

SSC9381G

High-Integrated USB Camera SoC

Processor

Preliminary Product Brief

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CHIP OVERVIEW

The SSC9381G products are highly integrated multimedia System-on-Chip (SoC) products for high-resolution intelligent video recording applications like USB camera.

The chip includes a 32-bit Dual-core RISC processor, advanced Image Signal Processor (ISP), high performance MJPEG/H.264/H.265 video encoder, Deep Learning Accelerator (DLA), Intelligent Video Engine (IVE), as well as high speed I/O interfaces like MIPI, and USB3.0.

Advanced low-power, low-voltage architecture and optimized design flow are implemented to fulfill long time usage applications. Hardwired AES/DES/3DES cipher engines are integrated to support secure boot, authentication, and video/audio stream encryption in security system.

The SSC9381G, powered by SigmaStar Technology, comes with a complete hardware platform and software SDK, allowing customers to speed up "Time-to-Market."

BLOCK DIAGRAM

Figure 1 shows the major functional blocks of SSC9381G chip.

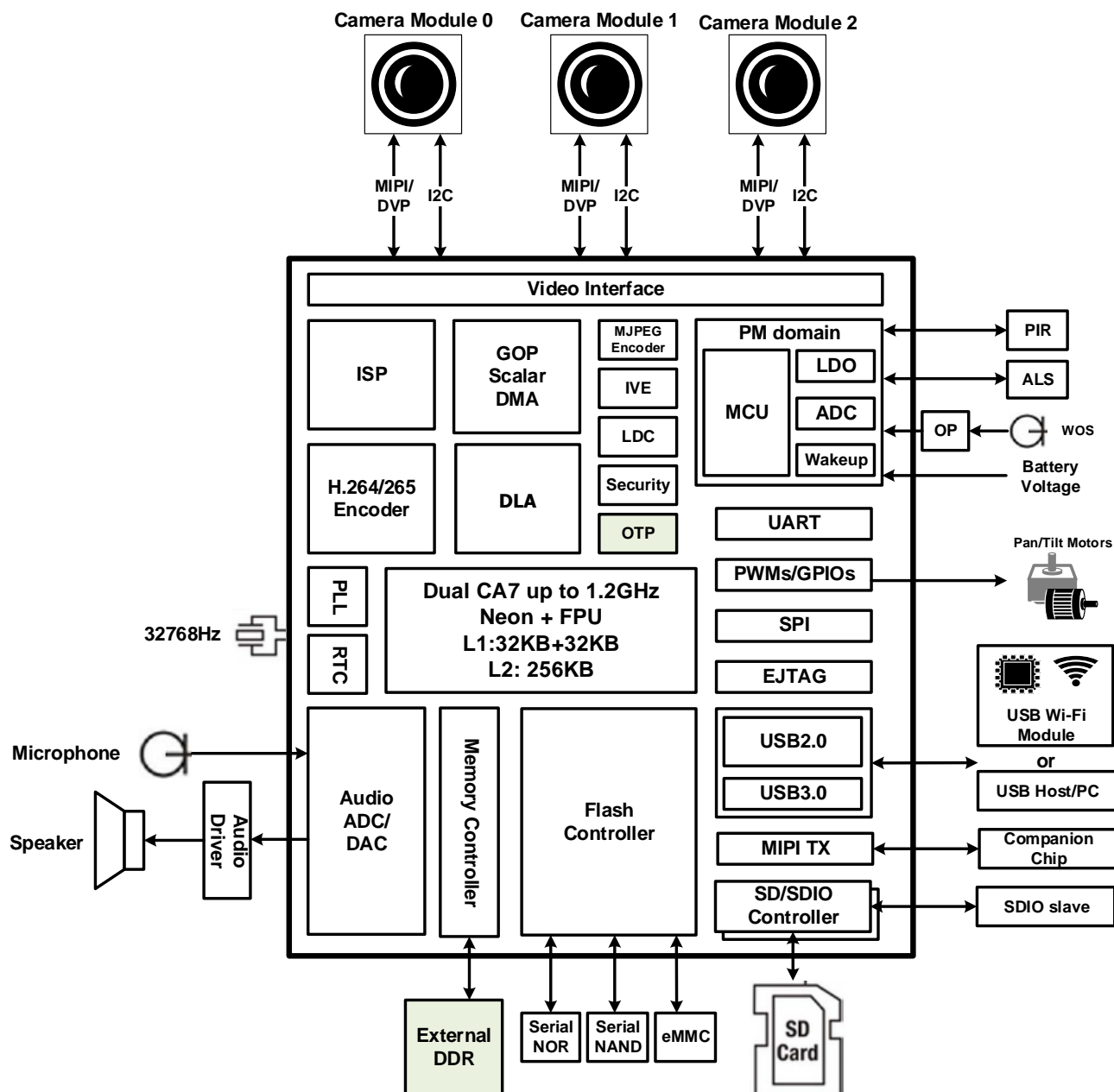


Figure 1: SSC9381G Block Diagram

FEATURES

■ High Performance Processor Core

- ARM Cortex-A7 Dual Core
- Clock rate up to 1.2GHz
- Neon and FPU
- Memory Management Unit for Linux support
- DMA Engine

■ Image/Video Processor

- Supports 8/10/12-bit parallel interface for raw data input
- Supports MIPI interface with 2/4 data lanes and 1 clock lane
- Supports max. three MIPI interfaces
- Supports sensor interface with both parallel and MIPI
- Supports 8/10-bit CCIR656 interface
- Supports max. 4K (3840x2160) pixels video recording and image snapshot
- Bad pixel compensation
- Temporal-domain Noise Reduction (3DNR)
- Bayer domain Spatial-domain Noise Reduction (2DNR)
- Bayer domain filter to remove purple false color in highlight regions
- Optical black correction
- Lens shading compensation
- Auto White Balance (AWB) / Auto Exposure (AE) / Auto Focus (AF)
- CFA color interpolation
- Color correction
- Gamma correction
- Video stabilization
- High Dynamic Range (HDR) with two exposure frames and de-ghost function
- Frame buffer data compression and de-compression to save memory bandwidth
- Wide Dynamic Range (WDR) with local tone mapping

- Flip, Mirror, and Rotation with 90 or 270 degree
- Lens distortion correction (LDC/FishEye)
- Rolling shutter compensation
- Fully programmable multi-function scaling engines

■ Advanced Color Engine

- Luma gain/offset adjustment
- Supports 2D peaking with user definition filter
- Horizontal noise masking
- Direct Luma Correction (DLC)
- Black/White Level Extension (BLE/WLE)
- IHC/ICC/IBC for chroma adjustment
- Histogram statistics
- Spatial domain IIR filter to reduce noise

■ H.265/HEVC

- Supports H.265/HEVC main profile
- Supported Prediction Unit (PU) size: 32x32, 16x16, 8x8
- Supported Transform Unit (TU) size: 32x32 to 4x4
- Search range [H: +/-128, V: +/-64]
- Supports up to quarter-pixel
- Supports frame level and MB level rate control
- Supports ROI encoding with custom QP map
- Supports max. 4K with 30 fps encoding

■ H.264 Encoder

- Supports H.264 baseline, constrained baseline, main, and high profile
- Supports 16x16, 8x8 and 4x4 block sizes
- Search range [H: +/-64, V: +/-32]
- Supports up to quarter-pixel
- Supports frame level and MB level rate control
- Supports ROI encoding with custom QP map
- Supports max. 4K with 30 fps encoding

- **JPEG Encoder**
 - Supports JPEG baseline encoding
 - Supports YUV422 or YUV420 formats
 - Supports max. 4K with 30 fps encoding
 - Supports real-time mode and frame encode mode
- **Video Encoding Performance**
 - Supports 4K 30 fps H.265/HEVC encoding
 - Supports 4K 30 fps H.264 encoding
 - • Supports MJPEG up to 4K 30 fps encoding
- **Deep Learning Accelerator (DLA)**
 - Pure hardwired accelerator
 - Supports various video analysis functions like FD/FR, human detection, MD/OD, object tracking, etc.
- **Audio Processor**
 - One stereo ADC for microphone input
 - 2-pin DMIC input
 - One stereo DAC for lineout
 - Supports 8K/16K/32KHz/48KHz sampling rate audio recording
 - Digital and analog gain adjustment
 - • I2S digital audio input and output with TDM up to 8-ch input and 2-ch output
- **NOR/NAND Flash Interface**
 - Compliant with standard, dual and quad SPI Flash memory components
 - High speed clock/data rate up to 108MHz
- **SD Card/eMMC Interface**
 - Compatible with SD spec. 2.0, data bus 1/4 bit mode
 - Supports eMMC 4.3 interface
- **SDIO 2.0 Interface**
 - Compatible with SDIO spec. 2.0, data bus 1/4 bit mode
 - Compatible with SD spec. 2.0, data bus 1/4 bit mode
- **USB Interface**
 - One USB port, which is configurable as:
 - USB 2.0 host or device, or
 - ✧ Host mode supports EHCI specification
 - ✧ Device mode supports 4 endpoints
 - USB 3.0 device
 - ✧ Supports Super-Speed, High-Speed, Full-Speed, and Low-Speed operation
 - ✧ Supports up to 8 endpoints
 - ✧ Configurable data buffering options for performance fine-tune
 - Supports suspend/hibernation/wake-up power saving mode
- **DRAM Memory**
 - Supports external dual 16-bit DDR3/DDR3L interface with 1~8Gb size
- **Connectivity**
 - Supports MIPI TX CSI2 up to 4K2K@30fps RGB/YUV/Generic 8-bit format
 - USB 2.0 Host Controller could be used for USB Wi-Fi Dongle or Module
 - One SDIO 2.0 Host Controller could be used for SDIO Wi-Fi module
 - Supports Wake-on-LAN (WOL)
 - Supports BT.656 8-bit output with max. 75MHz clock rate (single clock edge)
 - Supports BT.656 YUV422 format and progressive mode
- **Security Engines**
 - Supports AES/DES/3DES/RSA/SHA-I/SHA-256
 - Supports secure booting
- **Real Time Clock (RTC)**
 - Built-in RTC working with 32.768 KHz crystal
 - Alarm interrupt for wakeup
 - Tick time interrupt (millisecond)
 - Built-in regulator
 - Supports low leakage RTC-mode for long battery application
- **Power Management Unit (PM)**
 - Built-in LDO to provide both 0.9V and 1.8V power sources
 - Built-in RC FRO to generate clock source
 - Supports multiple GPIOs for power control and RTC events
 - Supports PIR (Passive Infrared Sensor) interface
 - Supports ALS (Ambient Light Sensor) interface
 - Supports WOS (Wake on Sound) function
 - Supports 1.8V serial flash interface for MCP under low power application

■ Peripherals

- Dedicated GPIOs for system control
- Supports max. 11 PWM outputs
- Three generic UARTs and one fast UART with flow control
- Three generic timers and one watchdog timer
- Two SPI masters
- Four I2C Masters
- Built-in SAR ADC with 4-channel analog inputs for different kinds of applications
- Supports internal temperature sensor

■ Operating Voltage Range

- Core: Typ. 0.9V
- I/O: 1.8 ~ 3.3V
- DRAM: 1.5V (DDR3) or 1.35V (DDR3L)
- Power Consumption: TBD

■ Package

- BGA with 307 pins, 13mm x 13mm, ball pitch 0.65mm, ball size 0.35mm
- Moisture Sensitivity Level: 3