Bluetooth Module Datasheet

CZW-3021-02

Model:CZW-3021-02

Hardware Version：V2.0

Release Date：2018.05.11

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List of Contents

1 summary

CZW-3021-02 is a Bluetooth module designed by ShenZhen Cheng Zhi Wei Technology Co.,Ltd. using Qualcomm Bluetooth chip qcc3021。

CZW-3021-02 is a Bluetooth,   audio and programmable application processor. It includes high-performance, analog, and digital audio codecs, Class-AB speaker driver, advanced power management, Li-ion battery charger, light-emitting diode (LED) drivers, and flexible interfaces including inter¬ integrated circuit sound (I^2 S), inter-integrated circuit interface (I^2 C), universal asynchronous receiver transmitter (UART), and programmable input/output (PIO)。

CZW-3021-02 package is compatible with czw02 series pins, easy replacement and upgrade

2 General specifications

Model Name	CZW-3021-02
Package	54 Pin Module
Dimension	13mm x 18mm x 2.4mm
Chipset	QCC3021
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	-91dBm
8DPSK Receive Sensitivity	-81dBm

3 Key Features

3.1 Device description

★ High-performance programmable Bluetooth® stereo audio SoC
★ Fully qualified single-chip dual-mode Bluetooth v5.0 system
★ Tri-core processor architecture with low power for extended battery life

3.2 Features

★ Qualified to Bluetooth® v5.0 specification
★ 120 MHz Qualcomm® Kalimba™ audio DSP
★ 32 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
★ Flexible PIO controller and LED pins with PWM support
★ 1-mic Qualcomm® cVc™ speaker noise reduction and echo cancellation technology
★ SBC and AAC audio codecs support
★ Serial interfaces: UART, Bit Serializer (I^2C/SPI), USB 2.0
★ Integrated PMU: Dual SMPS for system/digital circuits, Integrated Li-ion battery charger

3.3 Audio subsystem

★ 32- bit Kalimba audio digital signal processor (DSP) core with flexible clocking from 2 MHz to 120 MHz to allow
   optimization and trade-off performance vs. power consumption
★ DSP runs from ROM
★ 80 KB program random access memory (RAM)
★ 256 KB data RAM
★ 5 Mb ROM

3.4 Application subsystem

★ Dual core application subsystem 32 MHz operation
★ 32- bit Firmware Processor:
★ 32- bit Developer Processor:
★ Both cores execute code from external flash memory using QSPI clocked at 32 MHz
★ On-chip caches per core allow for optimized performance and power consumption Bluetooth subsystem

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

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

3.7 Power management

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

★ QCC3021 QFN 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)

3.8 Audio engine and digital audio interfaces

★ 24-bit I^2S 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 Class-AB headphone 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-toanalog converter (DAC)s support sample rates of 8, 16, 32, 44.1, 48, 96 kHz. DACs also support 192 kHz

3.9 Peripherals and physical interfaces

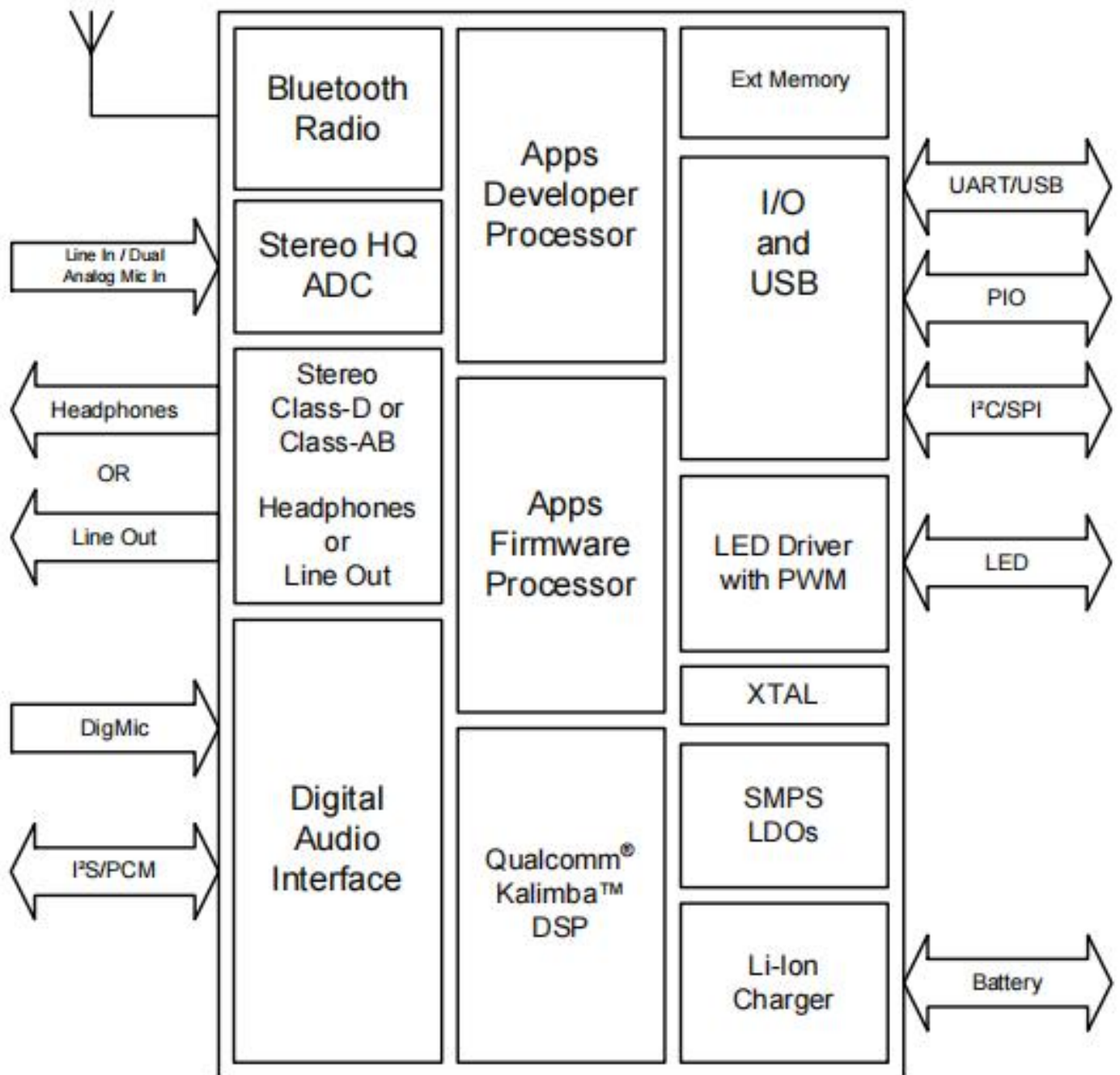★ A UART interface

★ 2 x Bit Serializers (programmable serial peripheral interface (SPI) and I^2C hardware accelerator)

★ 1 x USB interface

★ QSPI NOR flash interface

★ Up to 17 PIO and 4 open drain/digital input LED pads with pulse width modulation (PWM)

4 Applications

★ Wireless speakers

5 Block Diagram

6 Module Package Information

6.1 Pinout Diagram and package dimensions
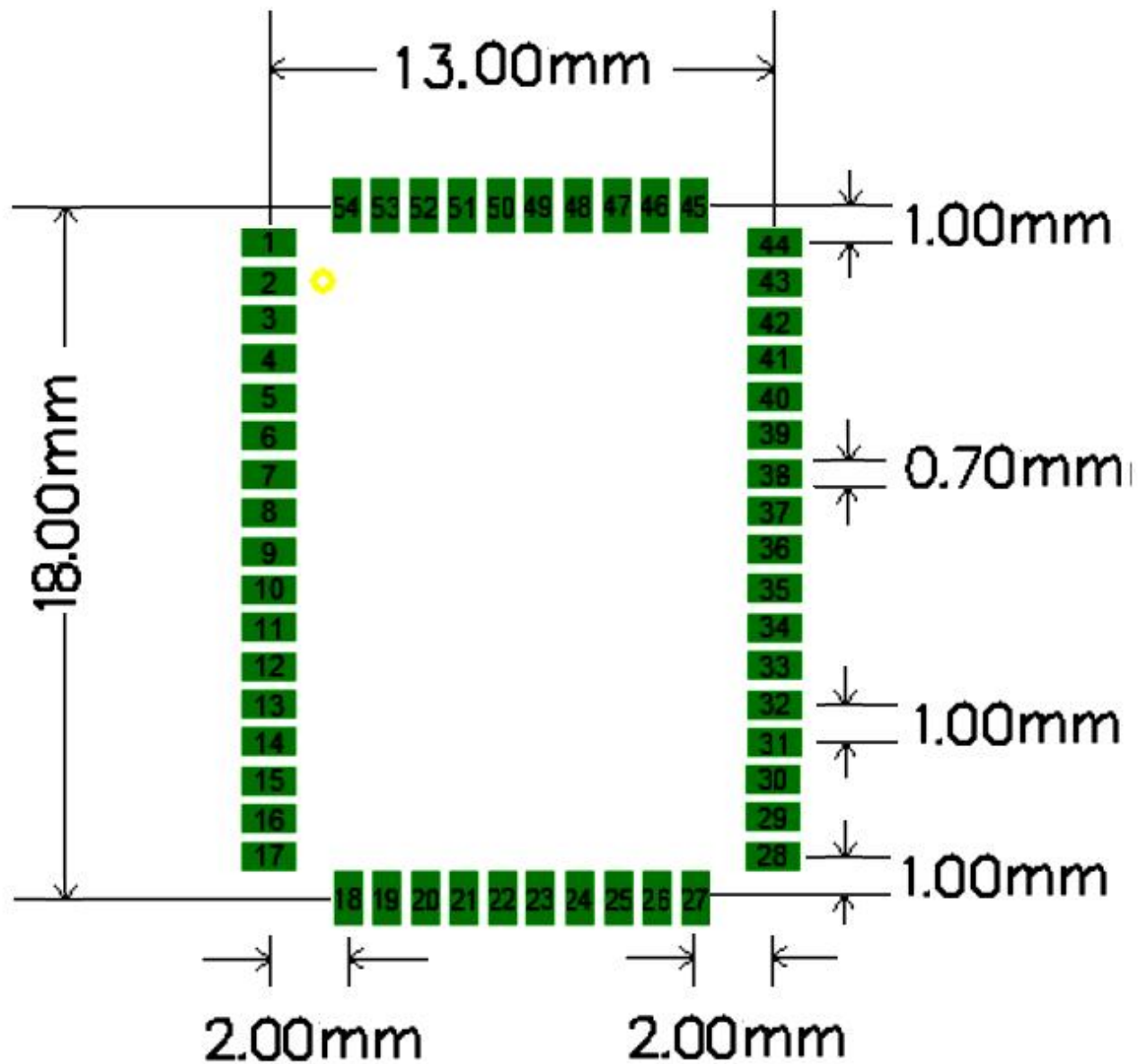
6.2 Module Pin descriptions

Top pins (left to right): PIO20 (54), PIO21 (53), PIO22 (52), PIO23 (51), NC (50), NC (49), NC (48), GDN (47), BT_RF (46), GDN (45)

Left side (top to bottom):
- NC — 1
- PIO19 — 2
- PIO18 — 3
- PIO17 — 4
- PIO16 — 5
- PIO15 — 6
- VBAT_SENSE — 7
- USB_DN — 8
- USB_DP — 9
- VCHG — 10
- VCHG_SENSE — 11
- CHG_EXT — 12
- SYS_CTRL — 13
- VBAT — 14
- GND — 15
- LED0 — 16
- LED1 — 17

Right side (top to bottom):
- 44 — GND
- 43 — MIC1_P
- 42 — MIC1_N
- 41 — MIC2_P
- 40 — MIC2_N
- 39 — MIC_BIAS
- 38 — GND
- 37 — SPKL_P
- 36 — SPKL_N
- 35 — SPKR_P
- 34 — SPKR_N
- 33 — NC
- 32 — PIO01
- 31 — PIO02
- 30 — PIO07
- 29 — PIO08
- 28 — PIO05

Bottom pins (left to right): LED2 (18), NC (19), LED5 (20), GDN (21), 1V8 (22), VDD_PADS4 (23), VDD_PADS1 (24), PIO04 (25), PIO03 (26), PIO06 (27)

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	NC	NC	NC
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_4	Supply	1.8 V/3.3 V PIO supply.
24	VDD_PADS_1	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[23]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 23.
52	PIO[22]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 22.
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
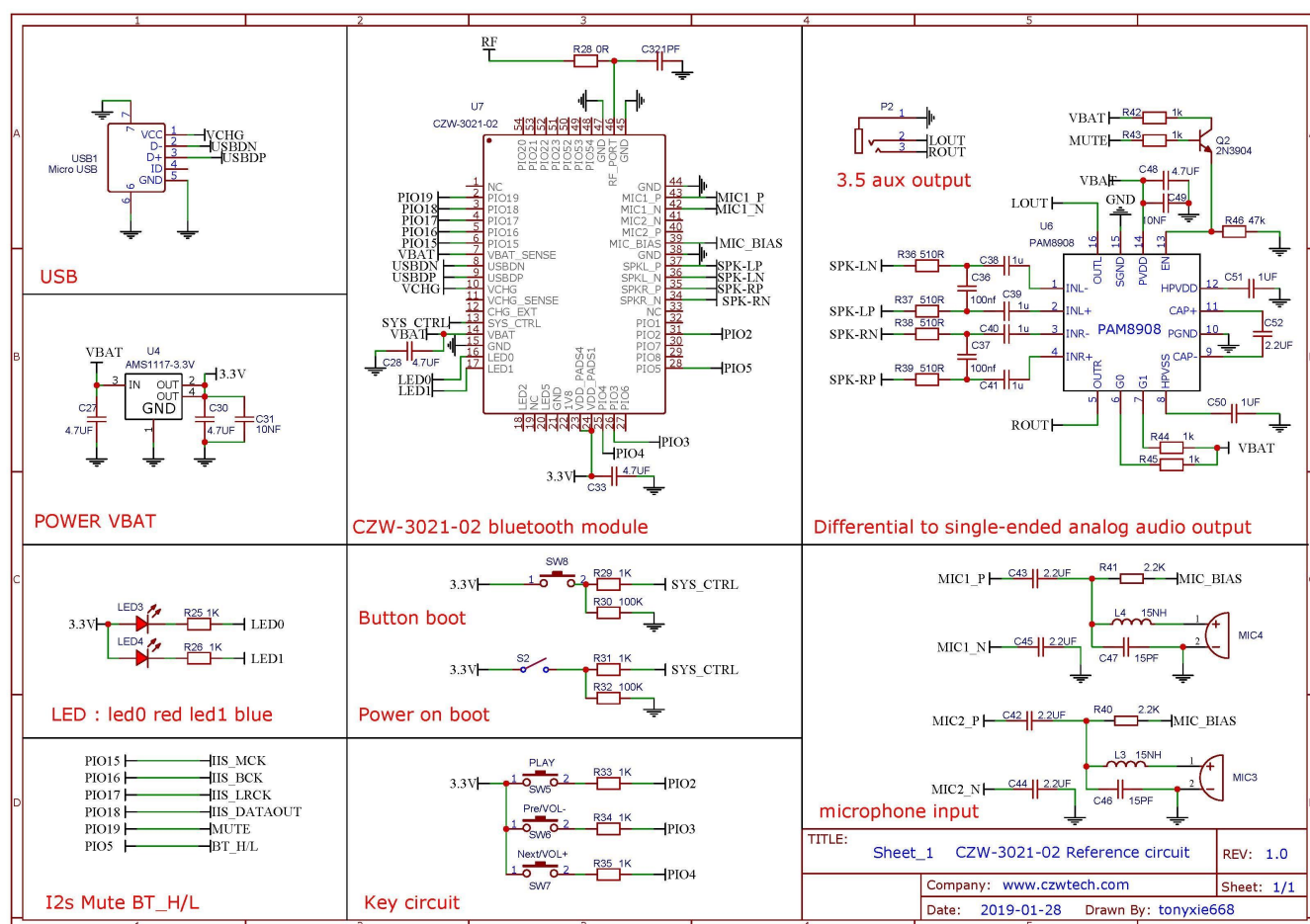
Notice: for reference only, please design the circuit according to the actual application
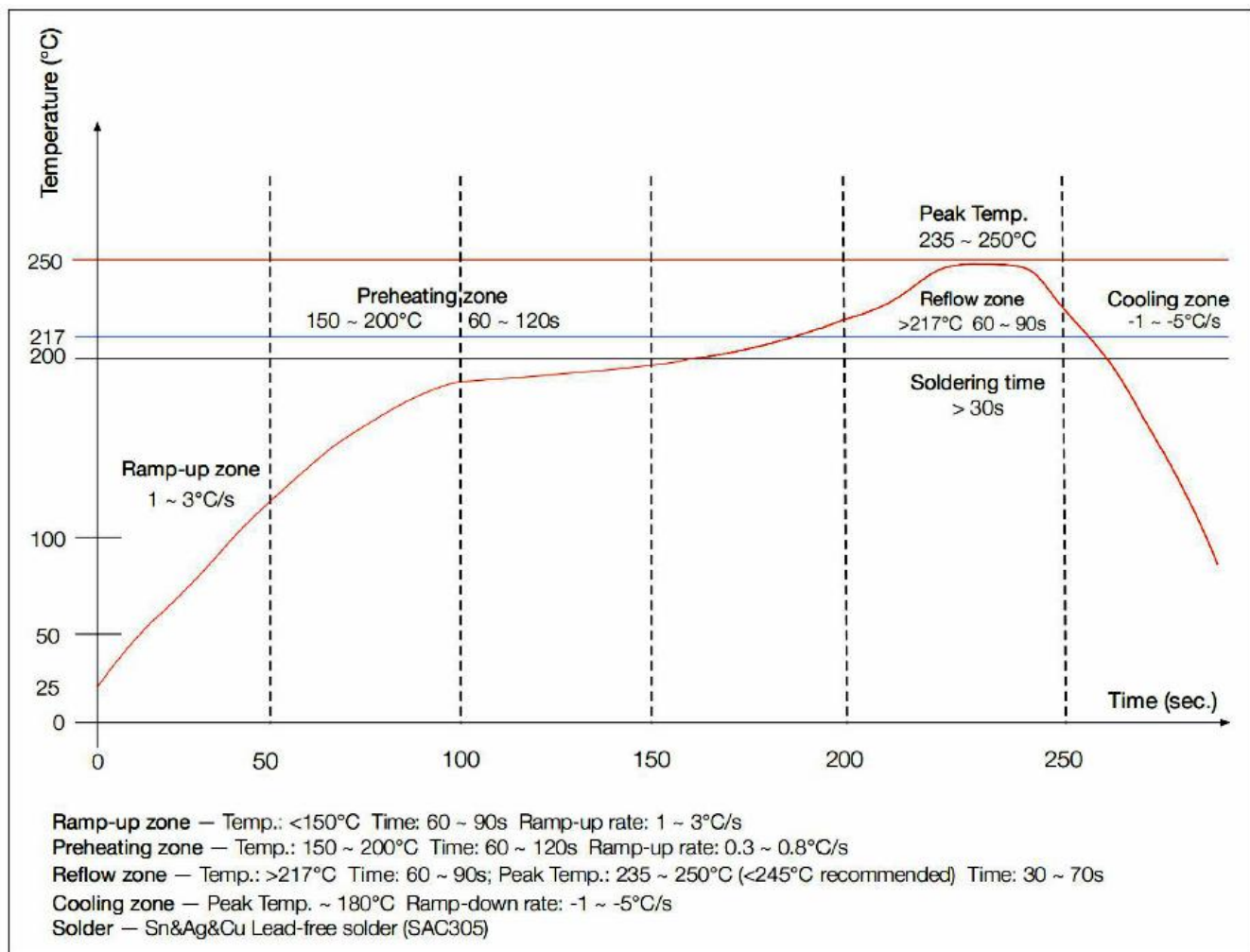
9 Electrical Characteristics

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!

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