

SSA330D/SSA330Q **High-Integrated AI Camera SoC** **Processor**

Preliminary Product Brief

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1. CHIP OVERVIEW

The SSA330D/SSA330Q products are highly integrated multimedia System-on-Chip (SoC) products for high-resolution intelligent video recording applications like AI 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 Ethernet.

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 SSA330D/SSA330Q, powered by SigmaStar Technology, comes with a complete hardware platform and software SDK, allowing customers to speed up "Time-to-Market."

2. BLOCK DIAGRAM

Figure 2-1 shows the major functional blocks of SSA330D/SSA330Q series chip.

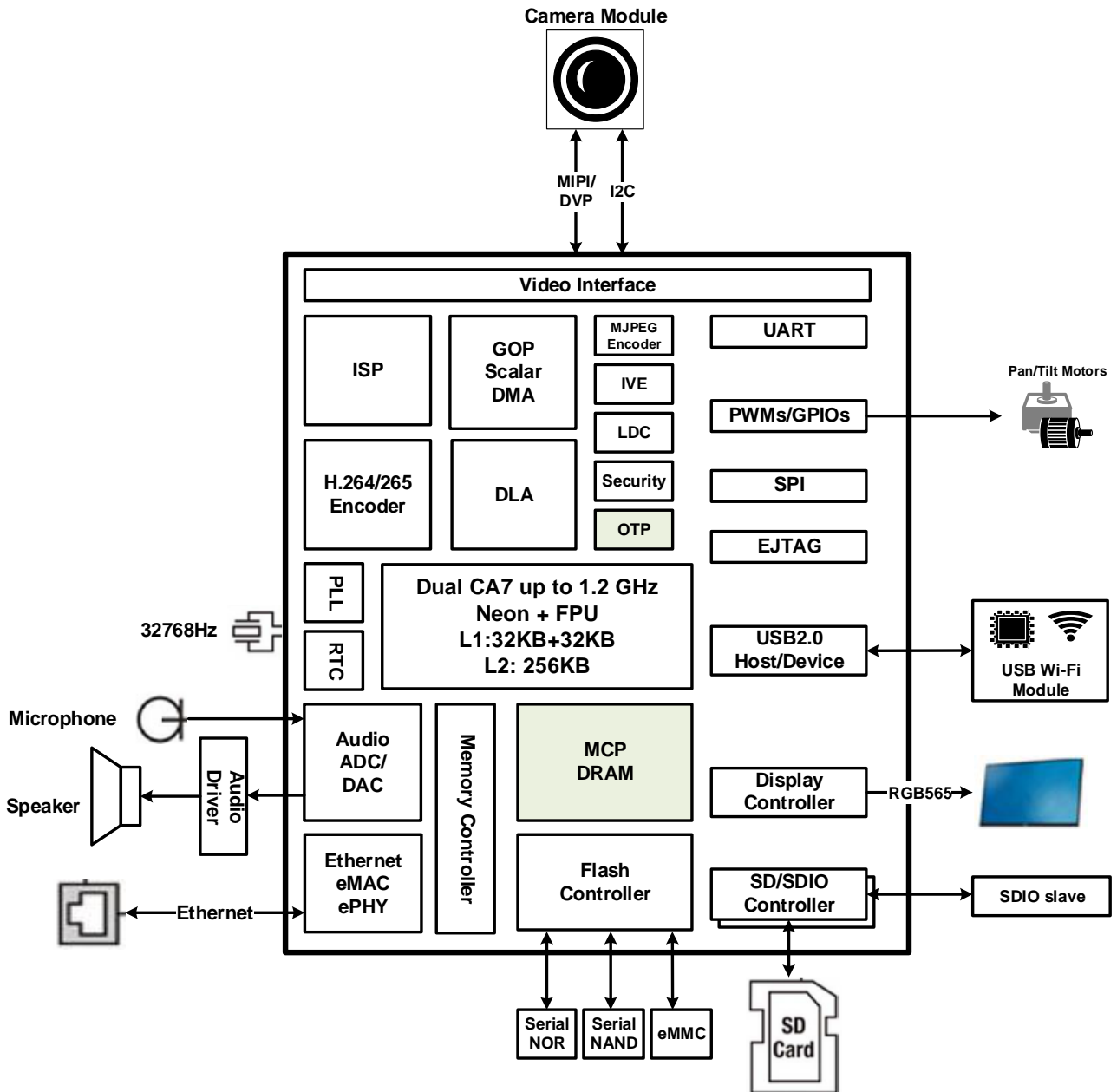


Figure 2-1: SSA330D/SSA330Q Block Diagram

3. 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 one MIPI interface
- Supports sensor interface with both parallel and MIPI
- Supports 8/10-bit CCIR656 interface
- Supports max. 3M (2304x1296) 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. 3M 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. 3M with 30 fps encoding

- **JPEG Encoder**
 - Supports JPEG baseline encoding
 - Supports YUV422 or YUV420 formats
 - Supports max. 3M with 30 fps encoding
 - Supports real-time mode and frame encode mode
- **Video Encoding Performance**
 - Supports 3M + HD + D1 30fps H.265/HEVC encoding
 - Supports 3M + HD + D1 30fps H.264 encoding
 - Supports MJPEG up to 3M 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 mono 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
- **Display Interface**
 - TTL output up to HD 60fps with RGB565 format
- **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 2.0 configurable host or device
 - Host mode supports EHCI specification
 - Device mode supports up to 8 endpoints
 - Supports suspend/hibernation/wake-up power saving mode
- **DRAM Memory**
 - Embedded 1Gb or 2Gb 16-bit DDR3 memory with max. 2133Mbps
- **Connectivity**
 - Built-in 10/100M Ethernet MAC and Ethernet PHY
 - USB 2.0 Host Controller could be used for USB Wi-Fi Dongle or Module
 - 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
- **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**
 - QFN with 128 pins, 12.3mm x 12.3mm