S2L IP Camera Processor

Overview

The Ambarella S2L 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 5Mp30 video, and a powerful ARM® Cortex™-A9 CPU for user applications. Targeting professional IP Camera designs, the S2L supports HDR and motion-compensated 3D NR to handle challenging lighting conditions, while the multi-streaming H.264 encoder with Smart-AVC delivers superb video quality at low bitrates.

The S2L 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 network connectivity.

The S2L chip is suitable for professional IP Cameras with 1080p30, 1080p60 and 5Mp30 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

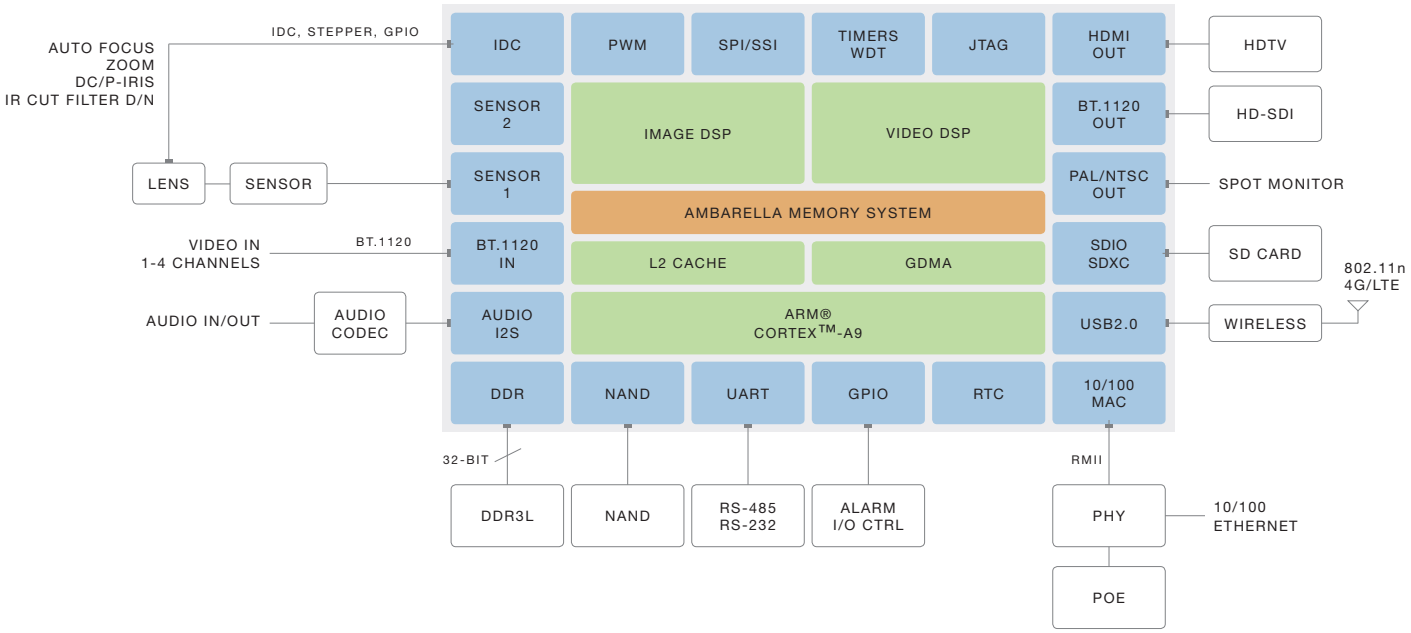
- Up to 14 Mpixel resolution
- Multi-exposure line-interleaved HDR
- Hardware dewarping engine
- Improved MCTF with advanced sharpening

High-Efficiency Video Encoding

- Up to 5M@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 S2L 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
- Dual-port RGB Bayer interface to popular sensors
  - Primary port: 8 lanes of SLVS/MIPI/HiSPI
  - Secondary port: 2-lane SLVS/MIPI/HiSPI
  - 12-lane SLVS in single port mode
  - 16-bit parallel
- BT.601/656/1120 video in and BT.656/1120 out
- 24-bit RGB out, HDMI® 1.4a with PHY out
- PAL/NTSC composite SD video out

Front End Sensor Processing
- 14 MPixels maximum resolution
- 480 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
- 180° fish-eye dewarping with multi-window modes
- 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
- Geometric and 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/intrusion detection and people counting
- License plate recognition
- Object recognition and more

Video Encoding
- H.264 codec BP/MP/HP Level 5.1 and MJPEG
- 14 MPixels maximum resolution
- 5M@30 fps encoding performance
- Up to 4 simultaneous stream encodes
- Smart-AVC low bitrate streaming
- 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 800MHz, 32-bit data bus
- Three SD controllers 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
- Two USB2.0 ports with Device and Device/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

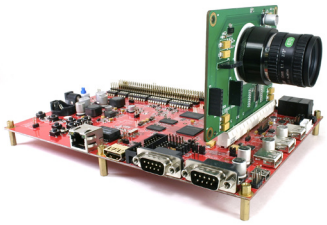
Physical
- 28nm Low Power CMOS
- <500mW for 1080p30 including DDR
- Operating temperature -20°C to +85°C
- TFBGA package with 404 balls, 15x15 mm, 0.65 mm pitch

S2L IP Camera Development Platform

The S2L 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)
- S2L 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

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



Contact **www.ambarella.com/about/contact/inquiries.html**