CM6610A

USB 2.0 High-Speed True HD Audio Processor

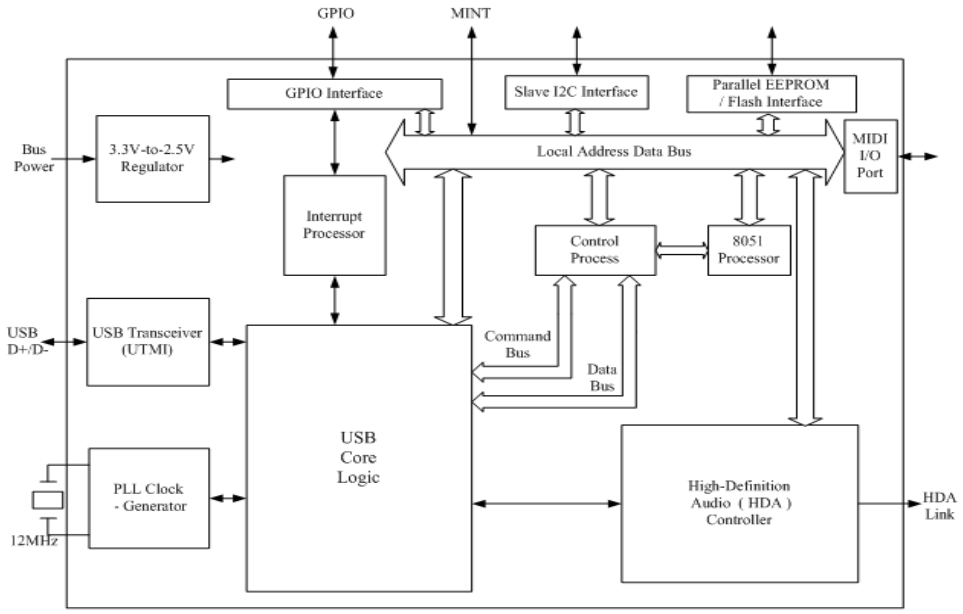
DESCRIPTION

Cmedia CM6610A is the world's first USB2.0 high-speed audio processor that can support the latest USB Audio Device Class Definition V2.0 and 2-channel true high-definition audio and Line-In/Mic-In. CM6610A reference design integrates CM9822 as the default codec to provide high-fidelity line output and headphone out up to 192KHz/24bit HD audio. It could also support 192KHz/24bit S/PDIF transmitter and receiver and also a USB2.0 MIDI I/O device for music creation applications. CM6610A has an embedded 8051 compatible microprocessor that can provide the best flexibility and functionality with the external upgradable 32KB NOR Flash ROM codes. With Cmedia versatile software technologies, CM6610A is a powerful audio core for high-value USB2.0 audio applications.

FEATURES

- USB Spec. Rev.2.0 high-speed/full-speed mode compatible
- Latest USB Audio Device Class Definition Release 2.0/1.0 compatible (UAC V2.0)
- USB Human Interface Device (HID) Class Definition Release 1.1 compliant
- Supports USB suspend/resume/reset functions
- Supports control, interrupt, bulk, and isochronous data transfers S/PDIF output interface Audio Engine
- Output capability (With Cmedia CM9822A HD Codec)
- 2-channel output
- Sample Rate: 44.1K/48K/96K/192KHz (192KHz is available only in USB Audio Class 2.0/High-speed mode)
- Bit Resolution: 16/24 bit
- Supports S/PDIF output via CM9822A codec

BLOCK DIAGRAM



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Release Note

Revision	Date	Description
0.1	2012/10/11	First release of preliminary technical information

1. Description and Overview

Cmedia CM6610A is the world's first USB2.0 high-speed audio processor that can support the latest USB Audio Device Class Definition V2.0 and 2-channel true high-definition audio and Line-In/Mic-In. CM6610A reference design integrates CM9822A as the default codec to provide high-fidelity line output and headphone out up to 192KHz/24bit HD audio. It could also support 192KHz/24bit S/PDIF transmitter and receiver and also a USB2.0 MIDI I/O device for music creation applications. CM6610A has an embedded 8051 compatible microprocessor that can provide the best flexibility and functionality with the external upgradable 32KB NOR Flash ROM codes. With Cmedia versatile software technologies, CM6610A is a powerful audio core for high-value USB2.0 audio applications.

2. Features

USB Compliance

- USB Spec. Rev.2.0 high-speed/full-speed mode compatible
- Latest USB Audio Device Class Definition Release 2.0/1.0 compatible (UAC V2.0)
- USB Human Interface Device (HID) Class Definition Release 1.1 compliant
- Supports USB suspend/resume/reset functions
- Supports control, interrupt, bulk, and isochronous data transfers S/PDIF output interface Audio Engine
- Output capability (With Cmedia CM9822A HD Codec)
  2-channel output
  Sample Rate: 44.1K/48K/96K/192KHz (192KHz is available only in USB Audio Class 2.0/High-speed mode)
  Bit Resolution: 16/24 bit
  Supports S/PDIF output via CM9822A codec
- Input capability (With Cmedia CM9822A HD Codec)
  Supports Sample Rate for ADC: 44.1K/48K/96K/192KHz
  (192KHz are available only in USB Audio Class 2.0/High-speed mode;192KHz is available only in CM9822A)
  Supports Bit Resolution for ADC : 16/24 bit (CM9822A ADC supports valid 20bit)
  Supports S/PDIF input for 44.1K/48K/96K/192KHz@16/24bit
  (96K/192KHz/24bit are available only in USB Audio Class 2.0/High-speed mode)

Audio I/O

- Integrated Intel HD-Audio codec compatible controller supports external HDA codec
- One pair of USB MIDI I/O interface for pro-audio application

Integrated 8051 Micro-processor

- Embedded 8051 micro-processor to handle the comment/protocol transactions
- Connects to an external parallel Flash/EEPROM memory (Max. 32KB, 55ns access time is required) for firmware ROM codes
- HID interrupts can be implemented via firmware codes
- Provides maximum HW configuration flexibility with firmware code upgrade
- VID/PID/Product String can be customized via firmware code programming

Control Interface

- Slave I2C control interface for external master device communication
- Interrupt pin for external master device read transaction
- 6 GPIO pins
- 1 dedicated Chip Reset control pin

General

- Embedded USB2.0 transceiver (up to 480MB bandwidth)
- Auto detection for high-speed/full-speed
- GPIO pin for USB Audio Class 2.0 and 1.0 application mode configuration
- Only single 12MHz crystal input is required (embedded PLL function)
- Only single 3.3V power supply required (embedded 3.3V to 2.5V regulator for digital core)
- 3.3V digital I/O pads with 5V tolerance
- Industrial standard LQFP-64 package

Value-added Software Features

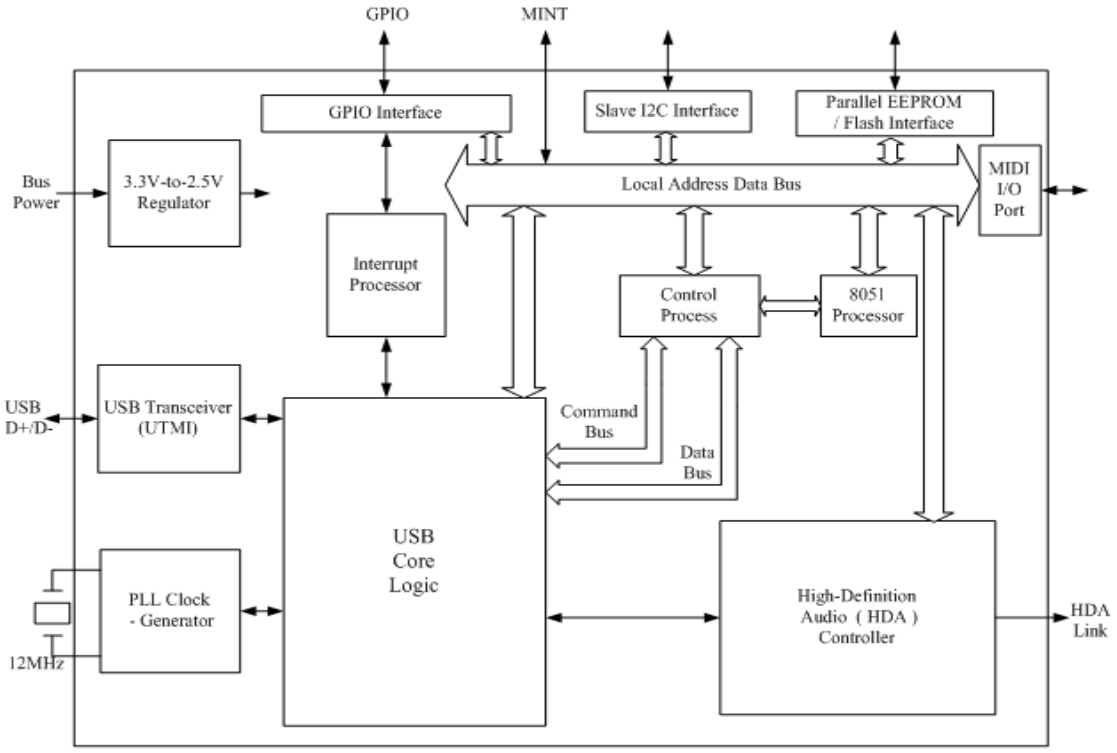
- Supports USB Audio Class 2.0 and high-speed mode on Windows® XP, Vista, , Windows® 7 and Windows® 8, Mac OS X 10.5.7 (or later) with Cmedia vendor drivers
- USB Audio class 1.0 with full-speed/high-speed modes compatible with Windows® XP, Vista, 7 and 8 UAA driver, Mac OS X and Linux embedded USB audio drivers
- For Windows, Cmedia drivers provide the following features options:
  Supports most industrial standards of PC 3D sound for gaming, including DirectSound™ 3D SW & HW and EAX™ 1.0&2.0 on Windows XP
  FlexBass™- Advanced Bass Management with programmable crossover frequency and supports large (full-range) or small (high-frequency w/o LFE) speakers
  10-band Equalizer with 12 preset modes
  27 global environment effects

3. Applications

- High-quality USB2.0 - 2ch Headphone/ Headset / Speakers
- High-quality USB gaming headset
- Portable high-quality USB2.0 audio box for laptops
- USB DAC/Speaker/HP Amp
- Unified Communications Peripheral Device
- ExpressCard compatible USB audio adaptor
- VGA card integrated USB2.0 audio
- Wired or wireless USB hub with audio features
- Pure USB MIDI devices
- Professional PC musician applications (recording mixer, keyboard, electrical guitar, etc.)
- Consumer stereo systems with embedded USB audio (portable CD/FM/MP3 players)
- USB2.0 VideoCam or Video Capture Box with mic/audio features

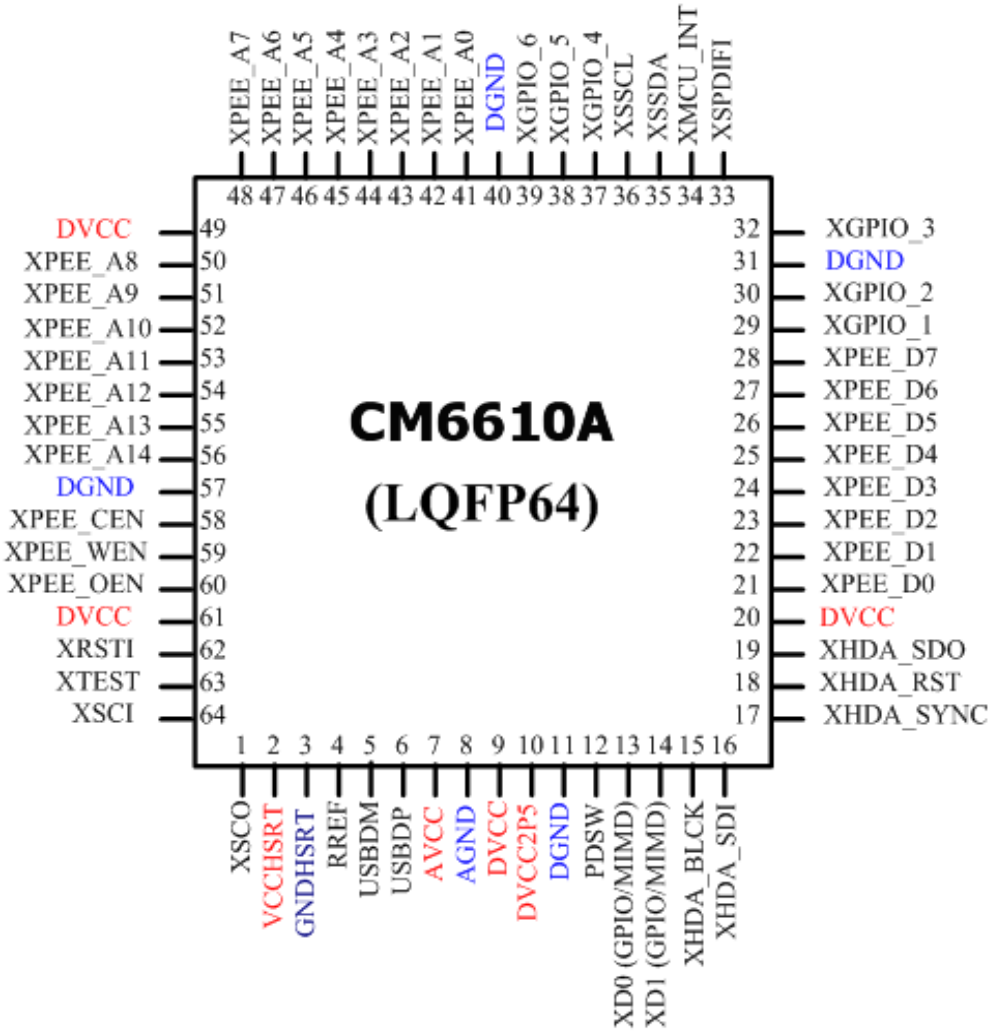
4. Block Diagram

CM6610A Functional Block Diagram



5. Pin Assignment

5.1 Pin-Out Diagram



5.2 Pin Description

Pin #	Symbol	I/O	Description
Clock			
64	XSCI	AI	12MHz crystal oscillator input
1	XSCO	AO	12MHz crystal oscillator output
USB2.0 BUS Interface			
5	USBDM	AIO	USB 2.0 data negative (USB D- signal)
6	USBDP	AIO	USB 2.0 data positive (USB D+ signal)
Power/Ground			
2	VCCHSRT	AI	USB PHY analog power supply pin (3.3V)
3	GNDHSRT	AI	USB PHY analog ground
7	AVCC	AI	USB PHY analog power supply pin (3.3V)
8	AGND	A	USB PHY analog ground
9	DVCC	DI	Digital power supply pin (3.3V)
10	DVCC2P5	DO	Digital power filter pin (2.5V), connecting external filter capacitors
11	DGND	D	Digital Ground
20	DVCC	DI	Digital power supply pin (3.3V)
31	DGND	D	Digital Ground
40	DGND	D	Digital Ground
50	DVCC	DI	Digital power supply pin (3.3V)
57	DGND	D	Digital Ground
61	DVCC	DI	Digital power supply pin (3.3V)
S/PDIF I			
33	SPDIFI	DI	S/PDIF receiver 3.3v input buffer, Schmitt trigger, pull-down
MCU Port 3/MIDI Interface			
13	XD0/GPIO/MIMD	DIO	MCU port 3 bit 0 (Serial input port) Programmable 3.3V/5V tolerance bidirectional buffer, pull-down
14	XD1/GPIO/MIMD	DIO	MCU port 3 bit 1 (Serial output port) Programmable 3.3V bidirectional buffer, pull-down
High-Definition Audio Interface			
15	XHDA_BCLK	DO	HDA link bit clock (24MHz) Programmable 3.3V output buffer
16	XHDA_SDI	DI	HDA link serial data in Programmable 3.3V bidirectional buffer, pull-down

17	XHDA_SYNC	DO	HDA link frame synchronization Programmable 3.3V output buffer
18	XHDA_RST	DO	HDA link reset signal, active low Programmable 3.3V output buffer
19	XHDA_SDO	DO	HDA link serial data out Programmable 3.3V output buffer
Parallel EEPROM/Flash Memory Interface			
21	XPEE_D0	DIO	Parallel EEPROM/FLASH data in/out 0 Programmable 3.3V bidirectional buffer, pull-down
22	XPEE_D1	DIO	Parallel EEPROM/FLASH data in/out 1 Programmable 3.3V bidirectional buffer, pull-down
23	XPEE_D2	DIO	Parallel EEPROM/FLASH data in/out 2 Programmable 3.3V bidirectional buffer, pull-down
24	XPEE_D3	DIO	Parallel EEPROM/FLASH data in/out 3 Programmable 3.3V bidirectional buffer, pull-down
25	XPEE_D4	DIO	Parallel EEPROM/FLASH data in/out 4 Programmable 3.3V bidirectional buffer, pull-down
26	XPEE_D5	DIO	Parallel EEPROM/FLASH data in/out 5 Programmable 3.3V bidirectional buffer, pull-down
27	XPEE_D6	DIO	Parallel EEPROM/FLASH data in/out 6 Programmable 3.3V bidirectional buffer, pull-down
28	XPEE_D7	DIO	Parallel EEPROM/FLASH data in/out 7 Programmable 3.3V bidirectional buffer, pull-down
58	XPEE_CEN	DO	Parallel EEPROM/FLASH chip enable, active low Programmable 3.3V output buffer
59	XPEE_WEN	DIO	Parallel EEPROM/FLASH write enable, active low Programmable 3.3V bidirectional buffer, pull-down
60	XPEE_OEN	DIO	Parallel EEPROM/FLASH read enable, active low Programmable 3.3V bidirectional buffer, pull-down
41	XPEE_A0	DIO	Parallel EEPROM/FLASH address 0 Programmable 3.3V bidirectional buffer, pull-down
42	XPEE_A1	DIO	Parallel EEPROM/FLASH address 1 Programmable 3.3V bidirectional buffer, pull-down
43	XPEE_A2	DIO	Parallel EEPROM/FLASH address 2 Programmable 3.3V bidirectional buffer, pull-down
44	XPEE_A3	DIO	Parallel EEPROM/FLASH address 3 Programmable 3.3V bidirectional buffer, pull-down
45	XPEE_A4	DIO	Parallel EEPROM/FLASH address 4 Programmable 3.3V bidirectional buffer, pull-down
46	XPEE_A5	DIO	Parallel EEPROM/FLASH address 5 Programmable 3.3V bidirectional buffer, pull-down
47	XPEE_A6	DIO	Parallel EEPROM/FLASH address 6 Programmable 3.3V bidirectional buffer, pull-down

48	XPEE_A7	DIO	Parallel EEPROM/FLASH address 7 Programmable 3.3V bidirectional buffer, pull-down
50	XPEE_A8	DIO	Parallel EEPROM/FLASH address 8 Programmable 3.3V bidirectional buffer, pull-down
51	XPEE_A9	DIO	Parallel EEPROM/FLASH address 9 Programmable 3.3V bidirectional buffer, pull-down
52	XPEE_A10	DIO	Parallel EEPROM/FLASH address 10 Programmable 3.3V bidirectional buffer, pull-down
53	XPEE_A11	DIO	Parallel EEPROM/FLASH address 11 Programmable 3.3V bidirectional buffer, pull-down
54	XPEE_A12	DIO	Parallel EEPROM/FLASH address 12 Programmable 3.3V bidirectional buffer, pull-down
55	XPEE_A13	DIO	Parallel EEPROM/FLASH address 13 Programmable 3.3V bidirectional buffer, pull-down
56	XPEE_A14	DIO	Parallel EEPROM/FLASH address 14 Programmable 3.3V bidirectional buffer, pull-down
GPIO and MCU Port 1 Interface			
29	XGPIO_1/ P1_0	DIO	General purpose input/output 8 (default output). / MCU port 1 bit 0, selected by register USB B9 bit 0 Programmable 3.3V/5V tolerance bidirectional buffer, pull-down
30	XGPIO_2/ P1_1	DIO	General purpose input/output 9 (default output). / MCU port 1 bit 1, selected by register USB B9 bit 1 Programmable 3.3V/5V tolerance bidirectional buffer, pull-down
32	XGPIO_3/ P1_2	DIO	General purpose input/output 10 (default input). / MCU port 1 bit 2, selected by register USB B9 bit 2 Programmable 3.3V/5V tolerance bidirectional buffer, pull-down
37	XGPIO_4/ P1_4	DIO	General purpose input/output 12 (default input). / MCU port 1 bit 3, selected by register USB B9 bit 3 Programmable 3.3V/5V tolerance bidirectional buffer, pull-down
38	XGPIO_5/ P1_5	DIO	General purpose input/output 13 (default input). / MCU port 1 bit 4, selected by register USB B9 bit 4 Programmable 3.3V/5V tolerance bidirectional buffer, pull-down
39	XGPIO_6/ P1_6	DIO	General purpose input/output 14 (default input). / MCU port 1 bit 5, selected by register USB B9 bit 5 Programmable 3.3V/5V tolerance bidirectional buffer, pull-down
2-Wire Slave Serial Bus (I2C)			
34	XMCU_INT	DO	Interrupt output for external MCU Programmable 3.3V output buffer
35	XSSDA	DIO	2-wire slave serial data Programmable 3.3V/5V tolerant bidirectional buffer, pull-down
36	XSSCL	DIO	2-wire slave serial clock Programmable 3.3V/5V tolerant bidirectional buffer, pull-down
Miscellaneous			
4	RREF	AI	Connect external reference resistor (12KΩ±1%)
12	PDSW	DO	External device power down control signal (default tri-state) Programmable 3.3V/5V tolerance output buffer
62	XRSTI	DI	CM6610A reset
63	XTEST	DI	Test Mode Select Pin: H: Test Mode L: Normal Operation

6. Electrical Characteristics

6.1 Maximum Ratings

Test Conditions; V_{DD} = 3.3V, DGND =0V, TA=+25°C

Parameter	Symbol	Min	Typ	Max	Units
Storge temperature	-	-55	-	150	°C
Operating ambient temperature	-	0	25	75	°C
DC supply voltage	-	3.0	3.3	3.6	V
I/O pin voltage	-	GND	-	V_{DD}	V
Power dissipation	-	-	0.15	-	W

6.2 Recommended Operation Conditions

Test Conditions: VDD = 3.3V, DGND =0V, TA=+25°C

Parameter	Symbol	Min	Typ	Max	Units
Input voltage range	-	V_{DD}-0.3	V_{DD}	V_{DD}+0.3	V
Output voltage range	-	0	-	V_{DD}	V

6.3 Power Consumption

Test Conditions: DVDD = 3.3V, DGND =0V, TA=+25°C

Parameter	Symbol	Min	Typ	Max	Units
Supply current : power up	-	-	40	-	mA
Supply current : power down	-	-	10	-	uA

6.4 DC Characteristics

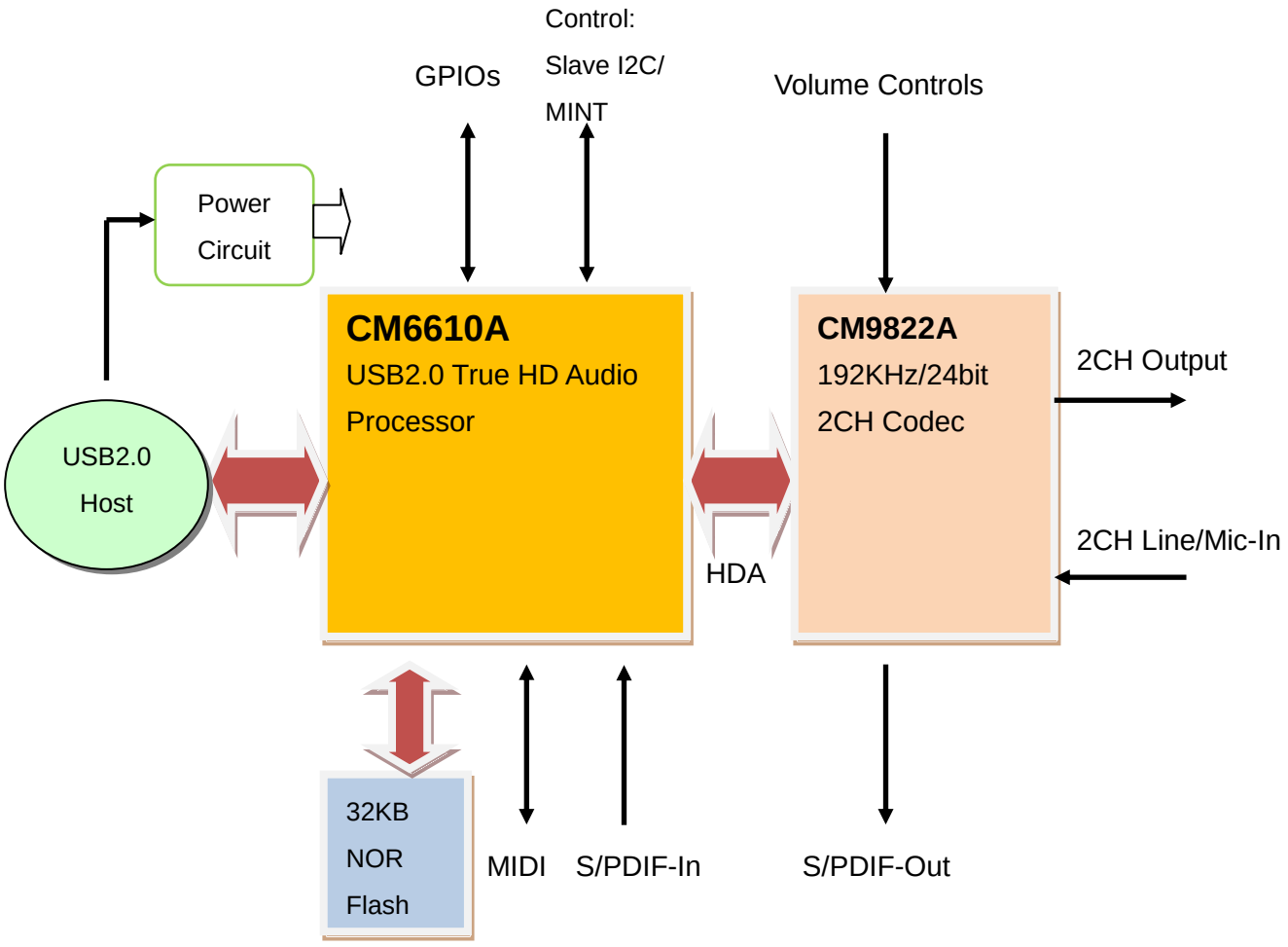
Test Conditions: DVDD = 3.3V, DGND =0V, TA=+25°C

Parameter	Symbol	Min	Typ	Max	Units
Input voltage range	Vin	V_{DD}-0.3	V_{DD}	V_{DD}+0.3	V
Output voltage range	Vout	0	-	V_{DD}	V
High level input voltage	Vih	0.7V_{DD}	-	-	V
Low level input voltage	Vil	-	-	0.3V_{DD}	V
High level output voitage	Voh	2.4	-	-	V
Low level output voltage	Vol		-	0.4	V
Input leakage current	Iil	-10	-	10	uA
Output leakage current	Iol	-10	-	10	uA
Output buffer driver current	-	-	8	-	mA
SPDIF transmit output driver current	-	-	8	-	mA

7. Application Notes

7.1 Typical System Block Diagram

Cmedia offers a total solution kit including CM6610A USB2.0 audio controller and high-quality CM9822A 2ch codec. The reference system design is as the following block diagram:



7.2 Reference Schematics

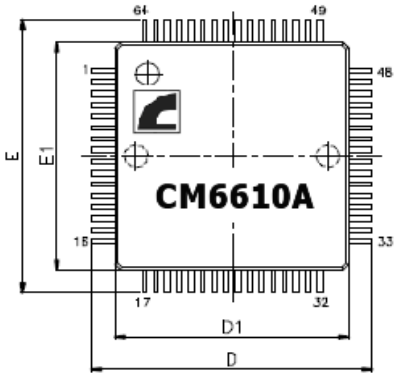
Please refer to up-to-date Cmedia CM6610A EVB Schematics file.

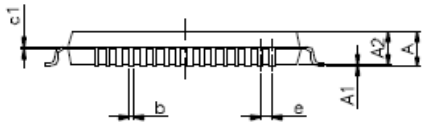
7.3 OS Compatibility

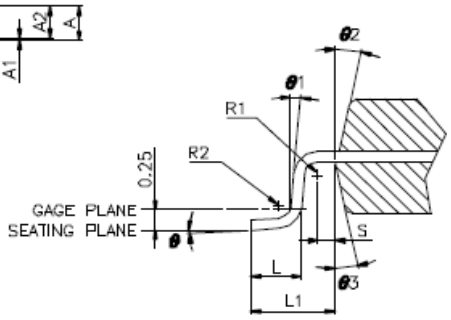
The following table shows the current compatibility with various OS:

	UAC 2.0	UAC 1.0
Windows 2K	X	Windows UAA Driver
Windows XP	Cmedia Driver	Windows UAA driver
Windows Vista	Cmedia Driver	Windows UAA driver
Windows 7	Cmedia Driver	Windows UAA driver
Windows 8	Cmedia Driver	Windows UAA driver
Mac OS X 10.5	Mac or Cmedia Driver	Mac Driver
Linux	TBD	Linux Driver

8. Package Dimension







VARIATIONS (ALL DIMENSIONS SHOWN IN MM)

SYMBOLS	MIN.	NOM.	MAX.
A	–	–	1.60
A1	0.05	–	0.15
A2	1.35	1.40	1.45
b	0.17	0.22	0.27
c1	0.09	–	0.16
2 D	11.75	12.00	12.25
2 D1	9.90	10.00	10.10
2 E	11.75	12.00	12.25
2 E1	9.90	10.00	10.10
e	0.50 BSC		
L	0.45	0.60	0.75
L1	1.00 REF		
S	0.20 REF		
θ	3.5° REF		
θ1	5.0° REF		
θ2	12° REF		
θ3	12° REF		
R1	0.16 REF		
R2	0.15 REF		

NOTES:

1. JEDEC OUTLINE:MS-026 BCD
2. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25mm PER SIDE. D1 AND E1 ARE MAXIMUM PLASTIC BODY SIZE DIMENSIONS INCLUDING MOLD MISMATCH.
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION.ALLOWABLE DAMBAR PROTRUSION SHALL NOT CAUSE THE LEAD WIDTH TO EXCEED THE MAXIMUM b DIMENSION BY MORE THAN 0.08mm.

—End of Specifications—

C-MEDIA ELECTRONICS INC.

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

TEL：+886-2-8773-1100

FAX：+886-2-8773-2211

E-MAIL：sales@cmedia.com.tw