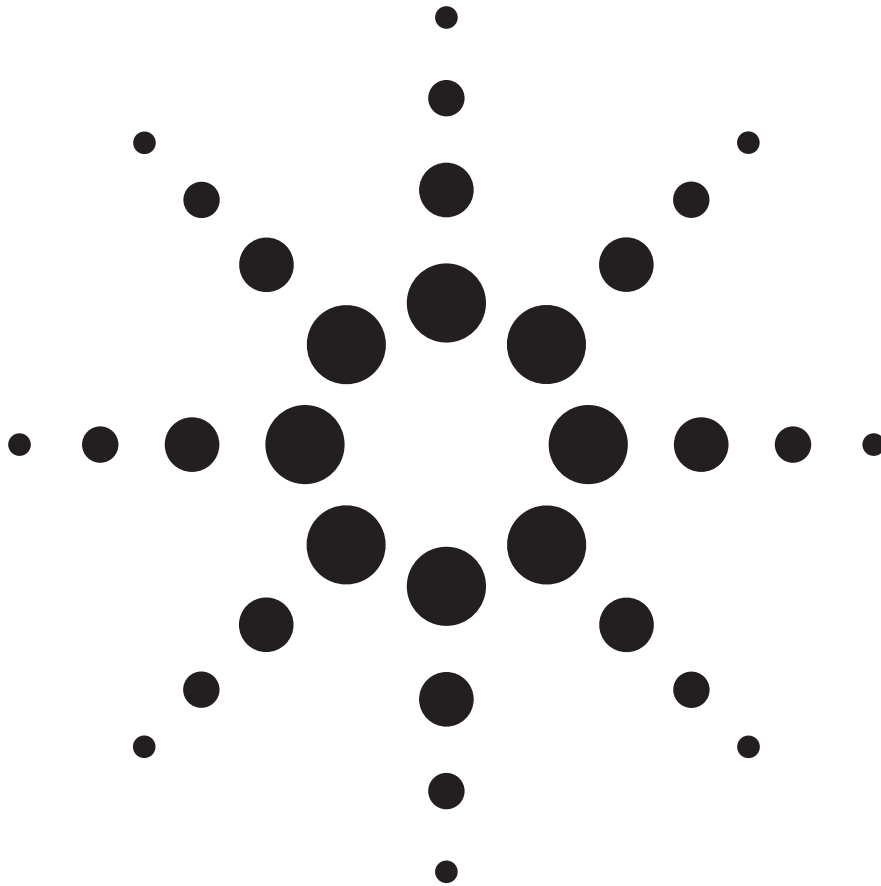


# Agilent Using Generate Scenario Mode in the N7509A Waveform Generation Toolbox

Application Note



Agilent Technologies

## Introduction

The N7509A includes a simple scenario generator that uses the N6030A sequence engine to sequence through several waveforms. This tool may be used to create several signals, and then cycle through them in a deterministic order. This gives the user the ability to output many signals seemingly at once. This note will guide the user through the setup of the scenario generator and show an example of the results.

This feature is available only in a fully licensed version. It is not active in demo mode.

This paper assumes that the user already has some familiarity with the basic N7509A controls. For this exercise, you will create three pulse signals, download them in order, and then play them back.

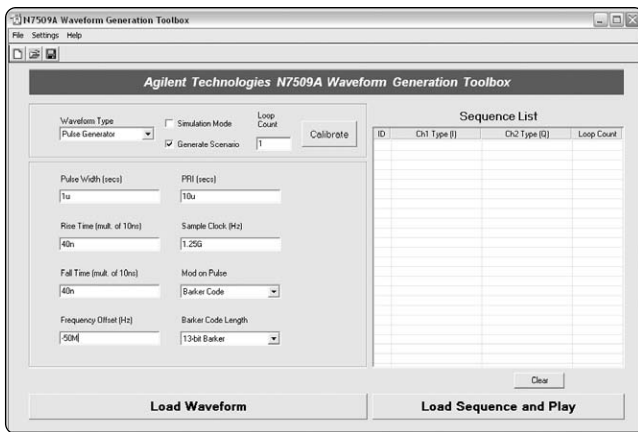


Figure 1. Generate scenario mode initial form

First, create a Barker pulse of 1  $\mu$ s pulse width and 10  $\mu$ s PRI. Use the Frequency Offset parameter to place the pulse to the left of the carrier frequency. For this example, -50 MHz is chosen for the first signal. The Loop Count parameter indicates how many pulses of this type to play before going to the next pulse type. Use a loop count of 1 to get maximum switching speed from the N6030A. After the parameters are chosen, select **Load Waveform** from the form. This populates the Sequence List but does not play any signal yet. Choose another signal type, for instance, a chirp of 100 MHz/ $\mu$ s. Select **Load Waveform** again to place the waveform inside the N6030A memory. The form should now look like Figure 2.

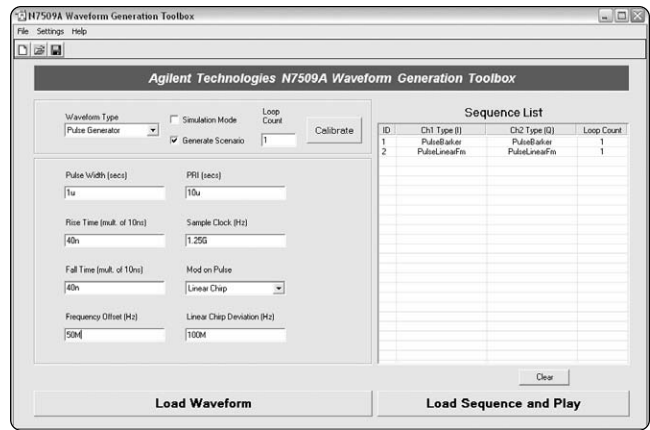


Figure 2. Generate scenario mode showing two signals

When using a chirp, be sure the frequency is offset enough so that the signals don't overlap. Otherwise, you won't be able to see them displayed later. In this instance, +50 MHz is used. For our final signal, a simple 1  $\mu$ s pulse at +200 MHz offset is generated. When all signals are defined and loaded, select **Load Sequence and Play** to perform the final steps.

To view the signals, tune the PSG to a convenient frequency and look at the results with a PSA. It should look like Figure 3.

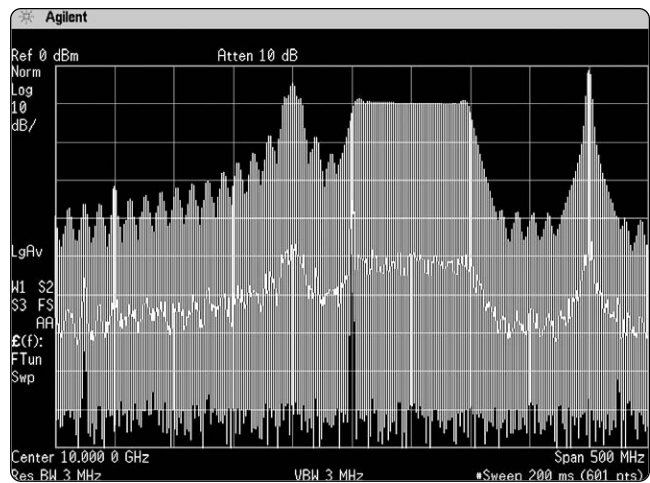


Figure 3. The scenario as viewed on an E4440A

In this version of the N7509A software, the scenario is not saved, nor can the Sequence List be edited after signals are loaded. If Generate Scenario mode is exited and re-entered, all previous information is lost. Of necessity, the N6030A begins Generate Scenario mode in a Preset state. Waveform memory and sequence memory are cleared.

## Recalling a Previously Generated Scenario

While there is no facility to directly save scenarios, there is a way to preserve the waveforms created so that they may be recalled into the scenario at a later time. It uses the **Save I/Q Binary Data** feature of the N7509A.

Upon entering Generate Scenario mode, select the Save I/Q Binary Data from the Settings menu. Each time a waveform is loaded, new I and Q binary files are written to the current location. *If more than one of the same type of waveform is loaded, be sure to rename the files between waveforms or the software will overwrite the previous data files.* In the previous example, we created a Barker coded pulse, a chirp, and a simple pulse. Figure 4 shows the I and Q binary data files containing these waveforms after they were renamed to preserve the data.

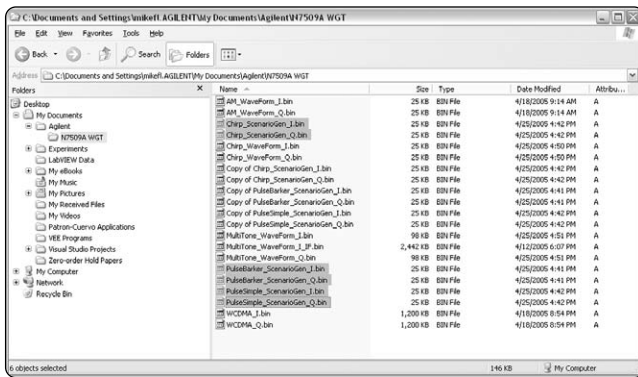


Figure 4. Explorer view showing location of I/Q binary data

In the next step, we will recall these files using the Custom Download form in Generate Scenario mode. Figure 5 illustrates the use of this form.

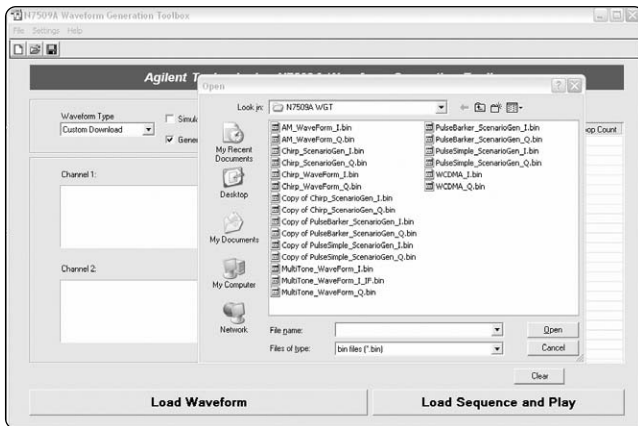


Figure 5. Custom download form showing Open dialogue

To recall the files, place the cursor in the Channel 1 and Channel 2 windows and left-click to launch the Open file dialogue. Be sure to load matching I and Q binary files for each waveform type. Select **Load Waveform** after each file recall. This will populate the Sequence List. The Loop Count is not preserved. Choose the appropriate Loop Count after recalling each waveform before selecting **Load Waveform**. After the waveforms have been loaded, select **Load Sequence and Play**. The scenario plays as before. Figure 6 shows the populated Scenario List.

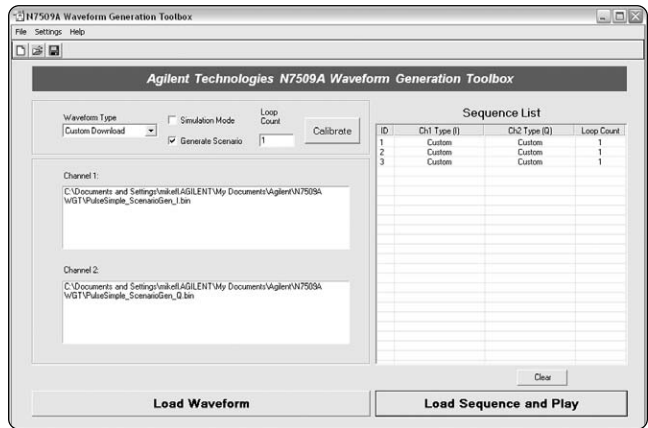


Figure 6. Custom download form showing a loaded scenario ready for play

## Web Resources

For more information, go to:  
[www.agilent.com/find/awg](http://www.agilent.com/find/awg)

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