

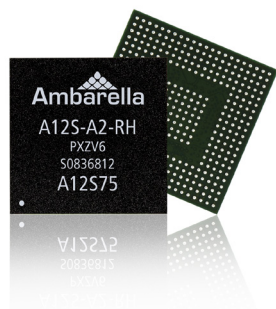


# A12S Sports and Flying Camera Processor

## Overview

The Ambarella A12S Sports and Flying Camera Processor is a system-on-chip solution that integrates an advanced image sensor pipeline (ISP), an H.264 encoder, and a powerful ARM® Cortex™-A9 CPU for advanced analytics, Wifi streaming and user applications.

Targeting the next generation of connected sports, 360° (VR) and flying cameras, the A12S delivers up to 4K-video recording at 30fps or equivalent performance while streaming a second, live, mobile-resolution video over a WiFi network for preview or sharing. A unique architecture and 28-nm process technology minimize power consumption while maximizing performance.



The 28 nm Ambarella A12S SoC Device.

## Key Features

### Flexible Low-Power Platform

- ARM® Cortex™-A9 CPU up to 792 MHz
- Fast Boot ThreadX/Linux Dual OS
- 28-nm low-power CMOS Process

### High Resolution and Frame Rate Image Processing

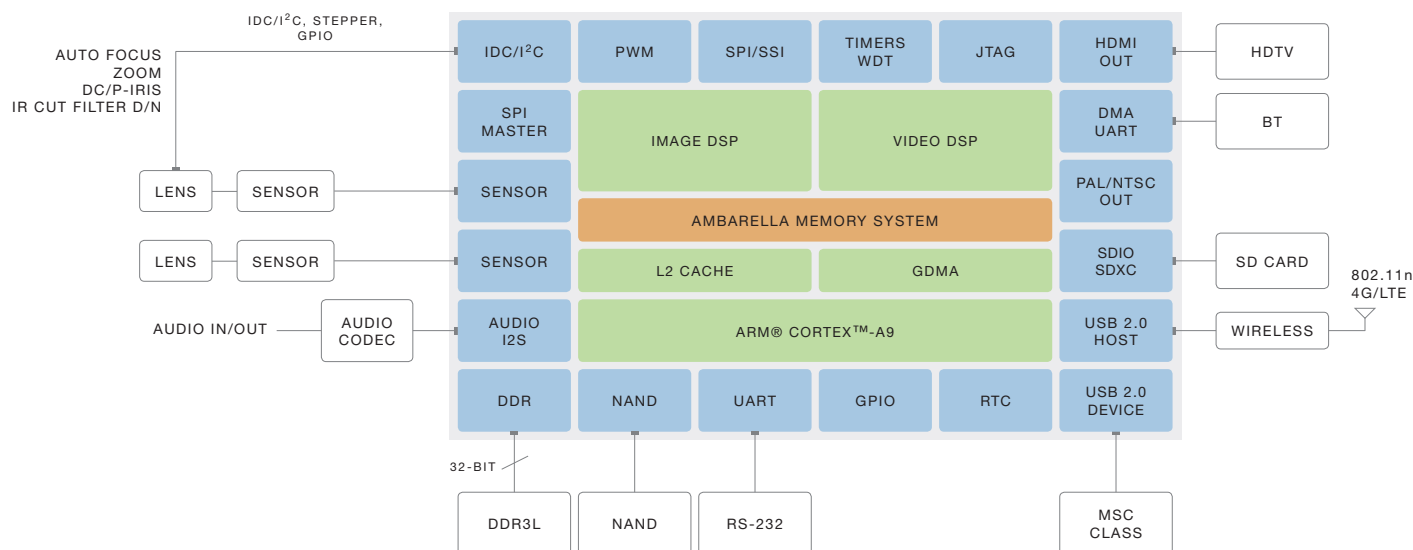
- Up to 32 Mpixel Still Picture Capture
- 4Kp30, 1920x1080p120 and 1280x720p240 Encoding (or equivalent)
- Simultaneous second stream
- Advanced Electronic Image Stabilization and Tilt Correction
- Dual processing pipe (for 360° cameras)

### 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 sports or flying camera design based on the Ambarella A12S device.



## General Specifications

### Processor Cores

- ARM® Cortex™-A9 up to 792 MHz
- 32 KB / 32 KB I/D and 128 KB L2 Cache
- AES / 3DES / SHA-1 / MD5 Cryptography Engine
- Ambarella Image and Video DSPs

### Sensor and Video I/O

- RGB Bayer interface to popular sensors
  - 8 lane MIPI mode
  - 10 lane SLVS / HiSPi™ mode
- 24-bit RGB out, HDMI® 1.4a with PHY out
- PAL / NTSC composite SD video out
- 2 sensor inputs

### CMOS Sensor Processing

- 32 MPixels maximum resolution
- Lens shading, fixed pattern noise correction
- Multi-exposure HDR (line-interleaved sensors)
- 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
- Crop, mirror, flip, 90° / 270° rotation

### Video Encoding

- H.264 codec BP / MP / HP Level 5.1 and MJPEG
- 4K@30 fps or 1080p@120 fps encoding performance
- 720p@240 fps high frame rate encoding performance
- Simultaneous streams
- Multiple CBR and VBR rate control modes

### Memory Interfaces

- DDR3 / DDR3L up to 600 MHz
- 16-bit / 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<sup>2</sup>C, and UART
- Many GPIO ports, multiple PWM, Steppers, IR, ADC
- Watchdog Timer, multiple general purpose timers, JTAG, I2S

### Physical

- 28-nm low-power CMOS
- Operating temperature: -20°C to +85°C
- LFBGA package with 404 balls, 15x15 mm, 0.65 mm pitch

## A12S Sports and Flying Camera Development Platform

The A12S Sports And Flying Camera Development Platform contains the necessary tools, software, hardware and documentation to develop a small form factor, wearable or flying camera module.

### Evaluation Kit (EVK)

- A12 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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