

LC6956A Datasheet

Shenzhen Lenze technology Co.,LTD

Version : 1.1

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LC6956A Features

CPU

- 32-bit DSP supports hardware Float Point Unit(FPU)
- Up to 240MHz 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/Dual MIC Environmental Noise Cancellation (ENC)
- Multi-band DRC limiter
- 30-band EQ configuration for voice Effects

Audio Codec

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

Bluetooth

- Compliant with Bluetooth V5.1+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

Peripherals

- One full speed USB 2.0 OTG controller
- Four multi-function 16-bit timers, support capture and PWM mode
- Three 16-bit PWM generator for motor driving
- Three full-duplex basic UART, UART0 and UART1 supports DMA mode
- Two SPI interface supports host and device mode
- 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
- VDDIO is 2.2V to 3.6V

Packages

- QFN32(4mm*4mm)

Temperature

- Operating temperature: -20 $^{\circ}$ C to +70 $^{\circ}$ C

● Storage temperature: -65°C to $+150^{\circ}\text{C}$

● Bluetooth Stereo headset

● Bluetooth Mono headset

● Bluetooth TWS headset

Applications



1、 Pin Definition

1.1 Pin Assignment

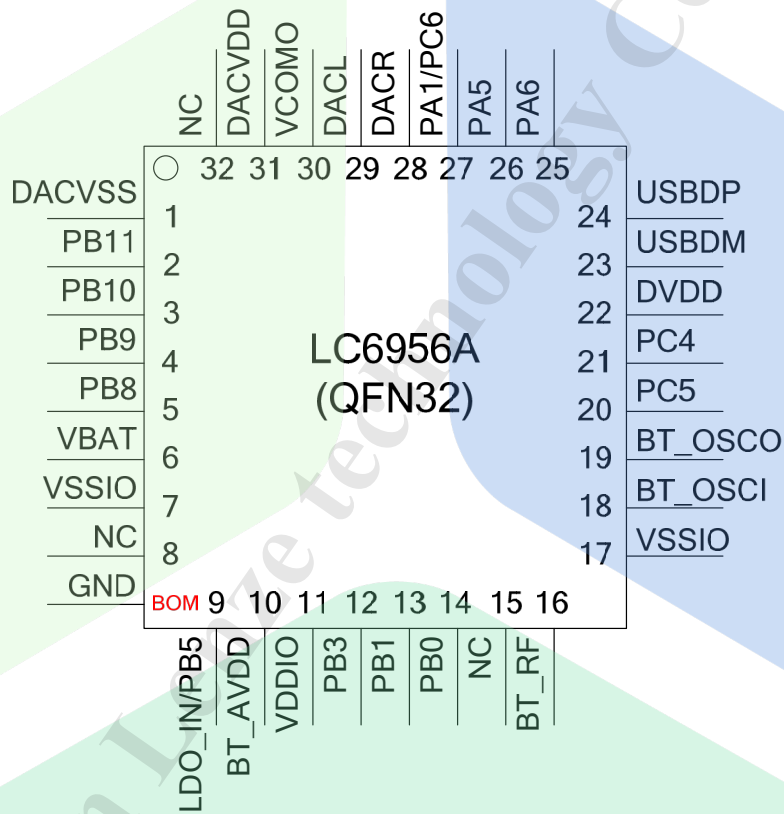


Figure 1-1 LC6956A Package Diagram

1.2 Pin Description

Table 1-1 LC6956A Pin Description

PIN NO.	Name	I/O Type	Drive (mA)	Function	Other Function
1	DACVSS	P	/	Ground	
2	PB11	I/O	/	GPIO	SDPG:SDC Power Gate;
3	PB10	I/O	24/8	GPIO	AMUX2R : Analog Channel2 Right; SD0CMB : SD0 Command(B); SPI2DOA : SPI2 Data Out(A); SD1DAT3B : SD1 Data3(B); ADC9 : ADC Input Channel9; UART2RXC : Uart2 Data In(C); PWMCH3L : Motor PWM Channel3(L) ;
4	PB9	I/O	24/8	GPIO	AMUX2L : Analog Channel2 Left; SD0CLKB : SD0 Clock(B); SPI2CLKA : SPI2 Clk(A); SD1DAT2B : SD1 Data2(B); CAP0 : Timer0 Capture; UART2TXC : Uart2 Data Out(C); PWMCH3H : Motor PWM Channel3(H) ;
5	PB8	I/O	24/8	GPIO	AMUX1R : Analog Channel1 Right; SD0DAT0B : SD0 Data0(B); SPI2_DIA : SPI2 Data In(A); SD1DAT1B : SD1 Data1(B); ADC8 : ADC Input Channel8; CLKOUT1 : Clk Out1;
6	VBAT	P	/	LDO Power	
7	VSSIO	P	/	Ground	
8	NC				
9	LDO_IN	P	/	Charge Power 5v	
	PB5	I/O	8	GPIO (High Voltage Resistance)	SD1CMDB : SD1 Command(B); SD0DAT2B : SD1 Data2(B); PWM3 : Timer3 PWM Output; CAP1 : Timer1 Capture; UART0TXC : Uart0 Data Out(C); UART0RXC : Uart0 Data In(C);
10	BT_AVDD	P	/	BT Power 1.3v	
11	VDDIO	P	/		IO Power 3.3v

12	PB3	I/O	24/8	GPIO	PWM2 : Timer2 PWM Output; ADC6 : ADC Input Channel 6;
13	PB1	I/O	24/8	GPIO (pull up)	Long Press Reset ; SPI1DOA : SPI1 Data Out(A); ADC5 : ADC Input Channel 5; TMR2 : Timer2 Clock Input; UART1RXA : Uart1 Data In(A);
14	PB0	I/O	8	GPIO (High Voltage Resistance)	SPI1CLKA : SPI1 Clock(A); UART1TXA : Uart1 Data Out(A); PWMCH1H : Motor PWM Channel1(H) ;
15	NC				
16	BT_RF	/	/		
17	VSSIO	P	/	Ground	
18	BT_OSCI	I	/	OSC In	
19	BT_OSCO	O	/	OSC Out	
20	PC5	I/O	24/8	GPIO	SD1CLKA : SD1 Clock(A); SPI1DOB : SPI1 Data Out(B); UART2RXD : Uart2 Data In(D); IIC_SDA_B : IIC SDA(B); ADC13 : ADC Input Channel 13; Touch15 : Touch Input Channel 15; PWMCH5L : Motor PWM Channel5(L) ;
21	PC4	I/O	24/8	GPIO	SD1CMDA : SD1 Command(A); SPI1CLKB : SPI1 Clock(B); UART2TXD : Uart2 Data Out(D); IIC_SCL_B : IIC SCL(B); ADC10 : ADC Input Channel 10; Touch14 : Touch Input Channel 14; PWMCH5H : Motor PWM Channel5(H) ;
22	DVDD	P	/		Core Power
23	USBDM	I/O	4	USB Negative Data (pull down)	UART1RXD : Uart1 Data In(D); SPI2DOB : SPI2 Data Out(B);
24	USBDP	I/O	4	USB Positive Data (pull down)	IIC_SDA_A : IIC SDA(A); UART1TXD : Uart1 Data Out(D); SPI2CLKB : SPI2 Clock(B); IIC_SCL_A : IIC SCL(A); ADC12 : ADC Input Channel 12;
25	PA6	I/O	24/8	GPIO	SD0DAT1A : SD0 Data1(A); ADC2 : ADC Input Channel 2; IIC_SDA_D : IIC SDA(D); Touch6 : Touch Input Channel 6; UART0RXA : Uart0 Data In(A);

26	PA5	I/O	24/8	GPIO	SD0DAT0A : SD0 Data0(A); ADC1 : ADC Input Channel 1; IIC_SCL_D : IIC SCL(D); Touch5 : Touch Input Channel 5; PWM0 : Timer0 PWM Output; UART0TXA : Uart0 Data Out(A);
27	PA1	I/O	24/8	GPIO	AMUX0R : Analog Channel0 Right; Touch1 : Touch Input Channel 1; ADC0 : ADC Input Channel 0; UART1RXC : Uart1 Data In(C); PWMCH0L : Motor PWM Channel0(L) ;
	PC6	I/O	24/8	GPIO	MIC : MIC Input Channel; ADC11 : ADC Input Channel 11;
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	NC				

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
LDO_IN	Charger Voltage	4.5	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	
LDO_IN	Charger Voltage	4.5	5.0	5.5	V	
V _{3.3}	Voltage output	—	3.3	—	V	VBAT = 5V, 100mA loading
V _{BT_AVDD}	Voltage output	—	1.3	—	V	VBAT=5V, 100mA loading
V _{DACVDD}	DAC Voltage	—	2.7	—	V	VBAT = 5V, 10mA loading
I _{L3.3}	Loading current	—	—	150	mA	VBAT = 5V

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	—	320	mA	Charge current at fast charge mode
I _{Trinkl}	Trickle Charge Current	20	45	70	mA	V _{BAT} < 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* 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

2.5 Internal Resistor Characteristics

Table 2-5

Port	General Output	High Drive	Internal Pull-Up Resistor	Internal Pull-Down Resistor	Comment
PA0、PA5、PA6 PB1、PB3 PB8~PB10	8mA	24mA	10K	10K	1、PB1 default pull up 2、USBDM & USBDP default pull down 3、PB0, PB5 can pull-up resistance to 5V 4、internal pull-up/pull-down resistance accuracy ±20%
PC4~PC6 PB11 Output 0	8mA	24mA	10K	10K	
Output 1	8mA	64mA			
PB0、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	
Crosstalk	-	-80	-	dB	
Output Swing		1		V _{rms}	
Dynamic Range		90		dB	1KHz/-60dB 10Kohm loading With A-Weighted Filter
DAC Output Power	11		-	mW	32ohm loading

2.7 ADC Characteristics

Table 2-7

Parameter	Min	Typ	Max	Unit	Test Conditions
Dynamic Range		80		dB	1KHz/-60dB
S/N	–	90	91	dB	1KHz/-60dB
THD+N	–	-70	–	dB	
Crosstalk	–	-80	–	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℃, 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℃, 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	

2.8.2 Receiver

Basic Data Rate

Table 2-10

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity			-90		dBm	25℃, 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℃, 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	

3、 Package Information

3.1 QFN32_4x4

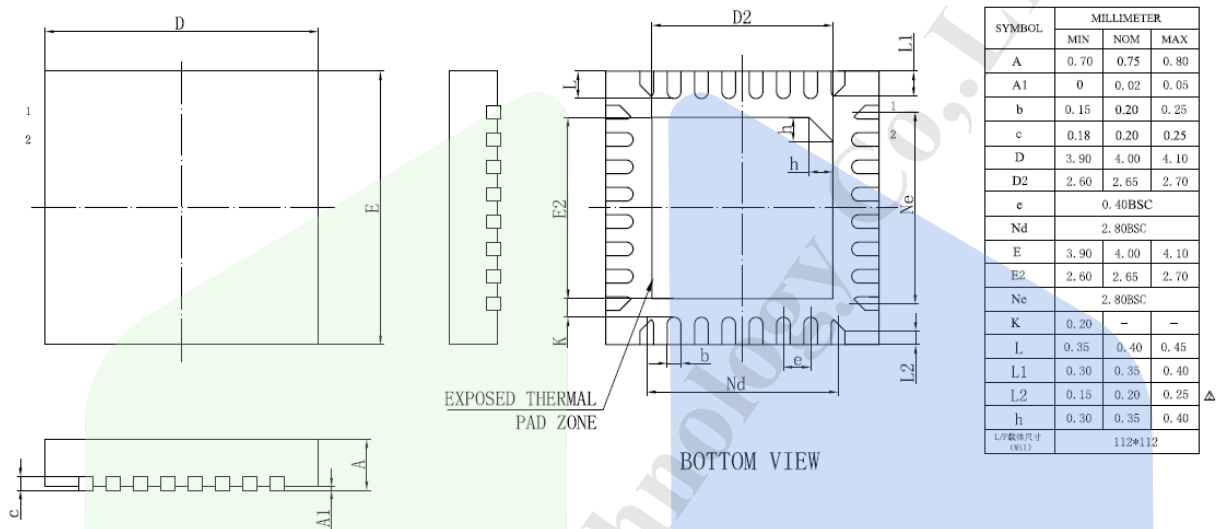


Figure 3-1 LC6956A Package

4、 Revision History

Date	Revision	Description
2019.12.04	V1.0	Initial Release
2020.03.31	V1.1	Update Pin Assignment

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