AC6939B Datasheet

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Version：1.3

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AC6939B 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

- 4 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 >= 85dB
- 1 channel MIC amplifier
- 1 channel analog MUX
- 4 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 150mA 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

- SOP16

Temperature

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

1、Pin Definition

1.1 Pin Assignment

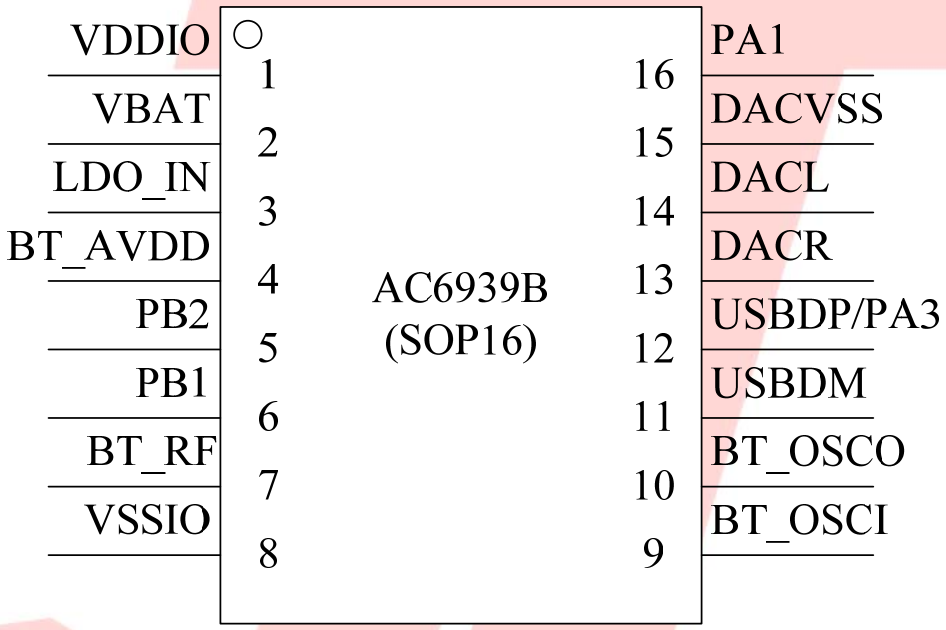


Figure 1-1 AC6939B_SOP16 Package Diagram

1.2 Pin Description

Table 1-1 AC6939B_SOP16 Pin Description

PIN NO.	Name	I/O Type	Drive (mA)	Function	Other Function
1	VDDIO	P	/	IO Power 3.3v	
2	VBAT	P	/	LDO Power	
3	LDO_IN	P	/	Charge Power 5v	
4	BT_AVDD	P	/	BT Power 1.3v	
5	PB2	I/O		GPIO	ADC12：ADC Input Channel12；
6	PB1	I/O		GPIO (pull up)	Long Press Reset； ADC6：ADC Input Channel6；
7	BT_RF	P	/		
8	VSSIO	P	/	Ground	
9	BT_OSCI	I	/	OSC In	
10	BT_OSCO	O	/	OSC Out	
11	USBDM	I/O	4	USB Negative Data	UART1RXD：Uart1 Data In(D)； IIC_SDA_A：IIC SDA(A)； ADC11：ADC Input Channel 11；
12	USBDP	I/O	4	USB Positive Data	UART1TXD：Uart1 Data Out(D)； IIC_SCL_A：IIC SCL(A)； ADC10：ADC Input Channel 10；
	PA3	I/O		GPIO	AMUX1L：Simulator Channel1 Left; ADC1：ADC Input Channel1； UART2TXA：Uart2 Data Output(A)； PWMCH0L：Motor PWM Channel0 (L)
13	DACR	O	/	DAC Right Channel	
14	DACL	O	/	DAC Left Channel	
15	DACVSS	P	/	Ground	
16	PA1	I/O	24	GPIO	MIC：MIC Input Channel ; PWM0：Timer0 PWM Output； ADC0：ADC Input Channel0； UART1TXC：Uart1 Data Output(C)； PWMCH0H：Motor PWM Channel0 (H)

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
LDOIN	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
$V_{3.3}$	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
$I_{L3.3}$	Loading current	_	_	150	mA	VBAT = 4.2V

2.3 Battery Charge

Table 2-3

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
LDOIN	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

<table>
<tr><th>Port</th><th colspan="4">Driving（mA）</th><th>Internal Pull-Up Resistor（kΩ）</th><th>Internal Pull-Down Resistor（kΩ）</th><th>Comment</th></tr>
<tr><td>PA1
PA1,PA3
PB1,PB2</td><td>3</td><td>8</td><td>18</td><td>24</td><td>10</td><td>10</td><td rowspan="3">1、USBDM & USBDP default pull down
2、internal pull-up/pull-down resistance | accuracy ±20%</td></tr>
<tr><td>USBDP</td><td colspan="2" rowspan="2">4</td><td colspan="2" rowspan="2">_</td><td>1.5</td><td>15</td></tr>
<tr><td>USBDM</td><td>180</td><td>15</td></tr>
</table>

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**

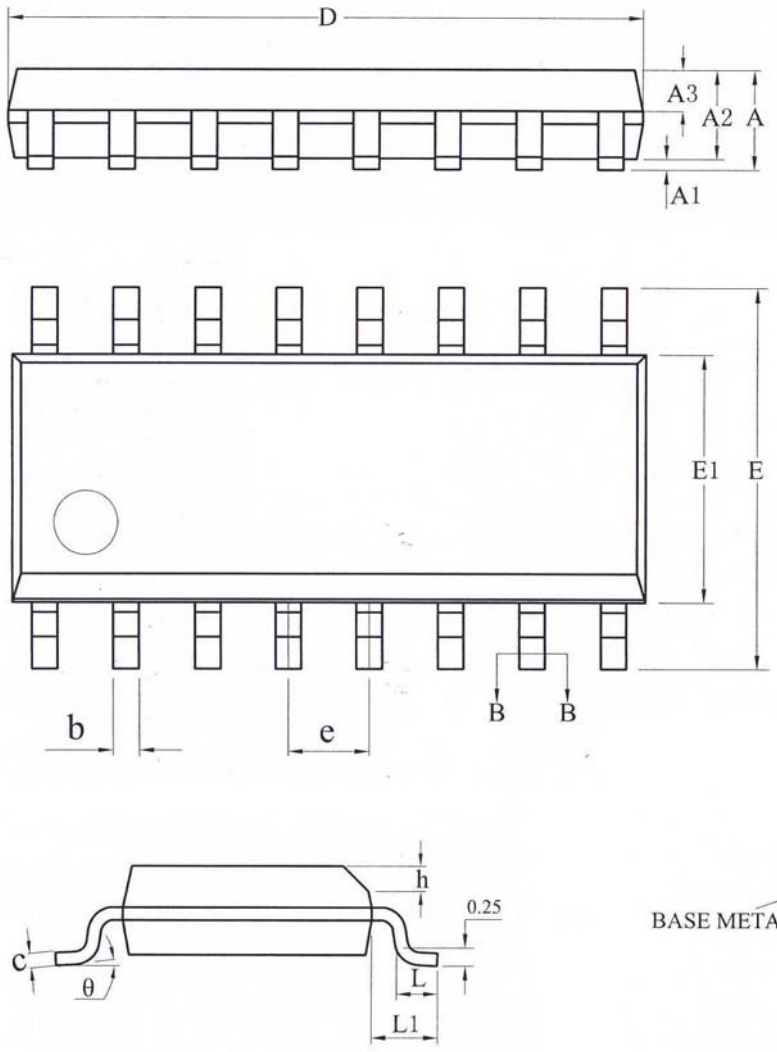
Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity			-90		dBm	25℃, Power Supply VBAT=5V 2441MHz
Co-channel Interference Rejection			-10		dB	
Adjacent Channel Interference Rejection	+1MHz		+4		dB	
	-1MHz		+4		dB	
	+2MHz		+34		dB	
	-2MHz		+34		dB	
	+3MHz		+44		dB	
	-3MHz		+25		dB	

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 SOP16



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.75
A1	0.10	—	0.225
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
b	0.39	—	0.47
b1	0.38	0.41	0.44
c	0.20	—	0.24
c1	0.19	0.20	0.21
D	9.80	9.90	10.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27BSC		
h	0.25	—	0.50
L	0.50	—	0.80
L1	1.05REF		
θ	0	—	8°

Figure 3-1 AC6939B_SOP16 Package

4、Revision History

Date	Revision	Description
2019.03.01	V1.0	Initial Release
2019.03.25	V1.1	Modify Electrical Characteristics
2019.04.01	V1.2	Modify BT Characteristics
2019.04.01	V1.3	Modify Bluetooth Support Paket Types