Agilent
IC-CAP Device Modeling Software

Complete and Accurate Parameter Extraction for Semiconductor Device Modeling

Technical Overview

Features At a Glance

- Open software architecture enables you to achieve maximum accuracy by integrating your own modeling expertise and methodologies, and provides ultimate flexibility to create and automate measurement, extraction and verification procedures.

- Turnkey extraction solutions for industry standard CMOS models, such as BSIM3/BSIM4, PSP, HiSIM, and HiSIM_HV minimize the learning curve and maximize model accuracy.

- Unique nonlinear high-frequency modeling with Agilent NeuroFET, Root models, high frequency BJT, MESFET, PHEMT, and state-of-the-art VerilogA models.

- Direct links to most commercial simulators (e.g., ADS, HSPICE, Spectre, and ELDO) ensure consistency between extracted models and the simulators used by circuit designers.

- The most advanced and complete on-wafer automated measurement and characterization environment with IC-CAP Wafer Professional.

- Powerful data handling capabilities.

Agilent EEsof EDA
IC-CAP

Agilent Technologies

About IC-CAP

IC-CAP (Integrated Circuit Characterization and Analysis Program) is the industry standard software for DC and RF semiconductor device characterization and modeling. IC-CAP extracts accurate compact models for use in high speed/digital, analog and power RF applications. IC-CAP offers device engineers and designers a state of-the-art modeling tool that fills numerous modeling needs, including automated instrument control, data acquisition, parameter extraction, graphical analysis, simulation, optimization, and statistical analysis. All of these capabilities are combined in a flexible, automated and intuitive software environment for efficient and accurate extraction of active, passive and user-defined devices and circuits. Today's most advanced semiconductor foundries and Integrated Device Manufacturers (IDMs) rely on IC-CAP for modeling silicon CMOS, Bipolar, compound gallium arsenide (GaAs), gallium nitride (GaN), and many other device technologies.

Agilent Technologies

The IC-CAP Platform – A Complete Device Modeling Solution

The semiconductor industry faces continuing challenges to maximize product performance and yield, decrease time-to-market, and reduce production costs. As device geometries get smaller, the need to use accurate models and to control statistical variations in device processing performance becomes ever more important. Typical circuit operating frequencies continue to advance well into the RF and microwave frequency range. Accurate device models are critical to circuit simulation convergence and accuracy. Circuit designers need models that can accurately predict device behaviors at DC, as well as in the RF and microwave regions.

Different process technologies require a variety of models that can be quickly adapted to the unique processes. Modeling software must therefore, be able to provide modeling engineers with the flexibility to modify and extend model parameters beyond those offered by standard models. To optimize performance and control variations, device designers and process engineers need both accurate models and statistical analysis capabilities. For circuit designers, both capabilities are a requirement for determining nominal performance, as well as extreme or worst-case behaviors.

The amount of data measured for device modeling purposes has been increasing exponentially. With modeling measurement taking several hours, or even days, it is important to be as efficient as possible,

without compromising measurement accuracy. Measurement control software must work in conjunction with the prober native control software, as well as with each instrument, to allow automated measurements across temperature.

IC-CAP addresses these challenges and provides significant competitive advantages to companies within the semiconductor industry.

IC-CAP modeling software offers modular products so that you can choose precisely the modules required for your particular modeling scenario. Central to the IC-CAP platform is the IC-CAP software environment, which supports graphical analysis, programming via parameter extraction language, and custom model and user interface development. An analysis module is required in most modeling applications for simulation, optimization and interfacing to external simulators. IC-CAP supports an extensive list of measurement instruments including DC, LCRZ and RF.

The most advanced automated measurement solution

With IC-CAP Wafer Professional (WaferPro), IC-CAP provides the most advanced solution for device modeling automated measurement. A dedicated test plan environment within the IC-CAP Platform allows the test engineer to measure and post process data using a variety of Agilent and third-party instrumentation.

Accurate Agilent proprietary and industry standard models

IC-CAP contains accurate models for building and maintaining up-to-date model libraries. Within a single environment, you can use IC-CAP to automate measurements, simulate device performance, extract data, optimize model parameters, perform statistical analysis, and generate worst-case models. IC-CAP provides extraction routines for industry standard, as well as Agilent proprietary models for diodes, BJT, MOSFET, MESFET, HEMT, noise, thermal models, and others. Extraction modules offer complete DC to RF parameter extraction capabilities. In addition, IC-CAP supports models and extraction routines that are developed by third parties, as well as numerous other simulation software packages, to accommodate a wide range of customer requirements. IC-CAP also supports the use of VerilogA models.
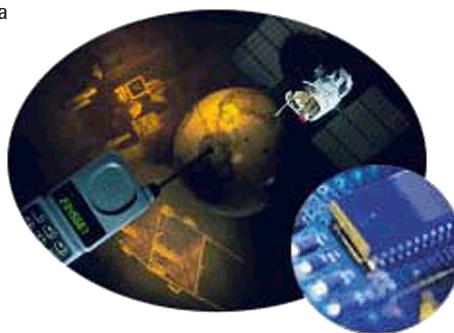
RF and microwave modeling capabilities

Accurate modeling of RF effects requires reliable measurement data. Building on proven strengths in RF and microwave test and measurement, Agilent EEsof EDA provides configurations for a variety of RF instruments such as the Agilent PNA, PNA-X and ENA series. IC-CAP RF extraction modules for proprietary and industry-standard models include RF-dependent parameter extraction, ensuring your models are suitable for high-frequency circuit simulation.

The most flexible software environment

IC-CAP operates in an open and flexible software architecture. Although we provide turnkey modeling solutions for many industry standard and proprietary models, most measurement and extraction algorithms can be modified by the user. Using the IC-CAP parameter extraction language (PEL) or the new Python programming environment, you can define and add your own models or extraction methodologies directly into IC-CAP. When necessary, the IC-CAP open measurement interface allows you to write your own measurement drivers to control instruments. It is also possible to design custom modeling packages for others to use by implementing custom user interface dialogs with IC-CAP GUI Studio.

Making Measurements with IC-CAP

Successful device modeling requires accurate measured data and a thorough understanding of the complex integration between the measurement hardware and the modeling software. The IC-CAP software is a powerful modeling tool that automates Agilent instruments and systems. Its measurement interface provides turn-key measurement drivers for a variety of single instruments and modeling systems configuration for DC, CV and RF measurements. The measured data is collected and stored in IC-CAP and can be directly used for parameter extractions and optimizations of compact device modeling. See Table 1 on page 8 for a list of supported instrument drivers.

IC-CAP Wafer Professional

In addition to the comprehensive built-in instrument library, IC-CAP's newest product addition, WaferPro, provides the ability to drive Agilent measurement equipment (from top bench instruments to parametric testers), as well as third-party probers, switch matrices and thermal chucks to execute efficient, automated on-wafer measurements across temperature. IC-CAP WaferPro is integrated into the IC-CAP platform and takes advantage of its powerful measurement and programming environment to enable a custom library of efficient measurement routines (e.g., adaptive measurement algorithms) that can greatly reduce the overall measurement time. Since the measurement routines are in the IC-CAP environment, either simple or complex post processing (such as calculation of spot measurements or figures of merit, RF de-embedding and direct extraction), can be applied to measured data before data is saved. Data are saved in either file or SQL Database formats. Sweep data are typically saved to IC-CAP MDM file format, while spot measurements are saved to Excel .csv files. To achieve the most efficient data query and import of high volume measured data, data can be saved into SQL Database file. IC-CAP provides an dedicated API to query and import data back into IC-CAP. See Table 2 on page 8 for a list of probers, switching matrixes and thermal chucks supported by WaferPro.
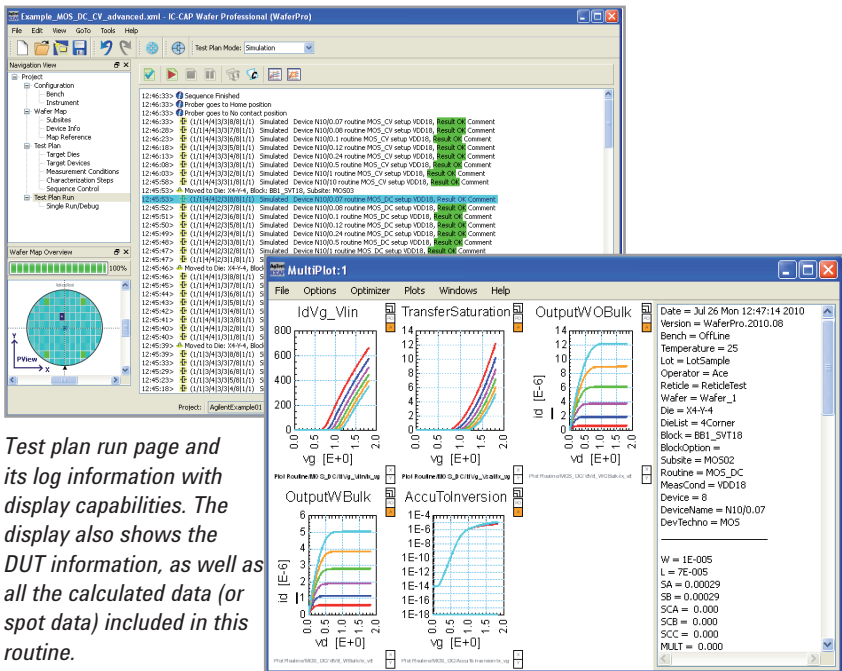
Test plan run page and its log information with display capabilities. The display also shows the DUT information, as well as all the calculated data (or spot data) included in this routine.
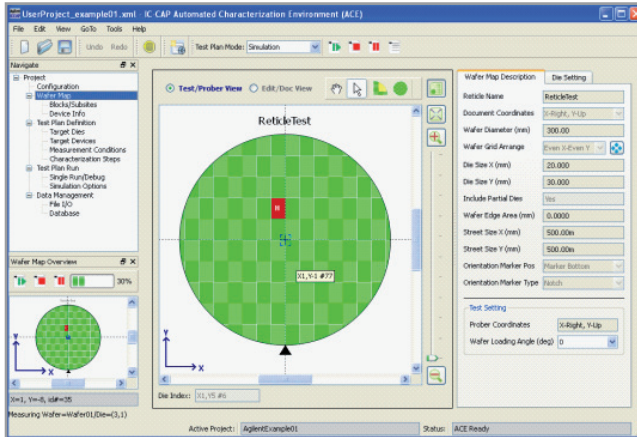

WaferPro

IC-CAP DataPro

After collecting and storing data to file or SQL Database, IC-CAP Data Selection and Processing tool (DataPro) allow users to find the golden/typical die for modeling. DataPro applies statistical analysis on measured data and/or on custom key figures of merit (such as gm, ring oscillator freq, etc.) and based on statistical distribution and variances, outliers can be identified and excluded from further analysis. The typical (mean) and corners data are identified and their data can be exported to other tools for target, typical or corner modeling.

Extracting Models with IC-CAP

A typical modeling procedure involves selecting a model based on the device technology and its final circuit application (e.g., DC, high frequency or both), making the necessary measurements to characterize a device or a set of devices, and then applying an extraction algorithm to calculate the model parameters to minimize discrepancies between measured and simulated data. This last step is achieved by either calculating the parameters using built-in or custom model equations from measured data, or by using tuning or optimization techniques.

IC-CAP provides the platform and tools engineers need to develop their own extraction methodologies. Turnkey modeling extraction packages for users who need to be up and running extracting models by day one are provided by both Agilent and third-party vendors.
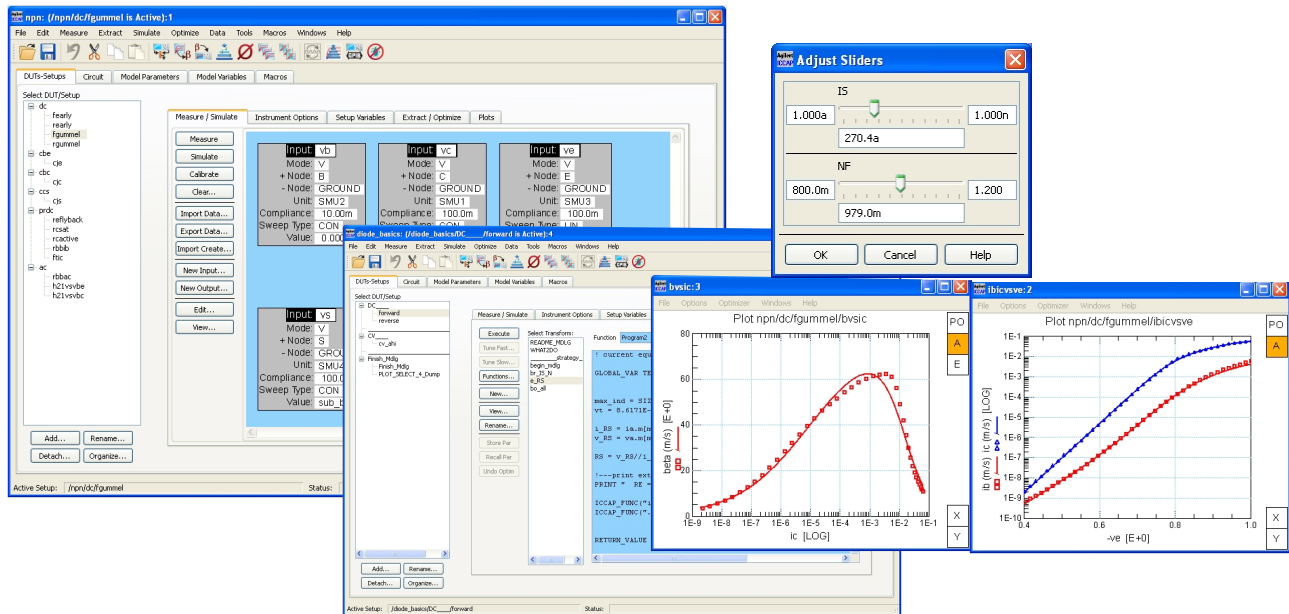
The IC-CAP platform provides the following key tools:

- **Advanced Graphical User Interface (GUI)**
  The IC-CAP GUI enables you to create and manage measurement and modeling projects, and read, organize and display data using single or multiple plot window displays. Multiplot windows allow for an unlimited number of plots, easy navigation and zooming capabilities.

- **PEL and Python Programming**
  Measured or simulated data is organized in IC-CAP Measured or simulated data is organized in IC-CAP units called "setups." Each setup provides the ability to post-process and display data. Data post processing is done real time using PEL or Python. IC-CAP PEL is a simple to learn language that is similar to HP Basic while Python is a modern, object oriented and very powerful language that maximizes speed and productivity.

  These powerful interpreted languages can be used to manipulate data, and create extraction and measurement algorithms within the IC-CAP environment.

  Both PEL and Python allow you to interactively develop new models and extraction routines, and modify existing extraction

modules, making IC-CAP an extremely open and flexible working environment.

- **Efficient Data Management**
  The IC-CAP Data Manager allows you to import/export data in an ASCII file format. This format, which has extension .mdm, is now recognized as a standard in the device modeling community and many measurement tools export data into this IC-CAP unique format. Data in other file formats such as .csv, .s2p, and .xls can also be written and imported.

  The new IC-CAP SQL Database link allows saving measured data into SQL Database and later import data back into IC-CAP for modeling.

- **Wide Choice of Industry Standard Simulators**
  Each IC-CAP project can simulate a user-defined netlist, which typically includes the model card and optionally, a subcircuit to be extracted. The IC-CAP simulator engine creates and maintains a Parameter Table based on the model and subcircuit parameters.. IC-CAP includes

three SPICE simulators and provides direct links to several external simulators (listed in Table 3). The analysis license includes the ability to simulate linear and transient analysis with the powerful Agilent ADS simulator at no extra charge.

- **Powerful Optimizers**
  IC-CAP contains 13 optimization algorithms. Using a combination of different optimization algorithms can be a real advantage when it comes to enhancing the model's fit. A large number of parameters can be optimized to a large number of weighted data sets. In addition, to automated optimizers and manual tuners, which can be invoked by PEL, a powerful tool called Plot Optimizer makes dynamic interactive optimization easy. The Plot Optimizer is a user interface that enables you to quickly set up all parameter optimization tasks on the fly. You can open the Plot Optimizer from every IC-CAP plot and automatically load the target and simulated data for a quick tuning and optimization.

Extracting Models with IC-CAP [continue]

- **Automation with Macros**
  Tasks within an extraction, or even entire extraction routines, can be automated with macros. A macro is a single programming routine that executes a series of IC-CAP commands, functions, PEL programs, or calls to the user environment. With macros, extraction techniques developed in R&D can be automated and leveraged to your production areas where minimal user interaction and high productivity are desired.

- **IC-CAP GUI Studio**
  The GUI Studio adds powerful capabilities for custom graphical user interface development to the highly flexible IC-CAP software environment. IC-CAP Studio provides users with the ability to directly create UIs tailored and customized for specific contexts and users. An engineer uses IC-CAP Studio to develop a user interface that automates and simplifies an entire measurement or extraction process flow. The customized and optimized UI modeling environment can then scan then be shared and exchanged with other colleagues or outside customers who can easily comprehend the flow and quickly perform the necessary measurement and extraction steps.

CMOS modeling

IC-CAP provides powerful turnkey extraction packages for all CMC industry-standard CMOS models: BSIM3, BSIM4, BSIMSOI, PSP, HiSIM, and HiSIM_HV. The CMOS Extraction packages all share a common architecture, which makes it possible to use the same measured data to extract different CMOS models.

The packages provide the following key features:

- DC, CV and temperature dependent modeling with geometry scaling and binning.

- New user interface makes CMOS modeling easy and convenient.

- Open and flexible extraction methodologies. All packages come with a robust extraction methodology that can be highly customized to adapt to specific process technologies.

- Where fine-tuning and optimization is necessary, the extraction process guides you through predefined optimizer and tuner steps.

- Powerful multiplot data display allows users to create and customize plots, including geometry and temperature scaling plots.

- Automatic generation of complete model documentation in HTML format.

- Automatic failure tracking and reporting during measurement and extraction process.

- Highly accurate RF extraction methodologies with enhanced, scalable RF gate and substrate resistance models.

- Target modeling capabilities. Target modeling allows users to extract a preliminary model based on targets (spot data) or re-center an existing model to match new process specs.

- Corner modeling extraction. Based on process parameters statistical variations and the typical extracted library, this package allows the user to extract corner libraries for a CMOS process. The final library can then be verified for a range of devices, temperatures and bias conditions on all supported simulators.
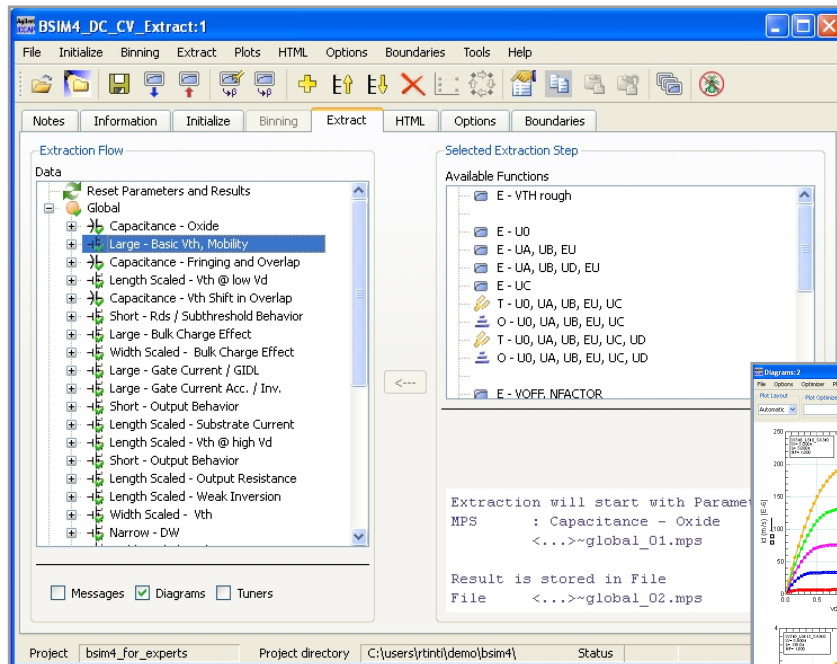
The CMOS extraction packages are regularly updated to support the latest model versions. Please check the web for updated information on supported versions and simulators.

In addition to the CMC compact models, IC-CAP provides legacy extraction packages for the NXP's MOS Model 9, UCB level 2, 3 models, and the data-based Root MOS Model. Please see Table 4 for a complete list of CMOS modeling packages and their product numbers.
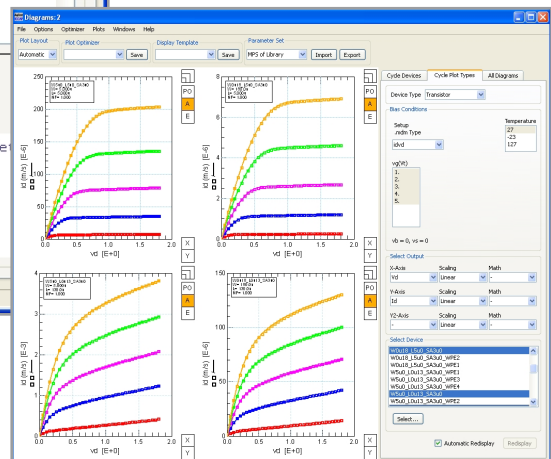
Extracting Models with IC-CAP [continue]

BJT modeling

BCTM VBIC BJT Model in blue since it is a product. Model VBIC is an abbreviation for the Vertical Bipolar Inter-Company, a public domain model developed by the Bipolar Circuits and Technology Meeting (BCTM) consortium. It models quasi saturation, avalanche, and substrate effects. The latest release includes self-heating effects.

High Frequency BJT Modeling Package

This package includes extractions for the Gummel-Poon model, which has been the industry standard model for BJT devices for decades. The package includes a special version of the GP model extraction, which is well suited for RF applications. Here, CV measurements are replaced with S-parameter measurements, making the junction capacitance extraction more convenient and accurate. Improved methods for extracting ideality, base resistance and reverse early voltage are also included. In addition to the standard GP, the package offers extraction for the Agilent EEBJT2 model, a modified GP model to improve the accuracy of both AC and DC behavior.

This Package also includes the extraction of the MEXTRAM CMC Industry standard bipolar model. Its extraction has been implemented in IC-AP through work jointly carried out by Philips/NXP Research Labs, TU Delft and Agilent EEsof EDA. Extensively used within Philips/NXP, the model has proven to be extremely robust and accurate.
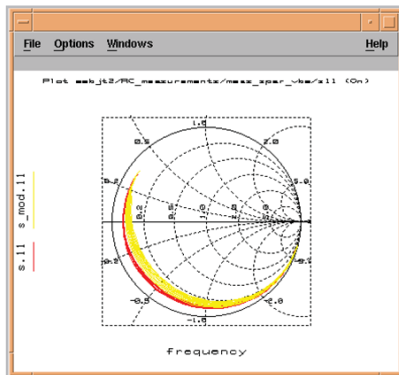
MESFET modeling

The High Frequency MESFET and PHEMT Modeling Package includes extractions for the following models:

Angelov-GaN Model

Modeling Gallium Nitride (GaN) devices is challenging due to the impact of trapping and thermal effects on the device electrical characteristics. Standard GaAs models are not accurate enough for this type of device. The Angelov-GaN model, developed by Prof. I. Angelov at Chalmers University of Technology, is quickly establishing itself as the industry's solution. Agilent's W8533 IC-CAP Angelov-GaN extraction package provides a dedicated software environment that allows users to perform the necessary measurements and extraction of the Angelov-GaN model. Typical DC and network analyzers are supported for making DC and S-parameters measurements and de-embedding. A convenient user interface lets users execute a step-by-step extraction flow to extract the model parameters. A turn-key flow provided in the package enables complete customization. Simulations are performed using Agilent ADS.

Curtice, Statz MESFET models

The package includes extraction routines for three popular industry-standard MESFET models: the Curtice quadratic, Curtice cubic and Statz (Raytheon). The differences between the three models are in the empirical relationships that describe the DC and AC characteristics of the device. IC-CAP extracts the model parameters from a combination of DC and S-parameter measurements.

EEFET3/EEHEMT1 models

These are empirical, nonlinear models for general GaAs FET or HEMT applications, including large-signal, three-terminal IC and packaged devices. They accurately model DC and bias-dependent S-parameters, time delay, sub-threshold current, and dispersion of Rds. Also included is the drain current model based on Agilent EEsof EDA original equations and advanced models for Cgs and Cgd, including transcapacitance effects. Static self-heating effects in drain current are also taken into account. The modules provide highly automated parameter extraction techniques with package parasitics extracted automatically. HEMTs are similar to MESFETs, but with one distinguishing difference in the behavior of Gm versus Vgs. EEHEMT1 is a superset of EEFET3 and has a set of analytic functions for modeling the Gm compression of a HEMT.
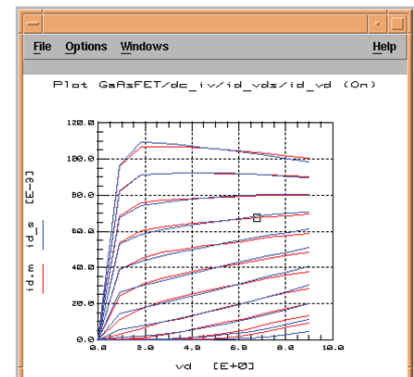
Root MESFET/HEMT models

These are process and technology independent, data-based models for large-signal, three-terminal applications. They model nonlinearities of GaAs FETs and HEMTs, including frequency dispersion. These models are scalable for varying geometries and feature automated data acquisition as well as high-speed model generation.

The Root MESFET/HEMT model creator is included in the Root Models generator software license.

Agilent NeuroFET Model

The NeuroFET is a measurement-based model that uses Artificial Neural Network (ANN) to describe the device measured states, charges and currents. The ANN is made up of simple, interconnected functions, called neurons, with weighted connections. These functions are infinitely differentiable, providing a good distortion behavior and they also work well on the boundaries and outside the measured regions resulting to a better convergence behavior in the simulator.

Advantages of the NeuroFET:
- Usable for all bias condition (even Vds ≤ 0 as may happen in switches)
- Improved DC and RF convergence, compared to table-based models
- Improved distortion simulation at low amplitude, compared to table-based models
- More accurate S-parameters vs. bias
- Better PAE simulation
- The model is general and works for HEMT, FET

The IC-CAP NeuroFET Extraction package controls the necessary data acquisition (DC and S-parameters measurements that are necessary to extract the model), includes some basic deembedding). The ANN training is then accomplished through a specific error optimization procedure. The output model file can then be simulated via ADS within the IC-CAP environment. The model can be verified by comparison to the original data or if available, to other measured data, such as non linear measurements (not provided).

Third-party models

Open framework and coding provides flexible development environment

The unique open and flexible IC-CAP framework enables third-parties to design and develop models and related extraction packages that work as add-ons in the IC-CAP environment. This is possible thanks to the IC-CAP GUI Studio and PEL capabilities. IC-CAP GUI Studio and PEL enable third parties to design and implement custom extraction packages, with specific user interfaces and related extraction routines.

BSIMSOI3v2 and EKV 2.6 Extraction Packages are available from ADMOS
www.admos.de

HiCUM and VBIC Extraction Toolkits are available from X-MOD
www.xmodtech.com

Product Configuration

The IC-CAP product includes 5 major components:

- IC-CAP Core Environment
- IC-CAP Simulation and Analysis
- IC-CAP Instrument Connectivity
- IC-CAP Wafer Professional (WaferPro)
- IC-CAP Data Processing and selection (DataPro)

IC-CAP is available as a complete Modeling Platform Bundle or as individual modules to give you the flexibility of choosing the exact modeling capabilities you need. In addition to the suite, the IC-CAP WaferPro Measurement Bundle is also now available and provides all the capabilities to make on-wafer automated measurements. In addition to these 5 base components, turnkey extraction modules are available (see Table 4).

Agilent W8500 IC-CAP Modeling Platform Bundle

The Agilent W8500 modeling suite provides the basic tools you need to start measuring and modeling devices and circuits. The modeling suite consists of the following components:

- W8501 Core environment
- W8502 Simulation and Analysis
- W8520 Instrument Connectivity

The modeling bundle lets you set up custom extraction routines, measure data using instrument drivers, analyze results, perform simulations, and optimize extracted parameters. Hundreds of modeling examples are available at no extra cost as a starting points to build and design your own extraction toolkits.

Agilent W8511 IC-CAP Wafer Professional Measurement Bundle

The W8511 provides the ability to run automated DC, CV and RF measurement on-wafer using WaferPro. It includes the following components:

- W8501 Core Environment
- W8520 Instrument Connectivity
- W8510 IC-CAP Wafer Professional (WaferPro)

IC-CAP WaferPro works within, and in conjunction with, the IC-CAP platform and lets users create and execute automated test plans. See the W8510 WaferPro section below for more details. Note that this bundle does not include the W8502 Simulation and Analysis which must be added to run the test plan in simulation mode.

Agilent W8501 IC-CAP Core Environment

The W8501 is the IC-CAP framework. It allows you to perform mathematical transforms, customize plots, write macros, create extraction routines using PEL and Python, and write user-defined functions using the C programming language. An extensive function library is included. Also included is IC-CAP Studio, which allows you to develop custom graphical user interfaces.

The W8501 also provides a new PEL API to query IC-CAP SQL Database and quickly import selected data into the IC-CAP environment.

Agilent W8502 analysis module

The analysis module is the IC-CAP simulator engine that provides the ability to simulate device or circuit performance using the default simulator ADS, the built-in SPICE simulators or by linking to a wide range of other external simulators. The ability to simulate linear (DC, CV and AC) and transient simulation with ADS is included. Links to other (SPICE) simulators can be added using the IC-CAP open simulator interface. Please refer to the web for a complete list of supported simulator links and their versions.

AgieInt W8520 Instrument Connectivity

Measurement drivers allow IC-CAP to control and automate the measurement instruments required to characterize your device or circuit. Table 1 lists the wide range of Agilent instruments that are supported with built-in drivers. All C-V, DC, AC, Time Domain and Noise instrument drivers are included in this license.

In addition to turnkey built-in drivers, users can add links to other instruments using the IC-CAP open measurement interface or using PEL to send write/read commands to any instrument connected to the GPIB bus.

Agilent W8510 Wafer Professional (WaferPro)

IC-CAP WaferPro is a powerful test plan suite specifically designed for on-wafer DC/CV and RF measurements. WaferPro allows users to create and execute automated test plans by managing wafer map and device information, measurement routines and conditions. WaferPro includes several built-in measurement routines, yet is flexible enough for users to customize the measurement and calculation of post-processed data. Measured sweep data is saved to IC-CAP MDM files, while spot measurements are conveniently saved to .csv files (MS Excel Comma Limited Files). For high volume applications, WaferPro can also save data to IC-CAP SQL Database. The SQL Database has been specifically designed to store on-wafer measurement data and has a built-in flexibility to accommodate a variety of custom data. SQLite and MySQL are supported. WaferPro supports all IC-CAP instruments, including the Agilent Parametric 407x and 408x Parametric Test Systems and a variety of industry-standard fully and semi-automated probers. See Table 2 on page 8 for a list of Probers, Switch Matrixes and thermal Chucks supported by WaferPro.

Agilent W8503 Data Selection and Processing

IC-CAP Data Selection and Processing tool (DataPro) is a separate toolkit that applies statistical analysis on selected measured data and based on statistical distribution and variances, identifies golden and corner dies. DataPro can import data directly from WaferPro (either file-based or database) or from simple IC-CAP project format. Statistical analysis can be applied to either sweep or spot type of measurements.

Product Configuration – Measurement Drivers

Table 1. Supported measurement drivers in IC-CAP W8520 Instrument Connectivity licence.

W8520 Instrument Connectivity Drivers	Instrument supported
LCRZ measurement drivers	Agilent E4991A impedance analyzer Agilent E4980A Precision LCR meter Agilent 4194 impedance analyzer[1] Agilent 4271 1 MHz dig. capacitance meter[1] Agilent 4275 multi-frequency LCR meter[1] Agilent 4280 2 MHz capacitance meter[1] Agilent 4284 precision LCR meter Agilent 4285 precision LCR meter Agilent 4294A precision LCR meter
DC measurement drivers	Agilent B1500A Semiconductor Device Analyzer Agilent B1505A Power Device Analyzer/Curve Tracer Agilent E5270 Series parameter analyzer: E5270B , E5272A, and E5273A Agilent B2900 Series Precision Source/Measure Unit Agilent 4156x semiconductor parameter analyzer Agilent 4140 pA meter/DC voltage source[1] Agilent 4141 DC source/monitor[1] Agilent 4142x modular DC source/monitor Agilent 4145x semiconductor parameter analyzer[1] Agilent 4155x semiconductor parameter analyzer
AC measurement drivers	Agilent PNA Series Agilent PNA-X Series (S-parameters, gain compression and intermodulation) Agilent ENA Series Agilent E8356A 10 MHz to 3 GHz[1] Agilent E8357A 10 MHz to 6 GHz[1] Agilent E8358A 10 MHz to 9 GHz[1] Agilent N5250A Millimeter-wave PNA, 10 MHz to 110 GHz Agilent 3577 network analyzer[1] Agilent 8510 network analyzer Agilent 8702 network analyzer[1] Agilent 8719 network analyzer Agilent 8720 network analyzer Agilent 8722 network analyzer Agilent 8753 network analyzer
Time domain measurement drivers	Agilent 54121T-54124T digitizing oscilloscopes[1] Agilent 54510 digitizing oscilloscopes[1] Agilent 54750 TDR oscilloscope[1] Agilent 8130 pulse generator[1] Agilent 8131 pulse generator[1]
Noise measurement drivers	Agilent 35670A dynamic signal analyzer

Table 2a. WaferPro supported Probers

Wafer Probers - Tokyo Electron (TEL)
Cascade PS21
Cascade Summit 12K
Suss PA300
Accretech UF3000
Tokyo Electron (TEL) P8 and P12

Table 2b. Switching Matrix

Switching Matrix
Agilent HP4070 1
Keithley 707/708
Agilent HP4080 1
Agilent B2200

Table 2c. Thermal Controllers

Thermal Controllers
Accretech
Cascade Summit
Cascade PS21
Temptronic TP032A
Tokyo Electron (TEL)

Table 3. Supported Simulators

Simulator	Company	Licences Required
ADS (hpeesofsim)	Agilent EESof	Included in the W8502 Analysis Module are linear, transient and Verilog-A simulations)
MMSIM (SPECTRE)	Cadence	License required
HSPICE	Synopsys	License required
SABER	Synopsys	License required
ELDO	Mentor Graphics	License required
Spice3, spice2, PSPICE, HPSPICE	Various	Still included W8502 Analysis Module, however, these simulators are no longer actively supported (legacy simulators)

Product Configuration – Extraction Packages

IC-CAP extraction modules and model generators
The modules listed in Table 4 include all of the measurement setups, mathematical transforms, extraction routines, and documentation required to perform extractions with IC-CAP.

Table 4. Extra packages

Device Technology	Product Number	Model Extraction Package
CMOS	W8553	UCB BSIM3, Target and Corner Modeling
	W8554	UCB BSIM4, Target and Corner Modeling
	W8550	PSP Extraction, Target and Corner Modeling
	W8551	HiSIM2 Extraction,Target and Corner Modeling
	W8555	HiSIM_HV Extraction,Target and Corner Modeling
	W8560	HiSIM2 & HiSIM_HV,Target and Corner Modeling
	W8552	UCB BSIMSOI, Target and Corner Modeling
	W8532	Agilent Root MOS
BJT & HBT	W8541	Agilent HBT
	W8540	High Frequency BJT (EEBJT2) Gummel-Poon & MEXTRAM
	W8542	VBIC
MESFET & HEMT	W8530	Curtice, Cubic Curtice, Quadratic Statz-Pucel (Raytheon) EEFET3, EEHEMT1
	W8531	NeuroFET
	W8532	Agilent Root MESFET/HEMT
	W8533	Angelov-GaN
Diode	W8532	Agilent Root diode

Licensed software

Each IC-CAP module is available in two license versions:

1. A node-locked version allowing thesoftware to execute only on a singleworkstation or a PC.

2. A network-licensed version for execution on multiple workstations or PCs on a network, allowing various workgroups to share the software.

Both licenses use the FLEXlm license management system. These two license options can be mixed freely. For example, a node-locked license of an instrument driver package can reside on a workstation or PC in the lab, while a network license for the analysis module can be shared among a group of engineers for data analysis.

World Wide Web

Our Agilent EEsof EDA World Wide Web includes a special Support Web area for downloadable patches, defects and solutions, and online technical support. In addition, Agilent EEsof EDA gives you access to other services, including:

- News and events
- Product information and on-line demos
- Product applications and examples
- Online product documentation
- Customer training classes
- Online and telephone technical support
- Knowledge center with application examples and users' discussion forum

World-Class Support and Training

Agilent EEsof EDA is committed to helping you achieve success with IC-CAP through customer education courses, technical support, and custom solution services.

To help you begin using IC-CAP quickly and productively, a comprehensive, three-day course is offered at various locations, including the Agilent EEsof EDA facility in Santa Rosa, California, USA.

A support contract also includes automatic software updates, literature, and documentation to bring you the latest product enhancements and features.

Contact Information

All Agilent EEsof EDA products:
www.agilent.com/find/eesof

IC-CAP device modeling:
www.agilent.com/find/eesof-iccap

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