6223C-PUD

Wi-Fi 2.4G 1T1R 11n + BT 4.2

Module specification

6223C-PUD**Module specification**

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客户承认 ：_____ 公司

_____ 标题

_____ 签名

_____ 日期

_____ 欧智通

变更履历

版本	日期	描述	编辑	核准
1.0	2018/10/18	New version	Lzm	Jacky
1.1	2018/12/18	Modify the telephone number	Lzm	Lxy
1.2	2018/12/25	Modify the office and TEL	Lzm	Lxy
1.3	2021/04/13	Proofread specification details	Lxy	Szs
1.3	2021/05/20	Supplementary Material list	Lxy	Szs
1.4	2021/07/12	Modifying Bluetooth Specifications	Lxy	QJP

CONTENTS

1. Overview

1.1 Introduction

6223C-PUD is a highly integrated module that supports 802.11b/g/n 1T1R, PCIe port, USB Bluetooth port and wifi speed up to 150Mbps. Bluetooth supports V2.1+V4.2 systems.

1.2 Features

12 x16 the LGA encapsulation
Anyway IEee802.11b /g/n+BT v2.1/v4.2 system, BLE4.0 dual-mode
Subscribed 2.4g 11n supports a maximum speed of 150Mbps
Anyway Wifi data interface supports PCIe V1.1
Slim Bluetooth data interface supports USB 2.0 and SUPPORTS PCM
Footed supports IEee802.11e/I, WAPI
Anyway WiFi supports P2P apps

BLOCK DIAGRAM:

1.2 General Specification

Module type	6223C-PUD
describe	Wi-Fi/Bluetooth module
size	L x W x H: 16 x 12 x 1.65 mm
Wi-fi interface	PCI-e
BT interface	USB / PCM
Working temperature	0°C to 70°C
Storage temperature	-40°C to 80°C
RoHS	All hardware components are fully compliant with EU RoHS directive

1.4 Recommended Operating Rating

		Min.	Typ.	Max.	Unit
Working temperature		0	25	70	deg.C
VDD		3.15	3.3	3.45	V
VDDIO		3.15	3.3	3.45	V
power dissipation		VCC33 = 3.3V(Unit:mA)			
	Wi-Fi on Mode	150.15			
	TX (2.4G HT40)	300			
	RX (2.4G HT40)	158			

※1.5 EEPROM information

wifi

Reg Domain	Channels 1-11 with active scan
Vendor ID	0x10EC
Device ID	0xD723

BT

Vendor ID	0x0BDA
Product ID	0xD723

2 Wi-Fi Rf specification

2.1 2.4GHz Rf specification

features	describe	
WLAN standard	802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)	
Frequency range	802.11b/g/n(HT20): 2412MHz to 2462MHz 802.11n(HT40): 2422MHz to 2452MHz	
Channel number	802.11b/g/n(HT20): 11 802.11n(HT40):7	
The output power	11Mbps : 12 dBm ± 1.5 dB @ EVM -9dB	
	54Mbps : 12 dBm ± 1.5 dB @ EVM -25dB	
	MCS7 : 12 dBm ± 1.5 dB @ EVM -28dB	
spectrum	符合 IEEE 标准	
The frequency error	±20 ppm	
The test item	Typical Value	Typical Value
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
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
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

Receive Sensitivity (11n,20MHz)@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 @ -69 dBm	≤-65
	- MCS=7 PER @ -67 dBm	≤-64
Maximum Input Level	802.11b : -10 dBm	
	802.11g/n : -20 dBm	
Antenna Reference	2 dBi peak gain	

3 Bluetooth Specification

3.1 Bluetooth Specification

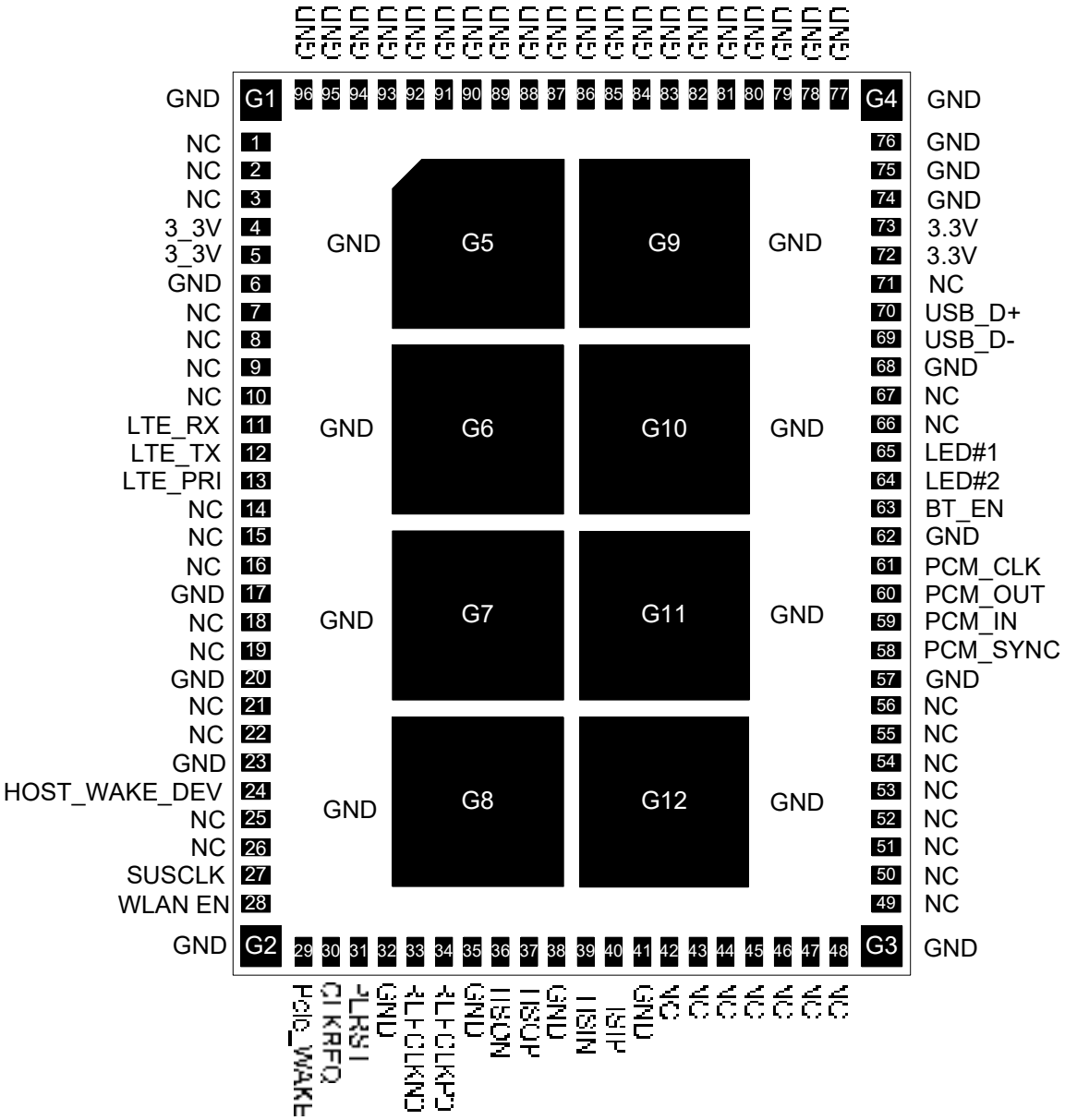
Feature	**Description**		
General Specification			
standard	BT v2.1+v4.2/BLE4.0.		
Data interface	USB2.0		
Antenna reference	2 dBi peak gain		
Frequency range	2402MHz-2480MHz		
Channel number	79 channels		
Modulation method	GFSK, π/4-DQPSK, 8DPSK		
Rf specifications			
	Minimum	**typical**	**maximum**
Output power (Class 1)	2 dBm	5 dBm	8 dBm
Sensitivity@ BER=0.1% for GFSK (1Mbps)		-92 dBm	
Sensitivity@ BER=0.01% for π/4-DQPSK (2Mbps)		-86 dBm	
Sensitivity@ BER=0.01% for 8DPSK (3Mbps)		-85 dBm	

Maximum input level	GFSK (1Mbps):-20dBm
	π/4-DQPSK (2Mbps) :-20dBm
	8DPSK (3Mbps) :-20dBm

4 Pin Assignments

4.1 Pin Outline

< TOP VIEW >



4.2 Pin Definition

Pin	Name	Type	Description	Level

1	NC	—	No connect	
2	NC	—	No connect	
3	NC	—	No connect	
4	3_3V	P	power input	3.3V
5	3_3V	P	power input	3.3V
6	GND	—	grounding	
7	NC	—	No connect	
8	NC	—	No connect	
9	NC	—	No connect	
10	NC	—	No connect	
11	LTE_RX	I/O	LTE coexist signal	VDDIO
12	LTE_TX	I/O	LTE coexistence signal	VDDIO
13	LTE_PRI	I/O	LTE coexistence signal Share with GPIO12 0: internal NV memory select 1: External EEPROM select	VDDIO
14	NC	—	No connect	
15	NC	—	No connect	
16	NC	—	No connect	
17	GND	—	grounding	
18	NC	—	No connect	
19	NC	—	No connect	
20	GND	—	grounding	
21	NC	—	No connect	
22	NC	—	No connect	
23	GND	—	grounding	
24	HOST_WAKE_DEV	I/O	Host wake up DEV, GPIO13	VDDIO
25	NC	—	No connect	
26	NC	—	No connect	
27	SUSCLK	I	External RTC input(32.768kHz) Share with GPIO15 0: USB1.2 or 2.0 1: otherwise	VDDIO
28	WLAN EN	I	WLAN EN 1: WLAN on,PCIe on (default)	VDD

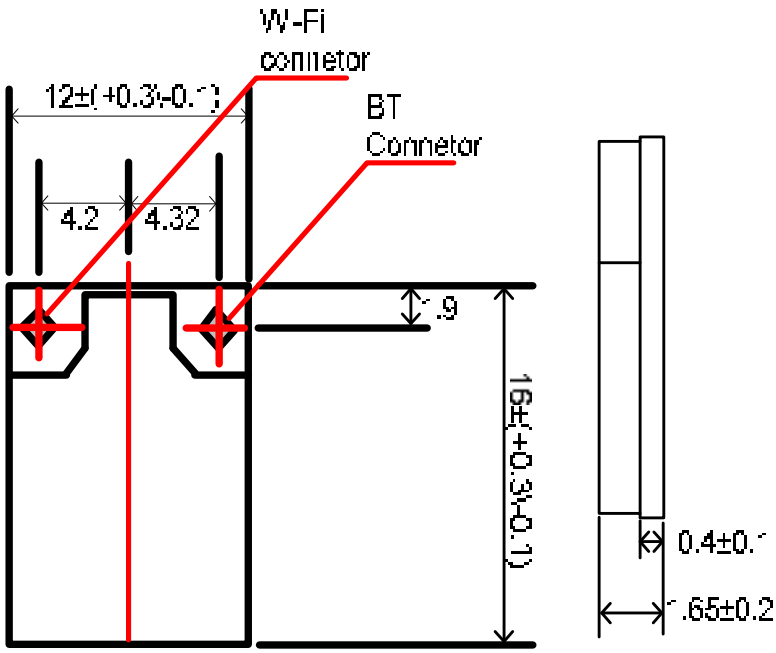
			0: WLAN off, PCIe off	
29	PCIe_WAKE	O/D	Power management event: open drain,active low. Used to reactivate the PCIe slot's main power rails and reference clocks. Share with BT wake up host function via sideband signals.	VDDIO
30	CLKREQ	I/O/D	PCI-e reference clock request signal. Can be shared with BTdevice clock request function	VDDIO
31	PERST	I	PCI-e reset signal:active low.	VDDIO
32	GND	—	grounding	
33	REFCLKN0	I	PCI-E CLK Difference -	
34	REFCLKP0	I	PCI-E CLK Difference +	
35	GND	—	grounding	
36	HSON	O	PCI-E Data Out Difference -	
37	HSOP	O	PCI-E Data Out Difference +	
38	GND	—	grounding	
39	HSIN	I	PCI-E Data IN Difference -	
40	HSIP	I	PCI-E Data IN Difference +	
41	GND	—	grounding	
42	NC	—	No connect	
43	NC	—	No connect	
44	NC	—	No connect	
45	NC	—	No connect	
46	NC	—	No connect	
47	NC	—	No connect	
48	NC	—	No connect	
49	NC	—	No connect	
50	NC	—	No connect	
51	NC	—	No connect	
52	NC	—	No connect	
53	NC	—	No connect	
54	NC	—	No connect	
55	NC	—	No connect	
56	NC	—	No connect	
57	GND	—	grounding	
58	PCM_SYNC	I/O	PCM sync signal	VDDIO
59	PCM_IN	I	PCM data input	VDDIO

60	PCM_OUT	O	PCM Data output	VDDIO
61	PCM_CLK	I/O	PCM clock	VDDIO
62	GND	—	grounding	
63	BT_EN	I	1:BT on, USB on (default) 0: BT off, USB off	VDDIO
64	LED#2	O	BT link LED,active low.	VDDIO
65	LED#1	O	WLAN link LED,active low.	VDDIO
66	NC	—	No connect	
67	NC	—	No connect	
68	GND	—	grounding	
69	USB_D-	I/O	USB differential -	
70	USB_D+	I/O	USB differential +	
71	NC	—	No connect	
72	3.3V	P	Main power voltage source input 3.3V	3.3V
73	3.3V	P	Main power voltage source input 3.3V	3.3V
74~76	GND	—	grounding	
G1-G12	GND	—	grounding	

P:POWER I:INPUT O:OUTPUT VDDIO:3.3V

5. Dimensions

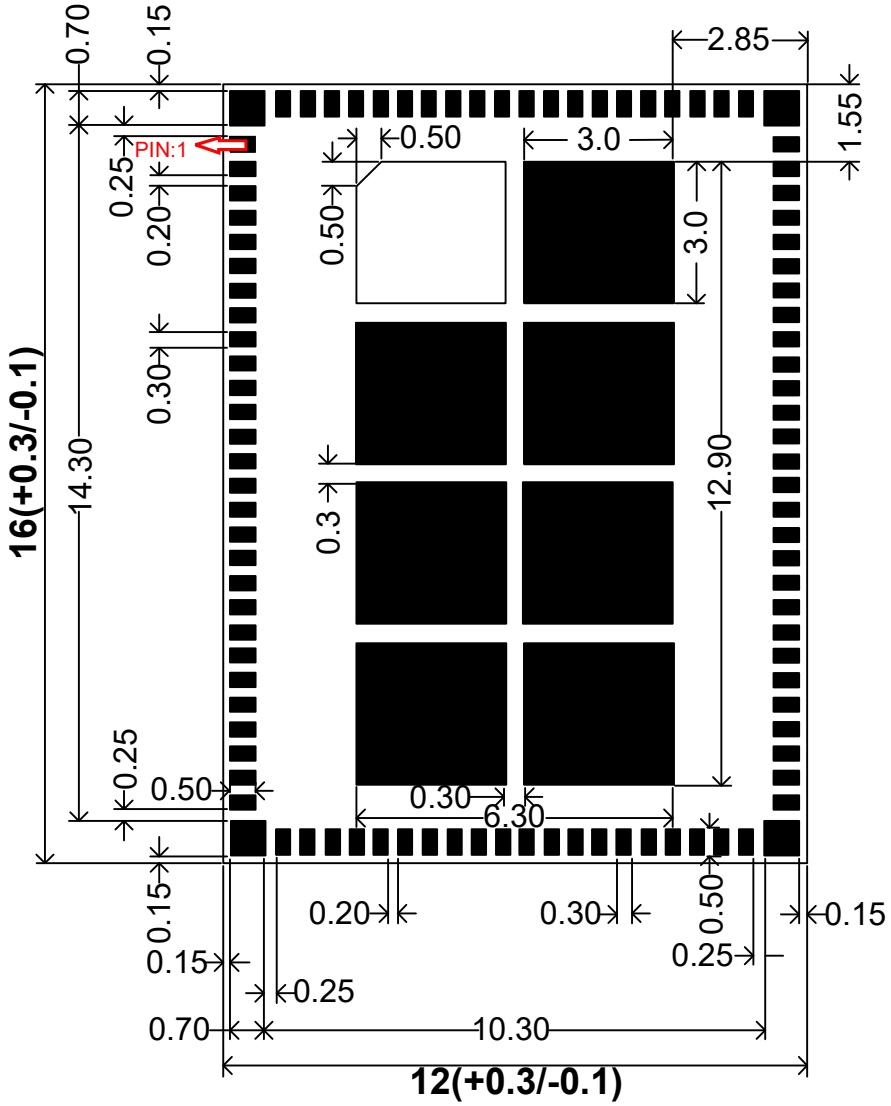
5.1 Module picture

<table>
<tr><td>L x W : 16 x 12 (+0.3/-0.1) mm
  </td><td rowspan="2"> 
</td></tr>
<tr><td>H: 1.65 (±0.2) mm</td></tr>
<tr><td>重量</td><td>0.69g</td></tr>
</table>

5.2 Physical Outline

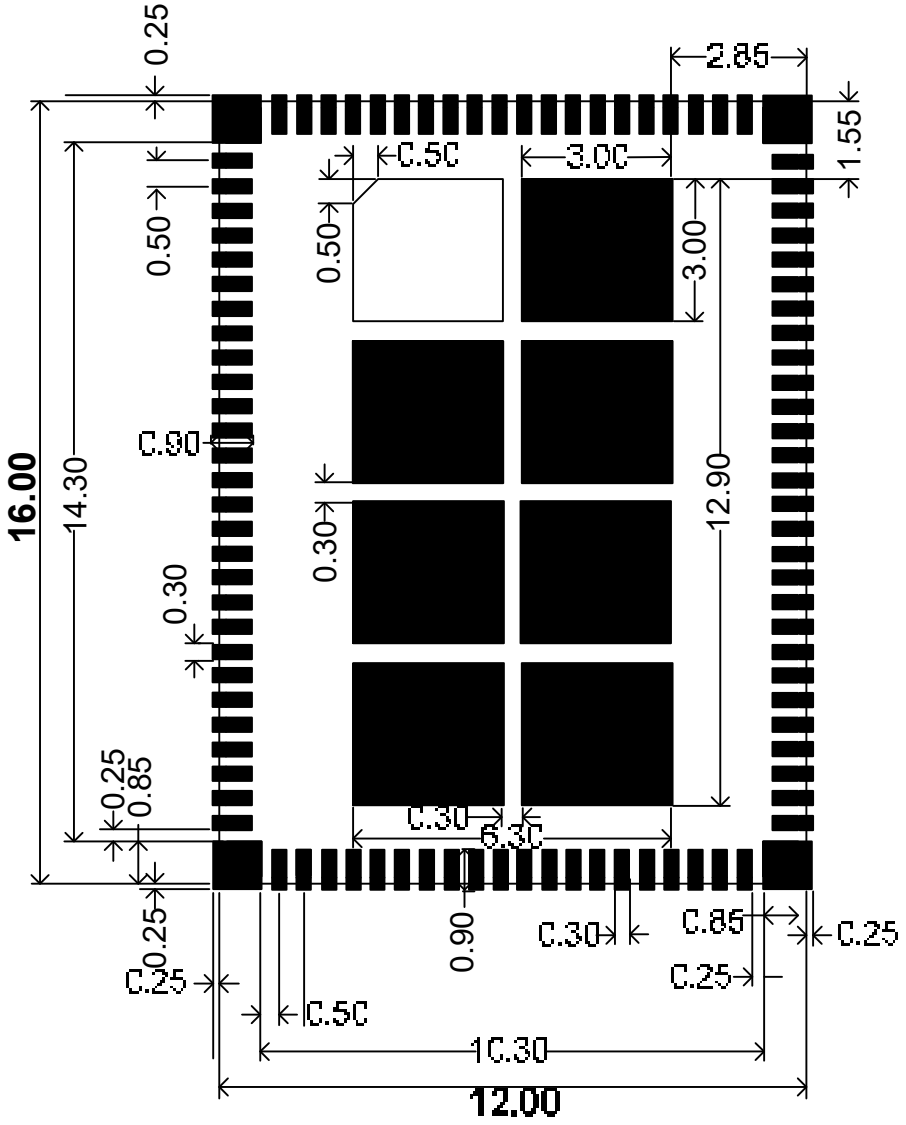
(Unit: mm)

< TOP VIEW >

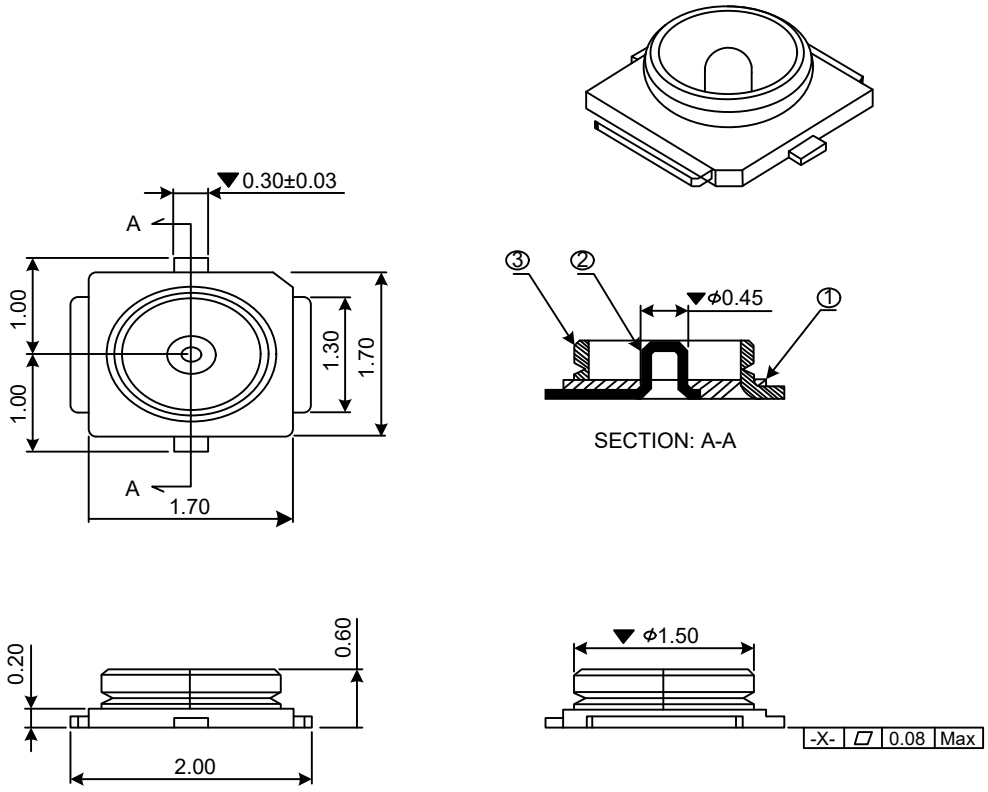


5.3 Module Physical Dimensions

(Unit: mm)

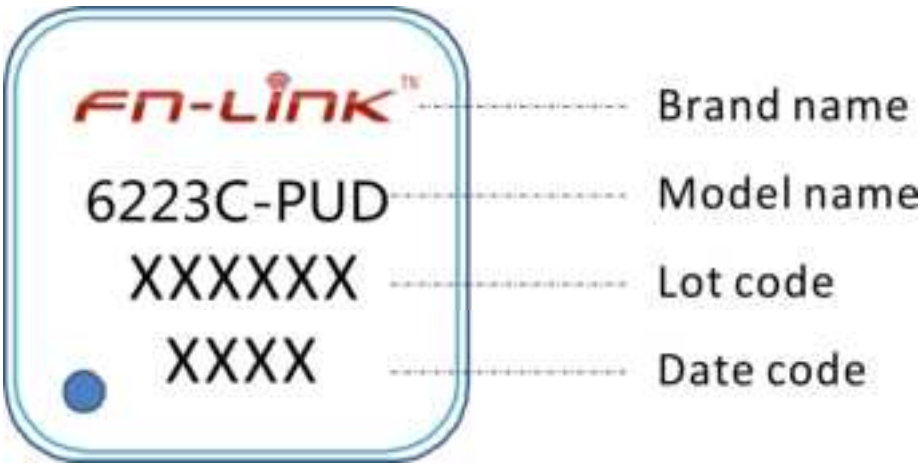


5.4 Connector Specification



5.5 Marking Description

< TOP VIEW >



6. **Host Interface Timing Diagram**

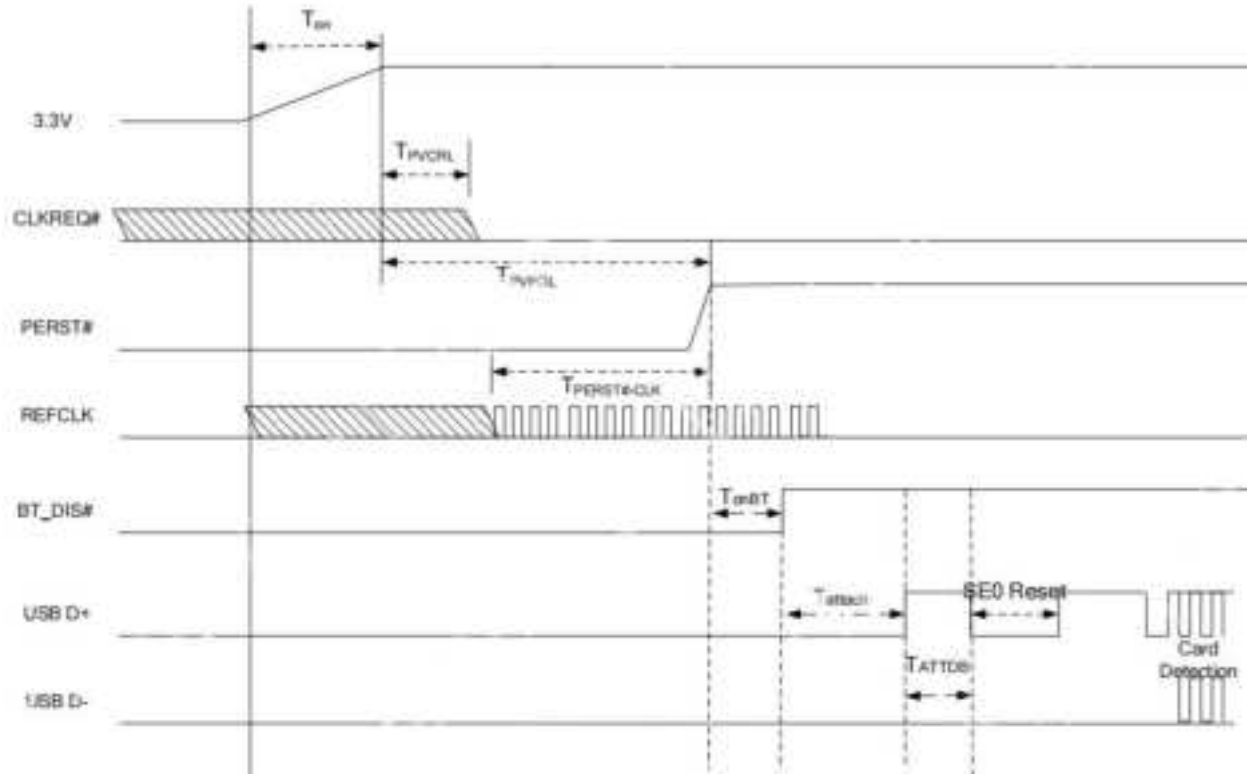
6.1 Bus during Power On Sequence

The boot timing diagram is only for cold boot;

If system goes to S3, S4 or reboot without power off 3v3, BT_DIS is not allowed to be asserted;

BT_DIS low duty require at least 5ms;

Do not driving any USB signal when BT_DIS is low;



T_{on}: the main power ramp up duration

T_{PRVRL}: power valid to CLKREQ# output active

T_{PVPGL}: power valid to PERST# input inactve

$T_{PERST\#-CLK}$: reference clock stable before PERST# inactive

T_{onBT}: the time interval to turn on BT after PERST# de-asserted

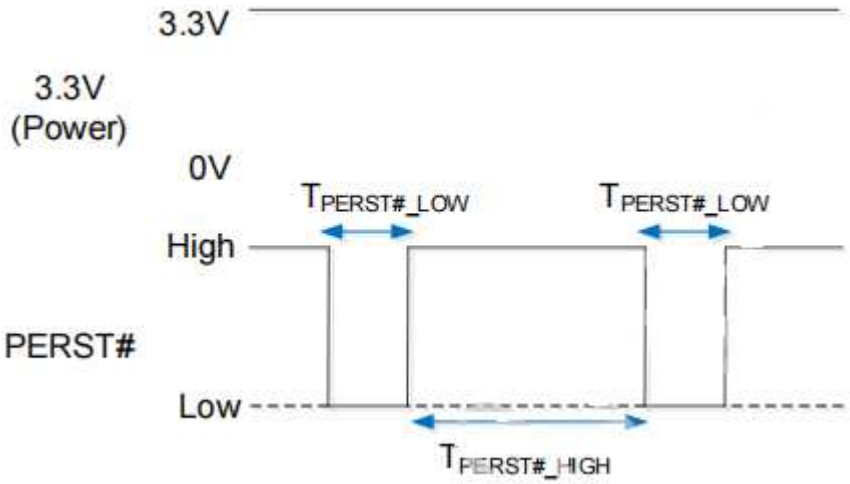
T_{attach}: the interval between BT_DIS to USB attached state

T_{ATTDB}: the debounce interval with a minimal duration of 100ms that provide by USB system software

$T_{SE0\ Reset}$: USB host send SE0 Reset duration

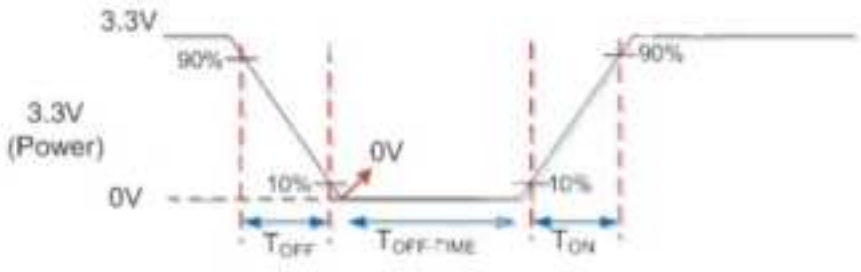
Symbol	Unit	Min	Typical	Max
T_{on}	ms	0.2	1.5	5
T_{PVCRL}	us	--		100
T_{PVPGL}	ms	Implementation specific; recommended 50 ms		--
$T_{PERST\#-CLK}$	us	100		--
T_{onBT}	ms	10	50	--
T_{attach}	ms	0.5	0.7	5
T_{ATTDB}	ms	100	--	--
$T_{SE0\ Reset}$	ms	10	--	20

6.2 PCIe PERST# Timing Sequence



	Min	Typical	Max	Unit	Description
$T_{PERST\#\_LOW}$	6	10	X	ms	PERST# low duration
$T_{PERST\#\_HIGH}$	400	500	X	ms	PERST# high duration

6.3 Power Off Sequence



Symbol	Unit	Min	Typical	Max
T_{OFF}	ms	5	20	50
$T_{OFF-TIME}$	ms	500	--	--
T_{ON}	ms	0.5	1.5	5

7. **Reference Design**

Schematics

Confidential

8.Ordering Information

Part No.	Description
FG6223CPUD-W1	RTL8723DE, b/g/n, Wi-Fi+BLE4.2, 1T1R, 12X16mm, PCIE+USB, PCB V3.0,双天线座

9.The Key Material List

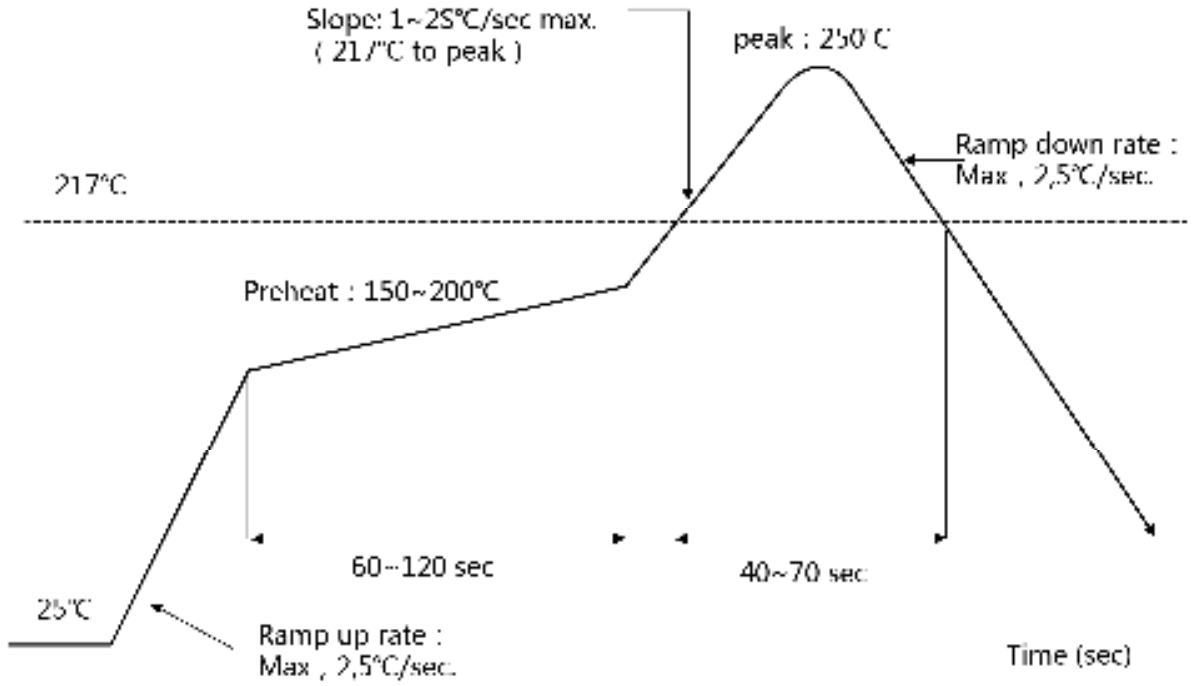
crystal	1612/2016,40MHZ,15pF,10ppm	ECEC,HOSONIC,TKD,JWT
PCB	6223C-PUD V3.0,green, 4L, 12X16X0.4mm	XY-PCB,KX-PCB,SL-PCB,Sunlord,Brain-power PCB
Main chip	RTL8723DE-VB-CG QFN56P	Realtek
Shielding cover	6223C-PUD-V3.0 屏蔽盖 尺寸 11.35x15.35x1.25mm 洋白铜,无定位脚,带绝缘层	信太，精力通
The antenna seat	4 generation antenna base	佳沃，创迪尔

10.**Recommended Reflow Profile**

Referred to IPC/JEDEC standard.

Peak Temperature : <250°C

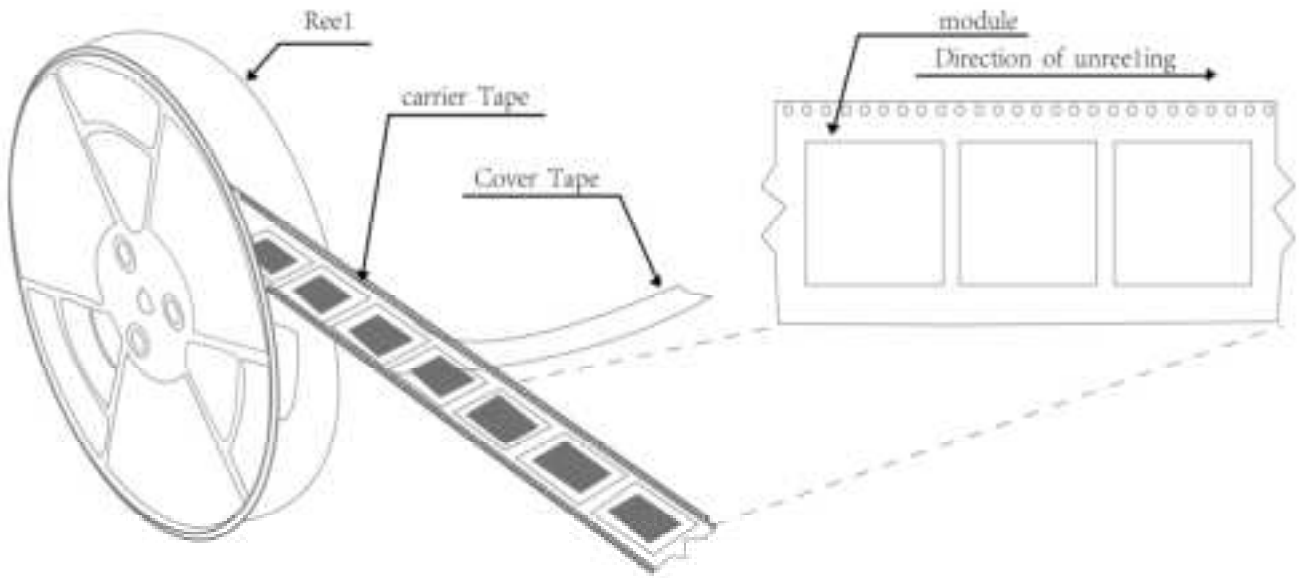
Number of Times : □2 times



11 Package Information

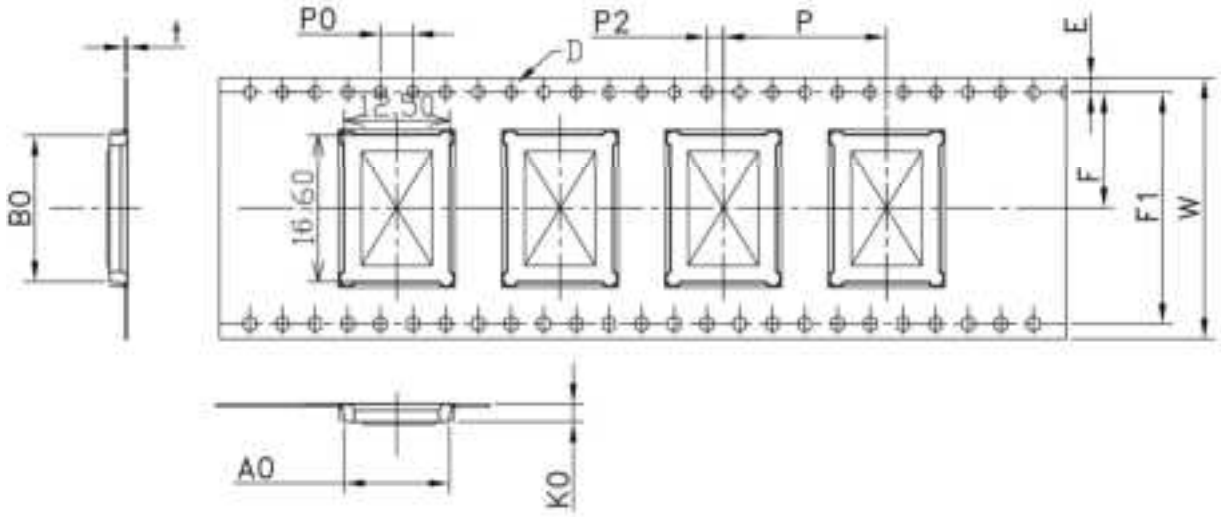
11.1 Reel

A roll of 2000pcs

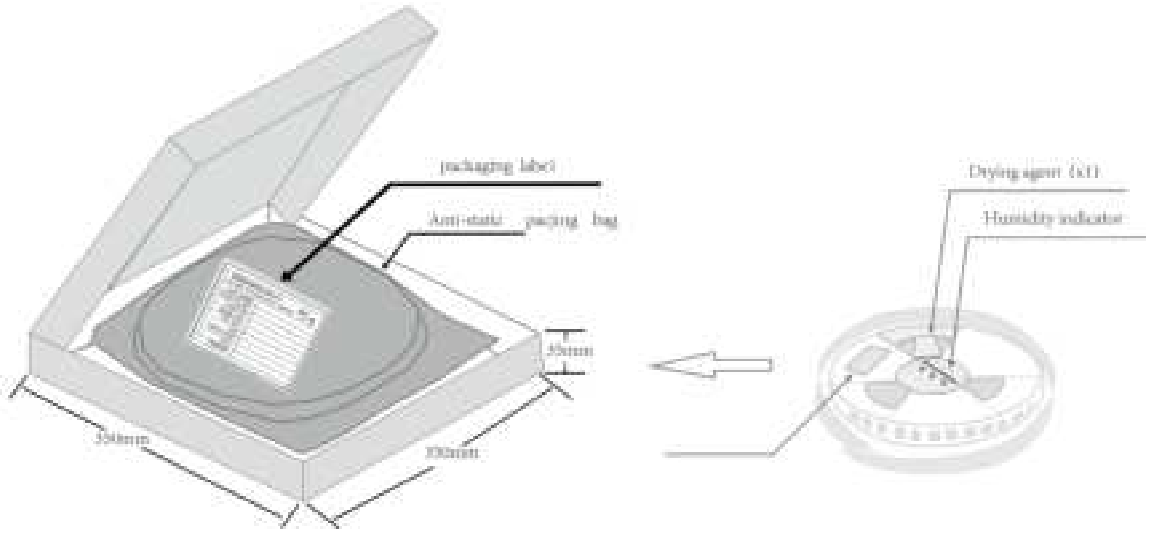


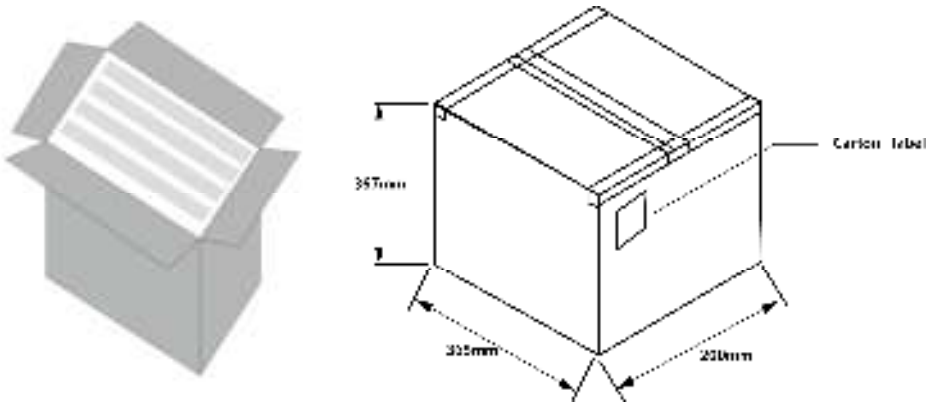
11.2 Carrier Tape Detail

ITEM	W	A0	B0	D	E	F	F1	K0	P0	P2	P	T
DIM	32	12.50	16.60	1.5	1.75	14.20	28.4	2.15	4.0	2.0	20.0	0.30
TOLE	+0.3 -0.2	±0.18	±0.18	+0.1 -0.0	±0.1	±0.15	±0.10	±0.10	±0.1	±0.15	±0.1	±0.05



11.3 Packaging Detail





12. 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

FCC Statement
FCC standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247
Integral FPC Antenna , 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. 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-6223C-PUD Or Contains FCC ID: 2AATL-6223C-PUD ”

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.