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DA7210/11 USER MANUAL

September 2012

User manual for the set-up and operation of the DA7210/11 evaluation board and control software

DA7210/11 USER MANUAL

Contents

1 Introduction

The DA7210/11 evaluation board has been produced to allow measurement, evaluation and programming of the DA7210/11 ultra-low power audio codec evaluation board and control software. The evaluation PCB is supplied together with a DVD ROM containing documentation and driver files.

The driver software uses a simple graphical user interface (GUI), allowing the DA7210/11 device to be controlled via a USB port of a PC. An additional GUI is available to control the highly configurable filter paths within the DA7210/11; including general purpose, five-band equaliser and high pass filters

The board has a number of jumper links to allow configuration of the board and to provide measurement test points.

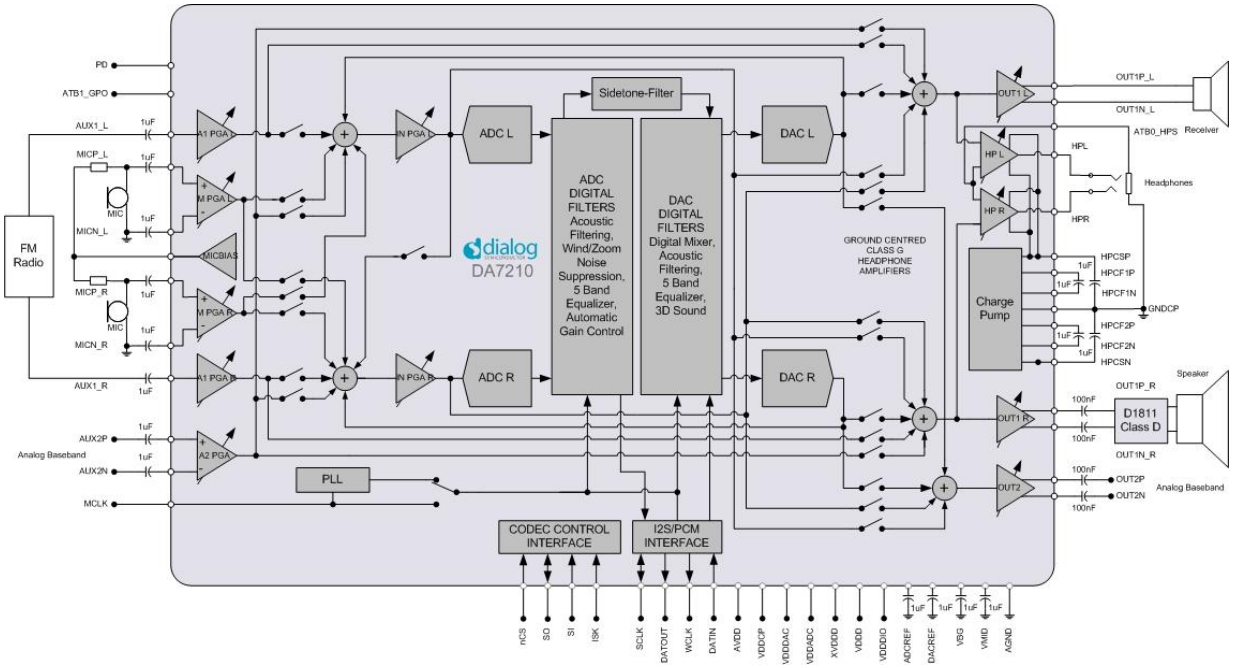


Figure 1 DA7210/11 Block Diagram

The accompanying software requires a PC operating Windows 2000/XP with a USB1.1 or USB2 interface. The software will run under Vista if the default installation location is changed to *'C:\Dialog Semiconductor\'*

The DA7210/11 device plus the USB Interface consume approximately 5mA in the standby state. The evaluation board and software are not guaranteed to operate in a USB hub. See the section on Power Supplies below.

The control software permits configuration of the device using either pre-prepared templates or individual write and read operations to all control registers

2 Hardware

There are three options available when using the DA7210/11 evaluation mainboard, Figure 2:

1. A miniboard containing the DA7210 in a CSP 49-pin package connected to evaluation board 44-179-93-02-C via jumpers J28, J30, J36 and J38, Figure 3. This board can also be used standalone or in conjunction with a customer development system.

2. A miniboard containing the DA7211-00 in a 36-pin CSP package connected to evaluation board 44-179-93-02-B via jumpers J28, J30, J36 and J38, Figure 4. This board can also be used standalone or in conjunction with a customer development system.
3. A miniboard containing the DA7211-01 in a 36-pin CSP package connected to evaluation board 44-179-93-02-E via jumpers J28, J30, J36 and J38,. This board can also be used standalone or in conjunction with a customer development system.

A USB-I2C bridge is used for communication with the device, and there are number of external active components to reduce the requirement for external equipment.

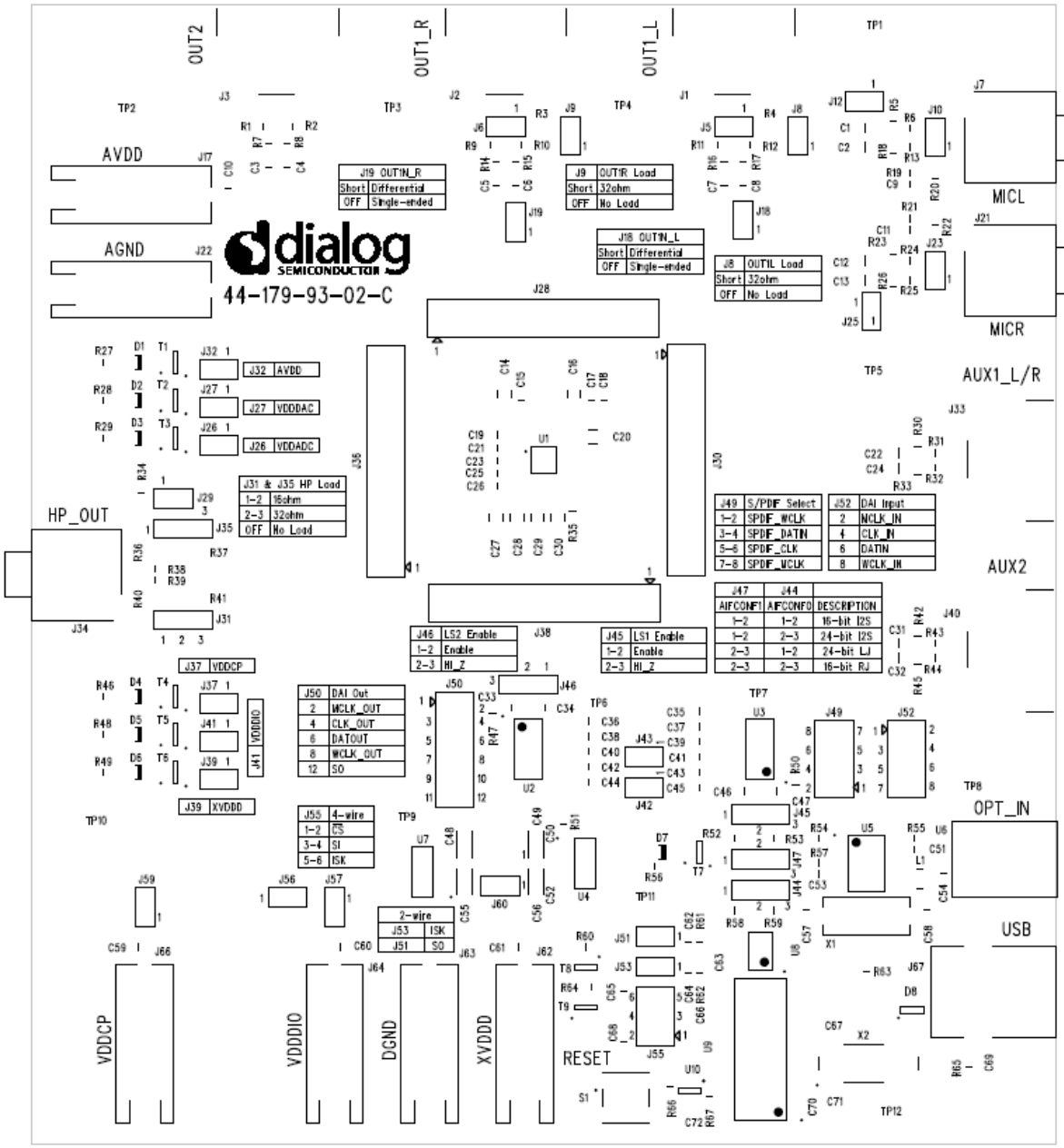


Figure 2 Evaluation Board 44-179-93-02-C Mainboard

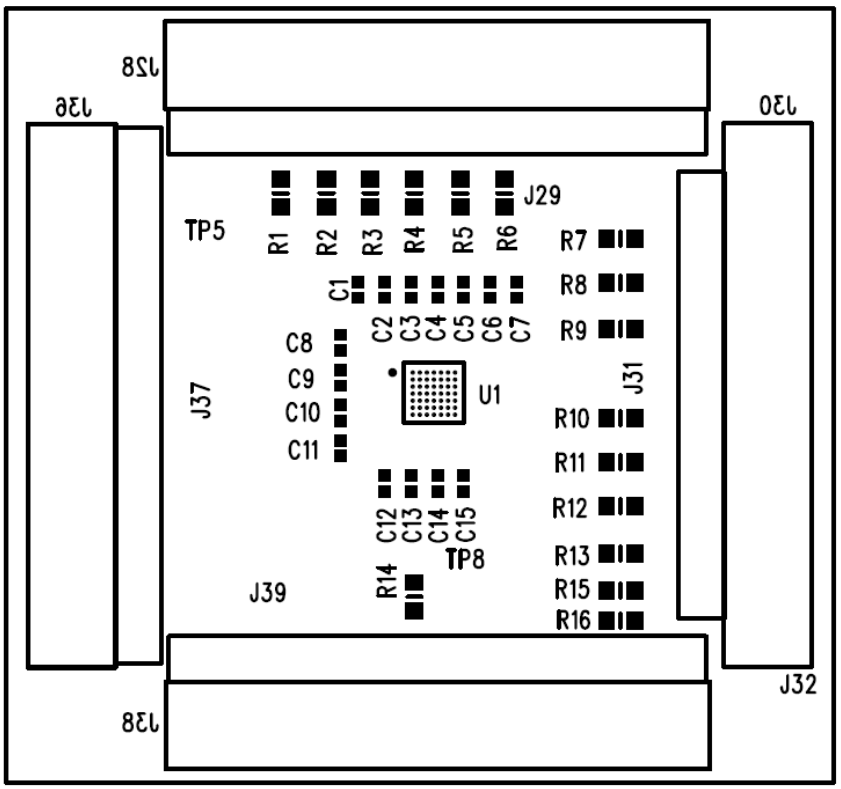


Figure 3 DA7210 44-179-93-04-C Miniboard

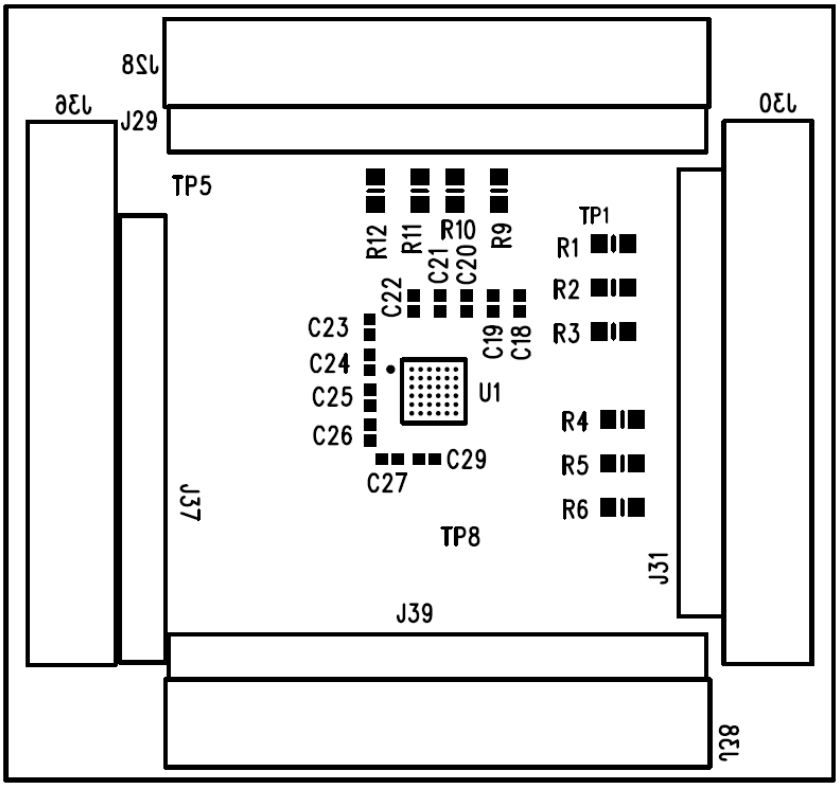


Figure 4 DA7211-00 44-179-93-04-B Miniboard

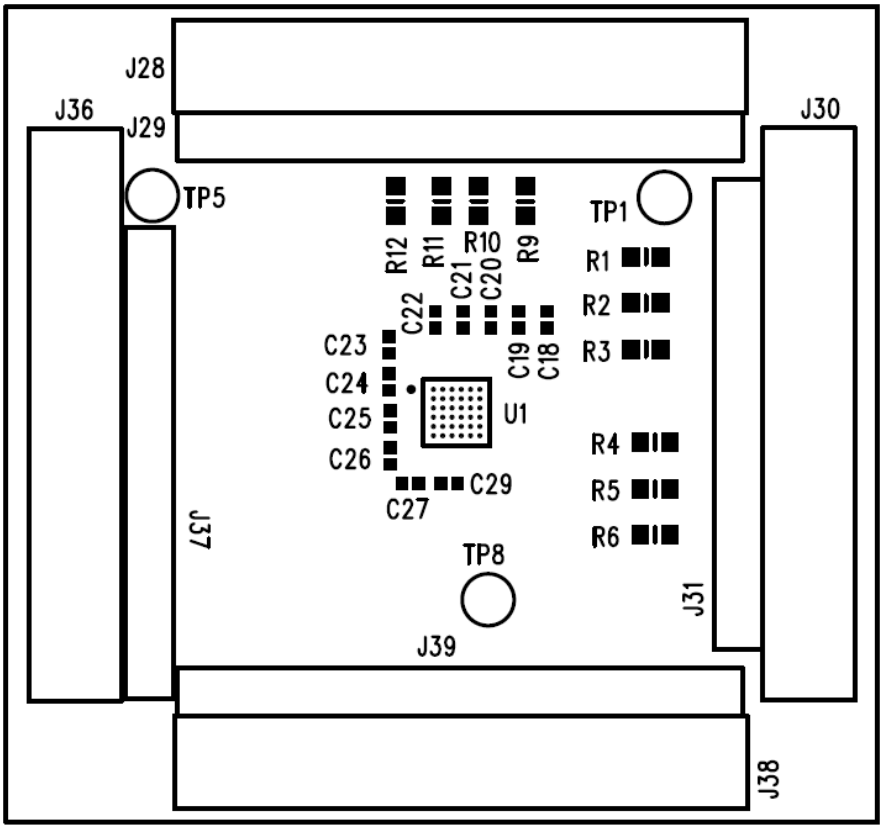


Figure 5 DA7211-01 44-179-93-04-E Miniboard

The passive components needed for noise decoupling or charge pump operation have been placed as close as possible to the DUT pins to ensure optimum operational performance.

Gerber data for the board is available on request.

2.1 Power Supplies

The board is intended to be supplied by power supplies in the range +1.8V_{dc} to +2.5V_{dc} (nominal). The power supplies are connected via 4mm sockets: AVDD, VDDCP, VDDDAC, VDDADC, VDDDIO, DGND and AGND. LEDs D1 to D6 will illuminate when the power supplies are correctly connected.

Some devices on the board will be powered from the +5V_{dc} or +3.3V_{dc} supply produced by the USB interface module.

For demonstration purposes the +5V_{dc} USB supply can be connected to regulator, U9, to produce +1.8V_{dc} capable of supplying all of the DUT the power supply pins. This configuration allows complete DUT operation using just USB and TOSLINK connections only, but maximum headphone power output will be limited when using +1.8V VDDDCP power supply.

2.2 Jumpers and Link Positions

Header	Link Position	Function	Notes
J5		OUT1_L speaker connection	External connection
J6		OUT1_R speaker connection	External connection
J8	On	OUT1_L 32Ω load selected	
	Off	OUT1_L no load	
J9	On	OUT1_R 32Ω load selected	
	Off	OUT1_R no load	
J10		MIC_L differential connection	External connection
J12	On	MICN_L single-ended input	
	Off	MICN_L differential input	
J18	On	OUT1N_L differential output	
	Off	OUT1N_L single-ended output	
J19	On	OUT1N_R differential output	
	Off	OUT1N_R single-ended output	
J23		MIC_R differential connection	External connection
J25	On	MIC_R single-ended input	
	Off	MIC_R differential input	
J26	Short link	Short VDDADC current measurement point	N/A for DA7211
	DMM link	VDDADC current measurement point	
J27	Short link	Short VDDDAC current measurement point	N/A for DA7211
	DMM link	VDDDAC current measurement point	
J29	On	Headphone sense ground connected	Should be disconnected for DA7211
	Off	Headphone sense ground disconnected	
J31	1-2	HPL 16Ω load selected	
	2-3	HPL 32Ω load selected	
J32	Short link	Short AVDD current measurement point	

	DMM link	AVDD current measurement point	
J35	1-2	HPR 16Ω load selected	
	2-3	HPR 32Ω load selected	
J37	Short link	Short VDDCP current measurement point	
	DMM link	VDDCP current measurement point	
J39	Short link	Short XVDDD current measurement point	N/A for DA7211
	DMM link	XVDDD current measurement point	
J41	Short link	Short VDDDIO current measurement point	N/A for DA7211
	DMM	VDDDIO current measurement point	
J42	On	WCLK slave mode	
	Off	WCLK master mode	
J43	On	CLK slave mode	
	Off	CLK master mode	
J44 / J47	1-2 / 1-2	16-bit I2S mode	J44 and J47 must both be set for correct S/PDIF receiver DAI format and word length
	1-2 / 2-3	24-bit I2S mode	
	2-3 / 1-2	24-bit left justified mode	
	2-3 / 2-3	16-bit right justified mode	
J45	1-2	DAI input level shift enable	
	2-3	DAI input level shift high impedance	
J46	1-2	DAI output level shift enable	
	2-3	DAI output level shift high impedance	
J48	On	S/PDIF receiver +5V supply enabled	
	Off	S/PDIF receiver +5V supply disabled	
J49	1-2	SPDIF word clock	Short links only if no sources are connected to J52
	3-4	SPDIF bit clock	
	5-6	SPDIF data	
	7-8	SPDIF master clock	

J50	1-2	MCLK output	External connections
	3-4	CLK output	
	5-6	DATOUT output	
	7-8	WCLK output	
	11-12	SO output	
J51	On	Control interface 2-wire ISK selected	Short only if J55 links are removed
	Off	Control interface 2-wire ISK de-selected	
J52	1-2	DAI MCLK input	Short only if J49 links are removed
	3-4	DAI CLK input	
	5-6	DAI DATIN input	
	7-8	DAI WCLK input	
J53	On	Control interface 2-wire SO selected	Short only if J55 links removed
	Off	Control interface 2-wire SO de-selected	
J55	1-2	Control interface 4-wire nCS selected	Short only if J51 and J53 links removed
	3-4	Control interface 4-wire SI de-selected	
	5-6	Control interface 4-wire ISK selected	
J56	On	XVDDD connected to VDDCP	
	Off	XVDDD disconnected from VDDCP	
J57	On	XVDDD connected to VDDDIO	
	Off	XVDDD disconnected from VDDDIO	
J59	On	VDDCP connected to AVDD	
	Off	VDDCP disconnected from AVDD	
J60	On	REG_+1.8V supply connected	
	Off	REG_+1.8V disconnected	

Table 1 Jumpers and Link Positions

The evaluation board can be set up to run solely from the +5V USB supply as the source for all board supplies. It is necessary to remove all external power supplies and to add jumpers J56, J57, J59 and J60 for this operation, which is the default configuration for the board.

The digital audio interface jumpers are set to receive a TOSLINK input and should be removed to accept other external clocks at J52. Figure 9 shows the extra links required to enable the onboard supplies.

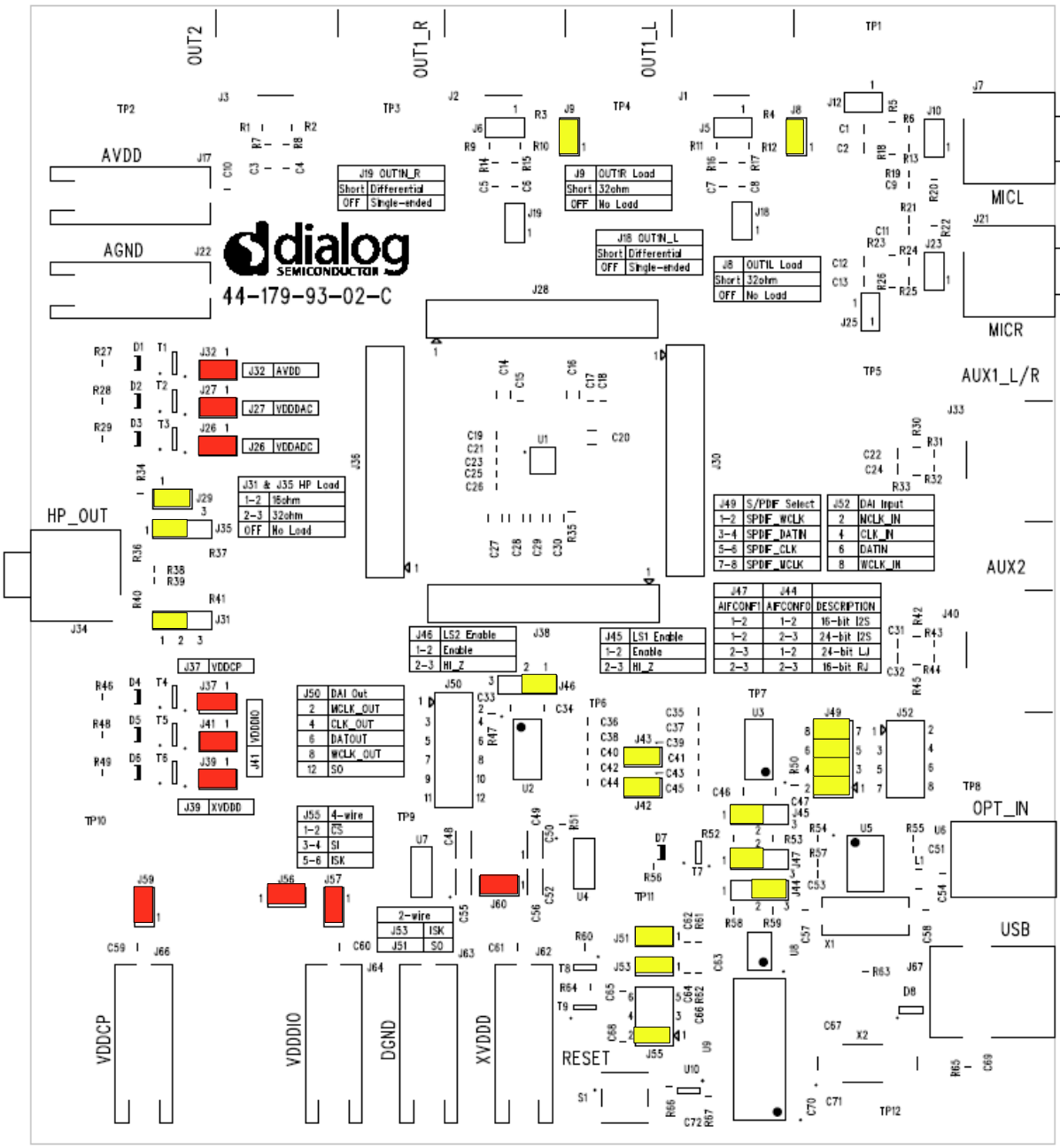


Figure 6 DA7210 Default Link locations

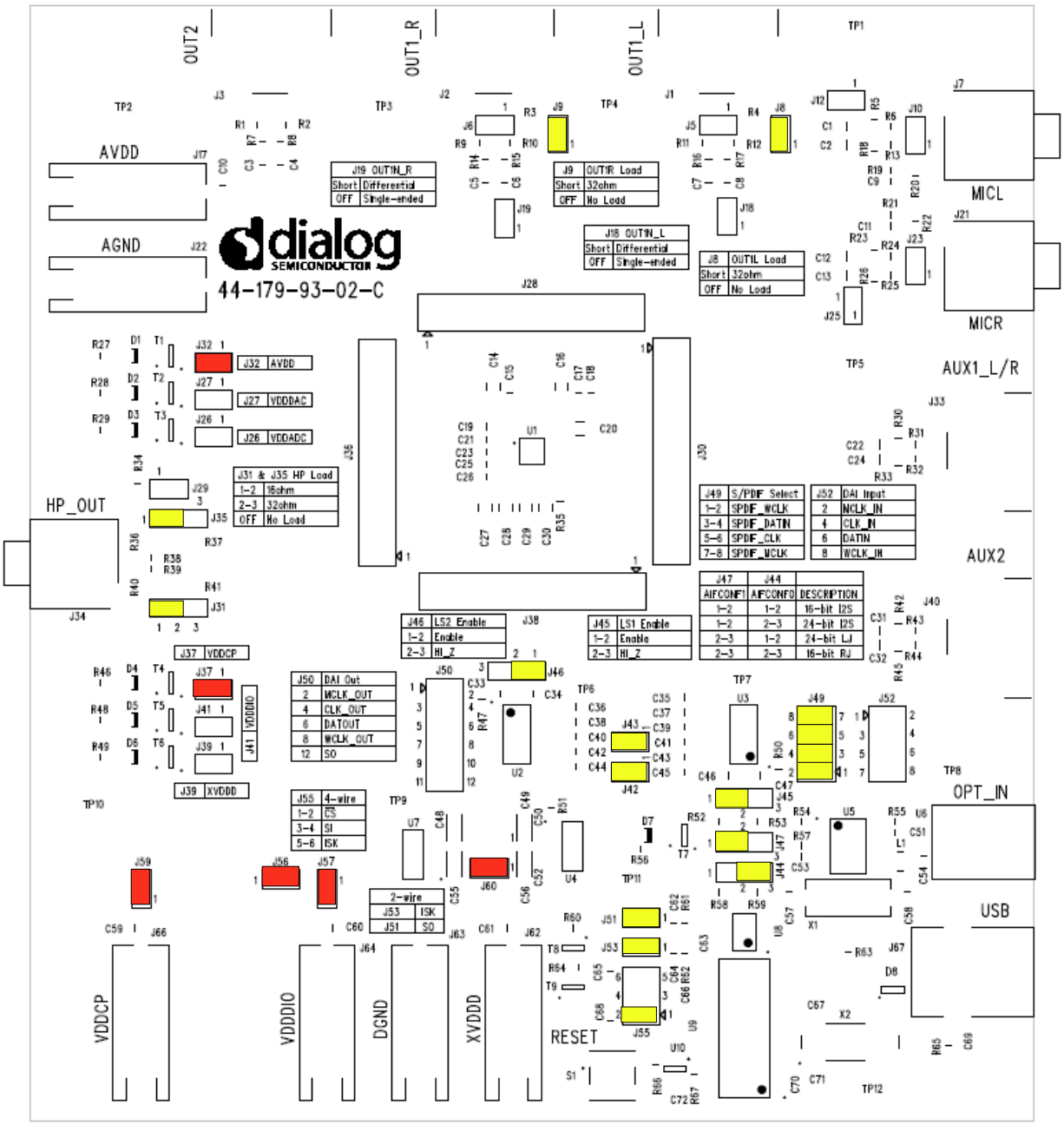


Figure 7 DA7211-00 Default Link Locations

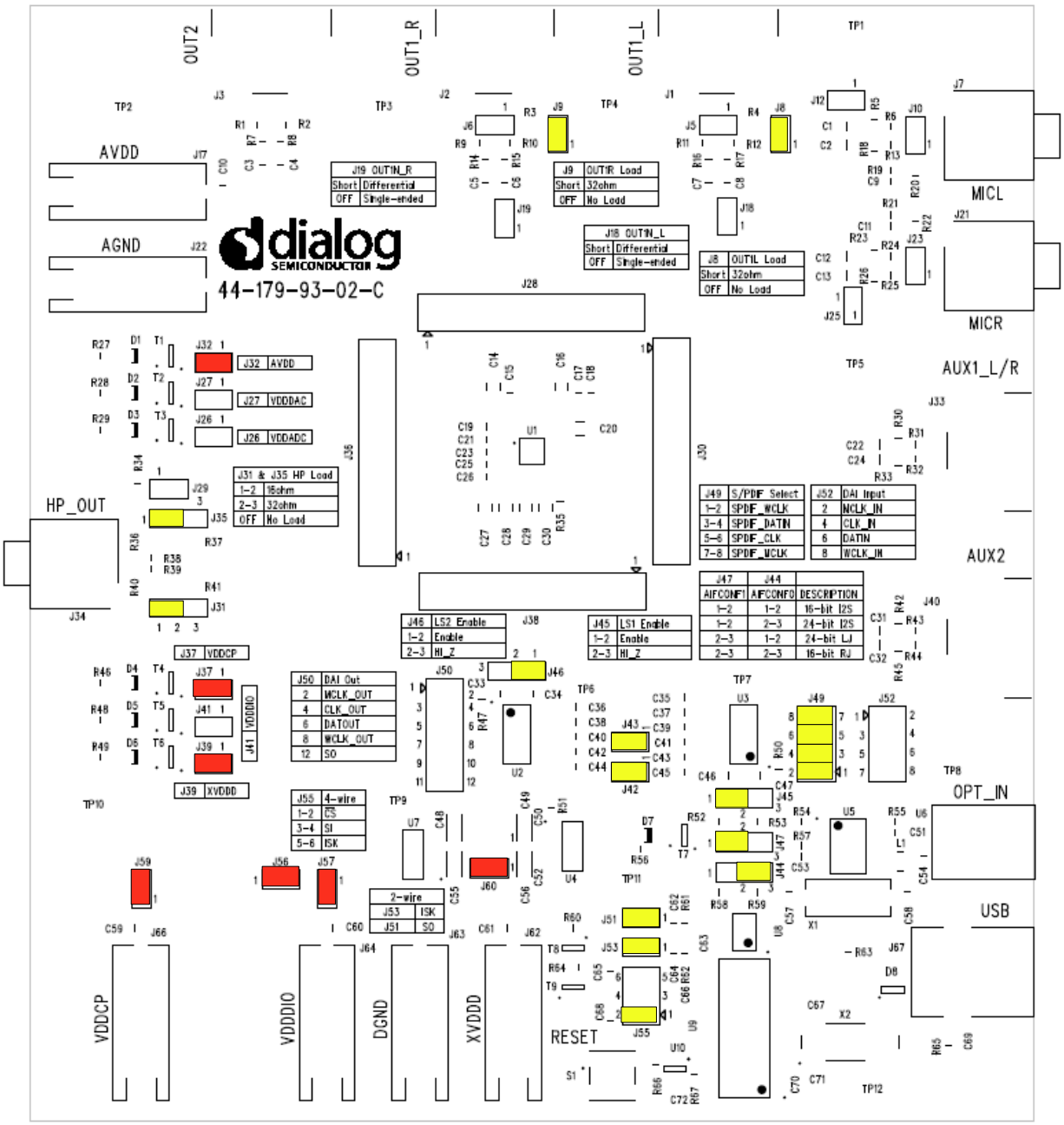


Figure 8 DA7211-01 Default Link Locations

Figure 9 shows the locations of the jumper links when using the DA7210 with external power supplies to AVDD J66, VDDCP J17, XVDDD J62 and VDDDIO J64. The digital audio interface jumpers are set to receive a TOSLINK input and should be removed to accept other external I2S clocks at J52.

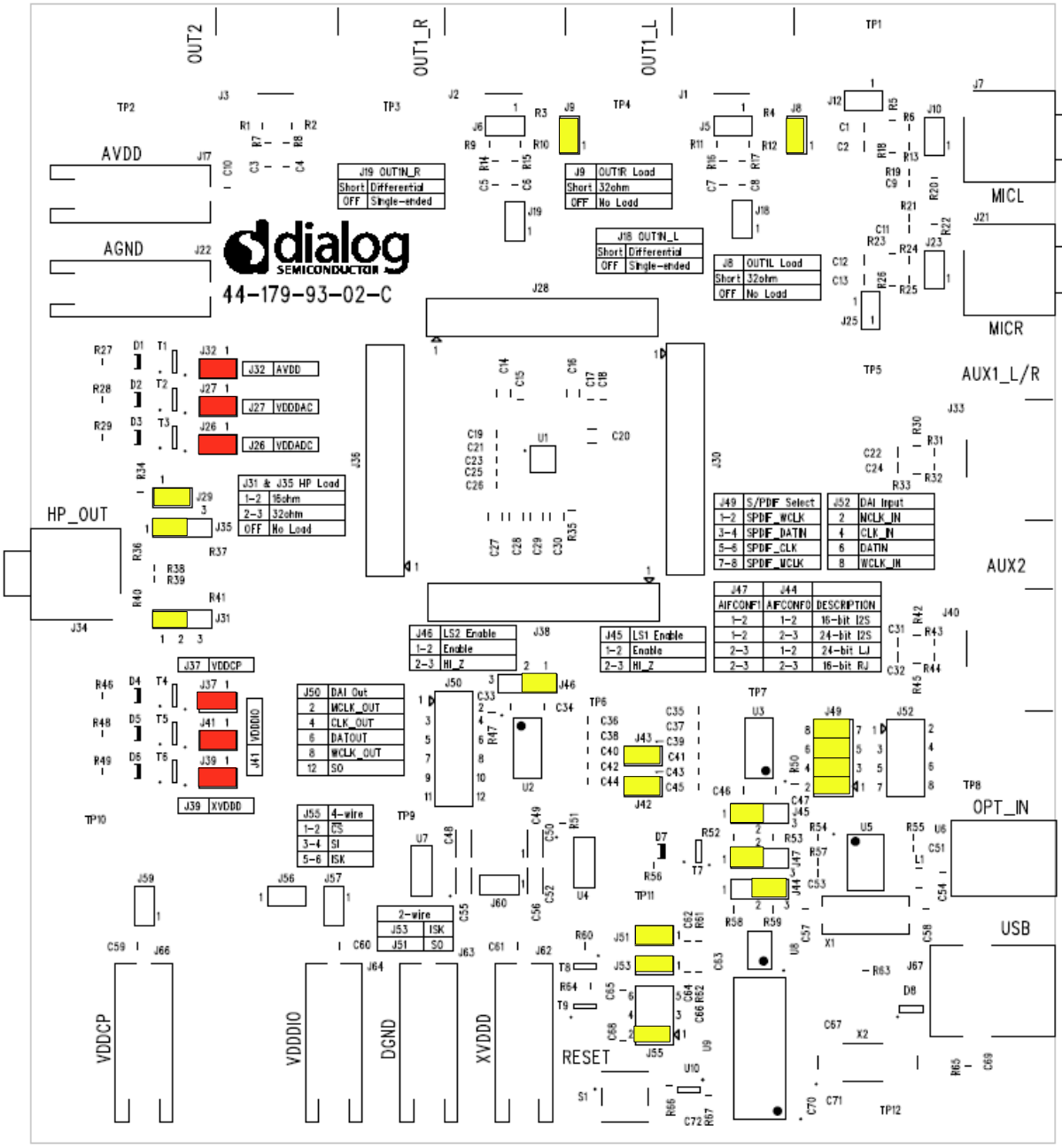


Figure 9 External Power Supply Jumper Configuration

3 Evaluation Board Features

3.1 USB Interface

The USB Interface is used here for the following purposes:

- As a source of I2C and SPI control signals.
- To provide a discrete signal to the power down pin *PD* (DA7210 only).
- To provide level shifting voltages.
- To allow standalone operation of the evaluation board using the $+5V_{dc}$ USB power supply only.

The USB control signal device is powered by the USB bus cable via a fixed $+3.3V_{dc}$ regulator.

The USB interface control signals can be isolated from rest of the evaluation board by removing J51, J53 and J55 described in Table 1. Removing these jumpers will allow external signal access to the DA7210 control interface. The USB interface can also be used to supply the power supplies to the DUT on the evaluation board.

The USB Interface implements multi-mastering on its I2C interface, permitting concurrent operation with any other multi-mastering controller. This allows the software to control a DA7210/11 device which is already part of the users system, and under control of the system processor.

4 Control Software

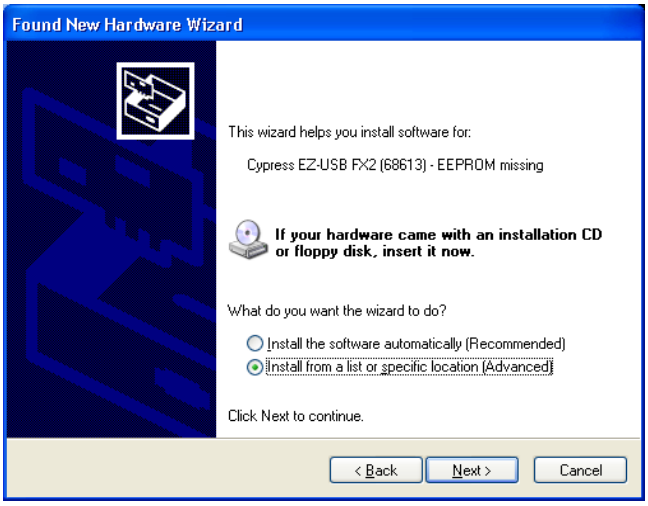
4.1 Installation

Insert the DVD-ROM containing the software into the controlling PC. If the installation does not start automatically, run the program 'setup.exe' from the DVD-ROM containing the software. An automated script will install the program to your PC. By default, the directory *'C:\ProgramFiles\Dialog Semiconductor\Audio\DA7210 Rev x.x'* will be used.

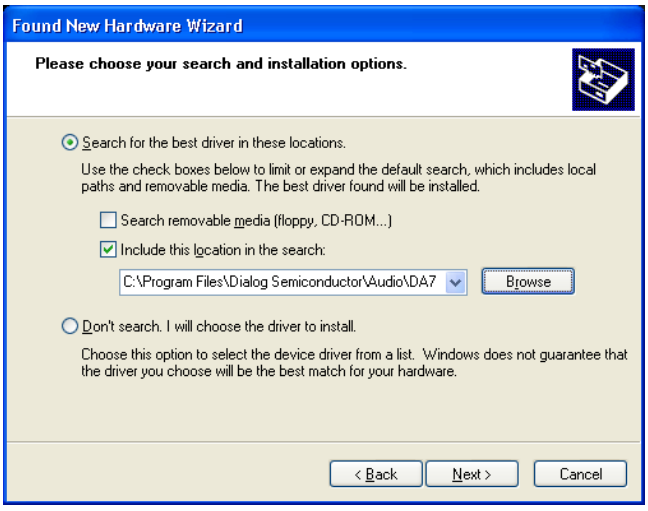
As Windows Vista imposes limitiations on the *'C:\Program Files'* directory, change this default to *'C:\Dialog Semiconductor\Audio\DA7210 Rev x.x'* when prompted.

Plug in the USB cable, and Windows will detect the USB device. It will prompt for the drivers, which should be automatically located on the root directory of the DVD-ROM. The setup file is *''dlgezusb.inf'* and the following description explains how to install the driver.

Select No, not this time and press Next >

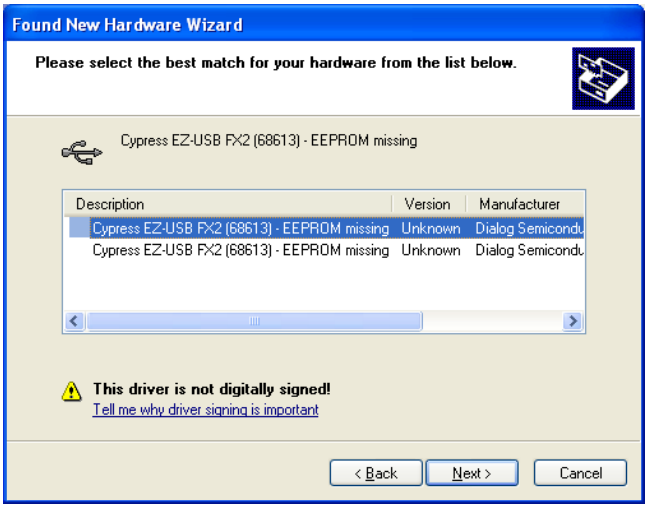


Select Install from a list or specific location (Advanced) and press Next >

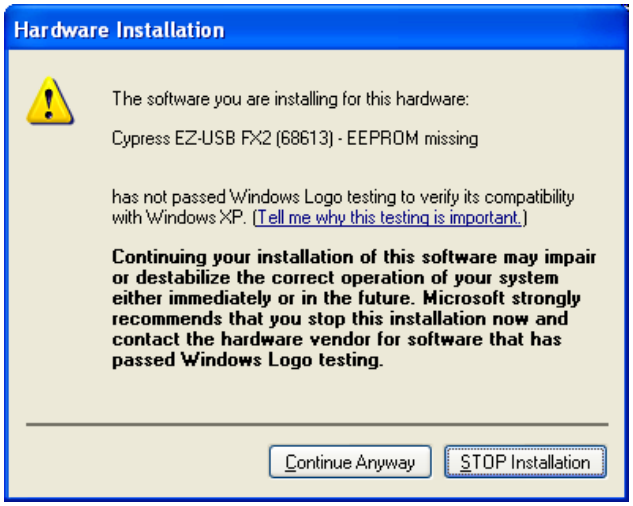


Select Browse and locate the folder

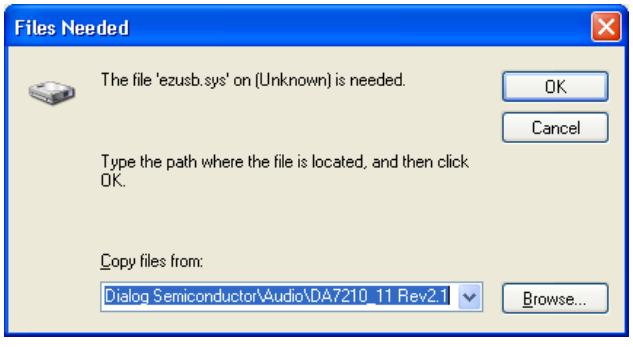
C:\Program Files\Dialog Semiconductor\Audio\DA7210_11 Rev x.x



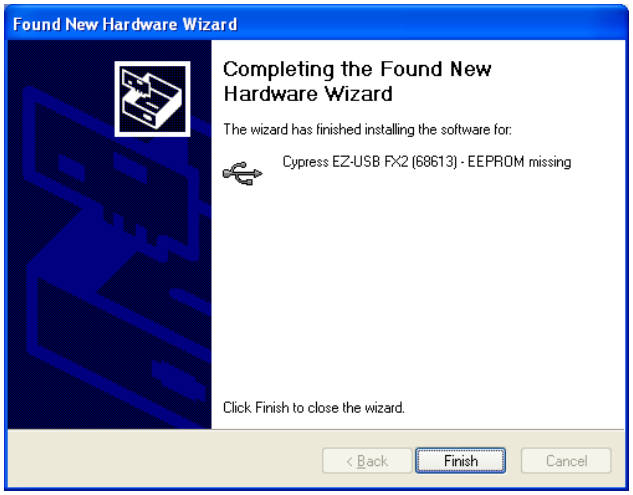
Select *dlgezusb.inf* and press *Next >*



Press Continue Anyway



Select Browse and locate C:\Program Files\Dialog Semiconductor\Audio\DA7210_11 Rev x.x then press OK



Select Finish

If you are using Windows XP, you may get a message saying that a USB2 device is attached to a USB1.1 port. This can safely be ignored.

To uninstall the software please use the Windows '*Add/Remove Programs'* function that can be found under '*Start->Settings->Control Panel'*.

4.2 Set-up Files

4.2.1 Text File

The DUT registers can written to by submitting a text file containing the register values; Figure 10 shows an example file. Only the data in the first three columns is required: register, data, R/W; other comments, such as those shown in the example, will be ignored. Lines of text that do not follow register write entries should be preceded by // in order that the line is ignored when reading the text file.

The text file can be created by saving the first three columns of the template spreadsheet file above as a text file or can be created from scratch; it is only necessary for the text file to contain the registers required for set up all others can be omitted.

To add a delay in the file the register value is entered as *Delay* followed by the delay time require in milliseconds. The example in Figure 10 shows a 100ms delay added as the third entry.

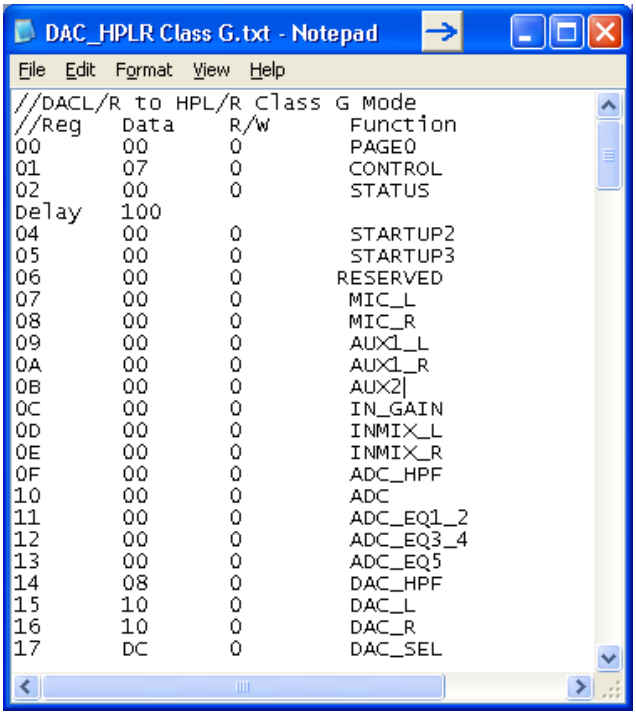


Figure 10 Text Set-up File

A selection of text files can be found on the DVD containing the register control software setup files.

4.2.2 Spreadsheet File

The register settings can be prepared using a spreadsheet file template provided, Figure 11, and saved as a tab delimited text file like Figure 10. The only bits that can be altered on the spreadsheet are the individual register bits in columns G to N and the R/W bit in column O. If any of these bits are set to 1 the bit will be highlighted in green on the register map. If the bit default setting is 1 and the bit value is changed to 0 then the register map bit will be highlighted in grey. This highlighting allows easy visual reference to the register changes from the default settings.

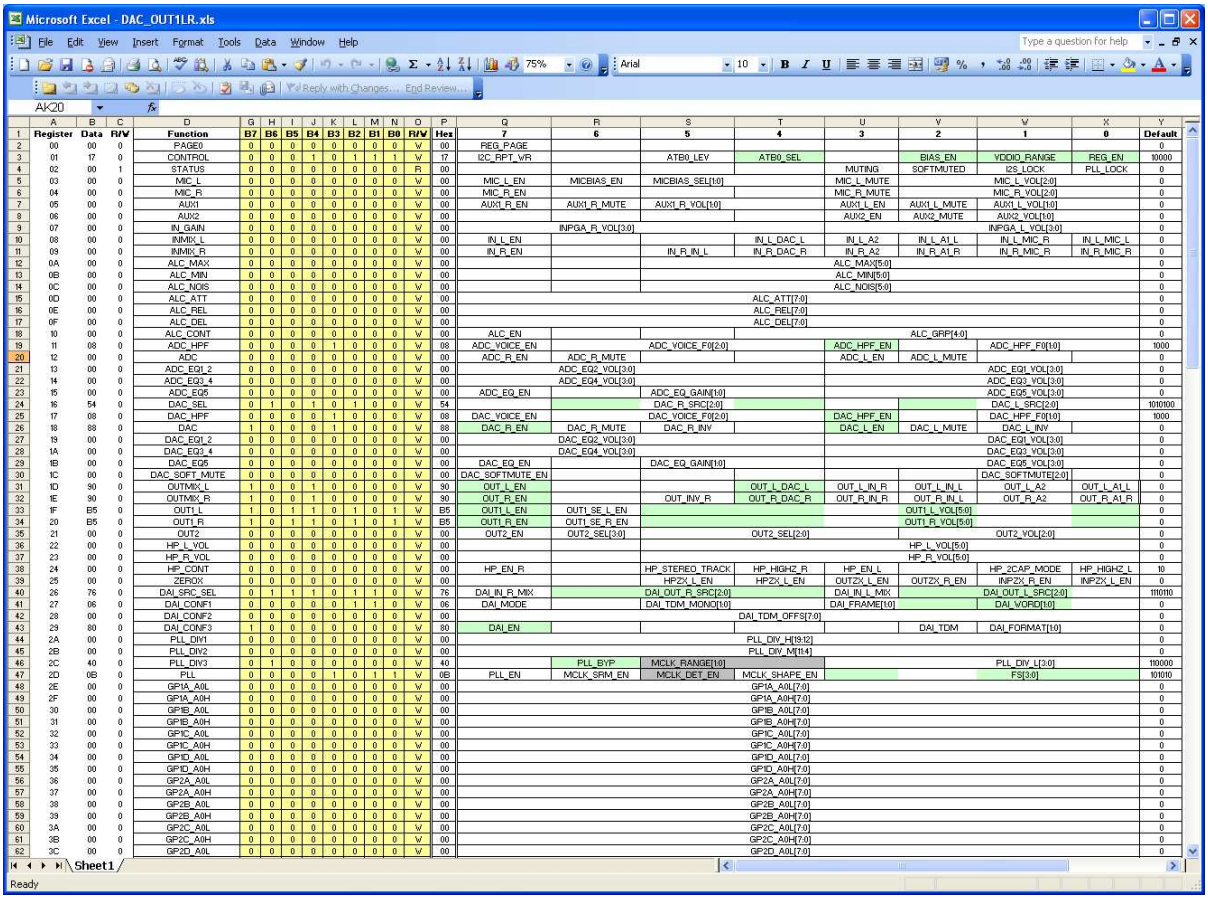


Figure 11 Spreadsheet Set-up File

4.3 Control Panels

Run the DA7210/11 program by clicking the shortcut on the appropriate item in the Start menu. The best setting for the PC display size is 1024x768 pixels or above. Font size on the PC display should be Normal (95dpi). It is important to note that a display size other than the recommended setting may affect the way in which the panels appear.

4.3.1 Front Panel

The front panel allows selection of a number of methods for programming the registers of the DUT.

- Submit a text file template, which allows register sequencing and time delays to be added.
- Select register map page 0 for individual register read/write access.
- Select register map page 1 for individual register write access.
- Select general purpose filters register map for individual register write access.
- Open a panel to access the volume control registers for real time volume control.
- Direct read/write access to a single register.

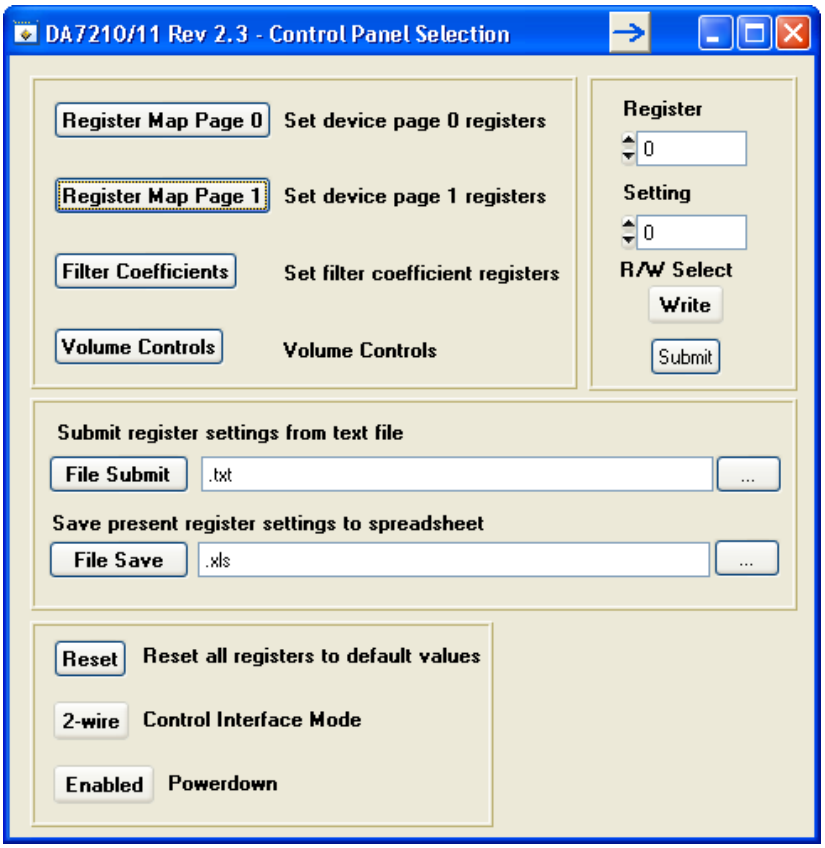


Figure 12 Front Panel

Any file path required can be opened using the *'…'* button to the right of the corresponding text box, but it must then be submitted or saved using the submit button to the left of the corresponding text box.

It is possible to save the present register settings by selecting a spreadsheet file by locating the filename path using the '*Save present register setting to spreadsheet'* box. This function will not read back the device registers, but will only output the values shown on Page 0 and Page 1 of the GUI.

The front panel also contains a reset button, a device power down button and 2-wire/4-wire control selection.

4.3.2 Register Map Page 0

The page 0 register map panel allows read/write access to single bits or to the hex value of a single register; both can be submitted individually.

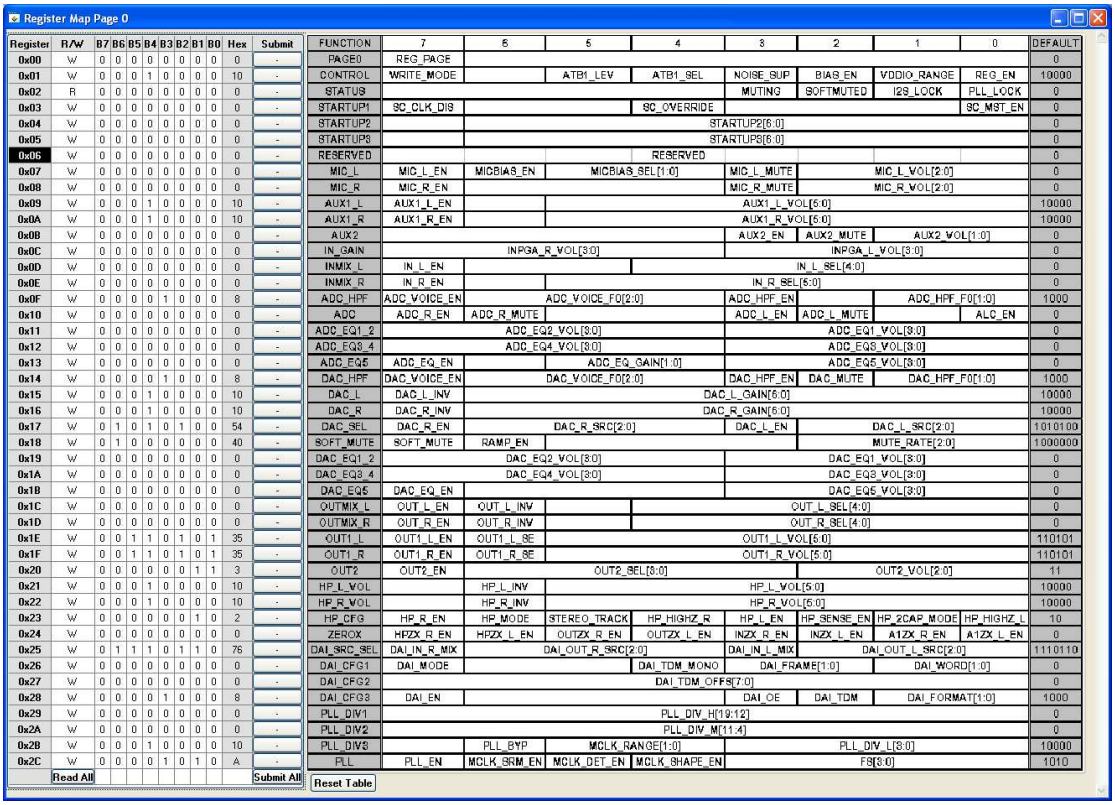


Figure 13 Register Map Page 0

To select readback of an individual register click on the R/W bit of the required register and select R. To read the value press the submit button of the same row.

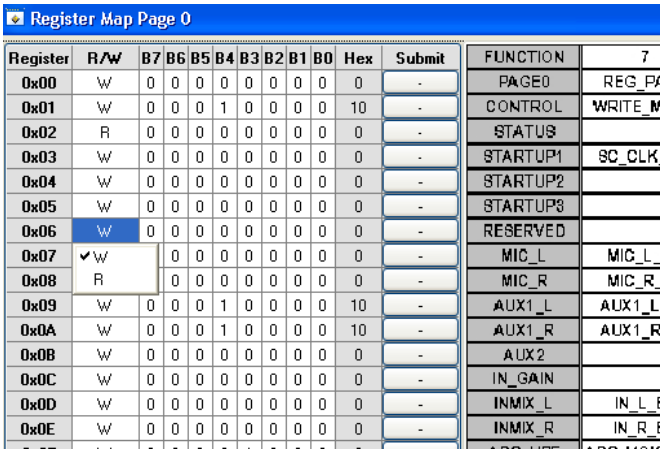


Figure 14 Selecting Individual Register Readback

A pop up window will then appear displaying the readback value of the register, Figure 15.

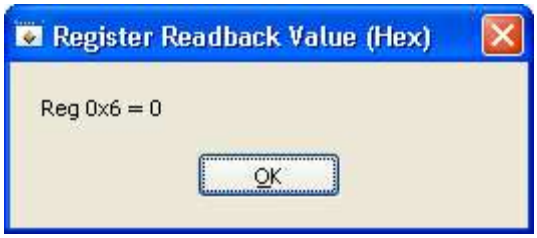


Figure 15 Readback Pop-up Window

To select readback of all Page 0 register simultaneously press the read all button at the base of the R/W column. This will write the register readback values to a spreadheet file at the following location: *C:\Program Files\Dialog Semiconductor\Audio\DA7210_11 Rev x.x \Page0_Readback_Values.xls*

Figure 16 Readback All Registers

4.3.3 Register Map Page 1

The page 1 register map panel allows access to single bits or to the hex value of a single register; both can be submitted individually. Readback from Page 1 registers is limited, but individual register readback can be selected in the same way as Page 1 where available.

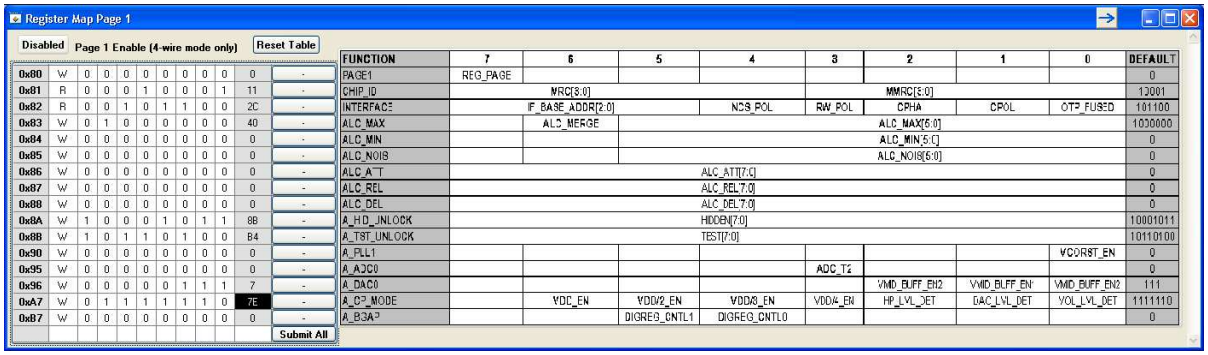


Figure 17 Register Map Page 1

4.3.4 GP Filters Register Map

The general purpose filters register map panel allows access to the hex value of a single register; all registers are submitted after changes. All registers may also be reset using the *Reset Filters* button.

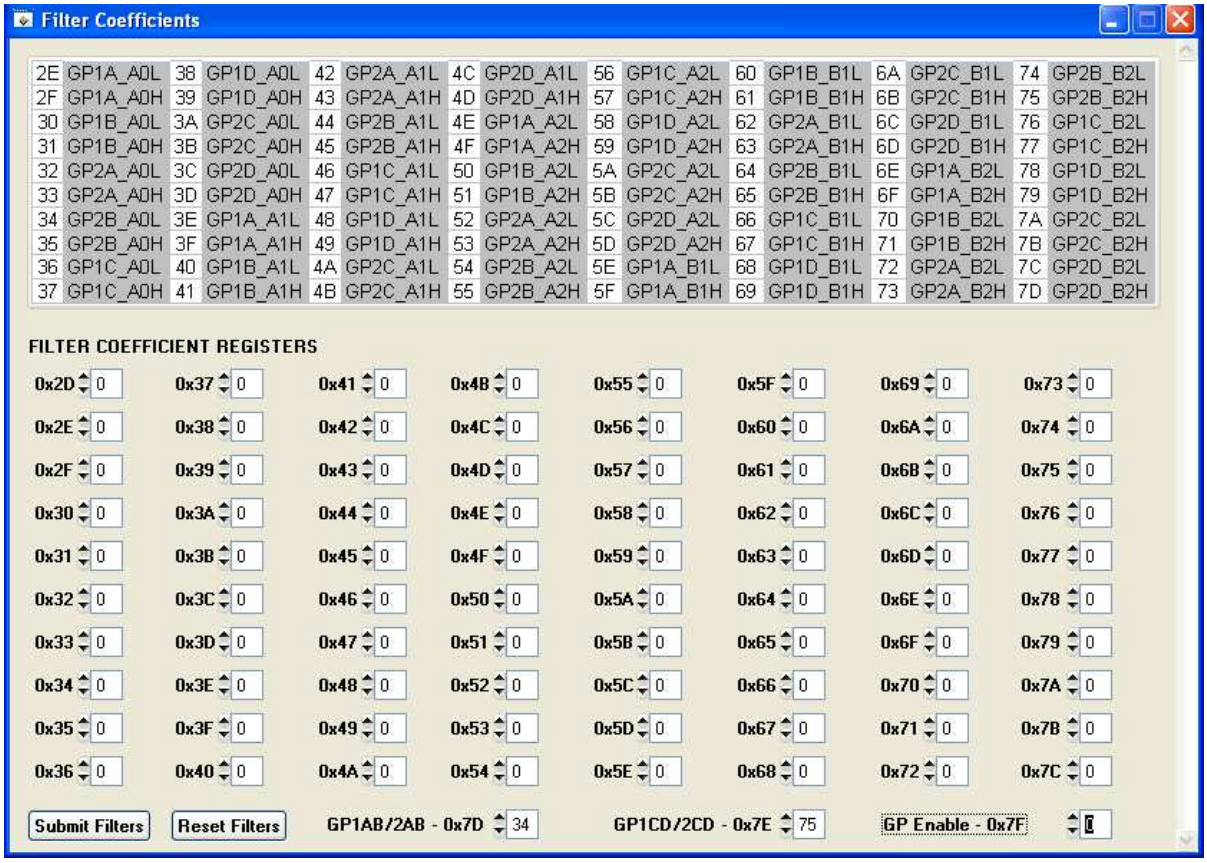


Figure 18 Filter Coefficients Set-up Panel

An alternative 'RT Filters' GUI is available that allows easy submission of any of the DAC or ADC filters paths present within the DA7210/11. This is contained on the installation DVD within the distribution kit.

4.3.5 Volume Control Panel

The *Volume Control* panel allows real time changes to any of the analogue input or output PGAs within the DUT. Muting is also possible where this function exists.

Gain controls are available to the following PGAs:

- AUX_L and AUX_R
- MIC_L and MIC_R
- A2 PGA
- Left and Right Input PGAs
- OUT1_L and OUT1_R
- HPL and HPR
- OUT2

It is possible to change the headphone and OUT1 gain control registers as stereo pairs by simultaneously selecting the *HPL follow HPR* and *OUT1L follow OUT1R* buttons.

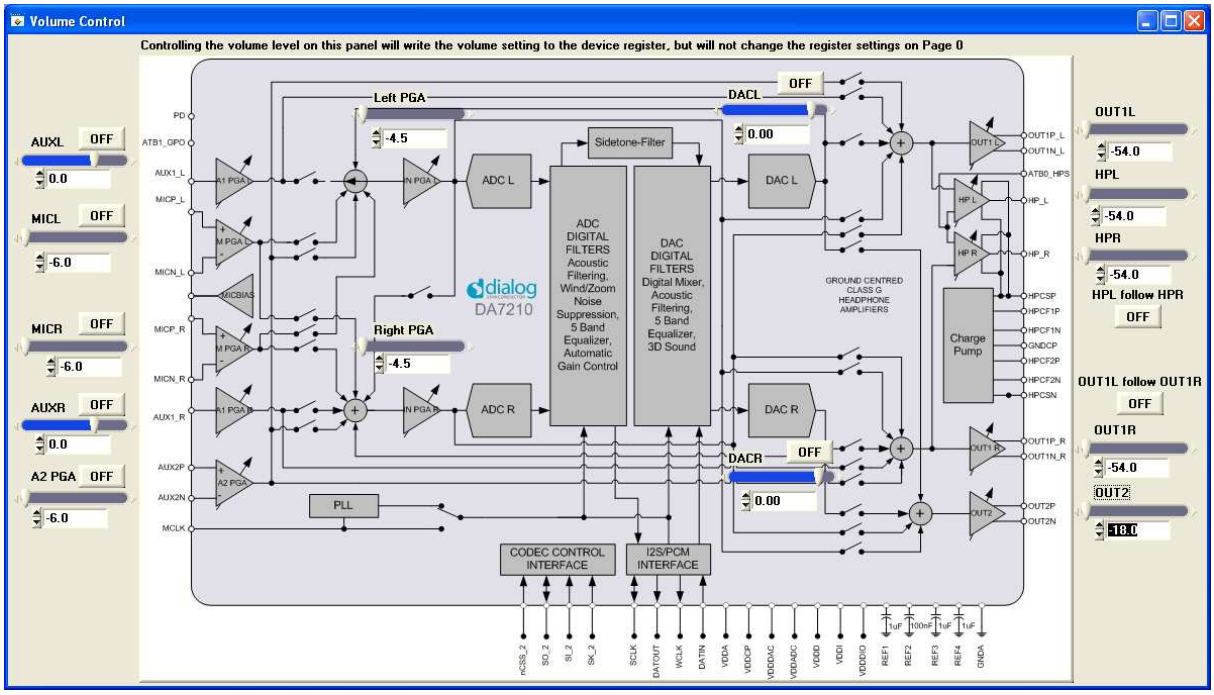


Figure 19 Volume Control Panel

5 RT Filters GUI

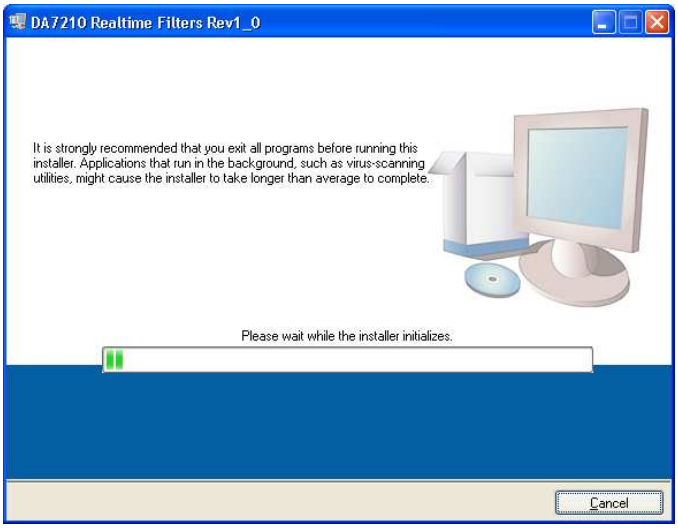
The RT filters GUI allows easy control of all the filter options within the DA7210/11 device through USB control. This includes general purpose filters, five-band equalisers and voice filters for ADC and DAC.

The *Filter Setup* page makes it possible to design the required filter response for all of the general purpose filter bi-quad IIR paths available in the DA7210/11.

5.1 Software Installation

The set-up file for the RT Filters control software can be found on the accompanying DVD in the folder *DA7210 RT Filters Rev x.x*

Double click *setup.exe* file and the install will begin.



Do not change the installation directory or necessary license files will not be accessible.