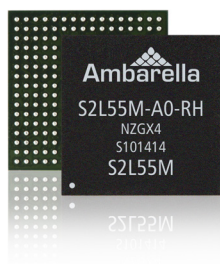




# S2Lm IP Camera Processor

## Overview

The Ambarella S2Lm IP Camera Processor is a system-on-chip solution that integrates an advanced image sensor pipeline (ISP), an H.264 encoder capable of up to 3Mp30 video, and a flexible ARM® Cortex™-A9 CPU for user applications. Targeting consumer and entry-level IP Camera designs, the S2Lm supports lens distortion correction, HDR and 3D noise reduction to handle challenging lighting conditions. The S2Lm H.264 encoder with Smart-AVC low-bitrate enhancement allows 1080p HD video to be streamed at below 1 Mbps/s, making it suitable for cloud-based systems. The S2Lm family is supported by a flexible Linux-based IP Camera SDK to allow development of differentiated products in areas such as sensor and lens tuning, analytics and cloud network connectivity.



The S2Lm chip is suitable for consumer and entry-level IP Cameras with 720p30, 1080p30 and 3Mp30 class performance

## Key Features

### Flexible Low-Power Platform

- ARM Cortex-A9 CPU
- Linux SDK for standards-based development
- 28 nm low power CMOS process

### Advanced Image Processing

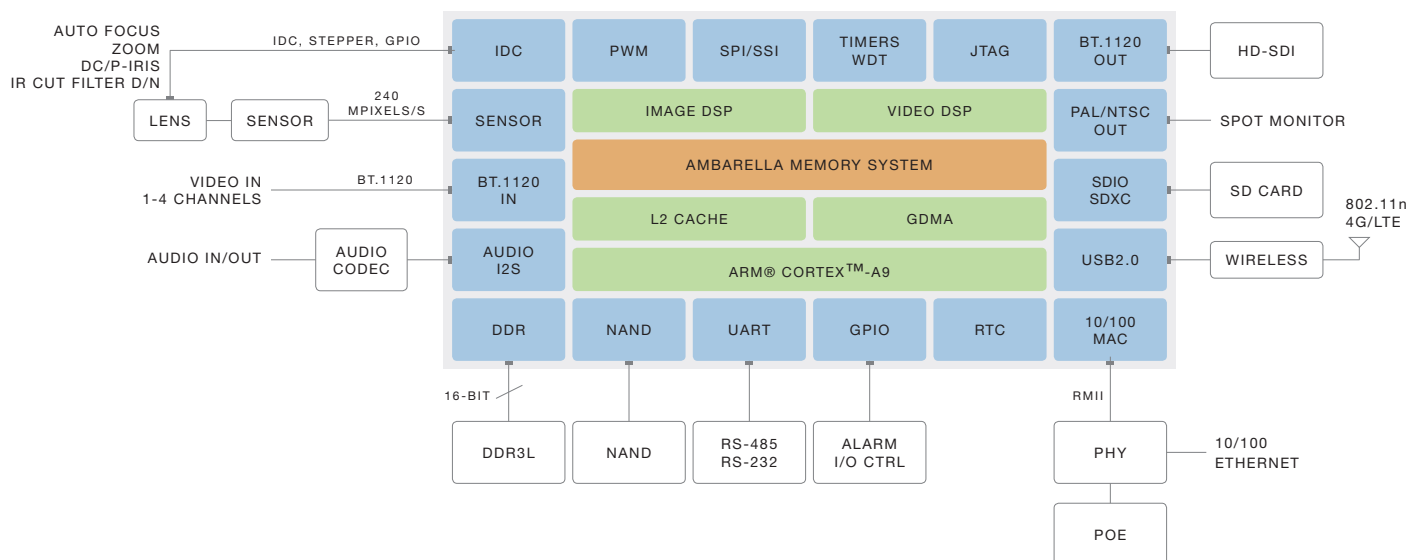
- Up to 5 Mpixel resolution
- Multi-exposure line-interleaved HDR
- Lens distortion correction

### High-Efficiency Video Encoding

- Up to 3M@30fps H.264 High Profile encoding
- Smart-AVC streaming as low as 600Kbps for 1080p30
- Flexible multi-streaming

## Block Diagram

The diagram below illustrates an IP Camera design based on the Ambarella S2Lm device.



## General Specifications

### Processor Cores

- ARM® Cortex™-A9
- 32KB/32KB I/D and 128 KB L2 Cache
- NEON™ and FPU acceleration
- AES/3/DES/SHA-1/MD5 Cryptography Engine
- Ambarella Image and Video DSPs

### Sensor and Video I/O

- RGB Bayer sensor port: 8-lane SLVS/MIPI/HiSPI
- 16-bit parallel
- BT.601/656/1120 video in and BT.656/1120 out
- 16-bit RGB out
- PAL/NTSC composite SD video out

### Front End Sensor Processing

- 5 MPixels maximum resolution
- 240 MHz maximum pixel rate
- Lens shading, fixed pattern noise correction
- Multi-exposure HDR (line-interleaved sensors)
- WDR local exposure

### Image Processing

- 3D motion compensated noise reduction (MCTF)
- Adjustable AE/AWB/AF
- Wide angle lens distortion compensation
- High quality polyphase scalers
- Digital PTZ and Virtual Cameras
- OSD engine; overlays, privacy mask
- Crop, mirror, flip, 90°/270° rotation
- DC-iris and P-iris
- Defect pixel correction
- Chroma lens distortion correction
- Gamma compensation and color enhancement
- Backlight compensation

### Intelligent Video Analytics

- Advanced 3rd party analytics options
- Face detection and tracking
- Intelligent motion detection
- Tampering detection

### Video Encoding

- H.264 codec BP/MP/HP Level 5.1 and MJPEG
- 5 MPixels maximum resolution
- 3M@30 fps encoding performance
- Up to 4 simultaneous stream encodes
- Smart-AVC low bitrate/high quality encoding
- On-the-fly change of multiple encoding parameters
- Flexible GOP configuration with I, P and B frames
- Temporal Scalable Video Codec with 4 Layers (SVCT)
- Dynamic region of interest
- Multiple CBR and VBR rate control modes

### Memory Interfaces

- DDR3/DDR3L up to 528MHz
- 16-bit data bus
- SD controller with SDXC SD™ Card
- NAND flash, SLC with ECC
- Boot from SPI-NOR, SPI-EEPROM, NAND flash, USB or eMMC

### Peripheral Interfaces

- 10/100 Ethernet with RMII/MII
- USB2.0 Device or Host w/PHY
- Multiple I2S, SSI/SPI, IDC, and UART
- Multiple PWM, Stepper, and ADC channels
- Many GPIO ports, PWM, Steppers, IR, ADC
- Watchdog Timer, multiple general purpose timers, JTAG

### Physical

- 28nm Low Power CMOS
- <500mW for 1080p30 including DDR
- Operating temperature -20°C to +85°C
- TFBGA package with 256 balls, 11x11 mm, 0.65 mm pitch

## S2Lm IP Camera Development Platform

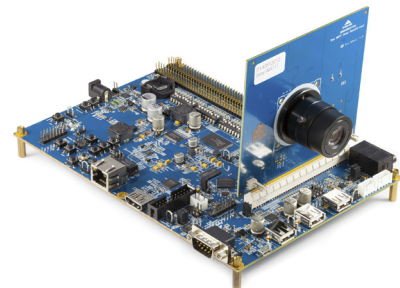
The S2Lm IP Camera Development Platform contains the necessary tools, software, hardware and documentation to develop an IP Camera while supporting development of customized features.

### Evaluation Kit (EVK)

- S2Lm main board with connectors for sensor/lens board and peripherals
- Sensor board: Aptina, Omnivision, Panasonic, Sony, and others
- Datasheet, BOM, schematics, and layout
- IP Camera reference application with C source code
- Additional reference design available for consumer cloud camera

### Software Development Kit (SDK)

- Linux 3.8.x kernel 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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