

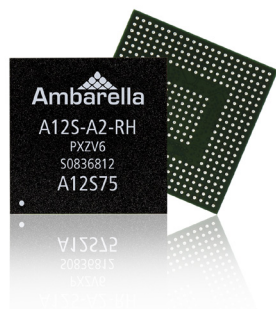


A12S Sports and Flying Camera Processor

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

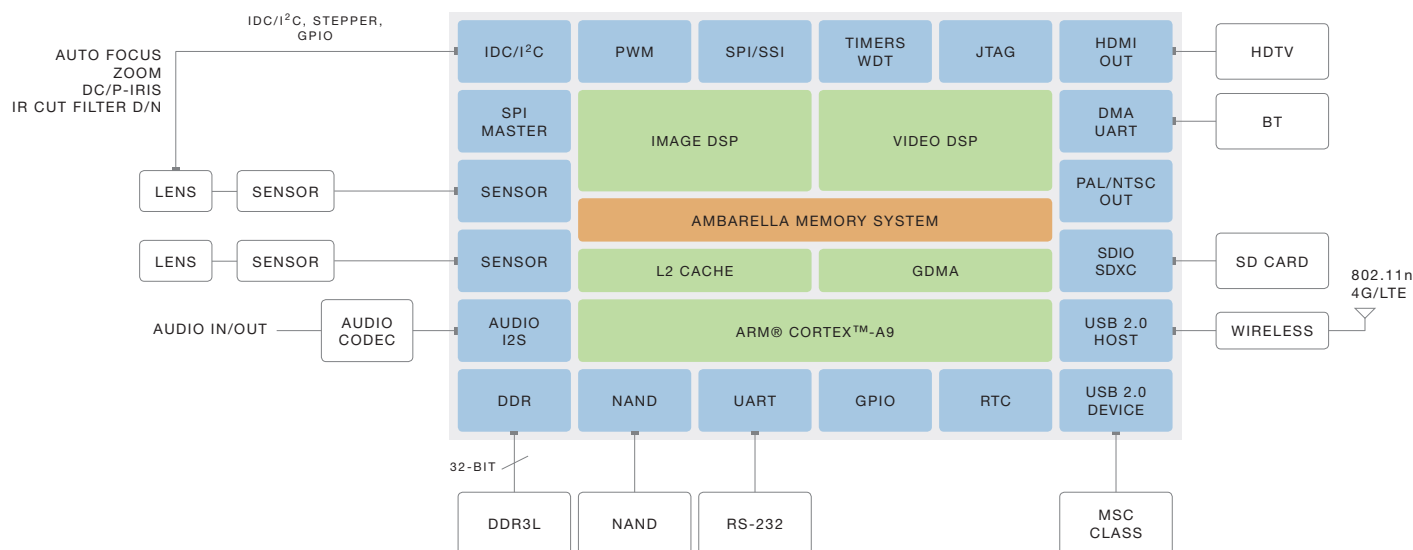
- Up to 32 Mpixel Still Picture Capture
- 4Kp30, 1920x1080p120 and 1280x720p240 Encoding (or equivalent)
- Simultaneous second stream
- Advanced Electronic Image Stabilization and Tilt Correction
- Dual processing pipe (for 360° cameras)

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 / I²C, 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

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