PRODUCT SPECIFICATION

L216A-SR

Wi-Fi Dual-band 1x1 11 a/b/g/n + Bluetooth 5.2

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

L216A-SR Module Datasheet

	Part NO.	Description
Ordering Information	FGL216ASRX-01	IW416UK,a/b/g/n Wi-Fi+BT5.2, 1T1R,SDIO3.0+UART, 12x12mm（Industrial）

Target power:

2.4G:16/14/13

5.8G:14/13

CONTENTS

Revision History

Version	Date	Contents of Revision Change	Preparde	Checked	Approved
V1.0	2021/11/23	New version	FC	LXY	QJP
V1.1	2022/03/07	Update weight information	FC	LXY	QJP
V1.2	2022/06/2	Update operating temperature Update packaging details	FC	LXY	QJP
V1.3	2022/11/5	Bluetooth update to 5.2	LXY	LXY	QJP
V1.4	2024/05/20	Delete Part NO -00	LXP	LXY	QJP

1. General Description

1.1 Introduction

L216A-SR module based on NXP IW416 that integrated Wi-Fi 4 and Bluetooth 5.2. Supporting a 1x1 SISO Wi-Fi operation in the 2.4 GHz and the 5 GHz band, provides a full-feature Wi-Fi subsystem with a peak PHY date rate of 150 Mbps. Bluetooth 5.2 capabilities including Low Energy (LE), LE long range, LE 2 Mbps and Periodic Advertising Sync Transfer (PAST).

With two operating temperature ranges of 0 to 70° C and -40 to 85° C. supports a SDIO host interface for the Wi-Fi radio and a UART host interface for Bluetooth radio.

1.2 Description

Model Name	L216A-SR
Product Description	Support Wi-Fi/Bluetooth functionalities
Dimension	L x W x H: 12 x 12 x1.8 mm
Wi-Fi Interface	Support SDIO3.0
BT Interface	UART
OS supported	Android /Linux/ Win CE /iOS /XP/WIN7/WIN10
Operating temperature	-40°C to 85°C (Industrial) 0°C to 70°C (Commercial)
Storage temperature	-40°C to 125°C

2. Features

General

- Support 802.11 a/b/g/n
- Dual band: 2.4 GHz and 5 GHz
- Single stream 802.11n with 20 MHz and 40 MHz channels
- Up to MCS7 data rates (150 Mbps)
- Security: WPA3, WPA2, WPA2-WPA mixed mode
- Independent ARM-based Wi-Fi and Bluetooth CPUs
  - Wi-Fi CPU: 160 MHz clock speed
  - Bluetooth CPU: 128 MHz clock speed

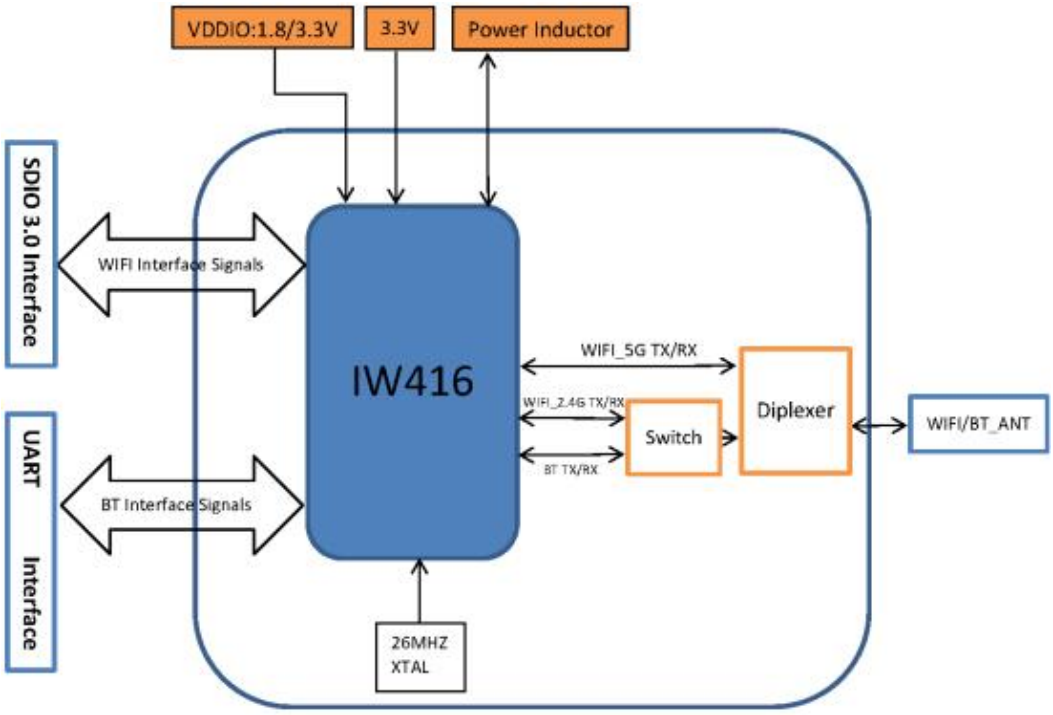
Host Interface

- SDIO 3.0 Interface for WLAN
- UART Interface for Bluetooth
- PCM audio interfaces

Bluetooth Features

- Bluetooth 5.2 compliant
- Long range - 4x coverage
- 2 Mbit/s data rate - 2x faster
- PCM audio interfaces
- AES security
- Supports Bluetooth classic(BDR/EDR)
- Supports Bluetooth Low Energy(BLE)

3. Block Diagram



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	802.11b /11Mbps : 16dBm ± 2 dB	EVM ≤ -10dB
	802.11g /54Mbps : 14dBm ± 2 dB	EVM ≤ -25dB
	802.11n /MCS7 : 13dBm ± 2 dB	EVM ≤ -28dB
Spectrum Mask	Meet with IEEE standard	
Freq. Tolerance	±20ppm	
SISO Receive Sensitivity (11b,20MHz) @8% PER	- 11Mbps PER @ -83 dBm	≤-76
SISO Receive Sensitivity (11g,20MHz) @10% PER	- 54Mbps PER @ -71 dBm	≤-68
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=7 PER @ -68 dBm	≤-67
SISO Receive Sensitivity	- MCS=7, PER @ -66 dBm	≤-64

(11n,40MHz) @10% PER		
Maximum Input Level	802.11b : -8 dBm	
	802.11g/n : -20 dBm	

Note: The Wi-Fi RF specification data will be updated in future version

4.2 5.8GHz WI-FI Specification

Feature	**Description**	
WLAN Standard	IEEE 802.11 a/n, Wi-Fi compliant	
Frequency Range	5.150 GHz ~ 5.850 GHz (5.8 GHz Band)	
Number of Channels	5.8GHz：Please see the table[1]	
Test Items	**Typical Value**	**EVM**
Output Power	802.11a /54Mbps : 14dBm ± 2 dB	EVM ≤ -25dB
	802.11n /MCS7 : 13dBm ± 2 dB	EVM ≤ -28dB
Spectrum Mask	Meet with IEEE standard	
Freq. Tolerance	±20ppm	
SISO Receive Sensitivity (11a,20MHz) @10% PER	- 54Mbps PER @ -71 dBm	≤-68
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=7 PER @ -68 dBm	≤-67
SISO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=7, PER @ -66 dBm	≤-64
Maximum Input Level	802.11b : -8 dBm	
	802.11g/n : -20 dBm	

[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

Note: The Wi-Fi RF specification data will be updated in future version

4.3 Bluetooth Specification

Feature	**Description**		
General Specification			
Bluetooth Standard	Bluetooth V5.2		
Host Interface	UART		
Frequency Band	2400 MHz ~ 2483.5 MHz		
Number of Channels	79 channels for BDR+EDR 40 channels for BLE		
Modulation	GFSK, π/4-DQPSK, 8-DPSK		
RF Specification			
	Min(dBm)	**Typical**(dBm)	**Max**(dBm)
BDR Output Power		8	
BLE Output Power		8	
Sensitivity @ BER=0.1% for GFSK (1Mbps)		-86	
Sensitivity @ BER=0.01% for π/4-DQPSK (2Mbps)		-86	
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)		-80	
Sensitive @PER=30.8% FOR BLE		-90	

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

5. ID setting information

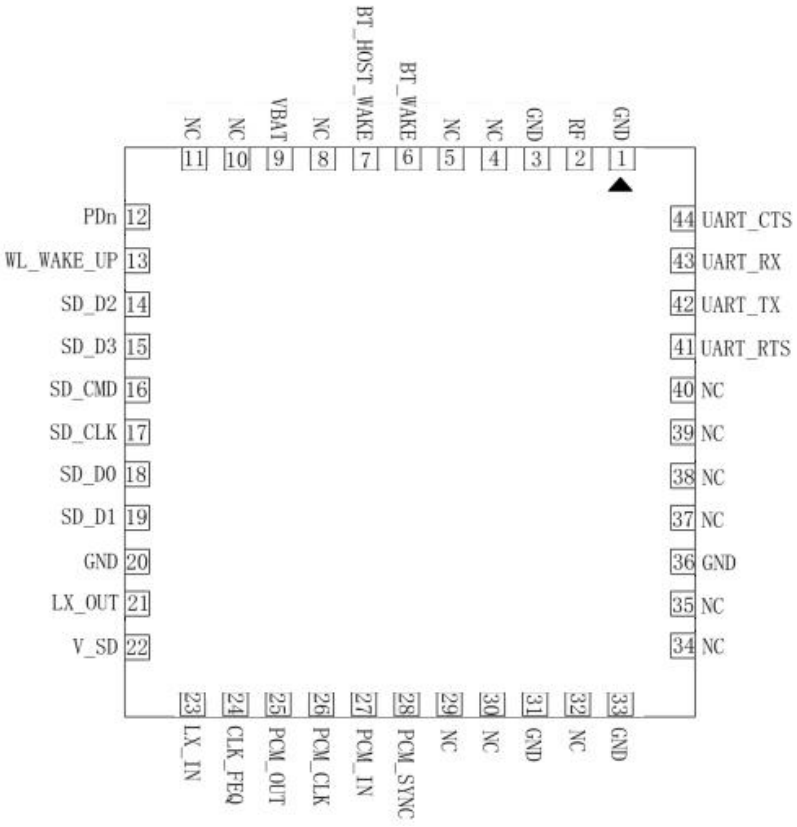
WI-FI

Vendor ID	-
Product ID	-

6. Pin Definition

6.1 Pin Outline

< TOP VIEW >



6.2 Pin Definition details

NO.	Name	Type	Description	Voltage
1	GND		Ground connections	
2	RF	I/O	WIFI/BT ANT	
3	GND		Ground connections	
4	NC		Floating (NC)	
5	NC		Floating (NC)	
6	BT_WAKE	I	Host Wake up BT,GPIO12	3.3V
7	BT_HOST_WAKE	O	BT Wake up Host,GPIO0	3.3V
8	NC		Floating (NC)	
9	VBAT	P	VDD3.3V	3.3V
10	NC		Floating (NC)	
11	NC		Floating (NC)	
12	PDn	I	When the host reboot, this pin should power down (active low),module side default pulled high	3.3V
13	WL_WAKE_UP	O	WLAN to wake up HOST,GPIO1	3.3V
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	GND		Ground connections	
21	LX_OUT		connect with power inductor and capacitors then connect with pin23	
22	V_SD	P	Only control the Voltage of SDIO， Can be 1.8V or 3.3V	1.8V/3.3V
23	LX_IN		DCDC_IN	2.2V
24	CLK_REQ	I	External Low Power Clock input(32.768KHz) (optional)	
25	PCM_OUT	O	PCM Output,GPIO4	3.3V
26	PCM_CLK	I/O	PCM Clock,GPIO6	3.3V
27	PCM_IN	I	PCM Input,GPIO5	3.3V
28	PCM_SYNC	O	PCM Sync,GPIO7	3.3V
29	NC		Floating (NC)	
30	NC		Floating (NC)	
31	GND		Ground connections	

32	NC		Floating (NC)	
33	GND		Ground connections	
34	NC		Floating (NC)	
35	NC		Floating (NC)	
36	GND		Ground connections	
37	NC		Floating (NC)	
38	NC		Floating (NC)	
39	NC		Floating (NC)	
40	NC		Floating (NC)	
41	UART_RTS	O	UART RTS,GPIO11	3.3V
42	UART_TX	O	UART SOUT,GPIO10	3.3V
43	UART_RX	I	UART SIN,GPIO9	3.3V
44	UART_CTS	I	UART CTS,GPIO8	3.3V

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

7. Electrical Specifications

7.1 Power Supply DC Characteristics

	Min.	Typ.	Max.	Unit
Operating Temperature	-40	25	85	℃
VDD	3.15	3.3	3.45	V
VDDIO	1.63	1.8	1.97	V
VDDIO	2.98	3.3	3.46	V

7.2 Power Consumption

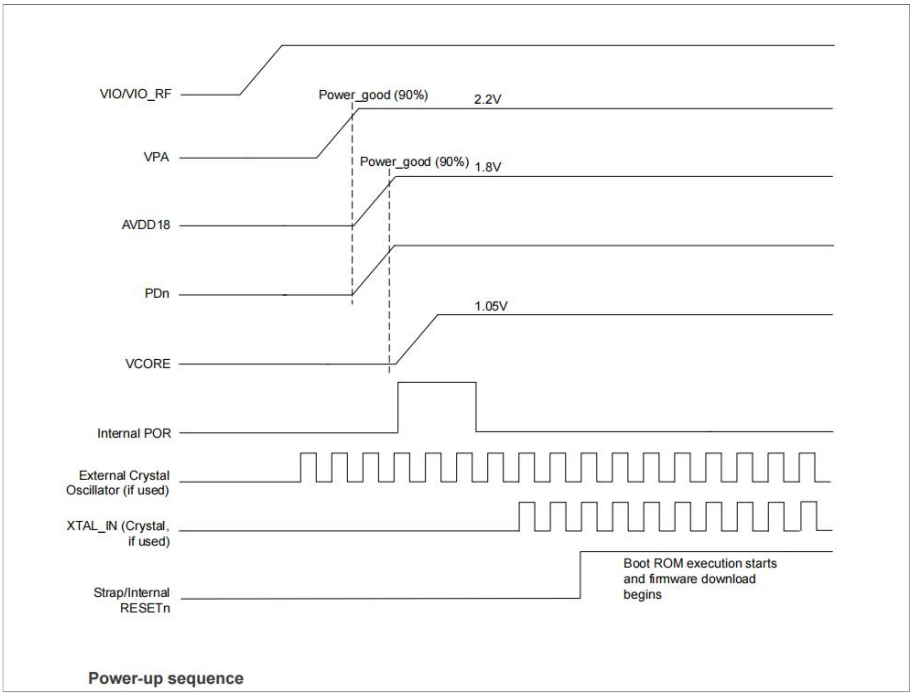
		VCC33 = 3.3V(Unit:mA)
Power Consumption	Wi-Fi on Mode	162
	TX (2.4G 11b)	473
	TX (2.4G HT20)	352
	TX (2.4G HT40)	331
	RX (2.4G HT40)	162

7.3 Interface Circuit time series

7.3.1 Power-up sequence timing

VPA must be good (90%) before AVDD18 starts ramping up.

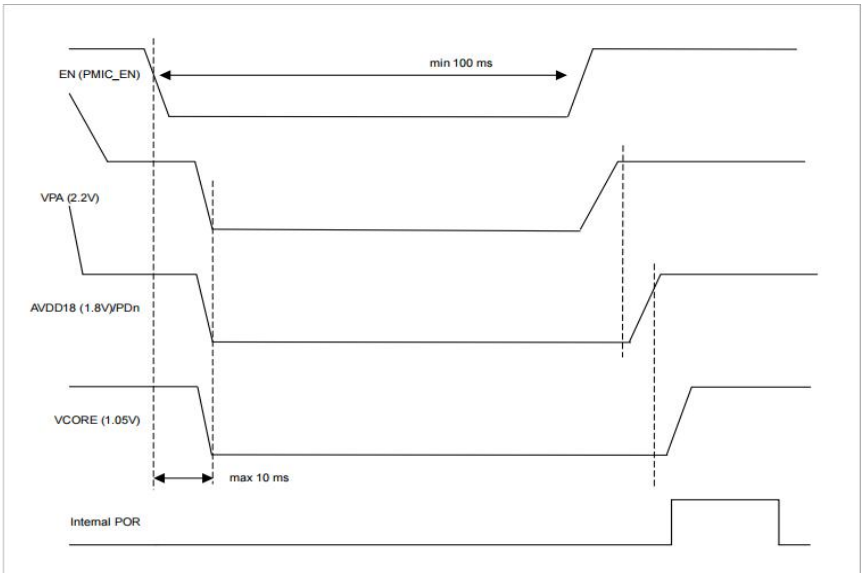
AVDD18 must be good (90%) before VCORE starts ramping up.



Power-up sequence

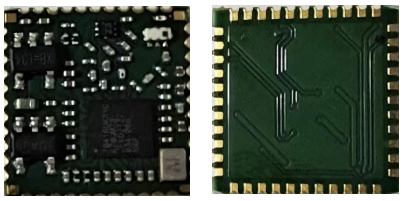
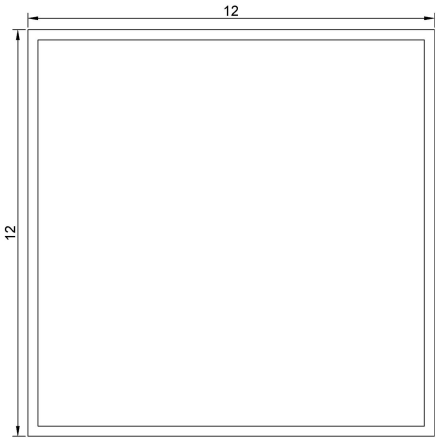
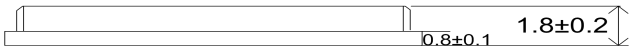
7.3.2 Power-down sequence

The maximum ramp-down time for VCORE from PMIC_EN assertion is 10 ms. PMIC_EN must be asserted a minimum of 100 ms to guarantee that VCORE and AVDD18 are discharged to less than 0.2V for the POR to generate properly after PMIC_EN is deasserted.



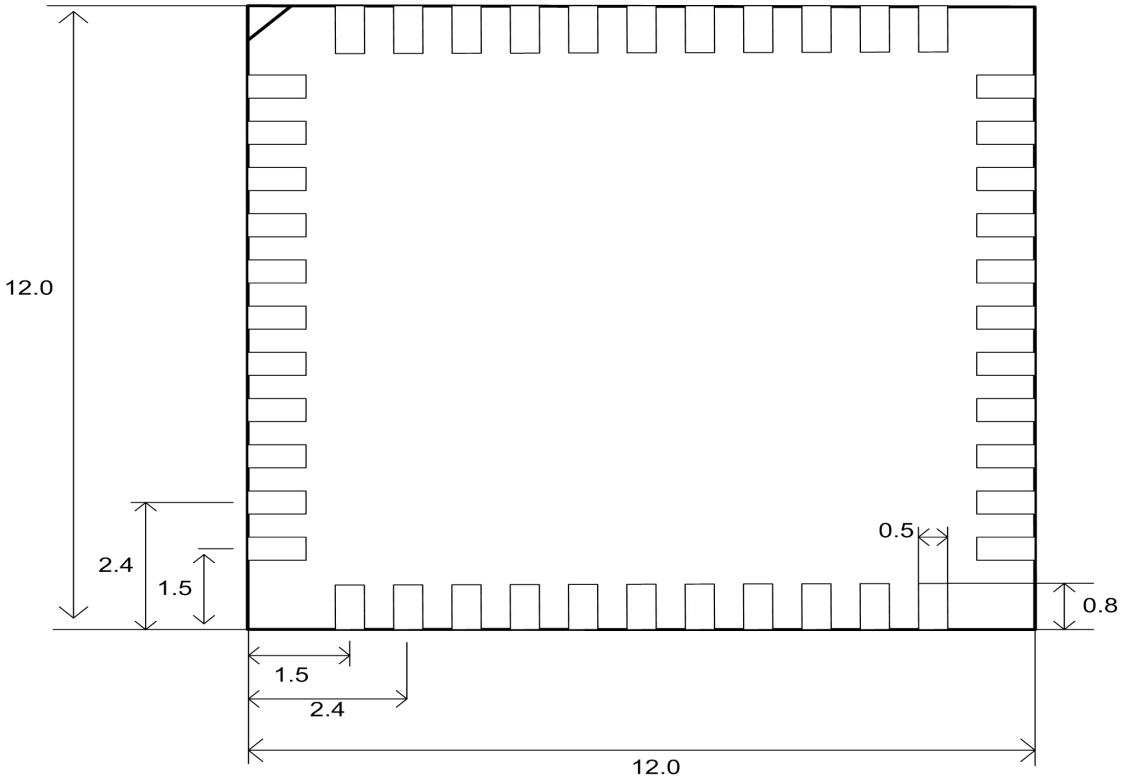
8. Size reference

8.1 Module Picture

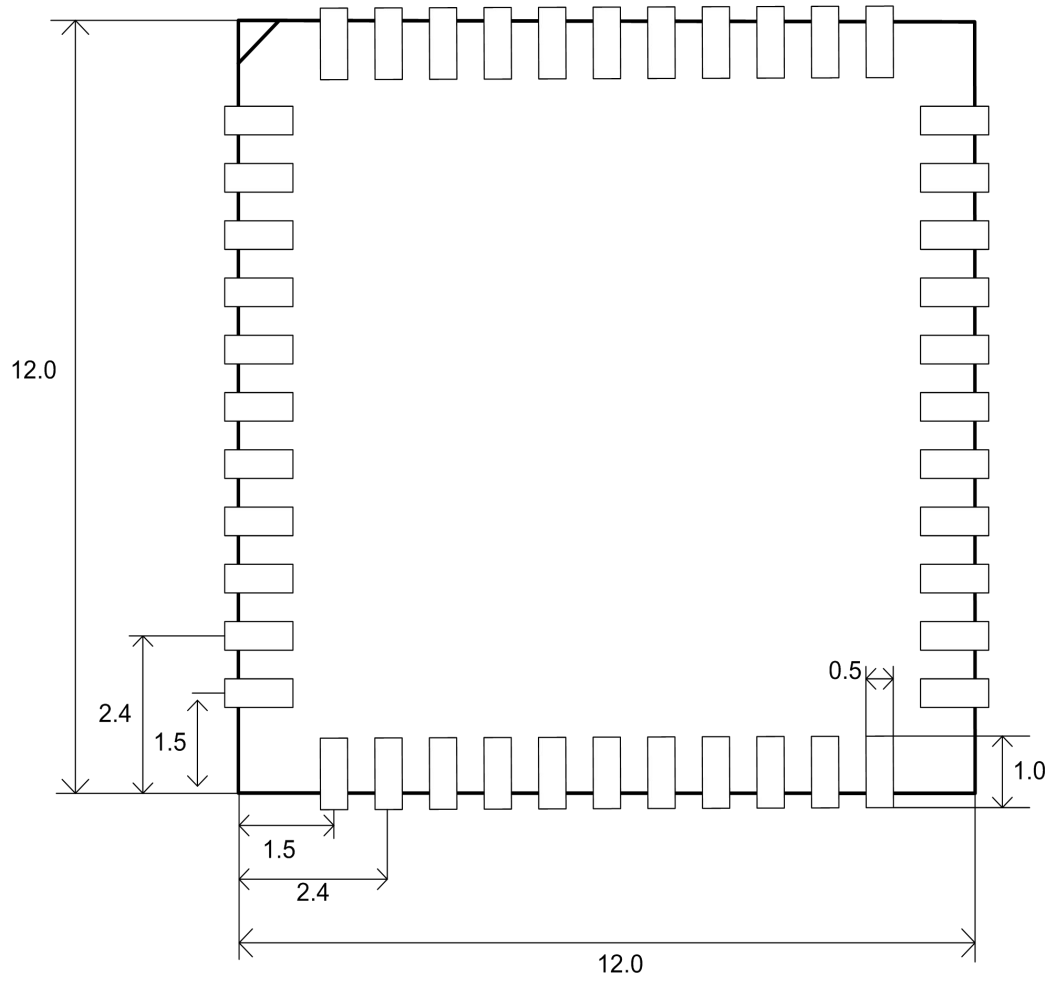
L x W : 12 x 12 (+0.3/-0.1) mm 	
H: 1.8 (±0.2) mm	
Weight	0.437g

8.2 Physical Dimensions

<TOP View>



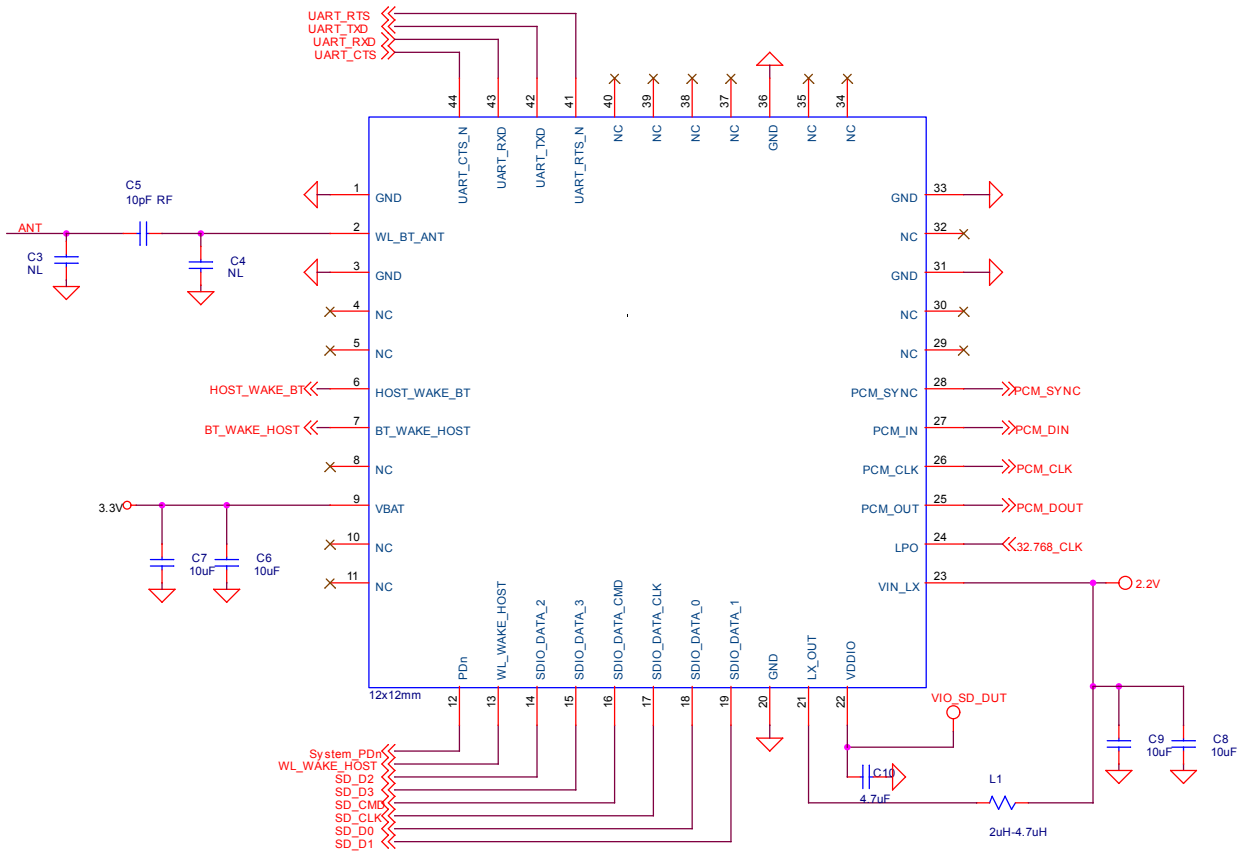
8.3 Layout Recommendation



9. The Key Material List

Chipset	IW416UK,802.11a/b/g/n+BT5.2	NXP
PCB	L216A-SR ,12x12x0.8mm	XY-PCB,KX-PCB,SL-PCB,Sunlord, TRULY
Crystal	2016 26MHz ±10ppm 10pF	TST,HOSONIC,TKD,ECEC,JWT
Diplexer	Diplexer,1608,2.4G+5G	TDK,Walsin,Glead,ACX,Taiyo,MA G.LAYERS,ftrgroup
Switch	0~6Ghz,SPDT switch,1x1mm	Skyworks,Maxscend
DCDC	1.5A,2Mhz,SOT23-5	ETA,XenCreator,Silergy
LDO	600mA,SOT23-5	ETA,XenCreator,LowpowerSEMI

10. Reference Design

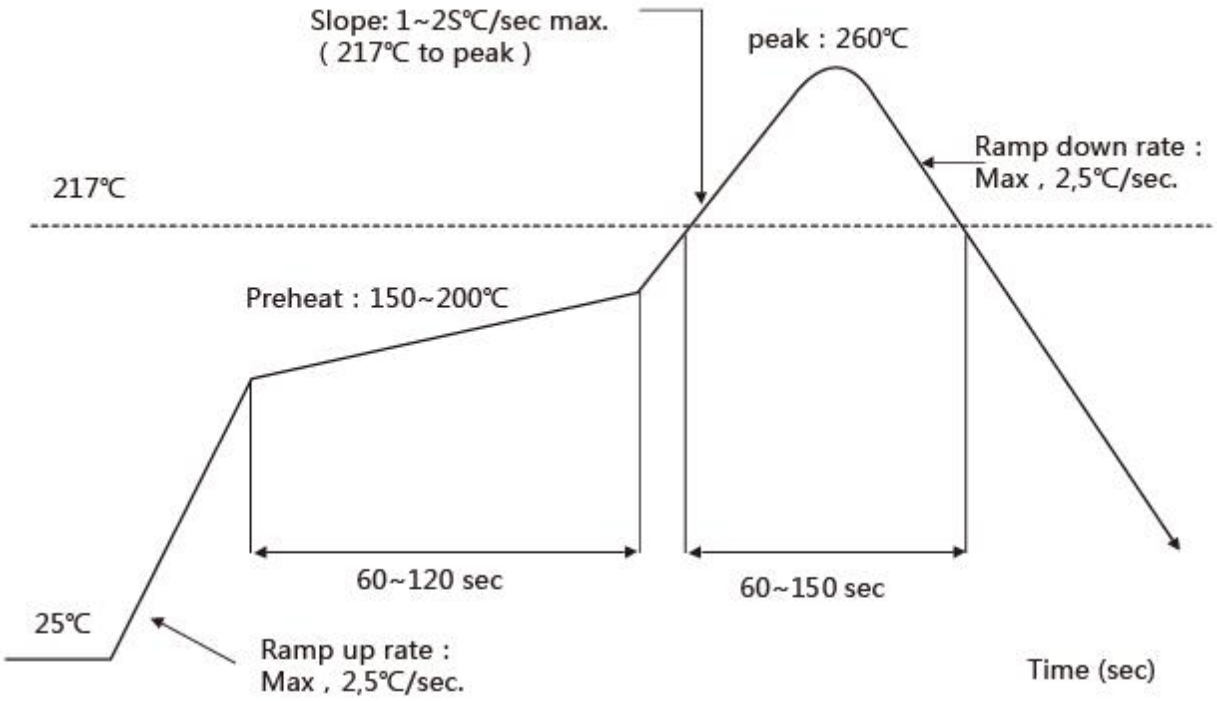


11. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <260°C

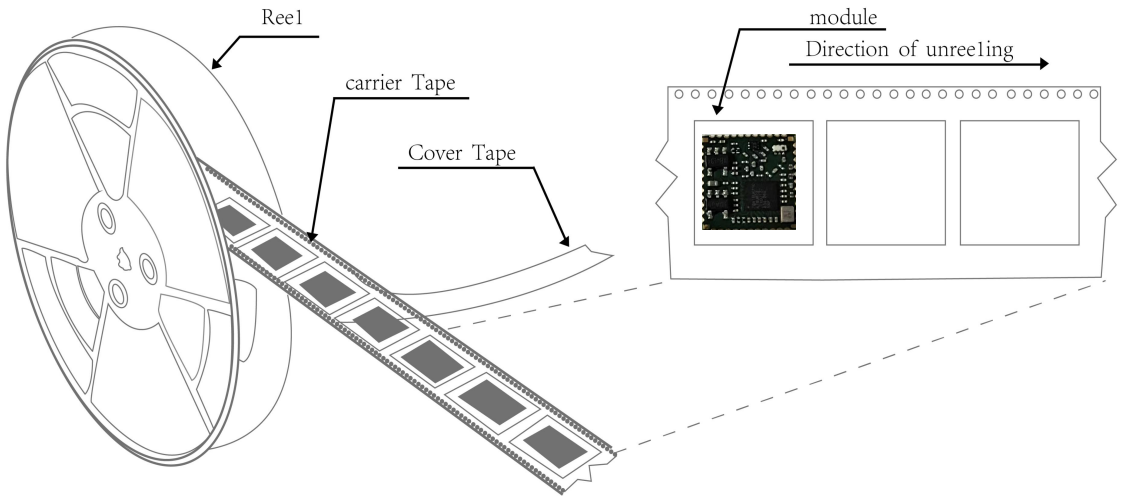
Number of Times : ≤2 times



12. Package

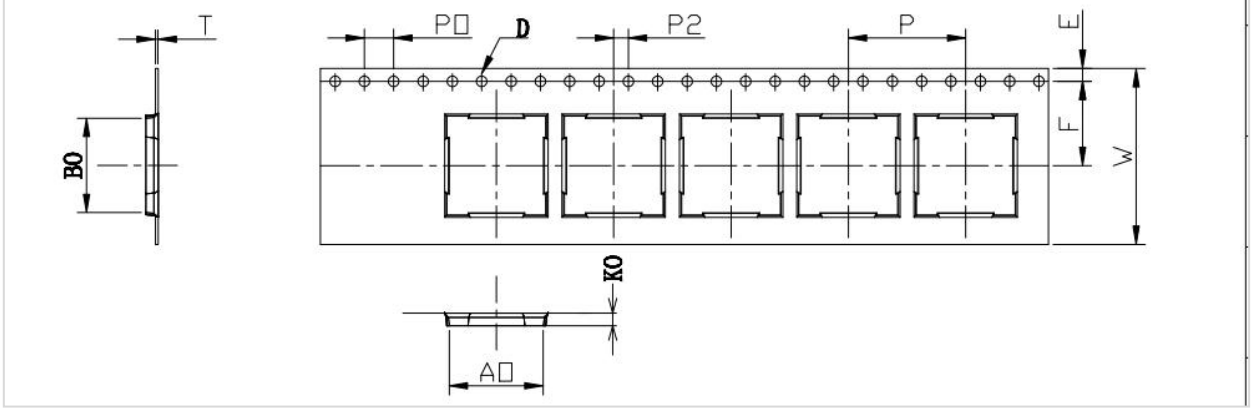
12.1 Reel

A roll of 1500pcs



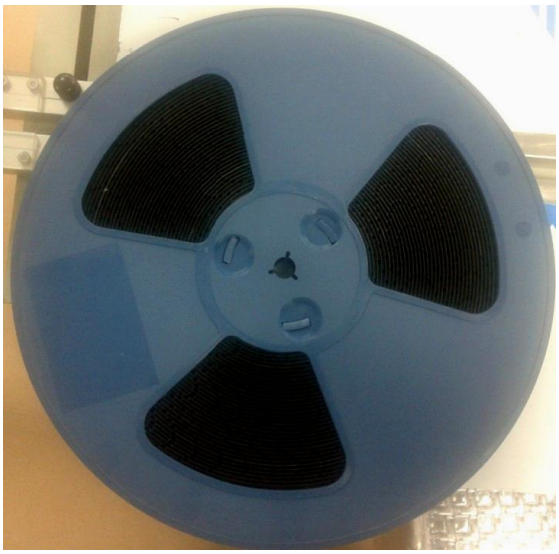
12.2 Carrier Tape Detail

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	+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



12.3 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. 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