

LM4931 Evaluation Package Instructions

The LM4931 Evaluation Package includes the following:

LM4931 Demoboard
I²C/SPI Card
I²C/SPI Cable
Software (From Website)

Hardware Installation Instructions:

- 1) Plug the I²C/SPI Card to the parallel port (LPT1) of the PC.
- 2) Determine whether you are going to use I2C or SPI.
- 3) Connect the LM4931 Demoboard to the I²C/SPI Card with the I²C/SPI Cable. Refer to the Silkscreen for the corresponding pin locations of SCL, SDA, extV_{DD} and GND. The I²C/SPI Cable uses the following color coding scheme:

(Green – SCL/SLK; Blue – ADDR/ENB; Orange – SDA/SDI)
(White/Green – extV_{DD}; White/Blue – VSS_D)

SCL/SCK (pin2)	ADDR/ENB (pin4)	SDA/SDI (pin6)	Green	Blue	Orange
extVDD (pin1)	VSS_D (Digital GND -pin3)	VSS_D (Digital GND -pin5)	White/Green	White/Blue	

I²C/SPI Silkscreen Pinout (Eval board/ I²C Card)

Code for I²C/SPI Cable

Location of
I²C/SPI
Interface on
Eval Board
(JP11)

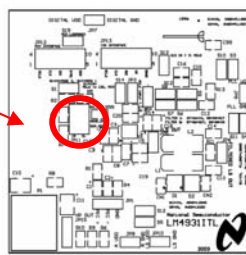


FIGURE 10. LM4931ITL Demo Board Silkscreen

I²C/SPI Card Instructions:

- 1) Attach the I²C/SPI Card to the PC's parallel port using the I²C/SPI Card's male DB-25 connector.
- 2) The LED indicator on the I²C/SPI card will light up when a proper connection is made.
- 3) Attach the I²C Cable to the I²C/SPI Card's corresponding 6-pin header.
- 4) The I²C/SPI Card can be powered up either through the PC's parallel port (pcVdd) or the LM4931 Demoboard's power supply (extVdd).

- 5) For pcVdd operation, the slide switch on the I²C/SPI Card must be set to the pcVdd position.
- 6) For extVdd operation, the slide switch on the I²C/SPI Card must be set to the extVdd position.

LM4931 Demoboard Instructions:

- 1) The supply pin, ground pin, inputs, and outputs are all easily accessed through the header pins of the LM4931 Demoboard. Each header pin is labeled accordingly on the Demoboard's Silkscreen layer.
- 2) Attach the I²C Cable to the LM4931 Demoboard's corresponding 6-pin header.
- 3) Connect a power supply to the Vdd and GND pin of the LM4931 Demoboard for power-up.
- 4) Connect input through the I2S interface (pin designations on datasheet)
- 5) More detailed instructions and connection descriptions can be found in the LM4931 datasheet

Software Installation Instructions:

- 1) A Windows95/98/NT/2000/XP operating system is required.
- 2) Run *setup.exe* to begin the software installation.
- 3) Run *LM4931v0_6beta.exe* to begin the software program.
- 4) Refer to datasheet for modes and default settings
- 5) To begin working with the GUI and demo board, please refer to settings below from **tabs** within the GUI.

Setting Interface Tab:

LM4931 Interface Program v0.6beta

INTERFACES

PCM MODE: ☒ LINEAR ☐ u-LAW ☐ A-LAW

I2S CONFIGURATION: ☐ MASTER ☒ SLAVE

PCM CONFIGURATION: ☐ MASTER ☒ SLAVE

I2S RESOLUTION: ☒ 16 BIT ☐ 32 BIT

PCM FRAME SYNC: ☐ LONG ☒ SHORT

GPIO DATA: ☐ 1 ☒ 0

GPIO OUTPUT:

- ☒ HP CONNECTED ☐ VC CLOCK ☐ GPIO DATA ☐ EXT LS ENABLE
- ☐ VOICE ADC SD ☐ VOICE DAC SD ☐ AUDIO DAC LEFT SD ☐ AUDIO DAC RIGHT SD
- ☐ IRQ ☐ PLL OUTPUT ☐ PLL FB CLOCK ☐ PLL INDIV CLOCK
- ☐ ST OVERFLOW ☐ PCM SDO ☐ BYPASS LOW ☐ BYPASS READY

DEFAULT

- 1) Please refer to the Application Information section (starting on pg.35) in the LM4931 datasheet if changing from default settings is necessary. (Software interface information is mainly on pg.42 and pg.43)

Setting Clocks Tab:

LM4931 Interface Program v0.6beta

CLOCKS

AUDIO SUB-SYSTEM INPUT SOURCE: ☒ PLL INPUT ☐ PLL OUTPUT

VOICE SUB-SYSTEM INPUT SOURCE: ☒ MCLK ☐ PLL OUTPUT

MCLK FREQUENCY: ☐ MCLK / 2 ☒ MCLK

PLL INPUT SOURCE: ☐ I2S INPUT CLOCK ☒ MCLK

PLL DITHER LEVEL: ☒ 32 ☐ 16 ☐ 48 ☐ 0

PLL DISABLE: ☐ YES ☒ NO

PLL TEST MODE: ☐ ON ☒ OFF

Q DIVIDER: ☒ 12 ☐ 8 ☐ 6 ☐ 4

PLL SETTINGS:

INPUT FIELDS (enter values below):

EXTERNAL MCLK FREQUENCY (MHz): 12.0000

SAMPLING FREQUENCY (kHz): 48.0

M: 4

P: 4

N: 4

NMOD: 0

OUTPUT FIELDS:

fcomp (MHz):

fvc0 (MHz):

fpll (MHz):

error (Hz):

SUGGESTED N:

SUGGESTED N MOD:

STEP 1) CALCULATE SUGGESTED N, N MOD

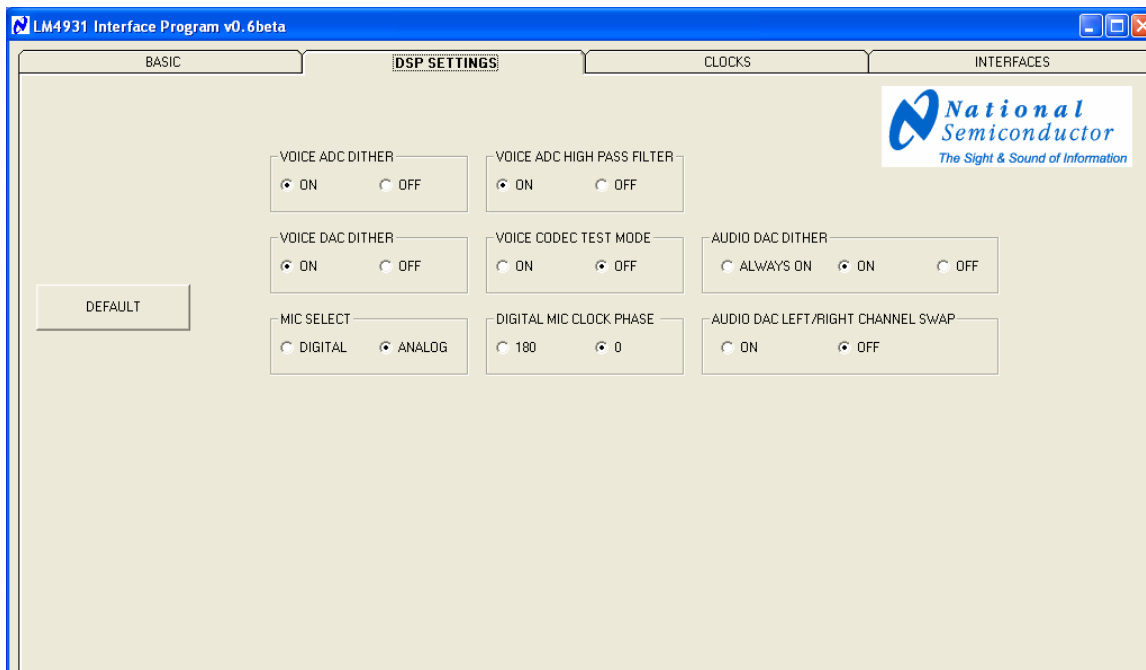
STEP 2) USE SUGGESTED N, NMOD

STEP 3) CALCULATE VALUES

PROGRAM REGISTERS

- 1) Set Audio Sub-system input source to PLL input if a 12.288MHz or 11.2896MHz master clock is available. This bypasses the PLL.
- 2) Voice sub-system input source should be checked to MCLK to bypass PLL if a 12.288MHz or 11.2896MHz master clock is available.
- 3) If the PLL must be used, fill in the input fields under the PLL settings frame and follow steps 1 through 3. Click the "PROGRAM PLL REGISTERS" button to set the PLL.

Setting **DSP** Tab:

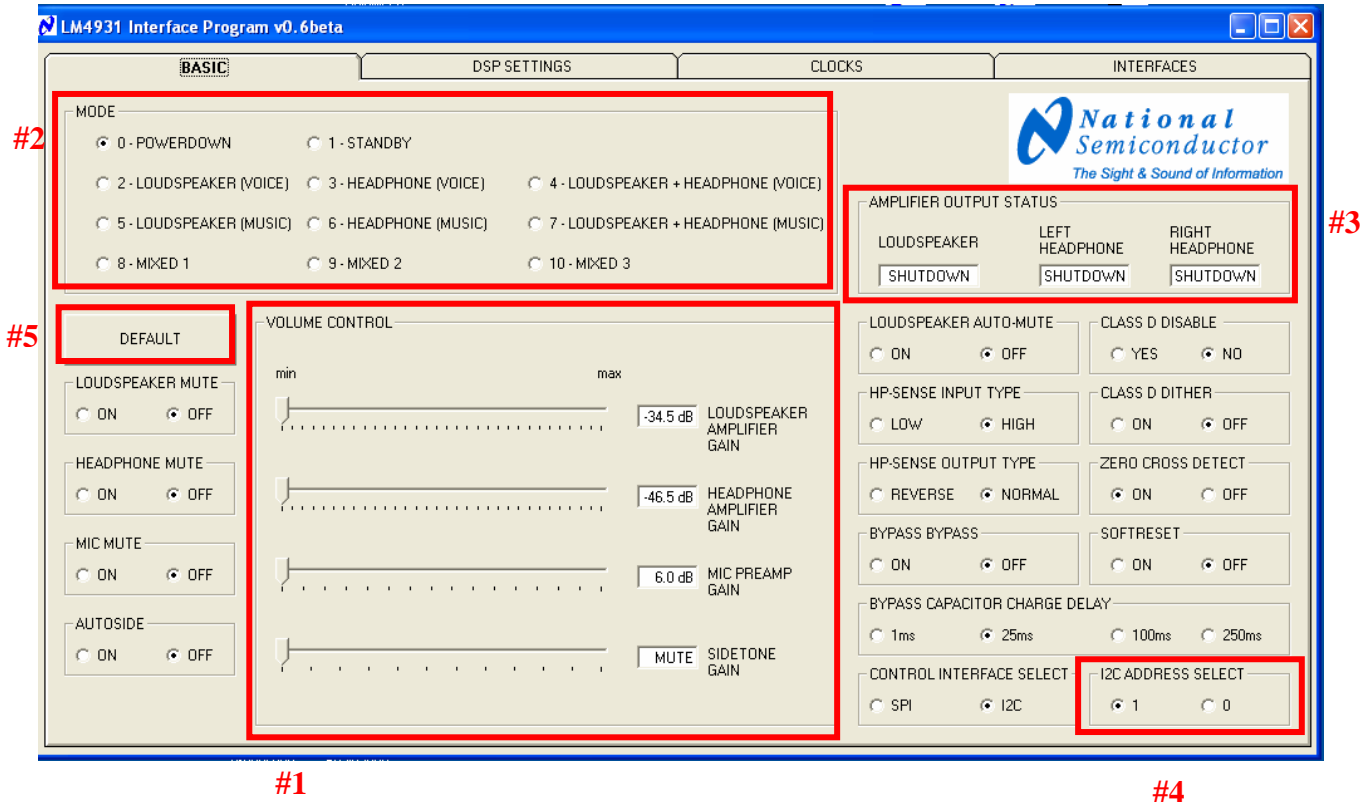


The screenshot shows the 'LM4931 Interface Program v0.6beta' window with the 'DSP SETTINGS' tab selected. The window has four tabs: BASIC, DSP SETTINGS, CLOCKS, and INTERFACES. The DSP SETTINGS tab contains several control groups with radio buttons and a 'DEFAULT' button.

Control Group	Options	Selected Option
VOICE ADC DITHER	ON, OFF	ON
VOICE ADC HIGH PASS FILTER	ON, OFF	ON
VOICE DAC DITHER	ON, OFF	ON
VOICE CODEC TEST MODE	ON, OFF	OFF
AUDIO DAC DITHER	ALWAYS ON, ON, OFF	ON
MIC SELECT	DIGITAL, ANALOG	ANALOG
DIGITAL MIC CLOCK PHASE	180, 0	0
AUDIO DAC LEFT/RIGHT CHANNEL SWAP	ON, OFF	OFF

A 'DEFAULT' button is located on the left side of the DSP SETTINGS tab.

- 1) Please refer to the register settings of the LM4931 datasheet if changes from the default settings are necessary. For further information also view Application Information section starting at pg.35. (Key information on Dithering is also on pg. 44)



Settings of the **BASIC** Tab:

- 1) Volume controls are accessed through the slider bars on bottom of GUI interface.
- 2) Output modes and other features are accessed through the radio buttons on top of GUI.
- 3) The status of each audio output is given in the corresponding text boxes located in the top right section of the GUI.
- 4) The address bit is set through the I2C software high or low. If ADDR is low, then the chip address is set to 0010000b. If ADDR is high, the address is set to 1110000b.
- 5) The DEFAULT button resets the GUI back to the default I2C/SPI settings.
- 6) Place in power down mode (0) before switching modes.
- 7) The LM4931 can be reset, excluding the I2C/SPI registers and PLL, by turning on "SOFTRESET". To resume normal operation,