iotTech

iTM1020

IEEE 802.11b/g/n 1T1R WLAN

Module Datasheet

Revision History

Date	Revision Content	Revised By	Version
2015/11/06	- Initial released	Issac Chen	1.0
2016/01/25	- Pin-define changed	Issac Chen	1.1
2016/03/31	- Update packing dimension	Ken Wu	1.2
2016/06/17	- Update description	Issac Chen	1.3
2016/07/28	- Update description	Issac Chen	1.4
2016/08/09	- Update PCB pin outline	Ken Wu	1.5
2016/12/05	- Update general description & pin-define	Ken Wu	1.6

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1. General Description

The iotTech iTM1020 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.

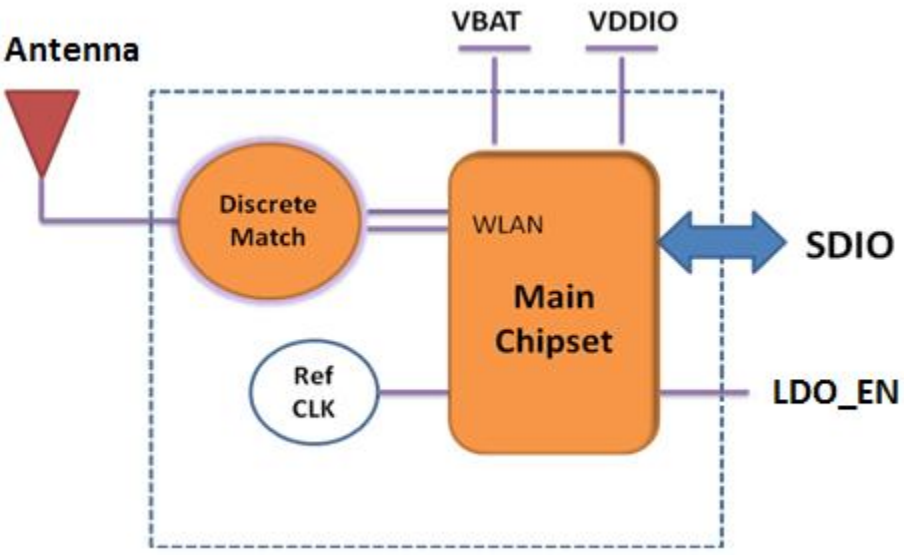
It includes additional LDOs and DC-DC buck convertor that could provide noise isolation for digital and analog supplies and excellent power efficient with minimum BOM cost.

This compact module is a total solution for Wi-Fi technologies. The module is specifically developed for Tablet, OTT box and Portable devices.

2. Features

- Wi-Fi Chipset : iComm SV6051P
- 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 handhelds.
- 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 iTM1020 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 -10°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		-92		dBm
	- 2Mbps		-90		dBm
	- 5.5Mbps		-88		dBm
	- 11Mbps		-86		dBm
RX Sensitivity 11g @ 10% PER	- 6Mbps		-90		dBm
	- 9Mbps		-87		dBm
	- 12Mbps		-85		dBm
	- 18Mbps		-83		dBm
	- 24Mbps		-80		dBm
	- 36Mbps		-77		dBm
	- 48Mbps		-74		dBm
	- 54Mbps		-72		dBm
Receive Sensitivity (11n,20MHz) @10% PER	- MCS0		-88		dBm
	- MCS=1		-85		dBm
	- MCS=2		-83		dBm
	- MCS=3		-79		dBm
	- MCS=4		-76		dBm
	- MCS=5		-72		dBm
	- MCS=6		-71		dBm
	- MCS=7		-70		dBm
Maximum Receive Level	802.11b		-10		dBm
	802.11g		-8		dBm
	802.11n		-8		dBm
Operating temperature	-10°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	15	18		dBm
	802.11g	13	14		dBm
	802.11n	12.5	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, 2nd harmonic		-56		dBm/ 1MHz
	7.2-7.5GHz, 3nd harmonic		-80		dBm/ 1MHz

3.4 Power Consumption

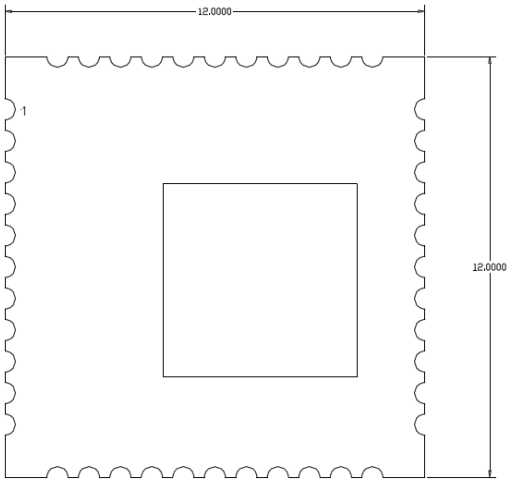
WLAN Operational Modes	Typ.	Unit
OFF[a]	4	uA
Rx, CCK, 1 Mbps	60	mA
Rx, OFDM, 54 Mbps	66	mA
Rx, HT20, MCS7	67	mA
Sleep	200	uA
Rx Power Saving, DTIM= 1	1.2	mA
Tx, CCK, 1 Mbps, 19dBm	282	mA
Tx, OFDM, 54 Mbps, 16dBm	218	mA
Tx, HT20, MCS7, 15dBm	223	mA

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

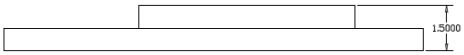
4. Pin Assignments

4.1 PCB Pin Outline (12X12mm)

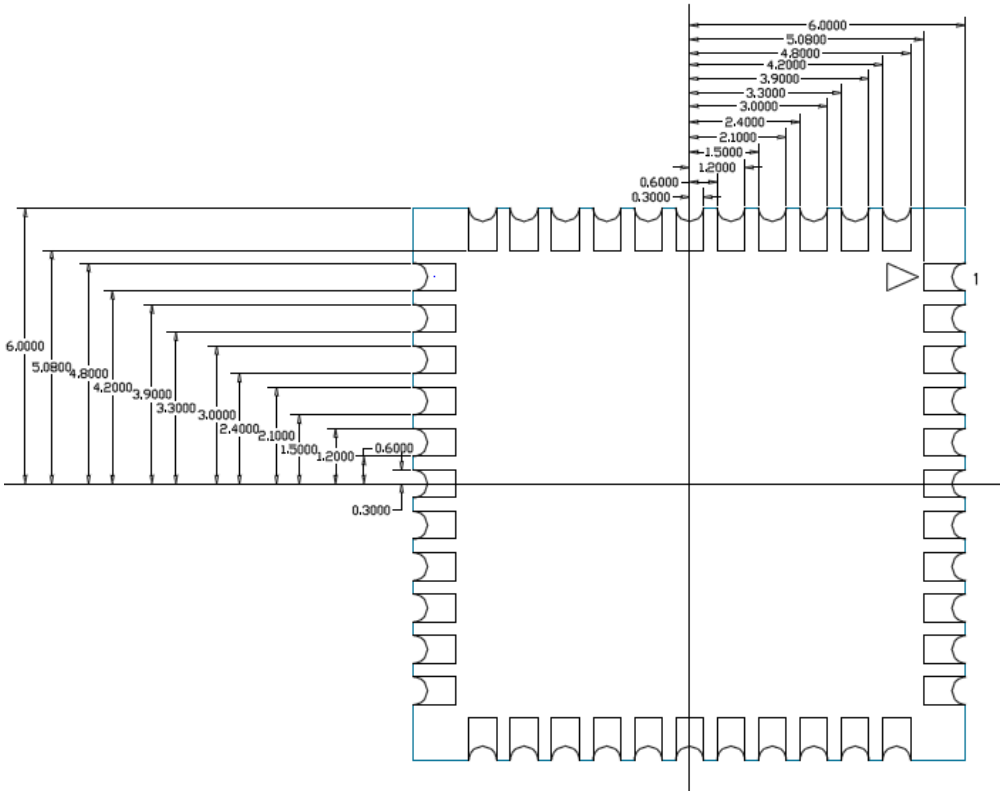
< TOP VIEW >



< SIDE VIEW >



< BOTTOM VIEW >



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	NC	—	Floating (Can be grounded)
6	NC	—	Floating (Don’t connect it to ground)
7	NC	—	Floating (Don’t connect it to ground)
8	NC	—	Floating (Don’t connect it to ground)
9	VBAT	P	Main power voltage source input
10	NC	—	Floating (Don’t connect it to ground)
11	NC	—	Floating (Don’t connect it to ground)
12	LDO_EN	I	WLAN device power enable/disable
13	NC	—	Floating (Don’t connect it to ground)
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 connect it to ground)
22	VDDIO	P	I/O Voltage supply input
23	NC	—	Floating (Don’t connect it to ground)
24	NC	—	Floating (Don’t connect it to ground)
25	NC	—	Floating (Don’t connect it to ground)
26	NC	—	Floating (Don’t connect it to ground)
27	NC	—	Floating (Don’t connect it to ground)
28	TEST PIN1	—	For internal testing only. DO NOT pull high when normal operation
29	NC	—	Floating (Don’t connect it to ground)
30	NC	—	Floating (Can be grounded)
31	GND	—	Ground connections
32	TEST PIN2	—	For internal testing only. DO NOT pull high when normal operation

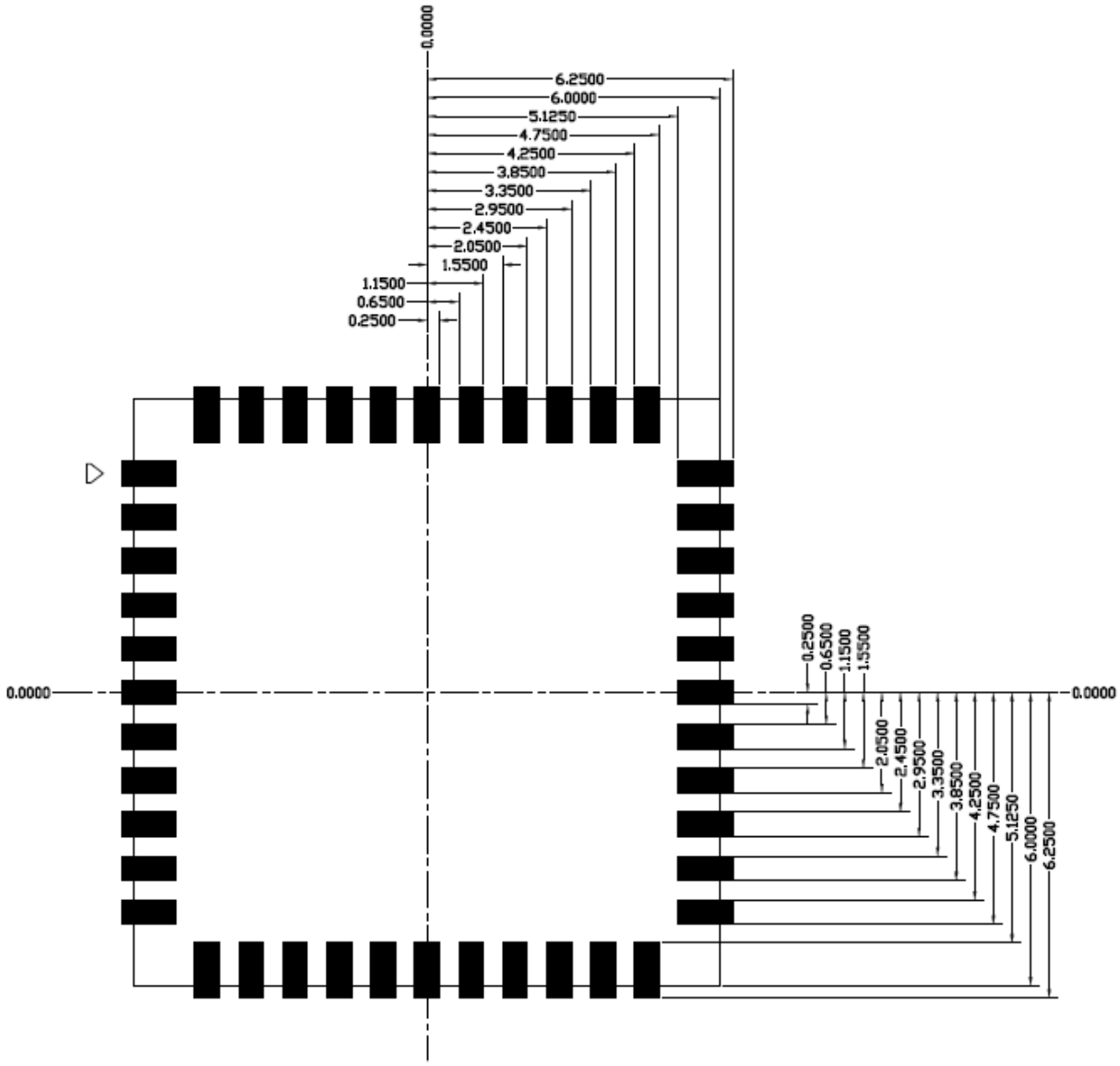
33	GND	—	Ground connections
34	NC	—	Floating (Don’t connect it to ground)
35	NC	—	Floating (Don’t connect it to ground)
36	GND	—	Ground connections
37	NC	—	Floating (Don’t connect it to ground)
38	NC	—	Floating (Don’t connect it to ground)
39	NC	—	Floating (Can be grounded)
40	NC	—	Floating (Can be grounded)
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	NC	—	Floating (Can be grounded)

5. Dimensions

5.1 Layout Recommendation

(Unit: mm)

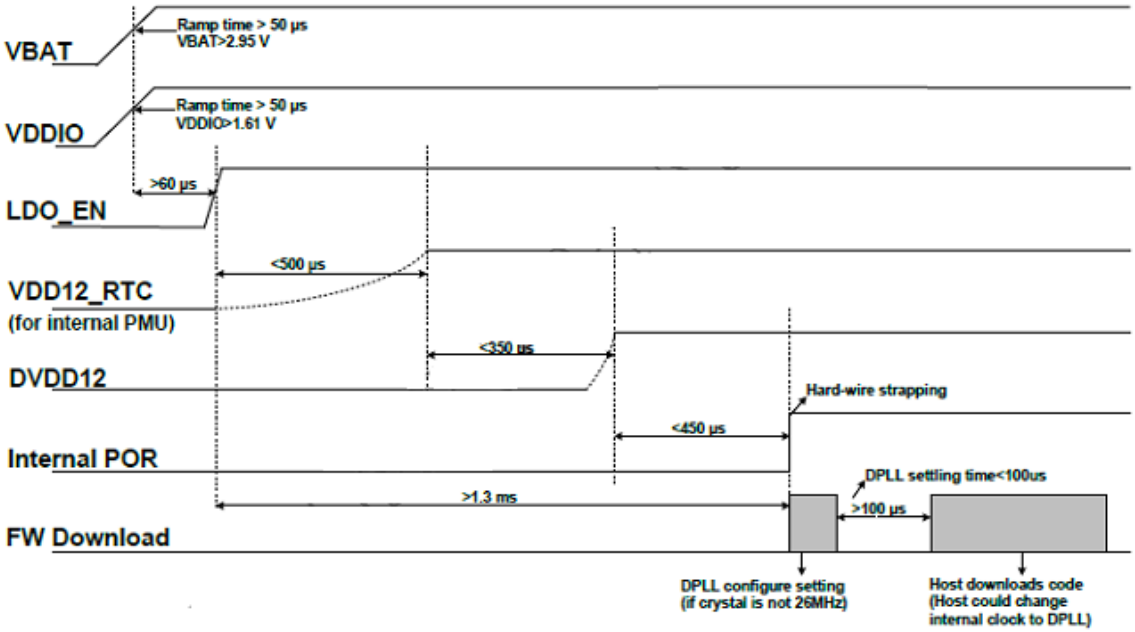
< TOP VIEW >



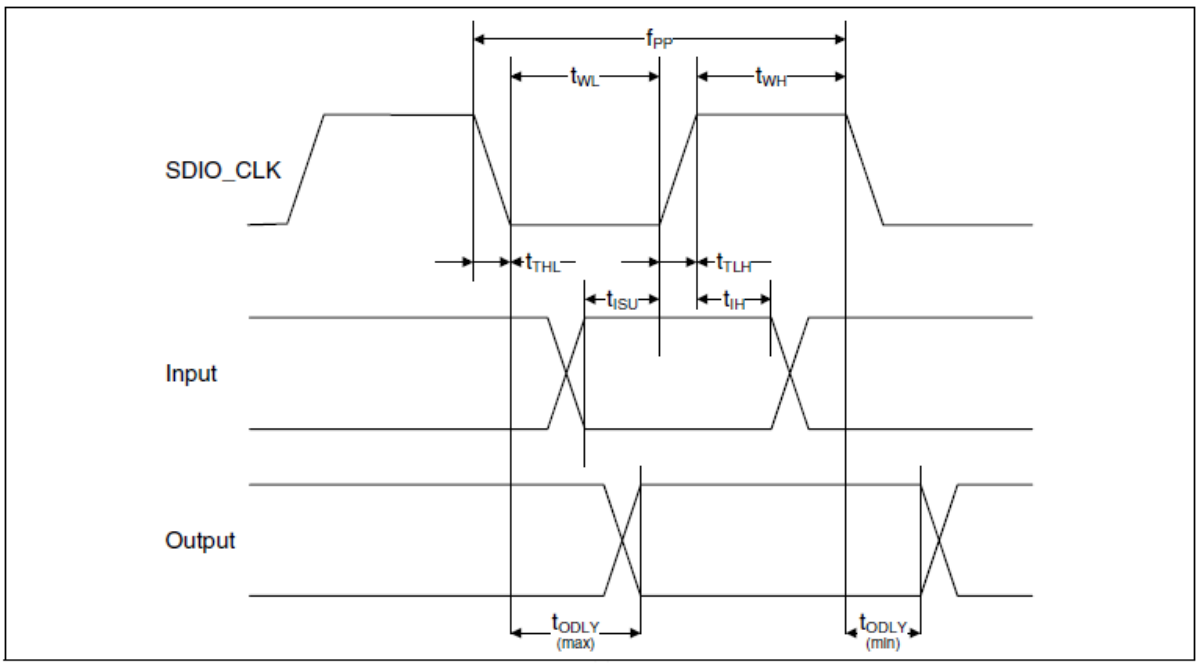
6. Host Interface Timing Diagram

6.1 Power UP Sequence

Shows the below figure, the power-on sequence of the iTM1020 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 iTM1020.
After LDO_EN is assert and host starts the power-on sequence of the iTM1020. 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.



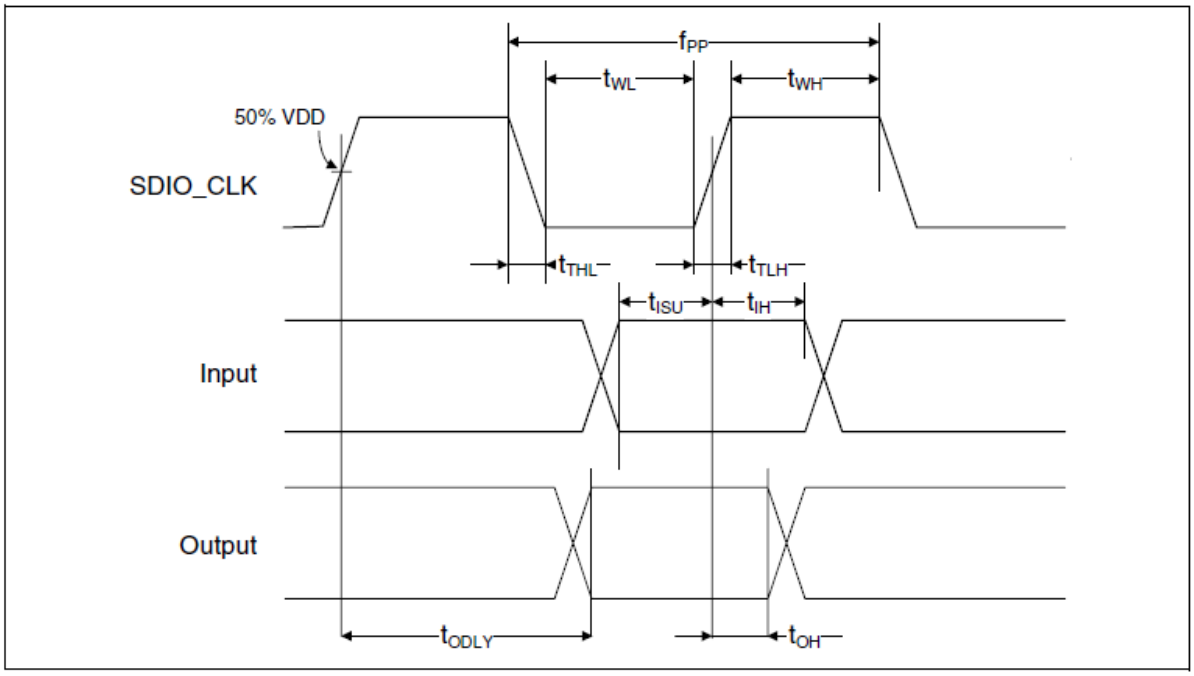
6.2 SDIO Default Mode Timing Diagram



Parameter	Symbol	Minimum	Typical	Maximum	Unit
SDIO CLK (All values are refferred to minimum VIH and maximum VIL[b])					
Frequency-Data Transfer mode	fPP	0	-	25	MHz
Frequency-Identification mode	fOD	0	-	400	kHz
Clock low time	tWL	10	-	-	ns
Clock high time	tWH	10	-	-	ns
Clock rise time	tTLH	-	-	10	ns
Clock low time	tTHL	-	-	10	ns
Inputs: CMD, DAT (referenced to CLK)					
Input setup time	tISU	5	-	-	ns
Input hold time	tIH	5	-	-	ns
Outputs: CMD, DAT (referenced to CLK)					
Output delay time – Data Transfer mode	tODLY	0	-	14	ns
Output delay time – Identification mode	tODLY	0	-	50	ns

a. Timing is based on CL ≤ 40pF load on CMD and Data.
b. min(Vih) = 0.7 x VDDIO and max(Vil) = 0.2 x VDDIO.

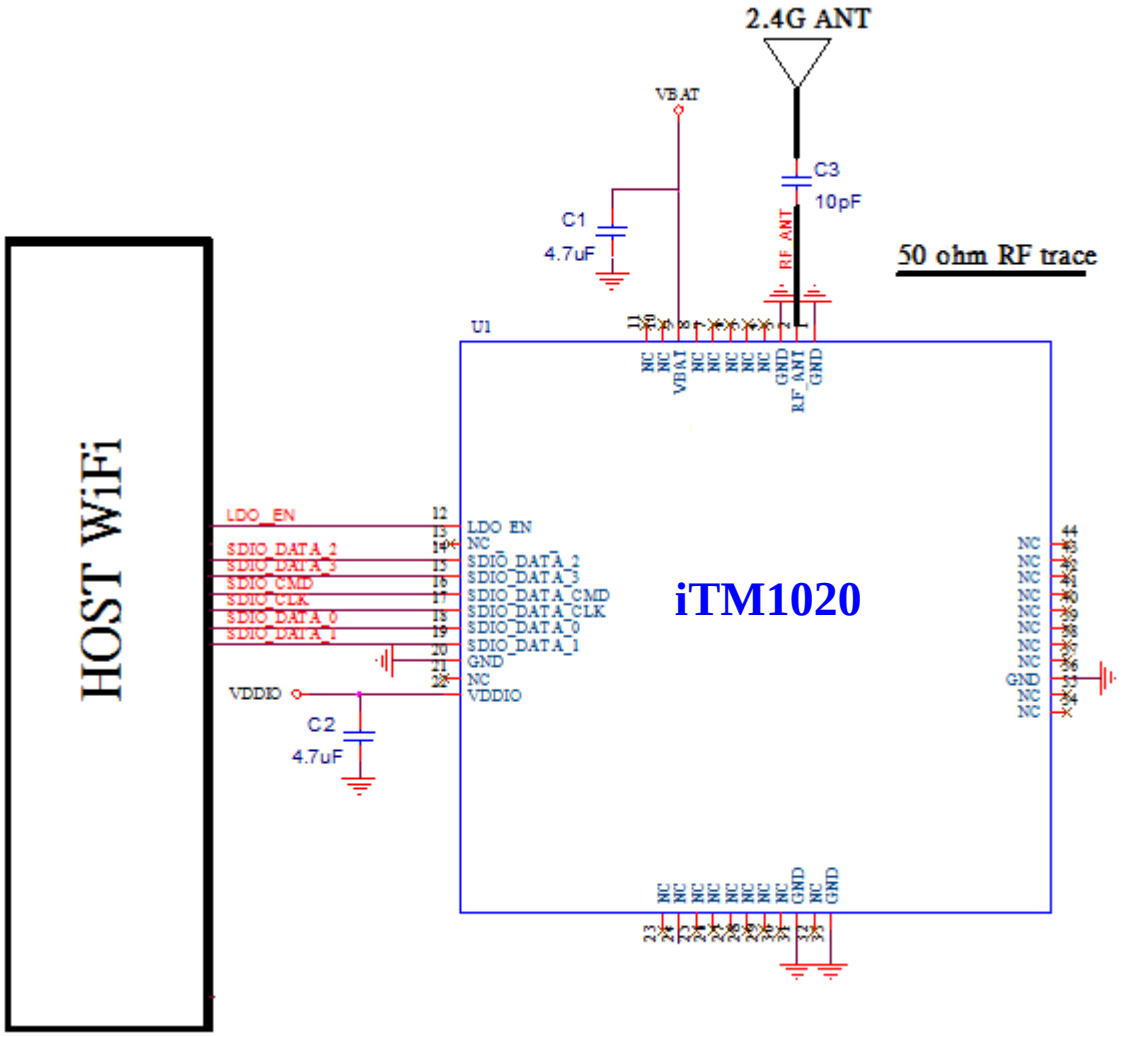
6.3 SDIO High Speed Mode Timing Diagram



Parameter	Symbol	Minimum	Typical	Maximum	Unit
SDIO CLK (All values are refferred to minimum VIH and maximum VIL[b])					
Frequency-Data Transfer mode	fPP	0	-	50	MHz
Frequency-Identification mode	fOD	0	-	400	kHz
Clock low time	tWL	7	-	-	ns
Clock high time	tWH	7	-	-	ns
Clock rise time	tTLH	-	-	3	ns
Clock low time	tTHL	-	-	3	ns
Inputs: CMD, DAT (referenced to CLK)					
Input setup time	tISU	6	-	-	ns
Input hold time	tIH	2	-	-	ns
Outputs: CMD, DAT (referenced to CLK)					
Output delay time – Data Transfer mode	tODLY	-	-	14	ns
Output hold time	tOH	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(Vih) = 0.7 x VDDIO and max(Vil) = 0.2 x VDDIO.

7. Reference Design

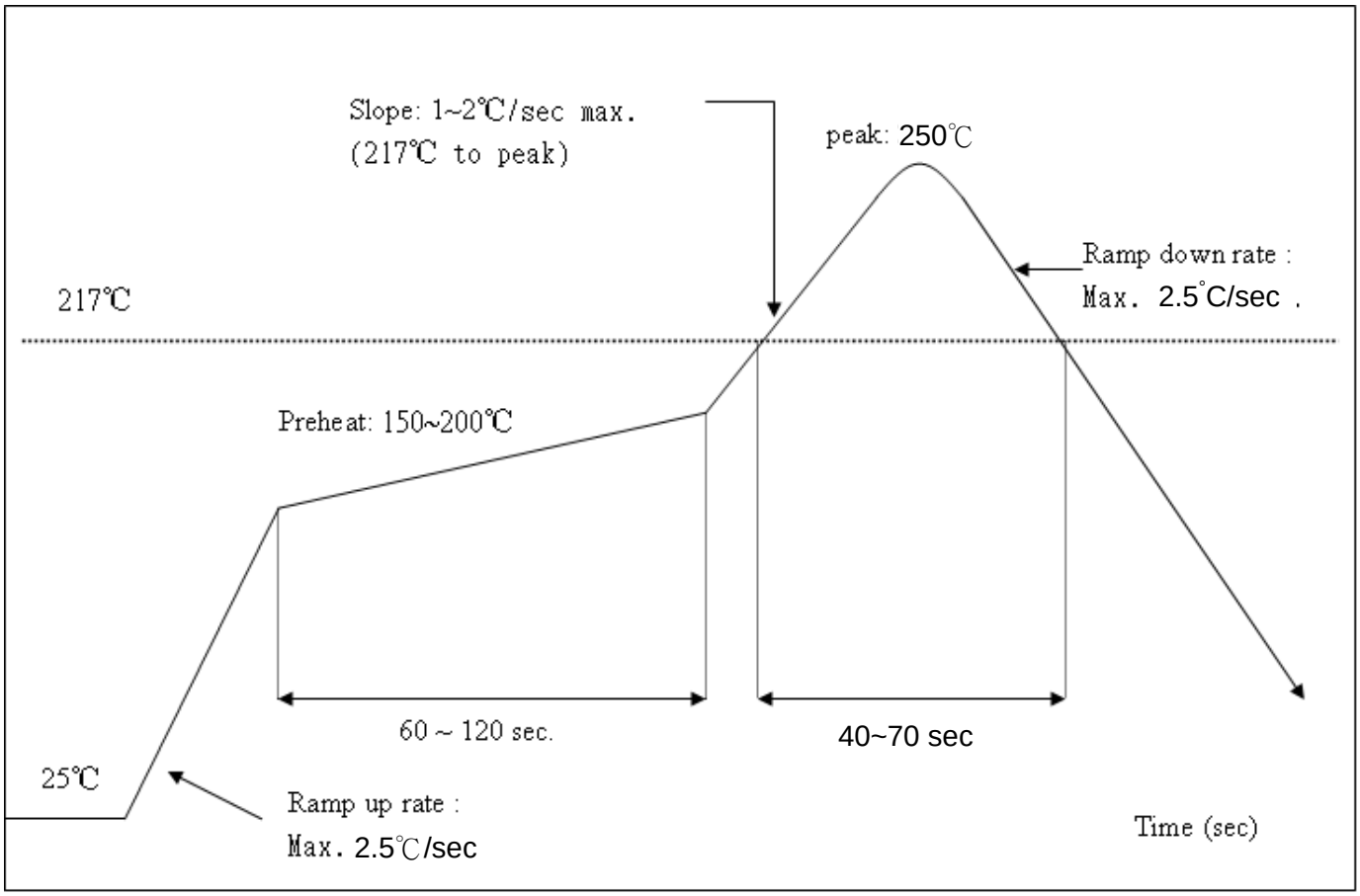


8. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <250°C

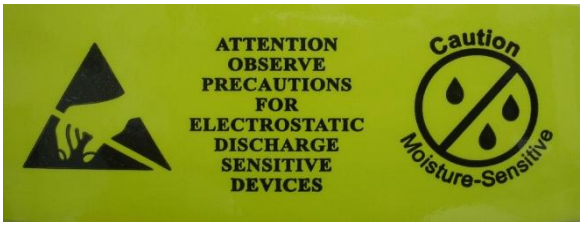
Number of Times : ≤2 times



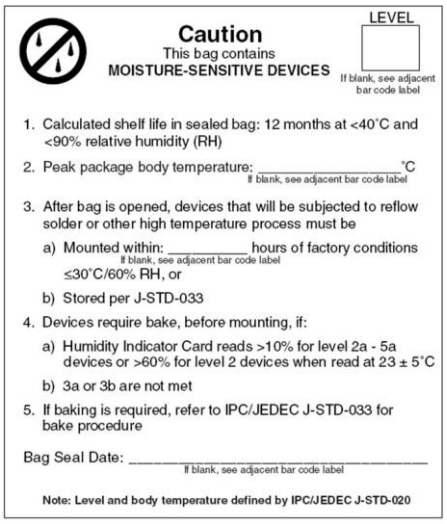
9. Packing Information

9.1 Label

Label A → Anti-static and humidity notice

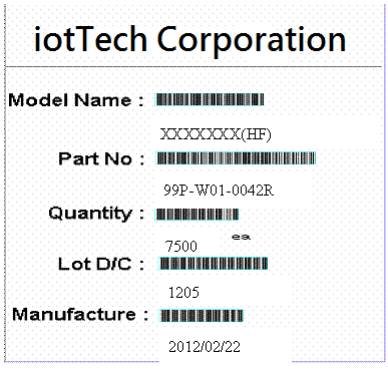


Label B → MSL caution / Storage Condition

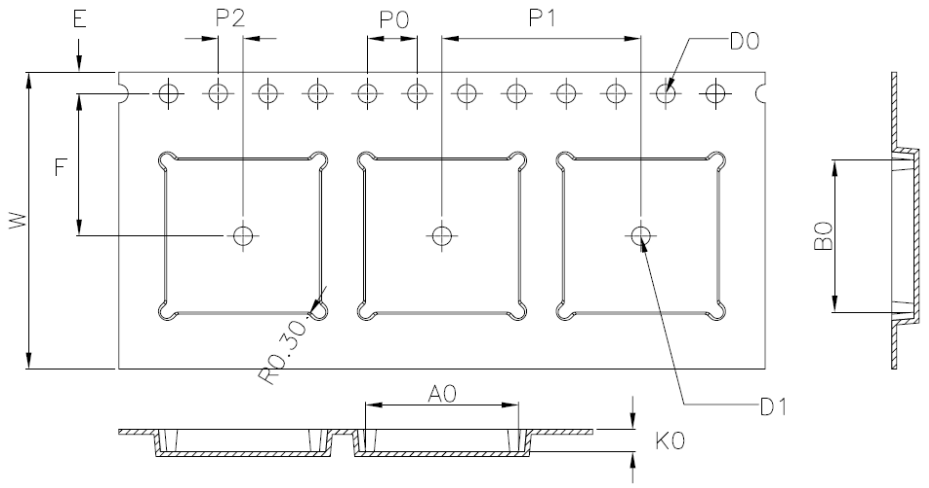


Label C → Inner box label .

Label D → Carton box label .

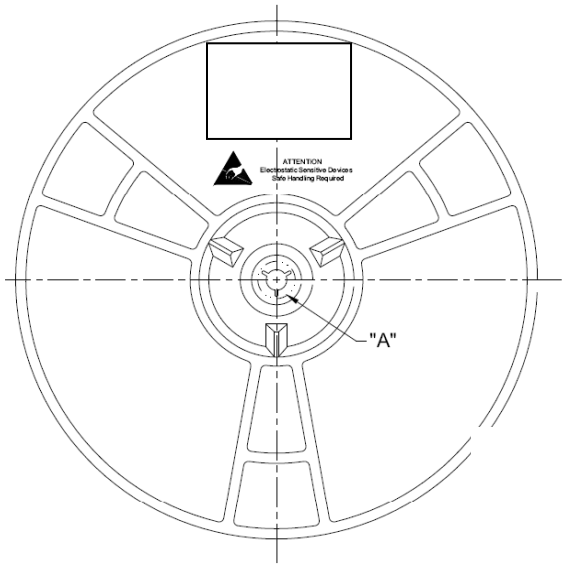


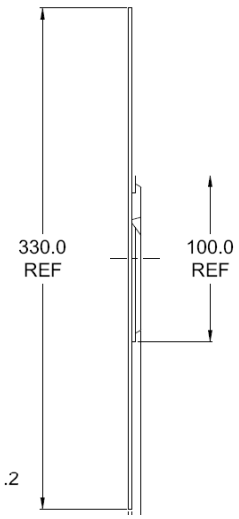
9.2 Dimension

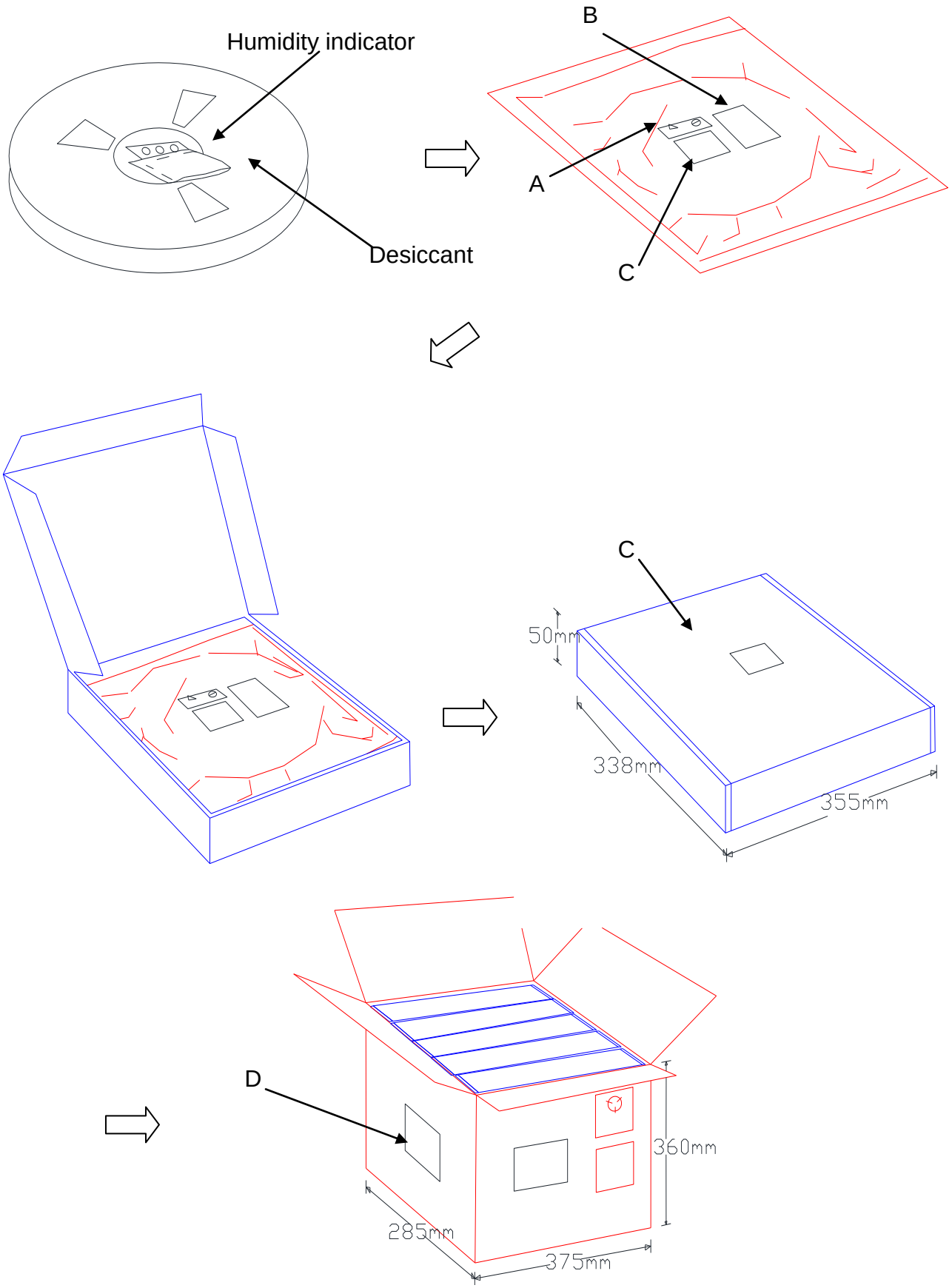


W	24.00±0.30
A0	12.30±0.10
B0	12.30±0.10
K0	1.80±0.10
E	1.75±0.10
F	11.50±0.10
P0	4.00±0.10
P1	16.00±0.10
P2	2.00±0.10
D0	1.50 $^{+0.10}_{-0.00}$
D1	ø1.50MIN

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.






Humidity indicator
Desiccant
B
A
C
C
50mm
338mm
355mm
D
360mm
285mm
375mm