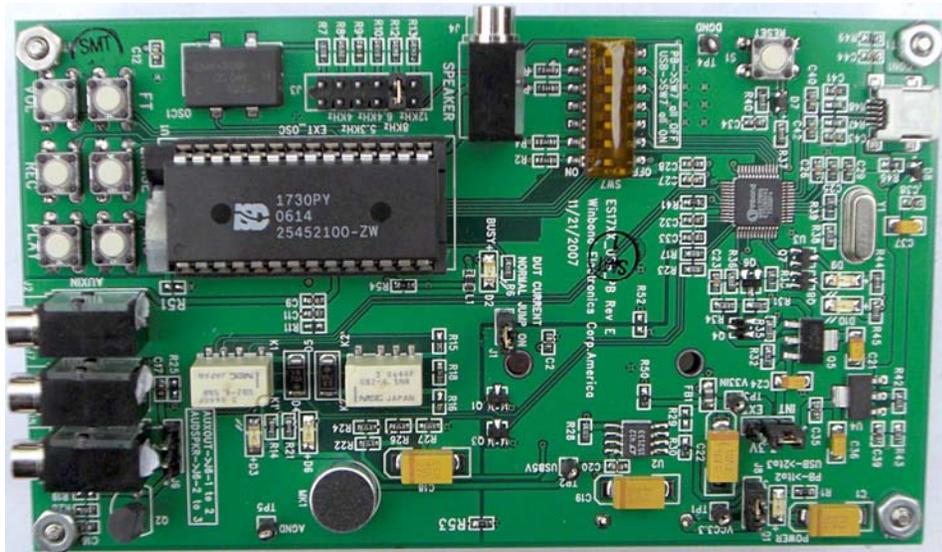


Nuvoton ChipCorder[®] 17xxx Family Evaluation System User Guide

ES-17xx-USB-PB Evaluation Board

Rev E



ES17xx Evaluation System Introduction:

This demo board allows the complete operation of the Nuvoton I17xx ChipCorder[®] IC controlled through the USB port of a PC. All the functions of the chip may be selected in real time to allow complete evaluation of this chip for an end application. The ISD17xx-USB-PB evaluation system also serves as Single Socket writer/ programmer.

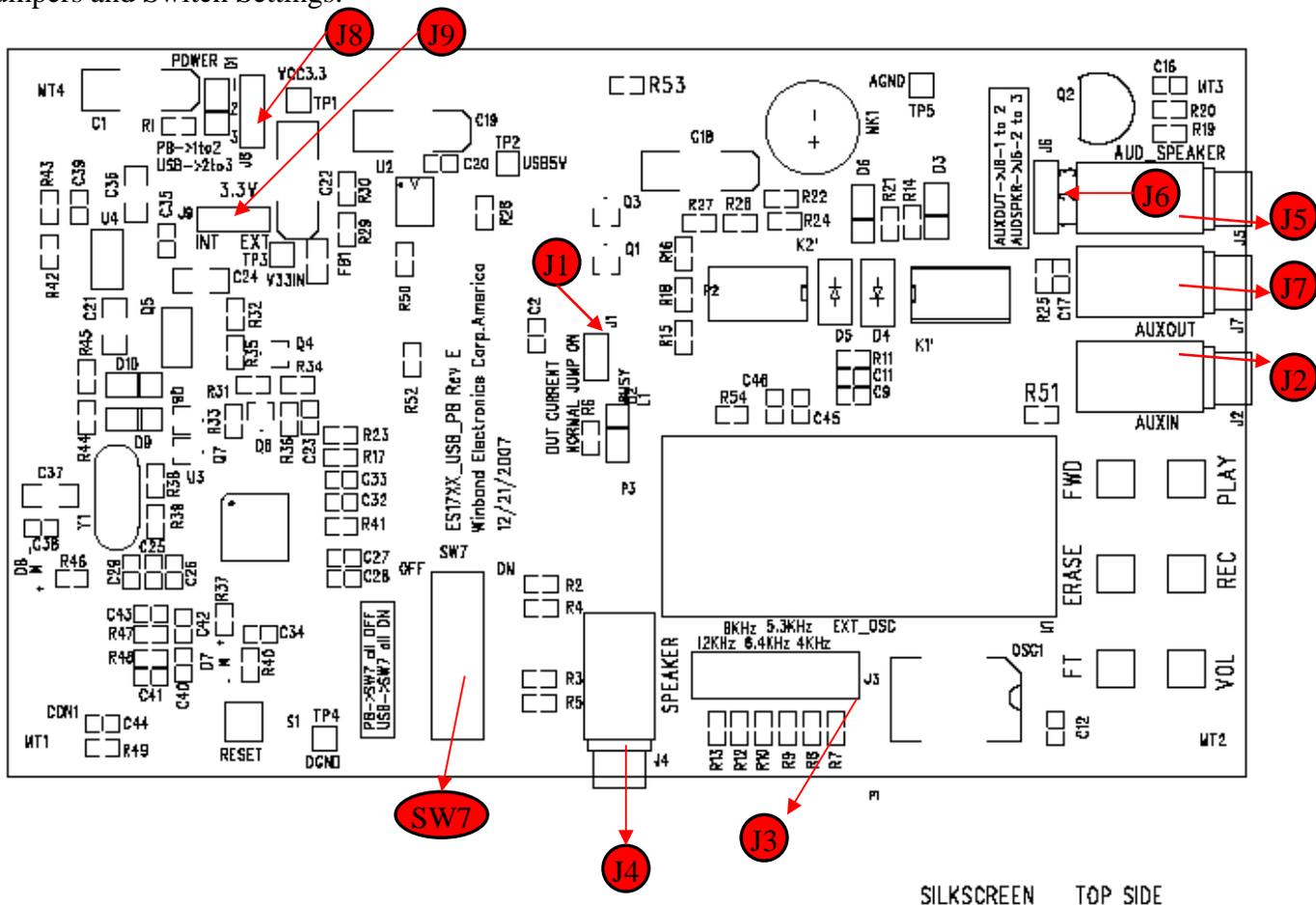
The 17xx series has two modes of operations, Push Button Mode and SPI mode. This manual will describe the hardware settings for each mode and the corresponding operations under the respective mode.

Evaluation System Kit includes:

- ES17xx_USB_PB Rev E demo board
- ES17xxx application software and user's guide (CD)

ISD17XX-USB-PB Board

Jumpers and Switch Settings:



J1: Device Current:

J1 provides a way to measure operating current. Just remove the jumper and connect an Ammeter across these two pins.

J2 (Aux-in), J4 (Speaker), J5(AUD-Speaker) and J7(Aux-out) Audio Jack input/ out put:**J3: Sample Rate Selection:**

This jumper selects the Sampling rate for recording.

Available options are: 4 KHz, 5.3 KHz, 6.4 KHz, 8 KHz and 12 KHz.

The EXT_OSC selection can only be used in USB mode and should only be set after checking the EXT_OSC box on the board setting panel. 

J6: Output Selection:

Connect pins 1-2 to route the output on AUX OUT Jack

Connect pins 2-3 to use current driver to drive speaker output on AUD_SPKR Jack

Note: Make sure to select the AUX/AUD bit in main software panel for above jumper.

J8: Power Settings:

Connect pins 1-2 and change SW7 to use the Demo board in Push Button mode, powered by batteries.

Connect pins 2-3 and change SW7 to use the Demo board in USB mode, powered by the USB port.

J9: External/Internal power Selection for U3

Default setting is Internal (used for development purposes)

SW7: Control Settings

This switch enables the USB control for the Demo Board.

All switches on; enables USB mode.

All switches off; disables USB control and is used for push button mode.

Push Button Mode

To work in Push Button Mode, user needs to adjust the following settings:

- J8 Power setting: use jumper to connect J8 Pin1 and pin2.
- SW7 signal path switch: switch all to the “OFF” position.
- Sampling rate: Select the desired sampling rate (J3).
- 3 AAA battery need to be installed on the back of the board.

Note: USB cable does not need to be plugged in.

In Push Button Mode, the 17xx chip completely works on its own. User will use the 6 push button to operate the chip. User can refer to the 17xx Chip datasheet for the complete explanation of these 6 button operations.

SPI Mode

17xx series chip supports SPI mode, which gives user more capabilities and flexibility to use the chip. This System supports all the SPI operations. Users need to adjust the hardware settings, install the demo software. The GUI interface software controls the chip.

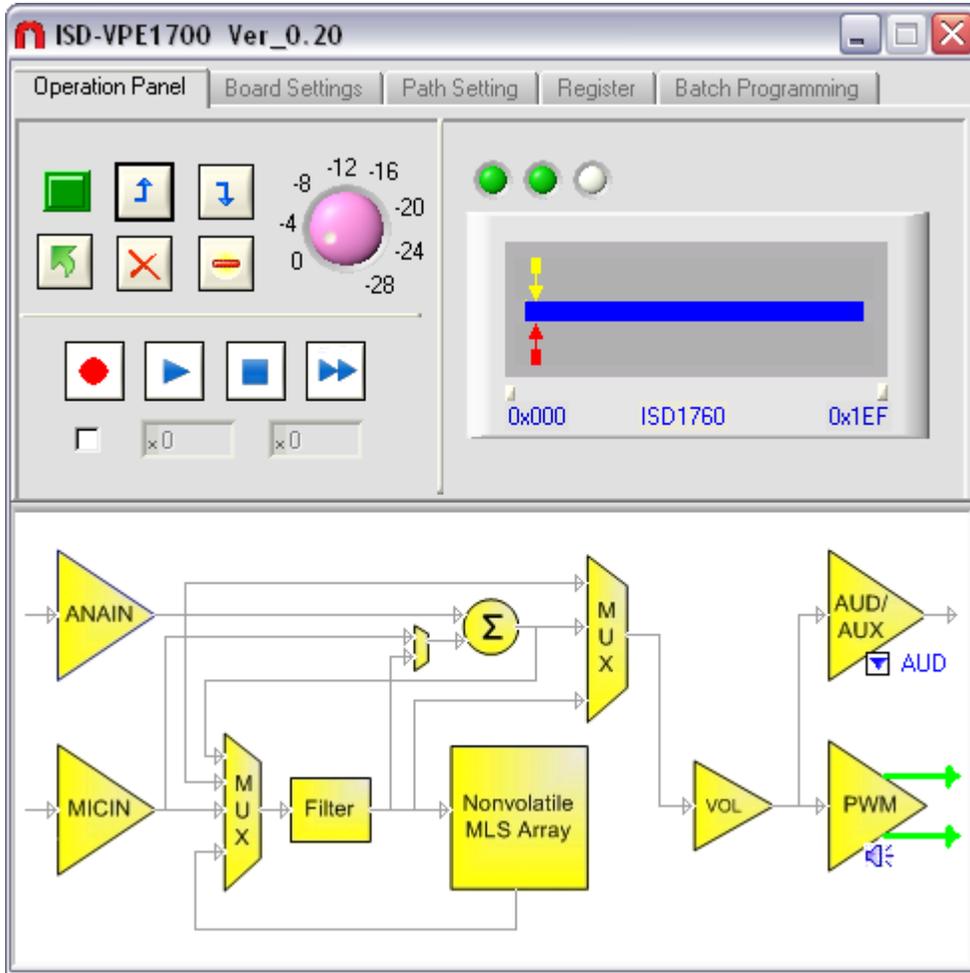
Note: Under SPI mode, users still can use the 6 buttons to operate the 17xx chip.

Hardware Settings for SPI mode

- J8 Power setting: use jumper to connect J8 Pin2 and pin3.
- SW7 signal path switch: switch all to the “ON” position.
- Choose right setting for J3.
- 3 AAA battery does not have to be installed.

Software Installation

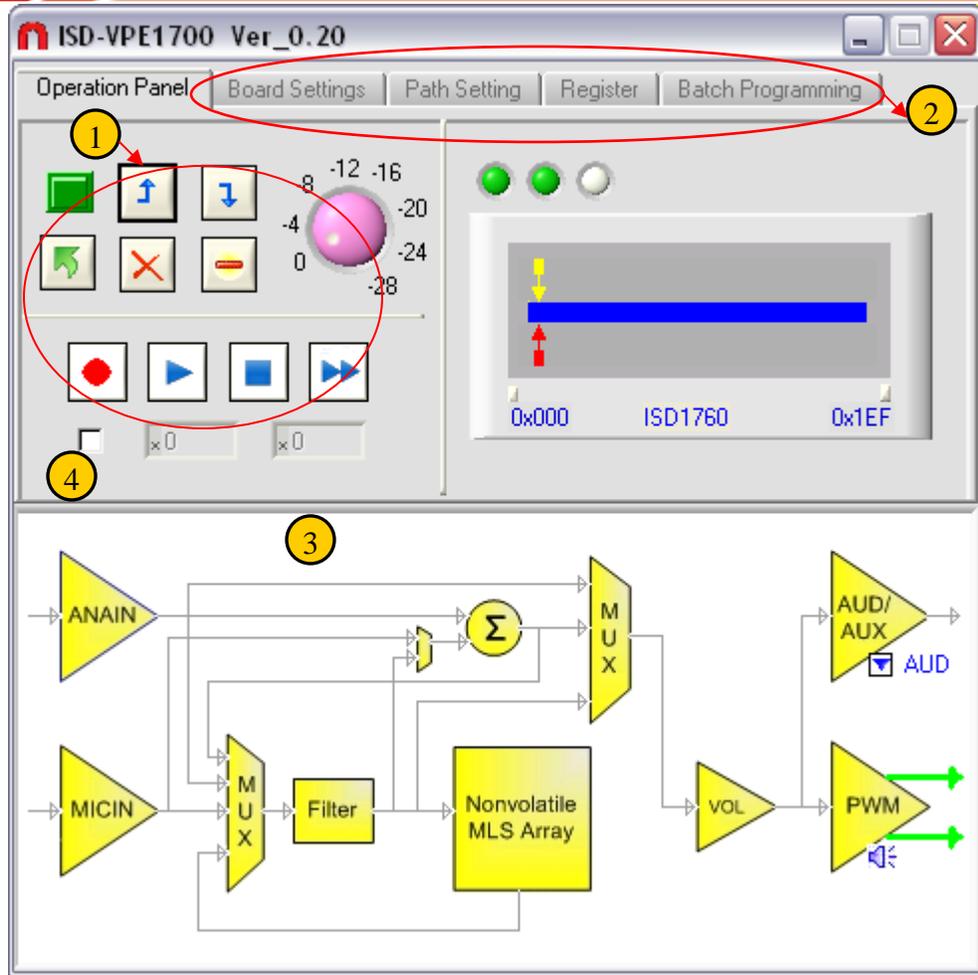
- Run the ES-17xx_Setup to install the software. After the installation, users can click start-> all programs->ES-VPE1700 demo->ISD-VPE1700 demo to launch the application.



ChipCorder® ISD- VPE1700 USB Demo Software Operation

The VPE1700 GUI interface consists of two parts, Operational panels: Operational and setting

- ① and ② on the top and Graphical Block diagrams of all possible input/output paths ③



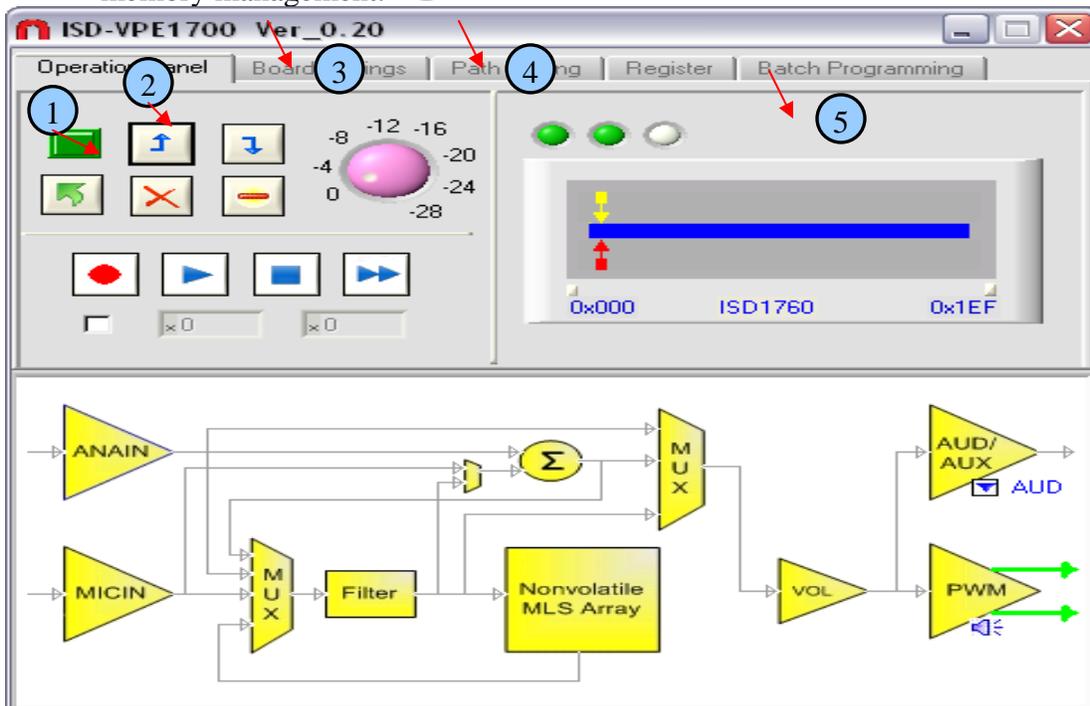
Major Features:

- ✚ The GUI interface consists of two parts, a main operational panel and a configuration panel. Users will work on the operation panel most of the time while they will use configuration panels to setup the device before each operation.
- ✚ All GUI controls in this software are self-descriptive. Users can move the mouse cursor over the control button , a tools tip message will popup explaining the purpose of the current control; See above for example; placing mouse over record button will display Record (4)
- ✚ A canvas window on the right side of the main panel, gives users insight of the current ISD17xx memory usage along with Rec/Play pointers and device ID. The blue bar shows empty rows in the chip. Once recorded, the corresponding rows will turn red. The yellow arrow indicates the play pointer and the red arrow indicates the record pointer. User can move the mouse cursor on these arrows to get the current play-pointer address or record-pointer address. After each operation, the pointers are updated in this canvas window.
- ✚ Once the board is attached and the device is powered up, any update on configuration settings will be effective immediately on the graphical block diagram automatically.
- ✚ This software supports all 17xx SPI commands.

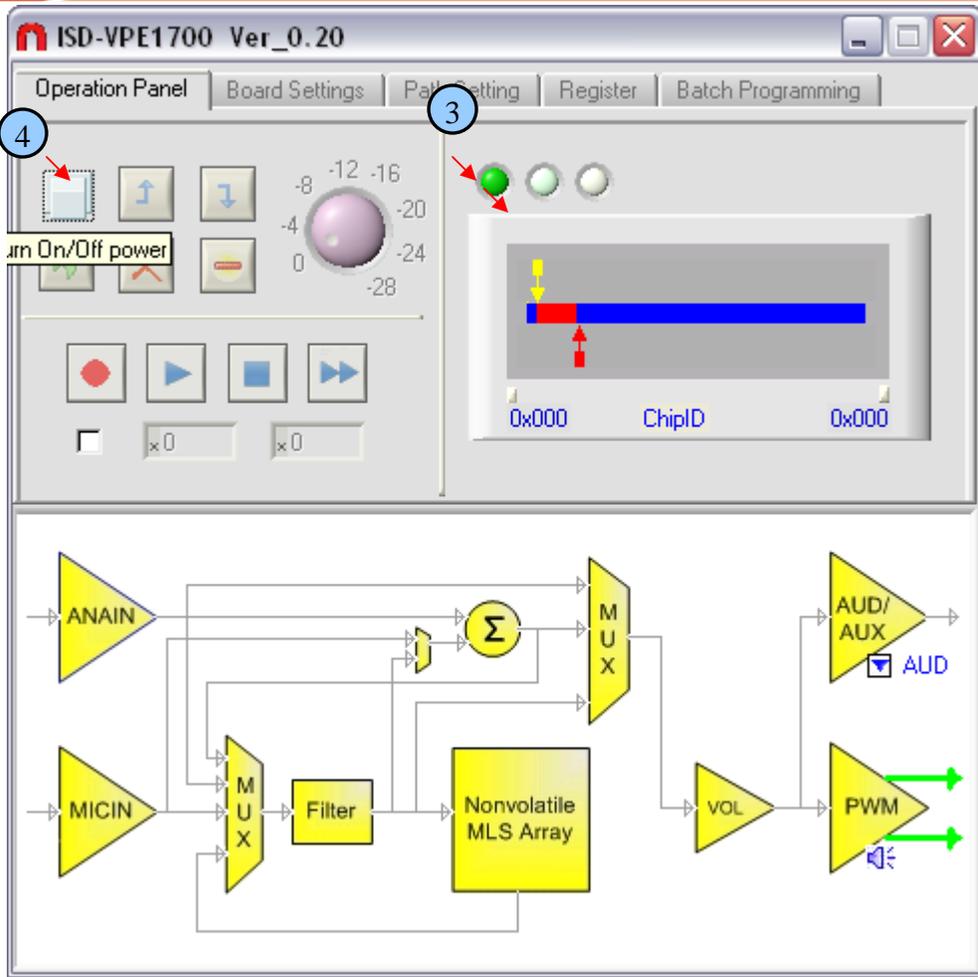
- This Software supports **batch programming**. In Batch programming tab on configuration panel, users can add .wav files; program will calculate the rows needed for each file, assign addresses to these files and burn them into the chip.
- Limitation:** The graphical bar uses circular memory message management (see data sheet for full description of circular memory management) to keep track of record, play and erase operations. But due to the hardware limitation if Set-Play, Set-Record or Set-Erase operations are used, the software is not able to read out the pointers addresses correctly and display it in the canvas window. In that case, it is up to user to arrange to addresses and control the memory organization.

Quick Setup

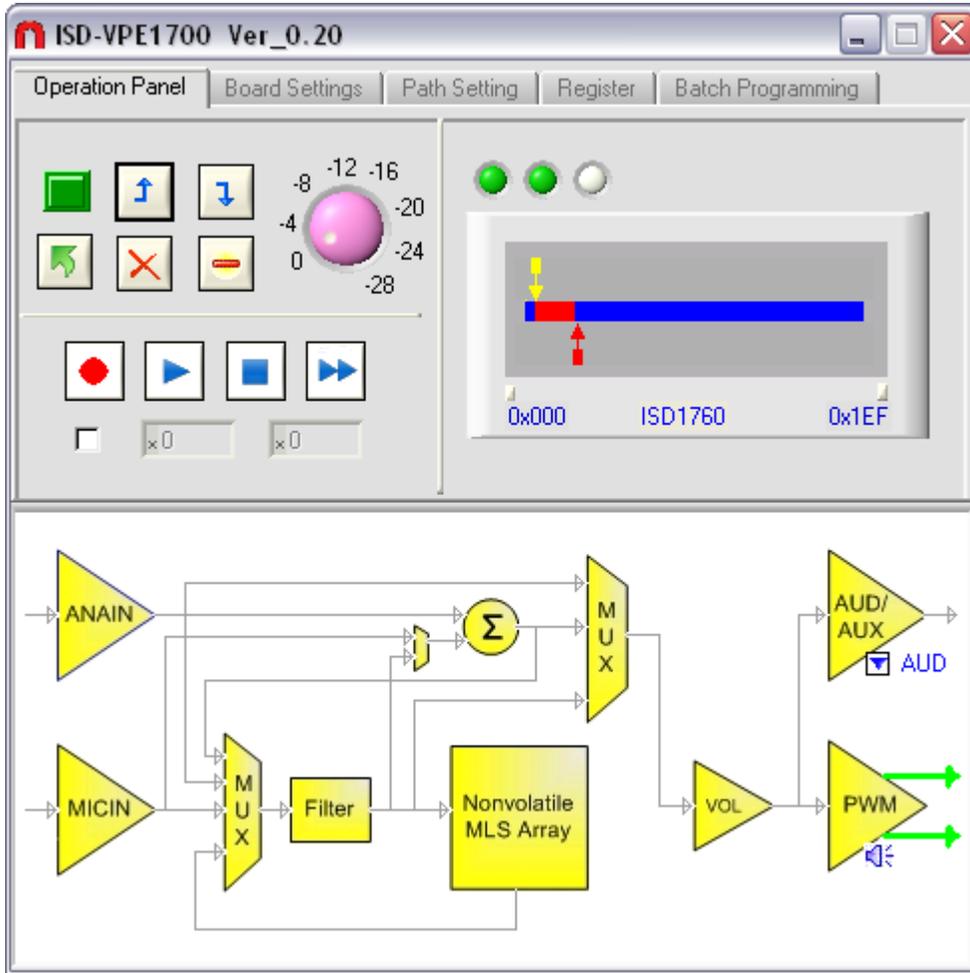
- 1) Attached the board to USB cable
- 2) Launch the software
- 3) Select Board power up button.
- 4) Select Device power up
- 5) The ISD1700 Evaluation board is ready for REC and playback.
- 6) Go to board setting panel to set the desired sampling rate and other settings
- 7) Go to Path setting panel to select the desired operation (REC input or Playback out put)
- 8) For pre-programming wave file into the desired IC go to batch programming panel, click on add (files) and click on burn, it will program all selected files into the ISD1700 using the circular memory management.



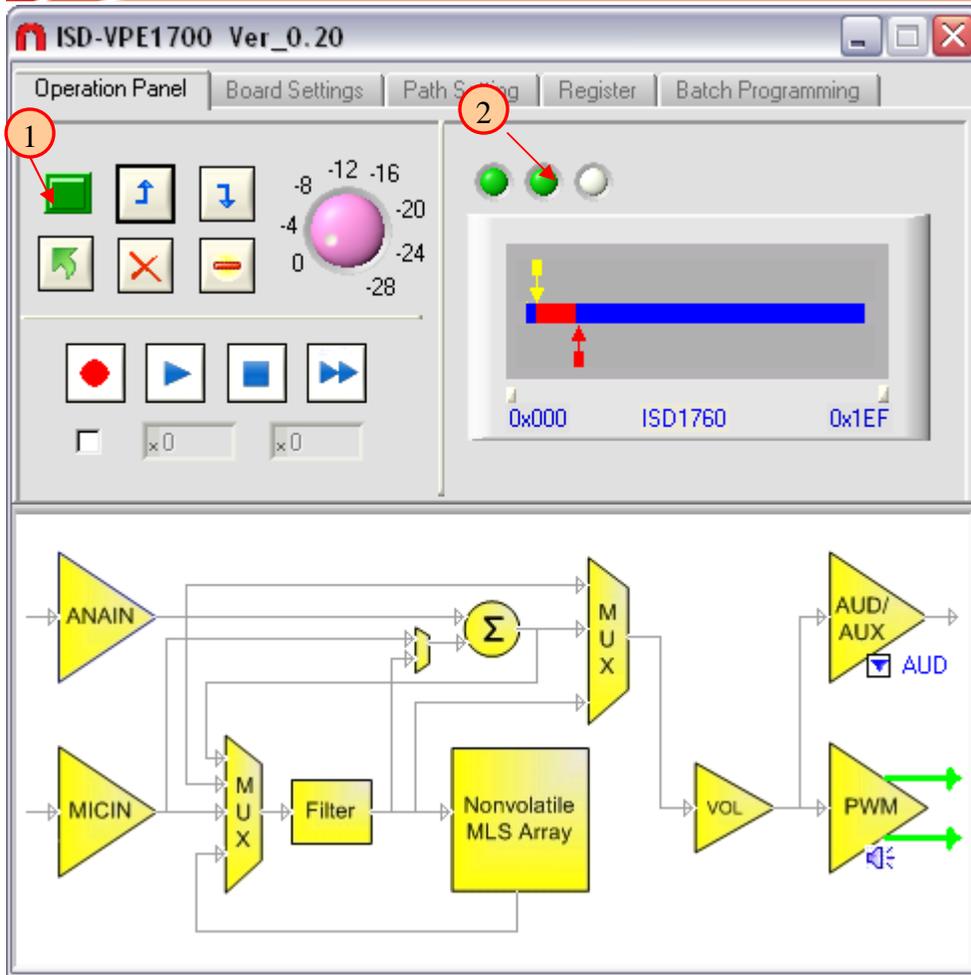
Once the software is running, it will constantly check if the demo board is attached. If board is not attached, all controls on the main panel are dimmed, and are not operational.



After USB cable plugged in, the board attached indicator will turn green (3). Users need to click the power toggle button to turn on the board power (4). All controls buttons on main panel are operational. See below.



After power is applied to the chip, next step is to power up the device. Click power up button ¹, a SPI “PowerUp” command will be sent to the chip. A power up indicator ² will turn green, and device status will be updated in canvas window. The yellow arrow indicates the current play-pointer address, and red arrow indicates the record-pointer address.

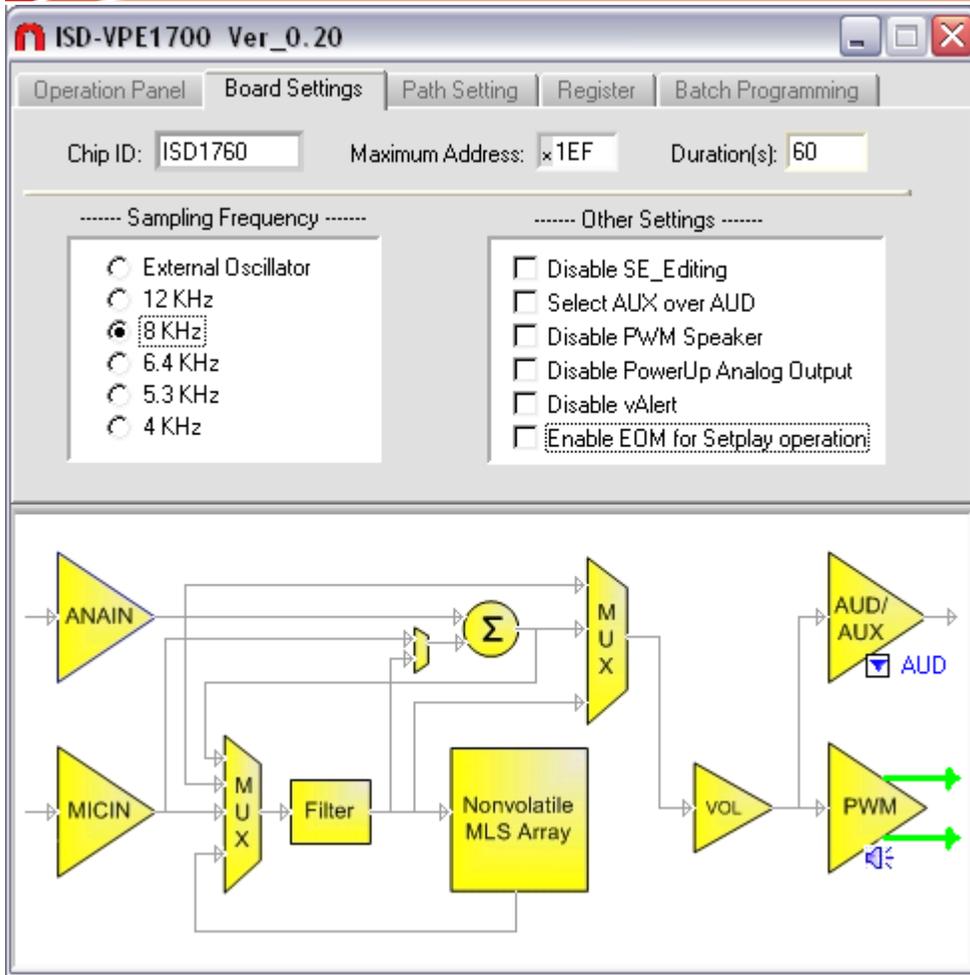


Hardware settings

After power up, chip is ready for operations such as record, play, erase, etc. Before each operation, user needs to make sure the board settings and path settings are correctly set as desired. Basically there are two important settings the user needs to keep in mind: setting the correct sampling rate, and correct path.

- ✚ To set sampling rate: Click “Board setting”, choose the sampling rate, make sure jumper J3’s position on the board is consistent with the selection here.

Note: if External Oscillator is chosen, the actual sampling rate will be 8 KHz.



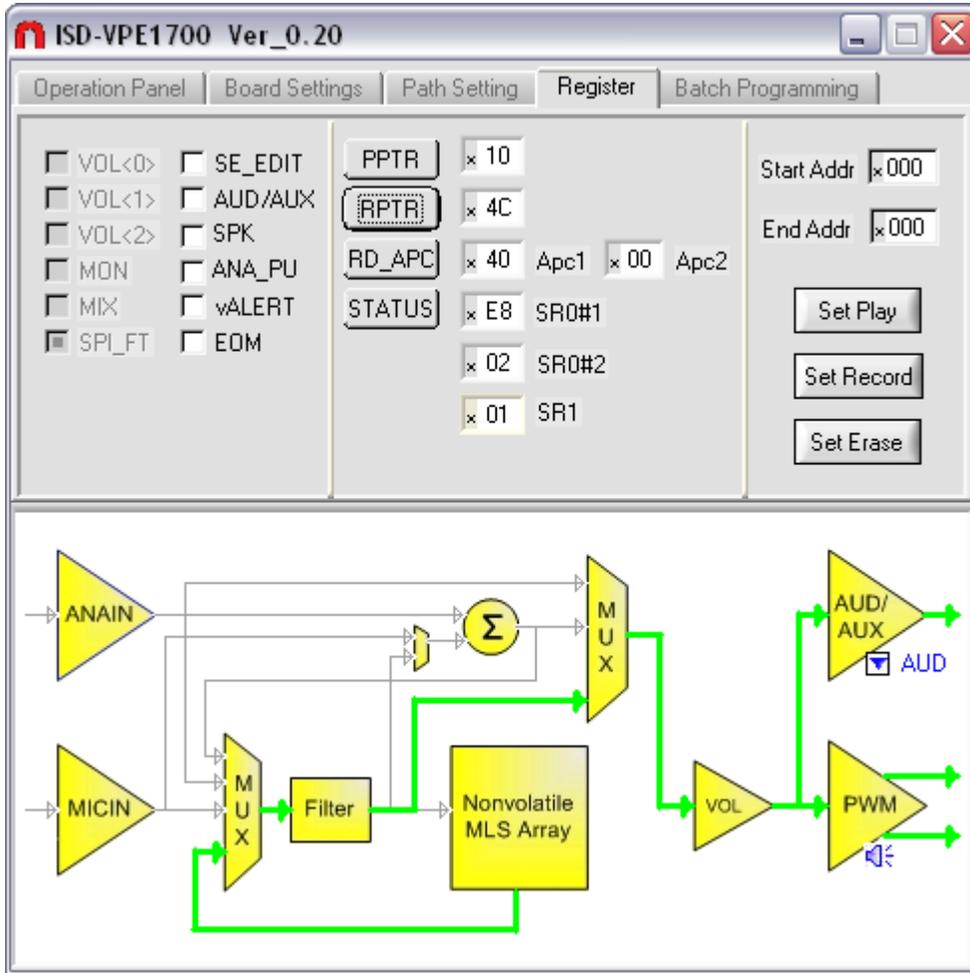
- ✚ To set an active path: Click Path setting tab, the user can pick out Idle, Record or Playback paths and that the options for each are available in the appropriate column.
- ✚ To view the path, user can choose one of view path radio button ①. As shown below, the playback path is chosen, the selected paths turns red, and the current playback is indicated by path setting radio button ②. The current playback path is (Ana+MLS)→O/P. And the path is also shown at the lower part of the configuration panel block diagram.
- ✚ The APC register (It's a single 12 bit register) controls the audio path. The user can click the WR, and RD to read and write the register.
- ✚ Click the speaker icon ③ to enable/disable PWM speaker drivers and as a separate selection, select AUD or AUX for that secondary output.
- ✚ The selection is effective immediately if the chip is powered up.

The screenshot shows the 'Path Setting' tab of the ISD-VPE1700 software. It features a table for selecting path settings and a block diagram of the audio processing pipeline.

Choose path setting:	Idle Path	Record Path	Playback Path
<input type="checkbox"/>	Analn FT	Analn Rec	(Ana + MLS) -->O/P
<input type="checkbox"/>	Analn FT	Analn Rec + Analn FT	(Ana + MLS) -->O/P
<input type="checkbox"/>	(Mic+Analn) FT	(Mic+Analn) Rec	(Ana + MLS) -->O/P
<input type="checkbox"/>	(Mic+Analn) FT	(Mic+Analn) Rec & FT	(Ana + MLS) -->O/P
<input checked="" type="checkbox"/>	FT Disable	Mic Rec	MLS -->O/P
<input type="checkbox"/>	FT Disable	Mic Rec + Mic FT	MLS -->O/P
<input type="checkbox"/>	FT Disable	Mic Rec	MLS -->O/P
<input type="checkbox"/>	FT Disable	Mic Rec + Mic FT	MLS -->O/P

Below the table is a block diagram showing the audio signal flow. It includes components like ANAIN, MICIN, MUX, Filter, Nonvolatile MLS Array, MUX, VOL, AUD/AUX, and PWM. Red circles with numbers 1, 2, and 3 highlight specific elements: circle 1 points to the 'View path' section, circle 2 points to the 'FT Disable' selection in the table, and circle 3 points to the 'AUD/AUX' output in the diagram.

- ✚ Register view is quite simple; the user can click around to gain some insight of the chip. Again, all controls are self-descriptive, the user can hover mouse cursor around to get the control explanation.



Batch Programming

Batch programming allows users to preprogram wav files into the chip. Users can select files, arrange files order , save into a project file, clear , load and burn these wav sounds to a continuous area of memory starting from row 16 (hex 10) of the memory array. The address selection and calculation is automatic based on the ISD1700 circular memory management.

ISD-VPE1700 Ver_0.20

Operation Panel | Board Settings | Path Setting | Register | Batch Programming

Directory: s:\UL10-Uk12\Farid Noory\

		Duration	Start	End
✓ 0	Blues.wav	0.726	010	017
1	Books.wav	0.612	018	01E
2	ChildrensMusic.wav	0.954	01F	027
3	Classical.wav	0.770	028	02F
4	Country.wav	0.600	030	035
5	Dance.wav	0.659	036	03C
6	EasyListening.wav	0.894	03D	045
7	Eight.wav	0.528	046	04B

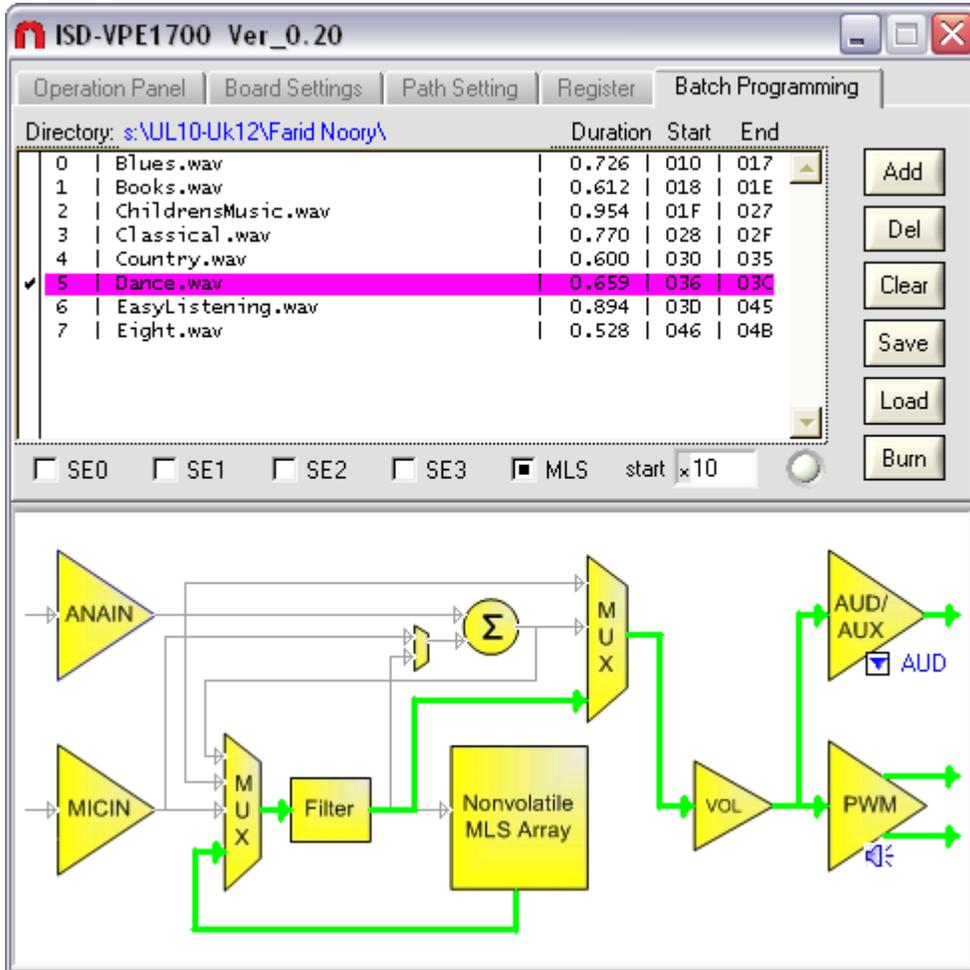
SE0
 SE1
 SE2
 SE3
 MLS
 start x10

Add
 Del
 Clear
 Save
 Load
 Burn

	Duration	Start	End
0 Blues.wav	0.726	010	017
1 Books.wav	0.612	018	01E
2 ChildrensMusic.wav	0.954	01F	027
3 Classical.wav	0.770	028	02F
4 Country.wav	0.600	030	035
✓ 5 Dance.wav	0.659	036	03C
6 EasyListening.wav	0.894	03D	045
7 Eight.wav	0.528	046	04B

➤ Add files. Click Add, and a select file dialog will popup, you can select multiple files or a single file from the list of wave files which you wish to burn into the device. Once files are selected, the program will automatically calculate each sound files duration and assign them a start address and end address.

Note : Please make a note after programming if you wish to add more files to the project you need to global erase the ISD17XX and reprogram your project.



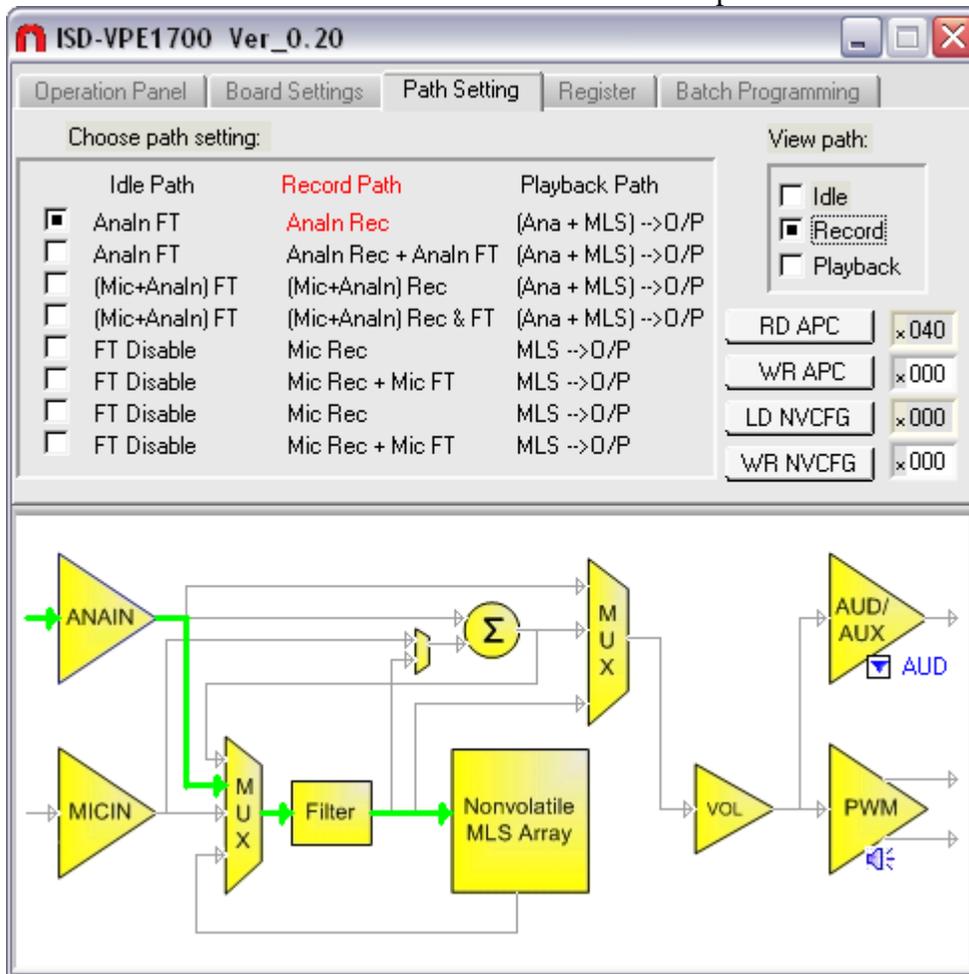
- ✚ Arrange file order. Use right arrow to select a file; the selected file will turn purple; then use the up/down arrow to move the file. The address will be updated.
- ✚ Burn will program these files into the memory one by one.
- ✚ Save will save these files' names into a .bpp file. (project file)
- ✚ Click load to load a saved .bpp file.
- ✚ Program always assume the start record address is 0x10 (the first 16 rows are for SE0-SE3)
- ✚ To record SE (Sound effect) messages, choose one to record, add file (or files), then click burn.

Note: if the file selected exceeds the maximum address, the exceeding part simply is ignored. For example, if SE0 is chosen, it can only record from row 0 to row3, no matter how long the file is. If Memory Array is chosen, it will only record until maximum address which is indicated in board settings tab and in canvas window.

Sample operation

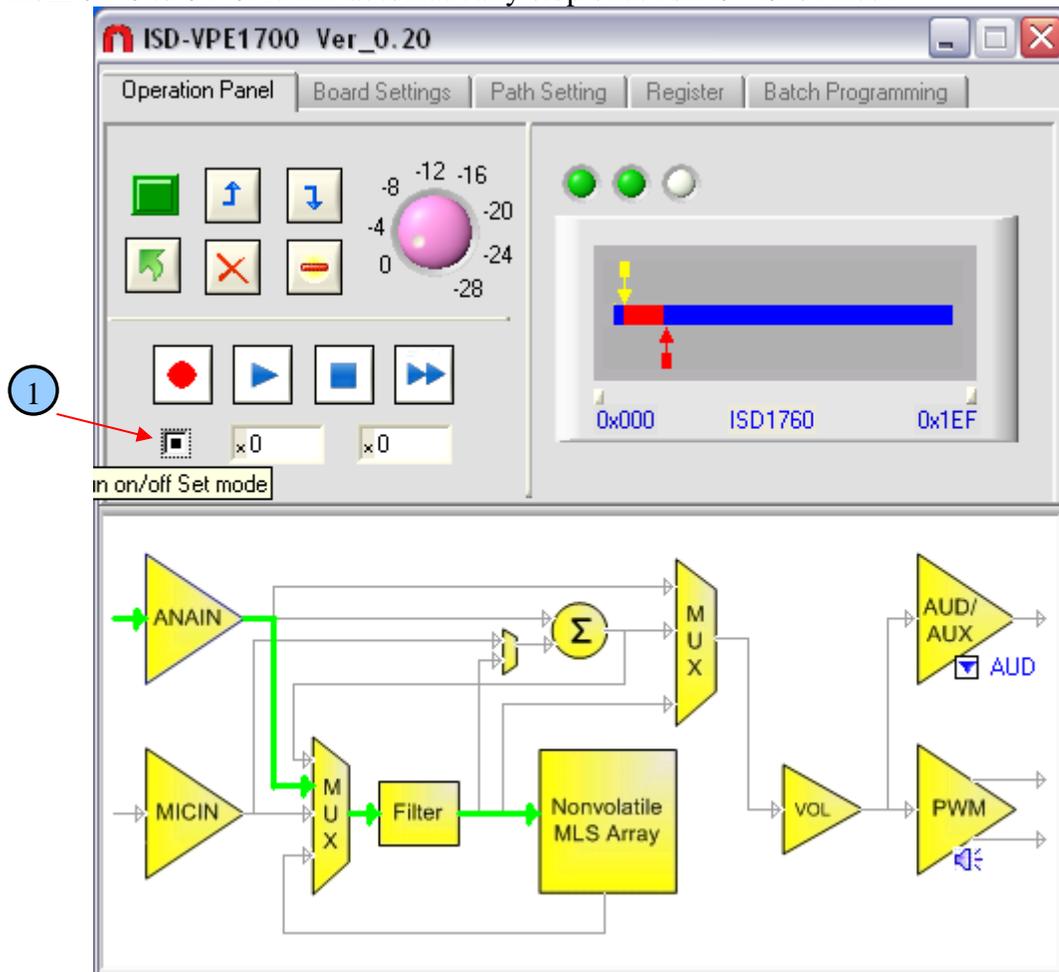
Example 1: Recording from ANAIN , and Playing back on the SPK

- 1.) Apply power to the board by pressing the power toggle button.
- 2.) Click Power Up button to power up the chip
- 3.) Choose correct settings: check the sampling rate, make sure jumper J3 is at correct position; In path setting panel click on choose the path (AnaIn Rec) Click On REC
- 4.) Play sound through PC, turn the PC volume in the middle;
- 5.) Click on record button in main panel, the ready/busy indicator will flash in red color ;
- 6.) Click stop when done (or anytime when you wants to stop recording);
- 7.) The graph bar will be updated, the two pointer arrows position in canvas window is updated; move the mouse on the handle to see the current pointers addresses.



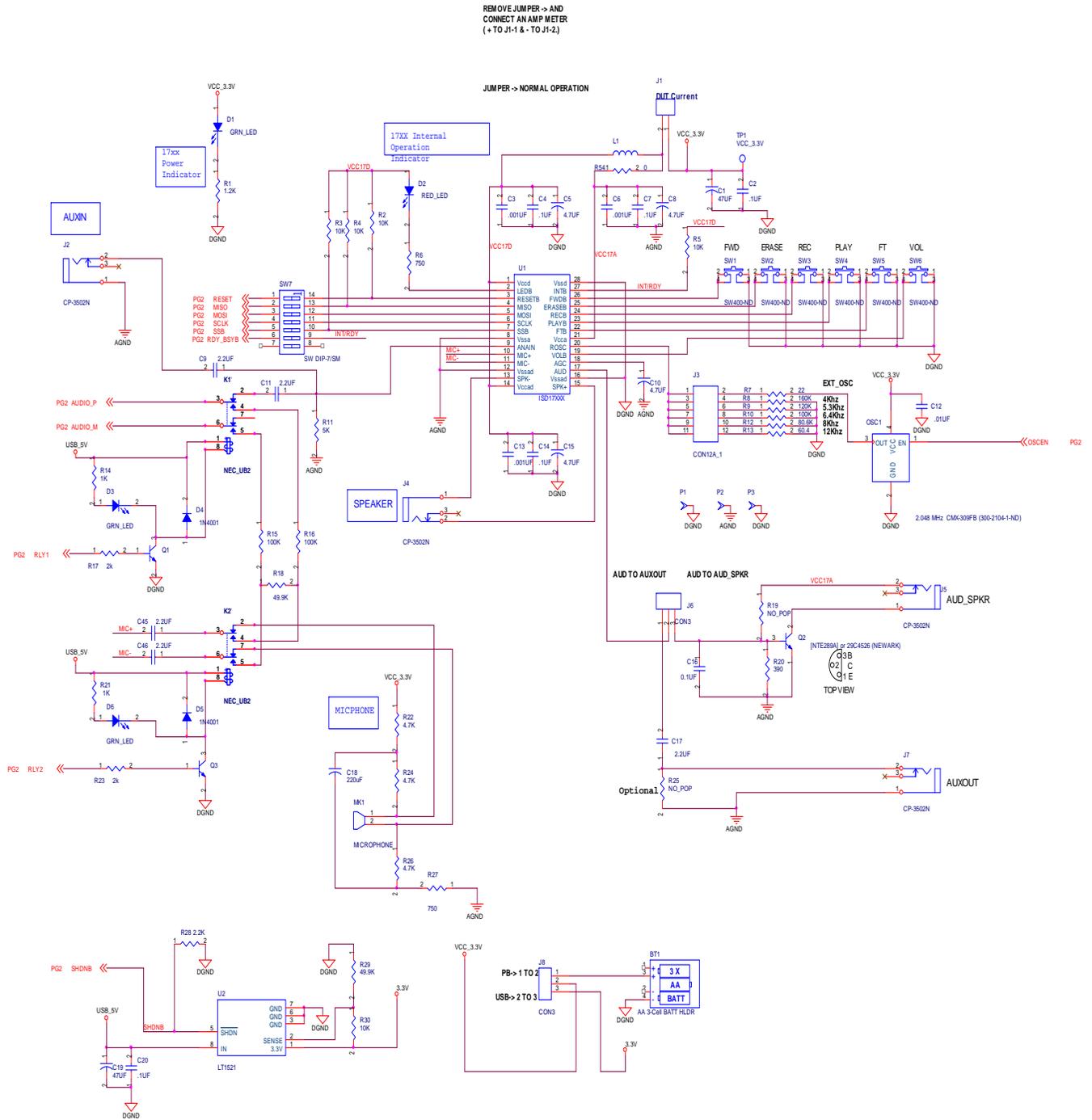
Example 2: Set record from 0x10 to 0x40

- 1) Apply power.
- 2) Click Power Up button to power up the chip device
- 3) Choose correct settings: check the sampling rate, make sure jumper J3 is at correct position; choose the correct path;
- 4) Click Set mode , fill in the start address as 10, end address as 40
- 5) Play sound through PC, turn the PC volume in the middle.
- 6) Click record button, the ready/busy indicator will flash red color ; ISD1700 D chip will record from 0x10 to 0x40. It will automatically stop once row 0x40 is filled.

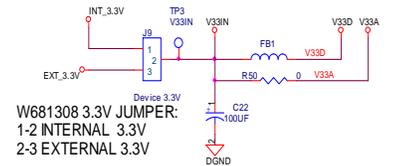
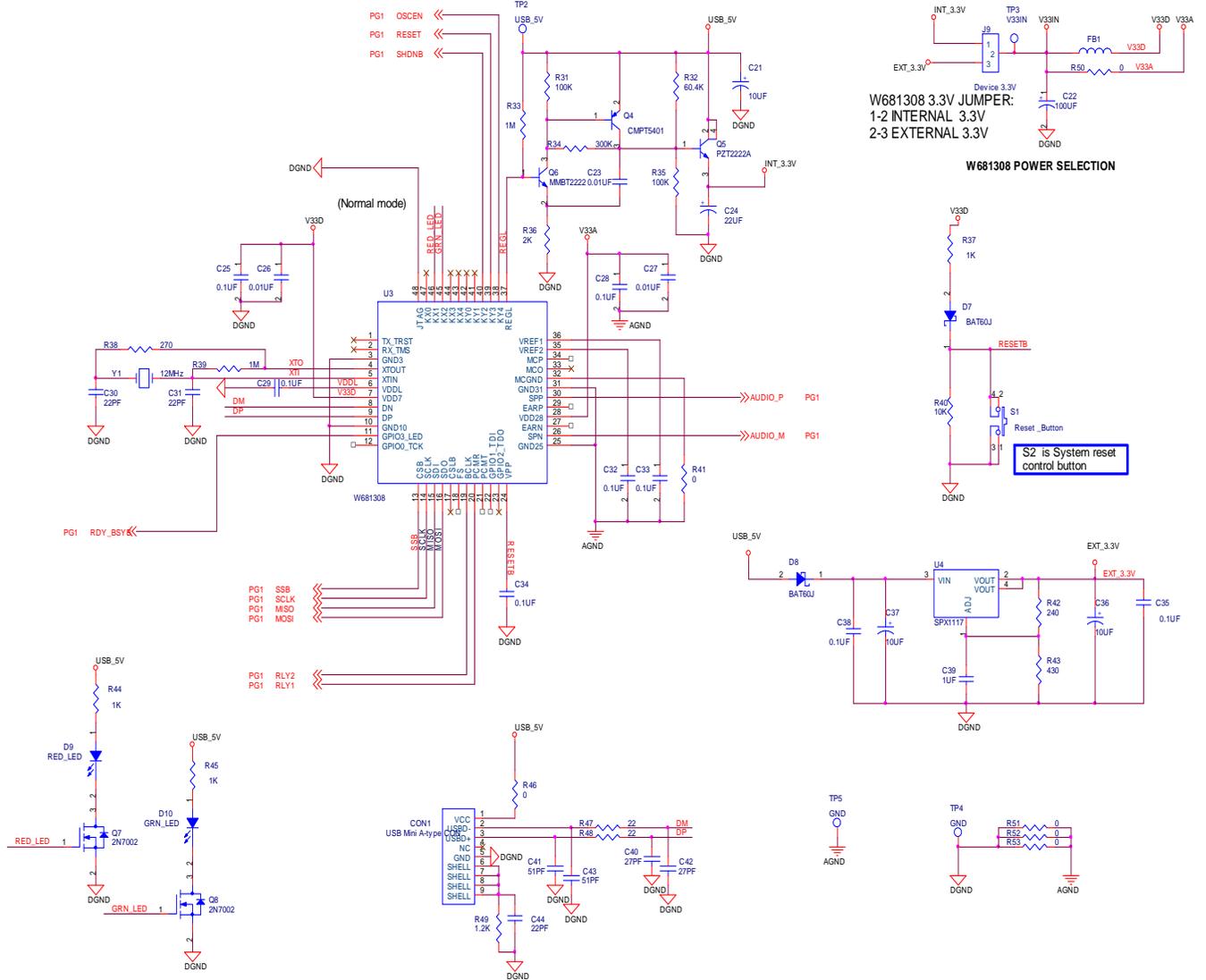


Note: When Set Mode is selected, Record, Play and Erase all turn to set mode; and they all need start address and end address to be able to work correctly.

ISD-ES17xx board Schematics



ISD-ED17xxx Board Schematics



W681308 POWER SELECTION

