

# **AC6956D Datasheet**

**Zhuhai Jieli Technology Co.,LTD**

**Version: 1.0**

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## AC6956D Features

### High performance 32-bit RISC CPU

- RISC 32-bit CPU
- DC-160MHz operation
- Support DSP instructions
- 64Vectored interrupts
- 4 Levels interrupt priority

### Flexible I/O

- 15 GPIO pins
- All GPIO pins can be programmable as input or output individually
- All GPIO pins are internal pull-up/pull-down selectable individually
- CMOS/TTL level Schmitt triggered input
- External wake up/interrupt on all GPIOs

### Peripheral Feature

- One full speed USB 2.0 OTG controller
- Four multi-function 16-bit timers, support capture and PWM mode
- Three 16-bit PWM generator for motor driving
- One 16-bit active parallel port
- One full-duplex basic UART
- Two full-duplex advanced UART
- Three SPI interface supports host and device mode
- One SD Card Host controller
- One IIC interface supports host and device mode
- One Quadrate decoder
- Watchdog
- 2 Crystal Oscillator
- 16-bit Stereo DAC with headphone amplifier, SNR >= 95dB
- 3 channel ADC , SNR >= 90dB
- 1 channel MIC amplifier
- Three channels analog MUX
- 9 channels 10-bit ADC
- 2 channels 8 levels Low Voltage Detector
- Power-on reset
- Embedded PMU support low power mode

### Bluetooth Feature

- CMOS single-chip fully-integrated radio and baseband
- Compliant with Bluetooth V5.1+BR+EDR+BLE specification
- Bluetooth Piconet and Scatternet support
- Meet class2 and class3 transmitting power requirement
- Support GFSK and  $\pi/4$  DQPSK all paket types

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- Provides +6dbm transmitting power
- receiver with -90dBm sensitivity
- Support a2dp\avctp\avdtp\avrcp\hfp\spp\smp\att\gap\gatt\rfcomm\sdp\l2cap profile

**Power Supply**

- VBAT is 2.2V to 5.5V
- VDDIO is 2.2V to 3.6V

**Package**

- QFN32\_4x4

**Temperature**

- Operating temperature: -20°C to +70°C
- Storage temperature: -65°C to +150°C

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# 1、 Pin Definition

## 1.1 Pin Assignment

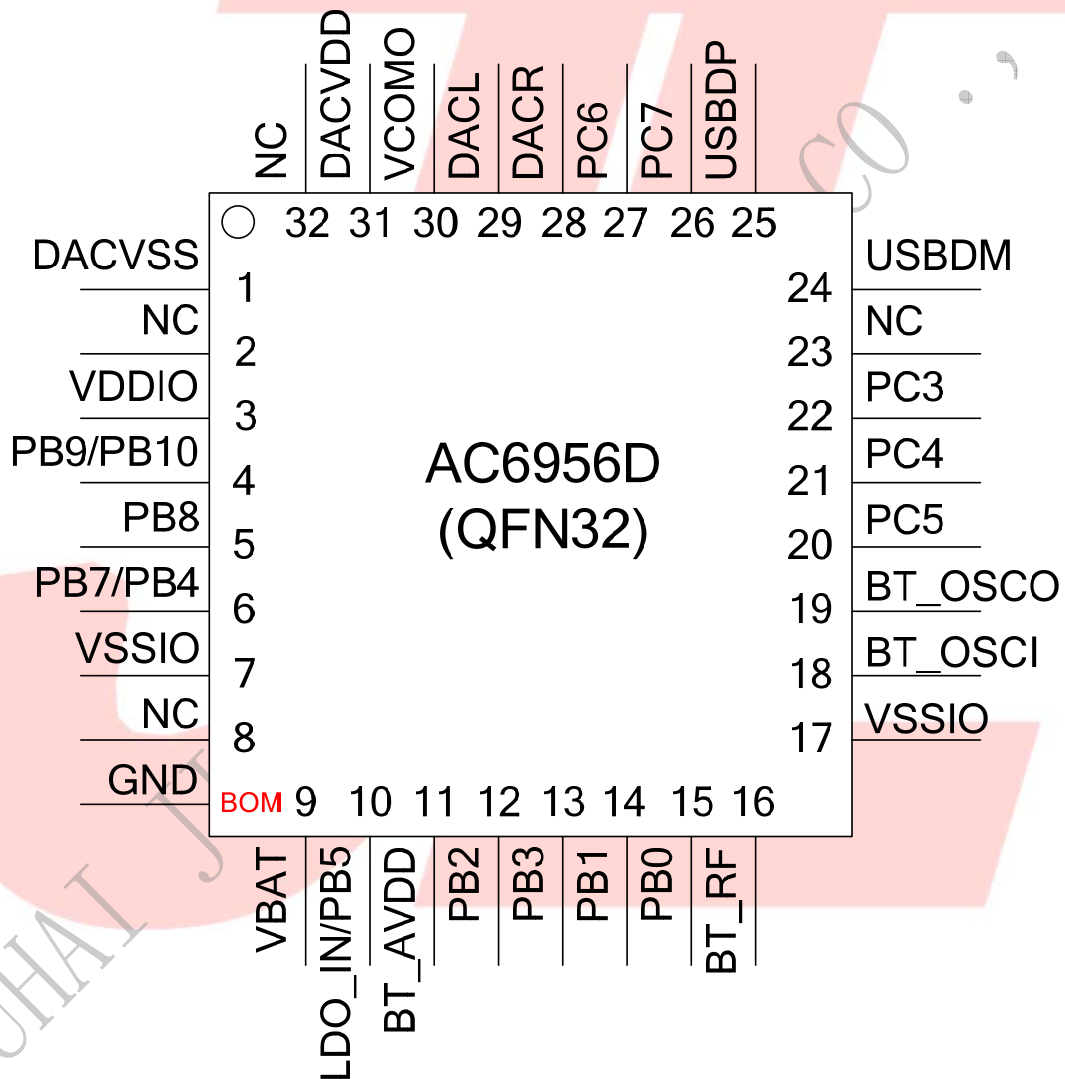


Figure 1-1 AC6956D\_QFN32\_4x4 Package Diagram

## 1.2 Pin Description

**Table 1-1 AC6956D\_QFN32\_4x4 Pin Description**

PIN NO.	Name	I/O Type	Drive (mA)	Function	Other Function
1	DACVSS	P	/	Ground	
2	NC				
3	VDDIO	P	/	IO Power 3.3v	
4	PB10	I/O	24/8	GPIO	AMUX2R: Analog Channel2 Right; SPI2DOA: SPI2 Data Out(A); ADC9: ADC Input Channel 9; UART2RXC: Uart2 Data In(C); PWMCH3L: Motor PWM Channel3(L);
	PB9	I/O	24/8	GPIO	AMUX2L: Analog Channel2 Left; SPI2CLKA: SPI2 Clk(A); CAP0: Timer0 Capture; UART2TXC: Uart2 Data Out(C); PWMCH3H: Motor PWM Channel3(H);
5	PB8	I/O	24/8	GPIO	AMUX1R: Analog Channel1 Right; SPI2_DIA: SPI2 Data In(A); ADC8: ADC Input Channel 8; CLKOUT1: Clk Out1;
6	PB7	I/O	24/8	GPIO	AMUX1L: Analog Channel1 Left;
	PB4	I/O	24/8	GPIO	IIC_SCL_C: IIC SCL(C); ADC7: ADC Input Channel 7; UART0TXB: Uart0 Data Out(B); LVD: Low Voltage Detect Input; PWMCH2H: Motor PWM Channel2 (H);
7	VSSIO	P	/	Ground	
8	NC				
9	VBAT	P	/	LDO Power	
10	LDO_IN	P	/	Charge Power 5v	
	PB5	I/O	8	GPIO (High Voltage Resistance)	PWM3: Timer3 PWM Output; CAP1: Timer1 Capture; UART0TXC: Uart0 Data Out(C); UART0RXC: Uart0 Data In(C);
11	BT_AVDD	P	/	BT Power 1.3v	

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12	PB2	I/O	8	GPIO (High Voltage Resistance)	SPI1DIA: SPI1 Data In(A); PWMCH1L: Motor PWM Channel1 (L);
13	PB3	I/O	24/8	GPIO	PWM2: Timer2 PWM Output; ADC6: ADC Input Channel 6;
14	PB1	I/O	24/8	GPIO (pull up)	Long Press Reset; SPI1DOA: SPI1 Data Out(A); ADC5: ADC Input Channel 5; TMR2: Timer2 Clock Input; UART1RXA: Uart1 Data In(A);
15	PB0	I/O	8	GPIO (High Voltage Resistance)	SPI1CLKA: SPI1 Clock(A); UART1TXA: Uart1 Data Out(A); PWMCH1H: Motor PWM Channel1(H);
16	BT_RF	/	/		
17	VSSIO	P	/	Ground	
18	BT_OSCI	I	/	OSC In	
19	BT_OSCO	O	/	OSC Out	
20	PC5	I/O	24/8	GPIO	SD1CLKA: SD1 Clock(A); SPI1DOB: SPI1 Data Out(B); UART2RXD: Uart2 Data In(D); IIC_SDA_B: IIC SDA(B); ADC13: ADC Input Channel 13; PWMCH5L: Motor PWM Channel5(L);
21	PC4	I/O	24/8	GPIO	SD1CMDA: SD1 Command(A); SPI1CLKB: SPI1 Clock(B); UART2TXD: Uart2 Data Out(D); IIC_SCL_B: IIC SCL(B); ADC10: ADC Input Channel 10; PWMCH5H: Motor PWM Channel5(H);
22	PC3	I/O	24/8	GPIO	SD1DAT0A: SD1 Data0(A); SPI1DIB: SPI1 Data In(B);
23	NC				
24	USBDM	I/O	4	USB Negative Data (pull down)	UART1RXD: Uart1 Data In(D); IIC_SDA_A: IIC SDA(A);
25	USBDP	I/O	4	USB Positive Data (pull down)	UART1TXD: Uart1 Data Out(D); IIC_SCL_A: IIC SCL(A); ADC12: ADC Input Channel 12;
26	PC7	I/O	/	GPIO	MIC_BIAS: Microphone Bias Output
27	PC6	I/O	24/8	GPIO	MIC: MIC Input Channel;

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					ADC11: ADC Input Channel 11;
28	DACR	O	/		DAC Right Channel
29	DACL	O	/		DAC Left Channel
30	VCOMO	/	/		DAC Reference Output
31	DACVDD	P	/		Power supply for audio DAC logic
32	NC				

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## 2、Electrical Characteristics

### 2.1 Absolute Maximum Ratings

Table 2-1

Symbol	Parameter	Min	Max	Unit
Tamb	Ambient Temperature	-20	+70	°C
Tstg	Storage temperature	-65	+150	°C
VBAT	Supply Voltage	2.2	5.5	V
LDO_IN	Charger Voltage	4.5	5.5	V
V <sub>3.3IO</sub>	3.3V IO Input Voltage	-0.3	VDDIO+0.3	V

### 2.2 PMU Characteristics

Table 2-2

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
VBAT	Voltage Input	2.2	3.7	5.5	V	
LDO_IN	Charger Voltage	4.5	5.0	5.5	V	
V <sub>3.3</sub>	Voltage output	—	3.3	—	V	VBAT = 5V, 100mA loading
V <sub>BT_AVDD</sub>	Voltage output	—	1.3	—	V	VBAT=5V, 100mA loading
V <sub>DACVDD</sub>	DAC Voltage	—	2.7	—	V	VBAT = 5V, 10mA loading
I <sub>L3.3</sub>	Loading current	—	—	150	mA	VBAT = 5V

### 2.3 Battery Charge

Table 2-3

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
LDO_IN	Charge Input Voltage	4.5	5	5.5	V	—
V <sub>Charge</sub>	Charge Voltage	4.15	4.2	4.25	V	—
I <sub>Charge</sub>	Charge Current	20		320	mA	Charge current at fast charge mode
I <sub>Trinkl</sub>	Trickle Charge Current	20	45	70	mA	V <sub>BAT</sub> < V <sub>Trinkl</sub>



## 2.4 IO Input/Output Electrical Logical Characteristics

Table 2-4

IO input characteristics						
Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
$V_{IL}$	Low-Level Input Voltage	-0.3	—	$0.3 * V_{DDIO}$	V	$V_{DDIO} = 3.3V$
$V_{IH}$	High-Level Input Voltage	$0.7 * V_{DDIO}$	—	$V_{DDIO} + 0.3$	V	$V_{DDIO} = 3.3V$
IO output characteristics						
$V_{OL}$	Low-Level Output Voltage	—	—	0.33	V	$V_{DDIO} = 3.3V$
$V_{OH}$	High-Level Output Voltage	2.7	—	—	V	$V_{DDIO} = 3.3V$

## 2.5 Internal Resistor Characteristics

Table 2-5

Port	General Output	High Drive	Internal Pull-Up Resistor	Internal Pull-Down Resistor	Comment
PB0~PB10 PC6	8mA	24mA	10K	10K	1、PB1 default pull up 2、USBDM & USBDP default pull down 3、internal pull-up/pull-down resistance   accuracy $\pm 20\%$
PC7			10K	10K	
PB5			10K	10K	
USBDP	4mA	—	1.5K	15K	
USBDM	4mA		180K	15K	

## 2.6 DAC Characteristics

Table 2-6

Parameter	Min	Typ	Max	Unit	Test Conditions
Frequency Response	20	—	20K	Hz	1KHz/0dB 10Kohm loading With A-Weighted Filter
THD+N	—	-75	—	dB	
S/N	—	95	—	dB	
Crosstalk	—	-80	—	dB	
Output Swing		1		Vrms	
Dynamic Range		90		dB	1KHz/-60dB 10Kohm loading With A-Weighted Filter
DAC Output Power	11		—	mW	32ohm loading

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## 2.7 ADC Characteristics

Table 2-7

Parameter	Min	Typ	Max	Unit	Test Conditions
Dynamic Range		80		dB	1KHz/-60dB
S/N	—	90	91	dB	1KHz/-60dB
THD+N	—	-70	—	dB	
Crosstalk	—	-80	—	dB	

## 2.8 BT Characteristics

### 2.8.1 Transmitter

#### Basic Data Rate

Table 2-8

Parameter	Min	Typ	Max	Unit	Test Conditions
RF Transmit Power		4	6	dBm	25℃, Power Supply VBAT=5V 2441MHz
RF Power Control Range		20		dB	
20dB Bandwidth		950		KHz	
Adjacent Channel	+2MHz	-40		dBm	
	-2MHz	-38		dBm	
Transmit Power	+3MHz	-44		dBm	
	-3MHz	-35		dBm	

#### Enhanced Data Rate

Table 2-9

Parameter	Min	Typ	Max	Unit	Test Conditions
Relative Power		-1		dB	25℃, Power Supply VBAT=5V 2441MHz
$\pi/4$ DQPSK Modulation Accuracy	DEVM RMS	6		%	
	DEVM 99%	10		%	
	DEVM Peak	15		%	
Adjacent Channel	+2MHz	-40		dBm	
	-2MHz	-38		dBm	
Transmit Power	+3MHz	-44		dBm	
	-3MHz	-35		dBm	

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## 2.8.2 Receiver

### Basic Data Rate

Table 2-10

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity			-90		dBm	25°C, Power Supply VBAT=5V 2441MHz
Co-channel Interference Rejection			-13		dB	
Adjacent Channel Interference Rejection	+1MHz		+5		dB	
	-1MHz		+2		dB	
	+2MHz		+37		dB	
	-2MHz		+36		dB	
	+3MHz		+40		dB	
	-3MHz		+35		dB	

### Enhanced Data Rate

Table 2-11

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity			-90		dBm	25°C, Power Supply VBAT=5V 2441MHz
Co-channel Interference Rejection			-13		dB	
Adjacent Channel Interference Rejection	+1MHz		+5		dB	
	-1MHz		+2		dB	
	+2MHz		+37		dB	
	-2MHz		+36		dB	
	+3MHz		+40		dB	
	-3MHz		+35		dB	

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### 3、 Package Information

#### 3.1 QFN32\_4x4

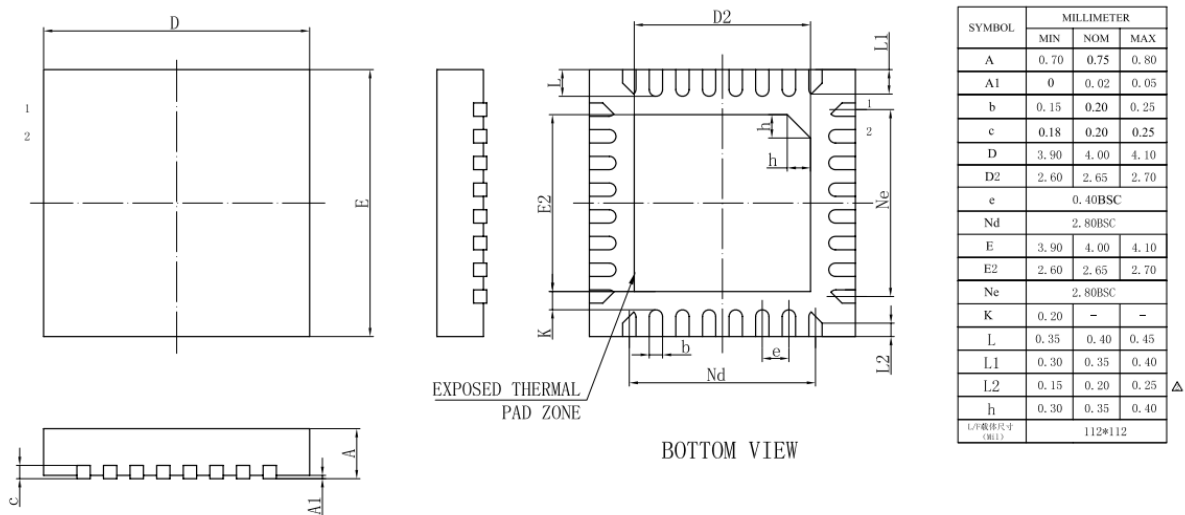


Figure 3-1 AC6956D\_QFN32\_4x4 Package

#### 4、Revision History

Date	Revision	Description
2019.11.18	V1.0	Initial Release

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