

PRODUCT SPECIFICATION

N240A-SRL

Wi-Fi 1x1 11ax dual band+ BLE 5.4

Combo Module

Version:v1.1

Customer: _____

Customer P/N: _____

Signature: _____

Date: _____

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Website:www.fn-link.com

N240A-SRL Module Datasheet

Ordering Information	Part NO.	Description
	FGN240ASRL-00	AIC8800D40L,a/b/g/n/ac/ax,1T1R,Wi-Fi6,BLE5.4,12X12,1T1R,SDIO

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1. General Description

1.1 Introduction

N240A-SRL is a highly integrated chip with dual band Wi-Fi6, BLE5.4 for wireless application.

Its WLAN function supports the SDIO 3.0 interface, and BT only supports UART interface. The module provides simple legacy and 20MHz/40MHz co-existence mechanism to ensure backward and network compatibility. Support 2.4GHz/5GHz Wi-Fi6.

The wireless module PHY rate can achieve up 286.8Mbps

1.2 Description

Model Name	N240A-SRL
Product Description	Support Wi-Fi /BT functionalities
Dimension	L x W x H: 12 x 12 x 2.47mm
Wi-Fi Interface	Support SDIO 3.0
OS supported	Android /Linux/ Win CE /XP/WIN7/WIN10
Operating temperature	-20°C to 80°C
Storage temperature	-40°C to 125°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

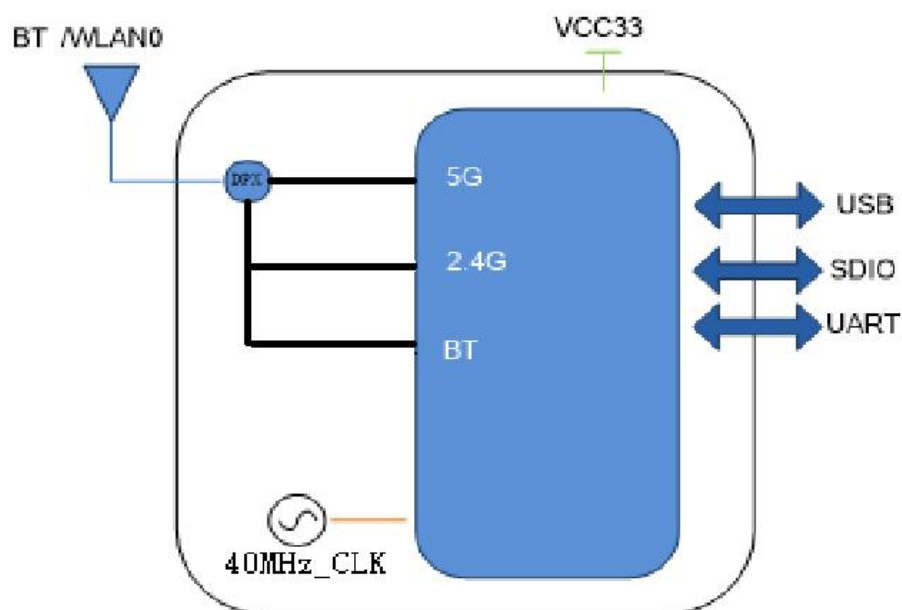
PHY Features

- Data rates up to 286.8Mbps with 20/40MHz bandwidth

Host Interface

- Supports SDIO3.0/USB2.0
- Supports all the mandatory and optional features of Bluetooth low energy 5.4
- Supports advanced master and slave topologies

3. Block Diagram



4. General Specification

4.1 2.4GHz RF Specification

Feature	Description	
WLAN Standard	IEEE 802.11b/g/n/ax, Wi-Fi compliant	
Frequency Range	2.400 GHz ~ 2.4835 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 : 18dBm \pm 2 dBm	EVM \leq -10dB
	802.11g /54Mbps : 15dBm \pm 2 dBm	EVM \leq -25dB
	802.11n /MCS7 : 15dBm \pm 2 dBm	EVM \leq -28dB
	802.11ax /MCS9 : 14dBm \pm 2 dBm	EVM \leq -32dB
	802.11ax /MCS11 : 13dBm \pm 2 dBm	EVM \leq -35dB
Spectrum Mask	Meet with IEEE standard	
Freq. Tolerance	\pm 20ppm	
Receive Sensitivity (11b,20MHz) @8% PER	- 11Mbps @-85dBm	\leq -76dBm
Receive Sensitivity (11g,20MHz) @10% PER	- 54Mbps @-73dBm	\leq -68dBm
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=7 @-70dBm	\leq -67dBm
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=7 @-68dBm	\leq -64dBm
Receive Sensitivity (11ax,20MHz) @10% PER	- MCS=11 @-63dBm	\leq -52dBm
Receive Sensitivity (11ax,40MHz) @10% PER	- MCS=11 @-61dBm	\leq -49dBm
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)		
Test Items	Typical Value		EVM
Output Power	802.11a 54Mbps: 15dBm ± 2 dBm		EVM ≤ -25dB
	802.11n MCS7: 15 dBm± 2 dBm		EVM ≤ -28dB
	802.11ac MCS8: 14dBm ± 2 dBm		EVM ≤ -30dB
	802.11ac MCS9: 14dBm ± 2 dBm		EVM ≤ -32dB
	802.11ax MCS11 : 12dBm ± 2 dBm		EVM ≤ -35dB
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 (11ac,40MHz) @10% PER	- MCS=0	PER @ -83 dBm, typical	≤-79
	- MCS=9	PER @ -63 dBm, typical	≤-54
Receive Sensitivity (11ax,20MHz) @10% PER	- MCS=0	PER @ -82 dBm, typical	≤-78
	- MCS=11	PER @ -65 dBm, typical	≤-52
Receive Sensitivity (11ax,40MHz) @10% PER	- MCS=0	PER @ -81 dBm, typical	≤-78
	- MCS=11	PER @ -62 dBm, typical	≤-49
Maximum input level	802.11a/n: -30 dBm		
	802.11ac: -30 dBm		
	802.11ax: -30 dBm		

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

4.3 Bluetooth Specification

Feature	Description
General Specification	
Bluetooth Standard	LE(1Mbps)、LE(2Mbps)
Host Interface	UART
Frequency Band	2400 MHz ~ 2483.5 MHz
Number of Channels	40 channels for BLE
Modulation	GFSK,
RF Specification	
Output Power , tolerance ± 3 dB	
	CL1(dBm)
BDR Output Power	/
EDR Output Power	/
BLE Output Power	9
Sensitivity, tolerance \pm dB	
Sensitivity @ BER=0.1% for GFSK (1Mbps)	/
Sensitivity @ BER=0.01% for $\pi/4$ -DQPSK (2Mbps)	/
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)	/
Sensitivity @ BER=30.8% for LE (1Mbps)	-85
Sensitivity @ BER=30.8% for LE (2Mbps)	-83
Maximum Input Level	GFSK :-20dBm

5. ID setting information

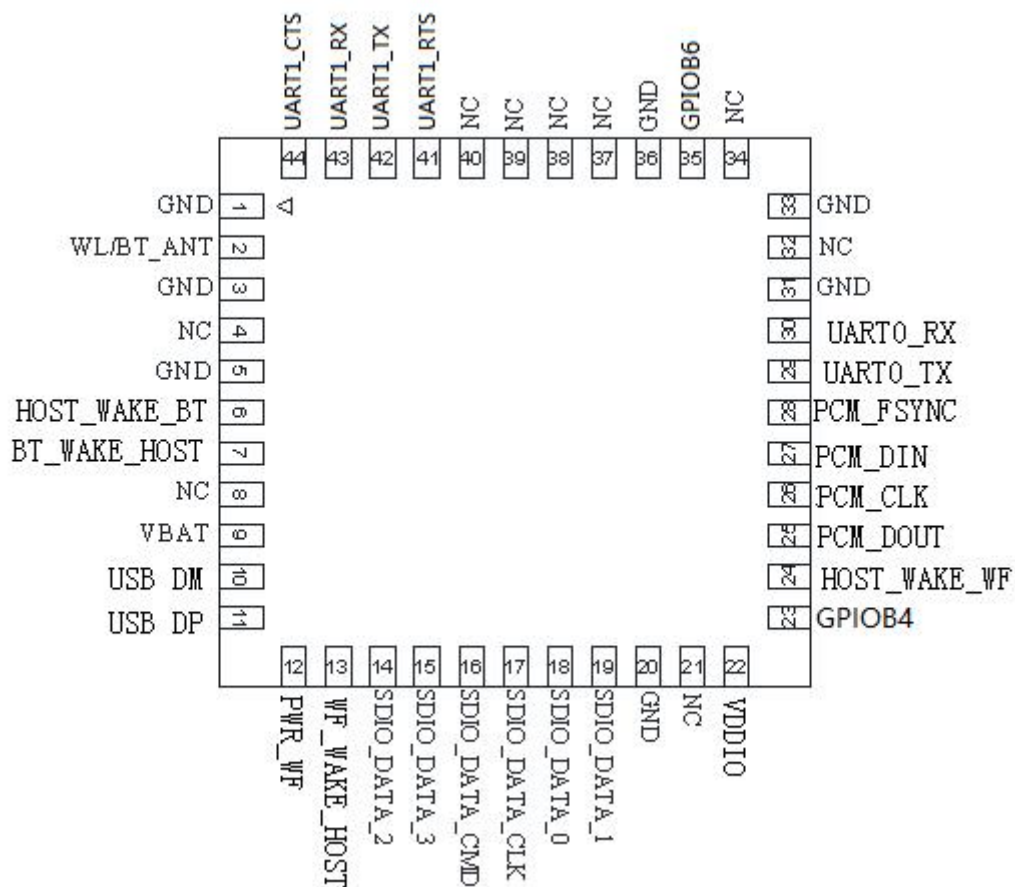
WI-FI

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	HOST_WAKE_BT	I/O	GPIOB3/HOST_WAKE_BT	VIO
7	BT_WAKE_HOST	I/O	GPIOB2/BT_WAKE_HOST	VIO
8	NC	—	Floating (Don't connected to ground)	
9	VBAT	P	Main power voltage source input	3.3V
10	USB DM	I/O	USB DM	
11	USB DP	I/O	USB DP	
12	PWR_WF	I	Default Power Enable: pull high» 6ms Power Disable: pull low	VIO
13	WF Wake Up Host	I/O	WF 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	VDDIO	P	I/O Voltage	1.8V/3.3V
23	GPIOB4	I/O	GPIOB4,if not used please keep NC	VIO
24	HOST_WAKE_WF	I/O	HOST_WAKE_WF	VIO
25	PCM_DOUT	O	PCM Data output	VIO
26	PCM_CLK	I/O	PCM clock	VIO
27	PCM_DIN	I	PCM data input	VIO
28	PCM_SYNC	I/O	PCM sync signal	VIO
29	UART0 TX	I/O	GPIOA9, UART0 TX	VIO
30	UART0 RX	I/O	GPIOA8, UART0 RX	VIO
31	GND	—	Ground connections	
32	NC	—	Floating (Don't connected to ground)	
33	GND	—	Ground connections	
34	NC	—	Floating (Don't connected to ground)	

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	BT_UART1_RTS, GPIOA7	VIO
42	UART1_TX	I/O	BT_UART1_TX, GPIOA5	VIO
43	UART1_RX	I/O	BT_UART1_RX, GPIOA4	VIO
44	UART1_CTS	I/O	BT_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

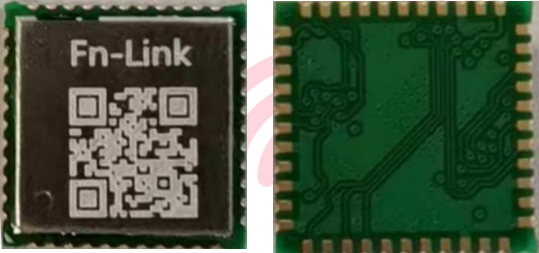
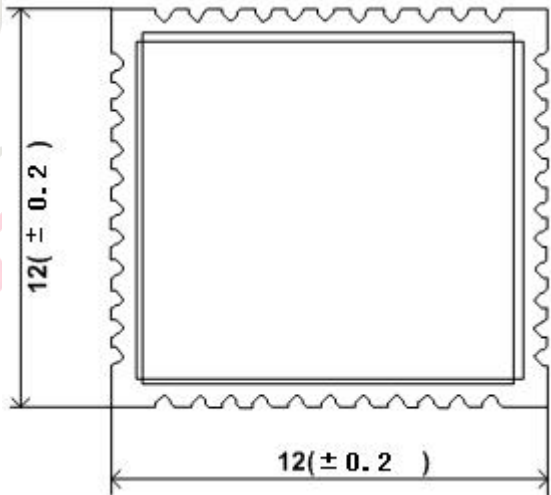

7.2 Power Consumption

2.4G	Test condition: VBAT=3.3V / VDDIO=3.3V	
	Current @ TX	Current @ RX
	Maximum(mA)	Maximum(mA)
11b@20dbm	268	57
11g@17dbm	187	57
HT20-mcs7@16dbm	179	58
HT40-mcs7@16dbm	163	57
VHT20-mcs8@16dbm	164	56
VHT40-mcs9@16dbm	162	56
HE20-mcs11@15dbm	138	57
HE40-mcs11@15dbm	134	58

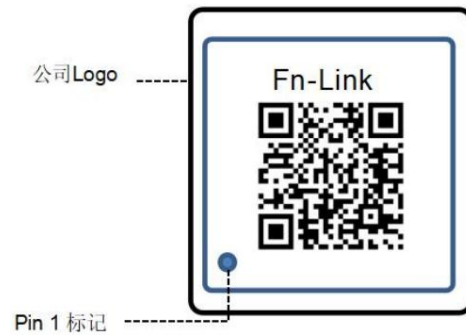
5G	Test condition: VBAT=3.3V / VDDIO=3.3V	
	Current @ TX	Current @ RX
	Maximum(mA)	Maximum(mA)
54M@17dbm	215	58
MCS7 HT20@17dbm	206	56
MCS7 HT40@17dbm	188	56
MCS8 VHT20@17dbm	203	58
MCS9 VHT40@16dbm	186	57
MCS11 HE20@15dbm	185	58
MCS11 HE40@14dbm	174	58

8. Size reference

8.1 Module Picture

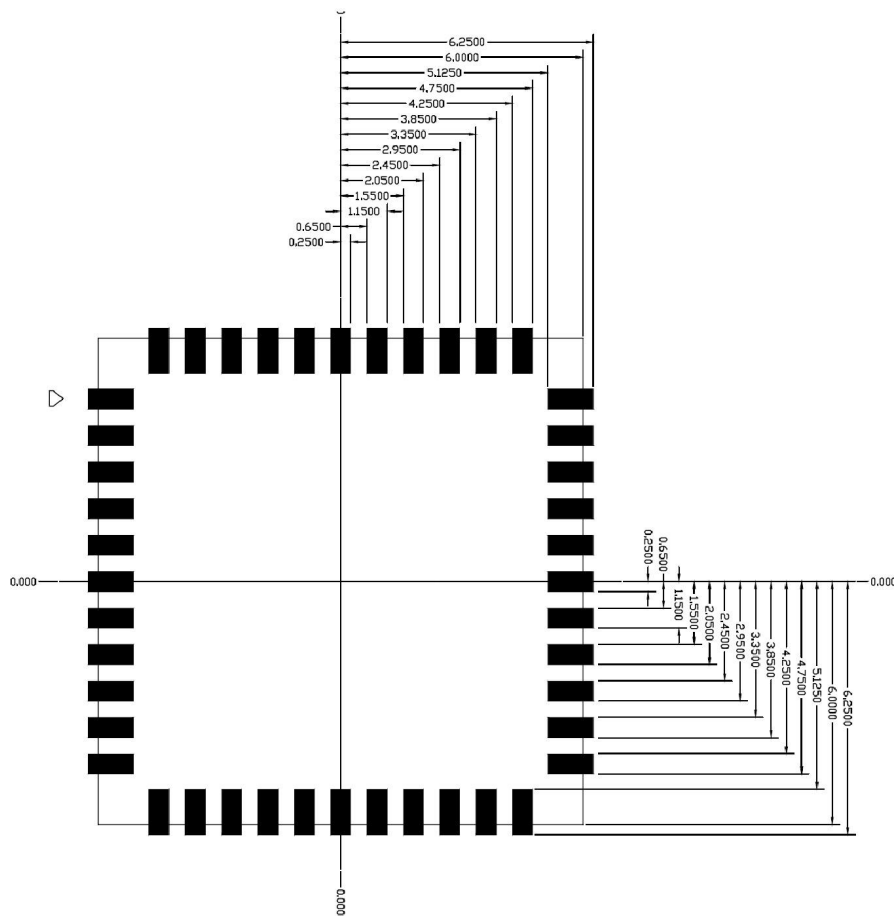
<p>L x W : 12 x 12 (±0.2) mm</p> 	
<p>H: 2.47 (±0.2) mm</p>	
<p>Weight</p>	<p>0.59(±0.1)g</p>

8.2 Marking Description



模组尺寸: 12 x 12 mm
屏蔽盖尺寸: 10.55 x 10.55mm

8.3 Layout Recommendation

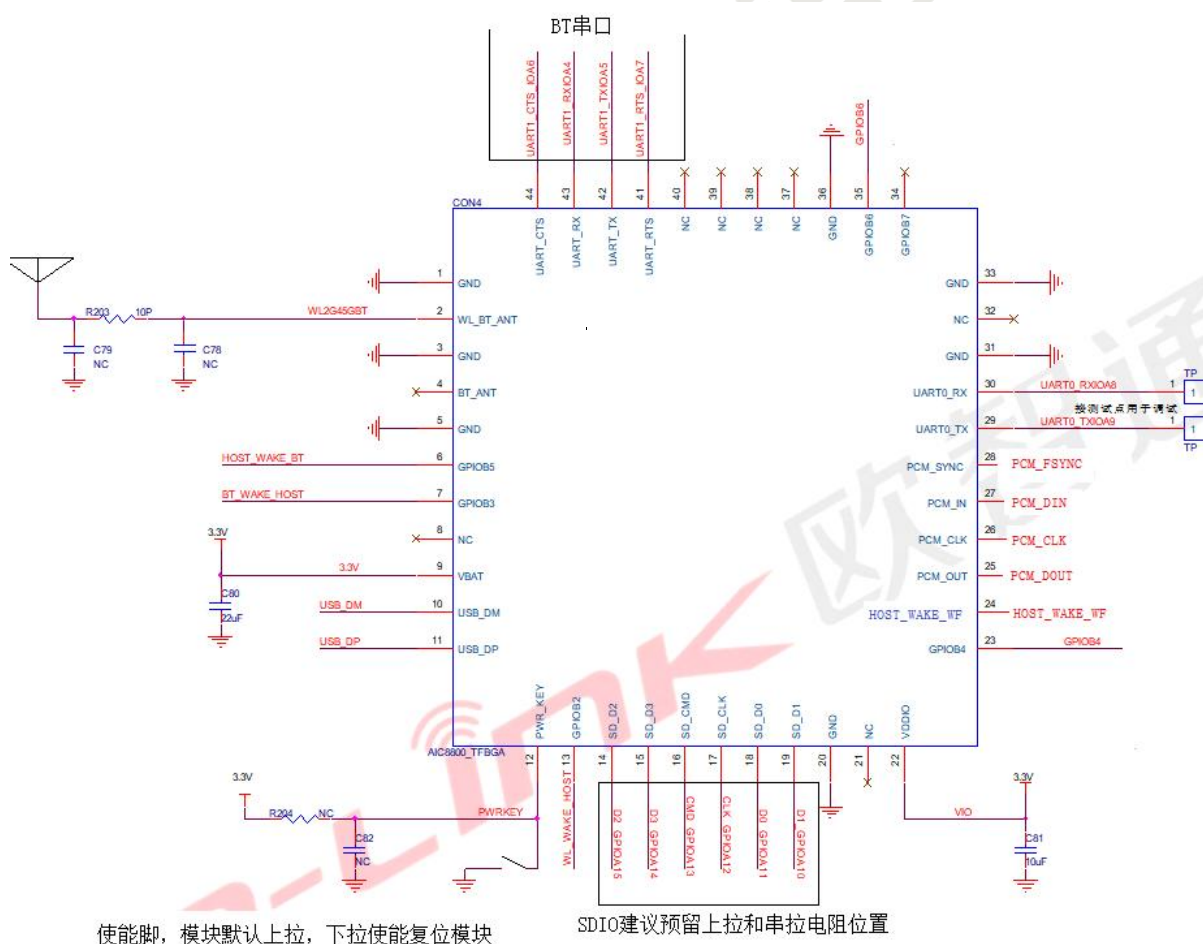


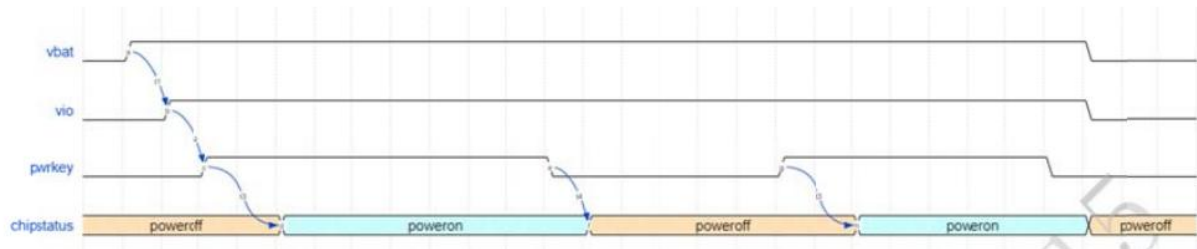
9. The Key Material List

Item	Part Name	Description	Manufacturer
1	Inductor	2016 4.7uH, $\pm 20\%$	Sunlord,Ceaiya, Cenker, Taiyo,inpaq
2	Crystal	2016 40MHz $\pm 10\text{ppm}$	ECEC, TKD, Hosonic, JWT, TXC
3	Chipset	AIC8800D40L	AIC
4	PCB	FR4, 4 LAYER, GREEN	XY-PCB,GDKX,Sunlord, SLPCB,Truly
5	shielding	N240A-SRL shielding	Sun-tek, JLitong,卓益

10. Reference Design

Note: Module requires independent power supply , supply capacity $\geq 1\text{A}$ and ripple less than 100mV; Do not share power with amplifier, infrared device, camera, etc.





t1: VIO's power on time \geq VBAT's

t2: power key's high time \geq VIO's +200us

t3: chip all power on ready time \geq power key high time + 8ms

t4: pwrkey pull low to chip all power off time \geq 6ms

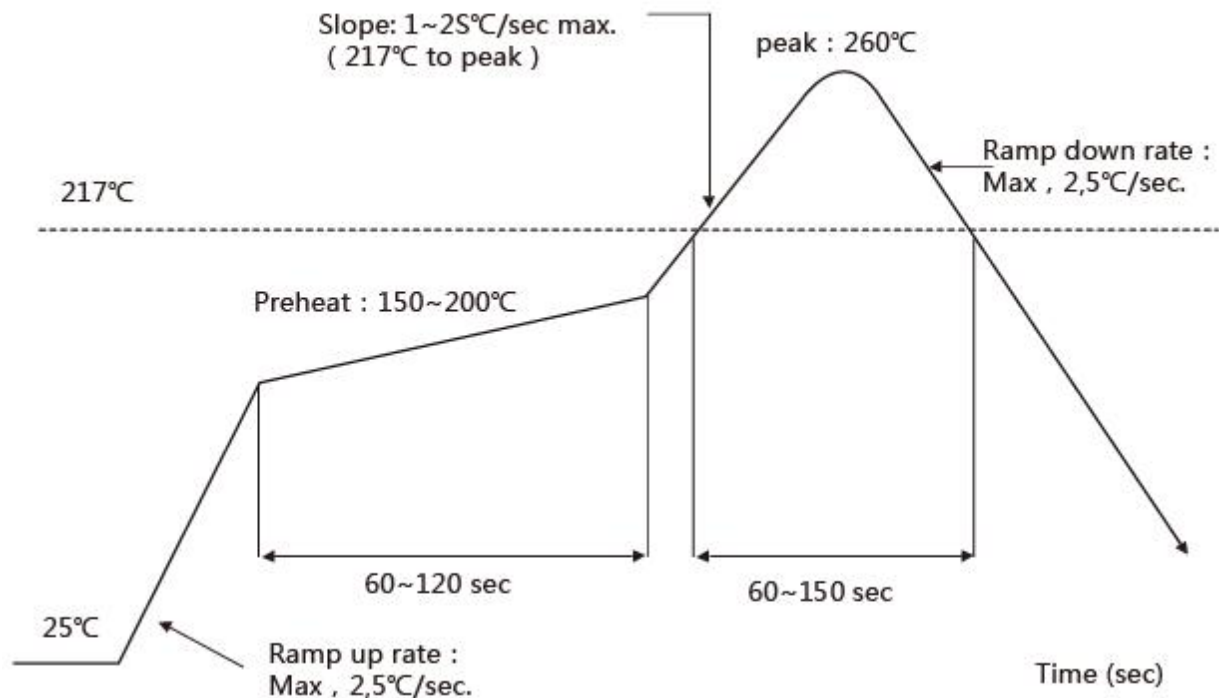
11. Recommended Reflow Profile

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



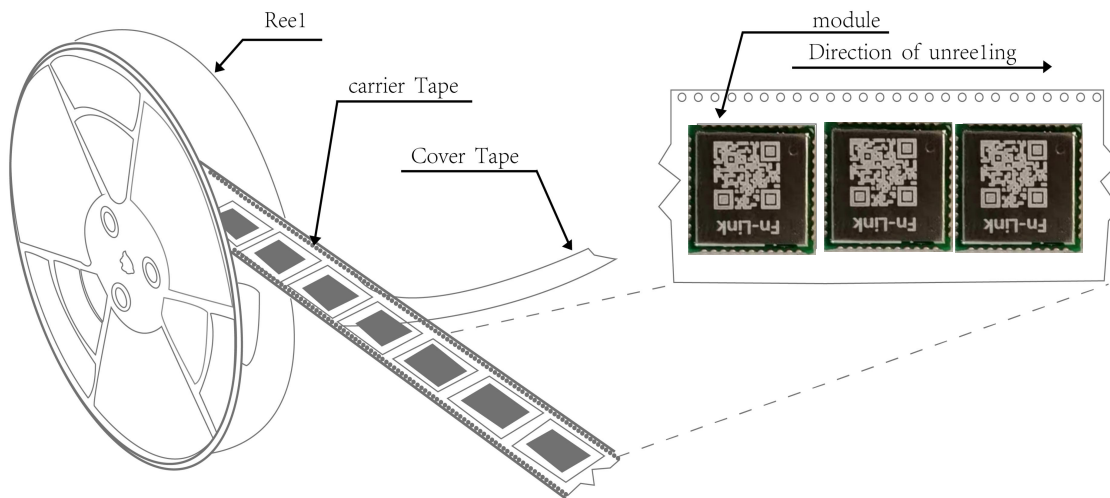
12. RoHS compliance

All hardware components are fully compliant with EU RoHS directive

13. Package

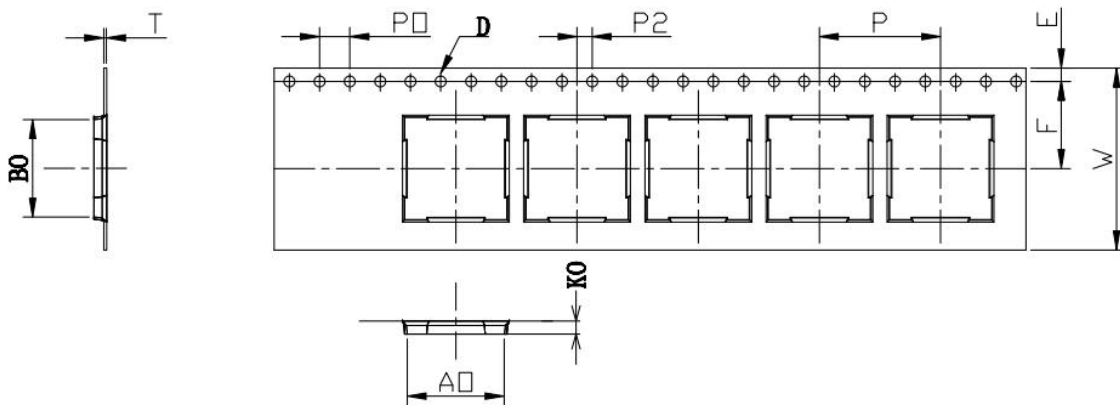
13.1 Reel

A roll of 1500pcs



13.2 Carrier Tape Detail

ITEM	W	A0	B0	D	F	E	K0	P0	P2	P	T
DIM	24	12.45	12.45	1.50	11.5	1.75	2.60	4.0	2.0	16.0	0.30
TOLE	$\begin{smallmatrix} +0.3 \\ -0.3 \end{smallmatrix}$	± 0.10	± 0.10	$\begin{smallmatrix} +0.1 \\ -0.0 \end{smallmatrix}$	$\begin{smallmatrix} +0.1 \\ -0.1 \end{smallmatrix}$	± 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 :21.3mm*32.6m

Color of plastic disc: blue



NY bag size:450mm*415mm



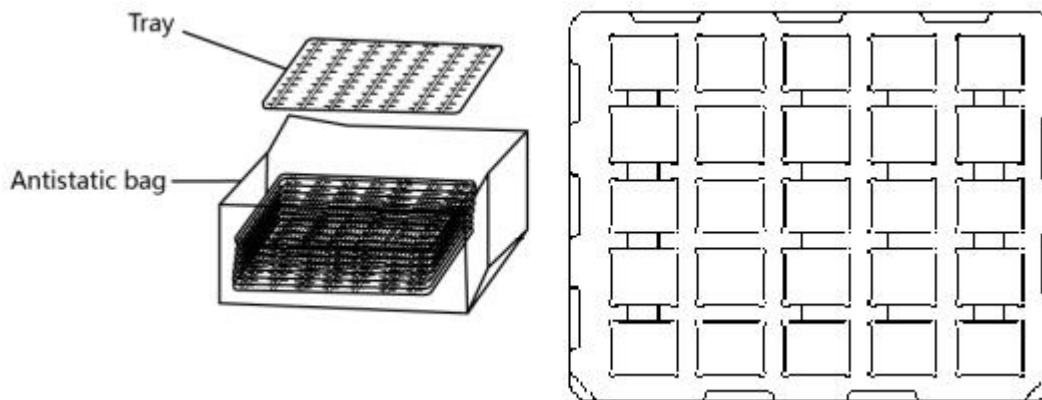
size : 350*350*35mm



The packing case size:360*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

Integration instructions for host product manufacturers according to KDB 996369 D03 OEMManual v01

Conditions on using FN-LINK TECHNOLOGY LIMITED regulatory approvals:

- A. Customer must ensure that its product (The " Wi-Fi/BT module") is electrically identical to FN-LINK TECHNOLOGY LIMITED reference designs. Customer acknowledges that any modifications to FN-LINK TECHNOLOGY LIMITED reference designs may invalidate regulatory approvals in relation to the CUSTOMER Product, or may necessitate notifications to the relevant regulatory authorities.
- B. Customer is responsible for ensuring that antennas used with the product are of the same type, with same or lower gains as approved and providing antenna reports to FN-LINK TECHNOLOGY LIMITED.
- C. Customer is responsible for regression testing to accommodate changes to FN-LINK TECHNOLOGY LIMITED reference designs, new antennas, and portable RF exposure safety testing/approvals.
- D. Appropriate labels must be affixed to the CUSTOMER Product that comply with applicable regulations in all respects.
- E. A user's manual or instruction manual must be included with the customer product that contains the text as required by applicable law. Without limitation of the foregoing, an example (for illustration purposes only) of possible text to include is set forth below:

2.2 List of applicable FCC rules

FCC Part 15 Subpart C 15.247, FCC Part 15 Subpart E

2.3 Specific operational use conditions

Radio Technology: Bluetooth BLE

Operation frequency: 2402-2480MHz

Channel No.: 40 channels

Data rate: 1Mbps/2Mbps

Channel Separation: 2MHz

Modulation: GFSK

Antenna Type: PCB antenna, max gain 4.46dBi

(Antenna information is provided by applicant.)

Radio Technology: 2.4G WIFI

Operation frequency: 2412MHz-2462MHz for IEEE 802.11 b, g, n/HT20, ax20,
2422MHz~2452MHz for IEEE802.11n/HT40, ax40

Channel No.: 802.11b/802.11g /802.11n (HT20)/802.11ax20: 11
802.11(HT40)/802.11ax40: 7

Modulation type: IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK)

IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK)

IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)

IEEE 802.11ax: OFDMA

(64QAM, 16QAM, QPSK, BPSK, 256QAM, 1024QAM)

Antenna Type: PCB antenna, max gain 4.46dBi

(Antenna information is provided by applicant.)

Radio Technology: 5G WIFI

Operation Frequency: 802.11a/n (HT20)/ac (VHT20)/ax20: 5180~5240MHz; 5260-5320MHz; 5500-5700MHz; 5745~5825MHz

802.11n (HT40)/ac (VHT40)/ax40: 5190~5230MHz; 5270-5310MHz; 5510-5670MHz; 5755~5795MHz

Channel separation: 20MHz for 802.11a/ 802.11ac (VHT20)/ 802.11n (HT20)/ax20
40MHz for 802.11ac (VHT40)/ 802.11n (HT40)/ax40

Modulation technology: IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11ac: OFDM (64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11ax: OFDMA
(64QAM, 16QAM, QPSK, BPSK, 256QAM, 1024QAM)

Antenna Type: PCB antenna, max gain 7.16dBi
(Antenna information is provided by applicant.)

The module can be used for mobile or portable applications with a maximum 7.16dBi antenna. The host manufacturer installing this module into their product must ensure that the final composite 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 shown 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

The antenna used is the PCB antenna on the module.

2.6 RF exposure considerations

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.

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.

The antennas used for this transmitter must be installed to provide a separation distance of at least 20cm from all persons and must not be located or operating in conjunction with any other antenna or transmitter.

2.7 Antennas

Antenna Specification are as follows:

Antenna Type: PCB antenna

Antenna Gain (Peak): BLE&2.4GWIFI: 4.46dBi

5GWIFI: 7.16dBi (Provided by applicant)

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;

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-N240A-SRL" With their finished product.

2.9 Information on test modes and additional testing requirements

Radio Technology: Bluetooth BLE

Operation frequency: 2402-2480MHz

Channel No.: 40 channels

Data rate: 1Mbps/2Mbps

Channel Separation: 2MHz

Modulation: GFSK

Antenna Type: PCB antenna, max gain 4.46dBi

(Antenna information is provided by applicant.)

Radio Technology: 2.4G WIFI

Operation frequency: 2412MHz-2462MHz for IEEE 802.11 b, g. n/HT20, ax20,
2422MHz~2452MHz for IEEE802.11n/HT40, ax40

Channel No.: 802.11b/802.11g /802.11n (HT20)/802.11ax20: 11
802.11(HT40)/802.11ax40: 7

Modulation type: IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK)

IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK)

IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)

IEEE 802.11ax: OFDMA

(64QAM, 16QAM, QPSK, BPSK, 256QAM, 1024QAM)

Antenna Type: PCB antenna, max gain 4.46dBi

(Antenna information is provided by applicant.)

Radio Technology: 5G WIFI

Operation Frequency: 802.11a/n (HT20)/ac (VHT20)/ax20: 5180~5240MHz; 5260-5320MHz; 5500-5700MHz; 5745~5825MHz

802.11n (HT40)/ac (VHT40)/ax40: 5190~5230MHz; 5270-5310MHz; 5510-5670MHz; 5755~5795MHz

Channel separation: 20MHz for 802.11a/ 802.11ac (VHT20)/ 802.11n (HT20)/ax20
40MHz for 802.11ac (VHT40)/ 802.11n (HT40)/ax40

Modulation technology: IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11ac: OFDM (64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11ax: OFDMA
(64QAM, 16QAM, QPSK, BPSK, 256QAM, 1024QAM)

Antenna Type: PCB antenna, max gain 7.16dBi
(Antenna information is provided by applicant.)

Host manufacturer must perform test of radiated & conducted emission and spurious emission, etc 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 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 circuitry), 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.