AU7842 Datasheet

USB Host MP3/WMA Decoder SOC

Rev 1.0

June 10 , 2007

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Revision History

Data	Revision	Description
2007-06-10	1.0	Initial release

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1. Overview

A highly integrated SOC for MP3/WMA player, AU7842 integrates MCU, MP3/WMA decoder, USB Host controller, SD/MMC card controller, a 16-bit audio decoder and an IR decoder in a single chip. Compared with traditional flash-MP3 player, AU7842 offers a lower cost, lower power consumption, flexible and more powerful Host MP3/WMA player solution.

1.1 Features

- Low power 0.18um CMOS technology
- Power supply 1.8V/3.3V, power consumption 110mW
- Enhanced 8051, up to 10 times faster than standard 8051
- USB2.0 full-speed host controller
- SD/MMC card controller
- Support MPEG 1/2/2.5 layer3 decoding, data rate 32kbps ~ 320kbps, including VBR
- Support WMA format, data rate 32kbps ~ 384kbps
- Support 9 sampling frequency: 8kHz/11.025kHz/12kHz/16kHz/22.05kHz/24kHz/32kHz/44.1kHz/48kHz
- Embedded sound equalizer
- Support tag format ID3v1 and ID3v2.4
- Support FAT16/FAT32 file system
- Embedded 16-bit sigma-delta audio DAC
- Embedded headphone amplifier
- Support IR Remote control
- GPIO for various purposes
- Support in-system debug through external emulator
- In-system firmware upgrade through U-disk or SD/MMC

1.2 Chip Architecture

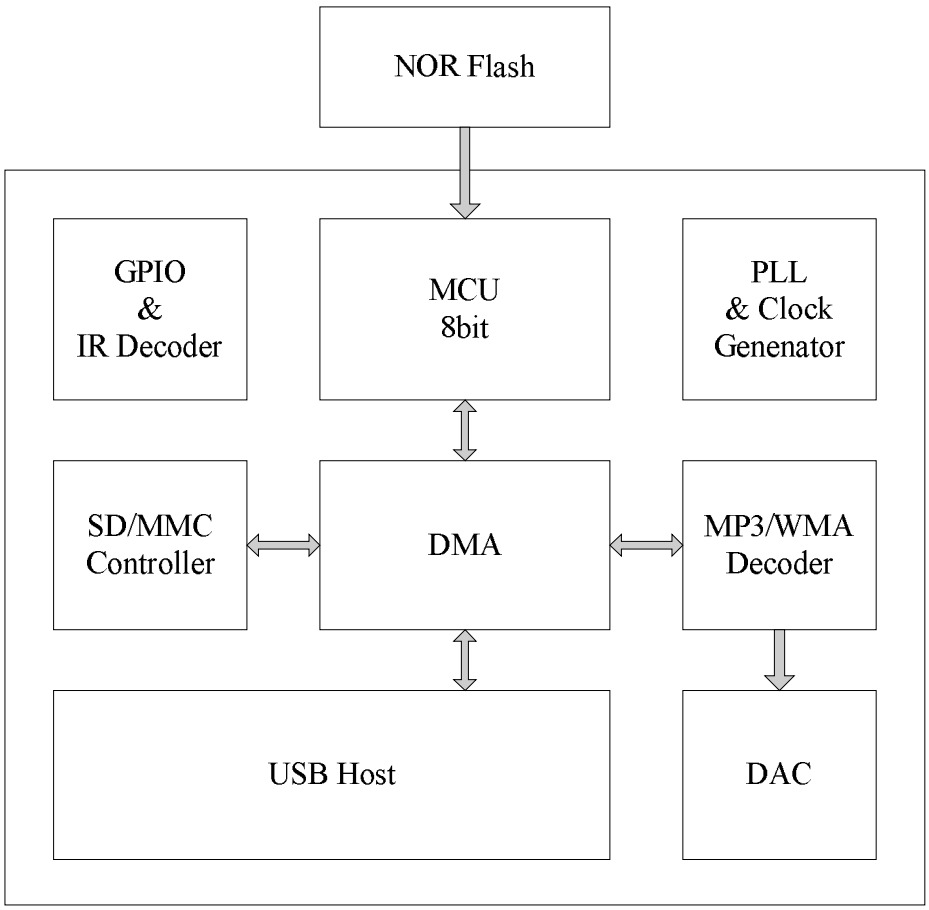

Figure 1 AU7842 Functional Block Diagram

2. System Application

- **MP3/WMA audio system**

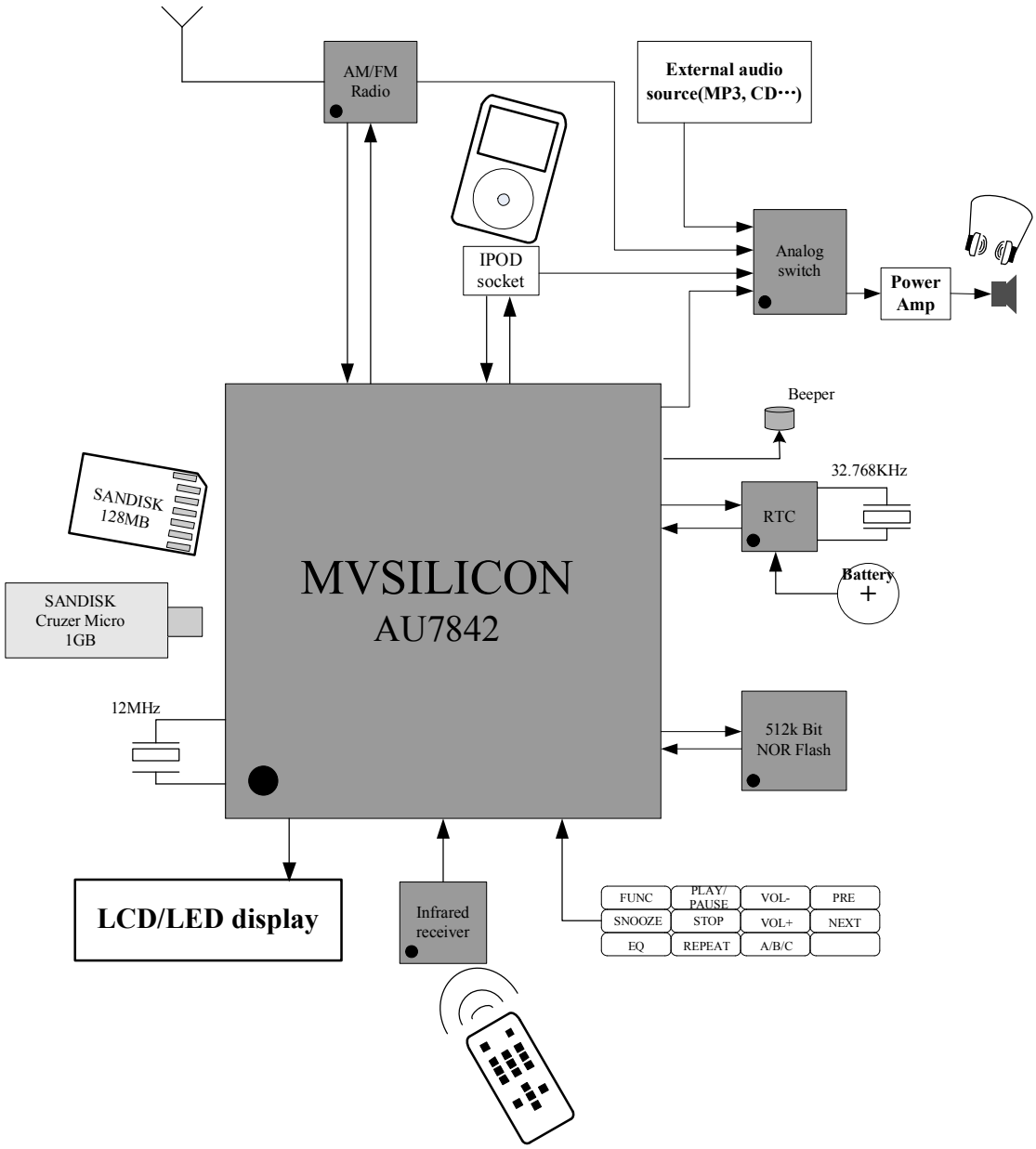

Figure 2 MP3/WMA Audio System

- **MP3/WMA mini audio system**

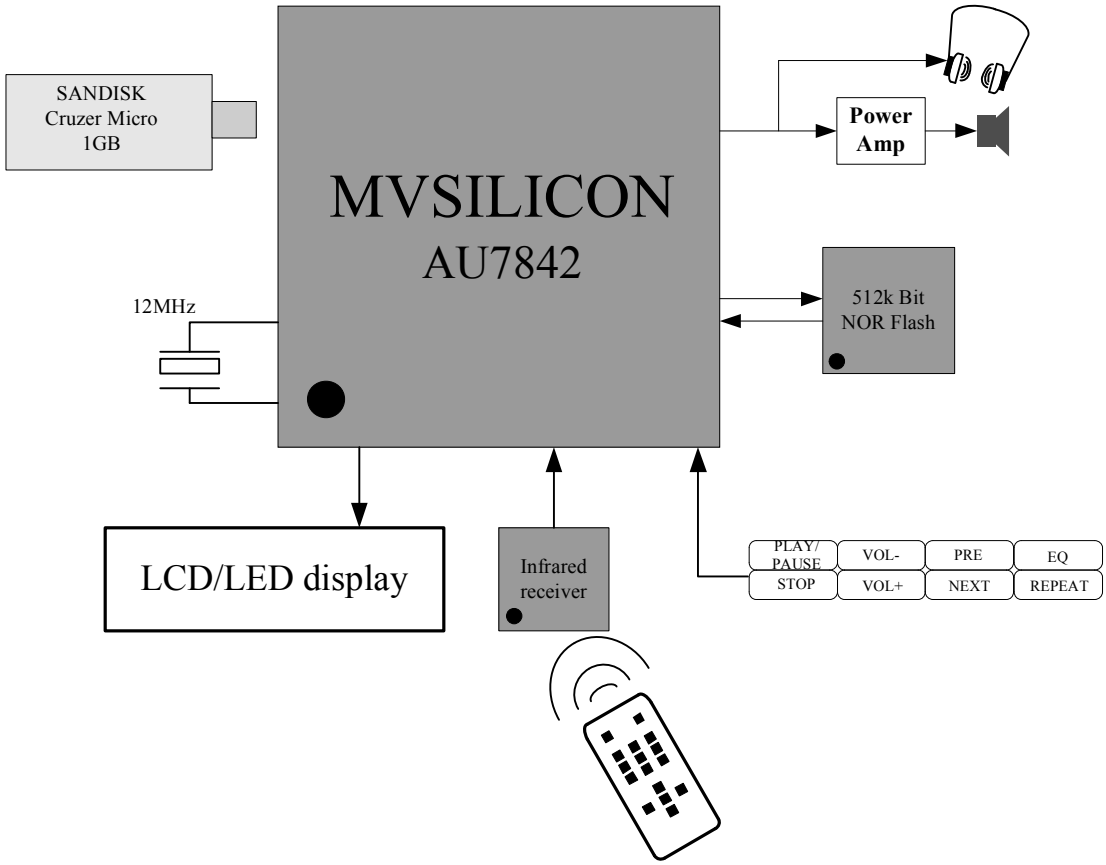

Figure 3 MP3/WMA Mini Audio System

3. Pin Description

AU7842 is a CMOS device. Floating level on input signals causes unstable device operation and abnormal current consumption. Pull-up or Pull-down resistors should be used appropriately for input or bidirectional pins.

Notation	Description
I	Input
O	Output
I/O	Bidirectional
I/OD	Bidirectional, Open drain output
AI	Analog Input
AO	Analog Output
PWR	Power
GND	Ground

3.1 AU7842 Pin Description

Table 1 AU7842 Pin Description

Pin name	Pin #	Type	Description
			NOR flash memory interface pins
FSH_DB [7:6]	18:19	I/O	Flash memory data bus
FSH_DB [5:2]	22:25	I/O	Flash memory data bus
FSH_DB [1:0]	30:31	I/O	Flash memory data bus
FSH_WR	90	I/O	Flash memory write signal
FSH_RD	91	I/O	Flash memory read signal
FSH_EN	92	I/O	Flash memory chip enable
FSH_AB[15:14]	62:63	I/O	Flash memory address bus
FSH_AB[13]	64	I/O	Flash memory address bus
FSH_AB[12]	61	I/O	Flash memory address bus
FSH_AB[11]	67	I/O	Flash memory address bus
FSH_AB[10]	39	I/O	Flash memory address bus
FSH_AB[9:8]	66:65	I/O	Flash memory address bus
FSH_AB[7:6]	58:57	I/O	Flash memory address bus
FSH_AB[5:4]	40:41	I/O	Flash memory address bus
FSH_AB[3:1]	34:36	I/O	Flash memory address bus
FSH_AB[0]	38	I/O	Flash memory address bus
			USB interface pins
USB_DP	10	I/O	USB Function D+ bus
USB_DM	9	I/O	USB Function D- bus
			CARD interface pins
SD_CLK	51	O	SD Card clock

SD_CMD	53	I/O	SD Card command line
SD_DAT	54	I/O	SD Card data line
			Remote control pin
IR	75	I	Inferred remote controller signal
			DAC AUDIO interface pins
DAC_HPOUTL	3	AO	Head phone left channel output
DAC_HPOUTR	1	AO	Head phone right channel output
DAC_VREF	5	AO	Internal voltage reference
			GPIO/MCU IO pins
P3[7:4]	86:83	I/OD	MCU P3 PORT
P3[3:0]	72:69	I/OD	MCU P3 PORT
P2[7:5]	17:15	I/OD	MCU P2 PORT
P2[4:3]	87:88	I/OD	MCU P2 PORT
P2[2:0]	98:100	I/OD	MCU P2 PORT
P1[7:4]	47:44	I/OD	MCU P1 PORT
P1[3:0]	29:26	I/OD	MCU P1 PORT
P0[1]	56	I/OD	MCU P0 PORT
P0[0]	55	I/OD	MCU P0 PORT
GPIO[7:3]	80:76	I/O	GPIO PORT
GPIO[2:0]	50:48	I/O	GPIO PORT
			CLK & Reset pins
XIN	12	I	Crystal oscillator input for PLL
XOUT	13	O	Crystal oscillator output for PLL
RESETn	21	I	System reset, active low
			Debug pin
DEBUG	89	I	When tied high, chip enter into debug mode and use external emulator. When tie low, chip works in normal mode
			Power/Ground pins
DAC_AVDD	4	PWR	Analog power for DAC(3.3V)
DAC_AVSS	2	GND	Analog ground for DAC
PLL_VSS	6	GND	Analog ground for PLL
PLL_VDD	7	PWR	Analog power for PLL(1.8V)
IO_VDD	11 37 52 73 94	PWR	Digital power for I/O(3.3V)
VSS	8 20 33 42 59 81	GND	Digital IO/core ground
VDD	14 32 43 60 68 82	PWR	Digital power for core (1.8V)
Reserved	74		NC

	93 95 96 97		

4. Package

4.1 Package Diagram

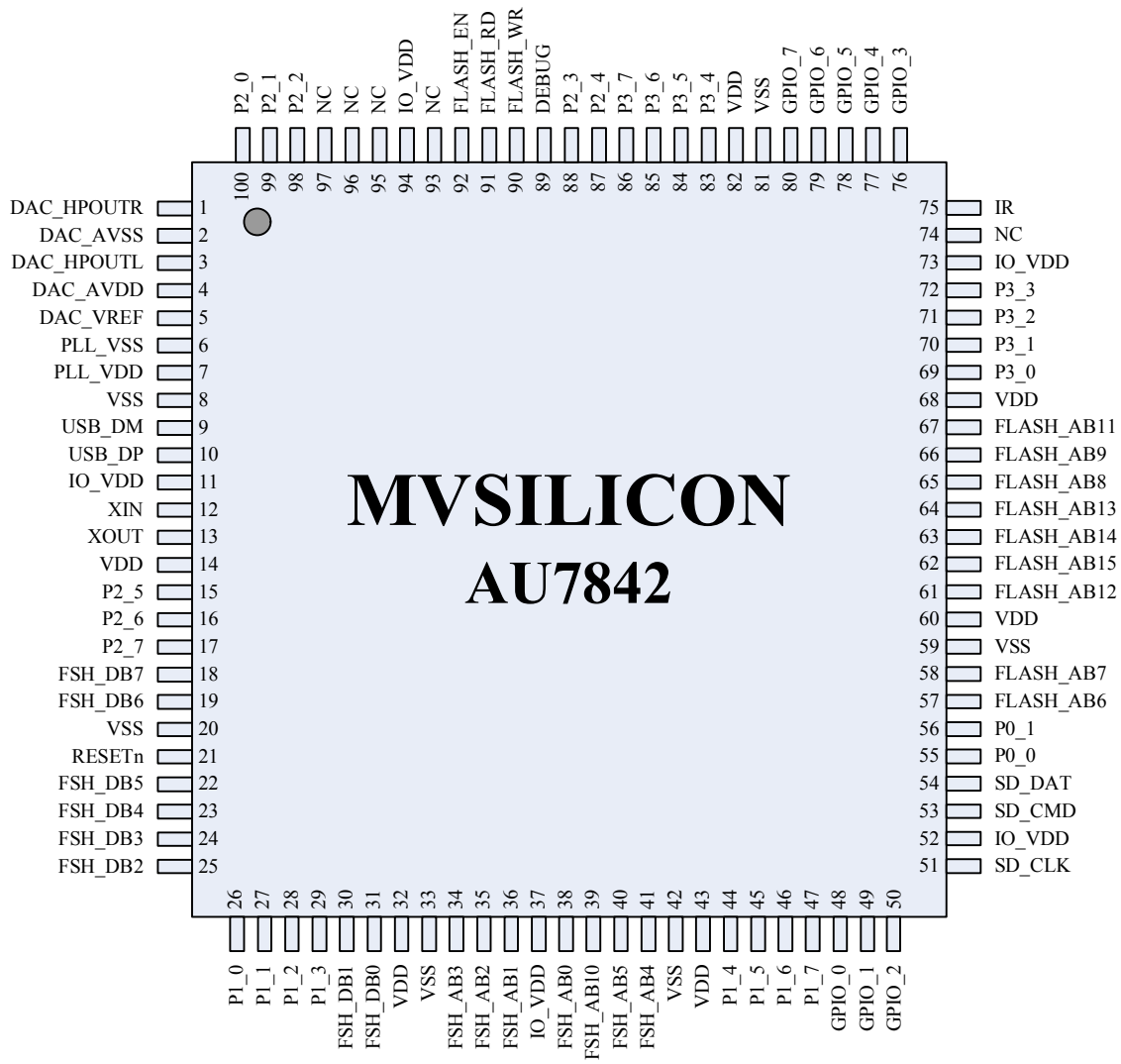

Figure 4 AU7842 Package Diagram (LQFP100-14x14mm / TOP View)

Notes: The “NC” IO in these diagrams means “not connected”, please refer to the application notes for detail.

4.2 Package Dimension Parameter

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.60
A1	0.05	0.15	0.25
A2	1.30	1.40	1.50
A3	0.54	0.64	0.74
b	0.19	—	0.27
b1	0.18	0.20	0.23
c	0.13	—	0.18
c1	0.12	0.13	0.14
D	15.80	16.00	16.20
D1	13.80	14.00	14.20
E	15.80	16.00	16.20
E1	13.80	14.00	14.20
e		0.50BSC	
L	0.40	0.60	0.80
L1		1.00BSC	
θ	0	—	8°

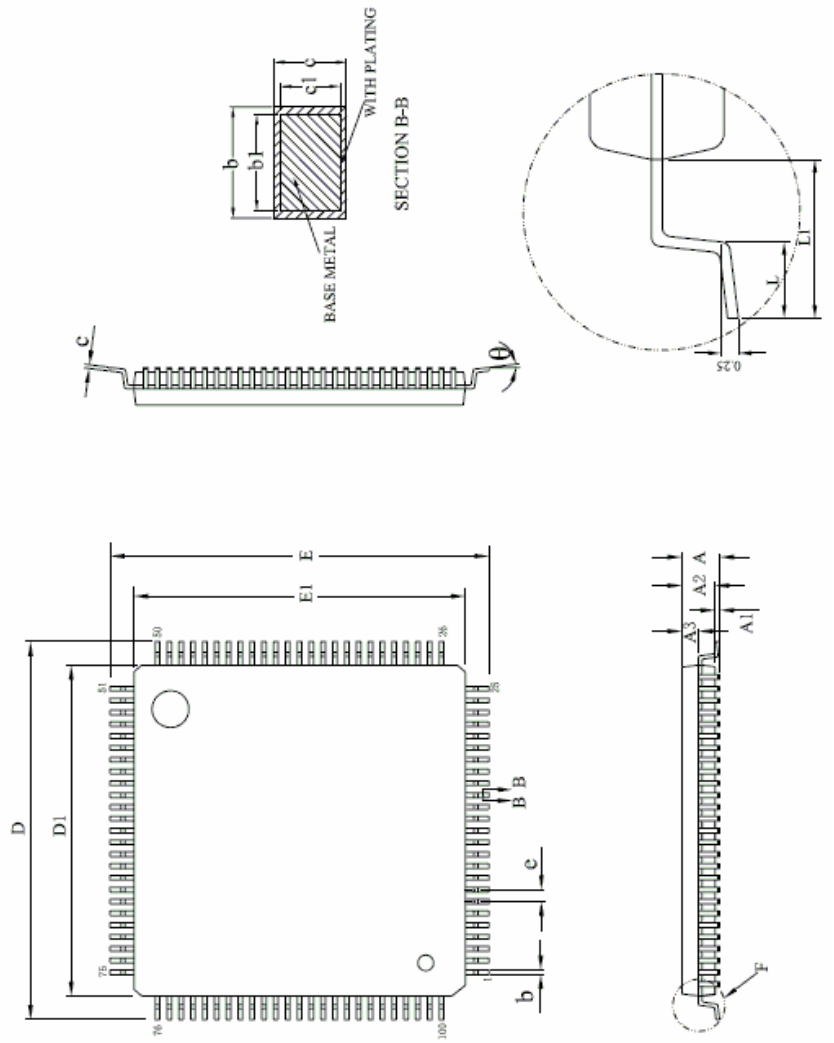

Figure 5 LQFP100-14x14mm Package Dimension Parameter

5. Electrical Specification

5.1 Absolute Maximum Ratings (Note 1)

Table 2 Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Power Supply Voltage (IO)	VCC_IO_AB	-0.5 to 4.6	V
Power Supply Voltage (Core)	VCC_CORE_AB	0 to 2	V
Power Supply Voltage (PLL)	VCC_PLL_AB	-0.2 to 2.2	V
Power Supply Voltage (DAC)	VCC_DAC_AB	-0.3 to 3.6	V
Storage Temperature	TEMP_STG	-20 to 125	C

5.2 Recommended Operating Conditions

Table 3 Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Power Supply Voltage (IO)	VCC_IO_OP	3.0	3.3	3.6	V
Power Supply Voltage (Core)	VCC_CORE_OP	1.62	1.8	1.98	V
Power Supply Voltage (PLL)	VCC_PLL_OP	1.62	1.8	1.98	V
Power Supply Voltage (DAC)	VCC_DAC_OP	3.0	3.3	3.6	V
Input Voltage (digital)	VIN	0		3.6	V
Operating Temperature	TEMP_OPR	0		70	C

5.3 Electrical Characteristics

Table 4 Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
VIH	Input High Voltage		2.0		3.6	V
VIL	Input Low Voltage		0		0.8	V
VOH	Output high voltage	@IOH=2mA	2.4			V
VOL	Output low voltage	@IOL=2mA			0.4	V
IOL	Low level output current for 8mA pins	@VOL = 0.4V	9.4	15.9	19.8	mA
IOH	Low level output current for 8mA pins	@VOH = 2.4V	11.2	23.8	38.3	mA
IL	Input leakage current		-10		10	uA
IOZ	Tri-state output leakage current		-10		10	uA
P_PLAY	Power consumption when playing	Playing mode		110		mW

Note:

1. "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. They are not meant to imply that the device should be operated at these limits.

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