

**PRODUCT SPECIFICATION**

**6222B-SRC**

**Wi-Fi Dual-band 2X2 11ac + Bluetooth 5.0/4.2**

**Combo Module**

Version:v1.6

## 6222B-SRC Module Datasheet

Ordering Information	Part NO.	Description
	FG6222BSRC-00	RTL8822CS-VS-CG, a/b/g/n/ac, Wi-Fi+BT5.0, 2T2R, SDIO+UART, PCB V3.0, 3antenna type
	FG6222BSRC-01	RTL8822CS-VL-CG, a/b/g/n/ac, Wi-Fi+BT4.2, 2T2R, SDIO+UART, PCB V3.0, 3antenna type
	FG6222BSRC-02	RTL8822CS-VL-CG, a/b/g/n/ac, Wi-Fi+BT4.2, 2T2R, SDIO+UART, PCB V3.0, 2antenna type
	FG6222BSRC-03	RTL8822CS-VS-CG, a/b/g/n/ac, Wi-Fi+BT5.0, 2T2R, SDIO+UART, PCB V3.0, 2antenna type
	FG6222BSRC-04	RTL8822CS-VL-CG, a/b/g/n/ac, Wi-Fi+BT4.2, 2T2R, SDIO+UART, PCB V3.0, 3antenna type, no shielding
	FG6222BSRC-05	RTL8822CS-VL-CG, a/b/g/n/ac, Wi-Fi+BT4.2, 2T2R, SDIO+UART, PCB V3.0, 3antenna type, 01005 版本
	FG6222BSRC-06	RTL8822CS-VS-CG, a/b/g/n/ac, Wi-Fi+BT5.0, 2T2R, SDIO+UART, PCB V3.0, 3antenna type, no shielding
	FG6222BSRC-07	RTL8822CS-VS-CG, a/b/g/n/ac, Wi-Fi+BT5.0, 2T2R, SDIO+UART, PCB V3.0, 2antenna type, no shielding
	FG6222BSRC-08	RTL8822CS-VH-CG, a/b/g/n/ac, Wi-Fi+BT5.0, 2T2R+BT, SDIO+Uart, PCB V3.0, 3antenna type
FG6222BSRC-K0	RTL8822CS-VS-CG, a/b/g/n/ac, Wi-Fi+BT5.0, 2T2R, SDIO+UART, PCB V3.0, 3antenna type, 客供 IC	

FG6222BSRC-K1	RTL8822CS-VL-CG, a/b/g/n/ac, Wi-Fi+BT4.2, 2T2R, SDIO+UART, PCB V3.0, 3antenna type,客供 IC
FG6222BSRC-K3	RTL8822CS-VS-CG, a/b/g/n/ac, Wi-Fi+BT5.0, 2T2R, SDIO+UART, PCB V3.0, 2antenna type,客供 IC
FG6222BSRC-K4	RTL8822CS-VL-CG, a/b/g/n/ac, Wi-Fi+BT4.2, 2T2R, SDIO+UART, PCB V3.0, 3antenna type, no shielding,客供 IC
FG6222BSRC-K7	RTL8822CS-VS-CG, a/b/g/n/ac, Wi-Fi+BT5.0, 2T2R, SDIO+UART, PCB V3.0, 2antenna type,no shielding,客供 IC
FG6222BSRC-D0	RTL8822CS-VBS-CG,a/b/g/n/ac,WiFi+BT5.0, 2T2R,SDIO+Uart, PCB V3.0,2antenna type
FG6222BSRC-T0	RTL8822CS-VBS-CG,a/b/g/n/ac,WiFi+BT5.0, 2T2R, SDIO+Uart, PCB V3.0,3antenna type

**Customer:** \_\_\_\_\_

**Customer P/N:** \_\_\_\_\_

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# 1. General Description

## 1.1 Introduction

FN-Link Technology would like to announce a low-cost and low-power consumption module which has all of the Wi-Fi functionalities. It is a highly-integrated IEEE 802.11 a/b/g/n/ac MAC/Baseband/RF WLAN single chip. For Wireless LAN operation. The integrated module provides SDIO interface for Wi-Fi. The module provides simple legacy and 20MHz/40MHz/80MHz co-existence mechanism to ensure backward and network compatibility.

The wireless module complies with IEEE 802.11 a/b/g/n/ac 2x2 MIMO standard and the speed can achieve up to 867Mbps with dual stream in 802.11n. The integrated module provides SDIO interface for Wi-Fi, UART / PCM interface for Bluetooth.

This combo module is a total solution for a combination of Wi-Fi and Bluetooth V5.0 /4.2 technologies. The module is specifically developed for all portable devices.

## 1.2 Description

Model Name	6222B-SRC
Product Description	Support Wi-Fi/Bluetooth functionalities
Dimension	L x W x H: 15 x 13 x 2.15 mm (typical)
Wi-Fi Interface	Support SDIO V3.0/V2.0/V1.1
BT Interface	UART / PCM
OS supported	Android /Linux/ Win CE /iOS /XP/WIN7/WIN10
Operating temperature	0°C to 70°C
Storage temperature	-40°C to 85°C

## 2. Features

### General

- Highly integrated wireless local area network(WLAN) system-on-chip (SOC) for 5 GHz 802.11ac, or 2.4G/5G 802.11n WLAN applications
- Dual-stream spatial multiplexing up to 867 Mbps data rate
- Supports 20/40MHz at 2.4GHz and supports 20/40/80MHz at 5GHz
- Supports Bluetooth for class1 and class2 power level transmissions without requiring an external PA

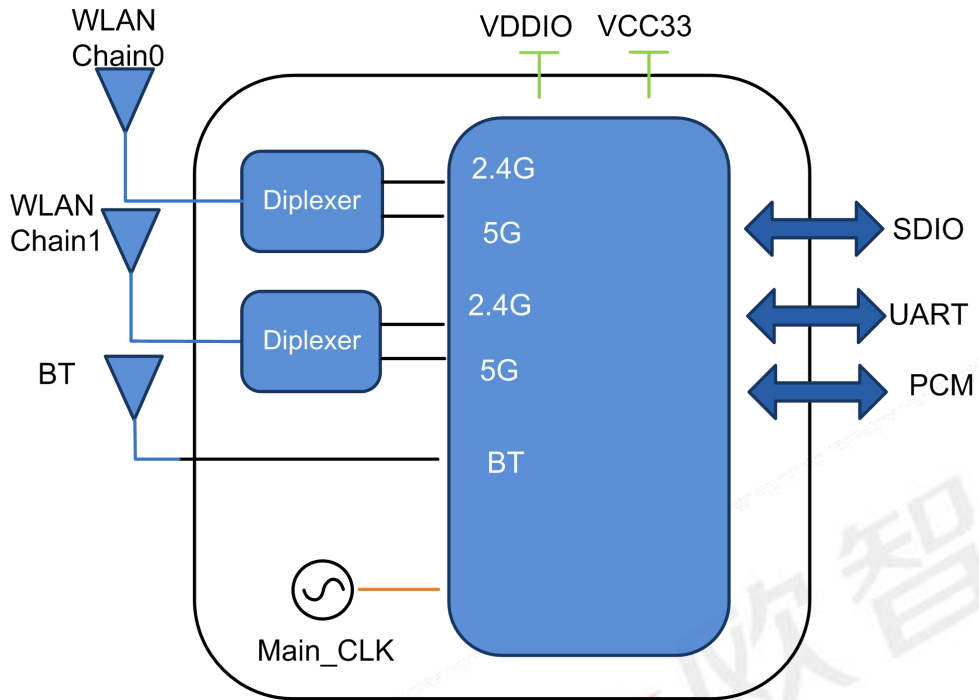
### Host Interface

- Supports low power SDIO3.0 interface for WLAN and UART/PCM interface for Bluetooth

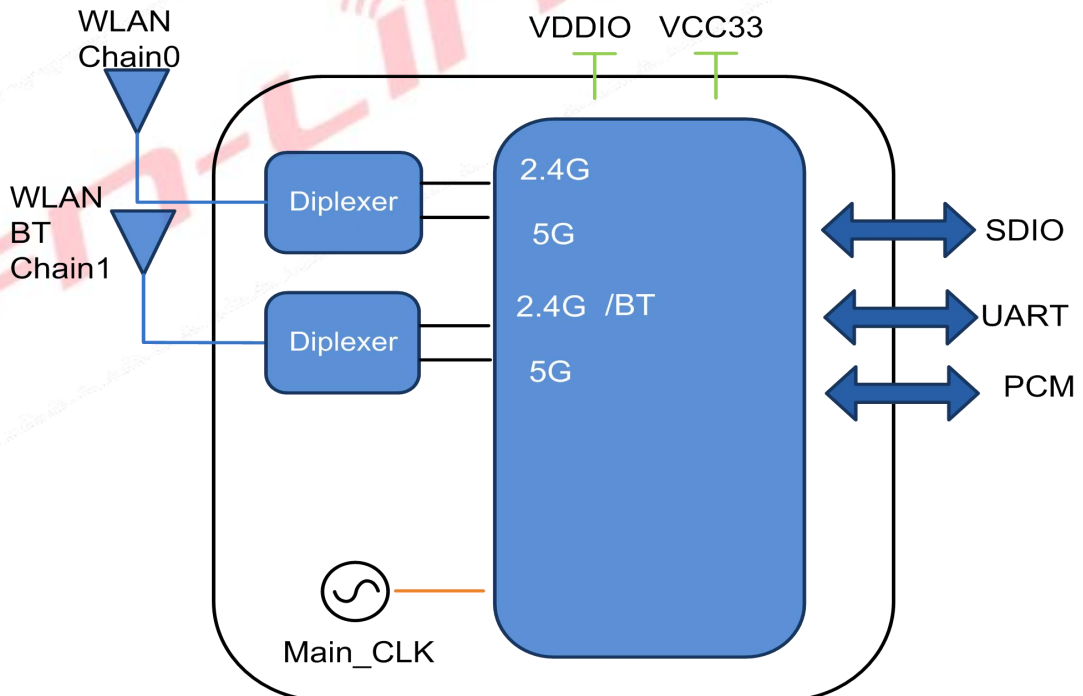
### Bluetooth Features

- Supports Bluetooth V5.0/4.2 system
- Supports WLAN-Bluetooth coexistence
- RTL8822CS-VBS support BT privacy 1.2
- BT host digital interface:
  - HCI UART (up to 4 Mbps)
  - PCM for audio data
- Module have muti applications:
  - 3 antenna type /BT5.0 or BT4.2 version
  - 2 antenna type /BT5.0 or BT4.2 version

### 3. Block Diagram



3 antenna type



2 antenna type



## 4. General Specification

### 4.1 2.4GHz RF Specification

Feature	Description		
WLAN Standard	IEEE 802.11 b/g/n Wi-Fi compliant		
Frequency Range	2.400 GHz ~ 2.497 GHz (2.4 GHz ISM Band)		
Number of Channels	2.4GHz: Ch1 ~ Ch14		
Test Items	Typical Value		EVM
Output Power	802.11b /11Mbps : 17dBm ± 2 dB		EVM ≤ -9dB
	802.11g /54Mbps : 15dBm ± 2 dB		EVM ≤ -25dB
	802.11n /MCS7 : 14dBm ± 2 dB		EVM ≤ -28dB
Spectrum Mask	Meet with IEEE standard		
Freq. Tolerance	± 20ppm		
SISO Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps	PER @ -92 dBm	≤-83
	- 2Mbps	PER @ -90 dBm	≤-80
	- 5.5Mbps	PER @ -87 dBm	≤-79
	- 11Mbps	PER @ -85 dBm	≤-76
SISO Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps	PER @ -89 dBm	≤-85
	- 9Mbps	PER @ -88 dBm	≤-84
	- 12Mbps	PER @ -87 dBm	≤-82
	- 18Mbps	PER @ -84 dBm	≤-80
	- 24Mbps	PER @ -81 dBm	≤-77
	- 36Mbps	PER @ -78 dBm	≤-73
	- 48Mbps	PER @ -73 dBm	≤-69
	- 54Mbps	PER @ -71 dBm	≤-68
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0	PER @ -89 dBm	≤-85
	- MCS=1	PER @ -86 dBm	≤-82
	- MCS=2	PER @ -84 dBm	≤-80
	- MCS=3	PER @ -80 dBm	≤-77
	- MCS=4	PER @ -77 dBm	≤-73
	- MCS=5	PER @ -72 dBm	≤-69
	- MCS=6	PER @ -71 dBm	≤-68
	- MCS=7	PER @ -69 dBm	≤-67
SISO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0,	PER @ -88 dBm	≤-82
	- MCS=1,	PER @ -85 dBm	≤-79
	- MCS=2,	PER @ -83 dBm	≤-77

	- MCS=3, PER @ -79 dBm	≤-74
	- MCS=4, PER @ -76 dBm	≤-70
	- MCS=5, PER @ -71 dBm	≤-66
	- MCS=6, PER @ -70 dBm	≤-65
	- MCS=7, PER @ -68 dBm	≤-64
Maximum Input Level	802.11b : -10 dBm	
	802.11g/n : -20 dBm	
Antenna Reference	Small antennas with 0~2 dBi peak gain	

### 4.2 5GHz RF Specification

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

Feature	Description	
WLAN Standard	IEEE 802.11a/n/ac 2x2, Wi-Fi compliant	
Frequency Range	4.900 GHz ~ 5.845 GHz (5.0 GHz ISM Band)	
Number of Channels	5.0GHz: Please see the table1	
Test Items	Typical Value	EVM
Output Power	802.11a /54Mbps : 15 dBm ± 2 dB	EVM ≤ -25dB
	802.11n /MCS7 : 14 dBm ± 2 dB	EVM ≤ -28dB
	802.11ac /MCS9 : 13 dBm ± 2 dB	EVM ≤ -32dB
Test Items	Test Value	Standard Value
SISO Receive Sensitivity (11a,20MHz) @10% PER	- 6Mbps PER @ -88 dBm	≤-85
	- 9Mbps PER @ -87 dBm	≤-84
	- 12Mbps PER @ -86 dBm	≤-82
	- 18Mbps PER @ -83 dBm	≤-80
	- 24Mbps PER @ -80 dBm	≤-77
	- 36Mbps PER @ -77 dBm	≤-73
	- 48Mbps PER @ -72 dBm	≤-69
	- 54Mbps PER @ -70 dBm	≤-68
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -88 dBm	≤-85
	- MCS=1 PER @ -85 dBm	≤-82
	- MCS=2 PER @ -83 dBm	≤-80
	- MCS=3 PER @ -80 dBm	≤-77
	- MCS=4 PER @ -76 dBm	≤-73
	- MCS=5 PER @ -71 dBm	≤-69
	- MCS=6 PER @ -70 dBm	≤-68

	- MCS=7 PER @ -69 dBm	≤-67
SISO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0 PER @ -85 dBm	≤-82
	- MCS=1 PER @ -82 dBm	≤-79
	- MCS=2 PER @ -80 dBm	≤-77
	- MCS=3 PER @ -77 dBm	≤-74
	- MCS=4 PER @ -73 dBm	≤-70
	- MCS=5 PER @ -69 dBm	≤-66
	- MCS=6 PER @ -68 dBm	≤-65
	- MCS=7 PER @ -67 dBm	≤-64
SISO Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0, NSS1 PER @ -86 dBm	≤-82
	- MCS=1, NSS1 PER @ -84 dBm	≤-80
	- MCS=2, NSS1 PER @ -82 dBm	≤-77
	- MCS=3, NSS1 PER @ -79 dBm	≤-73
	- MCS=4, NSS1 PER @ -75 dBm	≤-69
	- MCS=5, NSS1 PER @ -70 dBm	≤-68
	- MCS=6, NSS1 PER @ -69 dBm	≤-67
	- MCS=7, NSS1 PER @ -68 dBm	≤-62
	- MCS=8, NSS1 PER @ -65 dBm	≤-60
SISO Receive Sensitivity (11ac,40MHz) @10% PER	- MCS=0, NSS1 PER @ -84 dBm	≤-79
	- MCS=1, NSS1 PER @ -81 dBm	≤-77
	- MCS=2, NSS1 PER @ -79 dBm	≤-74
	- MCS=3, NSS1 PER @ -76 dBm	≤-70
	- MCS=4, NSS1 PER @ -73 dBm	≤-66
	- MCS=5, NSS1 PER @ -68 dBm	≤-65
	- MCS=6, NSS1 PER @ -67 dBm	≤-64
	- MCS=7, NSS1 PER @ -66 dBm	≤-59
	- MCS=8, NSS1 PER @ -65 dBm	≤-57
	- MCS=9, NSS1 PER @ -64 dBm	≤-55
SISO Receive Sensitivity (11ac,80MHz) @10% PER	- MCS=0, NSS1 PER @ -81 dBm	≤-79
	- MCS=1, NSS1 PER @ -78 dBm	≤-76
	- MCS=2, NSS1 PER @ -76 dBm	≤-74
	- MCS=3, NSS1 PER @ -72 dBm	≤-71
	- MCS=4, NSS1 PER @ -69 dBm	≤-67
	- MCS=5, NSS1 PER @ -66 dBm	≤-63
	- MCS=6, NSS1 PER @ -64 dBm	≤-62
	- MCS=7, NSS1 PER @ -62 dBm	≤-61
	- MCS=8, NSS1 PER @ -58 dBm	≤-56

	- MCS=9, NSS1 PER @ -60 dBm	≤-54
Maximum Input Level	802.11a/n : -30 dBm	
Antenna Reference	Small antennas with 0~2 dBi peak gain	

**15GHz(20MHz) Channel table**

<b>Band range</b>	<b>Operating Channel Numbers</b>	<b>Channel center frequencies(MHz)</b>
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
5745MHz~5825MHz	140	5700
	149	5745
	153	5765
	157	5785
	161	5805
	165	5825

### 4.3 Bluetooth Specification

Feature	Description		
<b>General Specification</b>			
Bluetooth Standard	Bluetooth V5.0 /4.2		
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		
<b>RF Specification</b>			
	<b>Min(dBm)</b>	<b>Typical(dBm)</b>	<b>Max(dBm)</b>
Output Power (Class 1)	2	5	8
Sensitivity @ BER=0.1% for GFSK (1Mbps)		-92	
Sensitivity @ BER=0.01% for $\pi/4$ -DQPSK (2Mbps)		-86	
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)		-85	
Maximum Input Level	GFSK (1Mbps):-20dBm		
	$\pi/4$ -DQPSK (2Mbps) :-20dBm		
	8DPSK (3Mbps) :-20dBm		

### 5. ID setting information

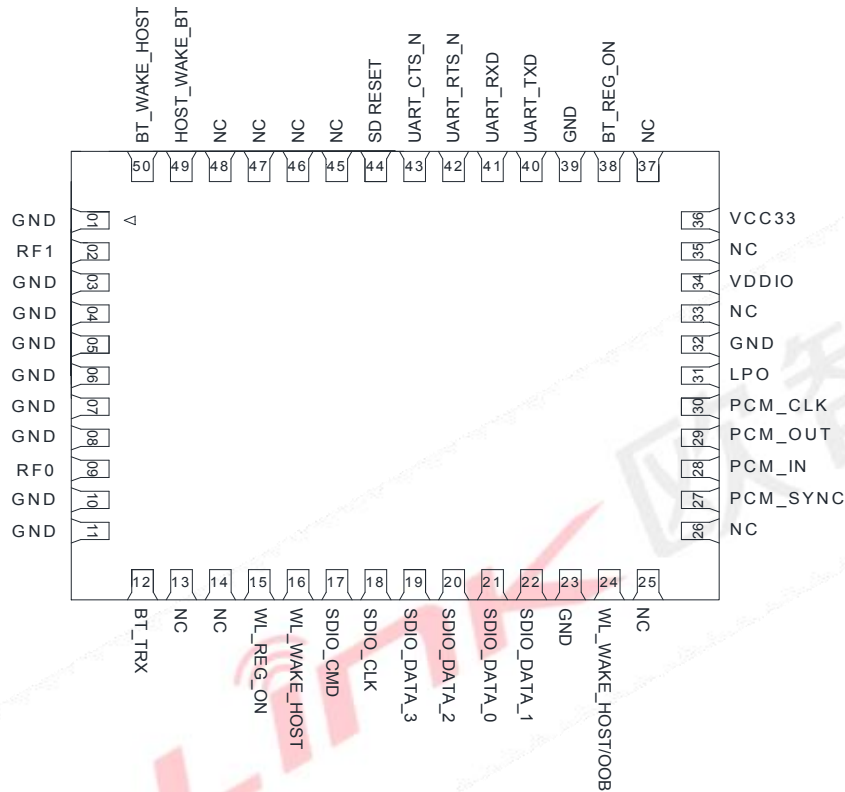
WI-FI

Vendor ID	8129
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	RF1	I/O	WLAN RF I/O port chain 1 (2antenna type BT&WLAN port)	
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	RF0	I/O	WLAN RF I/O port chain0	
10	GND	—	Ground connections	
11	GND	—	Ground connections	
12	BT_TRX	I/O	RF I/O port (2antenna type NC this pin)	
13	NC	—	GPIO6. If not used keep NC Do not connect to GND.	
14	NC	—	GPIO5. G_BT If not used keep NC. Do not connect to GND.	
15	WL_REG_ON	I	Enable pin for WLAN device ON: pull high ; OFF: pull low External pull low to shut down WL <b>If Pin44 connected this pin can NC.</b>	VDDIO
16	WL_WAKE_HOST	O	GPIO10. WLAN to wake-up HOST	VDDIO
17	SDIO_CMD	I/O	SDIO command line	1.8V or 3.3V
18	SDIO_CLK	I/O	SDIO clock line	1.8V or 3.3V
19	SDIO_DATA_3	I/O	SDIO data line 3	1.8V or 3.3V
20	SDIO_DATA_2	I/O	SDIO data line 2	1.8V or 3.3V
21	SDIO_DATA_0	I/O	SDIO data line 0	1.8V or 3.3V
22	SDIO_DATA_1	I/O	SDIO data line 1	1.8V or 3.3V
23	GND	—	Ground connections	
24	OOB/ WL_WAKE_HOST	O	GPIO10. SDIO interrupt	VDDIO
25	NC	—	GPIO7. If not used keep NC. Do not connect to GND.	
26	NC	—	No connect	
27	PCM_SYNC	I/O	PCM sync signal	VDDIO
28	PCM_IN	I	PCM data input	VDDIO
29	PCM_OUT	O	PCM Data output	VDDIO
30	PCM_CLK	I/O	PCM clock	VDDIO
31	LPO	I	External Low Power Clock input (32.768KHz) If not used keep NC	
32	GND	—	Ground connections	

33	NC	—	No connect	
34	VDDIO	P	I/O Voltage supply input 1.8V or 3.3V	1.8V or 3.3V
35	NC	—	No connect	
36	VCC33	P	Main power voltage source input 3.3V	3.3V
37	NC	—	No connect	
38	BT_REG_ON	I	Enable pin for Bluetooth device ON: pull high ; OFF: pull low External pull low to shut down BT	VDDIO
39	GND	—	Ground connections	
40	UART_TXD	O	Bluetooth UART interface	1.8V or 3.3V
41	UART_RXD	I	Bluetooth UART interface	1.8V or 3.3V
42	UART_RTS_N	O	Bluetooth UART interface	1.8V or 3.3V
43	UART_CTS_N	I	Bluetooth UART interface	1.8V or 3.3V
44	SD RESET	I	GPIO9, SD RESET This pin can externally shut down WLAN function when pulled low.	1.8V or 3.3V
45	NC	—	GPIO4, G_WL If not used keep NC. Do not pull high.	
46	NC	—	Module ground connection. Can keep NC.	
47	NC	—	No connect	
48	NC	—	Module ground connection. Can keep NC.	
49	HOST_WAKE_BT	I	HOST wake-up Bluetooth device	VDDIO
50	BT_WAKE_HOST	O	Bluetooth device to wake-up HOST	VDDIO

P:POWER I:INPUT O:OUTPUT VDDIO:1.8V or 3.3V

## 7. Electrical Specifications

### 7.1 Power Supply DC Characteristics

	MIN	TYP	MAX	Unit
Operating Temperature	0	25	70	deg.C
VCC33	3.15	3.3	3.45	V
VDDIO	1.7	1.8 or 3.3	3.45	V



**3.3V GPIO DC characteristics**

Symbol	Parameter	Min.	Nor.	Min.	Units
V <sub>IH</sub>	Input high voltage	2.0	3.3	3.6	V
V <sub>IL</sub>	Input low voltage	-	0	0.9	V
V <sub>OH</sub>	Output high voltage	2.97	-	3.3	V
V <sub>OL</sub>	Output low voltage	0	-	0.33	V

**1.8V GPIO DC characteristics**

Symbol	Parameter	Min.	Nor.	Min.	Units
V <sub>IH</sub>	Input high voltage	1.7	1.8	3.6	V
V <sub>IL</sub>	Input low voltage	-	0	0.8	V
V <sub>OH</sub>	Output high voltage	1.62	-	1.8	V
V <sub>OL</sub>	Output low voltage	0	-	0.18	V

**7.2 Power Consumption**

Power Consumption	VCC33 = 3.3V(Unit:mA)	
	Wi-Fi off	1.1
Idle DTIM=1	5G: 4	
	2.4G: 6	
TX (2.4G 11n HT40)	615	
RX (2.4G 11n HT40)	235	
TX (2.4G 11n HT20)	578	
RX (2.4G 11n HT20)	187	
TX (5G VHT80)	562	
RX (5G VHT80)	312	
TX (5G VHT20)	589	
RX (5G VHT20)	210	
BT OPP TX	36.8	
BT OPP RX	22.3	
BT LPS	1.8	
Power down	0.4	

### 7.3 Interface Circuit time series

#### 7.3.1 power up timing

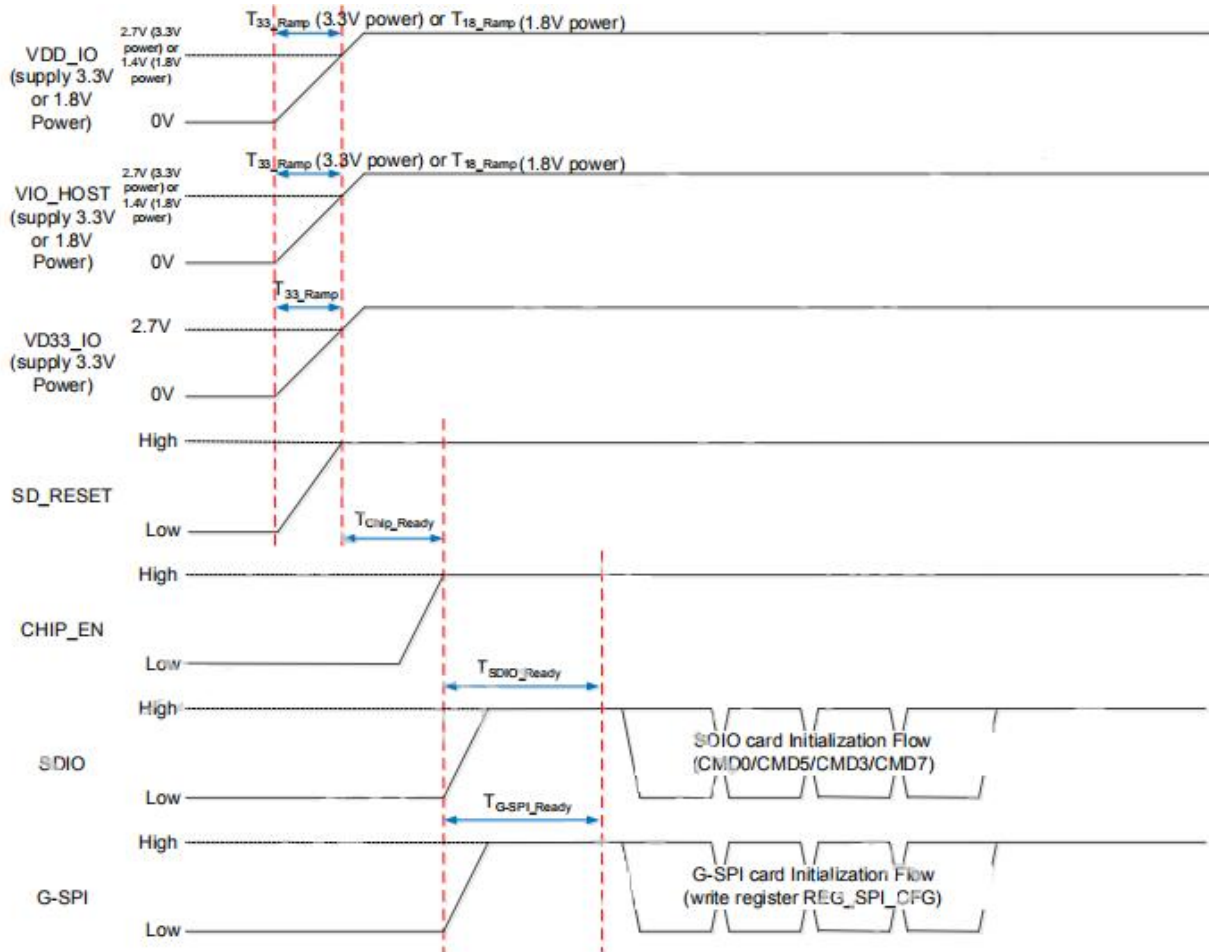


Figure 6. System Power-On Sequence

Table 21. System Power on Timing Parameters

	Min.	Typical	Max.	Unit	Description
$T_{18\_Ramp}$	0.1	0.5	2.5	ms	The 1.8V power ramp up duration.
$T_{33\_Ramp}$	0.1	0.5	2.5	ms	The 3.3V power ramp up duration.
$T_{Chip\_Ready}$	0	10	X	ms	CHIP_EN pull high timing
$T_{SDIO\_Ready}$	1	2	10	ms	SDIO Not Ready Duration. In this state, the RTL8822CS-VL-CG may respond to commands without the ready bit being set. After the

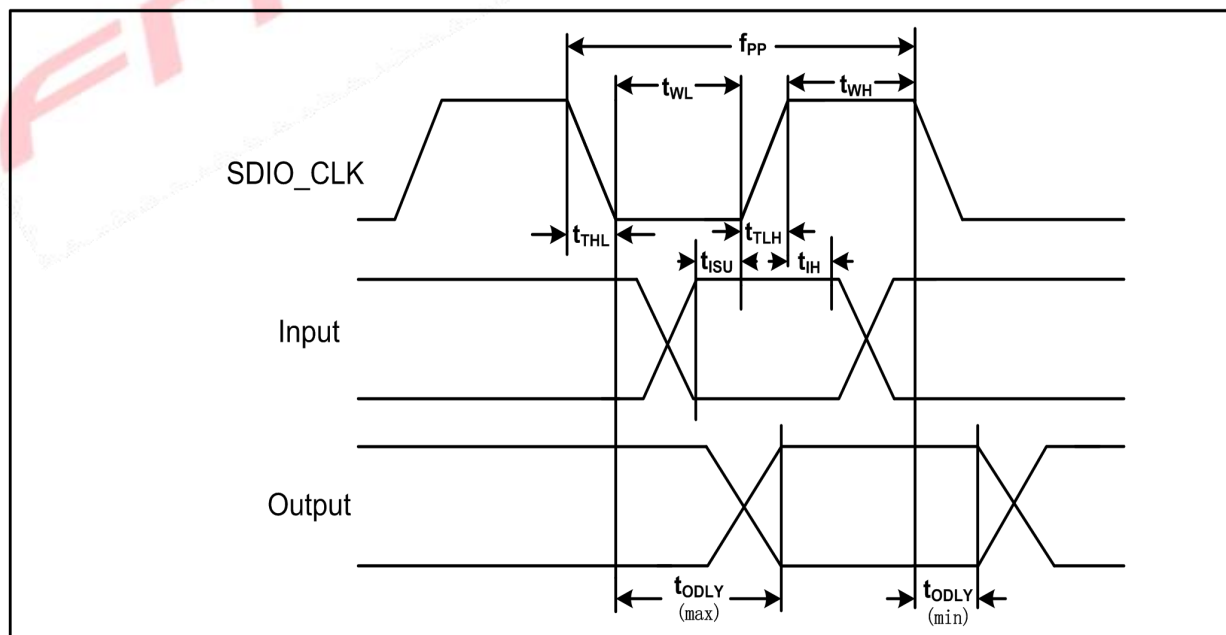
### 7.3.2 SDIO Pin Description

The module supports SDIO version 3.0 for all 1.8V 4-bit UHSI speeds: SDR50(100 Mbps), SDR104(208MHz) and DDR50(50MHz, dual rates) in addition to the 3.3V default speed(25MHz) and high speed (50 MHz). It has the ability to stop the SDIO clock and map the interrupt signal into a GPIO pin. This ‘out-of-band’ interrupt signal notifies the host when the WLAN device wants to turn on the SDIO interface. The ability to force the control of the gated clocks from within the WLAN chip is also provided.

#### SDIO Pin Description

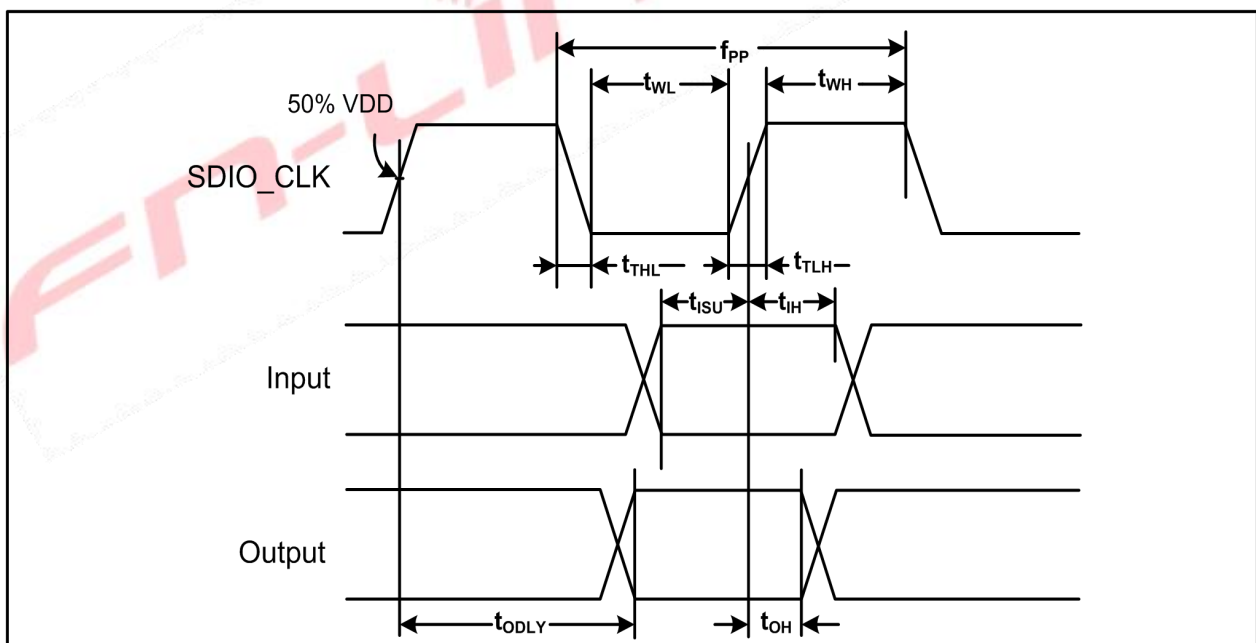
SD 4-Bit Mode	
DATA0	Data Line 0
DATA1	Data Line 1 or Interrupt
DATA2	Data Line 2 or Read Wait
DATA3	Data Line 3
CLK	Clock
CMD	Command Line

### 7.3.3 SDIO Default Mode Timing Diagram



Parameter	Symbol	Minimum	Typical	Maximum	Unit
<b>SDIO CLK(All values are referred to minimum VIH and maximum VIL<sup>b</sup>)</b>					
Frequency - Data Transfer mode	fPP	0	-	25	MHz
Frequency - Identification mode	fOD	0	-	400	kHz
Clock low time	tWL	10	-	-	ns
Clock high time	tWH	10	-	-	ns
Clock rise time	tTLH	-	-	10	ns
Clock low time	tTHL	-	-	10	ns
<b>Inputs:CMD, DAT(referenced to CLK)</b>					
Input setup time	tISU	5	-	-	ns
Input hold time	tIH	5	-	-	ns
<b>Outputs:CMD, DAT(referenced to CLK)</b>					
Output delay time - Data Transfer mode	tODLY	0	-	14	ns
Output delay time - Identification mode	tODLY	0	-	50	ns

- a. Timing is based on  $CL \leq 40$  pF load on CMD and Data.
- b.  $\text{Min}(V_{ih}) = 0.7 \times V_{DDIO}$  and  $\text{max}(V_{il}) = 0.2 \times V_{DDIO}$ .



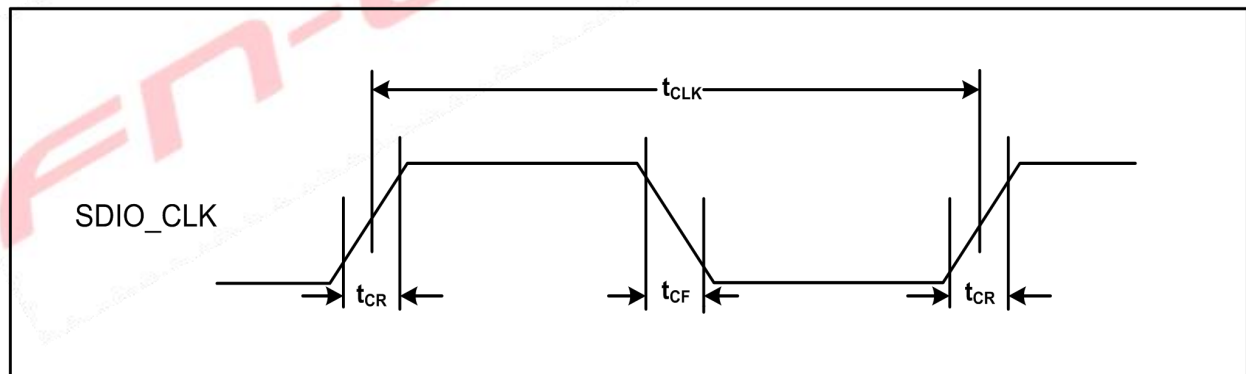
### 7.3.4 SDIO High Speed Mode Timing Diagram

Parameter	Symbol	Minimum	Typical	Maximum	Unit
<b>SDIO CLK(all values are referred to minimum VIH and maximum VIL<sup>b</sup>)</b>					
Frequency - Data Transfer mode	fPP	0	-	50	MHz
Frequency - Identification mode	fOD	0	-	400	kHz
Clock low time	tWL	7	-	-	ns
Clock high time	tWH	7	-	-	ns
Clock rise time	tTLH	-	-	3	ns
Clock low time	tTHL	-	-	3	ns
<b>Inputs:CMD, DAT(referenced to CLK)</b>					
Input setup time	tISU	6	-	-	ns
Input hold time	tIH	2	-	-	ns
<b>Outputs:CMD, DAT(referenced to CLK)</b>					
Output delay time - Data Transfer mode	tODLY	-	-	14	ns
Output delay time - Identification mode	tODLY	2.5	-	-	ns
Total system capacitance(each line)	CL	-	-	40	pF

- a. Timing is based on  $CL \leq 40$  pF load on CMD and Data.
- b.  $Min(V_{ih}) = 0.7 \times V_{DDIO}$  and  $max(V_{il}) = 0.2 \times V_{DDIO}$ .

### 7.3.5 SDIO Bus Timing Specifications in SDR Modes

Clock timing(SDR Modes)

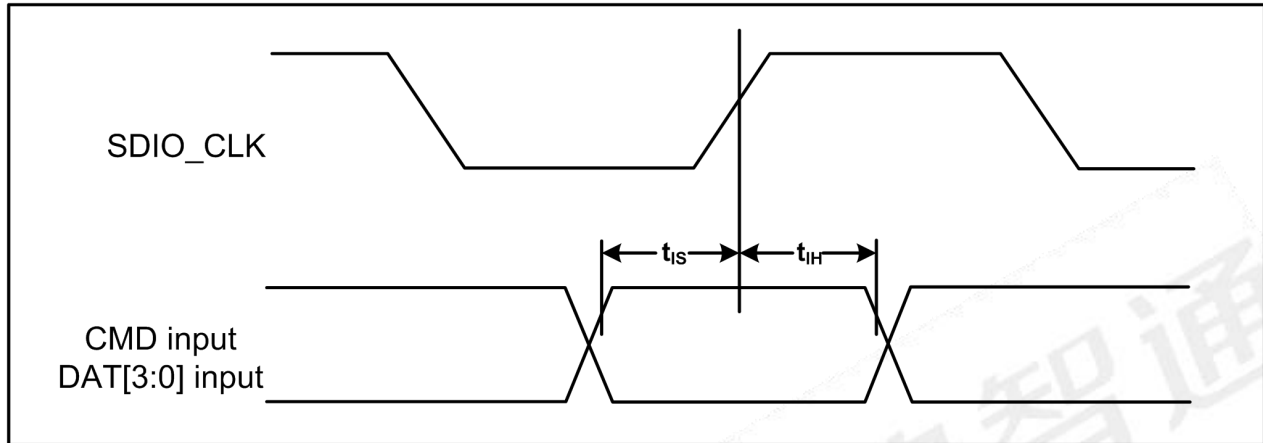


Parameter	Symbol	Minimum	Maximum	Unit	Comments
-	t <sub>CLK</sub>	40	-	ns	SDR12 mode
-		20	-	ns	SDR25 mode
-		10	-	ns	SDR50 mode
-		4.8	-	ns	SDR104 mode
-	t <sub>CR</sub> , t <sub>CF</sub>	-	0.2 × t <sub>CLK</sub>	ns	t <sub>CR</sub> , t <sub>CF</sub> < 2.00 ns (max)@100 MHz, C <sub>CARD</sub> = 10 pF

$t_{CR}, t_{CF} < 0.96 \text{ ns (max)@208 MHz,}$   
 $C_{CARD} = 10 \text{ pF}$

Clock duty	-	30	70	%	-
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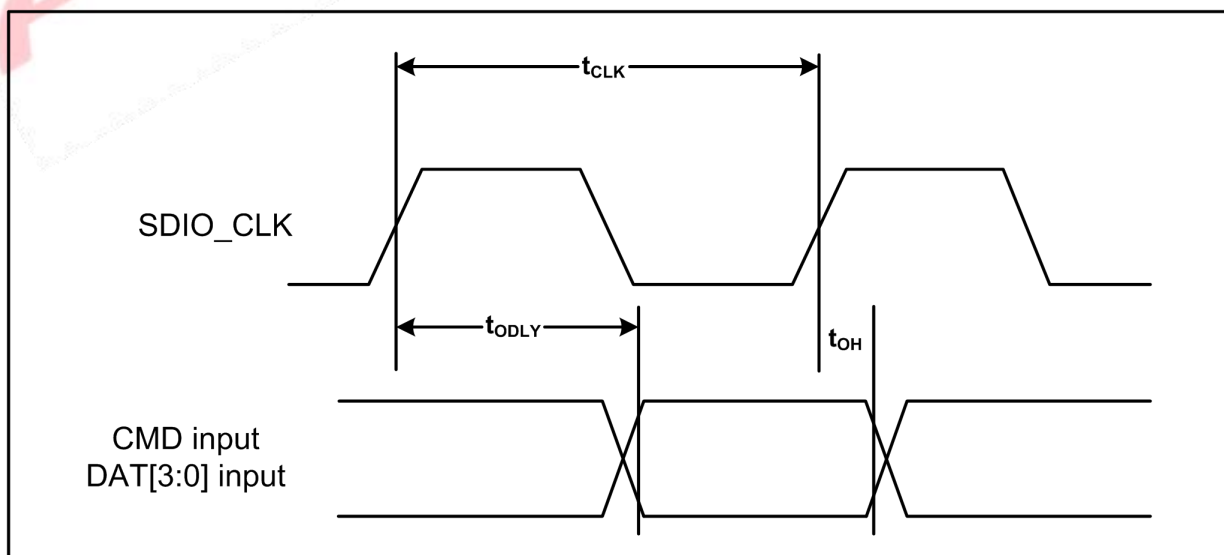
Card Input timing (SDR Modes)



Symbol	Minimum	Maximum	Unit	Comments
<b>SDR104 Mode</b>				
$t_{IS}$	1.70 <sup>a</sup>	-	ns	$C_{CARD} = 10\text{pF, VCT} = 0.975\text{V}$
$t_{IH}$	0.80	-	ns	$C_{CARD} = 5\text{pF, VCT} = 0.975\text{V}$
<b>SDR50 Mode</b>				
$t_{IS}$	3.00	-	ns	$C_{CARD} = 10\text{pF, VCT} = 0.975\text{V}$
$t_{IH}$	0.80	-	ns	$C_{CARD} = 5\text{pF, VCT} = 0.975\text{V}$

a. SDIO 3.0 specification value is 1.40 ns.

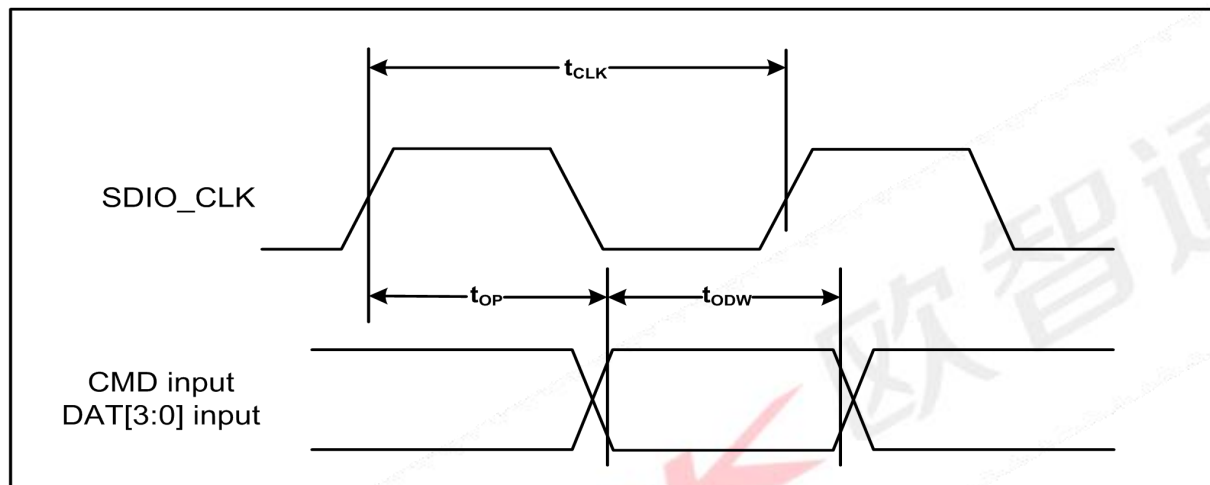
Card output timing (SDR Modes up to 100MHz)



Symbol	Minimum	Maximum	Unit	Comments
$t_{ODLY}$	-	7.85 <sup>a</sup>	ns	$t_{CLK} \geq 10$ ns $C_L = 30$ pF using driver type B for SDR50
$t_{ODLY}$	-	14.0	ns	$t_{CLK} \geq 20$ ns $C_L = 40$ pF using for SDR12, SDR25
$t_{OH}$	1.5	-	ns	Hold time at the $t_{ODLY}(\min)$ $C_L = 15$ pF

a. SDIO 3.0 specification value is 7.5 ns.

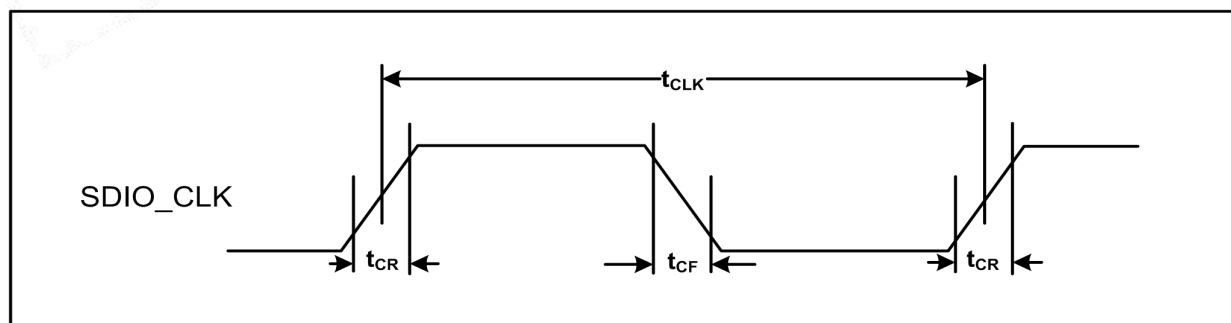
Card output timing (SDR Modes 100MHz to 208MHz)



Symbol	Minimum	Maximum	Unit	Comments
$t_{OP}$	0	2	UI	Card output phase
$\Delta t_{OP}$	-350	+1550	ps	Delay variation due to temp change after tuning
$t_{ODW}$	0.6	-	UI	$t_{ODW} = 2.88$ ns @ 208 MHz

- $\Delta t_{OP} = +1550$  ps for junction temperature of  $\Delta t_{OP} = 90$  degrees during operation
- $\Delta t_{OP} = -350$  ps for junction temperature of  $\Delta t_{OP} = -20$  degrees during operation
- $\Delta t_{OP} = +2600$  ps for junction temperature of  $\Delta t_{OP} = -20$  to  $+125$  degrees during operation

### 7.3.6 SDIO Bus Timing Specifications in DDR50 Mode

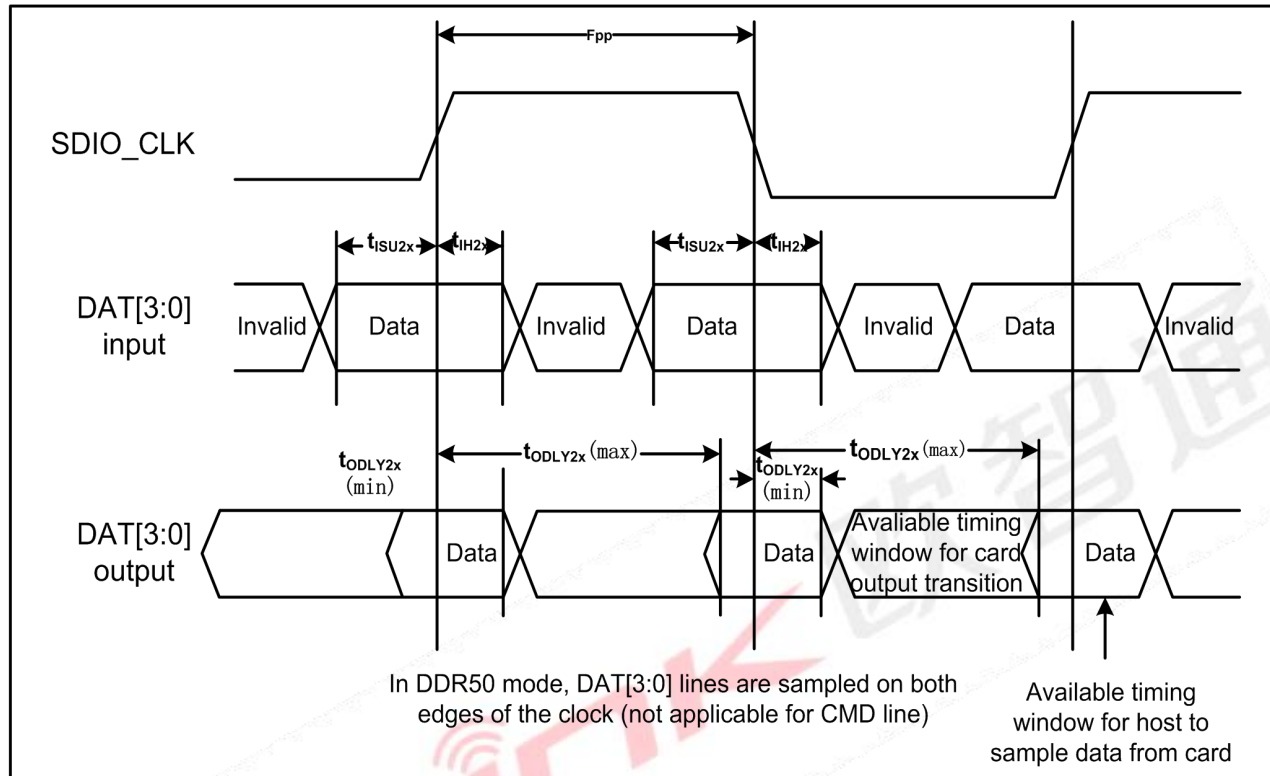


parameter	Symbol	Minimum	Maximum	Unit	Comments
-	$t_{CLK}$	20	-	ns	DDR50 mode

-	$t_{CR}, t_c$	-	$0.2 \times t_{CLK}$	ns	$t_{CR}, t_{CF} < 4.00$ ns (max)@50 MHz, $C_{CARD} = 10$ pF
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Clock duty	-	45	55	%	-
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Data Timing



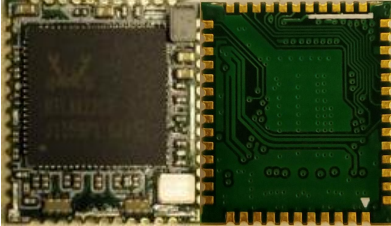
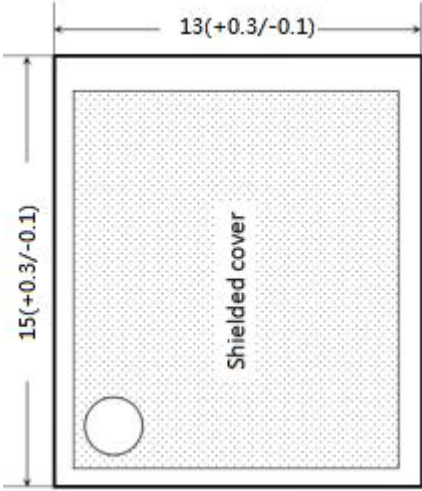
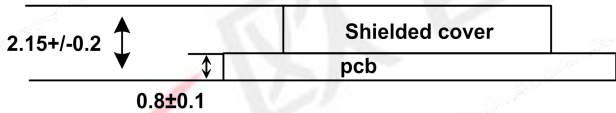
parameter	Symbol	Minimum	Maximum	Unit	Comments
<b>Input CMD</b>					
Input setup time	$t_{ISU}$	6	-	ns	$C_{CARD} < 10$ pF (1 Card)
Input hold time	$t_{IH}$	0.8	-	ns	$C_{CARD} < 10$ pF (1 Card)
<b>Output CMD</b>					
Output delay time	$t_{ODLY}$	-	13.7	ns	$C_{CARD} < 30$ pF (1 Card)
Output hold time	$t_{OH}$	1.5	-	ns	$C_{CARD} < 15$ pF (1 Card)
<b>Input DAT</b>					
Input setup time	$t_{ISU2x}$	3	-	ns	$C_{CARD} < 10$ pF (1 Card)
Input hold time	$t_{IH2x}$	0.8	-	ns	$C_{CARD} < 10$ pF (1 Card)
<b>Output DAT</b>					
Output delay time	$t_{ODLY2x}$	-	7.85 <sup>a</sup>	ns	$C_{CARD} < 25$ pF (1 Card)
Output hold time	$t_{ODLY2x}$	1.5	-	ns	$C_{CARD} < 15$ pF (1 Card)

a. SDIO 3.0 specification value is 7.0 ns



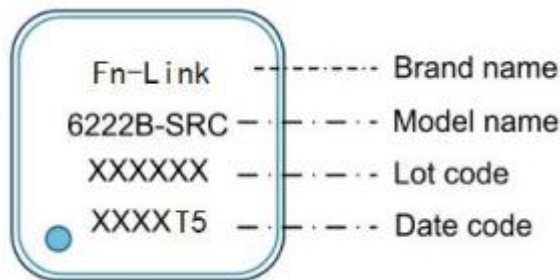
## 8. Size reference

### 8.1 Module Picture

<p><b>L x W : 15 x 13 (+0.3/-0.1) mm</b></p> 	
<p>With shielding H: 2.15 (+/-0.2) mm No shielding H: 1.8(+/-0.2) mm</p>	
<p><b>Weight</b></p>	<p>0.85g</p>

### 8.2 Marking Description

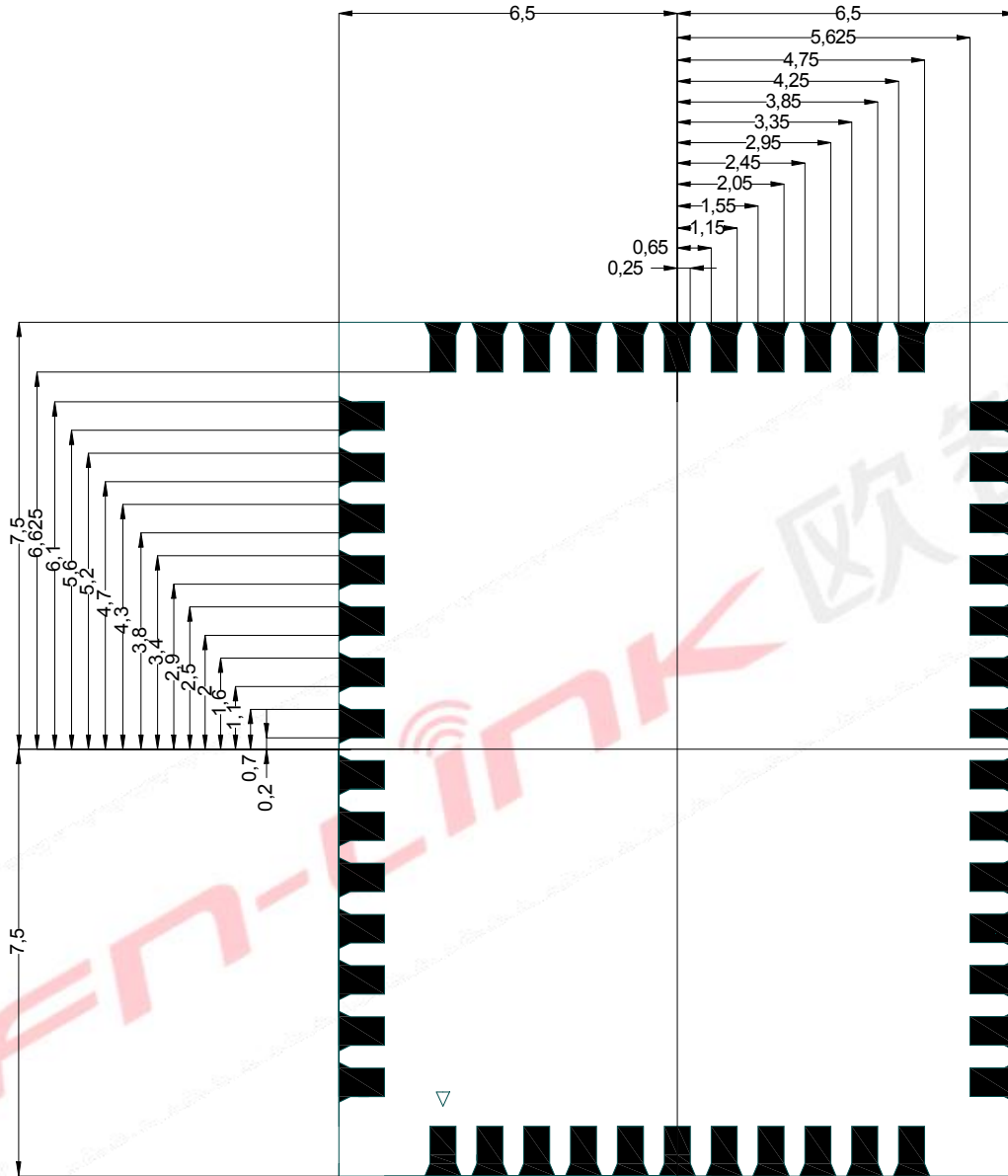
< TOP VIEW >



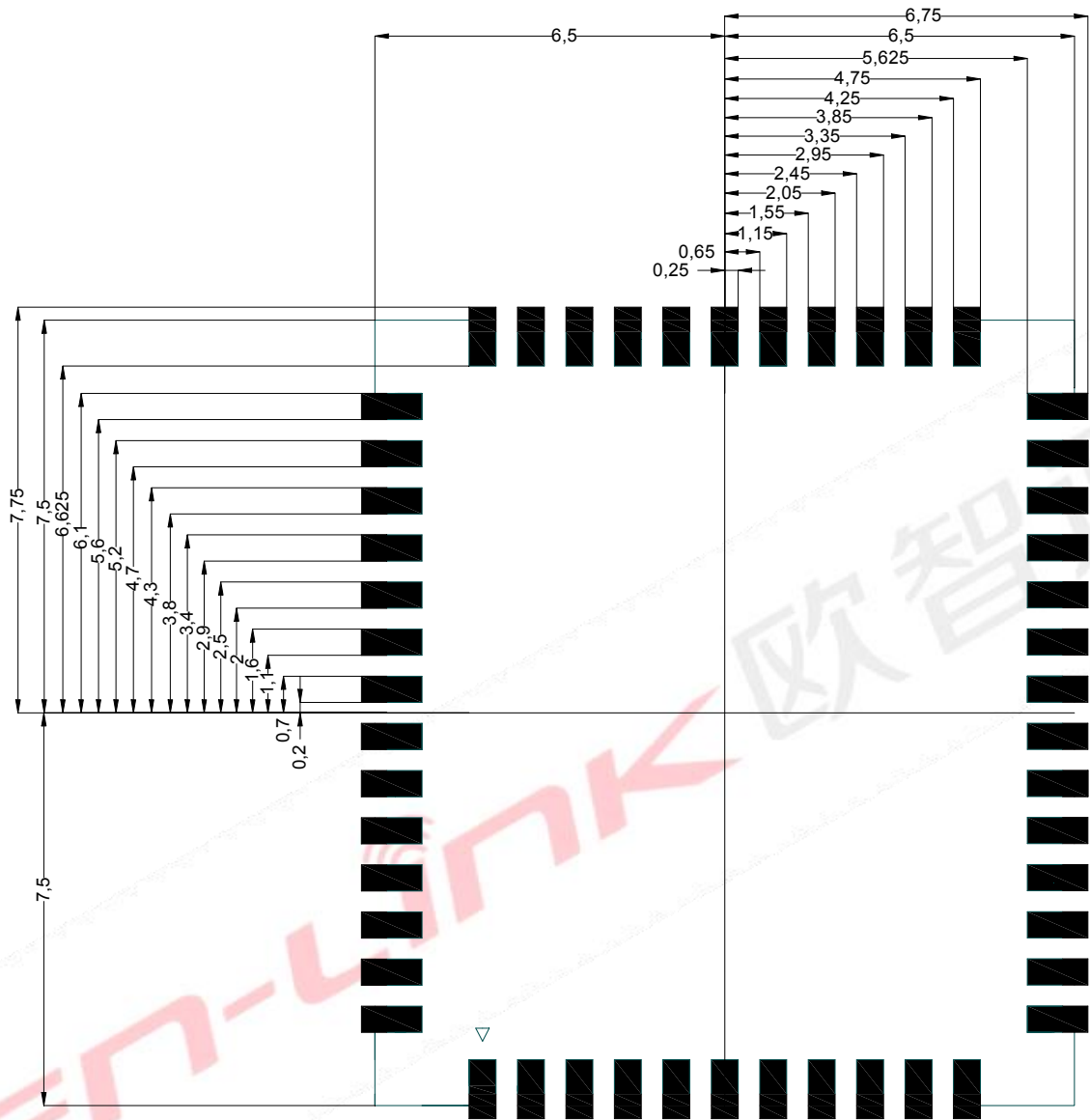
- 00, T5: 3 antenna/BT5.0;      -01, T4: 3 antenna/BT4.2;
- 02, D4: 2 antenna/BT4.2;      -03, D5: 2 antenna/BT5.0;
- 05, 05: 3 antenna/BT4.2;      -08, 08: 3 antenna/BT5.0;
- K0, K0: 3 antenna/BT5.0;      -K1, K1: 3 antenna/BT4.2;
- K2, K2: 2 antenna/BT4.2;      -K3, K3: 2 antenna/BT5.0;
- D0, D0: 2 antenna/BT5.0 -VBS;      -T0, T0: 3 antenna/BT5.0 -VBS;

### 8.3 Physical Dimensions

<TOP View>



### 8.4 Layout Recommendation

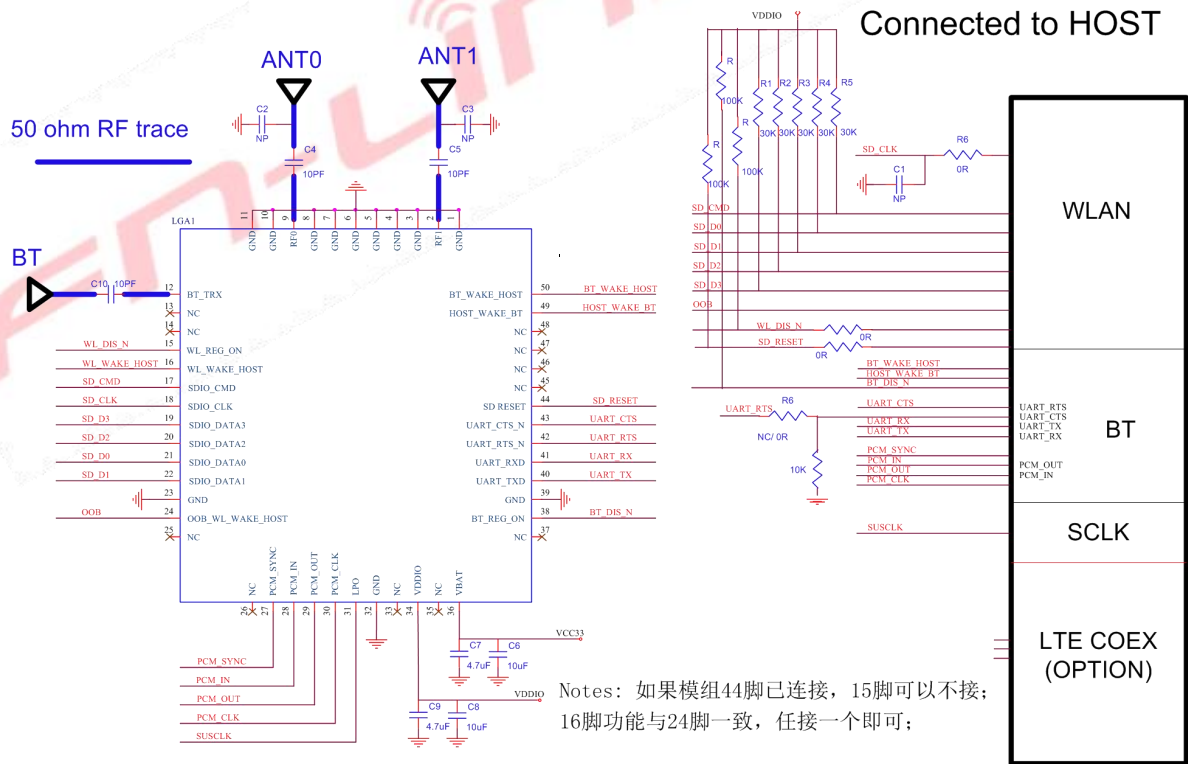


### 9. The Key Material List

Item	Part Name	Description	Manufacturer
1	Inductor	2012/2016 1uH/1.5uH ± 20%, Irms>0.8A	MURATA, microgate, cenke, ceaiya
2	Diplexer	1608 2.4G/5.8G diplexer	TDK, GLEAD, walsin, murata, acx
3	Shielding cover	6222B-SRC-V3.0 shielding	Suntech, Jlitong
4	Crystal	2520 40MHz 10ppm 12pF	HOSONIC, ECEC, TKD, JWT
5	Chipset	RTL8822CS-VS-CG RTL8822CS-VL-CG RTL8822CS-VH-CG RTL8822CS-VBS-CG 9X9mm	Realtek
6	PCB	6222B-SRC-V3.0 PCB 13x15x0.8mm	XY-PCB, KX-PCB, Sunlord, SL-PCB

### 10. Reference Design

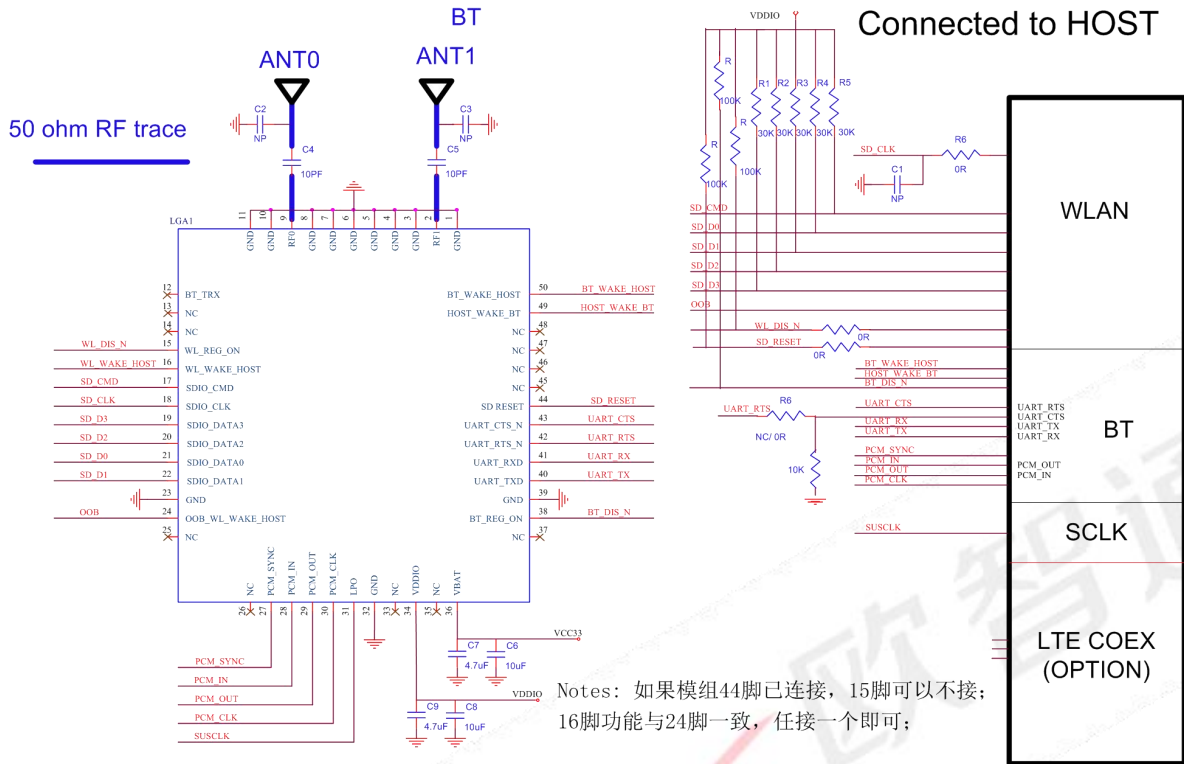
3antenna type reference shown:



C6, C7 caps should be closed to pin36 of the module

C8, C9 caps should be closed to pin34 of the module

2antenna type reference shown:



C6, C7 caps should be closed to pin36 of the module

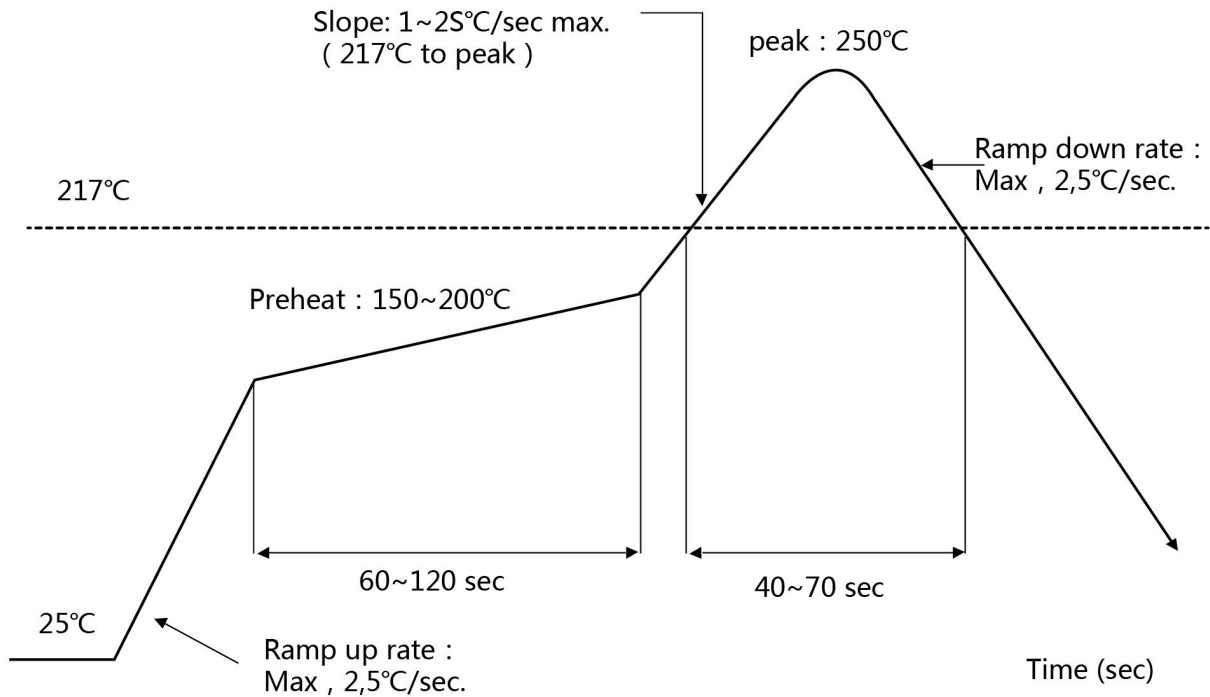
C8, C9 caps should be closed to pin34 of the module

## 11. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <250°C

Number of Times : ≤2 times



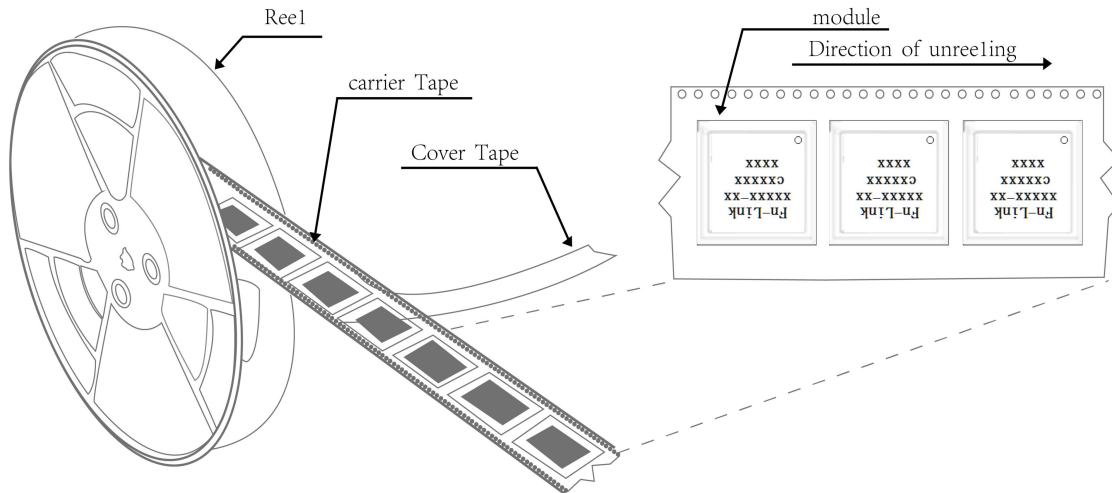
## 12. RoHS compliance

All hardware components are fully compliant with EU RoHS directive

### 13. Package

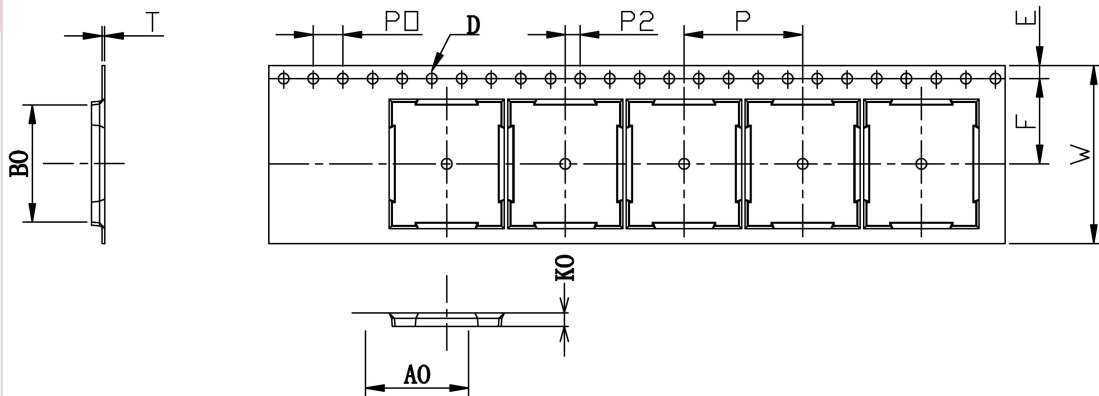
#### 13.1 Reel

A roll of 1500pcs



#### 13.2 Carrier Tape Detail

ITEM	W	A0	B0	D	F	E	KO	PO	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



### 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





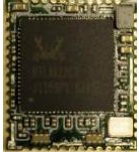
The Modules is a Moisture Sensitive Device level 3, in according with standard IPC/JEDEC J-STD-020, take care

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
- 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

Part No.	Diagram	Part No.	Diagram
FG6222BSRC-00		FG6222BSRC-08	
FG6222BSRC-01		FG6222BSRC-K0	
FG6222BSRC-02		FG6222BSRC-K1	
FG6222BSRC-03		FG6222BSRC-K3	
FG6222BSRC-04		FG6222BSRC-K4	

<p>FG6222BSRC-05</p>		<p>FG6222BSRC-K7</p>	
<p>FG6222BSRC-06</p>		<p>FG6222BSRC-D0</p>	
<p>FG6222BSRC-07</p>		<p>FG6222BSRC-T0</p>	