Rockchip

RK3588

New Generation Flagship – AIoT Solution

V 1.1

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New Generation Flagship – AIoT Solution

Rockchip RK3588

- **8 nm** — FinFET Process
- **8-Core** — Cortex A76 up to 2.4GHz
- **6TOPS** — AI Accelerator - NPU
- **8K** — Video Codec Display Output
- **32 GB** — Super large DRAM support

RK3588 CPU 8-Core A76+A55 — CPU Score on Geekbench — RK3399 — **4** Times improved

RK3588 GPU 4-Core Mali-G610 — GPU Score on Geekbench — RK3399 — **8** Times improved

RK3588 Key Specifications

KEY SPEC	Rockchip RK3588	Rockchip RK3588S
Processing		
CPU	4x Cortex-A76 | 4x Cortex-A55	
GPU	Mali G610 MC4 OpenGL ES1.1/ 2.0/ 3.0/ 3.1/ 3.2, OpenCL 2.0, Vulkan	
NPU	6 Tops NN Accelerator	
Memory I/F		
DDR I/F	Max. 32GB, 64-bit LPDDR4/ LPDDR4x/ LPDDR5	
Video		
Camera Input I/F	4x4lanes/ 4x2-lanes+2x4-lanes MIPI CSI	
ISP	48 MP resolution, HDR	
HDR	HDR10, HLG	
Display Output I/F*	2x MIPI DSI, **2x HDMI2.1**, 2x eDP	2x MIPI DSI, HDMI2.1, eDP
LCD Display	1x 8K/ 3x 4K/ 6x 1080P	
Video Encode	H.264/ H.265 up to 8Kp30	
Video Decode	VP9 / H.265/ H.264/ AV1 up to 8Kp60	
Connectivity		
Network	2x GbitE MAC | 1x RGMII | 3x CAN	1x GbitE MAC | 1x RGMII | 3x CAN
Expansion I/F	USB2.0, **USB3.1** | 3x PCIe2.1 | **4x1/1x4/2x2 PCIe3.0** | **3x SATA3.0**	USB2.0, **USB3.1** | 2x PCIe2.0 | 2x SATA3.0
Others		
Security	ARM Trustzone SHA-512/ AES-256/ DES/ RSA/ ECC cryptography	
Package	23x23mm, 0.65mm pitch	17x17mm, 0.41mm pitch

RK3588 Microprocessor Highlights

64bit Octa CPUs
Quad A76 + Quad A55
8nm FinFET process
2.4GHz

High-performance GPU, NPU
ARM Quad Mali G610
6TOPS NPU

ISP, Video Codec
48M ISP, HDR/3DNR
Full-duplex 8K video codec

32 GB DRAM
Support 64bit LPDDR4/
LPDDR4x/LPDDR5

Video In-/output
HDMI RX/Dual MIPI-CSI/…
HDMI TX/Dual MIPI-DSI/…
Support displays up to 8Kp60

SATA / PCIe
4 lane PCIE3.0
3 lane SATA3.0

Rich User Interfaces
QSPI, I2C, UART, I2S, CAN,
USB3.1, RGMII

Operation System
Linux
Andriod

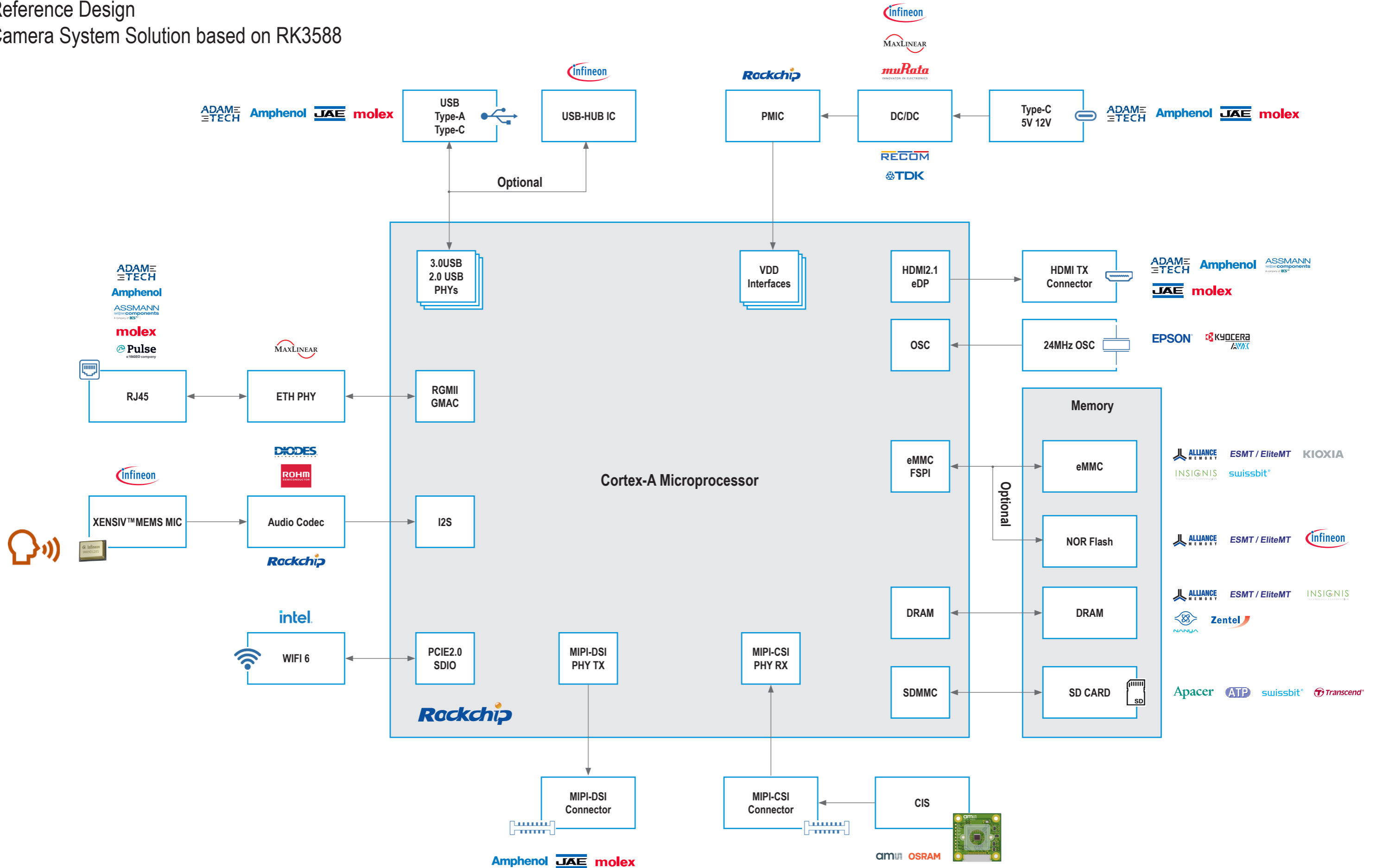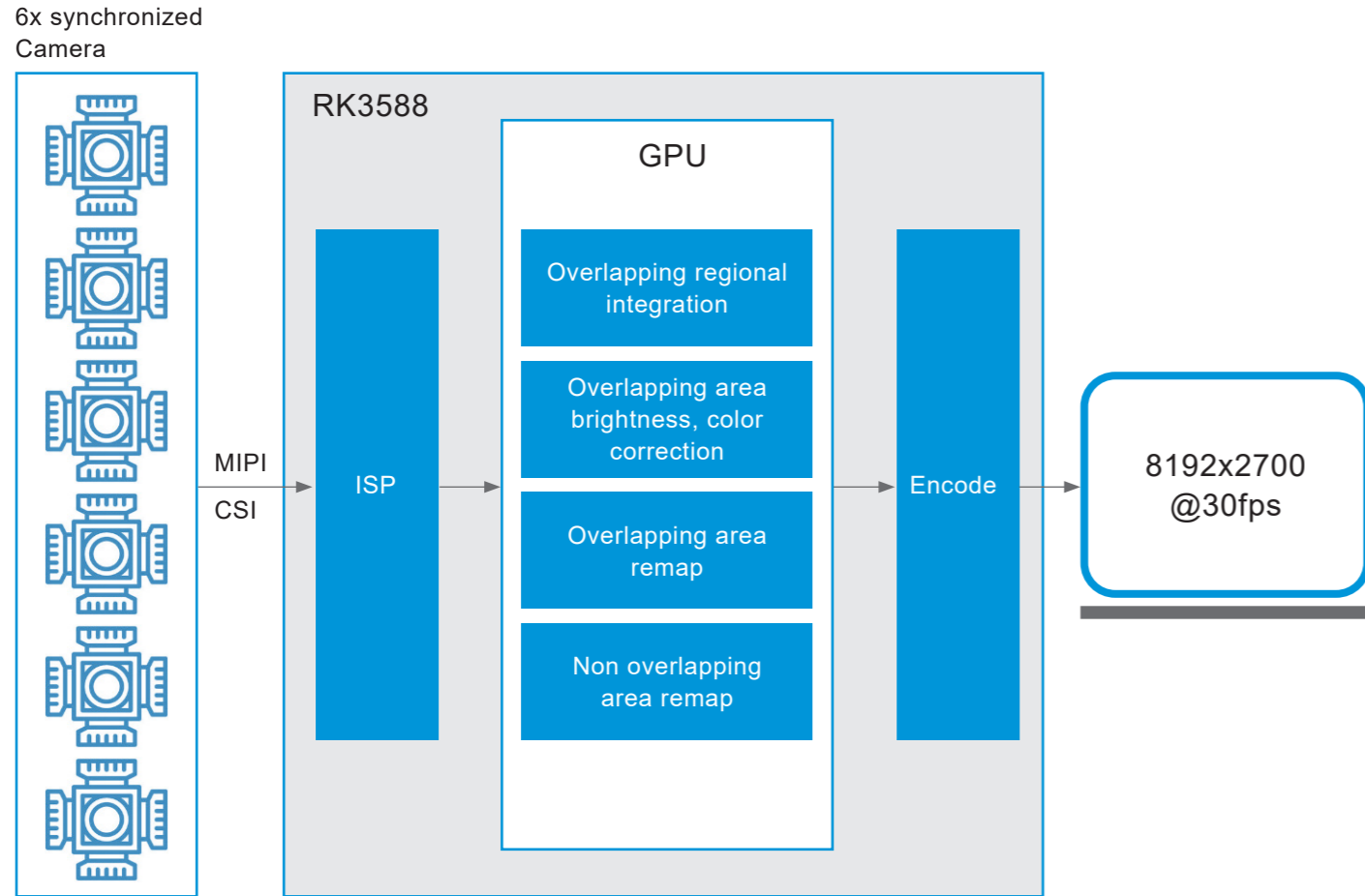**Applications**
ARM PC / Smart Screen
Edge Computing / AR/VR

Rockchip Application Microprocessor Highlights

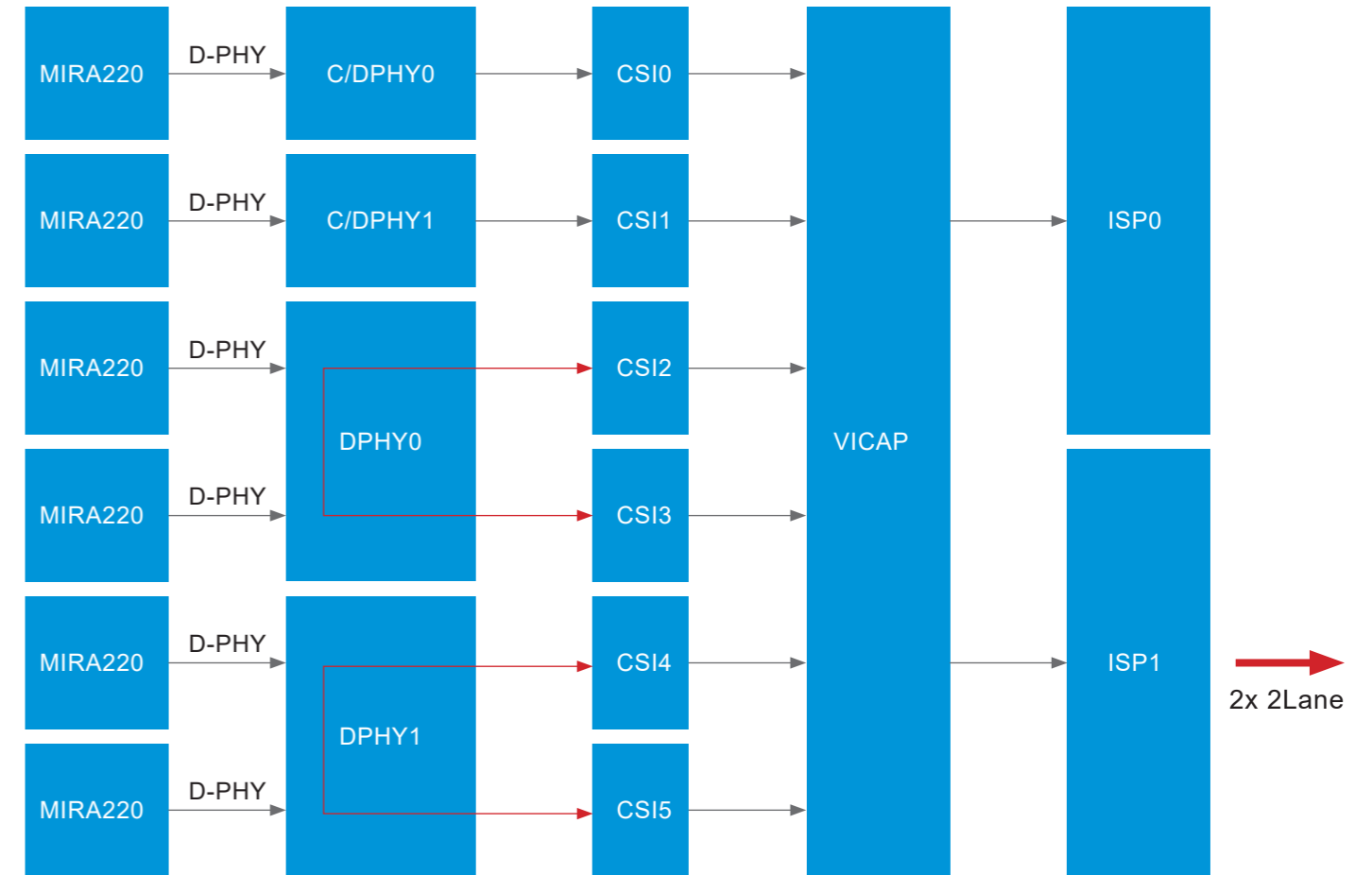|	Entry Level				Mid Range		High End	
	RV1106	RV1126	RK3308	PX30/RK3358	RK3328	RK3568	RK3399	RK3588
CPU	Quad-core Cortex-A7	Quad-core Cortex-A7	Quad-core Cortex-A35	Quad-core Cortex-A35	Quad-core Cortex-A53	Quad-core Cortex-A55	Dual Cortex-A72 Quad Cortex-A53	Quad Cortex-A76 Quad Cortex-A55
DSP / GPU	n/a	n/a	n/a	ARM G31 MP2	ARM Mali450 MP2	ARM Mali G52	ARM Mali-T860	ARM Mali G610
NPU	0.5Tops	2.0Tops	n/a	n/a	n/a	1.0 TOPs	3.0TOPs (RK3399Pro)	6.0 TOPs
DDR	Built-in 16bits DDR3L	32bits DDR3/DDR3L/ DDR4/LPDDR3/ LPDDR4	16bits DDR2/DDR3/ LPDDR2	32bits DDR4/ DDR3/ DDR3L/ LPDDR3/ LPDDR2	32bits DDR3/DDR3L/ DDR4	32bits DDR3/DDR3L/ DDR4/LPDDR4/ LPDDR4X	64bits DDR3/DDR3L/ LPDDR3/LPDDR4	64bit LPDDR4/LPDD4x/ LPDDR5
Display interface	RGB	RGB/MIPI-DSI	RGB	RGB/LVDS/ MIPI DSI	HDMI2.0a	MIPI DSI/LVDS, HDMI2.0b/eDp/Eink	HDMI2.0b/ Dual MIPI DSI/eDP	MIPI DSI/LVDS, HDMI2.1/eDp
Max. LCD resolution	720P	1080P	720P	1080P	n/a	4K	4K	8K
Video Encoder	2KP30 H.264, H.265	4KP30 H.264, H.265	n/a	1080P30 H.264	1080P30 H.264, H.265	1080P60 H.265, H.264	1080P H.264/VP8 @30fps	8KP30 H.264, H.265
Video Decoder	n/a	4KP30 H.264, H.265	n/a	1080P60 H.265, H.264	4KP30 H.265, H.264	4KP60 H.265, H.264	4K60 H.265 4K30 H.264	8KP60 H.265, H.264
ISP / Camera IF	5M ISP/MIPI-CSI	14M ISP/MIPI-CSI	n/a	8M ISP/MIPI-CSI	n/a	8M ISP/MIPI-CSI	13M ISP/MIPI-CSI	48M ISP/MIPI-CSI
Industrial / Automotive Qualification	-	Industrial	Automotive	Automotive	-	Automotive	Industrial	Automotive

Reference Design
Camera System Solution based on RK3588

Cortex-A Microprocessor

Blocks and connections:

- USB Type-A Type-C → USB-HUB IC (Optional)
- Type-C 5V 12V → DC/DC → PMIC
- PMIC → VDD Interfaces
- 3.0USB 2.0 USB PHYs
- HDMI2.1 eDP → HDMI TX Connector
- OSC → 24MHz OSC
- RJ45 → ETH PHY → RGMII GMAC
- XENSIV™MEMS MIC → Audio Codec → I2S
- WIFI 6 → PCIE2.0 SDIO
- MIPI-DSI PHY TX → MIPI-DSI Connector
- MIPI-CSI PHY RX → MIPI-CSI Connector ← CIS
- eMMC FSPI → eMMC (Optional)
- NOR Flash
- DRAM → DRAM
- SDMMC → SD CARD

Memory: eMMC, NOR Flash, DRAM, SD CARD

Vendor logos referenced: Infineon, MaxLinear, muRata, Rockchip, RECOM, TDK, ADAM TECH, Amphenol, JAE, molex, ASSMANN electronic components, Pulse, DIODES, ROHM SEMICONDUCTOR, intel, EPSON, KYOCERA AVX, ALLIANCE MEMORY, ESMT / EliteMT, KIOXIA, INSIGNIS, swissbit, NANYA, Zentel, Apacer, ATP, Transcend, ams OSRAM

360° Camera
RK3588 All View Stitching AVS Technology

6x synchronized
Camera

RK3588

MIPI
CSI

ISP

GPU

Overlapping regional integration

Overlapping area brightness, color correction

Overlapping area remap

Non overlapping area remap

Encode

8192x2700 @30fps

360° Camera
RK3588 Video Input Interface

MIRA220	D-PHY	C/DPHY0	CSI0		
MIRA220	D-PHY	C/DPHY1	CSI1		ISP0
MIRA220	D-PHY		CSI2	VICAP	
MIRA220	D-PHY	DPHY0	CSI3		
MIRA220	D-PHY		CSI4		ISP1
MIRA220	D-PHY	DPHY1	CSI5		

2x 2Lane

360° Camera
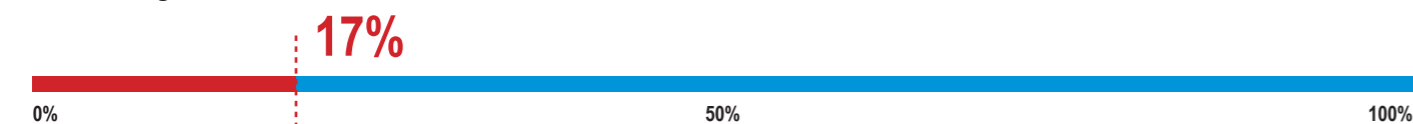## RK3588 System Resource Usage

Scenario Condition

Input
- 6x 1600x1400 30fps

Output
- 1x 8192x2700 30fps

CPU Frequency
- Cortex A76 running@2.0GHz
- Cortex A55 running@1.8GHz

Memory Usage

	Bandwidth Occupancy	Maximum Bandwidth	Usage in %
LDDDR4	12GB/s	34GB/s	35.3%
LPDDR5	12GB/s	44GB/s	27.3%

CPU Usage

17%

0%   50%   100%

AMS-OSRAM MIRA Family

	Mira050	Mira130	Mira220
Overview	2.25mm / 2.75mm	3.7mm / 4.3mm	5.5mm / 5.5mm
Features	Compact size High Ratio: Pixel area to package Area High NIR Sensitivity **Event detection mode (presence detection)*** **Background light cancellation** **Ultra low power**	Compact size High Ratio: Pixel area to package Area High NIR Sensitivity	
Advantages	Fits tight spaces **Ultra long Battery life - Sensor** Long Battery life - Illumination	Long Battery life - Sensor plus illumination Small camera module	
Applications	Facial Authentication for mobile devices and points of payment Active Stereo and Structured Light Vision Eye and Head tracking	Robotics SLAM Drones 3D Facial Mapping Active Stereo and Structured Light Vision	

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