

S6LM

IP Camera SoC with Advanced Imaging and Security Features

Key Features

Advanced Image Processing

- Up to 400 MPixel/s input rate
- Multi-exposure line-interleaved HDR
- Superior low-light processing
- Hardware dewarping engine
- 3D motion-compensated temporal filtering (MCTF)
- Electronic image stabilization (EIS)
- Up to three independent sensor inputs

High-Efficiency Video Encoding

- H.265 and H.264 video compression
- Flexible multi-streaming capability
- 5MP30 + 720p30 + 5MP1 video performance
- Multiple constant bit rate (CBR) and variable bit rate (VBR) control modes
- Smart H.264 and H.265 encoder algorithms

Flexible Low-Power Platform

- 64-bit quad-core Arm® Cortex®-A53 CPU up to 1 GHz
- Linux kernel version 4.14 or later (64-bit)
- Linux software development kit (SDK) for standards-based development
- Industry-leading image sensors support

Advanced Cybersecurity Features

- Secure boot with TrustZone® and secure memory, TRNG, OTP, DRAM scrambling and virtualization



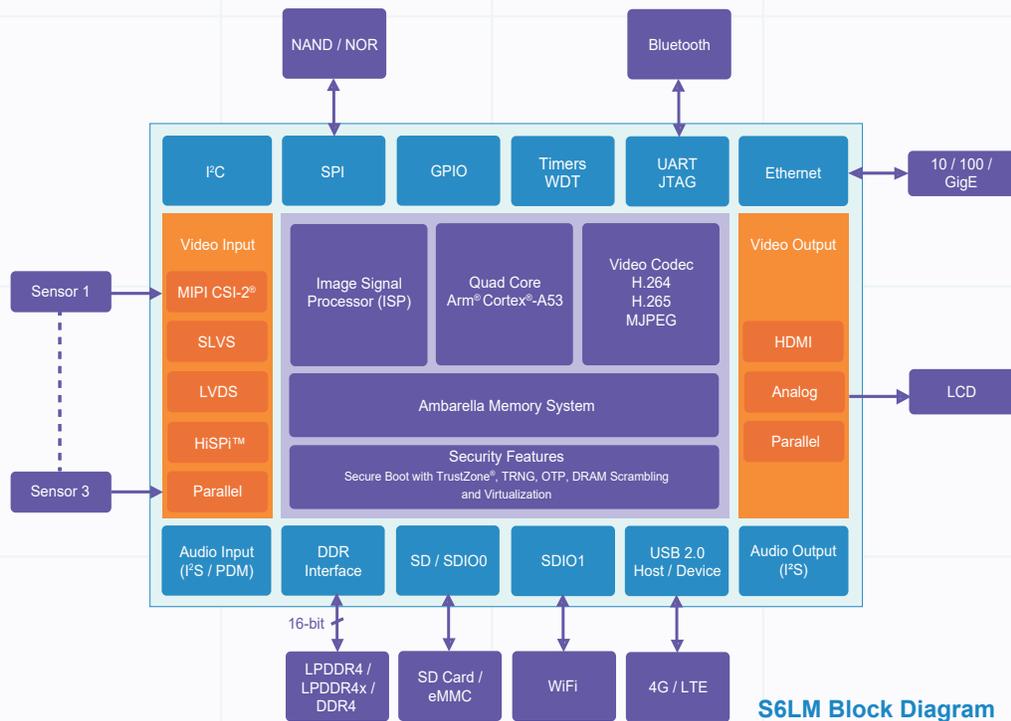
Overview

Ambarella's S6LM system on chip (SoC) combines state-of-the-art Internet protocol (IP) camera and security technology with image processing in a single, low-power design. Fabricated using advanced 10 nm process technology, S6LM achieves an industry-leading combination of low power and high performance in a wide range of professional and home security IP camera designs.

Meeting the demands of the next generation of intelligent IP cameras, S6LM's architecture provides efficient encoding in both AVC and HEVC video formats, delivering up to 5MP30 + 720p30 + 5MP1 video performance. S6LM minimizes cloud storage costs by streaming high-resolution video at low bit rates.

S6LM uses a next-generation image signal processor (ISP) to deliver outstanding imaging in low-light conditions, while its high dynamic range (HDR) processing extracts maximum image detail in high-contrast scenes.

S6LM includes a suite of advanced cybersecurity features such as secure boot with TrustZone® and secure memory, true random number generator (TRNG), one-time programmable memory (OTP), DRAM scrambling and virtualization, and a programmable secure level for each peripheral interface.



S6LM Block Diagram

General Specifications

Processor Cores

- Quad-core Arm® Cortex®-A53 up to 1 GHz
- 32KB / 32KB I/D and 1 MB L2 Cache
- NEON™ SIMD and FPU acceleration
- Ambarella image signal processor and video codec

Sensor and Video I/O

- Single, dual, or triple sensor inputs with independent ISP configuration
- Sub-LVDS / MIPI CSI-2® / SLVS / HiSPi™
- 16-bit parallel LVCMOS
- BT.601 / 656 video in and 16-bit BT.601 out
- HDMI® 2.0 including PHY with consumer electronic control (CEC) support
- PAL / NTSC composite SD video out

Sensor Processing

- 400 MPixel/s maximum pixel rate
- Lens shading correction
- Multi-exposure HDR (line-interleaved sensors)
- WDR with local tone mapping

Image Processing

- 3D motion-compensated temporal filtering (MCTF)
- 3-axis electronic image stabilization (EIS)
- Adjustable auto exposure (AE) / auto white balance (AWB) / auto focus (AF)
- 180° and 360° fisheye lens distortion correction (LDC)

- High quality polyphase scalars
- Digital pan / tilt / zoom (DPTZ) and virtual cameras
- On-screen display (OSD) engine, overlays, privacy mask
- Crop, mirror, flip, 90° / 270° rotation
- DC-iris and P-iris
- Defective pixel correction
- Geometric LDC
- Chromatic aberration correction
- Gamma compensation and color enhancement
- Backlight compensation

Intelligent Video Analytics

- People counting and tracking
- Face detection and recognition
- Human / pet / vehicle classification
- Object classification, recognition, and more
- License plate recognition

Video Encoding

- H.265 MP L5.0, H.264 MP / HP L5.1, and MJPEG
- 5MP30 + 720p30 + 5MP1 maximum encoding performance
- Up to eight simultaneous stream encodes
- Flexible group of pictures (GOP) configuration with I, P, and B frames
- Temporal scalable video codec (SVC-T) with four layers
- Dynamic region of interest (ROI)
- Multiple CBR and VBR control modules

Memory Interfaces

- LPDDR4 / LPDDR4x / DDR4 up to 1.6 GHz, 16-bit data bus
- Three SD controllers: SD / SDIO / SDXC
- Boot from SPI or parallel SLC NAND with BCH / SPI NOR / USB / eMMC

Peripheral Interfaces

- 10 / 100 / 1000 Ethernet with RMII / RGMII
- USB 2.0 port configurable for host / device
- Multiple I²S / PDM, SSI / SPI, I²C, and UART
- Multiple GPIO ports, PWM, IR, and ADC
- Watchdog timer, multiple general purpose timers, and JTAG

Physical

- 10 nm low-power complimentary metal-oxide semiconductor (CMOS)
- Operating temperature -25°C to +85°C
- FC VFBGA package (288 balls, 11x12 mm, 0.65 mm pitch)

S6LM IP Camera Development Platform

The S6LM IP camera development platform contains the necessary tools, software, hardware, and documentation to develop an IP camera utilizing the specialized hardware S6LM provides while supporting development of customized features.

Evaluation Kit

- S6LM main board with connectors for sensor / lens board and peripherals
- Sensor board: Sony, onsemi, OmniVision, Panasonic, and others
- Datasheet, BOM, schematics, and layout
- IP camera reference application with C and C++ source code available with additional licensing

Software Development Kit

- Linux 4.14 + 64-bit kernel with patches, drivers, tools, and application source code
- Latest Linaro GCC Toolchain for 64-bit Arm Cortex Arm V8
- Royalty-free libraries for ISP, 3A, dewarp, codecs
- Image tuning and manufacturing calibration tools
- Detailed documentation, including a programmer's guide and more



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