AC6366C Datasheet

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Version: V1.2

Date: 2024.03.06

AC6366C 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 V5.4+BR+EDR+BLE specification
- Meet class1 class2 and class3 transmitting power requirement
- Support GFSK and π/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\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, UART0 and UART1 supports DMA mode
- Two SPI interface supports host and device mode
- One hardware IIC interface supports host and device mode
- 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 2.0V to 4.5V
- VDDIO is 2.0V to 3.4V

Temperature

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

Packages

- QFN32(4mm*4mm)

Applications

- Bluetooth   IOT

1、Pin Definition

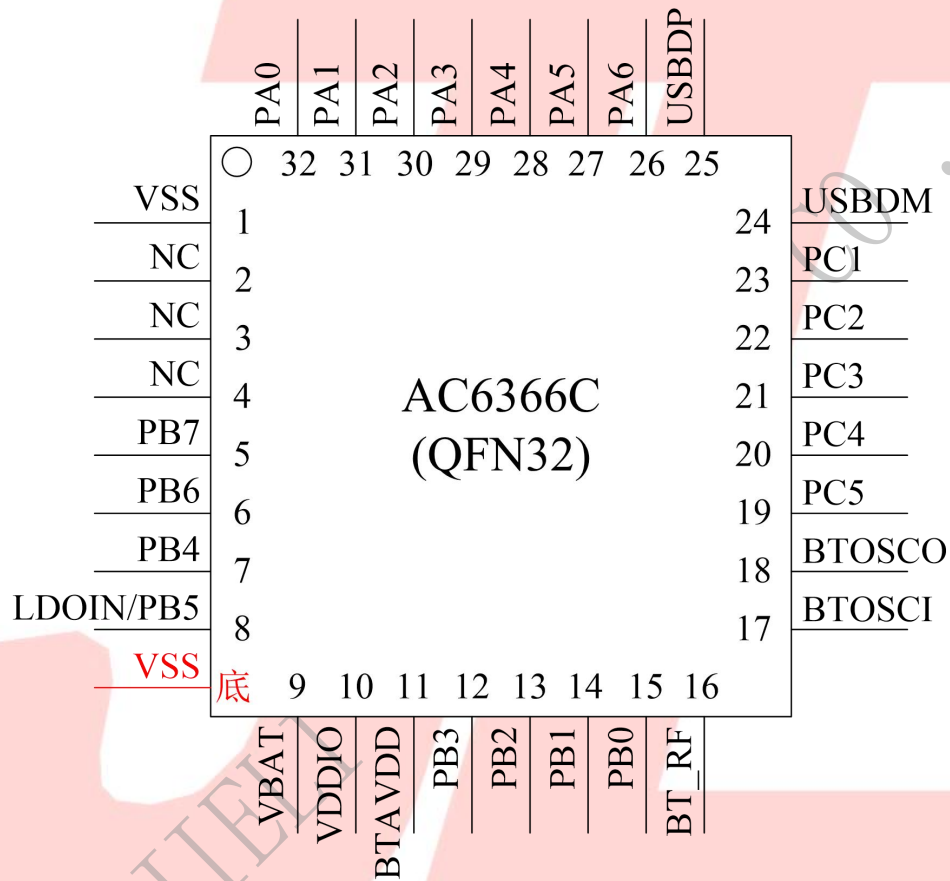## 1.1 Pin Assignment

Figure 1-1 AC6366C_QFN32 Package Diagram

1.2 Pin Description

Table 1-1   AC6366C_QFN32 Pin Description

PIN NO.	Name	I/O Type	Drive (mA)	Function	Other Function
1	VSS	P	/		Ground
2	NC		/		
3	NC	O	/		
4	NC	O	/		
5	PB7	I/O	24/8	GPIO	SPI2DOA: SPI2 Data Out(A) IIC_SDA_C: IIC DAT(C) ADC9: ADC Input Channel 9 PWM5: Timer5 PWM Output UART1RXA: Uart1 Data In(A)
6	PB6	I/O	24/8	GPIO	SPI2CLKA: SPI2 Data Out(A) IIC_SCL_C: IIC SCL(C) ADC8: ADC Input Channel 8 TMR3: Timer3 Clock Input UART1TXA: Uart1 Data Out(A)
7	PB4	I/O	24/8	GPIO	ADC7: ADC Input Channel 7 CLKOUT1 UART2TXC: Uart2 Data Out(C) UART2RXC: Uart2 Data In(C)
8	PB5	I/O	8	GPIO (High Voltage Resistance)	PWM3: Timer3 PWM Output SPI2_DIA: SPI2 Data In(A) CAP1: Timer1 Capture UART0TXC: Uart0 Data Out(C) UART0RXC: Uart0 Data In(C)
	LDOIN	P	/		Battery Charger In
9	VBAT	P	/		Battery Power Supply
10	VDDIO	P	/		IO Power 3.3v
11	BTAVDD	P	/		BT Power
12	PB3	I/O	/	GPIO	SD0DAT_D: SD0 Data(D); ADC6: ADC Input Channel 6 PWM2: Timer2 PWM Output UART2RXB: Uart2 Data In(B)

13	PB2	I/O	8	GPIO (High Voltage Resistance)	SD0CMD_D: SD0 Command(D)
					SPI1DIA: SPI1 Data In(A)
					CAP0: Timer0 Capture
					UART2TXB: Uart2 Data Out (B)
14	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
					UART0RXB: Uart0 Data In(B)
15	PB0	I/O	8	GPIO (High Voltage Resistance)	SD0CLK_D:SD0Clock(D)
					SPI1CLKA:SPI1 Clock(A)
					UART0TXB:Uart1 Data Out(B)
					TMR5:Timer5 Clock Input
16	BT_RF	/			BT Antenna
17	BTOSCI	I			BT OSC In
18	BTOSCO	O			BT OSC Out
19	PC5	I/O	24/8	GPIO	SD0CLK_AE: SD0 Clock(AE)
					SPI1DOB: SPI1 Data Out(B)
					IIC_SDA_B: IIC SDA(B)
					ADC12: ADC Input Channel 12
					TMR1: Timer1 Clock Input
					UART2RXD: Uart2 Data In(D)
20	PC4	I/O	24/8	GPIO	SD0CMD_A: SD0 Command(A)
					SPI1CLKB: SPI1 Clock(B)
					IIC_SCL_B: IIC SCL(B)
					ADC11: ADC Input Channel 11
					PWM1: Timer1 PWM Output
					UART2TXD: Uart2 Data Out (D)
21	PC3	I/O	24/8	GPIO	SD0DAT_A: SD0 Data(A)
					SPI1DIB: SPI1 Data In(B)
					CAP2: Timer2 Capture
					UART0TXD: Uart0 Data Out (D)
					UART0RXD: Uart0 Data In(D)
22	PC2	I/O	24/8	GPIO	ADC10: ADC Input Channel 10
					CAP5: Timer5 Capture
					UART1RXB: Uart1 Data In(B)
23	PC1	I/O	24/8	GPIO	TMR0: Timer0 Clock Input
					UART1TXB: Uart1 Data Out(B)
24	USBDM	I/O	4	USB Negative Data (pull down)	IIC_SDA_A: IIC SDA(A)
					SPI2_DOB: SPI2 Data Out(B)
					ADC14: ADC Input Channel 14
					UART1RXD: Uart1 Data In(D)

25	USBDP	I/O	4	USB Positive Data (pull down)	IIC_SCL_A: IIC SCL(A) SPI2_CLKB: SPI2 Clock(B) ADC13: ADC Input Channel 13 UART1TXD: Uart1 Data Output(D)
26	PA6	I/O	24/8	GPIO	IIC_SDA_D: IIC SDA(D) ADC4: ADC Input Channel 4 CAP4: Timer4 Capture UART0RXA: Uart0 Data In(A)
27	PA5	I/O	24/8	GPIO	IIC_SCL_D: IIC SCL(D) PWM0: Timer0 PWM Output UART0TXA: Uart0 Data Output(A)
28	PA4	I/O	24/8	GPIO	SD0CMD_CE: SD0 Command(CE) UART1_RTS: Uart1 Request to send ADC3: ADC Input Channel 3 TMR4: Timer4 Clock Input UART2RXA: Uart2 Data In(A)
29	PA3	I/O	24/8	GPIO	SD0DAT_C: SD0 Data(C) UART1_CTS: Uart1 Clear to send ADC2: ADC Input Channel 3 PWM5: Timer5 PWM Output UART2TXA: Uart1 Data Output(D)
30	PA2	I/O	24/8	GPIO	SD0CLK_C: SD0 Clock(C) CAP3: Timer3 Capture
31	PA1	I	24/8	GPIO	ADC1: ADC Input Channel 1 PWM4: Timer4 PWM Output UART1RXC: Uart0 Data In(C)
32	PA0	I/O	/	GPIO	SDPG: SD Power Supply ADC0: ADC Input Channel 0 CLKOUT0 UART1TXC: Uart1 Data Output(C)
	Substrate	VSS	-	Substrate	

2、 Electrical Characteristics

2.1 Absolute Maximum Ratings

Table 2-1

Symbol	Parameter	Min	Max	Unit
Topt	Operating temperature	-40	+85	°C
Tstg	Storage temperature	-65	+150	°C
VBAT	Supply Voltage	-0.3	4.5	V
LDOIN	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	
LDOIN	Charger Voltage	4.5	5	5.5	V	
V_{VDDIO}	Voltage output	2.0	3.0	3.4	V	VBAT = 4.2V, 100mA loading
V_{BT_AVDD}	Voltage output		1.3		V	VBAT=4.2V, 100mA loading
I_{vddio}	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		300	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 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~PA6 PB1,PB4,PB6,PB7 PC1~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%
PA0 PB3	Output 0	8mA	24mA	10K	10K	
	Output 1	8mA	64mA			
PB0, PB2, PB5		8mA	–	10K	10K	
USBDP		4mA	–	1.5K	15K	
USBDM		4mA	–	180K	15K	

2.6 BT Characteristics

2.6.1 Transmitter

Basic Rate   Table 2-6

Parameter		Min	Typ	Max	Unit	Test Conditions
RF Transmit Power		-	4	6	dBm	25°C, Power Supply VBAT=3.7V 2441MHz DH5
RF Power Control Range		-	20	-	dB	
20dB Bandwidth		-	950	-	KHz	
In-band spurious Emissions (BQB Test Mode RF_Tx Power=4dBm)	$F=F_0\pm1MHz$	-	-20	-	dBm	
	$F=F_0\pm2MHz$	-	-45	-	dBm	
	$F=F_0\pm3MHz$	-	-35	-	dBm	
	$F=F_0\pm>3MHz$	-	-45	-	dBm	

Enhanced Data Rate   Table 2-7

Parameter		Min	Typ	Max	Unit	Test Conditions
Relative Power		-	-1	-	dB	25°C, Power Supply VBAT=3.7V 2441MHz 2DH5
π/4 DQPSK Modulation Accuracy	DEVM RMS	-	4	-	%	
	DEVM 99%	-	10	-	%	
	DEVM Peak	-	7	-	%	
In-band spurious Emissions (BQB Test Mode RF_Tx Power=4dBm)	$F=F_0\pm1MHz$	-	-4	-	dBm	
	$F=F_0\pm2MHz$	-	-30	-	dBm	
	$F=F_0\pm3MHz$	-	-30	-	dBm	
	$F=F_0\pm>3MHz$	-	-37	-	dBm	

2.6.2 Receiver

Basic Rate   Table 2-8

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity		-	-88	-	dBm	
Co-channel Interference Rejection		-	6	-	dB	25°C,
Adjacent Channel selectivity C/I	+1MHz	-	-6	-	dB	Power Supply
	-1MHz	-	-8	-	dB	
	+2MHz	-	-17	-	dB	VBAT=3.7V
	-2MHz	-	-21	-	dB	2441MHz
	+3MHz	-	-15	-	dB	DH5
	-3MHz	-	-31	-	dB	

Enhanced Data Rate   Table 2-9

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity		-	-90	-	dBm	
Co-channel Interference Rejection		-	9	-	dB	25°C,
Adjacent Channel selectivity C/I	+1MHz	-	-10	-	dB	Power Supply
	-1MHz	-	-13	-	dB	
	+2MHz	-	-11	-	dB	VBAT=3.7V
	-2MHz	-	-21	-	dB	2441MHz
	+3MHz	-	-13	-	dB	2DH5
	-3MHz	-	-40	-	dB	

2.6.3 BLE

1M Data Rate   **Table 2-10**

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity		-	-91	-	dBm	
RF Transmit Power		-	6	-	dBm	
In-band Spurious Emission	|M-N|=2MHz	-	-41	-	dBm	25℃
	|M-N|≥3MHz	-	-40	-	dBm	Power Supply
Modulation Characteristics	Δf1 avg	-	250	-	KHz	VBAT=3.7V
	Δf2 99%	-	210	-	KHz	
	Δf1avg/Δf2avg	-	0.9	-	/	2440MHz
Carrier Frequency Offset		-50	-	+50	KHz	
Frequency Drift		-25	-	+25	KHz	
Frequency Drift Rate		-5	-	+5	KHz/50us	

2M Data Rate   **Table 2-11**

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity		-	-89	-	dBm	
RF Transmit Power		-	6	-	dBm	
In-band Spurious Emission	|M-N|=4MHz	-	-45	-	dBm	25℃
	|M-N|=5MHz	-	-45	-	dBm	Power Supply
	|M-N|≥6MHz	-	-45	-	dBm	
Modulation Characteristics	Δf1 avg	-	500	-	KHz	VBAT=3.7V
	Δf2 99%	-	430	-	KHz	
	Δf1avg/Δf2avg	-	0.9	-	/	2440MHz
Carrier Frequency Offset		-50	-	+50	KHz	
Frequency Drift		-25	-	+25	KHz	
Frequency Drift Rate		-5	-	+5	KHz/50us	

Long Range   **Table 2-12**

Parameter	Min	Typ	Max	Unit	Test Conditions
Sensitivity LE 125K(S8)	-	-99	-	dBm	VBAT=3.7V,25℃
Sensitivity LE 500K(S2)	-	-95	-	dBm	2440MHz

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(MIL)	112*112		
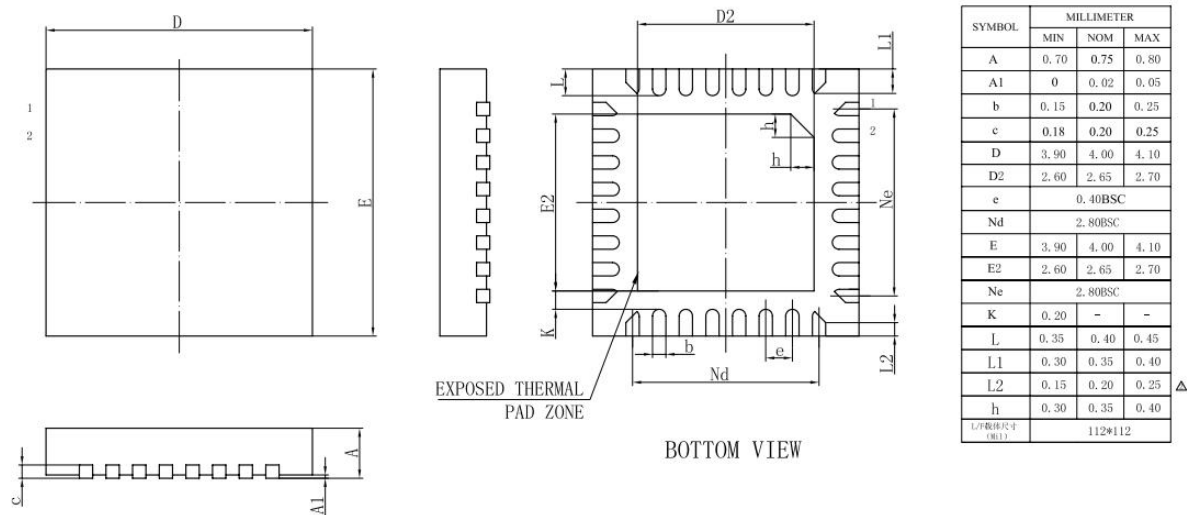
Figure 3-1   AC6366C_QFN32 Package

4、Revision History

Date	Revision	Description
2020.08.26	V1.0	Initial Release
2022.07.19	V1.1	Update Bluetooth Feature
2024.03.06	V1.2	Update Bluetooth Feature, Add BLE Parameter