



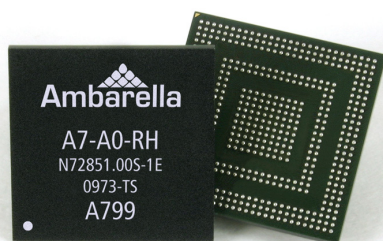
# A7 - 1080p60 IP Camera SoC

## Overview

The Ambarella A7 is a high performance IP Camera SoC that integrates a powerful image sensor pipeline and a multi-streaming, high quality, 1080p60 H.264 encoder and an ARM CPU.

Tuned for surveillance applications, the A7 leverages Ambarella's professional broadcast encoding technology with advanced 3D noise reduction to deliver pristine video at exceptionally low bit rates, even in complex high-motion and low-light scenes.

The industry-proven Linux SDK offers IP Camera vendors a high degree of differentiation through a rich API set with access to functions such as 3A tuning, digital PTZ, and dynamic range enhancements, while offering a predictable, fast path to production.



The Ambarella A7 enables low power, 1080p60+VGA, H.264 encoding performance.

## Key Features

### Broadcast-Grade 1080p60 H.264 Codec

- Low power, simultaneous 1080p60 + VGA H.264 encoding
- Multi-streaming with on-the-fly changes of frame rate, bit rate, and GOP structure
- Exceptionally low bit rates also in high-motion scenes

### High-Performance ISP

- 500 MHz pixel capture rate equivalent to 8 MP at 60 fps
- Up to 32 MP sensor resolution

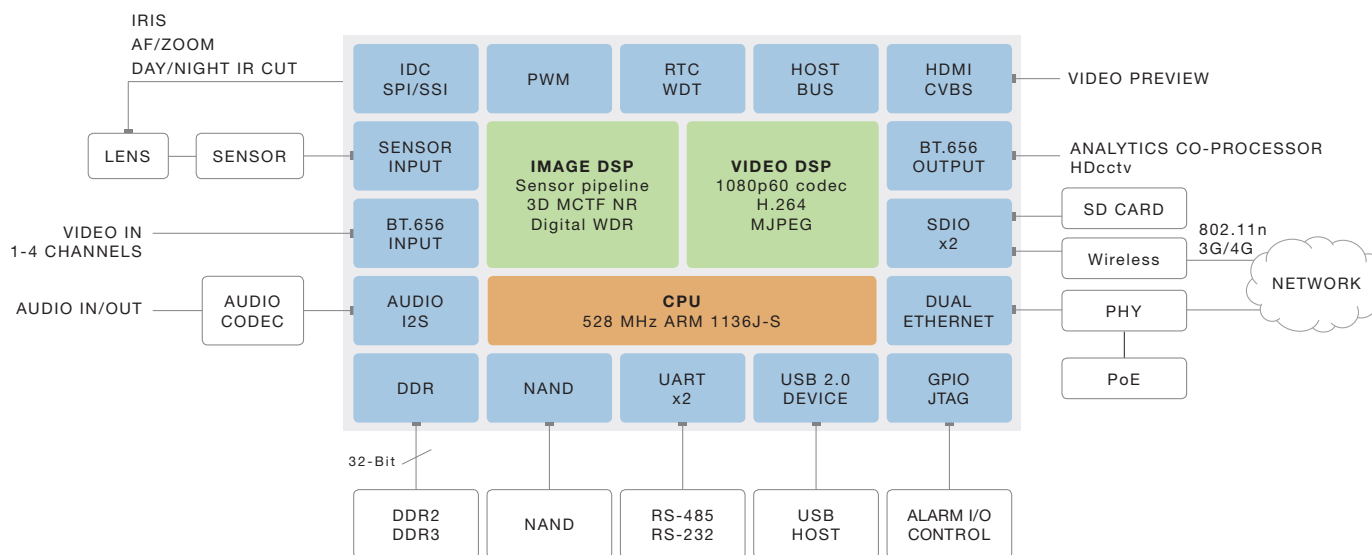
### Advanced Image Processing

- Motion compensated 3D noise reduction delivers smear-free video (MCTF)
- Digital WDR contrast enhancement and tone mapping
- Multi-window digital PTZ

### Flexible, Low Power SoC Platform

- ARM11 and DSP subsystem
- Linux-based SDK with rich API set provides for vendor differentiation
- 1.5 Watt for 1080p60 encode

## Block Diagram





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## General Specifications

### Sensor and Video I/O

- 12-lane SLVDS, HiSPI™ and parallel interface
- 500 MHz pixel capture rate, 32 MPixel sensor support
- BT.601/656/1120 YUV video in
- Dual digital video out; HDMI, BT.656/1120, RGB
- Composite video out

### Front End Sensor Processing

- Lens shading and chromatic aberration correction
- Black level correction
- Barrel compensation
- Defect pixel cluster correction
- CFA crosstalk and fixed pattern noise filtering
- RGB Bayer demosaicing
- 3D color transformation with gamma

### Image Processing

- 3D motion-compensated noise reduction (MCTF)
- Digital WDR contrast enhancement
- AE/AWB/AF libraries supplied
- Day/Night and DC/Stepper iris control
- Flicker suppression
- Four independent resizers with digital PTZ
- Crop, mirror, flip, 90 degree rotation
- Alpha-blending OSD; text, overlays, privacy mask
- Video warp engine

### Low Power

- 1.5 W power consumption for 1080p60 encode

### Video Encode

- H.264 BP/MP/HP Level 5.1, up to 1080p60+VGA
- Encode of 4MP@30fps, 5MP@24fps, 10MP@10fps
- MJPEG - over 200 Mpixels/s
- Up to 32 Megapixel encode resolution
- Broadcast-grade ME; up to 1920 pel search range
- Dynamic GOP, intra refresh, IDR insertion
- Sub-frame low-delay encoding
- CABAC up to 50 Mbps, CAVLC up to 100 Mbps
- Multi-streaming with on-the-fly changes of frame rate, bit rate, resolution, and GOP
- CBR, VBR, and Capped VBR with quality/fps priority

### CPU

- 528 MHz ARM1136J-S CPU
- AES/3DES/SHA-1/MD-5 hardware crypto engine

### Memory

- 32-bit DDR2/LPDDR2/DDR3/DDR3L, 384 MHz

### Peripherals

- SMIO controller for NAND, SDIO (2), CF, MMC, IDE
- Dual Ethernet MII and USB 2.0 Device
- I2S (6), SSI/SPI (3), IDC (3), PWM (5), RS-232C/485 (2)
- GPIO (up to 155), Stepper motor (4 sets), ADC (6 ch)
- Host interface (Intel/Motorola), RTC, WDT, JTAG

### Physical

- 15x15 mm, 528 ball FPGA package
- Operating temperature: -20°C to +85°C

## A7 IP Camera Development Platform

The A7 IP Camera Development Platform contains the necessary tools, software, hardware and documentation to develop a professional IP camera design.

### Evaluation Kit Hardware Platform (EVK)

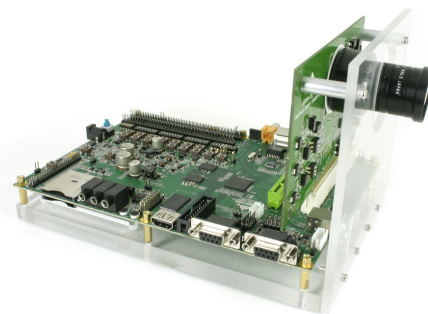
- Main board with A7 SoC and sensor board with C/CS mount lens
- Sensor : Aptina, OmniVision, Samsung, Sony — many choices available

### Software Development Kit (SDK)

- Royalty-free IP camera application with source
- Image tuning and manufacturing tools
- Linux 2.6.38 (or later) with drivers, kernel patches and toolchain

### Documentation

- Programmer's guide, application notes, API documents
- Data sheet, BOM, schematics and layout files



## Contact

### Ambarella

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