



iTM1821-CU

IEEE 802.11 a/b/g/n/ac 1T1R WLAN +
Bluetooth 2.1/4.2 with USB2.0 Host Interface
Combo Module Datasheet

V1.0

Revision History

Date	Revision Content	Revised By	Version
2019/04/01	- Initial released	Issac Chen	0.1
2020/07/08	- Add power consumption	Issac Chen	0.2
2020/11/03	- Correct reference circuit and pin define	Issac Chen	0.3
2024/12/05	- Official Release	Issac Chen	1.0

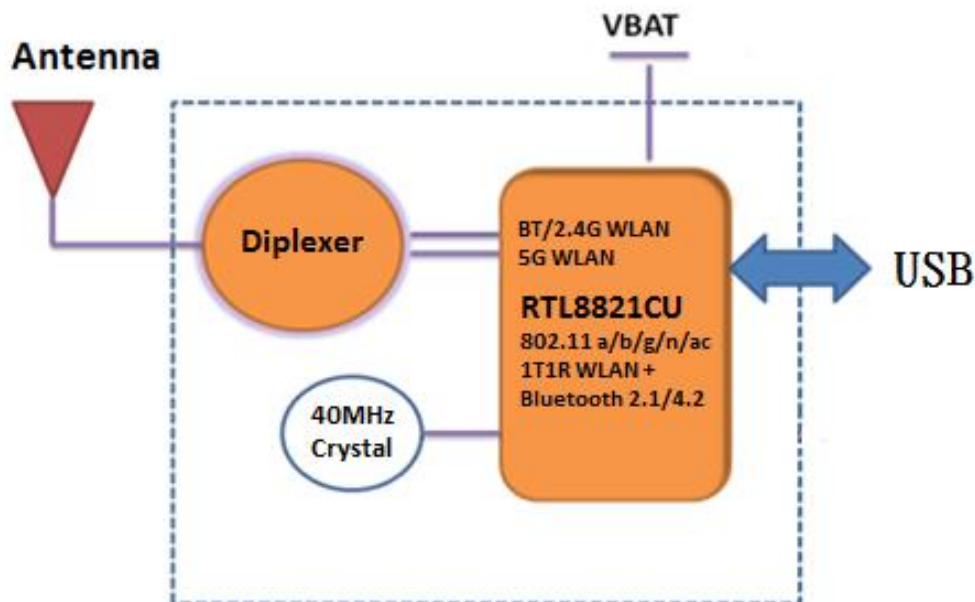
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1. General Description

The iotTech iTM1821-CU is a small size and low profile of WiFi + BT Combo module, board size is 12.2mm*13.0mm with module thickness of 2mm. It can be easily manufactured on SMT process and highly suitable for tablet PC, ultra book, mobile device and consumer products. It provides USB interface for WiFi+BT to connect with host processor. The WiFi throughput can go up to 433Mbps in theory by using 1x1 802.11ac MIMO technology and Bluetooth can support BT2.1+EDR/BT3.0 and BT4.2.

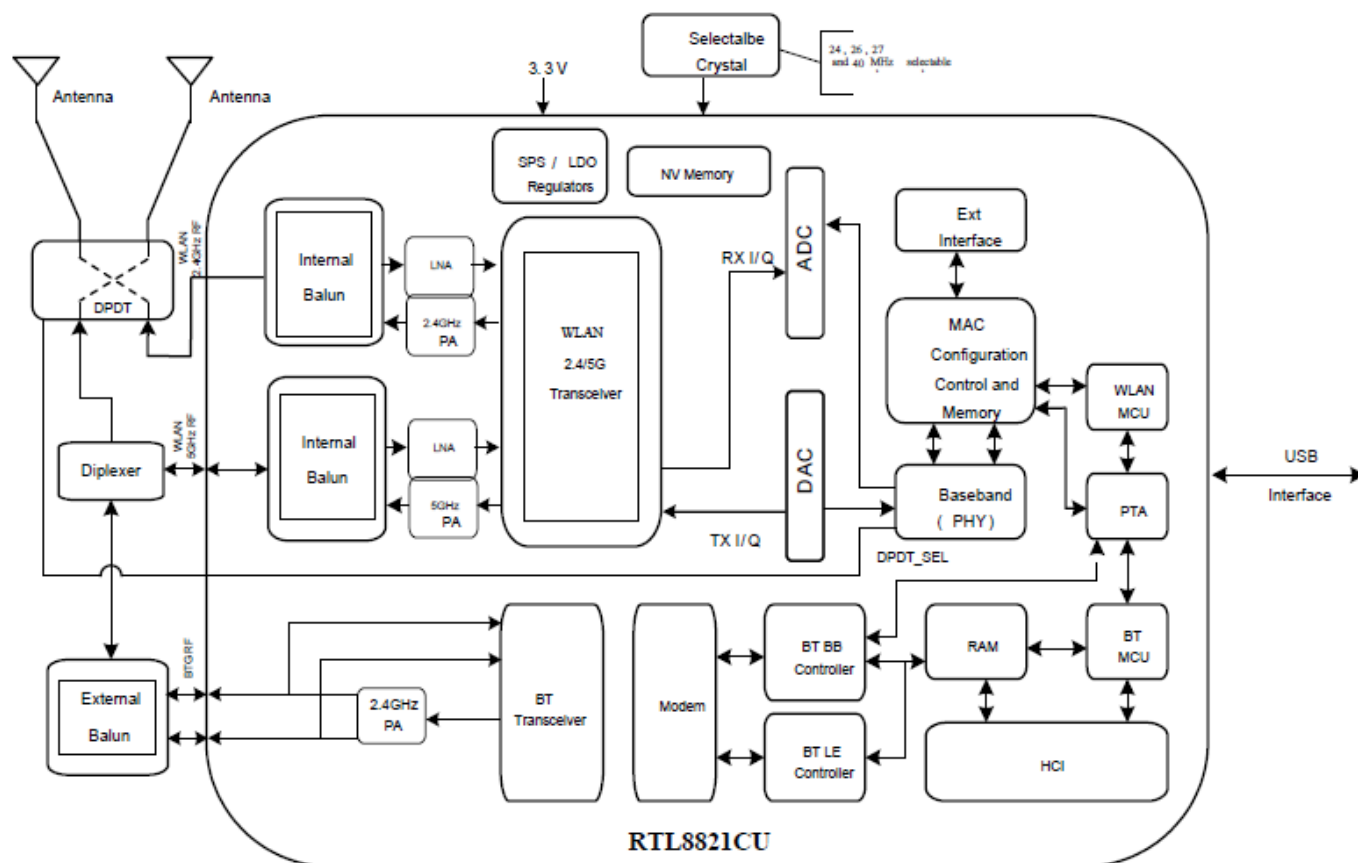
iTM1821-CU uses Realtek RTL8821CU, a highly integrated WiFi/BT single chip based on advanced COMS process. RTL8821CU integrates whole WiFi/BT function blocks into a chip, such as USB, MAC, BB, AFE, RFE, PA, EEPROM and LDO/SWR, except fewer passive components remained on PCB.



2. Features

- Operate at 2.4GHz+5GHz dual frequency bands
- USB2.0 host interface for WiFi and Bluetooth
- IEEE standards support: IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, IEEE 802.11n, IEEE 802.11ac, IEEE 802.11e, IEEE 802.11h, IEEE 802.11i, IEEE 802.11k
- Fully Qualified for Bluetooth 2.1+EDR specification including both 2Mbps and 3Mbps modulation mode
- Fully qualified for Bluetooth 3.0
- Fully qualified for Bluetooth 4.2 Dual mode
- Full-speed Bluetooth operation with Piconet and Scatternet support
- Enterprise level security which can apply WPA/WPA2 certification for WiFi.
- Maximum data rate up to 433Mbps in 802.11ac

The general functional block diagram of RTL8821CU chipset is shown as 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

3.1.2 Recommended Operating Ratings

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

Test conditions: At operating temperature 0°C ~70°C				
Symbol	Min.	Typ.	Max.	Unit
VBAT	3.0	3.3	3.6	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		-86	-82	dBm
	- 9Mbps		-84	-81	dBm
	- 12Mbps		-83	-79	dBm
	- 18Mbps		-81	-77	dBm
	- 24Mbps		-78	-74	dBm
	- 36Mbps		-74	-70	dBm
	- 48Mbps		-70	-66	dBm
	- 54Mbps		-69	-65	dBm
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0		-86	-82	dBm
	- MCS=1		-83	-79	dBm
	- MCS=2		-81	-77	dBm
	- MCS=3		-78	-74	dBm
	- MCS=4		-74	-70	dBm
	- MCS=5		-70	-66	dBm
	- MCS=6		-69	-65	dBm
	- MCS=7		-67	-64	dBm
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0		-84	-79	dBm
	- MCS=1		-80	-76	dBm
	- MCS=2		-78	-74	dBm
	- MCS=3		-75	-71	dBm
	- MCS=4		-72	-67	dBm
	- MCS=5		-67	-63	dBm
	- MCS=6		-66	-62	dBm
	- MCS=7		-64	-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	17	19	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	12	14	16	dBm
	802.11n	11	13	15	dBm
	802.11ac	9	11	13	dBm
@EVM	802.11a / 54Mbps	--	-29	-25	dB
	802.11n / MCS7	--	-32	-28	dB
	802.11ac / MCS9	--	-34	-32	dB

3.4 Bluetooth Specification

Feature	Description		
General Specification			
Bluetooth Standard	Bluetooth V4.2 of 1, 2 and 3 Mbps.		
Host Interface	USB		
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.		
RF Specification			
	Min.	Typical.	Max.
Output Power (Class 1.5)		8dBm	
Sensitivity @ BER=0.1% for GFSK (1Mbps)		-88dBm	
Sensitivity @ BER=0.01% for $\pi/4$ -DQPSK (2Mbps)		-85dBm	
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)		-81dBm	
Maximum Input Level	GFSK (1Mbps):-20dBm		
	$\pi/4$ -DQPSK (2Mbps) :-20dBm		
	8DPSK (3Mbps) :-20dBm		

3.5 Power Consumption

WiFi only:

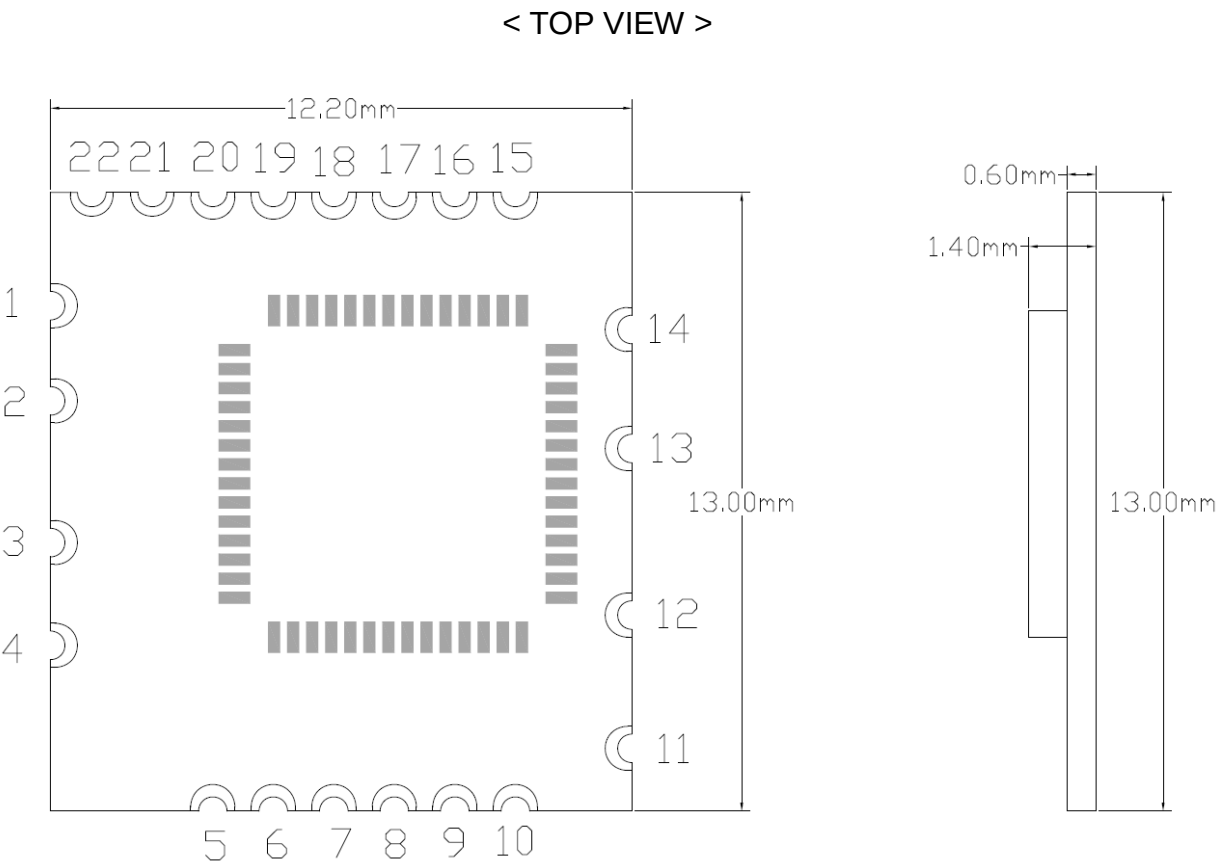
TX Mode: (Continuous mode)	240mA (2.4GHz/HT40/13dBm) 220mA (5GHz/HT80/11dBm)
RX Mode: (Conituous mode)	115mA (2.4GHz/HT40) 130mA (5GHz/HT80)
Associated Idle power saving with DTIM=3	2.1mA
Unassociated Idle:	0.1mA
RF disable Mode:	0.1mA

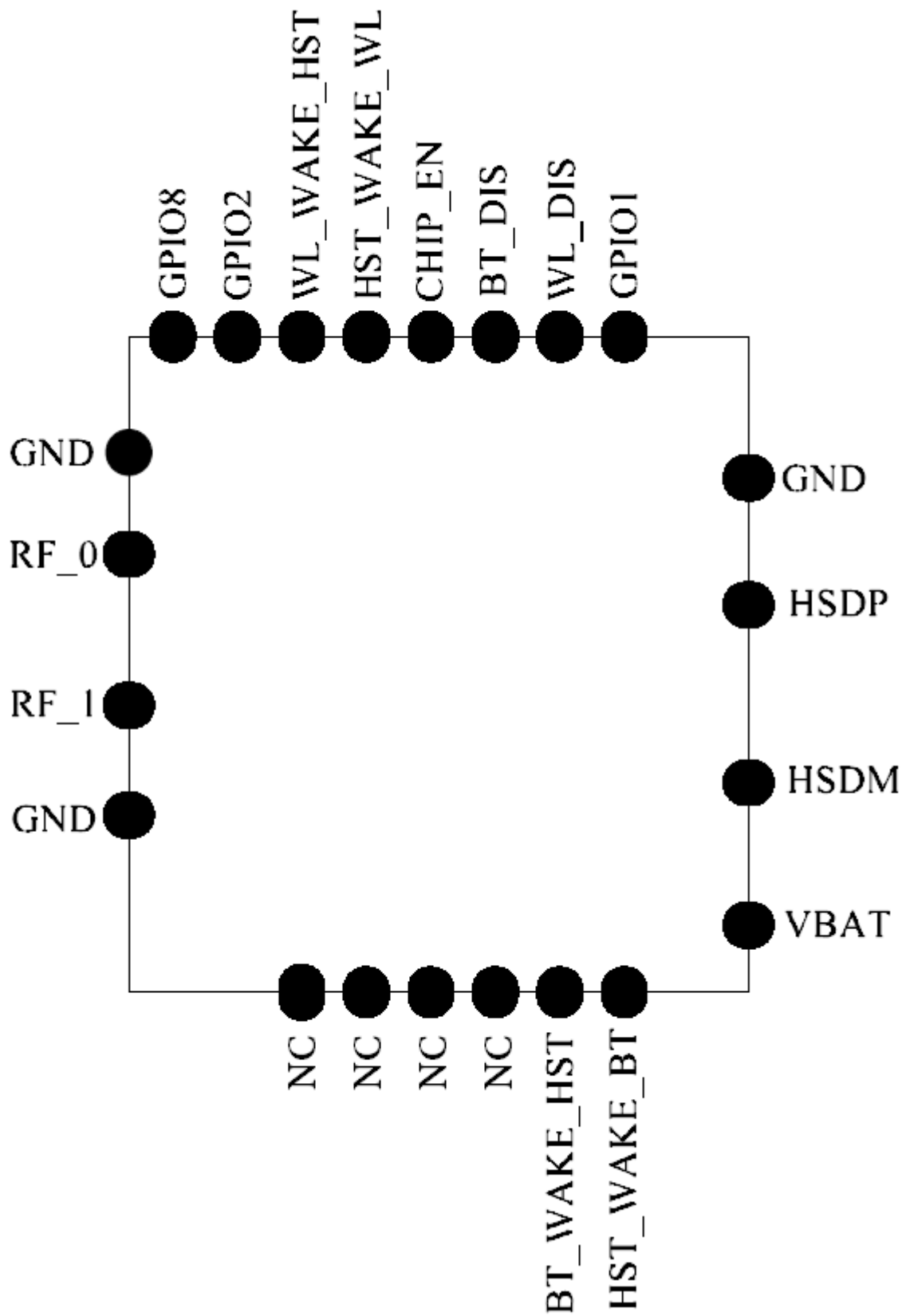
BT:

Inquiry & Page Scan:	0.9 mA
ACL no traffic:	7.5mA
SCO HV3:	15.0mA

4. Pin Assignments

4.1 PCB Pin Outline





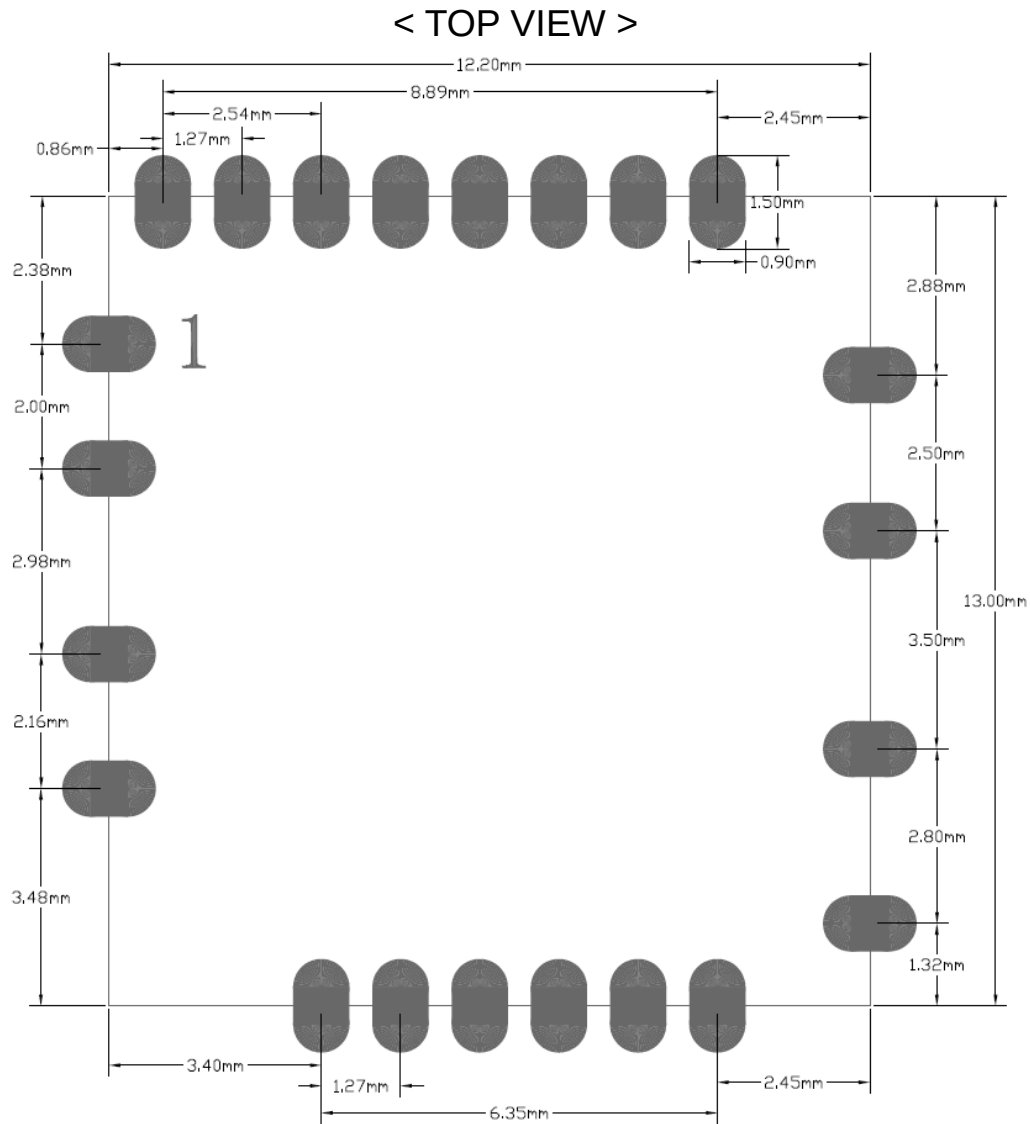
4.2 Pin Definition

Pin #	Name	Description
1	GND	Ground
2	RF_0	WIFI/BT signal pin
3	RF_1	Not Connected
4	GND	Ground
5	NC	Not Connected
6	NC	Not Connected
7	NC	Not Connected
8	NC	Not Connected
9	BT_WAKE_HST	Bluetooth device wake up host
10	HST_WAKE_BT	Host wake up Bluetooth device
11	VBAT	Main power voltage source input 3.3V
12	HSDM	USB2.0 differential pair for WLAN And Bluetooth
13	HSDP	USB2.0 differential pair for WLAN And Bluetooth
14	GND	Ground
15	GPIO1	GPIO1
16	WL_DIS	WLAN disable
17	BT_DIS	Bluetooth disable
18	CHIP_EN	Module enable
19	HST_WAKE_WL	Host wake up WLAN device
20	WL_WAKE_HST	WLAN device wake up Host
21	GPIO2	GPIO2
22	GPIO8	GPIO8
Total	22PINS	13.0*12.2*2.0mm Package

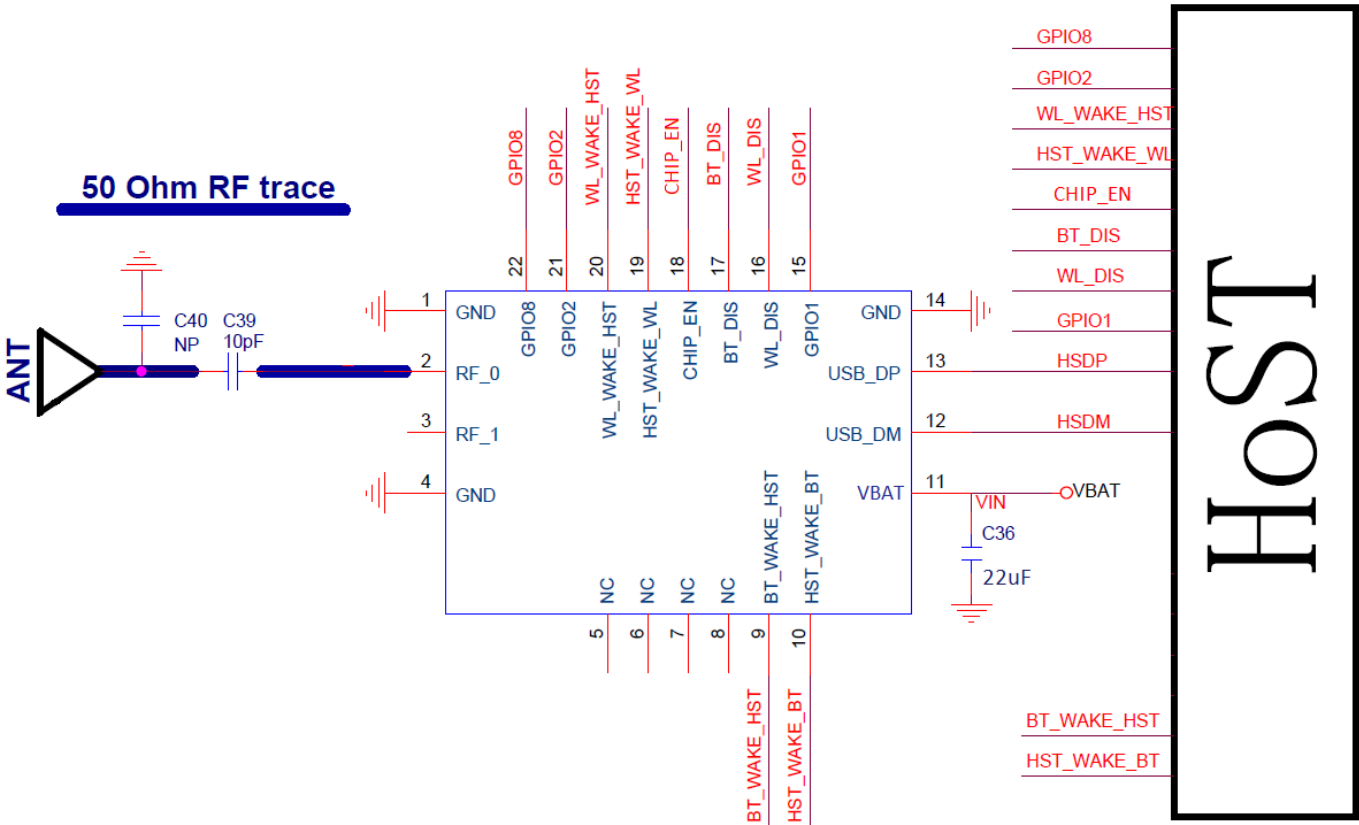
5. Dimensions

5.1 Layout Recommendation

(Unit: mm)



6. Reference Design

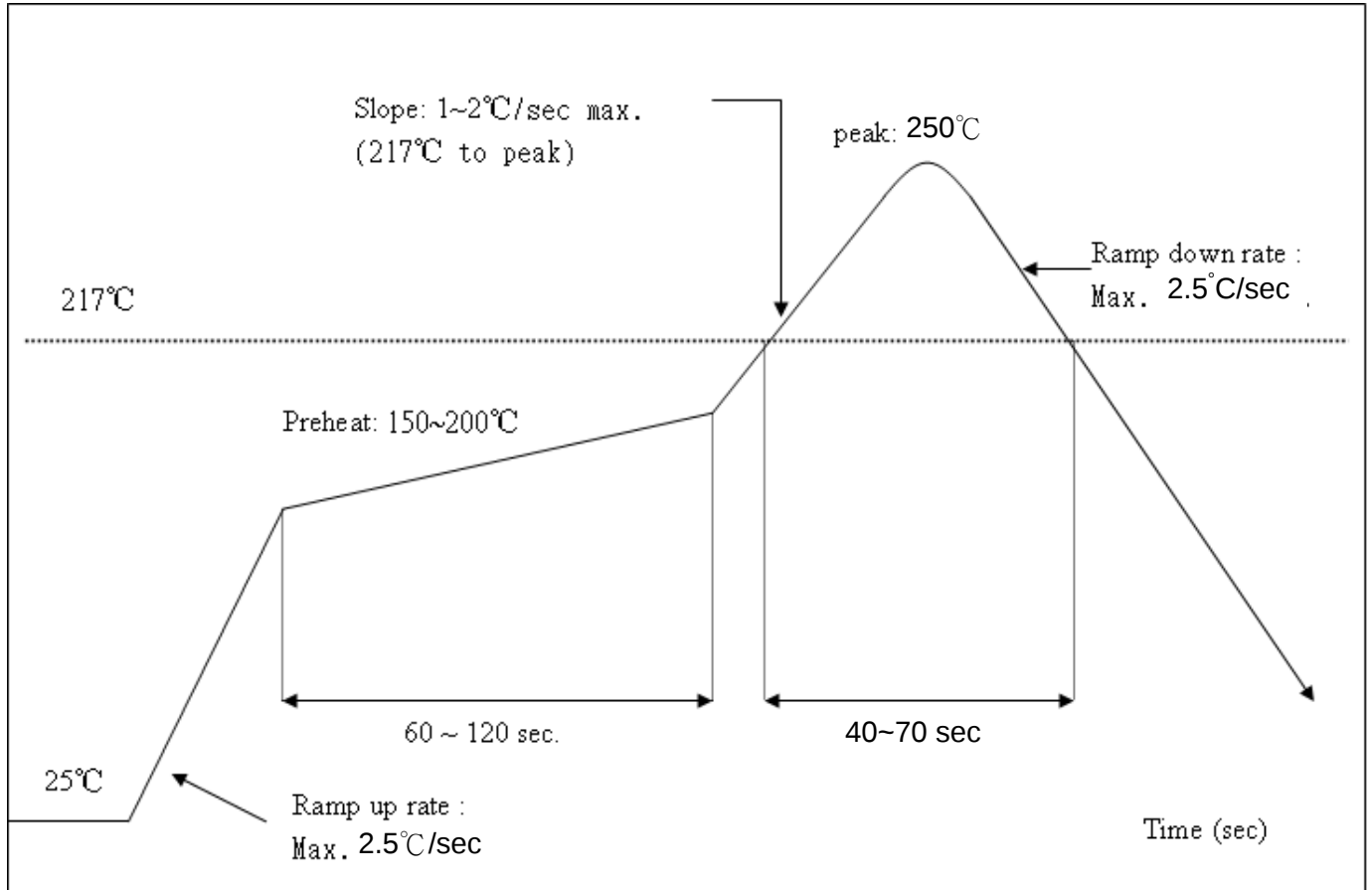


7. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

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

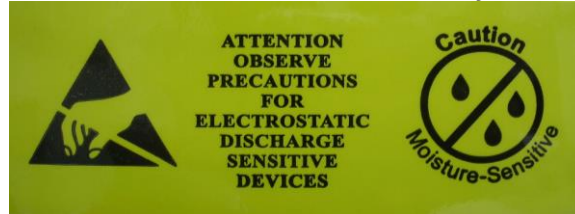
Number of Times : ≤ 2 times



8. Packing Information

8.1 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
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		

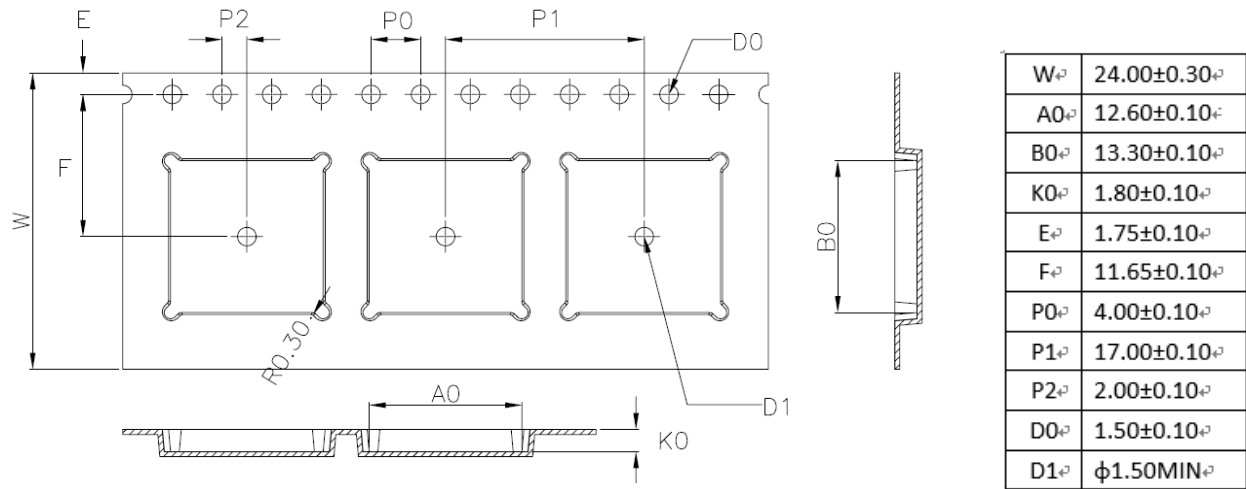
Label C → Inner box label .

PKG S/N :	
	9PKG12013100001
Model:	
	XXXXXXXX(HF)
P/N :	
	99P-W01-0042R
Qty :	
	1500
Date Code :	
	1205
Lot Code :	
	T0C102B

Label D → Carton box label .

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

8.2 Dimension



1. 10 sprocket hole pitch cumulative tolerance ± 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 ± 0.05 mm.
6. Packing length per 22" reel : 98.5 Meters.(1:3)
7. Component load per 13" reel : 1500 pcs.

