cmos028fdsoi Technology

SG models

DK1.2_RF_mmW

Comparison with DK1.1_RF_mmW model(s)

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General information on SG 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, nfet_acc, pfet_acc
  - ✔ Vt_lin : Threshold voltage defined as Vgs value for which drain current is ivt*M*1*W/(1*L+0+1*p_la) at Vds = 0.05V.
  - ✔ Dvtcc : Standard deviation of variation of threshold voltage defined as Vgs value for which drain current is ivt*M*W/L at Vds = 0.05. 5000 Monte-Carlo runs used.
  - ✔ Ilin : Drain current at Vgs = 1V, Vds = 0.05V.
  - ✔ Dibl : Vt_lin - Vt_sat.
  - ✔ Didovid : Standard deviation of normalized variation of drain current at Vgs = 1V, Vds = 0.05V. 5000 Monte-Carlo runs used.
  - ✔ Vt_sat : Threshold voltage defined as Vgs value for which drain current is ivt*M*1*W/(1*L+0+1*p_la) at Vds = vds_satV.
  - ✔ Abeta : delta_GmMax/GmMax * sqrt(w/L)

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lvtnfet_acc
Electrical characteristics per geometry

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lvtnfet_acc @ scribe=QFDMLVx01, l=0.03e-6, w=1e-6, nf=1, sa=85e-9, sb=85e-9, sd=114e-9, plorient=2, xpos=1.229e-6, ypos=0, pcpastrx_top=5.700e-08, pcpastrx_bot=8.000e-08, as=8.5e-14, ad=8.5e-14, ps=2.17e-06, pd=2.17e-06, vds_mm=0.05, vdd=1, temp=25

DK1.2_RF_mmW wrt DK1.1_RF_mmW

vbs	**-1**	**0**	**1**
Vt_lin [mV]	448.4 0.0mV	366.3 0.0mV	281.2 0.0mV
Ilin*L/W*1e6 []	3.84 0.0%	4.28 0.0%	4.69 0.0%
dVtcc*sqrt(L*W*1e12) []	1.22 -0.0%	1.22 0.1%	1.24 0.2%
abeta [%.µm]	0.41 1.9%	0.44 2.1%	0.47 2.2%
dIdovId*sqrt(L*W*1e12) []	0.34 1.1%	0.34 1.2%	0.34 1.1%

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lvtnfet_acc @ scribe=QFDMLVx06, l=1e-6, w=25e-6, nf=1, sa=85e-9, sb=85e-9, sd=114e-9, plorient=2, xpos=25.324e-6, ypos=0, pcpastrx_top=1.050e-07, pcpastrx_bot=1.050e-07, as=2.125e-12, ad=2.125e-12, ps=5.017e-05, pd=5.017e-05, vds_mm=0.05, vdd=1, temp=25

DK1.2_RF_mmW wrt DK1.1_RF_mmW

vbs	**-1**	**0**	**1**
Vt_lin [mV]	504.8 0.0mV	423.2 0.0mV	338.9 0.0mV
Ilin*L/W*1e6 []	11.26 0.0%	13.46 0.0%	15.78 0.0%
dVtcc*sqrt(L*W*1e12) []	4.34 1.3%	5.39 0.9%	6.97 0.6%
abeta [%.µm]	1.53 -1.1%	1.5 -1.0%	1.5 -0.7%
dIdovId*sqrt(L*W*1e12) []	1.85 0.1%	1.75 -0.1%	1.7 -0.3%

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lvtpfet_acc
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DK1.2_RF_mmW wrt DK1.1_RF_mmW

vbs	**-1**	**0**	**1**
Vt_lin [mV]	523.6 0.0mV	440.4 0.0mV	357.6 0.0mV
Ilin*L/W*1e6 []	1.3 0.0%	1.54 0.0%	1.77 0.0%
dVtcc*sqrt(L*W*1e12) []	1.91 -0.3%	1.96 -0.2%	2.05 -0.1%
abeta [%.µm]	0.6 2.3%	0.65 2.3%	0.66 2.3%
dIdovId*sqrt(L*W*1e12) []	0.54 2.0%	0.51 2.1%	0.49 2.1%

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lvtpfet_acc @ scribe=QFDMLVx06, l=1e-6, w=25e-6, nf=1, sa=85e-9, sb=85e-9, sd=114e-9, plorient=2, xpos=25.324e-6, ypos=0, pcpastrx_top=1.050e-07, pcpastrx_bot=1.050e-07, as=2.125e-12, ad=2.125e-12, ps=5.017e-05, pd=5.017e-05, vds_mm=0.05, vdd=1, temp=25

DK1.2_RF_mmW wrt DK1.1_RF_mmW

vbs	-1	0	1
Vt_lin [mV]	576 0.0mV	496.5 0.0mV	418.9 0.0mV
Ilin*L/W*1e6 []	2.58 0.0%	3.34 0.0%	4.05 0.0%
dVtcc*sqrt(L*W*1e12) []	5.22 0.5%	6.98 0.3%	9.1 0.2%
abeta [%.µm]	2.28 -0.8%	2.29 -0.7%	2.31 -0.6%
dIdovId*sqrt(L*W*1e12) []	2.71 -0.6%	2.62 -0.7%	2.52 -0.8%

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nfet_acc
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nfet_acc @ scribe=QFDMLVx01, l=0.03e-6, w=1e-6, nf=1, sa=85e-9, sb=85e-9, sd=114e-9, plorient=2, xpos=1.229e-6, ypos=0, pcpastrx_top=5.700e-08, pcpastrx_bot=8.000e-08, as=8.5e-14, ad=8.5e-14, ps=2.17e-06, pd=2.17e-06, vds_mm=0.05, vdd=1, temp=25

DK1.2_RF_mmW wrt DK1.1_RF_mmW

vbs	**-1**	**0**	**1**
Vt_lin [mV]	484.5 0.0mV	421.4 0.0mV	339.2 0.0mV
Ilin*L/W*1e6 []	3.53 0.0%	3.85 0.0%	4.22 0.0%
dVtcc*sqrt(L*W*1e12) []	1.32 -1.1%	1.3 -1.2%	1.29 -1.3%
abeta [%.µm]	0.35 -2.0%	0.35 -1.8%	0.38 -1.2%
dIdovId*sqrt(L*W*1e12) []	0.25 -2.5%	0.23 -2.5%	0.22 -2.4%

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nfet_acc @ scribe=QFDMLVx06, l=1e-6, w=25e-6, nf=1, sa=85e-9, sb=85e-9, sd=114e-9, plorient=2, xpos=25.324e-6, ypos=0, pcpastrx_top=1.050e-07, pcpastrx_bot=1.050e-07, as=2.125e-12, ad=2.125e-12, ps=5.017e-05, pd=5.017e-05, vds_mm=0.05, vdd=1, temp=25

DK1.2_RF_mmW wrt DK1.1_RF_mmW

vbs	**-1**	**0**	**1**
Vt_lin [mV]	544.4 0.0mV	478.6 0.0mV	395.6 0.0mV
Ilin*L/W*1e6 []	10.56 0.0%	12.37 0.0%	14.75 0.0%
dVtcc*sqrt(L*W*1e12) []	2.51 0.3%	3.41 0.2%	5.11 0.0%
abeta [%.µm]	1.22 -1.2%	1.18 -1.4%	1.16 -1.6%
dIdovId*sqrt(L*W*1e12) []	1.5 -0.3%	1.41 -0.5%	1.37 -0.6%

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pfet_acc
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pfet_acc @ scribe=QFDMLVx01, l=0.03e-6, w=1e-6, nf=1, sa=85e-9, sb=85e-9, sd=114e-9, plorient=2, xpos=1.229e-6, ypos=0, pcpastrx_top=5.700e-08, pcpastrx_bot=8.000e-08, as=8.5e-14, ad=8.5e-14, ps=2.17e-06, pd=2.17e-06, vds_mm=0.05, vdd=1, temp=25

DK1.2_RF_mmW wrt DK1.1_RF_mmW

vbs	**-1**	**0**	**1**
Vt_lin [mV]	546.5 0.0mV	482.8 0.0mV	413.7 0.0mV
Ilin*L/W*1e6 []	1.2 0.0%	1.38 0.0%	1.57 0.0%
dVtcc*sqrt(L*W*1e12) []	2.2 -1.0%	2.15 -1.1%	2.12 -1.2%
abeta [%.µm]	0.54 -0.2%	0.54 -0.0%	0.55 0.2%
dIdovId*sqrt(L*W*1e12) []	0.56 -0.6%	0.52 -0.4%	0.49 -0.3%

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pfet_acc @ scribe=QFDMLVx06, l=1e-6, w=25e-6, nf=1, sa=85e-9, sb=85e-9, sd=114e-9, plorient=2, xpos=25.324e-6, ypos=0, pcpastrx_top=1.050e-07, pcpastrx_bot=1.050e-07, as=2.125e-12, ad=2.125e-12, ps=5.017e-05, pd=5.017e-05, vds_mm=0.05, vdd=1, temp=25

DK1.2_RF_mmW wrt DK1.1_RF_mmW

vbs	-1	0	1
Vt_lin [mV]	634 0.0mV	564.8 0.0mV	491.4 0.0mV
Ilin*L/W*1e6 []	2.12 0.0%	2.72 0.0%	3.39 0.0%
dVtcc*sqrt(L*W*1e12) []	5.08 0.2%	6.35 0.1%	7.9 0.0%
abeta [%.µm]	1.94 -1.7%	1.95 -1.7%	1.98 -1.7%
dIdovId*sqrt(L*W*1e12) []	2.54 -0.2%	2.43 -0.3%	2.35 -0.4%

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lvtnfet_acc
Electrical characteristics scaling

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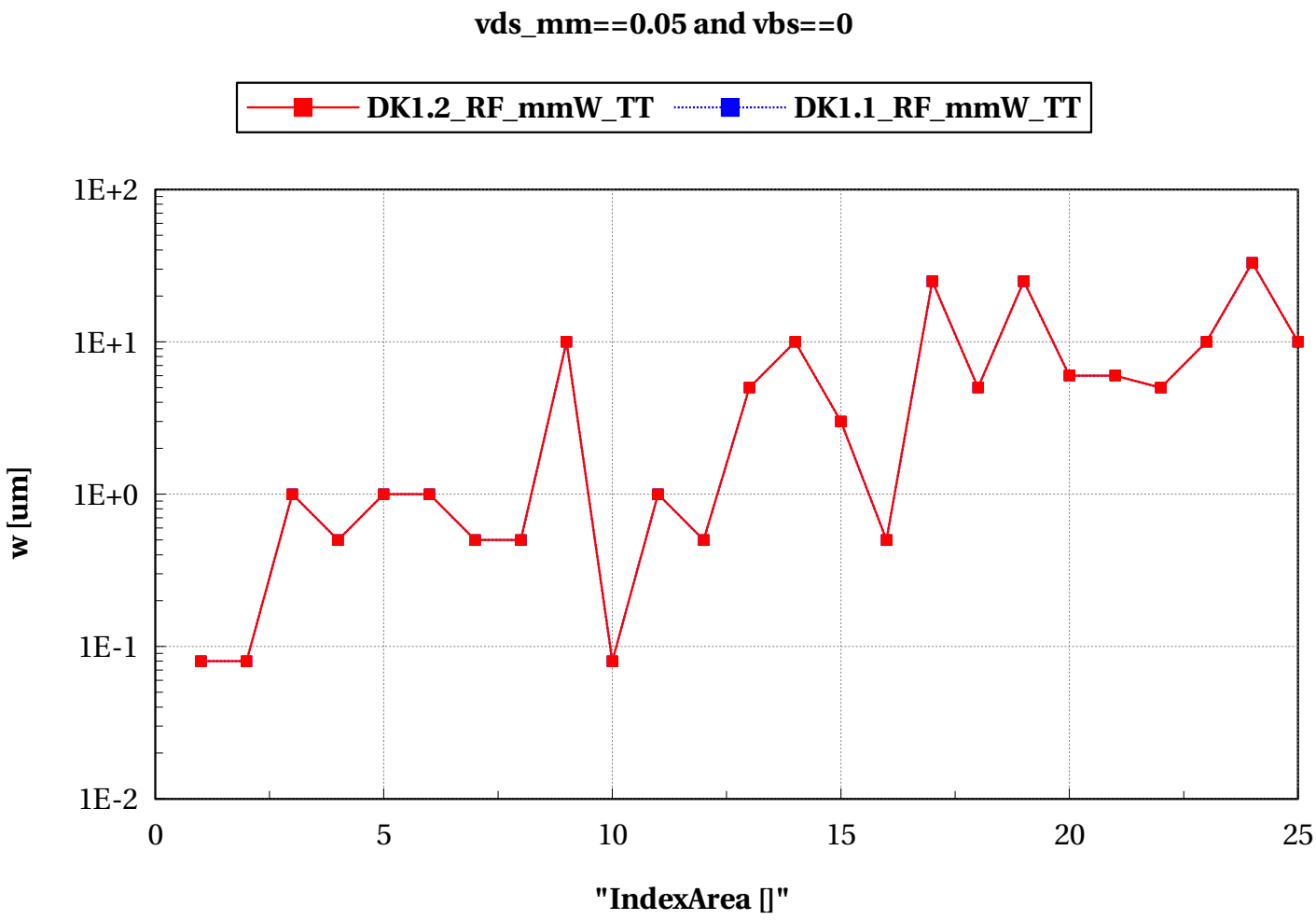

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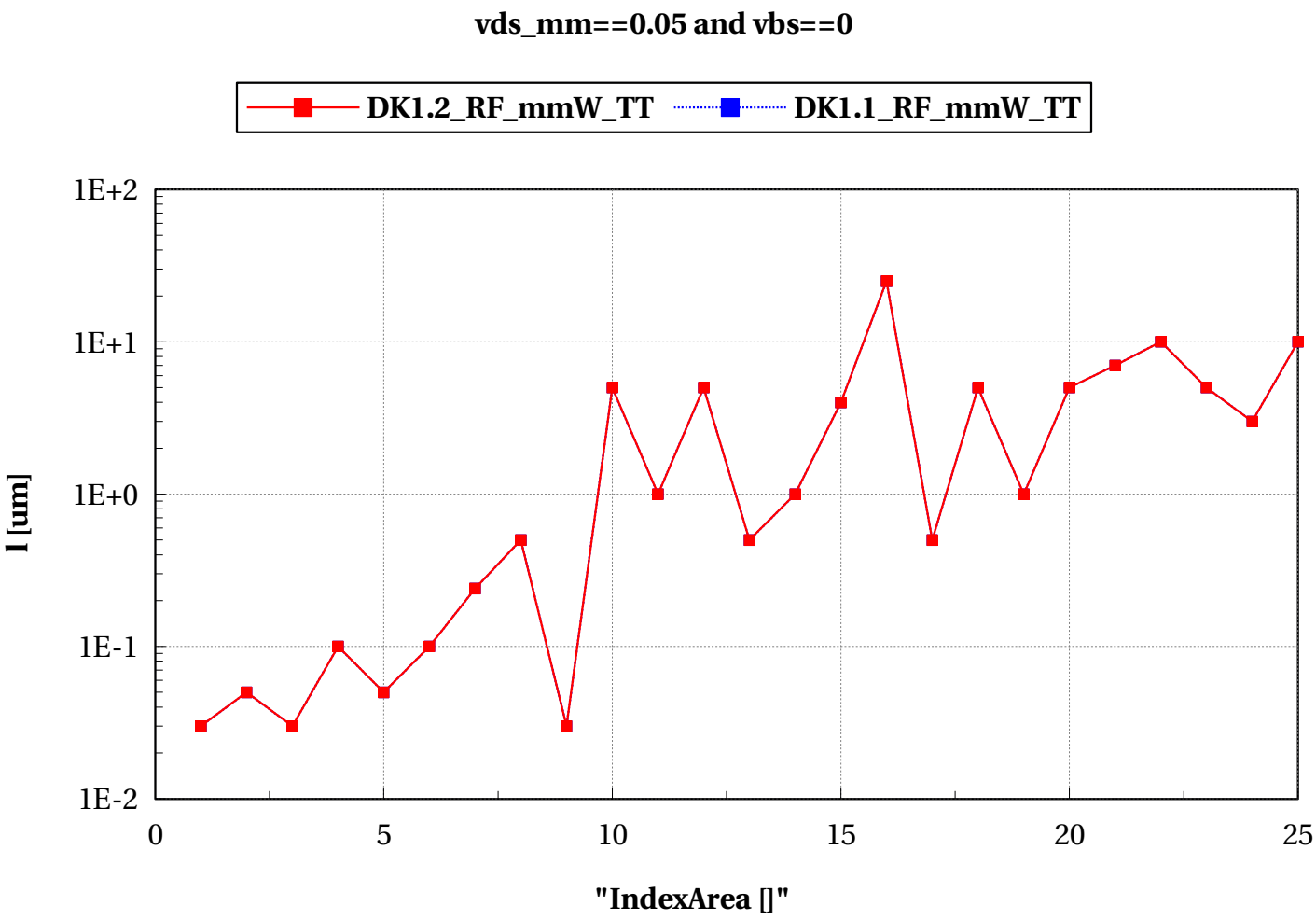

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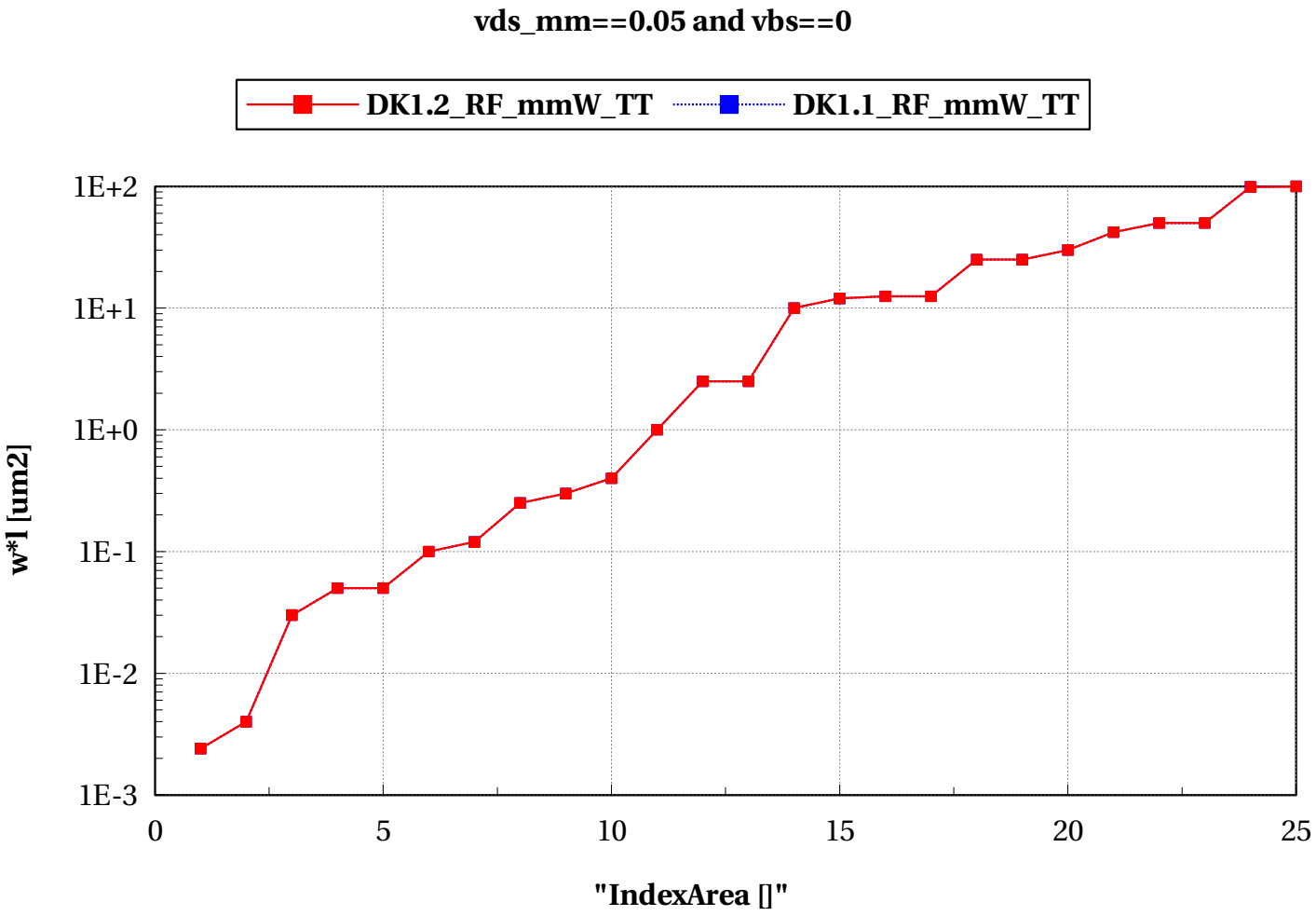

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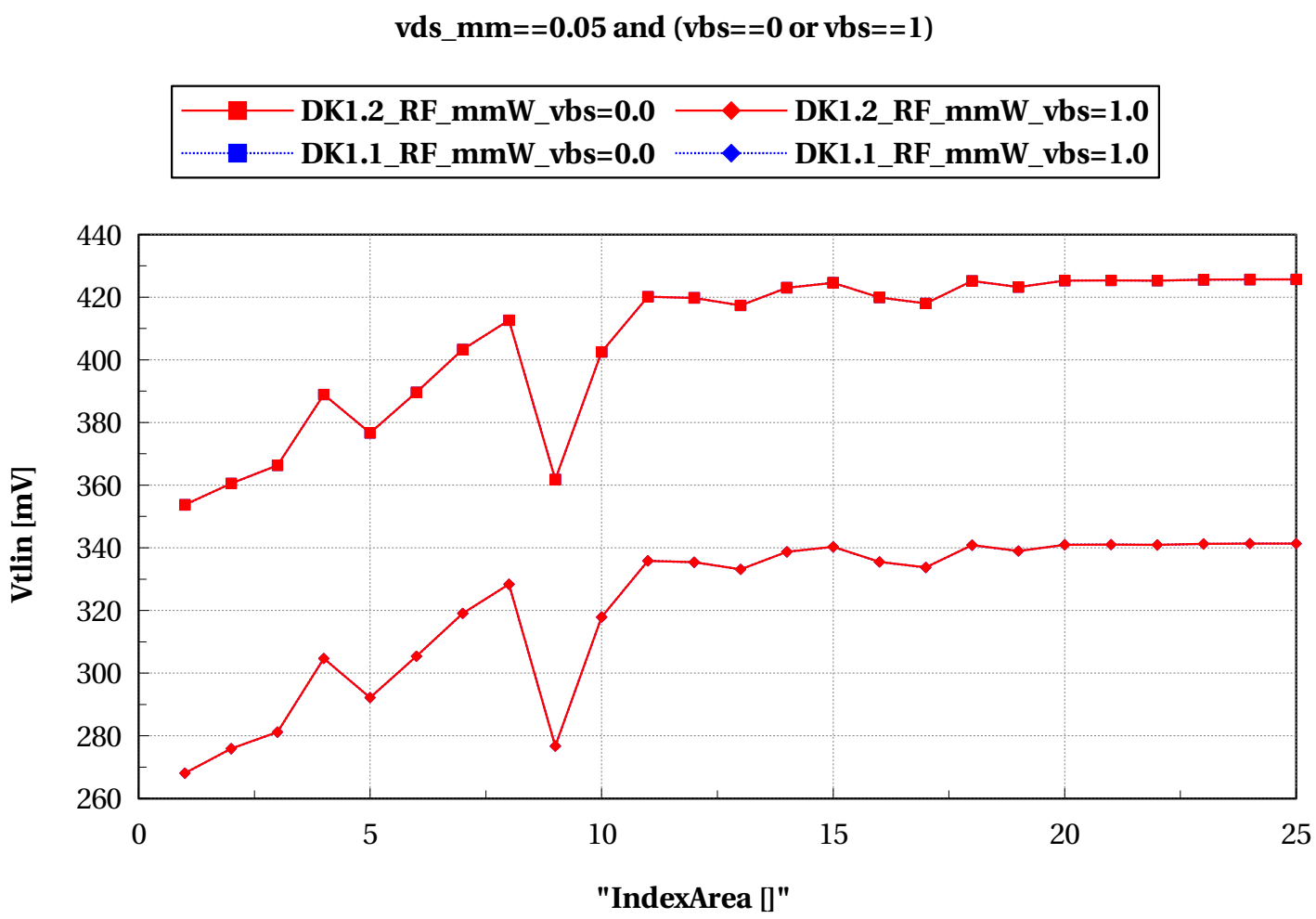

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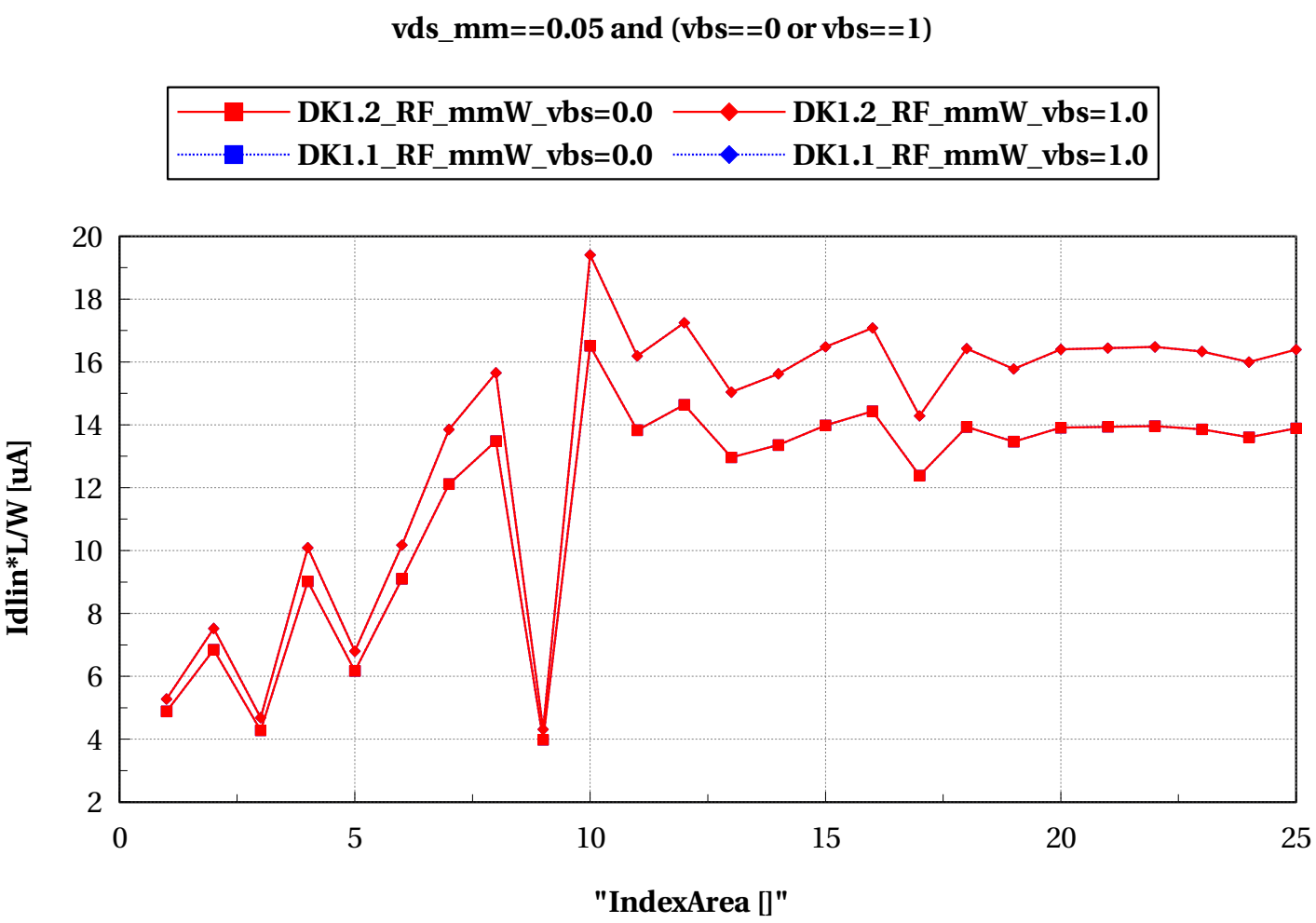

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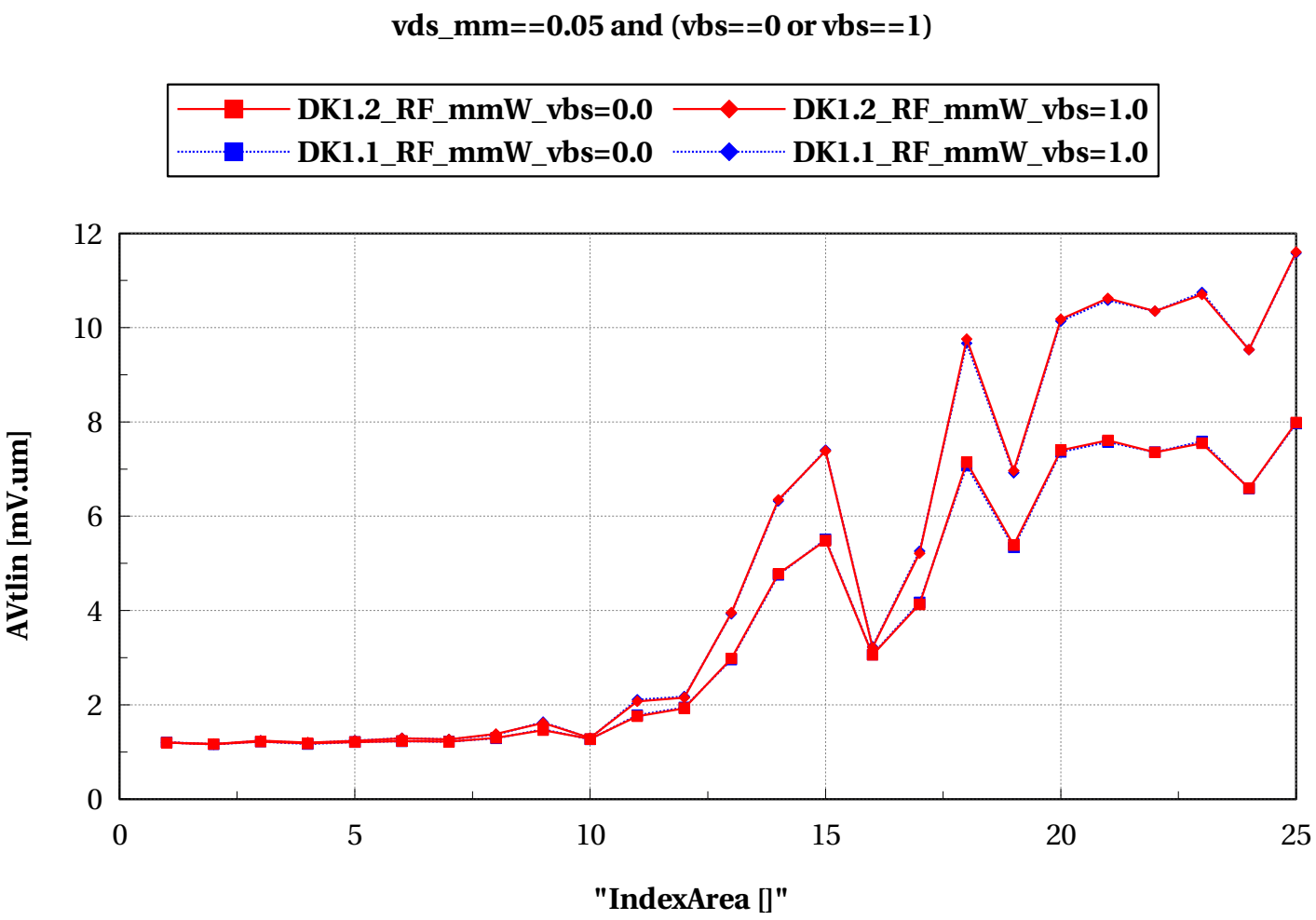

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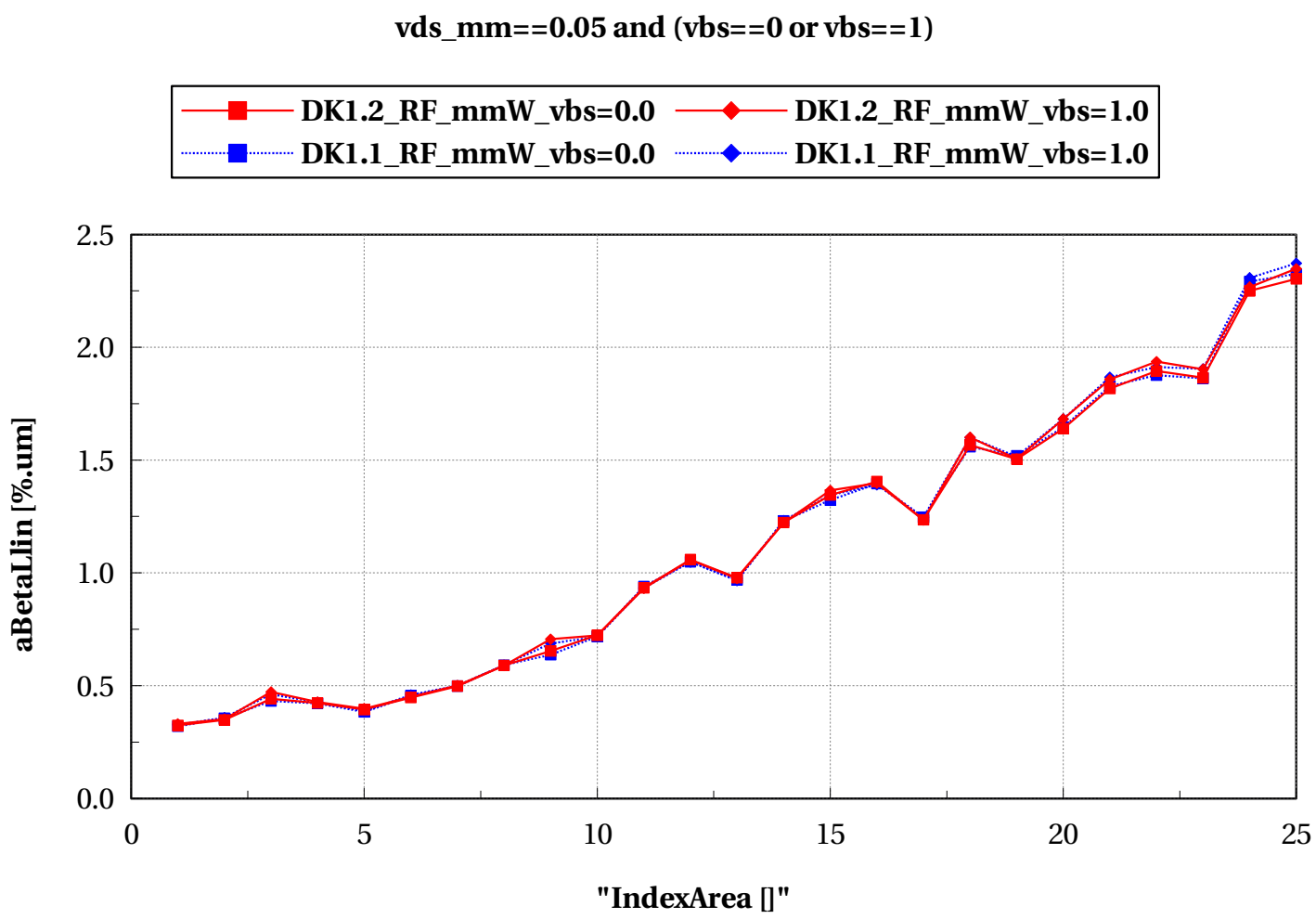

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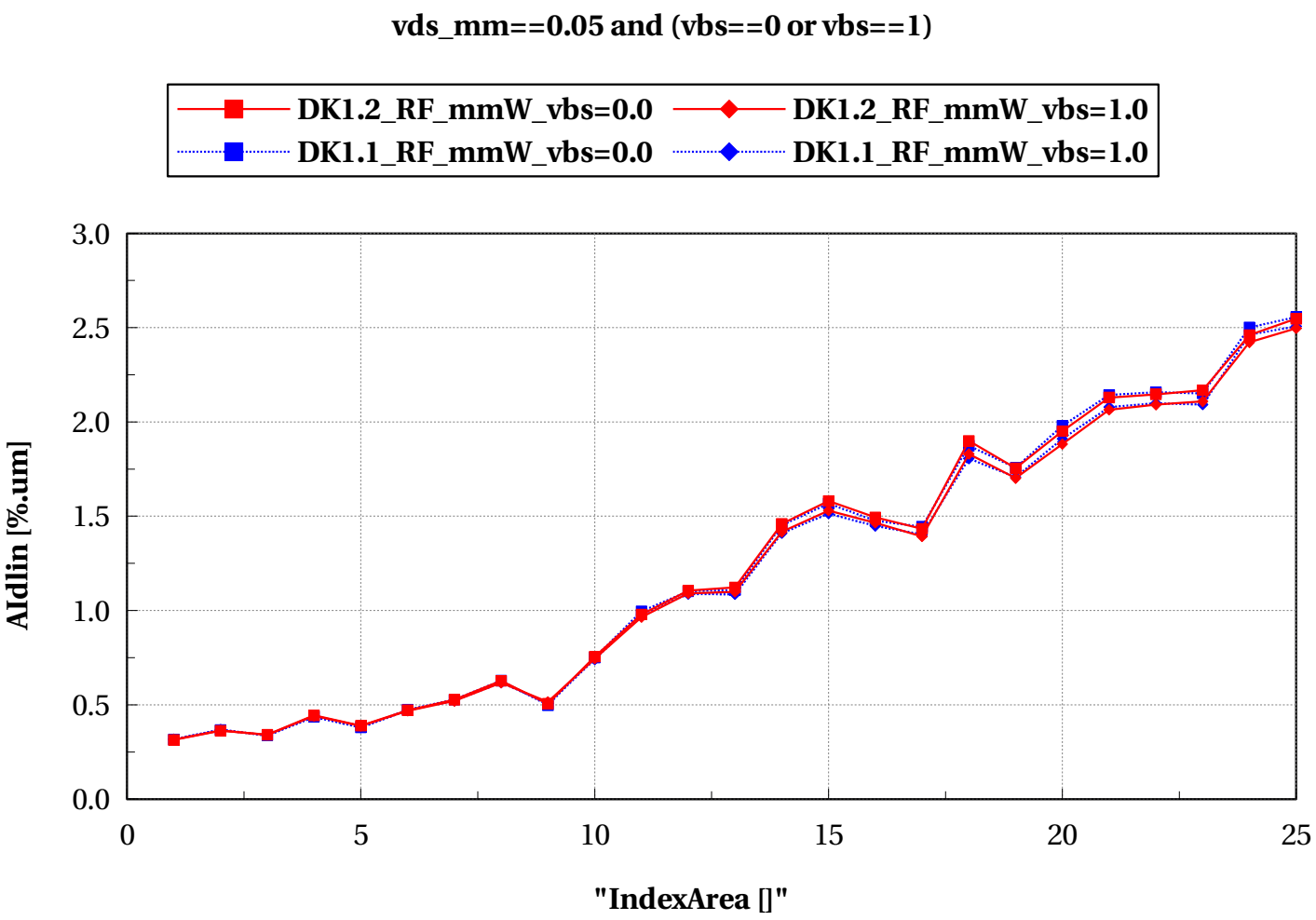

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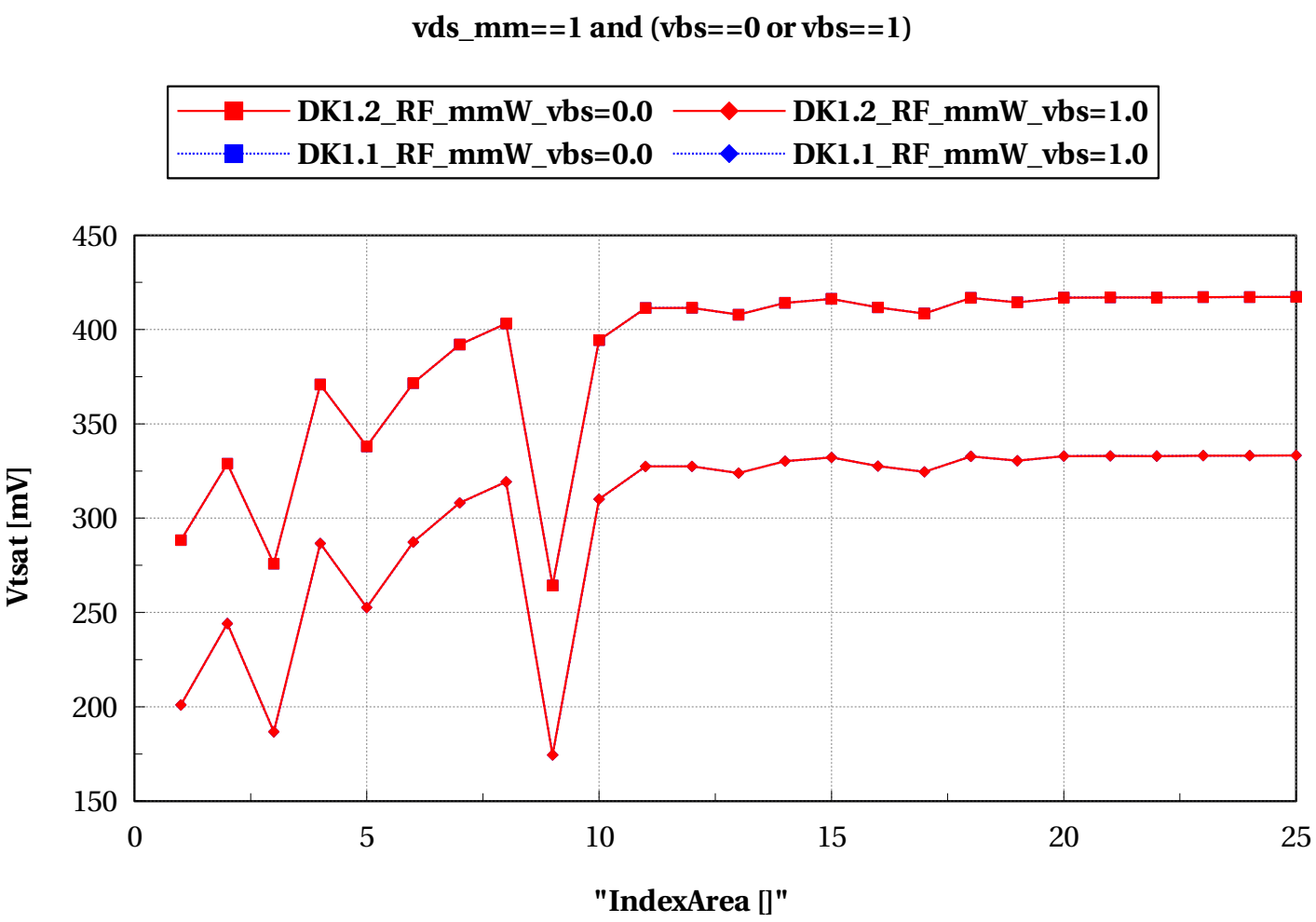

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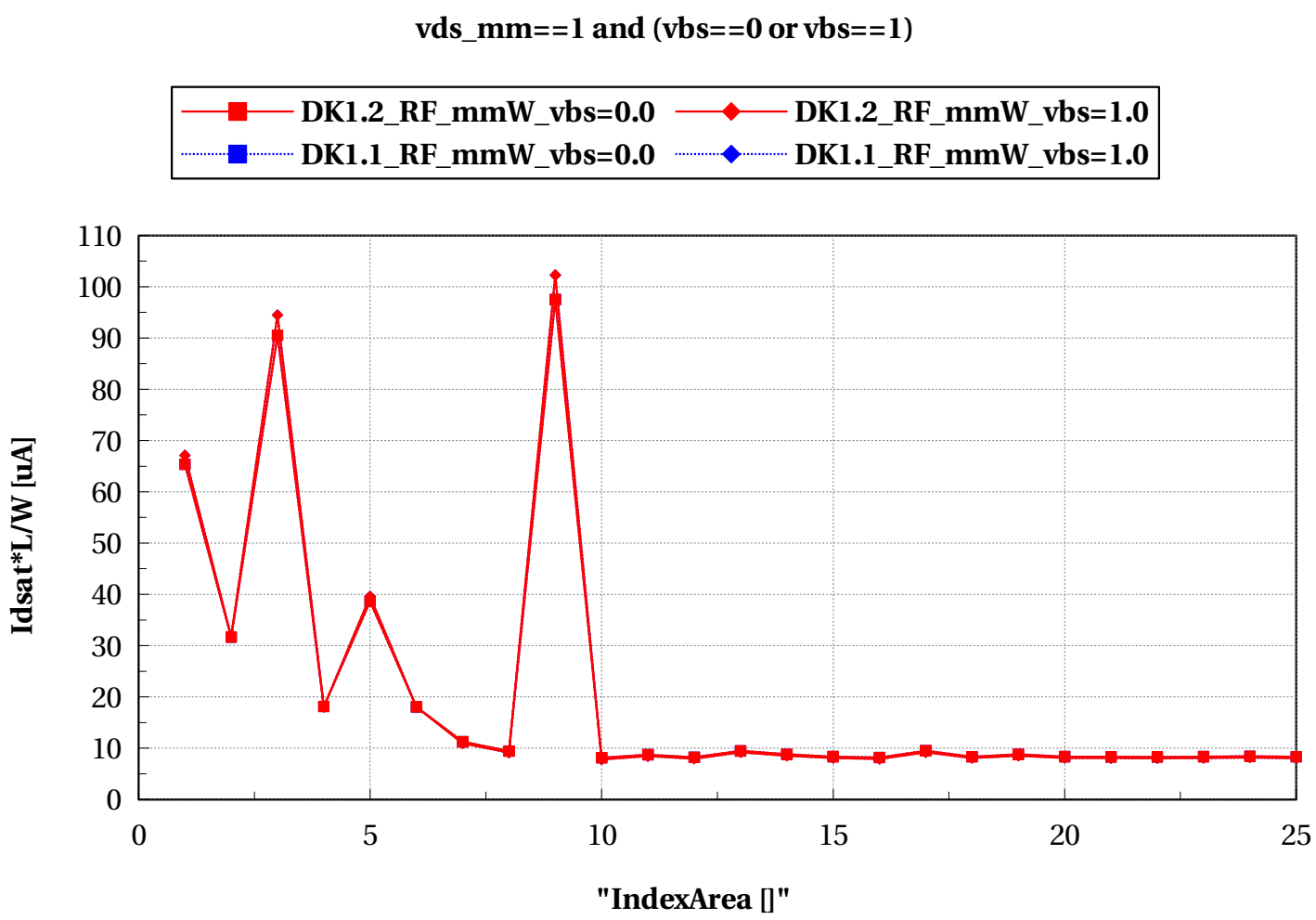

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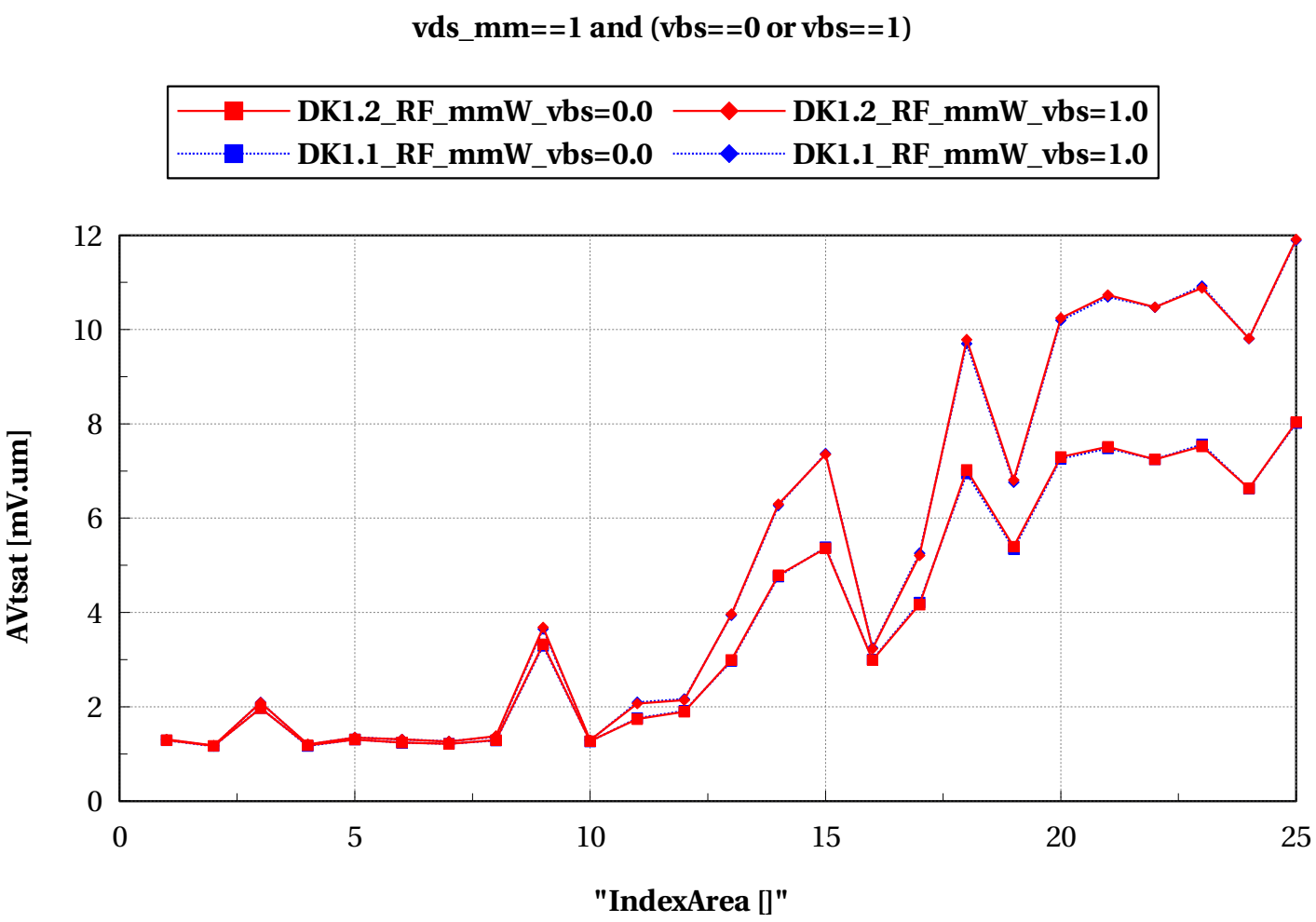

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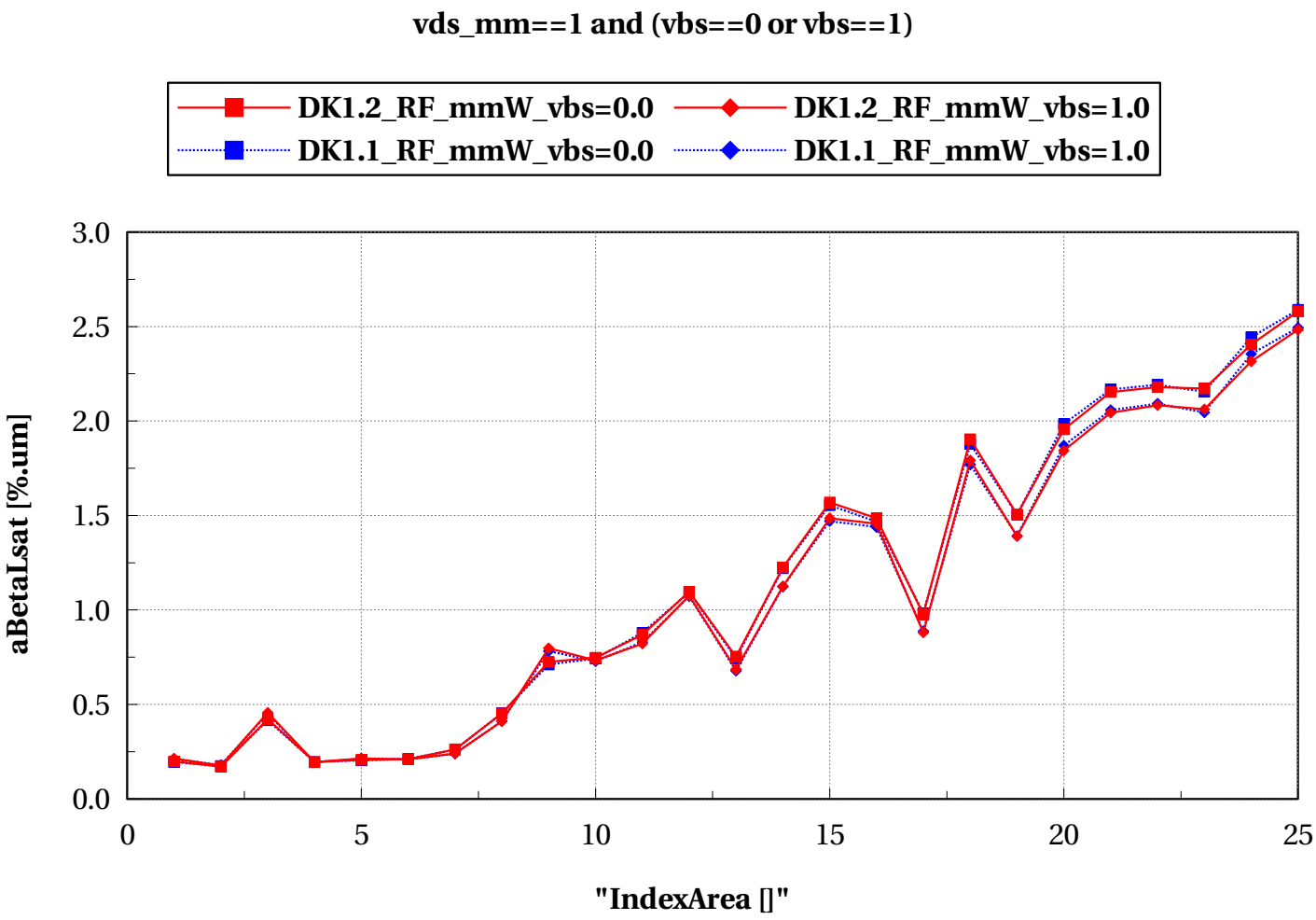

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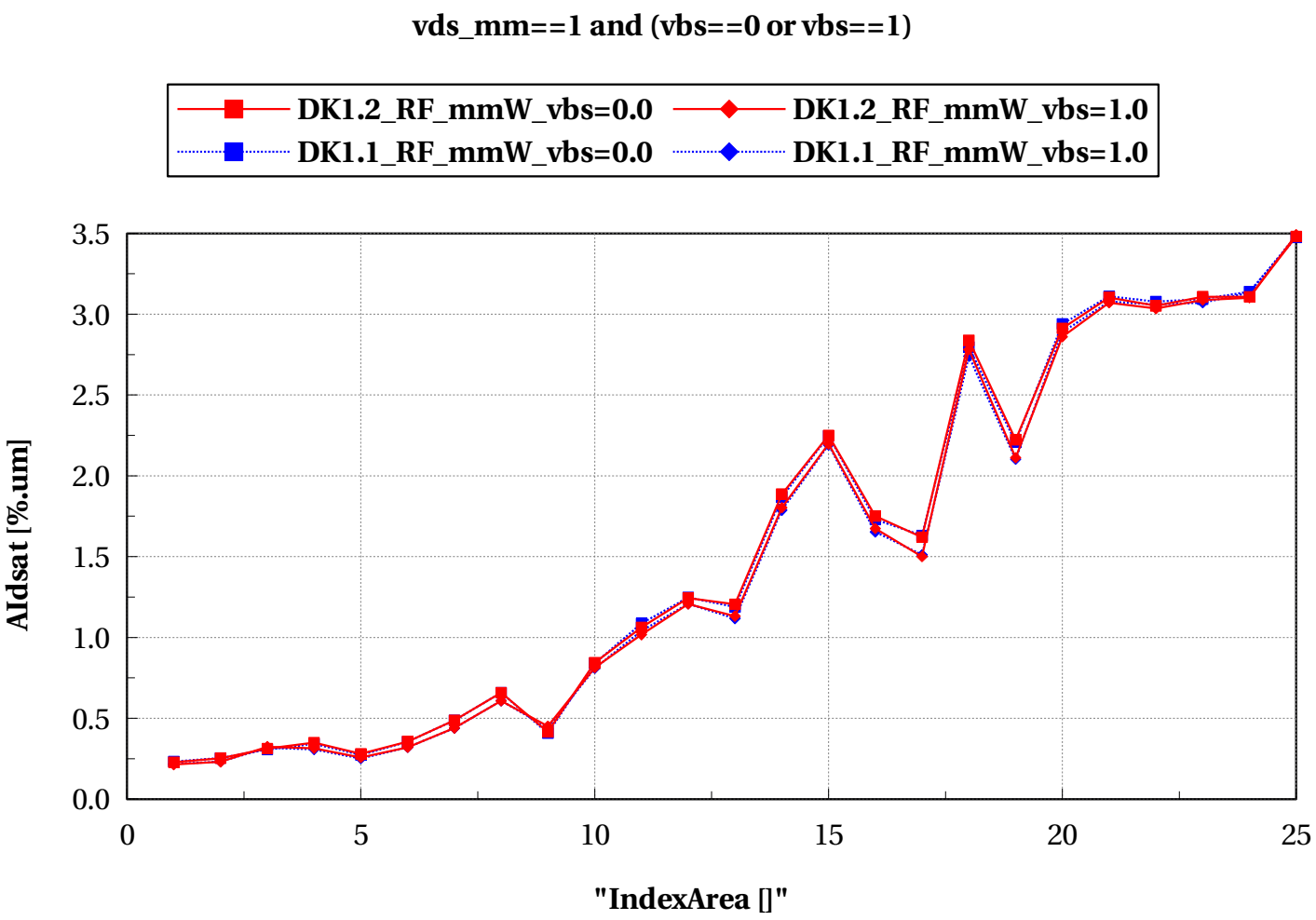

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lvtpfet_acc
Electrical characteristics scaling

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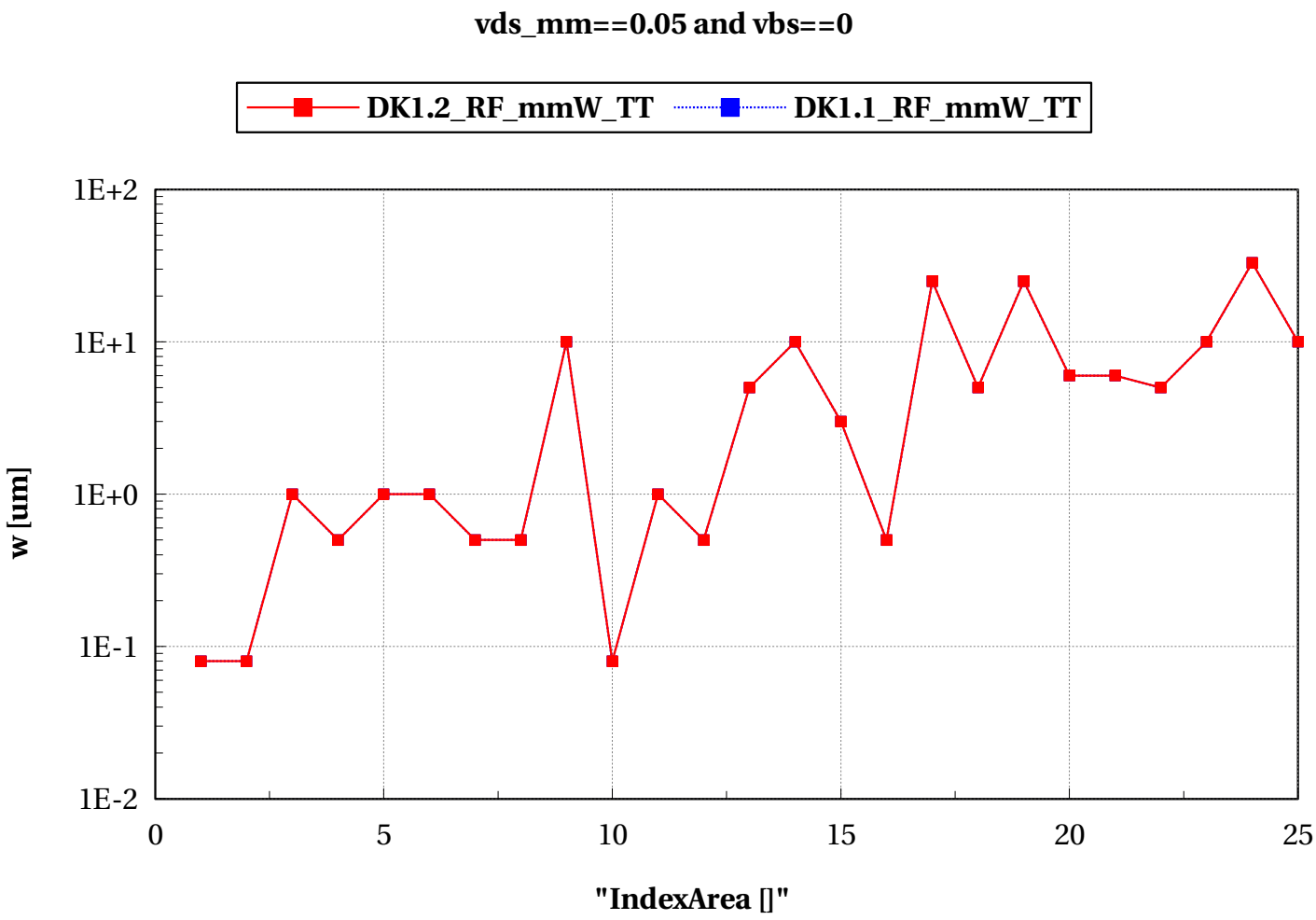

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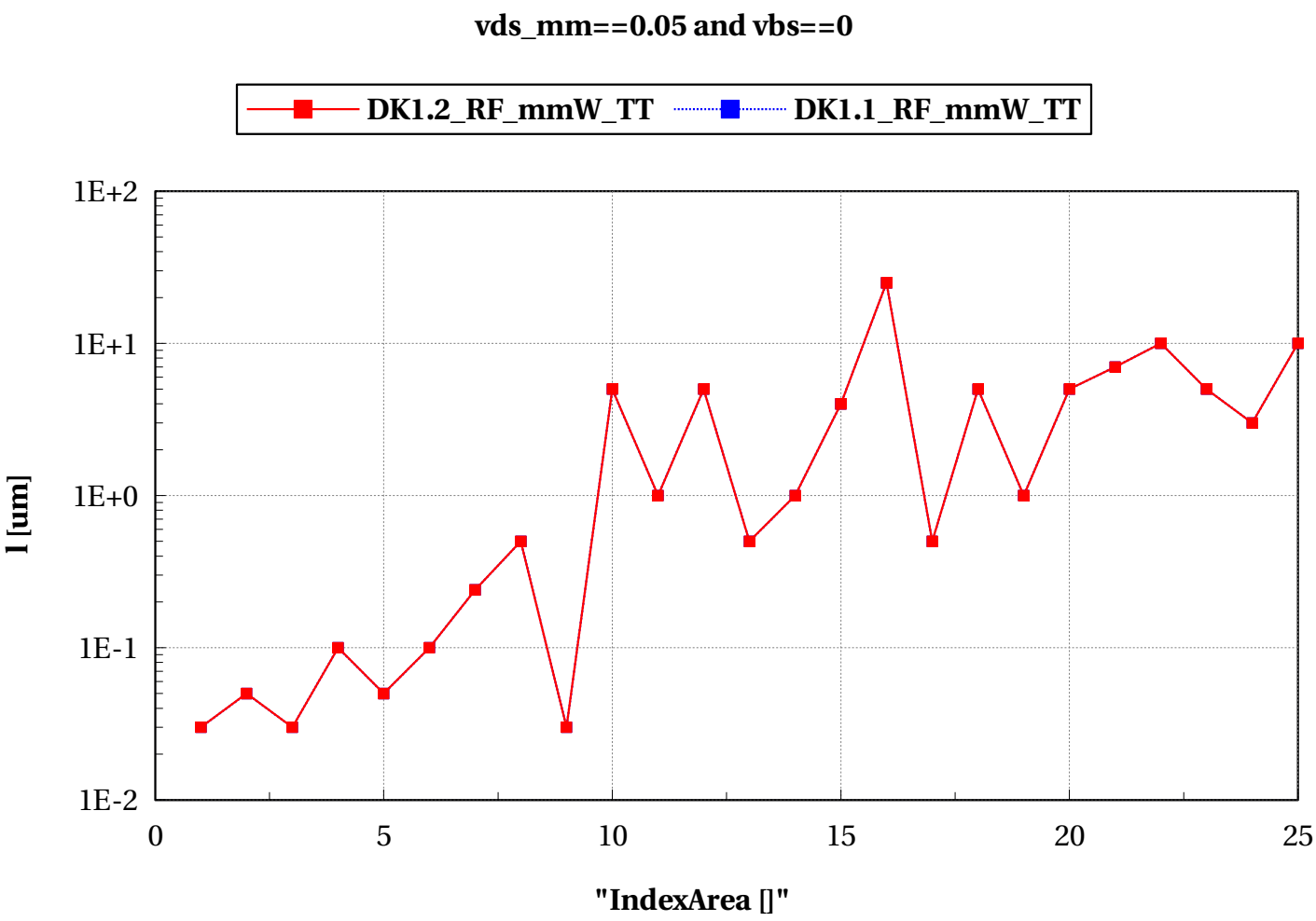

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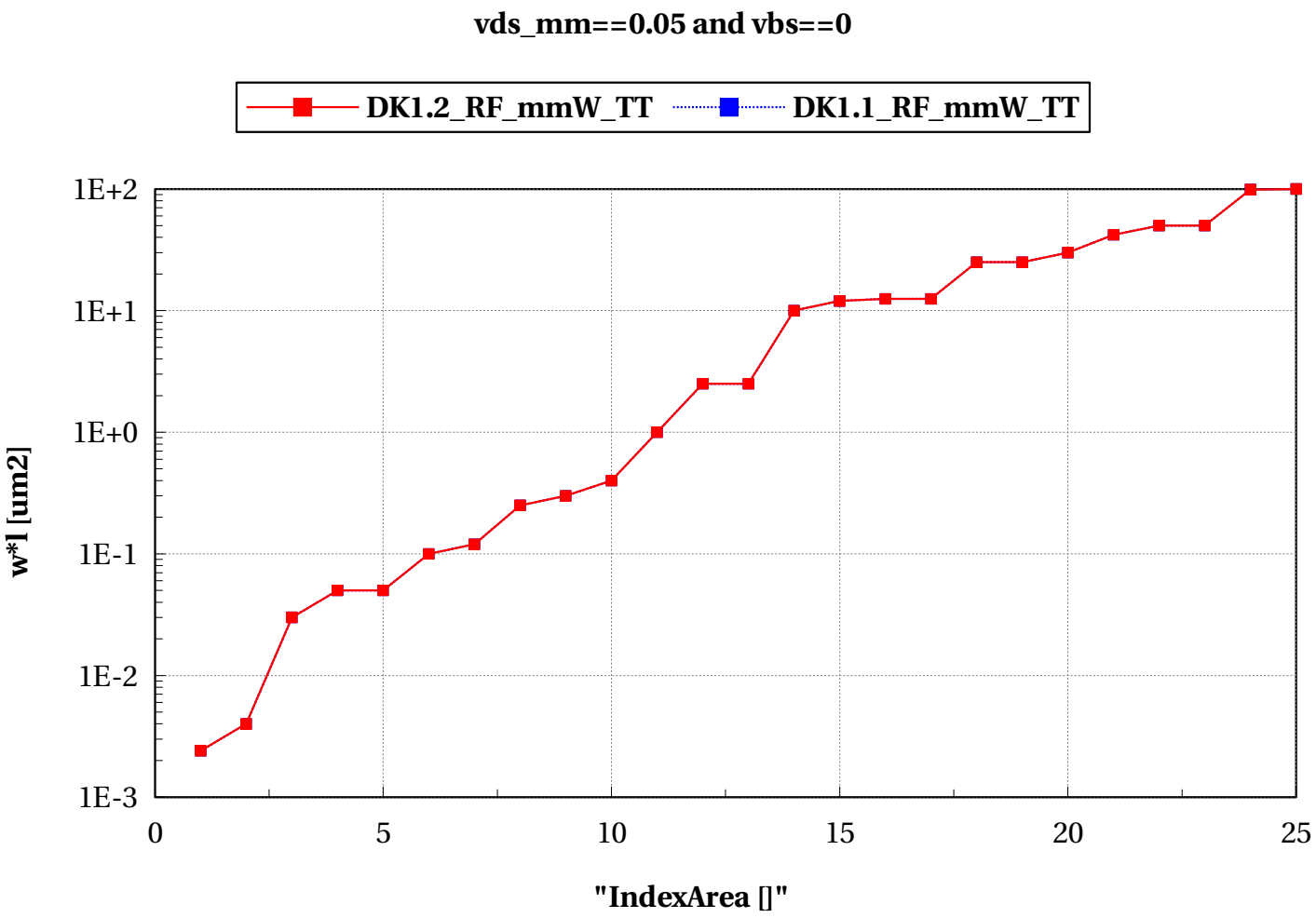
lvtpfet_acc, w*l [um2] vs "IndexArea []"



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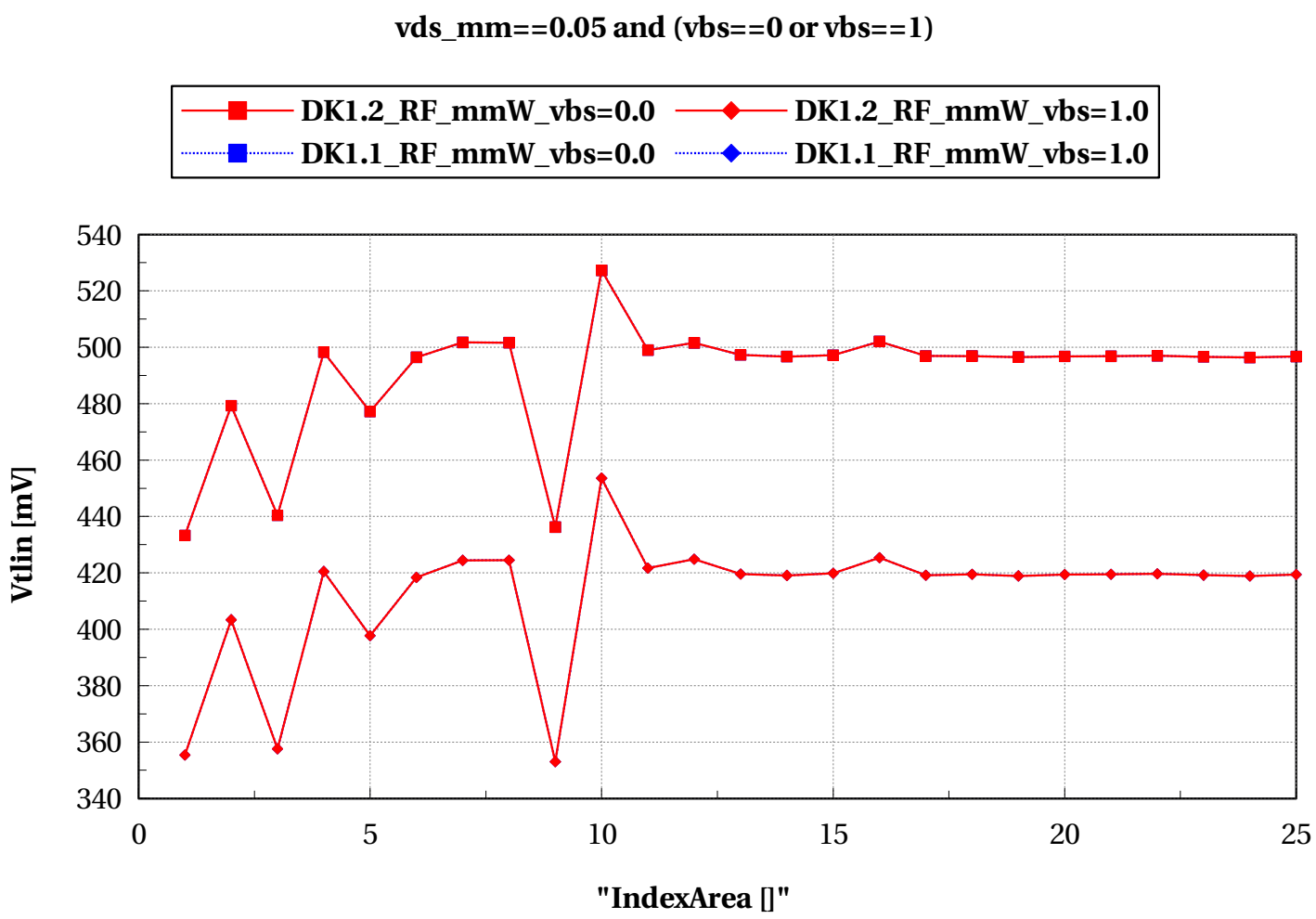
lvtpfet_acc, Vtlin [mV] vs "IndexArea []"



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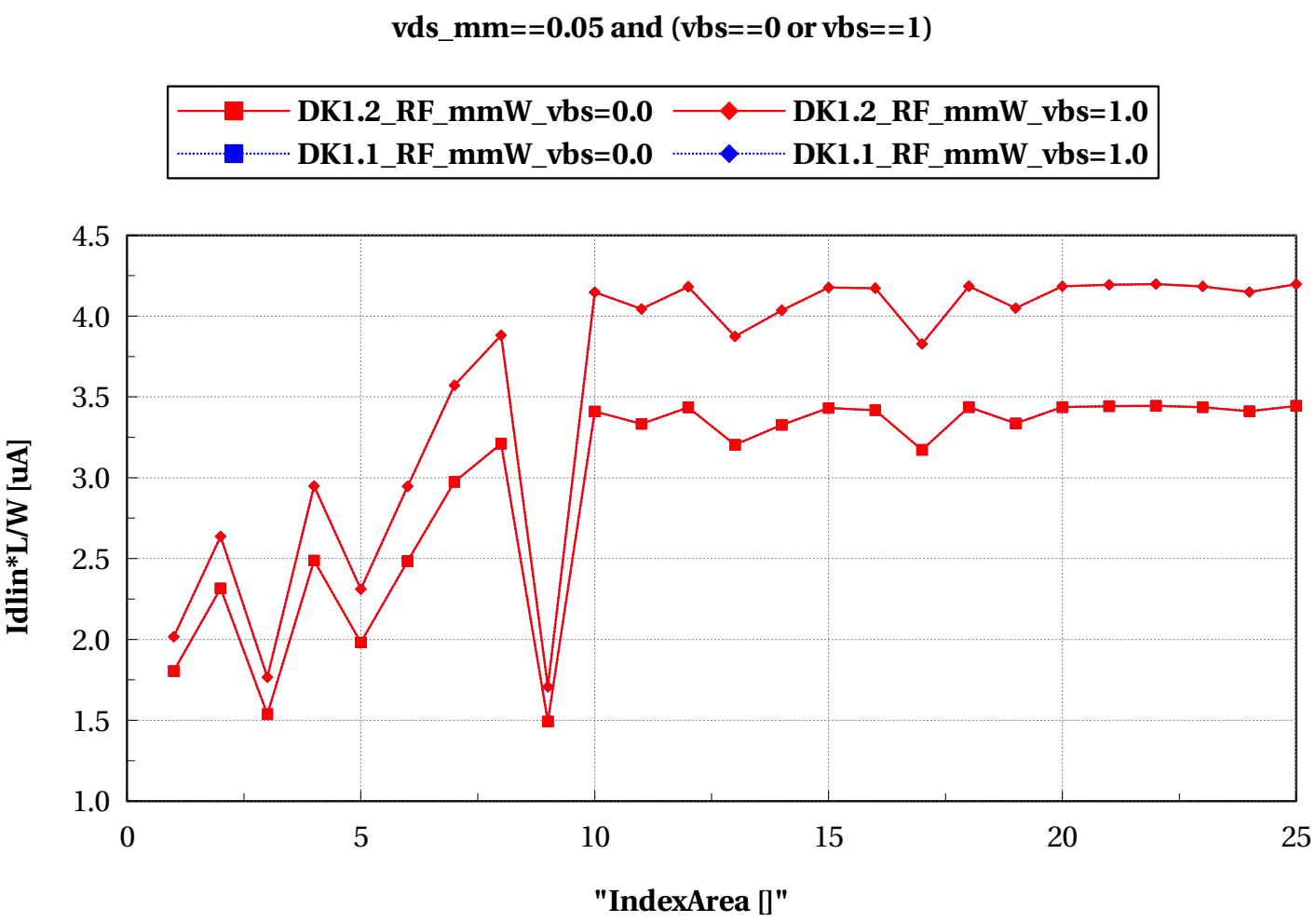

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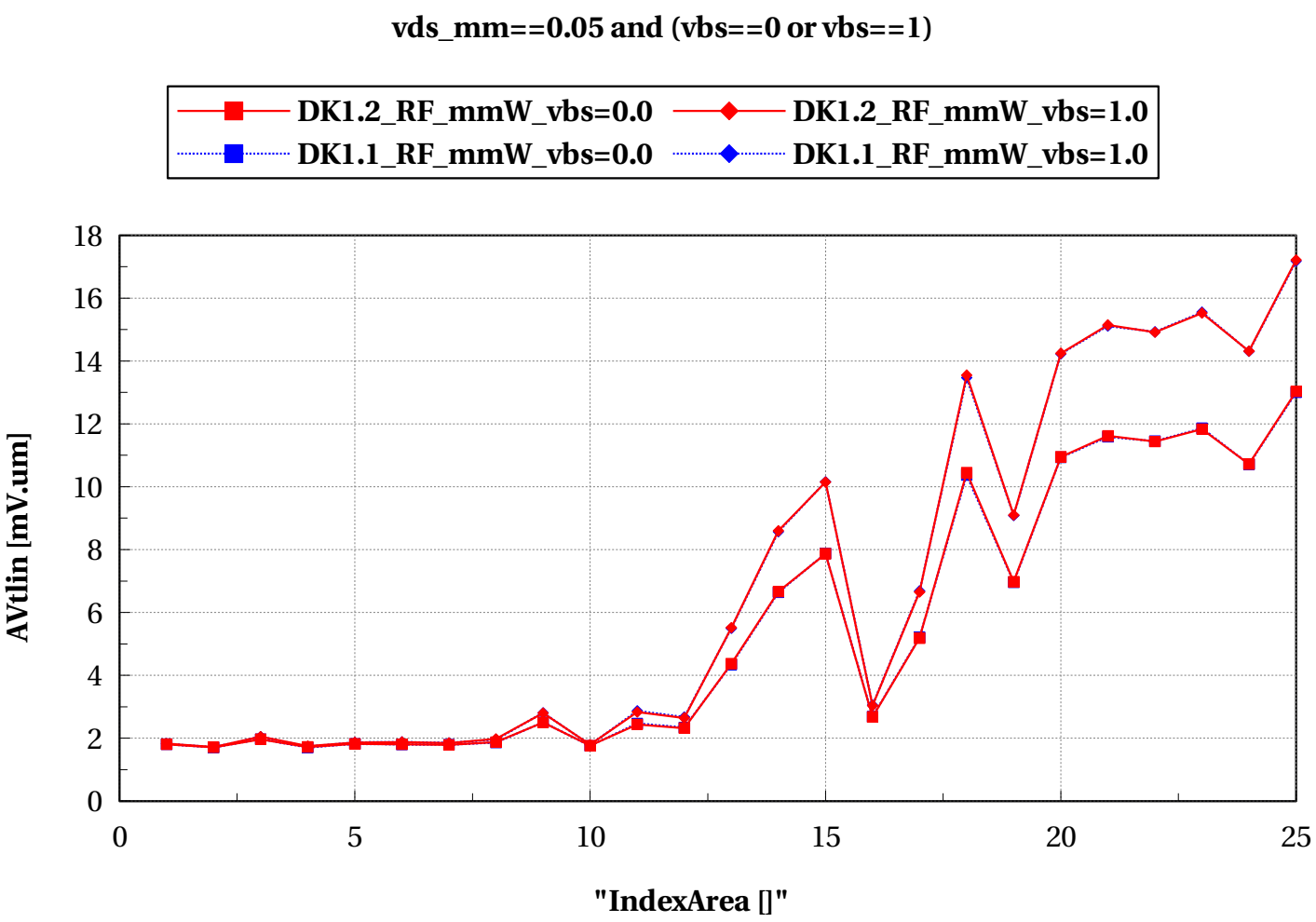
lvtpfet_acc, AVtlin [mV.um] vs "IndexArea []"



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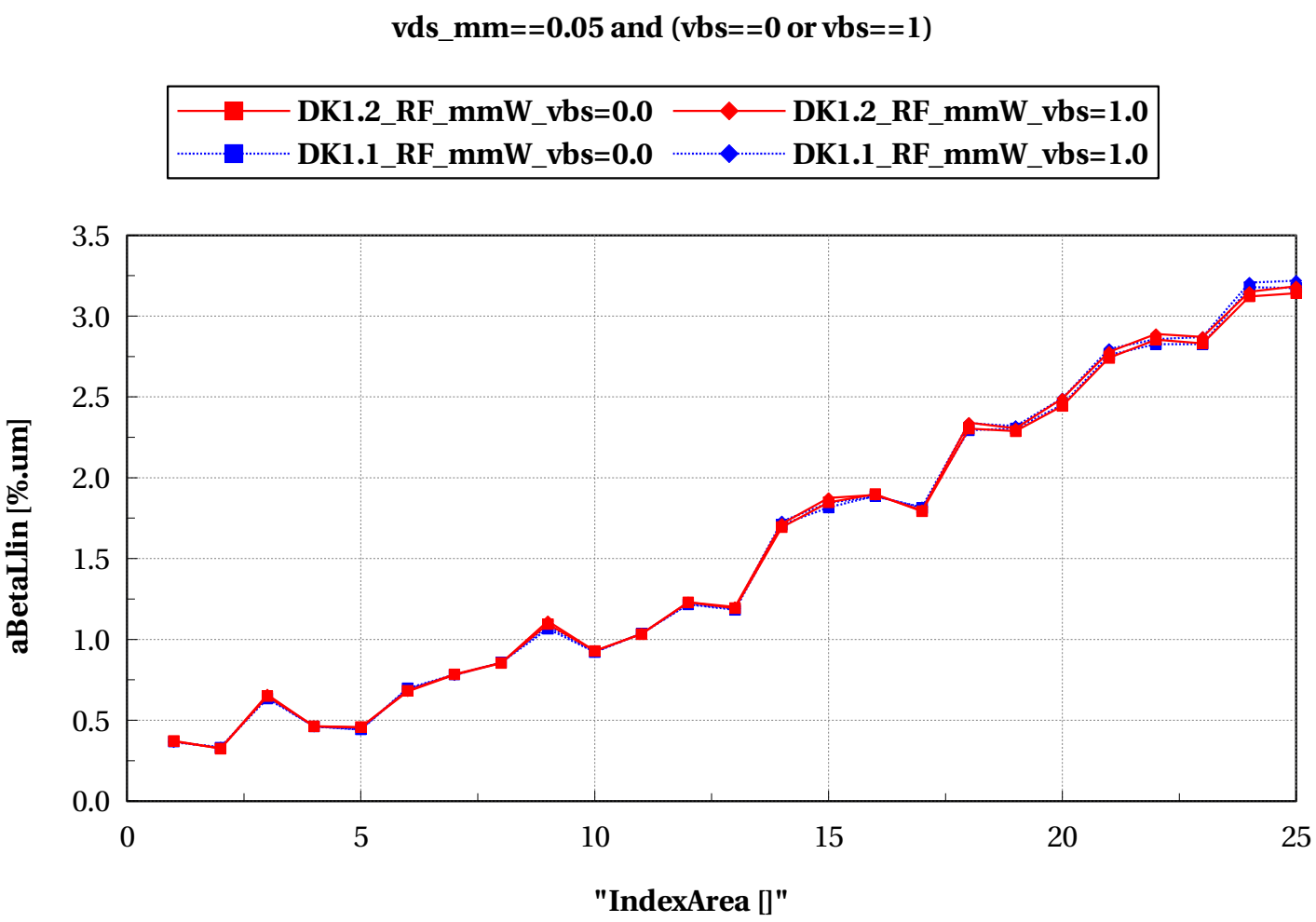
lvtpfet_acc, aBetaLlin [%.um] vs "IndexArea []"



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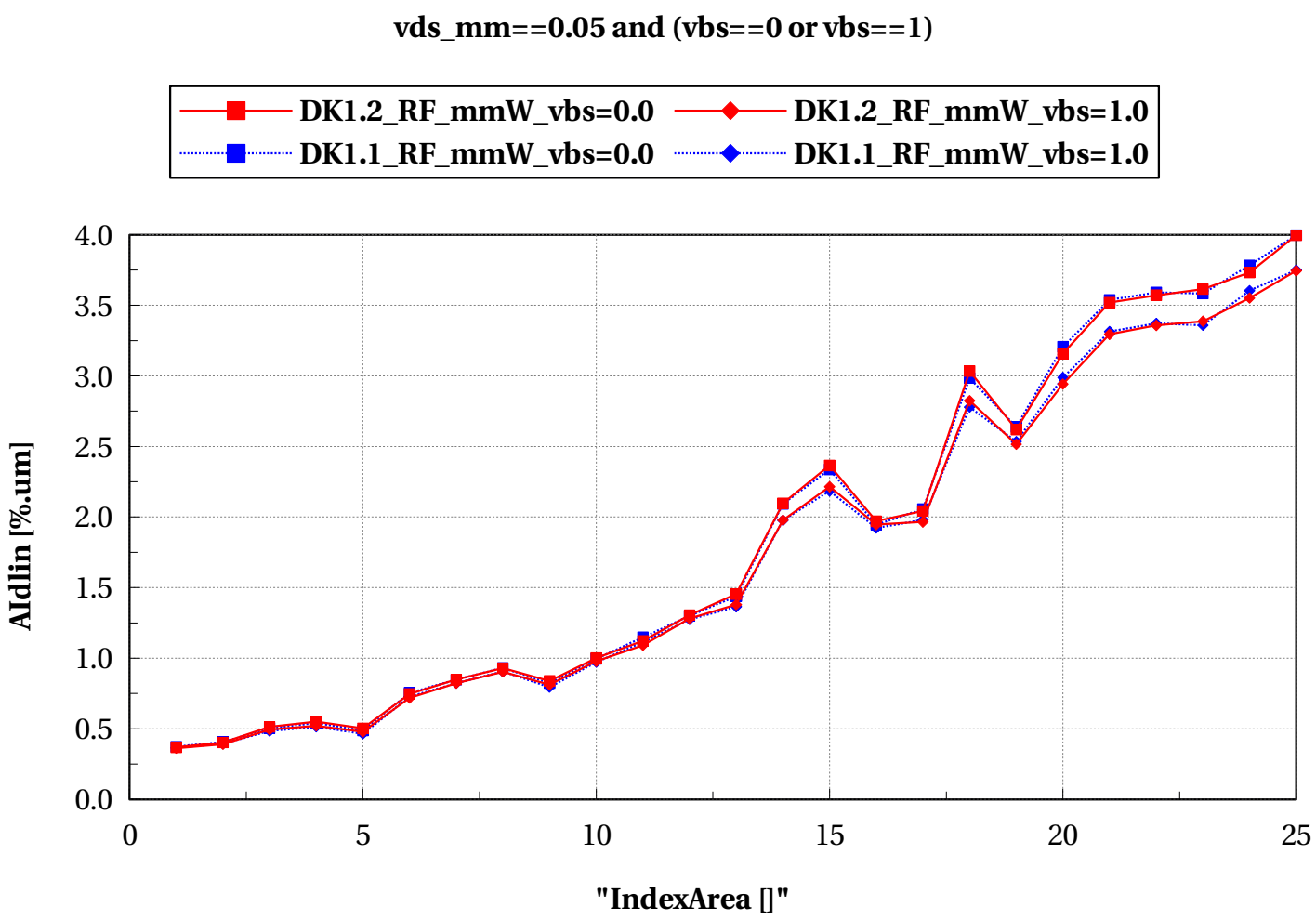
lvtpfet_acc, AIdlin [%.um] vs "IndexArea []"



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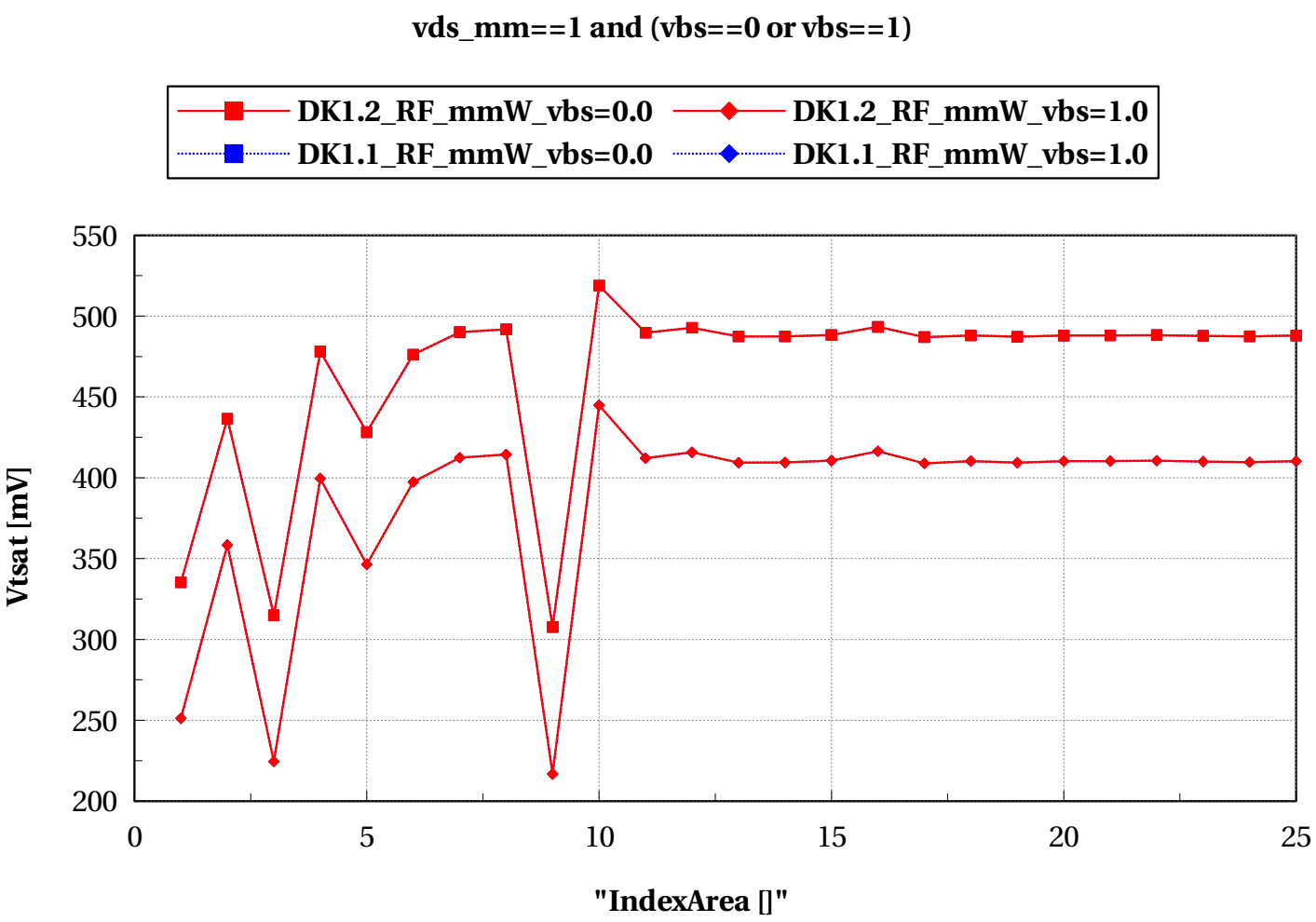
lvtpfet_acc, Vtsat [mV] vs "IndexArea []"



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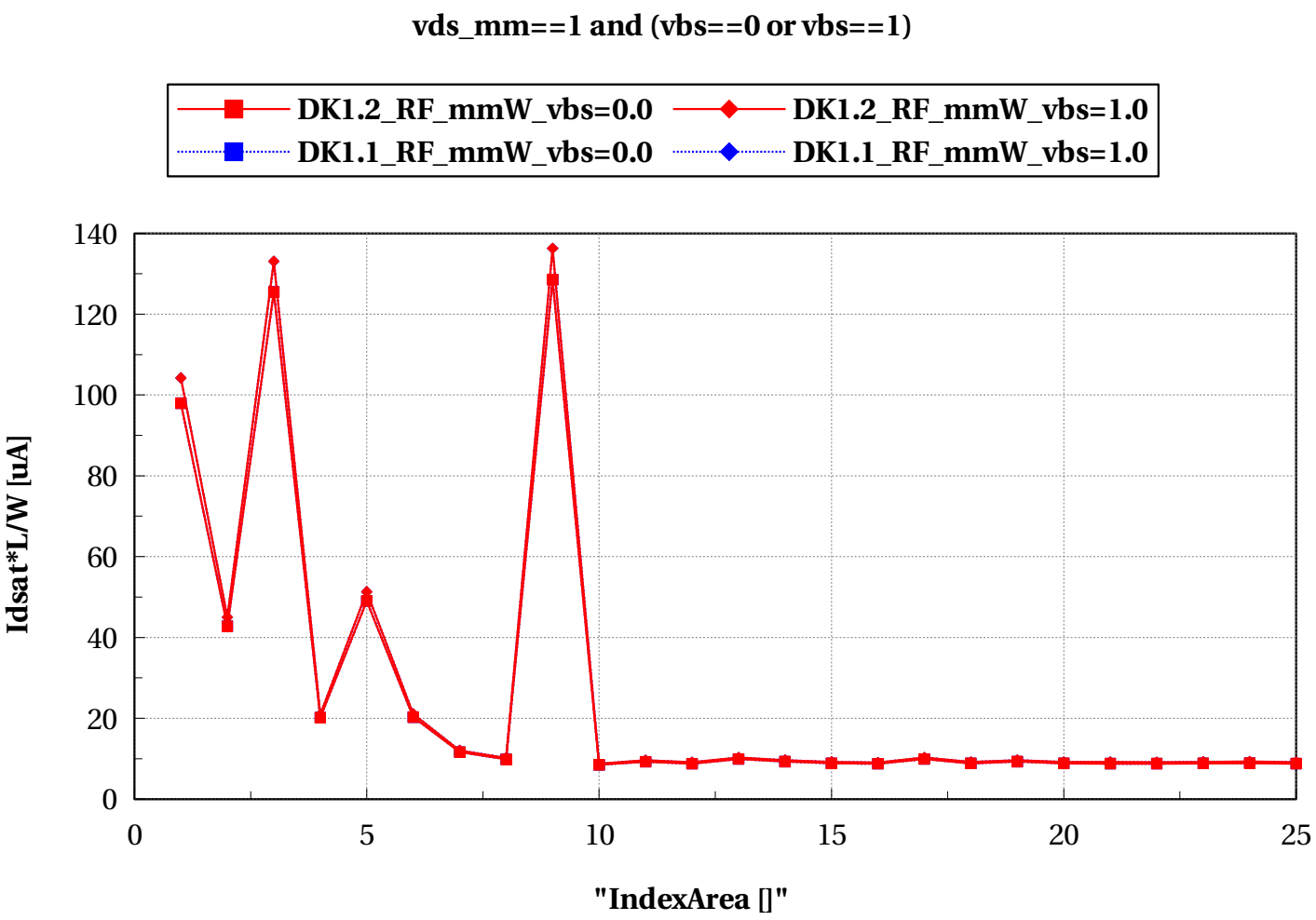
lvtpfet_acc, Idsat*L/W [uA] vs "IndexArea []"



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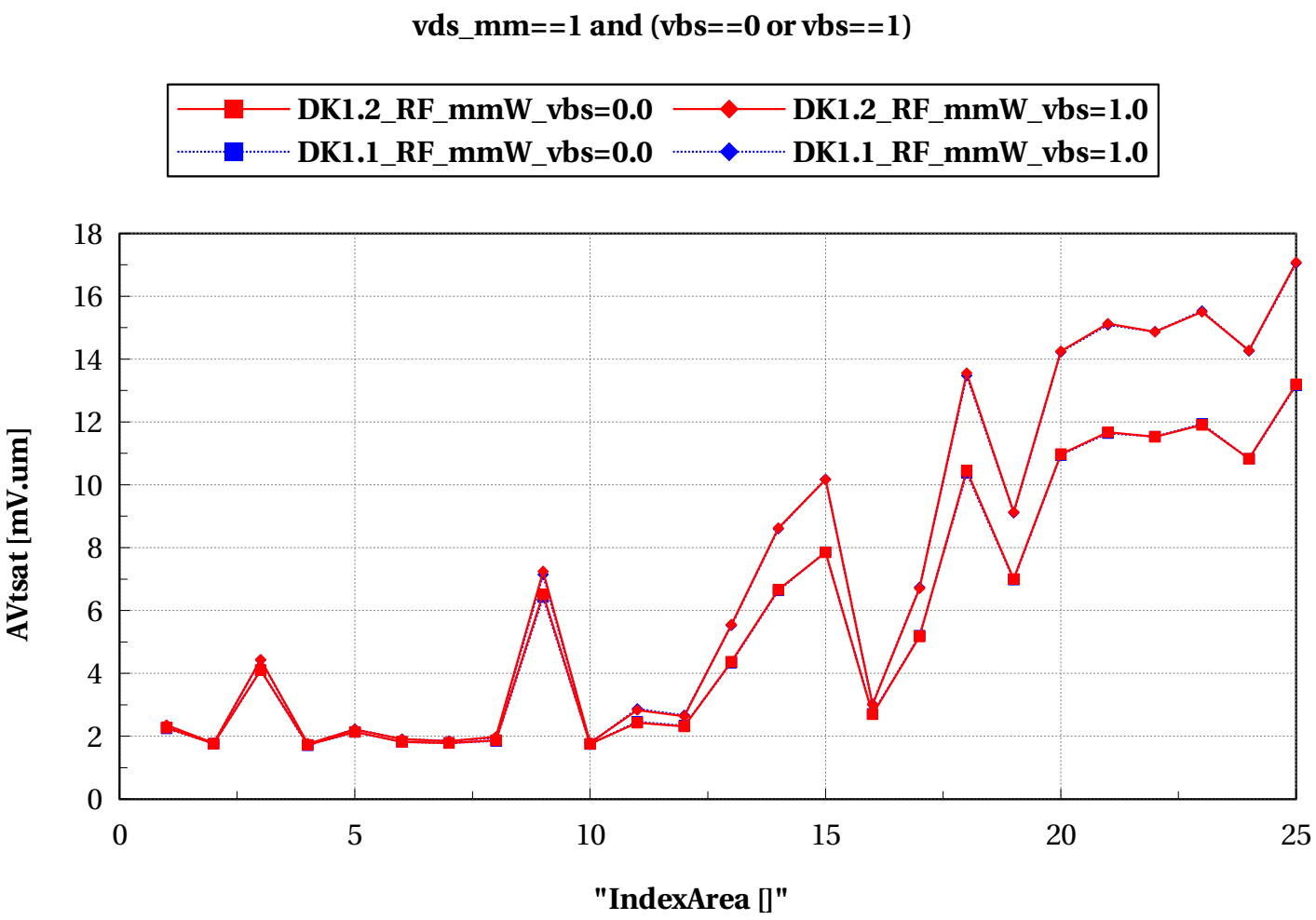
lvtpfet_acc, AVtsat [mV.um] vs "IndexArea []"



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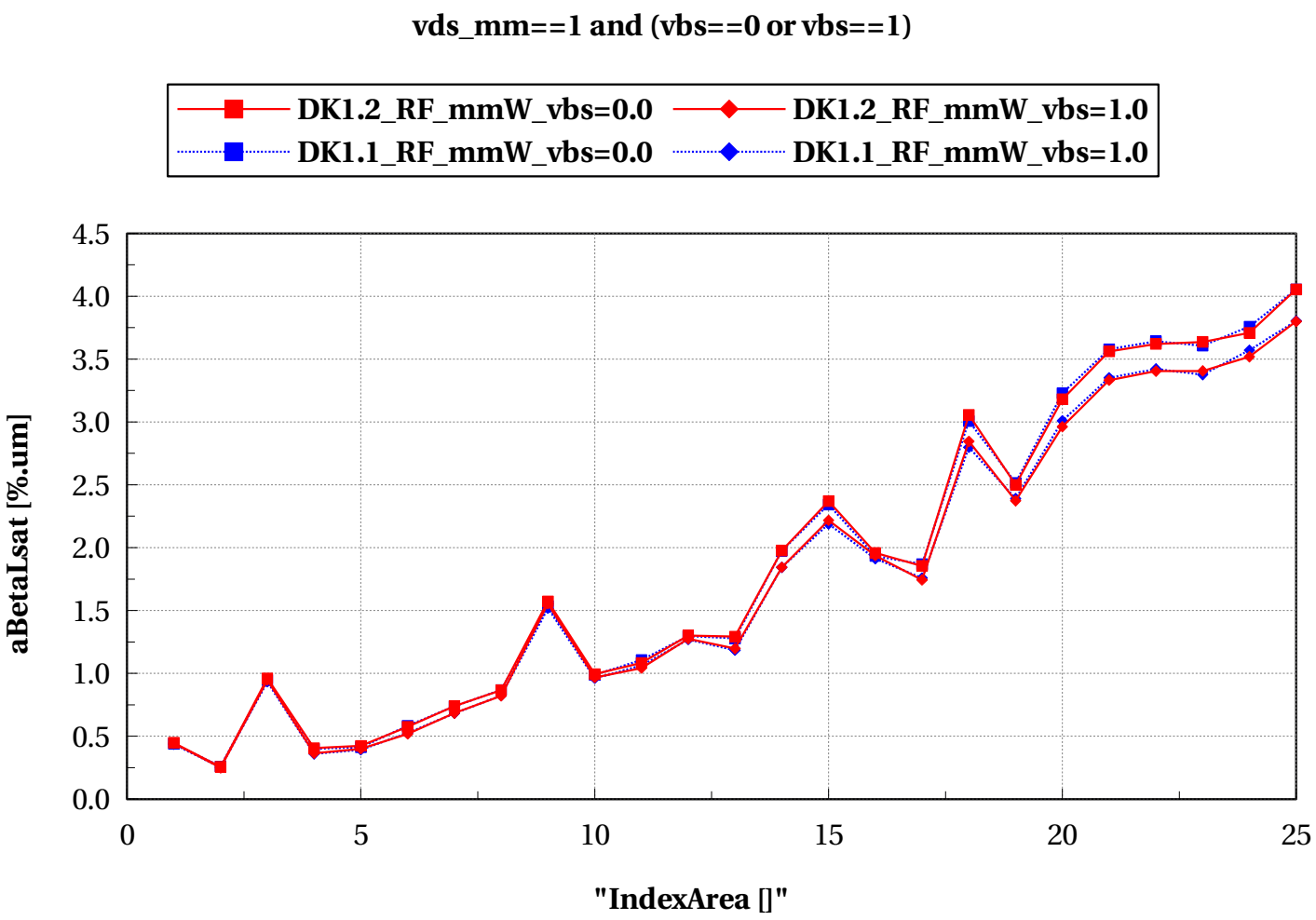
lvtpfet_acc, aBetaLsat [%.um] vs "IndexArea []"



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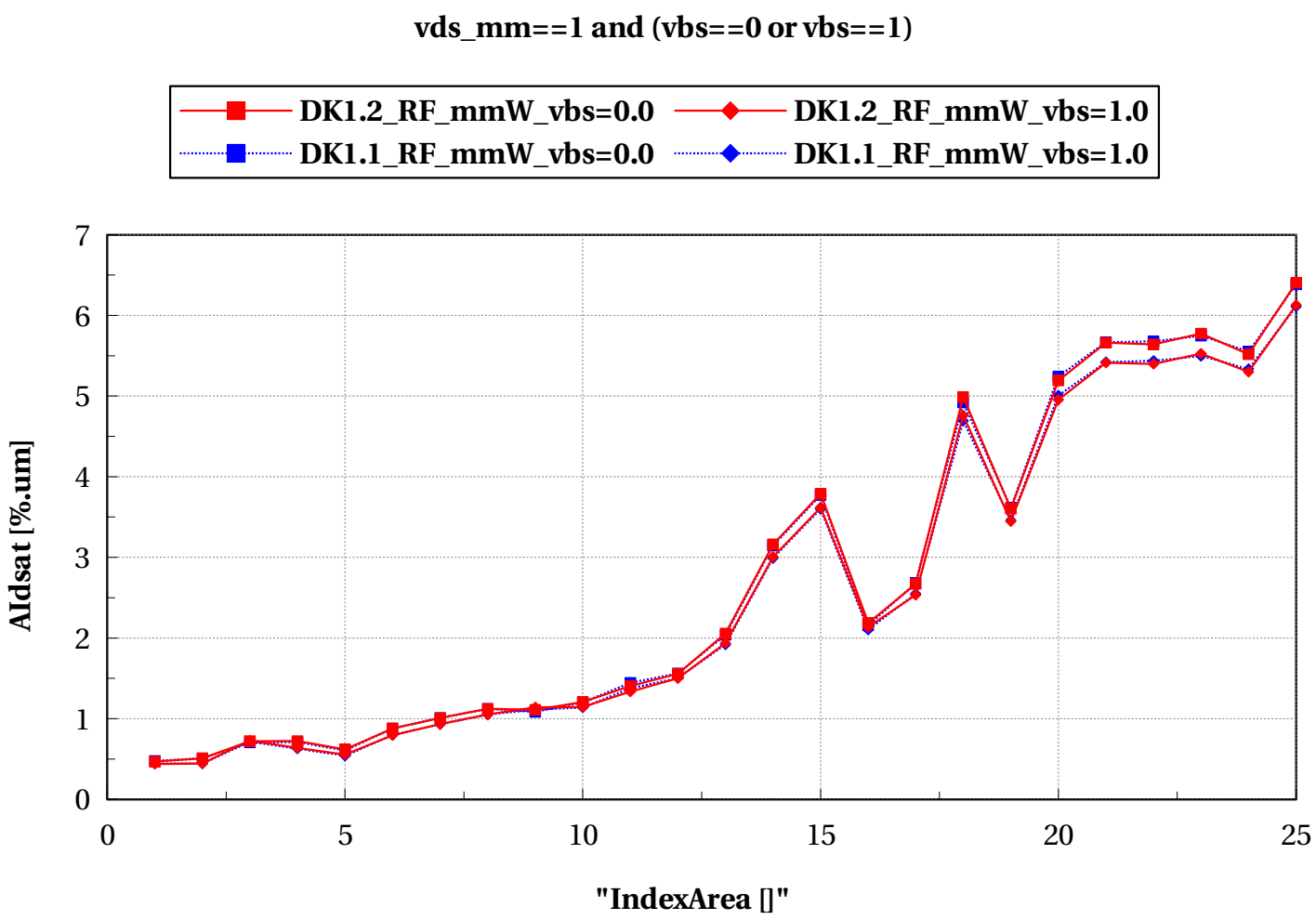
lvtpfet_acc, AIdsat [%.um] vs "IndexArea []"



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nfet_acc
Electrical characteristics scaling

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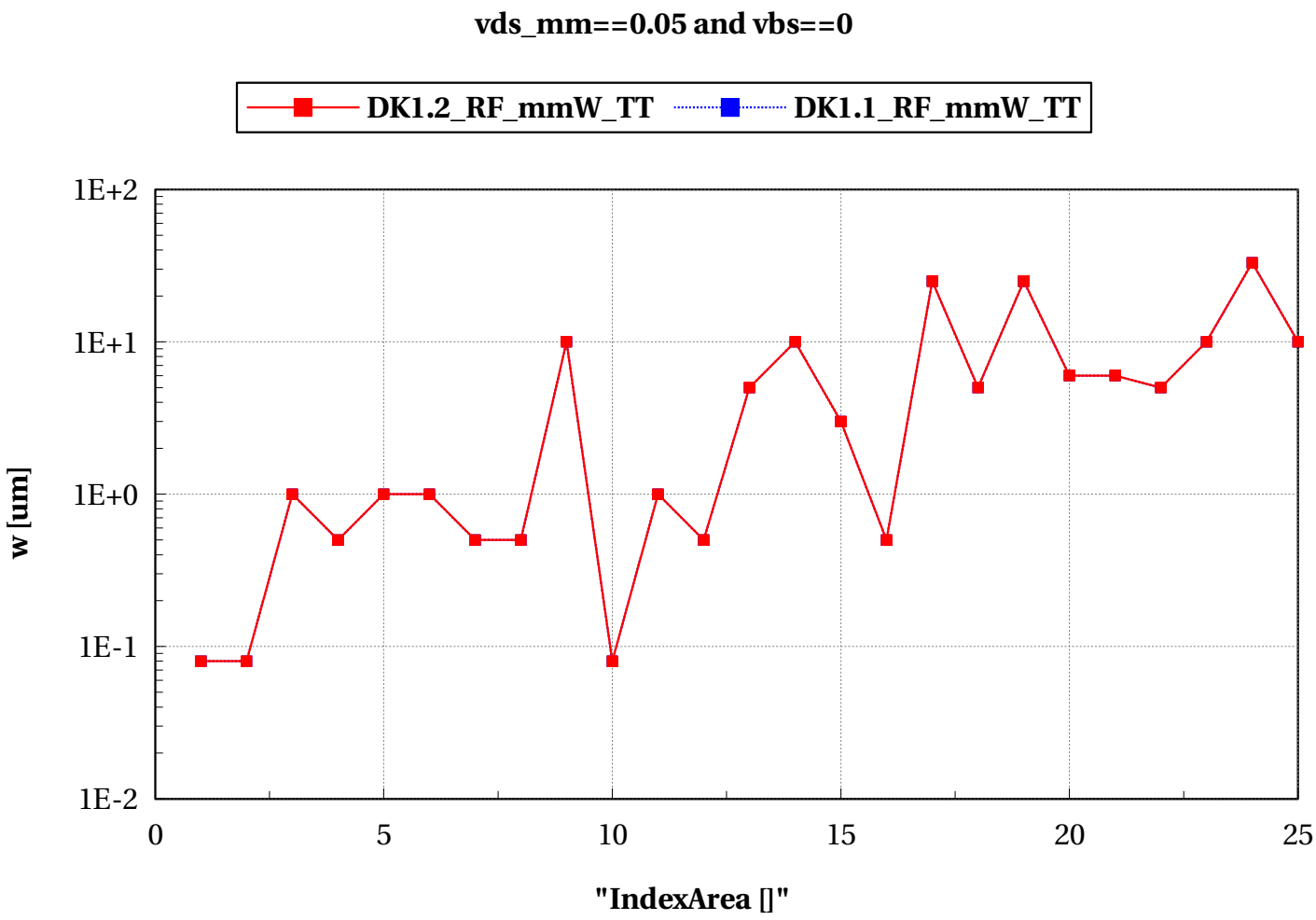
nfet_acc, w [um] vs "IndexArea []"



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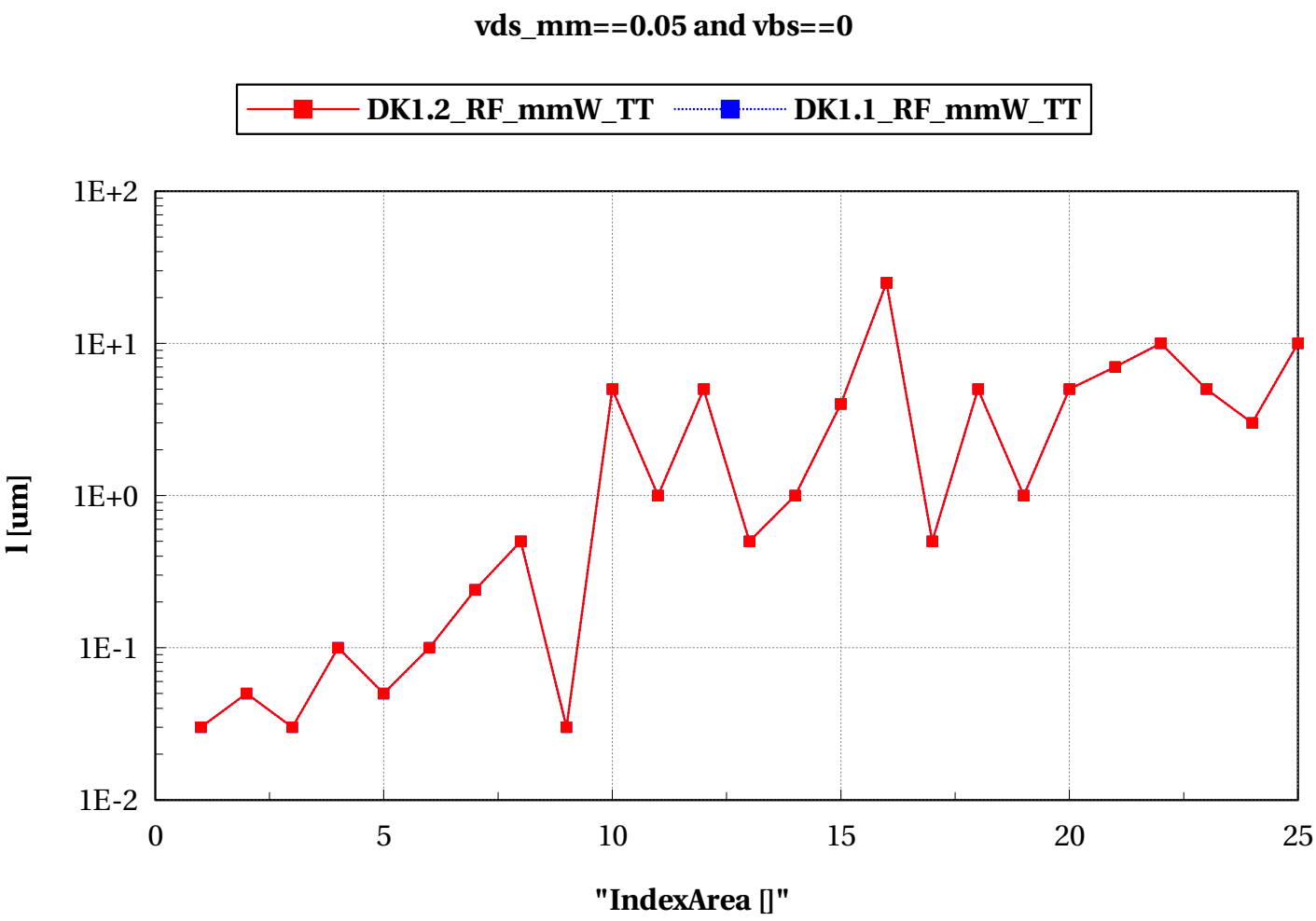

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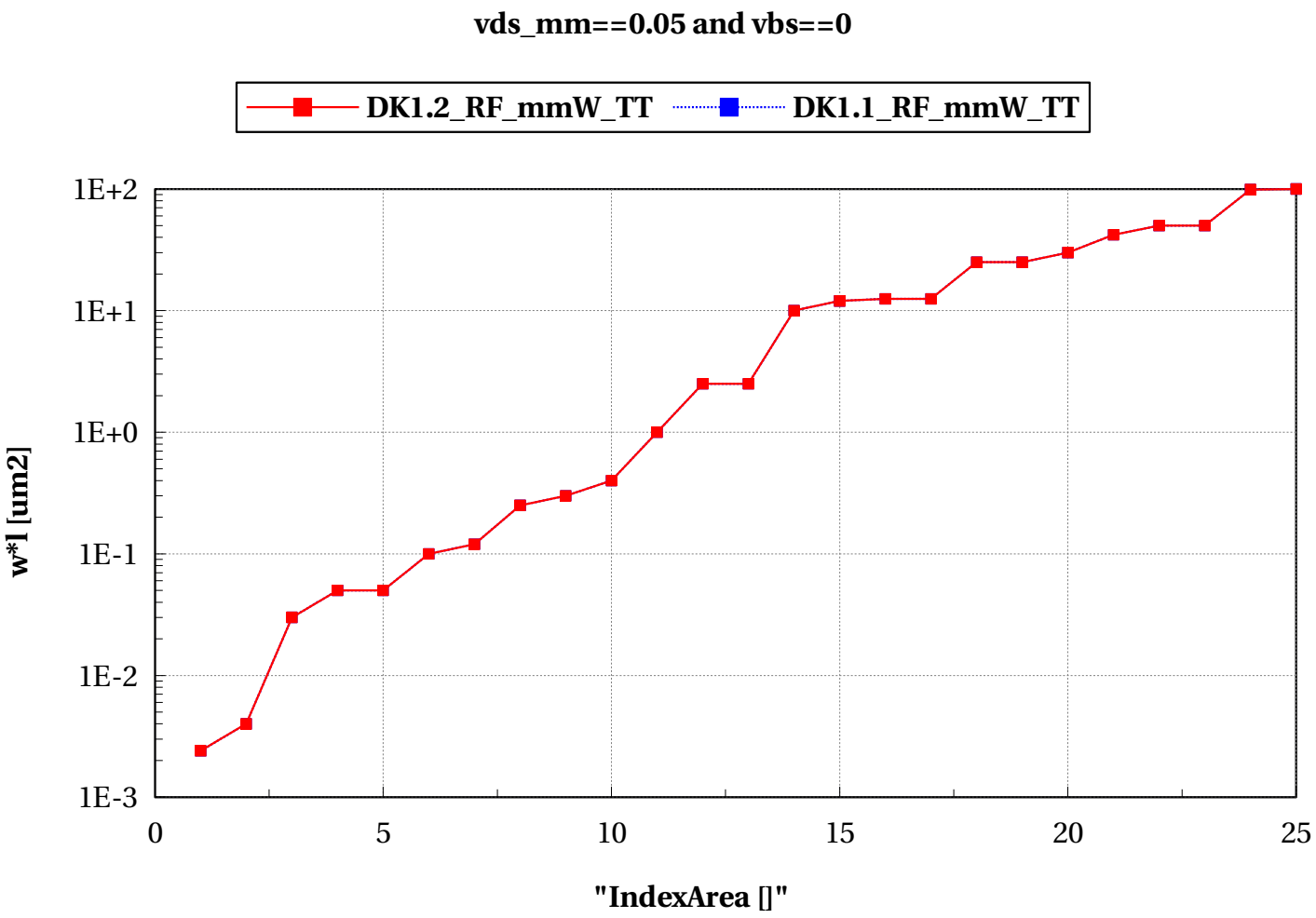

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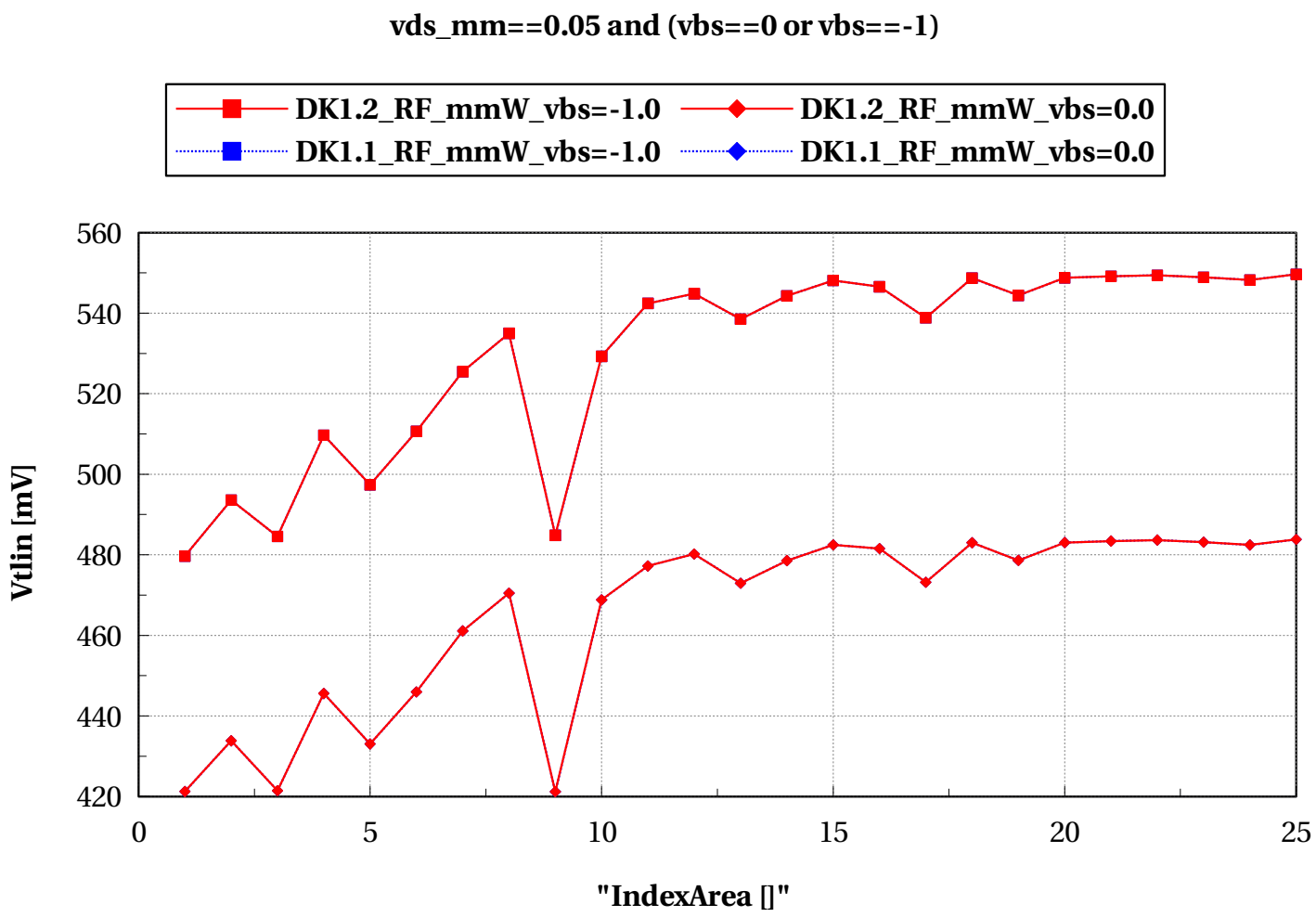
nfet_acc, Vtlin [mV] vs "IndexArea []"



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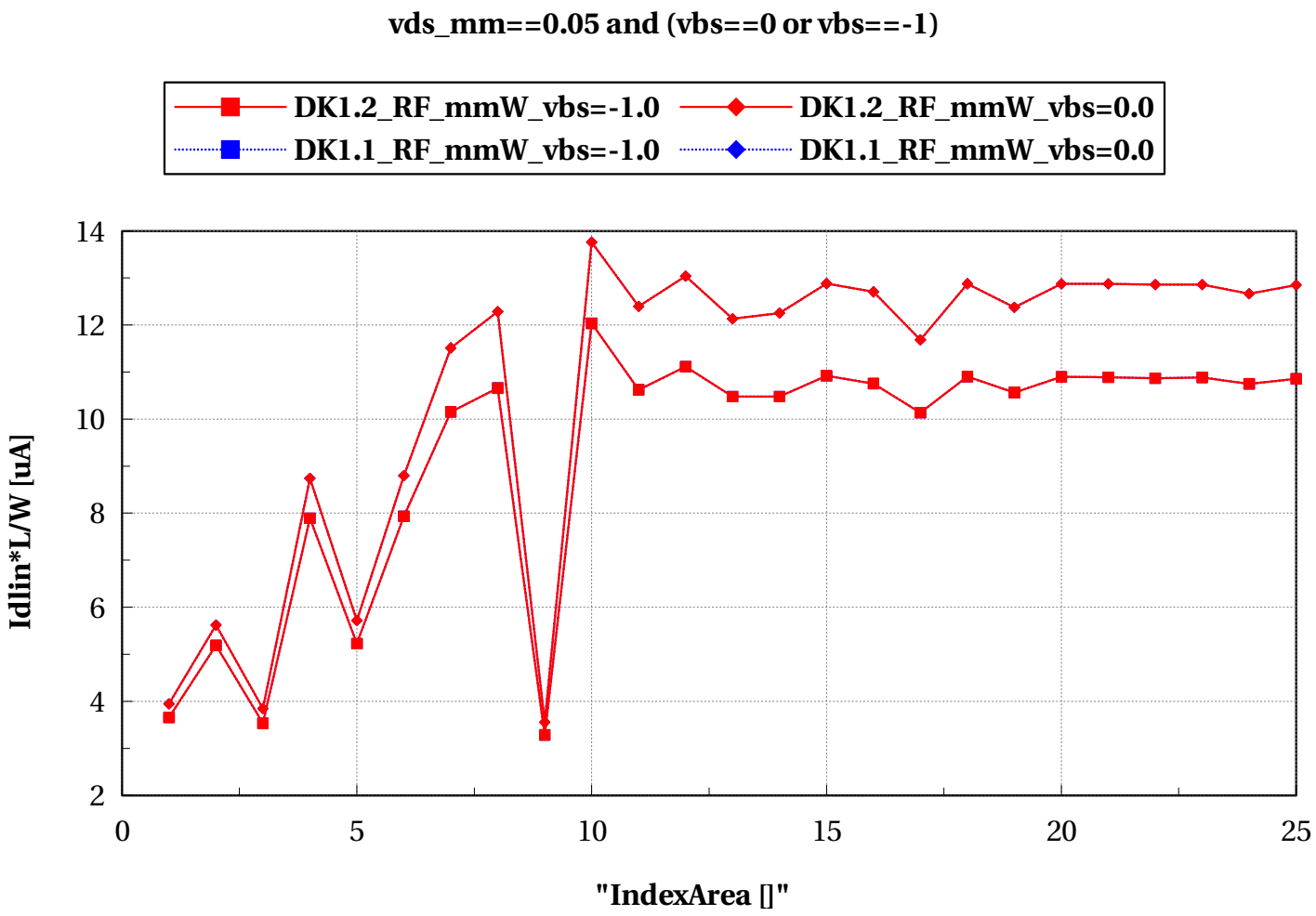
nfet_acc, Idlin*L/W [uA] vs "IndexArea []"



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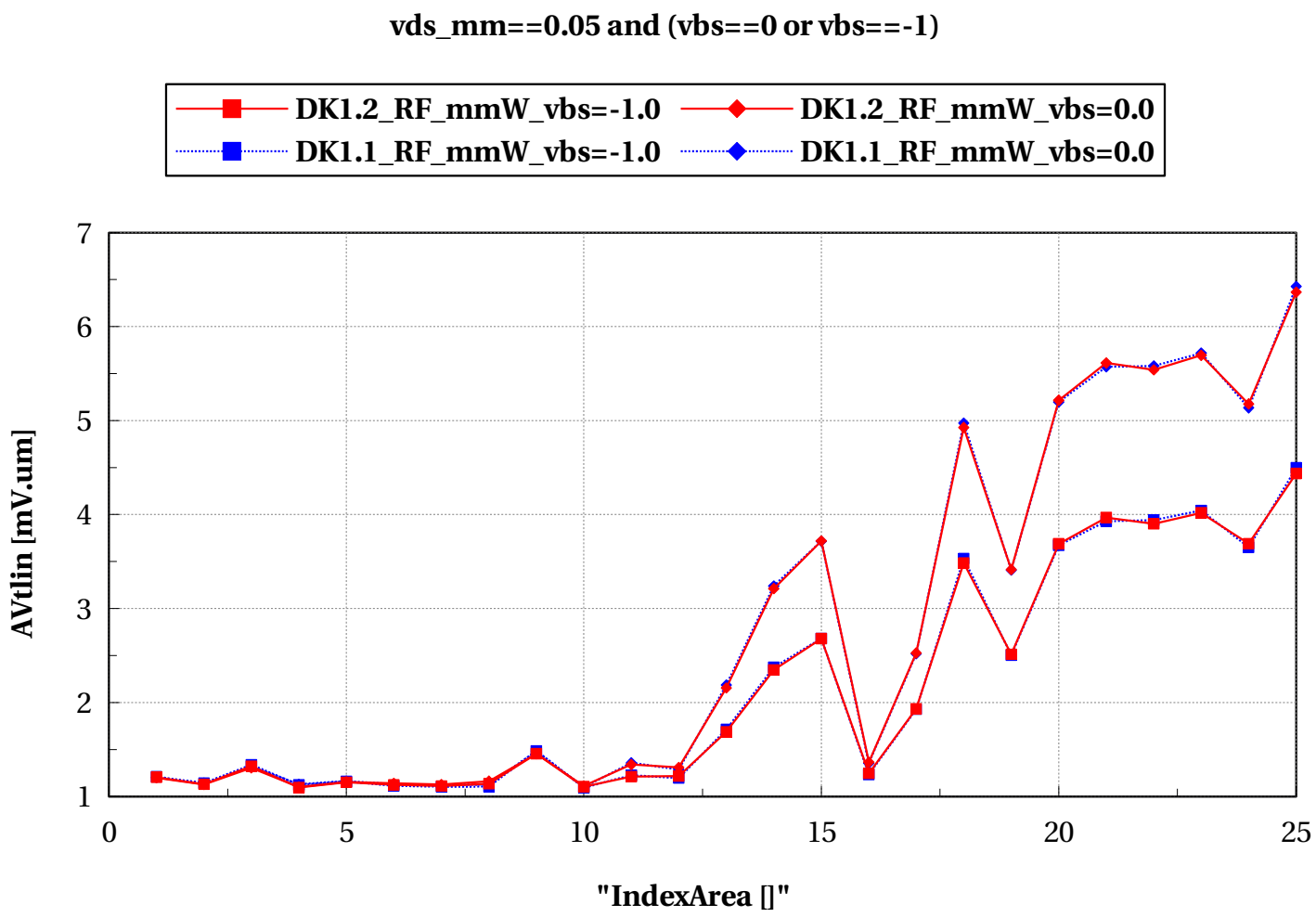
nfet_acc, AVtlin [mV.um] vs "IndexArea []"



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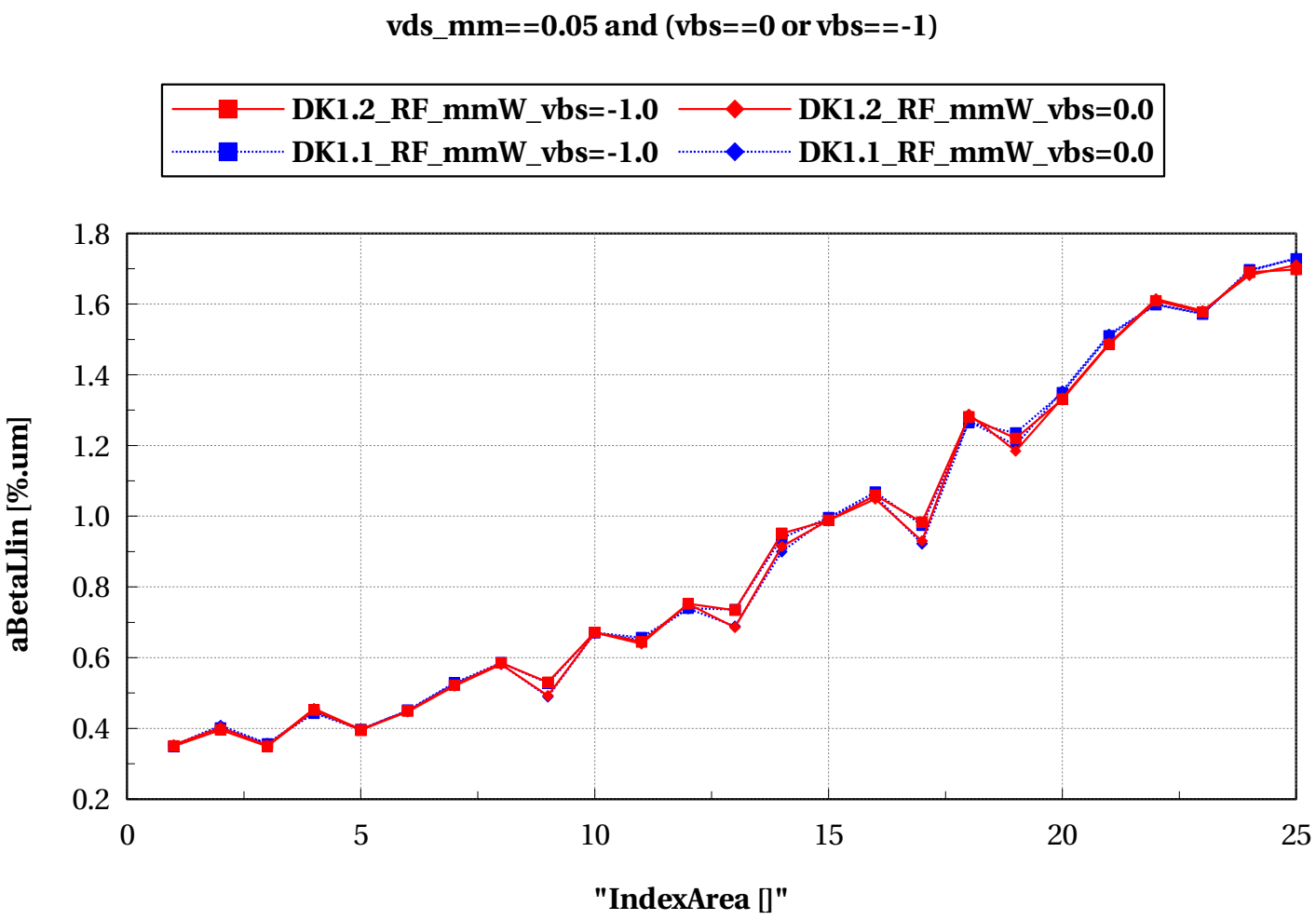
nfet_acc, aBetaLlin [%.um] vs "IndexArea []"



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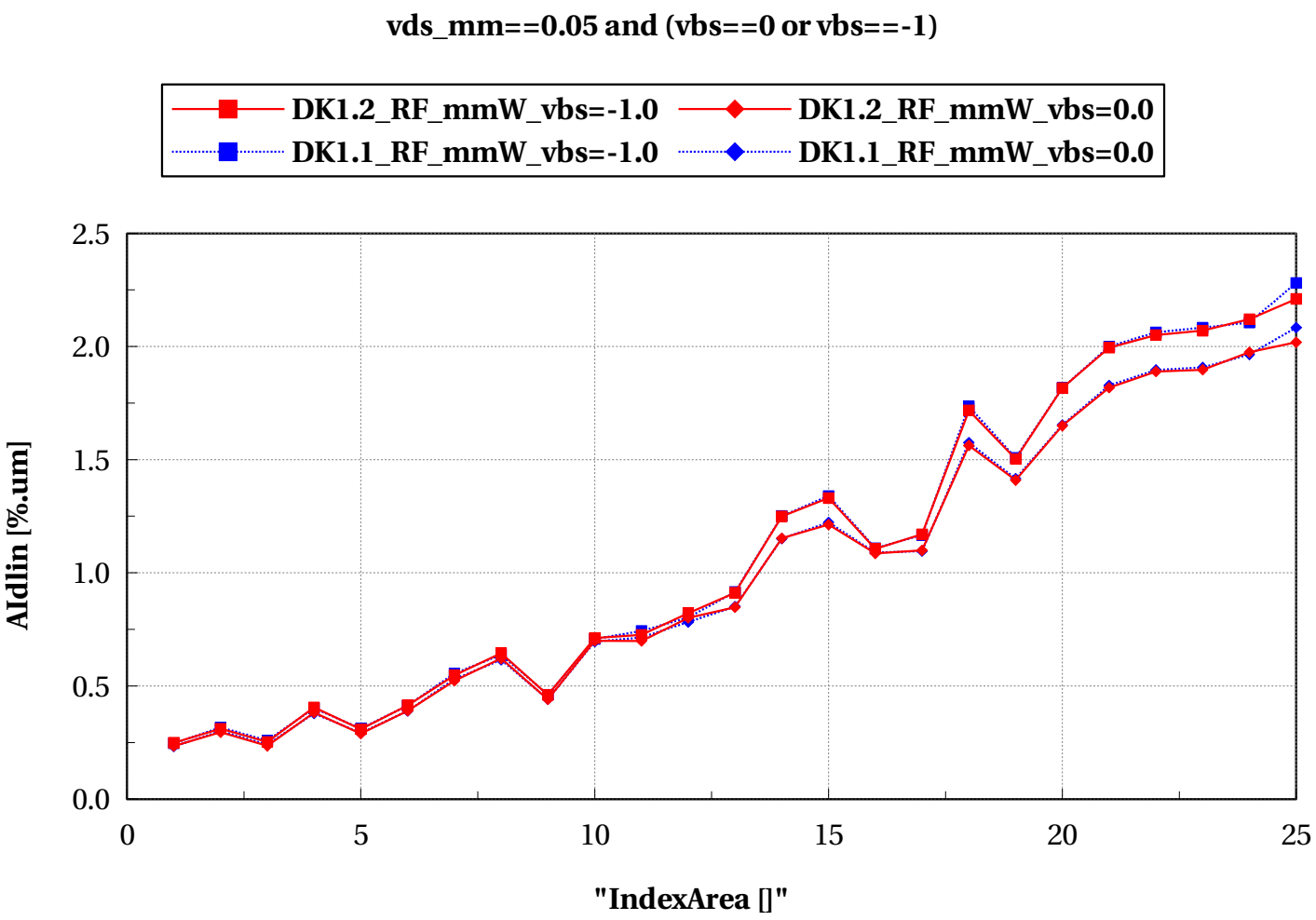
nfet_acc, AIdlin [%.um] vs "IndexArea []"



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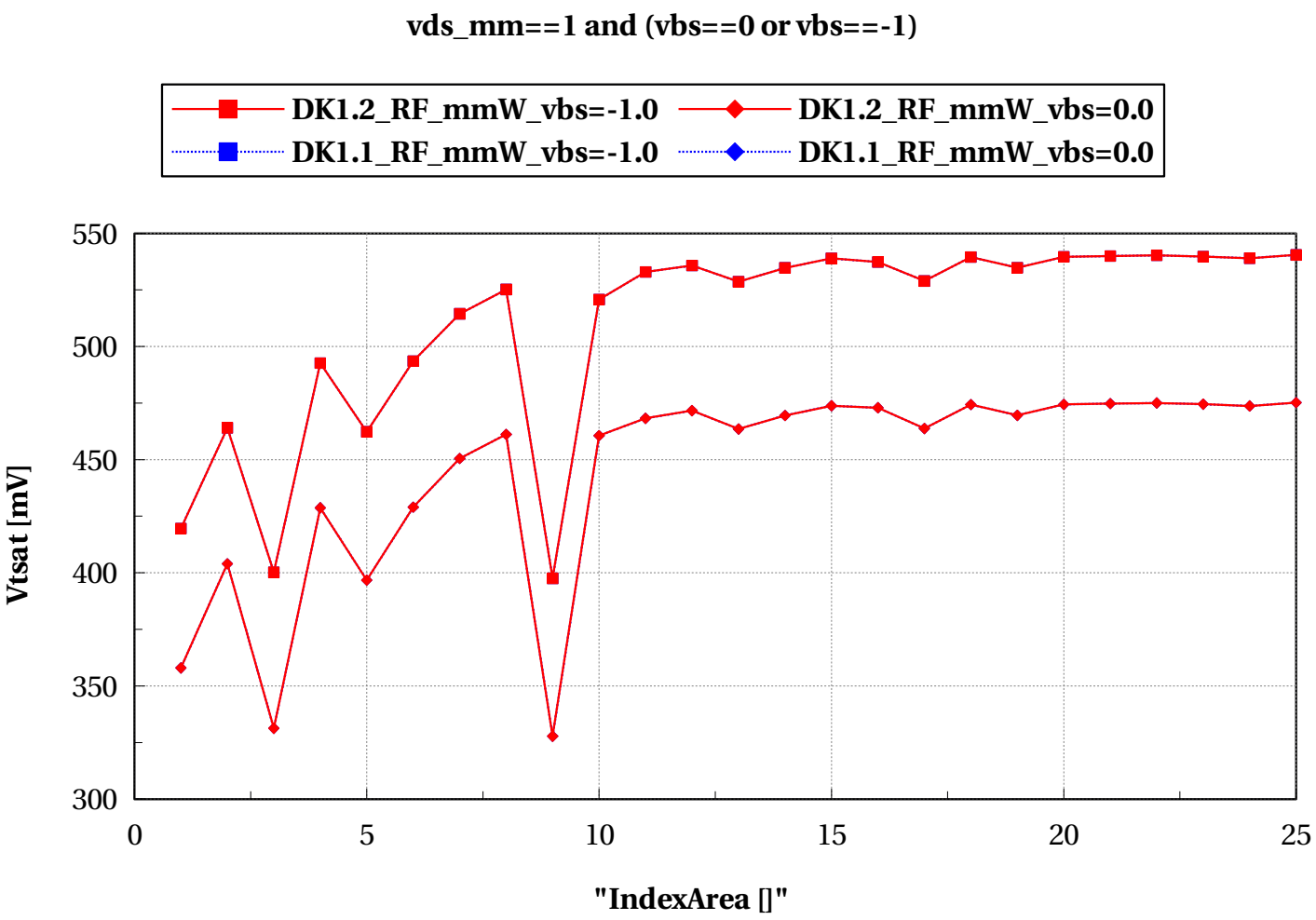
nfet_acc, Vtsat [mV] vs "IndexArea []"



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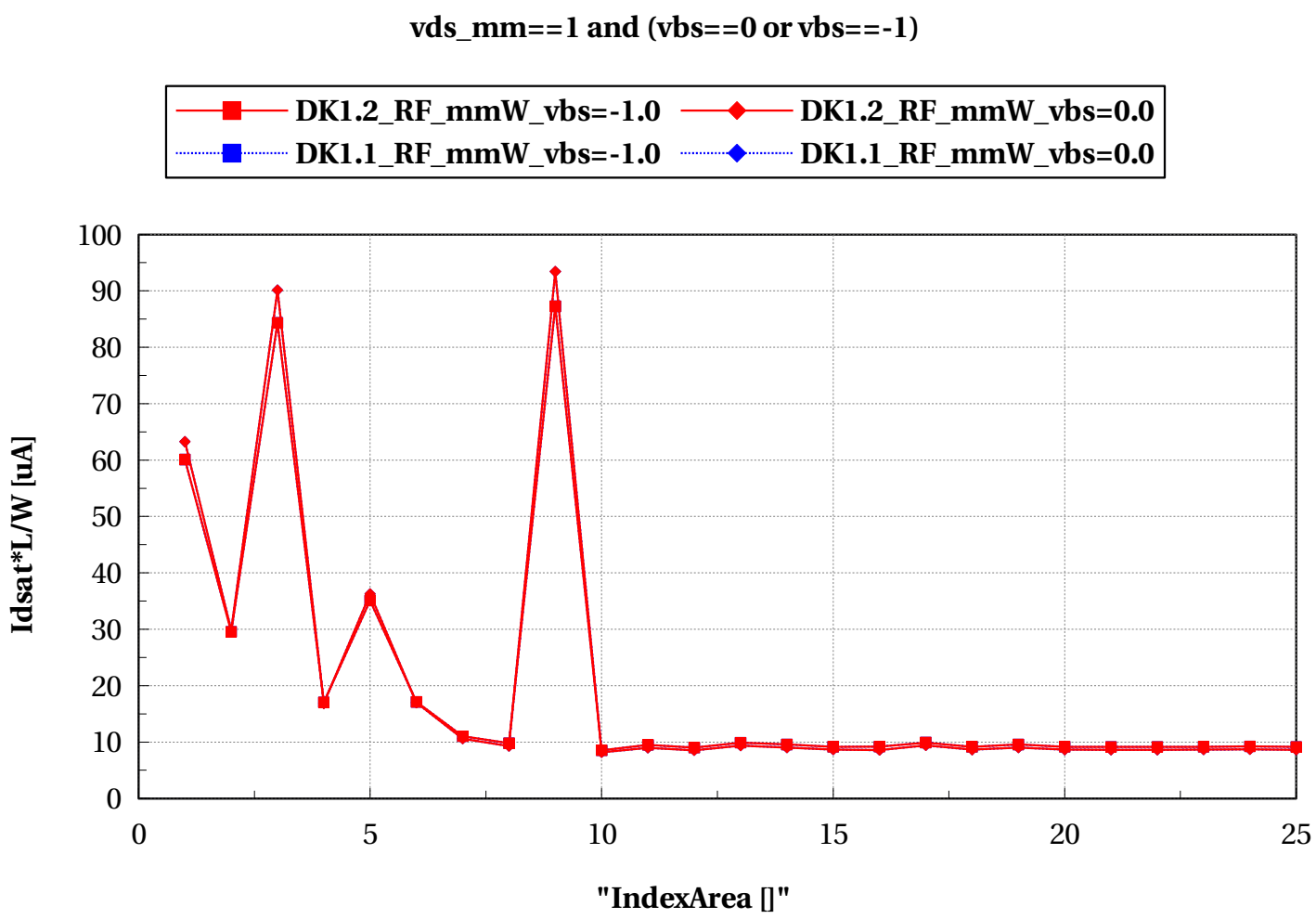
nfet_acc, Idsat*L/W [uA] vs "IndexArea []"



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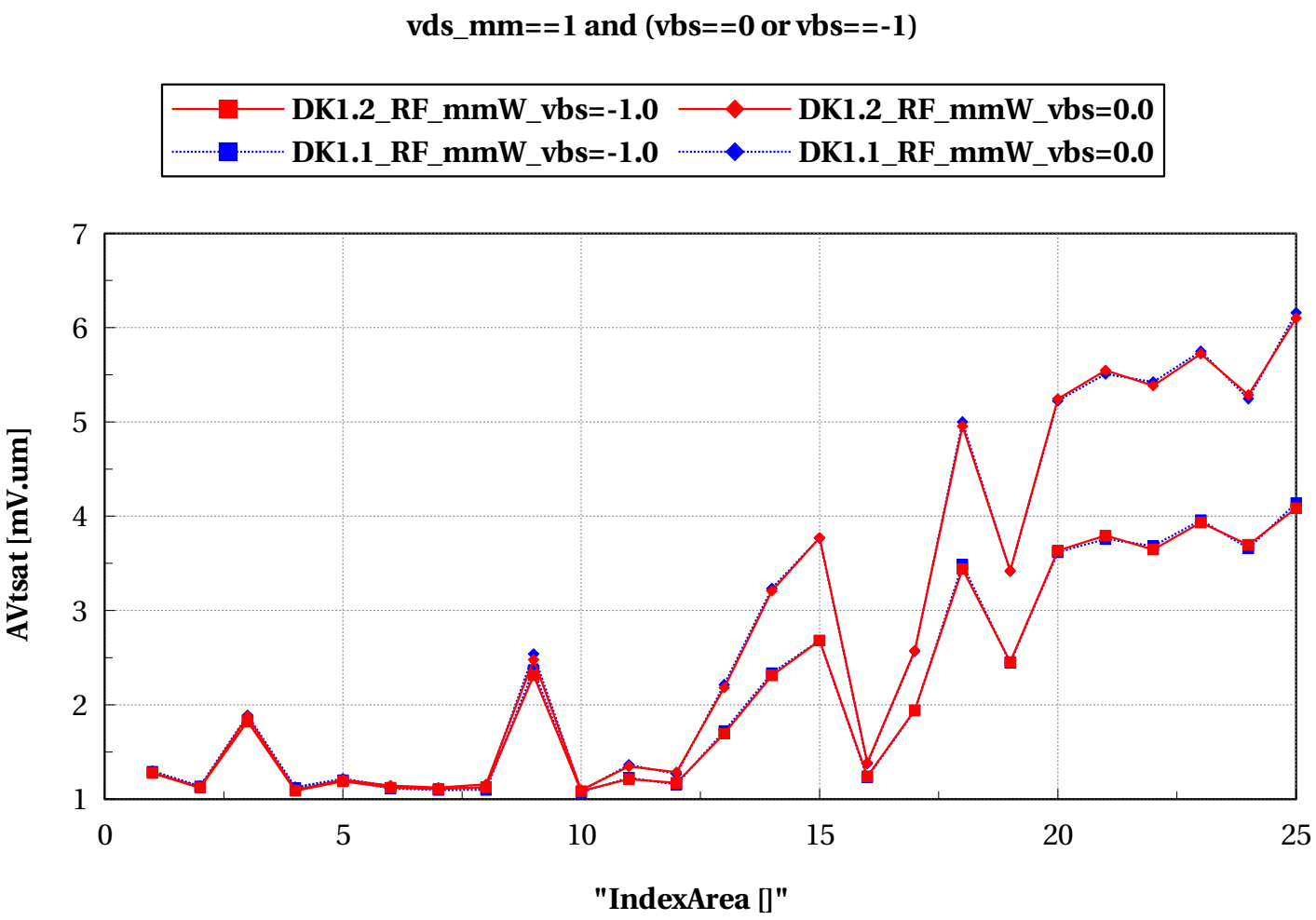
nfet_acc, AVtsat [mV.um] vs "IndexArea []"



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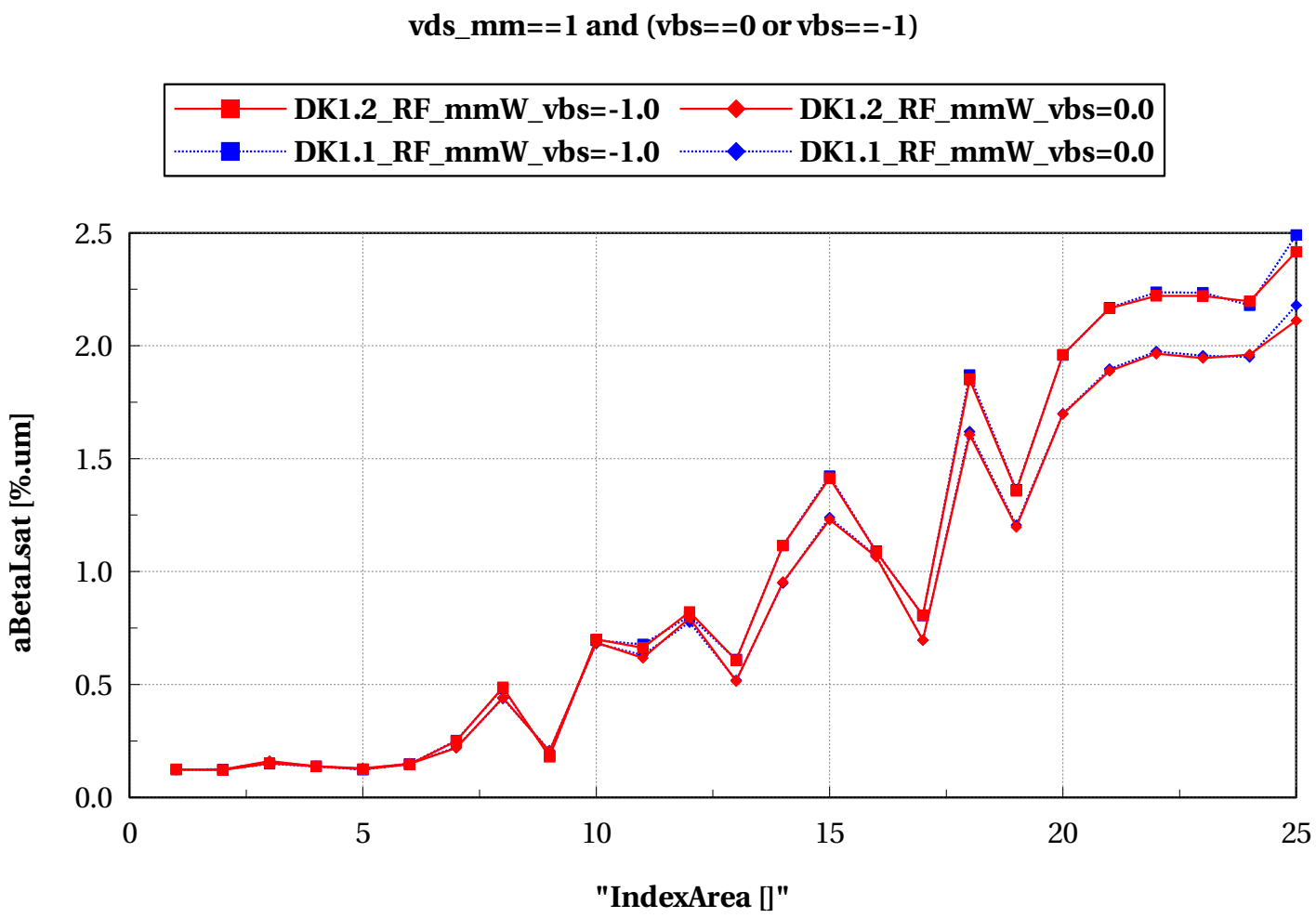

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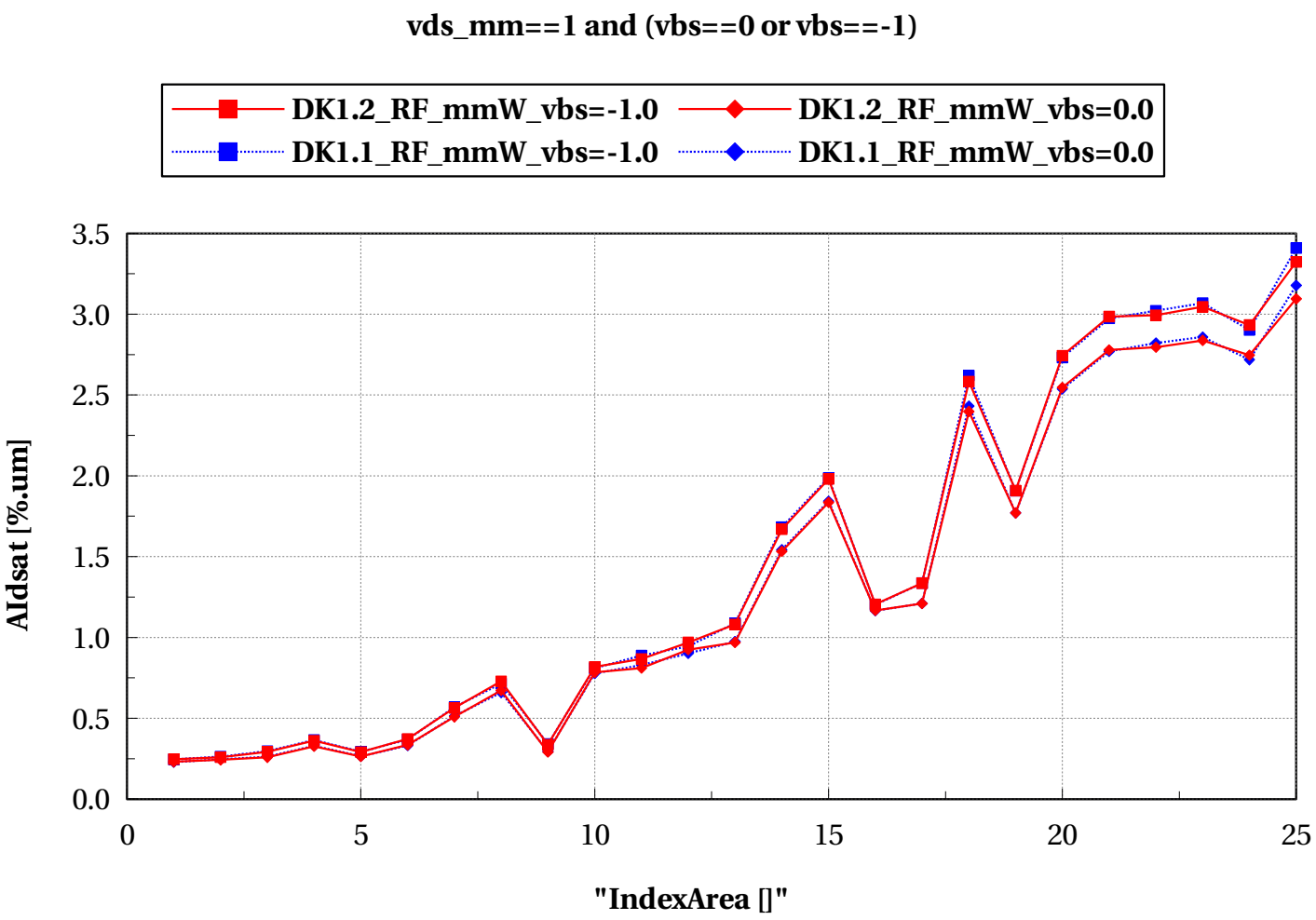

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pfet_acc
Electrical characteristics scaling

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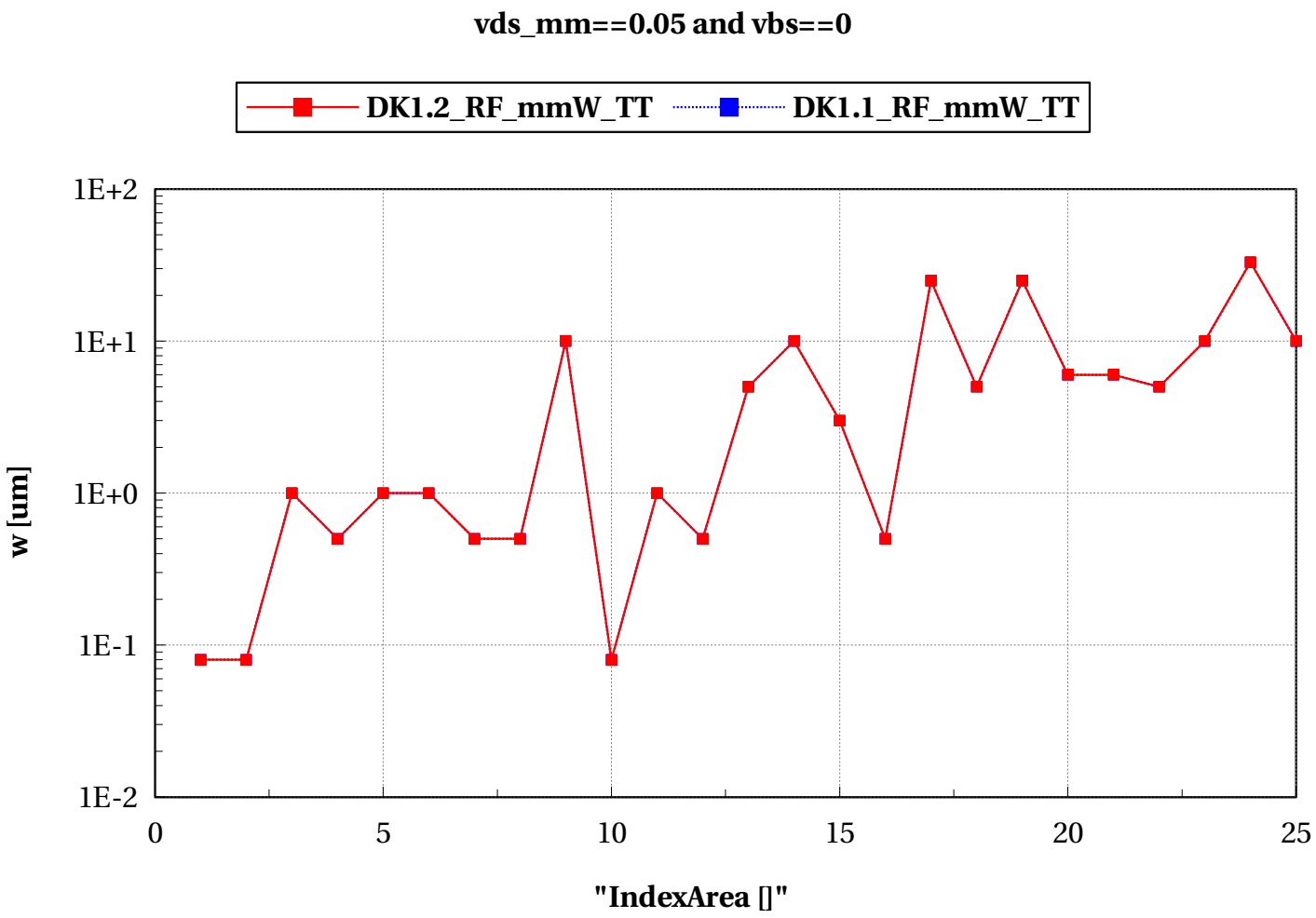
pfet_acc, w [um] vs "IndexArea []"



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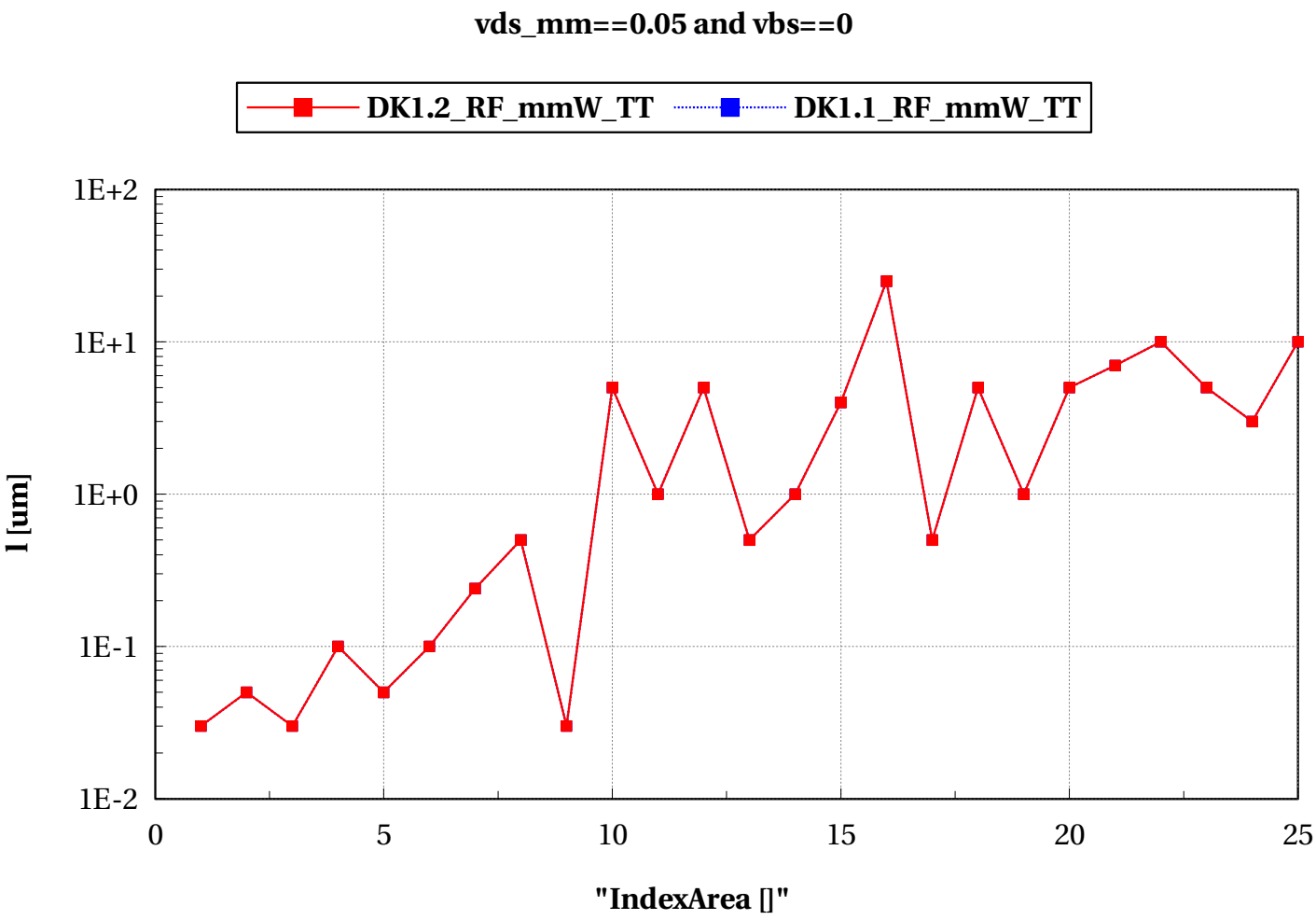

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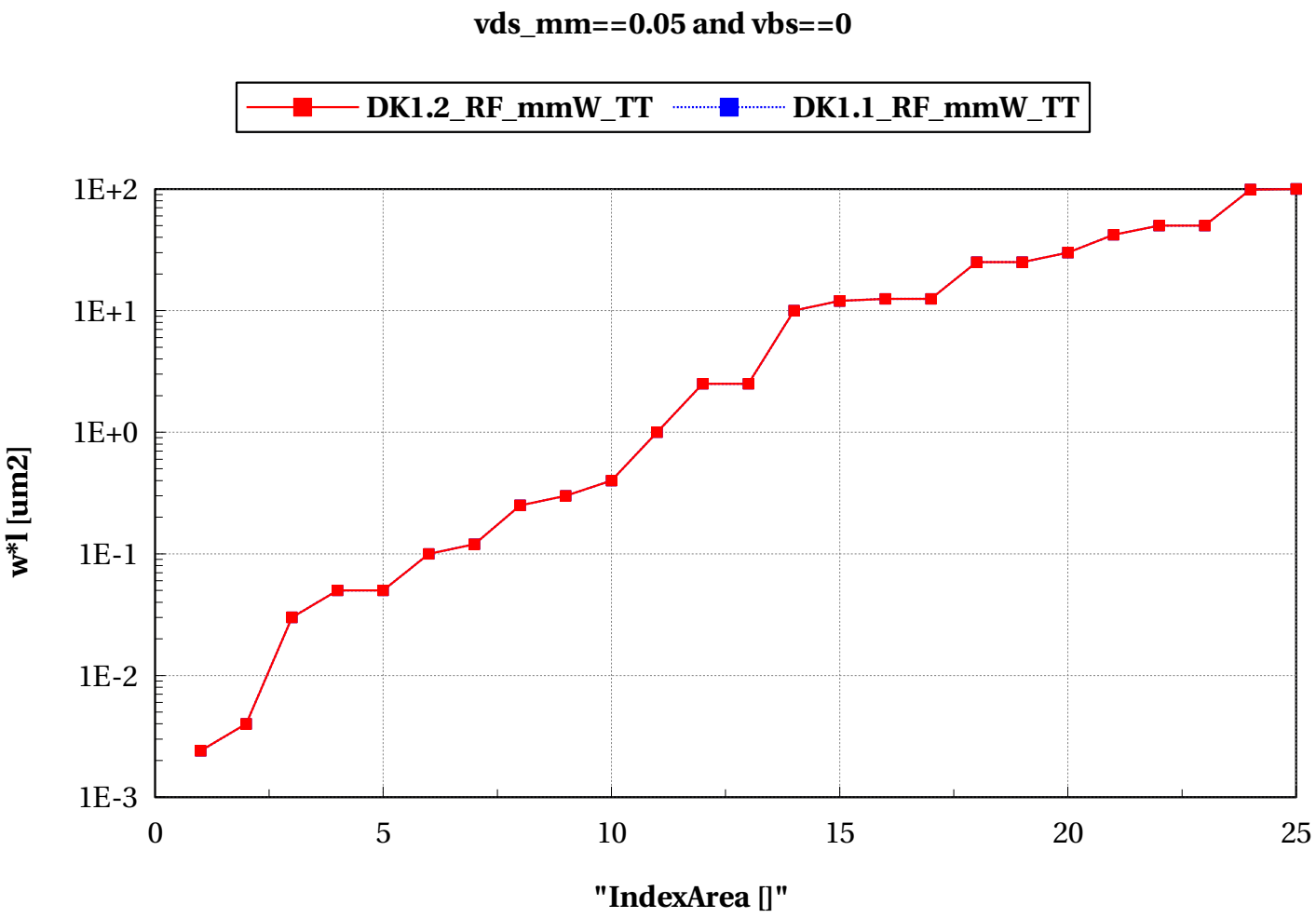

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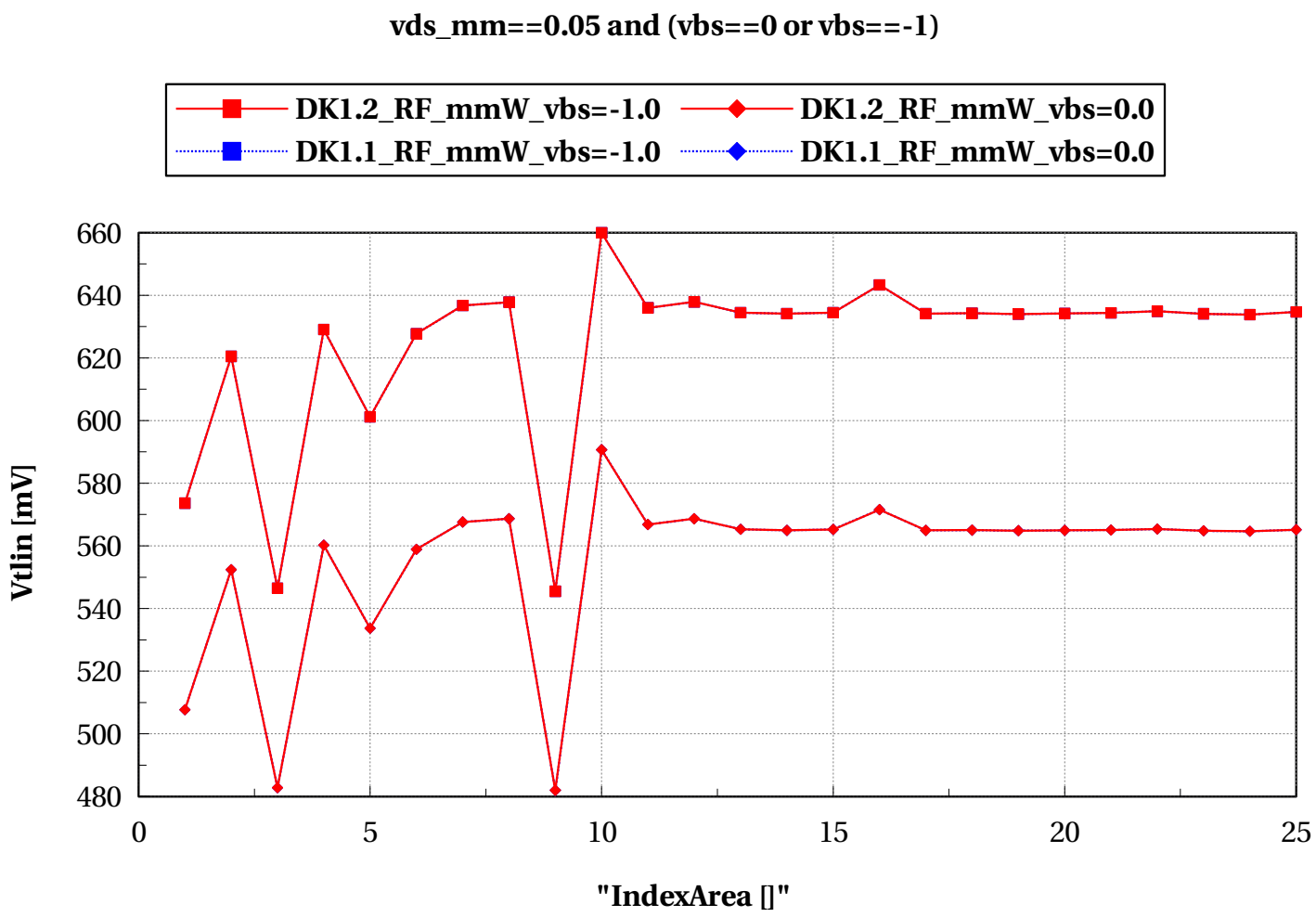
pfet_acc, Vtlin [mV] vs "IndexArea []"



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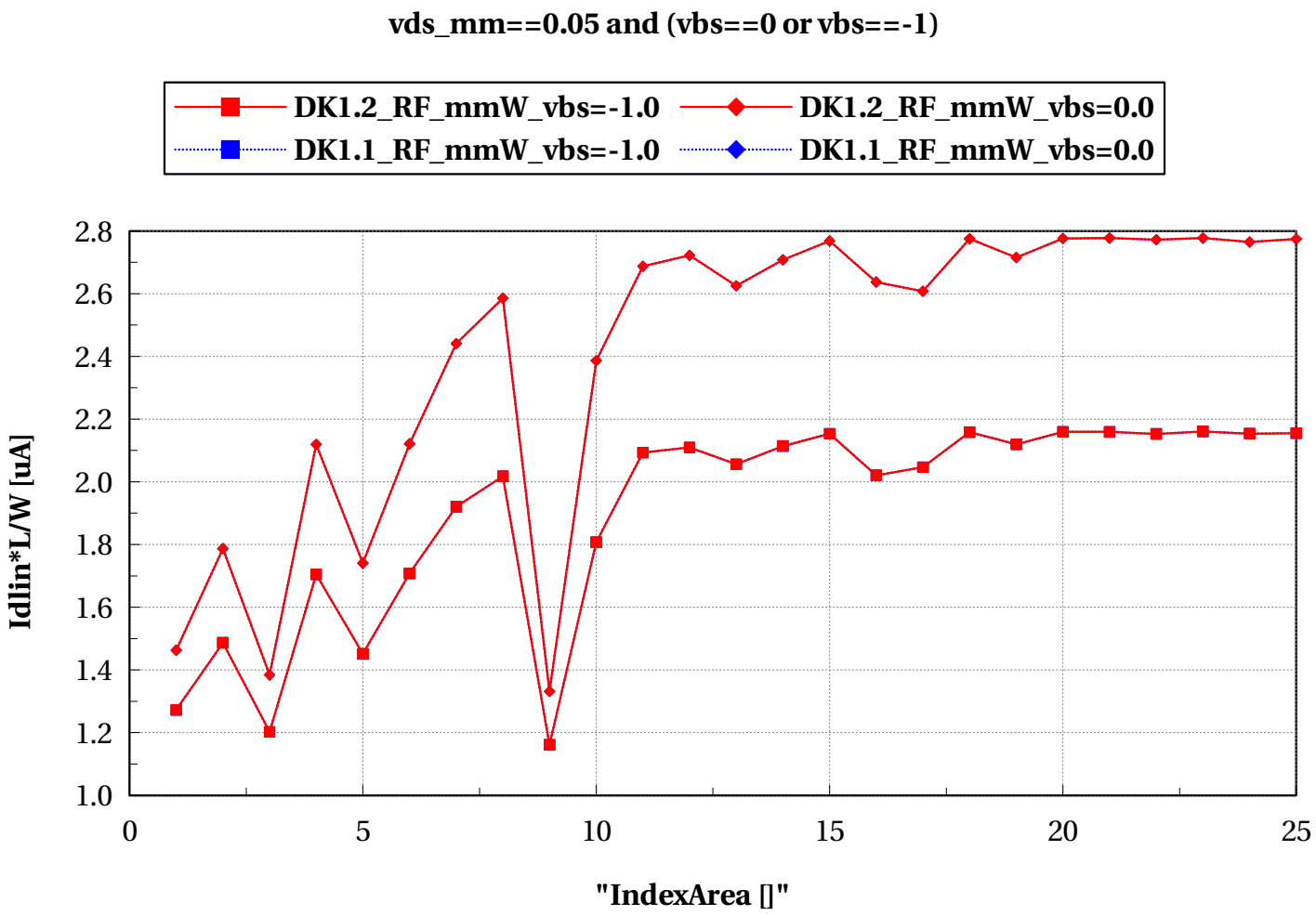

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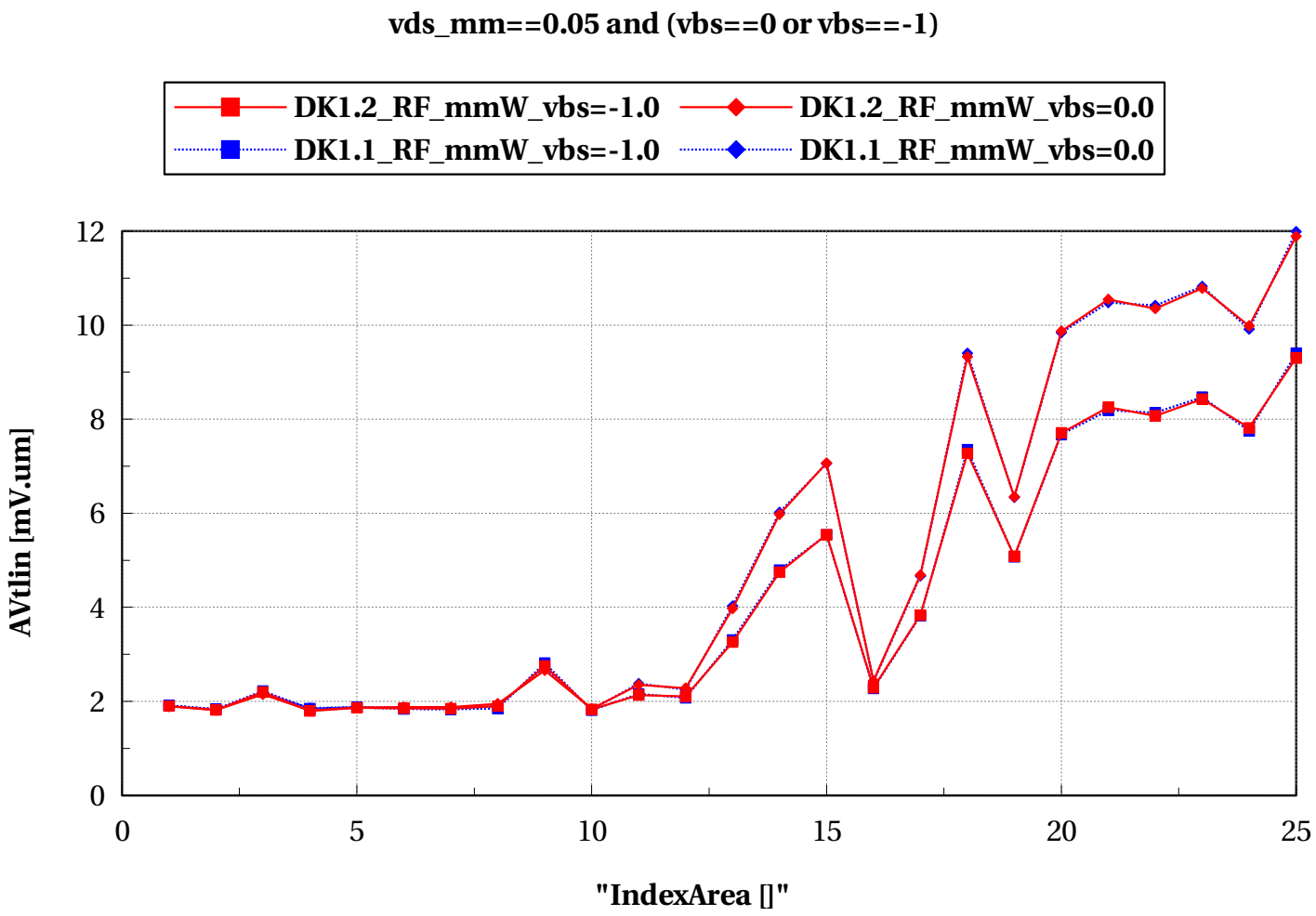

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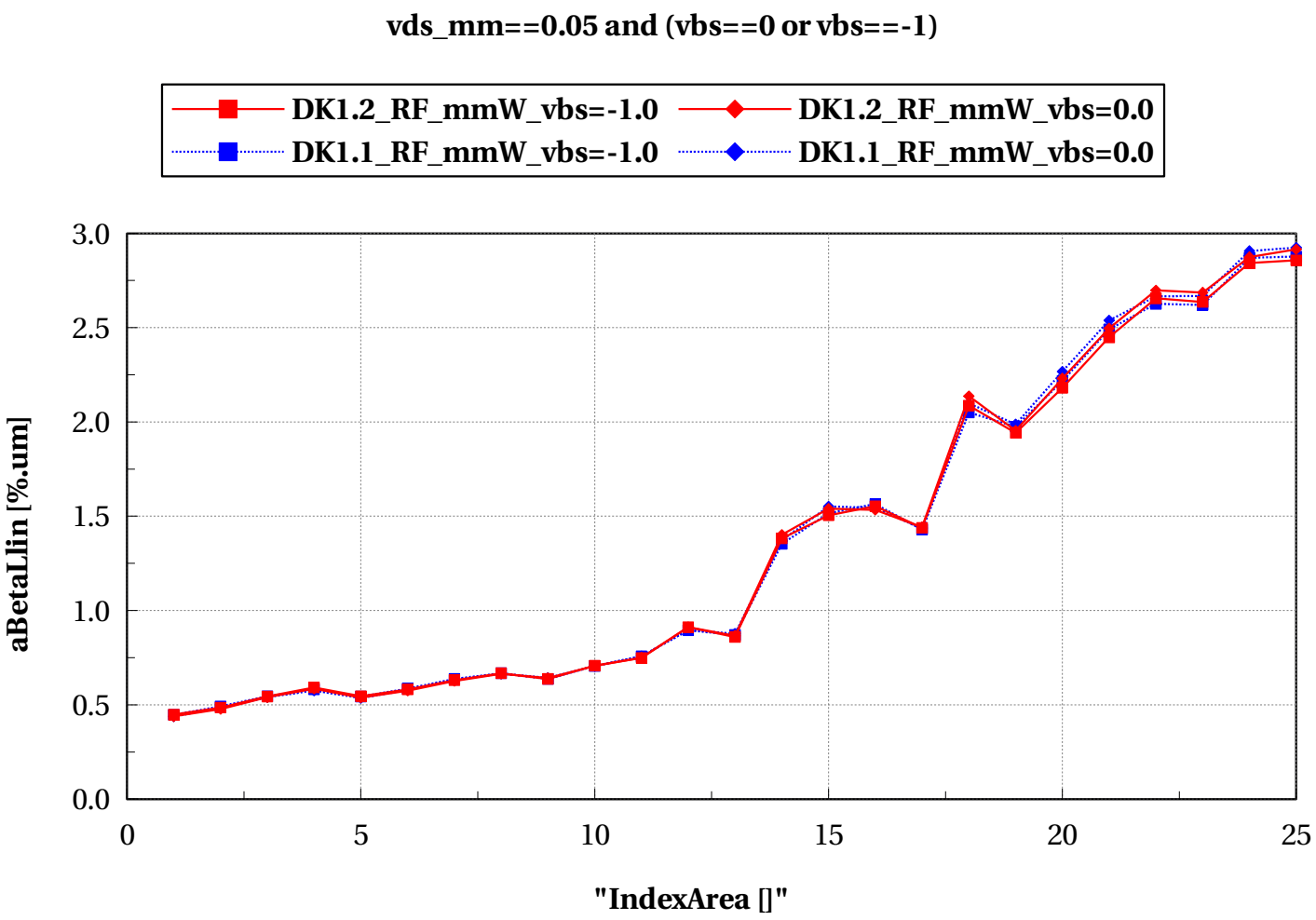

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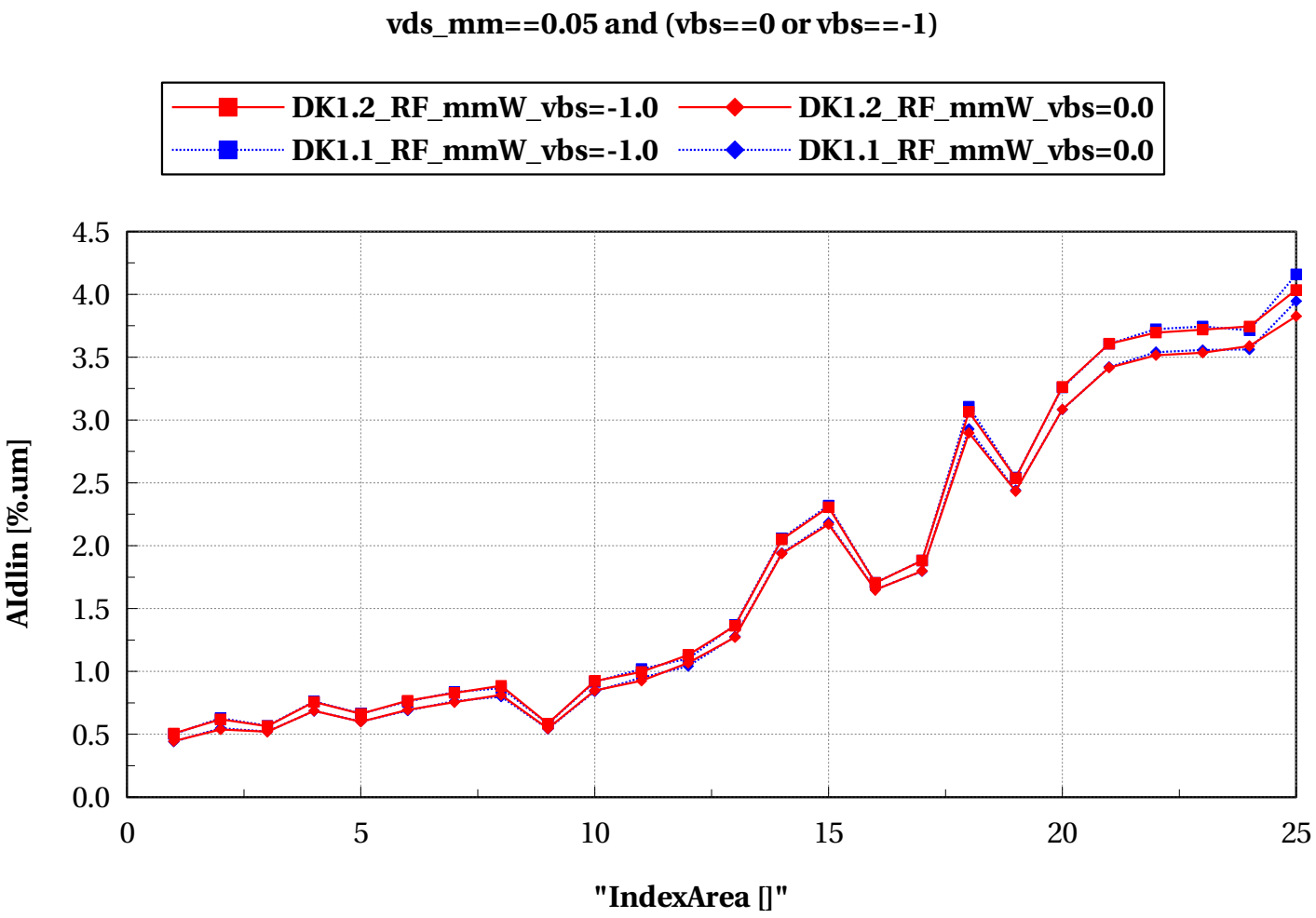

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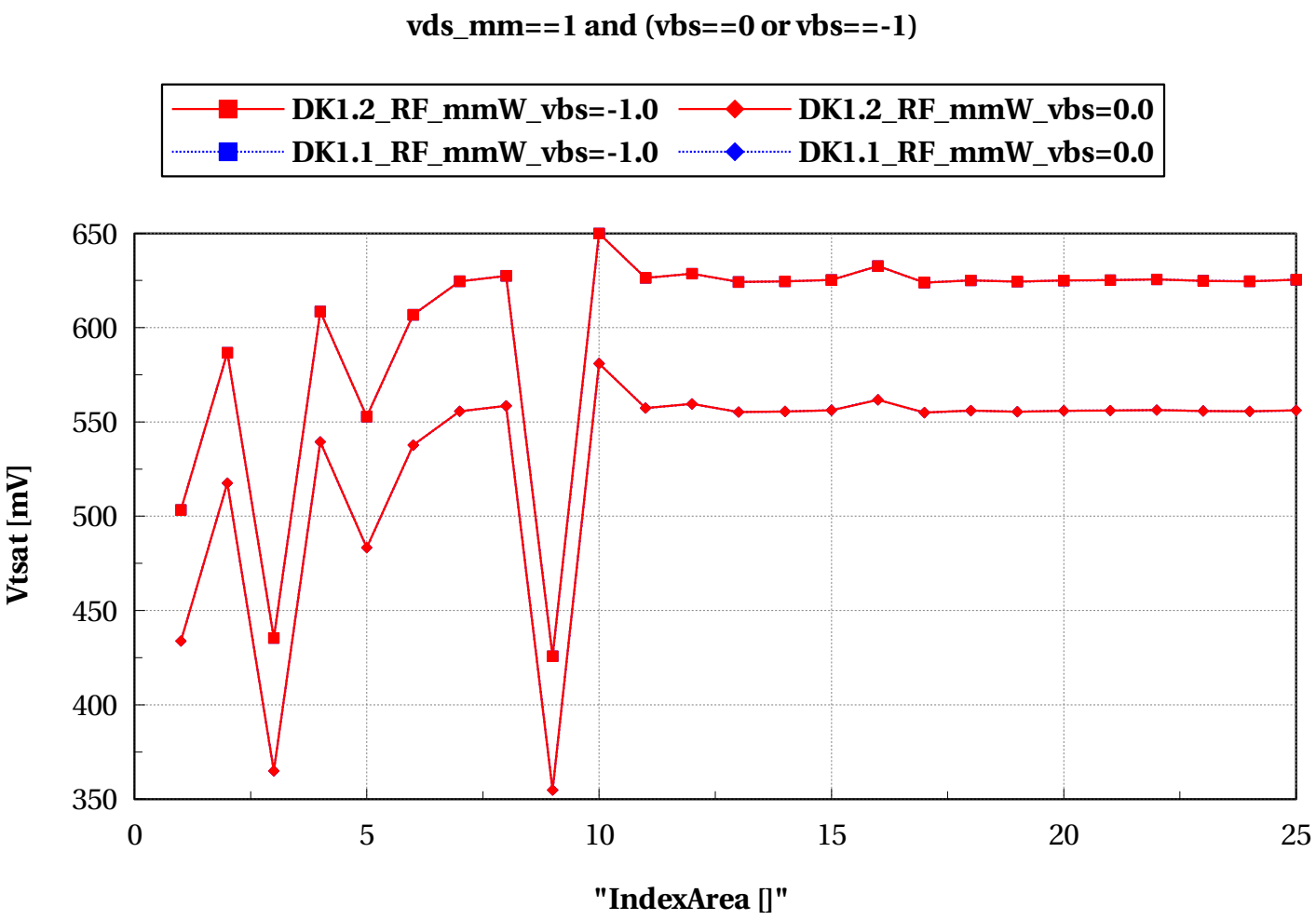

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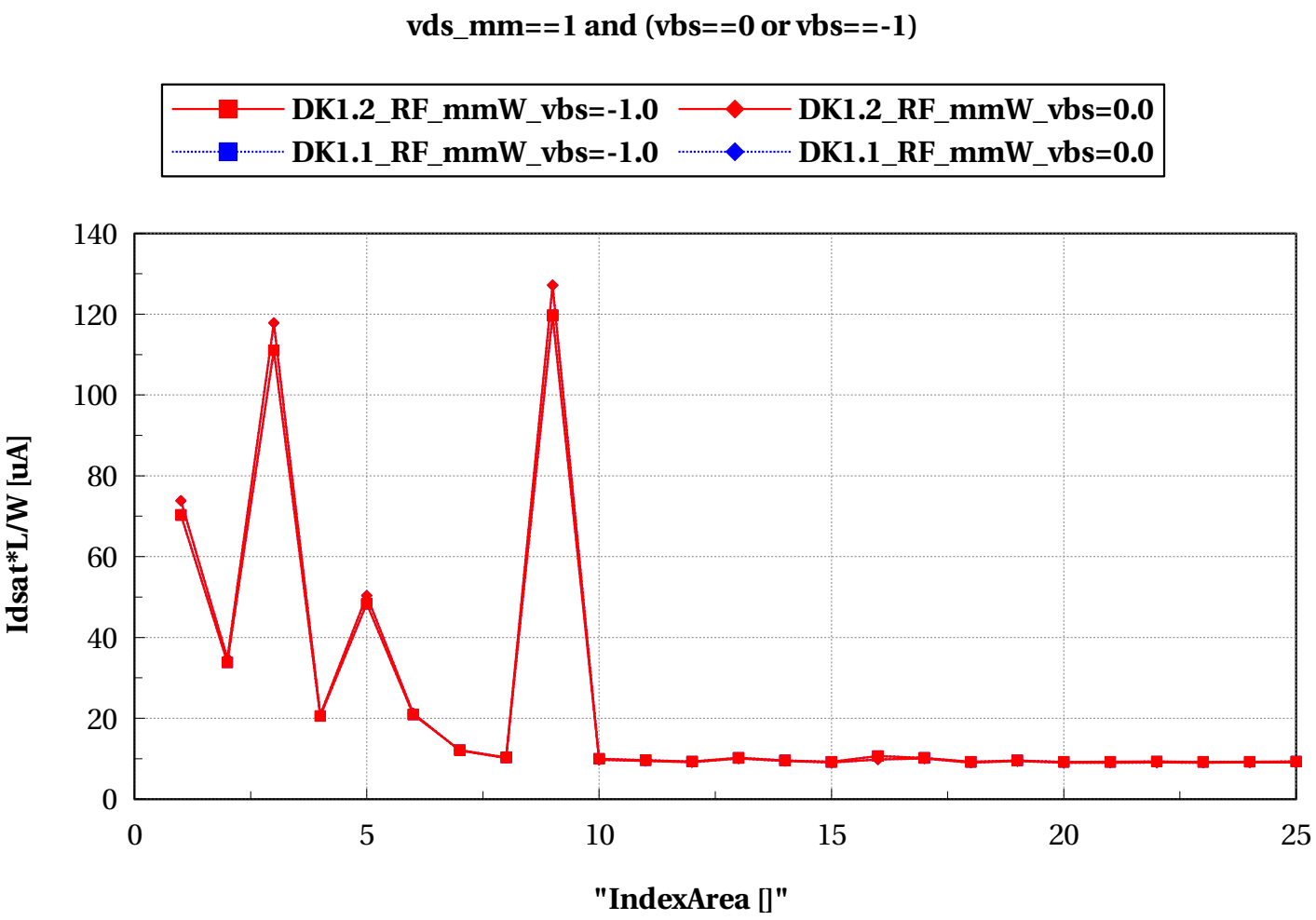

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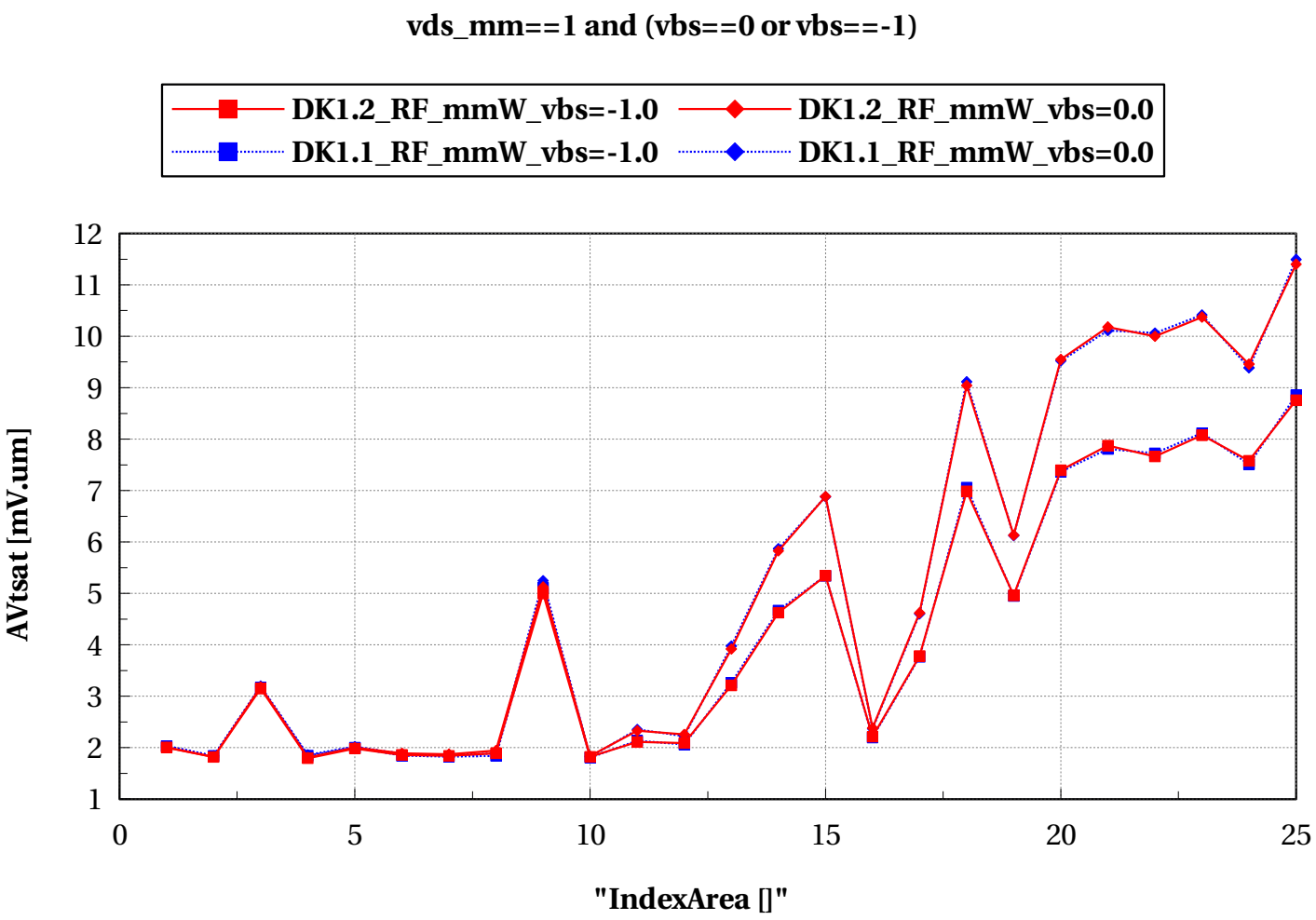

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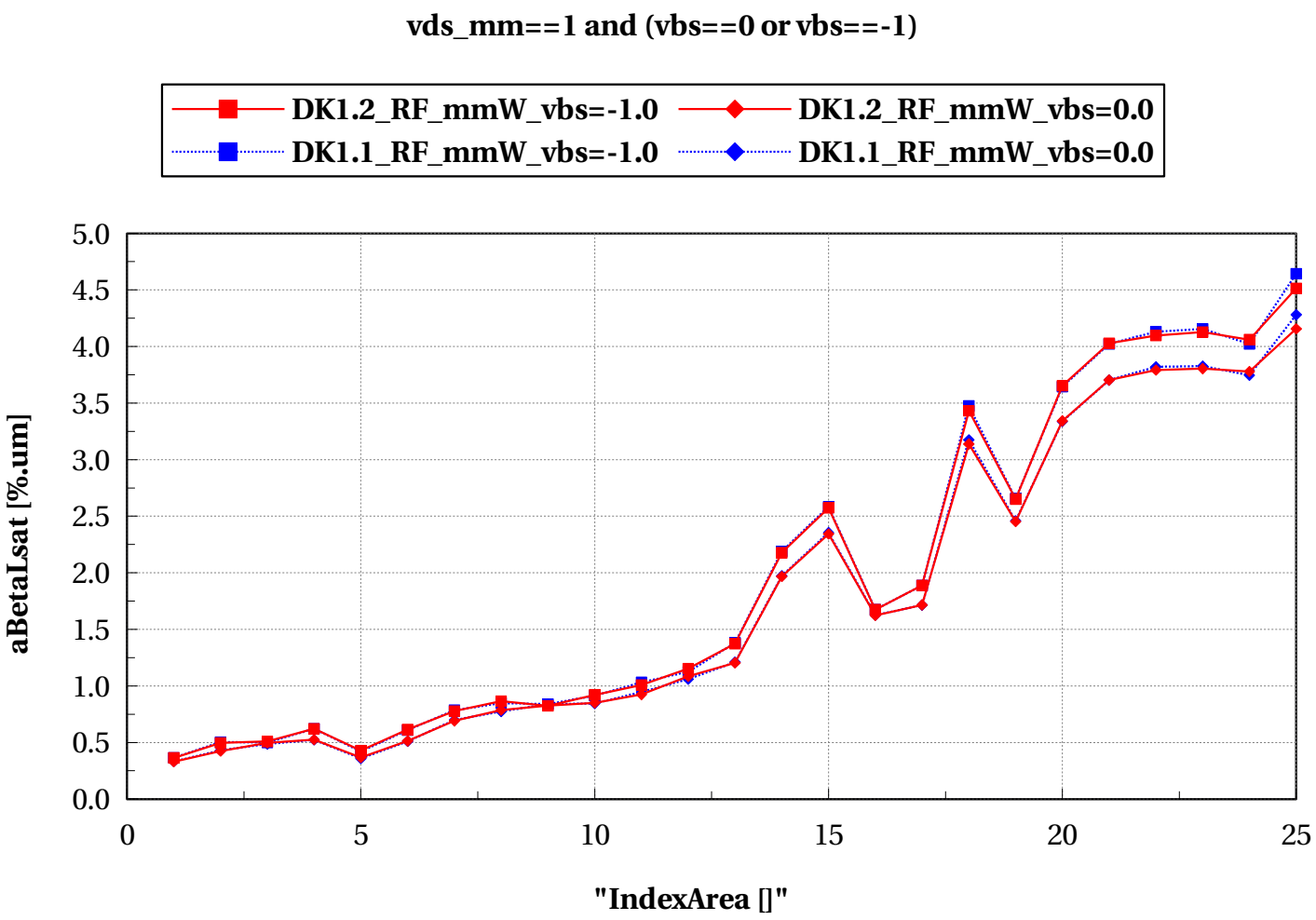

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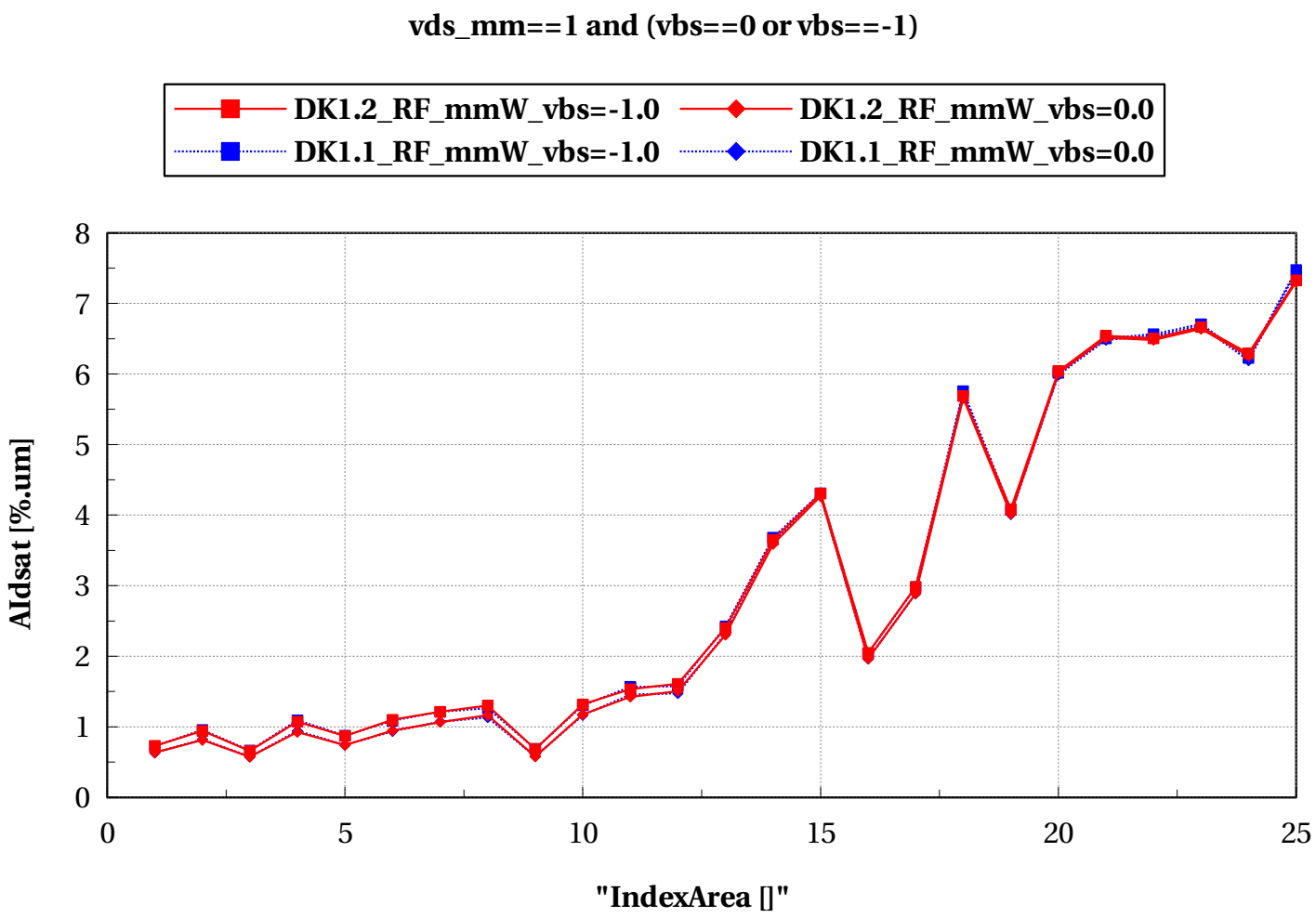

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Annex

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Conditions of simulations

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

- Model lvtnfet_acc (DK1.2_RF_mmW)
  - ✔ Input Parameters
    - ✘ vds_off = vds_sat V
    - ✘ mc_sens = 0
    - ✘ vds_lin = 0.05 V
    - ✘ ivt = 300e-9 A
    - ✘ model_version = 1.3.e
    - ✘ vds_mm = 0.05 V
    - ✘ ams_release = 2018.3
    - ✘ vgs_stop = Vdd V
    - ✘ dlshrink_ivt = 0
    - ✘ sbenchlsf_release = Alpha
    - ✘ vds_sat = Vdd V
    - ✘ mc_nsigma = 3
    - ✘ shrink_ivt = 1
    - ✘ vgs_start = 0 V

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- ✘ plashrink_ivt = 1
- ✘ ithslwi = 10e-9 A
- ✘ mc_runs = 5000
- ✘ vstep_ivt = 0.005 V
- ✘ vgs_off = 0 V
- ✘ temp = 25 °C
- ✘ vbs = 0 V
- ✘ vdd = 1 V

✔ Sweep Parameters

- ✘ vbs = -1.0, 0.0, 1.0, 2.0
- ✘ vds_mm = 0.05, 1.0

✔ Extra parameters

- ✘ lvt_dev = 1
- ✘ gflag__noisedev__rvt__cmos028fdsoi = 1
- ✘ gflag__noisedev__lvt__cmos028fdsoi = 1
- ✘ rvt_dev = 1

● Model lvtpfet_acc (DK1.2_RF_mmW)

✔ Input Parameters

- ✘ vds_off = vds_sat V
- ✘ mc_sens = 0
- ✘ vds_lin = 0.05 V
- ✘ ivt = 70e-9 A
- ✘ model_version = 1.3.e
- ✘ vds_mm = 0.05 V
- ✘ ams_release = 2018.3

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- ✘ vgs_stop = Vdd V
- ✘ dlshrink_ivt = 0
- ✘ sbenchlsf_release = Alpha
- ✘ vds_sat = Vdd V
- ✘ mc_nsigma = 3
- ✘ shrink_ivt = 1
- ✘ vgs_start = 0 V
- ✘ plashrink_ivt = 1
- ✘ ithslwi = 10e-9 A
- ✘ mc_runs = 5000
- ✘ vstep_ivt = 0.005 V
- ✘ vgs_off = 0 V
- ✘ temp = 25 °C
- ✘ vbs = 1 V
- ✘ vdd = 1 V

✔ Sweep Parameters

- ✘ vbs = -1.0, 0.0, 1.0, 2.0
- ✘ vds_mm = 0.05, 1.0

✔ Extra parameters

- ✘ lvt_dev = 1
- ✘ gflag__noisedev__rvt__cmos028fdsoi = 1
- ✘ gflag__noisedev__lvt__cmos028fdsoi = 1
- ✘ rvt_dev = 1

● Model nfet_acc (DK1.2_RF_mmW)

✔ Input Parameters

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life.augmented

- ✘ vds_off = vds_sat V
- ✘ mc_sens = 0
- ✘ vds_lin = 0.05 V
- ✘ ivt = 300e-9 A
- ✘ model_version = 1.2.d
- ✘ vds_mm = 0.05 V
- ✘ ams_release = 2018.3
- ✘ vgs_stop = Vdd V
- ✘ dlshrink_ivt = 0
- ✘ sbenchlsf_release = Alpha
- ✘ vds_sat = Vdd V
- ✘ mc_nsigma = 3
- ✘ shrink_ivt = 1
- ✘ vgs_start = 0 V
- ✘ plashrink_ivt = 1
- ✘ ithslwi = 10e-9 A
- ✘ mc_runs = 5000
- ✘ vstep_ivt = 0.005 V
- ✘ vgs_off = 0 V
- ✘ temp = 25 °C
- ✘ vbs = 0 V
- ✘ vdd = 1 V

✔ Sweep Parameters

- ✘ vbs = -1.0, 0.0, 1.0, 2.0
- ✘ vds_mm = 0.05, 1.0

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- ✔ Extra parameters
  - ✘ lvt_dev = 1
  - ✘ gflag__noisedev__rvt__cmos028fdsoi = 1
  - ✘ gflag__noisedev__lvt__cmos028fdsoi = 1
  - ✘ rvt_dev = 1

● Model pfet_acc (DK1.2_RF_mmW)

- ✔ Input Parameters
  - ✘ vds_off = vds_sat V
  - ✘ mc_sens = 0
  - ✘ vds_lin = 0.05 V
  - ✘ ivt = 70e-9 A
  - ✘ model_version = 1.2.d
  - ✘ vds_mm = 0.05 V
  - ✘ ams_release = 2018.3
  - ✘ vgs_stop = Vdd V
  - ✘ dlshrink_ivt = 0
  - ✘ sbenchlsf_release = Alpha
  - ✘ vds_sat = Vdd V
  - ✘ mc_nsigma = 3
  - ✘ shrink_ivt = 1
  - ✘ vgs_start = 0 V
  - ✘ plashrink_ivt = 1
  - ✘ ithslwi = 10e-9 A
  - ✘ mc_runs = 5000
  - ✘ vstep_ivt = 0.005 V

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- ✘ vgs_off = 0 V
- ✘ temp = 25 °C
- ✘ vbs = 0 V
- ✘ vdd = 1 V

✔ Sweep Parameters

- ✘ vbs = -1.0, 0.0, 1.0, 2.0
- ✘ vds_mm = 0.05, 1.0

✔ Extra parameters

- ✘ lvt_dev = 1
- ✘ gflag__noisedev__rvt__cmos028fdsoi = 1
- ✘ gflag__noisedev__lvt__cmos028fdsoi = 1
- ✘ rvt_dev = 1

● Model lvtnfet_acc (DK1.1_RF_mmW)

✔ Input Parameters

- ✘ vds_off = vds_sat V
- ✘ mc_sens = 0
- ✘ vds_lin = 0.05 V
- ✘ ivt = 300e-9 A
- ✘ model_version = 1.3.d
- ✘ vds_mm = 0.05 V
- ✘ ams_release = 2018.3
- ✘ vgs_stop = Vdd V
- ✘ dlshrink_ivt = 0
- ✘ sbenchlsf_release = Alpha
- ✘ vds_sat = Vdd V

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- ✘ mc_nsigma = 3
- ✘ shrink_ivt = 1
- ✘ vgs_start = 0 V
- ✘ plashrink_ivt = 1
- ✘ ithslwi = 10e-9 A
- ✘ mc_runs = 5000
- ✘ vstep_ivt = 0.005 V
- ✘ vgs_off = 0 V
- ✘ temp = 25 °C
- ✘ vbs = 0 V
- ✘ vdd = 1 V

✔ Sweep Parameters

- ✘ vbs = -1.0, 0.0, 1.0, 2.0
- ✘ vds_mm = 0.05, 1.0

✔ Extra parameters

- ✘ lvt_dev = 1
- ✘ gflag__noisedev__rvt__cmos028fdsoi = 1
- ✘ gflag__noisedev__lvt__cmos028fdsoi = 1
- ✘ rvt_dev = 1

● Model lvtpfet_acc (DK1.1_RF_mmW)

✔ Input Parameters

- ✘ vds_off = vds_sat V
- ✘ mc_sens = 0
- ✘ vds_lin = 0.05 V
- ✘ ivt = 70e-9 A

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- ✘ model_version = 1.3.d
- ✘ vds_mm = 0.05 V
- ✘ ams_release = 2018.3
- ✘ vgs_stop = Vdd V
- ✘ dlshrink_ivt = 0
- ✘ sbenchlsf_release = Alpha
- ✘ vds_sat = Vdd V
- ✘ mc_nsigma = 3
- ✘ shrink_ivt = 1
- ✘ vgs_start = 0 V
- ✘ plashrink_ivt = 1
- ✘ ithslwi = 10e-9 A
- ✘ mc_runs = 5000
- ✘ vstep_ivt = 0.005 V
- ✘ vgs_off = 0 V
- ✘ temp = 25 °C
- ✘ vbs = 1 V
- ✘ vdd = 1 V

✔ Sweep Parameters

- ✘ vbs = -1.0, 0.0, 1.0, 2.0
- ✘ vds_mm = 0.05, 1.0

✔ Extra parameters

- ✘ lvt_dev = 1
- ✘ gflag__noisedev__rvt__cmos028fdsoi = 1
- ✘ gflag__noisedev__lvt__cmos028fdsoi = 1

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- ✘ rvt_dev = 1

● Model nfet_acc (DK1.1_RF_mmW)

- ✔ Input Parameters
  - ✘ vds_off = vds_sat V
  - ✘ mc_sens = 0
  - ✘ vds_lin = 0.05 V
  - ✘ ivt = 300e-9 A
  - ✘ model_version = 1.2.c
  - ✘ vds_mm = 0.05 V
  - ✘ ams_release = 2018.3
  - ✘ vgs_stop = Vdd V
  - ✘ dlshrink_ivt = 0
  - ✘ sbenchlsf_release = Alpha
  - ✘ vds_sat = Vdd V
  - ✘ mc_nsigma = 3
  - ✘ shrink_ivt = 1
  - ✘ vgs_start = 0 V
  - ✘ plashrink_ivt = 1
  - ✘ ithslwi = 10e-9 A
  - ✘ mc_runs = 5000
  - ✘ vstep_ivt = 0.005 V
  - ✘ vgs_off = 0 V
  - ✘ temp = 25 °C
  - ✘ vbs = 0 V
  - ✘ vdd = 1 V

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- ✔ Sweep Parameters
  - ✘ vbs = -1.0, 0.0, 1.0, 2.0
  - ✘ vds_mm = 0.05, 1.0
- ✔ Extra parameters
  - ✘ lvt_dev = 1
  - ✘ gflag__noisedev__rvt__cmos028fdsoi = 1
  - ✘ gflag__noisedev__lvt__cmos028fdsoi = 1
  - ✘ rvt_dev = 1

● Model pfet_acc (DK1.1_RF_mmW)

- ✔ Input Parameters
  - ✘ vds_off = vds_sat V
  - ✘ mc_sens = 0
  - ✘ vds_lin = 0.05 V
  - ✘ ivt = 70e-9 A
  - ✘ model_version = 1.2.c
  - ✘ vds_mm = 0.05 V
  - ✘ ams_release = 2018.3
  - ✘ vgs_stop = Vdd V
  - ✘ dlshrink_ivt = 0
  - ✘ sbenchlsf_release = Alpha
  - ✘ vds_sat = Vdd V
  - ✘ mc_nsigma = 3
  - ✘ shrink_ivt = 1
  - ✘ vgs_start = 0 V
  - ✘ plashrink_ivt = 1

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- ✘ ithslwi = 10e-9 A
- ✘ mc_runs = 5000
- ✘ vstep_ivt = 0.005 V
- ✘ vgs_off = 0 V
- ✘ temp = 25 °C
- ✘ vbs = 0 V
- ✘ vdd = 1 V

✔ Sweep Parameters

- ✘ vbs = -1.0, 0.0, 1.0, 2.0
- ✘ vds_mm = 0.05, 1.0

✔ Extra parameters

- ✘ lvt_dev = 1
- ✘ gflag__noisedev__rvt__cmos028fdsoi = 1
- ✘ gflag__noisedev__lvt__cmos028fdsoi = 1
- ✘ rvt_dev = 1

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