

PRODUCT SPECIFICATION

N200AK-SR

Wi-Fi 1x1 11ax dual band+ Bluetooth 5.0

Combo Module

Version:v1.1



N200AK-SR Module Datasheet

Ordering Information	Part NO.	Description
	FGN200AKSR-00	AIC8800D, a/b/g/n/ac/ax Wi-Fi 2.4G/5G+BT5.0 1T1R, 12x12mm, SDIO, UART, Single antenna,带屏蔽盖
	FGN200AKSR-01	AIC8800D,a/b/g/n/ac/ax 2.4G+5G Wi-Fi+BT5.0, 1T1R,12x12mm,单天线,无屏蔽盖

Customer: _____

Customer P/N: _____

Signature: _____

Date: _____

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Revision History

[illegible]

1. General Description

1.1 Introduction

Fn-Link Technology would like to announce a low-cost and low-power consumption module which has the Wi-Fi 6 (2.4G 802.11a/b/g/n/ac/ax+5G 802.11a/n/ac/ax) and Bluetooth 5.0 functionalities.

Its WLAN function supports the SDIO 2.0 interface, and BT only supports UART interface . The module provides simple legacy and 20MHz/40MHz co-existence mechanism to ensure backward and network compatibility.

The wireless module PHY rate can achieve up to 229Mbps@RX and 286.8@TX.

1.2 Description

Model Name	N200AK-SR
Product Description	Support Wi-Fi /BT functionalities
Dimension	L x W x H: 12 x 12 mm
Wi-Fi Interface	Support SDIO 2.0
OS supported	Android /Linux/ Win CE /iOS /XP/WIN7/WIN10
Operating temperature	-20°C to 80°C
Storage temperature	-40°C to 85°C

2. Features

General

- Compliant with IEEE 802.11a/b/g/n/ac/ax
- support 2.4G+5G dual band, 20/40MHz bandwidth
- Wi-Fi Security WEP / WPA / WPA2/WPA3-SAE Personal, MFP
- Support STA, SoftAP, Wi-Fi Direct modes concurrently
- Support STBC, beamforming
- Support Wi-Fi 6 TWT

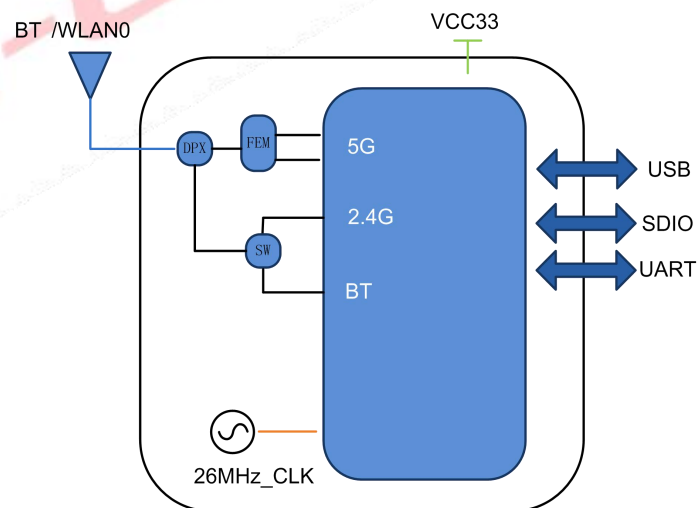
PHY Features

- Up to 229Mbps@RX and 286.8Mbps@TX PHY rate using 40MHz bandwidth

Host Interface

- Support, SDIO 2.0, UART or USB2.0
- Supports WLAN-Bluetooth coexistence

3. Block Diagram



4. General Specification

4.1 2.4GHz RF Specification

Feature	Description	
WLAN Standard	IEEE 802.11b/g/n/ac/ax, Wi-Fi compliant	
Frequency Range	2.400 GHz ~ 2.497 GHz (2.4 GHz ISM Band)	
Number of Channels	2.4GHz: Ch1 ~ Ch13, Ch14	
Modulation	DBPSK/DQPSK/CCK(DSSS)、BPSK/QPSK/16QAM/64QAM(OF DM)	
Test Items	Typical Value	EVM
Output Power	802.11b /11Mbps : 16dBm $\pm$ 2 dB	EVM $\leq$ -10dB
	802.11g /54Mbps : 14dBm $\pm$ 2 dB	EVM $\leq$ -25dB
	802.11n /MCS7 : 14dBm $\pm$ 2 dB	EVM $\leq$ -28dB
	802.11ac /MCS9 : 14 $\pm$ 2 dBm	EVM $\leq$ -32dB
	802.11ax /MCS9 : 14 $\pm$ 2 dBm	EVM $\leq$ -32dB
	802.11ax /MCS11 : 14 $\pm$ 2 dBm	EVM $\leq$ -35dB
	Tx power control by driver userconfig file. recommended power index setting as below: [0] =8 (ofdm1lowrate) [1] =8 (ofdm64qam) [2] =8 (ofdm256qam) [3] =8 (ofdm1024qam) [4] =7 (dsss) //建议改 level7 功率 16dbm 符合 CE 认证标准. MCS10,MCS11 仅支持 TX 不支持 RX,模组协商模式最高支持 MCS9. MCS10,11 功率为保证 EVM 可能被限制低于目标功率为正常现象。	
Spectrum Mask	Meet with IEEE standard	
Freq. Tolerance	$\pm$ 20ppm	
Receive Sensitivity (11b,20MHz) @8% PER	- 11Mbps $\leq$ -85dBm	$\leq$ -76dBm
Receive Sensitivity (11g,20MHz) @10% PER	- 54Mbps $\leq$ -73dBm	$\leq$ -68dBm
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=7 $\leq$ -70dBm	$\leq$ -67dBm
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=7 $\leq$ -68dBm	$\leq$ -64dBm
Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=8 $\leq$ -67dBm	$\leq$ -59dBm
Receive Sensitivity	- MCS=9 $\leq$ -63dBm	$\leq$ -54dBm

(11ac,40MHz) @10% PER		
Receive Sensitivity (11ax,20MHz) @10% PER	- MCS=9 ≤-65dBm	≤-57dBm
Receive Sensitivity (11ax,40MHz) @10% PER	- MCS=9 ≤-62dBm	≤-54dBm
Maximum Input Level	802.11b : -10 dBm	
	802.11g/n : -20 dBm	
Antenna Reference	Small antennas with 0~2 dBi peak gain	

4.2 WI-FI 5GHz Specification

Feature	Description		
WLAN Standard	IEEE 802.11a/n/ac/ax, Wi-Fi compliant		
Frequency Range	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	802.11a 54Mbps: 9 ± 2 dBm		EVM ≤ -25dB
	802.11n MCS7: 9 ± 2 dBm		EVM ≤ -28dB
	802.11ac MCS8: 9 ± 2 dBm		EVM ≤ -30dB
	802.11ac MCS9: 9 ± 2 dBm		EVM ≤ -32dB
	802.11ax MCS11 : 9 ± 2 dBm		EVM ≤ -35dB
	Tx power control by driver userconfig file.Power index setting as below: [0]=8 (ofdm1lowrate) 11dbm [1]=7 (ofdm64qam) [2]=7 (ofdm256qam) [3]=7 (ofdm1024qam) MCS10,MCS11only TX is supported and RX is not supported.And TX power may limited by the driver, not meet above listed spec.		
Receive Sensitivity (11a,20MHz) @10% PER	- 6Mbps	PER @ -89 dBm, typical	≤-85
	- 54Mbps	PER @ -71 dBm, typical	≤-68
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0	PER @ -89 dBm, typical	≤-85
	- MCS=7	PER @ -69 dBm, typical	≤-67
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0	PER @ -87 dBm, typical	≤-82
	- MCS=7	PER @ -67 dBm, typical	≤-64
Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0	PER @ -85 dBm, typical	≤-81
	- MCS=8	PER @ -66 dBm, typical	≤-59
Receive Sensitivity	- MCS=0	PER @ -83 dBm, typical	≤-79

(11ac,40MHz) @10% PER	- MCS=9	PER @ -63 dBm, typical	≤-54
Receive Sensitivity	- MCS=0	PER @ -82 dBm, typical	≤-78
(11ax,20MHz) @10% PER	- MCS=11	PER @ -65 dBm, typical	≤-57
Receive Sensitivity	- MCS=0	PER @ -81 dBm, typical	≤-78
(11ax,40MHz) @10% PER	- MCS=11	PER @ -62 dBm, typical	≤-54
Maximum input level	802.11a/n: -30 dBm		
	802.11ac: -30 dBm		
	802.11ax: -30 dBm		
Antenna Reference	Small antennas with 0~2 dBi peak gain		

Conditions : VBAT=3.3V ; VDDIO=3.3V ; Temp:25°C

15GHz(20MHz) Channel table

Band range	Operating Channel Numbers	Channel center frequencies(MHz)
5180MHz~5240MHz	36	5180
	40	5200
	44	5220
	48	5240
5260MHz~5320MHz	52	5260
	56	5280
	60	5300
	64	5320
5550MHz~5700MHz	100	5500
	104	5520
	108	5540
	112	5560
	116	5580
	120	5600
	124	5620
	128	5640
	132	5660
	136	5680
	140	5700
5745MHz~5825MHz	149	5745
	153	5765
	157	5785
	161	5805

	165	5825
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4.3 Bluetooth Specification

Feature	Description		
General Specification			
Bluetooth Standard	Bluetooth V5.0		
Host Interface	UART		
Antenna Reference	Small antennas with 0~2 dBi peak gain		
Frequency Band	2402 MHz ~ 2480 MHz		
Number of Channels	79 channels		
Modulation	GFSK, $\pi/4$ -DQPSK, 8-DPSK		
RF Specification			
	Min(dBm)	Typical(dBm)	Max(dBm)
Output Power (Class 1)	-3	5	8
Sensitivity @ BER=0.1% for GFSK (1Mbps)			-70
Sensitivity @ BER=0.01% for $\pi/4$ -DQPSK (2Mbps)			-70
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)			-70
Maximum Input Level	GFSK (1Mbps):-20dBm		
	$\pi/4$ -DQPSK (2Mbps) :-20dBm		
	8DPSK (3Mbps) :-20dBm		

5. ID setting information

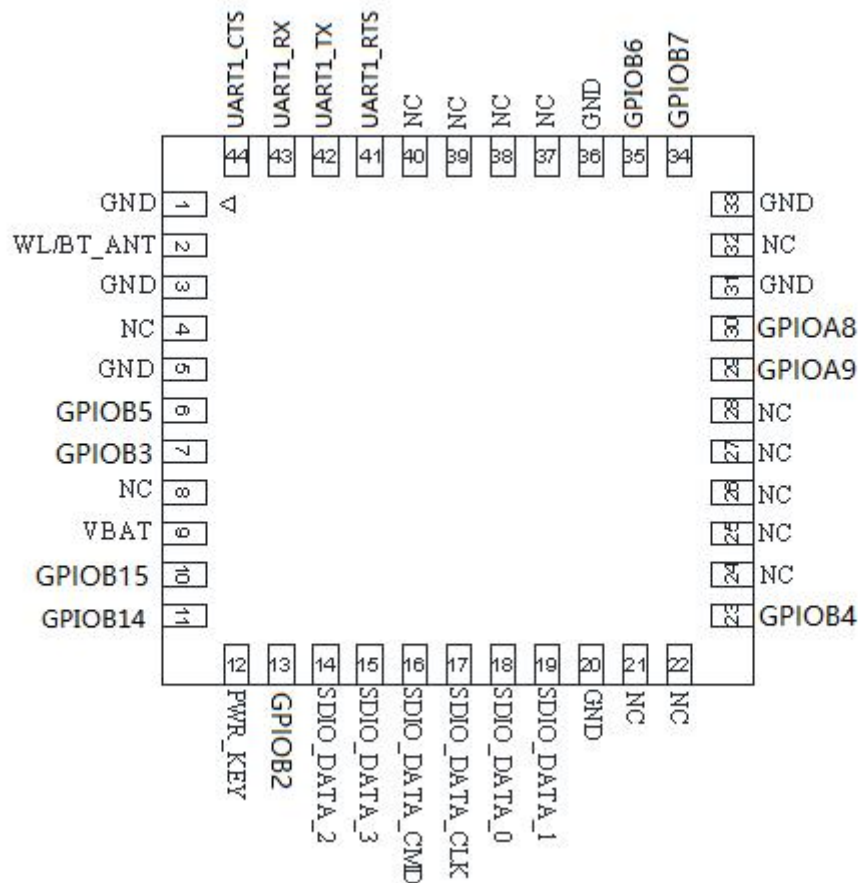
WI-FI

Vendor ID	TBD
Product ID	TBD

6. Pin Definition

6.1 Pin Outline

< TOP VIEW >



6.2 Pin Definition details

NO.	Name	Type	Description	Voltage
1	GND	—	Ground connections	
2	WL/BT_ANT	I/O	WLAN and BT RF I/O port	
3	GND	—	Ground connections	
4	NC	—	Floating (Don't connected to ground)	
5	GND	—	Ground connections	

6	GPIOB5	I/O	GPIOB5/HOST_WAKE_BT	VIO
7	GPIOB3	I/O	GPIOB3/BT_WAKE_HOST	VIO
8	NC	—	Floating (Don't connected to ground)	
9	VBAT	P	Main power voltage source input	3.3V
10	GPIOB15	I/O	USB DM	
11	GPIOB14	I/O	USB DP	
12	PWR_KEY	I	Default Power Enable: pull high» 6ms Power Disable: pull low	VIO
13	GPIOB2	I/O	WiFi Wake Up Host	VIO
14	SD_D2	I/O	SDIO data line 2, GPIOA15	VIO
15	SD_D3	I/O	SDIO data line 3, GPIOA14	VIO
16	SD_CMD	I/O	SDIO command line, GPIOA13	VIO
17	SD_CLK	I/O	SDIO clock line ,GPIOA12	VIO
18	SD_D0	I/O	SDIO data line 0 ,GPIOA11	VIO
19	SD_D1	I/O	SDIO data line 1, GPIOA10	VIO
20	GND	—	Ground connections	
21	NC	—	Floating (Don't connected to ground)	
22	VIO	P	I/O Voltage	1.8V/3.3V
23	GPIOB4	I/O	GPIOB4,if not used please keep NC	VIO
24	NC	—	Floating (Don't connected to ground)	
25	NC	—	Floating (Don't connected to ground)	
26	NC	—	Floating (Don't connected to ground)	
27	NC	—	Floating (Don't connected to ground)	
28	NC	—	Floating (Don't connected to ground)	
29	GPIOA9	I/O	GPIOA9, UART0 TX	VIO
30	GPIOA8	I/O	GPIOA8, UART0 RX	VIO
31	GND	—	Ground connections	
32	NC	—	Floating (Don't connected to ground)	
33	GND	—	Ground connections	
34	GPIOB7	I/O	GPIOB7, BT_DIS	VIO
35	GPIOB6	I/O	GPIOB6,,if not used please keep NC	VIO
36	GND	—	Ground connections	
37	NC	—	Floating (Don't connected to ground)	
38	NC	—	Floating (Don't connected to ground)	
39	NC	—	Floating (Don't connected to ground)	
40	NC	—	Floating (Don't connected to ground)	
41	UART1_RTS	I/O	UART1_RTS, GPIOA7	VIO

42	UART1_TX	I/O	UART1_TX, GPIOA5	VIO
43	UART1_RX	I/O	UART1_RX, GPIOA4	VIO
44	UART1_CTS	I/O	UART1_CTS, GPIOA6	VIO

P:POWER I:INPUT O:OUTPUT

7. Electrical Specifications

7.1 Power Supply DC Characteristics

The digital IO supports VDD33 or VDD18 application.

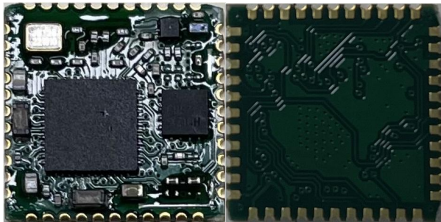
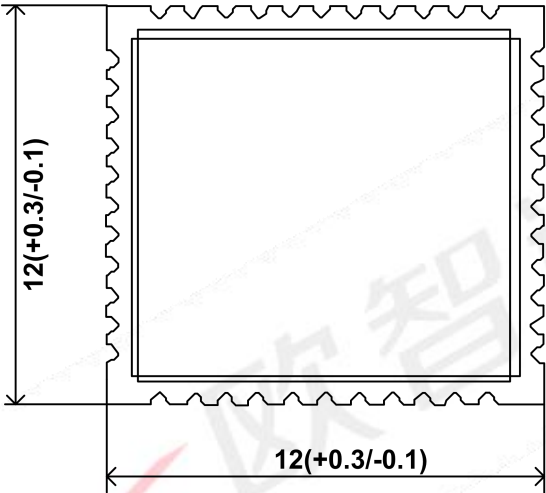
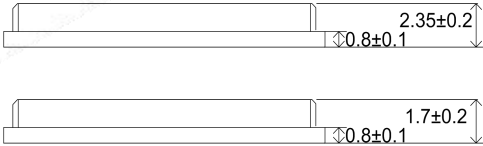
	MIN	TYP	MAX	Unit
Operating Temperature	-20	25	80	deg.C
VBAT	3	3.3	3.6	V
VDDIO	1.7	1.8/3.3	3.6	V

7.2 Power Consumption

	Test condition: VBAT=3.3V / VDDIO=3.3V	
	Current @ TX	Current @ RX
	Maximum(mA)	Maximum(mA)
11b@20dbm	239	39.5
11g@14dbm	157	39.2
HT20-mcs7@14dbm	158.1	39.3
HT40-mcs7@14dbm	145.8	39.6
VHT20-mcs8@14dbm	153.4	39.3
VHT40-mcs9@14dbm	143.1	39.6
HE20-mcs9@14dbm	149.9	39.2
HE40-mcs9@14dbm	139.9	39.7
HE20-mcs11@14dbm	148.8	/
HE40-mcs11@14dbm	139.9	/
BT	31.8	39

8. Size reference

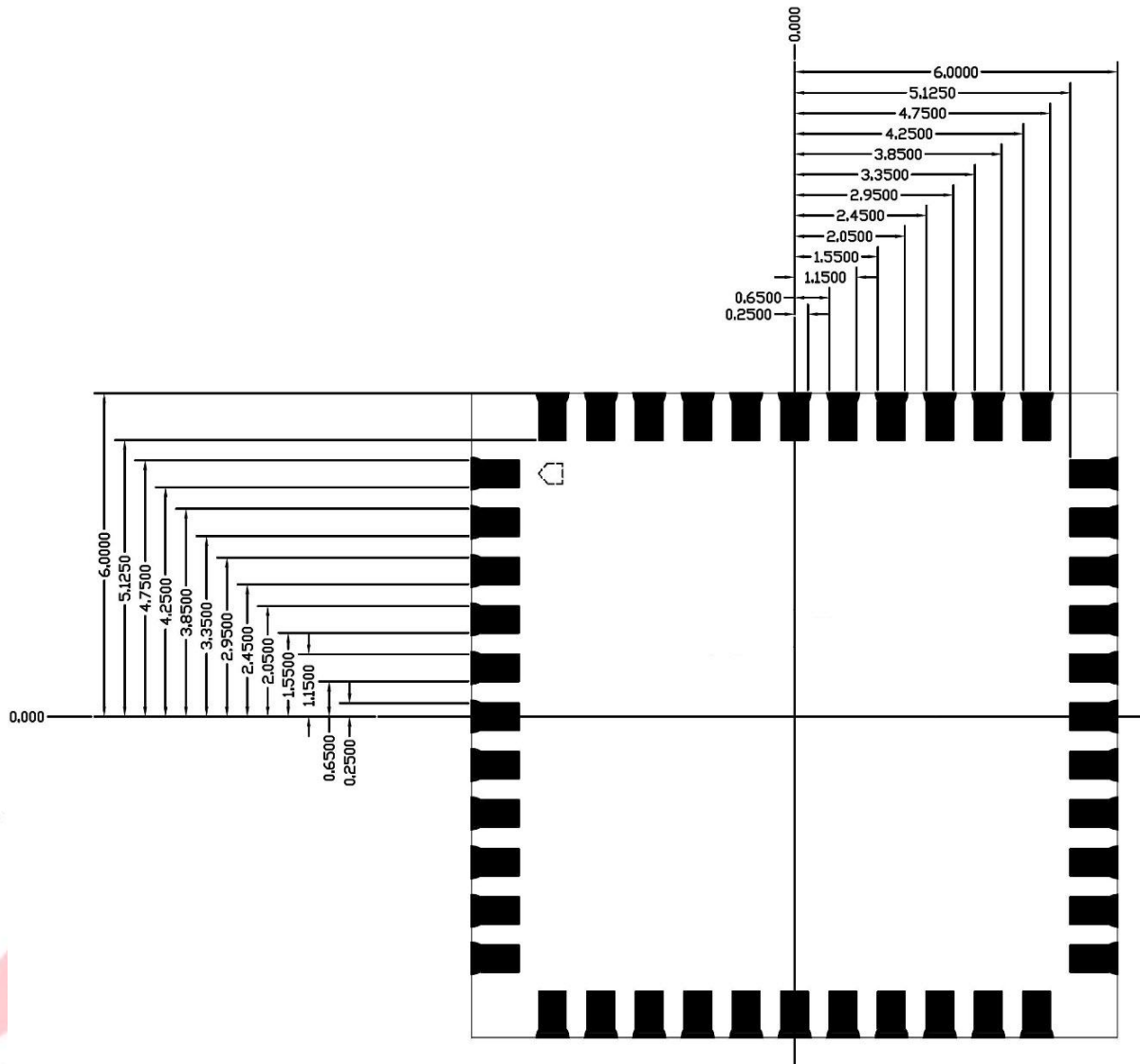
8.1 Module Picture

L x W : 12 x 12 (+0.3/-0.1) mm FGN200AKSR-00:  FGN200AKSR-01: 	
FGN200AKSR-00 H: 2.35 (±0.2) mm FGN200AKSR-01 H: 1.7 (±0.2) mm	
Weight	0.5g (±0.1) mm

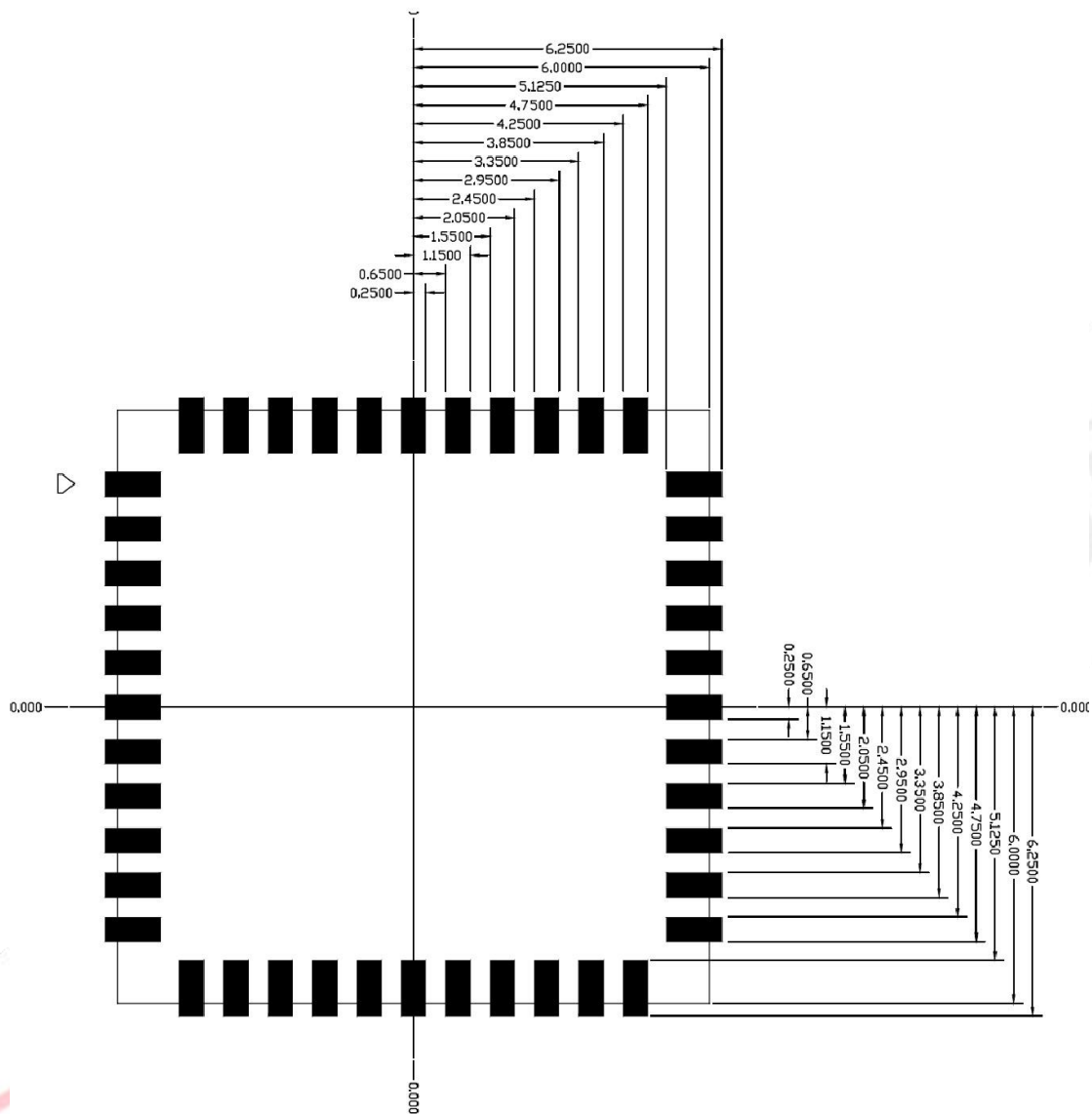
Note: Module picture will be updated in future version.

8.2 Physical Dimensions

<TOP View>



8.3 Layout Recommendation

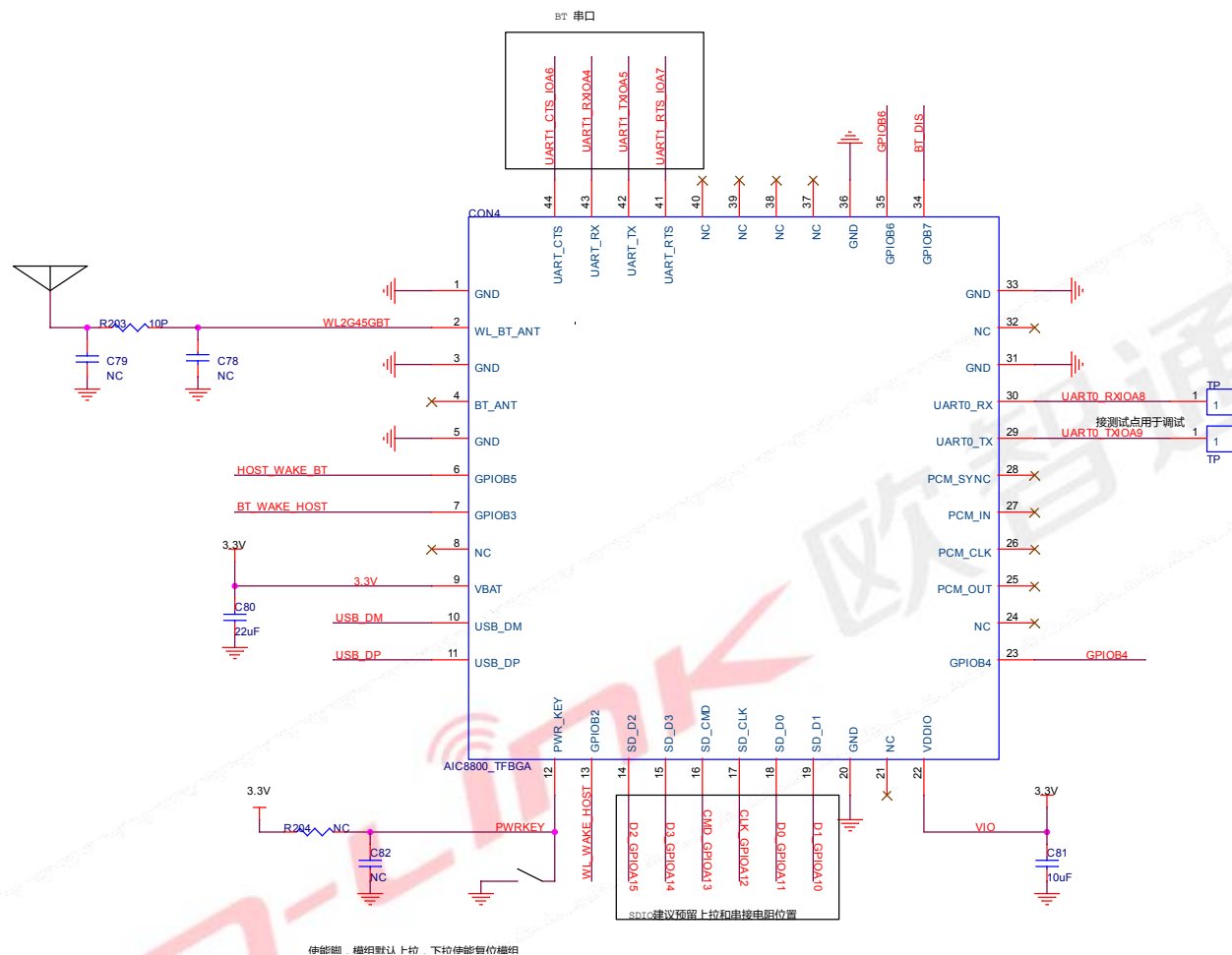


9. The Key Material List

Item	Part Name	Description	Manufacturer
1	Inductor	1608 4.7uH, $\pm 20\%$	Sunlord, Ceaiya, Cenker, Taiyo
2	Crystal	3225 26MHz $\pm 10\text{ppm}$	ECEC, TKD, Hosonic, JWT, TXC
3	Chipset	AIC8800D	AIC
4	PCB	FR4, 4 LAYER, GREEN	XY-PCB, GDKX, Sunlord, SLPCB
5	shielding	N200A-SR shielding	Sun-tek, JLitong
6	TVS	0201, 5V, 0.15pF, 12KV	WAYON, Murata

10. Reference Design

Note: Module requires independent power supply , supply capacity $\geq 350\text{mA}$ and ripple less than 100mV ; Do not share power with amplifier, infrared device, camera, etc.



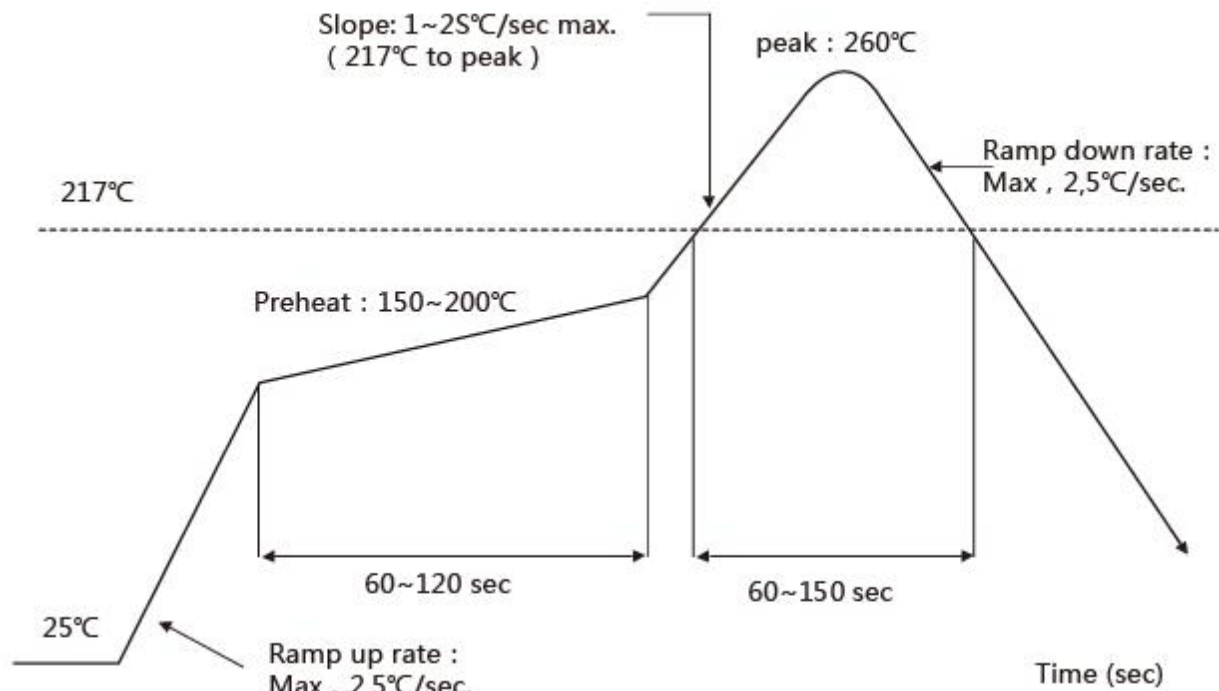
11. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature: $\leq 260^{\circ}\text{C}$

Time within 5°C of peak temperature: $\geq 10\text{s}$

Number of Times: ≤ 2 times



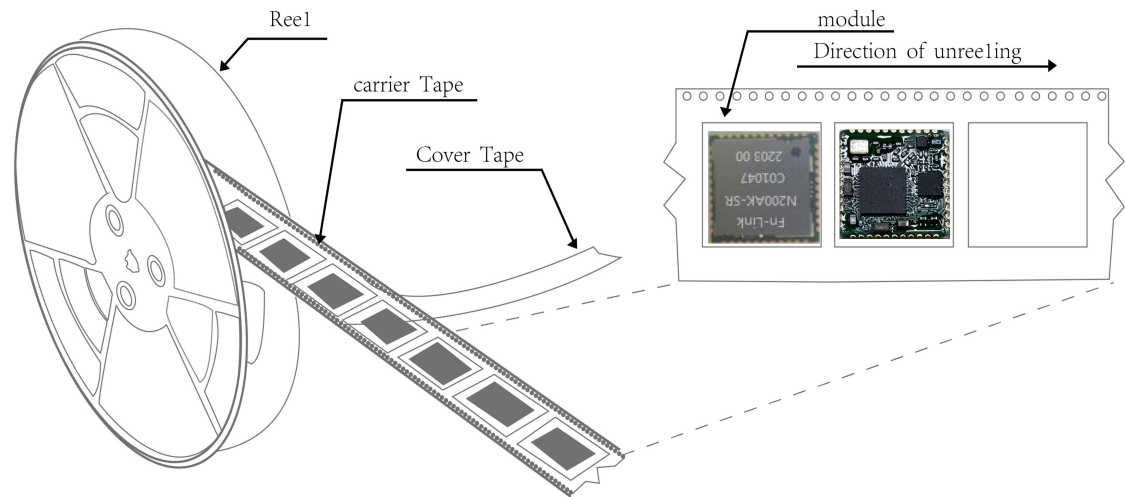
12. RoHS compliance

All hardware components are fully compliant with EU RoHS directive

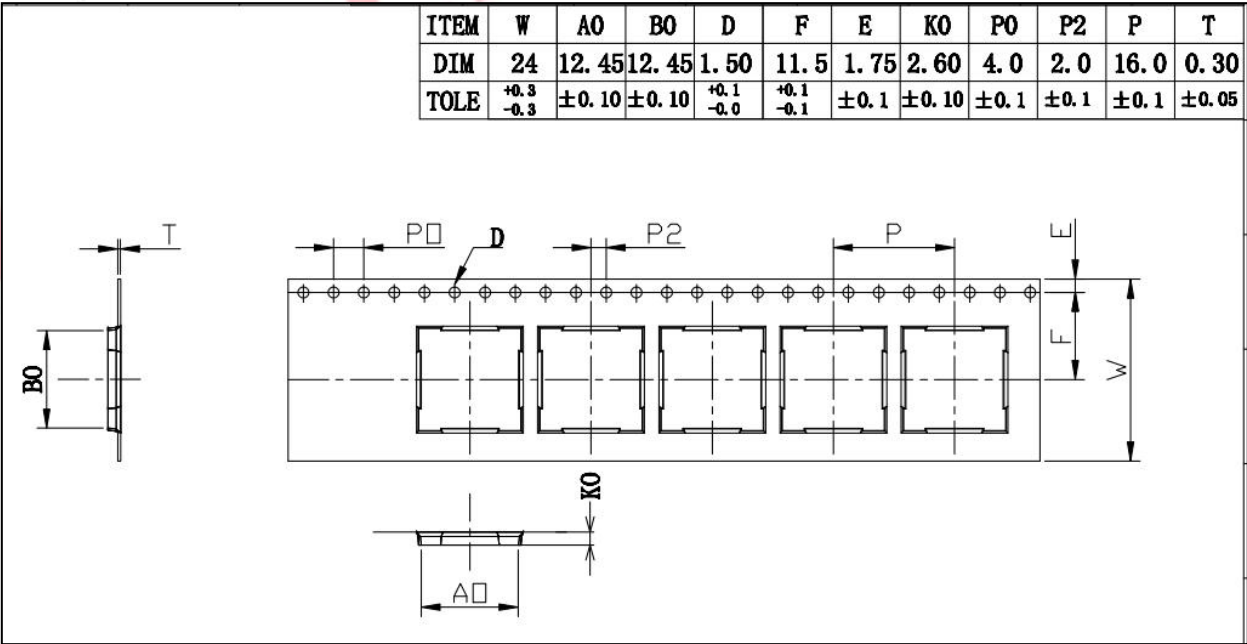
13. Package

13.1 Reel

A roll of 1500pcs



13.2 Carrier Tape Detail



13.3 Packaging Detail

the take-up package



Using self-adhesive tape

Size of black tape: 24mm*32.6m the cover tape :21.3mm*32.6m

Color of plastic disc: blue



NY bag size:450mm*415mm



size : 350*350*35mm



The packing case size:360*210*370mmg

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
- d) “IPC/JEDEC J-STD-033A paragraph 5.2” is respected
- e) Baking is required if conditions b) or c) are not respected
- f) Baking is required if the humidity indicator inside the bag indicates 10% RH or more