



iTM1056-A

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

Revision History

Date	Revision Content	Revised By	Version
2019/01/16	- Initial released	Jim Leng	1.0
2019/03/25	- Update RX sensitivity	Jim Leng	1.1
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1. General Description

The iotTech iTM1056-A is a low-cost and a highly integrated 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 all WIFI Access Points in the market.

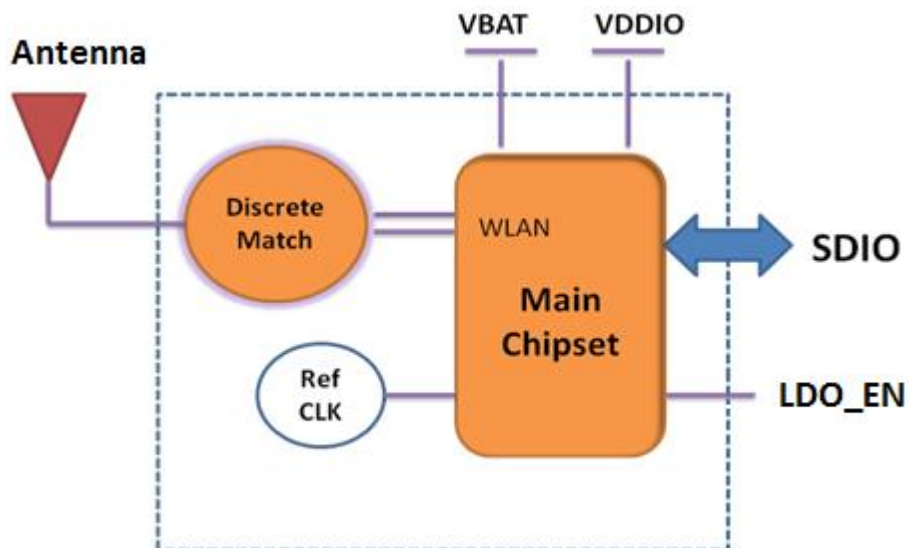
iTM1056-A is designed to support IEEE 802.11 a/b/g/n single stream with the state-of-the-art design techniques and process technology to achieve low power consumption and high throughput performance to address the requirement of mobile and handheld devices. iTM1056-A low power function uses the innovative design techniques and the optimized architecture which best utilizes the advanced process technology to reduce active and idle power, and achieve extreme low power consumption at sleep state to extend the battery life.

This compact module iTM1056-A is a total solution for Wi-Fi technologies. It is specifically developed for portable devices, and can minimize the resource consumption of CPU and memory for enabling Wi-Fi communication. iTM1056-A provides SDIO host interface for external CPU.

2. Features

- Wi-Fi Chipset : iComm SV6256P
- IEEE 802.11 a/b/g/n 1T1R
- Integrated dual-band 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)

The block diagram of iTM1056-A 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 ~85°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)

2.4G WLAN

Parameters	Conditions	Min.	Typ.	Max.	Unit
Frequency Range		2412		2484	MHz
RX Sensitivity 11b @ 8% PER	- 1Mbps		-95		dBm
	- 2Mbps		-93		dBm
	- 5.5Mbps		-91		dBm
	- 11Mbps		-88		dBm
RX Sensitivity 11g @ 10% PER	- 6Mbps		-91		dBm
	- 9Mbps		-90		dBm
	- 12Mbps		-88		dBm
	- 18Mbps		-86		dBm
	- 24Mbps		-82		dBm
	- 36Mbps		-79		dBm
	- 48Mbps		-74		dBm
	- 54Mbps		-73		dBm
Receive Sensitivity (11n,20MHz) @10% PER	- MCS0		-91		dBm
	- MCS=1		-88		dBm
	- MCS=2		-86		dBm
	- MCS=3		-81		dBm
	- MCS=4		-79		dBm
	- MCS=5		-74		dBm
	- MCS=6		-73		dBm
	- MCS=7		-72		dBm
Receive Sensitivity (11n,40MHz) @10% PER	- MCS0		-88		dBm
	- MCS=1		-85		dBm
	- MCS=2		-83		dBm
	- MCS=3		-78		dBm
	- MCS=4		-76		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 85°C
Storage temperature	-40°C to 85°C

5G WLAN

Parameters	Conditions	Min.	Typ.	Max.	Unit
Frequency Range		5180		5805	MHz
RX Sensitivity 11a @ 10% PER	- 6Mbps		-87		dBm
	- 9Mbps		-86		dBm
	- 12Mbps		-84		dBm
	- 18Mbps		-82		dBm
	- 24Mbps		-79		dBm
	- 36Mbps		-75		dBm
	- 48Mbps		-71		dBm
	- 54Mbps		-70		dBm
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0		-87		dBm
	- MCS=1		-84		dBm
	- MCS=2		-82		dBm
	- MCS=3		-79		dBm
	- MCS=4		-75		dBm
	- MCS=5		-71		dBm
	- MCS=6		-70		dBm
	- MCS=7		-69		dBm
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0		-84		dBm
	- MCS=1		-81		dBm
	- MCS=2		-79		dBm
	- MCS=3		-76		dBm
	- MCS=4		-72		dBm
	- MCS=5		-68		dBm
	- MCS=6		-67		dBm
	- MCS=7		-66		dBm

3.3 Wi-Fi RF Specification (TX)

2.4G WLAN

Parameters	Conditions	Min.	Typ.	Max.	Unit
Frequency Range		2412		2484	MHz
Output Power	802.11b	16.0	18.0		dBm
	802.11g	12.0	14.0		dBm
	802.11n	12.0	14.0		dBm
@EVM	802.11b		-30	-10	dB
	802.11g		-30	-25	dB
	802.11n		-30	-28	dB

5G WLAN

Parameters	Conditions	Min.	Typ.	Max.	Unit
Frequency Range		5180		5805	MHz
Output Power	802.11a	12.0	14.0		dBm
	802.11n	12.0	14.0		dBm
@EVM	802.11a		-30	-25	dB
	802.11n		-30	-28	dB

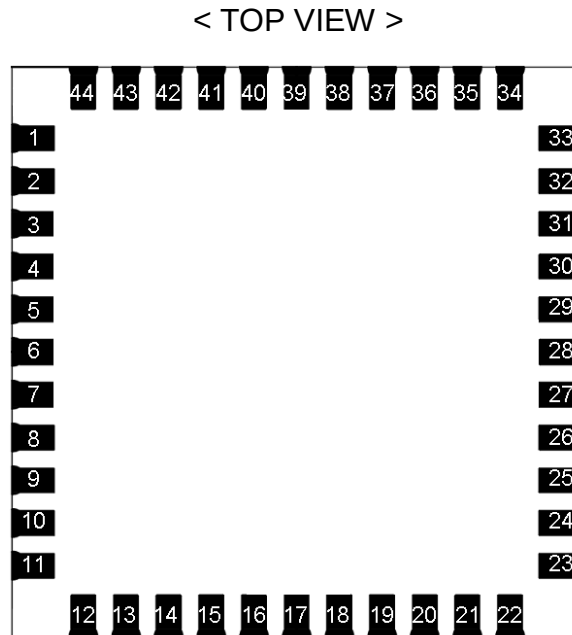
3.4 Power Consumption

SWR Buck Converter Enabled

WLAN Operational Modes	Typ.	Unit
OFF ^a	2	uA
Rx, CCK, 1 Mbps	60	mA
Rx, OFDM, 54 Mbps	67	mA
Rx, HT20, MCS7	67	mA
Rx, HT40, MCS7	75	mA
Rx, 5.18G HT20, MCS7	88	mA
Rx, 5.805G HT20, MCS7	88	mA
Rx, 5.18 G HT40, MCS7	97	mA
Rx, 5.805G HT40, MCS7	97	mA
Tx, CCK, 1 Mbps	282	mA
Tx, 11B, 11 Mbps@18dBm	315	mA
Tx, OFDM, 54 Mbps	265	mA
Tx, HT20, MCS7	268	mA
Tx, HT40, MCS7	272	mA
Tx, 5.18 G HT20, MCS7	330	mA
Tx, 5.805G HT20, MCS7	293	mA

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 (Don't connected to ground)
5	NC	—	Floating (Don't connected to ground)
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

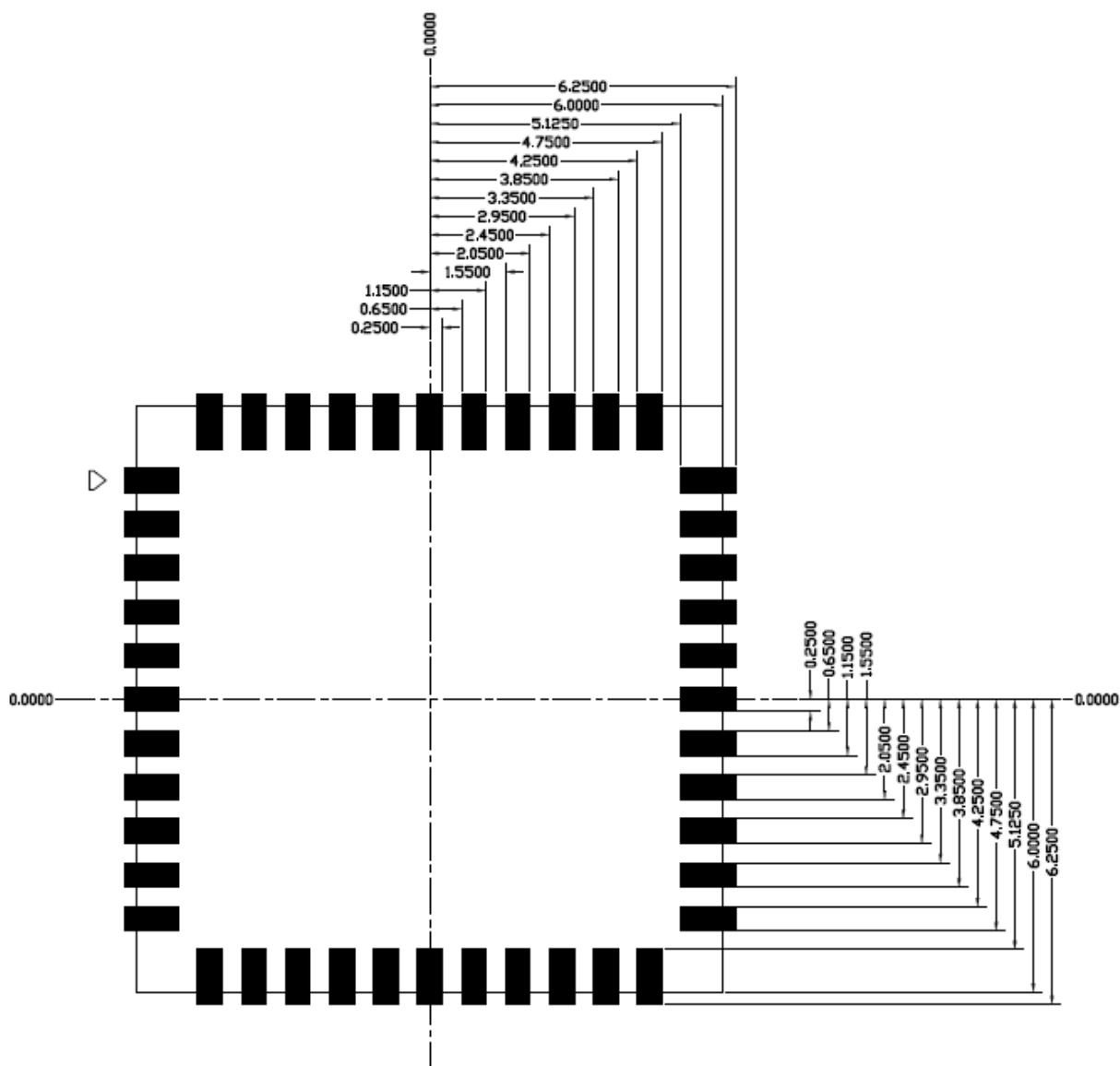
13	WL_HOST_WAKE	O	WLAN wake-up HOST
14	SDIO_DATA_2	I/O	SDIO data line 2
15	SDIO_DATA_3	I/O	SDIO data line3
16	SDIO_DATA_CMD	I/O	SDIO command line
17	SDIO_DATA_CLK	I/O	SDIO CLK line
18	SDIO_DATA_0	I/O	SDIO data line 0
19	SDIO_DATA_1	I/O	SDIO data line 1
20	GND	—	Ground connections
21	NC	—	Floating (Don't 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	NC	—	Floating (Don't connected to ground)
29	NC	—	Floating (Don't connected to ground)
30	NC	—	Floating (Don't connected to ground)
31	GND	—	Ground connections
32	NC	—	Floating (Don't connected to ground)
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 (Don't connected to ground)
40	NC	—	Floating (Don't connected to ground)
41	NC	—	Floating (Don't connected to ground)
42	NC	—	Floating (Don't connect it to ground)
43	NC	—	Floating (Don't connect it to ground)
44	NC	—	Floating (Don't connect it to ground)

5. Dimensions

5.1 Layout Recommendation

(Unit: mm)

< TOP VIEW >

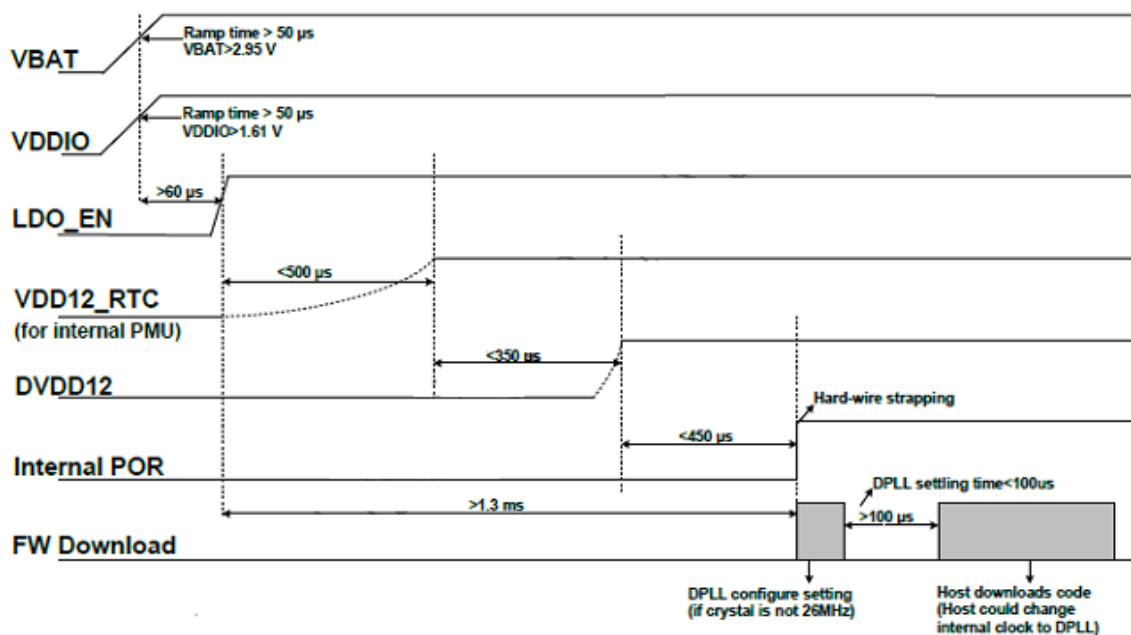


6. Host Interface Timing Diagram

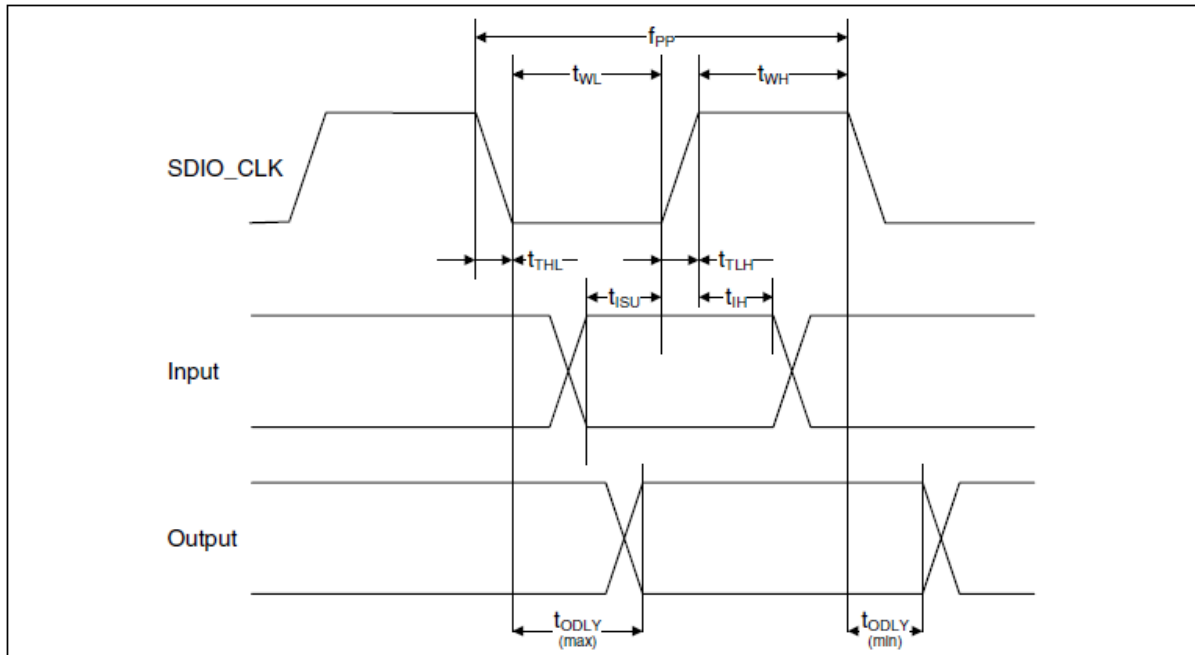
6.1 Power UP Sequence

Shows the below figure, the power-on sequence of the iTM1056-A 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 iTM1056-A. After LDO_EN is assert and host starts the power-on sequence of the iTM1056-A. 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

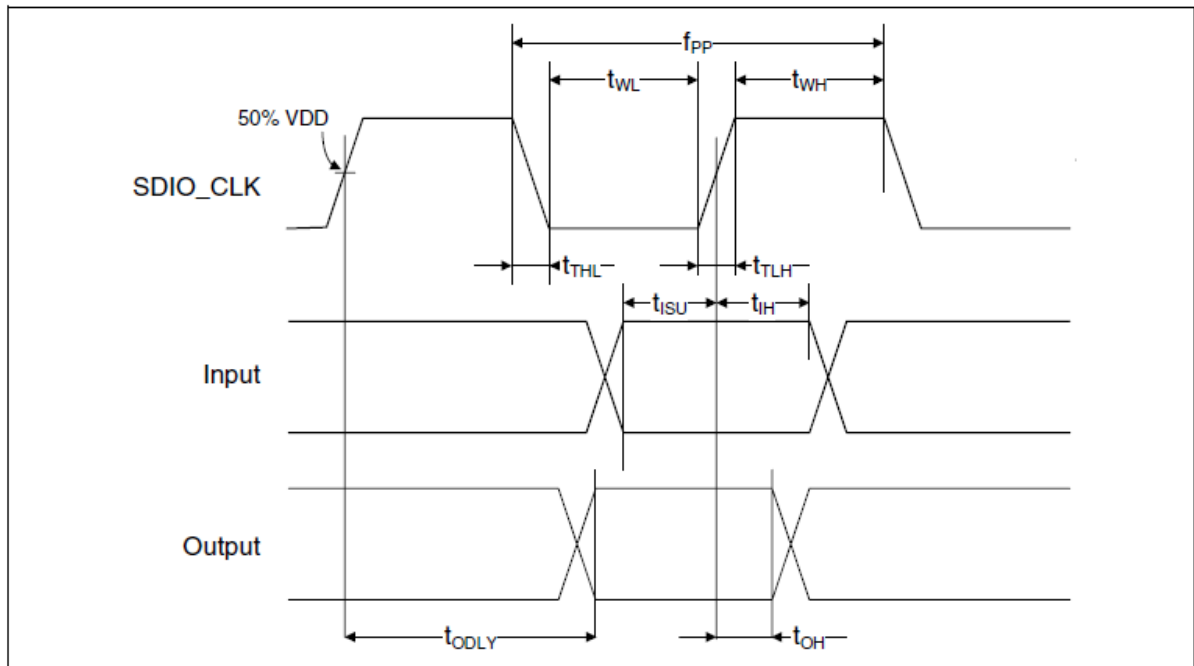


Parameter	Symbol	Minimum	Typical	Maximum	Unit
SDIO CLK (All values are referred to minimum V_{IH} and maximum V_{IL}^b)					
Frequency-Data Transfer mode	f_{PP}	0	-	25	MHz
Frequency-Identification mode	f_{OD}	0	-	400	kHz
Clock low time	t_{WL}	10	-	-	ns
Clock high time	t_{WH}	10	-	-	ns
Clock rise time	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 $C_L \leq 40\text{pF}$ load on CMD and Data.

b. $\min(V_{IH}) = 0.7 \times V_{DDIO}$ and $\max(V_{IL}) = 0.2 \times V_{DDIO}$.

6.3 SDIO High Speed Mode Timing Diagram

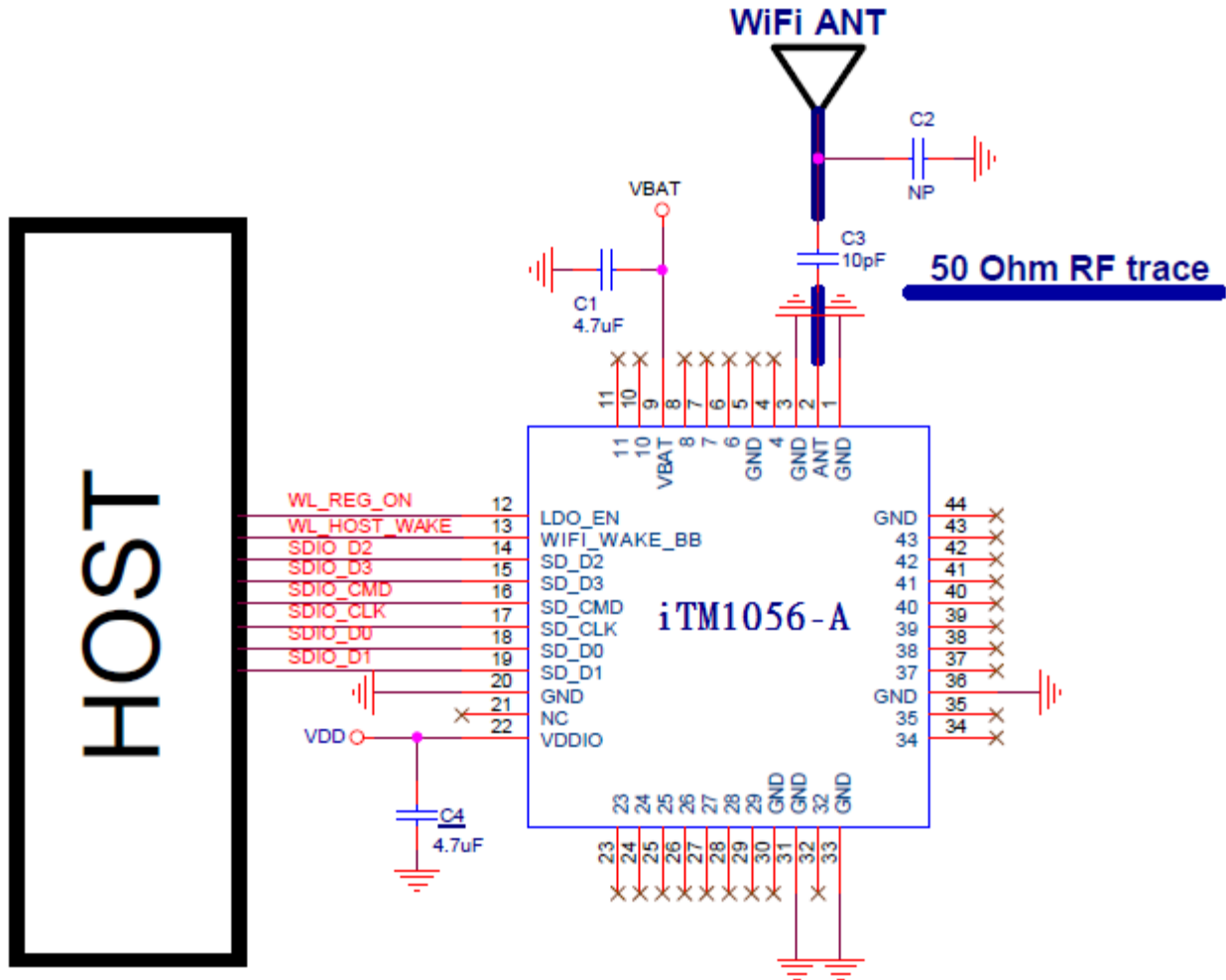


Parameter	Symbol	Minimum	Typical	Maximum	Unit
SDIO CLK (All values are referred to minimum V_{IH} and maximum V_{IL}^b)					
Frequency-Data Transfer mode	f_{PP}	0	-	50	MHz
Frequency-Identification mode	f_{OD}	0	-	400	kHz
Clock low time	t_{WL}	7	-	-	ns
Clock high time	t_{WH}	7	-	-	ns
Clock rise time	t_{TLH}	-	-	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 $CL \leq 40\text{pF}$ load on CMD and Data.

b. $\min(V_{IH}) = 0.7 \times V_{DDIO}$ and $\max(V_{IL}) = 0.2 \times V_{DDIO}$.

7. Reference Design

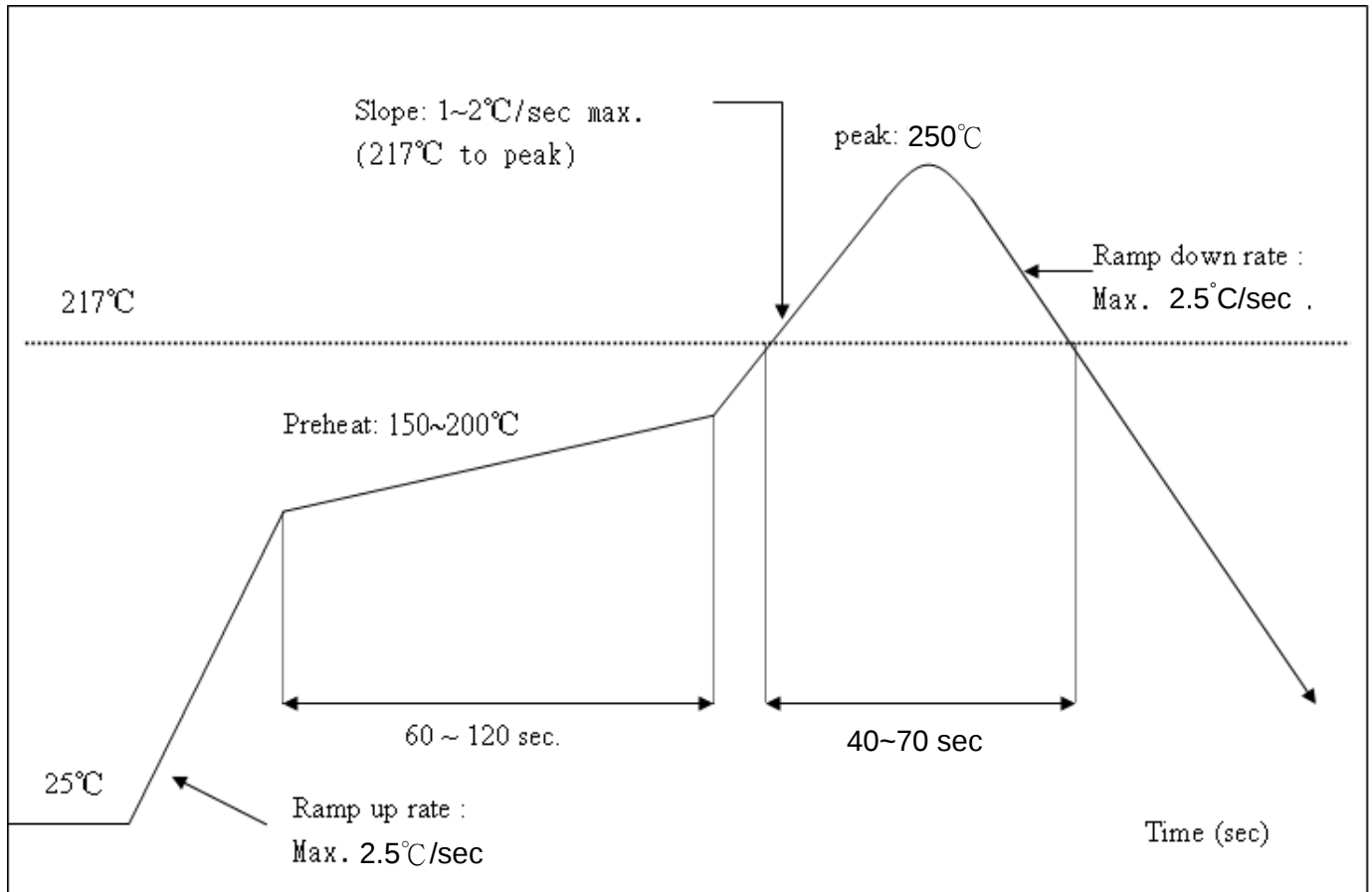


8. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

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

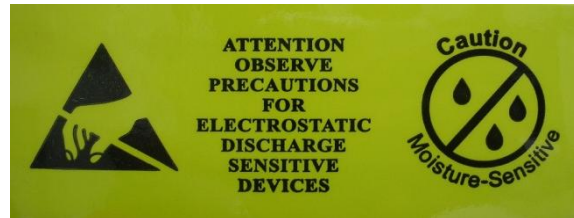
Number of Times : ≤ 2 times



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
	1. Calculated shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH) 2. Peak package body temperature: _____ °C # 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 # blank, see adjacent bar code label 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: _____ # 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 :	

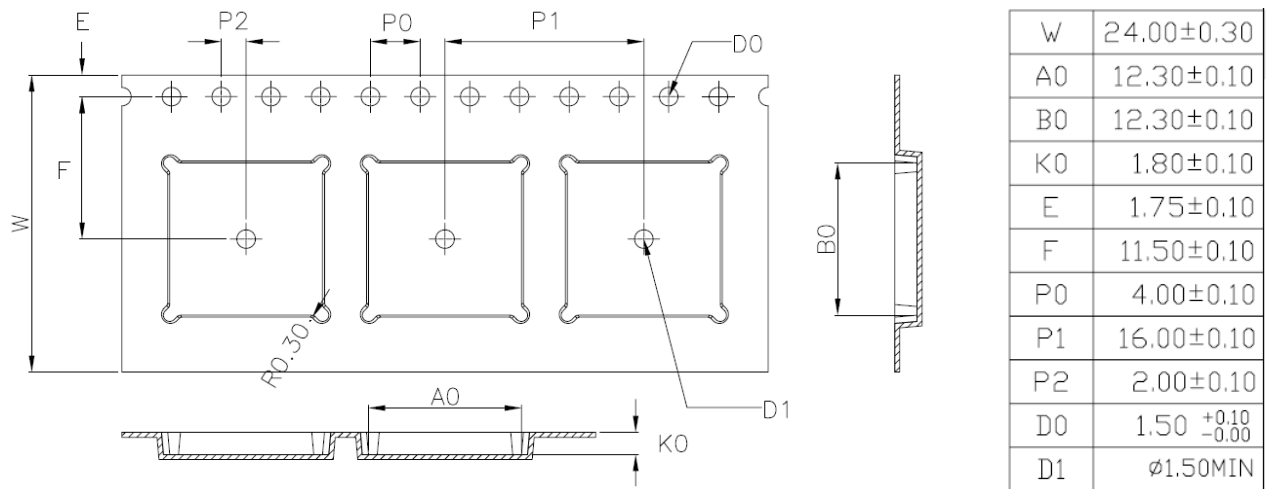
PKG S/N : 9PKG12013100001
 Model: XXXXXXXX(HF)
 P/N : 99P-W01-0042R
 Qty : 1500
 Date Code : 1205
 Lot Code : T0C102B

Label D → Carton box label .

iotTech Corporation	
Model Name :	
Part No :	
Quantity :	
Lot D/C :	
Manufacture :	

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

9.2 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.

