

AX650A is a professional smart IP camera SoC with strong AI capabilities. It integrates eight ARM Cortex-A55 processors, a high-efficiency NPU that offers 43.2TOPS@INT4 or 10.8TOPS@INT8, an AI enabled ISP pipeline that delivers up to 8K@30fps, and a VPU with H.264/H.265 encoding capabilities. All these functionalities are provided in a low power chip design.

With a high-performance AI-ISP and a power-efficient NPU, AX650A enables various AI innovations and brings an extraordinary AI enabled video and image processing experience to worldwide customers.

AX650A



Features

CPU

- Octo Cortex A55@1.7 GHz
- 32KB I-Cache
- 32KB D-Cache
- Neon acceleration
- Integrated FPU

NPU

- Up to 43.2 TOPs @INT4 or 10.8 TOPs @INT8
- Supports MAU
- Supports IVE

DSP

- Dual-core VDSP
- 32KB I-Cache
- 16KB D-Cache

ISP

- Up to 8K@30fps 2DOL
- 3A (AF, AWB, AE)
- AI-HDR
- AI-3DNR, 2DNR
- FPN removal and DPC
- BPC
- Lens shading
- Color enhancement
- Dehaze
- Fisheye
- DIS, EIS

Video Encoder

- H.264 HP/MP/BP Level V5.1
- H.265 MP Level V5.0
- I-/P-frames
- Up to 8K@30fps encoding
- Real-time multi-stream
- H.264/H.265 encoding: 7680×4320@30fps + 1080p@30fps
- CBR/VBR/AVBR/CVBR/FIXQP /QPMAP control mode
- Up to 8-ROI encoding
- JPEG encoding: 3840×2160@200fps
- Up to 200Mbps output

Video Decoder

- H.264 HP/MP/BP Level 5.2
- H.265 HP/MP/BP Level 5.1
- Up to 8K@60fps decoding
- JPEG decoding: 3840×2160@120fps
- Up to 300Mbps output

Video and Graphics Processing

- Video and graphics scaling
- Up to 12-region OSD overlay before encoding
- 90°, 180°, and 270° image rotation

Peripherals

Video Interfaces

VI

- 8-channel VI
- 4×4 / 8×2 Lane MIPI CSI
- Up to 3.5 Gbps
- Max 16 lane SLVS/Sub-LVDS
- 4×3trio C-PHY

VO

- 1×4 Lane MIPI DSI
- BT.1120/BT.656

Memory Interfaces

SDRAM Interface

- 64bit LPDDR4(x), supporting a max. capacity of 32 GB
- Up to 4266 Mbps

SPI Flash Interface

- Supports SPI Nor Flash
- Supports SPI Nand Flash

eMMC Interface

- eMMC V5.1
- Max. capacity of 2 TB

Ethernet

- Two Gigabit Ethernet ports
- RGMII, and RMII modes
- TSO network acceleration

USB

- One USB 3.0, two USB 2.0
- Supports Host or Device

PCIe

- 2 Lane PCIe 2.0 RC/EP mode

Other Interfaces

- I2S codec interface
- I2C, SPIs, and UART



WeChat
Subscription
Number



AXERA
Official Website

Security

- Secure boot
- Hardware-based encryption and decryption algorithms (including AES, DES, and 3DES)
- Hardware-based HASH algorithms (SHA-1, SHA-224, and SHA-256)
- Boot from eMMC, SPI Nor Flash, and SPI Nand Flash

Startup

Physical Spec.

Operating Voltage

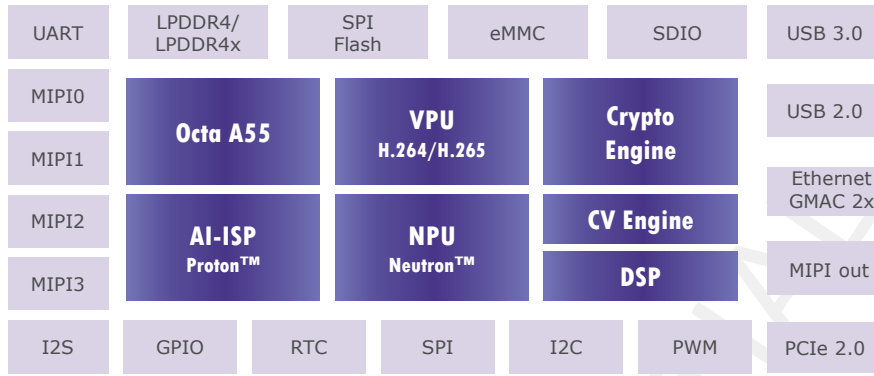
- 0.8V core voltage
- 1.1V/0.6V LPDDR4(x) interface voltage
- 1.8V/3.3V I/O voltage

Package

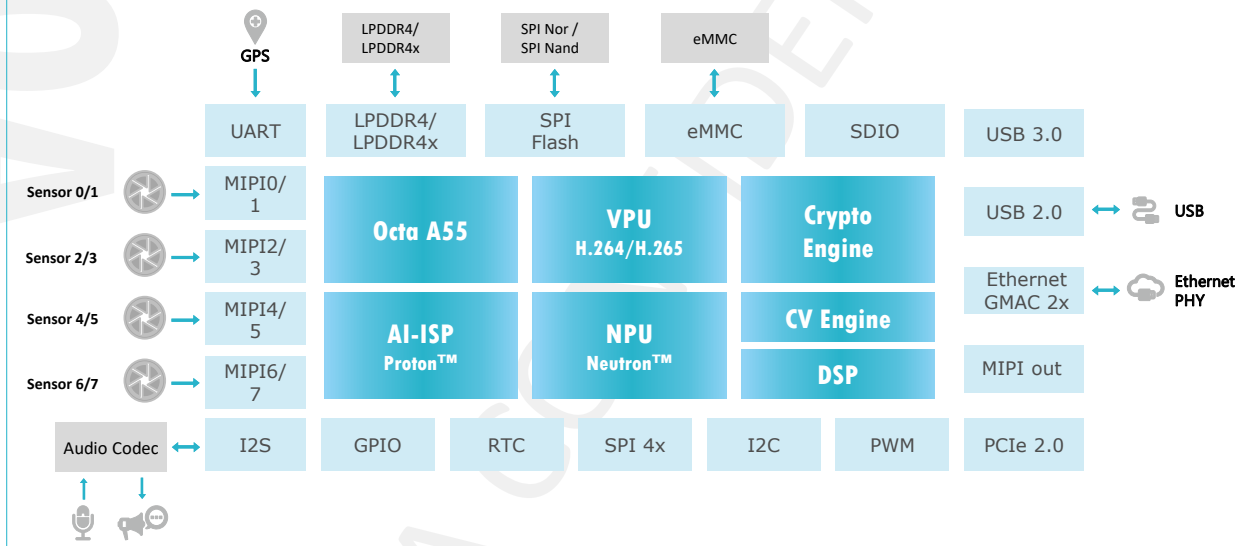
- 16 mm × 16 mm FC-CSP

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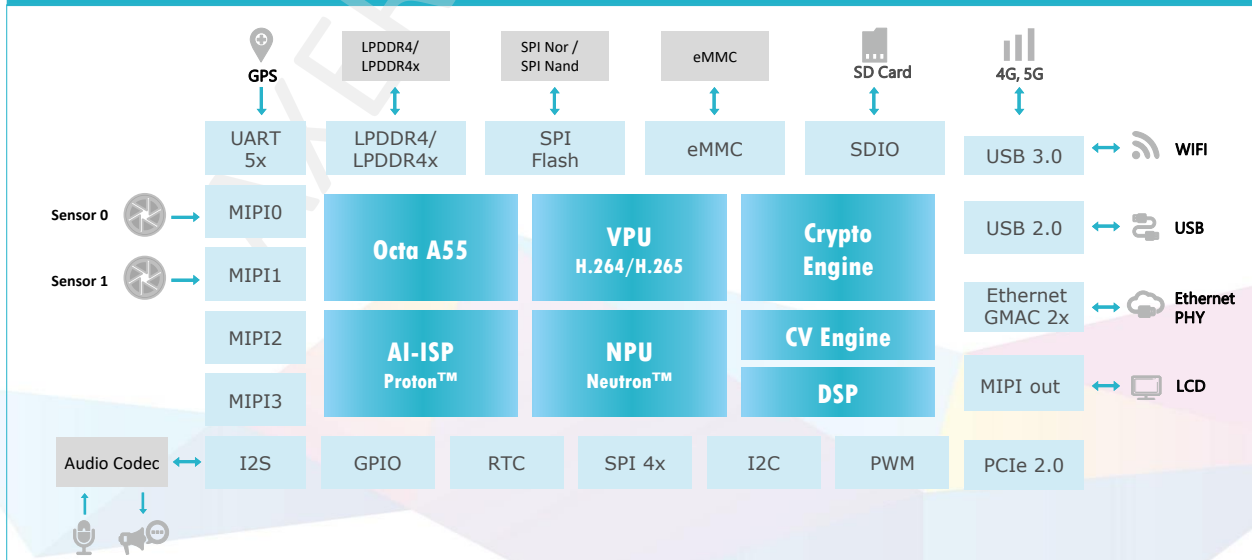
AX650A Block Diagram



AI IP Camera Solution



AI Action Camera Solution



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