

Cost-effective IPC SoC

Highly Integrated, Low-power, and Multi-camera IPC Solution

Overview

V821 is a highly integrated low-power multi-camera IPC SoC, featuring dual RISC-V architecture processors. This chip supports real-time dual-camera input and provides 1080P high-definition video processing capabilities with internal high-performance ISP and H.264 encoder. Additionally, V821 integrates Wi-Fi, LDO, IRCUT, and audio codec, offering a highly cost-effective IPC solution. With its excellent ISP processing performance, low power consumption, and high scalability, V821 can be applied in multi-camera IPCs, low-power doorbells, smart locks, and more products.

Highlight

- **Simplified peripherals:** Wi-Fi, LDO, IRCUT, and other IPC peripherals are integrated internally.
- **Real-time Dual-camera Input:** Provide switch-free input with 1080P resolution for binocular product support; support binocular products such as gun-ball linkage camera, door locks featuring face/palm vein recognition and peephole, and so on.
- **Low Power Consumption:** Support Keep-Alive mode (180 μ A@4.2V, DTIM10) for Wi-Fi router; provide AOV low power solution.
- **Simplified Development:** One Linux SDK supports both normal-boot and fast-boot, and also provide mass production solutions.
- **Simplified Mass Production:** One firmware for both IPC SoC and Wi-Fi MCU burning.

Note

This brief takes V821M2-WXX and V821L2-WXX as examples to describe the V821 product features. For all orderable device information, refer to [V821_Product_Selection_Sheet](#).

Features

Processor Core

- RISC-V CPU, up to 1 GHz
 - 16 KB I-cache, 16 KB D-cache, 128 KB L2 cache
 - Supports dedicated operators for acceleration: Conv, Depthwise Conv, MaxPool, Add, Concat, and so on
- RISC-V MCU, up to 600 MHz

Video Encoding/Decoding Performance

- H.264 BP/MP/HP encoding
 - Supports I/P frame
 - Maximum resolution: 3072 x 3072
- Multi-stream real-time encoding capability:
 - Single-camera: 1920x1080@30fps + 640x480@30fps
 - Dual-camera: 1920x1080@15fps*2 + 640x480@15fps*2
- JPEG encoding/decoding
 - Maximum resolution: 8192x8192
 - Maximum performance: 1920x1080@60fps
- Rate control modes: CBR, VBR, FIXQP, and QPMAP
- Encoding of 8 ROIs
- On-screen displaying (OSD) overlay pre-processing for 64 regions
- Supports simultaneous operation of H.264/MJPEG encoding and MJPEG decoding

Features

Video Output(for L2-WXX)

- One RGB interface
 - Serial/dummy RGB mode, up to 800 x 480@60fps
 - i8080 interface, up to 800x480@60fps

Video Input

- 1*2-lane/2*1-lane MIPI CSI
 - Up to 1.0 Gbit/s per lane
 - Compliant with MIPI-CSI2 V1.1 and MIPI DPHY V1.0
 - Maximum resolution: 1920x1920
- 8/10/12-bit width parallel CSI interfaces
- BT.656, BT.601, and Digital Camera (DC) protocol
- BT.656 up to 2*720P@30fps

ISP

- Sensor input supports up to 3456 x 1920 resolution
- 3A (AE,AWB, and AF). 3A parameters is adjustable.
- Time Division Multiplexing (TDM) mode and maximum 2-lane multiplexing
- Defect Pixel Correction (DPC) and lens shading correction
- Local tone mapping
- Multi-level noise reduction (spatial-domain noise reduction and time-domain multi-frame noise reduction) , remove color noise
- Color adjustment and color enhancement
- 4 channels of scaling output from 1/16x to 1x
- Provides ISP adjustment tool for the PC (online/offline/remote debugging)

Video & Graphics Processing

- One video channel and one UI channel
- Video channel supports 1/16x to 32x scaling
- 0/90/180/270 degree(s)' picture rotation
- Horizontal and vertical flip

Audio

- 1 DAC and 1ADC
- 1 x audio input: MICINP/N
- 1 x audio output: LINEOUTP/N
- Embedded 1 I2S/PCM interface, supporting maximum 16 channels, 8 kHz-384 kHz sample rate, and 8-bit to 32-bit width

Security

- AES, DES, and 3DES encryption and decryption algorithms
- MD5 and SHA256 tamper proofing
- 160-bit hardware pseudo random number generator(PRNG) with 192-bit seed
- 128-bit hardware true random number generator(TRNG)
- Integrated 2048-bit eFuse for chip ID and security application

Wi-Fi

- Compatible with IEEE 802.11b/g/n standard
- Single-band 2.4 GHz 1T1R mode
- Integrated LNA, PA, and T/R switch
- Security support for WPA/WPA2/WPA3 personal and WPS2.0
- Supports STA, SoftAP, STA+SoftAP, and monitor modes

Power Consumption (for L2-WXX)

- Hibernation: 10 μ A @4.2 V
- Standby: 120 μ A @4.2 V
- Wi-Fi DTIM with external 32.768 kHz XTAL
 - DTIM1: 650 μ A @4.2 V
 - DTIM3: 300 μ A @ 4.2 V
 - DTIM10: 180 μ A @ 4.2 V

Memory

- Embedded 64 MB DDR2
- SD2.0, eMMC4.41, and SPI NOR/NAND Flash for boot
- One SPI interface, supporting quad DTR mode

Peripherals

- 1 x USB2.0 DRD, supporting UAC/UVC protocol
- 3 x SPI, 3 x TWI, 4 x UART
- 1 x 10/100 Mbit/s Ethernet port with RMI interface
- 12-ch PWM, 3-ch GPADC

Package

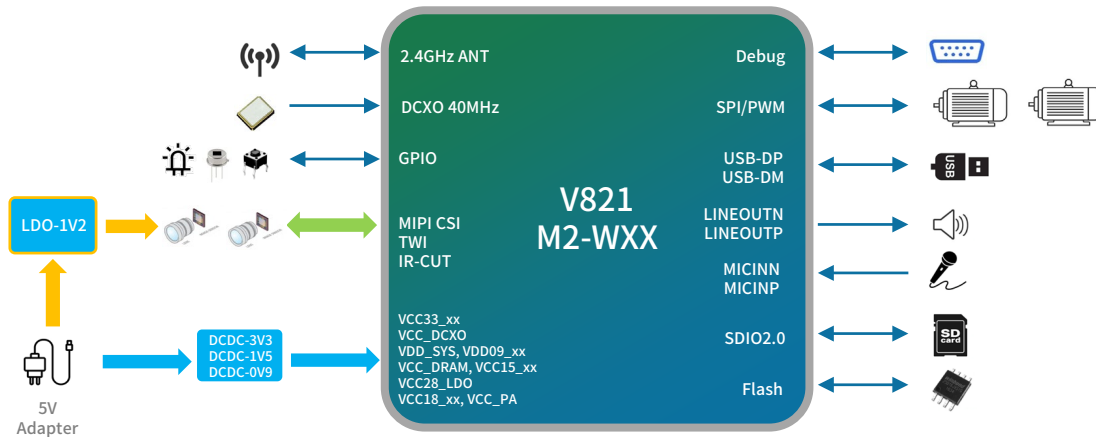
- QFN88, 9 mm x 9 mm

Block Diagram

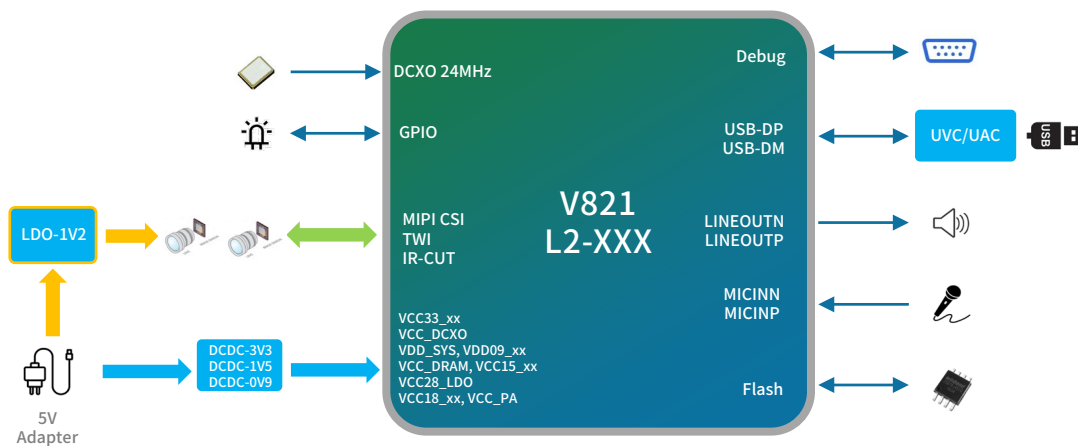


Application

- Wi-Fi Binocular Gun-Ball Linkage IPC



- Face Recognition Module



ABOUT ALLWINNER

Allwinner Technology, founded in 2007, is an outstanding designer dedicated to intelligent application SoC, high performance analog component and wireless connectivity IC. It is headquartered in Zhuhai China, with other R&D centers and offices in Shenzhen, HongKong, Xi'an, Beijing and Shanghai. Listed on the GEM of the Shenzhen Stock Exchange in 2015, with the stock code 300458.

Motivated by customer-oriented strategy, Allwinner aligns remarkable R&D teams with long-term core-technology investment in UHD video processing, high-performance multi-core CPU/GPU integration with AI and advanced manufacturing process in terms of high integration, ultra-low power consumption and full-stack integration platform, providing competitive turnkey solutions with considerate services. The products powered by Allwinner spread across from smart hardware, smart home, consumer electronics, HD media, smart video, connected car, industry control, wireless communication to analog products.

CONTACT US

Email: service@allwinnertech.com

This brief is for reference only and has no commitment. All content contained herein is subject to changes without notice.

©2024 Allwinner Technology Co., Ltd.