iotTech

iTM9139

Sub-GHz FSK Transceiver Module for 915MHz Band

Module Datasheet

Revision History

Date	Revision Content	Revised By	Version
2017/09/26	- Initial released	Issac Chen	0.1
2018/04/16	- Formal released	Issac Chen	1.0
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Contents

1. General Description

The iTM9139 SIP module is designed for 915MHz ISM band wireless applications using AMICCOM's A7139 FSK/GFSK transceiver chipset. This compact module features a fully programmable frequency synthesizer by SPI interface. The maximum data rate is up to 100kbps (by using 12.8MHz crystal, or 250kbps by using 16MHz crystal)

iTM9139 is optimized for very low power consumption. In addition, it can offer a very good link budget with a high efficient class-E power amplifier up to 16dBm and a low phase noise receiver. Therefore, iTM9139 is very suitable for battery powered application with a nice LOS (line-of-sight) wireless range.

2. Features

- RF Chipset : AMICCOM A7139
- Frequency band: 915 MHz.
- Programmable data rate from 2Kbps to 100Kbps
- Programmable TX power level from –34dBm to 15dBm.
- On chip regulator, supports input voltage 1.9 ~ 3.6 V.
- Ultra low deep-sleep mode current consumption 0.3uA
- RX mode current consumption (AGC Off): 3.8mA
- High RX sensitivity -102dBm@100Kbps data rate
- Easy to use.

3. Electrical Specification

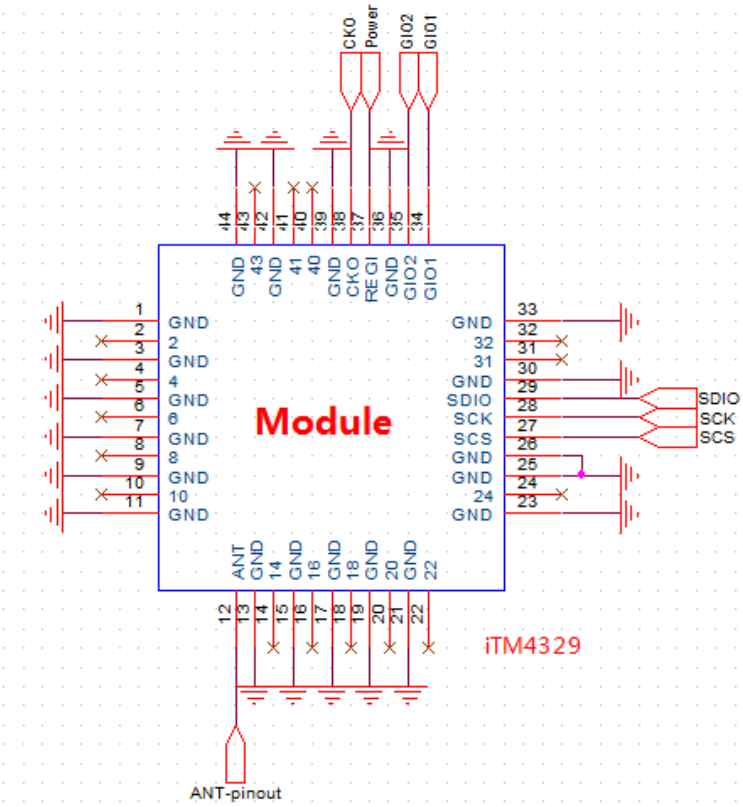
Item	Specification	Remark
Supply Voltage	2.2V~3.6V	
Current Consumption	0.3uA @Deep Sleep mode 2.0uA @Sleep mode(WOR off) 3.0uA @Sleep mode(WOR on) 0.15mA @Idle mode 0.45mA @Stand-by mode 2.6mA @PLL mode 4.9mA @Rx mode(AGC OFF) 14.0mA @Tx mode (-34.0dBm,TBG=0, TDC=0, PAC=0) 72.0mA @Tx mode (13.5dBm,TBG=5, TDC=3, PAC=1) 72.5mA @Tx mode (15.0dBm,TBG=7, TDC=2, PAC=1)	Typical +3.3V, 25℃ ***1**
Frequency	915 MHz	ISM band
TX Output Power	15.0 dBm (TBG=7, TDC=2, PAC=1)	Typical, +3.3V, 25℃ ***1**
RX Sensitivity	-117 dBm @ 2 Kbps mode, Dev = 8 KHz, IFBW=50KHz -112 dBm @ 2 Kbps mode, Dev = 8 KHz, IFBW=100KHz -112 dBm @ 10 Kbps mode, Dev = 1875 KHz, IFBW=50KHz -109 dBm @ 10 Kbps mode, Dev = 37.5 KHz, IFBW=100KHz -104 dBm @ 50 Kbps mode, Dev = 18.75 KHz, IFBW=50KHz -102 dBm @ 100 Kbps mode, Dev = 37.5 KHz, IFBW=100KHz -100 dBm @ 150 Kbps mode, Dev = 56.25 KHz, IFBW=150KHz -99 dBm @ 250 Kbps mode, Dev = 93.75 KHz, IFBW=250KHz	BER≦1E-3 +3.3V, 25℃ ***2**
Modulation	FSK	
Operating Temp.	-40 ~ 85 ℃	

** 1 To pass CE, the setting of TBG, TDC, PAC maybe changed with different antenna*

**2 For 250Kbps data rate mode, customers should use 16MHz X'tal.*

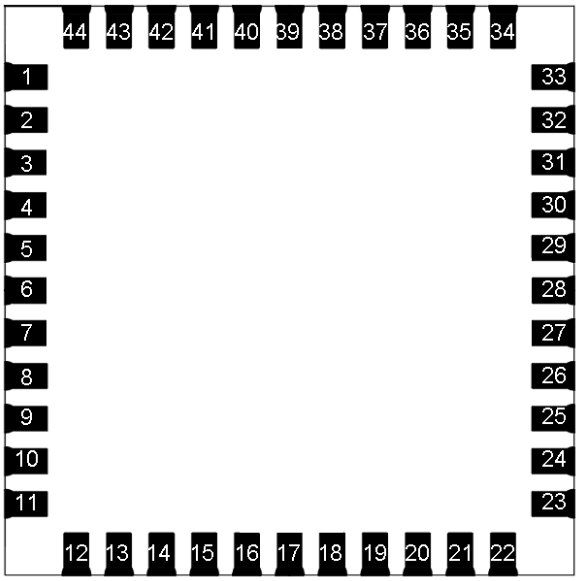
4. Pin Assignments

4.1 Schematic Diagram



4.2 PCB Pin Outline (12X12mm)

< TOP VIEW >

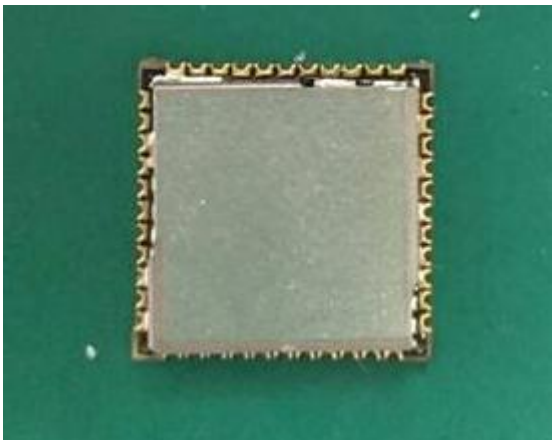


4.3 Pin Definition

NO	Name	Type	Description
1	GND	G	Ground connections
2	NC	—	Not connected
3	GND	G	Ground connections
4	NC	—	Not connected
5	GND	G	Ground connections
6	NC	—	Not connected
7	GND	G	Ground connections
8	NC	—	Not connected
9	GND	G	Ground connections
10	NC	—	Not connected
11	GND	G	Ground connections
12	ANT	I/O	RF input/output
13	GND	G	Ground connections
14	NC	—	Not connected
15	GND	G	Ground connections
16	NC	—	Not connected
17	GND	G	Ground connections
18	NC	—	Not connected
19	GND	G	Ground connections
20	NC	—	Not connected
21	GND	G	Ground connections
22	NC	—	Not connected
23	GND	G	Ground connections
24	NC	—	Not connected
25	GND	G	Ground connections
26	GND	G	Ground connections
27	SCS	I	SPI Select Input
28	SCK	I	SPI Clock Input
29	SDIO	I/O	SPI Data I/O
30	GND	G	Ground connections
31	NC	—	Not connected
32	NC	—	Not connected
33	GND	G	Ground connections
34	GIO1	I/O	Multi-function IO 1 / SPI data output

35	GIO2	I/O	Multi-function IO 2 / SPI data output
36	GND	G	Ground connections
37	REG_I	P	Voltage supply Input
38	CKO	O	Multi-function clock output
39	GND	G	Ground connections
40	NC	—	Not connected
41	NC	—	Not connected
42	GND	G	Ground connections
43	NC	—	Not connected
44	GND	G	Ground connections

4.4 Module Appearance

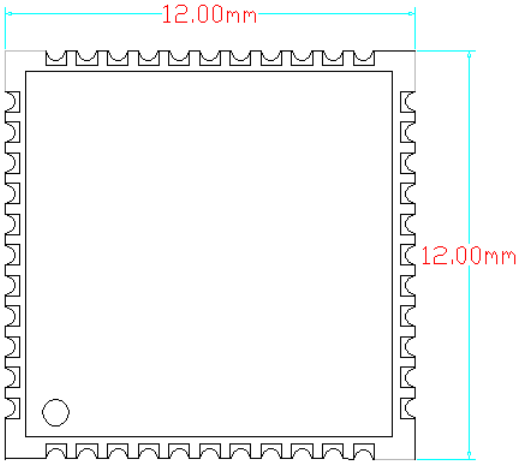


5. Dimensions

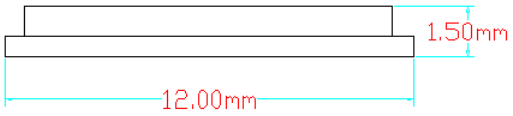
5.1 Physical Dimension

(Unit: mm)

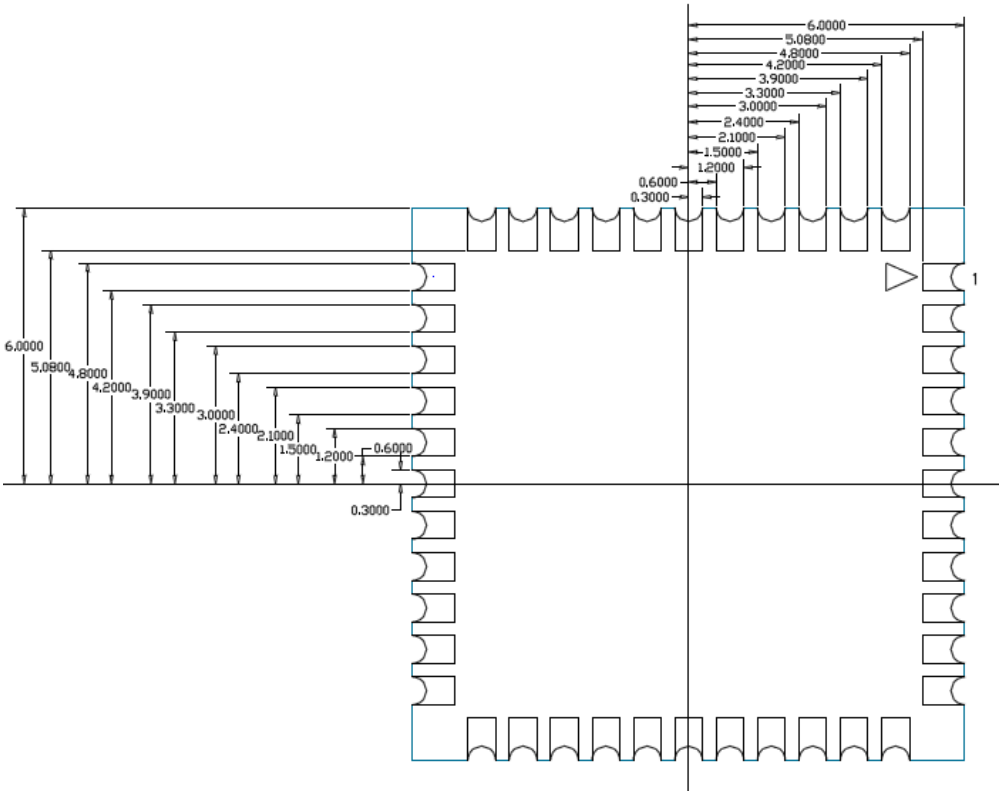
< TOP VIEW >



<SIDE VIEW>

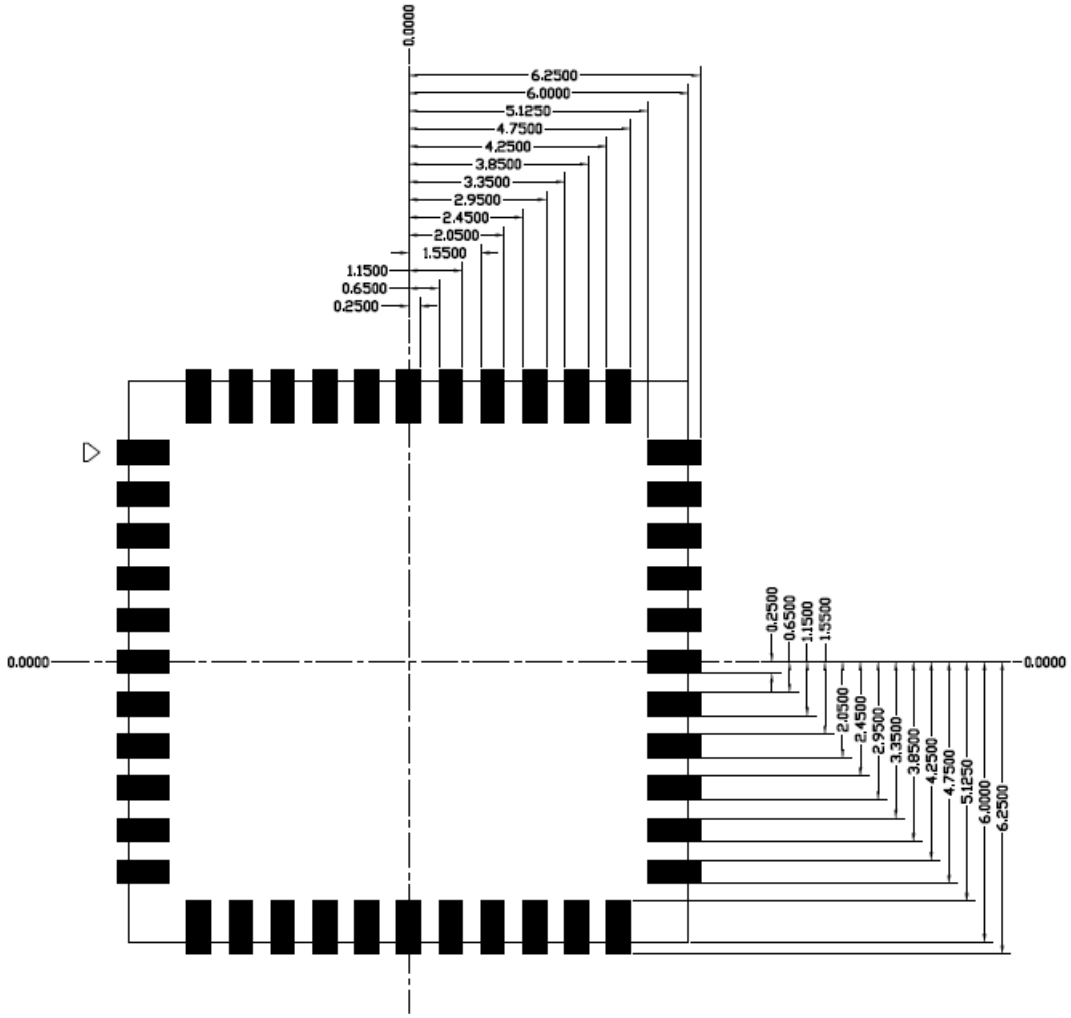


< BOTTOM VIEW >



5.2 Layout Recommendation

< TOP VIEW >



6. Host Interface Timing Diagram

6.1 SPI Timing Diagram

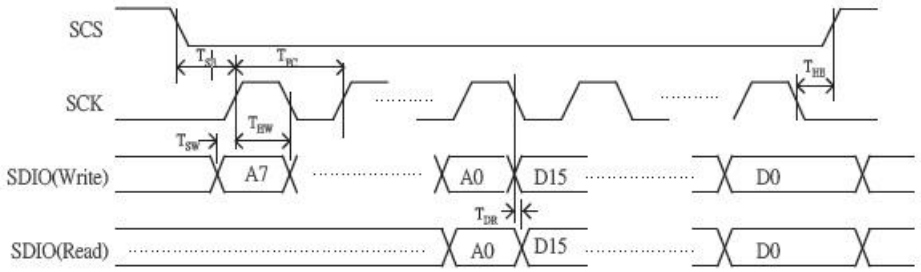
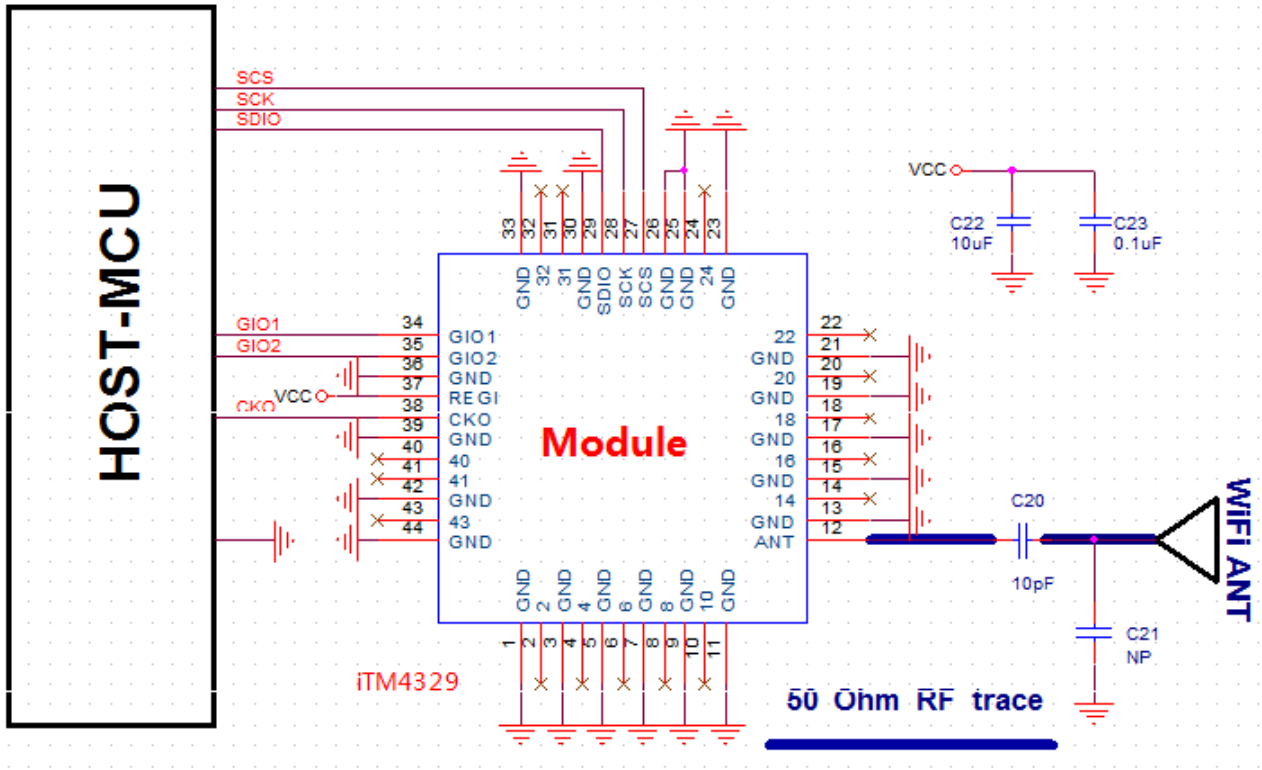


Figure 10.3 SPI timing sequence

Parameter	Description	Min.	Max.	Unit
T_{FC}	Clock frequency.		10	MHz
T_{SE}	SCS setup time.	50		ns
T_{HE}	SCS hold time.	50		ns
T_{SW}	SDIO setup time.	50		ns
T_{HW}	SDIO hold time.	50		ns
T_{DR}	SDIO delay time.	0	100	ns
T_{HR}	SDIO hold time.	0		ns

7. Reference Design

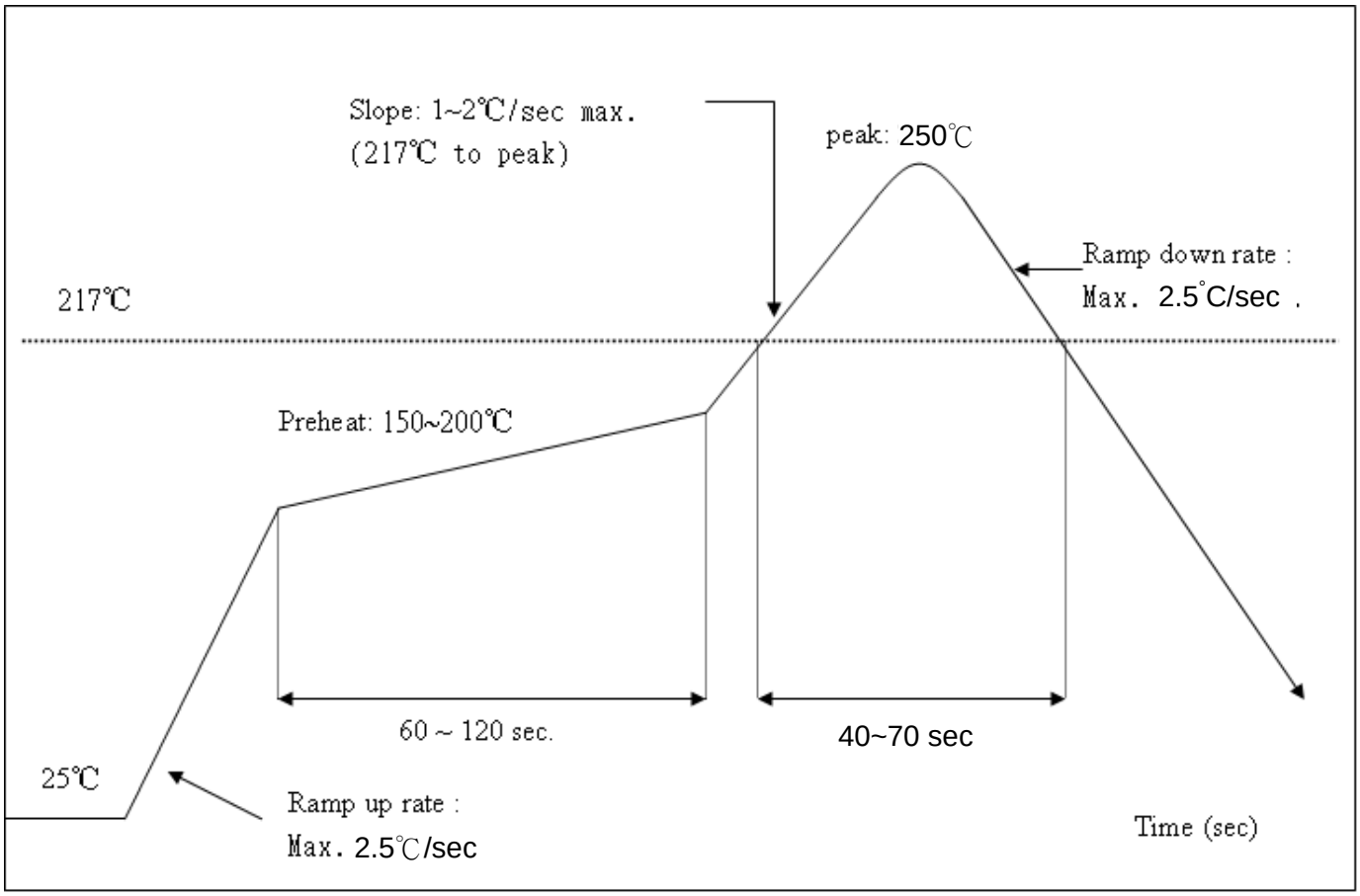


8. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <250°C

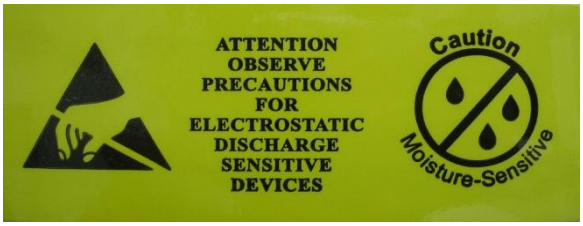
Number of Times : ≤2 times



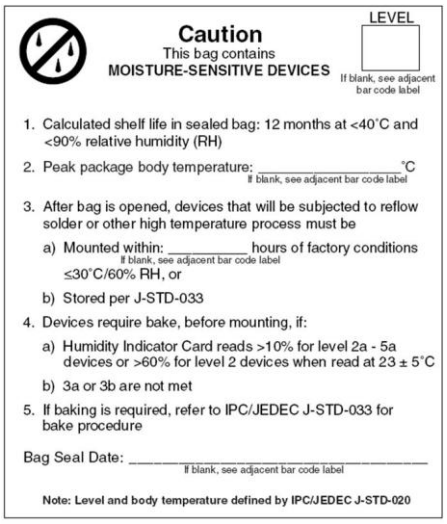
9. Packing Information

9.1 Label

Label A → Anti-static and humidity notice

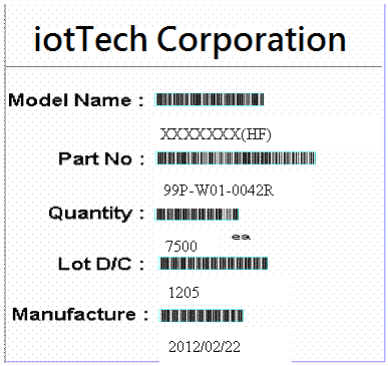


Label B → MSL caution / Storage Condition

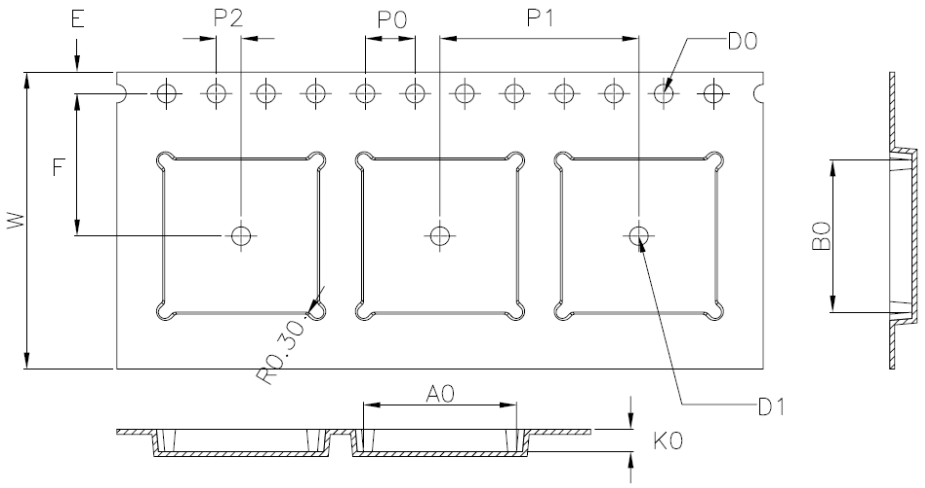


Label C → Inner box label .

Label D → Carton box label .

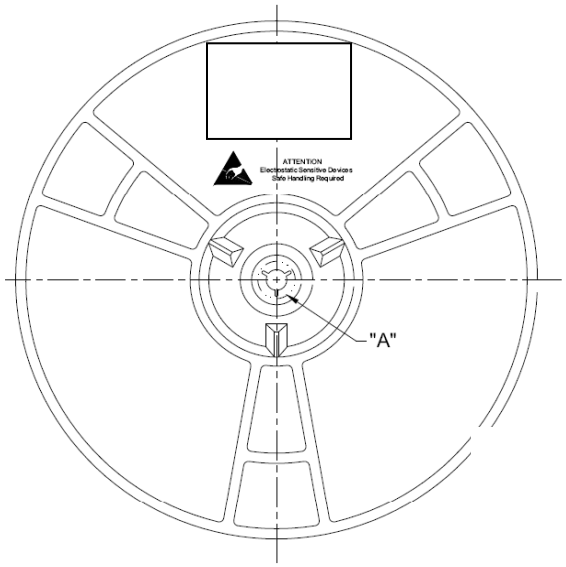


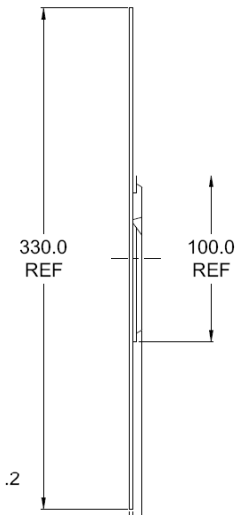
9.2 Dimension

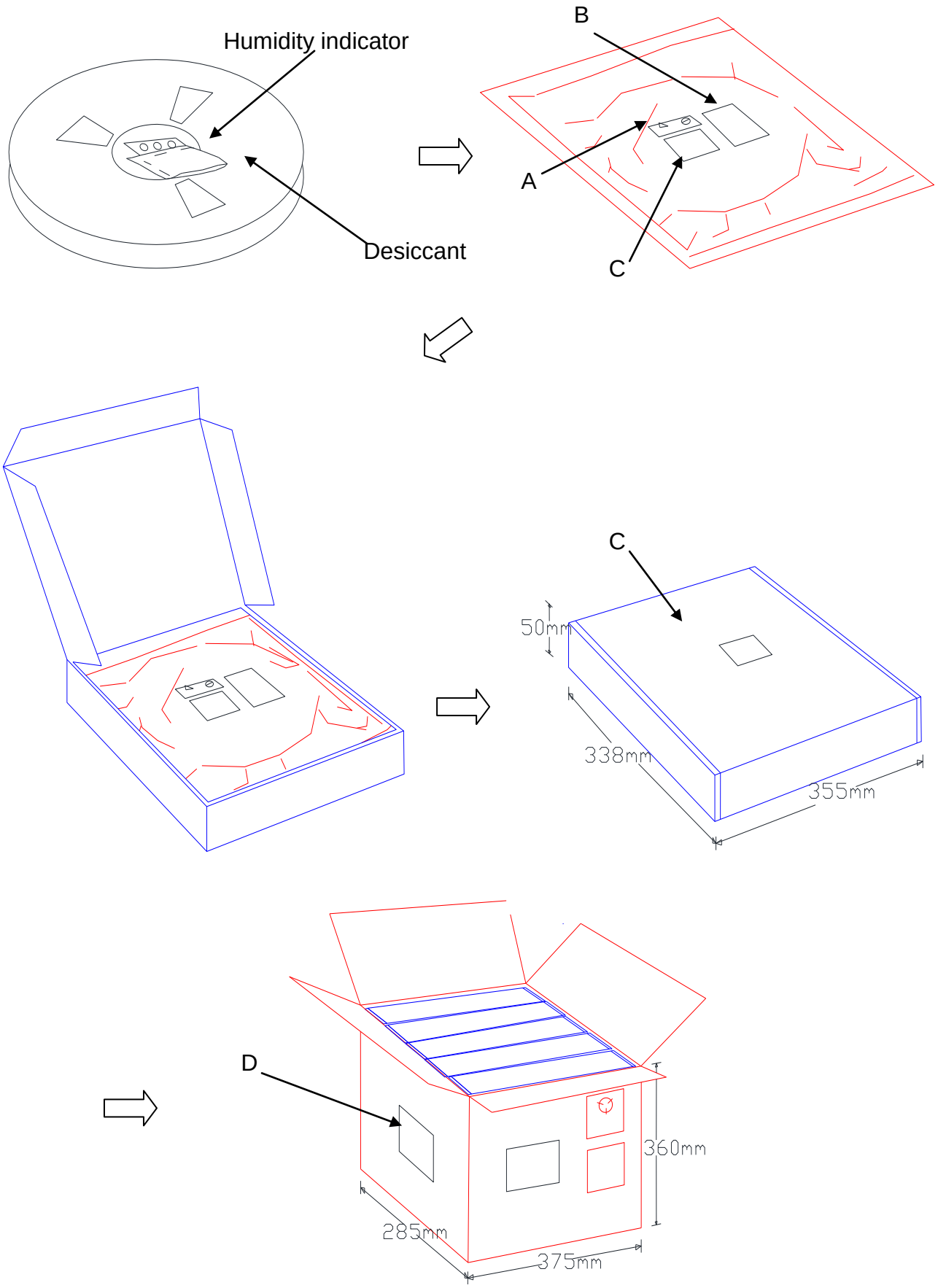


W	24.00±0.30
A0	12.30±0.10
B0	12.30±0.10
K0	1.80±0.10
E	1.75±0.10
F	11.50±0.10
P0	4.00±0.10
P1	16.00±0.10
P2	2.00±0.10
D0	1.50 $^{+0.10}_{-0.00}$
D1	ø1.50MIN

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