



ITM1016B / ITM1016BE

**IEEE 802.11b/g/n 1T1R WLAN
IOT Module Datasheet**

Revision History

Date	Revision Content	Revised By	Version
2015/04/16	- Initial released	Jay	1.0
2015/08/01	- Pin Definition Modified	Jay	1.1
2015/10/06	- Pin Definition Modified	Issac	1.2
2016/06/25	- Pin Definition Modified	Issac	1.3
2016/07/13	- Performance Fine-tune; Add GPIO	Issac	1.4
2016/08/09	- PCB Pin Outline Modified	Ken Wu	1.5
2016/11/01	- Pin Definition Modified	Issac	1.6

Contents

Contents	2
1. General Description	3
2. Features.....	4
3. General Specification	5
3.1 Voltages.....	5
3.1.1 Absolute Maximum Ratings.....	5
3.1.2 Recommended Operating Ratings	5
3.2 Wi-Fi RF Specification (RX)	6
3.3 Wi-Fi RF Specification (TX)	7
4. Pin Assignments.....	8
4.1 PCB Pin Outline.....	8
4.2 Pin Definition	9
5. Dimensions	10
5.1 Layout Recommendation.....	10
6. Host Interface Timing Diagram.....	11
6.1 Power UP Sequence	11
7. Reference Design	12
8. Recommended Reflow Profile	13
9. Packing Information	14
9.1 Label.....	14

1. General Description

The iotTech ITM1016B is a low-cost and a low-power single chip module providing for the highest level of integration for internet of thing embedded systems. This wireless module to support all mandatory IEEE 802.11 b/g/n standard and 54Mbps as well as 802.11n MCS0~MCS7, 20MHz, 800ns and 400ns guard interval.

It includes additional LDOs and DC-DC buck convertor that could provide noise isolation for digital and analog supplies and excellent power efficient with minimum BOM cost.

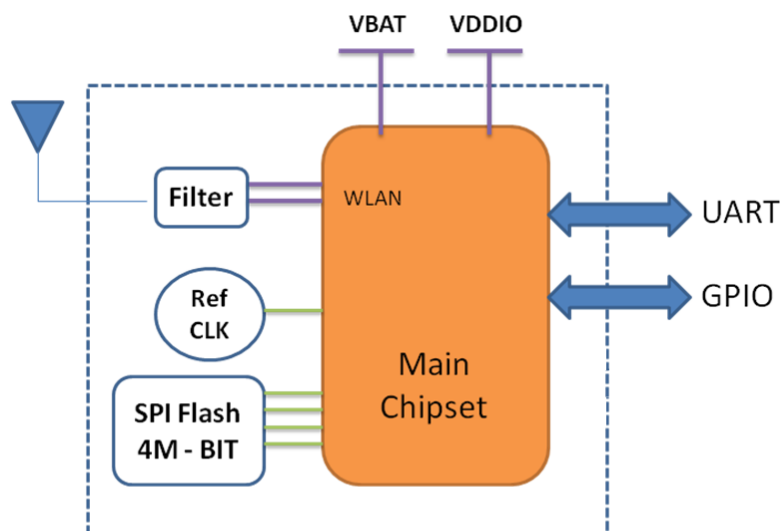
The ITM1016B module provides multiple peripheral interfaces including UART TX/RX, I2C, PWM,...etc., via 10 GPIO pins.

This compact module is a total solution for Wi-Fi technologies. The module is specifically developed for IOT embedded system devices.

2. Features

- Integrated WLAN CMOS efficient power amplifier with internal power detector and closed loop power calibration
- Single stream 802.11n provides highest throughput and superior RF performance for embedded system.
- Advanced 1X1 802.11n features:
 - Full / Half Guard Interval
 - Frame Aggregation
 - Reduced Inter-frame Space (RIFS)
 - Space Time Block Coding (STBC)
 - Greenfield mode
- AP/STA mode - – Soft-AP
- WiFi Direct(P2P)
- WFA features
 - WEP/TKIP/WPA/WPA2
 - WMM/WMM PS
 - WPS 1.0 and 2.0

The block diagram of ITM1016B module is depicted in the figure below.



3. General Specification

3.1 Voltages

3.1.1 Absolute Maximum Ratings

Symbol	Description	Min.	Max.	Unit
VBAT	Input supply Voltage	-0.3	3.6	V
VDDIO	Digital/Bluetooth/SDIO Voltage	-0.3	3.6	V

3.1.2 Recommended Operating Ratings

Test conditions: At room temperature				
Symbol	Min.	Typ.	Max.	Unit
VBAT	3.0	3.3	3.6	V
VDDIO	1.75	3.3	3.6	V

Note: The voltage of VDDIO is depended on system I/O voltage.

Test conditions: At operating temperature -10°C ~65°C				
Symbol	Min.	Typ.	Max.	Unit
VBAT	3.0	3.3	3.6	V
VDDIO	1.75	3.3	3.6	V

3.2 Wi-Fi RF Specification (RX)

Parameters	Conditions	Min.	Typ.	Max.	Unit
Frequency Range		2412		2484	MHz
RX Sensitivity 11b @ 8% PER	- 1Mbps		-90		dBm
	- 2Mbps		-88		dBm
	- 5.5Mbps		-86		dBm
	- 11Mbps		-84		dBm
RX Sensitivity 11g @ 10% PER	- 6Mbps		-89		dBm
	- 9Mbps		-87		dBm
	- 12Mbps		-84		dBm
	- 18Mbps		-82		dBm
	- 24Mbps		-78		dBm
	- 36Mbps		-75		dBm
	- 48Mbps		-72		dBm
	- 54Mbps		-70		dBm
Receive Sensitivity (11n,20MHz) @10% PER	- MCS0		-87		dBm
	- MCS=1		-84		dBm
	- MCS=2		-82		dBm
	- MCS=3		-78		dBm
	- MCS=4		-75		dBm
	- MCS=5		-71		dBm
	- MCS=6		-70		dBm
	- MCS=7		-68		dBm
Maximum Receive Level	802.11b		-10		dBm
	802.11g		-8		dBm
	802.11n		-8		dBm
Operating temperature	-10°C to 65°C				
Storage temperature	-40°C to 85°C				

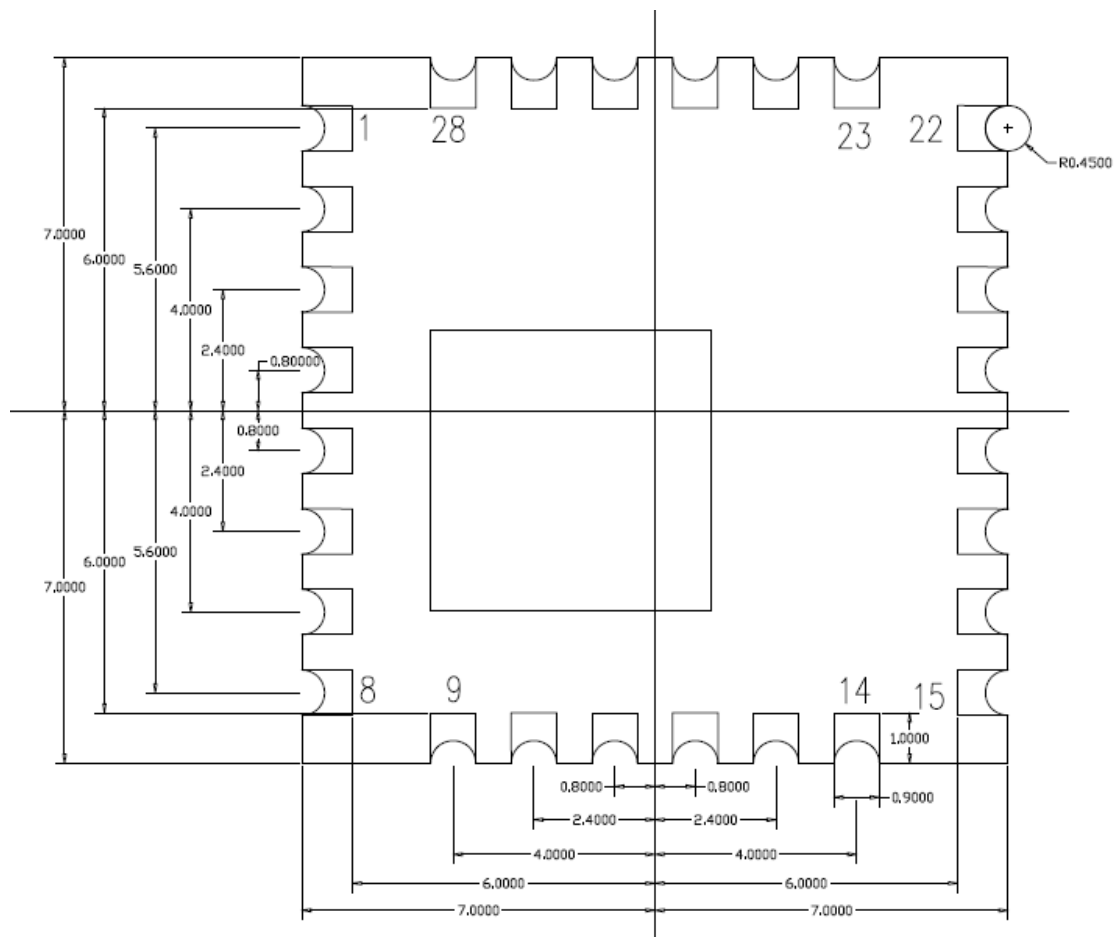
3.3 Wi-Fi RF Specification (TX)

Parameters	Conditions	Min.	Typ.	Max.	Unit
Frequency Range		2412		2484	MHz
Output Power	802.11b		17		dBm
	802.11g		15		dBm
	802.11n		14		dBm
@EVM	802.11b		-19		dB
	802.11g		-28		dB
	802.11n		-30		dB
Harmonic Level @ Ant Port (17dBm with 100% duty cycle, CCK, 1Mbps)	4.8-5GHz, 2 nd harmonic		-56		dBm/ 1MHz
	7.2-7.5GHz, 3 rd harmonic		-80		dBm/ 1MHz

4. Pin Assignments

4.1 PCB Pin Outline

< TOP VIEW >



4.2 Pin Definition

NO	Name	Type	Description
1	GND	—	Ground connections
2	GND	—	Ground connections
3	GND	—	Ground connections
4	GPIO8/PWM	I/O	GPIO8
5	GPIO2	I/O	GPIO2
6	GND	—	Ground connections
7	VDDIO	P	I/O voltage source input
8	VBAT	P	Main power voltage source input
9	GPIO1/I2C_SCL	I/O	GPIO1
10	GPIO3/I2C_SDA	I/O	GPIO3
11	LDO_EN	I	WLAN device power enable/disable
12	GND	—	Ground connections
13	SPI_MOSI	I/O	External SPI connections (option)
14	SPI_CSN	I/O	External SPI connections (option)
15	SPI_MISO	I/O	External SPI connections (option)
16	SPI_CLK	I/O	External SPI connections (option)
17	UART_TXD0/GPIO5	I/O	Debug UART TX / GPIO5
18	UART_RXD0/GPIO6	I/O	Debug UART RX / GPIO6
19	UART_RXD1/GPIO19	I/O	Data UART RX / GPIO19
20	UART_TXD1/GPIO20	I/O	Data UART TX / GPIO20
21	GND	—	Ground connections
22	GND	—	Ground connections
23	NC	—	ITM1016B: Floating (DO NOT connect)
	ANT	I/O	ITM1016BE: RF I/O port (Connect to antenna)
24	GND	—	Ground connections
25	GPIO18	I/O	GPIO18
26	GPIO15	I/O	GPIO15
27	GND	—	Ground connections
28	NC	—	Floating (DO NOT connect)

In current SDK, pin 17/18 are designated as system UART for debugging and firmware upload. Pin 19/20 are designated as data UART to implement WiFi-UART function.

Using pin 17/18 (Debug UART) for AT command communication with ITM1016B is recommended

Proprietary & Confidential Information

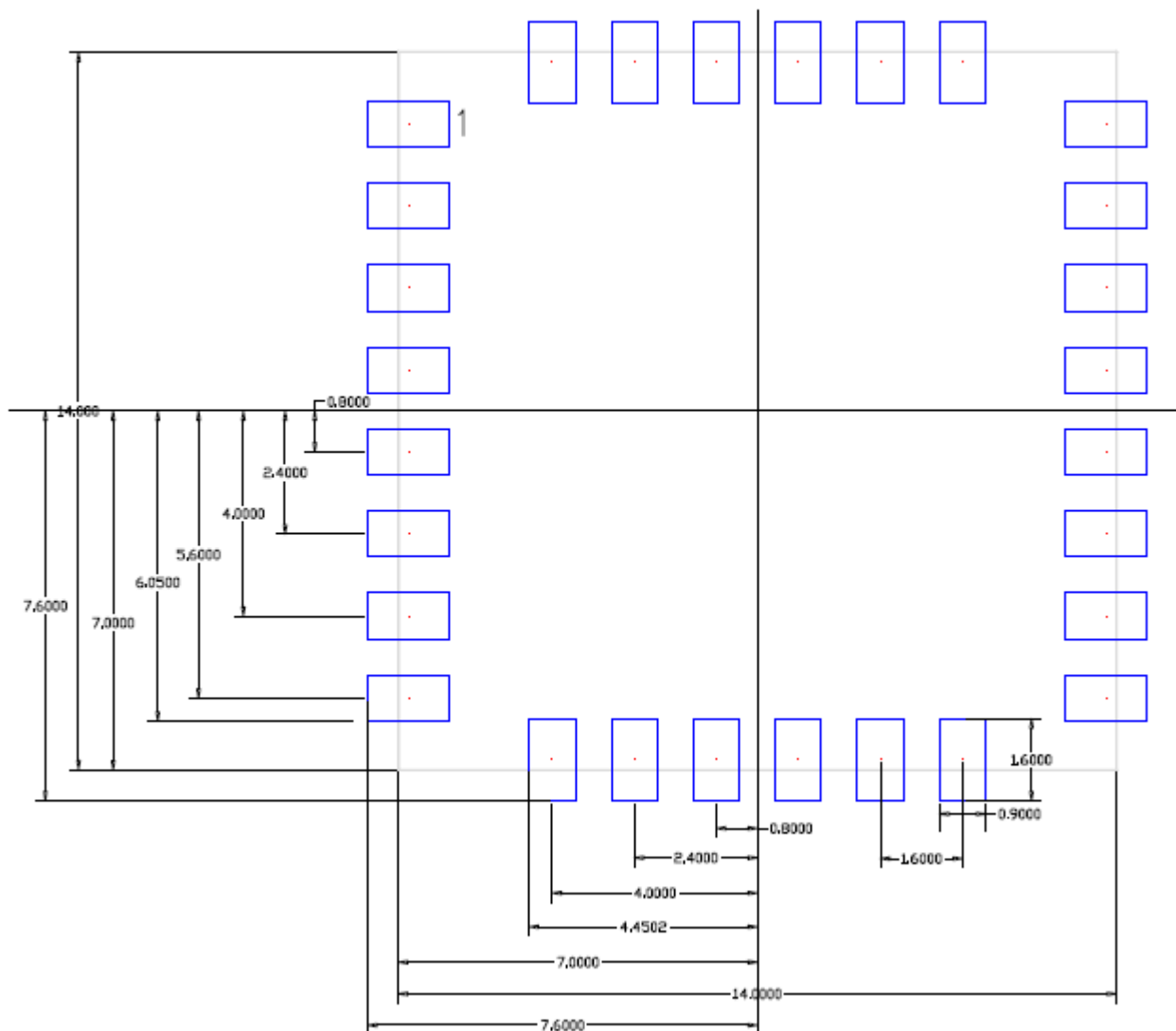
兆雲科技股份有限公司

5. Dimensions

5.1 Layout Recommendation

(Unit: mm)

< TOP VIEW >

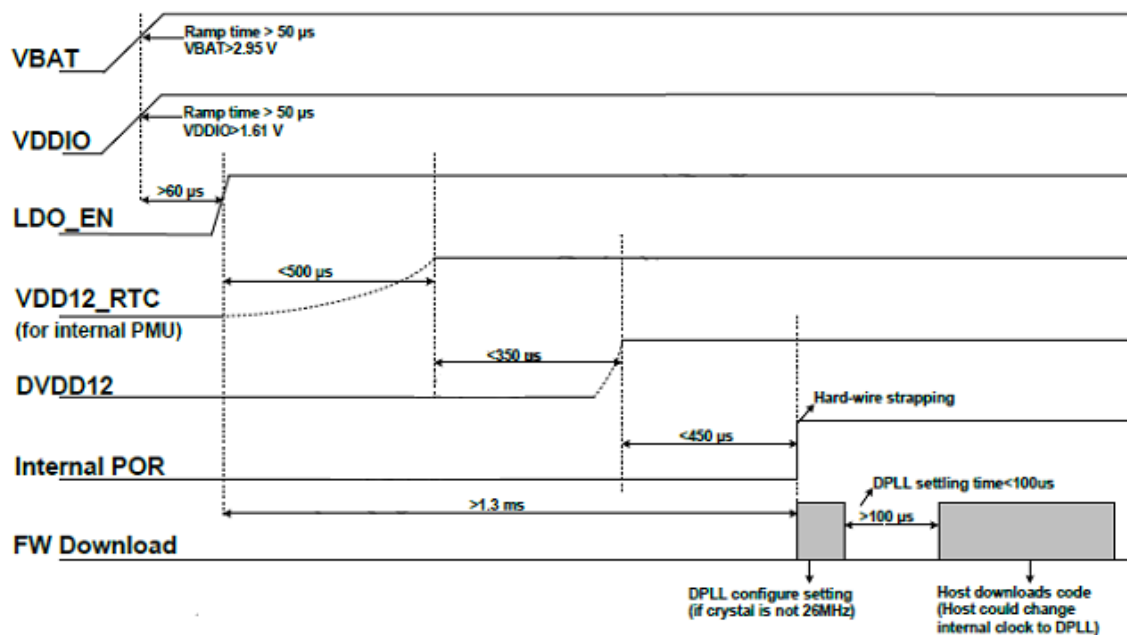


6. Host Interface Timing Diagram

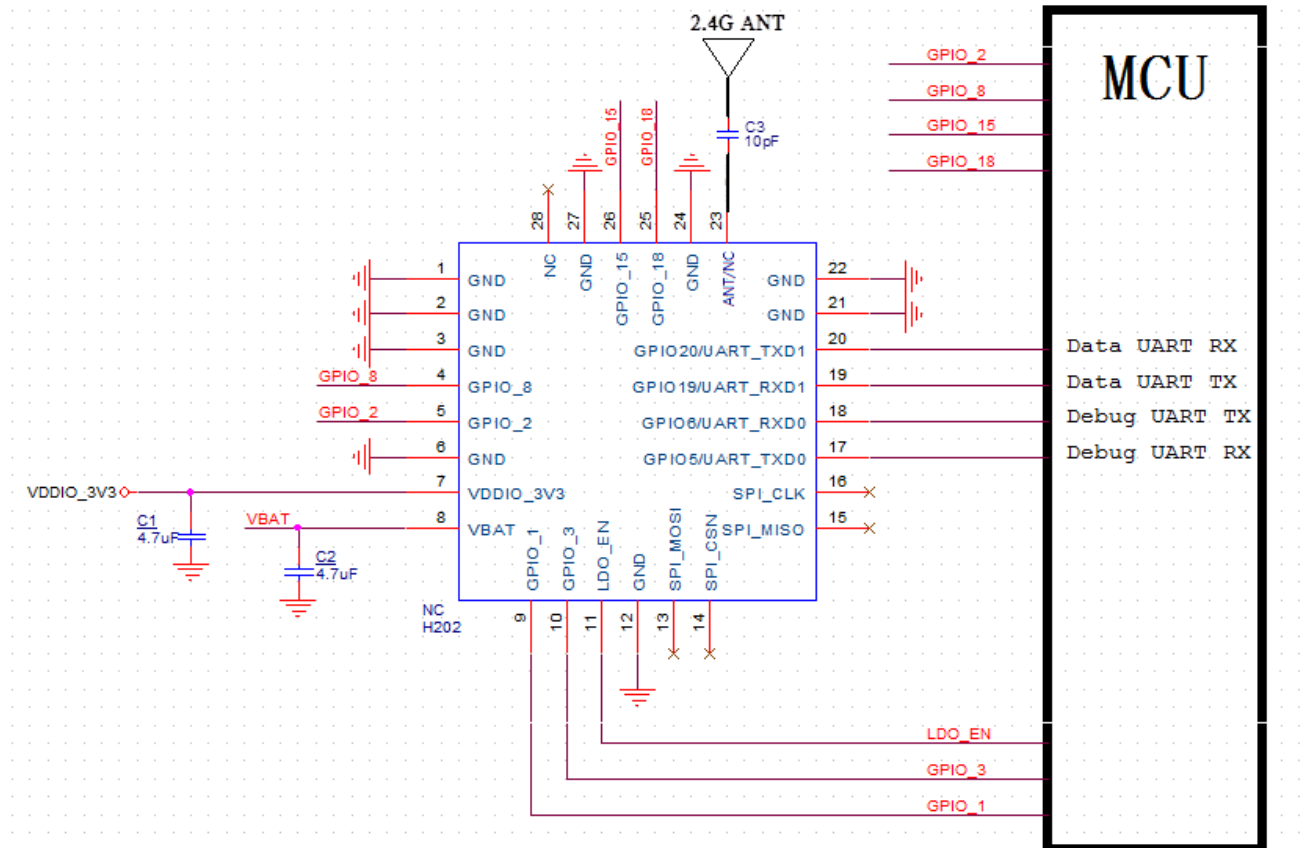
6.1 Power UP Sequence

Shows the below figure, the power-on sequence of the ITM1016B from power-up to firmware download, including the initial device power-on reset evoked by LDO_EN signal. After initial power-on, the LDO_EN signal can be held low to turn off the ITM1016B. After LDO_EN is assert and host starts the power-on sequence of the ITM1016B. From that point, the typical power-on sequence is shown below:

1. Within 1.3 millisecond, the internal power-on reset (POR) will be done. And host could download firmware code of DPLL setting if the internal running clock is crystal frequency.
2. After 100us of DPLL settling time, host could set internal clock to full speed and finish all the downloading of firmware code.



7. Reference Design

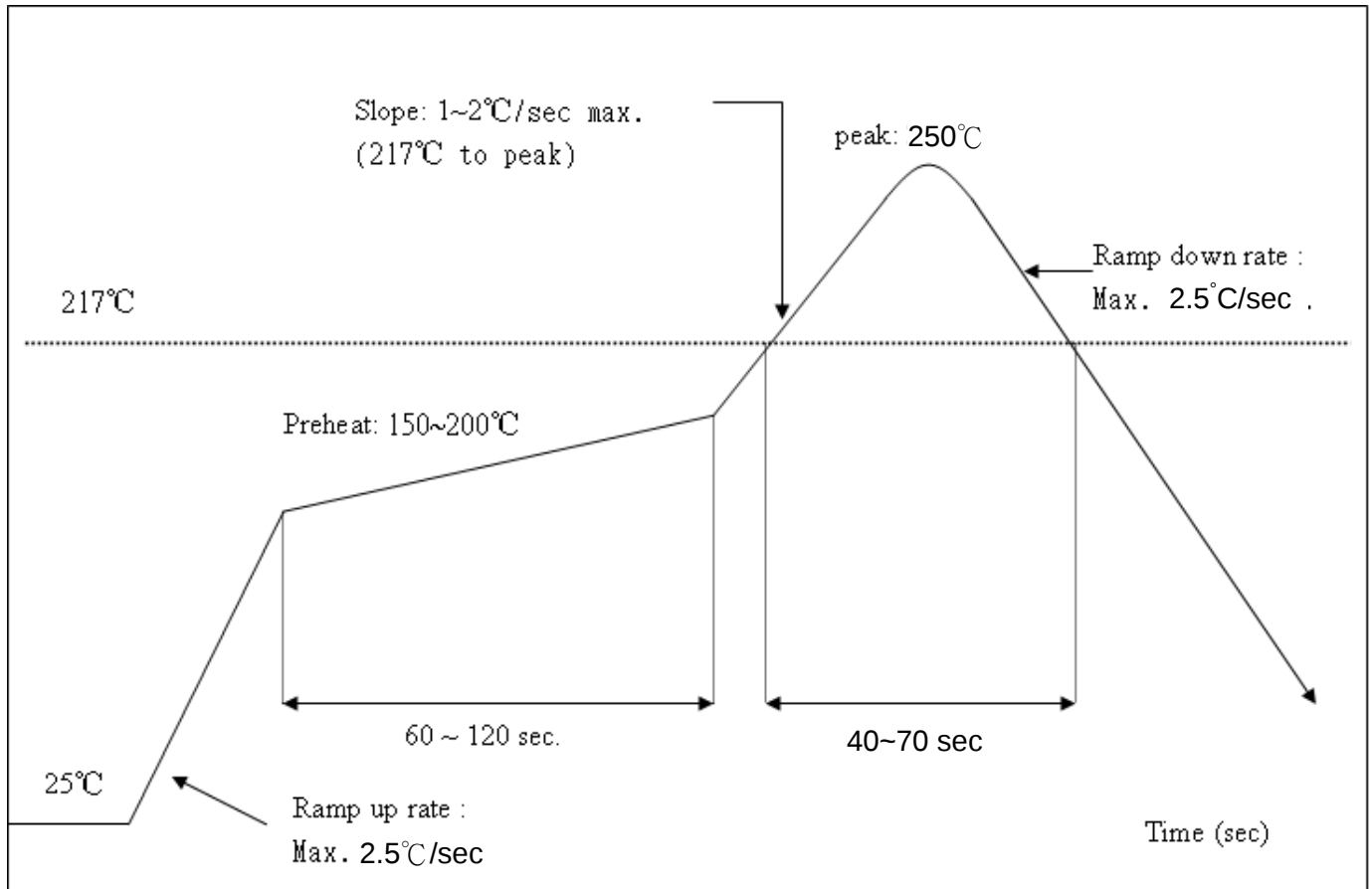


8. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : $<250^{\circ}\text{C}$

Number of Times : ≤ 2 times



9. Packing Information

9.1 Label

Label A → Anti-static and humidity notice



Label B → MSL caution / Storage Condition

	Caution This bag contains MOISTURE-SENSITIVE DEVICES	LEVEL If blank, see adjacent bar code label
	- Calculated shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH) - Peak package body temperature: _____ °C If blank, see adjacent bar code label - After bag is opened, devices that will be subjected to reflow solder or other high temperature process must be - Mounted within: _____ hours of factory conditions If blank, see adjacent bar code label ≤30°C/60% RH, or - Stored per J-STD-033 - Devices require bake, before mounting, if: - Humidity Indicator Card reads >10% for level 2a - 5a devices or >60% for level 2 devices when read at 23 ± 5°C 3a or 3b are not met - 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 :	