

## Customer Self-paced E-learning Sequence for Keithley Model 4200-SCS Semiconductor Characterization System

### Overview:

This document gives the recommended sequence for customer self-paced e-learning and tooling setup that Keithley has found to be effective and efficient for training new users of the Keithley Model 4200-SCS Semiconductor Characterization System. Total time required: Approximately 2 hours.

### Prerequisites

1. It assumes the reader knows the measurement basics of using source-measure units.
2. It assumes the reader has general knowledge of best practices for standard testing of semiconductor devices such as a MOSFET.
3. It assumes the customer has access to a properly set up Keithley 4200-SCS running Windows XP. Information on doing that can be found in the Model 4200-SCS Startup Guide, Packing List PA-716 which is available on the internet at <http://www.keithley.com/data?asset=5251> .
4. Review the system overview and introduction at <http://www.keithley.com/data?asset=50733> .
5. This document has references to specific sections of the 94-page 4200-SCS Semiconductor Characterization System *Quick Start Guide* 4200-903-01 Rev. C / May 2006. The customer needs to have a copy of that document, which is available on the internet at <http://www.keithley.com/data?asset=50695> .

This document is organized into these 4 sections:

- Test Setup
- Test Execution
- Data Analysis
- Verification of results / troubleshooting
- Common Usage Errors

### Test Setup

1. **How do I connect make basic connections from my 2-terminal or 3-terminal DUT to the 4200 SMU(s) with/without Pre-Amp?** Refer to page 1-14 of the 4200-SCS Quick Start Guide.
2. **How do I enable output voltages above the 20V default, up to 200V?** Refer to page 1-13 (Interlock Cable connection) of the 4200-SCS Quick Start Guide.

3. **How do I create a new project?** Refer to page 2-6 to 2-10 of the 4200-SCS Quick Start Guide.
4. **How do I create multiple sites for the project?** Refer to page 2-30 of the 4200-SCS Quick Start Guide.
5. **How do I configure the Stress/Measure cycle using the 4200-SCS?** Refer to page 2-33 to 2-38 of the 4200-SCS Quick Start Guide.
6. **How do I configure a Forcing Function window for the device terminal(s)?** Refer to page 2-16 of the 4200-SCS Quick Start Guide.
7. **How do I configure an ITM (Interactive Test Module)?** Refer to page 2-11 to 2-12 of the 4200-SCS Quick Start Guide.
8. **How do I create a user module / user library?** Refer to page 2-24 to 28 of the 4200-SCS Quick Start Guide.
9. **How do I connect external instruments to the 4200?** Refer to page 1-13 of the 4200-SCS Quick Start Guide.
10. **How do I configure the 4200-SCS after adding external instruments?** Refer to page 1-19, 1-20 of the 4200-SCS Quick Start Guide.
11. **What are the differences between an ITM (Interactive Test Module) and an UTM (User Test Module)?** Refer to page 2-5 of the 4200-SCS Quick Start Guide.

### **Test Execution**

12. **How do I execute an entire project?** Refer to page 2-30, 2-31 of the 4200-SCS Quick Start Guide.
13. **How do I execute a test in the project?** Refer to page 2-28, 2-29 of the 4200-SCS Quick Start Guide.
14. **How do I append test data(s) without clearing the previous test data?** Refer to page 2-30 of the 4200-SCS Quick Start Guide.

### **Data Analysis**

15. **How do I view the test results?** Refer to page 3-3, 3-4 of the 4200-SCS Quick Start Guide.

16. **How do I view / define the graph for the test?** Refer to page 3-5 to 3-8 of the 4200-SCS Quick Start Guide.
17. **How do I configure / define the graph for the test(s) for multiple sites?** Refer to page 3-7 (Synchronize Graphs) of the 4200-SCS Quick Start Guide.
18. **Where are my test data files (numerical and graphical data) located in folders on the 4200-SCS hard drive?** Refer to page 3-2 of the 4200-SCS Quick Start Guide.
19. **How do I distinguish the test data at multiple sites for the same test?** Refer to page 3-2 of the 4200-SCS Quick Start Guide.

### **Verification of Results / Troubleshooting**

20. **What are the Source/Measure operating boundaries of the 4200/4210 SMU(s)?** Refer to page 1-8 of the 4200-SCS Quick Start Guide.
21. **What are the hardware specifications of the 4200/4210 SMU(s)?** Refer to page 1-6 of the 4200-SCS Quick Start Guide.
22. **What are the hardware specifications of the optional 4200-PG2 pulse generator?** Refer to page 1-10 of the 4200-SCS Quick Start Guide.
23. **What are the hardware specifications of the optional 4200-SCP2 Scope?** Refer to page 1-11 of the 4200-SCS Quick Start Guide.

### **Common Usage Errors**

- Connecting the triaxial cables to SENSE terminal(s) instead of FORCE terminal(s).
- Attempting high-voltage tests without enabling INTERLOCK.
- Unable to execute a new test module (ITM/UTM) – New test module must be saved before it can be executed.
- Data visible on the Sheet tab, but not on the Graph tab – Graph must be defined.
- In WLR Toolkit; Clicking Run button instead of Run Test/Plan and Cycle Subsites button.
- Can't launch KTE-I applications when logged in under a new (custom) user account – The user must run ... Start ? Programs ? Keithley ? Initialize New User
- In KCON; trying to configure switch matrix connections, but can't see and DUT pins – The user must add a Test Fixture or a Prober (real or fake).
- In KULT; failing to indicate Library Dependencies leads to Build errors.
- In KXCI; receiving data "99E+36" for each data point – the user must list values using "LI" command.
- Using coaxial cables instead of triaxial cables for obtaining low-current measurement.