ISL5314EVAL2 User's Manual

Description

The ISL5314EVAL2 provides a means of evaluating the Intersil ISL5314, 125MSPS, Direct Digital Synthesizer (DDS). The board is controlled with software that allows for any clock frequency and output frequency within the abilities of the ISL5314 to be evaluated. The interface between the PC and the evaluation board is via the parallel port of an IBM compatible PC. The analog output of the DDS can be analyzed on external measuring equipment; typically either a spectrum analyzer or an oscilloscope. The clock source for the DDS can either be a user-changeable crystal or an external signal generator provided through an SMA connector. The board is shipped with a 125MSPS crystal. The complementary analog outputs of the DDS are processed through a 1:1 transformer. The board can be reconfigured to bypass the transformer and only a single-ended output used. Because there is an on-chip comparator, the means to process the analog sinewave from the DDS output into the comparator inputs is provided for square wave generation. The comparator's output is provided via an SMA connector. Consult the data sheet of the ISL5314 for details of the DDS's capabilities.
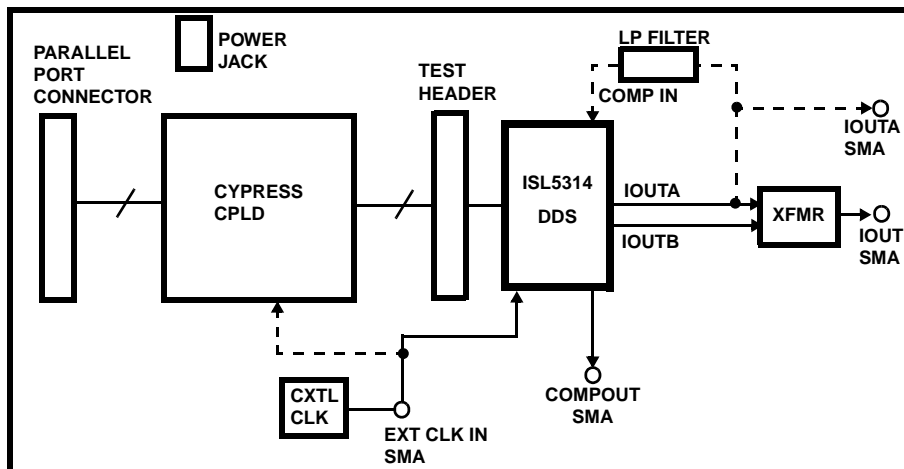
Features

- GUI software control via parallel port
- Clock: On-board crystal socket or externally applied
- 1:1 RF transformer for analog output

Ordering Information

PART NUMBER	PACKAGE
ISL5314EVAL2	Evaluation Board

Getting Started

The ISL5314EVAL2 is relatively easy to operate. The required equipment is as follows:

1. ISL5314EVAL2 evaluation board
2. Printer extension cable (DB25 male to female)
3. Clock source, either crystal or signal generator
4. Latest version of the software
5. 5V/500mA power supply
6. 1 RF cable with an SMA connector
7. Spectrum analyzer or oscilloscope

Software Download

Regardless of the version of the software that is shipped with the board, it is recommended that the user obtain the latest version. Go to www.intersil.com and do a product datasheet search on the ISL5314. Select the link to the ISL5314IN. In the related documents section, select the link to the DDS software. The link will download an installation program. Run the installation. Follow the instructions on the screen. After the program is installed, it will automatically run the software. If the computer has a non-NT based operating system, the software should work immediately, provided the parallel port address on the Board panel of the software is correct (default is 378). If the operating system is NT based, it is likely that the user will need to close the DDS software, find the directory in which it was installed (default is c:\ISL5314EVAL2), and run the port95nt.exe program once. After restarting the computer, run the ISL5314x.exe software located in the directory selected during installation. Once the port95nt.exe program is run on a computer, it should not have to be executed a second time.

Evaluation Board Block Diagram

Setup Instructions

Verify the following board jumper settings:

J2 (OPEN) - crystal enabled

J3 (OPEN) - 50Ω Load for external clock disabled

J7 (OPEN) - CPLD programming disabled

J37 (SHORT) - internal DAC reference enabled

The board is shipped with a 125MHz crystal clock source included. To confirm that the board is working properly, it is recommended that the user leave the crystal in place and the jumper settings as previously listed. After confirmation that the board is working properly, the user can change the clock source.

To begin, connect the included printer cable between the IBM-compatible PC and J6 of the evaluation board. Connect a coaxial cable between J11 (IOUT) and either a spectrum analyzer or an oscilloscope. The input impedance of the measurement equipment should be 50Ω. Connect the power cable to the power jack (J14) and to a 5V power supply. Turn on the power supply. Proceed to the *Software Instructions*.

Software Instructions

If the directions in *Software Download* have not been completed, go back and complete before proceeding.

With the board powered up and connected to the PC via the parallel port, launch the DDS software. The DDS software has three control tabs. On the 'Board' tab of the software, the 'Parallel Control Bus' must be checked before the software will communicate with the eval board. Use the 'DDS Options' tab to configure the part for different operating modes.

The tabs contain default settings the first time the software is executed. It remembers most previous settings every subsequent time it is executed. The first time the program is executed, the clock and center frequencies will be zero. On the front panel, the user should type '125M' into the clock frequency text box and hit the ENTER key. Mouse-click on the 'Soft Reset' button. This should default the center frequency register to $\frac{1}{4}$ of the clock frequency. Verify on the measurement equipment that there is a sinewave at 31.25MHz coming from J11 on the evaluation board. Once this has been verified, the user should change the center frequency to something else (maximum output frequency is $\frac{1}{2}$ the DDS clock rate). To change the center frequency, type a different frequency (i.e., '5M') into the center frequency register and hit the ENTER key. Or, change the center frequency register in hexadecimal format by typing a new value into one of the hexadecimal text boxes labeled 'center frequency register.' The format is 0x00, where 0x is a constant prefix. The analog output of the DDS should now be 5MHz, or whatever was programmed.

A 'step size' input box is located under both the center and offset frequency input boxes. The purpose of this box is for the user to be able to set a step size and then quickly evaluate a range of output frequencies by hitting the up and down arrows on their keyboard, or by mouse-clicking the arrows next to the 'step size' boxes.

Changing the Board Configuration

To drive the DDS with an external clock source, remove the oscillator (U1), or install jumper J2 which will disable the crystal. Drive the external clock into J8. Install J3 so that the external signal source will be loaded with 50Ω on the evaluation board. Change the 'Clock Frequency' text box on the front panel of the software to match the actual frequency used.

The board is normally configured for differential-to-single-ended output with transformer coupling (J11). For single-ended loading using IOUTA (J10), install a 0Ω resister at R48 and remove J5 and J15 next to the transformer, as well as R45 and R46. Ensure that R19 and J40 are not populated, and that R43 is populated with a resistor that does not violate the output voltage compliance range (typically 50Ω).

Performance Notes

1. Lab testing has shown that the transformer has little or no benefit to the harmonic performance of the analog output. This is due to a mismatch in IOUTA and IOUTB. For a more cost effective solution, the user may decide to use the single-ended configuration (IOUTA or IOUTB), which is simply to put a resistor between IOUTA and ground that forms a voltage with the current output of the DDS. The maximum output current is +20mA. A 50Ω load with full scale current will be a +1V signal. The maximum output voltage of the DDS is +1.25V. The output current is set with R41 (RSET). See data sheet for details.

2. Using a +5V supply for both the digital and analog supplies of the DDS can improve the SFDR, compared to using a +3.3V digital and +5V analog.

3. For applications that can provide a +5V supply for both the digital and analog (DVDD and AVDD) supplies of the DDS, the SFDR can be improved by connecting the COMP2 pin of the DDS to AVDD directly. This is especially true for 'DDS CLK-to-analog output frequency' ratios that are less than 4 (100M clock, 30MHz output, for example). For ratios greater than 4, this method has little effect. This cannot be done unless DVDD = AVDD = +5V. The evaluation board was not configured for this option, but a simple wire jumper can be used to prove or disprove its effectiveness. The user may wish to build this option into their system in the event that it improves the harmonic performance during evaluation.

4. The maximum DDS clock rate is 125MSPS with a +5V digital supply. The maximum DDS clock rate with a +3.3V digital supply is 100MSPS.

Schematics and Board Plots

The board schematic and layout can be found on the Intersil website by doing a product search on ISL5314 and selecting the link to the ISL5314IN.

For information regarding Intersil Corporation and its products, see www.intersil.com

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