

WG243 Datasheet

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

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1. General Description

1.1 Introduction

The WG243 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 USB network interface controller. It combines a WLAN MAC, a 2T2R capable WLAN baseband, and RF in a single chip. The RTL8852BU-VS-CG 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.

1.2 Description

Model Name	WG243
Product Description	Support Wi-Fi/Bluetooth functionalities
Dimension	L x W x H: 13 x 15 x 2.3 mm
Wi-Fi Interface	Support USB 2.0/ USB 3.0
BT Interface	USB 2.0/ USB 3.0
OS supported	Android /Linux/ iOS /WIN10
Operating temperature	- 10°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

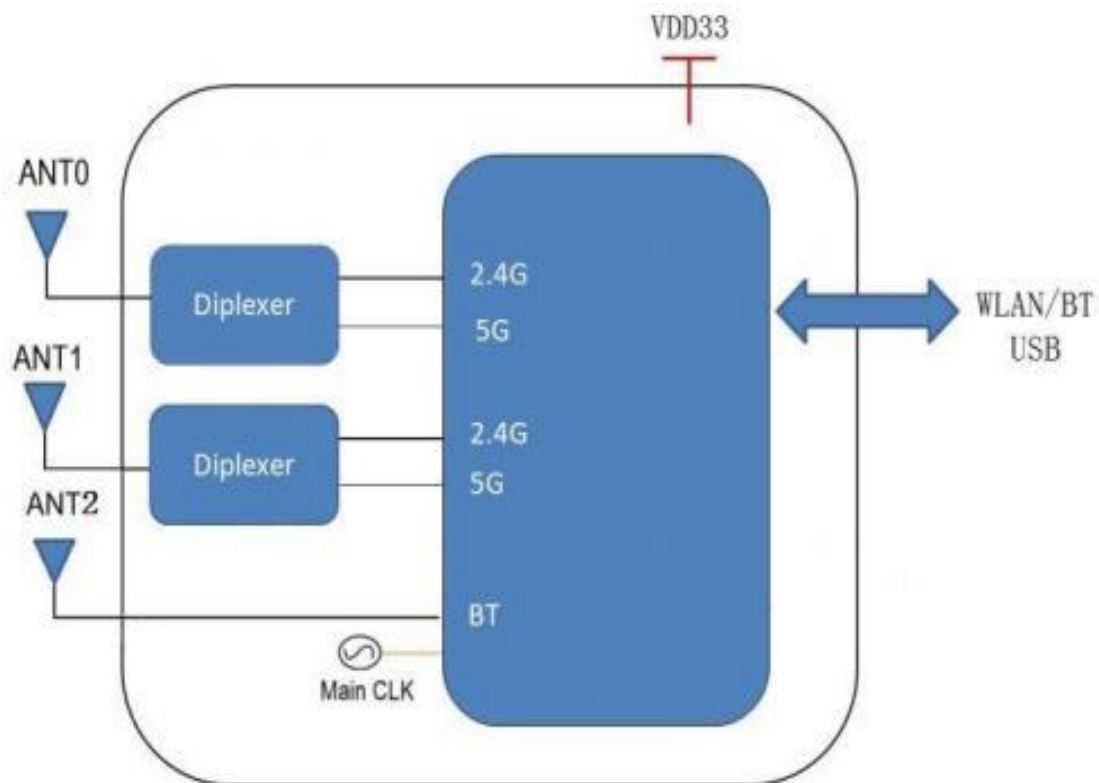
WLAN

- ◆ 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 USB 2.0/ USB 3.0 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 $\pm$ 2 dB	EVM $\leq$ -10dB
	802.11g /54Mbps: 18dBm $\pm$ 2 dB	EVM $\leq$ -25dB
	802.11n /MCS7: 17dBm $\pm$ 2 dB	EVM $\leq$ -28dB
	802.11ac VHT20/MCS8: 16dBm $\pm$ 2 dB	EVM $\leq$ -30dB
	802.11ac VHT40/MCS9: 15dBm $\pm$ 2 dB	EVM $\leq$ -32dB
	802.11ax HE20/MCS11: 13dBm $\pm$ 2 dB	EVM $\leq$ -35dB
	802.11ax HE40/MCS11: 13dBm $\pm$ 2 dB	EVM $\leq$ -35dB
Spectrum Mask	Meet with IEEE standard	
Freq. Tolerance	$\pm$ 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	-6Mbps PER @ -89dBm, typical	≤ -85

(11a,20MHz) @10% PER	-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	USB		
Antenna Reference	Small antennas with 0~2dBi 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)	2	5	8

Sensitivity @ BER=0. 1% for GFSK (1Mbps)		-82	
Sensitivity @ BER=0.01% for $\pi/4$ -DQPSK (2Mbps)		-80	
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)		-80	
Maximum Input Level	GFSK (1Mbps): -20dBm		
	$\pi/4$ -DQPSK (2Mbps): -20dBm		
	8DPSK (3Mbps): -20dBm		

Note: The RF specification will be updated in future version

5. ID setting information

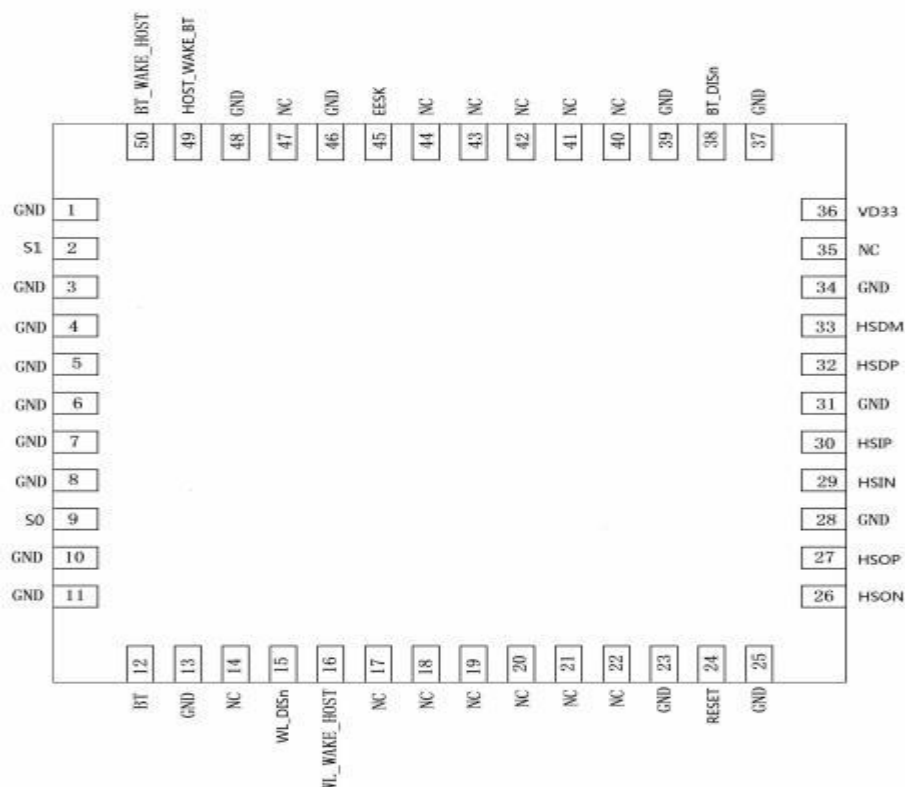
WI-FI

Vendor ID	0BDA
Product ID	A85B

6. Pin Definition

6.1 Pin Outline

< TOP VIEW >

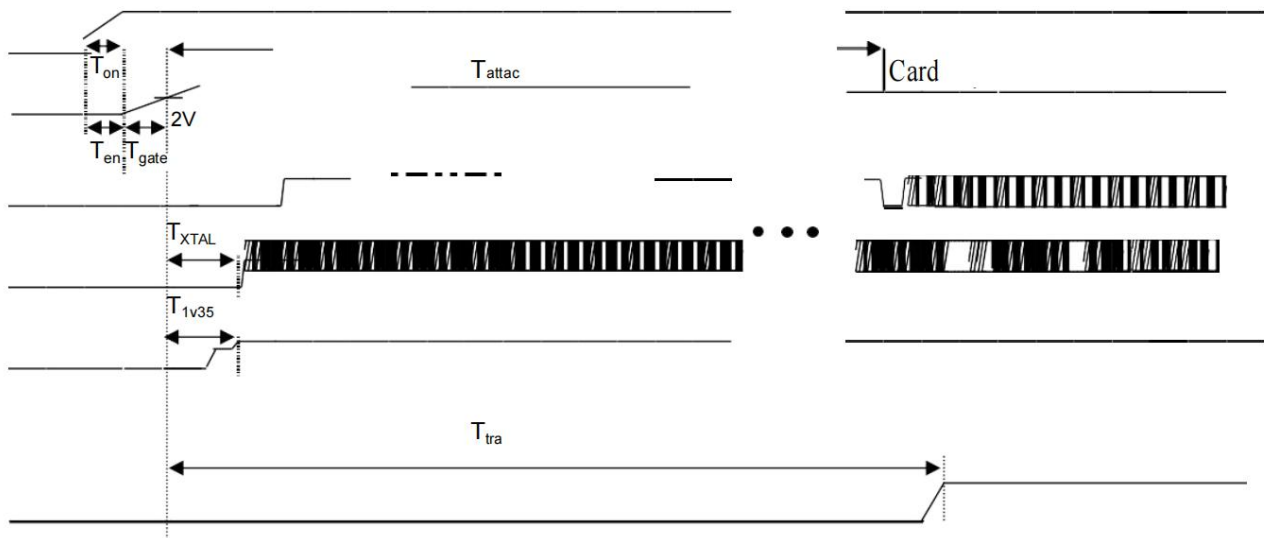


6.2 Pin Definition details

NO.	Name	Type	Description	Voltage
1	GND		Ground connections	
2	S1	I/O	RF I/O chain1, 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	S0	I/O	RF I/O chain0, dual band Wi-Fi	
10	GND		Ground connections	
11	GND		Ground connections	
12	BT		RF BT	
13	GND		Ground connections	
14	NC		Floating (NC)	
15	WL_DISn	I	Enable pin for WLAN device ON: pull high ; OFF: pull low	VDDIO
16	WL_WAKE_HOST	O	WLAN to wake up HOST	VDDIO
17	NC		Floating (NC)	
18	NC		Floating (NC)	
19	NC		Floating (NC)	
20	NC		Floating (NC)	
21	NC		Floating (NC)	
22	NC		Floating (NC)	
23	GND		Ground connections	
24	RESET	I/O	Enable pin for chipset. Pull low to shut down RTL8852BU. (Internal 47Kohm pull-high to 3.3V)	VDDIO
25	GND		Ground connections	
26	HS0N		USB 3.0 Transmit Differential Pair	

27	HSOP		USB 3.0 Transmit Differential Pair	
28	GND		Ground connections	
29	HSIN		USB 3.0 Receive Differential Pair	
30	HSIP		USB 3.0 Receive Differential Pair	
31	GND		Ground connections	
32	HSDP	I/O	USB2.0 differential pair D+	
33	HSDM	I/O	USB2.0 differential pair D-	
34	GND		Ground connections	
35	NC		Floating (NC)	
36	VD33	P	Main power input 3.3V	3.3V
37	GND		Ground connections	
38	BT_DISn		Enable pin for BT device ON: pull high ; OFF: pull low	
39	GND		Ground connections	
40	NC		Floating (NC)	
41	NC		Floating (NC)	
42	NC		Floating (NC)	
43	NC		Floating (NC)	
44	NC		Floating (NC)	
45	EESK		BT FW log	
46	GND		Ground connections	
47	NC		Floating (NC)	
48	GND		Ground connections	
49	HOST_WAKE_BT	I	Host to wake up Bluetooth device	VDDIO
50	BT_WAKE_HOST	O	Bluetooth device to wake up host.	VDDIO

7.2 USB Bus during power on Sequence



T_{on}: The main power ramp up duration

T_{en}: Interval between the rising point of 3.3V and chip_en

T_{gate}: Interval of 3.3V to be gated when chip_en voltage level < 2V

T_{attach}: USB attach state. The duration from resistor attached to USB host starting card detection procedure.

T_{xtal}: XTAL starts

T_{trap}: Power on trap duration. In back of this duration if pull high GPIO4, GPIO5 and EESK are necessary.

Power on Flow Description

After the main 3.3V ramp up, the internal power on reset is released by the power ready detection circuit and the power management unit is enabled. The power management unit enables the internal regulator and clock circuits.

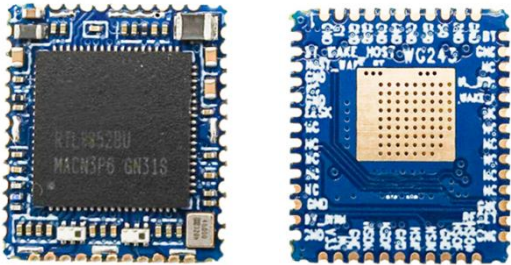
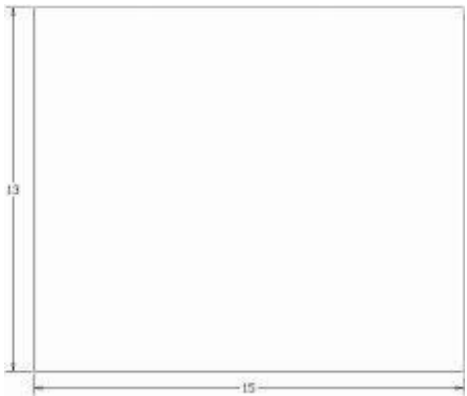
The power management unit also enables the USB circuits.

USB analog circuits attach resistors to indicate the insertion of the USB device.

	Unit	Min.	Typical	Max.
T_{on}	ms	-	1.5	5
T_{en}	ms	0	0	5
T_{gate}	ms	0	1.5	8
T_{attach}	ms	100	250	-
T_{xtal}	ms	-	1.5	8
T_{1v35}	ms	-	3	11
T_{trap}	ms	400	500	-

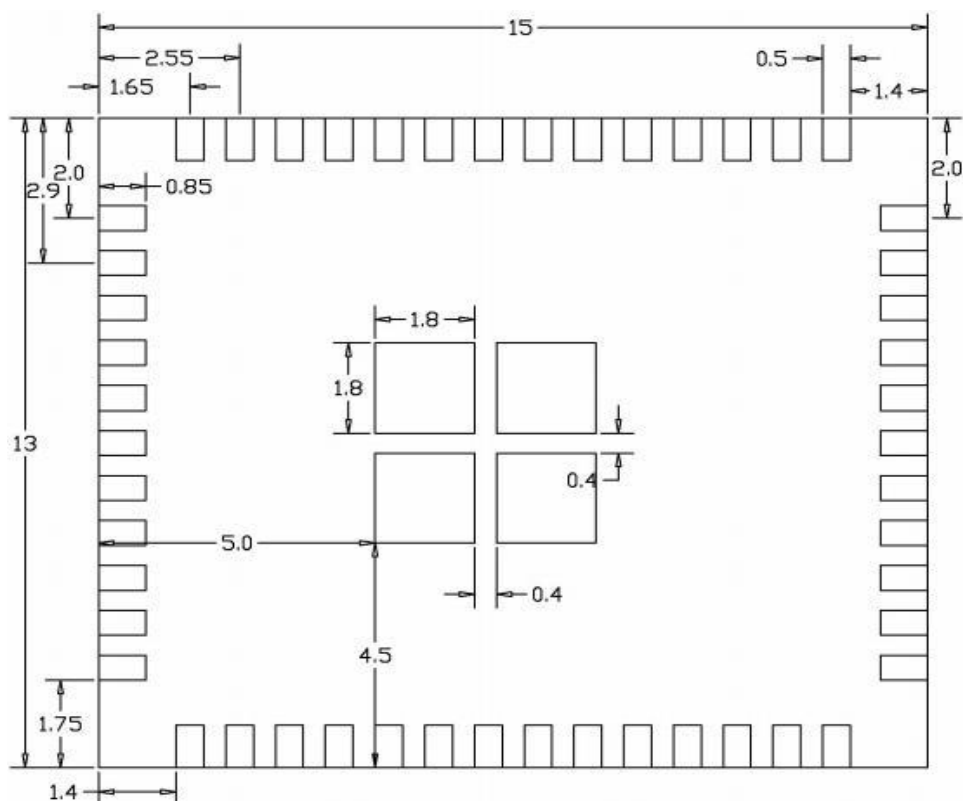
8. Size reference

8.1 Module Picture

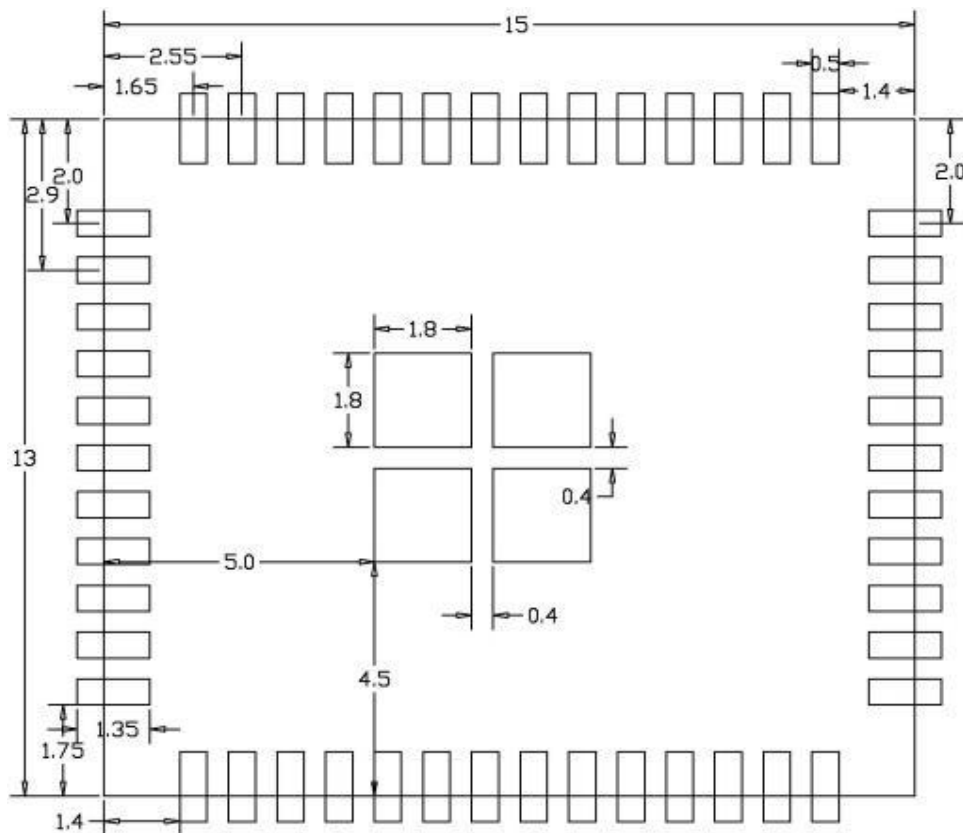
L x W : 13 x 15 (+0.3/-0.1) mm 	
H:2.3 (±0.2) mm	
Weight	0.91g

8.2 Physical Dimensions

<TOP View>



8.3 Layout Recommendation



9. The Key Material List

Item	Part Name	Description	Manufacturer
1	PCB	WG243 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	RTL8852BU-VS-CG QFN-76	Realtek
4	Shielding	WG243 Shielding	信太，精力通

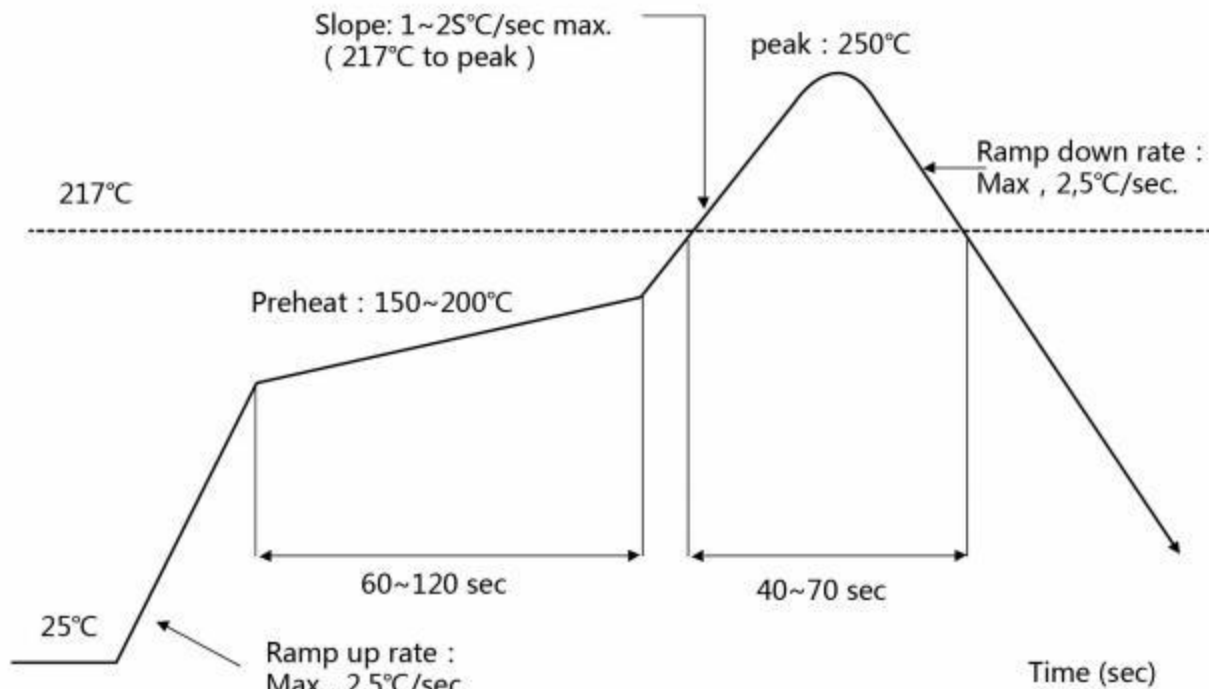
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11. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature: <250°C

Number of Times: ≤2 times



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:

- Calculated shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH)
- Environmental condition during the production: 30°C / 60% RH according to IPC/JEDEC J-STD-033A paragraph 5
- The maximum time between the opening of the sealed bag and the reflow process must be 168 hours if condition
- "IPC/JEDEC J-STD-033A paragraph 5.2" is respected
- Baking is required if conditions b) or c) are not respected
- Baking is required if the humidity indicator inside the bag indicates 10% RH or more

14. Contact Information

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