E103-RTL8811CU User Manual

RTL8811CU 2.4GHz&5.8GHz Wireless Module



Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Contents

RTL8811CU 2.4GHZ&5.8GHZ WIRELESS MODULE 0

DISCLAIMER 1

CHAPTER 1 PRODUCT OVERVIEW 2

1.1 PRODUCT INTRODUCTION 2
1.2 FEATURES 2
1.3 APPLICATION SCENARIOS 2

CHAPTER 2 SPECIFICATIONS 3

2.1 BASIC PARAMETERS 3
2.2 ELECTRICAL PARAMETERS 3
2.2.1 Recommended Conditions of Use 3
2.2.2 Power Specifications of 3.3V GPIO Interfaces 3
2.2.3 I/O interface power specifications 4
2.2.3 Current consumption 4
2.3 HARDWARE PARAMETERS 5

CHAPTER 3 MECHANICAL DIMENSIONS AND PIN DEFINITIONS 6

CHAPTER 4 WIFI PROTOCOL FEATURES 7

4.1 2.4GHZ PARAMETER CHARACTERISTICS 7
4.2 2.4GHZ TRANSMITTER PARAMETERS 8
4.3 2.4GHZ RECEIVER PARAMETERS 8
4.4 5GHZ PARAMETER CHARACTERISTICS 9
4.5 5GHZ TRANSMITTER PARAMETERS 9
4.6 5GHZ RECEIVER PARAMETERS 10

CHAPTER 5 SCHEMATICS ARE RECOMMENDED 11

CHAPTER 6 FREQUENTLY ASKED QUESTIONS 11

6.1 THE TRANSMISSION DISTANCE IS NOT IDEAL 11
6.2 MODULES ARE VULNERABLE 11

CHAPTER 7 WELDING OPERATION INSTRUCTIONS 12

7.1 REFLOW SOLDERING TEMPERATURE 12
7.2 REFLOW SOLDERING CURVE 13

CHAPTER 8 ANTENNA GUIDE 13

CHAPTER 9 BATCH PACKAGING METHODS 14

REVISION HISTORY 14

ABOUT US 14

`

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Disclaimer

EBYTE reserves all rights to this document and the information contained herein. Products, names, logos and designs described herein may in whole or in part be subject to intellectual property rights. Reproduction, use, modification or disclosure to third parties of this document or any part thereof without the express permission of EBYTE is strictly prohibited.

The information contained herein is provided “as is” and EBYTE assumes no liability for the use of the information. No warranty, either express or implied, is given, including but not limited, with respect to the accuracy, correctness, reliability and fitness for a particular purpose of the information. This document may be revised by EBYTE at any time. For most recent documents, visit www.cdebyte.com.

Copyright ©2012 – 2024，Chengdu Yibaite Electronic Technology Co., Ltd

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Chapter 1 Product Overview

1.1 Product Introduction

E103-RTL8811CU is a low-cost and high-performance dual-band WiFi module developed by Chengdu Yibaite Electronic Technology Co., Ltd. based on Realtek's RTL8811CU-CG chip solution. Compliant with IEEE 802.11b/g/n/ac standards, with a maximum speed of 433Mbps, rich interfaces and powerful processors, it provides a complete solution for integrated wireless WLAN devices with high throughput performance.



fig 1：E103-RTL8811CU

1.2 Features

- The working frequency band is in the two frequency bands of 2.4GHz~2.484GHz and 5.15GHz~5.85GHz;
- The wireless rate can reach up to 433M;
- Compliant with IEEE 802.11b/g/n/ac protocol standards；
- Support 5/10/20/40/80MHz channel bandwidth;
- Support WPA, WPA2 information encryption;
- Support 802.11ac 1x1, Wave-2 compatible with MU-MIMO STA mode;
- The communication interface is USB 2.0;
- Equipped with excellent MIMO technology and dual-frequency use;
- Operating temperature: -20~+70°C;
- Widely used in the Internet of Things;

1.3 Application Scenarios

- WiFi video transmission;
- WiFi audio transmission;
- Router;
- wifi repeater;
- Serial port forwarding and other smart home general-purpose modules;
- Cloud service apps
- IoT gateways;

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Chapter 2 Specifications

2.1 Basic Parameters

RF parameters	unit	numeric value	remark
WiFi protocol	-	IEEE 802.11b/g/n/ac	
Reference distance	M	200	The antenna gain is 5dBi, and the module communicates with the device
Communication interfaces	-	USB 2.0	
Operating frequency band	GHz	2.4～2.484&5.15~5.85	Supports the global license-free ISM 2.4GHz band
Operating temperature	℃	-20~70	
Operating humidity	RH	10%~95%	No condensation

2.2 Electrical Parameters

2.2.1 Recommended Conditions of Use

parameter		Min	Type	Max	Units
Operating temperature		-20	25	70	℃
External antenna standing waves		-	1.7	2	/
Supply voltage	VDD33	3.0	3.3	3.5	V

2.2.2 Power Specifications of 3.3V GPIO Interfaces

symbol	parameter	Min	Type	Max	unit
HIV	Input High Voltage	2.0	3.3	3.5	V
VILE	Input Low Voltage	-	0	0.9	V
VOH	Output High Voltage	3.0	-	3.3	V
THEFT	Output Low Voltage	0	-	0.33	V

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.2.3 I/O interface power specifications

symbol	parameter	Min	Type	Max	unit
HIV	Input High Voltage	2.0	3.3	3.6	V
VILE	Input Low Voltage	-	0	0.9	V
VOH	Output High Voltage	2.97	-	3.3	V
THEFT	Output Low Voltage	0	-	0.33	V

2.2.3 Current consumption

Test conditions	VDD33 Current (平均数值)		
	Type	Max	unit
WLAN Unassociated (Linux Driver)	86	98	but
2.4G WLAN 150Mbps Web browsing (Linux Driver)	114	133	but
5G WLAN 433Mbps Web browsing (Linux Driver)	128	162	but
2.4G 11b@1Mbps TX (RF test)17dBm	388	410	but
2.4G 11g@11Mbps TX(RF test)17dBm	334	444	but
2.4G 11g@6Mbps TX (RF test)17dBm	249	360	but
2.4G 11g@54Mbps TX(RF test)15dBm	225	376	but
2.4G 11n@HT20_MCS0 TX(RF test)17dBm	246	338	but
2.4G 11n@HT20_MCS7 TX(RF test)15dBm	196	346	but
2.4G 11n@HT40_MCS0 TX (RF test)16dBm	235	348	but
2.4G 11n@HT40_MCS7 TX(RF test)14dBm	197	342	but
2.4G 11b@11Mbps RX (RF test)	89	104	but
2.4G 11n@6Mbps RX (RF test)	95	142	but
2.4G 11n@HT20_MCS0 RX (RF test)	96	144	but
2.4G 11n@HT40_MCS7 RX (RF test)	101	140	but
5G 11a@6Mbps TX (RF test)16dBm	314	388	but
5G 11a@54Mbps TX (RF test)14dBm	268	404	but
5G 11n@HT20_MCS0 TX(RF test)15dBm	303	391	but

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

5G 11n@HT20_MCS7 TX(RF test)13dBm	242	394	but
5G 11n@HT40_MCS0 TX (RF test)15dBm	296	393	but
5G 11n@HT40_MCS7 TX(RF test)13dBm	226	386	but
5G 11ac@VHT80_MCS0 TX(RF test)14dBm	288	380	but
5G 11ac@VHT80_MCS9 TX (RF test)12dBm	162	334	but
5G 11n@6Mbps RX (RF test)	101	138	but
5G 11n@HT20_MCS0 RX (RF test)	99	140	but
5G 11n@HT40_MCS7 RX (RF test)	101	142	but
5G 11ac@VHT80_MCS9 RX (RF test)	107	126	but
Note: Use electrical parameters VDD33=3.3V, operating temperature: 25°C			

2.3 Hardware Parameters

Hardware parameters	Parameter details	remark
chip	RTL8811CU-CG	
Encapsulation	Patches	
Antenna interface	Stamp holes	The characteristic impedance is about 50 ohms
Communication interfaces	USB 2.0	
size	12*12*1.7mm	The error size is ±0.2mm
weight	0.47g	The error is ±0.1g

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Chapter 3 Mechanical Dimensions and Pin Definitions

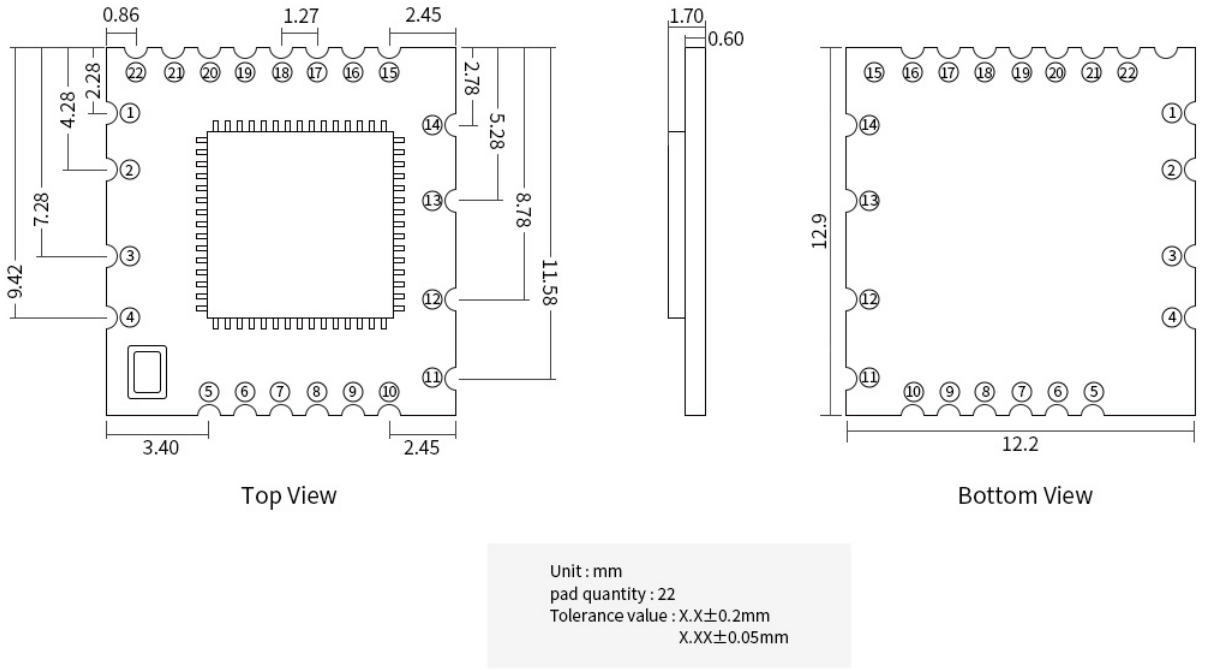


fig 1:: E103-RTL8811CU

serial number	Pin name	Pin type	Pin function description
1	GND	RF	Antenna feet
2	WLAN_ANT	RF	2.4G/5G Antenna Interface (Stamp Hole)
3	NC	/	
4	GND	P	earth
5	NC	/	
6	NC	/	
7	NC	/	
8	NC	/	
9	NC	/	
10	NC	/	
11	VDD33	P	VDD 3.3V power supply

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

12	DM	AI/O	USB2.0 Transmitter/Receiver Differential Pair
13	DP	AI/O	USB2.0 Transmitter/Receiver Differential Pair
14	GND	P	
15	NC	/	
16	WL_DIS	I	WLAN disable (active low)
17	NC	/	
18	CHIP_EN	I	When the voltage is high, the chip works normally. When the voltage is low, the chip is turned off.
19	GPIO7	I/O	The host wakes up the wireless LAN, and the input signal is controlled by the software
20	GPIO6	I/O	The wireless LAN wakes up the host, and the output signal is controlled by the software
21	NC	/	
22	WL_LED	I	WLAN LED (active low)
I-O-O;O;I-O;O;P-O;			

Chapter 4 WiFi protocol features

4.1 2.4GHz parameter characteristics

characteristic	Parameter details
Protocol Standards	IEEE 802.11b/g/n
Operating frequency band	2.4~2.484GHz(2.4GHz ISM Band)
channel	Ch1~Ch13(For 20MHz Channels)
Modulation	802.11b (DSSS): CCK, DQPSK, DBPSK; 802.11g (OFDM): BPSK, QPSK, QAM16, QAM64; 802.11n (OFDM): BPSK, QPSK, QAM16, QAM64;
Transmission rate	802.11b: 1, 2, 5.5, 11Mbps; 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps; 802.11n (HT20): MCS0~MCS7 6.5~72.2Mbps; 802.11n (HT40): MCS0~MCS7 13.5~150Mbps;
Frequency offset tolerance	≤±20ppm

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Conditions of use: VDD33=3.3V; Operating temperature: 25°C

4.2 2.4GHz transmitter parameters

Transmission rate	Transmit Power (dBm)	Power Deviation (dBm)	EVM(dB)
802.11b@1Mbps	Recommended Target TX Power : 17	±1.5	≦ -10
802.11b@11Mbps	Calibrated TX Power : 17	±1.5	≦ -10
802.11g@6Mbps	Recommended Target TX Power : 17	±1.5	≦ -10
802.11g@54Mbps	Calibrated TX Power : 15	±1.5	≦ -25
802.11n@HT20_MCS0	Recommended Target TX Power : 17	±1.5	≦ -10
802.11n@HT20_MCS7	Calibrated TX Power : 15	±1.5	≦ -28
802.11n@HT40_MCS0	Recommended Target TX Power : 16	±1.5	≦ -10
802.11n@HT40_MCS7	Calibrated TX Power : 14	±1.5	≦ -28
Note: Calibrate the transmit power at certain rates, and customers can define the target transmit power for other rates by modifying the configuration file of the driver software. The customer must define a transmit power that is the same or lower than the recommended target transmit power.			

4.3 2.4GHz receiver parameters

Receive rate	Min Input Level(dBm)	Max Input Level(dBm)	FOR
802.11b@1Mbps	-96	-5	< 8%
802.11b@11Mbps	-86	-5	< 8%
802.11g@6Mbps	-90	-5	< 10%
802.11g@54Mbps	-73	-5	< 10%
802.11n@HT20_MCS0	-88	-5	< 10%
802.11n@HT20_MCS7	-68	-5	< 10%
802.11n@HT40_MCS0	-86	-5	< 10%

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

802.11n@HT40_MCS7	-67	-5	< 10%

4.4 5GHz parameter characteristics

characteristic	Parameter details
Protocol Standards	IEEE 802.11 a/n/ac
Operating frequency band	5.15~5.25GHz; 5.25~5.35GHz; 5.47~5.73GHz; 5.735~5.835GHz (5GHz ISM Band)
channel	Ch36, Ch40, Ch44, Ch48; Ch52~Ch64; Ch100 ~Ch140; Ch149 ~Ch165 (For 20MHz Channels)
Modulation	802.11a (OFDM): BPSK, QPSK, QAM16, QAM64; 802.11n (OFDM): BPSK, QPSK, QAM16, QAM64;
Transmission rate	802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps; 802.11n (HT20): MCS0~MCS7 6.5~72.2Mbps; 802.11n (HT40): MCS0~MCS7 13.5~150Mbps; 802.11ac (VHT80): MCS0~MCS9(1T1R)29.3~433.3Mbps;
Frequency offset tolerance	≤±20ppm
Conditions of use: VDD33=3.3V; Operating temperature: 25°C	

4.5 5GHz transmitter parameters

Transmission rate	Transmit Power (dBm)	Power Deviation (dBm)	EVM(dB)
802.11a@6Mbps	Recommended Target TX Power : 16	±2	≦ -10
802.11a@54Mbps	Calibrated TX Power : 14	±2	≦ -25
802.11n@HT20_MCS0	Recommended Target TX Power : 15	±2	≦ -10
802.11n@HT20_MCS7	Calibrated TX Power : 13	±2	≦ -28
802.11n@HT40_MCS0	Recommended Target TX Power : 15	±2	≦ -10
802.11n@HT40_MCS7	Calibrated TX Power : 13	±2	≦ -28
802.11ac@VHT80_MCS0	Recommended Target TX Power : 14	±2	≦ -10

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

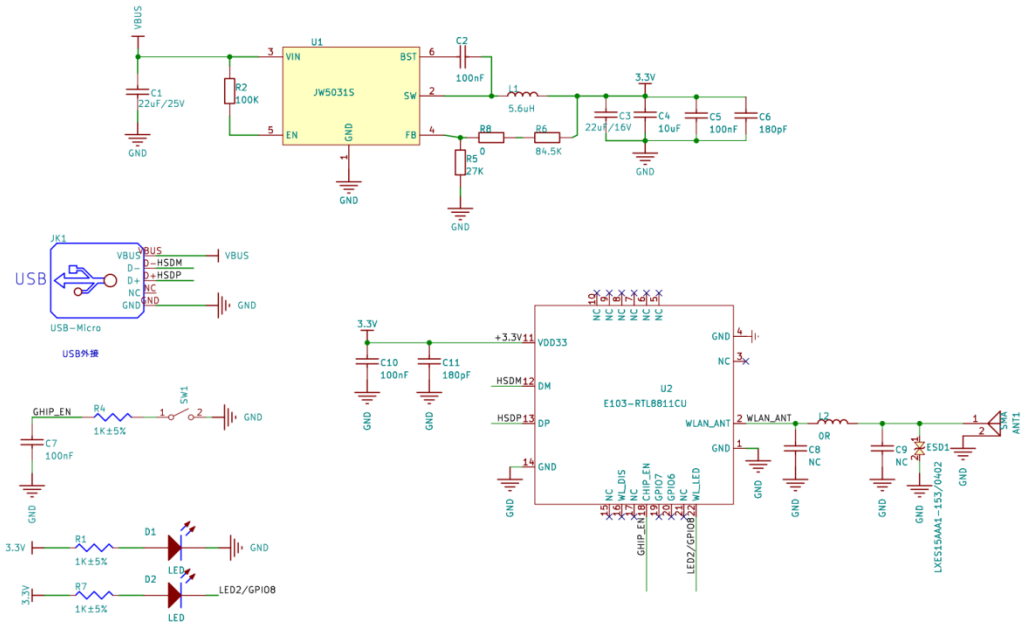
802.11ac@VHT80_MCS9	Calibrated TX Power : 12	±2	≦ -32
Note: Calibrate the transmit power at certain rates, and customers can define the target transmit power for other rates by modifying the configuration file of the driver software. The customer must define a transmit power that is the same or lower than the recommended target transmit power.			

4.6 5GHz receiver parameters

Receive rate	Min Input Level(dBm)	Max Input Level(dBm)	FOR
802.11a@6Mbps	-89	-5	< 10%
802.11a@54Mbps	-71	-5	< 10%
802.11n@HT20_MCS0	-87	-5	< 10%
802.11n@HT20_MCS7	-68	-5	< 10%
802.11n@HT40_MCS0	-86	-5	< 10%
802.11n@HT40_MCS7	-67	-5	< 10%
802.11ac@VHT80_MCS0	-82	-5	< 10%
802.11ac@VHT80_MCS9	-57	-5	< 10%

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Chapter 5 Schematics are recommended



Chapter 6 Frequently Asked Questions

6.1 The transmission distance is not ideal

- When there is a straight-line communication barrier, the communication distance will be attenuated accordingly;
- Temperature, humidity, and co-channel interference will lead to an increase in the communication packet loss rate.
- The ground absorbs and reflects radio waves, and the test effect near the ground is poor;
- Seawater has a strong ability to absorb radio waves, so the seaside test effect is poor;
- If there is a metal object near the antenna, or if it is placed in a metal shell, the signal attenuation will be very serious;
- The power register is set incorrectly, the air rate is set too high (the higher the air rate, the closer the distance);
- At room temperature, the low voltage of the power supply is lower than the recommended value, and the lower the voltage, the smaller the generating power;
- The antenna is poorly matched with the module or the antenna itself is of poor quality.

6.2 Modules are vulnerable

- Please check the power supply to ensure that it is between the recommended supply voltage, if the maximum value is exceeded, the module will be permanently damaged;
- Please check the stability of the power supply, the voltage should not fluctuate greatly and frequently;
- Please ensure that the installation and use process is anti-static operation, and the electrostatic sensitivity of high-frequency

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

devices;

- Please ensure that the humidity should not be too high during installation and use, and some components are humidity-sensitive devices;
- If there are no special needs, it is not recommended to use it at too high or too low temperatures.

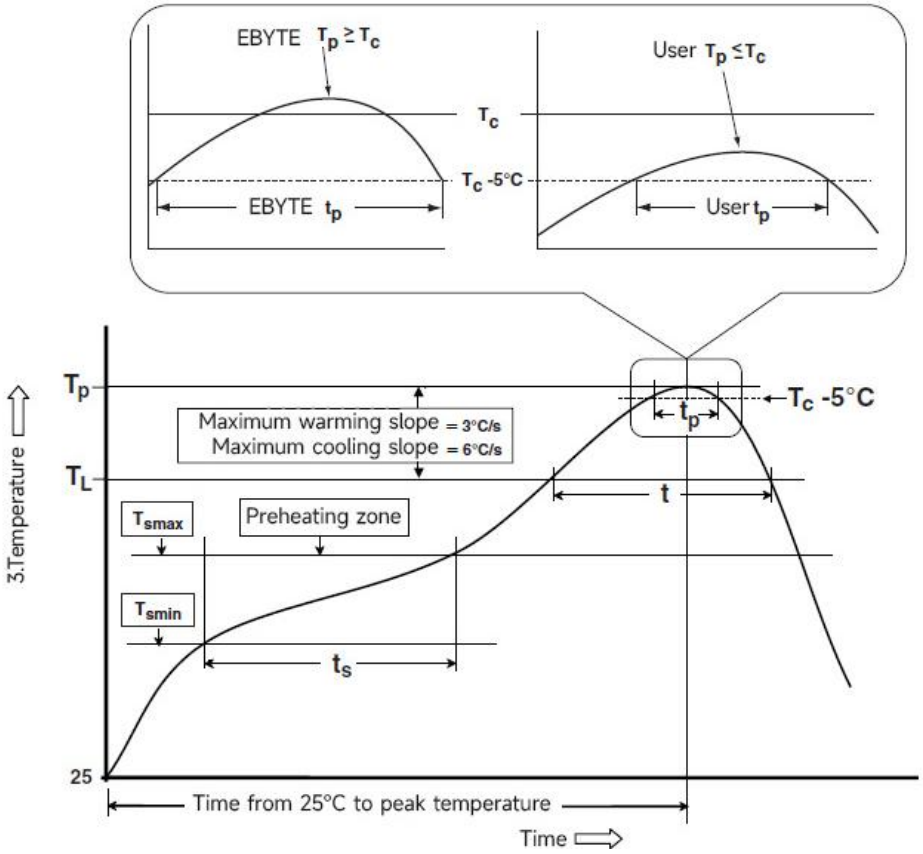
Chapter 7 Welding Operation Instructions

7.1 Reflow soldering temperature

Reflow soldering curve characteristics		Assembled with lead process	Lead-free process assembly
Preheating /keeping warm	Minimum temperature (Tsmin)	100℃	150℃
	Maximum temperature (Tsmax)	150℃	200℃
	Time(Tsmin~Tsmin)	60-120 seconds	60-120 seconds
Heating slope (TL~Tp)		3 °C/sec, maximum	3 °C/sec, maximum
Liquid phase temperature (TL)		183℃	217℃
TL above the holding time		60~90 seconds	60~90 seconds
Peak temperature of the package Tp		The user must not exceed the temperature indicated on the product's "Moisture Sensitivity" label.	The user must not exceed the temperature indicated on the product's "Moisture Sensitivity" label.
The time (Tp) within 5°C of the specified grading temperature (Tc) is shown in the figure below		20 seconds	30 seconds
Cooling slope (Tp~TL)		6°C/sec, max	6°C/sec, max
The time from room temperature to peak temperature		6 minutes, the longest	8 minutes, the longest
※The peak temperature (Tp) tolerance of the temperature curve is defined as the upper limit of the user			

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

7.2 Reflow soldering curve



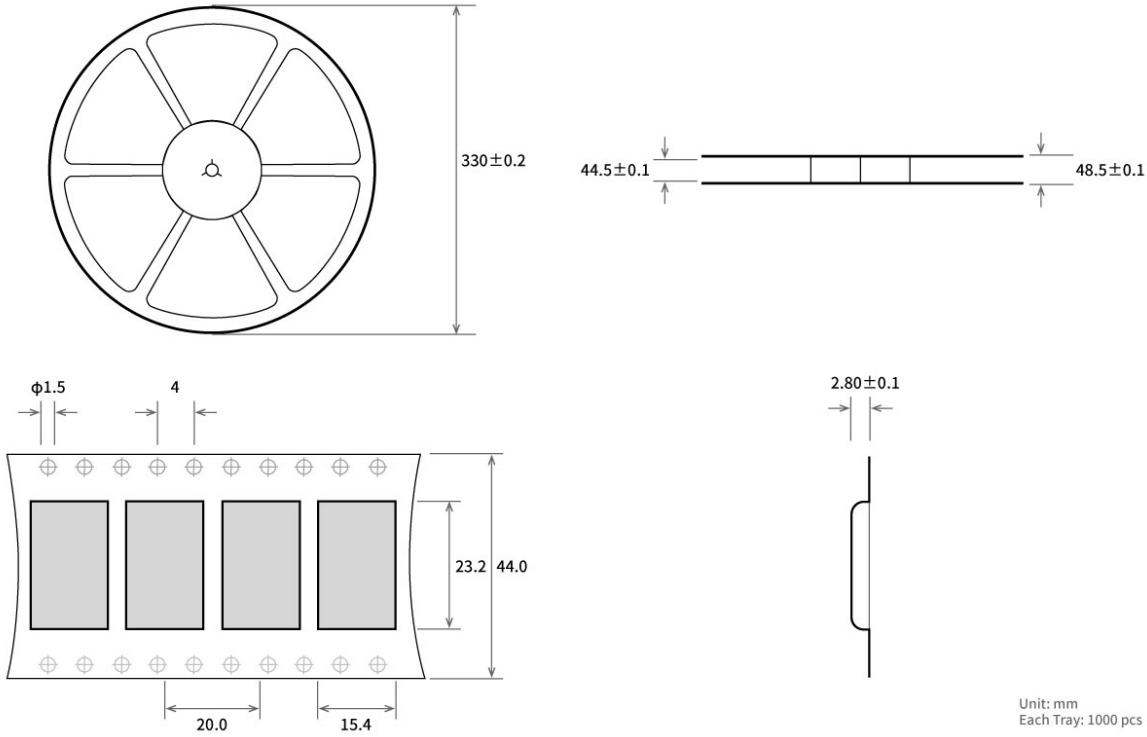
Chapter 8 Antenna Guide

Antennas play an important role in the communication process, and often inferior antennas will have a great impact on the communication system, so our company recommends some antennas as antennas that match our wireless modules and have excellent performance and reasonable prices.

Product model	type	Band	gain	size	Feeder	interface	peculiarity
		Hz	dBi	mm	Cm		
TX2400-JKD-20	Glue stick antenna	2.4G	5.0	13x175x25	-	SMA-J	Fixed bending, omnidirectional antenna
TX2400-JK-11	Glue stick antenna	2.4G	2.5	8x90x10	-	SMA-J	Fixed bending, omnidirectional antenna
TX2400-JZLW-15	Glue bar cabinet antenna	2.4G	5.0	165	-	IPEX-1	Straight, omnidirectional antenna

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Chapter 9 Batch Packaging Methods



Revision History

version	Date of revision	Revision Notes	Maintainers
1.0	2024-8-6	Initial release	Hao
1.1	2025-5-6	Modify the pin annotation	Hao

About us

Technical support: service@cdebyte.com

Documents and RF Setting download link: https://www.cdebyte.com

Thank you for using Ebyte products! Please contact us with any questions or suggestions: info@cdebyte.com

Address: B5 Mould Park, 199# Xiqu Ave, High-tech District, Sichuan, China

Chengdu Ebyte Electronic Technology Co.,Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000