



# H2 Video SoC for Consumer Applications

## Overview

The Ambarella H2 Video SoC for consumer applications integrates an advanced image sensor pipeline (ISP), H.265 10-bit (HEVC-10) and H.264 (AVC) encoders, and a powerful Quad core ARM® Cortex™-A53 CPU for advanced analytics, flight control, WiFi streaming, and other user applications.

Targeting the next generation of consumer applications such as connected drones, sports cameras, and 360° (VR) cameras, the H2 delivers up to 4K-video recording at 90fps or equivalent performance while streaming a second, live, mobile-resolution video over a WiFi network for preview or sharing.

Equipped with dedicated hardware, H2 can support 3D Electronic Image Stabilization (EIS) up to 4Kp60, and multi-exposure High Dynamic Range (HDR) capture up to 4Kp60.

A unique architecture and 14-nm process technology minimizes H2 power consumption while maximizing performance.



The 14 nm Ambarella H2 (H2S75) SoC Device.

## Key Features

### Flexible Low-Power Platform

- Quad core ARM® Cortex™ -A53 CPU up to 1 GHz
- Fast Boot ThreadX / Linux Dual OS
- 14-nm low-power CMOS Process

### High Resolution and Frame Rate Image Processing

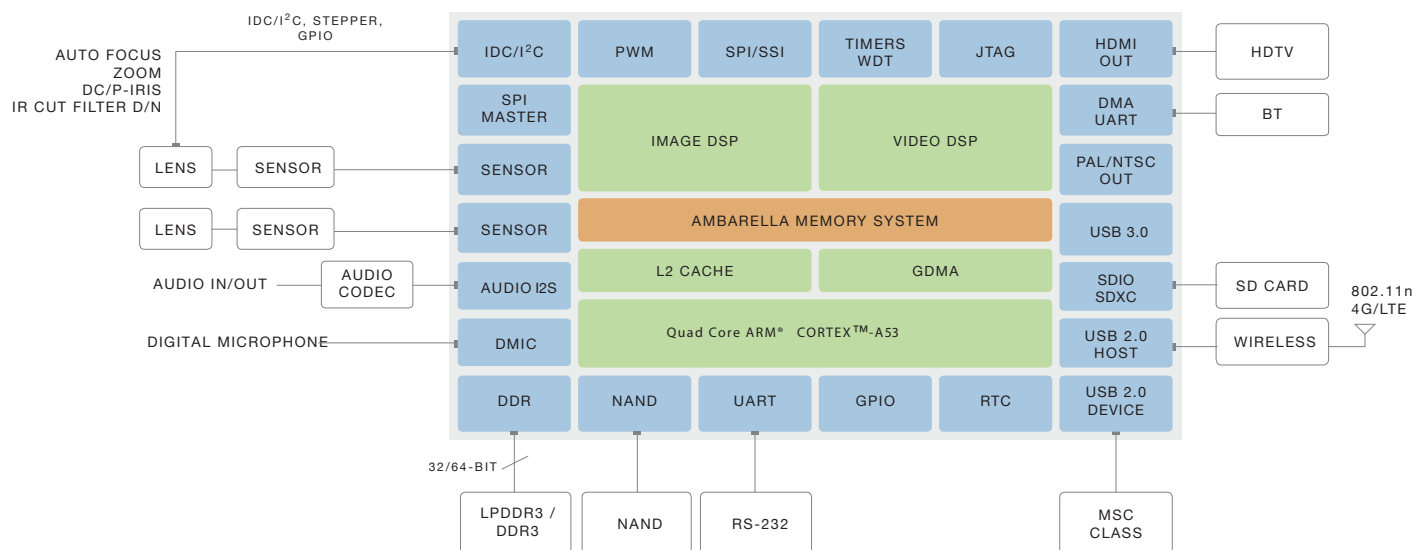
- 4Kp90 video encoding (AVC)
- 4Kp60 10-bit video encoding (HEVC-10)
- Hi-ISO still capture and video processing
- High Dynamic Range multi-exposure capture up to 4Kp60
- Simultaneous second stream
- 3D Electronic Image Stabilization (EIS) with 6-axis correction (translational, pitch, yaw, and roll) and shutter correction up to 4Kp60
- Dual processing pipe for Drone Optical Flow, 360° cameras, and other multi-sensor applications

### Wireless Connectivity and Video Streaming Options

- USB Host for 4G Module Connectivity
- DMA UART for Bluetooth (BT) Module Connection
- Dual Encode for On-The-Fly Mobile Resolution Streaming

## Block Diagram

The diagram below illustrates a camera design based on the Ambarella H2 device.



## General Specifications

### Processor Cores

- Quad-core ARM<sup>®</sup>Cortex™ -A53 up to 1 GHz
- 32KB / 32KB I/D and 256 KB L2 Cache
- AES / 3DES / SHA-1 / MD5 Cryptography Engine
- Ambarella Image and Video DSPs

### Sensor and Video I/O

- 4 MIPI CSI-2 sensor inputs, 4 lanes each
- 8 lanes SLVC-EC
- 8 lane MIPI mode
- 1 lane MIPI DSI output
- 10 lane SLVS / HiSpi™ mode
- 24-bit RGB out, HDMI<sup>®</sup> 2.0 with PHY out
- PAL / NTSC composite SD video out  
RGB Bayer interface to popular sensors

### CMOS Sensor Processing

- High Dynamic Range multi-exposure capture up to 4Kp60
- Lens shading, fixed pattern noise correction
- Multi-exposure HDR
- Wide Dynamic Range (WDR) local exposure

### Image Processing

- 3D motion-compensated noise reduction (MCTF)
- Adjustable AE / AWB / AF
- Lens Distortion Correction (LDC) for wide-angle-lens
- Defect pixel correction
- Geometric and chroma lens distortion correction
- Backlight compensation
- Electronic Image Stabilization and tilt correction up to 4Kp60
- Crop, mirror, flip, 90° / 270° rotation

### Video Encoding

- H.265 / HEVC MP Level 5.1 encoding up to 4Kp60
- H.264 MP / HP Level 5.2 encoding up to 4Kp90
- Simultaneous streams
- Multiple CBR and VBR rate control modes

### Memory Interfaces

- LPDDR3 / DDR3 (for certain parts)
- 32/64-bit data bus
- Three SD controllers, including SDXC™ / UHS-1 support
- NAND flash, SLC with ECC
- Boot from SPI-NOR, SPI-EEPROM, NAND flash, USB, or eMMC

### USB Interfaces

- One host and one configurable host / device interface, each with built-in PHY
- Device interface with USB 3.0 support

### Peripheral Interfaces

- Two USB 2.0 ports with Device and Device / Host w / PHY
- Multiple SSI / SPI, IDC / I<sup>2</sup>C, and UART
- Many GPIO ports, multiple PWM, Steppers, IR, ADC
- Watchdog Timer, multiple general purpose timers, JTAG, I2S

### Physical

- 14-nm low-power CMOS
- Operating temperature: -20°C to +85°C
- 14 x 15.5 mm packages

## H2 Consumer Applications Development Platform

The H2 Consumer Applications Development Platform contains the necessary tools, software, hardware and documentation to develop a small form factor camera.

### Evaluation Kit (EVK)

- H2 main board with connectors for sensor/lens board, peripherals
- Sensor board: Omnivision, Sony, and others
- Data sheet, BOM, schematics, and layout
- Reference application with C source code

### Software Development Kit (SDK)

- Dual OS ThreadX/Linux with patches, drivers, tools, and application source code
- Royalty-free libraries for ISP, 3A, dewarp, and codecs
- Image tuning and manufacturing calibration tools
- Detailed documentation with programmer's guide, application notes

## Contact [www.ambarella.com/about/contact/inquiries.html](http://www.ambarella.com/about/contact/inquiries.html)

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