HK NATER TECH LIMITED

RL-UM02WBS-8723BU Specification

Customer: _____

Description: RL-UM02WBS-8723BU-V1.2

Customer P/N:_____

Date: _____

Customer		
Approve	Auditing	Admit

Provider		
Approve	Auditing	Admit

Customer:	Provider:HK NATER TECH LIMITED
Add:	Add: 2F,NO.27,2 Baomin Rd.,Baoan Dist.SZ City,China
Tel:	Tel:0086-755-61522172/13510620050
Fax:	Fax:0086-755-61522171
Attn:	Attn:Lingo
E-mail:	E-mail:hsdgood@163.com

SPECIFICATIONS

IEEE 802.11 b/g/n 2.4GHz

BT V2.1/BT V3.0/BT V4.0

WiFi+BT 1T1R Module

RL-UM02WBS-8723BU

Version: V1.2

1.General Description

RTL8723BU is a highly integrated single-chip 802.11n Wireless LAN (WLAN) USB 2.0 Multi-Function network interface controller with integrated Bluetooth 2.1/3.0/4.0 controller. It combines a WLAN MAC, a 1T1R capable WLAN baseband, and RF in s single chip. The RTL8723BU provides a complete solution for a high-performance integrated wireless and Bluetooth device. The integration provides better coordination between 802.11 and Bluetooth, and with sophisticated dynamic power control and packet traffic arbitration, RTL8723BU is able to provide the best coexistence performance Overview.

General

- IEEE 802.11b/g/n 1T1R WLAN and Bluetooth single chip

Host Interface

- Complies with USB2.0 for WLAN and BT controller
- USB Multi-Function for both BT (USB function 0) and WLAN (USB function 1)
- USB LPM/ USB SS supported

WLAN Controller

- CMOS MAC, Baseband PHY, and RF in a single chip for IEEE 802.11b/g/n compatible WLAN
- Integrated Balun and DPDT
- Complete 802.11n solution for 2.4GHz band
- 72.2Mbps receive PHY rate and 72.2Mbps transmit PHY rate using 20MHz bandwidth
- 150Mbps receive PHY rate and 150Mbps transmit PHY rate using 40MHz bandwidth
- Backward compatible with 802.11b/g devices while operating in 802.11n mode
- IEEE 802.11b/g/n compatible WLAN
- IEEE 802.11e QoS Enhancement (WMM)
- IEEE 802.11i (WPA, WPA2). Open, shared key, and pair-wise key authentication services
- WAPI supported
- Switch diversity for DSSS/CCK
- Packet based hardware antenna diversity
- Selectable receiver FIR filters
- Programmable scaling in transmitter and receiver to trade quantization noise against increased probability of clipping
- Fast receiver Automatic Gain Control (AGC)

Other Features

- Supports Wake-On-WLAN via Magic Packet and Wake-up frame
- Support S3/S4 AES/TKIP group key update
- Support Win8 Network List Offload
- Support TCP/UDP/IP checksum offload

Bluetooth Controller

- Compatible with Bluetooth v2.1 and v3.0 Systems
- Supports Bluetooth 4.0 Low Energy(BLE)
- Integrated MCU to execute Bluetooth protocol stack
- Supports all packet types in basic rate and enhanced data rate
- Supports 4 piconets in a scatternet
- Supports Secure Simple Pairing
- Supports Low Power Mode (Sniff/Sniff Sub-rating/Hold/Park)
- Enhanced BT/WIFI Coexistence Control to improve transmission quality in different

WLAN MAC Features

- Frame aggregation for increased MAC efficiency (A-MSDU, A-MPDU)
- Low latency immediate High-Throughput Block Acknowledgement (HT-BA)
- PHY-level spoofing to enhance legacy compatibility
- Multi MACID support with Fast Channel switch
- Channel management and co-existence
- Transmit Opportunity (TXOP) Short Inter-Frame Space (SIFS) bursting for higher multimedia bandwidth
- WiFi Direct supports wireless peer to peer applications

WLAN PHY Features

- IEEE 802.11n OFDM
- One Transmit and one Receive path (1T1R)
- 20MHz and 40MHz bandwidth transmission
- Support 2.4GHz band channels
- Short Guard Interval (400ns)
- DSSS with DBPSK and DQPSK, CCKmodulation with long and short preamble
- OFDM with BPSK, QPSK, 16QAM, 64QAM modulation.

  Convolutional Coding Rate: 1/2, 2/3, 3/4, and 5/6
- Maximum data rate 54Mbps in IEEE 802.11g; and 150Mbps in IEEE 802.11n

profiles

- Bluetooth 4.0 Dual Mode support: Simultaneous LE and BR/EDR
- Supports multiple Low Energy states
- Support 3D Glasses application
- Support Intel Latency Tolerance Reporting (LTR)

Bluetooth Transceiver

- Fast AGC control to improve receiving dynamic range
- Supports AFH to dynamically detect channel quality to improve transmission quality
- Integrated internal Class 1, Class 2, and Class 3 PA
- Bluetooth 3.0+HS compliant
- Supports Enhanced Power Control
- Supports Bluetooth Low Energy
- Integrated 32K oscillator for power management

Peripheral Interfaces

- General Purpose Input/Output (8 pins)
- 4-wire EEPROM control interface (93C46)
- Three configurable LED pins
- Flexible XTAL frequency selection(52, 48, 40, 38.4, 27, 26, 25, 24, 20, 19.2, 17.664, 16, 14.318, 13 and 12MHz)
- Support XTAL or external clock input

2.General Specification

Model	RL-UM02WBS-8723BU-V1.2
Product Name	WLAN 11b/g/n USB2.0 module
Major Chipset	Realtek RTL8723BU
Standard	WIFI: IEEE802.11n 、IEEE 802.11g、IEEE 802.11b BT :V2.1/BT V3.0/BT V4.0
Data Transfer Rate	1,2,5.5,6,11,12,18,22,24,30,36,48,54,60,90,120 and maximum of 150Mbps
Modulation Method	DSSS,DBPSK, DQPSK, CCK and OFDM (BPSK/QPSK/16-QAM/ 64-QAM)
Frequency Band	2.400GHz ~ 2.4835 GHz
Spread Spectrum	IEEE 802.11b: DSSS (Direct Sequence Spread Spectrum) ,CCK(Com plem e ntary Code Keying) IEEE 802.11g/n:OFDM (Orthogonal Frequency Division Multiplexing)
Operation Range	Up to 180 meters in open space
OS Support	Windows 2000,XP32-64,Vista 32/64,Win7 32/64,Linux,Mac, Android, WIN CE
Security	WEP, TKIP, AES, WPA, WPA2
Bus Interface	WiFi：USB2.0 BT: USB2.0
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
Power Consumption	3.3 V ±0.2V I/O supply voltage
Operating Temperature	-10 ~ +70° C ambient temperature
Storage Temperature	-10 ~ 70°C ambient temperature
Humidity	5 to 90 % maximum (non-condensing)
Dimension	13. 4 x 12. 2 x 1.6mm (LxWxH) +-0.2MM

3.Block Diagram

Single-Band 11n (1x1) Solution with Integrated Bluetooth Controller with Antenna Diversity

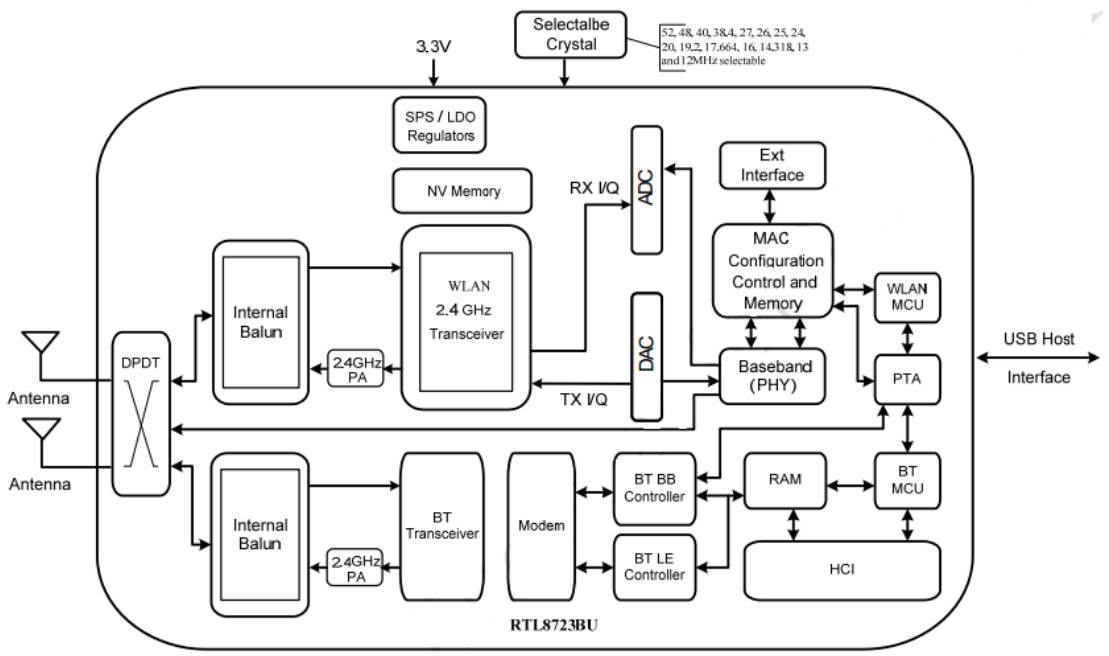


Figure 1. Single-Band 11n (1x1) and Integrated Blue tooth Controller Solution with Antenna Diversity

4.Power Supply DC Characteristics

Symbol	Parameter	Minimum	Typical	Maximum	Units
VA33, VA33_PAD_S0, VA33_PA_S0,VA33_PAD_S1 VA33_PA_S1,VA33_WLG_SYN,VA33_AFE,VD33IO,VDD_IO	3.3V Supply Voltage	3.0	3.3	3.6	V
VA12,VA12_BT,VA12_BT_SYN,VA12_WLG,VA12_WLG_SYN, VA12_AFE, VD12D	1.2V Core Supply Voltage	1.10	1.2	1.32	V
IDD33	3.3V Rating Current	-	-	600	mA

DC Characteristics

Module	Voltage	Current Consumption (linking)
RL-UM02WBS-8723BU-V1.2	3.3V	160mA (上网或者看电影时的功耗)

5.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)		-18		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 (≤-28)		-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)

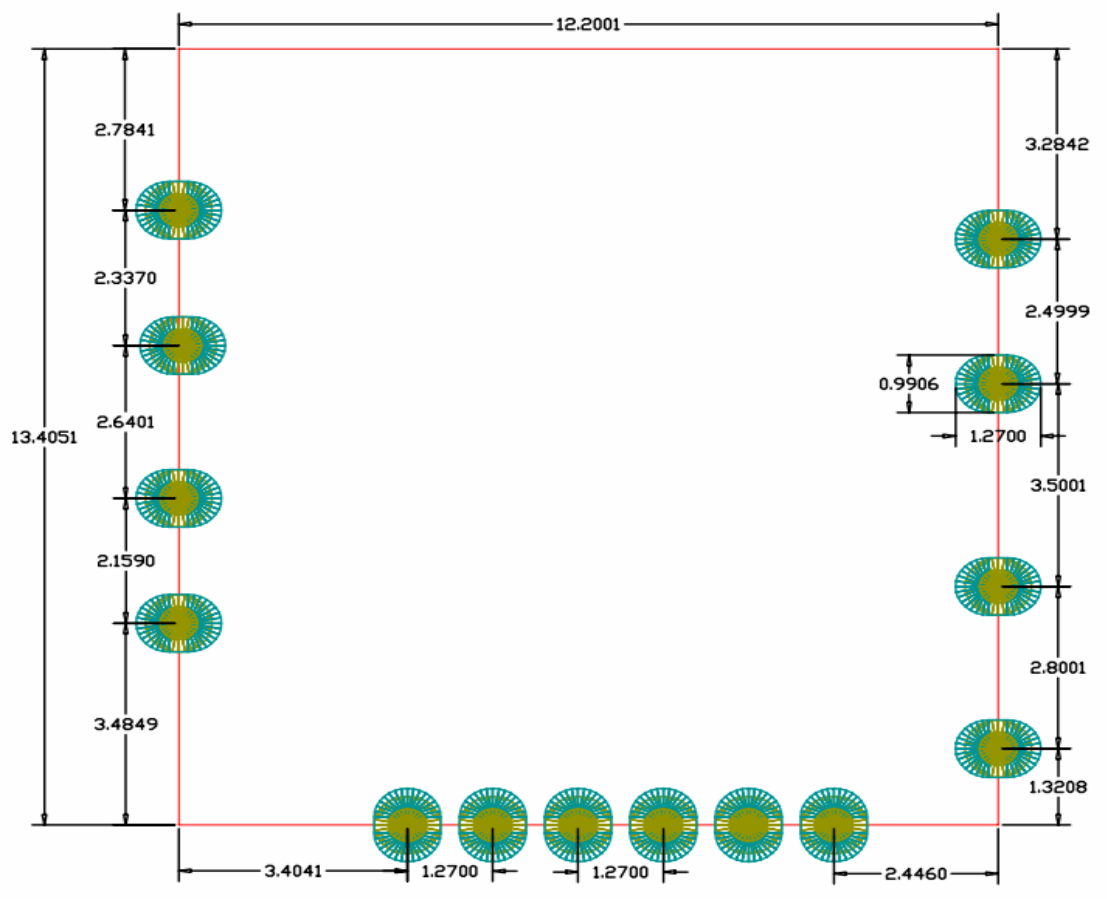
Items	Contents			
Specification	IEEE802.11n (BW40_MCS7)			
Mode	OFDM 135 Mbps			
Channel frequency	2412 ~ 2484 MHz			
RX (per≤65 dBm@10%)	-65 dBm			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (13±2 dBm)		13		dBm
EVM (≤-28)		-28		dB

6.Bluetooth Specification

Feature		Description		
General Specification				
Bluetooth Standard		Bluetooth V3.3 of 1, 2 and 3 Mbps.		
Host Interface		UART		
Antenna Reference		Small antennas with 0~2 dBi peak gain		
Frequency Band		2.400 GHz ~ 2483.5 GHz		
Number of Channels		79 channels		
Modulation		FHSS, GFSK, DPSK, DQPSK		
RF Specification				
		Min	Typical	Max
Output Power (Class 1.5)			10	
Output Power (Class 2)			2	
Sensitivity @ BER=0.1%	for GFSK (1Mbps)		-89	
Sensitivity @ BER=0.01%	for π/4-DQPSK (2Mbps)		-85	
Sensitivity @ BER=0.01%	for 8DPSK (3Mbps)		-83	
Maximum Input Level		GFSK (1Mbps):-20dBm		
		π/4-DQPSK (2Mbps) :-20dBm		
		8DPSK (3Mbps) :-20dBm		

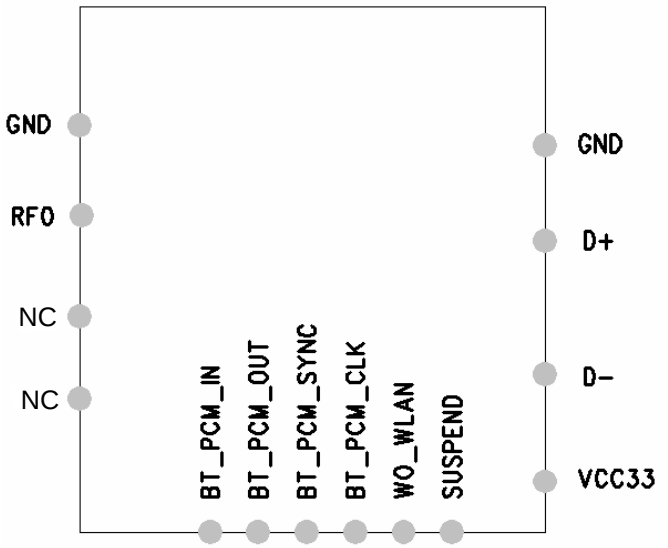
7.Mechanical

Dimensions (mm)	Length	Width	Height
	13.4 **(Tolerance:±0.2mm)**	12.2 **(Tolerance:±0.2mm)**	1.6 **(Tolerance:±0.2mm)**

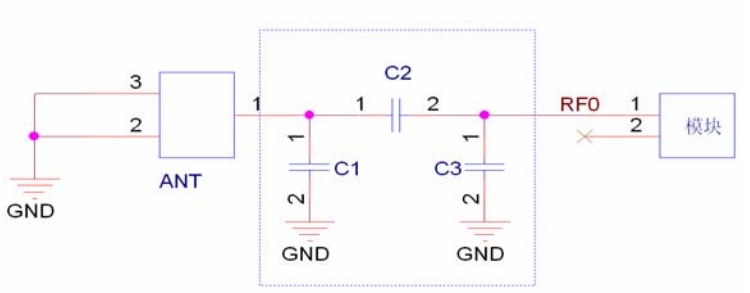


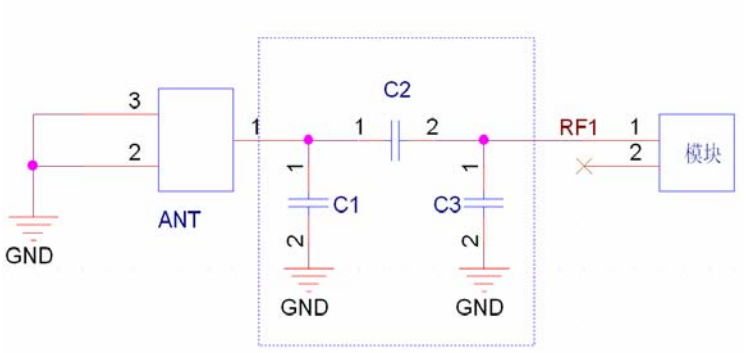
8.Module Pin Assignment

Pin	Function	Description
1	GND	Grond
2	RF0	WLAN/BT RF TX/RX signal0
3	RF1	NC
4	XIN	NC
5	GND	Grond
6	D+	High-Speed USB D+ Signal
7	D-	High-Speed USB D- Signal
8	VCC33	VDD3.3V for Digital IO
9	SUSPEND	Host wakeup pin
10	WO_WLAN	Host wakeup pin
11	BT_PCM_CLK	PCM clock
12	BT_PCM_SYNC	PCM sync
13	BT_PCM_OUT	PCM output
14	BT_PCM_IN	PCM input



9.1.WIFI RF Circuit reference pictures

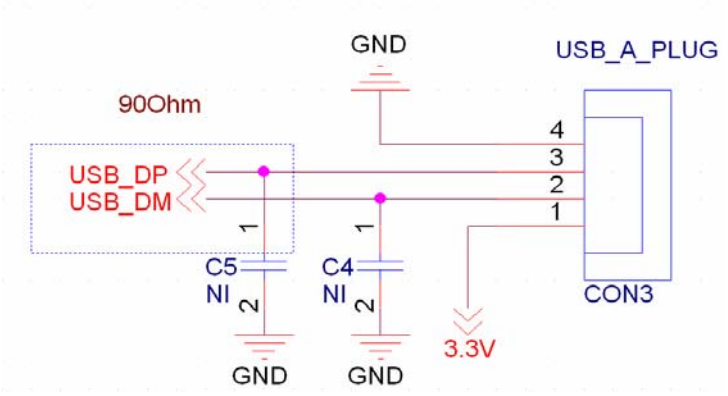




注:1.以上虚线框的部分需要进行天线匹配，以实际天线匹配的电子元器件参数为准.

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.

9.2. interface electrical characteristics



注：1.USB 数据线需要做 90Ohm 的阻抗。

2.建议电源输入端留一个电源开关，每次开关卡时可以做一个上电断电的作用

可以使用 wifi 复位，就不会有打不开 wifi 的错误现象出现。

Note:1.Two root go line do difference , but also required to make 90Ohm the impedance test.e get lock can do

2.Suggested that leave a power switch power supply input terminal ,every tim a electric power is on

Remark

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℃ to +70℃.

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℃ to +135℃.

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

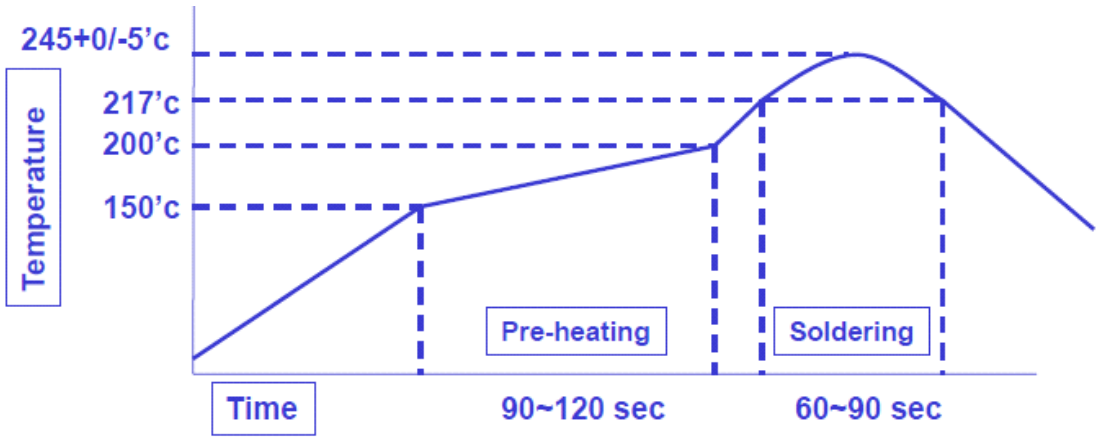
a) humidity indicator cards reads >30%

b) 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