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Comchips

KX6256
Module Data sheet

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Website: www.comchips.com

Customer Approval

Company _____

Title _____

Signature _____

Date _____

FTY _____

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1 Overview

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1.1 Introduction

The KX6256 is a highly integrated single-chip that support 1-stream 802.11ac solutions with Multi-user MIMO (Multiple-Input, Multiple-Output) STA mode with integrated Bluetooth 2.1/4.2 controller, SDIO (SDIO 1.1/2.0/3.0) interface, and HS-UART mixed interface. It combines a WLAN MAC, a 1T1R capable WLAN baseband, and RF in s single chip. The RTL8821CS provides a complete solution for a high-performance integrated wireless and Bluetooth device.

The KX6256 baseband implements Multi-user Multiple Input, Multiple Output (MU MIMO) Orthogonal Frequency Division Multiplexing (OFDM) STA mode with one transmit and one receive path (1T1R).

For legacy compatibility, Direct Sequence Spread Spectrum (DSSS), Complementary Code Keying (CCK) and OFDM baseband processing are included to support all IEEE 802.11b, 802.11g and 802.11a data rates.

The KX6256 supports fast receiver Automatic Gain Control (AGC) with synchronous and asynchronous control loops among antennas, antenna diversity functions, and adaptive transmit power control functions to obtain better performance in the analog portions of the transceiver.

The KX6256 MAC supports 802.11e for multimedia applications, 802.11i and WAPI (Wireless Authentication Privacy Infrastructure) for security, and 802.11n/802.11ac for enhanced MAC protocol efficiency.

The KX6256 Bluetooth controller complies with Bluetooth core specification v4.1, and supports dual mode (BR/EDR + Low Energy Controllers). It is compatible with previous versions, including v2.1 + EDR. For BR/EDR, it supports scatternet topology and allows active links in slave mode, and active links in master mode. For Low Energy, it supports multiple states and allows active links in master mode. The links in BR/EDR and LE can be active simultaneously.

1.2 Features

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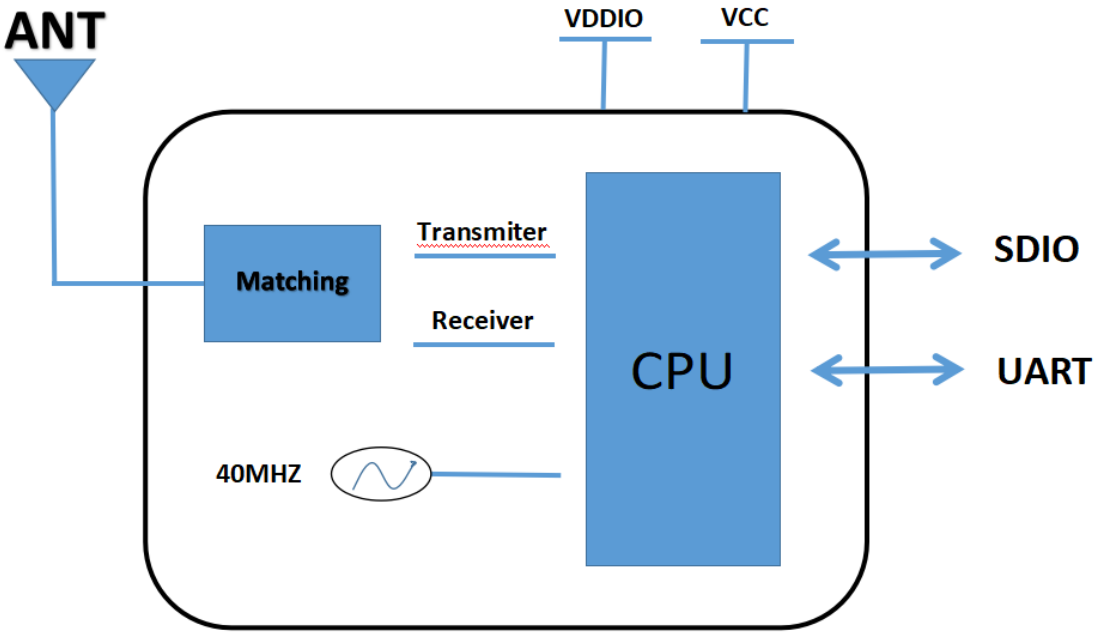
- CMOS MAC, Baseband PHY and RF in a single chip for IEEE 802.11a/b/g/n/ac compatible WLAN
- Compatible with Bluetooth v2.1+EDR
- Support 802.11ac 1x1,Wave-2 compliant with MU-MIMO STA mode
- Complete 802.11n MIMO solution for 2.4GHz and 5Ghz band
- Complete 802.11n MIMO solution for 2.4GHz and 5Ghz band
- Frame aggregation for increased MAC efficiency (A-MSDU, A-MPDU)
- Maximum PHY data rate up to 86.7Mbps using 20MHz bandwidth, 200Mbps using 40MHz bandwidth, and 433.3Mbps using 80MHz bandwidth.
- Channel management and co-existence
- Multiple BSSID feature allows the RTL8821CS to assume multiple MAC identities when used as a wireless bridge
- WiFi Direct supports wireless peer to peer applications
- 5MHz / 10MHz / 20MHz / 40MHz / 80MHz bandwidth transmission
- OFDM with BPSK, QPSK, 16QAM, 64QAM and 256QAM modulation. Convolutional Coding Rate: 1/2, 2/3, 3/4, and 5/6
- Maximum data rate 54Mbps in 802.11g, 150Mbps in 802.11n and 433Mbps in 802.11ac.
- Build-in both 2.4GHz and 5GHz PA
- Build-in both 2.4GHz and 5GHz LNA
- Support Bluetooth 4.1 features
- Bluetooth 4.0 Dual Mode support: Simultaneous LE and BR/EDR
- Enhanced BT/WLAN Coexistence Control to improve transmission quality in different profiles

1.3 Block Diagram



1.4 General Specification

Model Name	KX6256
Product Description	Support WLAN-Bluetooth coexistence
Dimension	L x W x H: 12.x 12 x2.1 mm
Wi-Fi Interface	Support SDIO
BT interface	Support UART
Operating temperature	0 to +70° C
Storage temperature	-55°C to 125°C
RoHS	All hardware components are fully compliant with EU RoHS directive

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1.5 DC Characteristics

Power Supply Characteristics

Symbol	Parameter	Minimum	Typical	Maximum	Units
VDD33	3.3V I/O Supply Voltage	3.0	3.3	3.6	V
VD10	1.05V Core Supply Voltage	0.945	1.05	1.155	V

2 RF Specifications

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2.1 2.4GHz RF Specification

Features	Description
WLAN Standard	IEEE802.11a/b/g/n/ac/e/i/h
Frequency Range	2.4~2.4835GHz (2.4GHz ISM Band)
Modulation Method	DSSS,DBPSK, DQPSK, CCK and OFDM (BPSK, QPSK, 16QAM,64QAM and 256-QAM)
Number of Channel	2.4GHz: 11: (Ch. 1-11) – United States 13: (Ch. 1-13) – Europe 14: (Ch. 1-14) – Japan

2.4G Transmitter Specifications

TX Rate	TX Power	TX Power Tolerance	EVM
802.1 1b @ 11 Mbps	17dBm	±2dBm	≤-13dB
802.11g@54Mbps	14dBm	±2dBm	≤-25dB
802.11n@BW20_MCS7	13dBrn	±2dBm	≤-28dB
802.11n@BW40_MCS7	13dBrn	±2dBm	≤-28dB

2.4G Receiver Specifications

RX Rate	Min Input Level(Typ)	Max Input Level(Typ)	PER
802.11b@11Mbps	-85dBm	-85dBm	<8%
802.11g@54Mbps	-68dBm	-70dBm	< 10%
802.11n@BW20_MCS7	-66dBm	-67dBm	< 10%
802.11n@BW40_MCS7	-65dBm	-65dBm	< 10%

2.2 5GHz RF Specification

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Features	Description
WLAN Standard	IEEE802.11a/b/g/n/ac/e/i/h
Frequency Range	4.9GHz ~ 6.0GHz (5GHz ISM Band)
Modulation Method	DSSS,DBPSK, DQPSK, CCK and OFDM (BPSK, QPSK, 16QAM,64QAM and 256-QAM)

5G Transmitter Specifications

TX Rate	TX Power	TX Power Tolerance	EVM
802.1 1a@ 54Mbps	13dBm	±2dBm	≤-25dB
802.11n@BW20_MCS 7	12dBm	±2dBm	≤-28dB
802.11ac@BW80_M CS9	10dBrn	±2dBm	≤-32dB

5G Receiver Specifications

RX Rate	Min Input Level(Typ)	Max Input Level(Typ)	PER
802.11a@54Mbps	-70dBm	-70dBm	<10%
802.11n@BW20_MC S7	-65dBm	-65dBm	< 10%
802.11ac@BW80_M CS9	-56dBm	-56dBm	< 10%

2.3 Bluetooth Specification

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Feature	Description		
General Specification			
Bluetooth Standard	Bluetooth V3.3 of 1, 2 and 3 Mbps.		
Host Interface	UART		
Antenna Reference	Small antennas with 0~2 dBi peak gain		
Frequency Band	2.400 GHz ~ 2483.5 GHz		
Number of Channels	79 channels		
Modulation	FHSS, GFSK, DPSK, DQPSK		
RF Specification			
	Min.	**Typical.**	**Max.**
Power (BDR：GFSK/1Mbps)	0dBm	5 dBm	10dBm
Power(EDF：π /4-DQPSK/2Mbps)	0dBm	5 dBm	10dBm
Power (BLE：GFSK/1Mbps)	0dBm	5 dBm	10dBm
Sensitivity @ BER=0.1% for (BDR：GFSK/1Mbps)		-85 dBm	
Sensitivity @ BER=0.1% for(EDF：π /4-DQPSK/2Mbps)		-85 dBm	
Sensitivity @ BER=0.1% for (BLE：GFSK/1Mbps)		-85 dBm	
Initial Freq Error	BDR：GFSK/1Mbps:±75KHZ		
	EDF：π /4-DQPSK/2Mbps :±75KHZ		

2.3 Bluetooth Specification

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Feature	Description		
General Specification			
Bluetooth Standard	Bluetooth V3.3 of 1, 2 and 3 Mbps.		
Host Interface	UART		
Antenna Reference	Small antennas with 0~2 dBi peak gain		
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Modulation	FHSS, GFSK, DPSK, DQPSK		
RF Specification			
	Min.	**Typical.**	**Max.**
Power (BDR：GFSK/1Mbps)	0dBm	5 dBm	10dBm
Power(EDF：π /4-DQPSK/2Mbps)	0dBm	5 dBm	10dBm
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Sensitivity @ BER=0.1% for (BDR：GFSK/1Mbps)		-85 dBm	
Sensitivity @ BER=0.1% for(EDF：π /4-DQPSK/2Mbps)		-85 dBm	
Sensitivity @ BER=0.1% for (BLE：GFSK/1Mbps)		-85 dBm	
Initial Freq Error	BDR：GFSK/1Mbps:±75KHZ		
	EDF：π /4-DQPSK/2Mbps :±75KHZ		

3 Pin Assignments

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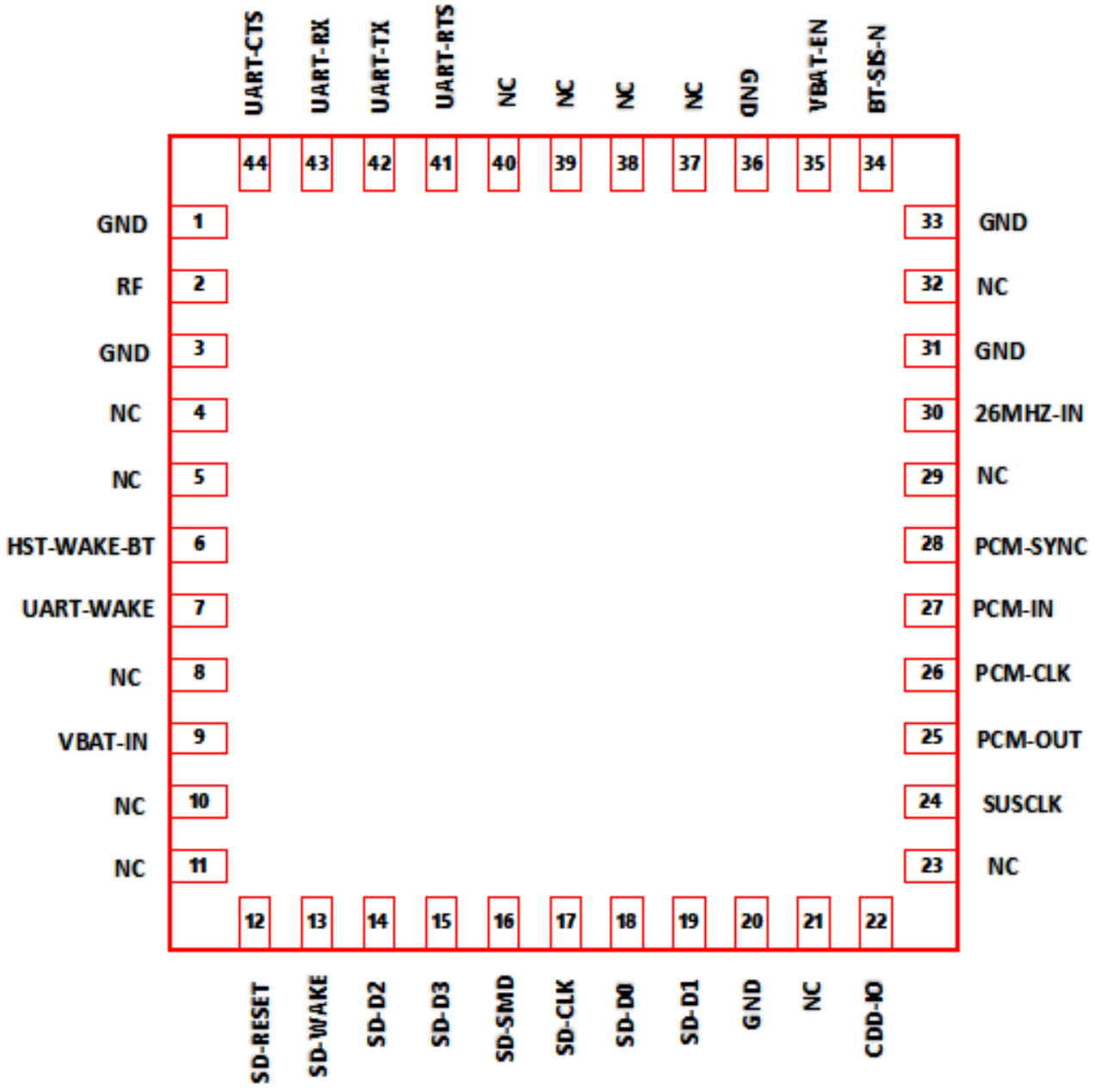
3.1 Pin Outline



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3.2 Pin Definition

PIN	Function	Description
1	GND	Ground
2	RF1	WIFI 2.4G ANT /BT&5G ANT&BT/ANT
3	GND	Ground
4-5	NC	NC
6	HST_WAKE_BT	GPIO13
7	UART_WAKE	GPIO14
8	NC	NC
9	VBAT_IN	3.3V_IN
10-11	NC	NC
12	SD_RESET	GPIO9
13	SD_WAKE	GPIO4
14	SD_D2	SDIO Data Line2
15	SD_D3	SDIO Data Line3
16	SD_SMD	SDIO Command Input
17	SD_CLK	SDIO Clock Input
18	SD_D0	SDIO Data Line0 .
19	SD_D1	SDIO Data Line1
20	GND	Ground
21	NC2	NC
22	VDD_I0	supply voltage for SDIO IO
23	NC	NC
24	SUSCLK	Shared with EECS
25	PCM_OUT	GPIO1
26	PCM_CLK	GPIO3
27	PCM_IN	GPIO0
28	PCM_SYNC	GPIO2
29	NC	NC
30	26MHZ_IN	26M/40MHz OSC Input
31	GND	Ground
32	NC	NC
33	GND	Ground
34	BT_DIS_N	GPIO11
35	VBAT_EN	This pin can externally shutdown the RTL8821CS VBAT LDO
36	GND	Ground
37-40	NC	NC
41	UART_RTS	High-Speed UART RTS
42	UART_TX	High-Speed UART Data Out
43	UART_RX	High-Speed UART Data In
44	UART_CTS	High-Speed UART CTS

4 Dimensions

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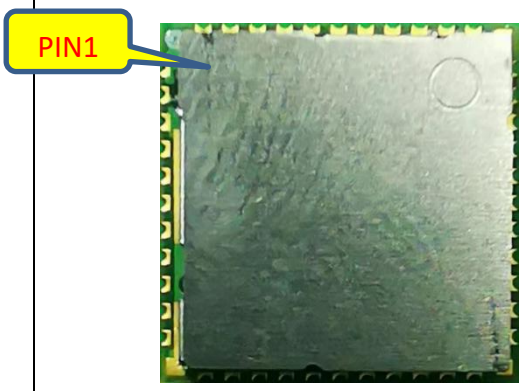
4.1 Module Picture

L x W : 12.1 x 12.2 (±0.2) mm

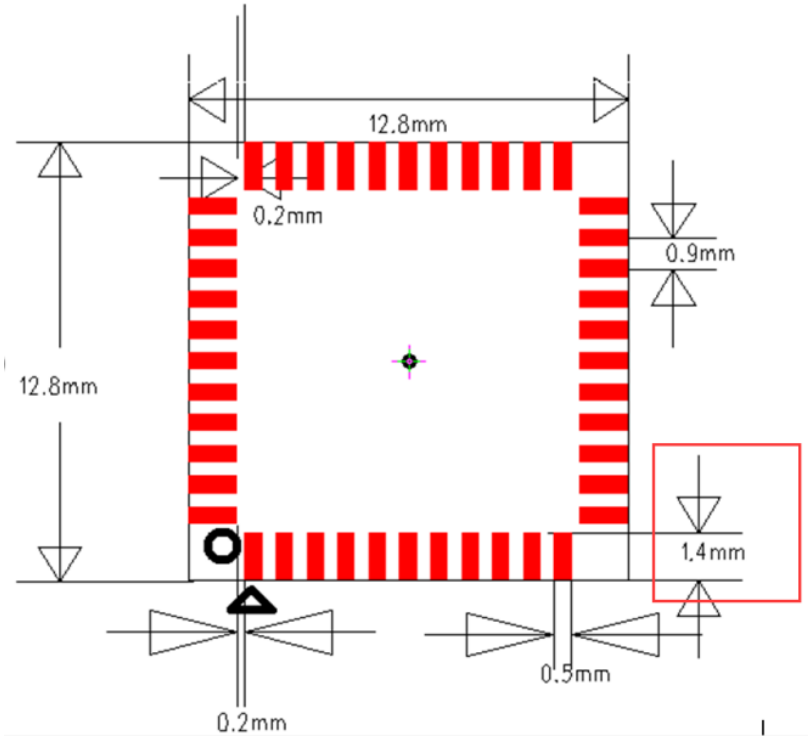


H:2.1(±0.2)mm

4.2 Module Physical Dimensions

(Unit: mm)

< TOP VIEW >



5 Reference Design

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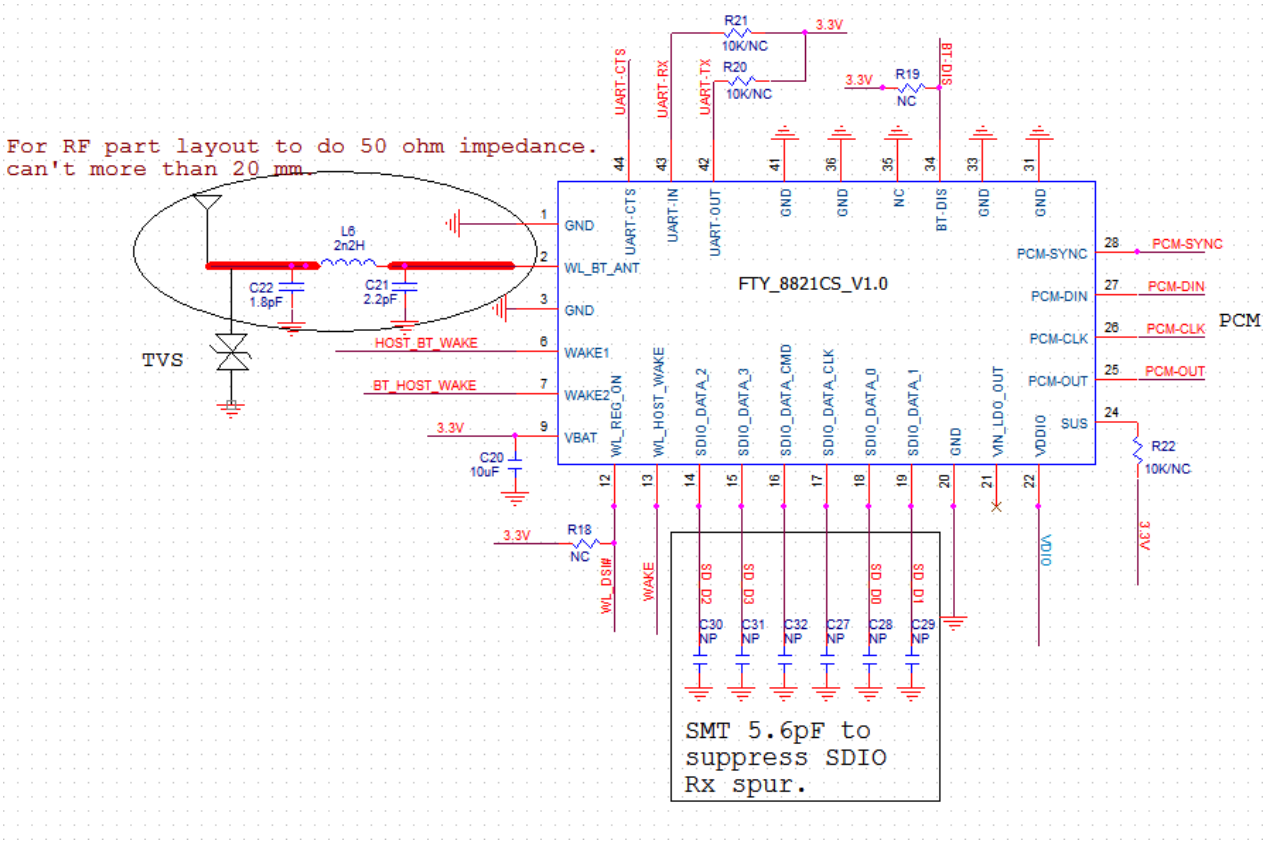

1. Above the dotted box part of the antenna matching is needed, the actual antenna matching electronic parameters shall prevail

6 The Key Material List

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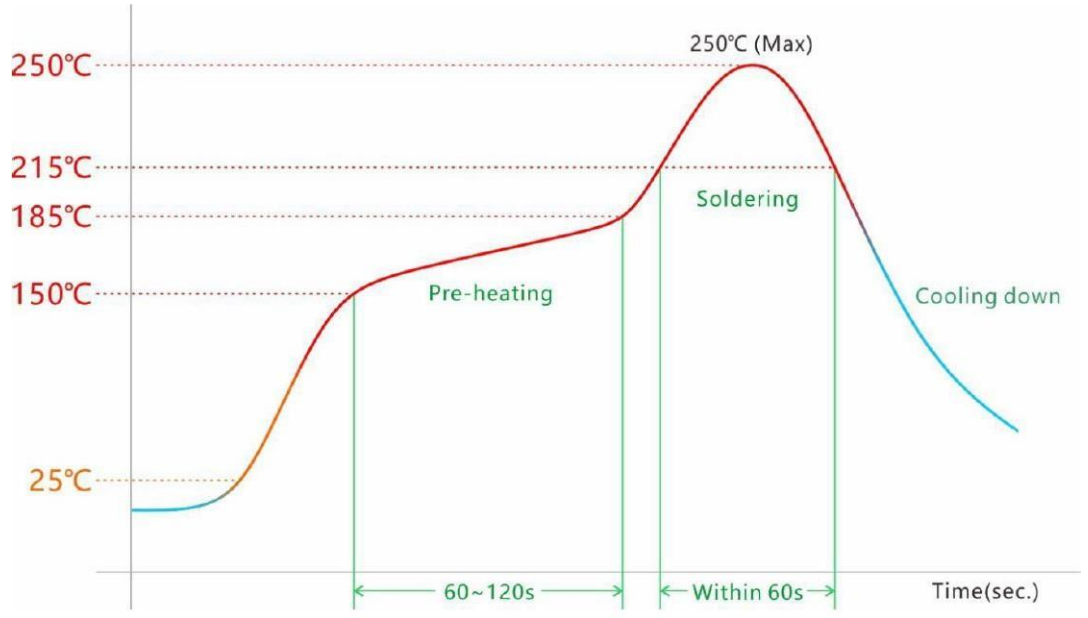
No.	Parts	Specification	Manufacturer	Note
1	Chipset	RTL8821CS-CG QFN56	Realtek Semiconductor Corp	
2	PCB	KX8821CS_V1.0	Shenzhen xiangyu circuit co., LTD	
3	PCB	KX8821CS _V1.0	Shenzhen Kexiang Precision Circuit Technology Co., LTD	
4	Crystal oscillator	2520/40MHZ/10PPM/12PF /(-20to+85 度)	hefei jing wei Electronics Co. Ltd.	
5	Crystal oscillator	40MHZ/12PF/10PPM/2520 /温度-20+85 度蓝晶:L225S400L	Zhejiang Lan jing xin Microelectronics Co., LTD	

7 Recommended Reflow Profile

Referred to IPC/JEDEC standard.
Peak Temperature : <250° C
Number of Times : ≤2 times



8 Package Information

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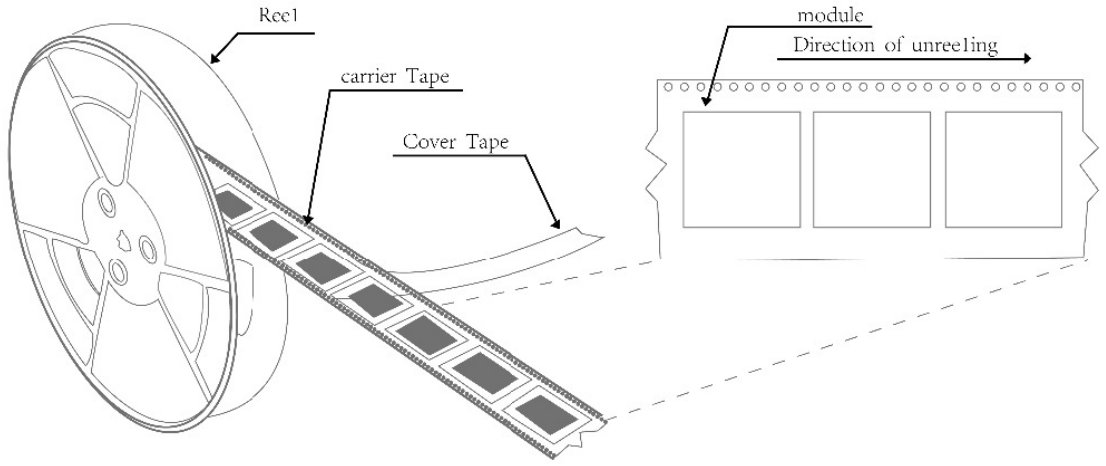
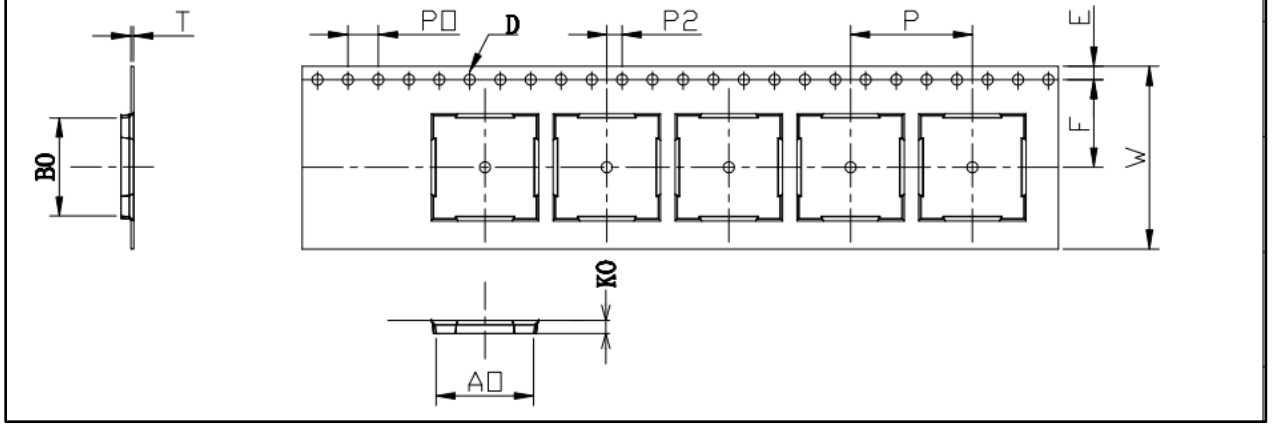
8.1 Reel

A roll of 1500pcs



8.2 Carrier Tape Detail

ITEM	W	A0	B0	D	F	E	K0	P0	P2	P	T
DIM	24	12.47	12.47	1.50	11.5	1.75	1.90	4.0	2.0	16.0	0.30
TOLE	+0.3 -0.3	±0.10	±0.10	+0.1 -0.0	+0.1 -0.1	±0.1	±0.10	±0.1	±0.1	±0.1	±0.05



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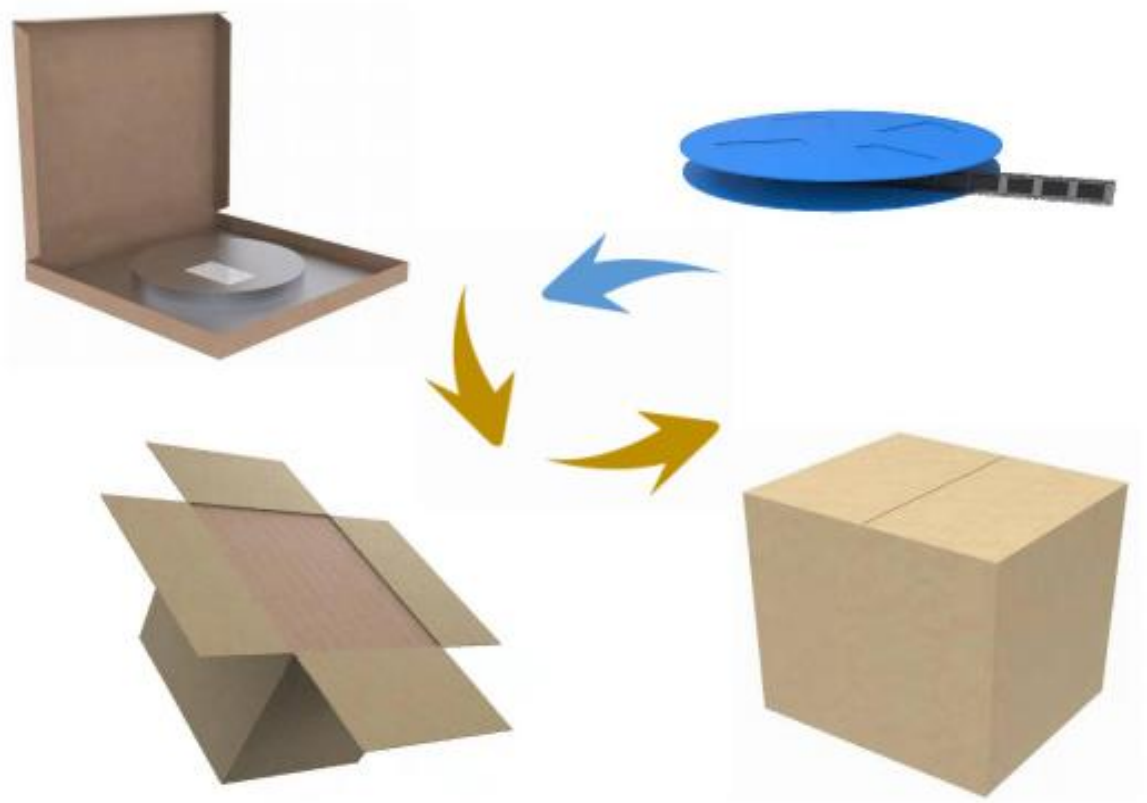
8.3 Packaging Detail



8.4 Moisture sensitivity

The Modules is a Moisture Sensitive Device level 3, in according with standard IPC/JEDEC J-STD-020, take care all the relatives requirements for using this kind of components.

Moreover, the customer has to take care of the following conditions:

a) Calculated shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH).

b)Environmental condition during the production: 30°C / 60% RH according to IPC/JEDEC J-STD-033A paragraph 5.

c) The maximum time between the opening of the sealed bag and the reflow process must be 168 hours if condition

b) “IPC/JEDEC J-STD-033A paragraph 5.2” is respected

e) Baking is required if conditions b) or c) are not respected

f) Baking is required if the humidity indicator inside the bag indicates 10% RH or more