TX-M2430 Datasheet

Zigbee + BLE5.0 Combo Module

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Revision History

Revision	Date	Description
0.1	2017.03.28	Initial release
1.0	2022.04.07	Renewal
1.1	2022.12.16	Add Module Internal PCB Antenna Specification SMT Temperature Sequence Packing Information

Table of Contents

1. Scope

The TX-M2430 is Bluetooth LE + IEEE802.15.4 multi-standard wireless solution with internal Flash and audio support, which combines the features and functions needed for all 2.4GHz IoT standards into a module. The TX-M2430 combines the radio frequency (RF), digital processing, protocols stack software and profiles for multiple standards into a module. The module supports standards and industrial alliance specifications including Bluetooth Low Energy (up to Bluetooth 5), BLE Mesh, 6LoWPAN, Zigbee, RF4CE, HomeKit and 2.4GHz proprietary standard.

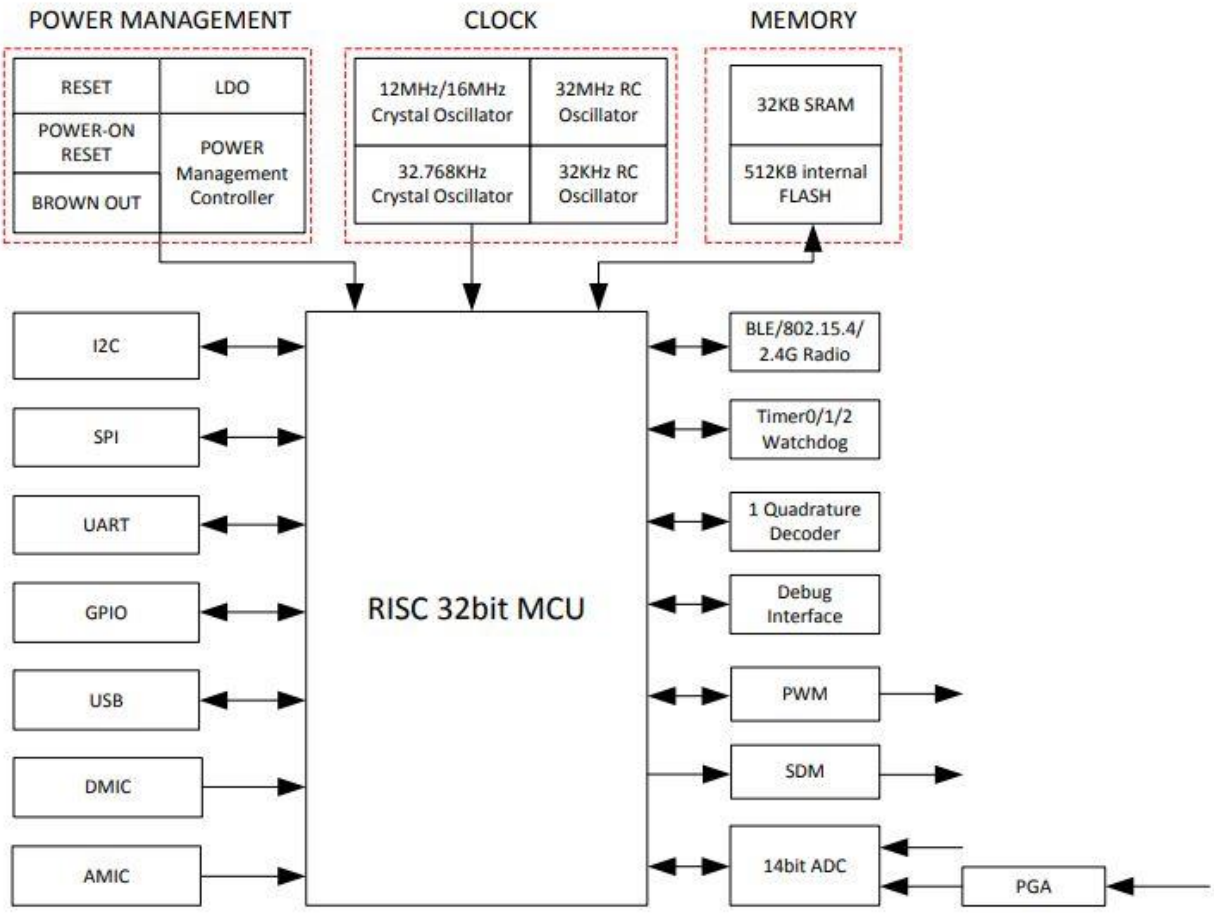
Application :

- Smartphone and tablet accessories
- RF Remote control
- Sports and fitness tracking
- Wearable devices
- Wireless toys
- Health Care

2. Features

- Embedded32-bit high performance MCU with clock up to 48MHz.
- Program memory: internal 512KB Flash
- Data memory: 32KB on-chip SRAM.
- 12MHz/16MHz & 32.768KHz Crystal and 32KHz/32MHz embedded RC oscillator.
- +7dBm TX power.
- RX sensitivity: -92 dBm @ BLE 1 Mbps, -97 dBm @ IEEE 802.15.4 250 kbps mode
- Up to 21 GPIOs depending on package option
- DMIC (Digital Mic).
- AMIC (Analog Mic)
- Mono audio output.
- UART with hardware flow control
- SPI/ I2C/ USB/ Debug Interface.
- Up to 6 channels of PWM, 2-channel IR.
- Sensor: 14-bit SAR ADC with PGA / Temperature sensor.
- One quadrature decoder.
- Embedded hardware AES.

3. Block Diagram

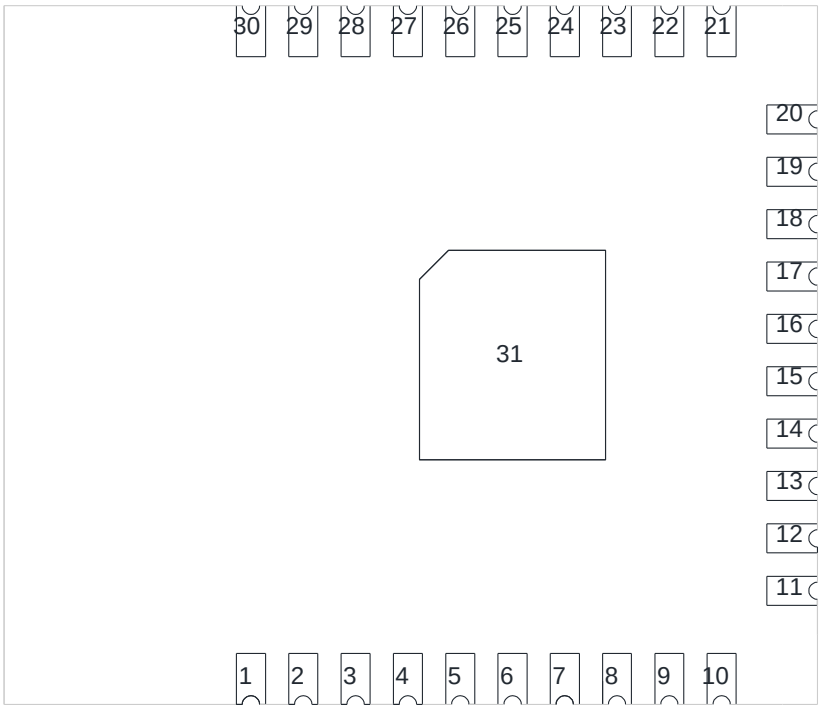


4. Product Information

4.1 Temperature Information

- Operating temperature	-40℃ ~ +85℃
- Storage temperature	-40℃ ~ +125℃

5. Pin Description



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

6. Electrical Specification

6.1 Absolute Maximum Rating

Item	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	℃

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

Item	Min	Typ	Max	unit	Condition
Power Supply Voltage	1.9	3.3	3.6	V	
Supply rise time (from 1.6V to 2.8V)			0.5	ms	
Operating temperature range	-40		85	℃	ET versions
	-40		125	℃	AT versions

6.3 Current Consumption

Item	Min	Typ	Max	unit	Condition
Tx Current	-	15	-	mA	Continuous Tx transmission, 0dBm out power
Rx Current	-	12	-	mA	Continuous Rx reception
Suspend Current	-	10	-	uA	IO wake up
	-	12	-	uA	Timer wakeup
Deep sleep current	-	1.7	-	uA	

6.4 AC characteristics

6.4.1 Digital inputs/outputs

Item	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

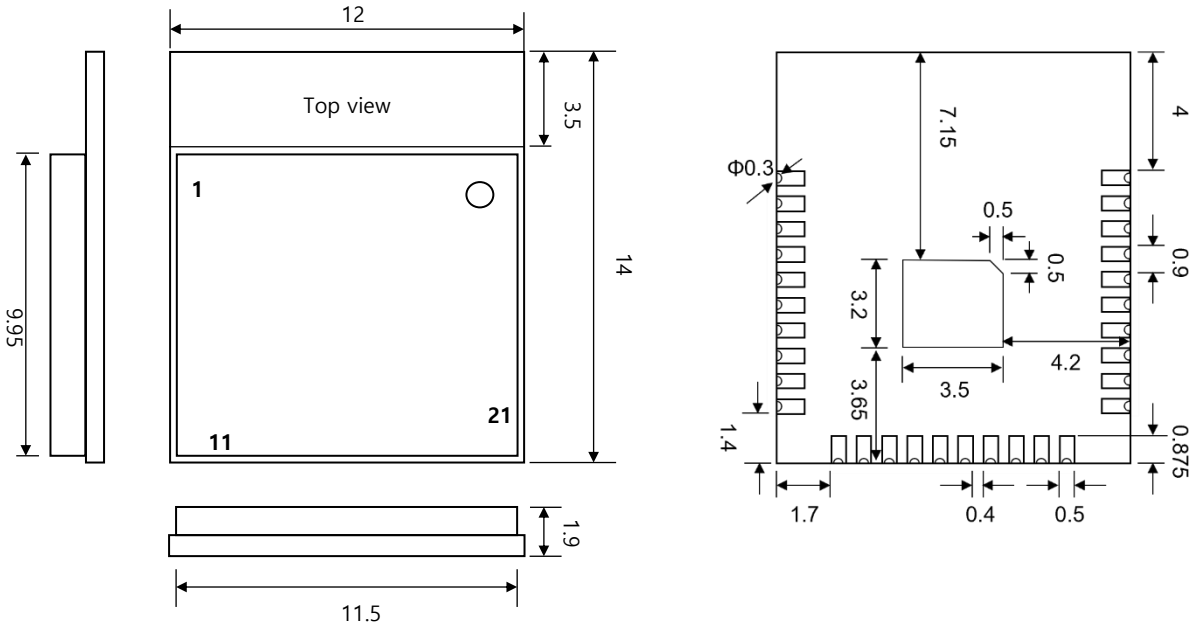
Item	Min	Typ	Max	unit	Condition
USB Output Signal Cross-over Voltage	1.3	-	2.0	V	

7. RF Specification

Nomal Condition : T=25℃, VDD=3.3V

Item		Min	Typ	Max	unit	Condition
BLE 1Mbps RF_Rx Performance						
Sensitivity	1Mbps	-93	-92	-90	dBm	
Frequency offset tolerance		-300		+300	kHz	
Co-channel rejection			-7		dB	
In-band blocking rejection	±1MHz offset		12		dB	
	±2MHz offset		33		dB	
	±3MHz offset		35		dB	
	>4MHz offset		52			
Image rejection			33		dB	
BLE 1Mbps RF_Tx Performance						
Output power			7	8	dBm	
Modulation 20dB bandwidth			1.3		MHz	
IEEE 802.15.4 250kbps RF_Rx Performance						
Sensitivity	250kbps		-97		dBm	
Frequency offset tolerance		-400		+400	kHz	
Co-channel rejection			-4		dB	
In-band blocking rejection	-2MHz offset		6		dB	
	+2MHz offset		6		dB	
	-3MHz offset		19		dB	
	+3MHz offset		19		dB	
	>4MHz offset		28			
Image rejection			28		dB	
IEEE 802.15.4 250kbps RF_Tx Performance						
Output power			7	8	dBm	
Modulation 20dB bandwidth			2.3		MHz	

8. Physical Dimensions (Unit : mm)

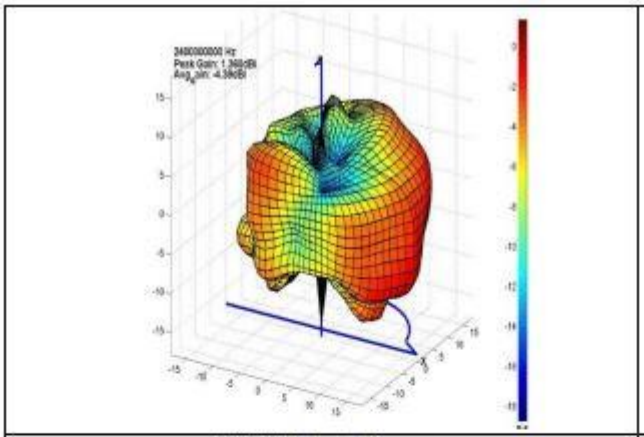


9. Internal Pattern Antenna Specification

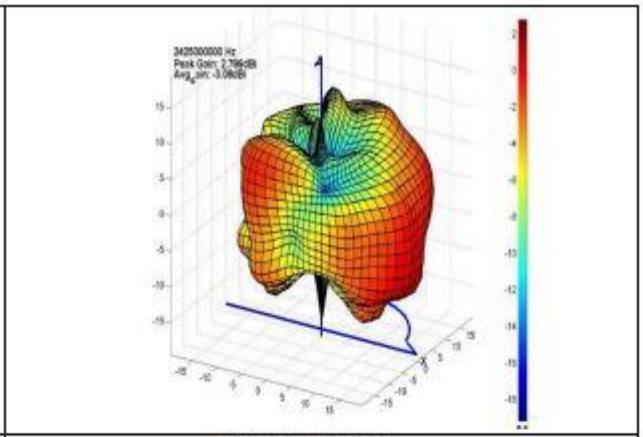
9.1 Antenna Gain

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

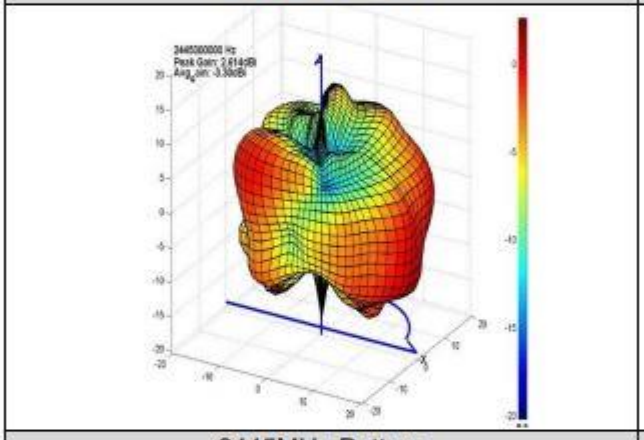
9.2 Antenna 3D Radiation Pattern



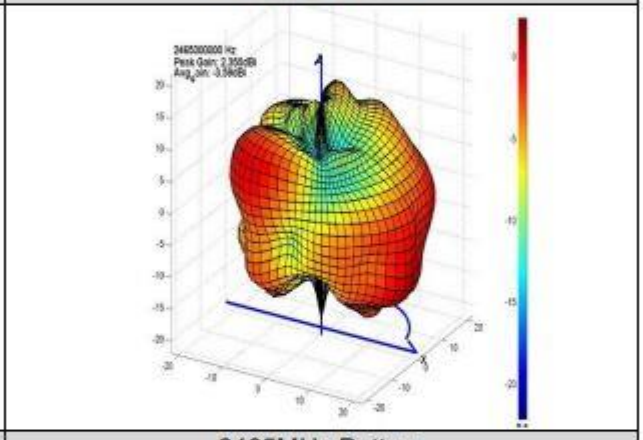
2400MHz Pattern



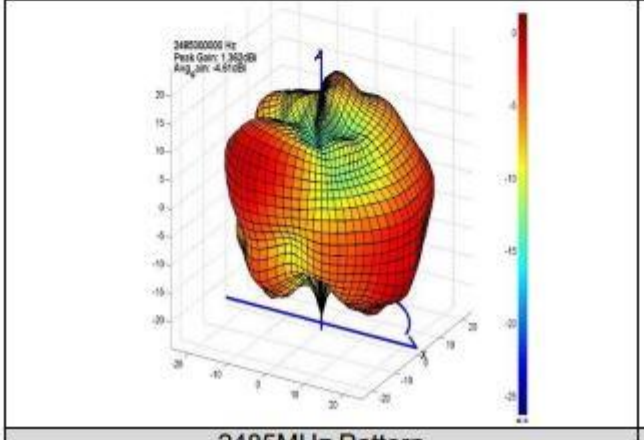
2425MHz Pattern



2445MHz Pattern

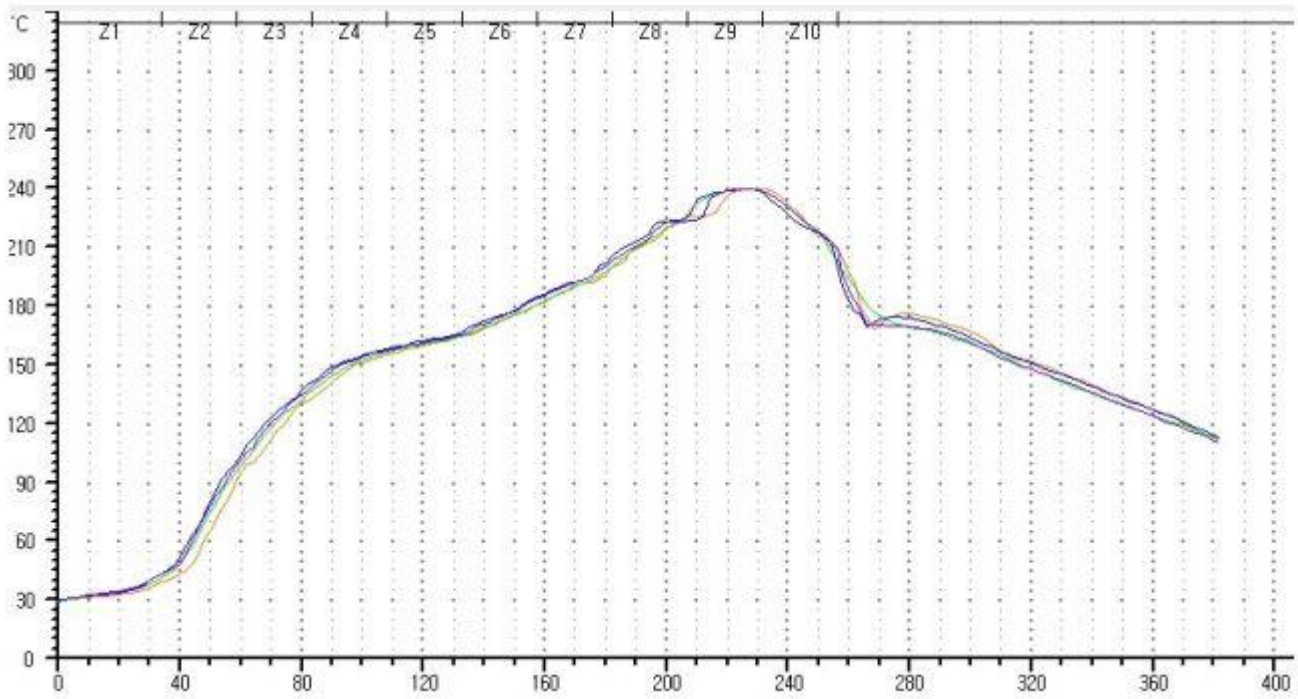


2465MHz Pattern



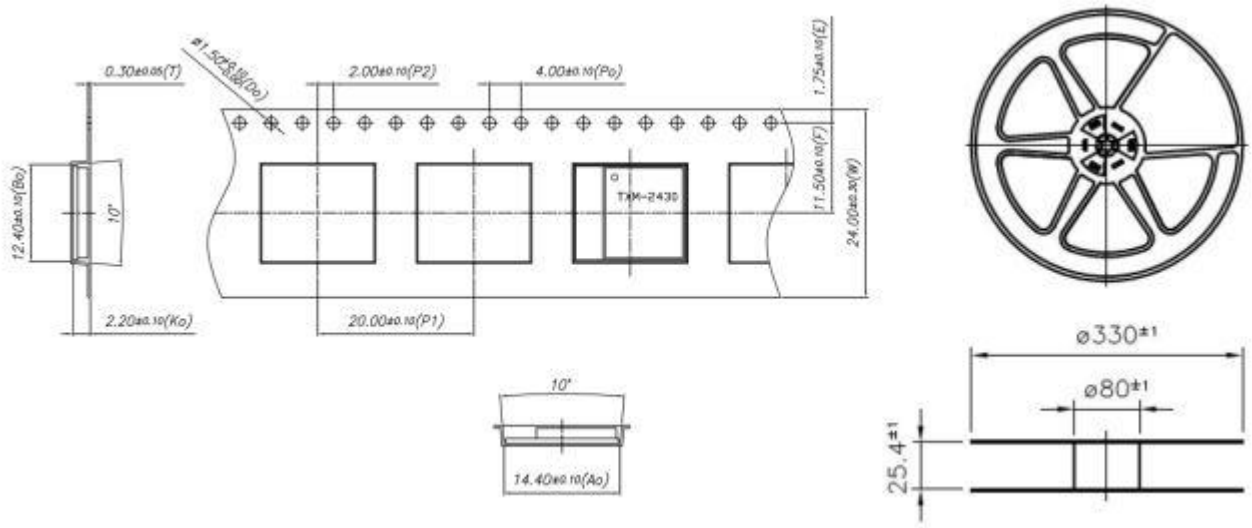
2485MHz Pattern

10. SMT Temperature Sequence (Pb-free)

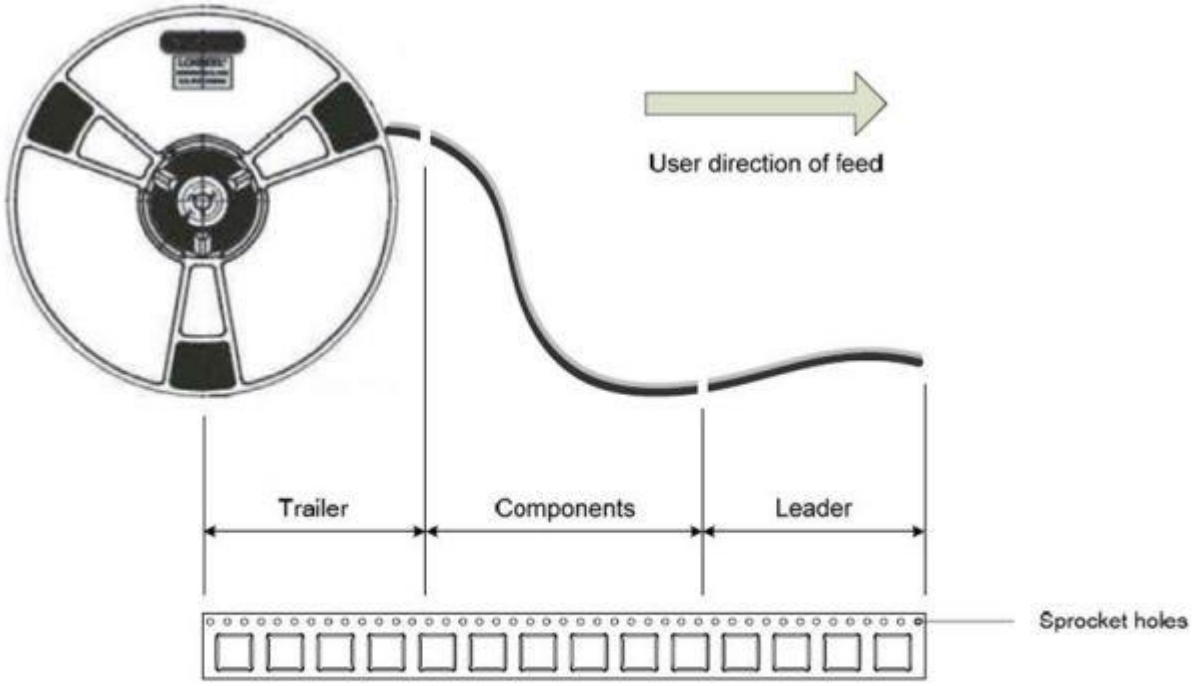


11. Packing Information

11.1 Carrier Tape and Reel Information



11.2 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