Semiconductors enabling XR as a new dimension for human connection

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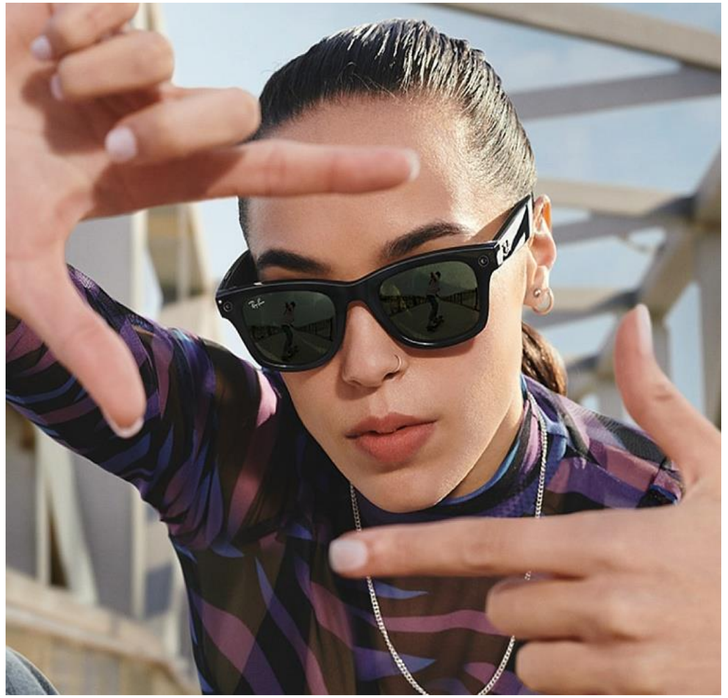
GlobalFoundries™

How we connect to each other is changing

The XR world is right in front of our eyes

Microsoft HoloLens

Facebook Ray-Ban Stories Glasses



XiaoMi Smart Glasses

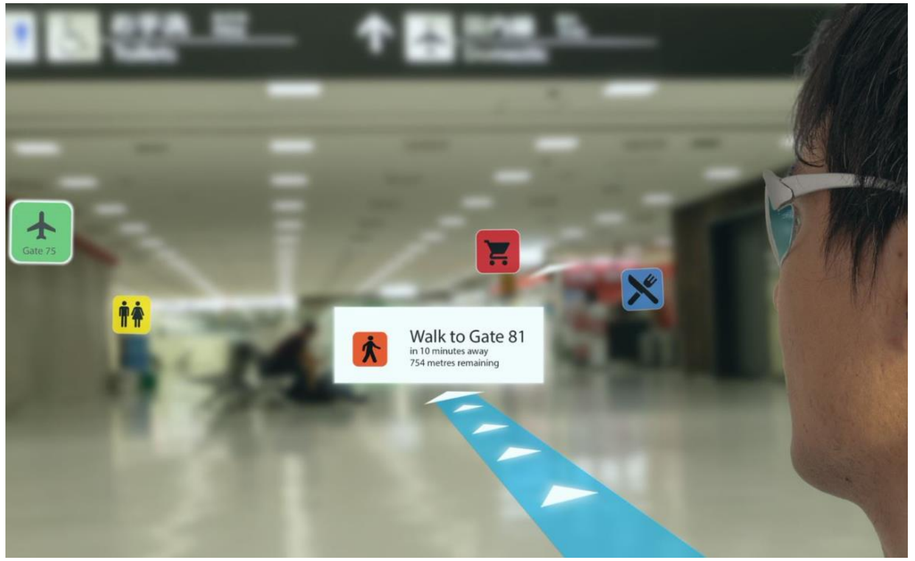
Company Website

We can experience natural interactions between humans and data with XR

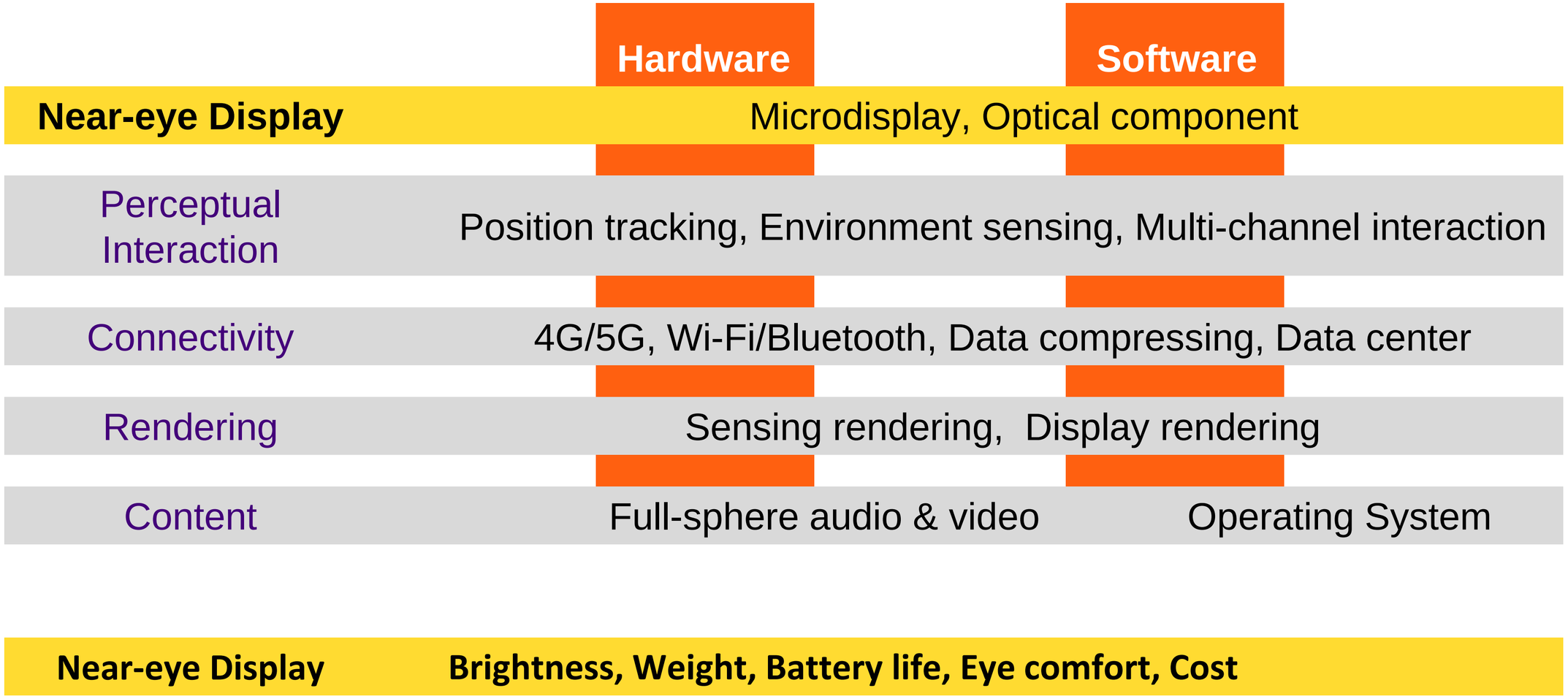
Now

- Seamless connection
- Always On
- Intelligent
- Secure

Future



XR technology needs and display challenges



GF® technology is enabling XR hardware

Cellular front-end module
8SW
45RFSOI
22FDX™

Transceiver
12LP RF

5G

Power Management
180 BCDLite®

Audio amplifier
55 BCDLite

Wireless charging
130 BCDLite

Display driver
55/40/28HV, 22FDX
LCOS, OLED, microLED

4G LTE

Cellular front-end module
8SW, 7SW

Transceiver
12LP RF

Wi-Fi front-end module
8SW, 7SW
SiGe PA

3D sensing
22FDX, ToF, SPAD
Radar, Lidar

Haptic sensing (voice/touch/gesture)
55 BCDLite

Microdisplay technologies all have pros & cons

	LCOS	OLED	microLED
Brightness	Medium	Low	**High**
Contrast ratio	Low	**Excellent**	**Excellent**
Refresh rate	Low	Medium	**High**
Resolution	**High**	Medium	**High**
Power efficiency	Low	Medium	**High**
Endurance	-10 ~ 85 °C	-50 ~ 70 °C	**-100 ~ 120 °C**
Manufacturing Maturity	**High**	Medium	**Low**

XR display driver IC has unique requirements

VR: Standalone DDIC

Highly integrated source and gate drivers with large display buffer

GF® solution in 55/40/28HV

AR: CMOS Backplane

Memory-In-Pixel

Pixel-level driver connection

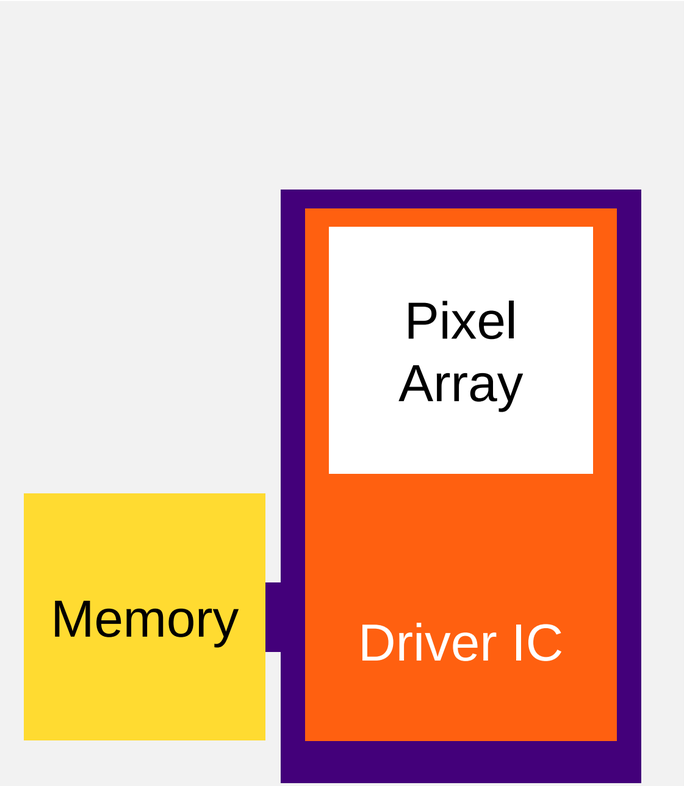
GF® solution in 28/22nm

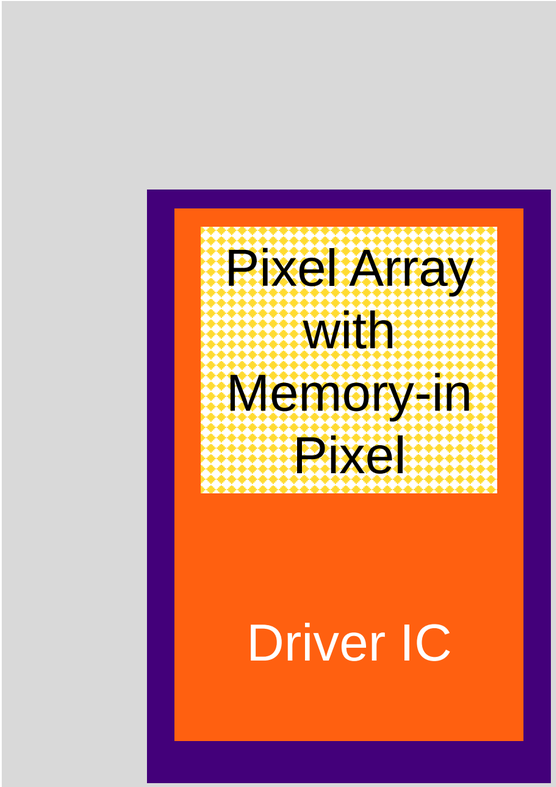
HUD in Car

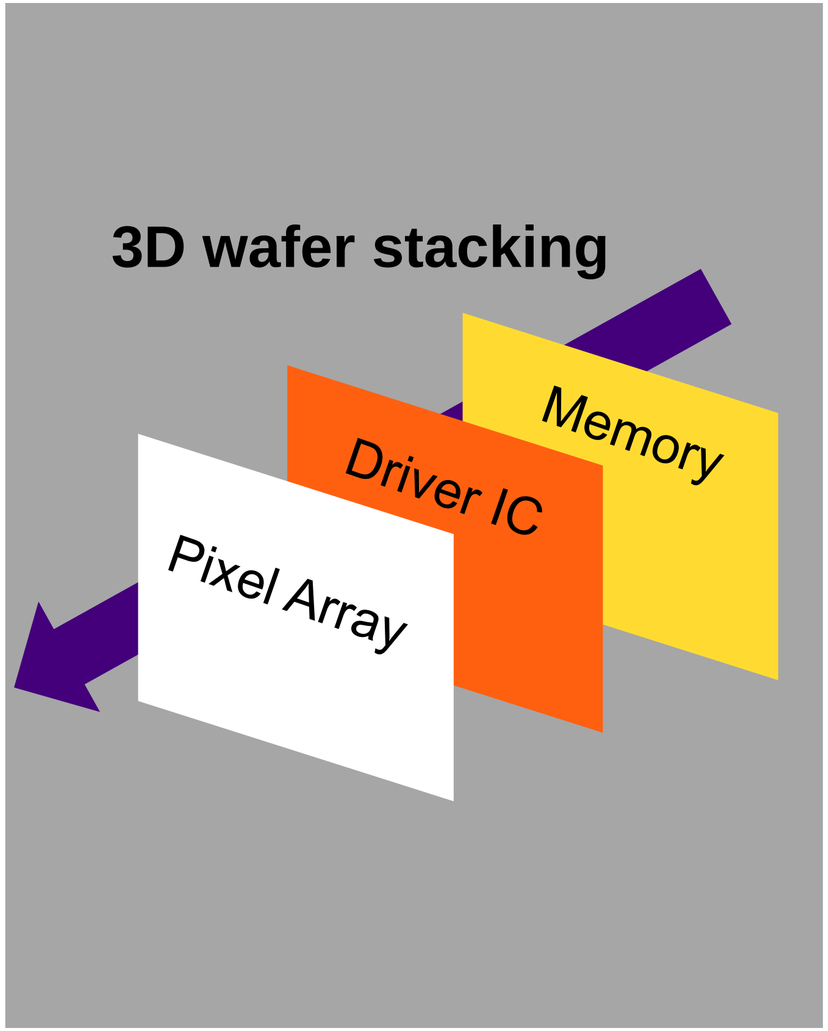
Automotive qualification requirement

GF® solution in 22FDX

Microdisplay backplane driver architecture



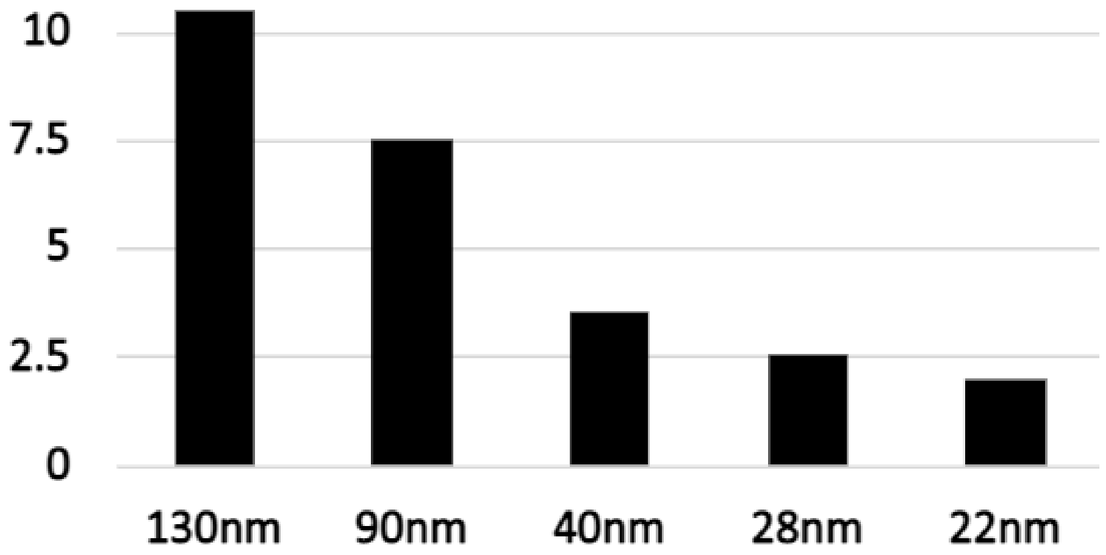




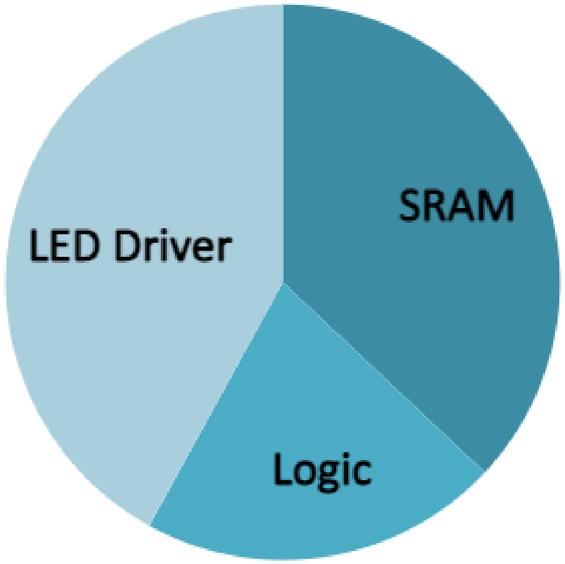
Microdisplay backplane needs CMOS <40nm node

To achieve pixel size <2.5um and 10,000PPI, microdisplay backplane process node needs to be <40nm.

Sub-pixel size estimation (um)



MicroLED backplane pixel area portion with 22FDX™

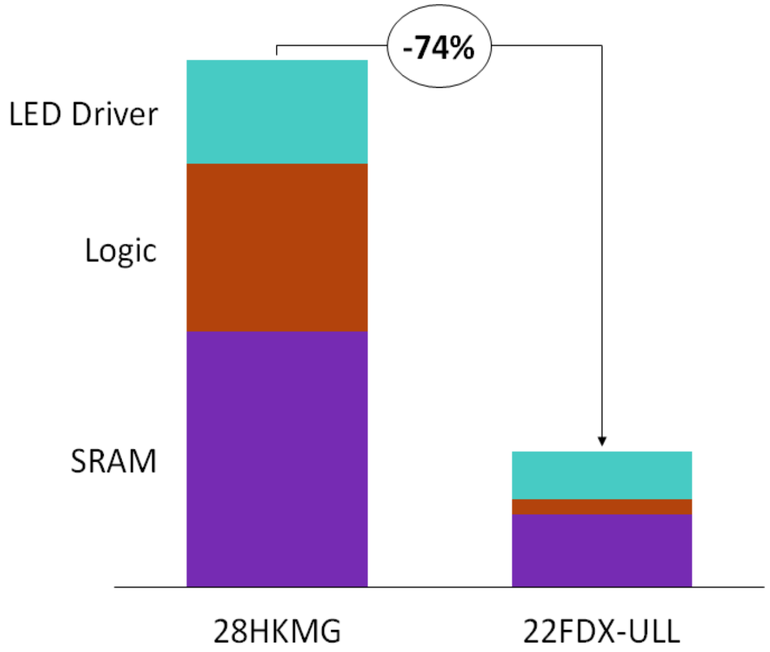


Source: 130-40nm data from Display week 2020 paper Jewoo Seong

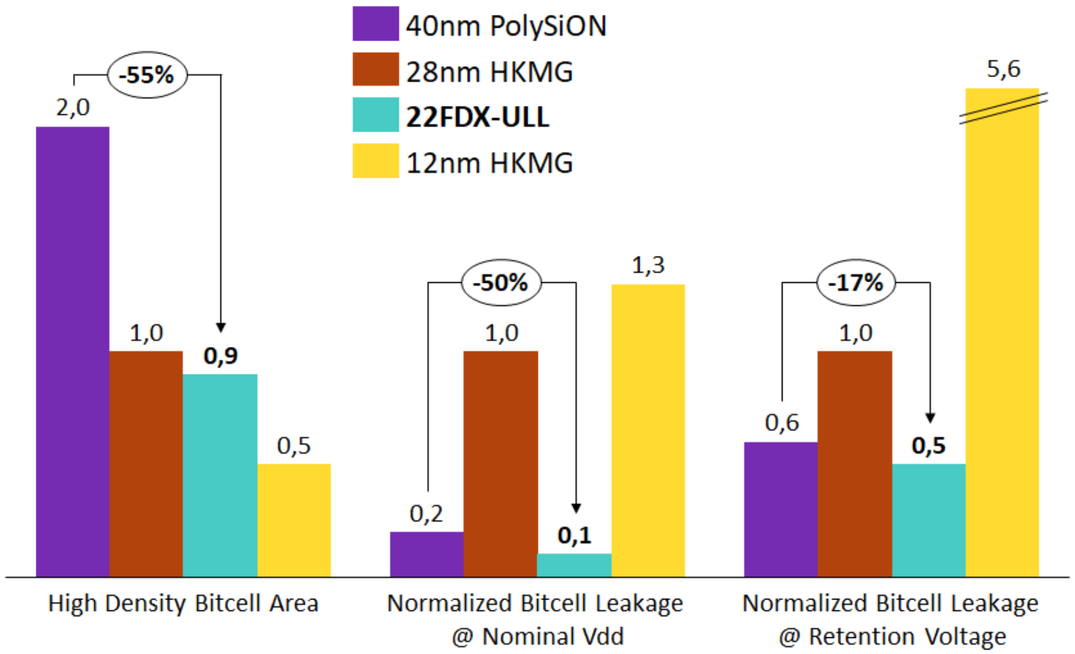
GF® 22FDX™ further reduces microdisplay power consumption to support always-on

GF® 22FDX shows leakage reduction comparing to all 40-12nm CMOS technology nodes.

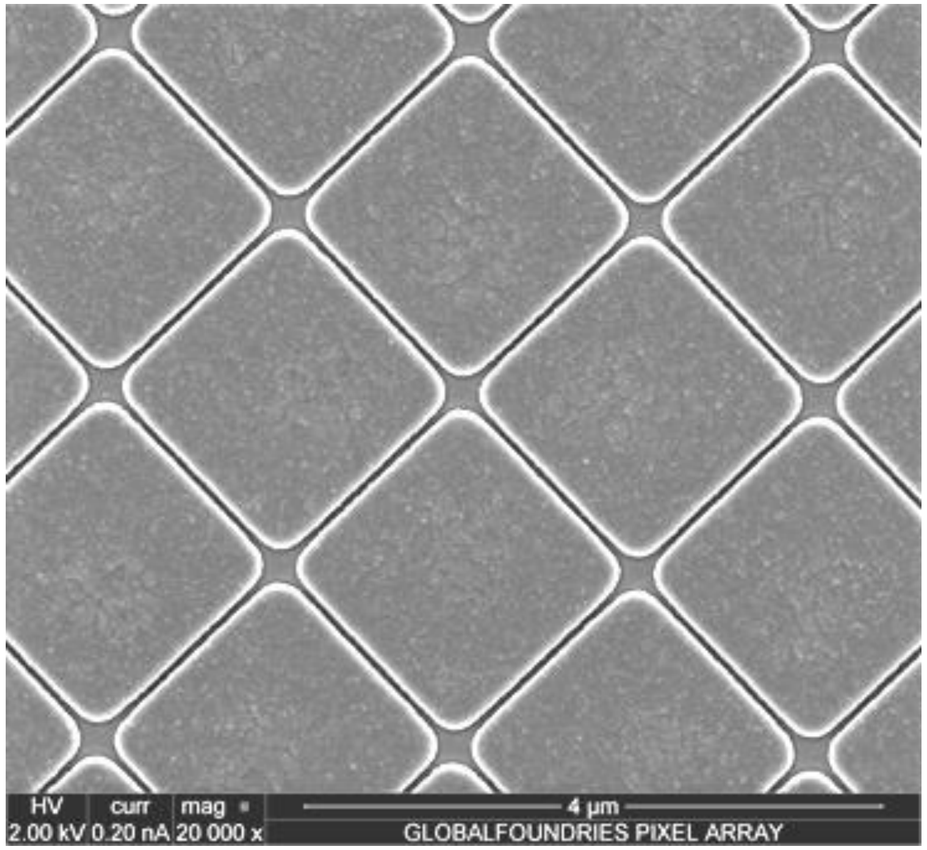
microLED pixel array leakage power

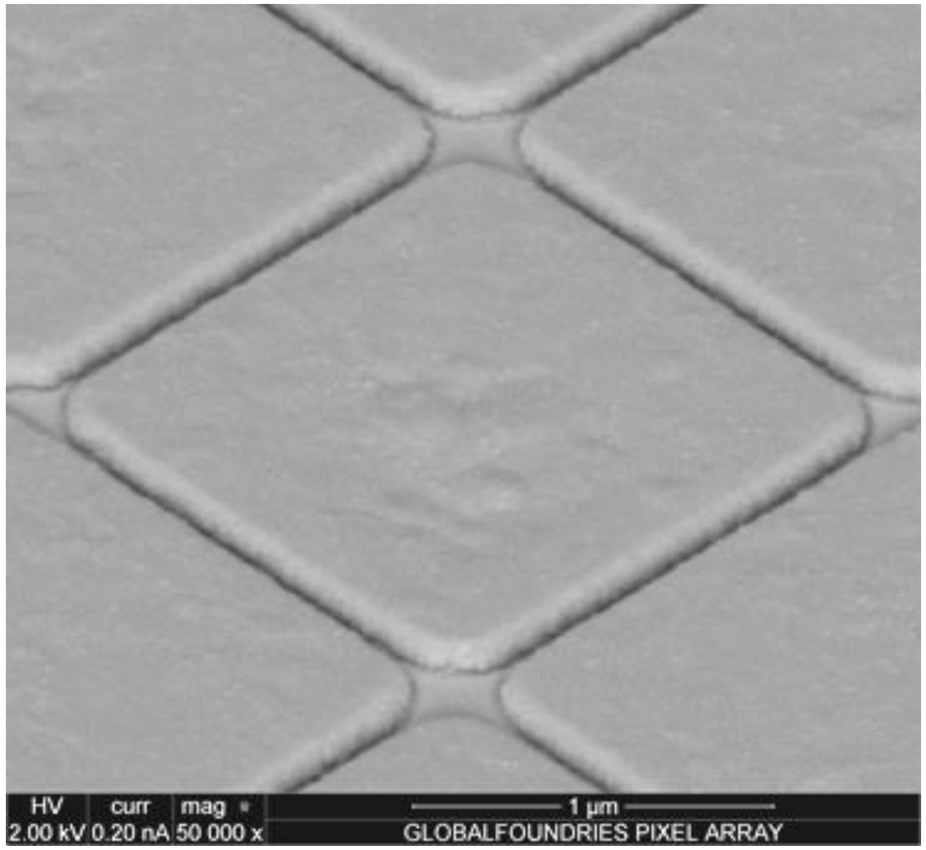


SRAM leakage power 40-12nm



XR display is reaching sub-pixel size <2um.





Let’s start to build the future together

Integrator

Foundry

Equipment

Fabless

Materials

IDM

R&D Institute

EDA

Thank You