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GSA MIXED-SIGNAL/RF
SPICE MODEL CHECKLIST

Checklist Form

Version 1.4, Apr. 2015

Section 1 – Foundry and Support Contact Information

Foundry	ams AG
Process	0.35µm HV-CMOS - H35xx – hitkit 4.10
Date	02/2013

SPICE Model Support Contact

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Section 2 – Foundry Modeling Documents

Document	Document Number & Title	Section	Revision	Date
SPICE Model Library	ENG-238: H35 Process Parameters	4	6.0	Mar 2009
	ENG-366: H35 10V CMOS Module PP		4.0	Aug 2010
	ENG-312: H35 120V CMOS Module PP		3.0	Jan 2012
Measured vs. Simulated Data	ENG-238: C35 Process Parameters	5	6.0	Mar 2009
	ENG-366: H35 10V CMOS Module PP		4.0	Aug 2010
	ENG-312: H35 120V CMOS Module PP		3.0	Jan 2012
Noise Model	ENG-244: H35 Noise Parameters	all	5.0	Jun 2011
	ENG-396: H35 10V Noise Parameters		1.0	Feb 2012
Matching Models	ENG-245: H35 Matching Parameters	all	3.0	Sep 2014
	ENG-397: H35 10V Matching Parameters		1.0	Sept 2010
Design Rules	ENG-243: H35 Design Rules	all	12.0	Sep 2012
	ENG-367: H35 10V Design Rules		2.0	Nov 2009
	ENG-313: H35 120V Design Rules		6.0	Nov 2013
Process Flow/X-section	ENG-238: H35 Process Parameters		6.0	Mar 2009
Device Characterization Report	ENG-238: H35 Process Parameters	4	6.0	Mar 2009
PCM Structure & Test Report				
Device Parasitic Methods				

Section 3 – Circuit Simulators

Simulator	Vendor and Tool	Level Support	Version	Version Date
Circuit Simulator (A)	Spectre	53	MMSIM10ISR17	
Circuit Simulator (B)	Eldo	53	V2010.2	
Circuit Simulator (C)	Hspice	49	V2009.09	

Comments

1.) Model Benchmark Simulator vs. Simulator > criteria: error < 0.5%

2.) Monte Carlo and Mismatch available for Spectre, Eldo

Section 4 – Model Classification, Noise, Matching, Statistical Variation, Results

Device Type	Device Name	Model Name	Model Type	Version	[illegible]	Comments	Terminals	No of Bins	1/f Noise	HF Noise	RF Params	HV Params	Stat Model	Stat Method	Samples/Lots	Model Val	Corner Val	Max Error	No of Plots
MOS	nmos4	modn	Bsim3	3.2	C	1	4	1	M			BS	SMC			R			4
	pmos4	modp	Bsim3	3.2	C	1	4	1	M			BS	SMC			R			4
	nmosm4	modnm	Bsim3	3.2	C	1	4	1	M			BS	SMC			R			4
	pmosm4	modpm	Bsim3	3.2	C	1	4	1	M		F	BS	SMC			R			4
	nmosh4	modnmh	Bsim3	3.2	C	2	4	1	M			BS	SMC			R			2
	nmosmh4	modnmh	Bsim3	3.2	C	2	4	1	M			BS	SMC			R			2
	nmosi	modni	Bsim3	3.2	C	1	6	1	M			BS	SMC			R			4
	pmosi	modpi	Bsim3	3.2	C	1	5	1	M			BS	SMC			R			4
	nmosim	modnim	Bsim3	3.2	C	1	6	1	M			BS	SMC			R			4
	pmosim	modpim	Bsim3	3.2	C	1	5	1	M			BS	SMC			R			4
	nmosil	modnil	Bsim3	3.2	C	1	6	1	M			BS	SMC			R			4
	pmosil	modpil	Bsim3	3.2	C	1	5	1	M			BS	SMC			R			4
	nmosiml	modniml	Bsim3	3.2	C	1	6	1	M			BS	SMC			R			4
	pmosiml	modpiml	Bsim3	3.2	C	1	5	1	M			BS	SMC			R			4
	pmossl	modpssl	Bsim3	3.2	C	1	5	1	M			BS	SMC			R			4
	pmossml	modpssml	Bsim3	3.2	C	1	5	1	M			BS	SMC			R			4
	nmos50t	modn50t	Bsim3	3.1	C	1	4	1	M			BS	SMC			R			2
	nmos50m	modn50m	Bsim3	3.1	C	1	4	1	M			BS	SMC			R			2
	nmos50h	modn50h	Bsim3	3.1	C	3	4	1	M			BS	SMC			R			2
	nmos50hs	modn50hs	Bsim3	3.1	C	3	4	1	M			BS	SMC			R			2
	nmosi50t	modni50t	Bsim3	3.1	S	3	5	1	M			BS	SMC			R			2
	nmosi50m	modni50m	Bsim3	3.1	S	3	5	1	M			BS	SMC			R			2
	nmosi50h	modni50h	Bsim3	3.1	S	3	5	1	M			BS	SMC			R			2
	nmosdi50h	modndi50h	Bsim3	3.1	S	3	5	1	M			BS	SMC			R			
	pmos50t	modp50t	Bsim3	3.1	S	3	5	1	M			BS	SMC			R			2
	pmos50m	modp50m	Bsim3	3.1	S	3	5	1	M			BS	SMC			R			2
	pmos50h	modp50h	Bsim3	3.1	S	3	5	1	M			BS	SMC			R			2
	pmos50hs	modp50hs	Bsim3	3.1	S	3	5	1	M			BS	SMC			R			2
	nmos20t	modn20t	Bsim3	3.1	S	3	4	1	M			BS	SMC			R			2
	nmos20m	modn20m	Bsim3	3.1	S	3	4	1	M			BS	SMC			R			2
	nmos20h	modn20h	Bsim3	3.1	S	3	4	1	M			BS	SMC			R			2
	nmos20hs	modn20hs	Bsim3	3.1	S	3	4	1	M			BS	SMC			R			2
	nmosi20t	modni20t	Bsim3	3.1	S	3	5	1	M			BS	SMC			R			2
	nmosi20m	modni20m	Bsim3	3.1	S	3	5	1	M			BS	SMC			R			2
	nmosi20h	modni20h	Bsim3	3.1	S	3	5	1	M			BS	SMC			R			2
	nmosdi20h	modndi20h	Bsim3	3.1	S	3	5	1	M			BS	SMC			R			
	pmos20t	modp20t	Bsim3	3.1	S	3	5	1	M			BS	SMC			R			2
	pmos20m	modp20m	Bsim3	3.1	S	3	5	1	M			BS	SMC			R			2
	pmos20h	modp20h	Bsim3	3.1	S	3	5	1	M			BS	SMC			R			2
	pmos20hs	modp20hs	Bsim3	3.1	S	3	5	1	M			BS	SMC			R			2
	nmos10mh	modn10mh	Bsim3	3.1	S	3	5	1	M			BS	SMC			R			4
	nmosd10mh	modnd10mh	Bsim3	3.1	S	3	5	1	M			BS	SMC			R			4
	pmos10mh	modp10mh	Bsim3	3.1	S	3	5	1	M			BS	SMC			R			4

	pmosd10mh	modp10mh	Bsim3	3.1	S	3	5	1	M		BS	SMC	R	4
	nmosi120m	modni120m	Bsim3	3.1	S	3	5	1	M		BS	SMC	R	4
	nmosi120h	modni120h	Bsim3	3.1	S	3	5	1	M		BS	SMC	R	4
	pmos120m	modp120m	Bsim3	3.1	S	3	5	1	M		BS	SMC	R	4
	pmos120h	modnd120h	Bsim3	3.1	S	3	5	1	M		BS	SMC	R	4
Bip	Vertph	vertph	GP	1	C	4	4	1		F	BS	SC	R	1
	vertn1	vertn1	GP	1	C	4	4	1		F	BS	SC	R	2
	vert10	vert10	GP	1	C	4	4	1	M	F	BS	SMC	R	2
	lat2	lat2	GP	1	S	4	5	1	M	F	BS	SC	R	2
Diode	subdiode	nd	Berkeley	1	C	5	2	1			BS			
	welldiode	pd	Berkeley	1	C	5	2	1			BS			
	nwd	nwd	Berkeley	1	C	5	2	1			BS			
	dn_ps	dn_ps	Berkeley	1	C	5	2	1			BS			
	dp_dn	dp_dn	Berkeley	1	C	5	2	1			BS			
	nd_sp	nd_sp	Berkeley	1	C	5	2	1			BS			
	pd_sn	pd_sn	Berkeley	1	C	5	2	1			BS			
CAP	cpoly	cpoly	CAP		C		2	1			BS	SMC	R	1
	cpm	cpm	CAP		C		2	1			BS	SC	R	
	cwpm	cwpm	CAP		S		2	1			BS	SC	R	
	cmim20	cmim20	CAP		C		2	1			BS	SC	R	
RES	rpoly1	rpoly1	RES		C	6	2	1			BS	SMC	R	
	rpoly2	rpoly2	RES		C	6	2	1			BS	SMC	R	
	rpolyh	rpolyh	RES		C	6	2	1			BS	SMC	R	
	rdiffn	rdiffn	RES		C		2	1			BS	SC	R	
	rdiffn3	rdiffn3	JFET	1	C	7	3	1			BS	SC	R	
	rdiffnr	rdiffnr	RES		C		2	1			BS	SC	R	
	rdiffn3	rdiffnr3	JFET	1	C	7	3	1			BS	SC	R	
	rdiffp	rdiffp	RES		C		2	1			BS	SC	R	
	rdiffp3	rdiffp3	JFET	1	C	7	3	1			BS	SC	R	
	rdiffps	rdiffps	RES		C		2	1			BS	SC	R	
	rdiffps3	rdiffps3	JFET	1	C	7	3	1			BS	SC	R	
	rnwell	rnwell	JFET	1	C	7	3	1			BS	SC	R	2
	rnwells	rnwells	JFET	1	C	7	3	1			BS	SC	R	2
	pjfet	pjfet	JFET	1	C	7	3	1			BS	SC		2
	rpwellr	rpwellr	JFET	1	C	7	3	1			BS	SC	R	2

Model Style:	S	Subcircuit Model
	C	Compact Model
1/f Noise, HF Noise:	M	Measured
RF Parameters:	Y	Y-Parameters Included
	S	S-Parameters Included
	F	FT or Transition Frequency Numbers Included
HV Parameters:	S	Safe Operating Area
Stat Model:	S	Statistical Parameters Available
	C	Process Corner Models Available
	M	Matching Parameters Available
Model Val:	R	Results of Model Validation Available

Comments

1. Scalable MOS models with physical parameter set
2. High Voltage MOS Transistors with fixed layout; Usage for specific cells only
3. Scalable HV MOS models with physical parameter set
4. Fixed layout for bipolar models
5. Model usage only in backward direction
6. Simple resistor model without RF behavior includes voltage, temp.- dependency and width dependency W=f(T)
7. Resistor modelled by a JFET

Section 5 – Device Specific Parameters

Device Type	Device Name	Model Name	Geom	Min Width	Max Width	Min Length	Max Length	Min Temp	Max Temp	Max Freq	
MOS	nmos4	modn	10	0.4		0.35		-40	180		*
	pmos4	modp	10	0.4		0.35		-40	180		*
	nmosm4	modnm	10	0.4		0.5		-40	180		
	pmosm4	modpm	10	0.4		0.5		-40	180		
	nmosh4	modnh	10	0.4		3.0	3.0	-40	180		
	nmosmh4	modnmh	10	0.4		3.0	3.0	-40	180		
	nmosi	modni	10	0.4		0.35		-40	180		
	pmosi	modpi	10	0.4		0.35		-40	180		
	nmosim	modnim	10	0.4		0.5		-40	180		
	pmosim	modpim	10	0.4		0.5		-40	180		
	nmosil	modnil	10	0.4		0.35		-40	180		
	pmosil	modpil	10	0.4		0.35		-40	180		
	nmosiml	modniml	10	0.4		0.5		-40	180		
	pmosiml	modpiml	10	0.4		0.5		-40	180		
	pmossl	modpssl	10	0.4		0.35		-40	180		
	pmosml	modpsml	10	0.4		0.5		-40	180		
	nmos50t	modn50t	10	5.0		0.5		-40	180		
	nmos50m	modn50m	10	5.0		0.5		-40	180		
	nmos50h	modn50h	10	5.0		1.0		-40	180		
	nmos50hs	modn50hs	10	20.0		4.0		-40	180		
	nmosi50t	modni50t	10	5.0		0.5		-40	180		
	nmosi50m	modni50m	10	5.0		0.5		-40	180		
	nmosi50h	modni50h	10	5.0		0.5		-40	180		
	nmosdi50h	modndi50h	10	5.0		0.5		-40	180		
	pmos50t	modp50t	10	5.0		1.0		-40	180		
	pmos50m	modp50m	10	5.0		1.0		-40	180		
	pmos50h	modp50h	10	5.0		1.4		-40	180		
	pmos50hs	modp50hs	10	5.0		2.8		-40	180		
	nmos20t	modn20t	10	5.0		0.5		-40	180		
	nmos20m	modn20m	10	5.0		0.5		-40	180		
	nmos20h	modn20h	10	5.0		0.5		-40	180		
	nmos20hs	modn20hs	10	5.0		1.8		-40	180		
	nmosi20t	modni20t	10	5.0		0.7		-40	180		

Device Type	Device Name	Model Name	Geom	Min Width	Max Width	Min Length	Max Length	Min Temp	Max Temp	Max Freq
	nmosi20m	modni20m	10	5.0		0.5		-40	180	
	nmosi20h	modni20h	10	5.0		0.5		-40	180	
	nmosdi20h	modndi20h	10	5.0		0.5		-40	180	
	pmos20t	modp20t	10	5.0		0.6		-40	180	
	pmos20m	modp20m	10	5.0		0.6		-40	180	
	pmos20h	modp20h	10	5.0		1.1		-40	180	
	pmos20hs	modp20hs	10	5.0		1.2		-40	180	
	nmos10mh	modn10mh	10	1.5		0.4		-40	180	
	nmosd10mh	modnd10mh	10	2.5		0.4		-40	180	
	pmos10mh	modp10mh	10	1.5		0.5		-40	180	
	pmosd10mh	modpd10mh	10	2.5		0.5		-40	180	
	nmosi120m	modni120m	10	10		0.5		-40	180	
	nmosi120h	modni120h	10	10		0.5		-40	180	
	pmos120m	modp120m	10	10		1.0		-40	180	
	pmos120h	modp120h	10	10		1.2		-40	180	
BJT	vertph	vertph		15	15	70	70	-40	180	
	vertn1	vertn1		34	34	34	34	-40	180	
	vert10	vert10		10	10	10	10	-40	180	
	lat2	lat2		2	2	2	2	-40	180	
Diode	subdiode	nd						-40	180	
	welldiode	pd						-40	180	
	nwd	cwd						-40	180	
	dn_ps	dn_ps						-40	180	
	dp_dn	dp_dn						-40	180	
	nd_sp	nd_sp						-40	180	
	pd_sn	pd_sn						-40	180	
CAP	cpoly	cpoly		0.8				-40	180	
	cpm	cpm		10		10		-40	180	
	cwpm	cwpm		10		10		-40	180	
	cmim20	cmim20		4		4		-40	180	
RES	rpoly1	rpoly1		0.65		L/W>5		-40	180	
	rpoly2	rpoly2		0.65		L/W>5		-40	180	
	rpolyh	Rpolyh		0.8		L/W>5		-40	180	
	rdiffn	Rdiffn		0.3		L/W>5		-40	180	
	rdiffn3	rdiffn3		0.3		L/W>5		-40	180	
	rdiffnr	Rdiffnr		0.3		L/W>5		-40	180	
	rdiffnr3	Rdiffnr		0.3		L/W>5		-40	180	
	rdiffp	Rdiffp		0.3		L/W>5		-40	180	
	rdiffp3	rdiffp3		0.3		L/W>5		-40	180	
	rdiffps	Rdiffps		0.3		L/W>5		-40	180	
	rdiffps3	rdiffps3		0.3		L/W>5		-40	180	
	rnwell	Rnwell	3	3.0		L/W>5		-40	180	
	rnwells	Rnwells		3.0		L/W>5		-40	180	
	pjfet	Pjfet		9.0		L/W>5		-40	180	

Device Type	Device Name	Model Name	Geom	Min Width	Max Width	Min Length	Max Length	Min Temp	Max Temp	Max Freq
	rpwellr	Rpwellr		2.0		L/W>5		-40	180	

IMPORTANT DISCLOSURES