

M550S Camera SoC

H.265/H.264 Encoder SoC with Hardware Fisheye Dewarping



Overview

The VATICS M550S Camera SoC integrates advanced image signal processing (ISP) engines, H.265/H.264 and MJPEG encoders, a 720MHz ARM® Cortex™ A5 CPU, a CEVA® DSP, and rich peripherals for implementing a wide range of camera applications, such as professional IP Camera, WiFi Home Camera, 720/360 Camera, Dash Camera, and Drone Camera, etc. M550S offers advanced imaging processing features such as multi-exposure true WDR, DWDR, 3D noise reduction, and fisheye dewarping and stitching.



The M550S SDK provides Linux-based and RTOS-based framework and development environment that includes image-tuning tools and a rich set of APIs, enabling easy product customization and differentiation in areas such as sensor and lens tuning, audio/video analytics and video streaming applications.

Key Features

Flexible Low-Power Platform

- ARM® Cortex™ A5 CPU
- CEVA® MM3101 DSP
- Linux and RTOS SDK
- 28-nm low-power CMOS process

Advanced Image Processing

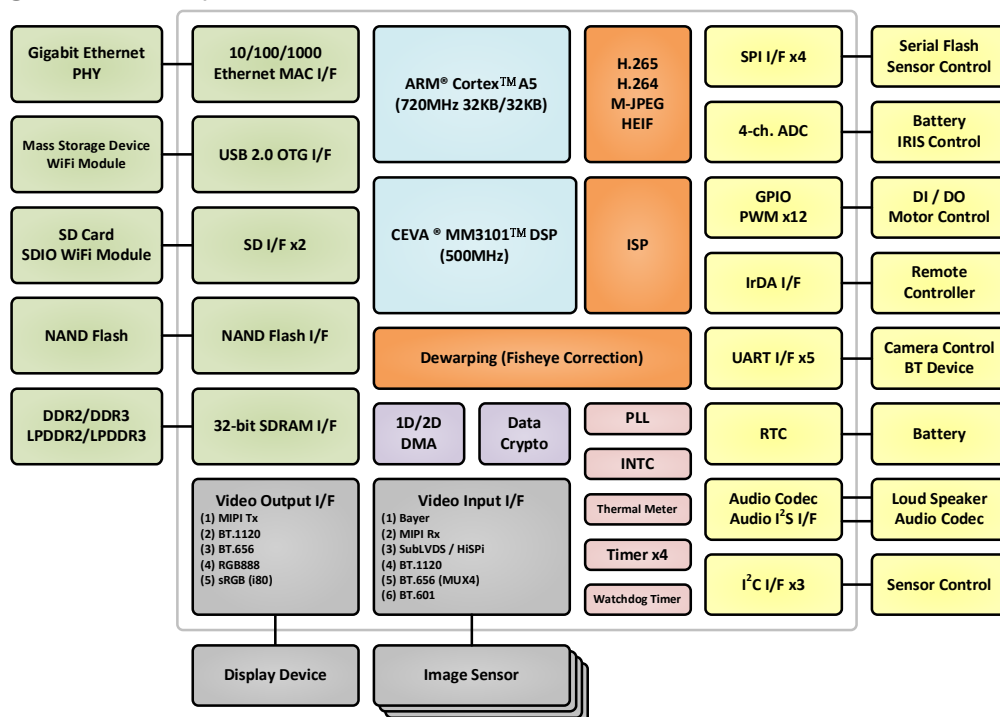
- Up to 7,936 x 7,936 sensor resolution
- Multi-shutter frames fusion (up to 120dB)
- Hardware dewarping for 360°/180° panorama
- Improved 2D/3D noise reduction
- Adaptive weighting edge enhancement

High-Efficiency Video Encoding

- H.265 and H.264 video compression
- H.265 up to 4M@30fps + 1M@30fps video
- H.264 up to 2M@60fps + 1M@30fps video
- Flexible, unlimited multi-channel streaming

Block Diagram

The diagram below illustrates the functional block diagram of M550S SoC and its connections to external components in a general camera product.



General Specifications

Processor Cores

- ARM® Cortex™ A5 up to 720 MHz
 - 32 KB/32 KB I/D
 - NEON™ and FPU acceleration
- CEVA® MM3101 DSPs

Sensor and Video I/O

- Seamless RGB Bayer interface to popular sensors
 - 8-lane x1 or 4-lane x2 SubLVDS/HiSPI or 4-lane MIPI
 - 14-bit + 12-bit parallel
- BT.601/656/1120 video in and BT.656/1120 video out
- 24-bit RGB and sRGB (i80) video out

Image Processing

- Lens shading, fixed pattern noise correction
- Multi-shutter frames fusion
- Local tone mapping
- 3D/2D noise reduction
- Adjustable AE/AWB/AF
- 360°/180° fisheye lens distortion correction
- High quality scalers
- Digital PTZ and Virtual Cameras
- OSD engine; overlays, privacy mask
- Crop, mirror, flip, 90°/270° rotation
- Defect pixel correction
- Geometric and chroma lens distortion correction
- Gamma compensation and color enhancement

Video Encoding

- H.265 (HEVC) MP, H.264 BP/MP/HP, and MJPEG
- H.265 4M@30fps+1M@30fps max. performance
- H.264 2M@60fps+1M@30fps max. performance
- Multiple simultaneous stream encodes
- Flexible GOP configuration with I, P frames
- Region of interest (ROI) encoding
- Multiple CBR and VBR rate control modes

Memory Interfaces

- DDR3/LPDDR2/LPDDR3 up to 500 MHz, 32-bit data bus
- Two SD controllers with SDXC SD™ card support
- NAND flash (compliant with ONFi version 2.2)
- Boot from SPI-NOR, SPI-NAND, NAND flash, SD, USB, or UART

Peripheral Interfaces

- 10/100/1000M Ethernet (RMII/MII/RGMII)
- USB 2.0 OTG x1
- I2S x1, SPI x4, I2C x3, and UART x5 (Tx/Rx)
- Up to 96 GPIOs, PWM x12, IrDA x1
- ADC x5 (one for on-chip temperature measurement)
- Watchdog Timer, multiple general purpose timers, JTAG

Physical

- 28-nm low-power CMOS process
- Operating temperature: -40°C to +85°C
- Package: TFBGA361, 13x13 mm, 0.65 mm pitch

Audio Solutions

- AEC/ANS/AGC/EQ/DRC
- Wind noise cancellation
- T3/T4 alarm detection

Video Solutions

- Motion detection/missing object detection
- Face detection
- Dual 360° panorama video stitching
- Digital image stabilization
- Smart encoder

M550S Development Platform

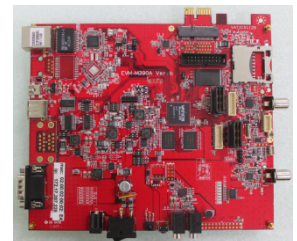
The M550S Development Platform contains the necessary tools, software, hardware and documentation to develop a camera product while supporting development of customized features.

Evaluation Kit (EVK)

- M550S Evaluation Board (EVB) with connectors for sensor/lens board and peripherals
- Sensor board: Omnivision, ON Semiconductor, Panasonic, Sony, and others
- Datasheet, BOM, schematics, and layout
- IP Camera and 720° dual-sensor Camera reference applications with C source code

Software Development Kit (SDK)

- Linux 4.9.X kernel with patches, drivers, tools, and application source code
- Image tuning and calibration tools
- Programmer's guide, application notes



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