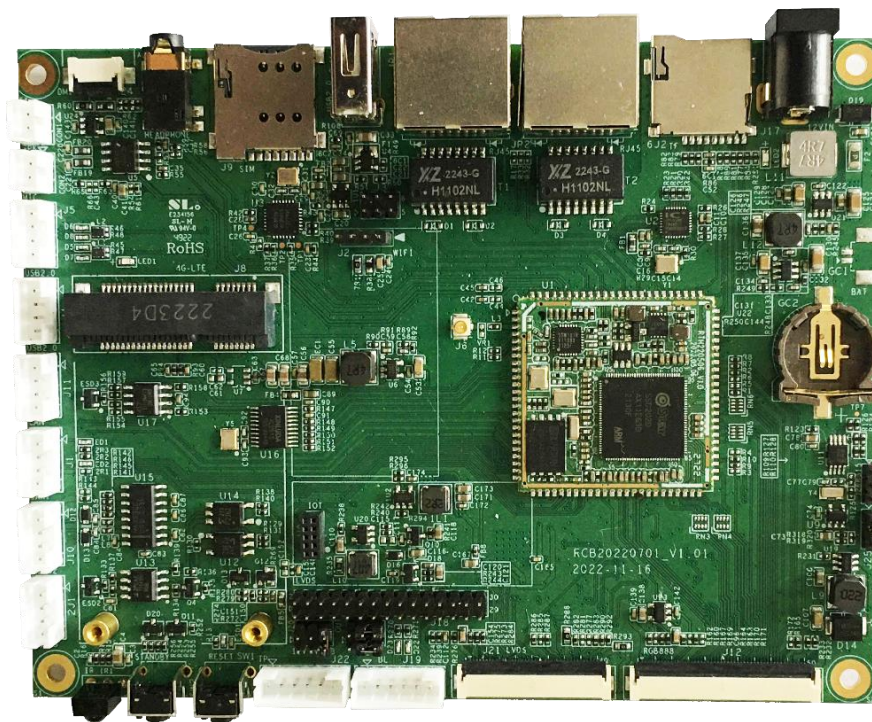


Development Board Hardware User Guide

MODEL:DB202



REVISION HISTORY

Version	Date	PCBA Version	Page	Description	AUTHOR
V1.0	2022/9/29	RTH220506_V1.0+RCB202 20701_V1.0	15	Hardware User Guide	
V1.01	2023/4/12	RTH220506_V1.0+RCB202 20701_V1.01	24	Fixed RS232 not working	

Website: www.geniatech.com

Address: Room 02-04, 10 / F, Block A, Building 8, Shenzhen International Innovation Valley, Dashi Road, Nanshan District, Shenzhen, Guangdong, China.

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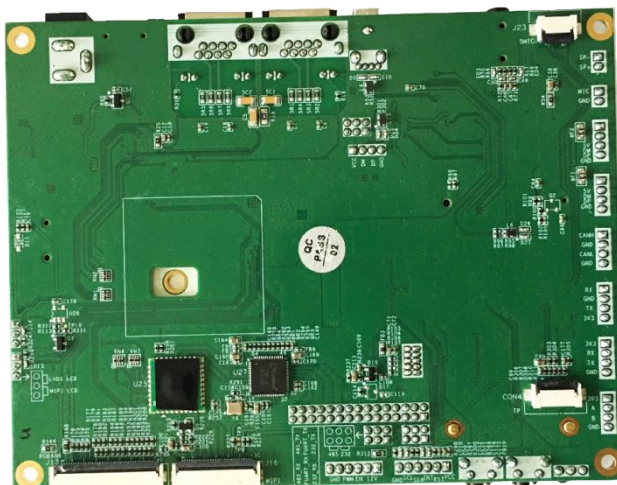
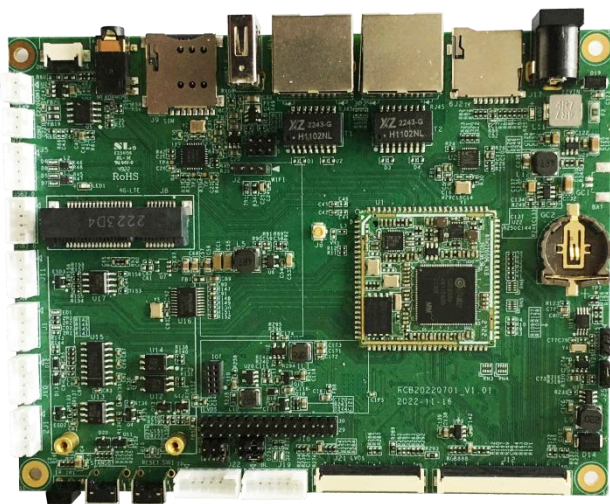
1. General Description

SSD20X is a highly integrated SoC chip from Sigmastar. It based on arm architecture (A7 dual core 1.2 GHz, integrates hardware H.264 / H.265 video decoder, built-in DDR, built-in 2 d graphics engine, support for TTL/MIPI display driver interface, built-in Ethernet MAC and PHY, etc., mainly used in intelligent building indoor machine, smart home control, small gateway, elevator floor indicator, the speech recognition application of household appliances, VOIP, coffee machine and so on many scenes with screen display.

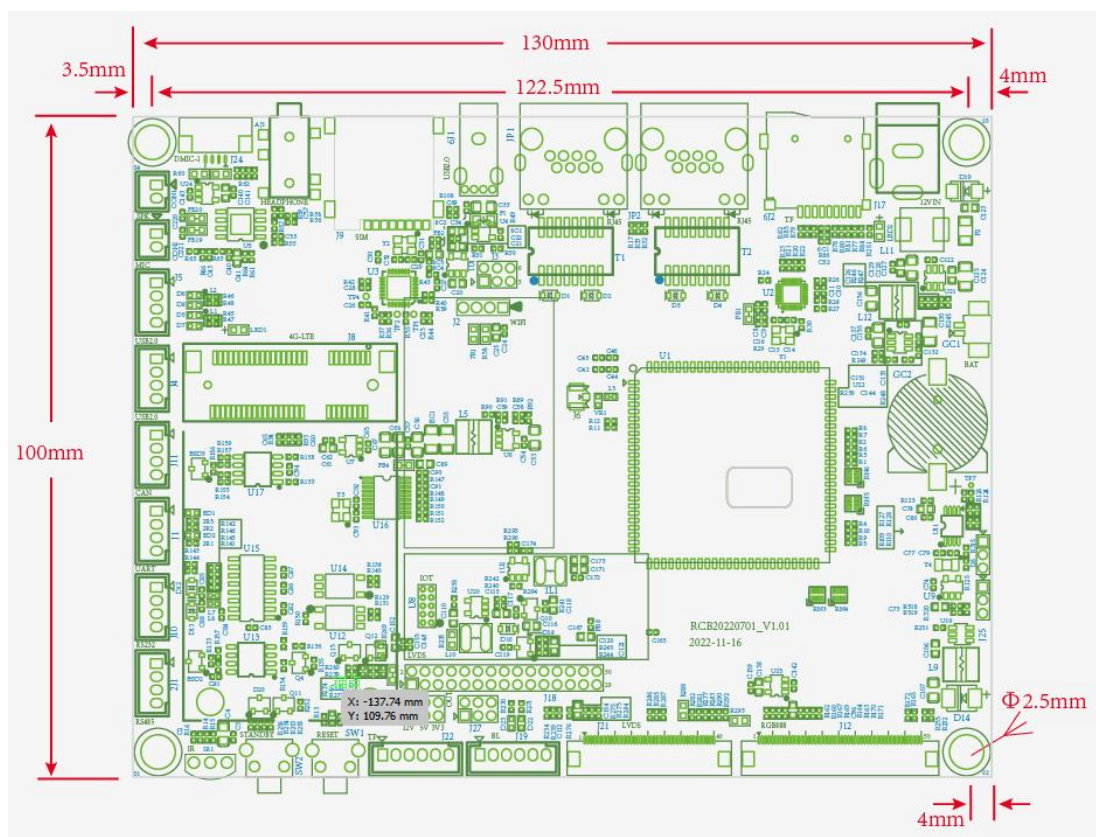
- Sigmastar SSD201/SSD202 with ARM Cortex-A7 Dual Core up to 1.2GHz
- 128MB RAM for SoM202 (64MB RAM for SoM201), 128MB/256MB Nand Flash
- Two 10/100M Ethernet
- Tiny Linux OS, 1s boot time
- Supports MIPI-DSI 4-lane interface. TTL supports the RGB666 or RGB888 format, and also supports the LVDS interface, with a maximum resolution of 1920 x 1080 FHD 60fps
- With rich interfaces such as I2C, UART, SPI, USB2.0, RMII, I2S(supports digital microphone array input), and others
- Support stereo input and output
- Support 8K/16K/48KHz sampling rate recording
- Stable operation at 0 °C-80 °C working temperature for 7X24 hours
- Designed for Commercial Application

2. Product pictures

Below pictures are for reference only:



3. Board view



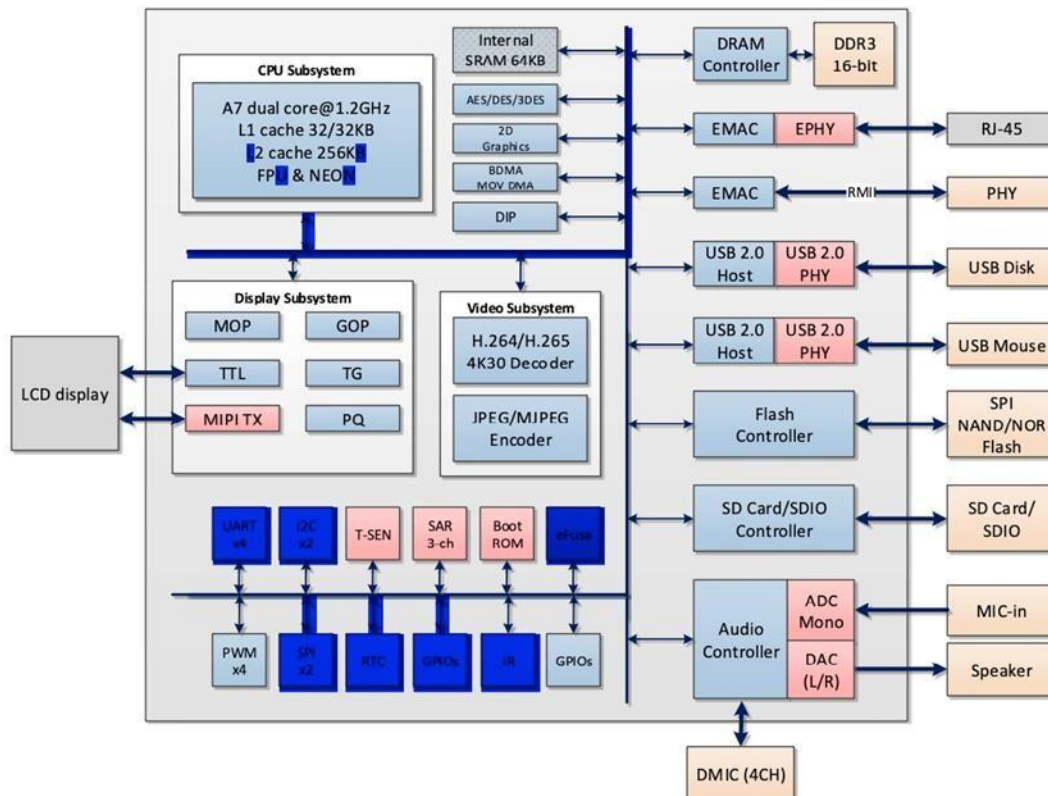
4.Features

CPU	Chip	SigmaStar SSD201/SSD202
	CPU Frequency	ARM® Cortex-A7 dual core up to 1.2GHz
Storage	Internal Memory	SoM202:DDR3 128MB SoM201: DDR2 64MB
	Internal Storage	1/2/4 bit SPI-NOR/SPI-NAND Flash 128MB/256MB/512MB
Network	2G/3G/4G/LTE	LTE for EU、LTE for AU、LTE for US(Optional)
	Built-in WiFi	802.11 a/b/g/n
	WiFi 2.4G Frequency Range	2.400~2.497GHz
	USB WiFi	Can delete built-in WiFi module,use external USB WiFi module.
	Ethernet port(LAN)	1*RJ45 10/100Mbps LAN(JP1) Default Ethernet port 1*RJ45 10/100Mbps (JP2),This network port is reused with the RGB display interface, and resistance hopping is required
Display	MIPI DSI	4-lane with max. 1.5Gbps and output up to FHD 60fps 30Pin FPC 0.5
	RGB	HD 60fps with RGB666 40Pin FPC 0.5
		HD 60fps with RGB888 format

		50Pin FPC 0.5	
	LVDS	Compatible with VESA and JEIDA standard Resolution Up to 1920x1080 60Hz or any other Resolution whose Pixel Clk less than 200MHz 40Pin FPC 0.5	
		Compatible with VESA and JEIDA standard Resolution Up to 1920x1080 60Hz or any other Resolution whose Pixel Clk less than 200MHz 2*15Pin 2.0	
	LVDS voltage	12V/5V/3.3V selection 6Pin 2.0 ranking	
Touch interface	Capacitive touch	6Pin2.0 ranking	
		6Pin FPC 0.5	
I/O interface	USB2.0	USB-A 2.0 x 1 Two 4Pin 2.0 ranking	
	CAN	4Pin 2.0 ranking	
	RS232	4Pin 2.0 ranking	Choose one of two functions
	RS485	4Pin 2.0 ranking	
	UART	4Pin 2.0 ranking	
Protocol	RS485	TIA485/EIA-485-A -7~+12V	
	CAN	ISO11898-2:2016 and SAE J2284-1 to SAE J2284-5 ESD Protection(8kV IEC and HBM) 5Mbit/s	
	UART	IO level 3.3V	
	RS232	±5~±15V	
Audio interface	AMIC	8K/16K/32K/48KHz sampling rate	
	DMIC	8K/16K/32K/48KHz sampling rate	
	1 x LINEOUT	8K/16K/32K/48KHz sampling rate	
IR Interface	1 x IR input	NEC code value	
Extended interface	LEDs	Power	
	SIM Slot	Micro SIM Card	
	SD Card	Micro SD Card	
	GTIoT	2*5P 1.27 socket	
	Debug	4P 2.0 ranking	
	Button	Reset,User-defined custom keys(Power Standby)	
Power pack	Supply voltage	DC12V 2A (4.5V~18V)	
	DC Interface	Φ5.5/2.1mm	
	Energy	Within 3W(No display screen for reference only)	
	RTC&Watchdog	3V	
Environment	Operating temperature	0℃- 80℃	
	Operating humidity	10%~90%	
Mechanical properties	Size (mm)	130*100	

	Net Weight (g)	90
Operating system(OS)	Linux kernel version: 4.9.84	UI flythings, littleVGL, miniGUI, QT
Other	WiFi antenna	

5.Sigmastar SSD20x Diagram



6.Support Formats

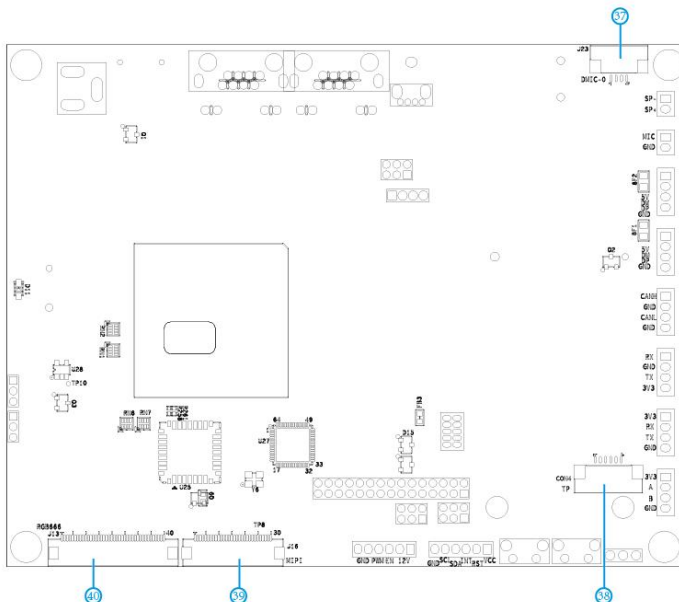
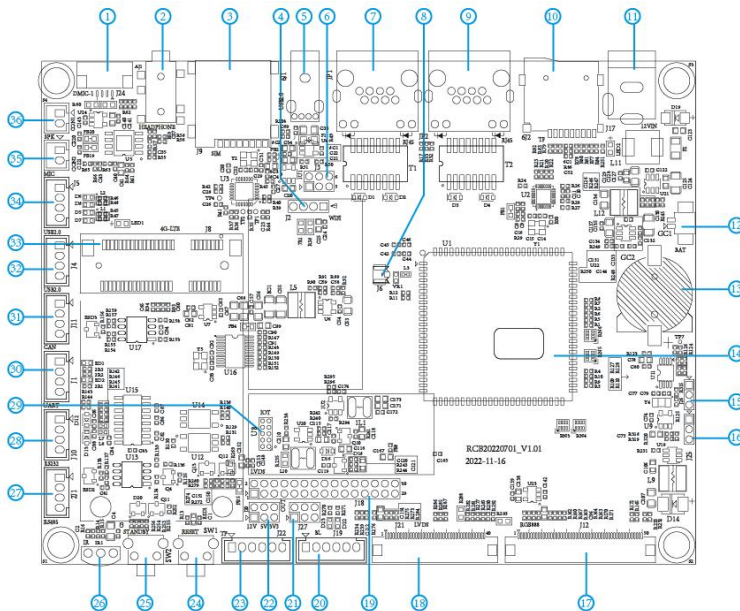
Video Decoder

- H.264/AVC Variable block size;CABAC/CAVLC;Support max.resolution FHD 1080P@60fps
- H.265/HEVC I/P/B slices;variable CTU size;High performance CABAC decoding;Support max.resolution FHD 1080P@60fps

JPEG Encoder

- Support JPEG baseline encoding
- Support YUV422 or YUV420 formats
- Support max. Resolution FHD(1920*1080) with 15fps

7.Extension GPIO definition



No.	Name	Description
1	DMIC interface	1*6Pin 0.5 FPC
2	Audio+Mic	1*3.5mm Jack
3	SIM Card Slot	1*Micro SIM Card
4	USB2.0-1	1*USB2.0 4Pin 2.0mm(For the USB WiFi modules)
5	USB2.0	1*USB2.0 Type A
6	USB2.0-1 Skipping selection	1* (2*3Pin 2.0mm)
7	LAN1	1*RJ45 10/100(LED)
8	WIFI ANT	1*IPXE Port
9	LAN2	1*RJ45 10/100(LED)
10	TF Card Slot	1*Micro SD Card
11	DC IN	1* DC IN (Φ5.5/2.1mm)
12	RTC Battery interface	1*2Pin
13	RTC Battery	CR1220 battery seat
14	SoM202	1*96Pin 1.0mm stamp package
15	WDT Function Selection	1*3Pin2.0mm
16	MIPI/LVDS Function Selection	1*3Pin2.0mm
17	RGB888	1*50Pin0.5mm FPC
18	LVDS	1*30Pin0.5mm FPC
19	LVDS	1*(2*15Pin2.0mm)
20	LCD Voltage	1*6Pin2.0mm
21	RS232/RS485 choose	1*(3*2Pin 2.0mm)
22	LCD Voltage choose	1*(3*2Pin 2.0mm)
23	I2C(TP)	1*6Pin2.0mm
24	Reset key	1*key
25	User-defined custom keys	1*key
26	IR Reception	1*IR
27	RS485	1*4Pin2.0mm
28	RS232	1*4Pin2.0mm
29	GTIoT	1*(2x5Pin1.27mm)
30	Debug UART	1*4Pin2.0mm
31	CAN	1*4Pin2.0mm
32	USB2.0-2	1*4Pin2.0mm
33	Mini PCIe	1*52Pin 8.5mm
34	USB2.0-3	1*4Pin2.0mm
35	AMIC	1*2Pin2.0mm
36	SPK	1*2Pin2.0mm
37	DMIC	1*6Pin0.5mm FPC
38	I2C(TP)	1*6Pin0.5mm FPC
39	MIPI	1*30Pin0.5mm FPC
40	RGB666	1*40Pin0.5mm FPC

8.Processor

Sigmastar SSD201/SSD202 is a highly integrated SOC. Based on ARM Cortex-A7 Dual Core up to 1.2GHz with Neon and FPU,Memory Management Unit for Linux support,DMA Engine; Embedded DDR2/DDR3 memory, integrates H.264/H.265 FHD (1920x1080)@30fps Decoder,JPEG Encoder FHD (1920x1080)@15fps,TTL /MIPI Display output FHD@60fps with 2D Graphics Engine.

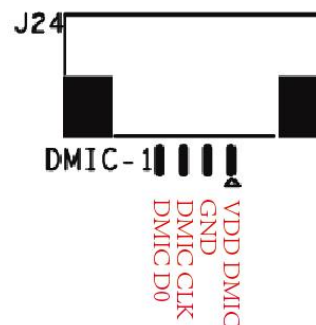
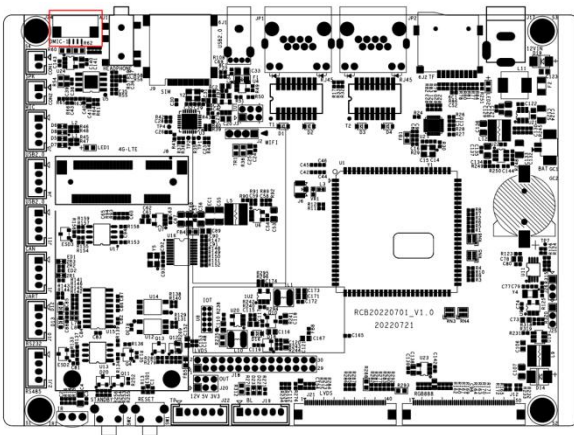
9. Memory

Sigmastar SSD201/SSD202 chip interior Embedded DDR2 or DDR3 memory,SSD201 integration 16-bit 512Mb DDR2 memory with max rate 1333Mbps,SSD202 integration 16-bit 1Gb DDR3 memory with max rate 1866Mbps.

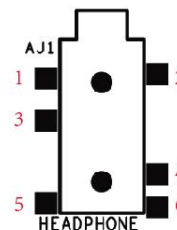
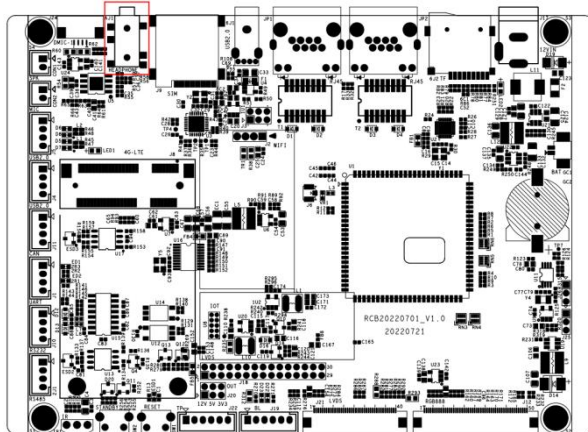
Supports 1/2/4-bit SPI-NOR / NAND (with ECC) flash with two chip selects,SPI-Nor flash supports 128Mb and 256Mb,Nand flash support 1Gb to 4Gb.

10. Internal connector/Port/Jumper

10.1 DMIC Interface(J24)

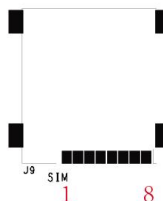
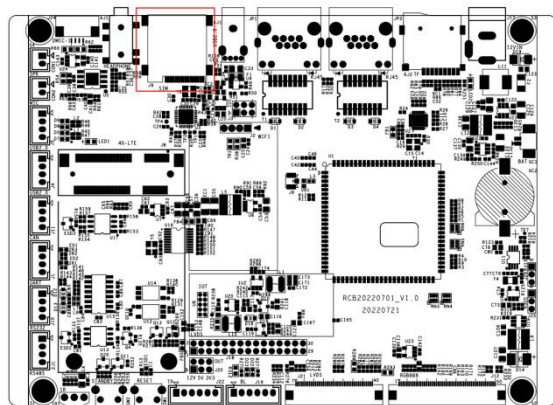


10.2 Audio+Mic Interface(AJ1)



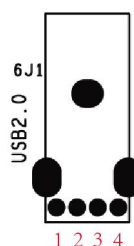
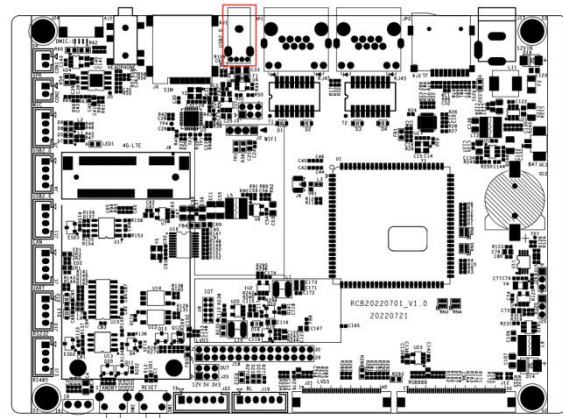
1	MIC_IN	2	GND
3	AUD_LINEOUT_R	4	NC
5	AUD_LINEOUT_L	6	AUD_LINEOUT_L

10.3 SIM Card(J9)



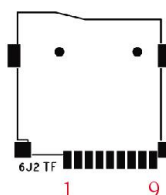
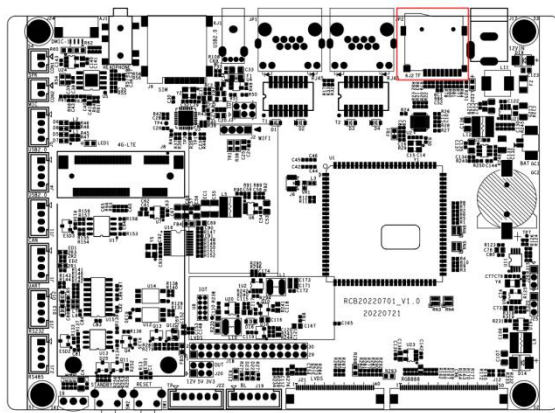
1	2	3	4
GND	UIM_VPP	UIM_DATA	NC
5	6	7	8
UIM_PWR	UIM_RST	UIM_CLK	NC

10.4 USB2.0-A(6J1)



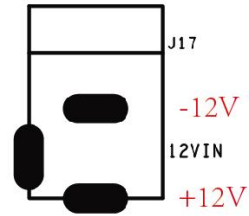
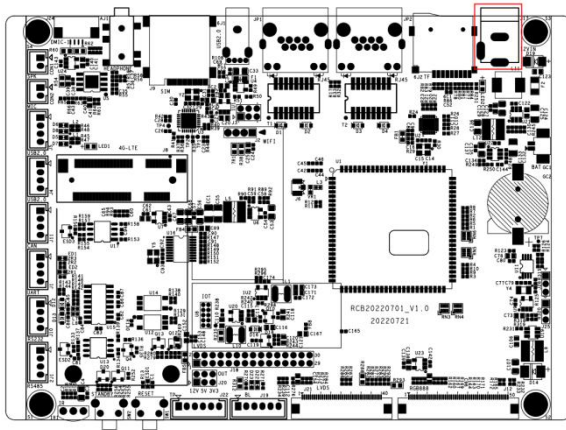
1	2	3	4
VDD_5V	USB_DM	USB_DP	GND

10.6 Micro SD Card(6J2)

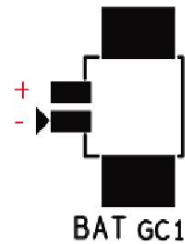
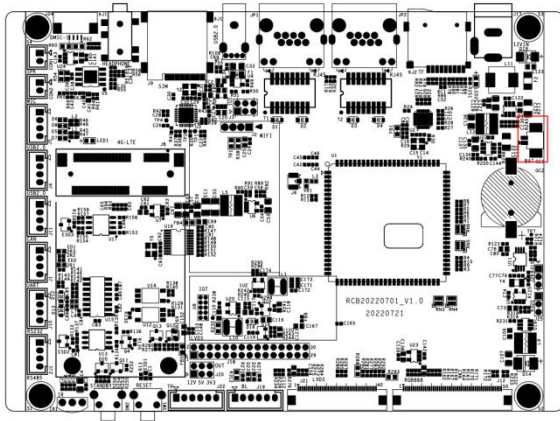


1	2	3	4	5
DATA2	DATA3	CMD	VDD	CLK
6	7	8	9	
GND	DATA0	DATA1	CD	

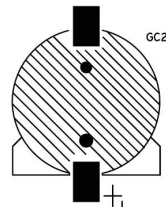
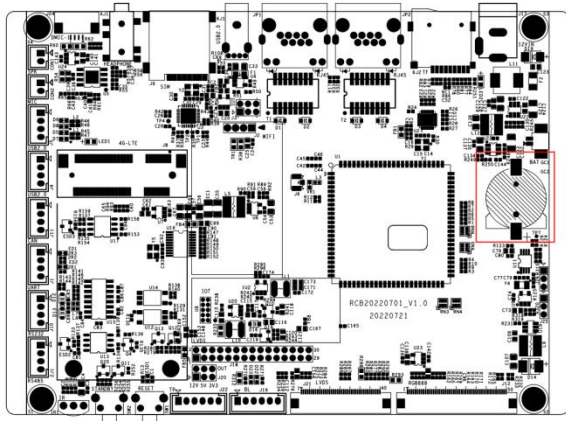
10.7 DC Jack(J17)



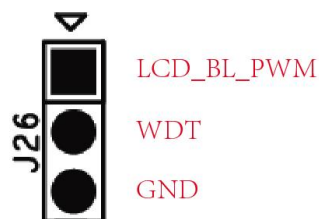
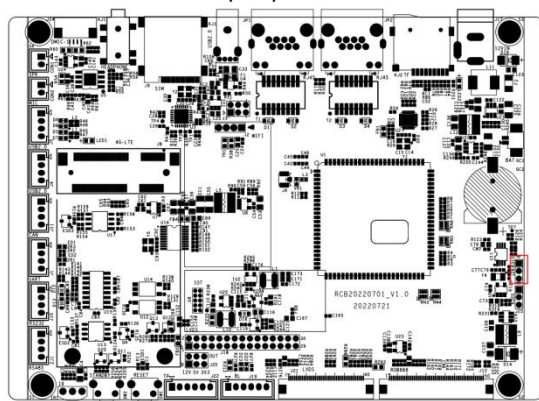
10.8 RTC battery port(GC1)



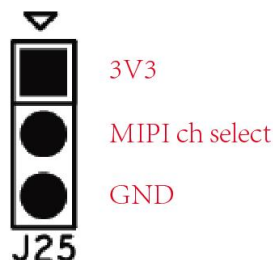
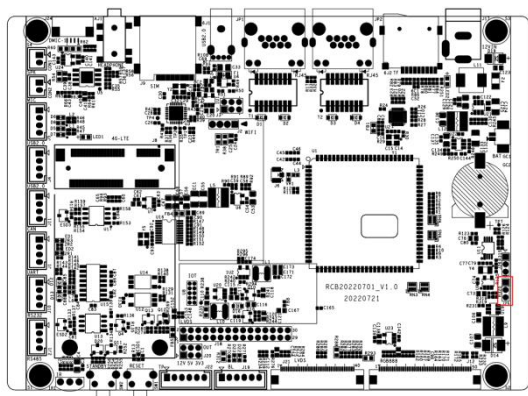
10.9 RTC battery(GC2)



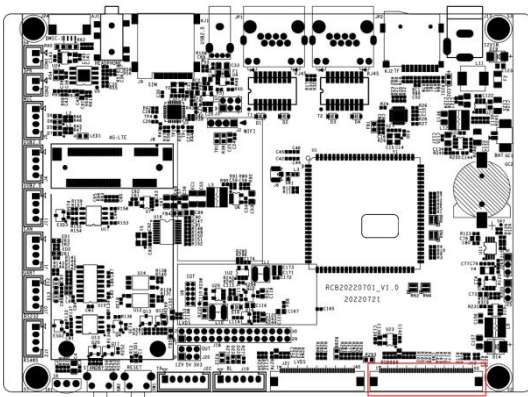
10.10 WDT Select(J26)



10.11 MIPI display output and LVDS display output select(J25)



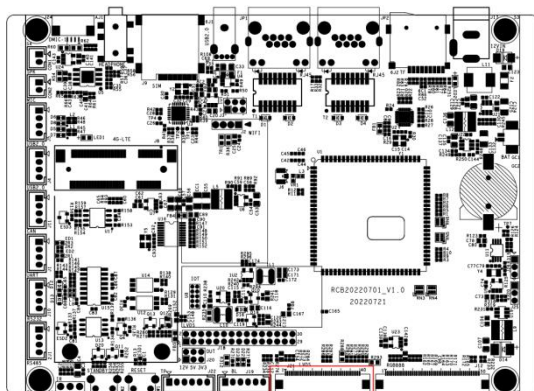
10.12 RGB888 display interface(J12)



Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name
1	LCD 1V8	2	LCD 1V8	3	GND	4	DITHB
5	VCOM 3.7V	6	NC	7	RGB Reset	8	LCD VDDA 10.4V
9	VGL -7V	10	VGH 16V	11	INV UD	12	EDGSL RL
13	GND	14	LCD PCLK	15	GND	16	LCD R0
17	LCD R1	18	LCD R2	19	LCD R3	20	LCD R4
21	LCD R5	22	LCD R6	23	LCD R7	24	LCD G0
25	LCD G1	26	LCD G2	27	LCD G3	28	LCD G4
29	LCD G5	30	LCD G6	31	LCD G7	32	LCD B0

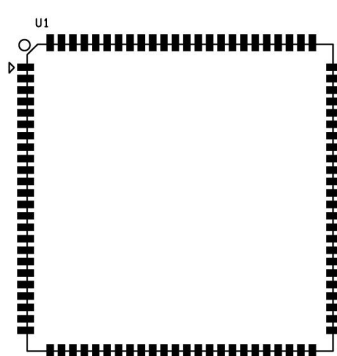
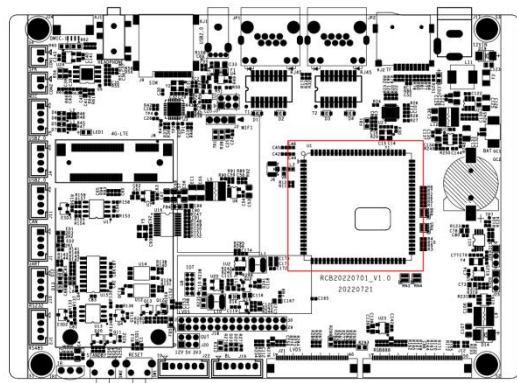
33	LCD B1	34	LCD B2	35	LCD B3	36	LCD B4
37	LCD B5	38	LCD B6	39	LCD B7	40	LCD HSYNC
41	LCD VSYNC	42	LCD DE	43	MODE	44	3V3
45	VCOM 3.7V	46	GND	47	BL LED-	48	BL LED-
49	BL LED+	50	BL LED+				

10.13 LVDS display interface(J21)

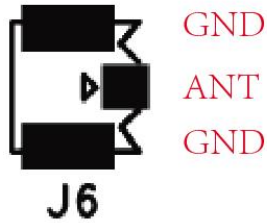
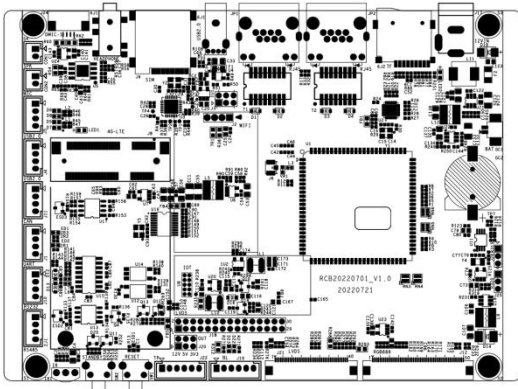


Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name
1	VCOM	2	3V3	3	3V3	4	NC
5	LVDS Reset	6	STBYB	7	GND	8	LVDS LB0N
9	LVDS LB0P	10	GND	11	LVDS LB1N	12	LVDS LB1P
13	GND	14	LVDS LB2N	15	LVDS LB2P	16	GND
17	LVDS LBCN	18	LVDS LBCP	19	GND	20	LVDS LB3N
21	LVDS LB3P	22	GND	23	NC	24	NC
25	GND	26	NC	27	NC	28	SELB
29	LCD VDDA	30	GND	31	BE LED-	32	BE LED-
33	L/R	34	U/D	35	VGL	36	NC
37	NC	38	VGH	39	BE LED+	40	BE LED+

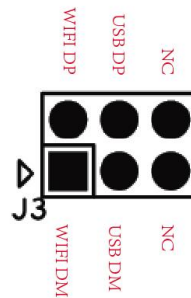
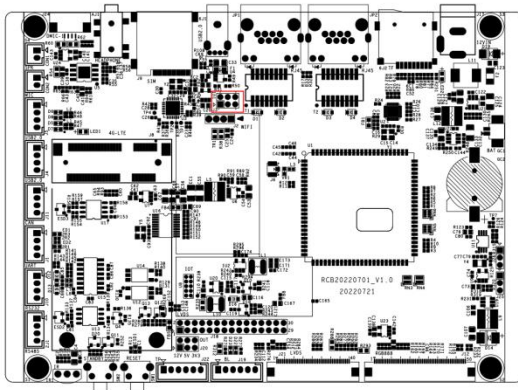
10.14 SoM core board (U1)



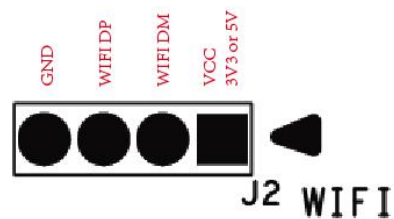
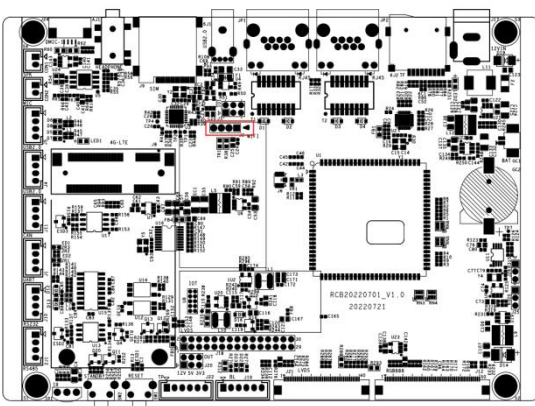
10.15 WiFi antenna(J6)



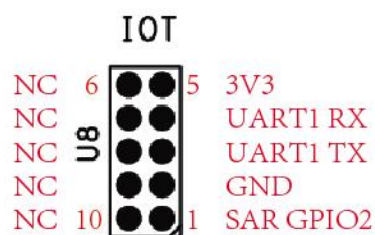
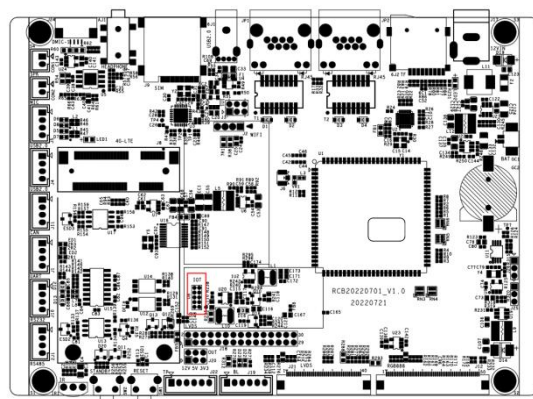
10.16 USB WiFi module interface selection (J3)



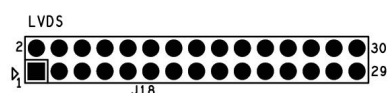
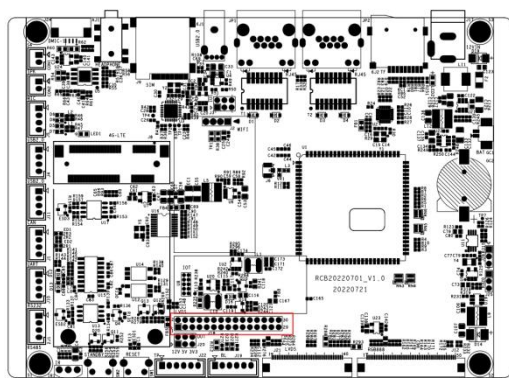
10.17 USB WiFi module interface(J2)



10.18 GTIoT interface (U8)

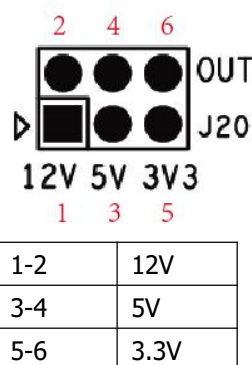
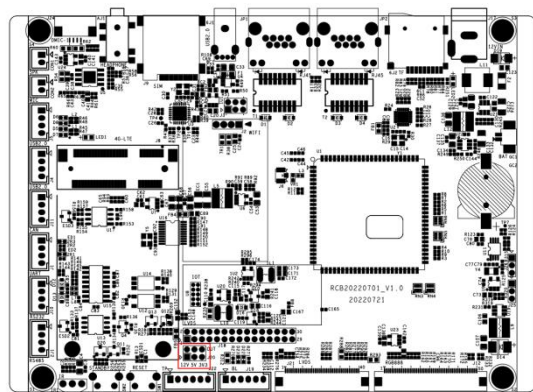


10.19 LVDS display interface (J18)

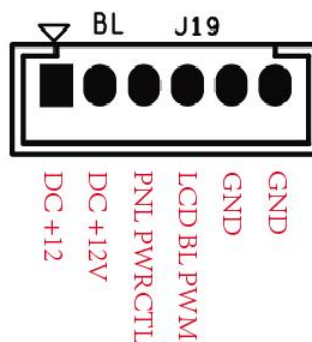
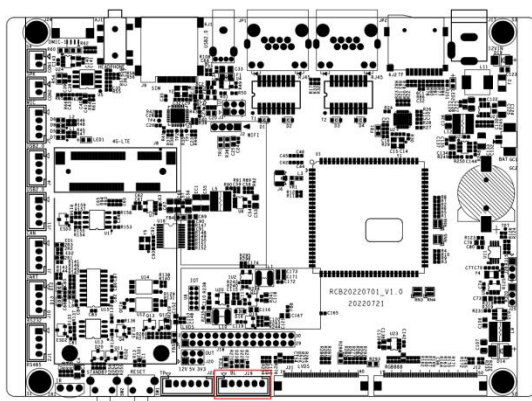


Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name
1	LVDS PANELVCC	2	LVDS PANELVCC	3	LVDS PANELVCC	4	GND
5	GND	6	GND	7	NC	8	NC
9	NC	10	NC	11	NC	12	NC
13	GND	14	GND	15	NC	16	NC
17	NC	18	NC	19	LVDS LA0N	20	LVDS LA0P
21	LVDS LA1N	22	LVDS LA1P	23	LVDS LA2N	24	LVDS LA2P
25	GND	26	GND	27	LVDS LACN	28	LVDS LACP
29	LVDS LA3N	30	LVDS LA3P				

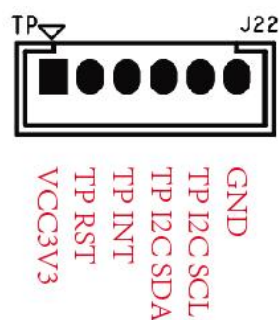
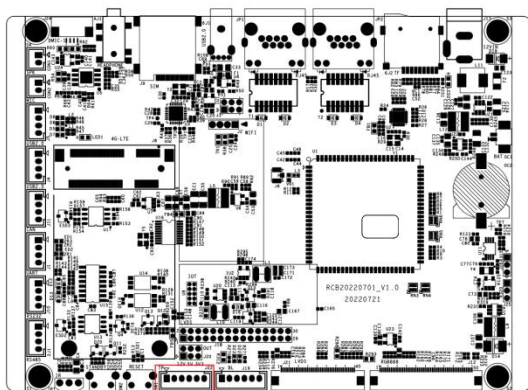
10.20 LVDS display voltage selection (J20)



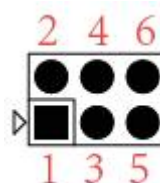
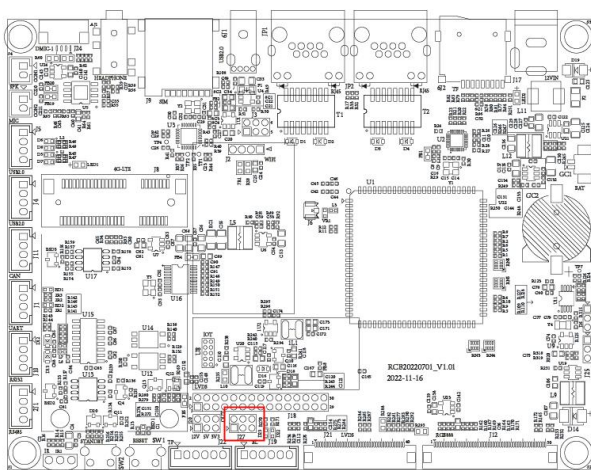
10.21 LVDS display voltage (J19)



10.22 TP I2C interface (J22)

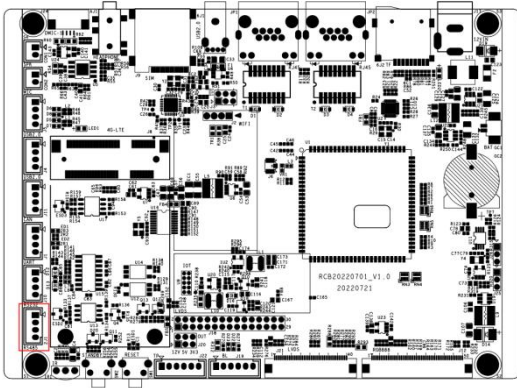


10.23 RS232 and RS485 function selection

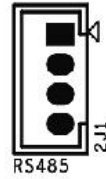


RS232	1-3
	2-4
RS485	3-5
	4-6

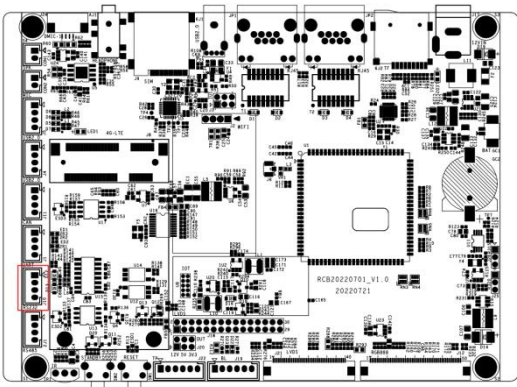
10.24 RS485 (J1)



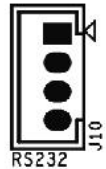
VCC 3V3
RS485 A
RS485 B
GND



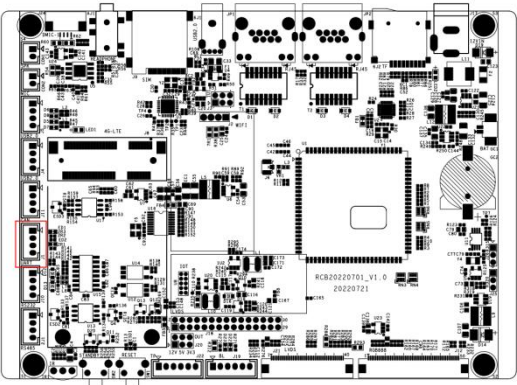
10.25 RS232 (J10)



VCC 3V3
RS232 RX
RS232 TX
GND



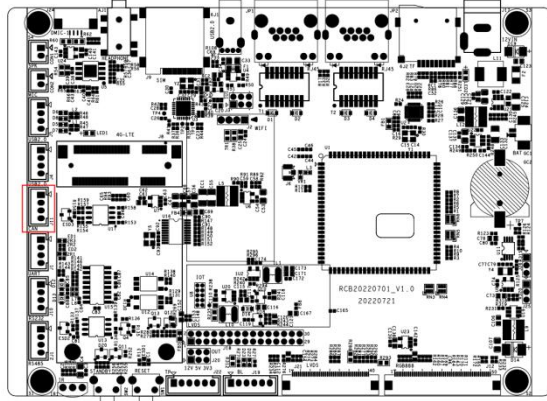
10.26 UART-Debug (J1)



GND
PM UART TX
PM UART RX
VCC 3V3



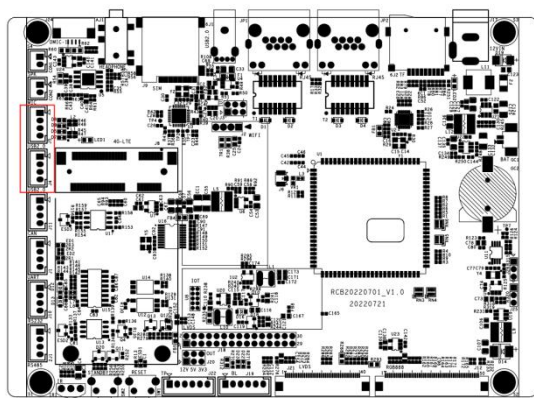
10.27 CAN (J11)



CAN H
GND
CAN L
GND



10.28 USB2.0 (J4,J5)



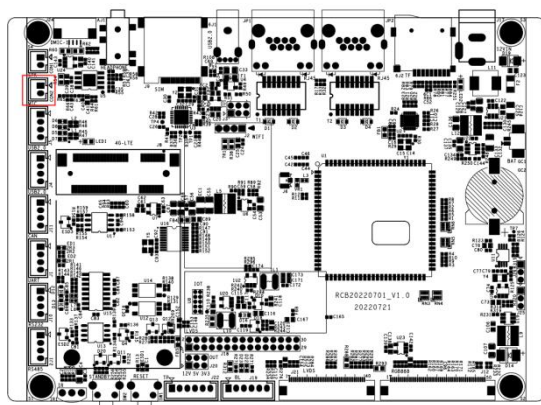
VCC 5V
USB DM
USB DP
GND



VCC 5V
USB DM
USB DP
GND



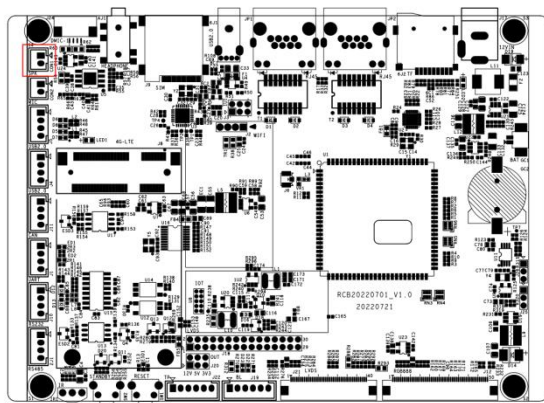
10.29 MIC (CON2)



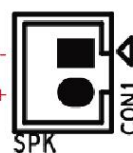
MIC IN
GND



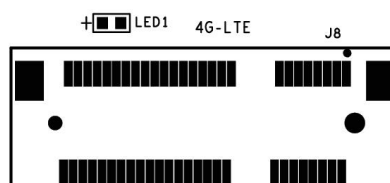
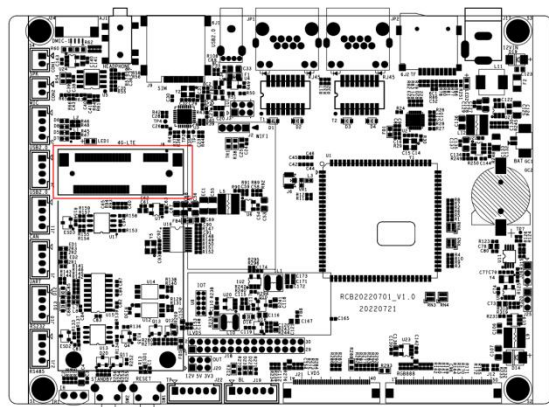
10.30 Spk (CON1)



SP-
SP+

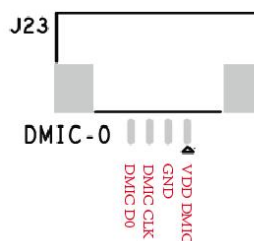
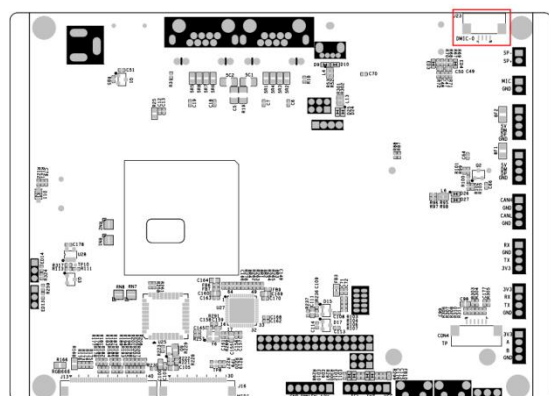


10.31 Mini PCIe (J8)

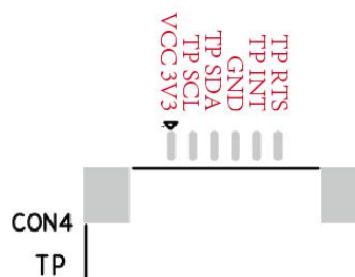
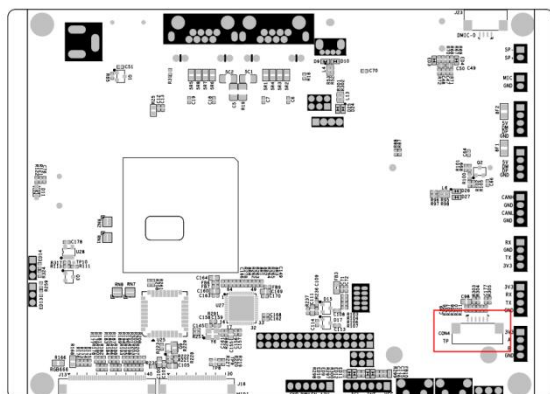


Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name
1	PCIE 3V3	2	PCIE 3V3	3	NC	4	GND
5	NC	6	PCIE 1V8	7	NC	8	PCIE UIM PWR
9	GND	10	PCIE UIM DATA	11	NC	12	PCIE UIM CLK
13	NC	14	PCIE UIM RST	15	GND	16	PCIE UIM VPP
17	NC	18	GND	19	NC	20	NC
21	GND	22	PCIERST	23	NC	24	PCEI 3V3
25	NC	26	GND	27	GND	28	PCIE 1V8
29	GND	30	NC	31	NC	32	NC
33	NC	34	GND	35	GND	36	4G USB DM
37	GND	38	4G USB DP	39	PCIE 3V3	40	GND
41	PCIE 3V3	42	3G LED	43	GND	44	NC
45	NC	46	NC	47	NC	48	PCIE 1V8
49	NC	50	GND	51	NC	52	PCIE 3V3

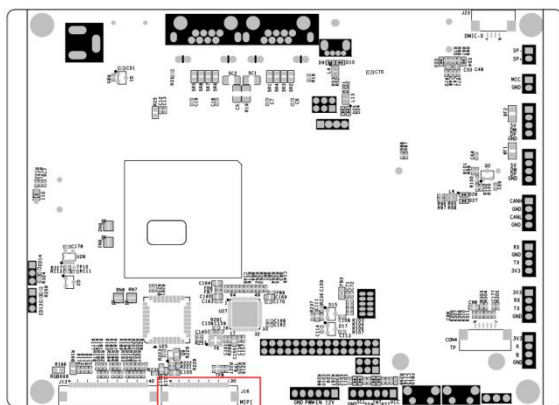
10.32 DMIC-0 (J23)



10.33 TP I2C interface (CON4)

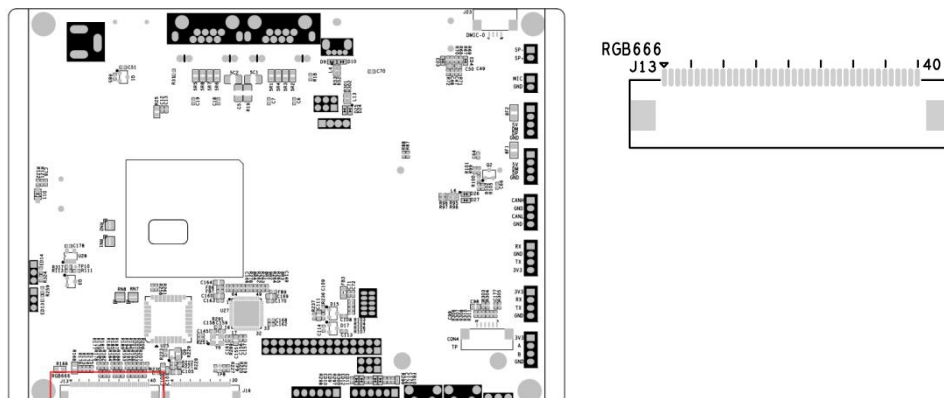


10.34 MIPI display interface (J16)



Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name
1	VCOM 0-6V	2	LCD 1V8	3	LCD 1V8	4	LRSTB
5	NC	6	GND	7	MIPI TX D0N	8	MIPI TX D0P
9	GND	10	MIPI TX D1N	11	MIPI TX D1P	12	GND
13	MIPI TX CKN	14	MIPI TX CKP	15	GND	16	MIPI TX D2N
17	MIPI TX D2P	18	GND	19	MIPI TX D3N	20	MIPI TX D3P
21	GND	22	LCD VDDA 9.4-9.8V	23	BL LED-	24	BL LED-
25		26		27	VGL -6.6-- -5.4V	28	VGH 17-19V
29	BL LED+	30	BL LED+				

10.35 RGB666 display interface (J13)



Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name
1	BL LED+	2	BL LED-	3	BL LED-	4	GND
5	3V3 SYS	6	RGB Reset	7	NC	8	NC
9	SPI DO	10	SPI CLK	11	SPI CS	12	LCD PCLK
13	LCD DE	14	LCD VSYNC	15	LCD HSYNC	16	LCD G4
17	LCD G5	18	LCD G6	19	LCD G7	20	LCD B0
21	LCD B1	22	LCD R6	23	LCD R7	24	LCD G0
25	LCD G1	26	LCD G2	27	LCD G3	28	LCD R0
29	LCD R1	30	LCD R2	31	LCD R3	32	LCD R4
33	LCD R5	34	GND	35	TP INT	36	TP SDA
37	TP SCL	38	TP RTS	39	3V3 SYS	40	GND

11.WiFi/RF

The SoM20x deployed Sigmaster RF chip SSW101B solution that integrates, WLAN compliant with IEEE 802.11 b/g/n specifications, meeting minimal requirements for WiFi. Just need to lead out the antenna.

12.Display Interface

SoM20x supports TTL / MIPI / LVDS screen display drive interface, high-speed differential signal for the line. The parasitic capacitance is very sensitive, so the ESD protection of the standard low junction capacitance should be selected on the signal path device.

12.1 TTL Screen display

Maximum resolution 1280*720 60fps Support signal format RGB565/RGB666/RGB888

Parallel RGB interface: DE mode and HV mode(Default DE Mode)

DE Mode:VSYNC,HSYNC,DOTCLK,DE,D[0-23]

HV Mode:VSYNC,HSYNC,DOTCLK,D[0-23]

12.2 MIPI DSI Screen display

1-4 data lanes,1 clock lane Level LP:0-12V HS:100-300mV HS:80Mbps-1.5Gbps/lane

Pixel format: 16bpp(565RGB) each pixel using two bytes

18bpp(666RGB) packed

18bpp(666RGB) loosely packed into three bytes

24bpp(888RGB),each pixel using three bytes

Video mode:BURST_MODE/SYNC_EVENT/SYNC_PULSE

Data/clock chn P/N swap

Data clock skew adjustment

12.3 LVDS Screen display

Compatible with VESA and JEIDA standard

Maximum resolution 1920*1080 60fps

Support DE Mode

LVDS voltage

12V/5V/3.3V selection

6Pin 2.0 ranking

13.Power Supplies

According to the SSD20x power supply time sequence requirements, the SoM20x core board introduces the SYS_3V3 and AVDD_RTC two core board power supply pins.

VCC_RTC (core board 96Pin) must be regular power supply, standby battery power supply, consumption current is low, after shutdown maintenance internal RTC power supply, current 1uA.

VCC_SYS (core board 1Pin) will mainly power the core board, with a power supply voltage of 3.3V and a peak current of 400mA.

PIN	Power Pin Description	Minimum	Maximum	Current	Power supply ripple requirements
1	SYS_3V3(INPUT)	2.97V	3.63V	Peak current 400mA <100mA(Standby)	<30mVrms
96	AVDD_RTC(INPUT)	2.97V	3.63V	<500uA	<30mVrms

SoM20x core board power timing and typical power supply circuit (**Important!!!**)

The AVDD_RTC and SYS_3V3 can supply power simultaneously (using the same power supply), and the power supply routing PCB is set To be a large area of copper paving, power supply allowance.

The 5V power supply (USB, CAN, RS485, etc.) shall be powered up after the SYS_3V3 power supply is stable.

For all IO pins, ensure no high-level input before charging on SYS_3V3

PIN	Power and GND Pin Description	Illustrate
1	SYS_3V3	Choose low ripple DC / DC power supply.ripple wave <30mVrms.
96	AVDD_RTC	Choose low ripple DC / DC power supply.ripple wave <30mVrms.
2,4,35,42,53, 66,80,85,90,95	GND	Power Ground

14.Real Time Clock Circuit

The SoM20x has a built-in RTC clock to power the AVDD_RTC pin through the backup battery, in the main power After the source shutdown, the RTC clock can still record the time, and the AVDD_RTC current consumes about 1uA. To maintain the RTC for a long time, you can consider choosing the external RTC chip.

Built-in RTC working with 32.768 KHz crystal,Tick time interrupt (millisecond).

Supports ultra-low power (<3uA).

15.Audio

One mono ADC for microphone input

Two stereo DMIC inputs

- One stereo DAC for lineout
- Supports 8K/16K/32K/48KHz sampling rate

audio recording

- ADC Pre-Amp gain supports 0dB, 6dB, 13dB, 23dB, 30dB, and 36dB
- ADC boost gain supports -6dB ~ 15dB or 0dB ~ 21dB with interval 3dB
- ADC digital gain supports -63.5dB ~ 33dB with interval 0.5dB, can be muted to zero
- SNR of DR A-Weighted ADC > 90dB (@gain = 0dB)

15.1 Mic

The SoM20x provides dual-end microphone signal access to the SSD20x built-in codec, both signals:

AUD_MICIN0 pseudo-differential microphone input mode

AUD_MICCM0 pseudo-differential microphone input mode

GND10

15.2 Speaker

The speaker signals are routed from the SSD20x built-in Audio CODEC, the two signals are:

AUD_LINEOUT_L0 Speaker amplifier Left output+

AUD_LINEOUT_R0 Speaker amplifier right output+

16. Precautions for use

1. Relative humidity: 10% ~ 90% .
2. Storage temperature: -10 ~ 125℃
3. Operation temperature: 0 ~ 80℃
4. Do not squeeze、 distort or disassemble the board.
5. Keep the board away from static electricity .
6. Keep the board away from water and other liquid.
7. Clean the board with soft and clean dry cloth when it's dirty.
8. Don't use long connect wires which may affect performance and image quality.