

## **DA7212 Ultra Low Power Codec**

## and

## Power Commander™ GUI Software

#### Introduction

The DA7212 Evaluation Board has been designed to allow measurement and evaluation of the DA7212 device.

All Audio Codec functionalities are self-contained within the Evaluation Board (EVB).

The EVB is supplied with a USB memory stick containing various documents and a GUI to allow the user to control the DA7212.

The GUI is called Power Commander<sup>™</sup>. It uses a simple graphical interface, allowing the DA7212 to be controlled via a USB port of a PC.

The EVB has a number of jumper links to enable the user to change the system configuration and to allow him to make appropriate measurements, although, in reality, few jumper links are required to be altered for standard operations of the DA7212.

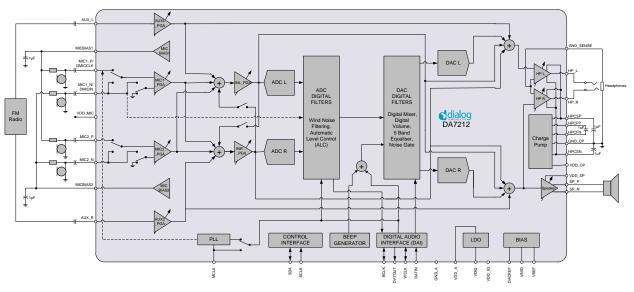


Figure :1 DA7212 Block Diagram



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### Summary

This document provides some useful information to the user about the EVB and the GUI to allow testing and evaluation of the DA7212 Ultra Low Power Codec.

The hardware solution is based upon two PCBs:

- "EVALUATION MOTHERBOARD 170-03-A"
- "CUSTOMER REFERENCE BOARD 169-02-A" (DA7212 mini board)

The GUI, called Power Commander<sup>™</sup>, requires a PC operating Windows 2000/XP/Vista/Windows 7 with a USB1.1 or USB2 interface. To run Power Commander<sup>™</sup> under Windows Vista, set the default installation location to 'C:\Dialog Semiconductor\'.

Note that Dialog recommends connecting the EVB to a 500 mA capable USB port as we cannot guarantee that a USB hub (set to 100 mA) is sufficient to operate it correctly.

See the section on Power Supplies below.

The GUI allows the user to: (i) configure the DA7212 using one of the several pre-loaded initialisation files (i.e. start-up sequences) available; (ii) write and read operations to all control registers; and (iii) monitor of device status.



#### Hardware

The DA7212 Evaluation Board consists of two boards:

A daughterboard containing the DA7212, and the essential external components. This board could also be used in standalone or as a module for a customer development platform.

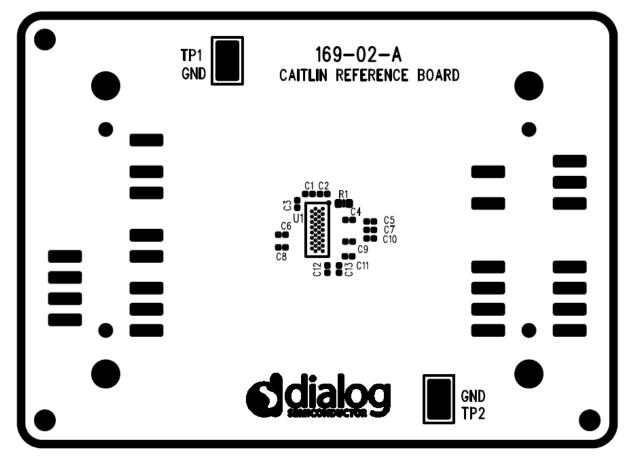


Figure 2: DA7212 Mini Board

Note a socketed mini board (169-01-A) is also available. See appendix B for more information.

A motherboard containing many circuit blocks that allows for flexible configuration and provides test access to the DA7212. It includes:

- a. USB Interface with Control Interface level shifters
- b. 1x audio optical input/output interfaces (with selection matrix)
- c. USB reset and 3.3V reset switches
- d. headphone output
- e. line out outputs
- f. auxiliary inputs
- g. analogue/digital microphone inputs
- h. master clock input
- i. power supply inputs (VBAT, GND)



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

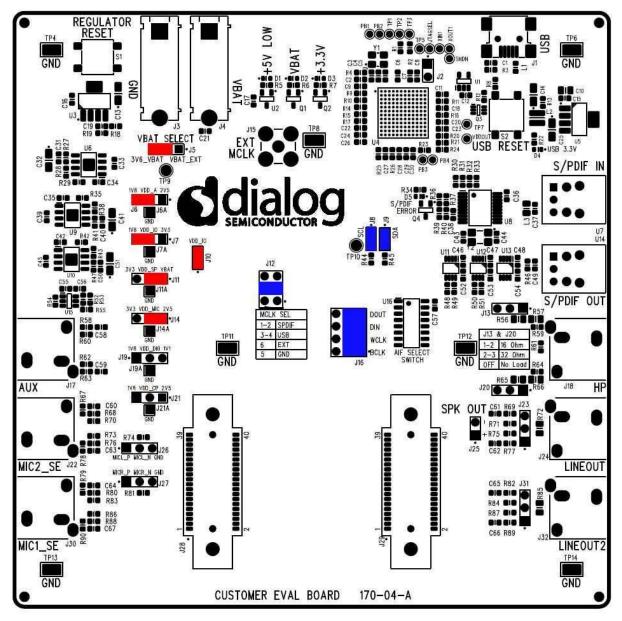


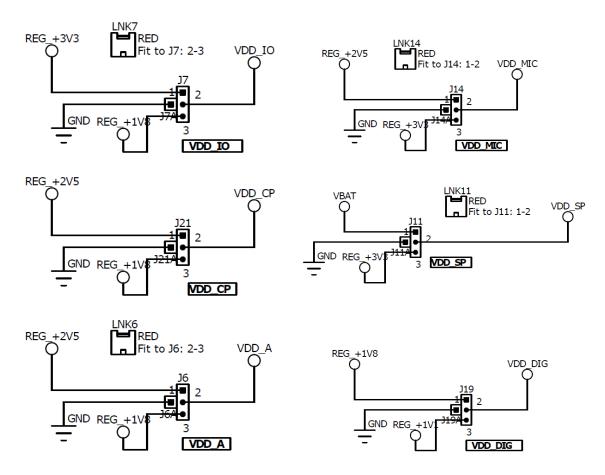
Figure 3: Mother Board – Default Jumper positions shown in Red (power) and Blue (signal)

Note: The EVB has been configured by default to work from the mother board's on-board regulators.



#### **Power Supplies**

The DA7212 EVB is powered when a USB cable is connected to J1 (+5V\_USB). With default jumper settings (J6, J7, J11, J14 and J19, J21), the DA7212 device on the daughterboard is powered form the on-board regulators.



As DA7212 supports a wide supply range the jumper configuration allows the user to select one of two on-board supplies for each supply by connecting the jumper link between pins 1&2 or 2&3 of the jumper. For maximum flexibility the jumper link can be removed and a voltage can be supplied directly onto pin 2 of the jumper with a ground connection connected to the A pin of the jumper. Current measurements on individual supplies can also be performed by connecting an ammeter between the supply and pin2 of the jumper.

Note: As VDD\_IO supplies the IO voltage for the USB interface and level translators jumper J10 has been provided for current measurements on this supply of the DA7212 device. For current measurements on VDD\_IO remove the jumper link and insert an ammeter between pins 1 & 2 of J10.

Note: VDD\_CP and VDD\_DIG are not used in DA7212 and the jumper link should be left unpopulated.



## Audio Connections

Connector	Name	Function
J17	AUX	Stereo single-ended auxiliary input
J30	MIC1_SE	Stereo single-ended microphone input (connects to MIC1_P and MIC2_P)
J22	MIC2_SE	Stereo single-ended microphone input (connects to MIC1_N and MIC2_N)
J26		Mono differential microphone input Pin 1: MIC1_P Pin 2: MIC1_N Pin 3: GND
J27		Mono differential microphone input Pin 1: MIC2_P Pin 2: MIC2_N Pin 3: GND
U7	S/PDIF IN	Digital optical input
U14	S/PDIF OUT	Digital optical output
J18	HP	Stereo single-ended headphone output
J24	LINEOUT	Differential line output (AC coupled, use J25 for speaker)
J23		Differential line output (AC coupled, use J25 for speaker) Pin 1: LINE_P Pin 2: GND Pin 3: LINE_N
J25		Differential speaker output (DC coupled) Pin 1: SP_P Pin 2: SP_N
J32	LINEOUT2	Unused
J31		Unused

Table 1 170-04-A Audio Connectors



## **Jumpers Link Positions and Button Settings**

Jumper number	Position	Function
J3 &J4		External VBAT and GND connection
J5	1-2, (default)	VBAT select: VBAT is generated from an on-board regulator supplied from the USB
	2-3	VBAT select: VBAT is supplied from J3&J4
J6	1-2, (default)	Connects VDD_A from onboard 1.8V supply
	2-3	Connects VDD_A from onboard 2.5V supply
	А	GND connection for connecting external supply between pin 2 and A
J7	1-2, (default)	Connects VDD_IO from onboard 1.8V supply
	2-3	Connects VDD_IO from onboard 3.3V supply
	А	GND connection for connecting external supply between pin 2 and A
J8	On, (default)	Connects USB I2C SCLK to device
J9	On, (default)	Connects USB I2C SDATA to device
J10	On, (default)	Connects VDD_IO to the DA7212 device.
J11	1-2	Connects VDD_SP from onboard 3.3V supply
	2-3, (default)	Connects VDD_SP from VBAT
	А	GND connection for connecting external supply between pin 2 and A
J12	1-2	MCLK comes from the SPDIF interface
	3-4, (default)	MCLK comes from the USB interface
	5	GND pin
	6	External MCLK pin, anexternal MCLK can be
		connected between pins 5

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		and 6.
J13	1-2	Inserts a 160hm load across the left headphone output for test purposes
	2-3	Inserts a 320hm load across the left headphone output for test purposes
J14	1-2	Connects VDD_MIC from onboard 3.3V supply
	2-3, (default)	Connects VDD_MIC from onboard 2.5V supply
	А	GND connection for connecting external supply between pin 2 and A
J15		Allows connection of an external MCLK using an SMB connector. J12 should have it's jumper link removed when using this option.
J16	1-2, (default)	Connects the SPDIF/USB BCLK to the DA7212 device
	3	GND for connecting BCLK to/from an external source between 2-3 (for example Audio Precision PSIA cable)
	4-5, (default)	Connects the SPDIF/USB WCLK to the DA7212 device
	6	GND for connecting WCLK to/from an external source between 5-6 (for example Audio Precision PSIA cable)
	7-8, (default)	Connects the SPDIF/USB DIN to the DA7212 device
	9	GND for connecting DIN from an external source between 8-9 (for example Audio Precision PSIA cable)
	10-11, (default)	Connects the SPDIF/USB WCLK to the DA7212 device
	12	GND for connecting DOUT to an external source between 11-12 (for example Audio Precision PSIA cable)
J19	1-2 2-3,	Not Used Do not connect for DA7212
	А	
J20	1-2	Inserts a 160hm load across



		the right headphone output for test purposes
	2-3	Inserts a 320hm load across the right headphone output for test purposes
J21	1-2, (default)	Not Used
	2-3	Do not connect for DA7212
	А	
<b>S1</b>		Regulator Reset button:
		Resets the 3.3V, 2.5V, 1.8V
		and 1.1V regulators
S2		USB Reset button:
		Resets the USB sub system

Table 2: 170-04-A Jumpers Link Positions and Button Settings



#### **Control Software**

#### Installation

From the USB memory stick provided with the EVB box, run the 'setup.exe' file (DA7212\_USB\DA7212 GUI\setup.exe).

₩ DA7213_1v1	- • •
Destination Directory Select the primary installation directory.	
All software will be installed in the following locations. To install software into a different locations, click the Browse button and select another directory.	
Directory for DA7213_1v1	
C:\Dialog Semiconductor\Audio\DA7213_1v1\	Browse
Directory for National Instruments products C:\Program Files\National Instruments\	Browse
Back Next	Cancel

Click "Next>>".

UA7213_1v1
Start Installation Review the following summary before continuing.
Adding or Changing         • DA7213_1v1 Files         Click the Next button to begin installation. Click the Back button to change the installation settings.
Save File << Back Next >> Cancel

Click "Next>>".



₩ DA7213_1v1		- • 💌
Installation Complete		
The installer has finished updating your system.		
	<pre></pre>	Finish

Click "Finish".

You may need to restart your computer; in this case a pop up window will appear asking you to do so.

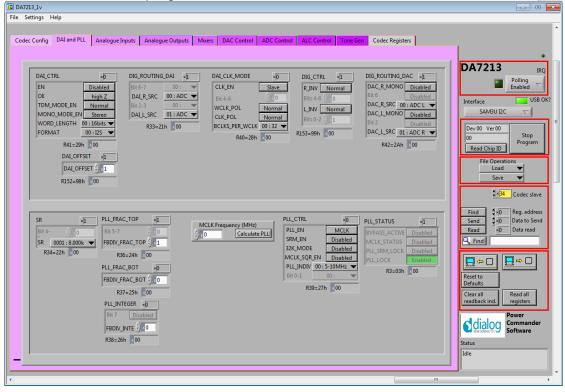
Once your computer has restarted, plug the USB cable to the EVB and Windows should detect the USB device and automatically install the driver. If not, the driver is located on this DA7212 USB stick



## **Control Panel**

Run the DA7212 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.

The following screen appears, with the "USB OK?" LED lit if the USB interface is correctly connected and operational.



To start the device, plug in the USB cable.

Figure 4 Initial Interface

If the Reset LED is blinking yellow, it indicates that the device is not yet communicating via the I2C interface. See Troubleshooting for more details.

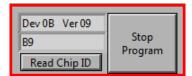


#### **Status and Controls**

**Polling Enabled** BY default the current page contents is updated via polling the I2C interface. If disabled, these readbacks are suppressed. This is used to force the communication over the bus to be silent. If this is set to automatic, the program will only poll the device while the application is the topmost window. If obscured by another program or window, polling will be disabled.

**LED** If the device is active this LED is green, or red if inactive.

correct.



#### Stop Program

This terminates the program. If there are unsaved changes, a dialog box is displayed.

This indicates the device version when the device

is active. When inactive, version status will not be

File Operations			
	Load	▼	
	Save	▼	

*Load* Loads previously saved text files, send all Registers and read back all registers.

"Load" opens a dialog box to select, view, copy or re-name a file.

Load Codec file opens a dialog box to allow selection of a codec setup file in the "\Codec Setups" directory.

**Save** Saves current panel state to a text file. Selecting "Save Codec file.." saves the codec registers in a slightly different format. Selecting "Register Dump" option saves current register values to the text file. See Appendix A.

Note: Difference between "Save" and "Register Dump" is that the "Save" dumps the contents of all panel controls to the file (a save state operation); whereas, "Register Dump" reads the device contents (including status registers) into the file. Note that some codec registers do not have readback capability.



Interface Selects between USB I2C control and offline mode. Switching to offline, then back to USB reinitialises the USB interface.

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Find     ♥×0     Reg. address       Send     ♥×0     Data to Send       Read     ×0     Data read	Slave Address Sets slave address of device. This affects all I2C communications. The codec slave addresses for DA7212 is 0x34. Note that this is the 8bit value (34h for Write, 35h for Read).
Se	nd Sends a single byte data to I2C device using Slave Address, Register Address and Data to Send.
Re Fir	<ul> <li>ad Reads single byte data from I2C device using Slave Address and Register Address.</li> <li>ad Finds a control matching a full or partial register name, a control bit name, a register number (e.g. R23 or 17h). Pressing "Find" repetitively will step through all matching items.</li> </ul>

**USB OK?** Indicates that the USB is OK and communicating.

Note: If Device Address does not match the port numbers on the device, this can be used to control/read any other device on the I2C bus.



Reads and upon Reload Configuration Clear all readback ind. Read all Read all Writes a panel. (	ronise Panel from Device all the register contents of the device dates the panel to match. ronise Device from Panel all the device registers to match the Refresh operation)	
Resets registers to values specified in configuration file for the PMIC section and defaul values for the codec.		
Clear all I2C readback indicators	Sets all readback indicators to 0.	
Read All Registers	Reads all registers, comparing with the panel controls.	

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## **Control Interface**

The Codec Config, DAI and PLL, Analogue Inputs, Analogue Outputs, Mixers, DAC Control, ADC Control, ALC control and Tone Gen pages all have the same format.

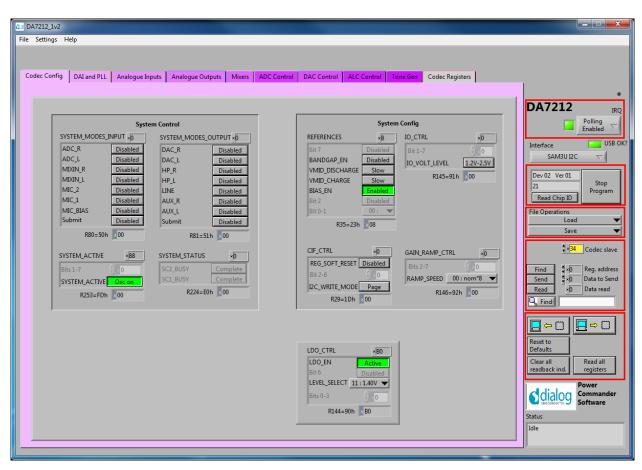
Each register cluster comprises a control with a mixture of Boolean toggle buttons, multi-value ring controls, or slide controls, as well as a hexadecimal indicator showing the total equivalent register value and a readback indicator showing the current register settings. The Event Register is labeled with a Register number in decimal and its hexadecimal equivalent.

The Readback indicator readings can be switched individually to decimal, octal, hexadecimal or binary by clicking on the "x", or they may all be changed at once between Hex and Binary by the "View>Binary Indicators" menu item.



## Codec Config Page

The Codec Config page allows access to the System Controller as well as some basic system settings such as the references, IO levels and digital LDO. To use the System Control panel (de)select the blocks as required for the inputs and outputs and click the Submit button to apply the changes. If no blocks are active then the System Active panel can be used to disable the on-chip oscillator and put DA7212 into an ultra-low power standby state. The CIF CTRL panel can be used to reset the chip and return all the registers to their hardware defaults.





## DAI and PLL Page

The DAI and PLL page allows control of the digital audio interface and phaselocked loop. The DAI CTRL panel sets the format on the DAI and the DAI CLK MODE panel sets the master/slave mode as well as the clock polarity and number of BCLKS per WCLK. The DIG ROUTING DAI panel selects the data source for the DAI and DIG ROUTING DAC selects the data source for the DAC.

The PLL Control panel contains all the settings for the PLL and on-chip clocking. The SR panel sets the sample rate being used. The PLL CTRL panel sets the input clock rate, whether the PLL is enabled and whether sample rate matching (SRM) is required to track the DAI in slave mode. If the PLL is required, the three FBDIV panels control the value of the feedback divider. The required values can be calculated using the DA7212 PLL Calculator spreadsheet, or they can be determined automatically by entering the supplied MCLK frequency and pressing the Calculate PLL button. The current status of the PLL is shown in the PLL STATUS panel. The PC COUNT panel controls the behavior of the internal program counter.

US DA7212_1v2	
File Settings Help	
Codec Config       DAI and PLL       Analogue Inputs       Analogue Outputs       Mixers       ADC Control       DAC Control       ALC Control       Tone Gen       Codec Registers         DAL_CTRL <ul> <li>Bit 6-7</li> <li>OE</li> <li>TDM_MODE_EN</li> <li>Mixers</li> <li>ADI C</li> <li>Bit 6-7</li> <li>OI : ADC</li> <li>Bit 6-7</li> <li>DAL_CLK_MODE</li> <li>Bit 6-7</li> <li>DAL_CLK_MODE</li> <li>Bit 6-7</li> <li>DAL_CLK_MODE</li> <li>Bit 4-6</li> <li>OI C</li> <li>DAL_SRC</li> <li>OI : ADC</li> <li>Bit 4-6</li> <li>OI CKK, POL</li> <li>Normal</li> <li>Bit 5-2</li> <li>OI : ADC</li> <li>Bit 2-23</li> <li>OI : ADC</li> <li>R33=21h</li> <li>IO</li> <li>R40=28h</li> <li>OI</li> <li>R153=99h</li> <li>OO</li> <li>CLSRC</li> <li>CLSRC</li></ul>	DA7212 IRQ Polling Polling Interface USB OK? SAM3U I2C V Dev 02: Ver 01 Stop Program Program
R41=29h         80         R42=2Ah         10           DAL_OFFSET         x0         R152=98h         x00	Read Chip ID       File Operations       Load       Save       \$\frac{3}{8}\$       Gate       Codec slave       Find       \$\frac{1}{9}\$       Reg. address
PLL Control           SR         VB         PLL_FRAC_TOP         VD         MCLK Frequency (MHz)         PLL_CTRL         ×C4         PLL_STATUS         ×C2           Bit 4-         0         Bit 5-7         0         Calculate PLL         PLL_EN         PLL_OUT         BVPASS_ACTIVE         Enabled	Send \$×0 Data to Send Read ×0 Data read
SR     1011:48.000k     FBDIV_FRAC_TOP     0       R34=22h     0B     R36=24h     00       PLL_FRAC_BOT     x0	Reset to Defaults
FBDIV_FRAC_BOT () 0 R37=25h 00 R37=27h C4	Clear all Read all registers
PLL_INTEGER         20         PC_COUNT         ×2           Bit 7         Disabled         PC_RESYNC_AUTO         Freerun           FBDIV_INTE         20         PC_REERUN         Free run           R38=266         20         R148=94h         x02	Status Idle



## Analogue Inputs

The Analogue Inputs page controls the input amplifiers and microphone biases. Each of the GAIN panels sets the target gain for the amplifiers, and the GAIN STATUS shows the currently active gain setting. Each of the CTRL panels sets the enable, mute, and gain change behavior (ramped or zerocrossed) for the amplifiers. The MIC CTRL panels allow selection of singleended or differential input signal. The MICBIAS CTRL panel enables and sets the output level for the microphone bias outputs. The MIC CONFIG panel sets the clock and data format when digital microphones are used.

DA7212_1v2		
File Settings Help		
Codec Config     DAI and PLL     Analogue Inputs     Analogue Outputs     Mixers     ADC Constraints       AUX_L_GAIN     #35     AUX_R_GAIN     #35     Bit 7     Disabled     Bit 7     Disabled       Bit 6     Disabled     Bit 7     Disabled     Bit 7     Disabled     Bit 7     Disabled       AUX_L_GAIN     110101:0.0dB     R48=30h     35     AUX_R_GAIN     110101:0.0dB     R49=31h     35       AUX_L_GAIN_STATUS     AUX_R_GAIN     0000000:-54.0dB     R49=31h     35     AUX_R_GAIN     000000:-54.0dB       R4=30h     00     AUX_R_CTRL     #44     AUX_R_CTRL     #44       L_AMP_GAIN     Disabled     R_AMP_RON_EN     Disabled       L_AMP_RAMP_EN     Disabled     R_AMP_RON_EN     Mate       L_AMP_RAMP_EN     Instant     R_AMP_RON_EN     Instant       L_AMP_ZC_SEL     01:AUX_L     Bits 0-1     00	Ontrol     DAC Control     ALC Control     Tone Gen     Codec Registers       MIC_1_GAIN     I     MIC_2_GAIN     *I       Br 3-7     0     AMP_GAIN     001:0dB ▼       R57=39h     01     MIC_2_GAIN_STATUS     MIC_2_GAIN_STATUS       MIC_1_GAIN_STATUS     MIC_2_GAIN_STATUS     MIC_2_GAIN_STATUS       AMP_GAIN     001:0dB ▼     R5=06h       R6=06h     01     MIC_2_CTRL     *B4       AMP_IN_MUTE_EN     Normal     Bit 5     Bit 4       Bit 4     Instant     AMP_IN_SEL     01:MIC1_P SE       Bits 0-1     0     0     Bits 0-1     0	DA7212 IRC Polling ⊂ Enabled ⊂ Interface USB C SAM3U I2C ⊂ Dev 02 Ver 01 21 Program File Operations Load ↓ Save ↓ Save ↓ Save ↓ Save ↓ Save ↓
R96=60h 44 R97=61h 44	R99=63h 84 R100=64h 84 R100=6	Read          •         ①         ①         Data read            ↓         Find          □         □         □



## Analogue Outputs

The Analogue Outputs page controls the headphone and line (speaker) amplifiers as well as the charge pump for the headphone supplies. The GAIN, GAIN STATUS and CTRL panels behave as for the Analogue Inputs page. The Charge Pump Control controls the mode and switching behavior of the charge pump as explained in the datasheet.

File Settings Help						
Codec Config DAI and PLL Analogue In	puts Analogue Outputs Mixers AD	C Control DAC Control ALC Control Tone Gen Codec Registers	•			
Headp	hone Control	Line Control	DA7212 IRQ			
HP_L_GAIN         x2D           Bit 6         0           HP_L_GAIN         101101: -12dB           R72=48h         2D           HP_L_GAIN         101101: -12dB           HP_L_GAIN         101101: -12dB           RL4=0Eh         2D           HP_L_CTRL         KAB           MUTE_EN         Ramped           ZC_EN         Instant           OE         Morral           Bits 0-1         0	HP_R_GAIN #2D Bit 6 0 HP_R_GAIN 101101:-12dB R73=49h 2D HP_R_GAIN_STATUS HIN_GAIN_STATUS HIN_HIN HIN HIN HIN HIN HIN HIN HIN	LINE_GAIN R74=4Ah R	Polling Enabled SAMBU I2C SAMBU I2C Dev 02 Ver 01 Stop Program File Operations Save Save Save Save Dev 02 Ver 01 Stop Program Save Dev 02 Ver 01 Save Dev 02 Ver 01 Save 02 Ver 02 V			
R107=6Bh × A8	R108=6Ch × A8	R109=6Dh ×40	Find			
CP_CTRL CP_EN Enabled CP_SMALL_SWITCH Enabled CP_MCHANGE 00:CP_MOD CP_MOD 11:CPVDD/1 CP_MOD 11:CPVDD/1 CP_ANA_LVL 01:Boosts CP R71=47h CD	CP_VOL_THRESHOLD1 56 Bit 6-7 00: CP_THRESH_VDD2 536 R149=95h 36	Pump Control CP_DELAY ★A5 CP_ON_OFF 10: auto ▼ CP_TAU_DELAY100: 64ms ▼ CP_FCONTROL 101: 0kHz ▼ R150=96h ▲A5 CP_DETECTOR ★D Bits 2-7 CPDETECTOR ★D R151=97h 000	Reset to Defaults Clear all readback ind. Read all registers Power Software Status Idle			



## **Mixers**

The Mixers page controls the behavior of the analogue input and output mixers. The GAIN, GAIN STATUS and CTRL panels behave as for the Analogue Inputs page. The MIXOUT CTRL panel also enables the Softmix feature to ramp in/out the the select inputs. The SELECT panels controls which inputs are routed to each of the four mixers.



## **ADC Control**

The ADC Control page enables the ADC, sets the digital gain applied after the ADC and controls the behavior of the high-pass filter.



## **DAC Control**

The DAC Control page controls the DAC, the DAC filters and the DAC noise gate. The DAC FILTERS panels control the high-pass filter as well as the 5-band EQ filter. There is also an option to apply a soft mute to the DAC input signal. The DAC NG panels control the behavior of the DAC noise gate in terms of its on and off thresholds, attack/decay rates and hold time.

13 DA7212_1v2				
File Settings Help				
Codec Config       DAI and PLL       Analogue Inputs       Analogue Outputs       Mixers       ADC Control       DAC Control       ALC Control       Tone Get       Codec Registers         DAC_L_CTR       AD       DAC_L_GAIN       #0F       DAC_R_GAIN       #0F       Bit 7       Disabled         L_EN       R_MUTE_EN       Romal       R_MUTE_EN       DAC_L_GAIN       #101111 : 0.0000dB       Bit 7       Disabled         Bit 4       Disabled       Bit 4       Disabled       Bit 7       Disabled       Bit 7       Disabled         Bit 50-2       0       RIDG=6Ah       AO       1101111 : 0.0000dB       RD2_R_GAIN \$ 1101111 : 0.0000dB       RD3_R 1101111 : 0.0000dB         R12=0Ch       6F       DAC_R_GAIN \$ 1101111 : 0.0000dB       R13=0Dh       6F         DAC_FLITERS1       #80       DAC_FLITERS3       #88       DAC_FLITERS4       #8       DAC_FLITERS4       #8       DAC_FLITERS4       #9	DA7212 IRQ Polling Enabled VSB OK? SAM3U I2C SAM3U I2C SAM3U I2C Dev 02 Ver 01 Stop Program File Operations Load Save			
AUDIO_HPF_CORNER 00:2Hz EQ_BAND1 1000:1.5d8 EQ_BAND3 1000:1.5d8 EQ_BAND3 1000:1.5d8 EQ_BAND5 1000:1.5d8 EX:0.3 COMPARING EXECUTION EXECU	Find     \$ 40     Aeg. address       Send     \$ 0     Data to Send       *Ø     Data read       *find         Find         Reset to       Defaults       Clear all       readback ind.       Reset to       Commander       Status   Idle			



## ALC Control

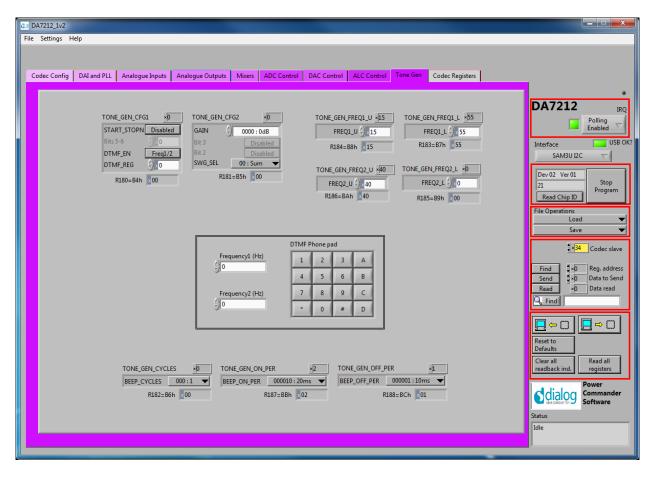
The ALC Control page configures the automatic level control on the record path. The ALC behavior is described in detail in the datasheet.

(E) DA7212_1v2	X				
File Settings Help					
Codec Config DAI and PLL Analogue Inputs Analogue Outputs Mixers ADC Control DAC Control ALC Control Tone Gen Codec Registers	·•				
ALC_CTRL1     BB     ALC_CTRL2     \$53     ALC_GAIN_LIMITS     7F     ALC_TARGET_MIN     B       ALC_REN     Enabled     ALC_RELEASE     0101119.2ms     GAIN_MAX     0111142.0dB     Bit 7     Disabled       ALC_ALIB_OVERFLOW     Disabled     ALC_ATTACK     000111.224ms     ATTEN_MAX     1111190.0dB     Bit 6     Disabled       ALC_CALIB_OVERFLOW     Disabled     R154=9Ah     \$53     R159=9Fh     7F     R157=90h     00011114.5dBFS	DA7212 IRQ Polling C Enabled C Interface USB OK?				
CALIB_MODE     Automatic     ALC_CTRL3     Al3     ALC_ANA_GAIN_LIMITS     AI       SYNC_MODE     ON     INTEG_RELEASE     01:1/16     Bit 7     Disabled       OFFSET_EN     Enabled     INTEG_ATTACK     00:1/4     ANA_GAIN_MAX     Bit 7       R43=2Bh     8B     ALC_HOLD     0011:10.4ms     Bit 3     Disabled       R155=9Bh     43     R160=A0h     71     R158=9Eh     02	Dev 02     Ver 01       21     Program       Read Chip ID     Program       File Operations     Load       Save     V				
ALC_ANTICLIP_CTRL \$         ALC_ANTICLIP_LEVEL         ALC_NOISE         SF           ANTICLIP_EN         Disabled         Bit 7         Disabled         Bit 7         Disabled           Bits 0-6         0         ANTICLIP_LEVEL         00000000 : 0.0039FS         Bit 6         Disabled           R161=A1h         00         R162=A2h         00         R156=9Ch         3F	Find Send Find Find Find Find Find Find Find Fi				
Advanced Controls       ALC_OFFSET_MAN_UL       ALC_OFFSET_MAN_UL       ALC_OFFSET_MAN_UL       ALC_OFFSET_MAN_UL       ALC_OFFSET_MAN_ML       AL	Reset to Defaults Clear all readback ind. Clear all registers Clear all Read all registers Commander Software				
R164=A4h 000 R163=A3h 00 R169=A9h 000 R168=A8h 000 R174=AEh 000	Status Idle				



### Tone Gen

The Tone Gen page controls the digital tone generator at the input to the DAC. TONE GEN CFG1 panel starts the tone generator and enables a DTMF tone if required. TONE GEN CFG2 panel sets the gain applied to the tone and controls which sine-wave generator is used (or both). The TONE GEN FREQ panels set the frequency for the two generators as described in the datasheet. The DTMF Phone pad panel produces DTMF tones when the buttons are pressed. The TONE GEN CYCLES panel controls how many beeps are produced, and the TONE GEN ON and OFF PER panels control the on and off periods.





## **Codec Registers**

This page presents the registers in a single table. The table is interactive, both receiving changes made in other controls, and passing values to other controls if changed in the table. In some conditions this register view may be useful.

🗵 DA7213 Jv						
File Settings Help						
		1	1		1	-
Codec Config DAI and PLL Analogue Inputs Analogue C	Outputs Mixers DA	C Control ADC Control	ALC Control To	one Gen Codec Registers		
					· ·	
					DA7213 100	
					DA/215 IRQ	
Codec Table	Codec Register Map				Polling	
Input Readbac Default	0xA5		al_affrot_ap2[_1(7:0)		Enabled	
0x074 0x00	0xA6		alc_offrot_op2m_1(7:0)		Interface USB OK	2
0x075 0x00	0xA7			alc_offrot_op2u_l(1:0	n	
0x07€ 0x00	0xA8		alc_offrot_op1(_r(7:0)		SAM3U I2C 🗸	
0x07; 0x00 0x075 0x00	0xA9		alc_offret_op1u_r(6:0)		Dev 00 Ver 00	
0x072 0x00	0xAA		al_affrot_ap2Lr(7:0)		Chan .	E
0x072 0x00	0xAB 0xAC		al=affrot_ap2m_r(7:0)	alc_offrot_op2u_r(1:0	Program	
0x07E 0x00				aic_BrittoCaped_r(10	Read Chip ID	
0x07( 0x00	PAGE0 REG_PAGE CONTROL REG_SOFT_RE:				WRITE MODE File Operations	
0x07[ 0x00		20	RESERVED(7:0)		Load V	
0x07E 0x00	SYSTEM_MODES	DAC_MODE(7:4)	hestines(1.0)	ADC_MODE(3:0)	Save 🔻	
0x07F 0x00	SYSTEM_TEST				SQ_OVERRIDE	
0x08( 0x00	PLL_TEST	PLL_TEST3(7:2)		PLL_TEST2	PLL_TEST1 \$34 Codec slave	H
0x081 0x00	PLL_SRM_TEST			PLL_SRM_TEST(3:0)		
0x00	OP_TEST1		OP_TEST1(7:0)		Find 🚦 ×D Reg. address	
0x08: 0x00 0x08: 0x00	OP_TEST2		OP_TEST2(6:	:0)	Send \$×0 Data to Send	
0x082 0x00	OP_TEST3		CP_LIMIT(7:0)			
0x08/ 0x01	OP_TEST4		OP_OPTLIN			
0x08E 0x07	DMIC_CTRL DMIC_R_EN		DMIC_L_EN		C. Find	
0x08( 0x51	DMIC_DATA_CTRL PAGE1 REG_PAGE			DMIC_CLK_RATE MIC_SAMPLEPHAS DI	MIC_DATA_SEL	
0x08[ 0x27	11	_ENG_TEST_MUX_SP_ST_MUX_SP_SELE	01(54)	DIG_TEST_MUX_ADDR(3:0)		
0x08i 0x49	ADC_TEST	Tel 42 Les 12 Les 201 2 10 2 Les 201 2 10 201	ADC_TEST(7:0)	and the firm and the states of		
0x00 0x00	ADC_BIAS_TRIM	A	DC_BIAS_TRIM(7:0)		Reset to	
0x0A 0x40	HP_TEST			HPAMP_TEST(4:0)	Defaults	
0x0A/ 0x1A	LINE_TEST			LINE_TEST(3:0)	Clear all Read all	
0x0A <sup>-</sup> 0x00	•				readback ind. registers	
			Read All		Power	
R	efresh Codec table		Read_Reg	gisters		
					Commander Software	
					Status	
					Idle	
-						
						-
•					4	



#### Troubleshooting

This section is an aid to resolving problems occurring in the previous sections.

#### **Software Issues**

The USB device should install without difficulty automatically. Make sure that the installation finds and uses the driver contained in the USB memory stick.

If the program is started before the USB Interface board is plugged in, the program will default to the offline mode. It can be useful to familiarise yourself with the software in a desk environment without the hardware attached. If the board is subsequently attached, move the Interface control to "USB". Make sure the USB is connected and then restart the program.

The software is optimized for a display screen size of 1024 by 768 pixels or greater, with Fonts set to Normal (96dpi).

There have been reported issues of unpredictable display effects when large fonts (120dpi) are used. This can be changed by right-clicking on the desktop, select Properties. Select the Settings tab, select Advanced, then Normal size from the drop-down box.

If communications are apparently lost, first press the "Start Device" button. This attempts to make the device go active.

Also switching the "Interface mode" to Offline, then back to USB can reinitialize the USB interface. Last resort is to unplug the USB then reconnect. The software will detect this and reinitialize.

#### Hardware Issues

Most hardware problems can be traced to incorrect jumper positions.

Check carefully jumper positions by comparing them with the default positions on page 7. Use the jumper table details and the board schematic as a guide to the jumper functions and locations.

### Selecting USB playback

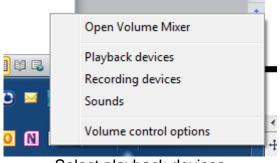
The dialog DA7212 EVB coupled with the digital IO board allows a number of audio sources to be selected with ease for testing and evaluation. One example is to stream audio from a PC to the EVB over USB, This can easily be done in the following way.

# DA7212 User Guide – Rev1.2





Right click on speaker symbol in task bar, circled in red



Select playback devices

Sound					
Playback Recording Sounds Communications					
Select a pla	yback device below to modify its settings:				
Speakers 2- USB Sound Device Default Device					
	Speakers 3- Dialog USB-Lab IO Ready				
3	Speakers ; neadphones IDT High Definition Audio CODEC Ready				
Communications Headphones IDT High Definition Audio CODEC Ready					
Configure Set Default 💌 Properties					
OK Cancel Apply					

Left click on Dialog US-Lab IO, then select "Set Default" and OK.

Audio played on the PC will now be streamed over USB to the digital IO board for use on the DA7212 board.



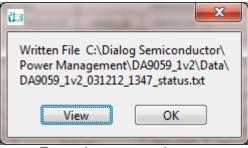
#### Appendix A – Register Text File

The software includes the ability to save and load a text file containing command codes representing the register addresses and data. This file is principally used to save and load setup data, but may also be used to perform a small degree of automation.

Note that at the end of the startup process, initiated by pressing "Start Device", a file "Host\_configuration.txt" is loaded and run to emulate the host processor writing immediately to the device.

If the option "Settings>Reg names in file" is set from the menu, register names, rather than numbers, are used in the file, and the slave address is replaced by the word "CODEC". This is generally preferable and more readable. Names are defined in the files "Registers\_DA7212.h", and "Hardware\_DA7212.h" that reside in the \Data\Drivers directory. Hex codes for slave address and register address are still accepted on reading in the file.

The use of the Save\logtest.txt facility permits register contents to be transferred to the user's own software. Clinking on Save\logtest.txt brings up the following panel, showing the location and name of the saved file. This is a Register dump of the entire device.



Example message box.

#### **I2C Register Text File Format**

The following formats are used for both read and write in the text file.

- Numbers apart from time delays are always expressed in Hex, separated by tabs. The use of "0x" in front of the hex value is optional.
- The first parameter is the device slave address in 8bit format. OR
- The first parameter is a token:
  - "WRITE2" or "CODEC" will write to the CODEC device at the currently selected slave address (I2C mode only).
  - "READ2" will read from the CODEC device at the values of a number of registers.

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- "DELAY" or "WAIT" will implement a time delay specified up to 65535 milliseconds. The delay time is specified in decimal or hex if preceded by "0x".
- ITERATE will cause the **whole** script to be repeated the specified number of times.
- The second parameter is the register address as a name or hex value.
- The third parameter is the data.
- Comments (i.e. lines beginning with '//') are permitted in the file.
- Inline comments (i.e. //comment) are permitted.
- The data will be processed in the order written and written directly to the specified device. The screen controls will be updated once command in the file have finished.
- The use of the slave address in the file allows any device attached to the I2C bus to be controlled.
- For read operations, the result of the read is passed to the history log window.

Example files contents:

//Write to CODEC in 3 ways CODEC MIC\_L 0x01 WRITE2 MIC\_R 0x02 0x34 0x09 0xB1

//Read CODEC starting at DAC\_R
// for next 10 registers
//Result is visible in Datalog window

READ2 DAC\_R 10

//Wait 255ms DELAY 255 WAIT 0xFF

#### Alternative form

//Register Dump

	-	
//Slave	Register	Data
0x92	0x01	0x00
0x92	0x02	0x01
0x92	0x03	0x02
0x92	0x04	0x02
0x92	0x05	0x04
0x92	0x06	0x05
0x92	0x07	0x06
0x92	0x08	0x07
0x92	0x09	0x08

The results in the history log file are shown below.

The Read operations are in brackets following the command.

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🛤 History Log	×			
Log Clear SAVE				
WINDOW	<u>&gt;</u>			
READ LDO1 10 [ 4C 18 2D 2D 26 18 0C 5A 62 61 00 00 93 6B D3 8A]				
//READ CODEC STARTING AT DAC_R // FOR NEXT 10 REGISTERS //RESULT IS VISIBLE IN DATALOG WINDOW				
READ2 DAC_R 10 [ 10 BA 40 00 00 00 90 90 35 35 03 2F 2F 8A C0 76]				
//SET PORT GPIO8 OR SYS_EN TO 1 PORT GPIO8 1	~			

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### Appendix A – Socketed Miniboard (169-01-A)

A socketed miniboard is available for evaluation purposes. This PCB uses larger passive components (0402) to allow for customer experimentation. A soldered device can replace the socket on request.

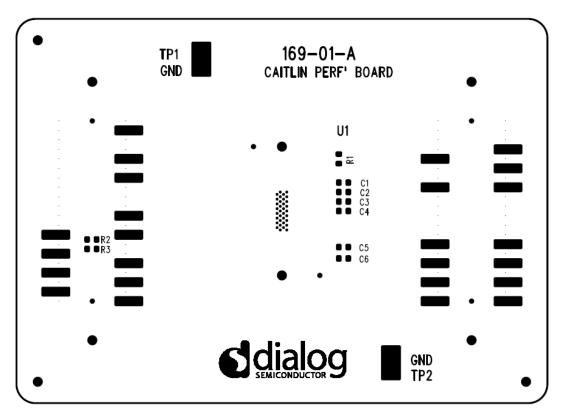


Figure 5 DA7212 Mini Board



#### **REVISION HISTORY**

REVISION	DATE	ORIGINATOR	CHANGE
1.0	28/06/2013	СМ	Initial Release
1.1	20/11/2013	СМ	Updated default jumper locations
1.2	21/11/2013	PH	Added description for each page in the GUI

Dialog Semiconductor Worldwide

**Germany (Headquarter)** Tel: (+49) 7021 805-0 Fax (+49) 7021 805-100 **USA** Tel: (+1) 949 623 8686 Fax: (+1) 949 623 8305 United Kingdom Tel: (+44) 1793 757700 Fax: (+44) 1793 757800 **China** Tel: (+852) 2607 4271 Fax: (+852) 2607 4169 **Japan** Tel: +81-3-3215-5123 Fax +81-3-3125-5124

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#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный) **Факс:** 8 (812) 320-02-42 **Электронная почта:** <u>org@eplast1.ru</u> **Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.