The Ambarella H22 SoC for consumer applications is a system-on-chip that integrates an advanced image sensor pipeline (ISP), H.265 (HEVC) and H.264 (AVC) encoders, and a powerful Quad core ARM® Cortex™-A53 CPU for advanced analytics, computer vision, flight control, WiFi streaming, and other user applications.

Targeting the next generation of connected drones, sports, and 360° (VR) cameras, the H22 delivers up to 4K-video recording at 60fps or equivalent performance while streaming a second, live, mobile-resolution video over a WiFi network for preview or sharing.

Equipped with dedicated hardware, H22 can support 3D Electronic Image Stabilization (EIS) up to 4Kp30, and multi-exposure High Dynamic Range (HDR) capture up to 4Kp30.

A unique architecture and 14-nm process technology minimizes H22 power consumption while maximizing performance.

**Key Features**

**Flexible Low-Power Platform**
- Quad core ARM® Cortex™-A53 CPU up to 1 GHz
- Fast Boot ThreadX / Linux Dual OS
- 14-nm low-power CMOS Process

**High Resolution and Frame Rate Image Processing**
- 4Kp60 video encoding (HEVC / AVC)
- High Dynamic Range multi-exposure capture up to 4Kp30
- Simultaneous second stream
- 3D Electronic Image Stabilization (EIS) with 6-axis correction (translational, pitch, yaw, and roll) and shutter correction
- Dual processing pipe for Drone Optical Flow, 360° cameras, and other multi-sensor applications

**Wireless Connectivity and Video Streaming Options**
- USB Host for 4G Module Connectivity
- DMA UART for Bluetooth (BT) Module Connection
- Dual Encode for On-The-Fly Mobile Resolution Streaming

**Block Diagram**

The diagram below illustrates a camera design based on the Ambarella H22 device.
General Specifications

Processor Cores
- Quad-core ARM® Cortex™-A53 up to 1 GHz
- 32 KB / 32 KB I/D and 256 KB L2 Cache
- AES / 3DES / SHA-1 / MDS Cryptography Engine
- Ambarella Image and Video DSPs

Sensor and Video I/O
- 2 MIPI CSI-2 sensor inputs, 4 lanes each
- 8 lane MIPI mode
- 10 lane SLVS / HiSPI™ mode
- 24-bit RGB out, HDMI® 2.0 with PHY out
- PAL / NTSC composite SD video out
- RGB Bayer interface to popular sensors

CMOS Sensor Processing
- High Dynamic Range multi-exposure capture up to 4Kp30
- Lens shading, fixed pattern noise correction
- Multi-exposure HDR
- Wide Dynamic Range (WDR) local exposure

Image Processing
- 3D motion-compensated noise reduction (MCTF)
- Adjustable AE / AWB / AF
- Lens Distortion Correction (LDC) for wide-angle-lens
- Defect pixel correction
- Geometric and chroma lens distortion correction
- Backlight compensation
- Electronic Image Stabilization and tilt correction up to 4Kp30
- Crop, mirror, flip, 90° / 270° rotation

Video Encoding
- H.265 / HEVC MP Level 5.1 encoding up to 4Kp60
- H.264 MP / HP Level 5.1 encoding up to 4Kp60
- Simultaneous streams
- Multiple CBR and VBR rate control modes

Memory Interfaces
- LPDDR4 (for certain parts) or LPDDR3 / DDR3 / DDR3L (for certain parts)
- 32-bit data bus
- Three SD controllers, including SDXC™ / UHS-1 support
- 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, IDC / I²C, and UART
- Many GPIO ports, multiple PWM, Steppers, IR, ADC
- Watchdog Timer, multiple general purpose timers, JTAG, I2S

Physical
- 14-nm low-power CMOS
- Operating temperature: -20°C to +85°C
- 11 x 11 mm or 14 x 14 mm packages

H22 Camera Development Platform

The H22 Camera Development Platform contains the necessary tools, software, hardware and documentation to develop a small form factor camera.

Evaluation Kit (EVK)
- H22 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

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