SSC8339DEW
High-Integrated Camera SoC Processor

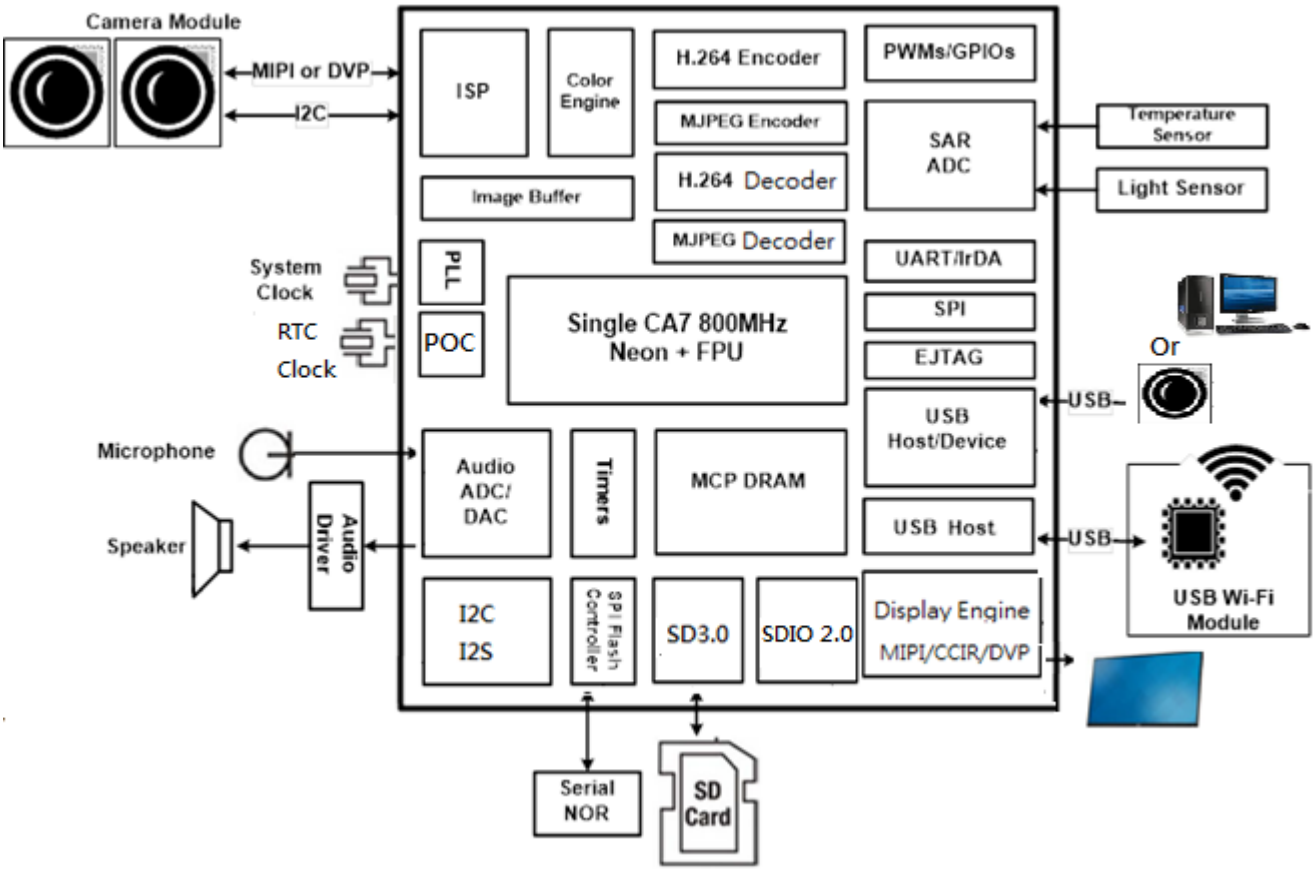
Preliminary Product Brief

FEATURES

- High Performance Processor Core
  - ARM Cortex-A7 single Core 800MHz
  - Neon and FPU
  - DMA Engine
- Image/Video Processor
  - Supports 10/12-bit parallel interface for raw data input
  - Supports MIPI interface with 4+2 lanes
  - Supports 8/10-bit CCIR656 interface
  - Supports multi sensors input configuration
    - 2 MIPI 4+2
    - One MIPI (2) + One Parallel Bayer
    - One MIPI (2) + One BT656/601
    - One MIPI (4) + One BT656
    - One MIPI (2/4) + One USB YUV422
    - Parallel Bayer + One BT656
  - Supports 3M pixels video recording and image snapshot
  - Bad pixel compensation
  - Noise Reduction (NR)
  - 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
  - Wide Dynamic Range (WDR)
  - Rotation with 90 or 270 degree
  - Lens distortion correction
  - Fully programmable multi-function scaling engines
- MStar Advanced Color Engine (MStarACE)
  - Luma gain/offset adjustment
  - Supports 2D peaking
  - Horizontal noise masking
  - Direct Luma Correction (DLC)
  - Black/White Level Extension (BLE/WLE)
  - IHC/ICC/IBC for chroma adjustment
  - Histogram statistics
- Multi-Standard Video Decoder
  - H.264 Decoder
    - Supports ITU-T H.264, ISO/IEC 14496-10 main profile, level 4.2
    - Supports max resolution up to 3M(2048x1536, 2304x1296)
    - Supports error concealment feature for erroneous video streams
    - Supports frame rate conversion between different encoding and display frame rates
    - Supports max bit rate up to 100Mb
  - JPEG Decoder
    - Support Baseline profile up to 8Kx8K
    - YUV420, YUV422
    - Max resolution 2M(1920x1080)p30fps, 3M(2048x1536)p20fps, 3M(2304x1296)p20fps
- Display Engine
  - Supports up to four graphics and five video display planes
  - Advanced algorithms for OSD de-flickering
  - Built-in high quality Motion-Adaptive (MADi) and Edge Oriented (EODi) de-interlacer
  - Independent high quality scaling path for HD and SD outputs
  - Built-in contrast and brightness control

- H.264 Encoder
  - Supports H.264 baseline and main profile encoding
  - Supports MVs: 16x16, 16x8, 8x16, 8x8, 8x4, 4x8, 4x4
  - Supports up to quarter-pixel
  - Supports two reference frames
  - Supports rate control and ROI
  - Support multi streams:
    - 3M@30fps + VGA@30fps
    - 1080p@30fps + 720p@30fps + 720p@30fps
- JPEG Encoder
  - Supports JPEG baseline encoding
  - Supports resolution up to 3M(2048x1536)p20fps or 3M(2304x1296)p20fps
  - Supports YUV422 or YUV420 formats
- Audio Processor
  - Built-in audio line buffer for 1Vrms output swing
  - Support up to 4 set mono DMIC
  - One Mono/Stereo ADC for microphone inputs
  - One 2set (Mono/Stereo, Single-end) DAC for lineouts
  - Supports 2ch I2S
  - Supports 8K/16K/32KHz sampling rate audio recording
  - Digital and analog gain adjustment
- Video Output Interface
  - Supports parallel output up to FHDp60fps (1920x1080p60)
  - Supports MIPI DSI up to 1280x720 60fps / 1920x1080 60fps
  - Support CCIR601 8/16-bit
- NOR Flash Interface
  - Compliant with standard, dual and quad SPI Flash memory components
- Storage
  - Support SPI Nor, SPI NAND
  - Compliant with standard, dual and quad SPI Flash memory components
  - SDXC by SD 3.0 support
- 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 2.0 Interface
  - One USB 2.0 Host Controller
  - One USB 2.0 configurable host or device
    - Host mode supports EHCI specification
    - Device mode supports 6 endpoints
- DRAM Memory
  - Embedded DDR3 DRAM memory
    - Memory size up to 1Gb
- Connectivity
  - One USB 2.0 OTG Controller could be used for USB Wi-Fi Dongle, PC or rear cam
    - One USB 2.0 OTG Controller could be used for PC or rear cam
  - One USB 2.0 Host Controller could be used for USB Wi-Fi Dongle or rear cam
    - One USB 2.0 Host Controller could be used for USB Wi-Fi Dongle
  - One SDIO 2.0 Host Controller could be used for SDIO Wi-Fi module
- Security Engines
  - Supports AES/DES/TDES
  - Supports secure booting
- Peripherals
  - Dedicated GPIOs for system control
  - Multiport PWM outputs shared with GPIOs
  - Two generic UARTs and one fast UART with flow control
  - Three generic timers and one watchdog timer
  - Three SPI masters
  - Four I2C Masters
  - One IR input
  - Built-in SAR ADC with 4 channels analog inputs for different kinds of applications
- Operating Voltage Range
  - Core: 0.95V
  - I/O: 1.8 ~ 3.3V
  - DRAM: 1.5V
  - Power Consumption: TBD
- Package
  - BGA 12x12mm-268-ball

CHIP BLOCK DIAGRAM



GENERAL DESCRIPTIONS

This is a highly integrated SOC based on ARM Cortex-A7, it integrates Image Signal Processor (ISP), Color Engine, Video (H.264/MJPEG) Encoders/Decoder and other useful peripherals for camera applications.

A typical utilization of the SSC8339DEW application processor is demonstrated in the following block diagram. The complete system includes a camera module (CMOS sensor), a connectivity module (WiFi or Ethernet), and a non-volatile storage (NOR flash or SD card). The ISP and Color Engine handle images captured from the camera sensor, and the video stream is composed of lots images. There are pre- and post- video processing stages. The pre-video processing rotates images, reduces noises, enhances signals and translates color domains. The post-video processing corrects lens distortion, adjusts color quality, and generates multiple video streams with different resolutions.

The MJPEG/H.264 video codec supports up to 60 frames per second with 1920x1080 resolution. Pure hardwired architecture achieves low power operation and extends battery time. MCTF (motion -compensated temporal filter) is integrated to enhance image quality and reduce video bit-rate under dark environment.

The well compressed video/audio streams could be streamed or stored in the cloud server through Wi-Fi or Ethernet or stored in a local SD Card. The NOR flash is usually reserved for operating system and application software. Moreover, other peripherals like SAR ADC, Audio ADC/DAC, UARTs, PWMs, GPIOs and SPI are supported to realize applications with maximal flexibility.