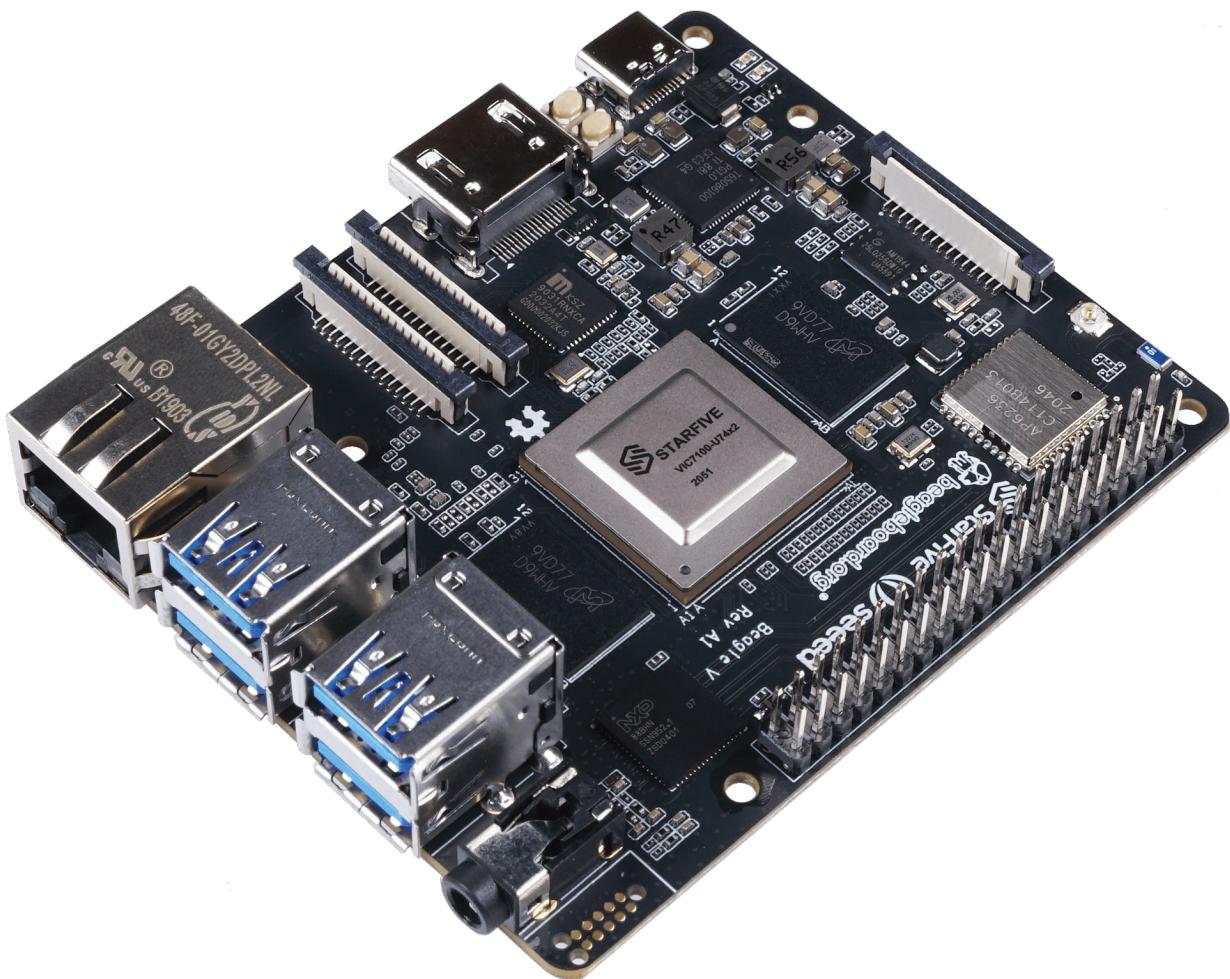


Beagle V

First Affordable RISC-V Computer Designed to Run Linux



Reference Guide

Revision A
January 11, 2021

Table of Contents

Overview

Description	3
Features	3

Specifications

Processor	4
Memory	4
Wireless Connectivity	4
Video Processing	4
Dedicated Audio Processing DSP and Sub-system	4
Peripherals	4
Power	4
Dimensions	4

Hardware Overview	5 - 6
-------------------------	-------

Pinout Diagram	7
----------------------	---

Overview

● Description

Beagle-V is the first affordable RISC-V computer designed to run Linux. It is fully open-source with open-source software, open hardware design and RISC-V open architecture. It is a joint effort by Seeed Studio, BeagleBoard.org and StarFive.

Beagle-V is powered by RISC-V U74 Dual-Core 64-bit RV64GFC ISA SoC running at 1GHz with 4GB/ 8GB LPDDR4 RAM variants and has rich I/O peripherals such as USB 3.0 ports, 40 pin GPIO header, Gigabit Ethernet Connector, Micro-SD card slot and much more.

Beagle-V also has rich AI features with Neural Network Engine and NVDLA Engine. It has onboard audio and video processing capabilities and has MIPI-CSI and MIPI-DSI connectors for video hardware.

It has wireless capabilities with Wi-Fi and BLE and has a wide software compatibility including support for FreeRTOS, Fedora, Debian and Linux.

You can use Seeed Fusion service to customize Beagle V according to your application and then move on to mass production.

● Features

- Truly open-source hardware, software and RISC-V open architecture
- Powerful and rich AI features with Neural Network Engine and NVDLA Engine
- Abundant I/O peripherals
- Wireless connectivity with Wi-Fi and BLE
- Onboard video and audio processing
- Wide software compatibility (FreeRTOS, Fedora, Debian, Linux)
- Integrated with Seeed Fusion Service for customization and mass production

Specifications

Processor

- RISC-V U74 Dual-Core 64-bit RV64GFC ISA SoC with 2MB L2 cache @ 1.0GHz
- Vision DSP Tensilica-VP6 for computing vision @ 600MHz
- NVDLA Engine (configuration 2048 MACs @ 800MHz)
- Neural Network Engine (1024MACs @ 500MHz)

Memory

- 4GB LPDDR4/ 8GB LPDDR4

Wireless Connectivity

- 2.4 GHz Wi-Fi (IEEE 802.11b/g/n)
- Bluetooth 4.2 (BLE)

Video Processing

- 2 x MIPI-CSI (up to 4K@30fps), 1 x MIPI-DSI (up to 4K@30fps)
- 1 x HDMI 1.4 (up to 1080p@60fps display)
- Video Decoder (H264/H265) up to 4K@60FPS; Support Dual stream decoding for 2K@30FPS each
- Dual channels of ISP, each channel support up to 4K@30FPS
- Support MIPI-CSI TX for video output after ISP and AI processing
- JPEG encoder/decoder

Dedicated Audio Processing DSP and Sub-system

- Ultra-low power Voice Activity Detector for audio bit-stream as a Voice Trigger
- On-chip Audio DAC
- Support DMIC and AMIC, up to 4 channels

Peripherals

- 4 x USB 3.0 ports
- 40 Pin GPIO Header (28 x GPIO, I2C, I2S, SPI, UART)
- Gigabit Ethernet Connector
- 3.5mm Audio jack (4-pole stereo audio output)
- Micro-SD card slot for system boot and data storage
- Support TRNG and OTP
- Support DMAC, QSPI and other peripheral
- Reset button and Power Button

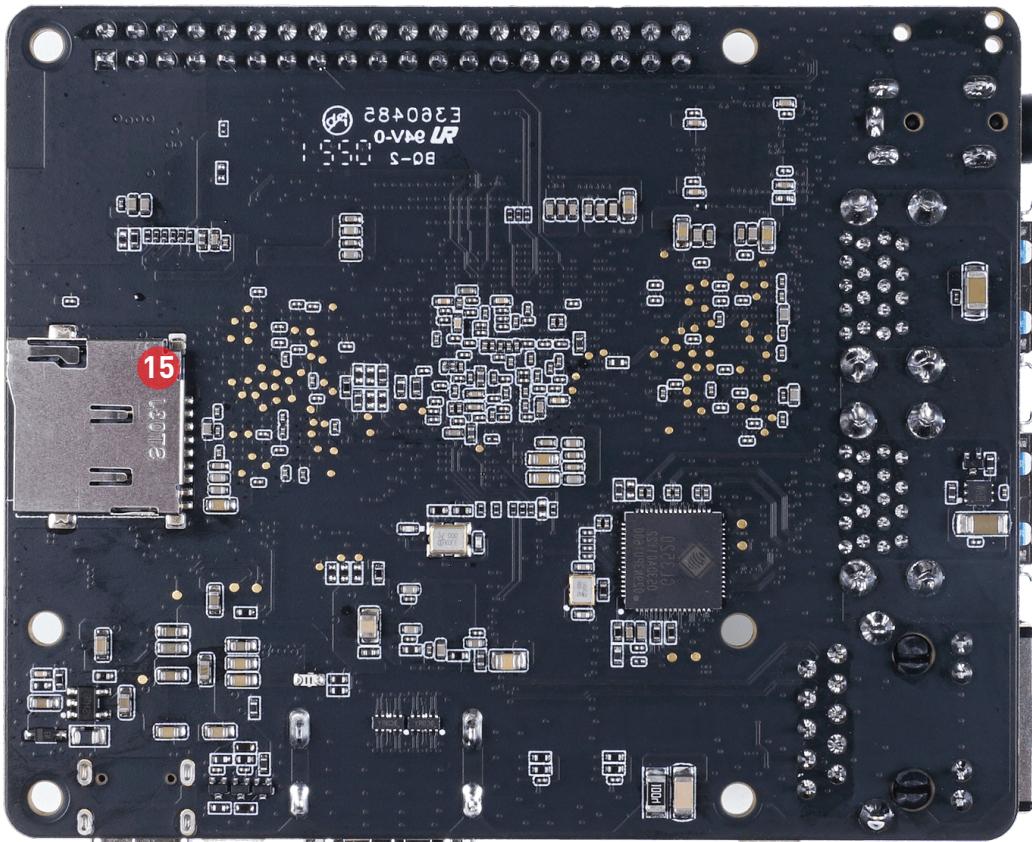
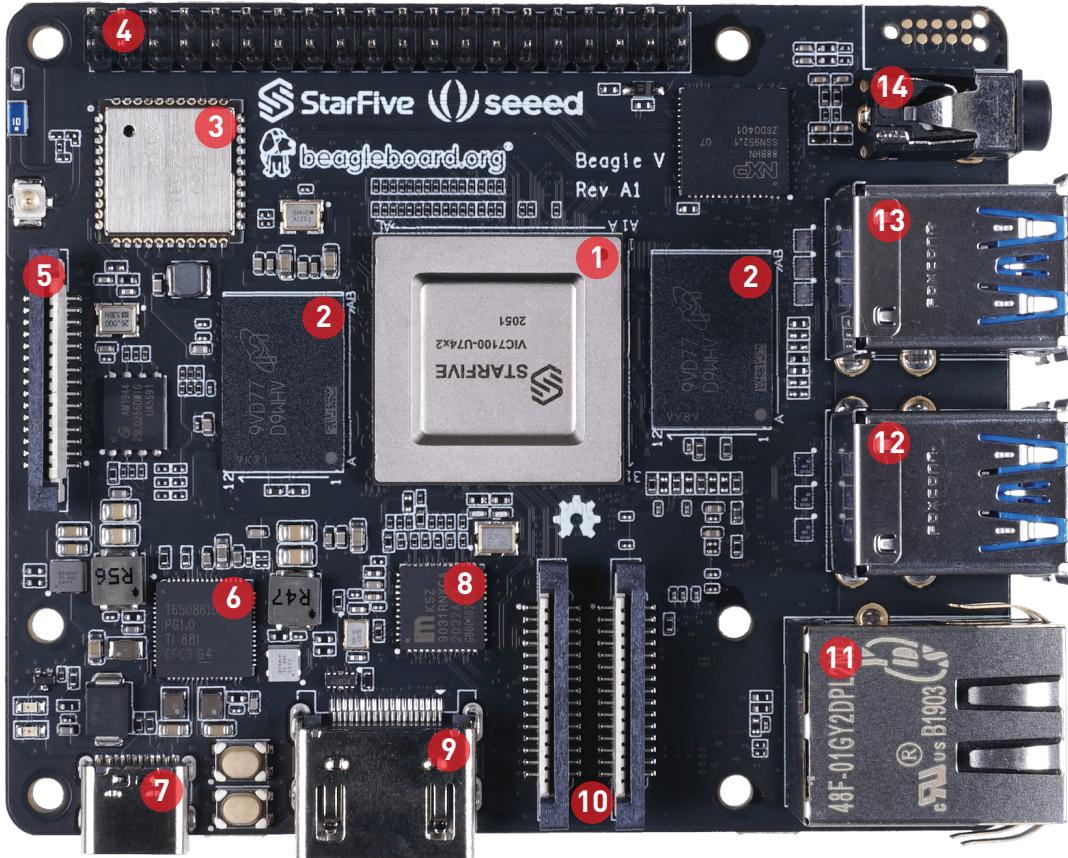
Power

- 5V DC via USB-C connector (minimum 3A)
- 5V DC via GPIO header (minimum 3A)

Dimensions

- 85.6 x 56 x 21mm

Pinout Diagram



Beagle V

Reference Guide

- 1** RISC-V U74 Dual-Core 64-bit RV64GFC ISA SoC
- 2** 4GB LPDDR4 RAM
- 3** 2.4GHz Wi-Fi and Bluetooth 4.2 (BLE)
- 4** 40 Pin GPIO Header
- 5** MIPI-DSI Connector
- 6** PMIC
- 7** USB Type-C Connector
- 8** LCD to HDMI IC
- 9** HDMI 2.0 Connector
- 10** 2 x MIPI-CSI Connector
- 11** Gigabit Ethernet (RJ45 Connector)
- 12** 2 x USB 3.0 Host Type-A
- 13** 2 x USB 3.0 Host Type-A
- 14** 3.5mm Audio Jack (4-pole stereo audio output)
- 15** Micro-SD SDXC Card Slot

Pinout Diagram

3.3V Power	1	2	5V Power
GPIO48 (I2C SDA)	3	4	5V Power
GPIO47 (I2C SCL)	5	6	GND
GPIO46	7	8	GPIO14 (UART TX)
GND	9	10	GPIO13 (UART RX)
GPIO44	11	12	GPIO45
GPIO22	13	14	GND
GPIO20	15	16	GPIO21
3.3V Power	17	18	GPIO19
GPIO18 (SPI MOSI)	19	20	GND
GPIO16 (SPI MISO)	21	22	GPIO17
GPIO12 (SPI SCLK)	23	24	GPIO15 (SPI CE0)
GND	25	26	GPIO11 (SPI CE1)
GPIO9	27	28	GPIO10
GPIO8	29	30	GND
GPIO6	31	32	GPIO7 (PWM0)
GPIO5 (PWM1)	33	34	GND
GPIO3	35	36	GPIO4
GPIO1	37	38	GPIO2
GND	39	40	GPIO0

Note:

All GPIOs can be configured to different functions including but not limited to SDIO, Audio, SPI, I2C, UART and PWM