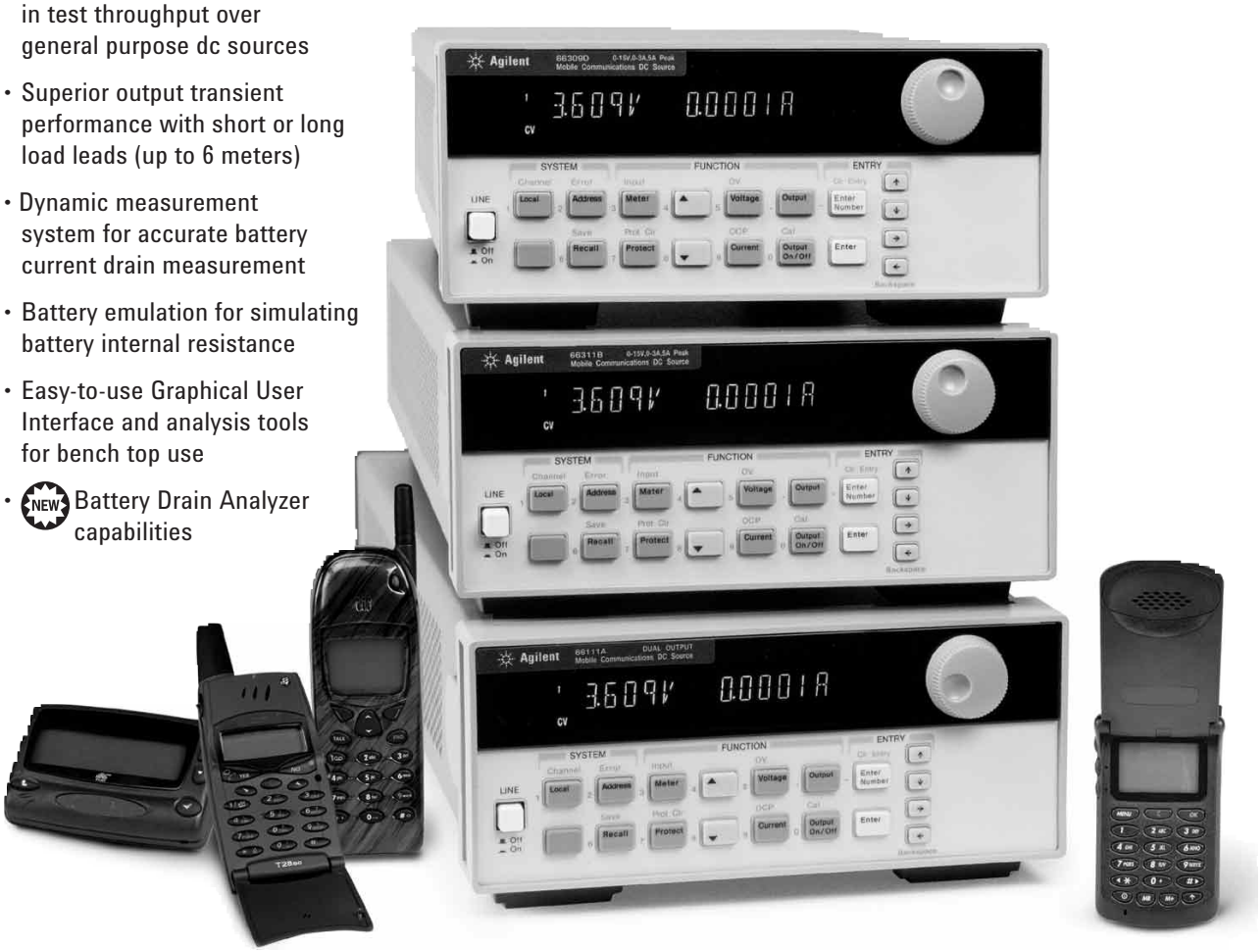
Agilent
Mobile Communications dc Sources

Models: 66309B, 66309D, 66311B, 66311D,
66319B, 66319D, 66321B, 66321D, 66332A

Product Overview

- Ideal for testing wireless and battery powered devices in R&D, Manufacturing, and Repair
- 20 to 30 times improvement in test throughput over general purpose dc sources
- Superior output transient performance with short or long load leads (up to 6 meters)
- Dynamic measurement system for accurate battery current drain measurement
- Battery emulation for simulating battery internal resistance
- Easy-to-use Graphical User Interface and analysis tools for bench top use
- NEW Battery Drain Analyzer capabilities



Agilent Technologies

Family of programmable electronic batteries

Agilent Technologies offers the Mobile Communications dc Sources, a family of specialized dc power sources for design and test of digital wireless appliances. All models offer dc sourcing, current sinking, fast transient response, and measurement capabilities. These specialized power supplies are designed for the unique challenges of simulating batteries and battery packs and measuring the current being drawn by the device under test.

Overcome Battery Powered Device Testing Challenges

Digital communications devices and digital battery powered devices present a unique testing challenge: they draw rapid pulses of current. By offering superior transient performance, unmatched in the marketplace, the Agilent Mobile Communications dc Sources dramatically reduce the transient voltage drop caused by the pulse loading of digital communications devices. The Agilent Mobile Communications dc Sources enable you to maximize test throughput by minimizing test interruption due to false trigger of device low voltage shutdown due to transient voltage drops.

Dynamic Measurement Capabilities

The Agilent Mobile Communications dc Sources offer a built-in advanced measurement system to accurately measure battery current when the device operates in different modes (such as talk mode, active mode, standby mode, and off/sleep mode). Measurements made during these modes are critical for ensuring that your devices are operating properly and that you are getting the most out of the battery.

Simulate both Main Battery and Charger

Single output models are recommended when you need to provide power as a replacement to your device's main battery during testing. Dual output models are recommended when you need to provide power as a replacement to your device's main battery and when you need to simulate the battery charger power; Use one output to connect in place of the main battery (which sinks current to simulate the main battery being charged) and use the second output to supply current to the battery charger input port.

Performs Like a Battery

With their battery emulation features, the Agilent 66319B/D and 66321B/D allow you to test your devices under the same power conditions that exist in actual use. Emulating the battery is key when characterizing battery operating life and detecting product failures. These dc sources simulate the effects of internal resistance of the battery, enabling them to emulate the operation of various battery types or batteries in different charge states.

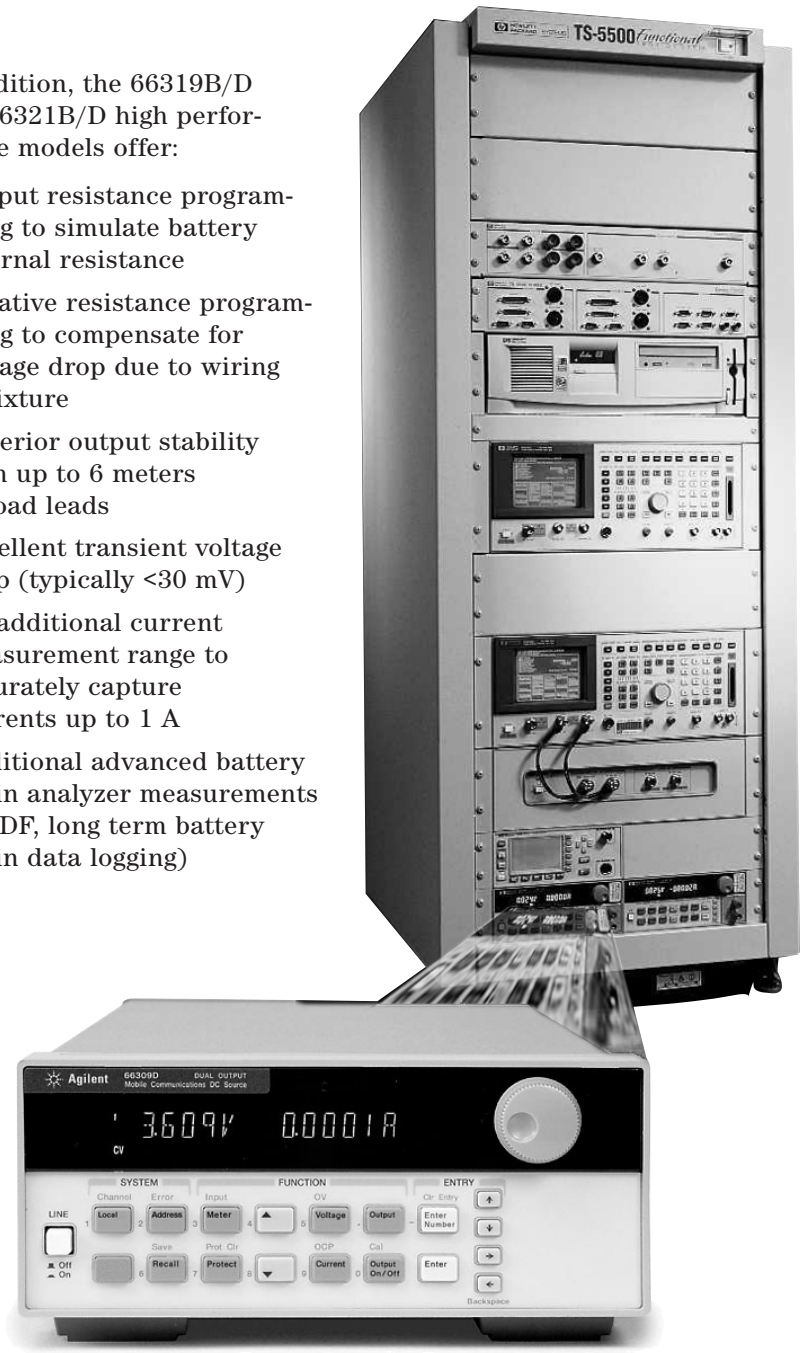
Feature Summary

Agilent has designed in the capability and flexibility that is required for accurately testing today's communications devices as well as your next generation designs. All models offer:

- Fast output response technology
- Programmable output response compensation to accommodate all types of wiring configurations
- Advanced DSP-based dynamic measurements
- Two current measurement ranges for microampere-level standby/leakage currents and multiple ampere-level transmit currents
- Current sinking for testing and calibrating charger circuitry
- Extensive protection features (including broken sense lead detection)
- GPIB Interface, SCPI (Standard Commands for Programmable Instruments), VXI*plug&play* drivers

In addition, the 66319B/D and 66321B/D high performance models offer:

- Output resistance programming to simulate battery internal resistance
- Negative resistance programming to compensate for voltage drop due to wiring in fixture
- Superior output stability with up to 6 meters of load leads
- Excellent transient voltage drop (typically <30 mV)
- An additional current measurement range to accurately capture currents up to 1 A
- Additional advanced battery drain analyzer measurements (CCDF, long term battery drain data logging)



Choosing the right model to fit your needs

For most wireless and battery powered devices
Examples: Cell phone handsets, PDAs, Wireless LAN access devices, *Bluetooth*™ enabled devices

The new and improved 66319B/D and 66321B/D high performance models are recommended for new automated test system platforms and for R&D applications. The 66309B/D and the 66311B/D are available for those customers who need to replicate existing test platforms and who do not want to re-engineer existing automated test system designs.

Figure 1.

For higher power applications of >50 Watts
Examples: Larger portable devices, laptop computers

The 66332A is a 100 W Mobile Communications dc Source that can support higher voltage (up to 20 V) devices and higher continuous currents of 5 A.

Please use the detailed specifications table on page 14 to compare how these products will perform in your application

Figure 2.

Solutions for NEM manufacturing and contract manufacturers

Agilent Technologies understands production issues and concerns such as test system throughput, test system flexibility, and test cost reduction. Fast integration time, reducing rack space, and availability of software drivers all insure fast ramp up of production test and effective use of capital resources.

For high volume manufacturing systems requiring high system throughput and ease of integration, using the Agilent Mobile Communications dc Source gives you:

- 20 to 30 times improvement in measurement speed over general purpose power supplies
- Typically less than 30 millivolt transient voltage drop, which represents a significant improvement when compared to general purpose power supplies
- Reduction or elimination of fixture capacitors
- Exceptional output stability with load leads up to 6 meters
- Simplicity in wiring with no special wiring necessary (such as coaxial wires)
- Broken sense lead detection and optional solid state relays
- Fast and accurate measurement functions for standby/leakage currents and active/talk-mode peak currents found during transmit pulses

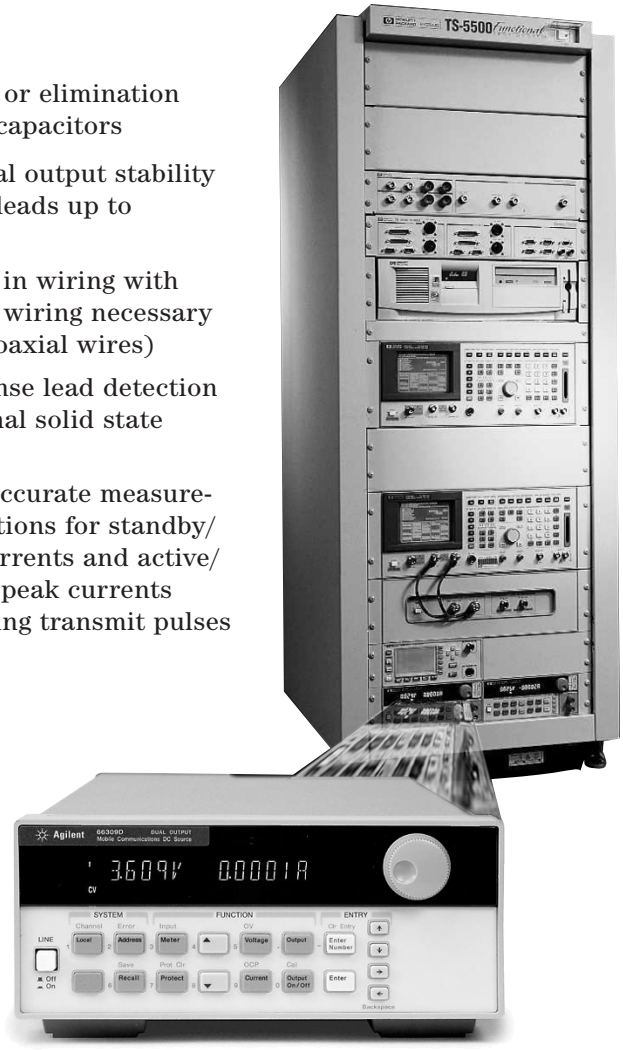


Figure 3. Agilent Technologies offers a full range of solutions from individual system-friendly instruments to fully-integrated test systems for your manufacturing test needs. In addition, Agilent can help you to minimize downtime with Agilent's proven reputation for excellent product reliability and world-wide support.

Simplify test and analysis in R&D or on the Repair bench

With the Agilent 14565A Device Characterization Software, testing, analyzing, and troubleshooting wireless and battery powered devices is made simple. The 14565A provides a graphical user interface that lets you easily control the Agilent Mobile Communications dc Sources. By using the advanced capabilities built into the Agilent Mobile Communications dc Source, you can spend more time testing and analyzing and less time configuring and reconfiguring multiple pieces of test equipment, such as a current shunt, oscilloscope, current probe, DMM, and datalogger.

When coupled with the 66319B/D or the 66321B/D, the 14565A Device Characterization Software also provides Battery Drain Analysis capabilities. More than just measuring battery run time, Battery Drain Analysis allows you to characterize current out of the battery and make tradeoffs in design that impact the current drain and battery life.

For R&D and Repair, using the Agilent Mobile Communications dc Source and 14565A Device Characterization Software give you:

- Fast and easy test setup
- Compact design with multiple instrument functionality

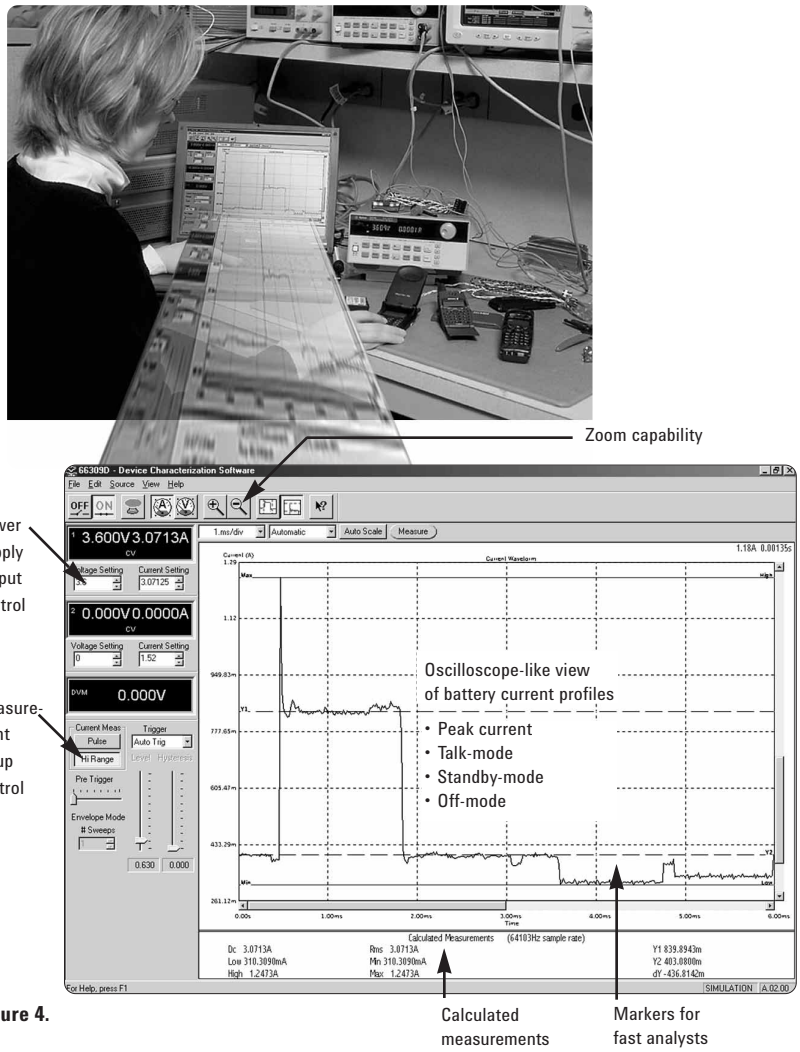


Figure 4.

- Dual dc outputs for replacing the main battery and the power adapter/ charger power source
- Electronic load capability for testing the battery charger circuitry
- Graphical user software with no programming required
- Digitize current waveforms
- Accurately log battery current drain measurements from 10 seconds to 1000 hours at 64,000 measurements per second
- Test designs simulating different battery states (charged, aged, elevated temperatures, etc.) and chemistries (Ni-Cad to Lithium Polymer)
- Zoom capability for analyzing waveform anomalies
- Adjust markers for fast measurements on digitized waveforms
- Easily document your test results
- Record test data to files for archive or analysis by other software packages

Agilent Mobile Communications dc Sources have the features and capabilities to meet your test requirements

Flexibility means protection of your investment for the future

The Agilent Mobile Communications dc Sources provide the sourcing you need to test today's wide variety of digital communications devices and the comfort margin to prepare for tomorrow's technologies. Each dc source provides high peak current capability in a compact box. Agilent has designed in the capability and flexibility to test today's devices and your next generation designs for PDAs, cell phones (formats include: 3G, cdma2000, WCDMA, CDMA, TDMA, GSM, PCS, DECT, TETRA, PHS, NADC), *Bluetooth*™ enabled devices, and Wireless LAN access devices.

Save valuable rack space

The Agilent Mobile Communications dc Source provides multiple-instrument functionality in a compact, half-rack integrated solution. By combining specialized power supply with dynamic measurement system, it simplifies test setup and reduces overall system size/complexity.

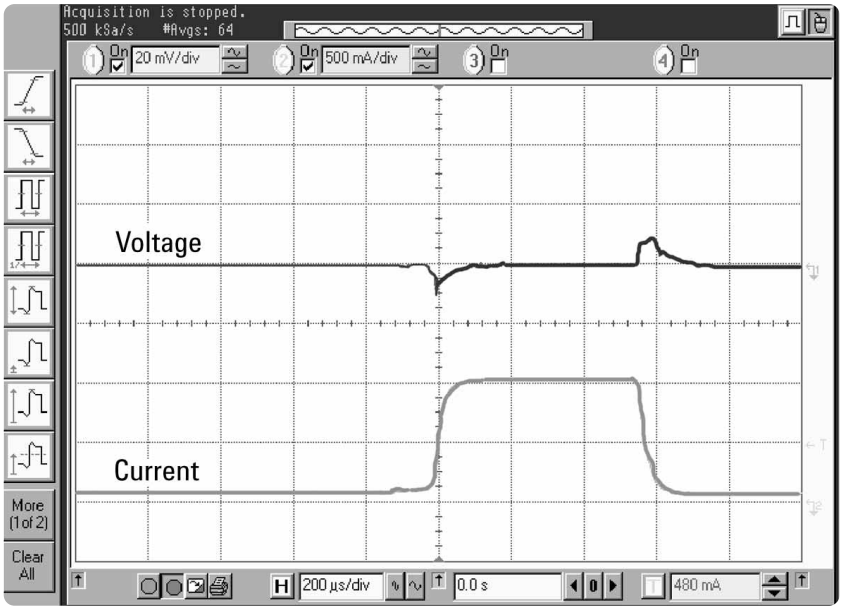


Figure 5. Actual output of 66319D with 6 meters of load leads and no fixture capacitor

Minimize voltage transients to maximize test speed

Digital communications devices draw rapid pulses of current that can cause significant voltage transients. These transients can cause your device's low voltage shutdown circuit to trip and unexpectedly stop your test. The Agilent Mobile Communications dc Sources have excellent voltage transient response characteristics to ensure maximum test system throughput by minimizing devices shutdowns due to transient voltage drop and recovery time. Since transient voltage drop is nearly eliminated, you can test your device at the low voltages necessary to simulate operation under nearly discharged battery conditions.

No special wiring needed to simplify system integration

An Agilent proprietary power supply control loop compensation design significantly reduces sensitivity to wiring impedance. Therefore, it is not necessary to use coaxial cables to connect to the DUT. Instead, you can achieve outstanding performance with ordinary twisted pair wires (one pair for the power leads and one pair for the remote sense leads).

Agilent Mobile Communications dc Sources have the features and capabilities to meet your test requirements (Continued)

Stable output, even with long leads
Agilent Mobile Communications dc Sources offer excellent output stability with up to 6 meters of load leads, which allows you to optimize your test setup for superior performance. Plus, user selectable compensation ranges ensure optimal performance over a wide range of device input capacitances and load-lead configurations. Superior stability and adjustable compensation eliminate the need for discrete resistors and capacitors at the test fixture.

High Speed programming to reduce test time
Agilent Mobile Communications dc Sources offer high-speed output programming that increases test throughput. Command processing times of less than 4 milliseconds and output programming response times of less than 200 microseconds increase throughput by reducing test cycle time.

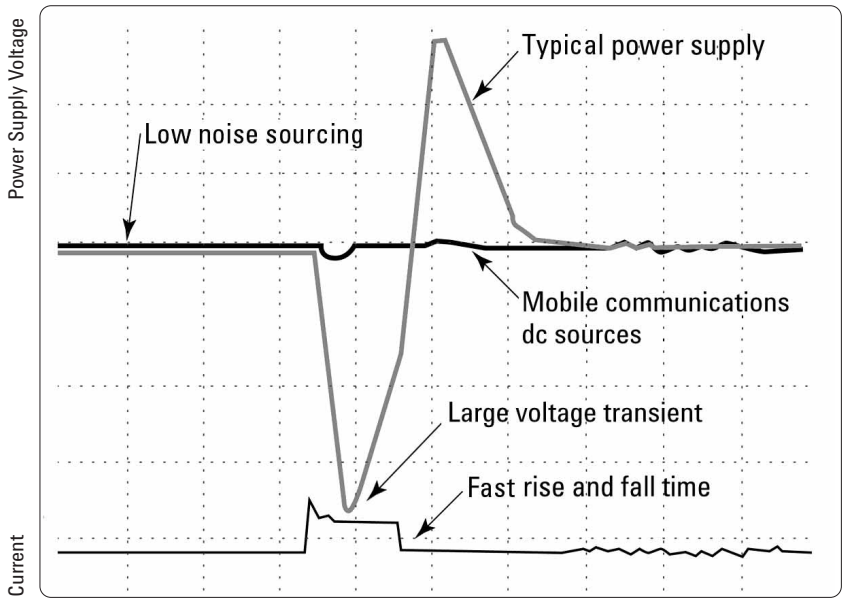


Figure 6. Transient response to typical GSM pulse: Comparison between general purpose power supply and Agilent Mobile Communications dc Source

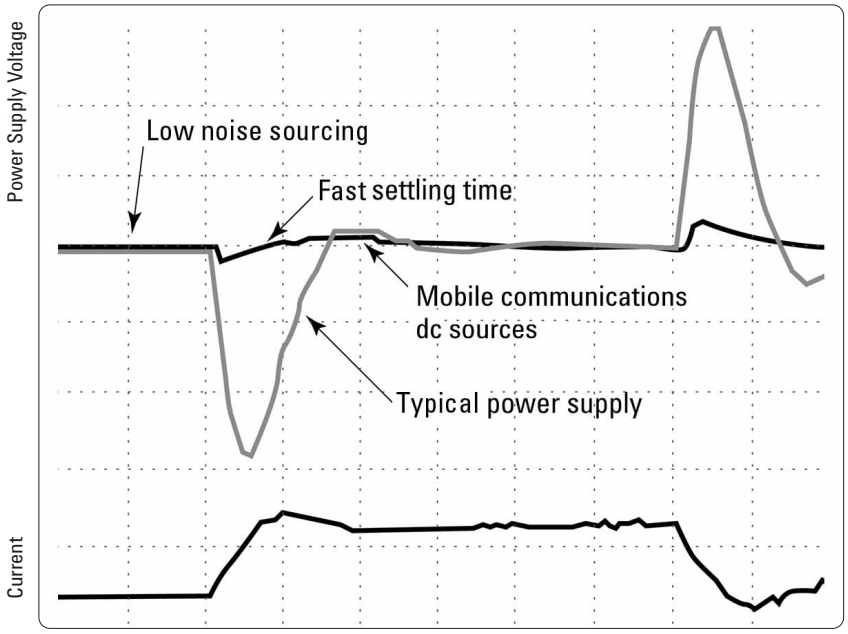


Figure 7. Settling time during GSM pulse: Comparison between general purpose power supply and Agilent Mobile Communications dc Source

Open sense detection to eliminate errors

Open sense connections can cause undesirable results in your test system, such as suspect test results due to erroneous voltage setting, low voltage shutdown due to a large transient voltage drop, and incorrect battery charger calibration (for devices that have internal chargers for rechargeable batteries).

The Agilent Mobile Communications dc Sources use a proprietary system to automatically detect open sense wire connections, which ensures reliable, accurate voltage to the device under test. Not only does this protect the DUT during test, but it means that tests are not executed and time is not wasted when system wiring integrity is compromised.

Sense lead connectivity can be checked prior to testing each device with virtually no impact on total test time. Even if only checked periodically, this system diagnostic feature will find problems and prevent shipping of incorrectly tested products.

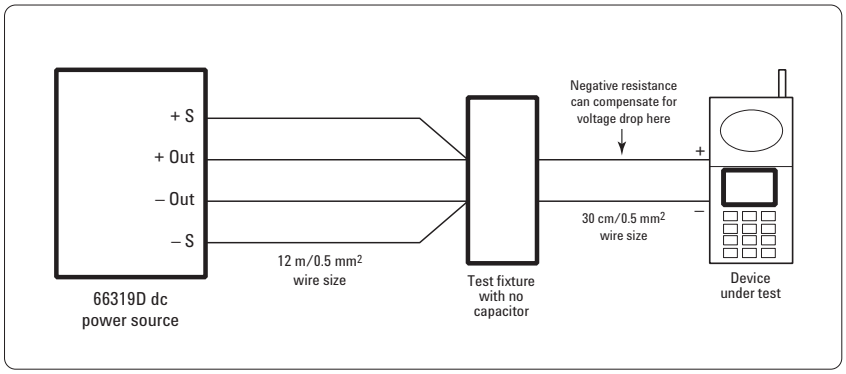


Figure 8. Using negative resistance to compensate for fixture/wiring resistance

A breakthrough capability to maintain voltage at the DUT

Removing all voltage drop in your system wiring and fixture is critical when testing devices with low battery voltages and sensitive low voltage shutdown circuits. Negative resistance programming eliminates the voltage drop in the piece of wire between the test fixture and the DUT's battery contact terminals. This negative resistance programming capability has been designed into the 66319B/D and 66321B/D. You simply program in a negative resistance equal to the resistance found in the fixture wiring/contacts. As more current flows out of the power supply, it will adjust its output voltage higher to compensate for the higher I*R voltage drop across the resistance in the fixture wiring/contacts. Similarly, as less current flows out of the power supply, it will adjust its output voltage lower to compensate for the lower I*R voltage drop across the resistance in the fixture wiring/contacts. The result is that you can accurately regulate and maintain supply voltage all the way to the DUT.

Agilent Mobile Communications dc Sources have the features and capabilities to meet your test requirements (Continued)

Dynamic measurements to quickly test or easily characterize your device
Agilent Mobile Communications dc Sources have specialized dynamic measurement systems that are ideal for measuring pulses found with digital communications devices. Measurements from microampere standby/leakage currents to ampere-level high current peaks can be accurately made using the Agilent Mobile Communications dc Source's multiple range measurement system.

To speed manufacturing test system throughput, measurements such as min, max, peak, and average values can be quickly made on pulsed currents. Unlike integrating measurement systems (which can take a long time to make measurements or which produce unrepeatable measurements when short integration windows are selected), with the Agilent Mobile Communications dc Source, you control the digitizer, so that you can ensure that it captures the portion of the current waveform that is important to you. Furthermore, built-in DSP-based filters can be applied so that you can obtain accurate measurements with minimum digitization time. The result is that you can make measurements quickly and accurately even on complex waveforms with unknown wave shape or period.

When characterizing devices in R&D, the built-in 64 kHz digitizer can be configured to trigger and capture voltage or current waveforms and return a buffer of readings with the waveform data points.

With the Agilent 14565A Device Characterization Software, testing, analyzing, and troubleshooting wireless and battery powered devices is made simple. The 14565A provides a graphical user interface that lets you easily control the Agilent Mobile Communications dc Sources. It gives you access to the Agilent Mobile Communications dc Source's high-powered measurement system and provides an oscilloscope-like view of the voltage or current waveforms of the device under test. The 14565A provides reference waveform save/recall, voltage and current waveform parameter measurements, triggering, markers, zoom control, and more. By using the advanced capabilities built into the Agilent Mobile Communications dc Source, you can spend more time testing and analyzing and less time configuring and reconfiguring multiple pieces of test equipment, such as a current shunt, oscilloscope, current probe, DMM, and datalogger.

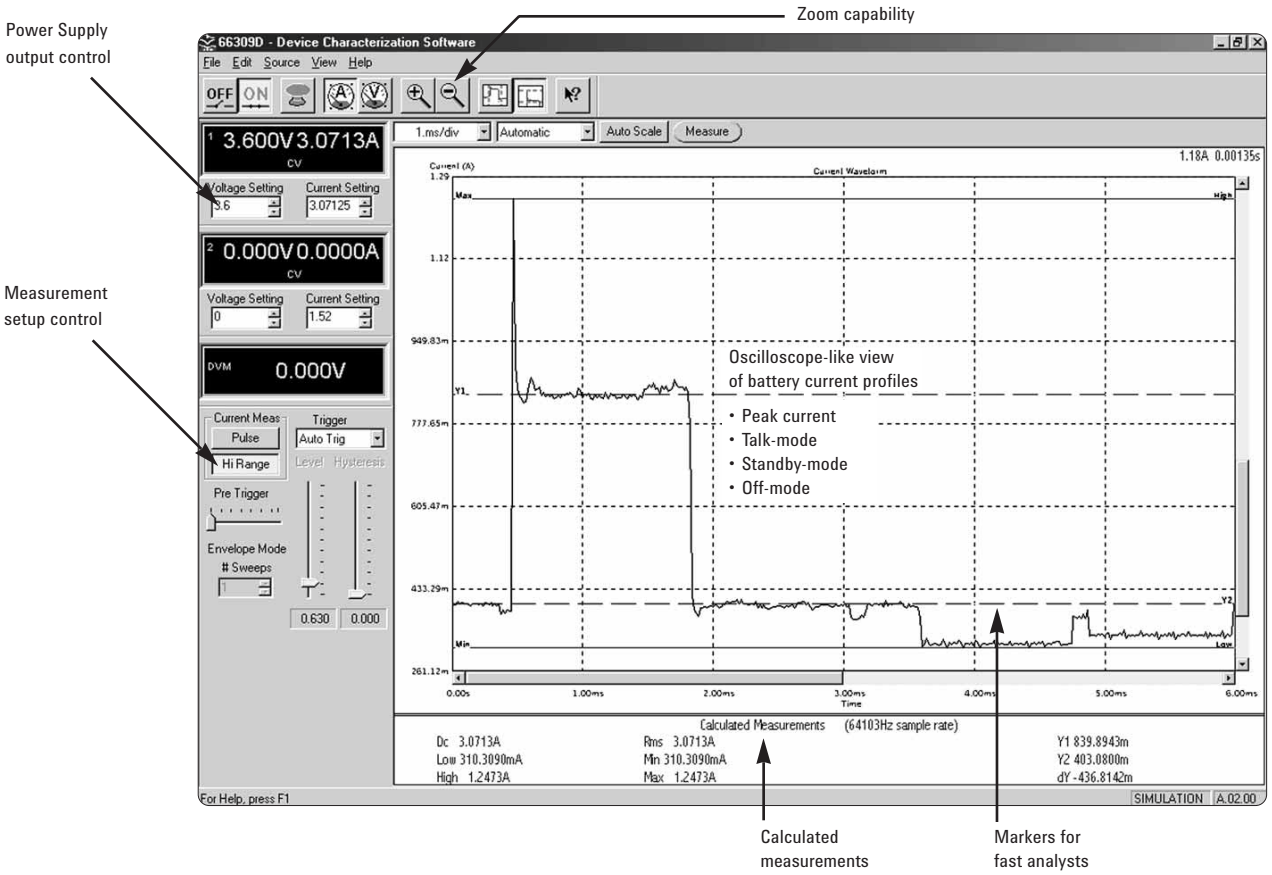


Figure 9. 14565A Device Characterization Software displaying GSM pulse current waveform

Battery Drain Analysis aids in design optimization

Battery Drain Analysis allows you to characterize current out of the battery and make tradeoffs in design that impact the current drain and battery life. But characterizing digital communications devices can be challenging. Narrow and low duty cycle current pulses are typical during low power modes. As wireless devices move about, signal strength, data rates, and what the user is doing with the device will cause large variations in the current being drawn from the battery. In order to characterize your device over its long operating time, you will need to capture minutes, hours, or even days worth of data, but you will need the resolution to see variations in narrow pulses.

The Agilent Mobile Communications dc Source* (when accessed using the 14565A Device Characterization Software with Battery Drain Analysis) provides the measurement and data reduction tools needed to analyze and visualize the current being drained from your battery. Using this information, you have the insights to make design tradeoffs to optimize battery run time.

The new Battery Drain Analyzer capability aids in the characterization process by providing for both fast digitization to

Agilent Mobile Communications dc Sources have the features and capabilities to meet your test requirements (Continued)

capture pulses and long data collection times to characterize operation over hours and days (up to 1000 hours). While the Mobile Communications dc Source can digitize current or voltage at 64 KHz, special data reduction capabilities integrate that data so that the resultant data files are manageable.

Visualizing the results is possible either with time domain analysis (oscilloscope-like view or data logger view) or statistical analysis (CCDF view). Results can be exported in tabular form to other software packages for further analysis.

* CCDF and Data Logging only available on 66319B/D or 66321B/D with firmware version A.03.00 or higher for 66319B/D. Requires 14565A software version 3.01 or higher.

True electronic battery emulation with programmable resistance
Batteries and battery packs have internal resistance and are not ideal voltage sources. The internal resistance varies with battery characteristics such as chemistry, amount of charge, temperature, age, and number of charge cycles.

Battery resistance impacts the performance and behavior of the wireless appliance.

The most obvious impact is the voltage drop that occurs when the device is drawing peak current. If the resistance is high

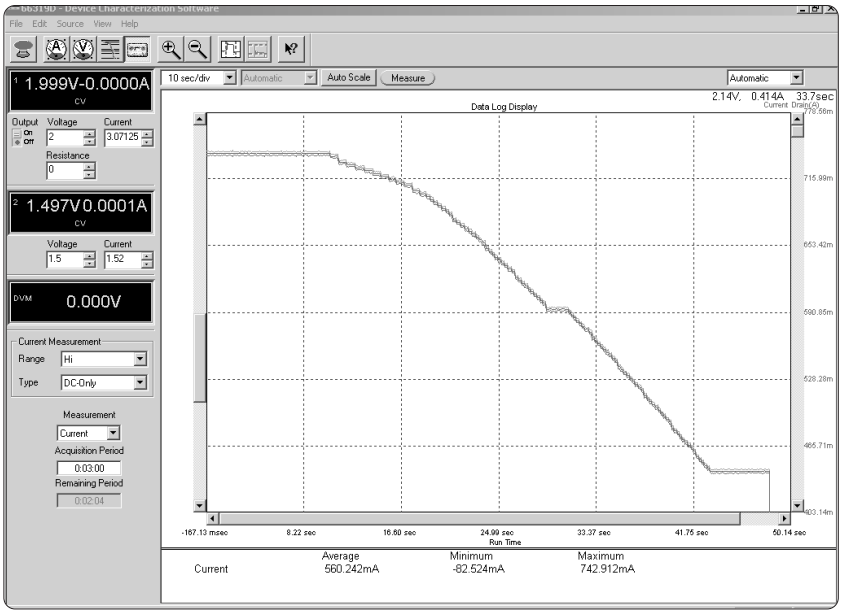


Figure 10. 14565A Device Characterization Software with Battery Drain Analysis displaying a long term data log

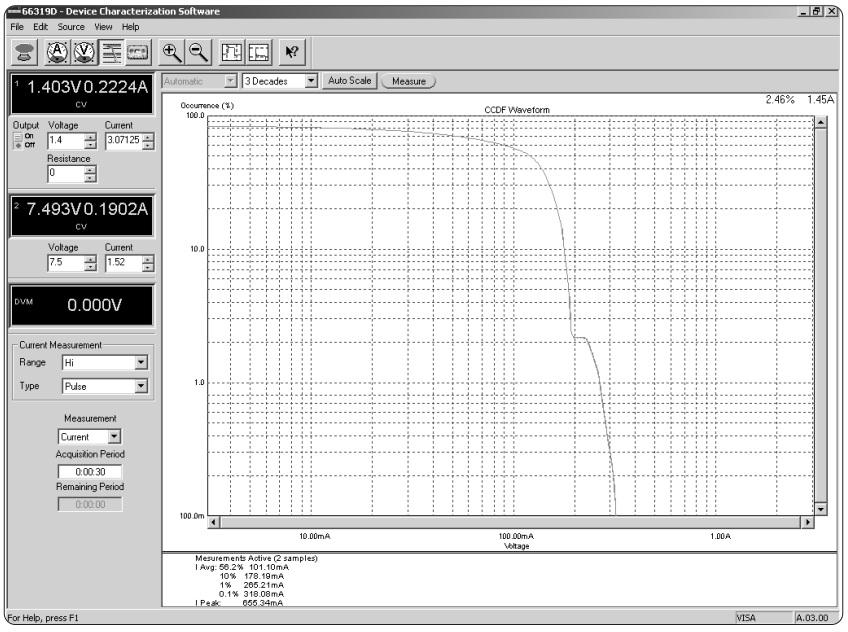


Figure 11. 14565A Device Characterization Software with Battery Drain Analysis displaying a CCDF chart (current vs % occurrence)

enough and the current is large enough, a large voltage drop will occur. This voltage drop could trigger the low voltage detect circuit and the device will shut off, indicating that the device has reached the end of its battery life. Therefore, the internal resistance of the battery factors into the run-time of the device.

Most power supplies have nearly 0 ohms of output resistance, where power supply output resistance is equivalent to battery internal resistance. If the power supply being used to test/characterize the device has nearly 0 ohms output resistance, then the test results using the power supply will be different then when using the battery.

Programmable resistance is standard on the Agilent 66319B/D and 66321B/D. The programmable output resistance feature of the Agilent Mobile Communications dc Source allows the source to more ideally emulate the characteristics and voltage response of an actual battery.

This feature, though, has advantages over using a real battery to do tests because it allows you to design, characterize, test, and verify wireless appliances under various controlled conditions that emulate real world battery conditions.

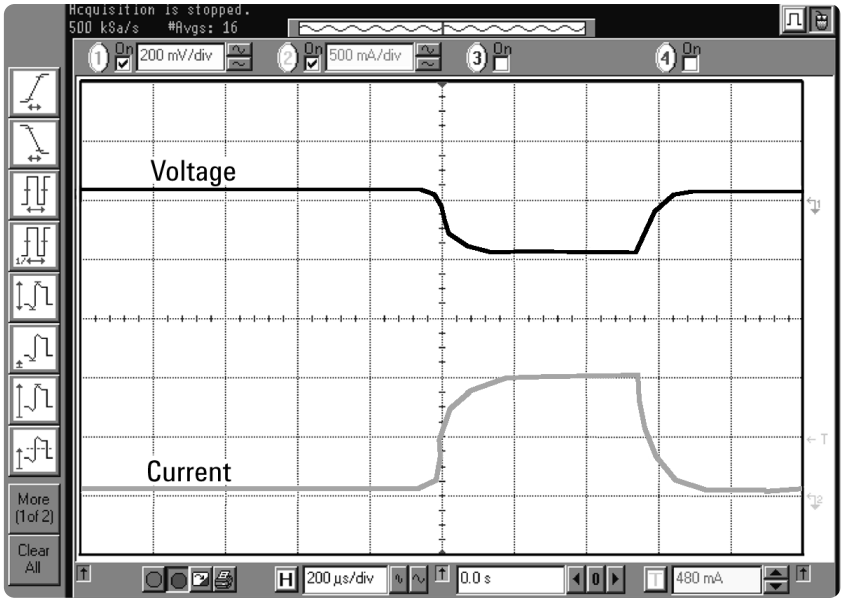


Figure 12. Actual NiMH battery voltage response with 230 milliohms of battery internal resistance

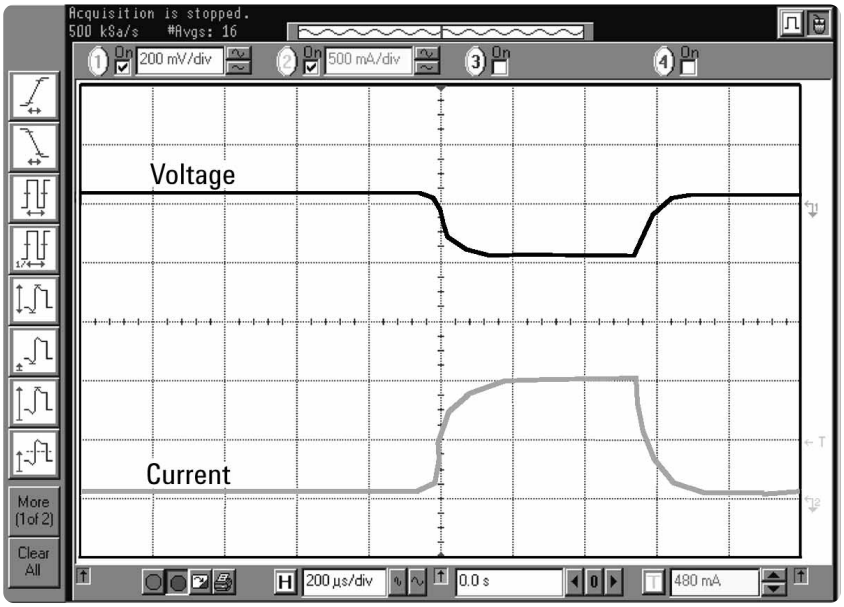


Figure 13. Actual output of the 66319D programming with 230 milliohms of output resistance

Summary of key specifications

Mobile communications
dc sources (40 W to 100 W)

- Ideal for wireless/portable product test
- Programmable output resistance (66319B/D and 66321B/D only)
- Dynamic pulse measurement
- High-speed programming
- SCPI (Standard Commands for Progrmmable Instruments)
- GPIB Interface[1], VXI*plug&play* drivers

Specifications (at 0° to 55° C unless otherwise specified)			**66309B/D**	**66311B/D**	**66319B/D**	**66321B/D**	**66332A**
Number of outputs			2	1	2	1	1
Output ratings	Voltage		0 to 15 V	0 to 15 V	0 to 15 V	0 to 15 V	0 to 20 V
	Current		0 to 3 A	0 to 3 A	0 to 3 A	0 to 3 A	0 to 5 A
	Peak current for up to 7 ms		5 A	5 A	5 A	5 A	—
Programming accuracy at 25°C ±5°C (% of setting plus fixed)	Voltage	0.05%+	10 mV	10 mV	10 mV	10 mV	10 mV
	+Current	0.05%+	1.33 mA	1.33 mA	1.33 mA	1.33 mA	2 mA
Ripple and Noise (20 Hz to 20 MHz)	Voltage (rms/p-p) Current (rms)		1 mV/6 mV 2 mA	1 mV/6 mV 2 mA	1 mV/6 mV 2 mA	1 mV/6 mV 2 mA	0.3 mV/3 mV 2 mA
dc measurement accuracy	Voltage	0.03%+	5 mV	5 mV	5 mV	5 mV	3 mV
	+20 mA to + rated current	0.2%+	0.5 mA[2]	0.5 mA[2]	—	—	0.5 mA
	-20 mA to - rated current	0.2%+	1.1 mA	1.1 mA	—	—	1.1 mA
	-3 A to + 5 A	0.2%	—	—	0.5 mA[2]	0.5 mA[2]	—
	-1 A to + 1 A	0.1%	—	—	0.2 mA	0.2 mA	—
	-20 mA to + 20 mA	0.1%+	2.5 µA	2.5 µA	2.5 µA	2.5 µA	2.5 µA
Dynamic measurement system	Buffer size		4096 points	4096 points	4096 points	4096 points	4096 points
	Sampling interval		15 µs - 31,200 s	15 µs - 31,200 s	15 µs - 31,200 s	15 µs - 31,200 s	15 µs - 31,200 s
Transient response time			<35 µs[3]	<35 µs[3]	<20 µs[3]	<20 µs	<100 µs[4]
Transient voltage dip (typical with up to 15 feet 22 AWG wiring)			70 mV	70 mV	40 mV	40 mV	500 mV
Programmable output resistance	Range		—	—	-40 mΩ to +1 Ω	-40 mΩ to +1 Ω	—
	Programming accuracy		—	—	0.5% + 2 mΩ	0.5% + 2 mΩ	—
	Resolution		—	—	1 mΩ	1 mΩ	—
Voltmeter input (66309D, 66319D, 66311D and 66321D only)	Input range		-25 to +25 Vdc	-25 to +25 Vdc	-25 to +25 Vdc	-25 to +25 Vdc	N/A
	dc readback accuracy (at 25°C ±5°C)		0.04% +5 mV	0.04% +5 mV	0.04% +5 mV	0.04% +5 mV	
	ac + dc readback accuracy (at 25°C ±5°C) with dc plus a sinewave input > 25 mV rms		1% + 5 mV (60 kHz to 10 kHz)	1% + 5 mV (60 kHz to 10 kHz)	1% + 5 mV (60 kHz to 10 kHz)	1% + 5 mV (60 kHz to 10 kHz)	— —
Auxiliary output (66309B/D and 66319B/D)							
Output ratings	Voltage Current		0 to 12 V 0 to 1.5 A	N/A	0 to 12 V 0 to 1.5 A	N/A	N/A
Programming accuracy	Voltage +Current		0.2% + 40 mV 0.2% + 4.5 mA	N/A	0.2% + 40 mV 0.2% + 4.5 mA	N/A	N/A
dc measurement accuracy	Voltage +Current		0.2% + 15 mV 0.2% + 3 mA	N/A	0.2% + 15 mV 0.2% + 3 mA	N/A	N/A
Ripple and Noise (20 Hz to 20 MHz)	Voltage (rms/p-p) Current (rms)		1 mV/6 mV 2 mA	N/A	1 mV/6 mV 2 mA	N/A	N/A

Notes:

1 66332A also has RS-232 interface.

2 Applies with current detector set to dc.

3 Time for the output voltage to recover to within 20 mV of final value after 0.1 to 1.5 A load change in high capacitance compensation range.

4 Time for the output voltage to recover to within 20 mV or 0.1% of the voltage rating of the unit following a change in load current of up to 50% of the output current rating.

Supplemental Characteristics

Non-warranted characteristics determined by design and useful in applying the product

dc Floating Voltage
Output terminals can be floated up to +/- 50 Vdc maximum from chassis ground (+/- 240 Vdc for 66332A)

Remote Sensing Voltage Drop
For 66332A: Up to 2 V can be dropped in each load lead. Add 2 mV to the load regulation specification for each 1 V drop in the positive output lead.

For 66309B/D, 66311B/D: Up to 4 V can be dropped in each load lead. Add 2 mV to the load regulation specification for each 1 V drop in the positive output lead.

For 66319B/D main output, 66321B/D main output: Up to 3 V total can be dropped in both load leads.

For 66319B/D auxiliary output, 66321B/D auxiliary output: Up to 4 V total can be dropped in both load leads.

Command Processing Time
Average time required for the output voltage to begin to change following receipt of GPIB data is 4 ms (with display disabled).

Output Programming Response Time
For 66332A: The rise and fall time (10/90% and 90/10%) of the output voltage is < 2 ms (400 µs in fast mode). The output voltage change settles within 1 LSB (0.025 % x full scale voltage) of final value in < 6 ms (2 ms in fast mode).

For 66311B/D, 66321B/D, 66309B/D output 1, 66319B/D output 1: The rise and fall time (10/90% and 90/10%) of the output voltage is < 200 µs.

Measurement Time
Average time to process query, calculate measurement parameter and return data is 50 ms (includes the default time of 30 ms for acquiring data and 20 ms data processing overhead).

GPIB Interface Capabilities
IEEE-488.2, SCPI command set, 6630A series programming capability (not supported in 66309B/D, 66319B/D, 66321B/D)

Input Power
(at worst case conditions of full load, 100 Vac mains)
For 66311B/D, 66321B/D: 1.7 A, 125 W
For 66309B/D, 66319B/D: 2 A, 170 W
For 66332A: 3.5 A, 250 W

Regulatory Compliance
Complies with EMC directive 89/336/EEC (ISM 1B)

Warranty Period 1 year

Size
For 66309B/D, 66311B/D, 66319B/D, 66321B/D: 212.8 mm W x 88.1 mm H x 435 mm D (8.4 in x 3.5 in x 17.13 in)

For 66332A: 425.5 mm W x 88.1 mm H x 364.4 mm D (16.8 in x 3.5 in x 14.3 in)

Weight
For 66309B/D, 66311B/D, 66319B/D, 66321B/D: 9.1 kg (20 lb) net, 11.1 kg (25 lb) shipping

For 66332A: 12.7 kg (28 lb) net, 15.0 kg (33 lb) shipping

Available models

Dual output models

66309B Dual output dc power source

66309D Dual output dc power source with auxiliary DVM

66319B Dual output dc power source with battery emulation

66319D Dual output dc power source with battery emulation and auxiliary DVM

Single output models

66311B Single output dc power source

66311D Single output dc power source with auxiliary DVM

66321B Single output dc power source with battery emulation

66321D Single output dc power source with battery emulation and auxiliary DVM

66332A Single output dc power source

Ordering Information

Opt 100 87 to 106 Vac, 47 to 63 Hz

Opt 120 104 to 127 Vac, 47 to 63 Hz

Opt 220 191 to 233 Vac, 47 to 63 Hz

Opt 230 207 to 253 Vac, 47 to 63 Hz

Opt 004 Make "Hi Compensation Mode" as default setting

Opt 020 Front-panel Binding Posts (66332A only)

Opt UJ0 No front panel binding posts (66332A only)

Opt 053 Add 14565A Device Characterization Software with Battery Drain Analysis (66319B/D, 66321B/D)

Opt 521 Solid State Relays (66309B/D, 66319B/D)

Opt AYK No Solid State Relays (66309B/D, 66319B/D)

Opt 760 Isolation and Reversal Relays (66332A only)

Opt 8ZJ Delete feet

Opt 8ZL Include feet

Opt 1CM* Rack-mount kit 66309B/D, 66311B/D, 66319B/D, 66321B/D: p/n 5062-3975; 66332A: p/n 5062-3974

Opt 1CP* Rack-mount Kit with Handles, p/n 5062-3975 (66332A only)

Opt AXS* Rack-mount Kit for side-by-side mounting, (N/A for 66332A) Locking Kit p/n 5061-9694; Flange Kit p/n 5062-3974

Opt 0B0 Delete standard documentation package

Opt 0L1 Include standard documentation package

Opt 0L2 Include extra standard documentation package

Opt 0B3 Include service manual

*Support rails required

Accessories

p/n 1494-0060 Rack Slide Kit (66332A only)

E3663AC Support rails for Agilent rack cabinets

14565A Device Characterization Software with Battery Drain Analysis

Note: Battery Drain Analysis means Data Logging and CCDF measurements. These capabilities require models 66319B, 66319D, 66321B or 66321D with version A.03.00 firmware or higher and 14565A software version 3.01 or higher.

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