JS-BTMA1R19

Fihonest Bluetooth Module User Manual

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Revision History

Date	Version	Description	Author
2016-04-26	V1.0	n First Release	

CONTENT

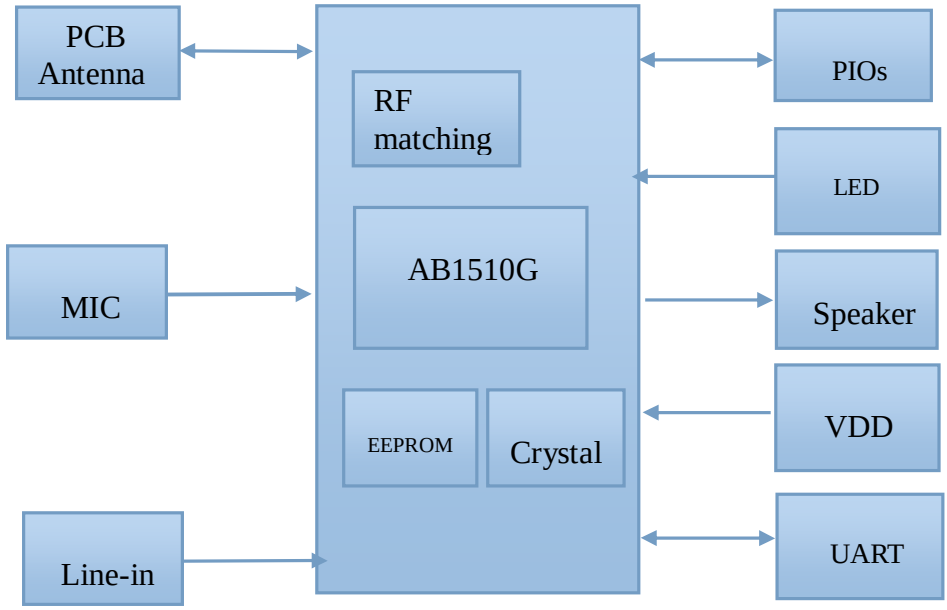
1. INTRODUCTION

The JS-BTMA1R19 Bluetooth® module is a perfect solution for enhanced audio applications, such as stereo headset and speaker. It can be connected with any Bluetooth® devices in an operating range. It is slim and light so the designers can have better flexibilities for the product shapes.

The JS-BTMA1R19 Bluetooth® module complies with Bluetooth® specification version 4.1 with EDR. It contains a powerful 48MIPS dual-MAC DSP coprocessor for enhanced audio applications. The built-in noise reduction and echo cancellation functions enhance the voice quality .It supports HSP, HFP, A2DP, AVRCP, SPP,HID profiles. It integrates RF baseband and radio, antenna,… etc. and provide UART interface, programmable I/O,stereo speaker output, microphone input,… etc.

The detail information of JS-BTMA1R19 Bluetooth® module is presented in this document below.

1.1 Block Diagram



1.2 Features

- ü Small overall dimension (25 * 14.5 * 2.2 mm)
- ü Bluetooth® V4.1
- ü Support EDR function
- ü Physical connection as SMD type
- ü High quality stereo audio
- ü Embedded 48MIPS dual-MAC DSP coprocessor
- ü Support for noise reduction and echo cancellation
- ü Multi-band configurable EQ
- ü Support for voice prompt
- ü Multipoint for HFP and A2DP
- ü Support HSP(v1.2), HFP(v1.6), A2DP(v1.3), AVRCP(v1.5),SPP(1.2),HID profiles
- ü Based on Airoha chip set AB1510G
- ü Integrated Li-ion battery charger supports 400mA fast charging and over-discharging protection
- ü Integrated 1.35V Buck and 3V/1.8V LDO regulator
- ü RoHS Compliant
- ü No radio signal interference, support for 802.11 co-existence

※ ***Some features are optional for customization on demand.***

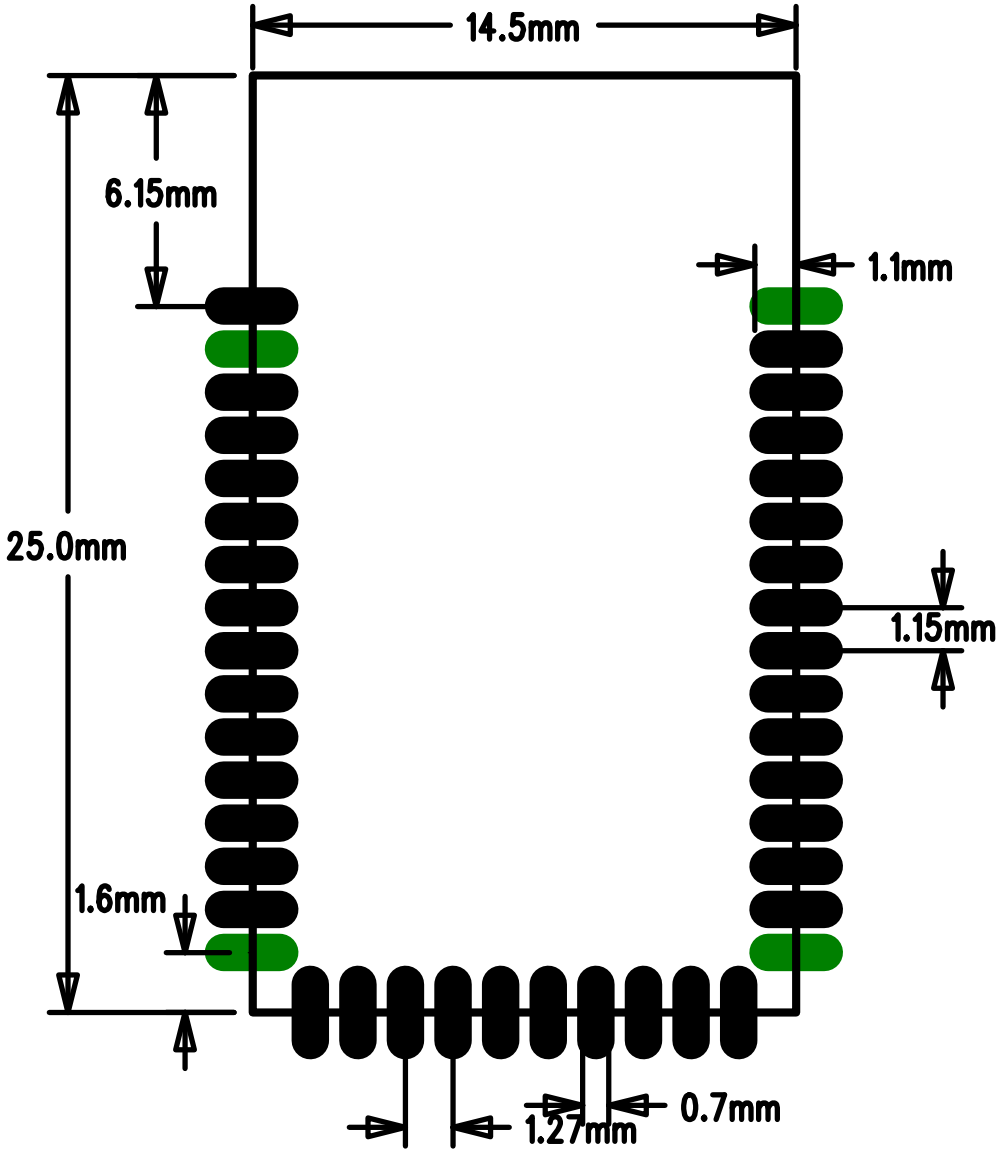
1.3 Application

- ü High Quality Stereo Bluetooth Headset
- ü Bluetooth Speaker

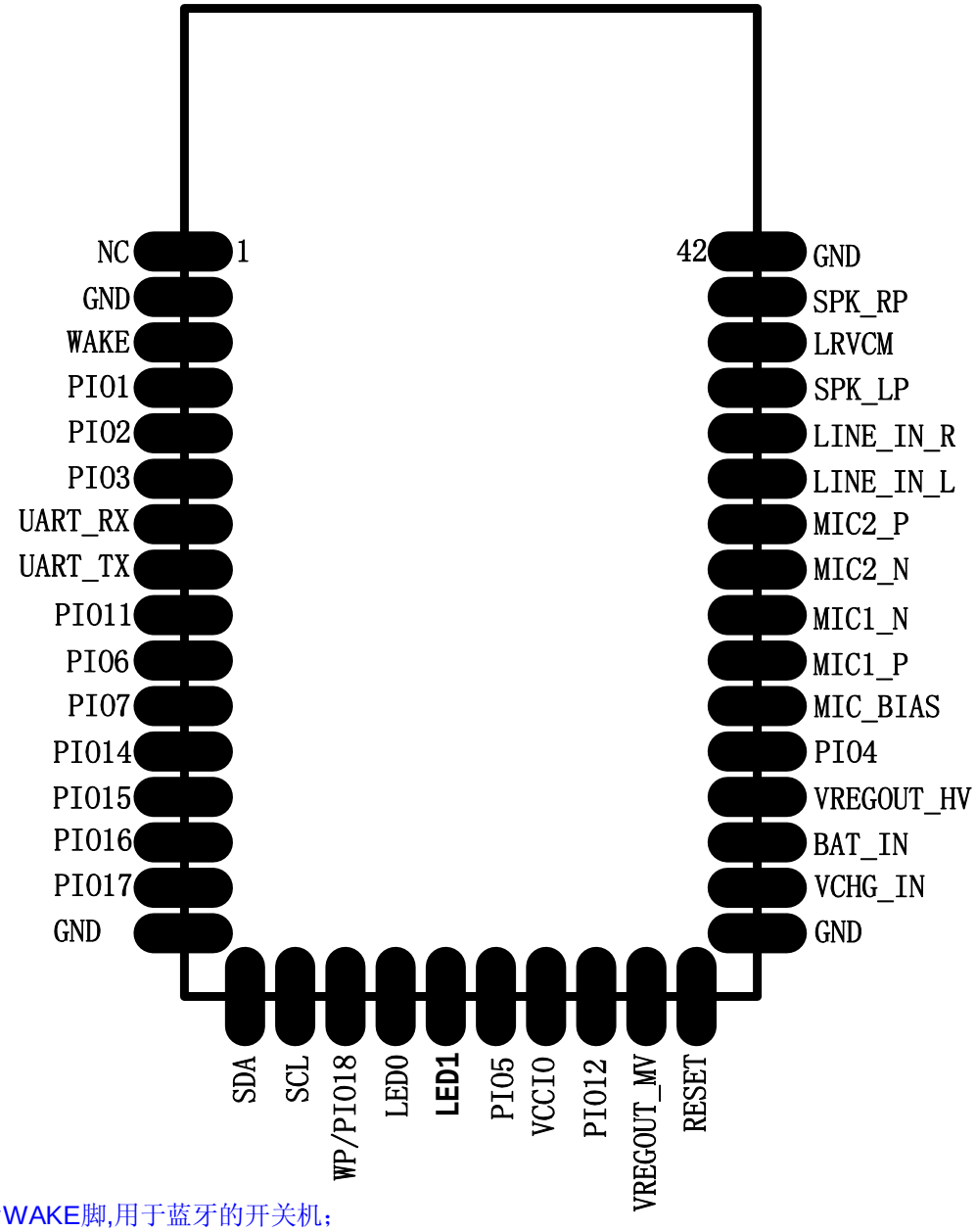
2. GENERAL SPECIFICATION

Bluetooth Specification	
Chip Set	Airoha AB1510G
Module ID	JS-BTMA1R19
BT Standard	Bluetooth® V4.1
RF TX Output Power	4dBm (Class II)(max)
Sensitivity	-86dBm@0.1%BER
Frequency Band	2.402GHz~2.480GHz ISM Band
Modulation Type	GFSK,π/4 DQPSK,8DPSK
Channel No.	79(for Classic)
Baseband Crystal OSC	26MHz
Hopping	1600hops/sec, 1MHz channel space
RF Input Impedance	50 ohms
Environmental	RoHS Compliant

3. PHYSICAL CHARACTERISTIC



Drill size:0.4mm
Ring+Drill size:0.4mm
Pad size:0.4mm



Note:

PIO0作为WAKE脚,用于蓝牙的开关机;

PIO1/PIO2/PIO3只能作为输入PIO口;

PIO7作为升级软件的CLK口，因此PIO7不能用于其他功能;

PIO4一般作为AMP的控制脚;

PIO5是UART_RTS;

PIO6/ PIO12/PIO14/PIO15/PIO16/PIO17作为I/0口使用;

P1011一般作为AUX IN检测脚;

PIO13和PIO12可以作为LED3和LED2;

PIO14，PIO15，PIO16，PIO17作为I2S输出是分别为LRCLK,DATE,MCLK,BCLK。LRCLK支持48K/44.1,BCLK支持32*LRCLK,MCLK是12.288M，只能支持MASTE，A2DP和AUX IN

3.1 Pin Description

Pin#	Pin Name	Pad Type	Description
1	NC	NC	NC
2	GND	Ground	Ground
3	WAKE	Input, Digital	Input Pin 用于蓝牙的开关机
4	PIO1	Input, Digital	Input Pin 只能作为输入PIO口
5	PIO2	Input, Digital	Input Pin 只能作为输入PIO口
6	PIO3	Input, Digital	Input Pin with 750K pull up 只能作为输入PIO口
7	UART_RX	Input, Digital	UART RX
8	UART_TX	Output, Digital	UART TX
9	PIO11	Input/Output, Digital	Programmable IO I2S输入脚
10	PIO6	Input/Output, Digital	Programmable IO 作为I/0口使用
11	PIO7	Input/Output, Digital	Programmable IO 升级软件的CLK口,不能用于其他功能
12	PIO14	Input/Output, Digital	Programmable IO 作为I/0口使用 可以作为PCM和SPI脚
13	PIO15	Input/Output, Digital	Programmable IO 作为I/0口使用 可以作为SPDIF输出口
14	PIO16	Input/Output, Digital	Programmable IO 作为I/0口使用 可以作为PCM和SPI脚
15	PIO17	Input/Output, Digital	Programmable IO 作为I/0口使用 可以作为PCM和SPI脚
16	GND	Ground	Ground
17	SDA	Input/Output, Digital	I2C data line
18	SCL	Input/Output, Digital	I2C clock line
19	WP/PIO18	Output, Digital	Write Protect Control for EEPROM
20	LED0	Open Drain	LED 0 for Red Light
21	LED1	Open Drain	LED 1 for Blue Light

22	PIO5	Input/Output, Digital AIO,Analog	Programmable IO 作为UART_RTS
23	VCCIO	Supply, 1.8V~3.3V	VCC for IO
24	PIO12	Input/Output, Digital	Programmable IO 作为I/O口使用 可以作为LED2,作为LED2使用时,上拉电压需要接VCCIO
25	VREGOUT_MV	Analog	LDO output 输出1.8V
26	RESET	Input, Digital	Global reset 拉高25MS以上复位
27	GND	Ground	Ground
28	VCHG_IN	Supply, 5V	VCC for Charger
29	BAT_IN	Supply	Battery input P, as Switching/Linear regulator input
30	VREGOUT_HV	Analog	LDO output 输出3.3V
31	PIO4	Input/Output, Digital AIO, Analog	Programmable IO 作为AMP的控制脚
32	MIC_BIAS	Analog	Microphone bias
33	MIC1_P	Analog	Microphone 1 P-path
34	MIC1_N	Analog	Microphone 1 N-path
35	MIC2_N	Analog	Microphone 2 N-path 暂时没有作用，只能使用MIC1
36	MIC2_P	Analog	Microphone 2 P-path 暂时没有作用，只能使用MIC1
37	LINE_IN_L	Analog	Line in L-path
38	LINE_IN_R	Analog	Line in P-path
39	SPK_LP	Analog	Speaker output LP
40	LRVCM	NC	NC
41	SPK_RP	Analog	Speaker output RP
42	GND	Ground	Ground

4.Function Description

4.1 Radio Transceiver

- The RF transceiver is a 2.4GHz-band transceiver for the Bluetooth Headset applications. There are three main functions – transmitter, receiver, and synthesizer. The enable control signals of these functions are given by the Baseband Processing Unit.

4.2 Baseband Processing Unit

- The baseband processing unit contains a MCU subsystem, a Link Manager and a Modem.

4.3 Serial Interfaces

4.3.1 SPI

- The SPI is capable of communicating with external devices. Both 3-wire and 4-wire mode SPI interfaces are supported. When 3-wire mode is selected, SPI_MOSI would be data I/O pin of the SPI interface. Only master mode is supported.

	Four-wire Mode		Three-wire Mode	
PIO14	O	NCS	O	NCS
PIO15	O	MOSI	I/O	DATA_IO
PIO16	I	MISO	NA	
PIO17	O	SCK	O	SCK

4.3.2 UART

- The UART interface supports flexible configurations as listed below. There are local FIFOs and DMA which can achieve high throughputs serial communications.

Configuration Parameters	Supported Values
Data Length	8 bits
Flow control	Hardware RTS/CTS None
Parity	Even Odd None
Number of stop bits	1 or 2

Baud rate	1200 2400 4800 9600 19200 38400 57600 76800 1152000 230400 460800 921600 1843200

4.4 Power Management/Regulation

- AB1510 integrates a Power Management Unit (PMU), one Bulk regulator, one LDO regulator, and a Li-ion

4.4.1 Li-ion Battery Charger

- The Li-mode battery charger of AB1510 provides five modes:
  - Trickle mode
  - Constant current mode (CC mode)
  - Constant voltage mode (CV mode)
  - Standby mode
  - Error mode

4.5 Audio

- The Audio Interface consists of:
  - Dual Analog audio input
  - Single Analog audio output
  - Dual Line-in inputs
  - Digital Audio interfaces (PCM)

The Audio Processor (APU) includes dual acoustic band ADC and DAC, variable gain amplifiers for external earphone and microphone. The line-input path can switch to processed by DSP or not. There are three digital audio interfaces to transmit or receive audio data. A low-noise microphone bias supply and a ring-tone generator are also embedded in the module.

4.5.1 Analog Audio Input

- There are dual analog audio input ports . The analog audio signal from microphone is first amplified by the microphone amplifier, and converts to digitized data by the ADC. The microphone amplifier is differential end and has programmable gain setting from 42dB to 0dB. The voice codec converts the digitized audio data to associated audio format (A-law/u-law/CVSD) and loads into data Memory through the Audio interface. Either BPU or DSP can access the audio data from data Memory. It also provide Microphone Bias voltage to Microphone to reduce BOM cost.

4.5.2 Analog Audio Output

- There is single analog audio output ports. The DAC loads the audio data from data Memory that is stored by the BPU or DSP. The audio data is decoded by the voice codec or after DSP unit processed then fed into DAC to convert to analog signal format, and amplified by the Ear amplify, and sent to the external speaker. The ear amplifier has programmable gain setting from 9dB to -12dB. The ear amplifier out provide LR voltage common DC to reduce external capacitor in application. The ring tone generator can generate five octave audio tones and play out by the speaker. The whole functions within APU are controlled by MCU

4.5.3 Line Input

n AB1510 provides dual line-input for stereo line-input source such as MP3 or Mobile phone. There are two paths that we can route. One is the line-input source route to the microphone amplifier input after the ADC digitized and DSP processed then send to DAC and Ear amplify. So Line in source can process by the DSP such as equalizer function. The other path is without DSP process. The line in source route to the ear amplifier input directly. All that we can control Line in source level by ear amplifier.

4.5.4 PCM

n The PCM interface support Master mode . In the EEPROM setting select wanted interface and transmit or receive audio data from data memory. The interface shares with the GPIO pin as below.

GPIO pins	PCM interface
GPIO14	PCM_SYNC
GPIO15	PCM_OUT
GPIO16	PCM_IN
GPIO17	PCM_CLK

The PCM interface is a four wire serial interface for transmitting and receiving voice data via digital channel. The PCM_CLK can be programmed to 128 KHz, 256 KHz, 512 KHz or 1536 KHz. The PCM_SYNC supports both short and long frame synchronization schemes. The PCM_SYNC is always fixed at 8 KHz.

5.ELECTRICAL CHARACTERISTIC

5.1 Absolute Maximum Ratings

Item	Min	Typ	Max	Unit
I/O supply voltage (VCCIO)	-0.3		3.6	V
Switching Regulator supply	-0.3		4.4	V
Charger supply voltage	-0.3		6.5	V
Operating temperature	-20		70	°C
Storage temperature	-65		150	°C

5.2 Recommended Operating Conditions

Item	Min	Typ	Max	Unit
Core supply voltage		1.25		V
I/O supply voltage	1.7		3.6	V
Switching Regulator supply	2.7		4.2	V
Audio Speaker voltage	2.7	3	3.3	V
Charger supply voltage	4.5	5	6.5	V

5.3 Battery charger

Item	Min	Typ	Max	Unit
Input Voltage	4.5	5	6.5	V
Charge Current (CC Mode)	25		400	mA
Trickle Charge Current		8		mA
Trickle Charge Threshold Voltage		2.92		V
Regulated Output (Float) Voltage		4.2		V

5.4 RF characteristics

Receiver		Average	Spec	Transmitter		Average	Spec	Unit
Sensitivity at 0.1% Ber	2402MHz	-86	<=-83	Output Power	2402MHz	2.3	0~4	dBm
	2441MHz	-86			2441MHz	2.3		dBm
	2480MHz	-85			2480MHz	2.4		dBm

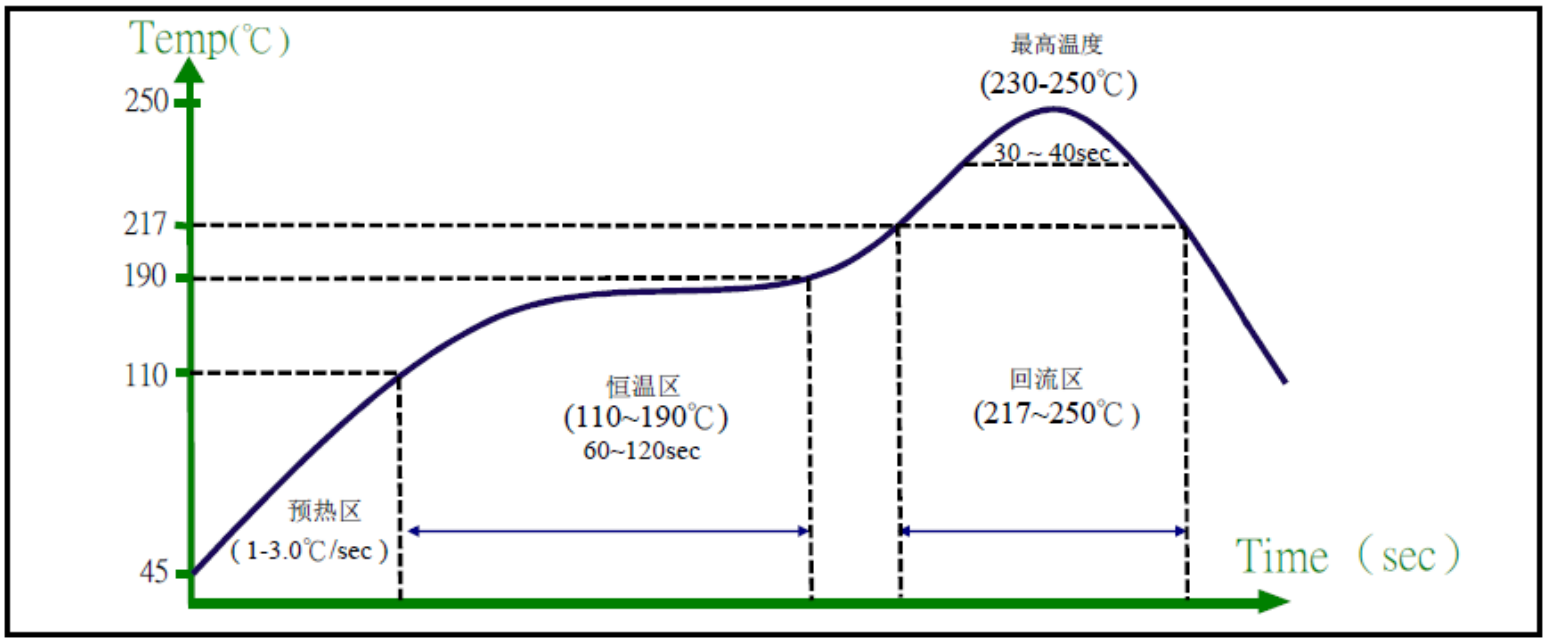
Crystal Trim		Average	Spec	Unit
Frequency Offset	2402MHz	9.5	+/-10	KHz
	2441MHz	9.2		KHz
	2480MHz	9.3		KHz

5.5 Power consumption

Item	Condition	Min	Typ	Max	Unit
Sniff mode*1	Interval=500ms		0.335		mA
SCO mode*2	HV3 packet		11.4		mA
eSCO mode*3	2EV3 packet		9.8		mA
A2DP mode*1	1kHz tone		10.436		mA
Power off mode			0.6		uA

6. REFLOW PROFILE

Reflow number of times: ≤ 2times

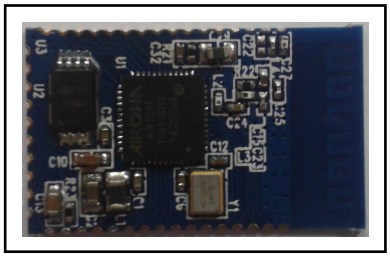


温度范围与要求

1. 预热区:60-90℃以下,升温率1 - 3.0℃/sec
2. 恒温区: 110-190℃时间为 60 - 120sec
3. 217℃以上: 30 - 90sec
4. 230℃ - 250℃ 时间为 30 -40sec
5. 最高温度: 230℃ - 250℃.

7. PACKAGING INFORMATION

1. BLUETOOTH® Module: JS-BTMA1R19



Note: Warning

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Please notice that if the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains FCC ID:2AHS5-1510G" any similar wording that expresses the same meaning may be used.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The module is limited to OEM installation ONLY.
The OEM integrator is responsible for ensuring that the end-user has no manual instruction to remove or install module.
The module is limited to installation in mobile application;
A separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and difference antenna configurations.
There is requirement that the grantee provide guidance to the host manufacturer for compliance with Part 15B requirements.

Note:

The installer must to perform tests inside of each host for the host manufactures product(s) are compliant to all the applicable FCC rules.