H22 Video SoC for Consumer Applications

Overview

The Ambarella H22 SoC for consumer applications is a system-on-chip that integrates an advanced image sensor pipeline (ISP), H.265 (HEVC) and H.264 (AVC) encoders, and a powerful Quad core ARM® Cortex™-A53 CPU for advanced analytics, computer vision, flight control, WiFi streaming, and other user applications.

Targeting the next generation of connected drones, sports, and 360º (VR) cameras, the H22 delivers up to 4K-video recording at 60fps or equivalent performance while streaming a second, live, mobile-resolution video over a WiFi network for preview or sharing.

Equipped with dedicated hardware, H22 can support 3D Electronic Image Stabilization (EIS) up to 4Kp30, and multi-exposure High Dynamic Range (HDR) capture up to 4Kp30.

A unique architecture and 14-nm process technology minimizes H22 power consumption while maximizing performance.

The 14 nm Ambarella H22 (H22S75) 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

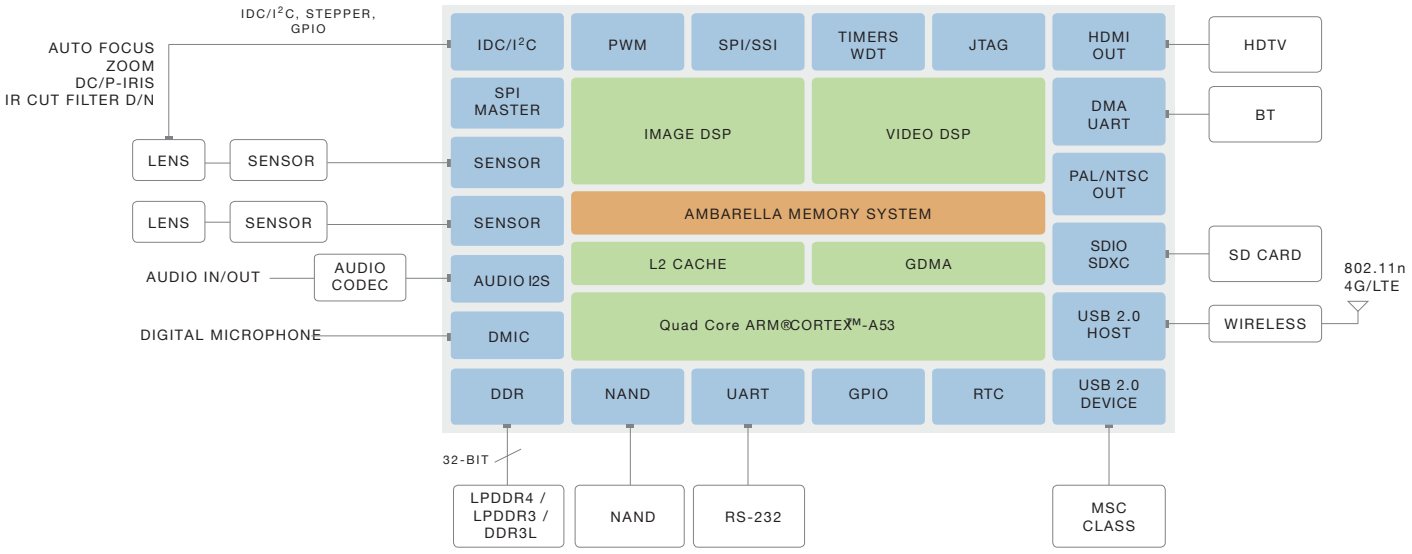
- 4Kp60 video encoding (HEVC / AVC)
- High Dynamic Range multi-exposure capture up to 4Kp30
- Simultaneous second stream
- 3D Electronic Image Stabilization (EIS) with 6-axis correction (translational, pitch, yaw, and roll) and shutter correction
- Dual processing pipe for Drone Optical Flow, 360º cameras, 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 H22 device.



General Specifications

Processor Cores
- Quad-core ARM® 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
- 2 MIPI CSI-2 sensor inputs, 4 lanes each
- 8 lane MIPI mode
- 10 lane SLVS / HiSPi™ mode
- 24-bit RGB out, HDMI® 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 4Kp30
- 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 4Kp30
- Crop, mirror, flip, 90° / 270° rotation

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

Memory Interfaces
- LPDDR4 (for certain parts) or LPDDR3 / DDR3 / DDR3L (for certain parts)
- 32-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

Peripheral Interfaces
- Two USB 2.0 ports with Device and Device / Host w / PHY
- Multiple SSI / SPI, IDC / I^2C, 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
- 11 x 11 mm or 14 x 14 mm packages

H22 Camera Development Platform

The H22 Camera Development Platform contains the necessary tools, software, hardware and documentation to develop a small form factor camera.

Evaluation Kit (EVK)
- H22 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**