

TX-M2430

Zigbee + BLE4.2 Combo Module

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Revision History

Revision	Data	Description
0.1	2017.03.28	Initial release Zigbee + BLE4.2 Combo Module
0.2	2017-06-22	7. RF Specification update 10. Reference Peripheral Circuit Update 11. Antenna Design Guide Update 12. SMT Temperature Sequence (Pb-free) Update 13. Packing Information

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1. Scope

It's compatible with Bluetooth standard supporting BLE specification up to version 4.2. It allows easy connectivity with Bluetooth Smart Ready mobile phones, tablets, and laptops, which support BLE slave and master mode operation, including broadcast, encryption, connection updates, and channel map updates.

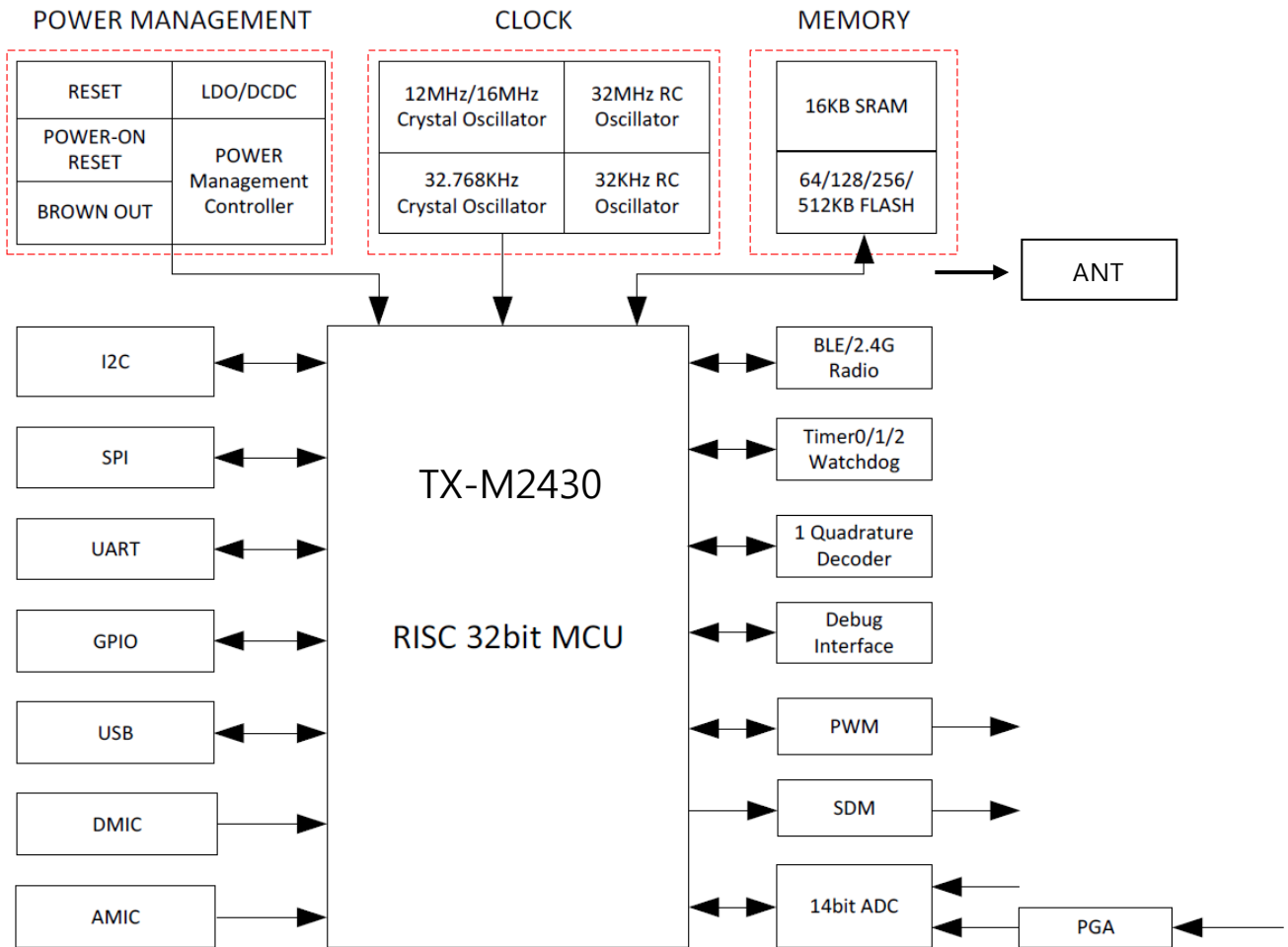
Application :

- **Smartphone and tablet accessories**
- **Remote control and 3D glasses**
- **Sports and fitness tracking**
- **Wearable devices**

2. Features

- Embedded 32-bit high performance MCU with clock up to 48MHz.
- Program memory: internal 512KB Flash
- Data memory: 16KB on-chip SRAM.
- 12MHz/16MHz & 32.768KHz Crystal and 32KHz/32MHz embedded RC oscillator.
- Up to 21 GPIOs depending on package option;
- DMIC(Digital Mic)
- AMIC (Analog Mic);
- Mono-channel Audio output;
- UART with hardware flow control;
- SPI/ I2C/ USB/ Debug Interface
- Up to 6 channels of PWM, 2-channel IR.
- Sensor: 14bit ADC with PGA / Temperature sensor.
- One quadrature decoder.
- Embedded hardware AES.
- Supports Apple Home Kit without external DSP.

3. Block Diagram



4. Product Information

4.1 Mechanical Information

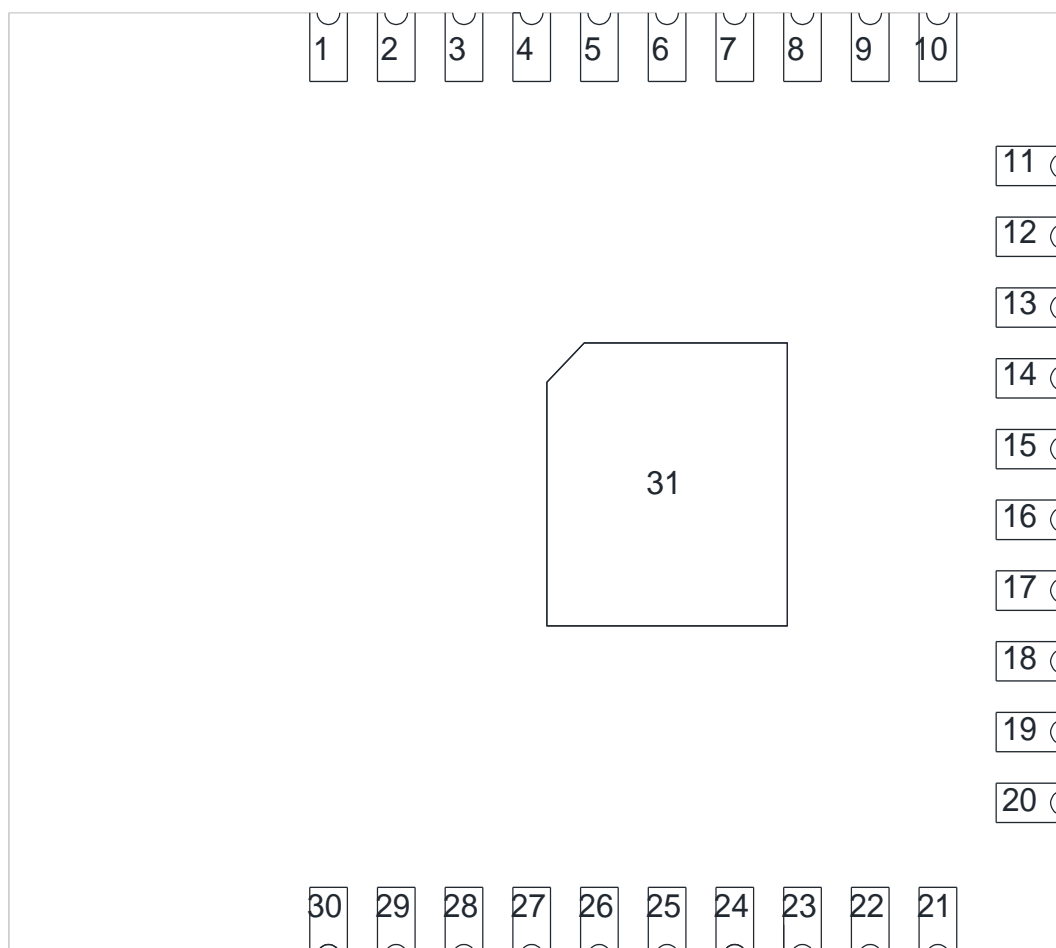
- Length	14	mm
- Width	12	mm
- Height	1.9	mm
- Weight	0.47	g

4.2 Temperature Information

- Operating temperature	-30°C ~ +85°C
- Storage temperature	-40°C ~ +125°C

5. Pin Description

[Top View]



Pin	Name	Type	Description
1	GND	-	Ground
2	PWM1/SDM_N/ANA_E1	I/O	PWM1 output/GPIO /SDM Negative output /ANA_E<1>
3	PWM0/SDM_P/ANA_E0	I/O	PWM0 output/GPIO /SDM Positive output/ANA_E<0>
4	RESETB	I	Power on reset, active low
5	GP5/ANA_D3	I/O	GPIO5/ANA_D<3>
6	GP4/ANA_D2	I/O	GPIO4/ANA_D<2>
7	UART_CTS/PWM5/ANA_C5	I/O	UART_CTS/PWM5 output/ GPIO /ANA_C<5>
8	UART_RTS/PWM4/ANA_C4	I/O	UAR_RTS/PWM4 output/GPIO /ANA_C<4>
9	UART_RX/PWM3/ANA_C3	I/O	UART_RX/PWM3 output/ GPIO /ANA_C<3>/(optional) 32KHz crystal input
10	UART_TX/PWM2/ANA_C2	I/O	UART_TX/PWM2 output/ GPIO/GPIO/GPIO/GPIO/ ANA_C<2>/(optional) 32KHz crystal output
11	CK/PWM5_N/ANA_B7	I/O	SPI clock/PWM5 inverting output/GPIO/ ANA_B<7>/I2C_SCK(I2C serial clock)
12	DI/PWM5/ANA_B6	I/O	SPI data input/PWM5 output/GPIO/ANA_B<6>/ I2C_SDA(I2C serial data)
13	DO/PWM4_N/ANA_B5	I/O	SPI data output/PWM4 inverting/Output/GPIO/ANA_B<5>
14	CN/PWM4/ANA_B4	I/O	SPI chip select(Active low)/PWM4 Output/GPIO/ANA_B<4>
15	PMW2_N/ANA_B1	I/O	PWM2 inverting output /GPIO/ANA_B<1>
16	PWM2/SWS/ANA_B0	I/O	PWM2 output/Single wire slave/GPIO/ANA_B<0>
17	UART_RX/SWM/ANA_A7	I/O	UART_RX/Single Wire Master/GPIO/ANA_A<7>
18	GND	-	Ground
19	VDD_3V3	I	Power supply voltage : 3.3V
20	GND	-	Ground
21	CK/PWM1_N/ANA_A4	I/O	SPI clock/PWM1 inverting output/GPIO/ ANA_A<4>/I2C_SCK (I2C serial clock)
22	DI/PWM1/ANA_A3	I/O	SPI data input/PWM1 output/GPIO/ ANA_A<3>/I2C_SDA (I2C serial data)
23	DMIC_CLK/ANA_A1	I/O	DMIC clock/GPIO/ANA_A<1>
24	DMIC_DI/PWM0/ANA_A0	I/O	DMIC data input/PWM0/GPIO/ANA_A<0>
25	DP/ANA_E3	I/O	USB data positive/GPIO/ANA_E<3>
26	DM/ANA_E2	I/O	USB data Minus/GPIO/ANA_E<2>
27	GND	-	Ground
28	RF	I/O	RF In/Out port
29	ANT	I/O	Internal Antenna port
30	GND	-	Ground
31	GND	-	Ground

6. Electrical Specification

6.1 Absolute Maximum Rating

Symbol	Min	Max	Unit
Supply Voltage	-0.3	3.9	V
Voltage on input Pin	-0.3	VDD+0.3	V
Output Voltage	0	VDD	V
Storage temperature Range	-65	150	°C

CAUTION: Stresses above those listed in “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

6.2 Recommended Operating condition

	Min	Typ	Max	unit	Condition
Power Supply Voltage	1.9	3.3	3.6	V	
Operating Temperature Range	-40	-	85	°C	ET Versions
	-40	-	125	°C	AT Versions

6.3 Current Consumption

	Min	Typ	Max	unit	Condition
Tx	-	15	-	mA	Continuous Tx transmission, 0dBm out power
Rx	-	12	-	mA	Continuous Rx reception
Suspend Current	-	10	50	uA	IO wake up
	-	12	52	uA	Timer wakeup
Deep sleep current	-	2	5	uA	

6.4 AC characteristics

6.4.1 Digital inputs/outputs

Symbol	Min	Typ	Max	unit	Condition
Input high voltage	0.7VDD	-	VDD	V	
Input low voltage	VSS	-	0.3VDD	V	
Output high voltage	VDD-0.3	-	VDD	V	
Output low voltage	VSS	-	0.3	V	

6.4.2 USB Characteristics

Symbol	Min	Typ	Max	unit	Condition
USB Output Signal Cross-over Voltage	1.3	-	2.0	V	

7. RF Specification

Nomal Condition : 25deg.C, VBAT=3.3V, VDDIO=3.3V

Bluetooth LE(Low Energy)	Min	Typ	Max	Unit
Output Power	-20	0	10	dBm
Modulation Characteristics				
Delta f1avg	225	-	275	KHz
Delta f2max (at 99.9%)	99	-	-	%
Delta f2avg / Delta f1avg	0.8	-	-	%
Carrier Frequency Offset and Drift				
Frequency Offset	-	-	150	KHz
Frequency Drift	-	-	50	KHz
Drift Rate	-	-	20	KHz
Receiver Sensitivity(PER<30.8%)	-70	-	-	dBm
Maximum Input Signal Level(PER<30.8%)	-10	-	-	dBm
PER Report Integrity (-30dBm Input)	50	-	65.4	%

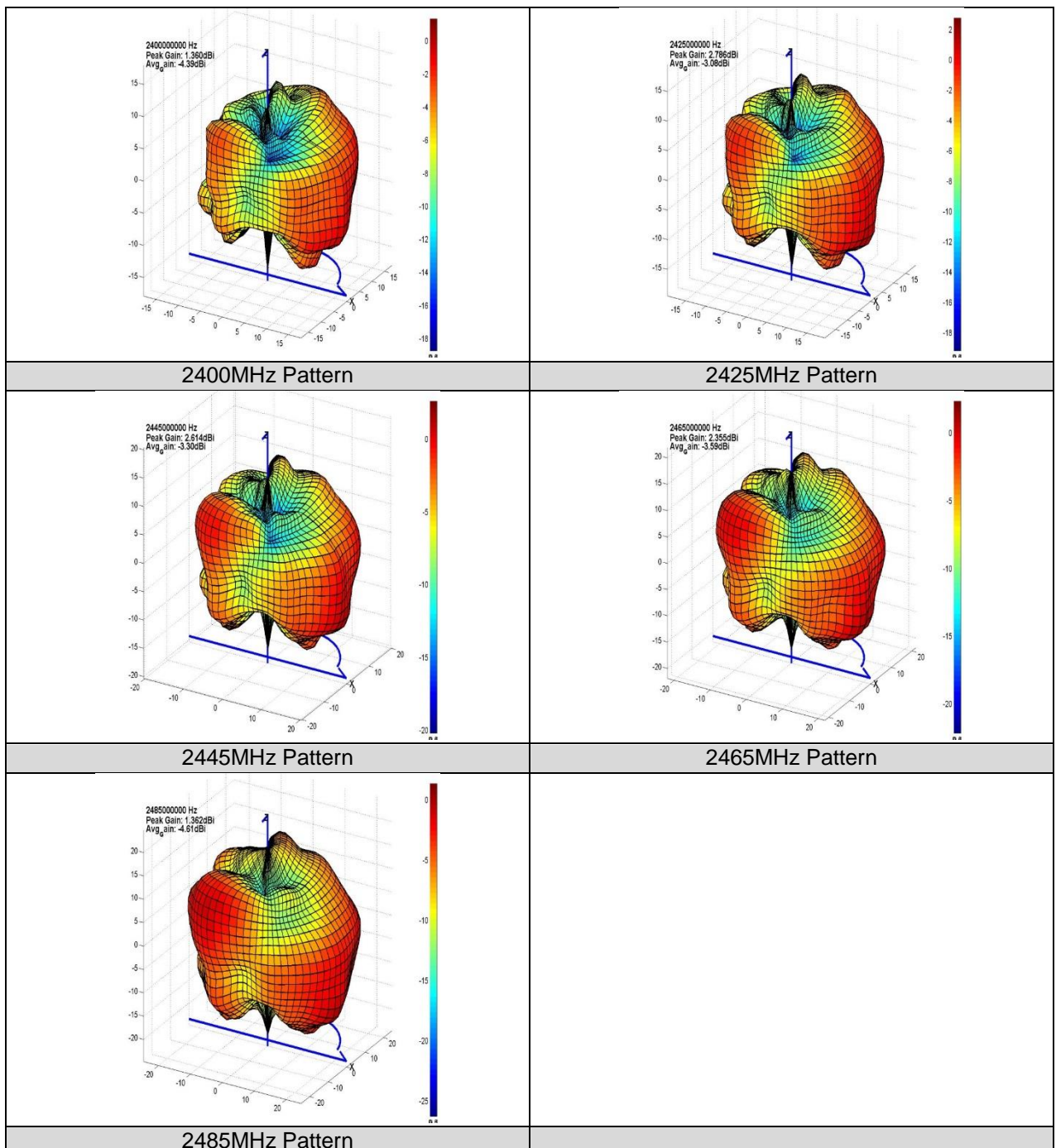
Zigbee	Min	Typ	Max	Unit
Frequency Range	2394		2507	MHz
Channel Bandwidth	-	5	-	MHz
Received RF Bandwidth	-	2	-	MHz
Output Power	-3	3	6	dBm
EVM ALL	-	-	35	%
Phase Error	-	6.5	-	Deg
Lo Leakage	-	-50	-	dB
Frequency Error	-96	-	96	KHz
Receiver Sensitivity(PER<1%, Packet length of 22byte)@250kbps	-85	-	-	dBm

8. Internal Pattern Antenna Specification

8.1 Antenna Gain

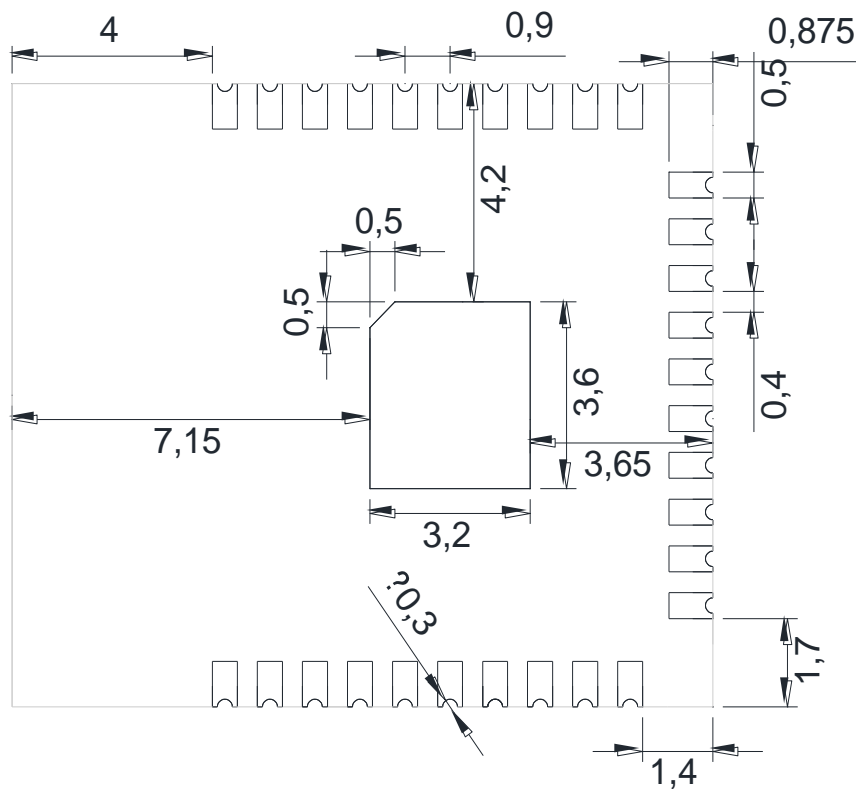
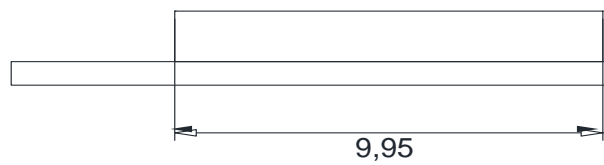
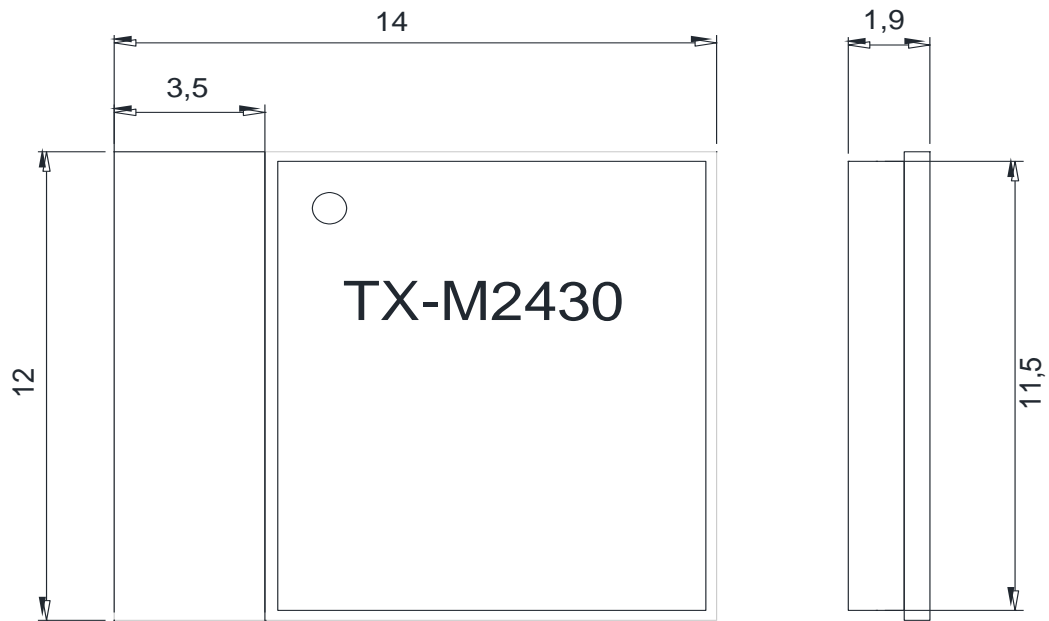
Frequency	Efficiency	Average Gain	Max Gain	Max Position
2400MHz	36.4 %	-4.4 dBi	1.4 dBi	Theta105/Pie60
2425MHz	49.1 %	-3.1 dBi	2.8 dBi	Theta105/Pie60
2445MHz	46.7 %	-3.3 dBi	2.6 dBi	Theta105/Pie60
2465MHz	43.7 %	-3.6 dBi	2.4 dBi	Theta105/Pie60
2485MHz	34.5 %	-4.6 dBi	1.4 dBi	Theta105/Pie240

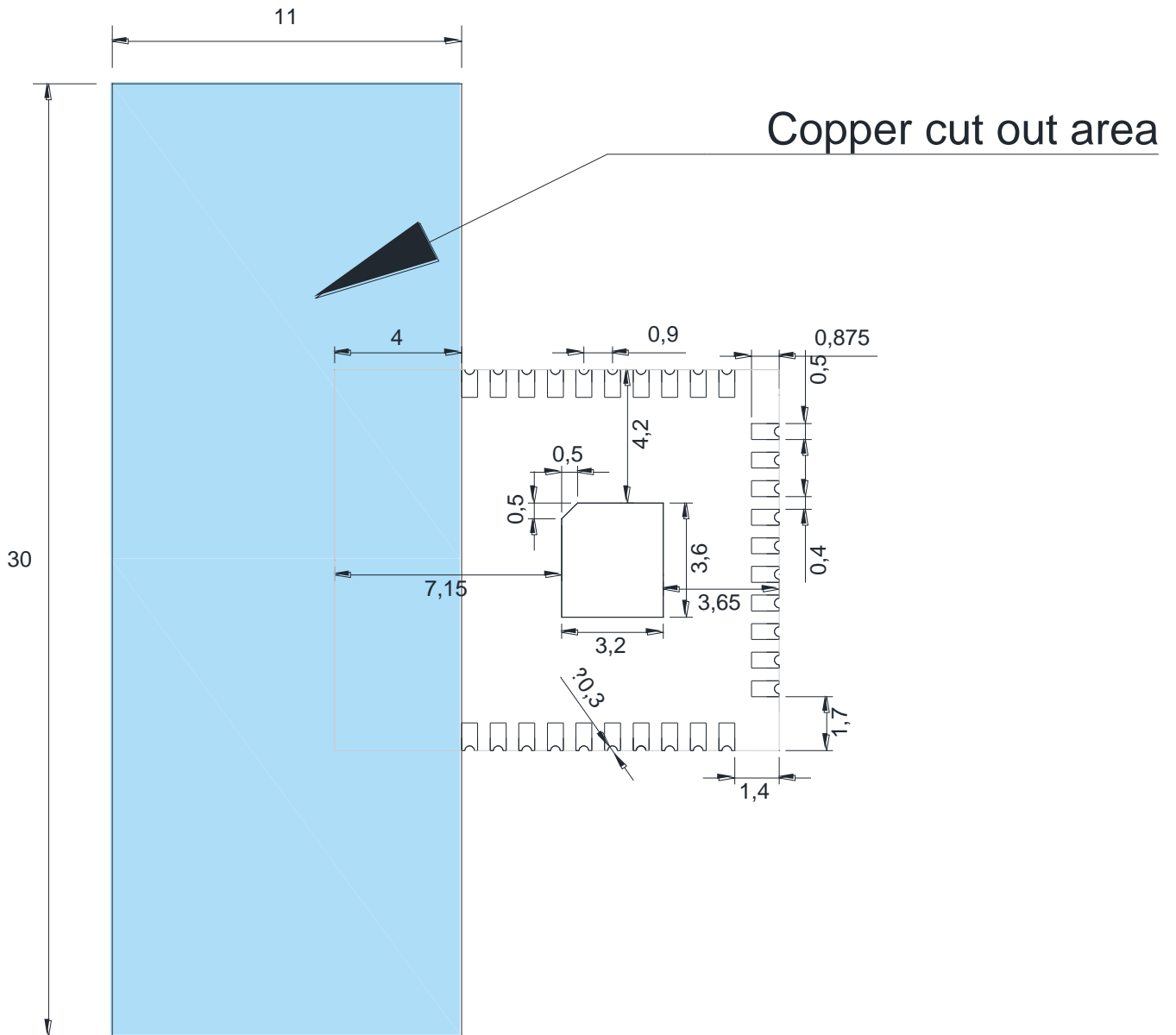
8.2 Antenna 3D Radiation Pattern



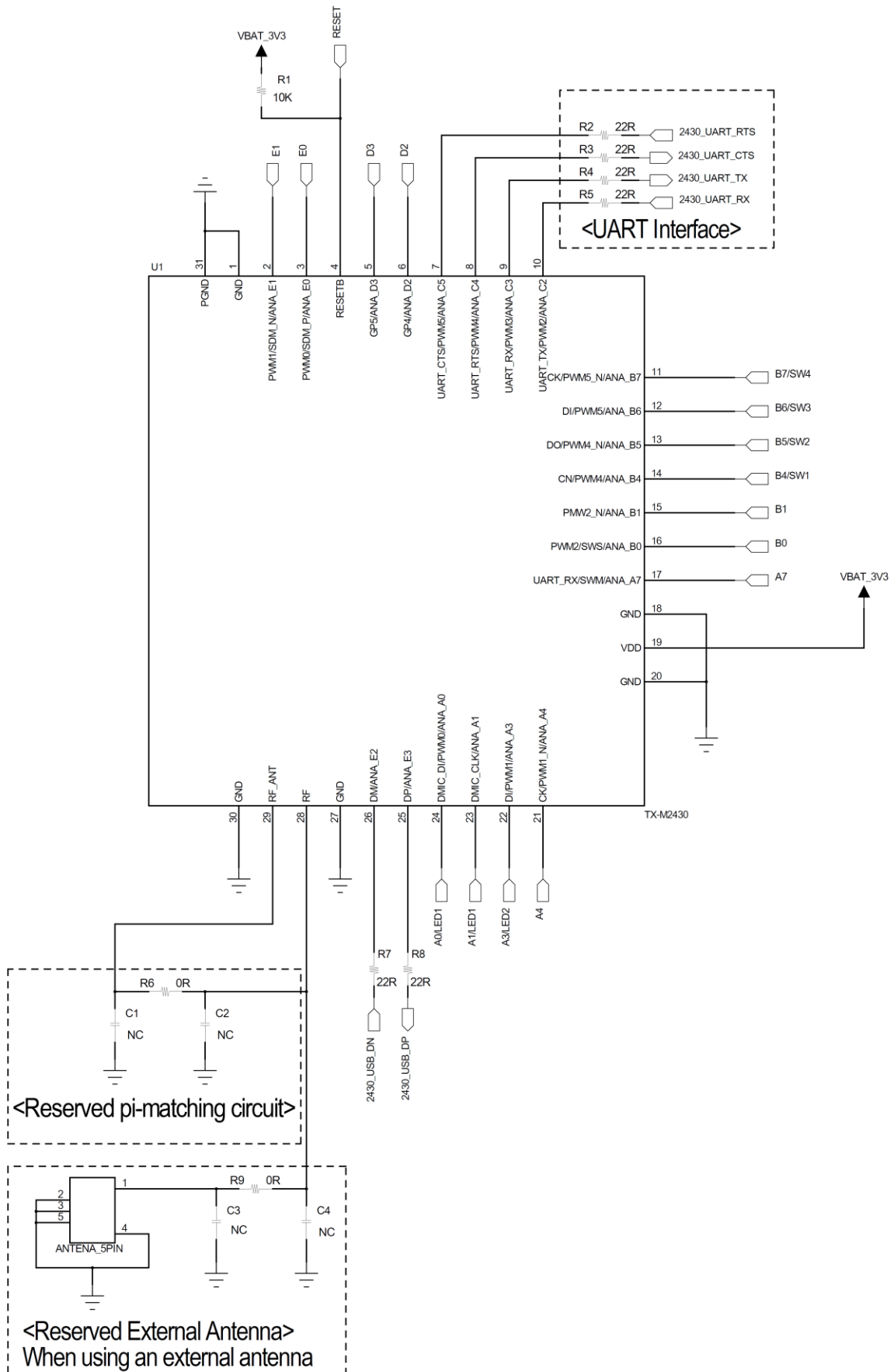
9. Mechanical Information

[Top View]



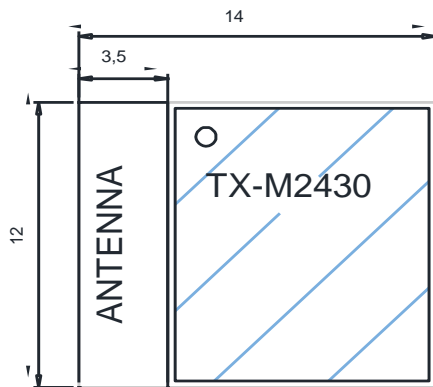


10. Reference Peripheral Circuit

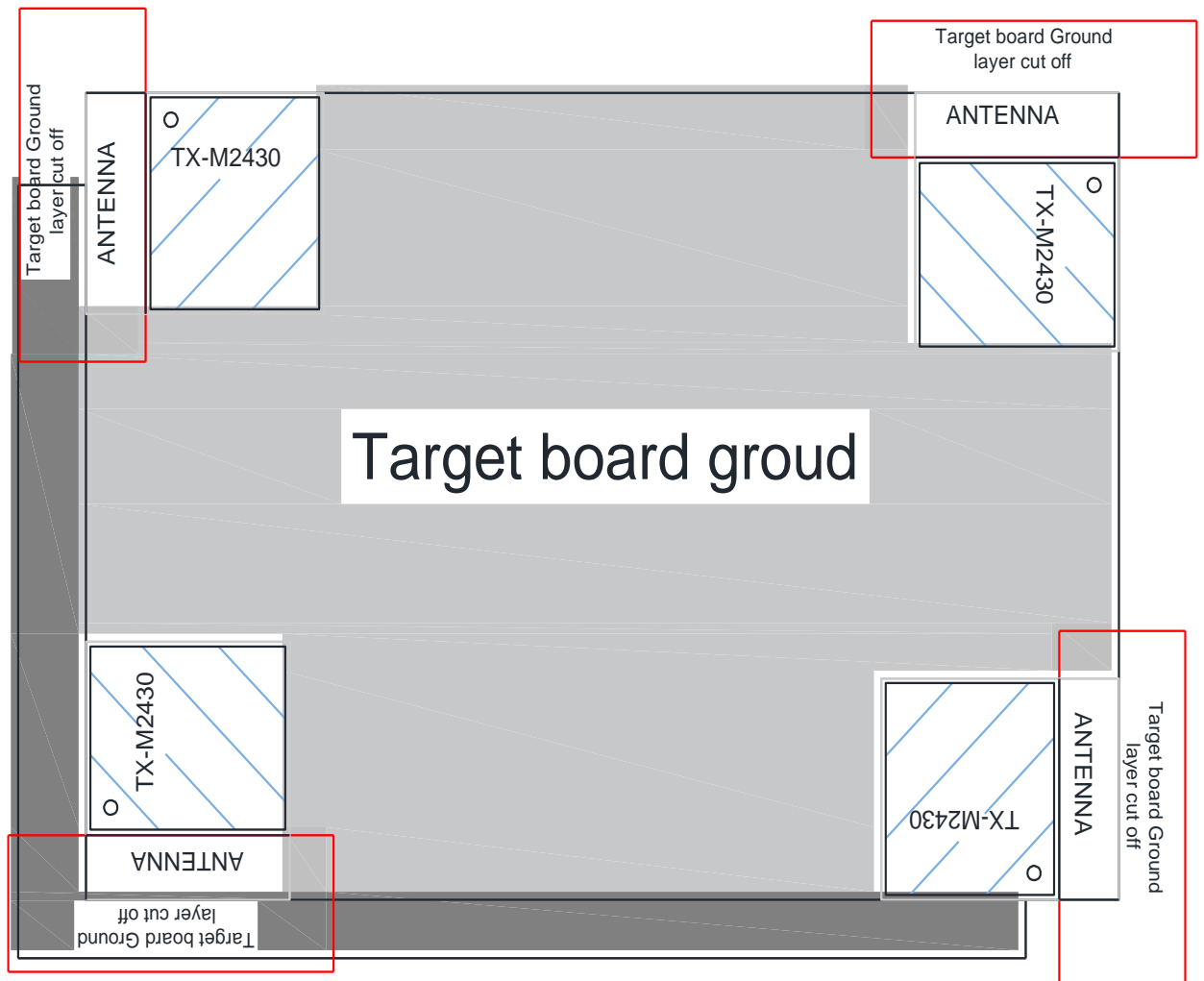


11. Antenna Design Guide

11. 1 Antenna Field in Module

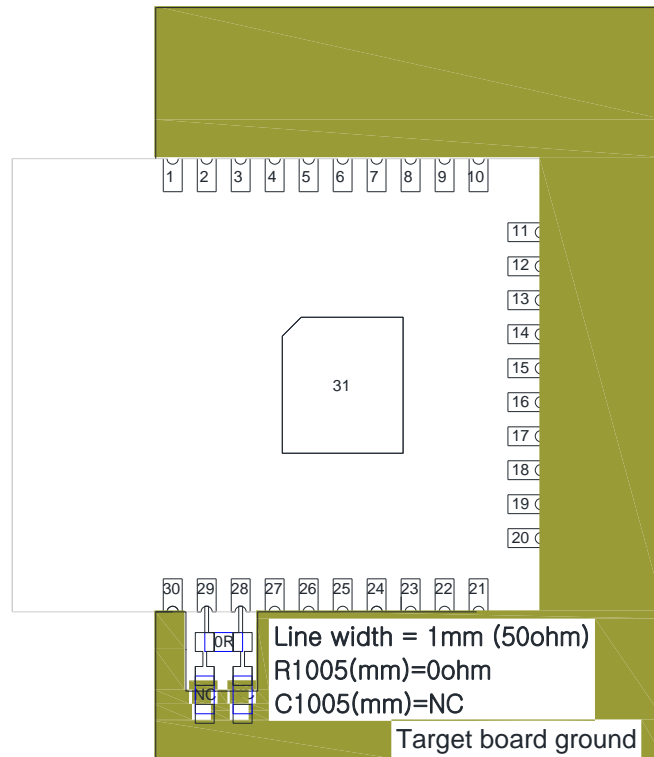


11. 2 Module position on Target board



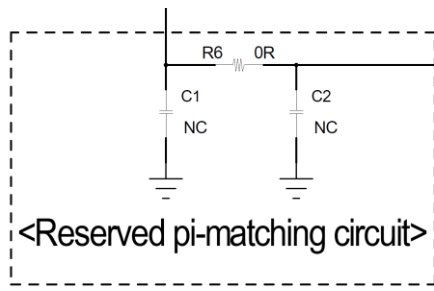
11. 3. In case of using the Internal antenna use

- Connect 28 pin(RF) and 29 pin(ANT) as show in figure.



※ TX-M2430 has Optimal antenna inside the module.

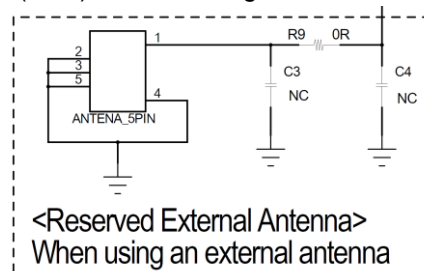
- Place the resistor as close to module as possible to keep a minimum trace distance.
- The default resistor value is 0 ohms. This value would be changed after measuring antenna matching
- Reserved pi-matching can be used to improve the antenna performance in case of connected the target board.



※ See Reference Peripheral Circuit

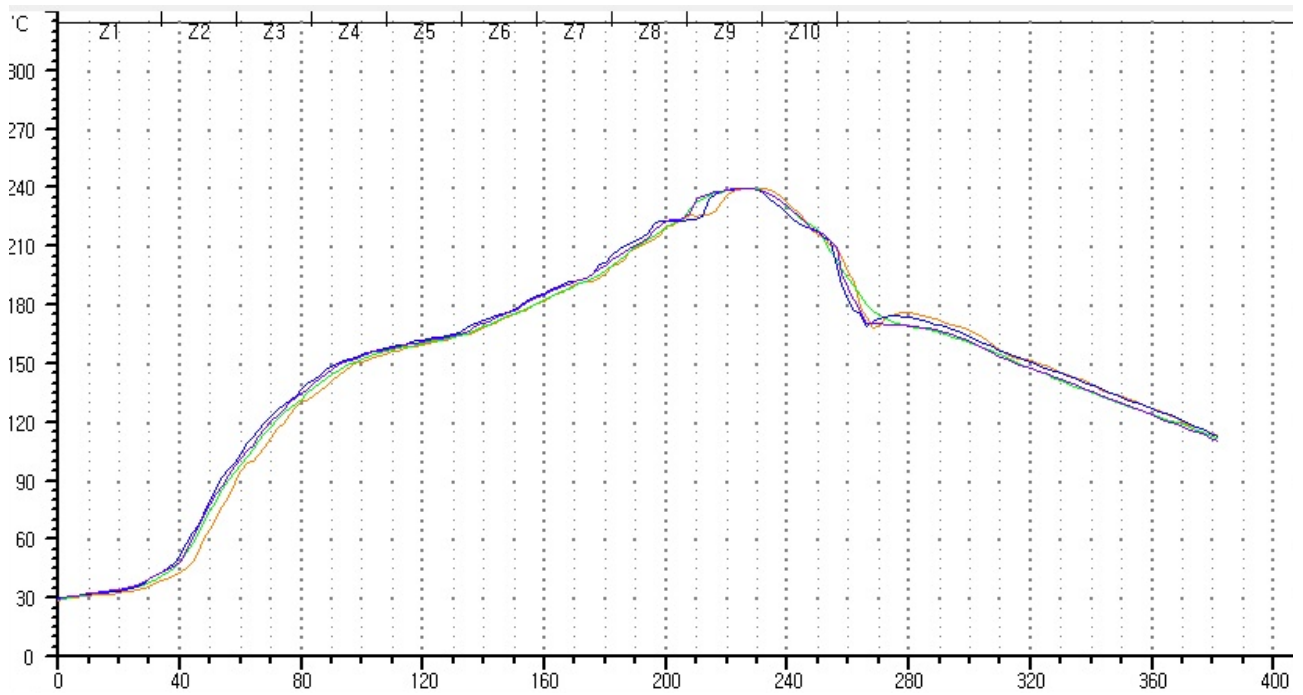
11. 4. In case of using the Internal antenna use

- Connect 28 pin(RF) and 29 pin(ANT) as show in figure.



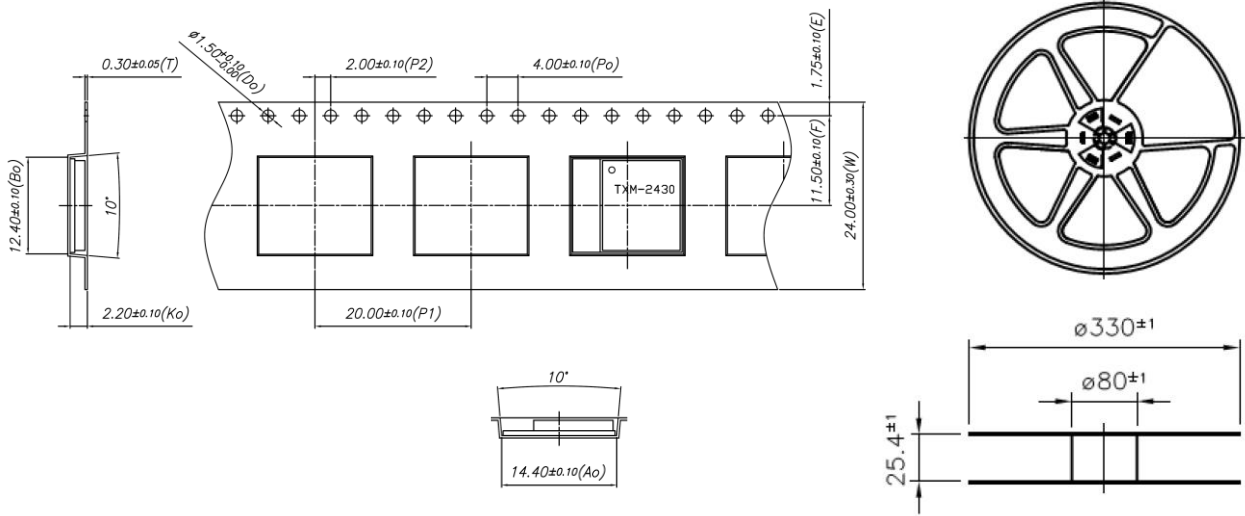
※ See Reference Peripheral Circuit

12. SMT Temperature Sequence (Pb-free)

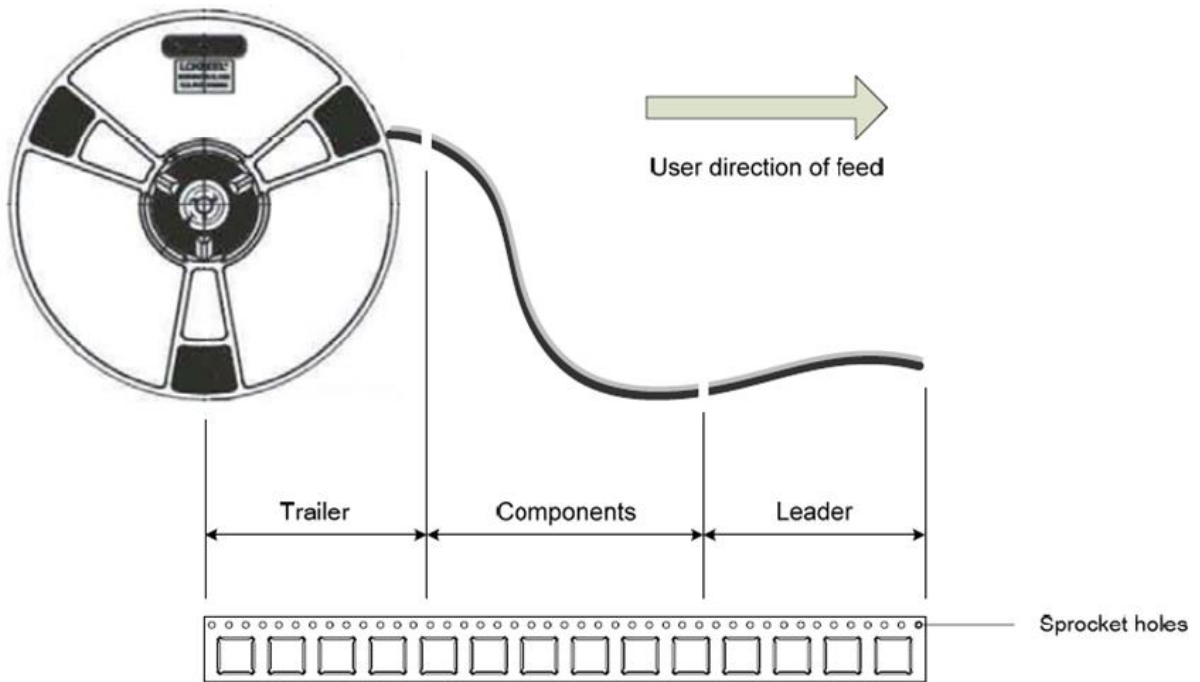


13. Packing Information

13.1 Carrier Tape and Reel Information



13.2 Leader and Trailer length



Leader (Empty carrier tape)	Components	Trailer (Empty carrier tape)	Reel / Hub size (mm)
Min. 500mm	1,400 pcs / Reel	Min. 500mm	330 / 25.4