HK NATER TECH LIMITED

RL-SM02BD-8723DS Specification

Customer: _____

Description: RL-SM02BD-8723DS-V1.0

Customer P/N:_____

Date: _____

Customer		
Approve	Auditing	Admit

Provider		
Approve	Auditing	Admit

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SPECIFICATION

Single-Chip IEEE802.11b/g/n 1T1R Wlan and BT2.1/4.2
with SDIO Interface,and HS-Uart Mixed Interface

RL-SM02BD-8723DS

WiFi+BT4.2 Combo Module LDO

Version 1.0

1. General Description

The Realtek RTL8723DS is a highly integrated 802.11b/g/n 1T1R WLAN and Bluetooth 2.1/4.2 single chip . It combines a WLAN MAC, a 1T1R capable WLAN baseband, BT Protocol Stack (LM, LL, and LE), BT Baseband, modem, and WLAN/BT RF in a single chip. The RTL8723DS provides a complete solution for a high throughput performance integrated wireless LAN, and Bluetooth

2. Features

General

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

Host Interface

- Complies with SDIO 1.1/2.0 for WLAN with clock rate up to 100MHz (SDR50 and DDR50)
- GSPI interface for configurable endian for WLAN
- Complies with HS-UART with configurable baud rate for Bluetooth

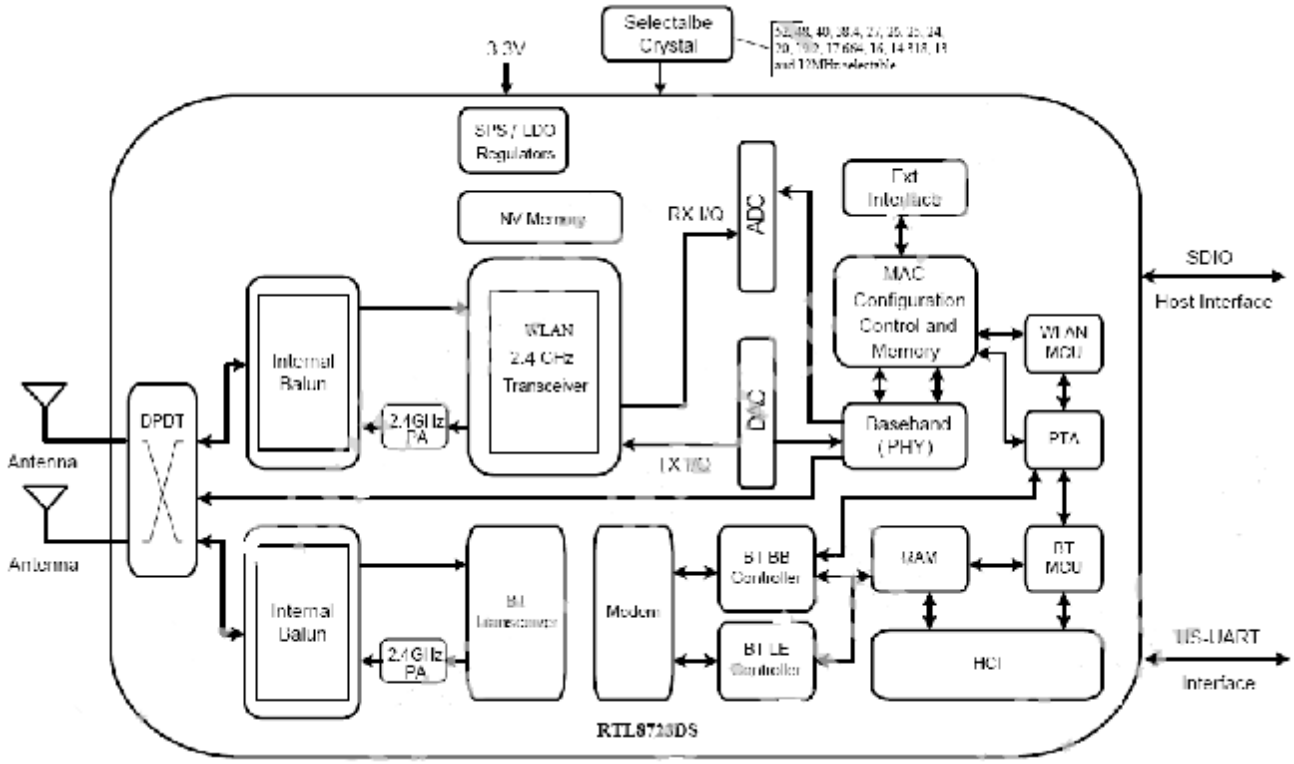
WLAN Controller

- CMOS MAC, Baseband PHY, and RF in a single chip for 802.11b/g/n compatible WLAN
- 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
- Compatible with 802.11n specification
- Backward compatible with 802.11b/g devices while operating in 802.11n mode
- 802.11b/g/n compatible WLAN
- 802.11e QoS Enhancement (WMM)
- 802.11i (WPA, WPA2). Open, shared key, and pair-wise key authentication services
- 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)
- On-chip ADC and DAC

Bluetooth Controller

- Compatible with Bluetooth V21+EDR and V4.2 Systems
- Supports Bluetooth 4.0 Low Energy(BLE)
- HS-UART interface for Bluetooth data transmission compliant with H5 specification
- PCM interface for audio data transmission via Bluetooth controller
- Integrated MCU to execute Bluetooth protocol stack
- Supports all packet types in basic rate and enhanced data rate
- Supports SCO/eSCO link (allows one link for PCM interface and three links for HS-UART)
- Supports piconets in a scatternet
- Supports Secure Simple Pairing

3.Diagram



RTL8723DS with antenna diversity

4.Temperature Limit Ratings

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

5. General Specification

Model	RL-SM12BD-8723DS-V1.0
Product Name	WLAN and BLUETOOTH SDIO module
Major Chipset	RTL8723DS-CG
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 V4.2
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	**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 Paring
Operating Voltage	3.3 V ±9% I/O supply voltage

6.Power Supply DC Characteristics

Symbol	Parameter	Minimum	Typical	Maximum	Units
VBAT_IN	Battery Supply Voltage	3.1	3.3	3.5	V
VDD_IO,	Digital IO Supply Voltage	1.62	1.8~3.3	3.6	V
VA1P25_RTX_S0, VA1P25_BT_SYN, VA1P25_WL_SY, VA1P25_RTX_S1, VA1P25_AFE,VD1P25	1.2V Core Supply Voltage	1.15	1.25	1.37	V
IDD33	3.3V Rating Current	-	-	600	mA

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			
Freq err limit	±13PPM			
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			
Freq err limit	±13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (14±2dBm)		14		dBm
EVM (≤-27)		-28		dB

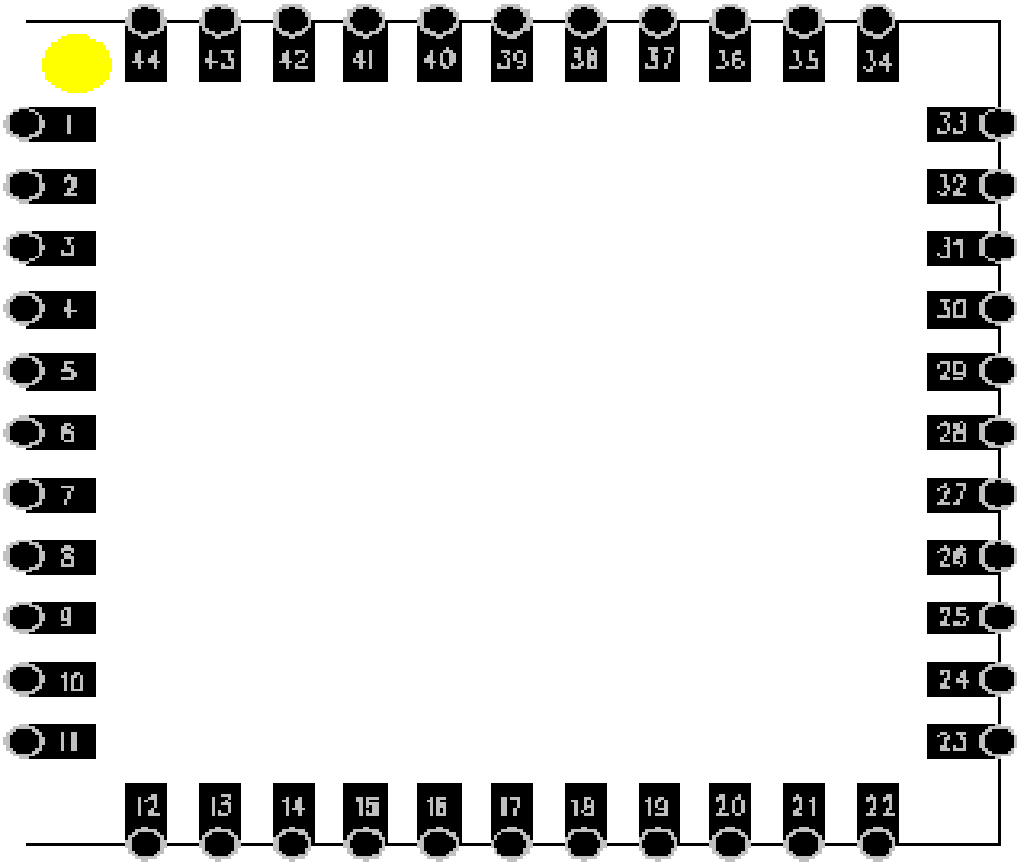
3) RF Characteristics for IEEE802.11n (BW20_MCS7)

Items	**Contents**			
Specification	IEEE802.11n (BW20_MCS7)			
Mode	BW20_MCS7 65 Mbps			
Channel frequency	2412 ~ 2484 MHz			
RX (per≤65 dBm@10%)	-65 dBm			
Freq err limit	±13PPM			
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	BW40_MCS7 135 Mbps			
Channel frequency	2412 ~ 2484 MHz			
RX (per≤65 dBm@10%)	-65 dBm			
Freq err limit	±13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (13±2 dBm)		13		dBm
EVM (≤-28)		-28		dB

8. Pin Definition



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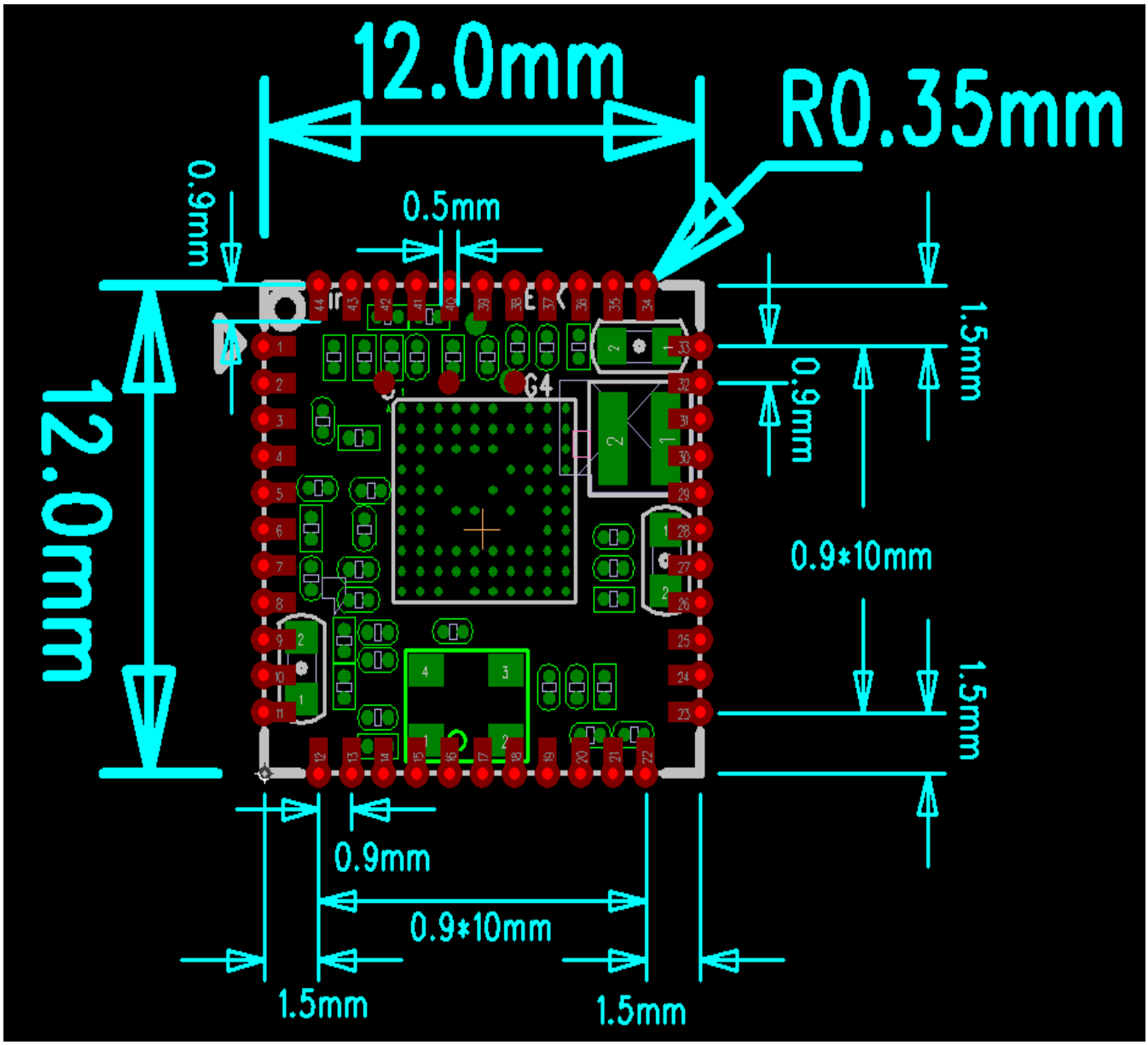
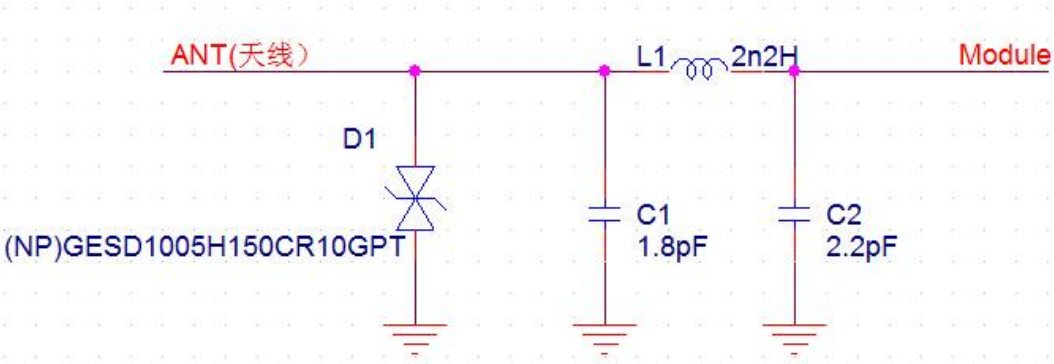
PIN	Function	Description
1	AGND	Grond
2	ANT	WIFI/BT_ANT
3	AGND	Grond
4	NC	NC
5	NC	NC
6	BT_HOST_WAKE_DEV	HOST wake-up Bluetooth device
7	BT_DEV_WAKE_HOST	Bluetooth device to wake-up HOST
8	NC	NC
9	VBAT_IN	3.3V±0.2V（只能用3.3V供电）
10	NC	NC
11	NC	NC
12	WL_DIS#	Shared with GPIO9 This Pin Can Externally Shutdown 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 Ra dio-off function with host interface remaining connected.
13	WL_DEV_WAKE_HOST	WLAN to wake-up HOST
14	SD_D2	SDIO data line 2
15	SD_D3	SDIO data line 3
16	SD_CMD	SDIO command line
17	SD_CLK	SDIO CLK line
18	SD_D0	SDIO data line 0
19	SD_D1	SDIO data line 1
20	AGND	Grond
21	NC	NC
22	VDDIO	1.8V / 3.3V
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_OUT	PCM Data output
26	PCM_CLK	PCM Clock
27	PCM_IN	PCM data input
28	PCM_SYNC	PCM sync signal
29	NC	NC
30	MAIN_XTAL_IN	MAIN_XTAL_IN
31	AGND	Grond
32	NC	NC
33	AGND	Grond
34	BT_DIS#	General Purpose Input/Output Pin
35	VBAT_EN	VBAT_EN
36	AGND	Grond
37	NC	NC
38	NC	NC
39	NC	NC
40	NC	NC
41	AGND	Grond
42	UART_OUT	HOST Data output
43	UART_IN	HOST Data input
44	UART_CTS	HOST_CTS

9. Size reference

Dimensions (mm)	Length	Width	Height
	12 (Tolerance:±0.2mm)	12 (Tolerance:±0.2mm)	1.6 (Tolerance:±0.2mm)



10.WIFI\BT RF Circuit reference pictures

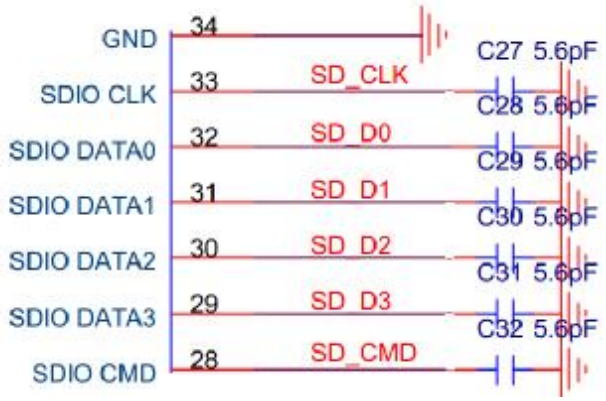


1. Above the dotted box part of the antenna matching is needed, the actual antenna matching electronic parameters shall prevail.

2.For RF part layout to do 50 ohm impedance. can't go on 90° of layout .The line length can't more than 20 mm.

注明：请一定要在焊天线端加一个 TVS 管，防止 ESD 静电打坏 WIFI 模组（如上图参考电路）.

11.SDIO interface Circuit reference pictures



12. Environmental Requirements and Specifications TP Content

12-1 Temperature

12-1.1 Operating Temperature Conditions

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

12-1.2 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℃.

12-2 PCB Bending

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

12-3 Handling environment

12-3.1. 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.

12-3.2. Terminals

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

12-3.3. 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.

12-4 Storage Condition

12-4.1. 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.

12-4.2. Moisture barrier bag open

Humidity indicator cards must be blue, <30%.

12-5 Baking Condition

Products require baking before mounting if

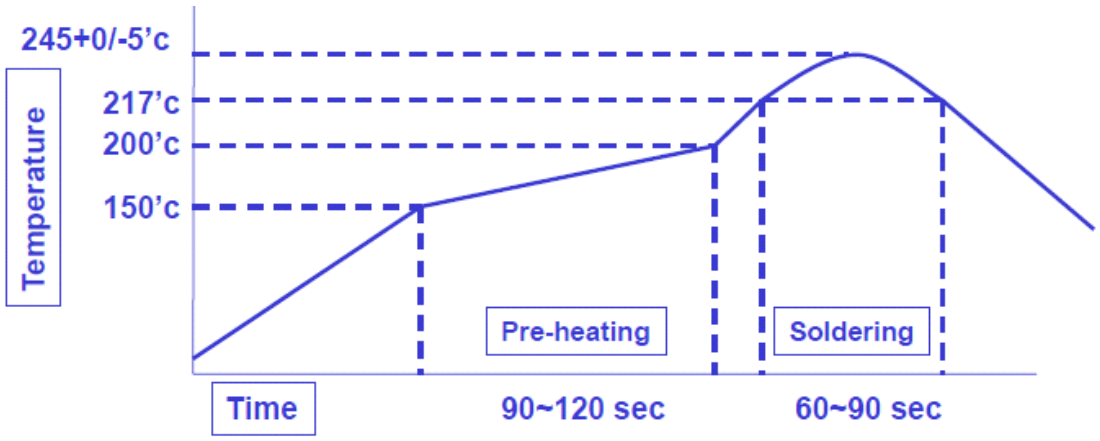
a) humidity indicator cards reads >30%

b) temp <30 degree C, humidity < 70% RH, over 96 hours

Baking condition: 90 degree C, 12-24 hours

Baking times: 1 time

12-6 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