Keysight Technologies
Precision Current-Voltage Analyzer Series

Technical
Overview

KEYSIGHT
TECHNOLOGIES
Unlocking Measurement Insights

Introduction

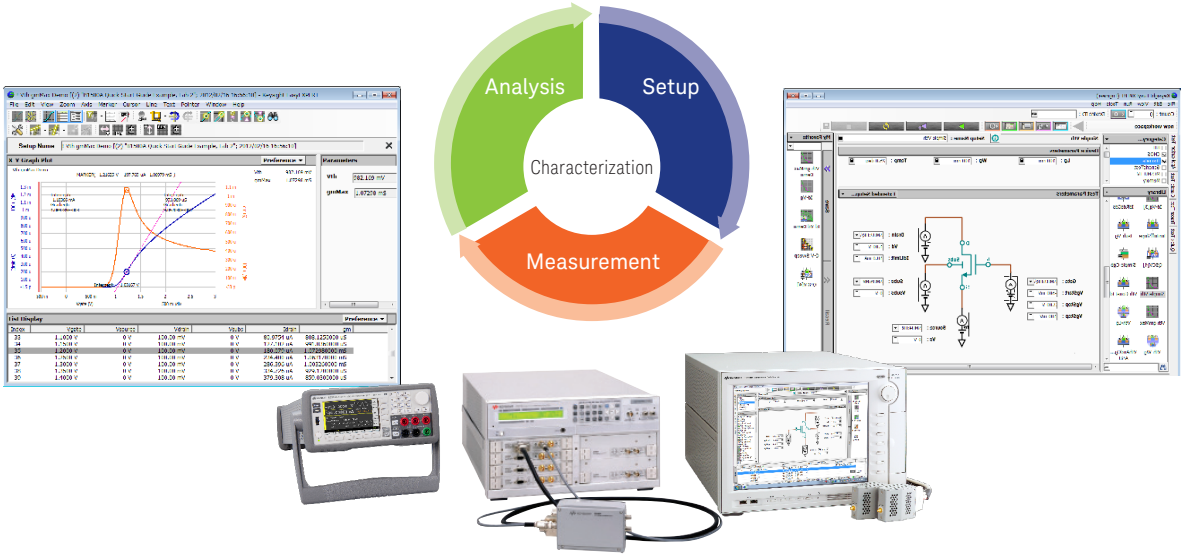
Accurate and Efficient Current-Voltage Measurement Solutions Provide Rich Insights into Material and Device Characteristics

Keysight's precision current-voltage analyzer solutions provide comprehensive graphical current-voltage characterization capabilities

Current versus voltage (IV) characterization is fundamental to understanding the properties of any material or electrical device. IV analysis provides more than just basic quantities such as resistivity or resistance; it also allows the extraction of parameters that can yield insights into fundamental material properties. For these reasons, the ability to accurately and quickly measure IV characteristics is extremely important for new material and device researchers.

Keysight Technologies, Inc. series of current-voltage analyzers provide a complete IV characterization solution by combining precision sourcing and measurement capabilities with intuitive graphical analysis. Source/measure units (SMUs) supply the core technology for this powerful solution. SMUs integrate 4-quadrant voltage and current sourcing with the ability to also simultaneously measure voltage and current. In addition, SMUs can provide much more than just DC sourcing; they also have the ability to do linear and logarithmic sweeps and pulsed measurements. For every solution the number of SMUs can be tailored and expanded to meet dynamic measurement needs, and all solutions provide integrated control and synchronization that does not require any programming.

EasyEXPERT group+, a powerful GUI-based control software, supports all of the tasks necessary for IV characterization. It facilitates measurement setup, data analysis and both manual and automated test execution. The seamless integration of all of these features gives Keysight's IV analyzers unique capabilities that can greatly improve engineering productivity. Keysight has IV analyzer solutions at a wide range of price performance points, from low-cost single-channel SMU models starting at approximately $5,000 up to modular mainframe solutions capable of performing advanced capacitance and pulsed IV measurements.



Keysight's IV solutions accelerate electronic material and device characterization.

Choosing which IV Analyzer in the Series Best Meets Your Needs

Economic IV Analyzer

The entry IV analyzer is available for a range of IV characterizations. With prices starting at $5000, this analyzer will be available in 2016.

- An SMU provides versatility of 4-quadrant precision voltage/current source and voltage/current measurement.
- A combination of multiple SMUs (up to 8) quickly enables IV curve measurement and analysis without programming.
- EasyEXPERT group+ is available on your PC.

Precision IV Analyzer

The high performance IV analyzer with current measurement capability as low as 0.1 fA along with SMU scalability is available for advanced IV characterization.

- Integration of multiple SMUs quickly enables IV curve measurement down to 0.1 fA and analysis without programming.
- Scalability and flexibility of configurable SMU modules up to 8 slots.
- EasyEXPERT group+ is available on your PC.

Advanced Device Analyzer

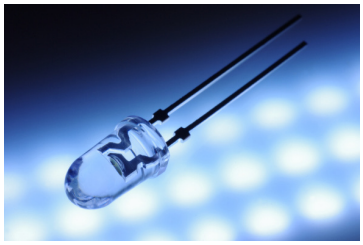
The all in one analyzer supporting IV, CV, pulse/dynamic IV and more. Designed for all-round characterization from basic to cutting-edge applications.

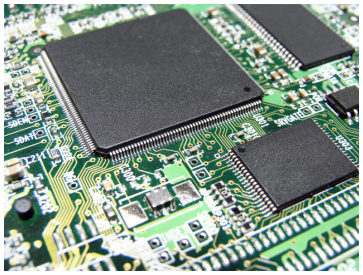
- Integration of SMUs, C meter (CMU), pulse/dynamic IV module (WGFMU) and so on quickly enables a range of characterizations from IV to CV, pulse/dynamic IV and more on single box.
- Scalability and flexibility of configurable modules up to 10 slots.
- EasyEXPERT group+ is available either on a mainframe built-in PC with 15 inch touch screen or on your PC.

		Economic IV Analyzer (*)	Precision IV Analyzer	Advanced Device Analyzer	
IV Measurement Features	Max. Output coverage	210 V / 3 A (10.5 A pulse)	200 V / 1 A	200 V / 1 A	10 kV / 1500 A
	Min. Current Measurement Resolution	10 fA	0.1 fA	0.1 fA	10 fA
	IV Spot/Sweep	DC/Pulse	DC/Pulse	DC/Pulse	DC/Pulse
	Max. SMU channels	Up to 8ch (Stacking up to 4 units)	Up to 8ch (Addition of Module)	Up to 10ch (Addition of Module)	Up to 10ch (Addition of Module)
	Connector Type	Banana (Triax adapter is available)	Active Guard Triaxial	Active Guard Triaxial	Active Guard Triaxial
Advanced Measurement Features	Capacitance Measurement (C-V, C-t, C-f, 1 kHz- 5 MHz)			YES	YES
	Ultra fast pulsed/transient IV (from 100 ns, 200 MSa/s, 10 V)			YES	
Software Features	Intuitive GUI	YES	YES	YES	YES
	Powerful graph capabilities	YES	YES	YES	YES
	Built-in database to store the measurement related data	YES	YES	YES	YES
	Personal analyzer on your PC	YES	YES	YES	YES

(*) Economic IV Analyzer will be available in 2016 by a future release of EasyEXPERT group+.

Cost-effective Application Coverage for Tasks Ranging from Nanomaterial Characterization to Advanced Electrical Device Test





IV characterization is necessary to fully understand the electrical behavior of devices and materials. This is true not only for semiconductor devices, but also for other devices such as nano-components, photovoltaic cells, optical devices, organic devices, sensors, passive/active discrete components and automotive devices. There is much on-going research into improving these devices to decrease power consumption and lower costs so as to improve the overall performance of the consumer devices in which the devices ultimately reside.

To meet the need for reduced development times, better IV characterization solutions than are provided by conventional IV measurement instruments are required. The combination of SMU technology with intuitive graphical analysis capabilities makes Keysight's IV analyzers the ideal solution for both basic and advanced IV analysis. SMU based hardware is easier to use and more accurate than conventional instrumentation, and Keysight's EasyEXPERT group+ software (which works will all Keysight IV analyzer products) has many features that facilitate IV characterization.

EasyEXPERT group+ comes with numerous furnished application tests that encompass the most common IV characterization tasks, and it also makes it easy to create customized tests using the SMU hardware. Either option allows you to display and analyze data graphically or numerically, thereby dramatically improving IV characterization productivity.

While IV analyzers have long been used to characterize conventional semiconductor devices, their cost has kept them from being widely used in other component and material characterization applications. However, Keysight's IV analyzer series now offers a wide range of choices and price/performance points, making it cost-effective for a wide range of uses and industries.

Examples of devices and materials requiring characterization	
Semiconductors, discrete and passive components	Diodes, laser diodes, LEDs
	Photodetectors, sensors
	Field Effect Transistors (FETs), Bipolar Junction Transistors (BJTs)
	ICs (Analog ICs, RFICs, MMICs, etc)
	Resistors, varistors, thermistors, switches
Electronics and green energy devices	Photovoltaic cells
	Power transistors, power devices
	Automotive
	Medical instruments
	Circuit tests needing DC bias
Research and education	Novel new materials
	Nano devices characterization (e.g. CNT)
	GMR (Giant Magnetic Resistance)
	Organic devices

Examples of furnished application tests	
Discrete devices	Id-Vg, Id-Vd, Ic-Vc, diode, etc.
Bipolar	Ic-Vc, diode, Gummel plot, breakdown, hfe, capacitance,
CMOS	Id-Vg, Id-Vd, Vth, breakdown, capacitance, QSCV, etc.
Memory	Vth, capacitance, endurance test, etc.
Power MOSFET	Id-Vds, Rds-Id, Id-Vgs, Capacitance, etc.
IGBT	Ic-Vce, Ic-Vge, Vce(sat), Vth Vge(off), breakdown
Solar Cell	I-V, Cp-V, Nyquist Plot, DLCP, etc.
Nano devices	Resistance, Id-Vg, Id-Vd, Ic-Vc, etc.
GaN	FET Current Collapse, Id-Vds Current Collapse, Diode Current
Discrete devices	Id-Vg, Id-Vd, Ic-Vc, diode, etc.

SMU Technology Provides Many Features that Simplify Difficult IV Measurement Tasks

Why use an SMU (Source/Measure Unit)?

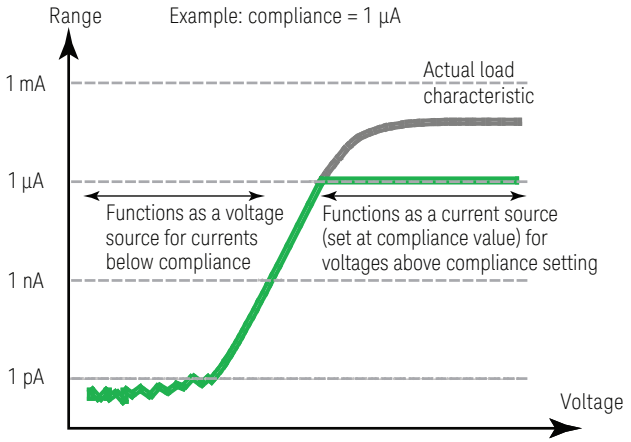
The SMU integrates many sourcing and measurement capabilities into a compact form. SMUs can function as a 4-quadrant precision voltage or current source, a precision voltage or current meter, and an electric load. They are also capable of outputting both DC and pulsed signals. The adjacent block diagram illustrates these capabilities. As this shows, the tight integration of these various resources eliminates the cabling and timing complexities associated with discrete instruments. Keysight's IV analyzers can integrate multiple SMUs to support applications requiring numerous source and measurement terminals.

Feedback mechanisms stabilize voltage and current sourcing

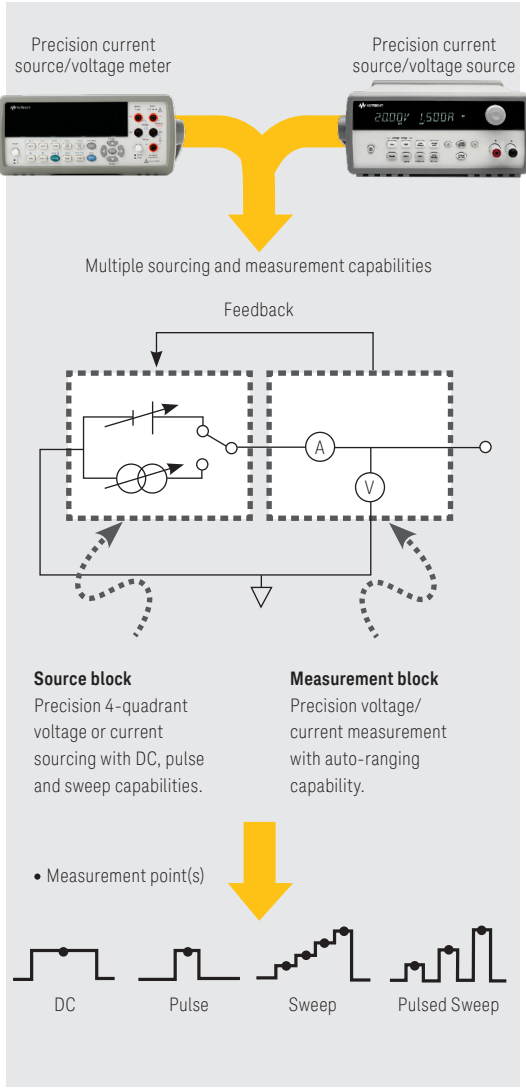
The close integration of the SMU's resources provides benefits not possible when using collections of conventional instruments. For example, SMUs can monitor their own current and voltage output via internal feedback, allowing them to maintain accurate and stable output levels even if load conditions change dynamically. SMUs also support remote 4-wire (Kelvin) sensing, which enables the accurate measurement of extremely small resistances at distances far from the actual instrument.

Compliance feature prevents device damage

SMUs have a compliance feature that allows the user to set a limit on the quantity not being forced by the SMU (i.e. current in voltage force mode and voltage in current force mode). The SMU will never force a voltage or current value on a DUT that causes it to exceed the specified compliance value. The ability to set a compliance limit helps prevent accidental device damage.



How compliance protects devices from accidental damage

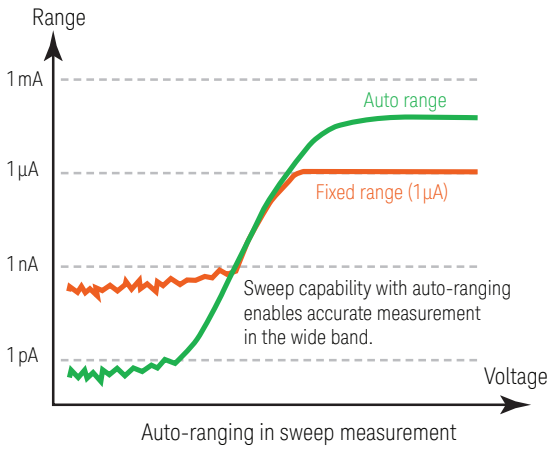


SMUs provide many versatile sourcing and measurement capabilities

The Most Accurate and Unparalleled Measurement Range on the Market, from 0.1 fA to 1500 A/10 kV

A broad dynamic range is covered by the auto-ranging and sweep capabilities

The IV characteristic can curve across multiple levels in most cases. Because the SMU in IV analyzer supports the built-in sweep operation in either DC step or pulsed step, it is extremely useful in performing IV measurements and drawing the IV curve in a single operation. In addition, SMU supports the auto-ranging capability that can change the measurement ranges automatically according to the measured value. These capabilities allow you to quickly obtain the full IV curve with the best accuracy.

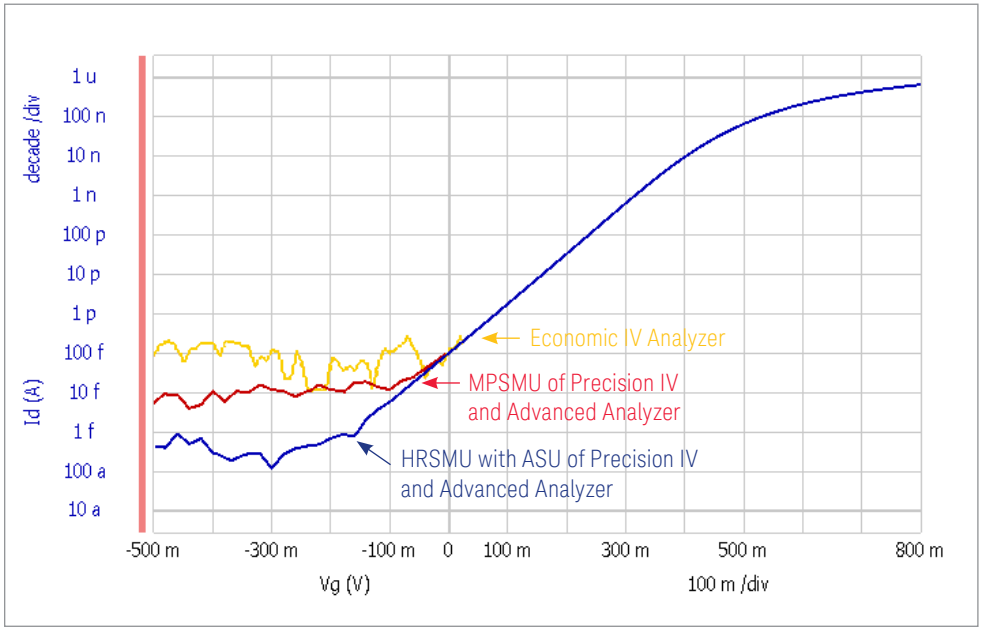


Auto-ranging in sweep measurement

Wide range to cover from 0.1 fA ultra low current to high voltage/current up to 1500 A/10 kV

The SMU's close integration of source and measurement circuitry reduces cable connections, and lowers measurement errors such as noise. The SMU's intrinsic low noise level, active guard technology and triaxial connection enable low current measurement down to 0.1 fA. In conjunction with the sweep and auto-ranging capabilities, the IV analyzer enable accurate IV characterization for a wide dynamic range from sub-ρA to A level across multiple levels.

The precision IV analyzer series offers a wide selection of SMU differentiated by the output coverage, low current performance and price range for low to mid power range. In addition, the advanced device analzyer offers more specific measurement capabilities and a greater output range for high power applications. The wide line-up allows to choose the best IV characterizatin solution to meet your needs from the application, performance, and cost view points.



Transistor measurement example across multiple levels from sub-pA that is measured by different SMUs.

GUI Based Intuitive User Interfaces for Quick Measurement Setup

Application test mode provides extensive libraries of pre-defined tests

Application test mode provides convenient task oriented point and click test setup and execution. An application test can be selected from the furnished libraries by device type and/or desired measurement, and then executed after modifying the default input parameters as needed. Modified test setups can be stored in a “My Favorite” list for quick future execution. The application tests are also completely user-modifiable using EasyEXPERT’s built-in graphical programming environment.

Classic test mode provides full hardware control by mouse point and click operation

When you perform measurements other than the ready-to-use applications in the library, the classic test mode provides direct access to the analyzers hardware capabilities. By taking full advantage of windows-based features, you can set the various parameters such as output voltage/current, number of sweep steps, range, and so on for the hardware available features. It has a similar look and feel to the front-panel interface of the 4155/56 parameter analyzer that has been the de-facto standard analyzer for a long time. The 4155/56 setup file can be converted to the classic test setup by using the furnished 4155/56 setup file converter.

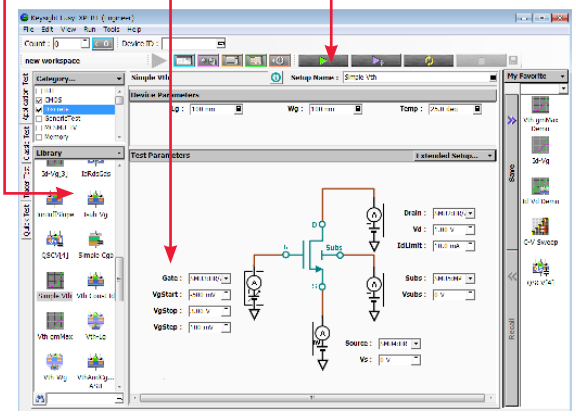
Tracer test mode provides real-time curve tracing

Tracer test mode offers intuitive and interactive sweep control similar to that of an analog curve tracer by using a rotary knob or mouse operation. It allows sweep measurements to be modified in real-time just like on a curve tracer, and both voltage and current can be swept bidirectionally (expanding in both the positive and negative directions simultaneously). This is useful for failure analysis and when characterizing unknown devices. Moreover, once you have determined the ideal test conditions using the tracer test you can easily transfer the settings into a classic test mode setup for further refinement or for automated testing.

Step 1. Select a measurement from one of the furnished libraries.

Step 2. Modify the measurement parameters as needed.

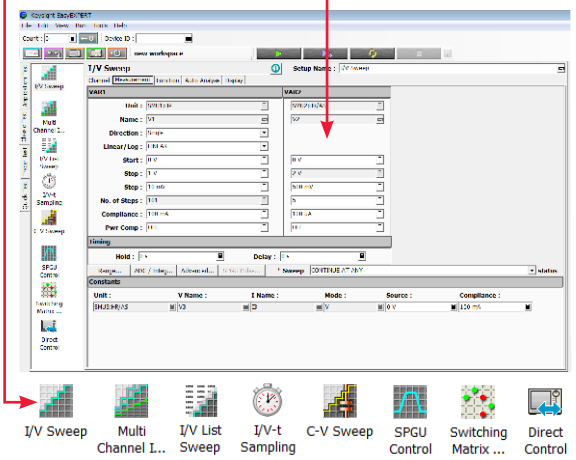
Step 3. Press the measure button to start the measurement.



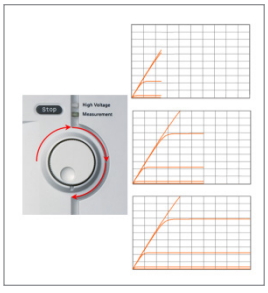
Application Test mode

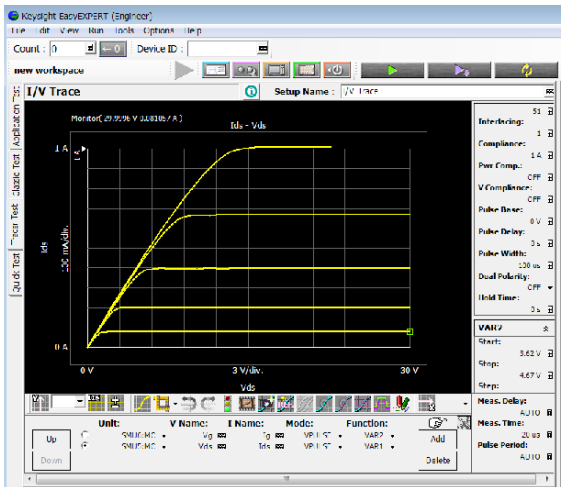
Various measurement options

Voltage, current, sweep points, range, etc. can be fully controlled.



Classic Test mode





Tracer Test mode

Accelerated Graphical Analysis and Data Exporting to Your PC for Further Data Processing

Auto-analysis and graphical display features accelerate your analysis

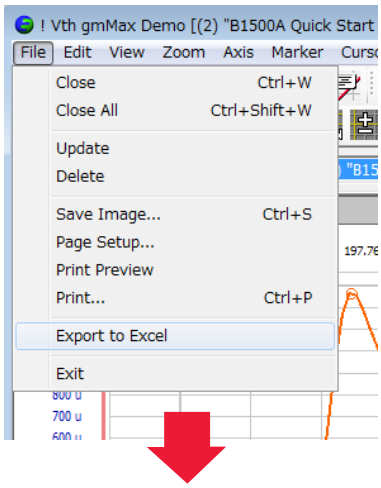
The data display window accelerates the analysis of the measurement results without using the external analysis utilities. It provides the powerful graphical display and analysis features for front-end analysis. This can pop-up automatically when the measurement is complete. It is also available to analyze the measurement results in the data store.

It provides many powerful analysis tools such as auto-scaling, marker and line operation, multiple Y axes capabilities and so on. For example, the data display and intuitive GUI operation allow for the extraction of the threshold voltage quickly through the process of finding the max position on the gm curve in Y2, drawing the tangent line on the Id curve in Y1, and reading out the intercept to the X axis, as illustrated in the following figure.

In conjunction with the auto-analysis capability of the measurement setup, you can perform the operation automatically after taking measurements without manual operation.

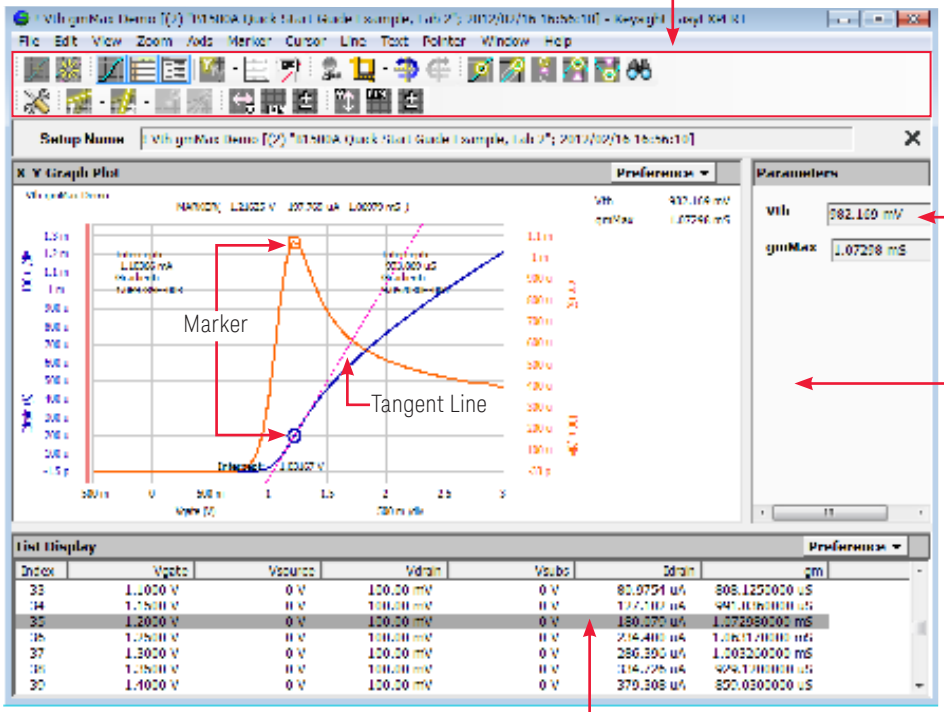
Direct Excel export for quick further analysis on your PC

The data display allows you to export data directly to an Excel spreadsheet without saving as a CSV file, thereby accelerating post-analysis on any computer. If necessary, the graph in this window can also be exported as an image file for reporting. The preference menu provides various options for the appearance such as color and information placed in the graph pane.



Direct data link to Excel spreadsheet.

Powerful analysis tool creates IV measurement data that gives an insight into characteristics by providing auto scaling, marker, line operations, and so on.



Parameters pane displays the parameters extracted by user functions. They can be displayed in the graph pain for graph image export

Graph pane is available for powerful graphical analysis.

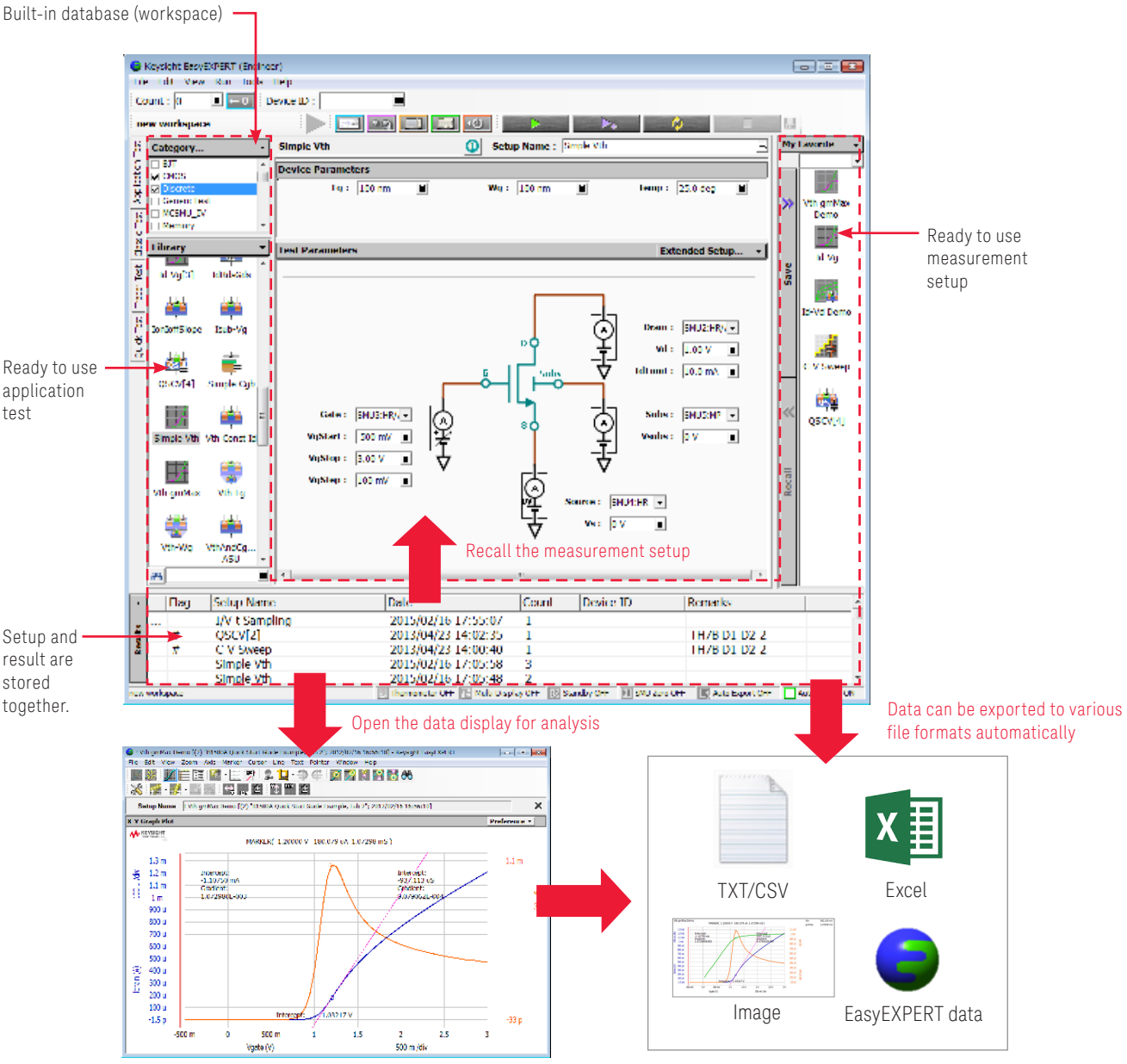
List data pane. The data at market position is highlighted.

Simple Management and Access to all Data Without Cumbersome File Handling

Built-in database allows you to store and rapidly recall the data that you need

The IV characteriztion performs repeatedly for various materials/devices, generating numerous files such as a measurement setup file, and so on. This can make it difficult to manage all the different fiiles and accurately record the information.

EasyEXPERT group+ has a built-in database to resolve this issue. Every time the measurement is performed, the combination of measurement setup and result can be stored automatically into the built-in database known as a “workspace”. This unique “workspace” allows you to manage and access all the relevant data without the need for accessing numerous files. The data stored in the “workspace” can be accessed for analysis or measurement reproduction at any time, and the data can automatically be exported in various file formats such as Excel, images, CSV, and so on.

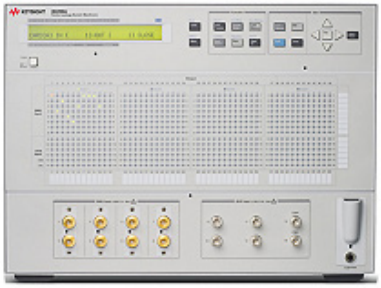


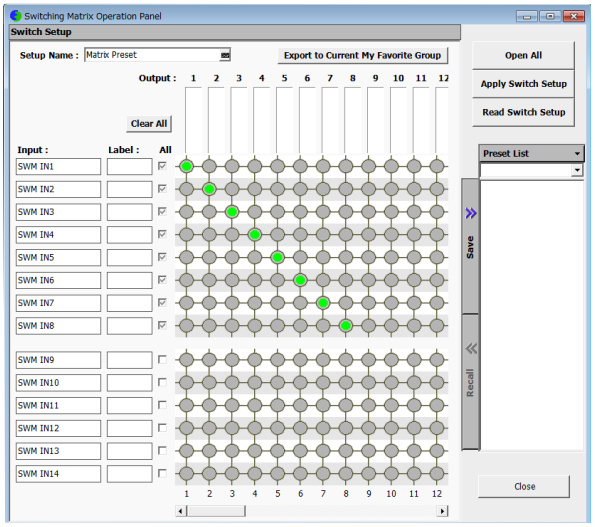
Main screen provides easy access to the data in the workspace and measurement capabilities

Quickly Perform Automated Multiple Measurements with Optional Switching Matrix and Prober Control

Intuitive GUI is used to control an optional switching matrix

The EasyEXPERT group+ also supports a switching matrix control. This allows you to create a switching matrix setup on GUI using mouse point and click operations. You can also use the EasyEXPERT group+ for the test system by integrating the analyzer and switching matrix to test multiple points with limited resources.

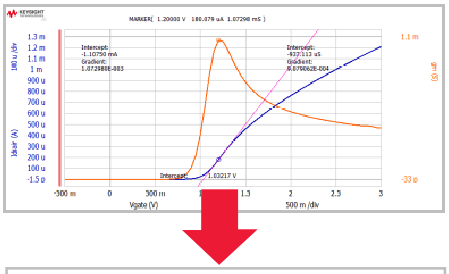


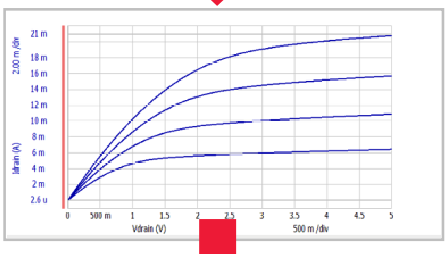


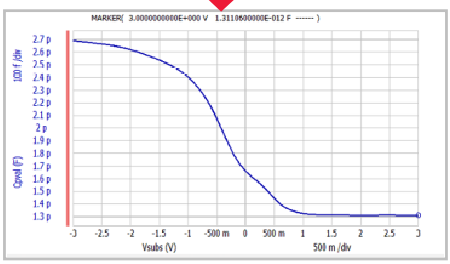
Make a quick automated test sequence without the need for programming

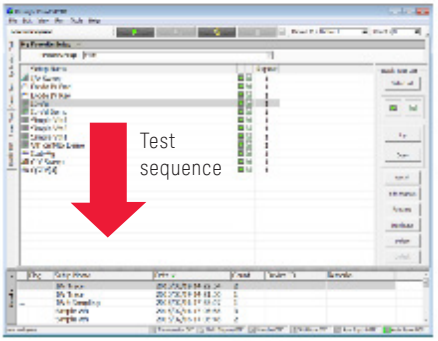
The EasyEXPERT group+ has a GUI-based quick test mode that supports automated test sequencing. Quick test mode provides a convenient means to execute a sequence of tests created in application test, classic test, or tracer test mode without the need for any programming. It allows you to select, copy, and rearrange any of these tests with a few simple mouse clicks. If you are using a switching matrix, you can also automatically call switching patterns created interactively using EasyEXPERT group+. You can also combine wafer prober control with quick test mode to perform multiple tests automatically across a wafer. In addition to supporting popular semiautomatic wafer probers, EasyEXPERT also allows you to create your own wafer prober drivers.

Automated testing is important to efficiently gather multiple parameters on the device. In many cases, instruments do not have automated test capability, and manually created test setups cannot be reused for automated testing. Therefore, the ability to reuse interactively created tests in automated testing is a highly useful with obvious productivity benefits.





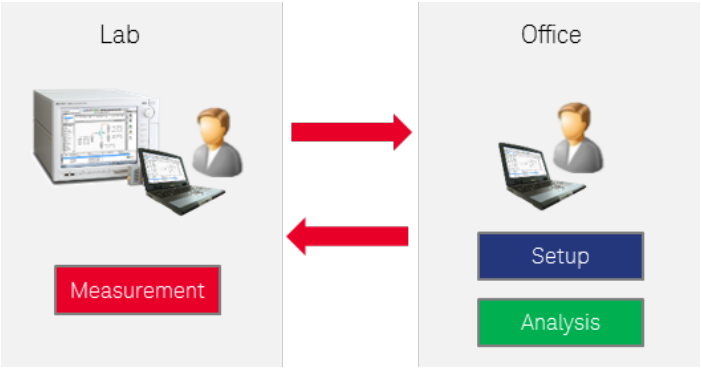




EasyEXPERT group+ Allows Flexible Characterization Tasks to be Performed that Significantly Improve Productivity

Take full advantage of the analyzer's powerful measurement and analysis capabilities from the lab to the office

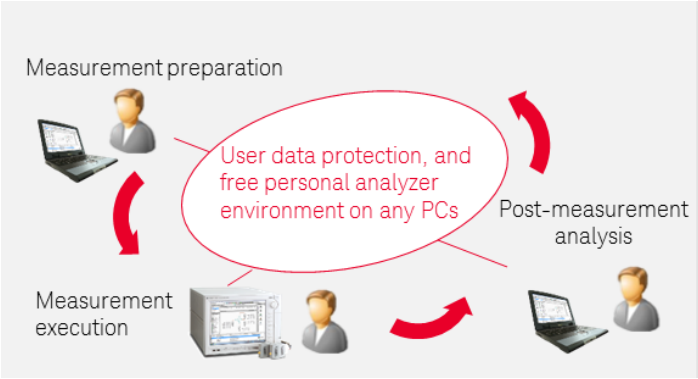
EasyEXPERT group+ can be installed on your PC, and used as your personal analyzer. Because it can be connected to the instrument via USB-GPIB interface, it is portable and can be used seamlessly either for offline tasks in the office or online measurement execution in the lab. It does not need to be within range of the instrument to operate correctly, and most of tasks can be operated in the office with the PC peripherals such as wide display, USB, HDD and software such as Excel to improve the productivity.



Your PC becomes your portable personal characterization environment

EasyEXPERT group+ can be installed on multiple PCs at no additional cost

EasyEXPERT group+ can be installed on multiple PCs at no additional cost so that every team member can have their own personal analyzer environment. This ensures speed, accuracy, and efficiency within any group work. EasyEXPERT group+ also provides options to protect important data when sharing it with multiple users.



Free personal analyzer accelerates inter-departmental cooperation

Offering support across the Keysight analyzer series for more flexibility and scalability according to your needs

The EasyEXPERT group+ provides a unified characterization platform across the Keysight precision IV analyzer series. Interoperability across the analyzers provides more flexibility in measurement operations and scalability of measurement capacity in the lab. Available applications can be adapted to configured resources.

Compare and Select the Best Analyzer for your Needs

Model number		Precision Current-Voltage Analyzer Series							
		Economic IV Analyzer (*1)		Precision IV Analyzer				Advanced Device Analyzer	
		B2901A/ B2902A	B2911A/ B2912A	E5262A	E5263A	E5260A	E5270B	B1500A	B1505A
Maximum output		210 V / 3 A	210 V / 3 A	100 V / 200 mA	200 V / 1 A	200 V / 1 A	200 V / 1 A	200 V / 1 A	10 kV / 1500 A
Minimum measurement resolution		100 fA / 0.1 µV	10 fA / 0.1 µV	5 pA / 100 µV	5 pA / 100 µV	5 pA / 100 µV	0.1 fA / 0.5 µV	0.1 fA / 0.5 µV	10 fA / 0.5 µV
Numbers of SMU channels		1 to 8	1 to 8	2	2	1 to 8	1 to 8	1 to 10	1 to 10
SMU channel upgradability		Instrument stacking up to 4 units	Instrument stacking up to 4 units	Not available	Not available	Add SMU module to the mainframe	Add SMU module to the mainframe	Add SMU module to the mainframe	Add SMU module to the mainframe
Output connector type		Banana(*2)	Banana(*2)	Active Guard Triaxial	Active Guard Triaxial	Active Guard Triaxial	Active Guard Triaxial	Active Guard Triaxial	Active Guard Triaxial
SMU features	Source operation	Voltage or current source with 4-quadrant operation (source & sink)	Voltage or current source with 4-quadrant operation (source & sink)	Voltage or current source with 4-quadrant operation (source & sink)	Voltage or current source with 4-quadrant operation (source & sink)	Voltage or current source with 4-quadrant operation (source & sink)	Voltage or current source with 4-quadrant operation (source & sink)	Voltage or current source with 4-quadrant operation (source & sink)	Voltage or current source with 4-quadrant operation (source & sink)
	Auto-ranging	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Compliance (limit)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Current-voltage measurement capability	Spot	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Sweep	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Time sampling	Yes	Yes	No	No	No	No	Yes	Yes
Advanced measurement capability	Capacitance	No	No	No	No	No	No	Yes	Yes
	Ultra-fast pulsed IV/ transient IV	No	No	No	No	No	No	Yes	No
Measurement setup and control	Mouse & keyboard operation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Classic test	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Application test	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Tracer test	Yes(*3)	Yes(*3)	Yes(*3)	Yes(*3)	Yes(*3)	Yes(*3)	Yes	Yes
	Test sequence	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Switch and prober control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Data analysis and management	Data management by workspace	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Graphical display with auto analysis	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Automated data store	Yes(*4)	Yes(*4)	Yes(*4)	Yes(*4)	Yes(*4)	Yes(*4)	Yes(*4)	Yes(*4)
	Automated data export	Yes(*5)	Yes(*5)	Yes(*5)	Yes(*5)	Yes(*5)	Yes(*5)	Yes(*5)	Yes(*5)
EasyEXPERT and analyzer controller	Built-in PC	No	No	No	No	No	No	YES (15 inch touch screen)	YES (15 inch touch screen)
	External PC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Group usage support	Personal analyzer environment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Interoperability across the Keysight analyzer series	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Data protection	Yes(*6)	Yes(*6)	Yes(*6)	Yes(*6)	Yes(*6)	Yes(*6)	Yes(*6)	Yes(*6)

(*1) The economic IV analyzer will be supported in 2016.
(*2) Banana to Triaxial adapter is available.
(*3) Tracer mode will be supported in 2016.
(*4) Measurement setup and result
(*5) Excel dynamic data link, Excel files, CSV files, images, text, EasyEXPERT file
(*6) Password protection and user level access control

Ordering Information

Economic IV Analyzer Configuration

The Economic IV analyzer will be supported in 2016.

Precision IV Analyzer Configuration

The GNDU (ground unit) is situated within the mainframe of any model. It can force 0 V and sink current up to 4 A. Every model contains triax cables for GNDU and SMU, the GNDU to Kelvin adapter, USB-GPIB interface and the EasyEXPERT group+ software install media.

Precision IV Analyzer (2ch fixed configuration)			
Model		**E5262A**	**E5263A**
Pre-configured SMU		Two MPSMU	One MPSMU and one HPSMU
Cable Length options			
015	1.5m cable length	Available	Available
030	3.0m cable length	Available	Available

Precision IV Analyzer (Configurable up to 8ch)			
Model		**E5260A**	**E5270B**
Pre-configured SMU		None	None
Cable Length options			
015	1.5m cable length	Available	Available
030	3.0m cable length	Available	Available
Quick configuration options			
A01	Four MPSMU package	Available	Available
A02	Two MPSMU and two HRSMU package	HRSMU is not supported	Available
A03	Four HRSMU package	HRSMU is not supported	Available
Add-on module options			
A10	Add one HPSMU	Available	Available
A11	Add one MPSMU	Available	Available
A17	Add one HRSMU	HRSMU is not supported	Available
A28	Add atto sense and switch unit (ASU)	ASU is not supported	Available

Ordering Information (continued)

Advanced Device Analyzer Configuration

The GNDU (ground unit) is situated within the mainframe of any model. It can force 0 V and sink current up to 4.2 A. The B1500A contains a keyboard, mouse, and triax cables for GNDU and SMU, the GNDU to Kelvin adapter and the EasyEXPERT group+ software install media. The following table provides details of the ordering information for the B1500A. Contact a Keysight sales representative for a quotation and the configurations for the B1505A (10 kV/1500 A model).

Mainframe	
B1500A	Semiconductor/Device Analyzer
Cable length options	
B1500A-015	1.5m cable length
B1500A-030	3.0m cable length
Quick configuration options	
B1500A-A00	Empty for custom configuration
B1500A-A01	Four MPSMU package
B1500A-A02	Four HRSMU package
B1500A-A03	Two MPSMU and two HPSMU package
B1500A-A04	Basic flash memory cell package (two MPSMU, two HRSMU, pulse generator module and accessories)
Add-on module options	
B1500A-A10	Add one HPSMU
B1500A-A11	Add one MPSMU
B1500A-A17	Add one HRSMU
B1500A-A1A	Add one Medium Current SMU (MCSMU) and connection box
B1500A-A1B	Add two Medium Current SMU (MCSMU) and connection box
B1500A-A20	Add one Multi-Frequency Capacitance Measurement Unit (CMU)
B1500A-A25	Add one High Voltage Semiconductor Pulse Generator (HV-SPGU)
B1500A-A28	Add ASU for HRSMU
B1500A-A29	Add ASU for MPSMU
B1500A-A30	Add Waveform Generator/Fast Measurement Unit (WGFMU)
B1500A-A31	Add Waveform Generator/Fast Measurement Unit (WGFMU) with connector adapter
Other Accessories	
N1301A	CMU accessories for B1500
N1301A-100	SMU CMU unify unit (SCUU)
N1301A-102	SMU CMU unify unit cable (3m)
N1301A-110	SMU CMU unify unit magnetic stand
N1301A-200	Guard switch unit (GSWU)
N1301A-201	Guard switch unit cable (1 m)
N1301A-202	Guard switch unit cable (3 m)
B1542A	Pulse IV Package for B1500 / EasyEXPERT

Ordering Information (continued)

Key specifications of configurable SMUs

The precision IV analyzer and advanced device analyzer provides several SMU selections for configuration. The following table indicates the key specification differences between each of the SMUs.

		Precision IV Analyzer		Advanced Device Analyzer	
		E5262A E5263A E5260A	**E5270B**	**B1500A**	**B1505A**
MPSMU (Medium Power SMU)	Max. output	100 V / 200 mA	100 V / 100 mA	100 V / 100 mA	100 V / 100 mA
	Min. resolution	5 pA / 100 µV	10 fA / 0.5 µV	10 fA / 0.5 µV (0.1 fA with optional ASU)	10 fA / 0.5 µV
HPSMU (High Power SMU)	Max. output	200 V / 1 A	200 V / 1 A	200 V / 1 A	200 V / 1 A
	Min. resolution	5 pA / 100 µV	5 pA / 100 µV	10 fA / 2 µV	10 fA / 2 µV
HRSMU (High Resolution SMU)	Max. output	Not supported	100 V / 100 mA	100 V / 100 mA	Not supported
	Min. resolution	Not supported	1 fA / 0.5 µV (0.1 fA with optional ASU)	1 fA / 0.5 µV (0.1 fA with optional ASU)	Not supported
MCSMU (Medium Current SMU)	Max. output	Not supported	Not supported	30 V / 100 mA (1 A pulse)	30 V / 100 mA (1 A pulse)
	Min. resolution	Not supported	Not supported	10 pA / 0.2 µV	10 pA / 0.2 µV
HCSMU (High Current SMU)	Max. output	Not supported	Not supported	Not supported	40 V / 1 A (20 A pulse)
	Min. resolution	Not supported	Not supported	Not supported	10 pA / 0.2 µV
HVSMU (High Voltage SMU)	Max. output	Not supported	Not supported	Not supported	3000 V / 8 mA
	Min. resolution	Not supported	Not supported	Not supported	10 pA / 200 µV
Ultra high voltage/high current accessories		Not supported	Not supported	Not supported	Other accessories are available for 10 kV / 1500 A measurement

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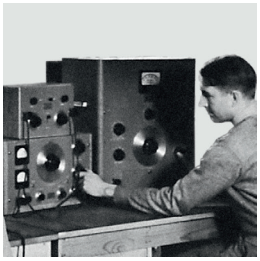

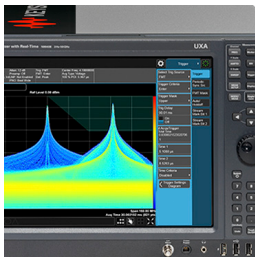

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