SPECIFICATION

IEEE 802.11 b/g/n 2.4GHz 1T1R WiFi with Bluetooth2.1 /3.0/4.0,and FM CONTROLLER with SDIO INTERFACE, and HS-UART MIXED INTERFACE

SM02BS (Realtek RTL8723BS)

Combo Module

Version 1.1

PRODUCT DESCRIPTION

SM02BS is a small size and low profile of WiFi+BT combo module with LGA (Land-Grid Array) footprint, board size is 14mm*14mm with module height of 2mm. 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.

SM02BS 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
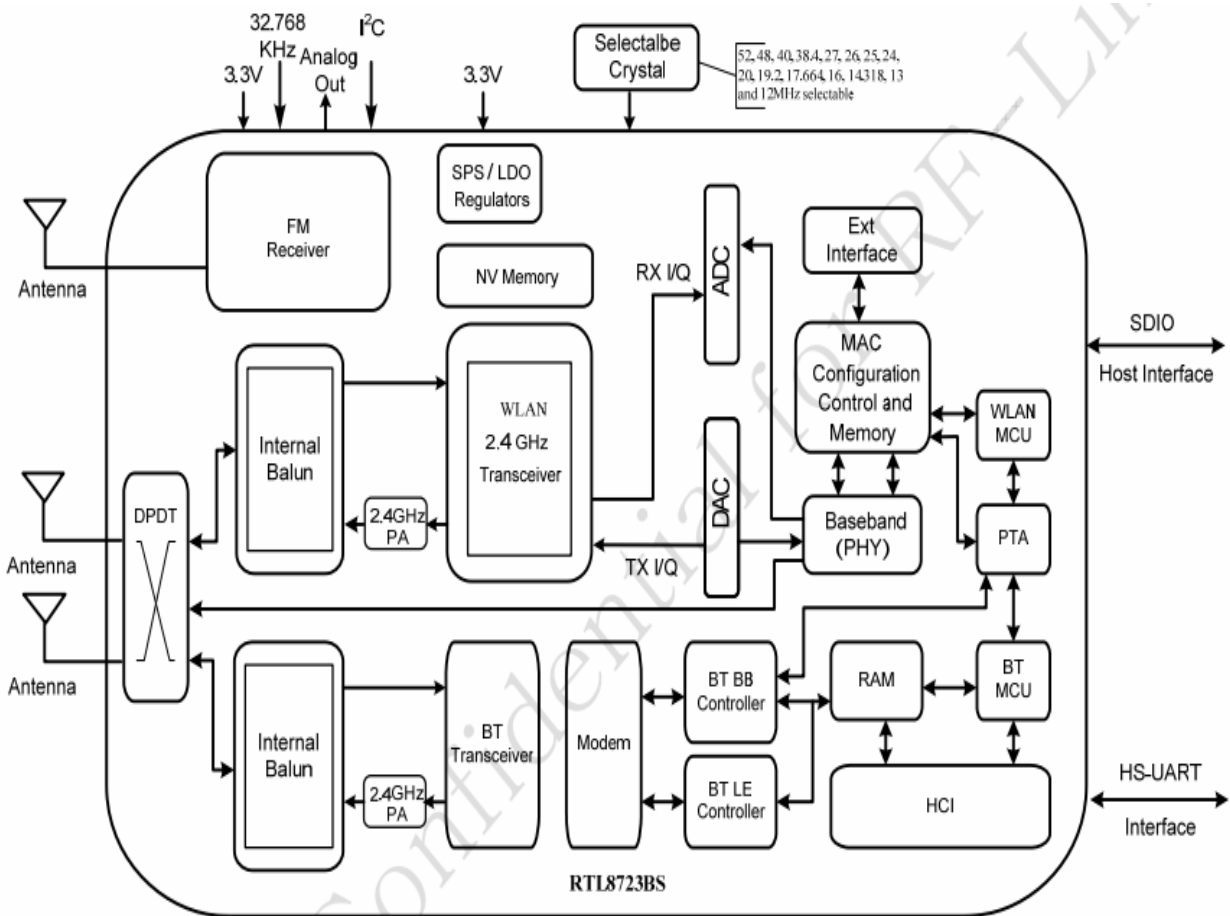PCB.

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

Diagram
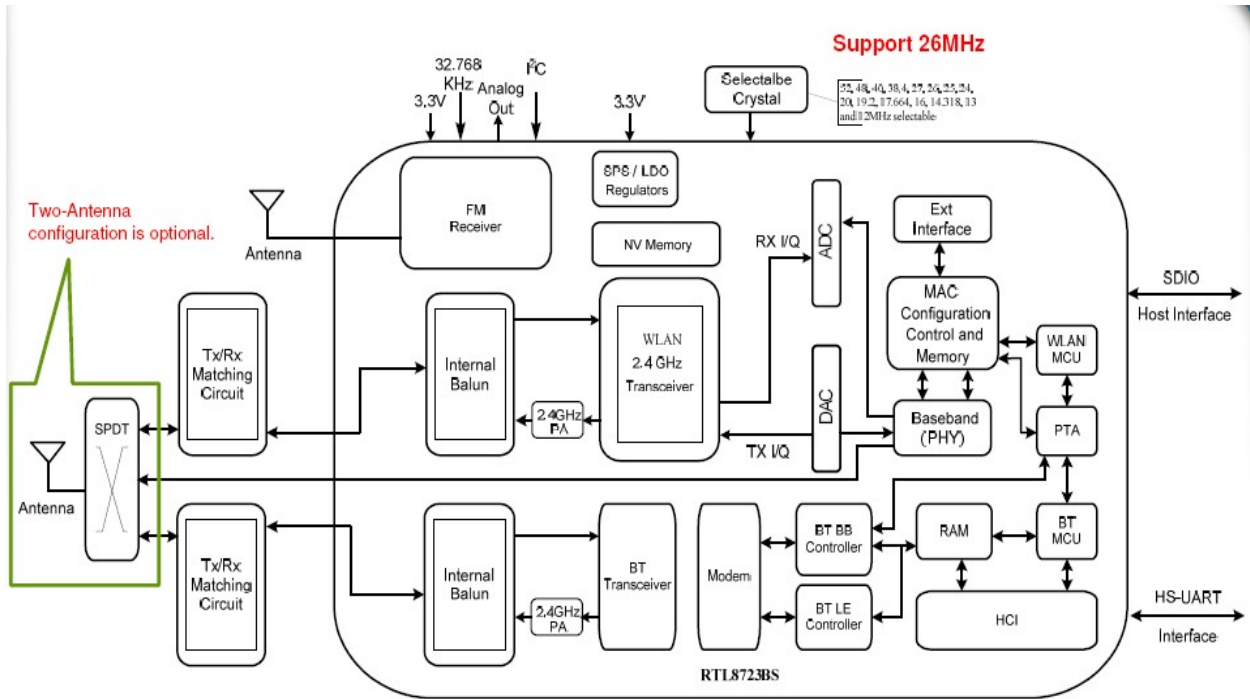
RTL8723BS with shared antenna between WLAN and Bluetooth
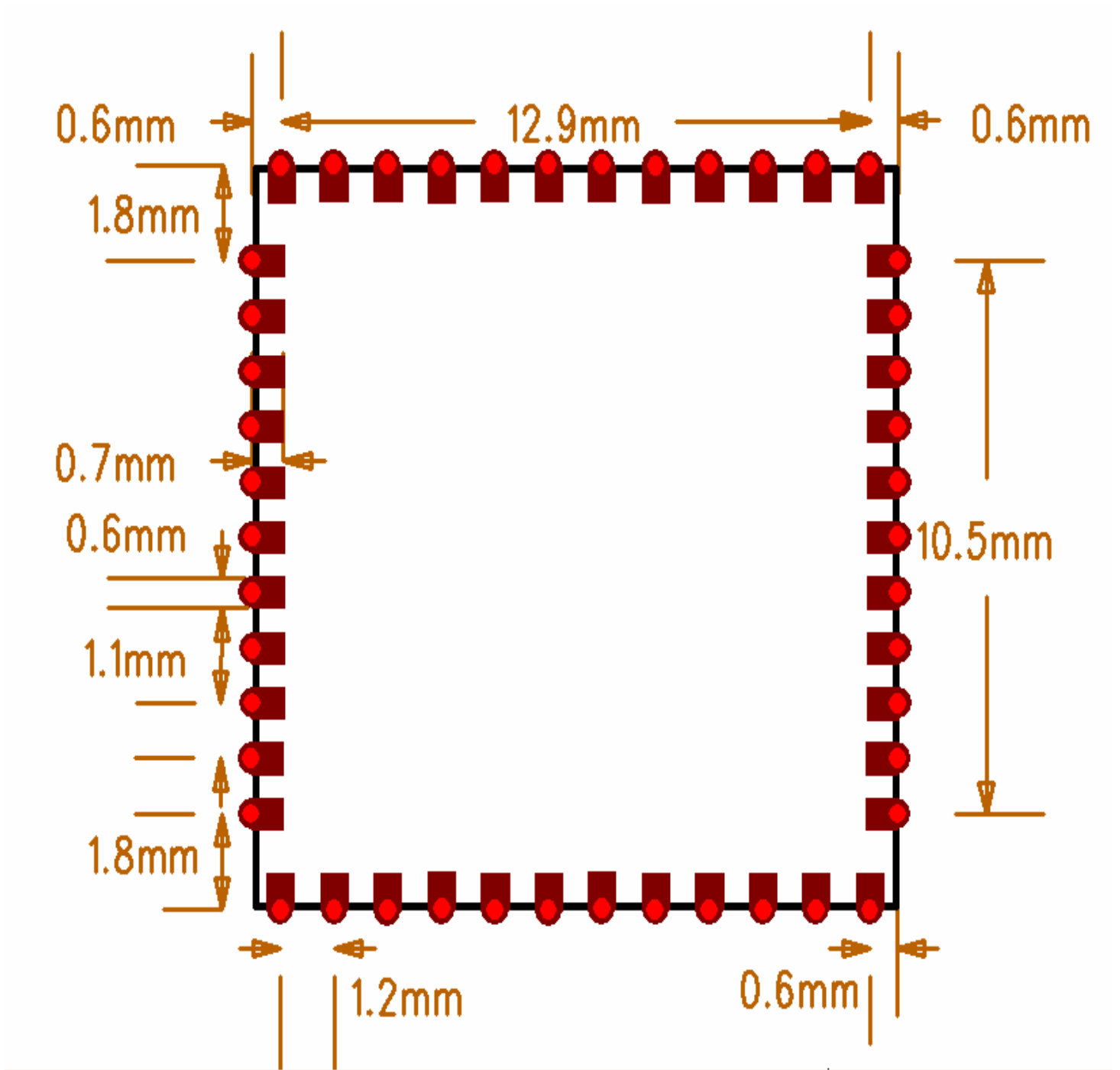

RTL8723BS with antenna diversity

PRODUCT SPECIFICATIONS

Main chipset	RTL8723BS (Realtek)
Standards	**WiFi:** EEE 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, π/4 DQPSK, GFSK

Network Architecture	**WiFi:**
	  Ad-hoc mode (Peer-to-Peer)
	  Infrastructure mode
	  Software AP
	  WiFi Direct
	
	BT:
	  Pico Net
	  Scatter Net

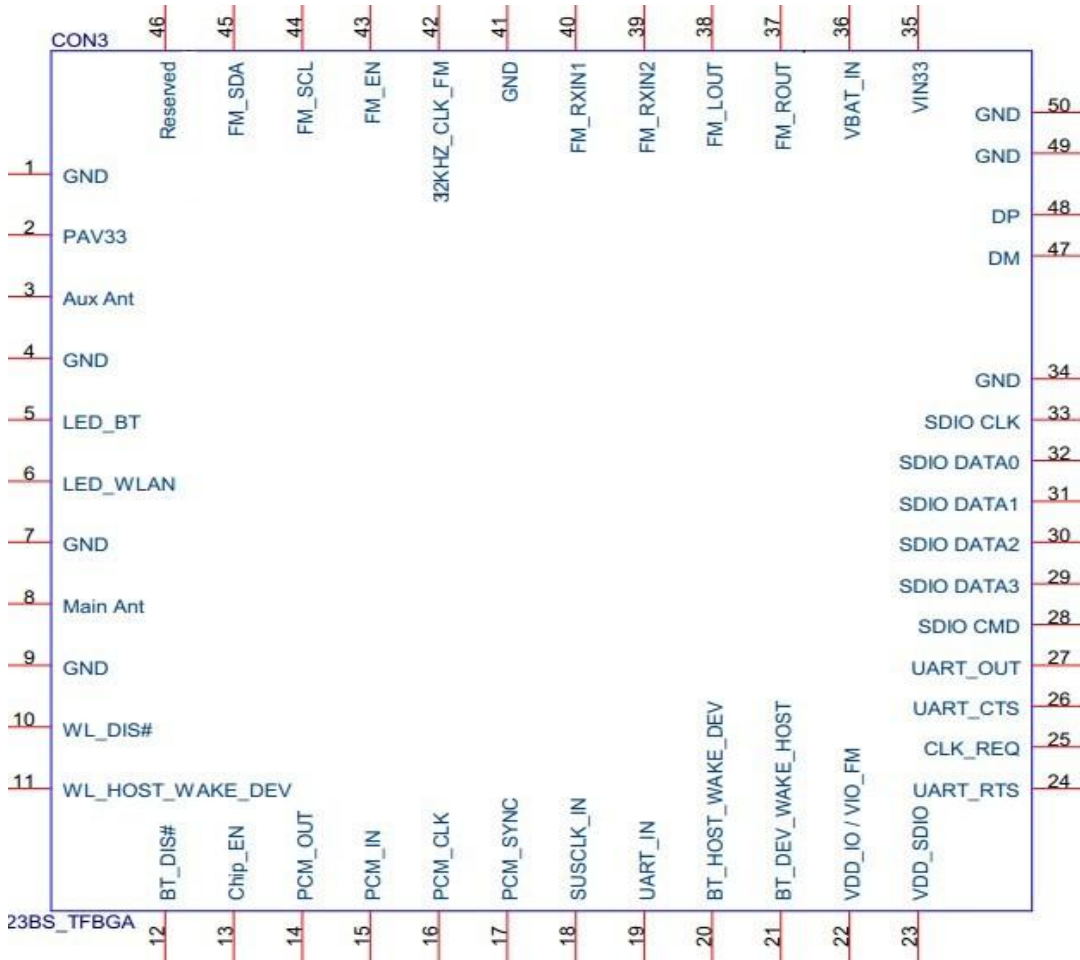|	

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 (Tolerance:±1.5dBm)	**802.11b@11Mbps** 16dBm	**802.11g@6Mbps** 15dBm **802.11g@54Mbps** 14dBm	**802.11n** 13dBm (MCS 0_HT20) 13dBm (MCS 7_HT20) 12dBm (MCS 0_HT40) 12dBm (MCS 7_HT40)
	BT: Max +10dBm		

Receiver Sensitivity	**802.11b@11Mbps** -82dBm	**802.11g@54Mbps** -71dBm	**802.11n** -67dBm (MCS 7_HT20) -64dBm (MCS 7_HT40)
	BT: -89dBm@1Mbps, -90dBm@2Mbps, -83dBm@3Mbps		

Security	**WiFi :**
	   WPA, WPA-PSK, WPA2, WPA2-PSK, WEP 64bit & 128bit, IEEE 802.11x, IEEE 802.11i
	
	BT:
	   Simple Paring

Operating Voltage	3.3 V ±9% I/O supply voltage
OS supported	Linux/Android

Power Consumption (3.3V) (Typical)	**WiFi only**
	     TX Mode: (Conituous mode)
	     85mA (MCS7/BW40/13dBm)
	     RX Mode: (Conituous mode)
	     75mA (MCS7/BW40/-60dBm)
	     Associated Idle with DTIM=1
	     2.1mA
	     Unassociated Idle:
	     0.1mA
	     RF disable Mode:
	     0.1mA
	BT :
	     Inquiry & Page Scan:
	     0.9 mA
	     ACL no traffic:
	     7.5mA
	     SCO HV3:
	     15mA

Mechanical

Dimensions (mm)	Length	Width	Height
	14 (Tolerance: ±0.2mm)	14 (Tolerance: ±0.2mm)	1.6 (Tolerance: ±0.2mm)

MODULE PIN ASSIGNMENT

| PIN	Function	Description
1	GND	Ground
2	PAV33	3.3V
3	Aux Ant	BT Antenna
4	GND	Ground
5	LED_BT	Shared with LED1. BT UART Data In
6	LED_WLAN	LED Pin (Active Low), shared with GPIO8
7	GND	Ground
8	MAIN ANT	RF Antenna
9	GND	Ground
10	WL_DIS	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 Radio-off function with host interface remaining connected.
11	WL_DEV_WAKE_HOST	General Purpose Input/Output Pin
12	BT_DIS	General Purpose Input/Output Pin
13	CHIP_EN	This Pin Can externally shut down the RTL8723BS (No Extra Power Switch Required). When this function is not required, external pull high is required.

14	PCM_OUT	PCM data Out, shared with GPIO1
15	PCM_IN	PCM data Input, shared with GPIO0
16	PCM_CLK	PCM Synchronization control, shared with GPIO2
17	PCM_SYNC	PCM_SYNC
18	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.
19	UART_IN	High-Speed UART Data In
20	BT_HOST_WAKE_DEV	Shared with GPIO13 The Host wakes up the WLAN and Bluetooth controller in Remote Wakeup Mode.
21	BT_DEV_WAKE_HOST	Shared with GPIO14 This pin is shared with both WIFI and BT functions to wakeup the host when the remote wake function is enabled. The Polarity can be defined by the customer.
22	VDD_IO / VIO_FM	VDD for GPIO0 to GPIO3 and GPI9to GPIO15 (3.3V~1.8V)
23	VDD_SDIO	VDD for SDIO and UART Pin, the power supply is same as the signal level of SDIO bus and UART bus (3.3V~1.8V)
24	UART_RTS	High-Speed UART RTS
25	CLK_REQ	Shared with GPIO15. When RTL8723B XTAL clock is fed from host chipset, it will assert CLKREQ to request XTAL clock. Otherwise, RTL8723BS will de-assert CLKREQ to indicate host chipset that there is no need to output the XTAL clock to RTL8723BS. This signal is used for power saving control with host chipset.
26	UART_CTS	High-Speed UART CTS
27	UART_OUT	High-Speed UART Data Ou
28	SDIO CMD	SDIO Command Input
29	SDIO DATA3	SDIO Data Line 3
30	SDIO DATA2	SDIO Data Line 2
31	SDIO DATA1	SDIO Data Line 1
32	SDIO DATA0	SDIO Data Line 0
33	SDIO CLK	SDIO Clock Input
34	GND	Ground
35	VIN33	VDD3.3V for Digital IO (GPIO6, LED 1, EESK and EECS)
36	VBAT_IN	Battery LDO input, 5.5V ~ 2.8V
37	FM_ROUT	FM analog audio output R
38	FM_LOUT	FM analog audio output L
39	FM_RXIN2	FM RF RX input N
40	FM_RXIN1	FM RF RX input P
41	GND	Ground
42	32KHZ_CLK_FM	32.768kHz clock input
43	FM_EN	This Pin is used to turn ON/OFF FM radio receiver.
44	FM_SCL	FM I^{2}C clock
45	FM_SDA	FM I^{2}C DATA
46	Reserved	General Purpose Input/Output Pin

WIFI\BT RF Circuit reference pictures

C1：0欧
C2：NA
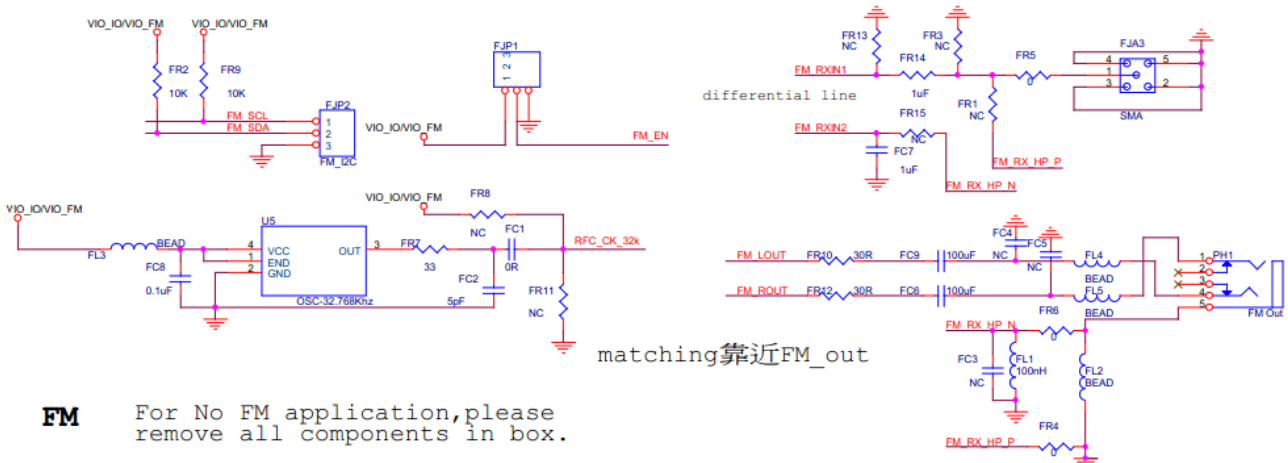C3：NA
C4：10PF
C5：1PF
C6：2.7nH
C7：1.2PF

WIFI\BT RF电路参考图
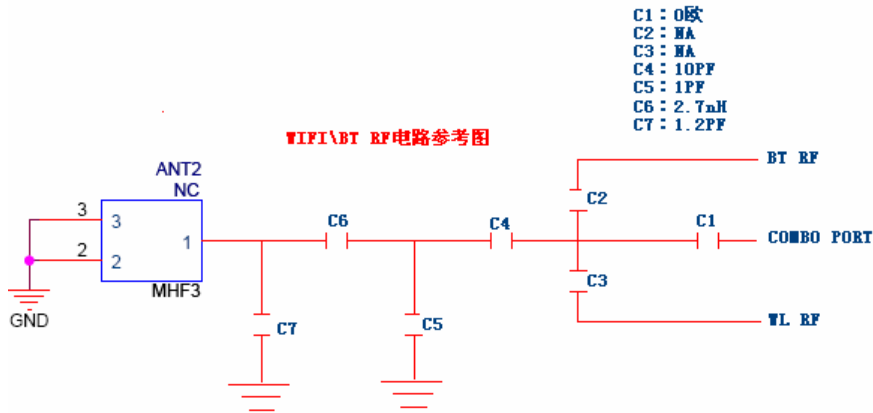
Note: The RF part layout must do 50 Ωimpedance.，can't get the line go 90°，can't get the line longer than 15 mm.

SDIO interface Circuit reference pictures
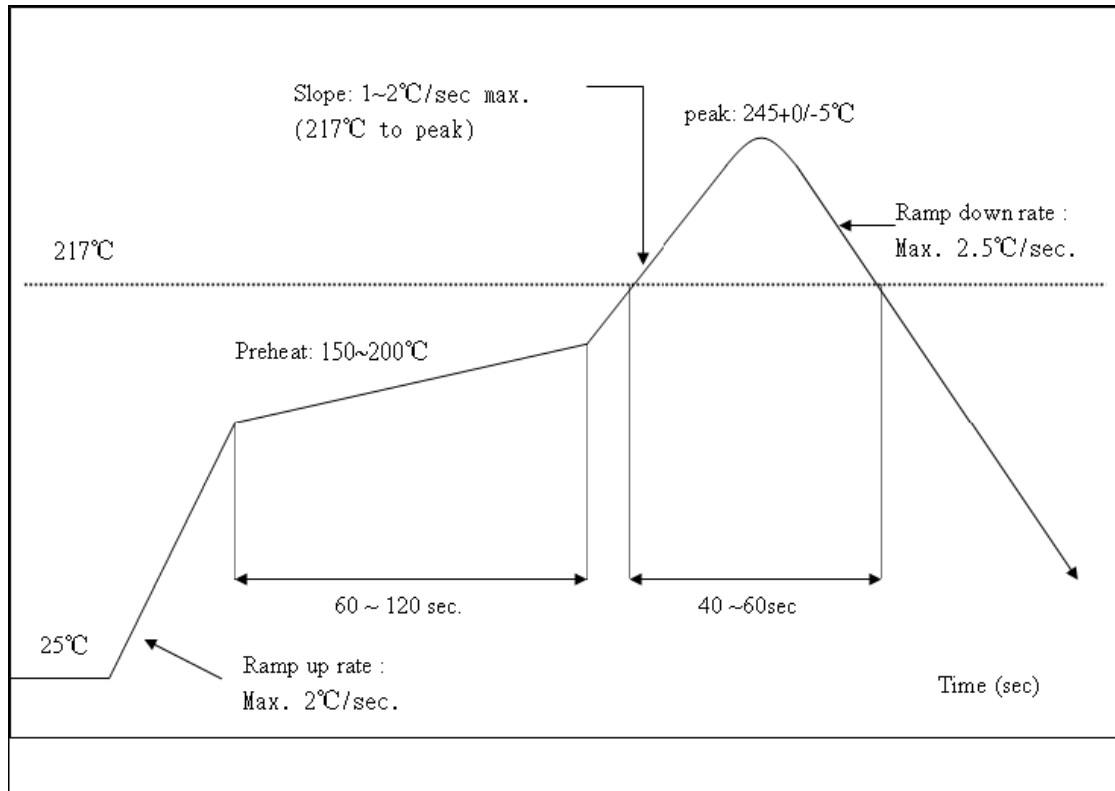

FM interface Circuit reference pictures

FM   For No FM application,please remove all components in box.
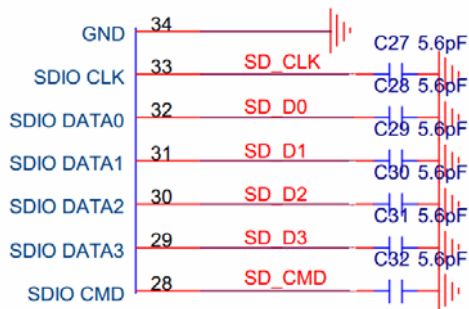
Recommended Reflow Profile

Referred to IPC/JEDEC standard.
Peak Temperature : <250°C
Number of Times : ≤2 times

ENVIRONMENTAL

Operating
Operating Temperature: 0°C to +70 °C
Relative Humidity: 5-90% (non-condensing)

Storage
Temperature: -40°C to +80°C (non-operating)
Relevant Humidity: 5-95% (non-condensing)

MTBF caculation
Over 150,000hours

Wireless module before the SMT note:

1.When customers Open stencil must be sure the hole bigger to the Wireless module plate, please press 1 to 1 and 0.7 mm is widened to open outward, the thickness of 0.12 mm.

2.Can't get the wifi module bare hands when needs,must we wear the gloves and static ring.

3.The furnace temperature according to the size of the customer the mainboard ,generally like to stick on a tablet standard temperature of 250 + - 5,can do 260 + - 5.

Storage and use Wifi module control should pay attention to the following matters:

1.Module of the storage life of vacuum packaging：

1-1.Storage life：12 months. Storage conditions:<40℃. Relative humidity:<90%R.H.

1-2.After this bag is opened，devices that will be subjected to infrared reflow, vapor-phase reflow, or equivalent processing must be：

1-3.Check the humidity card :stored at ≦20%RH.If :30%~40%(pink)or greater than 40%(red).Labeling module has moisture absorption.

   ① Mounthed within 168 hours at factory conditions of: t≦30%℃, ≦60%R.H.

   ② Once opened, the workshop the preservation of life for 168 hours.

1-4.If baking is required,devices may be baked for:

   ① Modules must be to remove module moisture problem.

   ② Baking temperature: 125 ℃, 8 hours.

   ③ After baking, put proper amount of desiccant to seal packages.

1-5.Module vacuum packing 2000 PCS per disc.

2.Module reel packaging items as follows.

2-1.Storage life：12 months. Storage conditions:<40℃. Relative humidity:<90%R.H.

2-2.Module apart packing after 168 hours，To launch patch need to bake, to remove the module hygroscopic, baking temperature conditions：125℃，8hours.

2-3.Reel packing 2000 PCS or 1000 PCS per disc.

3.Module pallet packaging items as follows：

3-1.Storage life：3 months. Storage conditions:<40℃. Relative humidity:<90%R.H.

3-2.Module if not used within 48 hours, before launch the need for baking, baking temperature: 125 ℃, 8 hours.

3-3.Pallet packaging each plate is 100 PCS to 1000 PCS or 2000 PCS shipment.

Wifi 模块贴片装机前注意事项：

1.客户在开钢网时一定要将 wifi 模块焊盘的孔开大，请按 1 比 1 再向外扩大 0.7mm 比例开钢网，厚度按 0.12mm.

2.有需要拿 wifi 模块时不可以光手去拿，一定要戴上手套以及静电环.

3.过炉温度要根据客户主板的大小而定，一般像平板电脑上的标准温度为250+-5°，也可以做到260+-5°

Wifi 模块储存及使用管制应注意事项如下：

1.模块的真空包装之储存期限：

1-1.保存期限：12个月，储存环境条件：温度在：<40℃，相对湿度：<90%R.H.

1-2.模块包装被拆后，SMT 组装之时限：

1-3.检查湿度卡：显示值应小于30%（蓝色），如：30%~40%(粉红色)或者大于40%（红色）表示模块已吸湿气.

   ① 工厂环境温度湿度管制：≦30%℃，≦60%R.H。

   ② 拆封后，车间的保存寿命为 168 小时.

1-4.如在拆封后的 168 个小时内未使用完，需要烘烤，烘烤条件如下：

   ① 模块须重新烘烤，以除去模块吸湿问题.

   ② 烘烤温度条件：125℃，8 小时.

   ③ 烘烤后，放入适量的干燥剂再密封包装.

1-5.模块真空包装每盘 2000pcs，真空包装图片<1>

2.模块卷盘包装事项如下：

2-1.保存期限：12个月，储存环境条件：温度在：<40℃，相对湿度：<90%R.H.

2-2.模块拆开包装168小时后，如要上线贴片需要重新烘烤，以除去模块吸湿问题，烘烤温度条件：125℃，8小时.

2-3.卷盘包装标准为每盘 2000pcs，也可以 1000pcs.

3.模块托盘包装事项如下：

3-1.保存期限：3个月，储存环境条件：温度在：<40℃，相对湿度：<90%R.H.

3-2.模块如在 48 小时内未使用，在上线之前需要进行烘烤，烘烤温度条件：125℃，8 小时。

3-3.托盘包装每盘为 100pcs，以 1000pcs 或 2000pcs 出货.