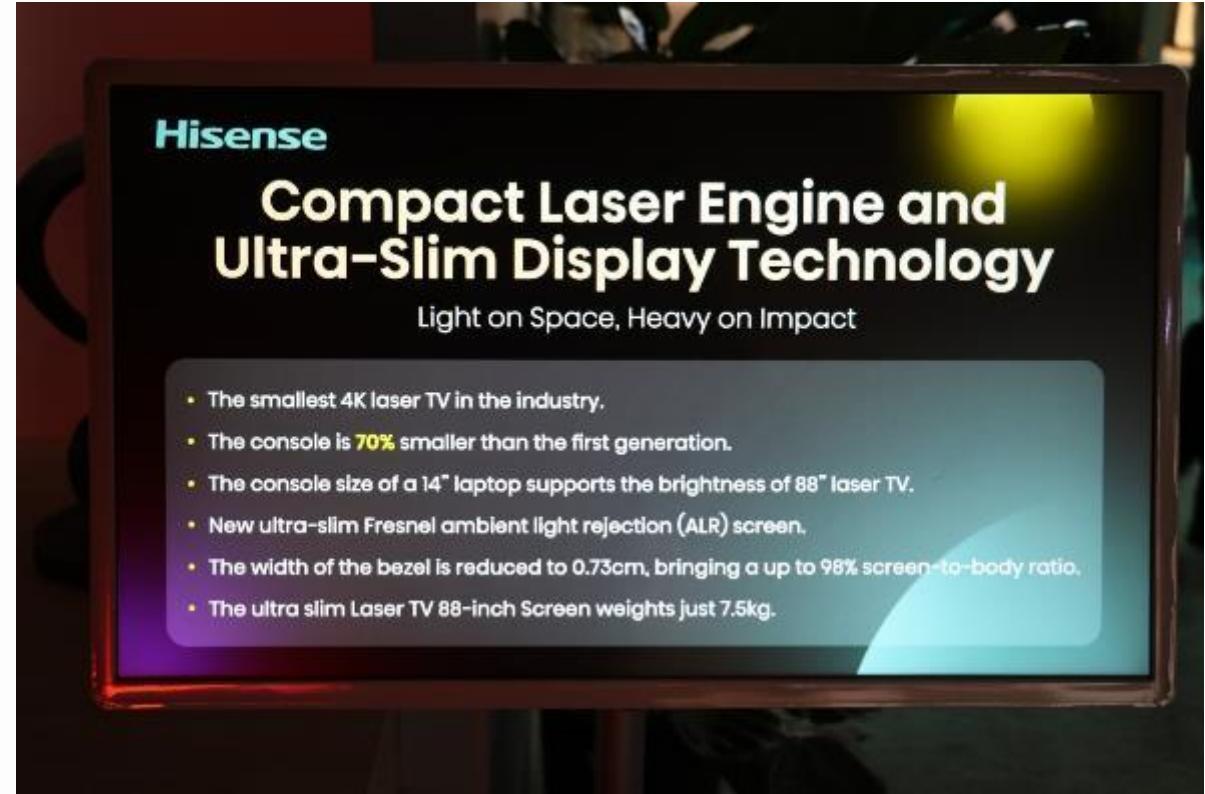


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Hisense's laser TV – Ultra-slim TV



Source: Photos taken by Omdia at CES 2024



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Hisense's multi-person glass-free 3D display



Source: Photos taken by Omdia at CES 2024



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Hisense – Gaming TV

- Hisense has been actively promoting gaming TVs since 2022.
- Its gaming TV is mainly equipped with BOE and AUO panels, and its refresh rate has also reached 144Hz, which is a breakthrough for TV panels.
- Hisense's gaming TV is 100% equipped with Mini LED backlighting, allowing gamers to experience better picture quality and smoothness.



Source: Photos taken by Omdia at CES 2024

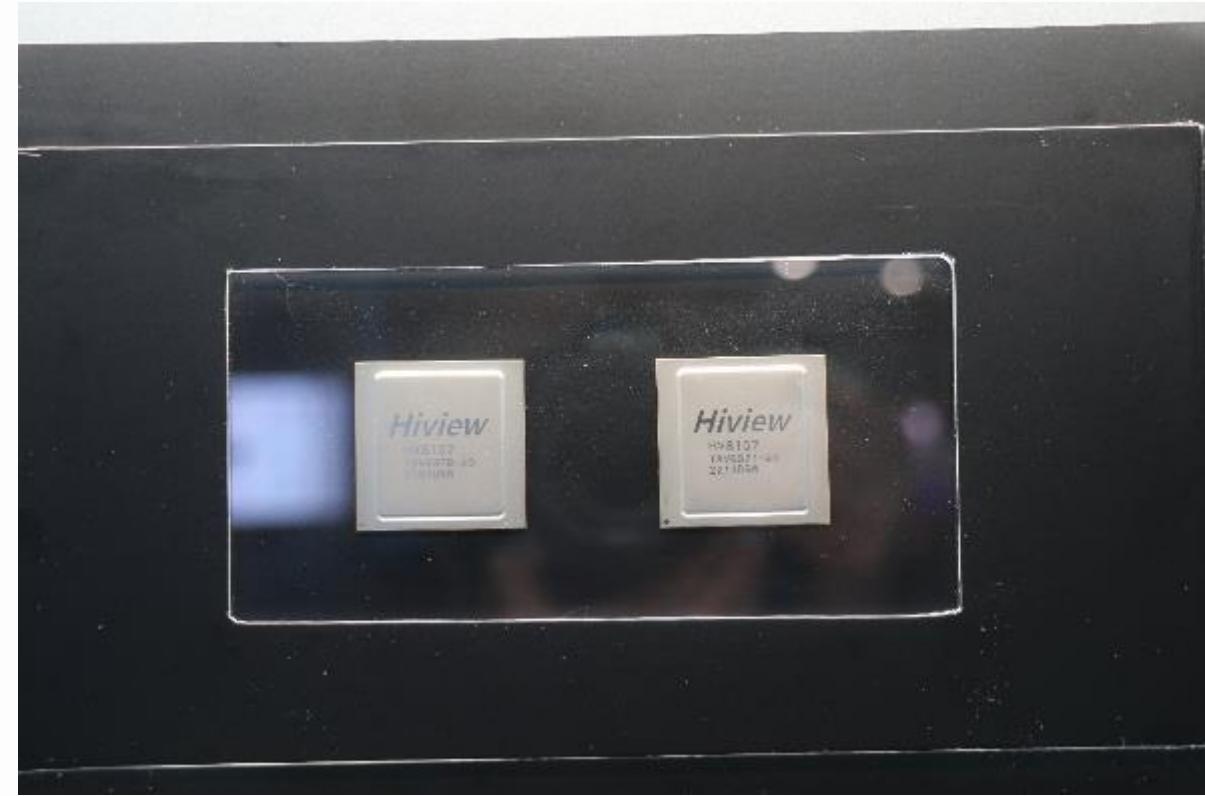
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Hisense's Hi-View Engine

- The Hisense Group's wholly owned subsidiary Xinxin (信芯) showcased its 8K Hi-View Engine X 120Hz chip. The mass production of this product represents Hisense's further improvement in its TVs' image quality.



Source: Photos taken by Omdia at CES 2024



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Hisense's ConnectLife concept



Source: Photos taken by Omdia at CES 2024

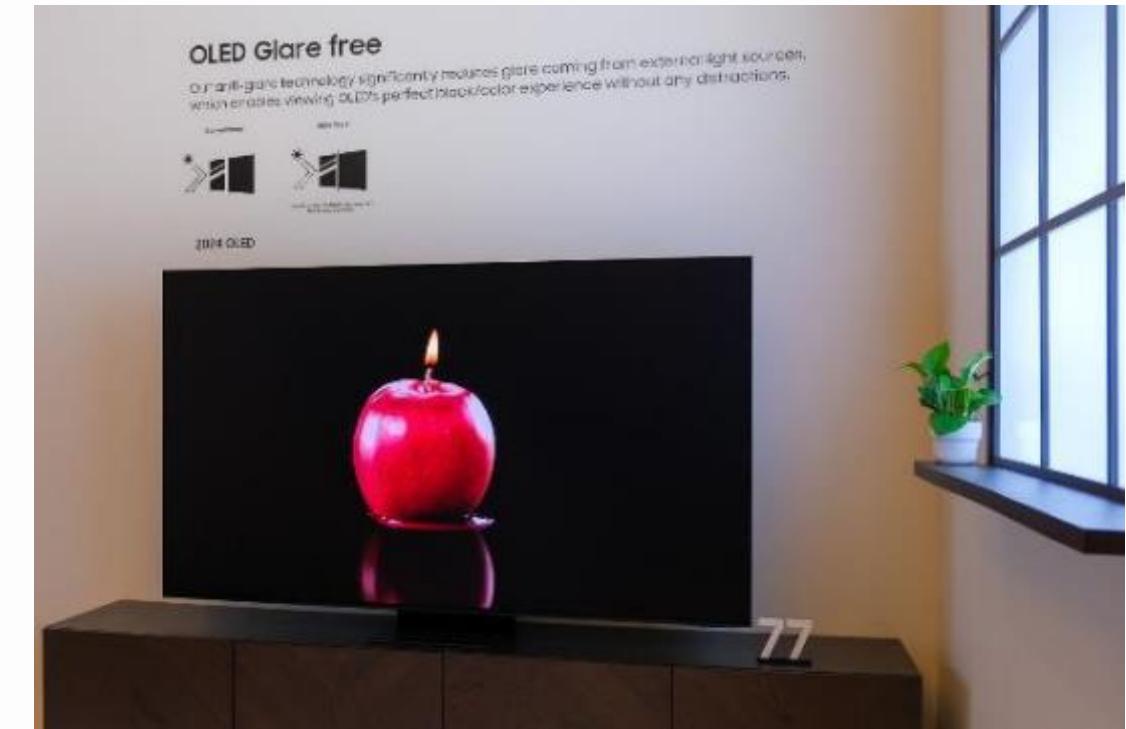
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Samsung – OLED Glare Free

- Samsung's new 2024 OLED TV model, S95D, offers an ultra-large 77-inch screen for fine details, a high frame rate, and vibrant video. The display is 20% brighter than previous models, with deep and rich blacks and AI-enhanced color accuracy. Samsung also introduced the S90D and S85D in various sizes, from 42-inch to 83-inch.
- Samsung's new OLED is its brightest OLED screen yet, and also features high refresh rates of up to 144Hz, so viewers can enjoy seamless motion and crystal-clear images on their screens.



Source: Photos taken by Omdia at CES 2024



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Samsung Display's low power consumption



Size	16-inch 16:10
Display tech	Oxide ultrathin
Resolution	3200x2000 (236 PPI)
Frame rate	1–120Hz

Source: Photos taken by Omdia at CES 2024

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LG Signature OLED T wireless transparent TV (1/2)

- LG Signature unveiled the transparent TV T series based on OLED technology for the first time at CES 2024, featuring 55 – to 77-inch transparent OLEDs as screens. This transparent TV has a 4K resolution and LG wireless audio and video transmission technology. The 77-inch OLED T transparent TV also utilizes LG Display's wireless transmission technology; moreover, content is not transmitted to the Signature OLED T via HDMI cables but via the same box used for wireless transmission in the M-series TVs, thus reducing the need for separate power supply wiring. In terms of performance, the OLED T is supported by LG's new Alpha 11 AI processor, which is 4x the performance of the previous generation's chip. According to LG, the additional performance has increased graphics performance by 70% and processing speed by 30%. The 77-inch OLED T and its innovative transparent display were praised for its seamless coordination with the environment, making the screen almost invisible when turned off, allowing it to blend in with the environment. The OLED T comes in three options: standalone, wall mounted, or against-the-wall, and can be further customized by adding vertical or floating shelves on one or both sides of the screen.

World's first 4K wireless transparent TV and transparent 77-inch OLED 4K



Source: Photos taken by Omdia at CES 2024



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LG Display – META Technology 2.0

- LG Display announced its OLED TV panel featuring its latest META Technology 2.0 at CES 2024.
- With peak brightness being a crucial component of higher picture quality, META Technology 2.0 features 42% brighter images than conventional OLED displays to achieve 3,000-nit peak brightness. A higher peak brightness enables a more vivid viewing experience; this is the highest brightness level of any large-sized OLED panel.



Evolution of META Technology



Source: Photos taken by Omdia at CES 2024

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LG Display – Eco-friendly OLED



Source: Photos taken by Omdia at CES 2024



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LG Display's META Technology 2.0 OLED compared to older technologies

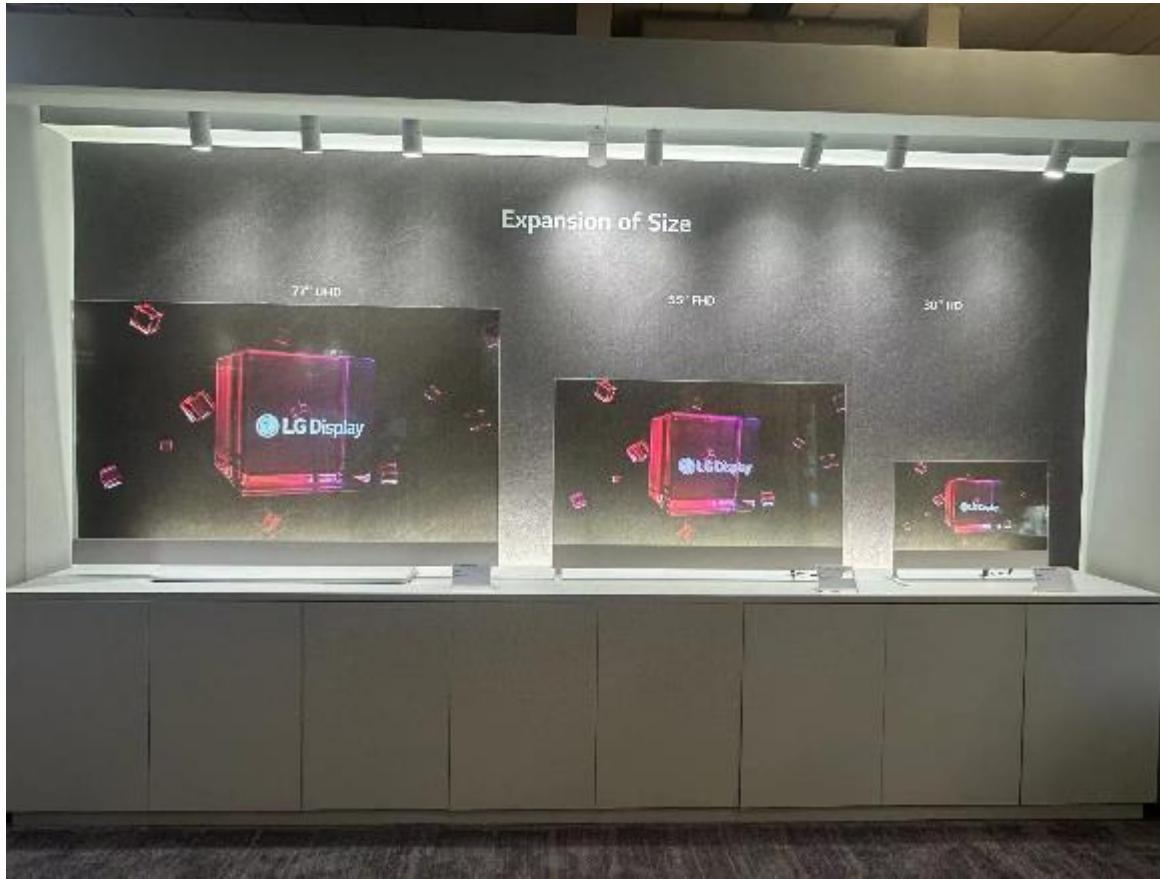
- According to the publicly available data of META Technology 2.0, not only has it made some technological breakthroughs in terms of brightness and viewing angle, but it has also advanced in terms of the frame rate. According to the table below, the frame rate can reach 4K at 144Hz and 8K at 120Hz. It seems that the issue of OLED achieving an 8K-level frame rate has been resolved.

	First generation (2013~)	Second generation (2021~)	Third generation (2023~)	Fourth generation (2024~)
Technology name	Self-lit	EX	META	META Technology 2.0
Key technologies	<ul style="list-style-type: none"> White OLED Tandem structure Solid-phase encapsulation 	<ul style="list-style-type: none"> Deuterium OLED Personalized algorithms Narrow bezels 	<ul style="list-style-type: none"> EX technology Microlens array META booster 	<ul style="list-style-type: none"> Microlens array+ META Multi booster Detail enhancer
Brightness (APL 10%/25%/100%)	? /450/135 nits	? /500/200 nits	? /700/250 nits	1500/750/250 nits
Peak brightness (APL 3% / 4K)	1,000 nits	1,300 nits (30% brighter)	2,100 nits (60% brighter)	3,000 nits (42% brighter)
Bezel size (4K 55-inch)	6.5mm (L/R/U)	4.3mm (L/R/U) (30% narrower)	4.3mm (L/R/U)	4.3mm (L/R/U)
Viewing angle	120°	120°	160° (30% wider)	160°
Surface treatment / reflection	Black / 2.1%	Master black / 1.0%	Vanta black / 0.4%	Vanta black / 0.4%
Frame Rate	120Hz	120Hz	120Hz	144Hz (4K), 120Hz (8K)

Source: Omdia

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LG Display – Transparent OLED



Source: Photo taken by Omdia at CES 2024

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- LG Display presented its full lineups of transparent OLEDs, including the 30-, 55-, and 77-inch displays, to present new shopping experiences to retail spaces by creating unique applications through the use of medium-sized and ultra-large transparent OLED panels.
- LG Display is the world's sole transparent OLED manufacturer; it maximizes OLED's self-emissive quality to achieve a high transparency rate that can replace glass windows, portray colors accurately, and provide design flexibility for improved space usage.
- Transparent OLEDs can also be used for indoor applications because they generate less heat than conventional LEDs. They can be installed in nearly all types of spaces and interiors, such as windows, walls, and floors of various sizes.

Veeo's Holodeck T55 transparent-screen presentation station



Source: Photo taken by Omdia at CES 2024

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- Veeo, Inc. will ship its new 55-inch Holodeck T55 presenter's station product this summer. The new product is aimed at users who wish to record their training or briefing materials as well as those who attend online virtual meetings on platforms such as Zoom, Meet, Teams, Webex, or Skype. The big glass system helps to secure the presenter's eye contact; its 55-inch transparent OLED screen can also layer in additional content from a connected computer.
- Three Veeo products are scheduled to launch in summer 2024:
 - Veeo Holodeck M30 (around \$2500) with a 30-inch screen and an enclosed case.
 - Veeo Holodeck T30 (around \$3,000) with an unenclosed 30-inch clear glass panel that recognizes gestures.
 - Veeo Holodeck T55 (around \$8,500) with an unenclosed 55-inch clear glass screen for conference rooms.

Konka's OLED TV – 812 series



Source: Photos taken by Omdia at CES 2024

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Skyworth's transparent OLED and Elevatable OLED



Source: Photos taken by Omdia at CES 2024

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RCA's transparent OLED TV

- RCA announced its transparent OLED TV, which uses LG Display's 65-inch and 30-inch transparent panels.



Source: Photos taken by Omdia at CES 2024

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RCA's OLED TV and Mini LED TV

RCA OLED TV – 65-inch 4K 120Hz web OS with Wi-Fi and Bluetooth 5.0



RCA Mini LED TV – 65-inch 4K 120Hz

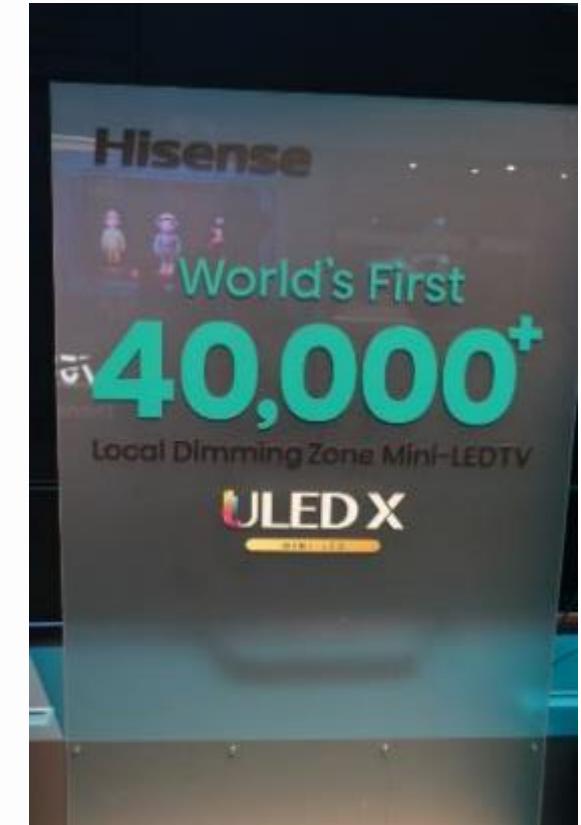


Source: Photos taken by Omdia at CES 2024

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Hisense – Mini LED-backlit LCD TV

- Hisense is another Chinese brand that focuses on Mini LED-backlit LCD TV products. At CES 2024, Hisense continued to showcase its ULED control system equipped with Mini LED-backlit TV products. It showcased a 110-inch ultra-large Mini LED-backlit TV produced by BOE, with a peak brightness exceeding 10,000 nits and a color gamut of 90% BT.2020. Hisense has also achieved a new breakthrough with the thinnest 4K Mini LED-backlit LCD TV 75UX. Its thickness is less than 14mm.



Source: Photos taken by Omdia at CES 2024

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Hisense – Mini LED-backlit LCD TV

- Hisense showcased the world's thinnest Mini LED TV: its 75UX product series, which has more than 5,000 partitions, a thinnest point of 13.6mm, and 18 embedded speakers.



Source: Photos taken by Omdia at CES 2024

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TCL – Mini LED-backlit LCD TV (1/2)

TCL QD Mini LED TV waterfall



Source: Photo taken by Omdia at CES 2024

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The world's largest QD Mini LED 115-inch with 20,000-plus zones



Source: Photos taken by Omdia at CES 2024, January 2024

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- According to Omdia's TV Display & OEM Intelligence Service, TCL is the world's largest TV manufacturer with its own-brand business and OEM production. The TCL brand was ranked the world's second- or third-largest TV brand in terms of shipment volume in from 2019 to 2023. TCL produces a wide range of devices across multiple product categories, though it is most famous for TV products. The quantum dot (QD) technology together with the Mini LED-backlit displays are the core technology to be applied to TCL's products currently and in the future. At CES 2024, TCL unveiled its largest QD Mini LED-backlit LCD TV product series, a 115-inch TV that is the world's first product with more than 20,000 local dimming zones.

TCL – Mini LED-backlit LCD TV (2/2)

- TCL has been devoting itself to developing QD Mini LED-backlit LCD TVs. At CES 2024, TCL showcased a new generation of the Mini LED backlighting display technology, in which the new products received several upgrades. The changes included six-crystal emission (previously dual-crystal emission, the adoption of the dispensing micro lens and the wide-angle even-light lens, and the use of the 1light in one drive (previously 2light in one drive). The upgrades significantly improved the display contrast ratio and brightness compared to the older-generation products.



Source: Photos taken by Omdia at CES 2024



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Skyworth – Mini LED-backlit LCD TV and QLED TV

- Skyworth is another major Chinese TV maker that exhibited a 100-/86-inch Mini LED-backlit LCD TV and a 100-inch QLED TV at CES 2024.



Source: Photos taken by Omdia at CES 2024

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Konka – QD Mini LED/Mini LED-backlit LCD TV

Konka QD Mini LED TV 809 series 75-inch 144Hz



Konka Mini LED 98-inch with 672 zones



Source: Photos taken by Omdia at CES 2024

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Konka – Micro LED display

- Konka promoted its 2-inch Micro LED display at CES 2024.
 - The 2-inch Micro LED watch has a chip size of 27x42µm and a resolution of 290x290 (200 PPI).
 - The display type is R/G/B full color and it has a brightness of 1,500 nits.



Source: Photos taken by Omdia at CES 2024

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Konka – QD Mini LED backlighting module

- Konka showed its Mini LED backlighting module with QD film at CES 2024. The module uses blue LED + QD film, has 1,296 dimming zones, and its chip size is 512x157 μm .

Konka QD – Mini LED back light module



Source: Photos taken by Omdia at CES 2024

Konka QD – Mini LED back light module



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Hisense – Wallpaper LCD TV

- In recent years, display applications have expanded, and wallpaper TVs are now being used as fashion displays. The continuous improvement in LCD TV displays allows TV makers such as Hisense to adopt LCD TV panels for the wallpaper TV business to provide good image quality.



Source: Photos taken by Omdia at CES 2024

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Skyworth – Wallpaper Mini LED-backlit LCD TV

The thinnest wallpaper Mini LED 86-inch



Source: Photos taken by Omdia at CES 2024

- Art paper 86-inch Mini LED-backlit OD5 all-in-one LCD TV
 - All-in-one 25mm ultra-thin body with a seamless built-in design and looks like a painting on the wall.
 - 2,880 Mini LED dimming zones provide good light control to fan out from point to area, and flagship image quality.
 - The peak brightness is 6,000 nits and the precise dimming capacity is 16 bits.
 - 4K 144Hz frames per second allows for quick-moving visuals to be seen with great clarity.

XDR 6,000 nits wallpaper Mini LED



The thinnest wallpaper Mini LED 86-inch



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TCL China Star – Gaming TV Display

- TCL China Star showcased its 75-inch 144Hz super-narrow-bezel gaming TV display at CES 2024.
 - The border can achieve 2.7/2.7/2.7/7.0/7.0mm through a large-sized GOA-driven TV panel with a high resolution.
 - The refresh rate will be 120Hz and 144Hz.

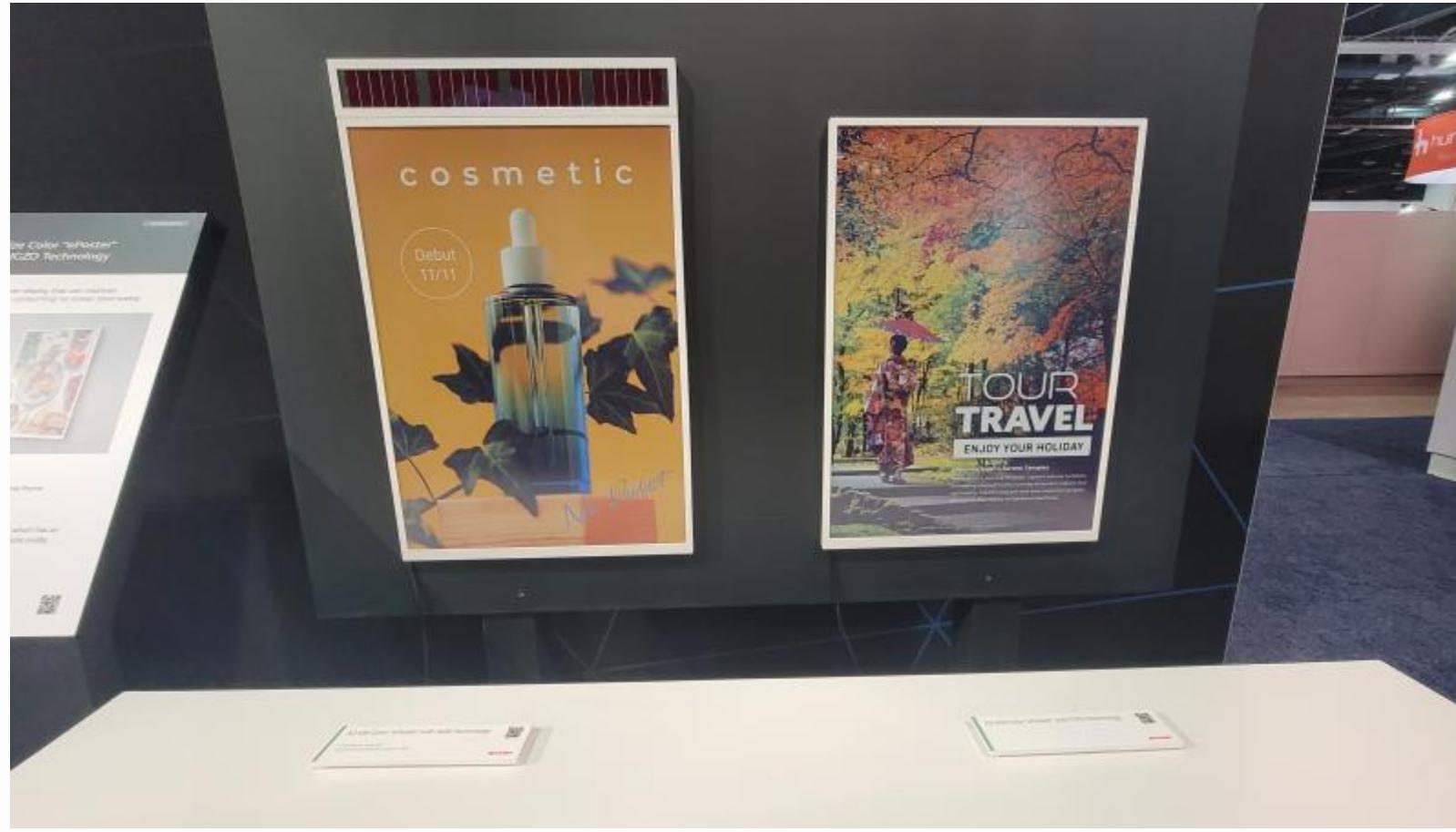


Source: Photos taken by Omdia at CES 2024



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Sharp – E-paper display with oxide (IZGO) TFT backplane – A2-sized ePoster



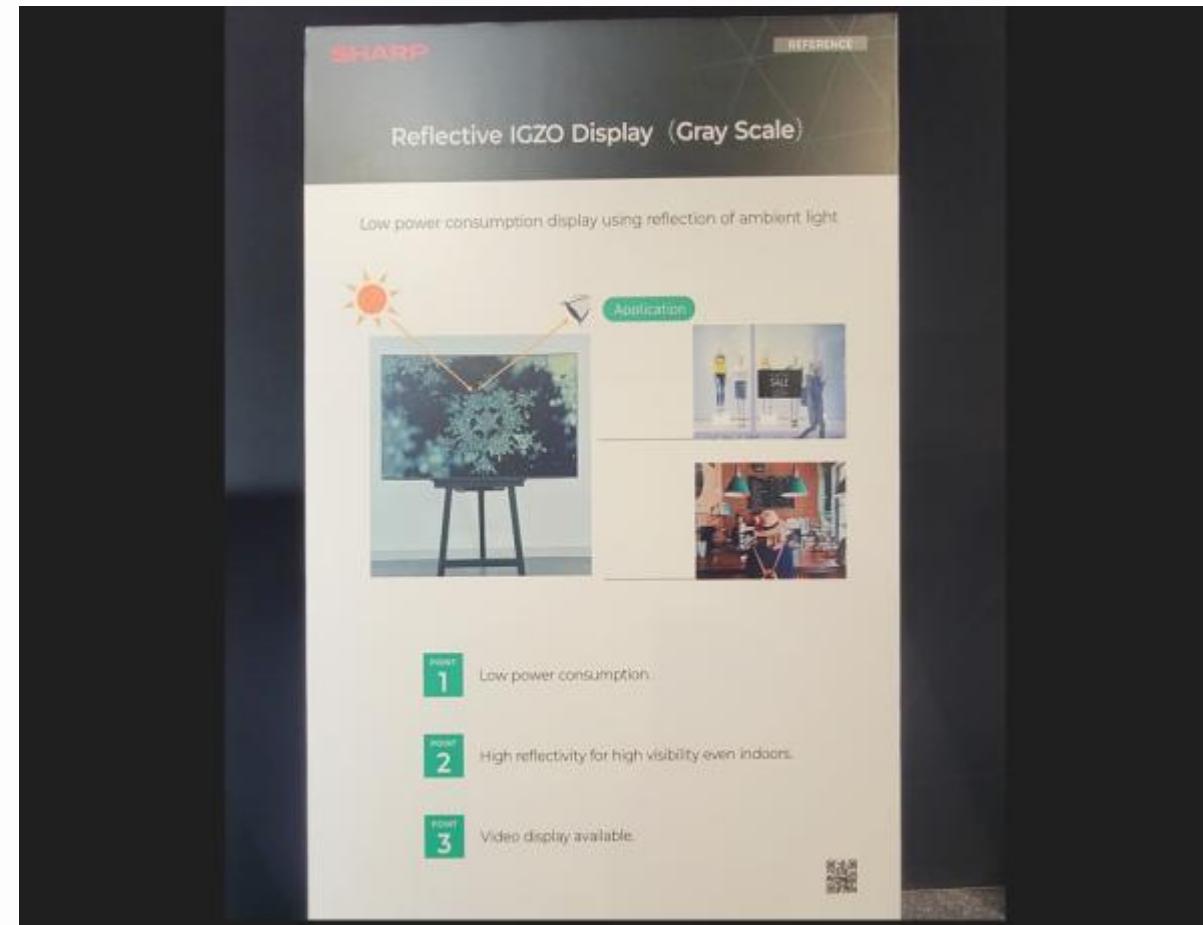
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Sharp – Reflective TFT LCD (IGZO oxide backplane) – 55-inch gray scale type

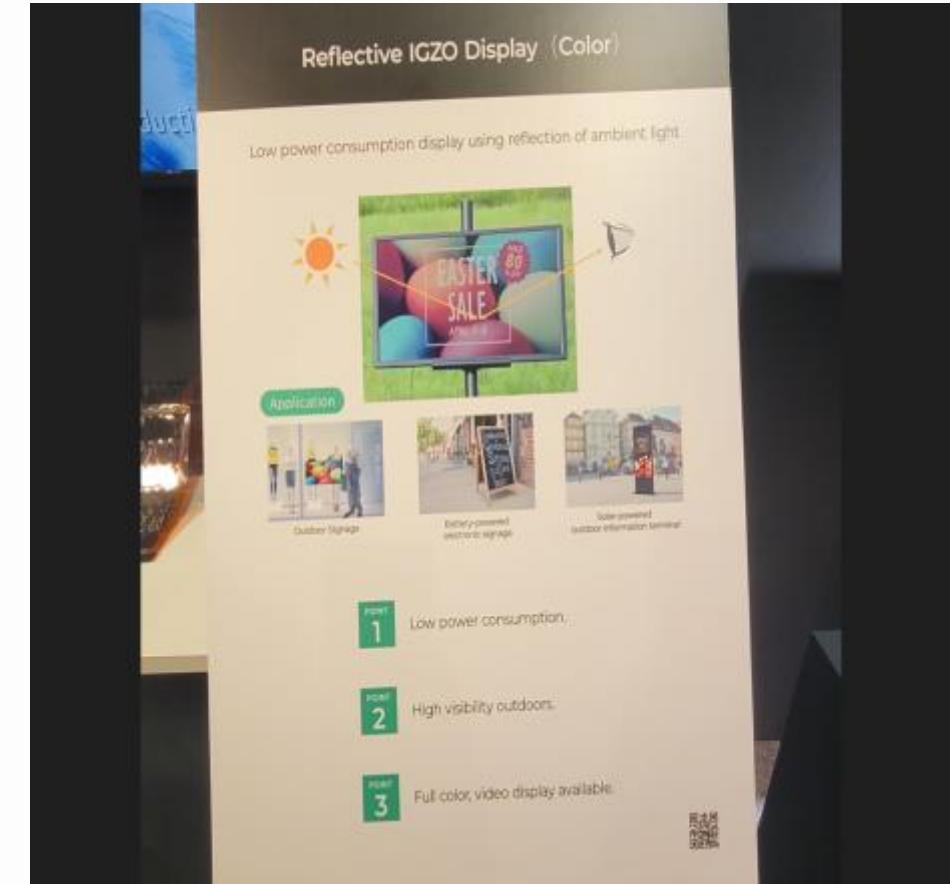


Source: Photos taken by Omdia at CES 2024



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Sharp – Reflective TFT LCD (IGZO oxide backplane) – 55-inch color type



Source: Photos taken by Omdia at CES 2024

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Sharp – AQUOS XLED LCD TV – LCD + Mini LED backlighting + QD



Source: Photos taken by Omdia at CES 2024

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AWOL Vision – 120-inch Vanish Laser TV

- AWOL Vision's laser TV comes with a special rolling screen and a short-distance high-pixel-density laser projector.



Source: Photos taken by Omdia at CES 2024

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Monitor displays

Samsung – QD OLED monitor

- Samsung Electronics announced its QD OLED monitor at CES 2024.
 - Samsung's newest Odyssey series includes the G9 49-inch, G8 32-inch, and G6 27-inch 360Hz.



Size	49-inch 21:9
Backlight	QD OLED
Series	Odyssey G9
Resolution	5120x1440
Frame rate	240Hz
Response time (GtG)	0.03ms

Source: Photos taken by Omdia at CES 2024

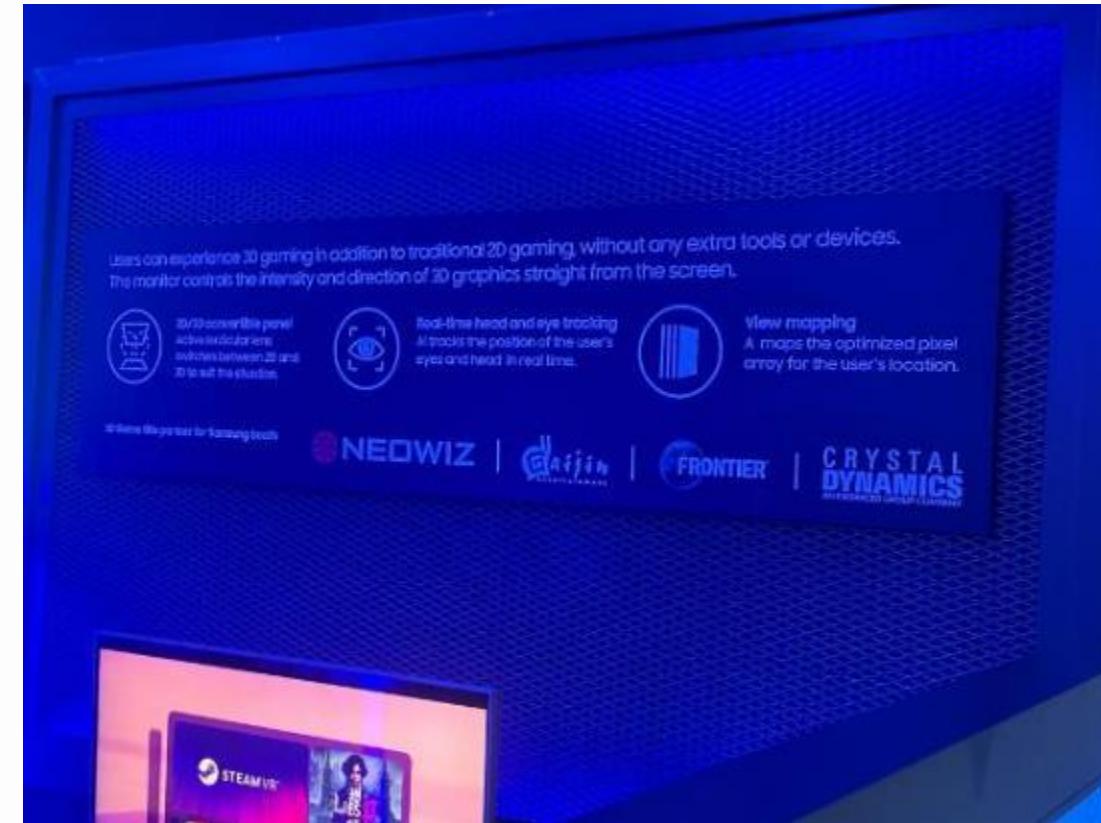


Size	32-inch 16:9
Backlight	QD OLED
Series	Odyssey G8
Resolution	3840x2160
Frame rate	240Hz
Response time (GtG)	0.03ms

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Samsung – 3D gaming monitor

- Samsung showcased its 3D gaming monitor: Users can experience 3D gaming in addition to traditional 2D gaming without any extra tools or devices.
- The monitor controls the intensity and direction of the 3D graphics from the screen itself.



Source: Photos taken by Omdia at CES 2024

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Alienware – 32-inch 4K QD OLED gaming monitor and 27-inch 360Hz QD OLED gaming monitor

- 32-inch 4K (2840x2160) QD OLED monitor with a 240Hz refresh rate, 0.03ms response time, DCI-P3 99% color gamut, 1700R curvature, and brightness of 1,000cd/m² (typical) (HDR peak).
- 27-inch QHD (2560x1440) QD OLED monitor with a 360Hz refresh rate, 0.03ms response time, DCI-P3 99% color gamut, and brightness of 400cd/m² (HDR TrueBlack 400).



Source: Photos taken by Omdia at CES 2024



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LG Electronics – OLED gaming monitor



Source: Photo taken by Omdia at CES 2024

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- LG Display presented its high-performance 27-inch QHD gaming OLED panel, which features the world's first 480Hz ultra-high refresh rate for an OLED display. With such a high refresh rate, the panel provides smooth and sharp visuals, even during fast screen transitions.
- The 34- and 39-inch panels have an ultra-wide (21:9) aspect ratio for more immersive gaming, while the 31.5-inch panel has a clear UHD (3840x2160) resolution that makes it suitable not only for gaming but also for office work and content consumption.
- LG Display's gaming OLED panels include millions of self-emitting pixels without a separate backlight source, high refresh rates and resolutions, as well as a fast response time of 0.03ms. LG Display also incorporates META Technology into its OLED gaming displays to further improve image quality while minimizing external light reflections during darker scenes.

LG Display – 21:9 OLED gaming monitor



Display 32-inch

Tech OLED

Resolution 3440x1440 (WQHD)

Refresh rate 240Hz

Curvature Yes (800R)



Display 39-inch

Tech OLED

Resolution 3440x1440 (WQHD)

Refresh rate 240Hz

Curvature Yes (800R)



Display 45-inch

Tech OLED

Resolution 3440x1440 (WQHD)

Refresh rate 240Hz

Curvature Yes (800R)

Source: Photos taken by Omdia at CES 2024

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LG Display – LCD and OLED monitors



World's Fastest Motion
Blurless monitors

Beyond Gaming
monitors



Display	27-inch/23.8-inch	27-inch
Tech	LCD	WOLED
Resolution	FHD/QHD	QHD
Refresh rate	500Hz/360Hz	480Hz
Curvature	Flat	Flat
GtG		0.03ms



	Multi-use monitor	Professional monitor
Display	31.5-inch	26-inch
Tech	OLED	OLED
Resolution	UHD/FHD	UHD
Refresh rate	240Hz/480Hz	
Curvature	Flat	Flat
PPI	140	163

Source: Photos taken by Omdia at CES 2024

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Acer – 57-inch Mini LED-backlit monitor

Acer – Mini LED-backlit monitor 57-inch



Source: Photos taken by Omdia at CES 2024

- The star of Acer's new gaming lineup is the Predator Z57. It is a 57-inch, 120Hz curved display that spans 7680x2160 pixels. It uses Mini LED backlighting for better contrast than a typical LCD monitor.
- The Z57 will come equipped with AMD FreeSync Premium to reduce screen-tearing, a 90W USB-C PD port, dual HDMI 2.1 ports, and a single DisplayPort 1.3 port, as well as a built-in KVM switch for using multiple devices with it. According to Acer, the Z57 has 2,304 dimming zones and HDR, with 1,000 nits for peak brightness. It also shows video from multiple sources at the same time, using picture-in-picture or a side-by-side split screen mode.



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HP – OMEN Transcend 32 UHD 240Hz OLED gaming monitor

- HP announced its OMEN Transcend 32 UHD 240Hz OLED gaming monitor at CES 2024.
- As the world's first gaming monitor with independent switchable USB ports, it can easily switch between devices or utilize the KVM features to drag and drop files across devices. This is the first ever OLED gaming monitor with 140W USB-C Power Delivery and audio tuned by HyperX, which includes a 10-band EQ that is fully customizable within the OMEN Gaming Hub.
- HP's QD OLED panel technology enables a 1,500,000:1 contrast ratio across its 4K UHD, 240Hz refresh rate, and 0.3ms response time panel. This is the first OMEN monitor to feature Dolby Vision and the first to be certified with VESA DisplayHDR True Black 400, providing up to 50x greater dynamic range and 4x improvement in rise time compared to DisplayHDR 1000.
- OMEN's Tempest Monitor Cooling Technology addresses burn-in concerns, and comes with a three-year warranty.



Model	OMEN Transcend 32 UHD 240Hz OLED gaming monitor
Size	31.5-inch
Resolution	4K UHD (3840x2160)
Panel	QD OLED
Color gamut	Display P3 99% Adobe RGB 97.5% sRGB 100% BT.2020 80%
Refresh rate	240Hz
Response time	0.03ms GtG
Ports	3x USB-A 3.2 downstream (10Gbs / 7.5W) 1x USB-C 3.2 downstream (10Gbs / Power Delivery 15W) 1x USB-C upstream (15W, data connection)
Video ports	1x DisplayPort 2.1 2x HDMI 2.1 1x USB-C upstream (full featured, DisplayPort Alt mode, Power Delivery 140W) (adaptive sync support)



Source: Photos taken by Omdia at CES 2024

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Samsung Display – QD OLED monitor

- Samsung Display announced the world's first UHD OLED monitor and the world's first 360Hz OLED monitors at CES 2024.



Size	49-inch 32:9
Backlight	QD OLED
Resolution	5120x1440
Frame rate	240Hz
Size	34-inch 21:9
Backlight	OLED
Resolution	3440x1440
Frame rate	175Hz

Source: Photos taken by Omdia at CES 2024



Size	31.5-inch 16:9
Backlight	QD OLED
Resolution	3840x2160
Frame rate	240Hz
Brightness	400cd/m ² (SDR) Peak 1,000:1 (HDR)



Size	27-inch 16:9
Backlight	QD OLED
Resolution	2560x1440
Frame rate	360Hz

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LG Electronics – Portable monitor – StanbyME version 2



Landscape mode



Portrait mode



Tablet mode

Source: Photos taken by Omdia at CES 2024

Display	27-inch LCD
Supplier	LG Display
Series	StanbyME Go
Resolution	FHD (1920x1080)
Frame rate	60Hz
Touch	Yes (in cell)
OS	Web OS 22
HDMI	1
USB 2.0	1
Type A	1
Speech recognition	Yes (LG ThinQ)
Battery	3 to 4 hours
Weight	12.7kg
Projection screen	Yes
Sound	Dolby Atmos
Set price	₩1,170,000 (CNY 6,900)
Mass production	July 2023

KTC – OLED gaming monitor

- KTC is a company that specializes in the TV OEM/ODM business, with an annual supply of approximately 7.5 million units of TVs worldwide. It was KTC's first time participating at CES this year. The company showcased its gaming monitor series, which includes 45-inch 21:9 products with 4K OLED, 27-inch 16:9 OLED, and gaming monitors with IPS panels and Mini LED backlighting local dimming technology.



Size	45-inch 21:9
Backlight	OLED
Resolution	3840x2160
Frame rate	240Hz
Brightness	450cd/m ² (SDR) Peak 1,000:1 (HDR)

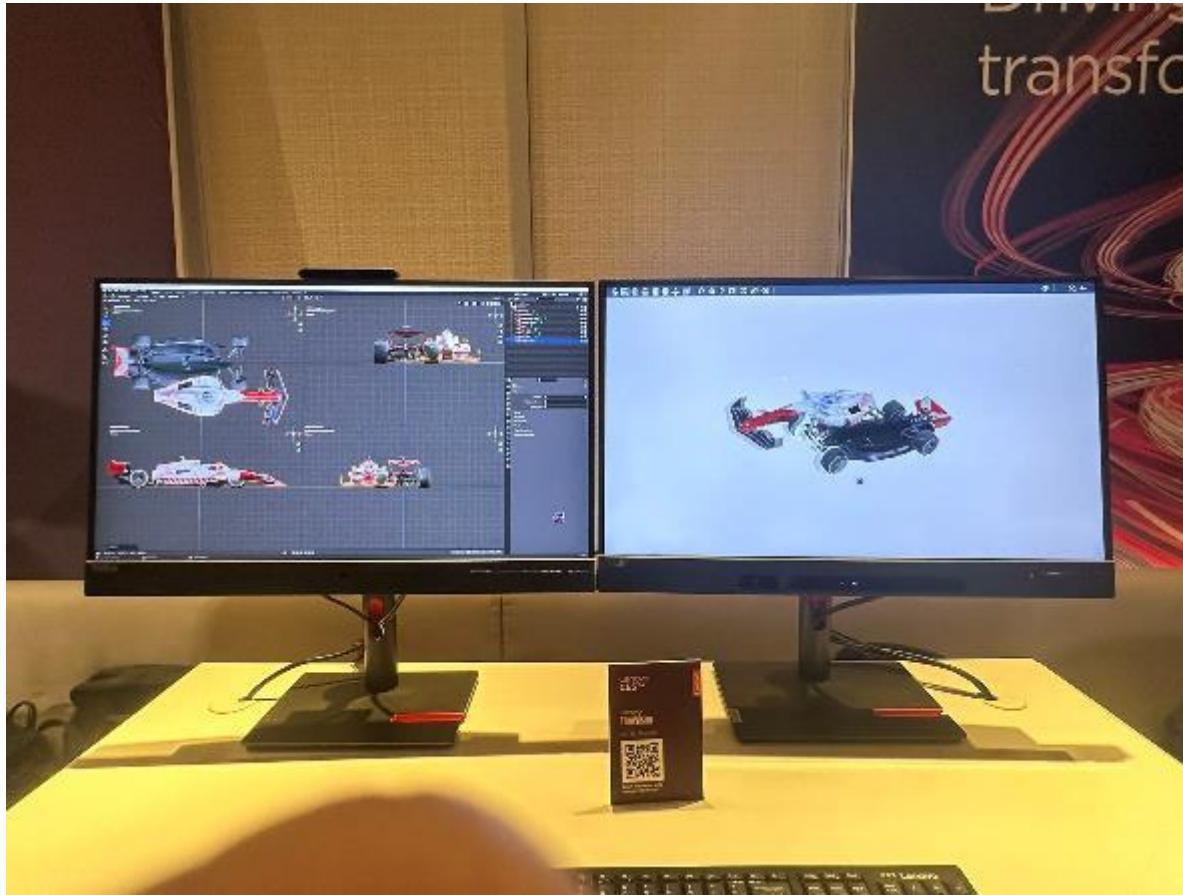
Size	27-inch Fast IPS Flat
Backlight	Mini -LED (576 zones)
Resolution	3840x2160
Frame rate	160Hz
Brightness	400cd/m ² (SDR) Peak 1,000:1 (HDR)

Size	27-inch 16:9
Backlight	OLED
Resolution	2560x1440
Frame rate	240Hz
Brightness	450cd/m ² (SDR) Peak 1,000:1 (HDR)

Source: Photos taken by Omdia at CES 2024

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Lenovo's commercial monitor – think vision 3D



Source: Photo taken by Omdia at CES 2024

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- Lenovo think vision 27-inch 3D glasses-free 2D/3D compatible display
 - The cutting-edge Lenovo ThinkVision 27-inch 3D brings all content to life in immersive 3D. Enjoy all 3D content without any glasses for extreme convenience. The monitor's 2D and 3D compatibility, combined with real-time eye tracking lets you experience seamless productivity. 99% DCI-P3 and Adobe sRGB color space coverage lets you create the most color-accurate content in 3D.
- Key details
 - 27-inch IPS 4K resolution
 - Immersive glasses-free 3D with real-time eye-tracking
 - 2D/3D compatible for hybrid efficiency
 - Hassle-free AI powered software ecosystem

Lenovo – 49-inch ThinkVision



Source: Photo taken by Omdia at CES 2024

- Features of the 49-inch ThinkVision:

- The ThinkVision P49w-30 monitor's 49-inch, 32:9 aspect ratio display offers a panoramic view. The wide display allows users to perform multiple tasks on a single screen. The monitor has dual QHD 5120x1440 resolution and a 2,000:1 contrast ratio. It also features in-plane switching (IPS) black panel technology, which delivers deep blacks and vibrant colors. With HDR10 support, users can experience lifelike HDR video content imagery.

Size	49-inch (32:9)
Panel type	Three-sided borderless IPS
Curvature	3800R
Resolution	5120x1440
Response time	4ms (extreme mode) 6ms (normal mode)
Refresh rate	60Hz
Brightness	350cd/m ²
Contrast Ratio	2,000:1

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MSI – QD OLED gaming monitor



Size

32-inch 16:9

Display tech

QD OLED

Resolution

3840x2160

Frame rate

240Hz

AI

AI SkySight uses AI technology to automatically detect the enemy's position and display it on the screen.

Source: Photos taken by Omdia at CES 2024

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TCL – QD Mini LED gaming monitor



Source: Photos taken by Omdia at CES 2024



Size	34-inch 21:9
Backlight	QD Mini LED 2,304 LED chips 1,152 zones
Resolution	3440x1440 (WQHD)
Frame rate	170Hz
Brightness	1600cd/m ²
Curved	Yes (1500R)
Size	27-inch 16:9
Backlight	QD Mini LED 1,152 zones
Resolution	3840x2160 (UHD)
Frame rate	160Hz
Brightness	1600cd/m ²
Curved	No

TCL China Star – Inkjet printing OLED gaming display

- TCL China Star showed its inkjet printing OLED 31-inch 4K gaming display at CES 2024.
 - It is the world's first domelike OLED desktop display, and the first to adopt "magic carpet" laminated module technology.
 - It has a wide 3D spatial perspective.



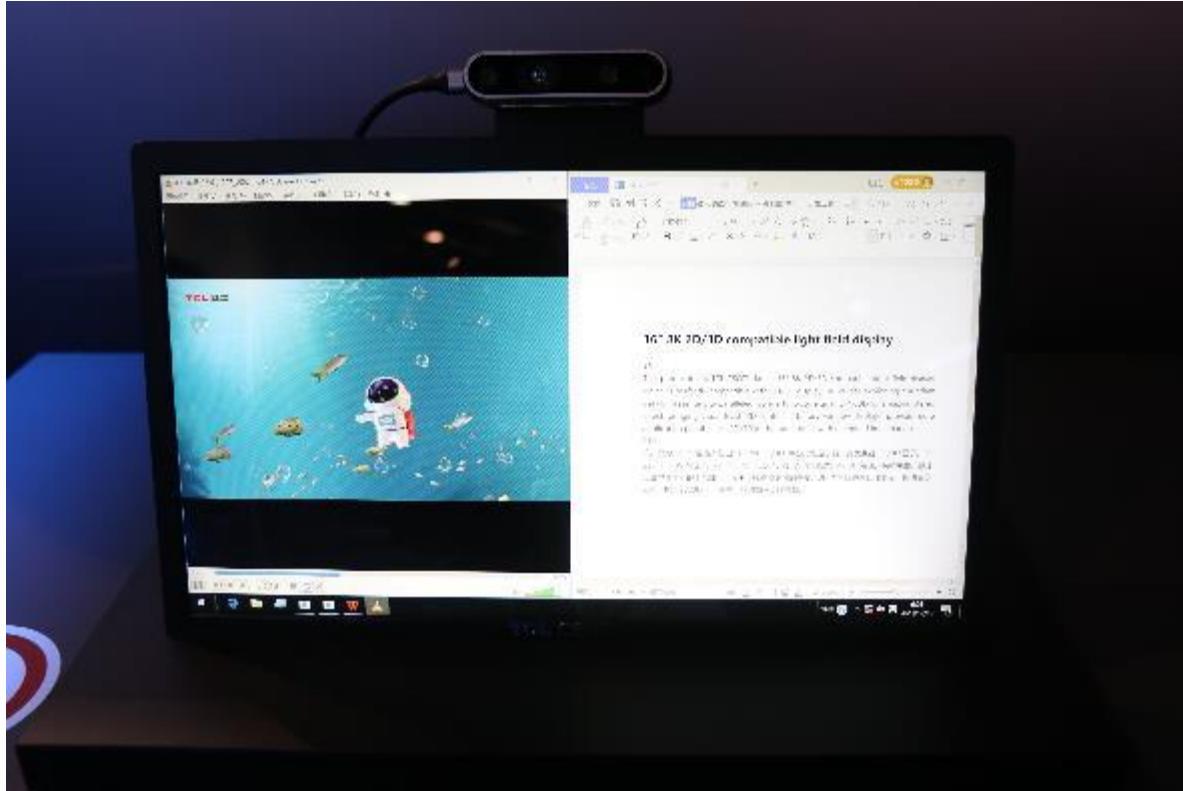
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TCL China Star – 3D/2D-compatible light field display

16-inch 8K 2D/3D-compatible light field display



Source: Photos taken by Omdia at CES 2024

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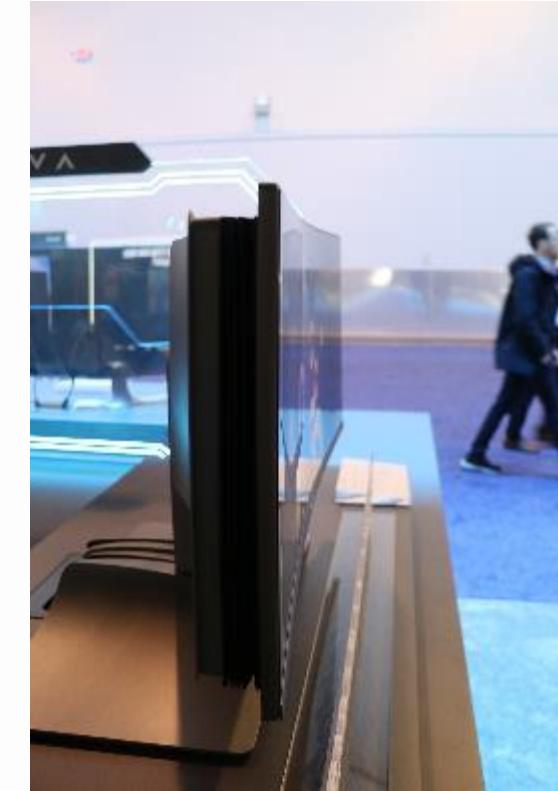
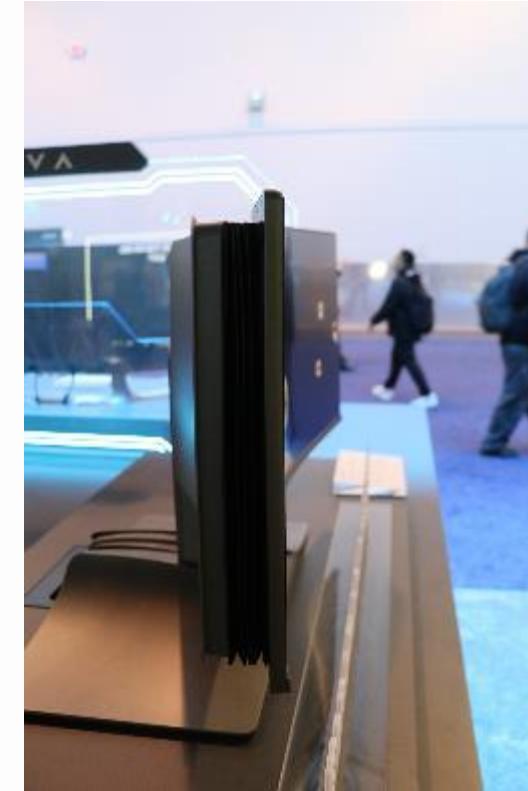
- The specifications are as follows:
 - Display size: 16-inch
 - Resolution: 8K
 - Compatible with 2D/3D

TCL China Star – Bendable Mini LED

34-inch bendable Mini LED (3440x1440, 165Hz refresh rate)



Source: Photos taken by Omdia at CES 2024

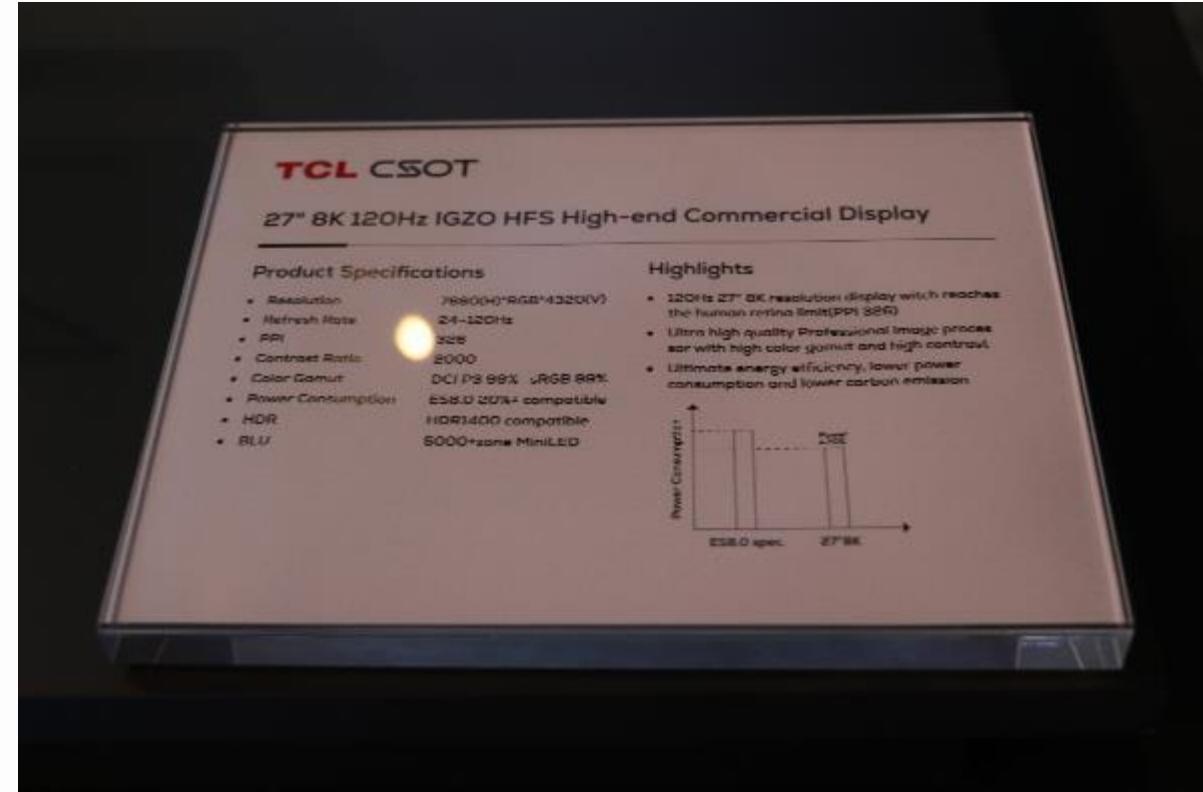


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TCL China Star – 27-inch IGZO monitor



Source: Photos taken by Omdia at CES 2024



RCA – Gaming monitor

49-inch curved gaming monitor (5120x1440, 165Hz refresh rate)



23.8-inch IPS flat gaming monitor (1920x1080)



Source: Photos taken by Omdia at CES 2024

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HKC Display – Gaming monitor

- HKC Display exhibited its gaming monitor, which uses a 27-inch flat display and oxide technology. It has the world's highest frame rate, 500Hz.
- HKC invested in an oxide test line at its Gen 8.6 IPS fab in Mianyang, China, and the company continues to find new applications for oxide displays in premium products.



- **Display specifications:**
 - Display: 27-inch oxide
 - Resolution: 2560x1440 (109 PPI)
 - Technology: Oxide gaming, ultra-high frame rate 500Hz
 - Aspect ratio: 16:9
- **Features:**
 - Color gamut: DCI PE 98%
 - Contrast: 1,500:1
 - Frame rate: 500Hz
 - Response time: GtG 1ms
 - Feature: Oxide IPS gaming monitor
 - Producing: Gen 8.6 IPS fab in Mianyang, China
 - QHD monitor with the highest frame rate in the world

Source: Photo taken by Omdia at CES 2024

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HKC Display – Curved monitor with IPS technology

- HKC Display announced its curved monitor with a screen size of 34 inches and IPS technology. The monitor has a curvature of 3800R and an aspect ratio of 21:9. The ultra-wide WQHD IPS curved monitor is suitable for working and entertainment purposes.



Source: Photo taken by Omdia at CES 2024

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HKC – OLED monitor

- HKC, which has brands and OEM/ODM business for TV and monitors, announced its OLED monitor product lineups at CES 2024. The G13 series features a 27-inch OLED display (2K 240Hz) and the P2 series features a 34-inch OLED display (3.5K 175Hz).

34-inch OLED 3.5K/175Hz gaming monitor



Source: Photos taken by Omdia at CES 2024

27-inch OLED 2K/240Hz gaming monitor



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Konka – Gaming monitor



Source: Photos taken by Omdia at CES 2024



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CTX – LCD and OLED monitor OEM/ODM products

- CTX exhibited a series of LCD monitors, LCD monitors with Mini LED backlighting, and curved OLED monitors.



Source: Photos taken by Omdia at CES 2024

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Sansui – OLED 27-inch gaming monitor

- Sansui unveiled a 27-inch OLED gaming monitor at CES 2024.



Source: Photos taken by Omdia at CES 2024

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Notebook PC displays

HP – OMEN Transcend OLED gaming laptops

Model	OMEN Transcend 14 gaming laptop PC	OMEN Transcend 16 gaming laptop PC		
Size	14.1-inch	16.1-inch	16.1-inch	16.1-inch
Resolution	2.8K (2880x1800)	WQXGA (2560x1600)	WQXGA (2560x1600)	WUXGA (1920x1200)
Panel	OLED	OLED	IPS Micro-Edge	IPS Micro-Edge
Panel sourcing	Samsung Display			
Processors	Intel Core Ultra 9 185H Intel Core Ultra 7 155H		Intel Core i9-14900HX Intel Core i7-14700HX	
Graphics	NVIDIA GeForce RTX 4070 Laptop GPU with 8GB GDDR6 memory NVIDIA GeForce RTX 4060 Laptop GPU with 8GB GDDR6 memory NVIDIA GeForce RTX 4050 Laptop GPU with 6GB GDDR6 memory			
Refresh rate	240Hz	240Hz	240Hz	165Hz
Response time	0.03ms GtG	0.2ms	3ms	3ms
Input/ connectivity	<ul style="list-style-type: none"> • 1x Thunderbolt 4 with USB Type-C 40Gbps signaling rate (USB Power Delivery, DisplayPort 1.4, HP Sleep and Charge) • 1x USB Type-C 10Gbps signaling rate (USB Power Delivery, DisplayPort 1.4, HP Sleep and Charge) • 1x USB Type-A 10Gbps signaling rate (HP Sleep and Charge) • 1x USB Type-A 10Gbps signaling rate • 1x headphone/microphone • 1x HDMI 2.1 	<ul style="list-style-type: none"> • 2x Thunderbolt 4 with USB Type-C 40Gbps signaling rate (USB Power Delivery, DisplayPort 1.4, HP Sleep and Charge) • 1x USB Type-A 5Gbps signaling rate (HP Sleep and Charge) • 1x USB Type-A 5Gbps signaling rate • 1x RJ-45 • 1x headphone/microphone combo • 1x HDMI 2.1 		

OMEN Transcend 14 gaming laptop PC



OMEN Transcend 16 gaming laptop PC



Source: Photos taken by Omdia at CES 2024

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HP's OMEN Transcend 14-inch gaming laptop

HP's OMEN Transcend 14 is a gaming laptop meant to do double the work of a normal laptop



Source: Photo taken by Omdia at CES 2024

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- HP's new OMEN Transcend is a 14-inch laptop designed to bridge the gap between gaming and normal usage. That means the colors are more subtle and bright colors can easily switch to all white in a few clicks.

LG Gram Fold

- LG showcased the Gram Fold, which is equipped with a 17-inch 2560x1920 foldable OLED with touch.
 - Display: Foldable OLED with touch
 - 13th Gen Intel core i5 processor and Intel Iris Xe graphics



Source: Photos taken by Omdia at CES 2024



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Lenovo – Yoga laptop series

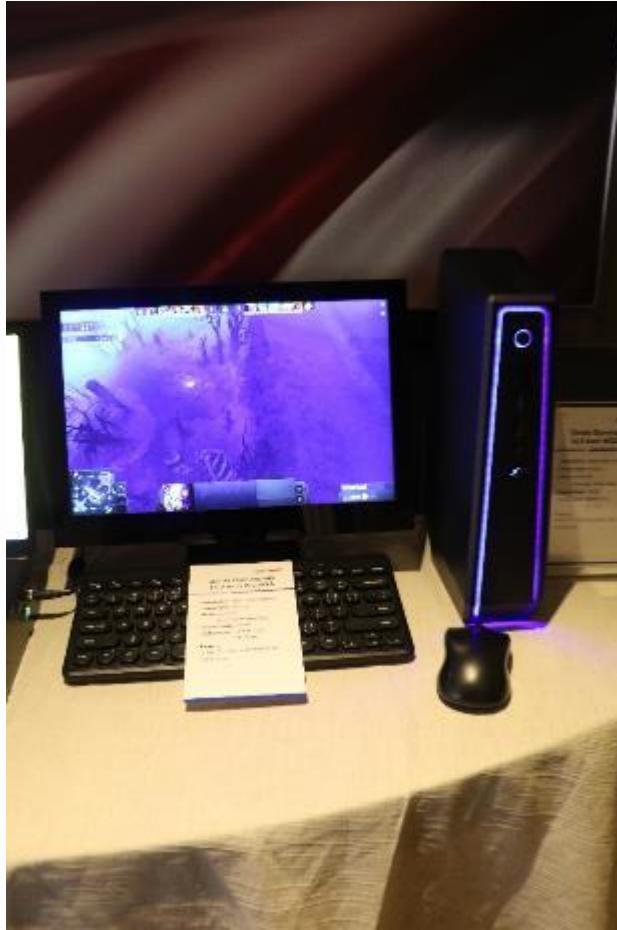


	Yoga book 9i	Yoga pro 9i	Yoga 9 (2-in-1)	X1 Carbon G12	X1 2-in 1 Gen 9	Plus G5 Hybrid	13X Gen 4
Size	13.3-inch x2	16-inch	14-inch	14-inch	14-inch	14-inch	13.5-inch
Technology	OLED	Mini LED	OLED	OLED	IPS LCD/OLED	OLED	OLED?
Resolution	2.8K	3.2K	4K/2.8K	2.8K	WUXGA/2.8K	2.8K	2.8K
Brightness	400 nits	1,200 nits	400 nits	500 nits	400 nits	400 nits	500 nits
	16:10	16:10	16:10	16:10	16:10	16:10	3:2
Refresh rate		165Hz		120Hz	120Hz		120Hz

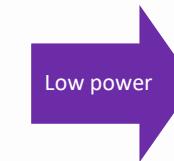
Source: Photos taken by Omdia at CES 2024

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HKC Display – Oxide gaming notebook and low power consumption



- **Display**
 - 14.5-inch
 - Technology: oxide notebook
 - Resolution: 2560x1600 (208 PPI)
 - Frame rate: 240Hz
 - Aspect ratio: 16:10
- **Display**
 - 14.5-inch
 - Technology: Oxide notebook
 - Resolution: 2560x1600 (208 PPI)
 - Frame rate: 10Hz
 - Aspect ratio: 16:10



Source: Photos taken by Omdia at CES 2024

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RCA – Notebook PC



Size	14.1-inch
Backlight	IPS LCD
Resolution	FHD
Touch	Yes
CPU	Intel Pentium N5030



Size	15.6-inch
Backlight	IPS LCD
Resolution	FHD
Touch	No
CPU	Intel Pentium N5030

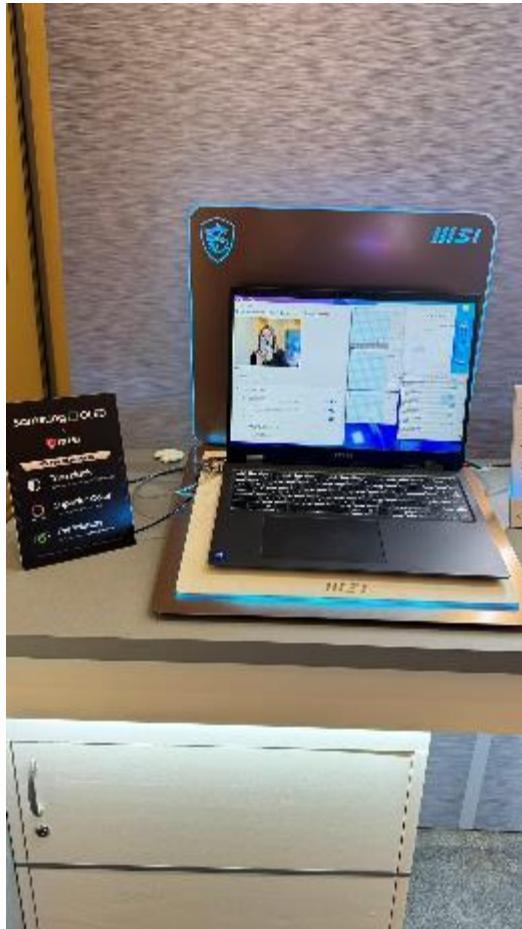


Size	10.1-inch
Backlight	LCD
Resolution	2560x1440
Touch	No
CPU	MediaTek 8768

Source: Photos taken by Omdia at CES 2024

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MSI – Prestige 16 AI Studio B1V



Size	16-inch
Display technology	QD OLED
Resolution	3840x2400
Aspect ratio	16:10
CPU	Intel core Ultra 9 processor 185H
GPU	NVIDIA GeForce RTX 4070 Laptop GPU 8GB GDDR6

AI
MSI AI Engine analyzes user behavior and the applications used, and automatically adjusts various system settings to best fit the user's needs.

Source: Photos taken by Omdia at CES 2024

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Samsung Display and MSI promoted 16-inch 240Hz OLED notebooks

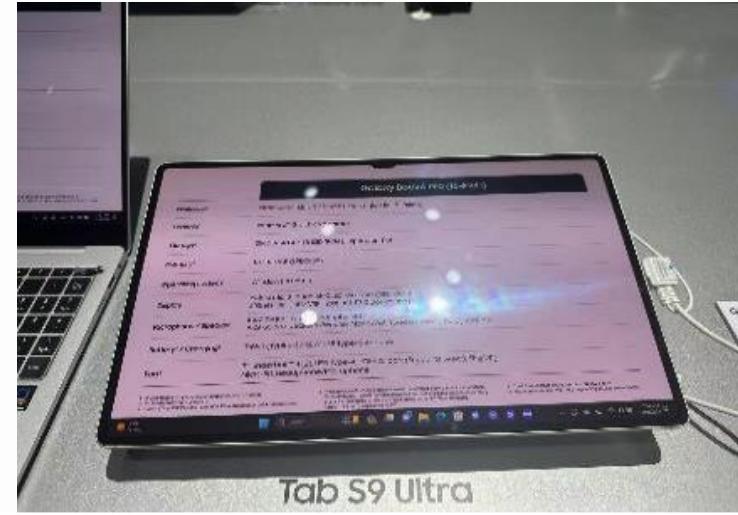


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Tablet displays

Samsung Tab S9 Ultra



Model	Tab S9 Ultra	Tab S9+	Tab S9
Size	14.6-inch	12.4-inch	11-inch
Display technology	Dynamic AMOLED 2X	AMOLED	AMOLED
Resolution	2960x1848 (WQXGA+)	2300x1752	2560x1600
CPU	Octa-core (3.36GHz, 2.8GHz, 2GHz)	Octa-core 1x3.36GHz+2x2.8GHz+2x2.8GHz+3x2.0GHz	Octa-core 3.36GHz Cortex-X3*1+2.8GHz Cortex A715*2+2.8GHz Cortex A710*2+2.0GHz Cortex-A510*3
Mass production	July 26, 2023	August 6, 2023	August 6, 2023

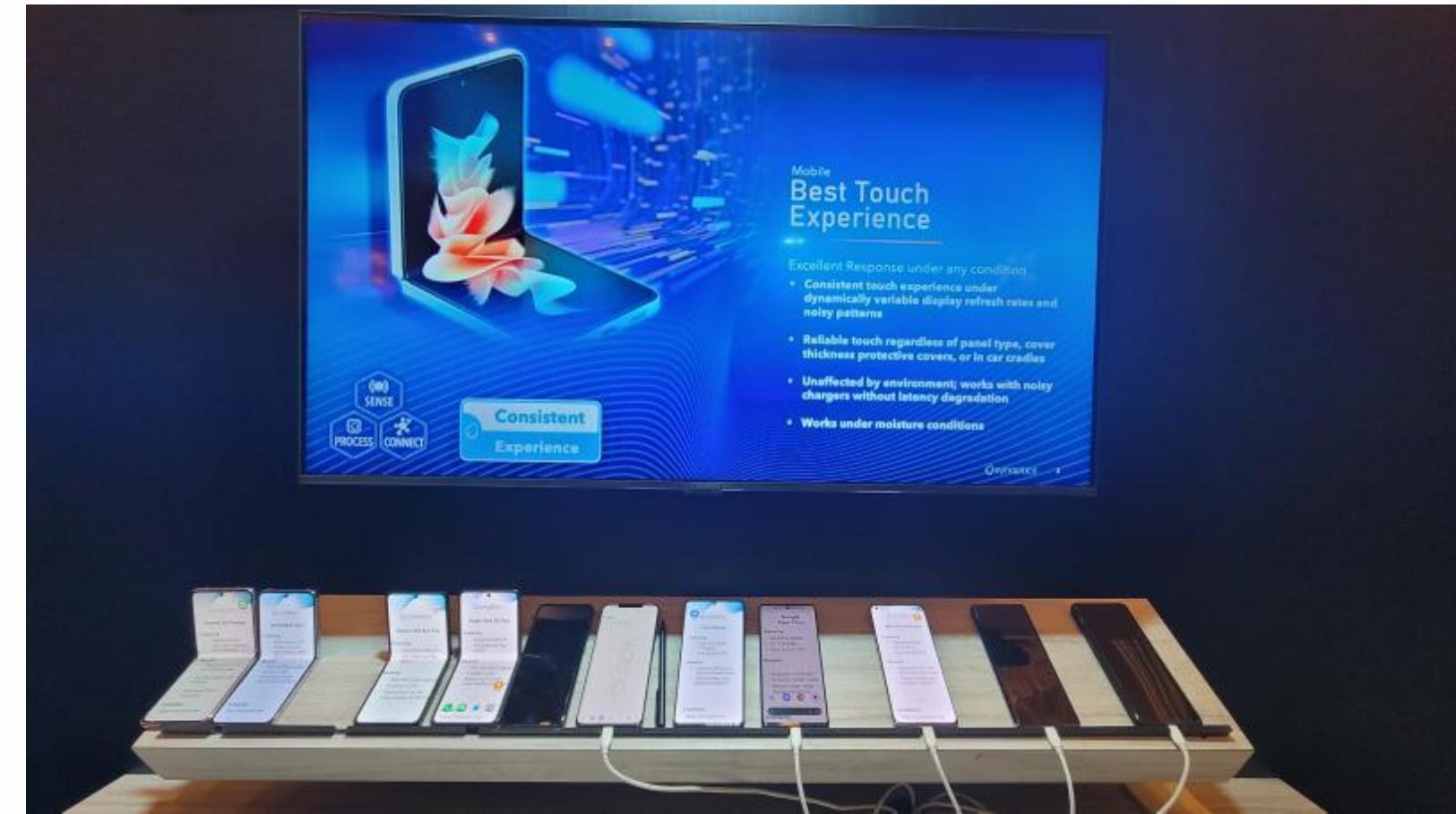
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Smartphone displays

Synaptics – Touch IC for flexible OLED and foldable OLED displays

- Specially for the foldable OLED display touch driver IC.
- CapFold: Detects angle on a foldable display; removes Hall IC, angle sensor, and heavy magnet.
- FaceDetect: Detects approach of a face capacitively; removes an IR proximity sensor.
- Minimal external components: As few as 6 external capx required.
- Low-cost FPC: Saves cost by implementing two-layer FPCs.



Source: Photo taken by Omdia at CES 2024

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TCL – Smartphone lineup

TCL 50 Series lineup



TCL 50 series lineup

Model	Specifications
TCL 50 XE 5G	6.6-inch, LCD, HD+, 90Hz
TCL 50 XL 5G	6.8-inch, LCD, FHD+, 120Hz
TCL 50 LE	6.6-inch, LCD, HD+, 90Hz
TCL 50 XE NxtPaper 5G	6.6-inch, LCD, HD+, 90Hz, reflection-free panels
TCL 50 XL NxtPaper 5G	6.8-inch, LCD, FHD+, 120Hz, reflection-free panels

Source: Photo taken by Omdia at CES 2024

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ASUS – ROG Phone 8 series

ASUS ROG Phone 8 series lineup



Source: Photos taken by Omdia at CES 2024



ROG Phone 8 Pro Edition and Pro

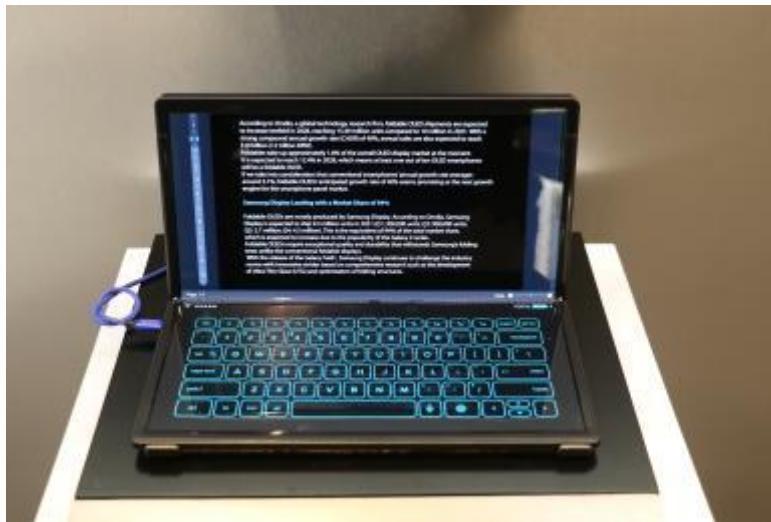
ROG Phone 8

- 6.78-inch flexible AMOLED
- Resolution: 2400x1080
- Refresh rate: Up to 165Hz
- LTPO 1–120Hz
- Brightness: 2,500 nits (peak)
- AniMe Vision*: Mini LED display (ROG Phone 8 Pro / Pro edition)

*AniMe Vision is a 341-element display that can display preset or user-created animations.

Samsung Display – Flexible OLED displays

Flex Note Extendable



Flex Hybrid



Flex Liple

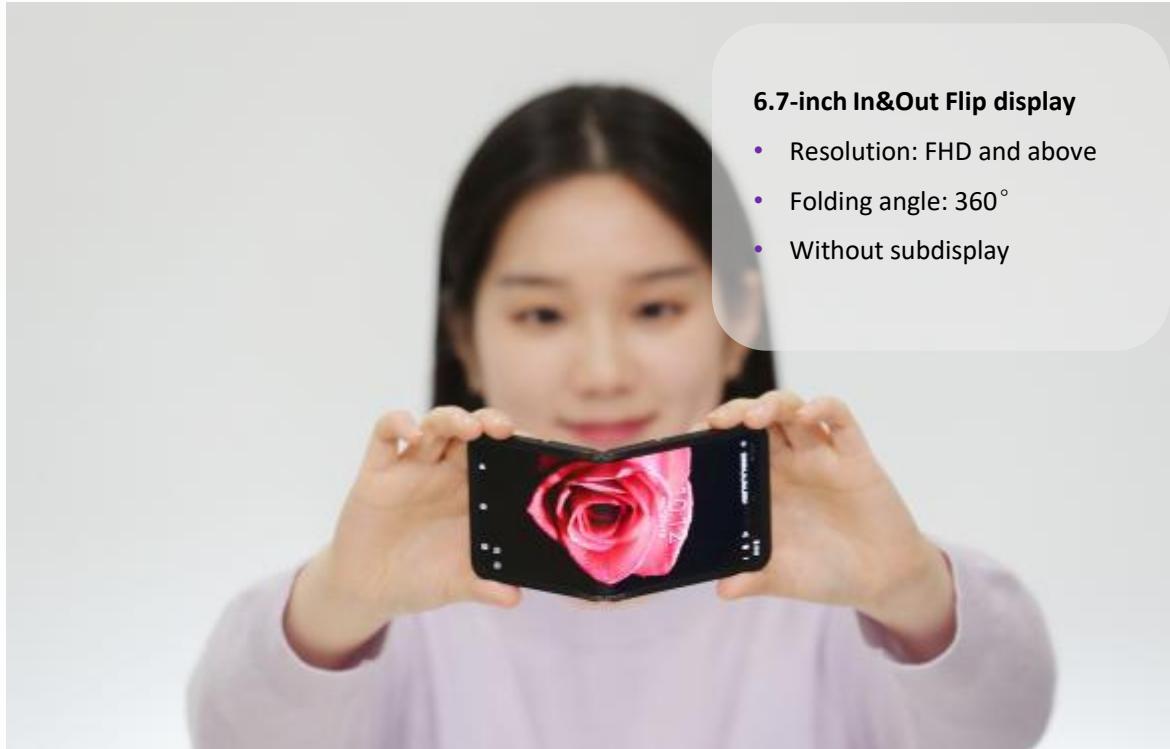


Source: Photos taken by Omdia at CES 2024

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Samsung Display – New changes to foldable screen

Samsung Display Flex In&Out Flip



Samsung Display Flip Liple



Source: Photos taken by Omdia at CES 2024

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Tianma's U8 has higher electroluminescence efficiency and lower voltage

Tianma U8 material system demo



TIANMA@CES2024

Source: Photo taken by Omdia at CES 2024

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Tianma U8 material system advantages (versus T7+ material system)

Display type	OLED
Electroluminescence efficiency	11% higher
Voltage	9% lower
Power consumption	Reduced by 8% (compared to the industry standard)
Blue light component	Reduced by 14% (compared to the industry standard)

Samsung Display – Steam Deck OLED



Source: Photos taken by Omdia at CES 2024



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Automotive displays

AGC's automotive products (1/2)

ACG light control side window and 3D curved cover glass for car-mounted displays



Source: Photos taken by Omdia at CES 2024

ACG light control panoramic roof with low-E coating



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AGC's automotive products (2/2)

ACG panoramic HUD windshield glass coating solution



Source: Photos taken by Omdia at CES 2024



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AUO's new Smart Cockpit 2024

AUO's new Smart Cockpit 2024



"Rollable RSE,"
a CES 2024
Innovation
Award Honoree



The "Interactive Transparent Window" received the esteemed CES Best of Innovation Award.

Source: Photos taken by Omdia at CES 2024

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BOE's automotive products

BOE automotive displays



Source: Photos taken by Omdia at CES 2024

Left

BOE	
Name	12.7" ADS Pro
Display Mode	Normally Black ADS-Pro
Resolution	2944 x 1840
Contrast	1,500:1
Luminance	410 nits
Operating Temp.	-20 to +80°C
Remark	120 Hz TDDI MUX2 Top Gate

Middle

BOE V+ VARTIFORM	
Name	44.8" Oxide MLED
Display Mode	Normally Black ADS
Resolution	8960 x 1092
Contrast	1,000,000:1
Luminance	2,000 nits
Dimming Zone	6048
Operating Temp.	-30 to +85°C
Remark	Oxide Substrate Glass Substrate MLED

Right

BOE V+ VARTIFORM	
Name	12.3" Privacy on Demand
Display Mode	Normally Black ADS
Resolution	1920 x 720
Contrast	1,500:1
Luminance	200 – 1,000 nits
Operating Temp.	-30 to +85°C
Privacy Mode	Driver typ. = 0.5% Co-driver typ. = 2.5%
L40/L0	
Share Mode	Driver and Co-Driver typ. = 45%
L40/L0	
Remark	Triple Cell Switchable Privacy

CarUX's automotive products (1/2)

CarUX display system embedded hidden IR camera



13" Tanuki (left) and 12.3" real wood hidden display (right)



10.3" transparent leather display



Applications		DMS / 3D Authentication ...	
Drowsiness	Not_Detected	Not_Detected	Unavailable
Distraction	Not_Detected	Unresponsive	Unresponsive
Long Distraction	Not_Detected	Not_Detected	Detected_Long
VATS Distraction	Not_Detected	Detected	Detected
Eye on Road	YES	No	No
Head on Road	YES	No	No

Source: Photos taken by Omdia at CES 2024

13" Tanuki

- Paper-like display
- Increased diffused reflection and decreased specula reflection
- Protects the eyes

12.3" real wood hidden display

- Real wood surface
- Blends into the vehicle's interior design
- Multiple wood options available

- Integrates screen and mood lighting
- Normal display and touch control can still be achieved through the leather UI
- Integrates decoration and mood lighting

CarUX's automotive products (2/2)

12.6" Kinematics display



- With up to 90° of portrait and landscape rotation
- UI or manual trigger rotation
- Voltage and current monitor

Source: Photos taken by Omdia at CES 2024

12.3" projective HUD



- Warpage correction (distortion free)
- High reflectivity
- No significant aberration
- Smaller volume

Pixiu 3 Premium



- 9.6" Micro LED
- 229 PPI (1920x1080)
- 1,000 nits

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Continental's automotive products

Secure entrance display (with cameras)



9.6" Micro LED displays



Curved In2Visible OLED display



Source: Photos taken by Omdia at CES 2024

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CSOT's automotive products

5.1" AR HUD



5.1" AR Head-up Display

Product Specifications

- Active Area(mm) 122.904(W)*40.968(H)
- Resolution 1440(H)*RGB*480(V)
- Transmittance Typ 8.9%
- Color Gamut NTSC Typ45%
- Contrast Ratio Min 1200:1 Typ 1600
- White transmittance uniformity Min 90%
- HTO 105C 500H

Highlights

- The FOG transmittance can reach up to 8.9% while ensuring NTSC 45%
- Uniformity of white transmittance up to 90%
- The first product is resistant to high temperatures, with an operating temperature of up to 105C 500H and a storage temperature of 105C 1000H

10.25" Micro LED + 15.9" Mini LED display



10.25" Micro LED+15.9" Mini LED Display

Product Specifications

- | | 10.25" | 15.9" |
|----------------------|-------------|-------------|
| • Panel Size | 10.25" | 15.9" |
| • Tech. | Micro LED | MiniLED |
| • Resolution | 1134*650 | 2880*1440 |
| • Refresh Rate | 120Hz | 60Hz |
| • Contrast Ratio | 1,000,000:1 | 1,000,000:1 |
| • PPI | 127 | 202 |
| • Color Gamut (NTSC) | 100% | 85% |
| • Luminance | 2000nits | 800nits |
| • View angle | H±30°/V±5° | / |

Highlights

- 10.25" Micro LED: Super-high brightness equipped with high transparency windshield(Tr70%), meeting the requirements of safe driving with an eye-catching brightness(> 2000nits) Ultra-large FOV, which is visible from the entire vehicle perspective, improving driving safety
- 15.9" Mini LED: Mini LED backlight, 3K irregular high-definition display equipped with Notch scheme

23.6" partial dynamic privacy auto display



23.6" Partial Dynamic Privacy Auto Display

Product Specifications

- | | 3840(H)*RGB*720(V) |
|----------------|-----------------------|
| • Resolution | 3840(H)*RGB*720(V) |
| • PPI | 165 |
| • Frame Rate | 60Hz |
| • Color Gamut | sRGB 100% |
| • Backplane | LTPS |
| • Public Mode | OEM V5.1 |
| • Privacy Mode | 30/0*4.5%; 45/0*1.25% |
| • ΔLum | <2.6% |
| • Δx&y | <5% |

Highlights

- Equipped with mini LED backlight and multi-switching cell technology, which minimized the brightness loss, less impact on power consumption, and can support local dimming function in both privacy and sharing mode
- The brightness can meet OEM V5.1 in sharing mode

Source: Photos taken by Omdia at CES 2024

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FIC's automotive products

Laser beam-based AR HUD



Holos 3D floating image



Source: Photos taken by Omdia at CES 2024

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Harman's automotive products

Harman Ready Display QD LED



Harman Ready Vision QVUE 2K and 5K



Harman Ready Display QSCAPE



Source: Photos taken by Omdia at CES 2024

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Himax's automotive products

Automotive local dimming TCON HX8880-F Series



Source: Photos taken by Omdia at CES 2024

Automotive lighting with CMVT and Ta Yih Industrial



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Automotive AMOLED touch controller



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Hisense's automotive products



Source: Photos taken by Omdia at CES 2024

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LG Display's automotive displays

57-inch pillar-to-pillar (P2P) LCD



Source: Photos taken by Omdia at CES 2024

32-inch 2560x1440 slidable OLED



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Marrelli's automotive products

Intelligent cockpit display



Intelligent cockpit display (continued)



LeanDisplay

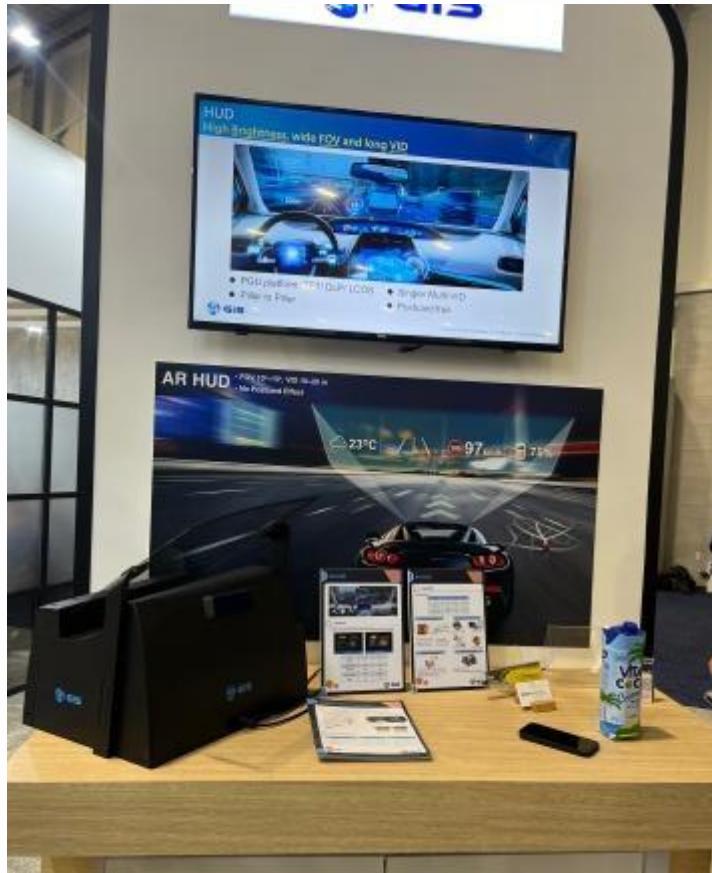


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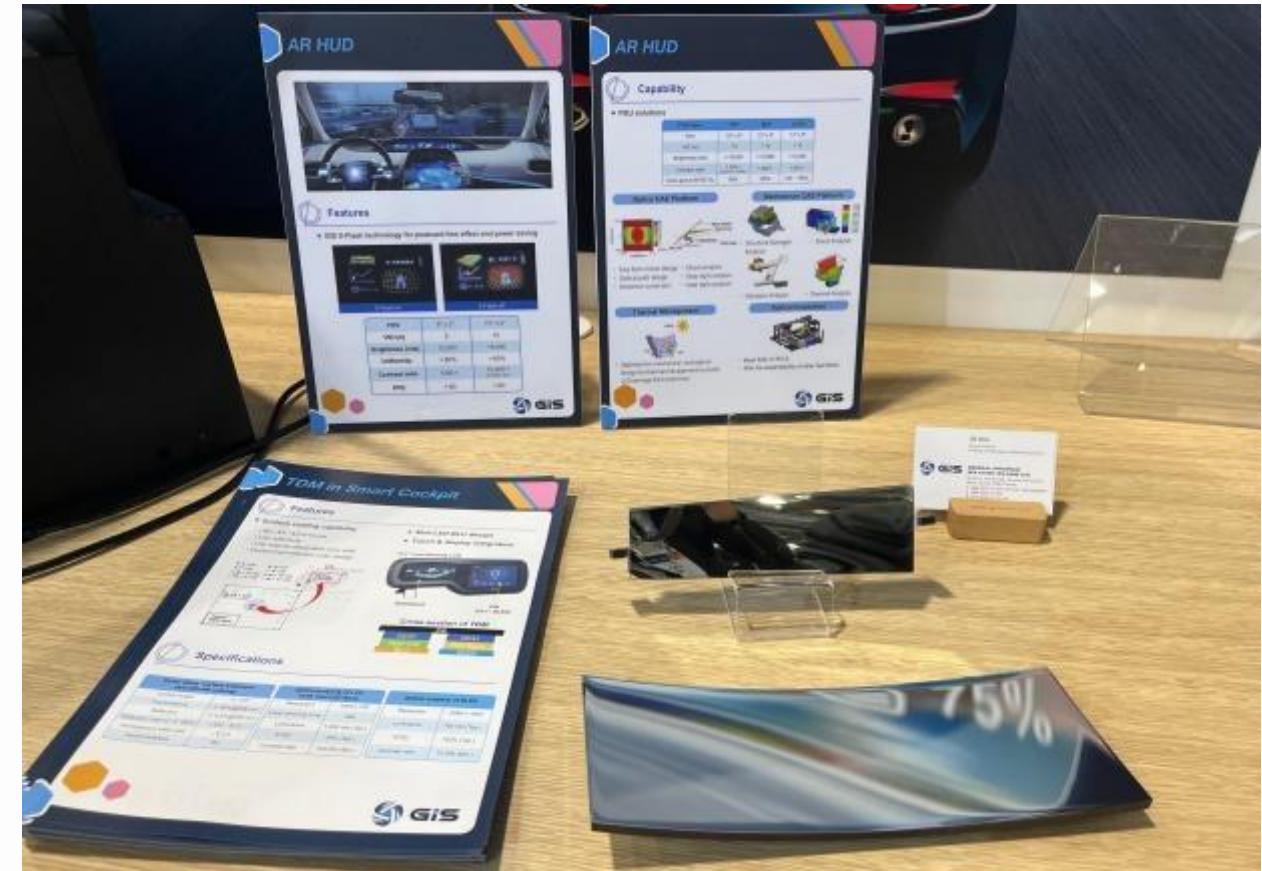
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GIS's automotive products

AR HUD



Freeform mirror



Source: Photos taken by Omdia at CES 2024

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HKC's automotive products

Dual 12.3-inch (cluster + CID)



15.6-inch FHD in-cell IPS (CID)



12.3-inch FHD local-dimming LCD



Source: Photos taken by Omdia at CES 2024

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Samsung Display's automotive products

**Rollable Flex 12.4-inch FHD+ (1200x1920)
15R ultra-thin glass (UTG)**



**13-inch (3:2) to 17.3-inch (4:3) Slidable Flex
Solo**



9.4-inch circle OLED



Source: Photos taken by Omdia at CES 2024

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Sony Honda Mobility Inc. (SHM) AFEELA – Micro LED car-front display

- SHM's new AFEELA car prototype features a special display on the front of the car. According to Sony, the display is to "show your style and relevant information on Car's front face. The customizable media bar redefines human connection with mobility, displaying relevant information such as vehicle status, and weather on the outside of the car – all while letting you express yourself and showcase yourself."
- Omdia believes that it is using a new Micro LED display prototype, because the display on the car's front has to consider things such as the weather condition, robustness, shock vibration, ultra high brightness, and it has a high resolution for the personalized information shown on the screen. Therefore, it being a Micro LED display makes more sense than LCD or OLED.



Source: Photos taken by Omdia at CES 2024



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Corning's LivingHinge and AutoGrade Gorilla cover glass in Tianma's 13-inch flexible OLED automotive display

Tianma's flexible OLED automotive displays with Corning LivingHinge and Corning AutoGrade Gorilla Glass technologies



Source: Photo taken by Omdia at CES 2024

- At CES 2024, Corning announced a new collaboration with Tianma to create the next generation of automotive interior displays with Corning's LivingHinge technology. Both companies aim to deliver flexible OLED cockpit displays that are sustainable, ready to integrate, and can significantly enhance the driving experience for consumers.
- As part of the collaboration, Tianma will produce displays that respond to increasing consumer demand for individualized experiences behind the wheel. According to Corning, "LivingHinge combines a flexible, 13-inch organic light-emitting diode (OLED) with Corning AutoGrade Gorilla Glass to create a durable, dynamically bendable cockpit display. With these technologies, drivers can customize their cockpit layout and seamlessly integrate critical information into their driving experience."
- According to Corning, LivingHinge uses Corning's ColdForm technology, which allows the cover glass for automotive displays to be shaped at room temperature. The cold-forming process is more cost effective and energy efficient than traditional hot-forming techniques. It can also reduce global warming potential by up to 25%, as verified by an independent lifecycle assessment, compared to hot-formed glass.
- Automaker GAC Motor's design division helped with the design of the display with the cover glass form factor.

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BOE and Corning collaborated on a 44.6-inch curved oxide TFT LCD automotive display with Corning's ColdForm cover glass

- The ultra-large 44.6-inch panel, enabled by Corning's ColdForm technology, has an independently verified lower environmental impact of at least 25%, and it represents the next generation of sustainable automotive cockpit designs.



Source: Photo taken by Omdia at CES 2024

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The Industrial Technology Research Institute (ITRI) AR interactive vehicle display features a transparent Micro LED display from AUO

- According to ITRI:
 - “The AR Interactive Vehicle Display is a transparent display that allows sightseeing passengers in a moving vehicle to view and interact with augmented reality (AR) content regarding their current location and surrounding attractions without the need to wear any devices. When passengers spot a site of interest, visual information is presented in real time, following their line of sight. Passengers can touch a visual cue on the screen to access detailed information, such as attraction features, local history, and geography. Even in the absence of a tour guide, passengers can enjoy an informative ride.”
- The AR Interactive Vehicle Display integrates a transparent Micro LED display, GPS, and a sensing camera that tracks passengers' line of sight.



Source: Photos taken by Omdia at CES 2024



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Sharp's 12.3-inch QDEL with IGZO (oxide) TFT backplane

- QDEL is a self-emissive QD display. Sharp has ever called it NanoLED. Sharp exhibited the in-development 12.3-inch new nano LED display, a quantum dot electroluminescence (QDEL) display that directly uses QD materials for luminance and color emission.
- Sharp exhibited a 6.2-inch QDEL (nano LED) in 2022 and a new 12.3-inch QDEL prototype in 2023.



Source: Photo taken by Omdia at CES 2024

Comparison of major properties of OLED and QDEL (nano LED)

Feature	OLED	QDEL (nano LED)
Efficiency	High	Mid
Emission bandwidth (color saturation)	Broad (FWHM approximately 40–80 nm)	Narrow (FWHM <30nm)
Color tunability	Low (because of the different emitter molecules)	Excellent (by QD size and composition)
Manufacturing process	Vacuum deposition	Contact printing, inkjet printing, photolithography
Large-area display	Yes	Yes
Flexible display	Yes	Yes
Transparent display	Yes	Yes
Cost of emitter	High	Low
Color range	450–650nm (visible)	420–1,500nm (visible to near IR)

Bobcat, in collaboration with Bi-Search Int'l, Inc. and LG Electronics, introduced a 30-inch transparent OLED touch display in the S7X's cab door



Source: Photos taken by Omdia at CES 2024

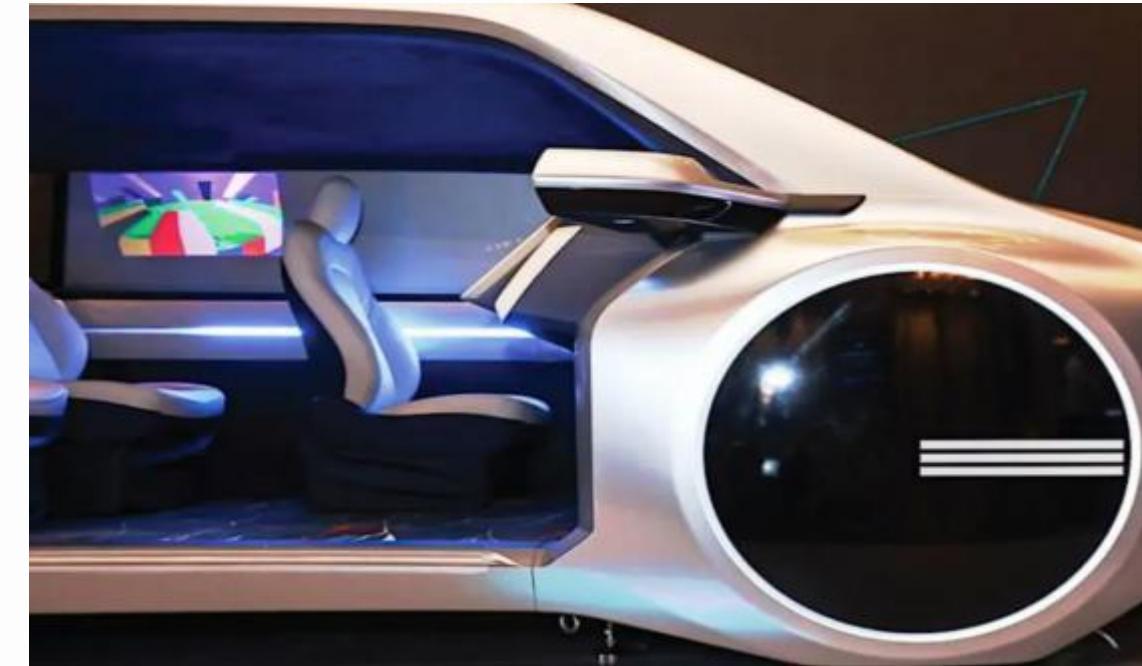
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Hisense's AR HUD automotive display by projection

- According to Hisense:
 - “Hisense is set to make its debut in the automotive industry at CES 2024. Hisense’s AR Heads-Up Display (HUD) combines holographic technology with proprietary panoramic TriChroma triple-laser projection, offering an impressive balance between compact size and exceptional display capabilities for more immersive imaging. AR HUD, coupled with laser phase and spectral tuning, delivers multi-directional displays with high resolution, remarkable transparency, extended projection distances, and wide-viewing angles to transform the windshield into an information hub, allowing drivers to simultaneously observe virtual images and the real environment at the same time.”



Source: Photos taken by Omdia at CES 2024



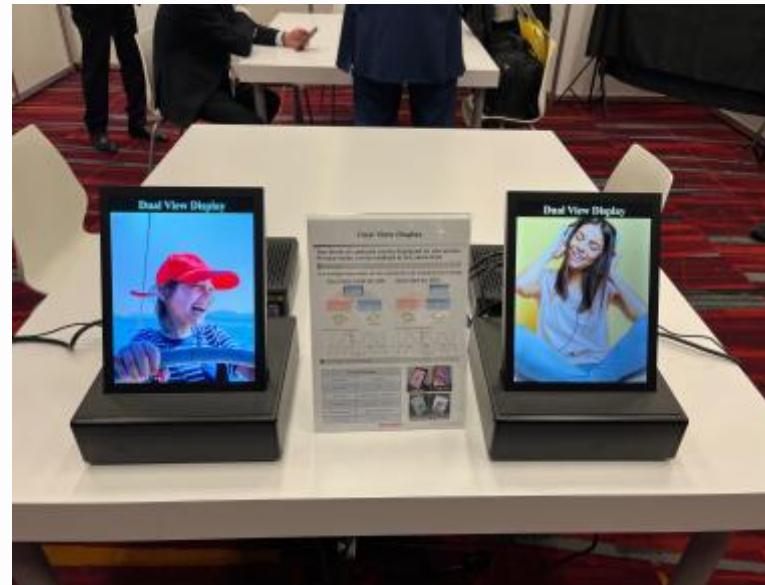
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Sharp's automotive products

12.3-inch X 2 super-long texture display (wood grain)



Dual-view display



Nano LED



Source: Photos taken by Omdia at CES 2024

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Visteon's automotive products

OLED TrueColor Image Enhancement



OLED TrueColor Image Enhancement

Market Trend:

- OLED demand comes from the consumer electronics market to the automotive market
- Display position shifts from N-dash to D-dash where it is more exposed to sunlight

Our Solution:

- Visteon's integrated algorithmic solution dynamically adjusts the display image to improve readability

Features and Benefits:

- High perceptual image quality in all driving conditions
- Lower power consumption
- Longer lifetime for OLED

Wide-format curved OLED display



Wide Format Curved OLED Display

Market Trend:

- Wide, curved OLED display
- High perceptual image quality
- Seamless display appearance

Our Solution:

- Custom OLED display using unique Visteon design and manufacturing capabilities
- High perceptual image quality and seamless display appearance with Visteon optical design expertise

Features and Benefits:

- Wide, curved display in custom format
- High perceptual image quality under all driving conditions
- Low reflection and black seamless performance

2 Wheel display



Source: Photos taken by Omdia at CES 2024

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Tianma's automotive products (1/2)

11.6-inch under-display camera



11.6“ Knob On Display With Haptic Feedbacks



27" Partial Privacy + Mini LED + Curve



Source: Photos taken by Omdia at CES 2024

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Tianma's automotive products (2/2)

4.1-inch local-dimming HUD



15.6-inch QD Mini LED



15.6-inch PM white Mini LED



Source: Photos taken by Omdia at CES 2024

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Visionox's automotive products

Rollable automotive HMI integrated display solution



Flexible automotive armrest display solution



Flexible automotive central control display solution



Source: Photos taken by Omdia at CES 2024

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Wearable displays

Samsung Display – RGB OLEDoS display

Samsung Display RGB OLEDoS



Source: Photo taken by Omdia at CES 2024

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1.03-inch RGB OLEDoS display

Display type	OLEDoS
PPI	3,500
Applications	XR headsets
Developer	eMagin

Samsung Display is the first to publicly introduce an RGB OLEDoS.

RGB OLEDoS utilizes red, green, and blue OLEDs on a silicon wafer to generate colors without the need for a separate light source.

Tianma – Ultra-high-PPI glass-based Micro LED display

Tianma glass-based Micro LED display



1.63-inch glass-based Micro LED display

Display type	Micro LED
PPI	403
Color	110% NTSC
Reflectance	5%
Applications	Smartwatch

Source: Photo taken by Omdia at CES 2024

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Garmin – Hybrid smartwatch

Garmin Lily 2 series



Lily 2 / Lily 2 Classic

Display type	LCD
Display size	1.00x0.84 inches (25.4x21.3mm)
Resolution	240x201 pixels
Color display	No (16 levels of gray scale)
Lens material	Corning Gorilla Glass 3

Source: Photo taken by Omdia at CES 2024

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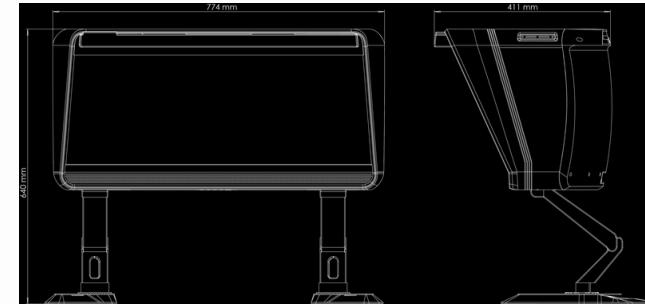
AR and VR displays

Brelyon – Desktop monitor to offer image depth

Brelyon Ultra Reality display rendering



Source: Photos taken by Omdia at CES 2024



Brelyon Ultra Reality specifications

Display	OLED
FOV	110°
Resolution	3840x1440
Brightness	450–700 nits
Contrast ratio	1:1,000 with ambient light suppression
Frame rate	60–144HZ
Color gamut	DCI-P3 98% (CIE1976)
Image size	122-inch

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Sony – XR head-mounted display and controllers

Sony XR head-mounted display



Source: Photos taken by Omdia at CES 2024



Sony XR head-mounted display specifications

Display	1.3-type OLED Microdisplays
Resolution	4K
Color gamut	DCI-P3 96%
Others	Video see-through function

Hisense's MR/AR glasses (1/2)

- Hisense introduced its MR and AR glasses for the first time at CES 2024.
 - The MR headset (all in one) uses pancake lenses and FST cameras. It supports gesture recording and eye tracking.
 - The AR glasses uses Micro OLED and birdbath lenses.



Source: Photos taken by Omdia at CES 2024

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Hisense's MR/AR glasses (2/2)



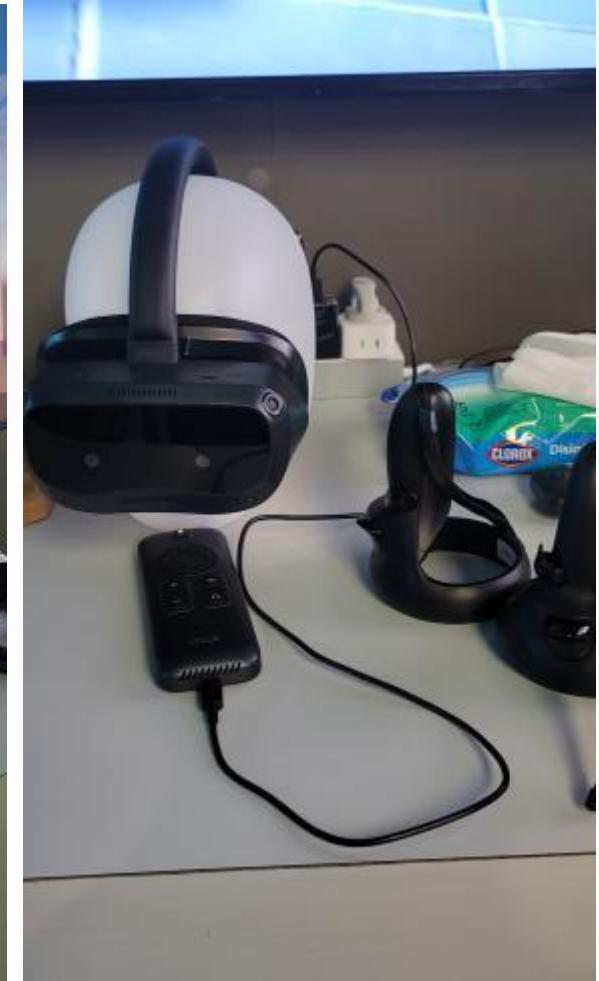
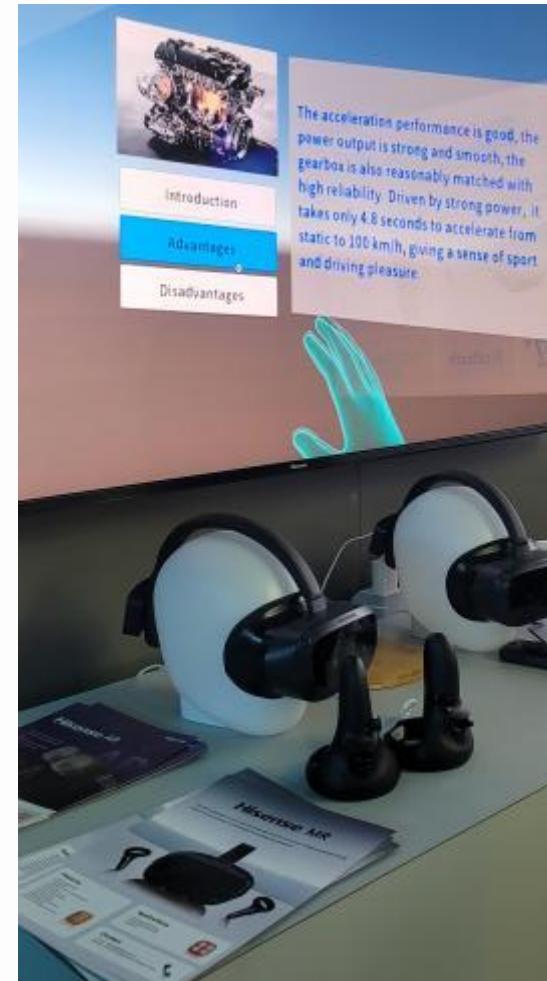
Source: Photos taken by Omdia at CES 2024



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Hisense's AR (smart glasses) and MR (head-mounted display)

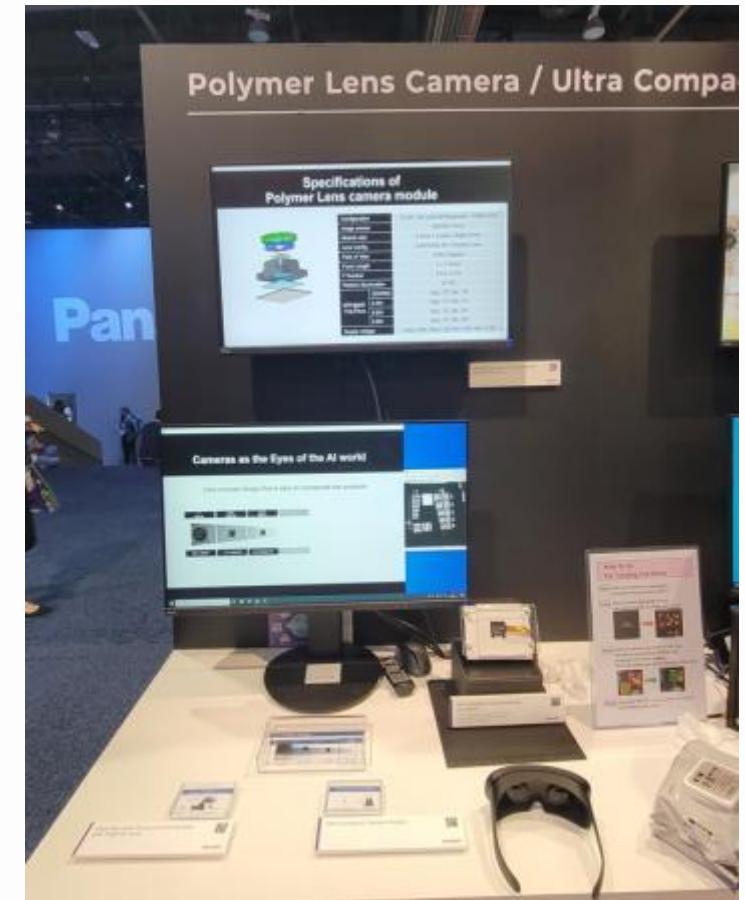
- AR: 1080p OLEDs (OLED on silicon) display
- MR: 2.56-inch LTPO TFT LCD with 2160x2160 resolution and 90Hz frequency.



Source: Photos taken by Omdia at CES 2024

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Sharp's XR (VR and MR) glass and polymer lens camera



Source: Photos taken by Omdia at CES 2024

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GOOVIS's G3 Max VR



Source: Photos taken by Omdia at CES 2024



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Ocutrx – OcuLenz is an innovative AR/XR headset

OcuLenz appearance



Source: Photo taken by Omdia at CES 2024

OcuLenz specifications

Display	Dual Quad AMOLED displays
FOV	72°
Resolution	1480x1440 pixels per eye
Brightness	1,200 nits
Color gamut	DCI-P3/100%
Patented	Interpupillary distance adjustment
Applications	Medical, military, consumer, and enterprise

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Pimax's Crystal VR Headset

- Pimax Technology's Pimax Crystal is the only VR headset to be named an honoree in the "XR Technologies & Accessories" category. According to Pimax, the Pimax Crystal offers the highest clarity in consumer VR partly because of its ultra-high-fidelity QLED + Mini LED backlight panels with local dimming, which feature a native resolution of 2880x2880 pixels per eye (not upscaled even at 120Hz). Additionally, it has glass aspheric lenses.



Source: Photos taken by Omdia at CES 2024



Display specifications:

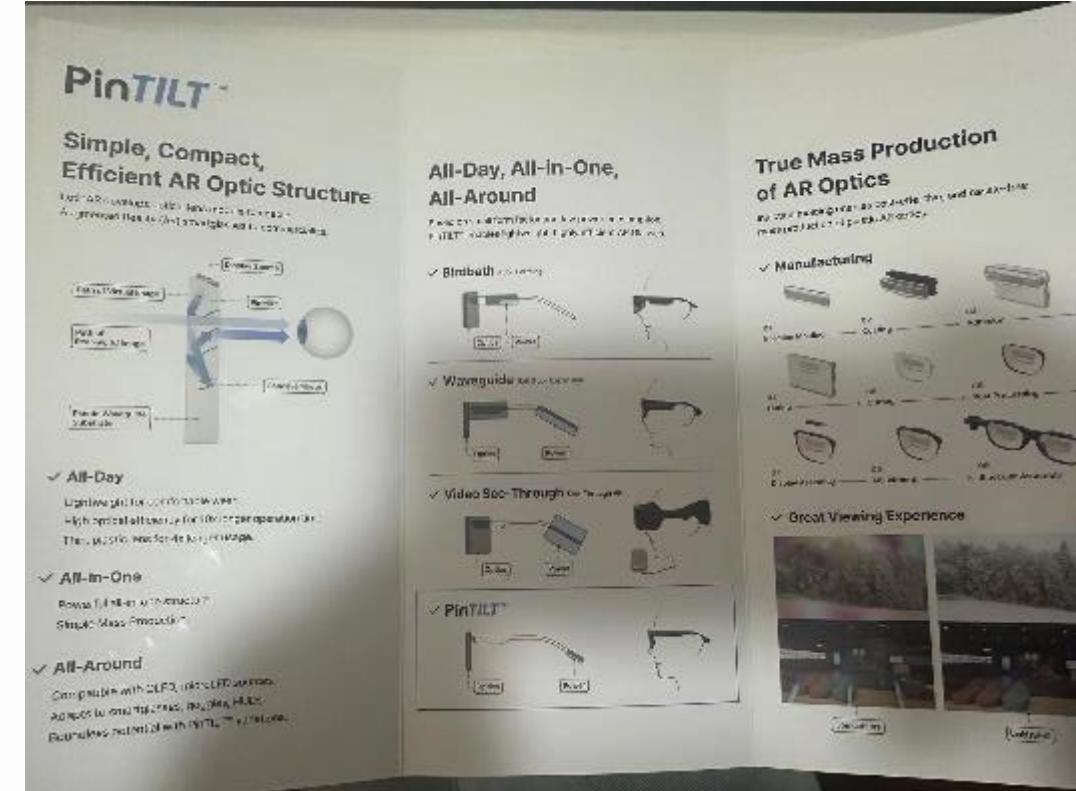
- QLED + Mini LED display
- 2880x2880 pixels per eye
- Brightness: 200 nits
- Local dimming: 20,000:1
- Colors: 100% NTSC
- Motion-to-photon (MTP) latency: 15ms
- Refresh rate: 72Hz/90Hz/120Hz/ (144Hz/160Hz in testing mode)
- HDR
- 35 PPD (pixels per degree)

LetinAR

- Founded in 2016, LetinAR Inc., a company based in Seoul, South Korea, made its appearance in the AR scene by presenting a new technology—PinTILT.



Source: Photos taken by Omdia at CES 2024



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XREAL – Lightweight spatial computing glasses

XREAL Air 2 Ultra usage scenario simulation



XREAL Air 2 Ultra specifications

Display	Micro OLED from Sony
FOV	52°
Resolution	1920x1080 pixels per eye
Refresh rate	Up to 120Hz (2D mode 120Hz, 3D mode 90Hz)
Brightness	Up to 500 nits (2D mode 30–500 nits, 3D mode 20—250 nits)
	Unit-based color calibration

Source: Photos taken by Omdia at CES 2024

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TCL's RayNeo AR

- RayNeo, incubated by TCL Electronics (1070.HK), is an industry leader in consumer-grade AR innovation.
 - In 2021, RayNeo launched the world's first binocular full-color Micro LED optical waveguide AR glasses.
 - It won the “best connected consumer device” at MWC’s Global Mobile Awards (GLOMO) 2023 with NXTWEAR S.
 - RayNeo also developed the RayNeo Air 2.



Model	RayNeo X2 Lite
Tech	Micro LED
Contrast	100,000:1
Brightness	1,500 nits

Source: Photos taken by Omdia at CES 2024



Model	NXTWEAR S+
Tech	Micro OLED
Refresh rate	120Hz

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Model	RayNeo Air 2
Tech	Micro OLED
Refresh rate	120Hz

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Vuzix's new Z100 AR smart glasses with monochrome Micro LED waveguide

- Vuzix, a supplier of smart glasses and AR technology and products, unveiled the Vuzix Z100 smart glasses, which will initially be offered as a developer's edition. Built using the Vuzix Ultralite OEM Platform, these smart glasses have been safety glasses-certified and are made to be worn all day. With these glasses, workers are able to receive critical updates, convenient workflow and task confirmations, and notifications from their work applications in real time.



Source: Photos taken by Omdia at CES 2024

TECHNICAL SPECIFICATIONS

OPTICS

- Display resolution: 640x480 monochrome green
- Display type: microLED waveguide
- Aspect ratio: 4:3
- Field of View: 30°
- Right eye display
- Prescription inserts available

POWER

- Internal battery
- 2+ days run-time

CONTROLS

- Temple touch

CONNECTIVITY

- Bluetooth Low Energy

DEVKIT

- Access to our complete Android and iOS SDKs, Vuzix Connect demo apps, and sample code.

Vuzix Z100 smart glasses specifications

Display	Micro LED waveguide display
FOV	30°
Resolution	640x480
Aspect ratio	4:3
Others	Right-eye display Prescription inserts available

Vuzix's smart glasses provide an interface between AI enhancement applications and human workers

Vuzix Z100 smart glasses



Vuzix Z100 smart glasses spec

Display	Micro LED waveguide display
FOV	30°
Resolution	640x480
Aspect ratio	4:3
Others	Right-eye display
	Prescription inserts available

Source: Photo taken by Omdia at CES 2024

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ASUS – A wearable display for multitaskers

ASUS AirVision M1 wearable display



ASUS AirVision M1 wearable display specifications

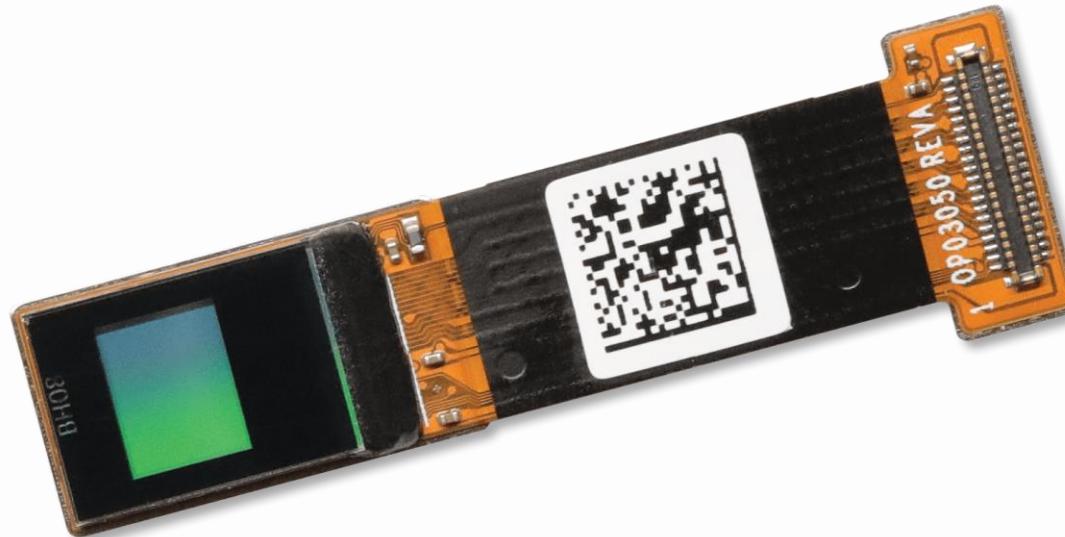
Display	Micro OLED display
FOV	57°
Resolution	FHD
Brightness	1,100 nits (peak)
Color gamut	DCI-P3 95%
Others	Content private, ASUS Eye Care technology

Source: Photos taken by Omdia at CES 2024

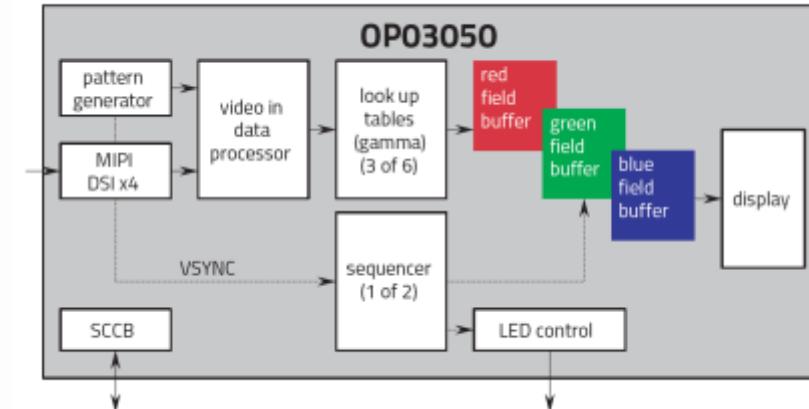
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OmniVision – Single-chip LCOS panel for next-generation smart AR/XR/MR glasses

OP03050 LCOS panel



Functional Block Diagram



OP03050 LCOS panel specifications

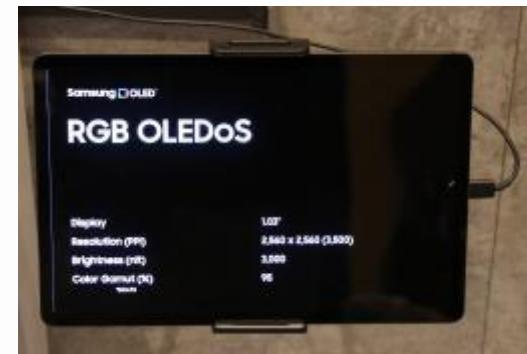
Native device diagonal	0.232-inch
Pixel pitch	3.0µ
Native resolution	1560x1200
Active native area	4,776x3,696mm
LC operational temp	+10°C~+70°C
Applications	AR/XR/MR glasses, head-mounted display, pico projectors

Source: Photos taken by Omdia at CES 2024

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Samsung Display – White and RGB OLEDoS

Samsung OLEDoS



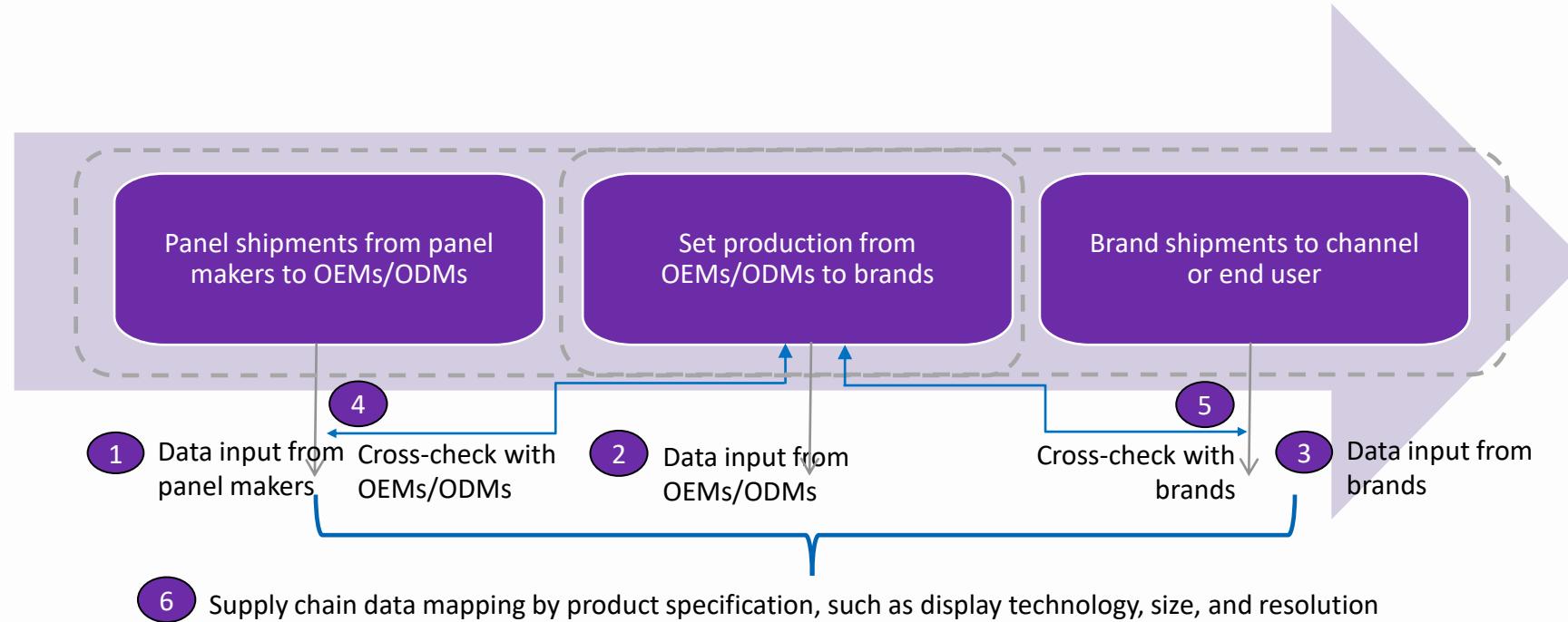
Source: Photos taken by Omdia at CES 2024

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Appendix

Methodology

- Omdia leverages detailed supply chain coverage, feeding into ongoing syndicated offerings. Omdia has established its own proprietary methodology, tracking how displays (panels) are shipped from panel makers and sourced from OEMs/ODMs that lead up to brands' shipments.



Source: Omdia

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Appendix

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