



**MVSILICON**

**AU7850 USB HOST MP3/WMA DECODER**

# **AU7850 Datasheet**

**USB Host MP3/WMA Decoder SOC**

**Rev0.2**

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## Revision History

<b>Data</b>	<b>Revision</b>	<b>Description</b>
	<b>V0.1</b>	<b>Initial</b>
	<b>V0.2</b>	

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## 1. Overview

A highly integrated SOC for MP3/WMA player, AU7850 integrates MCU, MP3/WMA decoder, USB Host controller, SD/MMC card controller, SAR-ADC, audio DAC, RTC, LCD driver and an IR decoder in a single chip. Compared with traditional flash-MP3 player, AU7850 offers low cost, low power consumption, flexible and more powerful host MP3/WMA player solution.

### 1.1 Features

- | Low power 0.18um CMOS technology
- | 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 layer2/3 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 DAC
- | 1 channel AUX in
- | 1 channel FM in
- | 9 channel 12bit SARADC for peripheral controls
- | Embedded segment LCD driver, support 1/3 bias or 1/4 bias two types
- | Embedded low power RTC module
- | Support IR Remote control
- | GPIO for various purposes
- | Embedded LDO, convert 5V to 3.3V and 1.8V
- | Embedded Power-on-Reset
- | Embedded 32KB OTP for program code storage

## 1.2 Chip Architecture

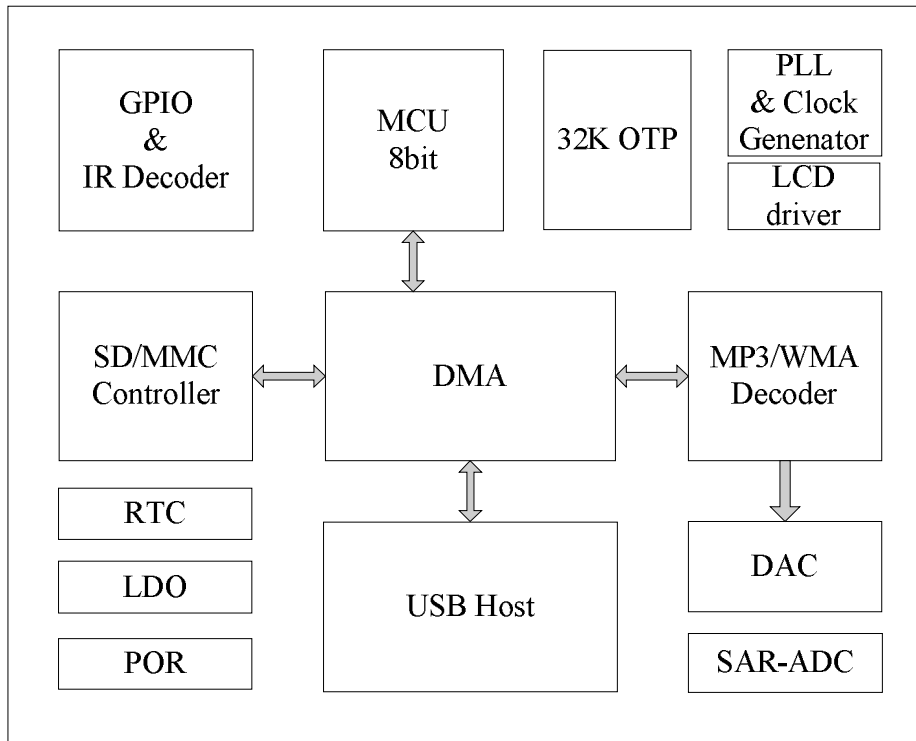


Figure 1 AU7850 Functional Block Diagram



## 2. System Application

### I MP3/WMA audio system

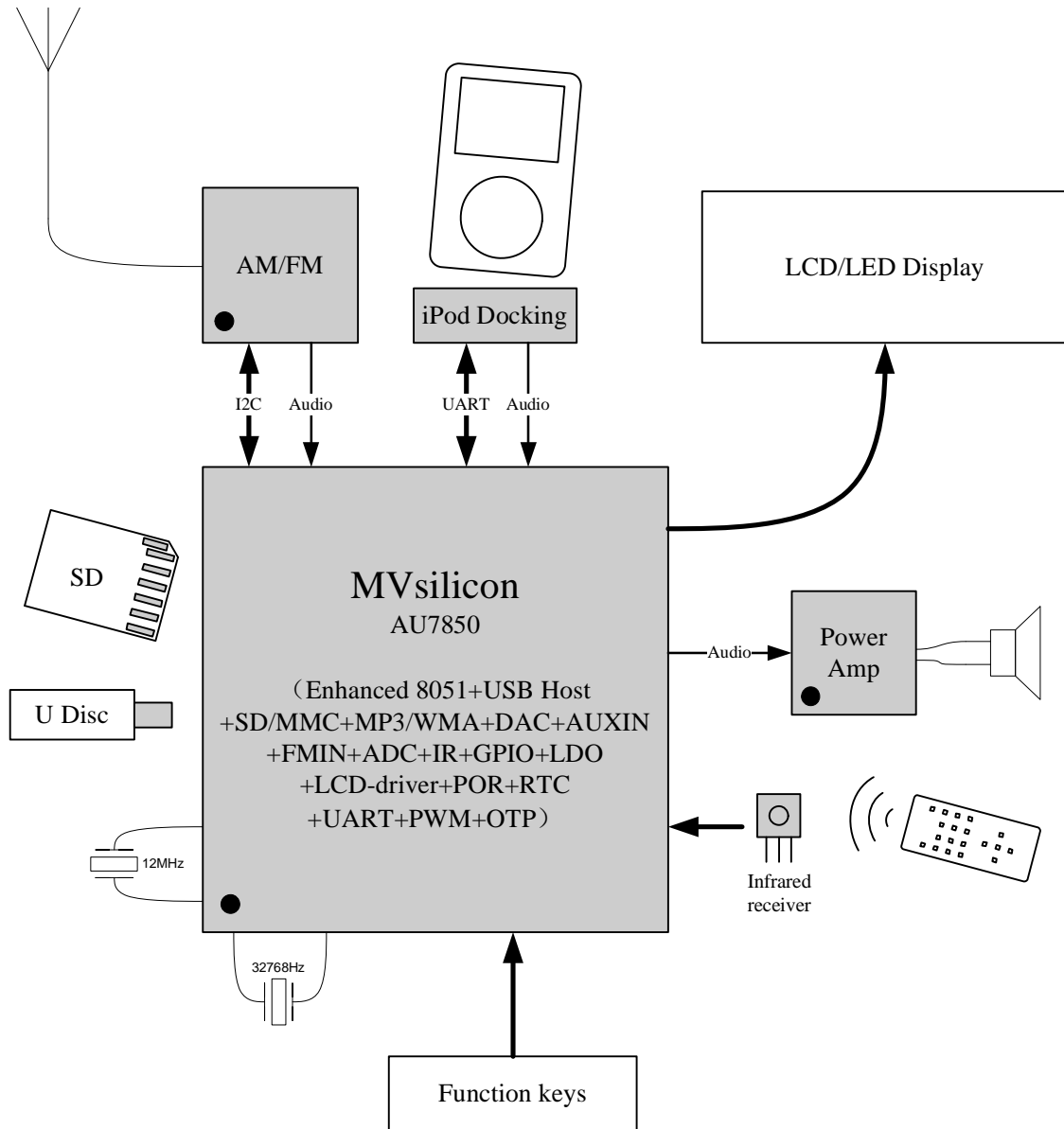


Figure 2 MP3/WMA Audio System

### 3. Pin Description

AU7850 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
PWR	Power
GND	Ground

#### 3.1 Pin Description

Table 1 Pin Description

Pin name	Pin #	Type	Description
<b>USB interface pins</b>			
<b>USB_DP</b>	14	I/O	USB Function D+ bus
<b>USB_DM</b>	13	I/O	USB Function D- bus
<b>DAC interface pins</b>			
<b>DAC_R</b>	41	AO	audio right channel output
<b>DAC_L</b>	42	AO	audio left channel output
<b>DACVMID</b>	40	AI	Internal voltage reference
<b>DAC_AUX_R</b>	43	AI	External AUX right channel in
<b>DAC_AUX_L</b>	44	AI	External AUX left channel in
<b>GPIO/MCU IO pins</b>			
<b>GPIO_A[1:0]</b>	37:36	I/O	GPIO PORT, bank A
<b>GPIO_A[2]</b>	9	I/O	GPIO PORT, bank A
<b>GPIO_A[3]</b>	6	I/O	GPIO PORT, bank A
<b>GPIO_A[4]</b>	8	I/O	GPIO PORT, bank A
<b>GPIO_A[5]</b>	7	I/O	GPIO PORT, bank A
<b>GPIO_A[7:6]</b>	46:45	I/O	GPIO PORT, bank A
<b>GPIO_B[5:0]</b>	33:28	I/O	GPIO PORT, bank B
<b>GPIO_B[6]</b>	1	I/O	GPIO PORT, bank B
<b>GPIO_B[7]</b>	3	I/O	GPIO PORT, bank B
<b>GPIO_C[0]</b>	5	I/O	GPIO PORT, bank C
<b>GPIO_C[1]</b>	34	I/O	GPIO PORT, bank C
<b>GPIO_C[2]</b>	4	I/O	GPIO PORT, bank C
<b>GPIO_C[3]</b>	48	I	GPIO PORT, bank C
<b>GPIO_D[7:0]</b>	27:20	I/O	GPIO PORT, bank D
<b>CLK pins</b>			
<b>XIN</b>	18	I	12MHz Crystal oscillator input for PLL

<b>XOUT</b>	19	O	12MHz Crystal oscillator output for PLL
<b>RTC_XIN</b>	11	I	32.768KHz Crystal oscillator input for RTC
<b>RTC_XOUT</b>	10	O	32.768KHz Crystal oscillator output for RTC
<b>Power/Ground pins</b>			
<b>VDD33</b>	2 35	PWR	power for digital
<b>DVSS</b>	47	GND	ground for digital
<b>LDO180</b>	17	PWR	LDO 1.8V out
<b>LDO330</b>	15	PWR	LDO 3.3V out
<b>LDO5V</b>	16	PWR	LDO 5V power in
<b>DACVDD33</b>	38	PWR	power for DAC
<b>DACVSS</b>	39	GND	ground for DAC
<b>RTC_PWR</b>	12	PWR	Power for RTC

## 4. Package

### 4.1 Package Diagram

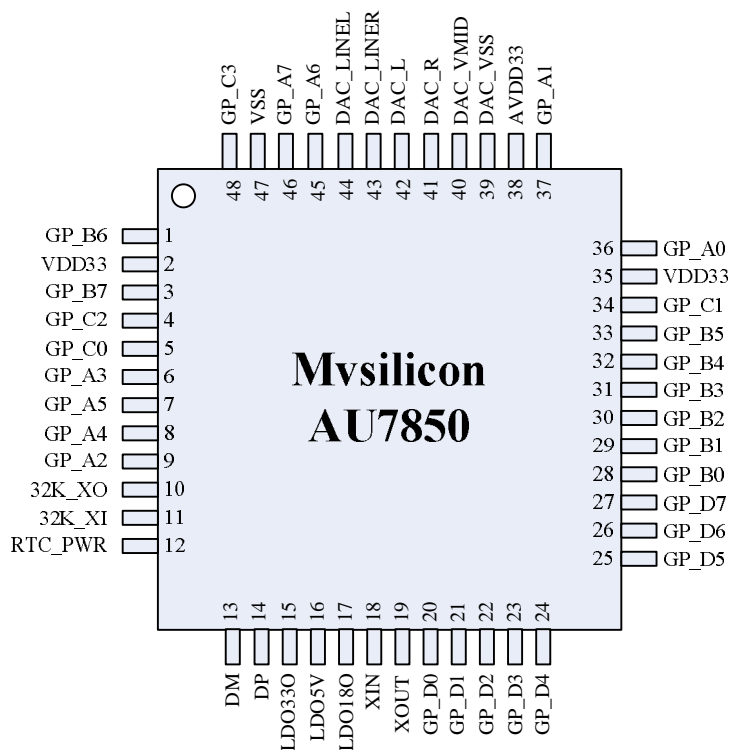


Figure 3 Package Diagram (LQFP48-7x7mm / TOP View)

## 4.2 Package Dimension Parameter

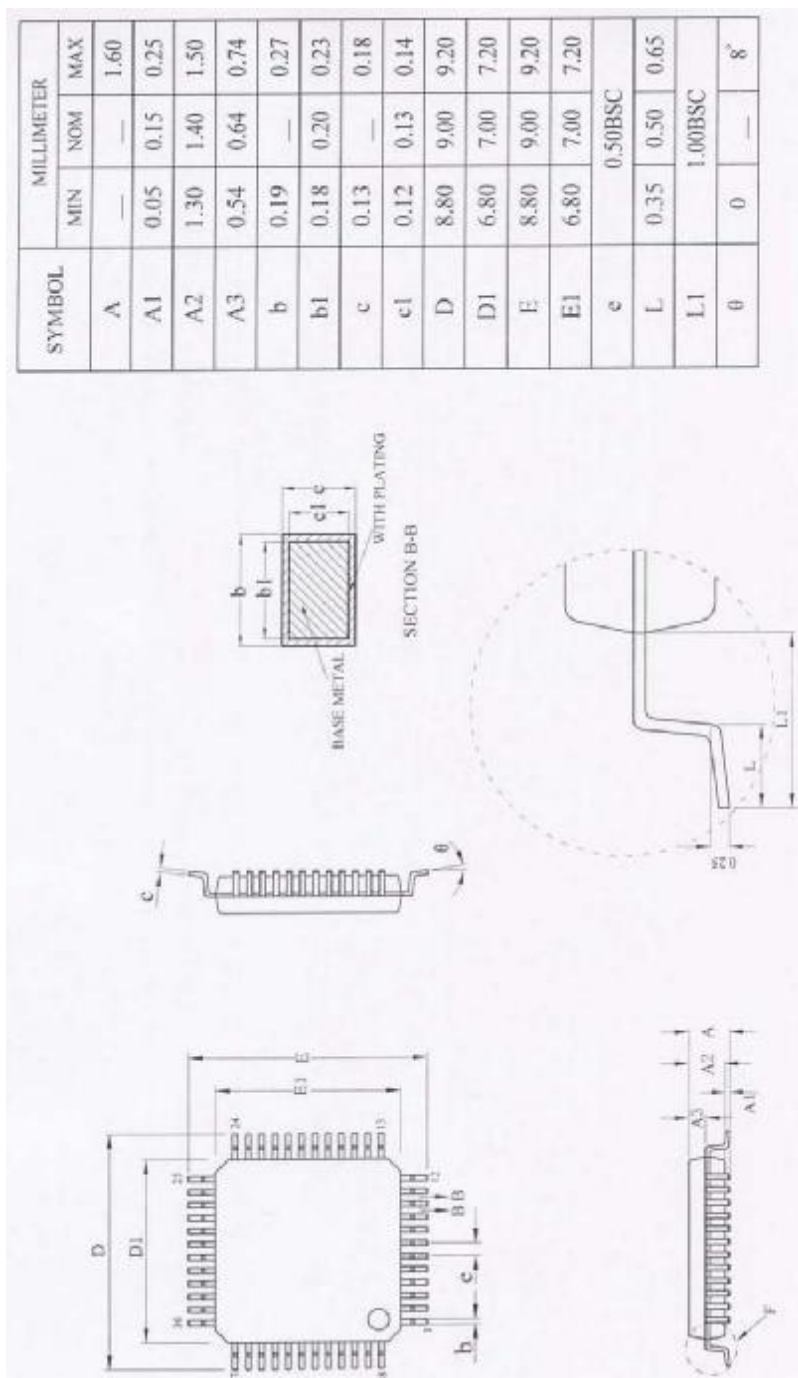


Figure 4 LQFP48-7x7mm Package Dimension Parameter

## 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
Storage Temperature	TEMP_STG	-65 to 150	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	3.3	3.6	V
Power Supply Voltage (Core)	VCC_CORE_OP	1.62	1.8	1.98	V
Input Voltage	VIN	0		3.6	V
Input Voltage (GPIO_C3)	VIN	0		5.5	V
Operating Free Air Temperature	TEMP_OPR	-20		70	C

### 5.3 Electrical Characteristics

Table 4 Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V <sub>IH</sub>	Input High Voltage		1.57		3.6	V
V <sub>IL</sub>	Input Low Voltage		-0.3		1.2	V
V <sub>OH</sub>	Output high voltage	@IOH=2mA	3.0			V
V <sub>OL</sub>	Output low voltage	@IOL=2mA			0.3	V
I <sub>L</sub>	Input leakage current		-10		10	uA
P <sub>PLAY</sub>	Power consumption when playing	Playing mode		85		mW

### 5.4 Audio Performance

Table 5 Audio Performance

Characteristics	Min	Typ	Max	Unit
Frequency Response 40Hz ~ 20KHz		<=1		DB
THD+N(1KHz out = 800mv rms)		<0.3		%
S/N (1KHz out = 800mv rms)		> -65		DB
L/R Channel Difference		0		DB
L/R Channel Separation		-65		DB
Max Noise Out		<0.5		MV



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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