# **Bluetooth Module Datasheet**

Model: SJR-BTM544

**Version: V1.1** 

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### 1 Introduction

**Sky Jiarun Technologies** introduces the pioneer of the Bluetooth 5.2 modules SJR-BTM544 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 QCC5144 BGA 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@v5.2 system.

### 2 Key Features

#### BTM544(QCC5144) Features

- Qualified to Bluetooth v5.2 specification
- Dual 120 MHz Qualcomm® Kalimba™ audio DSPs
- 32/80 MHz Developer Processor for applications
- Firmware Processor for system
- Flexible QSPI flash programmable platform
- High-performance 24bit stereo audio interface
- Digital and analog microphone interfaces
- Flexible PIO controller and LED pins with PWM support
- Serial interfaces: UART, Bit Serializer (I<sup>2</sup> 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<sup>™</sup> Noise Cancellation Technology, enabled using license key
- 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

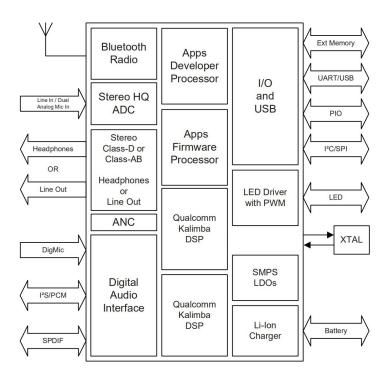
#### Bluetooth subsystem

- Qualified to Bluetooth v5.2 specification including 2 Mbps Bluetooth Low Energy
- 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
- USB to Bluetooth dongle

## **4 Block Diagram**

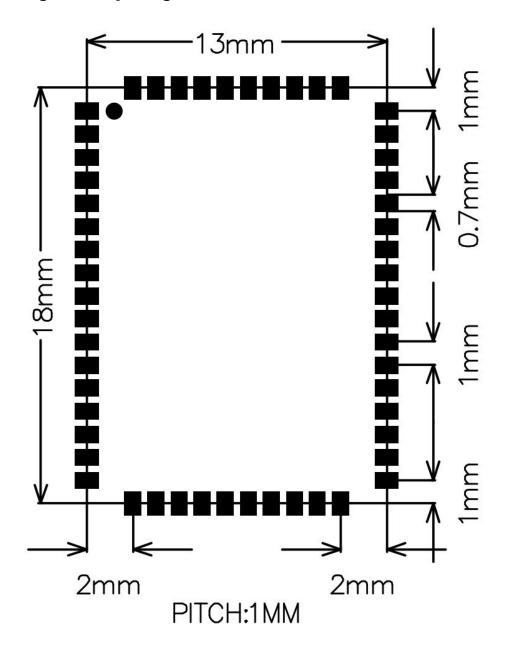


## **5 General specifications**

Model Name	SJR-BTM544
Product Description	Bluetooth 5.2 Class1.5 Module
Bluetooth Standard	Bluetooth 5.2
Chipset	QCC5144 BGA
Dimension	13mm x 18mm 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	9dBm
л /4 DQPSK Receive Sensitivity	-93dBm
8DPSK Receive Sensitivity	-87dBm

## **6 Module Package Information**

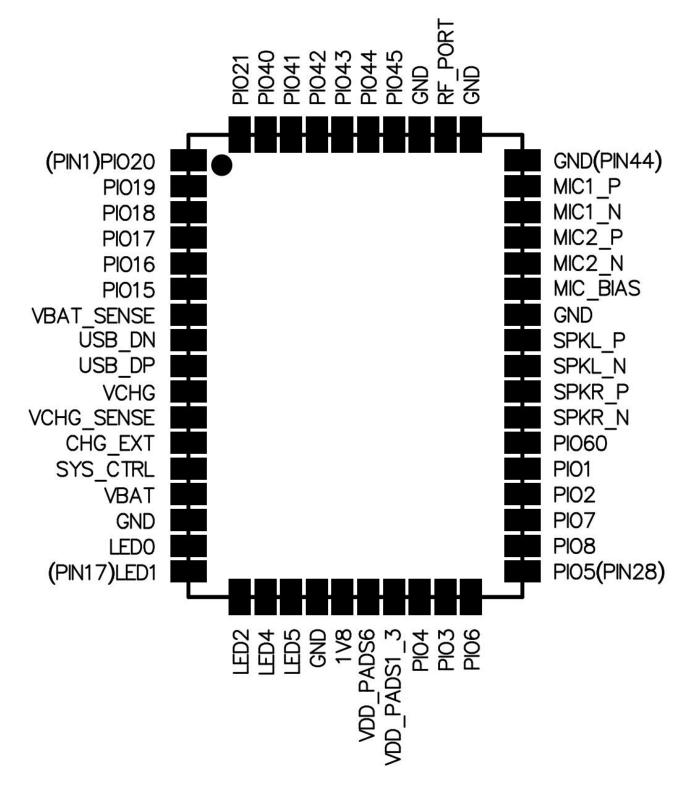
#### **6.1 Pinout Diagram and package dimensions**



Unit: MM

**Recommended PCB layout footprint** 

#### **6.2 Module Pin descriptions**



Pin#	Pin Name	Pin type	Description
		Digital: Bidirectional with	Programmable I/O line 21.
1	PIO[20]	programmable strength internal	Alternative function:
		pull-up/pull-down	PCM_DOUT[1]
2 PIO[19]	DIO[40]	Digital: Bidirectional with	Programmable I/O line 19.
	Pio[19]	programmable strength internal	Alternative function:

		pull- up/pull-down	PCM_DIN[0]
		Digital: Bidirectional with	Programmable I/O line 18.
3	PIO[18]	programmable strength internal	Alternative function:
	10[10]	pull-up/pull-down	PCM DOUT[0]
		Digital: Bidirectional with	Programmable I/O line 17.
4	PIO[17]	programmable strength internal	Alternative function:
		pull- up/pull-down	PCM_SYNC
		Digital: Bidirectional with	Programmable I/O line 16.
5	PIO[16]	programmable strength internal	Alternative function:
		pull- up/pull-down	PCM_CLK
		Digital: Bidirectional with	Programmable I/O line 15.
6	PIO[15]	programmable strength internal	Alternative function:
		pull- up/pull-down	MCLK_OUT
7	VBAT_SENSE	Analog	Battery voltage sense input.
	· = · · · = · · · · · · · · · · · · ·	, manag	USB Full Speed device D- I/O. IEC-61000-4-2
8	USB_DN	Digital	(device level) ESD Protection
	1		USB Full Speed device D+ I/O. IEC-61000-4-2
9	USB_DP	Digital	(device level) ESD Protection
10	VCHG	Cumply	
10	VCHG	Supply	Charger input to Bypass regulator.
			Charger input sense pin after external mode
11	VOUG SENSE	Analog	sense-resistor. High impedance.
1 1	VCHG_SENSE	Arialog	NOTE If using internal charger or no charger,
			connect VCHG_SENSE direct to VCHG.
			External charger transistor current control. Connect
12	CHG_EXT	Analog	to base of external charger transistor as per
· <b>-</b>	6110_27(1	, maiog	application schematic.
			Typically connected to an ON/OFF push button.
			Boots device in response to a button press when
			power is still present from battery and/or charger but
			software has placed the device in the OFF or
13	SYS_CTRL	Digital input	DORMANT state. Additionally useable as a digital
			input in normal operation. No pull.
			Additional function:
			PIO[0] input only
14	VBAT	Supply	Battery voltage input.
15	GND	Ground	Ground
	1	Analog or digital input/ open drain	General-purpose analog/digital input or open drain
16	AIO[0]/LED[0]	output.	LED output.
		Analog or digital input/ open drain	General-purpose analog/digital input or open drain
17	AIO[1]/LED[1]	output.	LED output.
		Analog or digital input/ open drain	General-purpose analog/digital input or open drain
18	AIO[2]/LED[2]	output.	LED output.
		Analog or digital input/ open drain	General-purpose analog/digital input or open drain
19	AIO[4]/LED[4]	output.	LED output.
		_ <u> </u>	<u> </u>

20	AIO[5]/LED[5]	Analog or digital input/ open drain	General-purpose analog/digital input or open drain
		output.	LED output.
21	GND	Ground	Ground
22	1V8	Supply	1.8V voltage output.
23	VDD_PADS6	Supply	1.8 V/3.3 V PIO supply.
24	VDD_PADS1_3	Supply	1.8 V/3.3 V PIO supply.
		Digital: Bidirectional with	Programmable I/O line 4.
25	PIO[4]	programmable strength internal	Alternative function:
		pull- up/pull-down	TBR_MOSI[1]
		Digital: Bidirectional with	Programmable I/O line 3.
26	PIO[3]	programmable strength internal	Alternative function:
		pull- up/pull-down	TBR_MISO[2]
		Digital: Bidirectional with	Programmable I/O line 6.
27	PIO[6]	programmable strength internal	Alternative function:
		pull- up/pull-down	TBR_MOSI[0]
		Digital: Bidirectional with	Programmable I/O line 5.
28	PIO[5]	programmable strength internal	Alternative function:
		pull- up/pull-down	TBR_MISO[1]
		Digital: Bidirectional with	Programmable I/O line 8.
29	PIO[8]	programmable strength internal	Alternative function:
		pull- up/pull-down	TBR_CLK
		Digital: Bidirectional with	Programmable I/O line 7.
30	PIO[7]	programmable strength internal	Alternative function:
		pull- up/pull-down	TBR_MISO[0]
		Digital: Bidirectional with	Programmable I/O line 2.
31	PIO[2]	programmable strength internal	Alternative function:
		pull- up/pull-down	TBR_MISO[3]
			Automatically defaults to RESET# mode when the
		Digital: Bidirectional with	device is unpowered, or in off modes.
32	PIO[1]	programmable strength internal	Reconfigurable as a PIO after boot.
		pull- up/pull-down	Alternative function:
			Programmable I/O line 1
		Digital: Bidirectional with	
33	PIO[60]	programmable strength internal	Programmable I/O line 60.
		pull-up/pull-down	
			Headphone/speaker differential right output,
24	ALIDIO LIDE NI SPICE N	Analog	negative.
34	AUDIO_HPR_N/ SPKR_N	Analog	Alternative function:
			Differential right line output, negative
			Headphone/speaker differential right output,
25	AUDIO HDD D/ CDVD D	Angles	positive.
35	AUDIO_HPR_P/ SPKR_P	Analog	Alternative function:
			Differential right line output, positive
200	AUDIO LIEU NUORIGI NI	Analan	Headphone/speaker differential left output,
36	AUDIO_HPL_N/ SPKL_N	Analog	negative.

			Alternative function:
			Differential left line output, negative
			Headphone/speaker differential left output, positive.
37	AUDIO_HPL_P/ SPKL_P	Analog	Alternative function:
			Differential left line output, positive
38	GND	Ground	Ground
39	AUDIO_MIC_BIAS	Analog	Mic bias output.
			Microphone differential 2 input, negative.
40	AUDIO_MIC2_N/ LINEIN_R_N	Analog	Alternative function:
			Differential audio line input right, negative
			Microphone differential 2 input, positive.
41	AUDIO_MIC2_P/ LINEIN_R_P	Analog	Alternative function:
			Differential audio line input right, positive
			Microphone differential 1 input, negative.
42	AUDIO_MIC1_N/ LINEIN_L_N	Analog	Alternative function:
			Differential audio line input left, negative
			Microphone differential 1 input, positive.
43	AUDIO_MIC1_P/ LINEIN_L_P	Analog	Alternative function:
			Differential audio line input left, positive
44	GND	Ground	Ground
45	GND	Ground	Ground
46	BT_RF	RF	Bluetooth transmit/receive.
47	GND	Ground	Ground
		Digital: Bidirectional with	Programmable I/O line 45.
48	PIO[45]	programmable strength internal	Alternative function:
		pull-up/pull-down	QSPI3_IO[3]
		Digital: Bidirectional with	Programmable I/O line 44.
49	PIO[44]	programmable strength internal	Alternative function:
		pull- up/pull-down	QSPI3_RAM_CS#
		Digital: Bidirectional with	Programmable I/O line 43.
50	PIO[43]	programmable strength internal	Alternative function:
		pull- up/pull-down	QSPI3_IO[1]
		Digital: Bidirectional with	Programmable I/O line 42.
51	PIO[42]	programmable strength internal	Alternative function:
		pull- up/pull-down	QSPI3_IO[2]
		Digital: Bidirectional with	Programmable I/O line 41.
52	PIO[41]	programmable strength internal	Alternative function:
		pull- up/pull-down	QSPI3_CLK
		Digital: Bidirectional with	Programmable I/O line 40.
53	PIO[40]	programmable strength internal	Alternative function:
		pull- up/pull-down	QSPI3_IO[0]
		Digital: Bidirectional with	Programmable I/O line 21.
54	PIO[21]	programmable strength internal	Alternative function:
		pull-up/pull-down	PCM_DOUT[2]

## **7 Electrical Characteristics**

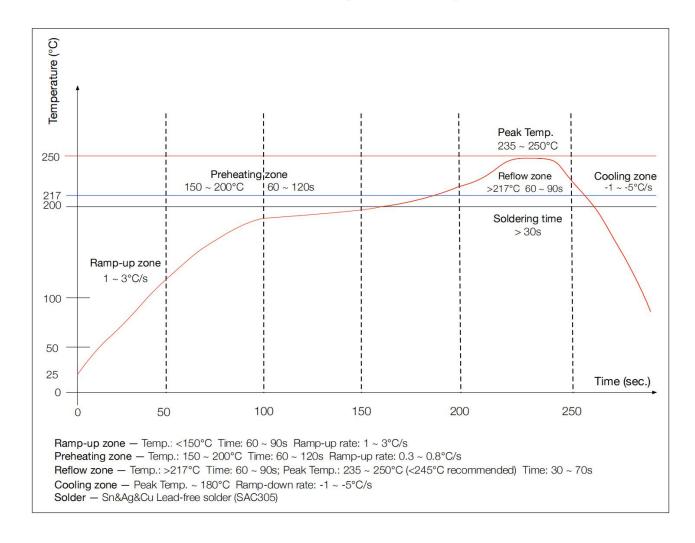
#### 7.1 Absolute Maximum Ratings

Rating	Minimum	Maximum
Storage temperature	<b>-40</b> ℃	+85℃

### 7.2 Recommended Operating Conditions

Operating Condition	Minimum	Maximum
Operating temperature range	<b>-40</b> ℃	+85°C
Supply voltage: VBAT	+2.8V	+4.3V

### 8 Recommended reflow temperature profile



The module Must go through 125  $^{\circ}$ 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℃烘烤 9 小时以上!

### **Record of Changes**

Data	Revision	Description
2020-04-23	V1.0	Original publication of this document.
2021-11-21	V1.1	Updata temperature.

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