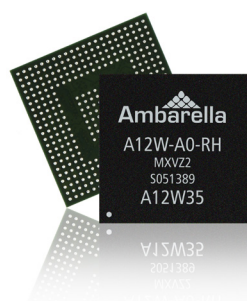# A12W Wearable Camera SoC

Overview

The Ambarella A12W Wearable Camera Processor is a system-on-chip solution that integrates an advanced image sensor pipeline (ISP), an H.264 encoder, and a powerful ARM® Cortex™-A9 CPU for advanced analytics and user applications. Targeting social and professional wearable camera designs, the A12W is fabricated at the 28 nm manufacturing process and is delivered with an SDK that is optimized for low power. Additionally, the A12W processor family enables powerful image processing tools such as lens distortion correction, high dynamic range and motion compensated filtering and sharpening.

The A12W chip targets small form factor and wearable camera designs.

Key Features

Flexible Low-Power Platform
- ARM® Cortex™-A9 CPU @ 504 MHz
- Fast Boot ThreadX / Linux Dual OS
- 28-nm low-power CMOS process

**High Resolution and Frame Rate Image Processing**
- Up to 32 Mpixel Still Picture Capture
- 1080p60, 2560x1440p15 and WVGAp240 encoding
- Simultaneous 1080p30 + 720p30 Encoding

Wireless Connectivity and Video Streaming Options
- Second USB host for 4G module connectivity
- DMA UART for BT module connection
- Dual encode for on-the-fly mobile resolution streaming

Block Diagram

The diagram below illustrates a wearable camera design based on the Ambarella A12W device.
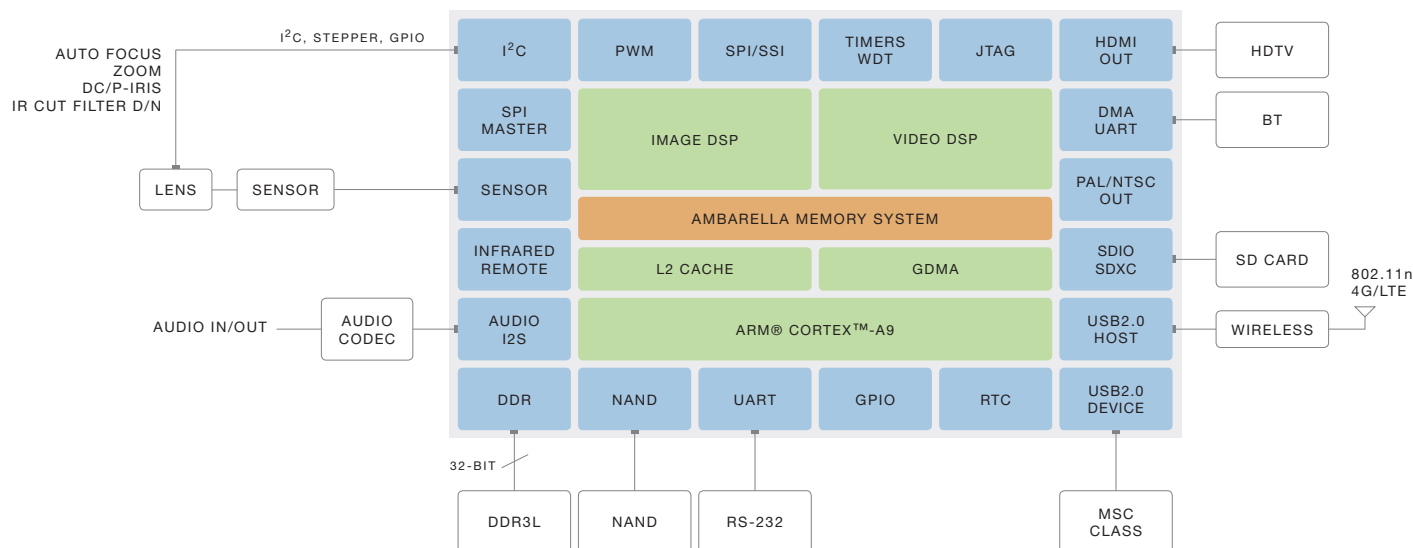
General Specifications

Processor Cores
- ARM® Cortex™-A9 up to 504 MHz
- 32KB / 32KB I/D and 128 KB L2 Cache
- AES / 3DES / SHA-1 / MD5 Cryptography Engine
- Ambarella Image and Video DSPs

Sensor and Video I/O
- RGB Bayer interface to popular sensors
    - 8 lanes MIPI mode
    - 10 lane SLVS / HISPI mode
- 24-bit RGB out, HDMI® 1.4a with PHY out
- PAL/NTSC composite SD video out

CMOS Sensor Processing
- 32 MPixels maximum resolution
- Lens shading, fixed pattern noise correction
- Multi-exposure HDR (line-interleaved sensors)
- WDR local exposure

Image Processing
- 3D motion compensated noise reduction (MCTF)
- Adjustable AE / AWB / AF
- Lens Distortion Correction (LDC) for wide angle lens
- Tilt correction
- Defect pixel correction
- Geometric and chroma lens distortion correction
- Backlight compensation
- Electronic Image Stabilization
- Crop, mirror, flip, 90°/270° rotation

Video Encoding
- H.264 codec BP / MP / HP Level 5.1 and MJPEG
- 4M@15 fps high resolution encoding performance
- WVGA@240 fps high frame rate encoding performance
- Simultaneous 1080p30 + 720p30 supported
- Multiple CBR and VBR rate control modes

Memory Interfaces
- DDR3 / DDR3L up to 400MHz
- 16-bit / 32-bit data bus
- Three SD controllers with SDXC SD™ Card
- NAND flash, SLC with ECC
- Boot from SPI-NOR, SPI-EEPROM, NAND flash, USB or eMMC

Peripheral Interfaces
- Two USB 2.0 ports with Device and Device / Host w/PHY
- Multiple SSI / SPI, I^{2}C, and UART
- Multiple PWM, Stepper, and ADC channels
- Many GPIO ports, PWM, Steppers, IR, ADC
- Watchdog Timer, multiple general purpose timers, JTAG, I2S

Physical
- Low-power 28-nm CMOS fabrication
- TFBGA package with 404 balls, 15x15 mm, 0.65 mm pitch

A12W Wearable Camera Development Platform

The A12W Wearable Camera Development Platform contains the necessary tools, software, hardware and documentation to develop a small form factor, wearable camera.

Evaluation Kit (EVK)
- A12 main board with connectors for sensor/lens board, peripherals
- Sensor board: Omnivision, Sony, and others
- Data sheet, BOM, schematics, and layout
- Reference application with C source code

Software Development Kit (SDK)
- Dual OS ThreadX/Linux with patches, drivers, tools, and application source code
- Royalty-free libraries for ISP, 3A, dewarp, and codecs
- Image tuning and manufacturing calibration tools
- Detailed documentation with programmer's guide, application notes

Contact **www.ambarella.com/about/contact/inquiries.html**