

HK NATER TECH LIMITED

RL-SM02BD-8723BS-V1.3 Specification

Customer: _____

Description: RL-SM02BD-8723BS-V1.3

Customer P/N: _____

Date: _____

Customer		
Approve	Auditing	Admit

Provider		
Approve	Auditing	Admit

Customer:

Add:

Tel:

Fax:

Attn:

E-mail:

Provider:HK NATER TECH LIMITED

Add: 2F,NO.27,2 Baomin Rd.,Baoan Dist.SZ City,China

Tel:0086-755-61522172/13510620050

Fax:0086-755-61522171

Attn:Lingo

E-mail:hsdgood@163.com

SPECIFICATION

**IEEE 802.11 B/G/N 2.4GHz 1T1R WiFi with Bluetooth2.1/3.0/4.0,
with SDIO Interface, and HS-UART mixed interface**

**RL-SM02BD-RTL8723BS-V1.3
Combo Module**

Version 1.3

1.PRODUCT DESCRIPTION

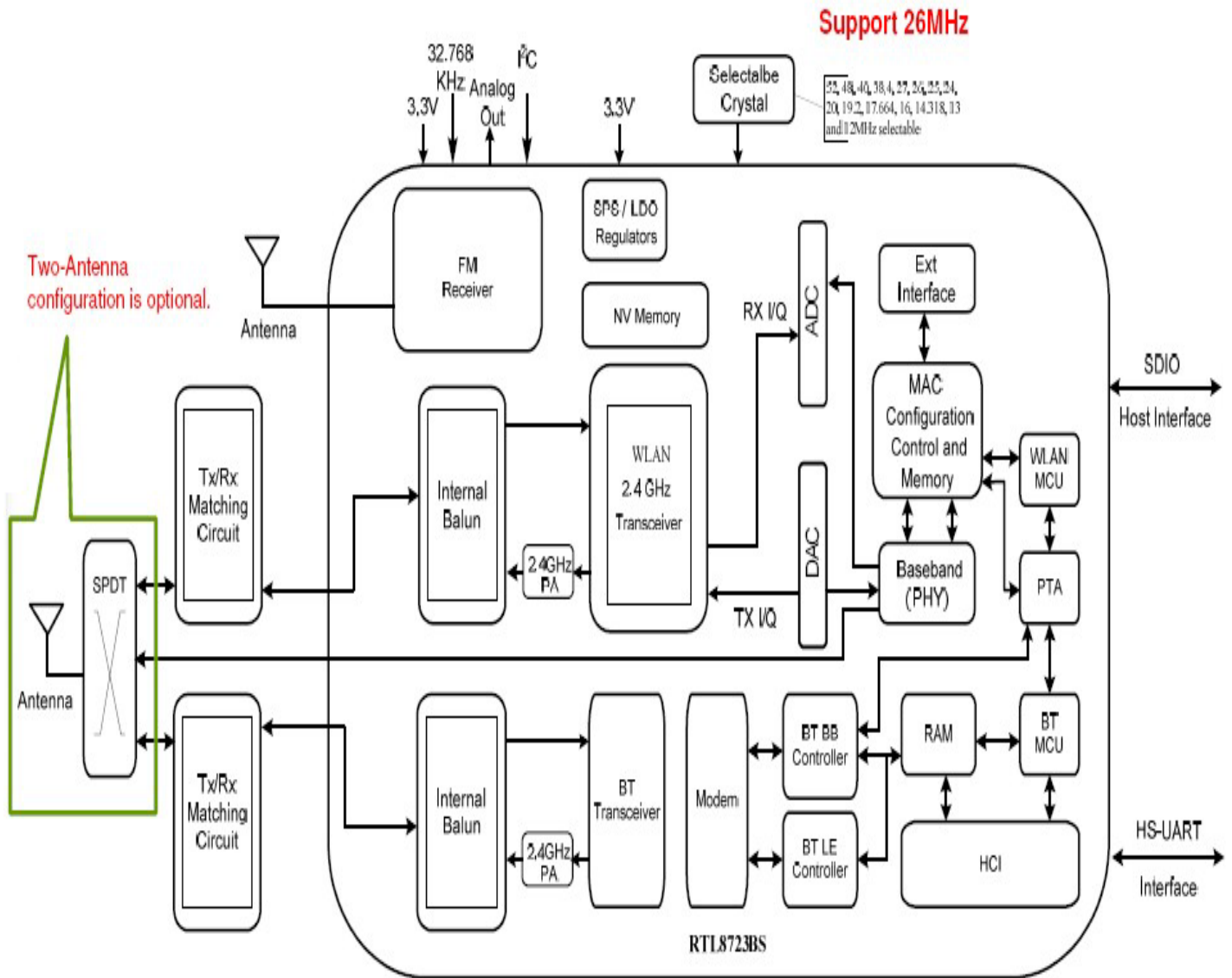
SM02BD is a small size and low profile of WiFi+BT combo module with LGA (Land-Grid Array) footprint, board size is 12mm*12mm with module height of 1.6mm. It can be easily manufactured on SMT process and highly suitable for tablet PC, ultra book, mobile device and consumer products. It provides GSPI/SDIO interface for WiFi to connect with host processor and high speed UART interface for BT. It also has a PCM interface for audio data transmission with direct link to external audio codec via BT controller. The WiFi throughput can go up to 150Mbps in theory by using 1x1 802.11n b/g/n MIMO technology and Bluetooth can support BT2.1+EDR/BT3.0 and BT4.0.

SM02BD uses Realtek RTL8723BS, a highly integrated WiFi/BT single MODULE based on advanced COMS process. RTL8723BS integrates whole WiFi/BT function blocks into a chip, such as SDIO/UART, MAC, BB, AFE, RFE, PA, EEPROM and LDO/SWR, except fewer passive components remained on PCB.

2.PRODUCT FEATURES

- ◆ Operate at ISM frequency bands (2.4GHz)
- ◆ GSPI/SDIO for WiFi and UART for Bluetooth
- ◆ IEEE standards support: IEEE 802.11b, IEEE 802.11g, IEEE 802.11n, IEEE 802.11d, IEEE 802.11e, IEEE 802.11h, IEEE 802.11i
- ◆ Fully Qualified for Bluetooth 2.1 + EDR specification including both 2Mbps and 3Mbps modulation mode
- ◆ Fully qualified for Bluetooth 3.0
- ◆ Fully qualified for Bluetooth 4.0 Dual mode
- ◆ Full -speed Bluetooth operation with Piconet and Scatternet support.
- ◆ Enterprise level security which can apply WPA/WPA2 certification for WiFi.
- ◆ WiFi 1 transmitter and 1 receiver allow data rates supporting up to 150 Mbps downstream and 150 Mbps upstream PHY rates
- ◆ For WiFi/BT, it uses fixed path for WiFi and BT, which means one antenna assigned for WiFi and the other is assigned for BT.
- ◆ Support Bluetooth adaptive power management mechanism
- ◆ Full-featured software utility for easy configuration and management
- ◆ RoHS compliance
- ◆ Low Halogen compliance

3. Diagram



4. Temperature Limit Ratings

Parameter	Minimum	Maximum	Units
Storage Temperature	-20	70	°C
Ambient Operating Temperature	0	60	°C
Junction Temperature	0	125	°C

5.PRODUCT SPECIFICATIONS

Main chipset :WiFi/BT Single Chip: Realtek RTL8723BS

Functional Specifications

Standards	WiFi: IEEE 802.11b, IEEE 802.11g, IEEE 802.11n, IEEE 802.11d, IEEE 802.11e, IEEE 802.11h, IEEE 802.11i
	BT: V2.1+EDR/BT v3.0/BT v3.0+HS/BT v4.0
Bus Interface	WiFi: GSPI/SDIO BT: UART
Data Rate	802.11b: 11, 5.5, 2, 1 Mbps 802.11g: 54, 48, 36, 24, 18, 12, 9, 6 Mbps 802.11n: MCS 0 to 7 for HT20MHz ;MCS 0 to 7 for HT40MHz BT: 1 Mbps for Basic Rate 2,3 Mbps for Enhanced Data Rate 6,9,12,18,24,36,48,54 Mbps for High Speed
Media Access Control	WiFi: CSMA/CA with ACK BT: AFH, Time Division
Modulation Techniques	802.11b: CCK, DQPSK, DBPSK 802.11g: 64 QAM, 16 QAM, QPSK, BPSK 802.11n: 64 QAM, 16 QAM, QPSK, BPSK BT: 8DPSK, $\pi/4$ DQPSK, GFSK
Network Architecture	WiFi: Ad-hoc mode (Peer-to-Peer) Infrastructure mode Software AP WiFi Direct BT: Pico Net Scatter Net
Operating Channel	WiFi 2.4GHz: 11: (Ch. 1-11) – United States 13: (Ch. 1-13) – Europe 14: (Ch. 1-14) – Japan BT 2.4GHz: Ch. 0 ~78
Frequency Range	2.400GHz ~ 2.4835 GHz
Transmit Output Power – 1x1	BT: Max +10dBm
Receiver Sensitivity	BT: -89dBm@1Mbps, -85dBm@2Mbps, -83dBm@3Mbps
Security	WiFi : WPA, WPA-PSK, WPA2, WPA2-PSK, WEP 64bit & 128bit, IEEE 802.11x, IEEE 802.11i BT: Simple Pairing
Operating Voltage	3.3 V \pm 9% I/O supply voltage
OS supported	Linux/Android

6. Power Supply DC Characteristics

Symbol	Parameter	Minimum	Typical	Maximum	Units
VBAT_LDO_IN	Battery Supply Voltage	2.8	3.7~5	5.5	V
VA33, VD33IO, SW_HV3,	3.3V Supply Voltage	3.0	3.3	3.6	V
VDD_IO, VDIO_SDIO	Digital IO Supply Voltage	1.62	1.8~3.3	3.6	V
VA12, VA12_BT, VA12_WLG, VD12D	1.2V Core Supply Voltage	1.08	1.2	1.32	V
IDD33	3.3V Rating Current	-	-	600	mA

DC Characteristics

Module	Voltage	Current Consumption (linking)
SM02BD-8723BS-V1.3	3.3V	160mA (上网或者看电影时的功耗)

7. Electrical Specifications

1) RF Characteristics for IEEE802.11b (11Mbps mode unless otherwise specified)

Items	Contents			
Specification	IEEE802.11b			
Mode	CCK 11 Mbps			
Channel frequency	2412 ~ 2484 MHz			
RX (per≤85 dBm@8%)	-85 dBm			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (17±2 dBm)		17		dBm
EVM (≤-18)		-23		dB

2) RF Characteristics for IEEE802.11g (54Mbps mode unless otherwise specified)

Items	Contents			
Specification	IEEE802.11g			
Mode	OFDM 54 Mbps			
Channel frequency	2412 ~ 2484 MHz			
RX (per≤70 dBm@10%)	-70 dBm			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (14±2dBm)		14		dBm
EVM (≤-27)		-28		dB

3) RF Characteristics for IEEE802.11n (BW20_MCS7)

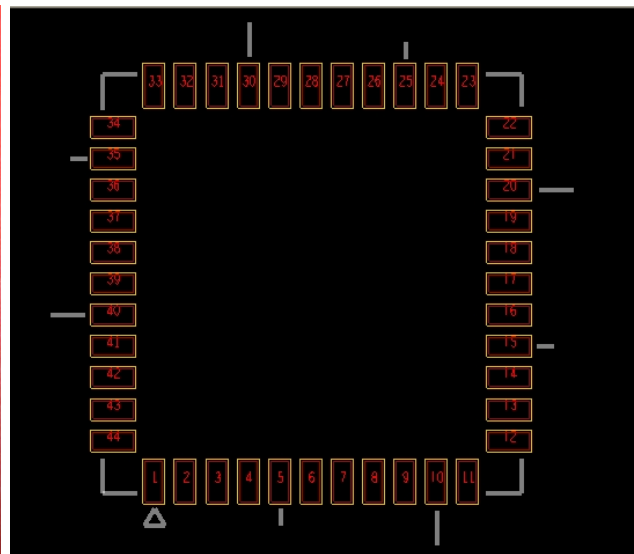
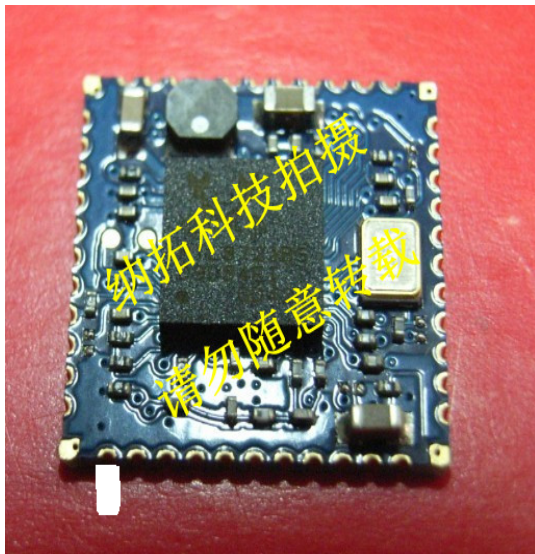
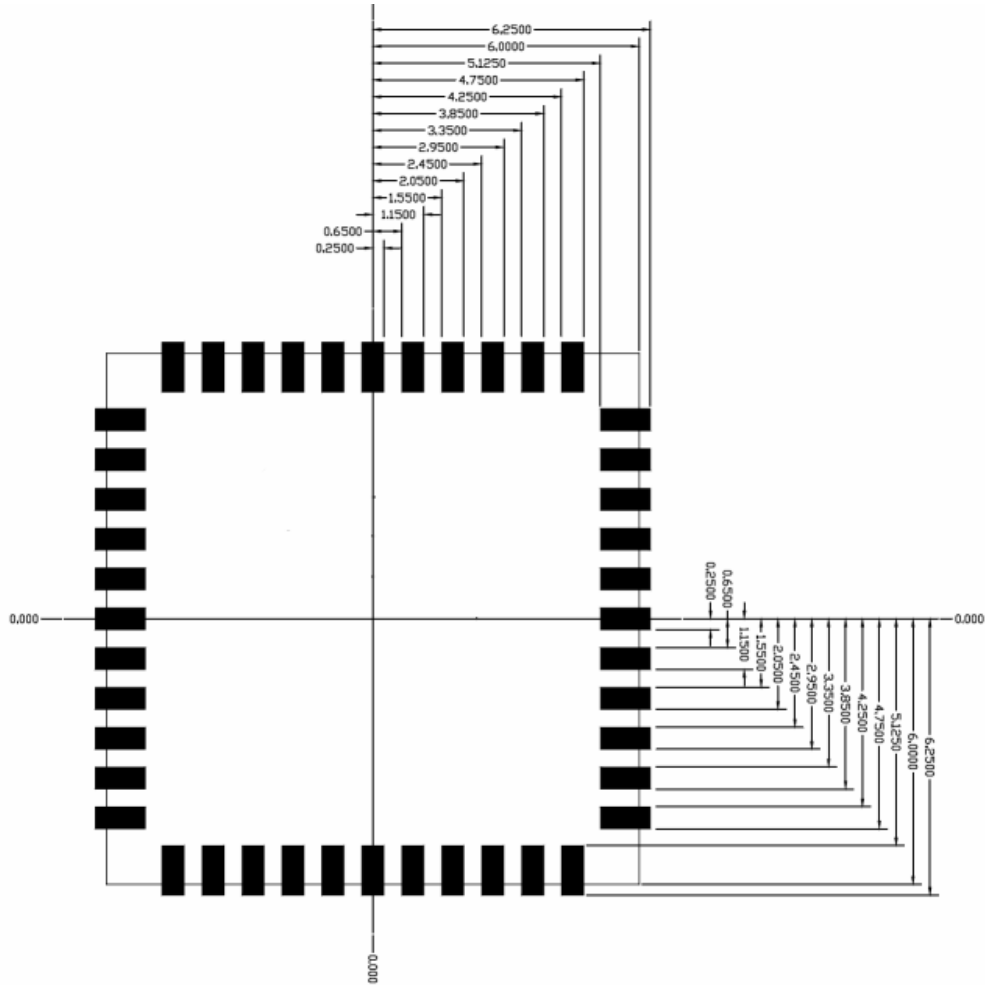
Items	Contents			
Specification	IEEE802.11n (BW20_MCS7)			
Mode	OFDM 65 Mbps			
Channel frequency	2412 ~ 2484 MHz			
RX (per≤65 dBm@10%)	-65 dBm			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (13±2 dBm)		13		dBm
EVM (≤-28)		-28		dB

4) RF Characteristics for IEEE802.11n (BW40_MCS7)

Items	Contents			
Specification	IEEE802.11n (BW40_MCS7)			
Mode	OFDM 135 Mbps			
Channel frequency	2412 ~ 2484 MHz			
RX (per≤65 dBm@10%)	-65 dBm			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (13±2 dBm)		13		dBm
EVM (≤-28)		-28		dB

8.Mechanical

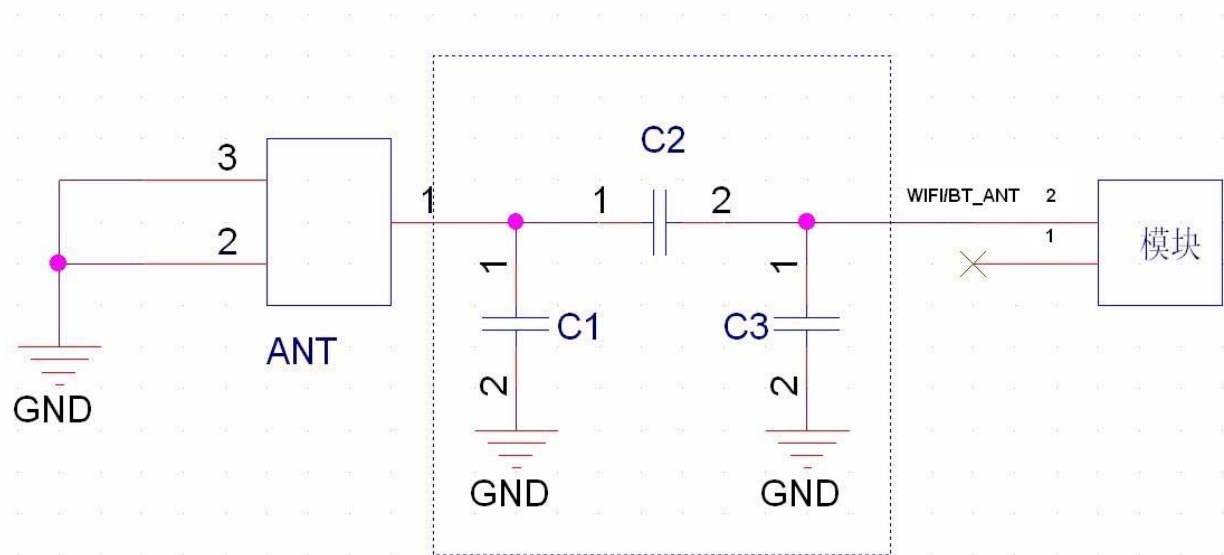
Dimensions (mm)	Length	Width	Height
	12 (Tolerance: $\pm 0.2\text{mm}$)	12 (Tolerance: $\pm 0.2\text{mm}$)	1.6 (Tolerance: $\pm 0.2\text{mm}$)



9. MODULE PIN ASSIGNMENT

PIN	Function	Description
1	GND	Grond
2	WiFi/BT_ANT	RF I/O Port
3	NC	NC
4	NC	NC
5	NC	NC
6	BT_WAKE	HOST wake-up Bluetooth device
7	BT_HOST_WAKE	Bluetooth device to wake-up HOST
8	NC	NC
9	VABT	3.3V±0.1V(Main power voltage source input)
10	NC	NC
11	NC	NC
12	WL_DSI	Shared with GPIO9 This Pin Can Externally Shutdown the RTL8723BS WLAN function when BT_DISn is Pulled Low. When this pin deasserted, SDIO interface will be disabled. This pin can also support the WLAN Ra dio-off function with host interface remaining connected.
13	WL_HOST_WAKE	WLAN to wake-up HOST
14	SDIO_Data_2	SDIO data line 2
15	SDIO_Data_3	SDIO data line 3
16	SDIO_CMD	SDIO command line
17	SDIO_CLK	SDIO CLK line
18	SDIO_Data_0	SDIO data line 0
19	SDIO_Data_1	SDIO data line 1
20	GND	Grond
21	NC	NC
22	VDD_IO	3.3V±0.1V
23	NC	NC
24	SUSCLK_IN	Shared with GPIO6. External 32K or RTC clock input with 1.8V ~ 3.3V swing. This clock source is configured by BT and WL FW, respectively.
25	PCM_DOUT	PCM Data output
26	PCM_CLK	PCM Clock
27	PCM_DIN	PCM data input
28	PCM_SYNC	PCM sync signal
29	NC	NC
30	26MHz_IN	Reference clock input 26MHz Active Crystals (or if pin10/11 input ,pin30 NC)
31	GND	Grond
32	NC	NC
33	GND	Grond
34	BT_DIS#	General Purpose Input/Output Pin
35	NC	NC
36	GND	Grond
37	NC	NC
38	NC	NC
39	NC	NC
40	NC	NC
41	GND	Grond
42	UART_OUT	HOST Data output
43	UART_IN	HOST Data input
44	UART_CTS	HOST_CTS

10.WIFI\BT RF Circuit reference pictures

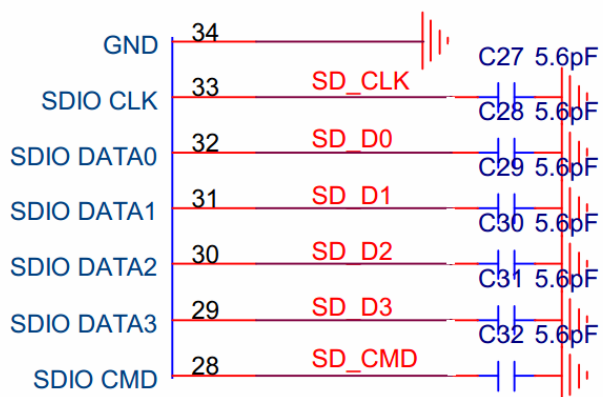


注:1.以上虚线框的部分需要进行天线匹配, 以实际天线匹配的电子元件参数为准.

2.以上为 RF 走线要做 50 欧姆阻抗, 走线不能走 90 度, 走线长度不能超过 15mm.

Note: The RF part layout must do 50 Ω impedance., can't get the line go 90°, can't get the line longer than 15 mm.

11.SDIO interface Circuit reference pictures



Environmental Requirements and Specifications TP Content

1 Temperature

1.1 Operating Temperature Conditions

The product shall be capable of continuous reliable operation when operating in ambient temperature of -10°C to +70°C.

1.2 Non-Operating Temperature Conditions

Neither subassemblies shall be damaged nor shall the operational performance be degraded when restored to the operating temperature when exposed to storage temperature in the range of -45°C to +135°C.

2 PCB Bending

The PCB bending spec shall be keep planeness under 0.1mm for both NATER and end assembly customer.

3 Handling environment

3.1. ESD

Symbol	Ratings	Max	Unit
V_{ESD} (HBM)	Electrostatic discharge voltage (human body model)	2000	V
V_{ESD} (CDM)	Electrostatic discharge voltage (charge device model)	500	

Please handle it under ESD protection environment.

3.2. Terminals

The product is mounted with motherboard through half hole. In order to prevent poor soldering, please do not touch the pad by hand.

3.3. Falling

It will cause damage on the mounted components when the product is falling or receiving drop shock. It may cause the product mal-function.

4 Storage Condition

4.1 Moisture barrier bag before opened

Moisture barrier bag must be stored under 30 degree C, humidity under 85% RH. The calculated shelf life for the dry packed product shall be a 12 months from the bag seal date.

4.2. Moisture barrier bag open

Humidity indicator cards must be blue, <30%.

5 Baking Condition

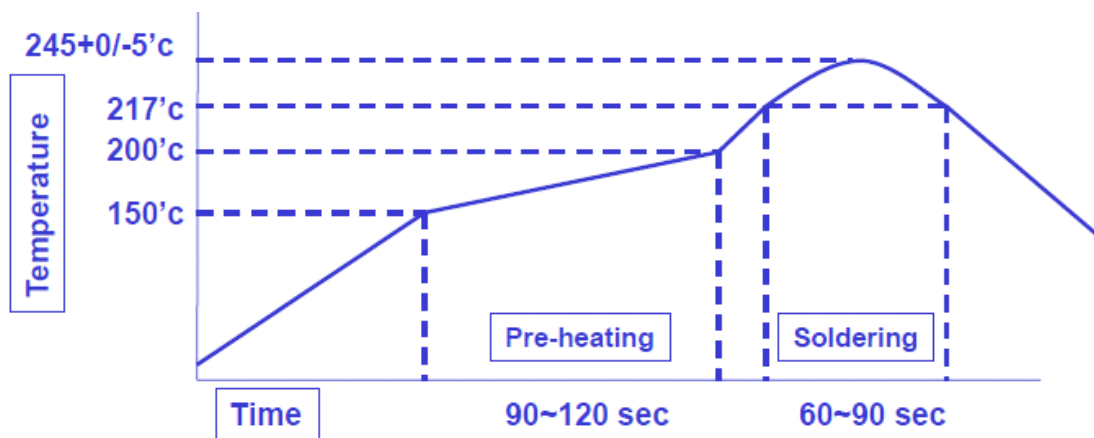
Products require baking before mounting if

- humidity indicator cards reads >30%
- temp <30 degree C, humidity < 70% RH, over 96 hours

Baking condition: 90 degree C, 12-24 hours

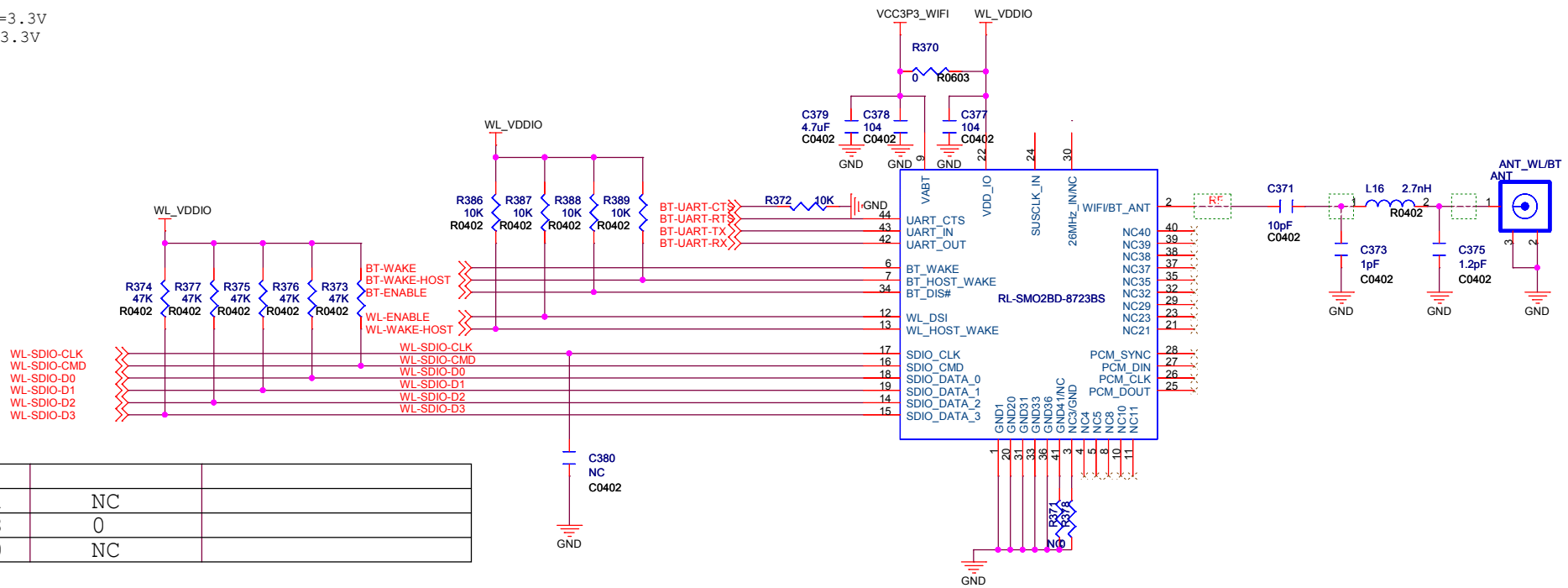
Baking times: 1 time

6 Soldering and reflow condition



- ◆ Follow the solder paste composition to set the reflow profile
- ◆ Lead free solder paste(SAC305, SAC387 or SAC405) reflow profile setting as above :
 - Ramp up rate (to Peak temp) : < 1.2°C/sec, typically
 - Time above Liquidus(217°C) : 60~90Sec
 - Peak Temp : 245±0/-5°C
 - Ramp-down rate (Peak to RT) : 1~3°C/sec, typically

WL-VDDIO =3.3V
 VCC-WIFI=3.3V



R371	NC	
R378	0	
R380	NC	

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