

I²S USB Audio Streaming

INTRODUCTION

The primary purpose of the USB interface on Wolfson test or customer evaluation boards is to permit access to the device register set using software such as WISCE™. As of firmware revision 0x5200 the USB interface additionally supports audio streaming to/from Wolfson I²S CODECs. This document describes features and limitations of the audio streaming implementation.

IDENTIFYING THE FIRMWARE

USB audio streaming will only be available if it is supported by the firmware on the evaluation main board. Firmware revisions 5200 upwards support audio streaming. This number can be checked visually on the board. Near the USB connector there will be an 8-pin DIP IC with a Wolfson sticker. The sticker will display the Wolfson logo and the 4-digit firmware revision number.

Figure 1 shows a section of the 6229-EV1-REV2 main board and highlights the firmware number (5202 in this example).

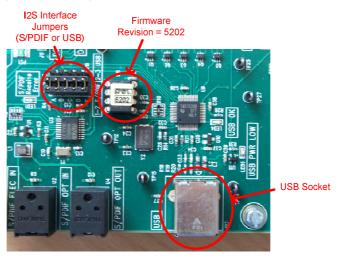


Figure 1 USB Section on 6229-EV1-REV2 Main Board

HARDWARE CONFIGURATION

Many Wolfson evaluation boards support audio streaming via USB and S/PDIF. Two types of evaluation board exist that support both formats with differing source selection methods:

- 1. Manual selection USB or S/PDIF streaming based on the setting of jumpers.
- 2. Automatic selection Board will default to USB streaming unless a valid S/PDIF signal is detected.

SOFTWARE CONFIGURATION

Wolfson evaluation boards have been designed to allow USB audio streaming without the installation of additional drivers. Upon connection, Windows will detect the evaluation board as a USB Composite Device (USB HID and USB Audio) and allocate the device the standard Windows drivers. The user must configure the device registers as required using RegWrite or WISCE™.

WAN 0240 Customer Information

WINDOWS XP

On Windows XP, insertion of an evaluation board should automatically select it as the default device for sound recording and playback. If the board is not automatically selected the user should ensure the settings in the Audio tab of "Sounds and Audio Devices Properties" (Start > Control Panel > Sound and Audio Devices) match those shown below (Figure 2).

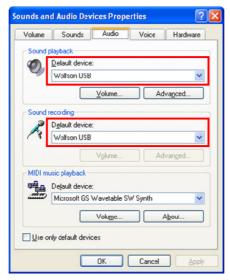


Figure 2 Wolfson USB Audio Device Selection in Windows XP

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.

WINDOWS VISTA / WINDOWS 7

Windows 7 and Vista require the user to manually select the evaluation board as the default source for audio playback. The default source is set by selecting "Wolfson USB" in the in the "Playback" tab of the "Sounds" window (Start > Control Panel > Hardware and Sound > Sound) and selecting "Set Default". See Figure 3 below.

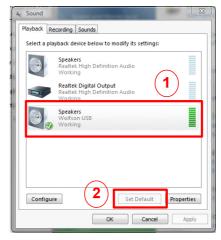


Figure 3 Wolfson USB Audio Playback Device Selection in Windows Vista/7

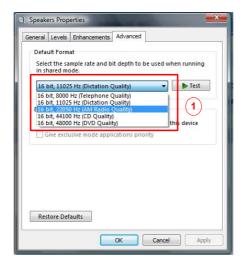
Customer Information WAN 0240

To select the evaluation board as the default audio record source go to the "Sounds" window (Start > Control Panel > Hardware and Sound > Sound). Select "Wolfson USB" in the "Recording" tab and then click "Set Default". See Figure 4 below.



Figure 4 Wolfson USB Audio Record Device Selection in Windows Vista/7

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 3), this will open the "Speaker Properties" windows shown in Figure 5 below.



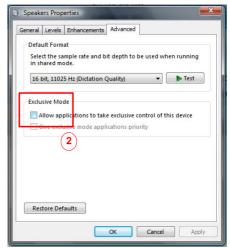


Figure 5 Sample Rate Configuration in Windows Vista/7

On the "Advanced" tab the required sample rate should be selected from the drop down box as shown in the left hand window above. Select 44.1kHz or 48kHz, 16 bit. Additionally the user must ensure that the exclusive mode boxes are not ticked in this window, to prevent applications from altering the sample rate.

WAN 0240 Customer Information

STREAMING CAPABILITIES

Audio streaming enabled evaluation boards support bi-directional stereo streaming to a Wolfson I²S codec. Evaluation boards fitted with 0x5200 build USB Audio streaming firmware support the audio rates shown below:

Sample Frequency: 48kHz and 44.1kHz.

Bit Depth: 16bit.

STREAMING LIMITATIONS

 Due to the hardware configuration of the evaluation boards, when utilising bi-directional audio streaming the DAC and ADC must run at the same sample rate. This is a result of the DAC and ADC I²S bus sharing common MCLK, BCLK and LRCLK signals.

When streaming audio from an ADC, changes in the sample rate of sound playback may cause the ADC sample rate to be altered to the same value (Windows XP only). When recording the sample rate will be set by the recording software and will remain at this rate unless changed by initialising audio playback.

This situation is avoided when "Wolfson USB" is not selected as the default device for sound playback in "Sounds and Audio Devices Properties".



Figure 6 De-select Wolfson USB Audio Device as Playback Device

- CPU intensive tasks can cause a PC to stop sending USB data, resulting in a click in the audio stream. This is an unavoidable issue affecting all USB Audio devices.
- The main volume slider in Windows volume control is disabled. Device volume control must be carried out by adjusting the volume registers in WISCETM.
- 5. It is not recommended to connect the Wolfson evaluation board through a USB hub.
- 6. Datasheet performance cannot be guaranteed when using USB audio streaming due to the limitations of the PC and the USB interface.



Customer Information WAN_0240

TROUBLESHOOTING

In some rare cases the Wolfson Evaluation boards may not install correctly. As a result, the green "FIRMWARE OK" LED will not light.

This issue can be easily resolved:

- 1. Go to device manager
- 2. Right clicking on the "USB Human Interface Device" icon with the yellow exclamation mark
- 3. Click "Uninstall".
- 4. Disconnect the Evaluation Board
- 5. Reconnect the Evaluation Board

Windows will detect a USB device and is normally able to load the drivers correctly during a second attempt.

WAN_0240 Customer Information

TECHNICAL SUPPORT

If you require more information or require technical support, please contact the nearest Wolfson Microelectronics regional office:

http://www.wolfsonmicro.com/contact

or one of our global distributors:

http://www.wolfsonmicro.com/distribution



Customer Information WAN 0240

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 trademarks 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