PRODUCT SPECIFICATION

6233A-SRB

Wi-Fi Dual-band 1x1 + BT5.2

Combo Module

Version:v1.6

Customer: _____

Customer P/N: _____

Signature: _____

Date: _____

Office: 14th floor, Block B, phoenix zhigu, Xixiang Street, Baoan District, Shenzhen

Factory: NO.8, Litong RD., Liuyang Economic & Technical Development Zone, Changsha, CHINA

TEL:+86-755-2955-8186 Website:www.fn-link.com

6233A-SRB Module Datasheet

	Part NO.	Description
Ordering Information	FG6233ASRB-00	RTL8733BS-CG,802.11b/g/n/a +BT5.2,1T1R+BT+ANT,12*12 , SDIO2.0/Uart,no Shielding/TVS,LDO,Dual antenna
	FG6233ASRB-01	RTL8733BS-CG,802.11b/g/n/a +BT5.2,1T1R+BT+ANT, 12*12,SDIO2.0/Uart,no Shielding/TVS,LDO,Single antenna
	FG6233ASRB-0D	RTL8733BS-CG,802.11b/g/n/a +BT5.2,1T1R+BT ANT,12* 12,SDIO2.0/Uart,with Shielding ,Single antenna
	FG6233ASRB-03	RTL8733BS-CG,802.11b/g/n/a +BT5.2,1T1R+BT,ANT,12*12 , SDIO2.0/Uart,with Shielding/TVS,LDO,Dual antenna

CONTENTS

Revision History

Version	Date	Contents of Revision Change	Preparde	Checked	Approved
V1.0	2020/08/21	New version	LXY	LXY	Szs
V1.1	2021/11/20	Update the specification format Add BT Specification	FC	LXY	QJP
V1.2	2022/6/13	Add -01 single antenna version	FC	LXY	QJP
V1.3	2024/03/11	Change the DCDC version to the LDO version	LXP	LXY	QJP
V1.4	2024/06/14	Add Part No. -0D	LXP	LXY	QJP
V1.5	2024/07/01	Add Part No. -03	LXP	LXY	QJP
V1.6	2024/07/08	Update Part No. -0D Module Picture	LXP	LXY	QJP

1. General Description

1.1 Introduction

6233A-SRB is a small size and low profile of Wi-Fi + BT Combo module with LGA module, board size is 12*12mm. It can be easily manufactured on SMT process and highly suitable for tablet PC, mobile device and consumer products. It provides SDIO 2.0 interface for Wi-Fi to connect with host processor and high speed UART interface for BT5.2. It also has a PCM interface for audio data transmission with direct link to external audio codec via BT controller.

The Wi-Fi throughput up to 150Mbps in theory by using 802.11n technology.

1.2 Description

Model Name	6233A-SRB
Product Description	Support Wi-Fi/Bluetooth functionalities
Dimension	L x W x H: 12 x 12 mm
Wi-Fi Interface	Support SDIO V1.1/2.0
BT Interface	UART / PCM
OS supported	Android /Linux/ Win CE /iOS /XP/WIN7/WIN10
Operating temperature	0°C to 70°C
Storage temperature	-40°C to 85°C

2. Features

General

- Operate at 2.4G&5GHz frequency bands
- IEEE standards support: IEEE 802.11a,IEEE 802.11b, IEEE 802.11g, IEEE 802.11n, IEEE 802.11d, IEEE 802.11e, IEEE 802.11h, IEEE 802.11i
- Enterprise level security which can apply WPA/WPA2/WPA3
- Wi-Fi 1T1R allow data rates supporting up to 150 Mbps PHY rates

Host Interface

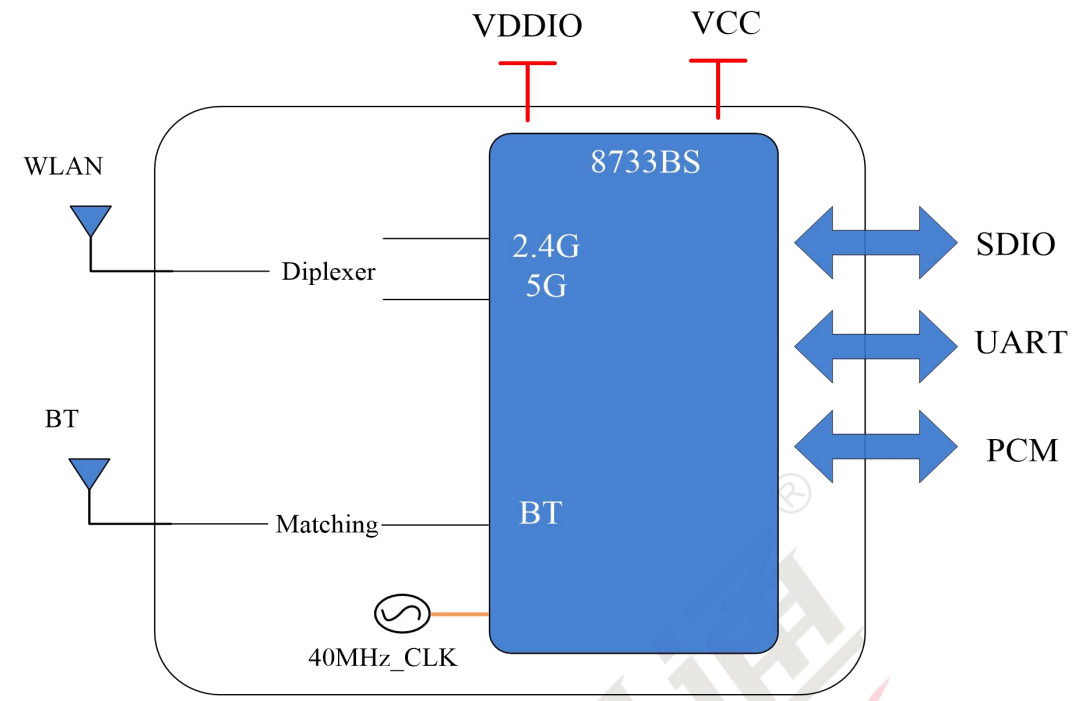
- SDIO2.0 for Wi-Fi and UART for BT5.2
- PCM interface for audio data transmission via BT controller

Bluetooth Features

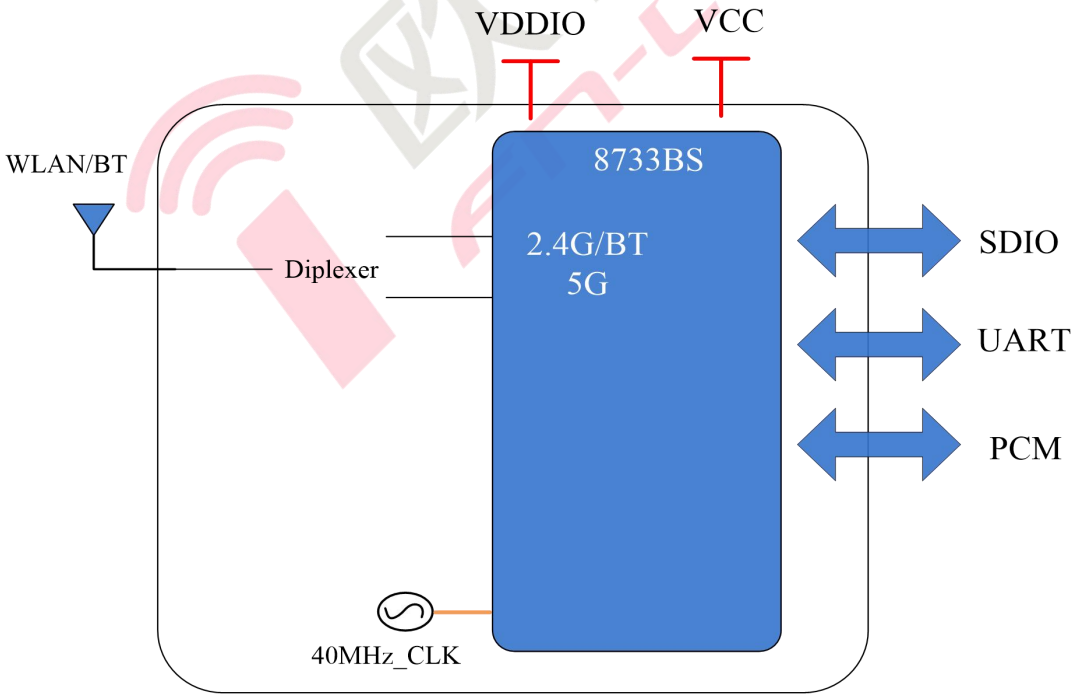
- Compatible with Bluetooth v2.1+EDR v5.2 system
- Support BLE4.0, BT5.2 dual mode

3. Block Diagram

---dual antenna version



---single antenna version



4. General Specification

4.1 2.4GHz WI-FI Specification

Feature	Description	
WLAN Standard	IEEE 802.11 b/g/n Wi-Fi compliant	
Frequency Range	2.400 GHz ~ 2.4835 GHz (2.4 GHz ISM Band)	
Number of Channels	2.4GHz：Ch1 ~ Ch14	
Test Items	**Typical Value**	**EVM**
Output Power[1]	802.11b /11Mbps : 17dBm ± 2 dB	EVM ≤ -9dB
	802.11g /54Mbps : 15dBm ± 2 dB	EVM ≤ -25dB
	802.11n /MCS7 : 14dBm ± 2 dB	EVM ≤ -28dB
Spectrum Mask	Meet with IEEE standard	
Freq. Tolerance	±20ppm	
SISO Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps PER @ -92 dBm	≤-83
	- 2Mbps PER @ -90 dBm	≤-80
	- 5.5Mbps PER @ -87 dBm	≤-79
	- 11Mbps PER @ -85 dBm	≤-76
SISO Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps PER @ -89 dBm	≤-85
	- 9Mbps PER @ -88 dBm	≤-84
	- 12Mbps PER @ -87 dBm	≤-82
	- 18Mbps PER @ -84 dBm	≤-80
	- 24Mbps PER @ -81 dBm	≤-77
	- 36Mbps PER @ -78 dBm	≤-73
	- 48Mbps PER @ -73 dBm	≤-69
	- 54Mbps PER @ -71 dBm	≤-68
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -89 dBm	≤-85
	- MCS=1 PER @ -86 dBm	≤-82
	- MCS=2 PER @ -84 dBm	≤-80
	- MCS=3 PER @ -80 dBm	≤-77
	- MCS=4 PER @ -77 dBm	≤-73
	- MCS=5 PER @ -72 dBm	≤-69
	- MCS=6 PER @ -71 dBm	≤-68
	- MCS=7 PER @ -69 dBm	≤-67
SISO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0, PER @ -88 dBm	≤-82
	- MCS=1, PER @ -85 dBm	≤-79
	- MCS=2, PER @ -83 dBm	≤-77

	- MCS=3, PER @ -79 dBm	≤-74
	- MCS=4, PER @ -76 dBm	≤-70
	- MCS=5, PER @ -71 dBm	≤-66
	- MCS=6, PER @ -70 dBm	≤-65
	- MCS=7, PER @ -68 dBm	≤-64
Maximum Input Level	802.11b : -10 dBm	
	802.11g/n : -20 dBm	
Antenna Reference	Small antennas with 0~2 dBi peak gain	

1.TX power can control by driver side to increase or decrease the output value;

4.2 5GHz WI-FI Specification

Feature	**Description**	
WLAN Standard	IEEE 802.11a/n Wi-Fi compliant	
Frequency Range[1]	5.150 GHz ~ 5.850 GHz (5.0 GHz Band)	
Number of Channels	5.0GHz：Please see the table1	
Test Items	**Typical Value**	**EVM**
Output Power[2]	802.11a/54Mbps : 15dBm ± 2 dB	EVM ≤ -25dB
	802.11n /MCS7 : 14dBm ± 2 dB	EVM ≤ -28dB
Test Items	**Test Value**	**Standard Value**
SISO Receive Sensitivity (11a,20MHz) @10% PER	- 6Mbps PER @ -88 dBm	≤-85
	- 9Mbps PER @ -87 dBm	≤-84
	- 12Mbps PER @ -86 dBm	≤-82
	- 18Mbps PER @ -83 dBm	≤-80
	- 24Mbps PER @ -80 dBm	≤-77
	- 36Mbps PER @ -77 dBm	≤-73
	- 48Mbps PER @ -72 dBm	≤-69
	- 54Mbps PER @ -70 dBm	≤-68
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -88 dBm	≤-85
	- MCS=1 PER @ -85 dBm	≤-82
	- MCS=2 PER @ -83 dBm	≤-80
	- MCS=3 PER @ -80 dBm	≤-77

	- MCS=4	PER @ -76 dBm	≤-73
	- MCS=5	PER @ -71 dBm	≤-69
	- MCS=6	PER @ -70 dBm	≤-68
	- MCS=7	PER @ -69 dBm	≤-67
SISO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0	PER @ -85 dBm	≤-82
	- MCS=1	PER @ -82 dBm	≤-79
	- MCS=2	PER @ -80 dBm	≤-77
	- MCS=3	PER @ -77 dBm	≤-74
	- MCS=4	PER @ -73 dBm	≤-70
	- MCS=5	PER @ -69 dBm	≤-66
	- MCS=6	PER @ -68 dBm	≤-65
	- MCS=7	PER @ -67 dBm	≤-64
Maximum Input Level	802.11a/n : -30 dBm		
Antenna Reference	Small antennas with 0~2 dBi peak gain		

2.TX power can control by driver side to increase or decrease the output value;

[1]5GHz(20MHz) Channel table

Band range	Operating Channel Numbers	Channel center frequencies(MHz)
5150MHz~5250MHz	36	5180
	40	5200
	44	5220
	48	5240
5250MHz~5350MHz	52	5260
	56	5280
	60	5300
	64	5320
5470MHz~5725MHz	100	5500
	104	5520
	108	5540
	112	5560
	116	5580
	120	5600
	124	5620
	128	5640
	132	5660

	136	5680
	140	5700
5725MHz~5850MHz	149	5745
	153	5765
	157	5785
	161	5805
	165	5825

4.3 Bluetooth Specification

Feature	**Description**
General Specification	
Bluetooth Standard	BDR(1Mbps),EDR(2Mbps & 3Mbps),LE(1Mbps),2LE(2Mbps)
Host Interface	UART
Frequency Band	2400 MHz ~ 2483.5 MHz
Number of Channels	79 channels for classic,40 channels for BLE
Modulation	GFSK, π/4-DQPSK,8DPSK
RF Specification	
Output Power , tolerance ±3 dB	
	CL1(dBm)
BDR Output Power	5
EDR Output Power	5
BLE Output Power	5
Sensitivity, tolerance : /	
Sensitivity @ BER=0.1% for GFSK (1Mbps)	-92
Sensitivity @ BER=0.01% for π/4-DQPSK (2Mbps)	-86

Sensitivity @ BER=0.01% for 8DPSK (3Mbps)	-85
Sensitivity @ BLE=30.8% for LE (1Mbps)	-90
Sensitivity @ BLE=30.8% for 2LE (2Mbps)	-90
Maximum Input Level	GFSK (1Mbps):-20dBm
	π/4-DQPSK (2Mbps) :-20dBm
	8DPSK (3Mbps) :-20dBm

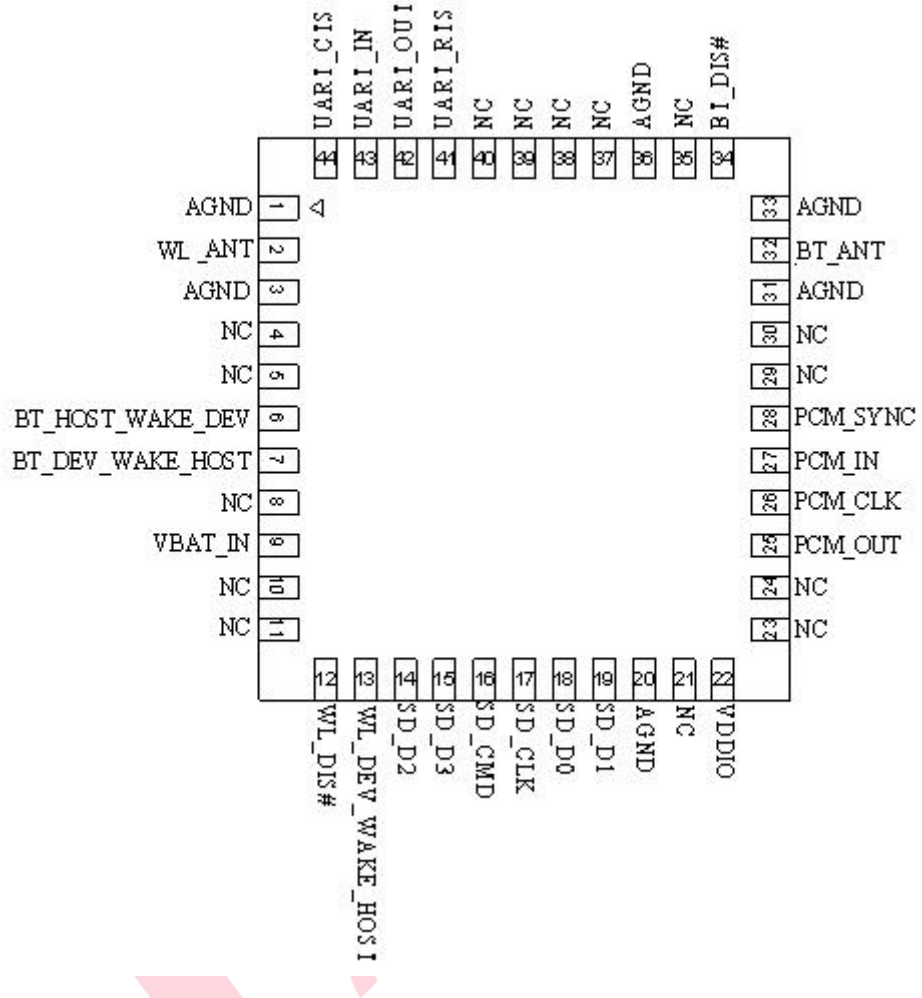
5. ID setting information

WI-FI

Vendor ID	024C
Product ID	B733

6. Pin Definition

6.1 Pin Outline



6.2 Pin Definition details

NO.	Name	Type	Description	Voltage
1	GND	—	Ground connections	
2	WL_ANT	I/O	WL port for dual antenna type WL/BT port for single antenna type	
3	GND	—	Ground connections	
4	NC		Floating (NC)	
5	NC		Floating (NC)	
6	HOST_WAKE_BT	I	Host to wake up Bluetooth device	VDDIO
7	BT_WAKE_HOST	O	Bluetooth device to wake up host	VDDIO
8	NC		Floating (NC)	

9	VBAT_IN	P	3.3V±10% Main power voltage source input	3.3V
10	NC		Floating (NC)	
11	NC		Floating (NC)	
12	WL_DIS#	I	This pin pull low can externally shut down the WLAN function. (may not supported recently)	3.3V
13	WL_HOST_WAKE	O	WLAN to wake up HOST	VDDIO
14	SD_D2	I/O	SDIO data line 2	
15	SD_D3	I/O	SDIO data line 3	
16	SD_CMD	I/O	SDIO command line	
17	SD_CLK	I	SDIO clock line	
18	SD_D0	I/O	SDIO data line 0	
19	SD_D1	I/O	SDIO data line 1	
20	AGND		Ground connections	
21	NC		Floating(NC)	
22	VDDIO	P	I/O Voltage supply input	1.8/3.3V
23	NC		Floating (NC)	
24	NC	I	32.768KHz Clock Input, Can keep NC	
25	PCM_OUT	O	PCM Output This pin should not pull high during power on moduel .(H-LDO mode , L-SWR mode)	VDDIO
26	PCM_CLK	I/O	PCM Clock	VDDIO
27	PCM_IN	I	PCM Input This pin should not pull high during power on moduel .(H-test mode ,L-normal mode)	VDDIO
28	PCM_SYNC	O	PCM Sync, default low This pin should not pull high during power on moduel . (H-external EEPROM ,L-internal NV memory)	VDDIO
29	NC		Floating (NC)	
30	NC		Floating (NC)	
31	AGND		Ground connections	
32	BT_ANT	I/O	BT port 1 for dual antenna type NC if module is single antenna type	
33	AGND		Ground connections	
34	BT_DIS#	I	BT Reset IN	3.3V

35	NC		Floating (NC)	
36	AGND		Ground connections	
37	NC		Floating (NC)	
38	NC		Floating (NC)	
39	NC		Floating (NC)	
40	NC		Floating (NC)	
41	UART_RTS		UART RTS Module pin is Ground connections	
42	UART_OUT	O	UART Output	VDDIO
43	UART_IN	I	UART Input	VDDIO
44	UART_CTS	I	UART CTS	VDDIO

P:POWER I:INPUT O:OUTPUT

7. Electrical Specifications

7.1 Power Supply DC Characteristics

	Min.	Typ.	Max.	Unit
Operating Temperature	0	25	70	deg.C
VCC33	3.15	3.3	3.45	V
VDDIO	1.7	1.8 or 3.3	3.45	V

7.2 Power Consumption

Power Consumption	TX HT40 11n Mode	106mA
	TX HT20 11n Mode	121.2mA
	TX HT20 11g Mode	126mA
	TX HT20 11b Mode	264mA
	RX Mode	69mA

7.3 Interface Circuit time series

7.3.1 SDIO Pin Description

The module supports SDIO version 2.0 for all 1.8V / 3.3V .

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

7.3.2 SDIO Default Mode Timing Diagram

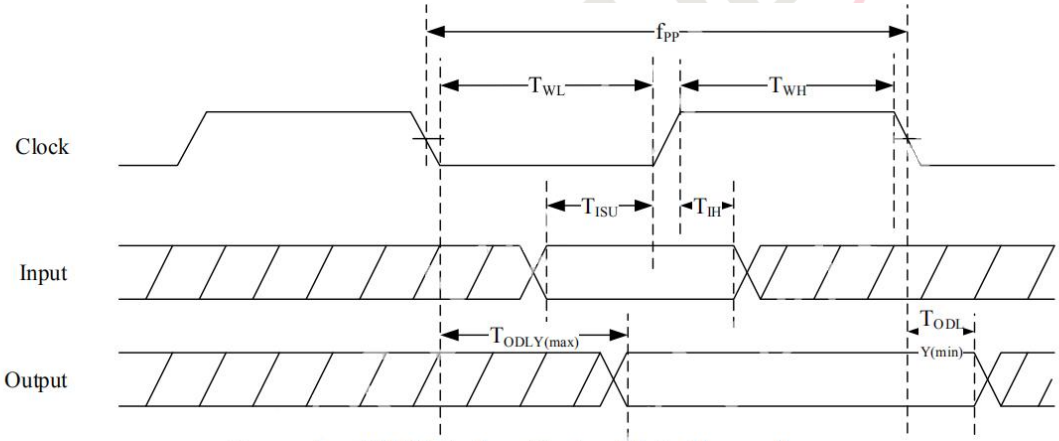


Figure 4. SDIO Interface Timing (default speed)

Table 13. SDIO Interface Timing Parameters (default speed)

NO	Parameter	MIN	MAX	Unit
f_{PP}	Clock Frequency	0	25	MHz
T_{WL}	Clock Low Time	10	-	ns
T_{WH}	Clock High Time	10	-	ns
T_{ISU}	Input Setup Time	5	-	ns
T_{IH}	Input Hold Time	5	-	ns
T_{ODLY}	Output Delay Time During Data Transfer Mode	0	14	ns
T_{ODLY}	Output Delay Time During Identification Mode	0	50	ns

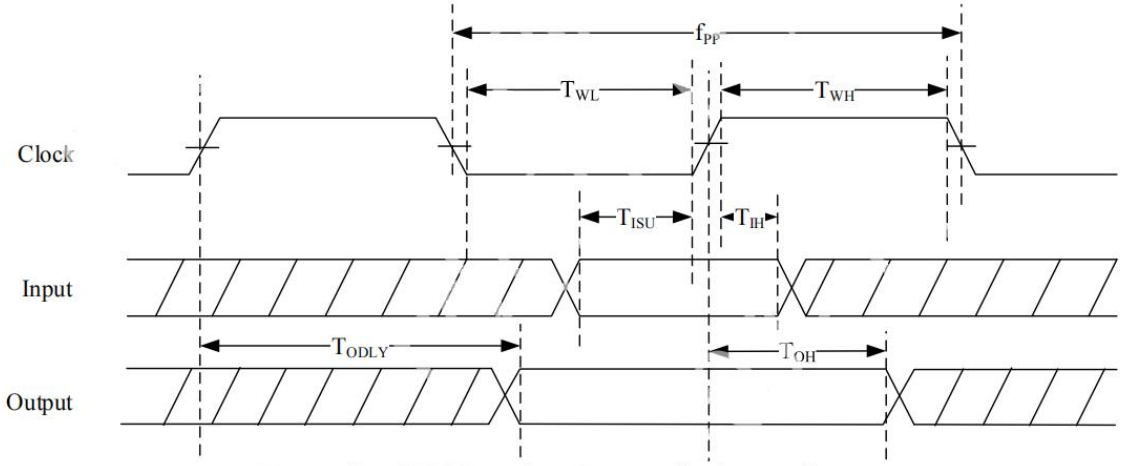


Figure 5. SDIO Interface Timing (high speed)

NO	Parameter	MIN	MAX	Unit
f_{PP}	Clock Frequency	0	50	MHz
T_{WL}	Clock Low Time	7	-	ns
T_{WH}	Clock High Time	7	-	ns
T_{ISU}	Input Setup Time	6	-	ns
T_{IH}	Input Hold Time	2	-	ns
T_{ODLY}	Output Delay Time During Data Transfer Mode	-	14	ns
T_{OH}	Output Hold Time	2.5	-	ns

7.3.3 SDIO Power-on sequence

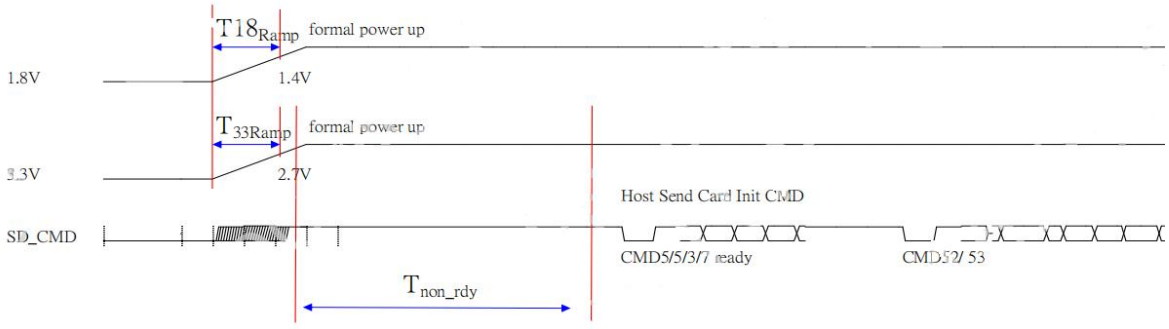


Figure 6. SDIO Interface Power-On Sequence

Table 15. SDIO Interface Power-On Sequence

Symbol	Description
T_{33ramp}	The 3.3V main power ramp up duration.
T_{18ramp}	The 1.8V main power ramp up duration.
T_{non_rdy}	SDIO Not Ready Duration. In this state, the RTL8723FS may respond to commands without the ready bit being set. After the ready bit is set, the host will initiate complete card detection procedure.

We recommend that the card detection procedures are divided into two phases: A 3.3V power pre-charge phase and a formal power-up phase.

After main 3.3V ramp up and 1.8V ramp up, the power management unit is enabled by the power ready detection circuit. The power management unit enables the SDIO block. eFUSE is then autoloaded to SDIO circuits during the T_{non_rdy} duration. After CMD5/5/3/7 procedures, card detection is executed. When the driver has loaded, normal CMD52 and CMD53 are used.

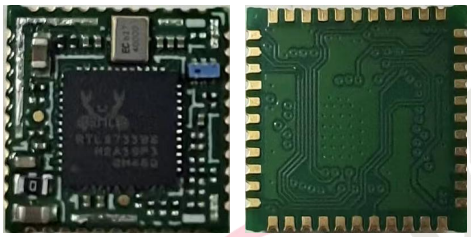
Table 16. SDIO Interface Power-On Timing Parameters

	Min	Typical	Max	Unit
T33ramp	0.2	0.5	2.5	ms
T18ramp	0.2	0.5	2.5	ms
Tnon-rdy	1	2	10	ms

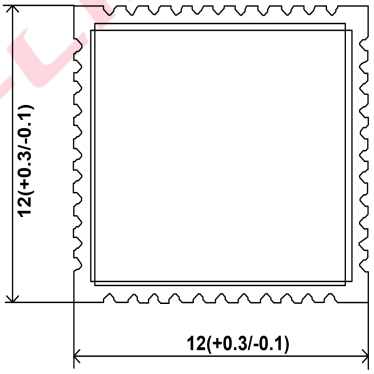
8. Size reference

8.1 Module Picture[1]

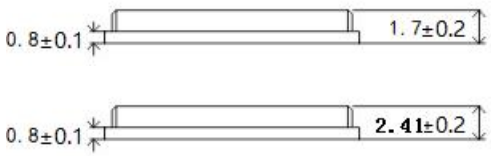
L x W : 12 x 12 (+0.3/-0.1) mm



FG6233ASRB-0D



No Shielding H: 1.7 (±0.2) mm
With Shielding H:2.41(±0.2)mm



Weight	0.45g

1.picture may updated in future version.

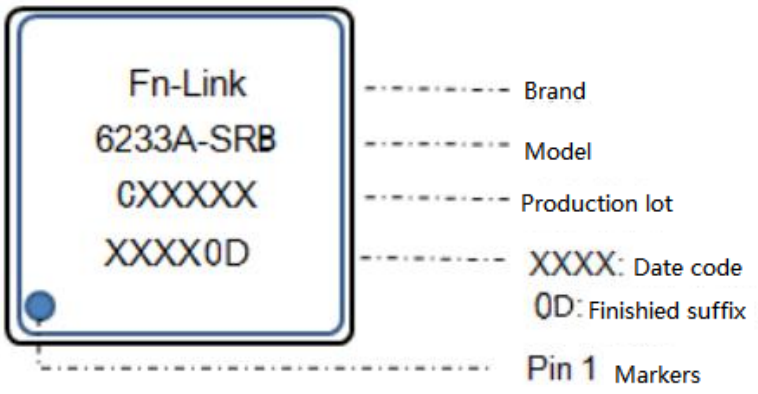
8.2 Marking Description

-00 lable information

< TOP VIEW >

lable rule：mac address;Model name;datecode+finished

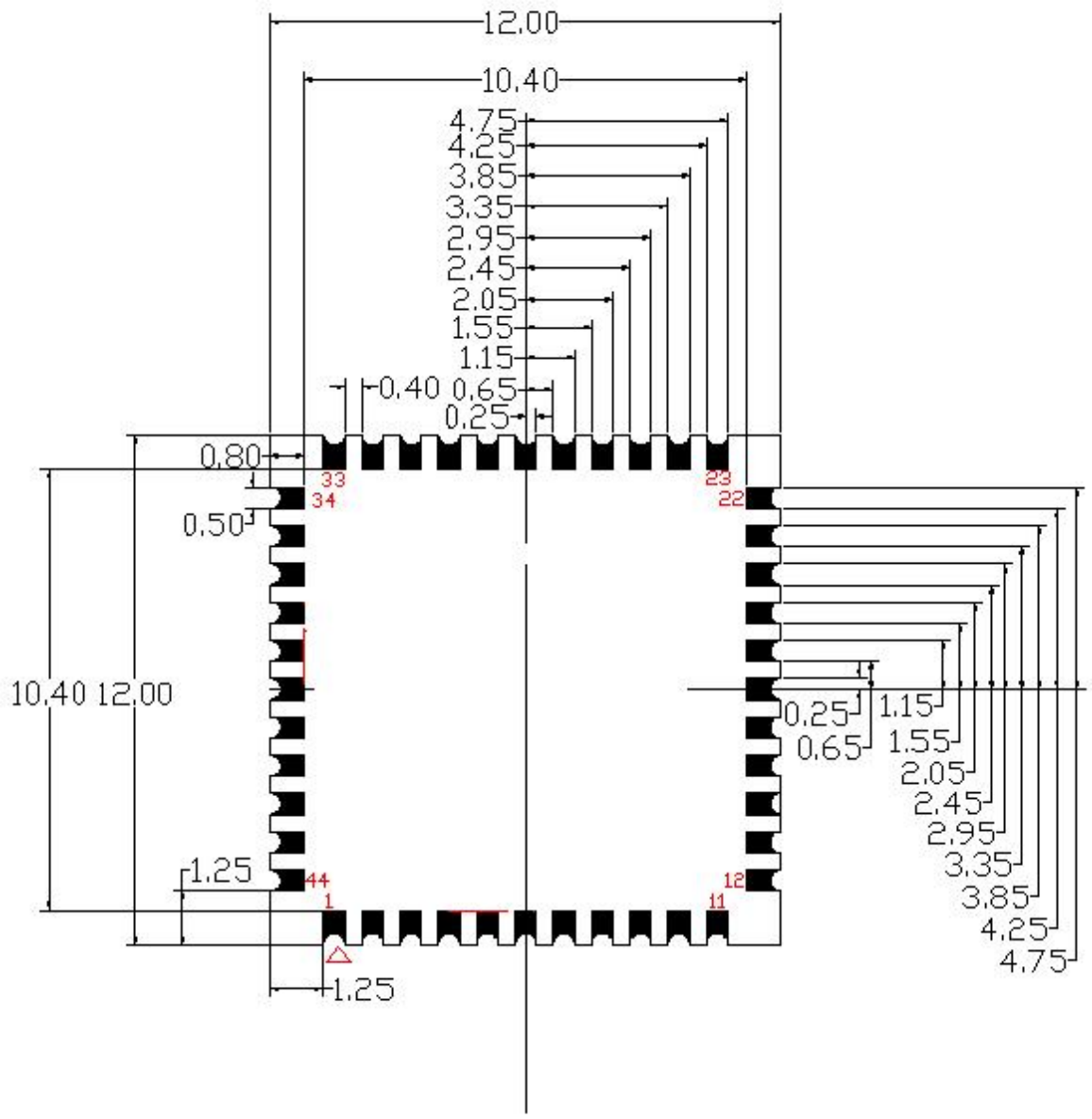
-0D MarkingDescription



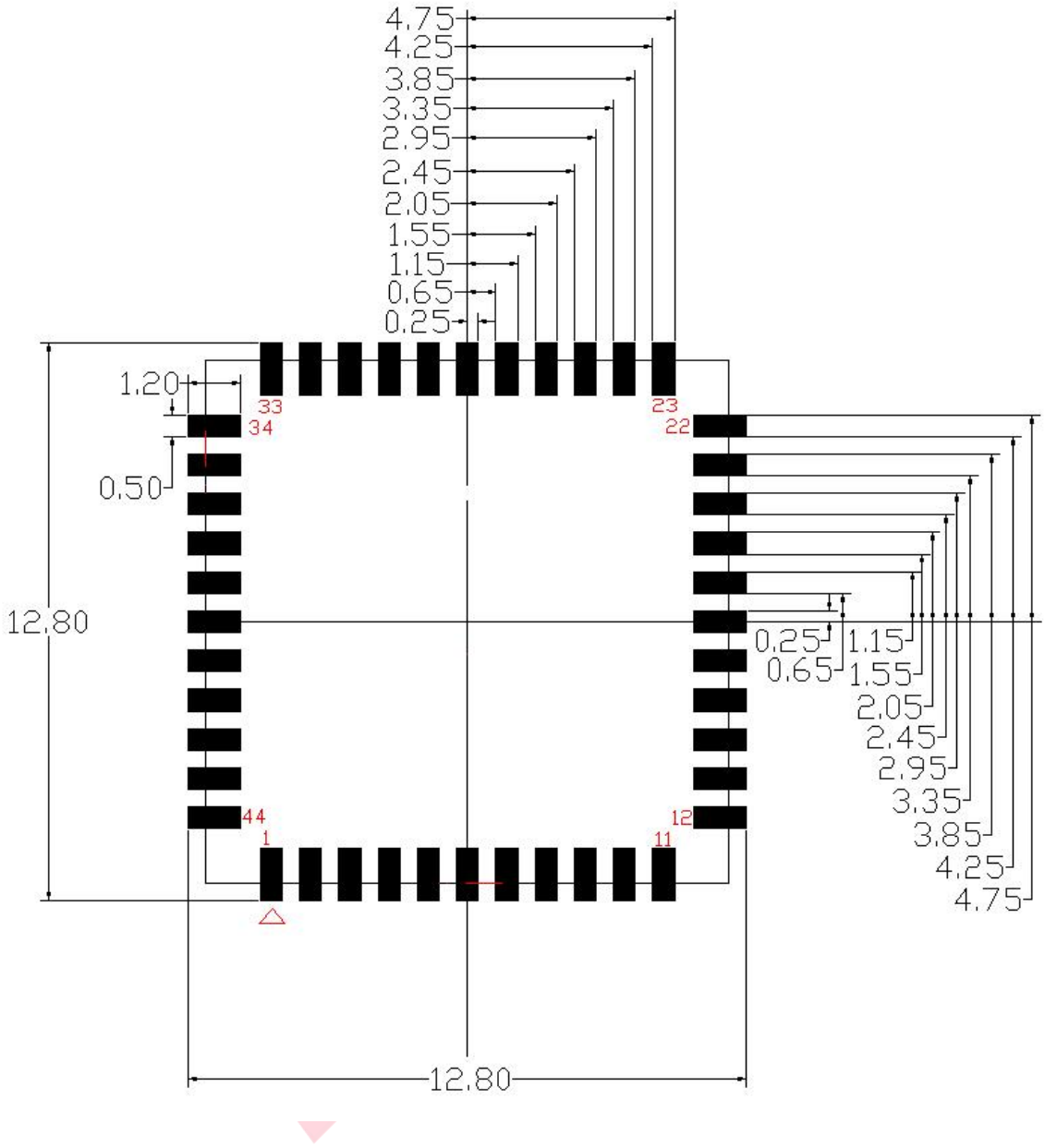
-03 MarkingDescription

8.3 Physical Dimensions

<TOP View>



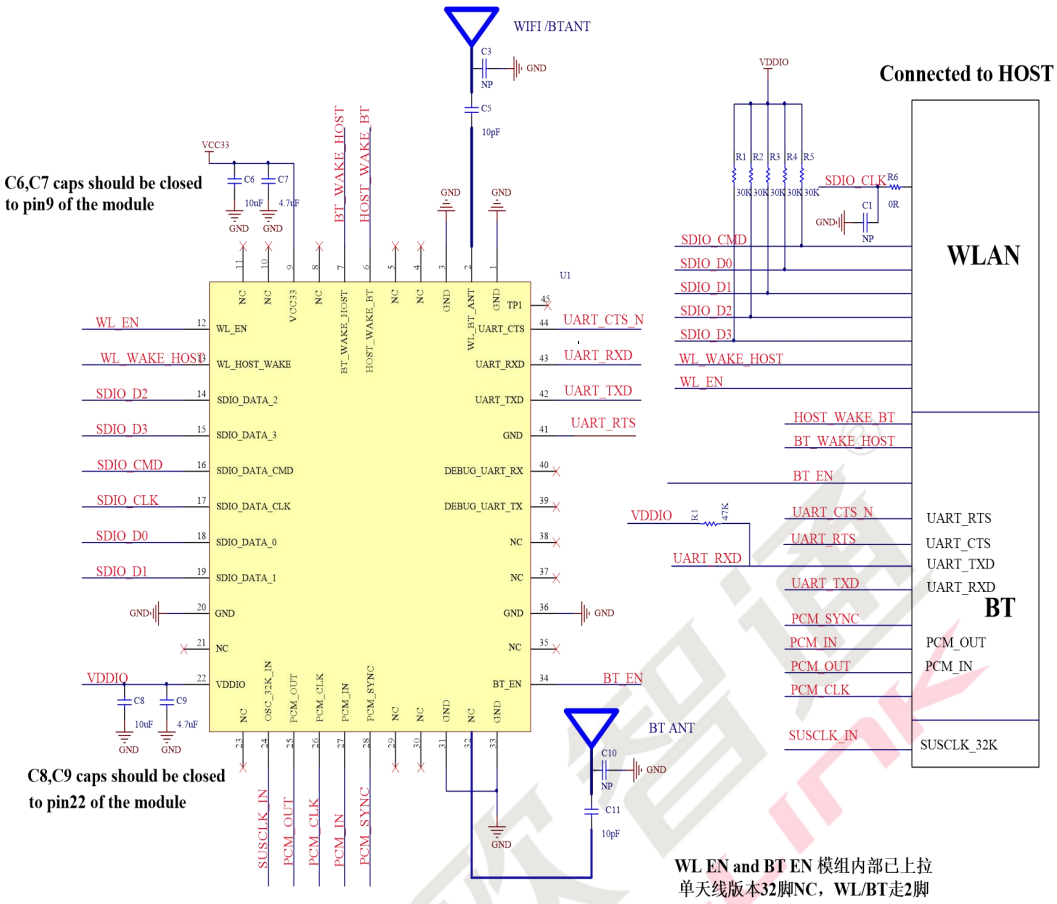
8.4 Layout Recommendation



9. The Key Material List

Chipset	RTL8733BS_QFN48	Realtek
PCB	6233A-SRB PCB green,4layer,FR4,12X12X0.8mm	XY-PCB,KX-PCB,SL-PCB,Sunlord, SL-PCB,XL PCB
Crystal	2520 40MHz 10ppm 12PF -20-85° C	ECEC,TKD,JWT,Hosonic

10. Reference Design



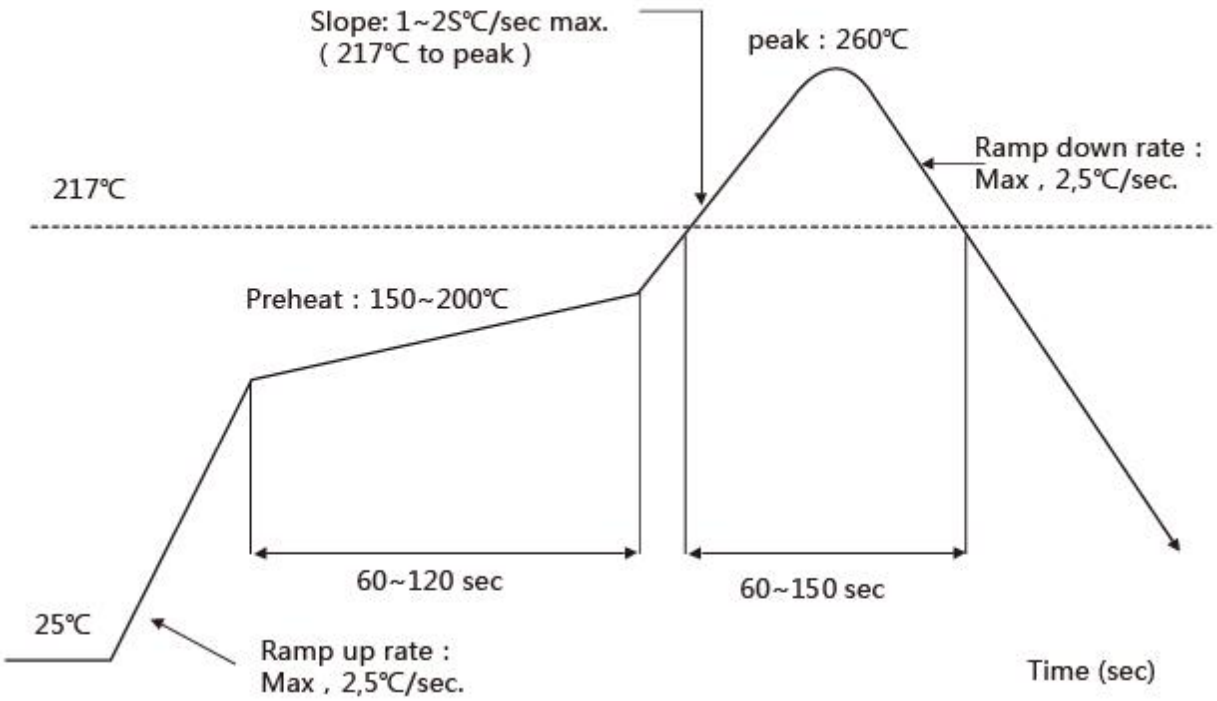
11. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature: ≤260°C

Time within 5°C of peak temperature：≥10s

Number of Times: ≤2 times



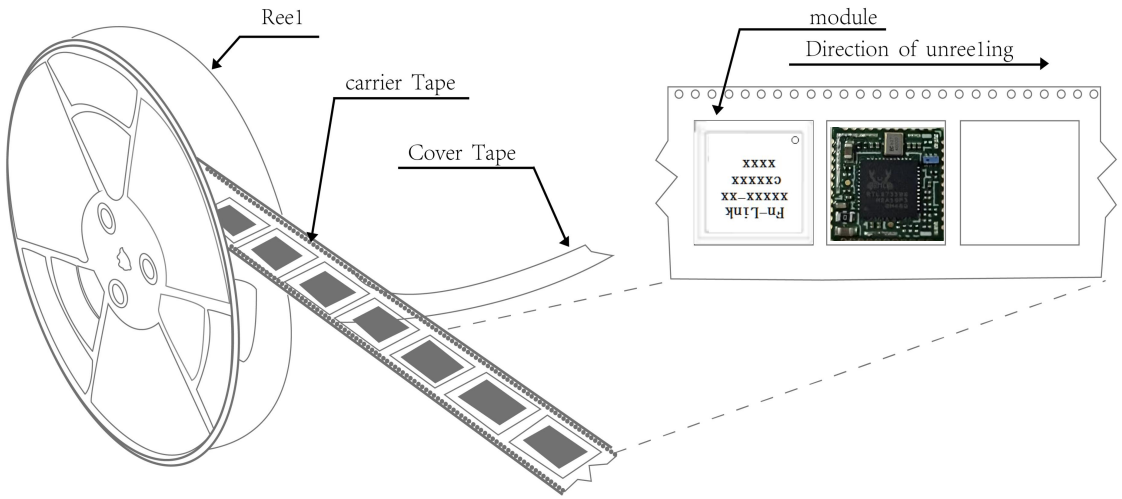
12. RoHS compliance

All hardware components are fully compliant with EU RoHS directive

13. Package

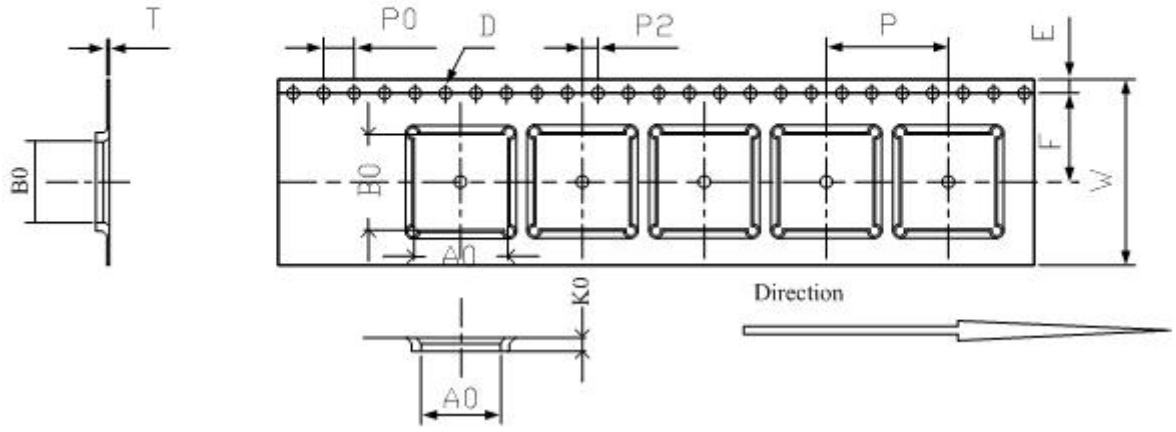
13.1 Reel

A roll of 1500pcs



13.2 Carrier Tape Detail

ITEM	W	A0	B0	D	F	E	K0	P0	P2	P	T
DIM	24	12.40	12.40	1.50	11.5	1.75	2.6	4.0	2.0	16.0	0.30
TOLE	+0.3 -0.3	±0.10	±0.10	+0.1 -0.0	+0.1 -0.1	±0.1	±0.10	±0.1	±0.1	±0.1	±0.05



13.3 Packaging Detail

the take-up package

Using self-adhesive tape

Size of black tape: 24mm*32.6m the cover tape :21.33mm*32.6m

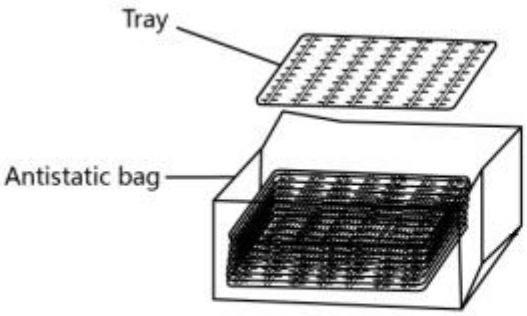
Color of plastic disc: black

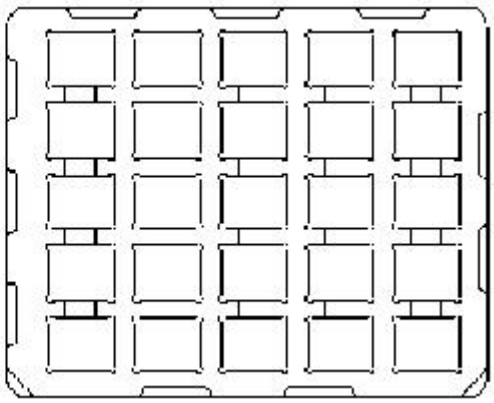
NY bag size:450mm*415mm size ： 350*350*35mm

The packing case size:350*210*370mm

13.4 Tray

Use pallet packaging for less than 300 pieces





14. Moisture sensitivity

The Modules is a Moisture Sensitive Device level 3, in according with standard IPC/JEDEC J-STD-020, take care

all the relatives requirements for using this kind of components.

Moreover, the customer has to take care of the following conditions:

a) Calculated shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH)

b) Environmental condition during the production: 30°C / 60% RH according to IPC/JEDEC J-STD-033A paragraph 5

c) The maximum time between the opening of the sealed bag and the reflow process must be 168 hours if condition

b) "IPC/JEDEC J-STD-033A paragraph 5.2" is respected

d) Baking is required if conditions b) or c) are not respected

e) Baking is required if the humidity indicator inside the bag indicates 10% RH or more

The Module is designed to comply with the FCC statement. when the host system using this module, with same antenna, same antenna connector, and same PCB wire beteeen module's TX pin to antenna connector, it should have label indicated it contain modular's FCC ID: 2AATL-6233A-SRB. This radio module must not installed to collocate and operating simultaneously with other radios in host system additional testing and equipment authorization may be required to operating simultaneously with other radio. The Module and its antenna must not be co-located or operating in conjunction with any other transmitter or antenna within a host device.

The modular must be installed in the host that assign by Company name: FN-LINK TECHNOLOGY LIMITED, Model no.: 6233A-SRB if other host types used would need further evaluation and possible C2PC if they are not significantly similar to the one tested The WIFI Module is designed for a compact PCB design. It should be installed and operated with host or other minimum distance of 20 centimeters between the radiator and your body." To comply with FCC regulations limiting both maximum RF output power and human exposure to RF radiation, the maximum antenna gain including cable loss in a mobile-only exposure condition must not exceed 3.39 dBi in the 2.4G band and 3.99 dBi in the 5G band. The module uses PIFA antenna interface and ping angle interface antenna, this antenna is sold with the module.

Notice to OEM integrator The end user manual shall include all required regulatory information/warning as show in this manual. The OEM integrator is responsible for testing their end-product for any additional compliance requirements required with this module installed. If the final product contains circuits of other FCC PART 15 Subparts, the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed The intended use is generally not for the general public. It is generally for industry/commercial use. The connector is within the transmitter enclosure and can only be accessed by disassembly of the transmitter that is not normally required, the user has no access to the connector. Installation must be controlled. Installation requires special training. This device complies with Part 15 of the FCC Rules. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.
Operations in the 5.15-5.35GHz band are restricted to indoors usage only.

EU Declaration of Conformity

for

(RED) 2014/53/EU

We, FN-LINK TECHNOLOGY LIMITED

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hereby, declare that the essential requirements set out in the (RED) 2014/53/EU have been fully fulfilled on our product with indication below:

Product Name: WIFI+BT module

Model / Brand Name: 6233A-SRB / FN-LINK

Hardware version: V1.0

Software version: V0.39

Manufacturer: FN-LINK TECHNOLOGY LIMITED

Address: No.8, Litong Road, Liuyang Economic & Technical Development Zone, Changsha, Hunan, China

Operation Frequency:

Bluetooth BR + EDR: 2400 MHz to 2483.5 MHz
BLE: 2400 MHz to 2483.5 MHz
2.4G WIFI: 2400 MHz to 2483.5 MHz
5G WIFI:5150 MHz to 5350 MHz; 5470 MHz to 5725 MHz; 5725 MHz to 5875 MHz

Transmit Power:
Bluetooth BR + EDR: 7.16 dBm
BLE: 6.98 dBm
2.4G WIFI: 18.59 dBm
5G WIFI: 5150 MHz to 5350 MHz: 17.70 dBm
5470 MHz to 5725 MHz: 17.44 dBm
5725 MHz to 5875 MHz: 13.85 dBm

The following standards have been applied for the investigation of compliance:

ETSI EN 301 489-1 V2.2.3 (2019-11)
ETSI EN 301 489-3 V2.3.2(2023-01)
ETSI EN 301 489-17 V3.2.4 (2020-09)
ETSI EN 301 893 V2.1.1(2017-05)
ETSI EN 300 440 V2.2.1(2018-07)

ETSI EN 300 328 V2.2.2 (2019-07)

EN IEC 62311:2020
EN 50665:2017

EN IEC 62368-1:2020+A11:2020
And apply notified body assessment:

Notified Body number 0980

Eurofins Electrical and Electronic Testing NA, Inc.

914 WEST PATAPSCO AVENUE • BALTIMORE, MARYLAND

21230

Furthermore, the ISO requirement for the in-process quality control procedure as well as the manufacturing process has been reached. The technical document as well as the test reports will be kept for a period at least 10 years after the last product has been manufactured at the disposal of the relevant national authorities of any Member State for inspection.
Detail contact information for this declaration has been listed below as the window of any issues relevant for this declaration.

Manufacturer Contact

Name (in print): Jim Hu

Title: Manager

Company name: FN-LINK TECHNOLOGY LIMITED
Tel: +8613538178944

Email: jim@fn-link.com

2024-09-20

Signature Date