



Best Single Chip USB Audio Controller for PC Entertainment

CM101S USB Audio Controller Technical Brief

Version 1.1

VP	Project Leader	Product Manager	Engineer	Test Engineer
<i>Eric Cheng</i>	<i>Lawrence Ding</i>	<i>Deko Tsai</i>	<i>William Liu</i>	<i>Yi-Sung Lin</i>

C-MEDIA ELECTRONICS INC.

TEL: 886-2-8773-1100 FAX: 886-2-8773-2211

6F, 100, Sec. 4, Civil Boulevard, Taipei, Taiwan 106, R.O.C.

For detailed product information, please contact sales@cmedia.com.tw

NOTICES

THIS DOCUMENT IS PROVIDED “AS IS” WITH NO WARRANTIES WHATSOEVER, INCLUDING ANY WARRANTY OF MERCHANTABILITY, NONINFRINGEMENT, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY WARRANTY OTHERWISE ARISING OUT OF ANY PROPOSAL, DOCUMENT OR SAMPLE.

ALL RIGHTS RESERVED. NO PART OF THIS DOCUMENT MAY BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING INFORMATION STORAGE AND RETRIEVAL SYSTEMS, WITHOUT PERMISSION IN WRITING FROM THE C-MEDIA ELECTRONICS, INC.

Third-party brands and names are the property of their respective owners.

Copyright 2002-2003 © C-Media Electronics Inc.

C-Media reserves the right to modify the specifications without further notice

1. DESCRIPTION AND OVERVIEW

CM101S is a highly integrated single chip for multimedia USB audio application. For traditional stereo audio source playback, no additional driver is required on all mainstream OSs, making it a truly plug-and-play audio device. For value added applications, C-Media provides driver and software to replace the standard USB audio driver; features including Dolby Digital Real-Time AC-3 encoding, global reverberation, equalizer, Sensaura 3D sound, boost gain with AGC, and virtual speaker shifter. For energy saving, USB suspend mode and resume is supported by CM101S. More flexible and customized design is possible with GPIO pin, which is accessible by USB vendor specific request.

Features

- USB 2.0 Full Speed Compatible
- USB audio device class specification v1.0 Compatible
- USB bus powered 500mA operation with suspend mode support
- Single 12MHz crystal input with on-chip PLL and embedded USB transceiver
- USB audio function topology has 1 input terminal, 1 output terminal, and 1 feature unit
- Alternate zero bandwidth setting for releasing bandwidth on USB bus during inactive operation
- Isochronous transfer using adaptive synchronization with internal PLL
- High performance 48KHz sampling rate for audio playback
- Embedded high performance 16 bit audio DAC
- Embedded class AB power amplifier for speaker driving
- Embedded power on reset block and Power amplifier enable / disable control pin
- Volume control input with simple external VR circuit
- GPIO pin for application specific usage
- **S/PDIF output interface**
- Single 5V external power supply with internal power regulation
- 3.3V IO with 5V tolerance; 3.3V core logics design
- Compatible with Win 98SE / Win ME / Win 2000 / Win XP, and Mac OS 9 / OS X without additional driver
- Compact 18 pin SOP package
- Target application: multimedia USB audio box, decoder integrated, pen driver
- **Dolby Digital Real Time Content Encoder (AC-3) software value added**
- **Software Xear 3D Sound Technology With HRTF 3D, EAX™, Speaker Shifter and Virtual 5.1CH effects**

PIN DESCRIPTIONS

CM101S

PIN #	Signal Name	PIN #	Signal Name
1	PAEN	10	TEST
2	GPIO	11	VREF
3	XO	12	VOLADJ
4	XI	13	AVDD
5	DVDD1	14	LOL
6	DVDD2	15	LOR
7	USBDP	16	AVSS
8	USBDM	17	SPDIF Out
9	DVSS	18	PDSW

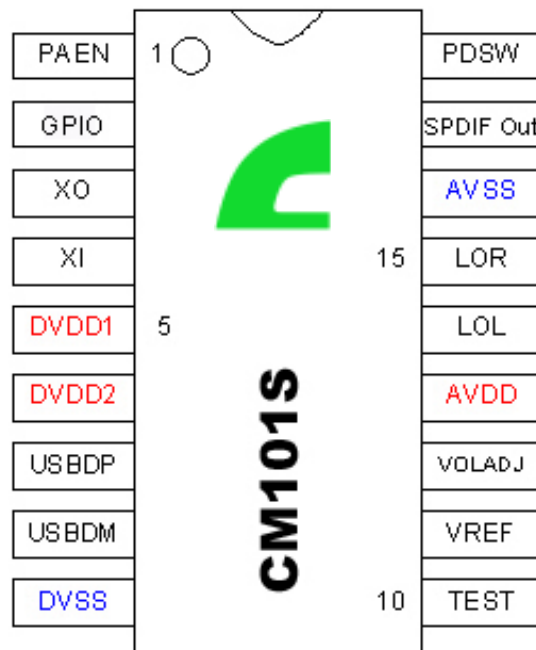
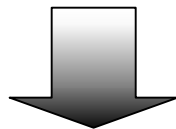


Figure 1. Pin Assignments (Top View)

Pin #	Symbol	Type	Description
1	PAEN	DI, PD	Power amplifier enable; H – normal mode, L – power down power amplifier
2	GPIO	DIO, PD	GPIO pin, default is input mode after reset; accessible by USB vendor specific request
3	XO	AO	Clock output pin for 12MHz oscillator
4	XI	AI	Clock input pin for 12MHz oscillator
5	DVDD1	P	5V digital power
6	DVDD2	P	3.3V voltage from internal regulator for decouple capacitor connection It is not affected by power down mode and can be used to connect USB pull up resistor.
7	USBDP	AIO	USB data D+
8	USBDM	AIO	USB data D-
9	DVSS	P	5V digital ground
10	TEST	DI, PD	Test mode select pin; pull low in normal mode operation
11	VREF	AO	Connect to external decouple capacitor for embedded bandgap
12	VOLADJ	AI	0 ~ 2.25V input for volume adjustment by external VR; pull high to disable VR volume adjustment function
13	AVDD	P	5V analog power
14	LOL	AO	Line out left channel
15	LOR	AO	Line out right channel
16	AVSS	P	5V analog ground
17	SPDIF Out	DO	SPDIF Out
18	PDSW	DO, 4mA	Power down switch control 1: normal mode, 0: power down mode

- Note: DI – digital input pin , DO – digital output pin, DIO – digital bi-directional pin, P – power pin, PD – pull down with 100K Ohm resistor, AI – analog input, AO – analog output

Block Diagram of CM101S

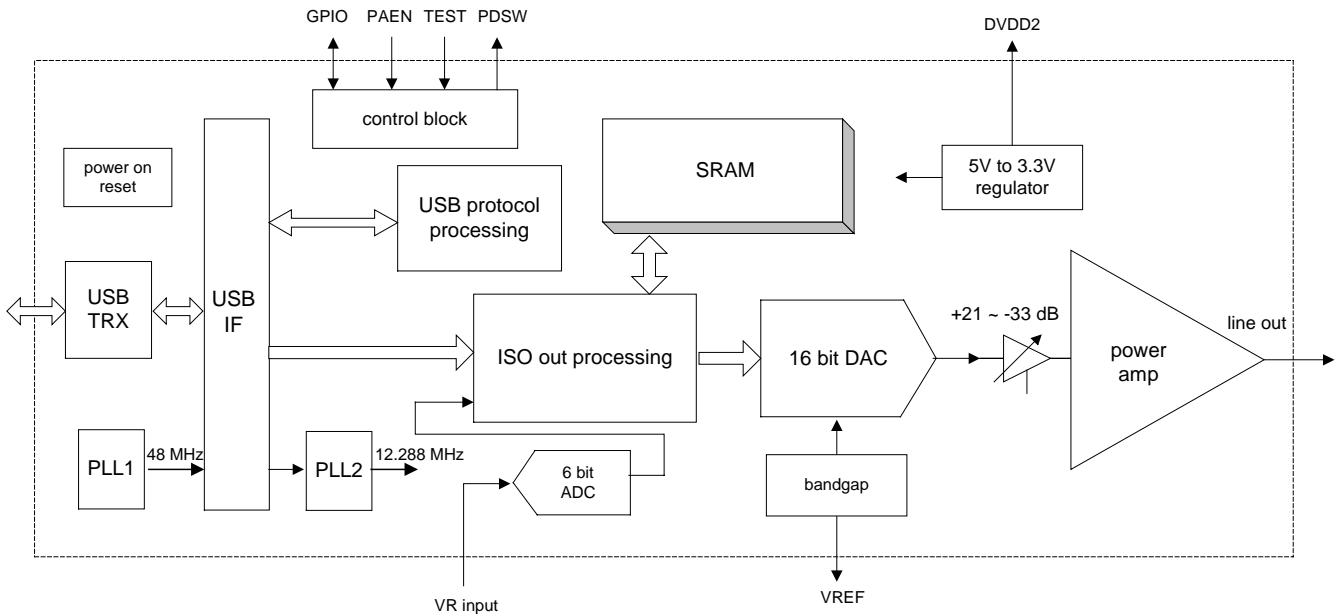


Figure 2 : Block Diagram of CM101S

Vendor Specific Request for GPIO Access

GPIO write

Offset	Field	Size	Value	Description
0	bmRequestType	1	43	
1	bRequest	1	01	
2	wValue	2	Value	Bit 0: GPIO value Bit 1: 1: output; 0: input
4	wIndex	2	0000	
6	wLength	2	0000	

GPIO read

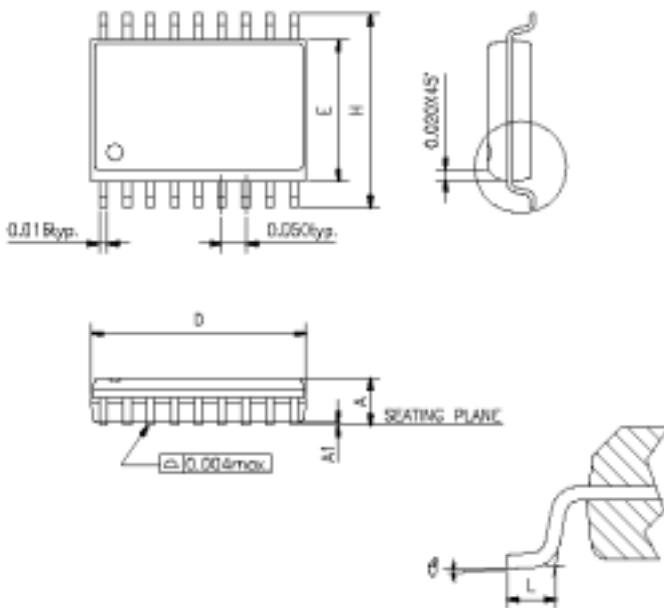
Offset	Field	Size	Value	Description
0	bmRequestType	1	C3	
1	bRequest	1	81	
2	wValue	2	Value	Bit 0: GPIO value Bit 1: 1: output; 0: input
4	wIndex	2	0000	
6	wLength	2	0001	

2. ORDERING INFORMATION

Model Number	Package	Operating Ambient Temperature	Supply Range
CM101S	18-Pin SOP	0 o C to +70 o C	DVdd = 4.5V, AVdd = 5.5V

Outline of Dimensions Dimensions shown in inches and (mm)

◆18-Pin SOP



SYMBOLS	MIN.	MAX.
A	0.093	0.104
A1	0.004	0.012
D	0.447	0.463
E	0.291	0.299
H	0.394	0.419
L	0.016	0.050
θ	0	8

Figure 3 : Mechanical Dimension of CM101S