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# Bluetooth Module Datasheet

## CZW-5124-03

**Model: CZW-5124-03**

**Hardware Version: V2.0**

**Release Date: 2019.01.11**

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**Shenzhen**

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## 1 summary

CZW-5124-03 is a Bluetooth module designed by ShenZhen Cheng Zhi Wei Technology Co.,Ltd. using Qualcomm Bluetooth chip qcc5124.

CZW-5124-03 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 (I<sup>2</sup> S), inter-integrated circuit interface (I<sup>2</sup> C), universal asynchronous receiver transmitter(UART), and programmable input/output (PIO).

CZW-5124-03 package is compatible with czw03 series pins, easy replacement and upgrade

## 2 General specifications

Model Name	CZW-5124-03
Package	60 Pin Module
Dimension	13.8mm x 20.5mm x 2.4mm
Chipset	QCC5124
Bluetooth Version	Bluetooth 5.0
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	-92dBm
8DPSK Receive Sensitivity	-85dBm

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## 3 Key Features

### 3.1 Device description

- ★ Quad-core processor architecture
- ★ High-performance Bluetooth® Audio SoC
- ★ Flexible flash programmable platform
- ★ Low power for extended battery life

### 3.2 Features

- ★ Qualified to Bluetooth® v5.0 specification
- ★ Dual 120 MHz Qualcomm® Kalimba™ audio DSPs
- ★ 32/80 MHz Developer Processor for applications
- ★ Firmware Processor for system
- ★ Flexible QSPI flash programmable platform
- ★ Advanced audio algorithms
- ★ High-performance 24- bit stereo audio interface
- ★ Digital and analog microphone interfaces
- ★ Active Noise Cancellation: Feedforward, Feedback, Hybrid
- ★ Serial interfaces: UART, Bit Serializer (I<sup>2</sup> C/SPI), USB 2.0
- ★ Integrated PMU: Dual SMPS for system/digital circuits, Integrated Li-ion battery charger
- ★ 25 PIOs, 5 LED pads with PWM

### 3.3 Audio subsystem

- ★ Dual 32- bit 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

### 3.4 Application subsystem

- ★ Dual core application subsystem 32/80 MHz operation
- ★ 32bit Firmware Processor:
- ★ 32bit 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

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### 3.5 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 Li-ion battery charger

### 3.6 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 software
- ★ Pre-charge to fast charge transition configurable at 2.5 V, 2.9 V, 3.0 V, and 3.1 V Power management

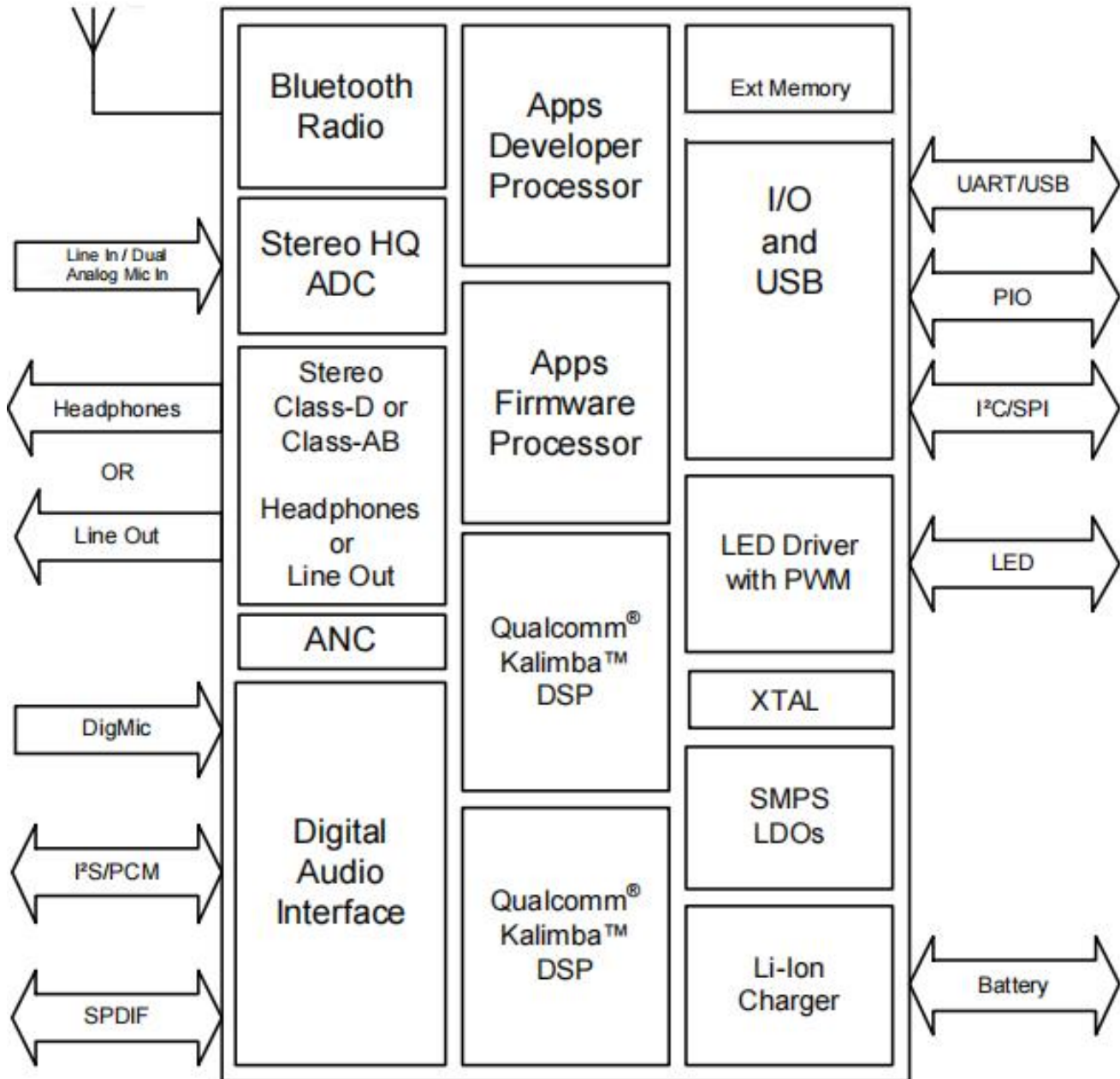
### 3.7 Power management

- ★ Integrated power management unit (PMU) to minimize external components
- ★ 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)

## 4 Applications

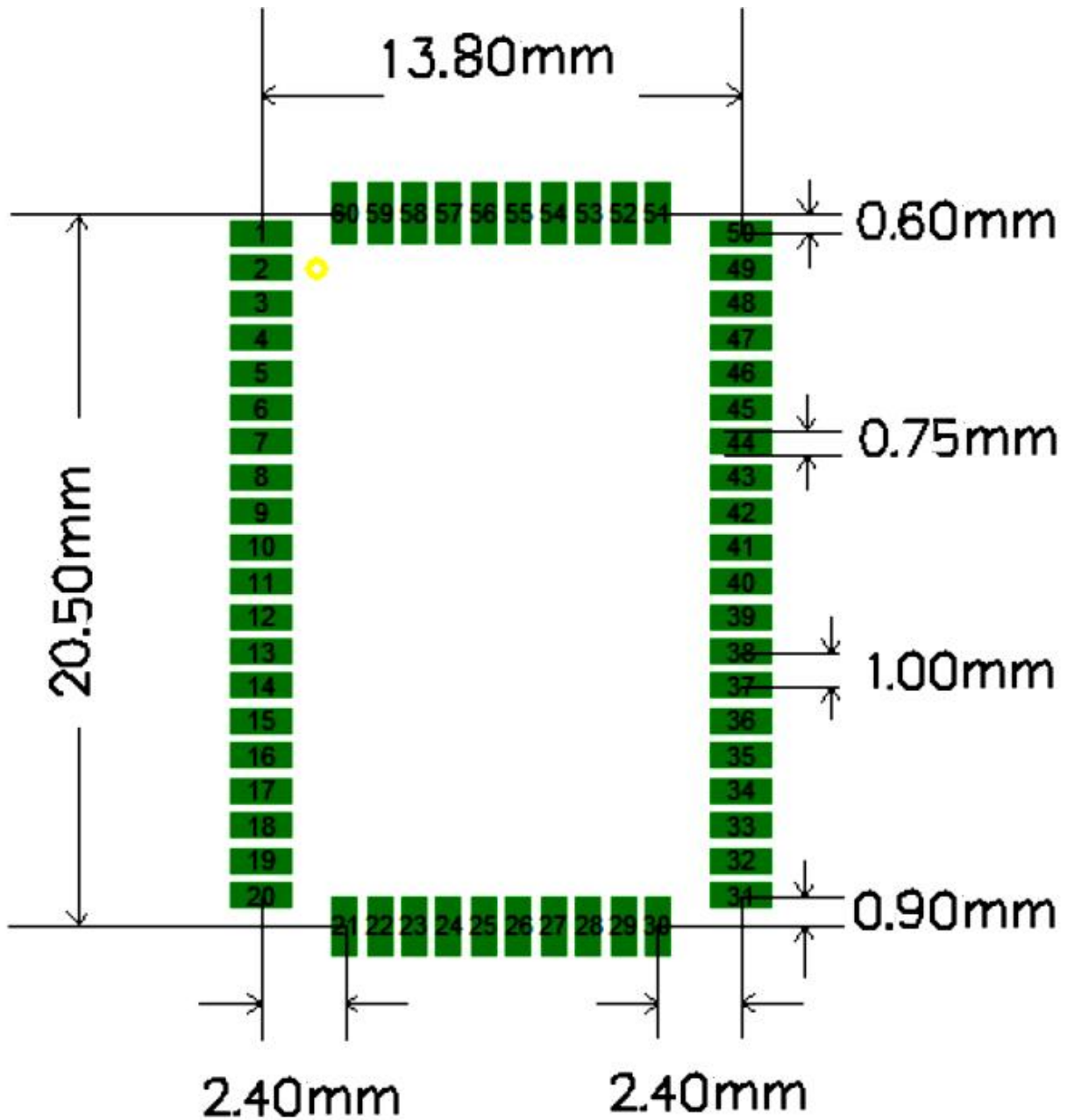
- ★ Wireless speakers
- ★ Wired/wireless stereo headsets/headphones
- ★ Qualcomm TrueWireless™ stereo earbuds
- ★ USB to Bluetooth dongle Features

## 5 Block Diagram



## 6 Module Package Information

### 6.1 Pinout Diagram and package dimensions



## 6.2 Module Pin descriptions

		NC	NC	NC	NC	GDN	RF_PORT	GDN	MIC_BIAS	PI021	PI020		
		60	59	58	57	56	55	54	53	52	51		
GDN	1											50	MIC1_N
PI060	2											49	MIC1_P
PI061	3											48	MIC2_N
LED4	4											47	MIC2_P
LED5	5											46	GND
USB-DN	6											45	SPKL_P
USB-DP	7											44	SPKL_N
VBAT_SENSE	8											43	SPKR_P
VCHG_SENSE	9											42	SPKR_N
CHG_EXT	10											41	GND
VDD_PADS7	11											40	VCHG
NC	12											39	VBAT
LED2	13											38	GND
PI054	14											37	1V8
PI053	15											36	SYS_CTRL
PI052	16											35	LEDO
PI008	17											34	LED1
PI007	18											33	TRB_MOSI
PI006	19											32	TRB_MISO
PI005	20											31	TRB_CLK
			21	22	23	24	25	26	27	28	29	30	
			PI004	PI003	PI002	PI001	PI019	PI016	PI017	PI018	PI015	VDD_PADS13	



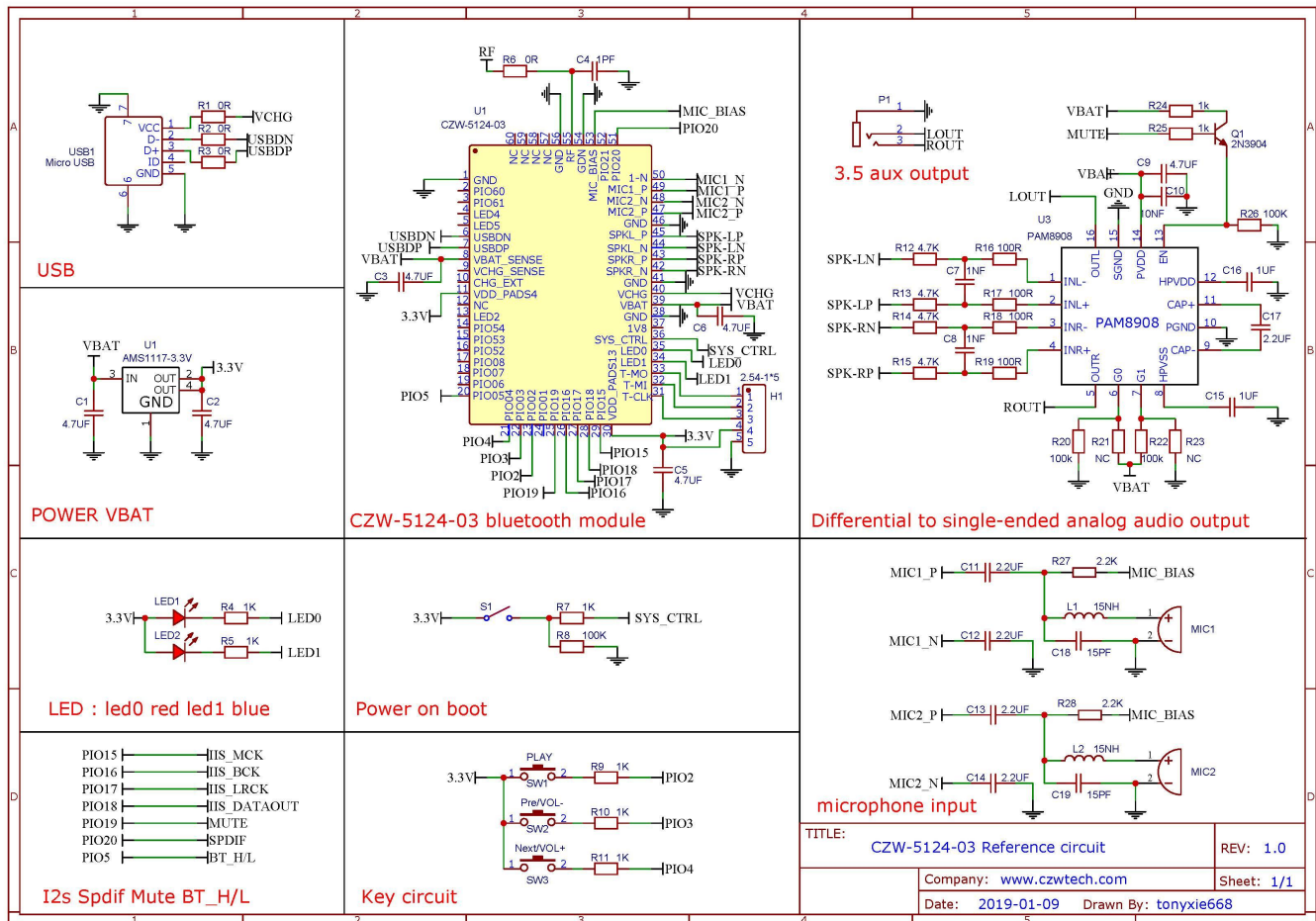
## 7 Pin Function Description

Pin#	Pin Name	Pin type	Description
1	GND	Ground	Ground
2	PIO[60]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 60.
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. NOTE If using internal charger or no charger, connect VCHG_SENSE direct to VCHG.
10	CHG_EXT	Analog	External charger transistor current control. 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. Alternative function: SDIO_D[0]
15	PIO[53]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 53. Alternative function: SDIO_CMD
16	PIO[52]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 52. Alternative function: SDIO_CLK
17	PIO[8]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 8. Alternative function: TBR_CLK
18	PIO[7]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 7. Alternative function: TBR_MISO[0]
19	PIO[6]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 6. Alternative function: TBR_MOSI[0]
20	PIO[5]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 5. Alternative function: TBR_MISO[1]
21	PIO[4]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 4. 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. Alternative function: TBR_MISO[2]
23	PIO[2]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 2. 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. 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. Alternative function: PCM_DIN[0]
26	PIO[16]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 16. Alternative function: PCM_CLK
27	PIO[17]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 17. Alternative function: PCM_SYNC
28	PIO[18]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 18. Alternative function: PCM_DOUT[0]
29	PIO[15]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 15. 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 Alternative function: Programmable I/O line 8.
32	TBR_MISO	Digital: Bidirectional with programmable strength internal pull- up/pull-down	TBR_MISO[0] Alternative function: Programmable I/O line7.
33	TBR_MOS	Digital: Bidirectional with programmable strength internal pull- up/pull-down	TBR_MOSI[0] 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. 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. Alternative function: Differential right line output, negative
43	SPKR_P	VDD_AUDIO_HP_SPKR	Headphone/speaker differential right output, positive. Alternative function: Differential right line output, positive
44	SPKL_N	VDD_AUDIO_HP_SPKL	Headphone/speaker differential left output, negative. Alternative function: Differential left line output, negative
45	SPKL_P	VDD_AUDIO_HP_SPKL	Headphone/speaker differential left output, positive. Alternative function: Differential left line output, positive
46	GND	Ground	Ground
47	MIC2_P	VDD_AUDIO_1V8	Microphone differential 2 input, positive. Alternative function: Differential audio line input right, positive
48	MIC2_N	VDD_AUDIO_1V8	Microphone differential 2 input, negative. Alternative function: Differential audio line input right, negative
49	MIC1_P	VDD_AUDIO_1V8	Microphone differential 1 input, positive. Alternative function: Differential audio line input left, positive
50	MIC1_N	VDD_AUDIO_1V8	Microphone differential 1 input, negative. 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. Alternative function: PCM_DOUT[1]
52	PIO[21]	Digital: Bidirectional with programmable strength internal pull-up/pull-down	Programmable I/O line 21. 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

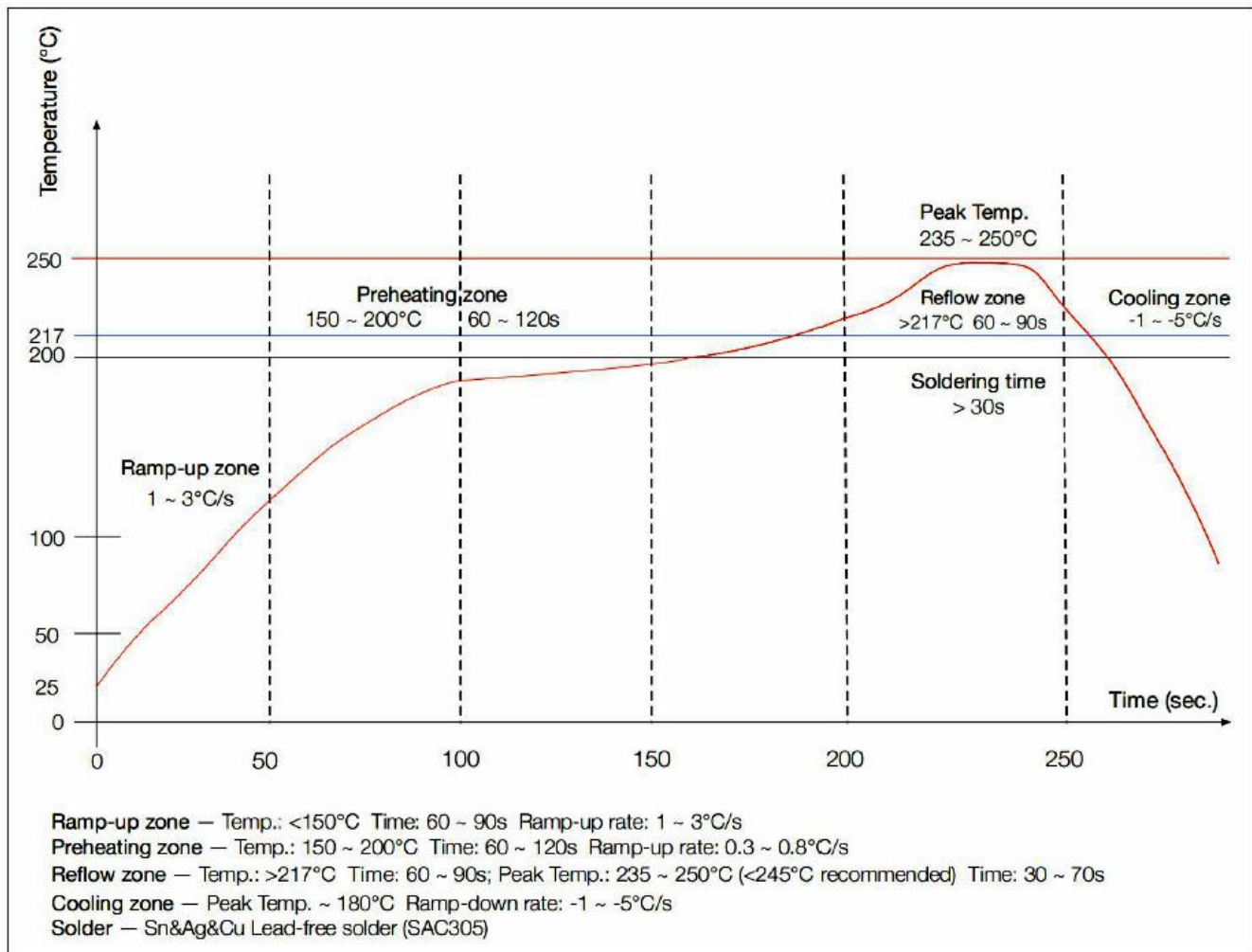
### 9.1 Absolute Maximum Ratings

Rating	Minimum	Maximum
Storage temperature	-40°C	+85°C

### 9.2 Recommended Operating Conditions

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

## 10 Recommended reflow temperature profile



**The module Must go through 100°C baking for at least 12 hours before SMT AND IR reflow process!**

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