

AC6956C Datasheet

Version: 1.1

Date: 2026.05.11

AC6956C Features

CPU

- 32-bit DSP supports hardware Float Point Unit(FPU)
- Up to 240MHz programmable processor
- 64Vectored interrupts
- 4 Levels interrupt priority

DSP Audio Processing

- SBC, AAC Audio decodes supported for BT audio
- mSBC voice codecs supported for BT phone
- Supports MP2, MP3, WMA, APE, FLAC, AAC, MP4, M4A, WAV, AIF, AIFC audio decoding
- Packet Loss Concealment (PLC) for voice processing
- Acoustic echo cancellation/suppression (AEC,AES)
- Single/Dual MIC Environmental Noise Cancellation (ENC)
- Multi-band DRC limiter
- 30-band EQ configuration for voice Effects

Audio Codec

- Two channels 16-bit DAC, SNR >= 95dB
- Three channels 16-bit ADC , SNR >= 90dB
- Sampling rates of 8KHz/11.025KHz/16KHz/22.05KHz/24KHz/32KHz/44.1KHz/48KHz are supported
- One analog MIC amplifier, build-in MIC bias generator
- Supports two PDM digital MIC inputs
- three channels Stereo analog MUX
- Supports cap-less, single-ended, and differential mode at the DAC path
- Supports 16ohm and 32ohm Speaker loading

Bluetooth

- Compliant with Bluetooth V5.1+BR+EDR+BLE specification

- Meet class1 class2 and class3 transmitting power requirement
- Provides +6dbm transmitting power
- receiver with -90dBm sensitivity
- Fast AGC for enhanced dynamic range
- Supports a2dp\avctp\avdtp\avrcp\hfp\spp\smp\att\gap\gatt\rfcomm\sdp\l2cap profile

Peripherals

- 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
- Three full-duplex basic UART, UART0 and UART1 supports DMA mode
- Two SPI interface supports host and device mode
- One hardware IIC interface supports host and device mode
- Built-in Cap Sense Key controller
- 10-bit ADC for analog sampling
- External wake up/interrupt on all GPIOs

PMU

- Low voltage LDO for internal digital and analog circuit supply
- 3uA current consumption in the soft-off mode
- Built-in LDO for the core, I/O, Bluetooth and flash
- VBAT is 2.2V to 5.5V
- VDDIO is 2.2V to 3.6V

Packages

- QFN32(4mm*4mm)

Temperature

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

Applications

- Bluetooth Stereo Sound Box
- Bluetooth Mono Sound Box
- Bluetooth TWS Sound Box

1、 Pin Definition

1.1 Pin Assignment

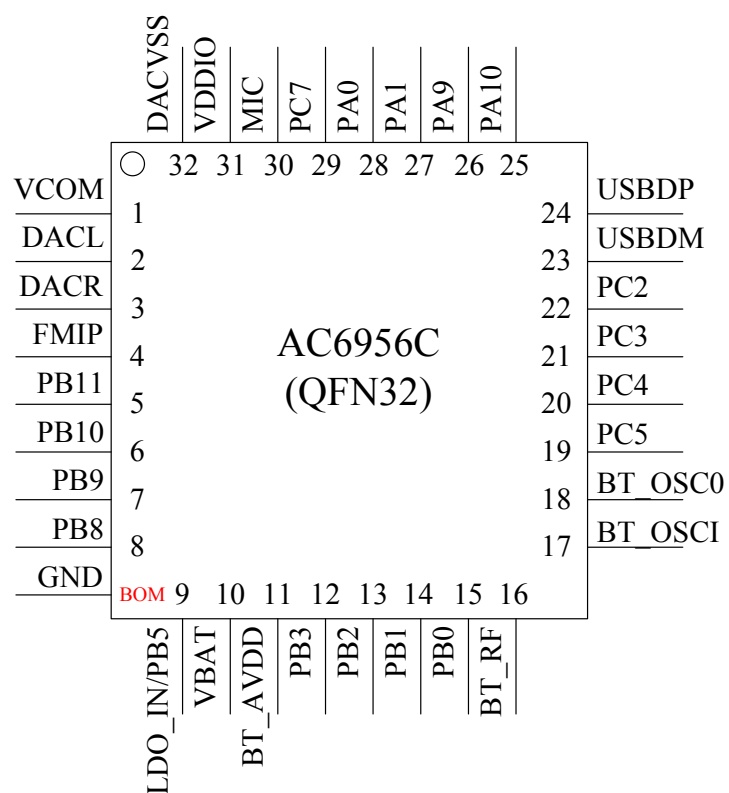


Figure 1-1 AC6956C Package Diagram

1.2 Pin Description

Table 1-1 AC6956C Pin Description

PIN NO.	Name	I/O Type	Drive (mA)	Function	Other Function
1	VCOM	P	/		DAC Reference
2	DACL	O	/		DAC Left Channel
3	DACR	O	/		DAC Right Channel
4	FMIP	I	/		FM Single Input
5	PB11	I/O	/	GPIO	SDPG:SDC Power Gate; SPDIF_OUT: Sony/Philips Digital Interface Out
6	PB10	I/O	8/24	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);
7	PB9	I/O	8/24	GPIO	AMUX2L: Analog Channel2 Left; SPI2CLKA: SPI2 Clk(A); CAP0: Timer0 Capture; UART2TXC: Uart2 Data Out(C); PWMCH3H: Motor PWM Channel3(H);
8	PB8	I/O	8/24	GPIO	AMUX1R: Analog Channel1 Right; SPI2_DIA: SPI2 Data In(A); ADC8: ADC Input Channel 8; CLKOUT1: Clk Out1;
9	LDO_IN	P	/		Battery Charge Input
	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);
10	VBAT	P	/		Power Supply
11	BT_AVDD	P	/		BT Power
12	PB3	I/O	8/24	GPIO	PWM2: Timer2 PWM Output; ADC6: ADC Input Channel 6;
13	PB2	I/O	8	GPIO (High Voltage Resistance)	SPI1DIA: SPI1 Data In(A); PWMCH1L: Motor PWM Channel1 (L);
14	PB1	I/O	8/24	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	/	/		BT Antenna
17	BT_OSCI	I	/	OSC In	
18	BT_OSCO	O	/	OSC Out	
19	PC5	I/O	8/24	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);
20	PC4	I/O	8/24	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);
21	PC3	I/O	8/24	GPIO	SD1DAT0A: SD1 Data0(A); SPI1DIB: SPI1 Data In(B);
22	PC2	I/O	8/24	GPIO	SD1DAT1A: SD1 Data1(A); ALNK1_DAT0: Audio Link Data0; Touch12: Touch Input Channel 12; FPIN5: Motor Auto-Stop Protective Pin5;
23	USBDM	I/O	4	USB Negative Data (pull down)	UART1RXD: Uart1 Data In(D); IIC_SDA_A: IIC SDA(A);
24	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;
25	PA10	I/O	8/24	GPIO	SD0CLKA: SD0 Clock(A); ALNK0_LRCKB: Audio Link Word Select(B); ADC3: ADC Input Channel 3; SPDIF_IN_B: Sony/Philips Digital Interface Input(B) TMR1: Timer1 Clock Input; Touch9: Touch Input Channel 9; UART2RXB: Uart2 Data In(B); PWMCH4L: Motor PWM Channel4(L);
26	PA9	I/O	8/24	GPIO	SD0CMA: SD0 Command(A);

					ALNK0_SCLKB: Audio Link Serial Clock(B); SPDIF_IN_A: Sony/Philips Digital Interface Input(A) Touch8: Touch Input Channel 8; UART2TXB: Uart2 Data Out(B); PWMCH4H: Motor PWM Channel4(H);
27	PA1	I/O	8/24	GPIO	AMUX0R: Analog Channel0 Right; Touch1: Touch Input Channel 1; ADC0: ADC Input Channel 0; UART1RXC: Uart1 Data In(C); PWMCH0L: Motor PWM Channel0(L);
28	PA0	I/O	8/24	GPIO	AMUX0L: Analog Channel0 Left; Touch0: Touch Input Channel 0; CLKOUT0: UART1TXC: Uart1 Data Out(C); PWMCH0H: Motor PWM Channel0(H);
29	PC7	I/O	/	GPIO	MIC_BIAS: Microphone Bias Output
30	MIC	I	/		MIC: MIC Input Channel;
31	VDDIO	P	/		IO Power 3.3v
32	DACVSS	P	/		DAC Ground

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 _{3.3IO}	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 _{3.3}	Voltage output	—	3.3	—	V	VBAT = 5V, 100mA loading
V _{BT_AVDD}	Voltage output		1.3		V	VBAT=5V, 100mA loading
V _{DACVDD}	DAC Voltage	—	2.7	—	V	VBAT = 5V, 10mA loading
I _{L3.3}	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 _{Charge}	Charge Voltage	4.15	4.2	4.25	V	—
I _{Charge}	Charge Current	20		320	mA	Charge current at fast charge mode
I _{Trinkl}	Trickle Charge Current	20	45	70	mA	V _{BAT} <V _{Trinkl}

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
PA0、PA1 PA9、PA10 PB1、PB3 PB8~PB10 PC2~PC5		8mA	24mA	10K	10K	1、PB1 default pull up 2、USBDM & USBDP default pull down 3、PB0, PB2, PB5 can pull-up resistance to 5V 4、internal pull-up/pull-down resistance accuracy ±20% 5、PRx supply by RTCVDD
PB11 PC7	Output 0	8mA	24mA	10K	10K	
	Output 1	8mA	64mA			
PB0、PB2 PB5		8mA	—	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	—	-90	—	dB	
Output Swing		1		Vrms	1KHz/-60dB 10Kohm loading With A-Weighted Filter
Dynamic Range		90		dB	
DAC Output Power	11		—	mW	32ohm loading

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			0.52	dBm	25°C, 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°C, Power Supply VBAT=5V 2441MHz
Adjacent Channel Transmit Power	+2MHz		-40		dBm	
	-2MHz		-38		dBm	
	+3MHz		-44		dBm	
	-3MHz		-35		dBm	

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	

3、 Package Information

3.1 QFN32_4x4

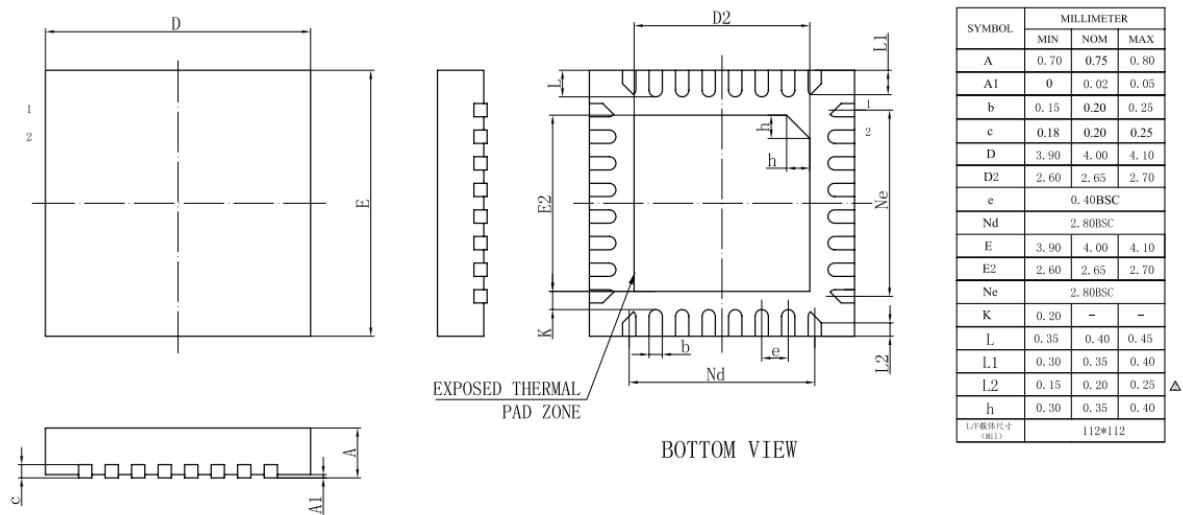


Figure 3-1 AC6956C Package

4. Summarize the specific operational use conditions

4.1. This modular transmitter is only for professional technicians to install, debug, and maintain. Non-professionals are not allowed to replace the antenna, configure power parameters, or modify the RF link without authorization.

4.2. All usage restrictions, antenna constraints, power limits, and installation specifications of this module also apply to the accompanying user manual provided by the main unit manufacturer. The main unit manufacturer must fully quote and incorporate all the constraints of this module into the product manual of the main unit, and publicize the compliance requirements for end users.

5. Human Safety Distance Requirements: This product is a mobile device type. To meet radio frequency radiation safety standards, the distance between the product and the human body must be greater than 5mm during normal operation. This distance requirement must be strictly adhered to during use and installation. It is not allowed to use the product in scenarios where the distance to the human body is less than 5mm. The overall design of the host device must meet this safety distance specification to ensure that terminal usage complies with relevant radiation safety regulations.

6. Antenna Type

Plannar Inverted F Antenna on board

7. Module have received FCC “Modular Approvals”, in compliance with CFR 47 FCC part 15 Subpart C regulations

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

WARNING!

FCC Radiation Exposure Statement:

This portable equipment with its antenna complies with FCC's RF radiation exposure limits set forth for an uncontrolled environment. To maintain compliance follow the instructions below;

1. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2. Avoid direct contact to the antenna, or keep it to a minimum while using this equipment.

This transmitter module is authorized to be used in other devices only by OEM integrators under the following condition:

The transmitter module must not be co-located with any other antenna or transmitter.

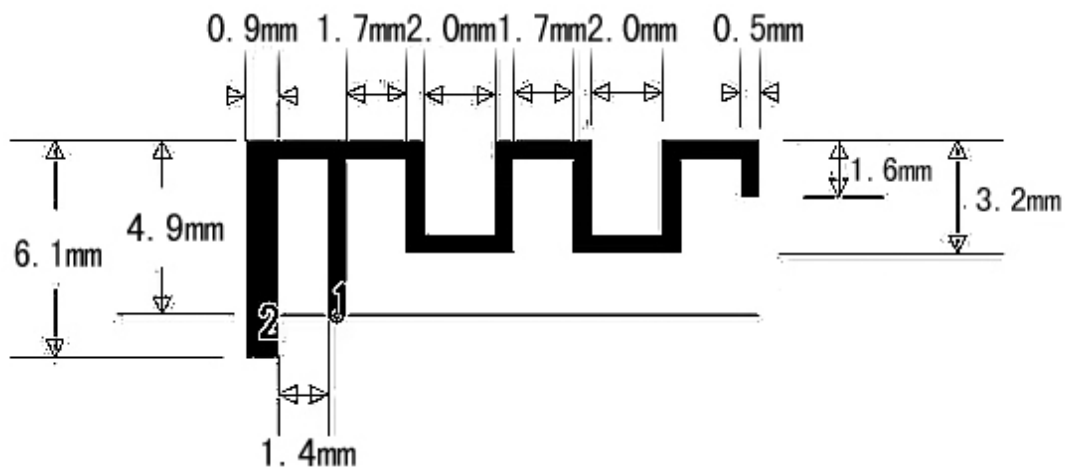
As long as the above condition is met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

8. The OEM must ensure that FCC labeling requirements are met. This shall include a clearly visible label on the exterior of the end product with the following nomenclature:
Contains FCC ID: 2BR5R58000

9. Antenna efficiency and gainn

Frequency (MHz)	Gain (dBi)	Efficiency (%)	AverageGain (dBi)	Efficiency (dB)
2400	2.92	72.20%	-1.14	-1.41
2410	1.95	61.36%	-2.05	-2.12
2420	2.00	61.00%	-1.98	-2.15
2430	0.80	47.29%	-3.09	-3.25
2440	0.12	40.82%	-3.87	-3.89
2450	0.97	48.41%	-3.08	-3.15
2460	1.28	53.80%	-2.81	-2.69
2470	1.29	51.75%	-2.98	-2.86
2480	1.79	58.79%	-2.45	-2.31
Average	1.46	55.05%	-2.61	-2.65
Peak	2.92	72.20%	-1.14	-1.41

10.Trace antenna designs



11. The host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

12 、 Revision History

Date	Revision	Description	
2026.05.11	V1.0	Initial	Release