

AC6969S Datasheet

Zhuhai Jieli Technology Co.,LTD

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AC6969S Features

CPU

- 32-bit DSP supports hardware Float Point Unit(FPU)
- Up to 160MHz programmable processor
- 64Vectored interrupts
- 4 Levels interrupt priority

DSP Audio Processing

- SBC, AAC Audio decodes supported for BT audio
- mSBC voice codec 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 analog Environmental Noise Cancellation (ENC)
- Multi-band DRC limiter
- 10-band EQ configuration for voice Effects

Audio Codec

- One channels 16-bit DAC, SNR >= 95dB
- One 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
- Two channel analog MUX
- Supports cap-less, single-ended mode at the DAC path
- Supports 16ohm and 32ohm Speaker loading

Bluetooth

- Compliant with Bluetooth V6.0+BR+EDR+BLE specification
- Meet class1 class2 and class3 transmitting

power requirement

- Support GFSK and $\pi/4$ DQPSK all packet types
- 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\sdpl2cap profile
- a2dp 1.3.2\avctp 1.4\avdtp 1.3\ avrcp 1.6.2\hfp 1.8 \spp 1.2\rfcomm 1.1\pnp 1.3\ hid 1.1.1\sdp core5.3\l2cap core 5.3

Peripherals

- One full speed USB 2.0 OTG controller
- Six multi-function 32-bit timers, support capture and PWM mode
- Three full-duplex basic UART, UART0 and UART1 supports DMA mode
- One SPI interface supports host and device mode
- One SD Card Host controller
- 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
- IOVDD is 2.2V to 3.6V

Packages

- SOP16

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Temperature

- Operating temperature: -40°C to +85°C
- Storage temperature: -65°C to +150°C

Applications

- Bluetooth speaker



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1、 Pin Definition

1.1 Pin Assignment

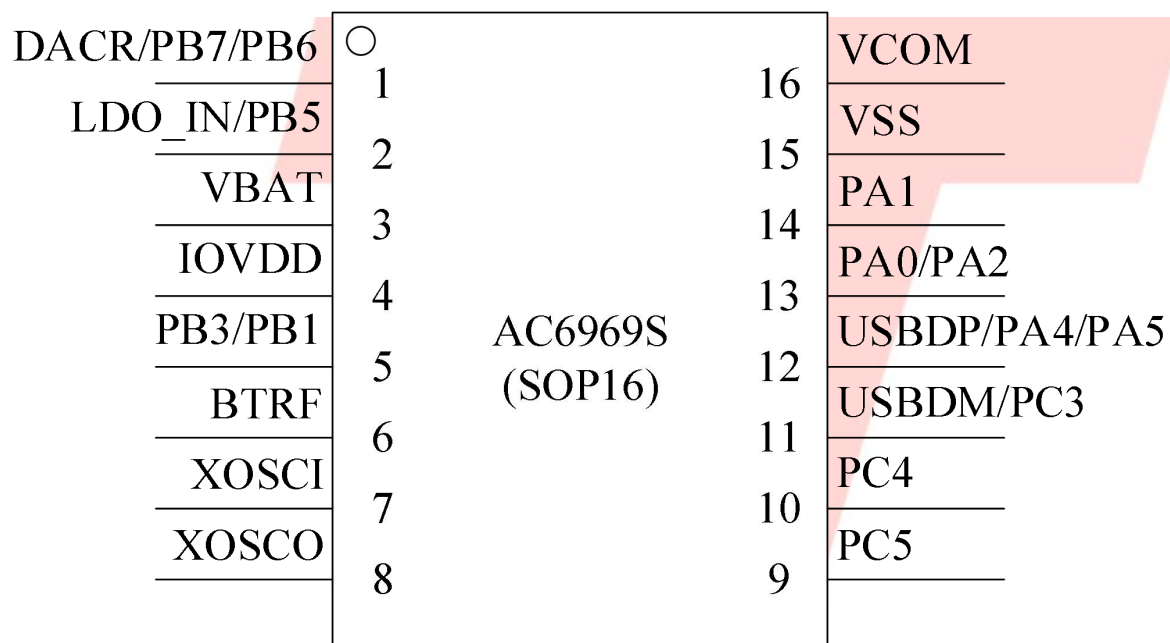


Figure 1-1 AC6969S_SOP16 Package Diagram

1.2 Pin Description

Table 1-1 AC6969S_SOP16 Pin Description

PIN NO.	Name	I/O Type	Drive (mA)	Function	Other Function
1	DACR	O	/		DAC Right Channel
	PB7	I/O	24/8	GPIO	AMUX1R: Analog Channel1Right; IIC_SDA_C: IIC DAT(C); ADC9: ADC Input Channel 9; PWM5: Timer5 PWM Output; UART1RXA: Uart1 Data In(A);
	PB6	I/O	24/8	GPIO	AMUX1L: Analog Channel1 Left; IIC_SCL_C: IIC SCL(C); ADC8: ADC Input Channel 8; TMR3: Timer3 Clock Input; UART1TXA: Uart1 Data Out(A);
2	LDO_IN	P	/		Battery Charger Power In
	PB5	I/O	/	GPIO (High Voltage Resistance)	PWM3: Timer3 PWM Output; CAP1: Timer1 Capture; UART0TXC: Uart0 Data Out(C); UART0RXC: Uart0 Data In(C);
3	VBAT	P	/		Power Supply
4	IOVDD	P	/		IO Power 3.3v
5	PB3	I/O	24/8	GPIO	PWM2: Timer2 PWM Output; ADC6: ADC Input Channel 6;
	PB1	I/O	24/8	GPIO (pull up)	Long Press Reset; ADC5: ADC Input Channel 5; TMR2: Timer2 Clock Input;
6	BT_RF	/	/		BT Antenna
7	BT_OSCI	I	/		BT OSC In
8	BT_OSCO	O	/		BT OSC Out
9	PC5	I/O	24/8	GPIO	SD0CLKA: SD0 Clock(A); SPI1DOB: SPI1 Data Out(B); IIC_SDA_B: IIC SDA(B); ADC12: ADC Input Channel 12; TMR1: Timer1 Clock Input; UART2RXD: Uart2 Data In(D);

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10	PC4	I/O	24/8	GPIO	SD0CMDA: SD0 Command(A); SPI1CLKB: SPI1 Clock(B); IIC_SCL_B: IIC SCL(B); ADC11: ADC Input Channel 11; PWM1: Timer1 PWM Output; UART2TXD: Uart2 Data Out (D);
11	USBDM	I/O	4	USB Negative Data (pull down)	IIC_SDA_A: IIC SDA(A); ADC14: ADC Input Channel 14; UART1RXD: Uart1 Data In(D);
	PC3	I/O	24/8	GPIO	SD0DAT0A: SD0 Data0(A); SPI1DIB: SPI1 Data In(B); CAP2: Timer2 Capture; UART0TXD: Uart0 Data Out (D); UART0RXD: Uart0 Data In(D);
12	USBDP	I/O	4	USB Positive Data (pull down)	IIC_SCL_A: IIC SCL(A); ADC13: ADC Input Channel 13; UART1TXD: Uart1 Data Output(D);
	PA5	I/O	24/8	GPIO	PWM0: Timer0 PWM Output;
	PA4	I/O	24/8	GPIO	AMUX0R: Analog Channel0 Right; ADC3: ADC Input Channel 3; TMR4: Timer4 Clock Input;
13	PA2	I/O	24/8	GPIO	MIC_BIAS: Microphone Bias Output CAP3: Timer3 Capture;
	PA0	I/O	/	GPIO	SDPG: SD Power Supply ADC0: ADC Input Channel 0; CLKOUT0 UART1TXC: Uart1 Data Output(C);
14	PA1	I/O	24/8	GPIO	MIC: MIC Input Channel ; ADC1: ADC Input Channel 1; PWM4: Timer4 PWM Output; UART1RXC: Uart1 Data In(C);
15	VSS	P	/		Ground
16	VCOM	/	/		DAC Reference Output

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2、Electrical Characteristics

2.1 Absolute Maximum Ratings

Table 2-1

Symbol	Parameter	Min	Max	Unit
Tamb	Operating Temperature	-40	+85	°C
Tstg	Storage temperature	-65	+150	°C
VBAT	Supply Voltage	-0.3	5.5	V
LDO_IN	Charger Voltage	-0.3	5.5	V
V _{3.3IO}	3.3V IO Input Voltage	-0.3	IOVDD+0.3	V

Note : The chip can be damaged by any stress in excess of the absolute maximum ratings listed below

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	VBAT = 4.2V
LDO_IN	Charger Voltage	-	-	300	mA	
V _{3.3IO}	Voltage output		3.3		V	VBAT = 4.2V, 100mA loading

2.3 Battery Charge

Table 2-3

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
LDO_IN	Voltage Input	4.5	5	5.5	V	-
V _{Charge}	Charger Voltage	4.15	4.2	4.25	V	-
I _{Charge}	Charge Current	20		300	mA	Charge current at fast charge mode
I _{Trinkl}	Trickle Charge Current	20	45	70	mA	VBAT < 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* IOVDD	V	IOVDD = 3.3V
V _{IH}	High-Level Input Voltage	0.7* IOVDD	–	IOVDD+0.3	V	IOVDD = 3.3V
IO output characteristics						
V _{OL}	Low-Level Output Voltage	–	–	0.33	V	IOVDD = 3.3V
V _{OH}	High-Level Output Voltage	2.7	–	–	V	IOVDD = 3.3V

2.5 Internal Resistor Characteristics

Table 2-5

Port	General Output	High Drive	Internal Pull-Up Resistor	Internal Pull-Down Resistor	Comment
PA1, PA4, PA5 PB1, PB3, PB5~PB7 PC3~PC5	8mA	24mA	10K	10K	1、PB1 default pull up 2、USBDM & USBDP default pull down 3、PB5 can pull-up resistance to 5V 4、internal pull-up/pull-down resistance accuracy ±20%
PB3 PA0	Output0 8mA	24mA	10K	10K	
	Output1 8mA	64mA			
PB5	8mA	–	10K	10K	
USB DP	4mA	–	1.5K	15K	
USB DM	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	
Output Swing		1		V _{rms}	
Dynamic Range		95		dB	1KHz/-60dB 10Kohm loading With A-Weighted Filter
DAC Output Power		20	–	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	Fsample=44.1kHz Fin=1KHz 2mVpp Input
S/N	–	90	91	dB	Fsample=44.1kHz
THD+N	–	-70	–	dB	Fin=1KHz 1.2Vpp Input

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°C, Power Supply VBAT=4.2V 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=4.2V 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	

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=4.2V 2441MHz
Co-channel Interference Rejection			-13		dB	
Adjacent Channel	+1MHz		+5		dB	
	-1MHz		+2		dB	
	+2MHz		+37		dB	
Interference Rejection	-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=4.2V 2441MHz
Co-channel Interference Rejection			-13		dB	
Adjacent Channel	+1MHz		+5		dB	
	-1MHz		+2		dB	
	+2MHz		+37		dB	
Interference Rejection	-2MHz		+36		dB	
	+3MHz		+40		dB	
	-3MHz		+35		dB	

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3、 Package Information

3.1 SOP16

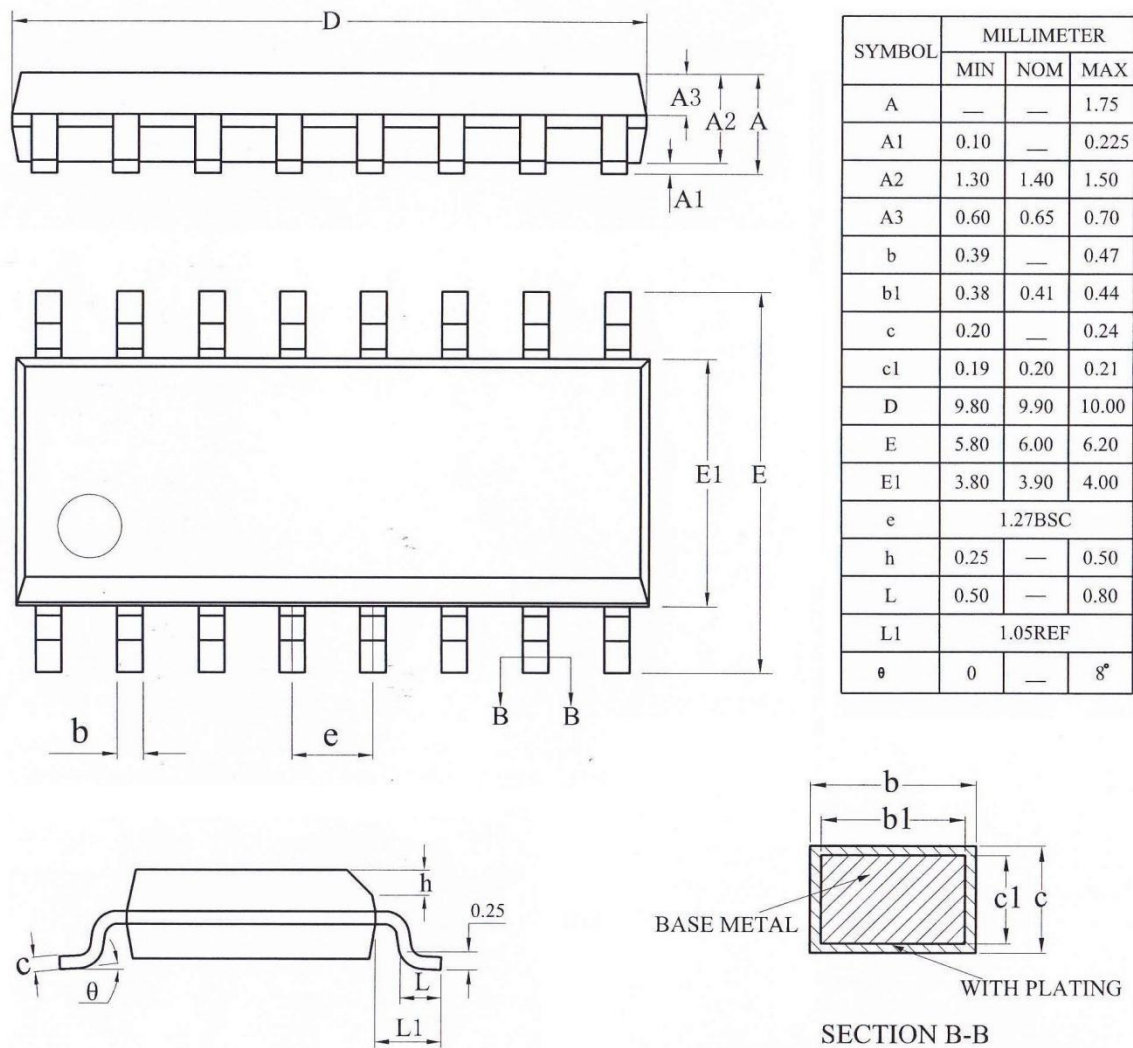


Figure 3-1. AC6969S_SOP16 Package

4、 Revision History

Date	Revision	Description
2022.12.05	V1.0	Initial Release
2025.08.29	V1.1	Update Bluetooth versions
2026.03.21	V1.2	Update PMU Characteristics
2026.04.03	V1.3	Update Pin Description and PMU Characteristics

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