



iTM1822-CE

**IEEE 802.11 a/b/g/n/ac 2T2R WLAN
+ Bluetooth 5.0 Combo Module**

2021-12-15

Revision History

Date	Revision Content	Revised By	Version
2019/11/22	- Initial released	Issac Chen	1.00
2019/12/09	- Revised BT host interface to USB	Ken Wu	2.00
2021/12/15	- Revised BT Class 1.5 TX spec	Issac Chen	2.10
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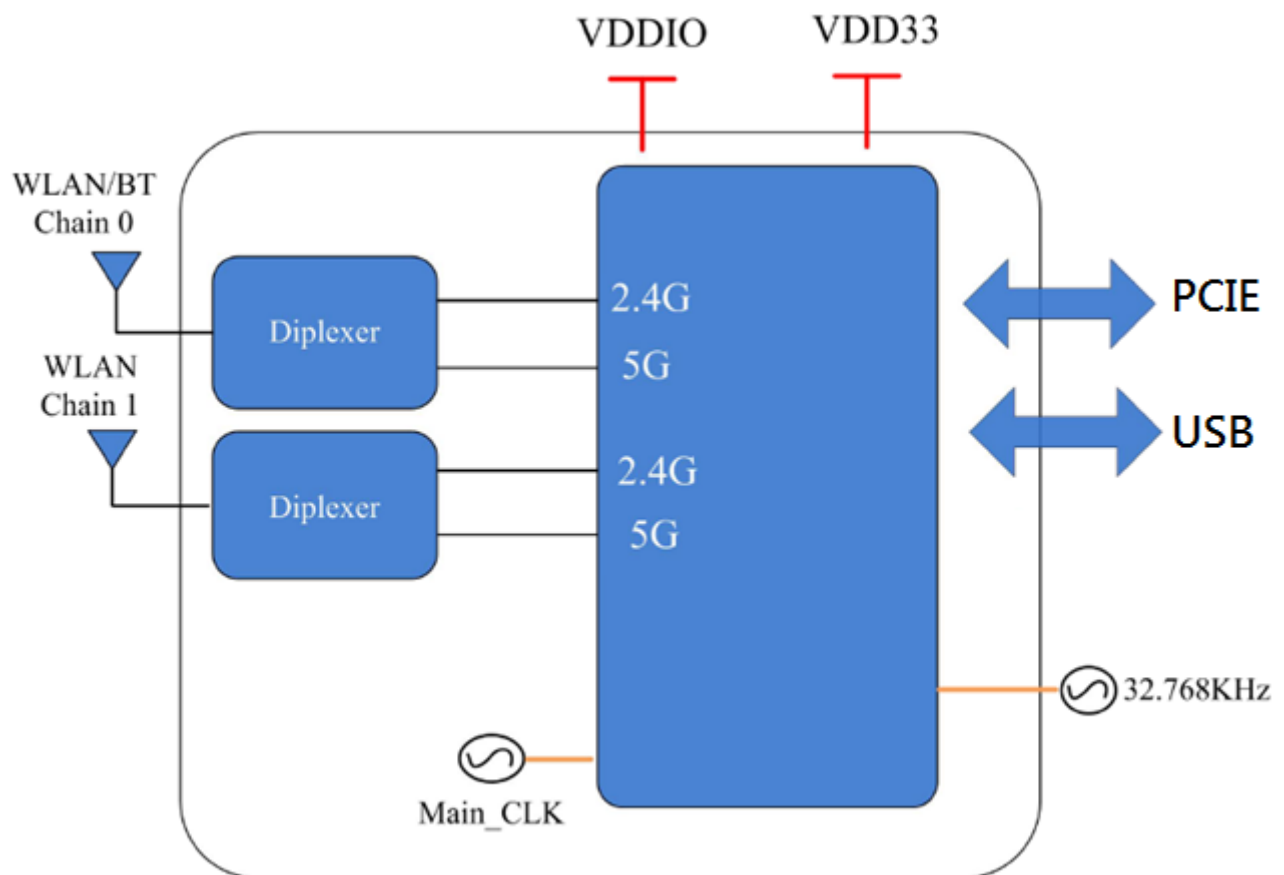
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1. General Description

The ITM1822-CE is a highly integrated module that supports 2-stream 802.11ac solutions with Multi-user MIMO (Multiple-Input, Multiple-Output) with integrated Bluetooth 2.1/3.0/4.1/5.0 controller, PCIE and USB mixed interface. It combines a WLAN MAC, a 2T2R capable WLAN baseband, and RF in a single module. ITM1822-CE provides a complete solution for a high-performance integrated wireless and Bluetooth device.

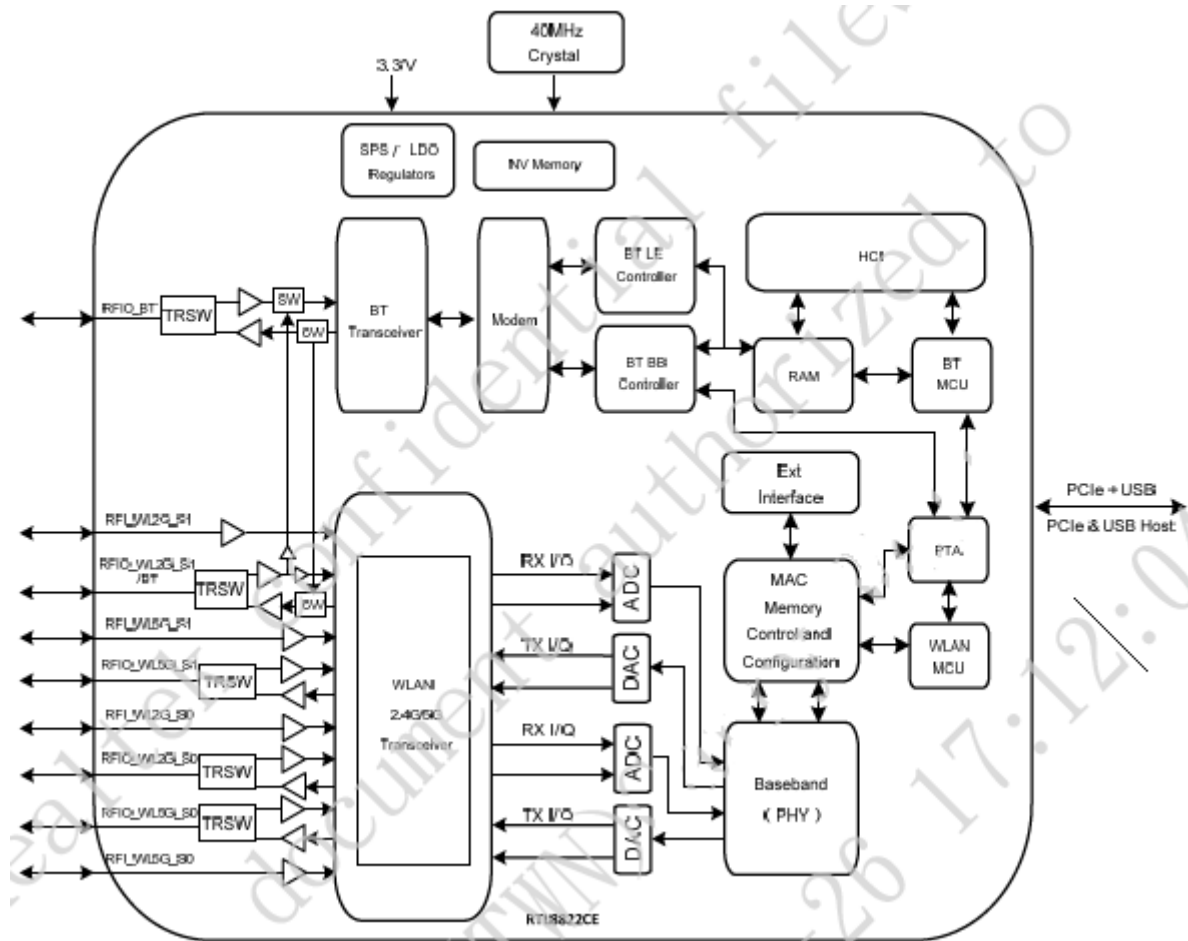
The general hardware for the module is shown as below.



2. Features

- IEEE 802.11a/b/g/n/ac compliant
- 5MHz / 10MHz / 20MHz / 40MHz / 80MHz bandwidth transmission
- Complies with PCI Express Base Specification Revision 2.1
- 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+EDR. Support Bluetooth 5.0 features
- Support Bluetooth Dual Mode: Simultaneous LE and BR/EDR
- USB interface for Bluetooth data transmission compliant with USB 2.0 FS-mode Spec.
- 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 RTL8822CE 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	3.15	3.3	3.45	V
VDDIO	1.70	1.8~3.3	3.45	V

Test conditions: At operating temperature -10°C ~70°C				
Symbol	Min.	Typ.	Max.	Unit
VBAT	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	17	18	20	dBm
	802.11g	15	17	18	dBm
	802.11n	14	16	17	dBm
@EVM	802.11b / 11Mbps	--	-21	-10	dB
	802.11g / 54Mbps	--	-30	-25	dB
	802.11n / MCS7	--	-30	-28	dB

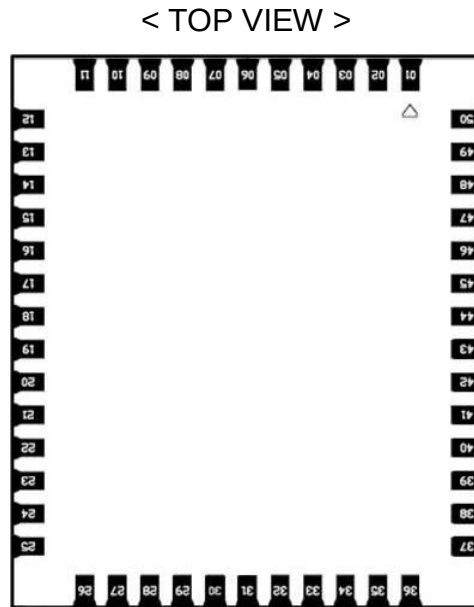
Parameters	Conditions	Min.	Typ.	Max.	Unit
Frequency Range		5150		5825	MHz
Output Power	802.11a	15	17	18	dBm
	802.11n	14	16	17	dBm
	802.11ac	13	14	16	dBm
@EVM	802.11a / 54Mbps	--	-29	-25	dB
	802.11n / MCS7	--	-31	-28	dB
	802.11ac / MCS9	--	-33	-32	dB

3.4 Bluetooth Specification

Feature	Description		
General Specification			
Bluetooth Standard	Bluetooth V5.0.		
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)		5dBm	
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	GND	—	Ground connections
3	WL/BT_ANT0	I/O	WLAN/BT RF I/O Port0
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	WLAN RF I/O Port1
10	GND	—	Ground connections
11	GND	—	Ground connections
12	PCM_OUT	O	PCM Data output
13	PCM_CLK	I/O	PCM Clock
14	PCM_IN	I	PCM Data Input
15	PCM_SYNC	I/O	PCM Sync Signal
16	GND	—	Ground connections

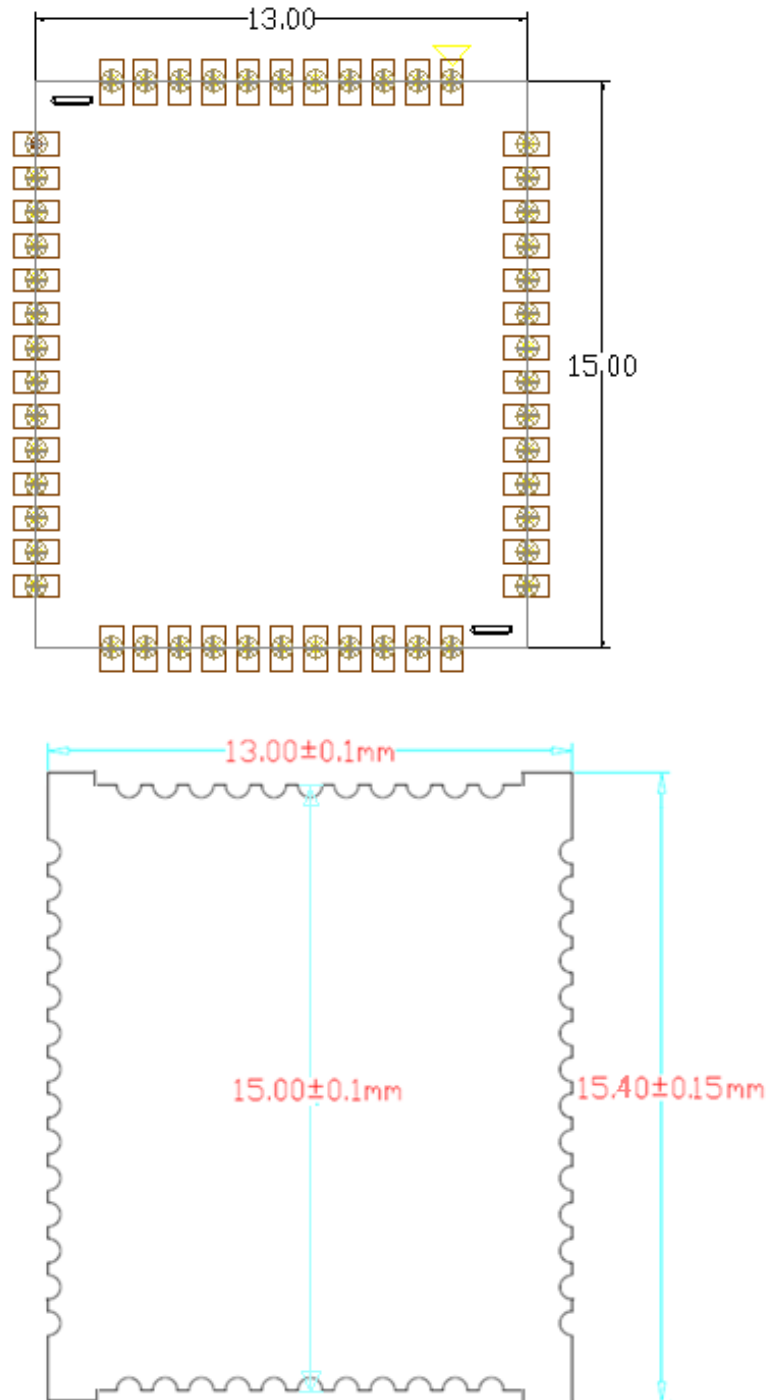
17	PCIE_WAKE_L	O	PCI-e wake up host, open drain, active low
18	PCIE_CLKREQ_L	O	PCI-e reference clock request signal, open drain, active low
19	PCIE_RST_L	I	PCI-e reset module, internal weak pull down
20	WL_EN	I	Enable pin for WLAN. Active high
21	UART_CTS	--	No Connect
22	UART_TXD	O	No Connect
23	LED_WL	O	WL LED pin(Active Low)
24	LED_BT	O	BT LED pin(Active Low)
25	GND	—	Ground connections
26	HSDM	I/O	Bluetooth USB_DM interface
27	HSDM	I/O	Bluetooth USB_DP interface
28	GND	—	Ground connections
29	PCIE_REFCLK_N	I	PCIE Reference Clock (-)
30	PCIE_REFCLK_P	I	PCIE Reference Clock (+)
31	GND	—	Ground connections
32	PCIE_TX_N	O	PCIE Data Output (-)
33	PCIE_TX_P	O	PCIE Data Output (+)
34	GND	—	Ground connections
35	PCIE_RX_N	I	PCIE Data Input (-)
36	PCIE_RX_P	I	PCIE Data Input (+)
37	GND	—	Ground connections
38	VDDIO	P	I/O Voltage supply input
39	GND	—	Ground connections
40	AVDD33_WL (VBAT)	P	Main power voltage source input
41	AVDD33_WL (VBAT)	P	Main power voltage source input
42	GND	—	Ground connections
43	HOST_WAKE_BT	I	HOST wake-up Bluetooth device
44	BT_WAKE_HOST	O	Bluetooth device to wake-up HOST
45	BT_EN	I	Bluetooth enable signal, active high.
46	GND	—	Ground connections
47	SUSCLK	I	External Low Power Clock input (32.768KHz)
48	GND	—	Ground connections
49	BT_ANT	I/O	BT RF IO port
50	GND	—	Ground connections

5. Dimensions

5.1 Physical Dimension (15mmx13mmx2.2mm)

(Unit: mm)

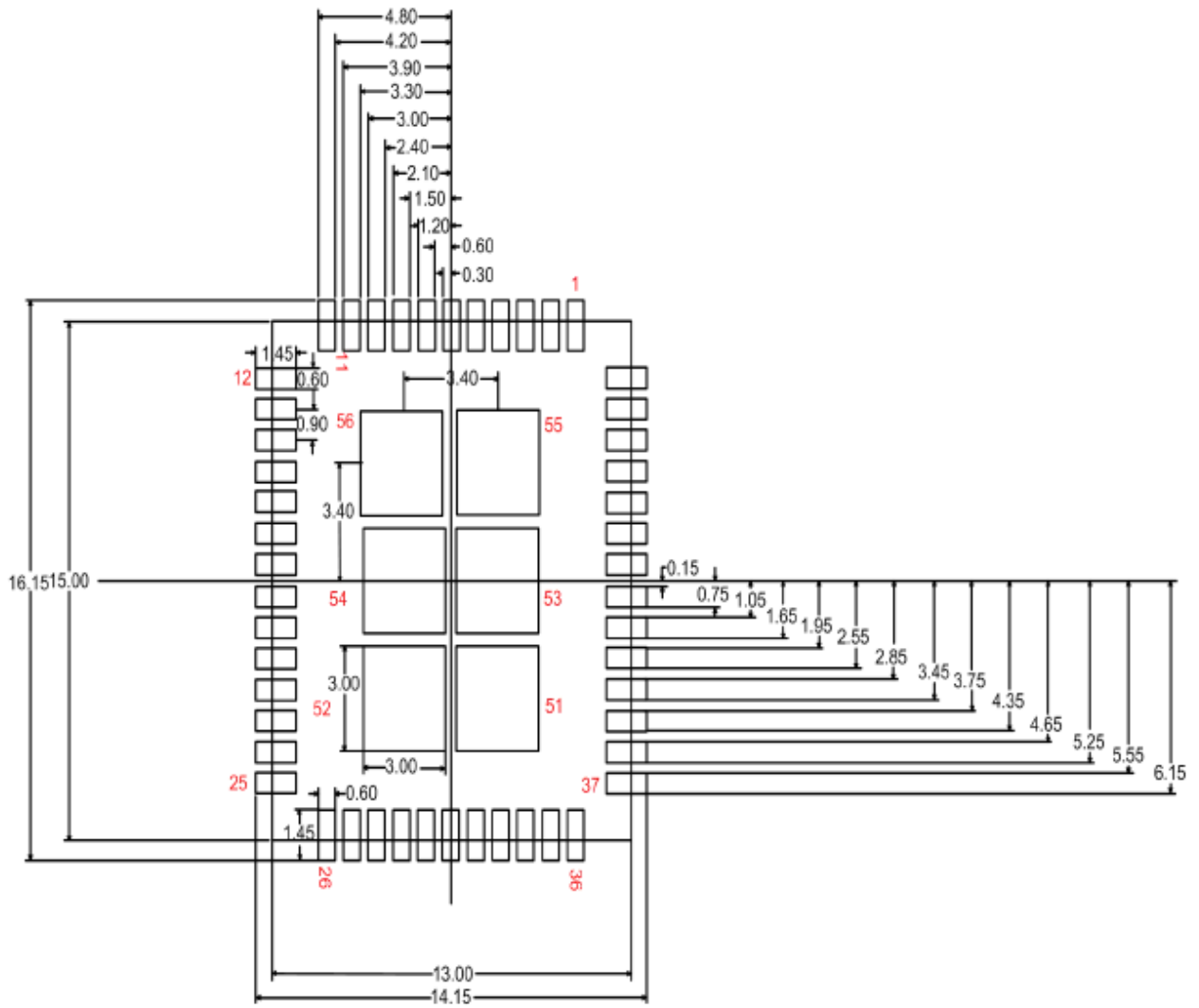
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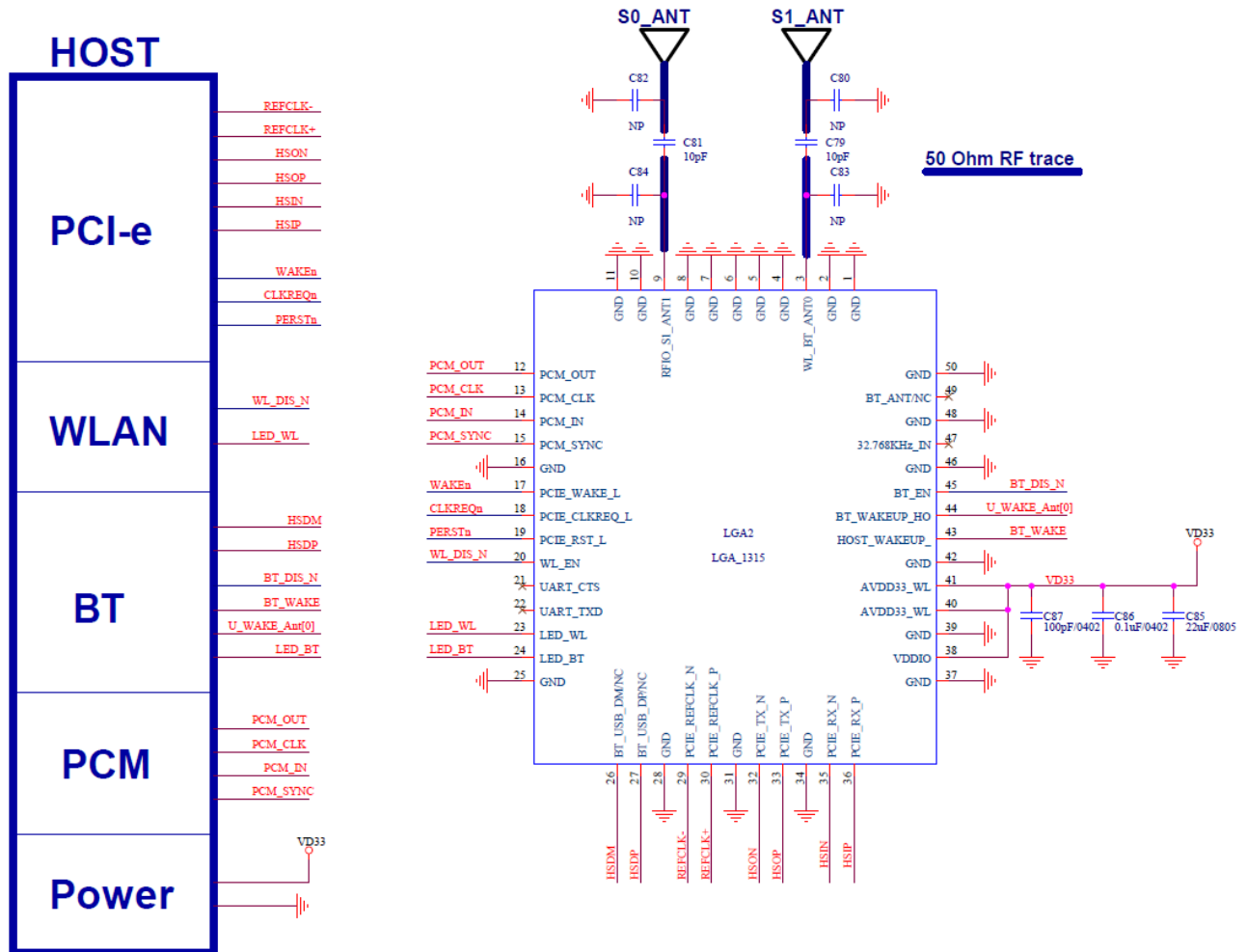
5.2 Layout Recommendation

(Unit: mm)

< TOP VIEW >



6. Reference Design

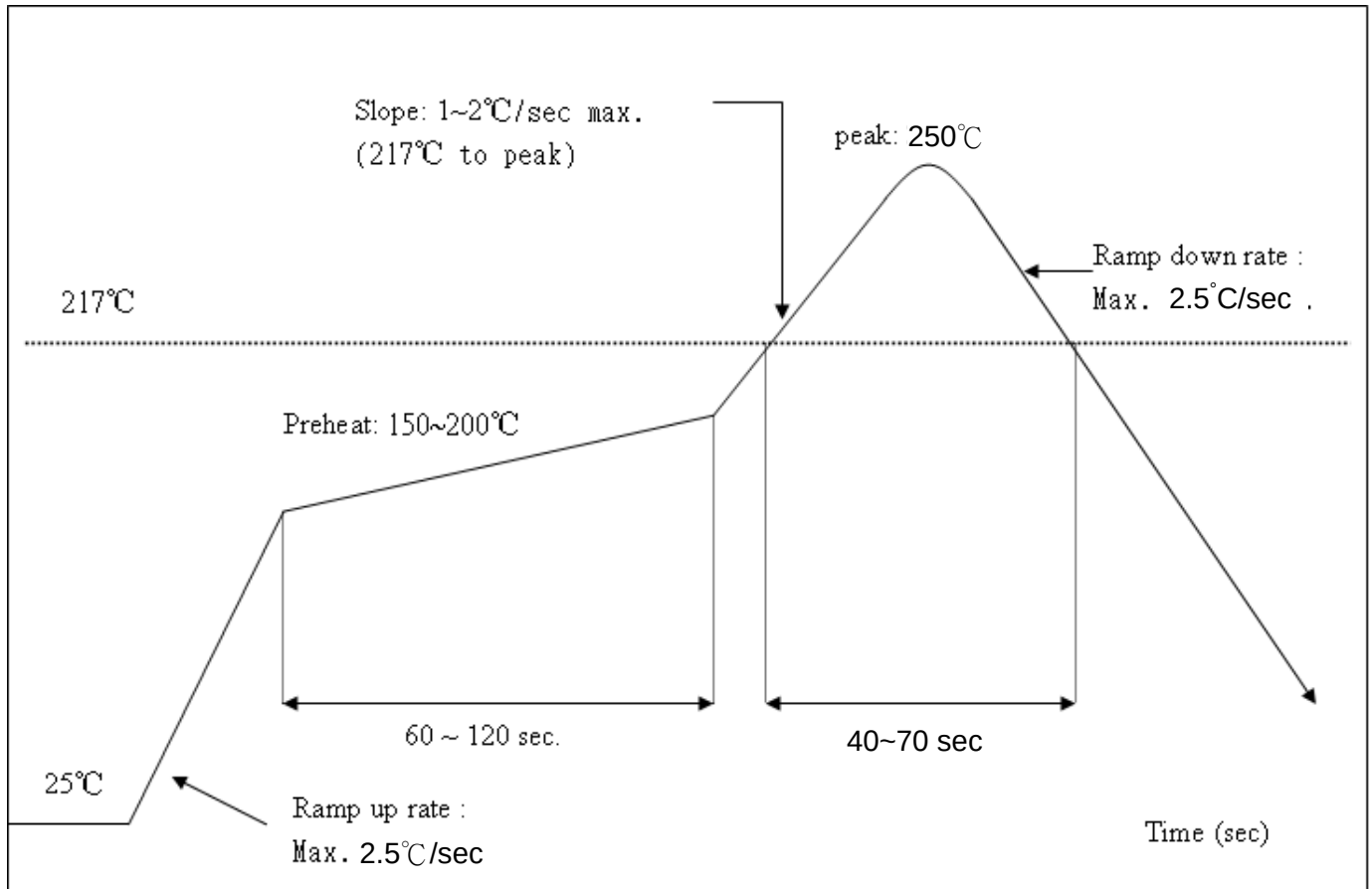


7. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <250°C

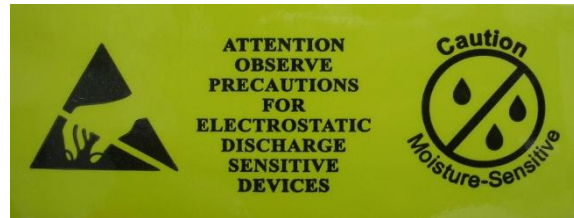
Number of Times : ≤ 2 times



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
	- 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		

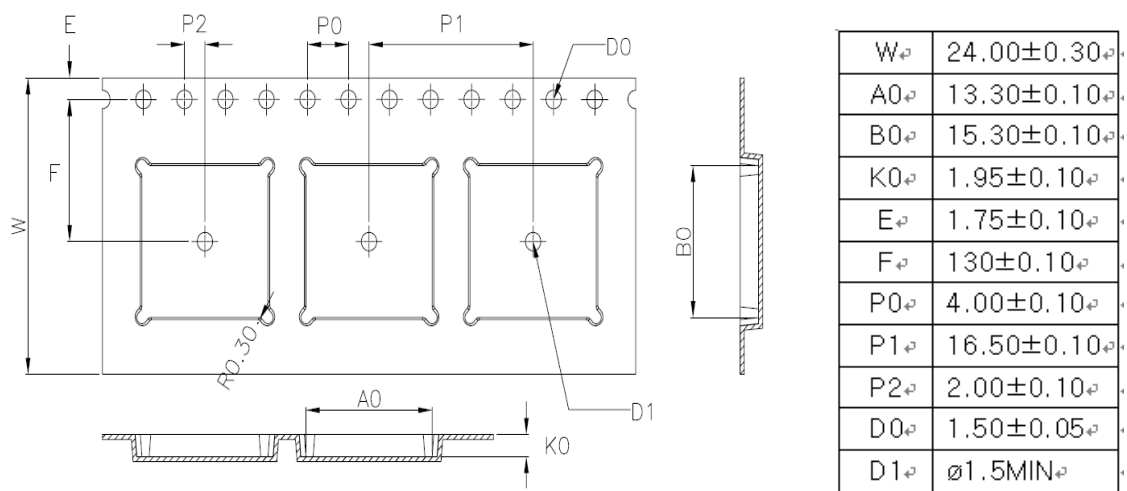
Label C → Inner box label .

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

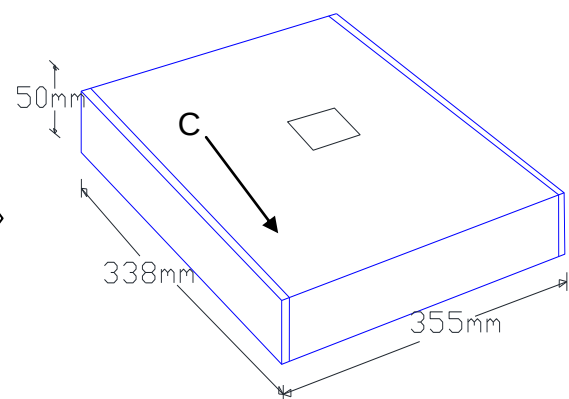
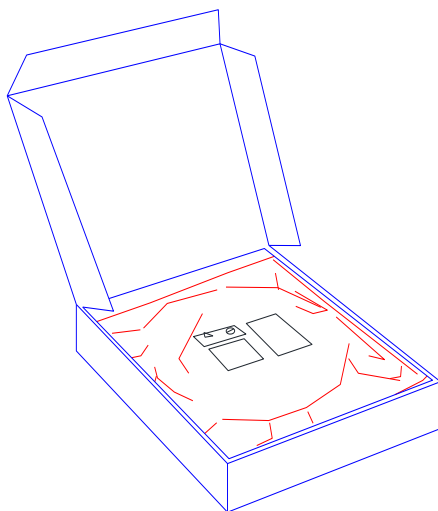
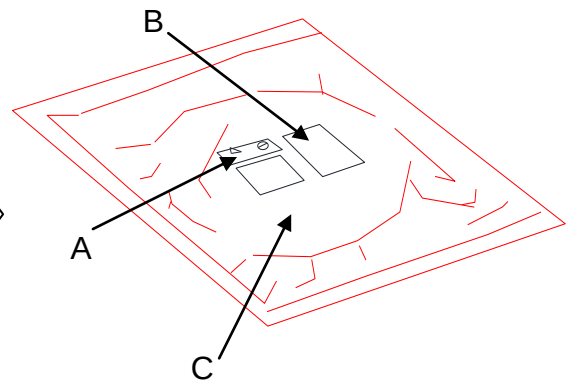
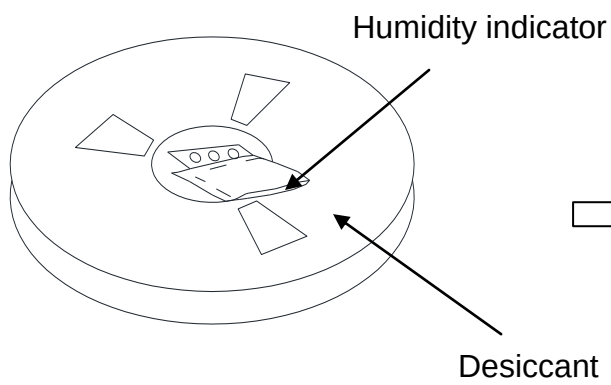
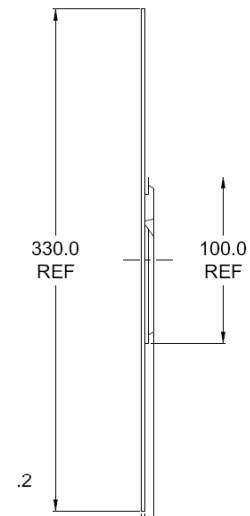
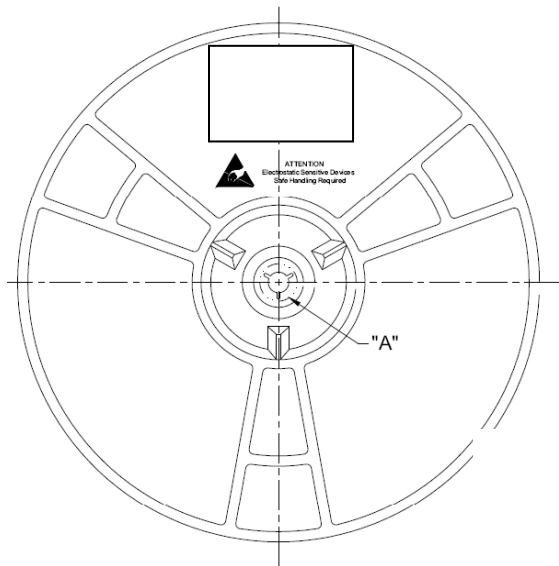
Label D → Carton box label .

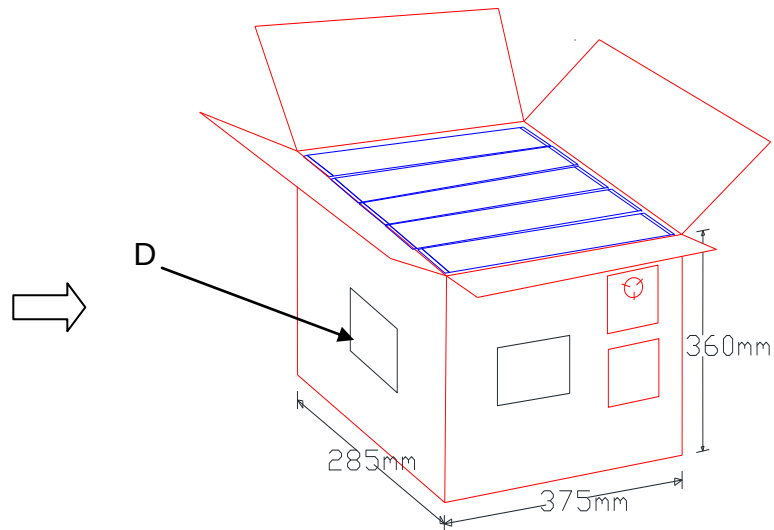
iotTech Corporation	
Model Name :	XXXXXXXX(HF)
Part No :	99P-W01-0042R
Quantity :	7500 ea
Lot D/C :	1205
Manufacture :	2012/02/22

8.2 Packing 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.





These devices have limited build-in ESD protection. The leads must be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage.

8.3 MSL Level / Storage Condition



Caution

This bag contains

MOISTURE-SENSITIVE DEVICES

Do not open except under controlled conditions

LEVEL

4

1. Calculated shelf life in sealed bag: 12 months at $< 40^{\circ}\text{C}$ and $< 90\%$ relative humidity(RH)

225 $^{\circ}\text{C}$ 240 $^{\circ}\text{C}$ 250 $^{\circ}\text{C}$ 260 $^{\circ}\text{C}$

2. Peak package body temperature: ☐ ☐ ☒ ☐

3. After bag is opened, devices that will be subjected to reflow solder or other high temperature process must

a) Mounted within: 48 hours of factory conditions

$< 30^{\circ}\text{C}/60\%$ RH, OR

b) Stored at $< 10\%$ RH

4. Devices require bake, before mounting, if:

a) Humidity Indicator Card is $> 10\%$ when read at $23 \pm 5^{\circ}\text{C}$

b) 3a or 3b not met

5. If baking is required, devices may be baked for 24 hours at $125 \pm 5^{\circ}\text{C}$

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

Bag Seal Date: See-SEAL DATE LABEL

Note: Level and body temperature defined by IPC/JEDEC J-STD-020

※NOTE : Accumulated baking time should not exceed 96hrs