K-A311D Mainboard Specification

Version	V2.0
Date	2023-08-16

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Changelog

1.0.0	2021-07-28	Chinese and English merged version.
1.1.0	2021-12-26	Updated based on V3.0 HW.
1.1.1	2022-05-14	Add MIPI panel HW notice.
1.1.2	2022-08-12	Add ARMv8-A architecture notice.
2.0.0	2023-02-20	Updated based on V4.0 HW.
2.0.1	2023-08-09	Update to expand serial interface definition.
2.0.2	2023-08-16	Update the instructions of the RJ45 Gigabit network port.

Contents

1 SOC Brief

A311D chip has the characteristics of high performance and high extension application. The main characteristics are as follows:

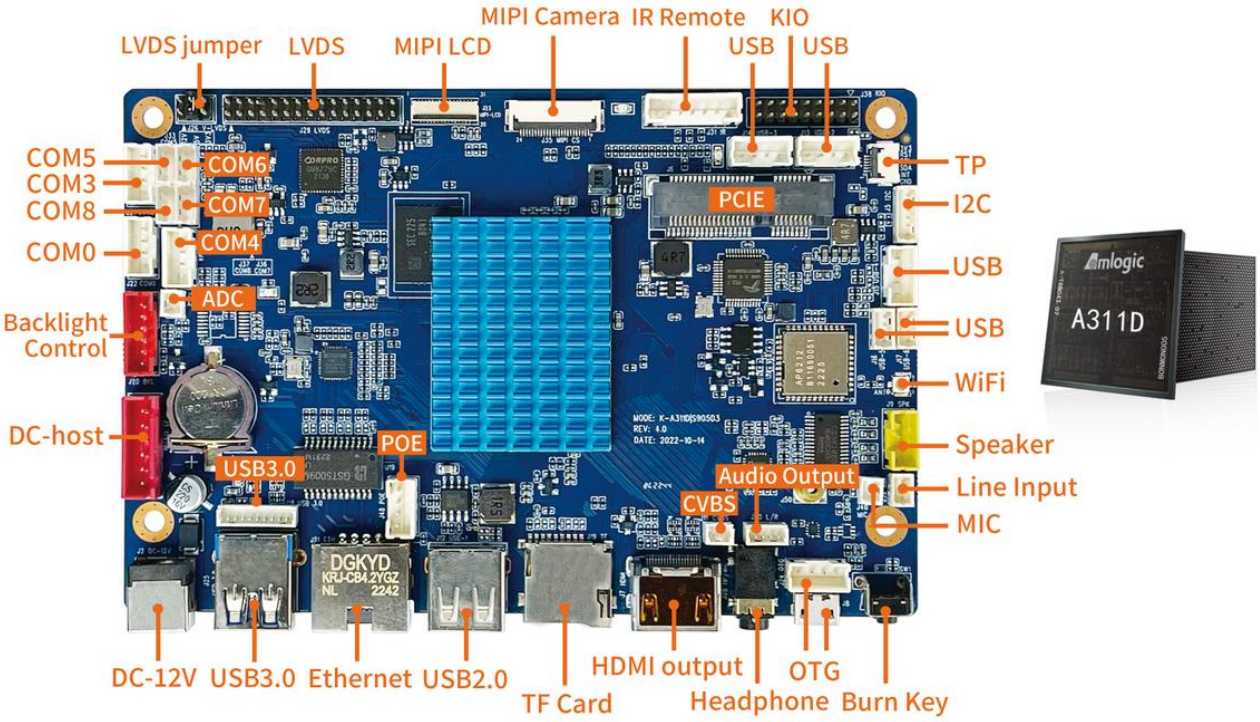
- CPU: Quad-core 64-bit Cortex-A73 architecture + dual-core 64-bit Cortex-A53 architecture, with the highest frequency of 2.2GHz; ARMV8-A architecture with Neon and Crypto expansion
- GPU: ARM Mali-G52 MP4, support OpenGL ES 1.1/2.0/3.2, OpenCl 2.0, Vulkan 1.1, embedded high-performance 2D accelerated hardware
- NPU: Support 5TOPS computing power
- Multimedia: Support 4K 60FPS H.265/H.264/VP9 video decoding; support 1080P 100FPS H.265/H.264 video coding; support 8M ISP, support HDR

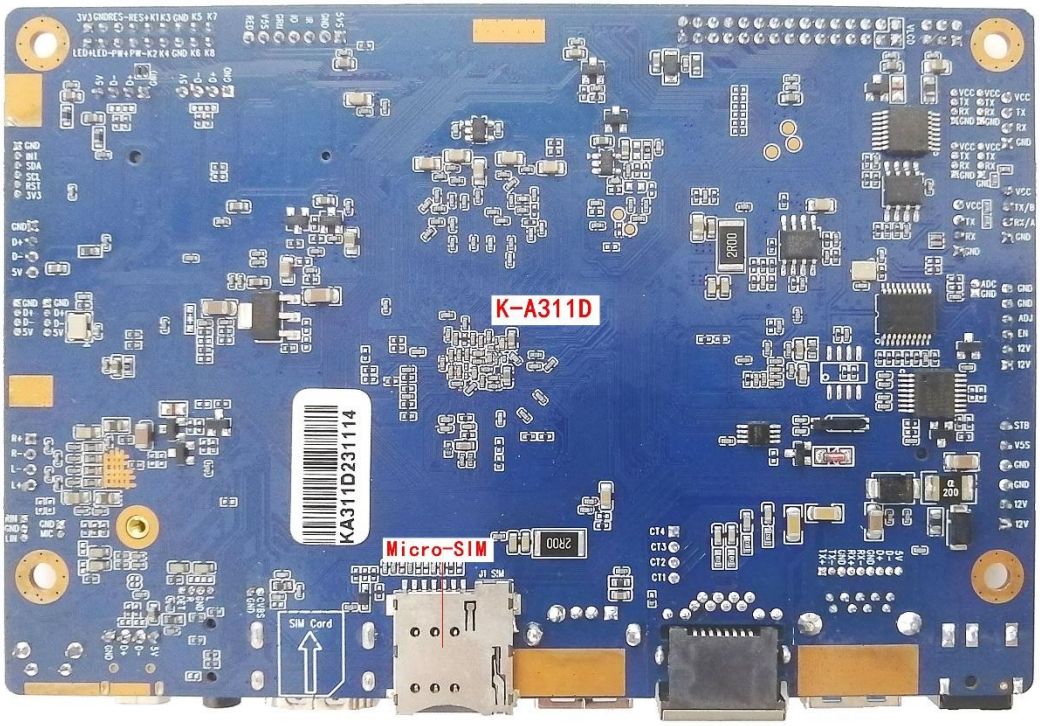
2 Product Overview

K-A311D mainboard is based on Amlogic A311D high-performance application processor platform. **A311D** is a low power, high performance processor for computing, personal mobile internet devices and other smart device applications. It integrates quad-core Cortex-A73+dual-core Cortex A53 clocked at up to 2.2GHz, with superior computing performance, 2D/3D graphics processing capabilities and Full HD video codec capabilities. It perfectly supports 4Kx2K@60fps decoding.

This mainboard is specially designed for **ultra-thin** applications with strict material selection and design. The compact size and rich interface facilitate its integration into the complete machine, bringing a smooth experience and superior performance to the final product. It can be applied to digital signage, touch interactive, consumer electronics, entertainment systems and other industries.

K-A311D V4.0 mainboard actual interface diagram as shown below.




K-A311D
KA311D231114
Micro-SIM
SIM Card

3 Specification List

K-A311D's system functions and interface features are shown in the following table.

Function & Interface	Detailed Description
CPU	Amlogic A311D Cortex-A73 quad-core+Cortex-A53 dual-core, up to 2.2GHz
DDR	LPDDR4 2GB (4GB optional)
Storage	The default comes with an 16GB EMMC NAND chip that can scale up to 128GB
LVDS LCD	30-pin industry-standard dual LVDS LCD supporting VESA/JEITA format up to 1080P output
MIPI LCD	30P FPC MIPI LCD panel (Note: MIPI and LVDS LCD are conflicted)
MIPI CSI	24P PFC MIPI CSI input interface
HP/MIC	Support CTIA 4-pole HP/Mic socket (Left-Right-GND-MIC)
Line Output	Support standard left and right channel line output (pin header)
Amplifier output	8 Ohm 6W Dual Audio Amplifier Output
MIC Input	Differential MIC input (pin header)
Line Input	Support standard left and right channel line input (pin header)
USB Interface	2 horizontal connectors (USB 3.0x1 and USB2.0 Hubx1), 7 pin headers (USB 2.0 Hubx6 and USB 3.0x1 **reuse**), 1 Micro USB connector/USB OTG pin header
Serial Port	1 TTL/485 compatible, 2 TTL/RS-232 compatible, 4 extended TTL/RS-232 compatible (Conflict with TF, you cannot use it at the same time)
TF Card	Self-elastic TF card socket, up to 256GB capacity
Camera	Support USB camera within 8 million pixels
WiFi	Built-in high performance SDIO interface WiFi module, support IEEE 802.11 b/g/n/ac
Bluetooth	Built-in high performance serial interface BT module with support for V2.1+EDR/BT v3.0/BT v3.0+HS/BT v4.0/BT v5.2
Ethernet	1 port 10/100/1000M Adaptive Ethernet RJ45 connector with **4 pin POE PD**
Mini PCI-E 4G	Industry standard Mini PCI-E 4G module interface
Backlight Control	1 port Industry standard LCD backlight control header, support for backlight switch and brightness adjustment
Infrared RC	Standard infrared remote control receiver and infrared receiver pin header
GPIO Signals	8-way GPIO signals for such as GPIO buttons and/or 3.3V digital input/output
ADC Input	1-way ADC voltage acquisition signal
I2C Bus	I2C pin header and FPC for I2C capacitive screen and etc
Real Time Clock	Ultra-low-power RTC circuit (CR1220 battery) with timer and alarm functionalities
LED Indicator	Red LED indicator for standby and green LED indicator for running
Buttons	Recovery mode button and power switch button
DC Input	Supports 9~15V wide voltage DC power input
Ambient Requirement	Working temperature -20°C ~ 70°C, working humidity 0%~95% (non-condensing)
Physical Size	Length*Width*Height (135.2mm*90mm*9mm), **PCB top side height 7mm**
Android Version	Recommended Android 9.0

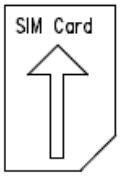
4 Interface definition

V4.0 version of the hardware modification details are as follows:

Modify Instruction
V4.0： * Power input to increase the protection of anti -wave tvs; 12V power supply increases anti - connection protection * Signals such as serial port, I2C, PW, and Res, increase TVS protection tube * J12 ETH Silk Printing Number Correction to J21 ETH * USB OTG and HUB functions through chip switching (Android default HUB function) * J5 and J47 socket definitions are adjusted to: square hole GND/Int/SDA/SCL/RST/3V3 * Increase TF and SPI extension 4 serial port compatibility design (default TF card function) * Optimize sound card power supply design to improve signal compatibility * WIFI IPEX seat packaging unified update and reinforcement!

➢ J1 Micro-SIM Card Socket

[J1] Micro-SIM Card Socket.



Note: The SIM card holder is a conventional medium card slot. When inserting the card, please make sure that the SIM card is inserted with the notch facing outwards.

➢ J2 DC-12V Socket

[J2] DC-12V power socket, positive outer and negative inner, inner pin diameter 2.0mm, outer ring diameter 5.5mm.

➢ J3 DC-12V Input Header

[J3] DC-12V Input Header (SIP 2.54mm-Square pad is pin 1).

Pin#	Definition	Note
1	12V	DC Power Input (9~15V)
2	12V	DC Power Input (9~15V)
3	GND	Power Ground

4	GND	Power Ground
5	V5S	5V Standby Power Input
6	STB	Standby Enable Output (0V for Standby)

➢ J5 I2C Bus Header

[J5] I2C Bus Header (SIP 1.25mm-Square pad is pin 1).

Pin#	Definition	Note
1	GND	Digital Ground
2	INT	Interrupt input (3.3V level)
3	SDA	I2C Bus data signal
4	SCL	I2C Bus clock signal
5	RST	Mainboard reset output (3.3V level)
6	3.3V	Power output supply 3.3V

➢ J6 m-PCIE 4G Socket

[J6] Standard m-PCIE 4G Socket.

➢ J7 HDMI Output Socket

[J7] Standard HDMI Output Socket.

Note: Due to the separate authorization of the main control chip HDMI, this interface function may cannot be used if don't soldered

➢ J8 Micro-USB Socket

[J8] USB 2.0 Micro-USB Socket.

Note: The J8 and J24 interfaces are signal multiplexers, and only one of them can be connected at the same time. And this set of signals is multiplexed through the SW2 switch and the signal source of USB 1x7Hub.

➢ J9 Speaker Header

[J9] Speaker Header (SIP 2.0mm-Square pad is pin 1).

Pin#	Definition	Note

1	R+	Speaker right channel +
2	R-	Speaker right channel -
3	L-	Speaker left channel -
4	L+	Speaker left channel +

➢ J11 CVBS Output Header

[J11] CVBS video output header (SIP 1.25mm-Square pad is pin 1).

Pin#	Definition	Note
1	GND	Signal Ground
2	CVBS	CVBS Video Output

➢ J12 USB Type A Socket

[J12] USB 2.0 Hub Type A Socket.

➢ J13 USB 2.0 Host Header

[J13] USB 2.0 Hub Header (SIP 2.0mm-Square pad is pin 1)

Pin#	Definition	Note
1	GND	Digital Ground
2	D+	USB Differential Data+
3	D-	USB Differential Data-
4	5V	Power output 5V

➢ J14 USB 2.0 Host Header

[J14] USB 2.0 Hub Header (SIP 2.0mm-Square pad is pin 1)

Pin#	Definition	Note
1	GND	Digital Ground
2	D+	USB Differential Data+
3	D-	USB Differential Data-
4	5V	Power output 5V

➢ J15 USB 2.0 Host Header

[J15] USB 2.0 Hub Header (SIP 2.0mm-Square pad is pin 1)

Pin#	Definition	Note
1	GND	Digital Ground
2	D+	USB Differential Data+
3	D-	USB Differential Data-
4	5V	Power output 5V

➢ J16 USB 2.0 Host Header

[J16] USB 2.0 Hub Header (SIP 1.25mm-Square pad is pin 1)

Pin#	Definition	Note
1	GND	Digital Ground
2	D+	USB Differential Data+
3	D-	USB Differential Data-
4	5V	Power output 5V

➢ J17 USB 2.0 Host Header

[J17] USB 2.0 Hub Header (SIP 1.25mm-Square pad is pin 1)

Pin#	Definition	Note
1	GND	Digital Ground
2	D+	USB Differential Data+
3	D-	USB Differential Data-
4	5V	Power output 5V

➢ J18 USB 3.0 Host Header

[J18] USB 3.0 Host Header (SIP 1.25mm-Square pad is pin 1)

Pin#	Definition	Note
1	TX+	USB Differential Data TX+
2	TX-	USB Differential Data TX-
3	GND	Digital Ground
4	RX+	USB Differential Data RX+
5	RX-	USB Differential Data RX-
6	GND	Digital Ground
7	D+	USB Differential Data+
8	D-	USB Differential Data-
9	5V	Power output 5V

Note: The J18 and J25 interfaces are signal multiplexers and cannot be used at the same time.

➢ J19 TF Card Socket

[J19] Standard TF Card Socket.

➢ J20 Backlight Control Header

[J20] Backlight Control Header (SIP 2.0mm-Square pad is pin 1).

Pin#	Definition	Note
1	12V	If the current exceeds 2A, external 12V is recommended
2	12V	If the current exceeds 2A, recommended to connect an external 12V power supply
3	EN	The default output is 5V
4	ADJ	3.3V square wave (1KHz Freq.)
5	GND	Power Ground
6	GND	Power Ground

➢ J21 RJ45 Gigabit Ethernet Jack

[J21] RJ45 Gigabit Ethernet Jack.

Note: The driver supports only 100 Mbit networks.

➢ J22 Data Serial Port 0

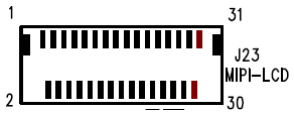
[J22] Built-in Serial Port 0 (SIP 2.0mm-Square pad is pin 1). The output level is TTL by default and it could be setup to RS-485 if required (RS-485 if U67 mounted). **The related software device node name is ttyS0**.

Pin#	Definition	Note
1	GND	Digital Ground
2	RX/A	Data receive (TTL or RS-485 level)
3	TX/B	Data transmit (TTL or RS-485 level)
4	VCC	Power output (Default 3.3V, 5V option)

Note: If you need to use the debugging serial port as a data serial port (baud rate 115200), please contact the supplier to obtain the customized software; this serial port will output the startup information in the first 5 seconds of power on (the upper or lower machine should handle this kind of data fault tolerance).

➢ J23 MIPI Panel FPC Connector

[J23] MIPI Panel FPC Connector (FPC-0.3mm 31-Pin Top/Bottom Contact).



Note: The J23 MIPI screen interface and the J29 LVDS interface internally reuse one MIPI channel. If you need to use J23, please adjust the hardware to remove the U9026 chip and solder 8R60, 8R61, 8R68, 8R67, 8R66, 8R65, 8R64, 8R19, 8R70, 8R69 A total of 10 0R-0402 resistors.

Pin#	Definition	Note
1	LED+	LED Anode
2	LED+	LED Anode
3	LED+	LED Anode
4	NC	Not Connected
5	LED-	LED Cathode
6	LED-	LED Cathode
7	LED-	LED Cathode
8	LED-	LED Cathode
9	GND	Digital Ground
10	GND	Digital Ground
11	MIPI_D2P	+MIPI differential lane2
12	MIPI_D2N	-MIPI differential lane2
13	GND	Digital Ground
14	MIPI_D1P	+MIPI differential lane1
15	MIPI_D1N	-MIPI differential lane1
16	GND	Digital Ground
17	MIPI_CKP	+MIPI differential clock output
18	MIPI_CKN	-MIPI differential clock output
19	GND	Digital Ground
20	MIPI_D0P	+MIPI differential lane0
21	MIPI_D0N	-MIPI differential lane0
22	GND	Digital Ground
23	MIPI_D3P	+MIPI differential lane3
24	MIPI_D3N	-MIPI differential lane3
25	GND	Digital Ground
26	VDD-1V8	Power Supply 1.8V (Not connected by default, R9232 0R needs to be soldered)
27	RESET	Reset Signal in 1.8V
28	GND	Digital Ground
29	VDD-1V8	Power Supply 1.8V
30	VDD-3V3	Power Supply 3.3V

31	VDD-3V3	Power Supply 3.3V

➢ J24 USB OTG Header

[J24] USB ADB Header (SIP 2.0mm-Square pad is pin 1), this port should only be used as system burn or ADB connection.

Pin#	Definition	Note
1	GND	Digital Ground
2	DP	USB Differential Data+
3	DM	USB Differential Data-
4	V5S	5V power supply from PC

Note: This port is the main chip USB OTG port pass-through port. The signal and J8 are in the same group, and the two cannot be connected at the same time. This set of signals is multiplexed through the SW2 switch and the signal source of USB 1x7Hub.

➢ J25 USB 3.0 Type A Socket

[J25] USB 3.0 Type A Socket.

Note: J25 and J18 interfaces are signal multiplexers and cannot be used at the same time.

➢ J26 LVDS Voltage Header

[J26] LVDS Voltage Header (DIP 2.0mm-Square pad is pin 1). If pin 1 and 2 are jumper shorted, the VLCD of J29 is 12V. If pin 3 and 4 are jumper shorted, the VLCD of J29 is 5V. If pin 5 and 6 are jumper shorted, the VLCD of J29 is 3.3V. Please adjust the jumper position according to the actual logic voltage of the LCD screen. Be careful not to jumper to the wrong position or it may damage the LCD screen and the motherboard circuit.

➢ J27 Data Serial Port 3

[J27] Built-in Serial Port 3 (SIP 2.0mm-Square pad is pin 1). The output level is RS-232 by default and it could be setup to TTL if required (RS-232 if U35 mounted). **The related software device node name is ttyS3.**

Pin#	Definition	Note
1	GND	Digital Ground
2	RX	Data receive (TTL or RS-232 level)

3	TX	Data transmit (TTL or RS-232 level)
4	VCC	Power output (Default 3.3V, 5V option)

➢ J28 4-Pole HP/Mic Jack

[J28] 4-Pole 3.5mm Headphone & Microphone Jack (CTIA Standard jack). It is the same signals with J40/J30. It supports insert detection for speaker mute.

➢ J29 LVDS Header

[J29] Dual LVDS header [DIP 2.0mm-Square pad is pin 1].

Pin#	Definition	Pin#	Definition
1	VLCD	2	VLCD
3	VLCD	4	GND
5	GND	6	GND
7	RXO0-	8	RXO0+
9	RXO1-	10	RXO1+
11	RXO2-	12	RXO2+
13	GND	14	GND
15	RXOC-	16	RXOC+
17	RXO3-	18	RXO3+
19	RXE0-	20	RXE0+
21	RXE1-	22	RXE1+
23	RXE2-	24	RXE2+
25	GND	26	GND
27	RXEC-	28	RXEC+
29	RXE3-	30	RXE3+

➢ J30 Audio Line Output

[J30] Audio Line Output (SIP 1.25mm-Square pad is pin 1).

Pin#	Definition	Note
1	DET	Headphone detect ADC signal
2	AR	Stereo output right channel
3	GND	Audio Ground

4	AL	Stereo output left channel

➢ J31 Remote Control & LED Header

[J31] Remote Control & LED Header (SIP 2.0mm-Square pad is pin 1).

Pin#	Definition	Note
1	5VS	Power output 5V standby
2	GND	Digital Ground
3	IR	5V level Irda remote control input signal
4	IO	3.3V level GPIO input signal
5	GREEN	Running indicator for external green LED
6	5VS	Power output supply 5V standby
7	RED	Standby indicator for external red LED

➢ J32 Data Serial Port 4

[J32] Built-in Serial Port 4 (SIP 2.0mm-Square pad is pin 1). The output level is RS-232 by default and it could be setup to TTL if required (RS-232 if U35 mounted). **The related software device node name is ttyS4.**

Pin#	Definition	Note
1	GND	Digital Ground
2	RX	Data receive (TTL or RS-232 level)
3	TX	Data transmit (TTL or RS-232 level)
4	VCC	Power output (Default 3.3V, 5V option)

➢ J33 Extended Serial Port 5

[J33] Extended Serial Port 5 (SIP 1.25mm-Square pad is pin 1). TTL 3.3V level is optional and can be configured as RS-232 level (RS-232 if U36 mounted). **It is mapped to software device node ttyP0**.

Pin#	Definition	Note
1	GND	Digital Ground
2	RX	Data receive (TTL or RS-232 level)
3	TX	Data transmit (TTL or RS-232 level)
4	VCC	Power output (Default 3.3V, 5V option)

Note: J33/J34/J36/J37 are SPI extended serial ports, which conflict with TF and default to TF card function.

➢ J34 Extended Serial Port 6

[J34] Extended Serial Port 6 (SIP 1.25mm-Square pad is pin 1). TTL 3.3V level is optional and can be configured as RS-232 level (RS-232 if U35 mounted). **It is mapped to software device node ttyP1**.

Pin#	Definition	Note
1	GND	Digital Ground
2	RX	Data receive (TTL or RS-232 level)
3	TX	Data transmit (TTL or RS-232 level)
4	VCC	Power output (Default 3.3V, 5V option)

Note: J33/J34/J36/J37 are SPI extended serial ports, which conflict with TF and default is TF card function.

➢ J35 MIPI CSI FPC Connector

[J35] MIPI Panel FPC Connector (FPC-0.5mm 24-Pin Top/Bottom Contact).

Pin#	Definition	Note
1	5V	5V Power Output
2	GND	Digital Ground
3	MIPI_D0N	+MIPI differential input lane0
4	MIPI_D0P	-MIPI differential input lane0
5	GND	Digital Ground
6	MIPI_D1N	+MIPI differential input lane1
7	MIPI_D1P	-MIPI differential input lane1
8	GND	Digital Ground
9	MIPI_D2N	+MIPI differential input lane2
10	MIPI_D2P	-MIPI differential input lane2
11	GND	Digital Ground
12	MIPI_D3N	+MIPI differential input lane3
13	MIPI_D3P	-MIPI differential input lane3
14	GND	Digital Ground
15	MIPI_CKP	+MIPI differential clock input
16	MIPI_CKN	-MIPI differential clock input
17	GND	Digital Ground
18	CM_PWRDN	Power Down (GPIOA_10 3.3V TTL IO)
19	CM_RESET	Reset Signal (GPIOA_11 3.3V TTL IO)
20	GND	Digital Ground
21	I2C_SDA	I2C Bus data signal

22	I2C_SCL	I2C Bus clock signal
23	GND	Digital Ground
24	MCLK	24 MHz Main Clock Output

➢ J36 Extended Serial Port 7

[J36] Extended Serial Port 7 (SIP 1.25mm-Square pad is pin 1). TTL 3.3V level is optional and can be configured as RS-232 level (RS-232 if U37 mounted). **It is mapped to software device node ttyP2**.

Pin#	Definition	Note
1	GND	Digital Ground
2	RX	Data receive (TTL or RS-232 level)
3	TX	Data transmit (TTL or RS-232 level)
4	VCC	Power output (Default 3.3V, 5V option)

Note: J33/J34/J36/J37 are SPI extended serial ports, which conflict with TF and default is TF card function.

➢ J37 Extended Serial Port 8

[J37] Extended Serial Port 8 (SIP 1.25mm-Square pad is pin 1). TTL 3.3V level is optional and can be configured as RS-232 level (RS-232 if U37 mounted). **It is mapped to software device node ttyP3**.

Pin#	Definition	Note
1	GND	Digital Ground
2	RX	Data receive (TTL or RS-232 level)
3	TX	Data transmit (TTL or RS-232 level)
4	VCC	Power output (Default 3.3V, 5V option)

Note: J33/J34/J36/J37 are SPI extended serial ports, which conflict with TF and default is TF card function.

➢ J38 Keypad and Switch Header

[J38] Keypad and Switch header (DIP 2.0mm-Square pad is pin 1).

Pin#	Definition	Pin#	Definition
1	3V3	2	LED+
3	GND	4	LED-
5	RES-	6	PW+
7	RES+	8	PW-
9	K1	10	K2
11	K3	12	K4
13	GND	14	GND

15	K5	16	K6
17	K7	18	K8

As shown below: Pin 6 and 8 as short press to turn screen on or off and long press to power down (software support required); Pin 5 and 7 as reboot; Pin 2 and 4 as LED indicator (or use pin1 and 3 directly). K1 as Volume Up, K2 as Volume Down, K3 as Sleep/Wake, K4 as Return, K5 as HOME (software support required), K6 ~ K8 as customized signal.

If K1~K8 are opened as GPIO, the corresponding numbers are as shown in the table below **(note: signals are multiplexed).**

Pin#	Definition	IO#	IO-Net	Muxed
9	K1	470	GPIOA_10	CM_PWRDN
10	K2	471	GPIOA_11	CM_RESET
11	K3	498	GPIOAO_2	TP_SCL
12	K4	499	GPIOAO_3	TP_SDA
15	K5	465	GPIOA_5	TP_INT
16	K6	435	GPIOH_8	4G_RST
17	K7	502	GPIOAO_6	IR_IO
18	K8	459	GPIOC_7	IR_LED

17-K7	15-K5	13-GND	11-K3	9-K1	7-RES+	5-RES-	3-GND	1-3V3
18-K8	16-K6	14-GND	12-K4	10-K2	8-PW-	6-PW+	4-LED-	2-LED+

➢ J39 Line Input Header

[J39] Audio line input header (SIP 1.25mm-Square pad is pin 1).

Pin#	Definition	Note
1	RIN	Line input right channel
2	GND	Audio Ground
3	LIN	Line input left channel

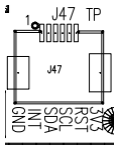
➢ J40 Microphone Input Header

[J40] Microphone input header (SIP 1.25mm-Square pad is pin 1).

Pin#	Definition	Note
1	GND	Audio Ground
2	MIC	Mono microphone input

➢ J47 I2C FPC Header

[J47] I2C Bus Header (FPC-0.5mm Bottom Contact Triangle Pin-1).



Pin#	Definition	Note
1	GND	Digital Ground
2	INT	Interrupt input (3.3V level)
3	SDA	I2C Bus data signal
4	SCL	I2C Bus clock signal
5	RST	Mainboard reset output (3.3V level)
6	3V3	Power output supply 3.3V

➢ J48 POE PD Header

[J48] POE PD Header (SIP 2.0mm-Square pad is pin 1)

Pin#	Definition	Note
1	CT4	Transformer Center4
2	CT3	Transformer Center3
3	CT2	Transformer Center2
4	CT1	Transformer Center1

Note: The power supply of the POE powered interface comes from the J21 Ethernet port. This interface is connected to the POE powered conversion board for 12V power supply conversion. The current size of the 12V power supply is affected by the power supply capability of the POE switch and the conversion capability of the adapter board. The typical current is 1 ~1.5A. This interface supports POE power supply equipment with 1/2 wires of the network cable being positive and 3/6 wires being negative. It can also be connected to POE power supply equipment with 4/5 wires of the network cable being positive and 7/8 wires being negative.

➢ J51 ADC Input Header

[J51] ADC input header (SIP 1.25mm-Square pad is pin 1).

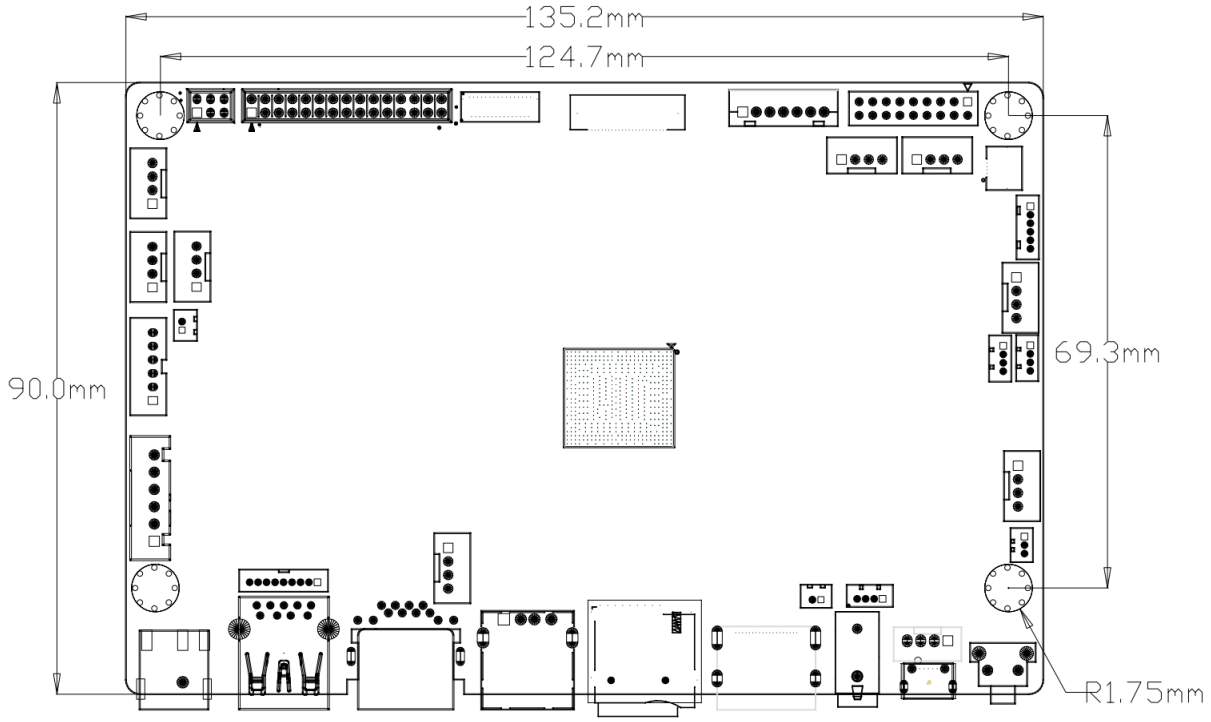
Pin#	Definition	Note
1	GND	Audio Ground
2	ADC	1.8V Level ADC input

➢ SW1 Recovery Mode Button

[SW1] On-board recovery mode button. First press and then hold for about 3-second while power on will enter the recovery mode.

5 Physical Size

The PCB size is 135.2mm*90mm and the fixing hole diameter is 3.5mm. The corresponding physical size parameters are shown in the figure below. For detailed size information, please consult the manufacturer for DXF file.



6 Assemble Precautions

Please note the following key points when using the K-A311D mainboard:

1. Relative humidity of this product: 10% to 90%, no condensation.
2. The working temperature of this product: -20°C ~ 70°C.
3. This storage temperature of this product: -40°C ~ 70°C.
4. Anti-static treatment is required during assembly and transportation of this product.
5. The board interface connection cable must not be too long. Otherwise, the signal quality may be affected.
6. Never allow the board to be distorted or heavily stressed during assembly.
7. Do not short circuit between mainboard and other peripherals.
8. When connecting to external LVDS or EDP LCD screen, pay attention to whether the screen voltage and current meet the requirements, and pay attention to the screen connector pin-1 direction.
9. When connecting to external LVDS or EDP LCD screen, pay attention to whether the backlight voltage and current meet the requirements. **If the LCD backlight power is above 20W, it is recommended to use a separate power board for backlight power supply.**
10. When connecting to peripherals using USB, GPIO, Serial, I2C, SPI, etc., pay attention to whether the IO voltage level and current of the peripheral meet the requirements. When using the power pin on these connectors to supply power to the external circuit, the regular power pin must not exceed 100mA, and the USB power pin must not exceed 500mA. When the serial port is connected to peripherals, level matching is also required. (3.3V TTL level, RS-232 level and RS-485 level)
11. Please connect the power to the power input socket or connector, and evaluate whether the current of the whole board meets the requirements according to the total peripherals. It is strictly forbidden to directly supply power from the backlight connector.
12. The communication module should be mounted at least 5mm away from the metal housing to avoid signal interference.

7 Software Guide

The internal serial port and extended serial port software port numbers of the K-A311D motherboard are as follows:

Port	Software Device Node
J22	/dev/ttyS0
J27	/dev/ttyS3
J32	/dev/ttyS4
J33	/dev/ttyP0 or /dev/ttyS5
J34	/dev/ttyP1 or /dev/ttyS6
J36	/dev/ttyP2 or /dev/ttyS7
J37	/dev/ttyP3 or /dev/ttyS8