

# *SiMKit* *Release Notes*

*for SiMKit version 2.3.1 and 2.3.2*

First Edition

Philips  
ED&T/Analogue Simulation

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## Preface

These are the release notes for *SiMKit* version 2.3.1 and 2.3.2. All changes with respect to *SiMKit 2.3* are reported in these release notes.

Changes in the models in *SiMKit 2.3.2* **only** concern PSP level 102 and Juncap level 200.

## Overview

*SiMKit* is a simulator-independent compact transistor model library.

Simulator-specific connections are handled through so-called adapters that provide the correct interfacing to:

- *Spectre*, the circuit simulator from *Cadence*
- *Pstar*, the circuit simulator from *Philips*
- *ADS*, the circuit simulator from *Agilent*.

The *SiMKit* library contains the most recent versions of the *Philips* transistor models. The following tables list the *SiMKit* models. The first table lists the *SiMKit* models, the second table lists the models for which only a *Pstar* and *Spectre* implementation are available.

For a full description please check:

[http://www.semiconductors.philips.com/Philips\\_Models/](http://www.semiconductors.philips.com/Philips_Models/)

In the following tables **e/g** stands for electric / geometric, **t** stands for self-heating and **s** stands for substrate model.

*Table 1: Real SiMKit models*

Model	Level	Pstar	Spectre	ADS	e/g	t	s
juncap	1	juncap	juncap	juncap	e	no	no
juncap	200	juncap	juncap200	juncap200	e	no	no
psp	102	pspe	psp102e	psp102e	e <sup>a</sup>	no	no
psp	1020	psp	psp1020	psp1020	g <sup>a</sup>	no	no
psp	1021	psp	psp1021	psp1021	g <sup>a</sup>	no	no
modella	500	tpl	bjt500	bjt500	e	no	no
modella	500	tplt	bjt500t	bjt500t	e	yes	no
mextram	504	tns/tps	bjt504	bjt504	e	no	yes
mextram	504	tnst/tpst	bjt504t	bjt504t	e	yes	yes
mextram	504	tn/tp	bjtd504	bjtd504	e	no	no
mextram	504	tnt/tpt	bjtd504t	bjtd504t	e	yes	no

Table 1: Real SiMKit models

Model	Level	Pstar	Spectre	ADS	e/g	t	s
mos	1100	mne/mpe	mos1100e	mos1100e	e	no	no
mos	1100	mn/mp	mos1100	mos1100	g	no	no
mos	1101	mne/mpe	mos1101e	mos1101e	e	no	no
mos	1101	mnet/mpet	mos1101et	mos1101et	e	yes	no
mos	11010	mn/mp	mos11010	mos11010	g	no	no
mos	11010	mnt/mpt	mos11010t	mos11010t	g	yes	no
mos	11011	mn/mp	mos11011	mos11011	g	no	no
mos	11011	mnt/mpt	mos11011t	mos11011t	g	yes	no
mos	1102	mne/mpe	mos1102e	mos1102e	e	no	no
mos	1102	mnet/mpet	mos1102et	mos1102et	e	yes	no
mos	11020	mn/mp	mos11020	mos11020	g	no	no
mos	11020	mnt/mpt	mos11020t	mos11020t	g	yes	no
mos	11021	mn/mp	mos11021	mos11021	g	no	no
mos	11021	mnt/mpt	mos11021t	mos11021t	g	yes	no
mos	2001	mne/mpe	mos2001e	mos2001e	e	no	no
mos	2001	mnet/mpet	mos2001et	mos2001et	e	yes	no
mos	2001	mn/mp	mos2001	mos2001	g	no	no
mos	2001	mnt/mpt	mos2001t	mos2001t	g	yes	no
mos	2002 <sup>b</sup>	mne/mpe	mos2002e	mos2002e	e	no	no
mos	2002 <sup>b</sup>	mn/mp	mos2002	mos2002	g	no	no
mos	3100	mn/mp	mos3100	mos3100	e	no	no
mos	3100	mnt/mpt	mos3100t	mos3100t	e	yes	no
mos	40	mn/mp	mos40	mos4000	e	no	no

Table 1: Real SiMKit models

Model	Level	Pstar	Spectre	ADS	e/g	t	s
mos	40	mnt/mpt	mos40t	mos4000t	e	yes	no

a. Note that for the PSP-model the electrical model is referred to as the local model and the geometrical model as global.

PSP level 102 is a test version in *SiMKit 2.3.1* and the official release is in *SiMKit 2.3.2*.

b. Note that the Mos 2002 is a test version in *SiMKit 2.3.1* and *2.3.2*.

Table 2: Other (older) models (Pstar and Spectre specific)

Model	Level	Pstar	Spectre
diode	500	d	dio500
mos	3002	mn/mp	mos3002
mos	902	mn/mp	mos902
mos	902	mne/mpe	-
mos	903	mn/mp	mos903
mos	903	mne/mpe	-
mextram	503	tn/tp	bjt503
mextram	503	tns/tps	bjt503
lpnp	301	tpl	bjt301
mos	705	mne/mpe	mos705

## **Release notes**

The release notes can be obtained by entering the following command:

```
cadenv -q simkit
```



# **1** **Improvements**

## PSP

*PSP level 101* has been removed.

*PSP level 102* is available in the *SiMKit 2.3.2*.

*PSP 102.0* is not backward-compatible with the previous version, *PSP 101.0*. The changes comprise some minor bug fixes.

- When `SWJUNCAP` (flag for *Juncap*) equals 2, the gate-edge length of the junction is now correctly set to the effective transistor width.
- The scaling rule for `DPHIB` (offset parameter for `PHIB`) has been changed. Existing parameter sets for *PSP 101.0* can easily be converted to work with *PSP 102.0*. The only change required is to set  $DPHIBL$  (in *PSP 102.0*) =  $DPHIB0 * DPHIBL$  (both from *PSP 101.0*). After conversion, the simulation results will be identical.
- A minor numerical issue has been resolved.
- Clipping and limiting of `NP` (gate poly-silicon doping) has been made more transparent; poly depletion is switched off for `NP=0` (or `NPO=0` in the global model) only.

*PSP level 102* in the *SiMKit 2.3.1* was a test version and did not contain the following improvements.

- A coding error in *Juncap2* has been solved.
- The parameters `LVARW` (width dependence of `LVAR`) and `WVARL` (length dependence of `WVAR`) have been removed from the binning model in order to ensure the continuity of parameters across bin-boundaries.
- A coding error in the equation for `KVTHO` (threshold shift parameter, stress model) has been resolved.

## Pstar specific issues

In *Pstar 5.2* the syntax for instance names has been changed. In previous *Pstar* versions the first underscore in the instance name was used to separate the model name from the occurrence name. In the new syntax a space is placed between the model and the occurrence. Please read the *Pstar 5.2* release notes for more details.

The changes in the *Pstar* code made it necessary to change the *Pstar-SiMKit* interface so that using the new syntax results in correct model names when printing errors and warnings. The consequence of this interface change is that *Pstar 5.2* will only work with *SiMKit 2.3.1* or higher.

### Installation Note

*SiMKit 2.3.1* and higher cannot be used with *Pstar 5.0* and *5.1* on a Linux 64 bits system unless the *Pstar* script is patched in the software installation. This can be done by spreading the patches included in the *SiMKit* distribution (in `install/pstar`) as follows:

```
spread -M -c -z -t ictools/EDT -a pstar_5.0_patch_simkit_2.3.1.tar.Z
```

```
spread -M -c -z -t ictools/EDT -a pstar_5.1_patch_simkit_2.3.1.tar.Z
```

If the patch is not installed, *Pstar 5.0* will use *SiMKit 2.0.1* and *Pstar 5.1* will use *SiMKit 2.2*.



# 2 **Known limitations**

## Known limitations

The following known limitations are in *SiMKit 2.3*, *2.3.1* and *2.3.2*:

- For MOS11 devices the spectral noise density values are zero for *cadence\_ic* versions that use *CMI3.0* (*cadence\_ic 5.0.33.500.0.6\_ads* and *cadence\_ic 5.0.33.500.0.6*). The spectral noise density values can be incorrect for *cadence\_ic* versions (5.10.41\*). The *cadence\_ic* versions with *CMI 1.0* (*cadence\_ic 4.4.6.\**) and *Spectre 6* (*cadence\_mmsim 6.0.1.174*) show the correct values.
- *Spectre* sp-noise analysis yields wrong results. This is not due to *SiMKit*, but to *Spectre*. The errors are most significant at high frequency values. *ED&T* is preparing a problem description for *Cadence*. *Spectre* noise analysis gives the correct results.
- The temp sweep for certain *SiMKit* models does not work properly in *ADS* unless a definition of an instance parameter temp is used:

```
qmod:q1 d g 0 0 Temp=temp
```