



# SPECIFICATIONS

Model : TL8733BUUA1

WiFi4 BT5.2 USB2.0 12.2\*12.9\*2.3mm 20PIN

Version : V2.0

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Revision History

Version	Date	Contents of Revision Change	Draft	Checked	Approved
V1.0	2023/08/28	New version	LIU	Roger Zhang	
V2.0	2024/07/18	Unified version	LIU	Roger Zhang	

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## 1. General Description

### 1.1 Introduction

The TL8733BUUA1 module is designed with the latest RTL8733BU-CG chip of Realtek which is highly integrated. The module of IEEE802.11a/b/g/n standard supports 2.4GHz/5.8GHz and USB2.0 interfaces, which combines. WLAN, MAC, supporting 1T1R, WLAN base band, modem, and providing stable and high-speed through external antenna. Long-distance wireless connection, supporting 20MHz/40MHz bandwidth, providing the highest physical layer rate up to 150Mbps, Low power consumption and high throughput.

### 1.2 Description

Model name	TL8733BUUA1
Product descriptor	IEEE802.11a/b/g/n
Dimension	12.2*12.9*2.3mm
Wi-Fi port	USB2.0
BT port	UART
Operating system support	Android/Linux/Win CE/iOS/WIN7/WIN10
Operating temperature	0℃ to+70℃
Storage temperature	-40℃ to+85℃

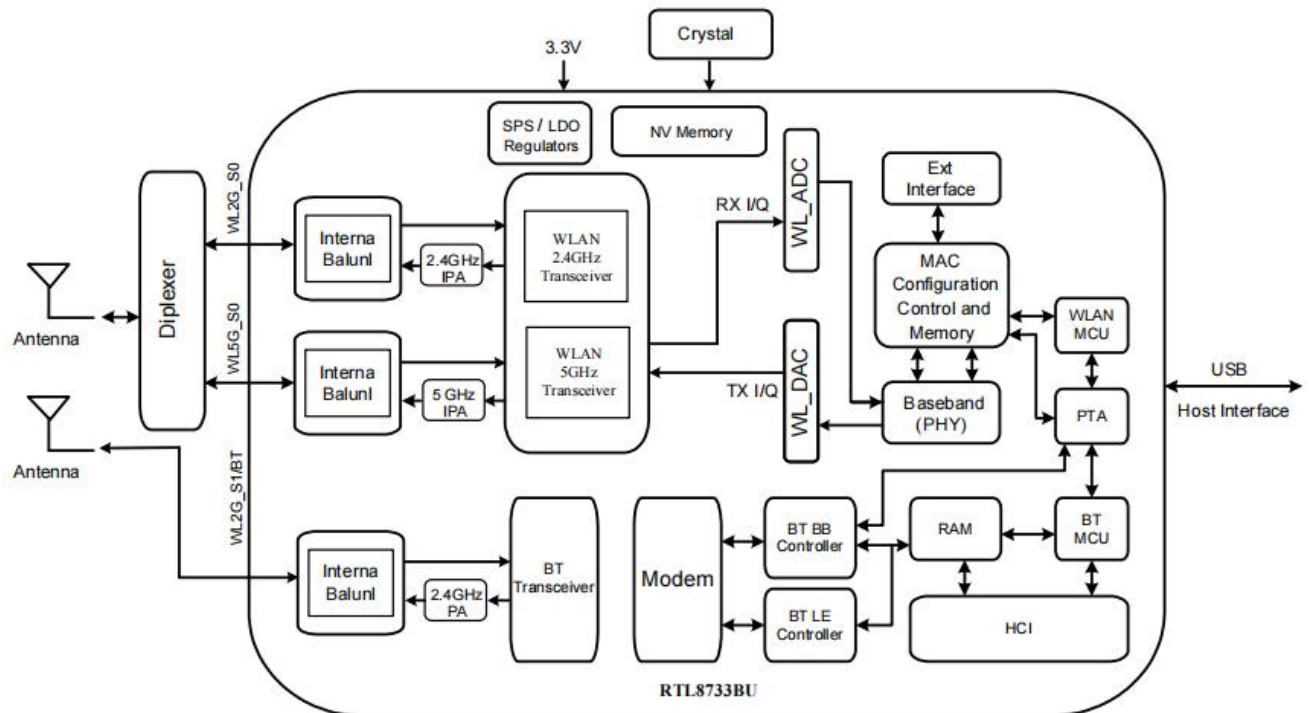
## 2. Product characteristics

- Standard:IEEE 802.11a/b/g/n
- Data rates up to 150Mbps with 20MHz/40MHz bandwidth
- Support 2.4GHz/5.8GHz Wi-Fi4
- Power supply3.3V±0.2V
- Bluetooth 5.2 Dual Mode support: Simultaneous LE and BR/EDR
- Supports Bluetooth 4.0 Low Energy(BLE)
- Compatible with Bluetooth v2.1+EDR and v5.2 Systems
- Supports USB2.0

### 3.Product picture



### 4.Block Diagram



## 5.General specification

### 5.1 2.4G WiFi Specifications

TX power can control by driver side to increase or decrease the output value

Feature	Description	
WLAN Standard	IEEE 802.11b/g/n Wi-Fi compliant	
Frequency Range	2.400GHz ~ 2.497GHz (2.4GHz ISM Band)	
Number of Channels	2.4GHz: Ch1 ~ Ch14	
Test Items	Typical Value	EVM
Output Power <sup>1</sup>	802.11b /11Mbps : 19dBm ± 2 dB	EVM ≤ -10dB
	802.11g /54Mbps : 16dBm ± 2 dB	EVM ≤ -25dB
	802.11n /MCS7 : 15dBm ± 2 dB	EVM ≤ -28dB
Spectrum Mask	Meet with IEEE standard	
Freq. Tolerance	±20ppm	
SISO Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps PER @ -94dBm	≤ -83
	- 11Mbps PER @ -85dBm	≤ -76
SISO Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps PER @ -90dBm	≤ -85
	- 54Mbps PER @ -71dBm	≤ -68
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -90dBm	≤ -85
	- MCS=7 PER @ -69dBm	≤ -67
SISO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0 PER @ -87dBm	≤ -82
	- MCS=7 PER @ -66dBm	≤ -64
Maximum Input Level	802.11b : - 10dBm	
	802.11g/n : - 20dBm	

## 5.2 5G WiFi Specifications

TX power can control by driver side to increase or decrease the output value;

Feature	Description	
WLAN Standard	IEEE 802.11a/n/Wi-Fi compliant	
Frequency Range	5.15GHz ~ 5.850GHz (5.0GHz ISM Band)	
Test Items	Typical Value	EVM
Output Power <sup>1</sup>	802.11a /54Mbps: 15dBm ± 2dB	EVM ≤ -25dB
	802.11n /MCS7: 15dBm ± 2dB	EVM ≤ -28dB
Spectrum Mask	Meet with IEEE standard	
Freq. Tolerance	± 20ppm	
SISO Receive Sensitivity (11a,20MHz) @10% PER	- 6Mbps PER @ -90dBm	≤ -85
	- 54Mbps PER @ -71dBm	≤ -68
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -90dBm	≤ -85
	- MCS=7 PER @ -69dBm	≤ -67
SISO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0 PER @ -87dBm	≤ -82
	- MCS=7 PER @ -66dBm	≤ -64

## 5.8G Frequency Reference

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

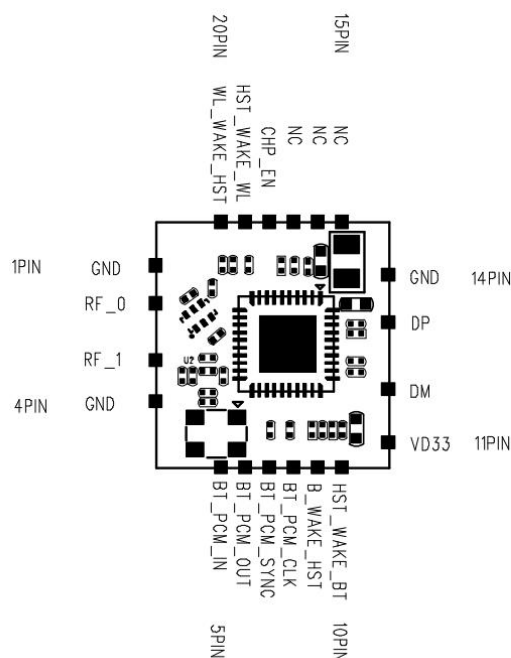


### 5.3 Bluetooth Specifications

Feature	Description		
General Specification			
Bluetooth Standard	Bluetooth V5.2		
Host Interface	UART		
Antenna Reference	Small antennas with 0~2dBi peak gain		
Frequency Band	2400 MHz ~ 2483.5 MHz		
Number of Channels	79 channels		
Modulation	GFSK, $\pi/4$ -DQPSK, 8-DPSK		
RF Specification			
	Min(dBm)	Typical(dBm)	Max(dBm)
Output Power (Class 1)	0	5	10
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		

## 6.Pin definition

### 6.1 Pin outline



### 6.2 Pin Definition details

Pin number	Pin name	Function description
1	GND	Ground
2	RF0	2.4G/5G WLAN and BT ANT ( signal )
3	RF1	NC(Reserve BT RF Double)
4	GND	Ground
5	BT_PCM_IN	PCM input
6	BT_PCM_OUT	PCM output
7	BT_PCM_SYNC	PCM sync
8	BT_PCM_CLK	PCM clock
9	BT_WAKE_HOST	Bluetooth device wake up host
10	HOST_WAKE_BT	Host wake up Bluetooth device
11	VDD33	Main power voltage source input 3.3V
12	USB_DM	USB2.0 differential pair for WLAN And Bluetooth
13	USB_DP	USB2.0 differential pair for WLAN And Bluetooth
14	GND	Ground
15	NC	Not connecting
16	NC	Not connecting
17	NC	Not connecting
18	CHIP_EN	CHIP_EN
19	HOST_WAKE_WL	Host wake up WLAN device
20	WL_WAKE_HOST	WLAN device wake up host

## 7. Electrical specification

### 7.1 Dc characteristics of power supply

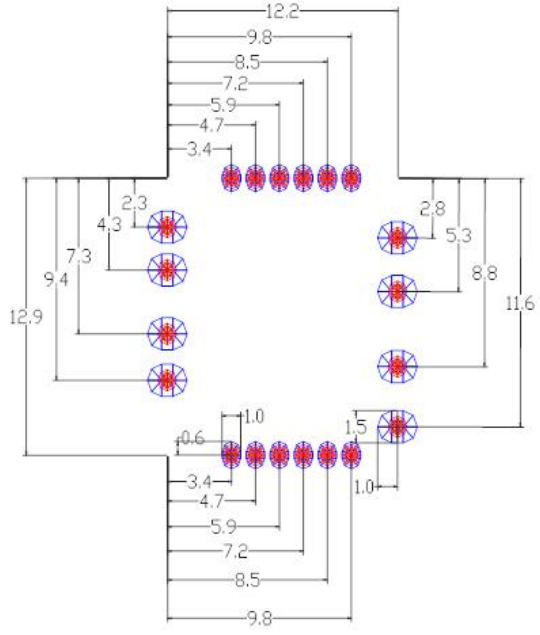
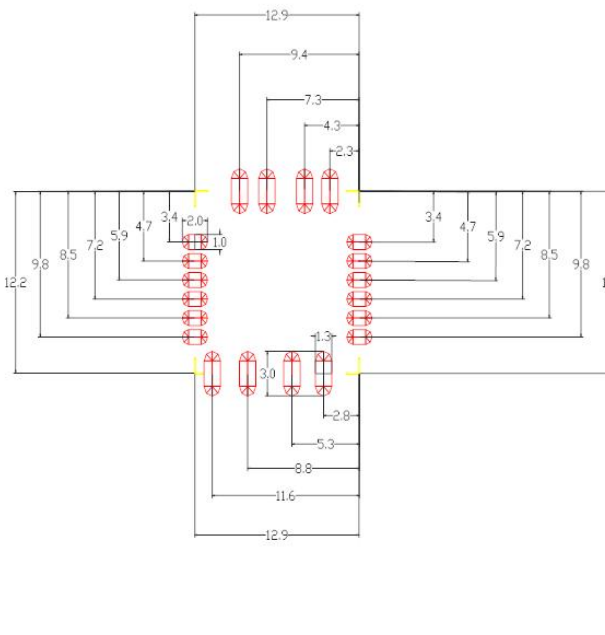
Describe	MIN	TYP	MAX	Unit
Operating Temperature	0	25	70	℃
VBAT	3	3.3	3.6	V
VDDIO	1.7	1.8/3.3	3.6	V

### 7.2 Power dissipation

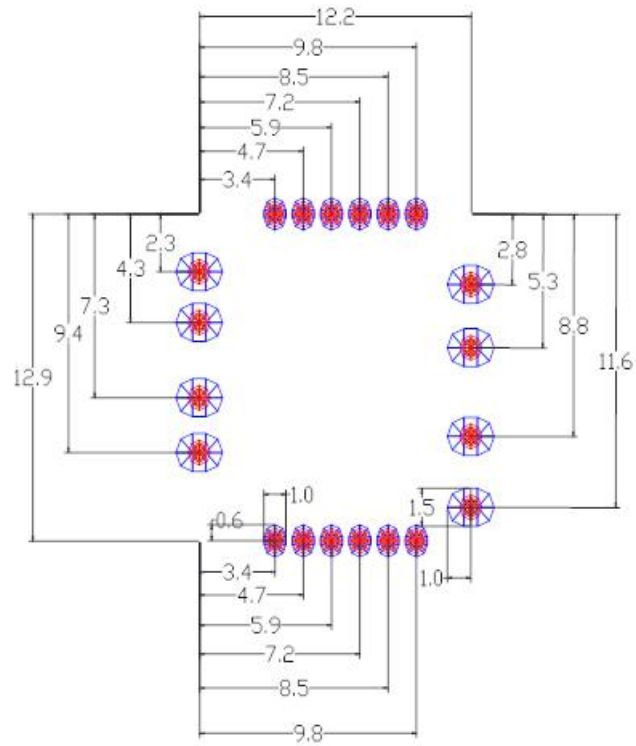
Power dissipation	Mode	VCC33=3.3V (Unit: mA)
	TX HT20 11g Mode	240
	TX HT20 11b Mode	261
	TX HT20 11n Mode	216
	TX HT40 11n Mode	228
	RX Mode	164

## 8. Dimensional reference

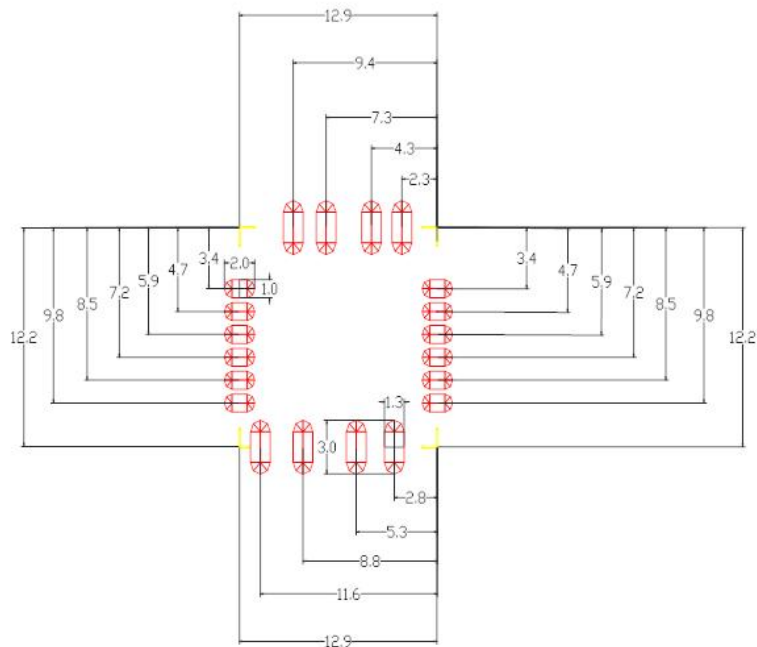
### 8.1 Physical size

<p>L x W : 12.2 x 12.9 (+0.1/-0.1) mm</p> 	<p><b>Reference design size</b></p> 
<b>Height</b>	<b>H: 2.3 (±0.2) mm</b>
<b>Weight</b>	<b>0.59g</b>

## 8.2 Physical Dimensions

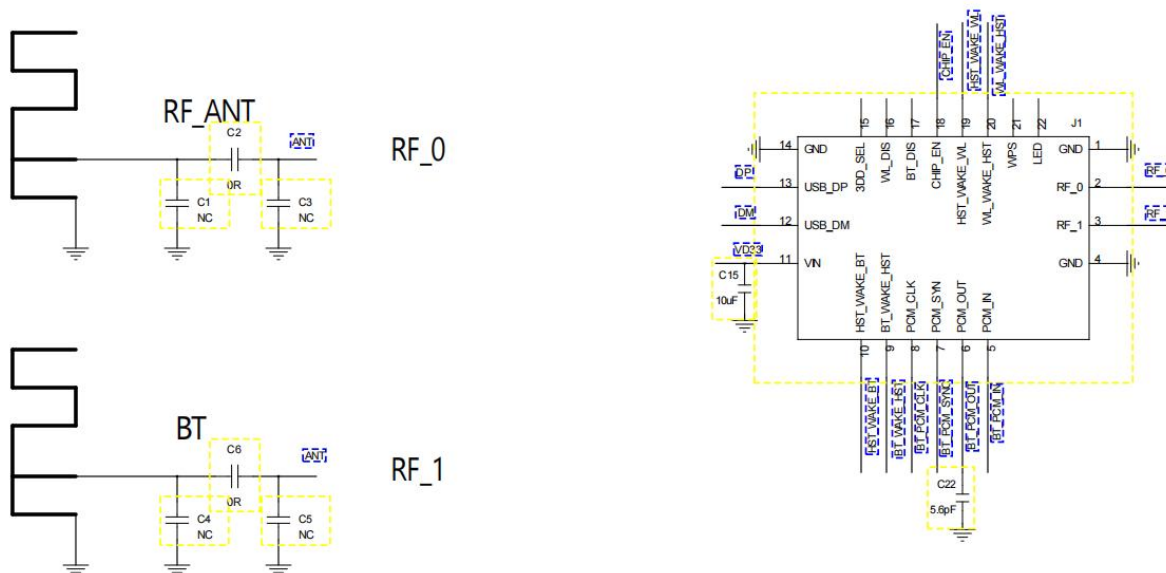


## 8.3 Layout Recommendation



## 9.Reference design

### 9.1 Reference design



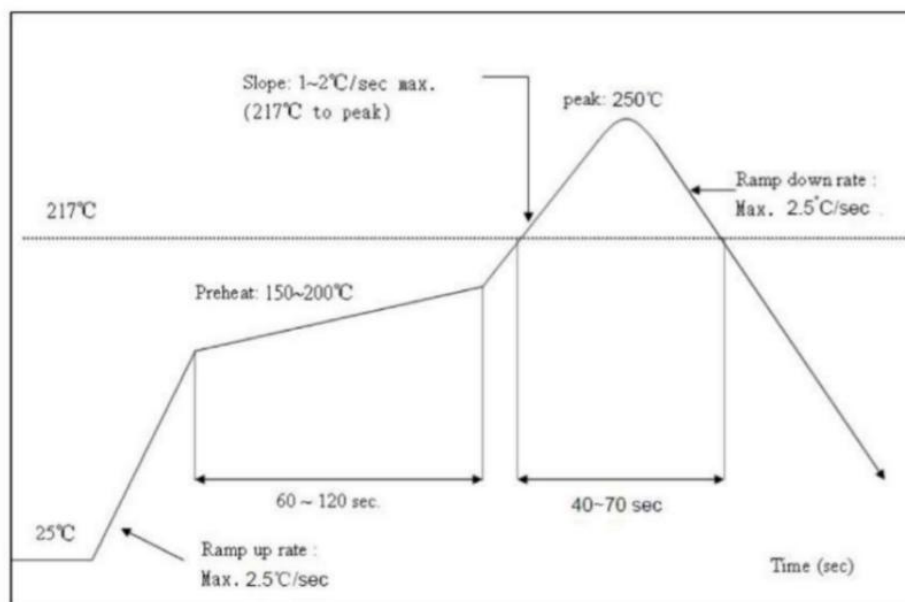
### 9.2 PCB design requirements

- RF The line should be covered with ground treatment and 50 ohm impedance
- USB Do differential isometric and 90 ohm impedance processing
- Power supply Suggestion 3.3V/1A

## 10.List of key materials

Part Name	Description	Manufacturer
Chip	RTL8733BU-CG	Realtek
PCB	TL8733BUUA1-V1.0 12.2*12.9*0.8mm four-layer Green oil 20PIN	FZX/YX/LC
Crystal	40MHz 10PPM 12PF -20℃～85℃ 3225 SMD ROHS	JWT/JF
Duplexer	LD18D2450LAN-D40/M/	JL

## 11.Reflow welding standard temperature



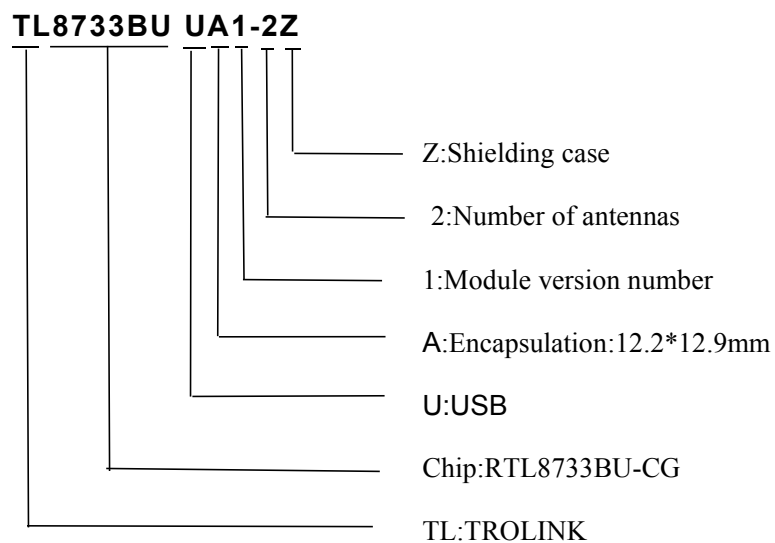
Heating zone: Temperature: <150℃, time: 60~90 seconds, slope control between 1 ~3℃/S. Preheating constant temperature zone: temperature: 150℃~200℃, time: 60-120 seconds, slope between 0.3-0.8. Reflow welding zone: Peak temperature 235 ° C ~ 250 ° C (recommended peak temperature < 245 ° C), time 30-70 seconds. Cooling zone: Temperature: 217℃~ 170℃, slope between 3 ~5℃/S. Solder is lead-free solder of tin silver copper alloy/ Sn&Ag& Cu Lead-free solder( SAC305)

## 12.Packaging information

- Use vacuum tape packing;
- Tape color: blue;
- Vacuum package built-in desiccant, 6 color humidity card;
- Other matters not covered shall be packaged according to customer's requirement;



## 13.Selection information



## **14. Moisture sensitivity**

The Modules is a Moisture Sensitive Device level 3, in according with standard IPC/JEDECJ-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 <90% relative humidity(RH)
- b) Environmental condition during the production: 30°C / 60% RH according to IPC/JEDECJ-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