

AB5605C

Audio Player Microcontroller

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2021.08.10



Declaration

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Revision History

Date	Version	Comments	Revised by
2021-08-10	0.0.1	First draft	Leo

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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 5.0 (QDID:115952);
- 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 mono 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°C to +85°C;
- Storage temperature: -65°C to +150°C;

2 Package Definition

2.1 Pin Assignment

1	VDDDAC	DACL	24
2	AGND	PF0	23
3	FM_ANT	MICL/PF2	22
4	PE7	PA5	21
5	PE6	PA6	20
6	PE0	PA7	19
7	VDDIO	USB_DP/PB3	18
8	VBAT	USB_DM/PB4	17
9	DGND	BT_OSCO	16
10	VDDBT	BT_OSCI	15
11	PB2	BT_ANT	14
12	PB1	PWRKEY	13

2.2 Pin Descriptions

Table 2-1 SSOP24 pin description

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

			IISLRCLK-G2 PE7
5	PE6	I/O	SPDIF2 ADC8 AUXL2 SDCLK-G3 SPI1CLK-G4 RX0-G4 HSTRX-G9 FMOSC-G6 PWM1-T4-G1 TMR3CAP_G7/IR_G7 IISCLK-G2 PE6
6	PE0	I/O	SPI0DI-G3 TX0-G5 PWM0-T3-G4 TMR3CAP_G5/IR_G5 IISMCLK-G2 PE0
7	VDDIO	PWR	VDDIO power output
8	VBAT	PWR	VBAT power input
9	DGND	GND	Digital Ground
10	VDDBT	PWR	BT power
11	PB2	I/O	ADC4 AUXR1 SDDAT0-G2 SPI1DO -G3 TX0-G2 TX2-G2 HSTRX-G2 PWM2-T3-G1 PB2
12	PB1	I/O	ADC3 AUXL1 SDCLK-G2 SPI1CLK-G3 RX0-G2 RX2-G2 HSTRX-G7 FMOSC-G4 PWM1-T3-G1 TMR3CAP_G4/IR_G4 PB1
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 IISCLK-G1 PA5
22	MICL/PF2	I/O	MICL SPDIF5 ADC10 SPI1DO -G5 TX0-G7 PWM0-T3-G3 TMR5CAP_G1/IR_G9 PF2
23	PF0	I/O	SPDIF3 AUXL3 SPI1DI-G5 TX0-G6 PWM1-T4-G2 PF0
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
Δ 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
Δ 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 resistor 0		8	10	12	K Ω	
R _{PUP1}	Internal pull-up resistor 1		0.24	0.3	0.36	K Ω	
R _{PUP2}	Internal pull-up resistor 2		160	200	240	K Ω	
R _{PDN0}	Internal pull-down resistor 0		8	10	12	K Ω	
R _{PDN1}	Internal pull-down resistor 1		0.24	0.3	0.36	K Ω	
R _{PDN2}	Internal pull-down resistor 2		160	200	240	K Ω	

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-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

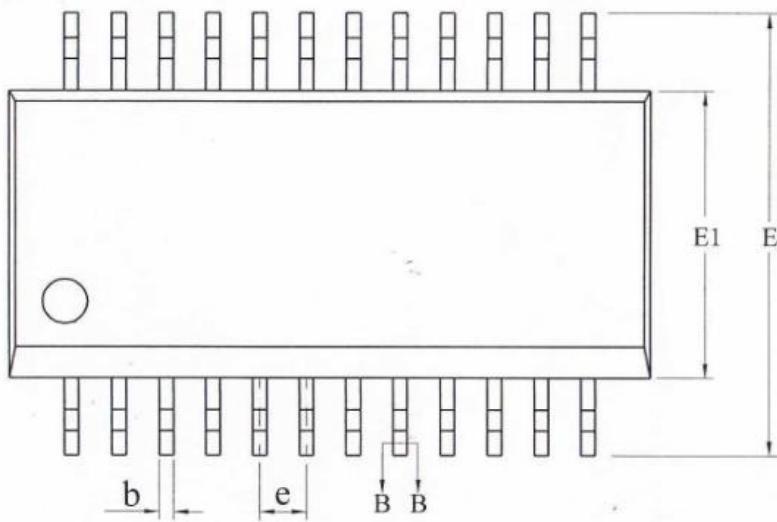
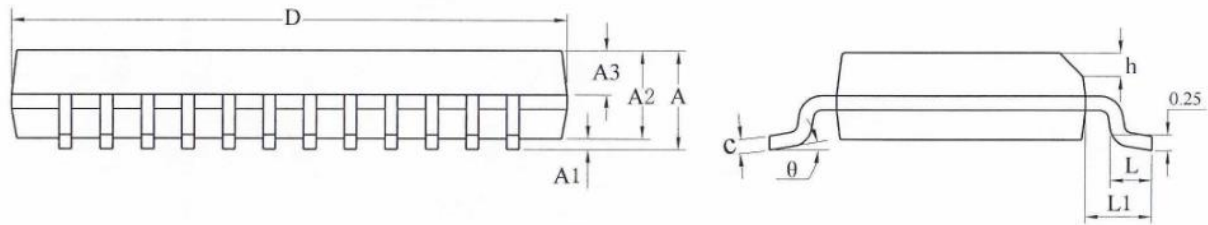
Characteristics	Min	Typical	Max	Unit	Conditions
Maximum Transmit Power	-	-	7	dBm	
RMS DEVM	-	5.5	-	%	Maximum TX power 2-DH5 packet
Peak DEVM	-	12.5		%	
EDR Relative Transmit Power		-0.2		dB	
Sensitivity @ Basic Rate		-88.3		dBm	BER=0.1%, using DH5 packet
Sensitivity @ EDR		-90.5		dBm	BER=0.01%, using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