



# 4K Action Camera SoC

## Overview

V316 is a high-performance, low-power Action Camera SoC for the new generation of 4K action camera. The chip integrates dual-core Cortex-A7 CPU, and supports up to 4K30 H.265/H.264 encoder and decoder, and provides various video output interfaces (including MIPI/RGB/HDMI) for screen-type products; V316 integrates the latest-generation ISP, and adopts WDR, multi-level noise reduction, other image enhancement and correction algorithms, and it also supports 6-Dof EIS and wide-angle distortion correction, which provides professional-grade picture effect for customers. The advanced 28nm low-power process enables the V316 to support product miniaturization and support up to 32bit DDR3/DDR4/LPDDR3/LPDDR4 for high bandwidth requirements. To support customers' rapid product production, V316 also provides a stable and easy-to-use Linux SDK, hardware and software reference design.

## Feature List

### Processor Core

- Dual-Core Cortex A7@1.2GHz
- Neon acceleration, integrated FPU

### Video Encoding/Decoding Performance

- H.264 BP/MP/HP, H.265 Main Profile encoding
- I/P/Dual P frame H.264/H.265 encoding
- MJPEG/JPEG baseline encoding
- Real-time multi-stream H.264/H.265 encoding capability:
  - 3840x2160@30fps+720p@30fps encoding
  - 3840x2160@30fps decoding
- Maximum 8192x8192 resolution for JPEG encoding/decoding
- CBR, VBR modes
- Encoding of eight ROIs

### Video Input

- Supports 4-lane MIPI/12-lane Sub-LVDS/4-lane HiSPi Combo interface, the maximum resolution is 4224x3168

### Video Output

- Supports 4 layers (2 video layers, 2 UI layers) overlay, video layer up to 4K, UI layer up to 1080P
- One PAL/NTSC, supporting automatic load detection
- One HDMI 1.4 up to 4K30fps
- One MIPI DSI up to 1080P60fps
- One RGB888/666/565 display output
- One BT.656/BT1120 video output

## ISP

- Maximum performance is 4224x3168@30fps
- Adjustable 3A functions (AE, AWB, and AF)
- Supports 2F WDR and Local Tone mapping, supporting highlight suppression and backlight compensation
- Supports bad pixel correction, Lens shading correction
- Supports multi-level 3D denoising, remove motion smear and color noise
- Supports color adjustment, color enhancement
- Supports image dynamic contrast enhance and sharpness enhance
- Support 6-Dof EIS
- Supports 4 channels of scaling output from 1/8x to 1x
- OSD overlaying of eight regions before encoding
- Supports image mirroring and flipping
- Provides ISP tuning tools for the PC

## Audio Encoding/Decoding

- Voice encoding/decoding complying with multiple protocols by using software
- Compliance with the G.711, G.726 and ADPCM protocols
- Audio 3A functions (AEC, ANR, and ALC)

## Audio Interface

- Integrated audio CODEC supporting 16-bit/20-bit/24-bit inputs and outputs
- I2S interface for connecting to an external audio CODEC
- Dual-channel differential MIC inputs for reducing background noises

## SDK

- Linux-4.9 SDK

## Graphics Processing

- Supports Lens distortion correction, fisheye and wide angle correction
- Supports 90°、180°、270° picture rotation

## Peripheral Interfaces

- POR
- External reset input
- Internal RTC
- Integrated multichannel ADC
- Six UART interfaces
- CIR, TWI, PWM, GPIO interfaces
- Two SD3.0/SDIO3.0 interfaces, supporting SDXC
- One USB2.0 OTG
- RGMII/RMII in 10/100 Mbit/s full/half-duplex mode and 1000Mbit/s full-duplex mode

## External Memory Interfaces

- 32-bit DDR4/DDR3/DDR3L/LPDDR4/LPDDR3 interfaces
  - maximum frequency of 800 MHz
- SPI NOR flash interface, Maximum capacity of 32 MB
  - 1-/2-/4-wire mode
  - 3-byte or 4-byte address mode
- SPI NAND flash interface, maximum capacity of 512 MB
- eMMC 5.0 interface, maximum capacity of 64GB
- NAND flash interface, components with 8 GB or larger capacity
  - 8-bit data width
  - Supports SLC、MLC、TLC
  - 4、8、24、40、64、80 Bit ECC

## BOOT

- Booting from SPI NOR flash, SPI NAND flash, NAND flash, or eMMC
- Supports write firmware by SD Card、USB device

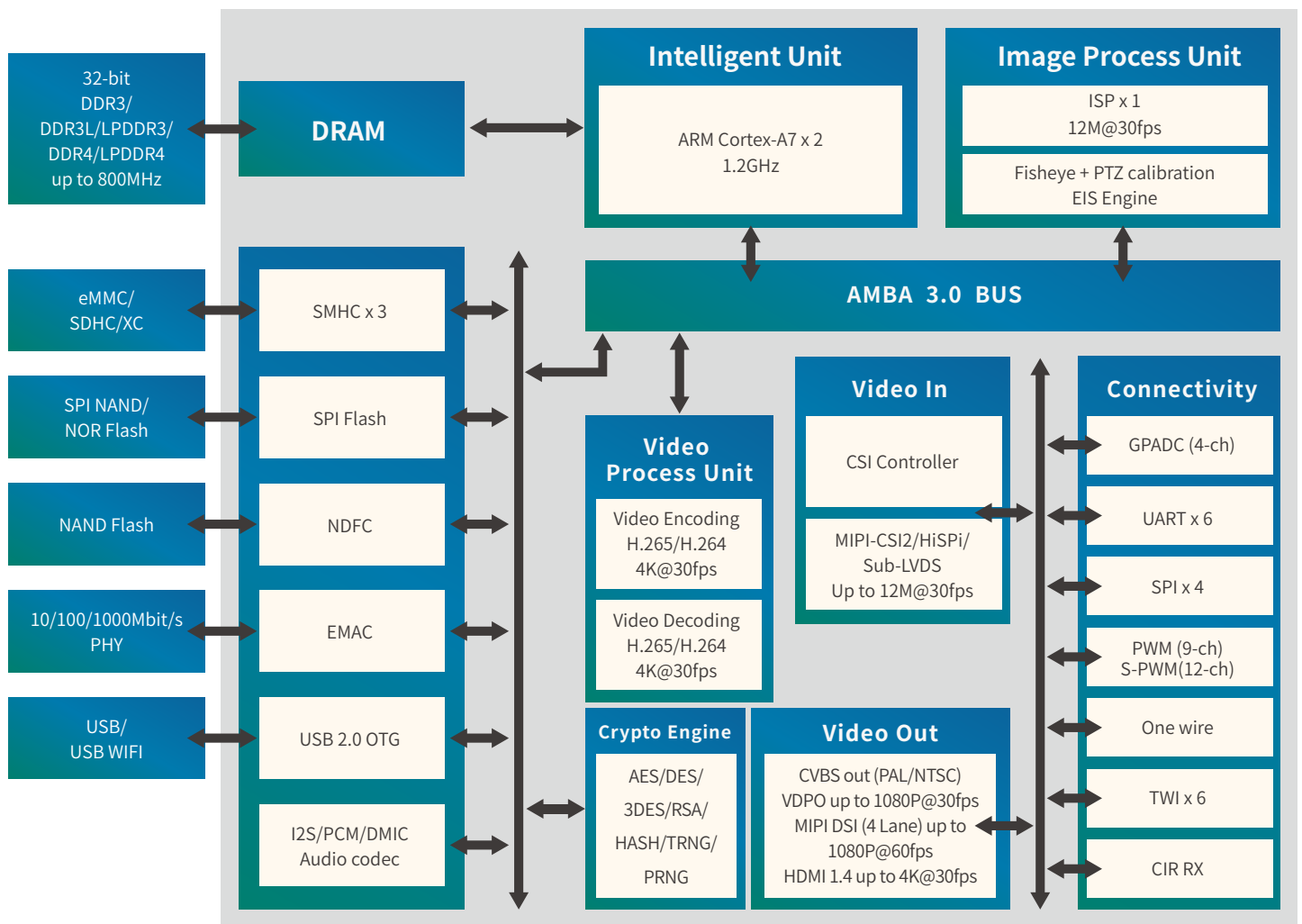
## Security Engine

- AES, DES, and 3DES encryption and decryption algorithms
- RSA1024/2048/4096 signature verification algorithm
- Hash-SHA1/256 and HMAC\_SHA1/256 tamper proofing
- Integrated 2Kbit OTP storage space and hardware random number generation

## Physical Specifications

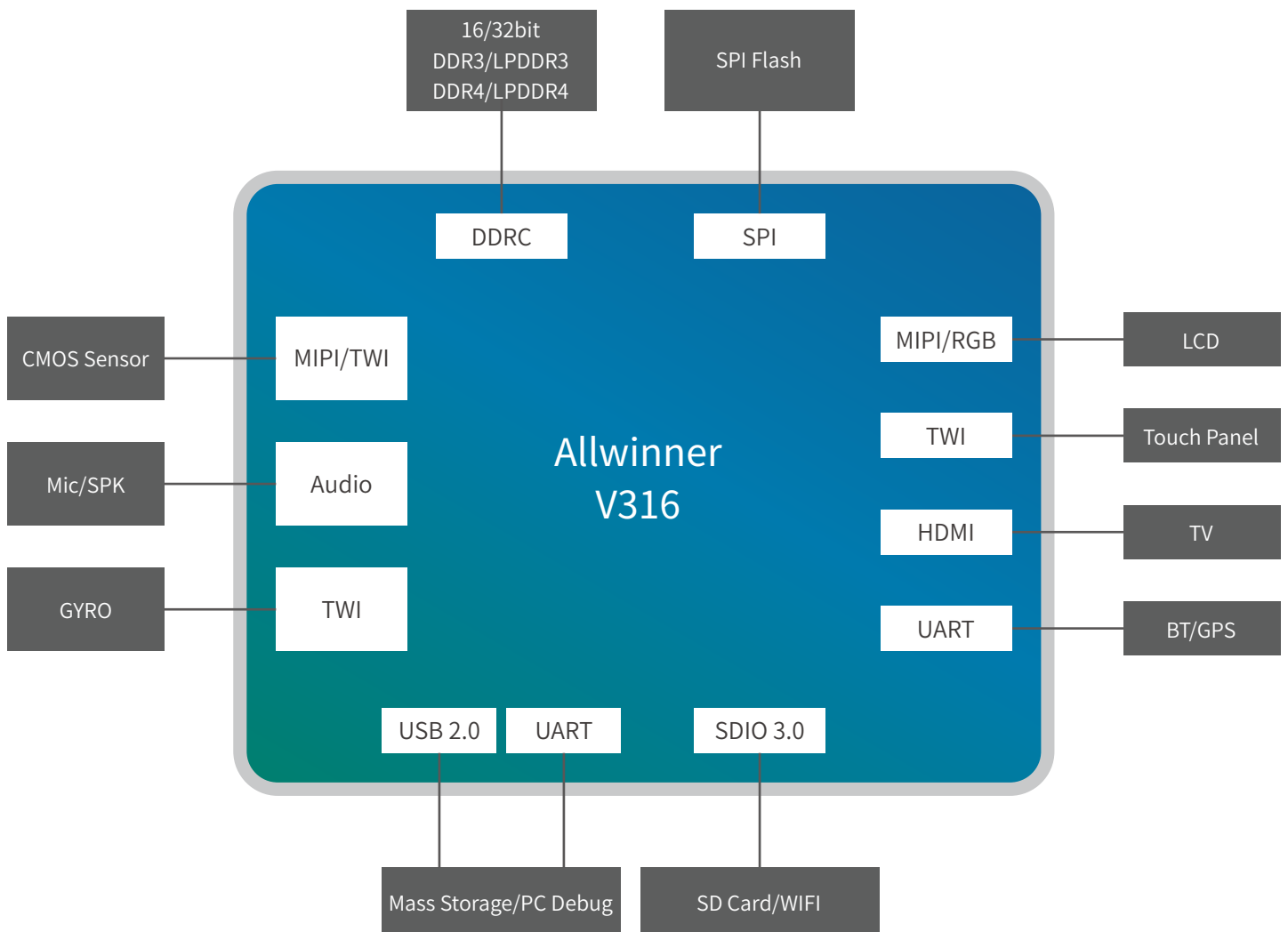
- Power consumption
  - Typical 4K30 encoding, power consumption of 1.1W
  - Supports super-standby mode
- Operating voltages
  - 0.9 V core voltage
  - 3.3 V I/O voltage and 3.8 V margin voltage
- Package
  - 14mm x 14mm, 412pin, 0.5 ball pitch, TFBGA RoHS

## Block Diagram



# Application Diagram

## - V316 Application Solution (4K30fps SDV)



### ABOUT ALLWINNER

Allwinner Technology is a leading fabless design company dedicated to smart application processor SoCs and smart analog ICs. Its product line includes multi-core application processors for smart devices and smart power management ICs used by brands worldwide.

With its focus on cutting edge UHD video processing, high performance multi-core CPU/GPU integration, and ultra-low power consumption, Allwinner Technology is a mainstream solution provider for the global tablet, internet TV, smart home device, automotive in-dash device, smart power management, and mobile connected device markets. Allwinner Technology is headquartered in Zhuhai, China.

### CONTACT US

For more product info, please contact [service@allwinnertech.com](mailto:service@allwinnertech.com), or scan the QR code to follow us on Wechat.

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