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AB5605B

Audio Player Microcontroller

Versions: 0.0.2
2022.01.22

Declaration

For further information on the technology, product and business term, please contact Bluetrum Company.

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Revision History

Date	Version	Comments	Revised by
2021-08-10	0.0.1	First draft	Leo
2022-01-22	0.0.2	Updata QDID	Leo

Table of Contents

1 Product Features

CPU and Flexible IO

- 32bit High performance CPU with DSP instruction;

- Program memory: internal 4M bit flash;

- Flexible GPIO pins with Programmable pull-up and pull-down resistors;

- Support GPIO wakeup or interrupt;

Bluetooth Radio

- Compliant to Bluetooth 5.2 (QDID:181186);

- TX output power +6dBm in typical;

- RX Sensitivity with -90.5dBm @EDR;

FM Tuner

- Support frequency band 76~108MHz;

- Auto search tuning;

- Programmable de-emphasis(50/75uS);

- Receive signal strength indicator (RSSI);

Audio Interface

- Audio codec with 16bit stereo DAC and 16bit mono ADC;

- Support flexible audio EQ adjust;

- Support Sample rate 8, 11.025, 12, 16, 22.05, 32, 44.1 and 48KHz;

- 2 channel Analog MUX;

- One channel MIC amplifier input;

- High performance mono audio ADC with 90dB SNR;

- High performance audio DAC with 96dB SNR, with headphone amplifier output;

Peripheral and Interfaces

- Three 32-bit timers;

- Three multi-function 32-bit timers, support Capture and PWM mode;

- WatchDog;

- Three full-duplex UART;

- SPI;

- IR controller;

- SD Card Host controller;

- Full speed USB 2.0 HOST/DEVICE controller;

- Sixteen Channels 10-bit SARADC;

- Build in PMU, such as LDO;

Package

- SSOP24;

Temperature

- Operating temperature: -40℃ to +85℃;

- Storage temperature: -65℃ to +150℃;

2 Package Definition

2.1 Pin Assignment

1	VCMBUF	DACL	24
2	VDDDAC	DACR	23
3	AGND	MICL/PF2	22
4	FM_ANT	PA5	21
5	PE7	PA6	20
6	PE6	PA7	19
7	PE0	USB_DP/PB3	18
8	VUSB	USB_DM/PB4	17
9	VDDIO	BT_OSCO	16
10	VBAT	BT_OSCI	15
11	DGND	BT_ANT	14
12	VDDBT	PWRKEY	13

2.2 Pin Descriptions

Table 2-1 SSOP24 pin description

Pin No.	Name	Type	Function
1	VCMBUF	A	VCM buffer output
2	VDDDAC	PWR	DAC power
3	AGND	GND	DAC Ground
4	FM_ANT	A	FMRX ANT
5	PE7	I/O	ADC9 AUXR2 SDDAT0-G3 SPI1DO -G4 TX0-G4 HSTRX-G4 PWM2-T4-G1 TMR4CAP_G1/IR_G8 IISLRCLK-G2

			PE7
6	PE6	I/O	SPDIF2 ADC8 AUXL2 SDCLK-G3 SPI1CLK-G4 RX0-G4 HSTRX-G9 FMOSC-G6 PWM1-T4-G1 TMR3CAP_G7/IR_G7 IISSCLK-G2 PE6
7	PE0	I/O	SPI0DI-G3 TX0-G5 PWM0-T3-G4 TMR3CAP_G5/IR_G5 IISMCLK-G2 PE0
8	VUSB	PWR	VUSB power input TX0-G8 TX1-G3 TX2-G3 HSTRX-G11
9	VDDIO	PWR	VDDIO power output
10	VBAT	PWR	VBAT power input
11	DGND	GND	Digital Ground
12	VDDBT	PWR	BT power
13	PWRKEY	A	Power key input
14	BT_ANT	A	BT ANT
15	BT_OSCI	A	26M OSC input
16	BT_OSCO	A	26M OSC output
17	USB_DM/PB4	I/O	USB DM ADC6 SDDAT0-G4/G6 SPI0CLK-G3 RX0-G3 HSTRX-G8 PWM1-T3-G2 PB4
18	USB_DP/PB3	I/O	USB DP ADC5 SDDAT0-G5 SDCMD-G6 SPI0DO-G3 TX0-G3 HSTRX-G3 PWM0-T3-G2 PB3
19	PA7	I/O	ADC2 AUXR0 SDDAT0-G1 SPI1DO-G2 SPI1DATA-G2 TX0-G1 TX1-G1 HSTRX-G1 PWM2-T5-G1 IISDI-G1 PA7

20	PA6	I/O	ADC1 AUXL0 SDCLK-G1/G4/G5/G6 SPI1CLK-G2 RX0-G1 RX1-G1 HSTRX-G6 FMOSC-G2 PWM1-T5-G1 TMR3CAP_G2/IR_G2 IISDO/DAT-G1 PA6
21	PA5	I/O	ADC0 SDCMD-G1/G4/G5 SPI1DI-G1 SPI1DI-G2 FMOSC-G1 PWM0-T5-G1 TMR3CAP_G1/IR_G1 IISSCLK-G1 PA5
22	MICL/PF2	I/O	MICL SPDIF5 ADC10 SPI1DO -G5 TX0-G7 PWM0-T3-G3 TMR5CAP_G1/IR_G9 PF2
23	DACR	A	DAC R
24	DACL	A	DAC L

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	3.0	5.0	5.5	V	
VBAT	Voltage input	2.4	3.3	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	-	56	-	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	-	2.8	-	V	Light Loading condition
△VVDDBT	Output Mismatch 1-sigma	-	48	-	mV	VDDBT=1.2v
ILOAD	Maximum output current	-	-	20	mA	@VBAT=3.0v
ISC	Short Circuit Current Limit	-	-	40	mA	@VBAT=3.8v

3.2 IO Parameters

Table 3-4 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 resister 0		8	10	12	KΩ	
R_{PUP1}	Internal pull-up resister 1		0.24	0.3	0.36	KΩ	
R_{PUP2}	Internal pull-up resister 2		160	200	240	KΩ	
R_{PDN0}	Internal pull-down resister 0		8	10	12	KΩ	
R_{PDN1}	Internal pull-down resister 1		0.24	0.3	0.36	KΩ	
R_{PDN2}	Internal pull-down resister 2		160	200	240	KΩ	

3.3 Audio DAC Parameters

Table 3-5 Audio DAC Parameters

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
SNR		-	96	-	dB	VDDDAC cap=1uF with A-wt filter Output -3dBV Fin=1KHz
THD+N		-	-70	-	dB	VDDDAC cap=1uF with A-wt filter Output -3dBV with 10K loading Fin=1KHz
Output Range	Maximum output voltage	-	2.6		$V_{peak\text{-}peak}$	32ohm Loading

3.4 Audio ADC Parameters

Table 3-6 Audio ADC Parameters

| Sym	Characteristics	Min	Typ	Max	Unit	Conditions
SNR		-	90	-	dB	VDDDAC cap=1uF with A-wt filter Input sine amplitude, 850mV RMS Fin=1KHz
THD+N		-	-76	-	dB	VDDDAC cap=1uF with A-wt filter Input sine amplitude, 850mV RMS Fin=1KHz.
Input Range	Input sine wave peak amplitude	0		VCM	V	From aux input, aux 0db gain, VCM represent VCM voltage.

3.5 BT Parameters

Table 3-7 BT Parameters

Characteristics	Min	Typical	Max	Unit	Conditions
Maximum Transmit Power	-	-	7	dBm	
RMS DEVM	-	5.5	-	%	Maximum TX power 2-DH5 packet
Peak DEVM	-	12.5		%	
EDR Relative Transmit Power		-0.2		dB	
Sensitivity @ Basic Rate		-88.3		dBm	BER=0.1%, using DH5 packet
Sensitivity @ EDR		-90.5		dBm	BER=0.01%, using 2-DH5 packet

3.6 Current Parameters

Table 3-8 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
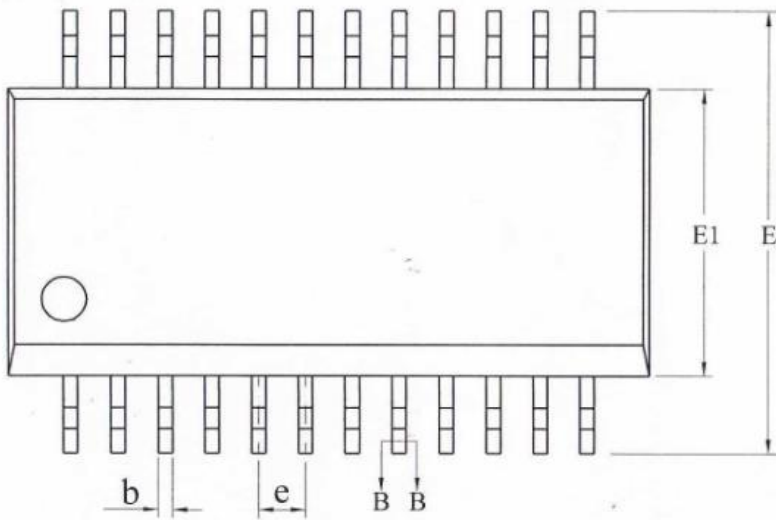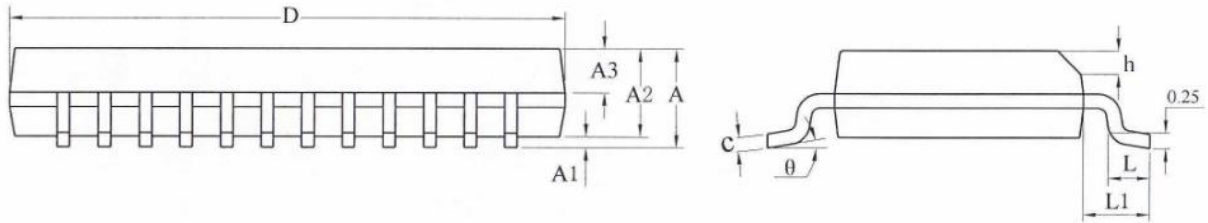
SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.75
A1	0.10	0.15	0.25
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
b	0.23	—	0.31
b1	0.22	0.25	0.28
c	0.20	—	0.24
c1	0.19	0.20	0.21
D	8.55	8.65	8.75
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	0.635BSC		
h	0.30	—	0.50
L	0.50	—	0.80
L1	1.05REF		
θ	0	—	8°

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PRODUCT RELEASE

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