

S2L

IP Camera Processor

Key Features

Flexible Low-Power Platform

- Arm® Cortex®-A9 CPU
- Flexible Linux SDK for standards-based development

Advanced Image Processing

- Up to 14 MPixel resolution
- Multi-exposure line-interleaved HDR
- Hardware dewarp for 180° panorama
- Improved motion-compensated temporal filtering (MCTF) with advanced sharpening

High-Efficiency Video Encoding

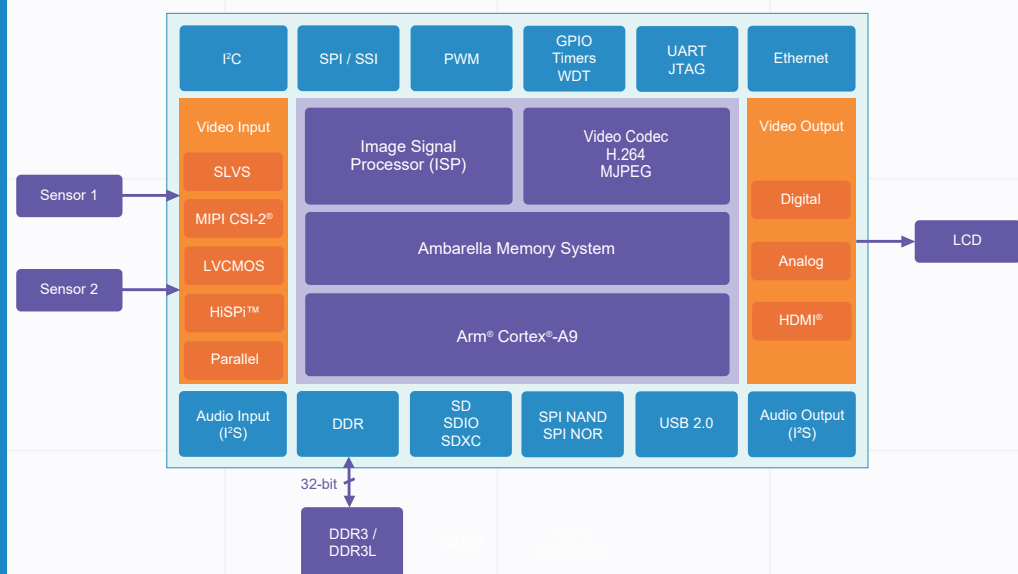
- Up to 5M@30fps H.264 high-profile encoding
- SmartAVC™ streaming as low as 600 Kbps for 1080p30
- Flexible multi-streaming



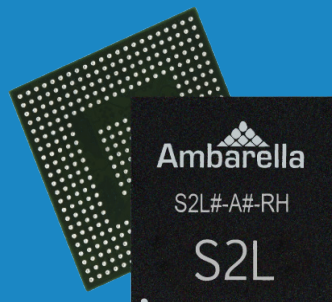
Overview

The Ambarella S2L internet protocol (IP) camera processor is a system on chip (SoC) solution that integrates an advanced image signal processor (ISP), an H.264 encoder capable of up to 5MP30 video, and a powerful Arm® Cortex®-A9 CPU for user applications. Targeting IP camera designs, the S2L supports high dynamic range (HDR) and motion-compensated 3D noise reduction to accommodate challenging lighting conditions, while the multi-streaming H.264 encoder with SmartAVC delivers superb video quality at low bit rates.

The S2L family is supported by a flexible Linux-based IP camera software development kit (SDK) to enable development of differentiated products in areas such as sensor and lens tuning, analytics, and network connectivity.



S2L Block Diagram



General Specifications

Processor Cores

- Arm® Cortex®-A9
- 32 KB / 32 KB I/D and 128 KB L2 cache
- NEON™ and FPU acceleration
- AES / 3DES / SHA-1 / MD5 cryptography engine
- Ambarella image and video digital signal processors (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
 - 16-bit parallel
- BT.601 / 656 / 1120 video in and BT.656 / 1120 video out
- 24-bit RGB out, HDMI® 1.4a with PHY out
- PAL / NTSC composite SD video out

Front End Sensor Processing

- 14 MPixel maximum resolution
- 480 MHz maximum pixel rate
- Lens shading and 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 auto exposure (AE) / auto white balance (AWB) / auto focus (AF)
- 180° fisheye dewarping with multi-window modes
- High-quality polyphase scalars
- Digital pan / tilt / zoom (DPTZ) and virtual cameras
- On-screen display (OSD) engine, overlays, and privacy mask
- Crop, mirror, flip, and 90° / 270° rotation
- DC-iris and P-iris
- Defect pixel correction
- Geometric and chroma lens distortion correction (LDC)
- Gamma compensation and color enhancement
- Backlight compensation

Intelligent Video Analytics

- Advanced third-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 MPixel maximum resolution
- 5M@30fps encoding performance
- Up to four simultaneous stream encodes

- SmartAVC low bit-rate streaming
- Flexible group of pictures (GOP) configuration with I, P, and B frames
- Temporal scalable video codec with 4 layers (SVC-T)
- Dynamic region of interest (ROI)
- Multiple constant bit rate (CBR) and variable bit rate (VBR) control modes

Memory Interfaces

- DDR3 / DDR3L up to 800 MHz, 32-bit data bus
- Three SD controllers with SDXC SD™ card
- NAND flash and SLC with EEC
- Boot from SPI NOR, SPI-EEPROM, NAND flash, USB, or eMMC

Peripheral Interfaces

- 10 / 100 Ethernet with RMII / MII
- Two USB 2.0 ports with device and device / host with PHY
- Multiple I²S, SSI / SPI, I²C, and UART
- Multiple PWM, stepper, and ADC channels
- Many GPIO ports, PWM, steppers, IR, and ADC
- Watchdog timer, multiple general purpose timers, and JTAG

Physical

- 28 nm low-power complimentary metal-oxide semiconductor (CMOS)
- <500 mW for 1080p30, including DDR
- Operating temperature -20°C to +85°C
- LFBGA 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, onsemi, Panasonic, Sony, and others
- Datasheet, BOM, schematics, and layout
- Reference application with C source code available with additional licensing

Software Development Kit (SDK)

- Linux 4.9.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 including a programmer's guide and more

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