Bluetooth Module Datasheet

Model: SJR-BTM350

Version: V1.2

2022-04-07

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1 Introduction

Sky Jiarun Technologies introduces the pioneer of the Bluetooth 5.3 modules SJR-BTM350 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 QCC3050 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@v5.3 system.

2 Key Features

BTM350(QCC3050) Features
- Qualified to Bluetooth v5.3 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 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
- 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
- 64 Mb flash memory
- 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
- Bluetooth USB Source application

4 Block Diagram
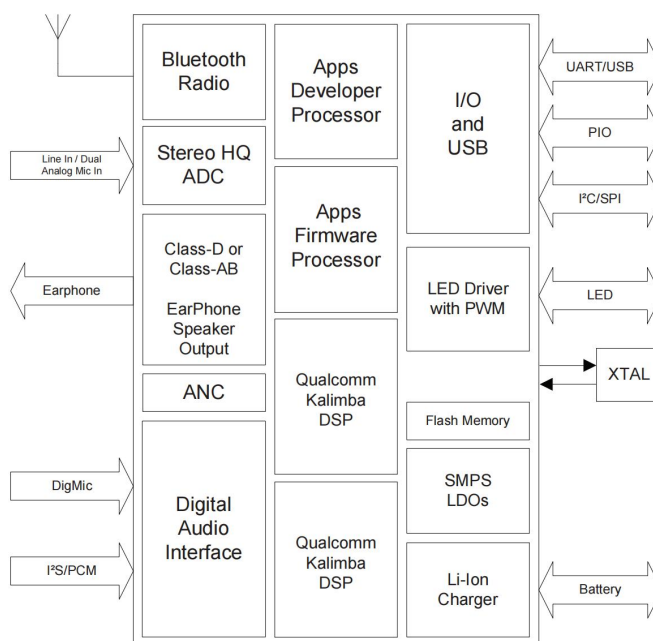
5 General specifications

Model Name	SJR-BTM350
Product Description	**Bluetooth 5.3 Class1.5 Module**
Bluetooth Standard	Bluetooth 5.3
Chipset	QCC3050 BGA
Dimension	13mm x 18mm x 2.5mm
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
π/4 DQPSK Receive Sensitivity	-93dBm
8DPSK Receive Sensitivity	-87dBm

6 Module Package Information

6.1 Pinout Diagram and package dimensions

13mm

18mm

1mm

0.7mm

1mm

1mm

2mm

2mm

PITCH:1MM
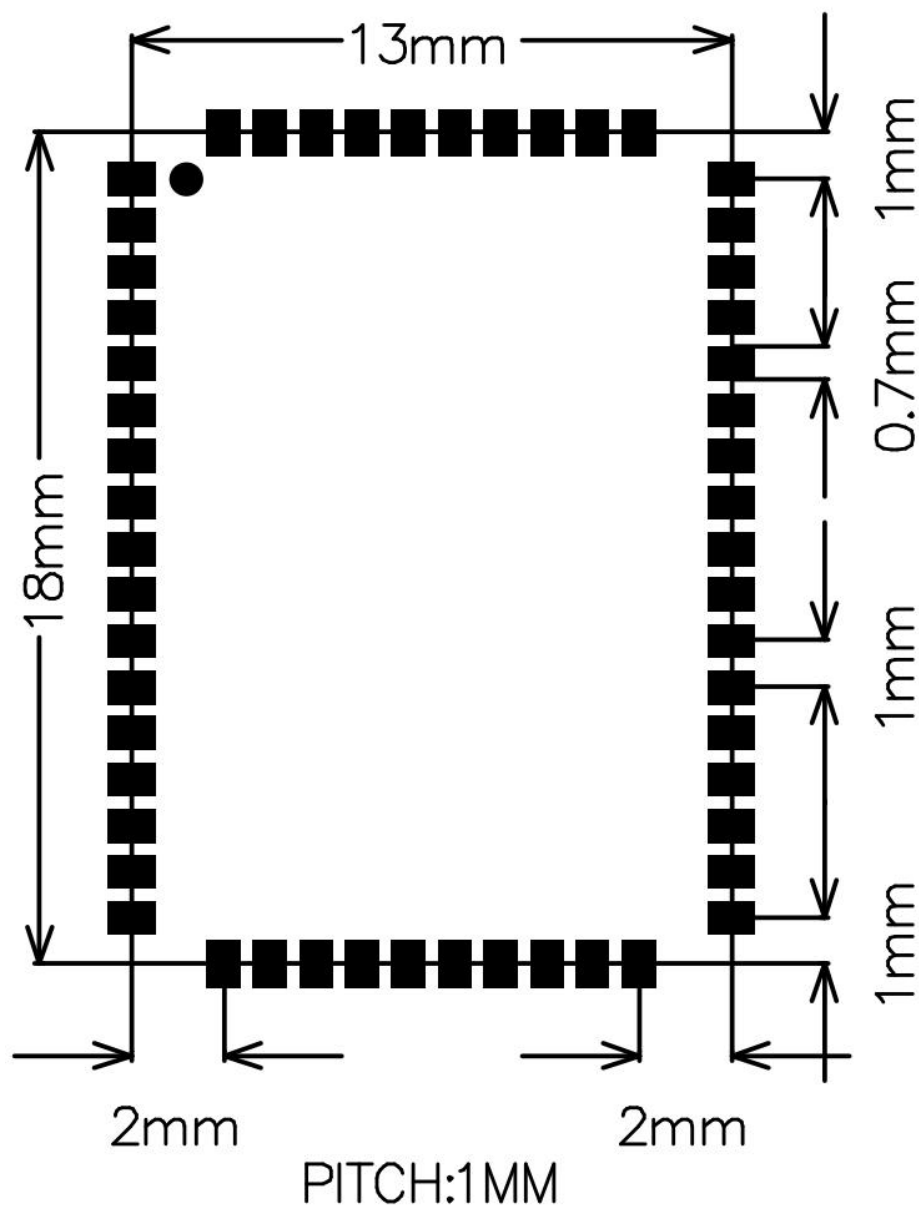
Unit：MM

Recommended PCB layout footprint

6.2 Module Pin descriptions
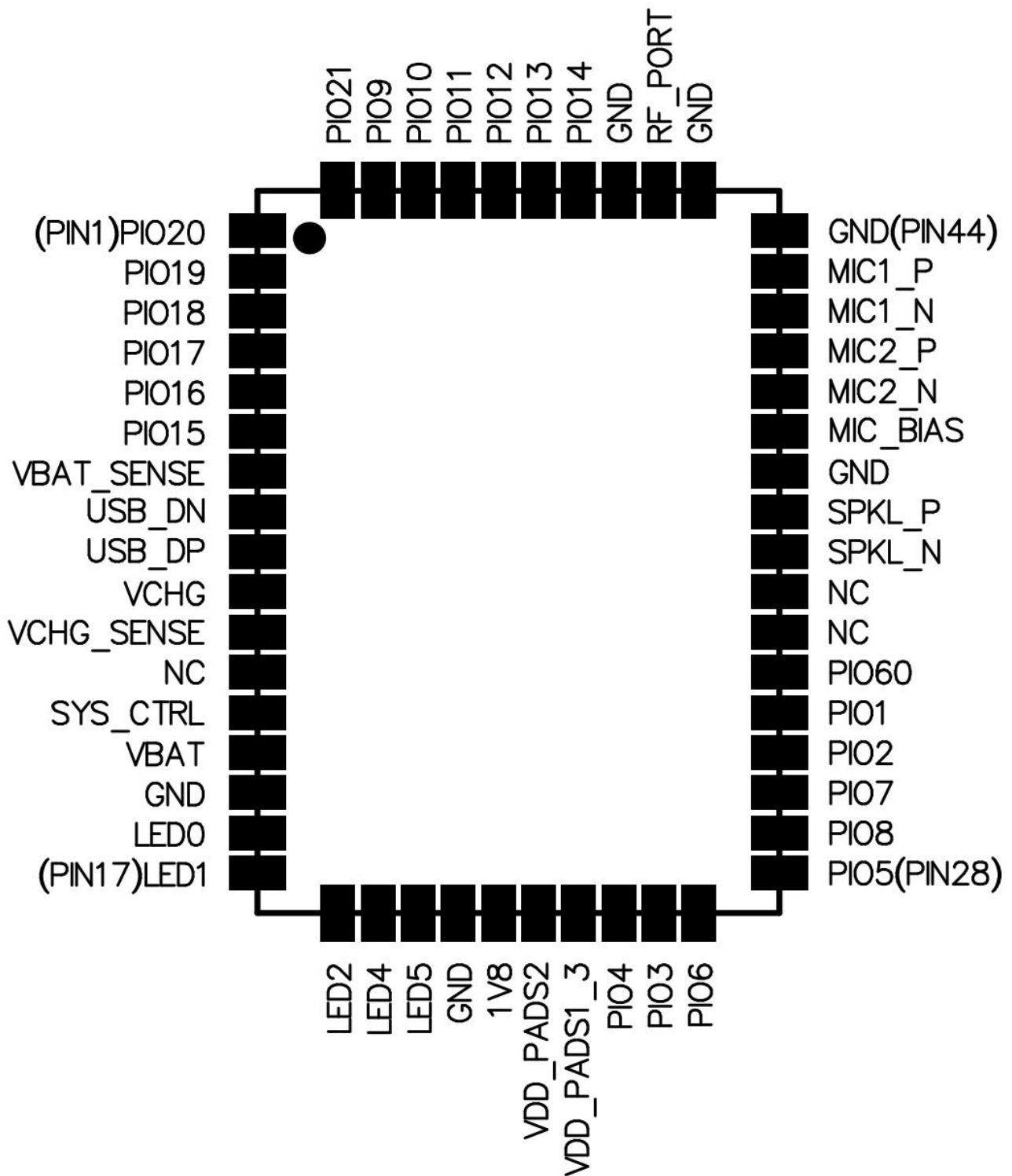
Pin#	Pin Name	Pin type	Description
1	PIO[20]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 20.
2	PIO[19]	Digital: Bidirectional with programmable strength internal	Programmable I/O line 19.

		pull- up/pull-down	
3	PIO[18]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 18.
4	PIO[17]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 17.
5	PIO[16]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 16.
6	PIO[15]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 15.
7	VBAT_SENSE	Analog	Charger input sense pin.
8	USB_DN	Digital	USB Full Speed device D- I/O. IEC-61000-4-2 (device level) ESD Protection
9	USB_DP	Digital	USB Full Speed device D+ I/O. IEC-61000-4-2 (device level) ESD Protection
10	VCHG	Supply	Charger input to Bypass regulator.
11	VCHG_SENSE	Analog	Charger input sense pin after external mode sense-resistor. High impedance. NOTE If using internal charger or no charger, connect VCHG_SENSE direct to VCHG.
12	NC	NC	NC
13	SYS_CTRL	Digital input	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 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
16	AIO[0]/LED[0]	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.
17	AIO[1]/LED[1]	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.
18	AIO[2]/LED[2]	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.
19	AIO[4]/LED[4]	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.
20	AIO[5]/LED[5]	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.

21	GND	Ground	Ground
22	1V8	Supply	1.8V voltage output.
23	VDD_PADS_2	Supply	1.8 V/3.3 V PIO supply.
24	VDD_PADS1_3	Supply	1.8 V/3.3 V PIO supply.
25	PIO[4]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 4. Alternative function: TBR_MOSI[1]
26	PIO[3]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 3. Alternative function: TBR_MISO[2]
27	PIO[6]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 6. Alternative function: TBR_MOSI[0]
28	PIO[5]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 5. Alternative function: TBR_MISO[1]
29	PIO[8]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 8. Alternative function: TBR_CLK
30	PIO[7]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 7. Alternative function: TBR_MISO[0]
31	PIO[2]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 2. Alternative function: TBR_MISO[3]
32	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
33	PIO[60]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 60.
34	NC	NC	NC
35	NC	NC	NC
36	AUDIO_HPL_N/ SPKL_N	Analog	Headphone/speaker differential left output, negative. Alternative function: Differential left line output, negative
37	AUDIO_HPL_P/ SPKL_P	Analog	Headphone/speaker differential left output, positive. Alternative function: Differential left line output, positive
38	GND	Ground	Ground
39	AUDIO_MIC_BIAS	Analog	Mic bias output.
40	AUDIO_MIC2_N/ LINEIN_R_N	Analog	Microphone differential 2 input, negative.

			Alternative function: Differential audio line input right, negative
41	AUDIO_MIC2_P/ LINEIN_R_P	Analog	Microphone differential 2 input, positive. Alternative function: Differential audio line input right, positive
42	AUDIO_MIC1_N/ LINEIN_L_N	Analog	Microphone differential 1 input, negative. Alternative function: Differential audio line input left, negative
43	AUDIO_MIC1_P/ LINEIN_L_P	Analog	Microphone differential 1 input, positive. 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
48	PIO[14]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 14.
49	PIO[13]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 13.
50	PIO[12]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 12.
51	PIO[11]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 11.
52	PIO[10]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 10.
53	PIO[9]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 9.
54	PIO[21]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 21.

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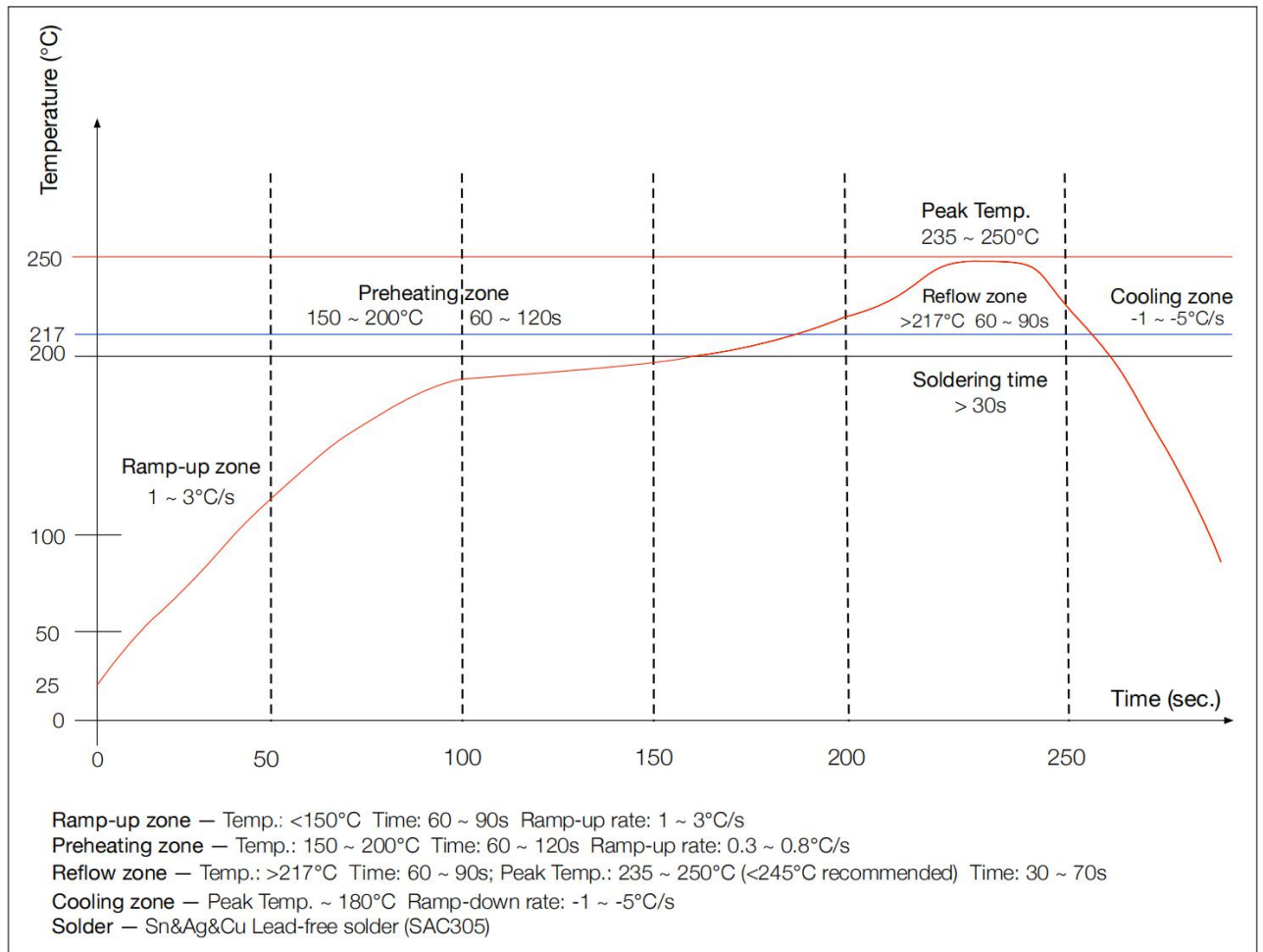
The module Must go through 125℃ baking for at least 9 hours before SMT AND IR reflow process!

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
2021-08-03	V1.0	Original publication of this document.
2021-11-21	V1.1	Update temperature.
2022-04-07	V1.2	Update bluetooth version.

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