



# AD9707/AD9706/AD9705/AD9704 EVB Quick Start Guide

One Technology Way • P.O. Box 9106 • Norwood, MA 02062-9106, U.S.A. • Tel: 781.329.4700 • Fax: 781.461.3113 • [www.analog.com](http://www.analog.com)

---

## Getting Started with the AD9707/AD9706/AD9705/AD9704 Evaluation Board and Software

### WHAT'S IN THE BOX

AD9707/AD9706/AD9705/AD9704-EBZ Evaluation Board  
Mini-USB Cable  
AD9707 Evaluation Board CD

### EXAMPLE EQUIPMENT LIST

DAC Clock Source: R&S SML 02  
Spectrum Analyzer: Agilent E4400  
PC: Windows PC with USB 2.0 ports  
DPG2: Data Pattern Generator series 2

### QUICK START PROCEDURE

#### INITIAL SETUP

1. Install AD970x software and support files on your PC.
2. Make the connections described in the Basic Hardware Setup below. The Evaluation Board will be powered up when the USB cable is plugged into connector XP2.
3. If operating the AD970x in PIN mode install JP11. If operating the AD970x in SPI mode (register read/write) press, and then release the AD9707 RESET button on the EVB. One of these two steps must be taken for the AD970x to be guaranteed to be in its default state.
4. Turn on the 175Mhz clock signal source.
5. Start the AD970x evaluation software control panel GUI and press the green GO button. The GUI display should look like Figure 6.

#### Getting the DAC to Output a 20Mhz sine wave

6. Start the DPG control software. The DPG software will display the DAC part number in the Evaluation Board window
7. In the port configuration tab select LVCMOS 3.3V (DCO). A green bar will appear in the configuration progress window. Once configuration is complete a clock frequency close to the clock generator frequency will appear in the Data Clock Frequency window.
8. Next select single tone generation from the Add Generated Waveforms pull down menu.
9. Set the sample rate to 175Mhz, Set the desired frequency to 20Mhz, Set DAC resolution to the DAC's number of bits (14 for AD9707 for example). Check the Unsigned Data box.
10. Select the tone in the Data Vector pull down menu.
11. Press the download arrow then the green arrow when it appears to start waveform generation.
12. You should see the spectrum shown in Figure 2.

## ***Basic Hardware Set-Up***

### **Equipment**

DPG2

Signal Source Clk

PC USB Cable

Spectrum Analyzer

### **Connections to AD9707/AD9706/AD9705/AD9704 Eval Board**

Install the EVB in the DPG2 system (Figure 5)

J10 (CLK IN), Set source to 175MHz, 3dBm output

XP2, USB port powers the EVB and provides the data interface from the PC to the PIC processor

S4 (IOUT\_A)

**EVALUATION SYSTEM**

**AD9707 EVALUATION BOARD**

The AD9707, AD9706, AD9705 and AD9704 are single, high performance CMOS TxDACs. Their evaluation board includes a PIC 18F4550 processor programmed to function as an interface between the PC USB and the SPI port of the device. And an AD9512 clock chip that takes in an up to 175Mhz signal from the clock source and provides the CLK+/CLK- input to the AD970x. The EVB is powered by the USB supply rail provided by the PC USB interface.

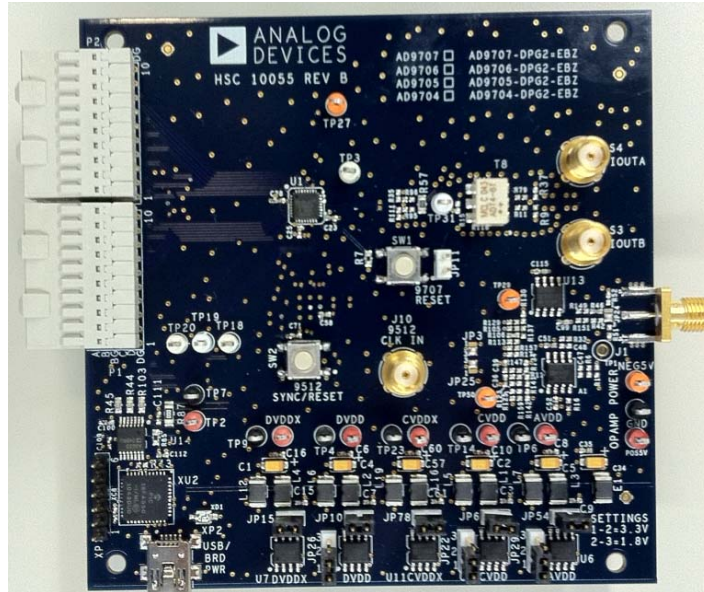


Figure 1: AD9707/AD9706/AD9705/AD9704 evaluation board

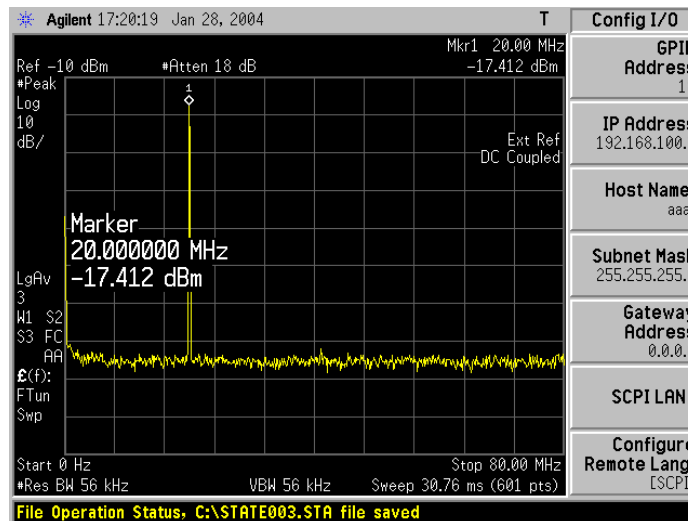


Figure 2: Spectrum analyzer Display of Output

### AD9707/AD9706/AD9705/AD9704 EVALUATION SOFTWARE GUI

The AD9707/AD9706/AD9705/AD9704 Evaluation Board companion software will display the control panel GUI shown in Figure 3. The content of on-chip registers is shown in the “AD970x readback array” section of the GUI. Figure 3 displays the state of the registers at power up before the SPI software is run. The GUI includes control panels for:

- Power Down that allows manual operation of
  - o Power Down and Sleep Features
  - o Clock Off Control
  - o External Reference Selection
- SPI Interface Setup
- DAC Data Interface and Clocking
- The built-in Self Calibration Feature
- The AD9512 Clock Chip included in the EVB

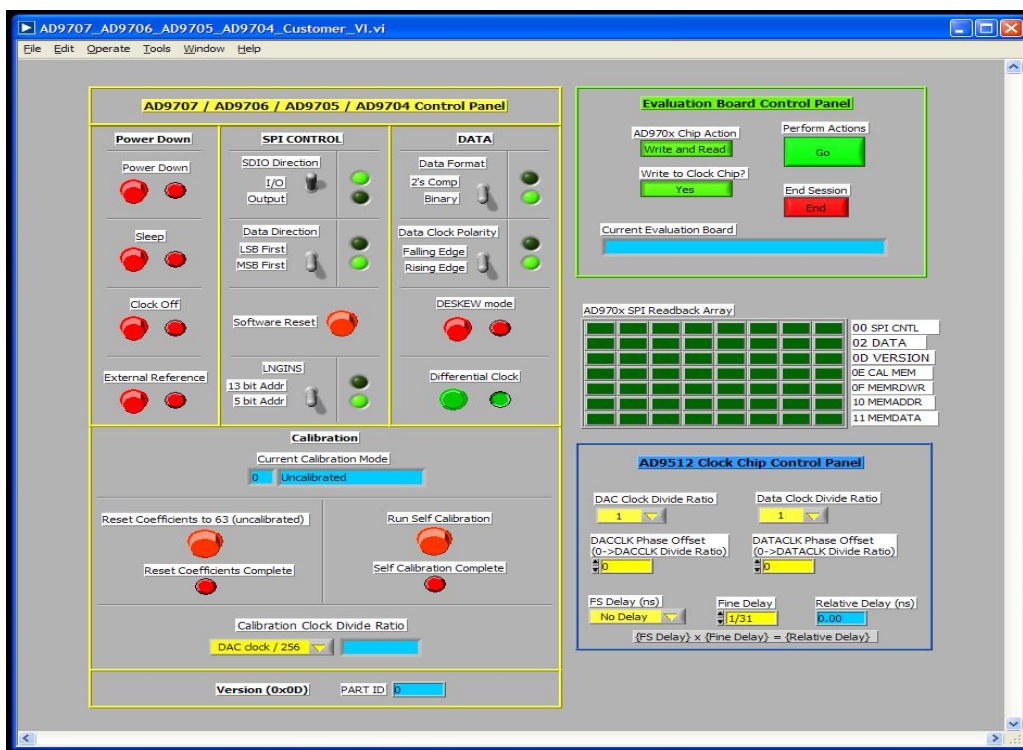


Figure 3: AD9707/AD9706/AD9705/AD9704 evaluation software Control Panel GUI

### Data Pattern Generator Hardware and Software

Figure 5 is block diagram and photograph of the bench setup for this product. The AD9707/AD9706/AD9705/AD9704 Evaluation Board plugs into the Data Pattern Generator (DPG) as shown in the photograph. The DPG provides real time data patterns to the product being evaluated at the DAC sampling frequency.

DPG software presents a GUI environment (Figure 4) that enables users to generate a wide selection of built in digital signals as well as user generated waveforms. DPG signals include:

- DC waveform, Noise waveforms: Gaussian, Uniform, White
- Sine Waves
- Cable waveforms: US/Europe Multi-channel 64 or 256 QAM
- Wireless waveforms: GSM: GMSK,EDGE/8PSK, WCDMA, LTE, WiMax

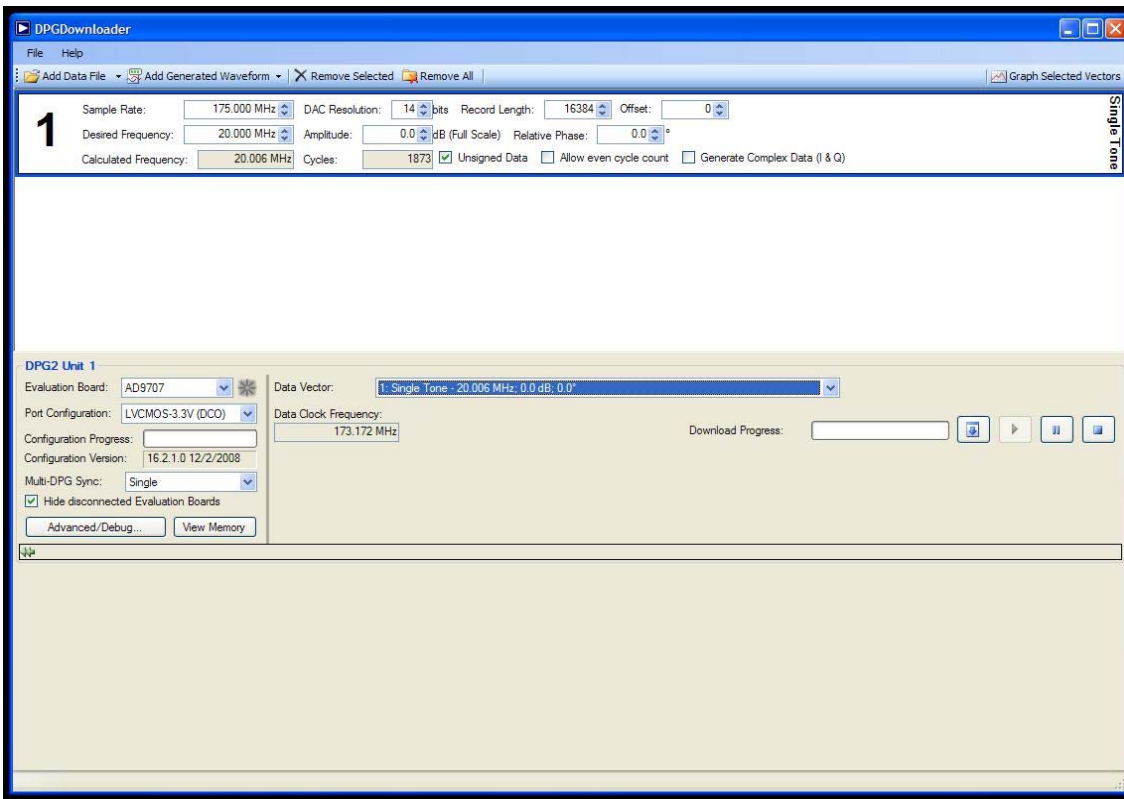


Figure 4: DPG GUI

## HARDWARE SETUP

- The 5V PC USB supply rail powers the evaluation board.
- The SPI register access interface connects to the evaluation board through the PC USB as well.
- A 175MHz sinusoidal clock with an amplitude of +3dBm is used.
- DAC current outputs are converted from differential to single ended using an RF transformer on the EVB. The output at S4 is capable of driving 50 ohms.

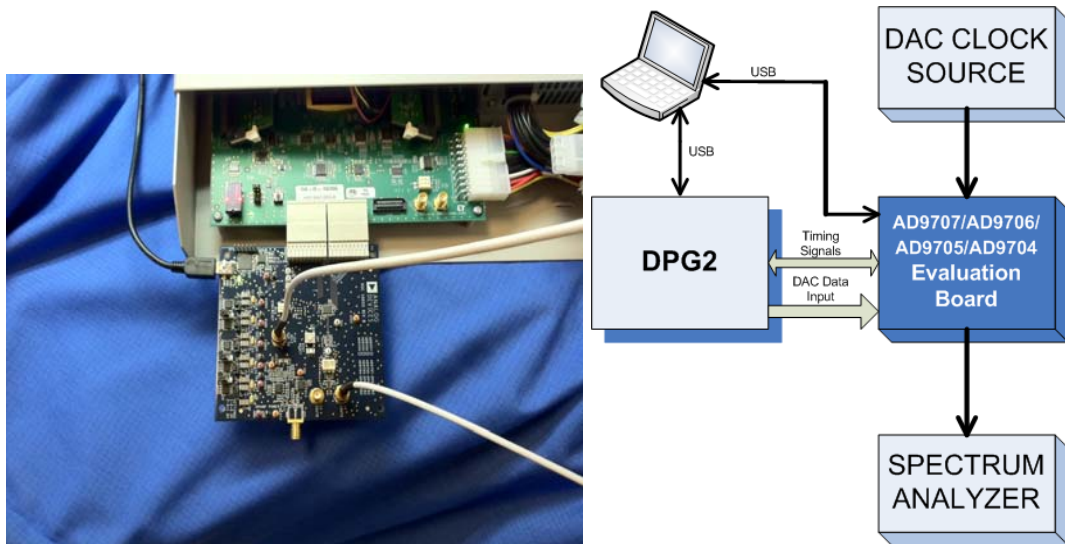


Figure 5: Bench set up

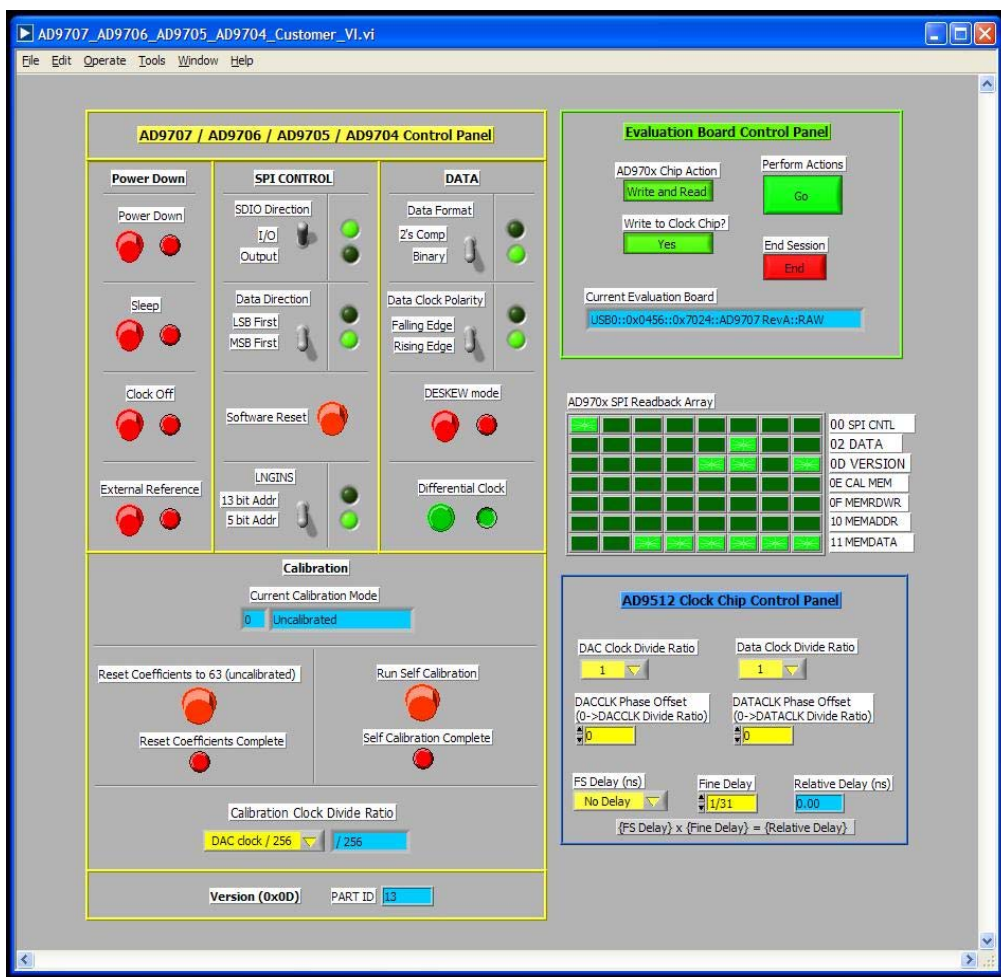


Figure 6: AD970x SPI evaluation software



