



ITM-1720-CM

IEEE 802.11b/g/n 1T1R WLAN + Bluetooth
LE 4.2 IoT Module Datasheet

V0.2

Revision History

Date	Revision Content	Revised By	Version
2023/11/16	- Initial released (Preliminary)	Issac Chen	0.1
2023/12/28	- Update dimension	Issac Chen	0.2
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	-		
	-		

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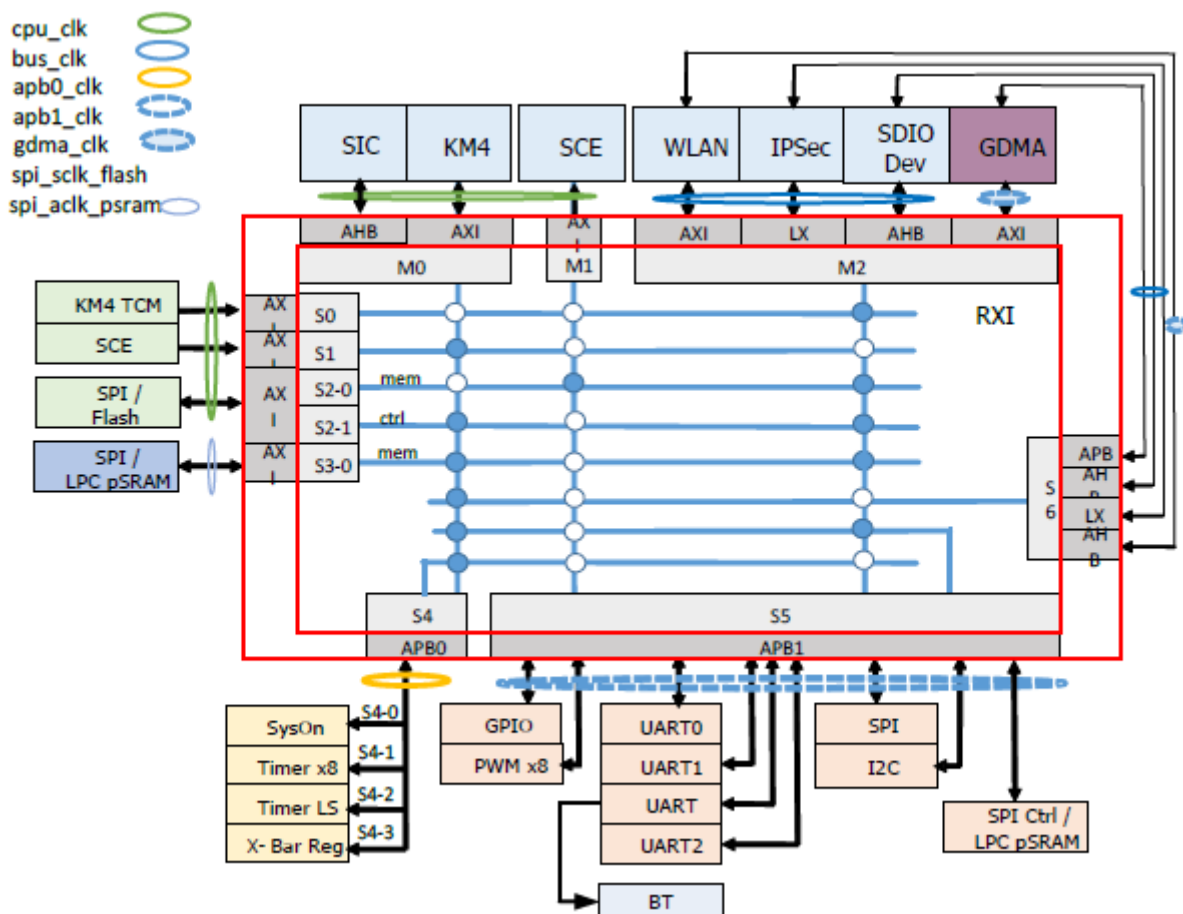
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1. General Description

iTM-1720-CM module is a highly integrated and low power consumption module supporting 2.4GHz Wireless LAN (802.11b/g/n) and Bluetooth Low Energy (BLE 4.2).

iTM-1720-CM module uses Realtek RTL8720CM chipset, which combines a KM4 MCU, WLAN MAC, a 1T1R capable WLAN baseband, RF, and Bluetooth in a single chip. It also provides a bunch of configurable GPIOs which are configured as digital peripherals for different applications and control usage. RTL8720CM also integrates memories ROM/RAM for WLAN/BLE IoT functions and applications. The user-friendly development kits (SDK and HDK) are supported for customers to develop their IoT product.

The architecture of RTL8720CM is shown as below.



2. Features

- CPU
 - KM4 (Real-M300)
 - Clock rate up to 100MHz
- Memory
 - 384KB ROM
 - 256KB SRAM + 4MB pSRAM
 - 2MB Flash
 - XIP (execute-in-place)
- Wi-Fi
 - 2.4GHz 1T1R IEEE 802.11b/g/n
 - Support 11n MCS7 HT20/HT40
- Bluetooth LE
 - BLE 4.2 (PHY, LL, L2CAP, SM, ATT, GAP, GATT)
 - Support BLE user GATT-based profile application.
- Security
 - Wi-Fi WEP, WPA, WPA2, WPS
 - Security engine: MD5, SHA-1, SHA2-256, DES, 3DES, AES
- I/O Interfaces (Total 16-pins GPIO can be configured for functions listed below)
 - SDIO 2.0 (Device mode)
 - Clock rate up to 50MHz
 - SPI (Master/Slave)
 - Master clock rate up to 20Mbps
 - Slave clock rate up to 4Mbps
 - UART
 - Max. 3 channels
 - Baud rate up to 4MHz
 - I2C
 - Clock rate up to 400kHz
 - PWM
 - Max. 8 channels

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

Operating temperature	-20°C to 70°C
Storage temperature	-40°C to 85°C

3.1.2 Recommended Operating Ratings

Test conditions: At room temperature				
Symbol	Min.	Typ.	Max.	Unit
VBAT	3.0	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		-92		dBm
	- 9Mbps		-91		dBm
	- 12Mbps		-90		dBm
	- 18Mbps		-87		dBm
	- 24Mbps		-84		dBm
	- 36Mbps		-81		dBm
	- 48Mbps		-76		dBm
	- 54Mbps		-74		dBm
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0		-92		dBm
	- MCS=1		-89		dBm
	- MCS=2		-86		dBm
	- MCS=3		-83		dBm
	- MCS=4		-80		dBm
	- MCS=5		-75		dBm
	- MCS=6		-74		dBm
	- MCS=7		-72		dBm
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0		-90		dBm
	- MCS=1		-86		dBm
	- MCS=2		-83		dBm
	- MCS=3		-80		dBm
	- MCS=4		-77		dBm
	- MCS=5		-72		dBm
	- MCS=6		-71		dBm
	- MCS=7		-69		dBm
Maximum Receive Level	802.11b		-10		dBm
	802.11g		-8		dBm
	802.11n		-8		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 @11Mbps		18.0		dBm
	802.11g @54Mbps		15.0		dBm
	802.11n @MCS7		14.0		dBm
@EVM	802.11b @11Mbps			-10	dB
	802.11g @54Mbps			-25	dB
	802.11n @MCS7			-28	dB

3.4 BLE RF Specification (RX)

Parameters	Conditions	Min.	Typ.	Max.	Unit
Frequency Range		2402		2480	MHz
RX Sensitivity (LE1M)		-100			dBm
RX Sensitivity (LE2M)		-96			dBm

3.5 BLE RF Specification (TX)

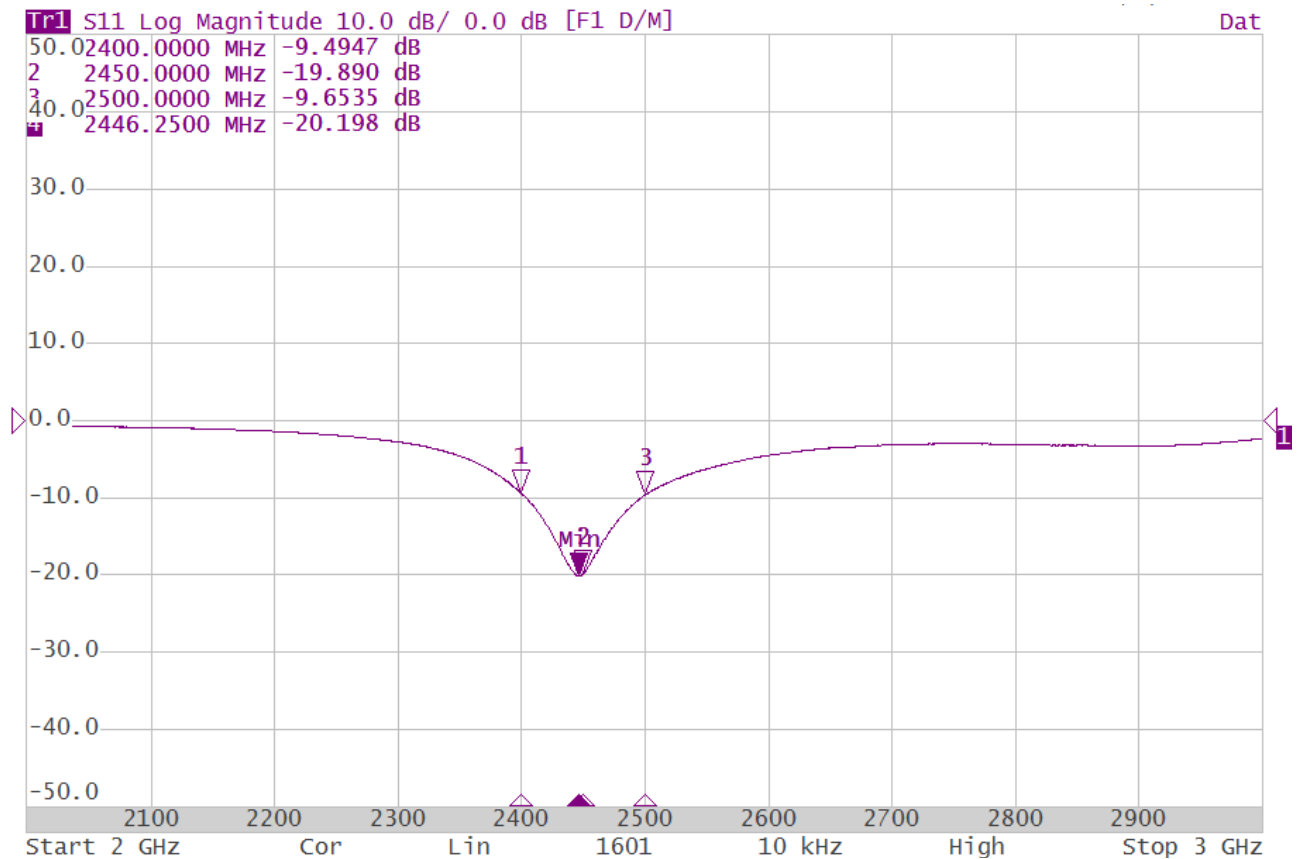
Parameters	Conditions	Min.	Typ.	Max.	Unit
Frequency Range		2402		2480	MHz
Output Power			5		dBm

3.6 Power Consumption

Parameters	Condition	Min.	Typ.	Max.	Unit
Current @SWR Mode	Deep Sleep		35		uA
	Standby		200		uA
	Sleep		410		uA
	MCU active		8.8		mA
	WLAN beacon only mode		43		mA
	WLAN associated idle (DTIM=1)		2.5		mA
	WLAN associated idle (DTIM=3)		1.2		mA

4. Embedded PCB Antenna

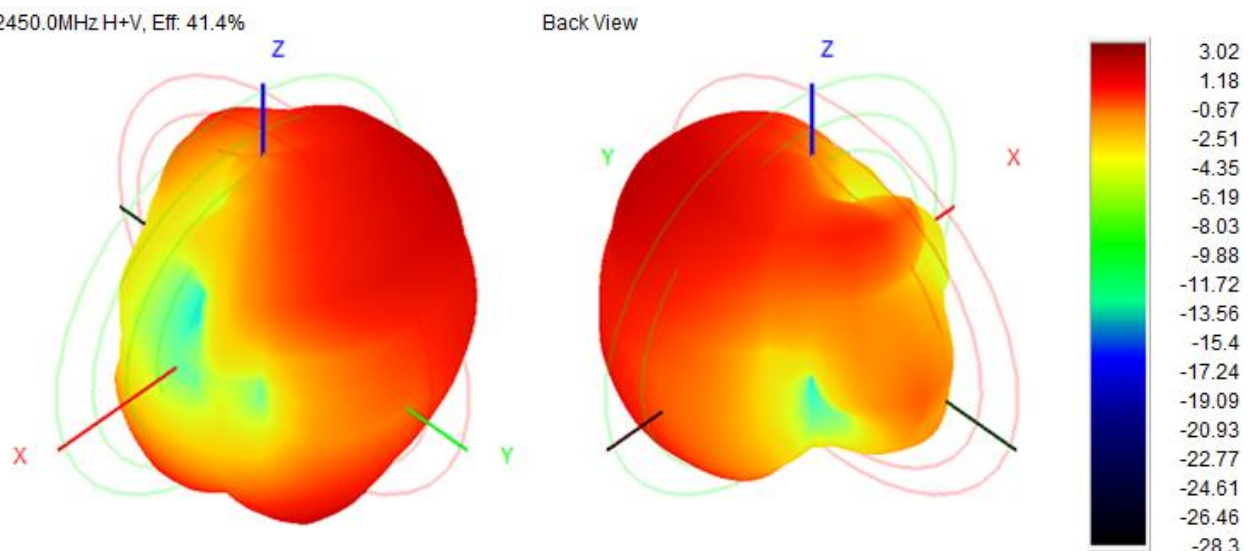
4.1 S11 Parameter

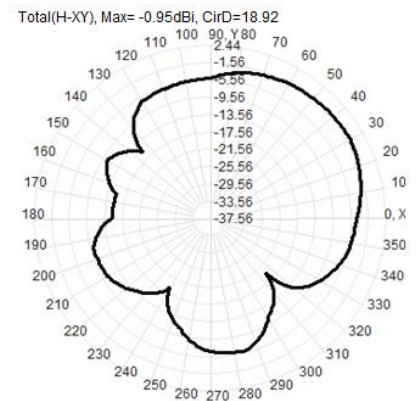
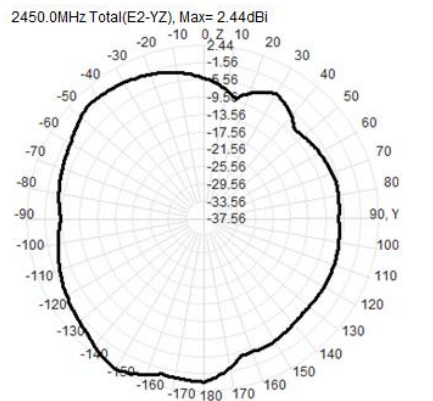
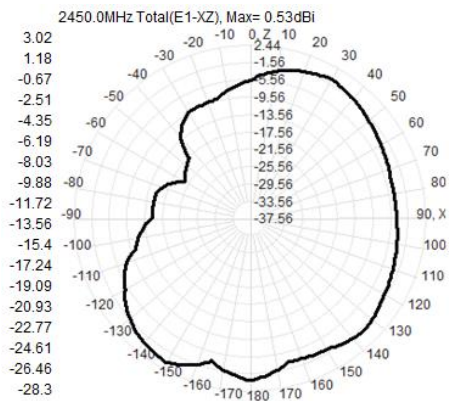


4.2 Gain Pattern

Passive Test (Free Space)

2450.0MHz H+V, Eff: 41.4%

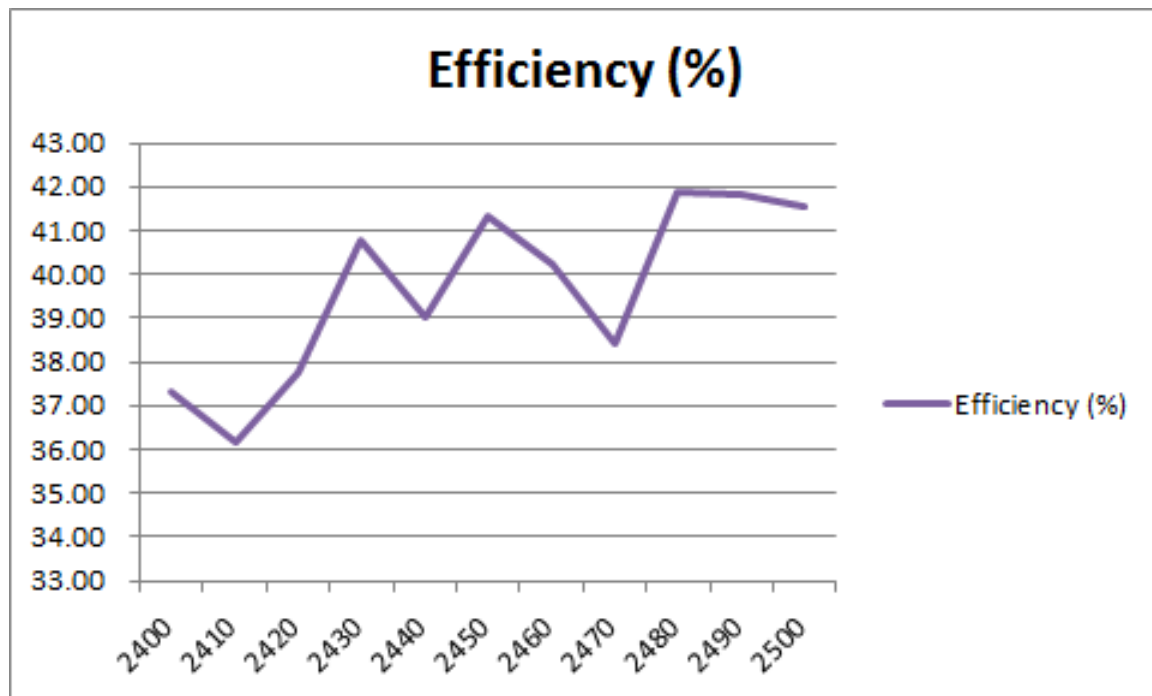




4.3 Efficiency

2400MHz~2500MHz (Average Efficiency = 40%)

Frequency ID	1	2	3	4	5	6	7	8	9	10	11
Frequency (MHz)	2400	2410	2420	2430	2440	2450	2460	2470	2480	2490	2500
Efficiency (dBi)	-4.28	-4.42	-4.23	-3.89	-4.09	-3.83	-3.96	-4.16	-3.78	-3.78	-3.81
Gain (dBi)	2.95	2.66	2.53	3.07	2.58	3.02	2.77	2.47	2.92	2.83	2.92
Efficiency (%)	37.32	36.14	37.74	40.81	39.04	41.36	40.22	38.40	41.88	41.84	41.56
Directivity (dB)	7.23	7.08	6.76	6.96	6.66	6.85	6.72	6.62	6.70	6.62	6.73

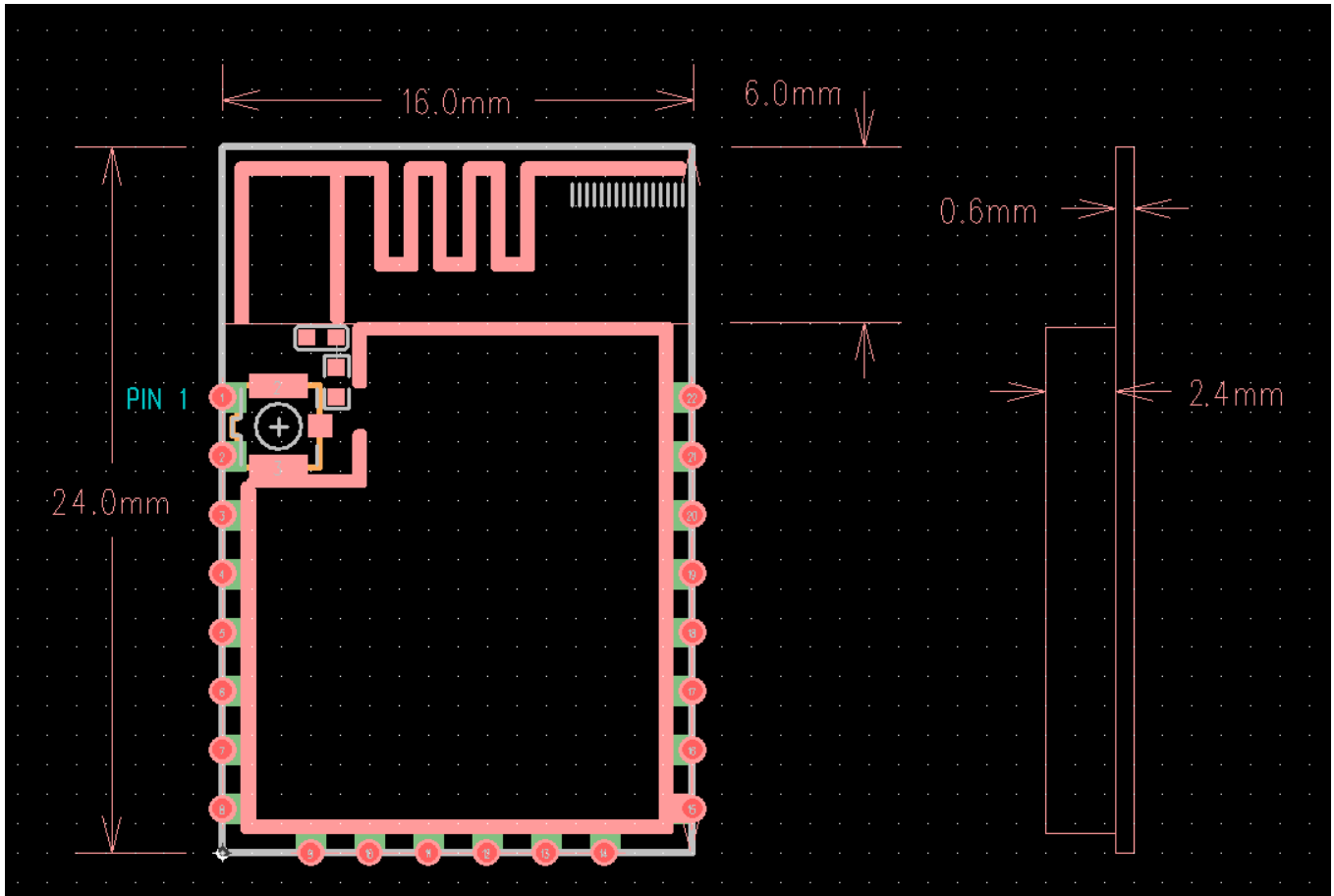


5. Pin Assignments

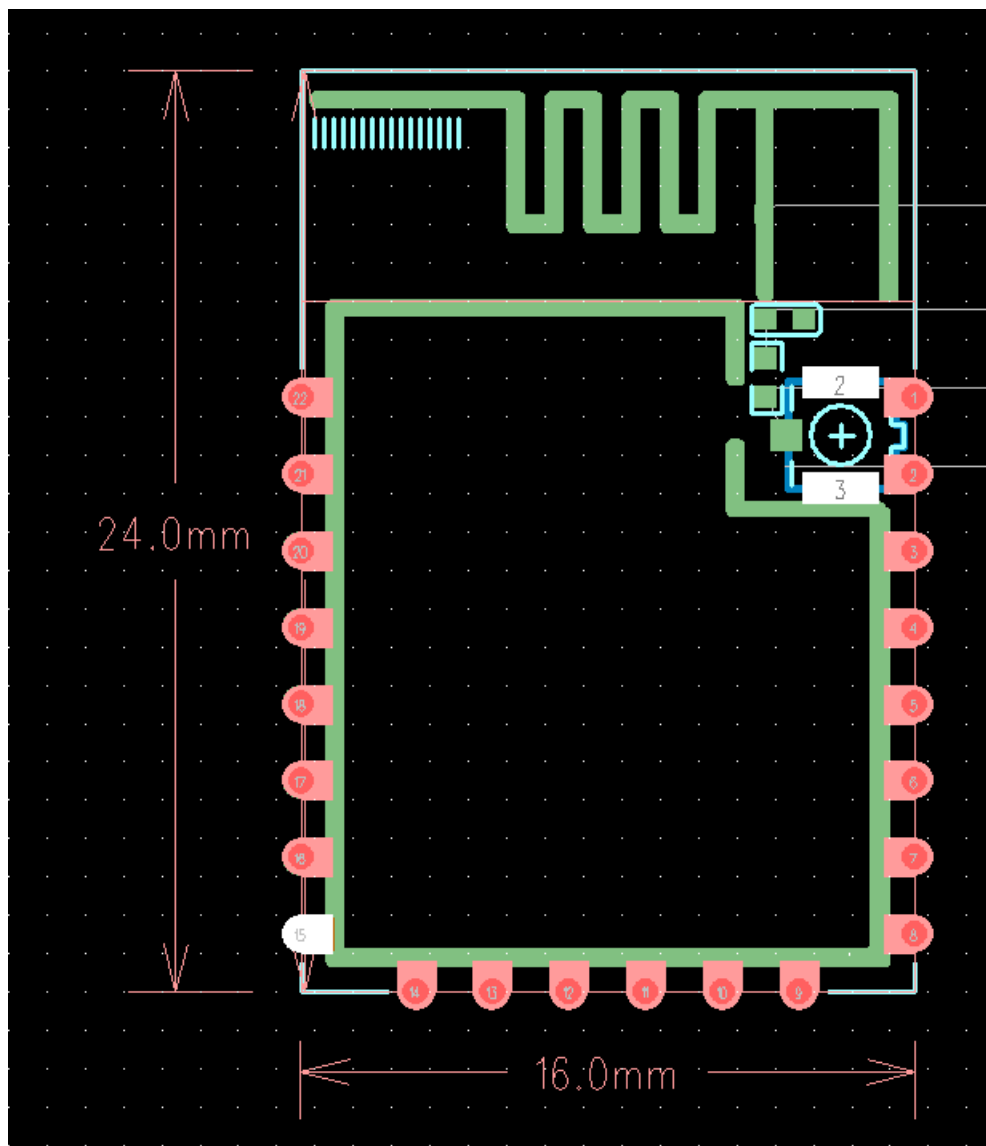
5.1 PCB Pin Outline (16.0mm x 24.0mm x 3.0mm)

< TOP VIEW >

< SIDE VIEW >



< BOTTOM VIEW >



5.2 Pin Definition

Pin	Pin-Define	Type	Description
1	GPIOA_23 / PWM7	I/O	GPIOA_23 / PWM7 Power-on trap pin: 0-SWR; 1-LDO
2	GPIOA_0 / UART1_RX / PWM0	I/O	GPIOA_0 / UART1_RX / PWM0 Power-on trap pin: 0-Normal operation; 1-Debug mode
3	CEN	I	Chip Enable (High Active)
4	GPIOA_1 / UART1_TX / PWM1	I/O	GPIOA_1 / UART1_TX / PWM1 Power-on trap pin: 0-efuse setting are loaded; 1- efuse setting are not loaded
5	GPIOA_2 / I2C_SCL / PWM2	I/O	GPIOA_2 / I2C_SCL / PWM2
6	GPIOA_3 / I2C_SDA / PWM3	I/O	GPIOA_3 / I2C_SDA / PWM3
7	GPIOA_4 / PWM4	I/O	GPIOA_4 / PWM4
8	VBAT	P	Main Power Supply Input
9	NC	I/O	Not Connected
10	NC	I/O	Not Connected
11	NC	I/O	Not Connected
12	NC	I/O	Not Connected
13	NC	I/O	Not Connected
14	GPIOA_17 / SD_CMD / PWM5	I/O	GPIOA_17 / SD_CMD / PWM5
15	GND	P	Ground
16	GPIOA_18 / SD_CLK / PWM6	I/O	GPIOA_18 / SD_CLK / PWM6
17	GPIOA_16 / UART2_TX / SPI_SCL / SD_D3	I/O	GPIOA_16 / UART2_TX / SPI_SCL / SD_D3
18	GPIOA_15 / UART2_RX / SPI_CSN / SD_D2	I/O	GPIOA_15 / UART2_RX / SPI_CSN / SD_D2
19	GPIOA_19 / SPI_MOSI / SD_D0	I/O	GPIOA_19 / SPI_MOSI / SD_D0
20	GPIOA_20 / SPI_MISO / SD_D1	I/O	GPIOA_20 / SPI_MISO / SD_D1
21	GPIOA_13 / UART0_RX	I/O	GPIOA_13 / UART0_RX (User command interface)
22	GPIOA_14 / UART0_TX	I/O	GPIOA_14 / UART0_TX (User command interface)

For normal-operation mode, GPIOA_0 should keep low when power-up/reset

For firmware-upgrade mode, GPIOA_0 and GPIOA_13 must keep high when power-up/reset

Pin Name	SPIC-Flash/SDIO	JTAG	UART	SPI/WL_LED/EXT_32K	I2C	PWM
GPIOA_0		JTAG_CLK	UART1_IN	EXT_32K		PWM[0]
GPIOA_1		JTAG_TMS	UART1_OUT	BT_LED		PWM[1]
GPIOA_2		JTAG_TDO	UART1_IN	SPI_CS _n	I2C_SCL	PWM[2]
GPIOA_3		JTAG_TDI	UART1_OUT	SPI_SCL	I2C_SDA	PWM[3]
GPIOA_4		JTAG_TRST	UART1_CTS	SPI_MOSI		PWM[4]
GPIOA_7	SPI_M_CS			SPI_CS _n		
GPIOA_8	SPI_M_CLK			SPI_SCL		
GPIOA_9	SPI_M_DATA[2]		UART0_RTS	SPI_MOSI		
GPIOA_10	SPI_M_DATA[1]		UART0_CTS	SPI_MISO		
GPIOA_11	SPI_M_DATA[0]		UART0_OUT		I2C_SCL	PWM[0]
GPIOA_12	SPI_M_DATA[3]		UART0_IN		I2C_SDA	PWM[1]
GPIOA_13			UART0_IN			PWM[7]
GPIOA_14	SDIO_INT		UART0_OUT			PWM[2]
GPIOA_15	SD_D[2]		UART2_IN	SPI_CS _n	I2C_SCL	PWM[3]
GPIOA_16	SD_D[3]		UART2_OUT	SPI_SCL	I2C_SDA	PWM[4]
GPIOA_17	SD_CMD					PWM[5]
GPIOA_18	SD_CLK					PWM[6]
GPIOA_19	SD_D[0]		UART2_CTS	SPI_MOSI	I2C_SCL	PWM[7]
GPIOA_20	SD_D[1]		UART2_RTS	SPI_MISO	I2C_SDA	PWM[0]
GPIOA_23				LED_0		PWM[7]

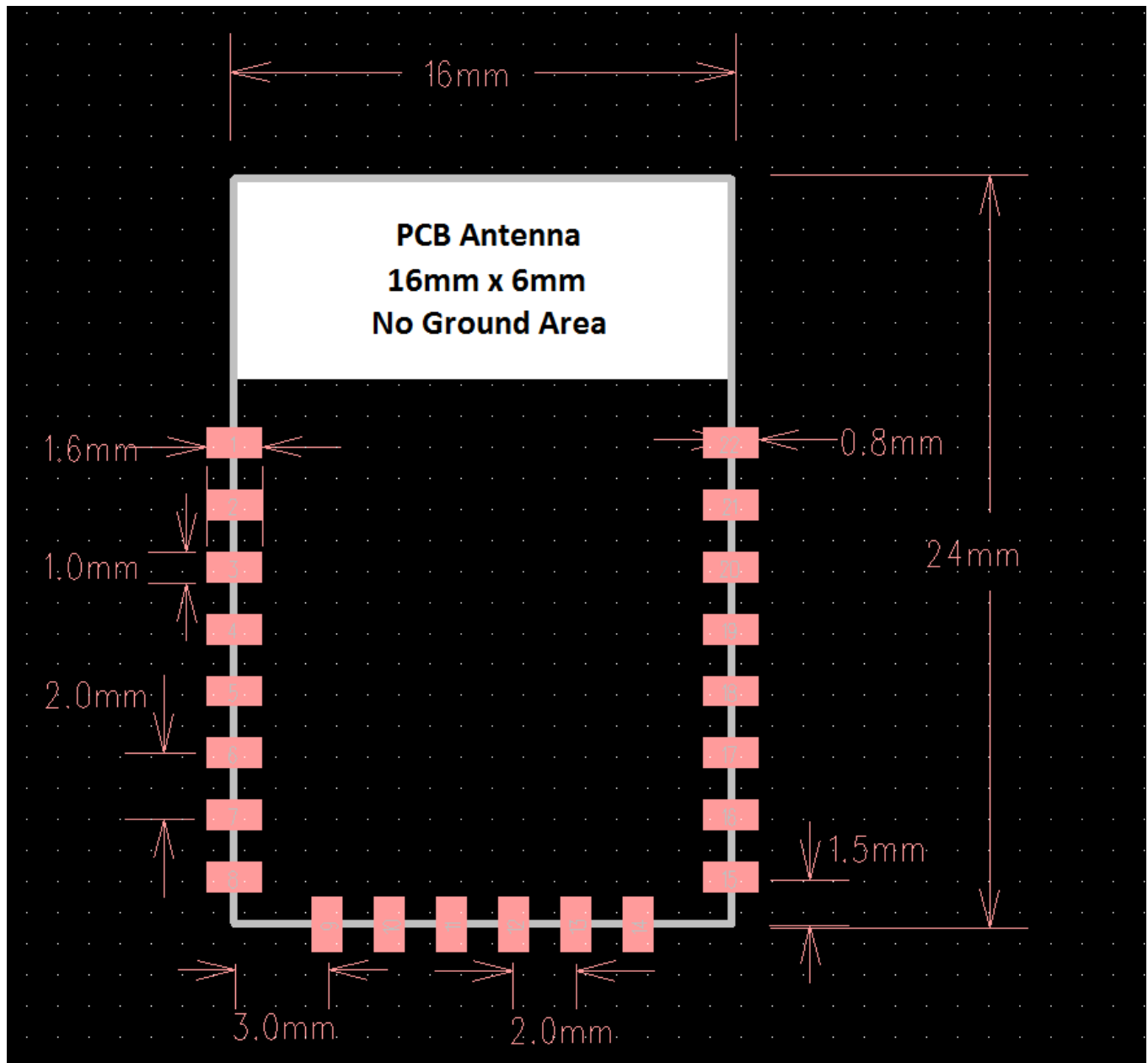
Pin Function Table

6. Dimensions

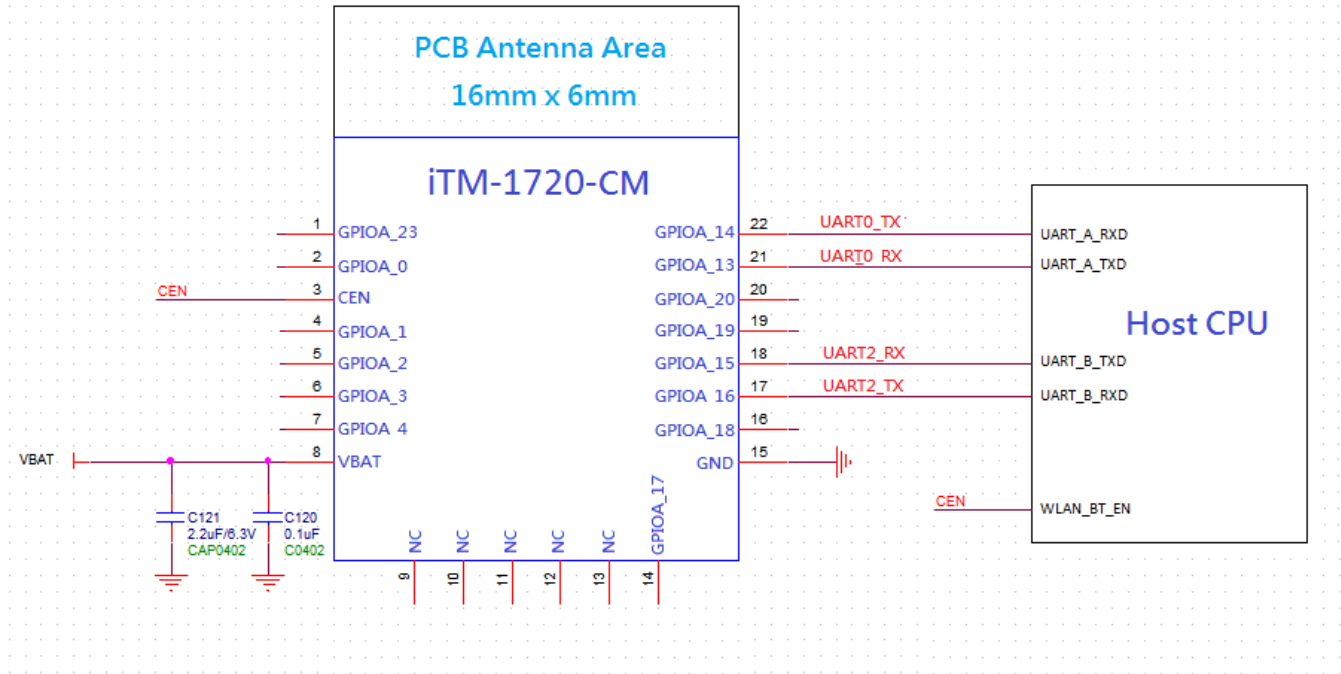
6.1 Layout Recommendation

(Unit: mm)

< TOP VIEW >



7. Reference Design

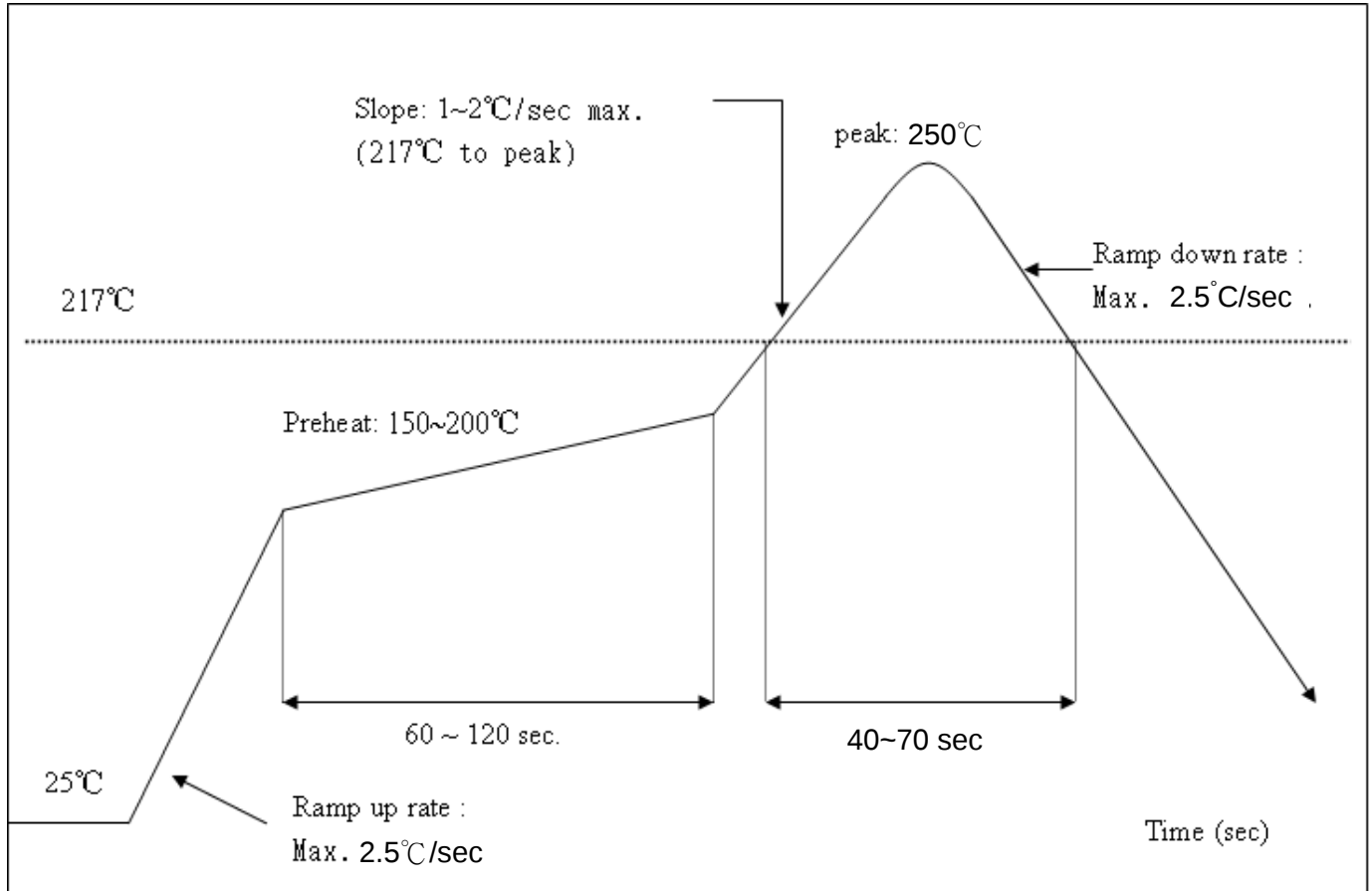


8. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

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

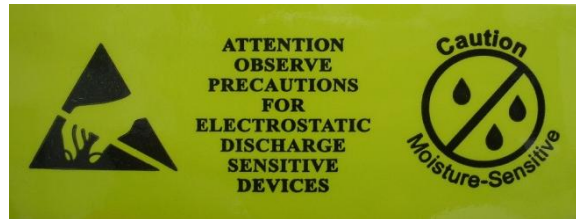
Number of Times : ≤ 2 times



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 If 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 If blank, see adjacent bar code label ≤30°C/60% 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 ± 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: _____ If blank, see adjacent bar code label Note: Level and body temperature defined by IPC/JEDEC J-STD-020	

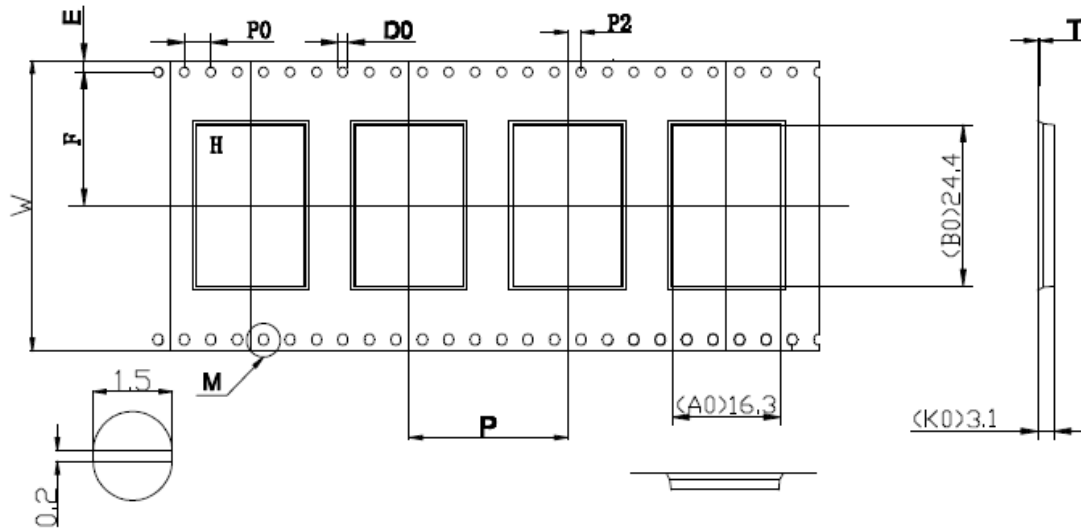
Label C → Inner box label .

PKG S/N :	
Model:	
P/N :	
Qty :	
Date Code	
Lot Code :	

Label D → Carton box label .

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

9.2 Dimension



Symbol	AO	BO	KO	PO	P	P2
Spec	16.3±0.10	24.4±0.10	3.10±0.10	4.00±0.10	32.0±0.10	2.00±0.10
Symbol	W	T	E	F	DO	
Spec	44.0±0.30	0.30±0.05	1.75±0.10	20.2±0.10	1.50±0.10	

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 : 900 pcs.

