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# Bluetooth Module Datasheet

## CZW-5124-02

**Model: CZW-5124-02**

**Hardware Version: V2.0**

**Release Date: 2019.01.11**

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**Shenzhen**

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## 1 summary

CZW-5124-02 is a Bluetooth module designed by ShenZhen Cheng Zhi Wei Technology Co.,Ltd. using Qualcomm Bluetooth chip qcc5124。

CZW-5124-02 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-5124-02 package is compatible with czw02 series pins, easy replacement and upgrade

## 2 General specifications

Model Name	CZW-5124-02
Package	54 Pin Module
Dimension	13mm x 18mm 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

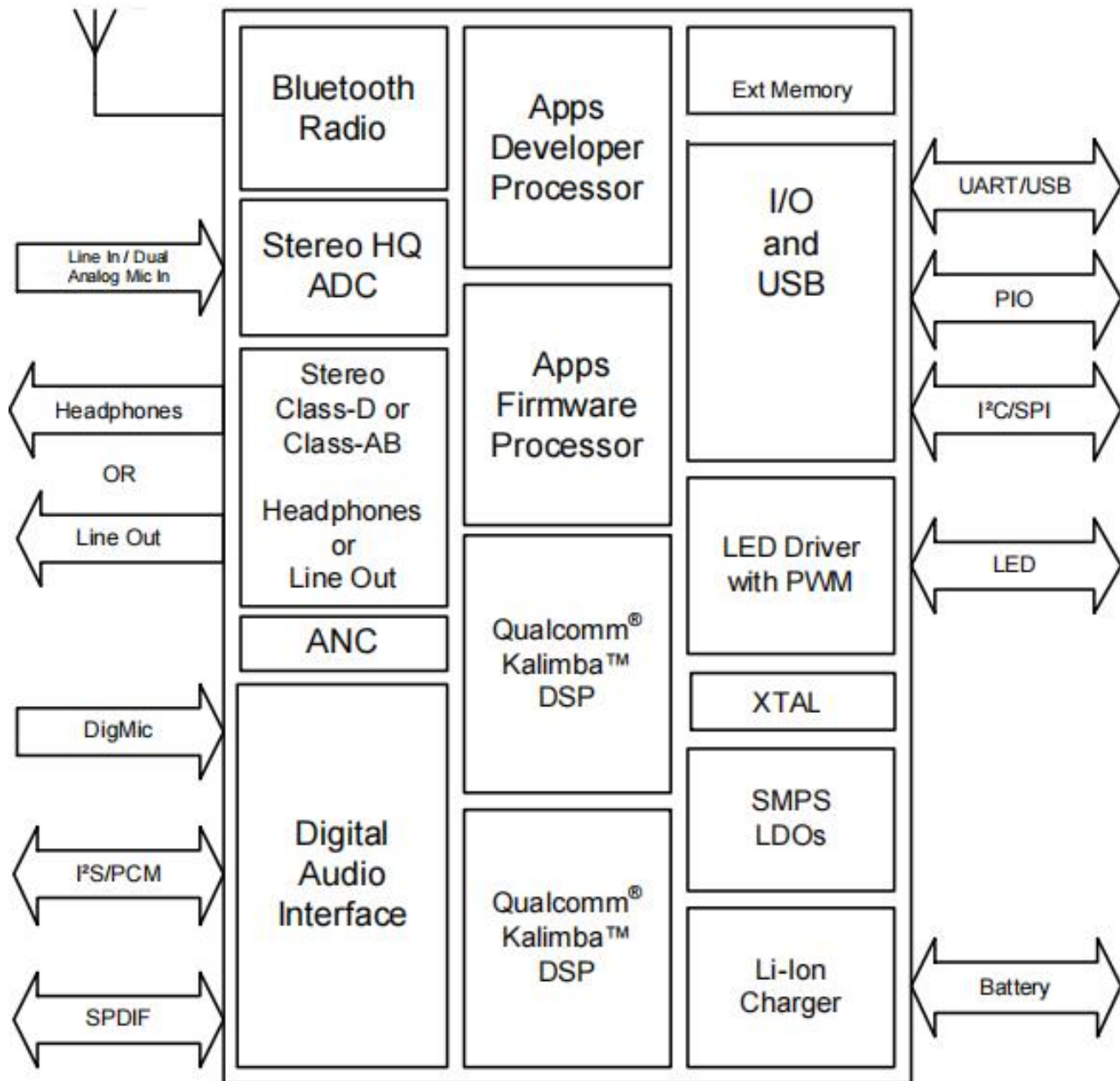
### 3.7 Power management

- ★ 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

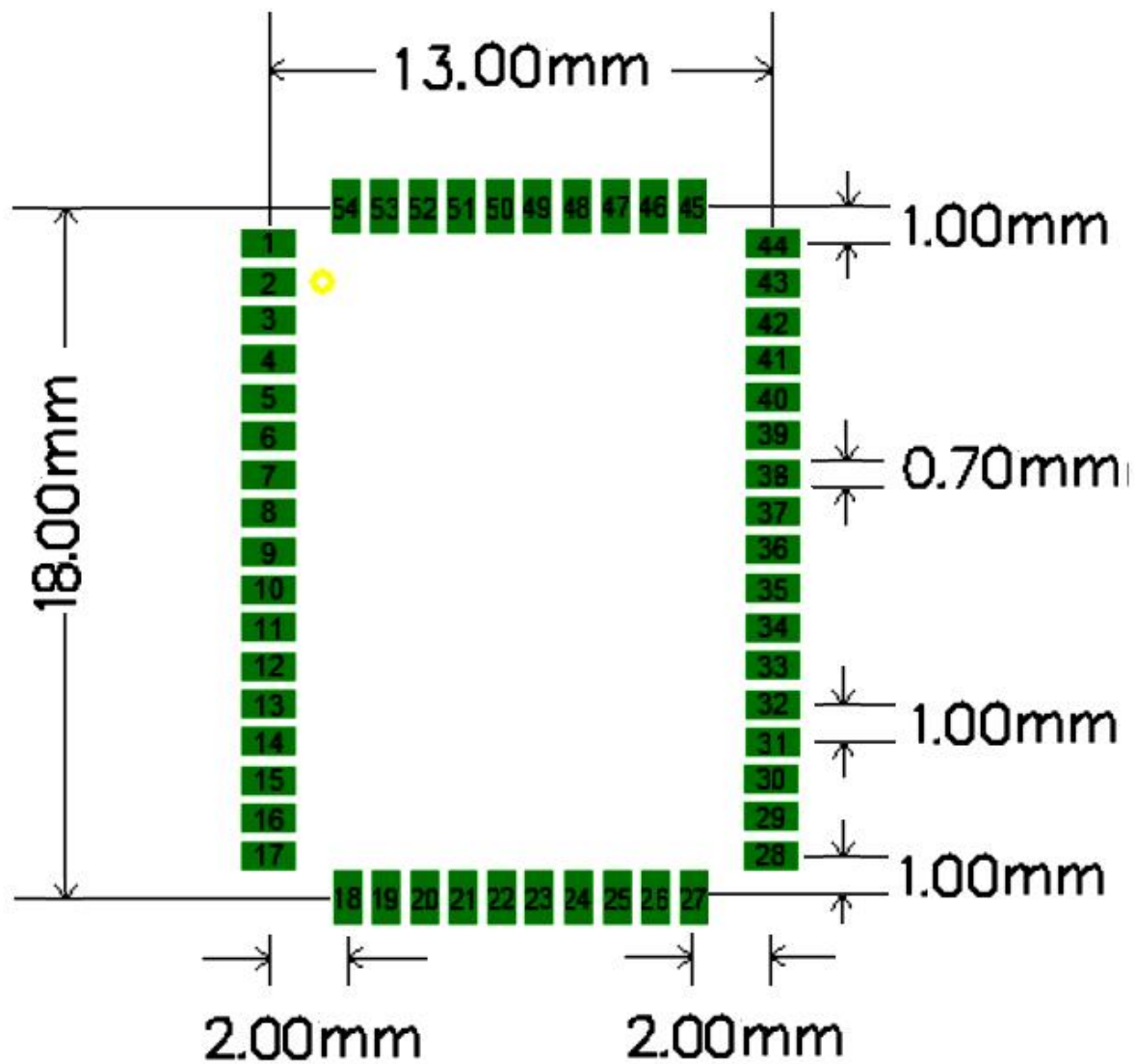
## 5 Block Diagram



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## 6 Module Package Information

### 6.1 Pinout Diagram and package dimensions



LED2	18	PI020	54
LED4	19	PI021	53
LED5	20	PI061	52
GDN	21	PI060	51
1V8	22	PI052	50
VDD_PADS1	23	PI053	49
VDD_PADS37	24	PI054	48
PI004	25	GDN	47
PI003	26	BT_RF	46
PI006	27	GDN	45



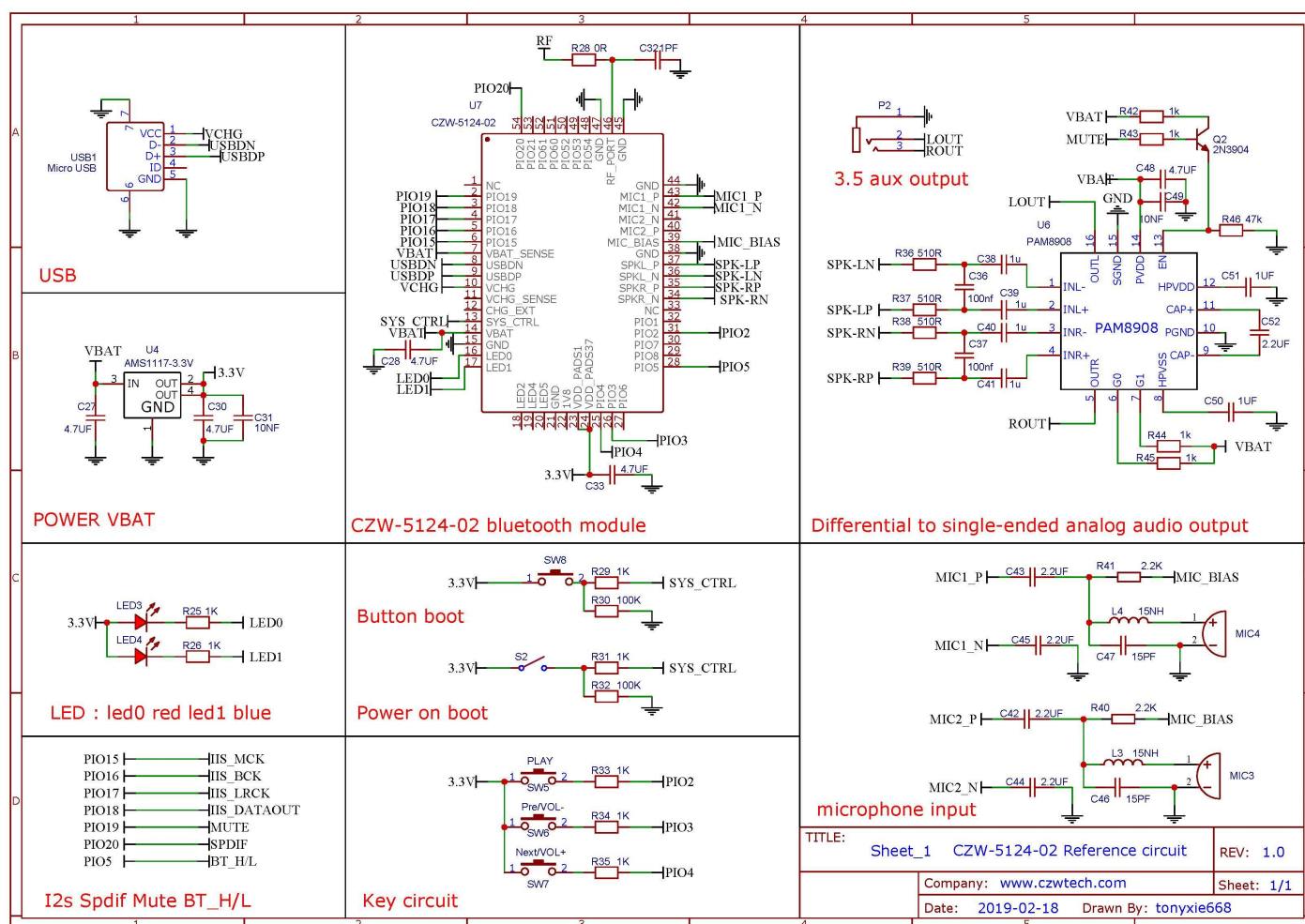
## 7 Pin Function Description

Pin#	Pin Name	Pin type	Description
1	NC	NC	NC
2	PIO[19]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 19. Alternative function: PCM_DIN[0]
3	PIO[18]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 18. Alternative function: PCM_DOUT[0]
4	PIO[17]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 17. Alternative function: PCM_SYNC
5	PIO[16]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 16. Alternative function: PCM_CLK
6	PIO[15]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 15. Alternative function: MCLK_OUT
7	VBAT_SENSE	Analog	Battery voltage sense input.
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	CHG_EXT	Analog	External charger transistor current control. Connect to base of external charger transistor as per application schematic.
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	LED[0]	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.
17	LED[1]	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.

Pin#	Pin Name	Pin type	Description
18	LED[2]	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.
19	LED[4]	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.
20	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_1	Supply	1.8 V/3.3 V PIO supply.
24	VDD_PADS_3、7	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	NC	NC	NC
34	SPKR_N	VDD_AUDIO_HP_SPKR	Headphone/speaker differential right output, negative. Alternative function: Differential right line output, negative
35	SPKR_P	VDD_AUDIO_HP_SPKR	Headphone/speaker differential right output, positive. Alternative function: Differential right line output, positive
36	SPKL_N	VDD_AUDIO_HP_SPKL	Headphone/speaker differential left output, negative. Alternative function: Differential left line output, negative

Pin#	Pin Name	Pin type	Description
37	SPKL_P	VDD_AUDIO_HP_SPKL	Headphone/speaker differential left output, positive. Alternative function: Differential left line output, positive
38	GND	Ground	Ground
39	MIC_BIAS	VDD_AUDIO_1V8	Mic bias output.
40	MIC2_N	VDD_AUDIO_1V8	Microphone differential 2 input, negative. Alternative function: Differential audio line input right, negative
41	MIC2_P	VDD_AUDIO_1V8	Microphone differential 2 input, positive. Alternative function: Differential audio line input right, positive
42	MIC1_N	VDD_AUDIO_1V8	Microphone differential 1 input, negative. Alternative function: Differential audio line input left, negative
43	MIC1_P	VDD_AUDIO_1V8	Microphone differential 1 input, positive. Alternative function: Differential audio line input left, positive
44	GND	Ground	Ground
45	GND	Ground	Ground
46	BT_RF	VDD_BT_RADIO	Bluetooth transmit/receive.
47	GND	Ground	Ground
48	PIO[54]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 54. Alternative function: SDIO_D[0]
49	PIO[53]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 53. Alternative function: SDIO_CMD
50	PIO[52]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 52. Alternative function: SDIO_CLK
51	PIO[60]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 60.
52	PIO[61]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 61.
53	PIO[21]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 21. Alternative function: PCM_DOUT[2]
54	PIO[20]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 20. Alternative function: PCM_DOUT[1]

## 8 Reference application circuit



## 9 Electrical Characteristics

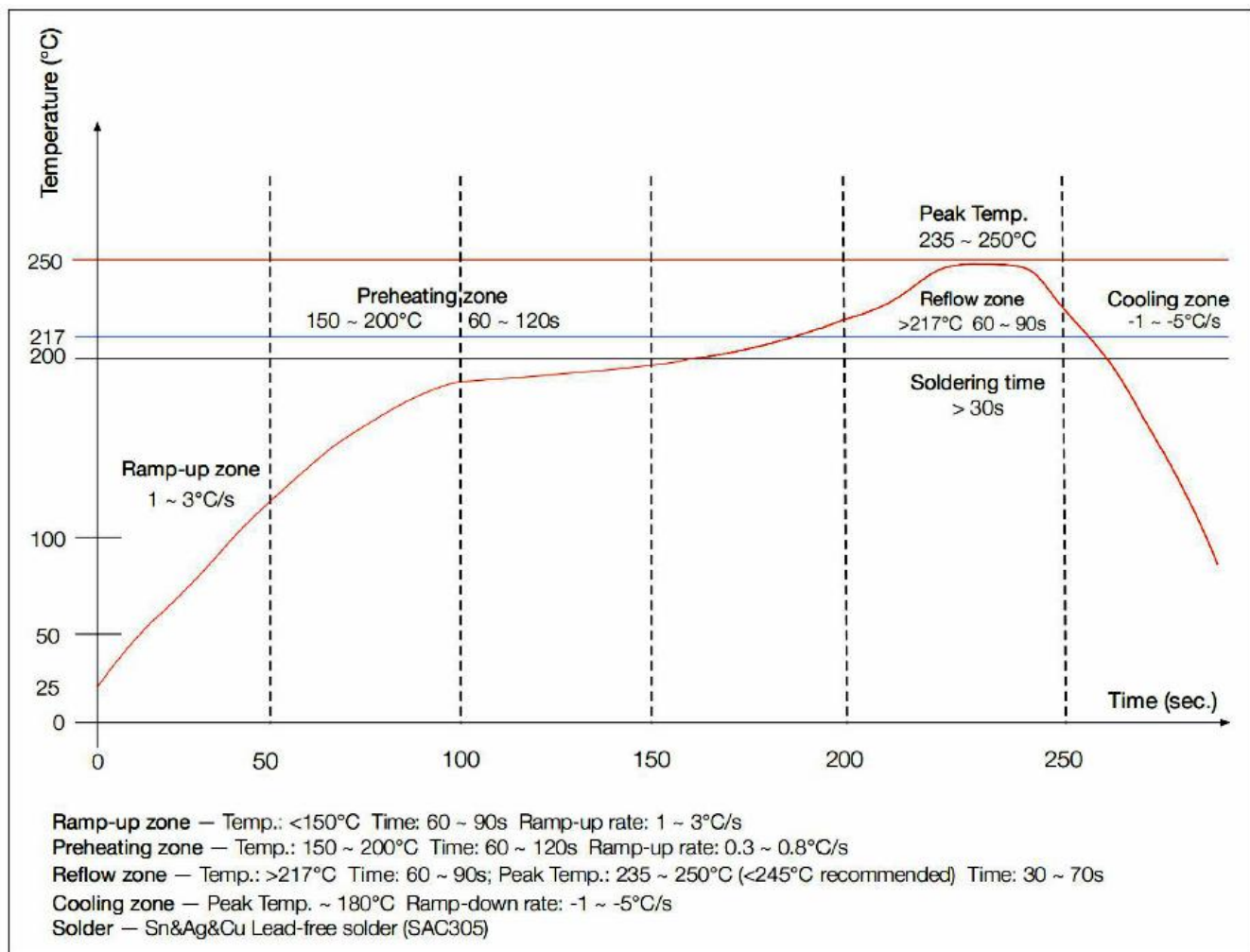
### 9.1 Absolute Maximum Ratings

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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