

## RELEASE NOTES

# NI Circuit Design Suite

## Version 10.0

These release notes contain system requirements for NI Circuit Design Suite 10.0, as well as information about product tiers, new features, documentation resources, and other changes since Multicap 9.0, Multisim 9.0, and Ultiboard 9.0.

NI Circuit Design Suite includes the following familiar Electronics Workbench software products: NI Multisim, NI Ultiboard, and the NI Multisim MCU Module (formerly MultiMCU).

## Contents

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Installing NI Circuit Design Suite 10.0 .....	2
Minimum System Requirements .....	2
Installation Instructions .....	2
Product Activation .....	3
What's New in NI Circuit Design Suite 10.0 .....	3
Mouse-Click Support for Interactive Components .....	3
Convergence Assistant .....	4
Increased Quality and Breadth of the Component Database .....	4
New Components from Leading Manufacturers .....	4
Generic Power Simulation Parts .....	4
Bipolar Sources .....	4
Graphical LCD .....	5
Single Symbol Representations of Standard Logic Components .....	5
Enhancements to Passive Components .....	5
Extended SPICE Modeling Capabilities .....	5
Parameterized SPICE models .....	5
Improved Support of Behavioral Sources .....	5
Support for BSIM 4 Parameters .....	6
Enhanced Data Visualization .....	6
Advanced Functionality of Static Probes .....	6
Add Traces to Grapher after Running Analyses .....	6
Display Initial Conditions on the Schematic .....	6

Current Probe Instrument .....	6
Enhanced Analysis Capabilities .....	6
Extended Language Support and File Management in the MCU Module.....	7
Improvements to Speed and Quality of NI Ultiboard .....	7
Advanced Options for Exported Data Interpolation .....	7
Miscellaneous Features .....	8
Unicode Characters.....	8
NI Installation and License Management .....	8
Product Tier Details.....	8
Documentation .....	14

## Installing NI Circuit Design Suite 10.0

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This section describes the system requirements and installation procedures for NI Circuit Design Suite.

### Minimum System Requirements

To run NI Circuit Design Suite 10.0, National Instruments recommends that your system meet the following requirements:

- Windows 2000 Service Pack 3 or later, or Windows XP
- Pentium 4 class microprocessor or equivalent (Pentium III class minimum)
- 512 MB of memory (256 MB minimum)
- 1.5 GB of free hard disk space (1 GB minimum)
- Open GL® capable 3D graphics card recommended (SVGA resolution video adapter with 800×600 video resolution minimum, 1024×768 or higher preferred)
- To develop custom LabVIEW based instruments for use in Multisim, LabVIEW 8.0.x or higher is required

### Installation Instructions

The NI Circuit Design Suite 10.0 installer installs all products in the suite: Multisim, Ultiboard, and the Multisim MCU Module.

National Instruments recommends that you close all open applications before you install NI Circuit Design Suite.

Unless you specify another location during installation, the NI Circuit Design Suite installation program copies files to <Program Files>\National

Instruments\Circuit Design Suite 10.0 after you complete the following steps:

1. Insert the NI Circuit Design Suite CD into the CD-ROM drive. If the CD startup screen is not visible, select **Run** from the Windows **Start** menu and run `setup.exe` from your CD.
2. Follow the instructions in the dialog boxes.

## Product Activation

When you run a product in the NI Circuit Design Suite for the first time, it will prompt you to activate a license for that product.

Note: To run the Multisim MCU Module, place a component from the MCU Module group on a Multisim circuit or open a Multisim file that contains a component from the MCU Module group.

If you do not activate a valid license, the product will run in Evaluation Mode and continue to prompt you to activate a license on each subsequent run. Evaluation Mode is valid for 30 days following the first run of the product.

For information about how to activate your software product, please refer to the *Activation Instructions for National Instruments Products Note to Users* included with your NI Circuit Design Suite 10.0 package.

## What's New in NI Circuit Design Suite 10.0

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This document describes the following new features of NI Circuit Design Suite 10.0:

- Mouse-Click Support for Interactive Parts
- Convergence Assistant
- Increased Quality and Breadth of the Component Database
- Extended SPICE Modeling Capabilities
- Enhanced Data Visualization
- Extended Analysis Capabilities
- Extended Programming and File Management in the MCU Module
- Improvements to Speed and Quality of NI Ultiboard
- Advanced Options for Exported Data Interpolation
- Miscellaneous Features

## Mouse-Click Support for Interactive Components

NI Multisim 10.0 lets you use your mouse to control interactive components during simulation. You can click on switches to toggle them, push keypad buttons with the mouse, and adjust the value of the variable components, such as

potentiometers, with a slider bar. You may also continue to use keyboard controls for these devices.

## **Convergence Assistant**

The Convergence Assistant adjusts simulation settings when a "Time Step Too Small" error occurs during interactive simulation. The assistant adjusts the minimum number of parameters required in order to allow convergence of the simulation. The assistant adjusts the following parameters:

1. Initial Condition
2. TMAX
3. RELTOL
4. RSHUNT
5. ITL1
6. Integration method
7. GMIN

## **Increased Quality and Breadth of the Component Database**

NI Multisim 10.0 has a number of new additions and improvements to the component database. These include: around 1,000 new components from leading manufacturers, generic power simulation parts, new bipolar sources, a Graphical LCD, single symbol representations of standard logic components, and improvements to passive components.

### **New Components from Leading Manufacturers**

NI Multisim 10.0 has approximately 1,000 new components with models from Analog Devices, Texas Instruments, and Linear Technologies. These additions include symbols, models, and IPC-standard landpatterns. Components include operational-amplifier, comparator, and voltage reference models.

### **Generic Power Simulation Parts**

NI Multisim 10.0 includes models for all power simulation parts found in the "Switch-Mode Power Supply SPICE Cookbook" by Christophe Basso. These components include Buck, Boost, Buck-Boost, and PWM controllers. Their models include voltage and current mode controlled devices, and models for average and detailed transient operation.

### **Bipolar Sources**

New bipolar pulse sources include both current and voltage sources.

## Graphical LCD

A Graphical LCD is available for users who purchase the MCU Module in conjunction with NI Multisim. The command system for the Graphical LCD follows the Toshiba T6963C. The graphical LCD is a two-color device with 256 x 256 pixel display resolution. This device supports three modes of operation: text-only, graphics-only, and mixed text and graphics.

## Single Symbol Representations of Standard Logic Components

In addition to the multi-section component representation of standard logic components such as logic gates and flip-flops, the component database now includes single symbol representations of common components. These single-symbol representations show the power and ground pins of these devices.

## Enhancements to Passive Components

You can now change the value of any resistor, capacitor, or inductor placed on the schematic without replacing it. You can also assign a landpattern to any passive component. You can assign information about the type of component, for instance metal-oxide, and this information propagates to the Bill of Materials. The tolerance of the components is automatically available for Monte-Carlo and Worst Case analyses, and you can edit the tolerances in the spreadsheet.

An advanced non-linear inductor model lets you define the inductor characteristics based on datasheet values.

## Extended SPICE Modeling Capabilities

NI Multisim 10.0 introduces enhancements to its SPICE modeling capabilities, including parameters in SPICE subcircuit models, improved support of behavioral sources, and support for BSIM 4 parameters.

### Parameterized SPICE models

You may now define parameters in the .subcircuit line of SPICE macro-models in NI Multisim. The definition of parameters is as follows.

```
.subckt <subckt_name> <node_list> PARAMS: param_name = value, ...
```

You may then use the parameter name in place of a value in the macro-model. The value of the parameter is editable in the component dialog on the schematic.

### Improved Support of Behavioral Sources

Behavioral sources now support nested instances of IF statements.

## Support for BSIM 4 Parameters

NI Multisim 10.0 supports the standard BSIM 4 parameters for MOSFET models. BSIM 4 supports up to 400 parameters. More information about BSIM 4 is available at <http://www-device.eecs.berkeley.edu/~bsim3/bsim4.html>.

## Enhanced Data Visualization

NI Multisim 10.0 includes a number of improvements to the way you configure and view results. These include: advanced functionality of the static probes, the ability to add traces to the Grapher after running a simulation, the ability to display the initial conditions of components on the schematic, a current probe instrument, and improvements to the memory and register displays of MCUs.

### Advanced Functionality of Static Probes

Placed (static) probes now include a reference designator, which allows you to select another probe as a reference net. In previous versions of NI Multisim, all probes referenced ground. You can also use probe reference designators to select which traces to view in analyses.

### Add Traces to Grapher after Running Analyses

You can add traces to the Grapher view after running an analysis, and select what type of data you want NI Multisim to store.

### Display Initial Conditions on the Schematic

You can choose to display the initial conditions of capacitors and inductors on the schematic.

### Current Probe Instrument

The current probe instrument is a virtual representation of a real current probe that connects to an oscilloscope. You connect one end of the probe to a net on the schematic and the other to the input to an oscilloscope. You can set the ratio of amps to volts displayed on the instrument. Note that the units remain in volts on the oscilloscope.

## Enhanced Analysis Capabilities

NI Multisim 10.0 now allows you to evaluate more expressions before and after running analyses. The definitions of the expressions are:

1.  $\text{avg}(\mathbf{X})$  — Running average of the vector  $\mathbf{X}$
2.  $\text{avg}(\mathbf{X}, d)$  — Running average of the vector  $\mathbf{X}$  over  $d$

3. `envmax(X, n)` — Upper envelope of the vector **X** where *n* is the number of points on either side of a peak that must be less than the value for a peak to be identified
4. `envmin(X, n)` — Lower envelope of the vector **X** where *n* is the number of points on either side of a peak that must be less than the value for a peak to be identified
5. `grpdelay(X)` — Group delay of **X** with results in seconds
6. `rms(X)` — Running RMS average of vector **X**
7. `integral(X)` — Running integral of vector **X**
8. `sgn(X)` — The sign or signum of a real number. It is -1 for a negative number, 0 for the number zero, and 1 for a positive number.

## Extended Language Support and File Management in the MCU Module

The MCU Module, formerly MultiMCU, supports C-code in addition to Assembly language. It has a code manager that lets you use multiple files to define the operation of the microcontrollers in the design. You can have header files and use libraries. You can also load in externally assembled binary files and view them in disassembled format.

## Improvements to Speed and Quality of NI Ultiboard

NI Ultiboard 10.0 contains enhancements to the quality of the product that include improvements to the speed of trace-placement and the ability to select whether or not to plate through-holes. Exported Gerber files do not contain mosaics in the polygons. Quality improvements in the landpatterns include: pin mappings from symbols to IC pin-outs and landpattern shapes and sizes in the database. All new landpatterns follow IPC standards.

## Advanced Options for Exported Data Interpolation

When exporting simulation data from NI Multisim to other NI data formats such as LVM or TDM files, you can choose the interpolation technique that best suits the signal. You can also control the interpolation method used when sending simulation data to NI LabVIEW based instruments running inside of NI Multisim. The interpolation methods include:

- Coerce
- Linear Interpolation
- Spline Interpolation

## Miscellaneous Features

Some of the other features added to the new suite include Unicode character support and NI installation and license management.

### Unicode Characters

All products in NI Circuit Design Suite 10.0 support Unicode characters. This feature allows you to use Cyrillic and Asian fonts inside the products.

### NI Installation and License Management

All products in NI Circuit Design Suite adhere to the standard method used to install and activate National Instruments software. You can activate the software automatically via the internet, or manually via a web browser, phone call, or email.

## Product Tier Details

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The following lists the schematic capture functionality available in Multisim Student and Education editions:

<b>Functionality</b>	<b>Student</b>	<b>Education</b>
Customizable GUI	X	X
Screen-capture utility	X	X
Comments on schematic	X	X
Circuit annotations	X	X
Modeless part placement and wiring	X	X
Fast retrieval parts bins	X	X
Auto and manual wiring	X	X
Virtual wiring by node name	X	X
Rubber banding on part move	X	X
Fast auto-connect passives	X	X
Subcircuits	X	X
3-dimensional breadboarding	X	X
Virtual NI ELVIS	X	X
Embedded questions - view and respond	X	X

<b>Functionality</b>	<b>Student</b>	<b>Education</b>
Forward/Back annotation with Ultiboard	X	X
Cross-probing with Ultiboard	X	X
Bus-vector connect		X
Spreadsheet view		X
Design constraints for layout		X
Advanced search		X
Zoom to selected part		X
Corporate database		X
User defined fields		X
Save components to database from workspace		X
Multiple circuits open		X
Embedded questions - create and edit		X
Electrical rules check		X
Graphically mark no-connect pins		X
Hierarchical designs		X
Multisheet designs		X
Project manager		X
Reports - including bill of materials		X
Pin and gate swap		X
Export to Mentor PADS layout		X
Device library	Partial	Complete
Maximum components in design	50	Unlimited

The following lists the simulation functionality available in Multisim Student and Education editions:

<b>Functionality</b>	<b>Student</b>	<b>Education</b>
Interactive simulation	X	X
Fully mixed-mode A/D simulation	X	X
Standard SPICE 3X5/XSPICE	X	X
Enhanced model support	X	X
PSPICE model simulation*	X	X
Speed/Accuracy tradeoffs	X	X
Simulation advisor	X	X
Convergence assistant	X	X
Virtual, interactive, animated parts	X	X
Mouse click support for interactive parts	X	X
Rated components	X	X
Insert faults into components	X	X
Measurement Probes	X	X
Component Wizard	X	X
NI measurement data file sources	X	X
NI measurement data file export	X	X
NI LabVIEW VIs as instruments and sources	X	X
Microphone & speaker	X	X
Circuit restrictions	X	X
Grapher & Postprocessor	X	X
RF design kit	X	X
Circuit wizards		X
C-Code modeling		X
Description box synced with simulation		X
Ladder diagrams/components		X
Model makers		X

<b>Functionality</b>	<b>Student</b>	<b>Education</b>
Load and save simulation profiles		X
Virtual Instruments	22	22
Analyses	10	18
Co-simulation of MCUs	Add On	Add On

\* Does not support all PSpice syntax

The following lists the layout functionality available in Ultiboard Student and Education editions:

<b>Functionality</b>	<b>Student</b>	<b>Education</b>
Push and Shove trace placement	X	X
Real-time & from copper ratsnest	X	X
Real-time polygon update with voiding	X	X
Forward/Backward annotation	X	X
Cross-probing with Multisim	X	X
Real-time DRC	X	X
64 layers and 1 nanometer resolution	X	X
Comprehensive Footprint Wizard	X	X
Enhanced 3D visualization with print	X	X
User annotations	X	X
Full screen mode		X
Gerber, DXF, IPC-D-356A, SVG output		X
Dimensions on PCB and Landpatterns		X
Dimensions in Database Manager		X
Net bridges		X
3D visualization inside circuit board		X
Turn off ratsnest for selected nets		X
Gridless follow-me placement		X
Load and save technology files		X
Polar Grids		X

<b>Functionality</b>	<b>Student</b>	<b>Education</b>
Customizable layer viewing		X
Split power-planes		X
Keep-in/Keep-out areas		X
Place components in array		X
Unplace all components		X
Ruler bar alignments and measurements		X
Auto-alignment		X
Save PCB Design as a component		X
Permanent grouping		X
Pin & gate swapping		X
Multiple clearances		X
Jump to Error		X
Equispace trace support		X
Differential Impedance Calculator		X
Transmission Line Calculator		X
Microvias		X
Test point insertion		X
Automatic tear-dropping		X
Pin necked trace support		X
Automatic jumper insertion		X
Copy Route & Replica Place functions		X
In-place footprint editor		X
Mechanical CAD		X
Export 3D info in 3D IGES, DXF formats		X
Copper amount report		X
Test point report		X
Customization of report generation		X
Multiple open documents		X

<b>Functionality</b>	<b>Student</b>	<b>Education</b>
Number of pins supported	350	1,000
Spreadsheet view	Limited	Complete

The following lists the autorouting functionality available in Ultiboard Student and Education editions:

<b>Functionality</b>	<b>Student</b>	<b>Education</b>
Fully customizable cost factors	X	X
Progressive Routing	X	X
Interactive autorouting	X	X
Constraint driven routing	X	X
Manual pre-placement: components, vias, traces	X	X
Auto Block Capacitor recognition	X	X
SMD mirroring	X	X
Trace rubberbanding	X	X
Follows keep-in/keep-out criteria	X	X
Pin number limit	350	1,000
Maximum number of layers	2	4

# Documentation

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NI Circuit Design Suite 10.0 includes a complete documentation set featuring printed and electronic resources for your reference.

The following printed and electronic resource is available:

- Getting Started with NI Circuit Design Suite Guide

The following electronic resources are available in PDF files:

- Multisim User Guide
- Multisim Component Reference Guide
- Multisim for Educators Guide
- Multisim MCU Module User Guide
- Ultiboard User Guide

To access the User Guides, select Start > All Programs > National Instruments > Circuit Design Suite 10.0 > Documentation and then select the file of interest.

The following online help files are available from the installed software Help menu and from the Start Menu:

- Multisim Education Edition Help File
- Ultiboard Help File

To access the Help Files, select Start > All Programs > National Instruments > Circuit Design Suite 10.0 > Documentation and then select the file of interest.

The following online help files are available from the installed software Help menu:

- Component Reference Education Edition Help File
- Multisim Symbol Editor Help File
- Multisim Title Block Editor Help File

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