PRODUCT SPECIFICATION

K265B-UU

Wi-Fi Dual-band 2x2 + Bluetooth 5.4

Combo Module

Version:v1.4

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

K265B-UU Module Datasheet

	Part NO.	Description
Ordering Information	FGK265BUUX-01	W265U1,802.11a/b/g/n/ac/ax+BT5.4,2T2R,13*15MM,USB +USB,3 天线，小米专用

CONTENTS

Revision History

Version	Date	Contents of Revision Change	Draft	Checked	Approved
V1.0	2023/06/28	New version	Lxp	Zl	Qjp
V1.1	2024/02/28	Update General Specification	Lxp	Zl	Qjp
V1.2	2024/06/27	Power standard update	Lxp	Tzq	Qjp
V1.3	2024/09/11	Update Layout Recommendation	Lxp	Tzq	Qjp
V1.4	2024/09/18	Update Marking Description and 5GHz Specification	Lxp	Tzq	Qjp

1. General Description

1.1 Introduction

K265B-UU is a Wi-Fi/Bluetooth combo chip supporting 2T2R 802.11ax and Bluetooth 5.4.The Wi-Fi system integrates PMU, MAC, PHY and Radio. It is designed to be fully compliant with IEEE802.11ax (aka Wi-Fi 6) standard and can operate at both 2.4GHz and 5GHz band. The max PHY data rate can reach up to 1201Mbps when operating at 80MHz bandwidth. It supports USB 2.0 host interface.

1.2 Description

Model Name	K265B-UU
Product Description	Support Wi-Fi/Bluetooth functionalities
Dimension	L x W x H: 15 x 13 x 2.31 mm
Host Interface	Support USB/UART
Operating temperature	-25°C to 85°C
Storage temperature	-40°C to 120°C

2. Features

General

- Compliant with IEEE 802.11 a/b/g/n/ac/ax
- Supports two spatial streams 2T2R MIMO
- Supports 20/40/80MHz bandwidth and modulation up to 1024-QAM
- Integrated PA/LNA/TR switch and single-ended RF port for both 2.4GHz and 5GHz
- Wi-Fi and Bluetooth co-existence
- Security features:
  - Supports WEP-40/WEP-104, AES/TKIP/CCMP/GCMP
  - Supports WPA/WPA2/WPA3 personal, WPA2/WPA3 enterprise
  - Supports WPS2.0
  - Supports WAPI

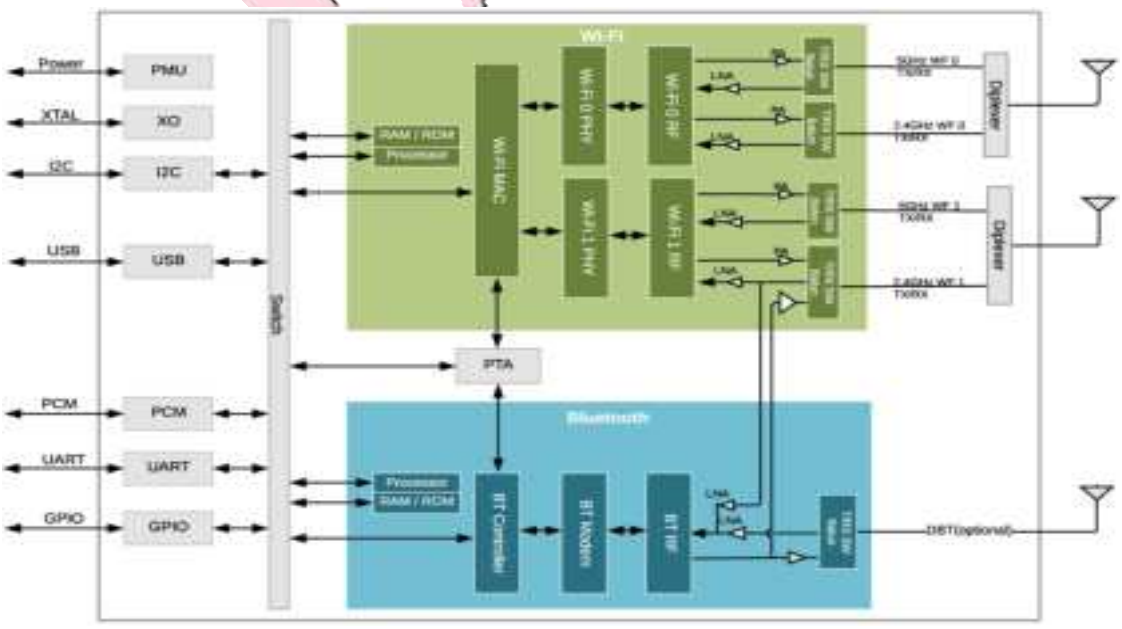
Host Interface

- High speed UART interface with hardware flow control

Bluetooth Features

- Supports Bluetooth v5.4 with BLE audio
- Supports dual mode BDR/EDR and BLE
- Backward-compatible with previous Bluetooth standards

3. Block Diagram



4. General Specification

4.1 WI-FI 2.4GHz Specification

Feature	Description	
WLAN Standard	IEEE 802.11 b/g/n/ac/ax Wi-Fi compliant	
Frequency Range	2.400 GHz ~ 2.4835 GHz (2.4 GHz ISM Band)	
FCC Number of Channels	2.4GHz：Ch1 ~ Ch11	
Spectrum Mask	Meet with IEEE standard	
Freq. Tolerance	±20ppm	
Test Items	**Test Value**	**Standard Value**
SISO Receive Sensitivity (11b,20MHz) @8% PER	- 11Mbps PER @ -86 dBm	≤-84
SISO Receive Sensitivity (11g,20MHz) @10% PER	- 54Mbps PER @-73 dBm	≤-71
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=7 PER @ -71 dBm	≤-69
SISO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=7 PER @ -68 dBm	≤-66
SISO Receive Sensitivity (11ax,20MHz) @10% PER	- MCS=11 PER @ -57 dBm	≤-55
SISO Receive Sensitivity (11ax ,40MHz) @10% PER	- MCS=11 PER @ -56 dBm	≤-54
Maximum Input Level	802.11b : -10 dBm	
	802.11g/n : -20 dBm	

4.2 WI-FI 5GHz Specification

Feature	Description	
WLAN Standard	IEEE 802.11a/n/ac/ax, Wi-Fi compliant	
Frequency Range	5.15 GHz ~ 5.850 GHz(5.0 GHz ISM Band)	
Spectrum Mask	Meet with IEEE standard	
Freq. Tolerance	±20ppm	
Test Items	**Test Value**	**Standard Value**

SISO Receive Sensitivity (11a,20MHz) @10% PER	- 54Mbps PER @ -70dBm	≤-68
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=7 PER @ -68 dBm	≤-66
SISO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=7 PER @-66 dBm	≤-64
SISO Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=8, NSS1 PER @ -64 dBm	≤ -62
SISO Receive Sensitivity (11ac ,40MHz) @10% PER	- MCS=9, NSS1 PER @ -60 dBm	≤ -58
SISO Receive Sensitivity (11ac,80MHz) @10% PER	- MCS=9, NSS1 PER @ -56 dBm	≤-54
SISO Receive Sensitivity (11ax,20MHz) @10% PER	- MCS=11 PER @ -58 dBm	≤-56
SISO Receive Sensitivity (11ax ,40MHz) @10% PER	- MCS=11 PER @ -56 dBm	≤-54
SISO Receive Sensitivity (11ax,80MHz) @10% PER	- MCS=11 PER @ -52 dBm	≤-50
Maximum Input Level	802.11a/n: -30 dBm	

2. 2.4G,5G output power control by firmware power by rate table, the table value must same with module target power

4.3 Bluetooth Specification

Feature	**Description**
General Specification	
Bluetooth Standard	BDR,EDR(1Mbps & 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	8

EDR Output Power	8
BLE Output Power	8
Sensitivity, tolerance : /	
Sensitivity @ BER=0.1% for GFSK (1Mbps)	-85
Sensitivity @ BER=0.01% for π/4-DQPSK (2Mbps)	-85
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)	-85
Sensitivity @ BLE=30.8% for LE (1Mbps)	-85
Sensitivity @ BLE=30.8% for 2LE (2Mbps)	-85
Maximum Input Level	GFSK (1Mbps):-20dBm
	π/4-DQPSK (2Mbps) :-20dBm
	8DPSK (3Mbps) :-20dBm

Note: The Bluetooth Specification will be updated in future version.

5. ID setting information

WI-FI

Vendor ID	-
Product ID	-

5.1 List of certified information

Certification project	Certificate number
SRRC	CMIIT:ID:24J43T23B983(M)
FCC	TBD
CE	TBD
IC	TBD
NCC	TBD
KCC	TBD

TELEC	TBD
Brazil	TBD
Argentina	TBD
Japan	TBD
BQB	QDID:216641

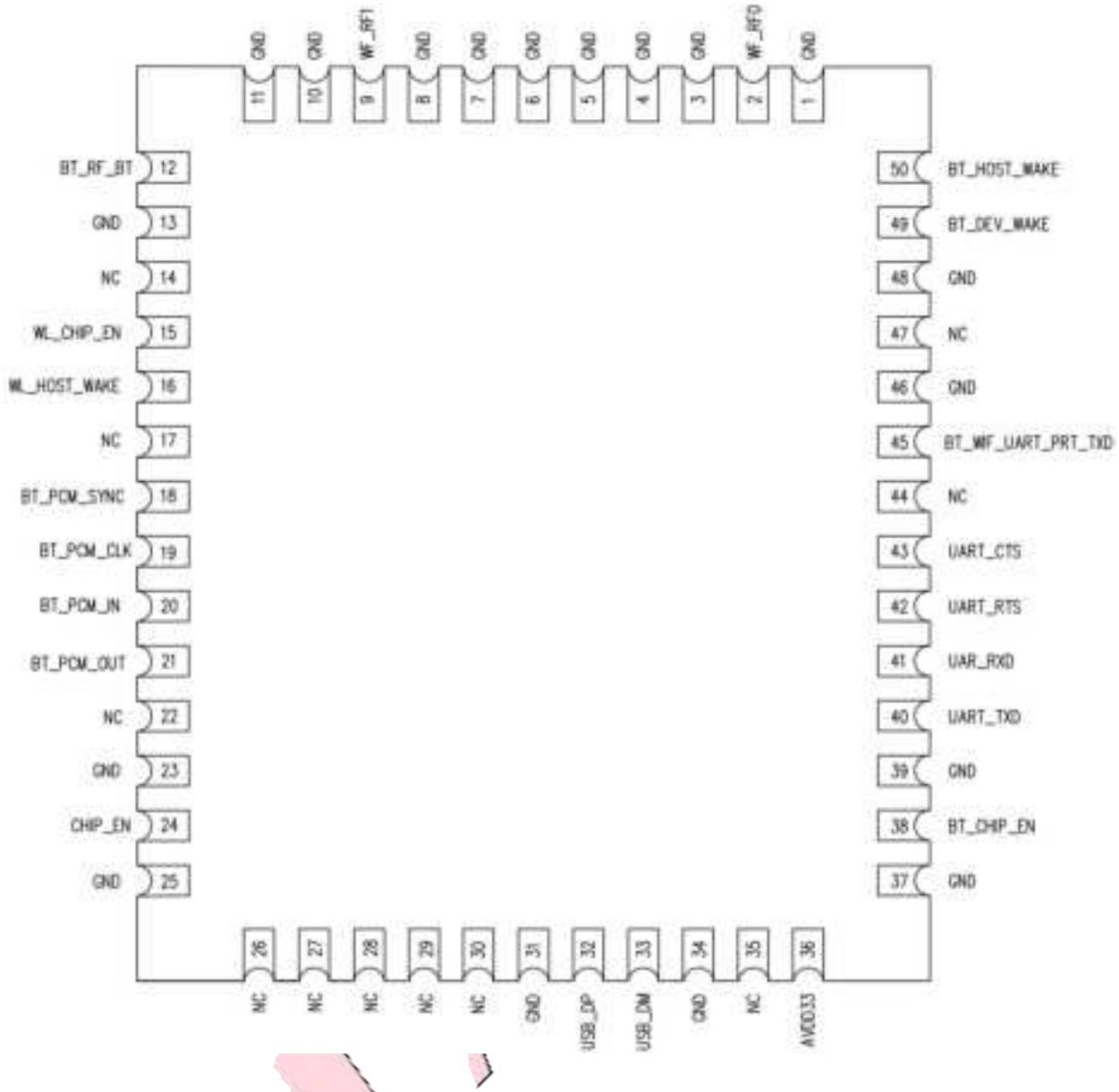
5.2 Software protocol, function and other support conditions

MCC	DBS	BT mode 双模	LE Advertising Extendsion	Bluetooth Scatternet

6. Pin Definition

6.1 Pin Outline

< TOP VIEW >



6.2 Pin Definition details

NO.	Name	Type	Description	Voltage
1	GND		Ground connections	
2	WF_RF0	I/O	RF I/O port chain0, dual band Wi-Fi	
3	GND		Ground connections	
4	GND		Ground connections	
5	GND		Ground connections	
6	GND		Ground connections	
7	GND		Ground connections	
8	GND		Ground connections	
9	WF_RF1	I/O	RF I/O port chain1, dual band Wi-Fi	

10	GND		Ground connections	
11	GND		Ground connections	
12	BT_RF_BT		BT antenna	
13	GND		Ground connections	
14	NC		Floating (NC)	
15	WL_CHIP_EN		WLAN Chip Enable, Low asserting reset for WLAN core	
16	WL_HOST_WAKE		WLAN device to wake up WLAN HOST	
17	NC		Floating (NC)	
18	BT_PCM_SYNC		Bluetooth PCM SYNC	
19	BT_PCM_CLK		Bluetooth PCM CLK	
20	BT_PCM_IN		Bluetooth PCM IN	
21	BT_PCM_OUT		Bluetooth PCM OUT	
22	NC		Floating (NC)	
23	GND		Ground connections	
24	CHIP_EN		chip Enable/Disable pin	
25	GND		Ground connections	
26	NC		Floating (NC)	
27	NC		Floating (NC)	
28	NC		Floating (NC)	
29	NC		Floating (NC)	
30	NC		Floating (NC)	
31	GND		Ground connections	
32	USB_DP		USB host positive data signal	
33	USB_DM		USB host positive data signal	
34	GND		Ground connections	
35	NC		Floating (NC)	
36	VDD33	P	Main power voltage source input 3.3V	3.3V
37	GND		Ground connections	
38	BT_CHIP_EN		Bluetooth CHIP Enable, Low asserting reset for Bluetooth core	
39	GND		Ground connections	
40	UART_TXD	I	Bluetooth High-Speed UART Data Out	
41	UART_RXD	I/O	Bluetooth High-Speed UART Data In	
42	UART_RTS		UART CTS	VDDIO
43	UART_CTS		UART RTS	3.3V
44	NC		Floating (NC)	

45	BT_WIF_UART_PRT_TXD	I	BT LOG Printing	
46	GND		Ground connections	
47	NC		Floating (NC)	
48	GND		Ground connections	
49	BT_DEV_WAKE	I	HOST wake-up Bluetooth device	
50	BT_HOST_WAKE	I	Bluetooth device to wake-up HOST	

P:POWER I:INPUT O:OUTPUT

7. Electrical Specifications

7.1 Power Supply DC Characteristics

	MIN	TYP	MAX	Unit
Operating Temperature	-25	25	85	deg.C
AVDD33	3.14	3.3	3.63	V
VDDIO	2.97	3.3	3.63	

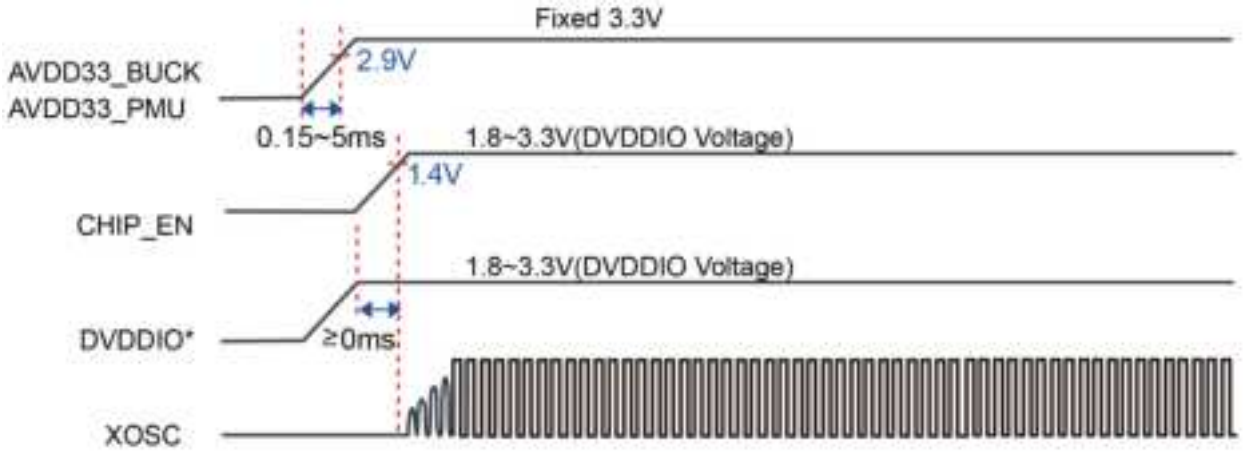
7.2 Power Consumption

Power Consumption	Wi-Fi only: TBD	BT: TBD

7.3 Interface Circuit time series

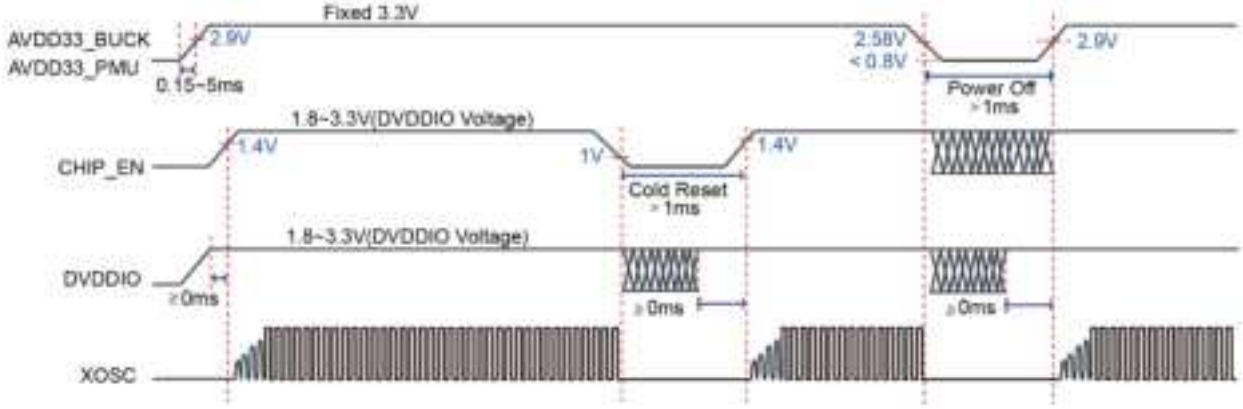
7.3.1 power on sequence

The following figure shows the power on sequence. when AVDD33_PMU, AVDD33_BUCK are 3.3V and CHIP_EN =1.8 V, start power on sequence.



7.3.2 Global Reset

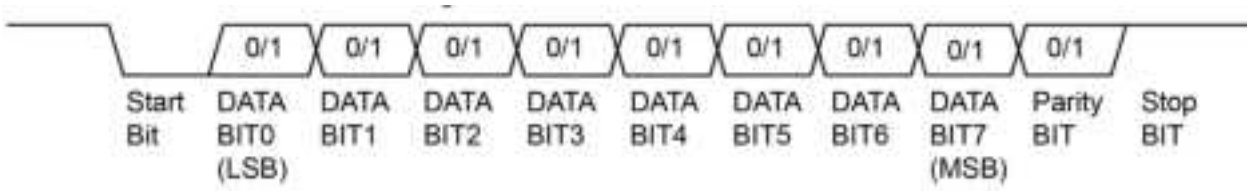
The following figure shows the cold reset sequence. The cold reset is controlled by AVDD33_PMU, AVDD33_BUCK and CHIP_EN.



7.3.3 UART

The UART baud rate is set by a configuration register after device is reset and firmware is downloaded, it can be updated by adjusting the baud rate register using HCI UART command on UART interface.

Commonly used baud rates are 4000000b/s, 2000000b/s, 1000000b/s, 921600b/s and 115200b/s. UART interface frame supports Start BIT, Parity BIT and Stop BIT. Parity BIT can be set by UART registers.



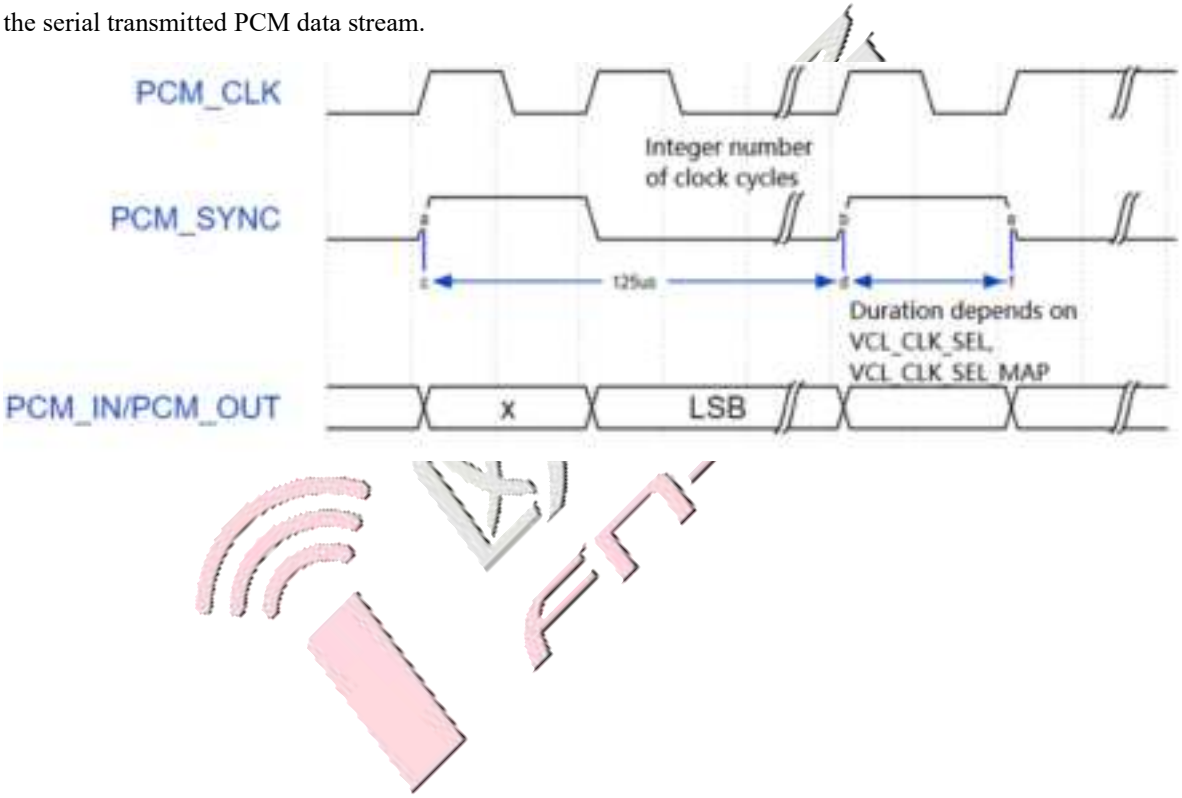
7.3.4 PCM

This section describes an interfacing example in which W256U1 can control a voice codec for Bluetooth applications. It supports the following features:

- Supports master and slave mode
- Supports A-law/u-law, and 12/13/14/15/16 bit linear PCM format.
- Supports Master clock output:200kHz,1MHz
- Supports SCO/ESCO packets

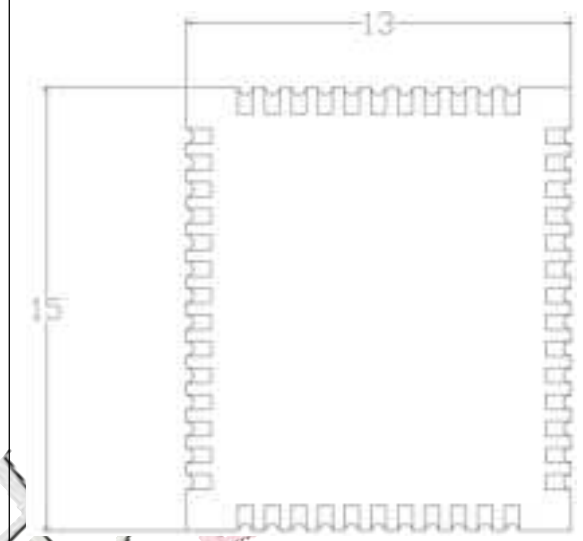
PCM interface has four signals: a synchronization pulse that represents the LSB or MSB signal name PCM_SYNC when a serial transmission occurs; Clock signal name PCM_CLK; Two data lines signal names PCM_IN and PCM_OUT, one in each direction, these two signals are time synchronized with PCM_CLK.

The synchronization signal PCM_SYNC is an 8kHz pulse. The frequency of the pulse is consistent with the LSB of the serial transmitted PCM data stream.



8. Size reference

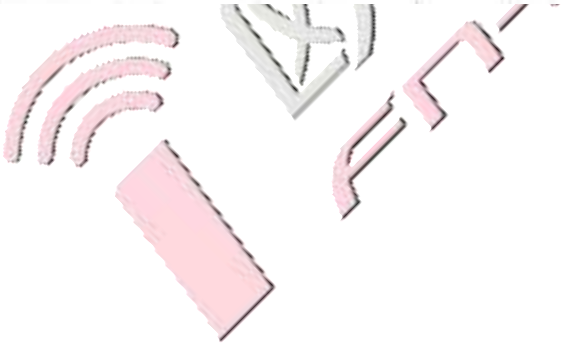
8.1 Module Picture

L x W : 15 x 13 (±0.2) mm	
H: 2.31mm	
Weight	0.92g

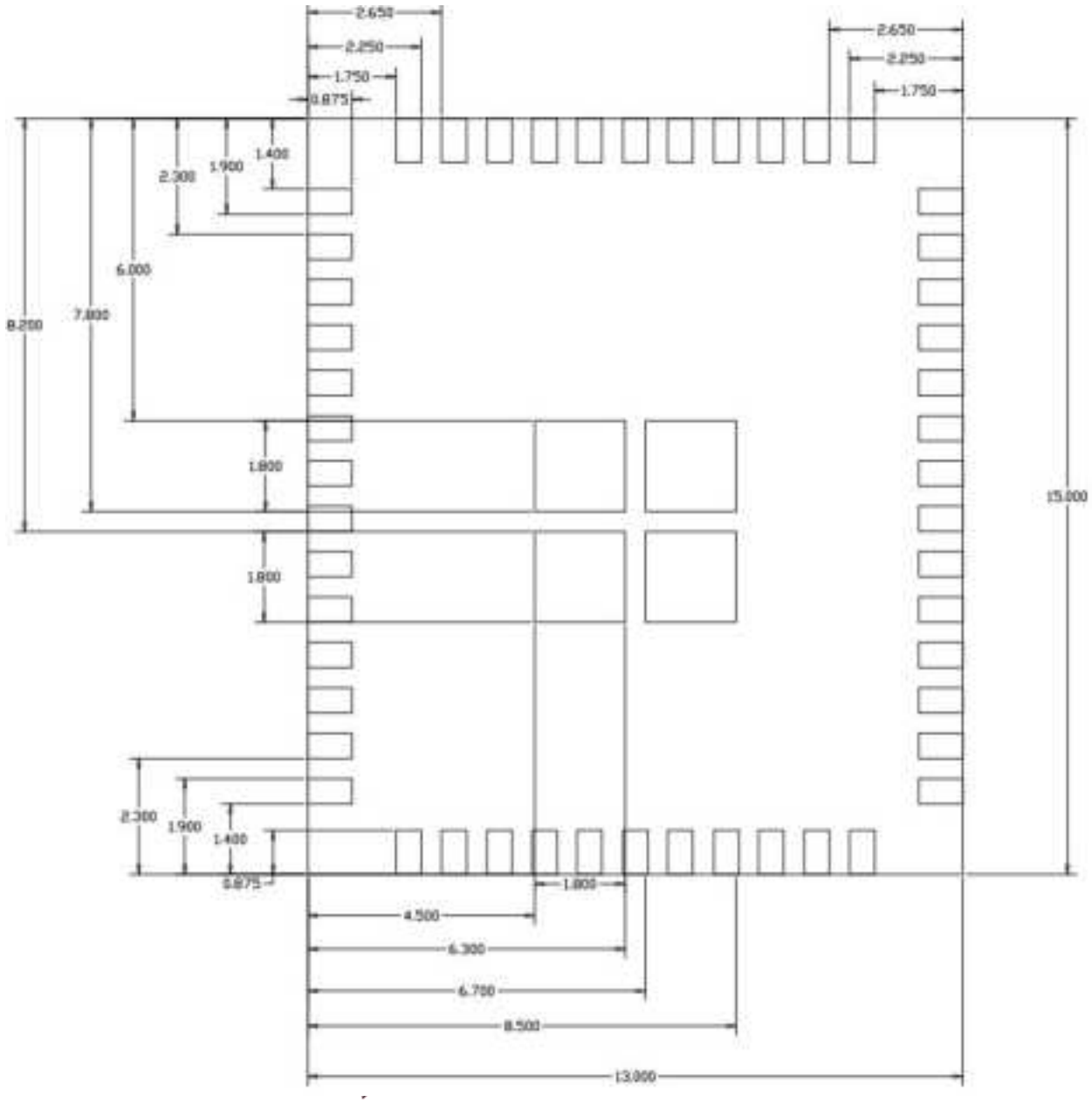
8.2 Marking Description

< TOP VIEW

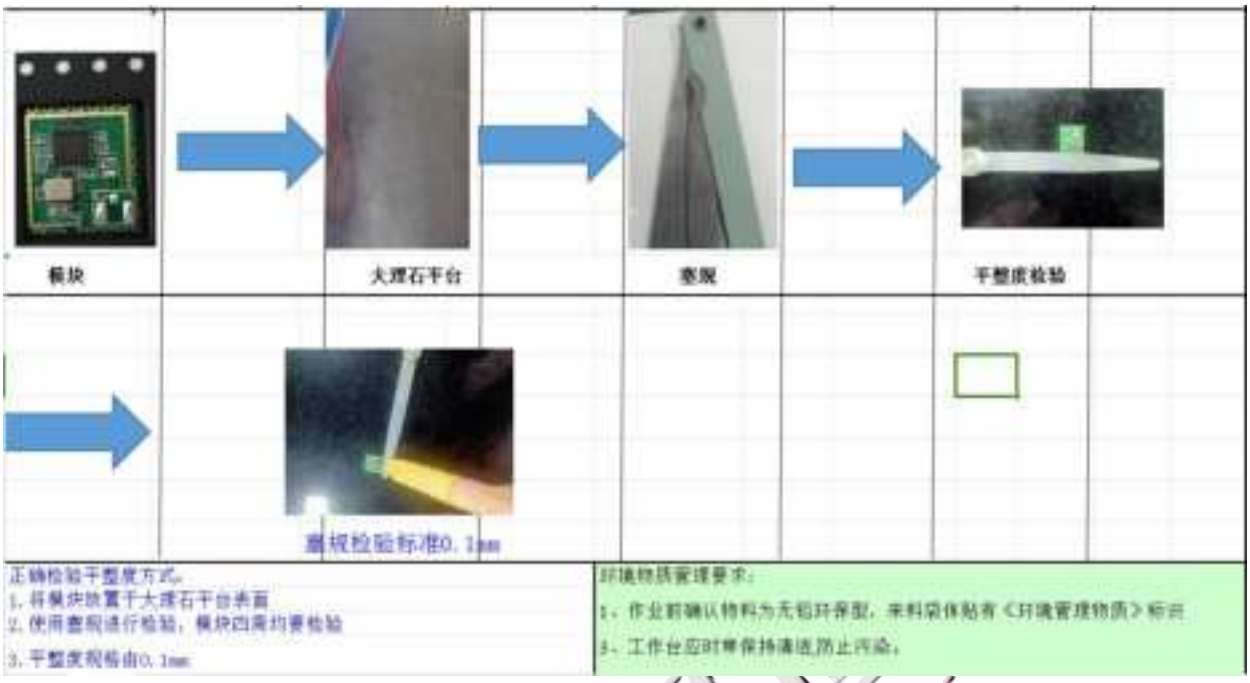
备注：
二维码内容：112233445566;FGK265BUUX-01
1. Fn-Link 商标 logo
2. 型号：K265B-UU
3. CMIT ID:24J43T238983(M)
4. V/N 01(V/N 到 01 之间为两个空格，01 为成品料号后缀）
5. 二维码：编码规则为“wifi mac 地址;成品料号”
例如：112233445566;FGK265BUUX-01（MAC 地址以实际为准）
-----BT MAC 在 WIFI MAC 基础上+1（WIFI 地址需跳 1，不能与 BT 地址重复），二维码中不显示此内容。



8.3 Layout Recommendation



8.4 Flat control

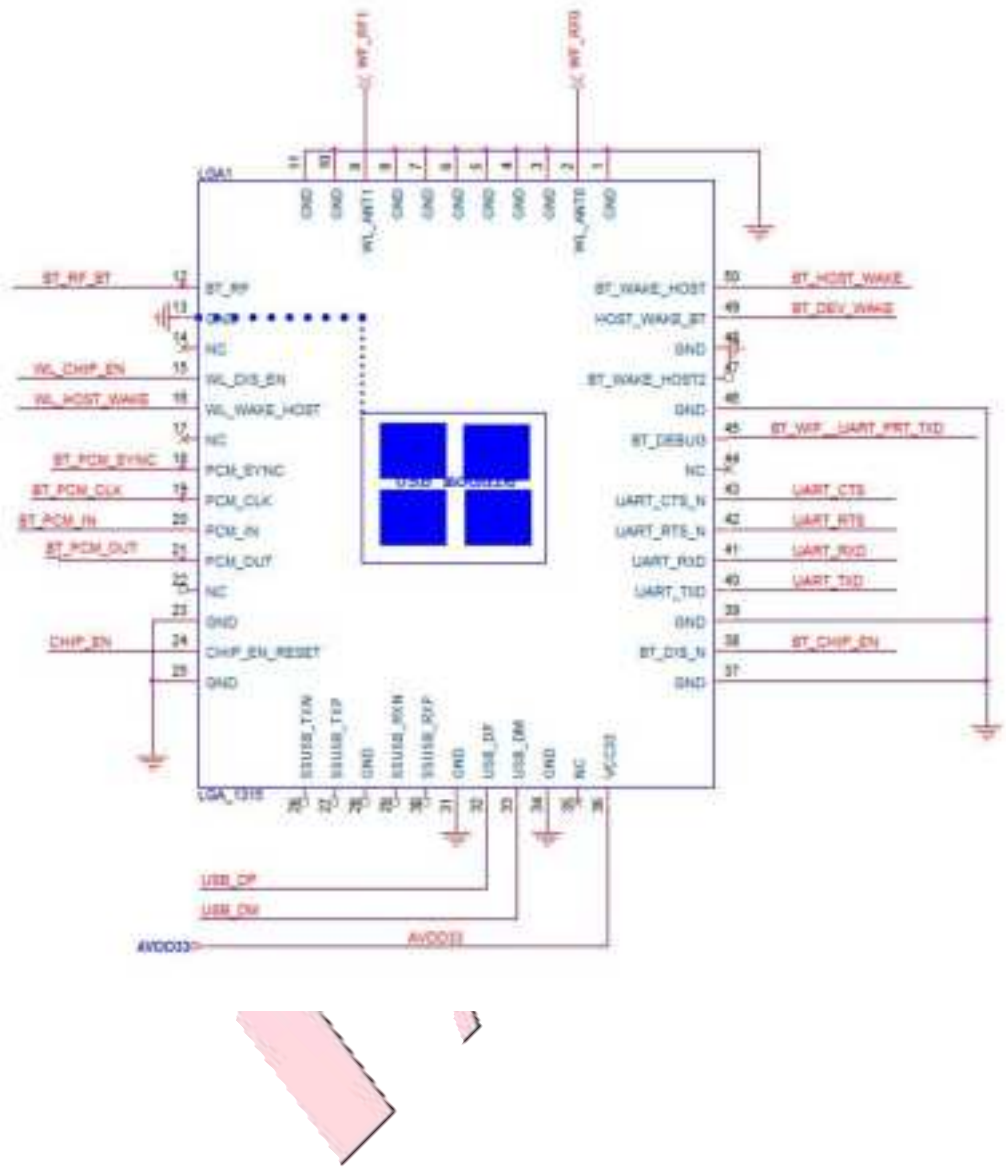


The flatness is 0.1mm

9. The Key Material List

Item	Part Name	Description	Manufacturer
1	Chipset	W265U1, QFN76	Amlogic
2	PCB	K265B-UU,4L,13x15x0.8mm	XY-PCB,KX-PCB,SL-PCB,Sunlord
3	Crystal	2016 40MHZ,15PF,±10PPM	TST,HOSONIC,TKD,ECEC,JWT
4	Shielding	K265B-UU shielding	XINTAI,JLitong
5	Duplexer		TDK.FEITEER

10. Reference Design

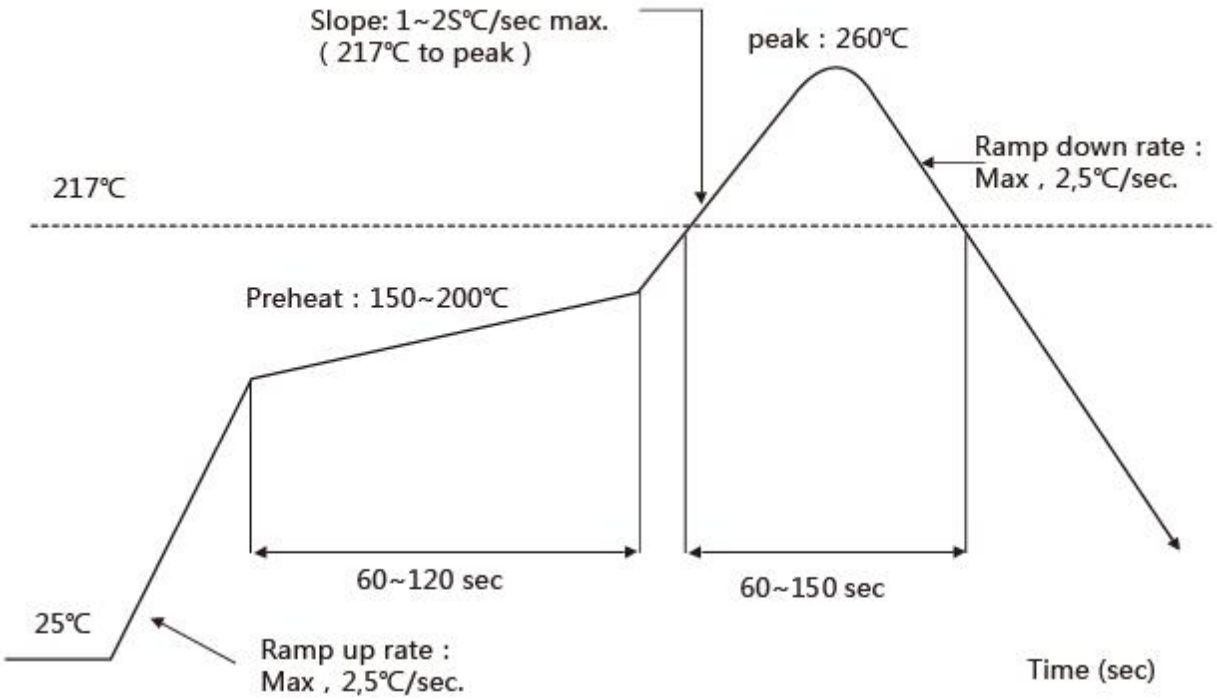


11. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <260°C

Number of Times : ≤2 times



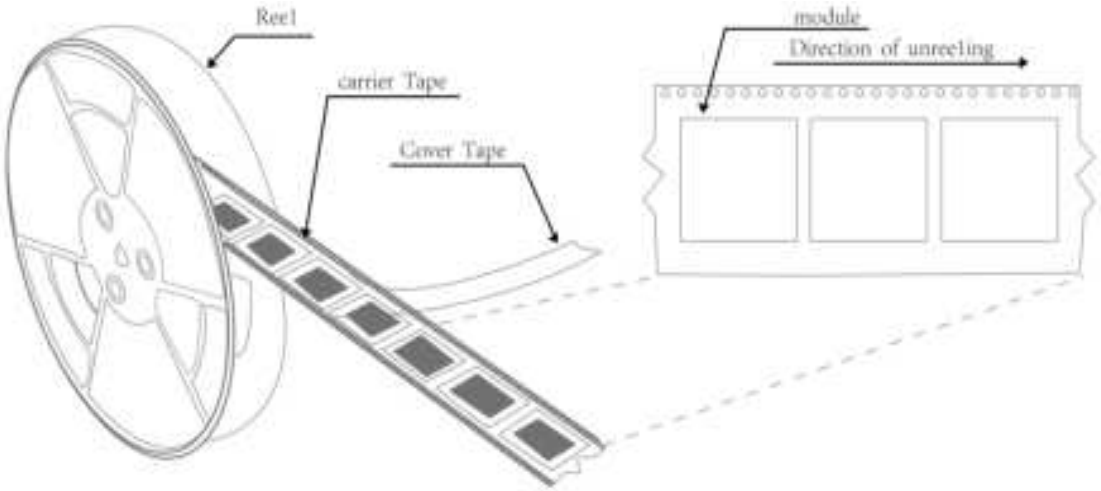
12. RoHS compliance

All hardware components are fully compliant with EU RoHS directive

13. Package

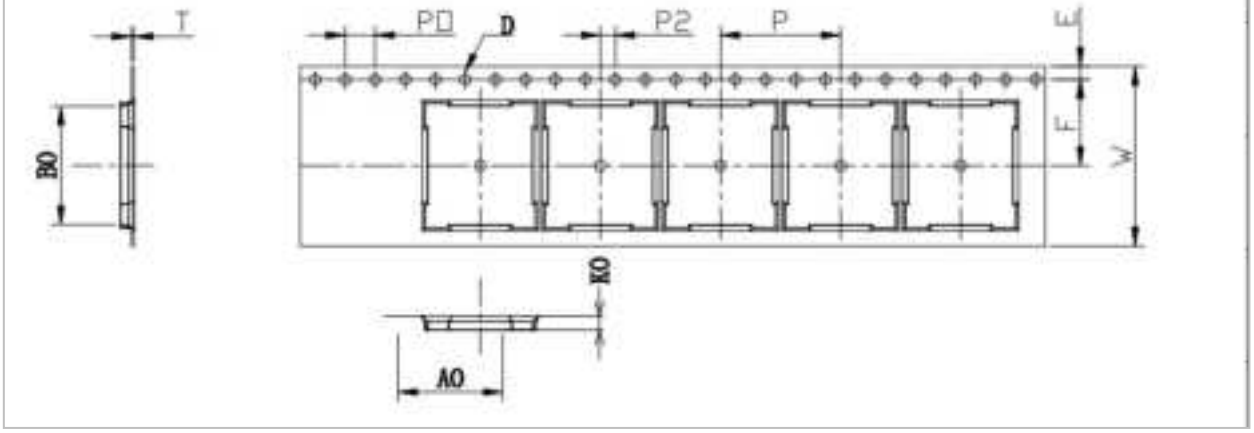
13.1 Reel

A roll of 1500pcs

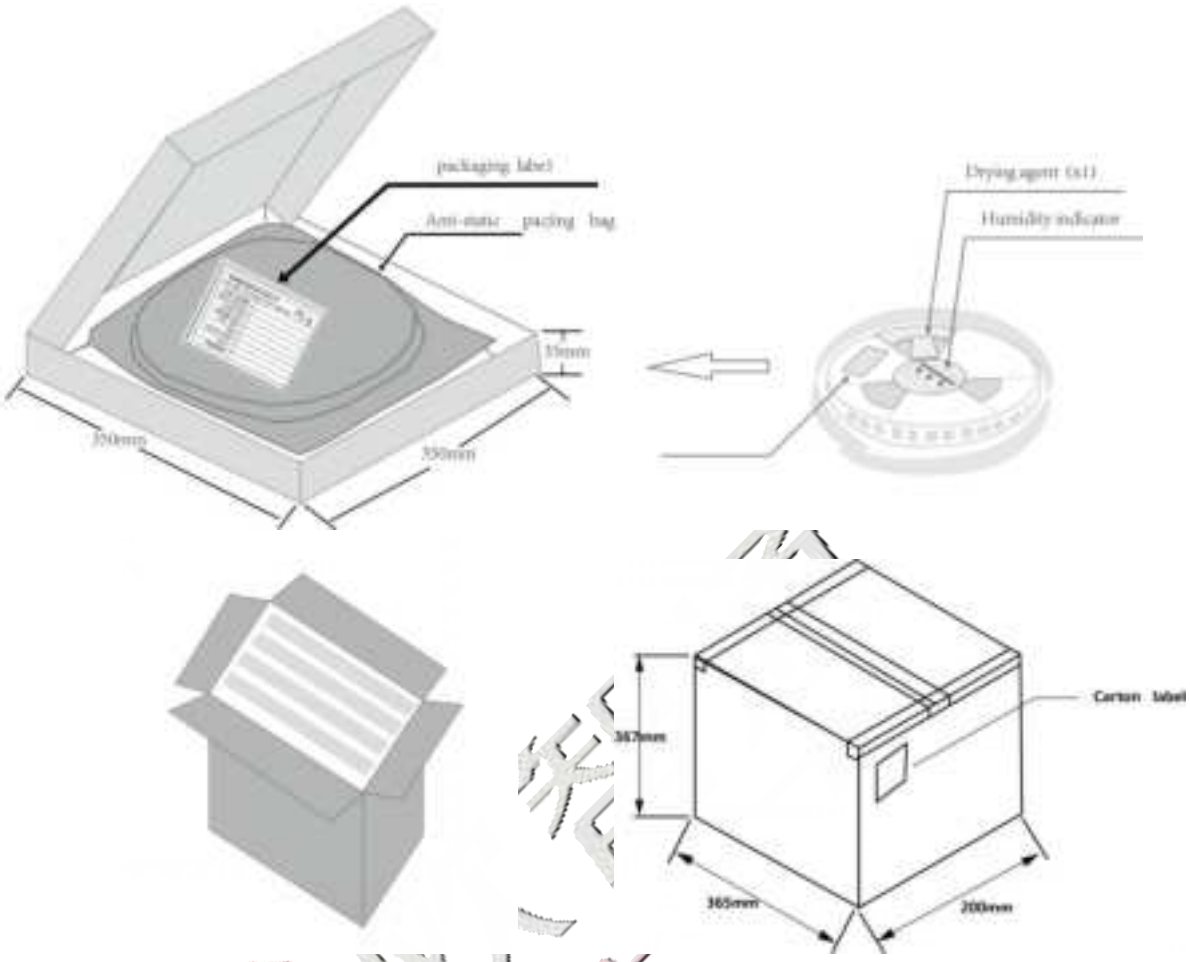


13.2 Carrier Tape Detail

ITEM	W	A0	B0	D	F	E	K0	P0	P2	P	T
DIM	24	13.40	15.40	1.50	11.5	1.75	2.65	4.0	2.0	16.0	0.30
TOLE	+0.3 -0.3	±0.15	±0.15	+0.1 -0.0	+0.1 -0.1	±0.1	±0.10	±0.1	±0.1	±0.1	±0.05

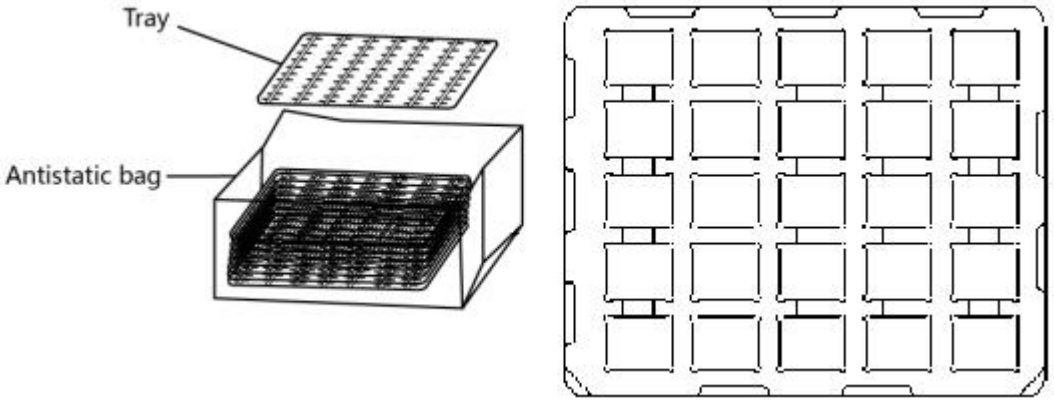


13.3 Packaging Detail



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

FCC

FCC compliance statement

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.

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

Exposure to radio frequency energy：

The radiated output power of this device meets the limits of FCC radio frequency exposure limits. This device should be operated with a minimum separation distance of 20 cm (8 inches) between the equipment and a person's body.

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.

ISED Canada compliance statement：

This device complies with ISED Canada license-exempt RSS standard(s). 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.

Operation in the band 5150 –5350 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.

Exposure to radio frequency energy:
The radiated output power of this device meets the limits of ISED Canada radio frequency exposure limits. This device should be operated with a minimum separation distance of 20 cm (8 inches) between the equipment and a person’s body.

Le présent appareil est conforme aux CNR d’ISDE 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’appareil doit accepter tout brouillage radioélectrique subi, même

si le brouillage est susceptible d'en compromettre le fonctionnement.
La bande 5150 –5350 MHz est réservée uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux.
L'exposition à l'énergie radiofréquence.
La puissance de sortie rayonné de cet appareil est conforme aux limites de la ISDE Canada limites d'exposition aux fréquences radio. Cet appareil doit être utilisé avec une distance minimale de séparation de 20 cm entre l'appareil et le corps d'une personne.

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01r01

2.2 List of applicable FCC rules
FCC Part 15 Subpart C 15.247 & 15.209 &15.407.

2.3 Specific operational use conditions
The module is a WIFI&BT Module with 2.4G&5G function.
WiFi Operation Frequency: 2412~2462MHz; 5180~5320MHz; 5500~5700MHz;5745~5825MHz.
BT Operation Frequency: 2402~2480MHz;
Type: FPC Antenna
The module can be used for mobile applications with a Gain:

ANT1:maximum 3.58dBi@2.4GHz， 3.37dBi@5GHz antenna gain

ANT2:maximum 3.58dBi@2.4GHz， 3.37dBi@5GHz antenna gain

ANT3(BT):maximum 3.58dBi@2.4GHz

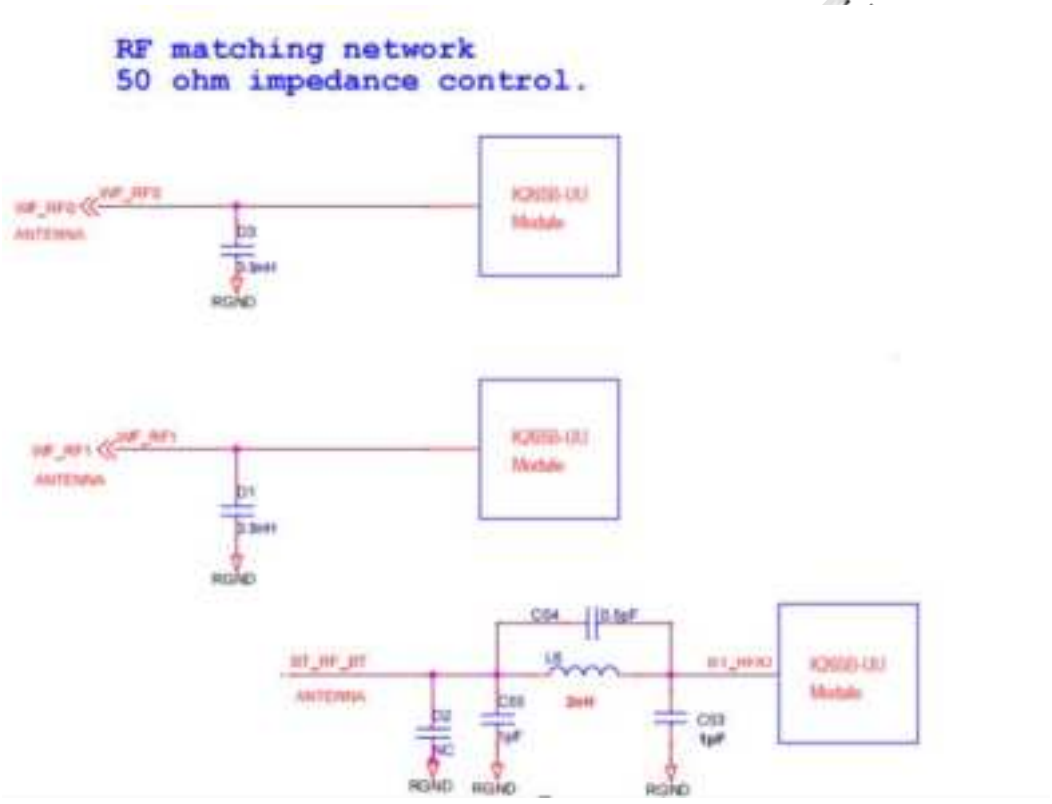
The host manufacturer installing this module into their product must ensure that the final compos it product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation. The host manufacturer has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module The end user manual shall include all required regulatory information/warning as show in this manual.

2.4 Limited module procedures

Not applicable The module is a Single module and complies with the requirement of FCC Part 15 212.

2.5 Trace antenna designs

When the K265B-UU module is used, a matching circuit needs to be reserved between the WLAN_ANT,BT_ANT antenna connector of the module and the antenna connector of the baseboard, and the recommended antenna matching circuit and initial parameters are shown in the following figure:



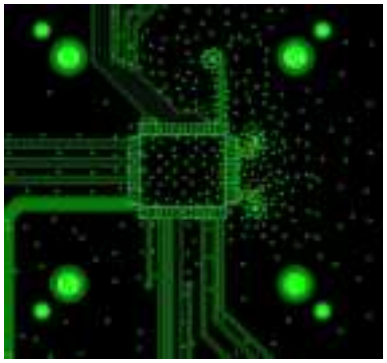
Wi-Fi&BT antenna reference design circuitry

For the WLAN_ANT circuit,D1,D3 use 3.9nH inductor.

For BT_ANT circuit ,L6 use 2nH inductor,C53,C55 use 1pF capacitor,C54 use 0.5pF capacitor ,D2 default, do match reserved, its final value according to the actual debugging results to determine.

Antenna interface to the bottom of the board antenna alignment to ensure

that the impedance control of 50Ω



Layout

ANTENNA MANUFACTURER:South Star Corporation
ANTENNA MODEL:WIFI/BT Antenna
ANTENNA TYPE:FPC ANTENNA
ANTENNA GAIN:
ANT1:3.58dBi@2.4G ,3.37dBi@5G;ANT2:3.58dBi@2.4G ,3.37dBi@5G;ANT3(BT):3.58dBi@2.4G
ANTENNA BANDWIDTH:
ANT1:80MHz@2.4G,700MHz@5G;ANT2:80MHz@2.4G,700MHz@5G;ANT3:80MHz@BT
ANTENNA FREQUNECY:
ANT1:2400-2500MHz,5150-5850MHz;ANT2:2400-2500MHz,5150-5850MHz;ANT3(BT):2400-2500MHz

ANTENNA IMPEDANCE:50Ω

ANTENNA POLARIZATION:LINEAR POLARIZATION
ANTENNA DIRECTIVITY:
ANT1:4.92dBi@2.4G,6.01dBi@5G;ANT2:4.92dBi@2.4G,6.01dBi@5G;ANT3(BT):4.92dBi@2.4G
ANTENNA FORM FACTOR:12.33mmX20.8mm

2.7 Antennas
Antenna Specification are as follows:
Type: FPC Antenna
Gain:

ANT1:maximum 3.58dBi@2.4GHz， 3.37dBi@5GHz antenna gain

ANT2:maximum 3.58dBi@2.4GHz， 3.37dBi@5GHz antenna gain

ANT3(BT):maximum 3.58dBi@2.4GHz

This device is intended only for host manufacturers under the following conditions: The transmitter module may not be co-located with any other transmitter or antenna; The module shall be only used with the internal antenna(s) that has been originally tested and certified with this module. The antenna must be either permanently attached or employ a “unique" antenna coupler. As long as the conditions above are met, further transmitter test will not be required However, the host manufacturer is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc).

2.8 Label and compliance information

Host product manufacturers need to provide a physical or e-label stating "Contains FCC ID: 2AATL-K265B-UU" with their finished product.

2.9 Information on test modes and additional testing requirements

Host manufacturer must perform test of radiated & conducted emission and spurious emission, e.t.c according to the actual test modes for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product. Only when all the test results of test modes comply with FCC requirements, then the end product can be sold legally.

2.10 Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is only FCC authorized for FCC Part 15 Subpart C 15.247 & 15 209 &15.407 and that 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. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuity), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

2.11 Note EMI Considerations

Note EMI Considerations: D04 Module Integration Guide has been considered as "best practice" for RF design engineering testing and evaluation of non-linear interactions which can generate additional non-compliant limits due to module placement to host components or properties.

For standalone mode, D04 Module Integration Guide was referenced, and simultaneous mode considered for the host product to confirm compliance.

2.12 How to make changes

Only the Grantee is permitted to make permissive changes.