The Model 2657A is a high voltage, high power, low current source measure unit (SMU) instrument that delivers unprecedented power, precision, speed, flexibility, and ease of use to improve productivity in R&D, production test, and reliability environments. The Model 2657A is designed specifically for characterizing and testing high voltage electronics and power semiconductors, such as diodes, FETs, and IGBTs, as well as other components and materials in which high voltage, fast response, and precise measurements of voltage and current are required. The Model 2657A offers the highest power and best low current performance in the industry. It is supported by the industry’s most powerful parametric characterization software platforms to grow with you as your applications evolve.

The Model 2657A offers highly flexible, four-quadrant voltage and current source/load coupled with precision voltage and current meters. It can be used as a:

- Semiconductor characterization instrument
- V or I waveform generator
- V or I pulse generator
- Precision power supply with V and I readback
- True current source
- Digital multimeter (DCV, DCl, ohms, and power with 6½-digit resolution)
- Precision electronic load

The Model 2657A can source or sink up to 3000V @ 20mA or 1500V @ 120mA.

Typical Applications:

- Power semiconductor device characterization and testing
- Characterization of GaN, SiC, and other compound materials and devices
- Breakdown and leakage testing to 3kV
- Characterization of sub-millisecond transients
Two Measurement Modes: Digitizing or Integrating

Precisely characterize transient and steady-state behavior, including rapidly changing thermal effects, with the two measurement modes in the Model 2657A. Each mode is defined by its independent analog-to-digital (A/D) converters.

The digitizing measurement mode provides speeds up to 1µs per sample. The dual 18-bit digitizers allow you to capture voltage and current transients simultaneously. In the integrating measurement mode, the dual 22-bit integrating analog to digital converters allow more precise measurement of voltage and current. Two A/D converters are used with each measurement mode, one for current and the other for voltage, that run simultaneously for accurate source readback that does not sacrifice test throughput.

The dual high speed A/D converters sample as fast as 1µs per point, enabling full simultaneous characterization of both voltage and current.

Expansion Capabilities

Through TSP-Link Technology technology, the Model 2657A can be linked with Series 2600B SMU instruments to form a larger integrated system with up to 32 nodes. Precision timing and tight channel synchronization are guaranteed with built-in 500ns trigger controllers. The fully isolated, independent channels of the SourceMeter SMU instruments make true SMU-per-pin testing possible.

High Power Device Test Fixture

The Model 8010 High Power Device Test Fixture provides safe and easy connections for testing packaged high power devices at up to 3000V or 100A. The Model 8010 provides connections for a high voltage SourceMeter SMU instrument (Model 2657A), one or two high current SourceMeter SMU instruments (Model 2651A), and three low power SourceMeter SMU instruments (Series 2600B or Model 4200-SCS SMU instruments). This allows devices with two terminals (diodes) or three terminals (transistors) or even four or five terminals to be characterized safely and accurately. The Model 8010 has full interlock capability for up to six SourceMeter SMU instruments. The Model 8010 has integrated protection circuits that protect the low voltage SourceMeter SMU instruments from high voltages the Model 2657A can output should a device fault occur. The Model 8010 includes both a high current (100A) and a high voltage (3000V) test socket. Various replacement test socket modules are available, including TO-247, TO-220, axial lead, and a blank socket module that allows building a custom socket. In addition to standard banana jumpers, the Model 8010 has rear-panel scope and thermal probe ports to simplify system integration.
2657A

Standard Capabilities of Series 2600B SMU instruments

Each Model 2657A includes all the features and capabilities provided in Series 2600B SourceMeter SMU instruments:

- Flexibility for use as either a bench-top I-V characterization tool or as a building block component of multiple channel I-V test systems.
- TSP Express software to perform common I-V tests quickly and easily without programming or installing software.
- Keithley’s Test Script Processor (TSP) technology supports creating and running custom user test scripts for high speed test automation, as well as creating sequences that allow the instrument to operate asynchronously without direct PC control.
- Parallel test execution and precision timing when multiple Series 2600B SMU instruments are connected together in a system.
- LXI Class C compliance.
- 14 digital I/O lines for direct connection to a probe station, component handler, or other automation tools.
- USB port for extra data and test program storage via USB memory device.

Model 2657A Condensed Specifications

### VOLTAGE ACCURACY SPECIFICATIONS

| Range  | Programming Resolution | Accuracy  
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>±(% rdg + volts)</td>
</tr>
<tr>
<td>200 V</td>
<td>5 mA</td>
<td>0.03% + 50 mV</td>
</tr>
<tr>
<td>500 V</td>
<td>10 mA</td>
<td>0.03% + 125 mV</td>
</tr>
<tr>
<td>1500 V</td>
<td>40 mA</td>
<td>0.03% + 175 mV</td>
</tr>
<tr>
<td>3000 V</td>
<td>80 mA</td>
<td>0.03% + 750 mV</td>
</tr>
</tbody>
</table>

| Display Resolution | Integrating ADC Accuracy 2  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>100 µV</td>
<td>0.025% + 50 mV</td>
</tr>
<tr>
<td>100 µV</td>
<td>0.025% + 100 mV</td>
</tr>
<tr>
<td>1 mV</td>
<td>0.025% + 600 mV</td>
</tr>
</tbody>
</table>

### CURRENT ACCURACY SPECIFICATIONS

| Range  | Programming Resolution | Accuracy  
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>±(% rdg + amps)</td>
</tr>
<tr>
<td>1 nA</td>
<td>30 pA</td>
<td>0.1% + 2E–12 + VoE–15</td>
</tr>
<tr>
<td>10 nA</td>
<td>300 pA</td>
<td>0.1% + 5E–12 + VoE–15</td>
</tr>
<tr>
<td>100 nA</td>
<td>3 pA</td>
<td>0.1% + 6E–11 + VoE–15</td>
</tr>
<tr>
<td>1 µA</td>
<td>30 pA</td>
<td>0.03% + 700 pA</td>
</tr>
<tr>
<td>10 µA</td>
<td>300 pA</td>
<td>0.05% + 5 nA</td>
</tr>
<tr>
<td>100 µA</td>
<td>3 nA</td>
<td>0.05% + 60 nA</td>
</tr>
<tr>
<td>1 mA</td>
<td>50 nA</td>
<td>0.05% + 300 nA</td>
</tr>
<tr>
<td>10 mA</td>
<td>60 nA</td>
<td>0.05% + 1.2 µA</td>
</tr>
<tr>
<td>100 mA</td>
<td>600 nA</td>
<td>0.05% + 12 µA</td>
</tr>
<tr>
<td>120 mA</td>
<td>3 µA</td>
<td>0.05% + 36 µA</td>
</tr>
</tbody>
</table>

### SUPPLEMENTAL CHARACTERISTICS

- **Typical Voltage Source Noise**: 0.005% of range.
- **Typical Current Source Noise**: 0.08% of range.
- **Typical Voltage Source Setting**: <1ms to 200V, <7ms to 3000V.
- **Typical Current Source Setting**: <5ms to 120mA, <200ms to 1µA.

Specifications are subject to change without notice.
**TRIGGERING AND SYNCHRONIZATION SPECIFICATIONS**

**TRIGGERING:** Trigger In to Trigger Out: 0.5µs, typical.
**SYNCHRONIZATION:** Single- or multi-node synchronized source change: <0.5µs, typical.

**PROGRAMMING**

**TEST SCRIPT BUILDER:** Integrated development environment for building, running, and managing TSP scripts.
**TSP EXPRESS (Embedded):** Tool that allows users to perform common I-V tests quickly and easily without programming or installing software.
**SOFTWARE INTERFACE:** TSP Express (Embedded), Direct GPIB/VISA, Read/Write with VB, VC/C++, VC#, LabVIEW™, TestPoint™, LabWindows™/CVI, etc.

**SYSTEM EXPANSION**

The TSP-Link expansion interface allows TSP-enabled instruments to trigger and communicate with each other. See figure below:

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