AB5636D

Audio Player Microcontroller

Versions: 0.0.5
2024.12.24

Declaration

Bluetrum reserves the right to make changes without further notice to any products herein to improve reliability, function or design.

For further information on the technology, product and business term, please contact Bluetrum Company.
For sales or technical support, please send email to the address:
Sales: sales@bluetrum.com
Technical: project@bluetrum.com

Revision History

Date	Version	Comments	Revised by
2022-07-29	0.0.1	First draft	Leo
2022-11-17	0.0.2	Update QDID	Leo
2023-01-05	0.0.3	Update Product Features	Leo
2023-09-05	0.0.4	Update to BT5.4	Leo
2024-12-24	0.0.5	Update to BT6.0	Leo

Table of Contents

1 Product Features

CPU and Flexible IO

- High performance 32bit RISC-V processor Core with DSP instruction
- RISC-V typical speed: 125MHz
- Program memory: internal 8M bit flash
- Internal 256KB RAM for data and program
- Flexible GPIO pins with Programmable pull-up and pull-down resistors
- Support GPIO wakeup or interrupt;

Bluetooth Radio

- Compliant to Bluetooth 6.0 and BLE specification

  QDID: Q309899 (Controller)

  QDID: Q304434 (Host)
- TX output power MAX +9dBm;
- RX Sensitivity with -94dBm @2M EDR;
- Support TWS communication with balance-efficiency Power consumption;
- Support TWS Master-slave switch;

Audio Interface

- High performance mono DAC with 98.8dB SNR, support single end mode or differential mode;
- High performance stereo ADC with 90dB SNR;
- One channel MIC amplifier input;
- Support flexible audio EQ adjust;
- Support Sample rate 8, 11.025, 12, 16, 22.05, 32, 44.1 and 48KHz;
- Four channels Stereo Analog MUX;

Peripheral and Interfaces

- Support AAC, mSBC high quality decode;
- Support Low power Touch Key;
- Support Low power enter ear detect;
- Three 32-bit timers;
- Three multi-function 32-bit timers, support Capture and PWM mode;
- WatchDog;
- Three full-duplex UART;
- Two SPI;
- IR controller;
- SD Card Host controller;
- Audio interface IIS Master/Slave;
- Full speed USB 2.0 HOST/DEVICE controller;
- Sixteen Channels 10-bit SARADC;
- Integrate IRTC;
- Build in PMU, such as charger/buck/LDO;

Package

- QFN20

Temperature

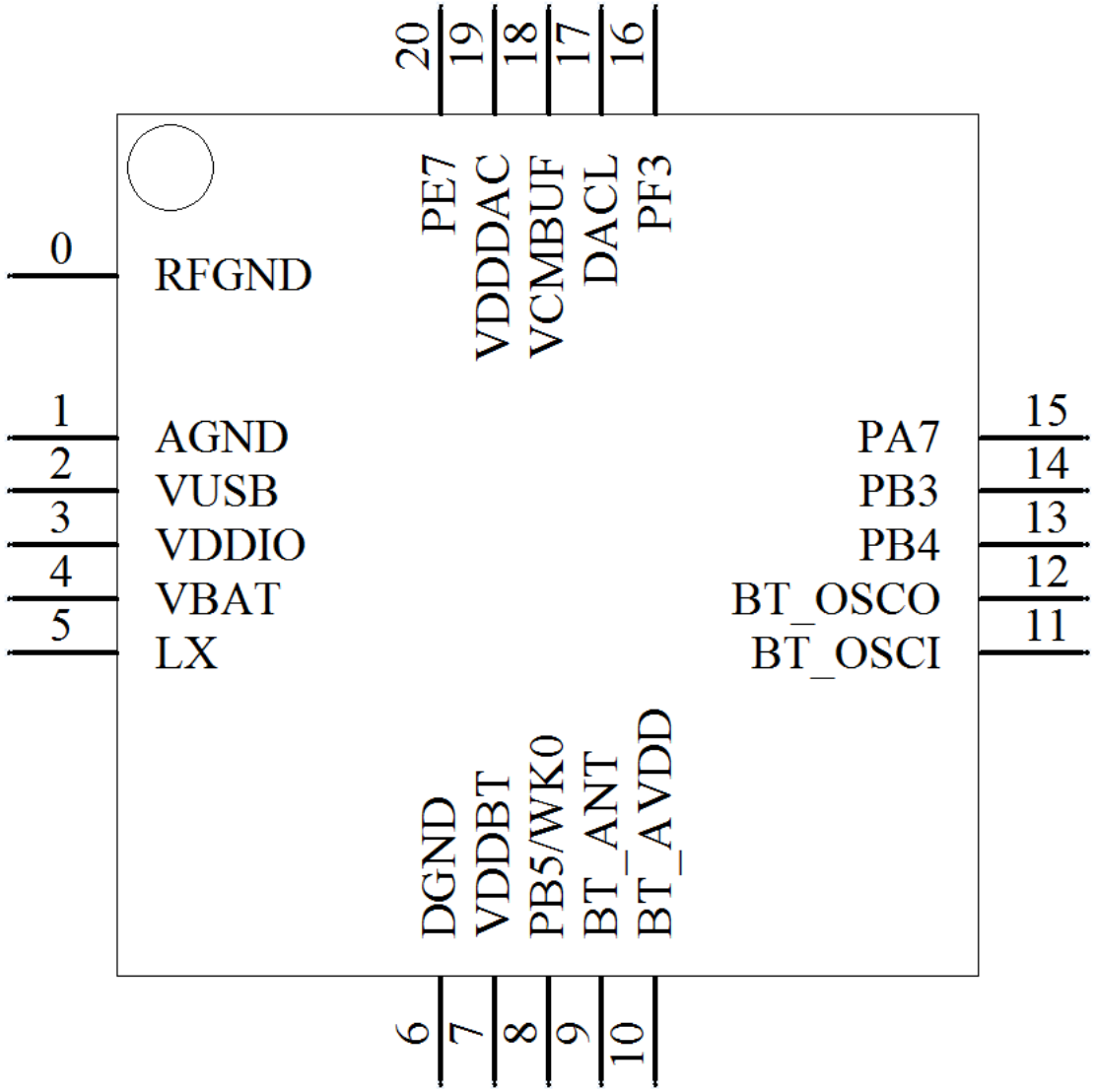
- Operating temperature: -40℃ to +85℃;
- Storage temperature: -65℃ to +150℃;

Supports

- A2DP/AVDTP/AVRCP/RFCOMM/HFP/HSP /SPP/HID

2 Package Definition

2.1 Pin Assignment



2.2 Pin Descriptions

Table 2-1 QFN20 pin description

Pin No.	Name	Type	Function
0	RFGND	GND	BT RF Ground
1	AGND	GND	DAC Ground
2	VUSB	PWR	VUSB power input TX0-G8 TX1-G3 TX2-G3 HSTRX-G11
3	VDDIO	PWR	VDDIO power output
4	VBAT	PWR	VBAT power input
5	LX	PWR	Buck inductor connect pin
6	DGND	GND	Digital Ground
7	VDDBT	PWR	BT power
8	PB5/WKO	I/O	ADC12 PWM2-T3-G2 IISDI-G3 WKO PB5
9	BT_ANT	A	BT ANT
10	BT_AVDD	PWR	BT RF Power
11	BT_OSCI	A	24M OSC input
12	BT_OSCO	A	24M OSC output
13	PB4	I/O	ADC6 SDDAT0-G4 SDDAT0-G6 RX0-G3 HSTRX-G8 PWM1-T3-G2 IIC_DAT-G8 PB4
14	PB3	I/O	ADC5 SDDAT0-G5 SDCMD-G6 TX0-G3 HSTRX-G3 PWM0-T3-G2 IIC_CLK-G8 PB3

15	PA7	I/O	ADC2 AUXR0 SDDAT0-G1/G7 SPI1DO-G2 TX0-G1 TX1-G1 HSTRX-G1 PWM2-T5-G1 IIS_DO-G1 IIC_DAT-G1 PA7
16	PF3	I/O	PWM2-T4-G2 PF3
17	DACL	A	DAC L
18	VCMBUF	A	VCM buffer output
19	VDDDAC	PWR	DAC power
20	PE7	I/O	ADC9 AUXR2 SDDAT0-G3 SPI1DO-G4 TX0-G4 HSTRX-G4 PWM2-T4-G1 IISDO-G2 IISDO-G3 IIC_DAT-G5 TMR4CAP_G1/IR_G8 PE7

Note: I/O: Digital input/output; I : Digital input; A : Analog Pin; PWR: Power Pin; GND: Ground.

3 Characteristics

3.1 PMU Parameters

Table 3-1 PMU voltage input Parameters

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
VUSB	Charger Voltage input	4.6	5.0	5.5	V	
VBAT	Voltage input	3.0	3.7	4.5	V	

Table 3-2 3.3V LDO Parameters

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
VDDIO	3.3V LDO voltage output	-	3.3	-	V	Light Loading condition
△VVDDIO	Output Mismatch 1-sigma	-	43	-	mV	VDDIO=3.3v
ILOAD	Maximum output current	-	-	150	mA	@VBAT=3.6v
ISC	Short Circuit Current Limit	-	-	300	mA	@VBAT=3.8v

Table 3-3 1.2V LDO Parameters

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
VDDBT	1.2V LDO voltage output	-	1.2	-	V	Light Loading condition
△VVDDBT	Output Mismatch 1-sigma	-	16	-	mV	VDDBT=1.2v
ILOAD	Maximum output current	-	-	100	mA	@VBAT=3.0v
ISC	Short Circuit Current Limit	-	-	200	mA	@VBAT=3.8v

Table 3-4 1.1V LDO Parameters

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
VDDCORE	1.1V LDO voltage output	-	1.1	-	V	Light Loading condition
△VVDDCORE	Output Mismatch 1-sigma	-	15	-	mV	VDDCORE=1.1v
ILOAD	Maximum output current	-	-	60	mA	@VBAT=3.6v
ISC	Short Circuit Current Limit	-	-	120	mA	@VBAT=3.8v

3.2 IO Parameters

Table 3-5 I/O Parameters

GPIO—Electrical Characteristics							
Symbol	Description	Related GPIO	Min	Typical	Max	Units	Conditions
VIL	Low-level input voltage		-0.3		1.27	V	VDDIO=3.3V
VIH	High-level input voltage		2.03		3.6	V	VDDIO=3.3V

GPIO—Electrical Characteristics							
Driver Ability 1	Output Driver Ability 1			32		mA	VDDIO=3.3V
Driver Ability 0	Output Driver Ability 0			8		mA	VDDIO=3.3V
RPUP0	Internal pull-up resister 0		8	10	12	KΩ	
RPUP1	Internal pull-up resister 1		0.24	0.3	0.36	KΩ	
RPUP2	Internal pull-up resister 2		160	200	240	KΩ	
RPDN0	Internal pull-down resister 0		8	10	12	KΩ	
RPDN1	Internal pull-down resister 1		0.24	0.3	0.36	KΩ	
RPDN2	Internal pull-down resister 2		160	200	240	KΩ	

3.3 Audio DAC Parameters

Table 3-6 Audio DAC Parameters

Mode	Sym	Characteristics	Min	Typ	Max	Unit	Conditions
Differential Mode	SNR		-	98.8	-	dB	VCM cap=NC VDDDAC cap=1uF with A-wt filter Output -4.2dBV with 10K loading Fin=1KHz
	THD+N		-	-73	-	dB	VCM cap=NC VDDDAC cap=1uF with A-wt filter Output -4.2dBV with 10K loading Fin=1KHz
	Output Range	Maximum output voltage	-	-4.2		dBVrms	32ohm Loading
VCMBUF Mode	SNR			96		dB	VCM cap=NC VDDDAC cap=1uF with A-wt filter Output -1.1dBV with 10K loading Fin=1KHz
	THD+N			-73		dB	VCM cap=NC VDDDAC cap=1uF with A-wt filter Output -1.1dBV with 10K loading Fin=1KHz
	Output Range	Maximum output voltage		-1.1		dBVrms	32ohm Loading
AC Coupling Mode	SNR			95		dB	VCM cap=NC

Mode	Sym	Characteristics	Min	Typ	Max	Unit	Conditions
							VDDDAC cap=1uF with A-wt filter Output -1.1dBV with 10K loading@220uF AC coupling Cap Fin=1KHz
	THD+N			-73		dB	VCM cap=NC VDDDAC cap=1uF with A-wt filter Output -1.1dBV with 10K loading@220uF AC coupling Cap Fin=1KHz
	Output Range	Maximum output voltage		-1.1		dBVrms	32ohm Loading

3.4 Audio ADC Parameters

Table 3-7 Audio ADC Parameters

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
SNR		-	90	-	dB	VCM cap=NC VDDDAC cap=1uF with A-wt filter Input sine amplitude, 850mV RMS Fin=1KHz
THD+N		-	-	-	dB	VCM cap=NC VDDDAC cap=1uF with A-wt filter Input sine amplitude, 850mV RMS Fin=1KHz.
Input Range	Input sine wave peak amplitude	VCM-1.2V	-	VCM+1.2	V	From aux input, aux 0db gain, VCM represent VCM voltage.

3.5 BT Parameters

Table 3-8 BT Parameters

Characteristics	Min	Typical	Max	Unit	Conditions
Transmit Power	-	8	9	dBm	
RMS DEVM	-	5.5	-	%	Maximum TX power

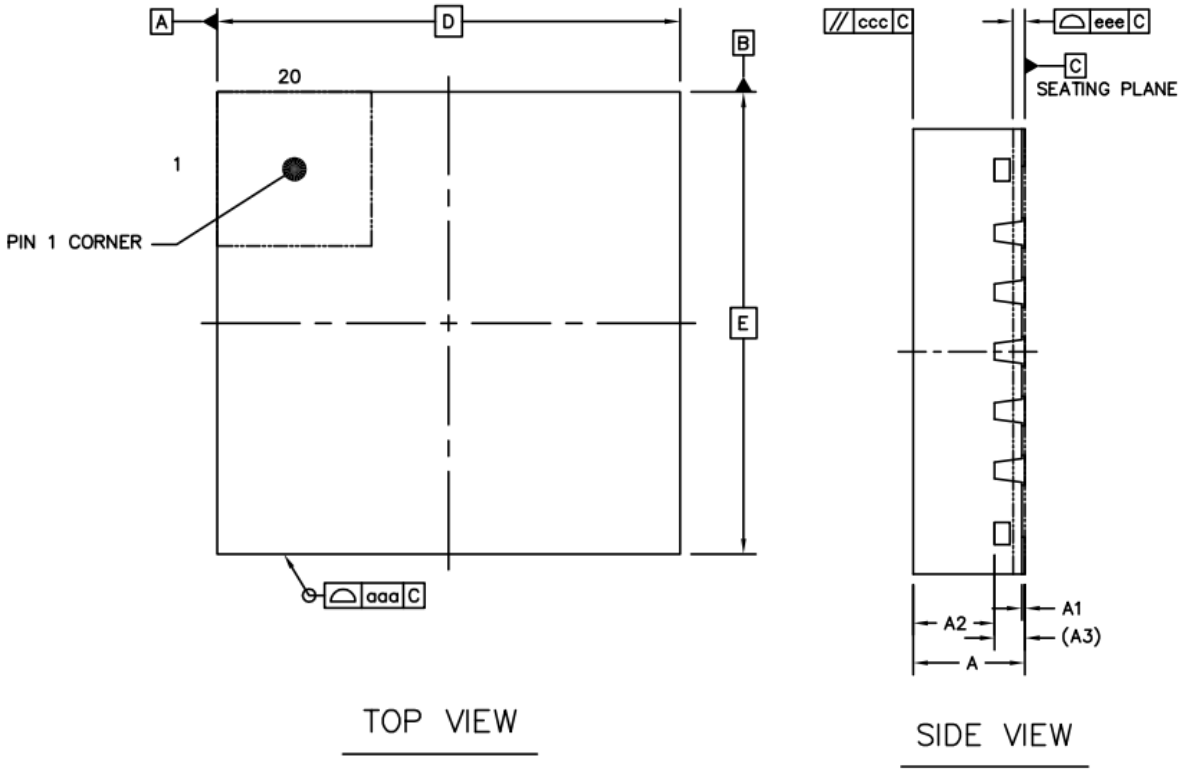
Characteristics	Min	Typical	Max	Unit	Conditions
Peak DEVM	-	12.5		%	2-DH5 packet
EDR Relative Transmit Power		-0.2		dB	
Sensitivity @ Basic Rate		-91.8		dBm	BER=0.1%, using DH5 packet
Sensitivity @ EDR		-94		dBm	BER=0.01%, using 2-DH5 packet

3.6 Current Parameters

Table 3-9 Current Parameters

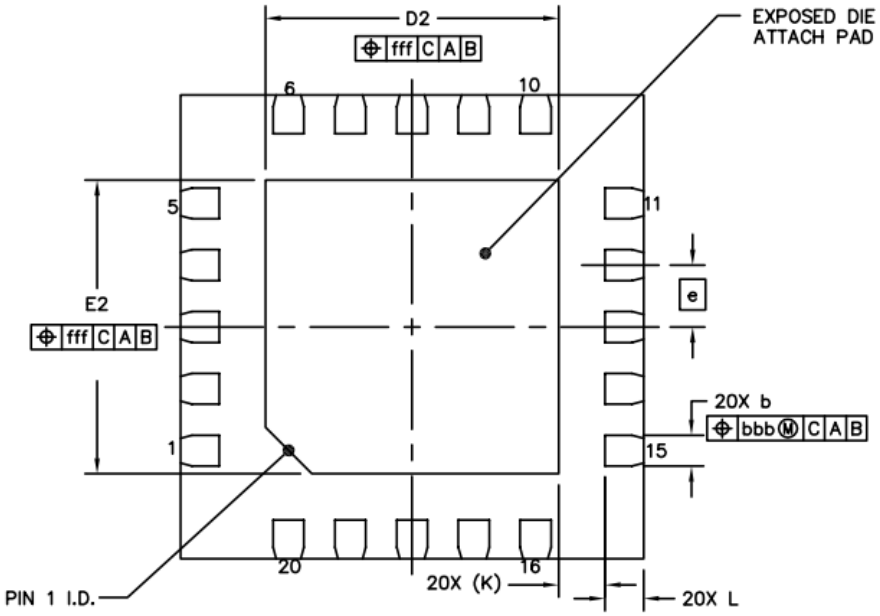
Sym	Characteristics	Min	Typ	Max	Unit	Conditions
IRTC	RTC mode current	-	4	-	uA	4.2V input, room temp.
Sleep	Sleep current	-	500	2000	uA	3.3V input, room temp

4 Package Information



TOP VIEW

SIDE VIEW



BOTTOM VIEW

		SYMBOL	MIN	NOM	MAX
TOTAL THICKNESS		A	0.7	0.75	0.8
STAND OFF		A1	0	0.02	0.05
MOLD THICKNESS		A2	---	0.55	---
L/F THICKNESS		A3		0.203 REF	
LEAD WIDTH		b	0.15	0.2	0.25
BODY SIZE	X	D		3 BSC	
	Y	E		3 BSC	
LEAD PITCH		e		0.4 BSC	
EP SIZE	X	D2	1.8	1.9	2
	Y	E2	1.8	1.9	2
LEAD LENGTH		L	0.15	0.25	0.35
LEAD TIP TO EXPOSED PAD EDGE		K		0.3 REF	
PACKAGE EDGE TOLERANCE		aaa		0.1	
MOLD FLATNESS		ccc		0.1	
COPLANARITY		eee		0.08	
LEAD OFFSET		bbb		0.07	
EXPOSED PAD OFFSET		fff		0.1	

Contact us

Address: 深圳市南山区沙河街道高发社区侨香路 4068 号智慧广场 A 栋 1301-1

E-mail: info@bluetrum.com

Website: www.bluetrum.com