

# **SimElectronics® Release Notes**

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*SimElectronics® Release Notes*

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<b>Summary by Version</b> .....	<b>1</b>
<b>Version 1.4 (R2010a) SimElectronics Software</b> .....	<b>3</b>
<b>Version 1.3 (R2009b) SimElectronics Software</b> .....	<b>7</b>
<b>Version 1.2 (R2009a) SimElectronics Software</b> .....	<b>9</b>
<b>Version 1.1 (R2008b) SimElectronics Software</b> .....	<b>13</b>
<b>Version 1.0 (R2008a+) SimElectronics Software</b> .....	<b>15</b>
<b>Compatibility Summary for SimElectronics Software</b> .....	<b>17</b>



## Summary by Version

This table provides quick access to what's new in each version. For clarification, see "Using Release Notes" on page 1.

<b>Version (Release)</b>	<b>New Features and Changes</b>	<b>Version Compatibility Considerations</b>	<b>Fixed Bugs and Known Problems</b>	<b>Related Documentation at Web Site</b>
<b>Latest Version V1.4 (R2010a)</b>	Yes Details	Yes Summary	Bug Reports	Printable Release Notes: PDF  Current product documentation
V1.3 (R2009b)	Yes Details	Yes Summary	Bug Reports	No
V1.2 (R2009a)	Yes Details	No	Bug Reports	No
V1.1 (R2008b)	Yes Details	No	Bug Reports	No
V1.0 (R2008a+)	Yes Details	Not applicable	Bug Reports	No

### Using Release Notes

Use release notes when upgrading to a newer version to learn about:

- New features
- Changes

- Potential impact on your existing files and practices

Review the release notes for other MathWorks™ products required for this product (for example, MATLAB® or Simulink®). Determine if enhancements, bugs, or compatibility considerations in other products impact you.

If you are upgrading from a software version other than the most recent one, review the current release notes and all interim versions. For example, when you upgrade from V1.0 to V1.2, review the release notes for V1.1 and V1.2.

## **What Is in the Release Notes**

### **New Features and Changes**

- New functionality
- Changes to existing functionality

### **Version Compatibility Considerations**

When a new feature or change introduces a reported incompatibility between versions, the **Compatibility Considerations** subsection explains the impact.

Compatibility issues reported after the product release appear under Bug Reports at The MathWorks™ Web site. Bug fixes can sometimes result in incompatibilities, so review the fixed bugs in Bug Reports for any compatibility impact.

### **Fixed Bugs and Known Problems**

The MathWorks offers a user-searchable Bug Reports database so you can view Bug Reports. The development team updates this database at release time and as more information becomes available. Bug Reports include provisions for any known workarounds or file replacements. Information is available for bugs existing in or fixed in Release 14SP2 or later. Information is not available for all bugs in earlier releases.

Access Bug Reports using your MathWorks Account.

## Version 1.4 (R2010a) SimElectronics Software

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	Yes—Details labeled as <b>Compatibility Considerations</b> , below. See also Summary	Bug Reports	Printable Release Notes: PDF  Current product documentation

New features and changes introduced in this version are:

- “New Linear and Rotary Motors Defined in Terms of Flux ” on page 3
- “New Potentiometer Block” on page 4
- “Initial Conditions Tab Added for Logic Blocks” on page 4
- “Changes in Block Parameterization” on page 4
- “New Demos” on page 5
- “Functions and Function Elements Being Removed ” on page 6

### **New Linear and Rotary Motors Defined in Terms of Flux**

Two new blocks represent models of a motor or actuator defined in terms of magnetic flux:

- FEM-Parameterized Linear Actuator block, located in the Translational Actuators library
- FEM-Parameterized Rotary Actuator block, located in the Rotational Actuators library

## New Potentiometer Block

The new Potentiometer block, located in the Passive Devices library, represents a potentiometer, where the wiper position is controlled by the input physical signal.

## Initial Conditions Tab Added for Logic Blocks

The dialog boxes of blocks in the Logic library now have an additional tab, Initial Conditions, which lets you specify the output initial state (low or high). See the respective block reference pages for details.

## Changes in Block Parameterization

The ability to parameterize SimElectronics® blocks by importing circuit data from a SPICE netlist is no longer supported. As a result, using the `netlist2sl` function is no longer recommended. See “Parameterizing Blocks” in the *SimElectronics User’s Guide* for alternative ways of block parameterization. Additional related changes introduced in this version are:

- “Changes to the SPICE-Compatible Blocks” on page 4
- “Changes to the Solar Cell Block” on page 5
- “Compatibility Considerations” on page 5

## Changes to the SPICE-Compatible Blocks

The SPICE-compatible blocks have been moved to the Additional Components library. They are organized in sublibraries according to function, for example, the SPICE-Compatible Sources library is now the Sources sublibrary of the Additional Components/SPICE-Compatible Components library. The Resistor block, renamed SPICE Resistor, and the Current-Controlled Switch and Voltage-Controlled Switch blocks have been moved to the Passive Devices sublibrary of the Additional Components/SPICE-Compatible Components library.

Some of the blocks have been renamed so that their names start with the “SPICE” prefix. The following table lists the old and new block names.



Old Name	New Name
Diode (SPICE)	SPICE Diode
NJFET	SPICE NJFET
NMOS	SPICE NMOS
NPN	SPICE NPN
PJFET	SPICE PJFET
PMOS	SPICE PMOS
PNP	SPICE PNP
Resistor	SPICE Resistor

There are no compatibility considerations as a result of renaming the SPICE-compatible blocks and moving them to the Additional Components library. Your existing models will be updated automatically when you open and save them in the new version.

### Changes to the Solar Cell Block

In previous versions, the Solar Cell block had the option of using the SPICE Environment Parameters block to set temperature. This is removed in R2010a to eliminate dependency on the SPICE sublibrary. Also, the Solar Cell model now uses the regular Diode block (exponential diode) rather than the SPICE Diode block.

### Compatibility Considerations

There is an insignificant change in results, of the order of  $1e-12$ , in the Solar Cell block because of the diode replacement.

### New Demos

Demos introduced in this version are:

- Finite Element Parameterized Solenoid
- Circuit Level Switched Capacitor ADC
- Switching Audio Power Amplifier

- Bridge Configuration Switching Audio Power Amplifier
- Differential Pair Amplifier
- Low-Noise Bipolar Transistor Voltage Amplifier
- Triangle Wave Generator
- LC Transistor Oscillator
- Voltage-Controlled Oscillator with PI Control
- Voltage Regulator
- Band-Pass Filter Using Three Mutually-Coupled Inductors
- Class-E RF Amplifier
- Diode Ring Demodulator
- LC Transmission Line and Test Bridge

## Functions and Function Elements Being Removed

Function or Function Element Name	What Happens When you use the Function or Element?	Use This Instead	Compatibility Considerations
netlist2sl	Issues a warning that it is not supported and may be removed in future releases	See “Parameterizing Blocks” in the <i>SimElectronics User’s Guide</i> for alternative ways of block parameterization	See “Changes in Block Parameterization” on page 4

## Version 1.3 (R2009b) SimElectronics Software

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	Yes—Details labeled as <b>Compatibility Considerations</b> , below. See also Summary	Bug Reports	No

New features and changes introduced in this version are organized by these topics:

- “Actuators & Drivers Library Blocks” on page 7
- “New Abstracted Timer Block” on page 8
- “New Demos” on page 8

### Actuators & Drivers Library Blocks

New features and changes introduced in this version are:

- “New Generic Rotary Actuator Block” on page 7
- “New Generic Linear Actuator Block” on page 7
- “Improved Servomotor Block” on page 8
- “Compatibility Considerations” on page 8

#### New Generic Rotary Actuator Block

The Generic Rotary Actuator block models the torque-speed characteristics of a generalized rotary actuator.

#### New Generic Linear Actuator Block

The Generic Linear Actuator block models the force-speed characteristics of a generalized linear actuator.

## **Improved Servomotor Block**

The Servomotor block now allows for the specification of additional parameters from within the Block Parameters dialog box.

## **Compatibility Considerations**

During simulation, the updated Servomotor block is backwards-compatible with models defined in earlier versions of the software. However, the model generates a warning in this version because the block dialog box supports additional unit options for torque and speed data. To remove the warnings, open the block dialog box and select appropriate units for the torque and speed data.

## **New Abstracted Timer Block**

The new Timer block, located in the Integrated Circuits library, is an abstracted behavioral model of a timer integrated circuit, such as the NE555.

## **New Demos**

Demos introduced in this version are:

- Brushless DC Motor
- ARINC 429 Communications Link
- PNP Bipolar Transistor Characteristics

## Version 1.2 (R2009a) SimElectronics Software

This table summarizes what's new in V1.2 (R2009a):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	No	Bug Reports	No

New features and changes introduced in this version are organized by these topics:

- “Actuators & Drivers Library” on page 9
- “Passive Devices Library” on page 10
- “Sources Library” on page 11
- “SPICE-Compatible Semiconductors Library” on page 11

### Actuators & Drivers Library

New features and changes introduced in this version are:

- “New Piezo Motor Blocks” on page 9
- “Enhanced H-Bridge Block” on page 10

### New Piezo Motor Blocks

The Actuators & Drivers library now contains blocks for modeling piezoelectric travelling wave motors. The library contains these new blocks:

- The Piezo Rotary Motor models the torque-speed characteristics of a rotary piezoelectric motor.
- The Piezo Linear Motor models the force-speed characteristics of a linear piezoelectric motor.

### **Enhanced H-Bridge Block**

The H-Bridge block now provides the option to dissipate current via two freewheeling diodes when the signal at the PWM port is low. To use this new option, select *Via two freewheeling diodes* for the *Freewheeling mode* parameter.

### **Passive Devices Library**

New features and changes introduced in this version are:

- “New Switch Blocks” on page 10
- “New Resistor Block” on page 10
- “New Crystal Block” on page 10
- “Enhanced Variable Inductor and Variable Capacitor Blocks” on page 10

### **New Switch Blocks**

The Passive Devices library now contains *Current-Controlled Switch* and *Voltage-Controlled Switch* blocks to model electrical switches with hysteresis.

### **New Resistor Block**

The Passive Devices library now contains a *Resistor* block to model a resistor as a function of temperature and process data.

### **New Crystal Block**

The Passive Devices library now contains a *Crystal* block to model the electrical characteristics of a crystal resonator.

### **Enhanced Variable Inductor and Variable Capacitor Blocks**

The *Variable Inductor* and *Variable Capacitor* blocks have the following enhancements:

- The *Variable Inductor* block now provides two options for the relationship between the voltage across the device and the current through the inductor. The new **Equation** parameter lets you select the voltage-current equation that you want.

- The Variable Capacitor block now provides two options for the relationship between the current through the device and the voltage across the capacitor. The new **Equation** parameter lets you select the current-voltage equation that you want.

## Sources Library

New features and changes introduced in this version are:

- “Enhanced Solar Cell Block” on page 11
- “New Two-Input Dependent Source Blocks” on page 11

### Enhanced Solar Cell Block

The Solar Cell block has the following enhancements:

- The block now provides the option to use an 8-parameter model that includes an additional diode and a parallel resistor.
- The block now models temperature dependence.

### New Two-Input Dependent Source Blocks

The SPICE-Compatible Sources library (in the Sources library) contains blocks for modeling dependent sources with two controlling inputs. The library contains these new blocks:

- PCCCS2 — Model polynomial current-controlled current source with two controlling inputs
- PCCVS2 — Model polynomial current-controlled voltage source with two controlling inputs
- PVCCS2 — Model polynomial voltage-controlled current source with two controlling inputs
- PVCVS2 — Model polynomial voltage-controlled voltage source with two controlling inputs

## SPICE-Compatible Semiconductors Library

New features and changes introduced in this version are:

### **Enhanced NMOS and PMOS Blocks**

The NMOS and PMOS blocks now provide the option to model the electrical characteristics of SPICE Level-3 MOSFET devices.



## Version 1.1 (R2008b) SimElectronics Software

This table summarizes what's new in V1.1 (R2008b):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	No	Bug Reports	No

New features and changes introduced in this version are:

- “New CMOS Logic Gate Blocks” on page 13
- “New Piezo Stack Block” on page 14
- “New Relay Block” on page 14
- “New Fuse Block” on page 14
- “New NMOS and PMOS Blocks” on page 14

### New CMOS Logic Gate Blocks

The Logic library (in the Integrated Circuits library) contains blocks for modeling CMOS logic gates behaviorally. The library contains these new blocks:

- CMOS AND
- CMOS Buffer
- CMOS NAND
- CMOS NOR
- CMOS NOT
- CMOS OR
- CMOS XOR

## **New Piezo Stack Block**

The Actuators & Drivers library now contains a Piezo Stack block to model the electrical and force characteristics of a piezoelectric stacked actuator.

## **New Relay Block**

The Passive Devices library now contains a Relay block to model the resistive and delay characteristics of a relay controlled by an external physical signal.

## **New Fuse Block**

The Passive Devices library now contains a Fuse block to model the following fuse characteristics:

- Resistance.
- Rated current at which the fuse blows when exceeded for a specified amount of time.

## **New NMOS and PMOS Blocks**

The SPICE-Compatible Semiconductors library (in the Semiconductor Devices library) now contains NMOS and PMOS blocks to model the electrical characteristics of SPICE Level-1 MOSFET devices.

## Version 1.0 (R2008a+) SimElectronics Software

This table summarizes what's new in V1.0 (R2008a+):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	Not applicable	Bug Reports	No

### Product Introduction

SimElectronics software is a modeling environment for the engineering design and simulation of electronic and electromechanical systems within the Simulink environment.

Version 1.0 includes these features:

- A library of electronic and electromechanical blocks that model components such as:
  - Sensors
  - Semiconductors
  - Actuators

For these blocks, you enter key parameter values directly from industry datasheets.

For more information about the available blocks, see “SimElectronics Block Libraries”.

- A function, `netlist2s1`, for creating library blocks that represent circuit data in a SPICE netlist.
- Ability to convert SimElectronics models to C code.
 

For more information about code generation, see “Generating Code” in the Simscape™ documentation.
- Access to linearization and steady-state solve capabilities in Simscape.

For more information about linearization, see “Linearizing at an Operating Point” in the Simscape documentation.

For more information about how Simscape solves models, see “How Simscape Simulation Works” in the Simscape documentation.

## Compatibility Summary for SimElectronics Software

This table summarizes new features and changes that might cause incompatibilities when you upgrade from an earlier version, or when you use files on multiple versions. Details are provided in the description of the new feature or change.

<b>Version (Release)</b>	<b>New Features and Changes with Version Compatibility Impact</b>
<b>Latest Version V1.4 (R2010a)</b>	See the <b>Compatibility Considerations</b> subheading for this new feature or change: <ul style="list-style-type: none"> <li>• “Changes in Block Parameterization” on page 4</li> </ul>
V1.3 (R2009b)	See the <b>Compatibility Considerations</b> subheading for this new feature or change: <ul style="list-style-type: none"> <li>• “Actuators &amp; Drivers Library Blocks” on page 7</li> </ul>
V1.2 (R2009a)	None
V1.1 (R2008b)	None
V1.0 (R2008a+)	None