Best USB Audio I/O Controller for

Headset and Multi-media Devices

CM108 High Integrated USB Audio I/O Controller Technical Brief

Version 1.0

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1.DESCRIPTION AND OVERVIEW

CM108 is a highly integrated single chip USB audio solution. All essential analog modules are embedded in CM108, including dual DAC and earphone driver, ADC, microphone booster, PLL, regulator, and USB transceiver. It is very suitable for USB headset, USB earphone or USB audio interface box application. Many features are programmable with jumper pins or external EEPROM. In addition, audio adjustment can be easily controlled via specific HID compliant volume control pins. Better yet, CM108 to adopt BTL type for analog output which can saving one capacitor. For value added application, external codec or audio DSP can be connected to CM108 via IIS pin for further processing. 4 GPIO pins can be accessed with customer application software for more flexible application.

Features

- Compliant with USB 2.0 full speed operation
- Compliant with USB audio device class specification v1.0
- Supports USB suspend/resume mode and remote wakeup with volume control pins
- Single 12MHz crystal input with on-chip PLL and embedded USB transceiver
- Jumper pin for speaker mode (playback only) or headset mode (playback + recording)
- For headset mode, USB audio function topology has 2 input terminals, 2 output terminals, 1 mixer unit, 1 selector unit, and 3 feature units
- Jumper pin for mixer unit enable/disable under headset mode
- For speaker mode, USB audio function topology has 1 input terminal, 1 output terminal, and 1 feature unit
- Support one control endpoint, one isochronous out endpoint, one isochronous in endpoint, and one interrupt in endpoint
- Alternate zero bandwidth setting for releasing playback bandwidth on USB bus when this device is inactive
- Volume up, volume down, and playback mute support USB HID for host control synchronization
- Record mute pin with LED indicator for record mute status
- External EEPROM interface for vendor specific USB VID, PID, and serial number
- EEPROM write function via vendor specific request for mass production convenience
- Customized embedded VID, PID, and product string by customer request
- 4 GPIO pins with read/write via HID
- S/PDIF output interface

Features

- Jumper pin for output voltage swing (3.5V or 2.5V)

- Jumper pin for power mode setting

- Isochronous transfer uses adaptive mode with internal PLL for synchronization

- 48K/44.1KHz sampling rate for both playback and recording

- Soft mute function

- Embedded high performance 16 bit audio DAC with earphone phone buffer

- I^2S interface for external ADC, DAC, or DSP.

- Adopt BTL Type for analog output, earphone unit direct connection without capacitor

- Host side data loss noise reduction function

- Embedded 16 bit ADC input with microphone boost

- Embedded power on reset block

- Embedded 5V to 3.3V regulator for single external 5V operation

- Compatible with Win98 SE / Win ME / Win 2000 / Win XP and Mac OS9 / OS X without additional driver

- 48 pin LQFP package

PIN DESCRIPTIONS

CM108 Pin Table

PIN #	Signal Name	PIN #	Signal Name	PIN #	Signal Name
1	SPDIFO	17	ADSCLK	33	AVSS2
2	DW	18	MUTEP	34	AVDD2
3	DR	19	ADLRCK	35	DVDD
4	SK	20	ADMCLK	36	DVSS2
5	CS	21	LEDR	37	REGV
6	MUTER	22	ADSEL	38	MSEL
7	PWRSEL	23	TEST	39	VOLUP
8	XI	24	AO	40	PDSW
9	XO	25	AO	41	USBDP
10	MODE	26	AI	42	USBDM
11	GPIO2	27	AI	43	GPIO1
12	LEDO	28	P	44	SDOUT
13	GPIO3	29	AO	45	DAMCLK
14	DVSS1	30	AO	46	DALRCK
15	GPIO4	31	AO	47	DASCLK
16	SDIN	32	AO	48	VOLDN
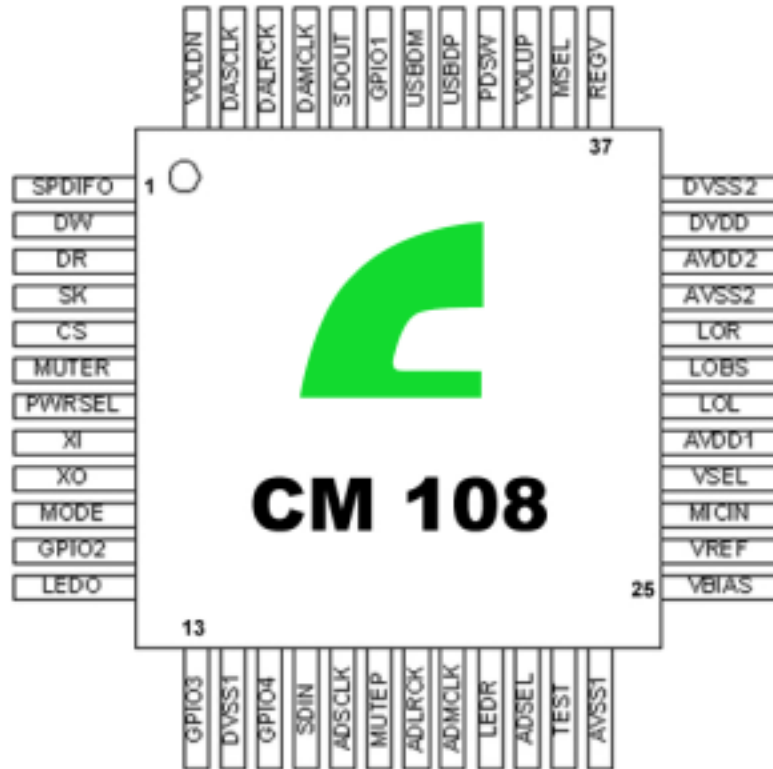
Figure 1. Pin Assignments (Top View)

Pin #	Symbol	Type	Description
1	SPDIFO	DO, 8mA, SR	SPDIF output
2	DW	DIO, 8mA, PD, 5VT	EEPROM interface data read from EEPROM
3	DR	DO, 4mA, SR	EEPROM interface data write to EEPROM
4	SK	DO, 4mA, SR	EEPROM interface clock
5	CS	DO, 4mA, SR	EEPROM interface chip select
6	MUTER	DI, ST, PU	Mute recording (edge trigger with de-bouncing)
7	PWRSEL	DI, ST	Only works with speaker mode (MODE pin pull H)Speaker mode 1-self power with 100mA 0-bus power with 500mAHeadset mode 1-bus power with 100mA 0-bus power with 500mA
8	XI	DI	Input pin for 12MHz oscillator
9	XO	DO	Output pin for 12MHz oscillator
10	MODE	DI, ST	Mode select bonding option 0-headset mode playback & recording; affected by PWRSEL 1-speaker mode playback only; affected by PWRSEL; ADC and mixer are both power down

Pin #	Symbol	Type	Description
11	GPIO2	DIO, 8mA, PD, 5VT	GPIO pin
12	LEDO	DO, SR, 8mA	LED for operation; output H for power on; toggling for data transmit
13	GPIO3	DIO, 8mA, PD, 5VT	GPIO pin
14	DVSS1	P	Digital grounding
15	GPIO4	DIO, 8mA, PD, 5VT	GPIO pin
16	SDIN	DIO, 8mA, PD, 5VT	ADC I2S data input
17	ADSCLK	DO, 4mA, SR	ADC I2S serial clock
18	MUTEP	DI, ST, PU	Mute playback (edge trigger with de-bouncing)
19	ADLRCK	DO, 4mA, SR	ADC I2S left/right clock
20	ADMCLK	DO, 4mA, SR	11.2896MHz output for 44.1KHz sampled data and 12.288MHz for 48KHz sampled data
21	LEDR	DO, SR, 8mA	LED for mute recording indicator; output H when recording is muted
22	ADSEL	DI, ST, PD	ADC input source select pin
23	TEST	DI, ST, PD	Test mode select pin; pull low for normal operation
25	VBIAS	AO	Microphone bias voltage supply (4.5V), with a small driving capability
26	VREF	AO	Connecting to external 10uF decoupling capacitor for embedded bandgap circuit; 2.25V output
27	MICIN	AI	Microphone input
28	VSEL	AI	0 2.5Vpp output 1 3.5Vpp output
29	AVDD1	P	5V analog power for analog circuit
30	LOL	AO	Line out left channel
31	LOBS	AO	DC 2.25V output for line out bias
32	LOR	AO	Line out right channel
33	AVSS2	P	Analog ground
34	AVDD2	P	5V analog power for analog circuit

Pin #	Symbol	Type	Description
35	DVDD	P	5V power supply to internal regulator
36	DVSS2	P	Digital grounding
37	REGV	AO	3.3V reference output for internal 5V to 3.3V regulator
38	MSEL	DI, ST	0-without mixer 1-with mixer (with default mute) USB descriptors are changed accordingly; mixer is power down by MSEL pulled L
39	VOLUP	DI, ST, PU	Volume up (edge trigger with de-bouncing)
40	PDSW	DO, 4mA , OD	Power down switch control (for PMOS polarity) 0-normal mode 1-power down mode
41	USBDP	AIO	USB data D+
42	USBDM	AIO	USB data D-
43	GPIO1	DIO, 8mA, PD, 5VT	GPIO pin
44	SDOUT	DO, 4mA, SR	DAC I2S data output
45	DAMCLK	DO, 4mA, SR	11.2896MHz output for 44.1KHz sampled data and 12.288MHz for 48KHz sampled data
46	DALRCK	DO, 4mA, SR	DAC I2S left/right clock
47	DASCLK	DO, 4mA, SR	DAC I2S serial clock
48	VOLDN	DI, ST, PU	Volume down (edge trigger with de-bouncing)

- DI – digital input pad, DO – digital output pad, DIO – digital bi-directional pad, AI/AO/AIO – analog pad, SR slew rate control, ST – Schmitt trigger, PD/PU – pull down or pull up, 5VT – 5 volt tolerant (3.3V pad), OD – open drain

I^{2}S interface

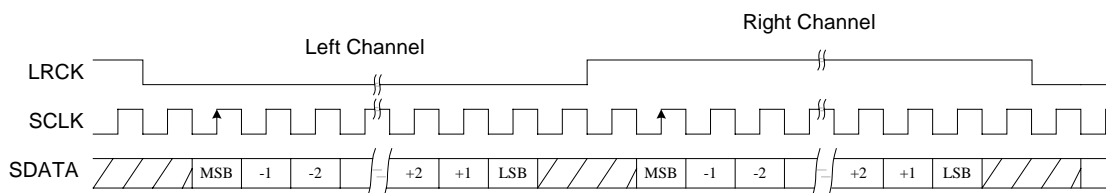Both playback and recording adopt the same mode

Figure 2   I^{2}S Block Of CM108

External EEPROM content

670X   where X = bit 4, 3, 2, 1
bit 2 serial number enable control 1: enable 0: disable
bit 1 product string enable control 1: enable 0: disable

1W = 2Bytes

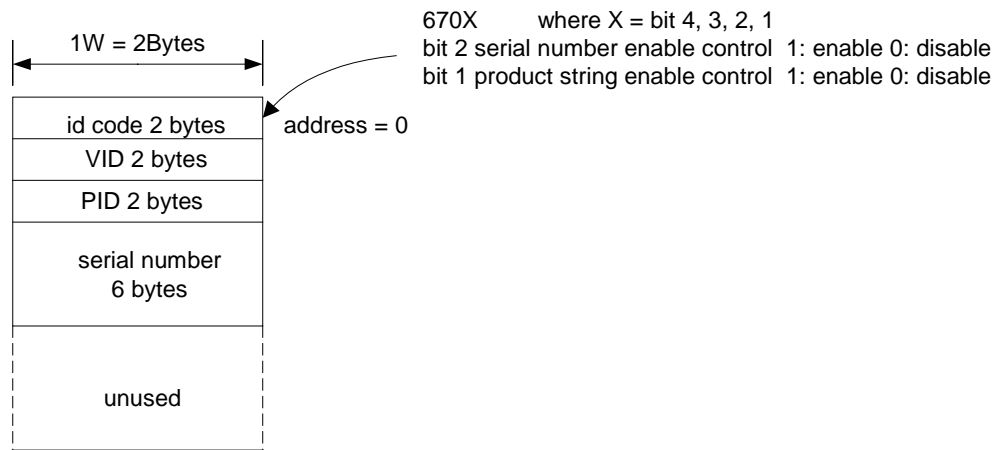| id code 2 bytes |
| VID 2 bytes |
| PID 2 bytes |
| serial number 6 bytes |
| unused |

address = 0

Figure 3   EEPROM Block Of CM108
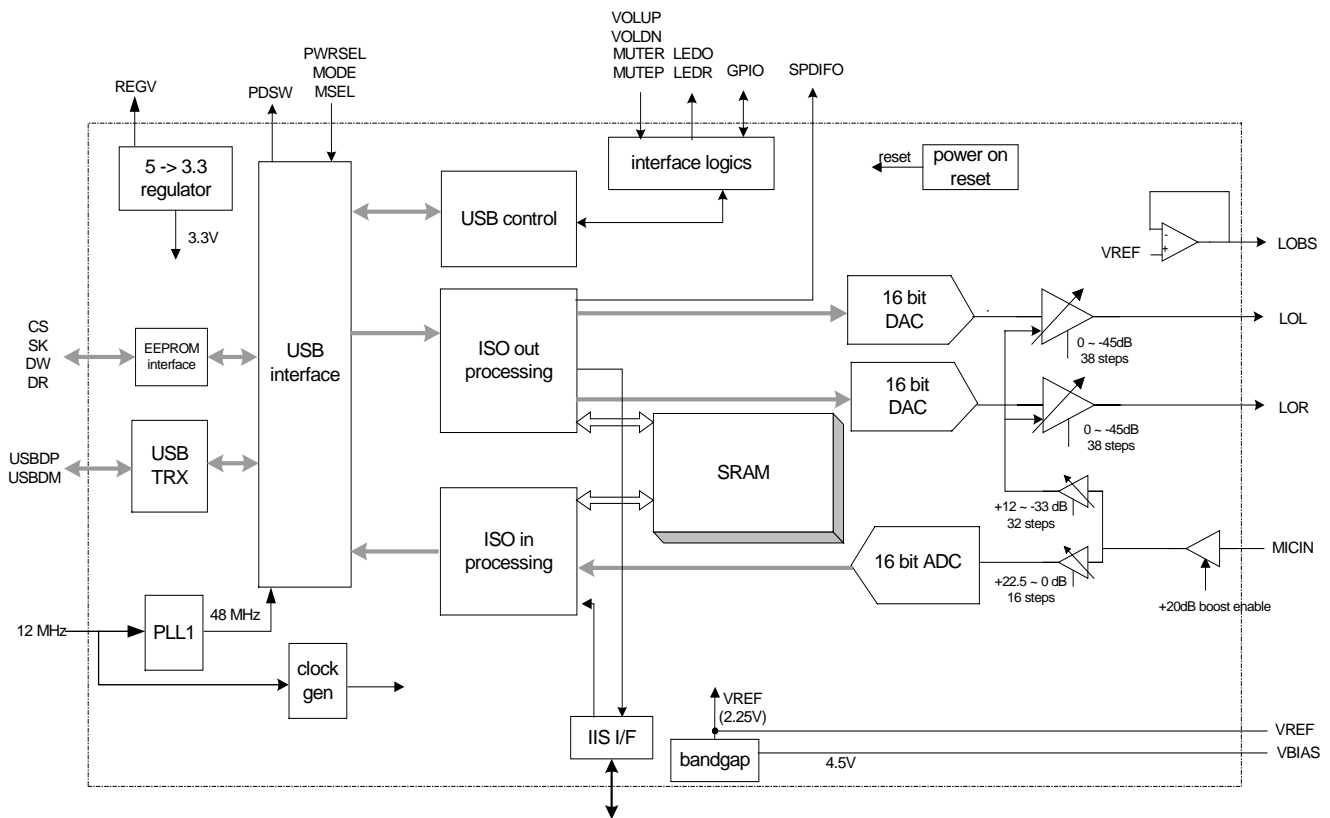
Function Block Diagram of CM108

Figure 3   Function Block Diagram Of CM108

2. ORDERING INFORMATION

Model Number	Package	Operating Ambient Temperature	Supply Range
CM108	48-Pin LQFP 7mm×7mm×1.4mm	0 o C to +70 o C	DVdd = 3.3V, AVdd = 5V

Outline of Dimensions Dimensions shown in inches and (mm)

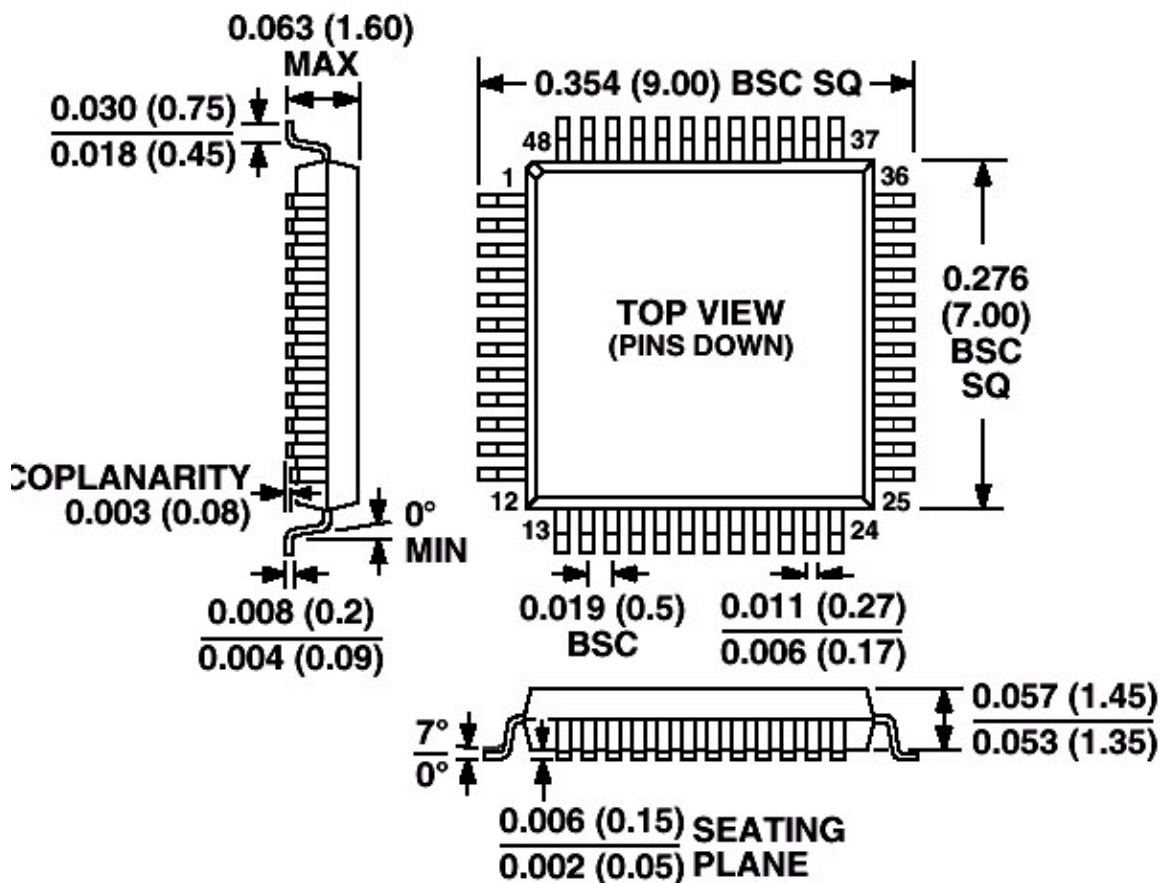◆**48-Lead Plastic Low Profile Quad Flat Package (LQFP)**

Figure 4 Mechanical Dimension of CM108

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