

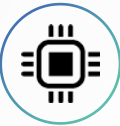


微显示屏方案-LCOS

Speaker: Guotao Liu(刘国涛)
2021-05-28



Company Brief



Fabless Semiconductor Company

with Mass Manufacturing over 160M ICs



First to Commercialize

High resolution panel based on LCoS &
Mobile TV based on CMOS RF

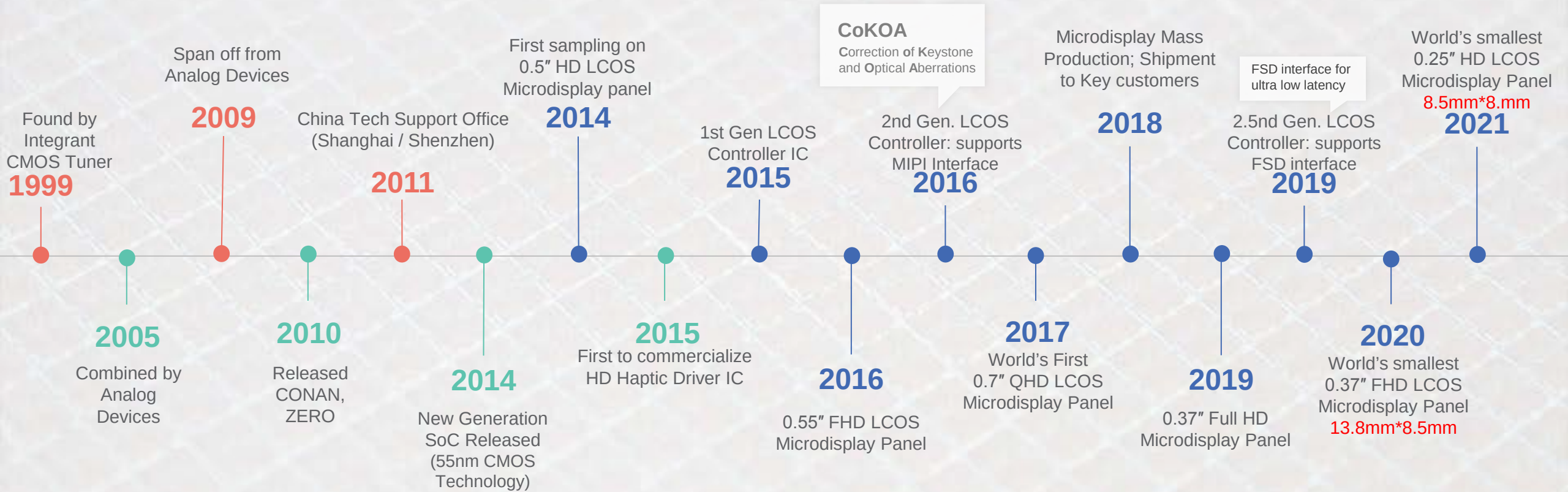


Located in

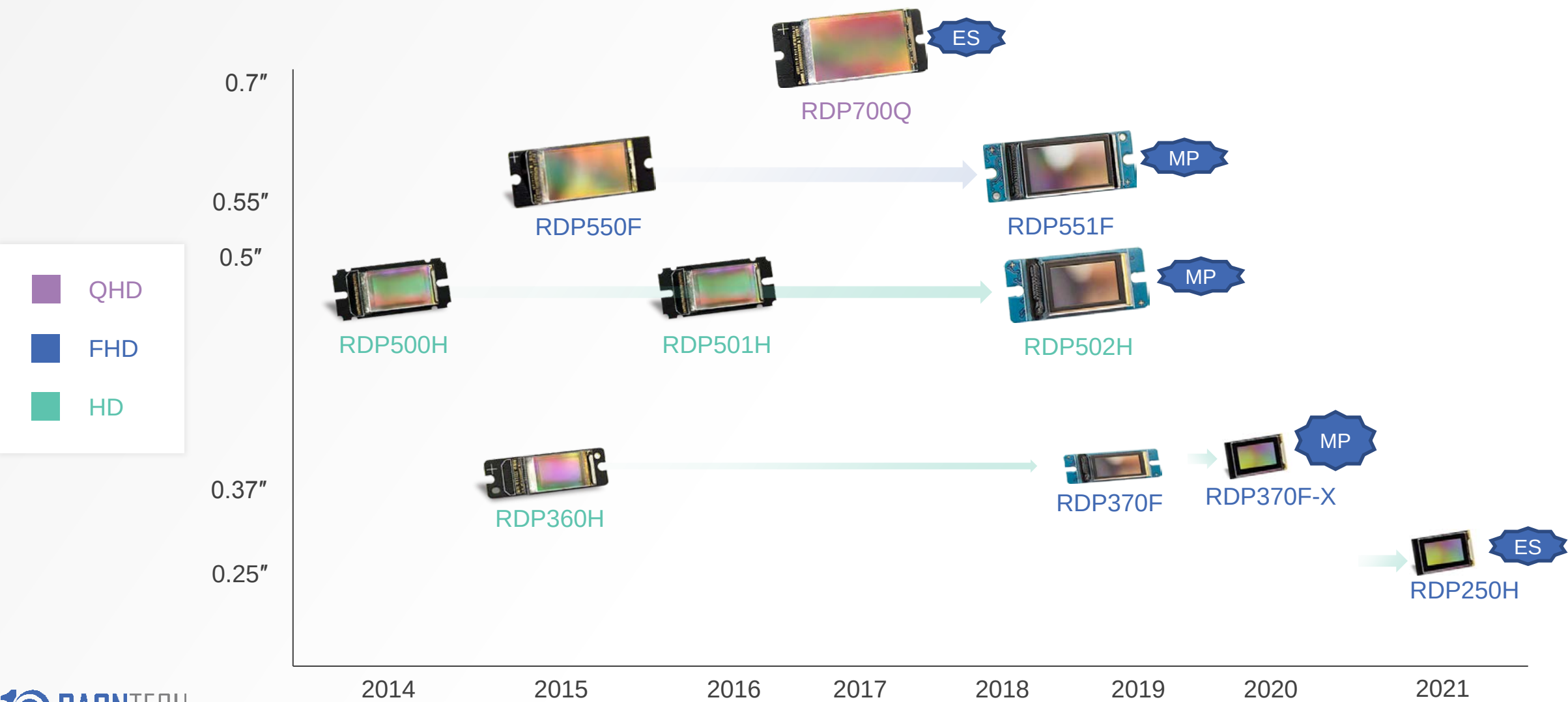
Bundang, Korea (Headquarters)
Shanghai & Shenzhen, China



History



Microdisplay Panel Roadmap



Target Market



Augmented Reality HMD



Video glasses/FPV goggles



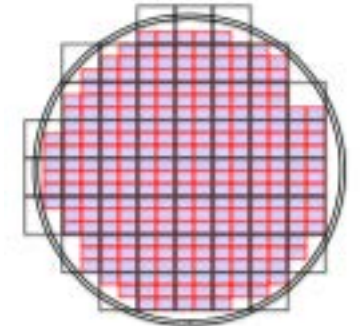
AR-Automotive (HUD / Lighting)



Projector (Mini/Pico)



SLM/WSS



Customization
(Backplane Design)

RAON Differentiation: Complete Solution for AR and Beyond



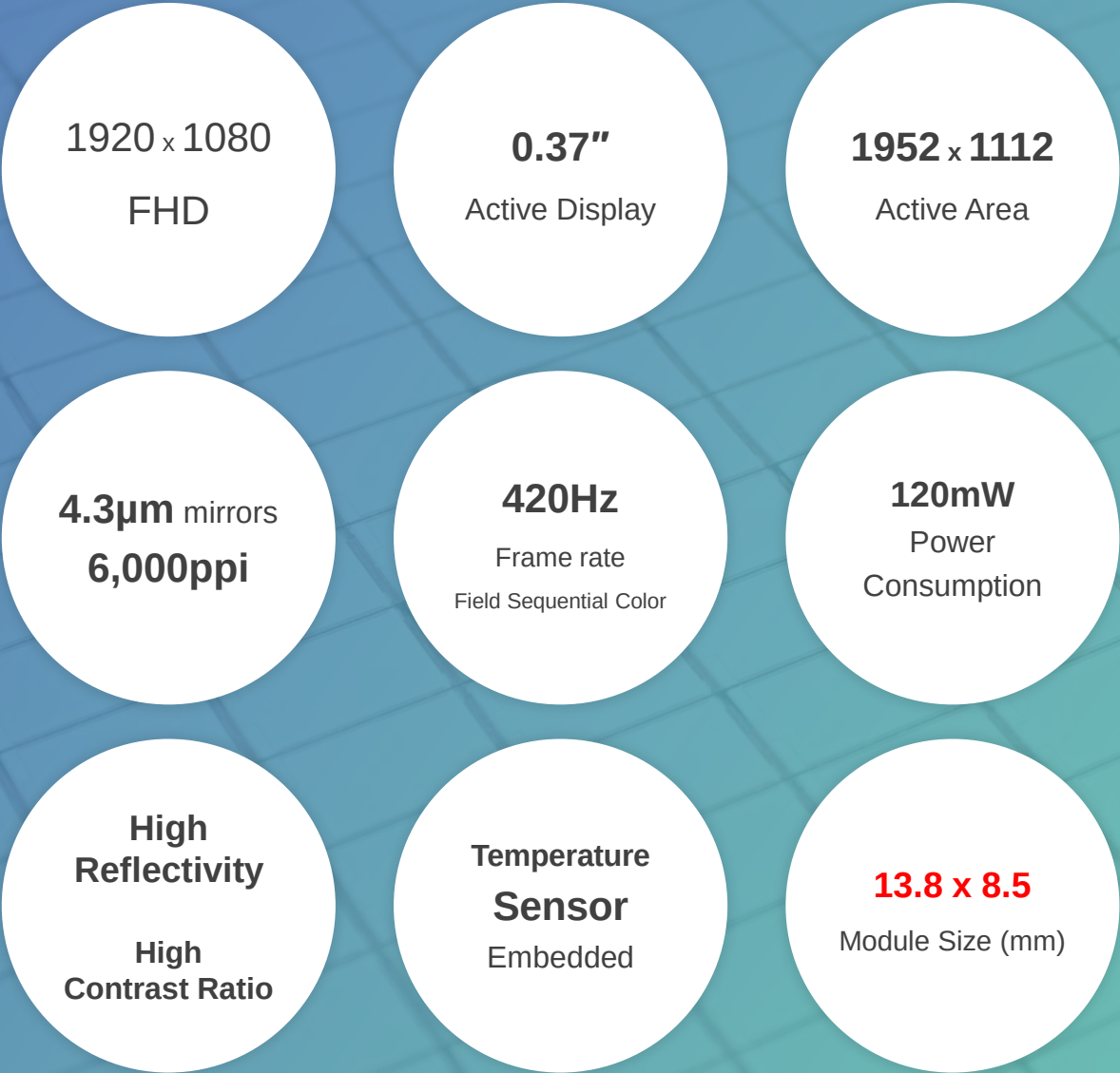
Panel Key feature:

RDP370FX

0.37"
Full HD (1920 x 1080)



Compatible
With RDC200A



Panel Key feature:

RDP250H

0.25"
HD (1280x 720)



Compatible
With RDC200A

1280x 720
HD

0.25"
Active Display

1312 x 800
Active Area

4.3 μ m mirrors
~5900ppi

672Hz
Frame rate
Field Sequential Color

80mW
Power
Consumption

**High
Reflectivity**

**High
Contrast Ratio**

**Temperature
Sensor**
Embedded

8.5 x 8.7
Module Size (mm)

Microdisplay Controller



RDC200A

Drives up to two RAON panels
HD and Full HD
«Near Zero» MTP latency supporting



INPUT

LVDS(Up to 8channels), MIPI(Up to 4lanes)
Up to 1920x1080 or 2048x1024 at 110Hz
2560x720 or 1280x720 at 120Hz
Kinds of standard input resolution or
Programable customized input resolution
FSD video data format interface:

Realizes Ultra Low display latency

OUTPUT

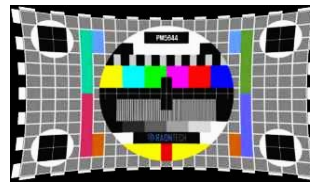
Up to **450Hz** Field Rate
Up to 1Gbps per channel by RDI LVDS Tx
One controller drives **two** panels: Independent for two sides
3D conversion: Side-by-Side, Top and Bottom, Frame-by-Frame
Panel swap: left and right swap for 3D effect
Image flip: Horizontal and Vertical
Pixel shift: left and right, top and bottom for assembly alignment
Dynamic Pixel Shift: **ATW** realization with IMU unit/SLAM on helmet
to reduce MTP latency
Up-scaler: 1.33x, 1.5x, 2.0x
OSD function supporting
Programable gamma correction
Programable LED on duty controlling
CoKOA: Correction of Keystone and Optical Aberrations
Small size and low power consumption: 7.4mmx7.4mm
only 200mW for driving two HD panels



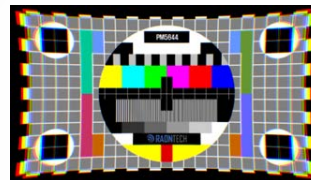
Correction of Keystone and Optical Aberrations



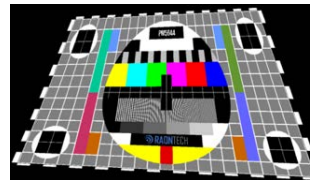
Barrel



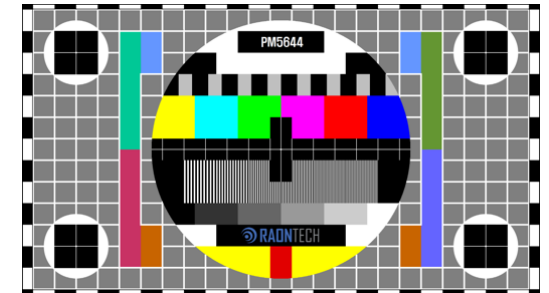
Pin-cushion



Chromatic Aberration

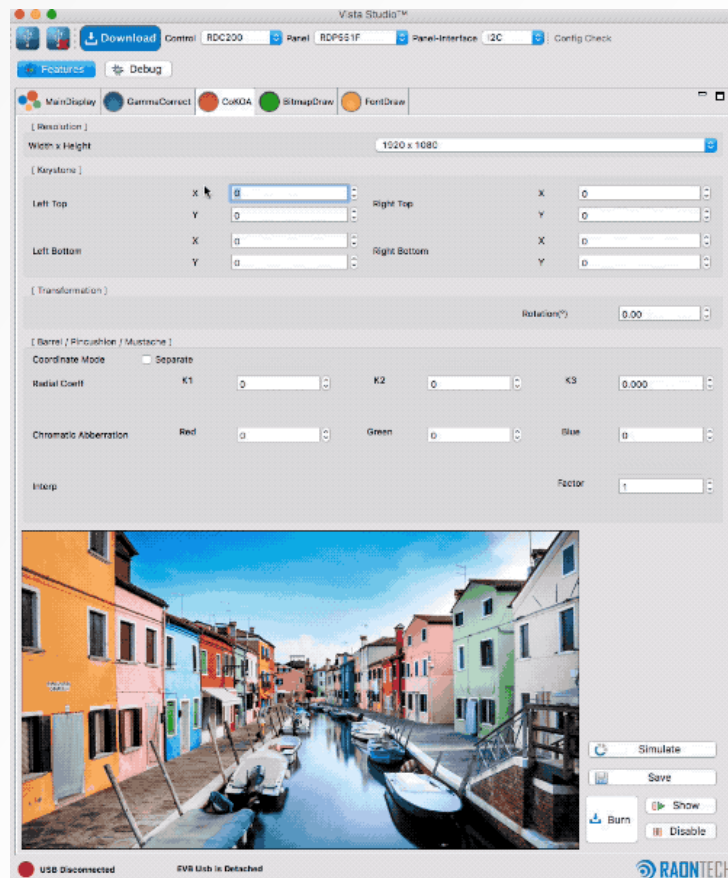


H,V Keystone

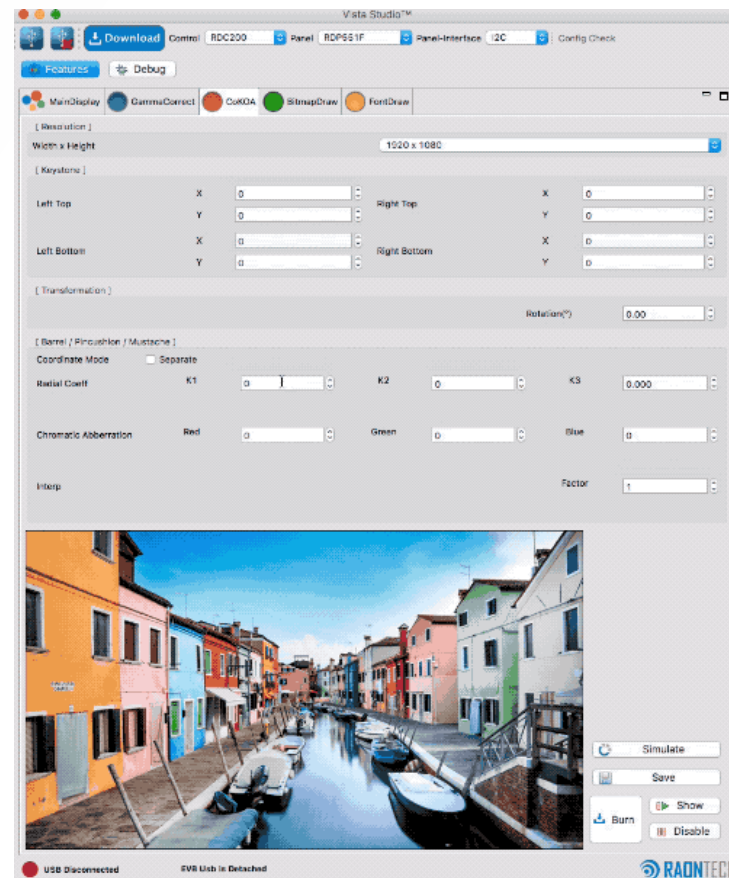




Correction of Keystone and Optical Aberrations



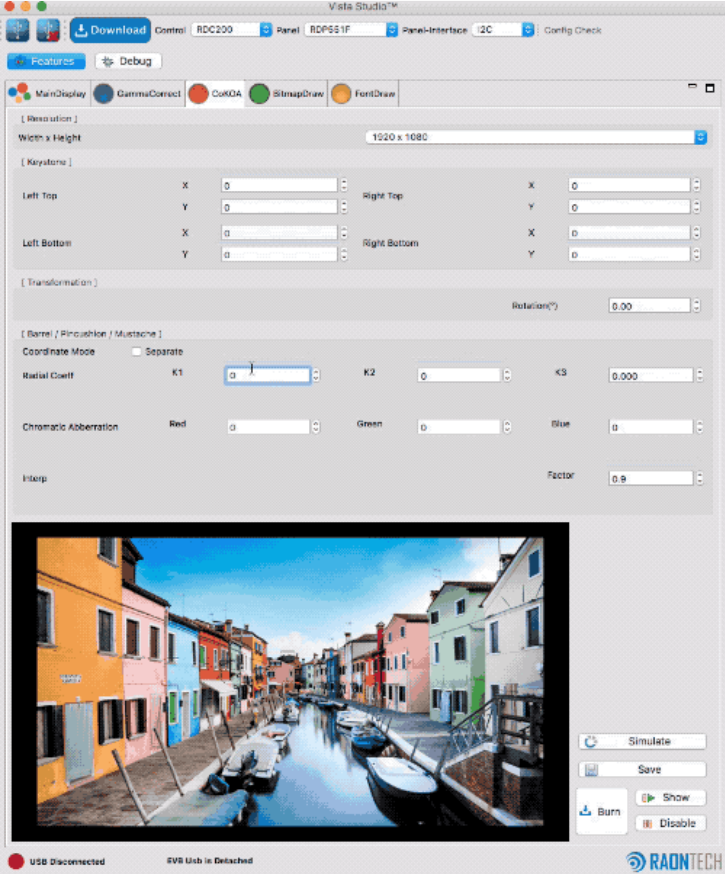
Keystone



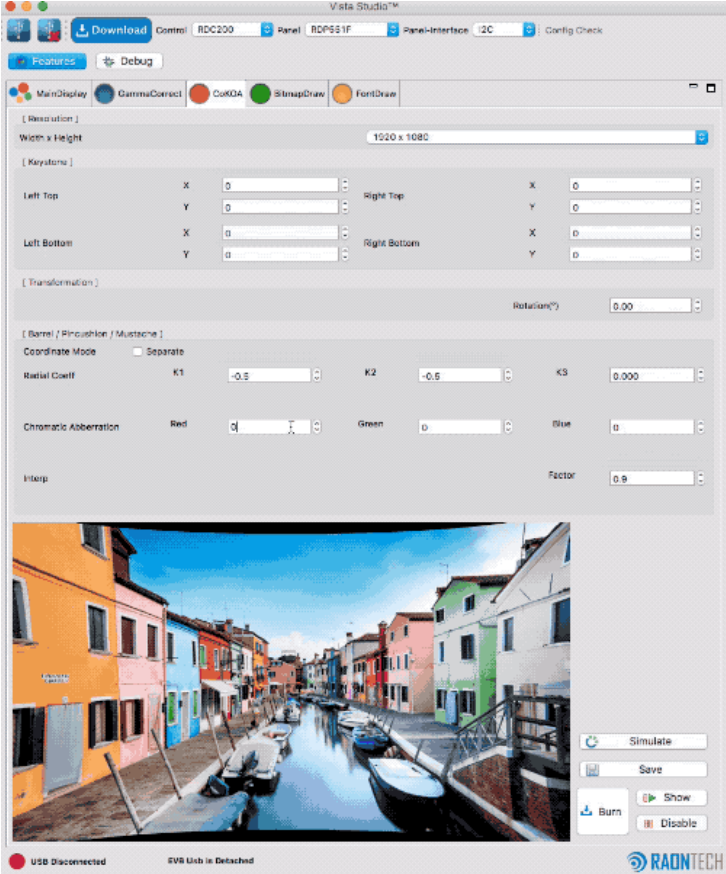
Barrel



Correction of Keystone and Optical Aberrations

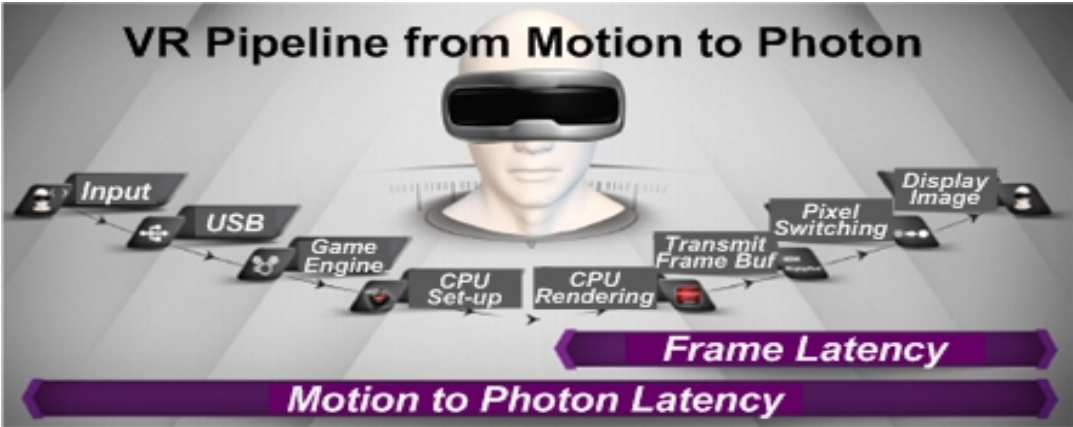


Pin-Cushion



Color Aberration

Dizzy-free & Color-Breakup-free AR with RAON's Proprietary Technology



Less than 10msec motion-to-photon (MTP) latency
With RAONTECH ATW solution



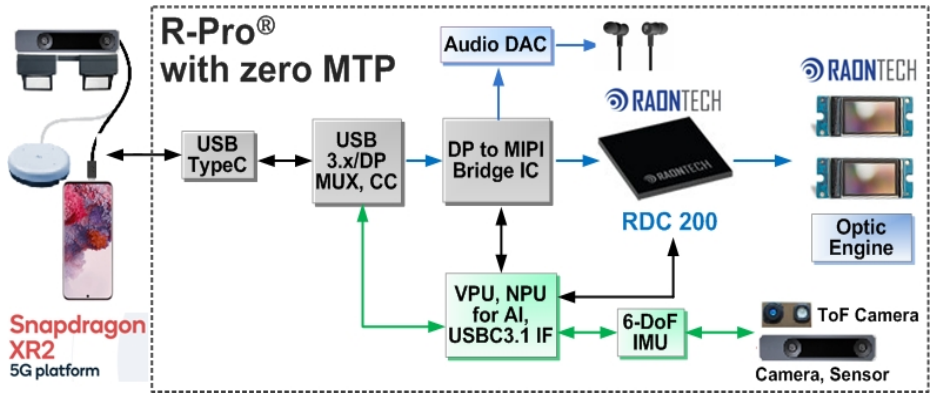
MTP latency

Competitors
1~200msec

RAONTECH < 10msec

Conventional Display: 60 Hz Source, No In-Display Offset Computation

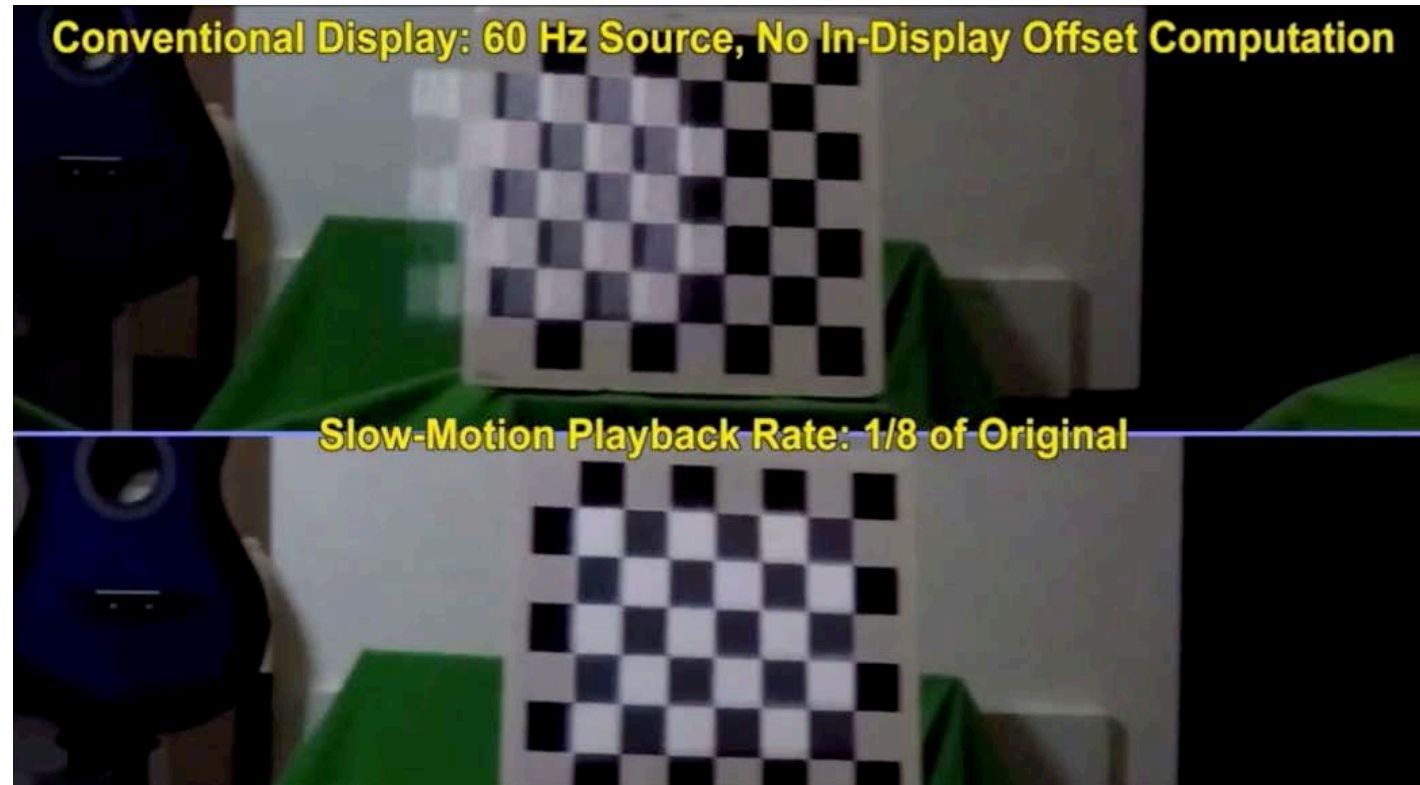
Slow-Motion Playback Rate: 1/8 of Original



Qualcomm
XR2 Ready
Rapid
Prototyping
and
Time-to-market
for Customers

Why MTP(Motion To Photon) Latency is Important at AR

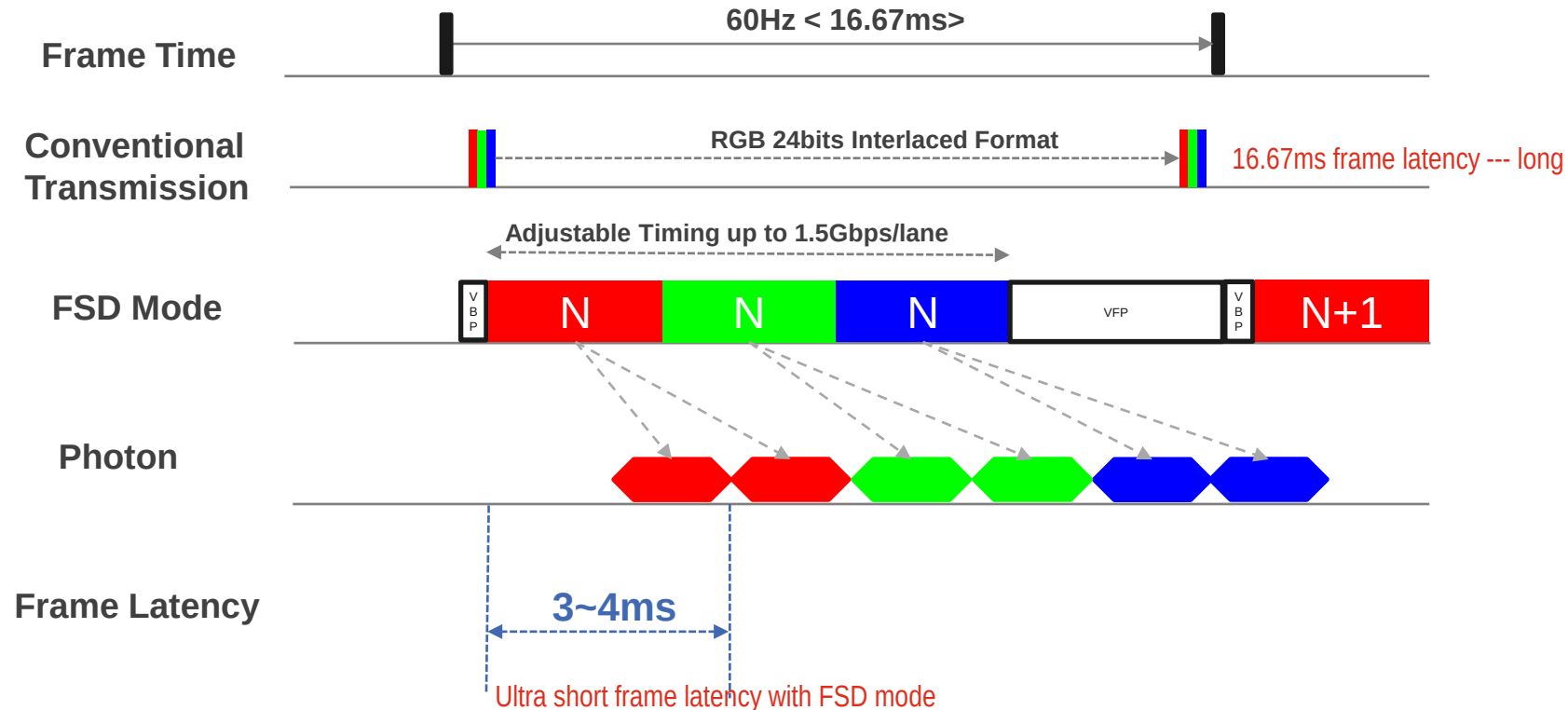
- ❑ For VR, Oculus recommends $\leq 20\text{ms}$ of Latency
- ❑ For OST(Optical See Through) AR : MTP Latency Tolerances should be smaller : $\leq 5\text{ms}$
- ❑ Aviation Reference : SAE ARP 5228(2001) Misregistration Tolerance : 5mrad (0.286°)



* video courtesy of Microsoft Research"

RDC200A FSD Interface for ultra low display latency (Field-by-Field Receiving Mode)

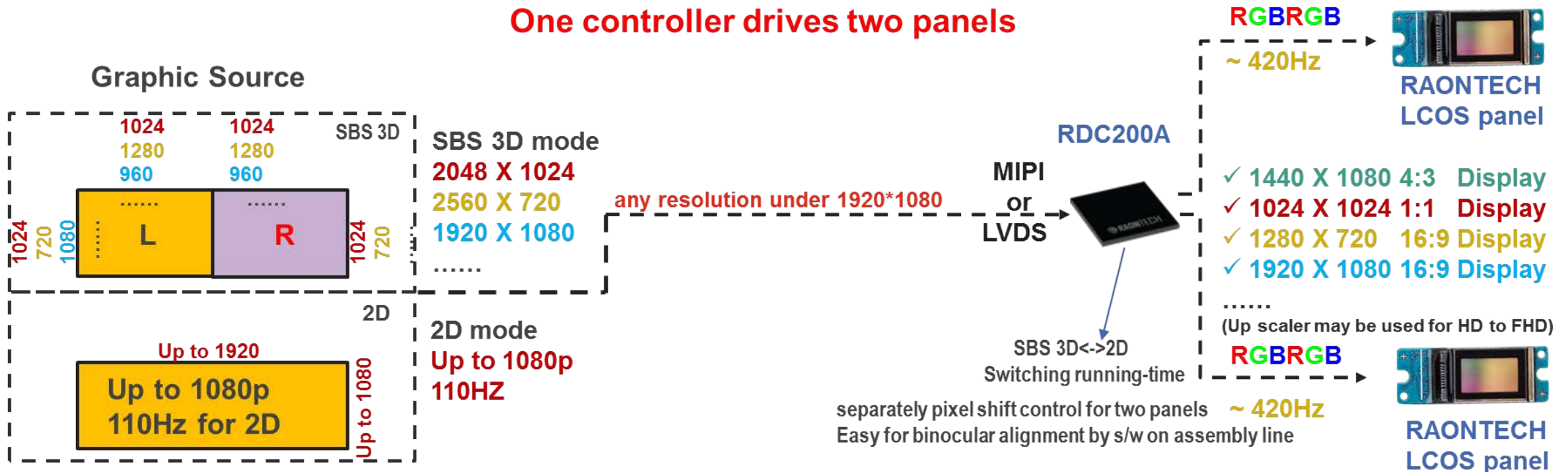
- ❑ FULL Capability Mode for FSD Interface for Micro Display.
(Field Sequential Display interface)
- ❑ Color order can configurable.
- ❑ Scan-out timing can adjustable.
- ❑ Final Frame Latency will Be 3 ~ 4ms.



LCOS controller: System structure-one controller drives two panels

(Lossless HD 3D up to 120Hz)

- ❑ Dual Panel driving Mode for 3D Application.
- ❑ Widen OE Alignment adjustment.
- ❑ Software Defined IPD w/o Image crop via unoccupied Pixel.
- ❑ Small BOM + Lowest Power Consumption : $\sim 600\text{mW}(1 \times \text{RDC200A} + 2 \times 1080\text{p panel})$ and $\sim 450\text{mW}(1 \times \text{RDC200A} + 2 \times 720\text{p panel})$
- ❑ Aspect Ratio 1:1 Up to 1K1K = 1024 X 1024 and 16:9 up to FHD
- ❑ Up scaler: HD input(2560*720 SBS 3D)->FHD display for each panel with one controller



Evaluation Kit

with Prism reference AR OE



R-VISTA50

Panel: RDP502H

Resolution: 1280 x 720

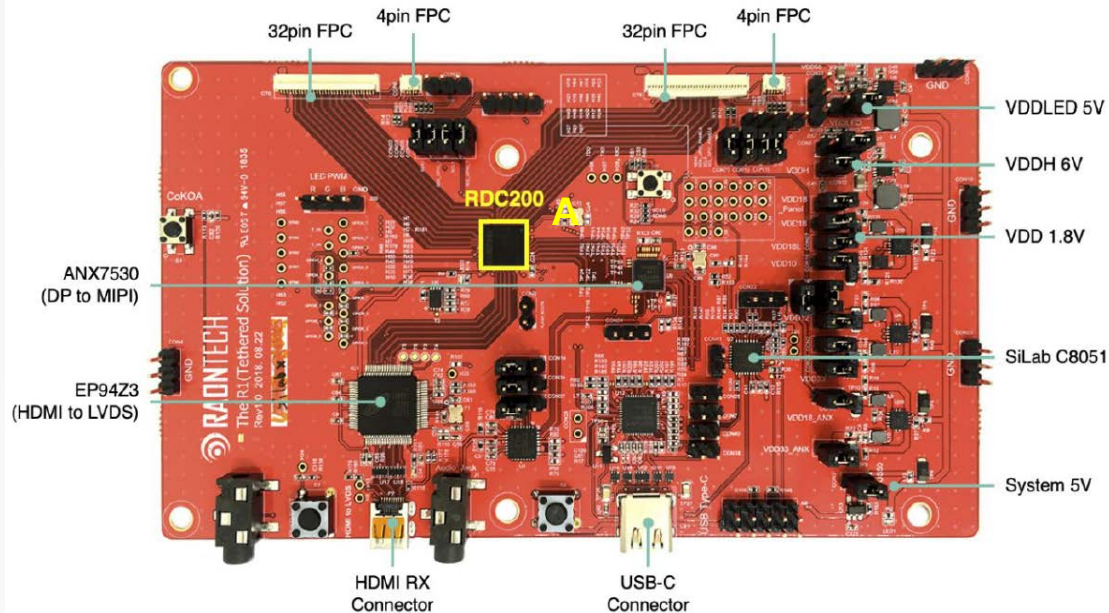
FOV: 40°

R-VISTA55

Panel: RDP551F

Resolution: 1920 x 1080

FOV: 45°



Evaluation Kit

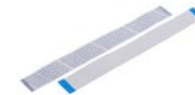
without Prism reference AR OE



Panels / Optics of
customer's choice



System Board
with RDC200A



FFC Cables



HDMI Input
Cable



USB Cables

Schematic,
PCB File,
GUI Program

Software Development Kit



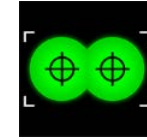
Vista Cube™

Designed to access display drivers for all series of RAON microdisplay panels and controllers.



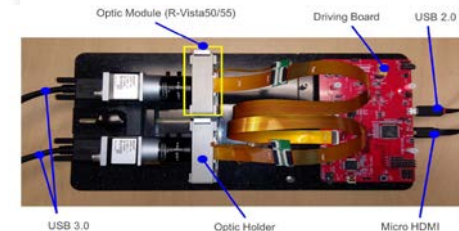
Vista Studio™

The most powerful responsive and intuitive GUI tool to calibrate microdisplay products. It supports Mac OS X, Windows® OS, and Linux® in both 32-bit and 64-bit versions.



DragonFly™

Alignment tool based on machine vision to support alignment tuning and display quality calibration of binocular system.





THANKS