

# **AC2102A Datasheet**

**Zhuhai Jieli Technology Co.,LTD**

**Version 1.1**

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## Revision History

| Date       | Revision | Description           |
|------------|----------|-----------------------|
| 2026.03.07 | V1.0     | Initial Release       |
| 2026.04.18 | V1.1     | Update Pin Assignment |
|            |          |                       |



# Table of Contents

|   |           |
|---|-----------|
| <b>Revision History</b> .....             | <b>1</b>  |
| <b>Table of Contents</b> .....            | <b>2</b>  |
| <b>AC2102A Features</b> .....             | <b>3</b>  |
| <b>1 Block Diagram</b> .....              | <b>5</b>  |
| <b>2 Pin Definition</b> .....             | <b>6</b>  |
| 2.1 Pin Assignment .....                  | 6         |
| 2.2 Pin Description .....                 | 7         |
| 2.3 Pin Specialist .....                  | 9         |
| <b>3 Electrical Characteristics</b> ..... | <b>10</b> |
| 3.1 Absolute Maximum Ratings .....        | 10        |
| 3.2 ESD Ratings .....                     | 10        |
| 3.3 PMU Characteristics .....             | 10        |
| 3.4 Battery Charge .....                  | 10        |
| 3.5 IO Characteristics .....              | 11        |
| 3.6 Audio DAC Characteristics .....       | 13        |
| 3.7 Audio ADC Characteristics .....       | 15        |
| 3.8 BT Characteristics .....              | 17        |
| 3.9 Radio Characteristics .....           | 18        |
| <b>4 Package Information</b> .....        | <b>19</b> |
| 4.1 QFN52_6×6mm .....                     | 19        |
| <b>5 IC Marking Information</b> .....     | <b>20</b> |
| <b>6 Solder-Reflow Condition</b> .....    | <b>21</b> |

# AC2102A Features

## SYSTEM

- 32bit DSP 307.2MHz
- With IEEE754 Single precision FPU
- Support FFT/MATH
- I-cache and D-cache
- Support EMU
- On-chip SRAM 288kbyte
- Support MMU
- Support MPU
- Built-In Flash
- 24MHz crystal oscillator
- Internal RC oscillator,PLL

## DSP Audio Processing

- SBC/AAC/LDAC/LHDC/LC3/CVSD/mSBC codec
- mSBC voice codec supported for BT phone
- PLC for voice processing
- Single/Multi MIC ENC
- Multi-band DRC
- Multi-band EQ (FIR/IIR)
- Support spatial sound

## Audio

- 3 x 24bit DAC
  - ❖ SNR 114dB
  - ❖ Noise 2uVrms
  - ❖ Supports single mode
  - ❖ Supports differential mode
  - ❖ Supports stereo VCMO mode 30mW
  - ❖ Sampling rate 8~384kHz
- 2 x 24bit ADC
  - ❖ SNR 100dB
  - ❖ Sampling rate 8~192kHz
  - ❖ support analog/digital microphone
  - ❖ Supports AMUX
- I<sup>2</sup>S/TDM/PDM/SPDIF AUDIO Master/Slave interface

## Bluetooth

- Dual-mode BT6.0 with LE Audio (DN 332415)

- Support AoA TX
- Support LE audio BIS/CIS
- Maximum transmitting power 13dBm
- Receiver sensitivity
  - ❖ -96dBm @BR
  - ❖ -96dBm @EDR Π/4 DQPSK
  - ❖ -88.5dBm @EDR 8DPSK

## Analog FM

- RX support stereo/mono
  - ❖ Frequency 50 - 108MHz
  - ❖ mono sensitivity 1.5uV EMF
- TX support stereo/mono
  - ❖ Frequency 50 - 108MHz

## Peripherals

- 1 x Full speed USB
- 1 x SD host controller
- 6 x GPMulti-function 32bit timer
- 1 x ADVMulti-function 32bit timer
- 3 x UART interface
- 1 x I<sup>2</sup>C Master/Slave interface
- 2 x SPI Master/Slave interface
- 1 x QDEC
- 1 x 10bit ADC(16 Channels)
- 1 x NFC ISO/IEC 14443 Type A (Low-Power Wake-Up support)
- 35 x GPIO Support function remapping

## PMU

- Integrated battery charger up to 380mA
- Support temperature sensor
- VPWR range 4.5V to 5.5V
- VBAT range 2.7V to 4.5V
- IOVDD range 2.7V to 3.6V

## Packages

- QFN52(6mm\*6mm)

## Temperature

- Operating temperature

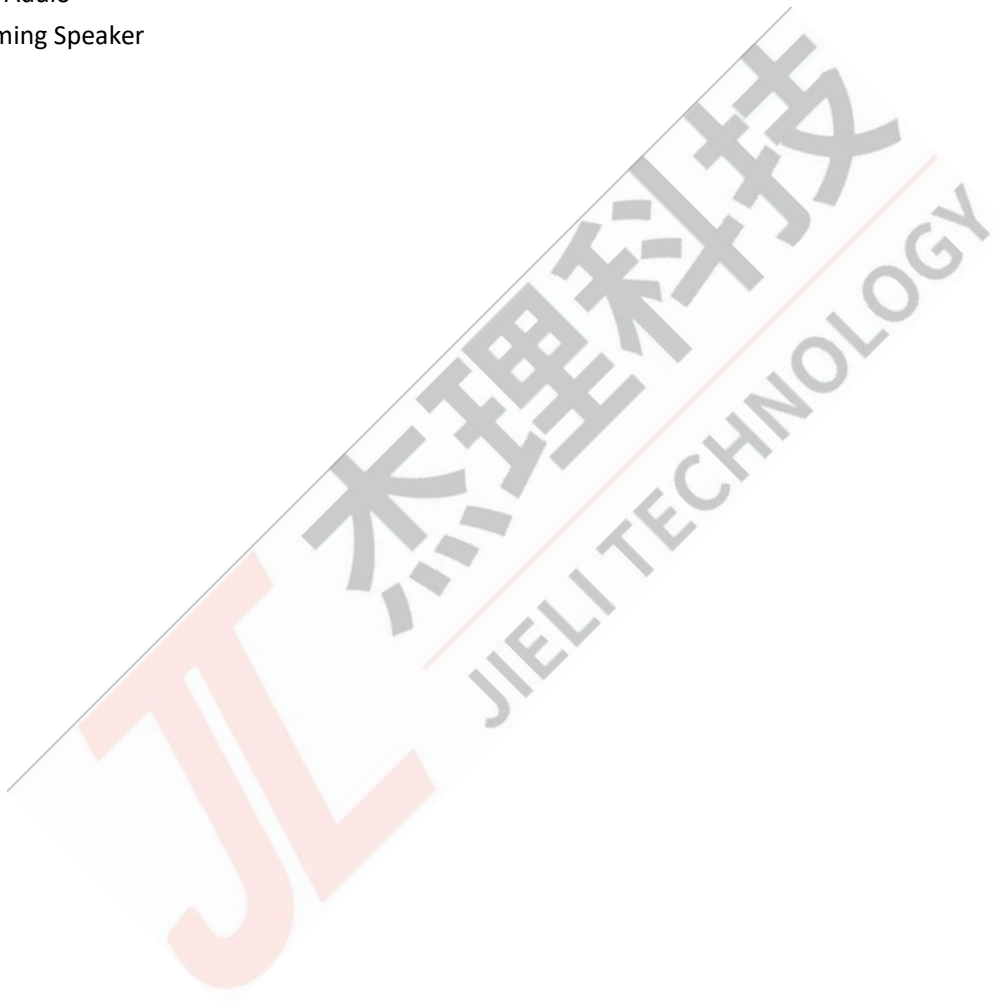
TC = -40°C to +85°C (standard range)

TC = -40°C to +105°C (extended range)

- Storage temperature -65°C to +150°C

### Applications

- Auracast Broadcast Speaker
- Soundbar
- Party box
- Outdoor Speaker
- Car Audio
- Gaming Speaker



# 1 Block Diagram

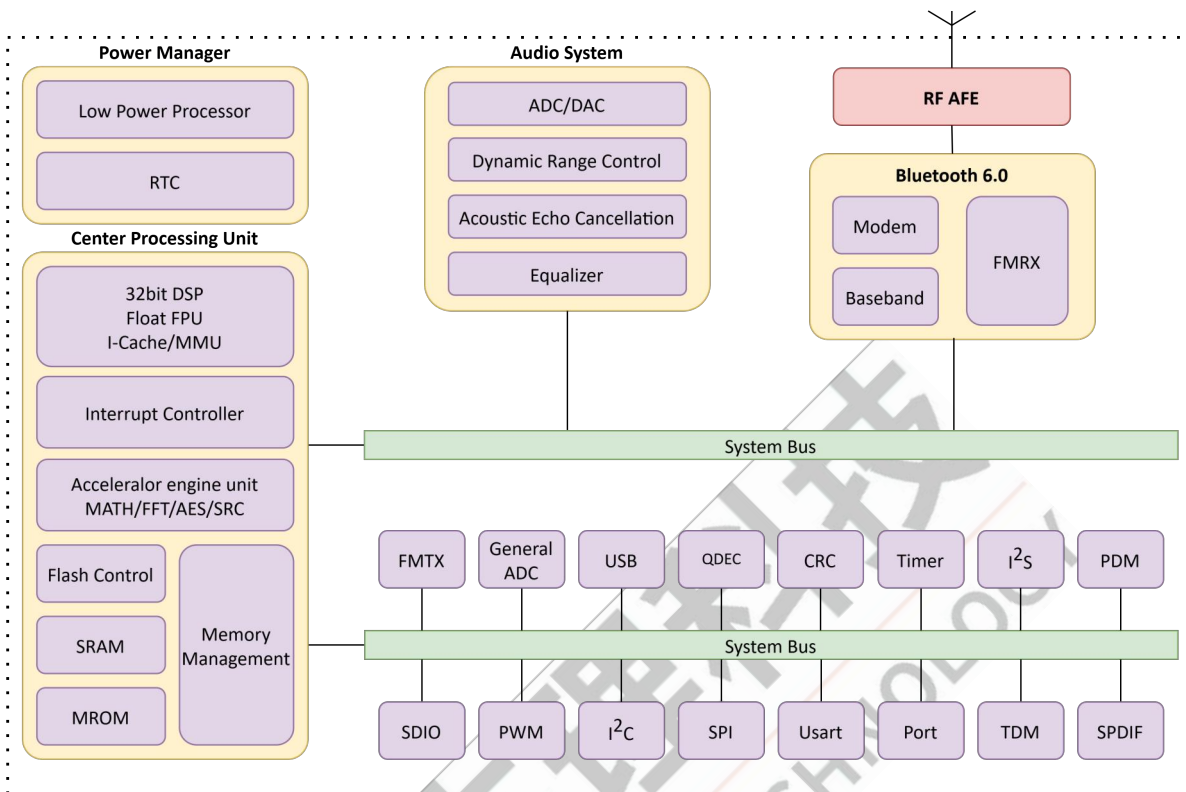


Figure 1-1 AC2102A Block Diagram

## 2 Pin Definition

### 2.1 Pin Assignment

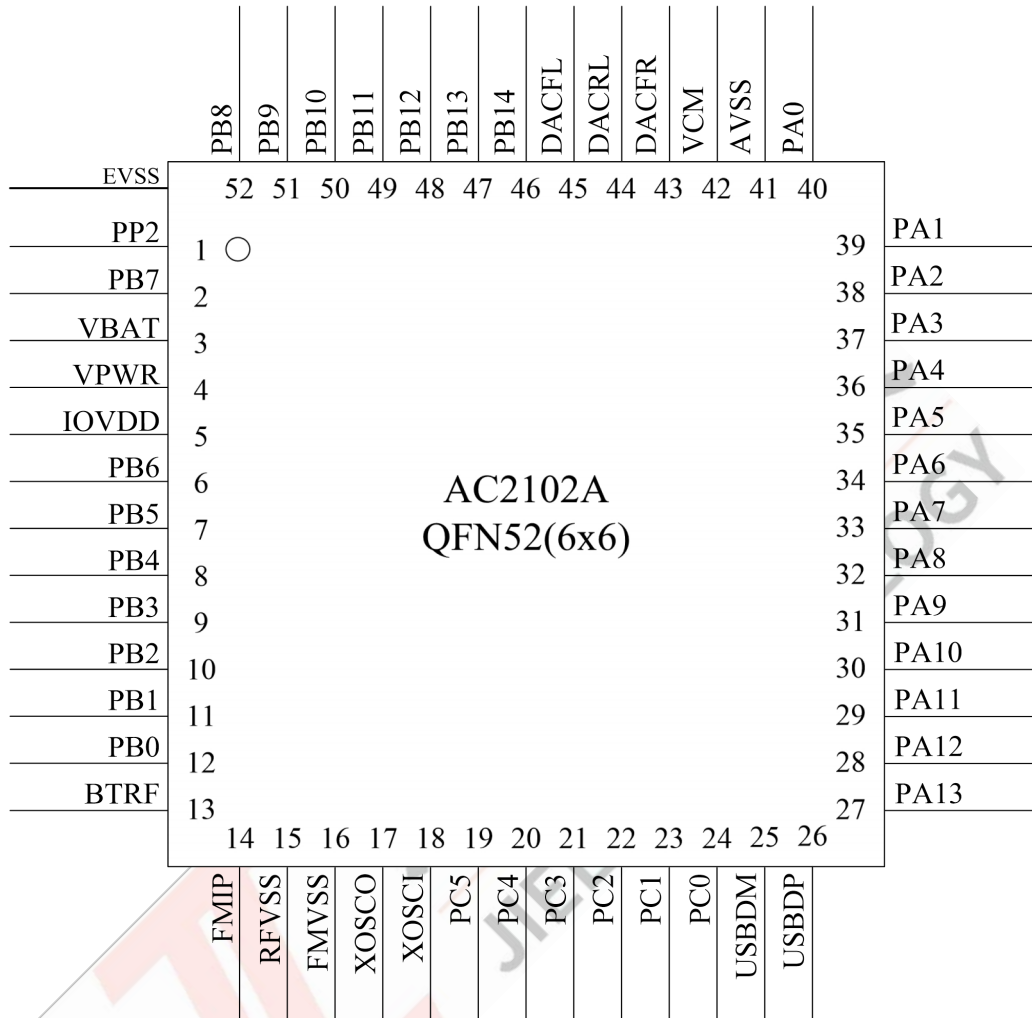


Figure 2-1 AC2102A Pin Assignment

## 2.2 Pin Description

**Table 2-2-1 AC2102A Pin Description**

| Pin No. | Name  | Type | IO Initial State | Description   |
|---------|-------|------|------------------|---|
| 1       | PP2   | O    | --               | SD Power<br>ADC13(ADC Input Channel 13)             |
| 2       | PB7   | I/O  | --               | --  |
| 3       | VBAT  | P    | --               | Battery Input                                       |
| 4       | VPWR  | P    | --               | Charge Power Input                                  |
| 5       | IOVDD | P    | --               | IO Power  |
| 6       | PB6   | I/O  | --               | 1/2 Voltage to ADCP2(ADC Input Channel P2)          |
| 7       | PB5   | I/O  | --               | 32k Crystal Oscillator Output                       |
| 8       | PB4   | I/O  | --               | 32k Crystal Oscillator Input                        |
| 9       | PB3   | I/O  | --               | MCLR(Device Reset)                                  |
| 10      | PB2   | I/O  | --               | LVD(External Low Voltage Detection Input)           |
| 11      | PB1   | I/O  | 10kΩ Pull-up     | Hold down 0 to reset<br>ADCP0(ADC Input Channel P0) |
| 12      | PB0   | I/O  | --               | 1/2 Voltage to ADCP1(ADC Input Channel P1)          |
| 13      | BTRF  | RF   | --               | Bluetooth RF Antenna                                |
| 14      | FMIP  | I    | --               | FM Postive Input                                    |
| 15      | RFVSS | G    | --               | RF Ground   |
| 16      | FMVSS | G    | --               | FM Ground   |
| 17      | XOSCO | O    | --               | Crystal Oscillator Output                           |
| 18      | XOSCI | I    | --               | Crystal Oscillator Input                            |
| 19      | PC5   | I/O  | --               | ADC12(ADC Input Channel 12)                         |
| 20      | PC4   | I/O  | --               | ADC11(ADC Input Channel 11)                         |
| 21      | PC3   | I/O  | --               | ADC10(ADC Input Channel 10)                         |
| 22      | PC2   | I/O  | --               | --  |
| 23      | PC1   | I/O  | --               | ADC9(ADC Input Channel 9)                           |
| 24      | PC0   | I/O  | --               | --  |
| 25      | USBDM | I/O  | 15kΩ Pull-down   | ADC15(ADC Input Channel 15)<br>USB Negative Data    |
| 26      | USBDP | I/O  | 15kΩ Pull-down   | ADC14(ADC Input Channel 14)<br>USB Positive Data    |
| 27      | PA13  | I/O  | --               | SPDIF_IN3(AMP_D)                                    |
| 28      | PA12  | I/O  | --               | SPDIF_IN2(AMP_C)<br>ADC4(ADC Input Channel 4)       |
| 29      | PA11  | I/O  | --               | SPDIF_IN1(AMP_B)<br>ADC3(ADC Input Channel 3)       |
| 30      | PA10  | I/O  | --               | SPDIF_IN0(AMP_A)                                    |



| Pin No. | Name            | Type | IO Initial State | Description  |
|---------|-----------------|------|------------------|--|
| 31      | PA9             | I/O  | --               | NFC_RX<br>ADC2(ADC Input Channel 2)                              |
| 32      | PA8             | I/O  | --               | ADC1(ADC Input Channel 1)  |
| 33      | PA7             | I/O  | --               | AUX1(Audio ADC Input)  |
| 34      | PA6             | I/O  | --               | AUX0(Audio ADC Input)  |
| 35      | PA5             | I/O  | --               | ADC0(ADC Input Channel 0)  |
| 36      | PA4             | I/O  | --               | MIC_B0(Audio ADC Input)  |
| 37      | PA3             | I/O  | --               | AUX3(Audio ADC Input)<br>AIN_BN(Audio ADC Negative Input)        |
| 38      | PA2             | I/O  | --               | AUX2(Audio ADC Input)<br>AIN_AN(Audio ADC Negative Input)        |
| 39      | PA1             | I/O  | --               | MIC_A0(Audio ADC Input)  |
| 40      | PA0             | I/O  | --               | MICBIAS(MIC Bias Output)<br>MICLDO(MIC Bias LDO Output)          |
| 41      | AVSS            | G    | --               | Audio Ground   |
| 42      | VCM             | P    | --               | Audio Reference Voltage  |
| 43      | DACFR           | O    | --               | Front Right Channel DAC Output                                   |
| 44      | DACRL<br>(VCMO) | O    | --               | Rear Left Channel DAC Output<br>Audio Common-mode Output voltage |
| 45      | DACFL           | O    | --               | Front Left Channel DAC Output                                    |
| 46      | PB14            | I/O  | --               | ADC8(ADC Input Channel 8)  |
| 47      | PB13            | I/O  | --               | --   |
| 48      | PB12            | I/O  | --               | ADC7(ADC Input Channel 7)  |
| 49      | PB11            | I/O  | --               | --   |
| 50      | PB10            | I/O  | --               | ADC6(ADC Input Channel 6)  |
| 51      | PB9             | I/O  | --               | --   |
| 52      | PB8             | I/O  | --               | FM_TX<br>ADC5(ADC Input Channel 5)                               |

**Note**

- 1.IO initial state abbreviations Z--High resistance, H--High level, L--Low level, X--May be changed during power on.
- 2.Timer, NFC, QDEC, UART, I<sup>2</sup>C, SPI and SD functions can be remapped to any I/O.

**Table 2-2-2 Pin Types Description**

| Pin Type | Description | Pin Type | Description     |
|----------|-------------|----------|-----------------|
| P        | Power       | I/O      | Input or Output |
| G        | Ground      | I        | Input           |
| RF       | RF antenna  | O        | Output          |

## 2.3 Pin Specialist

Table 2-3-1 Pin keep Description

| Pin       | Description for IOVDD power off mode                         |
|-----------|--|
| PB0~PB6   | keep IO state in IOVDD power off mode                        |
| VPWR      | Keep detection of charging insertion in IOVDD power off mode |
| Others IO | IO state loss in IOVDD power off mode                        |

## 3 Electrical Characteristics

### 3.1 Absolute Maximum Ratings

**Table 3-1 Absolute Maximum Ratings**

| Symbol | Parameter                          | Min  | Max  | Unit |
|--------|------------------------------------|------|------|------|
| Topt   | Operating temperature              | -20  | +85  | °C   |
| Tstg   | Storage temperature                | -65  | +150 | °C   |
| VBAT   | Supply Voltage                     | -0.3 | 5.5* | V    |
| VPWR   |                                    | -0.3 | 6    | V    |
| IOVDD  |                                    | -0.3 | 3.6  | V    |
| GPIO   | Input voltage of GPIO (except PB0) | -0.3 | 3.6  | V    |
| HVTIO  | Input voltage of HVT-IO (PB0)      | -0.3 | 6    | V    |

**Note**

1. Stresses beyond those listed under absolute maximum ratings may cause permanent damage to the device.
2. When VBAT is in the range of 4.5–5.5V, VPWR will connect to weak pull-up.

### 3.2 ESD Ratings

**Table 3-2 ESD Ratings**

| Parameter           | Typ   | Test pin | Reference standard          |
|---------------------|-------|----------|-----------------------------|
| Human Body Mode     | ±4kV  | All pins | JEDEC EIA/JESD22-A114       |
| Machine Mode        | ±300V | All pins | JEDEC EIA/JESD22-A115       |
| Charge Device Model | ±2kV  | All pins | ANSI/ESDA/JEDEC JS-002-2022 |

### 3.3 PMU Characteristics

**Table 3-3 PMU Characteristics**

| Symbol                | Parameter       | Conditions                        | Min | Typ | Max | Unit |
|-----------------------|-----------------|-----------------------------------|-----|-----|-----|------|
| VBAT                  | Power supply    | --                                | 2.7 | 3.7 | 4.5 | V    |
| VPWR                  | Power supply    | --                                | 4.5 | 5.0 | 5.5 | V    |
| <b>Operating mode</b> |                 |                                   |     |     |     |      |
| Symbol                | Parameter       | Conditions                        | Min | Typ | Max | Unit |
| IOVDD                 | Voltage output  | --                                | --  | 3   | --  | V    |
|                       | Loading current | IOVDD=3.0V@VBAT = 3.7V or VPWR=5V | --  | --  | 180 | mA   |
| <b>Low Power mode</b> |                 |                                   |     |     |     |      |
| Symbol                | Parameter       | Conditions                        | Min | Typ | Max | Unit |
| IOVDD                 | Loading current | IOVDD=3.0V@VBAT = 3.7V or VPWR=5V | --  | --  | 10  | mA   |

### 3.4 Battery Charge

**Table 3-4 Charger Characteristics**

| Symbol              | Parameter                | Min   | Typ | Max   | Unit |
|---------------------|--------------------------|-------|-----|-------|------|
| VPWR                | Charge Input Voltage     | 4.5   | 5   | 5.5   | V    |
| CV                  | CV Mode Voltage Accuracy | 4.175 | 4.2 | 4.225 | V    |
|                     |                          | 4.375 | 4.4 | 4.425 | V    |
| CC                  | CC Mode Current          | 40    | --  | 380   | mA   |
| I <sub>end</sub>    | End Of Charge Current    | 4     | --  | 38    | mA   |
| V <sub>Trickl</sub> | Trickle Charge Voltage   | --    | 3   | --    | V    |

### 3.5 IO Characteristics

**Table 3-5 IO Characteristics**

| Input Characteristics  |                          |                                |   |   |      |      |
|------------------------|--------------------------|--------------------------------|---|---|------|------|
| Symbol                 | Parameter                | Conditions                     | IO  | Min                                       | Max  | Unit |
| V <sub>IL</sub>        | Low-Level Input Voltage  | IOVDD = 3.0V                   | VPWR<br>PA0~PA13<br>PB0~PB14<br>PC0~PC5<br>USBDP<br>USBDM | -0.3                                      | 1.0  | V    |
|                        |                          | IOVDD = 3.0V                   | PP2   | --  | --   | V    |
| V <sub>IH</sub>        | High-Level Input Voltage | IOVDD = 3.0VW                  | PA0~PA13<br>PB1~PB14<br>PC0~PC5<br>USBDP<br>USBDM         | 2.0                                       | 3.3  | V    |
|                        |                          | IOVDD = 3.0V                   | VPWR<br>PB0   | 2.0                                       | 5.5  | V    |
|                        |                          | IOVDD = 3.0V                   | PP2   | --  | --   | V    |
|                        |                          |                                |   |   |      |      |
| Output Characteristics |                          |                                |   |   |      |      |
| Symbol                 | Parameter                | Conditions                     | IO  | Typ                                       | Unit |      |
| I <sub>OL</sub>        | Output Current           | IOVDD = 3.0V<br>Voutput = 0.3V | VPWR  | 2   | mA   |      |
|                        |                          | IOVDD = 3.0V<br>Voutput = 0.3V | PB0<br>PB6  | 1(HD=0)<br>4(HD=1)<br>8(HD=2)<br>9(HD=3)  | mA   |      |
|                        |                          | IOVDD = 3.0V<br>Voutput = 0.3V | PB8   | 1(HD=0)<br>4(HD=1)<br>8(HD=2)<br>64(HD=3) | mA   |      |
|                        |                          | IOVDD = 3.0V<br>Voutput = 0.3V | PP2   | --  | mA   |      |

|  |                      | IOVDD = 3.0V<br>Voutput = 0.3V | PA0~PA13<br>PB1~PB5<br>PB7<br>PB9~PB14<br>PC0~PC5 | 1(HD=0)<br>4(HD=1)<br>8(HD=2)<br>32(HD=3)   | mA   |
|--|----------------------|--------------------------------|---|---|------|
|  |                      | IOVDD = 3.0V<br>Voutput = 0.3V | USBDP<br>USBDM                                    | 10  | mA   |
| I <sub>OH</sub>                            | Output Current       | IOVDD = 3.0V<br>Voutput = 2.7V | VPWR  | 2   | mA   |
|  |                      | IOVDD = 3.0V<br>Voutput = 2.7V | PB6<br>PB0  | 1(HD=0)<br>4(HD=1)<br>8(HD=2)<br>9(HD=3)    | mA   |
|  |                      | IOVDD = 3.0V<br>Voutput = 2.7V | PB8   | 1(HD=0)<br>4(HD=1)<br>8(HD=2)<br>64(HD=3)   | mA   |
|  |                      | IOVDD = 3.0V<br>Voutput = 2.7V | PP2   | 120   | mA   |
|  |                      | IOVDD = 3.0V<br>Voutput = 2.7V | PA0~PA13<br>PB1~PB5<br>PB7<br>PB9~PB14<br>PC0~PC5 | 1(HD=0)<br>4(HD=1)<br>8(HD=2)<br>32(HD=3)   | mA   |
|  |                      | IOVDD = 3.0V<br>Voutput = 2.7V | USBDP<br>USBDM                                    | 10  | mA   |
| <b>Internal Resistance Characteristics</b> |                      |                                |   |   |      |
| Symbol                                     | Parameter            | Conditions                     | IO  | Typ   | Unit |
| R <sub>pu</sub>                            | Pull-up Resistance   | IOVDD = 3.0V                   | VPWR<br>PA0~PA13<br>PB0~PB14<br>PC0~PC5           | 5k(PU=1)<br>10k(PU=2)<br>200K(PU=3)         | Ω    |
|  |                      | IOVDD = 3.0V                   | USBDP   | 1.5k<br>5k(PU=1)<br>10k(PU=2)<br>200K(PU=3) | Ω    |
|  |                      | IOVDD = 3.0V                   | USBDM   | 180k<br>5k(PU=1)<br>10k(PU=2)<br>200K(PU=3) | Ω    |
|  |                      | IOVDD = 3.0V                   | PP2   | --  | Ω    |
| R <sub>pd</sub>                            | Pull-down Resistance | IOVDD = 3.0V                   | VPWR<br>PA0~PA13                                  | 5k(PD=1)<br>10k(PD=2)                       | Ω    |

|  |  |              |                     |  |   |
|--|--|--------------|---------------------|--|---|
|  |  |              | PB0~PB14<br>PC0~PC5 | 200K(PD=3)                                 |   |
|  |  | IOVDD = 3.0V | USBDP<br>USBDM      | 15k<br>5k(PD=1)<br>10k(PD=2)<br>200K(PD=3) | Ω |
|  |  | IOVDD = 3.0V | PP2                 | --   | Ω |

**Note**

 1. Internal pull-up/pull-down resistance accuracy  $\pm 20\%$ 

### 3.6 Audio DAC Characteristics

**Table 3-6 DAC Characteristics**

| Parameter         | Conditions  | Min | Typ | Max | Unit |
|-------------------|---|-----|-----|-----|------|
| Resolution        | --  | --  | 24  | --  | bits |
| Input Sample Rate | --  | 8   | --  | 384 | kHz  |
| SNR <sup>①</sup>  | Differential Mode<br>Fin=1kHz@0dBFS<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted<br>Load=10kΩ   | --  | 116 | --  | dB   |
|                   | Single-ended Mode<br>Fin=1kHz@0dBFS<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted<br>Load=10kΩ   | --  | 114 | --  | dB   |
|                   | VCMO Mode<br>Fin=1kHz@0dBFS<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted<br>Load=16Ω            | --  | 107 | --  | dB   |
| Dynamic Range     | Differential Mode<br>Fin=1kHz@-60dBFS<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted<br>Load=10kΩ | --  | 111 | --  | dB   |
|                   | Single-ended Mode<br>Fin=1kHz@-60dBFS<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted<br>Load=10kΩ | --  | 104 | --  | dB   |
|                   | VCMO Mode<br>Fin=1kHz@-60dBFS<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted<br>Load=16Ω          | --  | 102 | --  | dB   |
| THD+N             | Differential Mode<br>Fin=1kHz@-0.5dBFS*   | --  | -85 | --  | dB   |

|                       |  |           |    |      |    |       |
|-----------------------|--|-----------|----|------|----|-------|
|                       | Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted  |           |    |      |    |       |
|                       | Single-ended Mode<br>Fin=1kHz@-0.5dBFS*<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted           | Load=10kΩ | -- | -80  | -- | dB    |
|                       | VCMO Mode<br>Fin=1kHz@-0.5dBFS*<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted                   | Load=32Ω  | -- | -80  | -- | dB    |
| Noise Floor           | Differential Mode<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted                                 | Load=10kΩ | -- | 5.5  | -- | uVrms |
|                       | Single-ended Mode<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted                                 | Load=10kΩ | -- | 6.0  | -- | uVrms |
|                       | VCMO Mode<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted   | Load=16Ω  | -- | 5.5  | -- | uVrms |
| Noise Floor with MUTE | Differential Mode<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted                                 | Load=10kΩ | -- | 3.0  | -- | uVrms |
|                       | Single-ended Mode<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted                                 | Load=10kΩ | -- | 2.0  | -- | uVrms |
|                       | VCMO Mode<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted   | Load=16Ω  | -- | 3.0  | -- | uVrms |
| Stereo Crosstalk      | Single-ended Mode<br>Fin=1kHz@0dBFS<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted               | Load=10kΩ | -- | -100 | -- | dB    |
|                       | VCMO Mode<br>Fin=1kHz@0dBFS<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted                       | Load=10kΩ | -- | -100 | -- | dB    |
| Max Output Level      | Differential Mode<br>Fin=1kHz@0dBFS<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted<br>THD+N<0.1% | Load=10kΩ | -- | 2    | -- | Vrms  |
|                       | Single-ended Mode<br>Fin=1kHz@0dBFS  | Load=10kΩ | -- | 1    | -- | Vrms  |

|                  |  |          |    |    |    |    |
|------------------|--|----------|----|----|----|----|
|                  | Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted<br>THD+N<0.1%                                |          |    |    |    |    |
| Max Output Power | VCMO Mode<br>Fin=1kHz@0dBFS<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted<br>THD+N<0.1% | Load=16Ω | -- | 30 | -- | mW |

**Note**

- ① SNR is the ratio of output level with a 1kHz full-scale input to output level with MUTE on.

### 3.7 Audio ADC Characteristics

**Table 3-7 Audio ADC Characteristics**

| Parameter         | Conditions   | Min | Typ | Max | Unit |
|-------------------|--|-----|-----|-----|------|
| Resolution        | --   | --  | 24  | --  | bits |
| Input Sample Rate | --   | 8   | --  | 192 | kHz  |
| SNR               | Differential input Mode<br>Fin=1kHz@0dBFS<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted<br>ADC gain=0dB   | --  | 100 | --  | dB   |
|                   | Single-ended input Mode<br>Fin=1kHz@0dBFS<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted<br>ADC gain=0dB   | --  | 100 | --  | dB   |
| Dynamic Range     | Differential input Mode<br>Fin=1kHz@-60dBFS<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted<br>ADC gain=0dB | --  | 100 | --  | dB   |
|                   | Single-ended input Mode<br>Fin=1kHz@-60dBFS<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted<br>ADC gain=0dB | --  | 100 | --  | dB   |
| THD+N             | Differential input Mode<br>Fin=1kHz@0dBFS<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted<br>ADC gain=0dB   | --  | -85 | --  | dB   |
|                   | Single-ended input Mode  | --  | -80 | --  | dB   |



|                 |   |    |    |    |      |
|-----------------|---|----|----|----|------|
|                 | Fin=1kHz@0dBFS<br>Fs=44.1kHz<br>B/W=20Hz~20kHz A-Weighted<br>ADC gain=0dB |    |    |    |      |
| Analogue Gain   | --  | -3 | -- | 33 | dB   |
| Max Input Level | Differential input Mode<br>ADC gain=0dB                                   | -- | 2  | -- | Vrms |
|                 | Single-ended input Mode<br>ADC gain=0dB                                   | -- | 1  | -- | Vrms |

### 3.8 BT Characteristics

#### 3.8.1 Transmitter

**Table 3-8-1 Transmitter characteristics**

| Parameter   | Conditions                     | Min | Typ | Max | Unit |
|---|--------------------------------|-----|-----|-----|------|
| Maximum RF Transmit Power                           | BR                             | --  | 10  | 13  | dBm  |
| Maximum RF Transmit Power                           | EDR $\pi/4$ DQPSK<br>EDR 8DPSK | --  | 10  | --  | dBm  |
| Relative Transmit Power                             | EDR $\pi/4$ DQPSK<br>EDR 8DPSK | --  | -1  | --  | dB   |
| Maximum RF Transmit Power                           | BLE-1Mbps/2Mbps                | --  | 10  | --  | dBm  |
| $1\sigma$ of Maximum RF Transmit Power distribution | BR/EDR/BLE                     | --  | 2   | --  | dB   |

#### 3.8.2 Receiver

**Table 3-8-2 Receiver characteristics**

| Parameter                             | Conditions        | Min | Typ   | Max | Unit |
|---------------------------------------|-------------------|-----|-------|-----|------|
| Sensitivity                           | BR                | --  | -96   | --  | dBm  |
|                                       | EDR $\pi/4$ DQPSK | --  | -96   | --  | dBm  |
|                                       | EDR 8DPSK         | --  | -88.5 | --  | dBm  |
|                                       | BLE-1Mbps         | --  | -98.5 | --  | dBm  |
|                                       | BLE-2Mbps         | --  | -95.5 | --  | dBm  |
| $1\sigma$ of sensitivity distribution | BR/EDR/BLE        | --  | 2     | --  | dB   |

### 3.9 Radio Characteristics

#### 3.9.1 Analog FM Receiver

Table 3-9-1 FM receiver characteristics

| Parameter        | Conditions  | Min | Typ | Max | Unit              |
|------------------|---|-----|-----|-----|-------------------|
| Frequency range  |   | 50  |     | 108 | MHz               |
| Mono sensitivity | f MOD = 1 kHz,<br>$\Delta f = 22.5 \text{ kHz}, (S+N)/N = 26 \text{ dB},$<br>MONO |     | 1.5 |     | $\mu\text{V EMF}$ |

#### 3.9.2 Analog FM Transmitter

Table 3-9-2 FM transmitter characteristics

| Parameter         | Conditions | Min | Typ | Max | Unit |
|-------------------|------------|-----|-----|-----|------|
| Frequency range   |            | 50  |     | 108 | MHz  |
| Transmitter power |            |     | TBD |     | dBm  |

## 4 Package Information

### 4.1 QFN52\_6×6mm

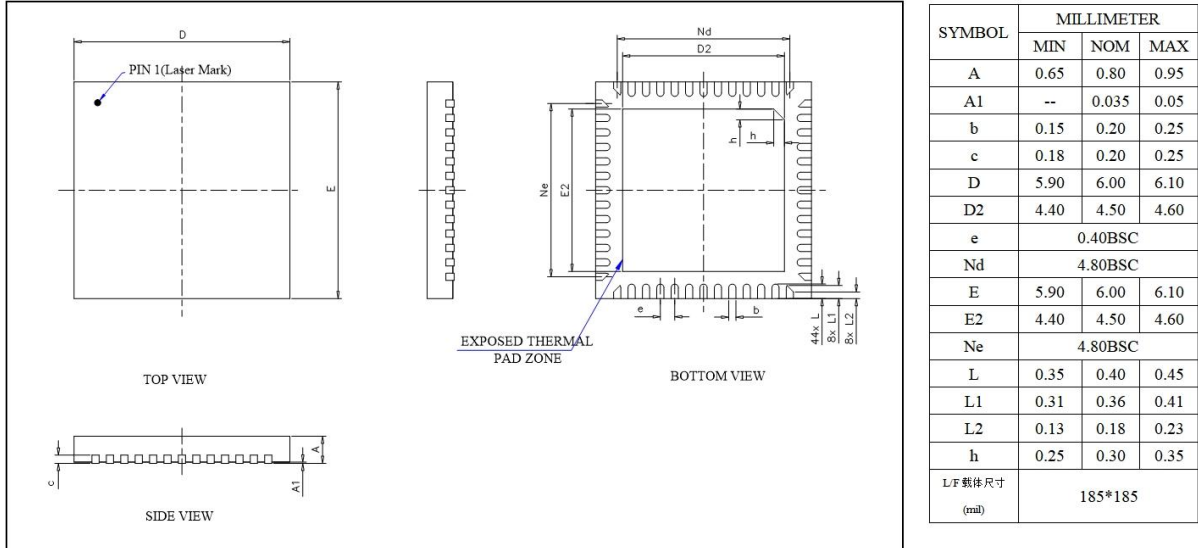


Figure 4-1 AC2102A Package

## 5 IC Marking Information

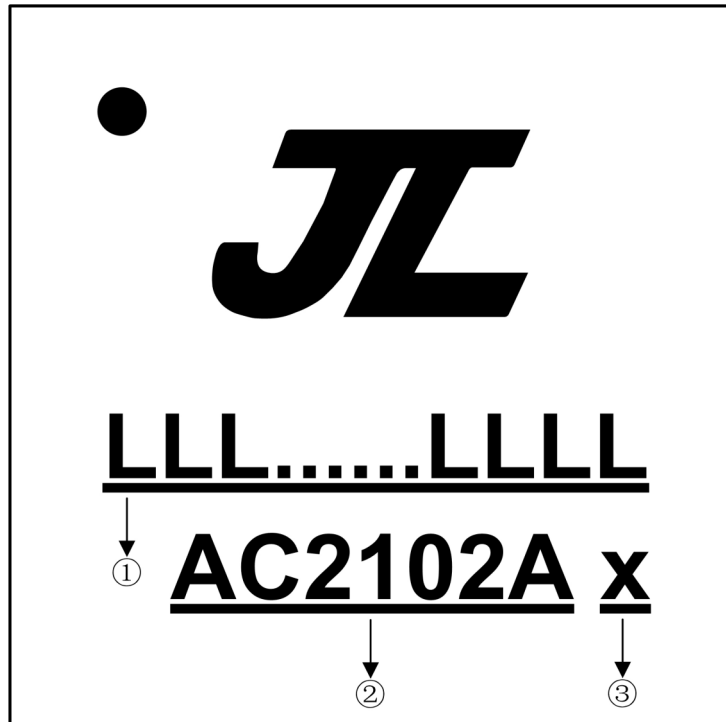


Figure 5-1 AC2102A Package Outline

- ① LLL.....LLLL Production Batch
- ② AC2102A Chip Model
- ③ x Built-in flash size
  - 4 4Mbit Flash
  - 8 8Mbit Flash
  - 6 16Mbit Flash
  - 3 32Mbit Flash

## 6 Solder-Reflow Condition

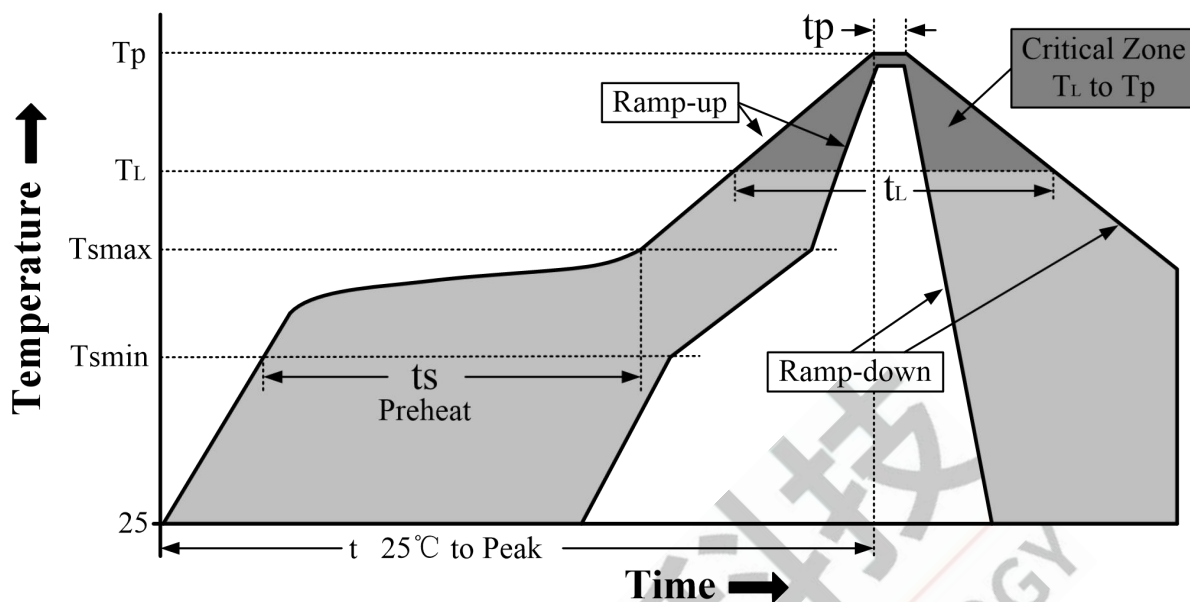


Figure 6-1 Classification Reflow Profile

Table 6-1 Classification Profiles

| Profile Feature   |  | Sn-Pb Eutectic Assembly | Pb-Free Assembly |
|---|--|-------------------------|------------------|
| Preheat/Soak  | Temperature Min ( $T_{smin}$ )                   | 100°C                   | 150°C            |
|   | Temperature Max ( $T_{smax}$ )                   | 150°C                   | 200°C            |
|   | Time ( $t_s$ ) from ( $T_{smin}$ to $T_{smax}$ ) | 60-120 seconds          | 60-180 seconds   |
| Average ramp-up rate ( $T_{smax}$ to $T_p$ )                      |  | 3°C/second max          | 3°C/second max   |
| Liquidous temperature ( $T_L$ )                                   |  | 183°C                   | 217°C            |
| Time ( $t_L$ ) maintained above $T_L$                             |  | 60-150 seconds          | 60-150 seconds   |
| Peak package body temperature ( $T_p$ )                           |  | See Table 6-2           | See Table 6-3    |
| Time within 5°C of actual Peak Temperature ( $t_p$ ) <sup>2</sup> |  | 10-30 seconds           | 20-40 seconds    |
| Ramp-down rate ( $T_p$ to $T_L$ )                                 |  | 6°C/second max          | 6°C/second max   |
| Time 25°C to peak temperature                                     |  | 6 minutes max           | 8 minutes max    |

**Note**

- 1.All temperatures refer to topside of the package, measured on the package body surface
- 2.Time within 5°C of actual peak temperature ( $t_p$ ) specified for the reflow profiles is a “supplier” and “user” maximum.

Table 6-2 SnPb Classification Temperature

| Package Thickness | Volume mm <sup>3</sup> | Volume mm <sup>3</sup> |
|-------------------|------------------------|------------------------|
|                   | < 350                  | ≥ 350                  |
| <2.5 mm           | 240 +0/-5°C            | 225 +0/-5°C            |
| ≥2.5 mm           | 225 +0/-5°C            | 225 +0/-5°C            |

**Table 6-3 Pb-free - Classification Temperature**

| Package Thickness | Volume mm <sup>3</sup><br>< 350 | Volume mm <sup>3</sup><br>350 - 2000 | Volume mm <sup>3</sup><br>> 2000 |
|-------------------|---------------------------------|--------------------------------------|----------------------------------|
| < 1.6mm           | 260°C                           | 260°C                                | 260°C                            |
| 1.6 mm - 2.5mm    | 260°C                           | 250°C                                | 245°C                            |
| > 2.5mm           | 250°C                           | 245°C                                | 245°C                            |

**Note**

1.\*Tolerance The device manufacturer/supplier shall assure process compatibility up to and including the stated classification temperature (this means Peak reflow temperature +0°C.For example 260°C+0°C)at the rated MSL level.