
Bluetooth Module Datasheet

Model: SJR-BTM581

Version: V1.2

2026-04-19

Sky Jiarun Technologies Co., Ltd.

Tel: (0755)85279490

E-mail: sales@tianjiarun.com

Web: www.tianjiarun.com

Baoan, Shenzhen

List of Contents

1 Introduction	3
2 Key Features	3
3 Applications	4
4 Block Diagram	4
5 General specifications	4
6 Module Package Information	5
6.1 Pinout Diagram and package dimensions	5
6.2 Module Pin descriptions	6
7 Electrical Characteristics	10
7.1 Absolute Maximum Ratings	10
7.2 Recommended Operating Conditions	10
8 Recommended reflow temperature profile	12

1 Introduction

Sky Jiarun Technologies introduces the pioneer of the Bluetooth 6.2 modules SJR-BTM581 which is a high performance, cost effective, low power and compact solution. The Bluetooth module provides a complete 2.4GHz Bluetooth system based on the QCC5181 WLCSP chipset which is a single chip radio and baseband IC for Bluetooth 2.4GHz systems. This module is fully qualified single-chip dual mode Bluetooth@v6.2 system.

2 Key Features

BTM581(QCC5181) Features

- Qualified to Bluetooth v6.2 specification
- Dual 240 MHz Qualcomm® Kalimba™ audio DSP
- 32/80 MHz Developer Processor for applications
- Firmware Processor for system
- Flexible QSPI flash programmable platform
- High-performance 24-bit stereo audio interface
- Digital and analog microphone interfaces
- Flexible PIO controller and LED pins with PWM support
- Serial interfaces: UART, Bit Serializer (I² C/SPI), USB 2.0
- Advanced audio algorithms
- Active Noise Cancellation:Hybrid, Feedforward, and Feedback modes, using Digital or Analog Mics, enabled using license keys available from Qualcomm®
- Qualcomm® aptX™ and aptX HD Audio
- aptX Adaptive, enabled using license key
- Qualcomm® cVc™ Noise Cancellation Technology,enabled using license key
- Integrated PMU: Dual SMPS for system/digital circuits, Integrated Li-ion battery charger
- 99-ball 4.930 mm x 3.936 mm x 0.57 mm, 0.4 mm pitch WLCSP

Application subsystem

- Dual-core application subsystem 32/80MHz operation
- 32-bit Firmware Processor (reserved for system use) executes:
 - Bluetooth upper stack
 - Profiles
 - House-keeping code
- 32-bit Developer Processor executes:
 - Developer applications
- Both cores execute code from external flash memory using QSPI clocked at 32 MHz or 80 MHz
- On-chip caches per core enable optimized performance and power consumption

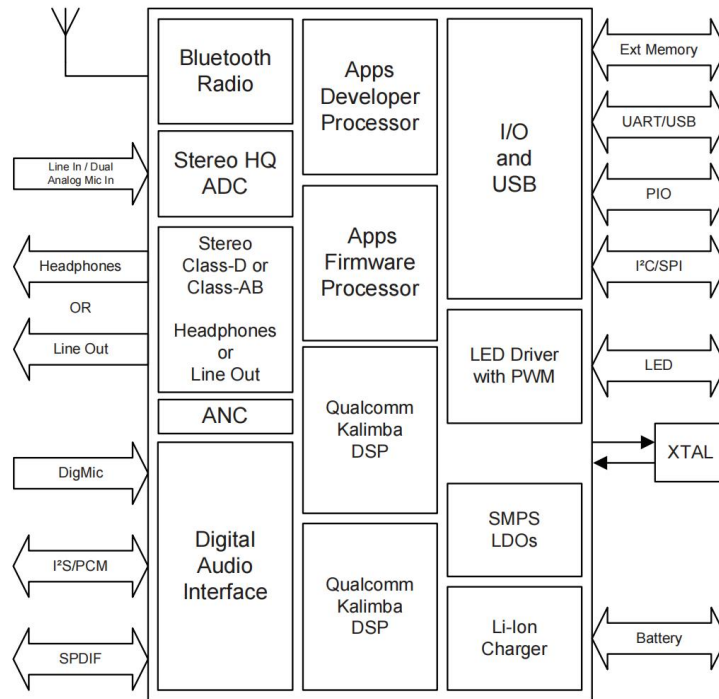
Bluetooth subsystem

- Qualified to Bluetooth v6.2 specification including 2 Mbps Bluetooth Low Energy and Bluetooth Low Energy Isochronous Channels
- Qualcomm® Bluetooth High Speed Link
- Single ended antenna connection with on-chip balun and Tx/Rx switch
- Bluetooth, Bluetooth Low Energy, and mixed topologies supported
- Class 1 support

3 Applications

- Wired/wireless stereo headsets/headphones
- Qualcomm TrueWireless™ stereo earbuds

4 Block Diagram

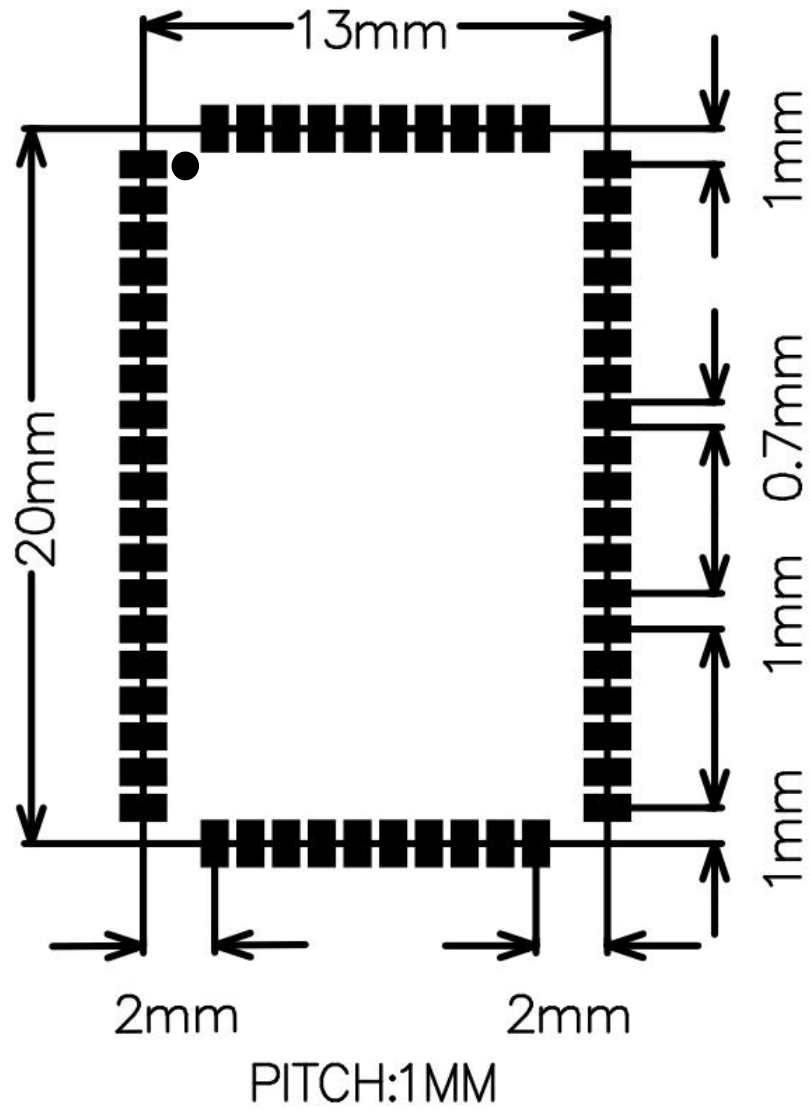


5 General specifications

Model Name	SJR-BTM581
Product Description	Bluetooth 6.2 Class1.5 Module
Bluetooth Standard	Bluetooth 6.2
Chipset	QCC5181 WLCSP
Dimension	13mm x 20mm x 2.8mm
Operating Conditions	
Voltage	2.8~4.3V
Temperature	-40~+85°C
Storage Temperature	-40~+85°C
Electrical Specifications	
Frequency Range	2402~2480MHz
Maximum RF Transmit Power	13dBm
π /4 DQPSK Receive Sensitivity	-94dBm
8DPSK Receive Sensitivity	-88dBm

6 Module Package Information

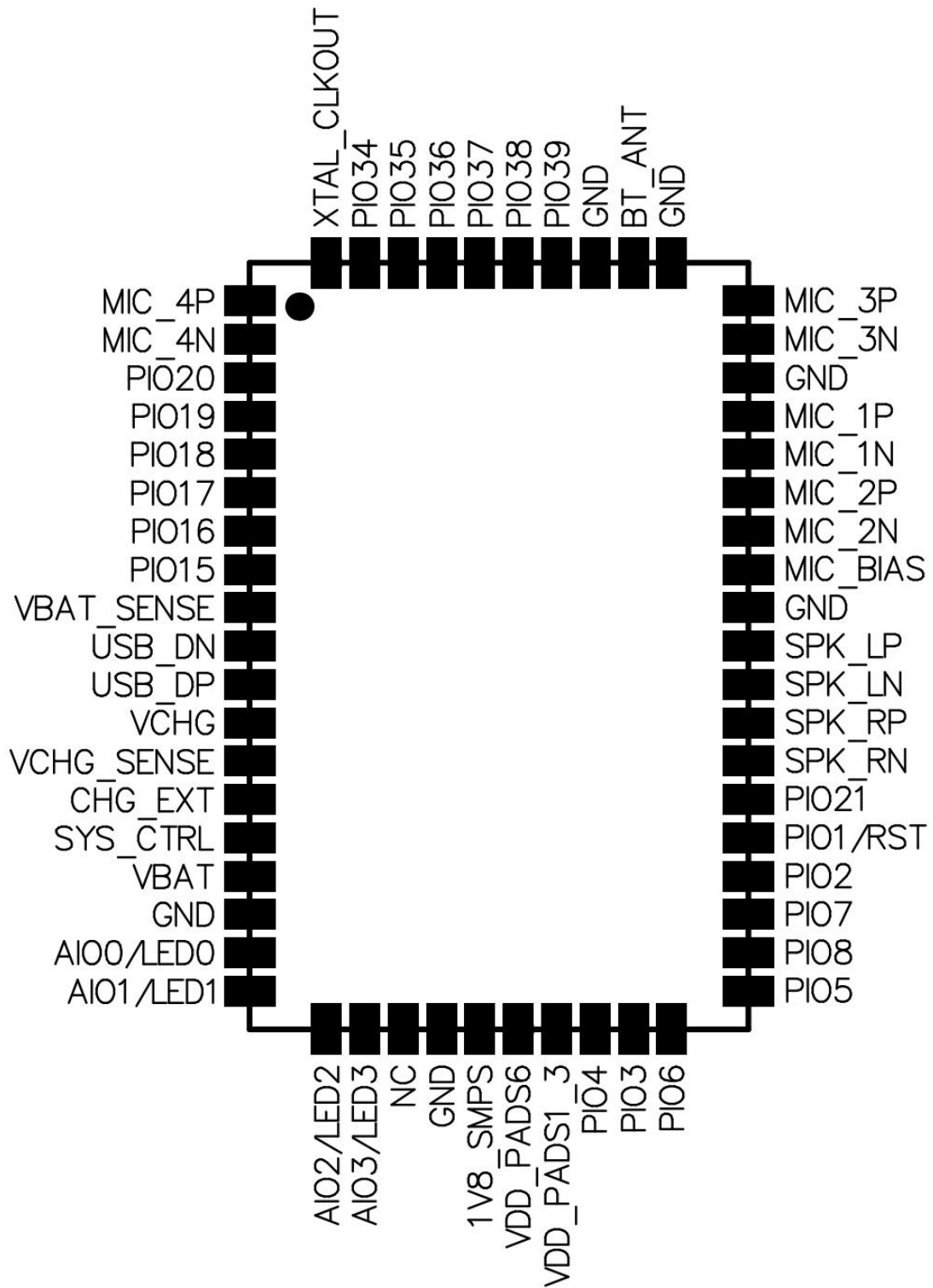
6.1 Pinout Diagram and package dimensions



Unit: MM

Recommended PCB layout footprint

6.2 Module Pin descriptions



Pin#	Pin Name	Pin type	Description
1	MIC_4P	Analog	Microphone differential 4 input, positive. Alternative function: ■ Differential audio line input 4,positive
2	MIC_4N	Analog	Microphone differential 4 input,negative. Alternative function: ■ Differential audio line input 4,negative
3	PIO[20]	Digital: Bidirectional with programmable strength internal pull-up/pull-down	Programmable I/O line 20. Alternative function: ■ PCM_DOUT[1]
4	PIO[19]	Digital: Bidirectional with programmable strength internal pull-up/pull-down	Programmable I/O line 19. Alternative function: ■ PCM_DIN[0]
5	PIO[18]	Digital: Bidirectional with programmable strength internal pull-up/pull-down	Programmable I/O line 18. Alternative function: ■ PCM_DOUT[0]
6	PIO[17]	Digital: Bidirectional with programmable strength internal pull-up/pull-down	Programmable I/O line 17. Alternative function: ■ PCM_SYNC
7	PIO[16]	Digital: Bidirectional with programmable strength internal pull-up/pull-down	Programmable I/O line 16. Alternative function: ■ PCM_CLK
8	PIO[15]	Digital: Bidirectional with programmable strength internal pull-up/pull-down	Programmable I/O line 15. Alternative function: ■ MCLK_OUT
9	VBAT_SENSE	Analog	Battery voltage sense input.
10	USB_DN	Digital	USB Full Speed device D- I/O.
11	USB_DP	Digital	USB Full Speed device D+ I/O.
12	VCHG	Supply	Supply to SMPS power switch from battery.
13	VCHG_SENSE	Analog	Charger input sense pin. High impedance. Connect VCHG_SENSE direct to SMPS_VCHG.
14	CHG_EXT	Analog	External charger transistor current control. Connect to base of external charger transistor as per application schematic.
15	SYS_CTRL	Digital input	Typically connected to an ON/OFF push button. If power is present from the battery and/or charger, and software has placed the device in the OFF or DORMANT state, a button press boots the device. Also usable as a digital input in normal operation. No pull. Additional function: ■ PIO[0] input only

16	VBAT	Supply	Battery voltage input.
17	GND	Ground	Ground
18	AIO0/LED0	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.
19	AIO1/LED1	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.
20	AIO2/LED2	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.
21	AIO3/LED3	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.
22	NC	NC	NC
23	GND	Ground	Ground
24	1V8_SMPS	Supply	1.8V voltage output.
25	VDD_PADS6	Supply	1.8 V/3.3 V PIO supply.
26	VDD_PADS1_3	Supply	1.8 V/3.3 V PIO supply.
27	PIO[4]	Digital: Bidirectional with programmable strength internal pull-up/pull-down	Programmable I/O line 4. Alternative function: ■ TBR_MOSI[1]
28	PIO[3]	Digital: Bidirectional with programmable strength internal pull-up/pull-down	Programmable I/O line 3. Alternative function: ■ TBR_MISO[2]
29	PIO[6]	Digital: Bidirectional with programmable strength internal pull-up/pull-down	Programmable I/O line 6. Alternative function: ■ TBR_MOSI[0]
30	PIO[5]	Digital: Bidirectional with programmable strength internal pull-up/pull-down	Programmable I/O line 5. Alternative function: ■ TBR_MISO[1]
31	PIO[8]	Digital: Bidirectional with programmable strength internal pull-up/pull-down	Programmable I/O line 8. Alternative function: ■ TBR_CLK
32	PIO[7]	Digital: Bidirectional with programmable strength internal pull-up/pull-down	Programmable I/O line 7. Alternative function: ■ TBR_MISO[0]
33	PIO[2]	Digital: Bidirectional with programmable strength internal pull-up/pull-down	Programmable I/O line 2. Alternative function: ■ TBR_MISO[3]
34	PIO[1]/RST	Digital: Bidirectional with programmable strength internal pull-up/pull-down	Automatically defaults to RESET# mode when the device is unpowered, or in off modes. Reconfigurable as a PIO after boot. Alternative function: ■ Programmable I/O line 1
35	PIO[21]	Digital: Bidirectional with programmable strength internal pull-up/pull-down	Programmable I/O line 21. Alternative function: ■ PCM_DOUT[2]

36	SPK_RN	Analog	Headphone/speaker differential 2 output, negative. Alternative function: ■ Differential line output 2, negative
37	SPK_RP	Analog	Headphone/speaker differential 2 output, positive. Alternative function: ■ Differential line output 2, positive
38	SPK_LN	Analog	Headphone/speaker differential 1 output, negative. Alternative function: ■ Differential line output 1, negative
39	SPK_LP	Analog	Headphone/speaker differential 1 output, positive. Alternative function: ■ Differential line output 1, positive
40	GND	Ground	Ground
41	MIC_BIAS	Analog	Mic bias output.
42	MIC_2N	Analog	Microphone differential 2 input, negative. Alternative function: ■ Differential audio line input 2, negative
43	MIC_2P	Analog	Microphone differential 2 input, positive. Alternative function: ■ Differential audio line input 2, positive
44	MIC_1N	Analog	Microphone differential 1 input, negative. Alternative function: ■ Differential audio line input 1, negative
45	MIC_1P	Analog	Microphone differential 1 input, positive. Alternative function: ■ Differential audio line input 1, positive
46	GND	Ground	Ground
47	MIC_3N	Analog	Microphone differential 3 input, negative. Alternative function: ■ Differential audio line input 3, negative
48	MIC_3P	Analog	Microphone differential 3 input, positive. Alternative function: ■ Differential audio line input 3,

			positive
49	GND	Ground	Ground
50	BT_ANT	RF	Bluetooth transmit/receive.
51	GND	Ground	Ground
52	PIO[39]	Digital: Bidirectional with programmable strength internal pull-up/pull-down	Programmable I/O line 39. Alternative function: ■ QSPI2_IO[3]
53	PIO[38]	Digital: Bidirectional with programmable strength internal pull-up/pull-down	Programmable I/O line 38. Alternative function: ■ QSPI2_CS0#
54	PIO[37]	Digital: Bidirectional with programmable strength internal pull-up/pull-down	Programmable I/O line 37. Alternative function: ■ QSPI2_IO[1]
55	PIO[36]	Digital: Bidirectional with programmable strength internal pull-up/pull-down	Programmable I/O line 36. Alternative function: ■ QSPI2_IO[2]
56	PIO[35]	Digital: Bidirectional with programmable strength internal pull-up/pull-down	Programmable I/O line 35. Alternative function: ■ QSPI2_CLK
57	PIO[34]	Digital: Bidirectional with programmable strength internal pull-up/pull-down	Programmable I/O line 34. Alternative function: ■ QSPI2_IO[0]
58	XTAL_CLKOUT	Analog	Buffered clock output.

7 Electrical Characteristics

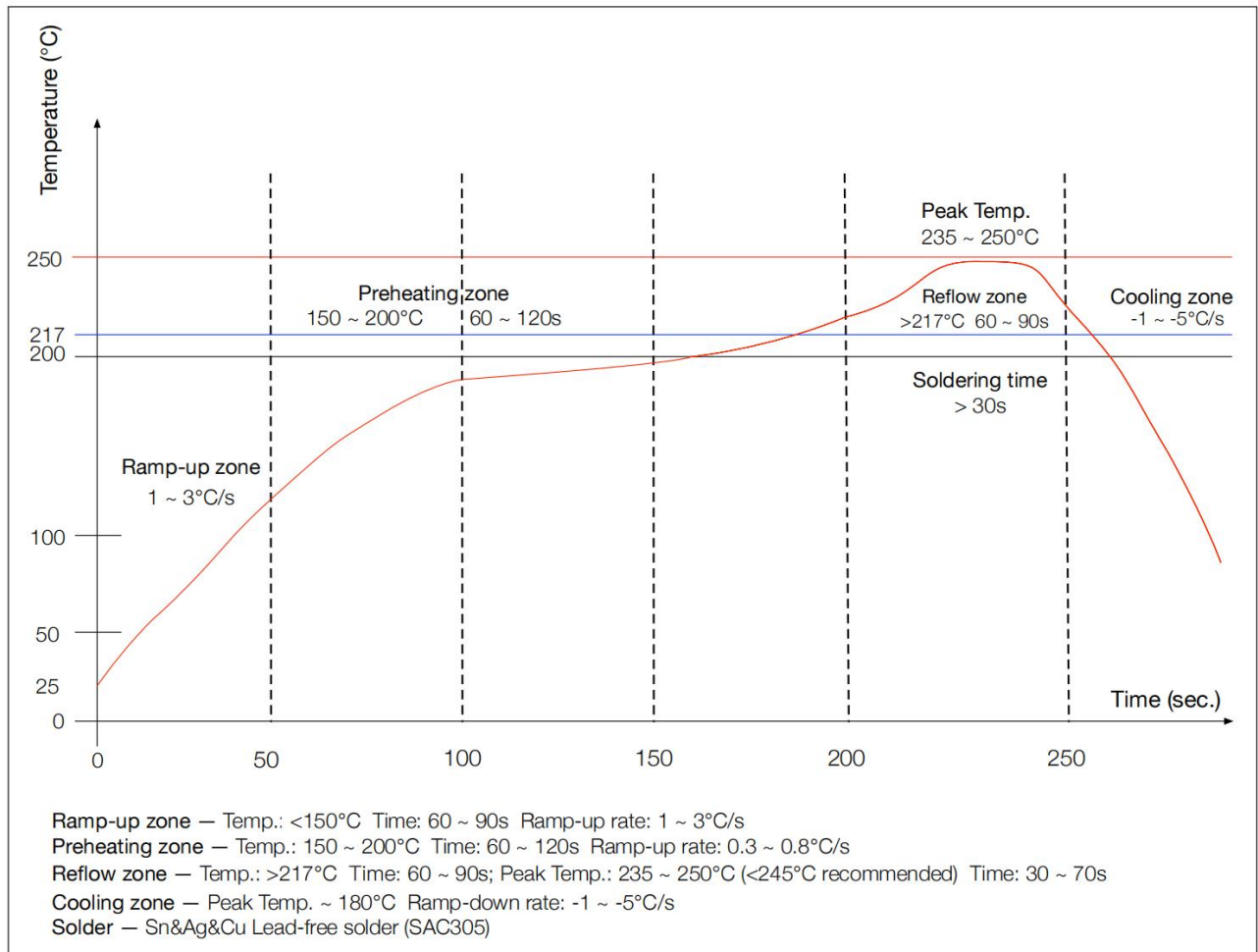
7.1 Absolute Maximum Ratings

Rating	Minimum	Maximum
Storage temperature	-40°C	+85°C

7.2 Recommended Operating Conditions

Operating Condition	Minimum	Maximum
Operating temperature range	-40°C	+85°C
Supply voltage: VBAT	+2.8V	+4.3V

8 Recommended reflow temperature profile



The module Must go through 125°C baking for at least 9 hours before SMT AND IR reflow process!

若拆封后未立即上线，天嘉润科技建议让下次上线前务必以 **125°C** 烘烤 **9** 小时以上！

Record of Changes

Data	Revision	Description
2023-02-01	V1.0	Original publication of this document.
2023-07-10	V1.1	Update bluetooth version information.
2026-04-19	V1.2	Update bluetooth version information.

IMPORTANT NOTICE

Sky Jiarun Technologies Co.,Ltd (SJR) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current. All products are sold subject to the SJR terms and conditions of sale supplied at the time of order acknowledgement, including those pertaining to warranty, patent infringement, and limitation of liability.

SJR warrants performance of its products to specifications applicable at the time of sale in accordance with SJR's standard warranty. Testing and other quality control techniques are utilized to the extent SJR deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

In order to minimize risks associated with customer applications, adequate design and operating safeguards must be used by the customer to minimize inherent or procedural hazards. SJR products are not authorized for use as critical components in life support devices or systems without the express written approval of an officer of the company. Life support devices or systems are devices or systems that are intended for surgical implant into the body, or support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided, can be reasonably expected to result in a significant injury to the user. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

SJR assumes no liability for applications assistance or customer product design. SJR does not warrant or represent that any license, either express or implied, is granted under any patent right, mask work right, or other intellectual property right of SJR covering or relating or any combination, machine, or process in which such products or services might be or are used.

Tel: (0755) 85279490

Fax: (0755) 85279683

Web: www.tianjiarun.com

E-mail: sales@tianjiarun.com