

AX631 is a UHD intelligent IPC SoC developed by Axera for industrial market. Integrated with the cutting-edge AXProton 4.0 AI-ISP, this chip supports real-time true black light of 4k@40 fps. Its high-performance AXNeutron 4.0 NPU optimized for diverse scenarios makes AX631 to take a leading role in high-quality image processing and intelligent analysis. AX631 provides reliable and easy-to-use SDK, empowering you to mass produce effectively.

AX631



Product Description

CPU

- Dual core Cortex A53 1.5 GHz
- 32KB I-Cache
- 32KB D-Cache
- 256KB L2 Cache
- Supports NEON acceleration
- Integrated with FPU

NPU

- Supports up to 16.0TOPs@INT4 or 4.0TOPs@INT8
- Supports mixed precision
- Supports various mainstream deep learning frameworks

ISP

- Supports AI ISP up to 4k@40 fps
- Supports 3A (AF, AWB, and AE)
- Supports image information statistics
- Supports AI-3DNR and 3DNR
- Supports AI-RLTM
- Supports 2-frame HDR
- Supports fixed pattern noise reduction
- Supports automatic detection and elimination of dynamic bad pixels
- Supports vignetting compensation
- Supports image enhancement
- Supports dehaze
- Supports fisheye correction
- Supports DIS and EIS

Video Encoding

- H.264 HP/MP/BP Level 5.1 encoding
- H.265 MP Level 5.0 encoding
- Supports I/P frames for H.264/H.265 format
- Real-time multi-stream H.264/H.265 encoding capability: 4k@50 fps
- Supports bitrate control modes of CBR, VBR, AVBR, CVBR, FIXQP, and QPMAP
- Supports encoding up to 8 ROIs
- JPEG capture performance: 4K@40fps

Video Decoding

- H.264 HP/MP/BP Level 4.2 decoding
- Max. decoding capability: 1080p@60fps
- Supports I/P/B-frame decoding
- JPEG decoding performance: 1080p@60fps

Video and Image Processing

- Supports customizing the position and number of OSD overlays
- Supports mosaic
- Supports bitmap
- Supports video and image cropping

Hardware Interface

Video Interface

Input

- Supports 1 × 4 lane or 2 × 2 lane MIPI
- Supports up to 2.5 Gbps per lane
- Supports Sub_LVDS

Output

- Supports 1-ch MIPI DSI
- Supports up to 1080p@60fps output

Storage Interface

DDR interface

- 32bit DDR4/LPDDR4/LPDDR4x interface
- Supports up to 3400 Mbps
- Capacity up to 4 GB

SPI Flash

- Supports SPI Nor Flash
- Supports SPI Nand Flash

eMMC Interface

- Supports eMMC 5.1
- Up to 2 TB

Peripheral Interface

Ethernet

- Supports 1-ch Ethernet
- Supports RGMII and RMII
- Supports TSO, UFO, and COE
- SiP RMII ePHY

USB

- Supports 1-ch USB 2.0
- Supports Host/Device mode

Other Interfaces

- SiP audio codec that supports I2S expansion
- Supports multiple I2C, SPI, and UART interfaces



WeChat Official Account



Official Website

Security

Built-in Security Module

- Supports secure boot
- Supports memory security isolation
- Hardware implementation of AES, DES, and 3DES encryption algorithms
- Hardware implementation of SHA-1, SHA-224, and SHA-256

Startup

- Supports booting from eMMC
- Supports booting from SPI Nor Flash
- Supports booting from SPI Nand Flash

Physical Specs

Operating voltage:

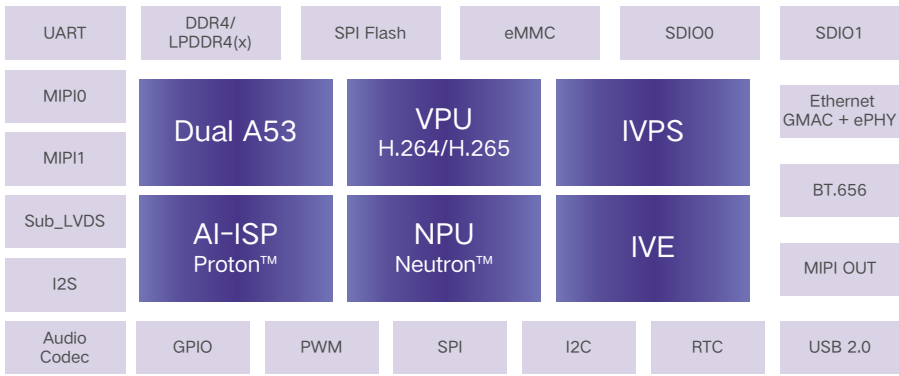
- Core voltage: 0.8 V
- DDR4 voltage: 1.2 V
- LPDDR4 voltage: 1.1 V
- IO voltage: 1.8V, 3.3V

Packaging

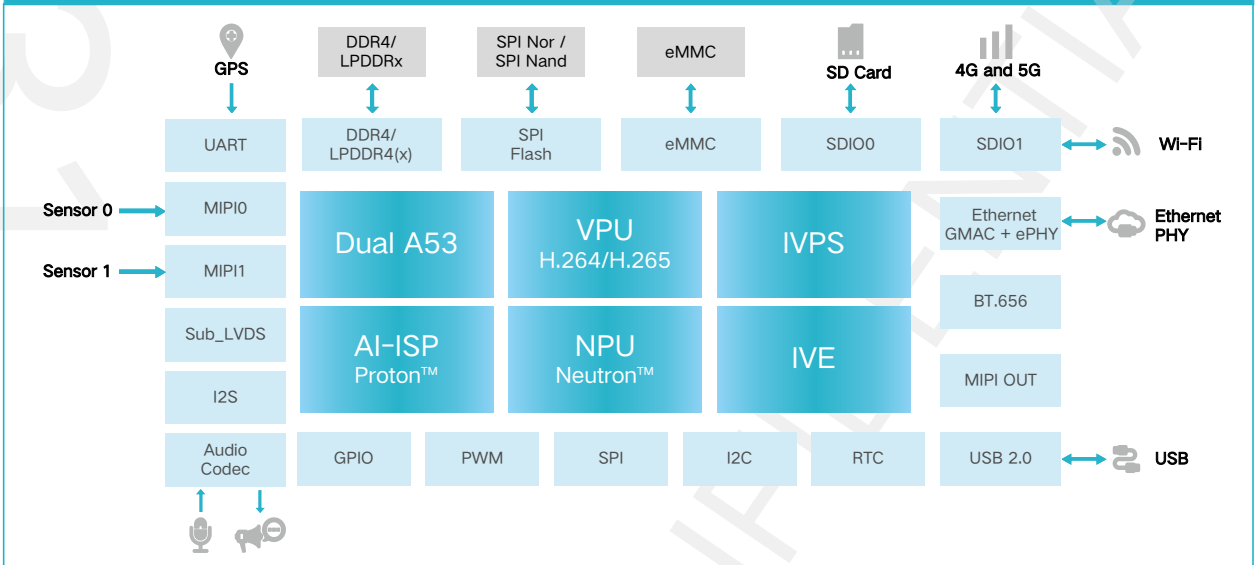
- 13 mm × 13 mm LFBGA

Any IMPORTANT NOTICE at the end of this data sheet addresses availability, warranty, changes, use in safety-critical applications, intellectual property matters and other important disclaimers. PRODUCTION DATA.

AX631 Block Diagram



Camera Solution for Industry Applications



• An IMPORTANT NOTICE at the end of this data sheet addresses availability, warranty, changes, use in safety-critical applications, intellectual property matters and other important disclaimers. PRODUCTION DATA.