PE9601

EVALUATION KIT

USER'S MANUAL

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This device is intended for use only in a research and development environment. It has not been tested for compliance with FCC regulations regarding interference with radio frequency energy. It might cause harmful interference with radio communications. The user assumes responsibliity for any interference caused by this device.

Introduction

Introduction

This Evaluation Kit is specifically designed for evaluating the PE9601 2.2 GHz Integer-N PLL. The Evaluation Kit allows maximum flexibilty for optimizing phase noise, spur, lock time and power performance for specific applications. Using the hardware and software provided in the Evaluation Kit, both serial and direct modes of programming can be demonstrated.

Applications Support

If you have a problem with your evaluation kit or the software, or if you have applications questions, call (858) 455-0660 and ask for applications support.

You may also contact us by fax or e-mail:

Fax: (858) 455-0770
E-Mail: help@peregrine-semi.com

FCC Labeling Requirement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may cause harmful interference, and (2) this device must accept any interference received including interference that may cause undesired operation.

Hardware
Section

Evaluation Kit Contents And Requirements

The Evaluation Kit includes all of the specific software and hardware required to evaluate the PE9601. Included in the Evaluation Kit are:

1 PE9601 Evaluation Board
1 PE9601 2.2 GHz Integer-N PLL
1 CD with Application Software included
2 Pairs of Jumpers
1 8-Wire Interface Cable with GND
2 Power Supply Cables
1 Set of Evaluation Kit Data Plots

In order to program the part using serial programming mode the Evaluation Kit software will need to be installed on a computer with the following minimum requirements:

PC Compatible with Microsoft Windows '95/98™
Mouse
Parallel Port

CAUTION: The PE9601-EK circuit contains components that might be damaged by exposure to voltages in excess of the specified voltage, including voltages produced by electrostatic discharges. Handle the board in accordance with procedures for handling static-sensitive components. Avoid applying excessive voltages to the power supply terminals or signal inputs or outputs.

Evaluation Kit Configuration

The PE9601 Evaluation Board is configured with an on-board VCO, TCXO reference and a second order passive loop filter. The VCO tuning range is from 1865 MHz to 2055 MHz and the reference oscillator runs at 10 MHz. The passive loop filter is designed for a 1 MHz comparison frequency and a 1918 MHz output frequency with unity gain crossover at 75 kHz, phase margin of 66 degrees and 1.2 dB of peaking. The data set provided was measured in this configuration with the default jumper settings shown in Figure 1. Figure 3 shows a typical set-up for evaluating the PLL using the Evaluation Kit.

Evaluation Kit Set-up

1. Start Microsoft Windows. Insert the Peregrine CD into CDROM drive and open CD directory. Click **Eval Kit Documentation, PE9601-2.2 GHz Integer-N PLL**, and then **Evaluation Board Software**. Choose the option of "Save and run the 9601.exe file in your hard disk" or "Run it from CD". Either way, then run **Setup.exe** from your hard disk directory and follow the instruction on the screen. This will install the Evaluation Kit Application Software. Some computers might not have cb.cfg nor CBERCODE.TXT file for error log. In this case, you would get an error message during the initial start up of the software. However, the software will work.

2. There are two sets of jumpers used to configure the Evaluation Board (see Figure 1). The connector J3 and REF Selector (JP1) select an option to use the 10 MHz on-board reference or an external reference. Setting the BMODE Control switch (BMODE switch S3-1) to the "on" position enables direct mode programming. In the direct mode, the PE9601 can be programmed using the fifteen on-board switches. Setting the BMODE Control switch (BMODE switch S3-1) to the "off" position and the A3-S_mode switch (A3-S_Mode switch S3-8) to the "on" position the serial programming mode is enabled. The Default jumper and switch settings are shown in Figure 1 which will place the part into serial programming mode. Peregrine Semiconductor recommends that the default settings be used initially to bring up the evaluation board and duplicate the enclosed measured data.

3. Verify a jumper is placed on the connector J3 and REF Selector (JP1) is positioned to select the on-board reference as shown in Figure 1. The connector J3 supplies power to the on-board TCXO. <u>Do not connect any external reference to the connector labeled Ext. REF In (J10) if the on-board reference is selected.</u> To use an external reference, remove the jumper from the connector J3 to disable the on-board reference and re-position the jumper on REF Selector (JP1) as shown in Figure 2. Connect the external reference to the connector labeled Ext. REF In (J10).

4. Next connect power supply cables to the Evaluation Kit board as shown in Figure 1. _Verify all supplies are turned off prior to connecting to evaluation board._
   a. Connect the 3 V supply to VccPLL [J7, Pins 1(+) & 3(-)].
   b. Connect the 5 V supply to VccVCO [J7, Pins 31(+) & 33(-)].
5. Using the application software provided, serial and direct programming can be evaluated. To enable software control of the evaluation board, ensure all DIP switches are turned off except for ENH (S1-1) and A3-S_Mode (S3-8) as shown in figure 1. Direct mode programming can be evaluated manually without the Application Software enabled. To enable direct mode programming, both the ENH (S1-1) and the Bmode (S3-1) DIP switches should be turned on. The on-board DIP switches can then be used to manually program the PLL. Note that M7 register is not available in the direct mode programming. Instructions for programming PLL registers are available in the datasheet.
6. To perform the evaluation of the PE9601 using the computer's printer port, connect the 8-wire interface cable (3-wire serial interface and GND) between the computer's printer port and J1 on the Evaluation Board.
7. Connect a spectrum analyzer or similar measurement system to the VCO Ouput (J5) to access the output of the on-board VCO. Additional GND posts and test points are available on the Evaluation Board for measurement flexibility.
8. Apply power to the 5V and 3V supply pins and run the application software. The Evaluation Kit can now be used to evaluate the PLL. Figure 3 shows a typical set-up for evaluating the PLL using the Evaluation Kit.

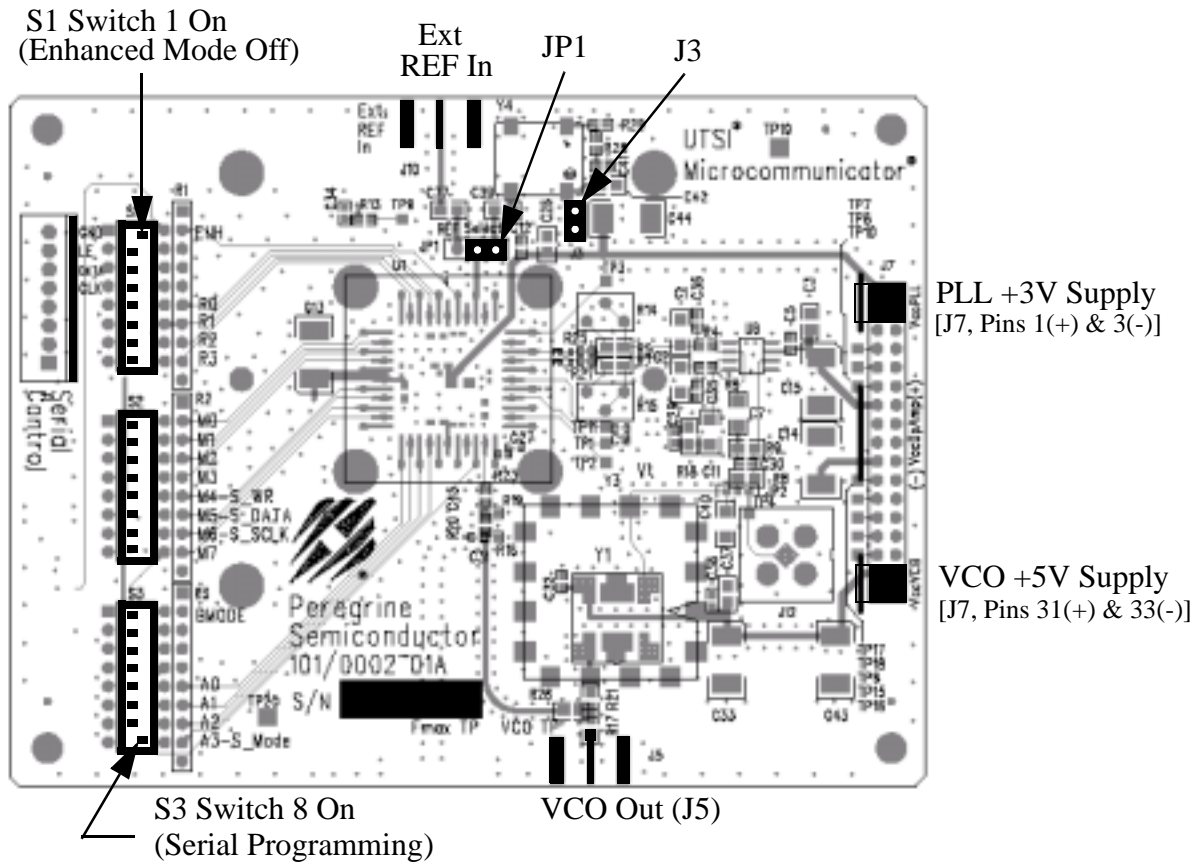Figure 1. Evaluation Kit Default Jumper & Switch Settings.

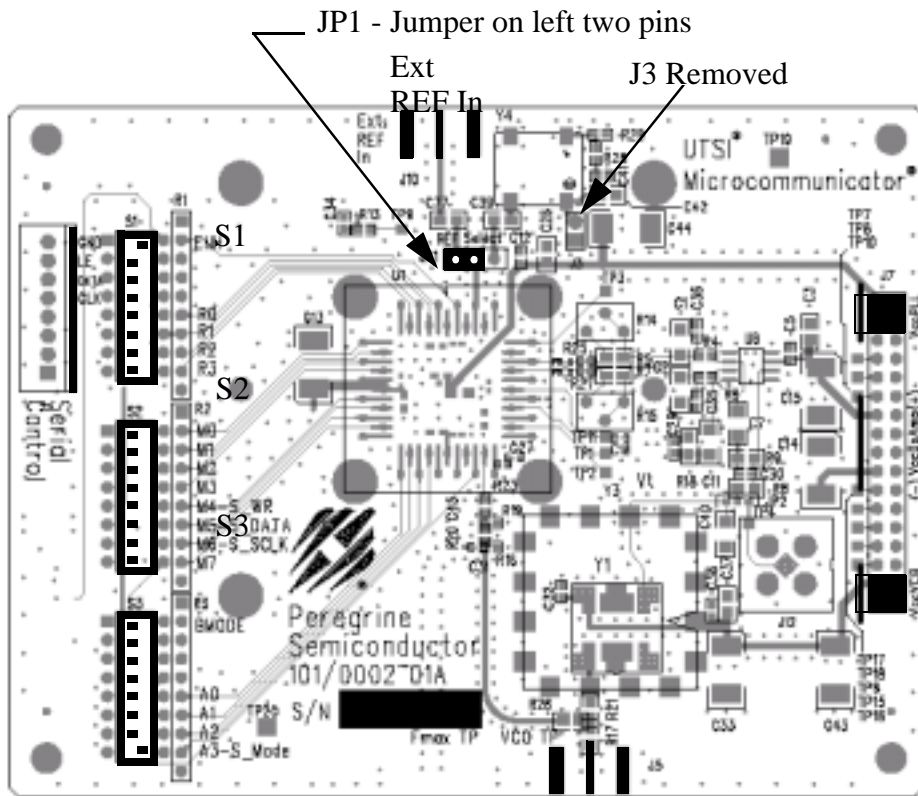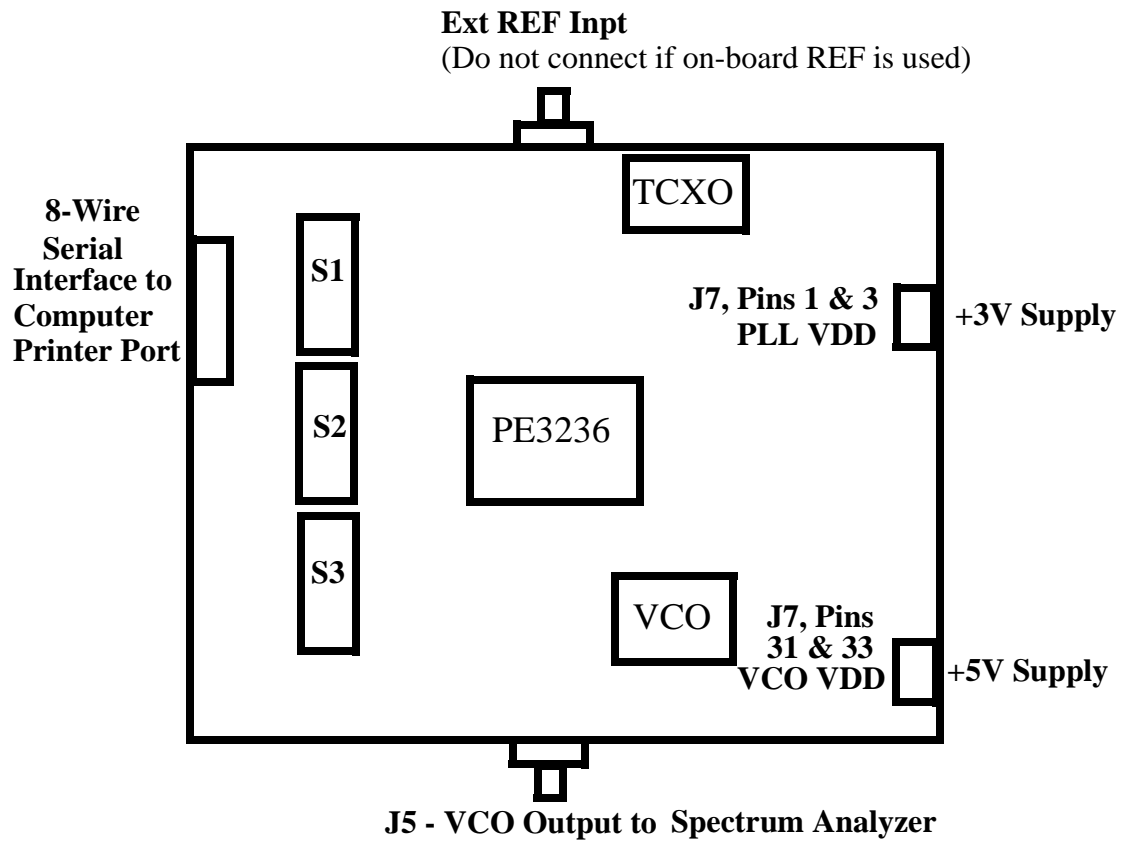Figure 2. Jumper Setting to Disable On-board Reference.

Figure 3. Typical Set-up for Evaluation Kit Measurements.

Ext REF Inpt
(Do not connect if on-board REF is used)

**8-Wire
Serial
Interface to
Computer
Printer Port**

| TCXO |

| S1 |

| S2 |

| S3 |

| PE3236 |

**J7, Pins 1 & 3
PLL VDD**   +3V Supply

| VCO | **J7, Pins
31 & 33
VCO VDD**   +5V Supply

J5 - VCO Output to Spectrum Analyzer

Software
Section

Software Setup for Serial Mode Programming

1) When programming the PE9601 in serial mode using the computer printer port option, the following software programming features are not available:
   - Enhancement modes are not available
   - Ping-pong mode is not available
   - Parallel and Direct interface modes are not available (Note: The direct mode programming can be performed using the sixteen on-board switches without using any software)

2) To run the PE9601 programming software using the serial interface mode, follow steps 1-8 below and Figure 4.

   Step 1: Start PE9601 program
   Step 2: Under the "IO port type" menu, select "computer printer port"
   Step 3: Select "Secondary Register" using the select frequency switch on the software front panel
   Step 4: Set reference frequency to 10 by typing it into the reference frequency box if on-board reference is being used. If an external reference is used, type in appropriate reference value.
   Step 5: Set reference counter (R counter) to 9 by typing it into the R counter box in the "R M A Select" box in the bottom left corner. Note that the numbers in the yellow boxes cannot be directly typed in.
   Step 6: Verify frequency step = 1.000 MHz.
   Step 7: Set Frequency to 1918 by typing it into the secondary frequency box. Once the frequency values is entered by "Enter" key in the keyboard, the software will automatically send out data to program PLL. You can click on "Send Data" button to program PLL too.
   Step 8: Verify on spectrum analyzer that part locks at 1918 MHz.

Figure 4: PE3236 Software Control Panel
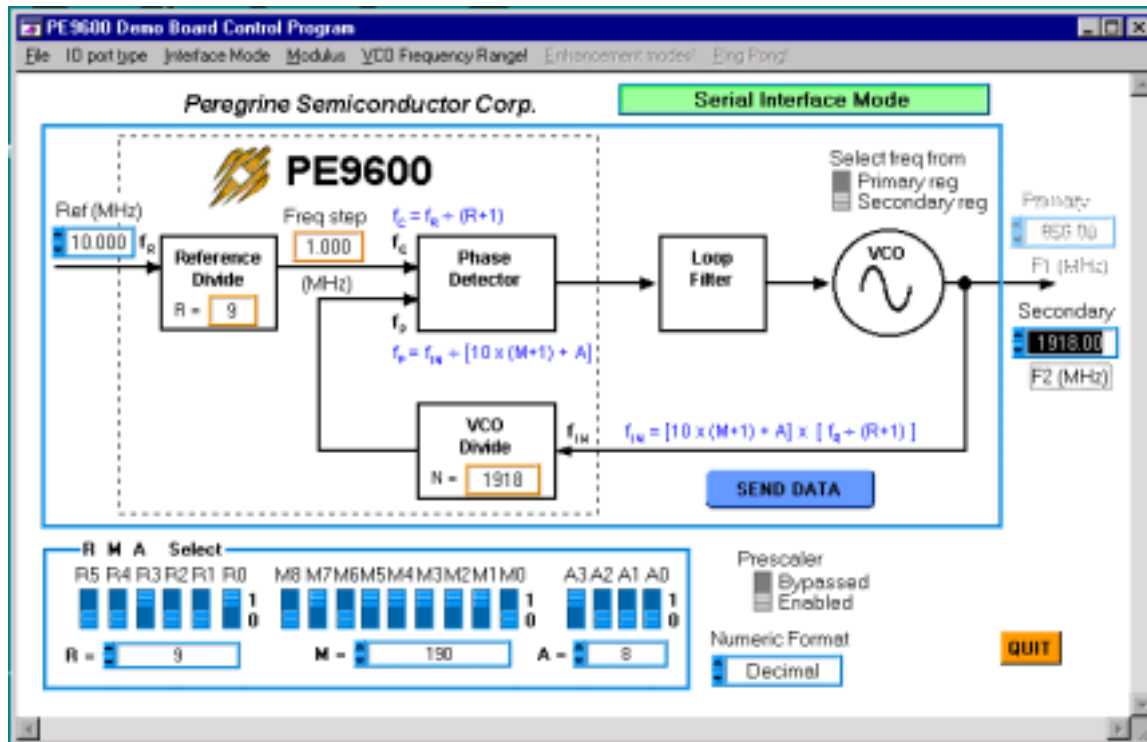
Note: Although the "PE9600" symbol appears on the above screen, this software is applicable to the PE9601.