VisionFive 2

The world's first high-performance RISC-V Single Board Computer with an integrated 3D GPU

Performance

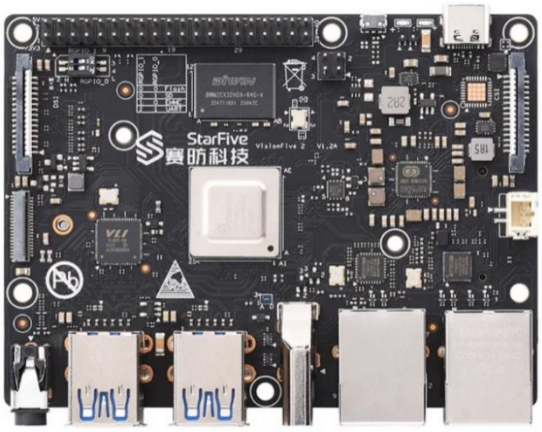
VisionFive 2 boasts a quad-core 64-bit SoC JH-7110 with RV64GC ISA, running up to 1.5 GHz, and integrated with IMG BXE-4-32 MC1, supporting OpenCL 3.0, OpenGL ES 3.2, and Vulkan 1.3.1.

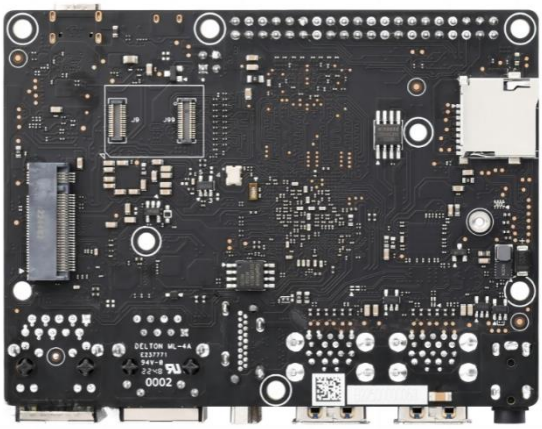
Interface

VisionFive 2 provides rich I/O peripherals such as M.2 connector, eMMC socket, USB 3.0 ports, a 40-pin GPIO header, Gigabit Ethernet ports, a TF card slot, and many more.

Image and Video Processing Capabilities

VisionFive 2 has onboard audio and video processing capabilities and has MIPI-CSI and MIPI-DSI connectors as multimedia peripherals. It Integrated StarFive ISP and is compatible with mainstream camera sensors; VisionFive 2 has a built-in image/video processing subsystem, supporting H.264/H.265/JPEG encoding and decoding.





Commercial Electronics

- SBC
- Soft routing
- Home NAS
- Notebook computer

Smart Home

- Intelligence home appliances
- Video surveillance
- Sweep robot
- Security control
- Remote control

Industrial Intelligence

- Industrial display
- Industrial control
- Industrial detection
- Intelligence gateway
- Robot
- Intelligence buildings
- Entertainment equipment

Function List

CPU System

- 64-bit quad-core high-performance RISC-V CPU
  - -Support RV64GC RISC-V ISA
  - -With up to 2MB L2 cache
  - -Cache consistency for quad-core

GPU System

- Imagination GPU: IMG BXE-4-32 MC1
- Working frequency up to 600 MHz
- Support OpenCL 3.0
- Support OpenGL ES 3.2
- Support Vulkan 1.2

Memory & Storage

- Provides the system memory of 2/4/8 GB LPDDR4 SDRAM up to 2800 Mbps
- Onboard TF card slot: The VisionFive 2 can boot from the TF card
- Flash: The firmware to store U-Boot and Bootloader

Video Processing Subsystem

- VisionFive 2 has a 1 × 2-lane MIPI CSI camera port, supporting up to 1080p@30fps
- Video encoder supports up to 1080p@30fps and multi-stream for H265
- Video decoder support up to 4K@60fps and multi-stream for H264/H265
- JPEG encoder/decoder

Clock Source

- OSC 24 MHz system main clock source for USB & GMAC
- OSC 32.768 KHz for RTC clock source

Audio Jack

VisionFive 2 offers a 4-ring 3.5 mm audio jack to output analog audio.

Connectivity Subsystem

- 2 × RJ45 Ethernet ports
- 4 × USB 3.0 ports
- 1 × USB device port
- 1 × HDMI 2.0 port, supporting up to 4K@30fp or 2K@60fps
- M.2 M-Key SSD socket, providing high-speed storage access
- eMMC socket for eMMC modules as OS and data storage
- 2-Pin fan header

Power Supply

VisionFive 2 supports various ways of powering, smart power adapter as well as fixed voltage:

- USB PD 2.0
- Support USB-C PD 2.0，9 V/2 A，12 V/2 A，15 V/2 A，20 V/2 A
- Qualcomm QC 2.0
- Support QC3.0/2.0 adapter, 9 V/2 A, 12 V/1.5 A
- Power adapter with fixed voltage from 5 V to 20 V on the USB-C power port
- 5 V Power from the GPIO Pin 2 and 4

GPIO Voltage & Alternative

- The required voltage level for all GPIO pins is 3.3 V.
- All GPIOs can be switched (multiplexed) to support different functions including but not limited to SDIO, Audio, DMIC, SPI, I2C, UART, PWM, and CAN bus

Display Subsystem

VisionFive 2 has the following interfaces for camera and display.

- 1 × 2-lane MIPI DSI display port, supporting up to 1080p@30fps
- 1 × 4-lane MIPI DSI display port, supporting up to 2K@30fps in both single display and dual display modes.
- 1 × HDMI 2.0, supporting up to 4K@30fps or 2K@60fps

Size

- Body size 100 mm × 74 mm

Temperature and Thermals

- The recommended ambient operating temperature range is 0 to 50 degrees Celsius
- VisionFive 2 will operate perfectly well without any extra cooling and is designed for sprint performance

Peripherals

- 1 × 2-lane MIPI DSI
- 1 × 4-lane MIPI DSI
- 1 × 2-lane MIPI CSI
- 1 × 3.5 mm audio jack
- 1 × USB-C for charging
- 1 × USB device port (by reusing the USB-C port)
- 4 × USB 3.0ports (multiplexed with a PCIe 2.0 1 × lane）
- 1 × HDMI 2.0
- 2 × RJ45 Ethernet ports
- 1 × 4-pin PoE header
- 1 × 2-pin fan header
- 1 × Reset button
- 1 × 40-pin GPIO header, supporting various interface options:
  - 3.3 V（2 pins）
  - 5 V（2 pins）
  - Ground（8 pins）
  - GPIO
  - CAN bus
  - DMIC
  - I2C
  - I2S
  - PWM
  - SPI
  - UART

RVspace: The Most Active RISC-V User Experience Center

RVspace is the first all-in-one RISC-V user experience center supported by StarFive Team as well as one of the most active RISC-V developer communities in the world. The center aims to provide the RISC-V user with the best development experience with the following resources:

- **Buy Now**: Integrated with all purchasing channels for VisionFive 2 and its accessories at home and abroad, ensuring that users can buy at the lowest logistics cost from the nearest distributor
- **Product Info**: Involved all information and resources about StarFive's products, including VisionFive SBC, JingHong SoC, and Duhbe CPU IP
- **Code Center**: Contained the GitHub open-source software SDK and technical documents in both Chinese and English, including hardware reference design, software underlying toolchain, image packages, and so on.
- **Application Center**: Published over 150 application notes in both Chinese and English covering official applications and community collaborative applications, helping users quickly locate application scenarios for VisionFive 2 and JH-7110.
- **Document Center**: The First technical documentation center based on DITA in the RISC-V world. It opened over 100 sets of HTML and PDF files in both Chinese and English, supporting search and intelligent sorting. These documents will be opened and allowed comments and editing, truly achieving community co-construction.
- **Communication**: Opened Chinese and English forums with rich topics and active users; the monthly average pageviews have exceeded 150,000.
- **Solution Center**: Integrated with rich solutions, covering industrial control, security gateway, edge computing, consumer electronics, open-source hardware, and so on.
- **Collaboration**: Provided open RISC-V device sponsorship services for developers, universities, and communities.

For more information, you can visit RVspace official website: https://wiki.rvspace.org/

Application Center: The Richest RISC-V Ecosystem Resources in China

VisionFive 2 provides wide software compatibility including support for Debian, OpenKylin, Ubuntu, OpenSUSE, OpenEuler, Deepin, and other software running on these operating systems.

The RVspace application center has covered over 150 application notes, ranging from Python, Raspberry Pi, object detection, product demos, development courses, function verification, games, and other applications from developers.

Python	RPi	Object Detection	Product Demo
• Demo 1: Using VisionFive 2 IIC to Read SHTC3 Data • … • Demo 11: Using VisionFive 2 GPIO to Make a Buzzer Beep	• Run RPi demo on VisionFive 2 to Make an LED Blink • …… • Run RPi demo on VisionFive 2 to Make an LED Blink at the PWM Frequency	• Using VisionFive 2 to Detect and Decode QR Codes • …… • Using VisionFive 2 to Detect Image Defects	• Demo 1: Using Firefox on VisionFive 2 to Visit Website • …… • Demo 8: Using Libreoffice on VisionFive 2
Development Courses	**Function Verification**	**Game**	**Others**
• Course 1: Using Air Pressure Sensor to Measure Height on VisionFive 2 • …… • Course 16: Using Smoke Sensor to Detect Alcohol Leakage on VisionFive 2	• Verification of GPU Graphics and Image on VisionFive 2 • …… • Using Node-red to test the Reading and Writing of Modbus Data	• Run Stardew Valley on VisionFive 2 • …… • Run Minecraft Server on VisionFive 2	• Demo 1: Compile and Install OpenWrt on VisionFive 2 • …… • Demo 20: Creating NES game consoles - USB controller button collection

The above applications can be applied in many fields, such as machine vision, entertainment equipment, health monitoring, access control and security and IoT, helping users develop customized projects and reflecting the enormous potential of RISC-V to apply in many application scenarios.

- **Machine Vision:** Recognize general objects, detect and decode QR codes, detect image edge, detect image defects, face recognition…
- **Entertainment Equipment** : 2D Quake2, 3D SuperTuxKart, OpenMRac, Stardew Valley…
- **Health Monitoring:** Temperature sensor, heart rate sensor…
- **Access Control and Security**: Flame sensor, smoke sensor, fire alarm device…
- **IoT**: Light ring control, remote control of smart homes…

About RISC-V

The RISC-V Instruction Set Architecture (ISA) was born at the University of California, Berkeley in 2010 and was open-sourced in 2013. It is the fifth generation product of the Reduced Instruction Set Computing (RISC) series and has the advantages of being concise, open, modular, and scalable. Currently, the RISC-V International Association has 5,890 members from 70 countries, including chip designers, chip design service providers, system integrators, software service providers, research institutions, and investment institutions. RISC-V has been widely used in IoT devices and is beginning to penetrate high-end applications such as servers, communications, AI, autonomous driving, VR, and office equipment. According to the latest forecast by Semico Research, the cumulative shipments of RISC-V CPU cores worldwide will reach approximately 170 billion by 2030.

About StarFive

Founded in 2018, StarFive is a Chinese local high-tech company with independent intellectual properties. StarFive provides world-leading products and solutions on RISC-V covering CPU IP, SoC, development boards, etc.

Dubhe Series CPU IP:

- Dubhe-90, the max performance commercial RISC-V CPU IP
- Dubhe-80, the high-efficiency commercial RISC-V CPU IP
- Dubhe-70, extremely low power consumption out of order commercial 64 bit RISC-V CPU IP

StarLink Series Interconnect Fabric IP:

- StarLink-500, StarFive's first self-developed interconnect fabric IP
- StarLink-700, StarFive's self-developed high-scalable, high-performance interconnect fabric IP

JingHong Series SoC:

- JH-7110/JH7110, the world's first high-performance multimedia processor for mass production

VisionFive Series SBC:

- VisionFive 2, the world's first SBC with an integrated 3D GPU for mass production

StarFive's products can be applied in a great variety of devices, scenarios, and industries including VDI, tablets, desktop/notebook computers, gateway, edge computing, industrial display, desktop computing, data center, etc.

StarFive, rooting in China, and taking a broad view of the world, aims to become the leader and promoter of global RISC-V technology and ecosystem. StarFive will cooperate comprehensively with the global ecosystem partners in kernel layer, system service layer, frame layer, application layer and all other respects. StarFive will promote RISC-V technology into more high-end application areas and create more value for global developers and customers by leading the RISC-V development and driving industry innovation.

Tech Doc: https://doc.rvspace.org/
https://doc-en.rvspace.org/
Community: https://rvspace.org/
Website: https://www.starfivetech.com/
Sales: sales@starfivetech.com
021-50478300
Marketing: marketing@starfivetech.com