Product Brochure
ECB31-PB Single Board Computer



成都亿佰特电子科技有限公司
Chengdu Ebyte Electronic Technology Co.,Ltd.

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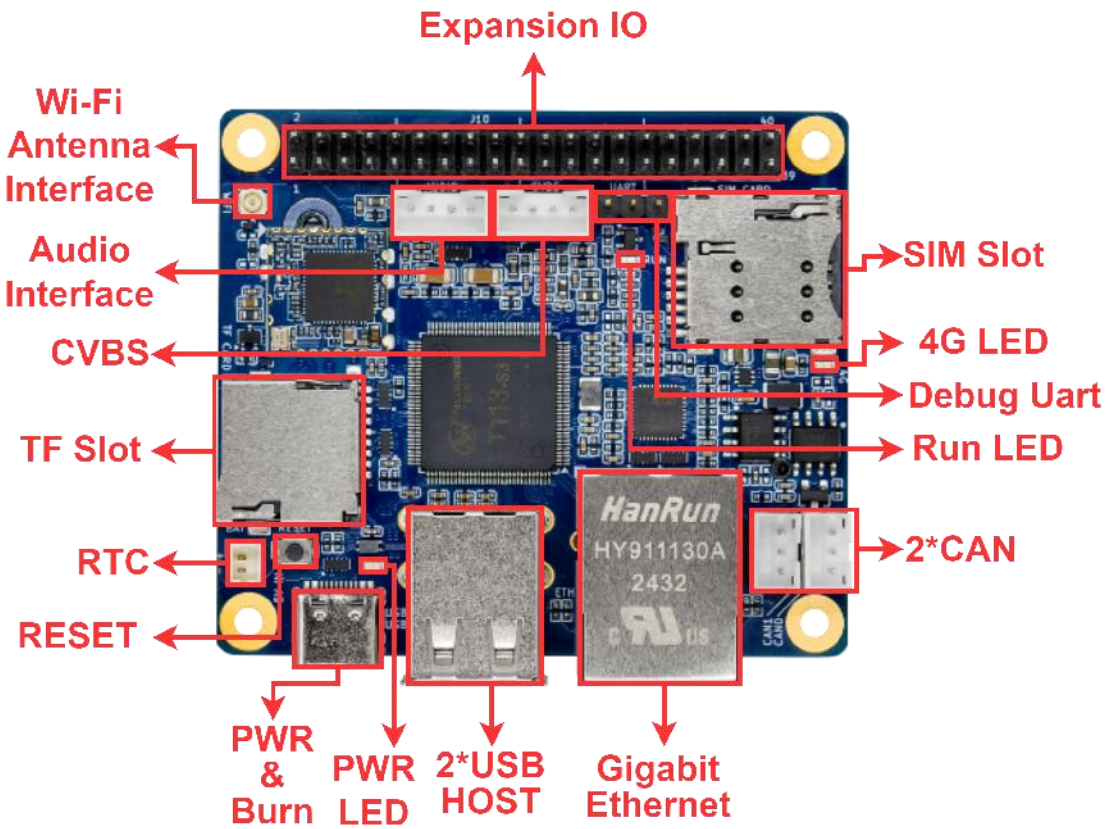
1. Product Overview

1.1.Product Introduction

Based on the All winner T113-S series processor, Ebyte has launched the cost-effective single-board computer ECB31-PB, which is compatible with the Raspberry Pi 3A in size, compact and with rich interfaces. The functional interface is designed with ESD, TVS and other protection devices to prevent interference such as surge static electricity from damaging the equipment. The design level is higher than that of ordinary development boards and can be used in industrial scenarios in batches.

Along with the single-board computer, Ebyte provides rich documentation and a complete software development environment, fast-response technical support and customized services, which can effectively help users improve development efficiency, shorten development cycles, and speed up product development and time to market.

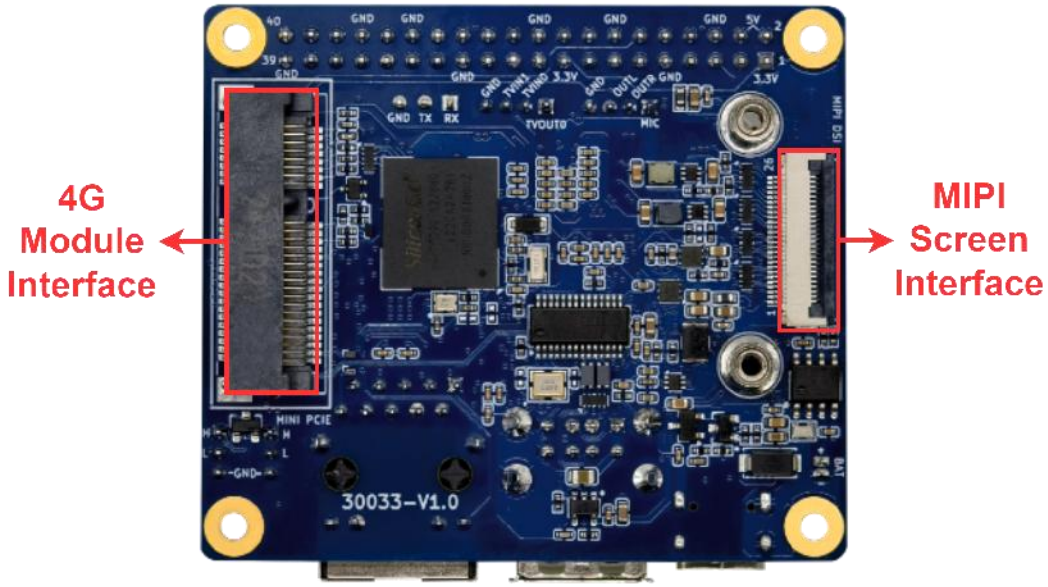
The single board computer function diagram is as follows:



Functional description of the front side of the single board computer

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Functional description diagram on the back of the single board computer

1.2.Get started quickly

For product burning system, function usage and operation, please refer to "ECB31-PB_User_Guide_CN_V1.0.pdf".

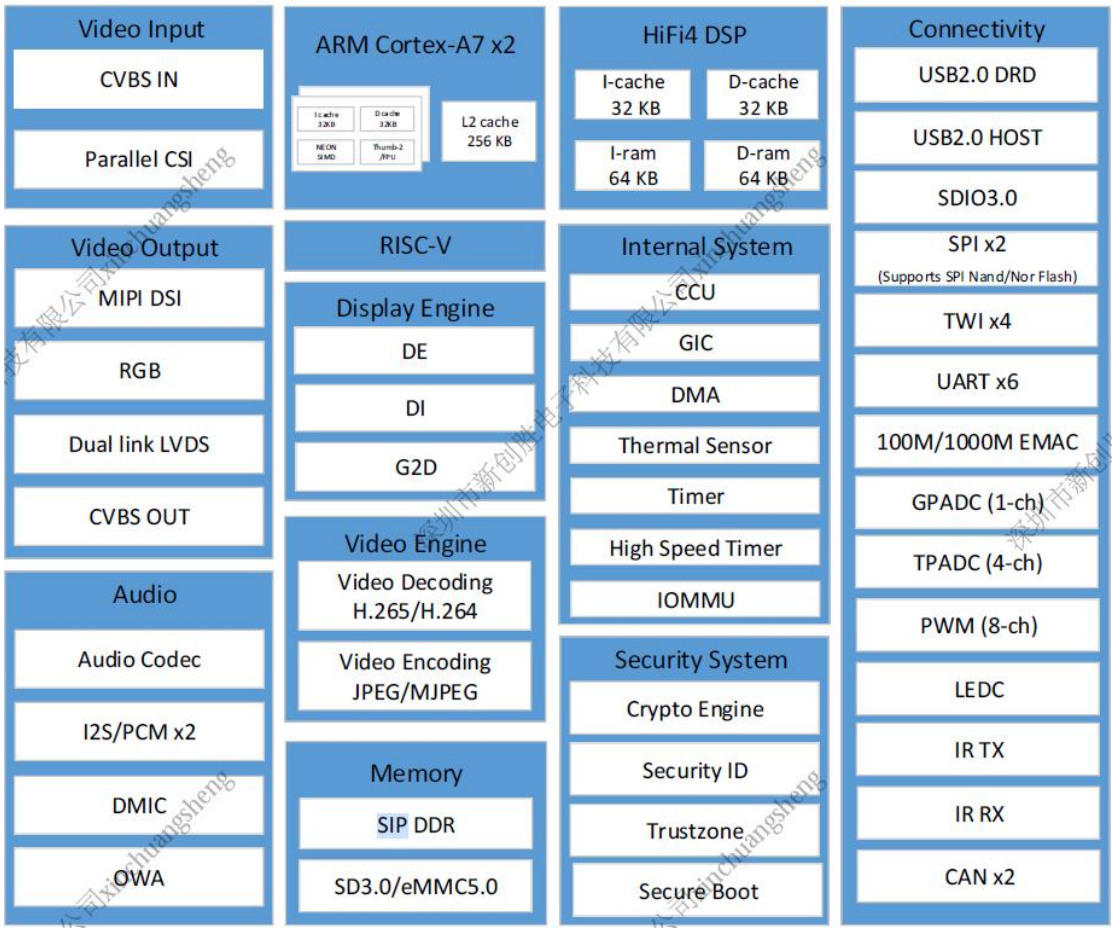
The document is located in the 01_Documents - User Manual folder on the network disk.

1.3.T113-SChip Introduction

Allwinner Technology's T113-S series processor is a dual-core ARM Cortex-A7+ RISC-V+HiFi4 DSP processor with built-in DDR. It supports full-format 1080P@60FPS video decoding, JPEG/MJPEG 1080P@60FPS video encoding, such as H.265, H.264, MPEG-1/2/4, JPEG, VC1, etc. It has rich multimedia interfaces MIPI-DSI/RGB/LVDS/CVBS/Parallel CSI, and supports 1080P@60FPS display. The integrated ADC/DAC and I2S/PCM/DMIC/OWA audio interfaces can work seamlessly with the CPU to accelerate multimedia algorithm applications and improve user experience. The processor also supports Gigabit Ethernet interface, 2 CAN interfaces, 2 USB2.0 interfaces, 6 UARTs and other functional interfaces. In addition, T113-S can be connected to other different peripheral devices such as WiFi and Bluetooth through SDIO and UART. The functional block diagram of the T113-S processor is shown in the figure below.

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T113-S processor system functional block diagram

1.4.Typical Applications

- Smart home;
- Smart toys;
- Smart cities;
- Tablet;
- IoT Gateway
- Advertising machine;
- Industrial All-in-one Machine;
- Industrial Control Motherboard;
- robot.

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2. Specifications

2.1.Function parameters

ECB31-PB single board computer function parameter table

Power Input	5V_3A, shares the Type-C interface with USB DEVICE;	
processor	Allwinner T113-S processor: Dual Arm Cortex-A7 core, 1.2GHz; RISC-V; HiFi4 DSP;	
storage	Memory	128/256MB, DDR3;
	FLASH	8GB, eMMC;
show	1-way 26-pin FPC MIPI display interface, supports 4-lane, maximum resolution supports 1080P (1920×1080@60fps), supports touch screen; 1 CVBS output, supports NTSC and PAL formats, 2.0mm pitch pin lead-out; 2-way CVBS input, supporting NTSC and PAL formats, 2.0mm pitch pin lead-out;	
USB HOST	2-way USB2.0 HOST;	
USB DEVICE	1 USB DEVICE, Type-C interface type, shared with power input, can be used to burn programs;	
4G	1st Road4G module slot, MINI-PCIe connector;	
Network port	1-channel 10/100/1000M adaptiveRJ45Ethernet port;	
Wi-Fi	1-channel 2.4G&5GWi-Fi;	
SIM card	1st RoadSIM card slot;	
TF card	1roadTF card slot, supports plug-in detection;	
Audio	2-way HP-out, 1-way MIC, 2.0mm pitch pin lead-out;	
debug	1 UART debug printing serial port (UART0), 2.54mm pitch pin lead-out;	
CAN	2-wayCANStandard protocol interface, 2.0mm pitch pin lead-out;	
GPIO	18 GPIOs, multiplexing functions, extended interface output;	
Serial Port	1st RoadUARTCommunication serial port, TTL level, function multiplexing,Extension interface lead;	
SPI	1roadSPI, function multiplexing,Extension interface lead;	
PWM	4roadPWM, function multiplexing,Extension interface lead;	
I2C	1I2C,Extension interface lead;	
button	1 reset button;	
Indicator Lights	1 power indicator light; 1 operating indicator light; 14G Statuslamp;	
Watchdog	Support on-chip watchdog function;	
RTC	1 way 1.25mmspacingRTC battery holder;	
Power Output	2road5V power output, extended interface lead out; 2road3.3V power output, extended interface lead out;	

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2.2.Model Description

Product models and parameters are shown in the table below:

Product Model Table

Product Model	processor	Memory	storage
ECB31-PB1E8-I	T113-S3	128MB DDR3	8GB eMMC
ECB31-PB2E8-I	T113-S4（T113M4020DC0）	256MB DDR3	8GB eMMC

2.3.Environmental characteristics

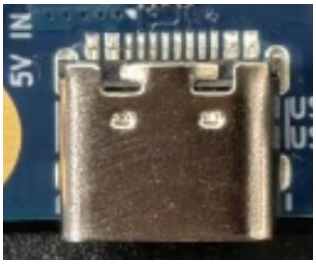
ECB31-PB Single Board Computer Environmental Characteristics Table

Operating temperature	-40℃ ～85℃, need to add a radiator and keep air circulation;
Storage temperature	-40℃ ～85℃;
Operating humidity	5~95% humidity, non-condensing;
Storage humidity	60℃@95% humidity, non-condensing;

3. Interface Definition

3.1.Power and USB DEVICE interface

The Type-C on the ECB31-PB single board computer is a 5V power supply and USB DEVICE interface. Only one USB Type-C cable is needed to connect the computer for power supply and burning. The interface is shown in the figure below:



Power and USB DEVICE interface diagram

3.2.Extension interface pin definition

ECB31-PB single board computer has 1 reserved2.54mm spacing2*20PinDouble-row pin interface. The power supply and I2C, SPI, PWM, serial port and other signals of this interface are

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consistent with the definition of the Raspberry Pi expansion interface. Some IO interfaces can be configured to different functions. The expansion interface is shown in the figure below:



Extended interface diagram

The expansion interface pin definitions are shown in the following table:

Extension interface pin definition table

Pin Number	Function	Pin Number	Function
1	3.3V_OUT	2	5V_OUT_IN
3	I2C1_SDA/RTC	4	5V_OUT_IN
5	I2C1_SCL/RTC	6	GND
7	GPIO17	8	GPIO14/UART3_TX/PWM2
9	GND	10	GPIO15/UART3_RX/PWM3
11	NC	12	NC
13	NC	14	GND
15	NC	16	NC
17	3.3V_OUT	18	NC
19	GPIO10/SPI1_MOSI	20	DGND
twenty one	GPIO9/SPI1_MISO	twenty two	GPIO25
twenty three	GPIO11/SPI1_SCLK	twenty four	GPIO8/SPI1_CE0
25	GND	26	GPIO7/SPI1_CE1
27	GPIO0/EEPROM_SDA/UART4_RX	28	GPIO1/EEPROM_SCL/UART4_TX
29	GPIO5	30	GND
31	GPIO6	32	GPIO12/PWM3
33	GPIO13/PWM2	34	GND
35	GPIO19/PCM_FS	36	GPIO16
37	GPIO26/RUN_LED	38	NC
39	GND	40	NC

All IO pin signal levels are 3.3V.

Pins 2 and 4 can be used for both 5V output and 5V input. Connect these two pins to the Type-C power supply interface on the board..when Do not connect the USB Type-C power cable when used for 5V input.

Pins 3 and 5 are I2C interfaces. The RTC chip is mounted on the board, and its address is

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0x68. Please avoid this address when connecting an external I2C module.

3.3.CAN interface

The ECB31-PB single board computer is designed with 2 CAN interfaces, which are led out through 2 2.0mm pitch pin headers. There are interface signal description labels on the back of the PCB board. The CAN interface is shown in the figure below:



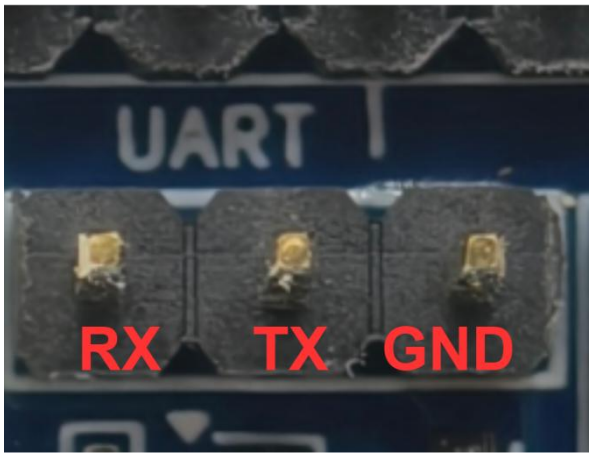
CAN interface line sequence diagram

3.4.UART debug interface

The ECB31-PB single board computer prints debugging information through the serial port UART0, and the default serial port rate is 115200bps. It is led out through a 1*3P 2.54mm spacing pin header socket. There is an interface signal description mark on the back of the PCB board. The UART interface is shown in the figure below:

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UART interface line sequence diagram

3.5.CVBS interface

The ECB31-PB single-board computer leads out two TV_IN and one TV_OUT analog video signals through the CVBS interface. It is led out through a 1*4P 2.0mm spacing pin header. There is an interface signal description mark on the back of the PCB board. The CVBS interface line sequence is shown in the figure below:



CVBS interface line sequence diagram

3.6.AUDIO interface

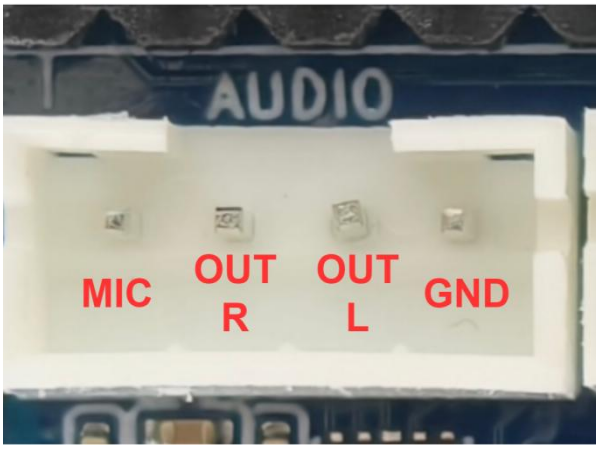
The ECB31-PB single board computer leads to the audio signals of the T113-S processor: HP_OUTR, HP_OUTL, MIC.

HP_OUTR and HP_OUTL are audio signal outputs, which can be connected to headphones,

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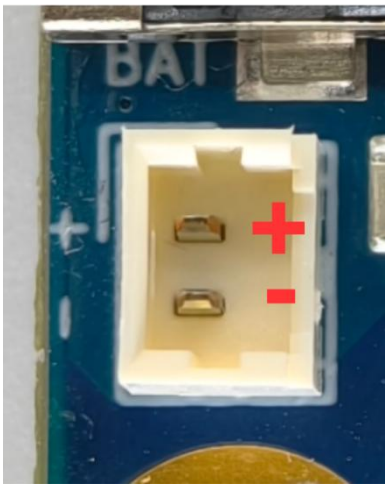
and MIC is the microphone audio signal input. There is an interface signal description mark on the back of the PCB board, and the AUDIO interface line sequence is shown in the figure below:



AUDIO interface line sequence diagram

3.7.Battery interface

ECB31-PB single board computer supports RTC real-time clock function, which can be powered by external battery to continue working when power is off, maintain time continuity, and avoid time reset after device restart. It is recommended to choose CR1220 or CR2032 battery. Please make sure that the positive and negative poles are not connected in reverse when installing the battery. The battery interface line sequence is shown in the figure below:



Battery interface wiring diagram

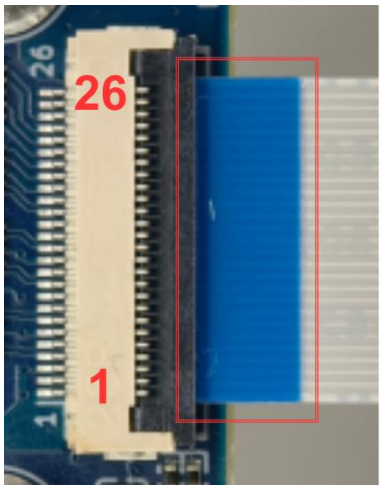
3.8.MIPI interface

ECB31-PB single board computer provides 1 MIPI4-laneVideo output supports

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1080*1920@60fps display. The interface uses a 26P flip-top FPC connector with a pitch of 0.5mm. It can be connected to Ebyte via the same-direction FPC cable.ECA11-5LM1019CUsed for touch screen module. Please note that the blue side should face upwards when connecting the cable. The pin definition is shown in the figure below:



MIPI interface pin definition diagram

MIPI interface pin definition table

Pin Number	Function	Level	type
26	5V_IN	5V	PWR_I
25	5V_IN	5V	PWR_I
twenty four	TP_INT	3.3V	DI
twenty three	TP_I2C_SCL	3.3V	I/O
twenty two	TP_I2C_SDA	3.3V	I/O
twenty one	TP_RST	3.3V	DI
20	LCD_BL_PWM	3.3V	DO
19	LCD_ID	1.8V	DI
18	DGND	GND	PWR
17	MIPI_DSI_D1P	1.8V	DO
16	MIPI_DSI_D1N	1.8V	DO
15	DGND	GND	PWR
14	MIPI_DSI_CLKP	1.8V	DO
13	MIPI_DSI_CLKN	1.8V	DO
12	DGND	GND	PWR
11	MIPI_DSI_D0P	1.8V	DO

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10	MIPI_DSI_D0N	1.8V	DO
9	DGND	GND	PWR
8	MIPI_DSI_D2P	1.8V	DO
7	MIPI_DSI_D2N	1.8V	DO
6	DGND	GND	PWR
5	MIPI_DSI_D3P	1.8V	DO
4	MIPI_DSI_D3N	1.8V	DO
3	DGND	GND	PWR
2	MIPI_DSI_RESET	1.8V	DI
1	DGND	GND	PWR

4. Software Resources

The ECB31-PB single-board computer is equipped with an operating system based on the Linux 5.4 kernel. The single-board computer comes with the cross-compilation tool chain Build root source code, U-boot source code, Linux kernel and various driver module source code required for embedded Linux system development, as well as various development and debugging tools suitable for Windows desktop environment and Linux desktop environment.

operating system:

Linux file system built by Build root

System source code:

U-boot 2018

Kernel 5.4

Build Root 2019.02

Open wrt

Development environment and tools:

USB burning tool: Phoenix Suit

SD card burning tool: Phoenix Card

System software resources are shown in the following table:

System Software Resource Table

category	name	describe	Source code
SPL	spl-pub	Boot0, boot uboot	<SDK>/brandy/brandy-2.0/spl-pub/

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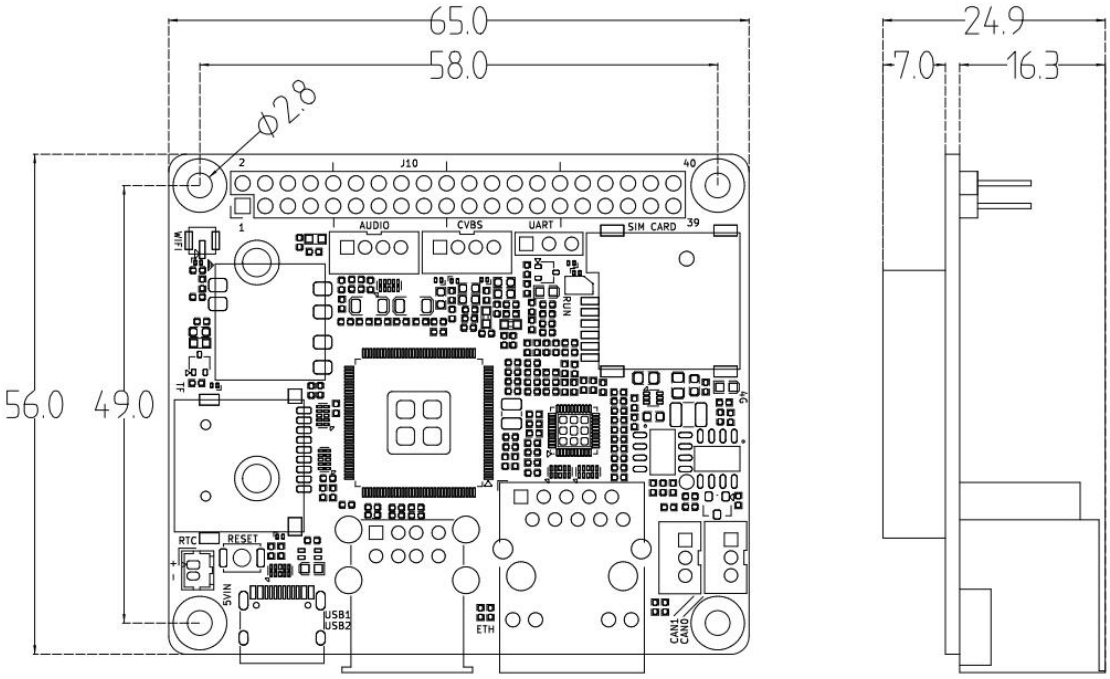
BOOT	u-boot 2018.07	Boot loader	<SDK>/brandy/brandy-2.0/u-boot-2018/
Kernel	Kernel 5.4.61	Linux Kernel	<SDK>/kernel/linux-5.4/
Device Driver	Audio	Built-in audio driver	sound/soc/sunxi_v2/*
	AWlink	CAN Driver	drivers/net/can/sunxi_awlink.c
	GMAC	Built-in MAC driver	drivers/net/ethernet/allwinner/sunxi-gmac.c
	GPADC	GPADC Driver	drivers/input/sensor/sunxi_gpadc.c
	GPIO	GPIO Driver	drivers/pinctrl/sunxi
	LCD	Disp2 display driver	drivers/video/fbdev/sunxi/disp2/disp/lcd/
	LRADC	Button module driver	drivers/input/keyboard/sunxi-keyboard.c
	SMHC	MMC Driver	drivers/mmc/host/sunxi-mmc.c
	SPI	SPI Driver	drivers/spi/spi-sunxi.c
	SPI-NAND	SPI-NAND Driver	drivers/mtd/awnand/spinand
	TVD	CVBS Input	drivers/media/platform/sunxi-tvd/
	TVE	CVBS output	drivers/video/fbdev/sunxi/disp2/tv/
	TWI	I2C Driver	drivers/i2c/busses/i2c-sunxi.c
	UART	Serial port driver	drivers/tty/serial/sunxi-uart.c
	VIN	CSI Driver	drivers/media/platform/sunxi-vin/
operating system	Buildroot 201902	201902 version of Buildroot	<SDK>/buildroot/buildroot-201902
	Buildroot 202205	Buildroot 202205	<SDK>/buildroot/buildroot-202205
	openwrt	openwrt	<SDK>openwrt/openwrt
Development Tools	PhoenixSuit	USB burning tool	/tools/PhoenixSuit
	PhoenixCard	SD card burning tool	/tools/PhoenixCard

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5. Structural dimensions

Unit: mm; error: ±0.1mm.



SBC structure dimensions

6. Reference Documentation

- ❖ T113-S_V1.9.pdf

7. Revision Notes

Revision Notes Table

Version	Modifications	Modification time	prepared by	Proofreading	Approval
V1.0	First Draft	25-5-26	LqCy	WFX	WFX

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