Maximize Speed and Throughput for Semiconductor Measurements Using Source Measure Units (SMUs)

Use a Four-Quadrant SMU Instrument Instead of a Power Supply and Digital Multimeter

Many semiconductor and electronic device tests involve sourcing a voltage and measuring a current as quickly as possible. Overall test time is a function of charge time, measure time, and discharge time, as well as the time to setup and process the test. Traditional power supplies can only source voltage or current and cannot sink. But, a four-quadrant SMU instrument can source and sink both voltage and current, while simultaneously measuring voltage, current, or resistance. The SMU instrument’s four-quadrant operation speeds up the discharge time by automatically using sink mode to quickly absorb all the charge from the device under test (DUT) and cabling. In addition, by tightly integrating this source and measure capability into one instrument, the need for a separate digital multimeter (DMM) and power supply is eliminated. This improves test times, simplifies overall test system design, and increases usability.

Use Embedded Test Scripts to Minimize Program Execution Time

When a typical test program executes from a PC controller, it continually communicates back and forth with the test instrument. This communication time, whether it is over GPIB, LAN, USB, or some other protocol, is often one of the largest contributors to slower test times. Embedded test scripts minimize this communication time by storing and then executing entire test programs directly from the instrument’s non-volatile memory. All setup, decision-making, and data storage is now done inside the instrument itself, independent of the PC. By using embedded test scripts, Keithley’s Test Script Processor (TSP®) technology enables dramatic improvements in overall test throughput. For example, a typical three-point diode test runs over 60% faster using embedded test scripts compared to traditional programming techniques.

Test in Parallel with Distributed Control

Implementing parallel test techniques to test multiple devices at the same time maximizes parts tested per test script. Touch-down or handler index, thus boosting productivity and lowering the cost of test. In a traditional test system, only one instrument at a time can execute a measurement or communicate with the PC controller. In a distributed test system, the combination of TSP and TSP-Link® technology enables dramatic improvements in overall test throughput. In a distributed test system, the embedded test script (TSP script) is distributed and synthesized across multiple instruments through TSP-Link® technology, a high-speed, SMU-to-SMU communication bus. There is one SMU instrument per SMU, and each SMU instrument works together as a coordinated system. Through the combination of TSP and TSP-Link technologies, measurements are performed in parallel.

Use Triax Cabling Instead of Coax Cabling

The coax cable’s signal-to-resistance causes a parallel current path that slows down settling times and limits the true current resolution of the system. Triax cables enable faster settling times and better resolution when sourcing or measuring.

2600B System SourceMeter® SMU Instruments
- Dual- or single-channel models
- Test up to 200V and 10A pulse
- Sub-pA resolution
- TSP and TSP-Link technologies

2650A High Power System SourceMeter® SMU Instruments
- Test up to 3kV and 100A pulse with 200W output power
- Touchpoint digitizer
- Sub-pA resolution
- TSP and TSP-Link technologies

2400 SourceMeter® SMU Instruments
- Test up to 1100V and 10A pulse
- Choose from over ten models
- pA resolution
- Entry-level price point

2450 advanced Touchscreen SourceMeter® SMU Instrument
- Industry-first 5-inch capacitive touchscreen GUI
- Test up to 200V and 1A
- Sub-pA resolution
- TSP and TSP-Link technologies

2600B-2450 advanced Touchscreen SourceMeter® SMU Instrument
- Industry-first 5-inch capacitive touchscreen GUI
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- Sub-pA resolution
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