



6223N-SRD

Wi-Fi Single-band 1X1 + Bluetooth 4.2
Combo Module Datasheet



6223N-SRD Module Datasheet

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	_____	Signature
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Revision History

Version	Date	Revision Content	Draft	Approved
1.0	2020/11/9	New version	fc	

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1 Overview

1.1 Introduction

6223N-SRD is a highly integrated and excellent performance Wireless LAN (WLAN) and BT. It provides SDIO interface for Wi-Fi to connect with host processor and high speed UART interface for BT. High-speed wireless connection up to 150 Mbps and Bluetooth can support BT2.1+EDR/BT3.0 and BT4.2. It can be easily manufactured on SMT process.

This WLAN Module design is based on Realtek RTL8723DS-CG QFN48 4.4X4.4mm(Realtek).It combines a MAC, a 1T1R capable baseband, and RF in a single chip. It is designed to provide excellent performance with low power Consumption and enhance the advantages of robust system and cost-effective.

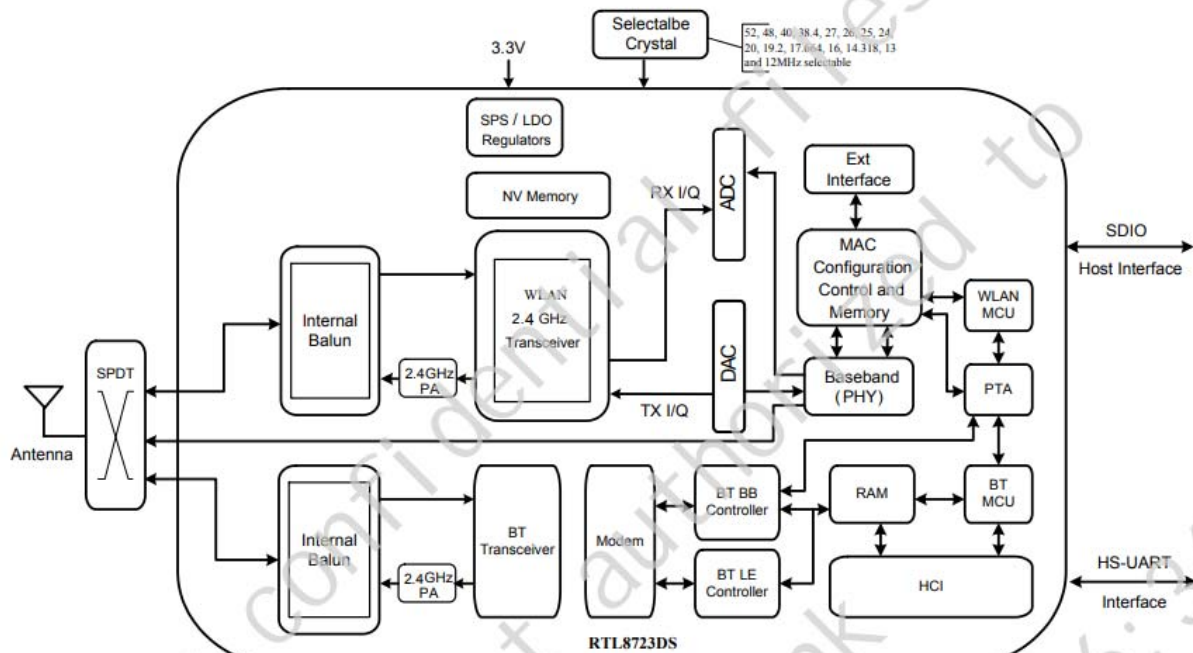
6223N-SRD integrates whole Wi-Fi/BT function blocks into a chip, such as SDIO/UART, MAC, BB, AFE, RFE, PA, EEPROM and LDO/SWR, except fewer passive components remained on PCB.

This compact module is a total solution for a combination of Wi-Fi + BT technologies. The module is specifically developed for Smart phones and Portable devices.

1.2 Features

- Operate at ISM frequency bands (2.4GHz)
- CMOS MAC, Baseband PHY, and RF in a single chip for 802.11b/g/n compatible WLAN
- Wi-Fi 1 transmitter and 1 receiver allow data rates supporting up to 150 Mbps downstream and 150 Mbps upstream PHY rates
- SDIO for Wi-Fi and UART for Bluetooth
- Fully Qualified for Bluetooth 2.1+EDR specification including both 2Mbps and 3Mbps modulation mode
- Fully qualified for Bluetooth 3.0
- Fully qualified for Bluetooth 4.2 Dual mode
- Full_speed Bluetooth operation with Piconet and Scatternet support

Block Diagram:



1.3 General Specification

Model Name	6223N-SRD
Product Description	Support Wi-Fi/BT functionalities
Dimension	L x W x T: 23 x 21 x 4.8 (typical) mm
BT Interface	Support UART
Wi-Fi Interface	Support SDIO 2.0
Operating temperature	0°C to 70°C
Storage temperature	-40° ~125°

1.4 Recommended Operating Rating

	Min.	Typ.	Max.	Unit
Operating Temperature	0	25	70	deg.C
VBAT	3.0	3.3	3.6	V
VDDIO	1.7	1.8 or 3.3	3.6	V

2 General Specification

2.1 Wi-Fi RF Specifications

Feature	Description
WLAN Standard	IEEE 802.11b/g/n, Wi-Fi compliant
Frequency Range	2412MHz-2462MHz
Channels	2.4GHz:CH1~CH11
Output Power	802.11b /11Mbps:17dBm $\pm$ 1.5dB@EVM $\leq$ -10dB
	802.11g /54Mbps:14dBm $\pm$ 1.5dB@EVM $\leq$ -25dB
	802.11n/MCS7@HT20:13dBm $\pm$ 1.5dB@EVM $\leq$ -28dB
	802.11n/MCS7@HT40:13dBm $\pm$ 1.5dB@EVM $\leq$ -28dB
Spectrum Mask	IEEE compliant
Freq. Tolerance	$\pm$ 15 ppm
Receive Sensitivity (11b) @8% PER	802.11b/11Mbps: PER@ $\leq$ -76
Receive Sensitivity (11g) @10% PER	802.11g/54Mbps: PER@ $\leq$ -65
Receive Sensitivity (11n,20MHz) @10% PER	802.11n/MCS7@HT20: PER@ $\leq$ -64
Receive Sensitivity (11n,40MHz) @10% PER	802.11n/MCS7@HT40: PER@ $\leq$ -61

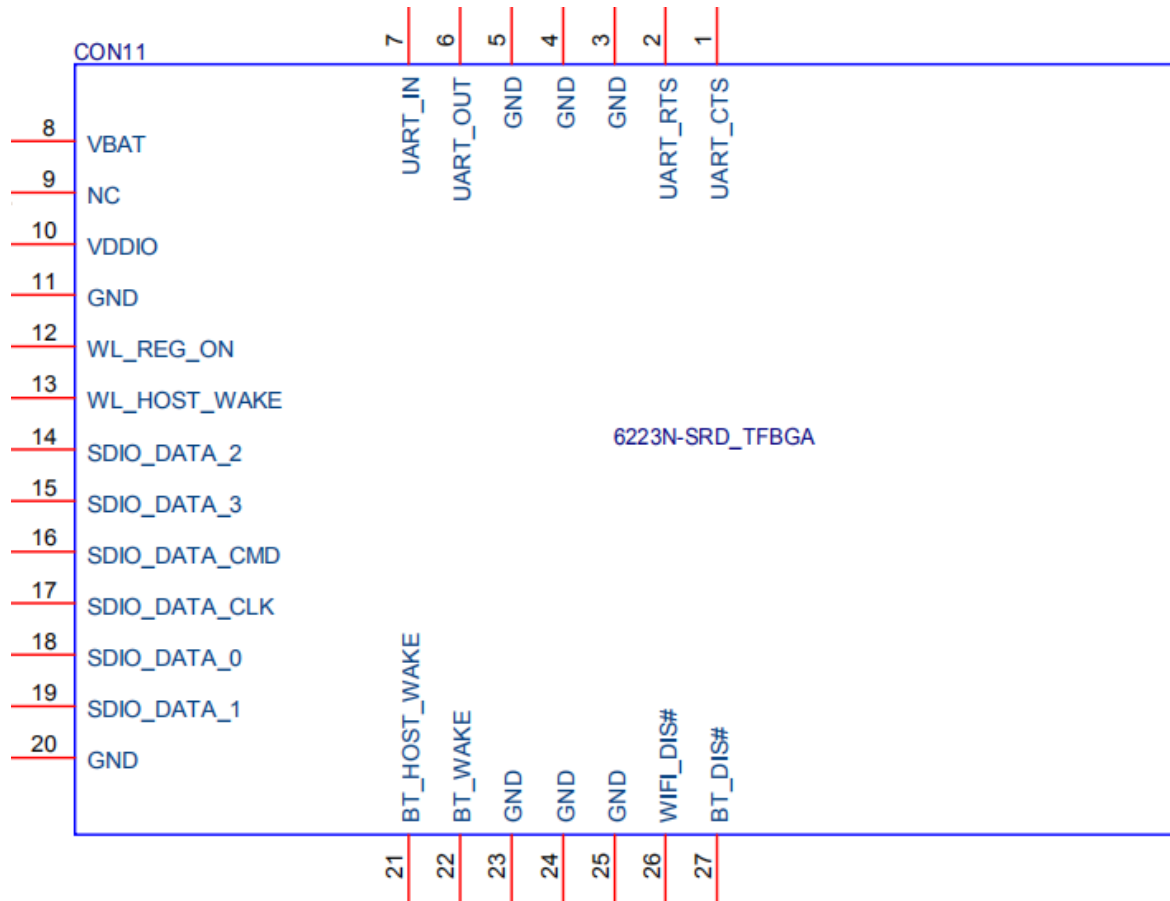
2.2 Bluetooth Specification

Feature	Description		
General Specification			
Bluetooth Standard	Bluetooth V4.2 of 1, 2 and 3 Mbps.		
Host Interface	UART		
Frequency Band	2402 MHz ~ 2480 MHz		
Number of Channels	79 channels		
Modulation	GFSK, $\pi/4$ -DQPSK and 8DPSK		
RF Specification			
	Min.	Typical.	Max.
Output Power (Class 1.5)		6dBm	
Output Power (Class 2)		2dBm	
Sensitivity @ BER=0.1% for GFSK (1Mbps)		-86dBm	
Sensitivity @ BER=0.01% for $\pi/4$ -DQPSK (2Mbps)		-86dBm	
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)		-80dBm	
Maximum Input Level	GFSK (1Mbps): -20dBm		
	$\pi/4$ -DQPSK (2Mbps) : -20dBm		
	8DPSK (3Mbps) : -20dBm		
Sensitive @PER=30.8% FOR BLE		-90dBm	

3 Pin Assignments

3.1 Pin Outline

<TOP>



3.2 Pin Definition

NO.	Name	Type	Description	Voltage
1	UART-CTS		UART-CTS	VDDIO
2	UART-RTS		UART-RTS	VDDIO
3	GND		Ground connections	
4	GND		Ground connections	
5	GND		Ground connections	
6	UART-OUT	O	UART output	VDDIO
7	UART-IN	I	UART input	VDDIO
8	VBAT	P	Supply 3.3V	3.3V
9	NC		Floating (Don't connected to	

			ground)	
10	VDDIO	P	I/O Voltage supply input 1.8V to 3.3V	1.8V ~ 3.3V
11	GND		Ground connections	
12	CHIP_EN	I	chip enable pin, default pull high	3.3V
13	WL_WAKE_HOST	I/O	WLAN device wake-up host	1.8V ~ 3.3V
14	SD_D2	I/O	SDIO Data line 2	1.8V ~ 3.3V
15	SD_D3	I/O	SDIO Data line 3	1.8V ~ 3.3V
16	SD_CMD	I/O	SDIO Command Input	1.8V ~ 3.3V
17	SD_CLK	I	SDIO Clock Input	1.8V ~ 3.3V
18	SD_D0	I/O	SDIO Data line 0	1.8V ~ 3.3V
19	SD_D1	I/O	SDIO Data line 1	1.8V ~ 3.3V
20	GND		Ground connections	
21	BT_HOST_WAKE		BT host wake-up device	VDDIO
22	BT_WAKE_HOST		BT device wake-up host	VDDIO
23	GND		Ground connections	
24	GND		Ground connections	
25	GND		Ground connections	
26	WIFI_DIS#		Pull high: ON , Pull low: OFF External pull low can disable WL	
27	BT_DIS#		Pull high: ON , Pull low: OFF External pull low can disable BT	

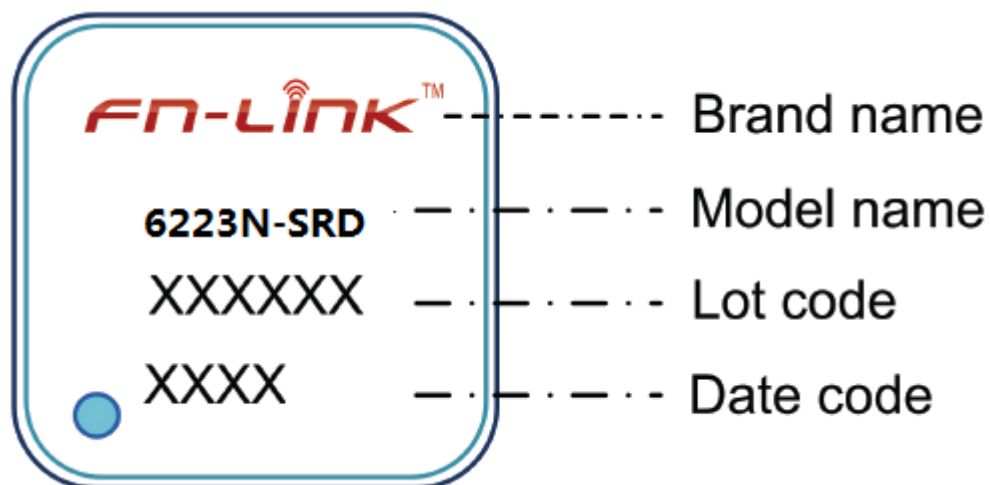
P:POWER I:INPUT O:OUTPUT

4 Dimensions

4.1 Module Picture

L x W : 23 x 21 (+0.3/-0.1) mm 	
H: 4.8 (±0.2) mm	
Weight	1.65g

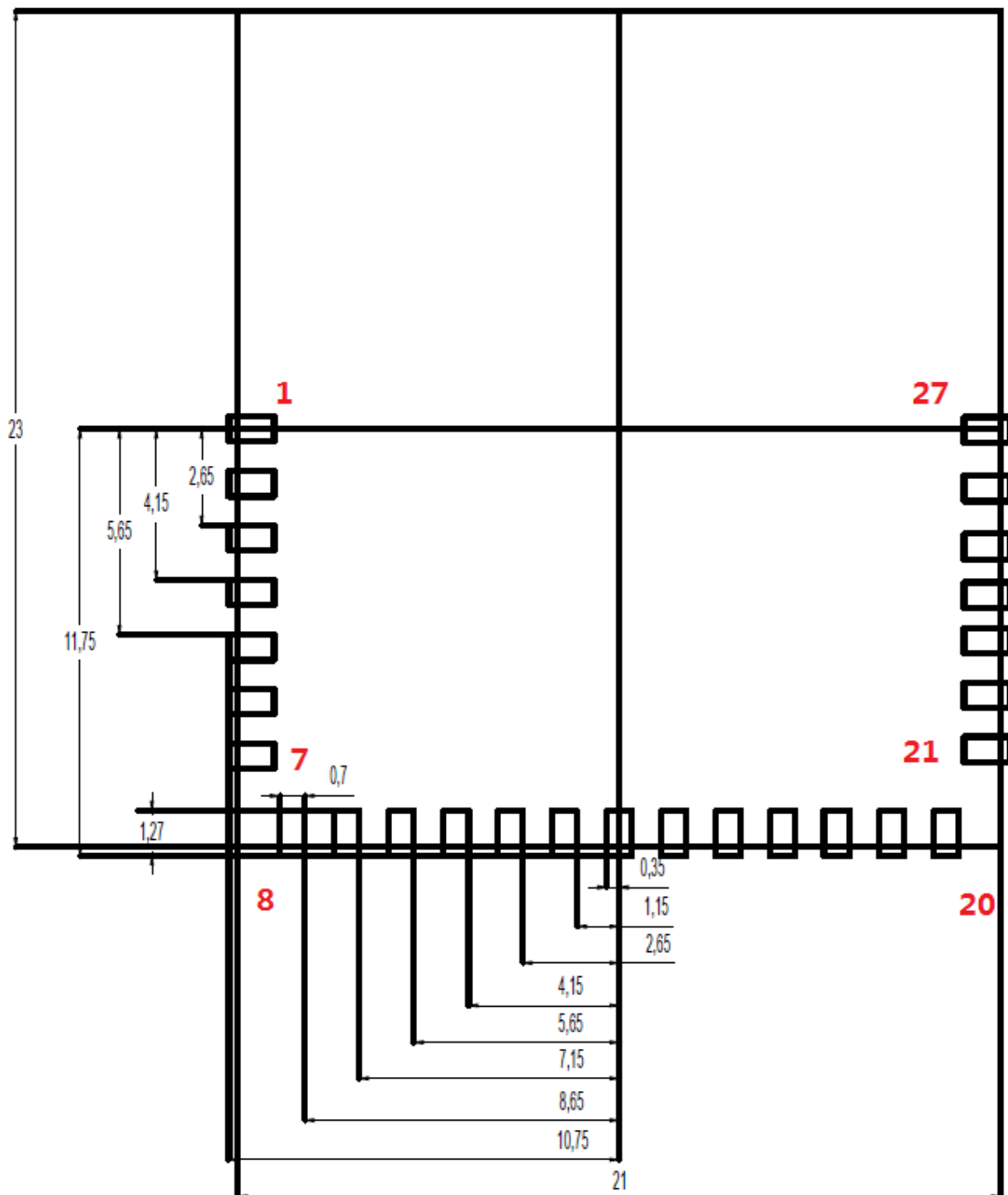
4.2 Marking Description



4.3 Module Physical Dimensions

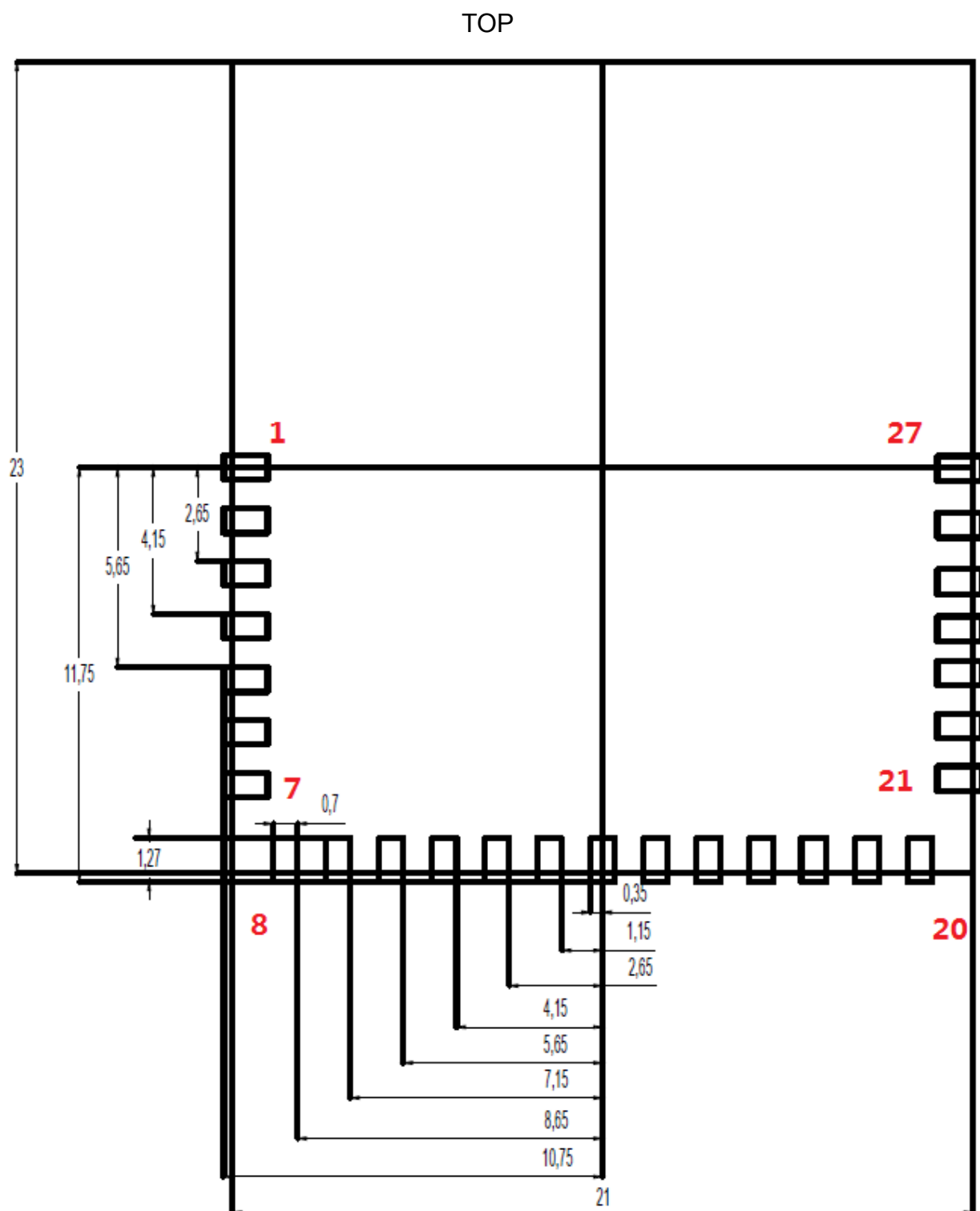
(unit: mm)

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4.4 Layout Reference

(unit: mm)



6 Host Interface Timing Diagram

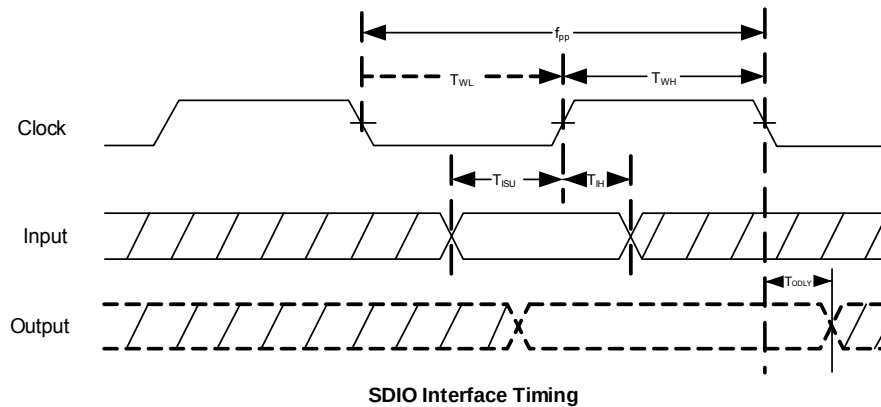
6.1 SDIO Pin Description

The module supports SDIO version 2.0 for all 1.8V 4-bit UHSI speeds: SDR12(25 Mbps), and SDR25(50Mbps) in addition to the 3.3V default speed(25MHz) and high speed (50 MHz). It has the ability to stop the SDIO clock and map the interrupt signal into a GPIO pin. This 'out-of-band' interrupt signal notifies the host when the WLAN device wants to turn on the SDIO interface. The ability to force the control of the gated clocks from within the WLAN chip is also provided.

SDIO Pin Description

SD 4-Bit Mode	
DATA0	Data Line 0
DATA1	Data Line 1 or Interrupt
DATA2	Data Line 2 or Read Wait
DATA3	Data Line 3
CLK	Clock
CMD	Command Line

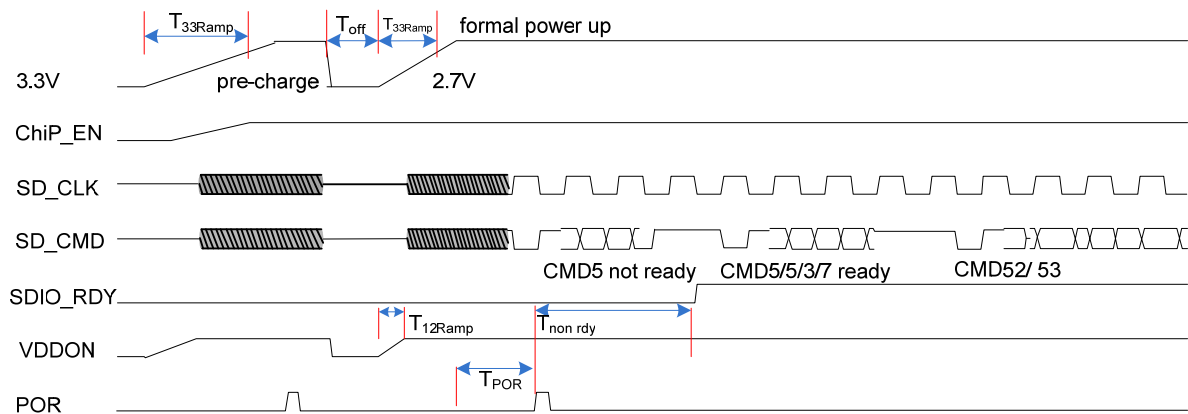
6.2 SDIO Default Mode Timing Diagram



SDIO Interface Timing Parameters

NO	Parameter	Mode	MIN	MAX	Unit
f_{pp}	Clock Frequency	Default	0	25	MHz
		HS	0	50	MHz
T_{WL}	Clock Low Time	DEF	10	-	ns
		HS	7	-	ns
T_{WH}	Clock High Time	DEF	10	-	ns
		HS	7	-	ns
T_{ISU}	Input Setup Time	DEF	5	-	ns
		HS	6	-	ns
T_{IH}	Input Hold Time	DEF	5	-	ns
		HS	2	-	ns
T_{ODLY}	Output Delay Time	DEF	-	14	ns
		HS	-	14	ns

6.3 SDIO Power-on sequence



Symbol	Min	Typical	Max	Unit
T_{33ramp}	0.2	-	No Limit	ms
T_{off}	250	500	1000	ms
T_{33ramp}	0.2	0.5	2.5	ms
T_{12ramp}	0.1	0.5	1.5	ms
T_{POR}	2	2	8	ms
T_{non_rdy}	1	2	10	ms

6.4 UART Interface Characteristics

The RTL8723DS UART interface is a standard 4-wire interface with RX, TX, CTS and RTS. The interface supports the Bluetooth 2.0 UART HCI H4 and H5 specifications. The default baud rate is 115.2K baud. In order to support high and low speed baud rate, the RTL8723DS provides multiple UART clocks.

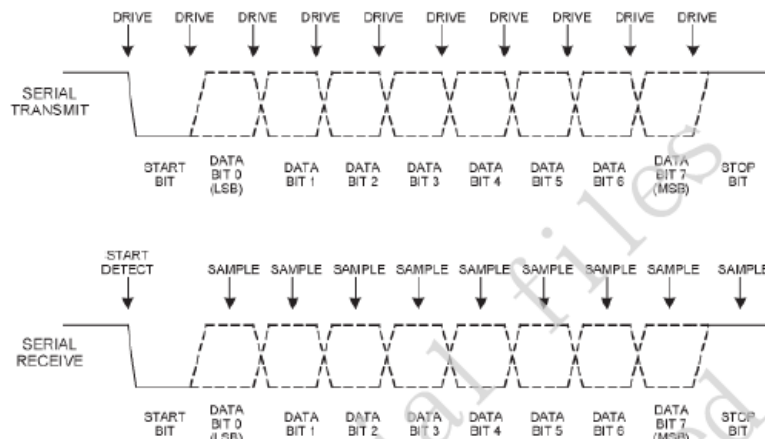


Figure 7. UART Interface Waveform

6.5 UART Interface Power-on Sequence

UART Hardware Flow Control Not Supported

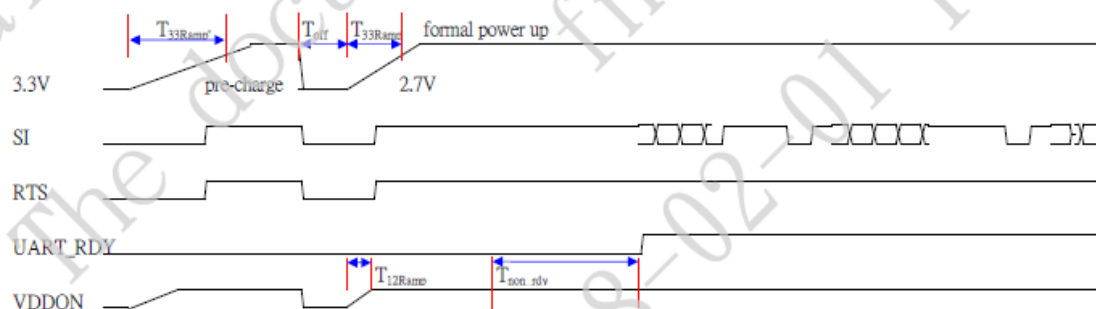
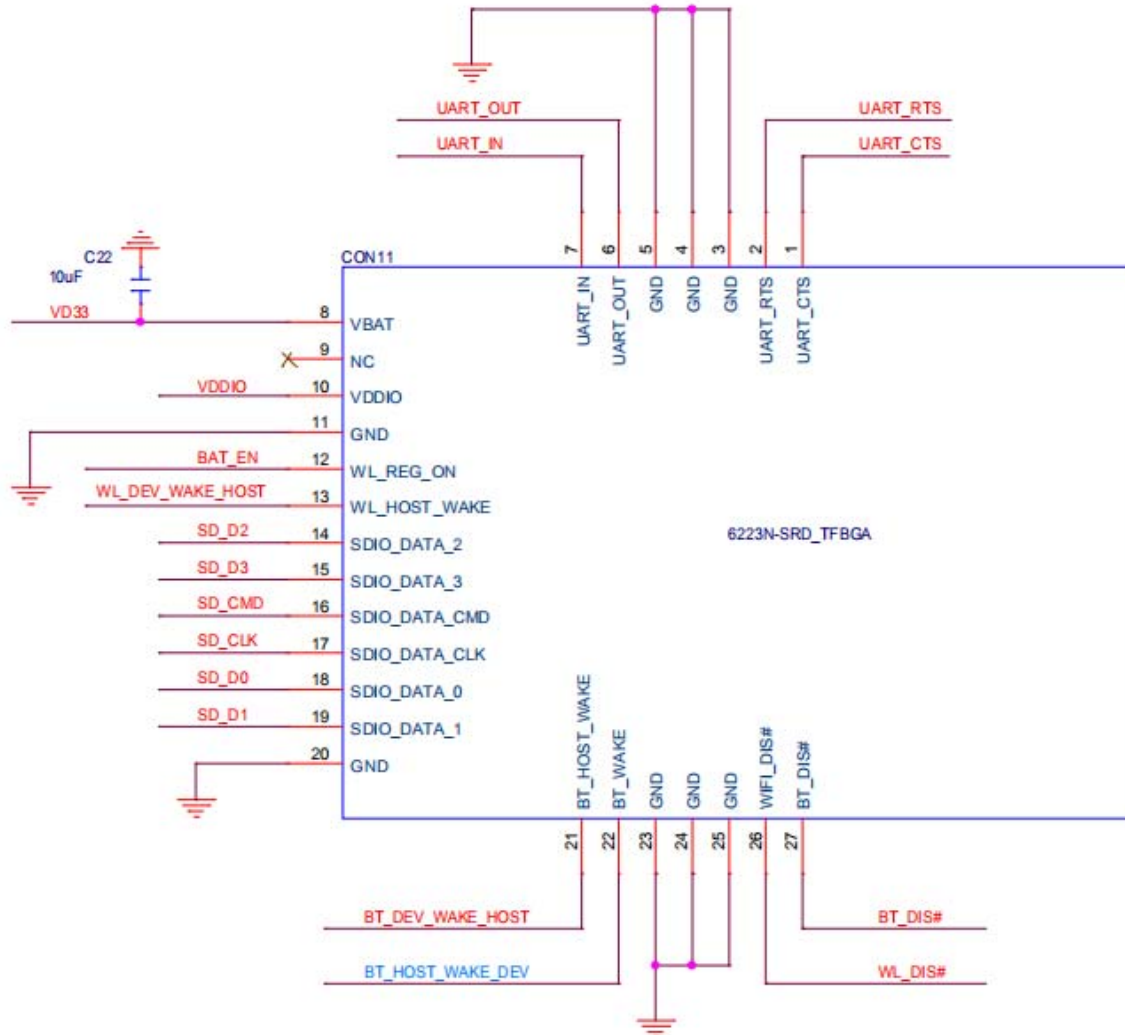


Figure 8. UART Power-On Sequence With Hardware Flow Control

7 Reference Design



Note:

1. BAT_EN could not use for module power off, please switch the 3.3V power for module on/off.
2. please keep the antenna on no metal area.

8 Ordering Information

Part No.	Description
FG6223NSRD-00	RTL8723DS,b/g/n,wifi1T1R,21*23.21mm,SDIO+UART,with metal antenna.

9 The Key Material List

Main	Shielding cover	6223NSRD V1.0 Shielding cover no insulation layer 14.8X11mm-full height of 1.4 copper, no positioning pin(信太)
Alternative	Shielding cover	6223NSRD V1.0 Shielding cover no insulation layer 14.8X11mm-full height of 1.4 copper, no positioning pin (精力通)
Main	Crystal	3225 24MHZ CL=12pF, ±10ppm (东晶)
Alternative	Crystal	3225 24MHZ CL=12pF, ±10ppm (泰晶)
Alternative	Crystal	3225 24MHZ CL=12pF, ±10ppm (晶威特)
Alternative	Crystal	3225 24MHz CL=12pF ±10ppm (鸿星)
Alternative	Crystal	3225 24MHz CL=12pF ±10ppm (TXC)
Main	TVS	0201 5V 0.05pF 15KV TVS (Murata)
Alternative	TVS	0201 5V 0.05pF 15KV TVS (Sunlord)
Alternative	TVS	0201 5V 0.05pF 15KV TVS (维安)
Main	Main Chipset	RTL8723DS-CG QFN48 4.4X4.4mm (Realtek)
Main	antenna	6223N-SRD metal antenna.
Main	PCB	6223N-SRD-V1.0,FR4,green,21X23X0.8mm (翔宇)
Alternative	PCB	6223N-SRD-V1.0,FR4,green,21X23X0.8mm (广东科翔)
Alternative	PCB	6223N-SRD-V1.0,FR4,green,21X23X0.8mm (顺络)
Alternative	PCB	6223N-SRD-V1.0,FR4,green,21X23X0.8mm (深联)

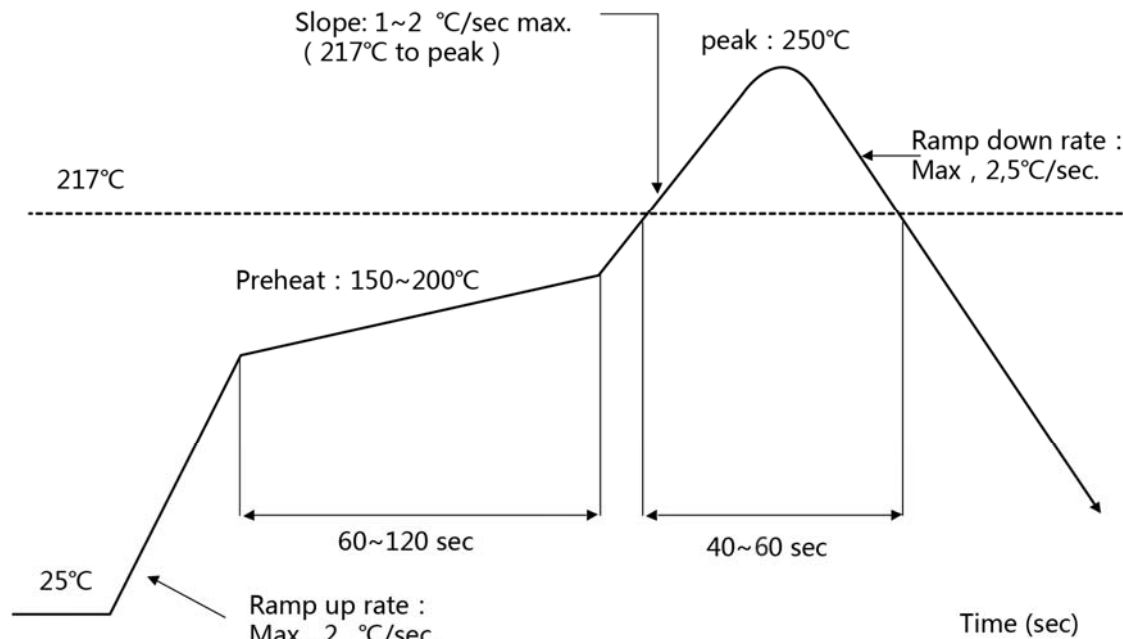
10 Environmental Requirements

10.1 Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <250°C

Number of Times : ≤2 times



10.2 Patch Wi-Fi/BT modules installed before the notice

Wi-Fi/BT module installed note:

1. Please press 1 : 1 and then expand outward proportion to 0.7 mm, 0.12 mm thickness When open a stencil.
 2. Take and use the WIFI/BT module, please insure the electrostatic protective measures.
 3. Reflow soldering temperature should be according to the customer the main size of the products, such as the temperature set at 250 + 5 °C for the MID motherboard.
- About the module packaging, storage and use of matters needing attention are as follows:
1. The module of the reel and storage life of vacuum packing: 1). Shelf life: 8 months, storage environment conditions: temperature in: < 40 °C, relative humidity: < 90% r.h.
 2. The module vacuum packing once opened, time limit of the assembly:

- Card:1) check the humidity display value should be less than 30% (in blue), such as: 30% ~ 40% (pink), or greater than 40% (red) the module have been moisture absorption.
- 2.) factory environmental temperature humidity control: $\leq -30\text{ }^{\circ}\text{C}$, $\leq 60\%$ r.h..
- 3). Once opened, the workshop the preservation of life for 168 hours.
3. Once opened, such as when not used up within 168 hours:
- 1). The module must be again to remove the module moisture absorption.
- 2). The baking temperature: $125\text{ }^{\circ}\text{C}$, 8 hours.
- 3). After baking, put the right amount of desiccant to seal packages.

11 Package

11.1 Reel

TBD

11.2 Packaging Detail

TBD

FCC Statement

FCC standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247

Integral antenna with antenna gain 2dBi

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.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: 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.

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 if without further certify for example C2PC with SAR. 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: 2AATL-6223N-SRD Or Contains FCC ID: 2AATL-6223N-SRD”

When the module is installed inside another device, the user manual of the host 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;
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Note: 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.

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.

Any company of the host device which install this modular with modular approval should perform the test of radiated & conducted emission and spurious emission, etc. according to FCC part 15C : 15.247 and 15.209 & 15.207 ,15B Class B requirement, Only if the test result comply with FCC part 15C : 15.247 and 15.209 & 15.207 ,15B Class B requirement, then the host can be sold legally.