

UPC-3568 Mainboard Specification

Document Version

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Changelog

1.0.0	2022-11-21	Chinese and English merged version.
1.0.1	2023-04-26	Update the NPU to 1Tops, add the mainboard back picture, and add the definition of J8 and J43 interfaces.
1.0.2	2023-06-01	Update COM5, COM7, and COM8 default RS-232 communication, adding OpenHarmony 3.2 to the operating system

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1 RK3568 Brief

RK3568 chip has the characteristics of high performance and high expansion application. At present, it is the most cost-effective chip in the Rockchip product line, and its hardware specifications are in a leading position in the industry.

- CPU: Quad-core 64-bit Cortex-A55 architecture, built on high-end 22nm technology, up to 2.0GHz.
- GPU: ARM Mali-G52 2EE, support OpenGL ES 1.1/2.0/3.2, OpenCL 2.0, Vulkan 1.1, embedded high performance 2D acceleration hardware.
- NPU: Support 1Tops work force.
- Multimedia: Support 4K 60fps H.265/H.264/VP9 video decoding; Support 1080P 100fps H.265/H.264 video coding; Supports 8M ISP and HDR.
- Display: Supports multiple screen display; Support EDP/HDMI2.0/MIPI/LVDS/24bit RGB/T-CON
- Interface: Support USB2.0/USB3.0/PCIE3.0/PCIE2.1/SATA3.0/QSGMII



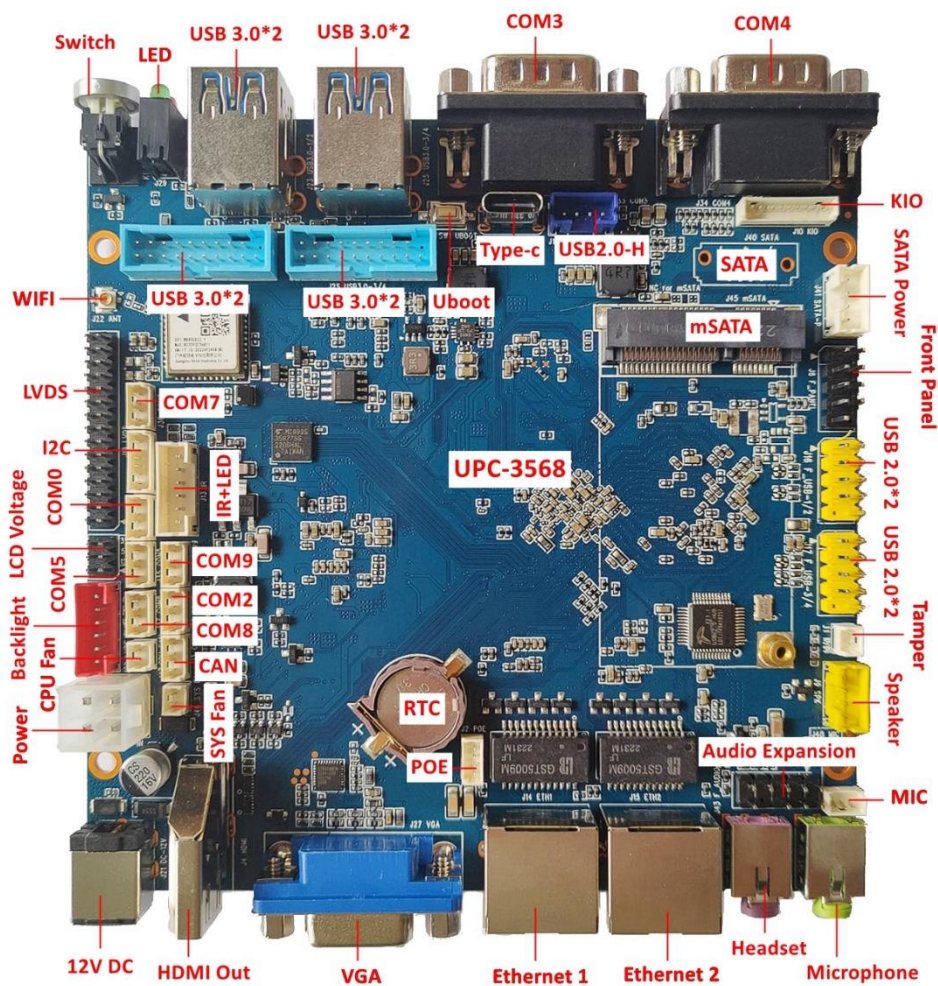
***Related functions are internal features of the CPU. For details about whether the mainboard supports these functions, see the corresponding interface descriptions.**

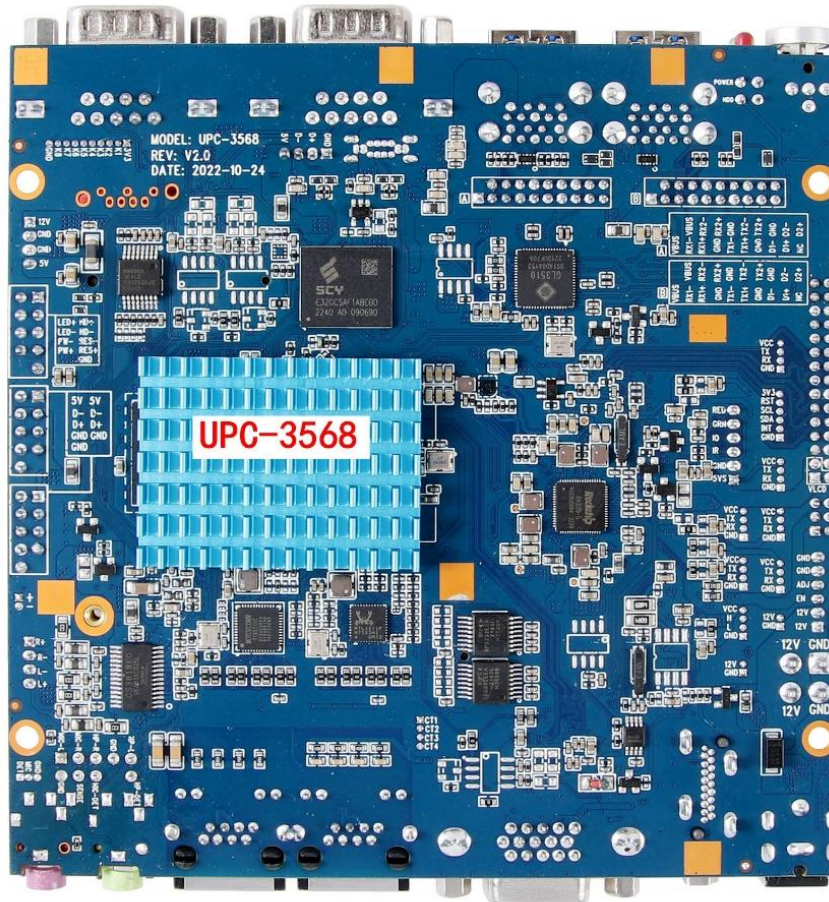
2 Product Overview

UPC-3568 mainboard is based on Rockchip RK3568 high-performance application processor platform. RK3568 is a low power, high performance processor for computing, personal mobile internet devices and other smart device applications. It integrates quad-core Cortex-A55 clocked at up to 2.0GHz, with superior computing performance, 2D/3D graphics processing capabilities and Full HD video codec capabilities. It perfectly supports 4Kx2K@60fps decoding and 4Kx2K HDMI output.

This mainboard is specially designed for **Self-Service Terminal** 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.

UPC-3568 V2.0 mainboard actual interface diagram as shown below.





3 Specification List

UPC-3568's system functions and interface features are shown in the following table.

Function & Interface	Detailed Description
CPU	RK3568 Cortex-A55 quad-core, up to 2.0GHz
DDR	LPDDR4 2GB (4GB 8GB optional)
Storage	The default comes with an 16GB EMMC NAND chip that can scale up to 128GB
HDMI Output	HDMI 2.0a standard display interface supports up to 4K output
LVDS	30-pin industry-standard dual LVDS supporting VESA/JEITA format up to 1080P output
VGA Output	Industry-standard DB-15 and 9-pin header VGA output up to 1080P
Amplifier output	8 Ohm 6W Dual Audio Amplifier Output
Headphone Output	Stereo Headphone Output (Audio Jack)
MIC Input	Differential MIC input (Audio Jack)
USB Interface	4 horizontal connectors (USB Host 3.0x4), 5 pin headers (USB Hub 2.0x4 and USB Host 2.0x1 direct), 4 pin headers USB3.0 (reuse), 1 Type-C socket (burn/debug port)
Serial Port	2 DB-9 serial port (reuse), with signal & power isolation; 1 TTL, 4 TTL/RS-232 compatible, 1 TTL/RS-485 compatible
USB Camera	Support USB camera within 8 million pixels
WiFi	Built-in high performance SDIO interface WiFi6 module, support IEEE 802.11 a/b/g/n/ac/ax. The default WiFi is 2.4G/5GHz.
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 v5.0
Ethernet	2 port 10/100/1000M Adaptive Ethernet RJ45 connector
Backlight Control	Industry standard LCD backlight control header, support for backlight switch and brightness adjustment
Infrared RC	Standard infrared receiver pin header
GPIO Signals	8-way GPIO signals for such as GPIO buttons and/or 3.3V digital input/output
Tamper Port	1 Tamper control port
I2C Bus	I2C pin header for I2C capacitive screen and etc
CAN Bus	1 CAN pin header for CAN Bus peripherals
SATA HD	Standard SATA 3.0 hard disk port with power supply header
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 (120mm*120mm*18mm), PCB top side height 16mm
Operating System	Recommended Android 11, Linux Buildroot/Debian 10/Ubuntu-18.04 and OpenHarmony 3.2 optional

4 Interface Definition

➤ J2 POE PD Header

[J2] POE PD Header (SIP 1.25mm-Square pad is pin 1)

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

Note: The power supply for the POE receiver port comes from the J14 Ethernet port. This port is connected to the external POE receiver board for 12V power supply conversion. The current of the 12V power supply depends on the power supply capability of the POE switch and the conversion capability of the conversion board. This port supports a POE power supply device with 1/2 positive and 3/6 negative cables, or a POE power supply device with 4/5 positive and 7/8 negative cables.

➤ J3 CAN Header 1

[J3] CAN Header 1 (SIP 1.25mm-Square pad is pin 1)

Pin#	Definition	Note
1	GND	Digital Ground
2	L	L Data
3	H	L Data
4	VCC	Power output (Default 3.3V, 5V option)

➤ J4 HDMI Output Socket

[J4] Standard HDMI 2.0 Output Socket.

➤ J5 I2C Bus Header

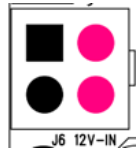
[J5] I2C Bus Header (SIP 1.25mm-Square pad is pin 1).

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	3V3	Power output supply 3.3V

➤ J6 DC-12V Input Header

[J6] DC-12V Input Header (SIP 2.54mm-Square pad is pin 1), it is the same to J21 Jack.



Pin#	Definition	Note
1	GND	Power GND
2	GND	Power GND
3	12V	Power Input
4	12V	Power Input

➤ J8 Front Panel Header

[J8] Front Panel Header (DIP 2.54mm-Square pad is pin 1).

Pin#	Definition	Note	Pin#	Definition	Note
1	HD+	Running indicator light+	2	LED+	Power indicator light+
3	HD-	Running indicator light-	4	LED-	Power indicator light-
5	RES-	Reset-	6	PW-	Power switch-
7	RES+	Reset+	8	PW+	Power switch+
9	GND	Digital Ground	10		Null

➤ J9 Speaker Header

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

Pin#	Definition	Note
1	OUTP_R+	Speaker right channel +
2	OUTN_R-	Speaker right channel -
3	OUTN_L-	Speaker left channel -
4	OUTP_L+	Speaker left channel +

➤ J10 Keypad and IO Header

[J10] Keypad and IO header (SIP 1.25mm-Square pad is pin 1).

Pin#	Definition	Note
1	3V3	3.3V Supply
2	K1	Keypad/IO [Software number 88]
3	K2	Keypad/IO [Software number 89]
4	K3	Keypad/IO [Software number 90]
5	K4	Keypad/IO [Software number 91]
6	K5	Keypad/IO [Software number 107]
7	K6	Keypad/IO [Software number 108]
8	K7	Keypad/IO [Software number 109]
9	K8	Keypad/IO [Software number 110]
10	GND	Digital Ground

Note: All KIO signals can be adjusted to regular GPIO via a separated software version (level is 3.3V); by default K1 Volume+/K2 Volume-/K3 Standby/K4 Exit/K5 Home, K6 ~ K8 as customized signal.

➤ J11 USB OTG Header

[J11] USB 3.0 Type-C Socket, this port should only be used as system burn or ADB connection.

➤ J12 USB 2.0 Host Direct Header

[J12] USB 2.0 Host Direct 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

➤ J13 Remote Control & LED Header

[J13] 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	RED	Standby indicator for external red LED

➤ J14 RJ45 Gigabit Ethernet Jack

[J14] RJ45 Gigabit Ethernet Jack.

➤ J15 RJ45 Extended Gigabit Ethernet Jack

[J15] RJ45 Extended Gigabit Ethernet Jack.

➤ J16 USB 2.0 DIP Header

[J16] USB 2.0 header (DIP 2.54mm-Square pad is pin 1).

Pin#	Definition	Note	Pin#	Definition	Note
1	5V	Power output 5V	2	5V	Power output 5V
3	D-	USB Differential Data+	4	D-	USB Differential Data+
5	D+	USB Differential Data-	6	D+	USB Differential Data-
7	GND	Digital Ground	8	GND	Digital Ground
9		Null	10	GND	Digital Ground

➤ J17 USB 2.0 DIP Header

[J17] USB 2.0 header (DIP 2.54mm-Square pad is pin 1).

Pin#	Definition	Note	Pin#	Definition	Note
1	5V	Power output 5V	2	5V	Power output 5V
3	D-	USB Differential Data+	4	D-	USB Differential Data+
5	D+	USB Differential Data-	6	D+	USB Differential Data-
7	GND	Digital Ground	8	GND	Digital Ground
9		Null	10	GND	Digital Ground

➤ J19 LVDS Header

[J19] Dual LVDS header (DIP 2.0mm-Triangle tag is pin 1).

Pin#	Definition	Pin#	Definition
1	VLCD	2	VLCD
3	VLCD	4	GND
5	GND	6	GND
7	RX00-	8	RX00+

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+

➤ 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, external 12V is recommended
3	EN	The default output is 5V
4	ADJ	3.3V square wave (1KHz Freq.)
5	GND	Power Ground
6	GND	Power Ground

Note: If the external DC input power exceeds 12V, make sure that the backlight part of the LCD screen can withstand the corresponding voltage.

➤ J21 DC-12V Jack

[J21] DC-12V power socket, positive outer and negative inner, inner pin diameter 2.0mm, outer ring diameter 5.5mm.

➤ J22 WiFi Antenna IPEX

[J22] Standard IPEX 3dBi antenna connector (Φ2.0mm).

➤ J23 Double USB 3.0 Socket

[J23] Standard Double USB 3.0 Type A Socket.

➤ J24 USB 3.0 Extension Interface

[J24] USB 3.0 DIP header (DIP 2.0mm-Square pad is pin 1).

Pin#	Definition	Pin#	Definition
1	VBUS	20	空
2	RX1-	19	VBUS
3	RX1+	18	RX2-
4	GND	17	RX2+
5	TX1-	16	GND
6	TX1+	15	TX2-
7	GND	14	TX2+
8	D1-	13	GND
9	D1+	12	D2-
10	NC	11	D2+

Note: The USB interface is connected to the 1x4 Hub group of USB3.0, and the signal and J23 are the same group, and the two cannot be connected at the same time.

➤ J25 Double USB 3.0 Socket

[J25] Standard Double USB 3.0 Type A Socket.

➤ J28 USB 3.0 Extension Interface

[J28] USB 3.0 DIP header (DIP 2.0mm-Square pad is pin 1).

Pin#	Definition	Pin#	Definition
1	VBUS	20	空
2	RX1-	19	VBUS
3	RX1+	18	RX2-
4	GND	17	RX2+
5	TX1-	16	GND
6	TX1+	15	TX2-
7	GND	14	TX2+
8	D1-	13	GND
9	D1+	12	D2-
10	NC	11	D2+

Note: The USB interface is connected to the 1x4 Hub group of USB3.0, and the signal and J25 are the same group, and the two cannot be connected at the same time.

➤ J29 Dual-Tier LED

[J29] User defined dual-tier LED. Lower power LED light (on the power); Upper level LED lights (flicker controlled by software after turning on).

➤ J31 Data Serial Port 0

[J31] Built-in Serial Port 0 (SIP 1.25mm-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 U9825 mounted). **The related software device node name is ttyS0.**

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)

➤ J32 Data Serial Port 2

[J32] Built-in Serial Port 2 (SIP 1.25mm-Square pad is pin 1). The output level is TTL only. **The related software device node name is ttyS2.**

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

Note: If you need to use the debugging serial port as a data serial port, 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).

➤ J33 DB-9 Serial Port 3

[J33] DB-9 male built-in Serial Port 3. The output level is RS-232 by default and it could be setup to RS-485 if required (RS-232 if U9016 mounted, RS-485 if U67 mounted). **The related software device node name is ttyS3.**

Pin#	Definition	Note
1	NC	Not Connected

2	RX	Data receive (RS-232 level)
3	TX	Data transmit (RS-232 level)
4	NC	Not Connected
5	GND	Digital Ground
6	NC	Not Connected
7	NC	Not Connected
8	NC	Not Connected
9	NC	Not Connected

Note: This port is completely isolated from the signal and power supply and can be used in industrial environments.

➤ J34 DB-9 Serial Port 4

[J34] DB-9 male built-in Serial Port 4. The output level is RS-232 by default and it could be setup to RS-485 if required (RS-232 if U9016 mounted, RS-485 if U9843 mounted). **The related software device node name is ttyS4.**

Pin#	Definition	Note
1	NC	Not Connected
2	RX	Data receive (RS-232 level)
3	TX	Data transmit (RS-232 level)
4	NC	Not Connected
5	GND	Digital Ground
6	NC	Not Connected
7	NC	Not Connected
8	NC	Not Connected
9	NC	Not Connected

Note: This port is completely isolated from the signal and power supply and can be used in industrial environments.

➤ J35 Data Serial Port 5

[J35] Built-in Serial Port 5 (SIP 1.25mm-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 U9825 mounted). **The related software device node name is ttyS5.**

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)
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➤ J36 Data Serial Port 7

[J36] Built-in Serial Port 7 (SIP 1.25mm-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 U9826 mounted). **The related software device node name is ttyS7.**

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)

➤ J37 Data Serial Port 8

[J37] Built-in Serial Port 8 (SIP 1.25mm-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 U9826 mounted). **The related software device node name is ttyS8.**

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)

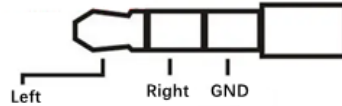
➤ J38 Data Serial Port 9

[J38] Built-in Serial Port 9 (SIP 1.25mm-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 U9823 mounted). **The related software device node name is ttyS9.**

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

➤ J39 3-Pole HP OUT Jack

[J39] 3-Pole 3.5mm Headphone Jack (CTIA Standard jack). It supports insert detection for speaker mute.



➤ J40 SATA Hard Disk Socket

[J40] SATA 3.0 Hard Disk Standard 7-Pin Data Cable Socket.

Note: J40 and J45 are the same set of SATA signals and cannot be used at the same time.

➤ J41 SATA Power Supply Header

[J41] SATA Power Supply Header (SIP 2.0mm-Square pad is pin 1)

Pin#	Definition	Note
1	12V	Power output 12V
2	GND	Power Ground
3	GND	Power Ground
4	5V	Power output 5V

Note: The maximum output current of 12V and 5V is not more than 1A. If the power supply is insufficient for a 3.5-inch hard disk, it is recommended to connect to an external power supply.

➤ J42 MIC IN Jack

[J42] 3.5mm Microphone Jack. Support for 2 and 3 segment microphones.

➤ J43 Audio Extension Interface

[J43] Audio Line Output (DIP 2.54mm-Square pad is pin 1).

Pin#	Definition	Note	Pin#	Definition	Note
1	MIC-L	Analog left channel microphone input	2	GND	Audio Ground
3	MIC-R	Analog right channel microphone input	4	SENSE	Front audio induction signal
5	HP-R	Analog stereo output right channel	6	MIC-DEL	Front microphone detect signal
7	GND	Audio Ground	8		null
9	HP-L	Analog stereo output left channel	10	HP-DEL	Front headphone detect signal

➤ J44 LVDS Voltage Header

[J44] LVDS Voltage Header (DIP 2.0mm-Triangle tag is pin 1). If pin 1 and 2 are jumper shorted, the VLCD of J19 is 12V. If pin 3 and 4 are jumper shorted, the VLCD of J19 is 5V. If pin 5 and 6 are jumper shorted, the VLCD of J19 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. If the external DC input power exceeds 12V, ensure that the logical part of the LCD can withstand the corresponding voltage.

➤ J45 mSATA Socket

[J45] mSATA Socket. Support standard mSATA modules.

Note: J45 and J40 are the same set of SATA signals and cannot be used at the same time.

➤ J46 CPU Fan Power Header

[J46] CPU fan power header (SIP 1.25mm-Square pad is pin 1). It is controlled by GPIO #20 (Low active)

Pin#	Definition	Note
1	GND	Digital Ground
2	12V	12V output with on/off switch

➤ J47 SYS Fan Power Header

[J47] SYS fan power header (SIP 1.25mm-Square pad is pin 1). It is controlled by GPIO #21 (Low active)

Pin#	Definition	Note
1	GND	Digital Ground
2	12V	12V output with on/off switch

➤ SW1 Recovery Mode Button

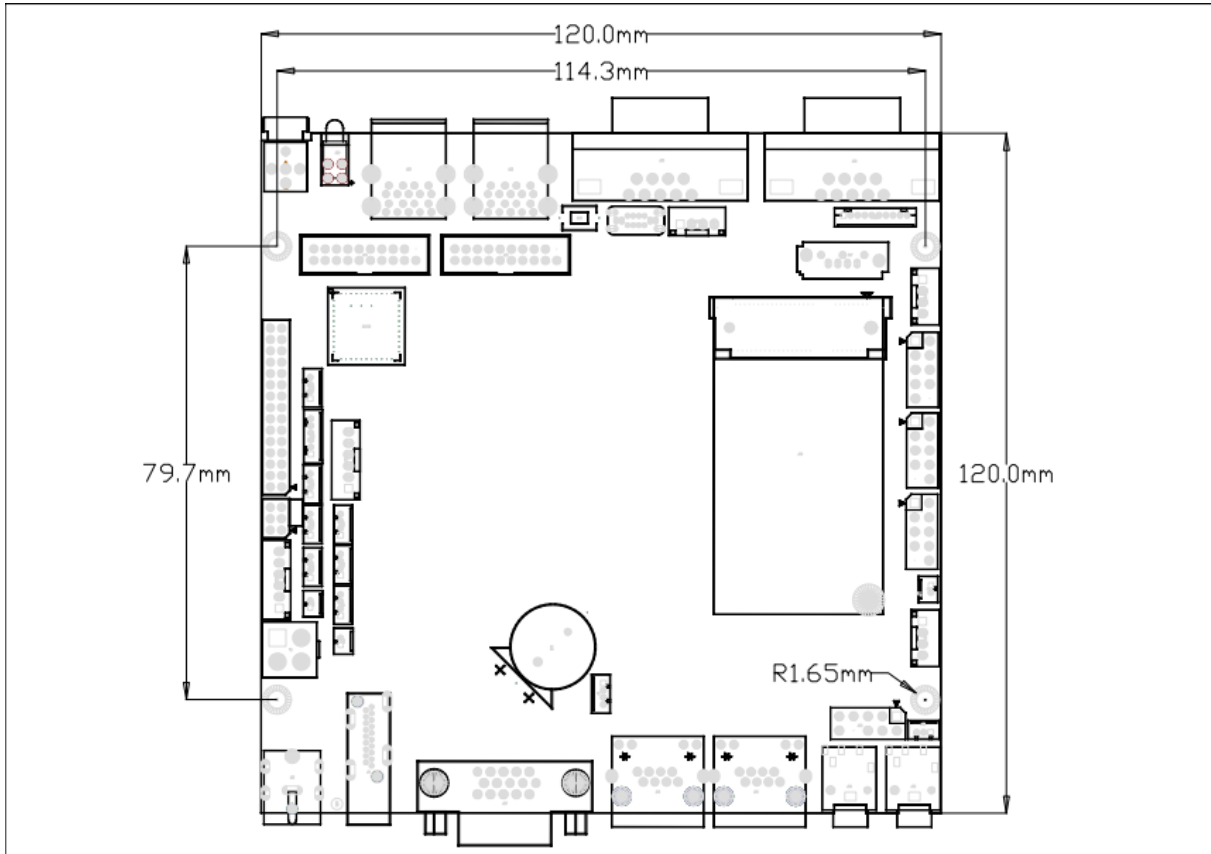
[SW1] On-board recovery mode button. First press and then hold for about 3-second while power on will enter the recovery mode.

➤ **K1 Switch Button with LED**

[K1] Switch Button with LED. Hardware switch; K1 power lamp can be turned on to control #154 high lighting.

5 Physical Size

The PCB size is 120mm*120mm, PCBA height is 16mm, fixed hole diameter is 3.3mm. 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 UPC-3568 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.
10. When connecting to peripherals using USB, GPIO, Serial, I2C, SPI, HDMI, 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.
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

UPC-3588 motherboard supports LVDS/HDMI/VGA any two output dual or triple screen display combination! For related output combinations, consult the manufacturer to provide corresponding abnormal patches.

The software port numbers of the serial ports and expansion serial ports on the UPC-3568 mainboard are as follows:

Port	Software Device Node
J31	/dev/ttyS0
J32	/dev/ttyS2
J33	/dev/ttyS3
J34	/dev/ttyS4
J35	/dev/ttyS5
J36	/dev/ttyS7
J37	/dev/ttyS8
J38	/dev/ttyS9