



# **iTM1822-BS**

**IEEE 802.11 a/b/g/n/ac 2T2R WLAN  
with BT 2.1/3.0/4.1 Combo Module**

**2018-08-03**

# Revision History

Date	Revision Content	Revised By	Version
2018/07/16	- Initial released	Issac Chen	0.10
2018/07/25	- Update description	Issac Chen	0.20
2018/07/27	- Update module dimension	Ken Wu	0.20a
2018/08/03	- Update pin description	Issac Chen	0.30

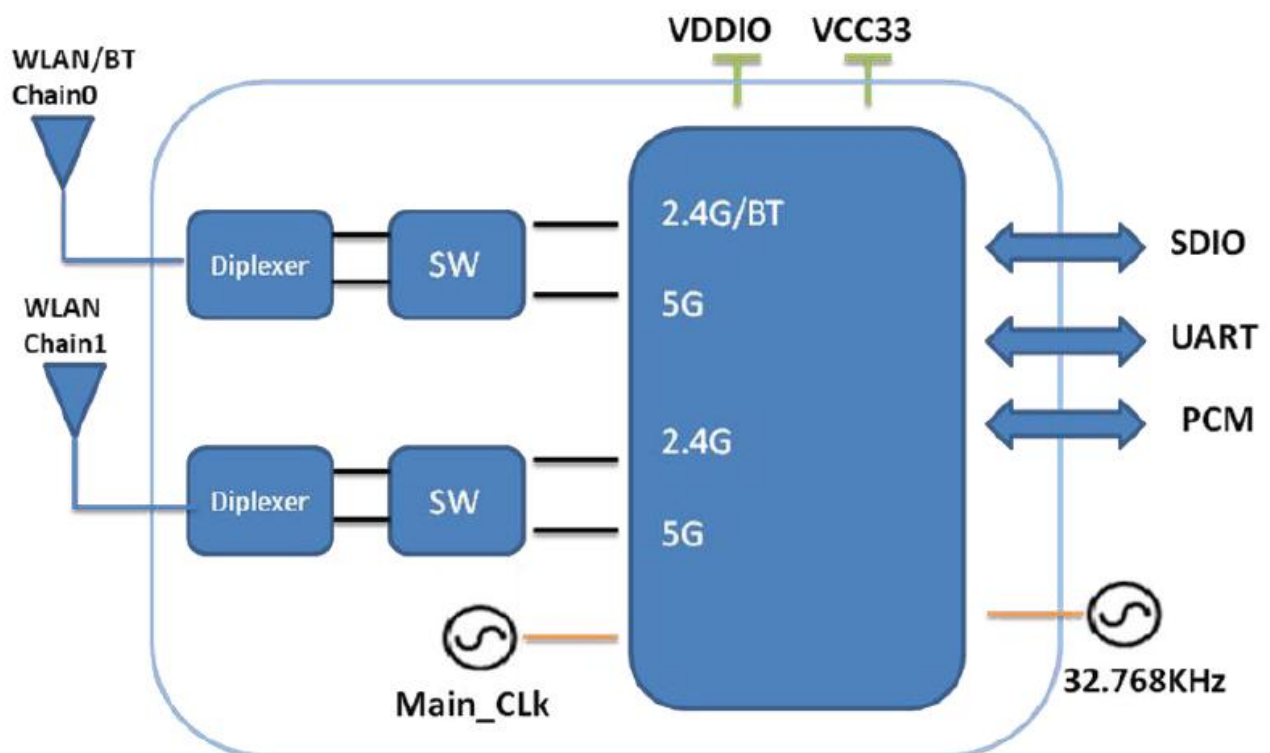
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# 1. General Description

The ITM1822-BS is a highly integrated single-chip that supports 2-stream 802.11ac solutions with Multi-user MIMO (Multiple-Input, Multiple-Output) with integrated Bluetooth 2.1/3.0/4.1 controller, SDIO (SDIO 1.1/2.0/3.0) interface, and HS-UART mixed interface. It combines a WLAN MAC, a 2T2R capable WLAN baseband, and RF in single chip. ITM1822-BS provides a complete solution for a high-performance integrated wireless and Bluetooth device.

The general hardware for the module is shown as below.

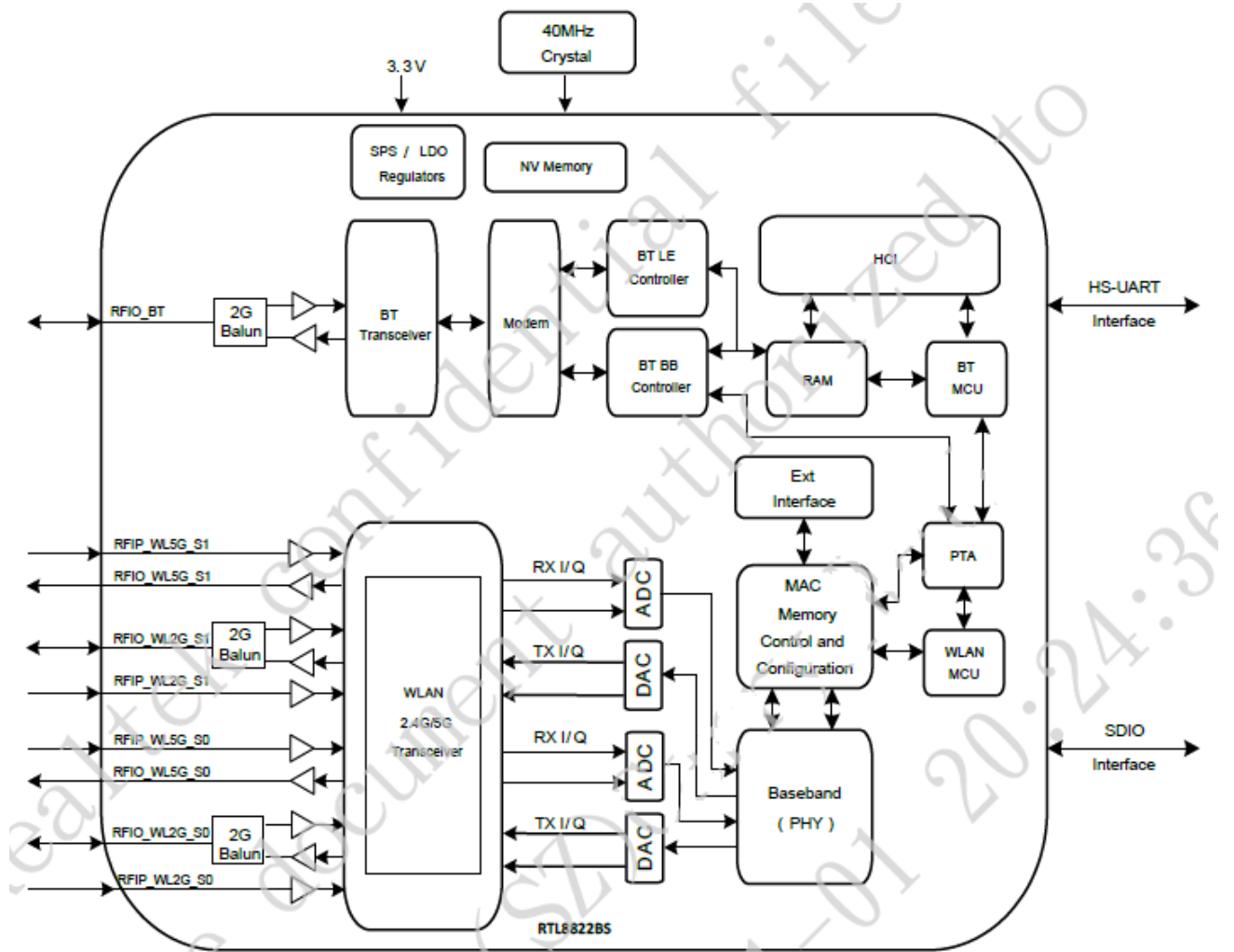


## 2. Features

- IEEE 802.11a/b/g/n/ac compliant
- 5MHz / 10MHz / 20MHz / 40MHz / 80MHz bandwidth transmission
- Complies with SDIO 1.1/2.0/3.0 for WLAN with clock rate up to 183MHz
- Dual-band 2T2R mode with data rate up to 866.7Mbps
- Support 802.11ac 2x2, Wave-2 compliant with MU-MIMO
- Complete 802.11n MIMO solution for 2.4GHz and 5Ghz band
- Maximum PHY data rate up to 173.3 Mbps using 20MHz bandwidth, 400Mbps using 40MHz bandwidth, and 866.7Mbps using 80MHz bandwidth

- DSSS with DBPSK and DQPSK, CCK modulation with long and short preamble,
- OFDM with BPSK, QPSK, 16QAM, 64QAM and 256QAM modulation. Convolutional Coding Rate: 1/2, 2/3, 3/4, and 5/6
- Support STBC and LDPC
- Build-in both 2.4GHz and 5GHz PA&LNA
- Compatible with Bluetooth v2.1 and v3.0 systems Support Bluetooth 4.1 features
- Support Bluetooth 4.2 LE Secure Connection by upper layer software upgrade
- HS-UART interface for Bluetooth data transmission compliant with H4 and H5 specification
- PCM interface for audio data transmission via Bluetooth controller
- Integrated internal Class 1, Class 2, and Class 3 PA
- Enhanced BT/WLAN Coexistence Control to improve transmission quality

The general functional block diagram of RTL8822BS chipset is shown as below.



## 3. General Specification

### 3.1 Voltages

#### 3.1.1 Absolute Maximum Ratings

Symbol	Description	Min.	Max.	Unit
VIN	Input supply Voltage	-0.3	3.6	V

#### 3.1.2 Recommended Operating Ratings

Test conditions: At room temperature				
Symbol	Min.	Typ.	Max.	Unit
VIN	3.15	3.3	3.45	V

Test conditions: At operating temperature -10°C ~70°C				
Symbol	Min.	Typ.	Max.	Unit
VIN	3.15	3.3	3.45	V

## 3.2 Wi-Fi RF Specification (RX)

## 2.4G WLAN

Parameters	Conditions	Min.	Typ.	Max.	Unit
Frequency Range		2412		2484	MHz
RX Sensitivity 11b @ 8% PER	- 1Mbps		-91	-83	dBm
	- 2Mbps		-89	-80	dBm
	- 5.5Mbps		-87	-79	dBm
	- 11Mbps		-85	-76	dBm
RX Sensitivity 11g @ 10% PER	- 6Mbps		-87	-82	dBm
	- 9Mbps		-86	-81	dBm
	- 12Mbps		-84	-79	dBm
	- 18Mbps		-82	-77	dBm
	- 24Mbps		-79	-74	dBm
	- 36Mbps		-75	-70	dBm
	- 48Mbps		-71	-66	dBm
	- 54Mbps		-70	-65	dBm
Receive Sensitivity (11n,20MHz) @10% PER	- MCS0		-87	-82	dBm
	- MCS=1		-84	-79	dBm
	- MCS=2		-82	-77	dBm
	- MCS=3		-79	-74	dBm
	- MCS=4		-75	-70	dBm
	- MCS=5		-71	-66	dBm
	- MCS=6		-70	-65	dBm
	- MCS=7		-69	-64	dBm
Receive Sensitivity (11n,40MHz) @10% PER	- MCS0		-84	-79	dBm
	- MCS=1		-81	-76	dBm
	- MCS=2		-79	-74	dBm
	- MCS=3		-76	-71	dBm
	- MCS=4		-72	-67	dBm
	- MCS=5		-68	-63	dBm
	- MCS=6		-67	-62	dBm
	- MCS=7		-66	-61	dBm
Maximum Receive Level	802.11b	-20	0		dBm
	802.11g	-20	0		dBm
	802.11n	-20	0		dBm

## 5G WLAN

Parameters	Conditions	Min.	Typ.	Max.	Unit
Frequency Range		5150		5825	MHz
RX Sensitivity 11a @ 10% PER	- 6Mbps		-87	-82	dBm
	- 9Mbps		-86	-81	dBm
	- 12Mbps		-84	-79	dBm
	- 18Mbps		-82	-77	dBm
	- 24Mbps		-79	-74	dBm
	- 36Mbps		-75	-70	dBm
	- 48Mbps		-71	-66	dBm
	- 54Mbps		-70	-65	dBm
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0		-87	-82	dBm
	- MCS=1		-84	-79	dBm
	- MCS=2		-82	-77	dBm
	- MCS=3		-79	-74	dBm
	- MCS=4		-75	-70	dBm
	- MCS=5		-71	-66	dBm
	- MCS=6		-70	-65	dBm
	- MCS=7		-69	-64	dBm
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0		-84	-79	dBm
	- MCS=1		-81	-76	dBm
	- MCS=2		-79	-74	dBm
	- MCS=3		-76	-71	dBm
	- MCS=4		-72	-67	dBm
	- MCS=5		-68	-63	dBm
	- MCS=6		-67	-62	dBm
	- MCS=7		-66	-61	dBm
Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0		-87	-82	dBm
	- MCS=1		-84	-79	dBm
	- MCS=2		-82	-77	dBm
	- MCS=3		-79	-74	dBm
	- MCS=4		-75	-70	dBm
	- MCS=5		-71	-66	dBm
	- MCS=6		-70	-65	dBm
	- MCS=7		-69	-64	dBm
	- MCS=8		-64	-59	dBm



	- MCS=9		-62	-57	dBm
Receive Sensitivity (11ac,40MHz) @10% PER	- MCS=0		-84	-79	dBm
	- MCS=1		-81	-76	dBm
	- MCS=2		-79	-74	dBm
	- MCS=3		-76	-71	dBm
	- MCS=4		-72	-67	dBm
	- MCS=5		-68	-63	dBm
	- MCS=6		-67	-62	dBm
	- MCS=7		-66	-61	dBm
	- MCS=8		-61	-56	dBm
	- MCS=9		-59	-54	dBm
Receive Sensitivity (11ac,80MHz) @10% PER	- MCS=0		-81	-76	dBm
	- MCS=1		-78	-73	dBm
	- MCS=2		-76	-71	dBm
	- MCS=3		-73	-68	dBm
	- MCS=4		-69	-64	dBm
	- MCS=5		-65	-60	dBm
	- MCS=6		-64	-59	dBm
	- MCS=7		-63	-58	dBm
	- MCS=8		-58	-53	dBm
	- MCS=9		-56	-51	dBm

### 3.3 Wi-Fi RF Specification (TX)

Parameters	Conditions	Min.	Typ.	Max.	Unit
Frequency Range		2412		2484	MHz
Output Power	802.11b	15	16	18	dBm
	802.11g	13	14	16	dBm
	802.11n	12	13	15	dBm
@EVM	802.11b / 11Mbps	--	-21	-10	dB
	802.11g / 54Mbps	--	-30	-25	dB
	802.11n / MCS7	--	-30	-28	dB

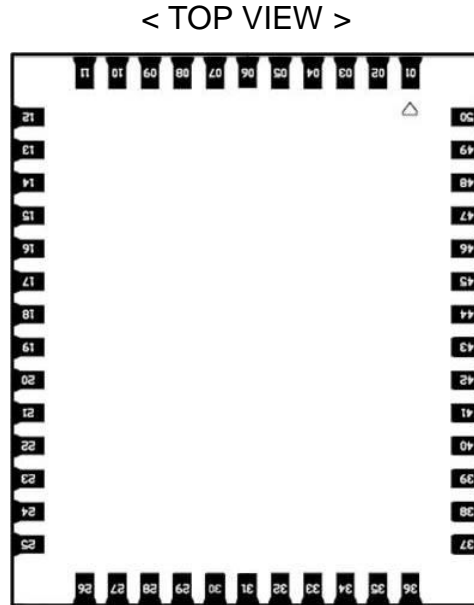
Parameters	Conditions	Min.	Typ.	Max.	Unit
Frequency Range		5150		5825	MHz
Output Power	802.11a	11	13	15	dBm
	802.11n	11	12	14	dBm
	802.11ac	9	10	12	dBm
@EVM	802.11a / 54Mbps	--	-29	-25	dB
	802.11n / MCS7	--	-31	-28	dB
	802.11ac / MCS9	--	-33	-32	dB

### 3.4 Bluetooth Specification

Feature	Description		
<b>General Specification</b>			
Bluetooth Standard	Bluetooth V4.1 of 1, 2 and 3 Mbps.		
Host Interface	UART.		
Antenna Reference	Small antennas with 0~2 dBi peak gain		
Frequency Band	2402 MHz ~ 2480 MHz.		
Number of Channels	79 channels		
Modulation	FHSS, GFSK, DPSK, DQPSK.		
<b>RF Specification</b>			
	<b>Min.</b>	<b>Typical.</b>	<b>Max.</b>
Output Power (Class 1.5)		10dBm	
Output Power (Class 2)		2dBm	
Sensitivity @ BER=0.1% for GFSK (1Mbps)		-92dBm	
Sensitivity @ BER=0.01% for $\pi/4$ -DQPSK (2Mbps)		-92dBm	
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)		-85dBm	
Maximum Input Level	GFSK (1Mbps):-20dBm		
	$\pi/4$ -DQPSK (2Mbps) :-20dBm		
	8DPSK (3Mbps) :-20dBm		

## 4. Pin Assignments

### 4.1 Pin Outline



### 4.2 Pin Definition

NO	Name	Type	Description
1	GND	—	Ground connections
2	WL/BT_ANT0	I/O	RF I/O port0
3	GND	—	Ground connections
4	GND	—	Ground connections
5	GND	—	Ground connections
6	GND	—	Ground connections
7	GND	—	Ground connections
8	GND	—	Ground connections
9	WL_ANT1	I/O	RF I/O port1
10	GND	—	Ground connections
11	GND	—	Ground connections
12	NC	O	No Connect
13	NC	—	No Connect
14	NC	—	No Connect
15	WL_REG_ON	I	Enable pin for WLAN device ON: pull high ; OFF: pull low

## iTM1822-BS Datasheet

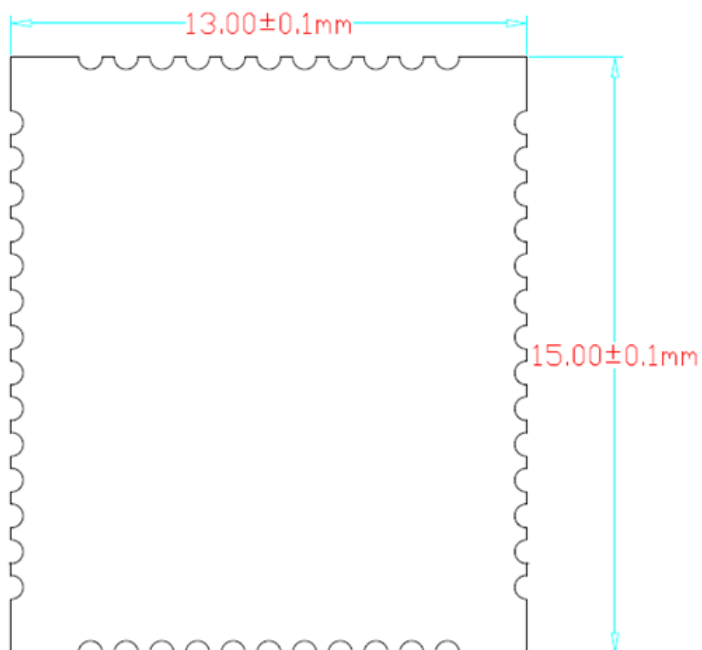
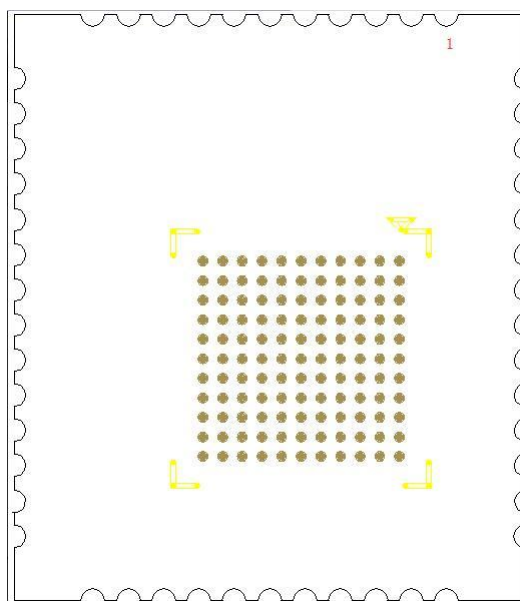
16	WL_HOST_WAKE	O	WLAN to wake-up HOST
17	SDIO_DATA_CMD	I/O	SDIO command line
18	SDIO_DATA_CLK	I/O	SDIO clock line
19	SDIO_DATA_3	I/O	SDIO data line 3
20	SDIO_DATA_2	I/O	SDIO data line 2
21	SDIO_DATA_0	I/O	SDIO data line 0
22	SDIO_DATA_1	I/O	SDIO data line 1
23	GND	—	Ground connections
24	NC	—	Floating (Don't connected to ground)
25	NC	—	Floating (Don't connected to ground)
26	NC	—	Floating (Don't connected to ground)
27	PCM_SYNC	I/O	PCM sync signal
28	PCM_IN	I	PCM data input
29	PCM_OUT	O	PCM Data output
30	PCM_CLK	I/O	PCM clock
31	LPO	I	External Low Power Clock input (32.768KHz)
32	GND	—	Ground connections
33	NC	—	Floating (Don't connected to ground)
34	VDDIO	P	I/O Voltage supply input
35	NC	—	Floating (Don't connected to ground)
36	VBAT	P	Main power voltage source input
37	NC	—	No Connect
38	BT_REG_ON	I	Enable pin for Bluetooth device ON: pull high ; OFF: pull low
39	GND	—	Ground connections
40	UART_TXD	O	Bluetooth UART interface
41	UART_RXD	I	Bluetooth UART interface
42	UART_RTS_N	O	Bluetooth UART interface
43	UART_CTS_N	I	Bluetooth UART interface
44	SD_RESET	I	Shut down WLAN function when pulled low
45	NC	—	No Connect
46	NC	—	No Connect
47	NC	—	No Connect
48	NC	—	No Connect
49	HOST_WAKE_BT	I	HOST wake-up Bluetooth device
50	BT_WAKE_HOST	O	Bluetooth device to wake-up HOST

## 5. Dimensions

### 5.1 Physical Dimension (15mmx13mmx2mm)

(Unit: mm)

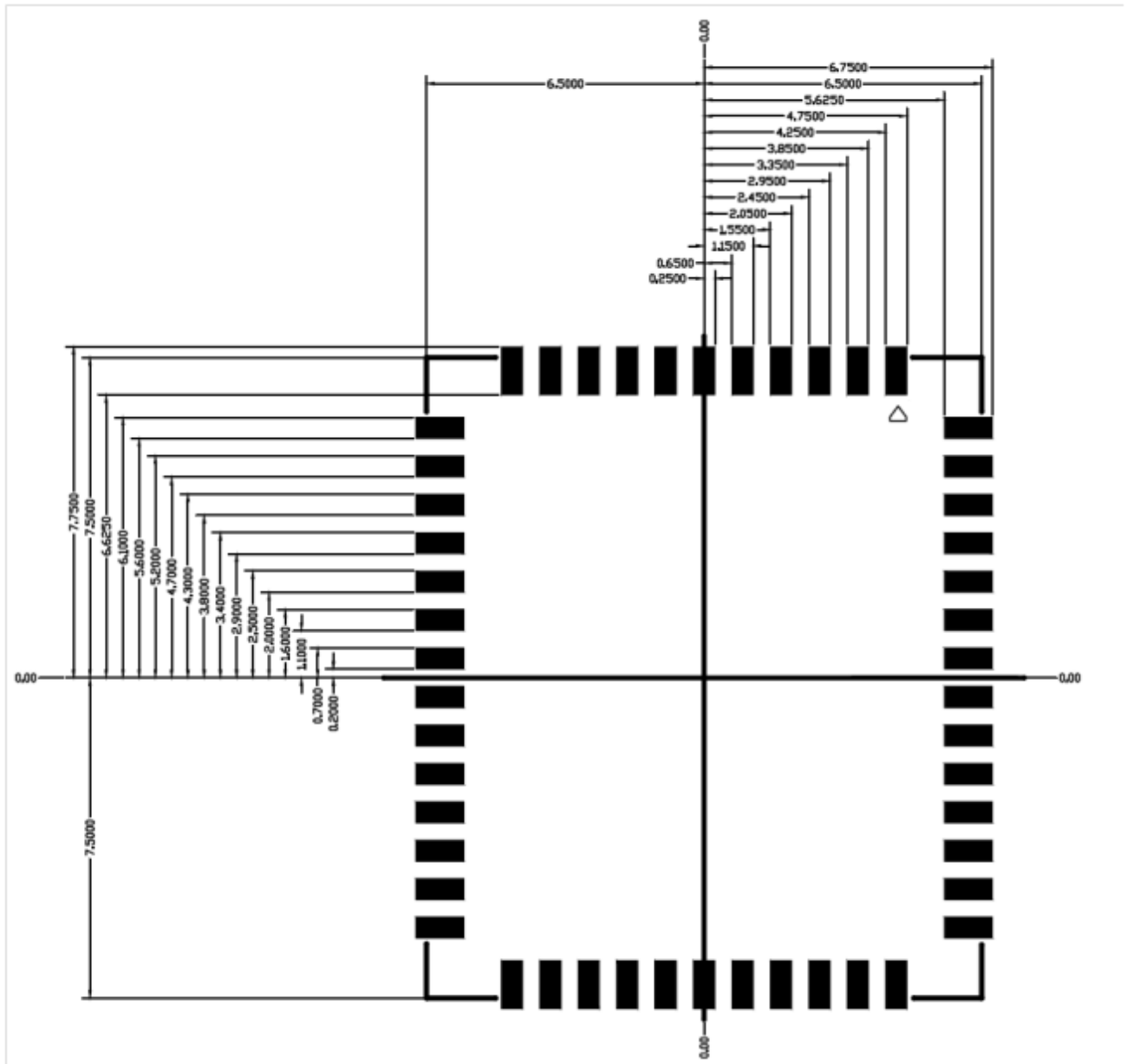
< TOP VIEW >



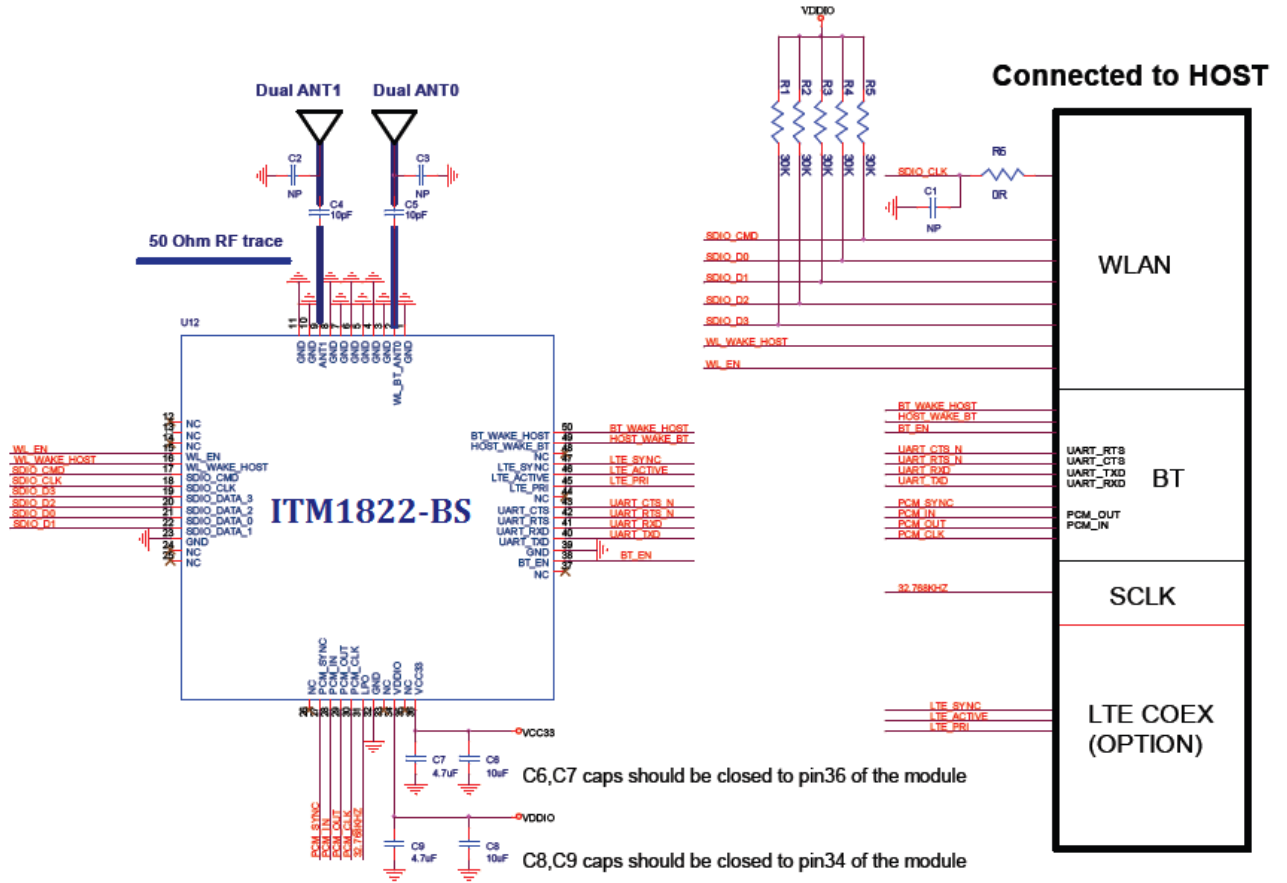
## 5.2 Layout Recommendation

(Unit: mm)

< TOP VIEW >



# 6. Reference Design

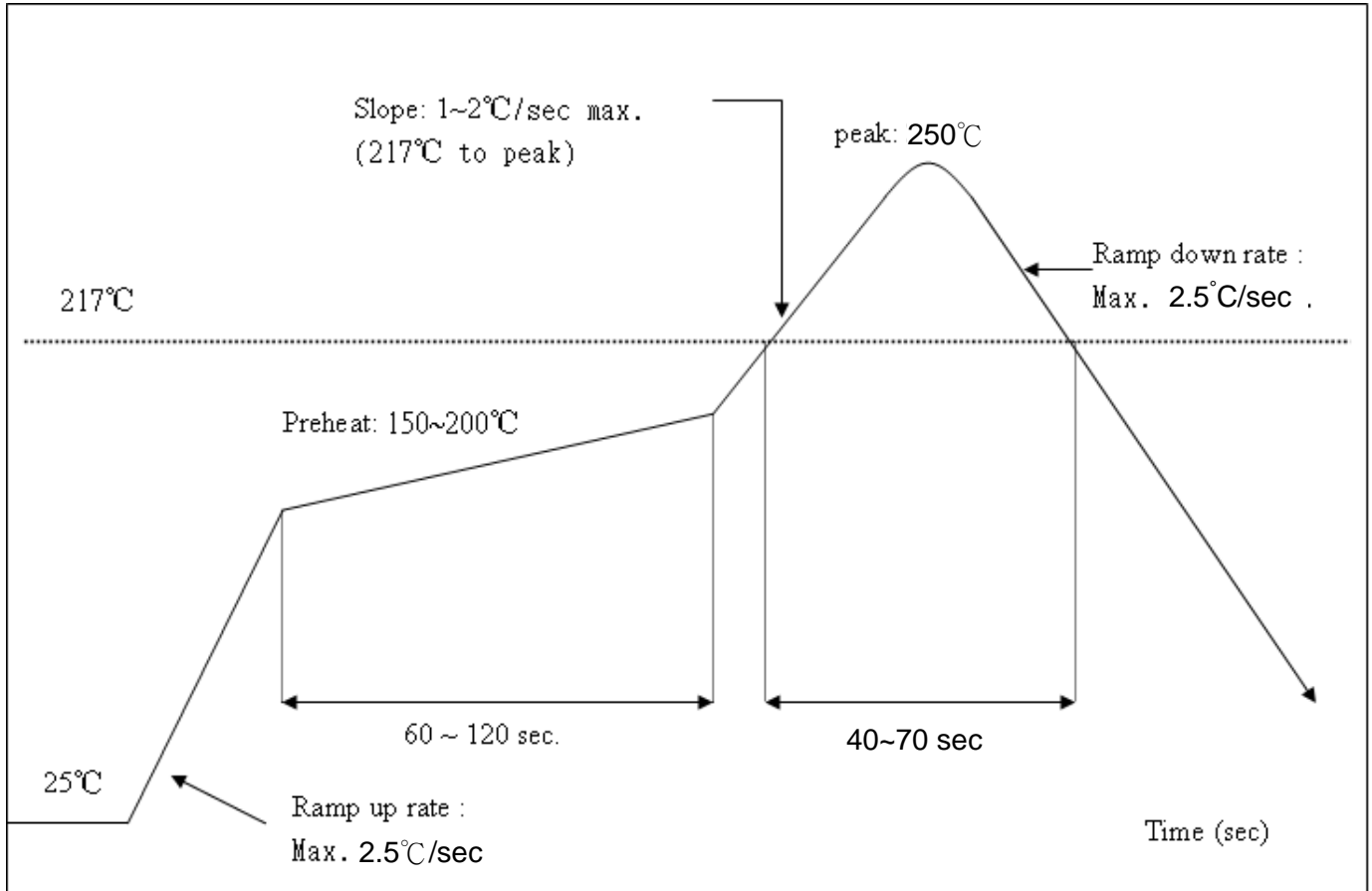


## 7. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <250°C

Number of Times :  $\leq 2$  times

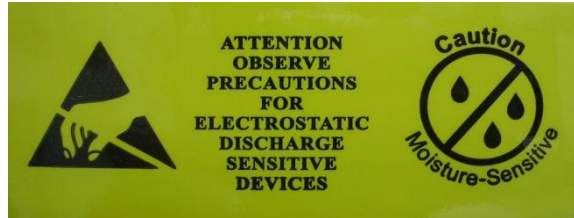




# 8. Packing Information

## 8.1 Label

Label A → Anti-static and humidity notice



Label B → MSL caution / Storage Condition

	<b>Caution</b>	LEVEL
	This bag contains MOISTURE-SENSITIVE DEVICES	
<small>If blank, see adjacent bar code label</small>		
1. Calculated shelf life in sealed bag: 12 months at <math> <40^{\circ}\text{C}</math> and <math> <90\%</math> relative humidity (RH)		
2. Peak package body temperature: _____ $^{\circ}\text{C}$ <small># blank, see adjacent bar code label</small>		
3. After bag is opened, devices that will be subjected to reflow solder or other high temperature process must be		
a) Mounted within: _____ hours of factory conditions <small># blank, see adjacent bar code label</small>		
<math> \leq 30^{\circ}\text{C}/60\% \text{ RH}</math>, or		
b) Stored per J-STD-033		
4. Devices require bake, before mounting, if:		
a) Humidity Indicator Card reads >10% for level 2a - 5a devices or >60% for level 2 devices when read at <math> 23 \pm 5^{\circ}\text{C}</math>		
b) 3a or 3b are not met		
5. If baking is required, refer to IPC/JEDEC J-STD-033 for bake procedure		
Bag Seal Date: _____ <small># blank, see adjacent bar code label</small>		
<small>Note: Level and body temperature defined by IPC/JEDEC J-STD-020</small>		

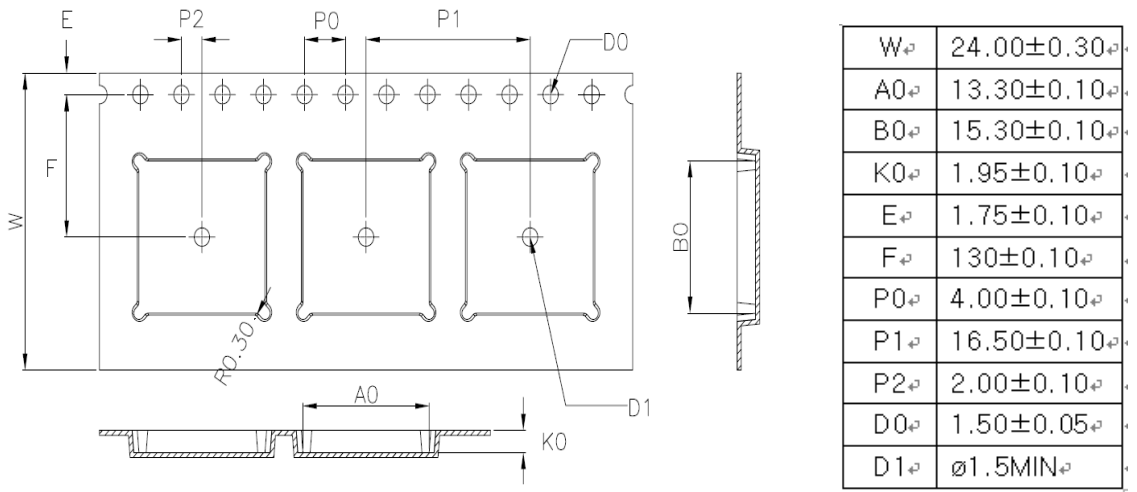
Label C → Inner box label .

PKG S/N :	
	9PKG1201310001
Model:	
	XXXXXXXX(HF)
P/N :	
	99P-W01-0042R
Qty :	
	1500
Date Code :	
	1205
Lot Code :	
	T0C102B

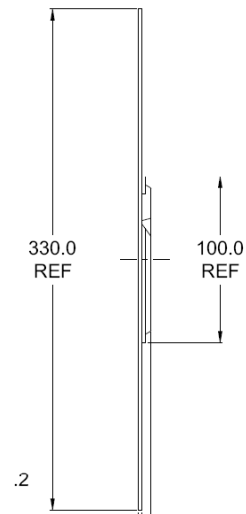
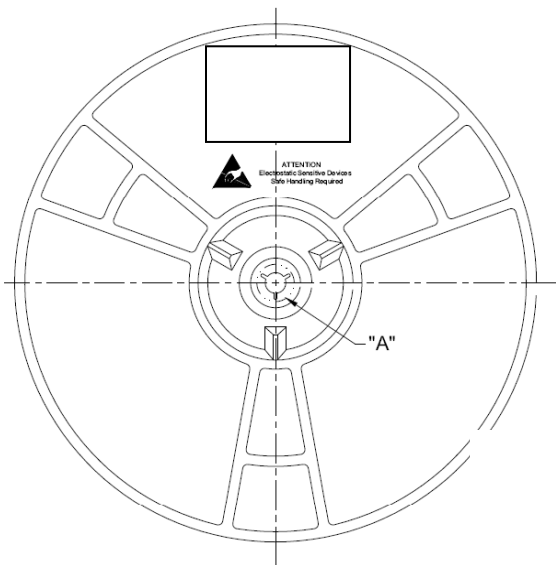
Label D → Carton box label .

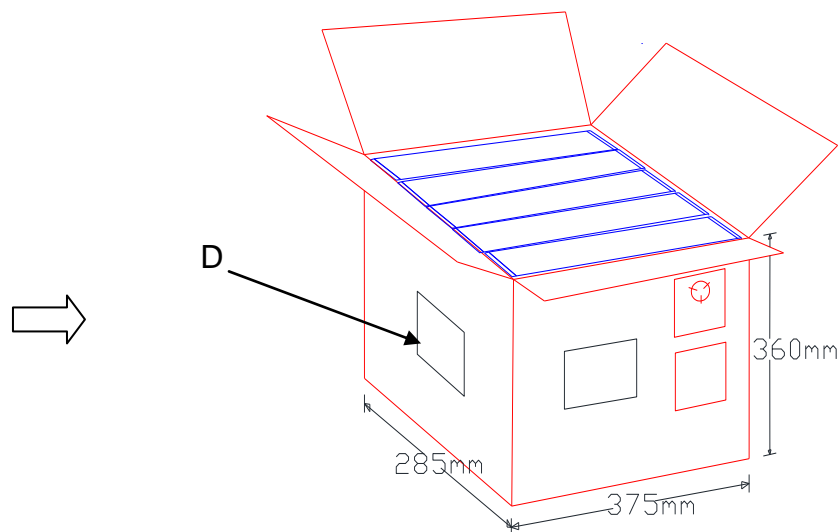
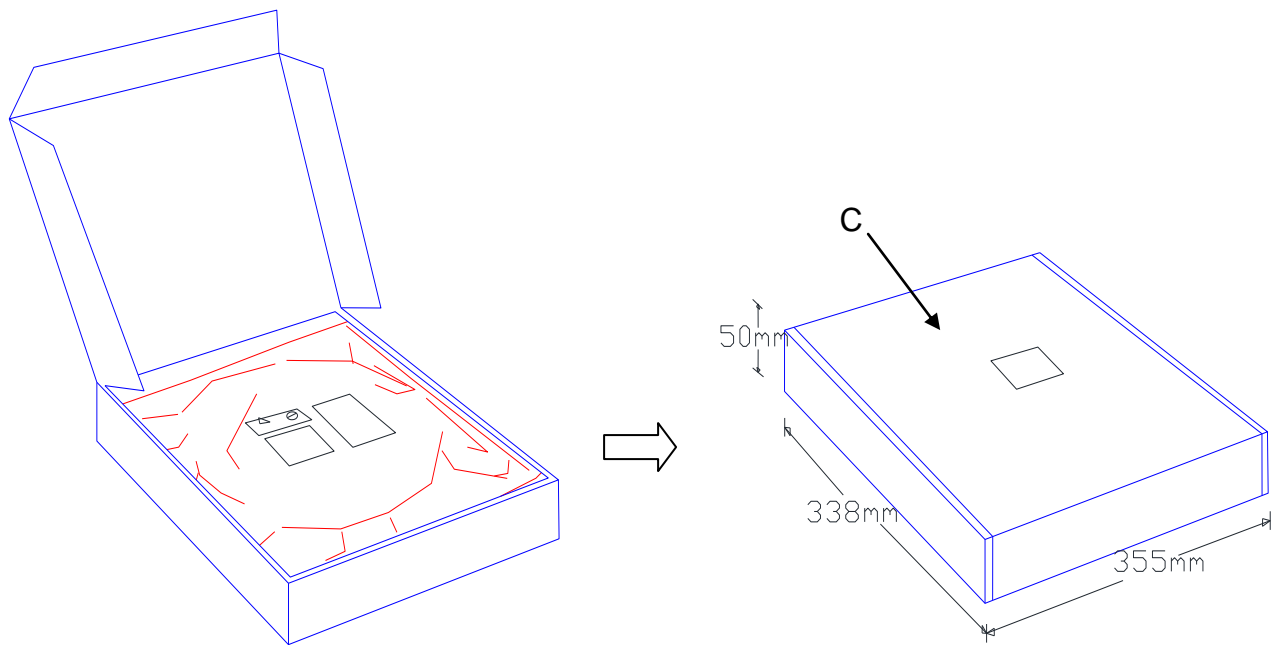
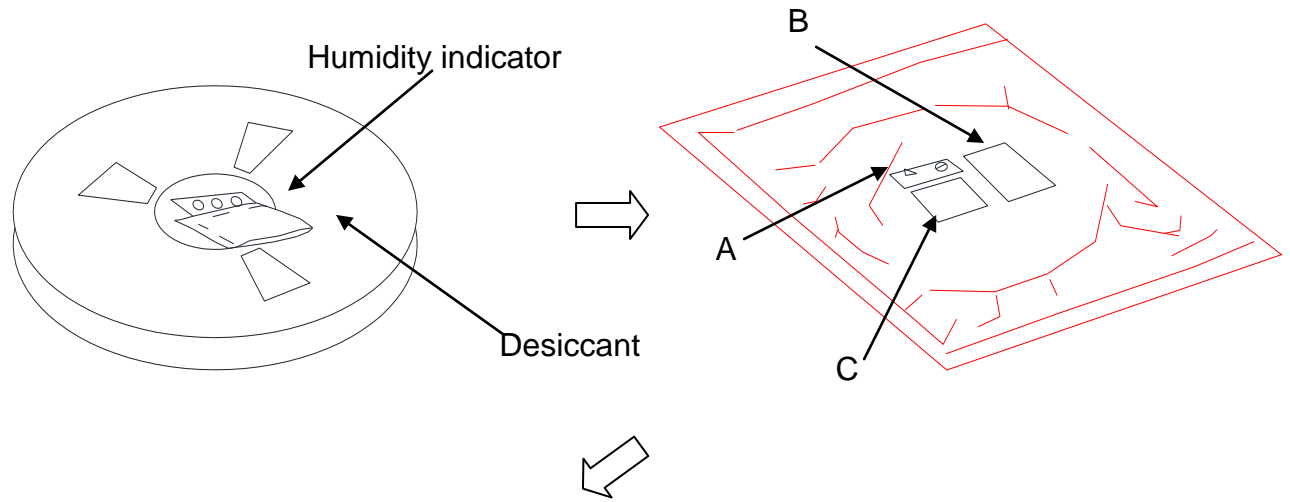
<b>iotTech Corporation</b>	
Model Name :	
	XXXXXXXX(HF)
Part No :	
	99P-W01-0042R
Quantity :	
	7500 <small>ea</small>
Lot D/C :	
	1205
Manufacture :	
	2012/02/22

## 8.2 Packing Dimension




1. 10 sprocket hole pitch cumulative tolerance  $\pm 0.20$ .
2. Carrier camber is within 1 mm in 250 mm.
3. Material : Black Conductive Polystyrene Alloy.
4. All dimensions meet EIA-481-D requirements.
5. Thickness :  $0.30 \pm 0.05$  mm.
6. Packing length per 22" reel : 98.5 Meters.(1:3)
7. Component load per 13" reel : 1500 pcs.





## 8.3 MSL Level / Storage Condition

	<h2>Caution</h2> <p>This bag contains <b>MOISTURE-SENSITIVE DEVICES</b></p>	<p>LEVEL</p> <div style="border: 1px solid black; padding: 5px; width: 40px; margin: 0 auto;">4</div>							
	<p>Do not open except under controlled conditions</p> <ol style="list-style-type: none"> <li>Calculated shelf life in sealed bag: 12 months at <math>&lt; 40^{\circ}\text{C}</math> and <math>&lt; 90\%</math> relative humidity(RH)</li> <li>Peak package body temperature:           <table style="display: inline-table; vertical-align: middle;"> <tr> <td style="text-align: center;"><math>225^{\circ}\text{C}</math></td> <td style="text-align: center;"><math>240^{\circ}\text{C}</math></td> <td style="text-align: center;"><math>250^{\circ}\text{C}</math></td> <td style="text-align: center;"><math>260^{\circ}\text{C}</math></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table> </li> <li>After bag is opened, devices that will be subjected to reflow solder or other high temperature process must           <ol style="list-style-type: none"> <li>Mounted within: 48 hours of factory conditions <math>&lt; 30^{\circ}\text{C}/60\%</math> RH, OR</li> <li>Stored at <math>&lt; 10\%</math> RH</li> </ol> </li> <li>Devices require bake, before mounting, if:           <ol style="list-style-type: none"> <li>Humidity Indicator Card is <math>&gt; 10\%</math> when read at <math>23 \pm 5^{\circ}\text{C}</math></li> <li>3a or 3b not met</li> </ol> </li> <li>If baking is required, devices may be baked for 24 hours at <math>125 \pm 5^{\circ}\text{C}</math></li> </ol> <p>Note : If device containers cannot be subjected to high temperature or shorter bake times are desired, reference IPC/JEDEC J-STD-033 for bake procedure</p> <p>Bag Seal Date: <u>          <b>See-SEAL DATE LABEL</b>          </u></p> <p>Note: Level and body temperature defined by IPC/JEDEC J-STD-020</p>		$225^{\circ}\text{C}$	$240^{\circ}\text{C}$	$250^{\circ}\text{C}$	$260^{\circ}\text{C}$	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
$225^{\circ}\text{C}$	$240^{\circ}\text{C}$	$250^{\circ}\text{C}$	$260^{\circ}\text{C}$						
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>						

**※NOTE : Accumulated baking time should not exceed 96hrs**