Device Modeling Drivers for the Model 4200-SCS

The ability to make precise measurements and extract device parameters from them is crucial to creating reliable device models used for circuit simulation. Keithley is committed to helping device physicists obtain the measurement data they need to verify device models. To address this device modeling challenge, Keithley has given the Model 4200-SCS Semiconductor Characterization System the flexibility to interface with some of the industry's most popular device modeling/circuit simulation environments. Now, device modelers can employ either the Celestry BSIMPro or Agilent IC-CAP modeling application to control the Model 4200-SCS via the system's built-in GPIB interface (Keithley eXternal Control Interface or KXCI). The new instrument drivers available allow these packages to control the Model 4200-SCS from within the modeling environment, just like any piece of instrumentation linked to the modeling station.

BSIMPro Instrument Driver

As part of a cooperative agreement with Keithley to provide modeling labs with fast, accurate parameter extraction for reliable simulation, Celestry Design Technologies, Inc. has developed an instrument driver for the Model 4200-SCS for its BSIMPro™ modeling package. Together, Keithley and Celestry will support BSIMPro customers who specify the Model 4200-SCS as their next-generation parameter analyzer. The BSIMPro driver for the Model 4200-SCS is available from Celestry at no charge to owners of the current version of the BSIMPro package.

The BSIMPro Instrument Driver allows BSIMPro users to control the Model 4200-SCS instrumentation from an external computer in order to extract device parameters for use in device modeling and circuit simulation. BSIMPro offers device engineers and designers state-of-the-art modeling software that fills numerous modeling needs, including instrument control, data acquisition, graphical analysis, simulation, optimization, and statistical analysis. After a user collects data via the Model 4200-SCS's GPIB interface, it's simple to extract SPICE models quickly using BSIMPro's proprietary extraction and optimization algorithms for circuits containing diodes, MOSFET devices, bipolar transistors, and passive components. Once the models are extracted, BSIMPro allows the user to verify their robustness and smoothness through a 3-D viewer and external network interface to SPICE simulators. BSIMPro optimizes DC and AC model fits for analog, digital, and mixed-signal applications.

For more information on Celestry's BSIMPro device modeling software or the driver for the Model 4200-SCS, contact any Keithley sales office or Celestry Design Technologies at http://www.celestry.com.

Transform the Model 4200-SCS into a dual-use test station, equally suitable for both device characterization and device modeling

Instrument drivers for Celestry's BSIMPro and Agilent's IC-CAP device modeling packages

Quickly extend a 4145 driver to take complete advantage of the Model 4200-SCS's source and measure capabilities

About the Model 4200-SCS

The Model 4200-SCS provides a total system solution for DC characterization of semiconductor devices and test structures, as well as measurement support for device modeling. This advanced parameter analyzer provides intuitive and sophisticated capabilities for semiconductor device characterization. The Keithley Interactive Test Environment (KITE) allows users to gain familiarity quickly with tasks such as managing tests and results and generating reports. Sophisticated and simple test sequencing and external instrument drivers simplify performing automated device and wafer testing.

The 4200-SCS is modular and configurable. The system supports up to eight Source-Measure Units, including up to four high-power SMUs with 1A/20W capability. An optional Remote PreAmp extends the resolution of any Source-Measure Unit from 100fA to 0.1fA.

Model 4200-SCS Measurement Capability

SMU Measurement Range	Voltage	200	V
	Current[1]	1	A
SMU Measurement Resolution	Voltage	1	μV
	Current	0.1	fA
SMU Measurement Accuracy	Voltage[2]	80	μV
	Current	10	fA
Ground Unit Max. Current		4.4	A

[1] With Model 4210-SMU
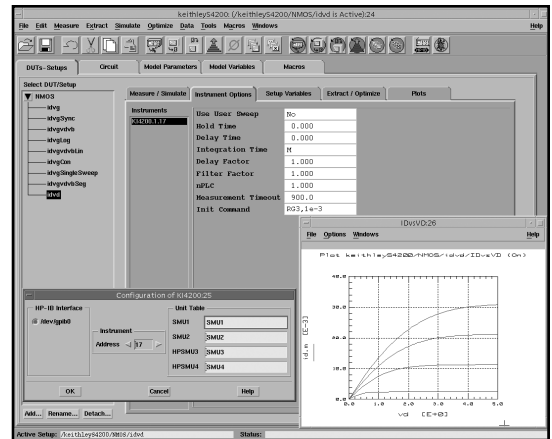[2] VMU Mode

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Device Modeling Drivers for the Model 4200-SCS
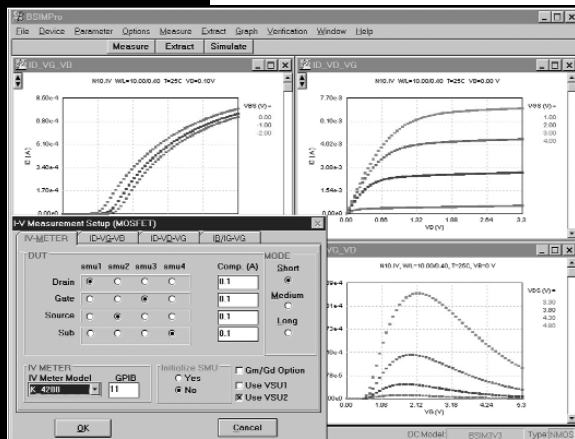
Celestry provides a 4200-SCS driver for BSIMPro.

Keithley provides the 4200-SCS driver for Agilent IC-CAP.

Ordering Information

BSIMPro™ — Instrument Driver for the Model 4200-SCS (available directly from Celestry Design Technologies, Inc.)

IC-CAP — Instrument Driver for the Model 4200-SCS (requires KTEI v4.3 or later)

4200ICDRV-4.3 — for the IC-CAP driver

4200ICSRC-4.3 — for the IC-CAP driver source code

IC-CAP Instrument Driver

IC-CAP (Integrated Circuit Characterization and Analysis Program) is a device modeling software package from Agilent EEsof EDA that provides a flexible environment for developing and extracting SPICE models for a wide range of active and passive devices. IC-CAP interfaces to the most popular circuit simulators, including Spectre, HSPICE, and ADS, in order to optimize model performance from DC to RF. For users who prefer the IC-CAP package, Keithley provides an IC-CAP Instrument Driver for the Model 4200-SCS. Installing the driver on a workstation equipped with IC-CAP allows semiconductor lab users to control the system's Source-Measure Units from within the IC-CAP environment. To the IC-CAP user, once the driver is installed, the Keithley hardware simply appears as another available instrumentation option. The Keithley driver provides full control of each SMU's delay factor, filter factor, and integration time, in addition to fast, normal, and quiet settings.

The IC-CAP Instrument Driver is compatible with IC-CAP v5.3, IC-CAP 2001 and the latest release of Keithley's KTE Interactive software (V4.3). For customers who require specific functionality that's not provided in this driver, the driver source code is available as an option. For more information on IC-CAP, visit http://contact.tm.agilent.com/tmo/eesof/products/85190a-a.html

User-Developed Drivers for Other Modeling Environments

The Model 4200-SCS also offers a GPIB command set that emulates the Model 4145 command set with extensions to provide access to the delay and timing controls options, ranges, and resolution that are now available with the 4200-SCS. The high degree of compatibility with the 4145 means that 4200-SCS users can quickly extend their 4145 driver to take complete advantage of the Model 4200-SCS's source and measure capabilities.

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