

AC6928B Datasheet

Zhuhai Jieli Technology Co.,LTD

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AC6928B 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

- 8 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
- One audio interface supports IIS, left adjusted, right adjusted and DSP mode
- 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
- One SPI interface supports host and device mode
- One SD Card Host controller
- One IIC interface supports host and device mode
- One Quadrature decoder
- Watchdog
- 1 Crystal Oscillator
- 16-bit Mono DAC with headphone amplifier, SNR \geq 95dB
- 1 channel ADC , SNR \geq 90dB
- 1 channel MIC amplifier
- 2 channels Stereo analog MUX
- 5 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 V5.0+BR+EDR+BLE specification
- Bluetooth Piconet and Scatternet support

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- Meet class2 and class3 transmitting power requirement
- Support GFSK and $\pi/4$ DQPSK all paket types
- Provides +2dbm transmitting power
- receiver with -89dBm sensitivity
- Support a2dp\avctp\avdtp\avrep\hfp\spp\smp\att\gap\gatt\rfcomm\sdpl2cap profile

FM Tuner

- Support worldwide frequency band 76-108MHz
- Fully integrated digital low-IF tuner & frequency synthesizer
- Autonomous search tuning
- Digital auto gain control (AGC)
- Digital adaptive noise cancellation
- Programmable de-emphasis (50/75 uS)
- Receive signal strength indicator (RSSI)
- Radio search in multi-channel simultaneously
- Digital volume control

Power Supply

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

Packages

- TSSOP20

Temperature

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

1、 Pin Definition

1.1 Pin Assignment

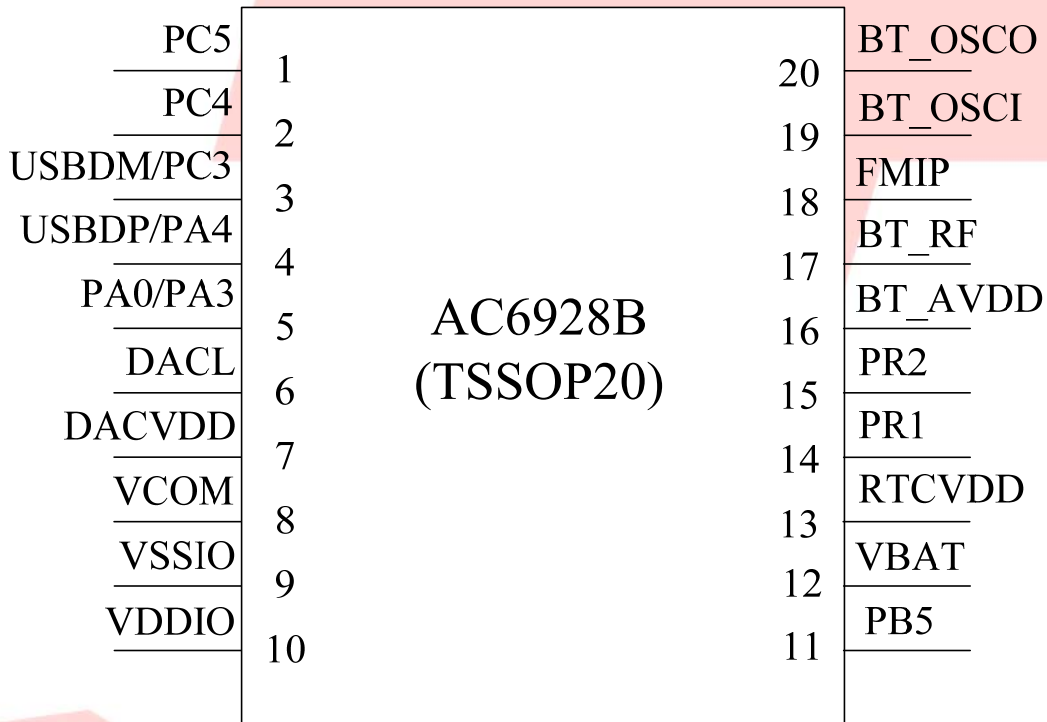


Figure 1-1 AC6928B_TSSOP20 Package Diagram

1.2 Pin Description

Table 1-1 AC6928B_TSSOP20 Pin Description

PIN NO.	Name	I/O Type	High Drive (mA)	Function	Other Function
1	PC5	I/O	24	GPIO	SD1CLKA: SD1 Clock(A); SPI1DOB: SPI1 Data Out(B); UART2RXD: Uart2 Data In(B); IIC_SDA_B: IIC SDA(B);
2	PC4	I/O	24	GPIO	SD1CMDA: SD1 Command(A); SPI1CLKB: SPI1 Clock(B); UART2TXD: Uart2 Data Out(B); IIC_SCL_B: IIC SCL(B);
3	PC3	I/O	24	GPIO	SD1DAT0A: SD1 Data0(A); SPI1DIB: SPI1 Data In(B); UART0RXC: Uart0 Data In(C); TMR3: Timer3 Clock Input; ADC10: ADC Input Channel 10;
	USBDM	I/O	4	USB Negative Data (pull down)	UART1RXD: Uart1 Data In(D); SPI2DOB: SPI2 Data Out(B); IIC_SDA_A: IIC SDA(A); ADC11: ADC Input Channel 11;
4	USBDP	I/O	4	USB Positive Data (pull down)	UART1TXD: Uart1 Data Out(D); SPI2CLKB: SPI2 Clock(B); IIC_SCL_A: IIC SCL(A);
	PA4	I/O	24	GPIO	PWM1: Timer1 PWM Output; AMUX1R: Simulator Channel1 Right; ADC1: ADC Input Channel 1; UART2RXA: Uart2 Data In(A); Touch11: Touch Input Channel 11;
5	PA0	I/O	24	GPIO	MIC: MIC Input Channel; UART0RXB: Uart0 Data In(B);
	PA3	I/O	24	GPIO	AMUX1L: Simulator Channel1 Left; ADC0: ADC Input Channel 0; UART2TXA: Uart2 Data Out(A); Touch10: Touch Input Channel 10;
6	DACL	O	/	DAC Left Channel	
7	DACVDD	P	/	DAC Power	
8	VCOM	P	/	DAC Reference	

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9	VSSIO	P	/	Ground	
10	VDDIO	P	/	IO Power 3.3v	
11	PB5	I/O	24	GPIO	UART0TXB: Uart0 Data Out(B); AMUX0R: Simulator Channel0 Right; SPI1DOA: SPI1 Data Out(A); SD0CLKB: SD0 Clock(B); ADC9: ADC Input Channel 9; Touch5: Touch Input Channel 5;
12	VBAT	P	/	LDO Power	
13	RTCVDD	P	/	RTC Power 3.3v	
14	PR1	I/O	10	RTCIO1 (output 0V)	RESET1: ADC12: ADC Input Channel 12;
15	PR2	I/O	10	RTCIO2 (pull up)	RESET2: ADC12: ADC Input Channel 12;
16	BT_AVDD	P	/	BT Power 1.3v	
17	BT_RF	P	/		
18	FMIP	I	/		
19	BT_OSCI	I	/	BT OSC In	
20	BT_OSCO	O	/	BT OSC Out	

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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
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	
V _{3.3}	Voltage output	–	3.3	–	V	VBAT = 5V, 100mA loading
V _{1.2}		–	1.2	–	V	VBAT = 5V, 50mA loading
V _{1.3}	Voltage output	–	1.3	–	V	VBAT=5V, 100mA loading
V _{DACVDD}	DAC Voltage	–	3.1	–	V	VBAT = 5V, 10mA loading
I _{L3.3}	Loading current	–	–	150	mA	VBAT = 5V

2.3 IO Input/Output Electrical Logical Characteristics

Table 2-3

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

2.4 Internal Resistor Characteristics

Table 2-4

Port	General Output	High Drive	Internal Pull-Up Resistor	Internal Pull-Down Resistor	Comment
PA0 PA3~PA4 PC3~PC5	8mA	24mA	10K	10K	1、USBDM & USBDP default pull down 2、internal pull-up/pull-down resistance accuracy $\pm 20\%$ 3、PR1 default output 0 4、PR2 default pull up
PR1 PR2	8mA	10mA	10K	10K	
USBDM USBPD	4mA	–	1.5K	15K	

2.5 DAC Characteristics

Table 2-5

Parameter	Min	Typ	Max	Unit	Test Conditions
Frequency Response	20	–	20K	Hz	1KHz/0dB 10Kohm loading With A-Weighted Filter
THD+N	–	-69	–	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

2.6 ADC Characteristics

Table 2-6

Parameter	Min	Typ	Max	Unit	Test Conditions
Dynamic Range		85		dB	1KHz/-60dB 10Kohm loading With A-Weighted Filter
S/N	–	90	–	dB	1KHz/-60dB
THD+N	–	-72	–	dB	10Kohm loading
Crosstalk	–	-80	–	dB	With A-Weighted Filter

2.7 BT Characteristics

2.7.1 Transmitter

Basic Data Rate

Table 2-7

Parameter		Min	Typ	Max	Unit	Test Conditions
RF Transmit Power			0	4	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 2-8

Parameter		Min	Typ	Max	Unit	Test Conditions
Relative Power			1.2		dB	25°C, 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	

2.7.2 Receiver

Basic Data Rate

Table 2-9

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity			-89		dBm	25°C, Power Supply VBAT=5V 2441MHz
Co-channel Interference Rejection			-13		dB	
Adjacent Channel	+1MHz		+5		dB	
	-1MHz		+2		dB	
Interference Rejection	+2MHz		+37		dB	
	-2MHz		+36		dB	
	+3MHz		+40		dB	
	-3MHz		+35		dB	

Enhanced Data Rate**Table 2-10**

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity			-89		dBm	25°C, Power Supply VBAT=5V 2441MHz
Co-channel Interference Rejection			-13		dB	
Adjacent Channel	+1MHz		+5		dB	
	-1MHz		+2		dB	
Interference Rejection	+2MHz		+37		dB	
	-2MHz		+36		dB	
	+3MHz		+40		dB	
	-3MHz		+35		dB	

2.8 FM Receiver Characteristics**Table 2-11**

Parameter	Min	Typ	Max	Unit	Test Conditions
Input Frequency	76		108	MHz	
Usable Sensitivity	3	4	8	dB μ V EMF	(S+N)/N=26dB
Adjacent Channel Selectivity		48		dB	\pm 200kHz
IIP3		88		db μ V EMF	Δ f1=200 kHz, Δ f2=400 kHz
Audio Output Voltage	0		3	V	Empty load
Audio Frequency Response	20		20k	Hz	DAC test
Audio (S+N)/N		52		dB	
Stereo Separation		40		dB	
Audio Total Harmonic Distortion (THD)		0.4		%	

3、Package Information

3.1 TSSOP20

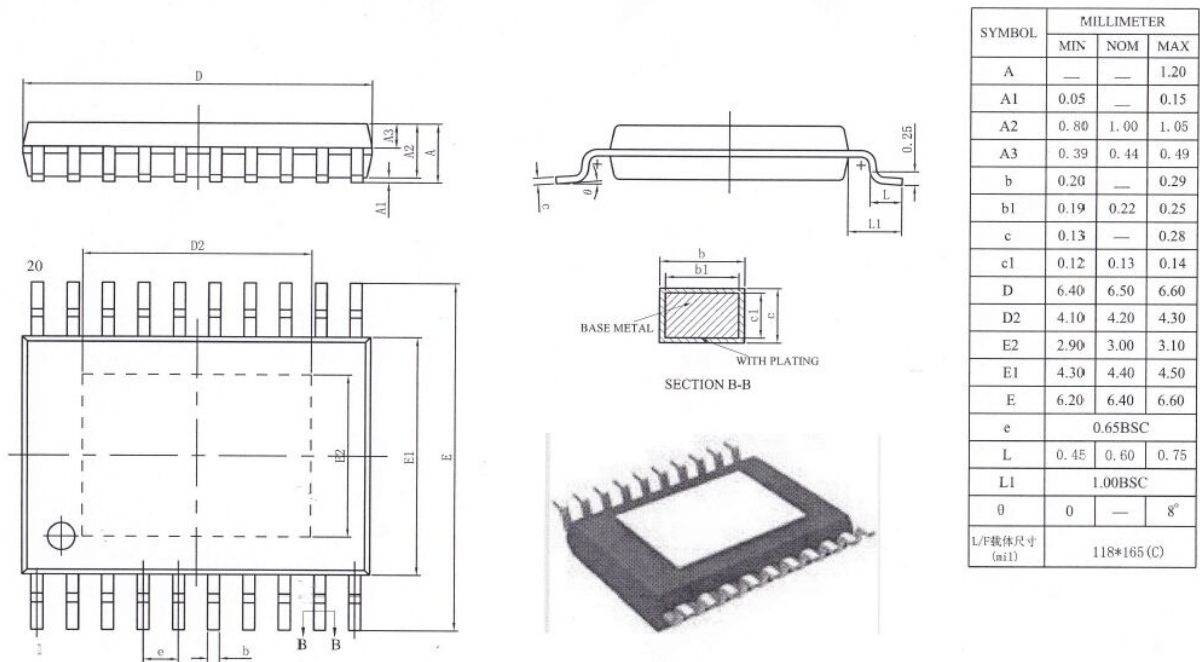


Figure 3-1. AC6928B_TSSOP20 Package

4、 Revision History

Date	Revision	Description
2018.06.12	V1.0	Initial Release
2018.11.09	V1.1	Add Electrical Characteristics



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