



MVSILICON

AU7840 USB HOST MP3/WMA DECODER SOC

AU7840 Datasheet

USB Host MP3/WMA Decoder SOC

Rev 1.00

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Revision History

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1. Overview

A highly integrated SOC for MP3/WMA player, AU7840 integrates MCU, MP3/WMA decoder, USB Host controller, SD/MMC card controller, a 16-bit audio decoder, ADC and an IR decoder in a single chip. Compared with traditional flash-MP3 player, AU7840 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 125mW, support sleep mode
- 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 sigma-delta audio DAC
- Embedded headphone amplifier
- Support IR Remote control
- GPIO for various purposes
- 1 channel 10-bit SAR ADC for peripheral controls
- 1 channel AUX in
- Embedded 64KB OTP memory for program code storage



1.2 Chip Architecture

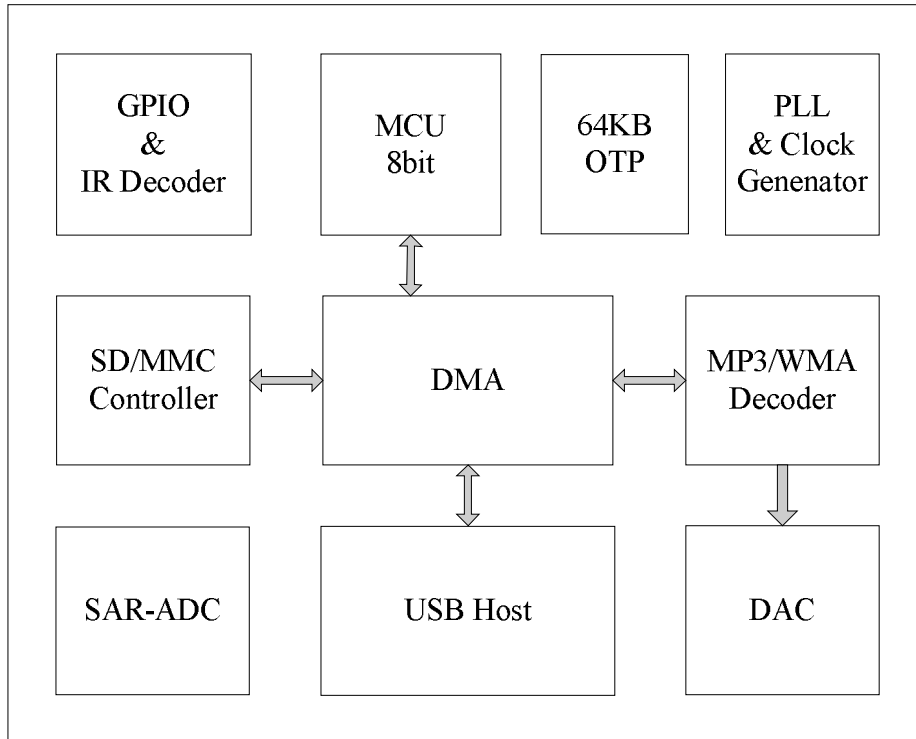


Figure 1 AU7840 Functional Block Diagram

2. System Application

- **MP3/WMA audio system**

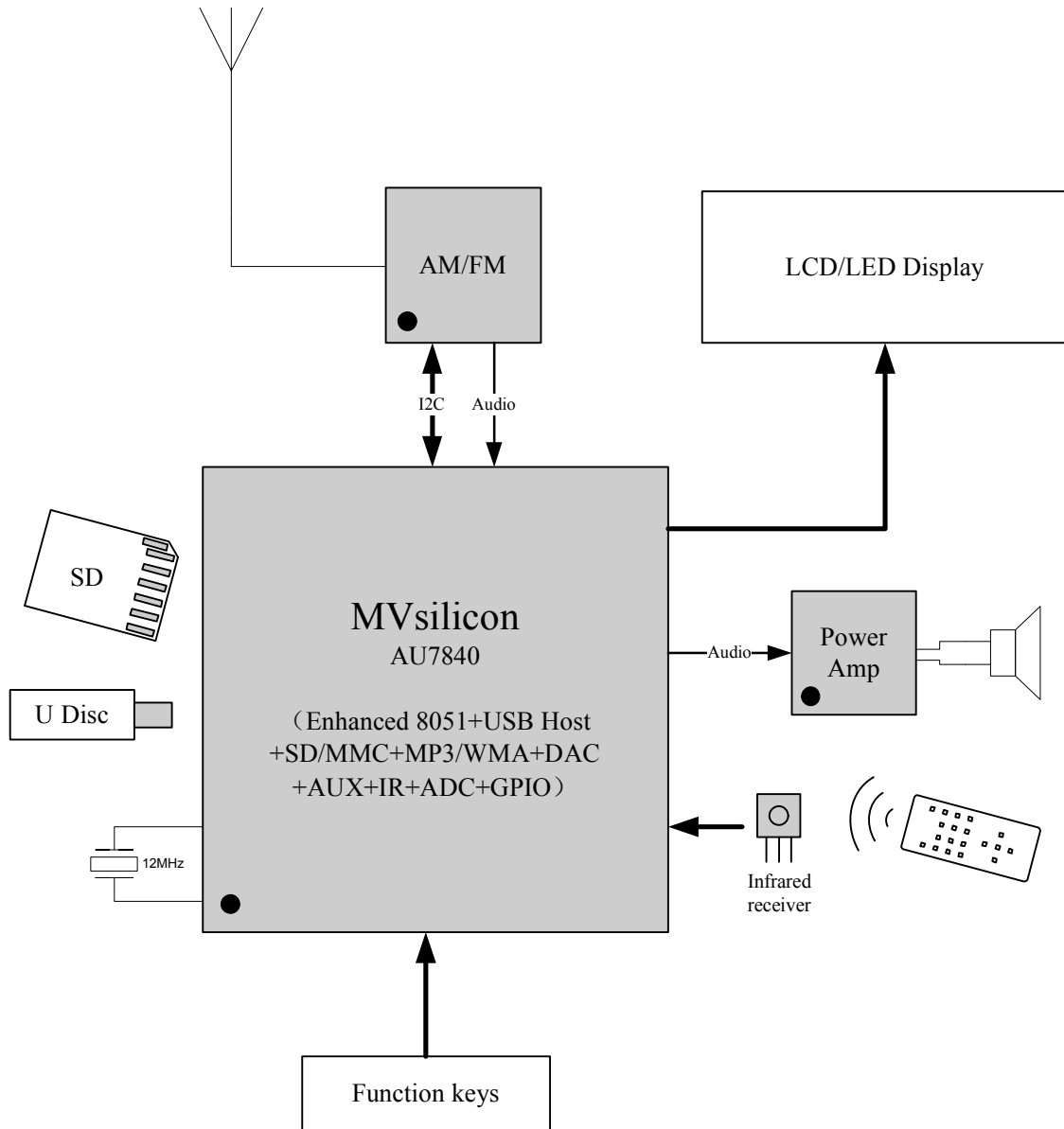


Figure 2 MP3/WMA Audio System

3. Pin Description

AU7840 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
AI	Analog Input
AO	Analog Output
PWR	Power
GND	Ground

3.1 Pin Description

Table 1 Pin Description

Pin name	Pin #	Type	Description
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	26	O	SD Card clock
SD_CMD	27	I/O	SD Card command line
SD_DAT0	28	I/O	SD Card data line
DAC AUDIO interface pins			
DAC_HPOUTR	48	AO	Head phone right channel output
DAC_HPOUTL	2	AO	Head phone left channel output
DAC_VREF	4	AI	Internal voltage reference
AUXIN_R	46	AI	External AUX right channel in
AUXIN_L	47	AI	External AUX left channel in
SAR ADC interface pins			
REXT100K	6	AI	ADC connected with a 100kohm external resistor
ADC_CH1	7	AI	Analog voltage input, channel 1
GPIO/MCU IO pins			
GPIO_A[3:0]	17:14	I/O	GPIO PORT, bank A
GPIO_A[7:4]	24:21	I/O	GPIO PORT, bank A
GPIO_B[2]	25	I/O	GPIO PORT, bank B
GPIO_B[7:3]	41:37	I/O	GPIO PORT, bank B
GPIO_C[1:0]	30:29	I/O	GPIO PORT, bank C
GPIO_C[3:2]	34:33	I/O	GPIO PORT, bank C
GPIO_D[0]	36	I/O	GPIO PORT, bank D



GPIO D[1]	42	I/O	GPIO PORT, bank D
CLK & Reset pins			
XIN	12	I	12MHz Crystal oscillator input for PLL
XOUT	13	O	12MHz Crystal oscillator output for PLL
RESET_N	20	I	System reset, active low
mod pin			
MOD[1:0]	43:44	I	Chip run mode configure pin
TEST	45	I	Chip test pin
Power/Ground pins			
DAC VDD33	3	PWR	Analog power for DAC(3.3V)
DAC_VSS	1	GND	Analog ground for DAC
AVDD33	5	PWR	Analog power(3.3V)
AVDD18	8	PWR	Analog power(1.8V)
VDD33	11 35	PWR	Digital power for I/O(3.3V)
VSS	19 31	GND	Digital IO/core ground
VDD18	18 32	PWR	Digital power for core (1.8V)

4. Package

4.1 Package Diagram

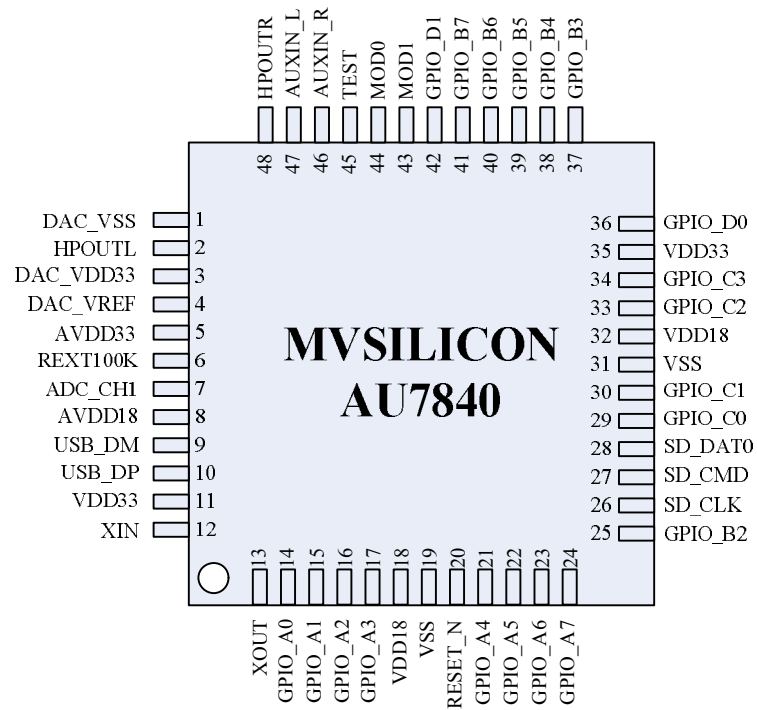


Figure 3 Package Diagram (LQFP48-7x7mm / TOP View)

4.2 Package Dimension Parameter

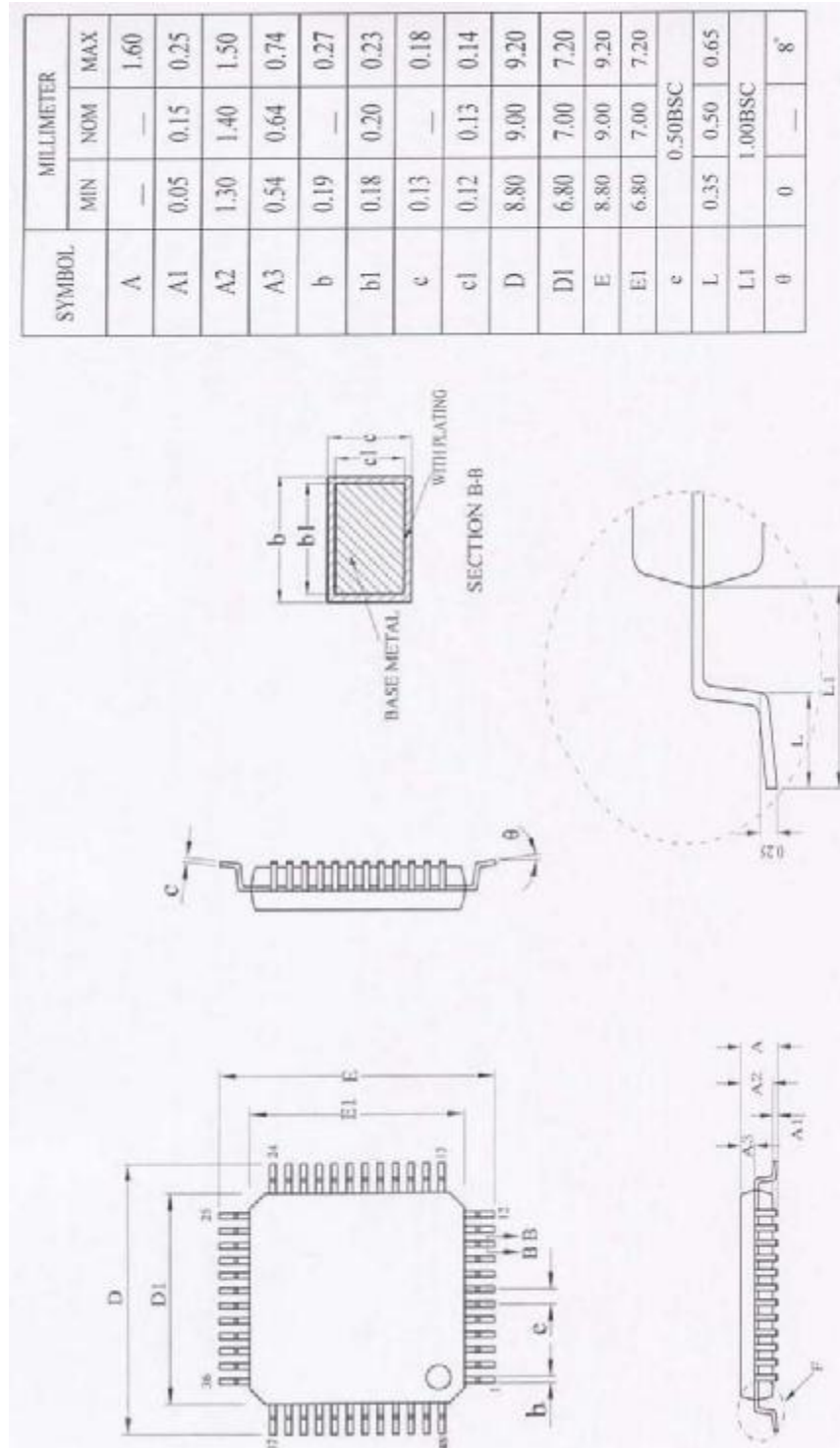


Figure 4 LQFP48-7x7mm Package Dimension Parameter

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
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	-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	2.97	3.3	3.63	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
Power Supply Voltage (ADC)	VCC_ADC_OP	3.15	3.3	3.45	V
Input Voltage (digital)	VIN	-0.3		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 _{IH}	Input High Voltage		2.0		5.5	V
V _{IL}	Input Low Voltage		-0.3		0.8	V
V _{OH}	Output high voltage	@I _{OH} =2mA	2.4			V
V _{OL}	Output low voltage	@I _{OL} =2mA			0.4	V
I _{OL}	Low level output current for 8mA pins	@V _{OL} = 0.4V	9.7	15.6	18.8	mA
I _{OH}	Low level output current for 8mA pins	@V _{OH} = 2.4V	11.6	23.5	36.0	mA
I _L	Input leakage current		-10		10	uA
I _{OZ}	Tri-state output leakage current		-10		10	uA
P _{PLAY}	Power consumption when playing	Playing mode		125		mW
P _{SLEEP}	Power consumption when sleeping	Sleeping mode		1.5		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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