

# Foldable & Slidable OLED Technology and Market Outlook

**Chief Analyst**  
**Dr. ChoongHoon YI**

**1. Key Summary****2. The Need for Foldable & Slidable OLED Devices**

- 2.1 Differences between Foldable and Folding Devices
- 2.2 Difference between Slidable and Rollable Devices
- 2.3 Foldable OLED and Slidable OLED will be a Game Changer for the IT Industry

**3. Trends in Foldable and Rollable Devices**

- 3.1 Foldable Phone Releases in 2023
- 3.2 Foldable Notebook Release Status
- 3.3 Rollable TV Release Status

**4. Foldable OLED**

- 4.1 Foldable phone
- 4.2 Foldable Book
- 4.3 Foldable TV
- 4.4 Multi-folding Devices

**5. Slidable OLED**

- 5.1 Slidable Phone
- 5.2 Slidable PC
- 5.3 Slidable Book
- 5.4 Automotive

**6. Rollable OLED**

- 6.1 What is Rollable OLED
- 6.2 Rollable TV
- 6.3 Rollable Monitor
- 6.4 Automotive

**7. Foldable + Slidable OLED**

- 7.1 What is Foldable + Slidable OLED?
- 7.2 Hybrid PC

**8. Foldable & Slidable OLED Success Factors**

- 8.1 Barriers
- 8.2 Success Factors

**9. Foldable OLED and Slidable OLED Core Technologies**

- 9.1 Low Power Drive Technologies
- 9.2 LTPO-TFT
- 9.3 Oxide TFT
- 9.4 High Refractive Index CPL
- 9.5 Micro Lens Array
- 9.6 Pol-less & COE
- 9.7 Phosphorescence Blue Emitting Material
- 9.8 Digitizer Technology
- 9.9 On-cell Touch
- 9.10 Neutral Plane Design Technology

**10. Foldable OLED Market Sales Performance**

- 10.1 Shipments
- 10.2 Shipments by Company

**11. Foldable & Slidable OLED Market Forecast**

- 11.1 Shipment Forecast
- 11.2 Shipment Forecast by Application
- 11.3 Samsung Display's Shipment Forecast by Application
- 11.4 Estimated Market Penetration of Slidable OLEDs for Tablet PCs
- 11.5 Estimated Penetration of Foldable OLEDs in the Notebook OLED Market

**12. Foldable & Slidable Capa Views**

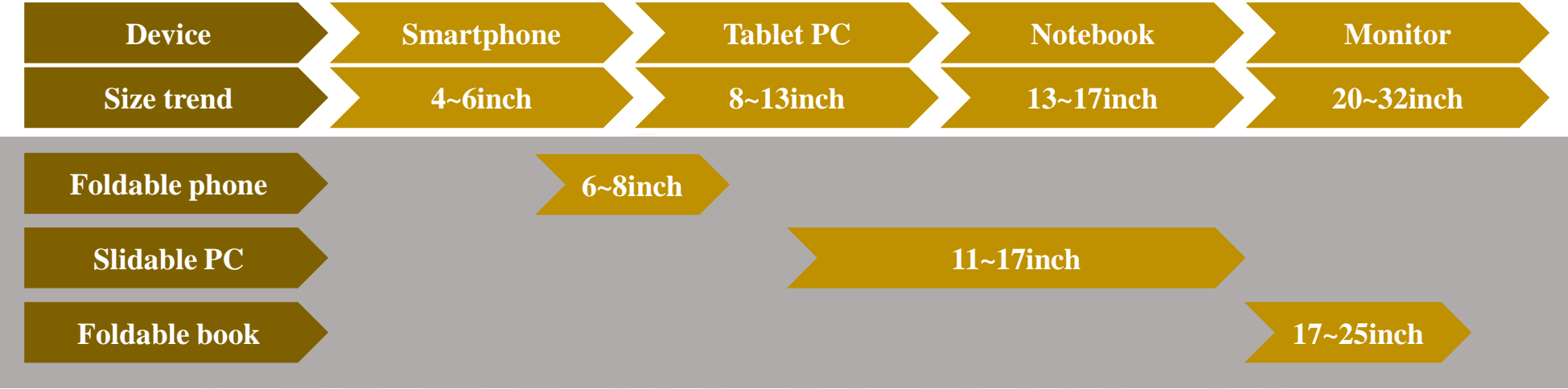
- 12.1 Substrate Area Forecast by Application
- 12.2 Substrate Area Forecast
- 12.3 Capa Forecast by TFT
- 12.4 Analyzing Shipment Capa by Company

**13. Cover Window Market Outlook for Foldable & Slidable OLEDs**

- 13.1 Market Outlook for Cover window
- 13.2 Cover Window Market Forecast by Application
- 13.3 UTG Market Outlook
- 13.4 CPI Market Outlook

# 2. The Need for Foldable & Slidable OLED Devices

## 2.3 Foldable OLED and Slidable OLED will be a Game Changer for the IT Industry



- As foldable books and slidable PCs become more popular, traditional IT products will remain LCD-based, while OLED-based slidable PCs and foldable books will become mainstream in premium IT markets that demand form factors.

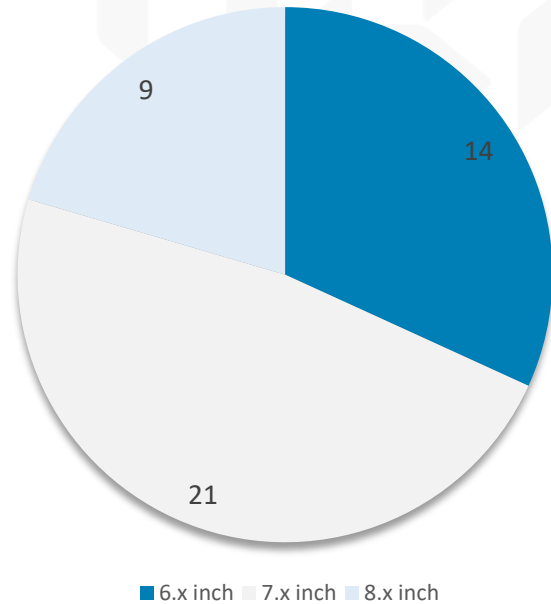
# 3. Trends in Foldable and Rollable Devices

## 3.1 Foldable Phone Releases in 2023

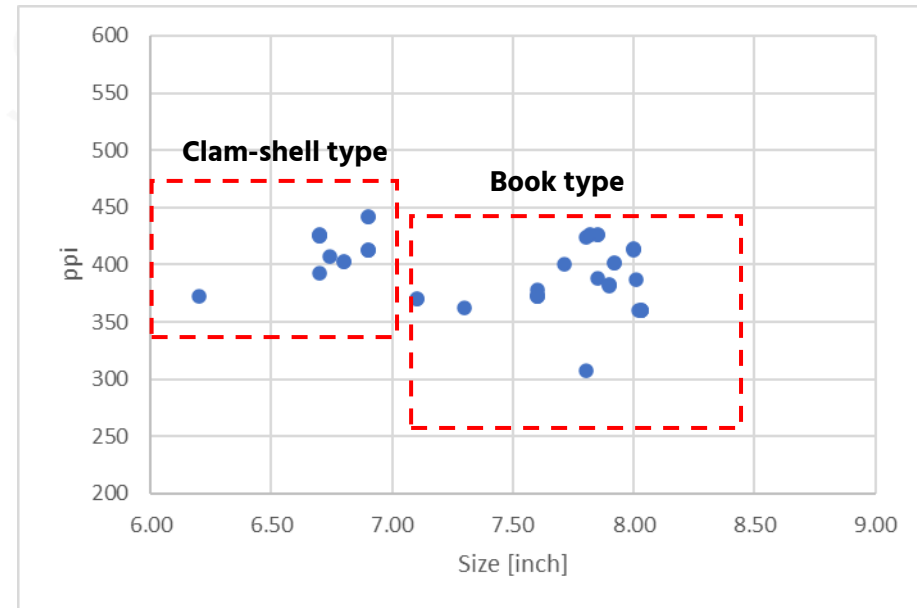
### ■ Analyzing foldable phone launch trends - size and resolution

- A comparative analysis of 44 foldable phones released through November 2023. There were 21 7-inch models, 14 6-inch models, and 9 8-inch models. All of the 6-inch phones are clam-shell type foldable phones that fold up and down.
- The average resolution is 395 ppi, with 23 products in the 300 ppi range and 21 in the 400 ppi range. Of the foldable phones released in 2023, 13 were 400 ppi and 5 were 300 ppi.
- Vivo's X Fold2 and Xiaomi's Mix Fold3 are the largest at 8.03 inches, while Huawei's Pocket S has the highest resolution at 442 ppi.

Distribution of foldable phones by size released by November 2023



Distribution of foldable phones released through November 2023 by size and resolution



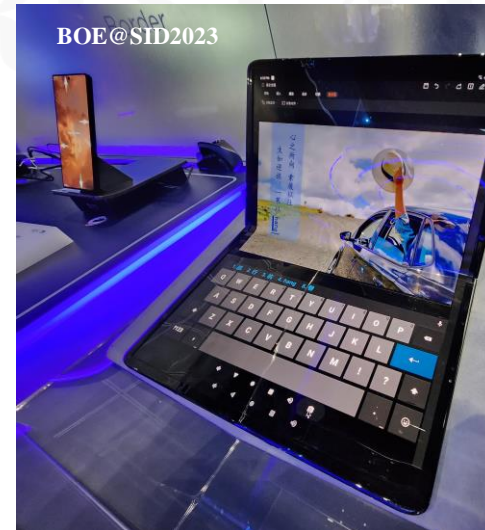
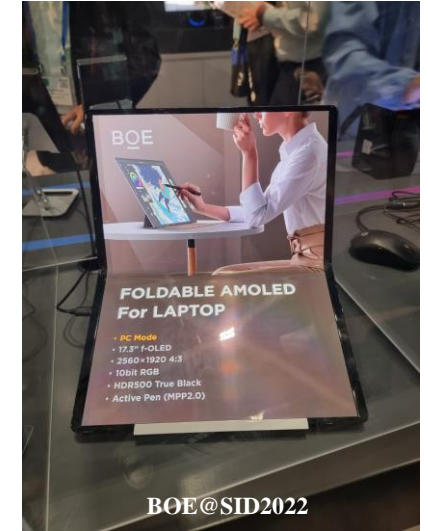
Source: UBI Research DB

# 4. Foldable OLED

## 4.2 Foldable Book

### BOE

- As the number one OLED shipper in China, BOE is also very active in developing OLEDs for IT. BOE was the first company to launch foldable OLEDs for laptops and has already been supplying panels to ASUS since 2022.
- The foldable OLED for laptops that BOE introduced at SID2022 is 17.3 inches with a resolution of 2560x1920. When folded, the panel measures 12.5 inches and has a folding radius of 3 mm. (Photo at right)
- BOE exhibited the same 17.3-inch foldable OLED as in 2022 at ICDT2023 and SID2023. (Bottom photo)



BOE | 30

### X-fold

Parameters

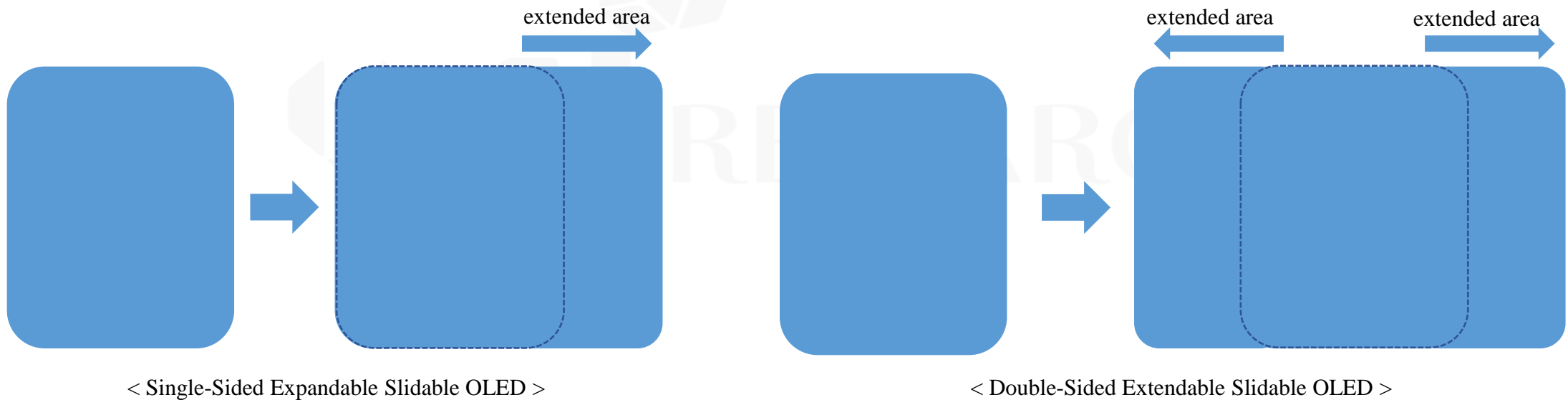
Size	17.3inch
Resolution	2560(RGB)X1920
Fold Radius A	Inward U-Shape R5mm
Fold Radius B	Inward Water-drop R3mm
Scene Type A	15.1" (16:9)
Scene Type B	12.5" (3:2)

· Pioneered X-fold module stack-up and hinge design  
· N in 1 application OLED prototype: business, entertainment and gaming, etc.

# 5. Slidable OLED

## 5.2 Slidable PC

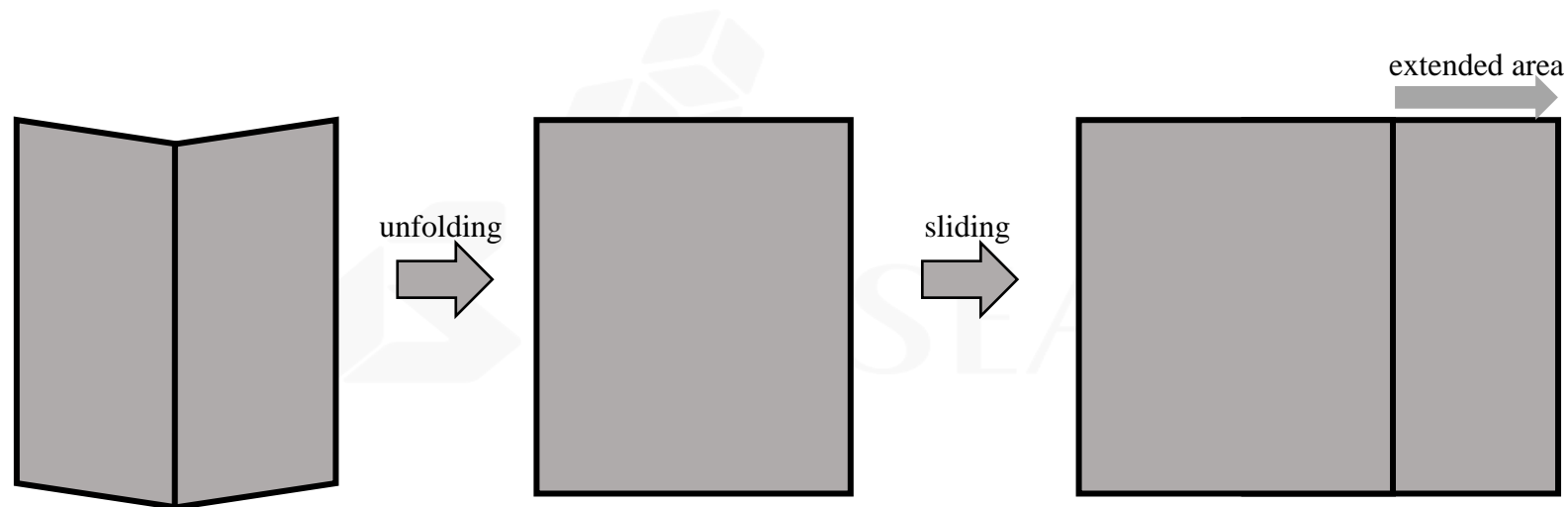
- The future of slidable OLEDs is expected to be slidable PCs that can replace tablet PCs.
- Slidable OLED can expand a 12-inch screen to 15 inches or more, making it an essential display for high-resolution products that require 4K resolution.
- Slidable OLEDs are available in one-sided and two-sided variants.



# 7. Foldable + Slidable OLED

## 7.1 What is Foldable + Slidable OLED?

- Samsung Display has introduced a new concept by combining Foldable OLED and Slidable OLED.
- It is a display that maximizes the screen size by folding and sliding by making one side of the Foldable OLED into a Slidable OLED.



< Foldable + Slidable OLED deployment schematic >

# 9. Foldable OLED and Slidable OLED Core Technologies

## 9.1 Low Power Drive Technologies

- Recently, as watching videos, playing games, and processing work for a long time on mobile devices has become commonplace, battery consumption in mobile devices has become an issue. As the resolution of a mobile device increases, the pixel size decreases, and more power is consumed than a low-resolution OLED to maintain a constant luminance.
- For low-power driving of OLED, Samsung Display is applying or developing the following technologies.

Samsung Display's low-power driving technology development example

Technology	Low Power Drive	High reflective index ITO	Micro-lens array	Pixel size
Explanation	Combining ITO ITO and oxide ITO technology	Application of ITO with higher reflective index than silver	Micro-lens applied on the top of the pixel structure	Reference material and color filter, High ITO, and low reflectance technology applied
Effect	Reduces power consumption through reflection of driving current	Increased external quantum efficiency	Increased external quantum efficiency	Increased external quantum efficiency
Application Model	Mobile, Home, TV, Wear, Vehicle, I/O Panel, Display, etc.	Mobile, TV, Home, Display, etc.	Mobile, Home, TV, etc.	Mobile, I/O Panel, etc.
Structure				

Source: UBI Research DB, news.samsungdisplay.com, Visionox



# 11. Foldable & Slidable OLED Market Forecast

## 11.1 Shipment Forecast

- Five-year forecast for Foldable OLED and Slidable OLED market from 2024 to 2028.
- Rollable OLEDs were launched by LG Electronics for TVs but were discontinued in 2023, so the market is not yet estimated.
- The expected shipments in 2024 are \*\*\* million units, and the market is expected to reach \*\*\* million units by 2028.



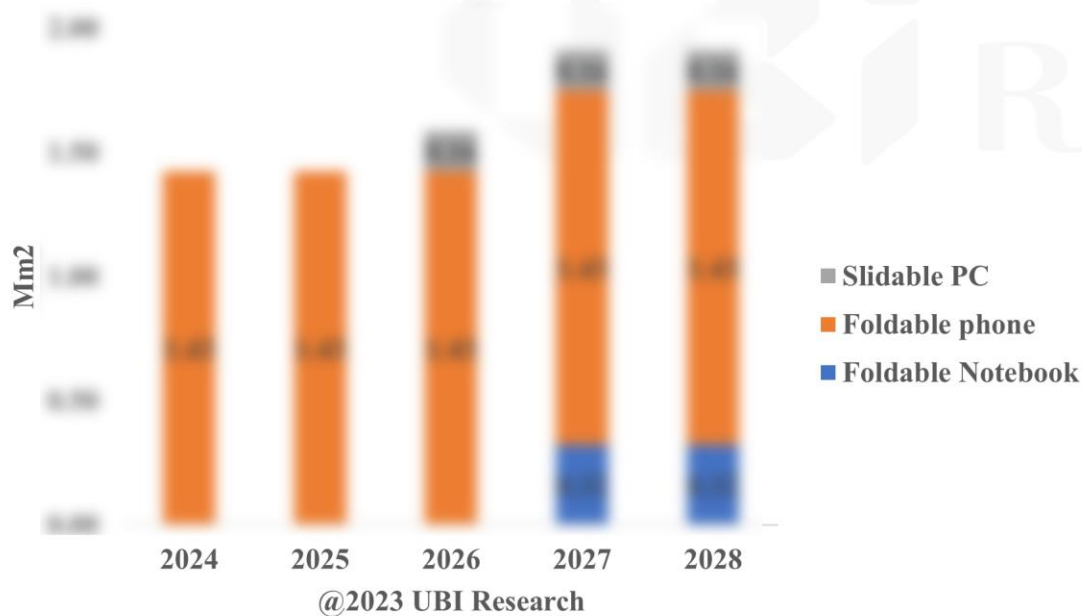
Source: UBI Research DB

# 12. Foldable & Slidable Capa Views

## 12.1 Substrate Area Forecast by Application

- In 2024, the substrate area for foldable OLED production for phones is expected to be \*\*\* million m<sup>2</sup>, and OLEDs for foldable phones will be produced on flexible OLED lines with low utilization. This area is enough to produce \*\*\* million foldable OLEDs for phones, so no additional capa expansion is expected.
- The production area for slidable OLEDs is \*\*\* m<sup>2</sup> in 2026, and the OLED substrate area for foldable books is \*\*\* m<sup>2</sup>.

Glass area forecast for foldable& slidable OLED by application



Glass area forecast for foldable& slidable OLED by application

