WG244 Datasheet

Wi-Fi 6 Dual-band 2T2R + Bluetooth 5.2 SDIO Combo Module

Document information	
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版本历史Revision History

Revision	Description	Approved	Date
V1.01	Initial Release	Allen zhou	20230423
V1.02	Updates the pin definitions and description	Allen zhou	20230718
V1.03	Update Section 6.3 / 6.4 timing description	Allen zhou	20230719

目录

1. General Description

1.1 Introduction

The WG244 is a highly integrated module that support 2-stream 802.11ax solutions with Multi-user MIMO (Multiple-Input, Multiple-Output) with Wireless LAN (WLAN) and integrated Bluetooth 5 SDIO network interface controller. It combines a WLAN MAC, a 2T2R capable WLAN baseband, and RF in a single chip. The WG244 provides a complete solution for a high-performance integrated wireless and Bluetooth device.

This compact module is a total solution for a combination of Wi-Fi + BT technologies. The module is specifically developed for Smart phones and Portable devices.

Figure 1: WG 244 product diagram

1.2 Description

Model Name	WG244
Product Description	Support Wi-Fi/Bluetooth functionalities
Dimension	L x W x H: 13 x 15 x 1.8 mm
Wi-Fi Interface	SDIO
BT Interface	SDIO
OS supported	Android /Linux/ iOS /WIN10
Operating temperature	- 30°C to 70°C
Storage temperature	-40°C to 85°C

2. Features

General

- Support 802. 11ac 2x2,Wave-2 compliant with RX MU-MIMO
- Backward compatible with 802. 11a/n/ac devices while operating at 802. 11ax data rates.
- IEEE 802. 11a/b/g/n/ac/ax compatible WLAN
- IEEE 802. 11i (WPA, WPA2, WPA3). Open, shared key, and pair-wise key authentication services
- IEEE 802. 11ax MIMO OFDM/OFDMA,IEEE 802. 11ac MIMO OFDM,IEEE 802. 11n MIMO OFDM

PHY Features

- CMOS MAC, Baseband PHY and RF in a single chip for IEEE 802. 11a/b/g/n/ac/ax compatible

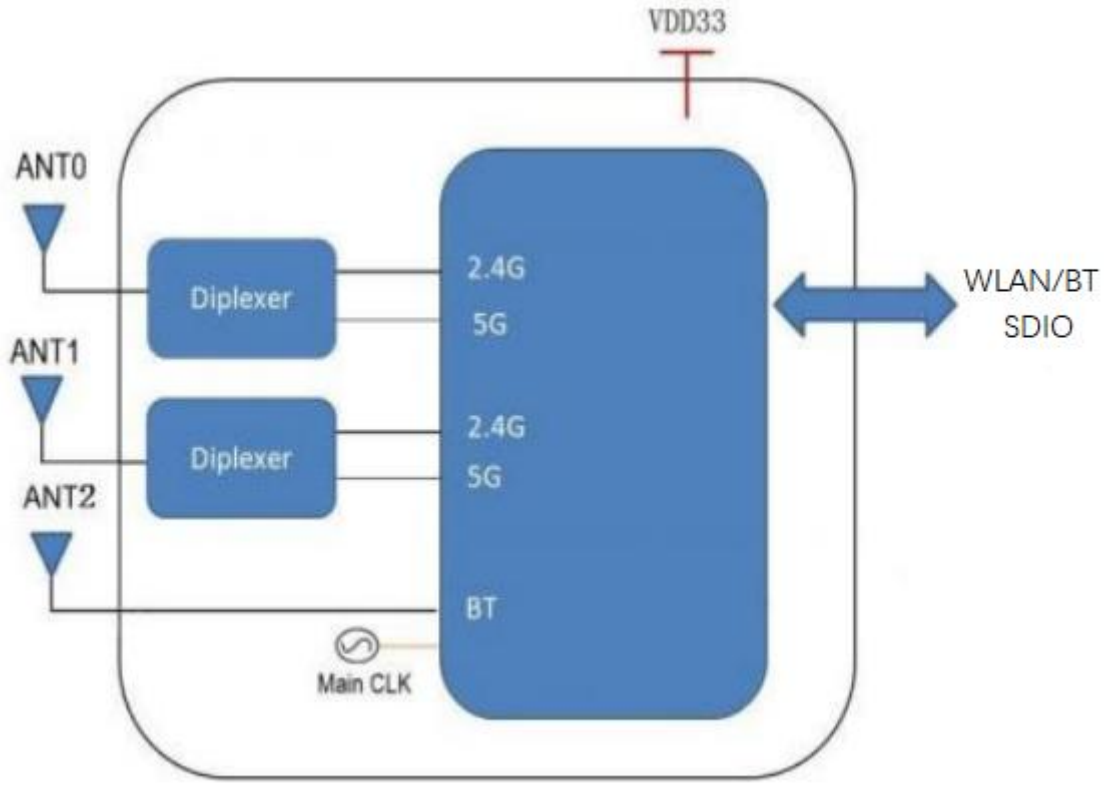
WLAN

- Maximum PHY data rate up to 286.8Mbps using 20MHz bandwidth, 573.5Mbps using 40MHz bandwidth, and 1201Mbps using 80MHz bandwidth

Bluetooth Features

- Complies with SDIO for WLAN and BT controller
- Compatible with Bluetooth v2. 1+EDR
- Support Bluetooth 5system (BT 5.2 Logo Compliant)
- Dual Mode support: Simultaneous LE and BR/EDR

3. Block Diagram



4. General Specification

4.1 2.4GHz RF 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)	
Number of Channels	2.4GHz：Ch 1 ~ Ch 14	
Test Items	Typical Value	EVM
Output Power	802.11b /11Mbps：19dBm ± 2 dB	EVM ≤ - 10dB
	802.11g /54Mbps：18dBm ± 2 dB	EVM ≤ -25dB
	802.11n /MCS7：17dBm ± 2 dB	EVM ≤ -28dB
	802.11ac VHT20/MCS8：16dBm ± 2 dB	EVM ≤ -30dB
	802.11ac VHT40/MCS9：15dBm ± 2 dB	EVM ≤ -32dB
	802.11ax HE20/MCS11：13dBm ± 2 dB	EVM ≤ -35dB
	802.11ax HE40/MCS11：13dBm ± 2 dB	EVM ≤ -35dB
Spectrum Mask	Meet with IEEE standard	
Freq. Tolerance	±20ppm	
SISO Receive Sensitivity (11b,20MHz) @8% PER	-1Mbps PER @ -94dBm	≤ -83
	- 11Mbps PER @ -85dBm	≤ -76
SISO Receive Sensitivity (11g,20MHz) @10% PER	-6Mbps PER @ -90dBm	≤ -85
	-54Mbps PER @ -71dBm	≤ -68
SISO Receive Sensitivity (11n,20MHz) @10% PER	-MCS=0, PER @ -90dBm	≤ -85
	-MCS=7, PER @ -69dBm	≤ -67
SISO Receive Sensitivity (11n,40MHz) @10% PER	-MCS=0, PER @ -87dBm	≤ -82
	-MCS=7, PER @ -66dBm	≤ -64
SISO Receive Sensitivity (11ac,20MHz) @10% PER	-MCS=0, PER @ -90dBm	≤ -85
	-MCS=8, PER @ -64dBm	≤ -62
SISO Receive Sensitivity (11ac,40MHz) @10% PER	-MCS=0, PER @ -87dBm	≤ -82
	-MCS=9, PER @ -59dBm	≤ -57
SISO Receive Sensitivity (11ax,20MHz) @10% PER	-MCS=0, PER @ -90dBm	≤ -85
	-MCS= 11, PER @ -60dBm	≤ -55
SISO Receive Sensitivity (11ax,40MHz) @10% PER	-MCS=0, PER @ -87dBm	≤ -82
	-MCS= 11, PER @ -57dBm	≤ -52
Maximum Input Level	802. 11b : - 10dBm	
	802. 11g/n : -20dBm	
Antenna Reference	Small antennas with 0~2dBi peak gain	

Note: The RF specification will be updated in future version

4.2 5GHz RF 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: 18 ± 2dBm	EVM ≤ -25dB
	802. 11n MCS7: 17 ±2dBm	EVM ≤ -28dB
	802. 11ac VHT20/MCS8: 16dBm ± 2 dB	EVM ≤ -30dB
	802. 11ac VHT40/MCS9: 15dBm ± 2 dB	EVM ≤ -32dB
	802. 11ac VHT80/MCS9: 15dBm ± 2 dB	EVM ≤ -32dB
	802. 11ax VHT20/MCS11: 13dBm ± 2 dB	EVM ≤ -35dB
	802. 11ax VHT40/MCS11: 13dBm ± 2 dB	EVM ≤ -35dB
	802. 11ax VHT80/MCS11: 13dBm ± 2 dB	EVM ≤ -35dB
Receive Sensitivity (11a,20MHz) @10% PER	-6Mbps PER @ -89dBm, typical	≤ -85
	-54Mbps PER @ -71dBm, typical	≤ -68
Receive Sensitivity (11n,20MHz) @10% PER	-MCS=0 PER @ -89dBm, typical	≤ -85
	-MCS=7 PER @ -69dBm, typical	≤ -67
Receive Sensitivity (11n,40MHz) @10% PER	-MCS=0 PER @ -87dBm, typical	≤ -82
	-MCS=7 PER @ -67dBm, typical	≤ -64
Receive Sensitivity (11ac,20MHz) @10% PER	-MCS=0 PER @ -90dBm, typical	≤ -85
	-MCS=8 PER @ -66dBm, typical	≤ -62
Receive Sensitivity (11ac,40MHz) @10% PER	-MCS=0 PER @ -87dBm, typical	≤ -82
	-MCS=9 PER @ -63dBm, typical	≤ -57
Receive Sensitivity (11ac,80MHz) @10% PER	-MCS=0 PER @ -84dBm, typical	≤ -79
	-MCS=9 PER @ -62dBm, typical	≤ -54
Receive Sensitivity (11ax,20MHz) @10% PER	-MCS=0 PER @ -90dBm, typical	≤ -85
	-MCS= 11 PER @ -60dBm, typical	≤ -55
Receive Sensitivity (11ax,40MHz) @10% PER	-MCS=0 PER @ -87dBm, typical	≤ -82
	-MCS= 11 PER @ -57dBm, typical	≤ -52
Receive Sensitivity (11ax,80MHz) @10% PER	-MCS=0 PER @ -84dBm, typical	≤ -79
	-MCS= 11 PER @ -54dBm, typical	≤ -49
Maximum input level	802. 11a/n: -30dBm	
	802. 11ac: -30dBm	
	802. 11ax: -30dBm	
Antenna Reference	Small antennas with 0~2dBi peak gain	

4.3 Bluetooth Specification

Feature	Description		
General Specification			
Bluetooth Standard	Bluetooth V5.2 of 1, 2 and 3Mbps.		
Host Interface	SDIO		
Antenna Reference	Small antennas with 0~2dBi peak gain		
Frequency Band	2402 MHz ~ 2480 MHz		
Number of Channels	79 channels		
Modulation	GFSK, π/4-DQPSK, 8-DPSK		
RF Specification			
	Min(dBm)	Typical(dBm)	Max(dBm)
Output Power (Class 1)	2	5	8
Sensitivity @ BER=0. 1% for GFSK (1Mbps)		-82	
Sensitivity @ BER=0.01% for π/4-DQPSK (2Mbps)		-80	
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)		-80	
Maximum Input Level	GFSK (1Mbps)：-20dBm		
	π/4-DQPSK (2Mbps)：-20dBm		
	8DPSK (3Mbps)：-20dBm		

Note: The RF specification will be updated in future version

5. ID setting information

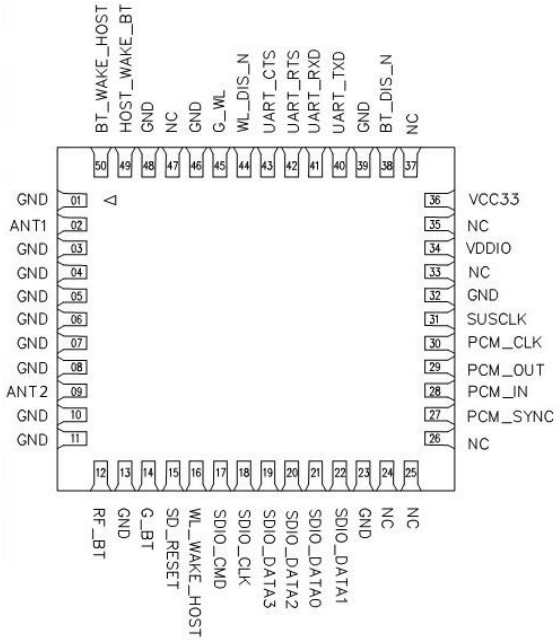
WI-FI

Vendor ID	0BDA
Product ID	A85B

6. Pin Definition

6.1 Pin Outline

< TOP VIEW >



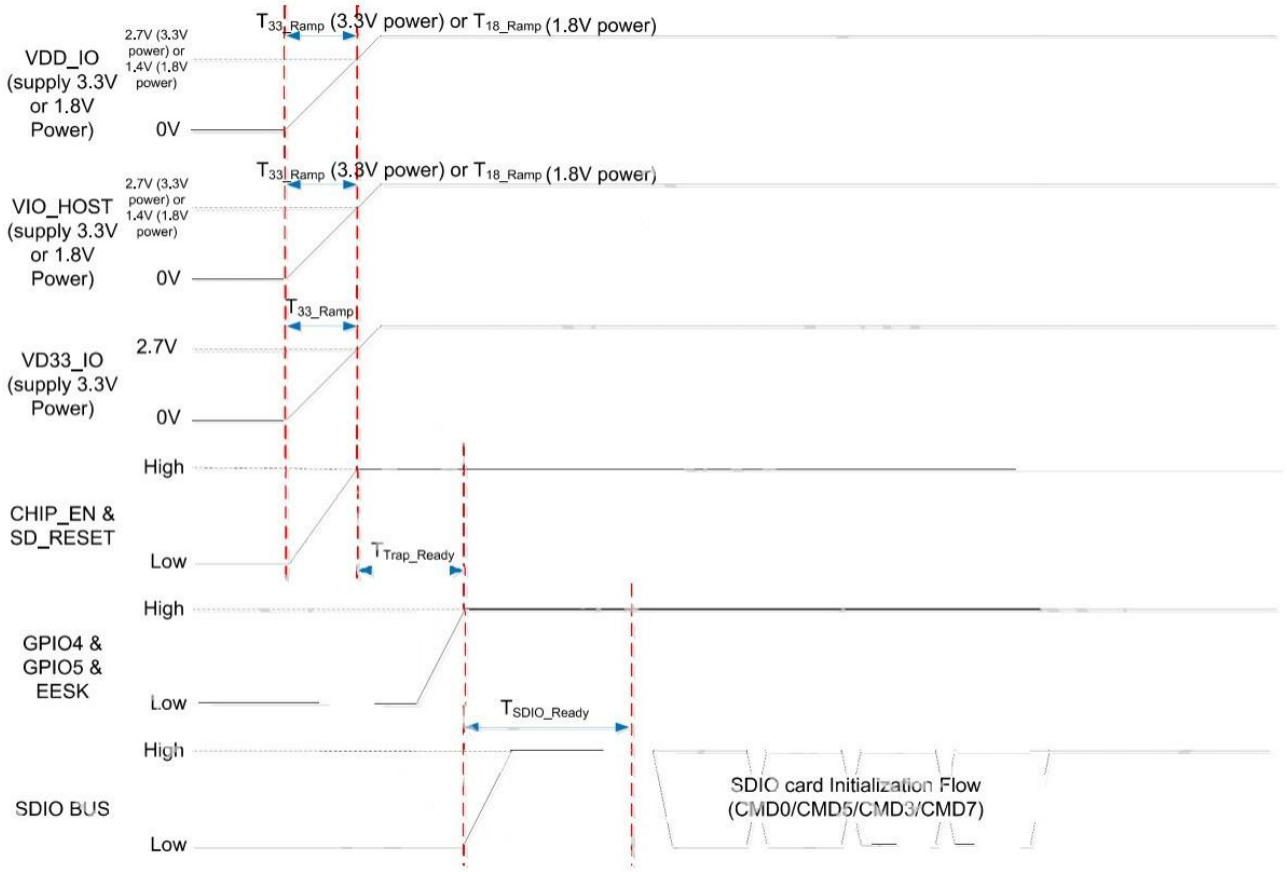
6.2 Pin Definition details

NO.	Name	Type	Description	Voltage
1	GND		Ground connections	
2	ANT1	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	ANT2	I/O	RF I/O port chain0, dual band Wi-Fi	
10	GND		Ground connections	
11	GND		Ground connections	
12	RF_BT		Reserved for BT RF I/O port, used only by the 3rd antenna functionary	
13	GND			
14	G_BT		GPIO5. G_BT If not used keep NC. Do not connect to GND.	
15	SD_RESET	I	Reset Pin for SDIO interface ON: pull high; OFF: pull low Low for disable SDIO interface	
16	WL_WAKE_HOST	O	GPIO10.	

			WLAN to wake-up HOST	
17	SDIO_CMD		SDIO command line	
18	SDIO_CLK		SDIO clock line	
19	SDIO_DATA3		SDIO data line 3	
20	SDIO_DATA2		SDIO data line 2	
21	SD_DATA0		SDIO Data line 0	
22	SD_DATA1		SDIO data line 1	
23	GND		Ground connections	
24	NC		Floating (NC)	
25	NC		Floating (NC)	
26	NC		Floating (NC)	
27	PCM_SYNC		PCM sync signal	
28	PCM_IN		PCM data input	
29	PCM_OUT		PCM Data output	
30	PCM_CLK		PCM clock	
31	SUSCLK		External Low Power Clock input (32.768KHz) If not used keep NC	
32	GND		Ground connections	
33	NC		Floating (NC)	
34	VDDIO		I/O Voltage supply input 1.8V or 3.3V	
35	NC		Floating (NC)	
36	VDD33	P	Main power voltage source input 3.3V	3.3V
37	NC		Floating (NC)	
38	BT_DIS_N		Enable pin for Bluetooth device ON: pull high; OFF: pull low External pull low to shut down BT	
39	GND		Ground connections	
40	UART_TXD		Bluetooth UART interface	
41	UART_RXD		Bluetooth UART interface	
42	UART_RTS		Bluetooth UART interface	
43	UART_CTS		Bluetooth UART interface	
44	WL_DIS_N			
45	G_WL		GPIO4, G_WL If not used keep NC.	

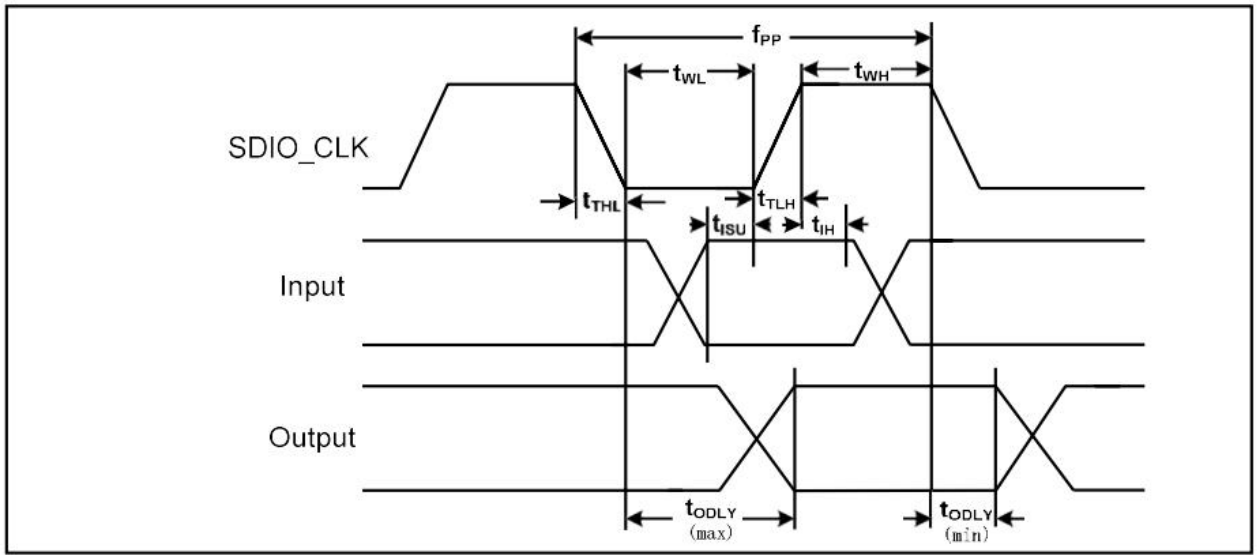
			Do not pull high on this pin.	
46	GND		Ground connections	
47	NC		Floating (NC)	
48	GND		Ground connections	
49	HOST_WAKE_BT	I	HOST wake-up Bluetooth device	VDDIO
50	BT_WAKE_HOST	O	Bluetooth device to wake-up HOST	VDDIO

6.3 Power on sequence



	Min.	Typical	Max.	Unit	Description
T18_Ramp	0.5	1.5	5	ms	The 1.8V power ramp up duration.
T33_Ramp	0.5	1.5	5	ms	The 3.3V power ramp up duration.
TTrap_Ready	400	500	X	ms	WLAN eFuse autoload. TTrap_Ready = 500ms (Typical)
TSDIO_Ready	10	20	X	ms	SDIO Not Ready Duration. In this state, the RTL8852BS may respond to commands without the ready bit being set. After the ready bit is set, the host will initiate complete card detection procedure.

6.4 SDIO Default Mode Timing Diagram



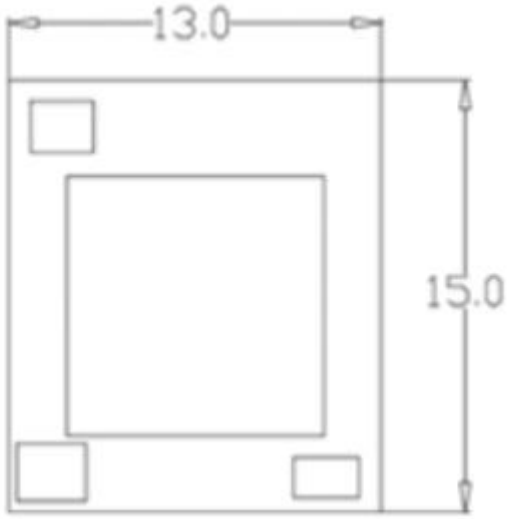
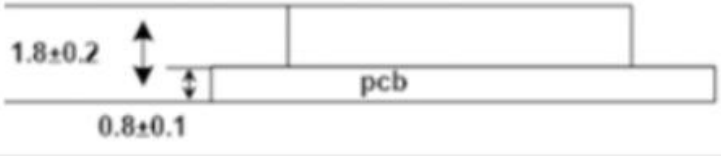
Parameter	Symbol	Min	Typical	Max	Unit
SDIO CLK(All values are referred to minimum VIH and maximum VIL[b])					
Frequency - Data Transfer mode	f_{PP}	0	-	25	MHz
Frequency - Identification mode	f_{OD}	0	-	400	kHz
Clock low time	t_{WL}	10	-	-	ns
Clock high time	t_{WH}	10	-	-	ns
Clock rise time	t_{TLH}	-	-	10	ns
Clock low time	t_{THL}	-	-	10	ns
Inputs:CMD, DAT(referenced to CLK)					
Input setup time	t_{ISU}	5	-	-	ns
Input hold time	t_{IH}	5	-	-	ns
Outputs:CMD, DAT(referenced to CLK)					
Output delay time - Data Transfer mode	t_{ODLY}	0	-	14	ns
Output delay time - Identification mode	t_{ODLY}	0	-	50	ns

a. Timing is based on CL ⩽ 40 pF load on CMD and Data.

b. Min(Vih) = 0.7 × VDDIO and max(Vil) = 0.2 × VDDIO.

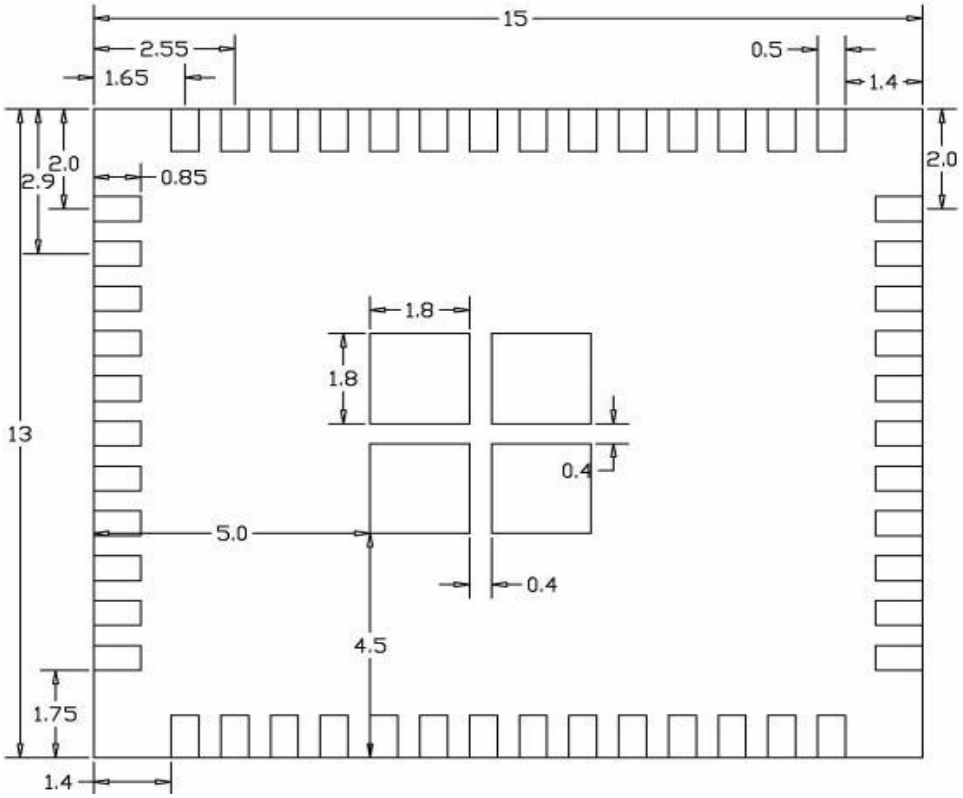
7. Size reference

7.1 Module Picture

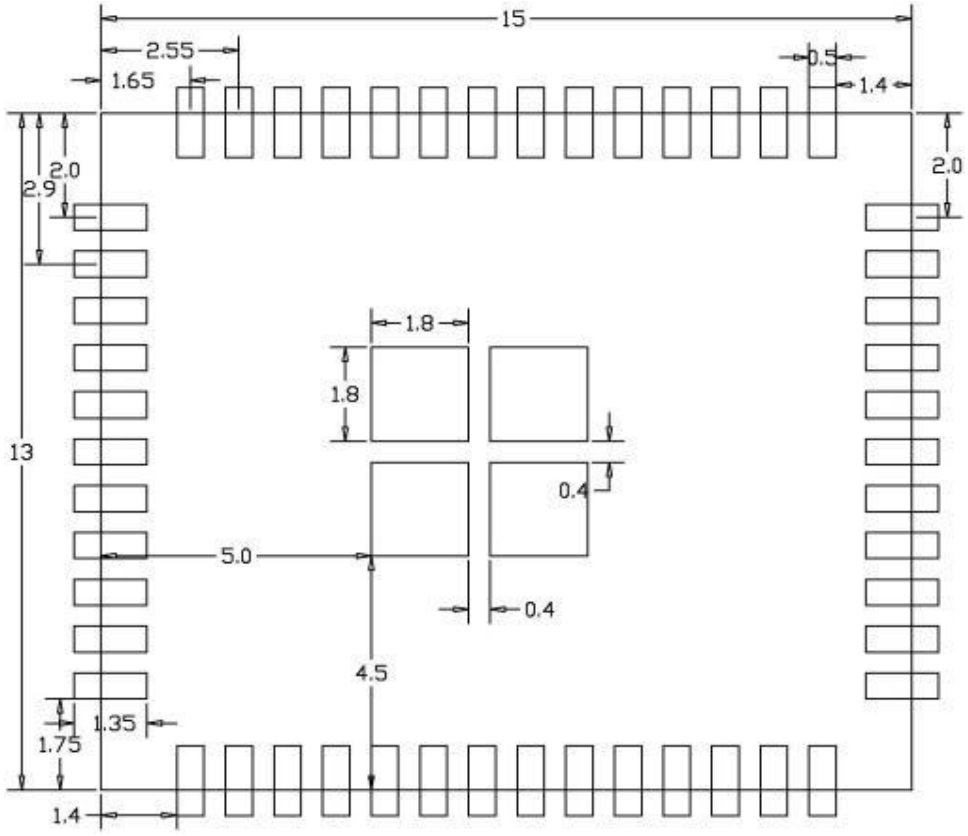
L x W : 13 x 15 (+0.3/-0.1) mm	
H:1.8 (±0.2) mm	
Weight	0.91g

7.2 Physical Dimensions

<TOP View>



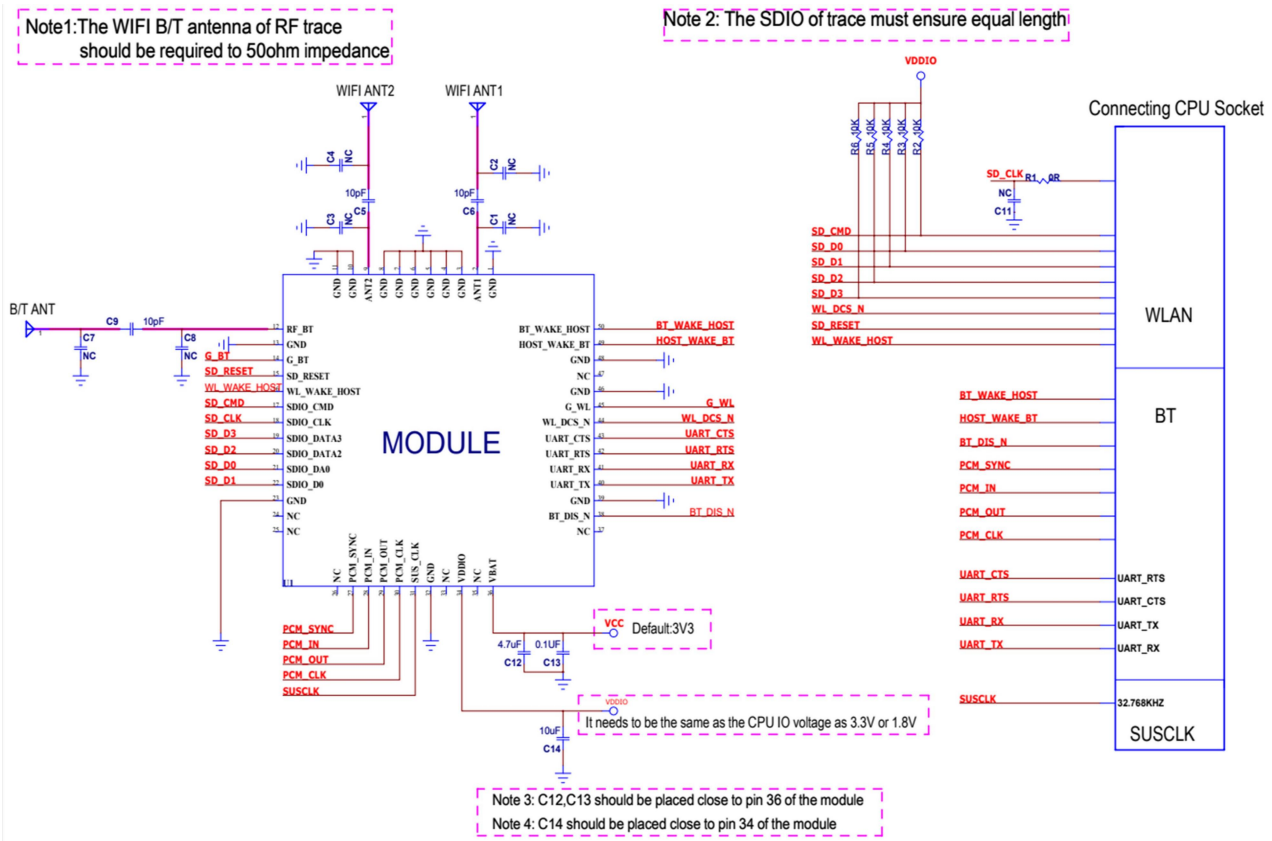
7.3 Layout Recommendation



8. The Key Material List

Item	Part Name	Description	Manufacturer
1	PCB	WG244 深绿色,4L, 15X13X0.8mm	XY-PCB , GDKX , Sunlord , SLPCB KX-PCB,
2	Crystal	2016 40MHz ±10ppm 12pF	ECEC, Hosonic, TKD , JWT
3	Chipset	WG244 QFN-76	Realtek
4	Shielding	WG244 Shielding	信太，精力通

9.Reference Design



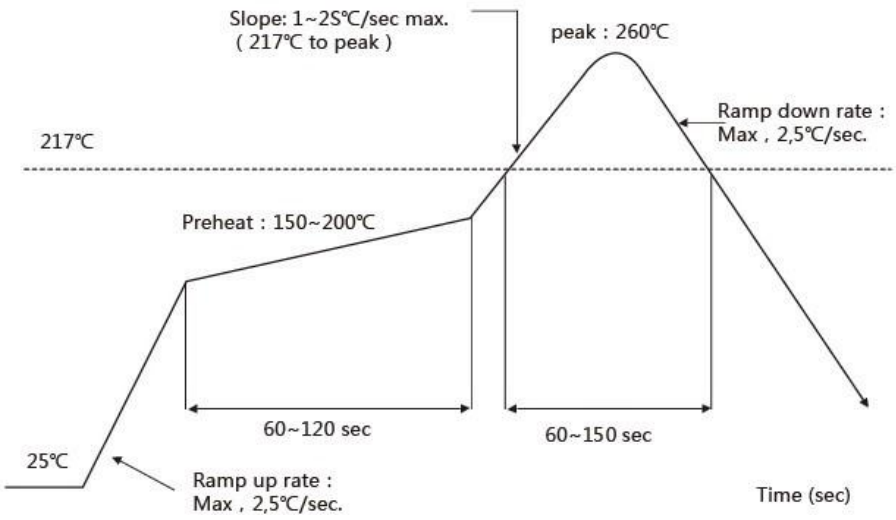
10. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <260℃

Time within 5℃ of peak temperature：≥10s

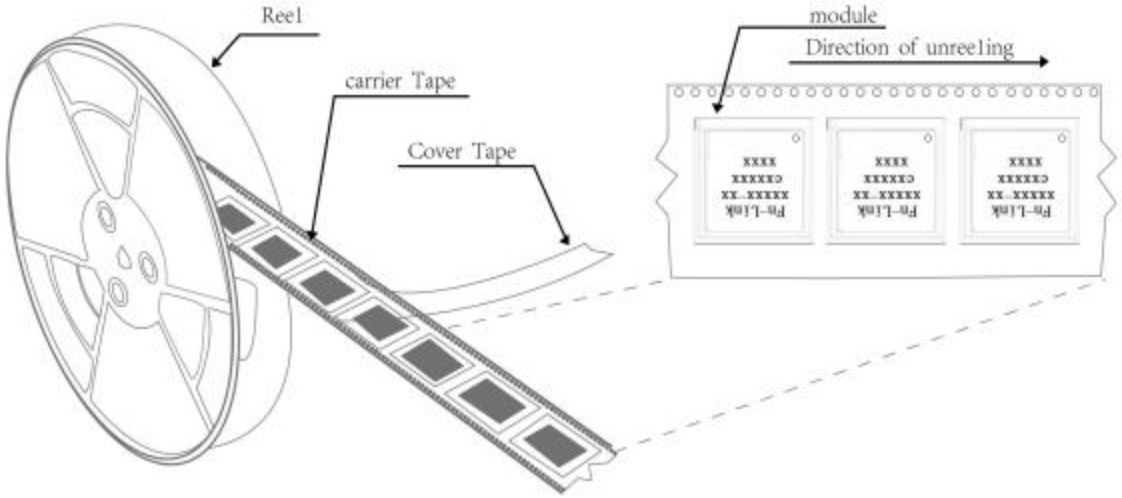
Number of Times： ≤2 times



11. Package

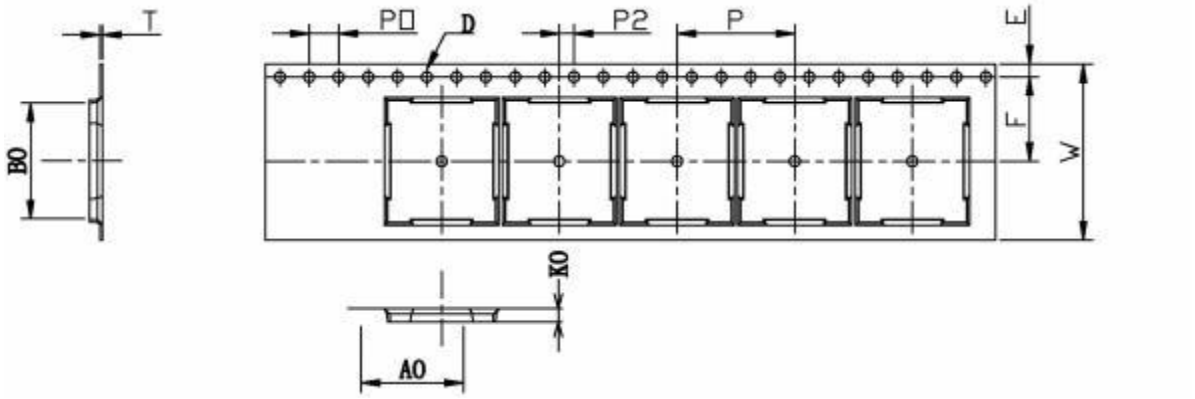
11.1 Reel

A roll of 1500pcs



11.2 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



11.3 Packaging Detail

the take-up package

Using self-adhesive tape

Size of black tape： 24mm*24.4m 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

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

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

13. Contact Information

深圳市天工测控技术有限公司

Skylab M&C Technology Co., Ltd.

地址：深圳龙华区工业东路利金城科技工业园9栋6楼

Address: 6 Floor, No.9 Building, Lijincheng Scientific & Technical park, Gongye East Road, Longhua District, Shenzhen, Guangdong, China

业务电话：Sales Phone: 86-755 8340 8210

技术电话：Technical Phone: 86-755 8340 8510

传真Fax：86-755-8340 8560

邮箱E-Mai：sales1@skylab.com.cn

网址Website：www.skylab.com.cn www.skylabmodule.com