cmos028fdsoi Technology

EGLVT Power Switch models

DK1.2_RF_mmW

Comparison with DK1.1_RF_mmW model(s)

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General information on EGLVT Power Switch models

- Maximum supply voltage is 1.15 V.
- Validity domain is defined as follows:
  - ✔ Drawn gate length varies from 100 nm to 100 nm.
  - ✔ Drawn transistor width varies from 55.35 um to 55.35 um.
  - ✔ Device temperature varies from -40 °C to 125 °C.

Output parameters definitions

- Model(s): eglvtpspfet
  - ✔ Vt_lin : Threshold voltage defined as Vgs value for which drain current is 70e-9*M*1*W/(1*L+0+1*p_la) at Vds = 0.05V.
  - ✔ Gm_ana : Drain transconductance at Ids = 5e-6*M*W/L, Vds = 0.3V, f = 100kHz.
  - ✔ Sv@1Hz : Gate noise voltage spectral density at 1Hz, Vgs = Vgs_ana, Vds = 0.3V
  - ✔ Gds_ana : Drain conductance at Ids = 5e-6*M*W/L, Vds = 0.3, f = 100k
  - ✔ Ft_ana : Transition frequency at Ids = 5e-6*M*W/L, Vds = 0.3V
  - ✔ Vgs_ana : Vgs value for which drain current is 5e-6*M*shrink_iana*W/(shrink_iana*L+dlshrink_iana+plashrink_iana*p_la) at Vds=0.3V.
  - ✔ Cdd_ana : Total drain capacitance at Ids = 5e-6*M*W/L, Vds = 0.3V, f = 100kHz.
  - ✔ Ilin : Drain current at Vgs = 1.15V, Vds = 0.05V.
  - ✔ Cdg_ana : Drain-to-Gate transcapacitance at Ids = 5e-6*M*W/L, Vds = 0.3V, f = 100kHz.
  - ✔ Ioffsat : Drain current at Vgs = -0.83V, Vds = vds_satV.
  - ✔ VtGmmax : Threshold voltage at Vds = 0.05 derived from Gm max method.
  - ✔ LogIoff : log10(Ioffsat).
  - ✔ Abeta : delta_GmMax/GmMax * sqrt(w/L)
  - ✔ Cgg_ana : Total gate capacitance at Ids = 5e-6*M*W/L, Vds = 0.3V, f = 100kHz
  - ✔ GDC_ana : Voltage gain at Ids = 5e-6*M*W/L, Vds = 0.3V, f = 100kHz
  - ✔ Sv@th : Gate thermal noise voltage spectral density, Vgs = Vgs_ana, Vds = 0.3V
  - ✔ Isat : Drain current at Vgs = 1.15V, Vds = 1.15V.

- ✔ AId : delta_Id/Id * sqrt(W.L)
- ✔ Avt : delta_Vt * sqrt(W.L)
- ✔ Vt_sat : Threshold voltage defined as Vgs value for which drain current is 70e-9*M*1*W/(1*L+0+1*p_la) at Vds = vds_satV.

eglvtpspfet
Electrical characteristics per geometry

eglvtpspfet @ w=55.35e-06, l=0.1e-06, nf=3, swshe=0, pre_layout_local=1, sa=3.96e-6, sb=4.2e-6, sd=1.4e-07, devtype=PT, as=7.3062e-11, ad=7.3062e-11, ps=4.482e-05, pd=4.482e-05, vbs=1.15, vdd=1.15, temp=25

DK1.2_RF_mmW wrt DK1.1_RF_mmW

	SSF	TT	FFF
Vt_lin [mV]	456.5 0.0mV	398.1 0.0mV	332 0.0mV
Ilin [mA]	0.9 0.0%	1.09 0.0%	1.31 0.0%
Vt_sat [mV]	421.9 0.0mV	363.1 0.0mV	295.9 0.0mV
Isat [mA]	6.32 0.0%	7.78 0.0%	9.34 0.0%
Ioffsat [pA]	28.25 0.0%	80.15 0.0%	321.3 0.0%
LogIoff [log(A)]	-10.55 -0.0%	-10.1 -0.0%	-9.49 -0.0%
VtGmmax [mV]	452 0.0mV	399.6 0.0mV	339 0.0mV
Vgs_ana [mV]	972.5 0.0mV	878.6 0.0mV	783.9 0.0mV
GDC_ana []	1.64 0.0%	2.01 0.0%	2.39 0.0%
GBW_QS [GHz]	2.4 0.0%	3.08 0.0%	3.83 0.0%
Ft_ana [GHz]	25.43 0.0%	28.9 0.0%	32.14 0.0%
Gm_ana [mS]	7.5 0.0%	8.32 0.0%	9.07 0.0%
Gds_ana [mS]	4.58 0.0%	4.15 0.0%	3.79 0.0%
Sv@1Hz [V/√Hz]	3.09e-06 0.0%	4.86e-06 0.0%	7.8e-06 0.0%
Sv@th [V/√Hz]	4.49e-09 0.0%	4.29e-09 0.0%	4.1e-09 0.0%
Cgg_ana [fF]	46.91 0.0%	45.83 0.0%	44.89 0.0%
Cdg_ana [fF]	386.2 0.0%	386.3 0.0%	379.4 0.0%
Cdd_ana [fF]	217.6 0.0%	209.4 0.0%	201.4 0.0%

Avt [mV.µm]	7.33 0.3%	7.37 0.3%	7.41 0.3%
Abeta [%.µm]	0.89 0.6%	0.81 0.6%	0.75 0.6%
AId [%.µm]	1.31 -0.3%	1.2 -0.3%	1.09 -0.3%

Annex

Conditions of simulations

The simulations were done with SBenchLSF Alpha using Eldo simulator 2018.3.

- Model eglvtpspfet (DK1.2_RF_mmW)
  - ✔ Input Parameters
    - ✘ vds_off = vds_sat V
    - ✘ vds_cgd = 0 V
    - ✘ vds_cgg = 0 V
    - ✘ mc_sens = 0
    - ✘ vds_lin = 0.05 V
    - ✘ ivt = 70e-9 A
    - ✘ model_version = 1.2.d
    - ✘ iana = 5e-6 A
    - ✘ vds_mm = 50e-3 V
    - ✘ ams_release = 2018.3
    - ✘ vgs_stop = vdd V
    - ✘ dlshrink_ivt = 0
    - ✘ sbenchlsf_release = Alpha
    - ✘ vds_sat = 1.15 V

- ✘ mc_nsigma = 3
- ✘ shrink_ivt = 1
- ✘ dlshrink_tinv = -26e-9
- ✘ vgs_start = -0.5 V
- ✘ plashrink_ivt = 1
- ✘ ithslwi = 10e-9 A
- ✘ vds_ana = 0.3 V
- ✘ vds_cbd = 0 V
- ✘ vddmax = vdd
- ✘ voffset = 0.2 V
- ✘ mc_runs = 5000
- ✘ vstep_ivt = 0.005 V
- ✘ vgs_off = -0.83 V
- ✘ temp = 25 °C
- ✘ f_ext = 100k Hz
- ✘ vbs = 1.15 V
- ✘ vdd = 1.15 V
- ✘ shrink_tinv = 0.9
- ✘ vds_gmgd = 0.6 V

✔ Sweep Parameters

✔ Extra parameters

- ✘ eglvt_dev = 1

● Model eglvtpspfet (DK1.1_RF_mmW)

✔ Input Parameters

- ✘ vds_off = vds_sat V

- vds_cgd = 0 V
- vds_cgg = 0 V
- mc_sens = 0
- vds_lin = 0.05 V
- ivt = 70e-9 A
- model_version = 1.2.c
- iana = 5e-6 A
- vds_mm = 50e-3 V
- ams_release = 2018.3
- vgs_stop = vdd V
- dlshrink_ivt = 0
- sbenchlsf_release = Alpha
- vds_sat = 1.15 V
- mc_nsigma = 3
- shrink_ivt = 1
- dlshrink_tinv = -26e-9
- vgs_start = -0.5 V
- plashrink_ivt = 1
- ithslwi = 10e-9 A
- vds_ana = 0.3 V
- vds_cbd = 0 V
- vddmax = vdd
- voffset = 0.2 V
- mc_runs = 5000
- vstep_ivt = 0.005 V

- ✘ vgs_off = -0.83 V
- ✘ temp = 25 °C
- ✘ f_ext = 100k Hz
- ✘ vbs = 1.15 V
- ✘ vdd = 1.15 V
- ✘ shrink_tinv = 0.9
- ✘ vds_gmgd = 0.6 V

✔ Sweep Parameters

✔ Extra parameters

- ✘ eglvt_dev = 1
- ✘ gflag__noisedev__eglvt__cmos028fdsoi = 0