The 2470 High Voltage SourceMeter® Source Measure Unit (SMU) Instrument brings advanced Touch, Test, Invent® technology right to your fingertips. It combines an innovative graphical user interface (GUI) with capacitive touchscreen technology to make testing intuitive and minimize the learning curve to help engineers and scientists learn faster, work smarter, and invent easier. With its 1100 V and 10 fA capability, the 2470 is optimized for characterizing and testing high voltage, low leakage devices, materials, and modules, such as silicon carbide (SiC), gallium nitride (GaN), power MOSFETs, transient suppression devices, circuit protection devices, power modules, batteries, and much more. These new capabilities, combined with Keithley’s decades of expertise in developing high precision, high-accuracy SMU instruments, make the 2470 a “go-to instrument” for high-voltage source and low-current measurement applications in the lab and in the test rack.

Key Features

• Wide coverage up to 1100 V / 1 A DC 20 W max.
• 10 fA measure resolution
• 0.012% basic measure accuracy with 6½-digit resolution
• Five-inch, high resolution capacitive touchscreen GUI
• Source and sink (4-quadrant) operation
• SCPI and TSP® scripting programming modes
• TSP-Link for multi-channel I-V testing
• Front panel input banana jacks; rear panel high-voltage input triaxial connections
• Built-in context-sensitive help
• Front-panel USB 2.0 memory I/O port for transferring data, test scripts, and test configurations
Learn Faster; Work Smarter; Invent Easier

The 2470 features a five-inch, full-color, high resolution touchscreen that supports intuitive operation, helps operators become familiar with the instrument quickly, and optimizes overall speed and productivity. A simple icon-based menu structure reduces the number of steps required to configure a test by as much as 50 percent and eliminates the cumbersome multi-layer menu structures typically used on soft-key instruments. Built-in, context-sensitive help supports intuitive operation and minimizes the need to review a separate manual. These capabilities, combined with the 2470’s high versatility, simplify its operation in both basic and advanced measurement applications, regardless of the user’s previous experience in working with SMU instruments.

All-in-One SMU Instrument

The 2470, Keithley’s fourth generation of SourceMeter SMUs, leverages the proven capabilities of the original 2410 High Voltage SourceMeter SMU Instrument. SMU instruments offer a highly flexible, four-quadrant voltage and current source/load coupled with precision voltage and current measurements. This all-in-one instrument has the capabilities of:

- Precision power supply with V and I readback
- True current source
- Digital multimeter (DCV, DCI, ohms, and power with 6½-digit resolution)
- Precision electronic load
- Trigger controller
Ease of Use Beyond the Touchscreen

In addition to its five-inch color touchscreen, the 2470 front panel offers a variety of features that enhance its speed, user-friendliness, and learnability, including a USB 2.0 memory I/O port, a HELP key, a rotary navigation/control knob, a front/rear input terminal selector button, and banana jacks for basic bench applications. The USB 2.0 memory port simplifies storing test results and instrument configurations, uploading test scripts into the instrument, and installing system upgrades. All front-panel buttons are backlit to enhance visibility in low-light environments.

Four Quick Setup modes simplify instrument setup. With one touch, the instrument can be quickly configured for various operating modes without the need to configure the instrument indirectly for this operation.

Comprehensive Built-in Connectivity

Rear panel access to rear-input connectors, remote control interfaces (GPIB, USB 2.0, and LXI/Ethernet), a D-sub 9-pin digital I/O port (for internal/external trigger signals and handler control), instrument interlock connector, and TSP-Link® connectors make it simple to configure multiple instrument test solutions and eliminate the need to invest in additional adapter accessories.
Convert Raw Data to Information

A full graphical plotting window converts raw data and displays it immediately as useful information, such as semiconductor I-V curves and waveforms. Using the 2470's Sheet view, test data can also be displayed in tabular form. The instrument supports exporting data to a spreadsheet for further analysis, dramatically improving productivity for research, benchtop testing, device qualification, and debugging.

TriggerFlow® Building Blocks for Instrument Control and Execution

The 2470 incorporates Keithley's TriggerFlow triggering system, which provides user control of instrument execution. TriggerFlow diagrams are created in much the same way that flow charts are developed, using four building blocks:

- **Wait** – Waits for an event to occur before the flow continues
- **Branch** – Branches when a condition has been satisfied
- **Action** – Initiates an action in the instrument, for example, measure, source, delay, set digital I/O, etc.
- **Notify** – Notifies other equipment that an event has occurred

A TriggerFlow model using a combination of these building blocks can be created from the front panel or by sending remote commands. With the TriggerFlow system, users can build triggering models from very simple to complex with up to 255 block levels. The 2470 also includes basic triggering functions, including immediate, timer, and manual triggering.
Unmatched System Integration and Programming Flexibility

When a 2470 is configured into a multi-channel I-V test system, its embedded Test Script Processor (TSP®) allows it to run test scripts, so users can create powerful measurement applications with significantly-reduced development times. TSP technology also offers channel expansion without a mainframe. Keithley’s TSP-Link® channel expansion bus can connect multiple 2470s and other TSP instruments, including Keithley’s other graphical SourceMeter instruments (2450, 2460, 2461), Keithley’s DMM7510, DMM6500, and DAQ6510 graphical multimeters, Series 2600B System SourceMeter SMU instruments, and Series 3700A Switch/Multimeter systems, in a master-subordinate configuration that operates as one integrated system. The TSP-Link expansion bus supports up to 32 units per GPIB or IP address, making it easy to scale a system to fit an application’s particular requirements.

Parallel Test Capability

The TSP technology in the 2470 supports testing multiple devices in parallel to meet the needs of device research, advanced semiconductor lab applications, and even high throughput production test. This parallel testing capability allows each instrument in the system to run its own complete test sequence, creating a fully multi-threaded test environment. The number of tests that can be run in parallel on a graphical SourceMeter can be as high as the number of instruments in the system.

Typical Applications

Ideal for current/voltage characterization and functional test of a wide range of today’s modern electronics and devices, including:

- **Devices**
  - Power semiconductors and materials: SiC, GaN, power MOSFETs, power diodes
  - IGBT
  - Thyristors, SCRs
  - Transient suppression devices
  - Circuit protection devices: TVS, MOVs, fuses, etc.
  - Connectors, switches, relays
  - Power management modules
  - Batteries

- **Tests**
  - I-V characterization
  - Forward voltage
  - Breakdown voltage
  - Leakage current
  - Isolation
  - Hi-Pot
  - Dielectric withstanding
Datasheet

KickStart start-up software lets users be ready to make measurements in minutes.

Instrument Control

Start-up Software

KickStart instrument control/start-up software enables users to start making measurements in minutes without programming. In most cases, users merely need to make some quick measurements, graph the data, and store the data to disk for later analysis in software environments such as Excel. KickStart offers:

- Instrument configuration control to perform I-V characterization
- Native X-Y graphing, panning, and zooming
- Spreadsheet/tabular viewing of data
- Saving and exporting of data for further analysis
- Saving of test setups
- Screenshot capturing of graphs
- Annotating of tests
- GPIB, USB 2.0, Ethernet compliance

Optional Apps Tailored for your Characterization Needs

The 2470 is an excellent tool to define nearly any DC test you choose for characterizing materials, electronic devices and modules. For more specific needs, Keithley offers on-instrument software apps that alter the 2470’s behavior, fitting your instrument to your needs. These apps can be installed directly to your 2470 by connecting to Keithley’s KickStart instrument control software and opening the relevant app in KickStart.

I-V Tracer App

Curve tracing analysis is a critical task for many users in the semiconductor development supply chain. Engineers and technicians both hold the traditional curve tracer as the simplest, fastest method for generating characteristic I-V curves on a device. They are heavily used by engineers in failure analysis and incoming inspection to qualify parts, identify counterfeit devices, and to quickly identify the location of a failure on damaged devices. SMUs have typically been limited to predefined sweeps with longer set up times than curve tracers — until I-V Tracer.

Keithley’s I-V Tracer app leverages the touchscreen and front-panel knob of the 2470 to allow precise, live control over the SMU output while viewing I-V results of 2 terminal...
devices. At each individual output level current and voltage are measured and plotted. The small footprint of the SMU enables portable bench top use, reserving high power (kW) traditional curve tracers for special cases. The power envelope of the 2470 allows it to comfortably operate in the low power range of traditional curve tracers like the Tektronix 576 and Tektronix 370A, while offering enhanced low current measurements.

I-V Tracer capabilities with the 2470:

- Use the full power envelope of the 2470 (max 1000 V or 1 A)
- 1000 V range allows careful tracing into reverse breakdown behavior
- Trace by sourcing voltage or current, positive or negative
- 2 or 4-wire sense
- Compare mode for verifying against a reference device
- Reading table view to see exact measurements
- Easily copy curves and settings to your PC with KickStart

Simplified Programming with Ready-to-Use Instrument Drivers

For those who prefer to create their own customized application software, native National Instruments LabVIEW® drivers, and IVI-C and IVICOM drivers are available at tek.com/keithley.
## Specifications

### Voltage Specifications\(^1,^2\)

<table>
<thead>
<tr>
<th>Range (^4)</th>
<th>Resolution</th>
<th>Source</th>
<th>Measure (^3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Accuracy (^5) 23 °C ± 5 °C, 1 Year ±(% setting + volts)</td>
<td>Noise (RMS) &lt;10 Hz</td>
</tr>
<tr>
<td>200.0000 mV</td>
<td>5 μV</td>
<td>0.015% + 200 μV</td>
<td>2 μV</td>
</tr>
<tr>
<td>2.000000 V</td>
<td>50 μV</td>
<td>0.020% + 300 μV</td>
<td>10 μV</td>
</tr>
<tr>
<td>20.0000 V</td>
<td>500 μV</td>
<td>0.015% + 2.4 mV</td>
<td>100 μV</td>
</tr>
<tr>
<td>200.000 V</td>
<td>5 mV</td>
<td>0.015% + 24 mV</td>
<td>1 mV</td>
</tr>
<tr>
<td>1000.000 V</td>
<td>50 mV</td>
<td>0.02% + 100 mV</td>
<td>20 mV</td>
</tr>
</tbody>
</table>

Temperature Coefficient \(\pm (0.15 \times \text{accuracy specification})/°C\), 0 °C to 18 °C and 28 °C to 50 °C

### Current Specifications\(^1,^2\)

<table>
<thead>
<tr>
<th>Range (^4)</th>
<th>Resolution</th>
<th>Source</th>
<th>Measure (^3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Accuracy (^5) 23 °C ± 5 °C, 1 Year ±(% reading + amps)</td>
<td>Noise (RMS) &lt;10 Hz</td>
</tr>
<tr>
<td>10.0000 nA</td>
<td>500 fA</td>
<td>1.00% + 200 fA</td>
<td>500 fA</td>
</tr>
<tr>
<td>100.000 nA</td>
<td>5 pA</td>
<td>0.060% + 250 pA</td>
<td>500 fA</td>
</tr>
<tr>
<td>1.00000 μA</td>
<td>50 pA</td>
<td>0.025% + 400 pA</td>
<td>5 pA</td>
</tr>
<tr>
<td>10.0000 μA</td>
<td>500 pA</td>
<td>0.025% + 1.5 nA</td>
<td>40 pA</td>
</tr>
<tr>
<td>100.000 μA</td>
<td>5 nA</td>
<td>0.020% + 15 nA</td>
<td>400 pA</td>
</tr>
<tr>
<td>1.00000 mA</td>
<td>50 nA</td>
<td>0.020% + 150 nA</td>
<td>5 nA</td>
</tr>
<tr>
<td>10.0000 mA</td>
<td>500 nA</td>
<td>0.020% + 1.5 μA</td>
<td>40 nA</td>
</tr>
<tr>
<td>100.000 mA</td>
<td>5 μA</td>
<td>0.025% + 15 μA</td>
<td>100 nA</td>
</tr>
<tr>
<td>1.00000 A</td>
<td>50 μA</td>
<td>0.067% + 900 μA</td>
<td>10 μA</td>
</tr>
</tbody>
</table>

Temperature Coefficient \(\pm (0.15 \times \text{accuracy specification})/°C\), 0 °C to 18 °C and 28 °C to 50 °C

### Notes
1. Speed = 1 PLC.
2. All specifications are guaranteed with output ON.
3. Accuracies apply to 2-wire and 4-wire modes when properly zeroed. For the 200 mV and 1 A ranges, the voltage burden may exceed the specification in 2-wire mode.
4. Maximum display and programming ranges are 5% overrange for voltage, except for the 1000 V range, which is 10% overrange (1100 V), and 5% overrange for current (for example, 1.05 A on the 1 A range).
5. For sink mode, accuracy is ±(0.15% + offset × 4) except for 1 A range, accuracy is ± (1.5% + offset × 8).
6. Rear-panel triaxial connections only.

### Resistance Measurement Accuracy (Local Or Remote Sense)\(^7,^8,^9\)

<table>
<thead>
<tr>
<th>Range</th>
<th>Default Resolution (^10)</th>
<th>Default Test Current</th>
<th>Normal Accuracy 23 °C ± 5 °C, 1 Year ± (% reading + ohms)</th>
<th>Enhanced Accuracy 23 °C ± 5 °C, 1 Year ± (% reading + ohms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(&lt; 2.000000 \Omega) 12</td>
<td>1 μΩ</td>
<td>User-defined</td>
<td>Source I(<em>\text{ACC}) + Meas V(</em>\text{ACC})</td>
<td>Meas I(<em>\text{ACC}) + Meas V(</em>\text{ACC})</td>
</tr>
<tr>
<td>20.0000 Ω</td>
<td>10 μΩ</td>
<td>100 mA</td>
<td>0.098% + 0.003 Ω</td>
<td>0.073% + 0.001 Ω</td>
</tr>
<tr>
<td>200.0000 Ω</td>
<td>100 μΩ</td>
<td>10 mA</td>
<td>0.077% + 0.03 Ω</td>
<td>0.053% + 0.01 Ω</td>
</tr>
<tr>
<td>200.000 kΩ</td>
<td>1 mΩ</td>
<td>1 mA</td>
<td>0.066% + 0.3 Ω</td>
<td>0.045% + 0.1 Ω</td>
</tr>
<tr>
<td>20.0000 kΩ</td>
<td>10 mΩ</td>
<td>100 μA</td>
<td>0.063% + 3 Ω</td>
<td>0.043% + 1 Ω</td>
</tr>
<tr>
<td>200.000 kΩ</td>
<td>100 mΩ</td>
<td>10 μA</td>
<td>0.065% + 30 Ω</td>
<td>0.046% + 10 Ω</td>
</tr>
<tr>
<td>2.00000 MΩ</td>
<td>1 Ω</td>
<td>1 μA</td>
<td>0.11% + 300 Ω</td>
<td>0.049% + 100 Ω</td>
</tr>
<tr>
<td>20.0000 MΩ</td>
<td>10 Ω</td>
<td>1 μA</td>
<td>0.11% + 1 kΩ</td>
<td>0.052% + 500 Ω</td>
</tr>
<tr>
<td>200.000 MΩ 13</td>
<td>100 Ω</td>
<td>100 nA</td>
<td>0.655% + 10 kΩ</td>
<td>0.349% + 5 kΩ</td>
</tr>
<tr>
<td>(&gt; 200.000 \Omega) 12, 13</td>
<td>—</td>
<td>User-defined</td>
<td>Source I(<em>\text{ACC}) + Meas V(</em>\text{ACC})</td>
<td>Meas I(<em>\text{ACC}) + Meas V(</em>\text{ACC})</td>
</tr>
</tbody>
</table>
Temperature Coefficient

± (0.15 × accuracy specification)/°C 0 °C to 18 °C and 28 °C to 50 °C

Source Current, Measure Resistance Mode

Total uncertainty = I source accuracy + V measure accuracy (4-wire remote sense)

Source Voltage, Measure Resistance Mode

Total uncertainty = V source accuracy + I measure accuracy (4-wire remote sense)

Guard Output Impedance

≥ 300 Ω typical

Notes

7. Speed = 1 PLC.
8. All specifications are guaranteed with output ON.
9. Accuracies apply to 2-wire and 4-wire modes when properly zeroed.
10. Measure resolution 6.5 digits.
11. Source readback enabled; offset compensation on.
12. Source current, measure resistance or source voltage, measure resistance only.
13. Rear-panel triaxial connections only.

Supplemental Specifications

Overrange

105% of range for 200 mV to 200 V, source and measure ranges; 110% of range for 1000 V, source and measure ranges

Regulation

Voltage

Line: 0.01% of range
Load: 0.01% of range + 100 µV

Current

Line: 0.01% of range
Load: 0.01% of range + 100 pA

Source Limits

Voltage Source Current Limit
Bipolar current limit set with a single value
Minimum value is 10% of range

Current Source Voltage Limit
Bipolar voltage limit set with a single value
Minimum value is 10% of range

Voltage Limit/Current Limit Accuracy
Add 0.3% of range and ±0.02% of reading to base specification

Overshoot

Voltage Source
< 0.1% typical
Step size = Full scale, resistive load, 20 V range, 10 mA current limit

Current Source
< 0.1% typical
Step size = Full scale, resistive load of 10 kΩ, 1 mA range, 20 V voltage limit

Range Change Overshoot
Overshoot into a fully resistive 100 kΩ load, 10 Hz to 20 MHz bandwidth, adjacent ranges: 250 mV typical

Output Settling Time
Time required to reach within 0.1% of final value: 20 V range, 100 mA current limit: < 200 µs typical

Maximum Slew Rate
0.2 V/µs, 200 V range, 100 mA limit into a 2 kΩ load (typical)
0.5 V/µs, 1000 V range, 10 mA limit into a 100 kΩ load (typical)

Overvoltage Protection
User-selectable values, 10% tolerance; factory default = none

Voltage Source Noise
10 Hz to 20 MHz (RMS): 4 mV typical into a resistive load

Common Mode Voltage
250 V DC

Common Mode Isolation
> 1 GΩ, < 1000 pF

Notes

14. High capacitance mode off.
Noise Rejection (typical)

<table>
<thead>
<tr>
<th>NPLC</th>
<th>NMRR</th>
<th>CMRR</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01</td>
<td>—</td>
<td>60 dB</td>
</tr>
<tr>
<td>0.1</td>
<td>—</td>
<td>60 dB</td>
</tr>
<tr>
<td>1</td>
<td>60 dB</td>
<td>100 dB*</td>
</tr>
</tbody>
</table>

* Except 10 nA and 100 nA current ranges ~90 dB

Load Impedance

- **Normal Mode**: 20 nF typical
- **High-Capacitance Mode**: Stable into 1 μF typical (specification only valid for ranges ≥100 μA)

Maximum Voltage Drop Between Force and Sense Terminals

5 V

Maximum Sense Lead Resistance

1 MΩ for rated accuracy

Sense Input Impedance

> 10 GΩ typical

Guard Offset Voltage

< 300 μV typical

**System Measurement Speeds**

Reading rates (readings per second) typical for 60 Hz (50 Hz), script (TSP) programmed

<table>
<thead>
<tr>
<th>NPLC</th>
<th>Trigger Origin</th>
<th>Measure to Memory</th>
<th>Measure to GPIB</th>
<th>Measure to USB</th>
<th>Measure to LAN</th>
<th>Source Measure to Memory</th>
<th>Source measure sweep to GPIB</th>
<th>Source Measure Sweep to USB</th>
<th>Source Measure Sweep to LAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01</td>
<td>Internal</td>
<td>3150 (2800)</td>
<td>2760 (2570)</td>
<td>2825 (2570)</td>
<td>2740 (2530)</td>
<td>1710 (1620)</td>
<td>1620 (1540)</td>
<td>1630 (1540)</td>
<td>1620 (1540)</td>
</tr>
<tr>
<td>0.01</td>
<td>External</td>
<td>2170 (2050)</td>
<td>2120 (2003)</td>
<td>2170 (2010)</td>
<td>2100 (1990)</td>
<td>1670 (1590)</td>
<td>1580 (1500)</td>
<td>1590 (1510)</td>
<td>1580 (1510)</td>
</tr>
<tr>
<td>0.1</td>
<td>Internal</td>
<td>540 (460)</td>
<td>530 (450)</td>
<td>530 (450)</td>
<td>470 (410)</td>
<td>470 (410)</td>
<td>470 (400)</td>
<td>470 (400)</td>
<td>470 (400)</td>
</tr>
<tr>
<td>0.1</td>
<td>External</td>
<td>500 (430)</td>
<td>490 (420)</td>
<td>500 (425)</td>
<td>480 (420)</td>
<td>450 (400)</td>
<td>460 (390)</td>
<td>460 (390)</td>
<td>410 (350)</td>
</tr>
<tr>
<td>1.00</td>
<td>Internal</td>
<td>59 (49)</td>
<td>59 (49)</td>
<td>59 (49)</td>
<td>58 (48)</td>
<td>58 (48)</td>
<td>58 (48)</td>
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<tr>
<td>1.00</td>
<td>External</td>
<td>58 (48)</td>
<td>57 (48)</td>
<td>58 (48)</td>
<td>58 (48)</td>
<td>57 (48)</td>
<td>57 (48)</td>
<td>55 (48)</td>
<td>55 (48)</td>
</tr>
</tbody>
</table>

Reading rates (readings per second) typical for 60 Hz (50 Hz), SCPI programmed

<table>
<thead>
<tr>
<th>NPLC</th>
<th>Trigger Origin</th>
<th>Measure to Memory</th>
<th>Measure to GPIB</th>
<th>Measure to USB</th>
<th>Measure to LAN</th>
<th>Source Measure to Memory</th>
<th>Source measure sweep to GPIB</th>
<th>Source Measure Sweep to USB</th>
<th>Source Measure Sweep to LAN</th>
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</thead>
<tbody>
<tr>
<td>0.01</td>
<td>Internal</td>
<td>3040 (2800)</td>
<td>3000 (2760)</td>
<td>3000 (2760)</td>
<td>3010 (2710)</td>
<td>1710 (1630)</td>
<td>1610 (1544)</td>
<td>1440 (1380)</td>
<td>1690 (1590)</td>
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<tr>
<td>0.01</td>
<td>External</td>
<td>2320 (2166)</td>
<td>2290 (2140)</td>
<td>2340 (2150)</td>
<td>2290 (2130)</td>
<td>1680 (1590)</td>
<td>1560 (1525)</td>
<td>1410 (1380)</td>
<td>1660 (1560)</td>
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<tr>
<td>0.1</td>
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<td>540 (460)</td>
<td>540 (460)</td>
<td>540 (460)</td>
<td>540 (460)</td>
<td>470 (410)</td>
<td>470 (410)</td>
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<td>58 (48)</td>
<td>58 (48)</td>
<td>57 (47)</td>
<td>58 (48)</td>
</tr>
</tbody>
</table>

Notes

15. Reading rates applicable for voltage or current measurements, autozero off, autorange off, filter off, binary reading format, and source readback off.
16. SCPI programming mode.
General Characteristics

(Default mode unless specified)

Factory Default Standard Power-Up Setting
SCPI mode

Source Output Modes
Fixed DC level
Memory/configuration list (mixed function)
Stair (linear and logarithmic)

Memory Buffer
>5,000,000 readings with selected measured values and timestamp

Real-Time Clock
Lithium battery backup (more than 3 years of battery life)

Remote Interfaces
GPMB: IEEE Std 488.1 compliant; supports IEEE Std 488.2 common commands and status model topology
USB device (rear panel, type B): 2.0 full-speed USBTMC
USB host (front panel, type A): USB 2.0, support for flash drives, FAT32
Ethernet: RJ-45 connector, 10/100 BT

IP Configuration
Static or DHCP

Expansion Interface
The TSP-Link® expansion interface allows TSP-enabled instruments to trigger and communicate with each other

LXI Compliance
LXI version 1.4 Core 2011

TSP Mode
Embedded Test Script Processor (TSP) accessible from any host interface

Display
Five-inch capacitive touch, color TFT WVGA (800 × 480) with LED backlight

Input Signal Connections
Front: Banana, Rear: High-voltage triaxial

Programmability
SCPI or TSP command sets

Interlock
Active high-input

Digital I/O
Lines: Six input/output, user-defined, for digital I/O or triggering
Connector: 9-pin female D
Input Signal Levels: 0.7 V (maximum logic low), 3.7 V (minimum logic high)
Input Voltage Limits: –0.25 V (absolute minimum), +5.25 V (absolute maximum)
Maximum Source Current: +2.0 mA at > 2.7 V (per pin)
Maximum Sink Current: –50 mA at 0.7 V (per pin, solid-state fuse protected)
5 V Power Supply Pin: Limited to 500 mA at > 4 V (solid-state fuse protected)
Handler: User-definable start of test, end of test, four category bits

Cooling
Forced air, variable speed

Overtemperature Protection
Internally sensed temperature overload puts instrument in standby mode

Power Supply
100 VRMS to 240 VRMS, 50 Hz or 60 Hz (automatically detected at power up)

VA Rating
220 VA maximum

Altitude
Maximum 2000 meters (6562 feet) above sea level

EMC
Conforms to European Union EMC Directive

Safety
NRTL listed to UL61010-1 and UL61010-2-30; conforms to European Union Low Voltage Directive

RoHS
Conforms to European Union Restriction on Hazardous Substances Directive

Vibration
MIL-PRF-28800F Class 3 Random

Warm up
One hour to rated accuracies
Dimensions

With handle and bumpers: 106 mm × 255 mm × 425 mm (4.18 in. high × 10.05 in. wide × 16.75 in. deep)
Without handle and bumpers: 88 mm × 213 mm × 403 mm (3.46 in. high × 8.39 in. wide × 15.87 in. deep)

Weight

With handle and bumpers: 4.54 kg (10 lb)
Without handle and bumpers: 4.08 kg (9.0 lb)

Environment

Operating: 0 °C to 50 °C, 70% relative humidity up to 35 °C; derate 3% relative humidity/°C, 35 °C to 50 °C
Storage: −25 °C to 65 °C
Pollution Category: 2

Supplied Accessories

8608  High Performance Test Leads
USB-B-1  USB Cable, Type A to Type B, 1 m (3.3 ft)
CS-1616-3  Safety Interlock Mating Connector
17469460X  TSP-Link/Ethernet Cable
2470 QuickStart Guide
Test Script Builder Software (available at www.tektronix.com)
LabVIEW and IVI Drivers (available at www.tektronix.com)

Available Accessories

Test Leads and Probes

8605  High Performance Modular Test Leads
8606  High Performance Modular Probe Kit
8608  High Performance Test Leads

Cables, Connectors, Adapters

TRX-1100V-BAN  HV Triax to Banana Adapter. Converts the 4 triax connectors on the rear panel to 5 banana jacks
TRX-1100V-*  3-slot HV Low Noise Triax Cable (0.5 m, 1 m, 2 m, 3 m lengths available)
8607  2-wire, 1000 V Banana Cables, 1 m (3.3 ft)
CS-1616-3  Safety Interlock Mating Connector

Communication Interfaces & Cables

7007-1  Shielded GPIB Cable, 1 m (3.3 ft)
7007-2  Shielded GPIB Cable, 2 m (6.6 ft)
17469460X  TSP-Link Ethernet Cable
KPCI-488LPA  IEEE-488 Interface for PCI Bus
KUSB-488B  IEEE-488 USB-to-GPIB Interface Adapter
USB-B-1  USB Cable, Type A to Type B, 1 m (3.3 ft)
## Triggering and Control

**2450-TLINK**  
DB-9 to Trigger Link Connector Adapter

**8501-1**  
Trigger Link Cable, DIN-to-DIN, 1 m (3.3 ft.)

**8501-2**  
Trigger Link Cable, DIN-to-DIN, 2 m (6.6 ft.)

## Rack Mount Kits

**4299-8**  
Single Fixed Rack Mount Kit

**4299-9**  
Dual Fixed Rack Mount Kit

**4299-10**  
Dual Fixed Rack Mount Kit. Mount one 2450 and one Series 26xxB

**4299-11**  
Dual Fixed Rack Mount Kit. Mount one 2450 and one Series 2400, Series 2000, etc.

## Available Services

**2470-3Y-EW**  
1-year factory warranty extended to 3 years from date of shipment

**2470-5Y-EW**  
1-year factory warranty extended to 5 years from date of shipment

**C/2470-3Y-17025**  
KeithleyCare® 3 Year ISO 17025 Calibration Plan

**C/2470-3Y-DATA**  
KeithleyCare 3 Year Calibration w/Data Plan

**C/2470-3Y-STD**  
KeithleyCare 3 Year STD Calibration Plan

**C/2470-5Y-17025**  
KeithleyCare 5 Year ISO 17025 Calibration Plan

**C/2470-5Y-DATA**  
KeithleyCare 5 Year Calibration w/Data Plan

**C/2470-5Y-STD**  
KeithleyCare 5 Year STD Calibration Plan

**C/NEW DATA**  
Calibration Data for New Units

**C/NEW DATA ISO**  
ISO-17025 Calibration Data for New Units

## Ordering Information

**2470**  
1000 V, 1 A, 20 W SourceMeter SMU Instrument

## Warranty Information

### Warranty Summary

This section summarizes the warranties of the 2470. For complete warranty information, refer to the Tektronix warranty page at [https://www.tek.com/service/warranties/warranty-2](https://www.tek.com/service/warranties/warranty-2). Any portion of the product that is not manufactured by Keithley is not covered by this warranty and Keithley will have no duty to enforce any other manufacturer’s warranties.

### Hardware Warranty

Keithley warrants the Keithley manufactured portion of the hardware for a period of one year from defects in materials or workmanship; provided that such defect has not been caused by use of the Keithley hardware which is not in accordance with the hardware instructions. The warranty does not apply upon any modification of Keithley hardware made by the customer or operation of the hardware outside the environmental specifications.

### Software Warranty

Keithley warrants for the Keithley produced portion of the software or firmware will conform in all material respects with the published specifications for a period of ninety (90) days; provided the software is used on the product for which it is intended in accordance with the software instructions. Keithley does not warrant that operation of the software will be uninterrupted or error-free, or that the software will be adequate for the customer’s intended application. The warranty does not apply upon any modification of the software made by the customer.
Contact Information:

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