



iTM1011-C

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

Revision History

Date	Revision Content	Revised By	Version
2015/03/16	- Initial released	Jay	1.0
2015/07/18	- Pin Definition Modification	Jay	1.1
2015/06/17	- Description Correction	Issac	1.2
2016/12/05	- Update description and pin define	Issac	1.3
2017/11/08	- Update operating temp. and TX power	Issac	1.4
2018/03/22	- Update official product naming	Issac	1.5
2018/05/02	- Update Pin define	Issac	1.6

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1. General Description

The iotTech iTM1011-C is a low-cost and a highly integrated single-chip WLAN module which has all of the Wi-Fi functionalities. The highly integrated module makes the possibilities of web browsing, VoIP, headsets and other applications. With seamless roaming capabilities and advanced security, also could interact with different vendors' 802.11b/g/n Access Points in the wireless LAN.

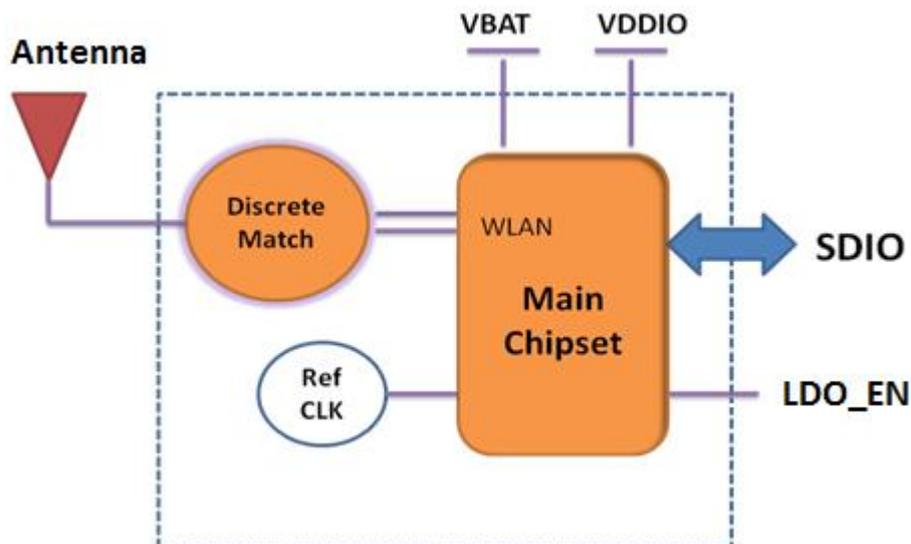
It is designed to support all mandatory IEEE 802.11b data rates of 1, 2, 5.5 and 11 Mbps, all 802.11g payload data rates of 6, 9, 12, 18, 24, 36, 48 and 54 Mbps, as well as 802.11n MCS0~MCS7, 20MHz, 800ns and 400ns guard interval. The integrated module provides SDIO interface for Wi-Fi.

This compact module is a total solution for Wi-Fi technologies. The module is specifically developed for RTOS embedded system, like Car-DVR devices.

2. Features

- Wi-Fi Chipset : iComm SV6030P
- 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
- Supports popular interfaces: SDIO 2.0 (50MHz, 4-bit and 1-bit) and SPI_SLAVE mode
- Integrated MCU with on-chip memory to share the loading of host CPU for Wi-Fi communication

The block diagram of iTM1011-C 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 -20°C ~70°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		-91		dBm
	- 2Mbps		-89		dBm
	- 5.5Mbps		-87		dBm
	- 11Mbps		-85		dBm
RX Sensitivity 11g @ 10% PER	- 6Mbps		-89		dBm
	- 9Mbps		-88		dBm
	- 12Mbps		-84		dBm
	- 18Mbps		-82		dBm
	- 24Mbps		-79		dBm
	- 36Mbps		-76		dBm
	- 48Mbps		-73		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		-69		dBm
Maximum Receive Level	802.11b		-10		dBm
	802.11g		-8		dBm
	802.11n		-8		dBm
Operating temperature	-20°C to 70°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	16.0	18.0		dBm
	802.11g	12.5	14.0		dBm
	802.11n	12.0	13.5		dBm
@EVM	802.11b		-19	-10	dB
	802.11g		-28	-25	dB
	802.11n		-30	-28	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

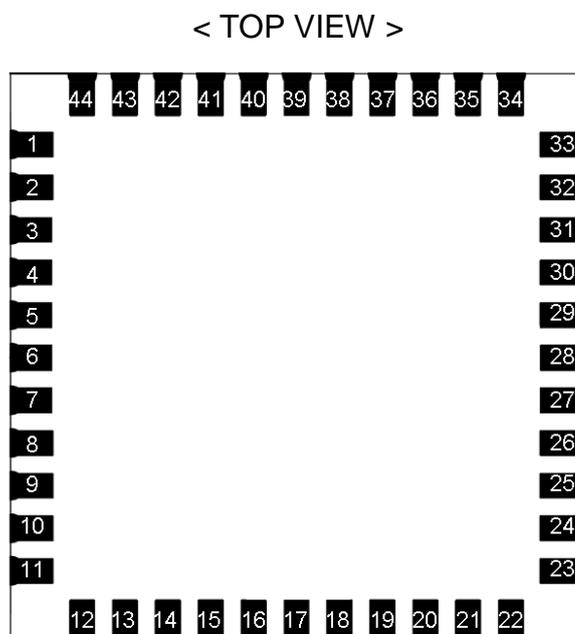
3.4 Power Consumption

WLAN Operational Modes	Typ.	Unit
OFF ^a	4	uA
Rx, CCK, 1 Mbps	60	mA
Rx, OFDM, 54 Mbps	66	mA
Rx, HT20, MCS7	67	mA
Sleep	200	uA
Rx Power Saving, DTIM= 1	1.2	mA
Tx, CCK, 1 Mbps, 19dBm	282	mA
Tx, OFDM, 54 Mbps, 16dBm	218	mA
Tx, HT20, MCS7, 15dBm	223	mA

a. Test condition: VBAT=3.3V, VIO=3.3V, LDO_EN=0V

4. Pin Assignments

4.1 PCB Pin Outline (12X12mm)



4.2 Pin Definition

NO	Name	Type	Description
1	GND	—	Ground connections
2	RF_OUT	I/O	RF I/O port
3	GND	—	Ground connections
4	NC	—	Floating (Can be grounded)
5	GND	—	Ground connections
6	NC	—	Floating (Don't connected to ground)
7	NC	—	Floating (Don't connected to ground)
8	NC	—	Floating (Don't connected to ground)
9	VBAT	P	Main power voltage source input
10	NC	—	Floating (Don't connected to ground)
11	NC	—	Floating (Don't connected to ground)
12	LDO_EN	I	WLAN device power enable/disable

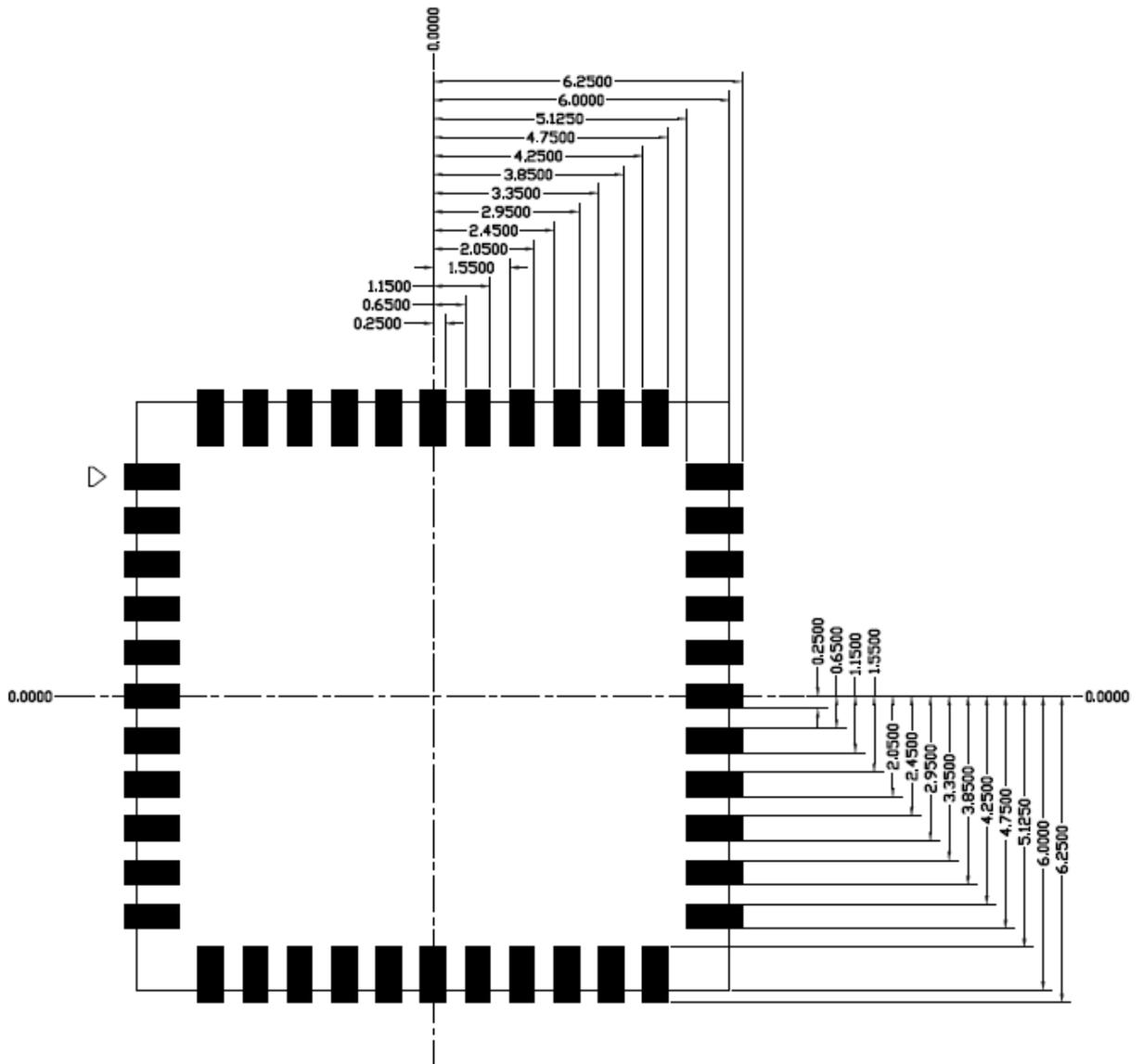
			GPIO8 Mode selection:
13	MODE_SEL	I	1. Default floating is SDIO mode. 2. Pull high is SPI mode.
14	SDIO_DATA_2	I/O	SDIO data line 2
15	SDIO_DATA_3	I/O	SDIO data line3
16	SDIO_DATA_CMD	I/O	SDIO command line
17	SDIO_DATA_CLK	I/O	SDIO CLK line
18	SDIO_DATA_0	I/O	SDIO data line 0
19	SDIO_DATA_1	I/O	SDIO data line 1
20	GND	—	Ground connections
21	NC	—	Floating (Don't connected to ground)
22	VDDIO	P	I/O Voltage supply input
23	NC	—	Floating (Don't connected to ground)
24	NC	—	Floating (Don't connected to ground)
25	NC	—	Floating (Don't connected to ground)
26	NC	—	Floating (Don't connected to ground)
27	NC	—	Floating (Don't connected to ground)
28	TEST PIN1	—	For internal testing only. DO NOT pull high when normal operation
29	NC	—	Floating (Don't connected to ground)
30	GND	—	Ground connections
31	GND	—	Ground connections
32	TEST PIN2	—	For internal testing only. DO NOT pull high when normal operation
33	GND	—	Ground connections
34	NC	—	Floating (Don't connected to ground)
35	NC	—	Floating (Don't connected to ground)
36	GND	—	Ground connections
37	NC	—	Floating (Don't connected to ground)
38	NC	—	Floating (Don't connected to ground)
39	NC	—	Floating (Can be grounded)
40	NC	—	Floating (Can be grounded)
41	NC	—	Floating (Can be grounded)
42	NC	—	Floating (Don't connect it to ground)
43	NC	—	Floating (Don't connect it to ground)
44	GND	—	Ground connections

5. Dimensions

5.1 Layout Recommendation

(Unit: mm)

< TOP VIEW >

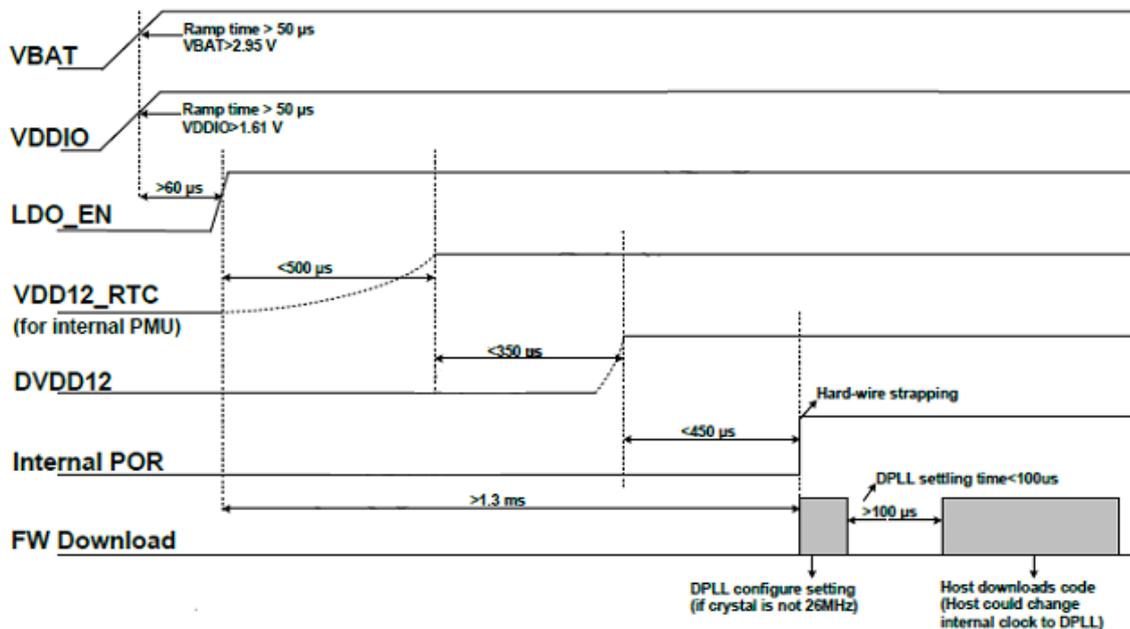


6. Host Interface Timing Diagram

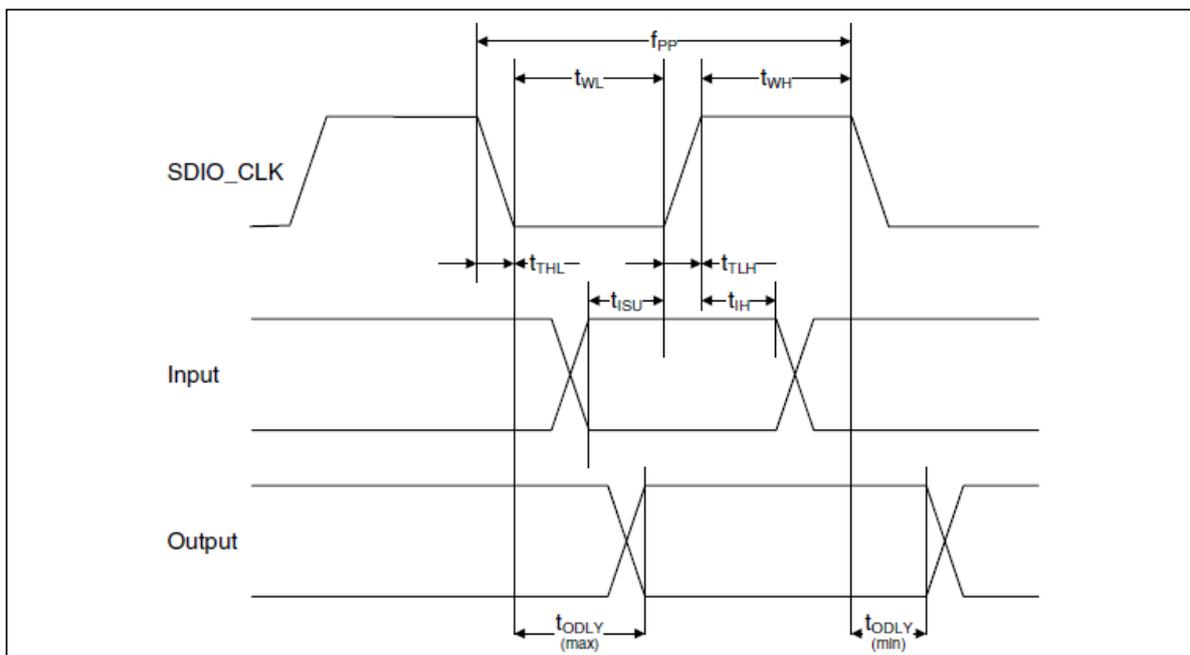
6.1 Power UP Sequence

Shows the below figure, the power-on sequence of the iTM1011-C 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 iTM1011-C. After LDO_EN is assert and host starts the power-on sequence of the iTM1011-C. 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.



6.2 SDIO Default Mode Timing Diagram

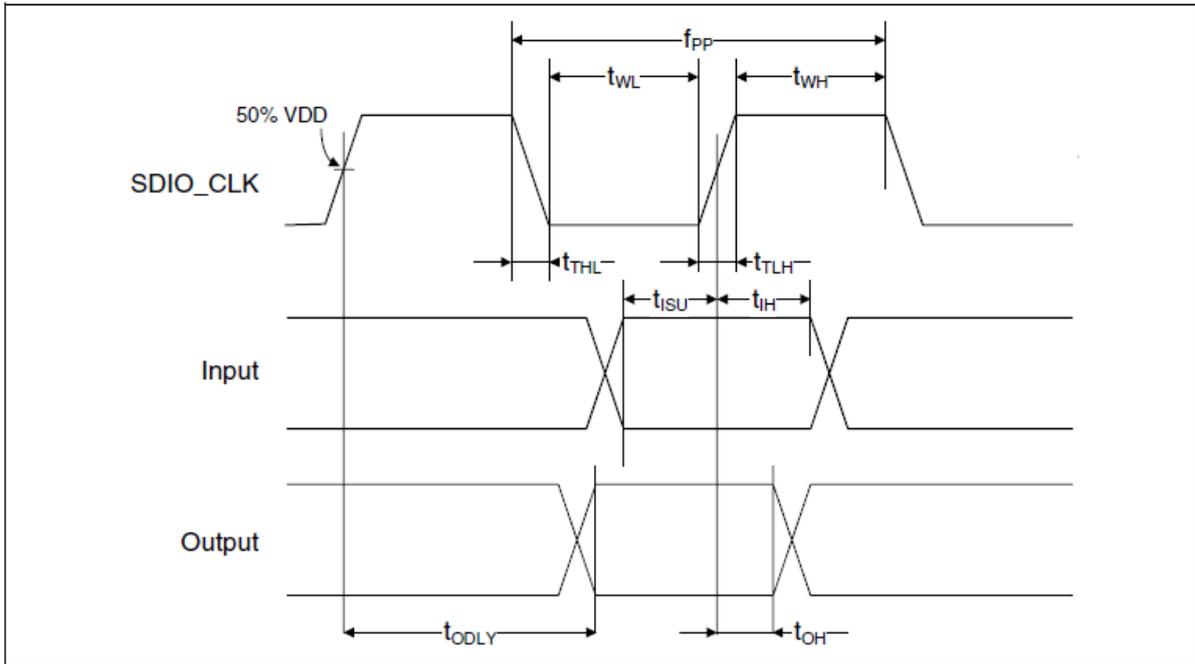


Parameter	Symbol	Minimum	Typical	Maximum	Unit
SDIO CLK (All values are referred to minimum VIH and maximum VIL^b)					
Frequency-Data Transfer mode	f _{PP}	0	-	25	MHz
Frequency-Identification mode	f _{OD}	0	-	400	kHz
Clock low time	t _{WL}	10	-	-	ns
Clock high time	t _{WH}	10	-	-	ns
Clock rise time	t _{TLH}	-	-	10	ns
Clock low time	t _{THL}	-	-	10	ns
Inputs: CMD, DAT (referenced to CLK)					
Input setup time	t _{ISU}	5	-	-	ns
Input hold time	t _{IH}	5	-	-	ns
Outputs: CMD, DAT (referenced to CLK)					
Output delay time - Data Transfer mode	t _{ODLY}	0	-	14	ns
Output delay time - Identification mode	t _{ODLY}	0	-	50	ns

a. Timing is based on CL ≤ 40pF load on CMD and Data.

b. min(V_{Ih}) = 0.7 x VDDIO and max(V_{Il}) = 0.2 x VDDIO.

6.3 SDIO High Speed Mode Timing Diagram

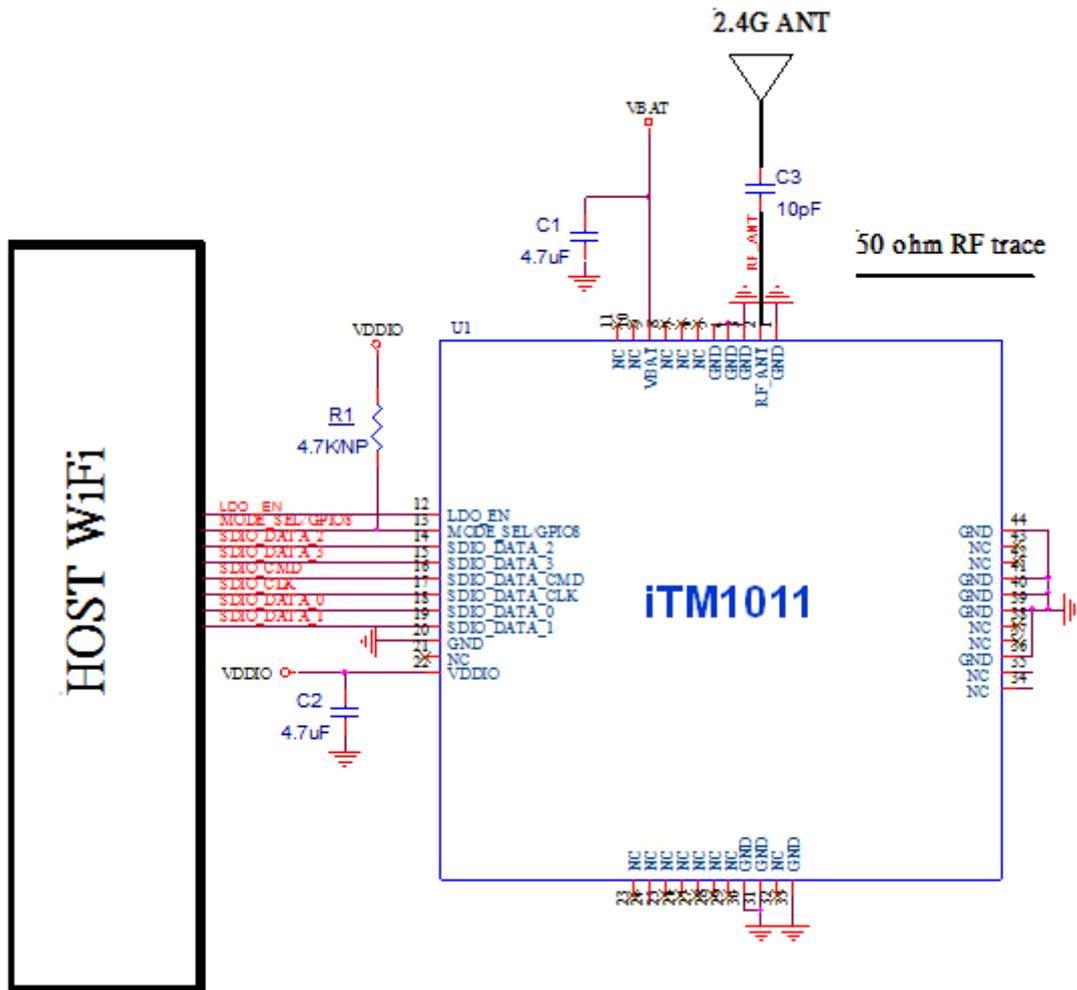


Parameter	Symbol	Minimum	Typical	Maximum	Unit
SDIO CLK (All values are referred to minimum VIH and maximum VIL^b)					
Frequency-Data Transfer mode	f _{PP}	0	-	50	MHz
Frequency-Identification mode	f _{OD}	0	-	400	kHz
Clock low time	t _{WL}	7	-	-	ns
Clock high time	t _{WH}	7	-	-	ns
Clock rise time	t _{TLH}	-	-	3	ns
Clock low time	t _{THL}	-	-	3	ns
Inputs: CMD, DAT (referenced to CLK)					
Input setup time	t _{ISU}	6	-	-	ns
Input hold time	t _{IH}	2	-	-	ns
Outputs: CMD, DAT (referenced to CLK)					
Output delay time - Data Transfer mode	t _{ODLY}	-	-	14	ns
Output hold time	t _{OH}	2.5	-	-	ns
Total system capacitance (each line)	CL	-	-	40	pF

a. Timing is based on CL ≤ 40pF load on CMD and Data.

b. min(V_{Ih}) = 0.7 x VDDIO and max(V_{Il}) = 0.2 x VDDIO.

7. Reference Design



Note: GPIO_8 Mode Selection (Module pin13)

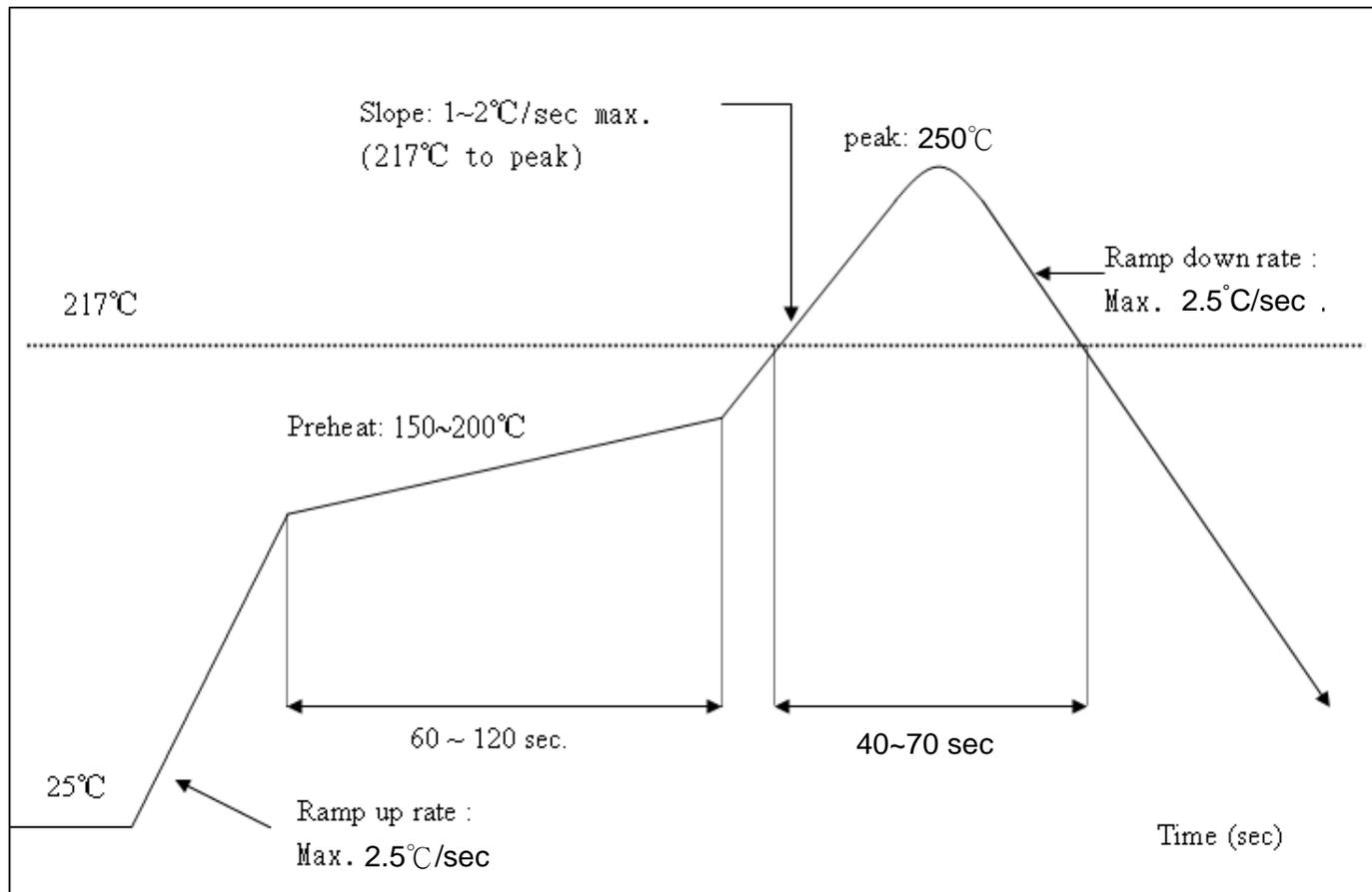
GPIO control state	Interface
Default Floating (no connections)	SDIO
Pull high (4.7K resistor)	SPI

8. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <250°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	LEVEL <input type="text"/>
	This bag contains MOISTURE-SENSITIVE DEVICES	
<small>If blank, see adjacent bar code label</small>		
1. Calculated shelf life in sealed bag: 12 months at <math><40^{\circ}\text{C}</math> and <math><90\%</math> relative humidity (RH)		
2. Peak package body temperature: _____ $^{\circ}\text{C}$ <small>If blank, see adjacent bar code label</small>		
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 <small>If blank, see adjacent bar code label</small>		
$\leq 30^{\circ}\text{C}/60\% \text{ RH}$, 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 $23 \pm 5^{\circ}\text{C}$		
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: _____ <small>If blank, see adjacent bar code label</small>		
<small>Note: Level and body temperature defined by IPC/JEDEC J-STD-020</small>		

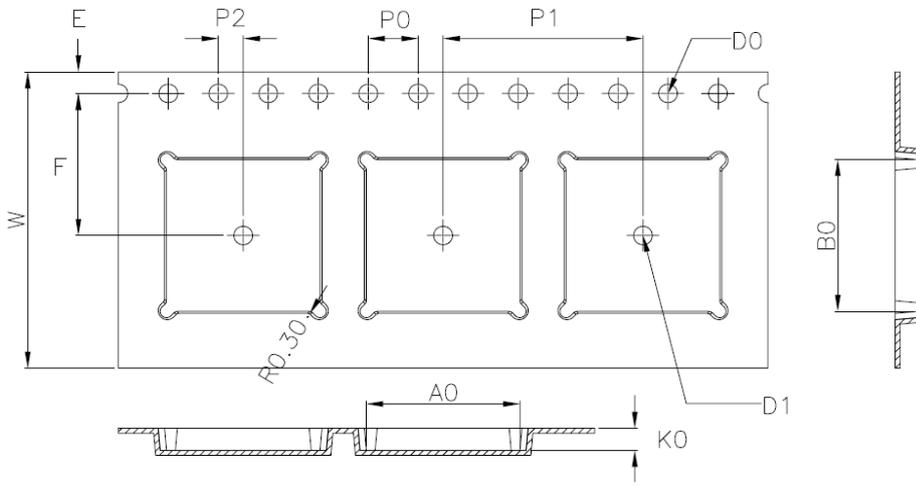
Label C → Inner box label .

PKG S/N :	
	9PKG1201310001
Model:	
	XXXXXXXX(HF)
P/N :	
	99P-W01-0042R
Qty :	
	1500
Date Code :	
	1205
Lot Code :	
	T0C102B

Label D → Carton box label .

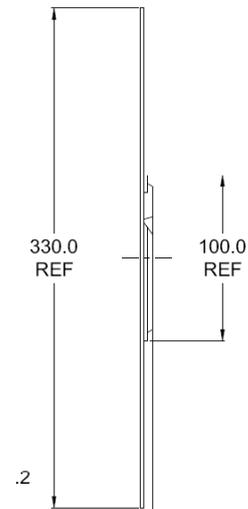
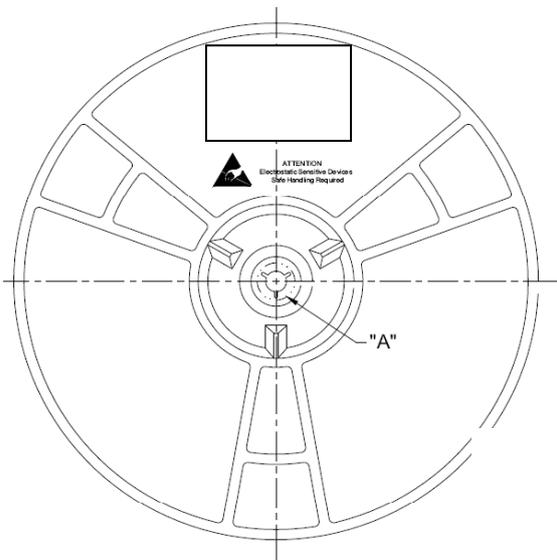
iotTech Corporation	
Model Name :	
	XXXXXXXX(HF)
Part No :	
	99P-W01-0042R
Quantity :	
	7500 <small>ea</small>
Lot D/C :	
	1205
Manufacture :	
	2012/02/22

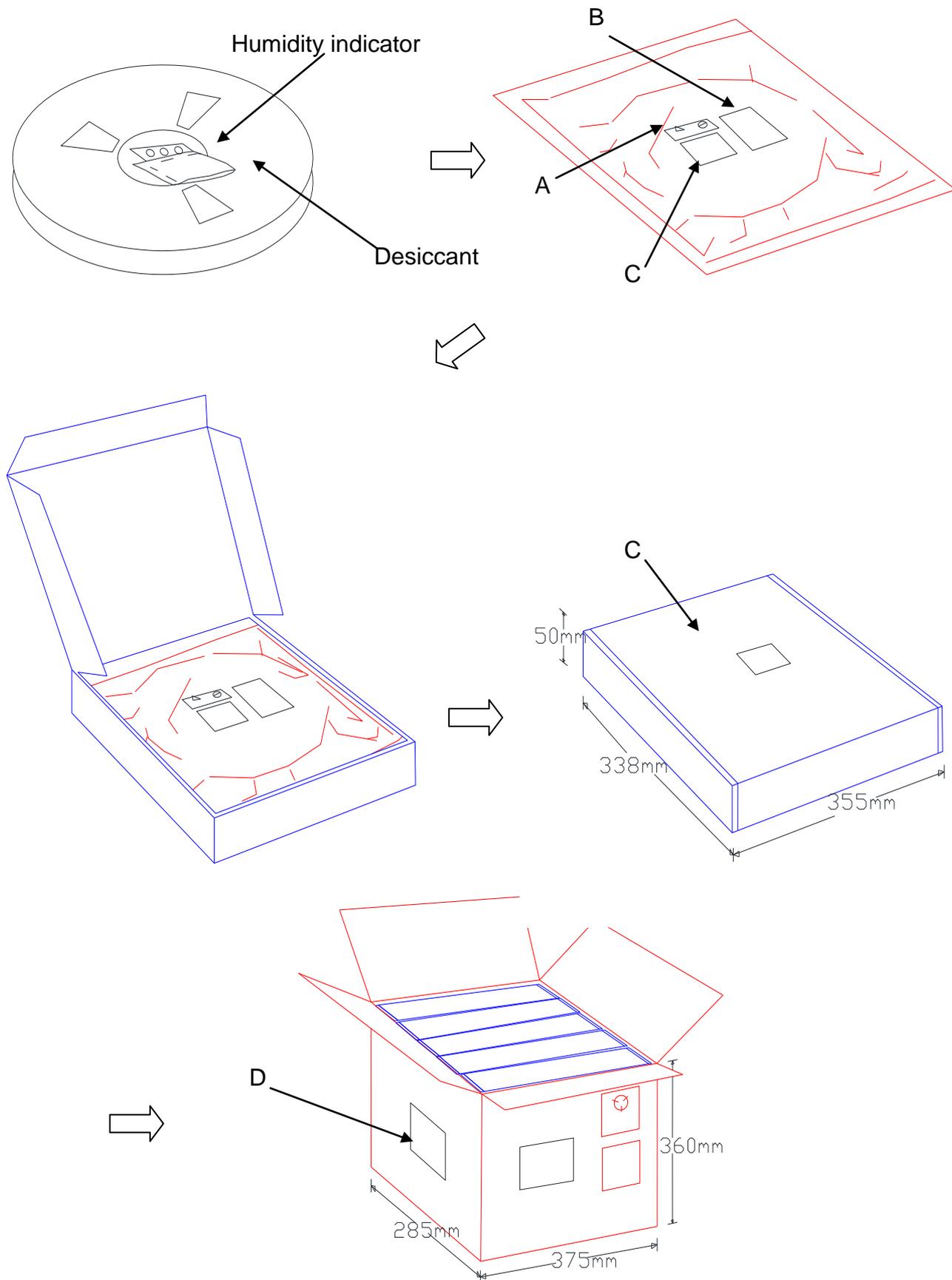
9.2 Dimension



W	24.00±0.30
A0	12.30±0.10
B0	12.30±0.10
K0	1.80±0.10
E	1.75±0.10
F	11.50±0.10
P0	4.00±0.10
P1	16.00±0.10
P2	2.00±0.10
D0	1.50 ^{+0.10} _{-0.00}
D1	∅1.50MIN

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





FCC Statement

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.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

The RF Module of 1080P Dash Cam is designed to comply with the FCC statement. FCC ID is WUI-BT58187. The host system using RF Module of 1080P Dash Cam Module, should have label indicated it contain modular's FCC ID: WUI-BT58187 . This radio module must not installed to colocate and operating simultaneously with other radios in host system additional testing and equipment authorization may be required to operating simultaneously with other radio.

The RF Module of 1080P Dash Cam is deaigned for a compact PCB design .It should be installed and operated with Dash Cam or other minimum distance of 20 centimeters between the radiator and your body." To comply with FCC regulations limiting both maximum RF output power and human exposure to RF radiation, the maximum antenna gain including cable loss in a mobile-only exposure condition must not exceed 6dBi in the 2.4G band. The RF Module of 1080P Dash Cam and its antenna must not be co-located or operating in conjunction with any other transmitter or antenna within a host device.

The OEM can use metal antennas or FPC antennas, and the antenna gain is less than 6dBi for this module.

If difference antenna types or host are used, C2PC should be applied.

Notice to OEM integrator

The end user manual shall include all required regulatory information/warning as show in this manual. The OEM integrator is responsible for testing their end-product for any additional compliance requirements required with this module installed.

The device must be professionally installed

The intended use is generally not for the general public.It is generally for industry/commercial use.

The connector is within the transmitter enclosure and can only be accessed by disassembly of the

transmitter that is not normally required, the user has no access to the connector. Installation must be controlled. Installation requires special training

This device complies with Part 15, Subpart C, Section 15.247 of the FCC Rules.

RF warning for Mobile device:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.