Series 2600B

• Tightly integrated, 4-quadrant voltage/current source and measure instruments offer best in class performance with 6½-digit resolution

• Family of models offer industry’s widest dynamic range: 10A pulse to 0.1fA and 200V to 100nV

• Built-in web browser based software enables remote control through any browser, on any computer, from anywhere in the world.

• Compatibility with the Keithley IVy mobile app enables true plug & play I/V characterization and test through any Android device.

• TSP (Test Script Processing) technology embeds complete test programs inside the instrument for best-in-class system-level throughput

• TSP-Link expansion technology for multi-channel parallel test without a mainframe

• Software emulation for Keithley’s Model 2400 SourceMeter SMU Instrument

• USB 2.0, LXI-C, GPIB, RS-232, and digital I/O interfaces

• Free software drivers and development/debug tools

• Optional ACS-Basic semiconductor component characterization software

Perform Quick I-V characterization with Android Devices

The Series 2600B System SourceMeter SMU Instruments are the industry’s leading current/voltage source and measure solutions, and are built from Keithley’s third generation SMU technology. The Series 2600B offers single- and dual-channel models that combine the capabilities of a precision power supply, true current source, 6½-digit DMM, arbitrary waveform generator, pulse generator, and electronic load — all into one tightly integrated instrument. The result is a powerful solution that significantly boosts productivity in applications ranging from bench-top I-V characterization through highly automated production test. Built-in web browser based software enables I-V testing through any computer from anywhere in the world. Or, use your Android smart device to perform plug & play I-V testing with fingertip control with the Keithley IVy application. For automated system applications, the Series 2600B’s Test Script Processor (TSP®) runs complete test programs from inside the instrument for industry-best throughput. In larger, multi-channel applications, Keithley’s TSP-Link® Technology works together with TSP Technology to enable high-speed, SMU-per-pin parallel testing. Because Series 2600B SourceMeter SMU Instruments have fully isolated channels that do not require a mainframe, they can be easily reconfigured and re-deployed as your test applications evolve.

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Perform Quick I-V characterization with Android Devices

The Series 2600B is compatible with the Keithley IVy application that is the fastest and easiest way to perform current-voltage (I-V) characterization, troubleshoot your device under test (DUT), and share the measurement results with others. It allows you to visualize, interact with, and share measurement results without programming, while gaining a deeper understanding of your DUT. These unique capabilities boost productivity across a wide range of applications in R&D, education, QA/FA, and more.
Ordering Information

**2601B** Single-channel System SourceMeter SMU Instrument (3A DC, 10A Pulse)

**2602B** Dual-channel System SourceMeter SMU Instrument (3A DC, 10A Pulse)

**2604B** Dual-channel System SourceMeter SMU Instrument (3A DC, 10A Pulse, Benchtop Version)

**2611B** Single-channel System SourceMeter SMU Instrument (200V, 10A Pulse)

**2612B** Dual-channel System SourceMeter SMU Instrument (200V, 10A Pulse)

**2614B** Dual-channel System SourceMeter SMU Instrument (1fA, 10A Pulse, Benchtop Version)

**2634B** Dual-channel System SourceMeter SMU Instrument (1fA, 10A Pulse, Benchtop Version)

**2635B** Single-channel System SourceMeter SMU Instrument (0.1fA, 10A Pulse)

**2636B** Dual-channel System SourceMeter SMU Instrument (0.1fA, 10A Pulse)

Accessories Supplied

- Operators and Programming Manuals
- 2600-ALG-2: Low Noise Triax Cable with Alligator Clips, 2m (6.6 ft.) (two supplied with 2634B and 2636B, one with 2635B)
- 2600-Kit: Screw Terminal Connector Kit (2601B/2602B/2604B/2611B/2612B/2614B)
- 2600B-800A: Series 2400 Emulation Script for Series 2600B (supplied on USB memory stick)
- 7709-308A: Digital I/O Connector
- CA-180-3A: TSP-Link/Ethernet Cable (two per unit)
- TSP Express Software Tool (embedded)
- Test Script Builder Software (supplied on CD)
- LabVIEW Driver (supplied on CD)
- ACS Basic Edition Software (optional)

Unmatched Throughput for Automated Test with TSP Technology

For test applications that demand the highest levels of automation and throughput, the Model 2600B’s TSP technology delivers industry-best performance. TSP technology goes far beyond traditional test command sequencers...it fully embeds then executes complete test programs from within the SMU instrument itself. This virtually eliminates all the time-consuming bus communications to and from the PC controller, and thus dramatically improves overall test times.

All channels in the TSP-Link system are synchronized to under 500ns.

Model 2400 Software Emulation

The Series 2600B is compatible with test code developed for Keithley’s Model 2400 SourceMeter SMU instrument. This enables an easier upgrade from Model 2400-based test systems to Series 2600B, and can improve test speeds by as much as 80%. In addition, it provides a migration path from SCPI programming to Keithley’s TSP technology, which when implemented can improve test times even more. For complete support of legacy test systems, the Model 2400’s Source-Memory-List test sequencer is also fully supported in this mode.

Third-generation SMU Instrument Design Ensures Faster Test Times

Based on the proven architecture of earlier Series 2600 instruments, the Series 2600B’s SMU instrument design enhances test speed in several ways. For example, while earlier designs used a parallel current ranging topology, the Series 2600B uses a patented series ranging topology, which provides faster and smoother range changes and outputs that settle more quickly.
**Series 2600B**

The Series 2600B SMU instrument design supports two modes of operation for use with a variety of loads. In normal mode, the SMU instrument provides high bandwidth performance for maximum throughput. In high capacitance (high-C) mode, the SMU instrument uses a slower bandwidth to provide robust performance with higher capacitive loads.

**Simplify Semiconductor Component Test, Verification, and Analysis**

The optional ACS Basic Edition software maximizes the productivity of customers who perform packaged part characterization during development, quality verification, or failure analysis. Key features include:

- Rich set of easy-to-access test libraries
- Script editor for fast customization of existing tests
- Data tool for comparing results quickly
- Formulator tool that analyzes captured curves and provides a wide range of math functions

For more information about the ACS Basic Edition software, please refer to the ACS Basic Edition data sheet.

**Powerful Software Tools**

In addition to compatibility with the Keithley IVy smart device app, embedded web browser based software, and optional ACS Basic Edition software, the free Test Script Builder software tool is provided to help users create, modify, debug, and store TSP test scripts. Table 1 describes key features of Series 2600B software tools.

**Three New Dual-Channel Bench-Top Models of Series 2600B Offer Industry-Best Value and Performance**

For applications that do not require leading-edge system-level automation capabilities, Keithley has expanded the Series 2600B to include 3 new value-priced “bench-top” models – the 2604B, 2612B, and 2634B. These models offer similar performance to Models 2602B, 2612B, and 2634B, respectively, but do not include TSP-Link, Contact Check, and Digital I/O capabilities.

**Complete Automated System Solutions**

Keithley’s S500 Integrated Test Systems are highly configurable, instrument-based systems for semiconductor characterization at the device, wafer, or cassette level. Built on our proven Series 2600B System SourceMeter SMU instruments, our S500 Integrated Test Systems provide innovative measurement features and system flexibility, scalable to your needs. The unique measurement capability, combined with the powerful and flexible Automated Characterization Suite (ACS) software, provides a comprehensive range of applications and features not offered on other comparable systems on the market.

When you need to acquire data on a packaged part quickly, the wizard-based user interface of ACS Basic Edition makes it easy to find and run the test you want, like this common FET curve trace test.

The flexible software architecture of ACS Basic Edition allows configuring systems with a wide range of controllers and test fixtures, as well as the exact number of SourceMeter SMU instruments the application requires.

**Table 1. Series 2600B software tools**

<table>
<thead>
<tr>
<th>Feature/Functionality</th>
<th>Keithley IVy Mobile App</th>
<th>Built-in Web Browser Based App</th>
<th>Test Script Builder (TSB)</th>
<th>ACS Basic Edition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Quick I-V characterization tool for bench and lab users to visualize, interact and share measurement data via Android devices.</td>
<td>Built-in web browser based software for I-V characterization.</td>
<td>Custom script writing tool for TSP instruments</td>
<td>Semiconductor characterization software for component test, verification, and analysis</td>
</tr>
<tr>
<td>Capability</td>
<td>Basic</td>
<td>General</td>
<td>Advanced</td>
<td>High Performance</td>
</tr>
<tr>
<td>Supported Hardware</td>
<td>Series 2600B</td>
<td>Series 2600B</td>
<td>Series 2600B, Series 3700</td>
<td>Series 2400, Series 2600B, 4200-SCS</td>
</tr>
<tr>
<td>Supported Buses</td>
<td>Not Applicable</td>
<td>LAN/LXI</td>
<td>GIPIB, RS-232, LAN/LXI, USB</td>
<td>GIPIB, LAN/LXI</td>
</tr>
<tr>
<td>Functionality</td>
<td>Visualize data in time mode, two terminal I-V mode and family of curves modes. Analyze collected data interactively with smart device’s built-in capabilities. Share data instantly via mobile networks/WiFi.</td>
<td>Linear/Log Sweeps, Pulsing, Custom sweeps, Single point source-measures. Note: Uses new 2600B’s new APIs for precision timing and channel synchronization.</td>
<td>Custom scripts with total flexibility, full featured debugger.</td>
<td>Intuitive, wizard-based GUI. Rich set of test libraries, curve trace capability.</td>
</tr>
<tr>
<td>Data Management</td>
<td>.csv and graphic data export</td>
<td>.csv export</td>
<td>User defined</td>
<td>Formulator tool with wide range of math functions</td>
</tr>
<tr>
<td>Installation</td>
<td>Free download from app stores</td>
<td>Not necessary. Embedded in the instrument.</td>
<td>Free Download or CD Install on PC.</td>
<td>Optional purchase</td>
</tr>
</tbody>
</table>

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www.keithley.com
TYPICAL APPLICATIONS
I-V functional test and characterization of a wide range of devices, including:

- Discrete and passive components
  - Two-leaded – Sensors, disk drive heads, metal oxide varistors (MOV's), diodes, zener diodes, sensors, capacitors, thermistors
  - Three-leaded – Small signal bipolar junction transistors (BJTs), field-effect transistors (FETs), and more
- Simple ICs – Optos, drivers, switches, sensors, converters, regulators
- Integrated devices – small scale integrated (SSI) and large scale integrated (LSI)
  - Analog ICs
  - Radio frequency integrated circuits (RFICs)
  - Application specific integrated circuits (ASICs)
  - System on a chip (SOC) devices
- Optoelectronic devices such as light-emitting diodes (LEDs), laser diodes, high brightness LEDs (HBLEDs), vertical cavity surface-emitting lasers (VCSELs), displays
- Wafer level reliability
  - NBTI, TDDB, HCI, electromigration
- Solar Cells
- Batteries
- And more...

In the first and third quadrants, Series 2600B SMU instruments operate as a source, delivering power to a load. In the second and fourth quadrants, they operate as a sink, dissipating power internally.

Models 2601B, 2602B, and 2604B I-V capability

Models 2611B, 2612B, and 2614B I-V capability

Models 2634B, 2635B, and 2636B I-V capability
Series 2600B System SourceMeter® SMU Instruments

SPECIFICATION CONDITIONS

This document contains specifications and supplemental information for the Models 2601B, 2602B, and 2604B System SourceMeter® SMU instruments. Specifications are the standards against which the Models 2601B, 2602B, and 2604B meet these specifications. Supplemental and typical values are non-warranted, apply at 23°C, and are provided solely as useful information.

Accuracy specifications are applicable for both normal and high capacitance modes.

The source and measurement accuracies are specified at the SourceMeter CHANNEL A (2601B, 2602B, and 2604B) or SourceMeter CHANNEL B (2602B and 2604B) terminals under the following conditions:

1. 23°C ±5°C, <70% relative humidity
2. After 2 hour warm-up
3. Speed normal (1 NPLC)
4. A/D auto-zero enabled
5. Remote sense operation or properly zeroed local operation
6. Calibration period = 1 year

SOURCE SPECIFICATIONS

VOLTAGE SOURCES

VOLTAGE PROGRAMMING ACCURACY

<table>
<thead>
<tr>
<th>Range</th>
<th>Programming Resolution</th>
<th>Accuracy (1 Year) 23°C ±5°C ±(% rdg. + volts)</th>
<th>Typical Noise (peak-peak) 0.1Hz–10Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 mV</td>
<td>5 µV</td>
<td>0.02% + 250 µV</td>
<td>20 µV</td>
</tr>
<tr>
<td>1 V</td>
<td>50 µV</td>
<td>0.02% + 400 µV</td>
<td>50 µV</td>
</tr>
<tr>
<td>6 V</td>
<td>50 µV</td>
<td>0.02% + 1.8 mV</td>
<td>100 µV</td>
</tr>
<tr>
<td>40 V</td>
<td>500 µV</td>
<td>0.02% + 12 mV</td>
<td>500 µV</td>
</tr>
</tbody>
</table>

TEMPERATURE COEFFICIENT (0°–18°C and 28°–50°C) ±(0.15 x accuracy specification)/°C. Applicable for normal mode only. Not applicable for high capacitance mode.

MAXIMUM OUTPUT POWER AND SOURCE/SINK LIMITS: 40.4W per channel maximum. ±40.4V @ ±1.0A, ±6.0V @ ±5.0A, four quadrant source or sink operation.

VOLTAGE REGULATION: Line: 0.01% of range. Load: ±0.01% of range + 100mV. Noise: 10Hz–20MHz: <20mV peak-peak (typical), <5mV RMS (typical), 6V range.

CURRENT LIMIT/COMPLIANCE: Bipolar current limit (compliance) set with single value. Minimum value is 10mA. Accuracy same as current source.

OVERSHOOT: <±50µV typical. Step size = 10% to 90% of range, resistive load, maximum current limit/compliance.

GUARD OFFSET VOLTAGE: <±4mV typical. Current <10mA.

ADDITIONAL SOURCE SPECIFICATIONS

TRANSIENT RESPONSE TIME: <70µs for the output to recover to within 0.1% for a 10% to 90% step change in load.

VOLTAGE SOURCE OUTPUT SETTLING TIME: Time required to reach within 0.1% of final value after source level command is processed on a fixed range.

100mV, 1V Ranges: <50µs typical.

6V Range: <100µs typical.

40V Range: <150µs typical.

CURRENT SOURCE OUTPUT SETTLING TIME: Time required to reach within 0.1% of final value after source level command is processed on a fixed range. Values below for I_out × R_load = 1V unless noted.

3A Range: <80µs typical (current less than 2.5A, R_load >2Ω).

1A–10mA Ranges: <80µs typical (R_load >6Ω).

1mA Range: <100µs typical.

100mA Range: <150µs typical.

1A Range: <500µs typical.

1mA Range: <2.5ms typical.

100mA Range: <25ms typical.

DC FLOATING VOLTAGE: Output can be floated up to ±250VDC from chassis ground.

REMOTE SENSE OPERATING RANGE: Bipolar current limit (compliance) set with single value. Maximum voltage between HI and SENSE HI = 3V. Maximum voltage between LO and SENSE LO = 3V.

VOLTAGE OUTPUT HEADROOM: 40V Range: Max. output voltage = 42V – total voltage drop across source leads (maximum 1Ω per source lead).

6V Range: Max. output voltage = 8V – total voltage drop across source leads (maximum 1Ω per source lead).

OVER TEMPERATURE PROTECTION: Internally sensed temperature overload puts unit in standby mode.

VOLTAGE SOURCE RANGE CHANGE OVERSHOOT: <300mV + 0.1% of larger range (typical). Overshoot into an 100Ω load, 20MHz BW.

CURRENT SOURCE RANGE CHANGE OVERSHOOT: <5% of larger range + 500mV/R_load (typical with source setting set to SETTLE_SMOOTH_100mA). See Current Source Output Settling Time for additional test conditions.

NOTES

1. Add 50µV to source accuracy specifications per volt of HI lead drop.
2. High Capacitance Mode accuracy is applicable at 25°C ±5°C only.
3. Full power source operation regardless of load to 30°C ambient. Above 30°C and/or power sink operation, refer to “Operating Boundaries” in the Series 2600B Reference Manual for additional power derating information.
4. For sink mode operation (quadrants II and IV), add 0.06% of limit range to the corresponding current limit and compliance specifications. Specifications apply with sink mode operation enabled.
5. Full power source operation regardless of load to 30°C ambient. Above 30°C and/or power sink operation, refer to “Operating Boundaries” in the Series 2600B Reference Manual for additional power derating information.
6. 10A range accessible only in pulse mode.
7. High Capacitance Mode accuracy is applicable at 25°C ±5°C only.
8. Full power source operation regardless of load to 30°C ambient. Above 30°C and/or power sink operation, refer to “Operating Boundaries” in the Series 2600B Reference Manual for additional power derating information.
9. For sink mode operation (quadrants II and IV), add 0.1% of compliance range and ±0.02% of limit setting to corresponding voltage source specification. For 100mA range add an additional 600µV of uncertainty.
10. Add 150µs when measuring on the 1A range.
11. Add 150µs to source accuracy specifications per volt of HI lead drop.
**SOURCE PULSE SPECIFICATIONS (continued)**

**PULSE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Region</th>
<th>Maximum Current Limit</th>
<th>Maximum Pulse Width</th>
<th>Maximum Duty Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 A @ 40 V DC, no limit</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>1</td>
<td>3 A @ 6 V DC, no limit</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>2</td>
<td>5 A @ 35 V 100 ms 25%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>5 A @ 35 V 4 ms 4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>10 A @ 20 V 1.8 ms 1%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**QUADRANT DIAGRAM:**

- **Region 1:** (A) 40 V
- **Region 2:** (B) 35 V
- **Region 3:** (C) 6 V
- **Region 4:** (D) 40 V

**NOTES**

12. Times measured from the start of pulse to the start off-time; see figure below.

13. Thermally limited in sink mode (quadrants II and IV) and ambient temperatures above 30°C. See power equations in the reference manual for more information.


**CONTACT CHECK**

- **FLEX**
- **MEDIUM**
- **SLOW**

**ADDITIONAL METER SPECIFICATIONS**

- **MAXIMUM LOAD IMPEDANCE:**
  - Normal Mode: 10mF (typical).
  - High Capacitance Mode: 50µF (typical).
- **COMMON MODE VOLTAGE:** 250VDC.
- **OVER RANGE:** 100% of source range, 102% of measure range.
- **MAXIMUM SENSE LEAD RESISTANCE:** 1kΩ for rated accuracy.
- **SENSE INPUT IMPEDANCE:** >10GΩ.

**NOTES**

16. Add 50µs to source accuracy specifications per volt of HI lead drop.

17. De-rate accuracy specifications for NPLC setting < 1 by increasing error term. Add appropriate % of range term using table below.

**ADDITIONAL METER SPECIFICATIONS**

<table>
<thead>
<tr>
<th>NPLC Setting</th>
<th>Range</th>
<th>1V–40V Range</th>
<th>1A–10mA Range</th>
<th>1A–3A Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>0.01</td>
<td>0.01</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>0.04</td>
<td>0.08</td>
<td>0.07</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>0.5%</td>
<td>0.8</td>
<td>0.6</td>
<td>1%</td>
<td>1%</td>
</tr>
</tbody>
</table>

**CURRENT MEASUREMENT ACCURACY**

<table>
<thead>
<tr>
<th>Range</th>
<th>Default Display Resolution</th>
<th>Input Resistance</th>
<th>Accuracy (1 Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 mV</td>
<td>100 mV</td>
<td>&gt;10 GΩ</td>
<td>±(0.05% + 100 µV)</td>
</tr>
<tr>
<td>1 µA</td>
<td>100 µA</td>
<td>&gt;10 GΩ</td>
<td>±(0.02% + 500 µA)</td>
</tr>
<tr>
<td>10 µA</td>
<td>100 µA</td>
<td>&gt;10 GΩ</td>
<td>±(0.02% + 1.5 mA)</td>
</tr>
<tr>
<td>100 µA</td>
<td>100 µA</td>
<td>&gt;10 GΩ</td>
<td>±(0.02% + 25 nA)</td>
</tr>
<tr>
<td>1 A</td>
<td>10 A</td>
<td>&gt;10 GΩ</td>
<td>±(0.05% + 3.5 mA)</td>
</tr>
<tr>
<td>3 A</td>
<td>30 A</td>
<td>&gt;10 GΩ</td>
<td>±(0.05% + 15 mA)</td>
</tr>
</tbody>
</table>

**TEMPERATURE COEFFICIENT (0°–18°C and 28°–50°C)**

- ±(0.15% accuracy specification)/°C. Applicable for normal mode only.
- Not applicable for high capacitance mode.

**METER SPECIFICATIONS**

**VOLTAGE MEASUREMENT ACCURACY**

<table>
<thead>
<tr>
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<td>±(0.02% + 500 µA)</td>
</tr>
<tr>
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<td>100 µA</td>
<td>&gt;10 GΩ</td>
<td>±(0.02% + 1.5 mA)</td>
</tr>
<tr>
<td>100 µA</td>
<td>100 µA</td>
<td>&gt;10 GΩ</td>
<td>±(0.02% + 25 nA)</td>
</tr>
<tr>
<td>1 A</td>
<td>10 A</td>
<td>&gt;10 GΩ</td>
<td>±(0.05% + 3.5 mA)</td>
</tr>
<tr>
<td>3 A</td>
<td>30 A</td>
<td>&gt;10 GΩ</td>
<td>±(0.05% + 15 mA)</td>
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**CURRENT MEASUREMENT ACCURACY**

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<th>Accuracy (1 Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 mA</td>
<td>100 mA</td>
<td>&lt;1 mV</td>
<td>±(0.05% + 100 µA)</td>
</tr>
<tr>
<td>1 µA</td>
<td>100 µA</td>
<td>&lt;1 mV</td>
<td>±(0.02% + 500 µA)</td>
</tr>
<tr>
<td>10 µA</td>
<td>100 µA</td>
<td>&lt;1 mV</td>
<td>±(0.02% + 1.5 mA)</td>
</tr>
<tr>
<td>100 µA</td>
<td>100 µA</td>
<td>&lt;1 mV</td>
<td>±(0.02% + 25 nA)</td>
</tr>
<tr>
<td>1 A</td>
<td>10 A</td>
<td>&lt;1 mV</td>
<td>±(0.05% + 3.5 mA)</td>
</tr>
<tr>
<td>3 A</td>
<td>30 A</td>
<td>&lt;1 mV</td>
<td>±(0.05% + 15 mA)</td>
</tr>
</tbody>
</table>

**ADDITIONAL METER SPECIFICATIONS**

- **MAXIMUM LOAD IMPEDANCE:**
  - Normal Mode: 10mF (typical).
  - High Capacitance Mode: 50µF (typical).
- **COMMON MODE VOLTAGE:** 250VDC.
- **OVER RANGE:** 100% of source range, 102% of measure range.
- **MAXIMUM SENSE LEAD RESISTANCE:** 1kΩ for rated accuracy.
- **SENSE INPUT IMPEDANCE:** >10GΩ.

**NOTES**

16. Add 50µs to source accuracy specifications per volt of HI lead drop.

17. De-rate accuracy specifications for NPLC setting < 1 by increasing error term. Add appropriate % of range term using table below.

18. Applies when in single channel display mode.

19. High Capacitance Mode accuracy is applicable for 25°C ±5°C only.

20. Applies when in single channel display mode.

21. Four-wire remote sense only in current meter mode selected. Voltage measure set to 100mV or 1V range only.

22. 10A range accessible only in pulse mode.

23. Compliance equal to 100mA.

24. High Capacitance Mode accuracy is applicable for 25°C ±5°C only.

25. Includes measurement of SENSE HI to HI and SENSE LO to LO contact resistances.
## Series 2600B Specifications

### General


**USB Control (rear):** USB 2.0 device, TMC488 protocol.

**RS-232:** Baud rates from 300bps to 115200bps.

**Ethernet:** RJ-45 connector, LXI Class C, 10/100BT, no auto MDIX.

**Expansion Interface:** The TSP-Link expansion interface allows TSP enabled instruments to trigger and communicate with each other. (Not available on Model 2604B)

**Cable Type:** Category 5e or higher LAN crossover cable.

**Length:** Three meters maximum between each TSP enabled instrument.

**LXI Compliance:** LXI Class C 1.4.


**Digital I/O Interface:** (Not available on Model 2604B)

**5V Power Supply Pins:** Limited to 250mA total for all three pins, solid state fuse protected. Output Enable: Active high input pulled down internally to ground with a 10kΩ resistor, when the output enable input function has been activated, each SourceMeter channel will not turn on unless the output enable pin is driven to >2.4V (nominal current = 2.4V/10kΩ = 240µA).

**USB File System (Front):** USB 2.0 Host: Mass storage class device.

**Power Supply:** 100V to 250VAC, 50–60Hz (auto sensing), 240VA max.

**Cooling:** Forced air. Side intake and rear exhaust. One side must be unobstructed when rack mounted.

**EMC:** Conforms to European Union Directive 2004/108/EC, EN 61326-1.

**Safety:** Conforms to European Union Directive 73/23/EEC, EN 61010-1, and UL 61010-1.

**Dimensions:** 89mm high × 238mm wide × 17½ in. (238mm × 89mm × 17½ in).

**Weight:** 2601B: 4.75kg (10.4 lbs), 2602B, 2604B: 5.50kg (12.0 lbs).

**Environment:** For indoor use only.

- **Altitude:** Maximum 2000 meters above sea level.
- **Operating:** 0°–50°C, 70% R.H. up to 35°C. Derate 3% R.H./°C, 35°–50°C.
- **Storage:** -25°C to 65°C.

---

### System SourceMeter® SMU Instruments

**2601B, 2602B, 2604B**

**High Capacitance Mode**

- **Voltage Source Output Settling Time:** Time required to reach 0.1% of final value after source level command is processed on a fixed range. Current limit = 1A.

<table>
<thead>
<tr>
<th>Voltage Range</th>
<th>Settling Time with $C_{load} = 4.7\mu F$</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 mV</td>
<td>200 µs (typical)</td>
</tr>
<tr>
<td>1 V</td>
<td>200 µs (typical)</td>
</tr>
<tr>
<td>6 V</td>
<td>200 µs (typical)</td>
</tr>
<tr>
<td>40 V</td>
<td>7 ms (typical)</td>
</tr>
</tbody>
</table>

- **Current Measure Settling Time:** Time required to reach 0.1% of final value after voltage source is stabilized on a fixed range. Values below for $V_{out} = 1V$ unless noted.

<table>
<thead>
<tr>
<th>Current Range</th>
<th>Settling Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 A – 1 A</td>
<td>&lt;120 µs (typical)</td>
</tr>
<tr>
<td>100 mA – 1 mA</td>
<td>&lt;100 µs (typical)</td>
</tr>
<tr>
<td>1 mA</td>
<td>&lt; 3 ms (typical)</td>
</tr>
<tr>
<td>100 µA</td>
<td>&lt; 3 ms (typical)</td>
</tr>
<tr>
<td>10 µA</td>
<td>&lt; 230 ms (typical)</td>
</tr>
<tr>
<td>1 µA</td>
<td>&lt; 250 µs (typical)</td>
</tr>
</tbody>
</table>

**Capacitor Leakage Performance Using High-C Scripts:**

- **1 µA:** <230 ms (typical)
- **1 mA:** < 3 ms (typical)
- **100 mA – 10 mA:** <100 µs (typical)

**Voltage Source Range Change Overshoot:**

- **<400mV + 0.1% of larger range (typical).**

**Noise, 10Hz–20MHz (6V Range):**

- **<30mV peak-peak (typical).**

**Output Enable:** Active high input pulled down internally to ground with a 10kΩ resistor, when the output enable input function has been activated, each SourceMeter channel will not turn on unless the output enable pin is driven to >2.4V (nominal current = 240µΑ).

**Absolute Maximum Input Voltage:**

- **5.25V**

**Absolute Minimum Input Voltage:**

- **-0.25V**

**Maximum Logic Low Input Voltage:**

- **0.7V**

**Minimum Logic High Input Voltage:**

- **2.1V**

**Maximum Source Current (flowing out of Digital I/O bit):**

- **+960µA**

**Maximum Sink Current (flowing into Digital I/O pin):**

- **-11mA (not including Model 2604B)**

**Power Source Range Change Delay:**

- **10µA Current Range and Above:**
  - **Delay into High Capacitance Mode:** 10ms.
  - **Delay out of High Capacitance Mode:** 10ms.
- **1µA and 10µA Current Ranges:**
  - **Delay into High Capacitance Mode:** 250ms.
  - **Delay out of High Capacitance Mode:** 10ms.

**Noise, 10Hz–20MHz (6V Range):**

- **<30mV peak-peak (typical).**

**Voltage Source Range Change Overshoot:**

- **<400mV + 0.1% of larger range (typical).**

**Current Measure Settling Time:**

- **100µA Current Range and Above:**
  - **Delay into High Capacitance Mode:** 10ms.
  - **Delay out of High Capacitance Mode:** 10ms.
- **1µA and 10µA Current Ranges:**
  - **Delay into High Capacitance Mode:** 250ms.
  - **Delay out of High Capacitance Mode:** 10ms.

**Power Supply:**

- **100V to 250VAC, 50–60Hz (auto sensing), 240VA max.**

**Cooling:**

- **Forced air. Side intake and rear exhaust. One side must be unobstructed when rack mounted.**

**Safety:**

- **Conforms to European Union Directive 73/23/EEC, EN 61010-1, and UL 61010-1.**

**Dimensions:**

- **89mm high × 238mm wide × 17½ in (238mm × 89mm × 17½ in).**

**Weight:**

- **2601B: 4.75kg (10.4 lbs), 2602B, 2604B: 5.50kg (12.0 lbs).**

**Environment:**

- **For indoor use only.**

- **Altitude:**
  - **Maximum 2000 meters above sea level.**

- **Operating:**
  - **0°–50°C, 70% R.H. up to 35°C. Derate 3% R.H./°C, 35°–50°C.**

- **Storage:**
  - **-25°C to 65°C.**
SERIES 2600B SPECIFICATIONS

This document contains specifications and supplemental information for the Models 2611B, 2612B, and 2614B System SourceMeter® SMU Instruments. Specifications are the standards against which the Models 2611B, 2612B, and 2614B are tested. Upon leaving the factory the 2611B, 2612B, and 2614B meet these specifications. Supplemental and typical values are non-warranted, apply at 23°C, and are provided solely as useful information.

Accuracy specifications are applicable for both normal and high capacitance modes. The source and measurement accuracies are specified at the SourceMeter CHANNEL A (2611B, 2612B, and 2614B) or SourceMeter CHANNEL B (2612B, 2614B) terminals under the following conditions:

1. 23°C ± 5°C, <70% relative humidity.
2. After 2 hour warm-up.
3. Speed normal (1 NPLC).
5. Remote sense operation or properly zeroed local sense operation.
6. Calibration period = 1 year.

SOURCE SPECIFICATIONS

VOLTAGE SOURCE SPECIFICATIONS

VOLTAGE PROGRAMMING ACCURACY

<table>
<thead>
<tr>
<th>Range</th>
<th>Programming Resolution</th>
<th>Accuracy (1 Year) 23°C ±5°C</th>
<th>Typical Noise (Peak-Peak) 0.1Hz–10Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>200mV</td>
<td>5µV</td>
<td>±0.02% + 37µV</td>
<td>±10µV</td>
</tr>
<tr>
<td>2V</td>
<td>50µV</td>
<td>±0.02% + 600µV</td>
<td>±50µV</td>
</tr>
<tr>
<td>20V</td>
<td>500µV</td>
<td>±0.02% + 5mV</td>
<td>±500µV</td>
</tr>
<tr>
<td>200V</td>
<td>5V</td>
<td>±0.02% + 50mV</td>
<td>±2mV</td>
</tr>
</tbody>
</table>

TEMPERATURE COEFFICIENT (0°C–18°C and 28°C–50°C): ±0.15 x accuracy specification/°C. Applicable for normal mode only. Not applicable for high capacitance mode.

VOLTAGE SOURCE SPECIFICATIONS

VOLTAGE REGULATION:

- Line: ±0.01% of range.
- Load: ±0.01% of range + 50µV.

MINIMUM PROGRAMMABLE PULSE WIDTH:

- Maximum value is 1ms. Accuracy is the same as current source.
- Pulse Width Accuracy:
  - 1mA: ±50µs
  - 10mA: ±500µs

OVERSHOOT:

- 2µs (typical).
- Time for additional test conditions.

ADDITIONAL SOURCE SPECIFICATIONS

OVER TEMPERATURE PROTECTION:

- Internally sensed temperature overload puts unit in standby mode.
- VOLTAGE SOURCE RANGE CHANGE OVERSHOOT: <300mV + 0.1% of larger range (typical).
- <300mV ± 0.1% of larger range (typical).

OVER TEMPERATURE PROTECTION:

- Internally sensed temperature overload puts unit in standby mode.
- VOLTAGE SOURCE RANGE CHANGE OVERSHOOT: <300mV ± 0.1% of larger range (typical).
- <300mV ± 0.1% of larger range (typical).

RESOLUTION:

- ±(% rdg. + amps)
- ±(0.01% of range + 100µV)
- ±(0.15 × accuracy specification)/°C
- ±(0.15 × accuracy specification)/°C

Pulse Width Accuracy:

- 1mA: ±50µs
- 10mA: ±100µs

MINIMUM PROGRAMMABLE PULSE WIDTH:

- 1µs

MINIMUM PROGRAMMABLE PULSE WIDTH:

- 1µs

MINIMUM WARRANTY:

- 1µs

NOTES:

1. Add 50µV to source accuracy specifications per volt of HI lead drop.
2. High Capacitance Mode accuracy is applicable at 23°C ±5°C only.
3. Full power source operation regardless of load to 30°C ambient. Above 30°C and/or power sink operation, refer to “Operating Boundaries” in the Series 2600B Reference Manual for additional power derating information.
4. For sink mode operation quadrants II and IV, add 0.06% of limit to the corresponding current limit accuracy specifications. Specifications apply with sink mode operation enabled.
5. Accuracy specifications do not include connector leakage. Derate accuracy by VSource x 0.1% per °C when operating between 18°C–28°C. Derate accuracy by VSource x 0.5% per °C when operating <18°C and >28°C.
6. Full power source operation regardless of load to 30°C ambient. Above 30°C and/or power sink operation, refer to “Operating Boundaries” in the Series 2600B Reference Manual for additional power derating information.
7. 10A range accessible only in pulse mode.
8. High Capacitance Mode accuracy is applicable at 23°C ±5°C only.
10. For sink mode operation quadrants II and IV, add 0.10% of compliance range and ±20% of limit setting to corresponding voltage source accuracy specification. For 200mV range add an additional 120mV of uncertainty.
11. Add 50µV to source accuracy specifications per volt of HI lead drop.

PULSE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Region</th>
<th>Maximum Current Limit</th>
<th>Maximum Pulse Width</th>
<th>Maximum Duty Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100 mA @ 200 V</td>
<td>DC: no limit</td>
<td>100%</td>
</tr>
<tr>
<td>2</td>
<td>1.5 A @ 20 V</td>
<td>DC: no limit</td>
<td>100%</td>
</tr>
<tr>
<td>3</td>
<td>1 A @ 180 V</td>
<td>8.5 ms</td>
<td>1%</td>
</tr>
<tr>
<td>4</td>
<td>10 A @ 5 V</td>
<td>1 ms</td>
<td>2.2%</td>
</tr>
</tbody>
</table>

MINIMUM PROGRAMMABLE PULSE WIDTH:

- 1µs
- 100µs

MINIMUM WARRANTY:

- 1µs

MINIMUM PROGRAMMABLE PULSE WIDTH:

- 1µs

MINIMUM WARRANTY:

- 1µs

MINIMUM WARRANTY:

- 1µs
SOURCE SPECIFICATIONS (continued)

PULSE SPECIFICATIONS (continued)

QUADRANT DIAGRAM:

NOTES

12. Times measured from the start of pulse to the start of time; see figure below.

13. Thermally limited in sink mode quadrants II and IV and ambient temperatures above 30°C. See power equations in the reference manual for more information.

14. Voltage source operation with 1.5 A current limit.

15. Typical performance for minimum settled pulse widths:

    | Source Value | Load    | Source Settling (% of range) | Min. Pulse Width |
    |--------------|---------|------------------------------|-----------------|
    | 5 V          | 0.5 Ω   | 1%                           | 500 µs          |
    | 20 V         | 200 Ω   | 2%                           | 200 µs          |
    | 100 V        | 100 Ω   | 2%                           | 5 ms            |
    | 200 V (1.5 A Limit) | 200 Ω   | 2%                           | 1.5 ms          |
    | 10 mA        | 200 Ω   | 1%                           | 200 µs          |
    | 1 A          | 200 Ω   | 1%                           | 500 µs          |
    | 1 A          | 180 Ω   | 0.2%                         | 5 ms            |
    | 10 A         | 0.5 Ω   | 0.5%                         | 500 µs          |

Typical tests were performed using remote operation, 8W sense, and best, fixed measurement range. For more information on pulse scripts, see the Series 2600B Reference Manual.

16. Times measured from the start of pulse to the start of time; see figure below.

17. Times measured from the start of pulse to the start of time; see figure below.

18. Power dissipation in the source for the specified conditions. See power equations in the reference manual for more information.

19. Accuracy for the specified range and accuracy/temperature specifications.

20. Temperature coefficient (0°–18°C and 28°–50°C) ±(0.15 x accuracy specification)/°C. Applicable for normal mode only. Not applicable for high capacitance mode.

21. Current source operation with 1.5 A current limit.

22. Current measurement accuracy.

23. Voltage burden.

SOURCE SPECIFICATIONS (continued)

METER SPECIFICATIONS

VOLTAGE MEASUREMENT ACCURACY 17, 18

<table>
<thead>
<tr>
<th>Range</th>
<th>Default Display Resolution 19</th>
<th>Input Resistance</th>
<th>Accuracy (1 Year) 23°C ±5°C ±(% rdg. + volts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 mV</td>
<td>100 nV</td>
<td>&gt;10 GΩ</td>
<td>0.015% + 225 µV</td>
</tr>
<tr>
<td>2 V</td>
<td>1 µV</td>
<td>&gt;10 GΩ</td>
<td>0.02% + 350 µV</td>
</tr>
<tr>
<td>20 V</td>
<td>10 µV</td>
<td>&gt;10 GΩ</td>
<td>0.015% + 5 mV</td>
</tr>
<tr>
<td>200 V</td>
<td>100 µV</td>
<td>&gt;10 GΩ</td>
<td>0.015% + 50 mV</td>
</tr>
</tbody>
</table>

TEMPERATURE COEFFICIENT (0°–18°C and 28°–50°C) ±(0.15 x accuracy specification)/°C.

CURRENT MEASUREMENT ACCURACY 18, 21

<table>
<thead>
<tr>
<th>Range</th>
<th>Default Display Resolution 23</th>
<th>Voltage Burden 23</th>
<th>Accuracy (1 Year) 23°C ±5°C ±(% rdg. + amps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 nA</td>
<td>100 nA</td>
<td>&lt;1 mV</td>
<td>0.06% + 100 pA</td>
</tr>
<tr>
<td>1 µA</td>
<td>1 µA</td>
<td>&lt;1 mV</td>
<td>0.025% + 500 pA</td>
</tr>
<tr>
<td>10 µA</td>
<td>10 µA</td>
<td>&lt;1 mV</td>
<td>0.025% + 1.5 nA</td>
</tr>
<tr>
<td>100 µA</td>
<td>100 µA</td>
<td>&lt;1 mV</td>
<td>0.02% + 25 nA</td>
</tr>
<tr>
<td>1 mA</td>
<td>1 mA</td>
<td>&lt;1 mV</td>
<td>0.02% + 200 nA</td>
</tr>
<tr>
<td>10 mA</td>
<td>10 mA</td>
<td>&lt;1 mV</td>
<td>0.02% + 2.5 µA</td>
</tr>
<tr>
<td>100 mA</td>
<td>100 mA</td>
<td>&lt;1 mV</td>
<td>0.02% + 20 µA</td>
</tr>
<tr>
<td>1 A</td>
<td>1 A</td>
<td>&lt;1 mV</td>
<td>0.01% + 1.5 mA</td>
</tr>
<tr>
<td>1.5 A</td>
<td>1.5 A</td>
<td>&lt;1 mV</td>
<td>0.05% + 3.5 mA</td>
</tr>
<tr>
<td>10 A</td>
<td>10 A</td>
<td>&lt;1 mV</td>
<td>0.4% + 25 mA (typical)</td>
</tr>
</tbody>
</table>

CURRENT MEASURE SETTLING TIME (Time for measurement to settle after a Vstep) 23: Time required to reach 0.1% of final value after source level command is processed on a fixed range. Values for V_g = 2V unless noted. Current Range: 1mA. Settling Time: <100 µs (typical).

TEMPERATURE COEFFICIENT (0°–18°C and 28°–50°C) ±(0.15 x accuracy specification)/°C. Applicable for normal mode only. Not applicable for high capacitance mode.

CONTACT CHECK 27 (not available on Model 2614B)

<table>
<thead>
<tr>
<th>Source Value</th>
<th>Load</th>
<th>Source Settling (% of range)</th>
<th>Min. Pulse Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 V</td>
<td>0.5 Ω</td>
<td>1%</td>
<td>500 µs</td>
</tr>
<tr>
<td>20 V</td>
<td>200 Ω</td>
<td>2%</td>
<td>200 µs</td>
</tr>
<tr>
<td>100 V</td>
<td>100 Ω</td>
<td>2%</td>
<td>5 ms</td>
</tr>
<tr>
<td>200 V (1.5 A Limit)</td>
<td>200 Ω</td>
<td>2%</td>
<td>1.5 ms</td>
</tr>
<tr>
<td>10 mA</td>
<td>200 Ω</td>
<td>1%</td>
<td>200 µs</td>
</tr>
<tr>
<td>1 A</td>
<td>200 Ω</td>
<td>1%</td>
<td>500 µs</td>
</tr>
<tr>
<td>1 A</td>
<td>180 Ω</td>
<td>0.2%</td>
<td>5 ms</td>
</tr>
<tr>
<td>10 A</td>
<td>0.5 Ω</td>
<td>0.5%</td>
<td>500 µs</td>
</tr>
</tbody>
</table>

Typical tests were performed using remote operation, 8W sense, and best, fixed measurement range. For more information on pulse scripts, see the Series 2600B Reference Manual.

16. Times measured from the start of pulse to the start of time; see figure below.

ADDITIONAL METER SPECIFICATIONS

MAXIMUM LOAD IMPEDANCE:

Normal Mode: 10mΩ (typical). High Capacitance Mode: 50µF (typical).

COMMON MODE VOLTAGE: 250VDC.

COMMON MODE ISOLATION: >1GΩ, <4500pF.

OVERRANGE: 101% of source range, 102% of measure range.

MAXIMUM SENSE LEAD RESISTANCE: 1Ω for rated accuracy.

SENSE INPUT IMPEDANCE: >10GΩ.
2611B, 2612B, 2614B

System SourceMeter® SMU Instruments

METER SPECIFICATIONS (continued)

NOTES
17. Add 100mV to source accuracy specifications per volt of HI load drop.
18. Deviate accuracy specifications for NPLC setting <1 by increasing error term. Add appropriate % of range term using table below.

<table>
<thead>
<tr>
<th>NPLC Setting</th>
<th>200mV Range</th>
<th>2V–200V Ranges</th>
<th>100mA Range</th>
<th>1µA–100mA Ranges</th>
<th>1A–1.5A Ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>0.01%</td>
<td>0.01%</td>
<td>0.01%</td>
<td>0.01%</td>
<td>0.01%</td>
</tr>
<tr>
<td>0.01</td>
<td>0.08%</td>
<td>0.07%</td>
<td>0.1%</td>
<td>0.05%</td>
<td>0.03%</td>
</tr>
<tr>
<td>0.001</td>
<td>0.8%</td>
<td>0.6%</td>
<td>1%</td>
<td>0.5%</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

19. Applies when in single channel display mode.
20. High Capacitance Mode accuracy is applicable at 25°C ±5°C only.
21. Accuracy specifications do not include connector leakage. Dev-rate accuracy by V_{2E11} per °C when operating between 18°–28°C. Derate accuracy by V_{2E11} + (0.15 * V_{2E11}) per °C when operating <18° and >28°C.
22. Applies when in single channel display mode.
23. Favors remote sense only and with current meter mode selected. Voltage measure set to 200mV or 2V range only.
24. 10A range accessible only in pulse mode.
25. Compliance equal to 100mA.
26. Four-wire remote sense only and with current meter mode selected. Voltage measure set to 200mV or 2V range only.
27. Includes measurement of SENSE HI to HI and SENSE LO to LO contact resistances.
28. High Capacitance Mode utilizes locked ranges. Auto Range is disabled.
29. 100nA range is not available in High Capacitance Mode.
30. High Capacitance Mode specifications are for DC measurements only.

HIGH CAPACITANCE MODE 28, 29, 30

VOLTAGE SOURCE OUTPUT SETTLING TIME: Time required to reach within 0.1% of final value after source level command is processed on a fixed range. Current limit = 1A.

Voltage Source Range | Settling Time with C_load = 4.7µF
---|---
200 mV | 660 µs (typical)
2 V | 660 µs (typical)
20 V | 1.5 ms (typical)
200 V | 20 ms (typical)

CURRENT MEASURE SETTLING TIME: Time required to reach within 0.1% of final value after current source is stabilized on a fixed range. Values below for V_{in} = 2V unless noted.

Current Measure Range | Settling Time
---|---
1.5 A – 1 A | <120 µs (typical) (R_{in} >6|Ω|
100 mA – 10 mA | <100 µs (typical)
10 µA | <5 ms (typical)
1 µA | <230 ms (typical)
100 µA | <250 ms (typical)
10 µA | <230 ms (typical)
1 µA | <250 ms (typical)

CAPACITOR LEAKAGE PERFORMANCE USING HIGH-C SCRIPTS H: Load = 5pF||100M|Ω|

MODE CHANGE DELAY:

100µA Current Range and Above:
- Delay into High Capacitance Mode: 10ms.
- Delay out of High Capacitance Mode: 10ms.
- 1µA and 10µA Current Ranges:
  - Delay into High Capacitance Mode: 240ms.
  - Delay out of High Capacitance Mode: 10ms.

VOLTOMETER INPUT IMPEDANCE: 30GΩ in parallel with 3300pF.

NOISE, 10Hz–20MHz (20V Range): <300µV peak-peak (typical).

VOLTAGE SOURCE RANGE CHANGE OVERSHOOT (for 20V range and below): <400mV + 0.1% of larger range (typical). Overshoot into a 200kΩ load, 20MHz B&W.

NOTES
28. High Capacitance Mode specifications are for DC measurements only.
29. 100mA range is not available in High Capacitance Mode.
30. High Capacitance Mode utilizes locked ranges. Auto Range is disabled.


USB CONTROL (REAR): USB 2.0 device. TMC488 protocol.

RS-232: Baud rates from 300bps to 115200bps.

ETHERNET: RJ-45 connector, LXI Class C, 10/100BT, no auto MDIX.

EXPANSION INTERFACE: The TSP-Link expansion interface allows TSP enabled instruments to trigger and communicate with each other. (Not available on Model 2614B).

Cable Type: Category 5e or higher LAN crossover cable.

Length: 3 meters maximum between each TSP enabled instrument.

LXI COMPLIANCE: LXI Class C 1.4.


DIGITAL I/O INTERFACE: (Not available on Model 2614B)

Connector: 25-pin female D
Input/Output Pins: 14 open drain I/O bits
Absolute Maximum Input Voltage: 5.25V
Absolute Minimum Input Voltage: –0.25V
Maximum Logic Low Input Voltage: 0.7V, +850µA max.
Minimum Logic High Input Voltage: 2.1V, +570µA.
Maximum Source Current (flowing out of Digital I/O bit): +960µA.
Maximum Sink Current @ Maximum Logic Low Voltage (0.7V): –5.0mA.
Absolute Maximum Sink Current (flowing into Digital I/O pin): –11mA.

5V Power Supply Pins: Limited to 250mA total for all three pins, solid state fuse protected.

Safety Interlock Pin: Active high input. >3.4V @ 24mA (absolute maximum of 6V) must be externally applied to this pin to ensure 200V operation. This signal is pulled down to chassis ground with a 10kΩ resistor. 200V operation will be blocked when the INTERLOCK signal is <0.4V (absolute minimum –0.4V). See figure below:

USB FILE SYSTEM (FRONT): USB 2.0 Host: Mass storage class device.

POWER SUPPLY: 100V to 250VAC, 50–60Hz (auto sensing), 240VA max.

COOLING: Forced air. Side intake and rear exhaust. One side must be unobstructed when rack mounted.


DIMENSIONS: 690mm high × 233mm wide × 460mm deep (3¾ in × 9 in × 17¾ in). Bench Configuration (with handle and feet): 104mm high × 238mm wide × 460mm deep (4 1⁄8 in × 9½ in × 17¾ in).

WEIGHT: 2611B: 47.5kg (104 lbs) 2612B, 2614B: 57.5kg (126 lbs)

ENVIRONMENT: For indoor use only. Altitude: Maximum 2000 meters above sea level.
Operating: 0°–50°C, 70% R.H. up to 35°C. Derate 3% R.H./°C, 35°–50°C.
Storage: –25°C to 65°C.
**SPECIFICATION CONDITIONS**

This document contains specifications and supplemental information for the Models 2634B, 2635B, and 2636B System SourceMeter® SMU instruments. Specifications are the standards against which the Models 2634B, 2635B, and 2636B are tested. Upon leaving the factory the 2634B, 2635B, and 2636B meet these specifications. Supplemental and typical values are non-warranted, apply at 23°C, and are provided solely as useful information.

Accuracy specifications are applicable for both normal and high capacitance modes.

The source and measurement accuracies are specified at the SourceMeter CHANNEL A (2634B, 2635B, and 2636B) or SourceMeter CHANNEL B (2634B, 2636B) terminals under the following conditions:

1. 23°C ± 5°C, <70% relative humidity.
2. After 2 hour warm-up
3. Speed normal (1 NPLC)
4. A/D auto-zero enabled
5. Remote sense operation or properly zeroed local sense operation
6. Calibration period = 1 year

**SOURCE SPECIFICATIONS**

**VOLTAGE SOURCE SPECIFICATIONS**

**VOLTAGE PROGRAMMING ACCURACY**

<table>
<thead>
<tr>
<th>Range</th>
<th>Programming Resolution</th>
<th>Accuracy (1 Year) 23°C ±5°C ±(% rdg. + volts)</th>
<th>Typical Noise (peak-peak) 0.1Hz–10Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 mV</td>
<td>5 µV</td>
<td>0.02% + 375 µV</td>
<td>20 µV</td>
</tr>
<tr>
<td>2 V</td>
<td>50 µV</td>
<td>0.02% + 600 µV</td>
<td>50 µV</td>
</tr>
<tr>
<td>20 V</td>
<td>500 µV</td>
<td>0.02% + 5 mV</td>
<td>500 µV</td>
</tr>
<tr>
<td>200 V</td>
<td>5 mV</td>
<td>0.02% + 50 mV</td>
<td>2 mV</td>
</tr>
</tbody>
</table>

**TEMPERATURE COEFFICIENT (0°C–18°C and 28°C–50°C): ±(0.15 × accuracy specification)/°C.**

Applicable for normal mode only. Not applicable for high capacitance mode.

**MAXIMUM OUTPUT POWER AND SOURCE/SINK LIMITS**

±20.2V @ ±1.5A, ±202V @ ±100mA, four quadrant source or sink operation.

**VOLTAGE RANGE:** Line: 0.01% of range. Load: ±0.01% of range + 100µA.

**NOISE 10Hz–20MHz:** <200mV pk-pk (typical), <3mV rms (typical), 20V range.

**CURRENT PROGRAMMING ACCURACY**

<table>
<thead>
<tr>
<th>Range</th>
<th>Programming Resolution</th>
<th>Accuracy (1 Year) 23°C ±5°C ±(% rdg. + amps)</th>
<th>Typical Noise (peak-peak) 0.1Hz–10Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 nA</td>
<td>20 fA</td>
<td>0.15% + 2 fA</td>
<td>800 fA</td>
</tr>
<tr>
<td>10 nA</td>
<td>200 fA</td>
<td>0.15% + 5 fA</td>
<td>2 pA</td>
</tr>
<tr>
<td>100 nA</td>
<td>2 pA</td>
<td>0.06% + 50 pA</td>
<td>5 pA</td>
</tr>
<tr>
<td>1 µA</td>
<td>20 pA</td>
<td>0.03% + 700 pA</td>
<td>25 pA</td>
</tr>
<tr>
<td>10 µA</td>
<td>200 pA</td>
<td>0.03% + 5 nA</td>
<td>60 pA</td>
</tr>
<tr>
<td>100 µA</td>
<td>2 nA</td>
<td>0.03% + 60 nA</td>
<td>3 nA</td>
</tr>
<tr>
<td>1 mA</td>
<td>20 nA</td>
<td>0.03% + 300 nA</td>
<td>6 nA</td>
</tr>
<tr>
<td>10 mA</td>
<td>200 nA</td>
<td>0.03% + 6 µA</td>
<td>200 µA</td>
</tr>
<tr>
<td>100 mA</td>
<td>2 µA</td>
<td>0.03% + 30 µA</td>
<td>600 nA</td>
</tr>
<tr>
<td>1 A</td>
<td>200 µA</td>
<td>0.05% + 1.8 mA</td>
<td>70 µA</td>
</tr>
<tr>
<td>1.5 A</td>
<td>50 µA</td>
<td>0.06% + 4 mA</td>
<td>150 µA</td>
</tr>
<tr>
<td>10 A</td>
<td>100 µA</td>
<td>0.5% + 40 mA</td>
<td>(typical)</td>
</tr>
</tbody>
</table>

**TEMPERATURE COEFFICIENT (0°C–18°C and 28°C–50°C): ±(0.15 × accuracy specification)/°C.**

Applicable for normal mode only. Not applicable for high capacitance mode.

**MAXIMUM OUTPUT POWER AND SOURCE/SINK LIMITS**

±1515A @ ±20V, ±101mA @ ±200V, four quadrant source or sink operation.

**CURRNT LIMIT/COMPLIANCE**

Bipolar current limit (compliance) set with single value.

Minimum value is 100µA. Accuracy is the same as current source.

**OVERSHOOT:** < (0.1% + 10mV) typical (step size = 10% to 90% of range, resistive load, maximum current limit/compliance).

**GUARD OFFSET VOLTAGE:** Minimum value is 20mV. Accuracy is the same as voltage source.

**MAXIMUM VOLTAGE SOURCE OUTPUT SETTLING TIME:** Time required to reach within 0.1% of final value after source level command is processed on a fixed range.

**MAXIMUM CURRENT SOURCE OUTPUT SETTLING TIME:** Time required to reach within 0.1% of final value after source level command is processed on a fixed range. Values below for Iout · Rload = 2V unless noted.

**Source Specifying: 2636B System SourceMeter® SMU Instruments**

**ADDITIONAL SOURCE SPECIFICATIONS**

**TRANSIENT RESPONSE TIME:** <70µs for the output to recover to within 0.1% for a 10% to 90% step change in load.

**VOLTAGE SOURCE OUTPUT SETTLING TIME:** Time required to reach within 0.1% of final value after source level command is processed on a fixed range.

**Range** | **Settling Time** | **Specifications** |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>200 mV</td>
<td>&lt;50 µs (typical)</td>
<td></td>
</tr>
<tr>
<td>2 V</td>
<td>&lt;50 µs (typical)</td>
<td></td>
</tr>
<tr>
<td>20 V</td>
<td>&lt;110 µs (typical)</td>
<td></td>
</tr>
<tr>
<td>200 V</td>
<td>&lt;700 µs (typical)</td>
<td></td>
</tr>
</tbody>
</table>

**DC FLOATING VOLTAGE:** Output can be floated up to ±250VDC.

**REMOTE SOURCE OPERATING RANGE**

Maximum voltage between HI and SENSE HI = 3V.

Maximum voltage between LO and SENSE LO = 3V.

**VOLTAGE OUTPUT HEADROOM:**

200V Range: Max. output voltage = 202V ± total voltage drop across source leads (maximum Iout · Rload = 2V unless noted).

20V Range: Max. output voltage = 23V ± total voltage drop across source leads (maximum Iout · Rload = 2V unless noted).

**OVER TEMPERATURE PROTECTION:** Internally sensed temperature overload puts unit in standby mode.

**VOLTAGE SOURCE RANGE CHANGE OVERSHOOT:** <300mV ± 0.1% of larger range (typical).

**CURRENT SOURCE RANGE CHANGE OVERSHOOT:** <5% of larger range + 500mV/Rload (typical).

**PULSE SPECIFICATIONS**

**Region** | **Maximum Current Limit** | **Maximum Pulse Width** | **Maximum Duty Cycle** |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100 mA @ 200 V DC</td>
<td>800 µs</td>
<td>100%</td>
</tr>
<tr>
<td>1</td>
<td>1.5 A @ 20 V DC</td>
<td>85 ms</td>
<td>100%</td>
</tr>
<tr>
<td>2</td>
<td>1 A @ 180 V</td>
<td>2.2 ms</td>
<td>1%</td>
</tr>
<tr>
<td>3</td>
<td>1 A @ 200 V</td>
<td>1 ms</td>
<td>2%</td>
</tr>
<tr>
<td>4</td>
<td>10 A @ 5 V</td>
<td>1 ms</td>
<td>2.2%</td>
</tr>
</tbody>
</table>

**MINIMUM PROGRAMMABLE PULSE WIDTH**

-10V to +10V: 100µs. NOTE: Minimum pulse width for set-tled source at a given I/V output and load can be longer than 100µs.

**PULSE WIDTH PROGRAMMING RESOLUTION:** 1µs.

**PULSE WIDTH PROGRAMMING ACCURACY**

±5µs.

**PULSE WIDTH JITTER:** 50µs (typical).

**QUADRANT DIAGRAM:**
2634B, 2635B, 2636B

System SourceMeter® SMU Instruments

SOURCE SPECIFICATIONS (continued)

NOTES
1. Add 50µV to source accuracy specifications per volt of HI lead drop.
2. High Capacitance Mode accuracy is applicable at 23°C ±5°C only.
3. Full power source operation regardless of load to 30°C ambient. Above 30°C and/or power sink operation, refer to “Operating Boundaries” in the Series 2600B Reference Manual for additional power derating information.
4. For sink mode operation (quadrants II and IV), add 0.06% of limit setting to the corresponding limit accuracy specifications. Specifications apply with sink mode operation enabled.
5. Full power source operation regardless of load to 30°C ambient. Above 30°C and/or power sink operation, refer to “Operating Boundaries” in the Series 2600B Reference Manual for additional power derating information.
6. 10A range accessible only in pulse mode.
7. High Capacitance Mode accuracy is applicable at 23°C ±5°C only.
8. Full power source operation regardless of load to 30°C ambient. Above 30°C and/or power sink operation, refer to “Operating Boundaries” in the Series 2600B Reference Manual for additional power derating information.
9. For sink mode operation (quadrants II and IV), add 10% of compliance range and ±0.02% of limit setting to corresponding voltage source specification. For 200mV range add an additional 120mV of uncertainty.
10. Times measured from the start of pulse to the start off-time; see figure below.
11. Times measured from the start of pulse to the start off-time; see figure below.
12. Thermally limited in sink mode (quadrants II and IV) and ambient temperatures above 30°C. See power equations in the Reference Manual for more information.
13. Voltage source operation with 1.5 A current limit.
14. Typical performance for minimum settled pulse widths:

<table>
<thead>
<tr>
<th>Source Value</th>
<th>Load</th>
<th>Source Settling (of range)</th>
<th>Min. Pulse Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 V</td>
<td>0.5 Ω</td>
<td>1%</td>
<td>900 µs</td>
</tr>
<tr>
<td>20 V</td>
<td>200 Ω</td>
<td>0.2%</td>
<td>200 µs</td>
</tr>
<tr>
<td>180 V</td>
<td>180 Ω</td>
<td>0.2%</td>
<td>5 ms</td>
</tr>
<tr>
<td>200 V (5 A Limit)</td>
<td>200 Ω</td>
<td>0.2%</td>
<td>1.5 ms</td>
</tr>
<tr>
<td>100 mA</td>
<td>200 Ω</td>
<td>1%</td>
<td>200 µs</td>
</tr>
<tr>
<td>1 Ω</td>
<td>180 Ω</td>
<td>0.2%</td>
<td>5 ms</td>
</tr>
<tr>
<td>10 A</td>
<td>0.5 Ω</td>
<td>0.5%</td>
<td>300 µs</td>
</tr>
</tbody>
</table>

Typical tests were performed using remote operation, 4W sense, and best, fixed measurement range. For more information on pulse scripts, see the Series 2600B Reference Manual.
15. Times measured from the start of pulse to the start off-time; see figure below.

METER SPECIFICATIONS

VOLTAGE MEASUREMENT ACCURACY

<table>
<thead>
<tr>
<th>Range</th>
<th>Default Display Resolution</th>
<th>Input Resistance</th>
<th>Accuracy (1 Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 mV</td>
<td>100 mV</td>
<td>&gt;10³ Ω</td>
<td>±(0.05% + 225 µV)</td>
</tr>
<tr>
<td>2 V</td>
<td>1 μV</td>
<td>&gt;10³ Ω</td>
<td>±0.02% + 350 µV</td>
</tr>
<tr>
<td>20 V</td>
<td>10 μV</td>
<td>&gt;10³ Ω</td>
<td>±0.015% + 5 mV</td>
</tr>
<tr>
<td>200 V</td>
<td>100 μV</td>
<td>&gt;10³ Ω</td>
<td>±0.015% + 50 mV</td>
</tr>
</tbody>
</table>

TEMPERATURE COEFFICIENT (0°C–18°C and 28°C–50°C): ±0.15 × accuracy specification/°C.
Applicable for normal mode only. Not applicable for high capacitance mode.

CURRENT MEASUREMENT ACCURACY

<table>
<thead>
<tr>
<th>Range</th>
<th>Default Display Resolution</th>
<th>Voltage Burden</th>
<th>Accuracy (1 Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;100 pA</td>
<td>0.1 fA</td>
<td>&lt;1 mV</td>
<td>±0.15% + 120 fA</td>
</tr>
<tr>
<td>1 nA</td>
<td>1 fA</td>
<td>&lt;1 mV</td>
<td>±0.15% + 240 fA</td>
</tr>
<tr>
<td>10 nA</td>
<td>10 fA</td>
<td>&lt;1 mV</td>
<td>±0.15% + 3 pA</td>
</tr>
<tr>
<td>100 nA</td>
<td>100 fA</td>
<td>&lt;1 mV</td>
<td>±0.06% + 40 pA</td>
</tr>
<tr>
<td>1 µA</td>
<td>10 pA</td>
<td>&lt;1 mV</td>
<td>±0.02% + 3.5 mA</td>
</tr>
<tr>
<td>10 µA</td>
<td>100 pA</td>
<td>&lt;1 mV</td>
<td>±0.02% + 1.5 mA</td>
</tr>
<tr>
<td>100 µA</td>
<td>1000 pA</td>
<td>&lt;1 mV</td>
<td>±0.02% + 25 nA</td>
</tr>
<tr>
<td>1 A</td>
<td>10 A</td>
<td>&lt;1 mV</td>
<td>±0.05% + 2.5 µA</td>
</tr>
<tr>
<td>1.5 A</td>
<td>10 A</td>
<td>&lt;1 mV</td>
<td>±0.05% + 1.5 µA</td>
</tr>
</tbody>
</table>

*100 pA range not available on Model 2634B.

CURRENT MEASURE SETTLING TIME (Time for measurement to settle after a Vstep): Time required to reach within 0.1% of final value after source level command is processed on a fixed range. Values for Vstep = 2V unless noted. Current Range: 1mA. Settling Time: <100µs (typical).
TEMPERATURE COEFFICIENT (0°C–18°C and 28°C–50°C): ±0.15 × accuracy specification/°C.
Applicable for normal mode only. Not applicable for high capacitance mode.

CONTACT CHECK

<table>
<thead>
<tr>
<th>Speed</th>
<th>Maximum Measurement Time to Memory</th>
<th>Accuracy (1 Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAST</td>
<td>1 (1.2) ms</td>
<td>±(%rdg. + ohms)</td>
</tr>
<tr>
<td>MEDIUM</td>
<td>4 (5) ms</td>
<td>±% + 10 Ω</td>
</tr>
<tr>
<td>SLOW</td>
<td>56 (62) ms</td>
<td>±% + 0.5 Ω</td>
</tr>
</tbody>
</table>

ADDITIONAL METER SPECIFICATIONS

MAXIMUM LOAD IMPEDANCE:
Normal Mode: 10mΩ (typical).
High Capacitance Mode: 50µF (typical).
COMMON MODE VOLTAGE: 250VDC.
OVER RANGE: 10% of source range, 10% of measure range.
MAXIMUM SENSE LEAD RESISTANCE: 1kΩ for rated accuracy.
SENSE INPUT IMPEDANCE: >10kΩ.
2634B, 2635B, 2636B

System SourceMeter® SMU Instruments

METER SPECIFICATIONS (continued)

NOTES
16. Add 50kΩ to source accuracy specifications per volt of IL lead drop.
17. Deviation accuracy specifications for NPLC setting <1 by increasing error term. Add appropriate % of range term using table below.

<table>
<thead>
<tr>
<th>NPLC Setting</th>
<th>200mV Range</th>
<th>2V–200V Range</th>
<th>100mA Range</th>
<th>1µA–100mA Range</th>
<th>1A–1.5A Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>0.01</td>
<td>0.08%</td>
<td>0.07%</td>
<td>0.1%</td>
<td>0.05%</td>
<td>0.0%</td>
</tr>
<tr>
<td>0.001</td>
<td>0.8%</td>
<td>0.6%</td>
<td>1%</td>
<td>0.5%</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

20. Applies when in single channel display mode.
21. High Capacitance Mode accuracy is applicable at 23°C ±5°C only.
22. Four wire remote sense only and with current meter mode selected. Voltage measure set to 200mV or 2V range only.
23. 10:NPLC, 11:Point Median Filter, <200V range, measurements made within 1 hour after zeroing. 23°C ± 1°C
24. Delay factor set to 1. Compliance equal to 100mA.
25. 10A range accessible only in pulse mode.
26. Delay factor set to 1. Compliance equal to 10mA.
27. High Capacitance Mode accuracy is applicable at 23°C ±5°C only.
28. Includes measurement of SENSE HI to HI and SENSE LO to LO contact resistances.

HIGH CAPACITANCE MODE 29, 30, 31

VOLTAGE SOURCE OUTPUT SETTLING TIME: Time required to reach within 0.1% of final value after source level command is processed on a fixed range. Current limit is 1A.
Voltage Source Range | Settling Time with Cint = 4.7µF
200 mV | 600 µs (typical)
2 V | 600 µs (typical)
20 V | 1.5 ms (typical)
200 V | 20 ms (typical)

CURRENT MEASURE SETTLING TIME: Time required to reach within 0.1% of final value after voltage source is stabilized on a fixed range. Values below for Vint = 2V unless noted.
Current Measure Range | Settling Time
1.5 A – 1 A | <120 µs (typical) (Rint >6Ω)
100 mA – 10 mA | <100 µs (typical)
1 µA | <5 ms (typical)
100 µA | <3 ms (typical)
10 µA | <230 ms (typical)
1 µA | <230 ms (typical)

CAPACITOR LEAKAGE PERFORMANCE USING HIGH-C SCRIPTS 32: Load = 5µF/100Ω
Test: 5V step and measure: 200ms (typical) @ 50mA.
MODEx CHANGE DELAY:
100µA Current Range and Above:
Delay into High Capacitance Mode: 10ms. Delay out of High Capacitance Mode: 10ms.
Delay into 10µA Current Range:
Delay into High Capacitance Mode: 230ms. Delay out of High Capacitance Mode: 10ms.
VOLTAGE SOURCE IMPEDANCE: 50ΩGΩ in parallel with 350ΩPΩ.
NOISE, 10Hz–20MHz (20V Range): <0.3mV peak-peak (typical).
VOLTAGE SOURCE RANGE CHANGE OVERSHOOT (for 20V range and below): <100mV + 0.1% of larger range (typical). Obershoot into a 200Ω load, 200MHz BW.

NOTES
29. High Capacitance Mode specifications are for DC measurements only.
30. 10mA range and below are not available in high capacitance mode.
31. High Capacitance Mode utilizes locked ranges. Auto Range is disabled.

SEE PAGES 14 AND 15 FOR MEASUREMENT SPEEDS AND OTHER SPECIFICATIONS.
Series 2600B

System SourceMeter® SMU Instruments

Applicable to Models 2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, and 2636B.

MEASUREMENT SPEED SPECIFICATIONS

MAXIMUM SWEEP OPERATION RATES (operations per second) FOR 60Hz (50Hz):

<table>
<thead>
<tr>
<th>A/D Converter Speed</th>
<th>Trigger Origin</th>
<th>Measure To Memory Using User Scripts</th>
<th>Measure To GPIB Using User Scripts</th>
<th>Source Measure To Memory Using User Scripts</th>
<th>Source Measure To GPIB Using User Scripts</th>
<th>Source Measure To Memory Using Sweep API</th>
<th>Source Measure To GPIB Using Sweep API</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.001 NPLC</td>
<td>Internal</td>
<td>20000 (20000)</td>
<td>10500 (10500)</td>
<td>7000 (7000)</td>
<td>6200 (6200)</td>
<td>12000 (12000)</td>
<td>5900 (5900)</td>
</tr>
<tr>
<td>0.01 NPLC</td>
<td>Digital I/O</td>
<td>8100 (8100)</td>
<td>7100 (7100)</td>
<td>5500 (5500)</td>
<td>5000 (5000)</td>
<td>11200 (11200)</td>
<td>5700 (5700)</td>
</tr>
<tr>
<td>0.1 NPLC</td>
<td>Internal</td>
<td>5000 (4000)</td>
<td>4000 (3500)</td>
<td>3400 (3000)</td>
<td>3200 (2900)</td>
<td>4200 (3700)</td>
<td>3100 (2800)</td>
</tr>
<tr>
<td>1.0 NPLC</td>
<td>Digital I/O</td>
<td>3600 (3200)</td>
<td>5400 (5000)</td>
<td>3000 (2700)</td>
<td>2900 (2600)</td>
<td>4150 (3650)</td>
<td>3050 (2775)</td>
</tr>
<tr>
<td>0.1 NPLC</td>
<td>Digital I/O</td>
<td>580 (490)</td>
<td>560 (475)</td>
<td>500 (465)</td>
<td>550 (460)</td>
<td>575 (480)</td>
<td>545 (460)</td>
</tr>
<tr>
<td>1.0 NPLC</td>
<td>Internal</td>
<td>59 (49)</td>
<td>59 (49)</td>
<td>59 (49)</td>
<td>59 (49)</td>
<td>59 (49)</td>
<td>59 (49)</td>
</tr>
<tr>
<td>1.0 NPLC</td>
<td>Digital I/O</td>
<td>58 (48)</td>
<td>58 (48)</td>
<td>59 (49)</td>
<td>59 (49)</td>
<td>59 (49)</td>
<td>59 (49)</td>
</tr>
</tbody>
</table>

MAXIMUM SINGLE MEASUREMENT RATES (operations per second) FOR 60Hz (50Hz):

<table>
<thead>
<tr>
<th>A/D Converter Speed</th>
<th>Trigger Origin</th>
<th>Measure To GPIB</th>
<th>Source Measure To GPIB</th>
<th>Source Measure Pass/Fail To GPIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.001 NPLC</td>
<td>Internal</td>
<td>1900 (1800)</td>
<td>1400 (1400)</td>
<td>1400 (1400)</td>
</tr>
<tr>
<td>0.01 NPLC</td>
<td>Internal</td>
<td>1450 (1400)</td>
<td>1200 (1100)</td>
<td>1100 (1100)</td>
</tr>
<tr>
<td>0.1 NPLC</td>
<td>Internal</td>
<td>450 (390)</td>
<td>425 (370)</td>
<td>425 (375)</td>
</tr>
<tr>
<td>1.0 NPLC</td>
<td>Internal</td>
<td>58 (48)</td>
<td>57 (48)</td>
<td>57 (48)</td>
</tr>
</tbody>
</table>

MAXIMUM MEASUREMENT RANGE CHANGE RATE: <150µs for ranges >10µA, typical. When changing to or from a range ≥1A, maximum rate is <500µs, typical.

MAXIMUM SOURCE RANGE CHANGE RATE: <2.5ms for ranges ≥1A, typical. When changing to or from a range ≥1A, maximum rate is <2ms, typical.

MAXIMUM SOURCE FUNCTION CHANGE RATE: <1ms, typical.

COMMAND PROCESSING TIME: Maximum time required for the output to begin to change following the receipt of the smux.source.levelv or smux.source.leveli command. <5ms typical.

NOTES


2. Exclude current measurement ranges less than 1mA.

3. 2635B/2636B with default measurement delays and filters disabled.

TRIGGERING AND SYNCHRONIZATION SPECIFICATIONS

TRIGGERING:

Trigger in to trigger out: 0.5µs, typical.

Trigger in to source change: 0.5µs, typical.

Trigger Timer accuracy: ±2µs, typical.

Source change after LXI Trigger: 280µs, typical.

SYNCHRONIZATION:

Single-node synchronized source change: <0.5µs, typical.

Multi-node synchronized source change: <0.5µs, typical.

NOTES

1. TSP-Link not available on Models 2604B, 2614B, and 2634B.

2. Fixed source range, with no polarity change.
SUPPLEMENTAL INFORMATION

FRONT PANEL INTERFACE: Two-line vacuum fluorescent display (VFD) with keypad and rotary knob.
- Display: Show error messages and user defined messages
- Display source and limit settings
- Show current and voltage measurements
- View measurements stored in dedicated reading buffers
- Keypad Operations: Change host interface settings
- Save and restore instrument setups
- Load and run factory and user defined test scripts (i.e. sequences) that prompt for input and send results to the display
- Store measurements into dedicated reading buffers

PROGRAMMING: Embedded Test Script Processor (TSP) accessible from any host interface. Responds to individual instrument control commands. Responds to high speed test scripts comprised of instrument control commands and Test Script Language (TSL) statements (e.g. branching, looping, math, etc.). Able to execute high speed test scripts stored in memory without host intervention.

Test Script Builder: Integrated development environment for building, running, and managing TSP scripts. Includes an instrument console for communicating with any TSP enabled instrument in an interactive manner. Requires:
- VISA (NI-VISA included on CD)
- Pentium III 800MHz or faster personal computer
- Microsoft .NET Framework (included on CD)
- Microsoft Windows 98, NT, 2000, or XP
- Keithley I/O Layer (included on CD)

Software Interface: TSP Express (embedded), Direct GPIB/VISA, READ/WRITE for VB, VC/C++, LabVIEW, LabWindows/CVI, etc.

READING BUFFERS: Dedicated storage area(s) reserved for measurement data. Reading buffers are arrays of measurement elements. Each element can hold the following items:
- Measurement Source setting (at the time the measurement was taken)
- Measurement status
- Time stamp
- Buffer Size, without timestamp and source setting:
- >60,000 samples
- Buffer Size, with timestamp and source setting:
- >140,000 samples

Accuracy: ±100ppm.

ACCESSORIES AVAILABLE

SOFTWARE
ACS-BASIC Component Characterization Software

RACK MOUNT KITS
4299-1 Single Rack Mount Kit with front and rear support
4299-2 Dual Rack Mount Kit with front and rear support
4299-5 IU Vent Panel

CABLES AND CONNECTORS
2600-BAN Banana Test Leads/Adapter Cable. For a single 2601B/2602B/2604B/2611B/2612B/2614B/2615B/2616B/2617B/2618B SMU instrument channel
2600-KIT Extra screw terminal connector, strain relief, and cover for a single SourceMeter channel (one supplied with 2601B/2611B, two with 2602B/2604B/2612B/2614B)
2600-FIX/TRIAX Phoenix-DI/O-Tricor Adapter for 2 wire sensing
2600-TRIAX Phoenix-DI/O-Tricor Adapter for 4 wire sensing
7078-TRX* 3-Slot, Low Noise Triax Cable. 0.3m–6.1m. For use with 2600-TRIAX Adapter
7078-TRX/GND 3-Slot male triax to BNC adapter (guard removed)
7709-308A Digital I/O Connector (model specific)
8606 High Performance Modular Probe Kt. For use with 2600-BAN

GPIB INTERFACES AND CABLES
7007-1 Double Shielded GPIB Cable, 1m (3.3 ft.)
7007-2 Double Shielded GPIB Cable, 2m (6.6 ft.)
KPCI-488LPA IEEE-488 Interface/Controller for the PCI Bus

DIGITAL I/O, TRIGGER LINK, AND TSP-LINK
2100-TLINK Digital I/O to TLINK Adapter Cable, 1m
CA-126-1A Digital I/O and Trigger Cable, 1.5m
CA-180-3A CAT5 Crossover Cable for TSP-Link and direct Ethernet connection (two supplied)

TEST FIXTURES
8101-PIV DC, Pulse IV and CV Component Test Fixture
8104-4TX 4 Pin Transistor Fixture
LB8028 Component Test Fixture – Optimized for device testing at up to 200V/1A

SWITCHING
Series 3700A DMM/Switch Systems
707B Semiconductor Switching Matrix Mainframe

CALIBRATION AND VERIFICATION
2600-STD-RES Calibration Standard 1GΩ Resistor for Models 2634B, 2635B, and 2636B

SERVICES AVAILABLE FOR ALL SERIES 2600B MODELS

EXTENDED WARRANTIES
C/26xxB-3Y-EW 1 Year Factory Warranty extended to 3 years
C/26xxB-5Y-EW 1 Year Factory Warranty extended to 5 years

CALIBRATION CONTRACTS
C/26xxB-3Y-DATA 3 Calibrations within 3 years includes calibration data before and after adjustment
C/26xxB-5Y-DATA 5 Calibrations within 5 years includes calibration data before and after adjustment
C/26xxB-3Y-STD 3 IS0-17025 accredited calibrations within 3 years
C/26xxB-5Y-STD 5 IS0-17025 accredited calibrations within 5 years

SERVICES AVAILABLE FOR ALL SERIES 2600B MODELS