BT8812

Audio Player Microcontroller

Versions: 0.0.1

2018/09/28

Declaration

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Revision History

Date	Version	Comments	Revised by
2018-09-28	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;
- Two SPI;
- IR controller;
- SD Card Host controller;
- SPDIF receiver;
- 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℃ to +85℃;
- Storage temperature: -65℃ to +150℃;

2 Package Definition

2.1 Pin Assignment

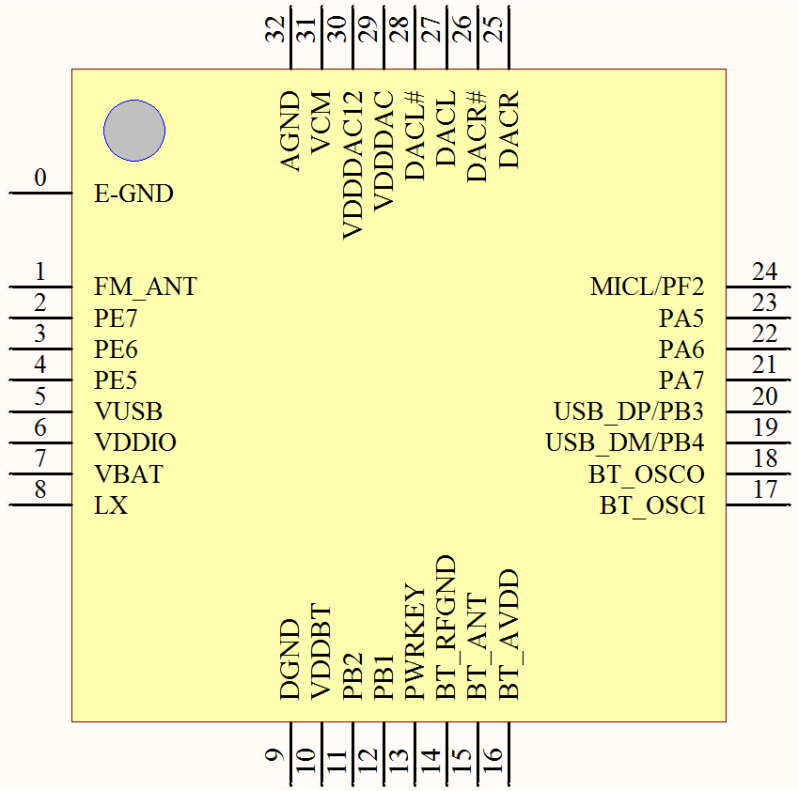


Figure 2-1 Pin assignment for QFN32L

2.2 Pin Descriptions

Table 2-1 QFN32L pin description

Pin No.	Name	Type	Function
0	E-GND	GND	E-Pad Ground
1	FM_ANT	A	FMRX ANT
2	PE7	I/O	ADC9 AUXR2 SDDAT0-G3 SPI1DO-G4 TX0-G4 HSTRX-G4 LPWM3-G1 TMR4CAP_G1/IR_G8 PE7
3	PE6	I/O	ADC8

			AUXL2 SPDIF4 SDCLK-G3 SPI1CLK-G4 RX0-G4 HSTRX-G9 FMOSC-G6 LPWM2-G1 TMR3CAP_G7/IR_G7 PE6
4	PE5	I/O	ADC7 SPDIF3 SDCMD-G3 SPI1DI-G4 FMOSC-G5 LPWM1-G1 TMR3CAP_G6/IR_G6 PE5
5	VUSB	PWR	VUSB power input
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	I/O	ADC4 AUXR1 SDDAT0-G2 SPI1DO-G3 TX0-G2 TX2-G2 HSTRX-G2 PWM2-T3 PB2
12	PB1	I/O	ADC3 FM/AM-G1 AUXL1 SDCLK-G2 SPI1CLK-G3 RX0-G2 RX2-G2 HSTRX-G7 FMOSC-G4 PWM1-T3 TMR3CAP_G4/IR_G4 PB1
13	PWRKEY	A	Power key input
14	BT_RFGND	GND	BT RF Ground
15	BT_ANT	A	BT ANT
16	BT_AVDD	PWR	BT RF Power

17	BT_OSCI	A	26M OSC input
18	BT_OSCO	A	26M OSC output
19	USB_DM/PB4	I/O	ADC6 USB DM SPI0CLK-G3 RX0-G3 PB4
20	USB_DP/PB3	I/O	ADC5 USB DP SPI0DO-G3 TX0-G3 PB3
21	PA7	I/O	ADC2 AUXR0 SDDAT0-G1 SPI1DO-G2 TX0-G1 TX1-G1 HSTRX-G1 PWM2-T4 PA7
22	PA6	I/O	ADC1 AUXL0 SDCLK-G1 SPI1CLK-G2 RX0-G1 RX1-G1 HSTRX-G6 FMOSC-G2 PWM1-T4 TMR3CAP_G2/IR_G2 PA6
23	PA5	I/O	ADC0 SDCMD-G1 SPI1DI-G2 FMOSC-G1 PWM0-T4 TMR3CAP_G1/IR_G1 PA5
24	PF2/MICL	I/O	ADC10 MICL SPI1DO-G5 TX0-G7 LPWM3-G2 PF2
25	DACR	A	DAC R
26	DACR#	A	DAC differential R#

27	DACL	A	DAC L
28	DACL#	A	DAC differential L#
29	VDDDAC	PWR	DAC power
30	VDDDAC12	PWR	DAC 1.2V power
31	VCM	PWR	DAC VCM
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	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
△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
△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
△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

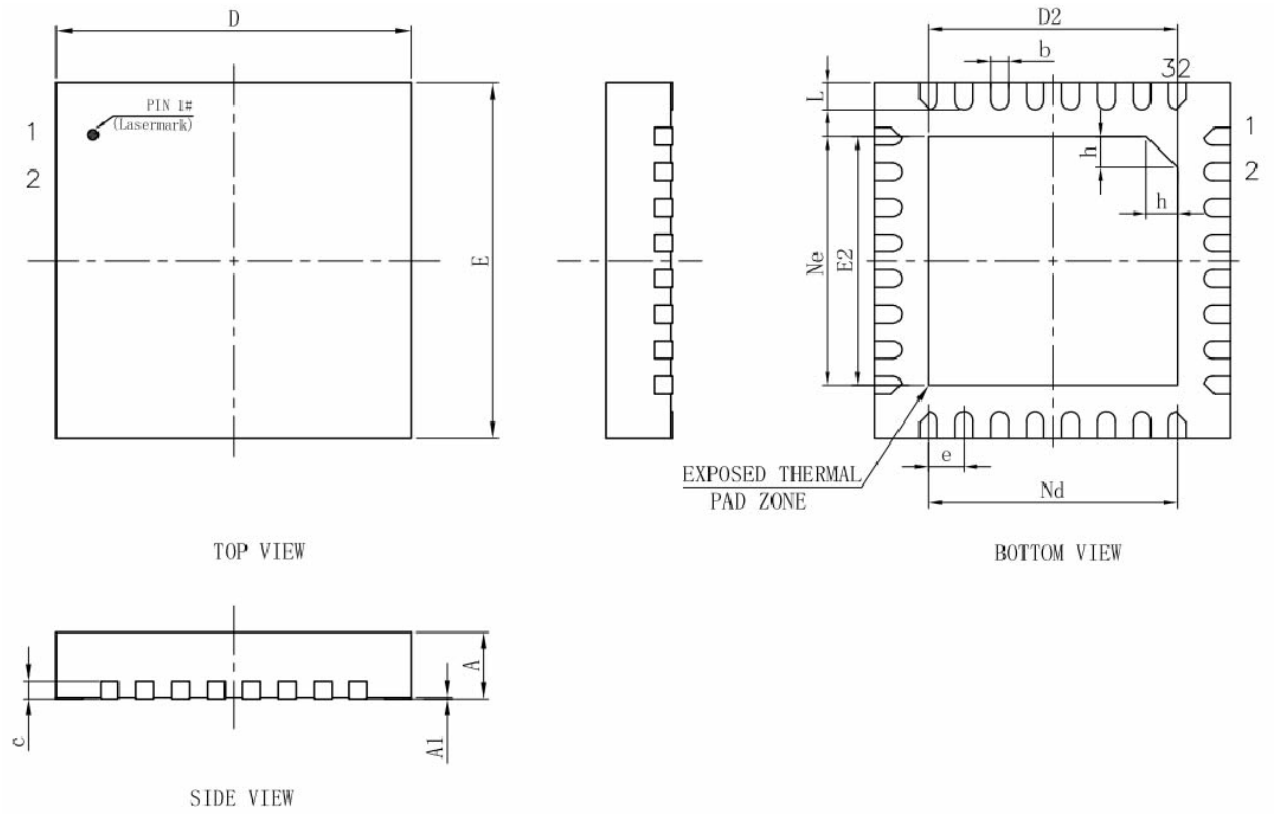
Characteristics	Min	Typical	Max	Unit	Conditions
Maximum Transmit Power	-	2	-	dBm	
RMS DEVM	-	5.5	-	%	Maximum TX power 2-DH5 packet
Peak DEVM	-	12.5		%	
EDR Relative Transmit Power		-0.2		dB	
Sensitivity @ Basic Rate		-90.5		dBm	BER=0.1%, using DH5 packet
Sensitivity @ EDR		-89.5		dBm	BER=0.01%, using 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



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		