

SSD2355 HIGH PERFORMANCE AIOT SYSTEM-ON-CHIP

PRODUCT BRIEF

CHIP OVERVIEW

The SSD2355 is a highly integrated System-on-Chip (SoC) dedicatedly designed for personal mobile device, battery device, and AIoT application.

The SSD2355 includes a 64-bit quad-core processor, advanced Image Signal Processor (ISP), Intelligence Processing Unit (IPU), Intelligence Video Engine (IVE) as well as high speed I/O interfaces like USB, Ethernet, and 12-bit ADC. These features in combination make the SSD2355 an ideal solution that facilitates design and development of high-performance, high-picture-quality, and low-cost products.

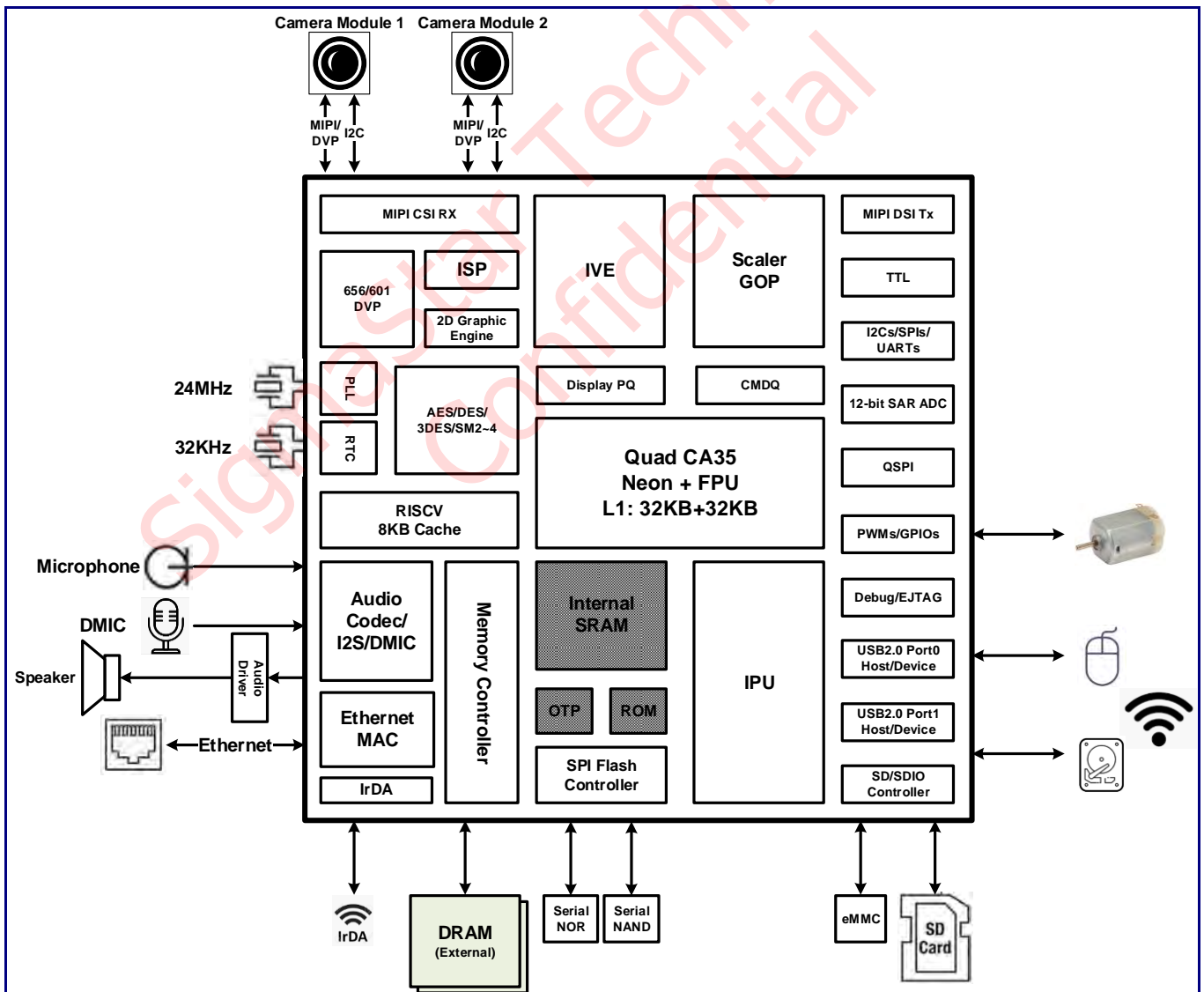
The programmable neural network inference engine featured in the SSD2355 allows customers to achieve a rich variety of intelligent applications with ease.

Implemented with the quad-core ARM Cortex-A35 CPU as well as an IPU, the SSD2355 enables fast startup, real-time performance, and connections with various peripheral interfaces.

Efficient computing resources are available to help customers develop industry and consumer applications. Advanced low-power, low-voltage architecture and optimized design flow are implemented to fulfill long time usage applications. Hardwired AES/DES/3DES as well as SM2/SM3/SM4 cipher engines are integrated to support secure boot, authentication, and video/audio stream encryption in security system.

The SSD2355, powered by SigmaStar Technology, comes with a complete hardware platform and software SDK, allowing customers to speed up "Time-to-Market."

BLOCK DIAGRAM



FEATURES

- **High Performance Processor Core**
 - ARM Cortex-A35 Quad Core
 - 32KB L1 I-cache and 32KB L1 D-cache for each core
 - 256KB L2 cache
 - Neon and FPU
 - Separate power domain for each core
 - Stand-alone voltage domain
- **Video Input Interface**
 - Supports 8/10 parallel interface for raw data input
 - Supports 10-bit BT601 interface
 - Supports 8-bit BT656 interface
 - Supports MIPI interface with 2 data lanes and 2 clock lanes
 - Supports sensor interface with both parallel and MIPI
 - Static and adaptive bad pixel compensation
 - Crosstalk noise reduction
 - Temporal-domain Noise Reduction (3DNR)
 - Sharpening filters for image enhancement
 - Spatial-domain Noise Reduction (2DNR) for luma and chroma image
 - Filter to remove purple false color in highlight regions
 - Symmetric/Asymmetric lens shading compensation
 - Auto White Balance (AWB) / Auto Exposure (AE) / Auto Focus (AF)
 - CFA color interpolation and demoiré filter
 - Color correction and color adjustment engine
 - Gamma correction
 - Frame buffer data compression and decompression to save memory bandwidth
 - Wide Dynamic Range (WDR) with local tone mapping
 - Fully programmable multi-function scaling engines
- **Intelligence Video Engine (IVE)**
 - Pure hardwired accelerator
 - Supports image process operator like Filter2D, Box filter, Gaussian filter, Bernsen, Dilate, Erode, etc.
 - Supports Matrix multiplication
- **Intelligence Processing Unit (IPU)**
 - Pure hardwired accelerator
 - Programmable 4/8/16-bit process
 - Supports RGB/YUV data format R/W DMA
 - Supports various video analysis functions like FD/FR, human detection, MD/OD, object tracking, etc.
 - Supports Transformer networks
- **Co-Processor (RISCV)**
 - Supports RV32 base instruction set, and M/C extension
 - 6 Stage Pipeline, Single Issue, in-order dispatch, out-of-order execution
 - 8Kbyte + 8Kbyte configurable I/D cache or I/D TCM
 - Up to 576MHz clock rate
 - Supports dynamic branch prediction
 - Supports memory property configuration
 - Supports JTAG debug
- **Audio Processor**
 - Supports 3-channel ADC with single-end or differential mode
 - Supports 2-channel DAC with single-end mode
 - ADC and DAC SNR over 95.2dB
 - Digital and analog gain adjustment
 - Supports 8-CH DMIC (1 clock + 4 data)
 - Supports I2S0 TDM mode with input max. 8-ch and output 2-ch
 - Supports I2S1 2-ch input and 2-ch output
 - Supports I2S2 2-ch input and 2-ch output
 - I2S0/1/2 support Master or Slave mode and 4/6 wire mode, bit width up to 32-bit
 - Supports SPDIF input, bit width up to 24-bit
- **Video Output Interface**
 - Picture quality enhancement (gamma, sharpness, brightness, 3x3 matrix, color dither, osdb, RGB swap)
 - Display channel can output to MIPI/Digital port, digital port including one of TTL/CCIR656/18080
 - Supports MIPI DSI TX 4lane, 2.5Gbps per lane, RGB 16/18/24-bit, 2560x1600@60fps
 - TTL/Parallel-RGB interface, 16/18/24-bit, 1280x800@60fps
 - Supports 8/16-bit 18080 interface
- **Advanced Color Engine**
 - Luma gain/offset adjustment
 - Black/White Level Extension (BLE/WLE)
 - Peaking/LPF/FCC/Coring
- **SPI NOR/NAND Flash Interface**
 - Compliant with standard, dual and quad SPI flash memory components
 - Max. 108MHz clock rate
 - Power failure protection
- **SD/eMMC Interface**
 - Compatible with SD spec. 2.0, data bus 1/4-bit mode
 - Compatible with SDIO spec. 2.0, data bus 1/4-bit mode
 - eMMC 5.0 with 4/8 data bit and max. 200MHz clock rate, HS400 DDR mode
- **USB Interface**
 - USB2.0 port0 configurable Host or Device
 - USB2.0 port1 configurable Host or Device (Host mode supports EHCI specifications)
- **DRAM Memory**
 - External 16-bit x1 DDR4
 - Data rate up to 2666Mbps for DDR4
- **Connectivity**
 - Two built-in 10/100M Ethernet MACs with RMII (EMAC x2)
 - Hash table with 256 entries
 - Broadcast/Multicast storm prevention
 - Supports both full-duplex and half-duplex operation
 - Supports IEEE 802.1Q VLAN tag detection for reception frames
 - Supports checking IPv4 header checksum and TCP, UDP, or ICMP checksum encapsulated in IPv4 or IPv6 datagram
- **Security Engines**
 - Supports AES128/AES192/AES256/DES/3DES/ RSA4096/SHA-1/SHA-256/SM2/SM3/SM4
 - Supports secure booting
 - FIPS 140-1 compliant random number generator
 - Embedded OTP (One Time Programmable) memory to store secure and calibration data
 - Supports ARM TrustZone
- **Boot Options**
 - SPI NOR
 - SPI NAND with ECC
 - SD Card
 - eMMC
 - USB
 - UART
- **Peripherals**
 - Dedicated GPIOs for system control
 - Supports 8x PWM inputs and 20x PWM outputs (shared with GPIOs)
 - Supports PWM in capture which contains orthogonal encoder mode (AB phase calculation), pulse/direction count calculation, etc.
 - Supports QSPI interface
 - Up to 7 generic UARTs and 4 fast UARTs with flow control
 - Up to 12 generic timers and one watchdog timer
 - Two SPI interfaces, which can be configured as master or slave mode
 - Two SPI interface, which is master mode only
 - Up to six I2C Masters
 - Built-in 10-bit SAR ADC with max. 5-channel analog inputs for different kinds of application
 - Built-in 12-bit SAR ADC (up to 1.5Msps) with max. 22-channel analog inputs for different kinds of application
 - Built-in 12-bit SAR ADC (up to 5Msps) with max. 2-channel analog inputs for different kinds of application
 - Supports 7x7 Keypad
 - Supports IrDA
 - Supports POR (Power On Reset)
 - Supports internal temperature sensor
- **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
- **Always on power domain (PM)**
 - Built-in RC FRO to generate clock source
 - Supports internal co-processor to control PM GPIO
 - Supports multiple GPIOs for power control and RTC events
- **Package**
 - BGA 14x14
 - Ball pitch and size: 0.65 and 0.3 mm