

# AB5632B

Audio Player Microcontroller

Versions: 0.0.6  
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## Declaration

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## Revision History

Date	Version	Comments	Revised by
2021-10-25	0.0.1	First draft	Leo
2022-03-15	0.0.2	Modify the information of Product Features	Leo
2022-05-10	0.0.3	Delete BT RADIO support TWS related content, update the supported protocol	Leo
2022-08-31	0.0.4	Update QDID	Leo
2023-01-05	0.0.5	Update Product Features	Leo
2023-02-21	0.0.6	Modify the number of MIC channel	Leo

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## 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 4M 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 5.3 and BLE specification (QDID: 193597);
- TX output power MAX +9dBm;
- RX Sensitivity with -94dBm @2M EDR;

### Audio Interface

- High performance stereo DAC with 98dB SNR, support single end mode or differential mode;
- Two channels high performance 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

- QFN32L;

### Temperature

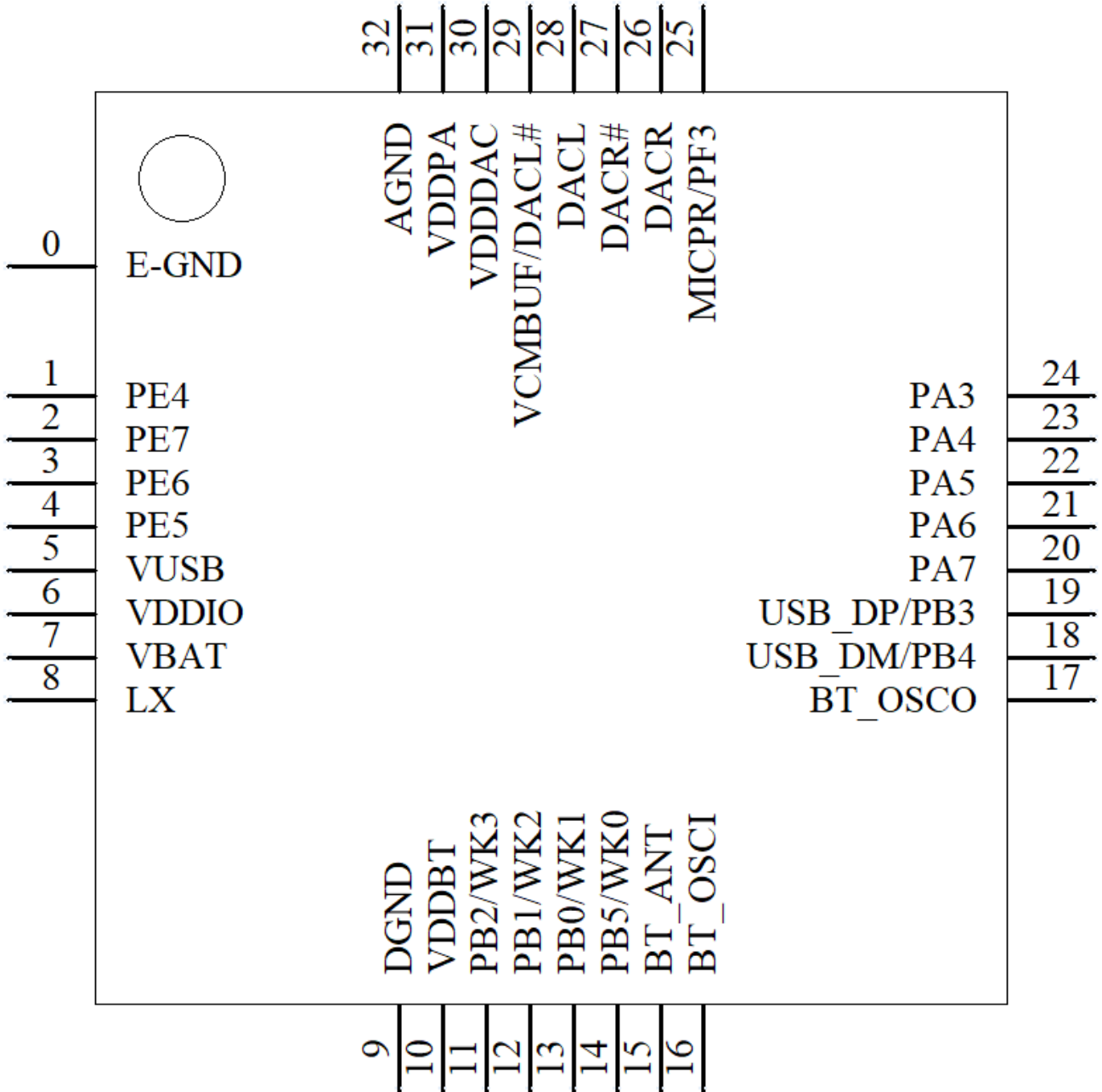
- Operating temperature: -40°C to +85°C;
- Storage temperature: -65°C to +150°C;

### Supports

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

2 Package Definition

2.1 Pin Assignment



## 2.2 Pin Descriptions

**Table 2-1 QFN32L pin description**

Pin No.	Name	Type	Function
0	E-GND	GND	E-Pad Ground
1	PE4	I/O	SD PG PWM1-T3-G4 PE4
2	PE7	I/O	ADC9 AUXR2 PDM_DATLR-G2 SDDAT0-G3 SPI1DO-G4 TX0-G4 HSTRX-G4 PWM2-T4-G1 IISDO-G2 IISDO-G3 IIC_DAT-G5 TMR4CAP_G1/IR_G8 PE7
3	PE6	I/O	ADC8 AUXL2 PDM_CLKLR-G2 SDCLK-G3 SPI1CLK-G4 RX0-G4 HSTRX-G9 FMOSC-G6 PWM1-T4-G1 IISLRCLK-G2 IISLRCLK-G3 IIC_CLK-G5 IIC_CLK-G6 TMR3CAP_G7/IR_G7 PE6
4	PE5	I/O	ADC7 SDCMD-G3 SPI1DI-G4 FMOSC-G5 PWM0-T4-G1 IISCLK-G2 IIC_DAT-G6 TMR3CAP_G6/IR_G6 PE5
5	VUSB	PWR	VUSB power input TX0-G8 TX1-G3

			TX2-G3 HSTRX-G11
6	VDDIO	PWR	VDDIO power output
7	VBAT	PWR	VBAT power input
8	LX	PWR	Buck inductor connect pin
9	DGND	GND	Digital Ground
10	VDDBT	PWR	BT power
11	PB2/WK3	I/O	ADC4 AUXR1 SDDAT0-G2 SPI1DO-G3 TX0-G2 TX2-G2 HSTRX-G2 PWM2-T3-G1 IISCLK-G3 IISDI-G2 IIC_DAT-G3 WK3 PB2
12	PB1/WK2	I/O	ADC3 AUXL1 SDCLK-G2 SPI1CLK-G3 RX0-G2 RX2-G2 HSTRX-G7 FMOSC-G4 PWM1-T3-G1 IISMCLK-G3 IISMCLK-G2 IIC_CLK-G3 IIC_CLK-G4 TMR3CAP_G4/IR_G4 WK2 PB1
13	PB0/WK1	I/O	WK1 ADC11 SDCMD-G2 SPI1DI-G3 FMOSC-G3 PWM0-T3-G1 IIC_DAT-G4 TMR3CAP_G3/IR_G3 PB0
14	PB5/WK0	I/O	WK0 ADC12 PWM2-T3-G2 IISDI-G3 WK0 PB5

15	BT_ANT	A	BT ANT
16	BT_OSCI	A	24M OSC input
17	BT_OSCO	A	24M OSC output
18	PB4/USB_DM	I/O	ADC6 USB DM PDM_DATLR-G4 SDDAT0-G4 SDDAT0-G6 SPIOCLK-G3 RX0-G3 HSTRX-G8 PWM1-T3-G2 IIC_DAT-G8 PB4
19	PB3/USB_DP	I/O	ADC5 USB DP PDM_CLKLR-G4 SDDAT0-G5 SDCMD-G6 SPIO0-G3 TX0-G3 HSTRX-G3 PWM0-T3-G2 IIC_CLK-G8 PB3
20	PA7	I/O	ADC2 AUXR0 PDM DATLR-G3 SDDAT0-G1/G7 SPI1DO-G2 TX0-G1 TX1-G1 HSTRX-G1 PWM2-T5-G1 IISDO -G1 IIC_DAT-G1 PA7
21	PA6	I/O	ADC1 AUXL0 PDM_CLKLR-G3 SDCLK-G1/G4/G5/G6 SPI1CLK-G2 RX0-G1 RX1-G1 HSTRX-G6 FMOSC-G2 PWM1-T5-G1 IISLRCLK-G1 IIC_CLK-G1/G2 TMR3CAP_G2/IR_G2 PA6
22	PA5	I/O	ADC0



			SDCMD-G1/G4/G5 SPI1DI-G1/SPI1DI-G2 FMOSC-G1 PWM0-T5-G1 IISCLK-G1 IIC_DAT-G2 TMR3CAP_G1/IR_G1 PA5
23	PA4	I/O	SPI1DO-G1 TX1-G2 PWM2-T3-G3 IISMCLK-G1 PA4
24	PA3	I/O	SPI1CLK-G1 RX1-G2 PWM1-T3-G3 IISDI-G1 PA3
25	MICPR/PF3	I/O	MICPR PWM2-T4-G2 PF3
26	DACR	A	DAC R
27	DACR#	A	DAC differential R#
28	DACL	A	DAC L
29	DACL#/VCMBUF	A	DAC differential L# VCM buffer output
30	VDDDAC	PWR	DAC power
31	VDDPA	PWR	DAC 1.2V power
32	AGND	GND	DAC Ground

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
$\Delta$ VDDIO	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
$\Delta$ VDDBT	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
$\Delta$ VDDCORE	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
$V_{IL}$	Low-level input voltage		-0.3		1.27	V	VDDIO=3.3V
$V_{IH}$	High-level input voltage		2.03		3.6	V	VDDIO=3.3V
Driver Ability 1	Output Driver Ability 1			32		mA	VDDIO=3.3V
Driver Ability 0	Output Driver Ability 0			8		mA	VDDIO=3.3V
$R_{PUP0}$	Internal pull-up resistor 0		8	10	12	K $\Omega$	
$R_{PUP1}$	Internal pull-up resistor 1		0.24	0.3	0.36	K $\Omega$	
$R_{PUP2}$	Internal pull-up resistor 2		160	200	240	K $\Omega$	

GPIO—Electrical Characteristics							
R <sub>PDN0</sub>	Internal pull-down resistor 0		8	10	12	KΩ	
R <sub>PDN1</sub>	Internal pull-down resistor 1		0.24	0.3	0.36	KΩ	
R <sub>PDN2</sub>	Internal pull-down resistor 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 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

Mode	Sym	Characteristics	Min	Typ	Max	Unit	Conditions
							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-1.2	-	VCM+1.2	V	From aux input, aux 0db gain, VCM represent VCM voltage.

### 3.5 BT Parameters

Table 3-8 BT Parameters

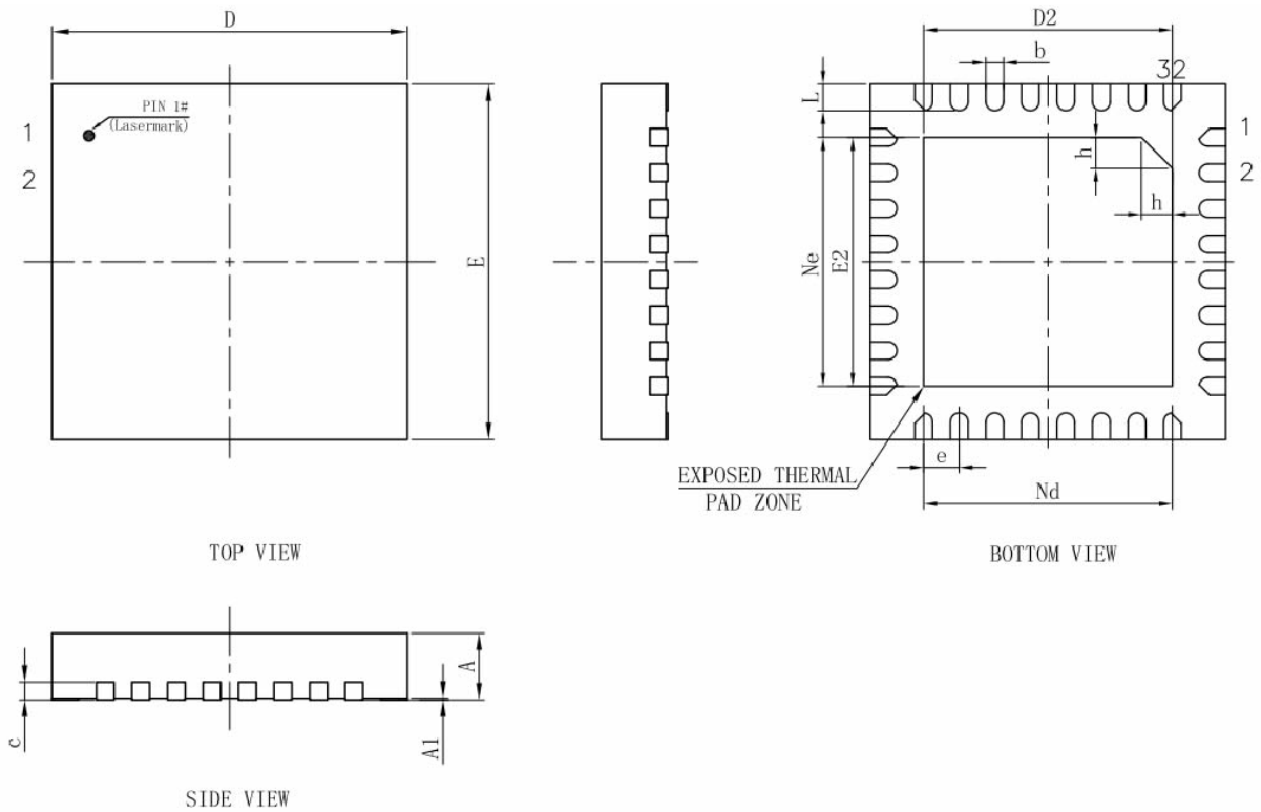
Characteristics	Min	Typical	Max	Unit	Conditions
Transmit Power	-	8	9	dBm	Maximum TX power 2-DH5 packet
RMS DEVM	-	5.5	-	%	
Peak DEVM	-	12.5		%	
EDR Relative Transmit Power		-0.2		dB	
Sensitivity @ Basic Rate		-91.8		dBm	BER=0.1%, using DH5 packet
Sensitivity @ EDR		-94		dBm	BER=0.01%, using 2-DH5 packet

### 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**



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	2.70	2.80	2.90
e	0.40BSC		
Ne	2.80BSC		
Nd	2.80BSC		
E	3.90	4.00	4.10
E2	2.70	2.80	2.90
L	0.25	0.30	0.35
h	0.30	0.35	0.40
L/F载体尺寸	122X122		



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