# Bluetooth Module Datasheet

# CZW-5126-03

**Model:CZW-5126-03**

**Hardware Version：V2.0**

**Release Date：2019.03.16**

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# List of Contents

# 1 summary

CZW-5126-03 is a Bluetooth module designed by ShenZhen Cheng Zhi Wei Technology Co.,Ltd. using Qualcomm Bluetooth chip qcc5126。

CZW-5126-03 is a Bluetooth, audio and programmable application processor.It includes high-performance, analog, and digital audio codecs, Class-AB and Class-D headphone drivers, advanced power management, Li-ion battery charger, light-emitting diode (LED) drivers, and flexible interfaces including inter┐integrated circuit sound (I²S), universal asynchronous receiver transmitter(UART), and programmable input/output (PIO)。

CZW-5126-03 package is compatible with czw03 series pins, easy replacement and upgrade

# 2 General specifications

| | |
|---|---|
| Model Name | CZW-5126-03 |
| Package | 60 Pin Module |
| Dimension | 13.8mm x 20.5mm x 2.4mm |
| Chipset | QCC5126 |
| Bluetooth Version | Bluetooth 5.1 |
| Power Class | Class2 |
| Transmission Distance | ≥10M |
| Voltage | 2.8~4.2V |
| Temperature | -10～+70℃ |
| Storage Temperature | -40～+85℃ |
| Frequency Range | 2402～2480MHz |
| Maximum RF Transmit Power | 9dBm |
| π/4 DQPSK Receive Sensitivity | -96dBm |
| 8DPSK Receive Sensitivity | -89dBm |

# 3 Key Features

## 3.1 Audio subsystem

★ Dual 32bit Kalimba audio digital signal processor (DSP) cores with flexible clocking from 2 MHz to 120 MHz to allow optimization and trade-off performance vs. Power consumption
★ DSPs execute code from ROM and from program RAM, original equipment manufacturer (OEM) and third party developed features can run from program RAM
★ 80 KB program RAM
★ 256 KB data RAM
★ 5 Mb ROM
★ 16 Mb Audio buffer RAM

## 3.2 Application subsystem

★ Dual core application subsystem 32/80 MHz operation
★ 32- bit Firmware Processor:
★ 32- bit Developer Processor:
★ Both cores execute code from external flash memory using QSPI clocked at 32 MHz or 80 MHz
★ On-chip caches per core allow for optimized performance and power consumption Bluetooth subsystem
★ Qualified to Bluetooth v5.0 specification including 2 Mbps Bluetooth low energy (Production parts)
★ Single ended antenna connection with on-chip balun and Tx/Rx switch
★ Bluetooth, Bluetooth low energy, and mixed topologies supported
★ Class 1 support

## 3.3 Li-ion battery charger

★ Integrated battery charger supporting internal mode (up to 200 mA) and external mode (up to 1.8 A)
★ Variable float (or termination) voltage adjustable in 50 mV steps from 3.65 V to 4.4 V
★ Thermal monitoring and management are implementable in application sftware
★ Pre-charge to fast charge transition configurable at 2.5 V, 2.9 V, 3.0 V, and 3.1 V Power management
★ Integrated power management unit (PMU) to minimize external components
★ QCC5126 VFBGA runs directly from a Li-ion, USB, or external supply (2.8 V to 6.5 V)
★ Auto-switching between battery and USB (or other) charging source
★ Power islands employed to optimize power consumption for variety of use-cases
★ Dual switch-mode power supply (SMPS)

### 3.4 Audio engine and digital audio interfaces

★ 24- bit I²S interface with 1 input and 3 output channels
★ Programmable audio master clock (MCLK)
★ Sony/Philips digital interface (SPDIF): 2, configurable as input or output
★ Stereo analog outputs configurable as differential Class-AB headphone outputs or differential high efficiency Class-D outputs:
★ Dual analog inputs configurable as single ended line inputs or, unbalanced or balanced analog microphone inputs:
★ 1 microphone bias (single bias shared by the two channels):
★ Digital microphone inputs with capability to interface up to 6 digital microphones
★ Both analog-to-digital converter (ADC)s and digital-to-analog converter (DAC)s support sample rates of 8, 16, 32, 44.1, 48, 96 kHz. DACs also support 192 kHz.

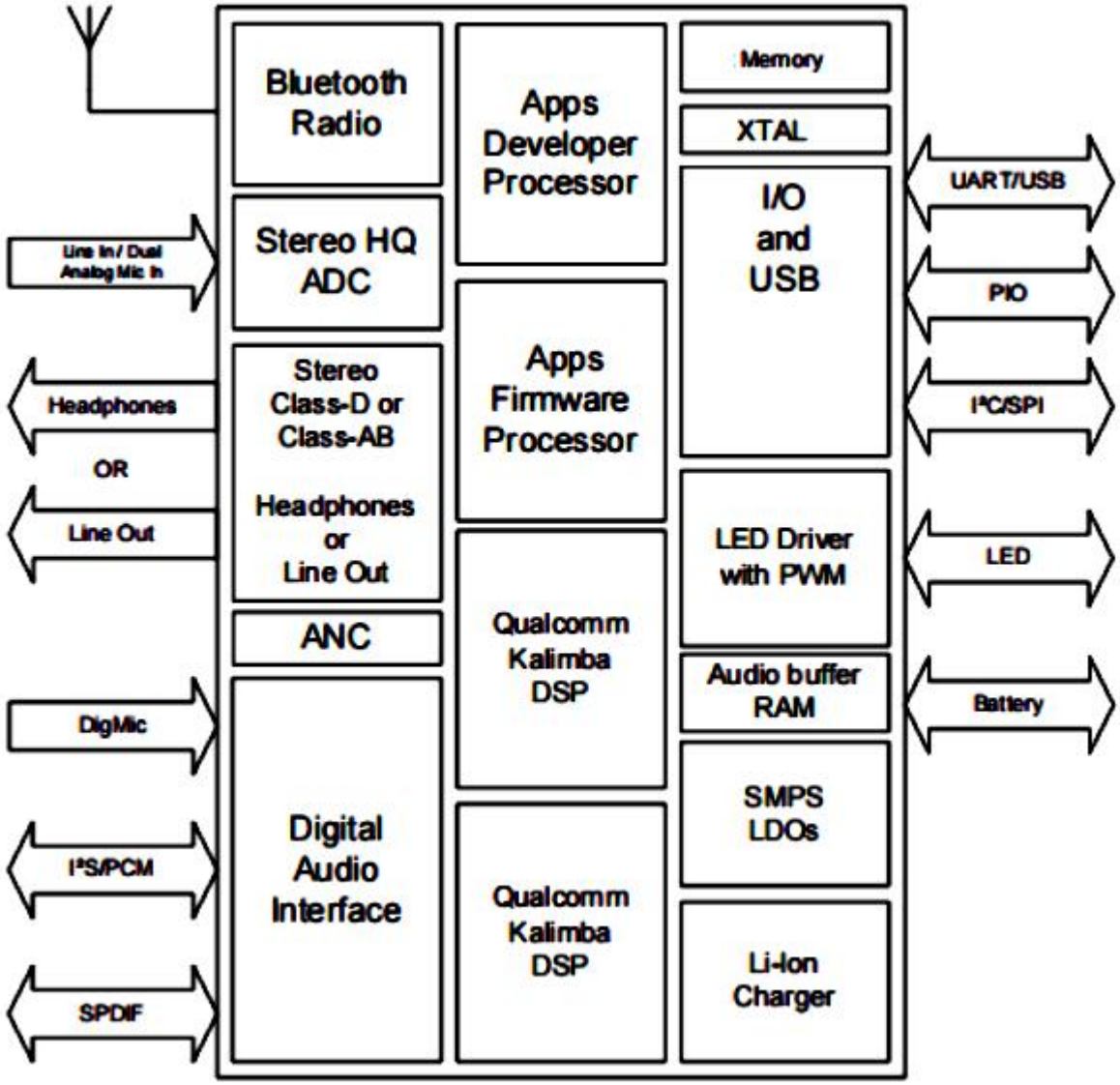
### 3.5 Peripherals and physical interfaces

★ A UART interface
★ 2 x Bit Serializers (programmable serial peripheral interface (SPI) and I²C hardware accelerator)
★ 1 x USB interface:
★ A secure digital input/output (SDIO) v2.0 compliant Host with 1 port, capable of interfacing to storage device (SD), or multimedia card (MMC) cards
★ QSPI NOR flash interface
★ Up to 19 PIO and 5 open drain/digital input LED pads with pulse width modulation (PWM)

# 4 Applications

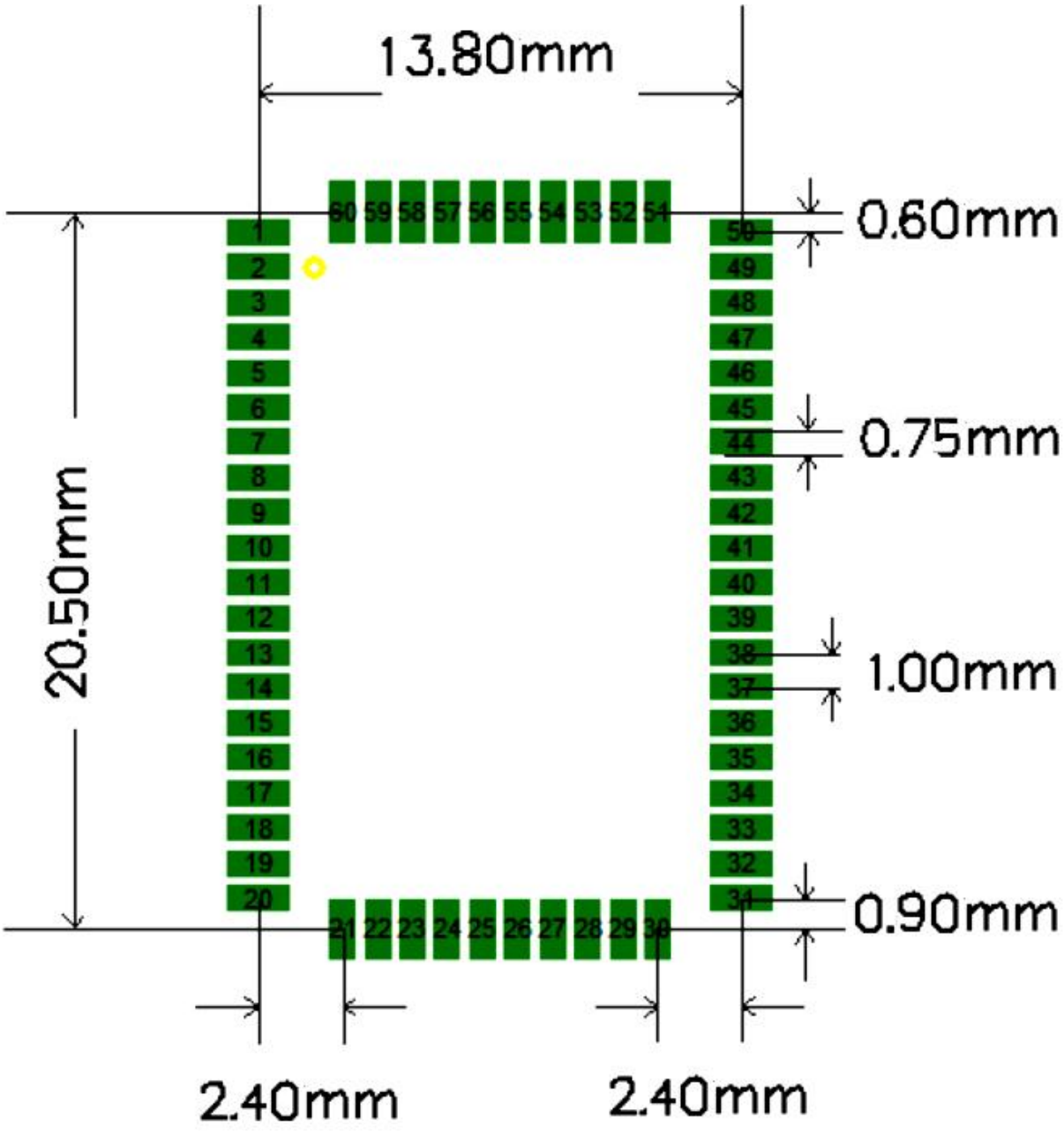
★ Wireless speakers
★ Wired/wireless stereo headsets/headphones
★ Qualcomm True Wireless™ stereo earbuds/speakers

# 5 Block Diagram

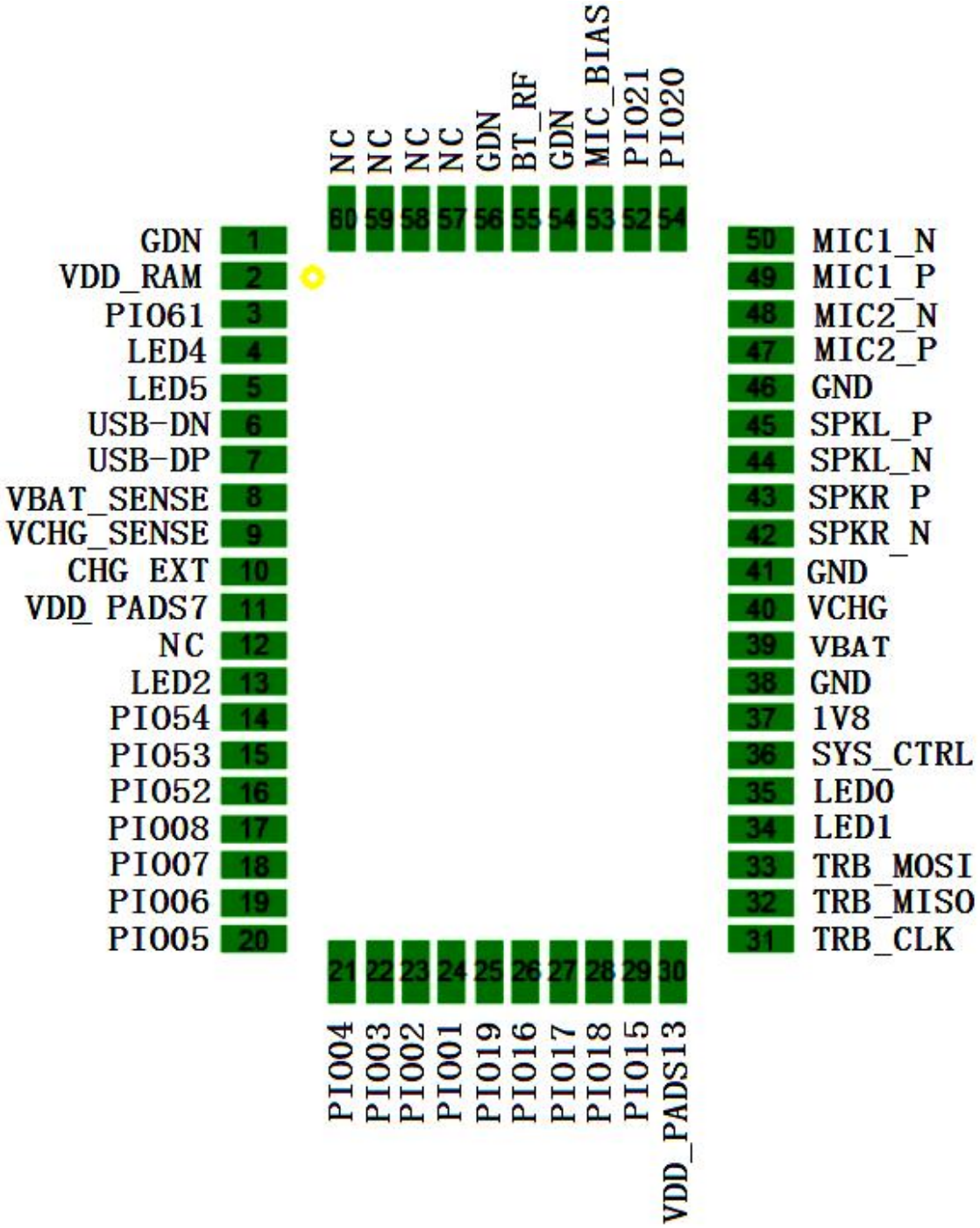


# 6 Module Package Information

## 6.1 Pinout Diagram and package dimensions



## 6.2 Module Pin descriptions



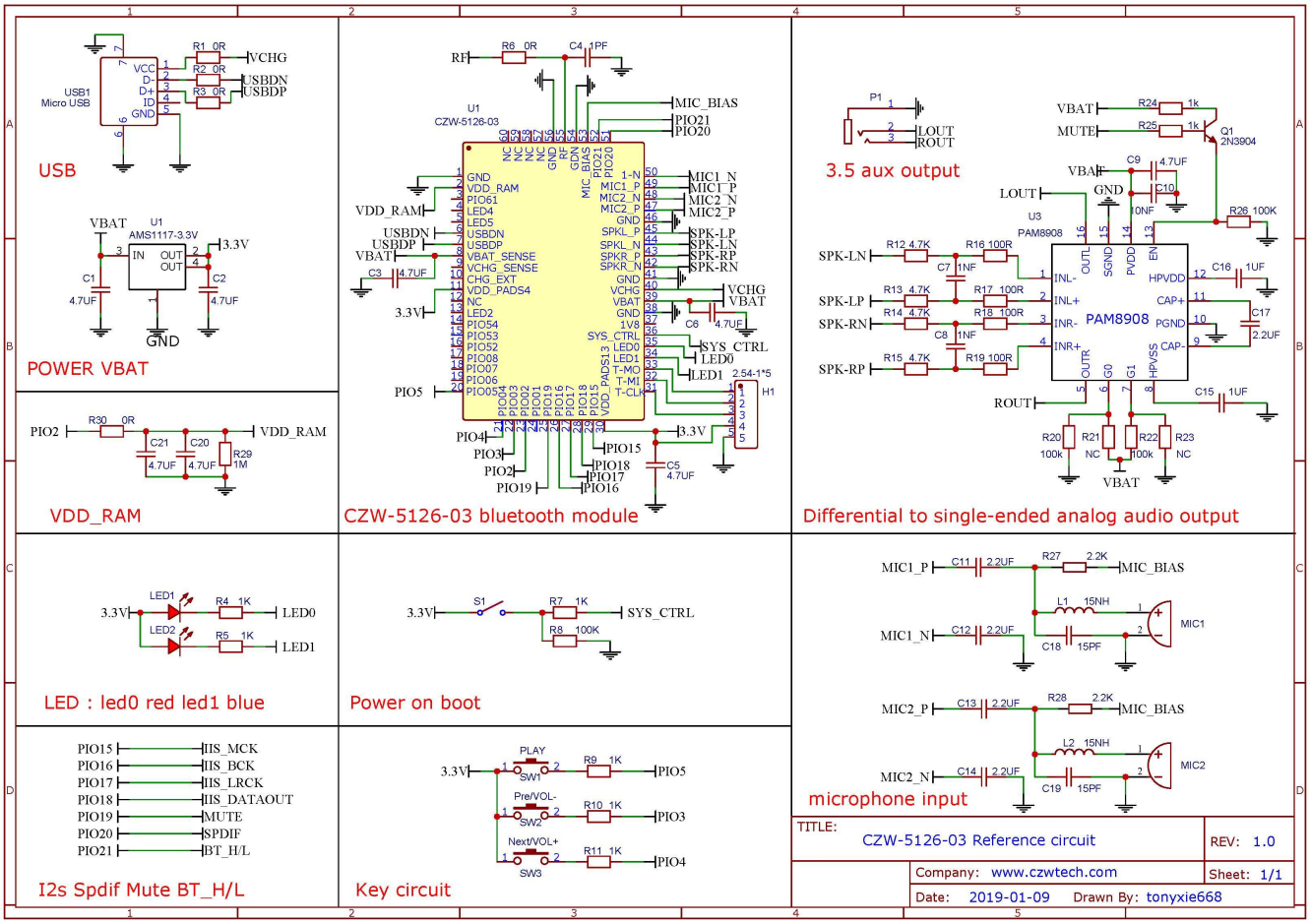
# 7 Pin Function Description

| Pin# | Pin Name | Pin type | Description |
|---|---|---|---|
| **1** | GND | Ground | Ground |
| **2** | VDD_RAM | Supply | 1.8 V PIO supply for Audio buffer RAM. |
| **3** | PIO[61] | Digital: Bidirectional with programmable strength internal pull- up/pull-down | Programmable I/O line 61. |
| **4** | LED[4] | Analog or digital input/ open drain output. | General-purpose analog/digital input or open drain LED output. |
| **5** | LED[5] | Analog or digital input/ open drain output. | General-purpose analog/digital input or open drain LED output. |
| **6** | USB_DN | Digital | USB Full Speed device D- I/O. IEC-61000-4-2 (device level) ESD Protection |
| **7** | USB_DP | Digital | USB Full Speed device D+ I/O. IEC-61000-4-2 (device level) ESD Protection |
| **8** | VBAT_SENSE | Analog | Battery voltage sense input. |
| **9** | VCHG_SENSE | Analog | Charger input sense pin after external mode sense-resistor. High impedance.<br>NOTE If using internal charger or no charger, connect VCHG_SENSE direct to VCHG. |
| **10** | CHG_EXT | Analog | External charger transistor current control.<br>Connect to base of external charger transistor as per application schematic. |
| **11** | VDD_PADS_7 | Supply | 1.8 V/3.3 V PIO supply. |
| **12** | NC | NC | NC |
| **13** | LED[2] | Analog or digital input/ open drain output. | General-purpose analog/digital input or open drain LED output. |
| **14** | PIO[54] | Digital: Bidirectional with programmable strength internal pull- up/pull-down | Programmable I/O line 54.<br>Alternative function: SDIO_D[0] |
| **15** | PIO[53] | Digital: Bidirectional with programmable strength internal pull- up/pull-down | Programmable I/O line 53.<br>Alternative function: SDIO_CMD |
| **16** | PIO[52] | Digital: Bidirectional with programmable strength internal pull- up/pull-down | Programmable I/O line 52.<br>Alternative function: SDIO_CLK |
| **17** | PIO[8] | Digital: Bidirectional with programmable strength internal pull- up/pull-down | Programmable I/O line 8.<br>Alternative function: TBR_CLK |
| **18** | PIO[7] | Digital: Bidirectional with programmable strength internal pull- up/pull-down | Programmable I/O line 7.<br>Alternative function: TBR_MISO[0] |
| **19** | PIO[6] | Digital: Bidirectional with programmable strength internal pull- up/pull-down | Programmable I/O line 6.<br>Alternative function: TBR_MOSI[0] |
| **20** | PIO[5] | Digital: Bidirectional with programmable strength internal pull- up/pull-down | Programmable I/O line 5.<br>Alternative function: TBR_MISO[1] |
| **21** | PIO[4] | Digital: Bidirectional with programmable strength internal pull- up/pull-down | Programmable I/O line 4.<br>Alternative function: TBR_MOSI[1] |

| Pin# | Pin Name | Pin type | Description |
|---|---|---|---|
| **22** | PIO[3] | Digital: Bidirectional with programmable strength internal pull- up/pull-down | Programmable I/O line 3.<br>Alternative function: TBR_MISO[2] |
| **23** | PIO[2] | Digital: Bidirectional with programmable strength internal pull- up/pull-down | Programmable I/O line 2.<br>Alternative function: TBR_MISO[3] |
| **24** | 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.<br>Alternative function: Programmable I/O line 1 |
| **25** | PIO[19] | Digital: Bidirectional with programmable strength internal pull- up/pull-down | Programmable I/O line 19.<br>Alternative function: PCM_DIN[0] |
| **26** | PIO[16] | Digital: Bidirectional with programmable strength internal pull- up/pull-down | Programmable I/O line 16.<br>Alternative function: PCM_CLK |
| **27** | PIO[17] | Digital: Bidirectional with programmable strength internal pull- up/pull-down | Programmable I/O line 17.<br>Alternative function: PCM_SYNC |
| **28** | PIO[18] | Digital: Bidirectional with programmable strength internal pull- up/pull-down | Programmable I/O line 18.<br>Alternative function: PCM_DOUT[0] |
| **29** | PIO[15] | Digital: Bidirectional with programmable strength internal pull- up/pull-down | Programmable I/O line 15.<br>Alternative function: MCLK_OUT |
| **30** | VDD_PADS_1、3 | Supply | 1.8 V/3.3 V PIO supply. |
| **31** | TBR_CLK | Digital: Bidirectional with programmable strength internal pull- up/pull-down | TBR_CLK<br>Alternative function: Programmable I/O line 8. |
| **32** | TBR_MISO | Digital: Bidirectional with programmable strength internal pull- up/pull-down | TBR_MISO[0]<br>Alternative function: Programmable I/O line7. |
| **33** | TBR_MOS | Digital: Bidirectional with programmable strength internal pull- up/pull-down | TBR_MOSI[0]<br>Alternative function: Programmable I/O line6. |
| **34** | LED[1] | Analog or digital input/ open drain output. | General-purpose analog/digital input or open drain LED output. |
| **35** | LED[0] | Analog or digital input/ open drain output. | General-purpose analog/digital input or open drain LED output. |
| **36** | 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.<br>Additional function: PIO[0] input only |
| **37** | 1V8 | Supply | 1.8V voltage output |
| **38** | GND | Ground | Ground |
| **39** | VBAT | Supply | Battery voltage input. |
| **40** | VCHG | Supply | Charger input to Bypass regulator. |
| **41** | GND | Ground | Ground |

| Pin# | Pin Name | Pin type | Description |
|---|---|---|---|
| **42** | SPKR_N | VDD_AUDIO_HP_ SPKR | Headphone/speaker differential right output, negative.<br>Alternative function: Differential right line output, negative |
| **43** | SPKR_P | VDD_AUDIO_HP_ SPKR | Headphone/speaker differential right output, positive.<br>Alternative function: Differential right line output, positive |
| **44** | SPKL_N | VDD_AUDIO_HP_ SPKL | Headphone/speaker differential left output, negative.<br>Alternative function: Differential left line output, negative |
| **45** | SPKL_P | VDD_AUDIO_HP_ SPKL | Headphone/speaker differential left output, positive.<br>Alternative function: Differential left line output, positive |
| **46** | GND | Ground | Ground |
| **47** | MIC2_P | VDD_AUDIO_1V8 | Microphone differential 2 input, positive.<br>Alternative function: Differential audio line input right, positive |
| **48** | MIC2_N | VDD_AUDIO_1V8 | Microphone differential 2 input, negative.<br>Alternative function: Differential audio line input right, negative |
| **49** | MIC1_P | VDD_AUDIO_1V8 | Microphone differential 1 input, positive.<br>Alternative function: Differential audio line input left, positive |
| **50** | MIC1_N | VDD_AUDIO_1V8 | Microphone differential 1 input, negative.<br>Alternative function: Differential audio line input left, negative |
| **51** | PIO[20] | Digital: Bidirectional with programmable strength internal pull- up/pull-down | Programmable I/O line 20.<br>Alternative function: PCM_DOUT[1] |
| **52** | PIO[21] | Digital: Bidirectional with programmable strength internal pull- up/pull-down | Programmable I/O line 21.<br>Alternative function: PCM_DOUT[2] |
| **53** | MIC_BIAS | VDD_AUDIO_1V8 | Mic bias output. |
| **54** | GND | Ground | Ground |
| **55** | BT_RF | VDD_BT_RADIO | Bluetooth transmit/receive. |
| **56** | GND | Ground | Ground |
| **57** | NC | NC | NC |
| **58** | NC | NC | NC |
| **59** | NC | NC | NC |
| **60** | NC | NC | NC |

# 8 Reference application circuit




**Notice: for reference only, please design the circuit according to the actual application**

# 9 Electrical Characteristics

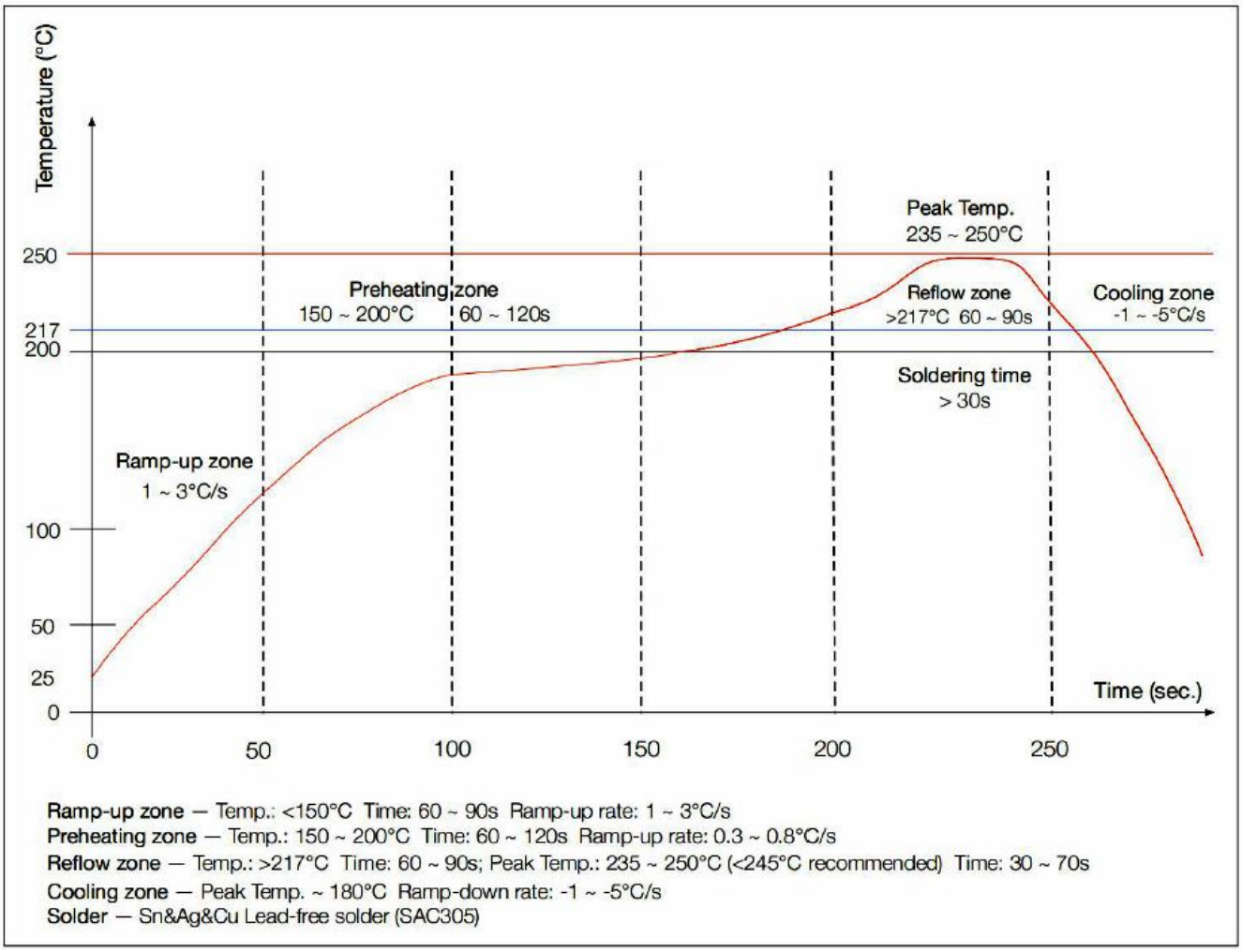
## 9.1 Absolute Maximum Ratings

| Rating | Minimum | Maximum |
|---|---|---|
| Storage temperature | -40℃ | +85℃ |

## 9.2 Recommended Operating Conditions

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

# 10 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 100℃ baking for at least 12 hours before SMT AND IR reflow process!**

# IMPORTANT NOTICE

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