cmos028fdsoi Technology

PDC vs MC Noise report for LVT models

DK1.2_RF_mmW

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General information on PDC vs MC Noise report for LVT models

● Maximum supply voltage is - V.

● Validity domain is defined as follows:

  ✔ Drawn gate length varies from 30nm to 10um.

  ✔ Drawn transistor width varies from 80nm to 10um.

  ✔ Device temperature varies from -40 °C to 125 °C.

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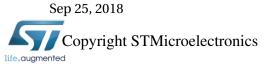# Output parameters definitions

● Model(s): lvtnfet_acc, lvtpfet_acc

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lvtnfet_acc
Electrical characteristics per geometry

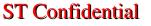Technology R&D Crolles Site – TDP/TDS/SPICE Modeling

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lvtnfet_acc @ w=20e-6, l=2.0e-6, pre_layout_local=1, nf=4, sa=8.500e-08, sb=8.500e-08, sd=1.140e-07, pcpastrx_top=1.050e-07, pcpastrx_bot=1.050e-07, devtype=PCELLwoWPE, as=4.25e-13, ad=4.25e-13, ps=1.017e-05, pd=1.017e-05, vbs=0, vdd=1, temp=25

	TT_Noisedev=4	TT_Noisedev=0	TT_Noisedev=2	PRO_MC_PARAM_ TT_1_MC_AVG-3S	PRO_MC_PARAM_ TT_1_MC_AVG	PRO_MC_PARAM_ TT_1_MC_AVG+3S
logSi2@1Hz [log10(A²/Hz)]	-18.11	-17.94	-17.78	-18.11	-17.94	-17.78
logSi2ovId2@1Hz [log10(1/Hz)]	-9.51	-9.34	-9.18	-9.51	-9.34	-9.18
logSv2@1Hz [log10(V²/Hz)]	-11.65	-11.49	-11.33	-11.66	-11.49	-11.33

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lvtpfet_acc
Electrical characteristics per geometry

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lvtpfet_acc @ w=0.30e-6, l=0.030e-6, pre_layout_local=1, nf=1, sa=8.500e-08, sb=8.500e-08, sd=1.140e-07, pcpastrx_top=5.700e-08, pcpastrx_bot=8.000e-08, devtype=PCELLwoWPE, as=2.55e-14, ad=2.55e-14, ps=7.7e-07, pd=7.7e-07, vbs=1, vdd=1, temp=25

	TT_Noisedev=4	TT_Noisedev=0	TT_Noisedev=2	PRO_MC_PARAM_ TT_1_MC_AVG-3S	PRO_MC_PARAM_ TT_1_MC_AVG	PRO_MC_PARAM_ TT_1_MC_AVG+3S
logSi2@1Hz [log10(A²/Hz)]	-16.67	-15.66	-14.65	-16.68	-15.66	-14.65
logSi2ovId2@1Hz [log10(1/Hz)]	-7.28	-6.26	-5.25	-7.28	-6.26	-5.25
logSv2@1Hz [log10(V²/Hz)]	-8.89	-7.88	-6.87	-8.89	-7.88	-6.87

lvtpfet_acc @ w=20e-6, l=2.0e-6, pre_layout_local=1, nf=4, sa=8.500e-08, sb=8.500e-08, sd=1.140e-07, pcpastrx_top=1.050e-07, pcpastrx_bot=1.050e-07, devtype=PCELLwoWPE, as=4.25e-13, ad=4.25e-13, ps=1.017e-05, pd=1.017e-05, vbs=1, vdd=1, temp=25

	TT_Noisedev=4	TT_Noisedev=0	TT_Noisedev=2	PRO_MC_PARAM_ TT_1_MC_AVG-3S	PRO_MC_PARAM_ TT_1_MC_AVG	PRO_MC_PARAM_ TT_1_MC_AVG+3S
logSi2@1Hz [log10(A²/Hz)]	-19.24	-19	-18.76	-19.24	-19	-18.76
logSi2ovId2@1Hz [log10(1/Hz)]	-9.84	-9.6	-9.36	-9.84	-9.6	-9.36
logSv2@1Hz [log10(V²/Hz)]	-11.88	-11.65	-11.41	-11.89	-11.65	-11.41

lvtnfet_acc
Electrical characteristics scaling

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Scaling versus Length @ W/L=10 and W/NF<5e-6

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lvtnfet_acc, logSi2@1Hz+log10(nf) vs "L=W/10 [m]"

W/L==10 and Temp==25

Legend:
- DK1.2_RF_mmW_TT_Noisedev=4
- DK1.2_RF_mmW_TT_Noisedev=0
- DK1.2_RF_mmW_TT_Noisedev=2
- DK1.2_RF_mmW_PRO_MC_PARAM_TT_1_MC_AVG-3S
- DK1.2_RF_mmW_PRO_MC_PARAM_TT_1_MC_AVG
- DK1.2_RF_mmW_PRO_MC_PARAM_TT_1_MC_AVG+3S

Y-axis: logSi2@1Hz+log10(nf)
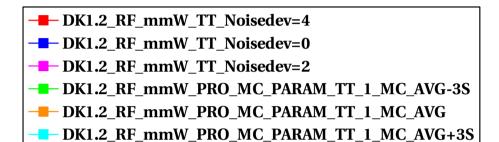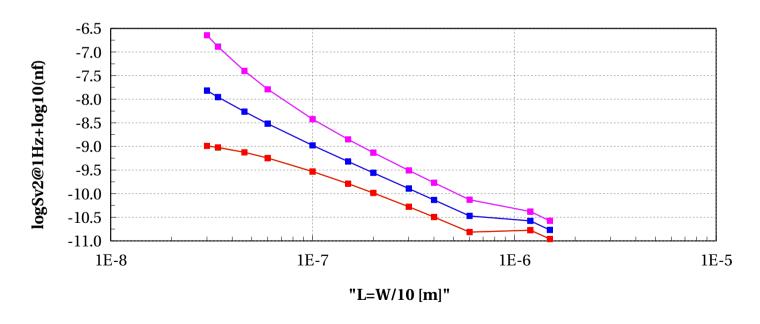X-axis: "L=W/10 [m]"

lvtnfet_acc, logSi2ovId2@1Hz+log10(nf) vs "L=W/10 [m]"

W/L==10 and Temp==25

- ■ **DK1.2_RF_mmW_TT_Noisedev=4**
- ■ **DK1.2_RF_mmW_TT_Noisedev=0**
- ■ **DK1.2_RF_mmW_TT_Noisedev=2**
- ■ **DK1.2_RF_mmW_PRO_MC_PARAM_TT_1_MC_AVG-3S**
- ■ **DK1.2_RF_mmW_PRO_MC_PARAM_TT_1_MC_AVG**
- ■ **DK1.2_RF_mmW_PRO_MC_PARAM_TT_1_MC_AVG+3S**

Y-axis: **logSi2ovId2@1Hz+log10(nf)** (−5.0 to −9.0)

X-axis: **"L=W/10 [m]"** (1E-8 to 1E-5)

lvtnfet_acc, logSv2@1Hz+log10(nf) vs "L=W/10 [m]"

W/L==10 and Temp==25

Legend:
- DK1.2_RF_mmW_TT_Noisedev=4
- DK1.2_RF_mmW_TT_Noisedev=0
- DK1.2_RF_mmW_TT_Noisedev=2
- DK1.2_RF_mmW_PRO_MC_PARAM_TT_1_MC_AVG-3S
- DK1.2_RF_mmW_PRO_MC_PARAM_TT_1_MC_AVG
- DK1.2_RF_mmW_PRO_MC_PARAM_TT_1_MC_AVG+3S

lvtpfet_acc
Electrical characteristics scaling
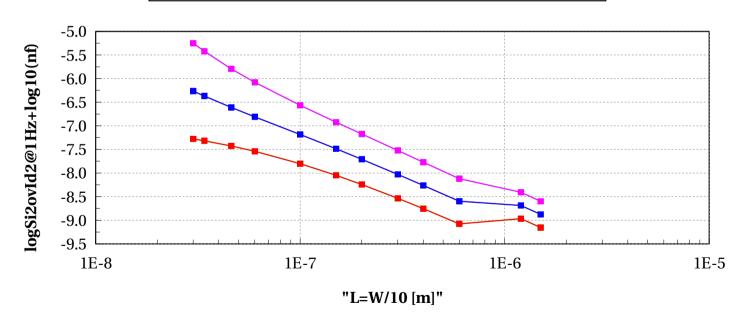
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Scaling versus Length @ W/L=10 and W/NF<5e-6

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lvtpfet_acc, logSi2@1Hz+log10(nf) vs "L=W/10 [m]"

W/L==10 and Temp==25

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lvtpfet_acc, logSi2ovId2@1Hz+log10(nf) vs "L=W/10 [m]"

W/L==10 and Temp==25

Legend:
- ■ DK1.2_RF_mmW_TT_Noisedev=4 (red)
- ■ DK1.2_RF_mmW_TT_Noisedev=0 (blue)
- ■ DK1.2_RF_mmW_TT_Noisedev=2 (magenta)
- ■ DK1.2_RF_mmW_PRO_MC_PARAM_TT_1_MC_AVG-3S (green)
- ■ DK1.2_RF_mmW_PRO_MC_PARAM_TT_1_MC_AVG (orange)
- ■ DK1.2_RF_mmW_PRO_MC_PARAM_TT_1_MC_AVG+3S (cyan)

Y-axis: logSi2ovId2@1Hz+log10(nf)

X-axis: "L=W/10 [m]"

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lvtpfet_acc, logSv2@1Hz+log10(nf) vs "L=W/10 [m]"

W/L==10 and Temp==25

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Annex

Technology R&D Crolles Site – TDP/TDS/SPICE Modeling

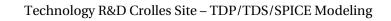ST Confidential
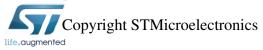
Conditions of simulations

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

● Model lvtnfet_acc (DK1.2_RF_mmW)
  ✔ Input Parameters
    ✘ ams_release = 2018.3
    ✘ mc_runs = 500
    ✘ iana = 5e-6 A
    ✘ temp = 25 °C
    ✘ mc_sens = 0
    ✘ f_ext = 100k Hz
    ✘ sbenchlsf_release = Alpha
    ✘ vbs = 0 V
    ✘ model_version = 1.3.e
    ✘ vds_ana = Vdd/4 V
    ✘ mc_nsigma = 3
    ✘ vdd = 1 V
  ✔ Sweep Parameters
  ✔ Extra parameters

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- ✘ lvt_dev = 0
- ● Model lvtpfet_acc (DK1.2_RF_mmW)
  - ✔ Input Parameters
    - ✘ ams_release = 2018.3
    - ✘ mc_runs = 500
    - ✘ iana = 2e-6 A
    - ✘ temp = 25 °C
    - ✘ mc_sens = 0
    - ✘ f_ext = 100k Hz
    - ✘ sbenchlsf_release = Alpha
    - ✘ vbs = 1 V
    - ✘ model_version = 1.3.e
    - ✘ vds_ana = Vdd/4 V
    - ✘ mc_nsigma = 3
    - ✘ vdd = 1 V
  - ✔ Sweep Parameters
  - ✔ Extra parameters
    - ✘ lvt_dev = 0

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