

touch, test, invent™



A Whole New Experience in DC Source Measure Testing

Model 2450 Advanced Touchscreen SourceMeter® SMU Instrument

# The Go-to Instrument that Everyone's Got to Have

Whether you're new to Source-Measure Unit (SMU) instruments or have been using them for years, the 2450 SMU eliminates the hassles associated with today's I-V testing solutions. Its advanced touchscreen and simple menu structure make it so intuitively easy to setup and use; you can start making measurements quickly without wasting valuable time paging through a manual and learning how to use the instrument. Plus, you'll appreciate the flexibility and application versatility that makes the 2450 ideal for I-V functional test and characterization of a wide range of today's modern devices, including:

- Semiconductors
- LEDs
- Solar Cells
- Nanomaterials and Devices
- Graphene
- Printed/Flexible Electronics
- Batteries/Electrochemistry
- Sensors
- Biotechnology



## Learn Faster, Work Smarter, Invent Easier

The 2450 SMU Instrument is an innovative, compact I-V solution that offers the capabilities of analyzers, curve tracers, and I-V systems at a fraction of their cost.

- An interactive, capacitive touchscreen enables a superior user experience: Easy to learn; simple to use; faster speed to answer.
- Source and measure voltage, current, and resistance in one tightly-coupled instrument.
- The graphical interface provides I-V curve tracing functionality for much less than the cost of traditional curve tracers.
- Extended low-level voltage, current, and resistance capabilities give the 2450 the application versatility to truly make it the SMU for everyone.

All this, combined with proven Keithley SMU precision and accuracy, equip the 2450 for today's challenges as well as those yet to evolve. This integrated I-V instrument is a sound investment for the future that's affordable today. With its intuitive user experience, performance, and versatility, the 2450 will be the favorite go-to instrument in your lab now and for years to come.

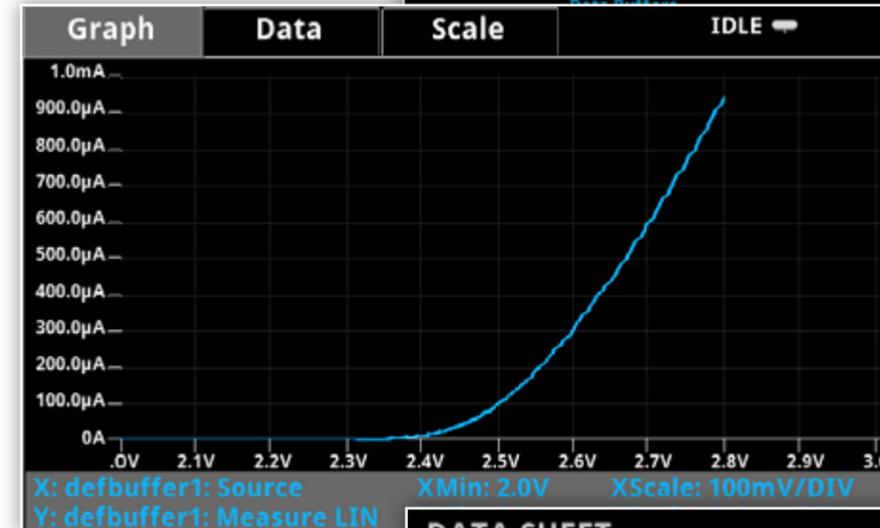
# Get More Done in Less Time

The 2450 takes a giant step for test and measurement into today's world of state of the art smart technology. Unlike conventional instruments that have dedicated pushbutton technology and small, obscure, limited-character displays, the 2450 features an advanced, full-color, five-inch capacitive touchscreen with multi-point, pan-pinch-zoom-swipe operation that is incredibly easy to use right from power-on. A built-in, context-sensitive help system minimizes the need to page through a manual to learn the instrument and develop your measurement applications. A new, icon-based menu system eliminates the cumbersome, multi-layer menu structures typically used on soft key-based instruments, so you're ready to make measurements in just two configuration steps, further optimizing overall speed and productivity.

Home page advanced source and measure display details instrument status, enables you to change ranges, set source values, and protection levels for fast experimentation.



Icon-based menu system can reduce configuration steps by as much as 50% and eliminates cumbersome, multi-layer menu structures.



Full data display, charting, and export to a spreadsheet environment let you convert raw data to useful information.

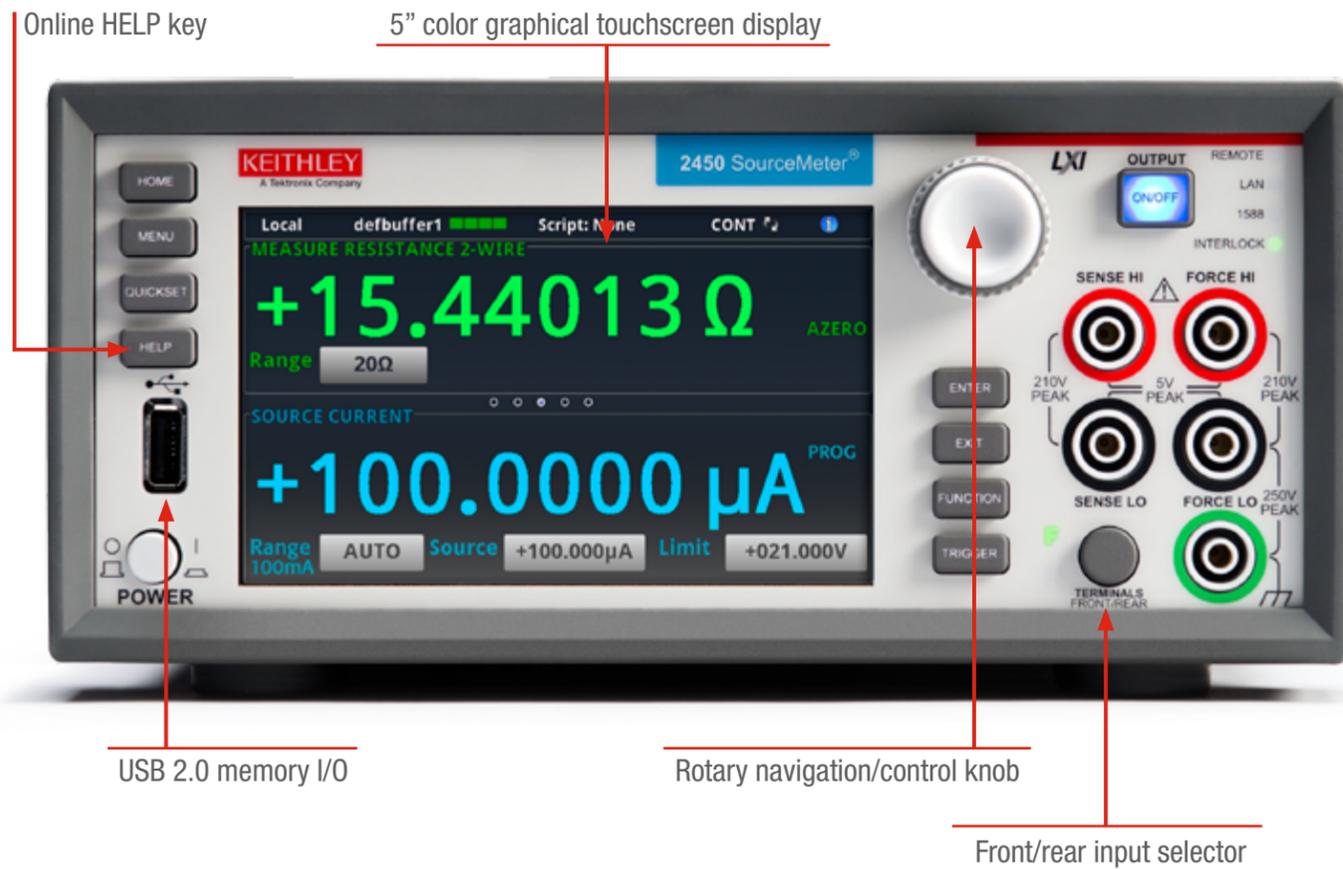
**DATA SHEET**

Buffer: defbuffer1 [Up Arrow] [Down Arrow] [Jump] [Refresh]

	Time	Source	Measure
1	05/08 09:50	0	-2.51326e-07
2	09:50:03.6	0.1	6.38803e-05
3	09:50:05.3	0.2	0.000127991
4	09:50:05.8	0.3	0.00019225
5	09:50:06.4	0.4	0.000256259
6	09:50:06.9	0.5	0.000320488
7	09:50:07.5	0.6	0.000384533
8	09:50:08.0	0.7	0.000448547
9	09:50:08.6	0.8	0.000512793
10	09:50:09.1	0.9	0.000576823
11	09:50:09.7	1	0.000641066

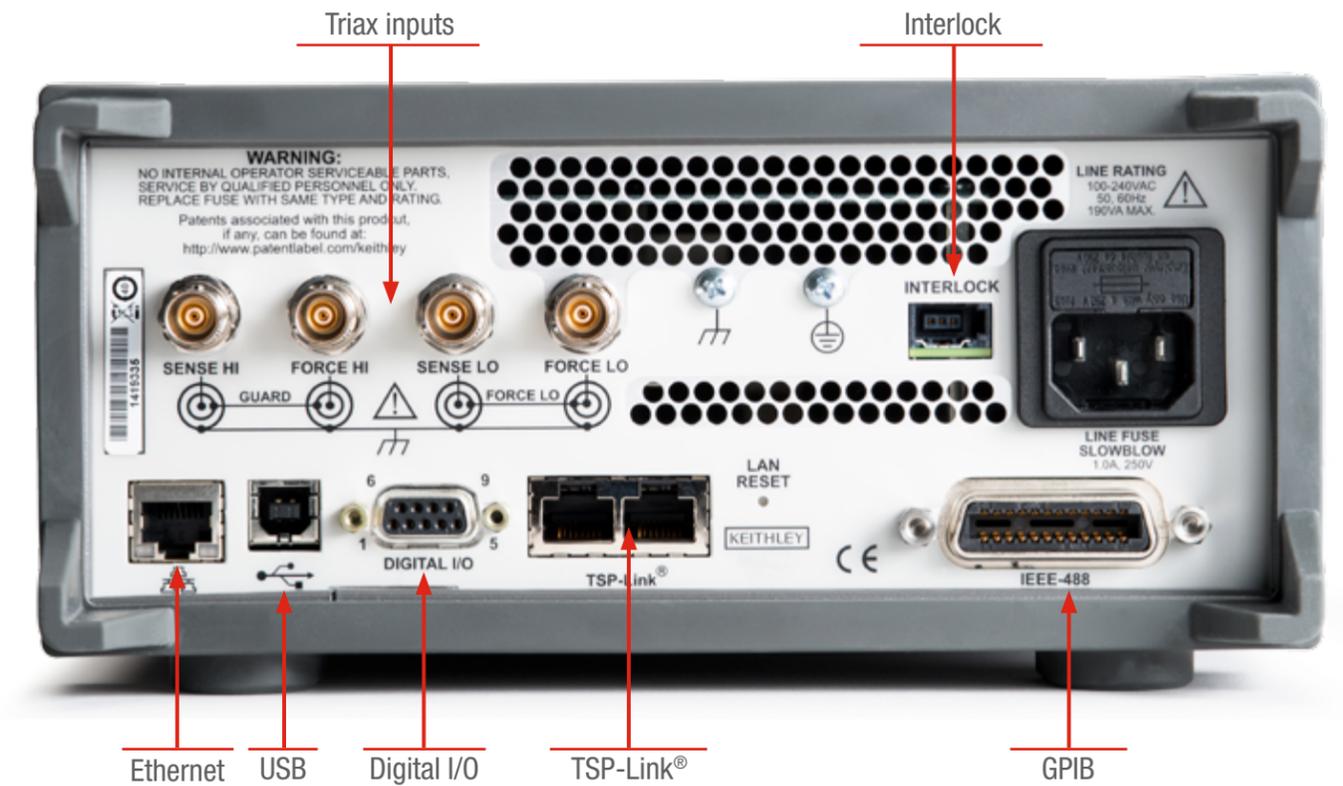
## A Smart Toolkit Beyond the Touchscreen

Speed, ease-of-use, and usability don't stop with the 2450 advanced touchscreen. Its front panel includes a HELP key, rotary navigation/control knob, front/rear input selector button, and banana jacks for basic bench applications. A USB 2.0 memory I/O port makes it easy to store data, save instrumentation configurations, load test scripts, and upgrade the system.



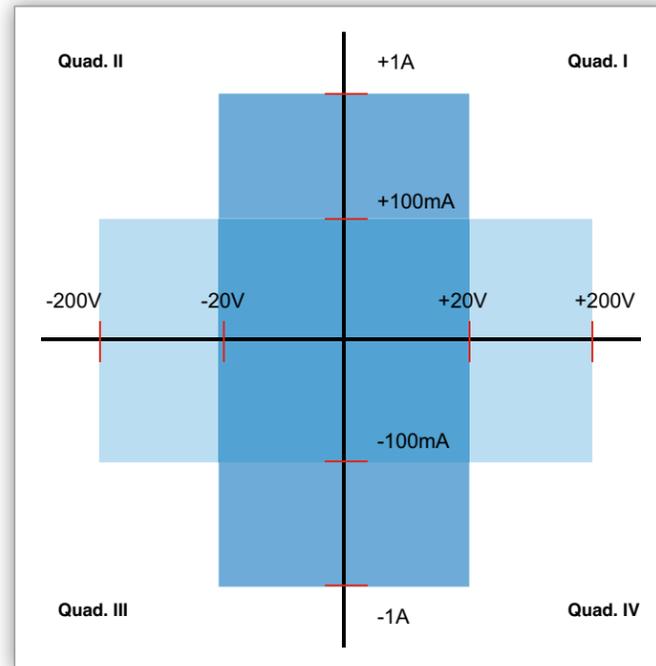
## Comprehensive Built-in Connectivity Saves Money

Optimized for signal integrity, the 2450 rear panel features built-in triax connections for system applications and low level measurement performance, eliminating the need to invest in additional adapter accessories. The TSP-Link® feature makes it convenient and easy to configure multiple instrument test solutions. The availability of Ethernet/LXI, USB, and GPIB connectivity help reduce the overall cost of test.



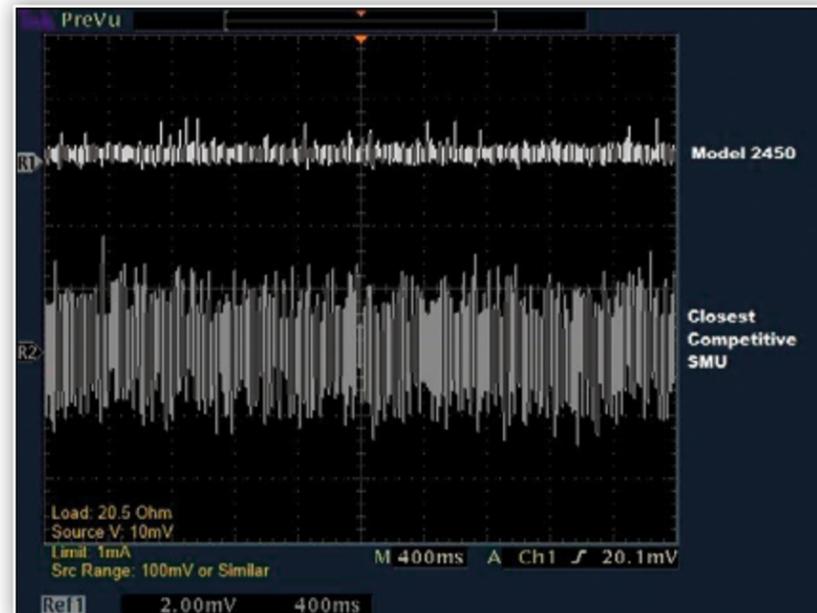
## Proven Precision, Accuracy, and Performance

The 2450 is based on the proven analog performance of Keithley's Model 2400 SourceMeter SMU Instrument and offers a highly flexible, four-quadrant voltage and current source/load coupled with precision voltage and current meters. This fourth-generation member of Keithley's award-winning SMU family provides the superior precision, resolution, accuracy, and dependability that you've come to expect from Keithley SMU instruments.



### Enhanced Sensitivity Reduces the Need for Expensive Low Level Instruments

- Lower current and voltage measurement ranges (100nA, 10nA, and 20mV)
- Two times lower wideband noise - ideal for testing next-generation devices
- Superior versatility saves money and serves more applications



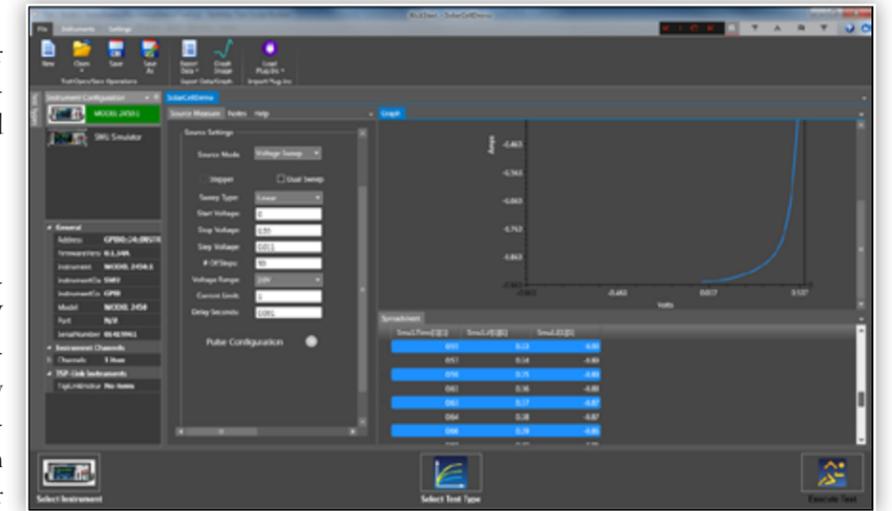
With significantly lower wideband noise than its closest competitor, the 2450 is the perfect solution for I-V testing of next-generation devices.

## Software Tools that Maximize Productivity

The 2450 features several software tools for building programmatic test system applications or for fast prototype testing and characterization on your R&D bench.

### Instrument Control without Programming Hassles

Keithley's new instrument and control software helps you quickly setup and perform I-V measurements and then display the measurement data in tables and graphs without any programming. Kickstart Measurement Software lets you easily store data to a disk then export the data to a software environment for more complex analysis.



KickStart Measurement Software lets the novice or experienced SMU user start taking measurements in minutes without any programming.

### Integrated Development Environment

For developing applications using the TSP mode, the 2450 also works with a free software tool that simplifies creating powerful test scripts for programming custom test functions. Keithley's Test Script Builder lets you create, modify, debug, and store your custom test scripts then download them from your PC to the 2450 for saving in its non-volatile memory. Scripts can also be uploaded to the 2450 using a flash drive inserted into the front panel USB port.

### Unmatched Programming Flexibility and System Integration

- Test Script Processor (TSP®) technology executes full test programs from within the instrument, offers channel expansion without a mainframe, and enables parallel test capability
- Standard SCPI programming mode to optimize instrument features
- 2400 SCPI mode provides backward compatibility and preserves existing Model 2400 software investment

# More than You'd Expect from a Source Measure Unit (SMU) Instrument

A SMU instrument is a fully-integrated, all-in-one solution for current-voltage (I-V) testing and characterization. SMU instruments are ordinarily used on an R&D bench or in automatic test systems in both labs and manufacturing operations to perform I-V characterization. Keithley pioneered the development of these individual, compact, bench-top instruments and is the leader in SMU instrument technology today.

A typical SMU instrument can:

- Simultaneously source voltage or current and measure voltage and/or current
- Perform resistance measurements using programmable force voltage or force current values

But, the 2450 incorporates functionality beyond that of a typical SMU instrument. In addition to characteristic SMU functionality, this innovative, compact I-V solution offers the capabilities of analyzers, curve tracers, and I-V systems that cost so much more. Yet, available at a fraction of the price of these solutions, the 2450 is more than affordable. With its intuitive user experience, performance, and application versatility, combined with proven Keithley SMU instrument precision and accuracy, the 2450 will become the favorite go-to instrument in your lab – the first time you use it and for years to come.



The 2450 graphical interface provides I-V curve tracing functionality at a fraction of traditional curve tracer cost.

# Condensed Specifications

## Voltage Specifications

Range	Source			Measure		
	Resolution	Accuracy (23° ±5°C) 1 Year ±(% setting + volts)	Noise (RMS) (<10Hz)	Resolution	Input Resistance	Accuracy (23° ±5°C) 1 Year ±(% rdg. + volts)
20.00000 mV	500 nV	0.100% + 200 μV	1 μV	10 nV	>10 GΩ	0.100% + 150 μV
200.0000 mV	5 μV	0.015% + 200 μV	1 μV	100 nV	>10 GΩ	0.012% + 200 μV
2.000000 V	50 μV	0.020% + 300 μV	10 μV	1 μV	>10 GΩ	0.012% + 300 μV
20.00000 V	500 μV	0.015% + 2.4 mV	100 μV	10 μV	>10 GΩ	0.015% + 1 mV
200.0000 V	5 mV	0.015% + 2.4 mV	1 mV	100 μV	>10 GΩ	0.015% + 10 mV

## Current Specifications

Range	Source			Measure		
	Resolution	Accuracy (23° ±5°C) 1 Year ±(% setting + amps)	Noise (RMS) (<10Hz)	Resolution	Voltage Burden	Accuracy (23° ±5°C) 1 Year ±(% rdg. + amps)
10.00000 nA	500 fA	0.100% + 100 pA	500 fA	10 fA	<100 μV	0.10% + 50 pA
100.0000 nA	5 pA	0.060% + 150 pA	500 fA	100 fA	<100 μV	0.060% + 100 pA
1.000000 μA	50 pA	0.025% + 400 pA	5 pA	1 pA	<100 μV	0.025% + 300 pA
10.00000 μA	500 pA	0.025% + 1.5 nA	40 pA	10 pA	<100 μV	0.025% + 700 pA
100.0000 μA	5 nA	0.020% + 1.5 nA	400 pA	100 pA	<100 μV	0.02% + 6 nA
1.000000 mA	50 nA	0.020% + 1.5 nA	5 nA	1 nA	<100 μV	0.02% + 60 nA
10.00000 mA	500 nA	0.020% + 1.5 μA	40 nA	10 nA	<100 μV	0.02% + 600 nA
100.0000 mA	5 μA	0.025% + 1.5 μA	100 nA	100 nA	<100 μV	0.025% + 6 μA
1.000000 A	50 μA	0.067% + 900 μA	3 μA	1 μA	<100 μV	0.03% + 500 μA

- LXI, USB2.0, GPIB, LAN, TSP-Link® and digital I/O Interfaces are supported
- Refer to [www.keithley.com](http://www.keithley.com) for additional product details, complete specifications, application notes, software, videos, product tours, and other information.

## Ordering Information

**2450** 200V, 1A, 20W SourceMeter Instrument

**2450-NFP** 200V, 1A, 20W SourceMeter Instrument, with No Front Panel

**2450-RACK** 200V, 1A, 20W SourceMeter Instrument, without Handle

**2450-NFP-RACK** 200V, 1A, 20W SourceMeter Instrument, with No Front Panel and No Handle

## Accessories Supplied

**8608** High Performance Test Leads

**USB-B-1** USB Cable, Type A to Type B, 1m (3.3 ft)

**CS-1616-3** Safety Interlock Mating Connector

**CA-180-3A** TSP-Link®/Ethernet Cable

Documentation CD

**2450 QuickStart Guide**

**Test Script Builder** Software (supplied on CD)

**KickStart Startup** Software (supplied on CD)

**LabVIEW®** and **IVI Drivers** (Available on our website at [www.keithley.com](http://www.keithley.com))

## Recommended Services

**2450-3Y-EW** 1-year factory warranty extended to 3 years from date of shipment

**2450-5Y-EW** 1-year factory warranty extended to 5 years from date of shipment

Calibration Standard with CalData ISO 17025 Accredited

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**KEITHLEY**

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