

WCN 3988 A1 Manual

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1、 Basic information

1.1 characteristics

1. The WCN3988 mainboard is equipped with octa-core CPU, the master chip highest frequency of 2.1GHz; It runs Android 14. It comes standard with 8GB RAM and 128GB FLASH.

2. This scheme adopts single mainboard design and is used as a mobile screen mainboard.

3. This program supports 2*7W speaker and 2*3W speaker high-fidelity audio output.

4. Wireless chip specifications:

The WCN3988 is a single-die wireless local area network (WLAN), Bluetooth, and FM combo solution to support 1 × 1 IEEE802.11 a/b/g/n/ac WLAN standards, and Bluetooth + LE 5.x + HS enabling seamless integration of WLAN/Bluetooth and low energy technology. It also includes a standalone GPS/GNSS low noise amplifier (GPS LNA).

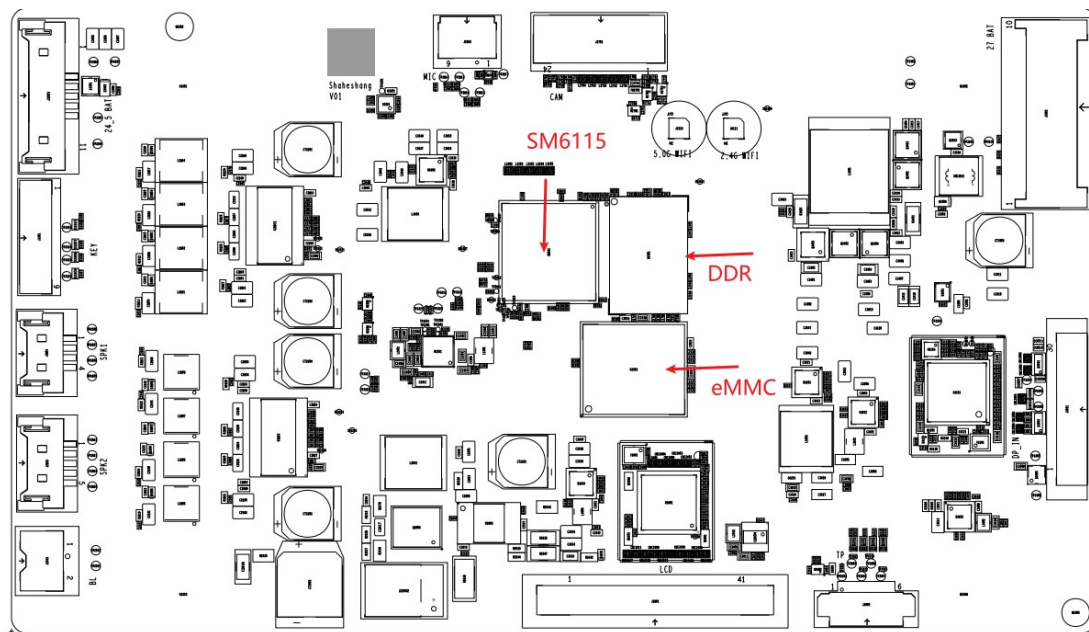
Communication process: External device <-----> antenna <-----> WCN3988 <-----> Main chip.

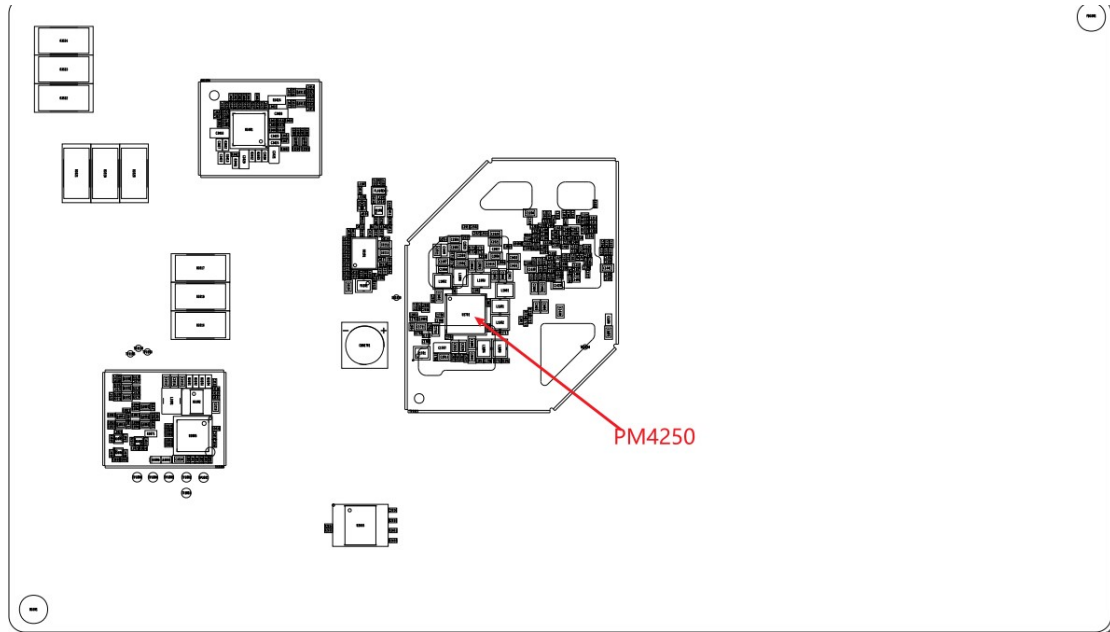
The electromagnetic wave sent by the external device is captured by the machine antenna and transmitted to the RF chip WCN3988. After receiving the electromagnetic wave inside the RF chip, it is converted into digital data through signal demodulation, and then communicated with the main chip through the serial port.

Support communication frequency bands: 2.4GHz, 5GHz;

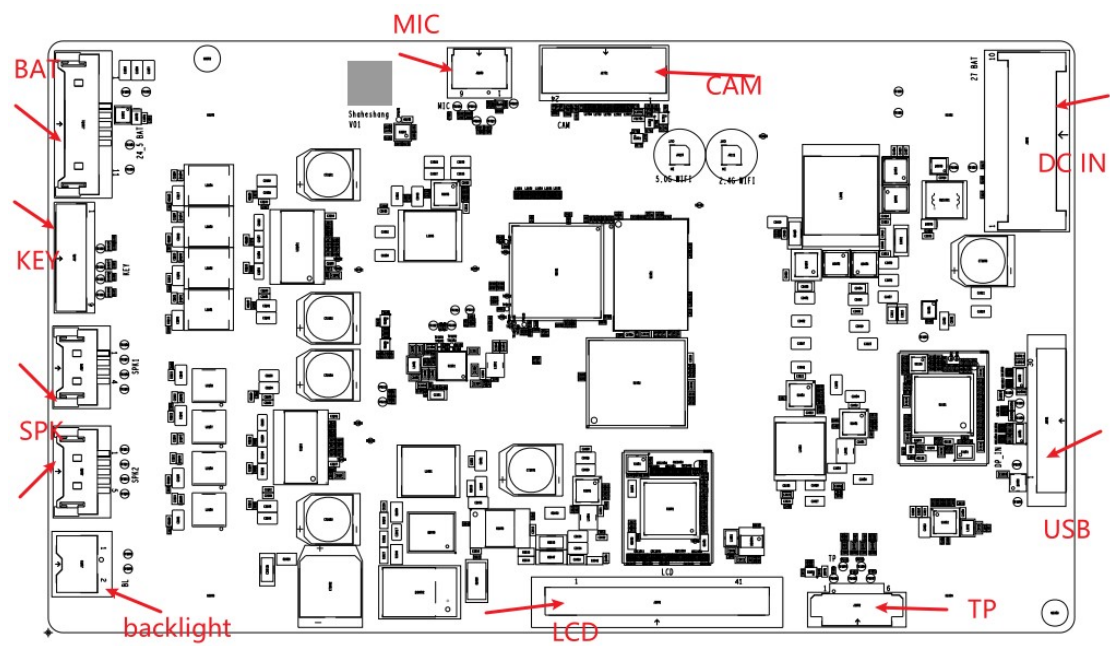
1.2 Mainboard Introduction

1. Chip position

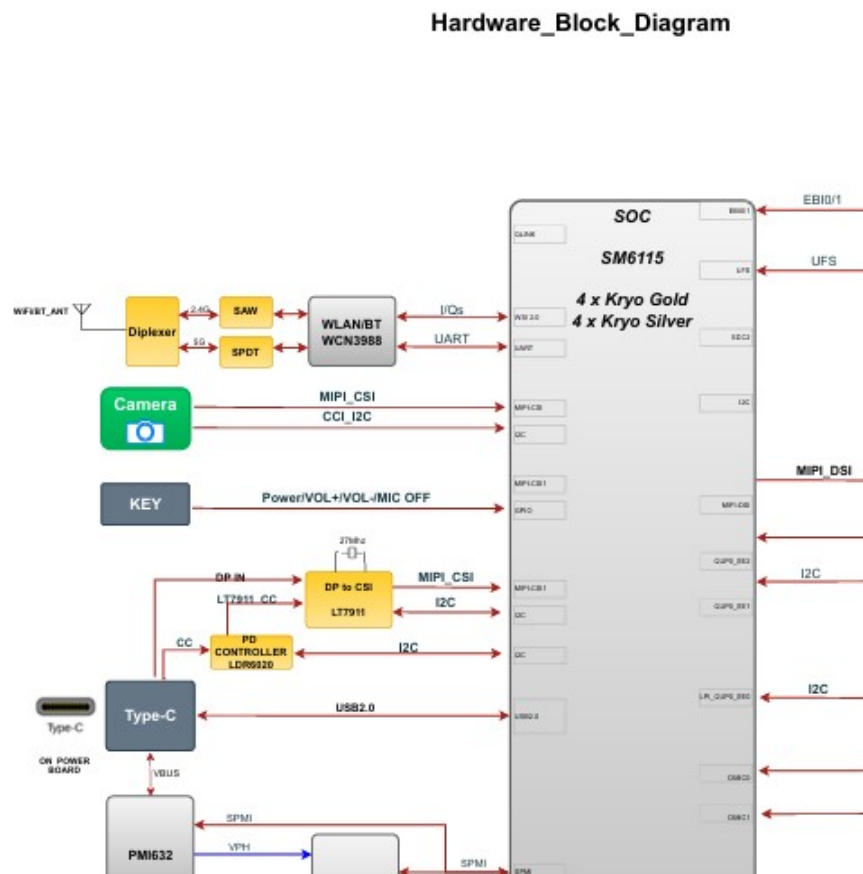




2. Main interface diagram



3. block diagram



2、 Feature

2.1 MainboardCore

1.The product equipped with eight-core CPU, the highest frequency is 2.1GHz, the lowest is 2.0GHz; LPDDR4 supports a maximum frequency of 2.1GHz; The operating system is Android13

2.2 Antenna coaxial connector

1. Normal temperature and humidity
-10° C--60° C ; 10%RH--90*%RH
2. Work temperature and humidity
0° C--50° C ; 10%RH--80*%RH

2.3 Operating

1. Power supply

- 1.DC IN:19V
- 2.Battery :16.8V

2. Current

- 1.Max:2.4A

3. Output

1. The maximum power:45.6W

2.4 Multimedia

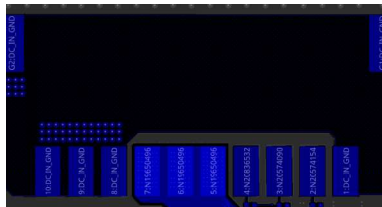
- 1.reveal: 4-lane DSI
- 2.camera: 4-lane CSI

2.5 Audio

1. Encode: 1080p60 8-bit HEVC; 1080p60 8-bit H.264
2. Decode: 1080p60 8-bit H.264; 1080p60 8-bit HEVC, VP9

3、Key Port

1. DC IN



Pin No.	Name	Description	Pin No.	Name	Description
1	GND	Ground	6	DC_IN_CONN	DC_IN_CONN
2	PWR_UART_TX	PWR_UART_TX	7	DC_IN_CONN	DC_IN_CONN
3	PWR_UART_RX	PWR_UART_RX	8	GND	Ground
4	PWR_GPIO_INT	PWR_GPIO_INT	9	GND	Ground
5	DC_IN_CONN	DC_IN_CONN	10	GND	Ground

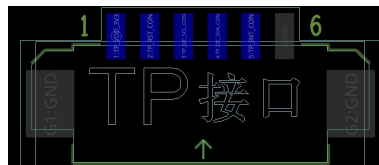
2. USB



Pin No.	Name	Description	Pin No.	Name	Description
1	USB_VBUS	USB_VBUS	16	USB_SBU2	USB_SBU2
2	USB_VBUS	USB_VBUS	17	USB_SBU1	USB_SBU1
3	USB_VBUS	USB_VBUS	18	GND	Ground
4	USB_VBUS	USB_VBUS	19	USB0_HS_CON_DM	USB0_HS_CON_DM
5	USB_VBUS	USB_VBUS	20	USB0_HS_CON_DP	USB0_HS_CON_DP

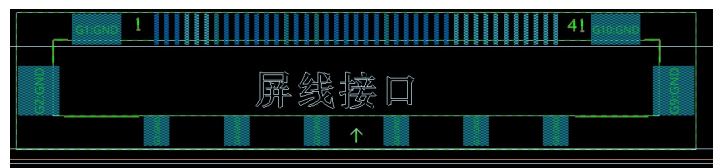
6	USB_VBUS	USB_VBUS	21	GND	Ground
7	NC	NC	22	USB_CC1	USB_CC1
8	GND	Ground	23	USB_CC2	USB_CC2
9	GND	Ground	24	GND	Ground
10	USB_SS_RX1-	USB_SS_RX1-	25	USB_SS_RX2-	USB_SS_RX2-
11	USB_SS_RX1+	USB_SS_RX1+	26	USB_SS_RX2+	USB_SS_RX2+
12	GND	Ground	27	GND	Ground
13	USB_SS_TX1+	USB_SS_TX1+	28	USB_SS_TX2+	USB_SS_TX2+
14	USB_SS_TX1-	USB_SS_TX1-	29	USB_SS_TX2-	USB_SS_TX2-
15	GND	Ground	30	GND	Ground

3. TP



Pin No.	Name	Description	Pin No.	Name	Description
1	TP_VDD_3V3	TP_VDD_3V3	4	TP_I2C_SDA_CON	TP_I2C_SDA_CON
2	TP_RST_CON	TP_RST_CON	5	TP_INT_CON	TP_INT_CON
3	TP_I2C_SCL_CON	TP_I2C_SCL_CON	6	GND	Ground

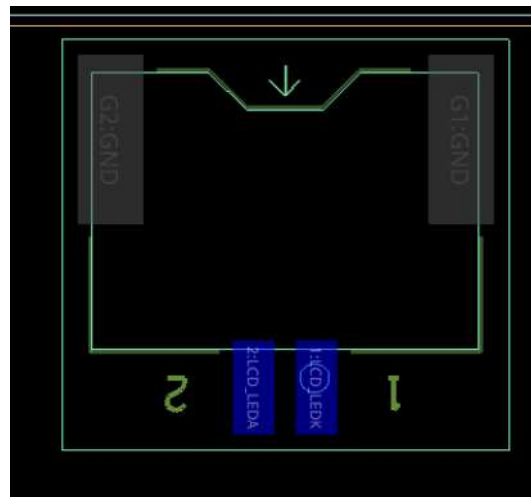
4. LCD



Pin No.	Name	Description	Pin No.	Name	Description
1	LCD_12V	LCD_12V	21	LVDS_L3_N_CON	LVDS_L3_N_CON
2	LCD_12V	LCD_12V	22	LVDS_CLK_P_CON	LVDS_CLK_P_CON
3	LCD_12V	LCD_12V	23	LVDS_CLK_N_CON	LVDS_CLK_N_CON
4	NC	NC	24	GND	Ground
5	NC	NC	25	LVDS_L2_P_CON	LVDS_L2_P_CON
6	NC	NC	26	LVDS_L2_N_CON	LVDS_L2_N_CON

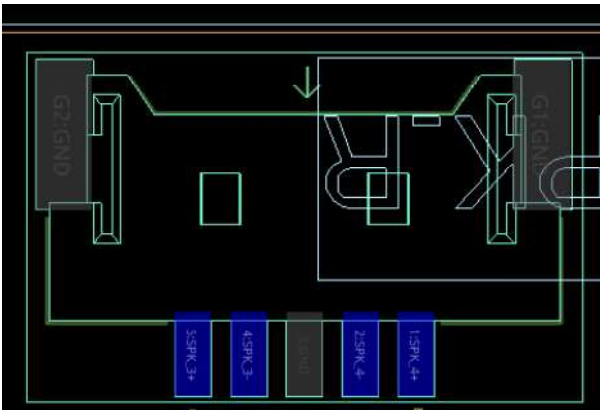
				N	
7	GND	Ground	27	LVDS_L1_P_CON	LVDS_L1_P_CON
8	LVDS_L3_P_D1_CON	LVDS_L3_P_D1_CON	28	LVDS_L1_N_CO N	LVDS_L1_N_CON
9	LVDS_L3_N_D1_CON	LVDS_L3_N_D1_CON	29	LVDS_L0_P_CON	LVDS_L0_P_CON
10	LVDS_CLK_P_D1_CON	LVDS_CLK_P_D1_CON	30	LVDS_L0_N_CO N	LVDS_L0_N_CON
11	LVDS_CLK_N_D1_CO N	LVDS_CLK_N_D1_CO N	31	NC	NC
12	LVDS_L2_P_D1_CON	LVDS_L2_P_D1_CON	32	NC	NC
13	LVDS_L2_N_D1_CON	LVDS_L2_N_D1_CON	33	NC	NC
14	GND	Ground	34	NC	NC
15	LVDS_L1_P_D1_CON	LVDS_L1_P_D1_CON	35	NC	NC
16	LVDS_L1_N_D1_CON	LVDS_L1_N_D1_CON	36	NC	NC
17	GND	Ground	37	NC	NC
18	LVDS_L0_P_D1_CON	LVDS_L0_P_D1_CON	38	NC	NC
19	LVDS_L0_N_D1_CON	LVDS_L0_N_D1_CON	39	NC	NC
20	LVDS_L3_P_CON	LVDS_L3_P_CON	40	NC	NC
			41	NC	NC

5. Backlight



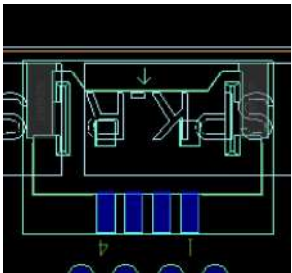
Pin No.	Name	Description
1	LCD_LEDK	LCD_LEDK
2	LCD_LED A	LCD_LED A

6.SpK (5Pin)



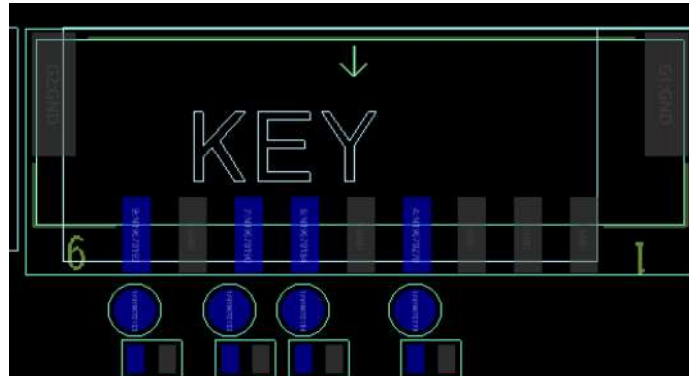
Pin No.	Name	Description	Pin No.	Name	Description
1	SPK_4+	SPK_4+	4	SPK_3-	SPK_3-
2	SPK_4-	SPK_4-	5	SPK_3+	SPK_3+
3	GND	GND			

7.SpK (4Pin)



Pin No.	Name	Description	Pin No.	Name	Description
1	SPK_2+	SPK_2+	3	SPK_1-	SPK_1-
2	SPK_2-	SPK_2-	4	SPK_1+	SPK_1+

8. Key



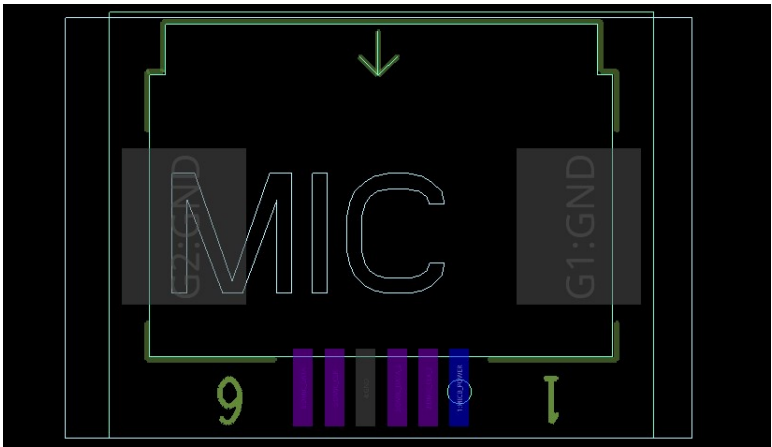
Pin No.	Name	Description	Pin No.	Name	Description
1	GND	GND	6	KYPD_VOL_DOWN_N	KYPD_VOL_DOWN_N
2	GND	GND	7	KYPD_VOL_UP_N	KYPD_VOL_UP_N
3	GND	GND	8	GND	GND
4	DMIC_OFF	DMIC_OFF	9	KYPD_PWR_N	KYPD_PWR_N
5	GND	GND			

9. Battery



Pin No.	Name	Description	Pin No.	Name	Description
1	VBAT	VBAT	7	I2C_SCL_BAT	I2C_SCL_BAT
2	VBAT	VBAT	8	GND	GND
3	VBAT	VBAT	9	GND	GND
4	VBAT	VBAT	10	GND	GND
5	NC	NC	11	GND	GND
6	I2C_SDA_BAT	I2C_SDA_BAT			

10. MIC



Pin No.	Name	Description	Pin No.	Name	Description
1	MICB_POWER	MICB_POWER	4	GND	GND
2	DMIC_CLK_2	DMIC_CLK_2	5	DMIC_CLK	DMIC_CLK
3	DMIC_DATA_2	DMIC_DATA_2	6	DMIC_DATA	DMIC_DATA

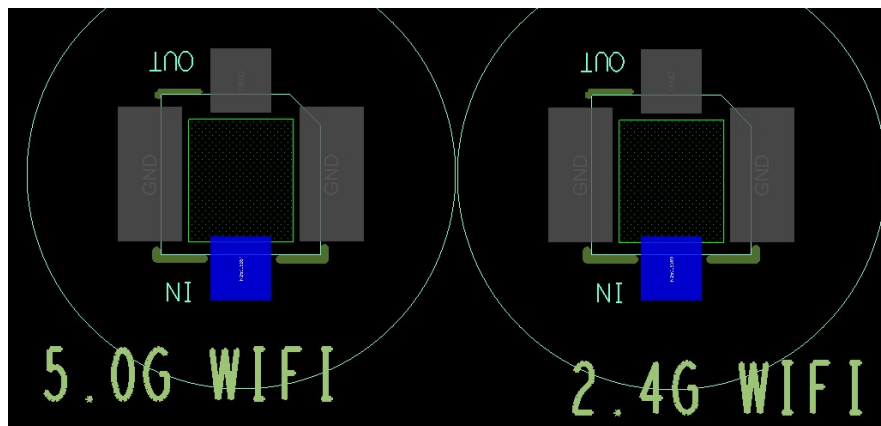
11. Camera



Pin No.	Name	Description	Pin No.	Name	Description
1	DVDD_1P2	DVDD_1P2	13	GND	GND
2	DOVDD_1P8	DOVDD_1P8	14	MIPI_CSIO_LN1_P1	MIPI_CSIO_LN1_P1
3	GND	GND	15	MIPI_CSIO_LN1_M1	MIPI_CSIO_LN1_M1
4	AVDD_2V8	AVDD_2V8	16	MIPI_CSIO_LN0_P1	MIPI_CSIO_LN0_P1

5	GND	GND	17	MIPI_CSIO_LN0_M 1	MIPI_CSIO_LN0_M 1
6	MIPI_CSIO_LN3_P1	MIPI_CSIO_LN3_P1	18	GND	GND
7	MIPI_CSIO_LN3_M 1	MIPI_CSIO_LN3_M 1	19	NC	NC
8	MIPI_CSIO_LN2_P1	MIPI_CSIO_LN2_P1	20	CAM_MCLK	CAM_MCLK
9	MIPI_CSIO_LN2_M 1	MIPI_CSIO_LN2_M 1	21	GND	GND
10	GND	GND	22	CAM_RST	CAM_RST
11	MIPI_CSIO_CLK_P1	MIPI_CSIO_CLK_P1	23	CCI_I2C_SDA0	CCI_I2C_SDA0
12	MIPI_CSIO_CLK_M 1	MIPI_CSIO_CLK_M 1	24	CCI_I2C_SCL0	CCI_I2C_SCL0

12. Antenna coaxial connector



Pin No.	Name	Description	Pin No.	Name	Description
1	IN	RF_IN	2	GND	GND
3	GND	GND	45	GND	GND

FCC Radiation Exposure Statement

The modular can be installed or integrated in mobile or fix devices only. This modular cannot be installed in any portable device, for example, USB dongle like transmitters is forbidden.

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: 2AQ5R-WCN3988 or Contains FCC ID: 2AQ5R-WCN3988".

When the module is installed inside another device, the user manual of this device must contain below warning statements:

1. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

The host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

The end user manual shall include all required regulatory information/warning as shown in this manual, include: This product must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

To assure continued compliance, any changes or modifications not expressly approved by the party.

Responsible for compliance could void the user's authority to operate this equipment. (Example- use only shielded interface cables when connecting to computer or peripheral devices).

ISED Notice

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s).

Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference.
- (2) This device must accept any interference received, including interference that may cause undesired operation of the device.

The digital apparatus complies with Canada ICES-3 (B)/NMB-3(B).

Cet appareil contient des émetteurs/récepteurs exemptés de licence qui sont conformes aux RSS exemptés de licence d'innovation, sciences et développement économique Canada. Le fonctionnement est soumis aux deux conditions suivantes:

- (1) Cet appareil ne doit pas causer d'interférences nuisibles, et
- (2) Cet appareil doit accepter toute interférence reçue, y compris les interférences susceptibles de provoquer un fonctionnement indésirable de l'appareil.

L'appareil numérique est conforme au Canada ICES-3 (B)/NMB-3(B).

This device complies with exemption from the current assessment limits in section 2.5 of CNR - 102 and RSS 102 RF exposure compliance, users can obtain canadian data on RF field exposure and RF field exposure. This equipment complies with Canada radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum 20cm distance from a radiator or your body. This transmitter must not be co-located or operate in conjunction with any other antenna or transmitter.

Cet appareil est conforme à l'exemption des limites d'évaluation courante dans la section 2.5 du cnr -102 et conformité avec rss 102 de l'exposition aux rf, les utilisateurs peuvent obtenir des données canadiennes sur l'exposition aux champs rf et la conformité. This equipment complies with Canada radiation exposure limits set forth for an uncontrolled environment. Cet équipement doit être installé et fonctionner à au moins 20cm de distance d'un radiateur ou de votre corps. Cet émetteur ne doit pas être co-localisé ou fonctionner en conjonction avec une autre antenne ou un autre émetteur.

Operation in the 5150-5250 MHz band is restricted to indoor use only.

Le fonctionnement dans la bande 5150-5250 MHz est limité à un usage intérieur seulement.

If the IC number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains IC: 24301-WCN3988".

When the module is installed inside another device, the user manual of this device must contain below warning statements:

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s).

Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference.
- (2) This device must accept any interference received, including interference that may cause undesired operation of the device.

Cet appareil contient des émetteurs/récepteurs exemptés de licence qui sont conformes aux RSS exemptés de licence d'innovation, sciences et développement économique Canada. Le fonctionnement est soumis aux deux conditions suivantes:

- (1) Cet appareil ne doit pas causer d'interférences nuisibles, et
- (2) Cet appareil doit accepter toute interférence reçue, y compris les interférences susceptibles de provoquer un fonctionnement indésirable de l'appareil.

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

Les dispositifs doivent être installés et utilisés en stricte conformité avec les instructions du fabricant telles que décrites dans la documentation utilisateur fournie avec le produit.

5.15 GHz 帯 ~ 5.35 GHz 帯: 屋内使用のみ