

AC6351D Datasheet

Zhuhai Jieli Technology Co.,LTD

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AC6351D Features

CPU

- 32-bit DSP supports hardware Float Point Unit(FPU)
- Up to 240MHz programmable processor
- 64 Vectored interrupts
- 4 Levels interrupt priority

Bluetooth

- Compliant with Bluetooth V5.3+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

- Three SPI interface supports host and device mode
- Two SD Card Host controller
- One hardware IIC interface supports host and device mode
- Built-in Cap Sense Key controller
- 14 channels 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
- Built-in Li-Ion battery charger with up to 200mA charger current capability
- VBAT is 2.2V to 5.5V
- VDDIO is 2.2V to 3.6V

Packages

- LQFP48(7mm*7mm)

Temperature

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

Applications

- Bluetooth Keyboard

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1、 Pin Definition

1.1 Pin Assignment

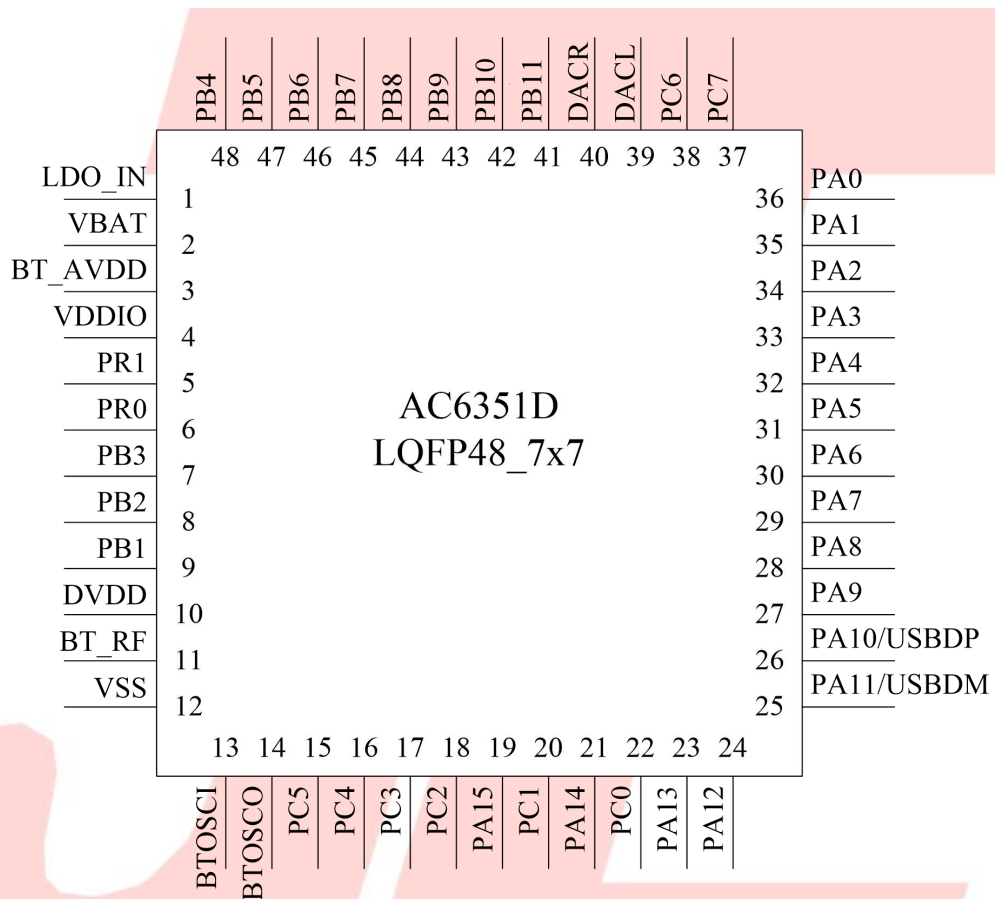


Figure 1-1 AC6351D_LQFP48 Package Diagram

1.2 Pin Description

Table 1-1 AC6351D_LQFP48 Pin Description

PIN NO.	Name	I/O Type	Drive (mA)	Function	Other Function
1	LDO_IN	P	/		Battery Charger Power In
2	VBAT	P	/		Power Supply
3	BT_AVDD	P	/		BT Power
4	VDDIO	P	/		IO Power 3.3v
5	PR1	I/O	8	GPIO	OSCO_32K: 32KHz OSC Out
6	PR0	I/O	8	GPIO	OSCI_32K: 32KHz OSC In
7	PB3	I/O	24/8	GPIO	PWM2: Timer2 PWM Output; ADC6: ADC Input Channel 6;
8	PB2	I/O	8	GPIO (High Voltage Resistance)	PWMCH1L: Motor PWM Channel1 (L);
9	PB1	I/O	24/8	GPIO (pull up)	Long Press Reset; ADC5: ADC Input Channel 5; UART1RXA: Uart1 Data In(A);
10	DVDD	P	/		Core Power 1.2V
11	BT_RF	/	/		BT Antenna
12	VSS	P	/		Ground
13	BT_OSCI	I	/		BT OSC In
14	BT_OSCO	O	/		BT OSC Out
15	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);
16	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);

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17	PC3	I/O	24/8	GPIO	SD1DAT0A: SD1 Data0(A); SPI1DIB: SPI1 Data In(B); ALNK1_DAT1: Touch13: Touch Input Channel 13;
18	PC2	I/O	24/8	GPIO	SD1DAT1A: SD1 Data1(A); ALNK1_DAT0: Touch12: Touch Input Channel 12; FPIN5: Motor Auto-Stop Protective Pin5;
19	PA15	I/O	24/8	GPIO	CAP2: Timer2 Capture;
20	PC1	I/O	24/8	GPIO	SD1DAT2A: SD1 Data2(A); Touch11: Touch Input Channel 11; UART1RXB: Uart1 Data In(B); FPIN4: Motor Auto-Stop Protective Pin4;
21	PA14	I/O	24/8	GPIO	FPIN0: Motor Auto-Stop Protective Pin0;
22	PC0	I/O	24/8	GPIO	SD1DAT3A: SD1 Data3(A); Touch10: Touch Input Channel 10; UART1TXB: Uart1 Data Out(B); FPIN3: Motor Auto-Stop Protective Pin3;
23	PA13	I/O	24/8	GPIO	
24	PA12	I/O	24/8	GPIO	PWM1: Timer1 PWM Output; ADC4: ADC Input Channel 4; UART0RXD: Uart0 Data In(D);
25	PA11	I/O	24/8	GPIO	UART0TXD: Uart0 Data Out(D);
	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);
26	PA10	I/O	24/8	GPIO	SD0CLKA: SD0 Clock(A); ADC3: ADC Input Channel 3; TMR1: Timer1 Clock Input; Touch9: Touch Input Channel 9; UART2RXB: Uart2 Data In(B); PWMCH4L: Motor PWM Channel4(L);
	USBDP	I/O	4	USB Positive Data (pull down)	UART1TXD: Uart1 Data Out(D); SPI2CLKB: SPI2 Clock(B); IIC_SCL_A: IIC SCL(A); ADC12: ADC Input Channel 12;
27	PA9	I/O	24/8	GPIO	SD0CMA: SD0 Command(A); Touch8: Touch Input Channel 8; UART2TXB: Uart2 Data Out(B); PWMCH4H: Motor PWM Channel4(H);
28	PA8	I/O	24/8	GPIO	SD0DAT3A: SD0 Data3(A); FPIN2: Motor Auto-Stop Protective Pin2;

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29	PA7	I/O	24/8	GPIO	SD0DAT2A: SD0 Data2(A); TMR0: Timer0 Clock Input; Touch7: Touch Input Channel 7;
30	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);
31	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);
32	PA4	I/O	24/8	GPIO	Touch4: Touch Input Channel 4;
33	PA3	I/O	24/8	GPIO	Touch3: Touch Input Channel 3; UART2RXA: Uart2 Data In(A);
34	PA2	I/O	24/8	GPIO	Touch2: Touch Input Channel 2; UART2TXA: Uart2 Data Out(A); CAP3: Timer3 Capture;
35	PA1	I/O	24/8	GPIO	Touch1: Touch Input Channel 1; ADC0: ADC Input Channel 0; UART1RXC: Uart1 Data In(C); PWMCH0L: Motor PWM Channel0(L);
36	PA0	I/O	24/8	GPIO	Touch0: Touch Input Channel 0; CLKOUT0: UART1TXC: Uart1 Data Out(C); PWMCH0H: Motor PWM Channel0(H);
37	PC7	I/O	/	GPIO	
38	PC6	I/O	/	GPIO	ADC11: ADC Input Channel 11;
39	DACL	O	/		DAC Left Channel
40	DACR	O	/		DACRight Channel
41	PB11	I/O	/	GPIO	SDPG:SDC Power Gate;
42	PB10	I/O	24/8	GPIO	SD0CMB: SD0 Command(B); SPI2DOA: SPI2 Data Out(A); SD1DAT3B: SD1 Data3(B); ADC9: ADC Input Channel 9; UART2RXC: Uart2 Data In(C); PWMCH3L: Motor PWM Channel3(L);

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43	PB9	I/O	24/8	GPIO	SD0 Clock(B); SPI2CLKA: SPI2 Clk(A); SD1DAT2B: SD1 Data2(B); CAP0: Timer0 Capture; UART2TXC: Uart2 Data Out(C); PWMCH3H: Motor PWM Channel3(H);
44	PB8	I/O	24/8	GPIO	SD0DAT0B: SD0 Data0(B); SPI2_DIA: SPI2 Data In(A); SD1DAT1B: SD1 Data1(B); ADC8: ADC Input Channel 8; CLKOUT1: Clk Out1;
45	PB7	I/O	24/8	GPIO	
46	PB6	I/O	24/8	GPIO	SD1CLKB: SD1 Clock(B); SD0DAT1B: SD0 Data1(B); IIC_SDA_C: IIC SDA(C); TMR3: Timer3 Clock Input; UART0RXB: Uart0 Data In(B); PWMCH2L: Motor PWM Channel2 (L);
47	PB5	I/O	/	GPIO (High Voltage Resistance)	SD1CMDDB: SD1 Command(B); SD0DAT2B: SD1 Data2(B); PWM3: Timer3 PWM Output; CAP1: Timer1 Capture; UART0TXC: Uart0 Data Out(C); UART0RXC: Uart0 Data In(C);
48	PB4	I/O	24/8	GPIO	SD1DAT0B: SD1 Data0(B); SD0DAT3B: SD0 Data3(B); IIC_SCL_C: IIC SCL(C); ADC7: ADC Input Channel 7; UART0TXB: Uart0 Data Out(B); LVD: Low Voltage Detect Input; PWMCH2H: Motor PWM Channel2 (H);

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2、Electrical Characteristics

2.1 Absolute Maximum Ratings

Table 2-1

Symbol	Parameter	Min	Max	Unit
Tamb	Operating Temperature	-40	+85	°C
Tstg	Storage temperature	-65	+150	°C
VBAT	Supply Voltage	-0.3	4.5	V
LDO_IN	Charger Voltage	-0.3	6	V
V _{3.3IO}	3.3V IO Input Voltage	-0.3	3.6	V

Note : The chip can be damaged by any stress in excess of the absolute maximum ratings listed below

2.2 PMU Characteristics

Table 2-2

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
VBAT	Voltage Input	2.2	3.7	4.5	V	
LDO_IN	Charger Voltage	4.5	5.0	5.5	V	
V _{3.3}	Voltage output	2.2	3.0	3.4	V	VBAT = 5V, 100mA loading
V _{BT_AVDD}	Voltage output	1.2	1.25	1.35	V	VBAT=5V, 100mA 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~PA15 PB1, PB3, PB4, PB6~PB10 PC0~PC5		8mA	24mA	10K	10K	1、PB1 default pull up 2、USBDM & USBDP default pull down 3、PB0, PB2, PB5 can pull-up resistance to 5V 4、internal pull-up/pull-down resistance accuracy ±20%
PB11 PC7	Output0	8mA	24mA	10K	10K	
	Output1	8mA	64mA			
PB0, PB2, PB5		8mA	—	10K	10K	
PR0-PR1		8mA	—	10K	10K	
USBDP		4mA	—	1.5K	15K	
USBDM		4mA	—	180K	15K	

2.5 BT Characteristics

2.5.1 Transmitter

Basic Data Rate

Table 2-5

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 2-6**

Parameter		Min	Typ	Max	Unit	Test Conditions
Relative Power			-1		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	

2.5.2 Receiver

Basic Data Rate**Table 2-7**

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	

Enhanced Data Rate**Table 2-8**

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	

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3、Package Information

3.1 LQFP48(7mm*7mm)

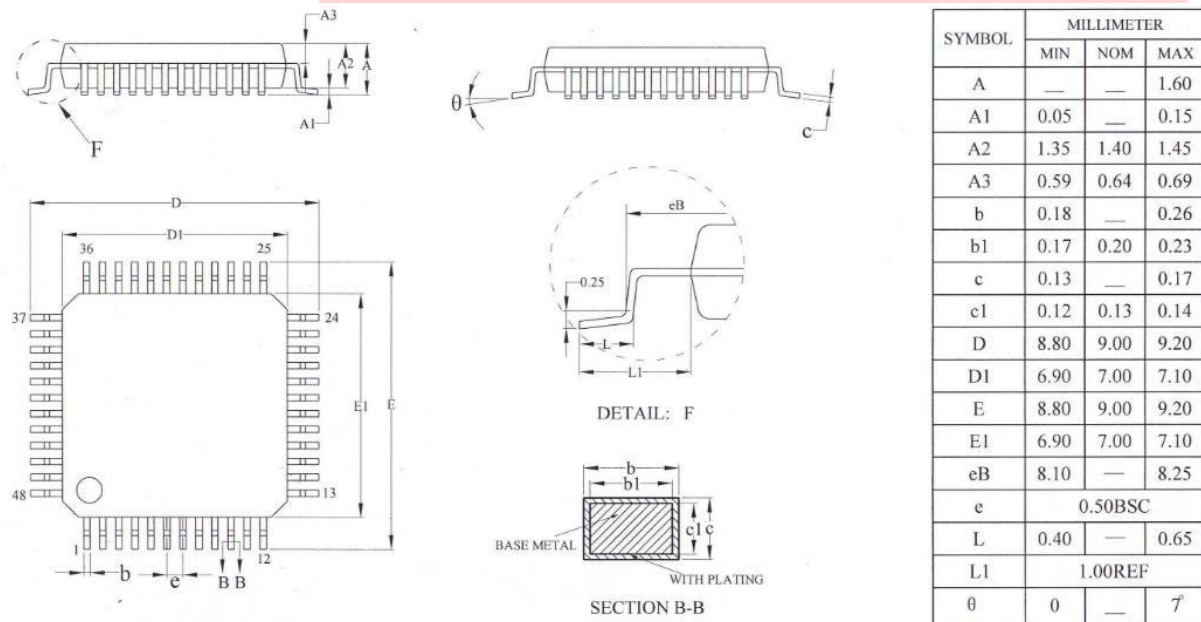


Figure 3-1. AC6351D_LQFP48 Package

4、Revision History

Date	Revision	Description
2020.08.11	V1.0	Initial Release
2022.07.19	V1.1	Update Bluetooth Feature