

Example Configurations

DOC TYPE:	EXAMPLE CONFIGURATIONS
BOARD REFERENCE:	WM8912-6201-FL32-M-REV1
BOARD TYPE:	Customer Mini Board
WOLFSON DEVICE(S):	WM8912
DATE:	March 2010
DOC REVISION:	Rev 1.0

INTRODUCTION

The WM8912-6201-FL32-M-REV1 Customer Mini Board is compatible with the 6201-EV1-REV3 customer evaluation board and together provide a complete hardware platform for evaluation of the WM8912. The WM8912 Customer Mini Board can also be used independently and connected directly to a processor board using flying wires or appropriate headers. This document will cover both, but performance data will be based on the Wolfson system with 6201-EV1-REV3 main board. Configurations covered are listed below:

- Electrical S/PDIF DAC to headphone playback
- Optical S/PDIF DAC to lineout playback
- USB streaming DAC to headphone playback

This document should be used as a starting point for evaluation of WM8912 but it will not cover every possible configuration.

Assumptions:

1. The user is familiar with the 6201-EV1-REV3 main board and that the board is correctly configured for the path of interest (see related documents below).
2. The user has control of the WM8912 register settings, for example by installing Wolfson WISCE software.

Related documents:

1. WM8912 datasheet
2. WM8912-6201-FL32-M-REV1 Schematic and Layout.pdf
3. 6201-EV1-REV3 Schematic and Layout.pdf
4. WISCE Quick Start Guide.pdf

TABLE OF CONTENTS

INTRODUCTION..... 1

TABLE OF CONTENTS..... 2

BOARD CONFIGURATION STAND-ALONE..... 3

 CONNECTION DIAGRAM 3

 I/O TABLE..... 4

BOARD CONFIGURATION WITH 6201-EV1-REV3 MAIN BOARD 5

 ELECTRICAL S/PDIF DAC TO HEADPHONE PLAYBACK 5

 OPTICAL S/PDIF DAC TO LINEOUT PLAYBACK..... 8

 USB AUDIO STREAMING TO HEADPHONE PLAYBACK..... 10

APPLICATION SUPPORT..... 13

IMPORTANT NOTICE 14

ADDRESS: 14

BOARD CONFIGURATION STAND-ALONE

The WM8912 Customer Mini Board can be used as a stand-alone module for direct connection to a processor board via flying leads or dedicated headers. This section will detail important considerations and provide all information required to do this without risking damage to the device.

CONNECTION DIAGRAM

Figure 1 below shows the connections required to power-up and control the WM8912 Customer Mini Board.

Please refer to the Table 1 for further detail on external I/O connections.

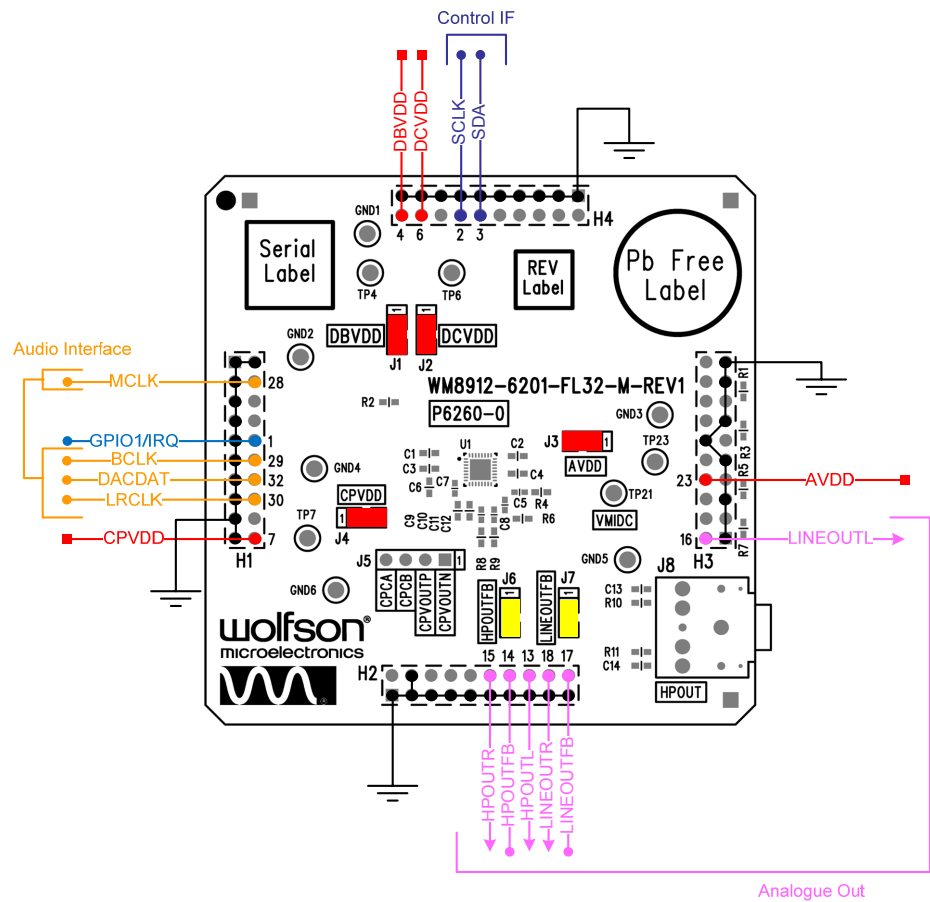


Figure 1 Stand-Alone Board Configuration

I/O TABLE

SIGNAL	BOARD REFERENCE	IMPORTANT NOTES
Voltage Supplies		
AVDD	H3: pin 8	AVDD = 1.71V to 2.0V
CPVDD	H1: pin 20	CPVDD = 1.71V to 2.0V
DCVDD	H4: pin 18	DCVDD = 0.95V to 1.98V
DBVDD	H4: pin 20	DBVDD = 1.42V to 3.6V
Ground		
DGND	Common Ground	Analogue and digital grounds must always be within 0.3V of each other.
AGND		
CPVDD		
Control Interface		
SDA	H4: pin 12	Both control interface signals should swing between DGND and DBVDD.
SCLK	H4: pin 14	
Master Clock		
MCLK	H1: pin 4	Signal should swing between DGND and DBVDD.
Digital I/O and Audio Interface		
GPIO1/IRQ	H1: pin 10	Signals should swing between DGND and DBVDD.
BCLK/GPIO4	H1: pin 12	
DACDAT	H1: pin 14	
LRCLK	H1: pin 16	
Analogue Outputs		
HPOUTL	H2: pin 16	Ground referenced headphone output.
HPOUTR	H2: pin 12	
HPOUTFB	H2: pin 14	HP reference pin, recommended to be connected to the common ground at headphone connector.
LINEOUTL	H3: pin 2	Ground referenced line output.
LINEOUTR	H2: pin 18	
LINEOUTFB	H2: pin 20	LINE reference pin, recommended to be connected to the common ground at line output connector.
Charge Pump and VMID		
CPVOUTP	J5: pin 2	Charge Pump and VMIDC test points.
CPVOUTN	J5: pin 1	
CPCA	J5: pin 4	
CPCB	J5: pin 3	
VMIDC	TP21	

Table 1 I/O Configuration

BOARD CONFIGURATION WITH 6201-EV1-REV3 MAIN BOARD

This section focuses on evaluation of the WM8912-6201-FL32-M-REV1 Customer Mini Board in combination with the 6201-EV1-REV3 main board. This system is the reference platform for measurement data contained in this document. Please note that only a limited number of usage modes will be covered.

ELECTRICAL S/PDIF DAC TO HEADPHONE PLAYBACK

The following section details board configuration for DAC to headphone playback using the S/PDIF electrical input.

BLOCK DIAGRAM

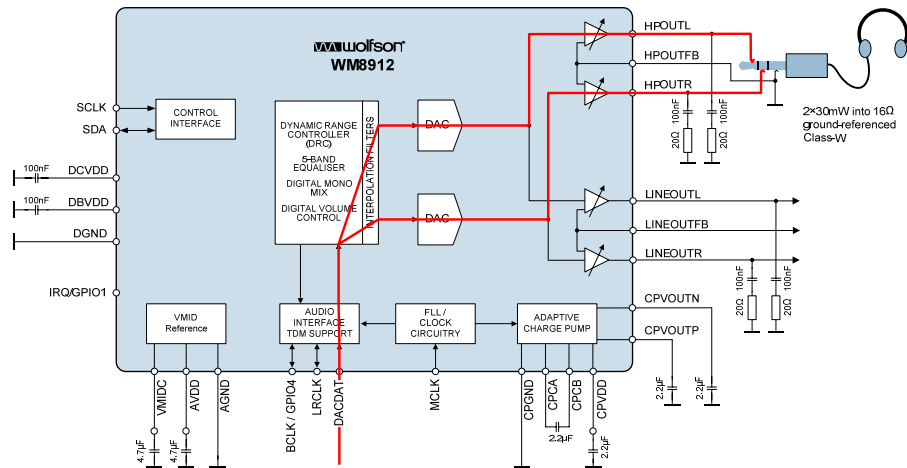


Figure 2 Path Diagram for DAC to Headphone Playback

BOARD CONFIGURATION

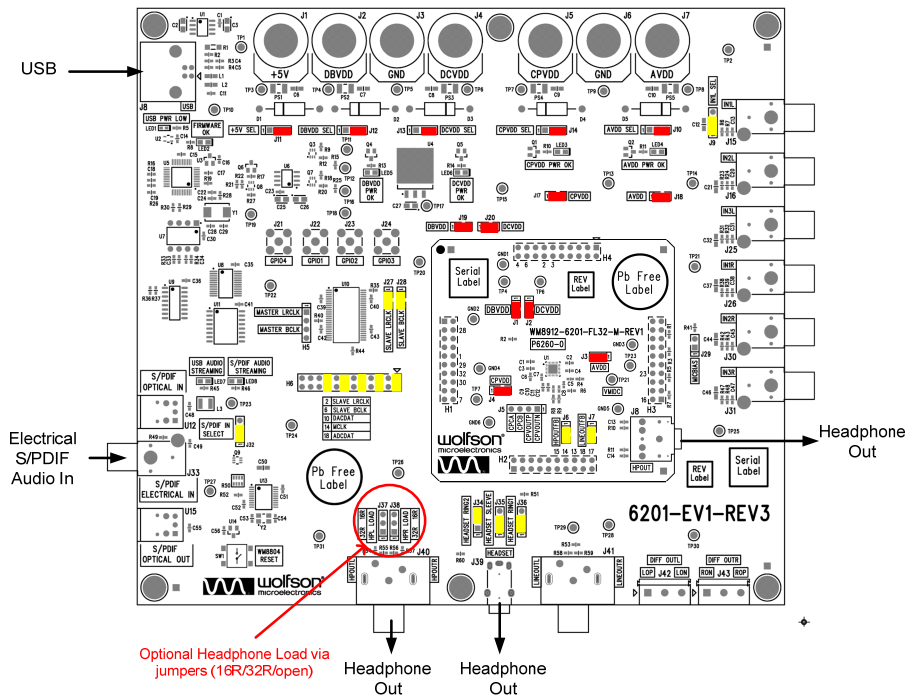


Figure 3 Board Configuration for Electrical S/PDIF DAC to Headphone

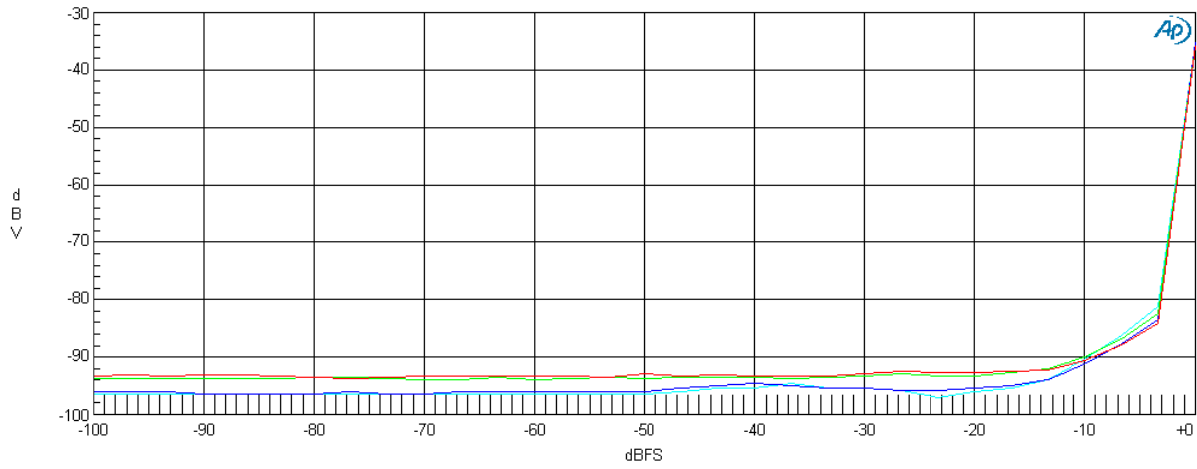
REGISTER SETTINGS

Register settings provided below are simply the minimum requirement to configure the desired path and have not in any way been optimised.

REG INDEX	DATA VALUE	COMMENT
0x00	0x0000	Software Reset
0x16	0x0006	MCLK_INV=0, SYSCLK_SRC=0, MCLK_SRC=0, TOCLK_RATE=0, ADC_DIV=000, DAC_DIV=000, OPCLK_ENA=0, CLK_SYS_ENA=1, CLK_DSP_ENA=1, TOCLK_ENA=0
0x6C	0x0100	WSEQ_ENA=1, WSEQ_WRITE_INDEX=0_0000
0x6F	0x0100	WSEQ_ABORT=0, WSEQ_START=1, WSEQ_START_INDEX=00_0000
0x14	0x845E	TOCLK_RATE_DIV16=0, TOCLK_RATE_X4=0, SR_MODE=0, MCLK_DIV=0
0x39	0x0039	HPOUTL_MUTE=0, HPOUT_VU=0, HPOUTLZC=0, HPOUTL_VOL=11_1001
0x3A	0x00B9	HPOUTR_MUTE=0, HPOUT_VU=1, HPOUTRZC=0, HPOUTR_VOL=11_1001
0x21	0x0000	DAC_MONO=0, DAC_SB_FILT=0, DAC_MUTERATE=0, DAC_UNMUTE_RAMP=0, DAC_OSR128=0, DAC_MUTE=0, DEEMPH=00
0x68	0x0005	CP_DYN_PWR=1

Table 2 Register Settings for DAC to Headphone Playback

PERFORMANCE PLOT



Sweep	Trace	Color	Line Style	Thick	Data	Axis	Comment
1	1	Cyan	Solid	1	Anlr.THd+N Ampl	Left	22Hz-22kHz, A-Weighted, Left
1	2	Blue	Solid	1	Anlr.THd+N Ampl	Left	22Hz-22kHz, A-Weighted, Right
2	1	Green	Solid	1	Anlr.THd+N Ampl	Left	22Hz-20kHz, AES17, Left
2	2	Red	Solid	1	Anlr.THd+N Ampl	Left	22Hz-20kHz, AES17, Right

System: AP2
 Board: 6201-EV1-REV3 + WM8912-6201-FL32-M-REV1
 Manufacturer Mark Code: DWS
 Input Path: Electrical S/PDIF In
 Input Signal: 997Hz, 24-bit, 256fs
 Output Path: HPOUT 32R
 Supplies: AVDD=CPVDD=DBVDD=DCVDD=1V8
 BW Filter: As stated in comments
 Additional Filter: As stated in comments

Figure 4 Performance Plot for DAC to HPOUT with 32R Load

OPTICAL S/PDIF DAC TO LINEOUT PLAYBACK

The following section details board configuration for DAC to lineout playback using the S/PDIF optical input.

BLOCK DIAGRAM

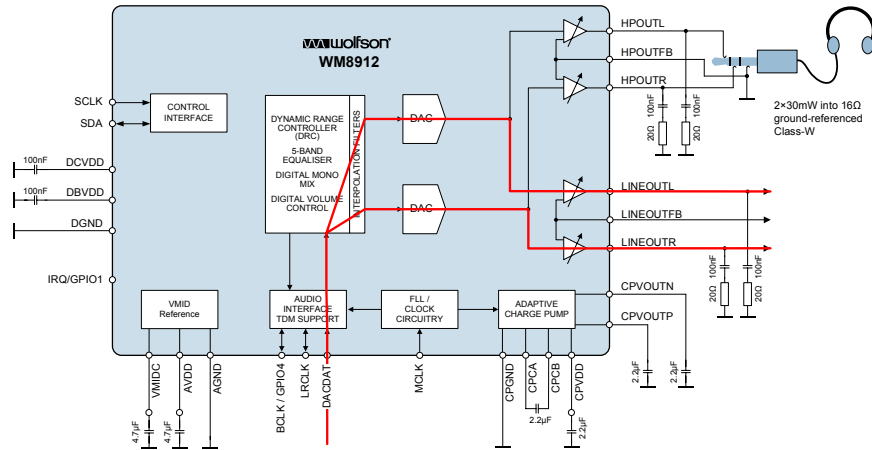


Figure 5 Path Diagram for DAC to Lineout Playback

BOARD CONFIGURATION

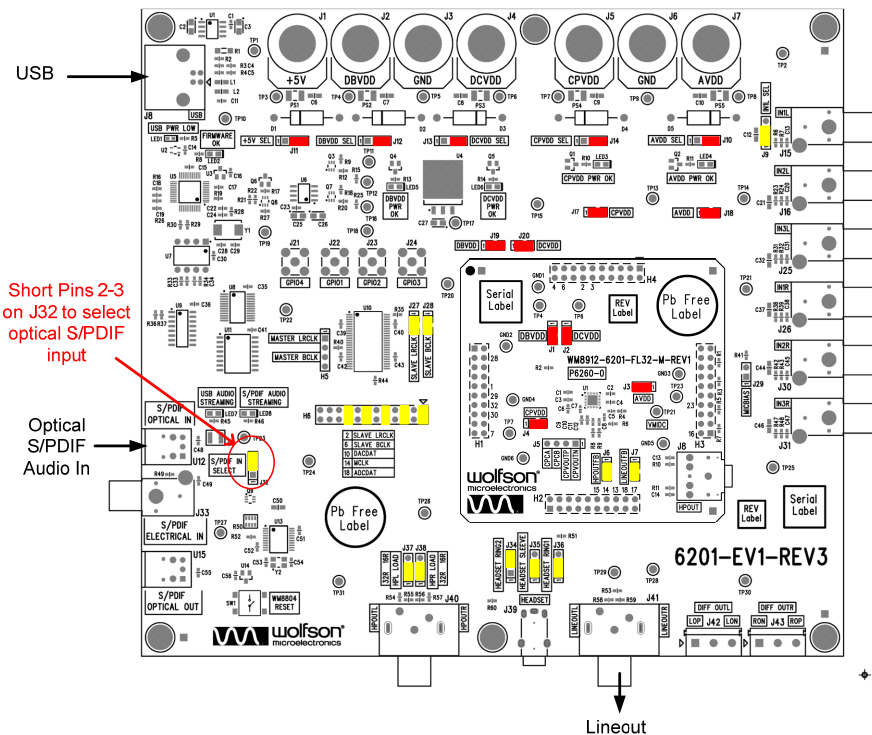


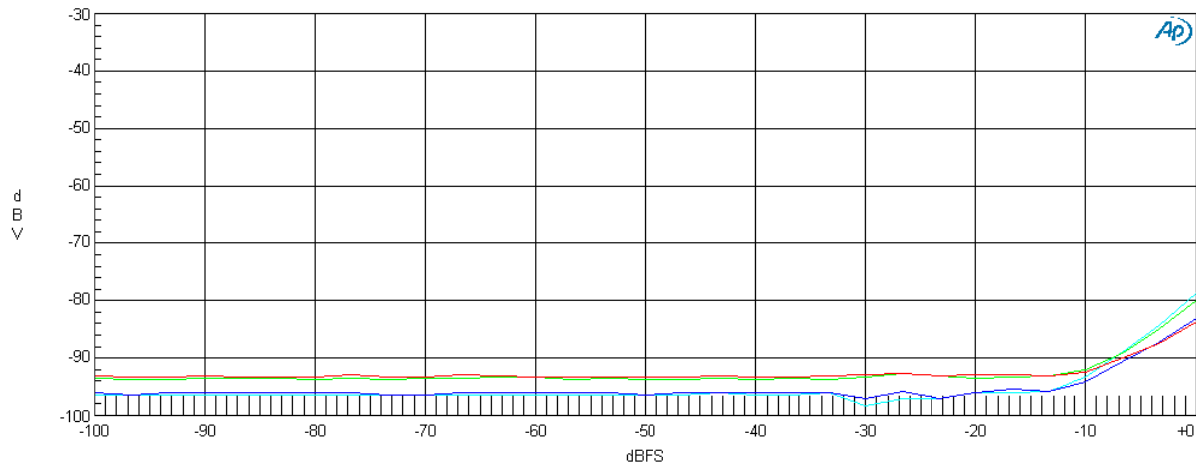
Figure 6 Board Configuration for Optical S/PDIF DAC to Lineout

REGISTER SETTINGS

Register settings provided below are simply the minimum requirement to configure the desired path and have not in any way been optimised.

REG INDEX	DATA VALUE	COMMENT
0x00	0x0000	Software Reset
0x16	0x0006	MCLK_INV=0, SYSCLK_SRC=0, MCLK_SRC=0, TOCLK_RATE=0, ADC_DIV=000, DAC_DIV=000, OPCLK_ENA=0, CLK_SYS_ENA=1, CLK_DSP_ENA=1, TOCLK_ENA=0
0x6C	0x0100	WSEQ_ENA=1, WSEQ_WRITE_INDEX=0_0000
0x6F	0x0100	WSEQ_ABORT=0, WSEQ_START=1, WSEQ_START_INDEX=00_0000
0x14	0x845E	TOCLK_RATE_DIV16=0, TOCLK_RATE_X4=0, SR_MODE=0, MCLK_DIV=0
0x3B	0x0039	LINEOUTL_MUTE=0, LINEOUT_VU=0, LINEOUTLZC=0, LINEOUTL_VOL=11_1001
0x3C	0x00B9	LINEOUTR_MUTE=0, LINEOUT_VU=1, LINEOUTRZC=0, LINEOUTR_VOL=11_1001
0x21	0x0000	DAC_MONO=0, DAC_SB_FILTER=0, DAC_MUTERATE=0, DAC_UNMUTE_RAMP=0, DAC_OSR128=0, DAC_MUTE=0, DEEMPH=00
0x68	0x0005	CP_DYN_PWR=1

Table 3 Register Settings for DAC to Lineout Playback

PERFORMANCE PLOT

Sweep	Trace	Color	Line Style	Thick	Data	Axis	Comment
1	1	Cyan	Solid	1	Anlr.THd+N Ampl	Left	22Hz-22kHz, A-Weighted, Left
1	2	Blue	Solid	1	Anlr.THd+N Ampl	Left	22Hz-22kHz, A-Weighted, Right
2	1	Green	Solid	1	Anlr.THd+N Ampl	Left	22Hz-20kHz, AES17, Left
2	2	Red	Solid	1	Anlr.THd+N Ampl	Left	22Hz-20kHz, AES17, Right

System: AP2
Board: 6201-EV1-REV3 + WM8912-6201-FL32-M-REV1
Manufacturer Mark Code: DWS
Input Path: Electrical S/PDIF In
Input Signal: 997Hz, 24-bit, 256fs
Output Path: LINEOUT 100K
Supplies: AVDD=CPVDD=DBVDD=DCVDD=1V8
BW Filter: As stated in comments
Additional Filter: As stated in comments

Figure 7 Performance Plot for DAC to Lineout with 100K Load

USB AUDIO STREAMING TO HEADPHONE PLAYBACK

The following section details board configuration for USB audio streaming to headphone output.

BLOCK DIAGRAM

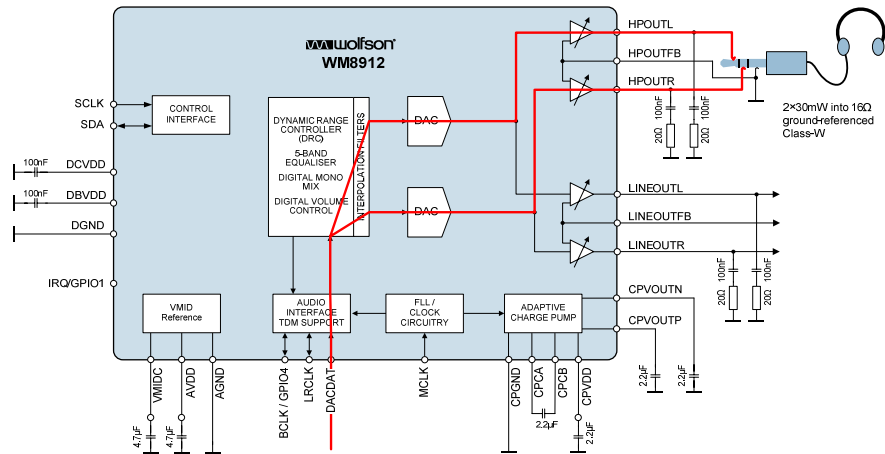


Figure 8 Path Diagram for DAC to Headphone Playback

CONFIGURATION IN MICROSOFT WINDOWS

USB Audio streaming is supported by Windows XP, Windows Vista and Windows 7.

Upon connection of the evaluation board to a PC, Windows will detect the evaluation board as a USB Composite Device (USB HID and USB Audio) and allocate the device the standard Windows drivers.

Windows may automatically select the evaluation board as the default device for audio playback. If this is not the case, the Wolfson evaluation board will need to be selected manually.

In Windows XP this is done in the audio tab of "Sounds and Audio Devices Properties" (Start -> Control Panel -> Sound and Audio Devices). See Figure 9.

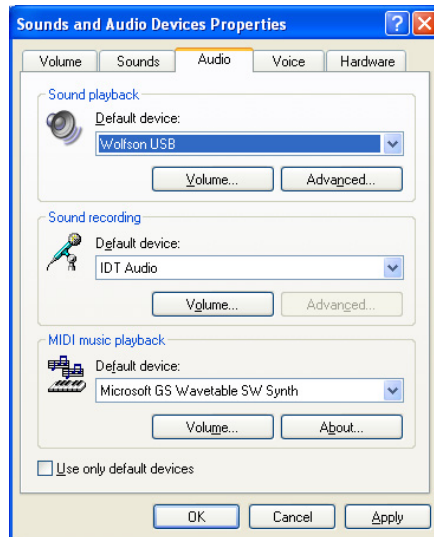


Figure 9 Select Wolfson USB as Default Audio Device in XP

In Windows Vista / Windows 7 this is done in the "Sound" window (Start -> Control Panel -> Hardware and Sound -> Sound) by selecting the Wolfson USB device and clicking on the "Set Default" button. See Figure 10 below.

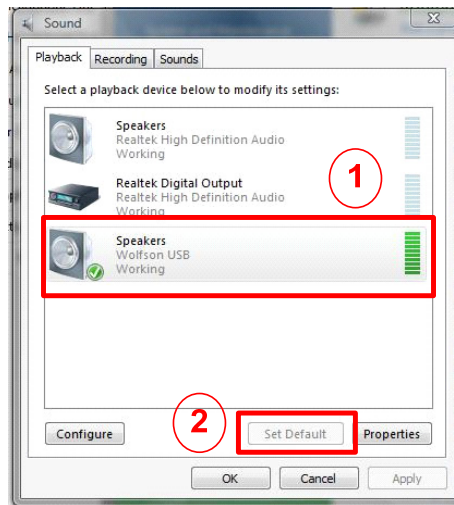


Figure 10 Select Wolfson USB as Default Audio Device in Windows Vista/7

During audio streaming the evaluation board will change the audio sample rate automatically as requested by the PC operating system. In Windows XP the sample rate selected will match the audio source/destination file. If multiple audio sources are used simultaneously the audio is software mixed to the higher sample rate.

Sample rate control in Windows Vista / 7 allows the sample rate to be configured to a value and prevent applications from changing it. To set sample rate select "Properties" in the sounds window (Figure 10), this will open the "Speaker Properties" windows (Figure 11).

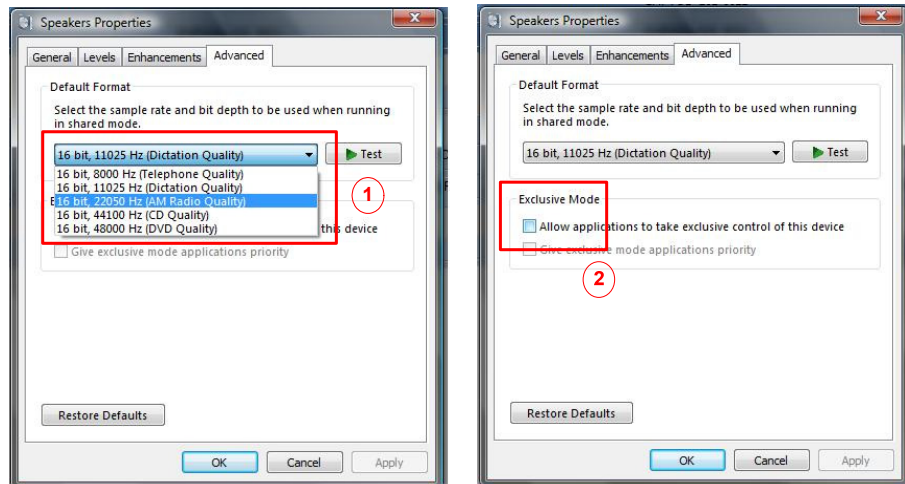


Figure 11 Sample Rate Control in Windows Vista/7

On the "Advanced" tab the required sample rate should be selected from the drop down box as shown in the left hand window above. Additionally the user must ensure that the exclusive mode checkboxes are not ticked in this window, to prevent applications from altering the sample rate.

BOARD CONFIGURATION

The 6201-EV1-REV3 main board will automatically select audio streaming from the USB interface unless an S/PDIF input is detected. To ensure USB streaming is used, there must not be any input to either optical or electrical S/PDIF.

In the correct mode the USB Audio Streaming LED should be lit.

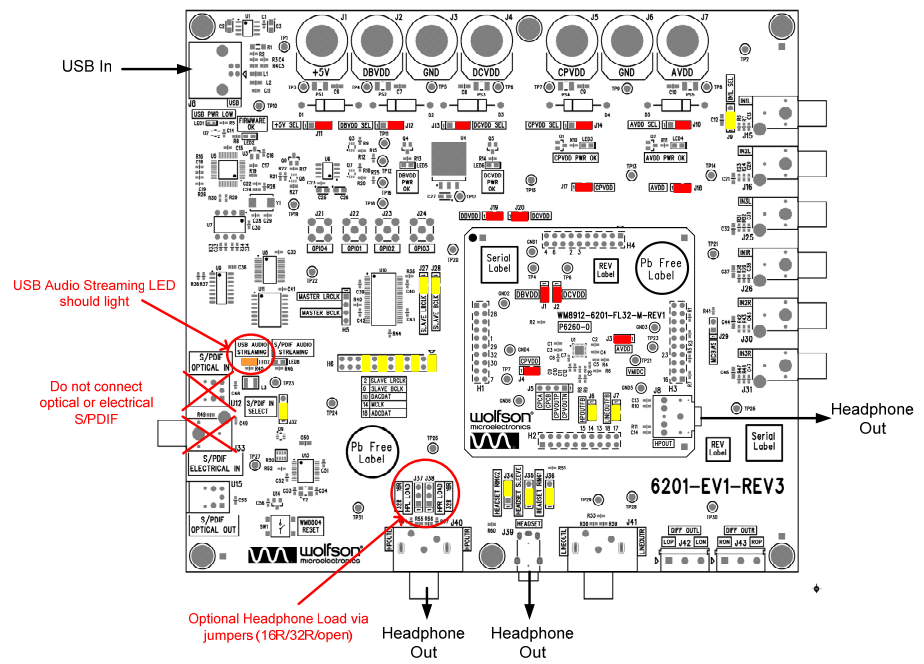


Figure 12 Board Configuration for USB Audio to Headphone

REGISTER SETTINGS

Register settings for this path are provided in Table 2.

APPLICATION SUPPORT

If you require more information or require technical support, please contact the Wolfson Microelectronics Applications group through the following channels:

Email: apps@wolfsonmicro.com

Telephone Apps: +44 (0) 131 272 7070

Fax: +44 (0) 131 272 7001

Mail: Applications Engineering at the address on the last page

or contact your local Wolfson representative.

Additional information may be made available on our web site at:

<http://www.wolfsonmicro.com>

IMPORTANT NOTICE

Wolfson Microelectronics plc ("Wolfson") products and services are sold subject to Wolfson's terms and conditions of sale, delivery and payment supplied at the time of order acknowledgement.

Wolfson warrants performance of its products to the specifications in effect at the date of shipment. Wolfson reserves the right to make changes to its products and specifications or to discontinue any product or service without notice. Customers should therefore obtain the latest version of relevant information from Wolfson to verify that the information is current.

Testing and other quality control techniques are utilised to the extent Wolfson deems necessary to support its warranty. Specific testing of all parameters of each device is not necessarily performed unless required by law or regulation.

In order to minimise risks associated with customer applications, the customer must use adequate design and operating safeguards to minimise inherent or procedural hazards. Wolfson is not liable for applications assistance or customer product design. The customer is solely responsible for its selection and use of Wolfson products. Wolfson is not liable for such selection or use nor for use of any circuitry other than circuitry entirely embodied in a Wolfson product.

Wolfson's products are not intended for use in life support systems, appliances, nuclear systems or systems where malfunction can reasonably be expected to result in personal injury, death or severe property or environmental damage. Any use of products by the customer for such purposes is at the customer's own risk.

Wolfson does not grant any licence (express or implied) under any patent right, copyright, mask work right or other intellectual property right of Wolfson covering or relating to any combination, machine, or process in which its products or services might be or are used. Any provision or publication of any third party's products or services does not constitute Wolfson's approval, licence, warranty or endorsement thereof. Any third party trade marks contained in this document belong to the respective third party owner.

Reproduction of information from Wolfson datasheets is permissible only if reproduction is without alteration and is accompanied by all associated copyright, proprietary and other notices (including this notice) and conditions. Wolfson is not liable for any unauthorised alteration of such information or for any reliance placed thereon.

Any representations made, warranties given, and/or liabilities accepted by any person which differ from those contained in this datasheet or in Wolfson's standard terms and conditions of sale, delivery and payment are made, given and/or accepted at that person's own risk. Wolfson is not liable for any such representations, warranties or liabilities or for any reliance placed thereon by any person.

ADDRESS:

Wolfson Microelectronics plc
Westfield House
26 Westfield Road
Edinburgh
EH11 2QB
United Kingdom

Tel :: +44 (0)131 272 7000

Fax :: +44 (0)131 272 7001

E-mail :: apps@wolfsonmicro.com