

# **AC6969W Datasheet**

**Zhuhai Jieli Technology Co.,LTD**

**Version: V1.2**

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# AC6969W Features

## CPU

- 32-bit DSP supports hardware Float Point Unit (FPU)
- Up to 160MHz programmable processor
- 64 Vectored 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)
- One analog MIC Environmental Noise Cancellation (ENC)
- Multi-band DRC limiter
- 10-band EQ configuration for voice Effects

## Audio Codec

- Two channels 16-bit DAC, SNR  $\geq$  95dB
- One channels 16-bit ADC, SNR  $\geq$  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 channels Mono analog MUX
- Supports cap-less, single-ended, and differential mode at the DAC path
- Supports 16ohm and 32ohm Speaker loading

## Bluetooth

- Compliant with Bluetooth V6.0+BR+EDR+BLE specification (DN Q334307)

- Meet class2 and class3 transmitting power requirement
- Support GFSK and  $\pi/4$  DQPSK all packet types
- Provides maximum +6dbm transmitting power
- receiver with minimum -90dBm sensitivity
- Fast AGC for enhanced dynamic range
- Supports a2dp\avctp\avdtp\avrcp\hfp\spp\smpt\att\gap\gatt\rfcomm\sdpl2cap profile
- a2dp 1.4\avctp 1.4\avdtp 1.3\ avrcp 1.6.3\ hfp 1.9\spp 1.2\rfcomm 1.2\pnp 1.3\ hid 1.1.1\sdp core 6.0\l2cap core 6.0

## 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 hardware IIC interface supports host and device mode
- 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

- SOP16

## Temperature

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

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## Applications

- Bluetooth Headphones



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## 1.2 Pin Description

Table 1-1 AC6969W Pin Description

PIN NO.	Name	I/O Type	Drive (mA)	Function	Other Function
1	LDO_IN	P	/		Battery Charger In
	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);
2	VBAT	P	/		Battery Power Supply
3	VDDIO	P	/		IO Power 3.3v
4	PB1	I/O	24/8	GPIO (pull up)	Long Press Reset; ADC5: ADC Input Channel 5; TMR2: Timer2 Clock Input; UART0RXB: Uart0 Data In(B);
5	FMIP	I	/		FM ANT
6	BT_RF	/	/		BT Antenna
7	BT_SOCI	I	/		BT OSC In
8	BT_SOCO	O	/		BT OSC Out
9	USBDP	I/O	4	USB Positive Data (pull down)	SPI2CLKB: SPI2 Clock(B); IIC_SCL_A: IIC SCL(A); ADC13: ADC Input Channel 13; UART1TXD: Uart1 Data Output(D);
	PA0	I/O	/	GPIO	SDPG: SD Power Supply ADC0: ADC Input Channel 0; CLKOUT0 UART1TXC: Uart1 Data Output(C);
10	USBDM	I/O	4	USB Negative Data (pull down)	SPI2DOB: SPI2 Data Out(B); IIC_SDA_A: IIC SDA(A); ADC14: ADC Input Channel 14; UART1RXD: Uart1 Data In(D);
	PC1	I/O	24/8	GPIO	SPI2DIB: SPI2 Data In(B); TMR0: Timer0 Clock Input; UART1TXB: Uart1 Data Output(B);
11	PA4	I/O	24/8	GPIO	SD0CMDC: SD0 Command(C) AMUX0R: Analog Channel0 Right; UART1_RTS: Uart1 Request to send; ADC3: ADC Input Channel 3;

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					TMR4: Timer4 Clock Input; UART2RXA: Uart2 Data In(A);
12	PA3	I/O	24/8		SD0DATC: SD0 Data(C); AMUX0L: Analog Channel0 Left; PLNK_SCLK: PLNK Serial Clock; UART1_CTS: Uart1 Clear to send; ADC2: ADC Input Channel 3; PWM5: Timer5 PWM Output; UART2TXA: Uart1 Data Output(D);
13	PA2	I/O	24/8	GPIO	SD0CLKC: SD0 Clock(C); MIC_BIAS: Microphone Bias Output CAP3: Timer3 Capture;
	PA1	I/O	24/8	GPIO	MIC: MIC Input Channel ; ADC1: ADC Input Channel 1; PWM4: Timer4 PWM Output; UART1RXC: Uart0 Data In(C);
14	VSSIO	P	/		Ground
15	DACR	O	/		DAC Right Channel
16	DACL	O	/		DAC Left Channel

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## 2、Electrical Characteristics

### 2.1 Absolute Maximum Ratings

Table 2-1

Symbol	Parameter	Min	Max	Unit
Tamb	Ambient Temperature	-40	+85	°C
Tstg	Storage temperature	-65	+150	°C
VBAT	Supply Voltage	-0.3	4.5	V
V <sub>3.3IO</sub>	3.3V IO Input Voltage	-0.3	VDDIO+0.3	V
LDO_IN	Charge Input Voltage	-0.3	5.5	V

### 2.2 PMU Characteristics

Table 2-2

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
LDO_IN	Loading current	—	—	300	mA	VBAT = 4.2V
VBAT	Voltage Input	2.2	3.7	4.5	V	
V <sub>VDDIO</sub>	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	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		300	mA	Charge current at fast charge mode
I <sub>Trickl</sub>	Trickle Charge Current	20	45	70	mA	V <sub>BAT</sub> < V <sub>Trickl</sub>

## 2.4 IO Input/Output Electrical Logical Characteristics

Table 2-4

IO input characteristics						
Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
V <sub>IL</sub>	Low-Level Input Voltage	-0.3	–	0.3* VDDIO	V	VDDIO = 3.3V
V <sub>IH</sub>	High-Level Input Voltage	0.7* VDDIO	–	VDDIO+0.3	V	VDDIO = 3.3V
IO output characteristics						
V <sub>OL</sub>	Low-Level Output Voltage	–	–	0.33	V	VDDIO = 3.3V
V <sub>OH</sub>	High-Level Output Voltage	2.7	–	–	V	VDDIO = 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 PC1 PB1	8mA	24mA	10K	10K	1、PB1 default pull up 2、USBDM & USBDP default pull down 3、internal pull-up/pull-down resistance   accuracy ±20%
PA0	Output 0	8mA	10K	10K	
	Output 1	8mA	10K	10K	
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	–	V <sub>rms</sub>	
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 Fin=1KHz 1.2Vpp Input
THD+N	-	-70	-	dB	
Crosstalk	-	-90	-	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°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
$\pi/4$ DQPSK	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
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Sensitivity		-90		dBm	25°C, Power Supply VBAT=5V 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=5V 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	

**2.9 FM Receiver Characteristics****Table 2-12**

Parameter	Min	Typ	Max	Unit	Test Conditions
Input Frequency	76		108	MHz	
Usable Sensitivity	3	4	8	dB $\mu$ V EMF	(S+N)/N=26dB
Adjacent Channel Selectivity		48		dB	$\pm$ 200kHz
IIP3		88		dB $\mu$ V EMF	$\Delta$ f1=200 kHz, $\Delta$ f2=400 kHz
Audio Output Voltage	0		3	V	Empty Load
Audio Frequency Response	20		20k	Hz	DacTest
Audio (S+N)/N		58		dB	
Stereo Separation		40		dB	
Audio Total Harmonic Distortion (THD)		0.4		%	

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## 3、 Package Information

### 3.1 SOP16

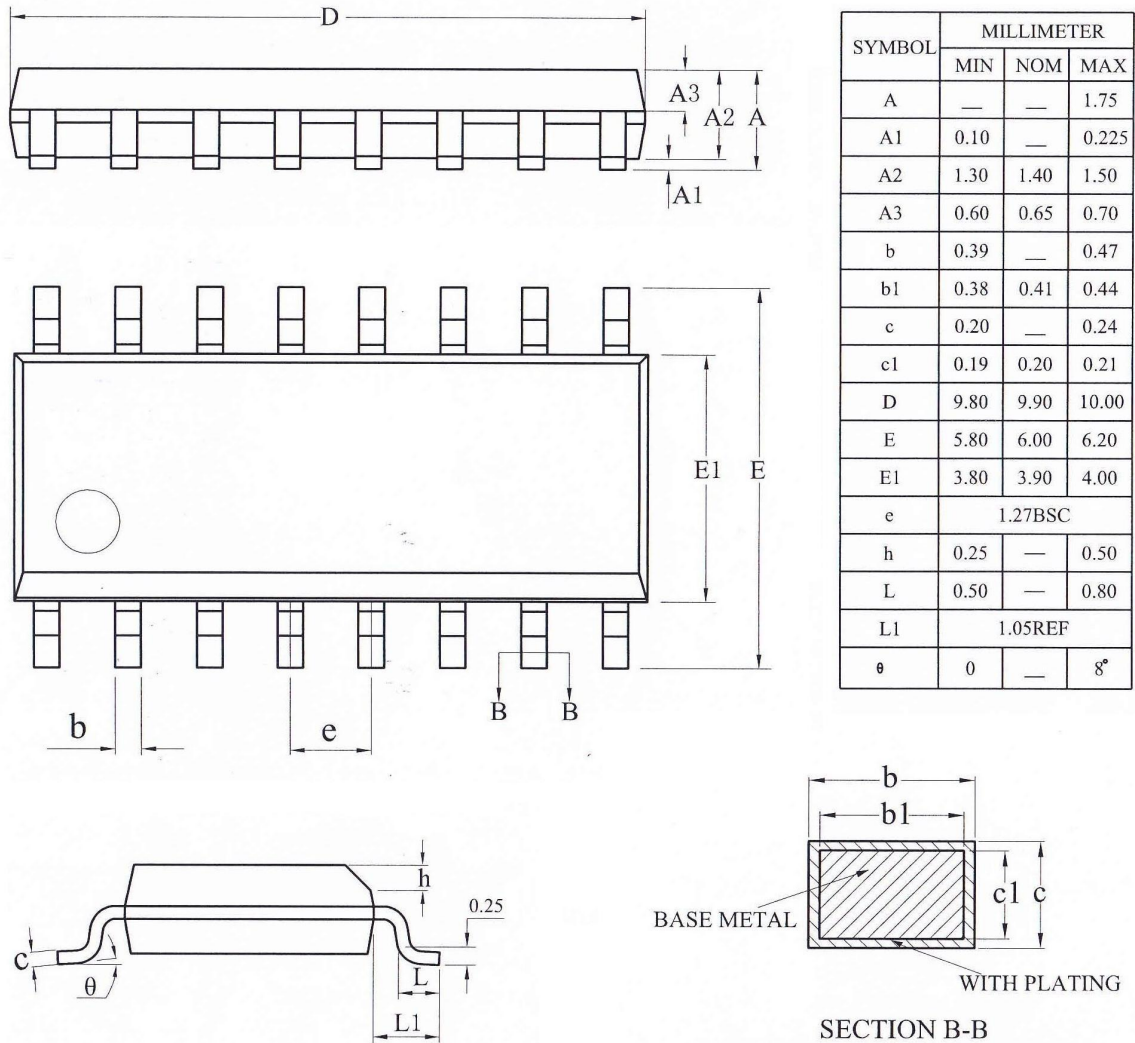


Figure 3-1. AC6969W\_SOP16 Package

### 3、Revision History

Date	Revision	Description
2024.12.02	V1.0	Initial Release
2025.01.09	V1.1	Update Bluetooth Vision and profiles
2026.03.21	V1.2	Update PMU Characteristics

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