



iTM1821-AU

IEEE 802.11 a/b/g/n/ac 1T1R WLAN

with BT 2.1/3.0/4.0 USB Module

2018-07-27

Revision History

Date	Revision Content	Revised By	Version
2018/07/16	- Initial released	Issac Chen	0.00
2018/07/27	- PCB dimension update	Ken Wu	0.10
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1. General Description

ITM1821-AU is a highly integrated module 802.11a/b/g/n/ac 1T1R USB2.0 WLAN controller. 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 the module. The module provides a complete solution for a high throughput performance integrated wireless LAN and Bluetooth device.

The ITM1821-AU WLAN baseband implements OFDM with 1 transmit and 1 receive path and is compatible with the 802.11ac specification. Features include one spatial stream transmission, short guard interval (GI) of 400ns, spatial spreading, and transmission over 20MHz, 40MHz and 80MHz channel bandwidth.

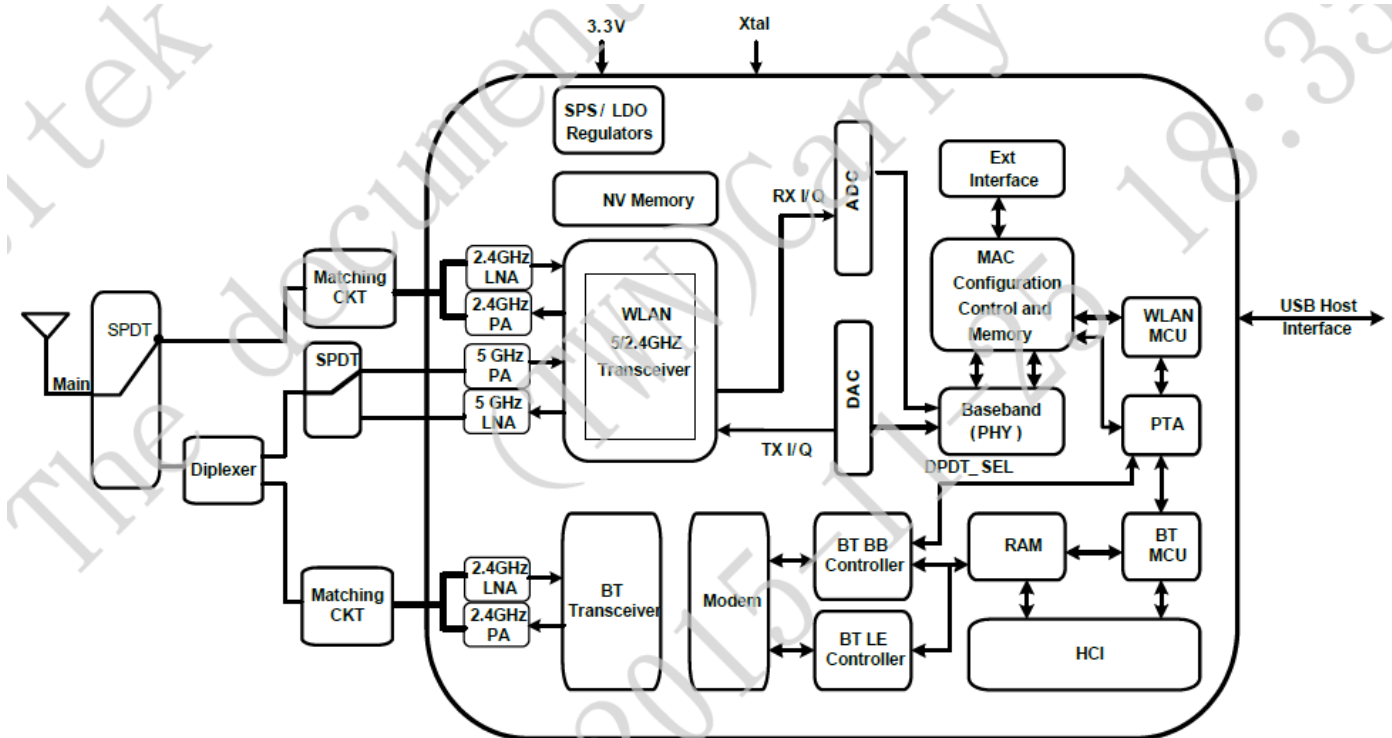
The ITM1821-AU Bluetooth controller complies with Bluetooth core specification v4.0, and supports dual mode (BR/EDR+AMP+LOW Energy Controllers). It is compatible with previous versions, including v2.1+EDR and v3.0+HS. For BR/EDR, it supports scatternet topology and allows four active links in slave mode, or links in master mode. For Low Energy, it supports multiple states and allows to link in BR/EDR and LE modes simultaneously.

The general hardware for the module is shown as below.

2. Features

- Support 802.11a/b/g/n/ac Draft 3.0 1T1R WLAN and Bluetooth
- Complies with USB2.0 for WLAN and BT controller
- Compatible with IEEE 802.11b standard to provide wireless 11Mbps data rate
- Compatible with IEEE 802.11a standard to provide wireless 54Mbps data rate
- Compatible with IEEE 802.11g standard to provide wireless 54Mbps data rate
- Compatible with IEEE 802.11n standard to provide wireless 150Mbps data rate
- Compatible with IEEE 802.11ac standard to provide wireless 433.3Mbps data rate
- Operation at 2.4~2.5GHz and 5.15~5.825GHz frequency band to meet worldwide regulations
- Provides simple legacy and 20MHz/40MHz/80MHz co-existence mechanisms to ensure backward and network compatibility.
- Supports infrastructure networks via Access Point and ad-hoc network via peer-to-peer communication
- Supports IEEE 802.11i(WPA and WPA2). Open, shared key, and pair-wise key authentication services
- Bluetooth 3.0+HS compliant
- Bluetooth Low Energy Support
- Supports AFH to dynamically detect channel quality to improve transmission quality
- Fast AGC control to improve receiving dynamic range

The general functional block diagram of RTL8188EUS 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

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	- 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)

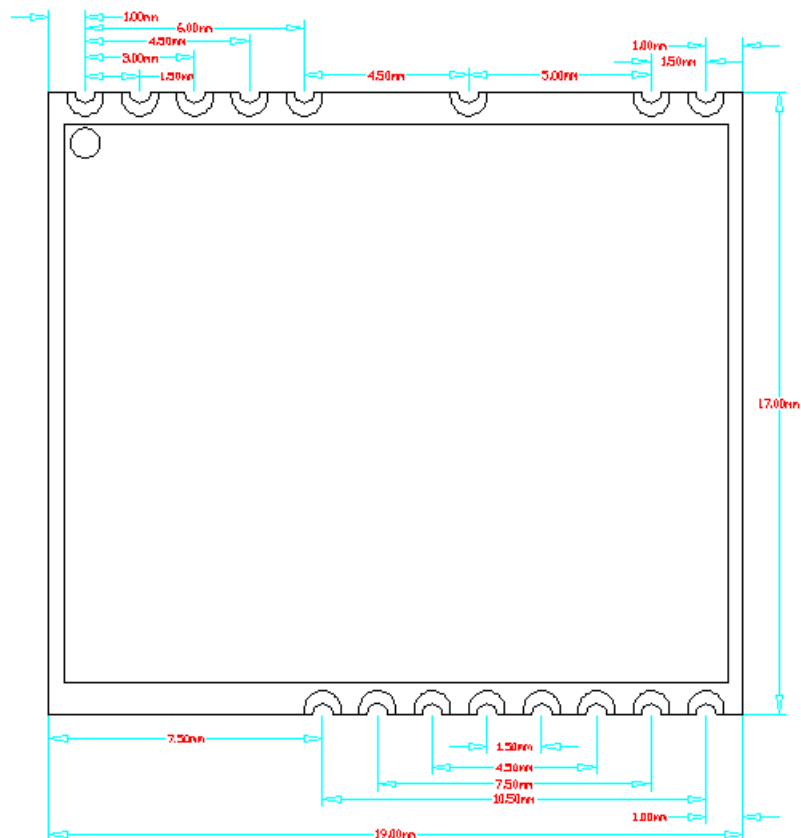
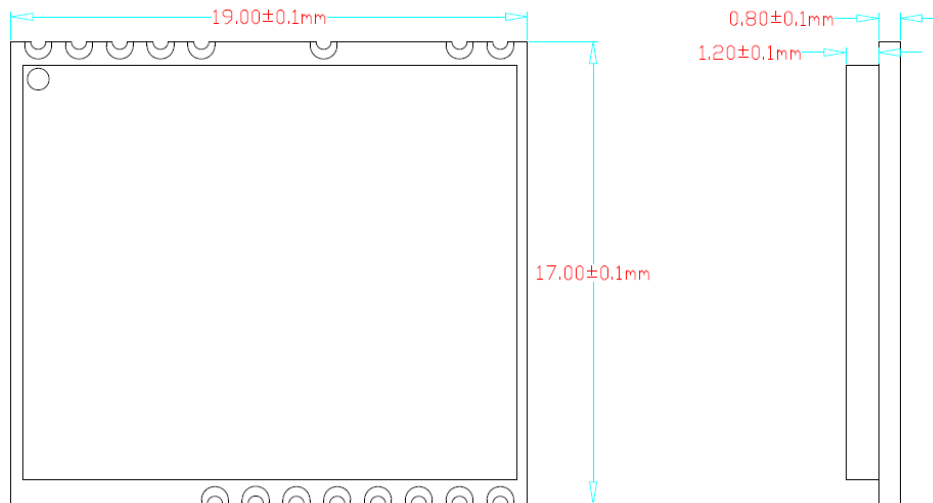
Parameters	Conditions	Min.	Typ.	Max.	Unit
Frequency Range		2412		2484	MHz
Output Power	802.11b	15	16	18	dBm
	802.11g	13	14	16	dBm
	802.11n	12	13	15	dBm
@EVM	802.11b / 11Mbps	--	-21	-10	dB
	802.11g / 54Mbps	--	-30	-25	dB
	802.11n / MCS7	--	-30	-28	dB

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

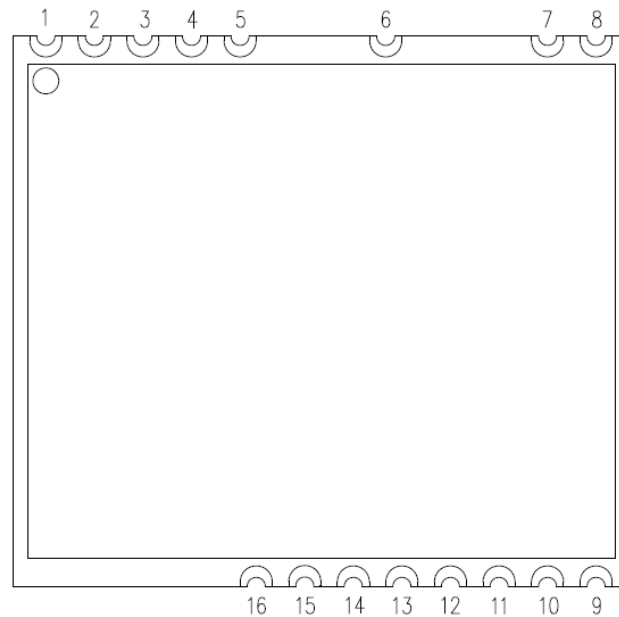
4. Pin Assignments

4.1 PCB Pin Outline

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4.2 Pin Definition



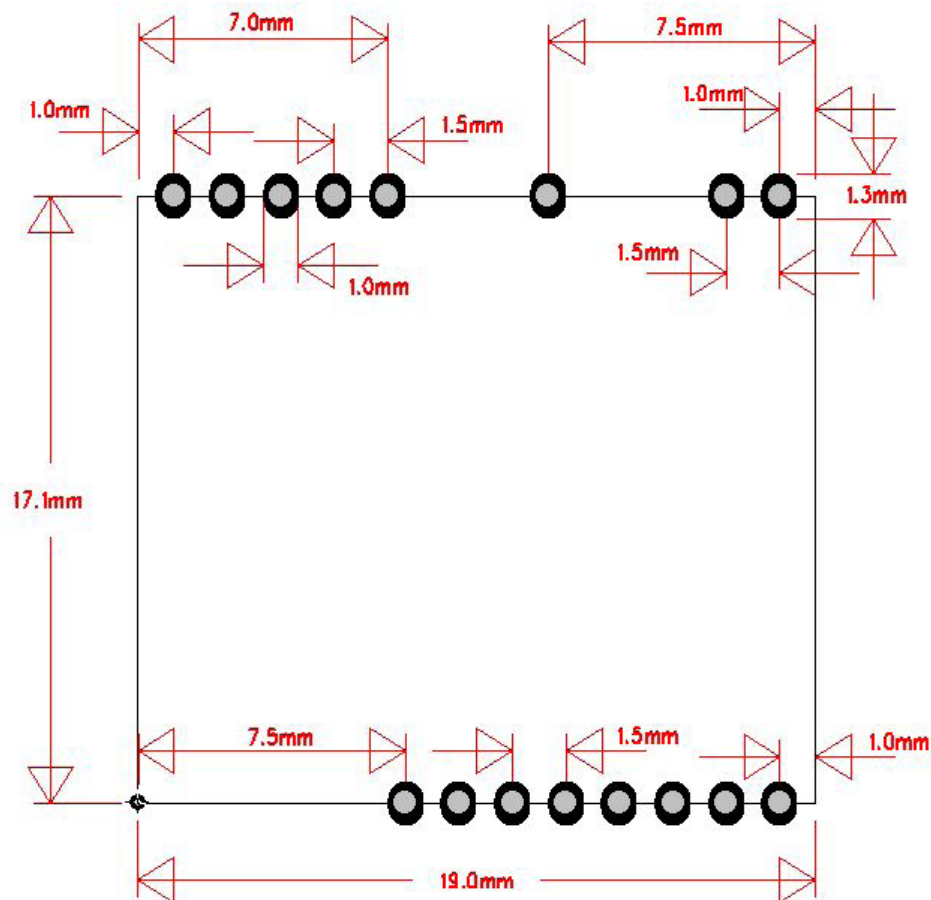
Pin-No	Pin-Define	Type	Description
1	GND	G	Ground
2	RF1	I/O	RF port for AUX antenna
3	GND	G	Ground
4	RF0	O	RF port for MAIN antenna
5	GND	G	Ground
6	LED0	O	LED Pin
7	VDD	P	3.3V Power Supply
8	GND	G	Ground
9	DM	I/O	USB DM-
10	DP	I/O	USB DP+
11	GND	G	Ground
12	PDN	I	Power down chip (active low)
13	CHIP_WAKE_HOST	O	Chip wakes up host
14	HOST_WAKE_CHIP	I	Host wakes up chip
15	WLAN_DIS_N	I	Force WLAN function entering Radio-Off mode(active low)
16	BT_DIS_N	I	Force BT function entering Radio-Off mode(active low)

5. Dimensions

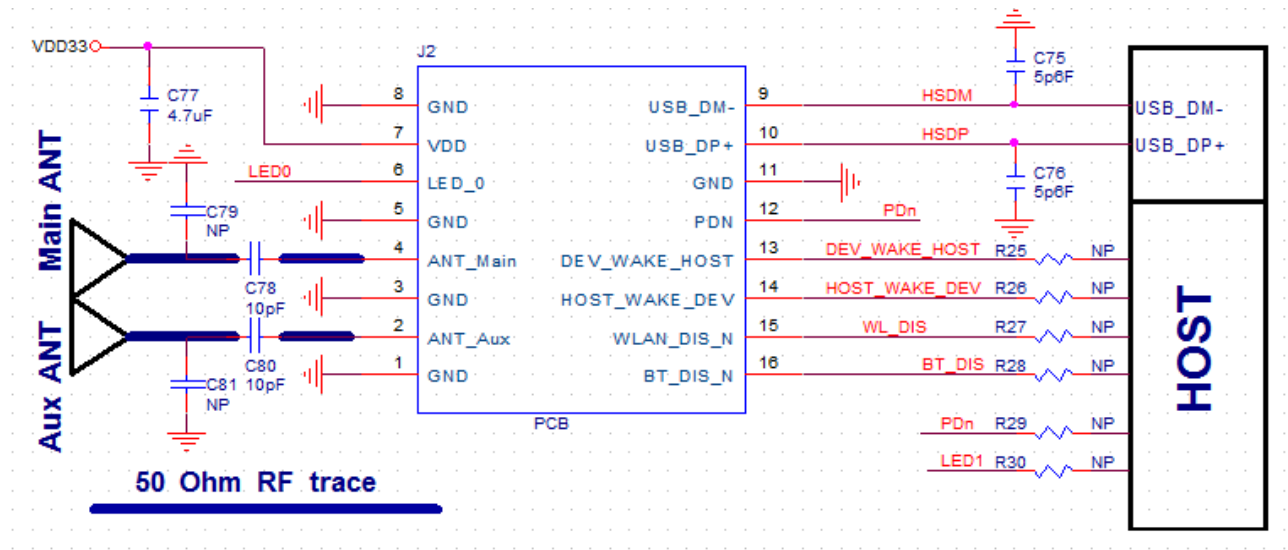
5.1 Layout Recommendation

(Unit: mm)

< TOP VIEW >



6. Reference Design

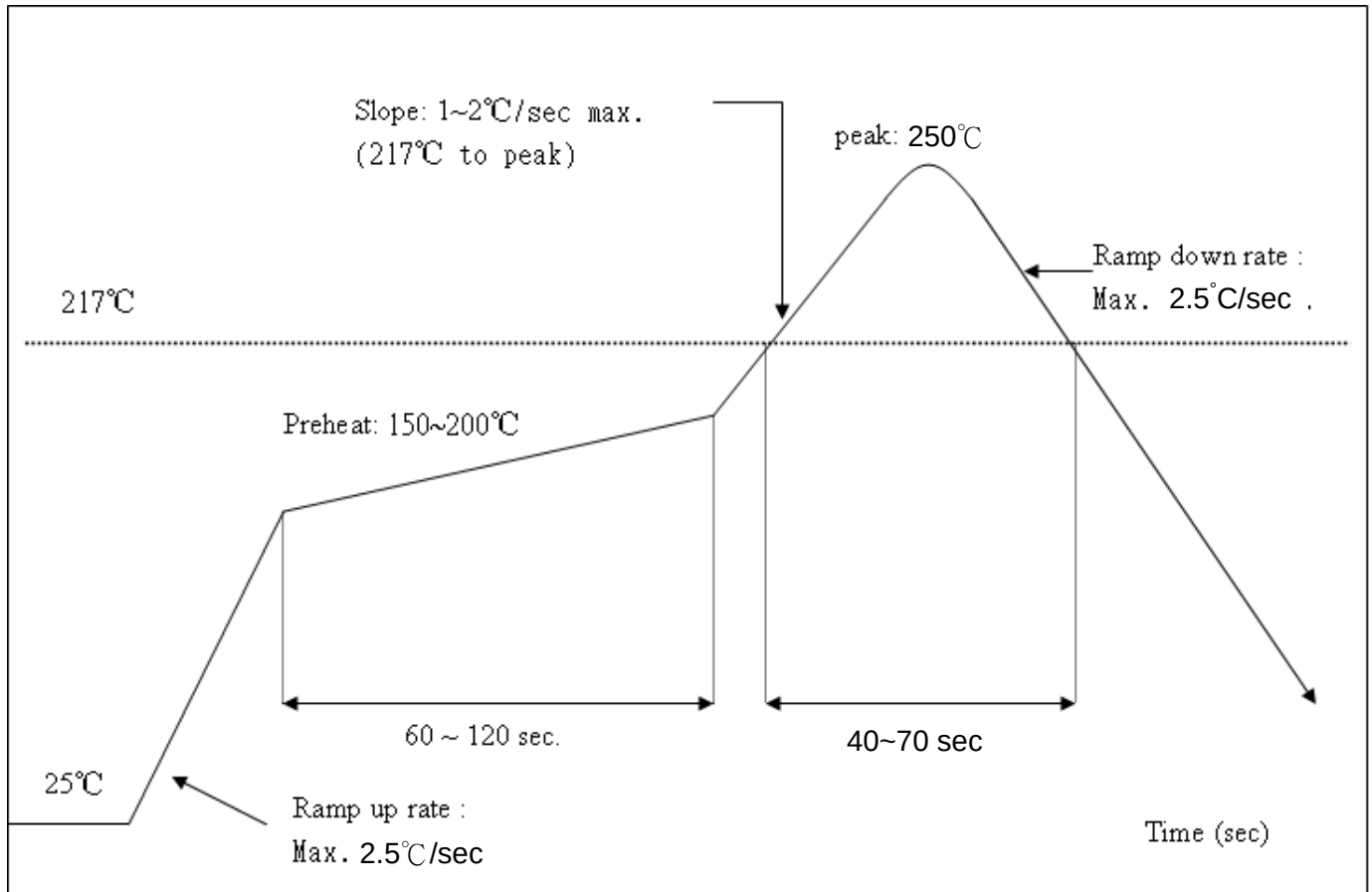


7. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <250°C

Number of Times : ≤ 2 times



8. Packing Information

9.1 Label

Label A → Anti-static and humidity notice



Label B → MSL caution / Storage Condition

	Caution	LEVEL
	This bag contains MOISTURE-SENSITIVE DEVICES	 If blank, see adjacent bar code label
1. Calculated shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH) 2. Peak package body temperature: _____ °C If blank, see adjacent bar code label 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 If blank, see adjacent bar code label ≤30°C/60% RH, 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 23 ± 5°C 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: _____ If blank, see adjacent bar code label Note: Level and body temperature defined by IPC/JEDEC J-STD-020		

Label C → Inner box label .

PKG S/N :	
Model:	
P/N :	
Qty :	
Date Code :	
Lot Code :	

Label D → Carton box label .

iotTech Corporation	
Model Name :	
Part No :	
Quantity :	
Lot D/C :	
Manufacture :	

9.2 Dimension

TBD