ANALOG DEVICES

EV-ADA4961SDP1Z User Guide
UG-779

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Evaluating the ADA4961 Low Distortion, 3.2 GHz, Differential DGA

INTRODUCTION

The ADA4961 is a differential in, differential out, digital variable gain amplifier (DVGA), intended for driving 50 Ω loads, with bandwidths greater than 2 GHz. This document describes, in detail, the standard test procedure for verifying the operation of the ADA4961.

Complete specifications for the ADA4961 are available in the ADA4961 data sheet available from Analog Devices, Inc., and should be consulted in conjunction with this user guide when using the evaluation board.

TEST EQUIPMENT

The test equipment required consists of the following:

- +5 V power supply, capable of 200 mA output
- Two CW generators, capable of 0 dBm output at >100 MHz
- One spectrum analyzer
- One Mini-Circuits ZFSC-2-2500-S+ RF splitter
- One Windows® 7 PC with ADA4961 software loaded, USB 2.0 or later interface required

For reference, a photo of the complete setup is shown in Figure 1.

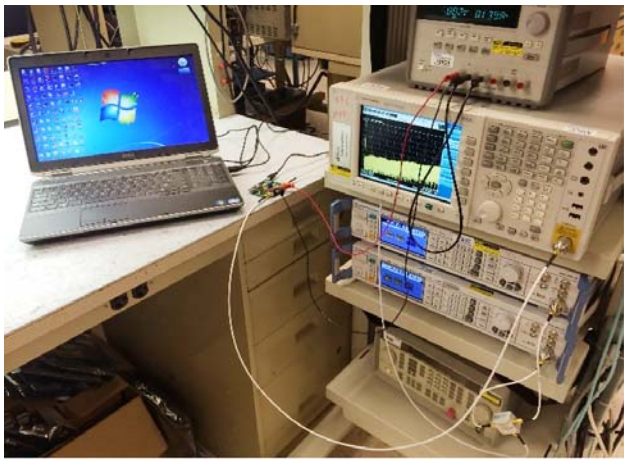

Figure 1. ADA4961 Test Procedure Setup

INITIAL EQUIPMENT SETUP

1. Set the power supply to +5 V, power supply turned off for now.
2. Set CW Generator 1 to 99 MHz at −20 dBm, RF output off for now.
3. Set CW Generator 2 to 101 MHz at −20 dBm, RF output off for now.
4. Set the spectrum analyzer to a center frequency of 100 MHz, with a 10 MHz span, an RBW of 30 kHz, and an input attenuation of 10 dB. Use the peak detector mode on the spectrum analyzer for this test.
5. Connect the two generator outputs to the input terminals of the Mini-Circuits combiner. Connect the output of the combiner to the input SMA connector, J1, on the ADA4961 evaluation board. The output SMA connector, J2, on the ADA4961 evaluation board connects to the spectrum analyzer. The details of the SMA connections, as well as the SDP-S daughter card connection and the USB cable connection to the PC, are shown in Figure 2.
6. If the spectrum analyzer allows, place markers at 97 MHz, 99 MHz, 101 MHz, and 103 MHz.

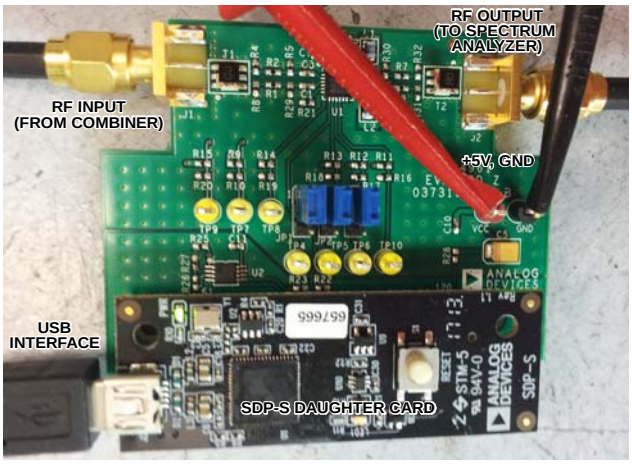

Figure 2. Detail of Connections from Test Equipment and PC to the ADA4961 Evaluation Board

SOFTWARE INSTALLATION

The user software for the ADA4961 evaluation board is built around the Analog Devices SDP-S USB hardware and software. All software described in the following steps is available in the ADA4961 software archive. To install the software for this environment, perform the following steps:

1. To install the SDP-S drivers, run the executable, **SDPDriversNET_2013.exe**.
2. The SDP EEPROM Programmer must be installed on the PC. In the **SDPEEPROMProgrammer_2013** folder in the ADA4961 software archive, there is a **setup.exe** file. Run this setup file. At the conclusion, the SDP EEPROM Programmer is visible from the Windows 7 **Start** menu.
3. Extract the file, **ADA4961_0p0p0.zip**.
4. From the ADA4961 unzipped archive, run the **ADA4961_0p0p0_installer.exe** executable.
5. An **ADA4961** icon appears on the PC desktop, but is not ready to use until the DUT EEPROM is initialized in the next step.

DUT EEPROM INITIALIZATION

To perform this initialization, users must have the executable, **EEPROMProgrammer.exe**, and the file, **ADA4961_eval_board.sdpeeprom**, stored on their PC.

The ADA4961 interfaces with the PC through the SDP-S daughter card interface, as shown in Figure 2.

There is an EEPROM installed on the ADA4961 evaluation board. This EEPROM must be programmed initially for the USB interface to recognize the board. To program the EEPROM, take the following steps:

1. Without applying power to the ADA4961 evaluation board, connect the evaluation board and the SDP-S daughter card, as shown in Figure 2. Connect the SDP-S USB cable to the PC.
2. Run the SDP EEPROM Programmer. The SDP EEPROM Programmer GUI opens, as shown in Figure 3.

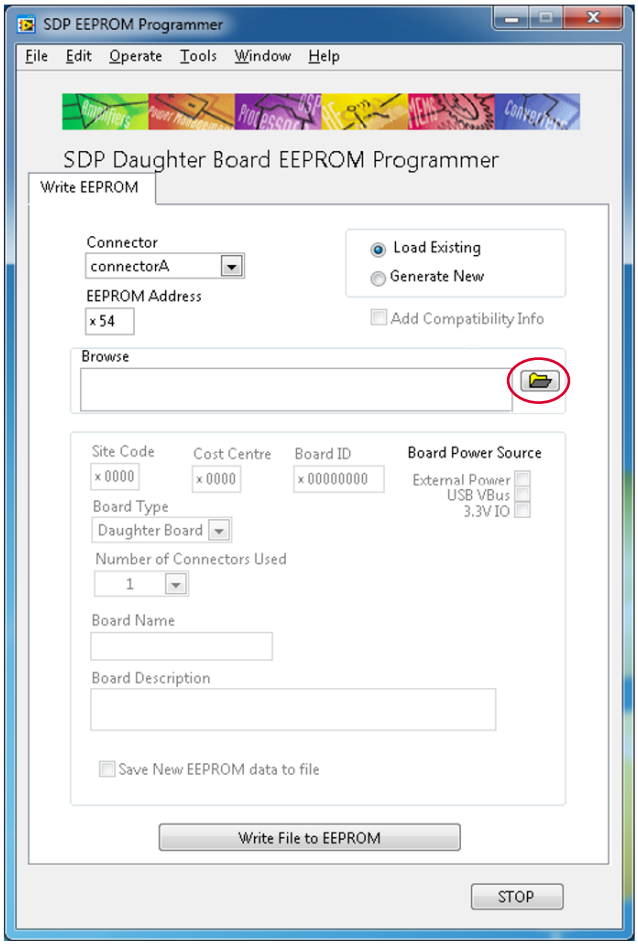

Figure 3. SDP EEPROM Programmer GUI

3. Enter 0x54 for the EEPROM address, click **Load Existing**, click the **Select Folder** button (circled in red in Figure 3), and then a selection window opens, as shown in Figure 4. You may need to navigate to the directory where the EEPROM configuration file is stored. Open the **ADA4961_eval_board.sdpeeprom** file, and then click **OK**.

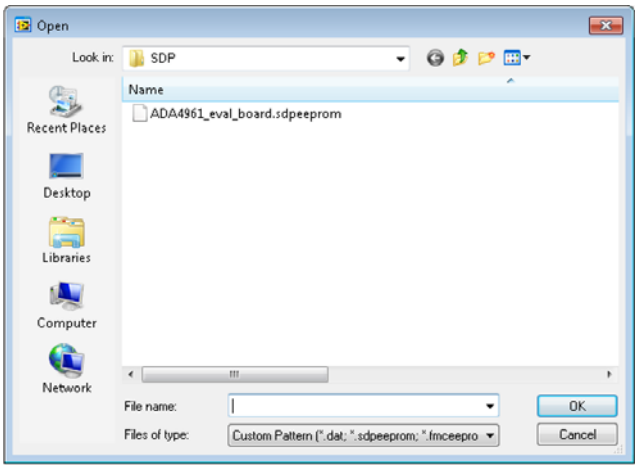

Figure 4. Selection Window for EEPROM Configuration File

4. After Step 3 is completed, the SDP EEPROM Programmer GUI window opens again, as shown in Figure 3. Click **Write File to EEPROM**, and a window opens indicating that the EEPROM has been programmed, as shown in Figure 5.

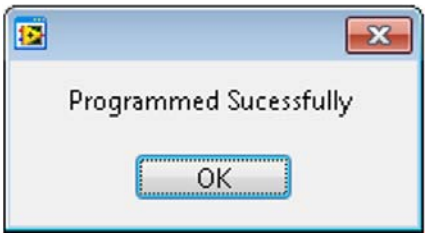

Figure 5. EEPROM Programmed

RUNNING THE SOFTWARE GUI

After the DUT EEPROM is initialized, the ADI ADA4961 Customer Software rev 0.0.0 is able to detect the evaluation board. To run the software, double click the **ADA4961** icon that is present on the desktop. The ADI ADA4961 Customer Software rev 0.0.0 GUI opens, as shown in Figure 6. When the ADI ADA4961 Customer Software rev 0.0.0 GUI is started, move the gain control slider to the bottom of its range (the slider all the way to the bottom on the ADI ADA4961 Customer Software rev 0.0.0 GUI).

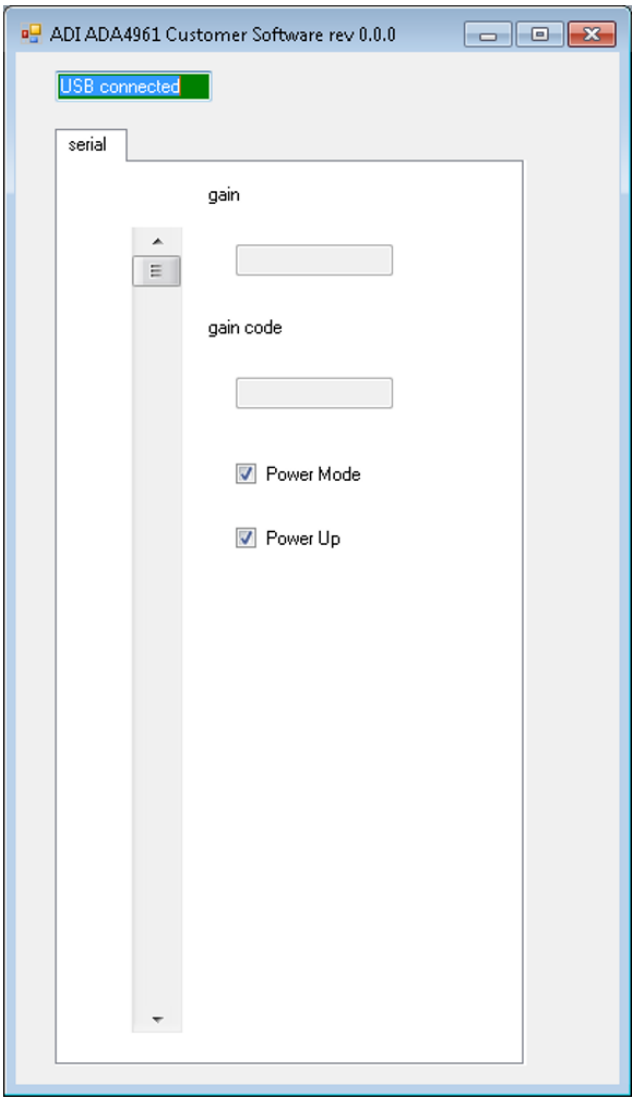

Figure 6. ADI ADA4961 Customer Software rev 0.0.0 GUI

APPLYING POWER AND MEASUREMENT INITIALIZATION

Turn on the +5 V power supply. The measured current is between 130 mA and 145 mA. Turn on the RF outputs on both CW signal generators. Markers were enabled in a previous step in the procedure, so the spectrum analyzer appears similar to Figure 7.

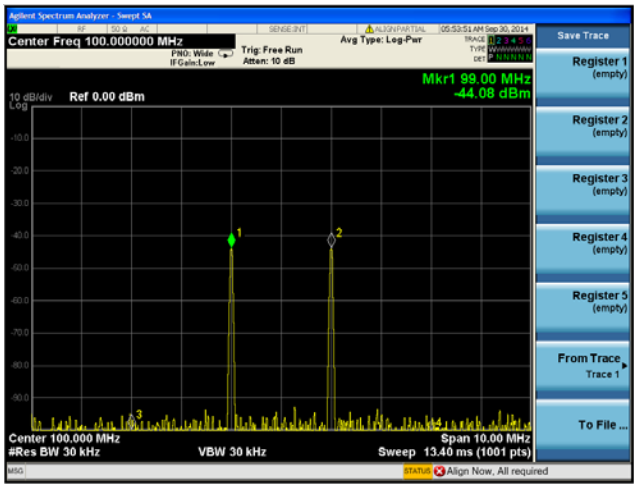

Figure 7. Initial View of Spectrum Analyzer

Adjust the level of each CW generator so that Marker 1 and Marker 2 are at −40 dBm, as shown in Figure 8. Note that this step only needs to be done on the first ADA4961 DUT tested. For remaining tests on this DUT, leave the CW output power levels as they are currently set. The power/tone during this measurement is between −39 dBm and −41 dBm.

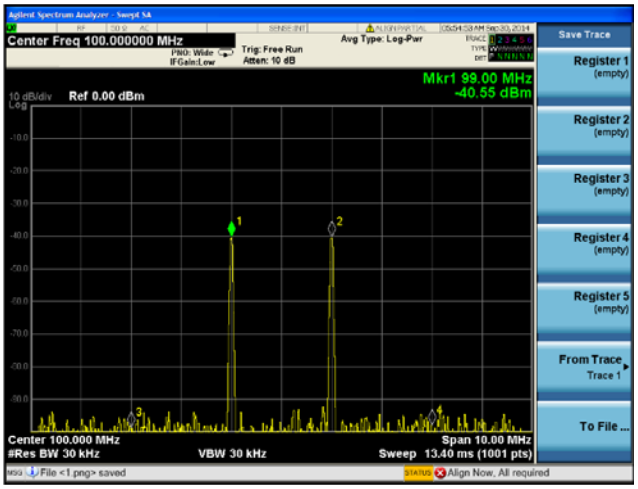

Figure 8. Spectrum Analyzer Screen, CW Generators Set for −40 dBm/Tone on ADA4961 Output

Move the gain control slider in the ADI ADA4961 Customer Software rev 0.0.0 GUI to the top of its range. The power/tone increases to between −20 dBm and −18 dBm, as shown in Figure 9. Note that during this step, the current increases to between 155 mA and 170 mA. The current stays at this level for the remainder of the test. This increase is a result of the software enabling the ADA4961 high performance mode.

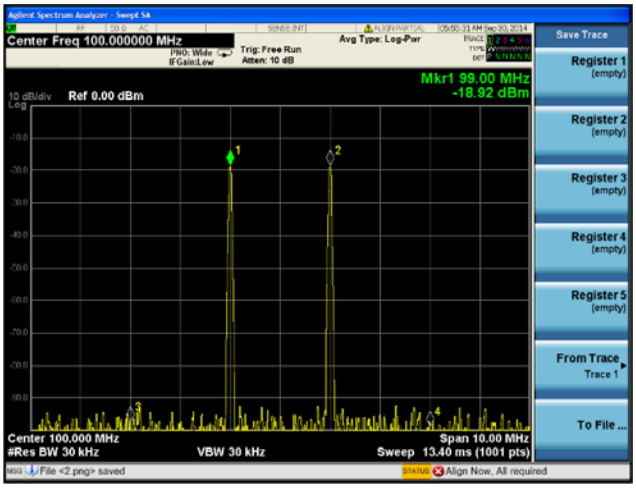

Figure 9. Spectrum Analyzer Display with ADA4961 Set to Maximum Gain

SPUR MEASUREMENT, COMPLETION OF TEST

Marker 3 and Marker 4 indicate the third-order harmonic performance of the ADA4961 amplifier and measurements system. On top end spectrum analyzers such as the Agilent PXA or Rohde and Schwarz, these markers may be in the noise floor. If lesser performing spectrum analyzers are used, spur height for Marker 3 and Marker 4 may be as high as −90 dBm. If this requirement is met, the DUT has passed test and this procedure is complete.

REVISION HISTORY

11/14—Rev. 0 to Rev. A

Change to Title.....1

10/14—Revision 0: Initial Version