CV28M

Computer Vision SoC for IP Cameras

Key Features

Flexible Low-Power Platform
- CVflow® computer vision engine
- 64-bit dual-core Arm® Cortex®-A53 CPU up to 1 GHz
- Linux kernel version 4.14 or later (64-bit)
- Linux SDK for standards-based development
- Secure boot with TrustZone® and secure memory, TRNG, OTP, DRAM scrambling and virtualization
- Industry-leading image sensor support
- 10 nm low-power CMOS process

CVflow Computer Vision Engine
- CNN / DNN inference acceleration for detection, classification, and more
- CNN toolkit for easy porting with Caffe, TensorFlow, and ONNX
- Accelerators for conventional CV operations
- Tools for high- and low-level algorithm development

Advanced Image Processing
- Up to 320 MPixel/s input rate
- Multi-exposure line-interleaved HDR
- Superior low-light processing
- 3D motion-compensated temporal filtering (MCTF)
- Hardware dewarping engine
- Electronic image stablilization (EIS)
- Up to three independent sensor inputs

High-Efficiency Video Encoding
- H.265 and H.264 video compression
- Flexible multi-streaming capability
- Up to 4KP30 video performance
- Multiple CBR and VBR bit rate control modes
- Smart H.264 and H.265 encoder algorithms
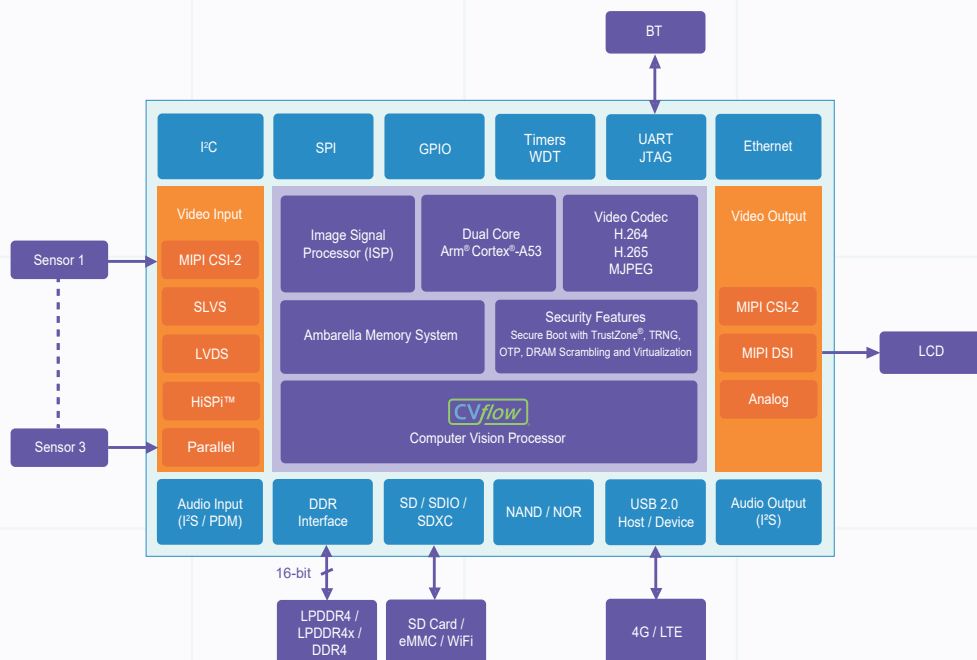
Ambarella
CV28M-A0-RH
A2ABDS
S246358
CV28M
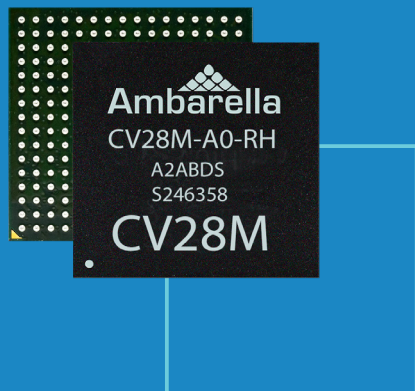
Overview

Ambarella's CV28M SoC combines state-of-the-art computer vision technology with image processing in a single, low-power design. Fabricated using advanced 10 nm process technology, CV28M achieves an industry-leading combination of low power and high performance in both human and computer vision applications.

Meeting the demands of the next generation of intelligent IP cameras, CV28M's CVflow® architecture provides deep neural network (DNN) computer vision processing and 4KP30 video encoding, enabling a multitude of computer vision applications on the edge. Efficiently encoding in both AVC and HEVC video formats, CV28M minimizes cloud storage costs by streaming high-resolution video at low bit rates.

To further enhance its computer vision capabilities, CV28M uses a next-generation image signal processor (ISP) to deliver outstanding imaging in low-light conditions, while its high dynamic range (HDR) processing extracts maximum image detail in high-contrast scenes.

CV28M includes a suite of advanced security features to implement on-device physical security, including secure boot with TrustZone®, TRNG, OTP, DRAM scrambling and virtualization. To help customers easily port their own neural networks onto the CV28M SoC, Ambarella's software development kit offers a complete set of tools.

CV28M Block Diagram

General Specifications

Processor Cores
- Dual-core Arm® Cortex®-A53 up to 1 GHz
- NEON™ SIMD and FPU acceleration
- AES / SHA1 / SHA2-256 crypto acceleration
- Ambarella image signal processor and video codec

Sensor and Video I/O
- Single, dual, or triple sensor input with independent ISP configuration
- Sub-LVDS / MIPI CSI-2 / SLVS / HiSPi™ input
- 16-bit parallel LVCMOS video in
- BT.601 / 656 video in
- PAL / NTSC composite SD video out
- 4-lane MIPI DSI / CSI-2 and FPD (VESA / JEIDA) out

Sensor Processing
- 320 MPixel/s maximum pixel rate
- Lens shading correction
- Multi-exposure HDR (line-interleaved sensors)
- WDR with local tone mapping

Image Processing
- 3D motion-compensated temporal filtering (MCTF)
- 3-axis electronic image stabilization (EIS)
- Adjustable AE / AWB / AF
- 180° fisheye lens distortion correction
- High-quality polyphase scalers
- Digital PTZ and virtual cameras

- OSD engine and overlays
- Crop, mirror, flip, 90° / 270° rotation
- DC-iris and P-iris
- Defective pixel correction
- Geometric lens distortion correction
- Chromatic aberration correction
- Gamma compensation and color enhancement
- Backlight compensation
- Vignetting compensation

Intelligent Video Analytics
- CVflow vision processor for CNN / DNN edge analytics
- People counting and tracking
- Face detection and recognition
- Human / pet / vehicle classification
- Object classification, recognition, and more
- License plate recognition

Video Encoding
- H.265 MP L5.1, H.264 MP / HP L5.1, and MJPEG
- 4KP30 maximum encoding performance
- Up to 8 simultaneous stream encodes
- Flexible GOP configuration with I, P, and B frames
- Temporal scalable video codec (SVC-T) with 4 layers
- Dynamic region of interest (ROI)
- Multiple CBR and VBR rate control modules

Security Features
- Secure boot with TrustZone® and secure memory, TRNG, OTP, DRAM scrambling and virtualization

Memory Interfaces
- LPDDR4 / LPDDR4x / DDR4 up to 1.6 GHz, 16-bit data bus
- Three SD controllers: SD / SDIO / SDXC
- Boot from SPI or parallel SLC NAND with BCH / SPI NOR / USB / eMMC

Peripheral Interfaces
- 10 / 100 / 1000 Ethernet with RMII / RGMII
- One USB 2.0 port configurable as host / device
- Audio interface including I2S and DMIC
- Multiple SSI / SPI, I2C, and UART
- Multiple GPIO ports, PWM, IR, and ADC
- Watchdog timer, multiple general-purpose timers, and JTAG

Physical
- 10 nm low-power CMOS
- Operating temperature -25°C to +85°C
- FC VFBGA package (288 balls, 11x12 mm, 0.65 mm pitch)

CV28M Camera Development Platform

The CV28M camera development platform contains the necessary tools, software, hardware, and documentation to develop a camera utilizing the powerful CVflow processor while supporting the development of customized features.

Evaluation Kit
- CV28M main board with connectors for sensor / lens board and peripherals
- Sensor board: Sony, ON Semi, Omnivision, and others
- Datasheet, BOM, schematics, and layout
- SDK and reference application with C source code

Software Development Kit
- Royalty-free libraries for ISP, dewarp, and video recording
- Image tuning and manufacturing calibration tools
- Detailed documentation, including a programmer's guide and more
- CNN / DNN model preparation, porting, and profiling tools

www.ambarella.com/contact-us/