Data Sheet

Module name：IA9QH5 5G_MODULE_FPC Module

Wireless Module

Model Number: ZY- IA9QH5

TX P/N: 2PCB-0002135
RX P/N: 2PCB-0002136

Version 1

September. 8, 2022

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ZYLUX

1. Features

- 5.2GHz/5.8GHz ISM Band
- GFSK modulation
- Low BOM cost
- Long distance > 30m (Line of sight)
- Support 1-1 duplex mode or 1-N broadcasting mode
- Digital I2S audio interface
- Support no audio detection function
- Antenna diversity
- Short delay time variation
- Audio format 16/24bit , 32/44.1/48K/96KHz sampling rate
- Robust Packet error correction
- Low power consumption
- No RF induced audio noise
- Audio latency time < 20ms

  (Programmable according customized spec.)

2. Application

- Wireless HTiB Rear Speaker
- Wireless Outdoor Speaker
- Wireless TV theater
- Wireless Audio Sender
- Wireless Headphone
- Wireless Stereo Ear Microphone

3. RF Specification

Item	Min	Typ	Max	Unit	Note
Channel Range	5160	–	5245	MHz	
-20dB bandwidth	–	2.5	–	MHz	2M Mode
RF Output Power		12		dBm	
Sensitivity	–	-91	–	dBm	The smaller, the better

Table 1 5.2GHz RF Specification

Item	Min	Typ	Max	Unit	Note
Channel Range	5735	–	5840	MHz	
-20dB bandwidth	–	2.5	–	MHz	2M Mode
RF Output Power		8		dBm	
Sensitivity	–	-89	–-	dBm	The smaller, the better

Table 2 5.8GHz RF Specification

4. Electrical Specification

Item	Min	Typ	Max	Unit	Note
Power Supply Voltage	3.0	3.3	3.6	V	
Operating Temperature	0	25	55	℃	
2.1CH Audio Mode					
Consumption Current (TX_MODE)		210		mA	RF Power :11dBm
Consumption Current (RX_MODE)		103		mA	No GPIO driving
0.1CH Audio Mode					
Consumption Current (TX_MODE)		132		mA	RF Power :11dBm
Consumption Current (RX_MODE)		91		mA	No GPIO driving

Table 3

Item						
Symbol	**Parameter**	**Min**	**Typ**	**Max**	**Unit**	**Conditions**
VIH	Input High Threshold	2.0	–	3.33	V	LDO_OUT=3V
VIL	Input Low Threshold	-0.3	–	0.8	V	LDO_OUT=3V
VOH	Output High Threshold	2.4	–	–	V	LDO_OUT=3V
VOL	Output Low Threshold	–	–	0.4	V	LDO_OUT=3V

Table 4

◆ Power On Reset Characteristics

Symbol	**Parameter**	**Min**	**Typ**	**Max**	**Unit**	**Conditions**
Trst			10		mS	

Table 5

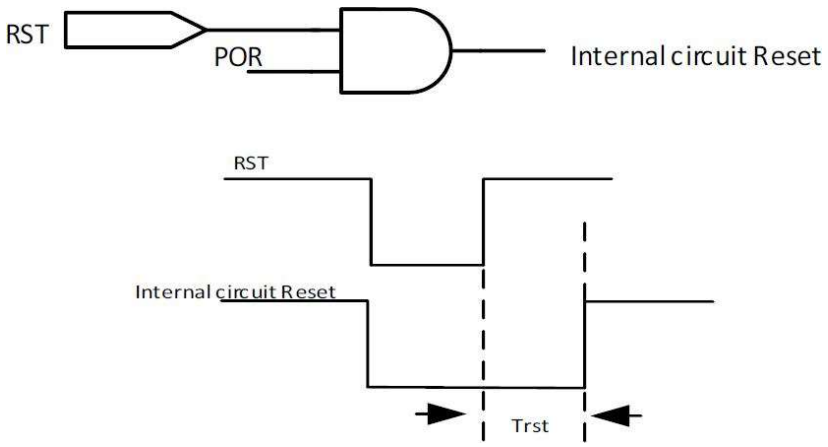
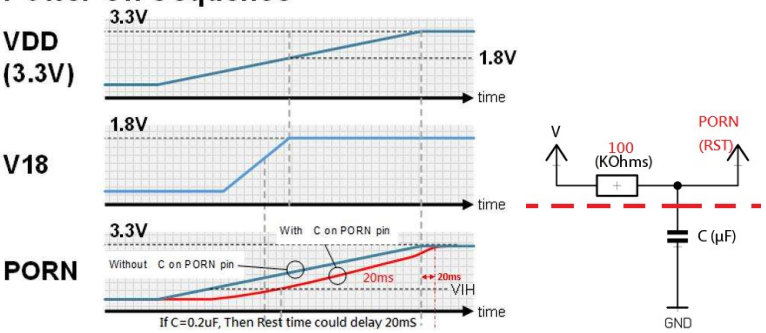


Fig 4.1 Power On Reset Timing Chart

Power On Sequence



RC circuit delay time constant online calculator

Resistance: 100 KΩ Please select the unit of resistance.

Capacitance: 0.2 uf Please select the capacitor unit

Time: 20 mSec Please select time unit

Calculation Clear

5. Mechanical Specification

Fig 5.1 5G_MODULE_FPC Module TX with shielding case

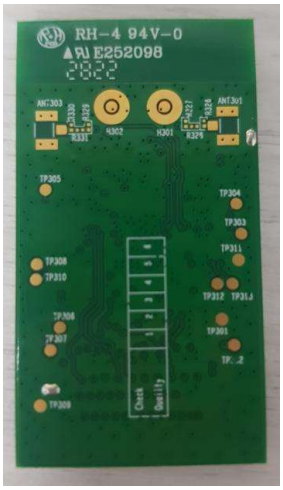


Fig 5.2 5G_MODULE_FPC Module TX Button ViewTop View

- Dimension：46 * 25 * 1 mm
- PCB 4 Layers

Mechanical Drawing：

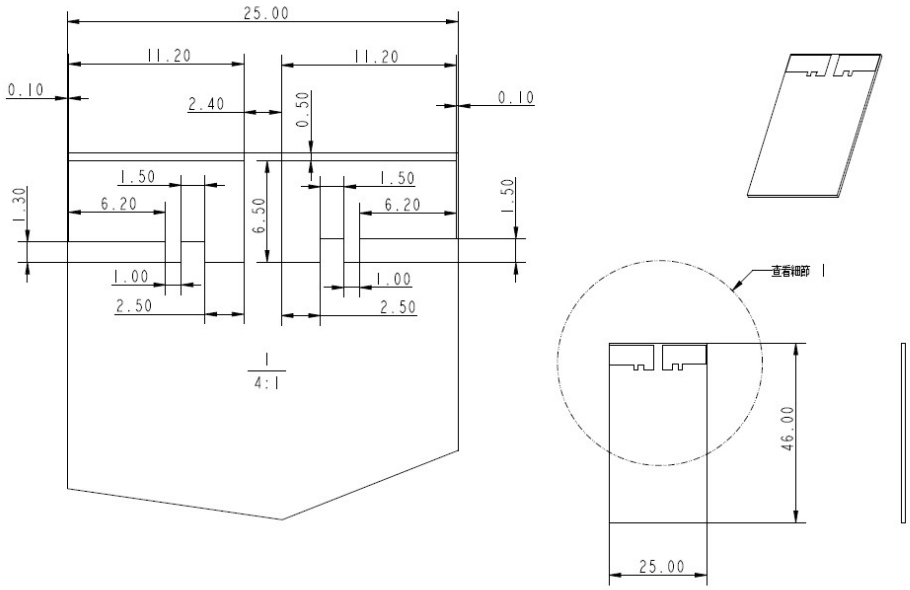


Fig 5.3 Mechanical Drawing of 5G_MODULE_FPC Module with shielding case

6. Block Diagram

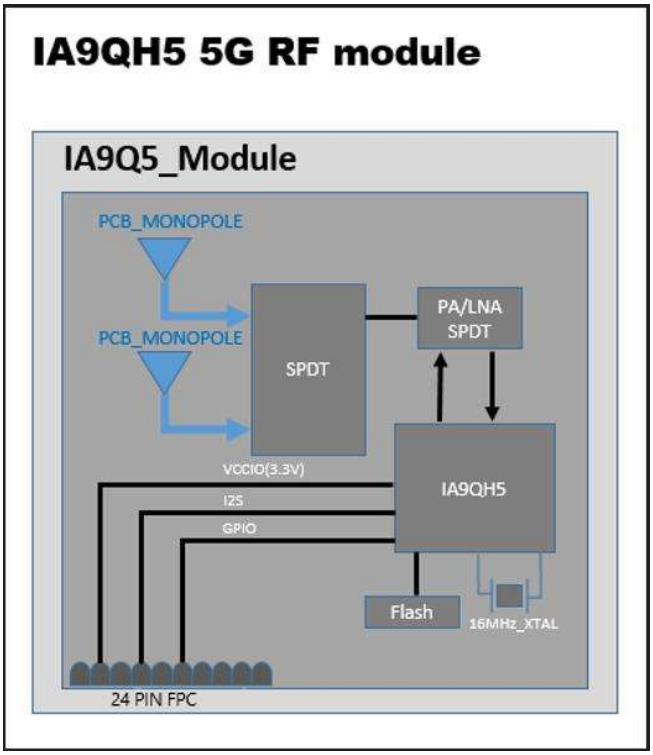


Fig 6.1 Block Diagram of IA9QH5 5G_MODULE_FPC Module

7.Interface

Fig 7.1 Pin sequence of 5G_MODULE_FPC Module

Pin	Name	I/O	TX Function Define	RX Function Define
1	VCCIO	P	DC 3.0 ~ 3.6V IN	DC 3.0 ~ 3.6V IN
2	VCCIO	P	DC 3.0 ~ 3.6V IN	DC 3.0 ~ 3.6V IN
3	DGND	P	Digital GND	Digital GND
4	GPIO 14	I/O	GPIO	GPIO
5	GPIO 17	I/O	GPIO	AMP RESET(L Act)
6	GPIO 16	I/O	GPIO	GPIO
7	GPIO 30	I/O	GPIO	GPIO
8	GPIO 21	I/O	GPIO	GPIO
9	SPB_I2S_DATA	I/O	SPB I2S audio Data	SPB I2S audio Data
10	SPA_I2S_DATA	I/O	I2S DATA 0	SYNC LED
11	SPA_I2S_LRCK	I/O	SPA I2S audio LRCK	SPA I2S audio LRCK
12	SPA_I2S_BCK	I/O	SPA I2S audio BCK	SPA I2S audio BCK
13	DGND	P	Digital GND	Digital GND
14	SPB_I2S_MCLK	I/O	SPB I2S audio MCLK	SPB I2S audio MCLK
15	SPB_I2S_LRCK	I/O	SPB I2S audio LRCK	SPB I2S audio LRCK
16	SPB_I2S_BCK	I/O	SPB I2S audio BCK	SPB I2S audio BCK
17	GPIO 13	I/O	GPIO	GPIO
18	GPIO 32	I/O	GPIO	GPIO
19	I2C_CLK_M	I/O	GPIO	I2C Master/Slave clock signal , must be connected to VCC via a pull high resistor
20	I2C_DATA_M	I/O	GPIO	I2C Master/Slave data signal , must be connected to VCC via a pull high resistor
21	I2C_CLK_S	I/O	I2C Master/Slave clock signal , must be connected to VCC via a pull high resistor	GPIO
22	I2C_DATA_S	I/O	I2C Master/Slave data signal , must be connected to VCC via a pull high resistor	GPIO
23	GPIO15	I/O	GPIO	GPIO
24	GPIO0	I/O	GPIO	GPIO

Table 6 IO Function Define

8. Design Reference

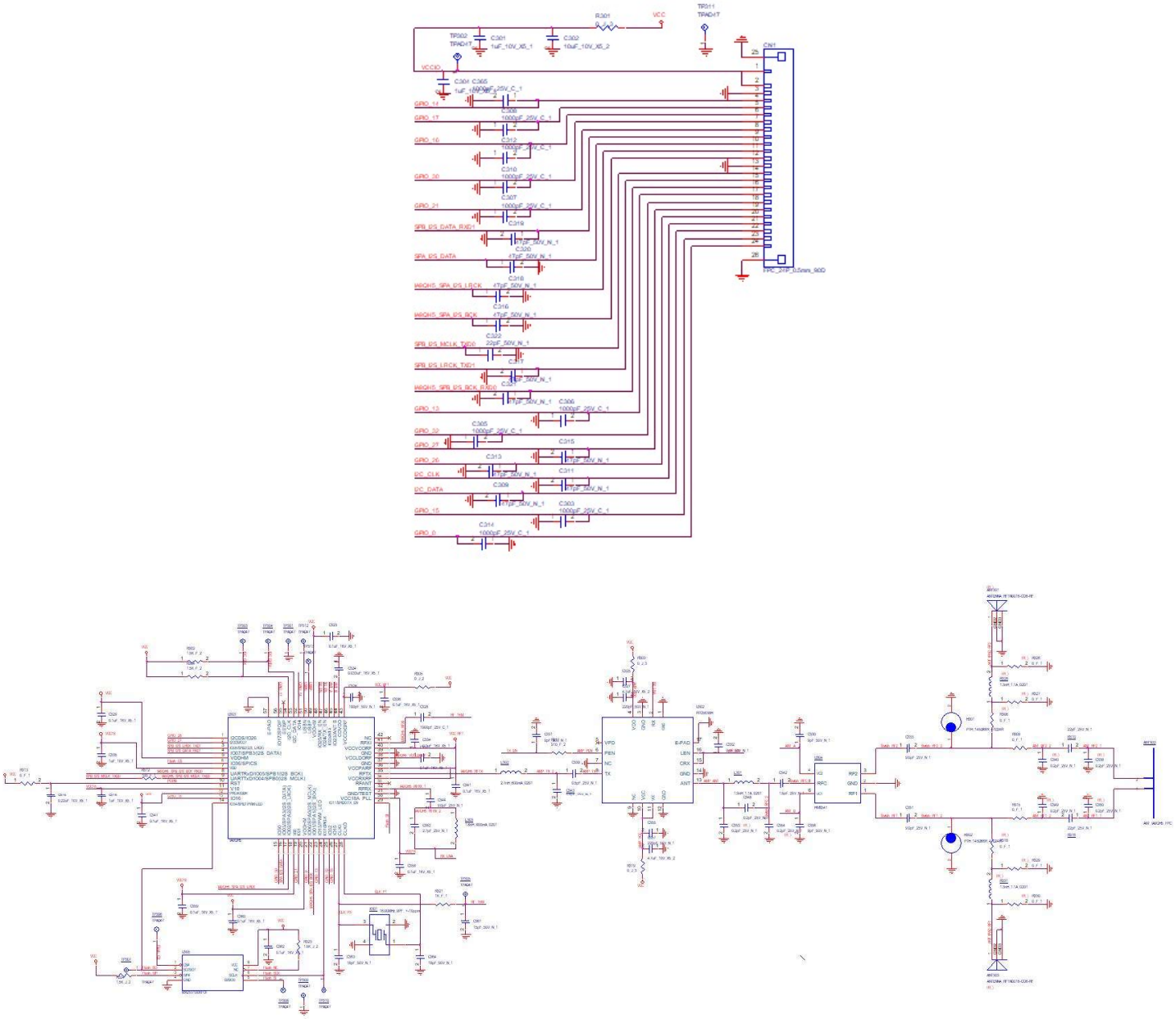


Fig 8.1 Design Circuit

9. I2S Interface

I²S interface is supported by pin Sound Port A&B (SPA&SPB). Sound Port A (SPA), includingSPA0, SPA1, SPA2 and SPA3, are defined as I2S_MCLK, BCK, LRCK, and I2S_DATA respectively. Sound Port B (SPB), including SPB0, SPB1, SPB2, and SPB3, are also defined asI2S_MCLK, BCK, LRCK, and I2S_DATA respectively.

IA9QH5 I²S audio interface can work for master and slave mode.

In master mode, **IA9QH5** generate I2S_MCLK/LRCK/BCK for external audio codec. In slave mode, **IA9QH5** accept external LRCK/BCK signal. **IA9QH5** will synchronize with external audio clock. Mono channel data can feed through left channel (Lch) pr right channel (Rch) as Figure 10.1

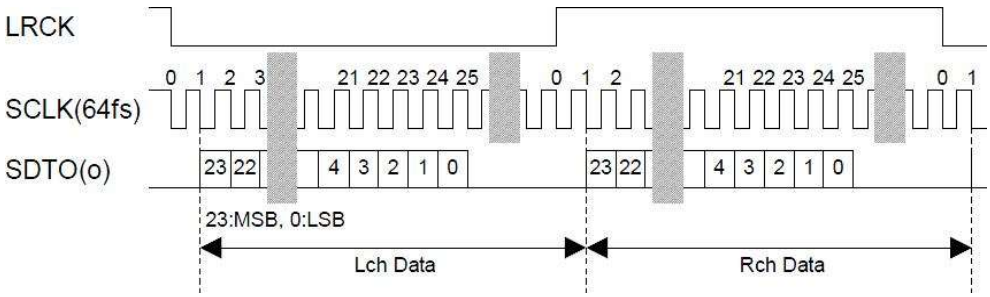


Figure 9.1 I2S Signal

I²S timing chart is shown Figure 10.2 and Table 9

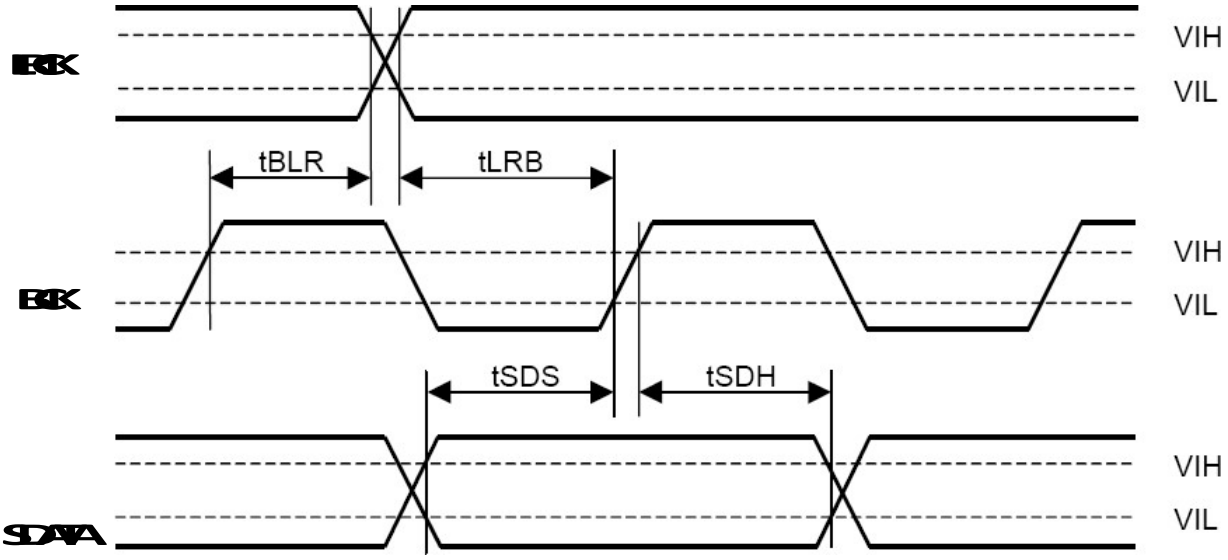


Fig 9.2 I2S timing chart

Symbol	Parameter	Min	Typ	Max	Unit
tBLR	BCK rising to LRCK edge	60			ns
tLRB	LRCK edge to BCK rise	60			ns
tSDS	SDATA setup time	60			ns
tSDH	SDATA hold time	60			ns

Table 7

Audio output clock jitter is shown Table 10

Symbol	**Parameter**	**Min**	**Typ**	**Max**	**Unit**	**Conditions**
△I2S_MCLK	Locking rangevs nominal I2S_MCLK frequency	-800		+800	ppm	256Fs

Table 8 Audio Output clock Jitter

10. DC Power Supply

10.1 Power-On Timing

On Board Flash power on timing is shown Figure 11.1 and Table 11

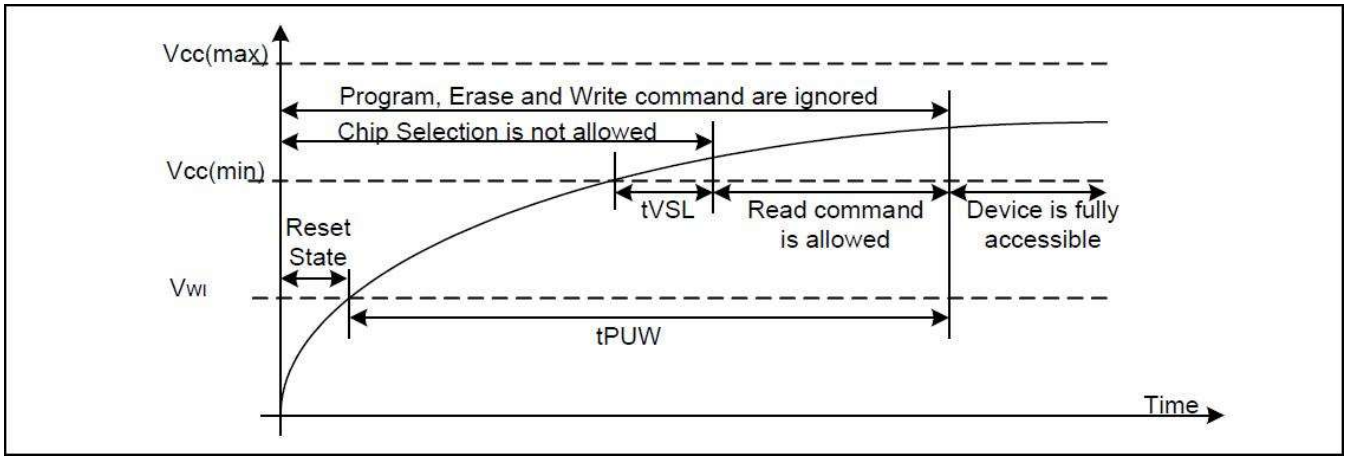


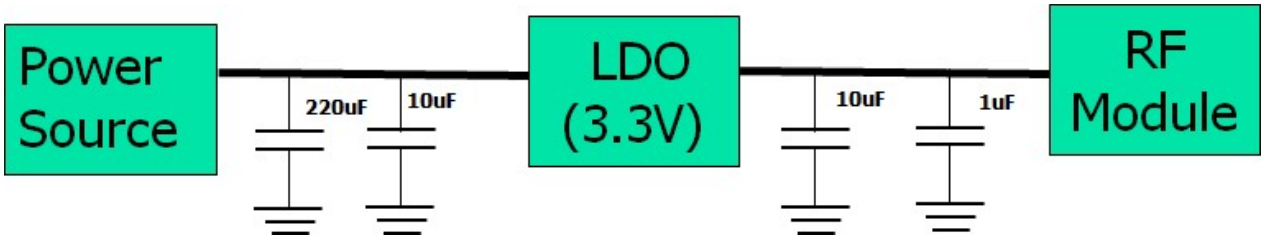
Fig 10.1 On Board Flash Power On Timing

Symbol	Parameter	Min	Max	Unit
tVSL	VCC(min) To CS# Low	10		us
tPUW	Time Delay From VCC(min) To Write Instruction	1	10	ms
VWI	Write Inhibit Voltage VCC(min)	1	2.5	V

Table 9

10.2 DC Power

Recommend system DC power supply for IA9QH5 5G_MODULE_FPC Module as below :



Long power supply lines on the PCB should be avoided. VCC connections and VCC bypass capacitors must be connected as close as possible to 5G_MODULE_FPC module. Power supply ripple of module side must be below 150mVpp to ensure RF normal operation.

LDO Spec.:

- ⇨ **High PSRR Low Dropout Voltage Linear Regulators**
- ⇨ **Iout ≧ 500mA**
- ⇨ **PSRR ≧ 65dB**

11. Antenna Application

1.1 Suggested Clear Area

The recommended antenna clearance for embedded PCB antennas are shownbelow. Note that this clearance should be maintained when mounting the module on a motherboard.

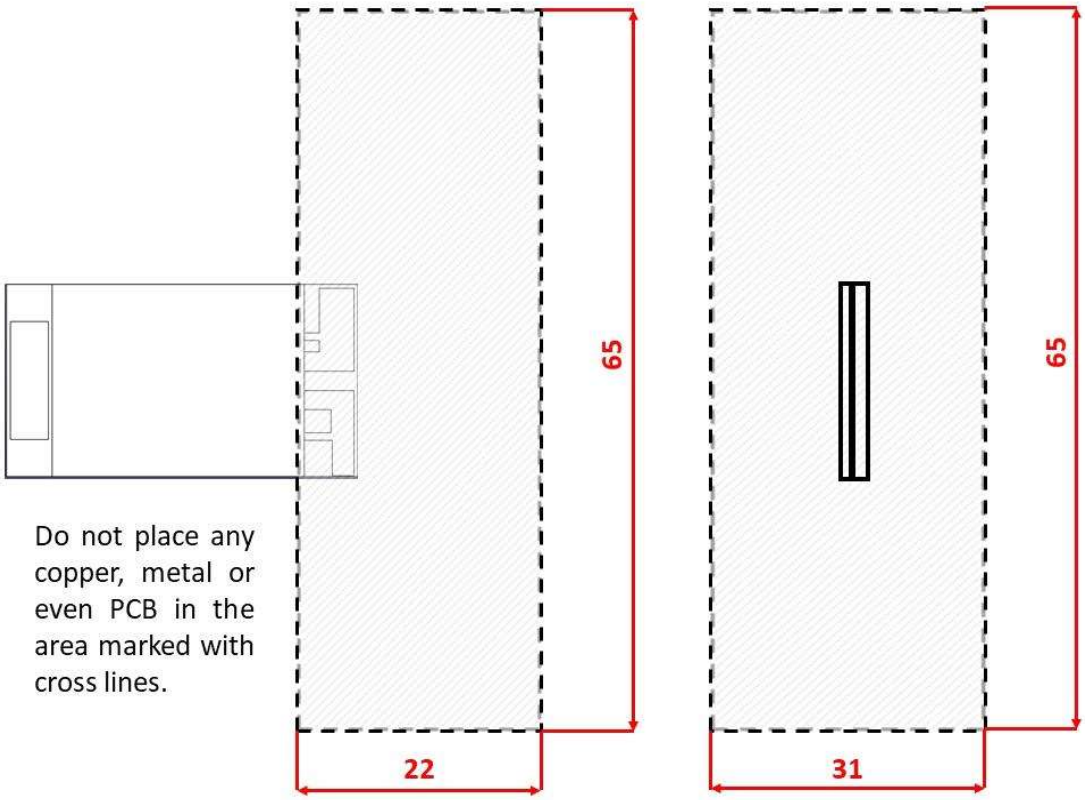


Fig 11.1 Antenna Clearance Recommendations from Top and Side View

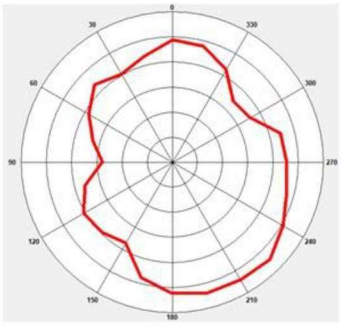
Do not place any copper, metal or even PCB in the area marked with cross lines.

Unit : mm

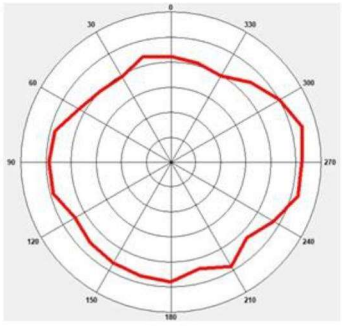
11.2 Antenna Pattern

1. Port 1

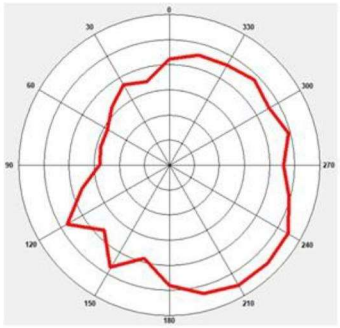
5200 MHz



H(XY)

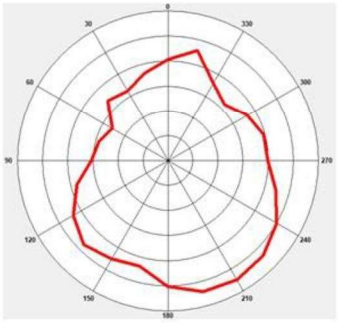


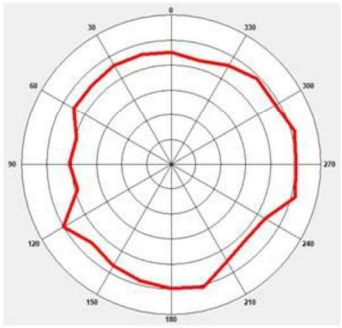
E1(XZ)

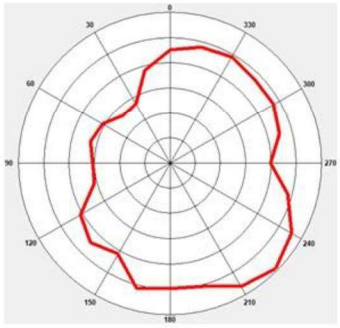


E2(YZ)

5790 MHz



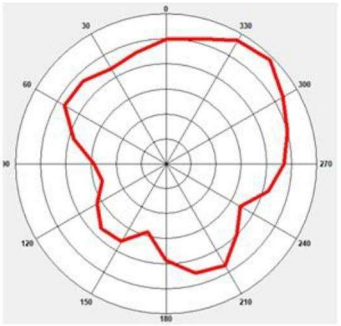




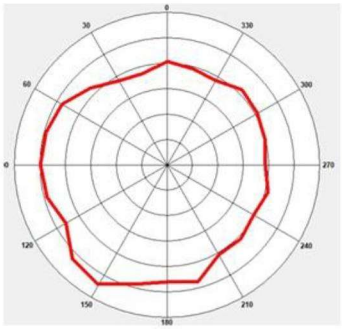
Max : 5
Min : -25
Scale : 5/div

2. Port 2

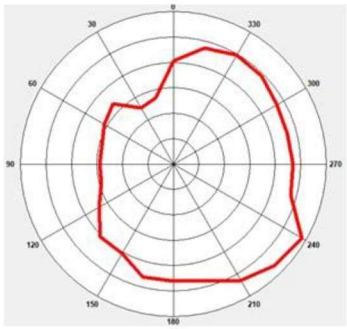
5200 MHz



H(XY)

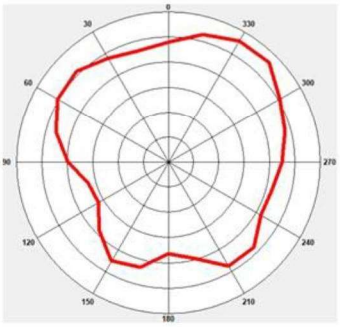


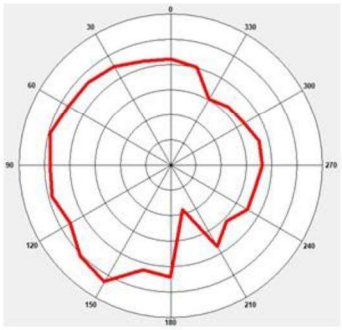
E1(XZ)

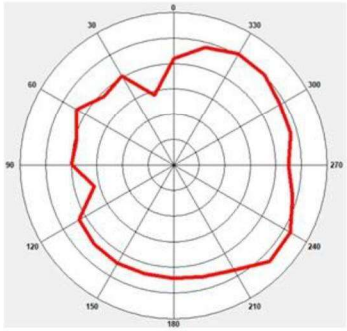


E2(YZ)

5790 MHz





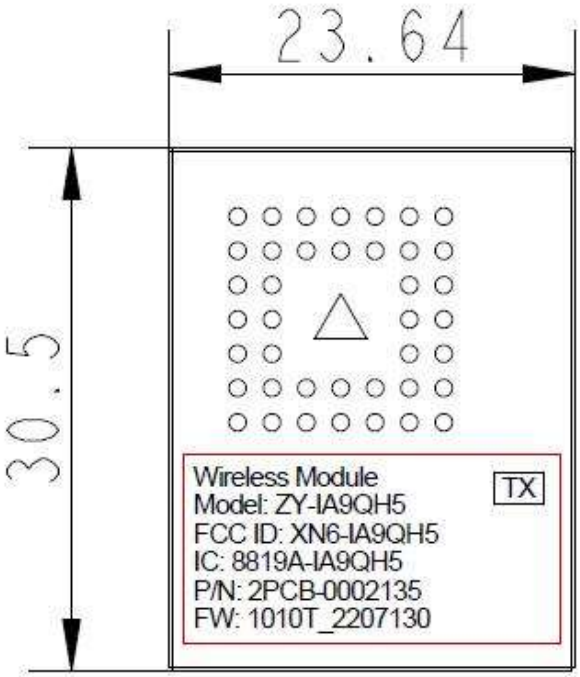


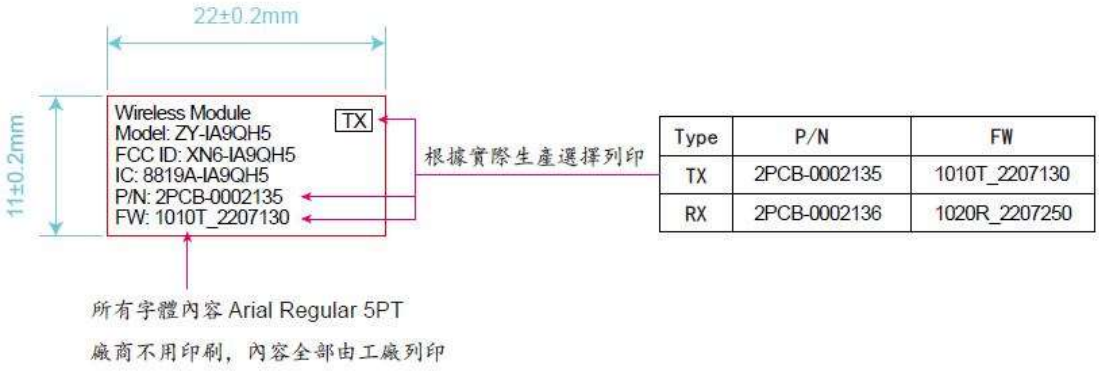
Max : 5
Min : -25
Scale : 5/div

11.3 ANTENNA EFFICIENCY & PEAK GAIN

Frequency(GHz)	Efficiency(%)(1/2)	Peak Gain(dBi)(1/2)
5160	70.34/64.67	4.2/4.97
5245	66.12/68.71	3.79/5.38
5735	64.21/86.42	4.35/5.20
5840	58.96/78.10	3.73/4.22

12. Label





Type	P/N	FW
TX	2PCB-0002135	1010T_2207130
RX	2PCB-0002136	1020R_2207250

13. Regulatory approvals - FCC/IC

FCC and ISED certification

Label Information

The ZY-IA9QH5 module has been certified by the requirements set by the US Federal Communications Commission (Part 15) and Industry Canada (RSS-Gen, Issue 2, June 2006 and RSS-210e) for certification as modular intentional radiators. The certification identification numbers are as follows:
FCC ID: XN6-IA9QH5 IC: 8819A-IA9QH5

FEDERAL COMMUNICATIONS COMMISSION INTERFERENCE 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.

CAUTION:
Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.

RF exposure warning
This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provide with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

Innovation, Science and Economic Development Canada's Notices
This device complies with Innovation, Science and Economic Development Canada's licence-exempt RSSs. Operation is subject to the following two conditions:
(1) This device may not cause interference; and
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Avisos de Canadá Sobre Innovación, Ciencia y Desarrollo Económico
Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :
(1) l'appareil ne doit pas produire de brouillage, et
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Radio Frequency (RF) Exposure Information
The radiated output power of the Wireless Device is below the Innovation, Science and Economic Development Canada radio frequency exposure limits. The Wireless Device should be used in such a manner such that the potential for human contact during normal operation is minimized.

This device has also been evaluated and shown compliant with the IC RF Exposure limits under mobile exposure conditions. (antennas are greater than 20cm from a person's body).

Informations concernant l'exposition aux fréquences radio (RF)
La puissance de sortie émise par l'appareil de sans fil est inférieure à la limite d'exposition aux fréquences radio Canadá Sobre Innovación, Ciencia y Desarrollo Económico. Utilisez l'appareil de sans fil de façon à minimiser les contacts humains lors du fonctionnement normal.

Ce périphérique a également été évalué et démontré conforme aux limites d'exposition aux RF d'IC dans des conditions d'exposition à des appareils mobiles (antennes sont supérieures à 20 cm à partir du corps d'une personne).

Equipment labeling requirements
The statement shown below, or its equivalent, must appear on the external label of every piece of equipment that contains ZY-IA9QH5 module. If the size of the final equipment is too small to support such a label, the statement described in must appear in the user manual for that equipment.
Contains XN6-IA9QH5
Contains IC: 8819A-IA9QH5

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.