AC6376F Datasheet

Zhuhai Jieli Technology Co.,LTD

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AC6376F Features

CPU

- 32-bit DSP supports hardware Float Point Unit(FPU)
- Up to 160MHz programmable processor
- 64Vectored interrupts
- 4 Levels interrupt priority

Bluetooth

- Compliant with Bluetooth V5.1+BR+EDR+BLE specification
- Meet class1 class2 and class3 transmitting power requirement
- Support GFSK and π/4 DQPSK all packet types
- Provides maximum+8dbm transmitting power
- receiver with -94dBm sensitivity
- Fast AGC for enhanced dynamic range
- Supports A2DP\AVCTP\AVDTP\AVRCP\HFP\SPP\ SMP\ATT\GAP&GATT\RFCCOMM\SDP\ L2CAP profile

Peripherals

- One full speed USB 2.0 OTG controller
- Six multi-function 32-bit timers, support capture and PWM mode
- Three full-duplex basic UART, support DMA mode
- One hardware IIC interface supports host and device mode
- Two Built-in low power Cap Sense Keys
- Built-in Cap Sense Key controller
- 10-bit ADC for analog sampling
- External wake up/interrupt on all GPIOs

PMU

- Low voltage LDO and DC-DC for internal digital and analog circuit supply
- 2uA current consumption in the soft-off mode
- Built-in LDO and DC-DC for the core, I/O, Bluetooth and flash
- VBAT is 2.0V to 4.5V
- VDDIO is 2.0V to 3.4V

Packages

- QFN32(4mm*4mm)

Temperature

- Operating temperature: -40℃to+85℃
- Storage temperature: -65℃ to +150℃

Applications

- Bluetooth IOT

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1、Pin Definition

1.1 Pin Assignment

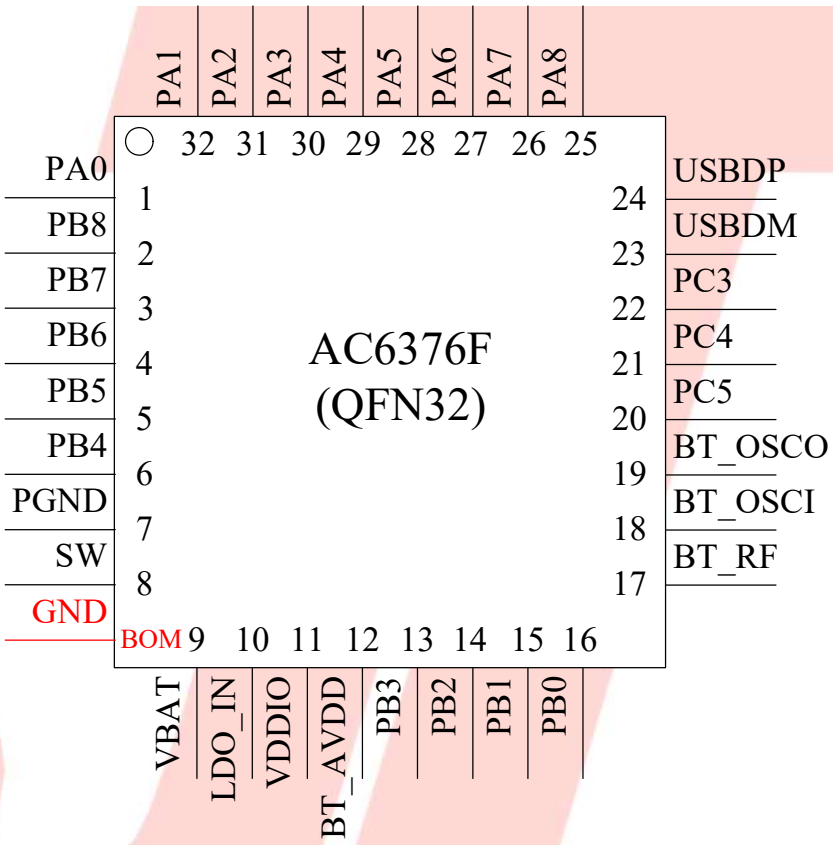

Figure 1-1 AC6376F Package Diagram

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1.2 Pin Description

Table 1-1 AC6376F Pin Description

PIN NO.	Name	I/O Type	Drive (mA)	Function	Other Function
1	PA0	I/O	8	GPIO (High Voltage Input)	
2	PB8	I/O	8/24	GPIO	UART0RXB: Uart0 Data Input(B); CAP4: Timer4 Capture;
3	PB7	I/O	8/24	GPIO	UART0TXB: Uart0 Data Output(B); SPI1DOA: SPI1 Data Out(A); Q-decoder1;
4	PB6	I/O	8/24	GPIO	UART1RXA: Uart1 Data Input(A); SPI1CLKA: SPI1 Clk(A); PWM2: Timer2 PWM Output; ADC9: ADC Input Channel 9; Touch7: Touch Input Channel 7; Q-decoder0;
5	PB5	I/O	8/24	GPIO	SPI1DIA: SPI1 Data Input(A); ADC8: ADC Input Channel 8; UART1TXA: Uart1 Data Output(A);
6	PB4	I/O	8/24	GPIO	ADC12: ADC Input Channel 12; TMR2: Timer2 Clock Input;
7	PGND	P	/		DCDC Ground
8	SW	P	/	DCDC output	DCDC switch output, connected to inductor
9	VBAT	P	/		connect to battery
10	LDO_IN	P	/		Charge Power Input; UART0TXC: Uart0 Data Output(C); UART0RXC: Uart0 Data Input(C); PWM3: Timer3 PWM Output; CAP1: Timer1 Capture;
11	VDDIO	P	/		IO Power 3.3v
12	BT_AVDD	P	/		BT Power
13	PB3	I/O	8/24	GPIO	
14	PB2	I/O	8/24	GPIO	SPI2DOC: SPI2 Data Out(C); ADC7: ADC Input Channel 7; UART2RXC: Uart2 Data Input(C); CAP5: Timer5 Capture; LP_TH1: Low Power Touch Channel 1;

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15	PB1	I/O	8/24	GPIO (pull up)	Long Press Reset; UART2TXC: Uart2 Data Output(C); ADC6: ADC Input Channel 6; LP_TH0: Low Power Touch Channel 0;
16	PB0	I/O	8	GPIO (High Voltage Input)	SPI2DIC: SPI2 Data Input(C);
17	BT_RF	/	/		BT Antenna
18	BT_OSCI	I	/		BTOSC In
19	BT_OSCO	O	/		BTOSC Out
20	PC5	I/O	8/24	GPIO	UART2RXD: Uart2 Data Input(D); SPI1DOB: SPI1 Data Out(B); IIC_SDA_B: IIC SDA(B); ADC5: ADC Input Channel 5;
21	PC4	I/O	8/24	GPIO	UART2TXD: Uart2 Data Output(D); SPI1CLKB: SPI1 Clk(B); IIC_SCL_B: IIC SCL(B); ADC4: ADC Input Channel 4; PWM4: Timer4 PWM Output;
22	PC3	I/O	8/24	GPIO	UART0RXD: Uart0 Data Input(D);
23	USBDM	I/O	4	USB Negative Data (pull down)	UART1RXD: Uart1 Data Input(D); SPI2DOB: SPI2 Data Out(B); IIC_SDA_A: IIC SDA(A); ADC11: ADC Input Channel 11;
24	USBDP	I/O	4	USB Positive Data (pull down)	UART1TXD: Uart1 Data Output(D); SPI2CLKB: SPI2 Clk(B); IIC_SCL_A: IIC SCL(A); ADC10: ADC Input Channel 10;
25	PA8	I/O	8/24	GPIO	ADC3: ADC Input Channel 3; UART2RXB: Uart2 Data Input(B); Touch5: Touch Input Channel 5;
26	PA7	I/O	8/24	GPIO	UART2TXB: Uart2 Data Output(B); Touch4: Touch Input Channel 4;
27	PA6	I/O	8/24	GPIO	SPI2DOA: SPI2 Data Out(A); IIC_SDA_D: IIC SDA(D); ADC2: ADC Input Channel 2; UART0RXA: Uart0 Data Input(A); CAP0: Timer0 Capture; Touch3: Touch Input Channel 3;

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28	PA5	I/O	8/24	GPIO	SPI2CLKA: SPI2 Clk(A); IIC_SCL_D: IIC SCL(D); ADC1: ADC Input Channel 1; UART0TXA: Uart0 Data Output(A); PWM5: Timer5 PWM Output; Touch2: Touch Input Channel 2;
29	PA4	I/O	8/24	GPIO	SPI2DIA: SPI2 Data Input(A); UART2RXA: Uart2 Data Input(A); CAP2: Timer2 Capture; OSC32KI: 32KHz OSC In; Touch1: Touch Input Channel 1;
30	PA3	I/O	8/24	GPIO	UART2TXA: Uart2 Data Output(A); ADC0: ADC Input Channel 0; PWM1: Timer1 PWM Output;; OSC32KO: 32KHz OSC Out; Touch0: Touch Input Channel 0;
31	PA2	I/O	8/24	GPIO	SPI1CLKC: SPI1 Clk(C); UART1RXC: Uart1 Data Input(C); CAP3: Timer3 Capture;
32	PA1	I/O	8/24	GPIO	SPI1DIC: SPI1 Data Input(C); UART1TXC: Uart1 Data Output(C); PWM0: Timer0 PWM Output;
Substrate		P	/	GND	-

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2、Electrical Characteristics

2.1 Absolute Maximum Ratings

Table 2-1

Symbol	Parameter	Min	Max	Unit
Tamb	Ambient Temperature	-40	+85	℃
Tstg	Storage temperature	-65	+150	℃
VBAT	Supply Voltage	-0.3	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 Recommended Operating Conditions

Table 2-2

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
VBAT	Voltage Input	2.0	3.7	4.5	V	
LDO_IN	Charger Voltage	4.5	5.0	5.5	V	
$V_{3.3}$	Voltage output	2.0	3.0	3.4	V	VBAT = 4.2V, 100mA loading
V_{BT_AVDD}	Voltage output	1.2	1.25	1.35	V	VBAT=4.2V, 100mA 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
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	$V_{BAT}<V_{Trikl}$

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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**
PA1~PA8, PB1~PB8, PC3~PC5,	8mA	24mA	10K	10K	1、PB1 default pull up 2、USBDM & USBDP default pull down 3、internal pull-up/pull-down resistance | accuracy ±20%
PA0,PB0	8mA	8mA	10K	10K	
USBDP	4mA	_	1.5K	15K	
USBDM	4mA	_	180K	15K	

2.6 BT Characteristics

2.6.1 Transmitter

Basic Data Rate **Table 2-6**

Parameter		**Min**	**Typ**	**Max**	**Unit**	**Test Conditions**
RF Transmit Power			6	8	dBm	25℃, Power Supply VBAT=5V 2441MHz
RF Power Control Range			20		dB	
20dB Bandwidth			950		KHz	
Adjacent Channel Transmit Power	+2MHz		-40		dBm	
	-2MHz		-38		dBm	
	+3MHz		-44		dBm	
	-3MHz		-35		dBm	

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Enhanced Data Rate **Table 2-7**

Parameter		Min	Typ	Max	Unit	Test Conditions
Relative Power			-1		dB	25℃, Power Supply VBAT=5V 2441MHz
π/4 DQPSK Modulation Accuracy	DEVM RMS		6		%	
	DEVM 99%		10		%	
	DEVM Peak		15		%	
Adjacent Channel Transmit Power	+2MHz		-40		dBm	
	-2MHz		-38		dBm	
	+3MHz		-44		dBm	
	-3MHz		-35		dBm	

2.6.2 Receiver

Basic Data Rate **Table 2-8**

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity			-94		dBm	25℃, Power Supply VBAT=5V 2441MHz
Co-channel Interference Rejection			-13		dB	
Adjacent Channel Interference Rejection	+1MHz		+5		dB	
	-1MHz		+2		dB	
	+2MHz		+37		dB	
	-2MHz		+36		dB	
	+3MHz		+40		dB	
	-3MHz		+35		dB	

Enhanced Data Rate **Table 2-9**

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity			-94		dBm	25℃, Power Supply VBAT=5V 2441MHz
Co-channel Interference Rejection			-13		dB	
Adjacent Channel Interference Rejection	+1MHz		+5		dB	
	-1MHz		+2		dB	
	+2MHz		+37		dB	
	-2MHz		+36		dB	
	+3MHz		+40		dB	
	-3MHz		+35		dB	

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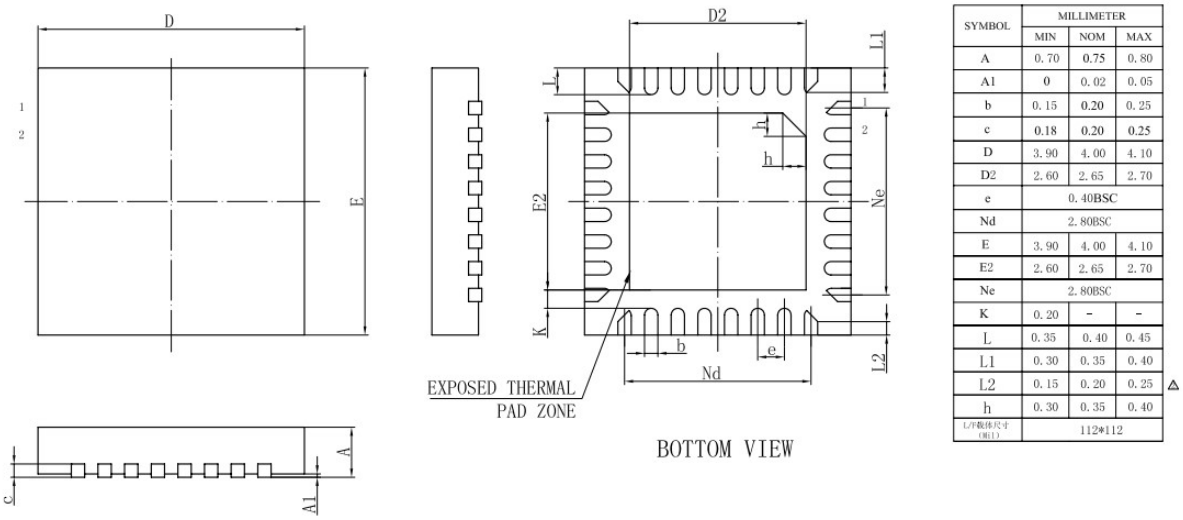
3、 Package Information

3.1 QFN32(4mm*4mm)



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0	0.02	0.05
b	0.15	0.20	0.25
c	0.18	0.20	0.25
D	3.90	4.00	4.10
D2	2.60	2.65	2.70
e	0.40BSC		
Nd	2.80BSC		
E	3.90	4.00	4.10
E2	2.60	2.65	2.70
Ne	2.80BSC		
K	0.20	-	-
L	0.35	0.40	0.45
L1	0.30	0.35	0.40
L2	0.15	0.20	0.25
h	0.30	0.35	0.40
L/F载体尺寸 (WH)	112*112		

Figure 3-1 AC6376F Package

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4、Revision History

Date	Revision	Description
2020.11.04	V1.0	Initial Release

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