Bluetrum Technology

AB5305A

Audio Player Microcontroller

Versions: 0.0.1

2018/09/27

Declaration

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
2018-09-27	0.0.1	First draft	Leo

Table of Contents

1 **Product Features**

CPU and Flexible IO

- 32bit High performance CPU with DSP instruction
- Flexible GPIO pins with Programmable pull-up and pull-down resistors;
- Support GPIO wakeup or interrupt;

Bluetooth Radio

- Compliant to Bluetooth 5.0 and BLE specification (QDID: 115952);
- TX output power +2db in typical;
- RX Sensitivity with -90.5dBm @Basic Rate;

FM Tuner

- Support frequency band 76~108MHz;
- Auto search tuning;
- Programable de-emphasis(50/75uS);
- Receive signal strength indicator (RSSI);

Audio Interface

- Audio codec with 16bit stereo DAC and two channel 16bit ADC;
- Support flexible audio EQ adjust;
- Support Sample rate 8, 11.025, 12, 16, 22.05, 32, 44.1 and 48KHz;
- 4 channel Stereo Analog MUX;
- Two channel MIC amplifier input;
- High performance Stereo audio ADC with 90dB SNR;

- High performance Stereo audio DAC with 95dB 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

- SSOP24L;

Temperature

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

2 Package Definition

2.1 Pin Assignment

Figure 2-1 Pin assignment for SSOP24L

2.2 Pin Descriptions

Table 2-1 SSOP24L pin description

Pin No.	Name	Type	Function
1	DACL	A	DAC L
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
			LPWM3-G1
			TMR4CAP_G1/IR_G8
			PE7
6	PE6	I/O	ADC8
			AUXL2
			SPDIF4

			SDCLK-G3
			SPI1CLK-G4
			RX0-G4
			HSTRX-G9
			FMOSC-G6
			LPWM2-G1
			TMR3CAP_G7/IR_G7
			PE6
7	PE0	I/O	SPI0DI-G3
			TX0-G6
			LPWM2-G2
			IISDI-G2
			TMR3CAP_G5/IR_G5
			PE0
8	VDDIO	PWR	VDDIO power output
9	VBAT	PWR	VBAT power input
10	DGND	GND	Digital Ground
11	VDDBT	PWR	BT power
12	PWRKEY	A	Power key input
13	BT_RFGND	GND	BT RF Ground
14	BT_ANT	A	BT ANT
15	BT_RFGND	GND	BT RF Ground
16	BT_OSCI	A	26M OSC input
17	BT_OSCO	A	26M OSC output
18	USB_DM/PB4	I/O	ADC6
			USB DM
			SPI0CLK-G3
			RX0-G3
			PB4
19	USB_DP/PB3	I/O	ADC5
			USB DP
			SPI0DO-G3
			TX0-G3
			PB3
20	PA7	I/O	ADC2
			AUXR0
			SDDAT0-G1
			SPI1DO-G2
			TX0-G1
			TX1-G1
			HSTRX-G1
			PWM2-T4
			PA7
21	PA6	I/O	ADC1
			AUXL0
			SDCLK-G1
			SPI1CLK-G2
			RX0-G1

			RX1-G1
			HSTRX-G6
			FMOSC-G2
			PWM1-T4
			TMR3CAP_G2/IR_G2
			PA6
22	PA5	I/O	ADC0
			SDCMD-G1
			SPI1DI-G2
			FMOSC-G1
			PWM0-T4
			TMR3CAP_G1/IR_G1
			PA5
23	MICL/PF2	I/O	ADC10
			MICL
			SPI1DO-G5
			TX0-G7
			LPWM3-G2
			PF2
24	PF0	I/O	AUXL3
			SPI1DI-G5
			PF0

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	5.0	V	
VBAT	Voltage input	3.0	3.7	5.0	V	

Table 3-2 3.3V LDO Parameters

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
VDDIO	3.3V LDO voltage output	3.0	3.3	3.6	V	Light Loading condition
$\triangle$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 1.6V LDO Parameters

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
VDDBT	1.6V LDO voltage output	-	1.6	-	V	Light Loading condition
$\triangle$VVDDBT	Output Mismatch 1-sigma	-	27	-	mV	VDDBT=1.6v
ILOAD	Maximum output current	-	-	100	mA	@VBAT=3.0v
ISC	Short Circuit Current Limit	-	-	200	mA	@VBAT=3.8v

Table 3-4 1.2V LDO Parameters

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
VDDCORE	1.2V LDO voltage output	-	1.2	-	V	Light Loading condition
$\triangle$VVDDCORE	Output Mismatch 1-sigma	-	20	-	mV	VDDCORE=1.2v
ILOAD	Maximum output current	-	-	80	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 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 3-6 Audio DAC Parameters

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
SNR		-	96	-	dB	VCM cap=1uF VDDDAC cap=1uF with A-wt filter Output -3dBV Fin=1KHz
THD+N		-	-86	-	dB	VCM cap=1uF 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 3-7 Audio ADC Parameters

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
SNR		-	90	-	dB	VCM cap=1uF VDDDAC cap=1uF with A-wt filter Input sine amplitude, 850mV RMS Fin=1KHz
THD+N		-	-87	-	dB	VCM cap=1uF 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 3-8 BT Parameters

Characteristics	Min	Typical	Max	Unit	Conditions
Maximum Transmit Power	-	2	-	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		-90.5		dBm	BER=0.1%, using DH5 packet
Sensitivity @ EDR		-89.5		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