SIRENZA MICRODEVICES

Application Note 101
PLL Evaluation Board

This application note details the basic connection, operation and software settings for the Sirenza Phase Locked Loop (PLL) Evaluation Boards. The PLL EVB is designed to provide an easy method of evaluating the Sirenza PLL products. The Sirenza PLL module consists of a custom designed VCO, a commercially available PLL IC, a loop filter, and in some cases a buffer amplifier to isolate the PLL from phase errors due to load variations.

Parts Needed for Proper Evaluation Board Operation:
- Sirenza PLL Evaluation PCB with part mounted on the EVB
- 25 Pin extension cable for parallel port (Note this is not a printer cable)
- Specification for PLL being used including Application Note.
- PLL controller Software (either from CD or downloaded)
- Power Supply
- Spectrum Analyzer (Agilent 8563E is recommended)
- BNC Cable
- SMA Cable

Downloading Software:
Download our PLL software from the following link:
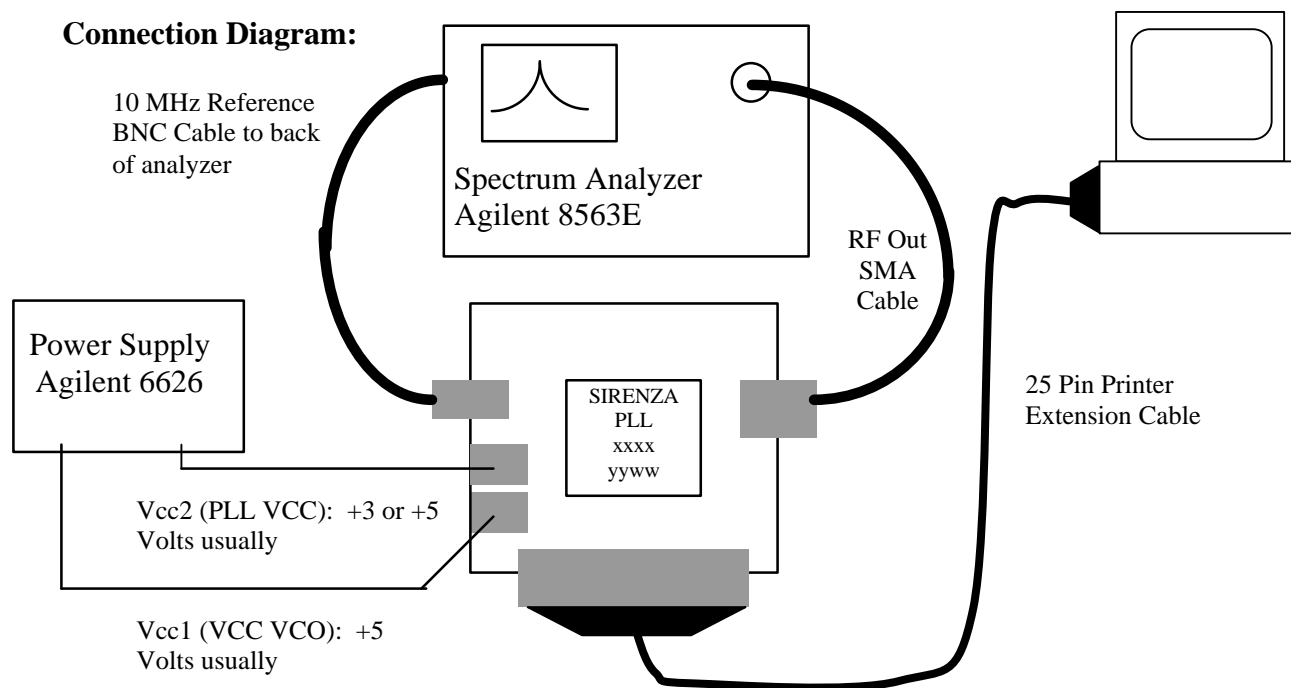**http://www.sirenza.com/downloads/pllcontroller4.zip**
Click on the link to download the PLL Controller 4.0 software (zip file) Save the file to your computer and open, it using WinZip (or other zip file extraction program). Double click Setup.exe and follow the installation instructions on screen Use **PLLCON-0308-0000000030** for the Serial Number

Connection Diagram:

10 MHz Reference BNC Cable to back of analyzer

Spectrum Analyzer Agilent 8563E

RF Out SMA Cable

Power Supply Agilent 6626

SIRENZA PLL xxxx yyww

Vcc2 (PLL VCC): +3 or +5 Volts usually

Vcc1 (VCC VCO): +5 Volts usually

25 Pin Printer Extension Cable

Running the Software:

1   Run the PLL Controller software from the Programs folder on the Start menu.

2   The first time you run the software, it will provide a list of the parallel ports that are available on your computer. Choose the port that you will use to control the PLL synthesizer.

3   Select "Open App Note..." from the File menu of the PLL Controller. From the AppNotes folder, select the appropriate app note. For example, with the PLL350-2140, choose **appnote113-.van**. The correct application note can be determined from the product specification.

4   Many of the PLL modules use a PLL IC with variable charge pump current. The loop of each module is optimized for a charge pump setting. This is specified in the specification sheet. For example, with the PLL400-1143, make sure the Option number is set to **100**. This is the default option when loading the 109 app note.

5   Make sure the Reference Input used is 10 MHz.

6   Enter the channel spacing in kHz. The PLL module is optimized for a particular step size. This is available from the specification sheet under step size.

7   Enter the Desired Output Frequency.

8   Press the Send All button.

Each time the Output Frequency is changed, pressing the Send All button will reprogram the PLL synthesizer.

Common Troubleshooting Issues:

No or low RF Output: check to determine there is current being supplied to the unit, this is usually a result of no DC applied to the unit.

Excess Loop Peaking (above 4 dB): This is normally caused by an incorrect command word being sent to the PLL. Usually this is either the control word setting the wrong phase detector current or the R-word with an incorrect step size set.

The loop is not locked: Check to see there is a reference signal being applied and the amplitude is between 2 and 4 Volts peak-to-peak (for +5 V operation of PLL IC). The other common issue is not all words have been sent to the PLL module. Make sure all words have been sent by pushing the SEND ALL button..

Excess Noise on the signal: This is normally the result of an incorrect control word setting. Check the Option specified on the specification.

Programming and troubleshooting aids:

The PLL controller software has programming aids and trouble shooting aids built in. The bit patterns for all words are displayed for any combination of output frequency and reference used for the unit. Use of this in conjunction with either an oscilloscope or word analyzer is useful in troubleshooting integration issues.