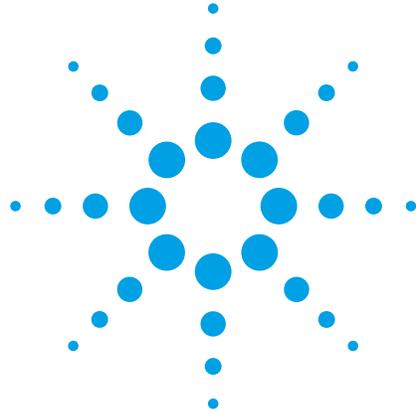


Accelerate Vehicle Charging System Simulation with the Agilent N6705A DC Power Analyzer



Application Note



Introduction

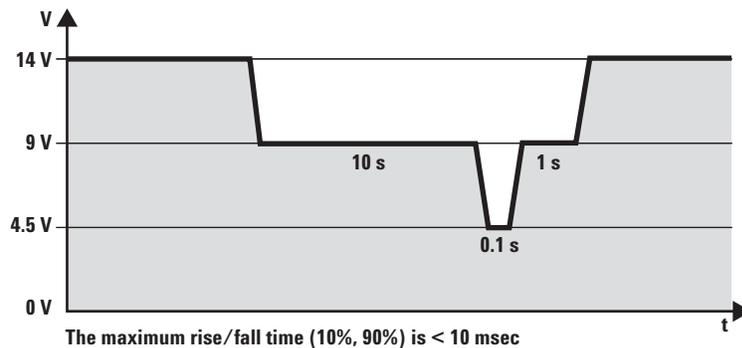
This application brief describes how the Agilent N6705A DC Power Analyzer can simulate vehicle charging system power waveforms for R&D electrical component testing.

Description

When R&D engineers test electrical components for use in a vehicle, it is necessary to simulate various power conditions. This ensures that the electrical components in the vehicle continue to work properly during different power conditions from the charging system. For example,

abrupt loading of the vehicle power system such as during starter crank causes voltage dips powering the electrical components. Figure 1 describes an example of such a voltage dip waveform. Electrical components found in vehicle telematics (vehicle tracking, satellite navigation, mobile communications, television, etc.) and mechatronics (anti-lock braking systems, spin-assist, airbag deployment, etc.) are thoroughly tested through a variety of charging scenarios similar to the voltage dip that replicate cranking profiles, power disturbances or decay reflected on the vehicle's power system.

Figure 1. An example of a voltage dip waveform



Agilent Technologies

Problem

Simulating these power waveforms demands a system capable of producing several different voltage waveforms. Some automotive R&D engineers create custom test stations containing specialized equipment made for recreating these power waveforms. This solution is expensive, inflexible and requires a lot of time. Often times, these systems are ordered from outside vendors and contain an internal power supply with fast protection, a high-speed function generator and an industrial computer interface. Also, it does not easily allow for much flexibility for changing test settings because this system is custom-made for specific tests. Finally, testing the electrical components would require a trip to a local test station because the number of these customized systems is low.

Solution: The Agilent N6705A DC Power Analyzer

The Agilent N6705A DC Power Analyzer has the arbitrary waveform capability, slew rate control and configurability to recreate low-frequency power waveforms to

power the electrical components in a vehicle. It packs the power of up to four power supplies, a function generator, an oscilloscope, a voltmeter, an ammeter and a datalogger in a 7 inch high, bench top package.

The DC Power Analyzer provides an easy way for an R&D or design validation engineer to recreate some of the automotive power waveforms such as slow decreasing/increasing of operating voltage, quick charges, cranking profiles and voltage dips all from the front panel. While the design has been optimized for use on the bench, the N6705A DC Power Analyzer is also an LXI Class C instrument with LAN, GPIB and USB interfaces.

The N6705A is a modular power system that houses up to four power supply outputs. Each output can either work independently of the others or be synchronized with other outputs. There are over twenty different power modules ranging in performance (basic, high-performance and precision) and power (50 W, 100 W and 300 W). Mix and match up to four power modules in the N6705A to test multiple DUTs.

Simulating transients using the front panel

There are arbitrary waveform controls built into the N6705A that allow users to create nine different waveforms: sine, step, pulse, ramp, trapezoid, staircase, exponential, user defined voltage and user defined current waveforms. These waveforms are all configurable from the front panel without having to write a single line of code!

Replicate the signal in Figure 1 by creating a four step user-defined voltage waveform. The voltage waveform begins at 14 V, drops to 9 V for 10 s, dips down to 4.5 V for a brief 100 ms, rises to 9 V for 1 s and returns to 14 V after the dip. Figure 2a shows the user defined voltage waveform setup screen on the N6705A reflecting the steps previously described. Figure 2b shows the waveform in scope view. Notice how the N6705A is capable of measuring and displaying voltage and current data at the device under test (DUT) in an oscilloscope-like display.

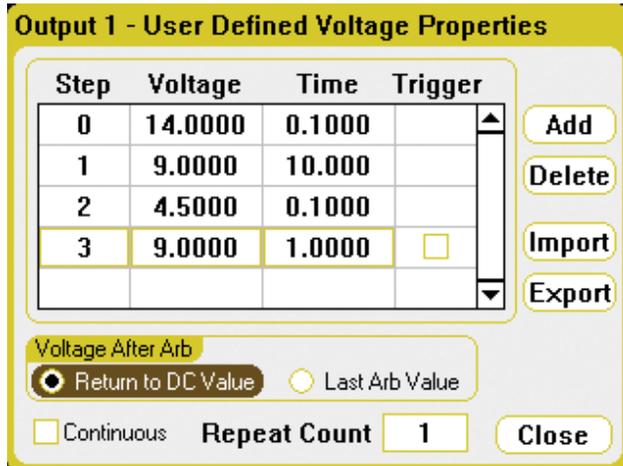


Figure 2a. N6705A screenshot of the user defined arbitrary voltage waveform setup screen

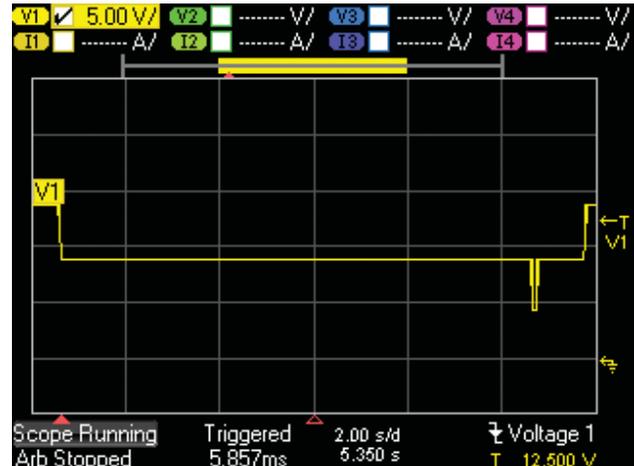


Figure 2b. N6705A screenshot of the very brief voltage dip waveform in scope view

The N6705A also allows users to save user-defined waveform setups and scope data to the 64 MB of internal memory or to an external USB memory device.

Configurable slew rate

The power waveform in the Figure 1 example has a maximum rise/fall time of less than 10 ms. This example requires a slew rate of 450 V/s. All power modules available for the N6705A have programmable slew rates. Slew rates can be as low as 4.76 V/s and are configurable from the Output Source Settings screen on the front panel. Note that the maximum slew rate is limited by the output rise time specification of the module.

Summary

The Agilent Technologies N6705A DC Power Analyzer has the capability to simulate basic automotive power waveforms for vehicle electrical systems with its arbitrary waveform control, slew rate control and flexibility. The N6705A is an intuitive system designed for the R&D or design validation engineer to incorporate multiple instruments in a bench top package.

Related applications

- Voltage drop out detection
- Sleep current margin test
- Stress and abuse test

Related products

- N6700 Low-Profile Modular Power System



Agilent Email Updates

www.agilent.com/find/emailupdates

Get the latest information on the products and applications you select.



Agilent Direct

www.agilent.com/find/agilentdirect

Quickly choose and use your test equipment solutions with confidence.



www.agilent.com/find/open

Agilent Open simplifies the process of connecting and programming test systems to help engineers design, validate and manufacture electronic products. Agilent offers open connectivity for a broad range of system-ready instruments, open industry software, PC-standard I/O and global support, which are combined to more easily integrate test system development.



www.lxistandard.org

LXI is the LAN-based successor to GPIB, providing faster, more efficient connectivity. Agilent is a founding member of the LXI consortium.

Remove all doubt

Our repair and calibration services will get your equipment back to you, performing like new, when promised. You will get full value out of your Agilent equipment throughout its lifetime. Your equipment will be serviced by Agilent-trained technicians using the latest factory calibration procedures, automated repair diagnostics and genuine parts. You will always have the utmost confidence in your measurements.

Agilent offers a wide range of additional expert test and measurement services for your equipment, including initial start-up assistance onsite education and training, as well as design, system integration, and project management.

For more information on repair and calibration services, go to

www.agilent.com/find/removealldoubt

www.agilent.com

For more information on Agilent Technologies' products, applications or services, please contact your local Agilent office. The complete list is available at: www.agilent.com/find/contactus

Phone or Fax

Americas

Canada	877 894 4414
Latin America	305 269 7500
United States	800 829 4444

Asia Pacific

Australia	1 800 629 485
China	800 810 0189
Hong Kong	800 938 693
India	1 800 112 929
Japan	81 426 56 7832
Korea	080 769 0800
Malaysia	1 800 888 848
Singapore	1 800 375 8100
Taiwan	0800 047 866
Thailand	1 800 226 008

Europe

Austria	0820 87 44 11
Belgium	32 (0) 2 404 93 40
Denmark	45 70 13 15 15
Finland	358 (0) 10 855 2100
France	0825 010 700
Germany	01805 24 6333*
	*0.14€/minute
Ireland	1890 924 204
Italy	39 02 92 60 8484
Netherlands	31 (0) 20 547 2111
Spain	34 (91) 631 3300
Sweden	0200-88 22 55
Switzerland (French)	44 (21) 8113811 (Opt 2)
Switzerland (German)	0800 80 53 53 (Opt 1)
United Kingdom	44 (0) 7004 666666

Other European Countries:

www.agilent.com/find/contactus

Revised: March 23, 2007

Product specifications and descriptions in this document subject to change without notice.

© Agilent Technologies, Inc. 2007

Printed in USA, April 30, 2007

5989-6453EN



Agilent Technologies