ITM1811-CU User Manual

IEEE 802.11 a/b/g/n/ac
2.4GHz/5GHz 1T1R WLAN with USB2.0 Host Interface Module

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

Contents

1. General Description

The iotTech ITM1811-CU is a small size and low profile of dual-band WiFi 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 Wi-Fi to connect with host processor. The Wi-Fi throughput can go up to 433Mbps in theory by using 1x1 802.11ac MIMO technology.

ITM1811-CU uses Realtek RTL8811CU, a highly integrated Wi-Fi single chip based on advanced COMS process. RTL8811CU integrates whole Wi-Fi 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 Wi-Fi function
- 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
- Enterprise level security which can apply WPA/WPA2 certification for WiFi.
- Maximum data rate up to 433Mbps in 802.11ac

3. General Specification

Operating temperature	-10°C to 70°C
Storage temperature	-40°C to 85°C

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 -10°C ~70°C				
Symbol	**Min.**	**Typ.**	**Max.**	**Unit**
VBAT	3.0	3.3	3.6	V

3.1.3 Crystal Specification

Parameters	Conditions	Min.	Typ.	Max.	Unit
Nominal Frequency			40		MHz
Load Capacitance			12		pF
Operating Temperature		-20		+70	℃
Frequency Tolerance	25℃±3℃	-10		+10	ppm

Frequency Stability	Operating Temp. Range	-10		+10	ppm
Drive Level				100	uW
ESR				40	ohm

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 Power Consumption

WLAN:

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

4. Antenna

This module has been approved to operate with the antenna type listed below, with the maximum permissible gain indicated.

Part Number	Frequency Band	Antenna Type	Gain(dBi)
PCTEL 710621	2.4GHz and 5GHz	External Antenna	2400-2690 MHz 1dBi 4900-5900MHz 3dBi

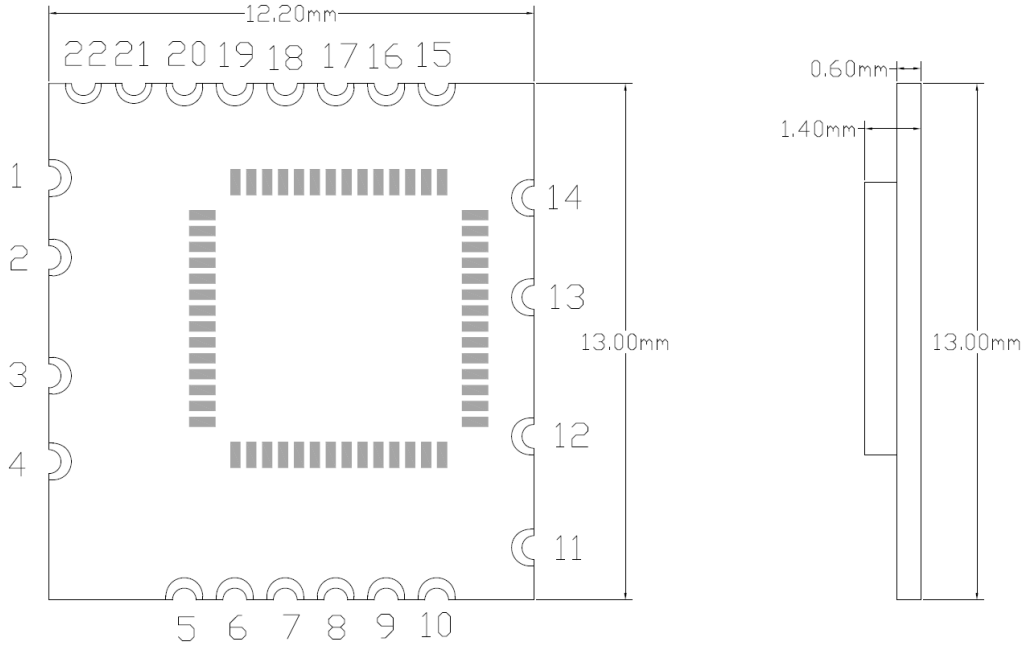
Please refer to the antenna datasheet for detailed specifications.

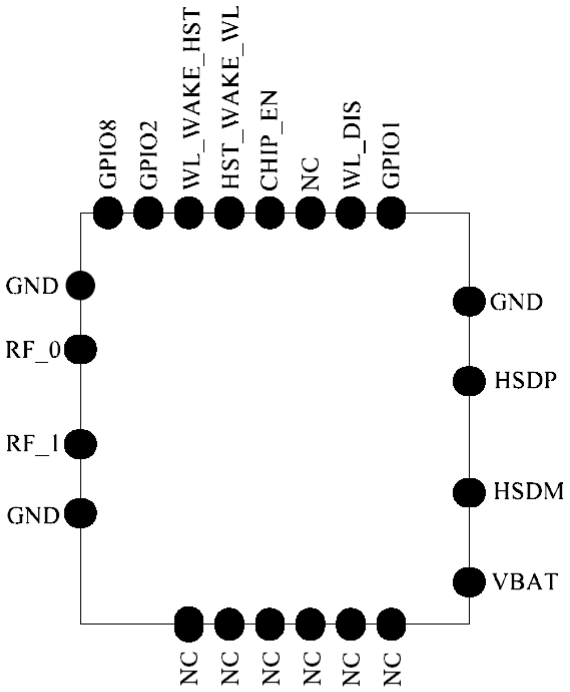
Antenna installation must be performed by a professional installation team.

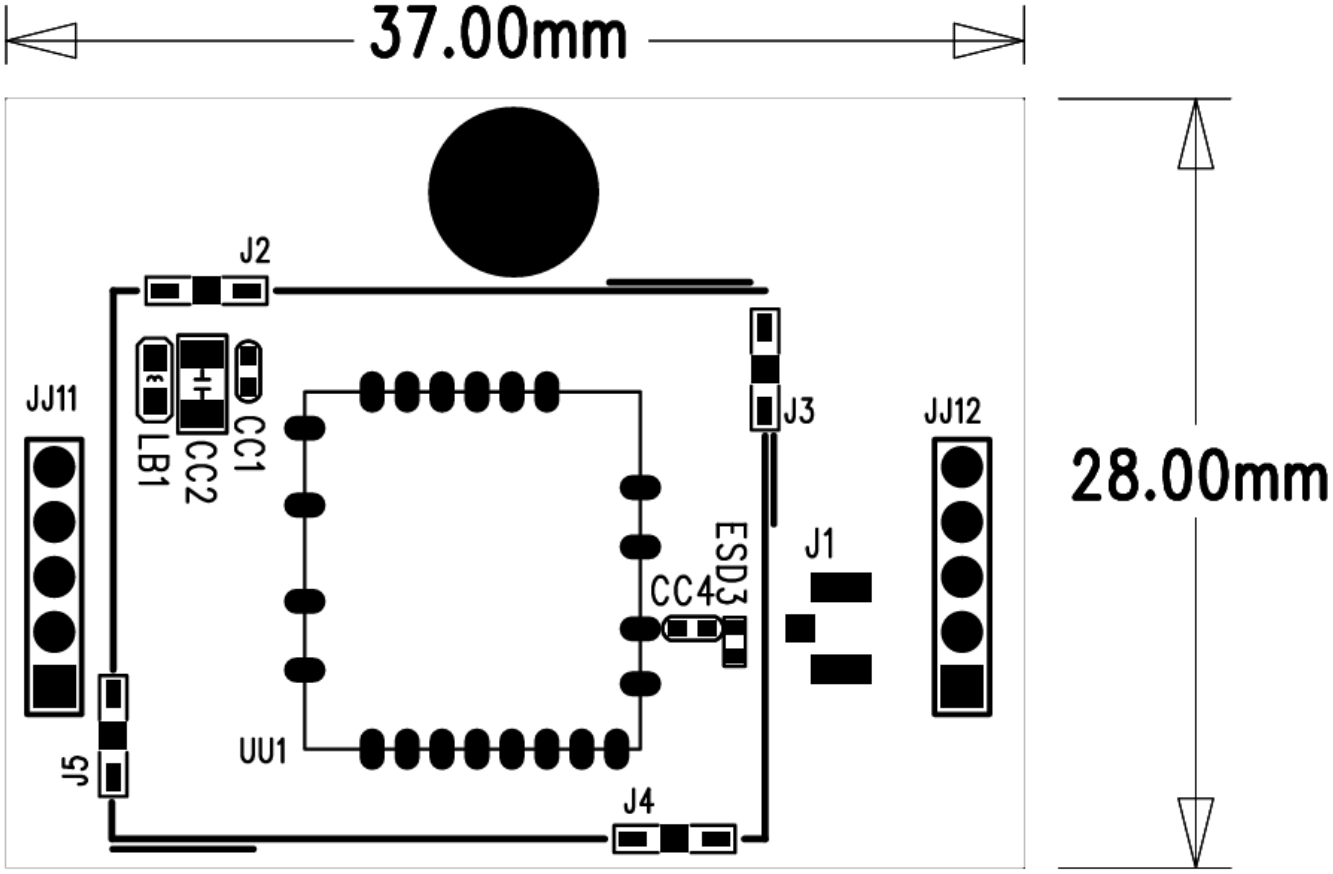
5. Pin Assignments

5.1 PCB Pin Outline

< TOP VIEW >






37.00mm
28.00mm
J2
JJ11
LB1
CC2
CC1
J3
JJ12
ESD3
J1
CC4
UU1
J5
J4

5.2 Pin Definition

Pin #	Name	Description
1	GND	Ground
2	RF_0	WIFI 2.4GHz/5GHz 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	NC	Not Connected
10	NC	Not Connected
11	VBAT	Main power voltage source input 3.3V
12	HSDM	USB2.0 differential pair for WLAN function
13	HSDP	USB2.0 differential pair for WLAN fucntion
14	GND	Ground
15	GPIO1	GPIO1
16	WL_DIS	WLAN disable
17	NC	Not Connected
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

JJ11 Pin Definition:

Pin #	Name
1	NC
2	GND
3	HSDP
4	HSDM
5	3.3V

JJ12 Pin Definition:

Pin #	Name
1	GND
2	HEATER_ENZ
3	NC
4	HEATER_PWR
5	GND

FCC 15.19 Warning

This device complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions:
1) this device may not cause harmful interference and
2) this device must accept any interference received, including interference that may cause undesired operation.

Cet appareil est conforme à la partie 15 des règlements de la FCC.
Le fonctionnement est soumis aux deux conditions suivantes :
1)cet appareil ne doit pas provoquer d'interférences nuisibles ;

2)cet appareil doit accepter toute interférence reçue, y compris les interférences pouvant entraîner un fonctionnement indésirable.

FCC 15.21 Warning

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

Vous êtes averti que les changements ou modifications non expressément approuvés par la partie responsable de la conformité pourraient annuler votre autorisation d'utiliser l'équipement.

Requirement of FCC KDB 996369 D03 for module certification:

2.2 List of applicable FCC rules
This module complies with FCC Part 15.247
2.3 Summarize the specific operational use conditions
Refer to instruction
The module is limited to the following antenna:
Antenna Type: External Antenna
Antenna Gain: 1dBi (92400-2690 MHz); 3dBi (4900-5900MHz)
2.4 Limited module procedures
No
2.5 Trace antenna designs
No
2.6 RF exposure considerations
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body.
This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2.7 Antennas
Refer to instruction
The module is limited to the following antenna:
Antenna Type: External Antenna
Antenna Gain: 1dBi (92400-2690 MHz); 3dBi (4900-5900MHz)
2.8 Label and compliance information
If the FCC ID number is not visible when the module is installed inside another device, the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following:
Contains FCC ID: W3TITM1811
Contains IC: 26044-ITM1811
2.9 Information on test modes and additional testing requirements
In accordance with FCC guidance, it is recommended that the host product manufacturer perform investigative measurements to confirm that the system does not exceed the spurious emissions limits or band edge limits once the module is installed in the host system.
If the host system contains other transmitters, additional testing is required to check for

emissions that may occur due to the intermixing of emissions with the other transmitters, digital circuitry, or due to the physical properties of the host product (enclosure). RF exposure assessments to account for transmissions across all transmitters that can operate simultaneously is also required. For additional information refer to FCC KDB 996369 D04 Module Integration Guide.

2.10 Additional testing, Part 15 Subpart B disclaimer

The host product manufacturer is responsible for compliance with any other FCC rules that apply to the host not covered by the modular transmitter grant of certification.

2.11 Note EMI Considerations

The host manufacturer is recommended to use FCC KDB 996369 D04 Module Integration Guide recommending as "best practice" RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant limits due to module placement to host components or properties.

2.12 How to make changes

Only grantees are permitted to make permissive changes, it is recommended that module manufactures provide contact information and some guidance to host providers in the integration instructions if they expect their module will be used differently than granted.