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SAMSUNG SYSTEM LSI



Investor Presentation
2020

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BUSINESS UPDATE

MARKET OPPORTUNITIES

SAMSUNG STRATEGY

KEY TAKEAWAYS

Financial Highlights

At the Heart of Mobile Innovation



1/3

Global Smartphones
Powered by
ISOCELL Image Sensors

* TSR, Dec. `19



5G

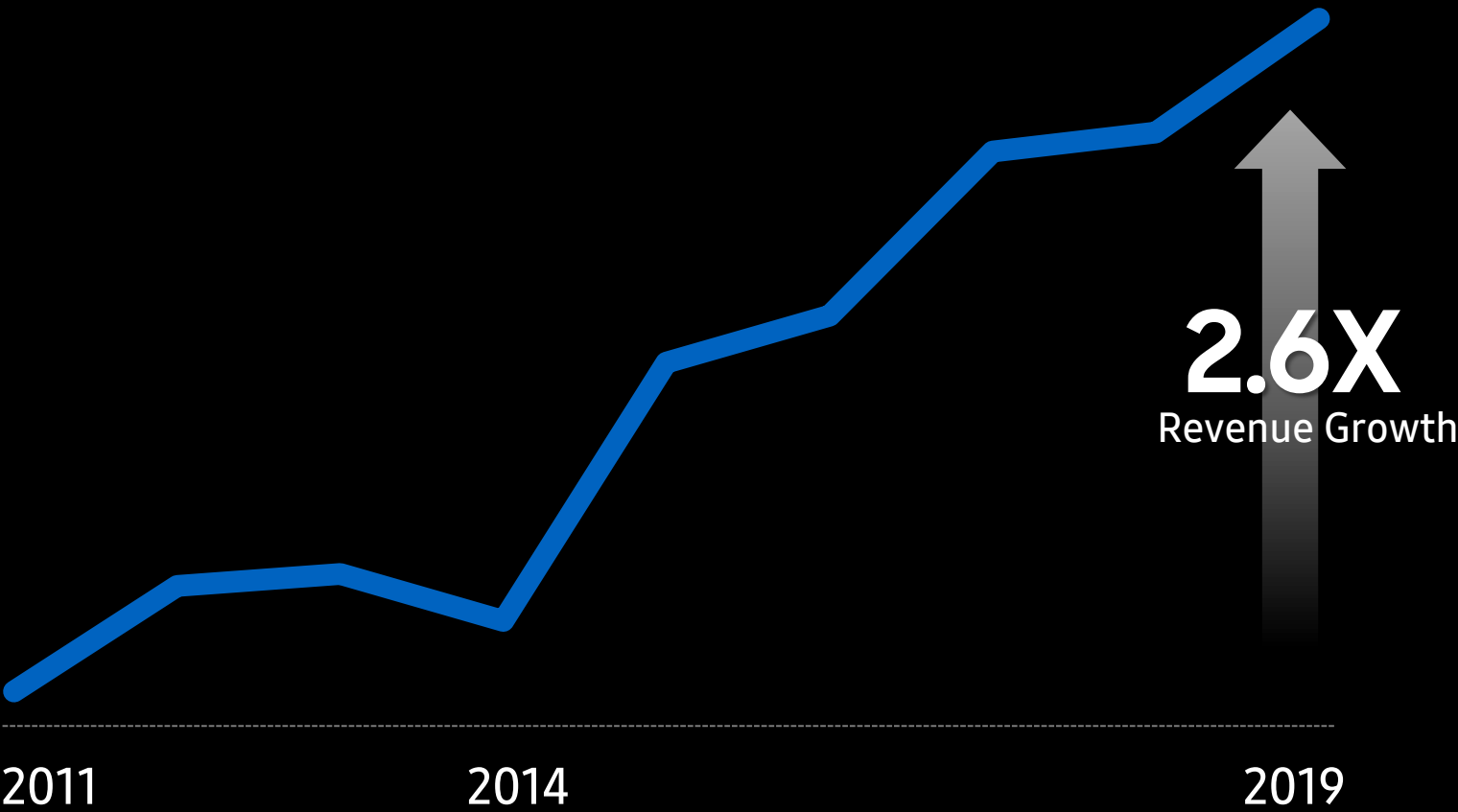
Leading Provider
of 5G Modem
& 5G Mobile SOC



1/2

60% of Global Mobile Displays
Featured with
System LSI's OLED Driver ICs

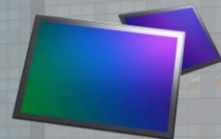
* IHS, 2019



Business Portfolio



Exynos Processor
Modem/RF/Connectivity



ISOCELL
Image Sensor



Mobile DDI
Touch Controller



NFC/eSE
Fingerprint Sensor



SIM/eSIM
Banking/ID



Power
Management IC

Mobile Devices



Automotive



IT / Consumer Devices



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BUSINESS UPDATE

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SAMSUNG STRATEGY

KEY TAKEAWAYS

Technologies for the Next Decade

5G Network

On-device Intelligence

Mobile Camera

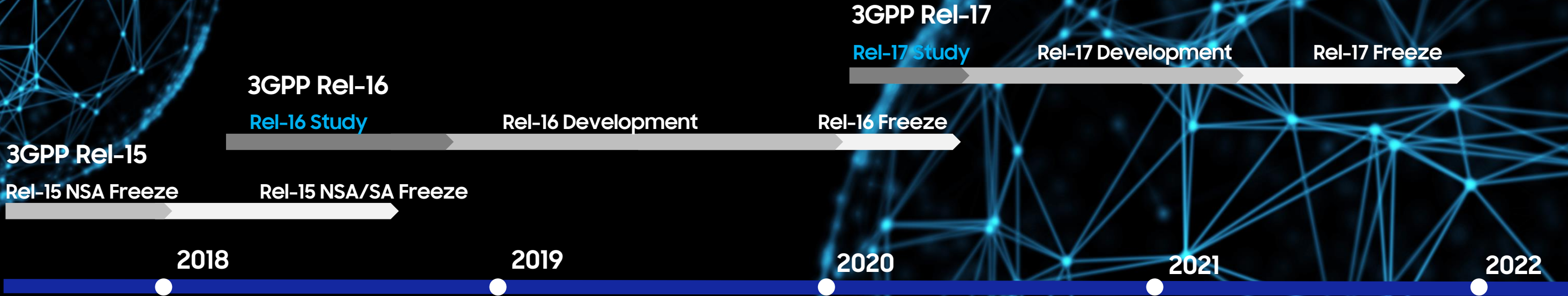
Smart Mobility

toward

Intelligent Connectivity

5G Network

5G for Everyone



5G Phase 1

- Commercial service rollout
- Non standalone network
- Combination of 4G LTE and 5G NR

5G Phase 2

- Mass Market 5G devices with various 5G chipsets
- Standalone network deployment
- Global adoption of mmWave
- NR-V2X, Industrial IoT

Intelligence on the Devices

Smarter Future Powered by AI

Artificial Intelligence (AI) is playing an increasingly prominent role in our day to day lives and it promises to transform the technological landscape. Complex algorithms and processes, such as machine learning and deep learning, are driving the transformation, boosting the need for more powerful on-device AI solutions.



Personalization



Privacy / Security



Rapid Response



Availability

Personal Assistant



Next-level
Photography



ADAS / AD



Real-time
Translation



Mobile Camera

Ultra-high Resolution

64 and 108Mp mobile image sensors

Small and Slim

Packs in ultrafine ~0.7um sized pixels

Intelligent Camera

Scene-Adaptive HDR Processing,
Face Detection/Recognition, Fast AF

Mobile Camera Technical Trend

Multiple Cameras

More front and rear facing cameras

DSLR-like Performance

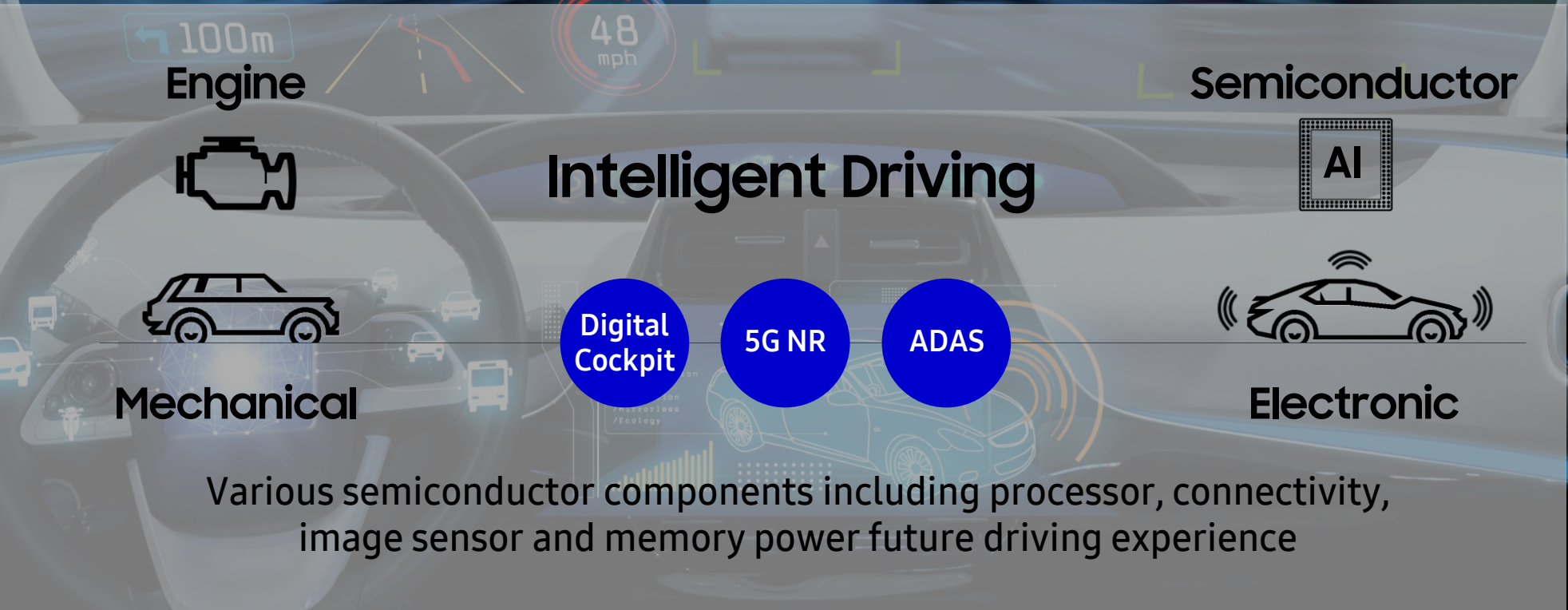
High light sensitivity, super zoom, slow-mo

3D Depth Sensing

DVS, ToF for Game/VR/AR

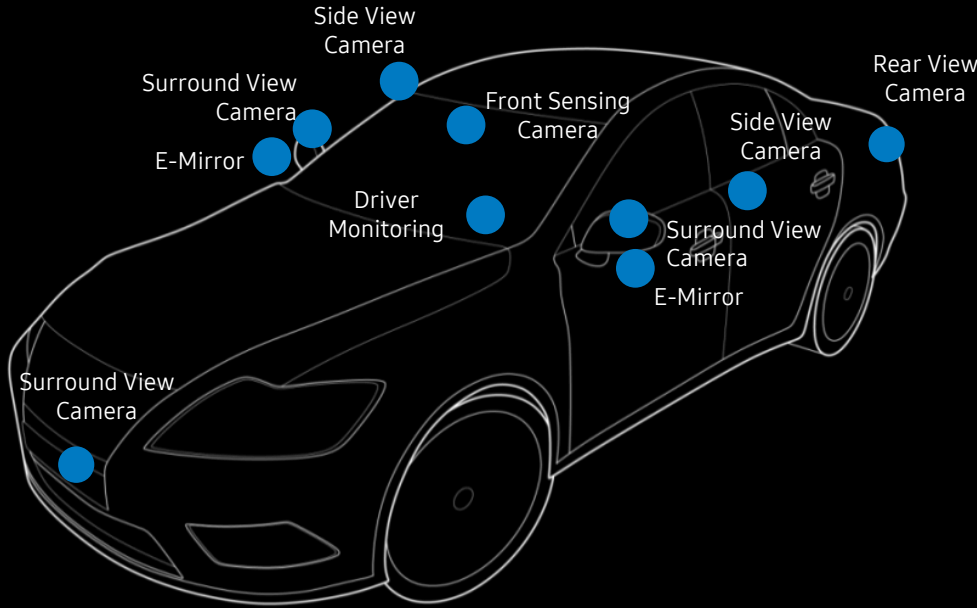
Smart Mobility with IC Technology

Innovation in Automotive Industry

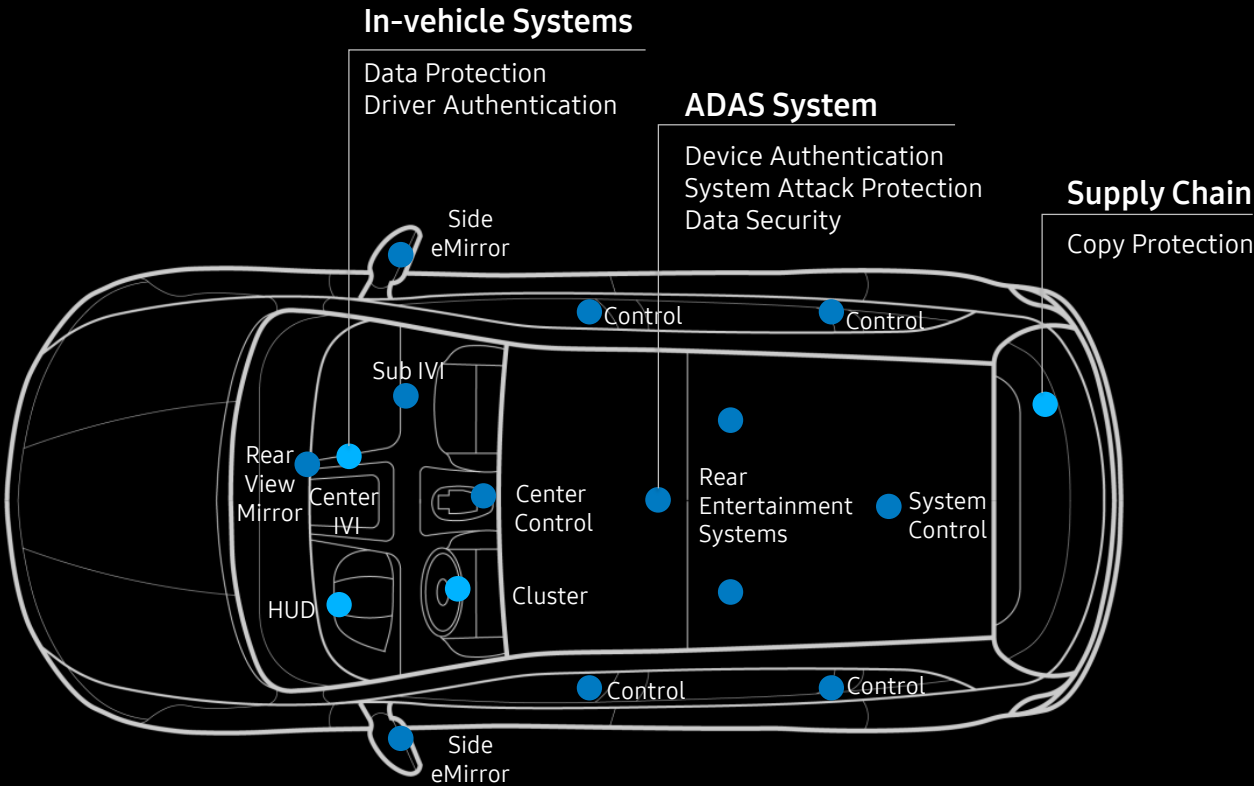


Enriched Systems in Future Mobility

Cameras, Displays and Security Systems for the Future Mobility



Cameras for
ADAS/Autonomous Driving



Displays and Security Systems for
Driving, System Control and In-vehicle Entertainment

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SAMSUNG STRATEGY

KEY TAKEAWAYS

Strategy for the Growth

Innovation to Bring Ideas to Life

Total Solution

Integrated, extended portfolio
Hardware & software capability

Technical Leadership

Leading technologies for 5G/AI/Sensor
Technology on leading-edge process

Market Shaper

Close collaboration with ecosystem partners
Pioneering future market

Solutions for Mobile Devices

Advanced IC Portfolio for Mobile Innovation

ISOCELL Image Sensor

Super resolution, sub-micron sensors
for front / rear cameras
Motion & depth sensor



Exynos Processor

Mobile processors
LTE/5G modems & RF ICs
Connectivity
Supply modulator



Power Management IC

PMIC for mobile processor,
UFS memory, OLED display,
Wireless charger, USB Type-C PDIC



NFC / Secure Element

Mobile payment
Data security solution



Touch Controller

Low power, high sensitive



OLED Display Driver IC

Bezel-less full screen



Fingerprint Sensor

Fingerprint sensor on display



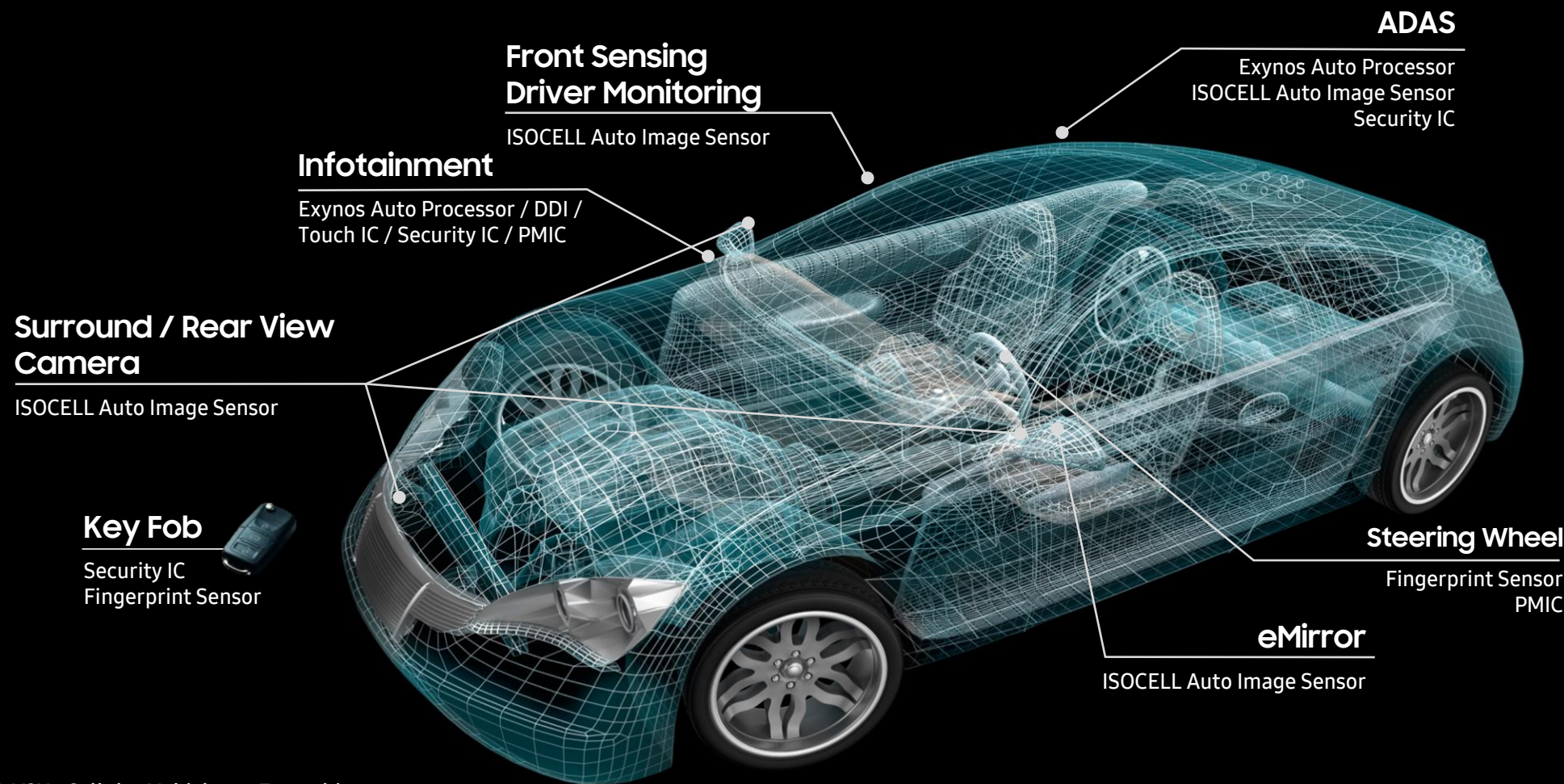
Reference Designs

Optimized platform design



Solutions for Mobility

Transforming the Driving Experience with IC Technologies



Exynos Auto
Processors and modem solution for infotainment, telematics and ADAS system

ISOCELL Auto
High sensitive, high resolution image sensors with embedded security

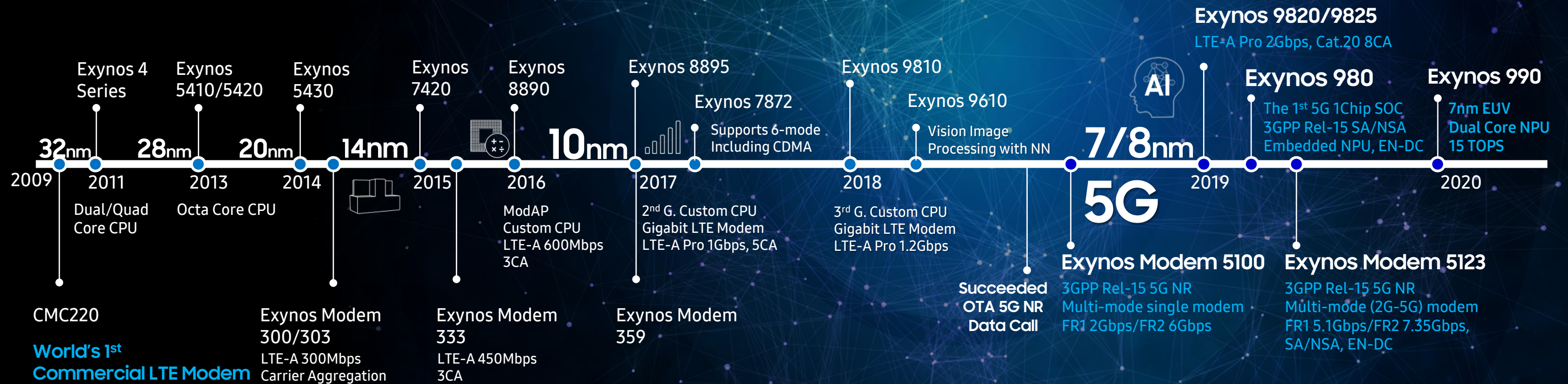
Security
Safe and highly reliable security solutions to protect personal data and privacy

Display
Display driver ICs, Touch Controllers for integrated cockpit system

* C-V2X : Cellular Vehicle-to-Everything

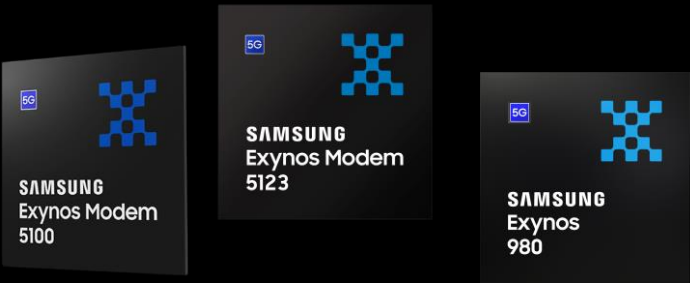
Exynos Processor

Path of the Innovation



Exynos 5G Processor

Unlocking the future of 5G with Exynos



Hyper-fast
Up to 7.35Gbps*
* Based on FR2 (mmWave)



Compliant with
3GPP 5G NR Rel-15



Global spectrum
covers FR1 & FR2



Ready for 5G Phase 2
supporting NSA & SA



Technologies for speed
256 QAM, 4x4 MIMO, EN-DC



Full 5G chipset
Modem, RF IC, ET, PMIC

Making 5G into a Reality

5G Smartphones powered by Exynos



5G



Exynos for Device Intelligence

An Intelligent Powerhouse

Powerful hardware architecture

Integrated hardware & software design

Efficient deep learning algorithms

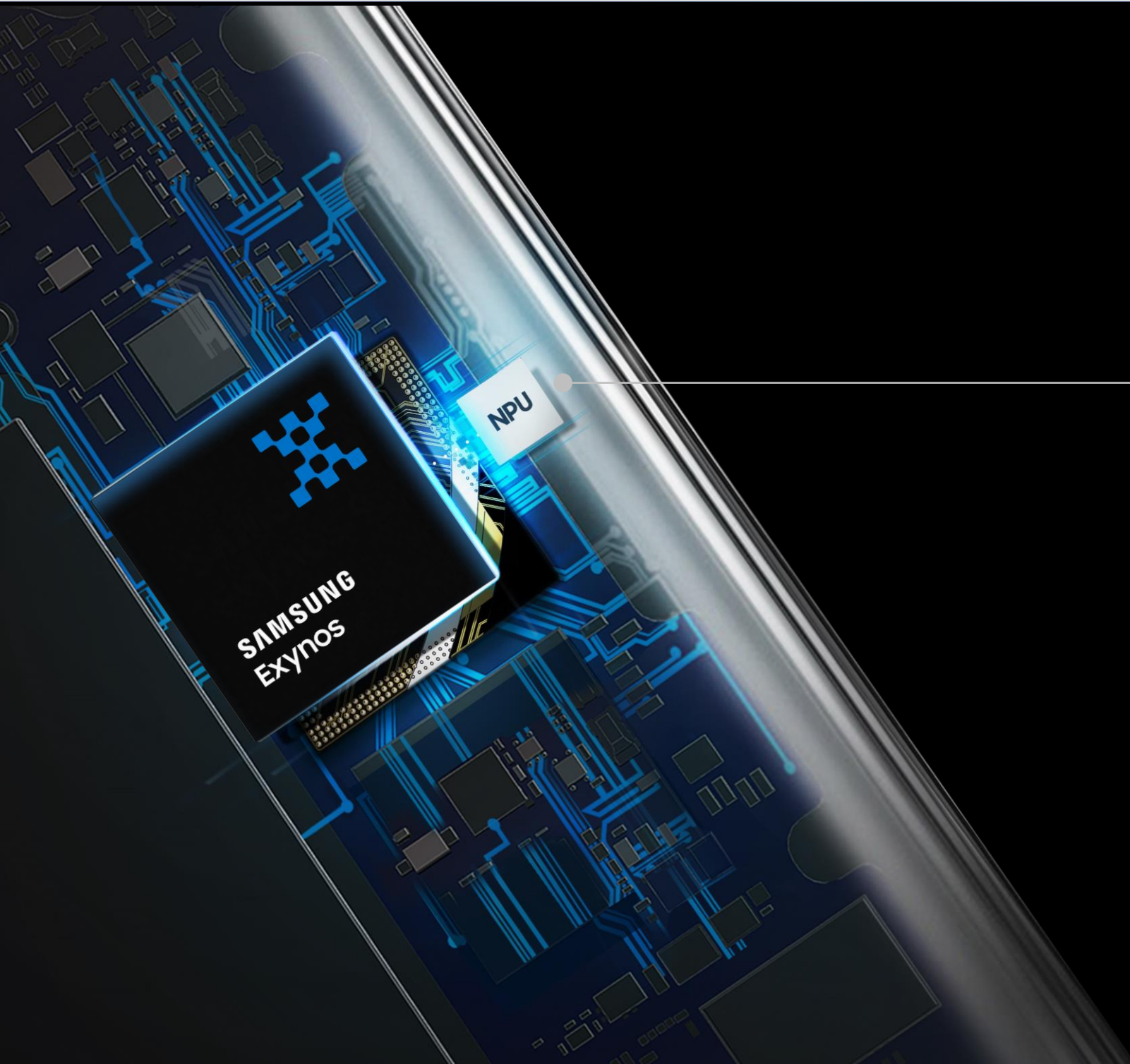
Neural Processing SDK

Deep learning frameworks

TensorFlow | Caffe | Caffe2 | PyTorch | Android NN API | ONNX

Software architecture & tools

Compiler | Conversion tools | Pre-trained models | Library



Exynos Auto for Mobility



Driving the Future of Mobility

In-vehicle Infotainment
Exynos Auto V

Powerful Processor
for Intelligent Multi-screen
Infotainment Platform

ADAS System
Exynos Auto A

Intelligent Processor
for ADAS System

Telematics
Exynos Auto T

LTE & 5G Modems
for Telematics System
Low Latency, C-V2X



Exynos Auto V9

A Processor to Power the Next Generation
In-vehicle Infotainment System



Supports 6 Displays &
12 Cameras in 1 Chip



Embedded
NPU



Tri-cluster
GPU

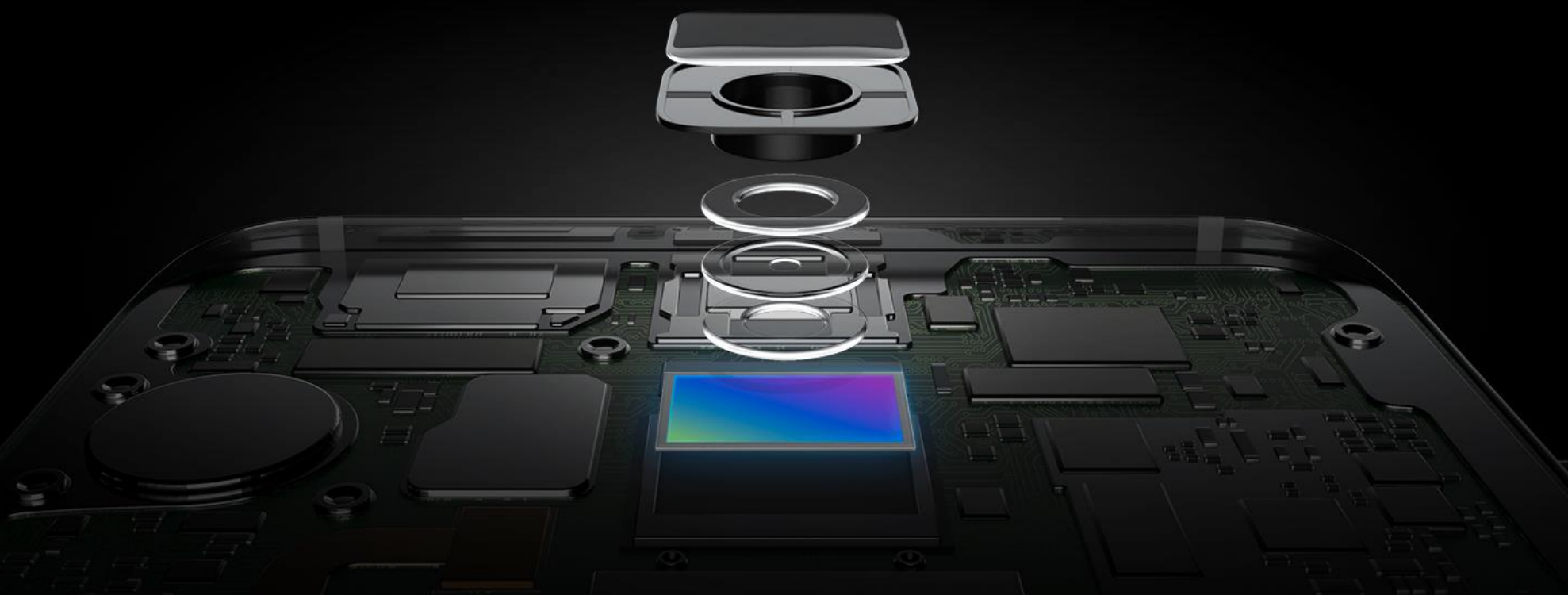


Safety
System

ISOCELL Image Sensor

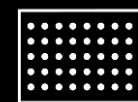
SAMSUNG ISOCELL

Image sensors to redefine mobile photography



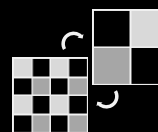
ISOCELL Plus

Upgraded Pixel Isolation Technology
Better Low Light Sensitivity, Higher Color Fidelity
Fit for Realizing High-resolution with Sub-micron Pixel



Super Resolution Sub-micron Pixel

0.7um & 0.8um Fine Pixels
to Integrate up to 108 Megapixel



Hybrid Pixel Algorithm

Tetracell / Nonacell Technology
Hybrid pixel algorithms to enable
clear and bright photos at any time



Smart ISO

Intelligent ISO level selections
depending on light environment

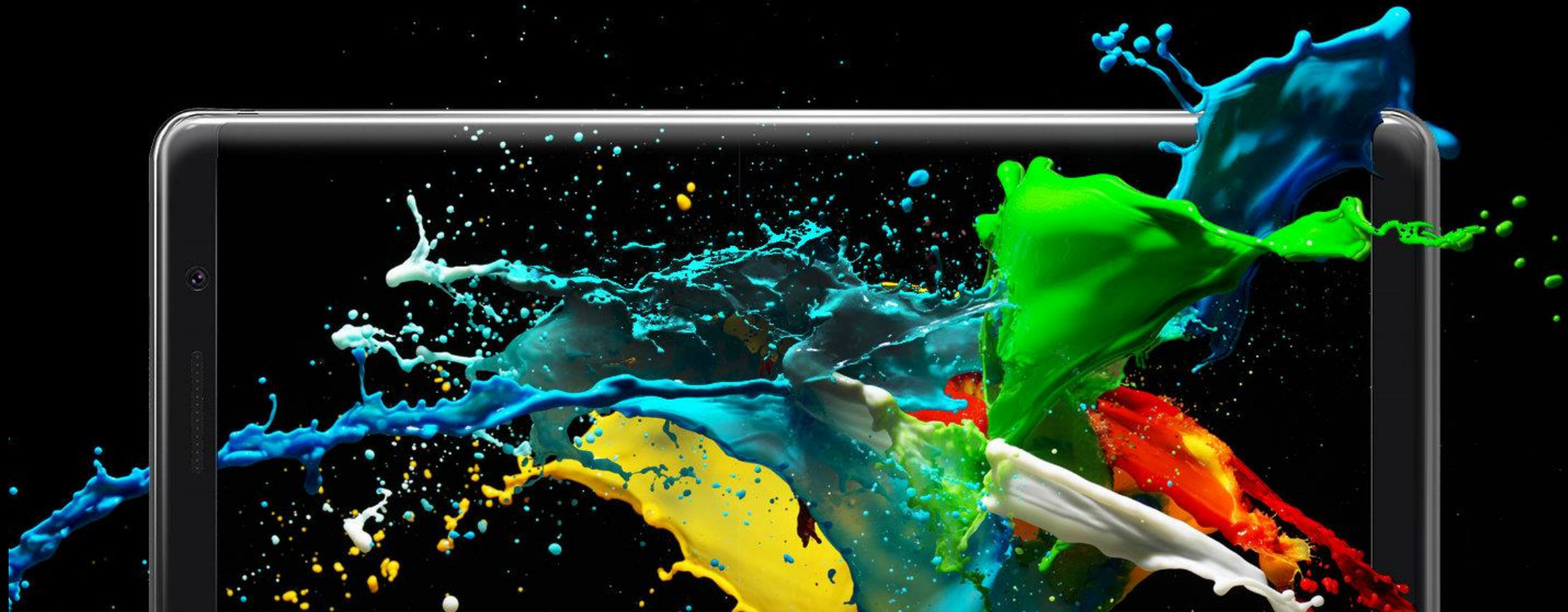
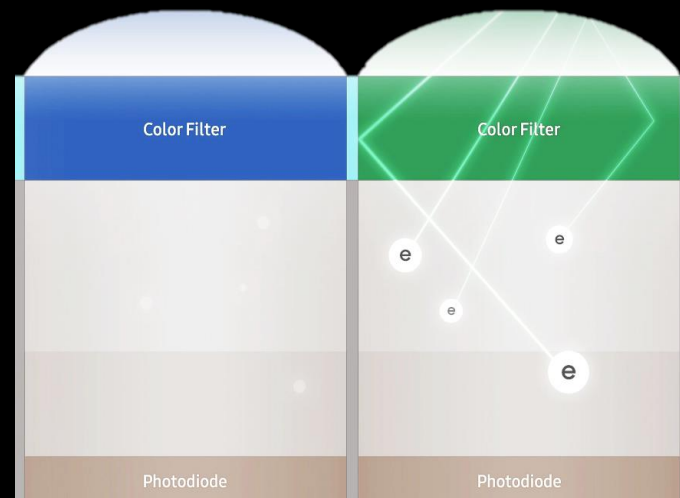
ISOCELL Plus Pixel Technology

Remarkable color accuracy and balance

An advanced pixel isolation technology that minimizes optical loss and cross-talk by placing a barrier around each pixel



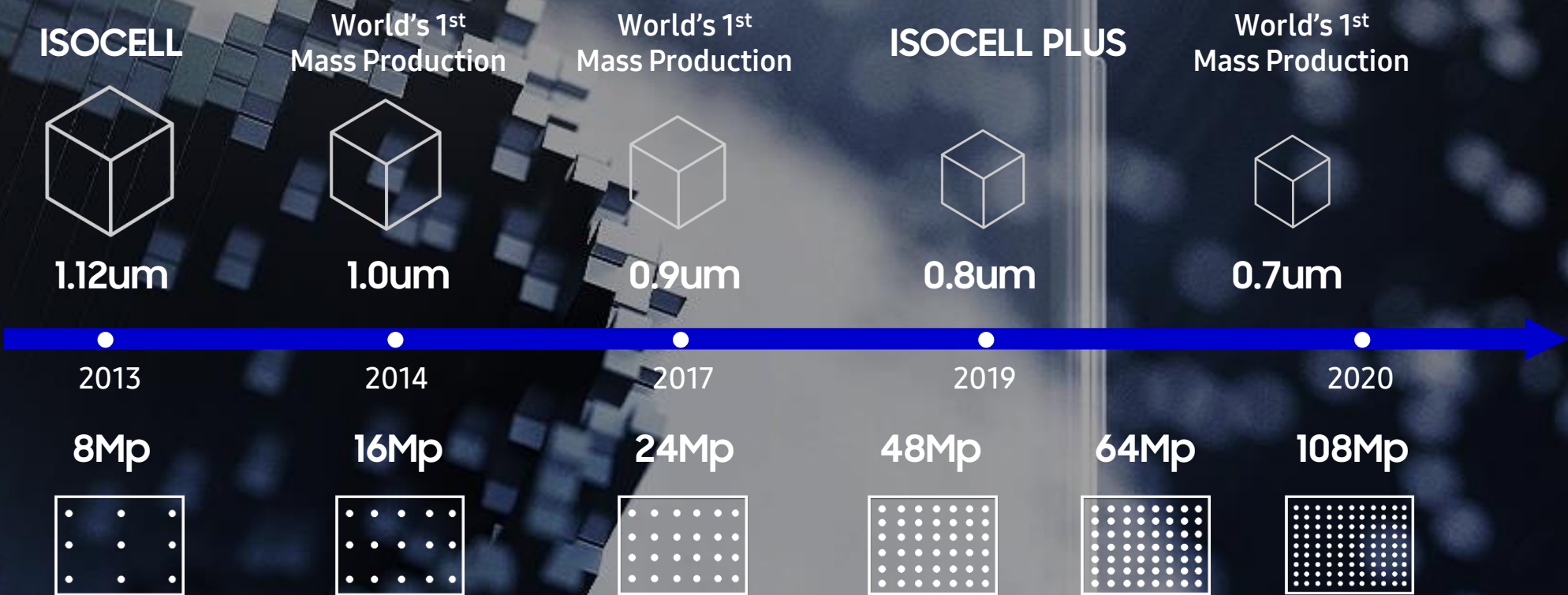
ISOCELL Plus



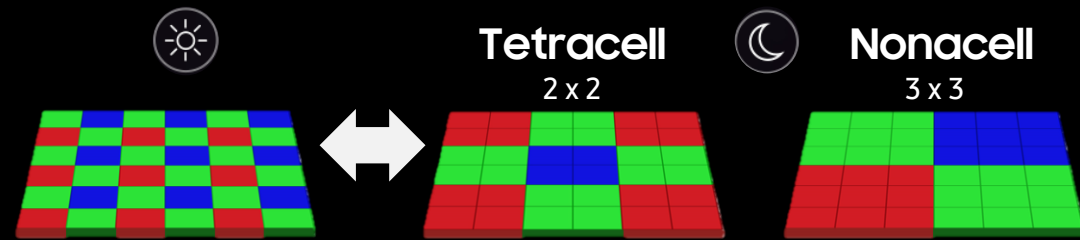
Advanced Image Sensor Technologies

Super Resolution, Sub-micron Pixel

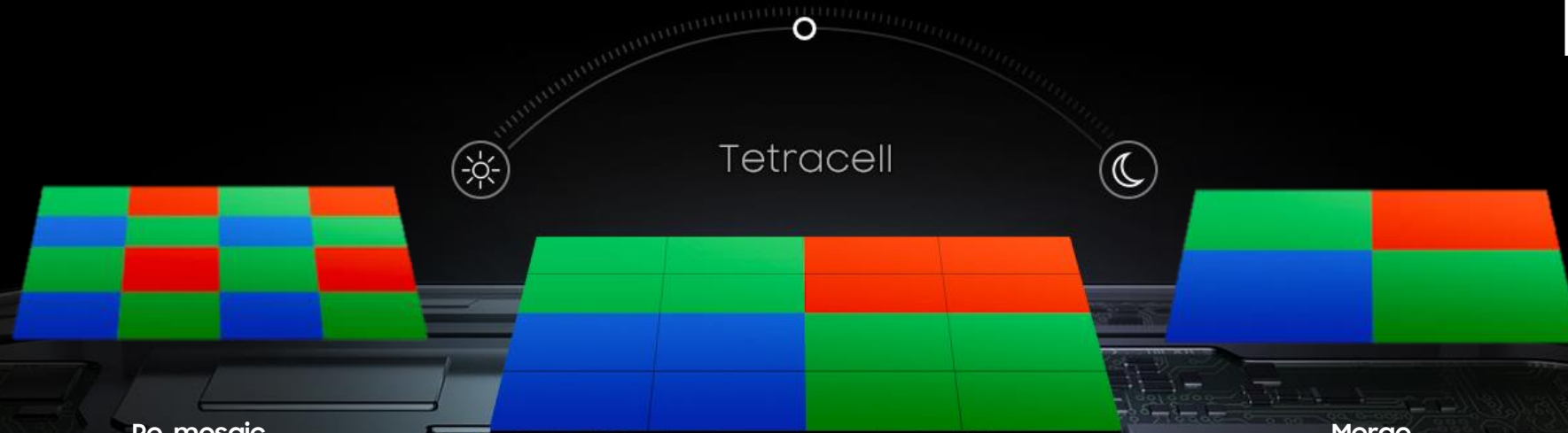
Super resolution in a tiny sensor enabled by ISOCELL Plus pixel technology



Advanced Image Sensor Technologies



Small pixels for detail
big pixels for brightness



Re-mosaic
Algorithm

More Details with
Super Resolution

Merge
Four Neighboring Pixels

Brighter Images with
Big-pixel like Performance

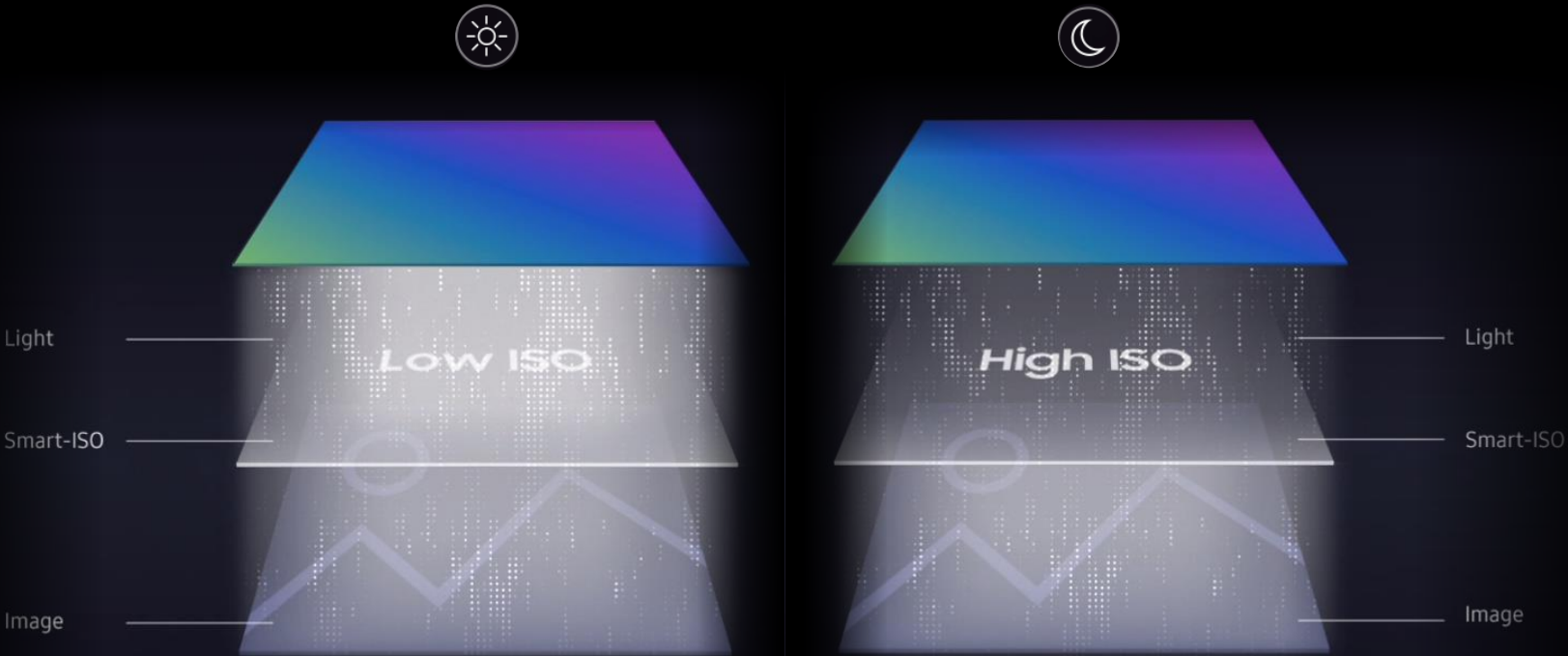
Tetracell and Nonacell technologies
Hybrid pixel merging and remosaic solutions
that enable bright photos in low-light
and detailed photos in day light

Advanced Image Sensor Technologies

Smart-ISO

Intelligent ISO caters to variable environments

Low ISO
in bright environments

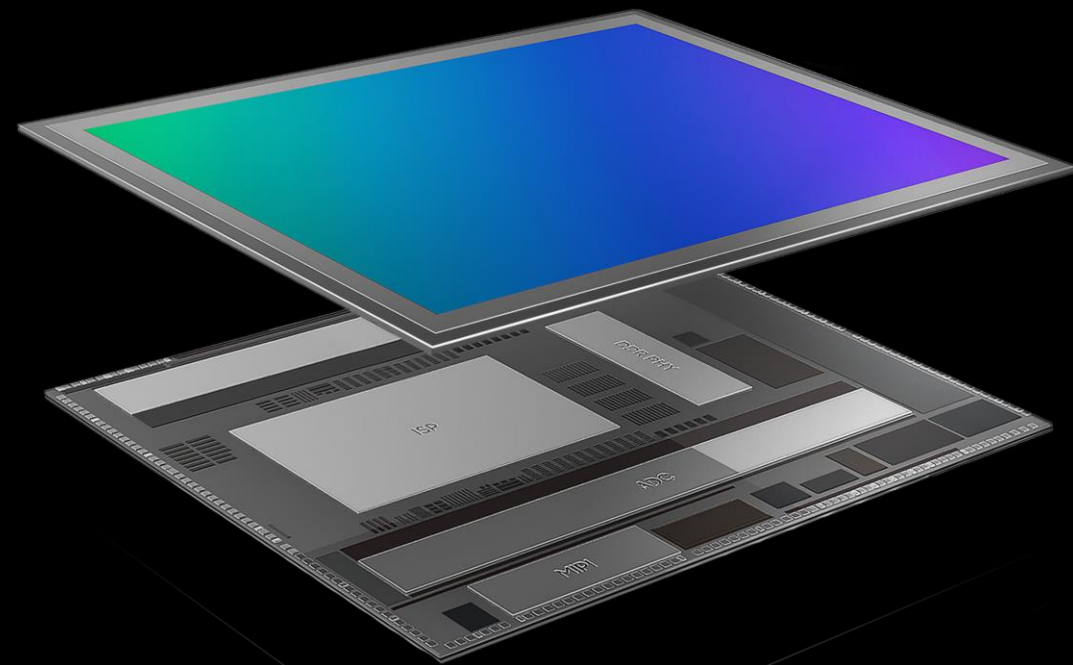


High ISO
for low-lit settings



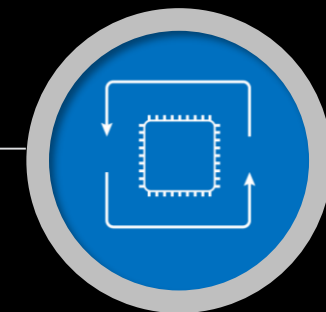
Process & Service Competency

Stunning Mobile Images with ISOCELL



Advanced Node

28nm based Image Sensors



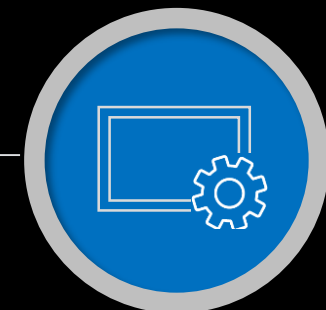
Unique Pixel Technology

Various Pixel Technologies and Algorithm for Superior Image Quality with Small Pixel



Design Service

Hardware and Software Integrated Solution
Custom Sensor Design



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SAMSUNG STRATEGY

KEY TAKEAWAYS

KEY TAKEAWAYS

- ✓ Samsung has maintained the position as a key supplier of mobile processors, image sensors and display driver ICs.
- ✓ Innovations in semiconductor technologies will be the key driver in various new applications that adopts AI/Deep Learning, 5G NR network, and smart mobility.
- ✓ Samsung's System LSI business provides integrated total solutions for mobile, and is now on the path to be a key player in the field of 5G, autonomous mobility, and device intelligence.

Samsung's System LSI Business Possibilities Beyond Components

Meet Samsung System LSI

 www.samsung.com/semiconductor
www.samsung.com/Exynos
www.samsung.com/ISOCELL

 www.facebook.com/SamsungExynos
www.facebook.com/SamsungISOCELL

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 WeChat – Exynos, ISOCELL

SAMSUNG