

Hailo-15™ AI Vision Processor

Unprecedented AI performance
in a camera power envelope



Overview

Hailo-15™ is a series of AI Vision Processors for smart cameras. The Hailo-15™ System-on-a-Chip (SoC) can run more advanced video analytics by processing multiple complex deep learning applications at full scale and at superior efficiency.

Hailo-15™ combines Hailo's patented and field proven AI inferencing capabilities with advanced computer vision engines, generating data-rich video analytics at a premium image quality, supported by AI-powered image enhancement.

Highlights & Key Features

Unparalleled AI Analytics

- Up to 20 TOPS (Tera Operation Per Second) running on a powerful Neural Network (NN) Core enabling processing of multiple advanced DL models in parallel
- High FPS deep learning model processing for faster and highly accurate detection of more objects per frame
- Best AI performance at a standard camera power consumption & cost envelope

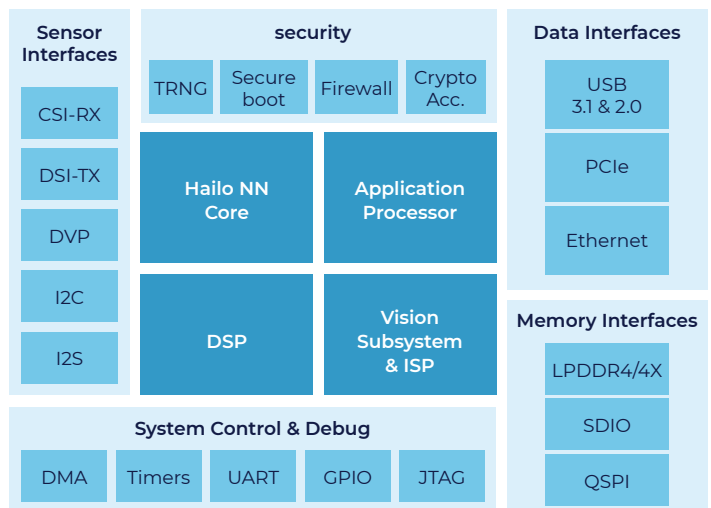
Superior Image Quality

- AI-powered vision processing with low-light, image stabilization and image perfection capabilities, for enhanced image quality
- Premium 4k60 image quality with a cutting-edge ISP pipeline and an advanced Vision sub-system with High Dynamic Range (HDR) and Noise Reduction (NR) algorithms
- Industry leading DSP vision processing and high-quality video encoding

Flexible & Secure System

- Industry-standard frameworks with a complete Yocto-based Linux distribution
- Industrial grade SoC with a variety of interfaces for image sensors, data, and memory
- Secure boot and secure debug with hardware accelerated crypto library, TrustZone, TRNG, and Firewall

Block Diagram



General Specifications

High-performance NN core sub-system

- | Hailo-15H | Hailo-15M | Hailo-15L |
|-----------|-----------|-----------|
| 20 TOPS | 11 TOPS | 7 TOPS |
- Hailo's patented structure defined dataflow architecture
 - Full software control for continuous capability upgrades

Vision sub-system

- ISP: up to 12MP resolution, 600 Mpixel/s pixel rate
- RGGB & RCCB CFAs support
- Up to 3 exposures merging
- WDR for low light image processing
- Advanced noise reduction features: 2DNR, 3DNR, Chroma NR
- Video Encoding (HEVC & AVC) H.265/H.264, multiple stream

Sensor Interfaces

- Video In: dual MIPI CSI, DVP 24 bit
- Video Out: MIPI DSI
- I2C (x4), I2S (x2 in, x2 out), SPI (x4)

Memory Interfaces*

- LPDDR4/4X 32bit @4266 MT/s
- QSPI
- SDIO 3.0/eMMC5.1 (up to HS200)

DSP vision processing sub-system

- Vector DSP, 256 MACs@ 700 MHz supports up to 350 GOPs

Physical

- Packaging: FCBGA 15x15 mm
- Operating temperature -40°C to 85°C

Data Interfaces

- PCIe Gen 3.0 x 4 lanes (Endpoint or RC)
- 10 / 100 / 1000 Ethernet with RMII / RGMII
- USB 3.1 Gen2 Host / Device. 2.0 Host

Security

- Secure boot
- Secure debug
- Hardware accelerated crypto library
- TrustZone, TRNG, Firewall

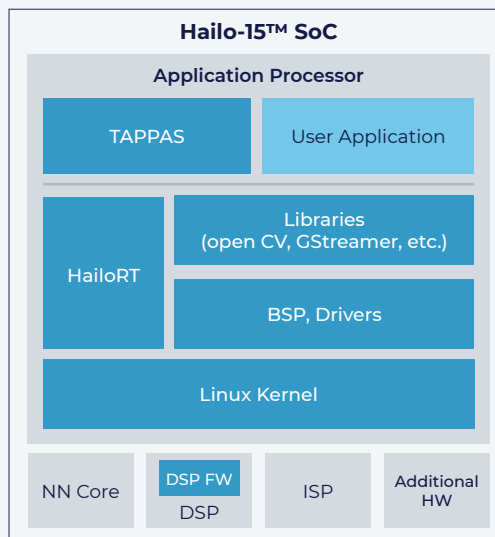
Application Processor sub-system**

- Quad-core ARM™ A53 up to 1.3 GHz 12 kDMIPs

* Hailo-15L – LPDDR4 32bit @3200 MT/s ** Hailo-15L – Quad-core ARM™ A53 up to 1.1 GHz 10.1 kDMIPs

Comprehensive Software Package

The vision processor software package includes a set of drivers, libraries and tools designed to develop smart cameras based on AI computer vision. It includes all the support for camera hardware interfaces and protocols, as well as specialized image- and video-processing algorithms and vision subsystem that are optimized for the requirements of camera-based applications.



System Usage

The Hailo-15™ series of AI Vision Processors offers a versatile solution for a variety of smart cameras, accommodating diverse requirements and able to be integrated into numerous AI-powered smart IP cameras.

Hailo-15™ Camera Development Kit

The camera development kit provides everything needed for development and prototyping cameras with AI video analytics and contains a Single Board Computer (SBC) with integrated Hailo-15™, software, documentation and support.

[Click here for more information](#)

