Bluetooth Module Datasheet

Model: SJR-BTM371

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1 Introduction

Sky Jiarun Technologies introduces the pioneer of the Bluetooth 5.3 modules SJR-BTM371 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 QCC3071 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@v5.3 system.

2 Key Features

BTM371(QCC3071) Features

- Qualified to Bluetooth v5.3 specification
- 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 (I^2C/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
- 1 or 2 mic Qualcomm® cVc™ headset speech processing
- Integrated PMU: Dual SMPS for system/digital circuits, Integrated Li-ion battery charger

Application subsystem

- Dual-core application subsystem 32/80 MHz 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

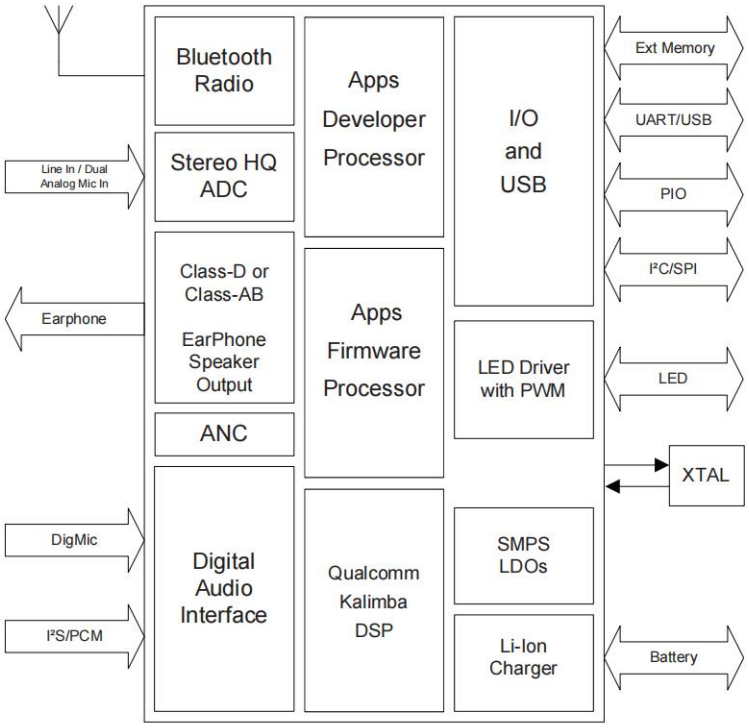
Bluetooth subsystem

- Qualified to Bluetooth v5.3 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

- Qualcomm TrueWireless™ stereo earbuds

4 Block Diagram

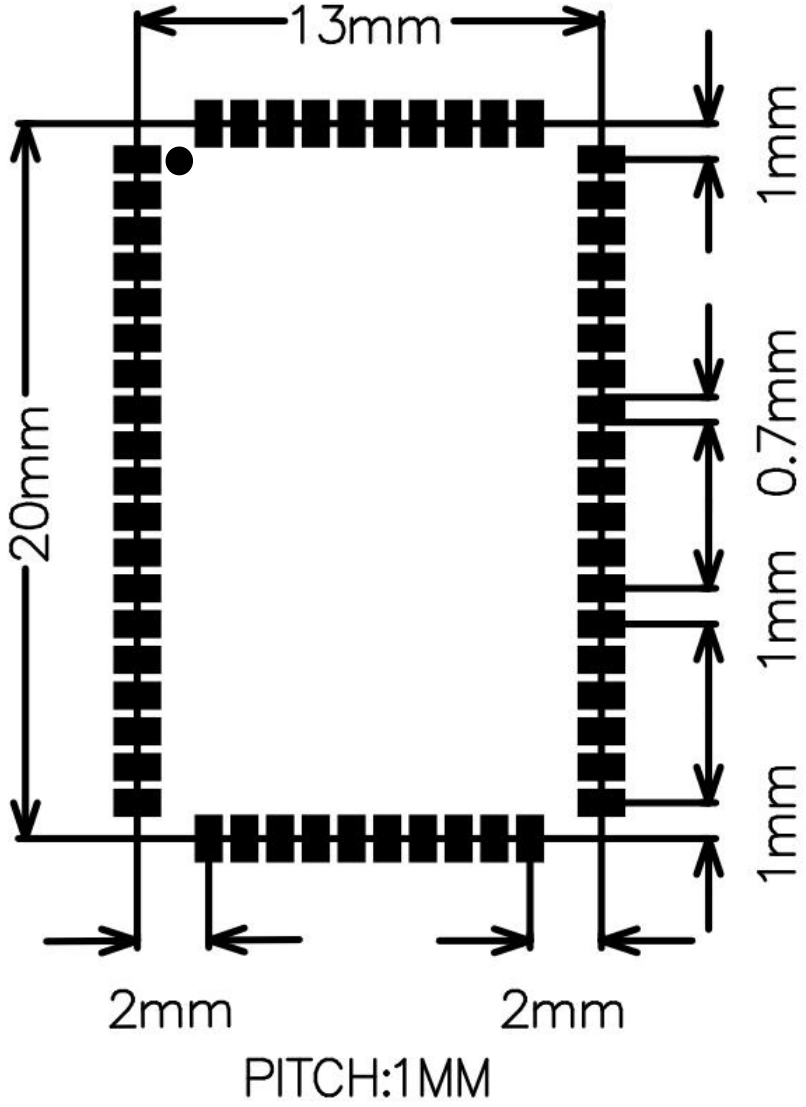


5 General specifications

Model Name	**SJR-BTM371**
Product Description	**Bluetooth 5.3 Class1.5 Module**
Bluetooth Standard	Bluetooth 5.3
Chipset	QCC3071 WLCSP
Dimension	13mm x 20mm x 2.8mm
Operating Conditions	
Voltage	2.8~4.3V
Temperature	-40～+85℃
Storage Temperature	-40～+85℃
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

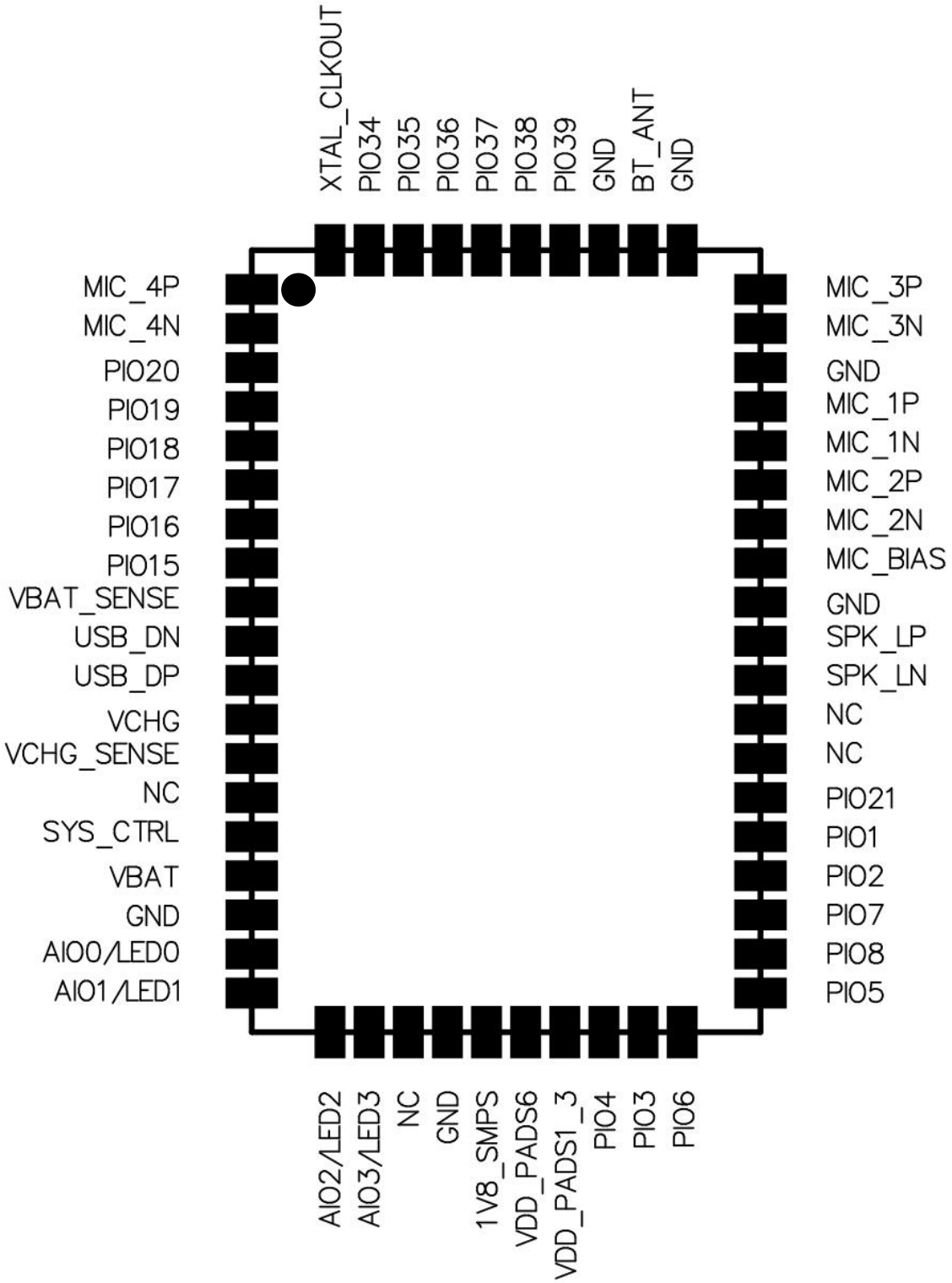
6.1 Pinout Diagram and package dimensions



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.
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.
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	NC	NC	NC
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]	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.
36	NC	NC	NC
37	NC	NC	NC

38	SPK_LN	Analog	Headphone/speaker differential output, negative.
39	SPK_LP	Analog	Headphone/speaker differential output, 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	Programmable I/O line 37. Alternative function:

		internal pull-up/pull-down	■ 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

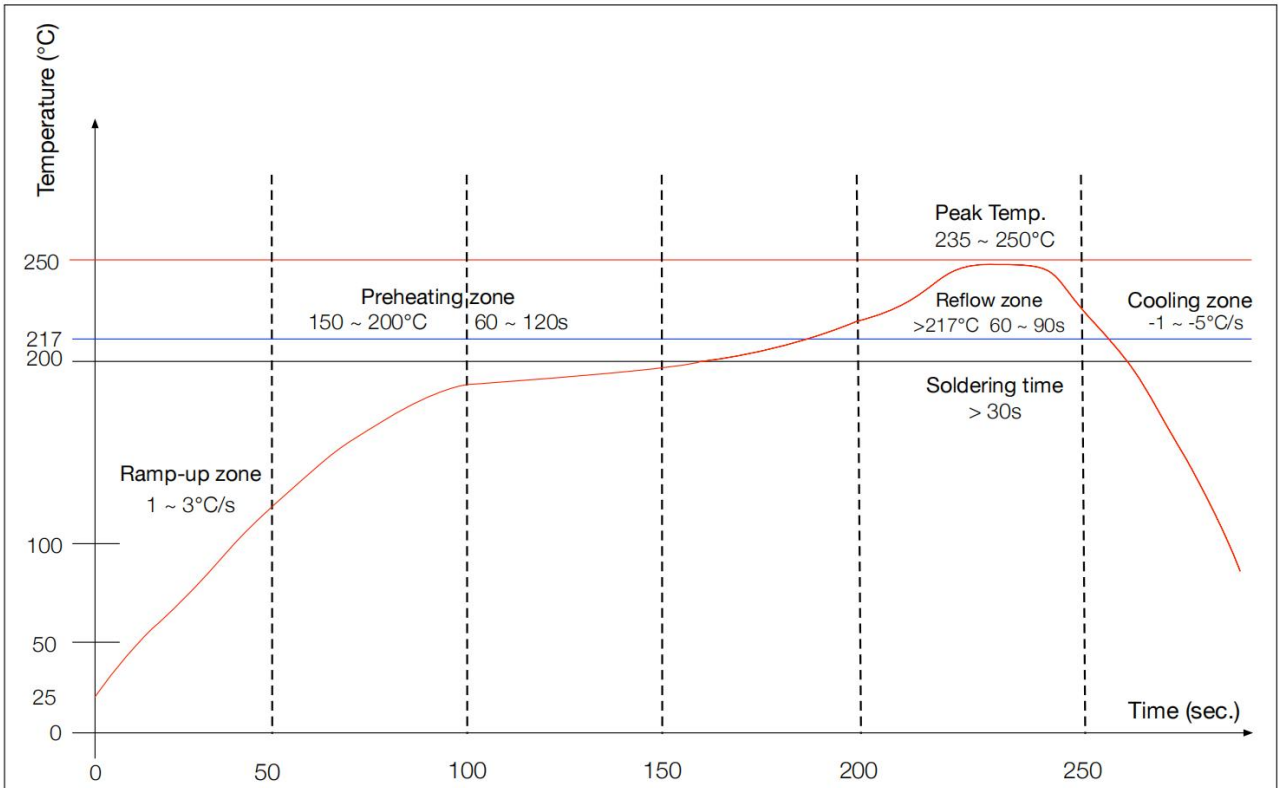
7.1 Absolute Maximum Ratings

Rating	Minimum	Maximum
Storage temperature	-40℃	+85℃

7.2 Recommended Operating Conditions

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

8 Recommended reflow temperature profile



Ramp-up zone — Temp.: <150°C Time: 60 ~ 90s Ramp-up rate: 1 ~ 3°C/s
Preheating zone — Temp.: 150 ~ 200°C Time: 60 ~ 120s Ramp-up rate: 0.3 ~ 0.8°C/s
Reflow zone — Temp.: >217°C Time: 60 ~ 90s; Peak Temp.: 235 ~ 250°C (<245°C recommended) Time: 30 ~ 70s
Cooling zone — Peak Temp. ~ 180°C Ramp-down rate: -1 ~ -5°C/s
Solder — Sn&Ag&Cu Lead-free solder (SAC305)

The module Must go through 125℃ 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**℃烘烤 **9** 小时以上！

Record of Changes

Data	Revision	Description
2022-03-03	V1.0	Original publication of this document.

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