Agilent N6705A DC Power Analyzer

Simulating Power Interruptions for DC Input Devices

Application Note

Agilent Technologies

Introduction

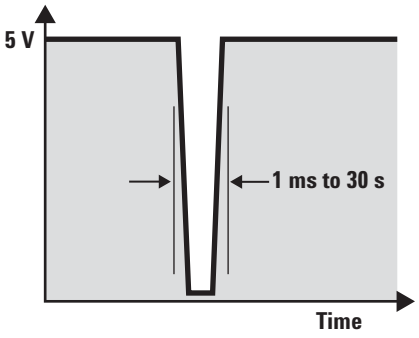
This application brief describes how the Agilent N6705A DC Power Analyzer can simulate power interruptions for DC input devices.

Description

Simulating power interrupts for DC input devices is important to verify the design of the device under test (DUT). Interruptions originate from disturbances on the power line such as sudden power dropouts or voltage sags. DC devices have specifications that describe how wide of an interrupt the device can tolerate. The purpose of the power interrupt test is to find the point at which the device fails by controlling the length of the interrupt pulse.

For example, a disk drive test requires two DC inputs: a 12 V simple bias for basic power and a 5 V test signal. A drop out pulse of varying width is asserted on the test signal to test how wide a pulse the DUT can handle. The result of the test is a range of pulse widths. Figure 1 shows an example of such a test pulse. The pulse lasts between 1 ms and 30 s.

Figure 1. An example of a power interrupt pulse.



Problem

This example requires two DC power inputs to the disk drive: one power source to provide a simple 12 V bias for basic power and another power source fast enough to create a 1 ms drop out pulse on a 5 V power line. Here are the two most common approaches to create these signals for this test:

- Some engineers use a function generator. A function generator is capable of producing fast pulses. However, function generators are low-power instruments, and therefore it is difficult or impossible to find a function generator capable of sourcing enough power for this kind of test. Also, most function generators do not have built-in voltage or current measurements for quick readback to verify everything is operating as expected.

- Another solution is to use a fast, wide-bandwidth power supply such as a bipolar power supply to source the pulsed 5 V power. Additionally, a DAC is required to create the fast pulse amplified by the power supply. While this solution is capable of generating the required pulse, introducing additional instruments increases noise, system complexity, and cost. Also, the high peak currents from inrush current could cause oscillations on the output of the bipolar power supply because of its high bandwidth. In order to reduce this output noise from the power supply, this method may require a capacitor at the DUT. This solution is bulky, noisy, costly, and complex.

Solution: The Agilent N6705A DC Power Analyzer

The Agilent N6705A DC Power Analyzer is a fast power source with additional layers of functionality to fit the needs of this test. The N6705A has the power of up to four DC power supplies, a function generator, an oscilloscope, a voltmeter, an ammeter and a datalogger in a benchtop package. Designed with the R&D and design validation engineer in mind, all of the capability of the DC Power Analyzer is accessible from the front panel without having to write a single line of code!

Multiple power inputs

The N6705A has over twenty DC power modules available in three different performance categories: Basic (50, 100, 300 W), High-Performance (50, 100, 300 W), and Precision modules (50, 100 W). Mix and match up to four of these power modules for a multiple DC output instrument.

In the previously described example, a Basic DC power module from the N6730, N6740 or N6770 families can provide the 12 V bias. A High-Performance DC power module such as the N6751A or N6752A has the speed necessary to create a 1 ms drop out pulse for the 5 V line. These power modules have down-programming times of 300 µs or less at 5 V.

Simulating power interrupts

The N6705A allows users to program pulse waveforms and other arbitrary waveforms without having to write a single line of code. From the example described earlier, users can configure the drop out pulse on the 5 V line directly from the front panel. Figure 2a shows the configuration screen for creating pulse waveforms. In addition to pulses, users can also create sine, step, ramp, trapezoidal, staircase, exponential, user defined voltage, and user defined current waveforms.

Figure 2b shows the voltage waveforms of the two DC outputs in an oscilloscope-like display. Notice the trace selection near the top of the screen, trigger markings, and unit/division definitions. Users can configure the displayed traces and trigger levels directly in scope view or through the scope properties page. There are knobs located on the front panel of the N6705A that control volts/division or amps/division, markers, offsets and trigger levels, similar to what one would find on a basic oscilloscope.

Measurement capability

Beyond sourcing arbitrary waveforms, the N6705A is also capable of providing useful measurements. Users can characterize the device under test by measuring the voltage and current sourced into the DUT. The N6705A measures and displays current waveforms without the need for a current transducer such as a current shunt or probe. The N6705A also has a built-in datalogger which enables you to capture voltage and current waveforms for seconds, minutes, hours, or even days.

Summary

The Agilent N6705A DC Power Analyzer can simulate DC power interruptions such as 1 ms drop out pulses. The N6705A is a flexible, intuitive instrument that combines the functionality of up to 4 power supplies, a function generator, an oscilloscope, a voltmeter, an ammeter, and a datalogger. These capabilities are packed in a benchtop footprint making this the ideal instrument for any R&D or design validation engineer simulating multiple biases or complex power waveforms.

Related applications

- Vehicle charging system simulation
- Slow increasing/decreasing voltage ramp tests
- Powering noise rejection ratio tests

Related products

- N6700 Low-Profile Modular Power System

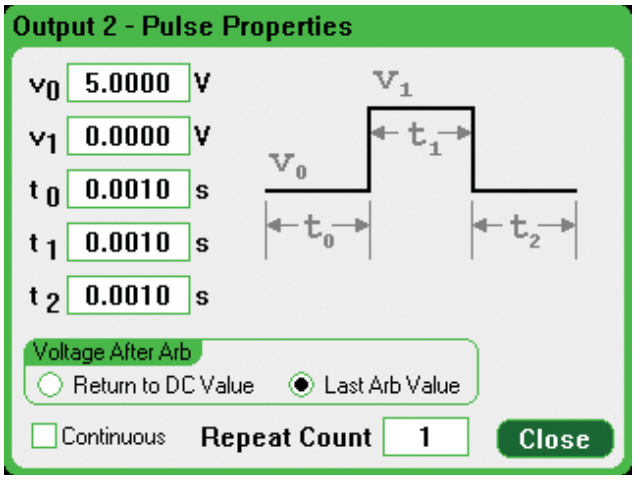


Figure 2a. N6705A pulse waveform configuration screen.

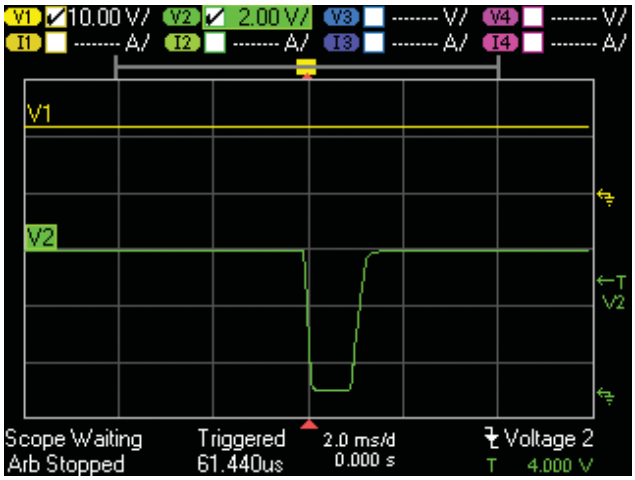


Figure 2b. Voltage waveforms on channels 1 and 2 in N6705A Scope View.

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