AC6936D Datasheet

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Version：1.1

Date：2019.05.15

AC6936D Features

High performance 32-bit RISC CPU

- DC-160MHz operation
- With 16k read only cache
- 64Vectored interrupts
- 8 Levels interrupt priority
- Coprocessor with mathematic instructions

Flexible I/O

- 14 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 in all working conditions
- Long press reset on all GPIOs

Peripheral Feature

- One full speed USB 2.0 OTG controller
- Hardware universal algorithm accelerator for FFT and AEC
- Four multi-function 16-bit timers, support capture and PWM mode
- Three 16-bit PWM generator for motor driving with automatic stop protection
- One full-duplex basic UART
- Two full-duplex advanced UART with DMA
- One IIC interface supports host and device mode
- One Quadrate decoder
- One LED light controller
- Watchdog
- One 12/24Mhz Crystal Oscillator
- Hardware Audio algorithm accelerator
- 16-bit Stereo DAC with headphone amplifier, SNR >= 96dB
- 1 channels ADC , SNR >= 90dB
- 1 channel MIC amplifier
- 3 channels analog MUX
- 11 channels 10-bit ADC
- 2 channels 8 levels Low Voltage Detector
- Power-on reset
- Embedded PMU support low power mode
- Integrated Li-ion battery charger,up to supports 200mA fast charging
- Communication with TWS headset charging case

Bluetooth Feature

- CMOS single-chip fully-integrated radio and baseband

- Bluetooth V5.0+BR+EDR+BLE specification
- Bluetooth Piconet and Scatternet support
- Meet class2 and class3 transmitting power requirement
- Support 1M GFSK\2M GFSK\S2 CODE\S8 CODE\π/4 DQPSK all paket types
- Provides +4dbm 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 4.2V
- VDDIO is 2.2V to 3.6V

Package

- QFN32_4x4

Temperature

- Operating temperature range: -40℃ to +80℃
- Storage temperature range: -65℃ to +150℃

1、Pin Definition

1.1 Pin Assignment

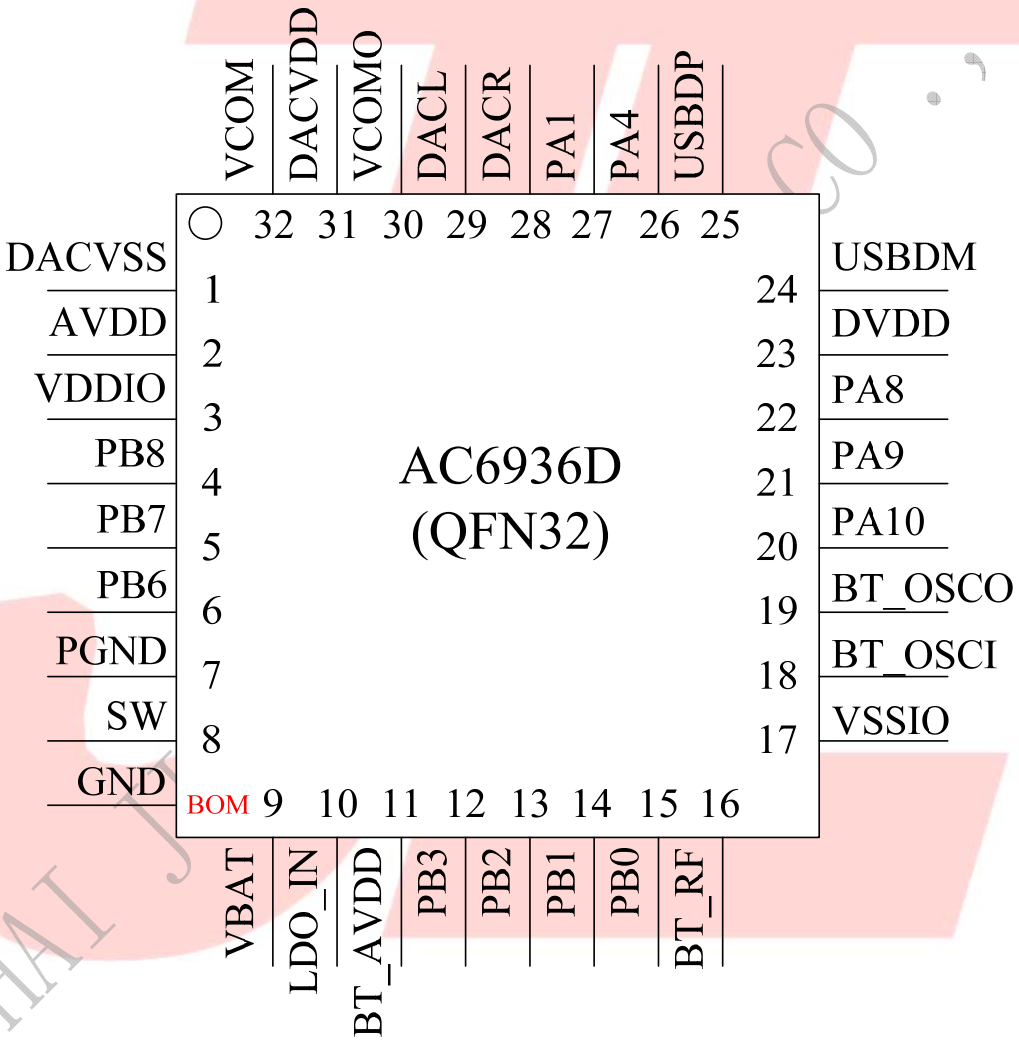


Figure 1-1 AC6936D_QFN32_4x4 Package Diagram

1.2 Pin Description

Table 1-1 AC6936D_QFN32_4x4 Pin Description

PIN NO.	Name	I/O Type	Drive (mA)	Function	Other Function
1	DACVSS	P	/	Ground	
2	AVDD	P	/	AVDD Power	
3	VDDIO	P	/	IO Power 3.3v	
4	PB8	I/O	/	GPIO	ALNK_MCLKB：ALNK Master Clock(B)； UART0RXB：Uart0 Data Input(B)；
5	PB7	I/O	/	GPIO	AMUX0R：Simulator Channel0 Right； SPI1DOA：SPI1 Data Output(A)； SD0CLKB:SD0 Clock(B); ALNK_DAT1B：Audio Link Data1(B)； ADC9：ADC Input Channel9； UART0TXB：Uart0 Data Output(B)； PWMCH2H：Motor PWM Channel2 (H)
6	PB6	I/O	/	GPIO	PWM3：Timer3 PWM Output； AMUX0L：Simulator Channel0 Left； SPI1CLKA:SPI1 Clock(A)； SD0CMDB：SD0 Command(B)； ALNK_DAT0B：Audio Link Data0(B)； ADC8：ADC Input Channel8； UART1RXA：Uart1 Data Input(A)；
7	PGND	P	/	Ground	
8	SW	P	/	DCDC output	DCDC switch output, connected to inductor
9	VBAT	P	/	LDO Power	
10	LDO_IN	P	/	Charge Power 5v	
11	BT_AVDD	P	/	BT Power 1.3v	
12	PB3	I/O	/	GPIO	32K OSC Input;
13	PB2	I/O	/	GPIO	ADC12：ADC Input Channel12； 32K OSC Output;
14	PB1	I/O	/	GPIO (pull up)	Long Press Reset； ADC6：ADC Input Channel6；
15	PB0	I/O	/	GPIO (High Voltage	ALNK_DAT3B：Audio Link Data3(B)；

				Input)	
16	BT_RF	/	/		
17	VSSIO	P	/	Ground	
18	BT_OSCI	I	/	OSC In	
19	BT_OSCO	O	/	OSC Out	
20	PA10	I/O	/	GPIO	SD1CLKA：SD1 Clock(A)； SPI1DOB：SPI1 Data Output(B)； IIC_SDA_B：IIC Data(B)； ADC5：ADC Input Channel5； PWMCH1L：Motor PWM Channel1 (L)；
21	PA9	I/O	/	GPIO	SD1CMDA：SD1 Command(A)； SPI1CLKB：SPI1 Clock(B)； IIC_SCL_B：IIC Clock(B)； ADC4：ADC Input Channel4； UART2TXD：Uart2 Data Output(D)； UART2RXD：Uart2 Data Input(D)； WKUP4：External Edge Wakeup4；
22	PA8	I/O	/	GPIO	SD1DAT0A：SD1 Data0(A)； IIC_SDA_C：IIC Data(C)； SPI1_DI_B：SPI1 Data In(B)； TMR3：Timer3 Clock Input； UART0RXC：Uart0 Data Input(C)；
23	DVDD	P	/	CORE POWER	
24	USBDM	I/O	/	USB Negative Data	UART1RXD：Uart1 Data In(D)； IIC_SDA_A：IIC SDA(A)； ADC11：ADC Input Channel 11；
25	USBDP	I/O	/	USB Positive Data	UART1TXD：Uart1 Data Out(D)； IIC_SCL_A：IIC SCL(A)； ADC10：ADC Input Channel 10；
26	PA4	I/O		GPIO	AMUX1R：Simulator Channel1 Right； PWM1：Timer1 PWM Output； ADC2：ADC Input Channel2； ALNK_DAT3A：Audio Link Data3(A)； SPI2DIA：SPI2 Data Input(A)； UART2RXA：Uart2 Data Input(A)； FPIN0：Motor Auto-Stop Protective Pin0；
27	PA1	I/O	/	GPIO	MIC：MIC Input Channel ； PWM0：Timer0 PWM Output； ADC0：ADC Input Channel0； UART1TXC：Uart1 Data Output(C)；

					PWMCH0H：Motor PWM Channel0 (H)
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	VCOM	P	/	DAC reference voltage	

2、Electrical Characteristics

2.1 Absolute Maximum Ratings

Table 2-1

Symbol	Parameter	Min	Max	Unit
Tamb	Ambient Temperature	-40	+80	°C
Tstg	Storage temperature	-65	+150	°C
VBAT	Supply Voltage	-0.3	5.5	V
$V_{3.3IO}$	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
LDOIN	Voltage Input	4.5	5	5.5	V	_
VBAT	Voltage Input	2.2	3.7	5.5	V	
V_{DVDD}	Voltage output	0.9	1.2	1.25	V	VBAT = 4.2V, 30mA loading
V_{VDDIO}	Voltage output	_	3.3	_	V	VBAT = 4.2V, 100mA loading
V_{BT_AVDD}	Voltage output		1.3		V	VBAT=4.2V, 100mA loading
V_{DACVDD}	DAC Voltage	_	3.1	_	V	VBAT = 4.2V, 10mA loading
LDO_IN	Loading current	_	_	150	mA	VBAT = 4.2V

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		200	mA	Charge current at fast charge mode
I_{Trikl}	Trickle Charge Current	20	45	70	mA	$V_{BAT} < V_{Trikl}$

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 Voltaget	-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 Voltaget	_	_	0.33	V	VDDIO = 3.3V
V_{OH}	High-Level Output Voltaget	2.7	_	_	V	VDDIO = 3.3V

2.5 Internal Resistor Characteristics

Table 2-5

Port	**Driving（mA）**				**Internal Pull-Up Resistor（kΩ）**	**Internal Pull-Down Resistor（kΩ）**	**Comment**
PA1 PA4 PA8~PA10 PB1~PB3 PB6~PB8	3	8	18	24	10	10	1、USBDM & USBDP default pull down 2、internal pull-up/pull-down resistance | accuracy ±20%
PB0	8		_		10	10	
USBDP	4		_		1.5	15	
USBDM					180	15	

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	_	-74	_	dB	
S/N	_	96	_	dB	
Crosstalk	_	-60	_	dB	
Output Swing		0.95		Vrms	
Dynamic Range		94		dB	1KHz/-60dB 10Kohm loading With A-Weighted Filter
DAC Output Power	11	18	_	mW	32ohm loading

2.7 ADC Characteristics

Table 2-7

Parameter	Min	Typ	Max	Unit	Test Conditions
Dynamic Range		82		dB	1KHz/-60dB 10Kohm loading With A-Weighted Filter
S/N	_	90	_	dB	1KHz/-60dB
THD+N	_	-64	_	dB	10Kohm loading
Crosstalk	_	-80	_	dB	With A-Weighted Filter

2.8 BT Characteristics

2.8.1 Transmitter

Basic Data Rate **Table 2-8-1**

Parameter		Min	Typ	Max	Unit	Test Conditions
RF Rransmit Power			0	4	dBm	25℃, Power Supply VBAT=5V 2441MHz
RF Power Control Range			28		dB	
20dB Bandwidth			950		KHz	
Adjacent Channel Transmit Power	+2MHz		-40		dBm	
	-2MHz		-38		dBm	
	+3MHz		-44		dBm	
	-3MHz		-35		dBm	

Enhanced Data Rate **Table 2-8-2**

Parameter		Min	Typ	Max	Unit	Test Conditions
Relative Power			1.2		dB	25℃, Power Supply VBAT=5V 2441MHz
π/4 DQPSK Modulation Accuracy	DEVM RMS		5		%	
	DEVM 99%		10		%	
	DEVM Peak		15		%	
Adjacent Channel Transmit Power	+2MHz		-40		dBm	
	-2MHz		-38		dBm	
	+3MHz		-44		dBm	
	-3MHz		-35		dBm	

2.8.2 Receiver

Basic Data Rate **Table 2-8-3**

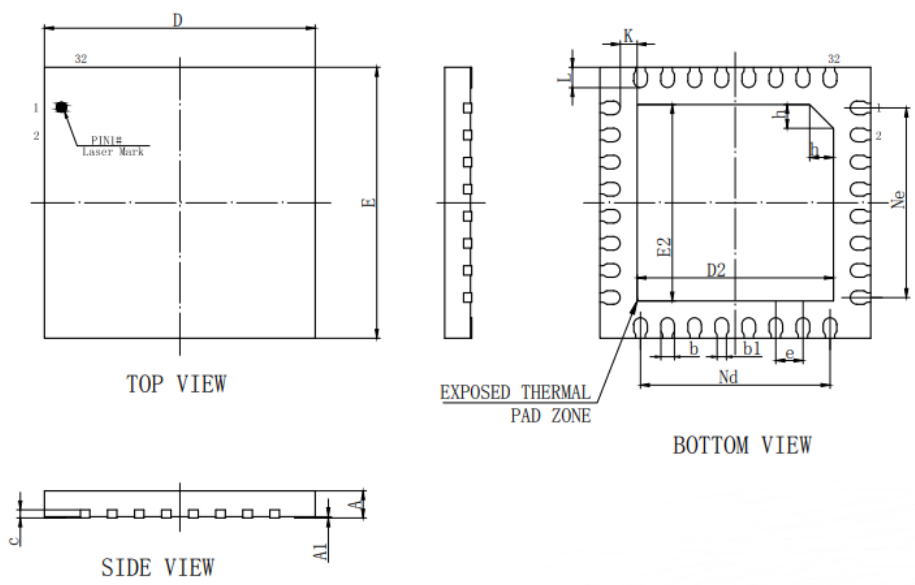
Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity			-90		dBm	25℃, Power Supply VBAT=5V 2441MHz
Co-channel Interference Rejection			-10		dB	
Adjacent Channel Interference Rejection	+1MHz		+4		dB	
	-1MHz		+4		dB	
	+2MHz		+34		dB	
	-2MHz		+34		dB	
	+3MHz		+44		dB	
	-3MHz		+25		dB	

Enhanced Data Rate **Table 2-8-4**

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity			-90		dBm	25℃, Power Supply VBAT=5V 2441MHz
Co-channel Interference Rejection			-10		dB	
Adjacent Channel Interference Rejection	+1MHz		+4		dB	
	-1MHz		+4		dB	
	+2MHz		+34		dB	
	-2MHz		+34		dB	
	+3MHz		+44		dB	
	-3MHz		+25		dB	

3、 Package Information

3.1 QFN32_4x4



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.28	0.30	0.32
A1	0	0.02	0.05
b	0.15	0.20	0.25
b1	0.14REF		
c	0.102REF		
D	3.90	4.00	4.10
D2	2.80	2.90	3.00
e	0.40BSC		
Nd	2.80BSC		
E	3.90	4.00	4.10
E2	2.80	2.90	3.00
Ne	2.80BSC		
K	0.25REF		
L	0.25	0.30	0.35
h	0.30	0.35	0.40

Figure 3-1 AC6936D_QFN32_4x4 Package

4、Revision History

Date	Revision	Description
2019.04.28	V1.0	Initial Release
2019.05.15	V1.1	Modify Bluetooth Support Paket Types