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FSA

FSA MIXED-SIGNAL/RF
SPICE MODEL CHECKLIST

Checklist Form
Version 1.2, August 2007

Section 1 – Foundry and Support Contact Information

Foundry austriamicrosystems AG

Process C35xx

Date 08/2007

SPICE Model Support Contact

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Section 2 – Foundry Modeling Documents

Document	Document Number & Title	Section	Revision	Date
SPICE Model Library	ENG-182: C35 Process Parameters	4	5.0	May 2007
Measured vs. Simulated Data	ENG-182: C35 Process Parameters	5	5.0	May 2007
RF SPICE Model Library	ENG-188: C35 RF Spice Models	all	5.0	Nov 2005
Noise Model	ENG-189: C35 Noise Parameters	all	3.0	Jan 2007
Matching Models	ENG-228: C35 Matching Parameters	all	2.0	May 2006
Design Rules	ENG-183: C35 Design Rules	all	6.0	Jan 2007
Process Flow/X-section	ENG-182: C35 Process Parameters		5.0	May 2007
Device Characterization Report	ENG-182: C35 Process Parameters	4	5.0	May 2007
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	5.1.41	
Circuit Simulator (B)	Eldo	53	6.5.2	
Circuit Simulator (C)	Hspice	49	V2004.03	
Circuit Simulator (D)	Smartspice	49	2.11.0	
Circuit Simulator (E)	Smash	8	4.3.5	
Circuit Simulator (F)	Agilent-ADSsim	8	2004A	

Comments

1.) Model Benchmark Simulator vs. Simulator > criteria: error < 0.5%
2.) Monte Carlo and Mismatch available for Spectre, Eldo
3.) Special RF Models for Resistors, Caps, MOS available in Spectre, Eldo, ADSsim

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

Device Type	Device Name	Model Name	Model Type	Version	Model Style	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			S	SMC			R			8
	pmos4	modp	Bsim3	3.2	C	1	4	1	M			S	SMC			R			8
	nmosh4	modnh	Bsim3	3.2	C	2	4	1	M			S	SMC			R			2
	nmosm4	modnm	Bsim3	3.2	C	1	4	1	M			S	SMC			R			8
	pmosm4	modpm	Bsim3	3.2	C	1	4	1	M			S	SMC			R			8
	nmosmh4	modnmh	Bsim3	3.2	C	2	4	1	M			S	SMC			R			2
	nmosrf	modnrf	Bsim3	3.2	S	3	4	1	M		YSF	S	SMC			R			13
	pmosrf	modprf	Bsim3	3.2	S	3	4	1	M		YSF	S	SMC			R			13
	nmosl4	modnl	Bsim3	3.2	C	1	4	1	M			S	SMC			R			6
	pmosl4	modpl	Bsim3	3.2	C	1	4	1	M			S	SMC			R			6
	nmosml4	modnml	Bsim3	3.2	C	1	4	1	M			S	SMC			R			6
	pmosml4	modpml	Bsim3	3.2	C	1	4	1	M			S	SMC			R			6
	nmoshl4	modnhl	Bsim3	3.2	C	2	4	1	M			S	SMC			R			2
	nmosmhl4	modnmhl	Bsim3	3.2	C	2	4	1	M			S	SMC			R			2
BJT	vert10	vert10	GP	1	C	4	4	1	M			S	SMC			R			2
	lat2	lat2	GP	1	C	4	5	1	M			S	SMC			R			2
Diode	subdiode	nd	Berkeley	5	C		2	1											
	welldiode	pd	Berkeley	5	C		2	1											
	nwd	nwd	Berkeley	5	C		2	1											
CAP	ngatecap	ngatecap	CAP		C			1				S	SC			R			
	cpoly	cpoly	CAP		C		2	1				S	SC			R			1
	cmim	cmim	CAP		C		2	1				S	SC			R			
RES	rdiffp	rdiffp	RES		C		2	1				S	SC			R			
	rdiffp3	rdiffp3	JFET		C		3	1				S	SC			R			
	rdiffn	rdiffn	RES		C		2	1				S	SC			R			
	rdiffn3	rdiffn3	JFET		C		3	1				S	SC			R			
	rnwell	rnwell	JFET		C		3	1				S	SC			R			
	rpoly1	rpoly1	RES	6	C		2	1				S	SMC			R			
	rpoly2	rpoly2	RES	6	C		2	1				S	SMC			R			
	rpolyh	rpolyh	RES	6	C		2	1				S	SMC			R			
	rpolyhrf	rpolyhrf	RES	3	S	3	3	1			YSF	S	SC			R			6
	rpoly2rf	rpoly2rf	RES	3	S	3	3	1			YSF	S	SC			R			6
IND	StxxxAyyyB		IND		S		3	1			YSF		C			R			9
VAR	CVAR	cvar	BSIM	3.2	S		3	1			YSF	S	SMC			R			9

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 only width scalable; Usage for specific cells only
3.) Fully modeled RF behavior valid to given fmax
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.)Inductor name syntax: S..spiral, T..type(P=square,Y=square symm), xxx port1 drive ind *10 in nH, A..layout, yyy..outer diameter, B..process

Section 5 – Active Device Specific Parameters

Device Type	Device Name	Model Name	Geom	Min Width	Max Width	Min Length	Max Length	Max Finger	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		0.35			-40	180	
	pmosm4	modmp	10	0.4		0.35			-40	180	
	nmosh4	modnh	10	0.4		3	3		-40	180	
	nmosmh4	modnmh	10	0.4		3	3		-40	180	
	nmosrf	modnrf	3	5.0	200	0.35	0.35	40	-40	180	
	pmosrf	modprf	3	5.0	150	0.35	0.35	30	-40	180	
	nmosl4	modnl	10	0.4		0.35			-40	180	
	pmosl4	modpl	10	0.4		0.35			-40	180	
	nmosml4	modnml	10	0.4		0.35			-40	180	
	pmosml4	modpml	10	0.4		0.35			-40	180	
	nmoshl4	modnhl	10	0.4		3	3		-40	180	
	nmosmhl4	modnmhl	10	0.4		3	3		-40	180	

Device Type	Device Name	Model Name	Geom	Min E Width	Max Width	Min Length	Max Length	Max Config	Min Temp	Max Temp	Max Freq
BJT	VERT10	vert10		10	10	10	10		-40	180	
	LAT2	lat2		2	2	2	2		-40	180	

*) Max. frequency is strongly dependent on the transistor length:
for L=0.35um fmax=1GHz.

Section 6 – Passive Device Specific Parameters

Device Type	Device Name	Model Name	Geom	Min Width	Max Width	Min Length	Max Length	Min Temp	Max Temp	Max Freq
Diode	subdiode	nd						-40	180	
	welldiode	pd						-40	180	
	nwd	nwd						-40	180	
VAR	cvar	cvar		6	1000	0.65	0.65	-40	125	6
IND	StxxxAyyyB							-40	125	>6
CAP	ngatecap	ngatecap		0.4		0.35		-40	125	
	cpoly	cpoly		0.8		0.8		-40	180	
	cmim	cmim		4.0	30	4.0	30	-40	125	
RES	rdiffp	rdiffp		0.3		L/W>5		-40	180	
	rdiffp3	rdiffp3		0.3		L/W>5		-40	180	
	rdiffp	rdiffn		0.3		L/W>5		-40	180	
	rdiffp3	rdiffn3		0.3		L/W>5		-40	180	
	rnwell	rnwell	3	3.0		L/W>5		-40	180	
	rpoly2	rpoly2		0.65		L/W>5		-40	180	
	rpolyh	rpolyh		0.8		L/W>5		-40	180	
	rpolyhrf	rpolyhrf	3	1	3		30	-40	180	>6
	rpoly2rf	rpoly2rf	3	1	3		90	-40	180	>6

*Inductor name syntax: S..spiral, T..type(P=square,Y=square symm), xxx port1 drive ind *10 in nH,
A..layout, yyy..outer diameter, B..process