



cmos028fdsoi Technology

SG LLE WPE models

DK1.2_RF_mmW

Comparison with DK1.1_RF_mmW model(s)

LLE - SG WPE

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Sep 24, 2018

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

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General information on SG LLE WPE 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.

Output parameters definitions

- Model(s): lvtnfet_acc, lvtpfet_acc, nfet_acc, pfet_acc
 - ✓ V_{t_lin} : Threshold voltage defined as V_{gs} value for which drain current is $i_{vt} \cdot M \cdot 1 \cdot W / (1 \cdot L + 0 + 1 \cdot p_la)$ at $V_{ds} = 0.05V$.
 - ✓ I_{sat} : Drain current at $V_{gs} = 1V$, $V_{ds} = V_{dd}V$.
 - ✓ V_{t_sat} : Threshold voltage defined as V_{gs} value for which drain current is $i_{vt} \cdot M \cdot 1 \cdot W / (1 \cdot L + 0 + 1 \cdot p_la)$ at $V_{ds} = v_{ds_sat}V$.
 - ✓ I_{lin} : Drain current at $V_{gs} = 1V$, $V_{ds} = 0.05V$.
 - ✓ Log_{ioff} : $\log_{10}(I_{offsat})$.

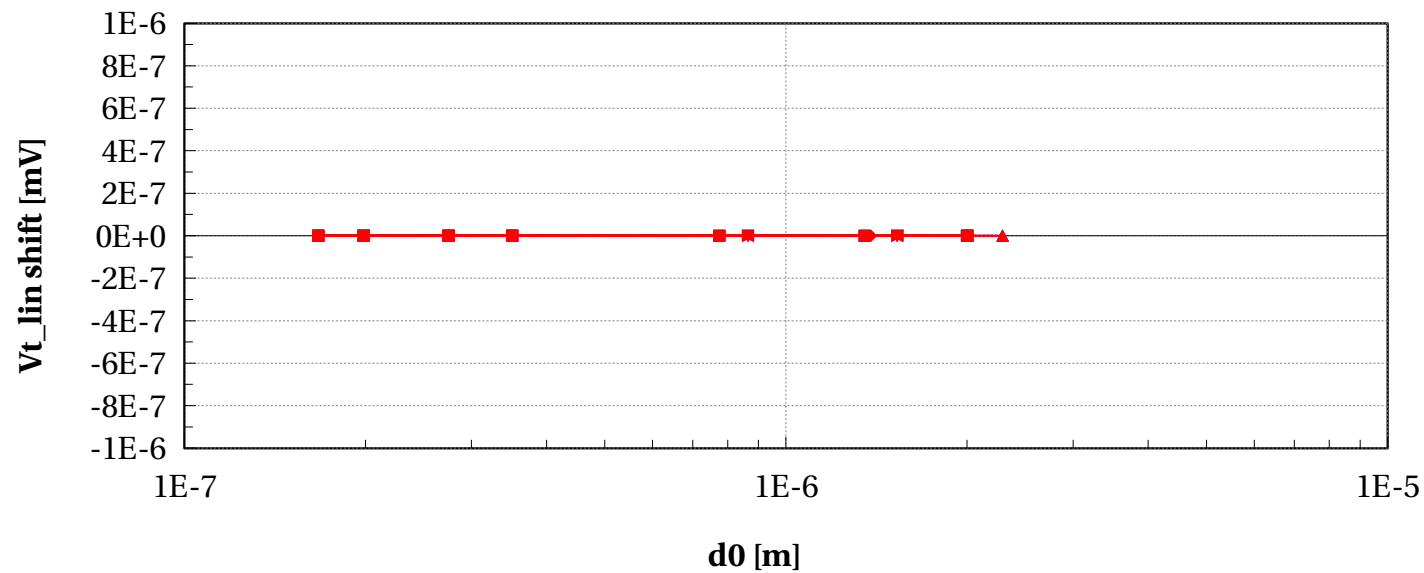
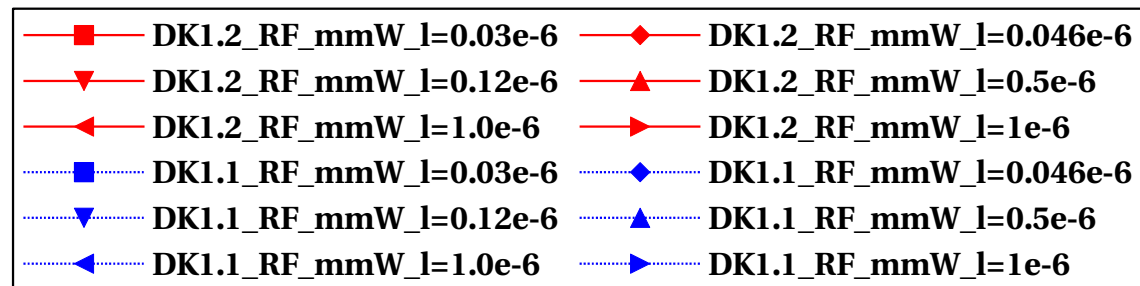
lvtnfet_acc

Electrical characteristics scaling

- WPE effect w.r.t d0 - Lscaling at W=1u

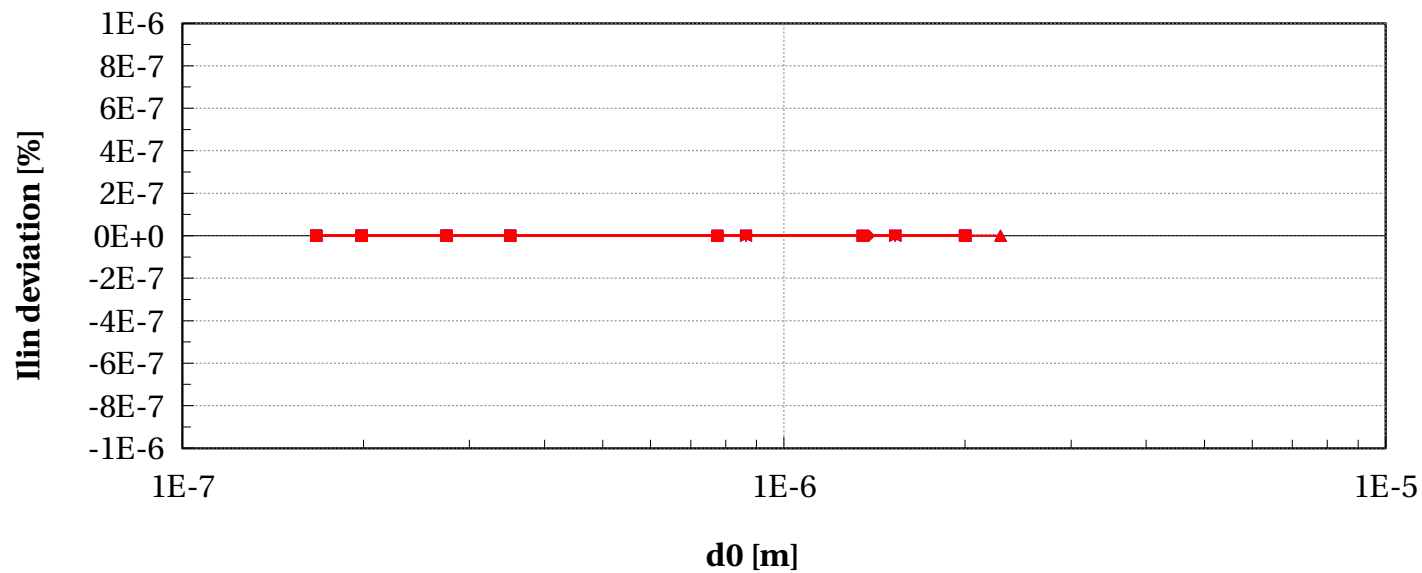
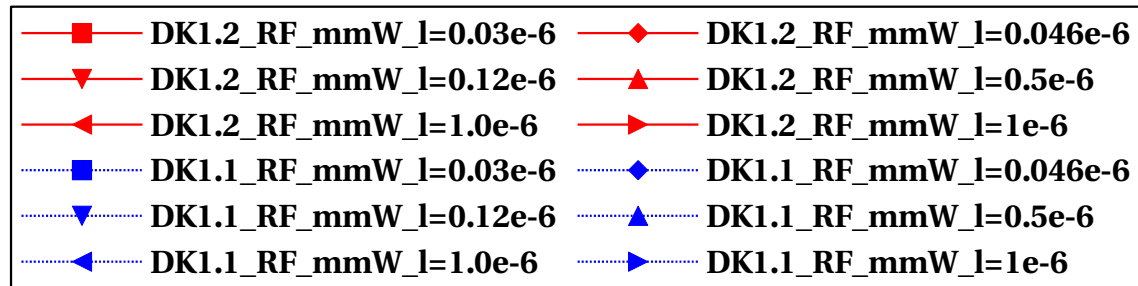
lvtnfet_acc, Vt_lin shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and W==1e-6



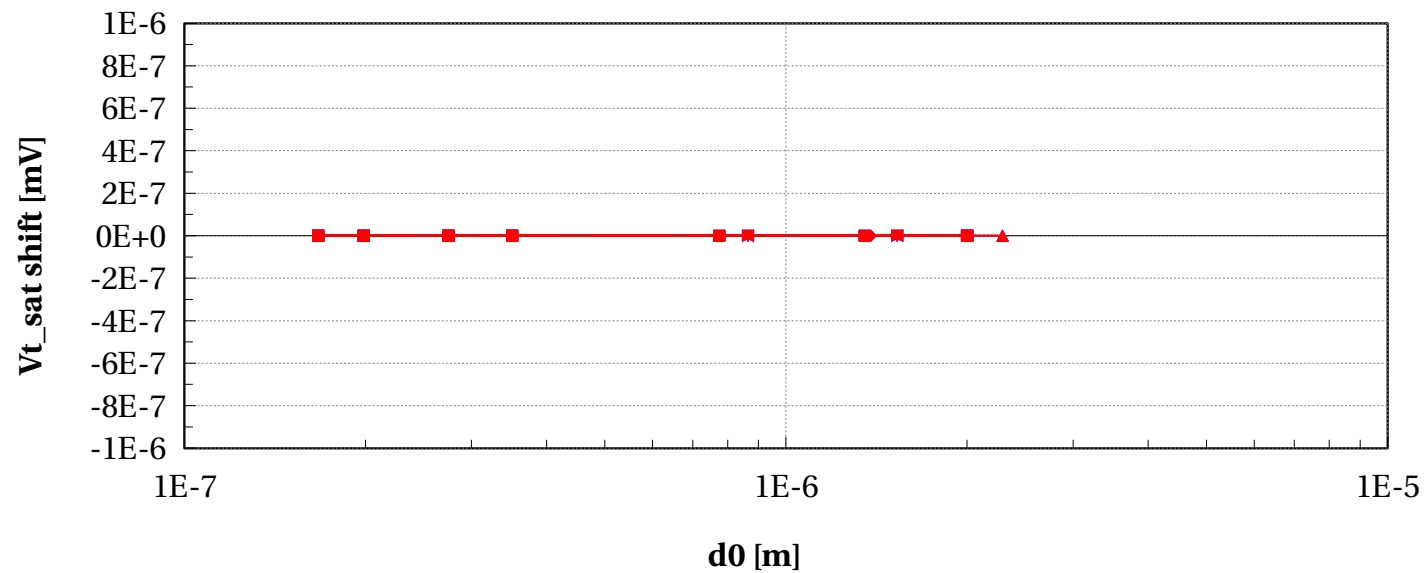
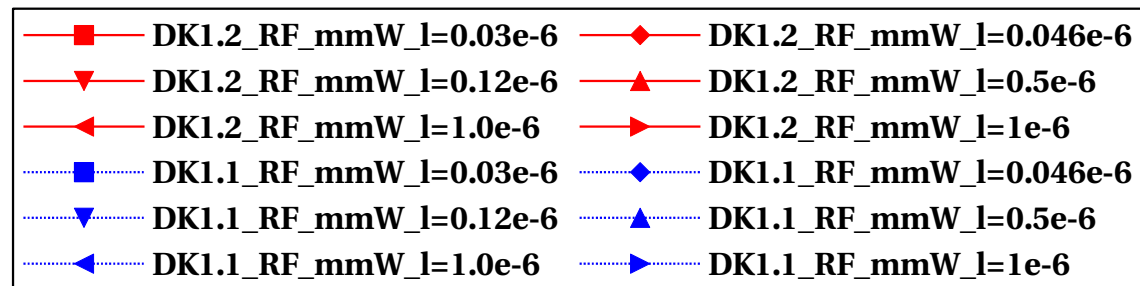
lvtnfet_acc, Ilin deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and W==1e-6



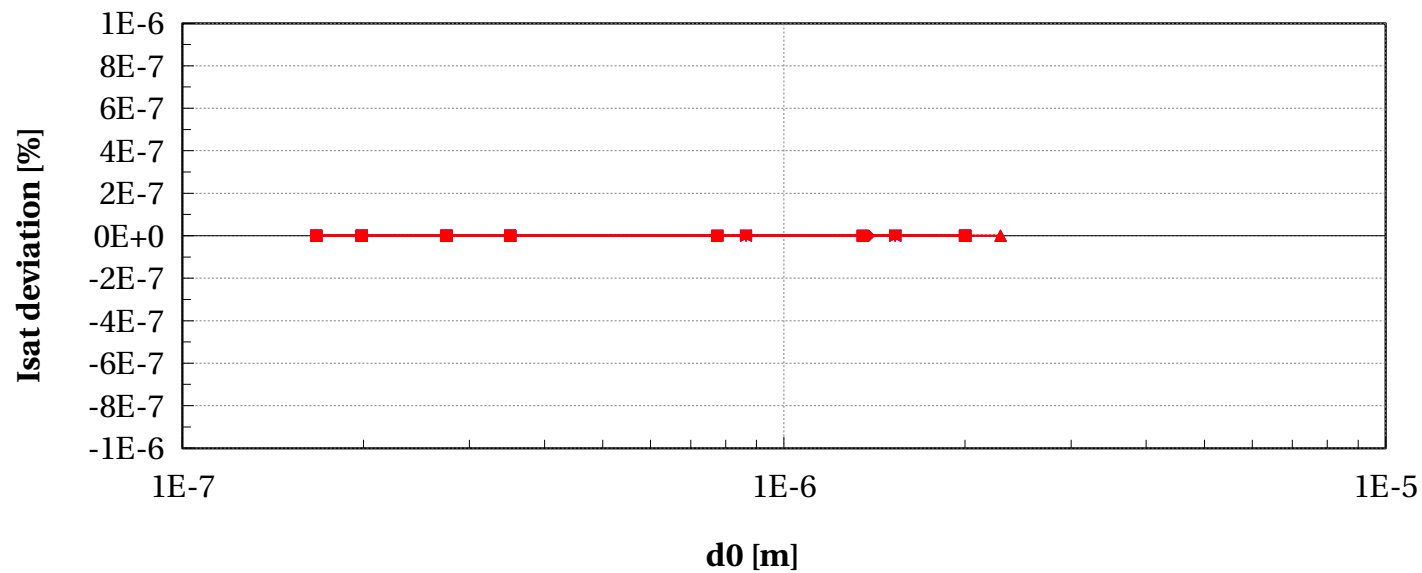
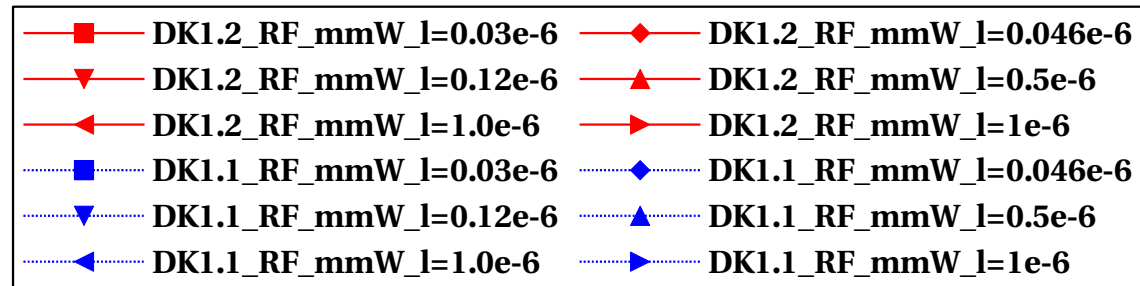
lvtnfet_acc, Vt_sat shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and W==1e-6



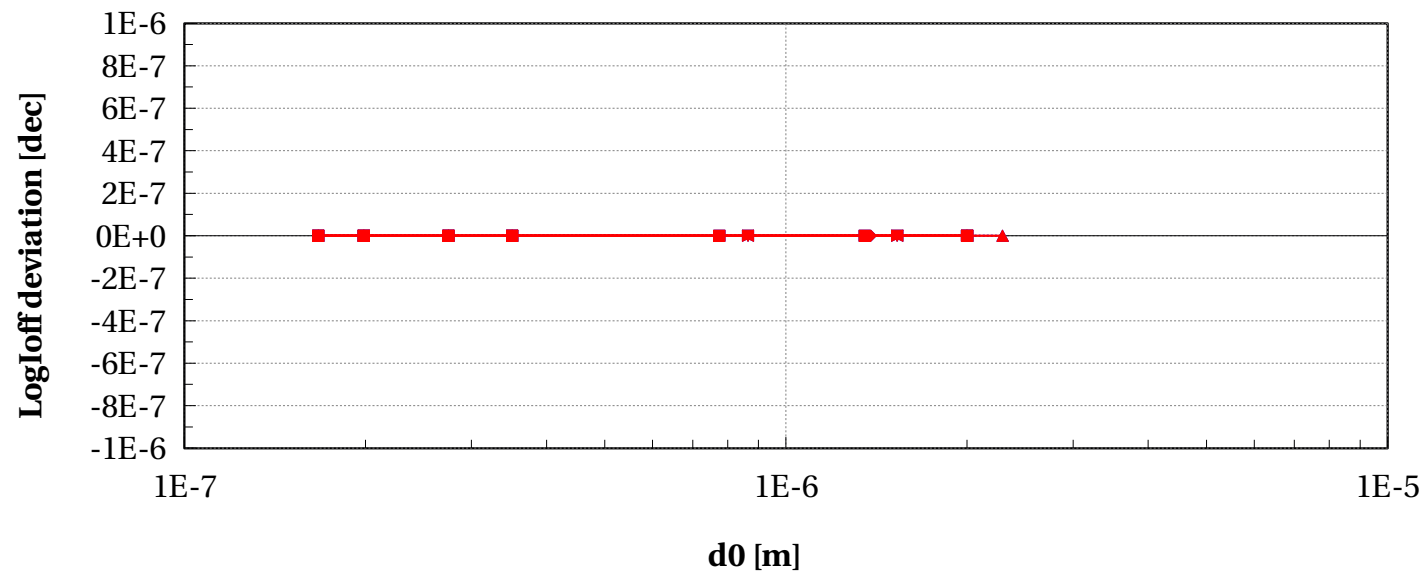
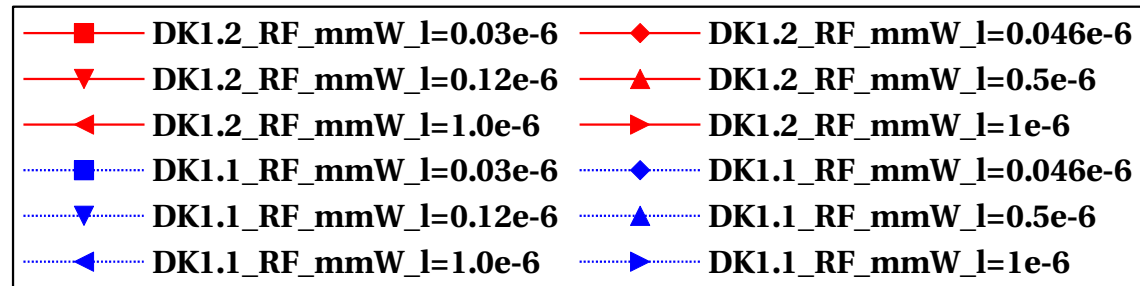
lvtnfet_acc, Isat deviation [%] vs d0 [m]

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lvtnfet_acc, Logloff deviation [dec] vs d0 [m]

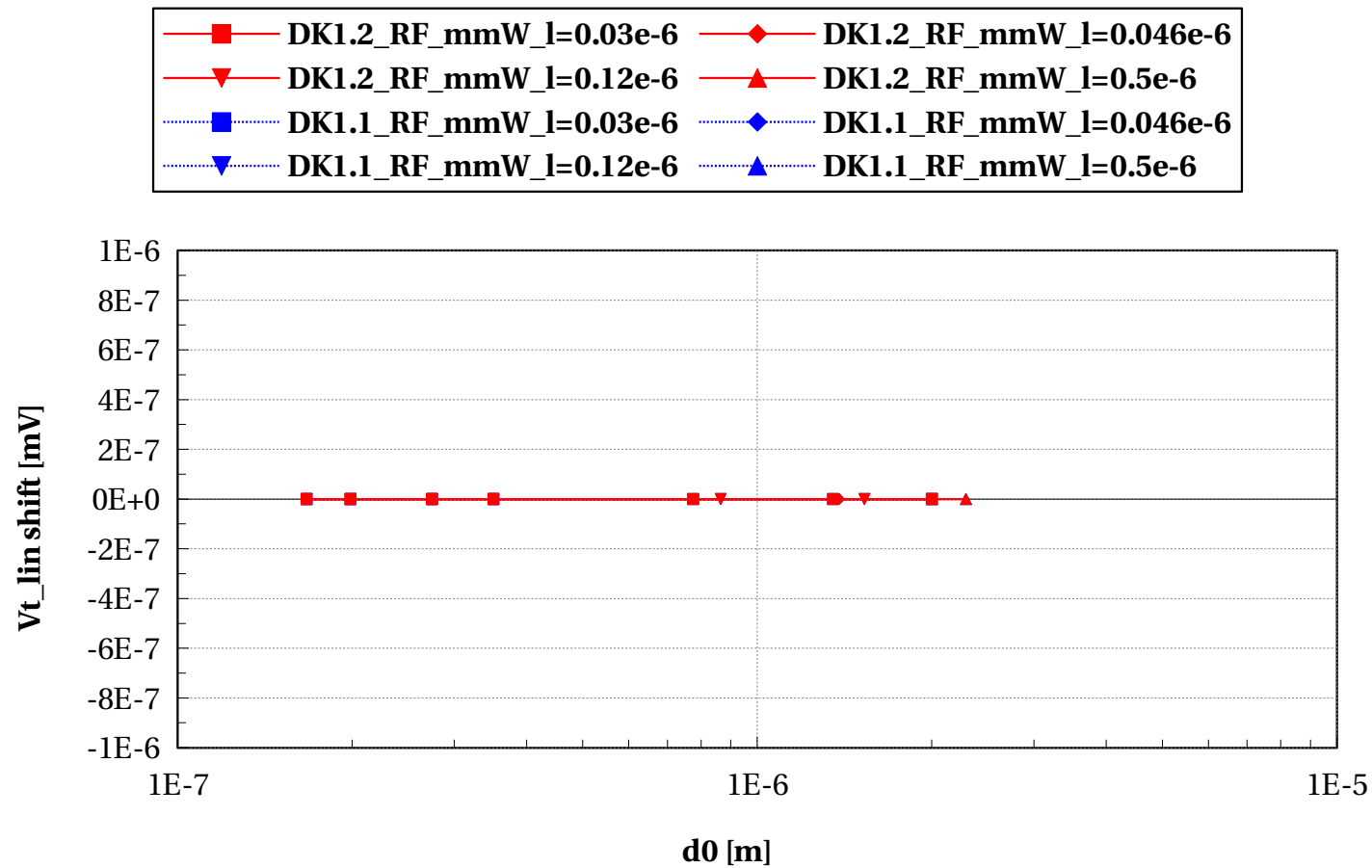
temp==25 and d1==10e-6 and W==1e-6



- WPE effect w.r.t d0 - Lscaling at $W=0.34u$

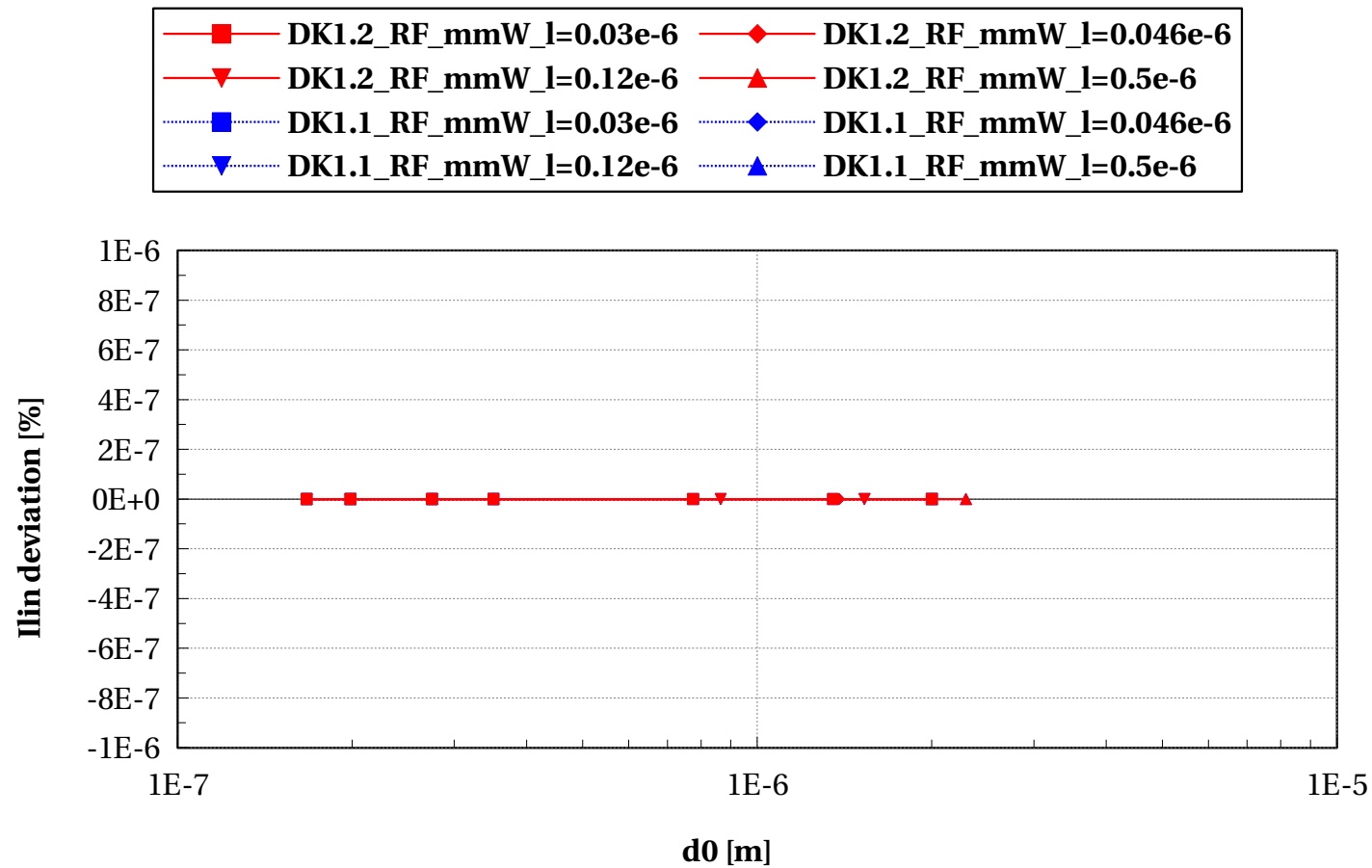
lvtnfet_acc, Vt_lin shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and W==0.34e-6



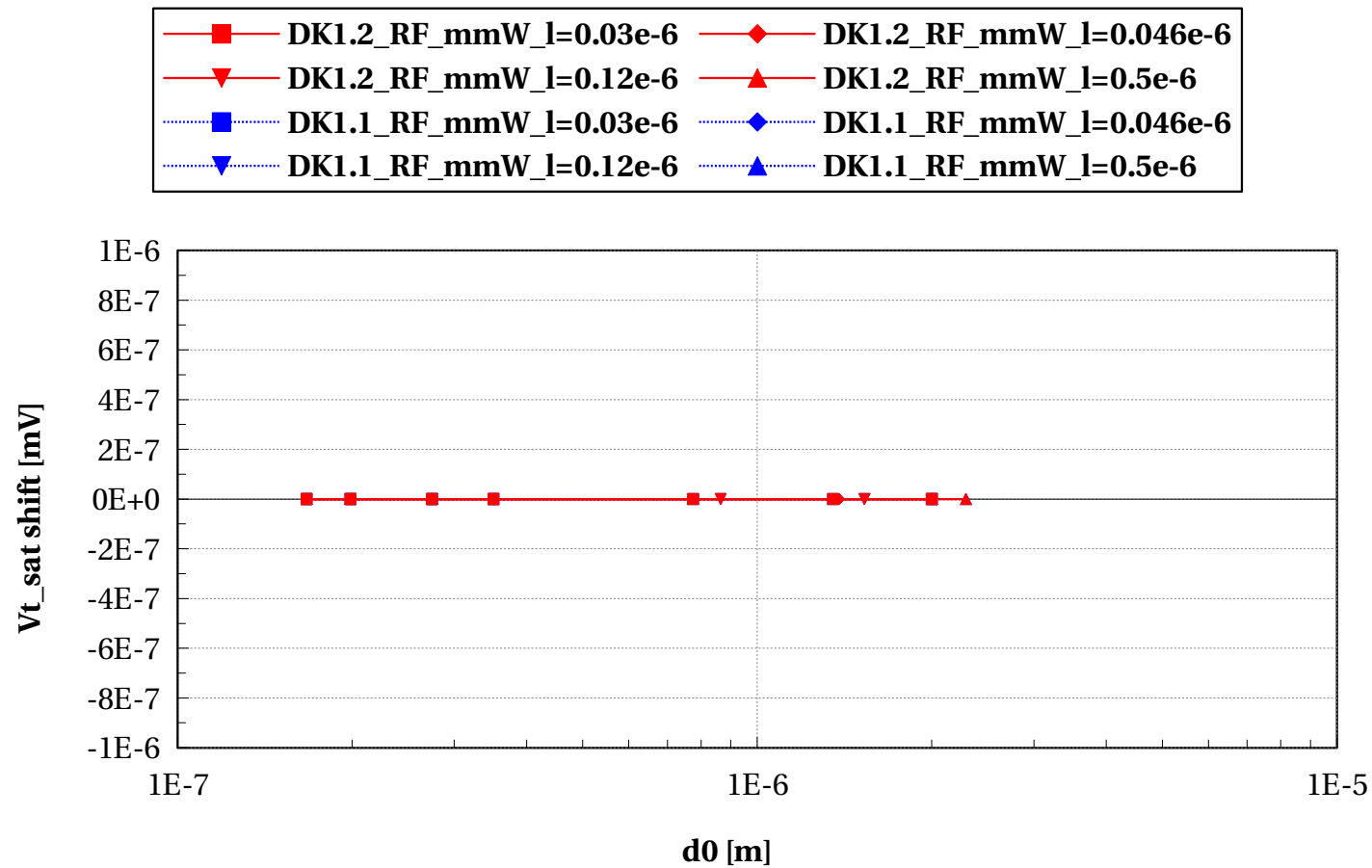
lvtnfet_acc, Ilin deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and W==0.34e-6



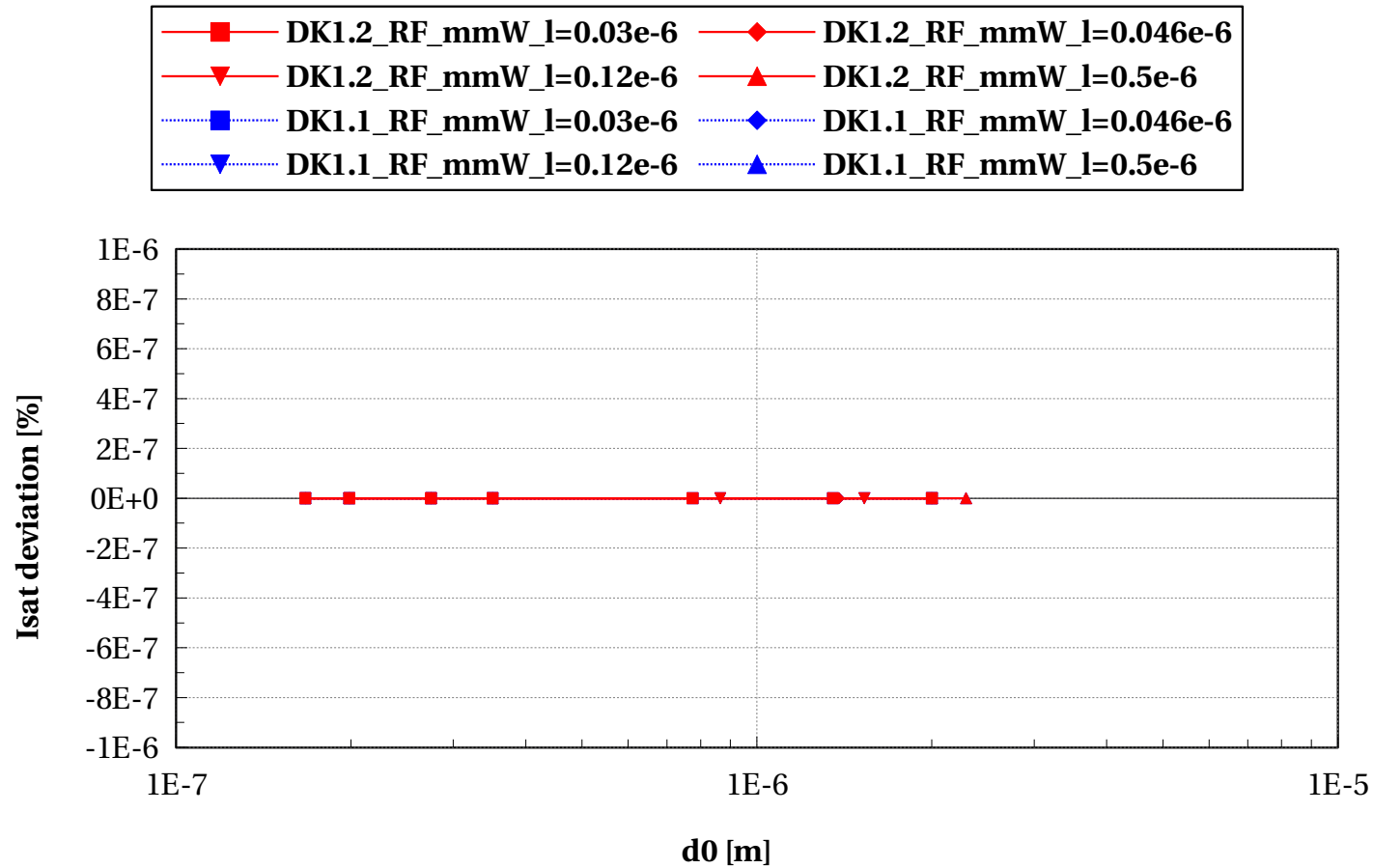
lvtnfet_acc, Vt_sat shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and W==0.34e-6



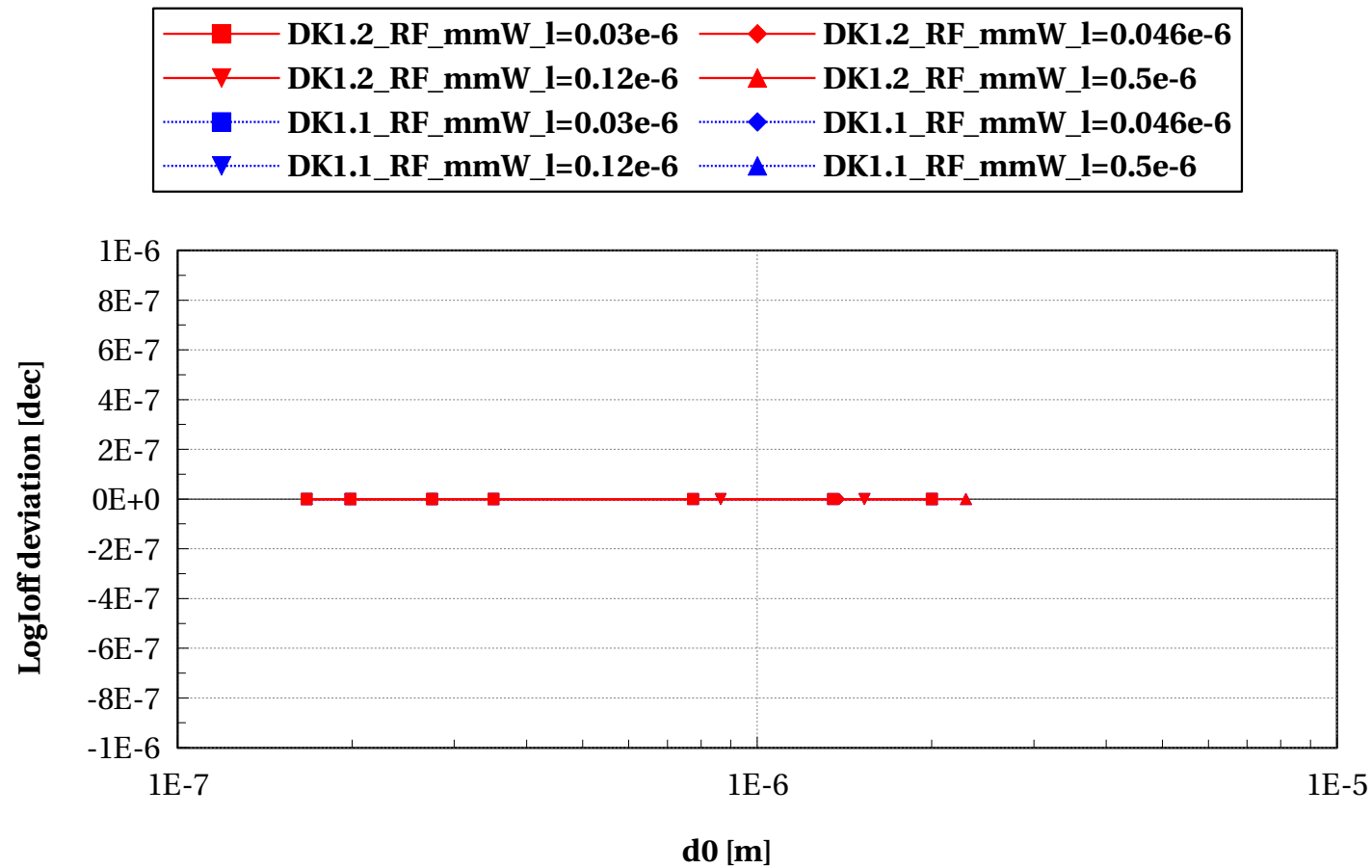
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lvtnfet_acc, Logloff deviation [dec] vs d0 [m]

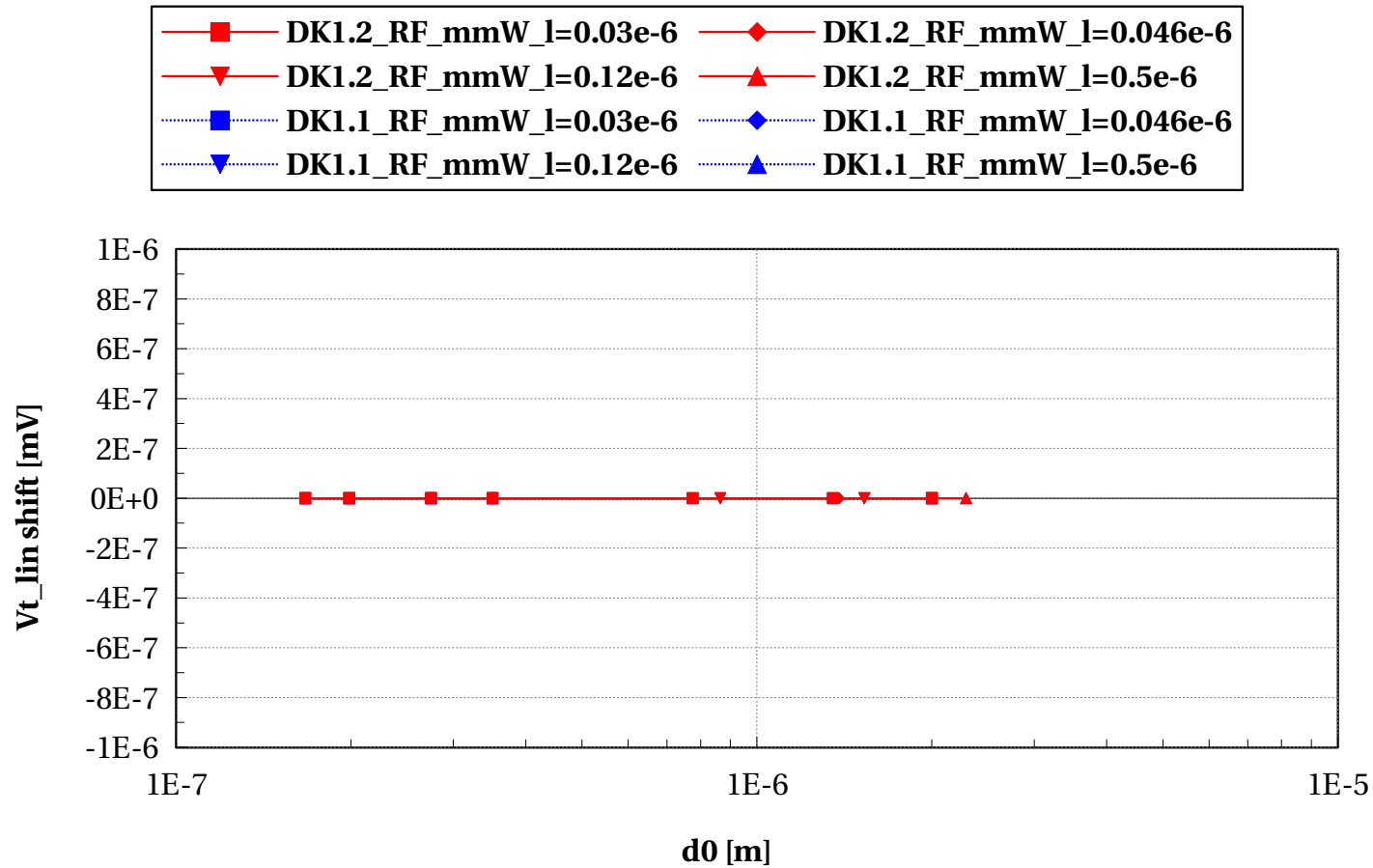
temp==25 and d1==10e-6 and W==0.34e-6



- WPE effect w.r.t d0 - Lscaling at $W=0.1\mu$

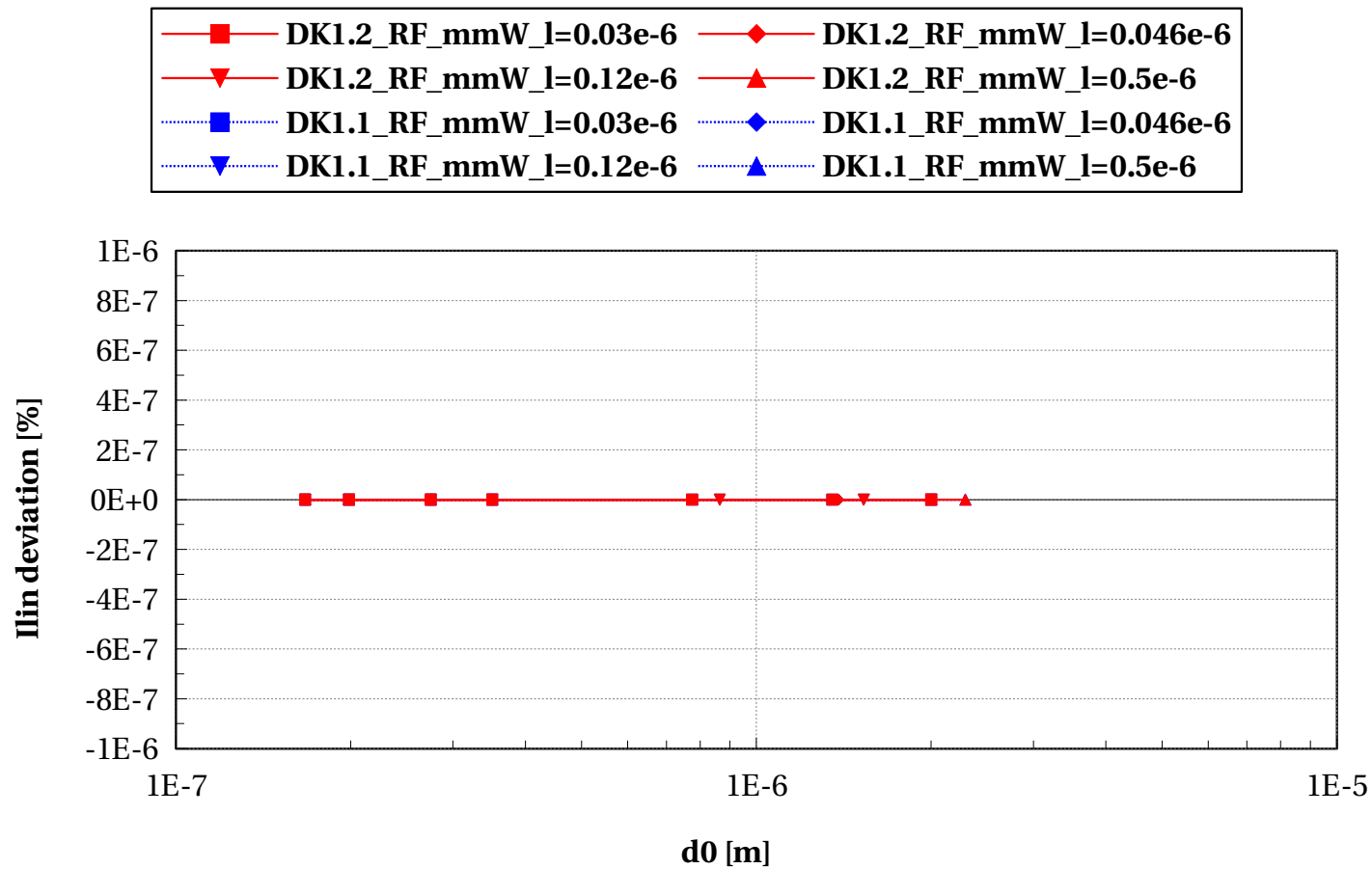
lvtnfet_acc, Vt_lin shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and W==0.1e-6



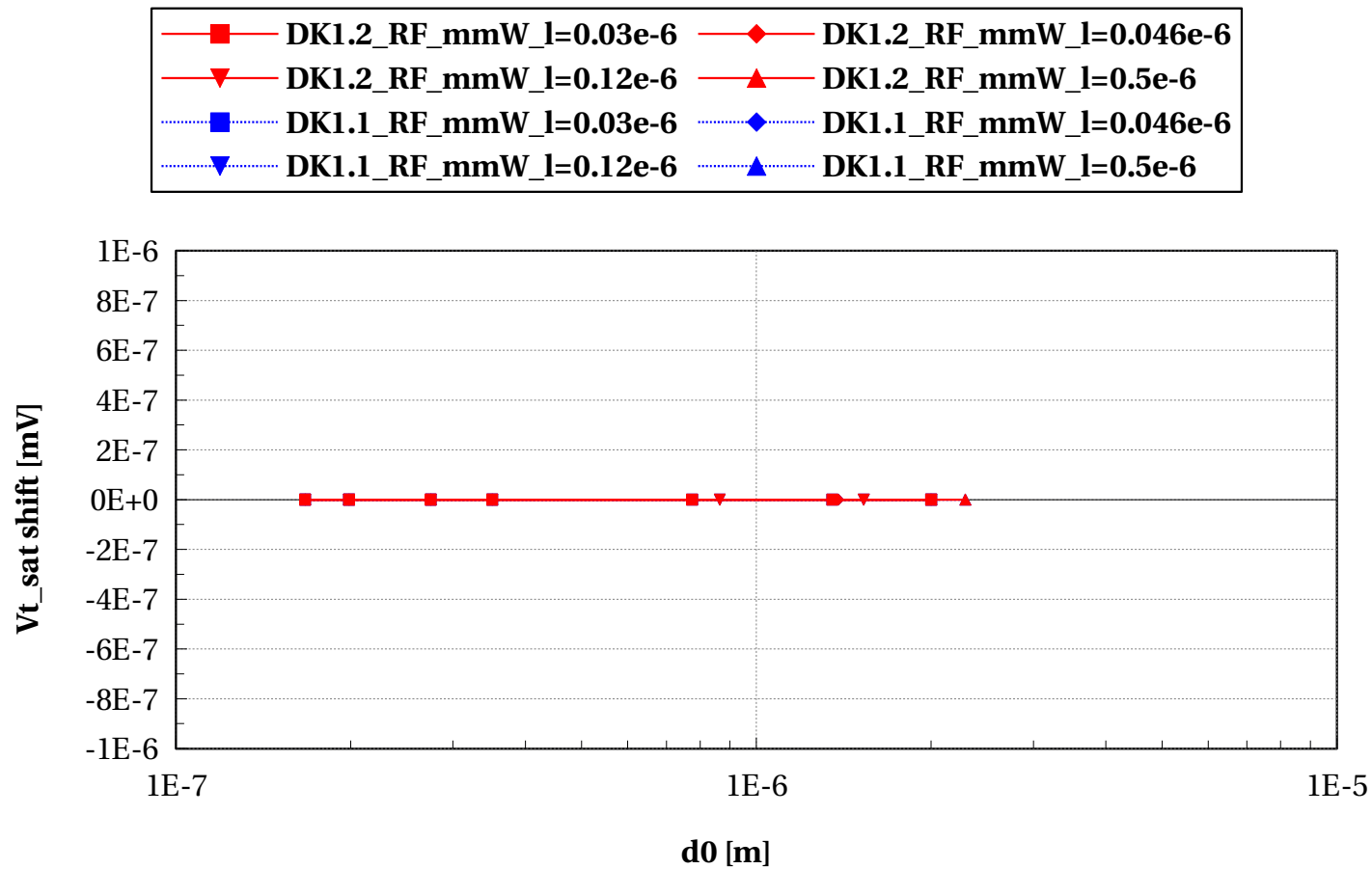
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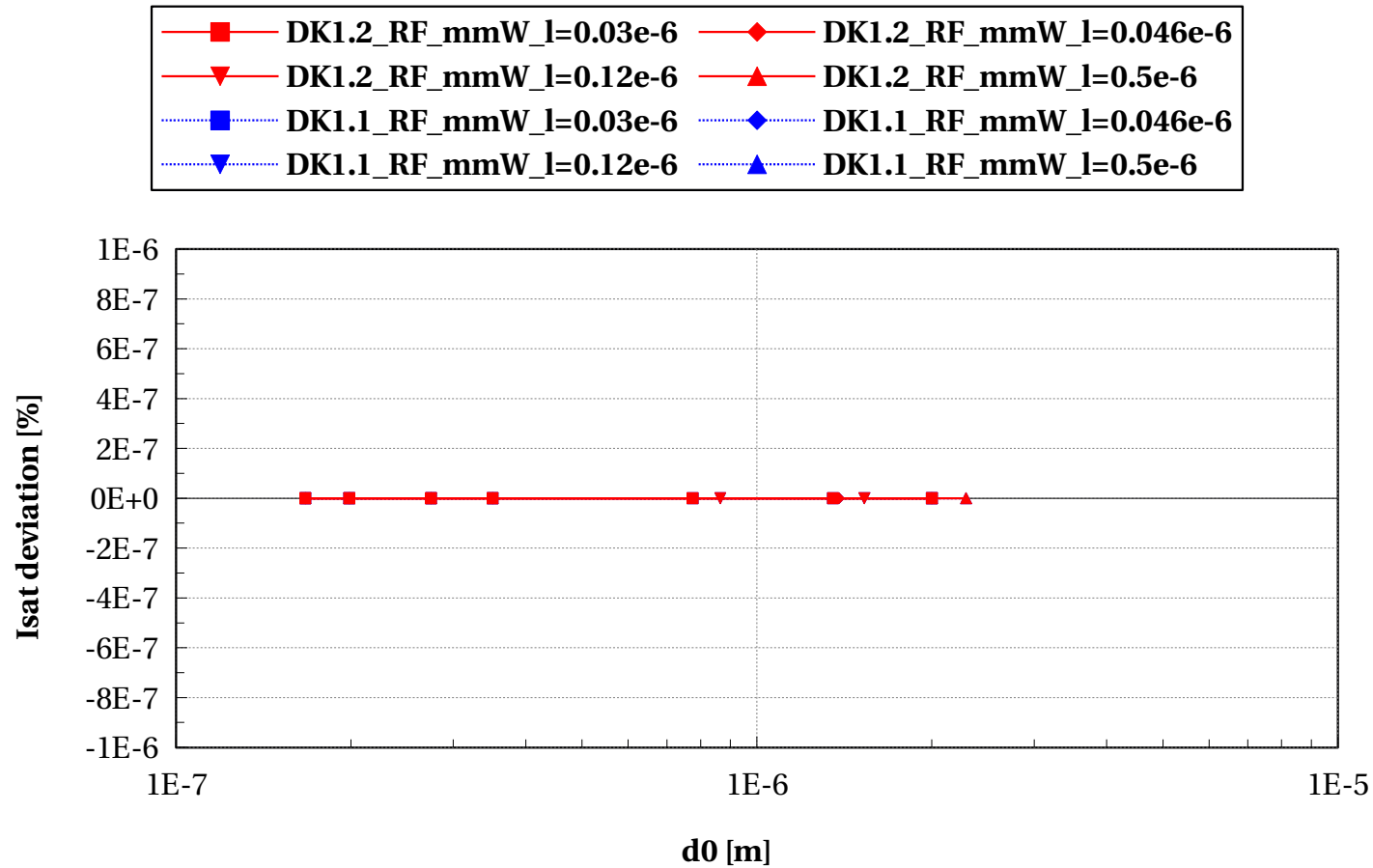
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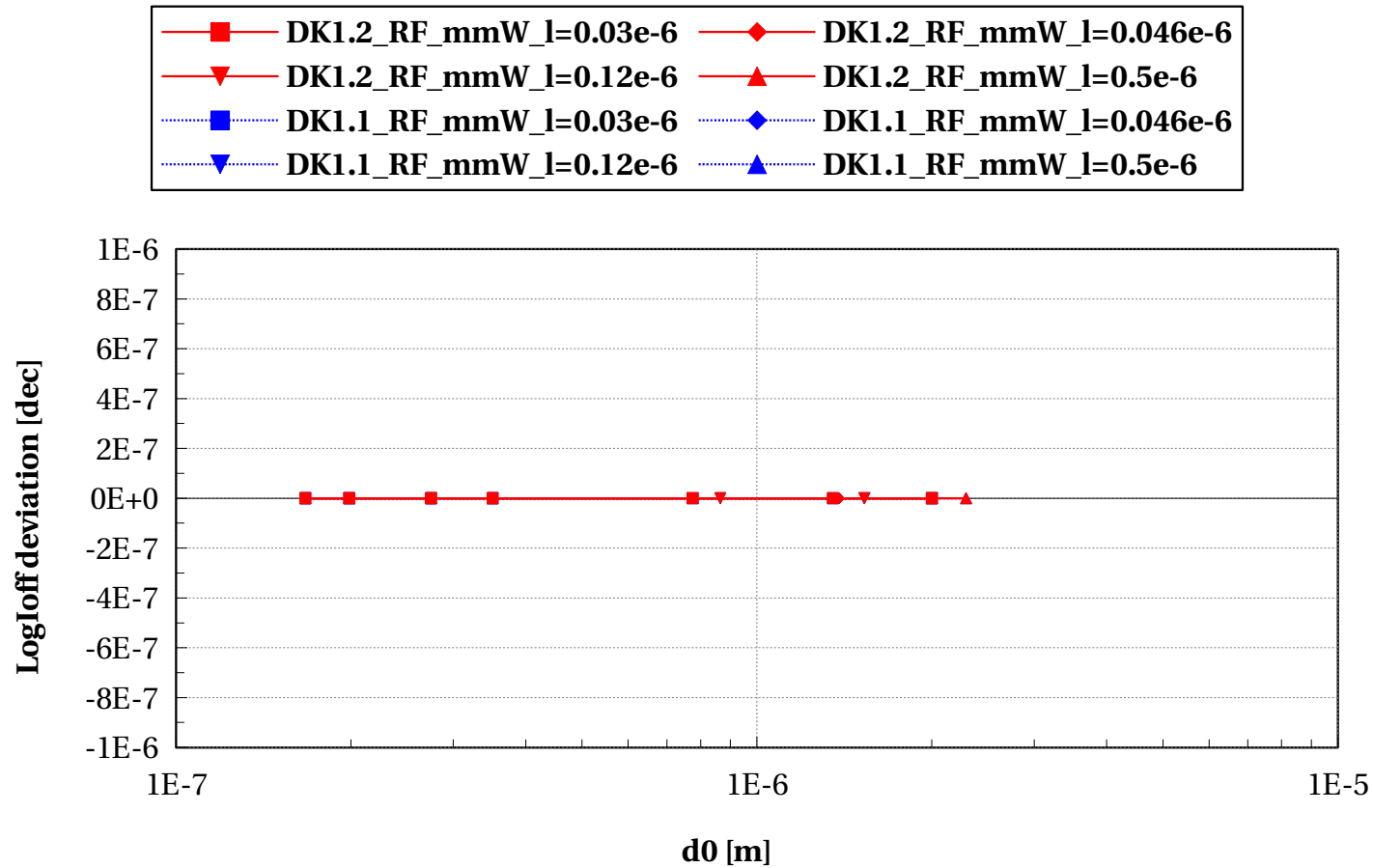
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lvtnfet_acc, Logloff deviation [dec] vs d0 [m]

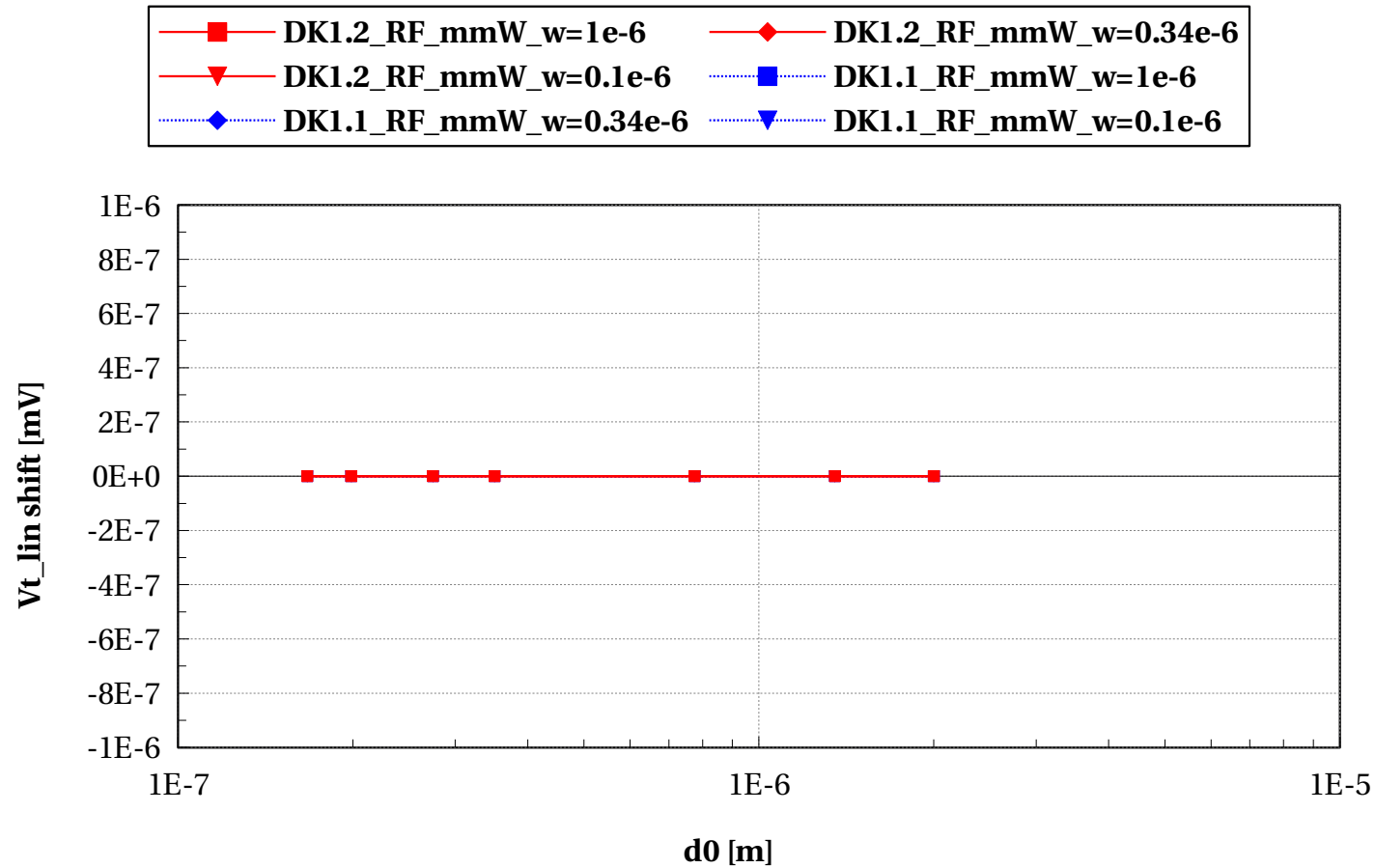
temp==25 and d1==10e-6 and W==0.1e-6



- WPE effect w.r.t d0 - Wscaling at $L=0.03u$

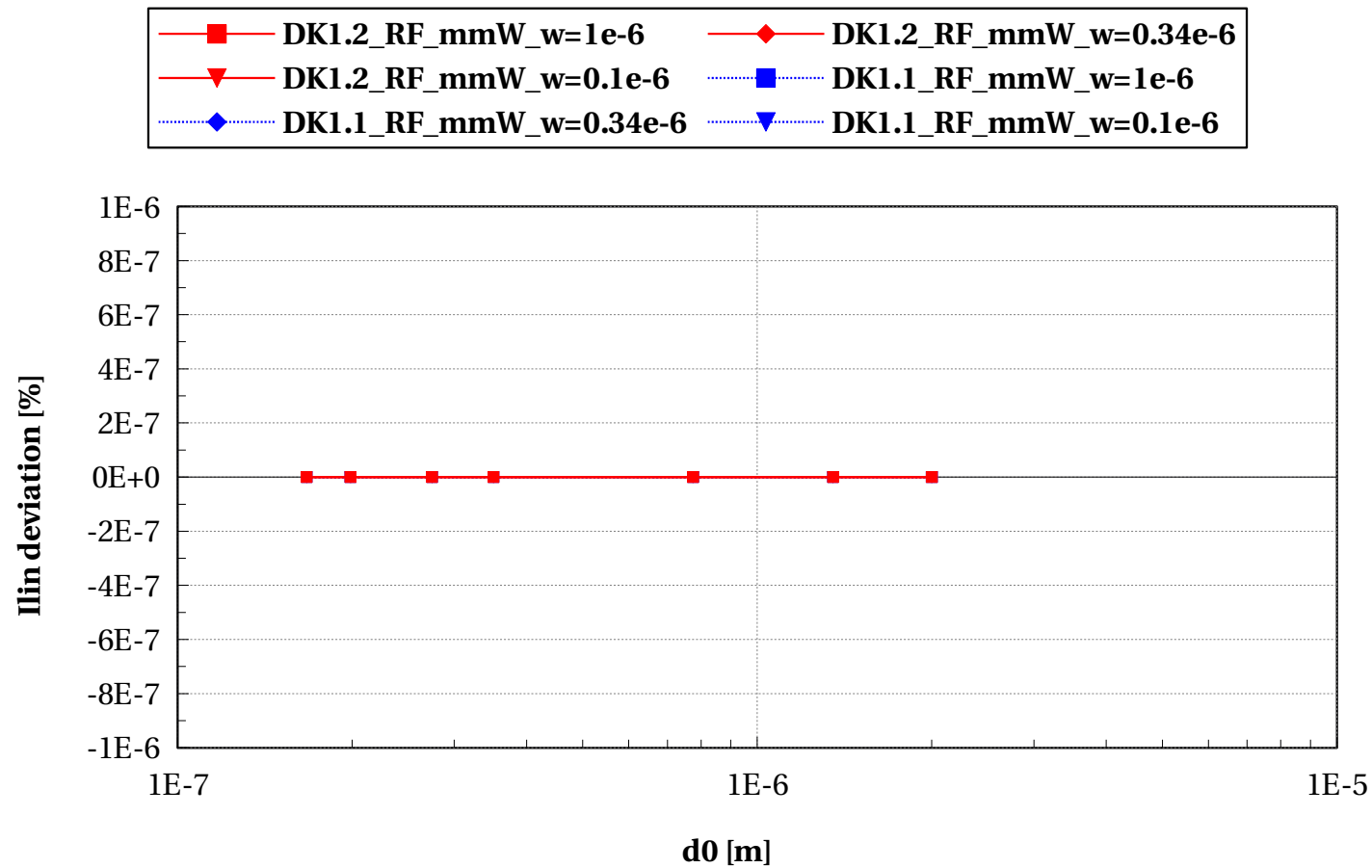
lvtnfet_acc, Vt_lin shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and L==0.03e-6



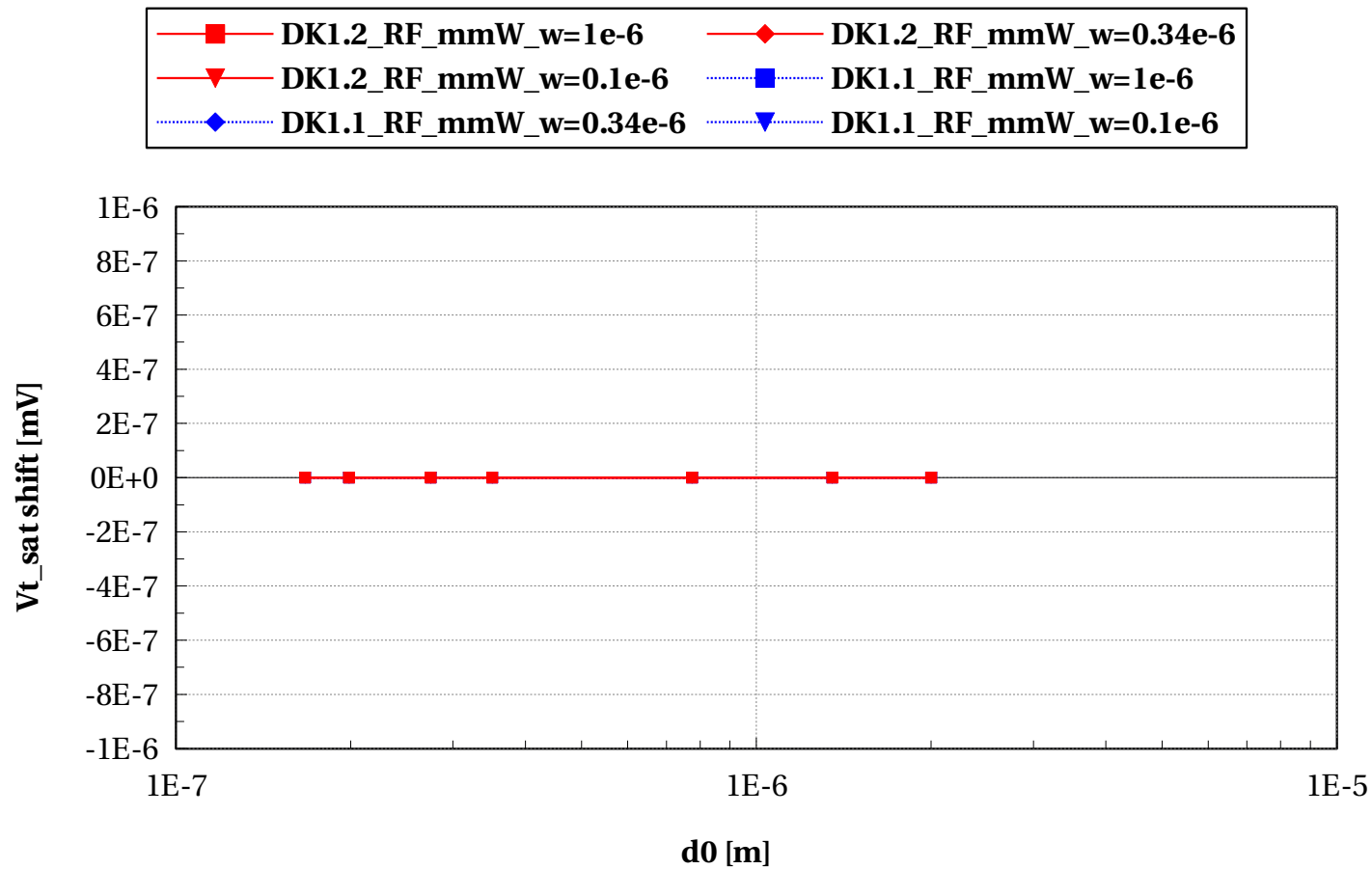
lvtnfet_acc, Ilin deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and L==0.03e-6



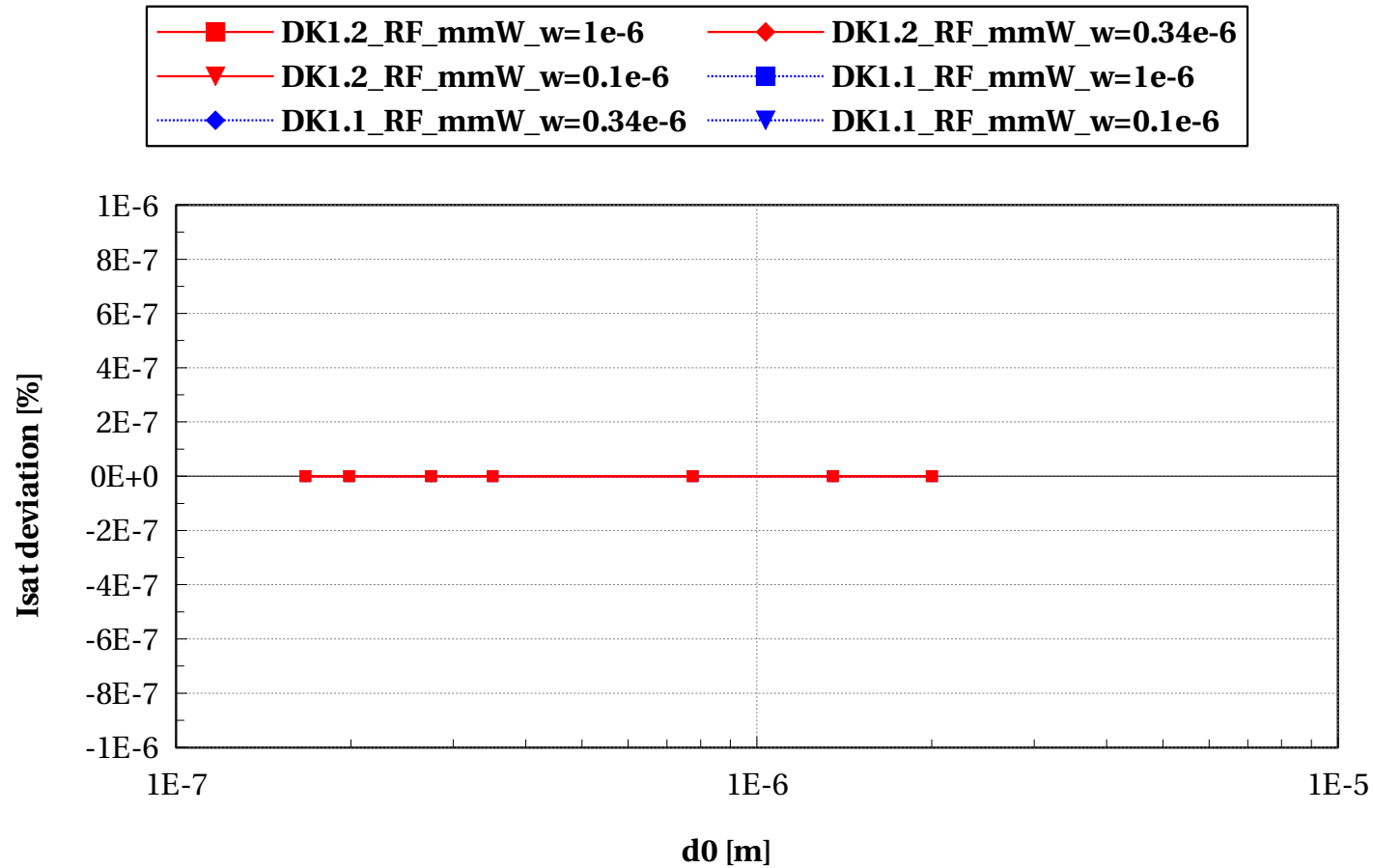
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temp==25 and d1==10e-6 and L==0.03e-6



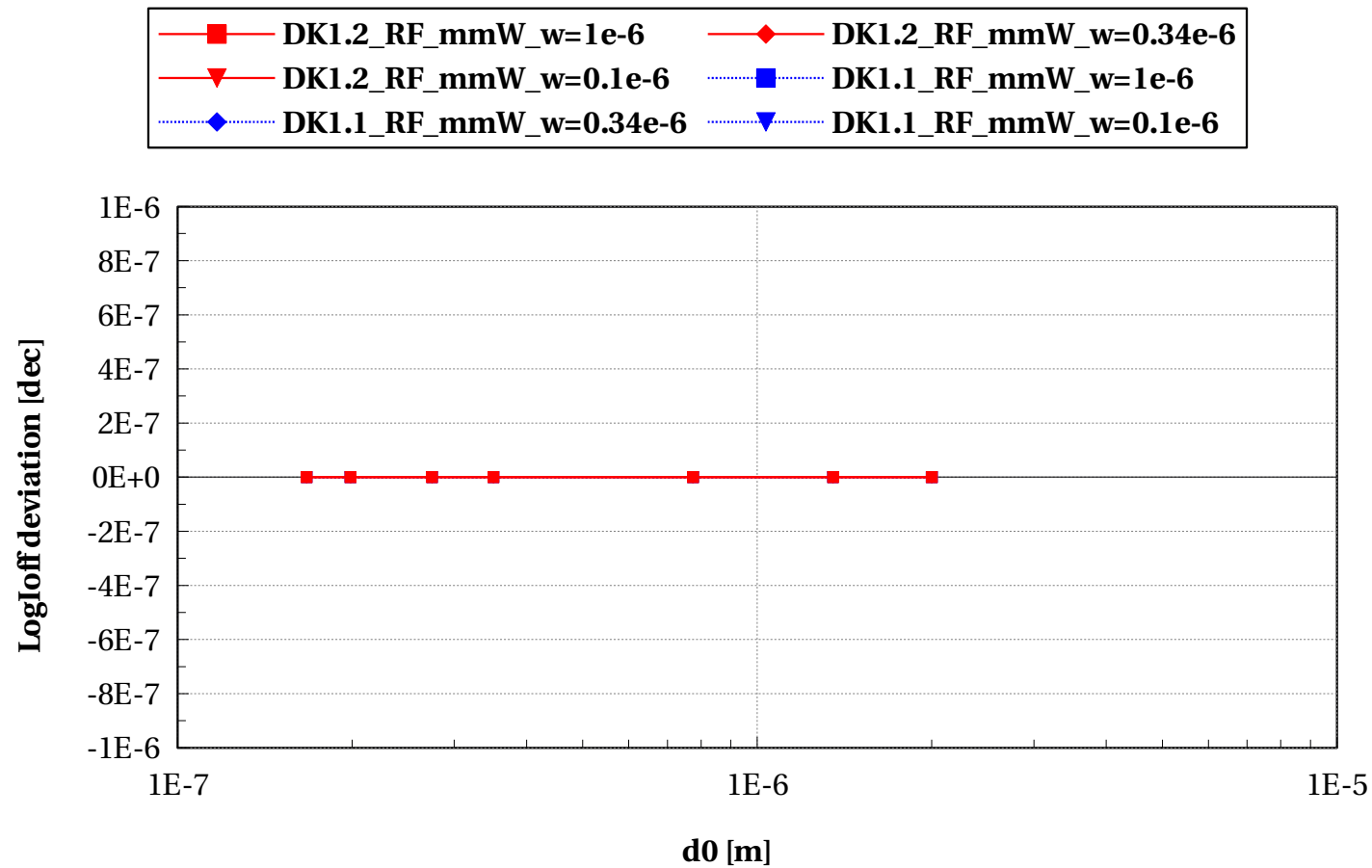
lvtnfet_acc, Isat deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and L==0.03e-6



lvtnfet_acc, Logloff deviation [dec] vs d0 [m]

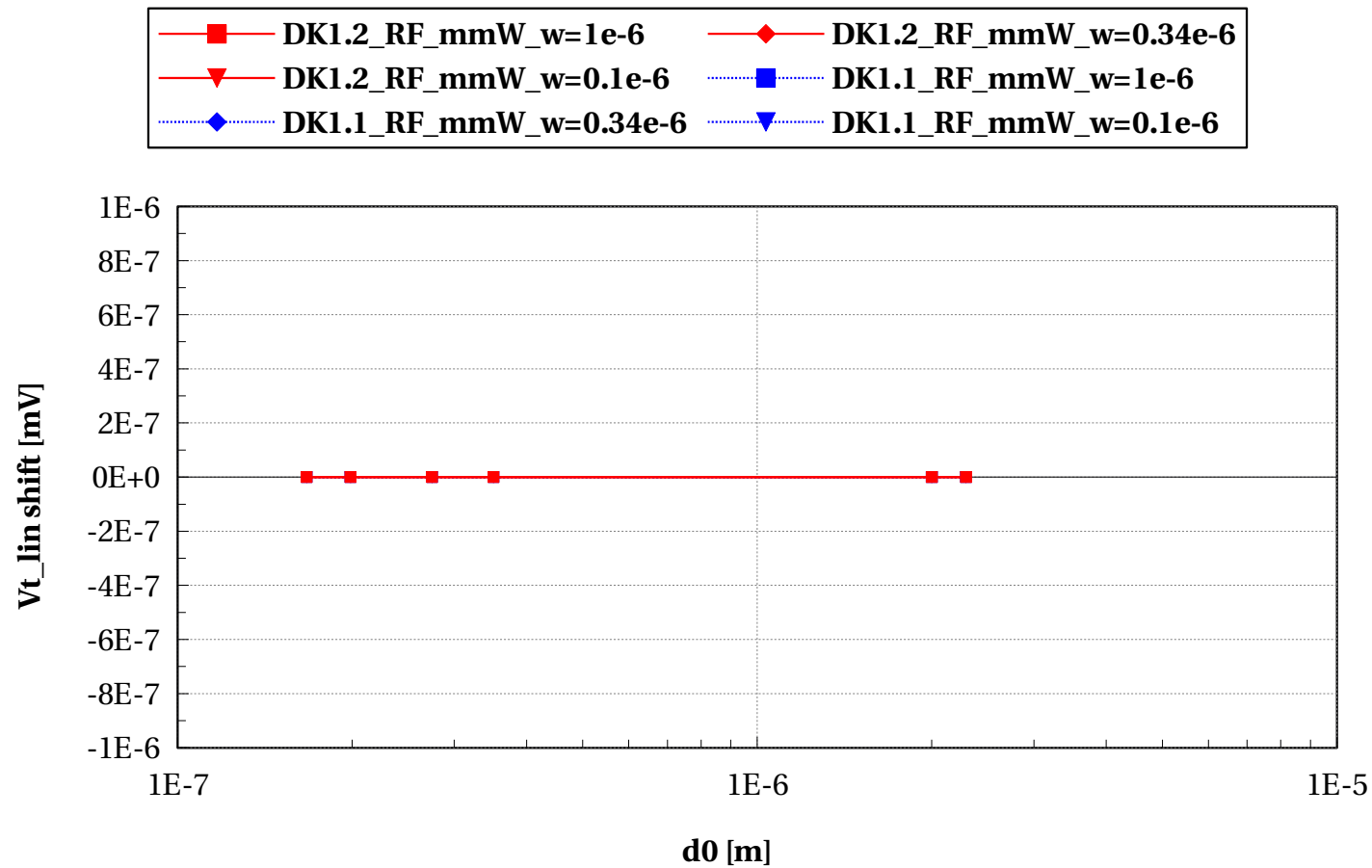
temp==25 and d1==10e-6 and L==0.03e-6



- WPE effect w.r.t d0 - Wscaling at $L=0.5u$

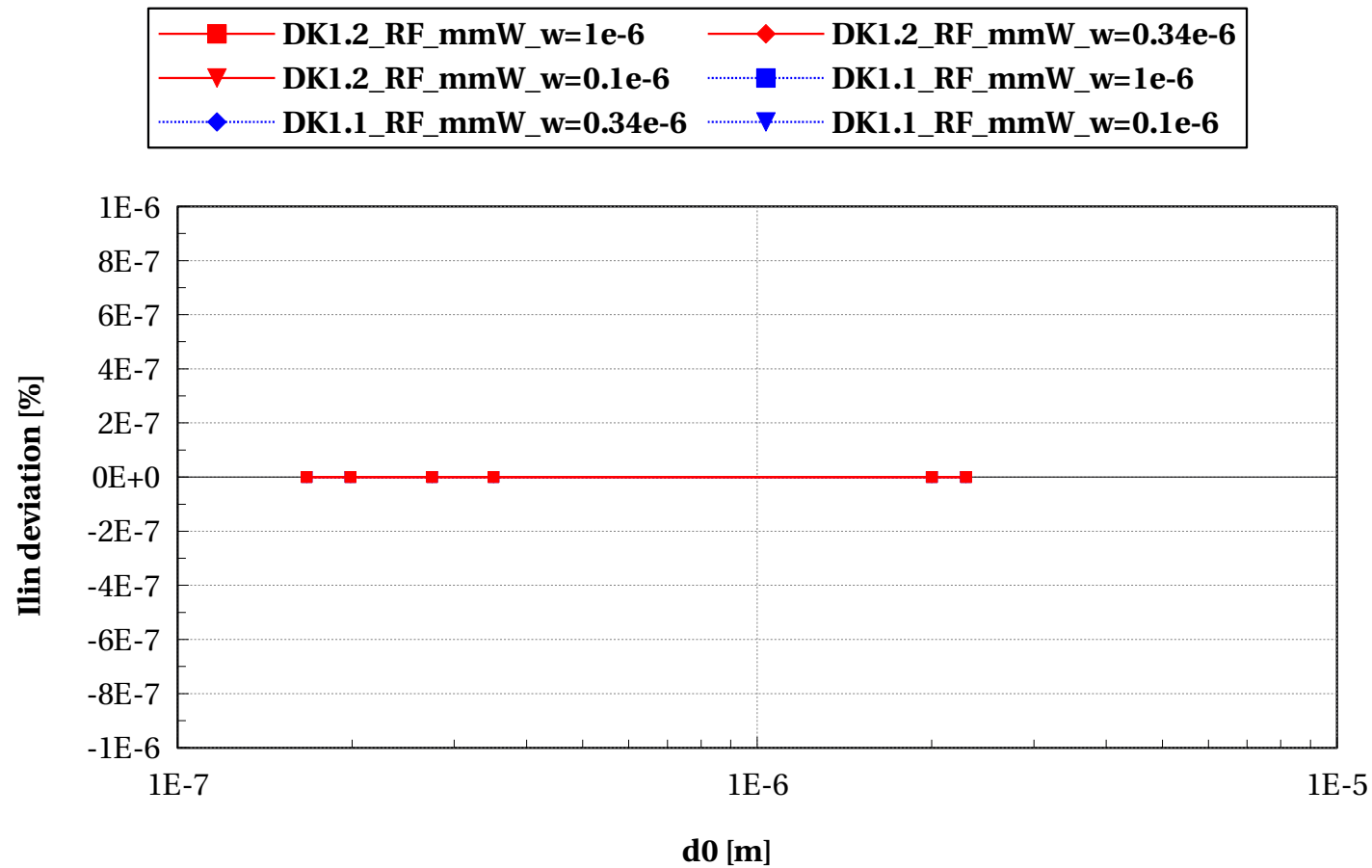
lvtnfet_acc, Vt_lin shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and L==0.5e-6



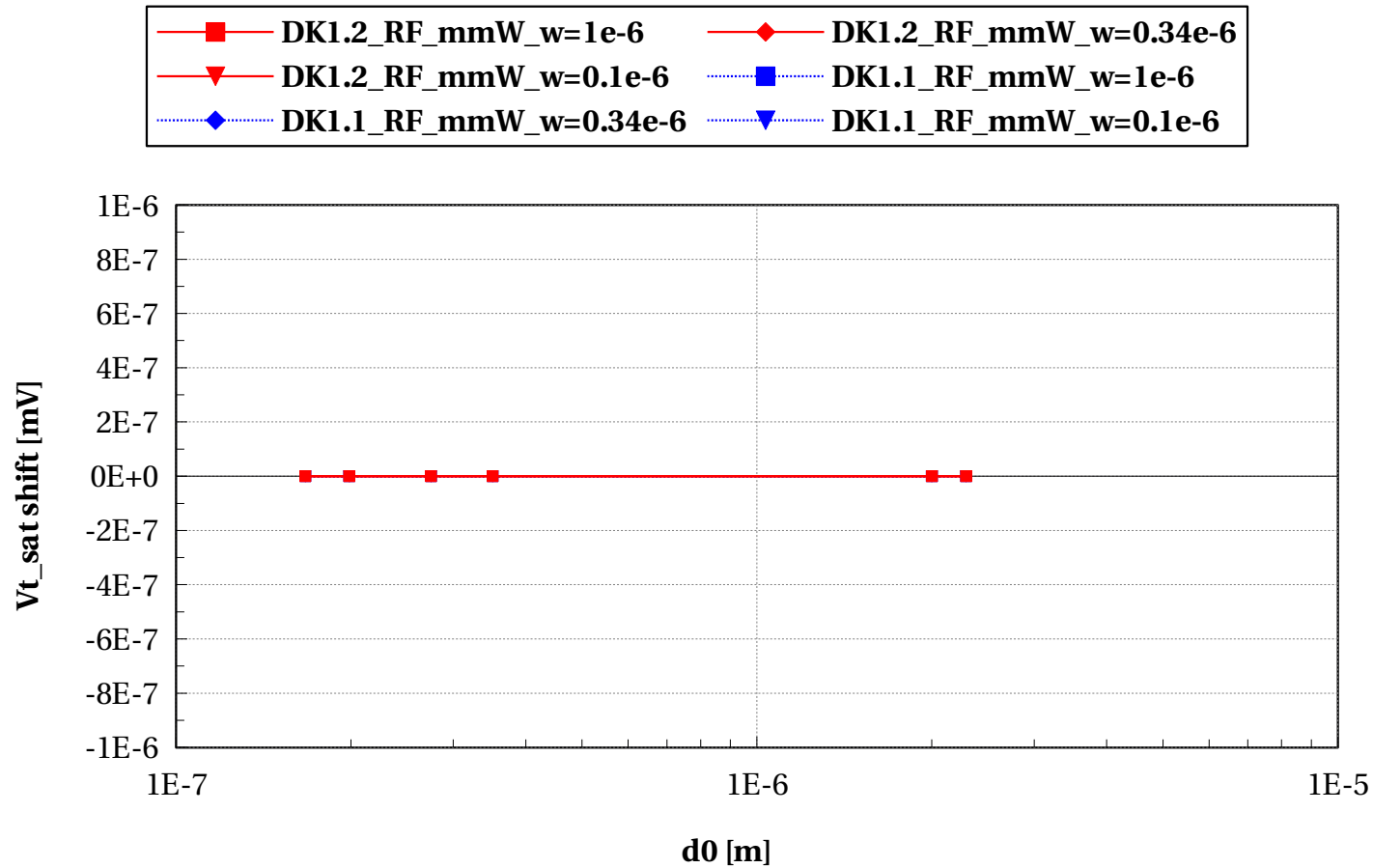
lvtnfet_acc, Ilin deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and L==0.5e-6



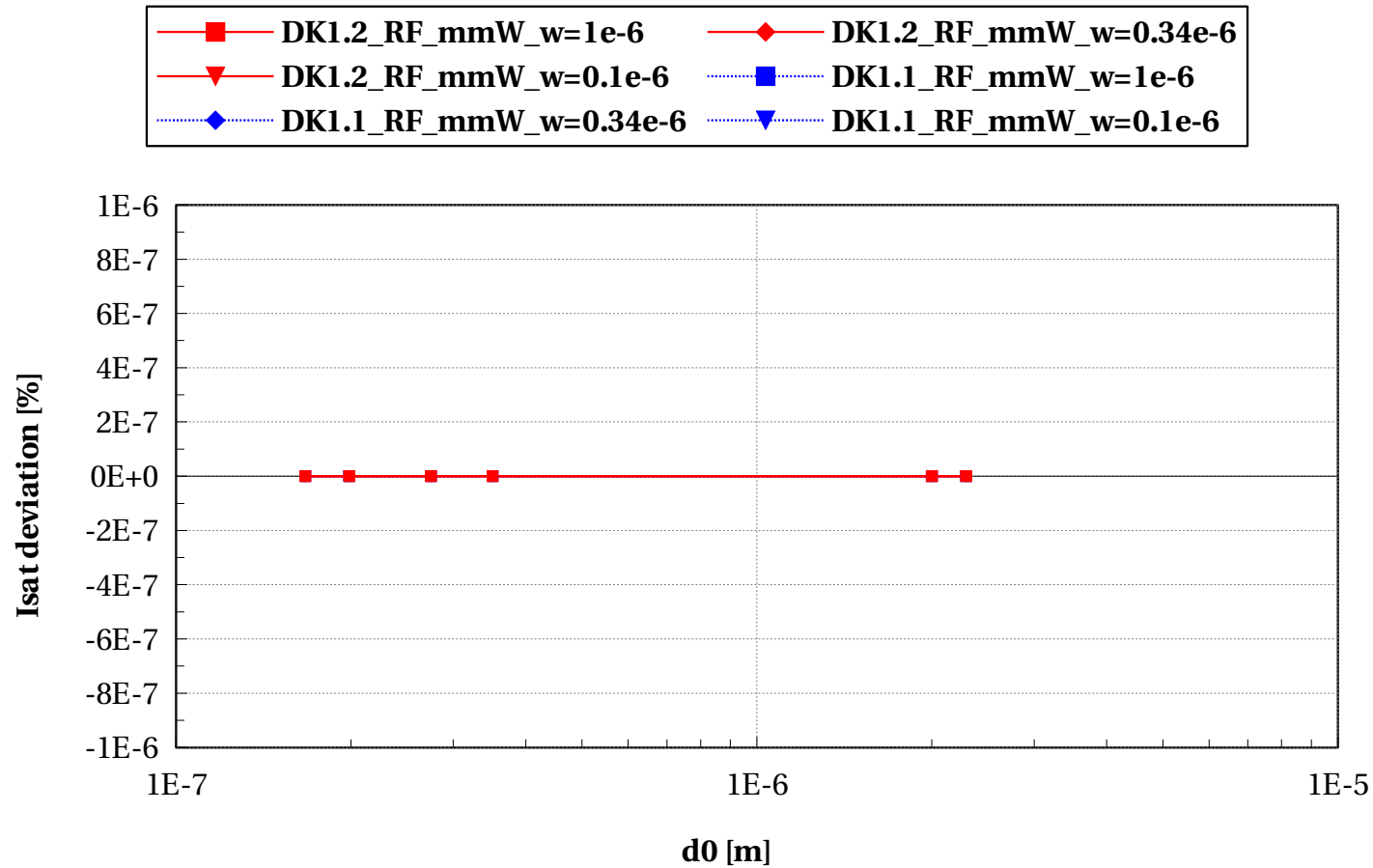
lvtnfet_acc, Vt_sat shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and L==0.5e-6



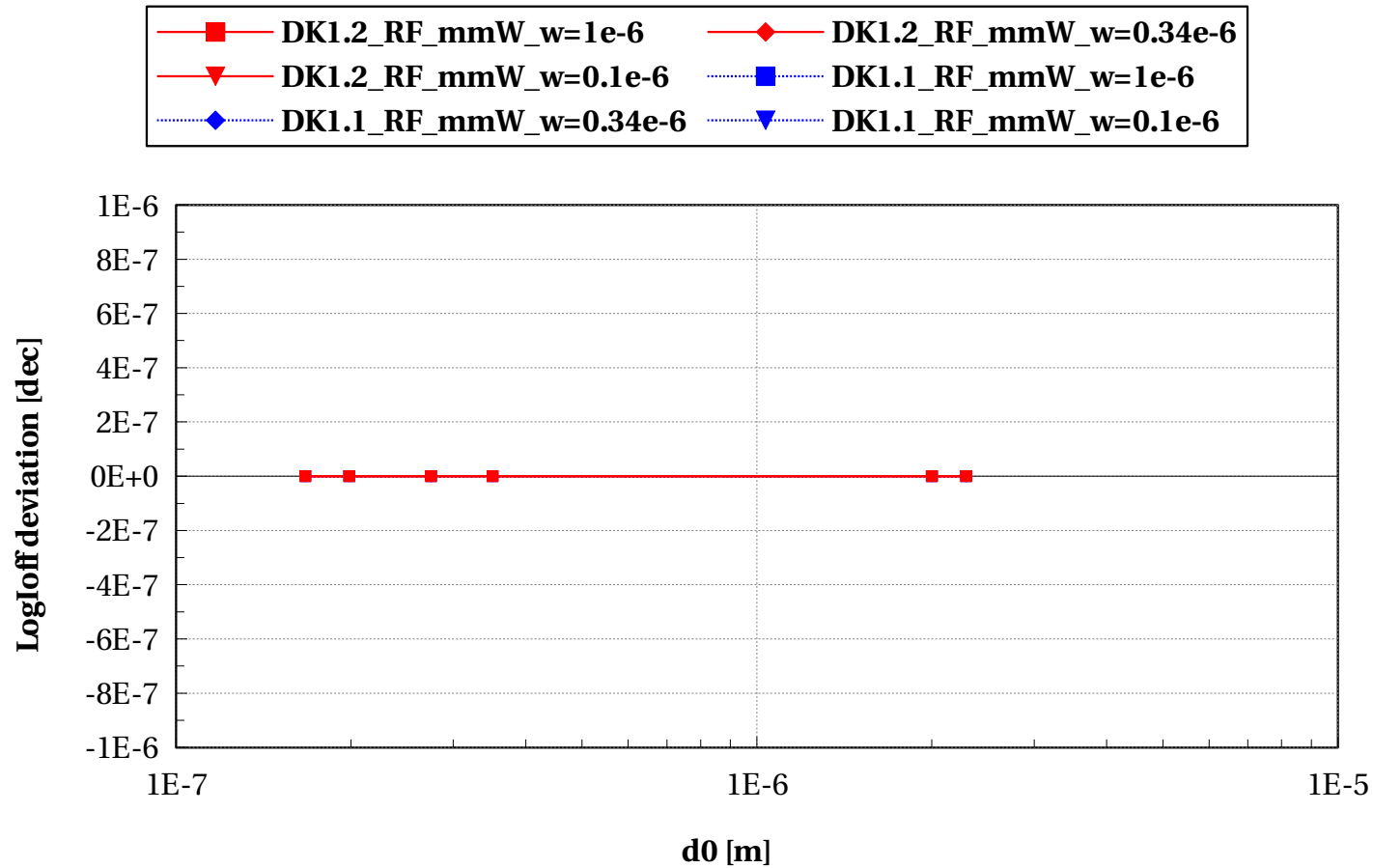
lvtnfet_acc, Isat deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and L==0.5e-6



lvtnfet_acc, Logloff deviation [dec] vs d0 [m]

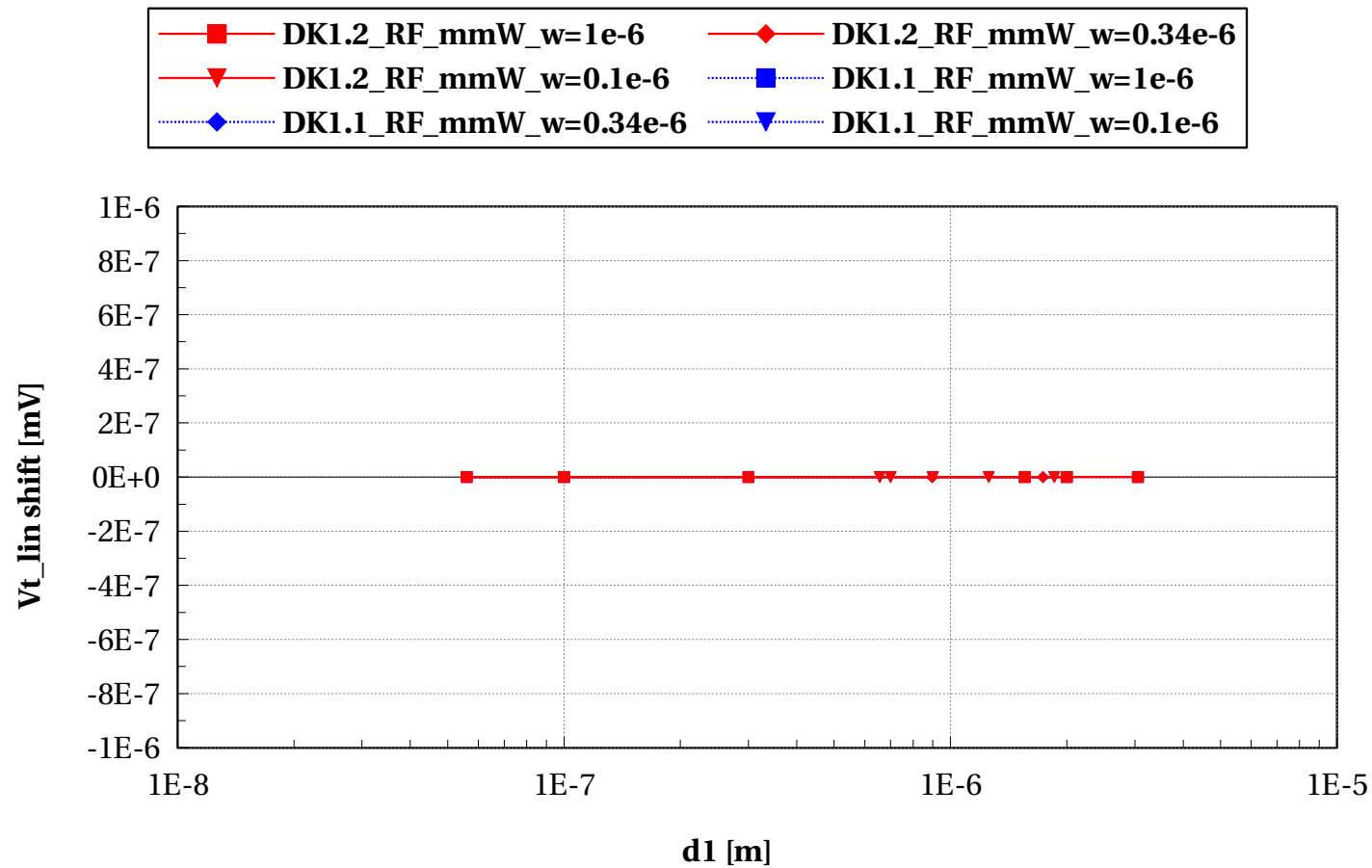
temp==25 and d1==10e-6 and L==0.5e-6



- WPE effect w.r.t d1 - Wscaling at $L=0.03u$

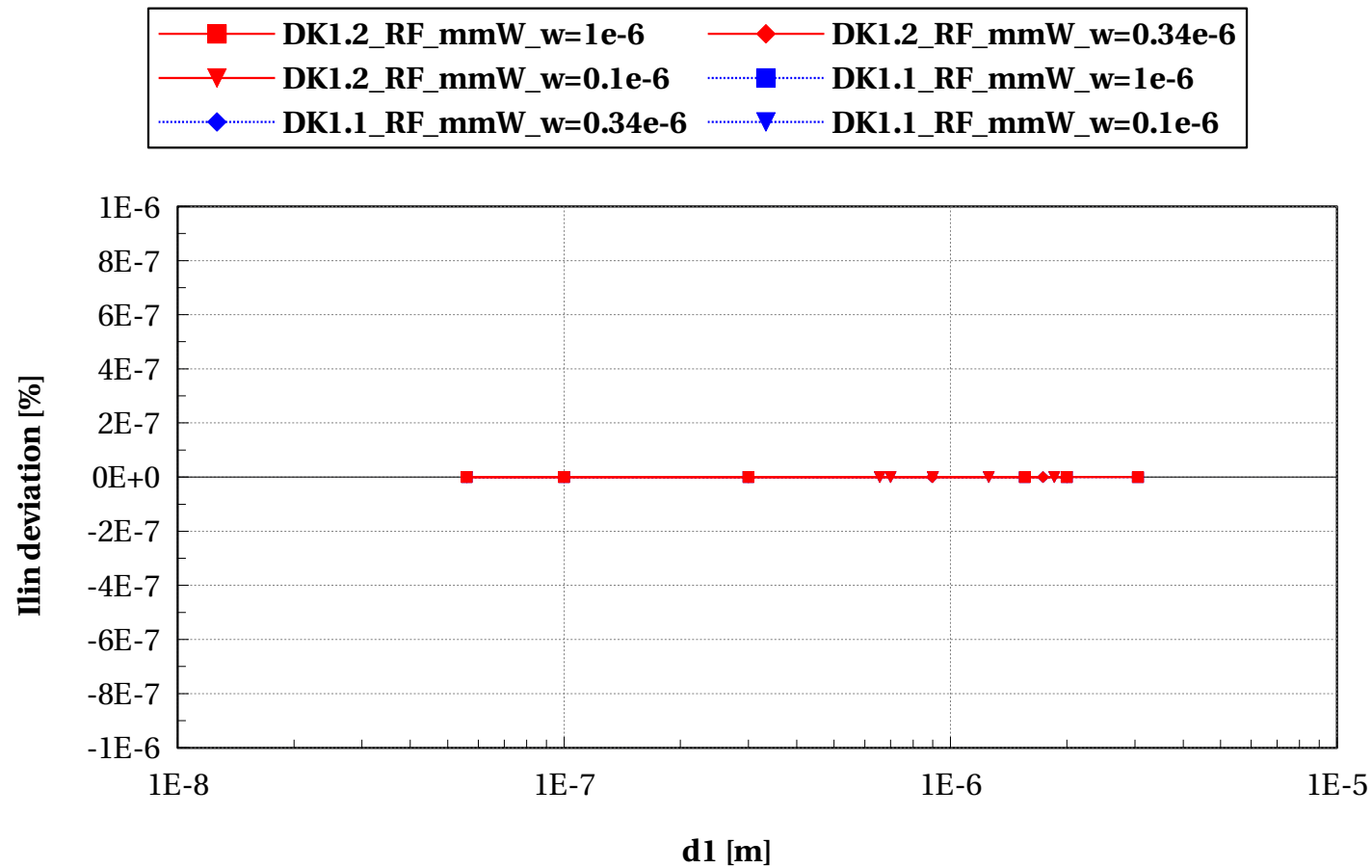
lvtnfet_acc, Vt_lin shift [mV] vs d1 [m]

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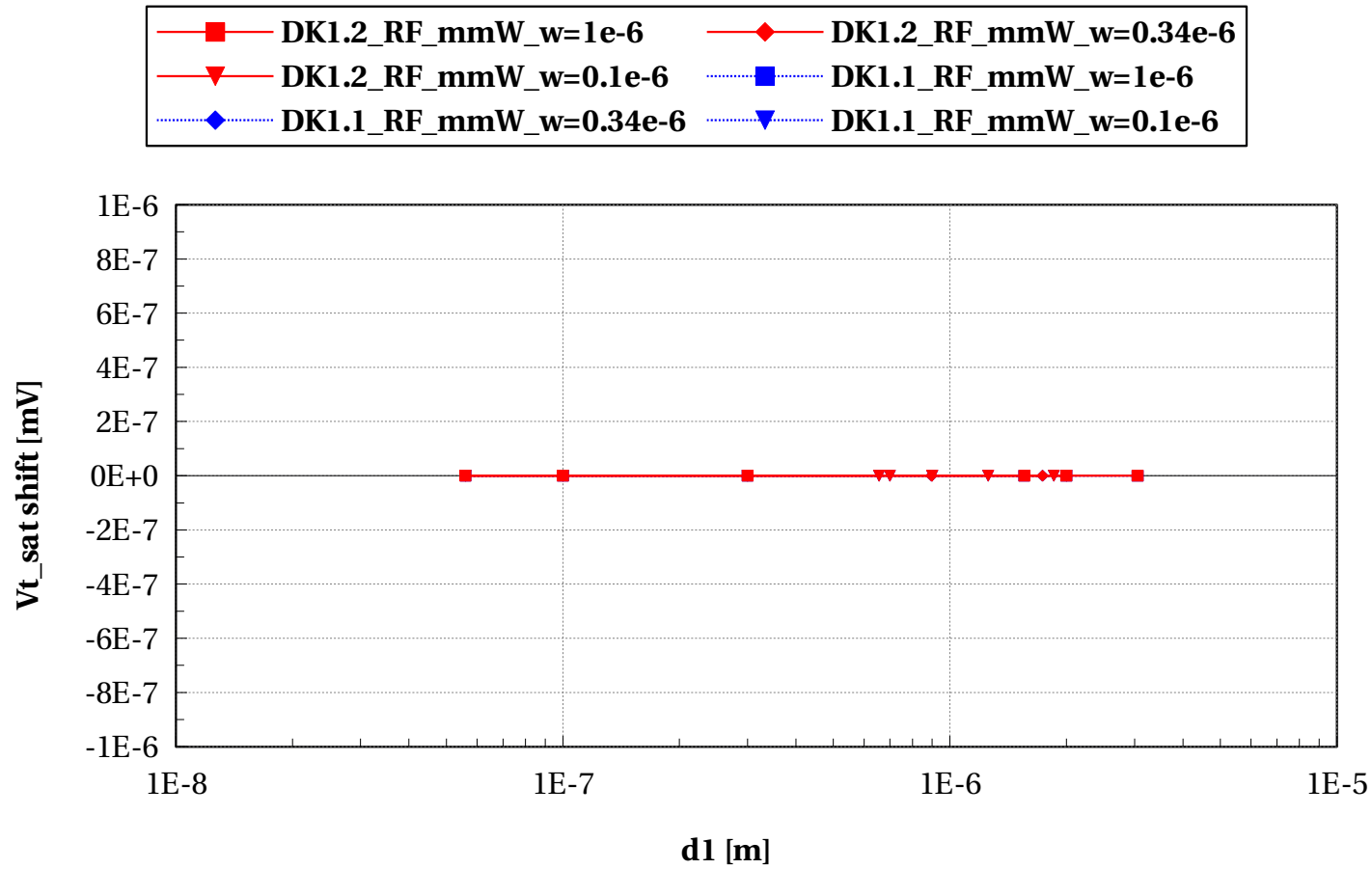
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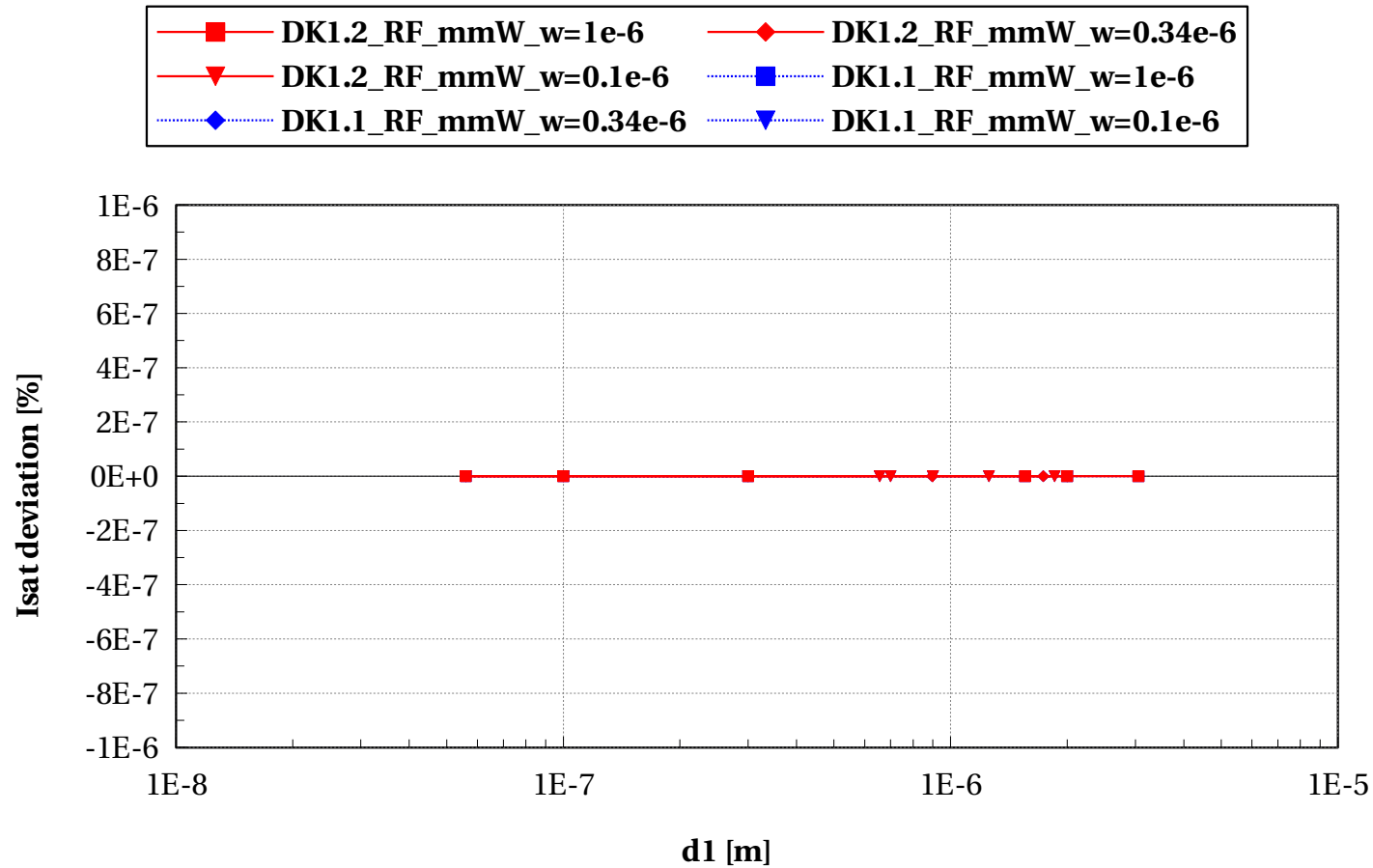
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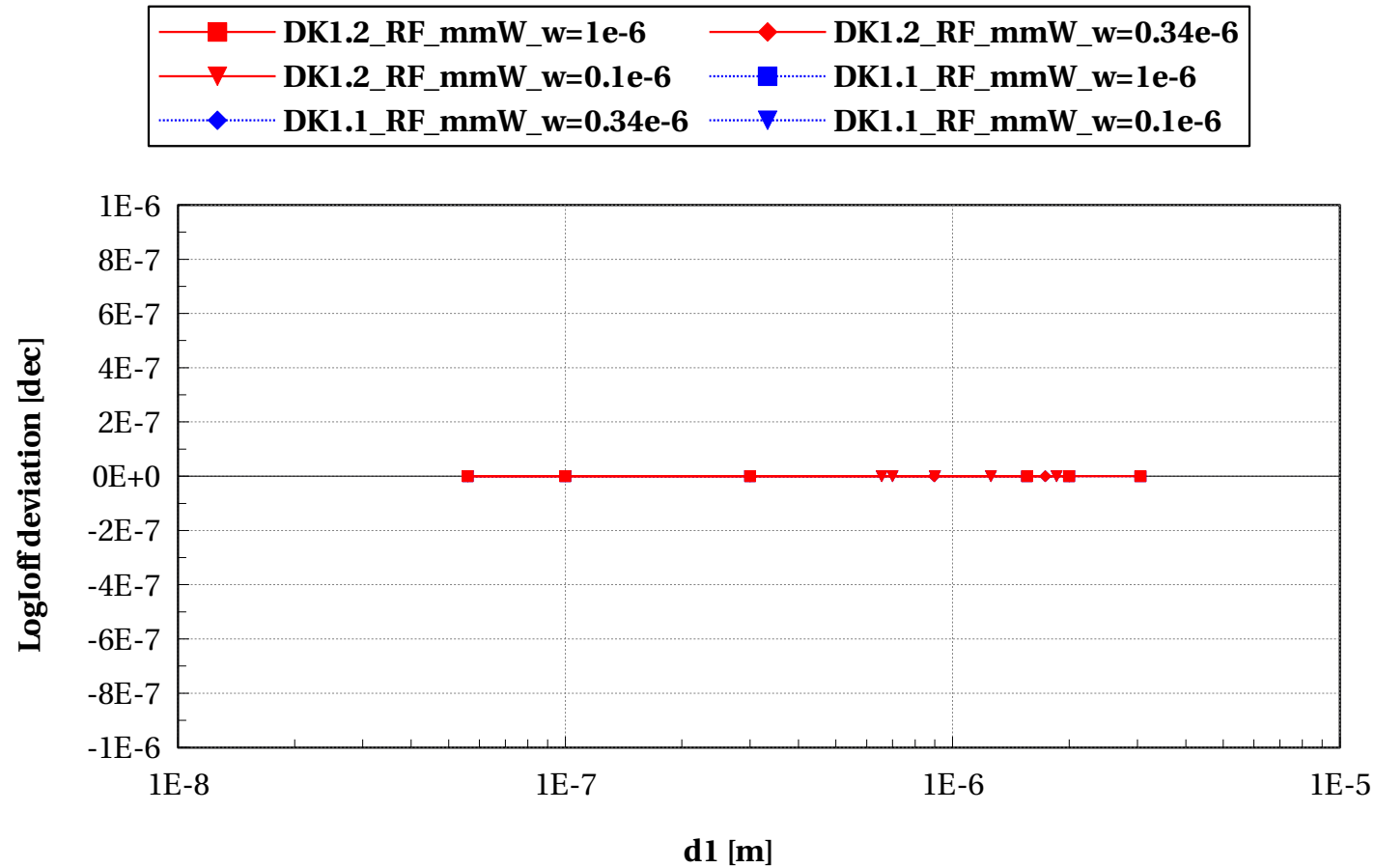
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lvtnfet_acc, Logloff deviation [dec] vs d1 [m]

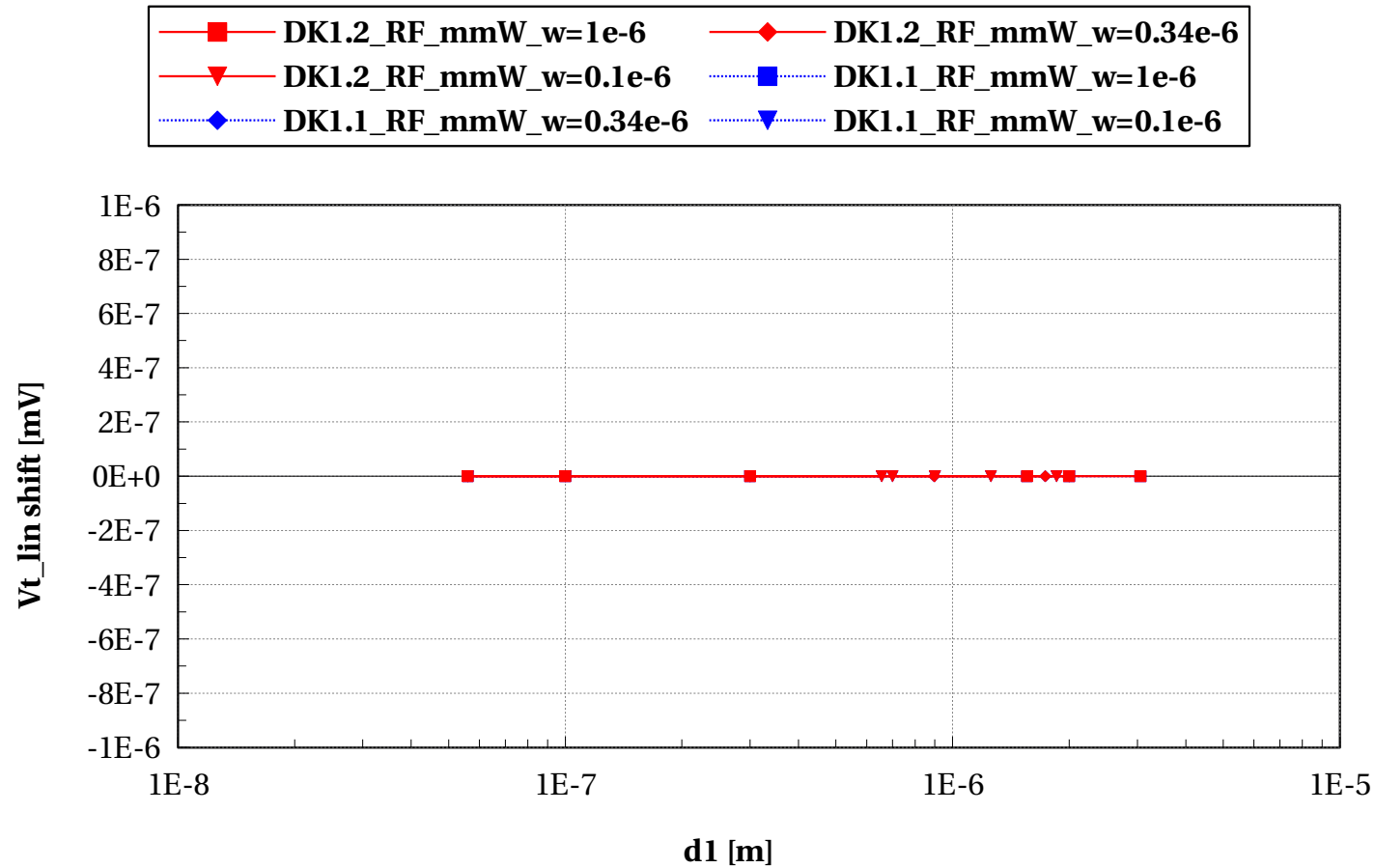
temp==25 and d0==10e-6 and L==0.03e-6



- WPE effect w.r.t d1 - Wscaling at $L=0.12u$

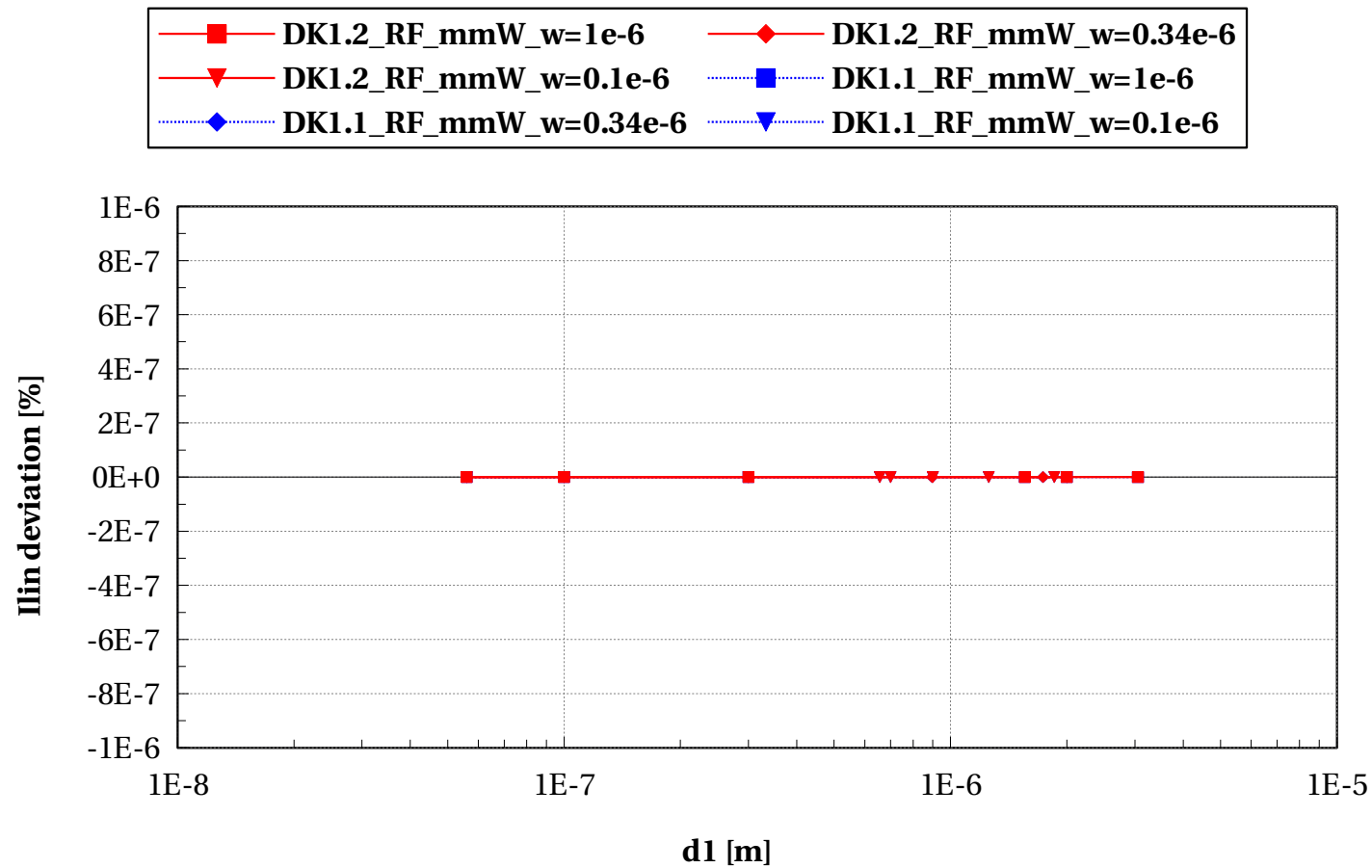
lvtnfet_acc, Vt_lin shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and L==0.12e-6



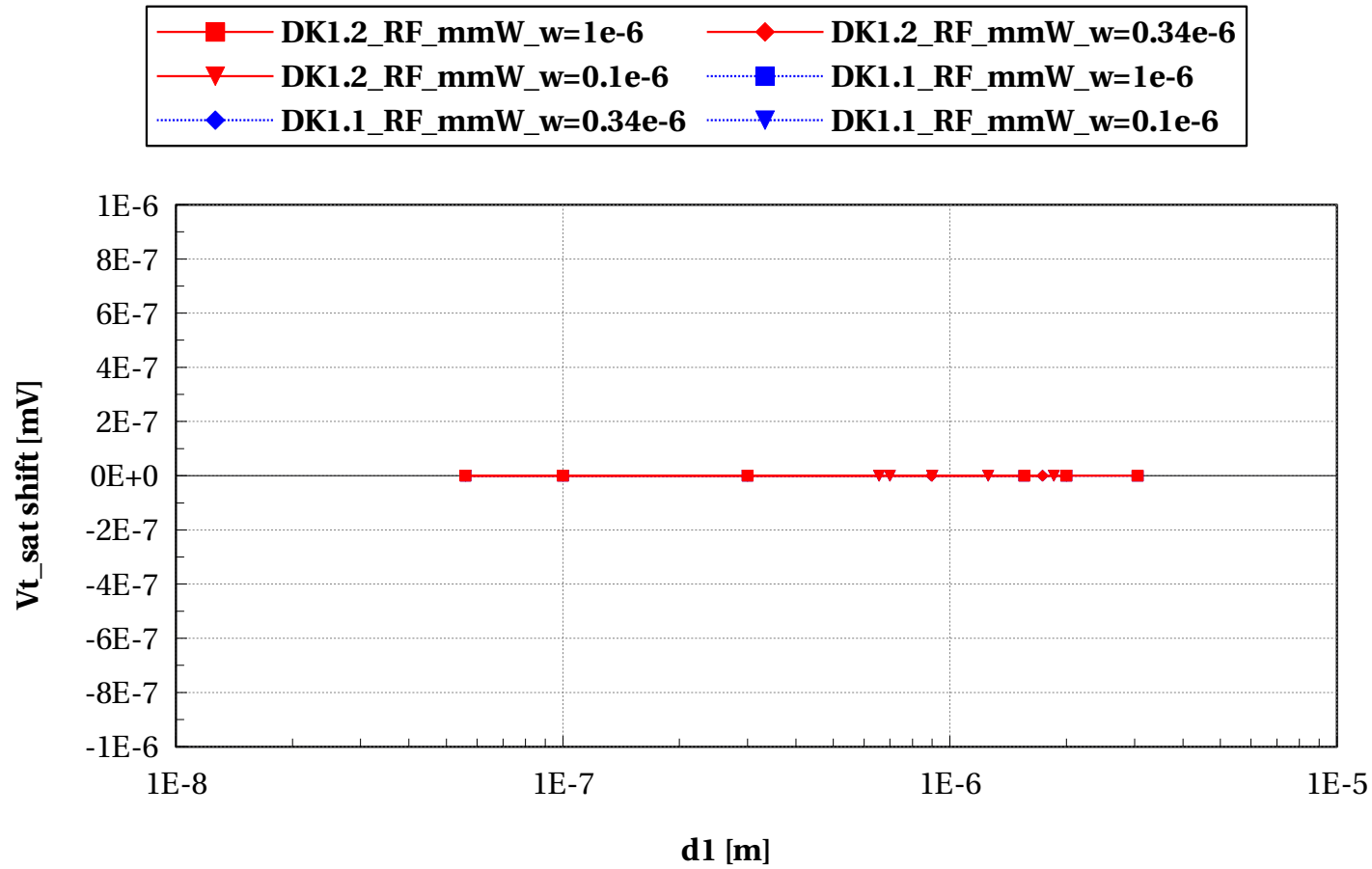
lvtnfet_acc, Ilin deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and L==0.12e-6



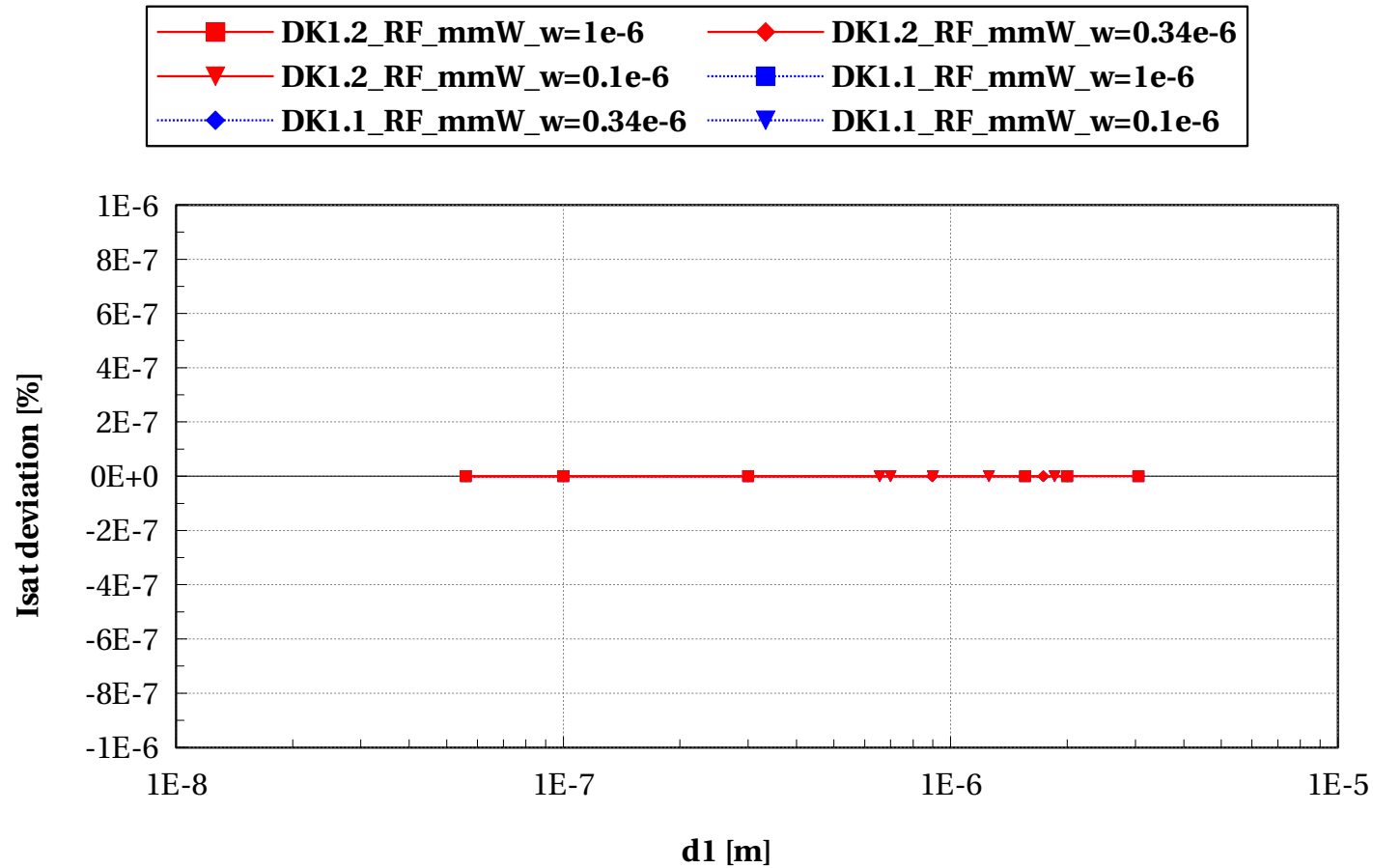
lvtnfet_acc, Vt_sat shift [mV] vs d1 [m]

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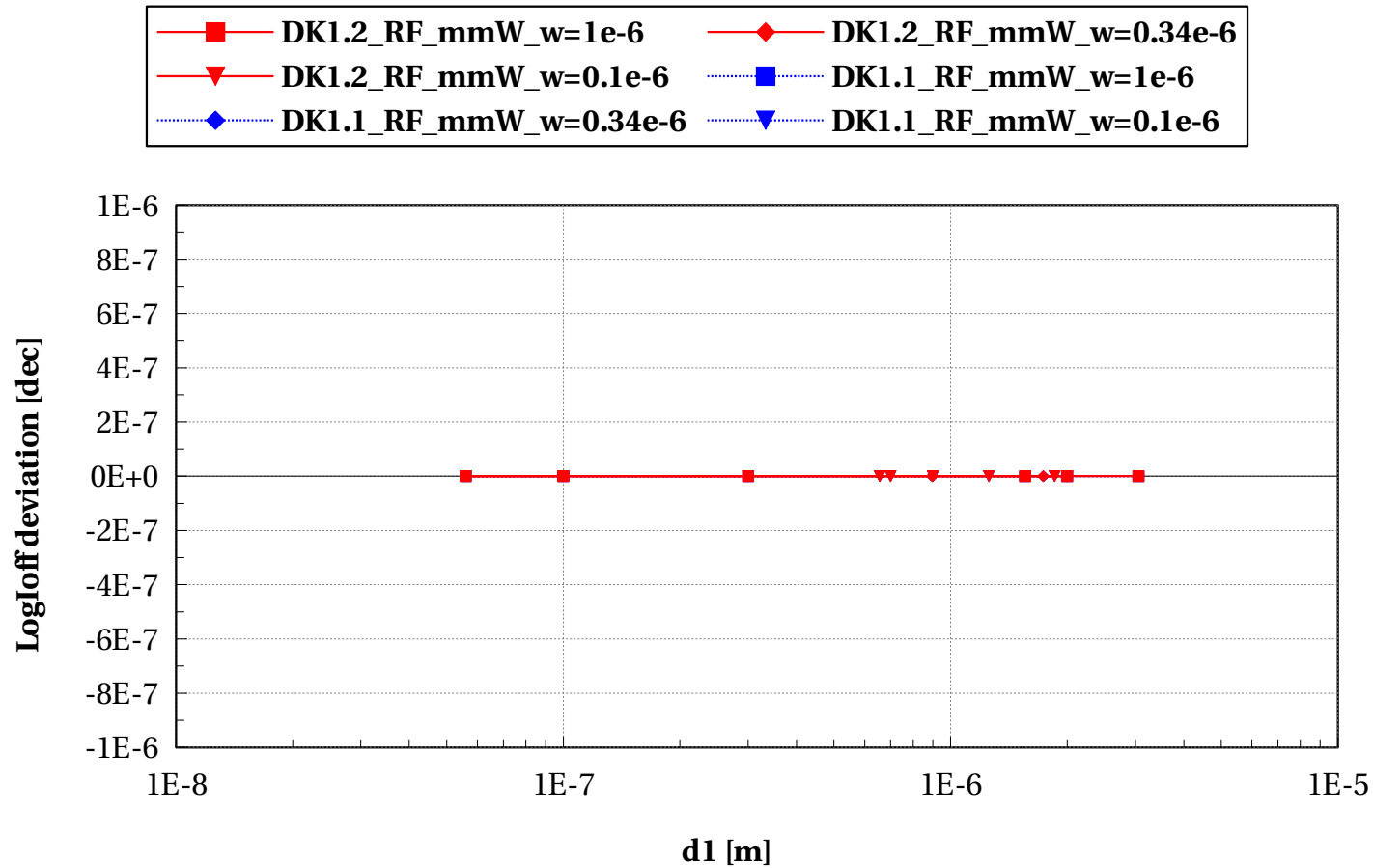
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lvtnfet_acc, Logloff deviation [dec] vs d1 [m]

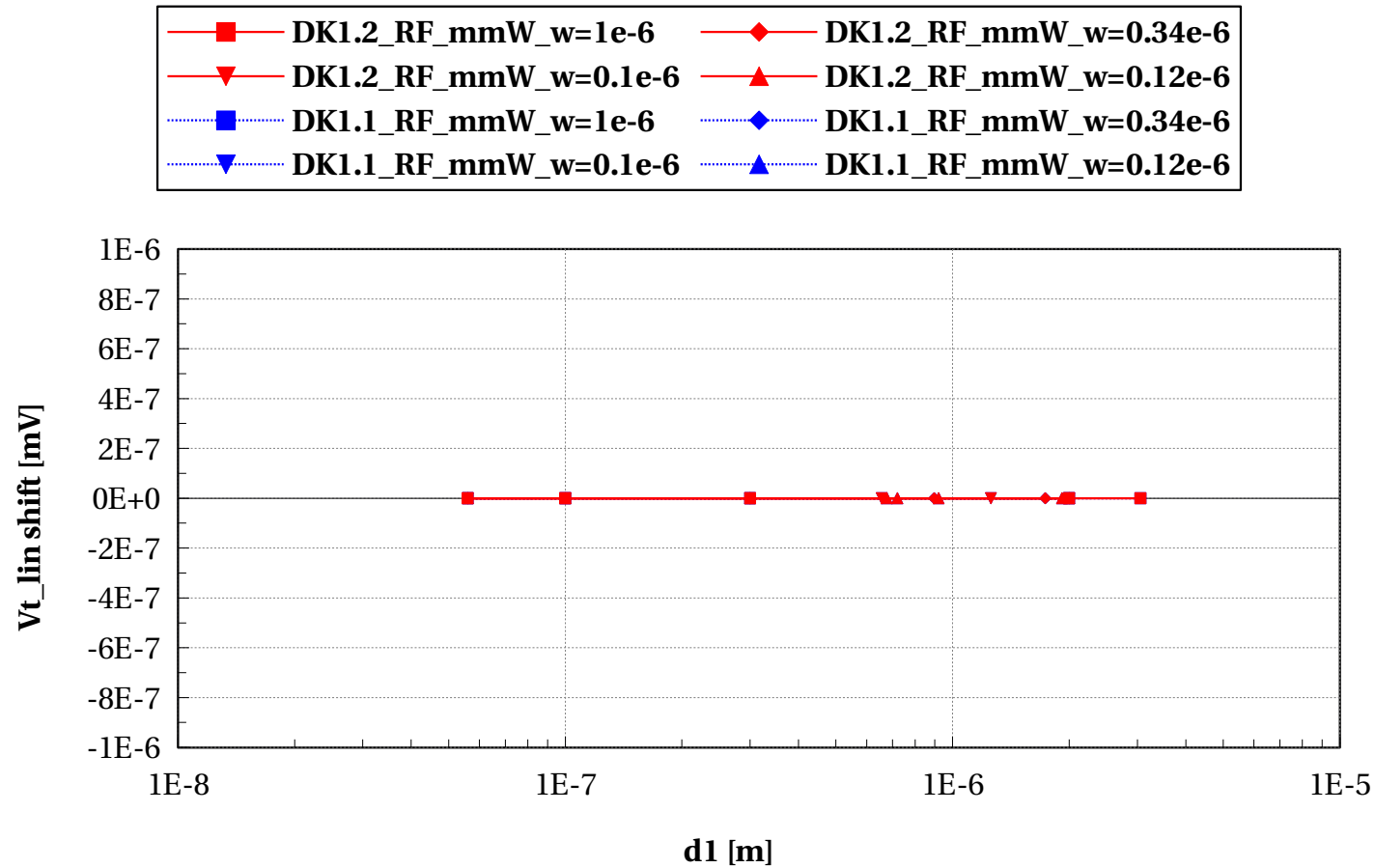
temp==25 and d0==10e-6 and L==0.12e-6



- WPE effect w.r.t d1 - Wscaling at L=1u

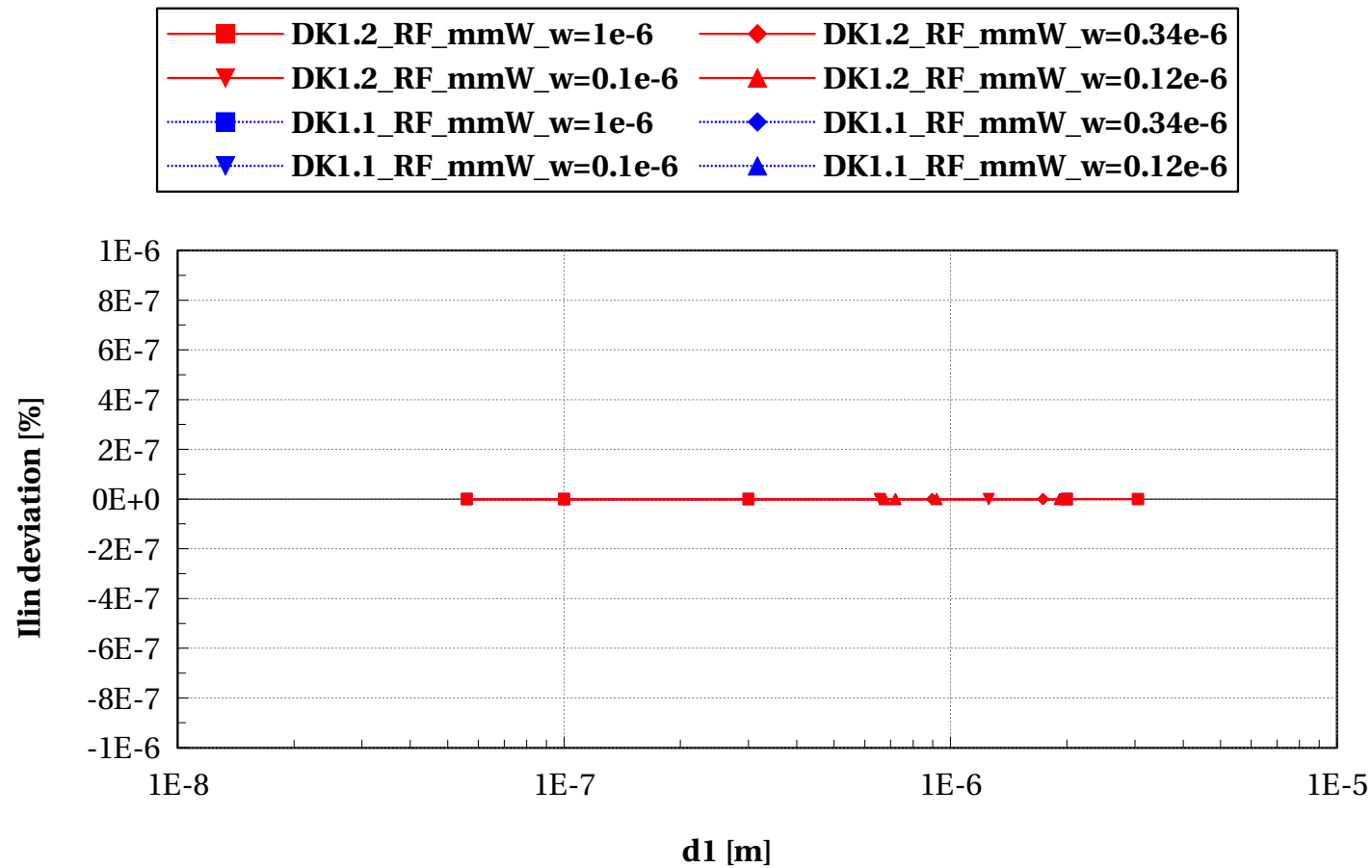
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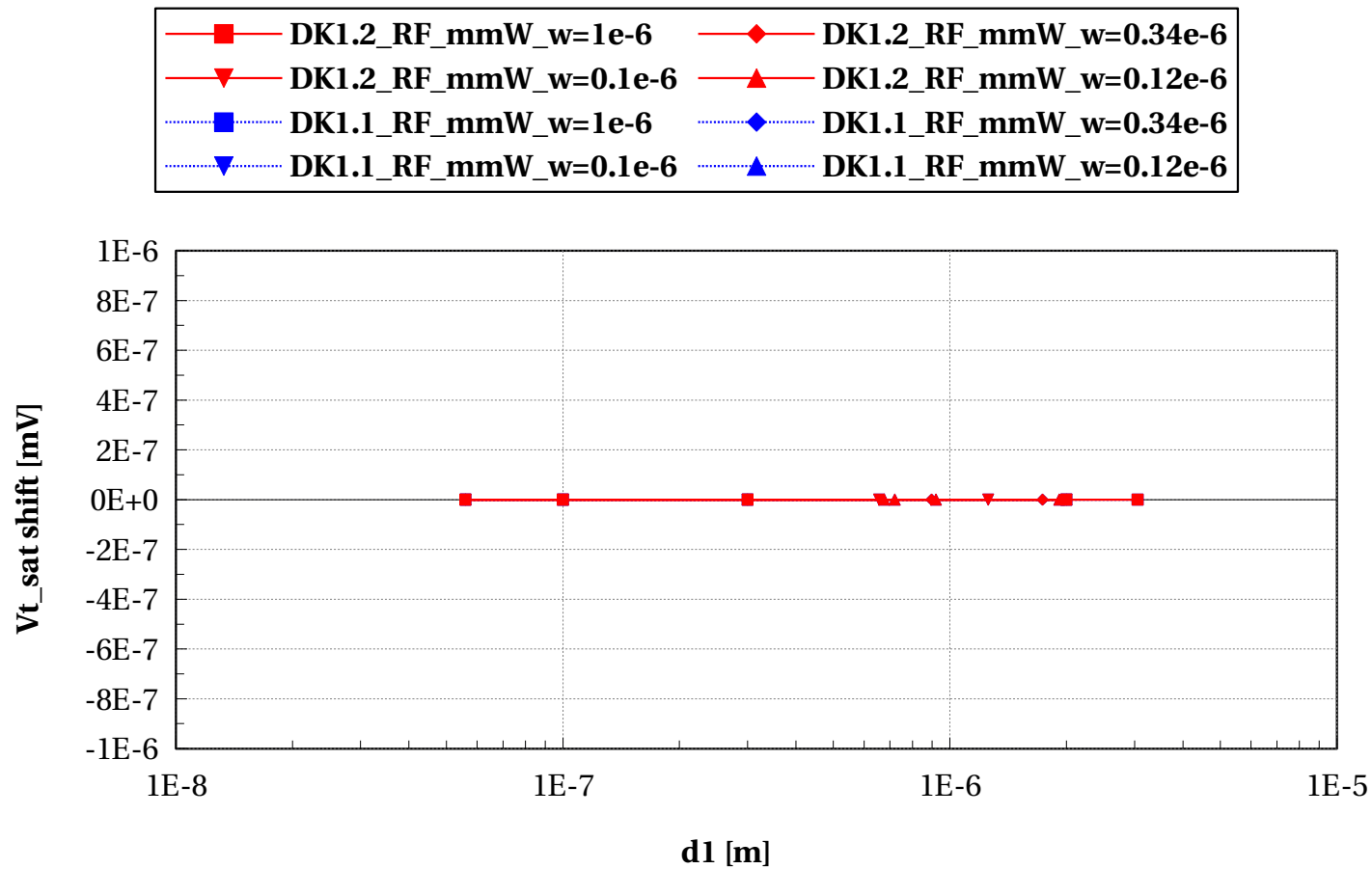
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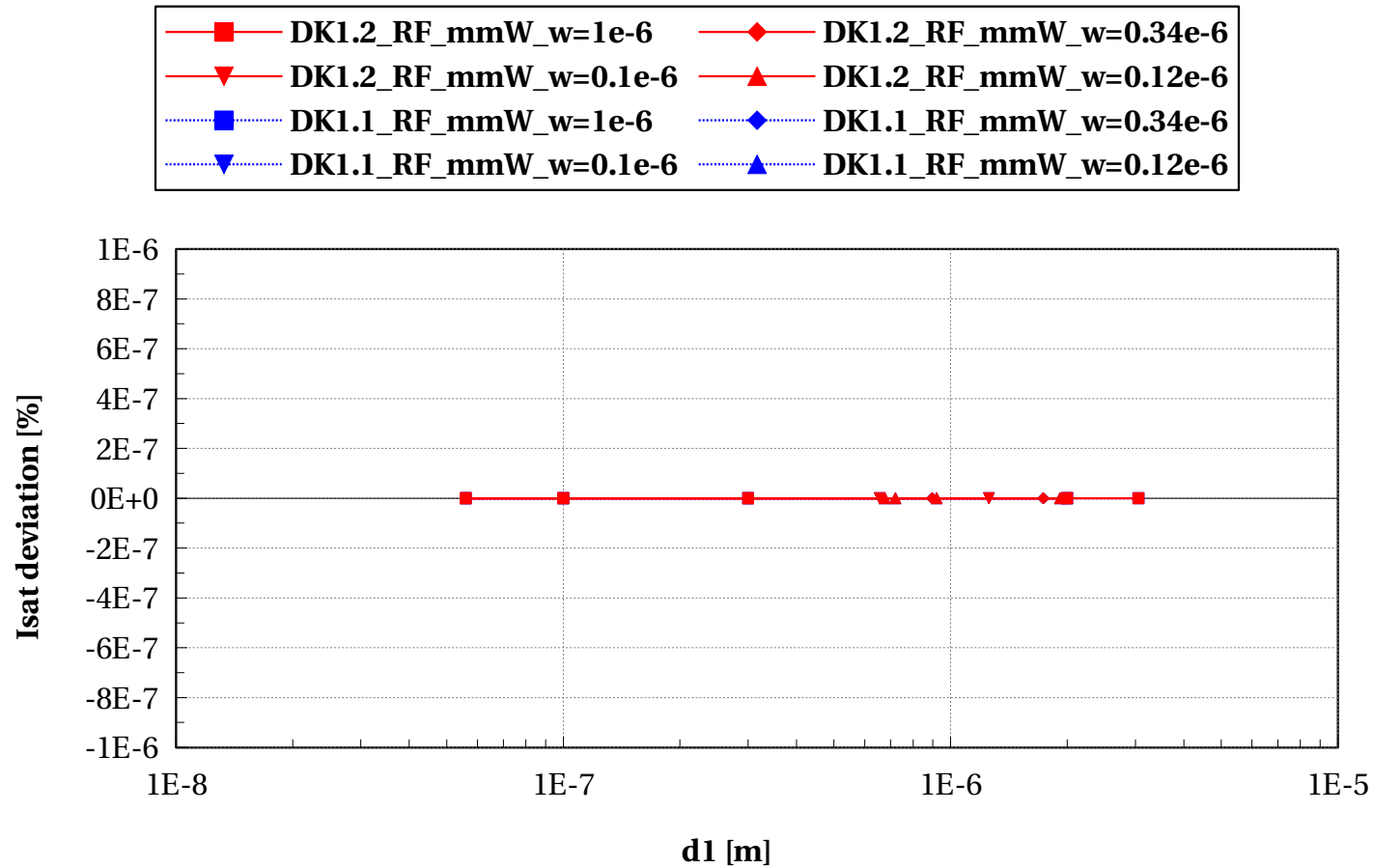
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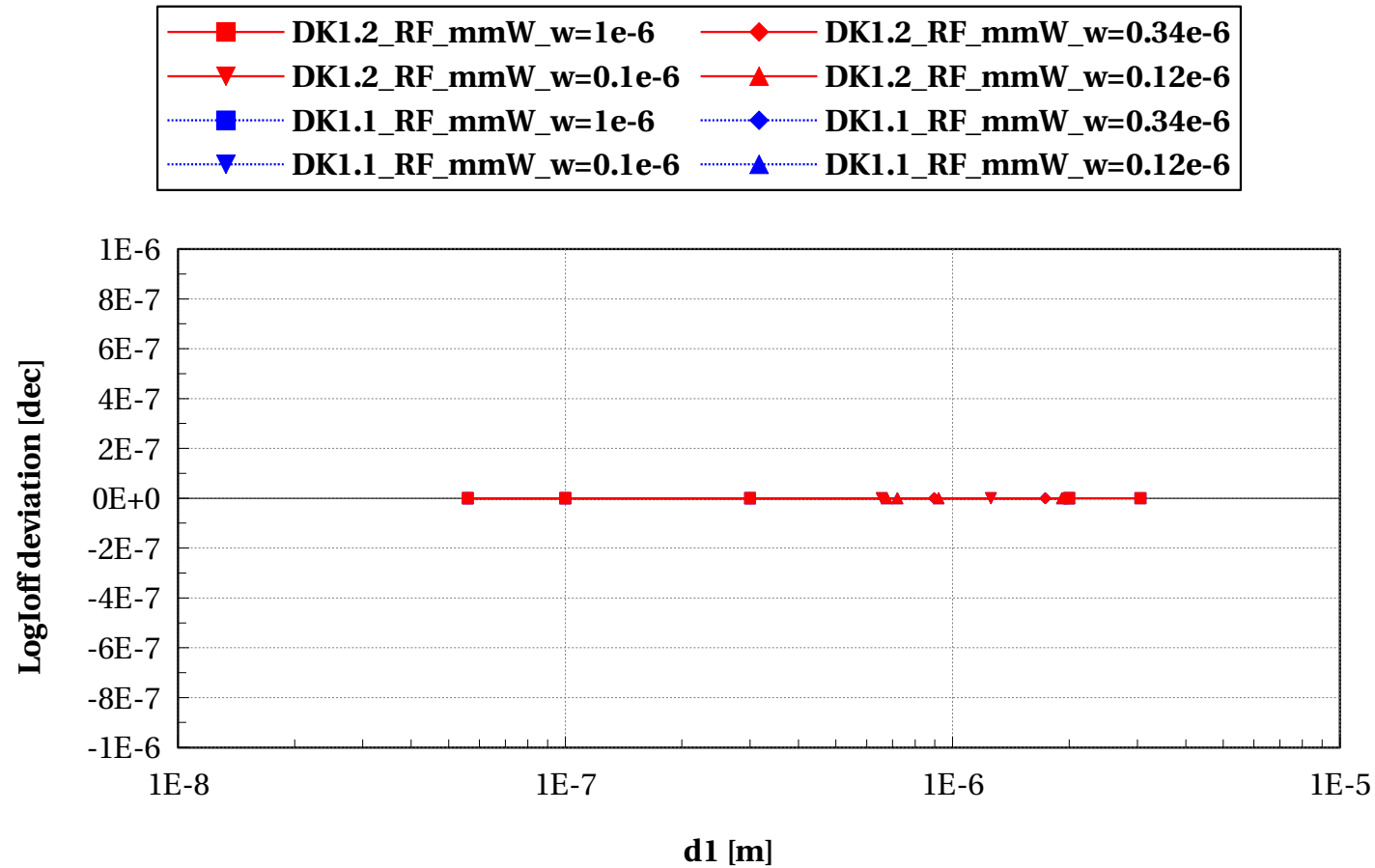
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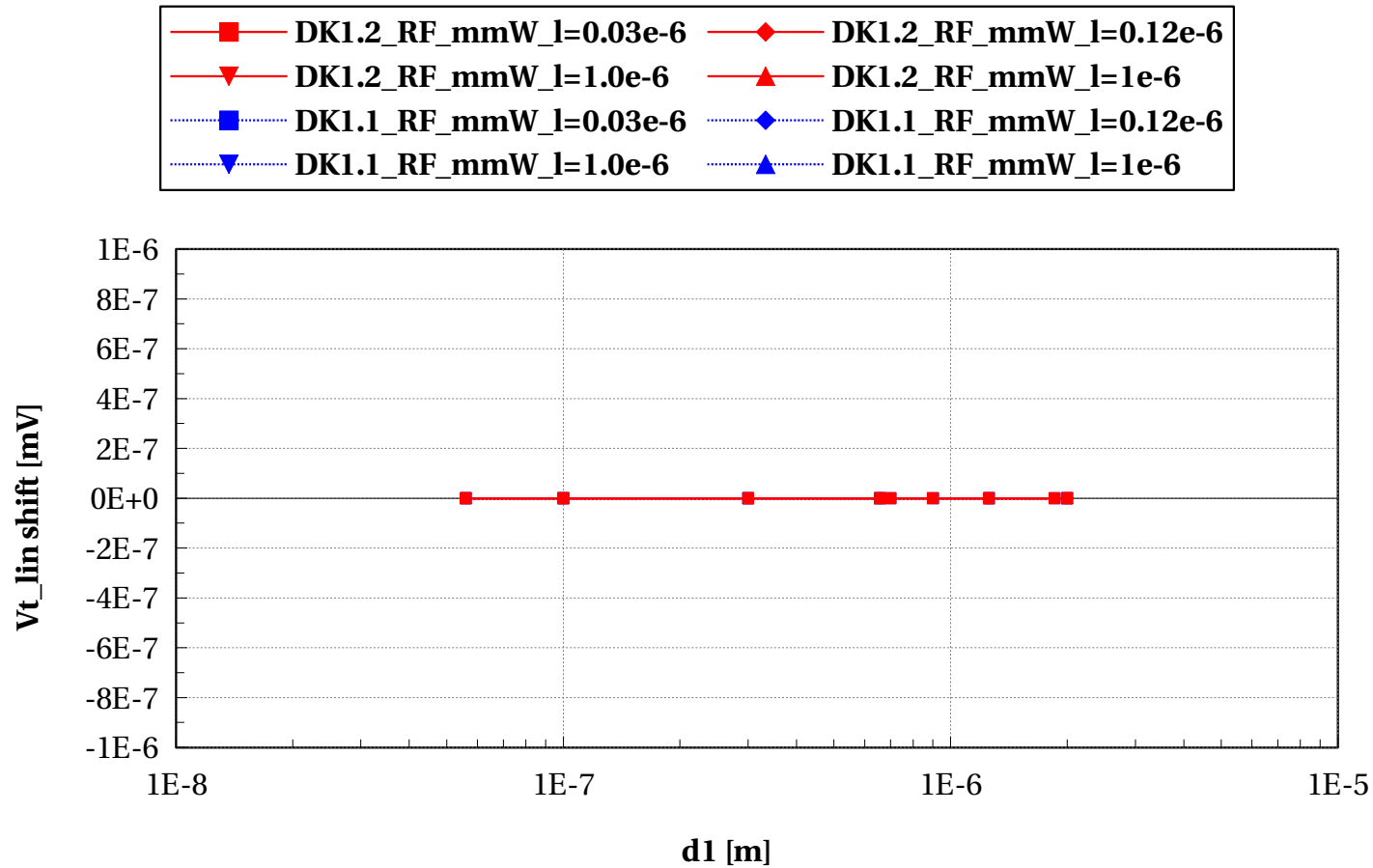
temp==25 and d0==10e-6 and L==1e-6



- WPE effect w.r.t d1 - Lscaling at $W=0.1u$

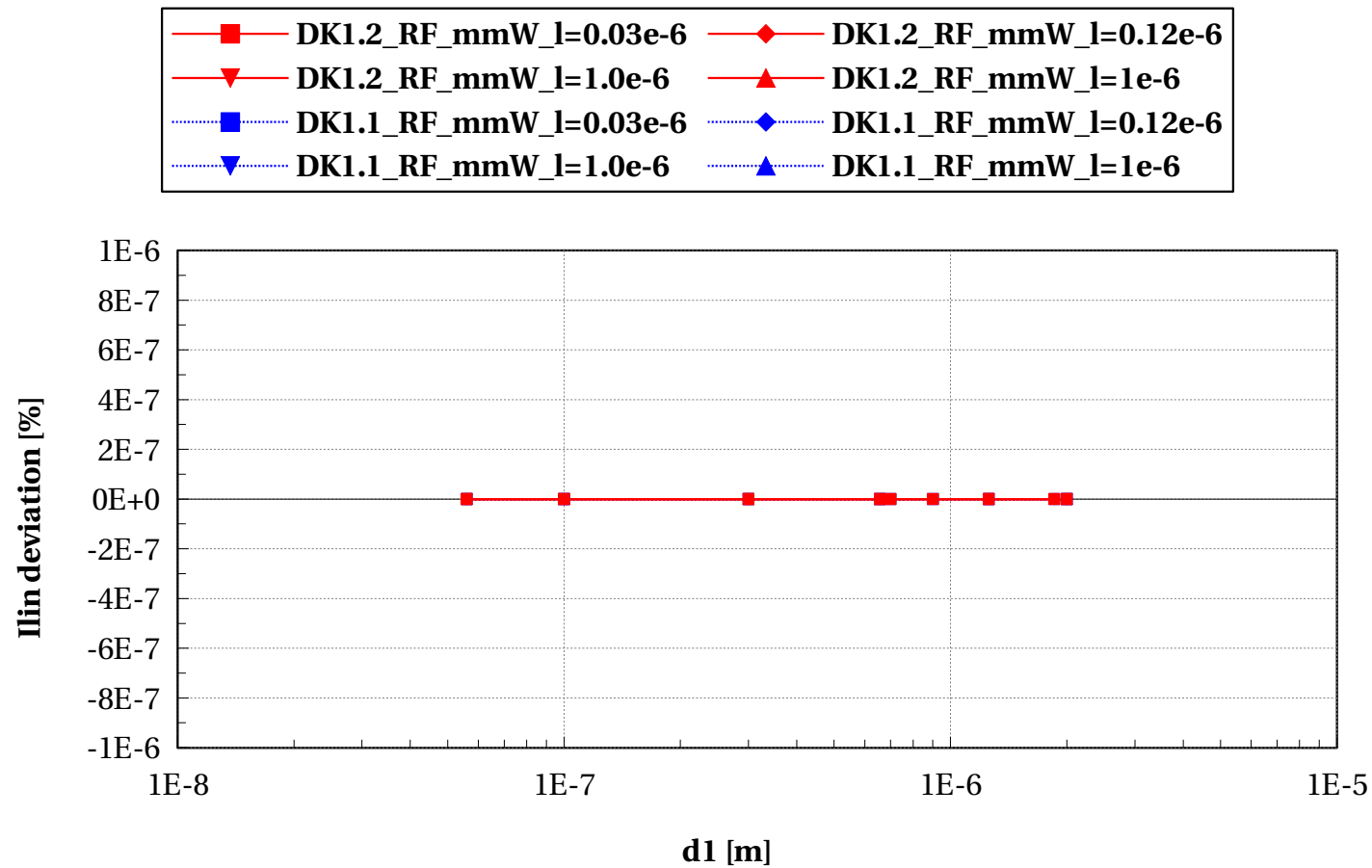
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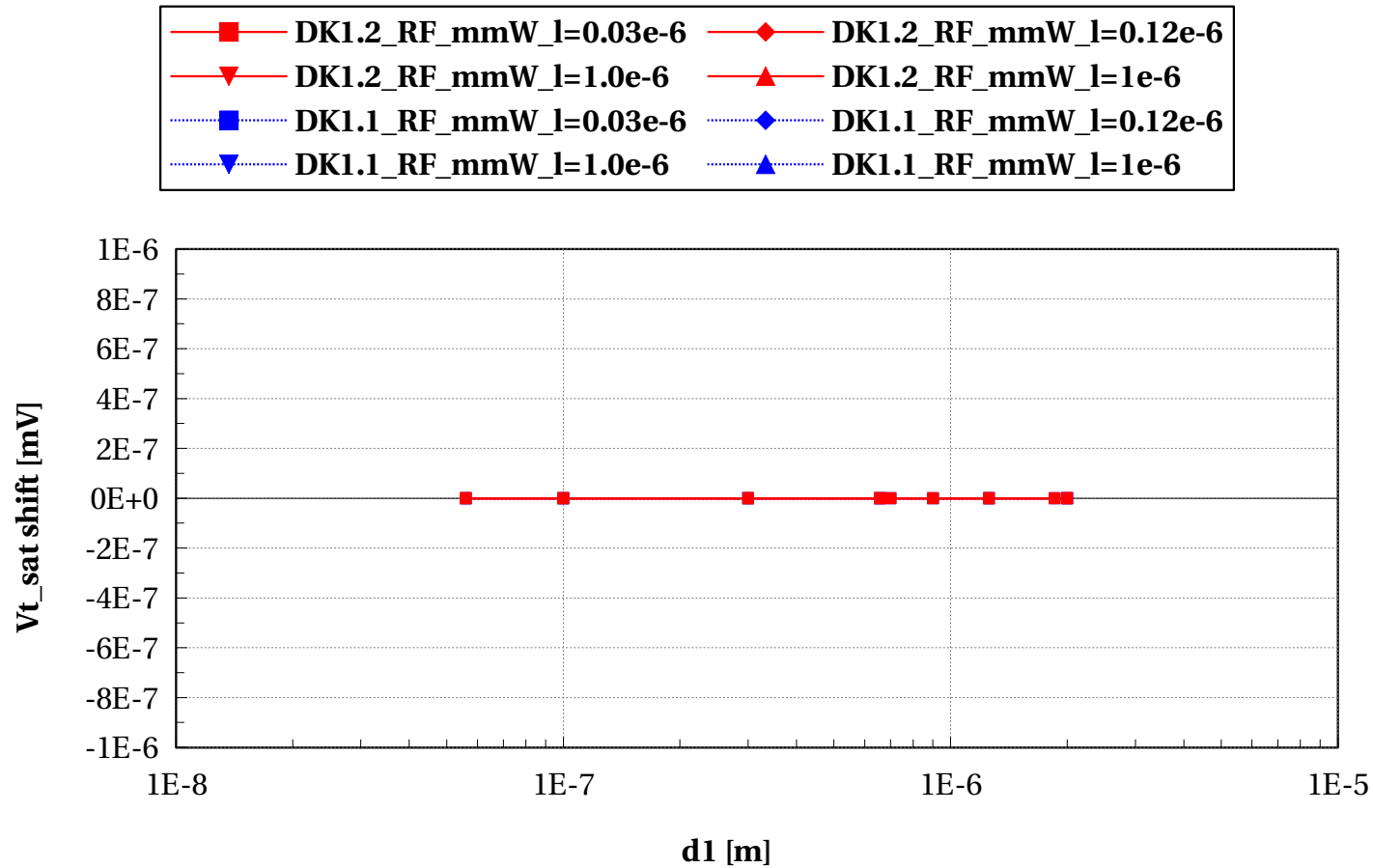
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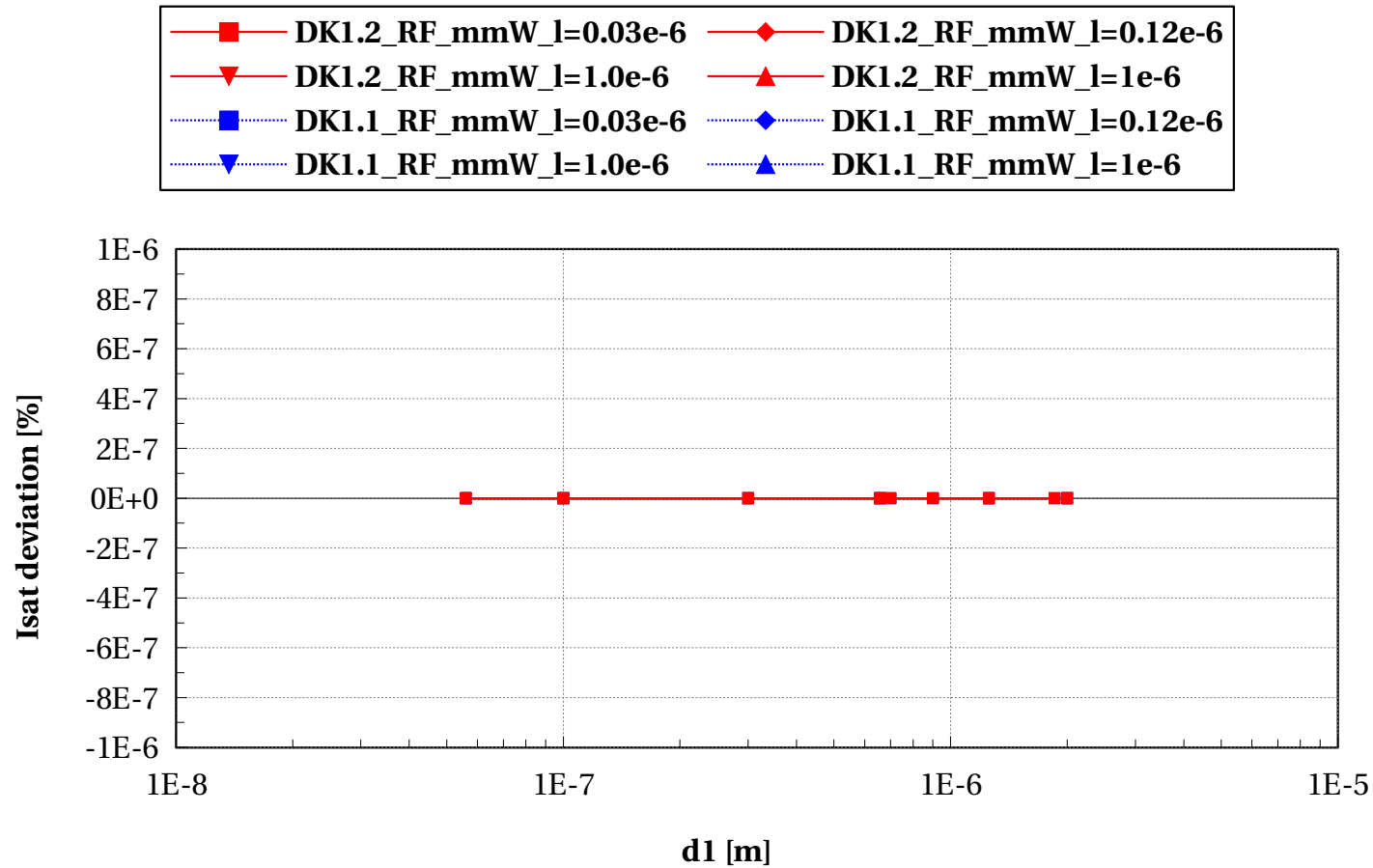
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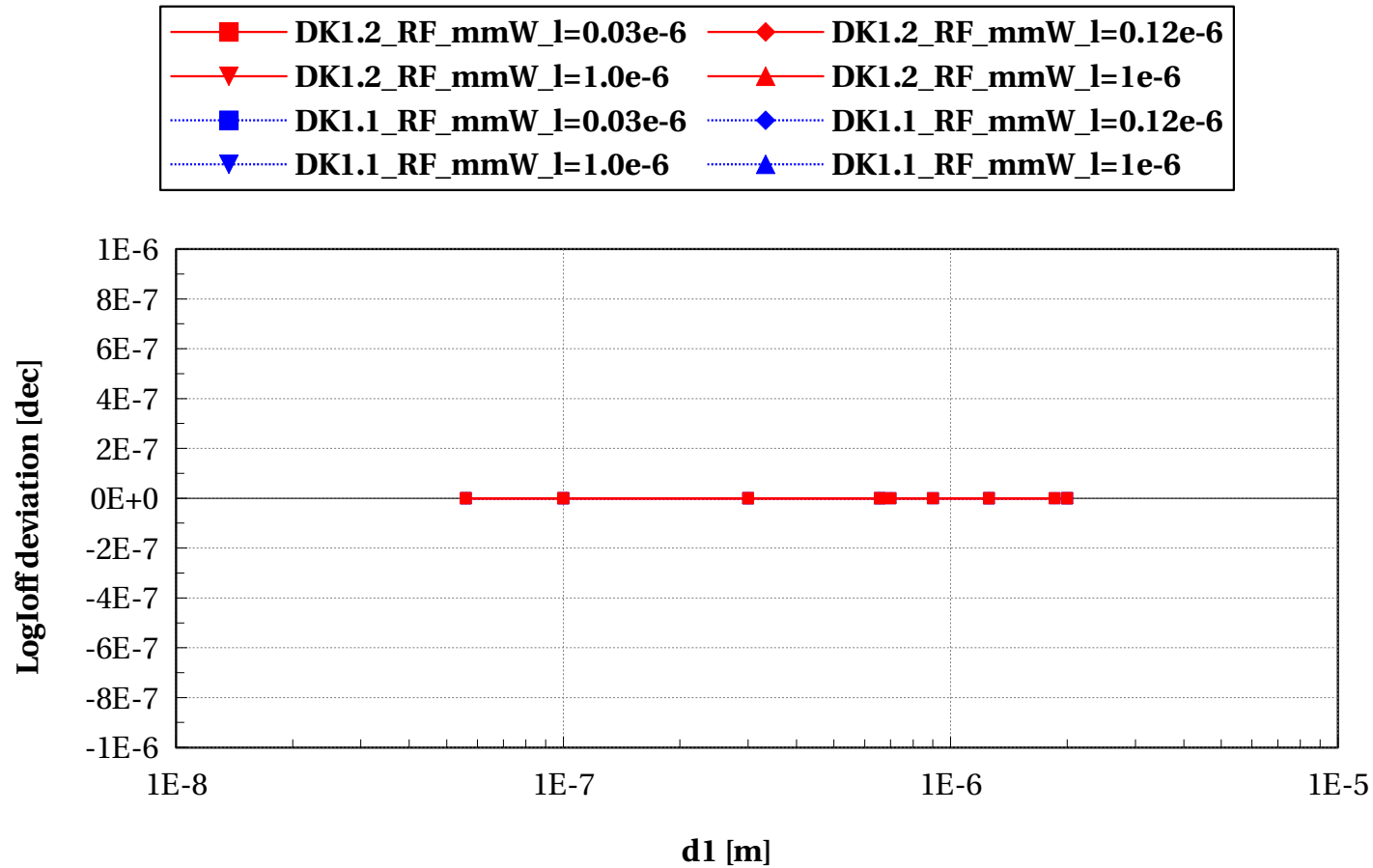
lvtnfet_acc, Isat deviation [%] vs d1 [m]

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lvtnfet_acc, Logloff deviation [dec] vs d1 [m]

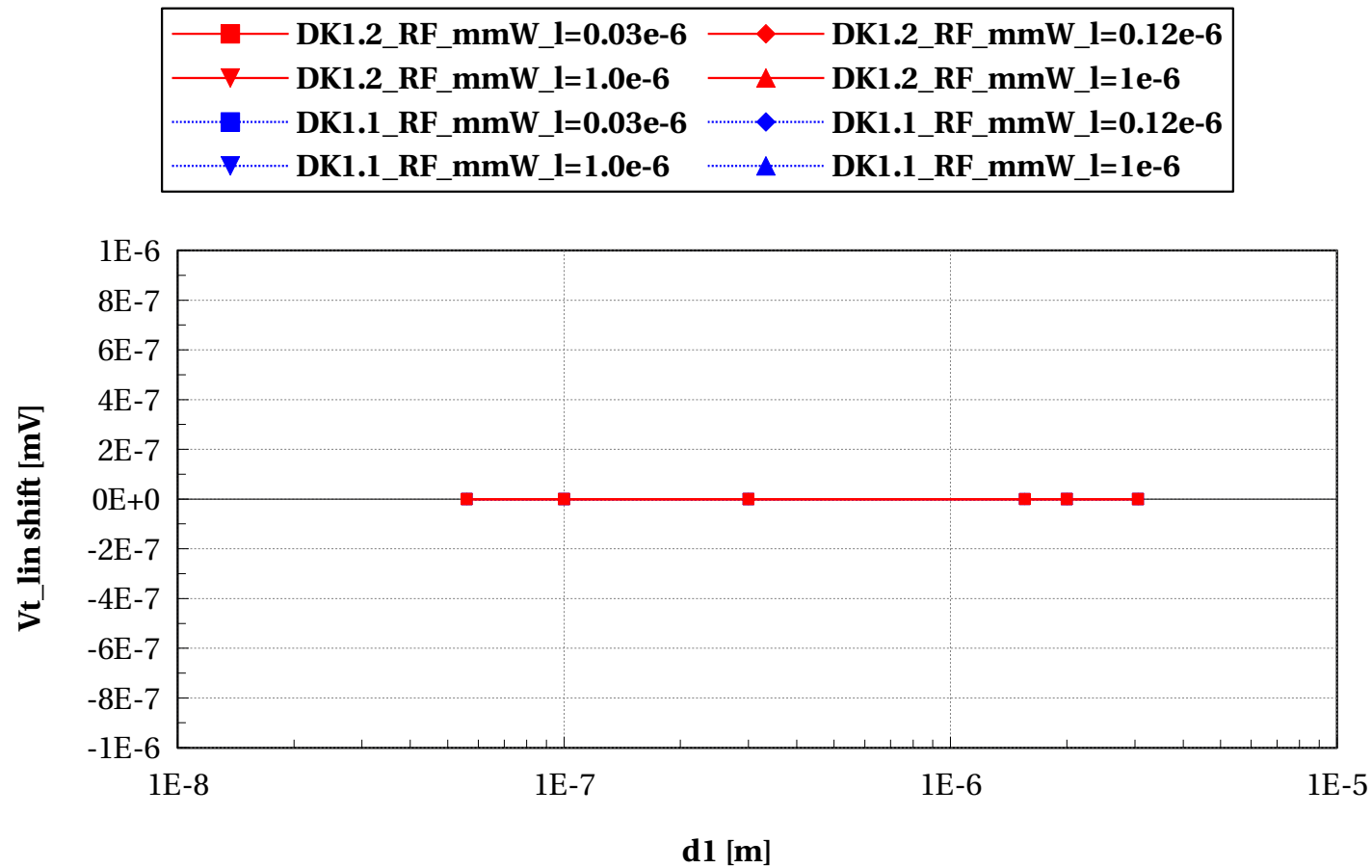
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- WPE effect w.r.t d1 - Lscaling at W=1u

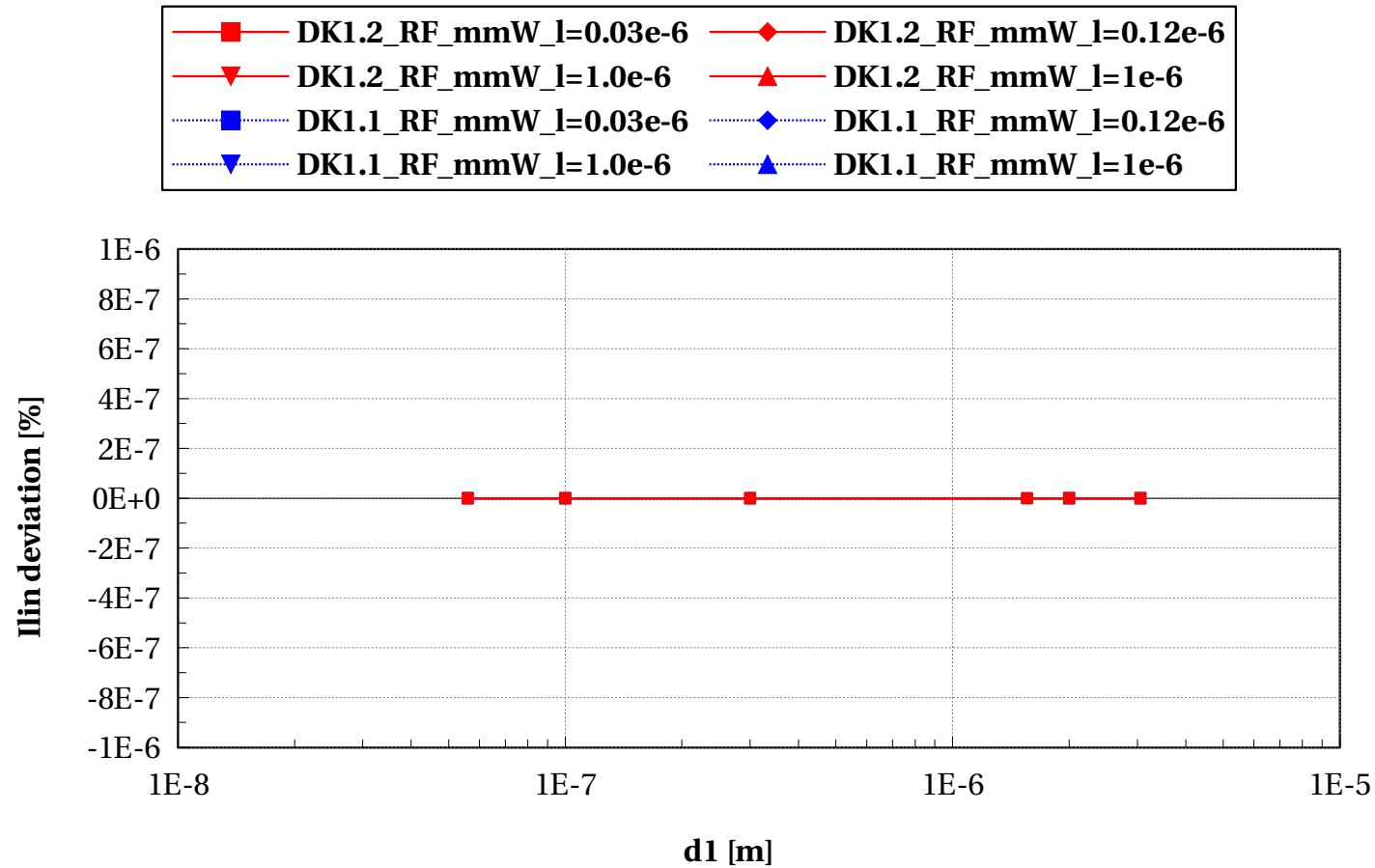
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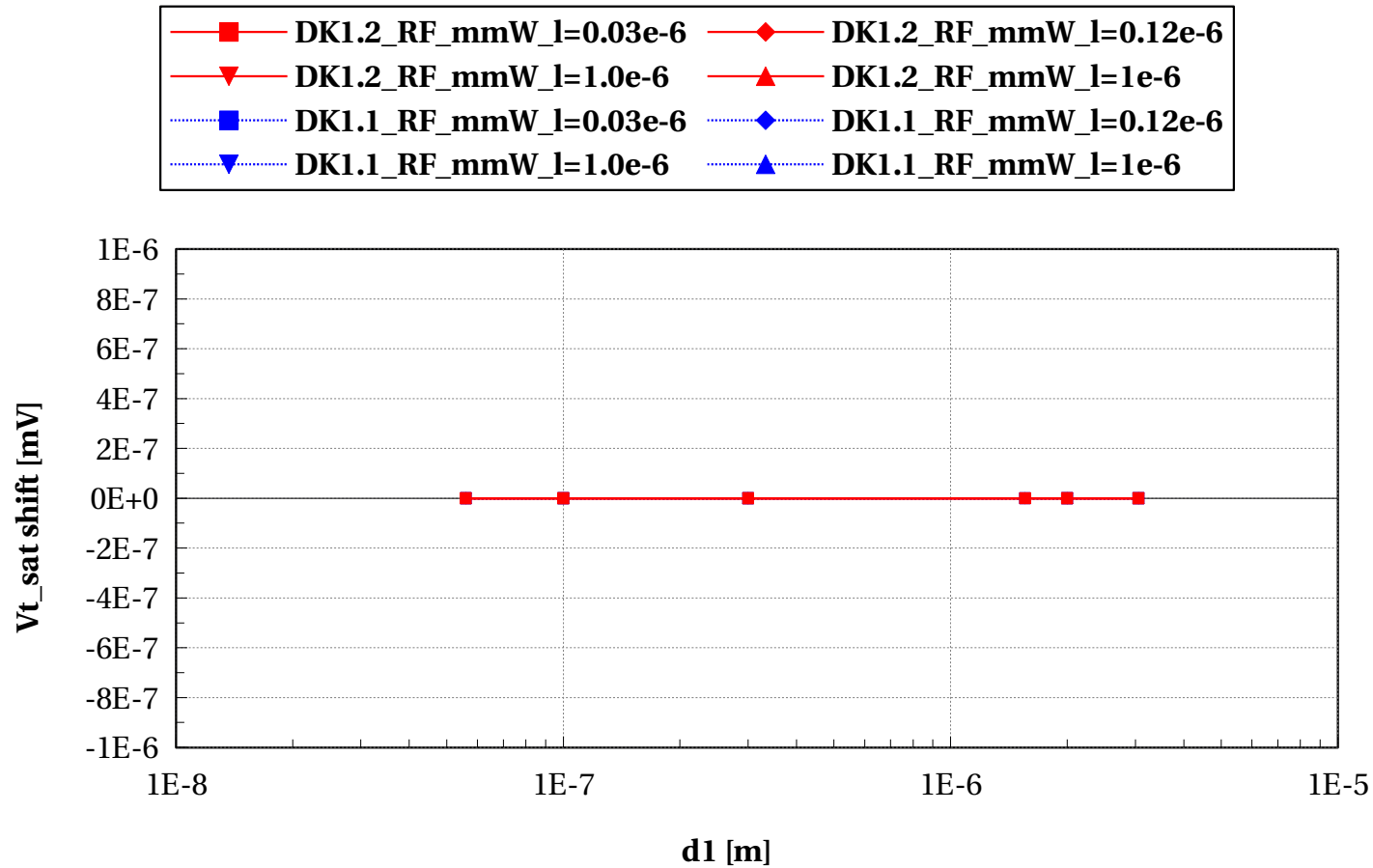
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temp==25 and d0==10e-6 and W==1e-6



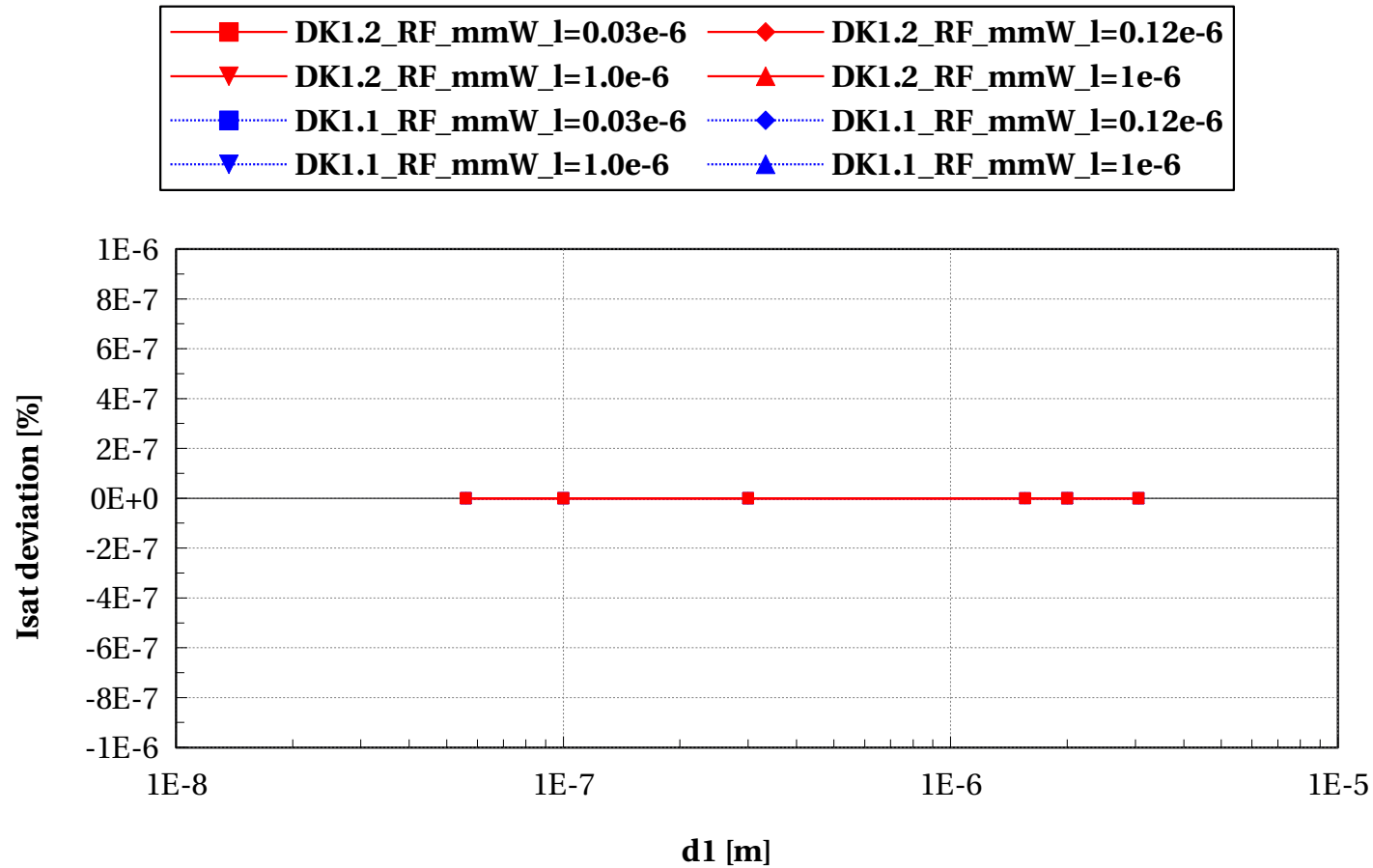
lvtnfet_acc, Vt_sat shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and W==1e-6



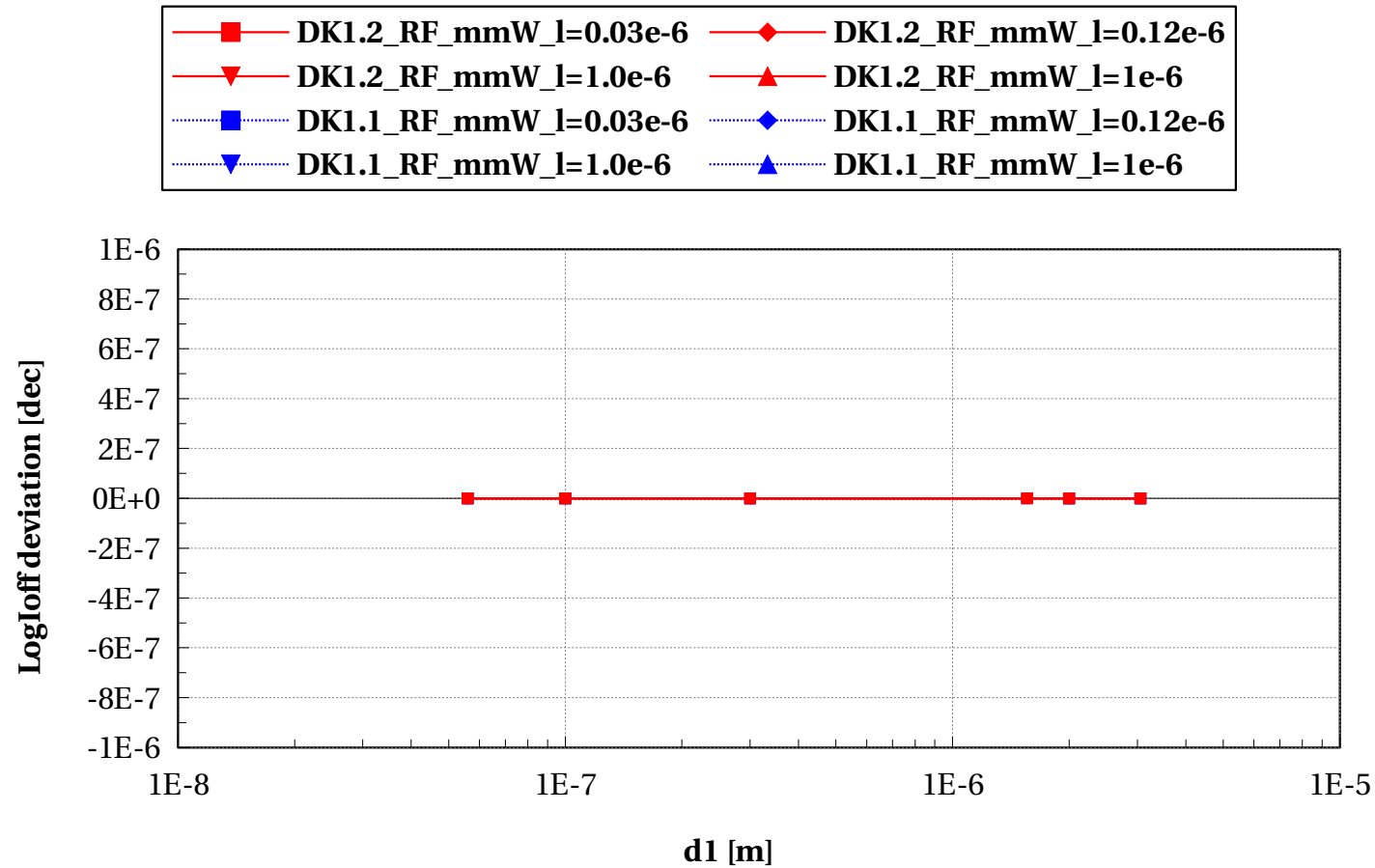
lvtnfet_acc, Isat deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and W==1e-6



lvtnfet_acc, Logloff deviation [dec] vs d1 [m]

temp==25 and d0==10e-6 and W==1e-6



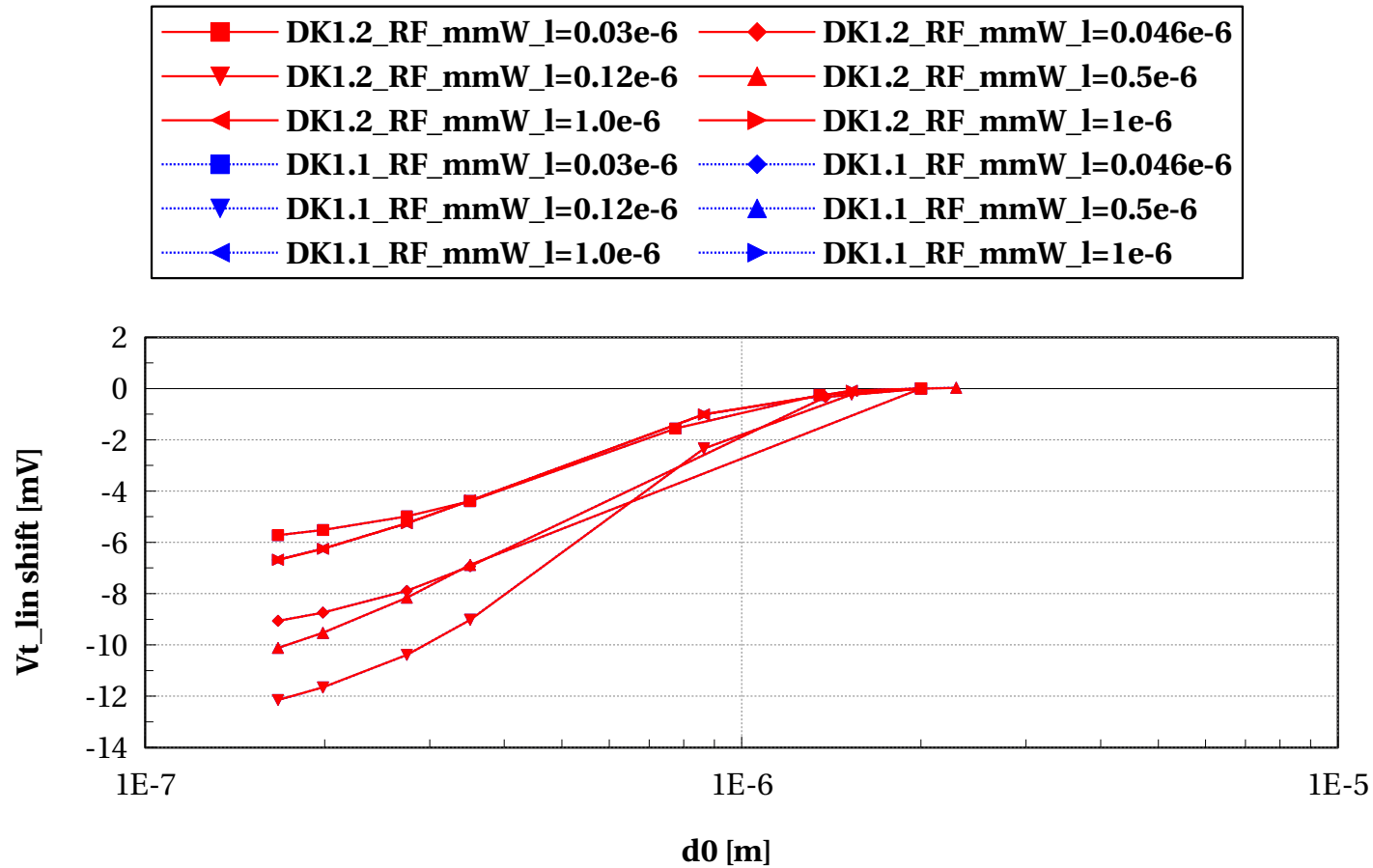
lvtpfet_acc

Electrical characteristics scaling

- WPE effect w.r.t d0 - Lscaling at W=1u

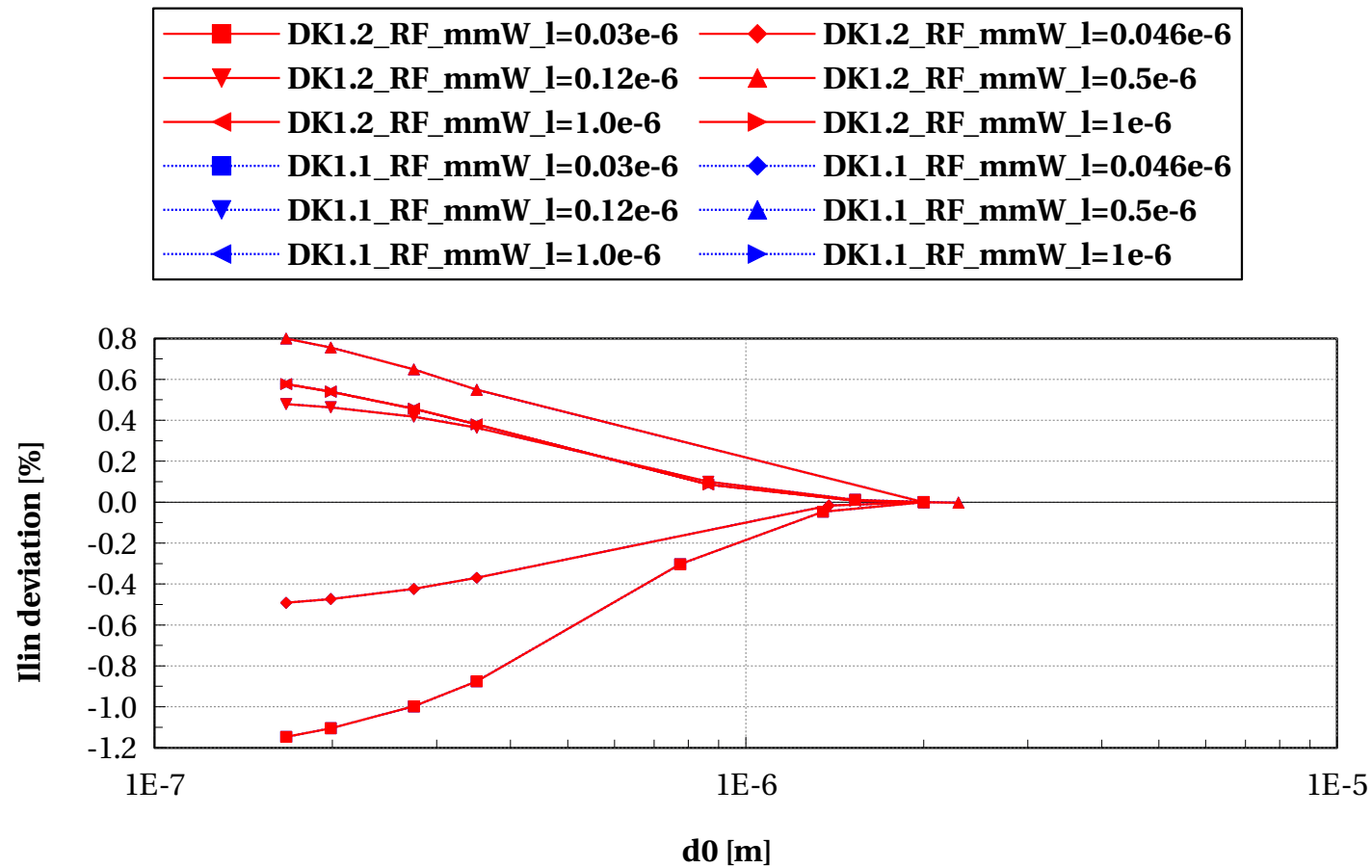
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temp==25 and d1==10e-6 and W==1e-6



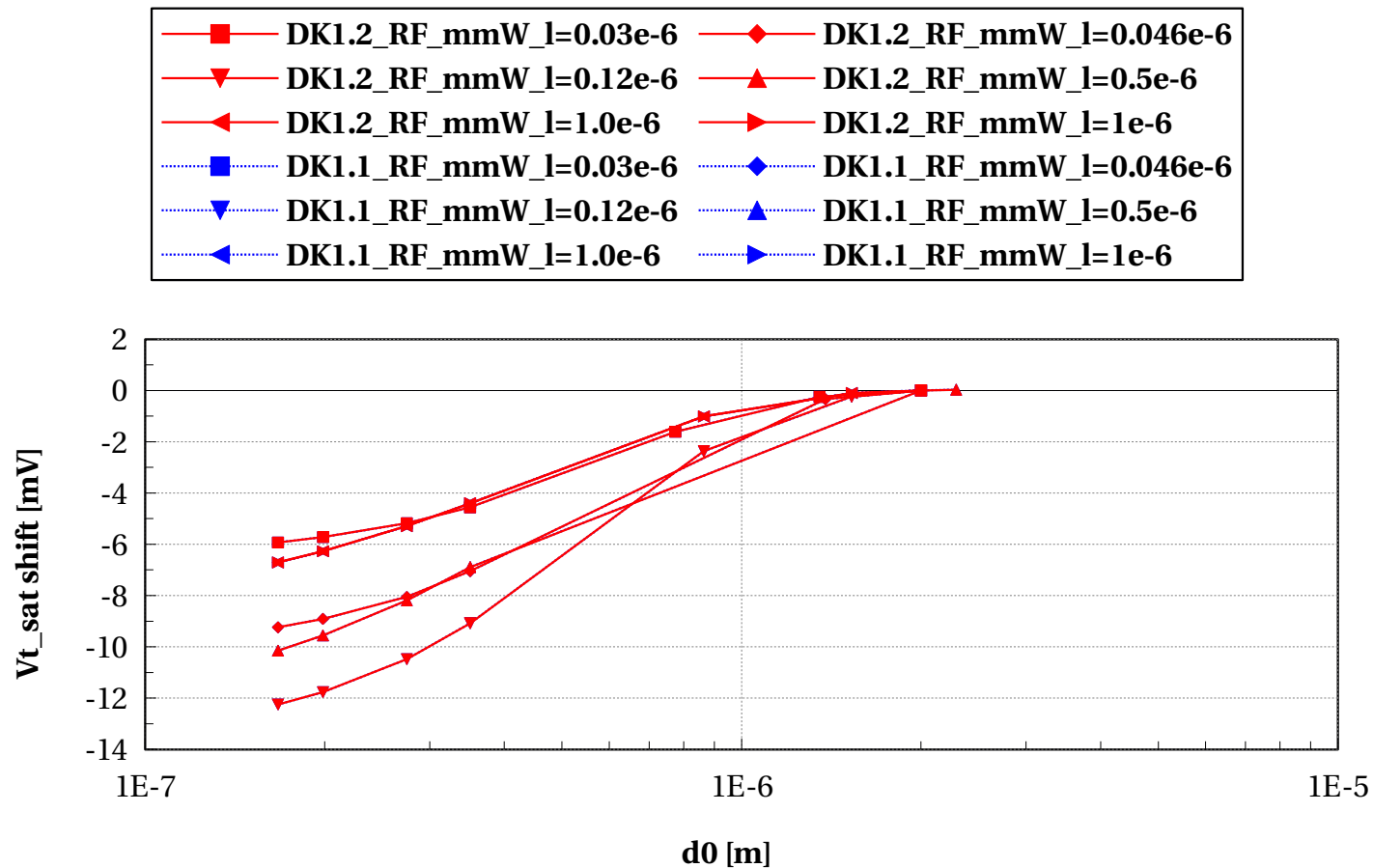
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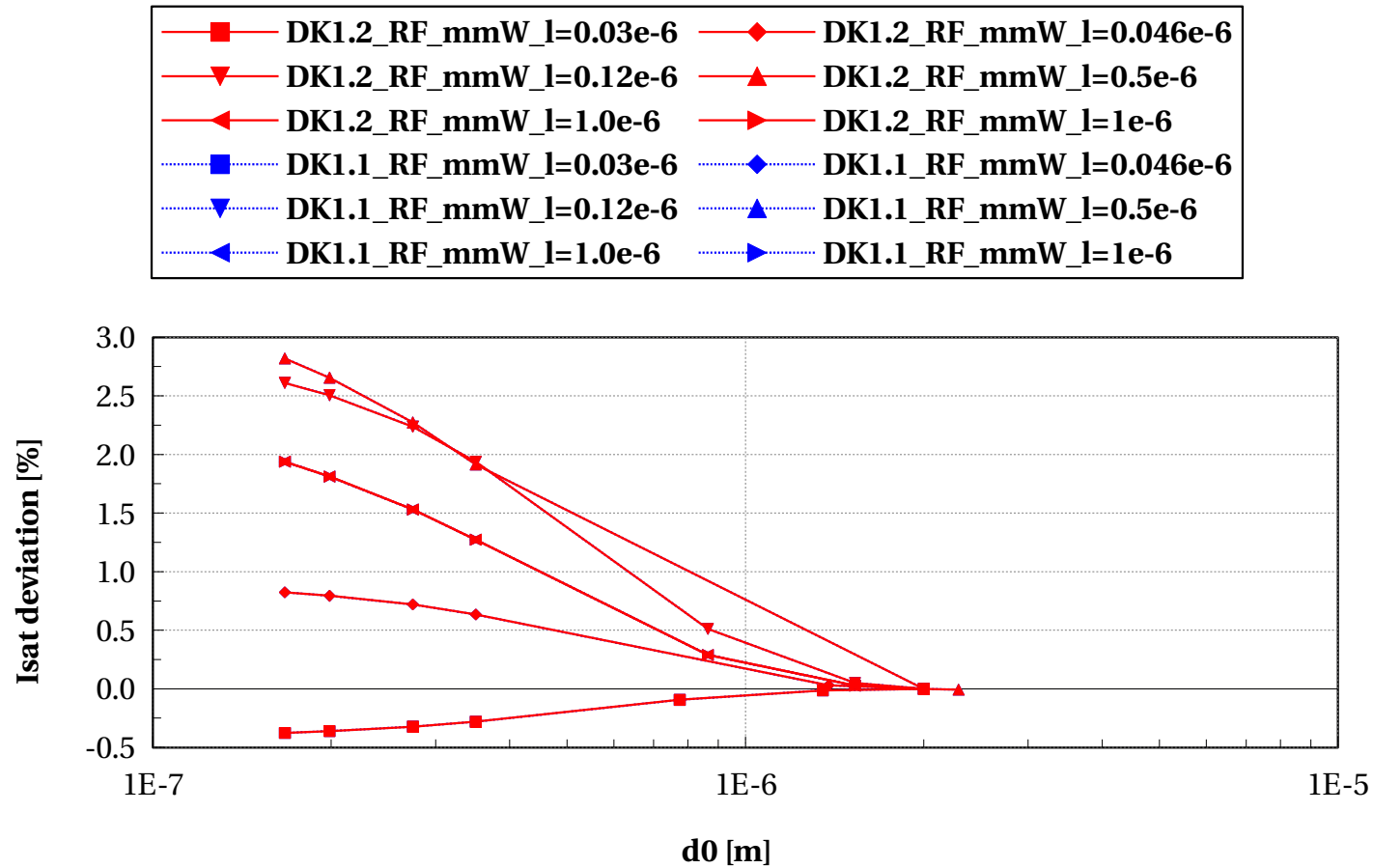
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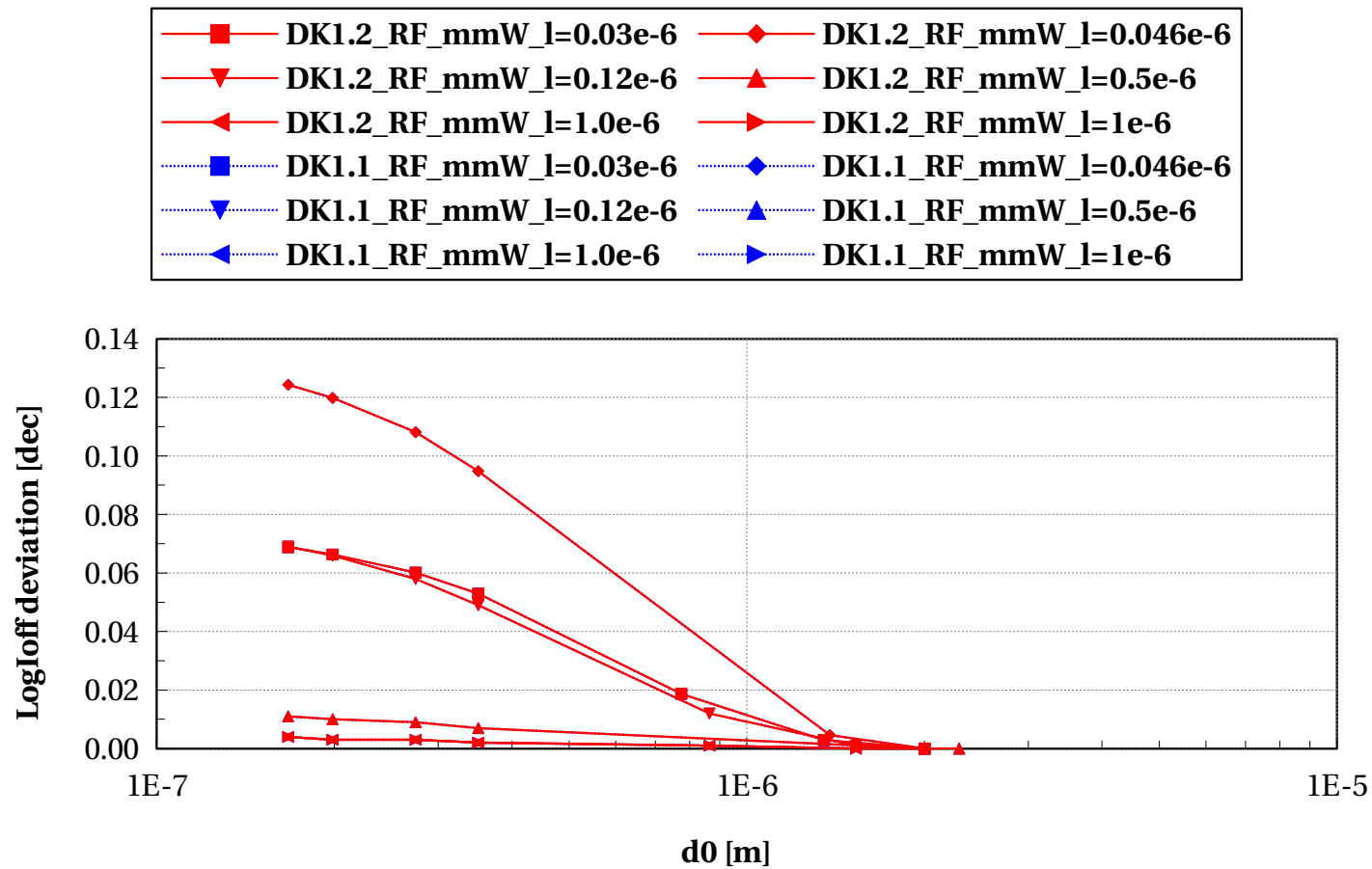
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lvtpfet_acc, Logloff deviation [dec] vs d0 [m]

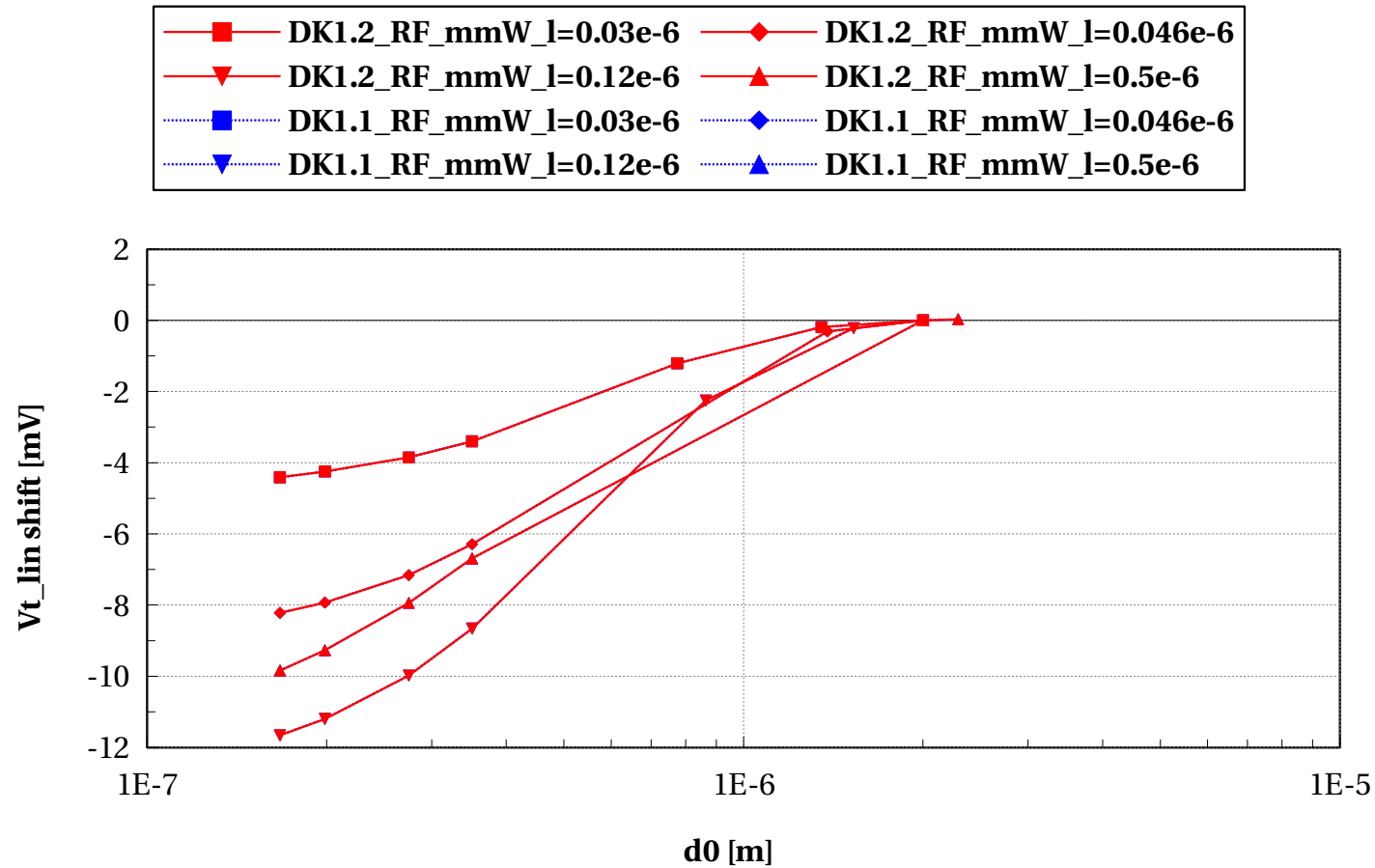
temp==25 and d1==10e-6 and W==1e-6



- WPE effect w.r.t d0 - Lscaling at $W=0.34u$

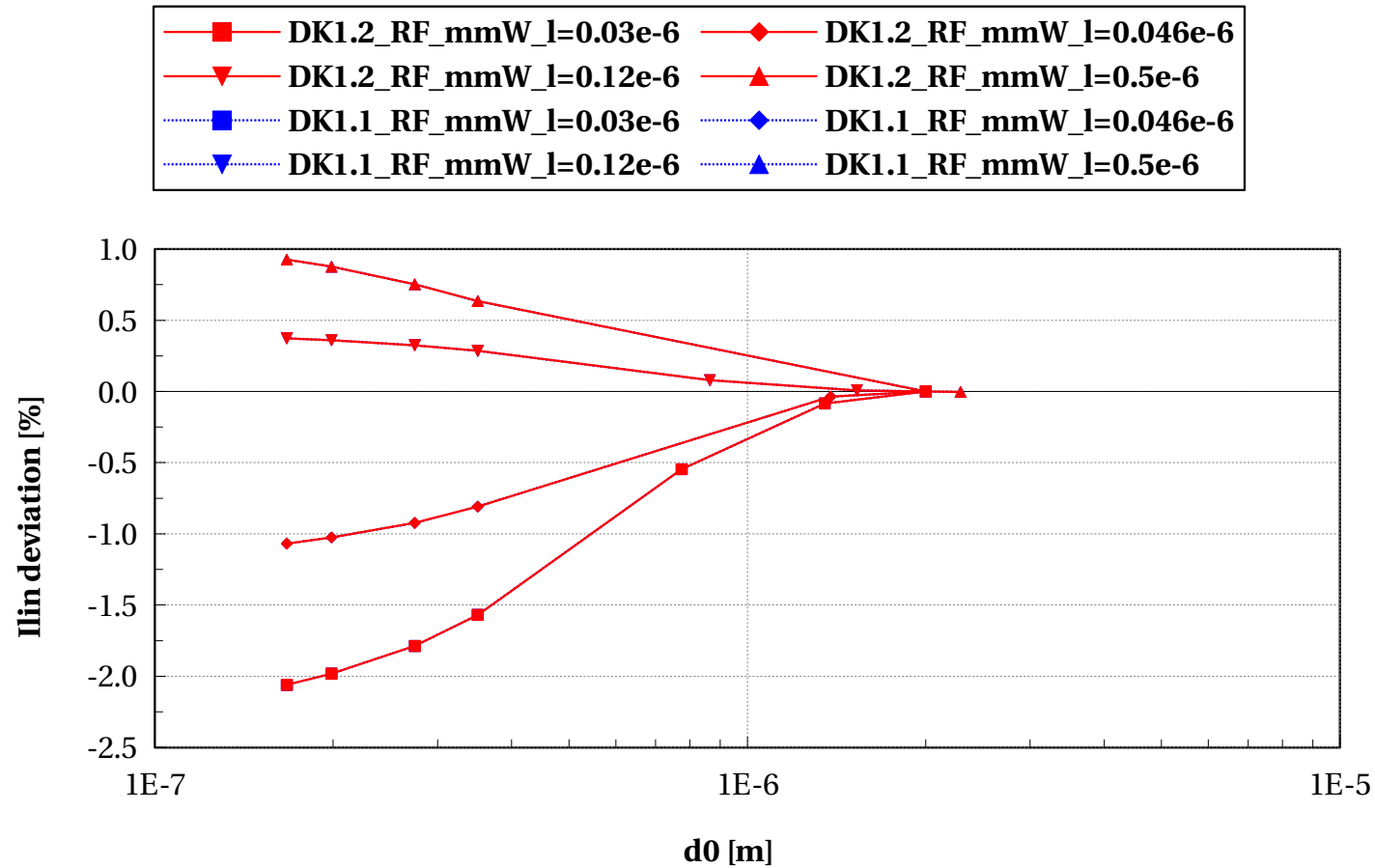
lvtpfet_acc, Vt_lin shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and W==0.34e-6



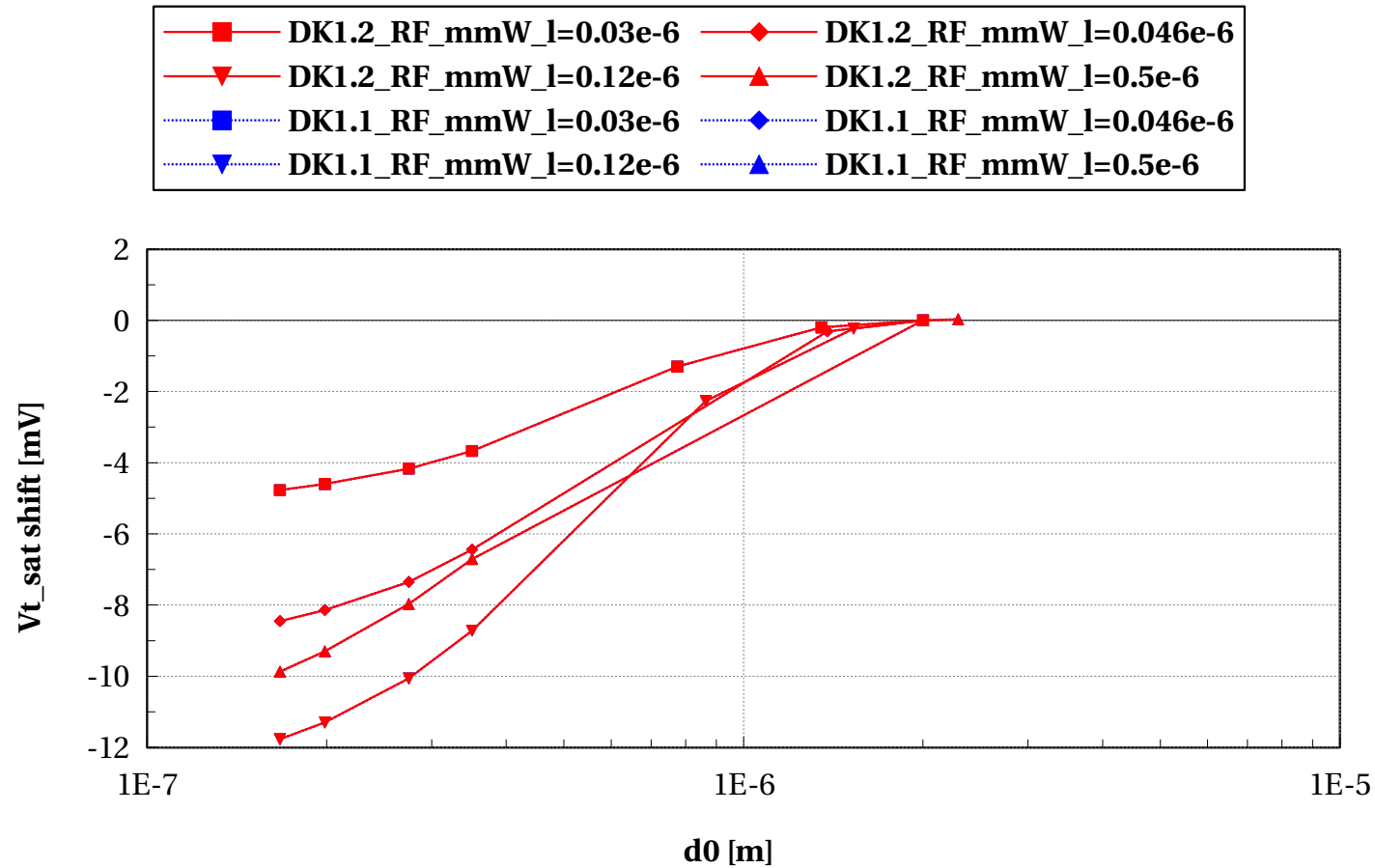
lvtpfet_acc, Ilin deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and W==0.34e-6



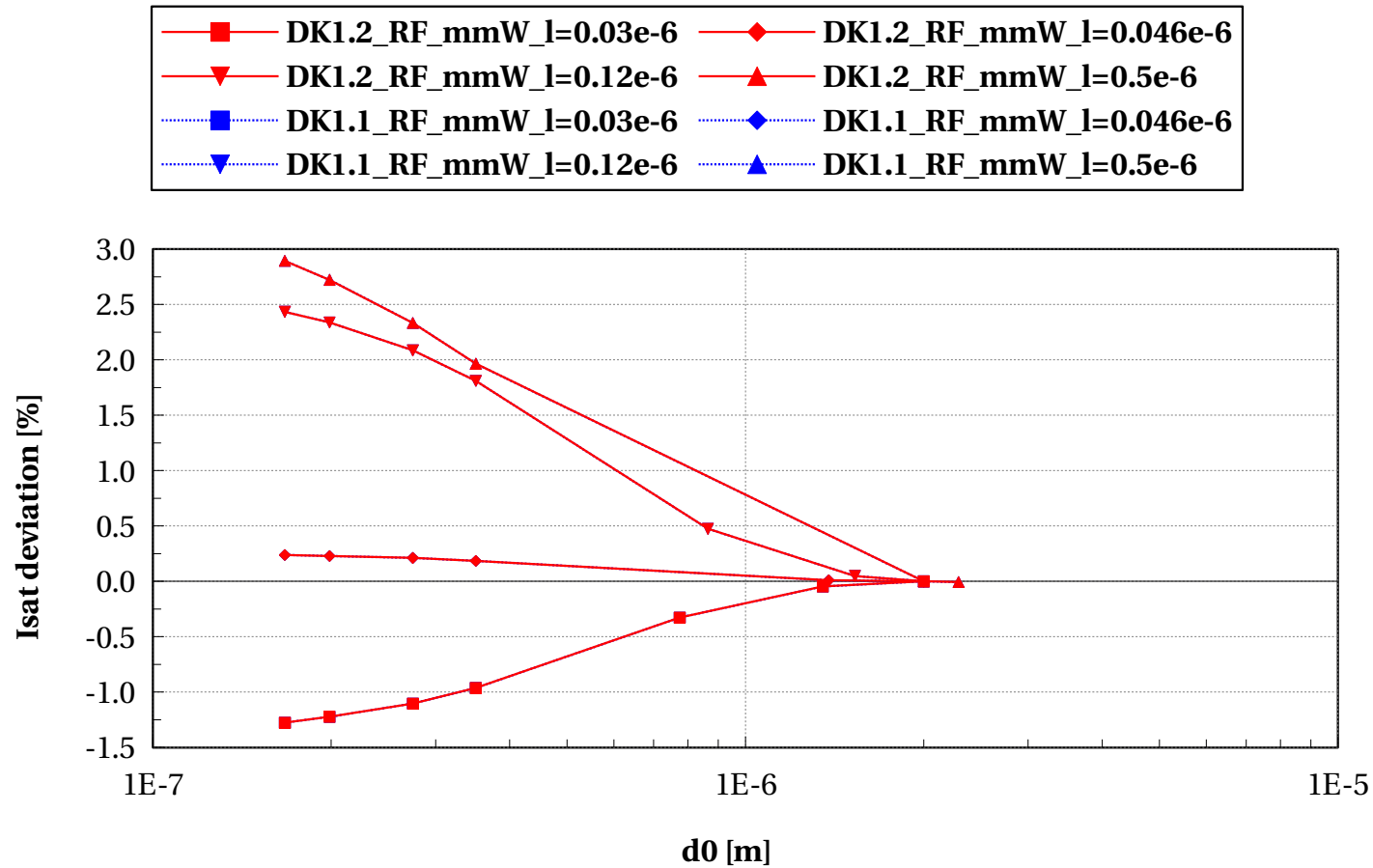
lvtpfet_acc, Vt_sat shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and W==0.34e-6



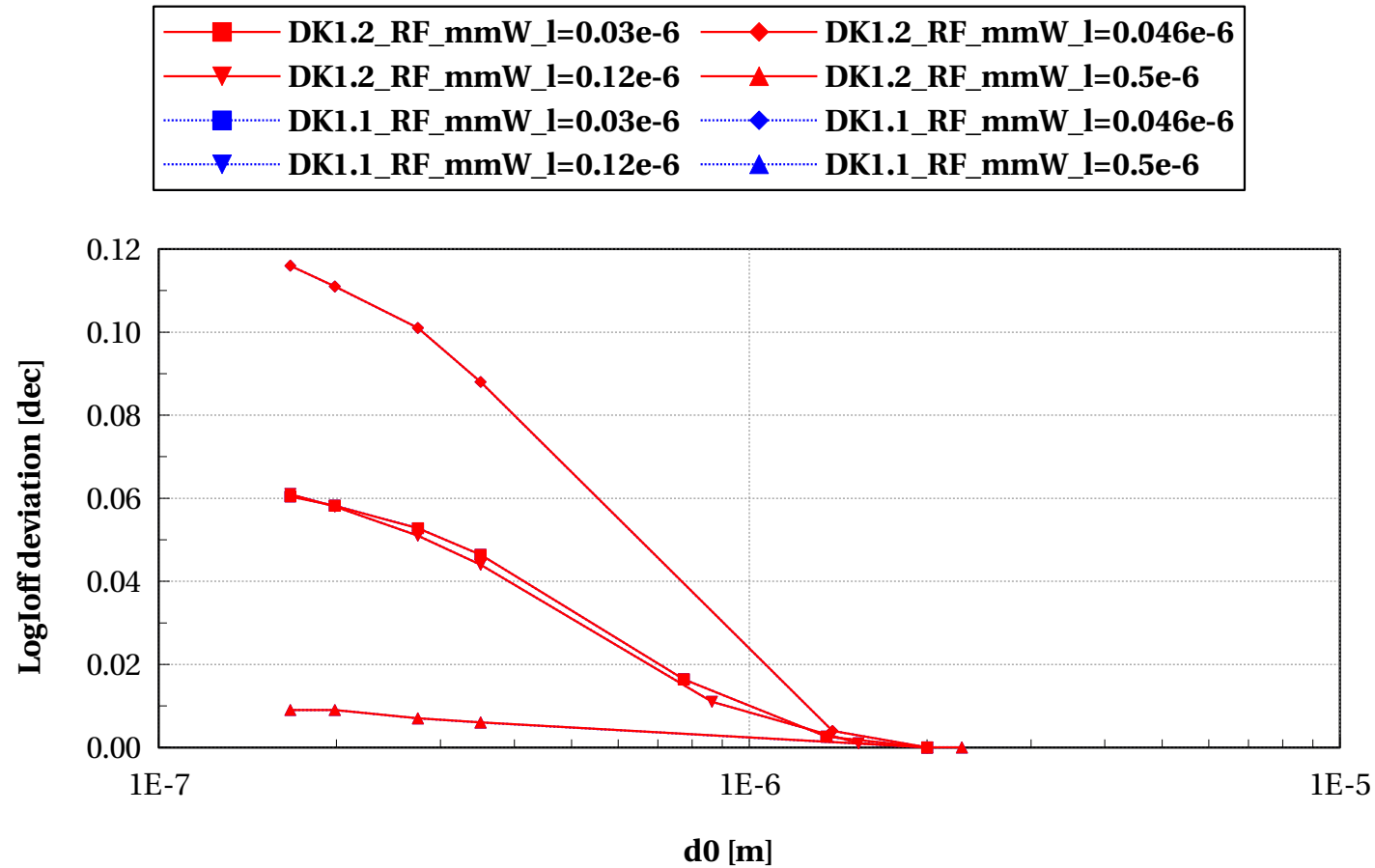
lvtpfet_acc, Isat deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and W==0.34e-6



lvtpfet_acc, Logloff deviation [dec] vs d0 [m]

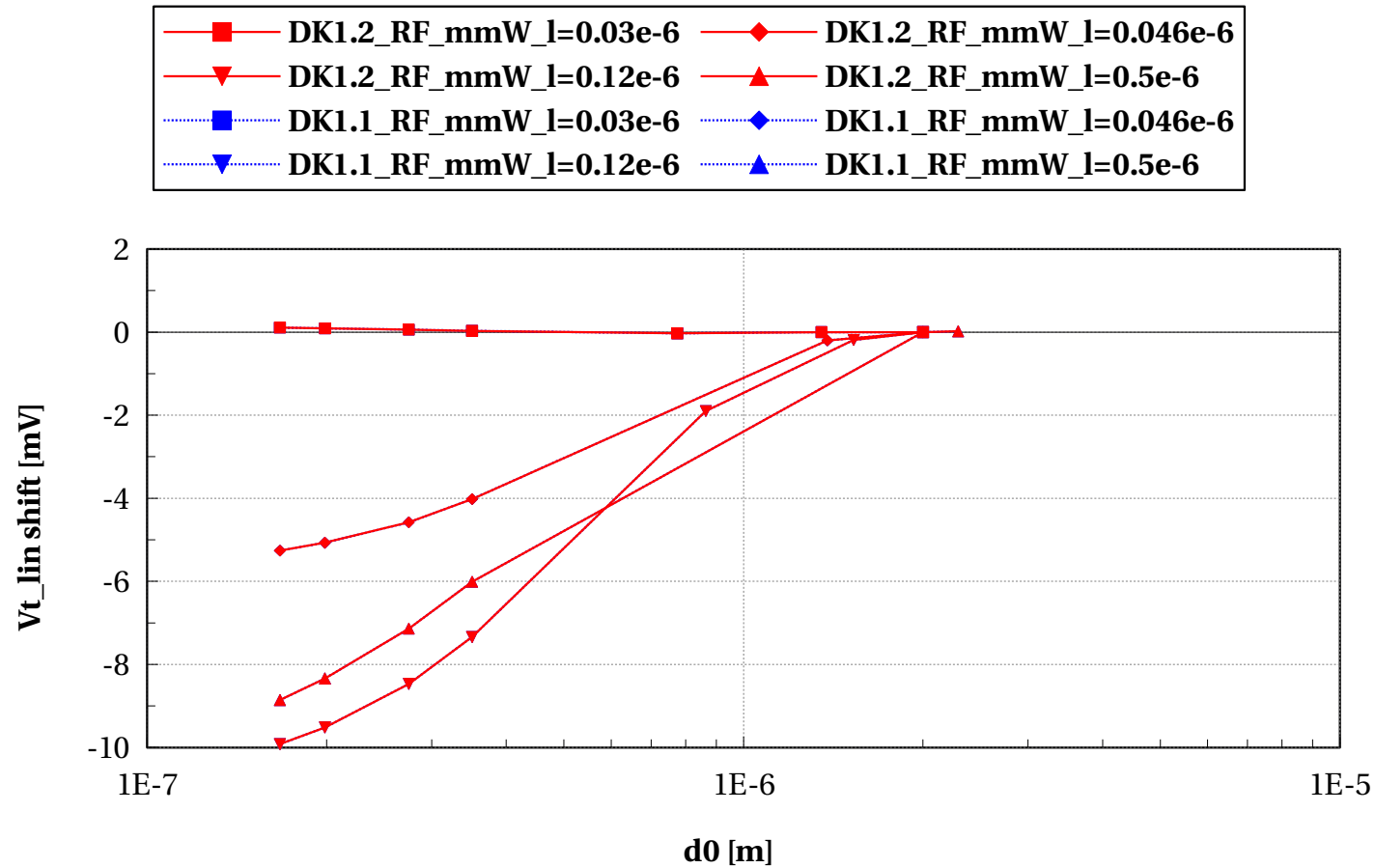
temp==25 and d1==10e-6 and W==0.34e-6



- WPE effect w.r.t d0 - Lscaling at W=0.1u

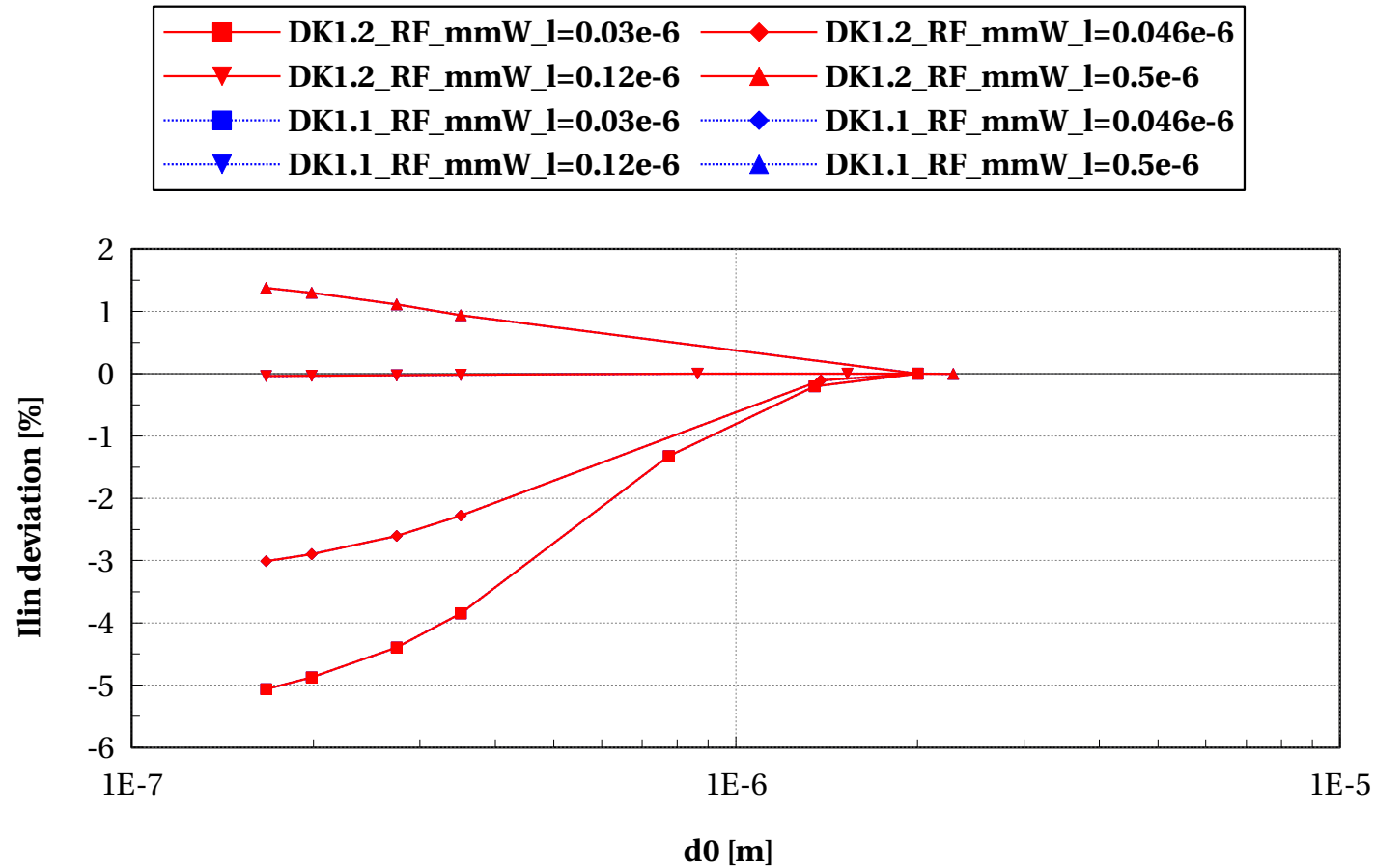
lvtpfet_acc, Vt_lin shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and W==0.1e-6



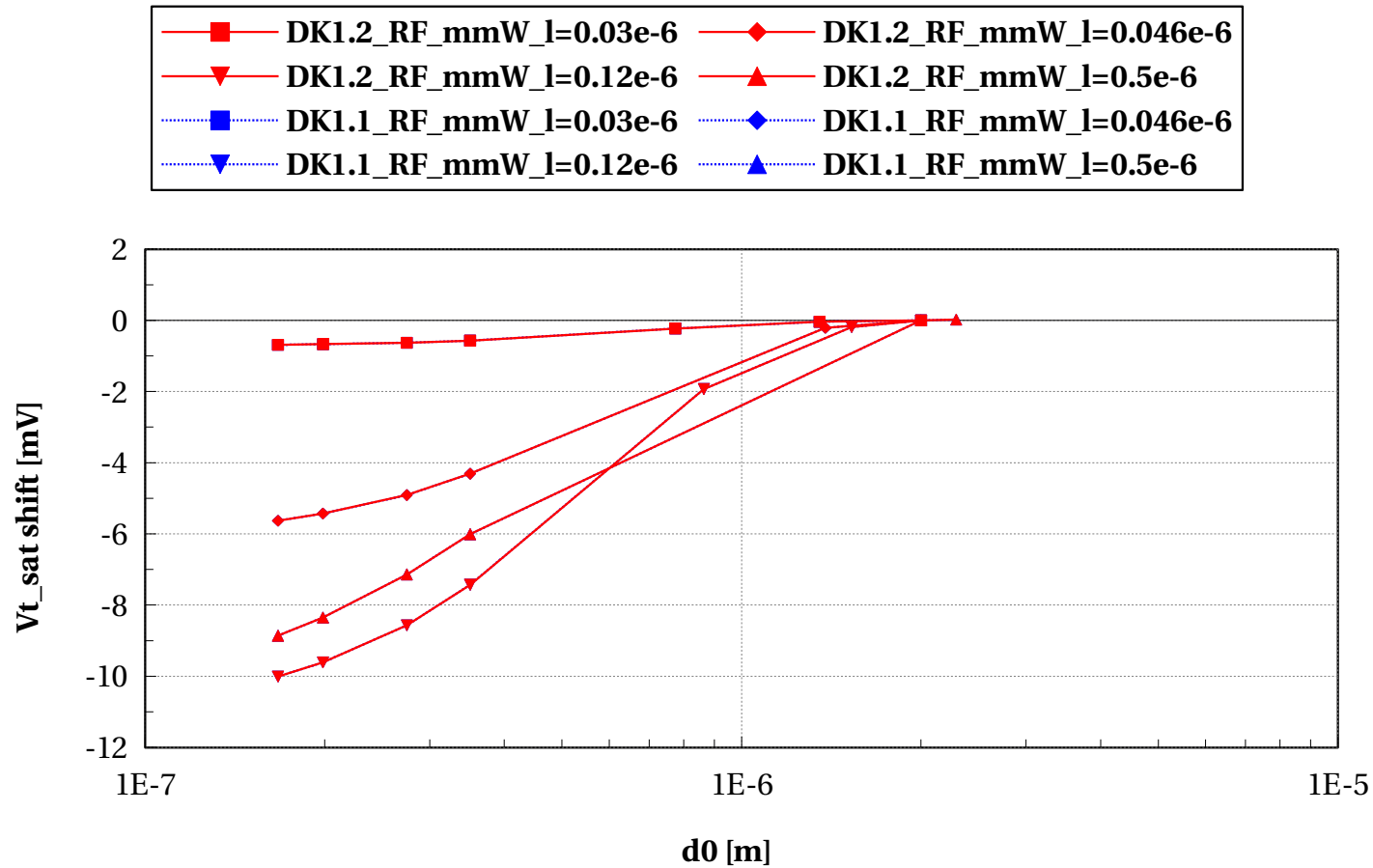
lvtpfet_acc, Ilin deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and W==0.1e-6



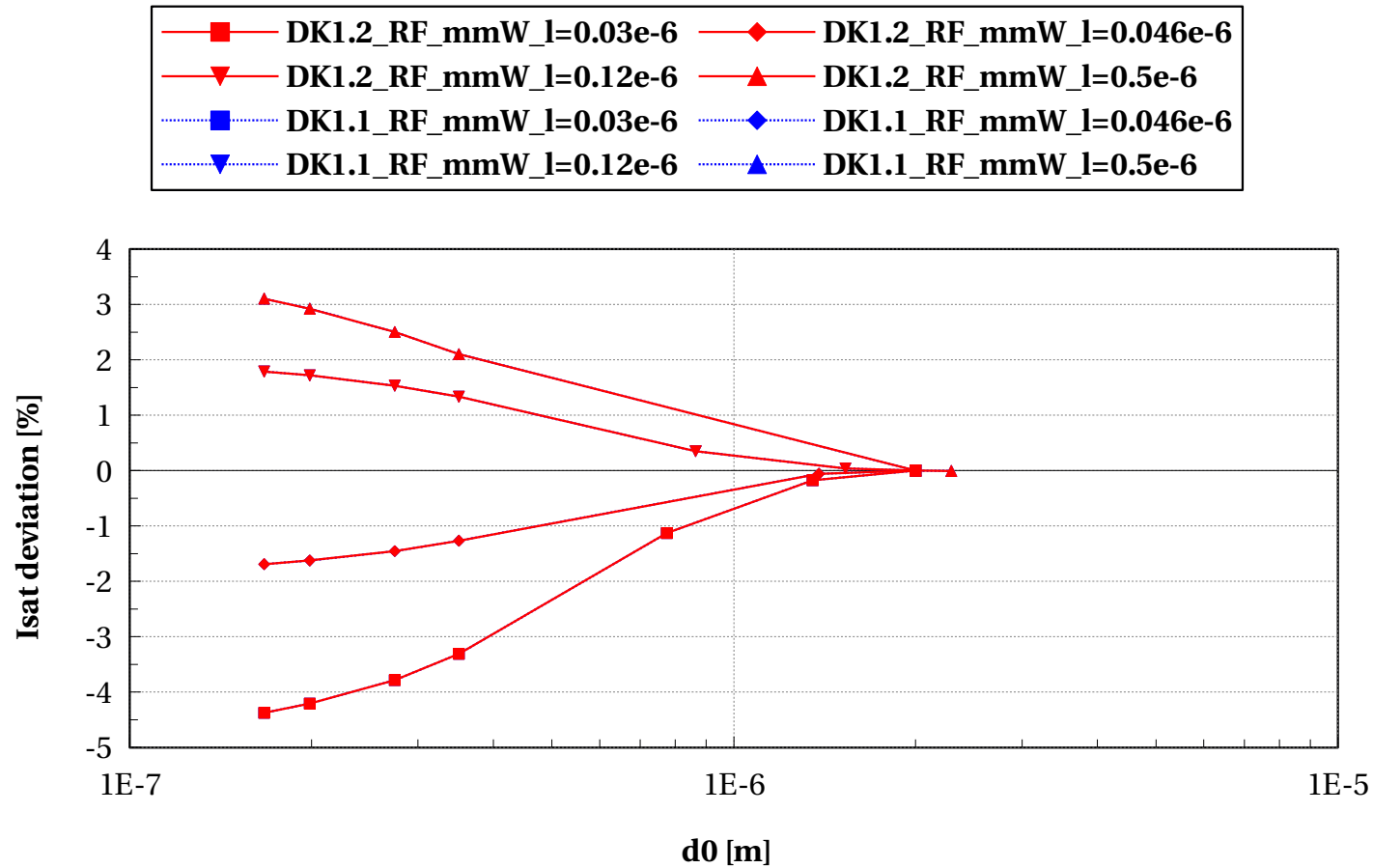
lvtpfet_acc, Vt_sat shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and W==0.1e-6



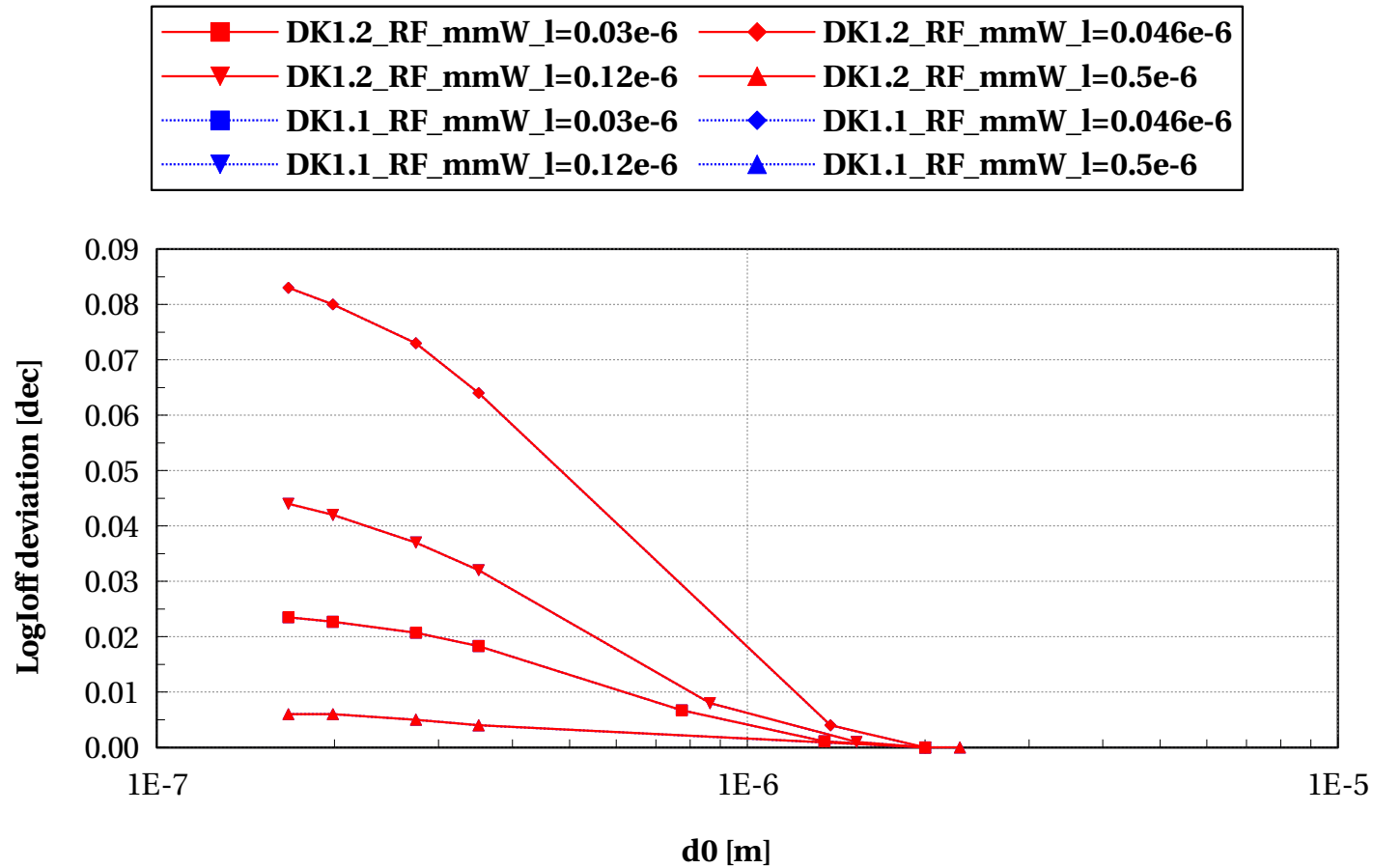
lvtpfet_acc, Isat deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and W==0.1e-6



lvtpfet_acc, Logloff deviation [dec] vs d0 [m]

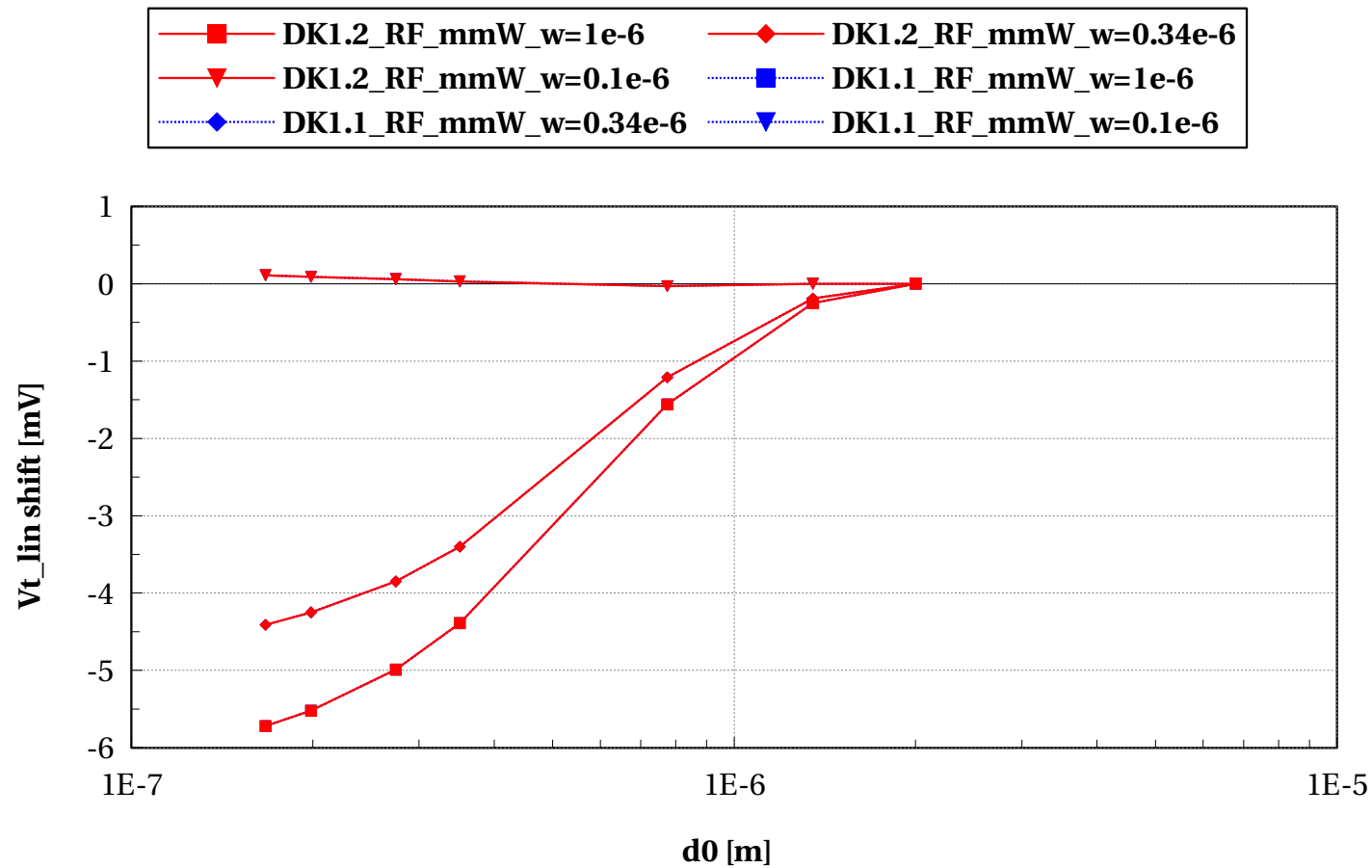
temp==25 and d1==10e-6 and W==0.1e-6



- WPE effect w.r.t d0 - Wscaling at $L=0.03u$

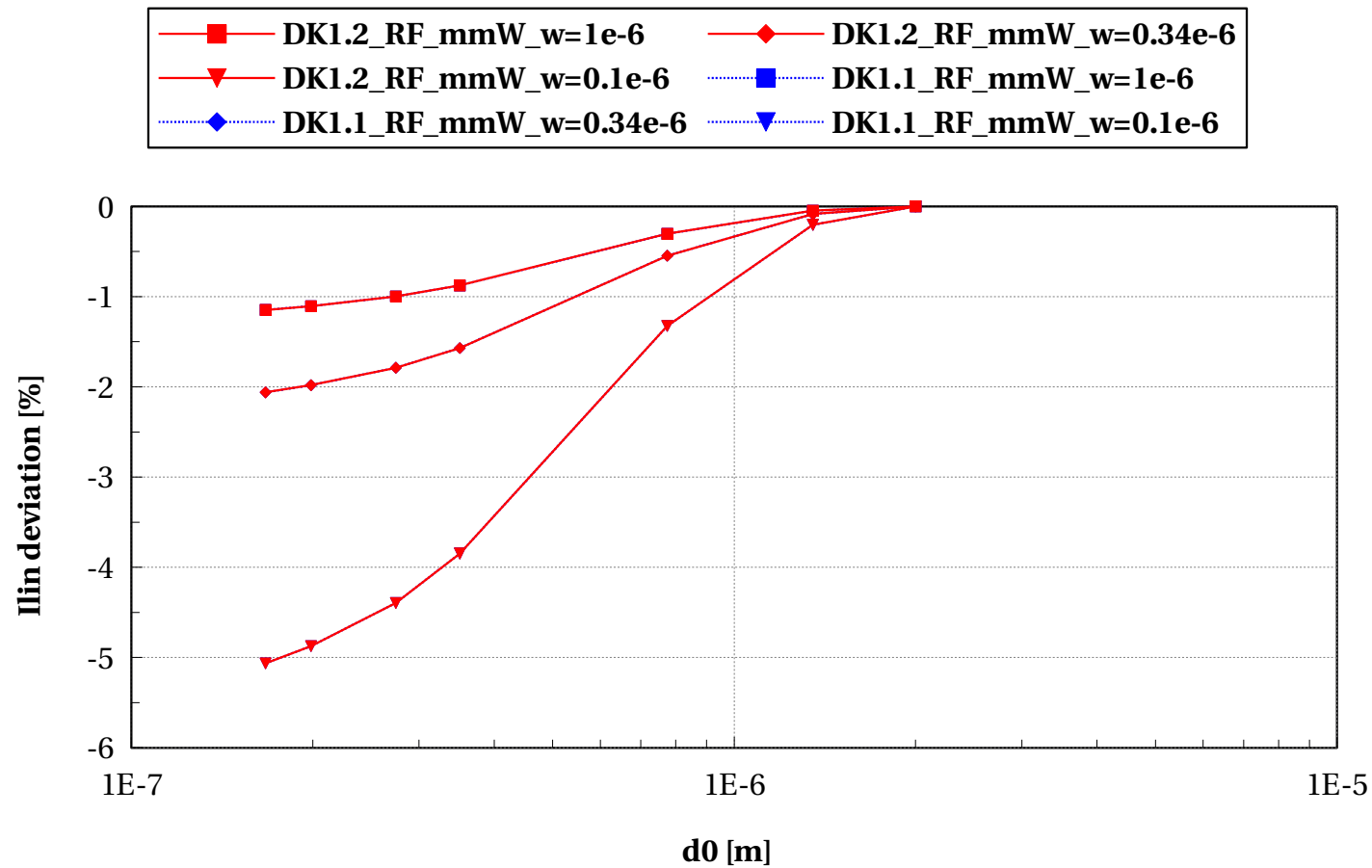
lvtpfet_acc, Vt_lin shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and L==0.03e-6



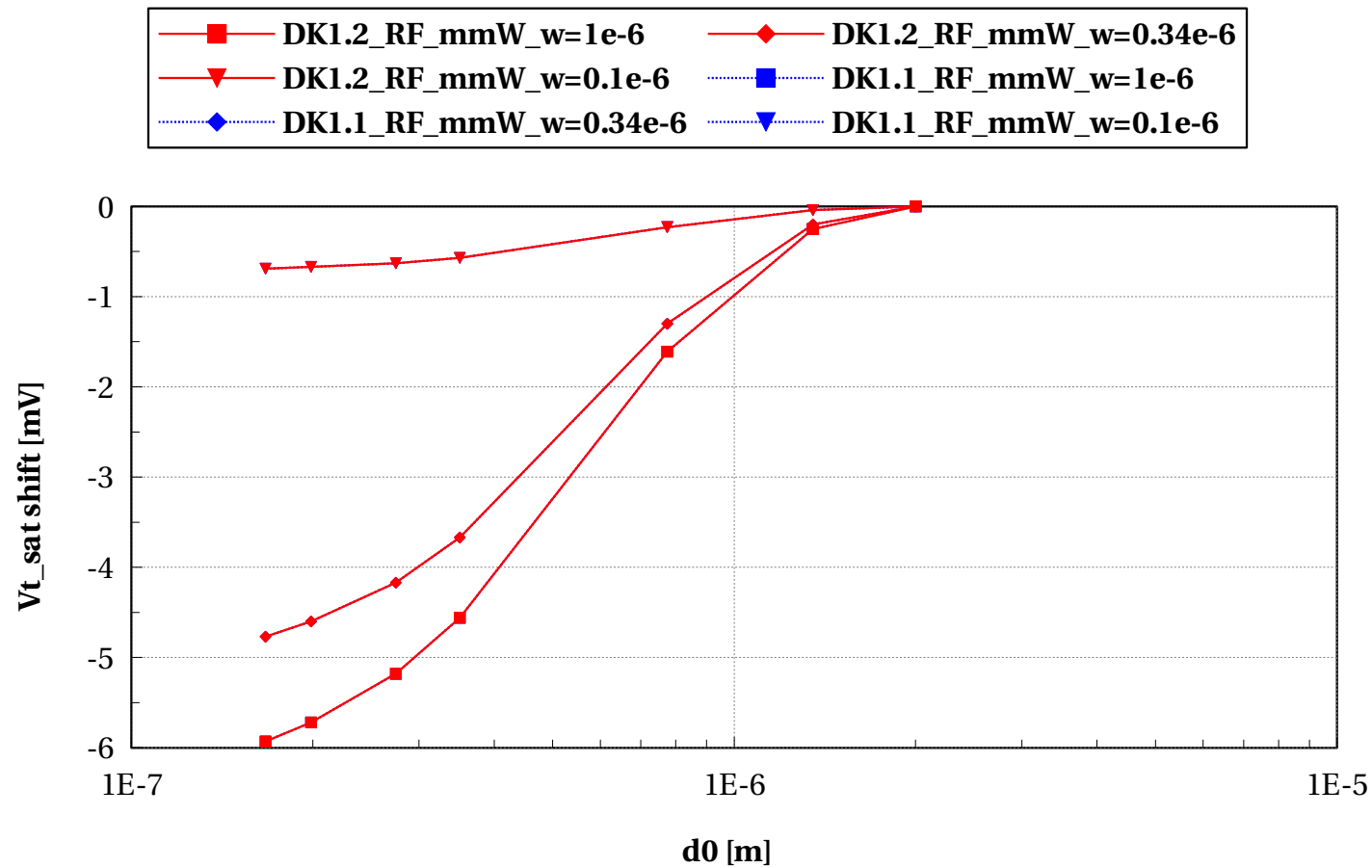
lvtpfet_acc, Ilin deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and L==0.03e-6



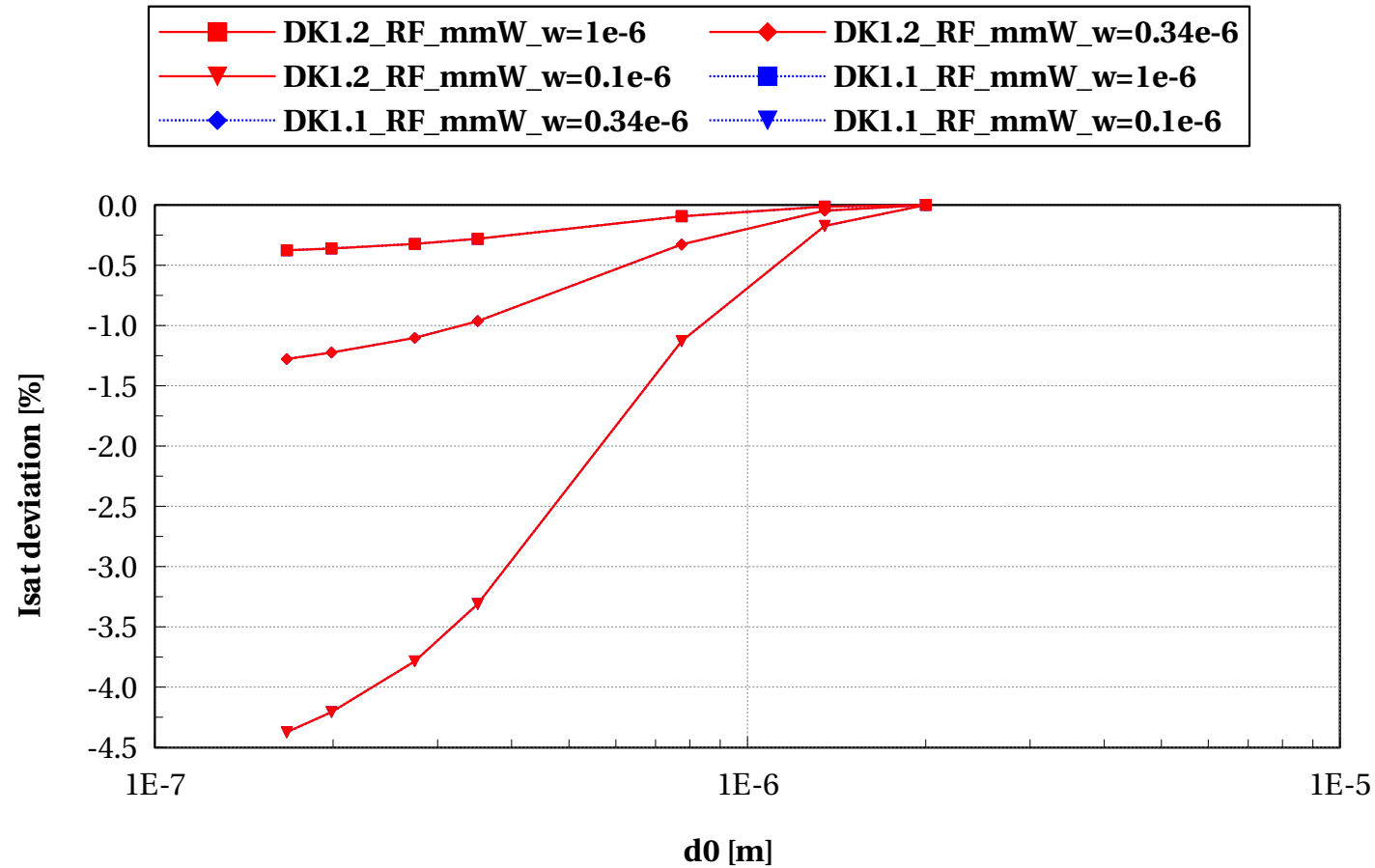
lvtpfet_acc, Vt_sat shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and L==0.03e-6



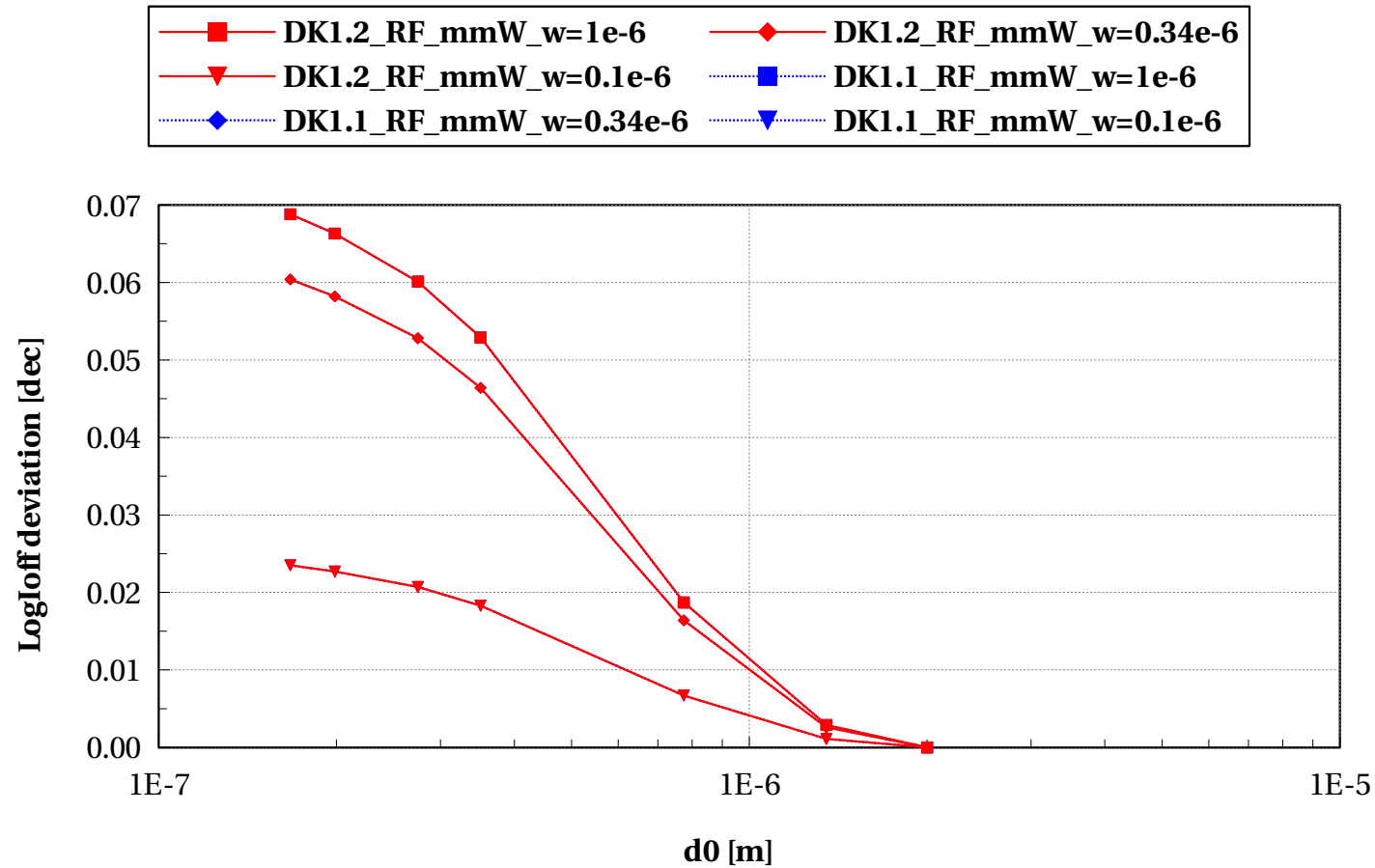
lvtpfet_acc, Isat deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and L==0.03e-6



lvtpfet_acc, Logloff deviation [dec] vs d0 [m]

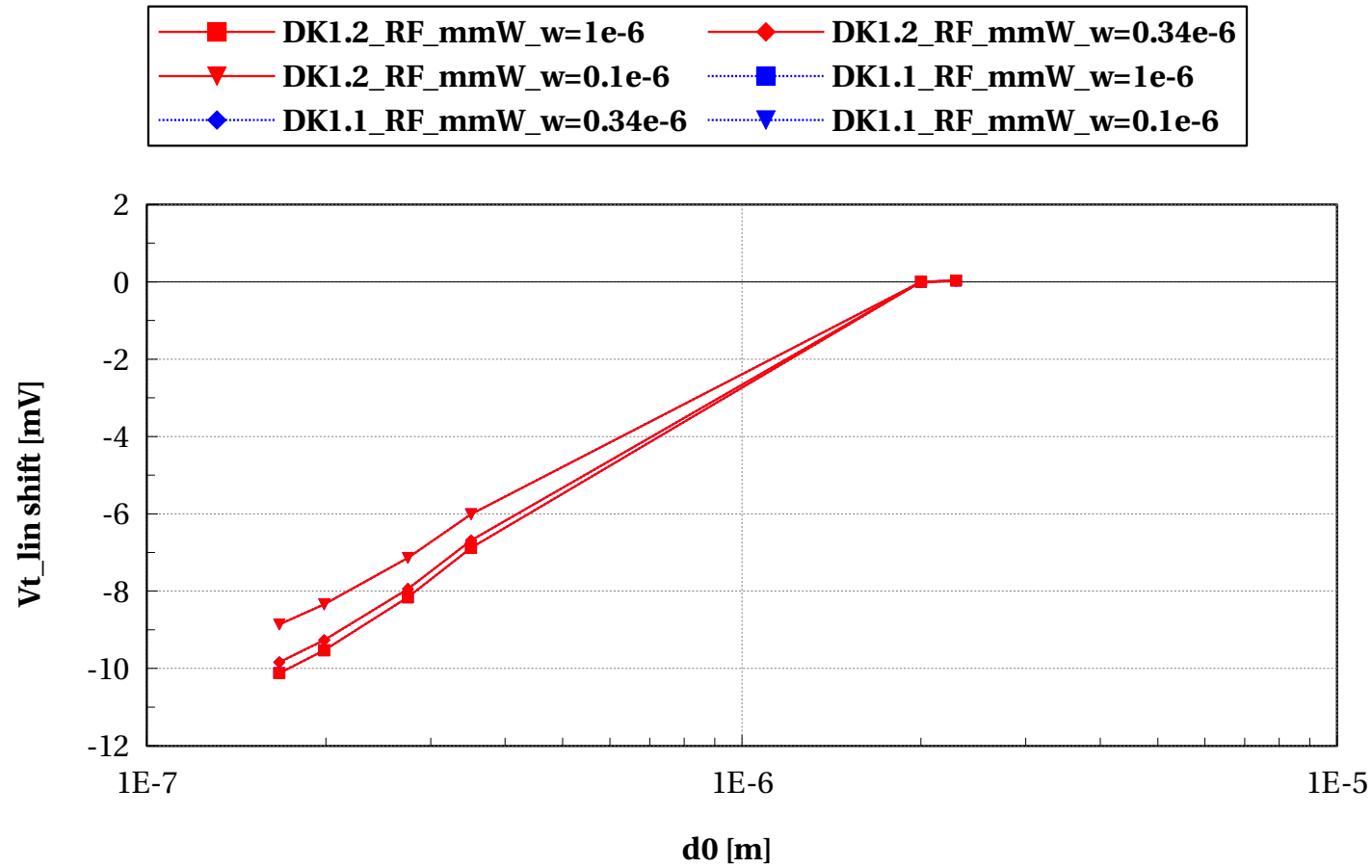
temp==25 and d1==10e-6 and L==0.03e-6



- WPE effect w.r.t d0 - Wscaling at $L=0.5u$

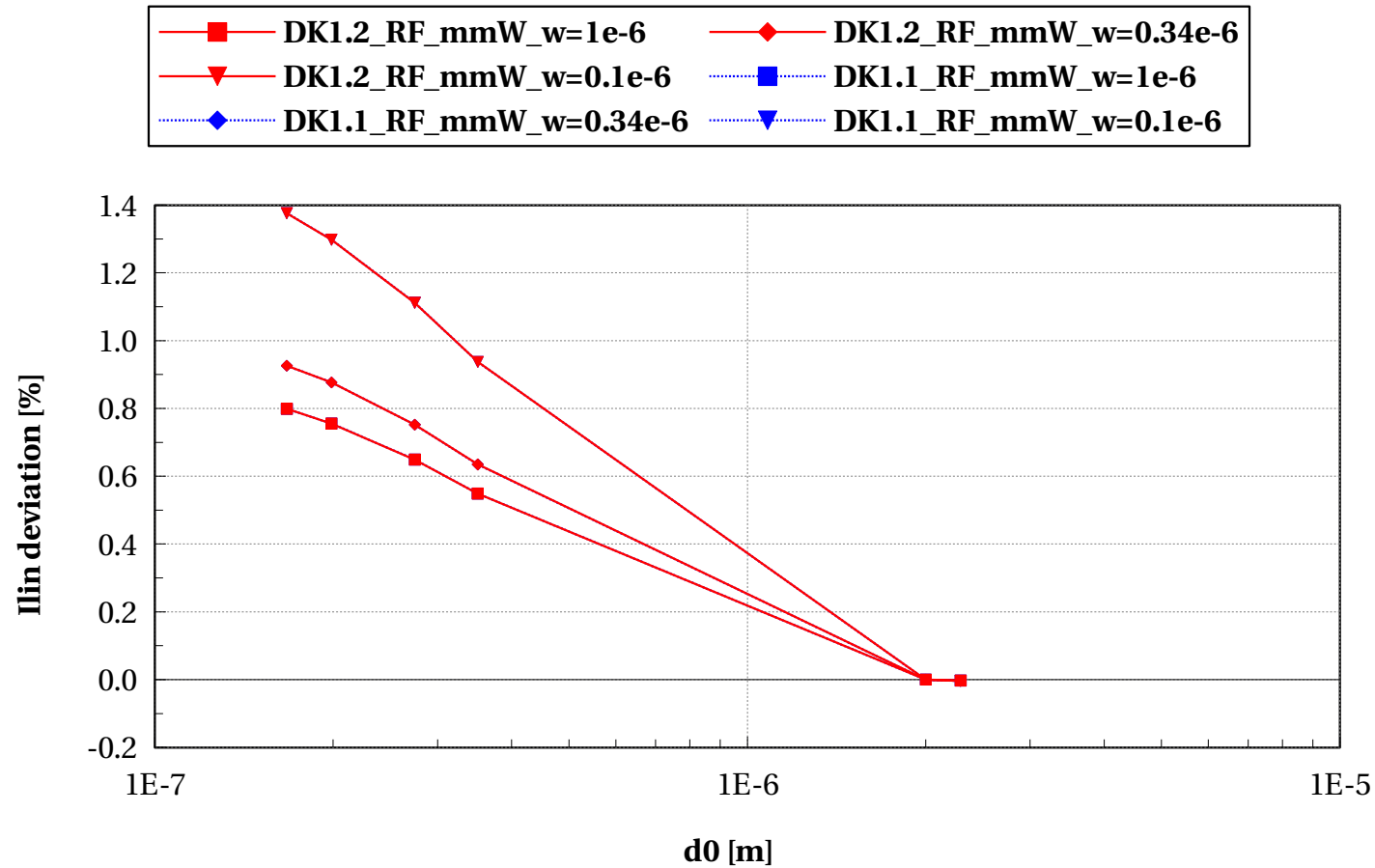
lvtpfet_acc, Vt_lin shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and L==0.5e-6



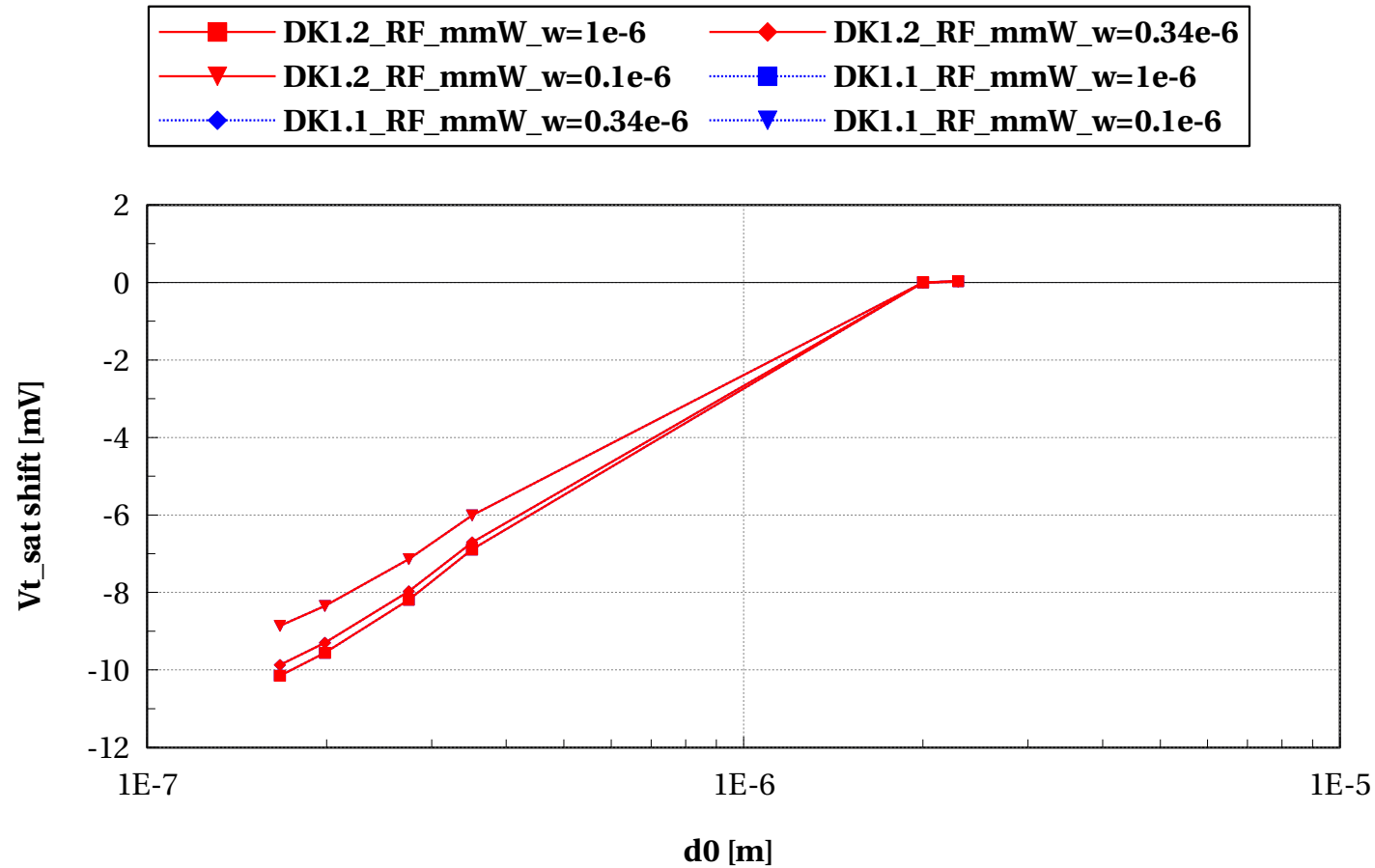
lvtpfet_acc, Ilin deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and L==0.5e-6



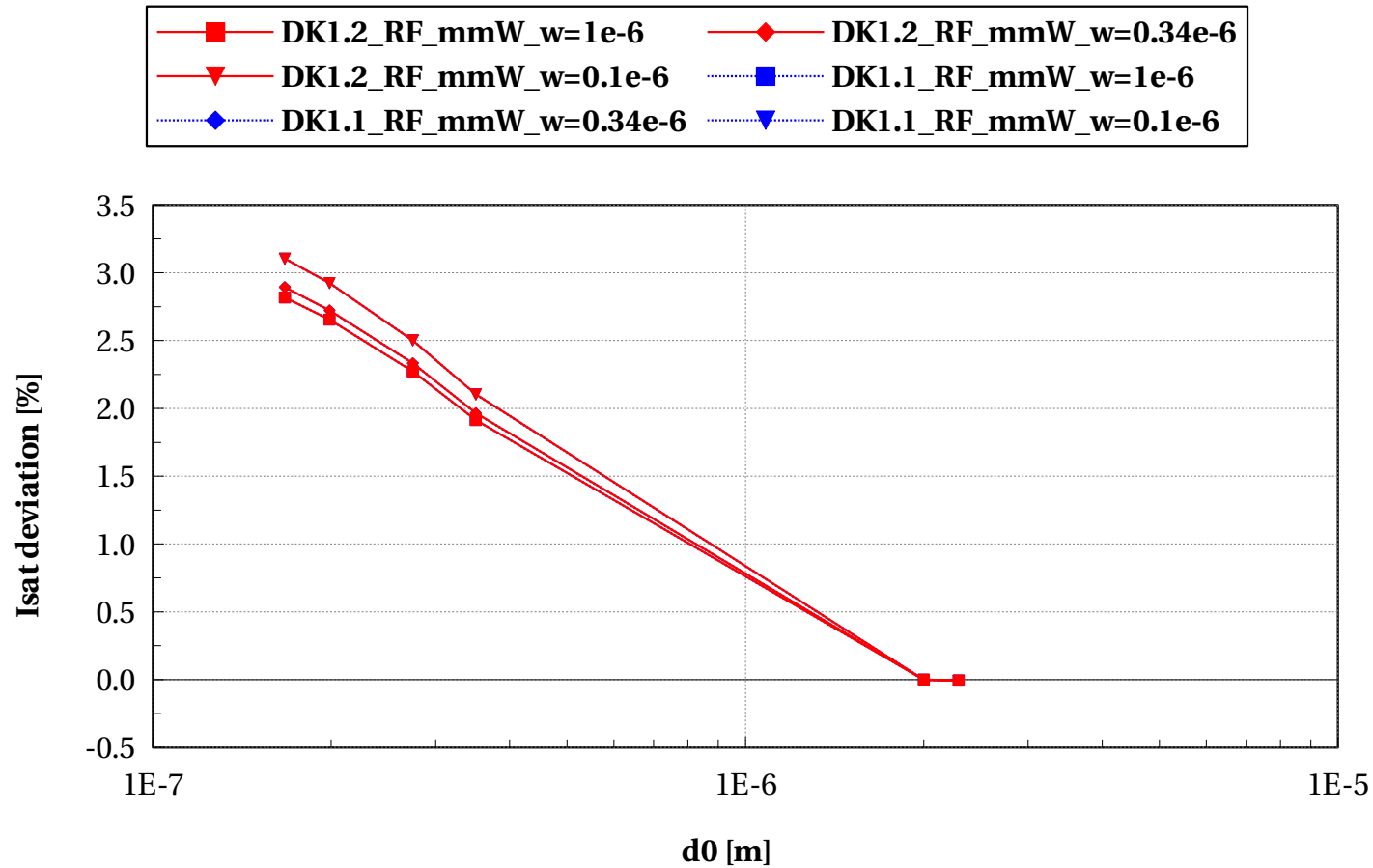
lvtpfet_acc, Vt_sat shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and L==0.5e-6



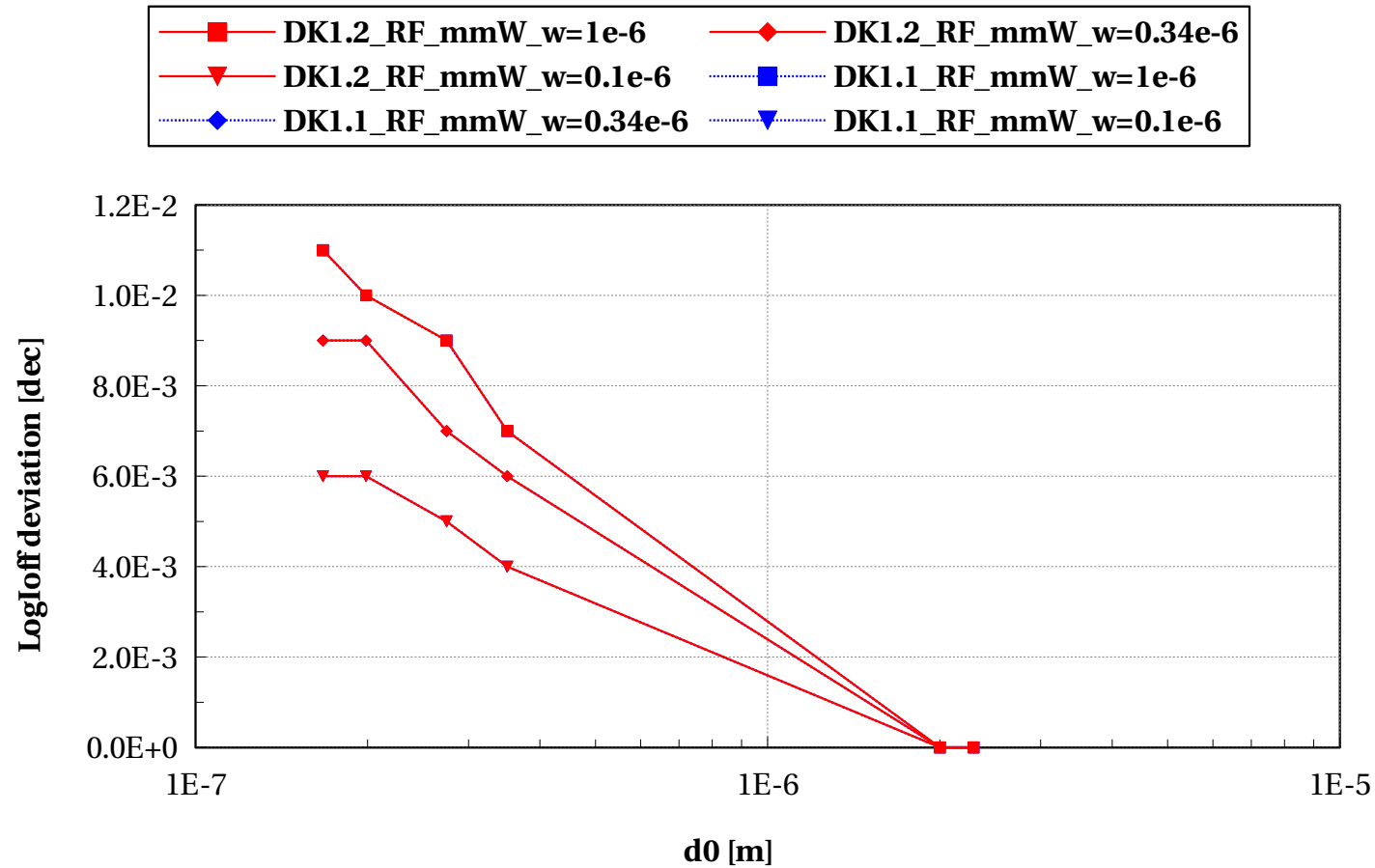
lvtpfet_acc, Isat deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and L==0.5e-6



lvtpfet_acc, Logloff deviation [dec] vs d0 [m]

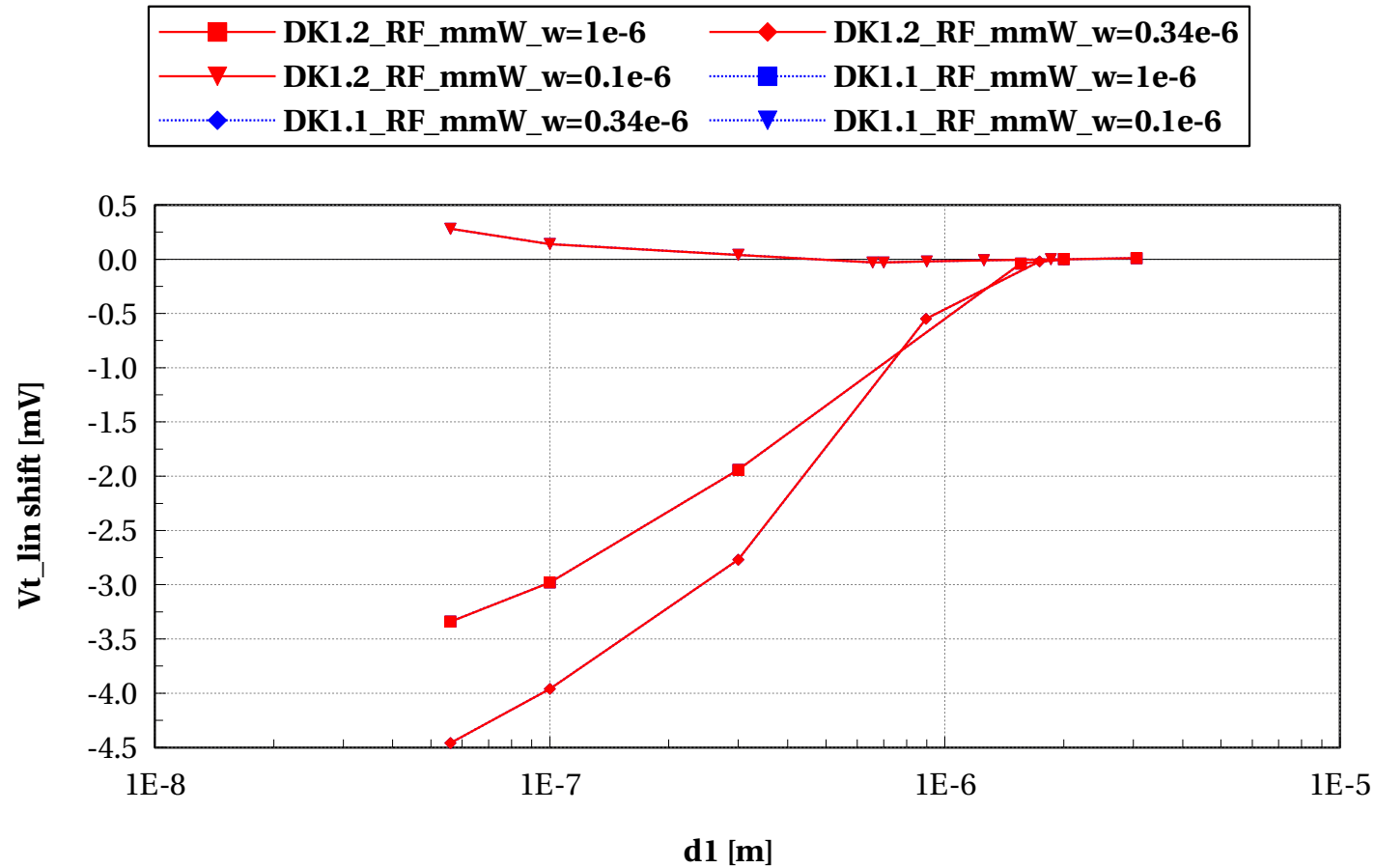
temp==25 and d1==10e-6 and L==0.5e-6



- WPE effect w.r.t d1 - Wscaling at $L=0.03u$

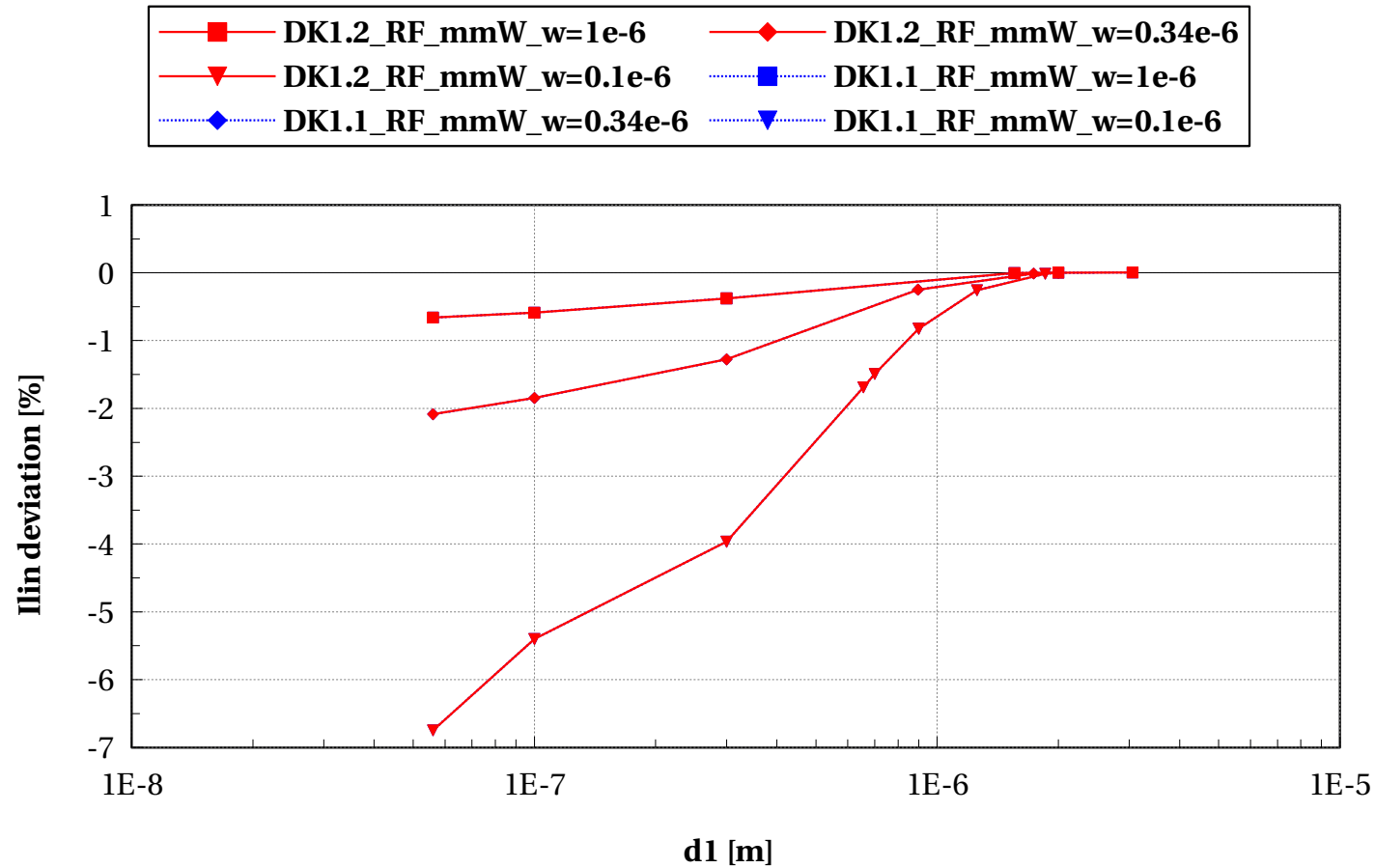
lvtpfet_acc, Vt_lin shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and L==0.03e-6



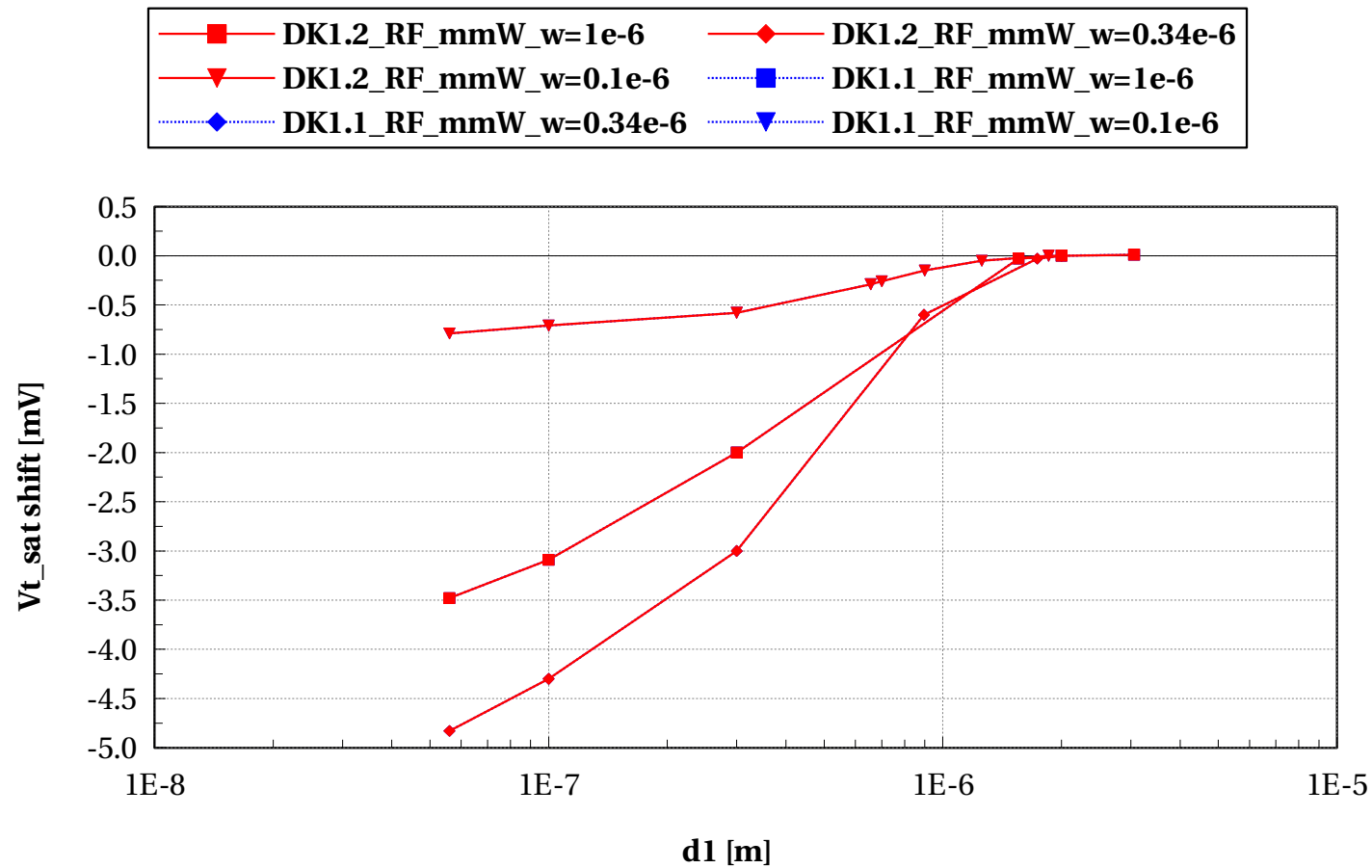
lvtpfet_acc, Ilin deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and L==0.03e-6



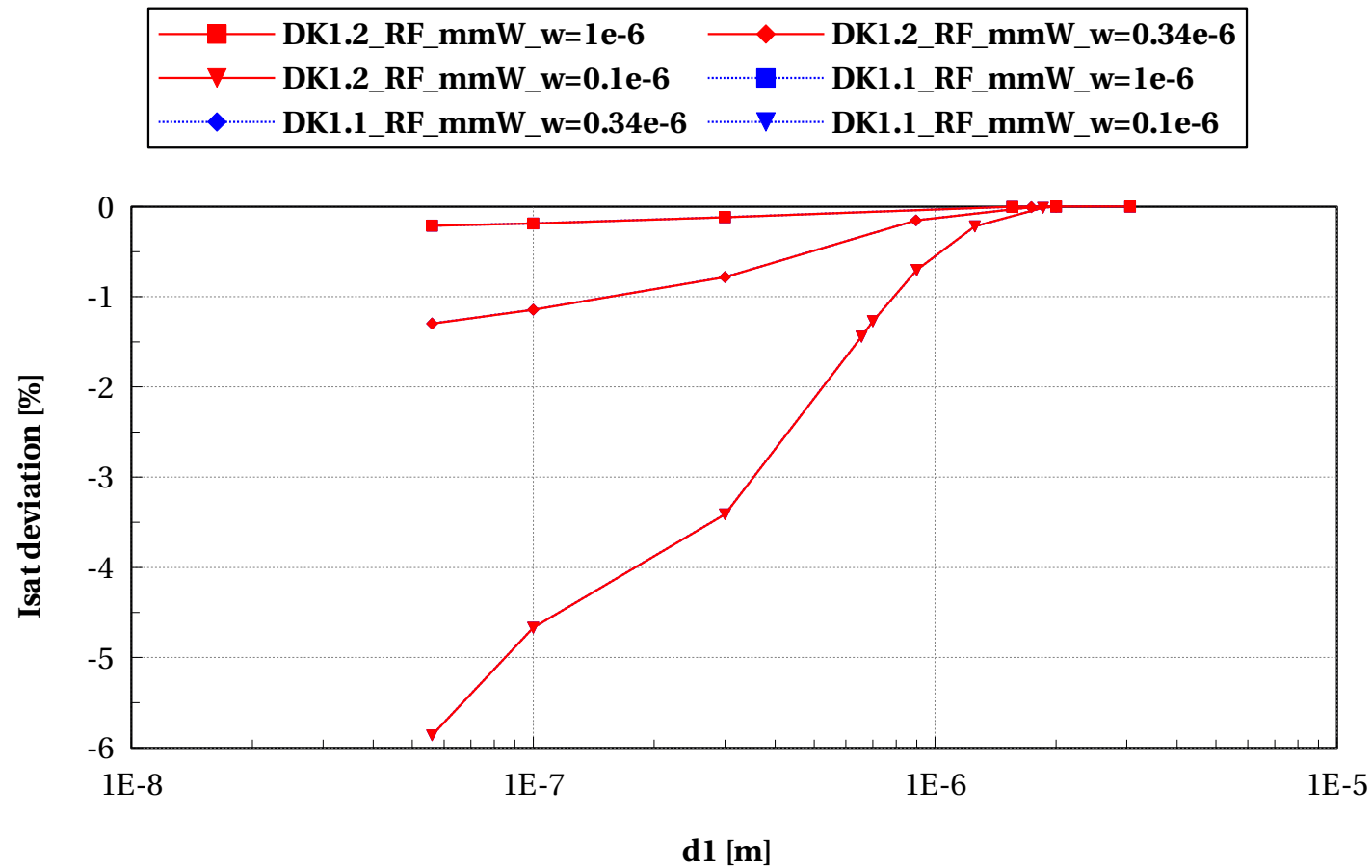
lvtpfet_acc, Vt_sat shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and L==0.03e-6



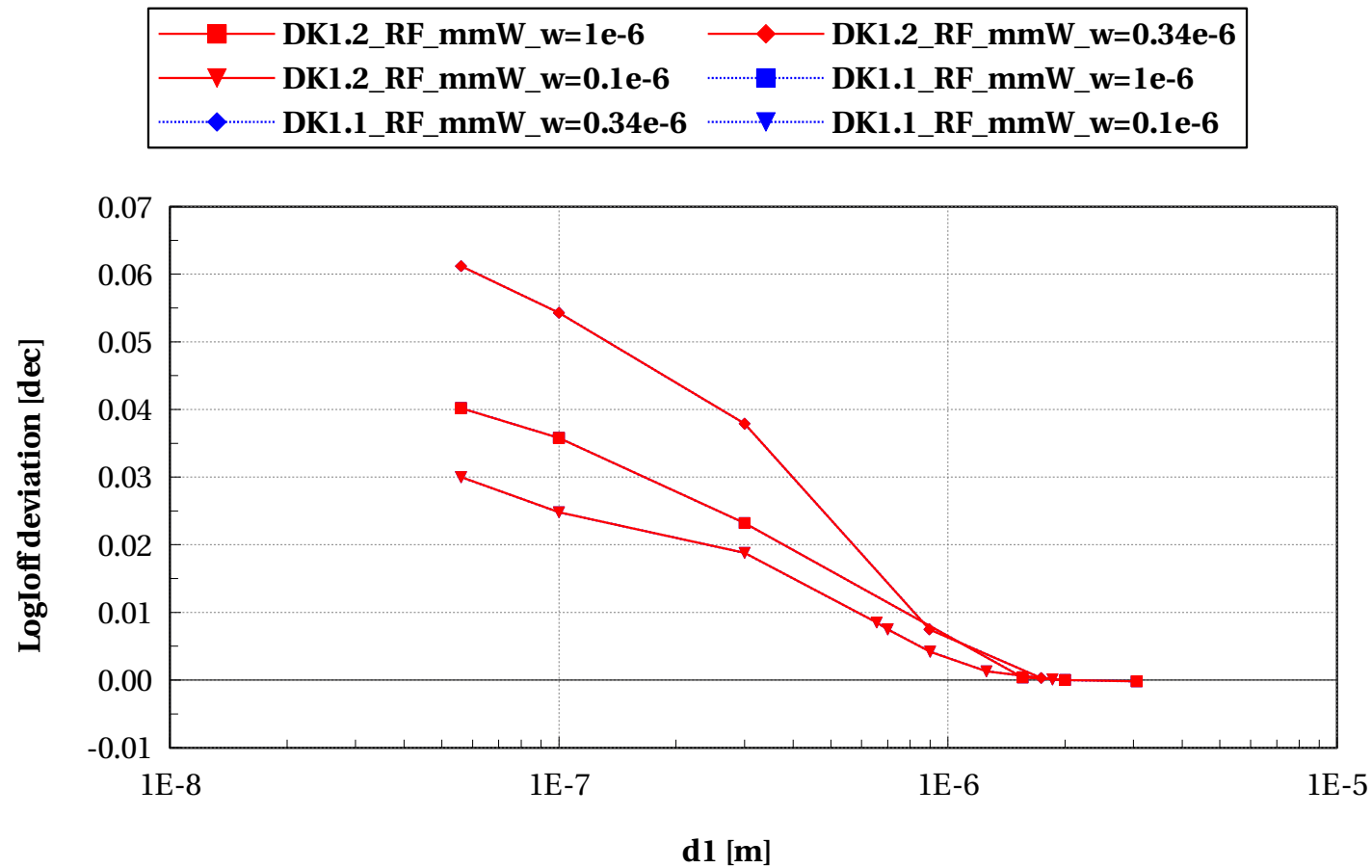
lvtpfet_acc, Isat deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and L==0.03e-6



lvtpfet_acc, Logloff deviation [dec] vs d1 [m]

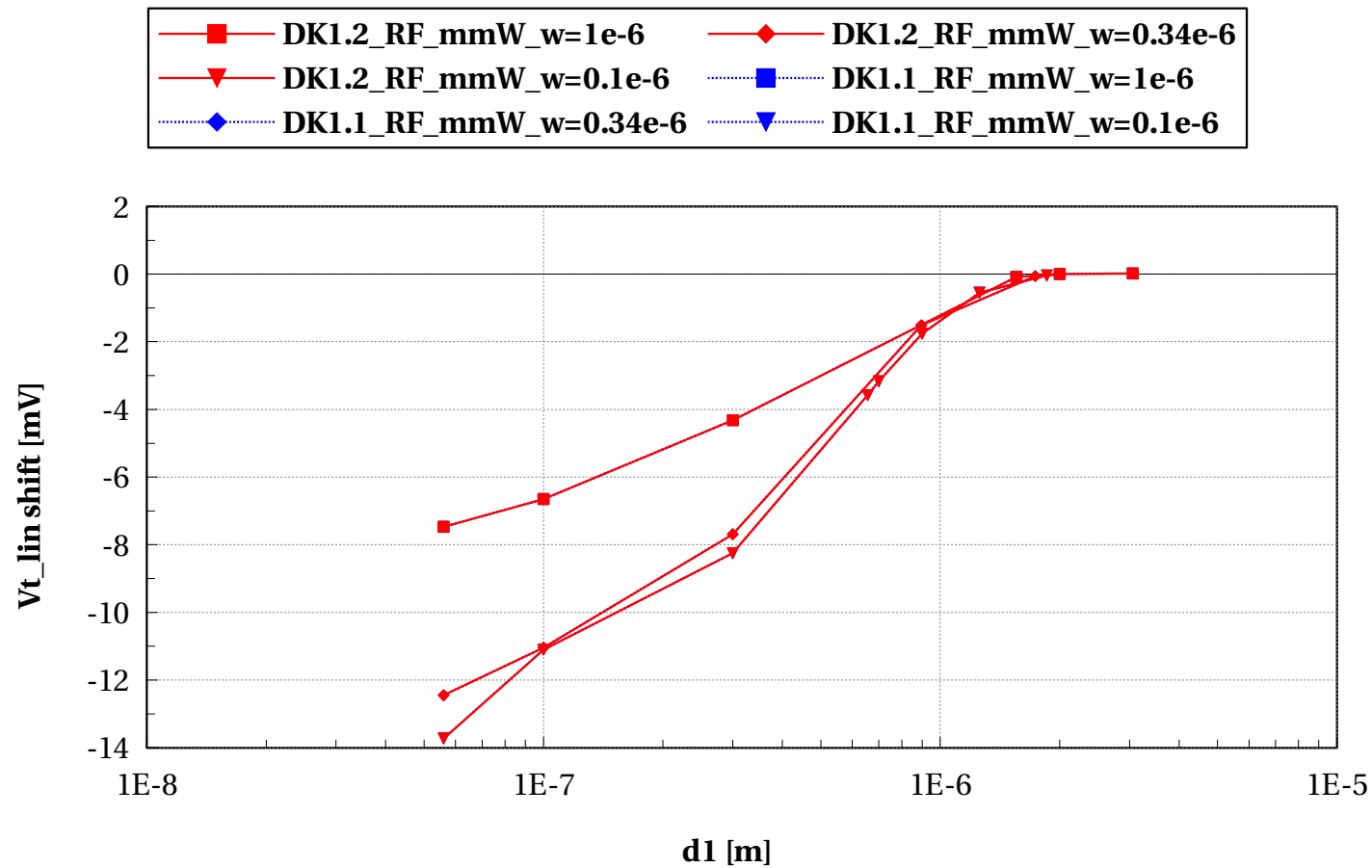
temp==25 and d0==10e-6 and L==0.03e-6



- WPE effect w.r.t d1 - Wscaling at $L=0.12u$

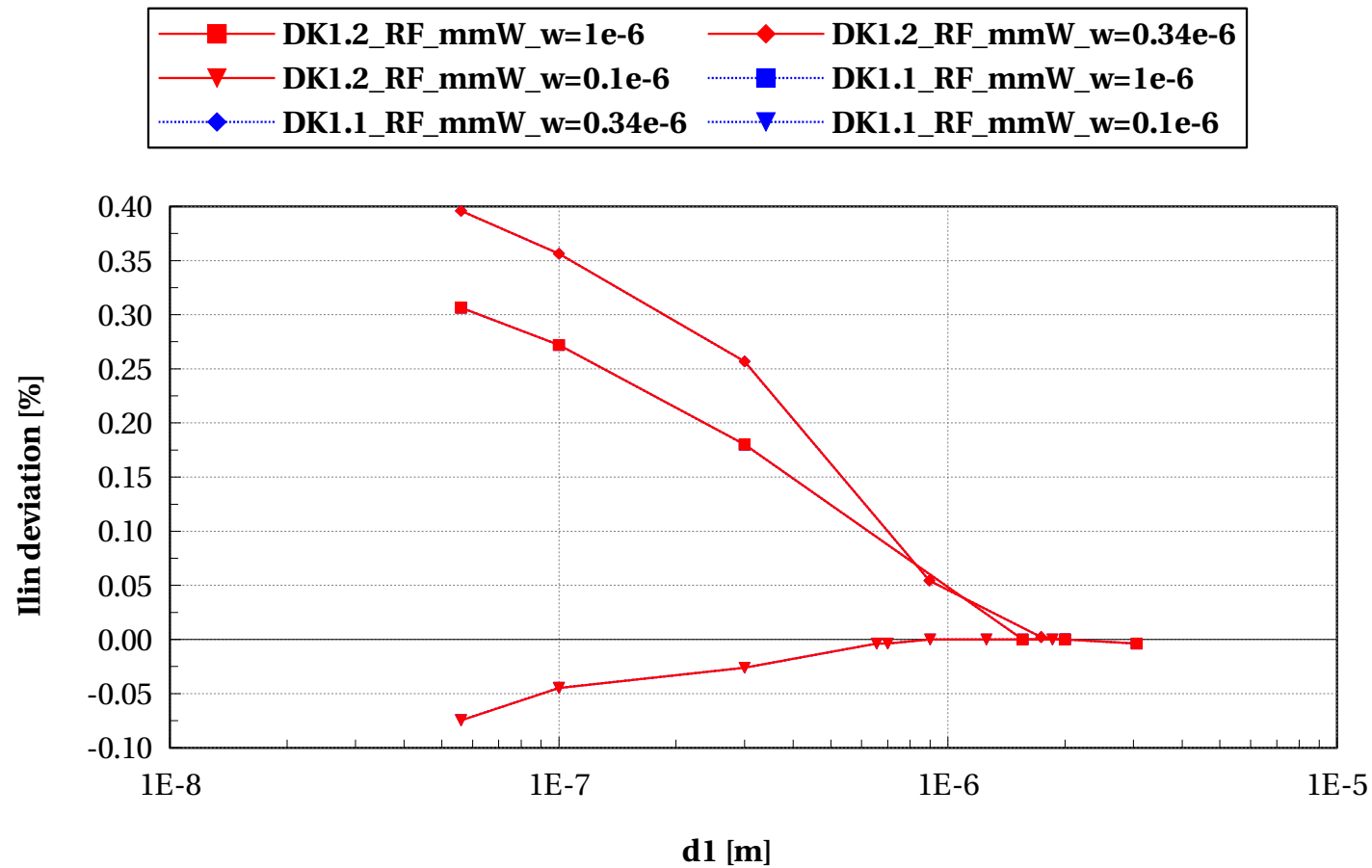
lvtpfet_acc, Vt_lin shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and L==0.12e-6



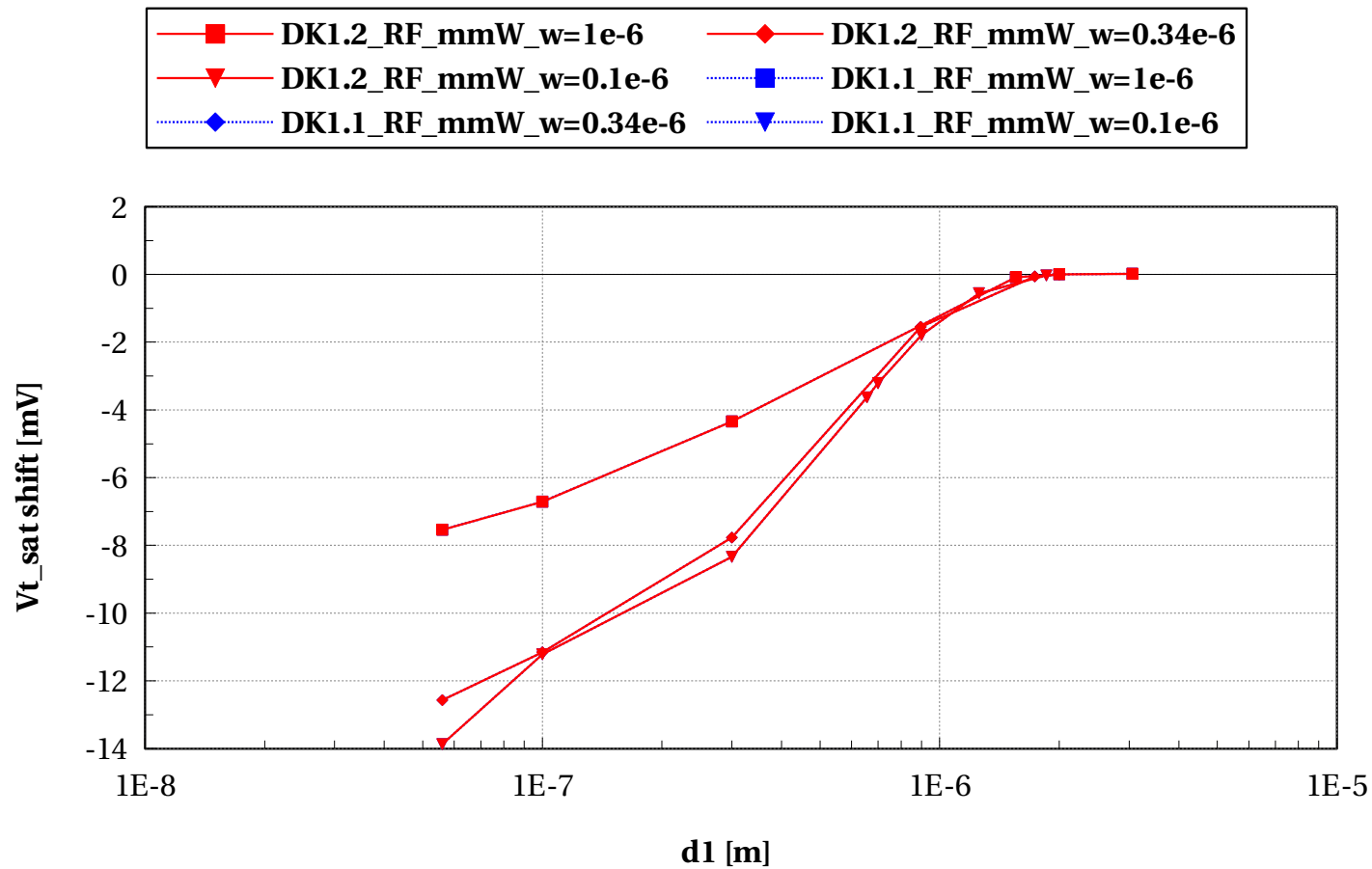
lvtpfet_acc, Ilin deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and L==0.12e-6



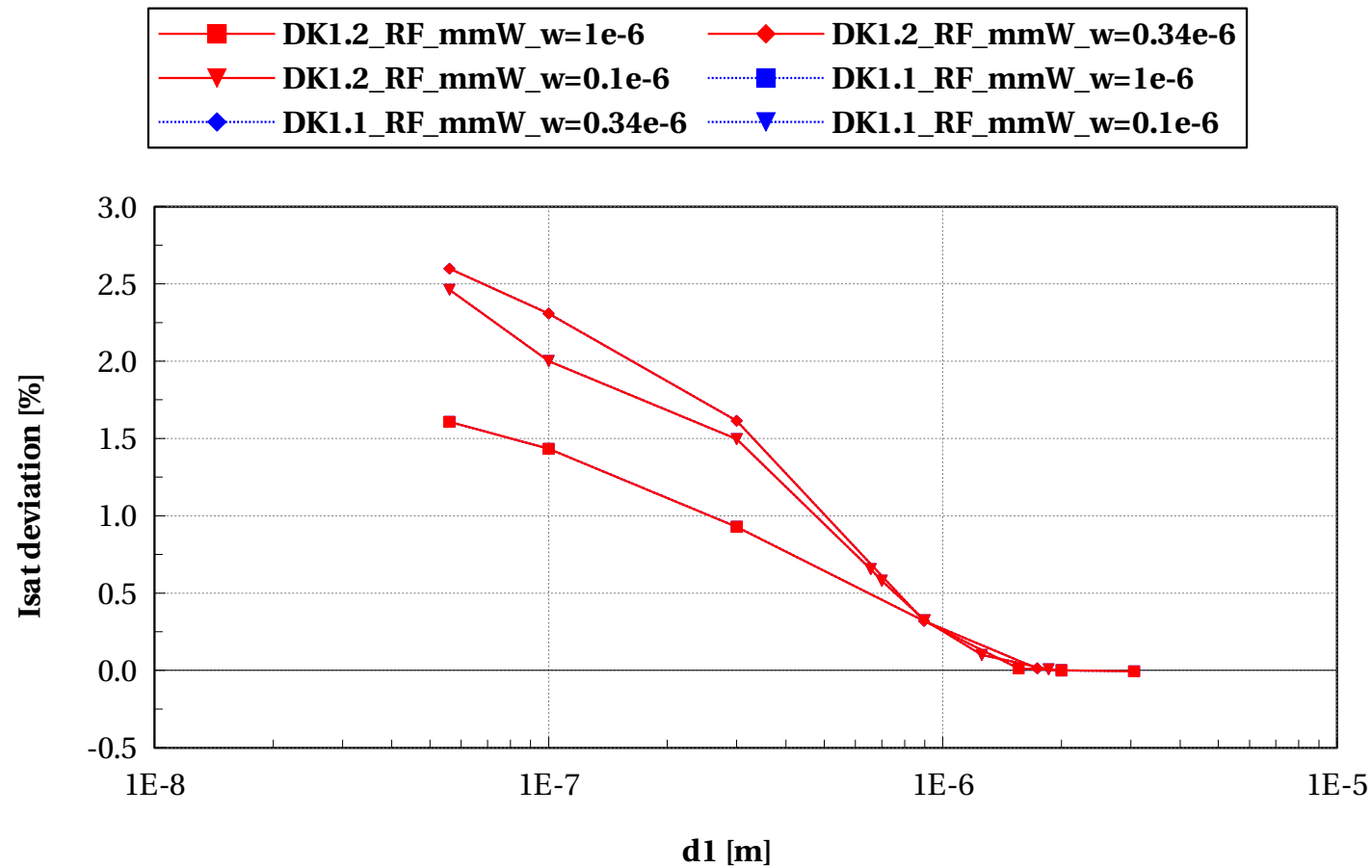
lvtpfet_acc, Vt_sat shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and L==0.12e-6



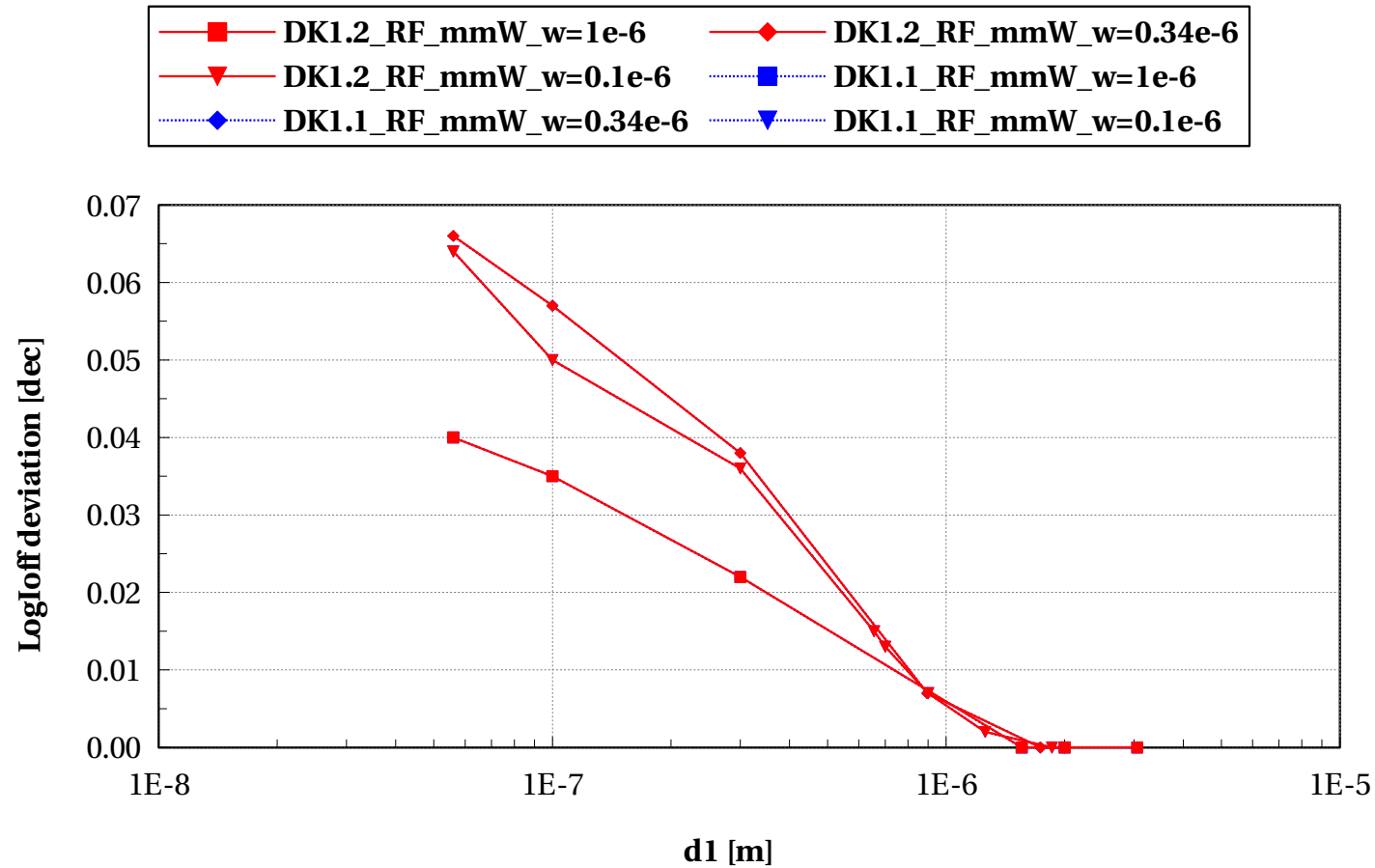
lvtpfet_acc, Isat deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and L==0.12e-6



lvtpfet_acc, Logloff deviation [dec] vs d1 [m]

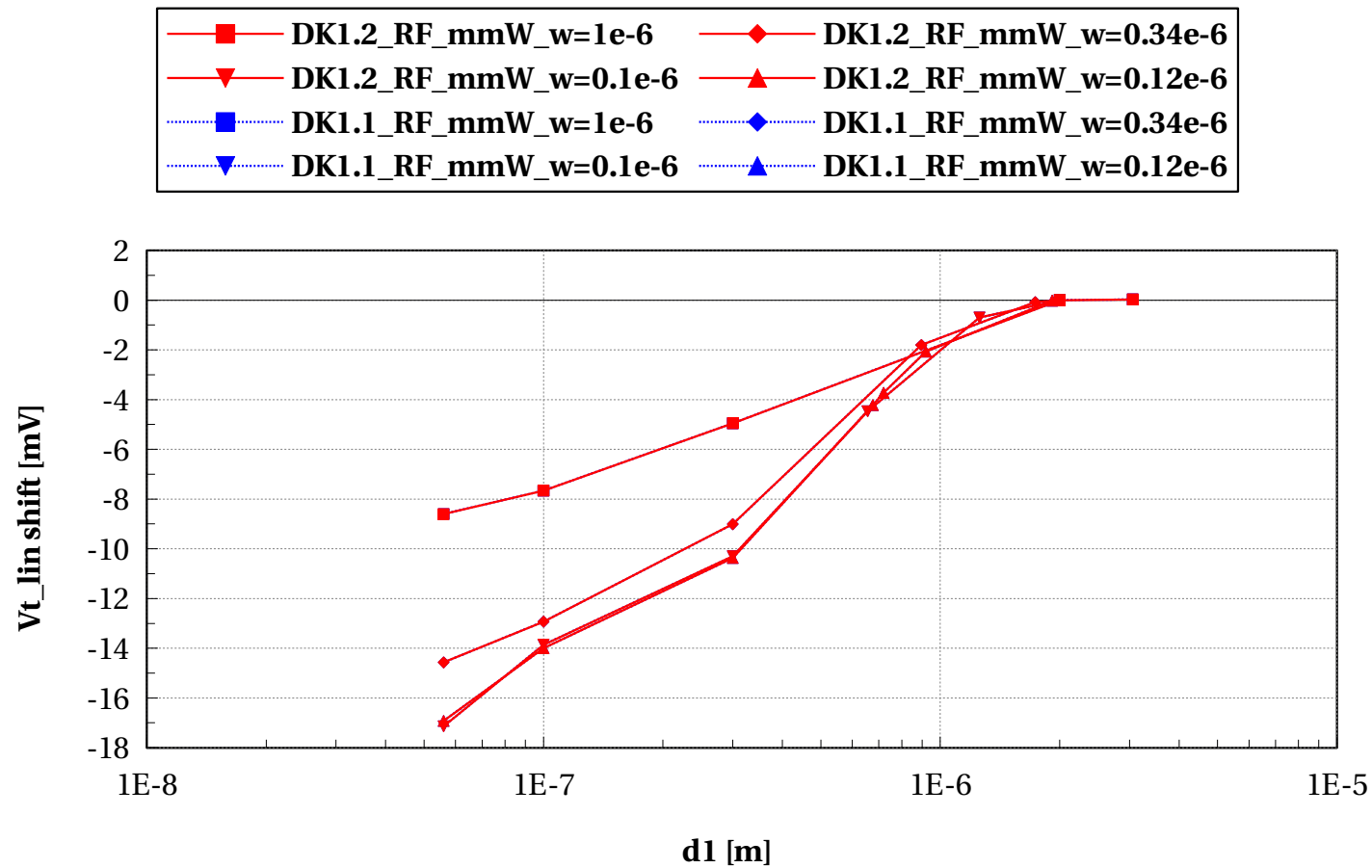
temp==25 and d0==10e-6 and L==0.12e-6



- WPE effect w.r.t d1 - Wscaling at L=1u

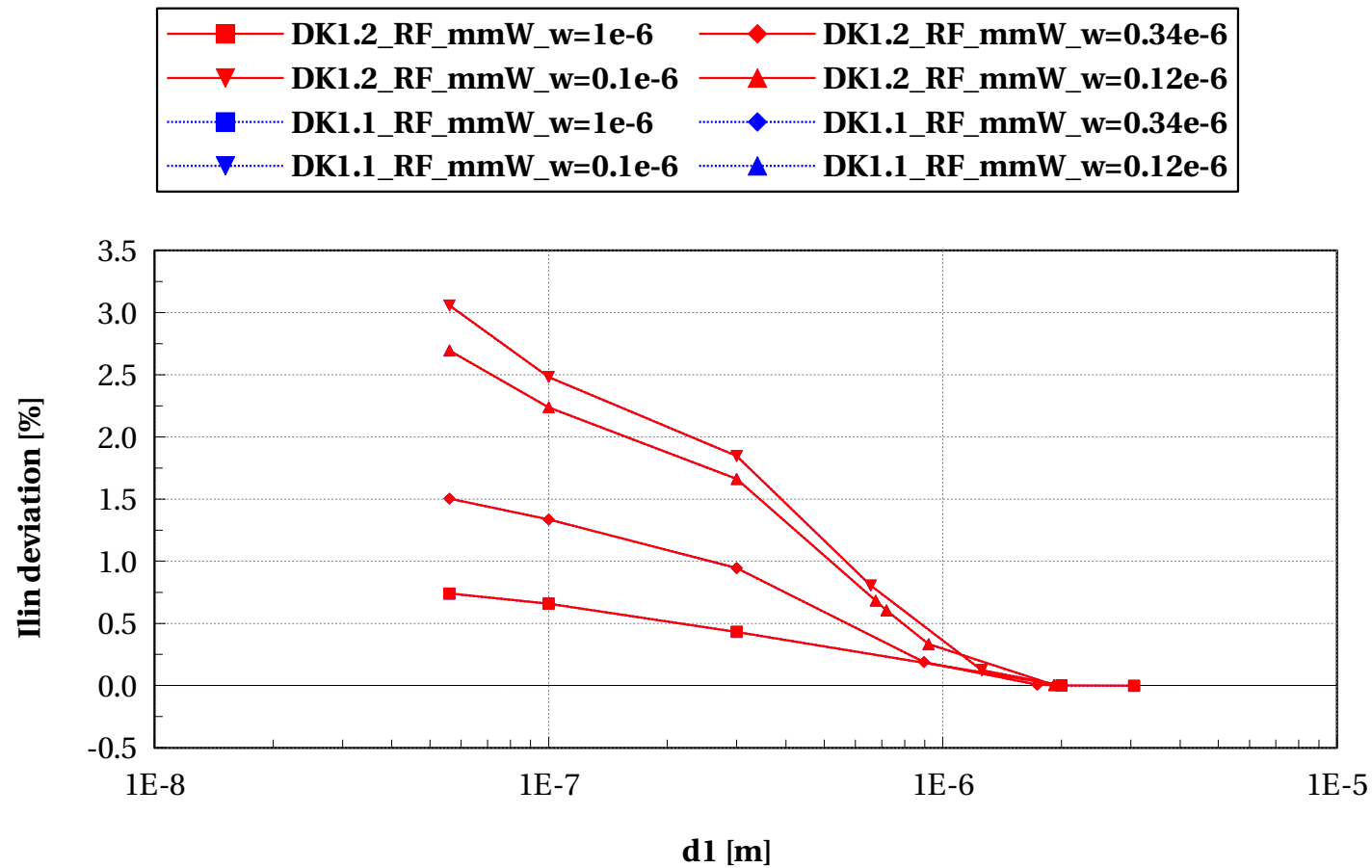
lvtpfet_acc, Vt_lin shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and L==1e-6



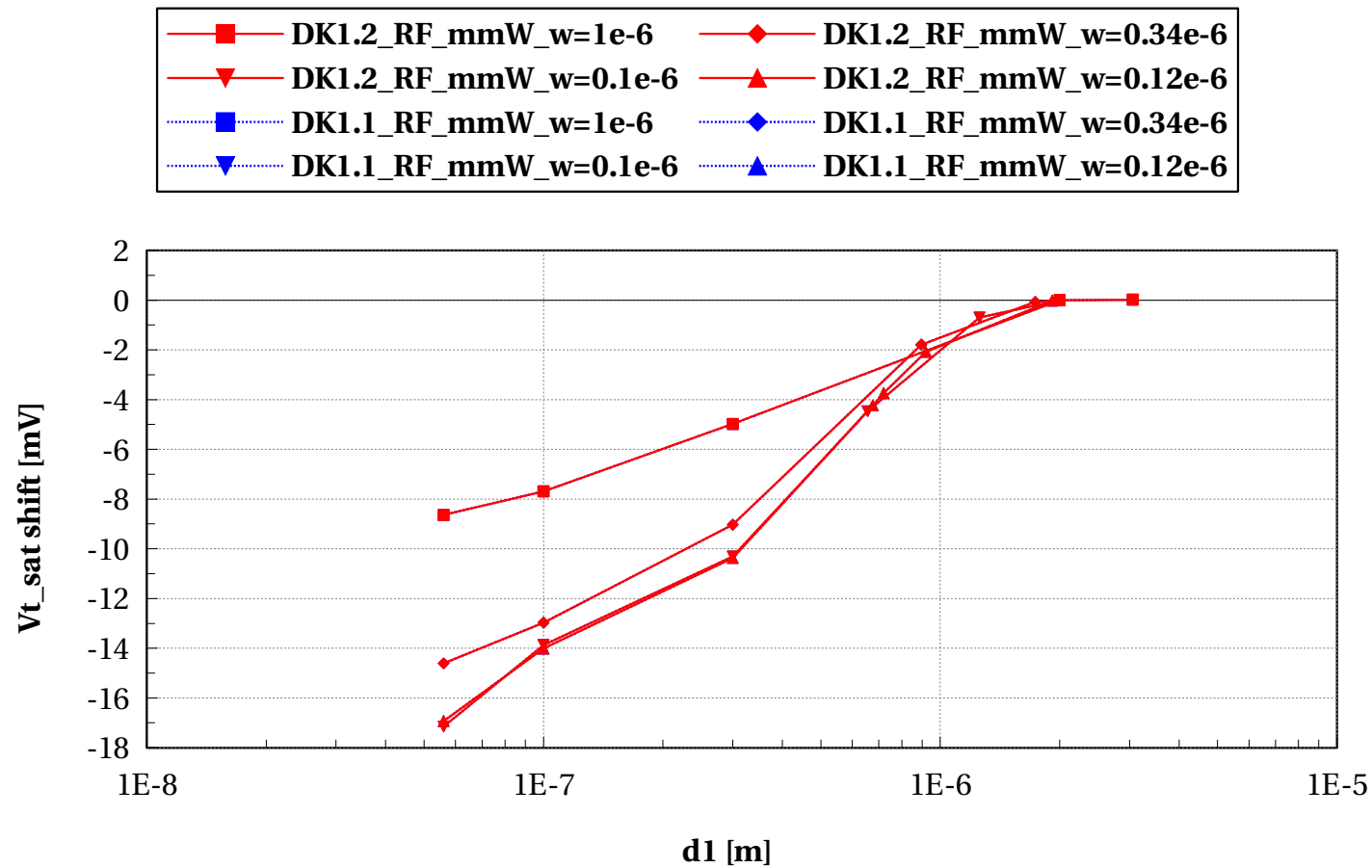
lvtpfet_acc, Ilin deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and L==1e-6



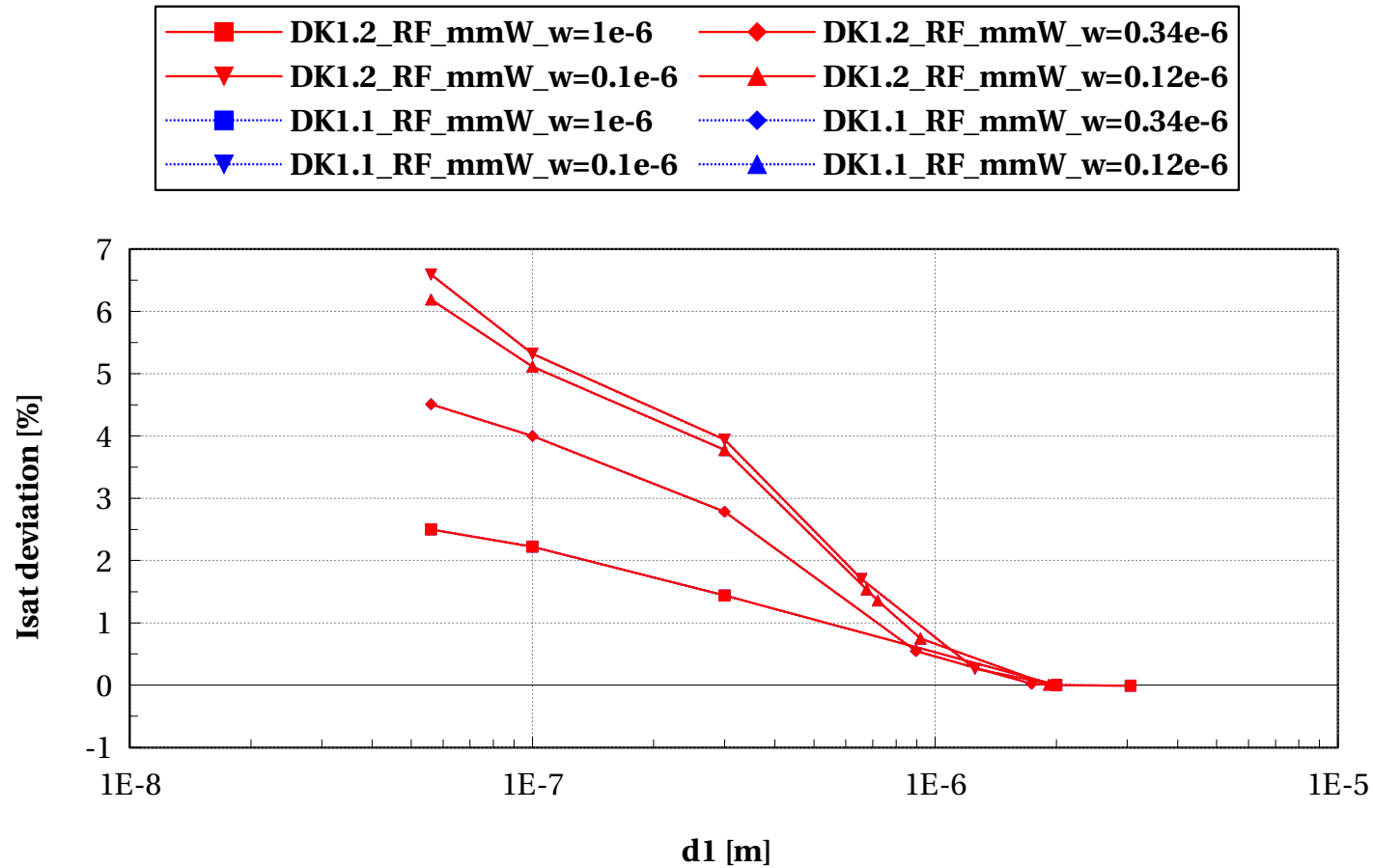
lvtpfet_acc, Vt_sat shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and L==1e-6



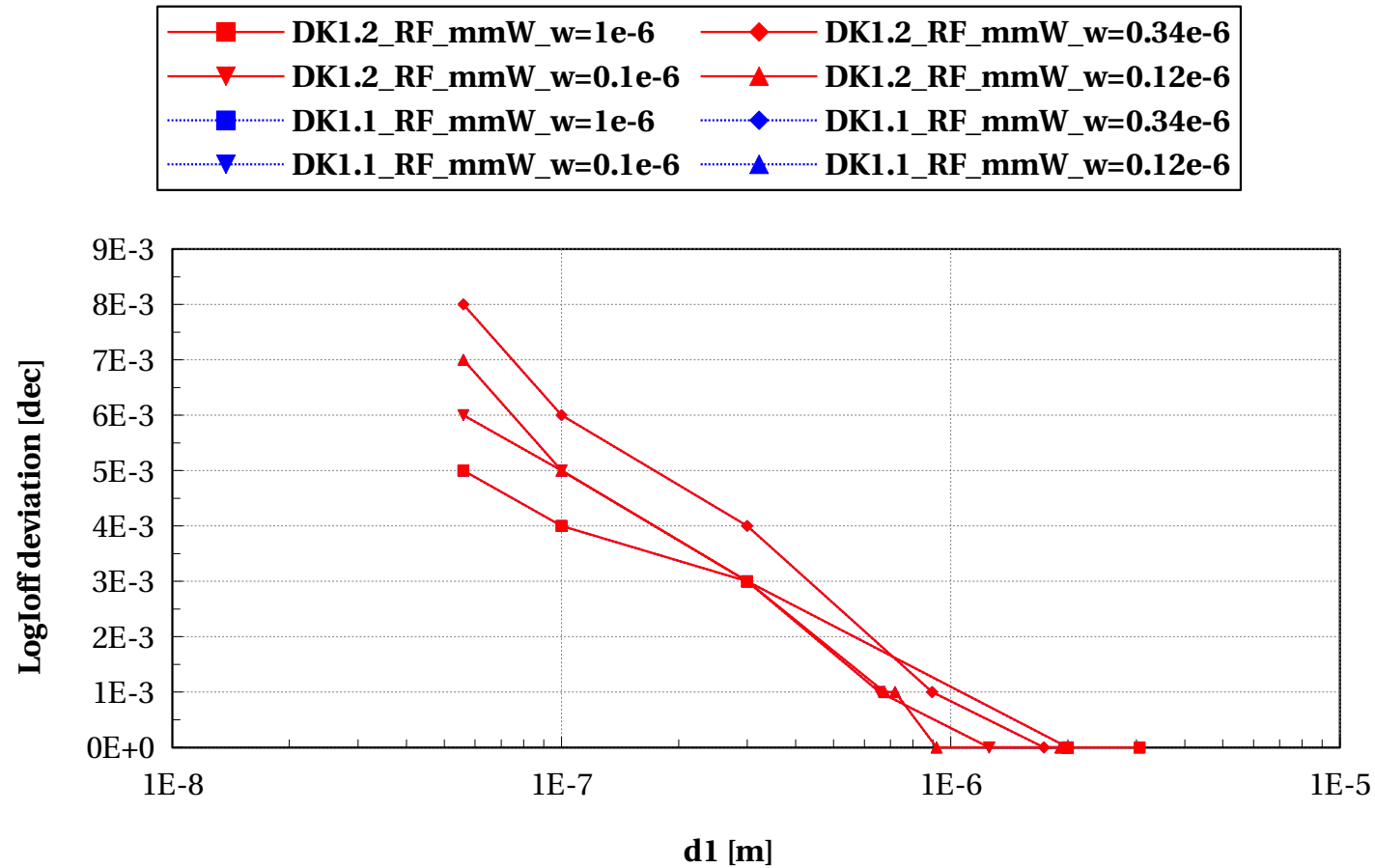
lvtpfet_acc, Isat deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and L==1e-6



lvtpfet_acc, Logloff deviation [dec] vs d1 [m]

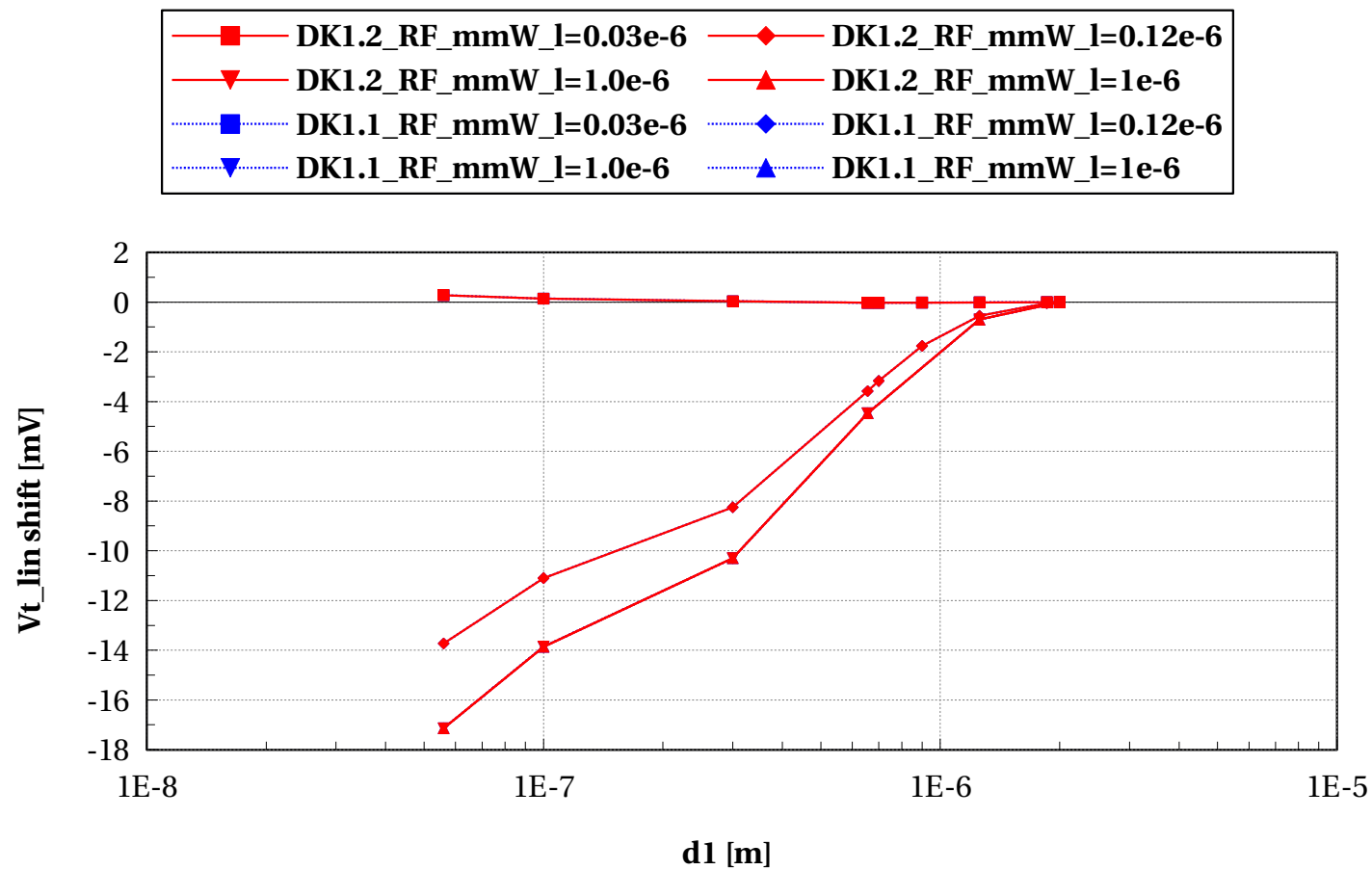
temp==25 and d0==10e-6 and L==1e-6



- WPE effect w.r.t d1 - Lscaling at $W=0.1u$

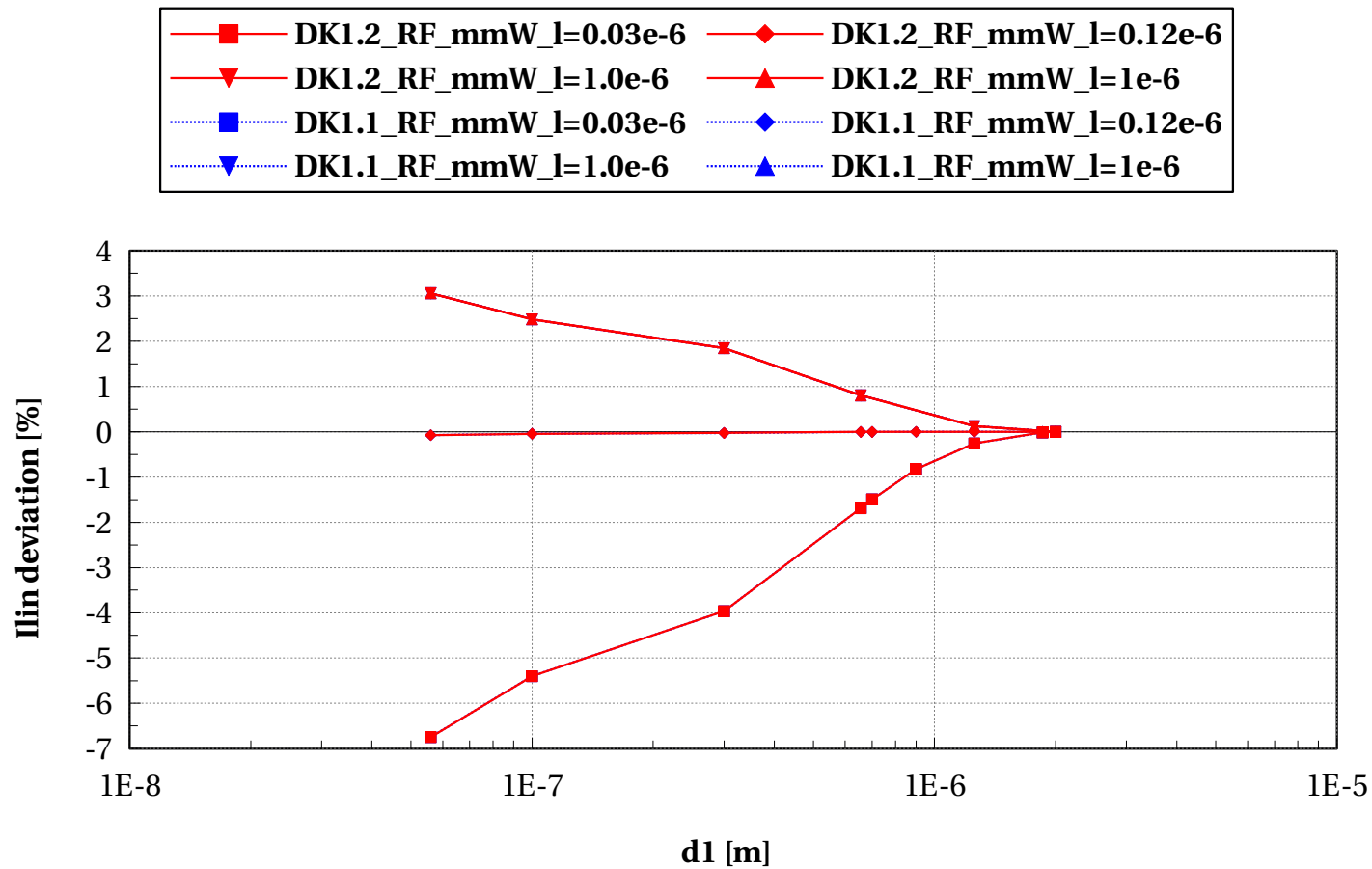
lvtpfet_acc, Vt_lin shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and W==0.1e-6



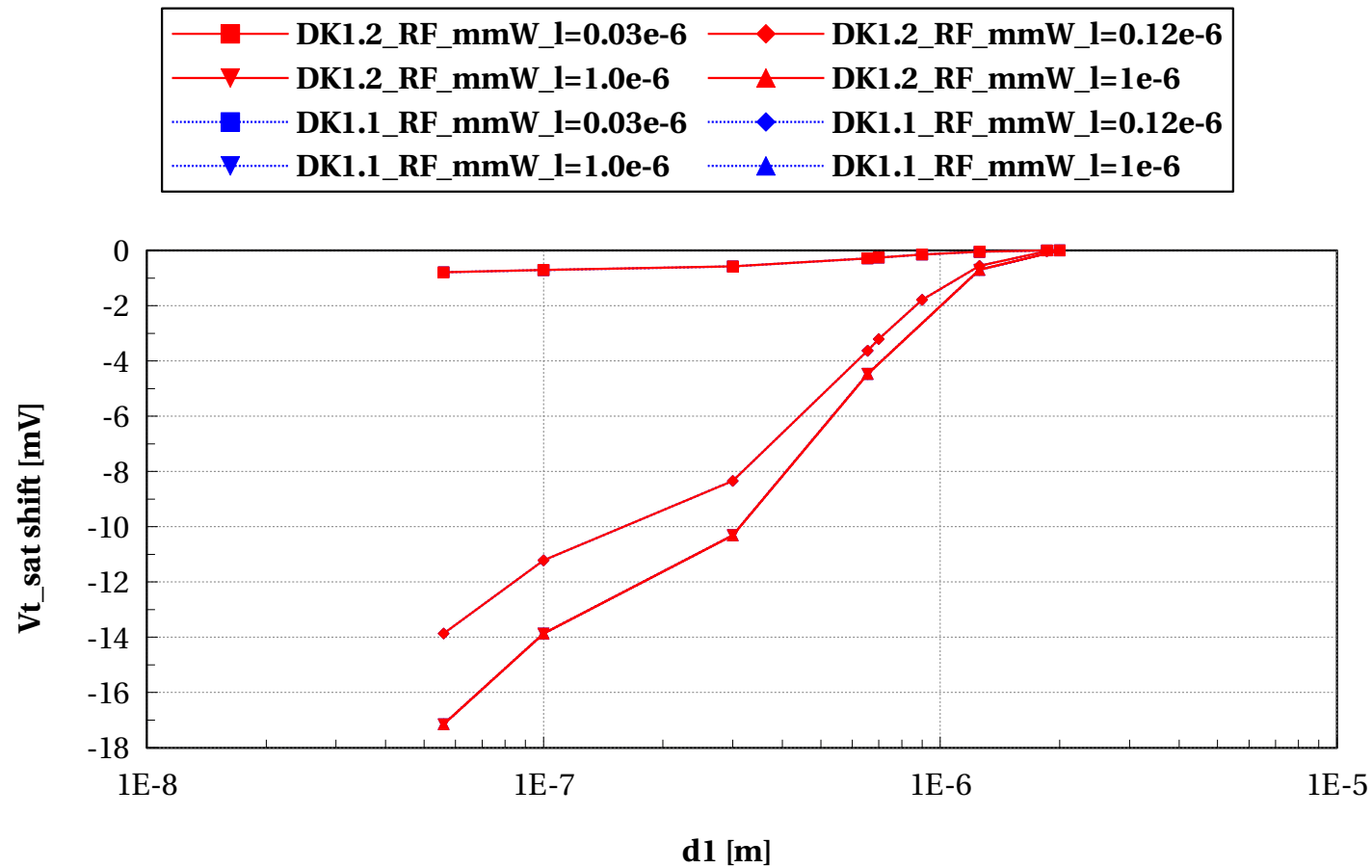
lvtpfet_acc, Ilin deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and W==0.1e-6



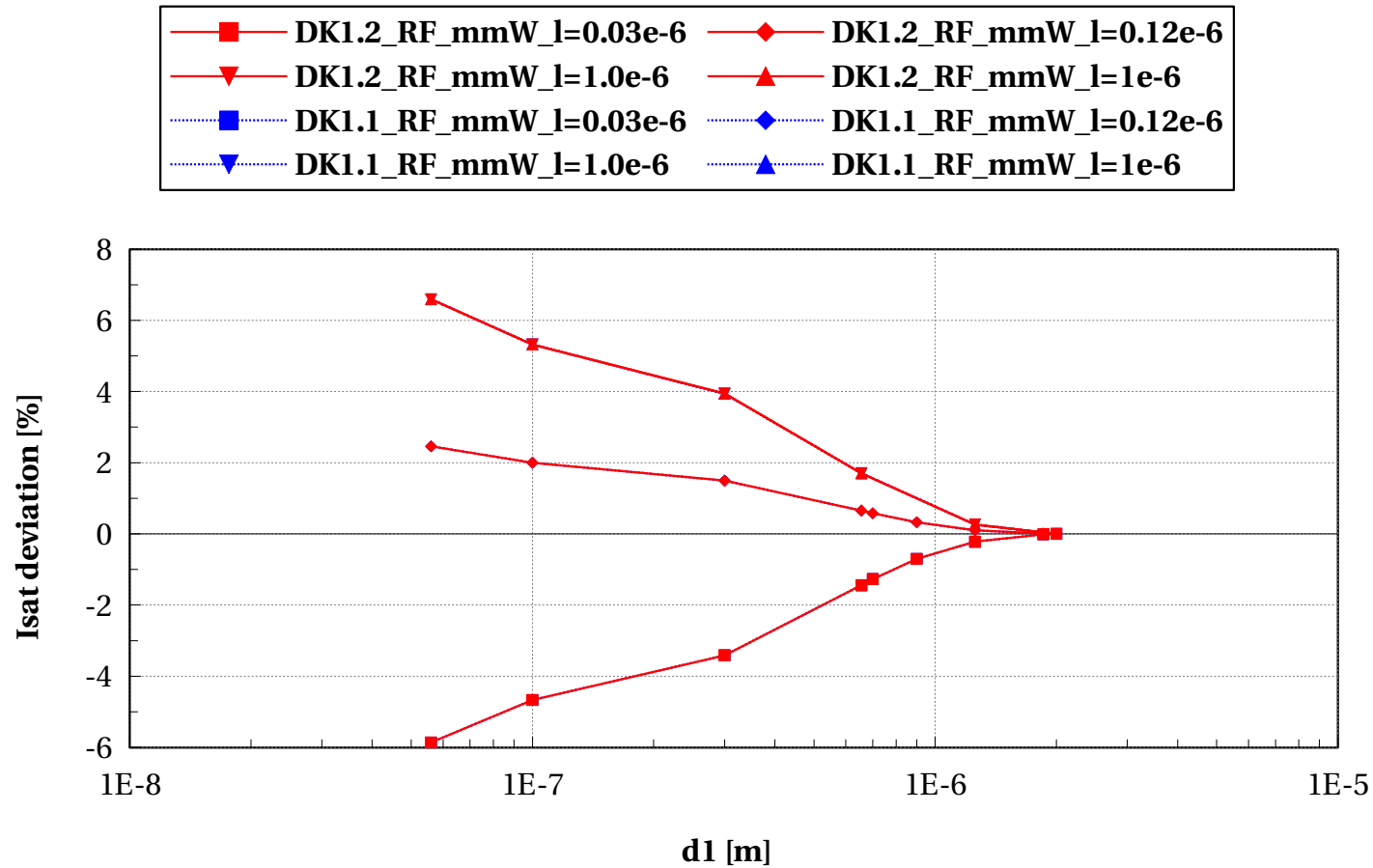
lvtpfet_acc, Vt_sat shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and W==0.1e-6



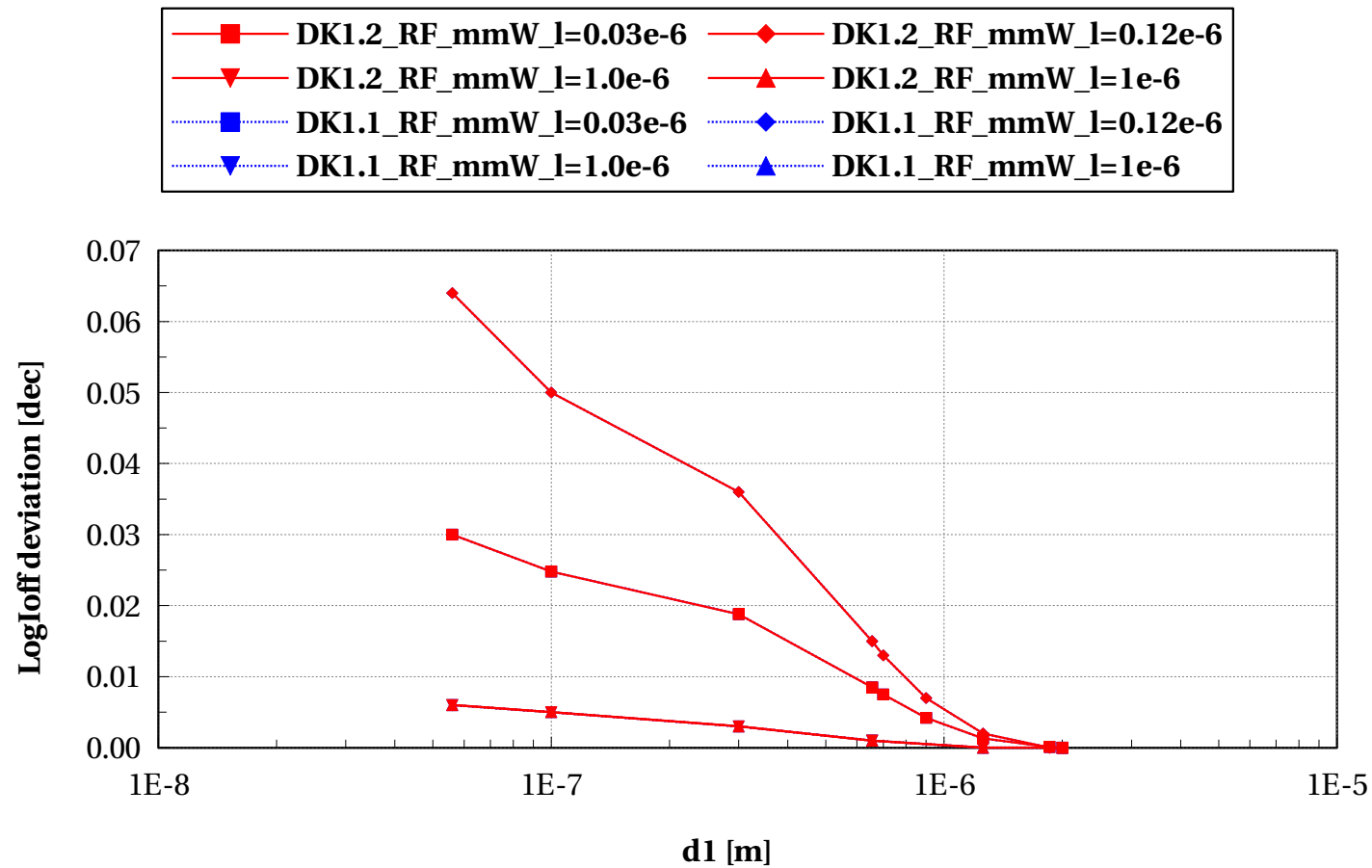
lvtpfet_acc, Isat deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and W==0.1e-6



lvtpfet_acc, Logloff deviation [dec] vs d1 [m]

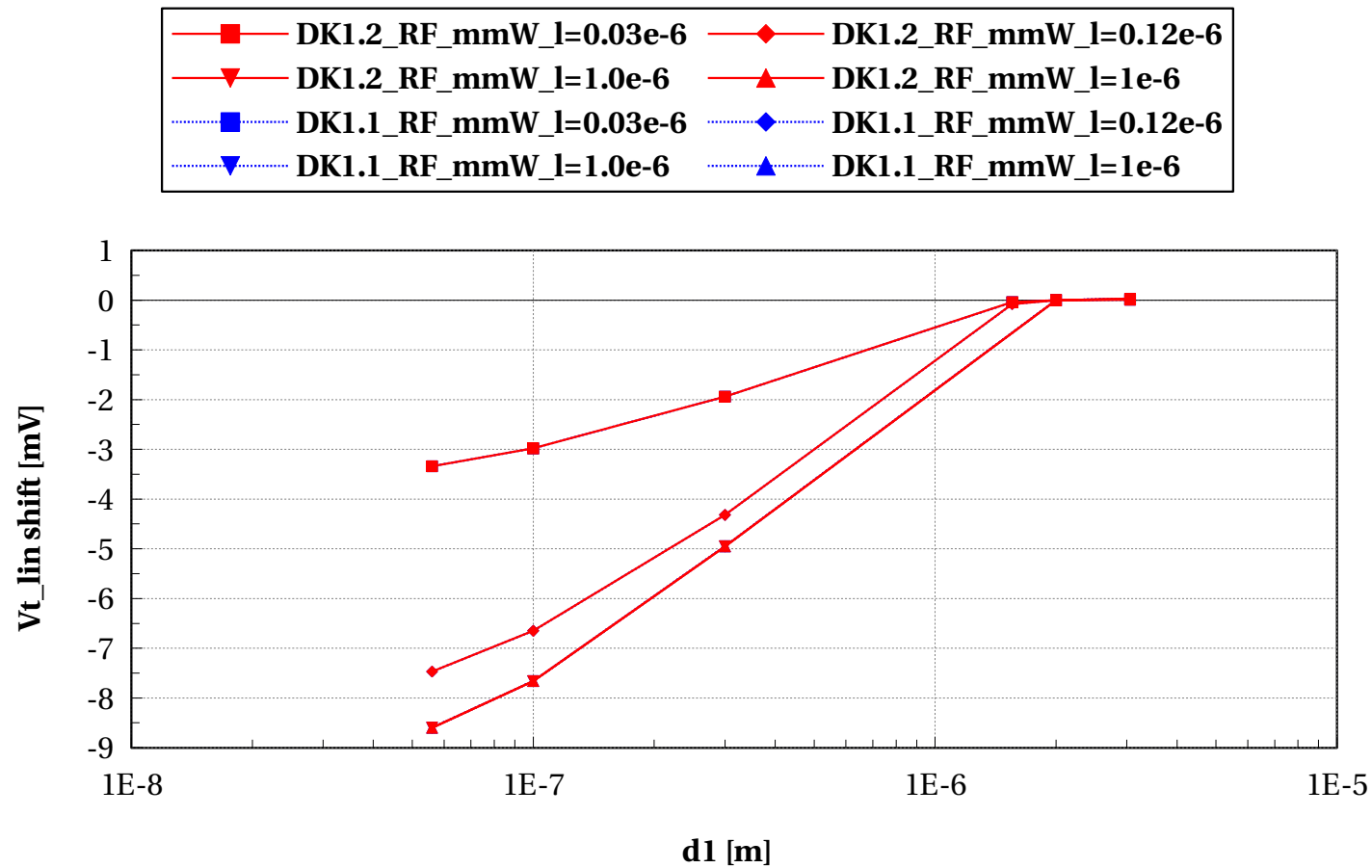
temp==25 and d0==10e-6 and W==0.1e-6



- WPE effect w.r.t d1 - Lscaling at W=1u

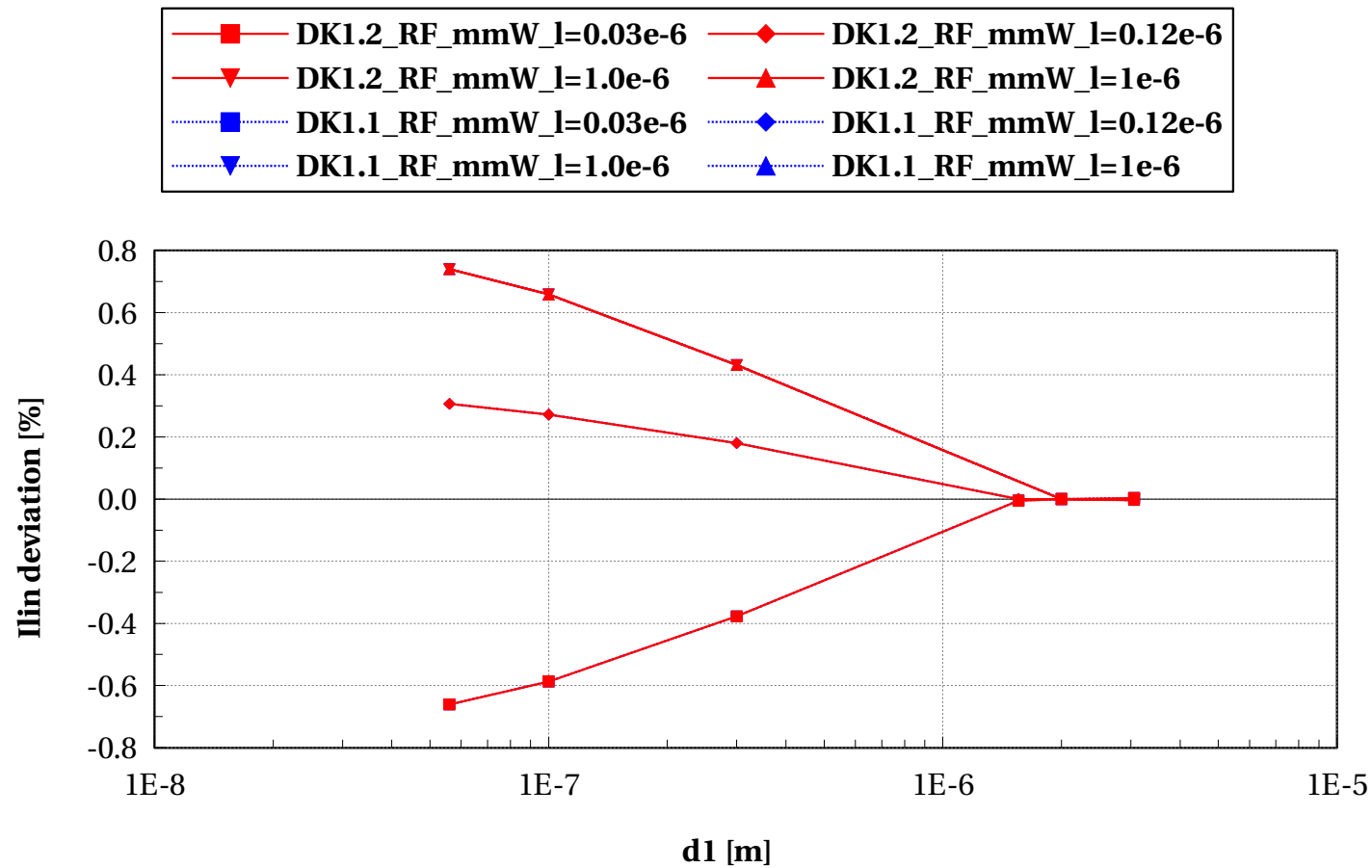
lvtpfet_acc, Vt_lin shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and W==1e-6



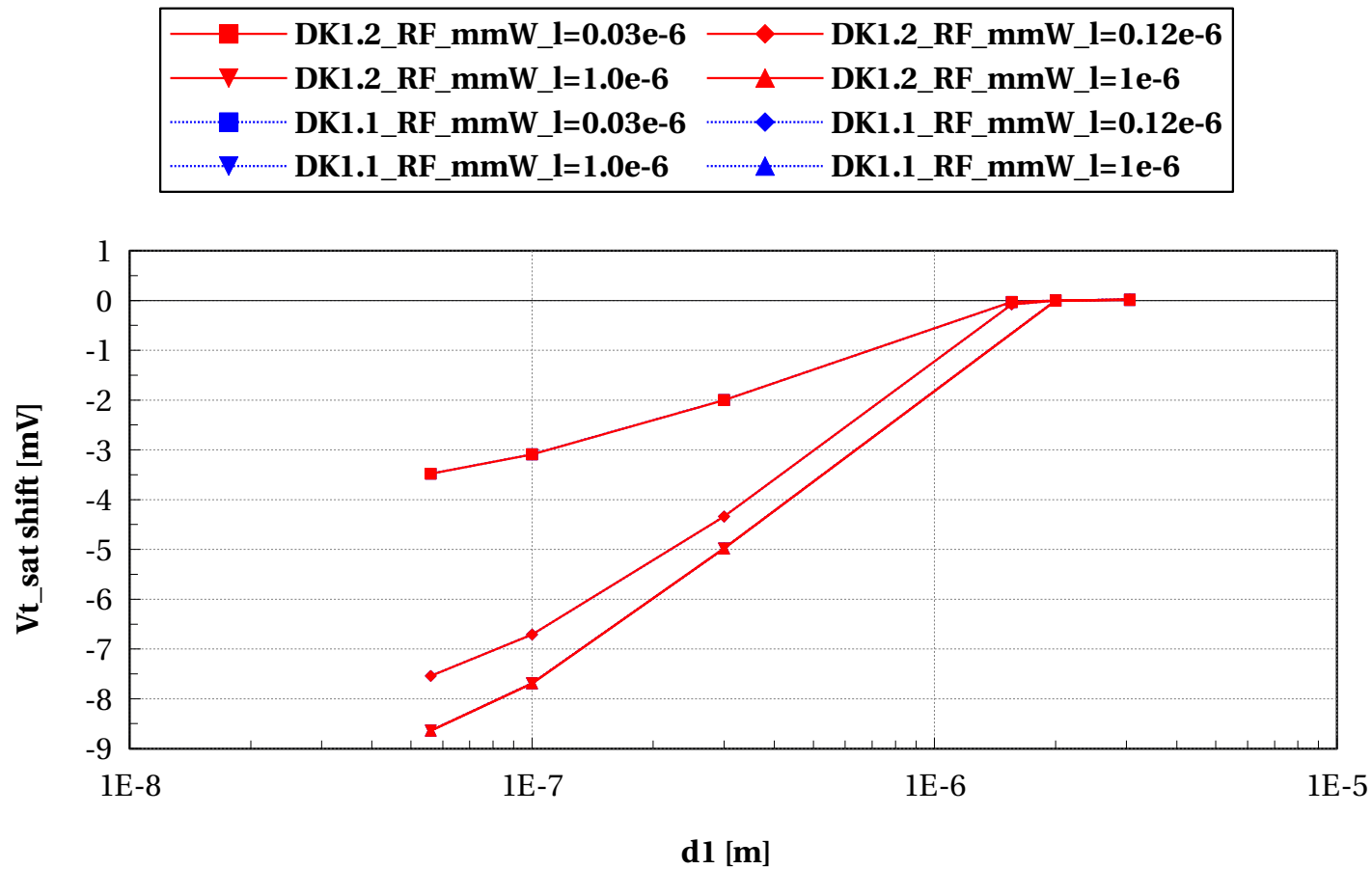
lvtpfet_acc, Ilin deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and W==1e-6



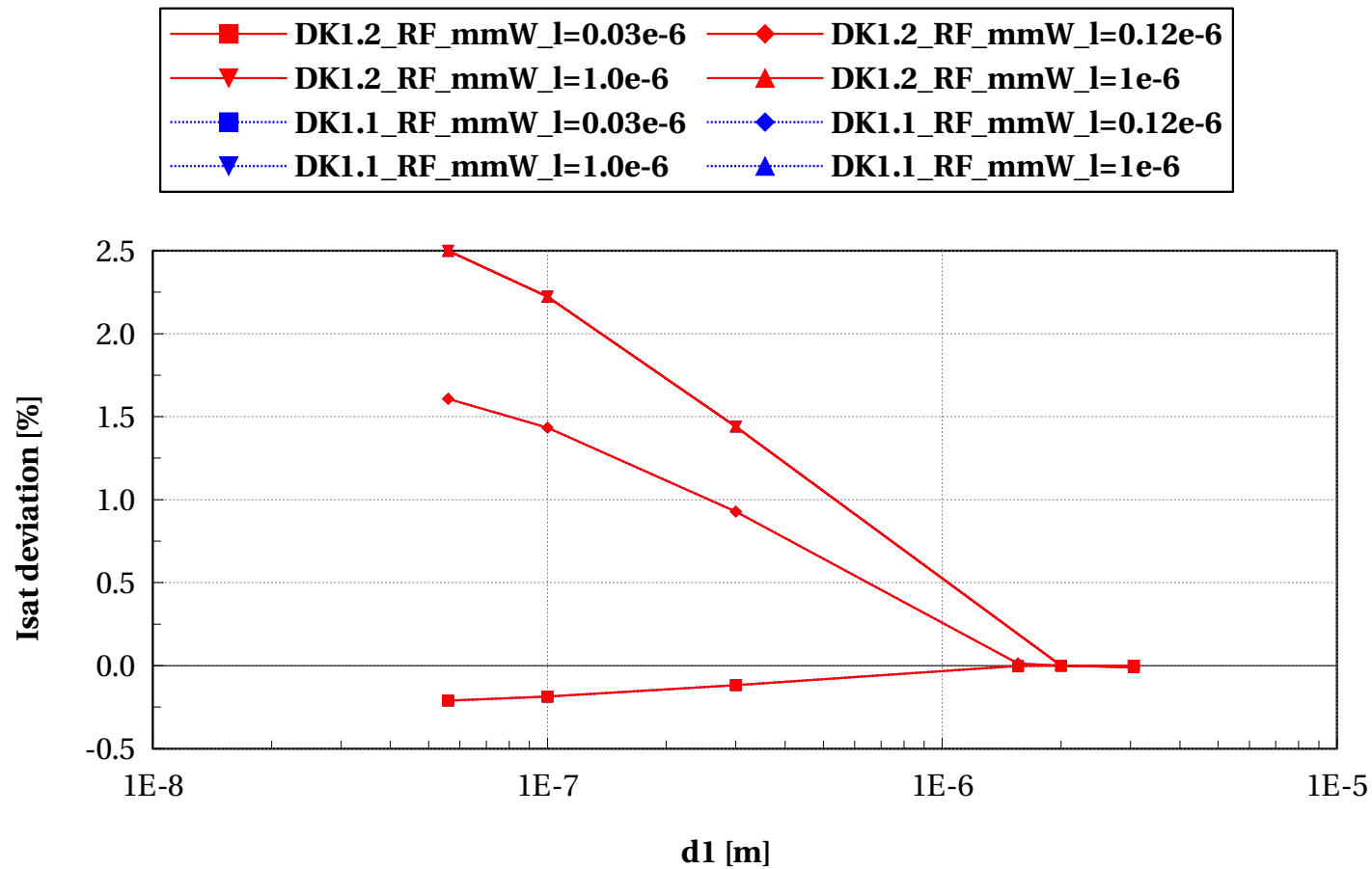
lvtpfet_acc, Vt_sat shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and W==1e-6



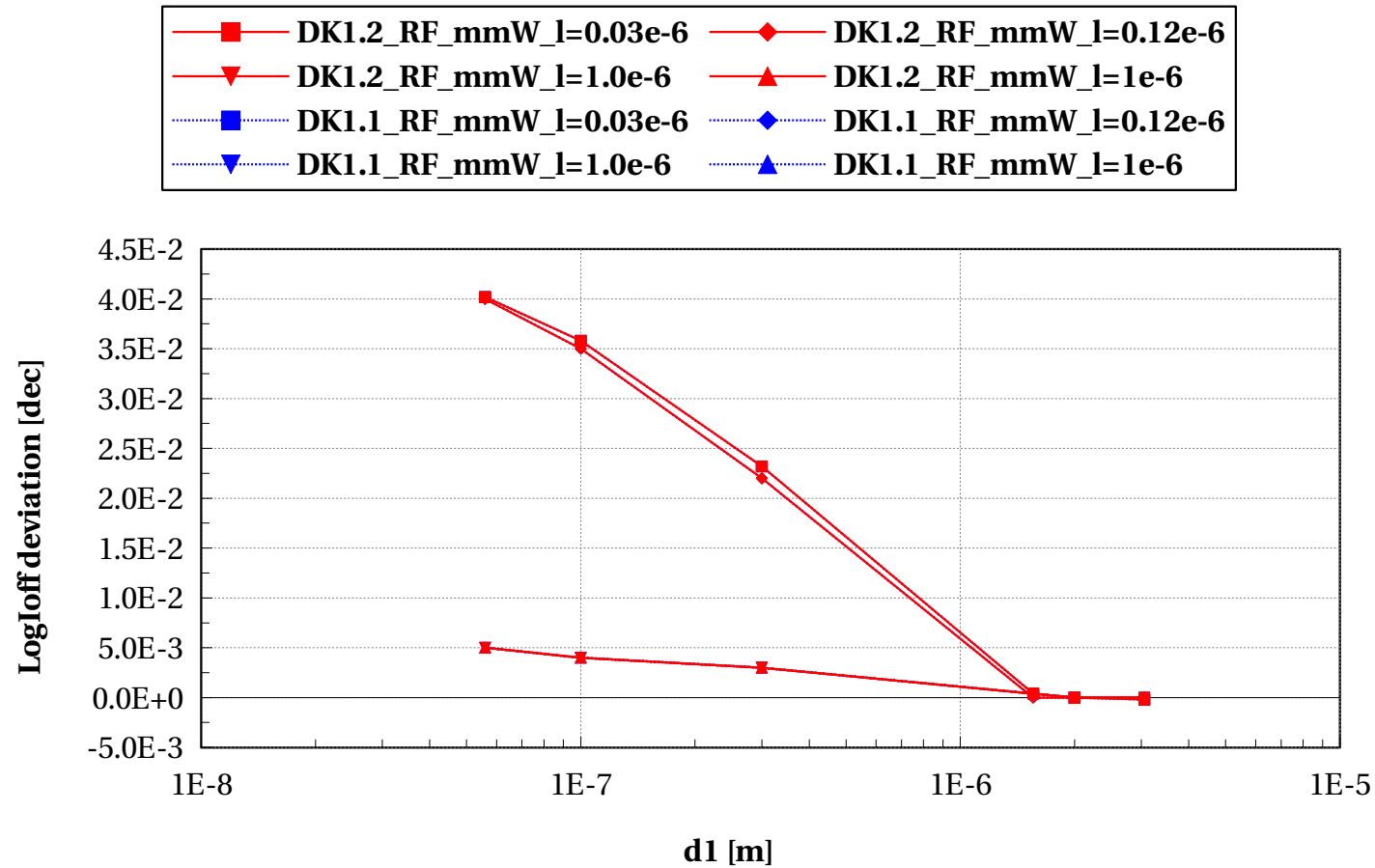
lvtpfet_acc, Isat deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and W==1e-6



lvtpfet_acc, Logloff deviation [dec] vs d1 [m]

temp==25 and d0==10e-6 and W==1e-6



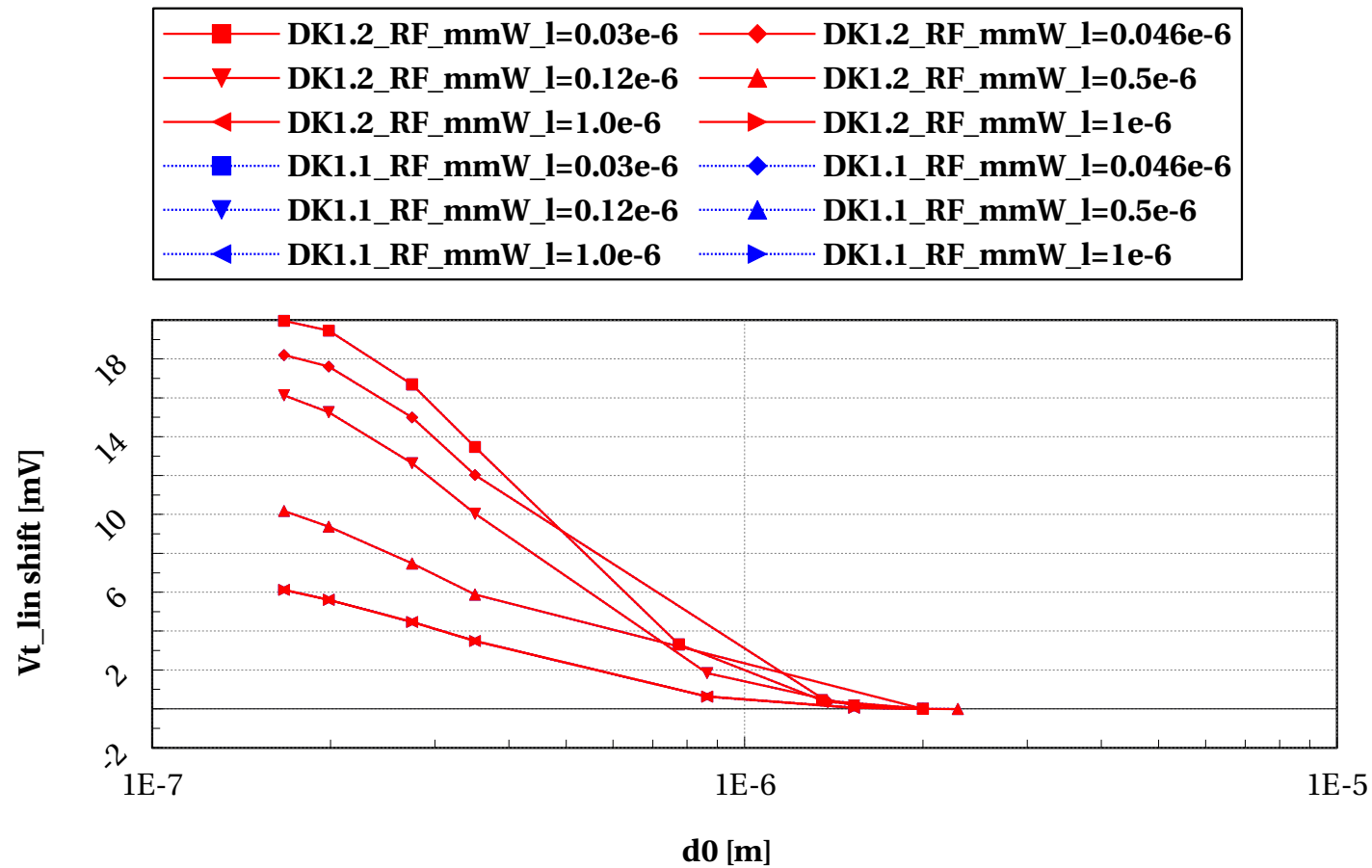
nfet_acc

Electrical characteristics scaling

- WPE effect w.r.t d0 - Lscaling at W=1u

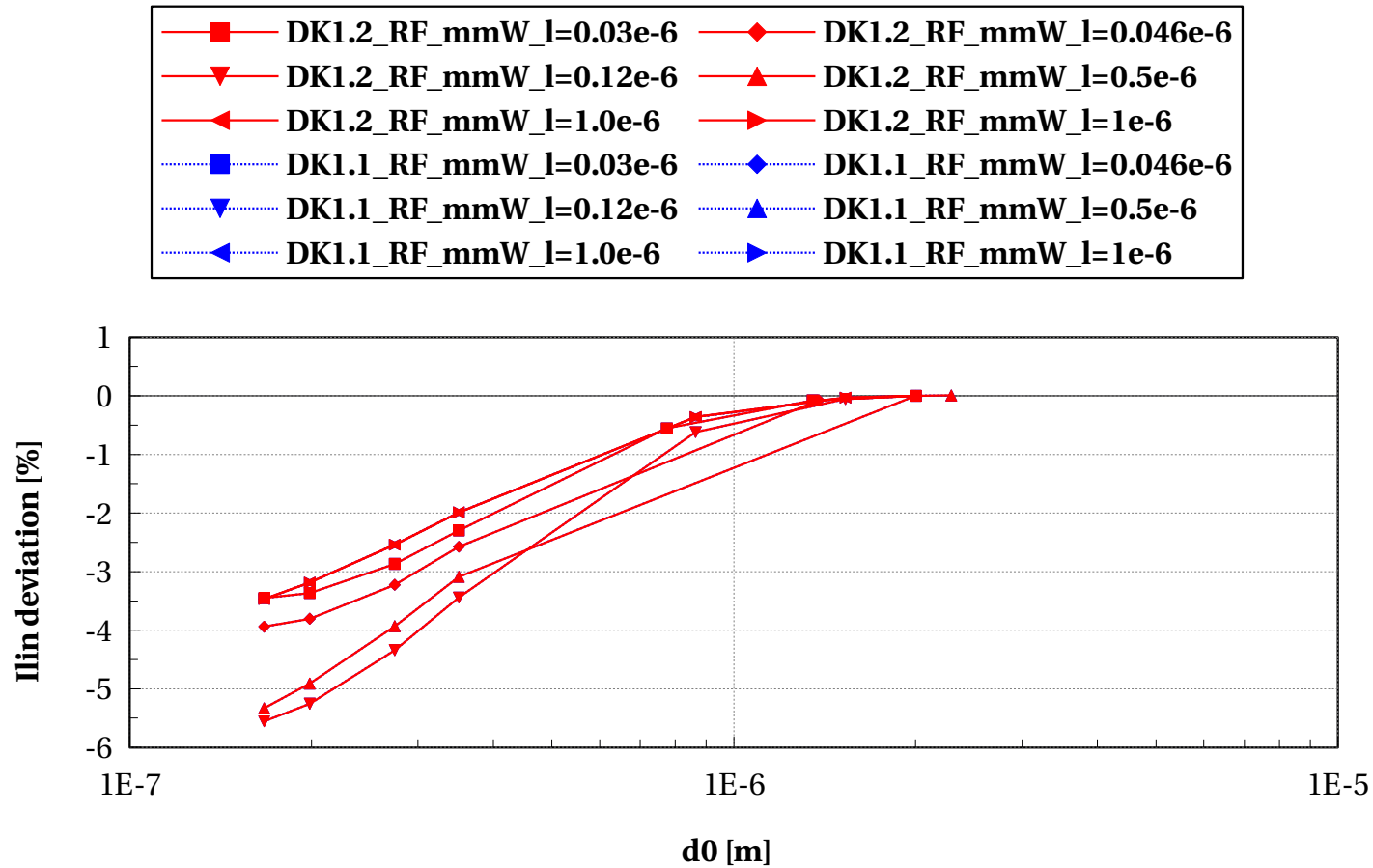
nfet_acc, Vt_lin shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and W==1e-6



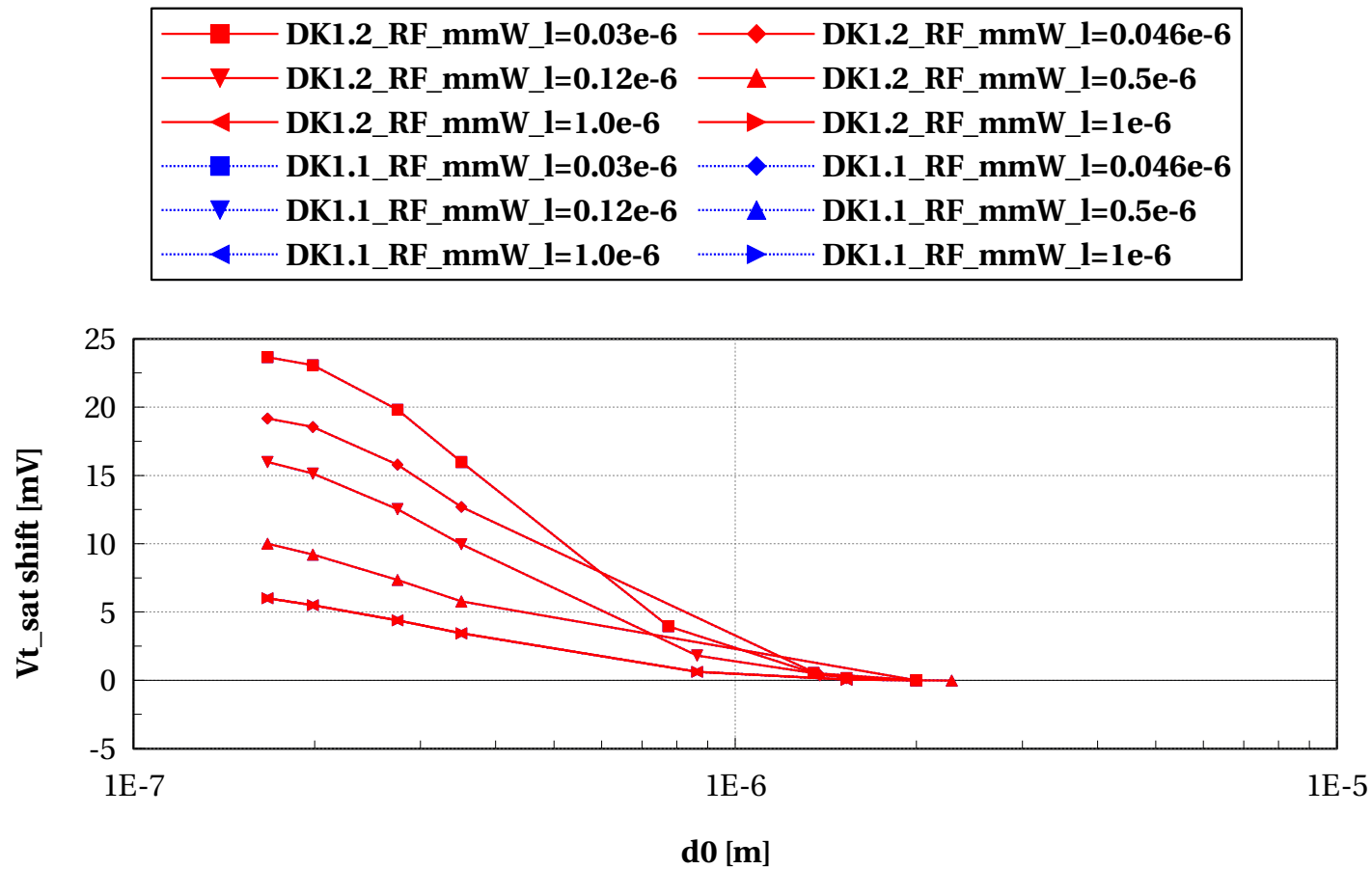
nfet_acc, Ilin deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and W==1e-6



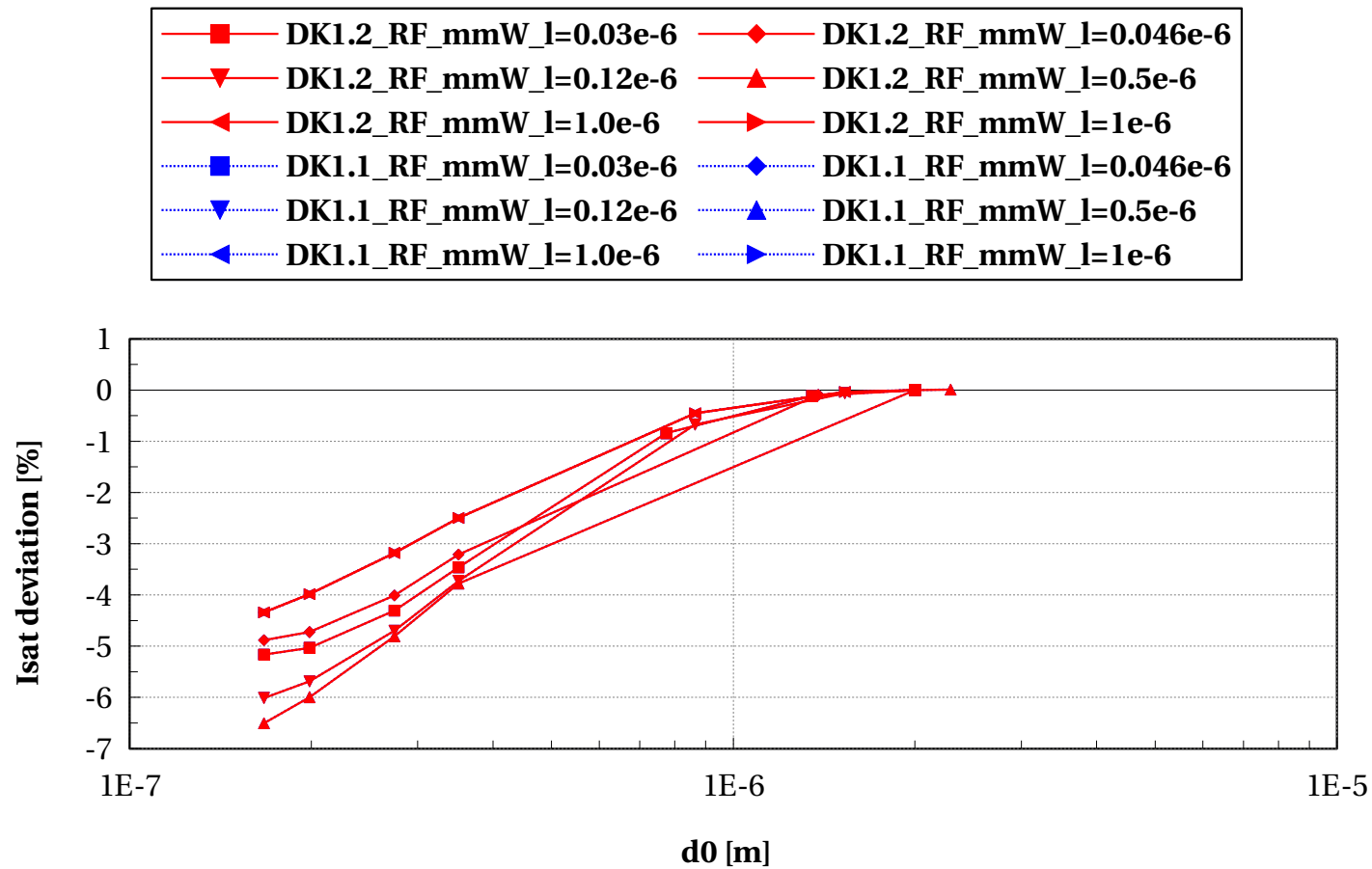
nfet_acc, Vt_sat shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and W==1e-6



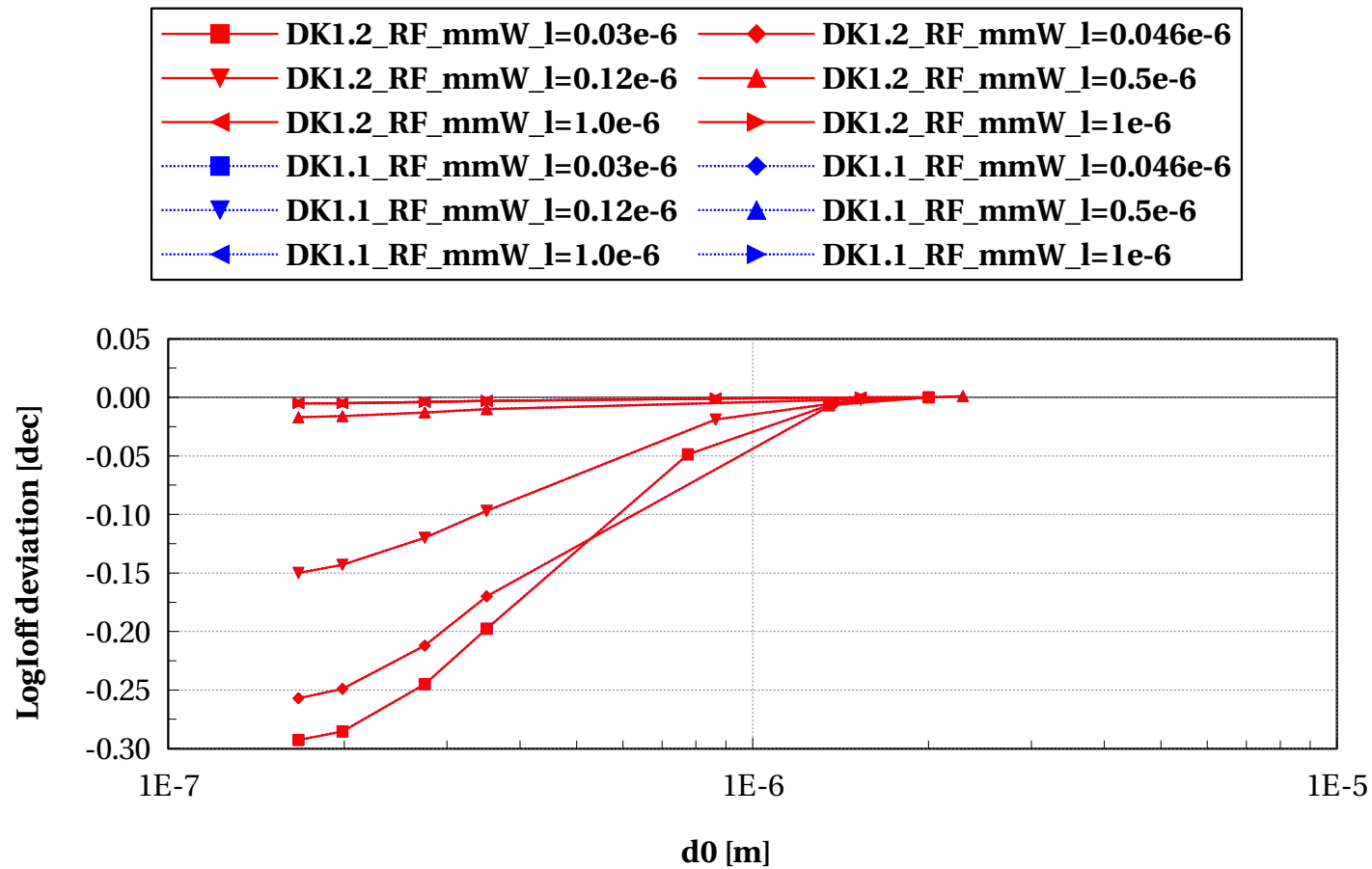
nfet_acc, Isat deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and W==1e-6



nfet_acc, Logloff deviation [dec] vs d0 [m]

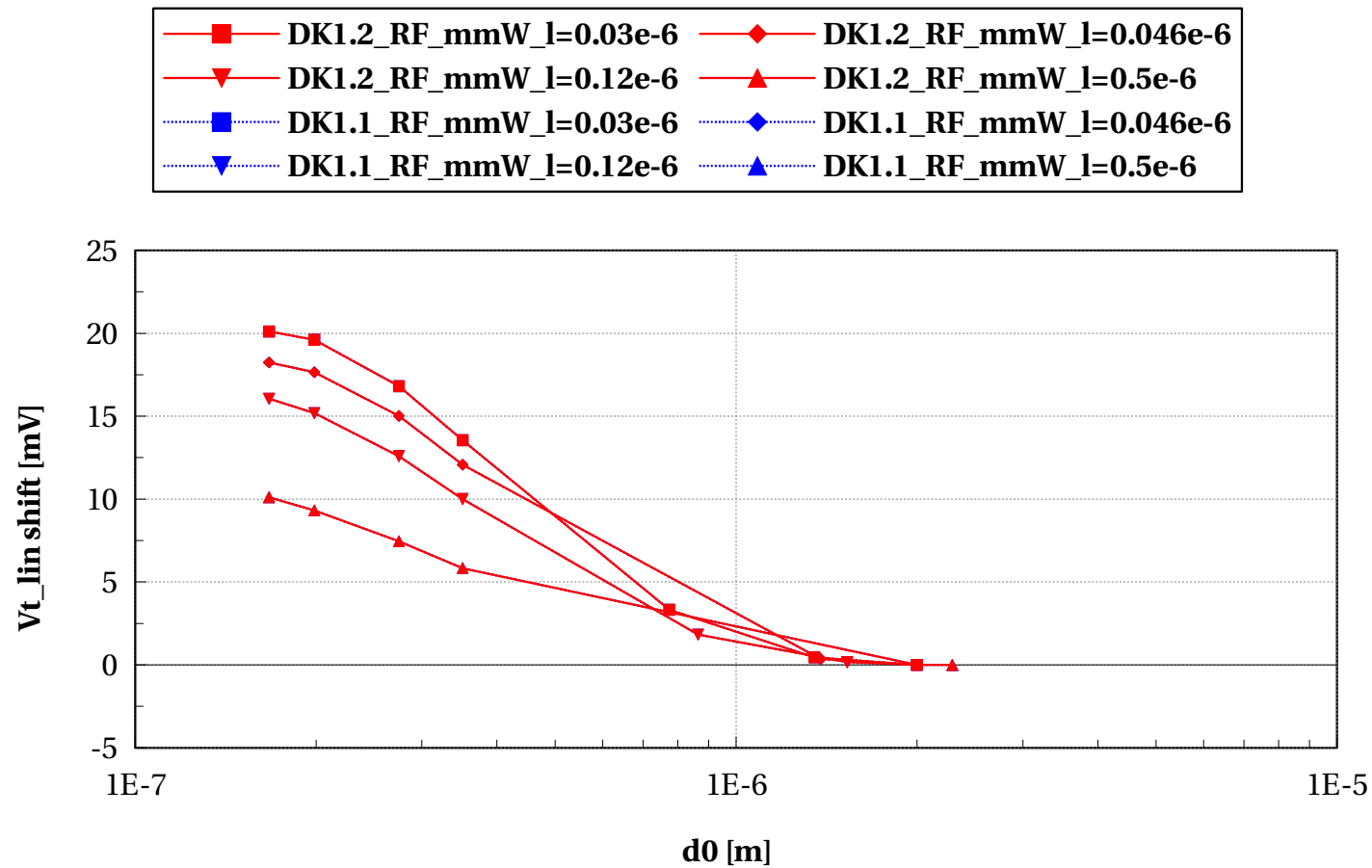
temp==25 and d1==10e-6 and W==1e-6



- WPE effect w.r.t d0 - Lscaling at $W=0.34u$

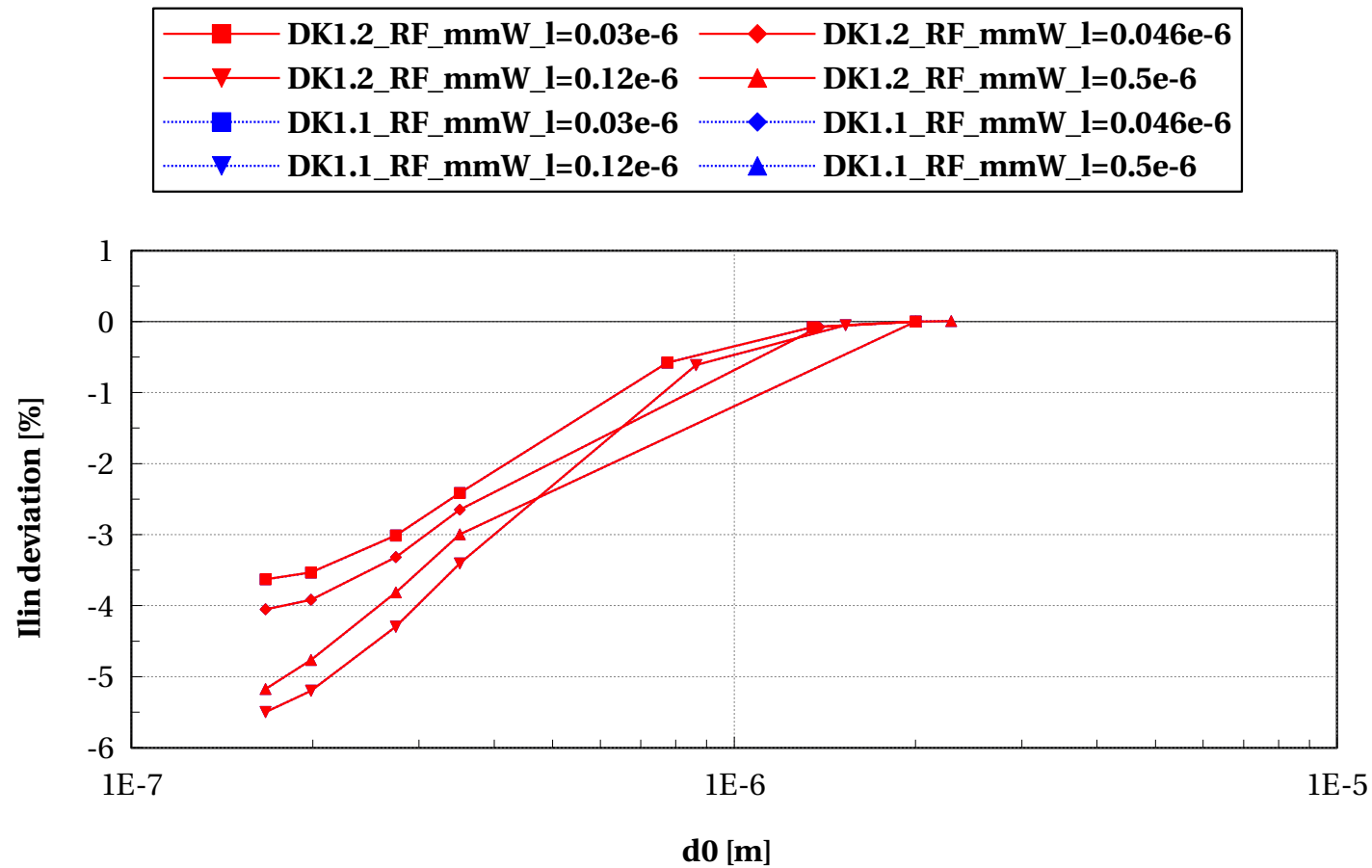
nfet_acc, Vt_lin shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and W==0.34e-6



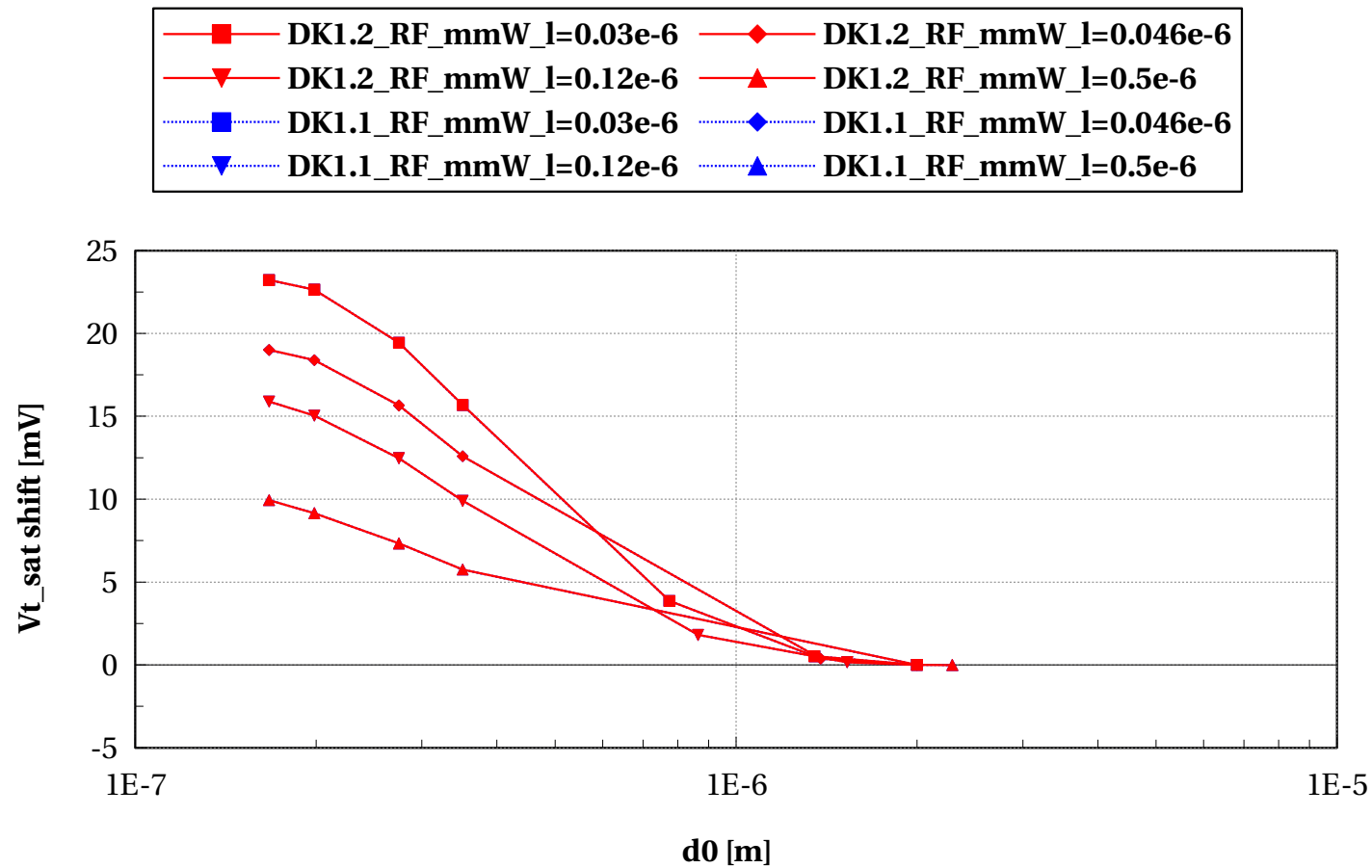
nfet_acc, Ilin deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and W==0.34e-6



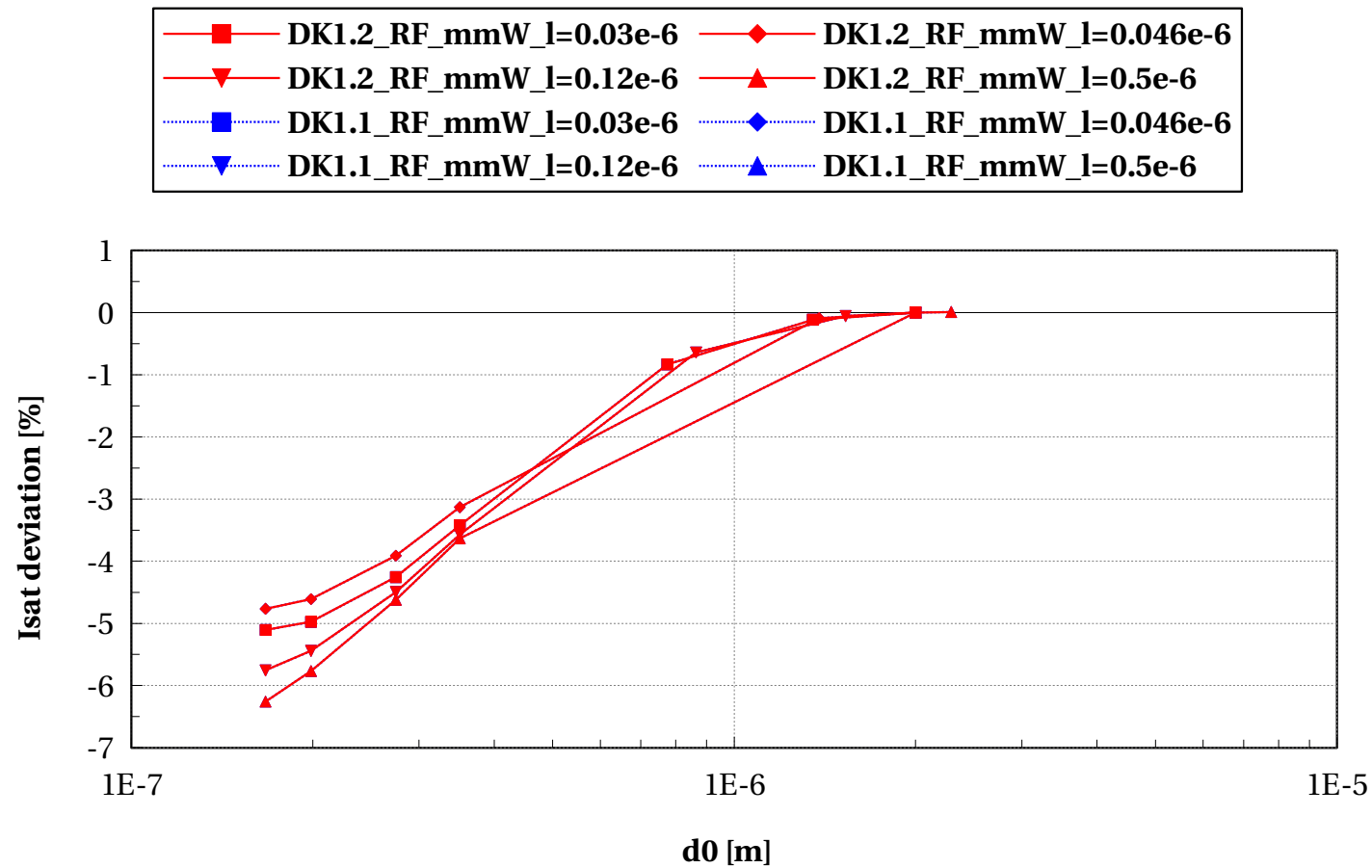
nfet_acc, Vt_sat shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and W==0.34e-6



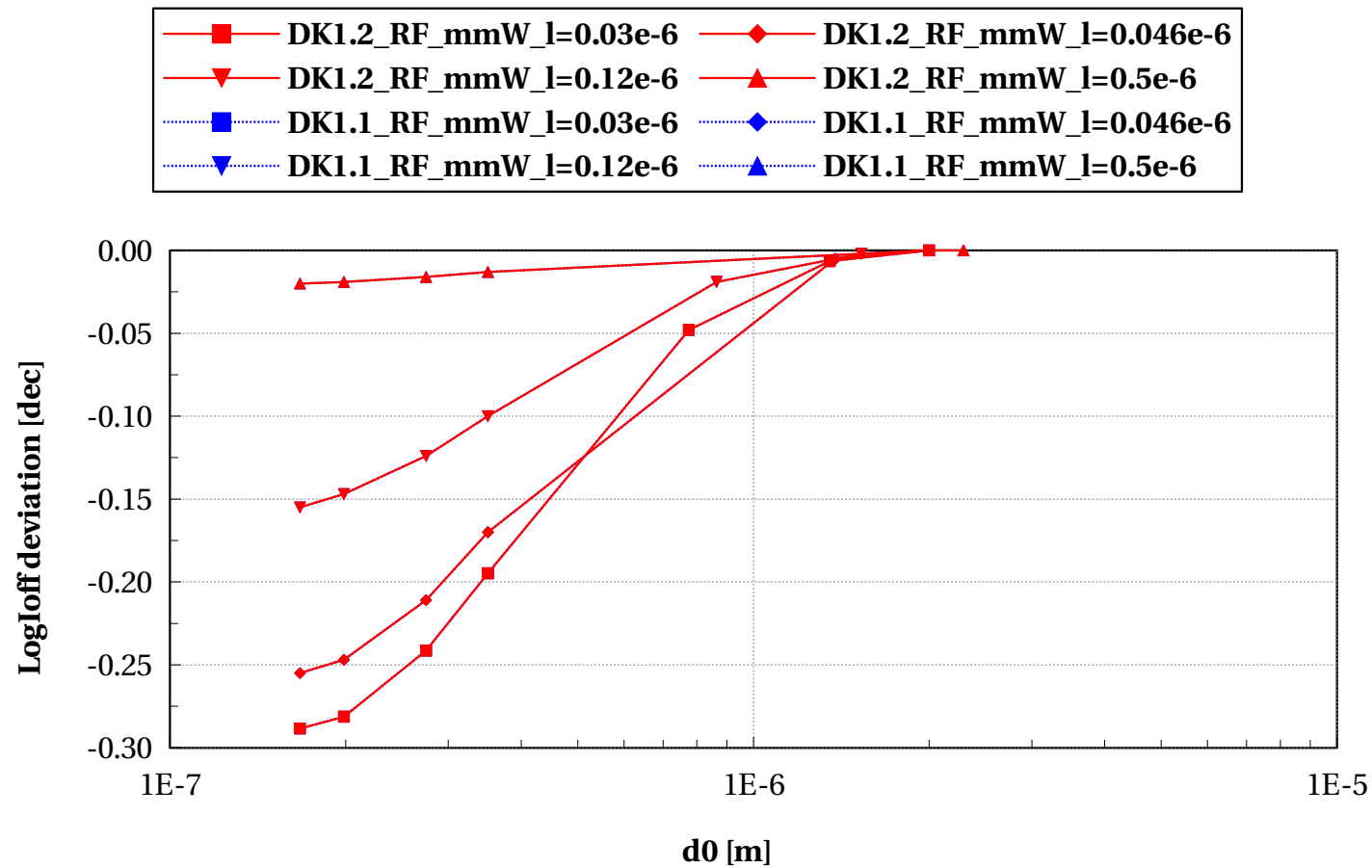
nfet_acc, Isat deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and W==0.34e-6



nfet_acc, Logloff deviation [dec] vs d0 [m]

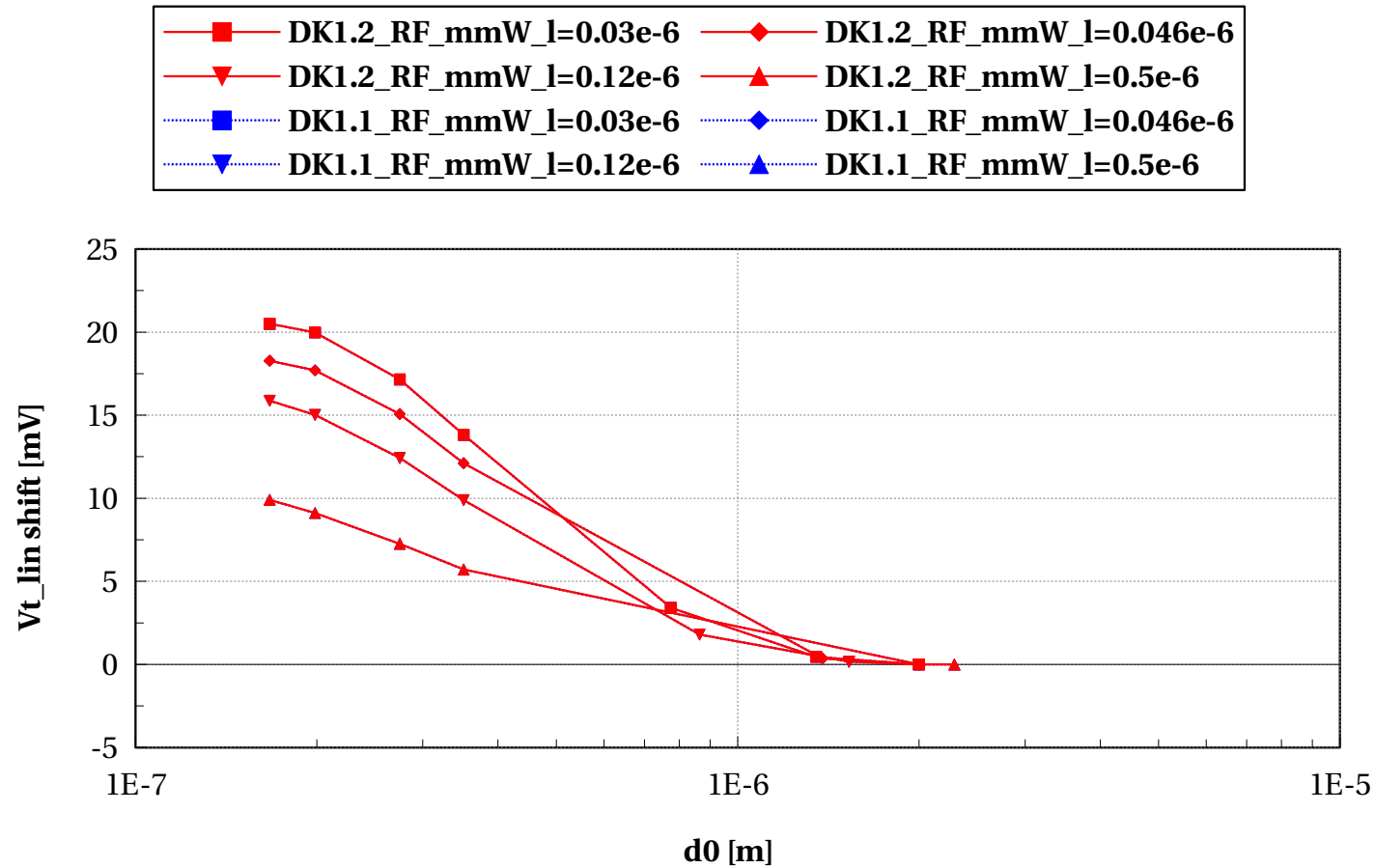
temp==25 and d1==10e-6 and W==0.34e-6



- WPE effect w.r.t d0 - Lscaling at $W=0.1\mu$

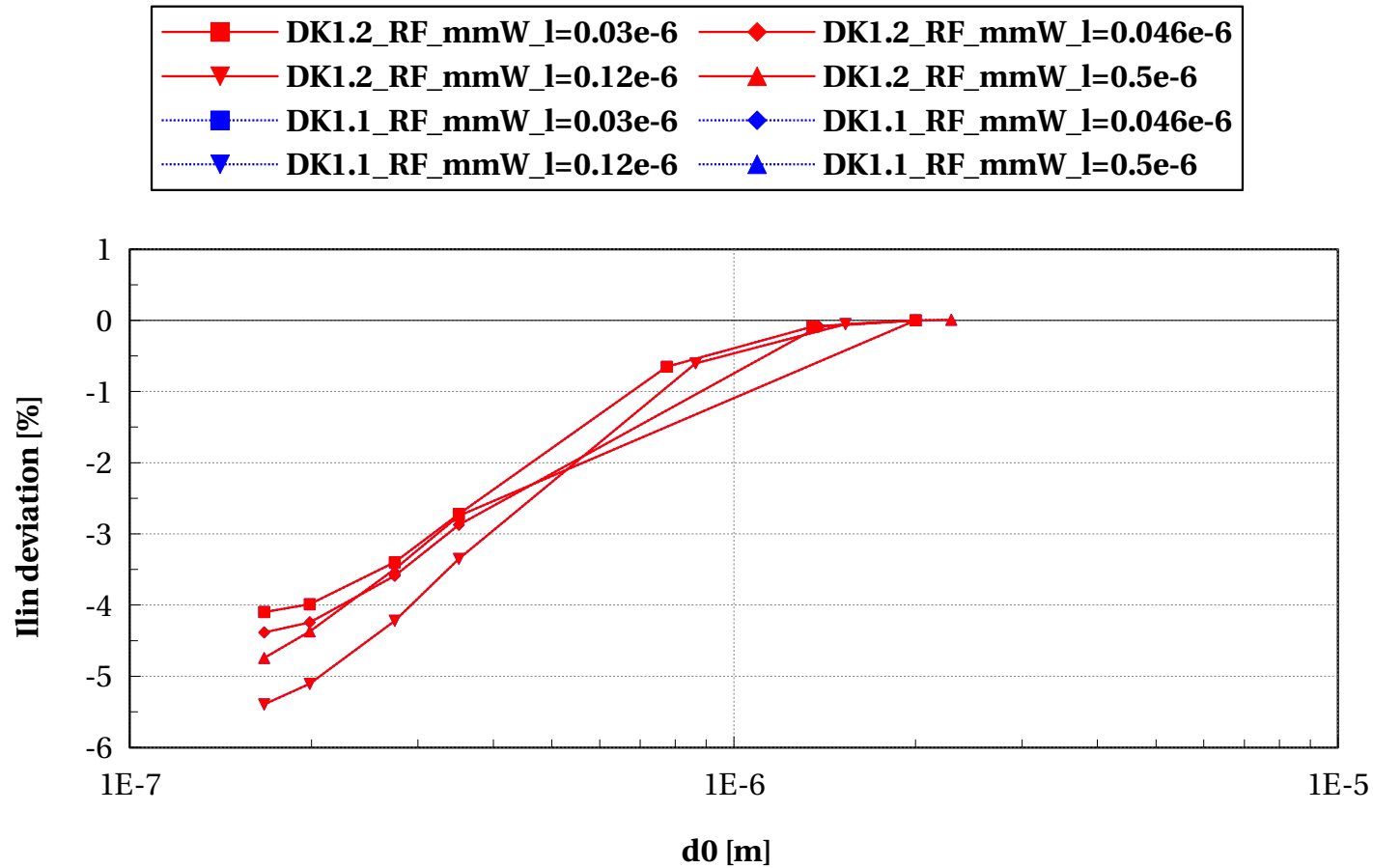
nfet_acc, Vt_lin shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and W==0.1e-6



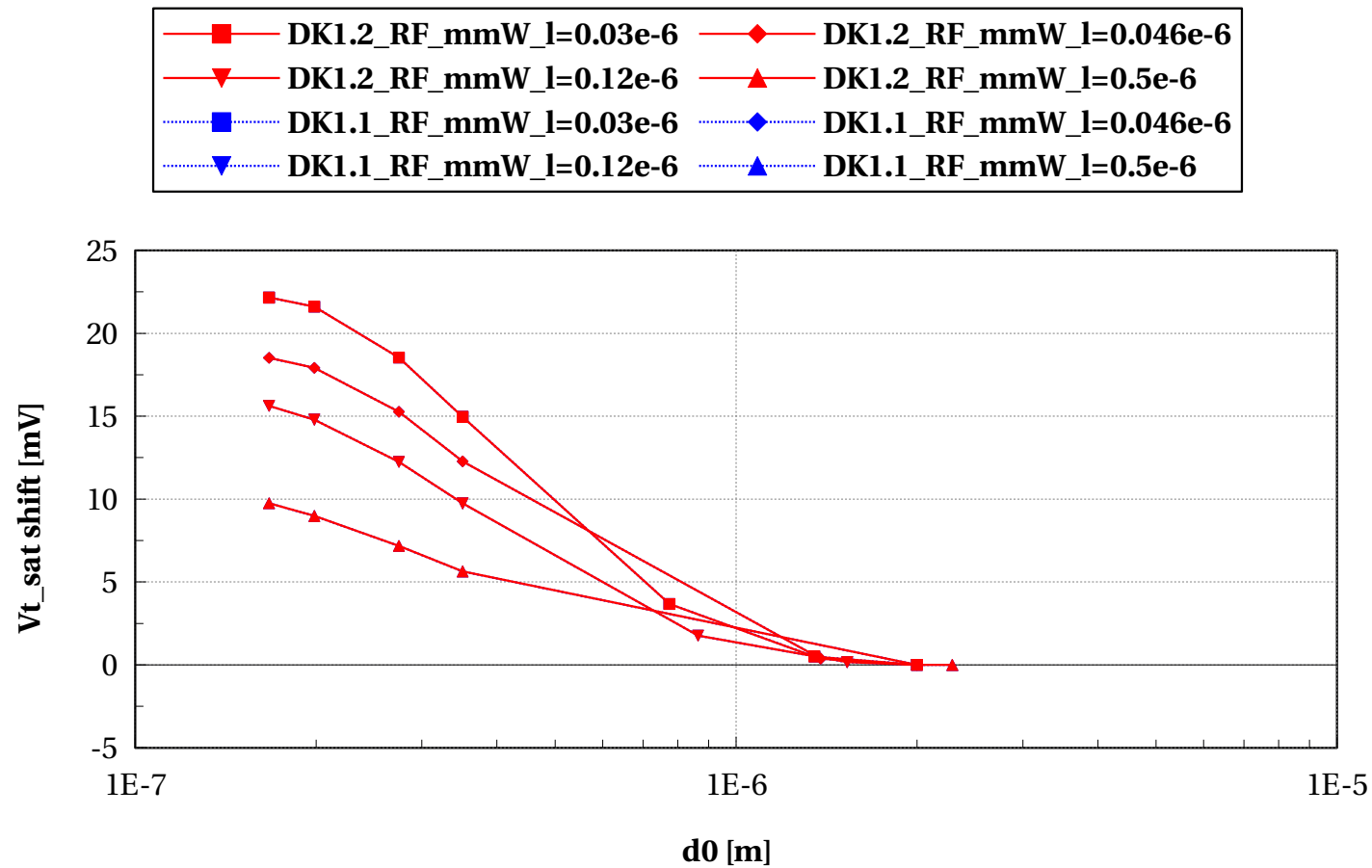
nfet_acc, Ilin deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and W==0.1e-6



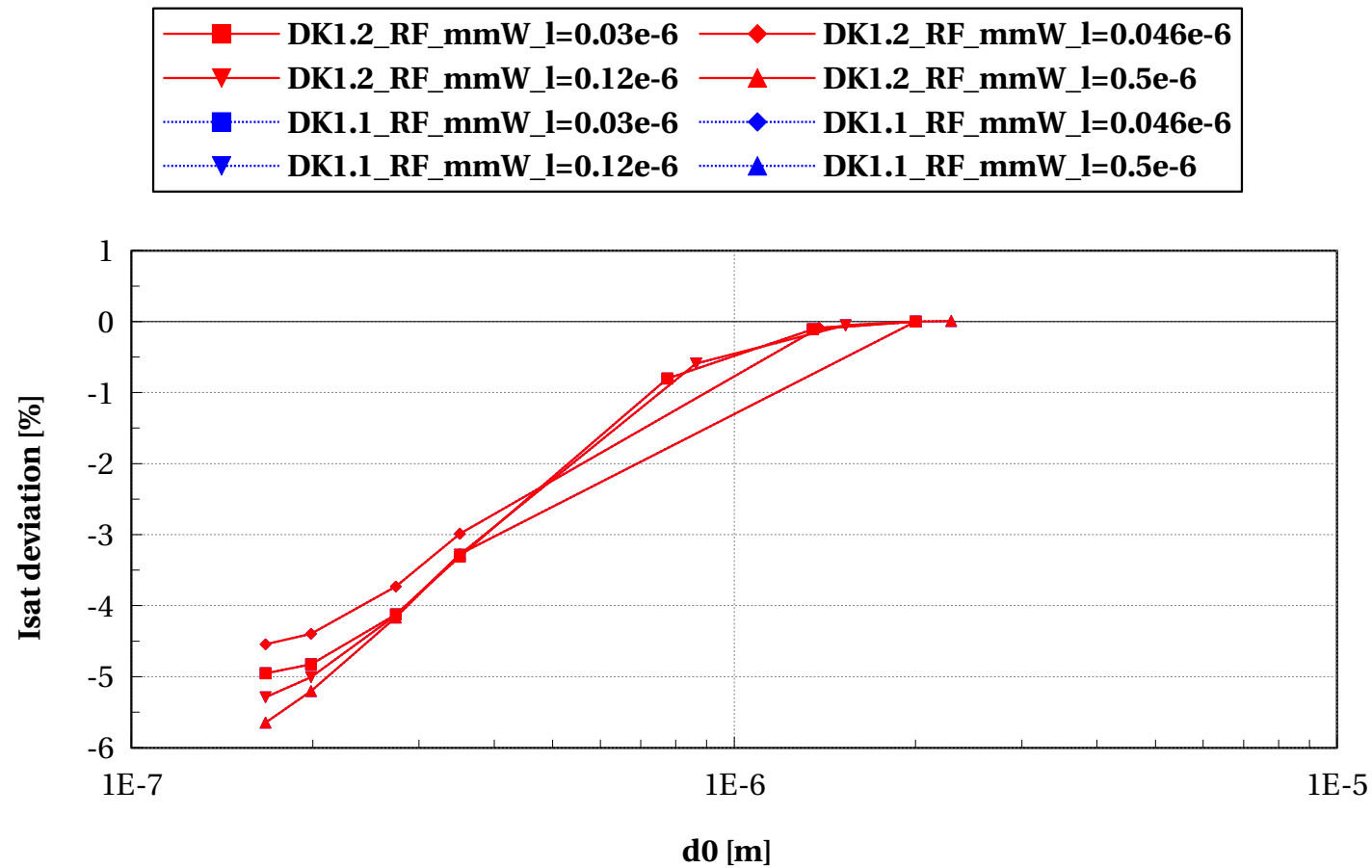
nfet_acc, Vt_sat shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and W==0.1e-6



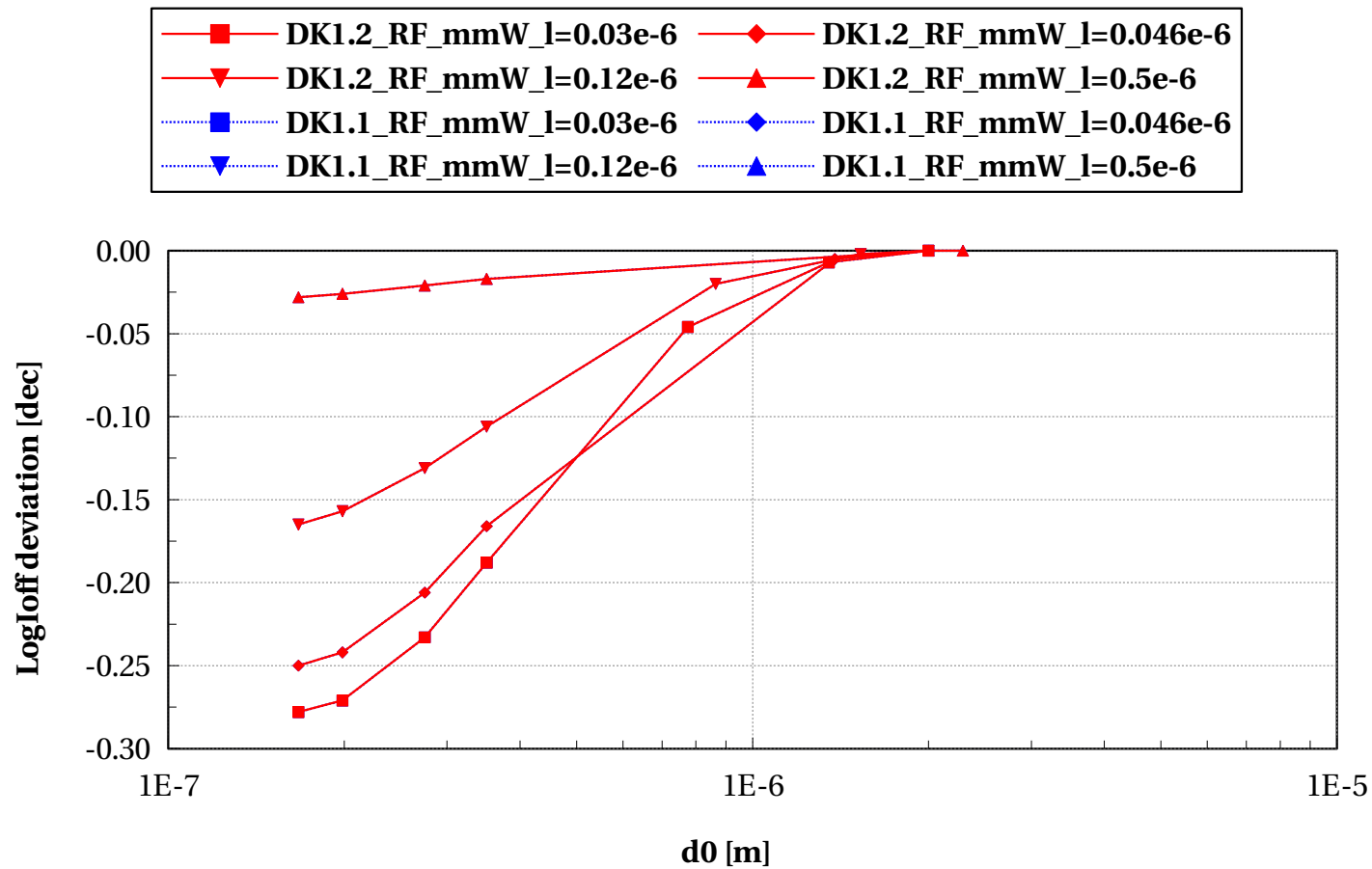
nfet_acc, Isat deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and W==0.1e-6



nfet_acc, Logloff deviation [dec] vs d0 [m]

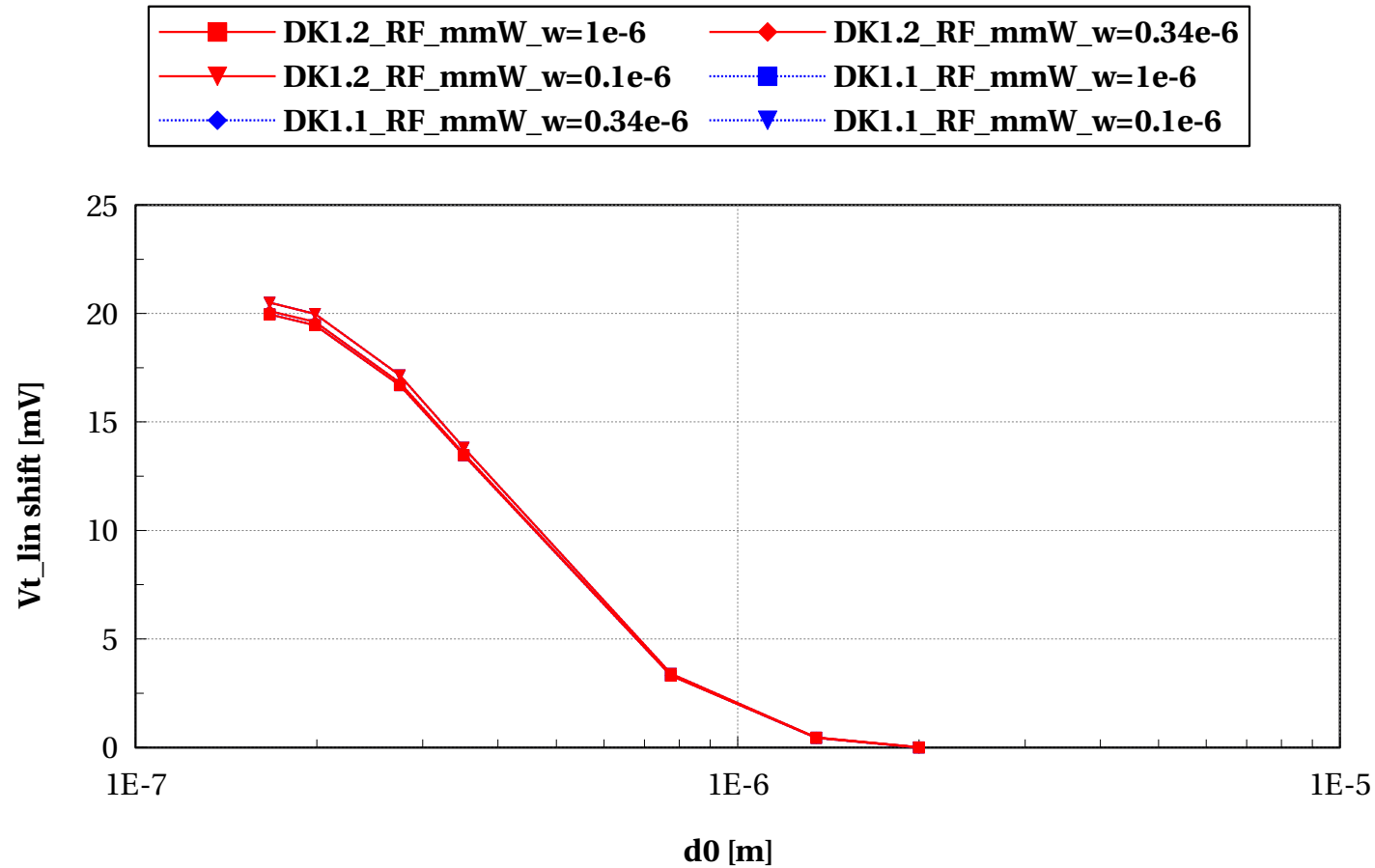
temp==25 and d1==10e-6 and W==0.1e-6



- WPE effect w.r.t d0 - Wscaling at $L=0.03u$

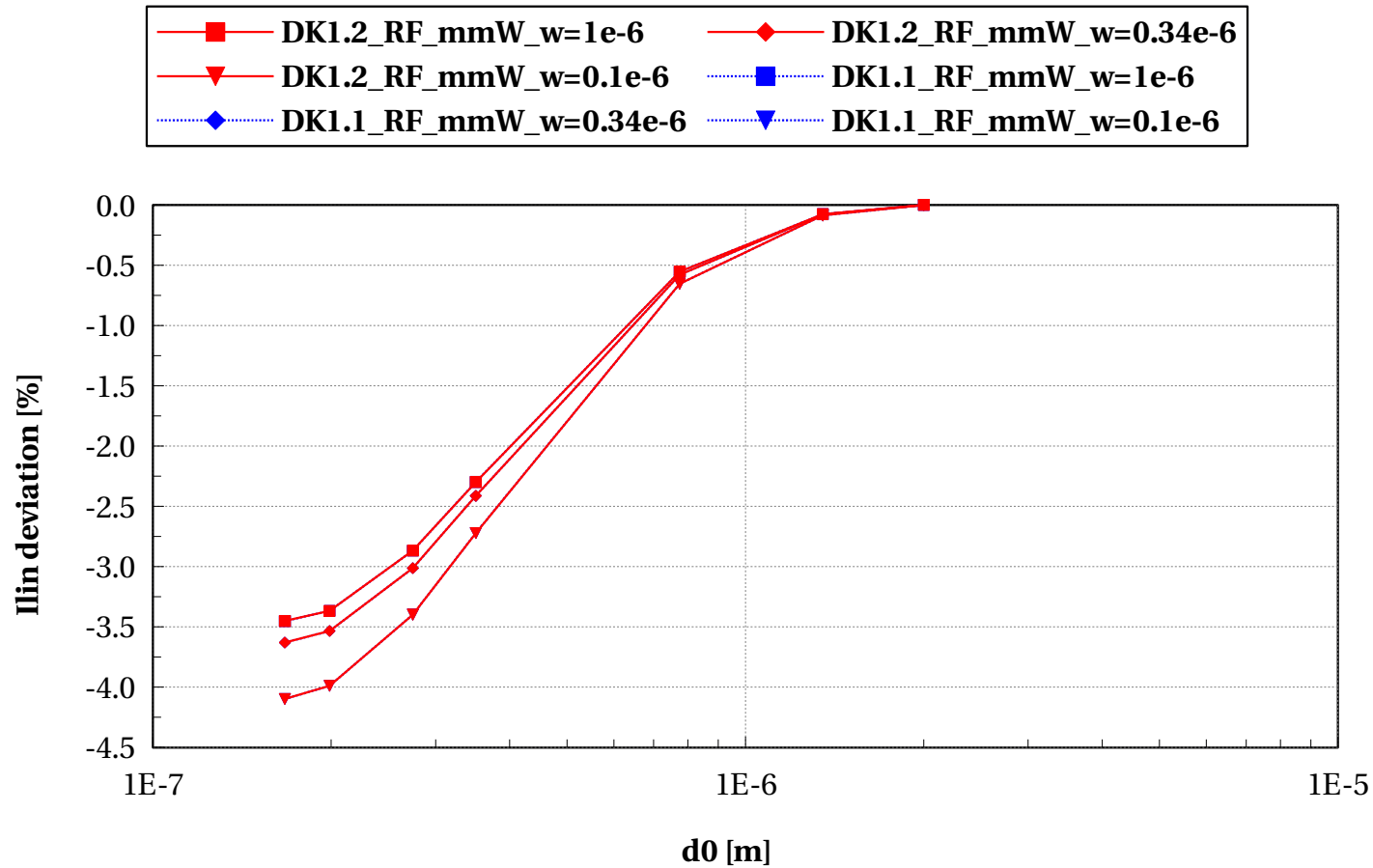
nfet_acc, Vt_lin shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and L==0.03e-6



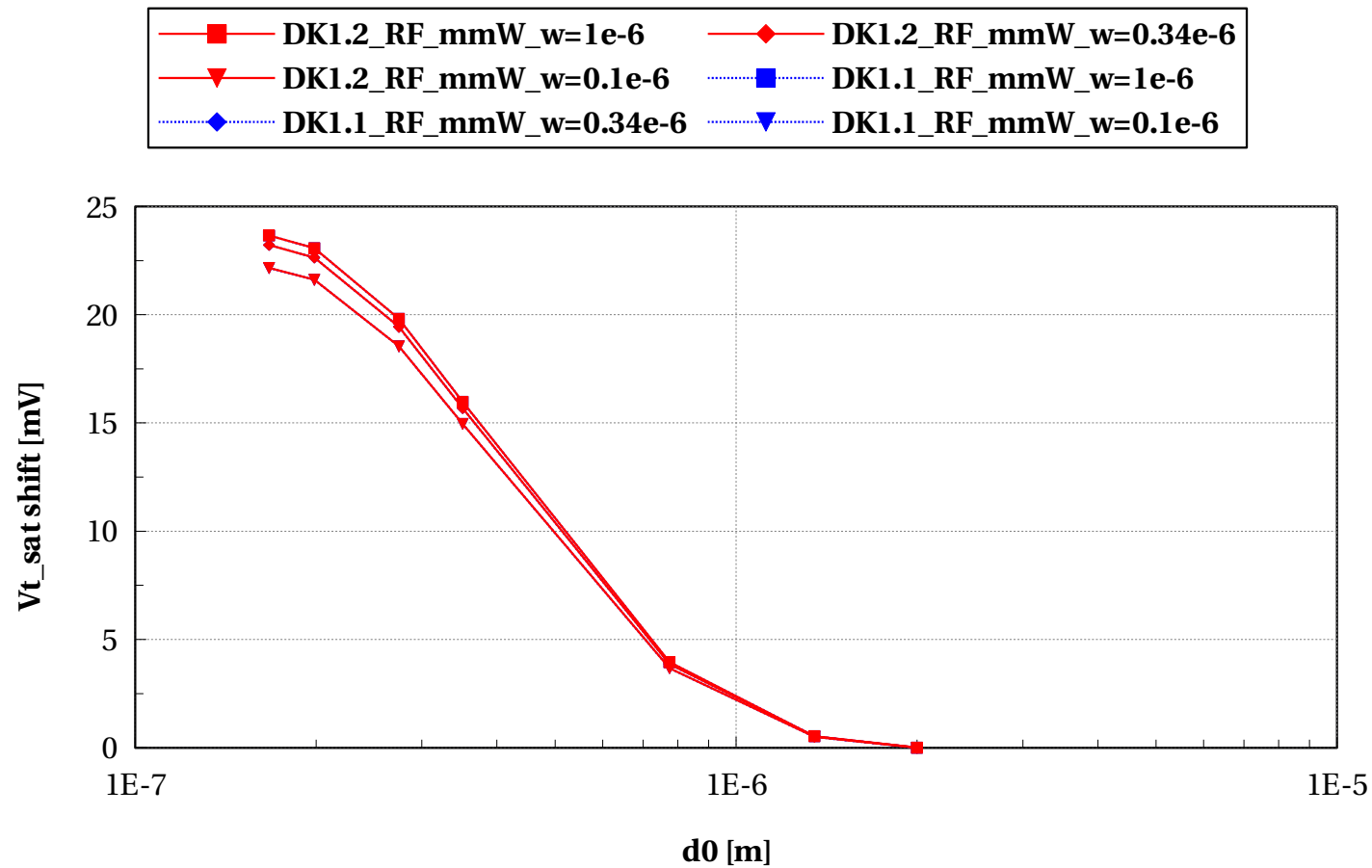
nfet_acc, Ilin deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and L==0.03e-6



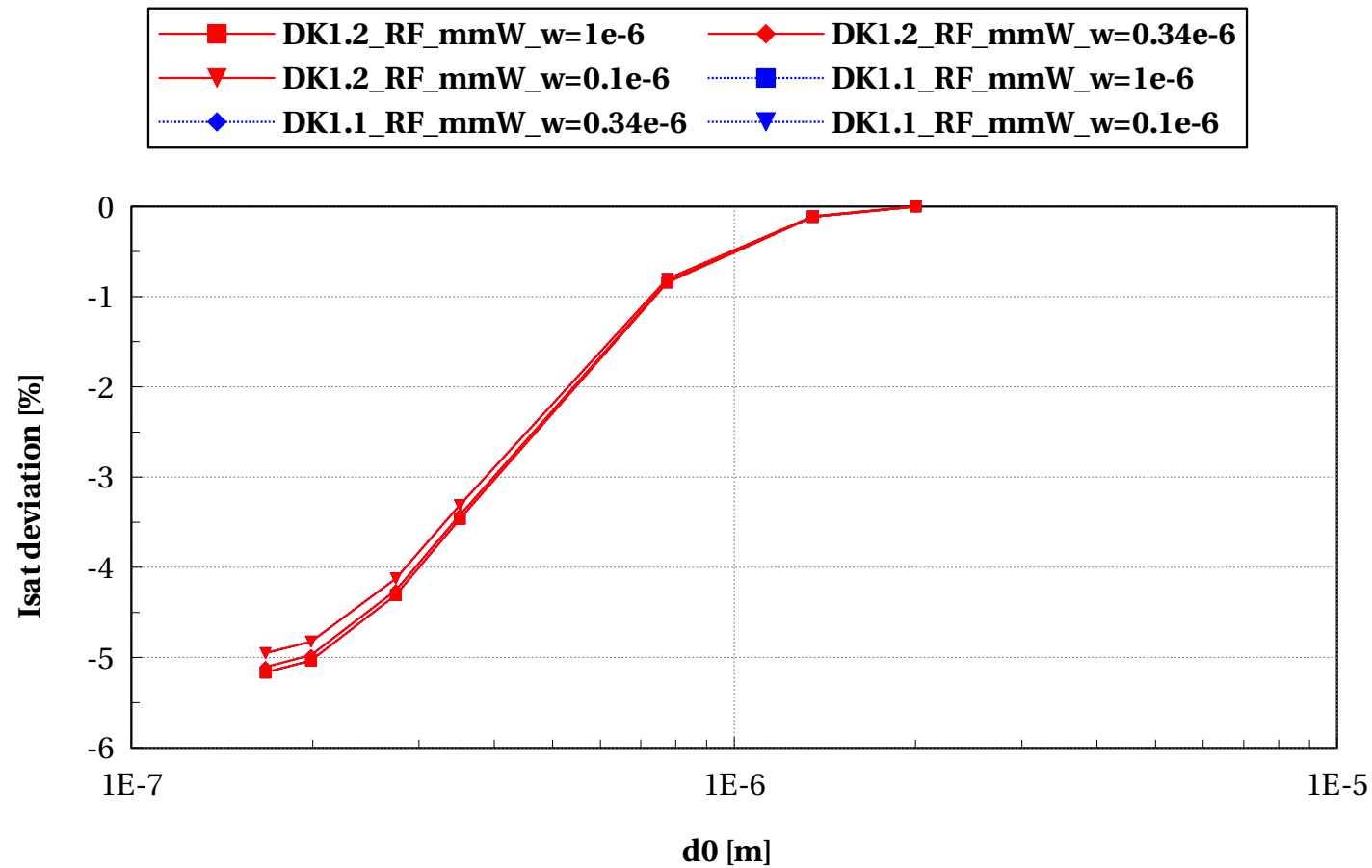
nfet_acc, Vt_sat shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and L==0.03e-6



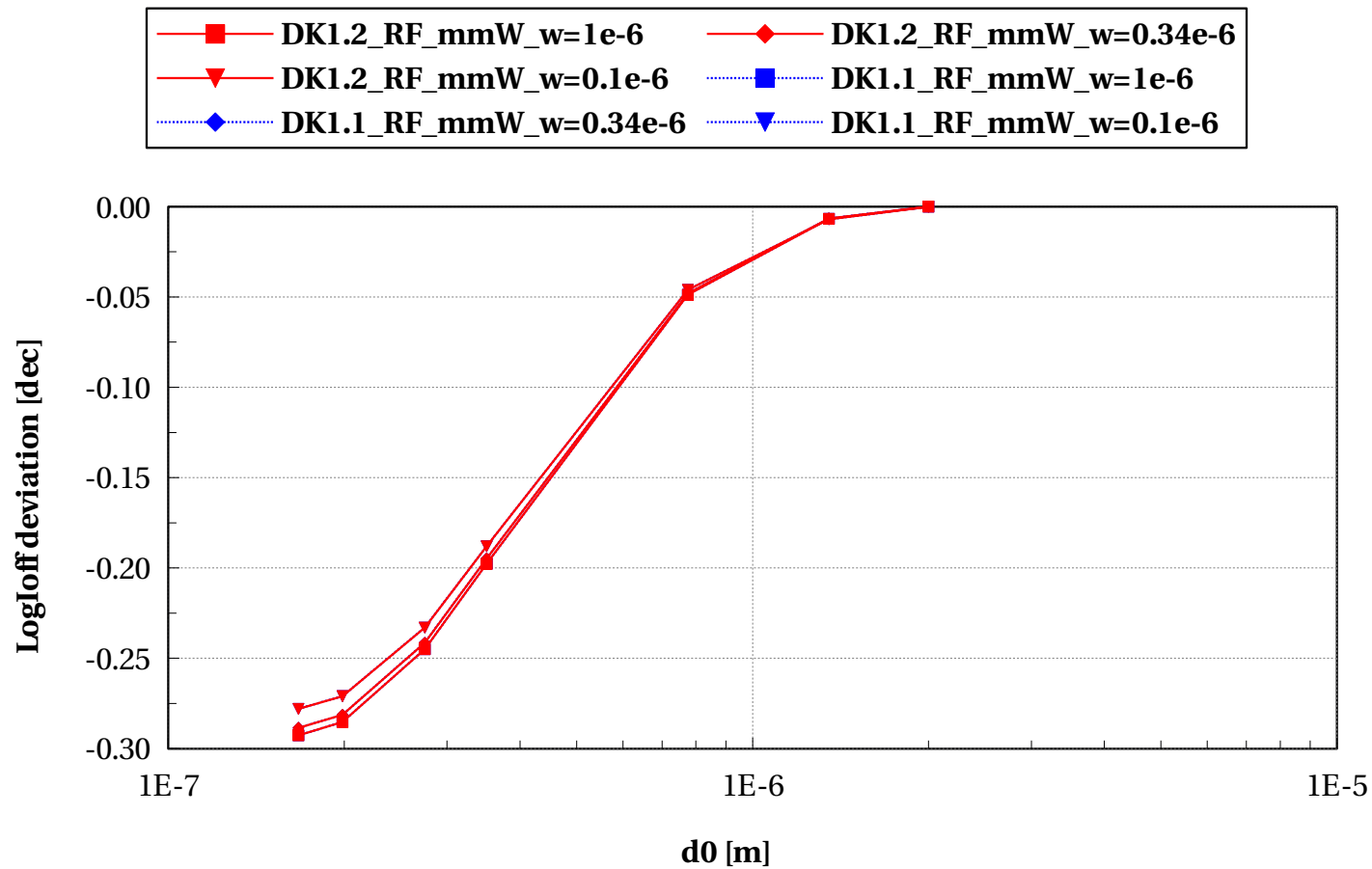
nfet_acc, Isat deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and L==0.03e-6



nfet_acc, LogIoff deviation [dec] vs d0 [m]

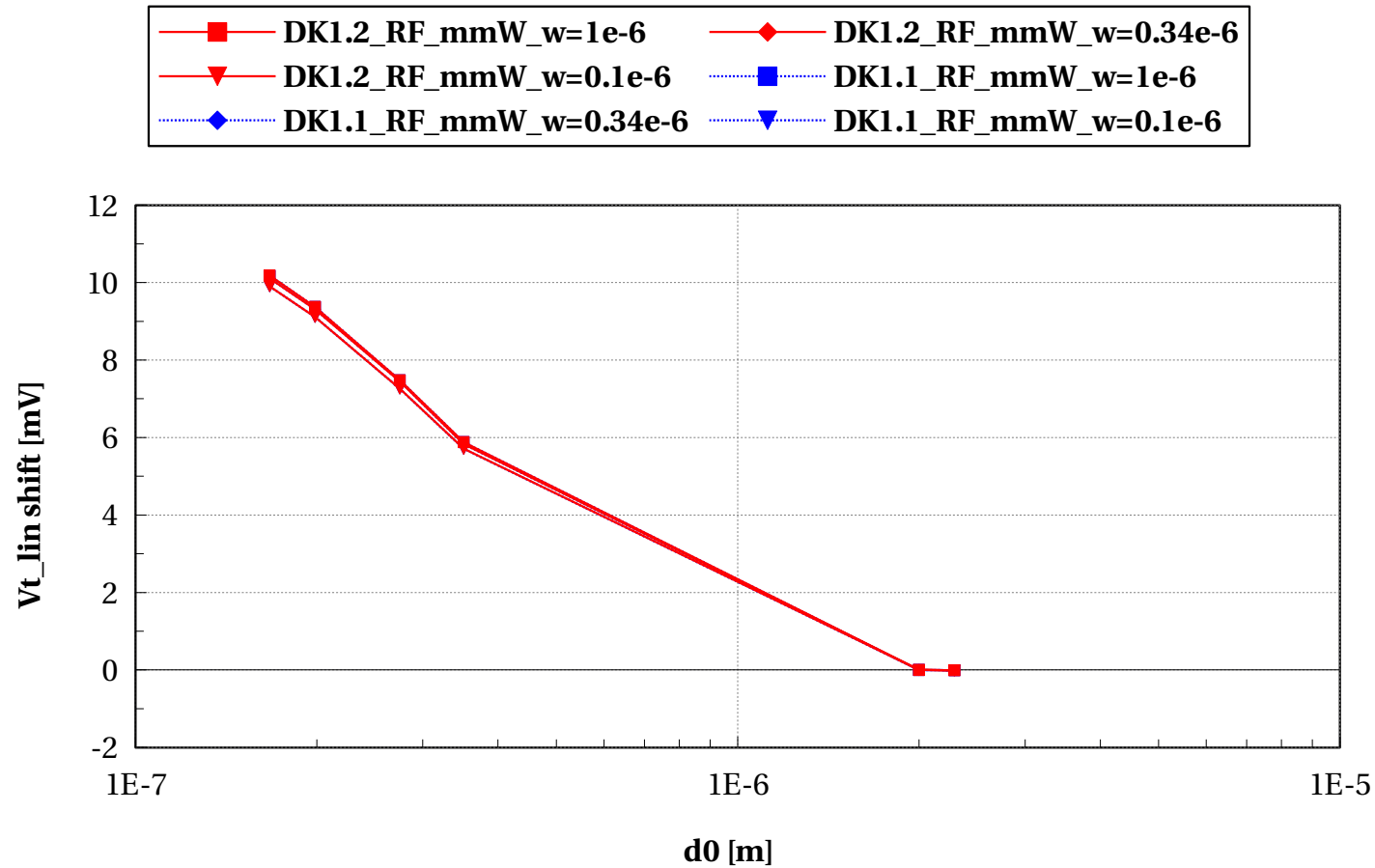
temp==25 and d1==10e-6 and L==0.03e-6



- WPE effect w.r.t d0 - Wscaling at $L=0.5u$

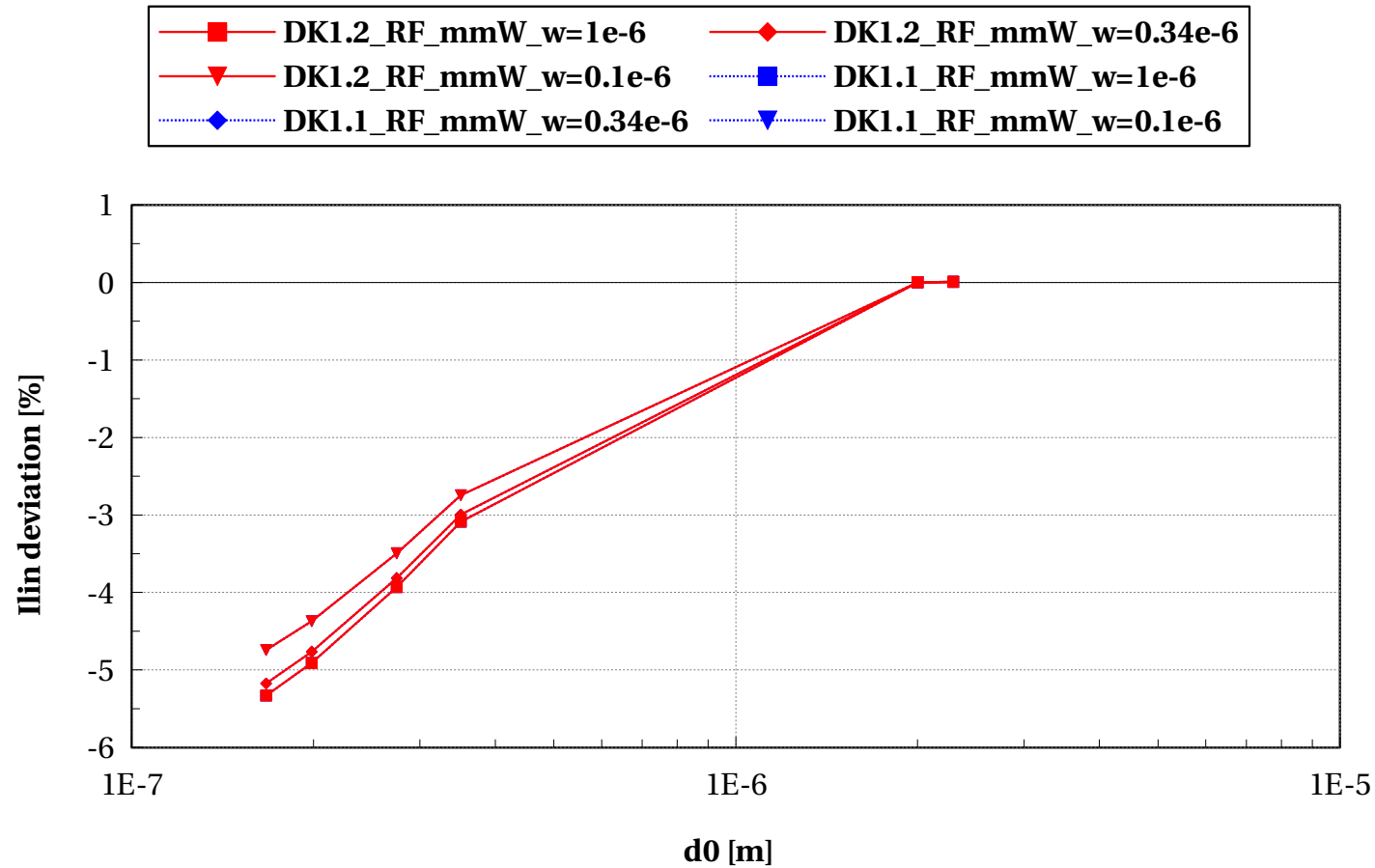
nfet_acc, Vt_lin shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and L==0.5e-6



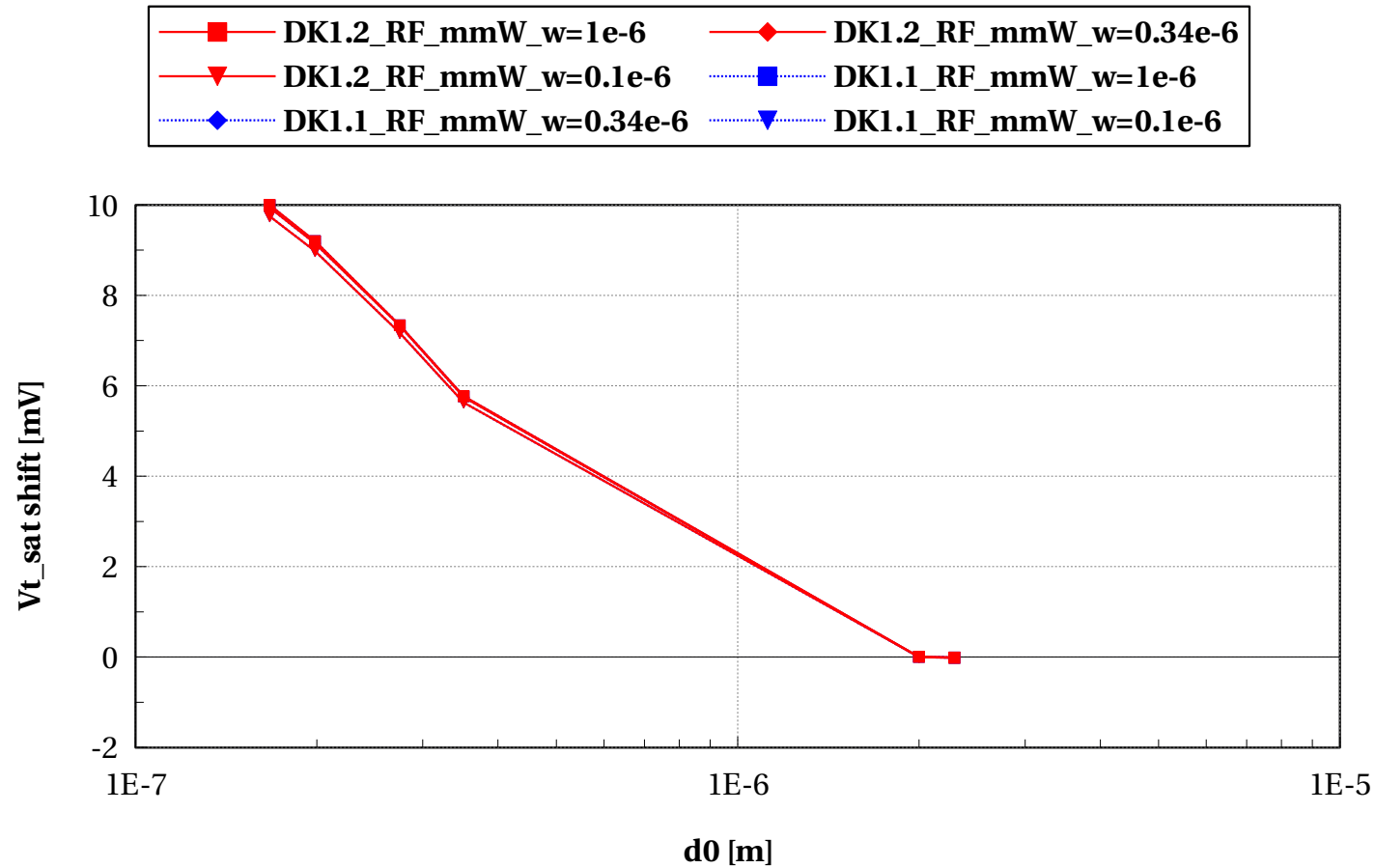
nfet_acc, Ilin deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and L==0.5e-6



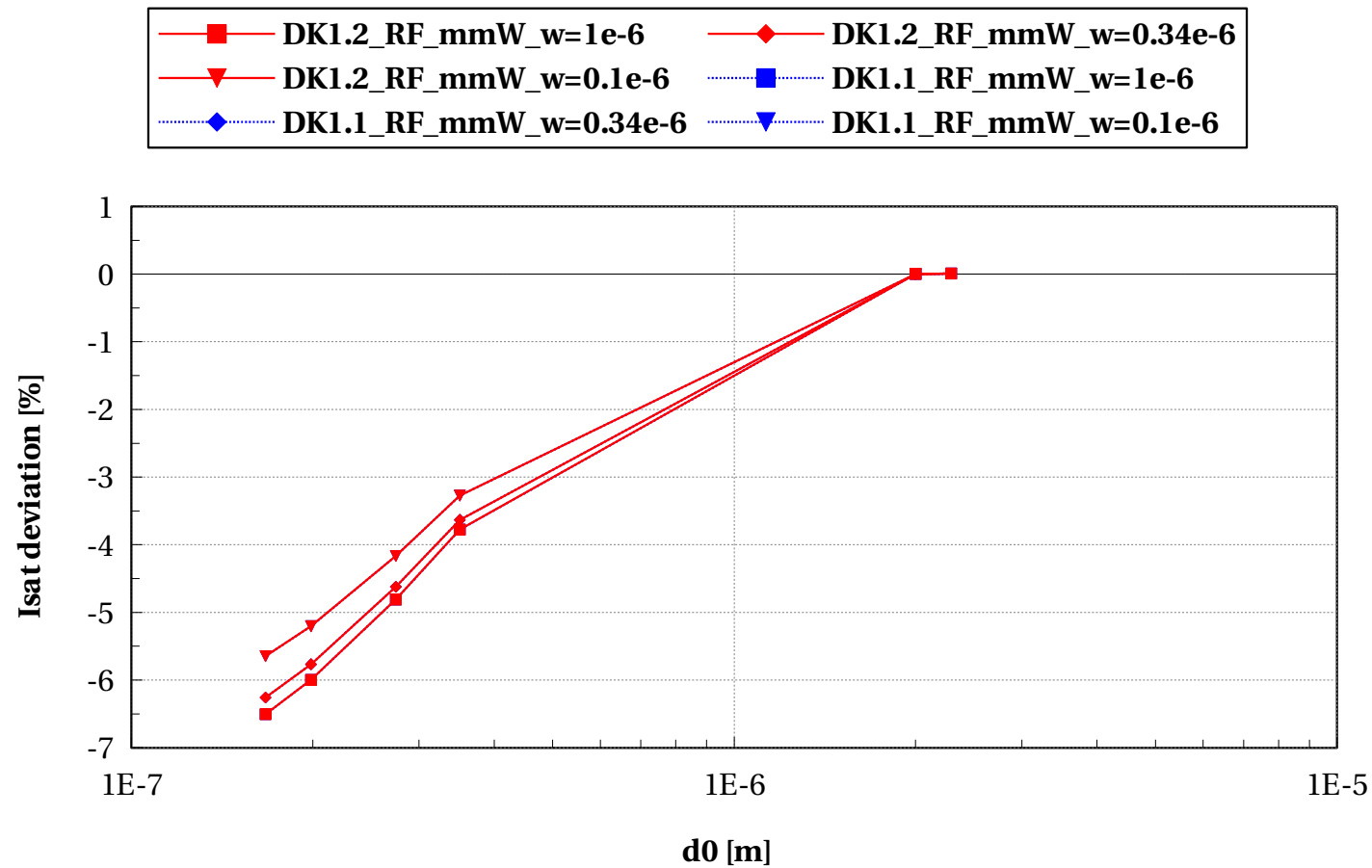
nfet_acc, Vt_sat shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and L==0.5e-6



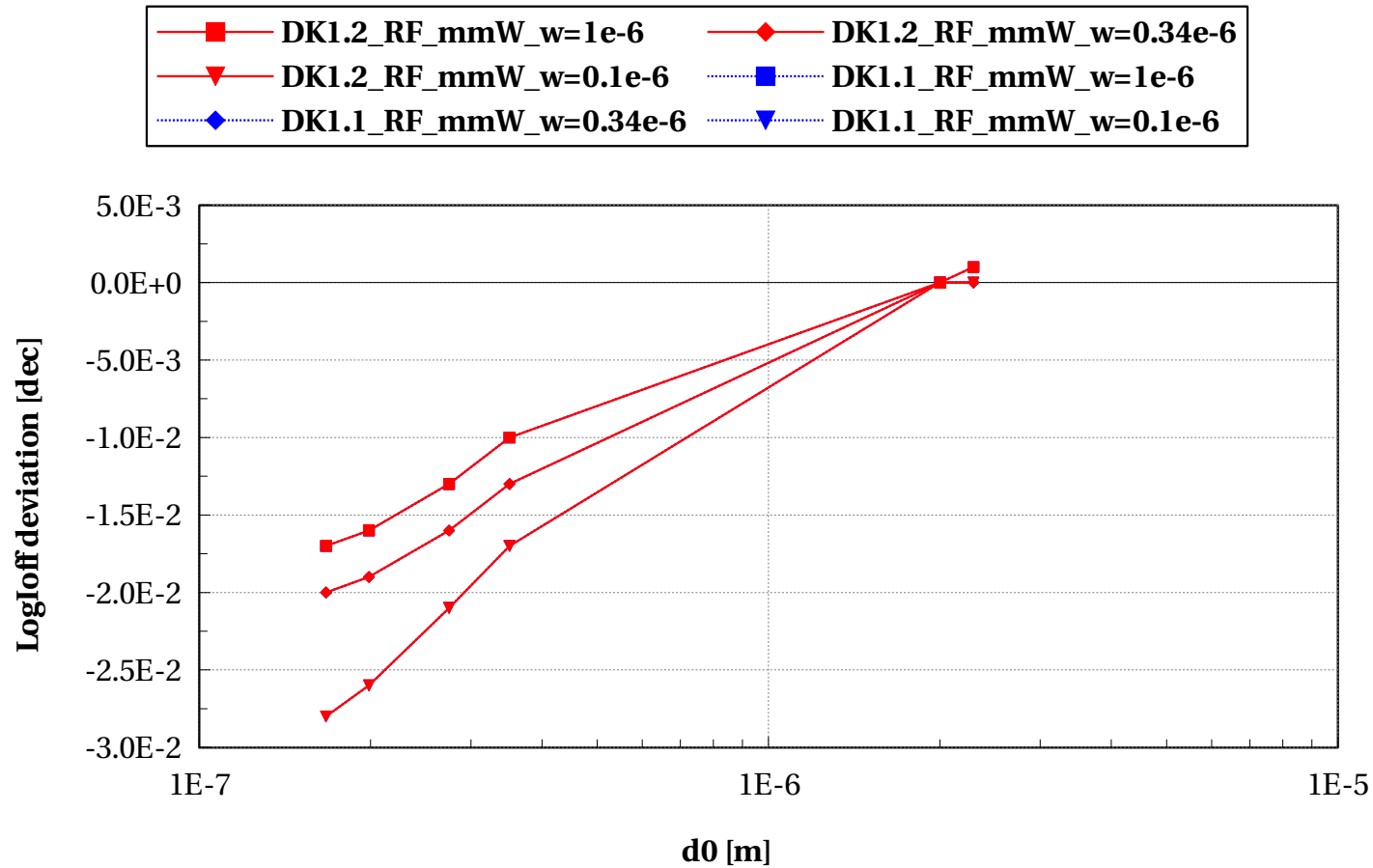
nfet_acc, Isat deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and L==0.5e-6



nfet_acc, LogIoff deviation [dec] vs d0 [m]

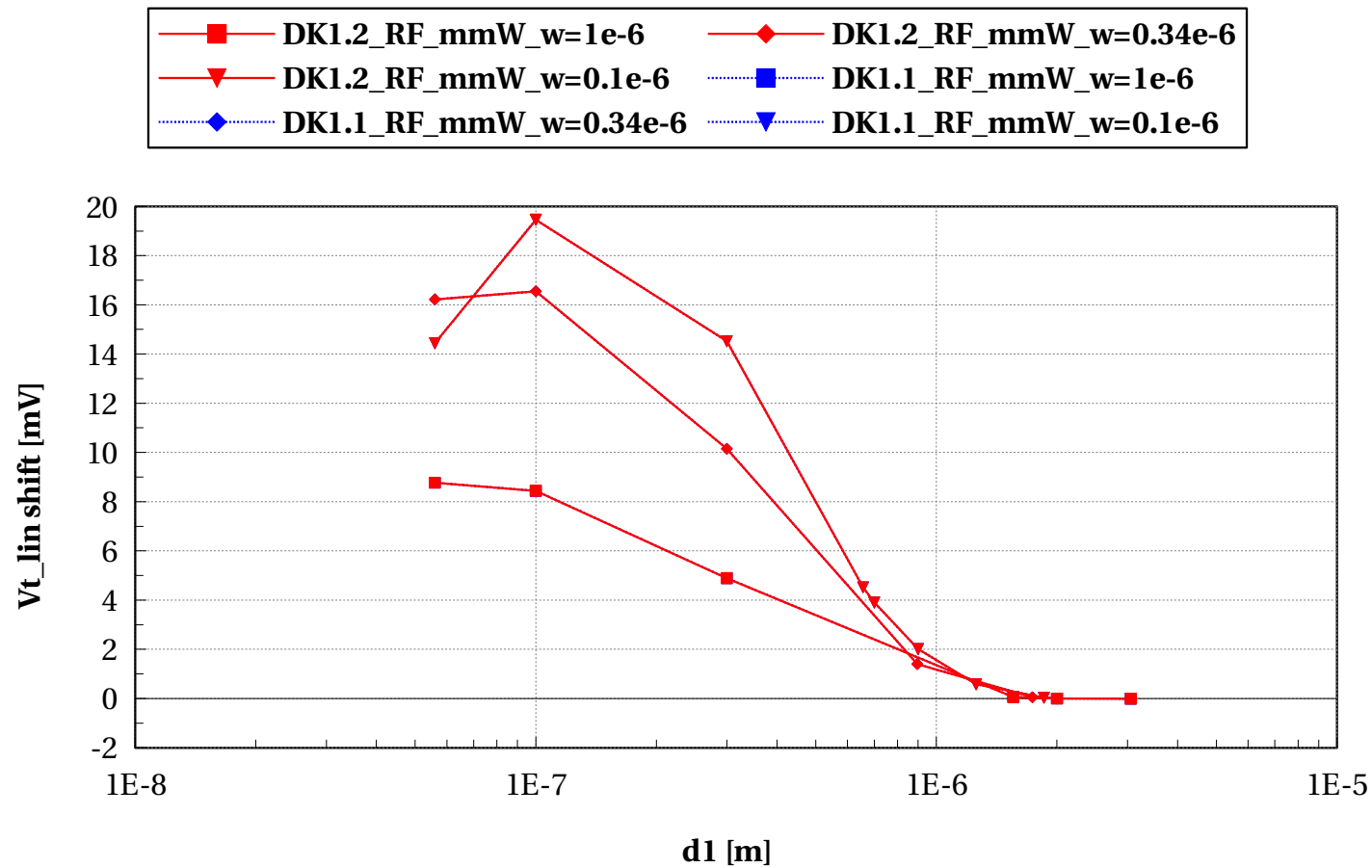
temp==25 and d1==10e-6 and L==0.5e-6



- WPE effect w.r.t d1 - Wscaling at $L=0.03u$

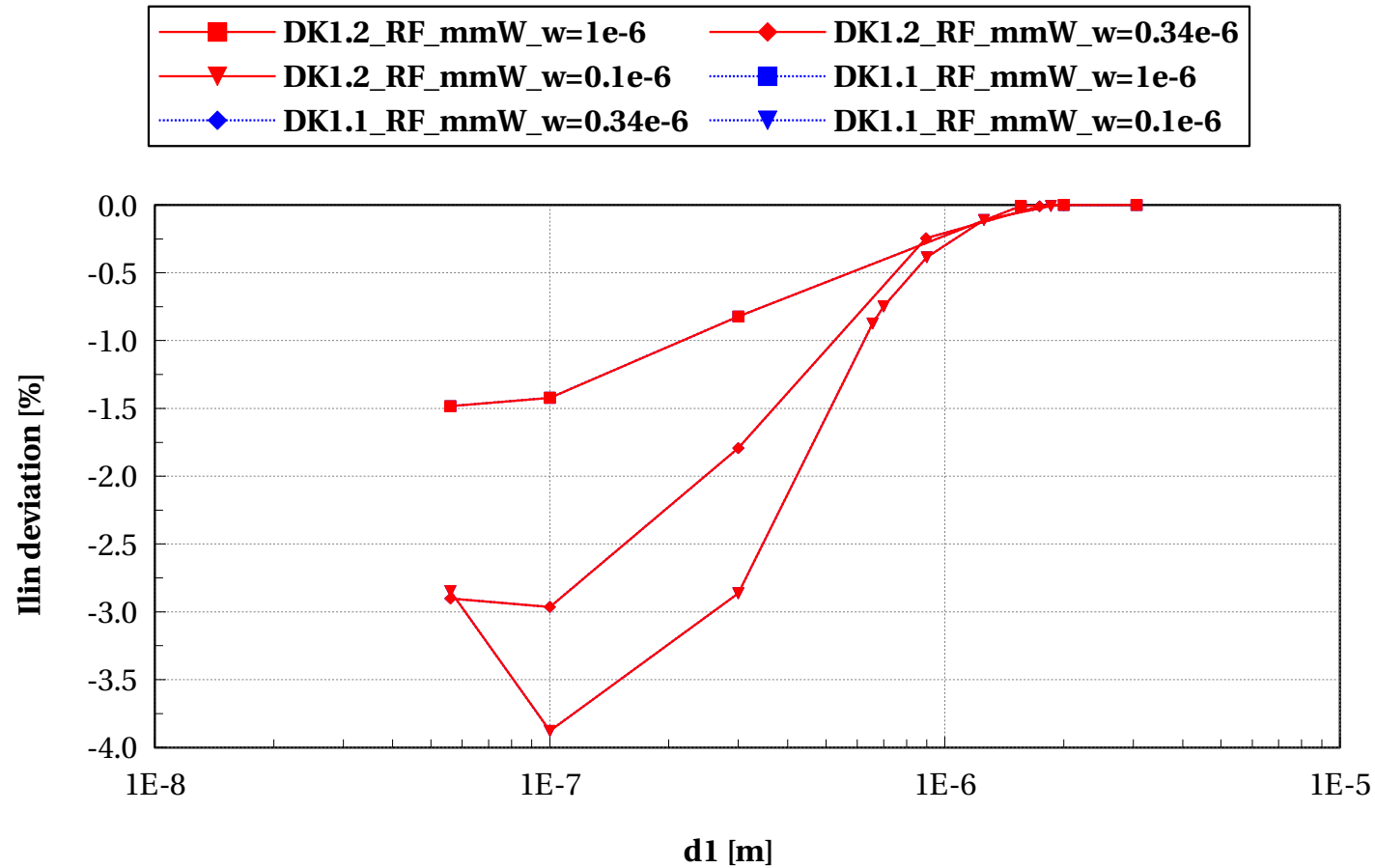
nfet_acc, Vt_lin shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and L==0.03e-6



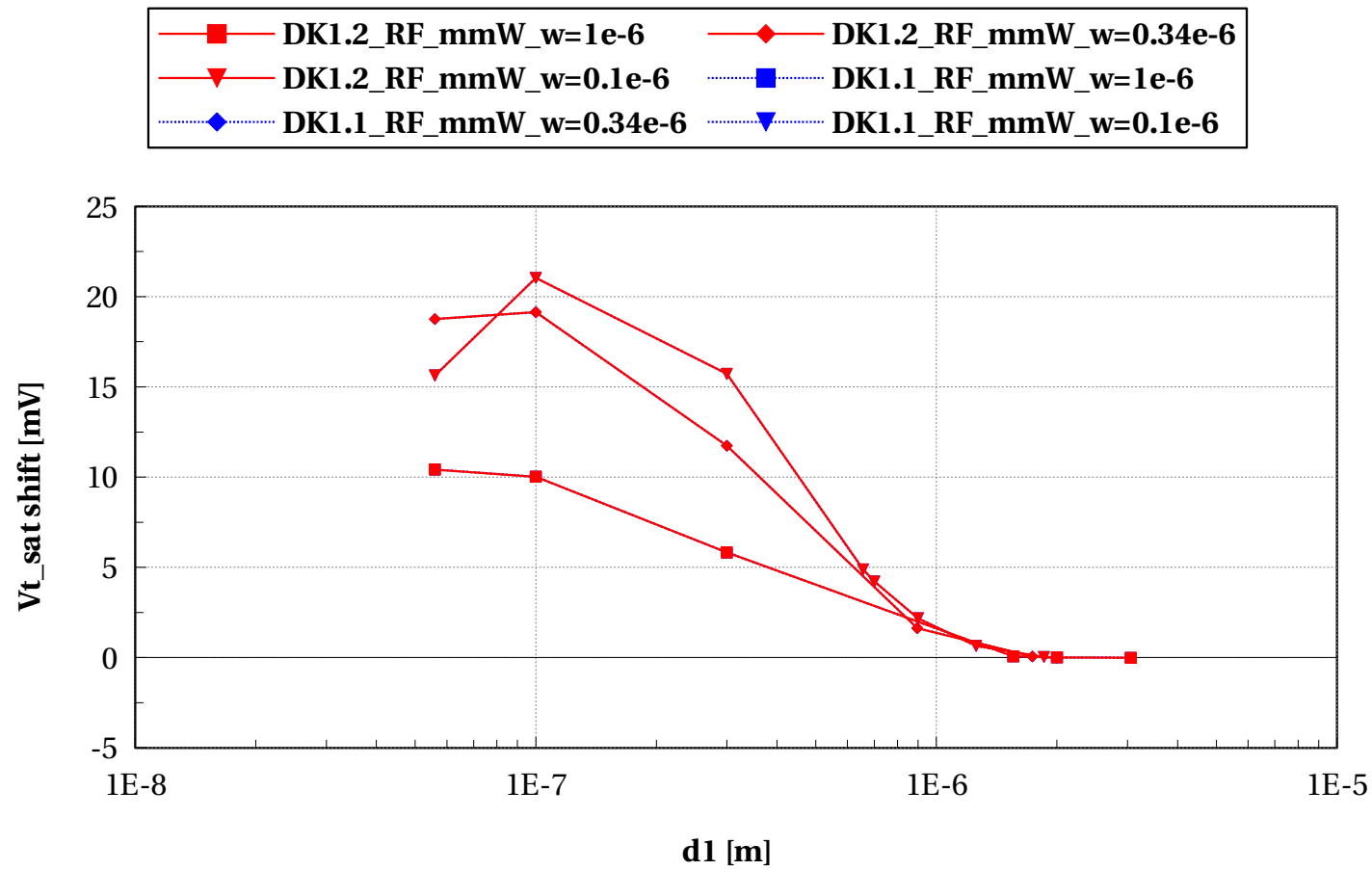
nfet_acc, Ilin deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and L==0.03e-6



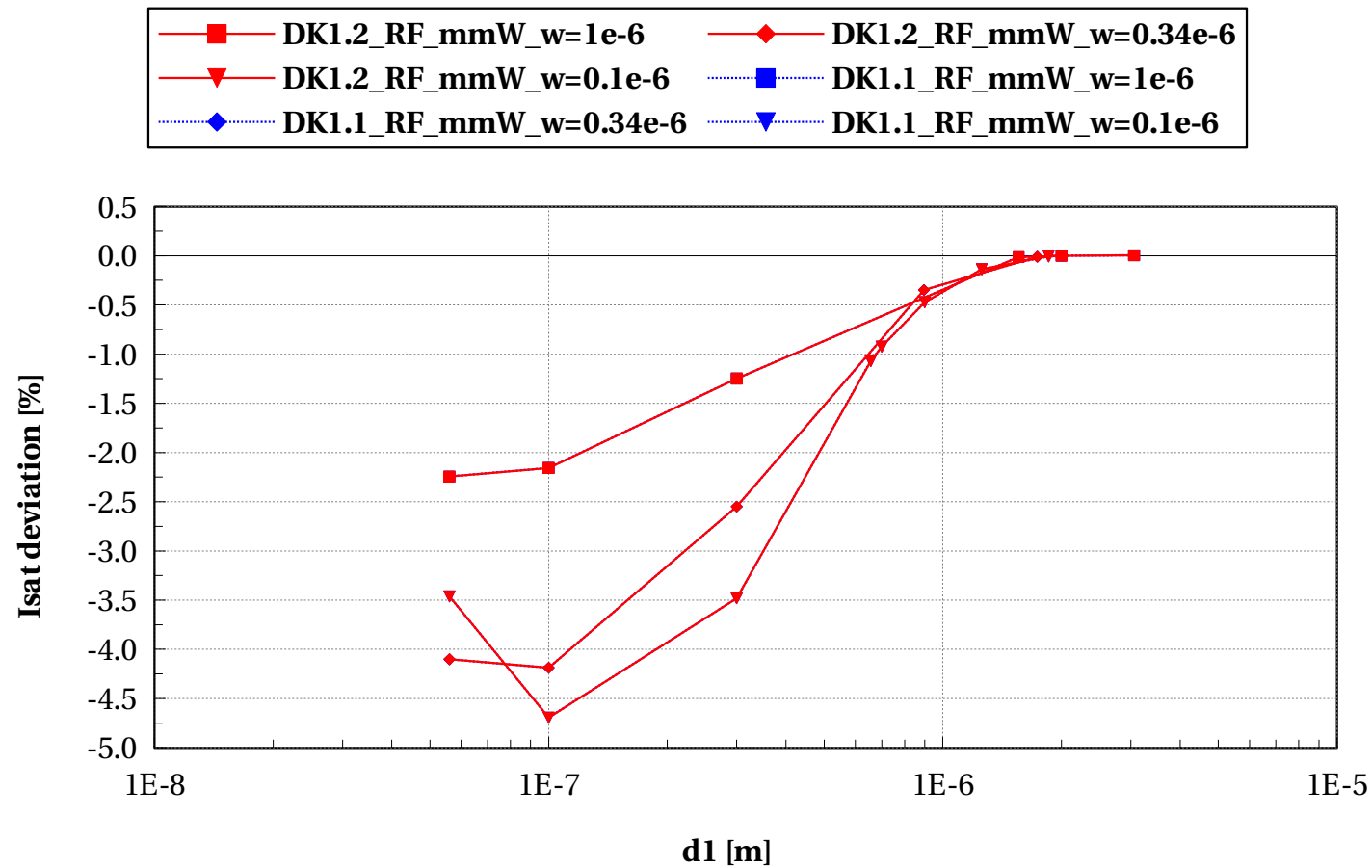
nfet_acc, Vt_sat shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and L==0.03e-6



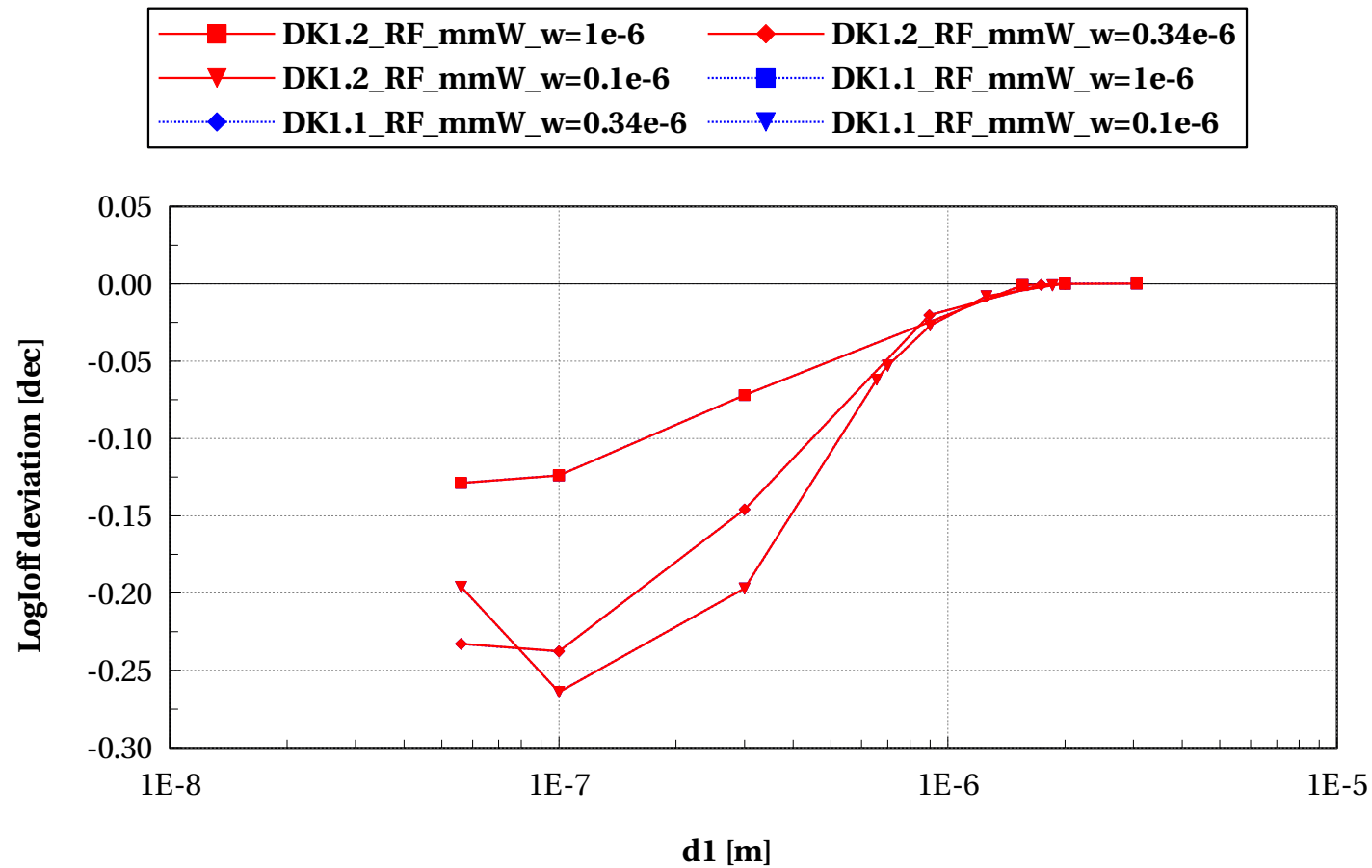
nfet_acc, Isat deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and L==0.03e-6



nfet_acc, Logloff deviation [dec] vs d1 [m]

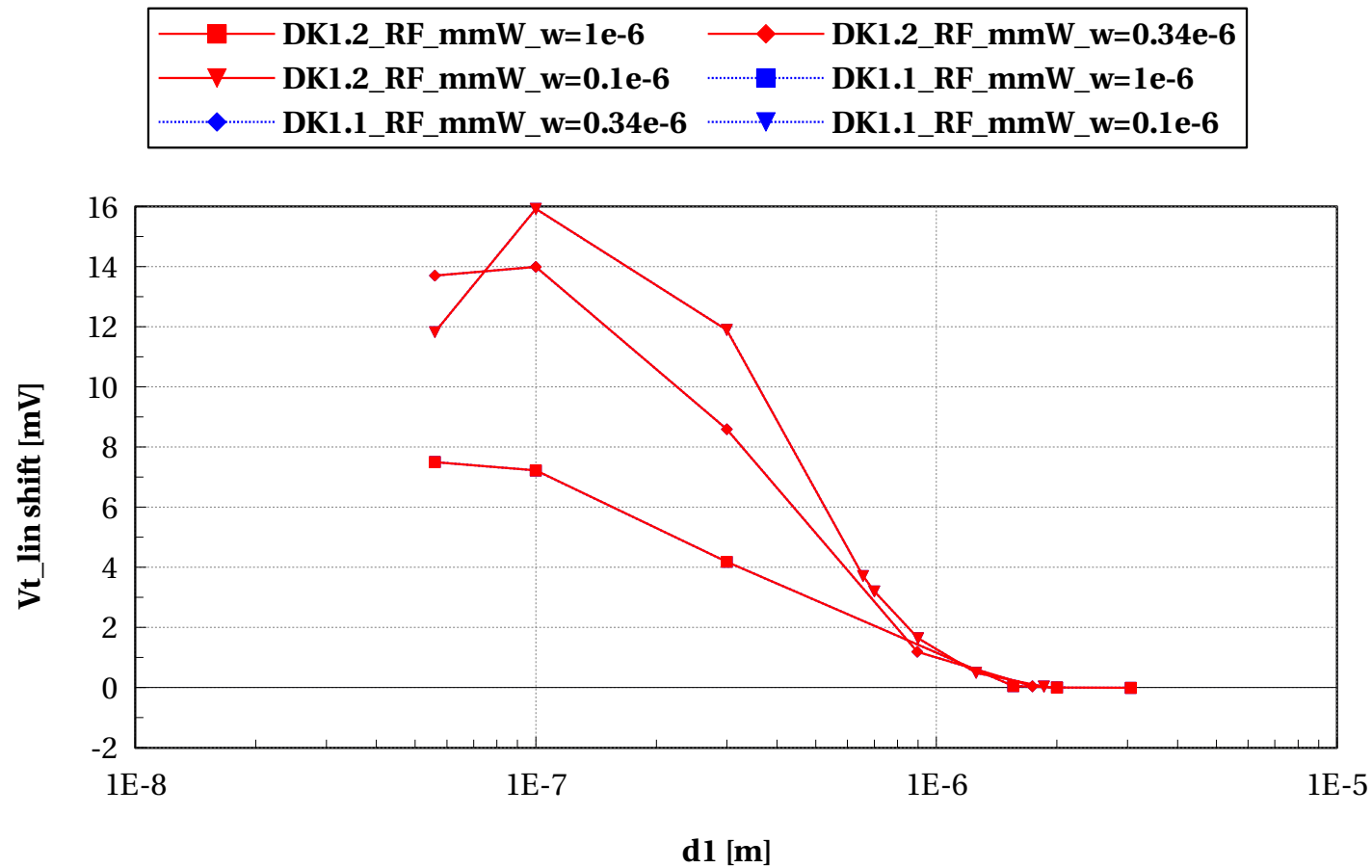
temp==25 and d0==10e-6 and L==0.03e-6



- WPE effect w.r.t d1 - Wscaling at $L=0.12u$

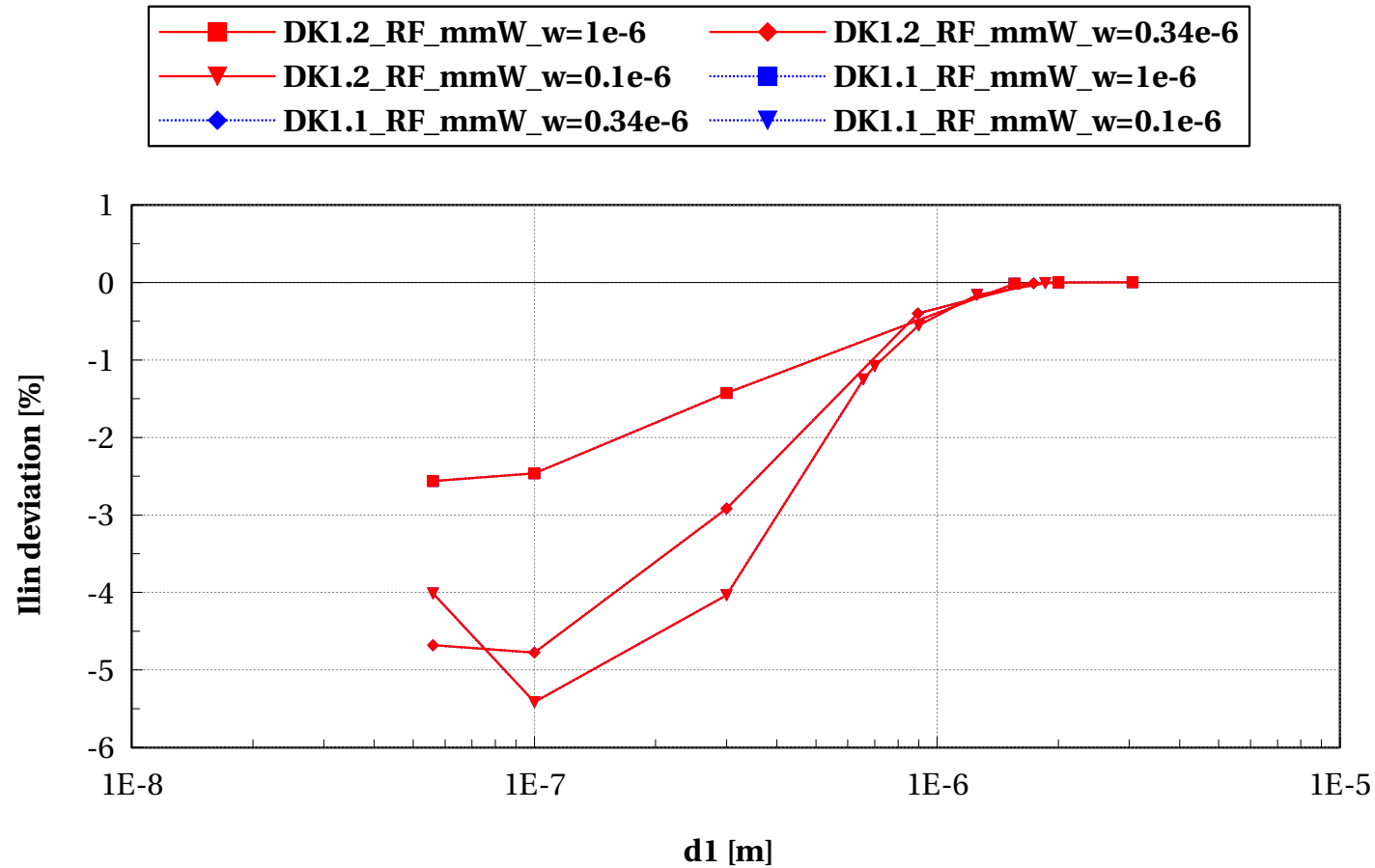
nfet_acc, Vt_lin shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and L==0.12e-6



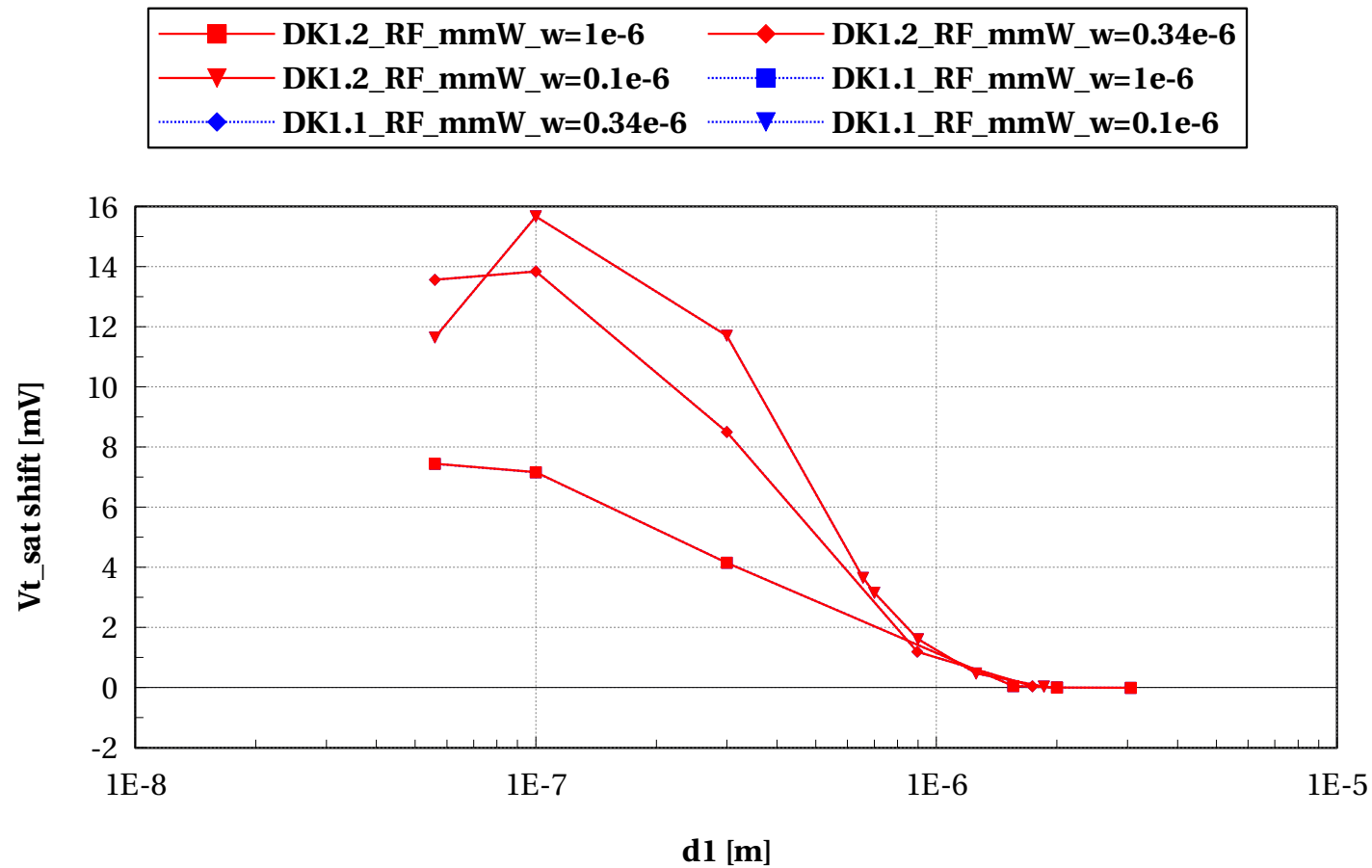
nfet_acc, Ilin deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and L==0.12e-6



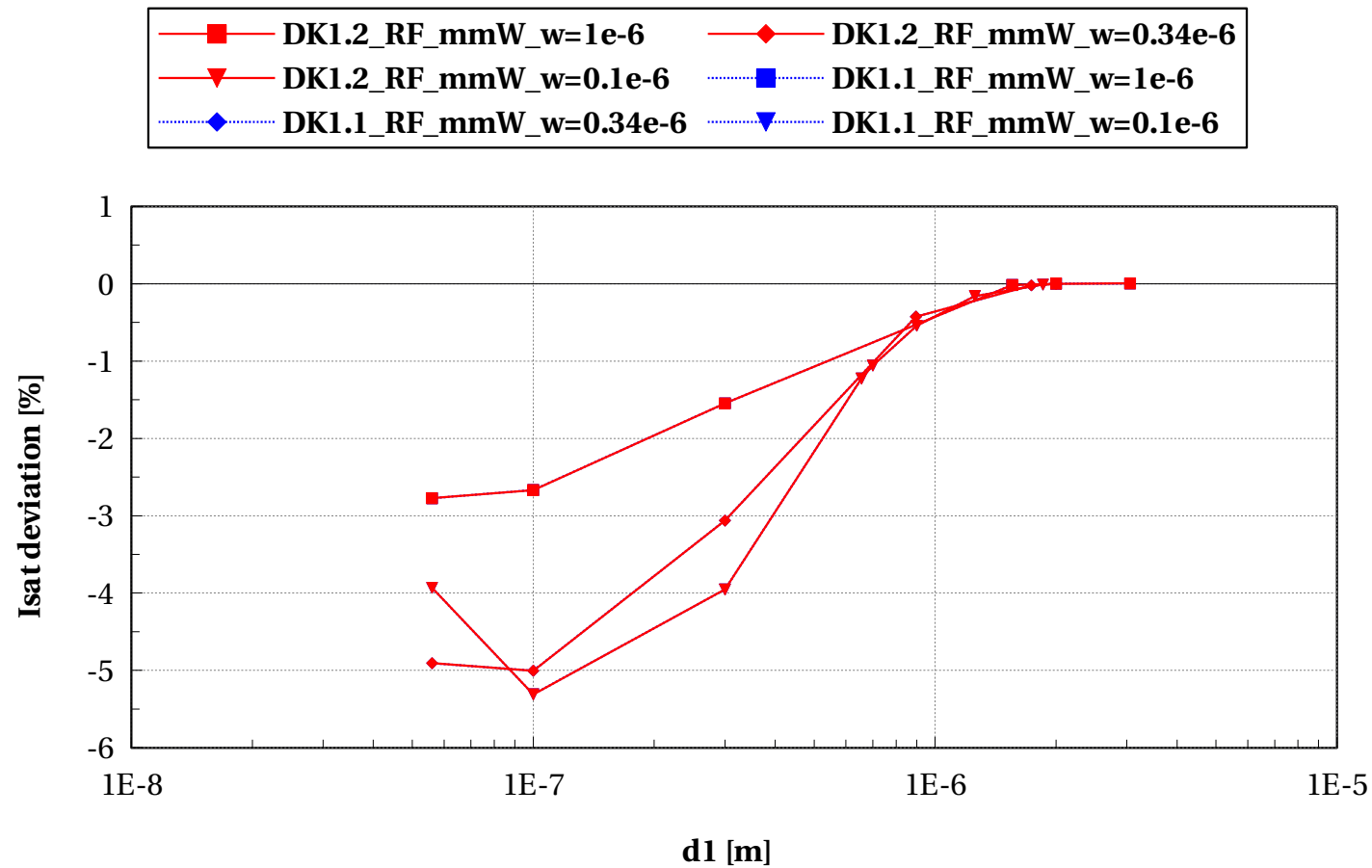
nfet_acc, Vt_sat shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and L==0.12e-6



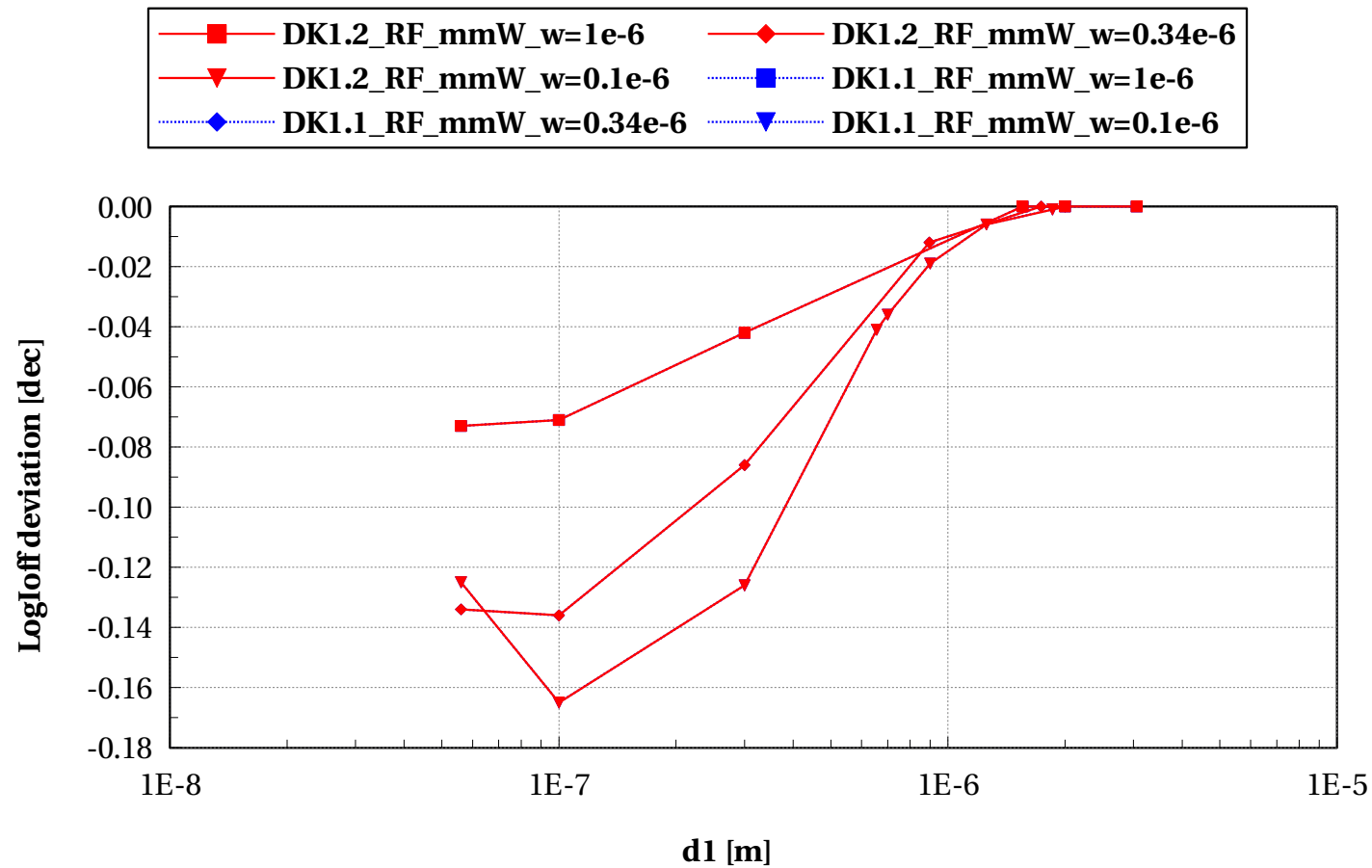
nfet_acc, Isat deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and L==0.12e-6



nfet_acc, Logloff deviation [dec] vs d1 [m]

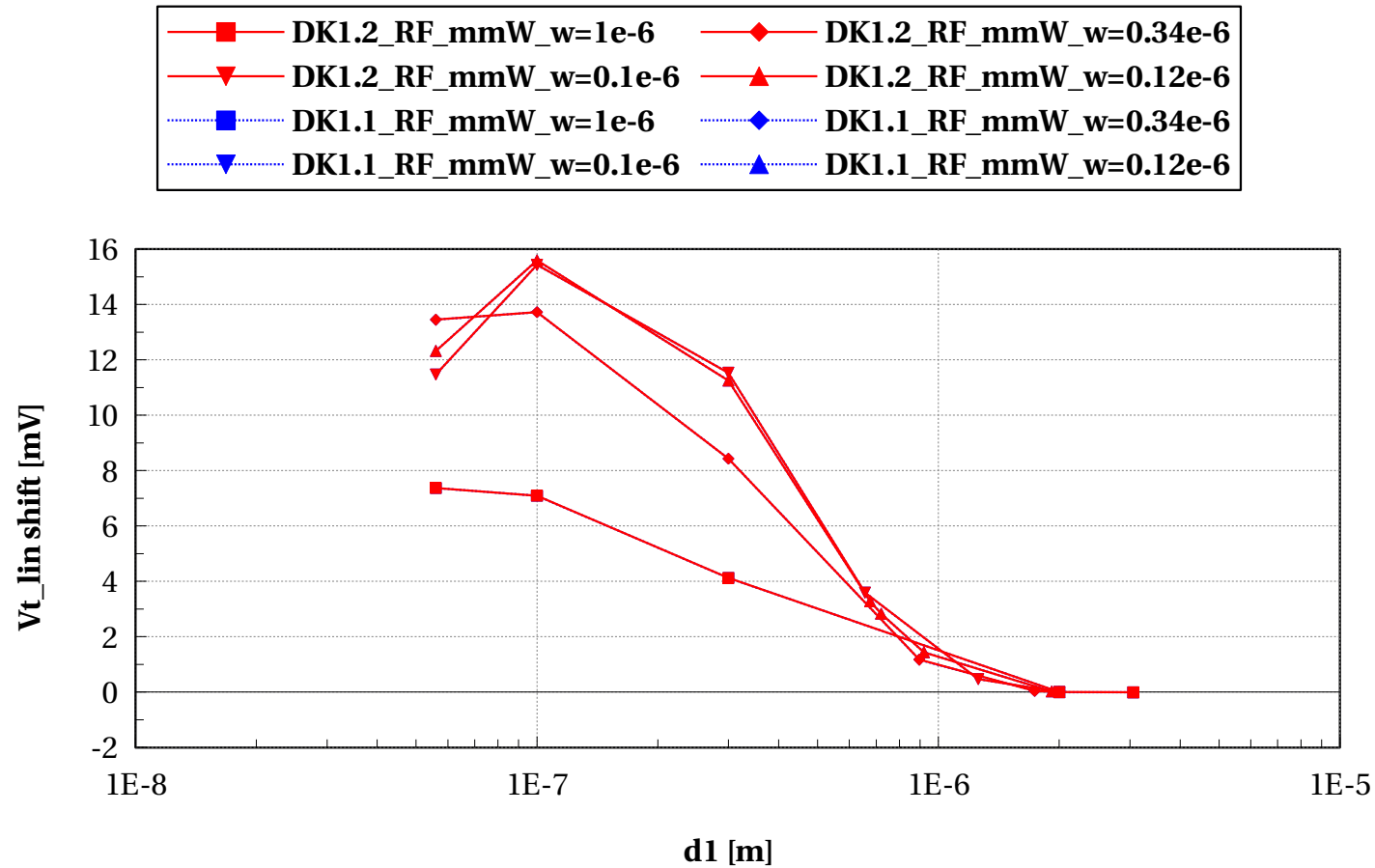
temp==25 and d0==10e-6 and L==0.12e-6



- WPE effect w.r.t d1 - Wscaling at L=1u

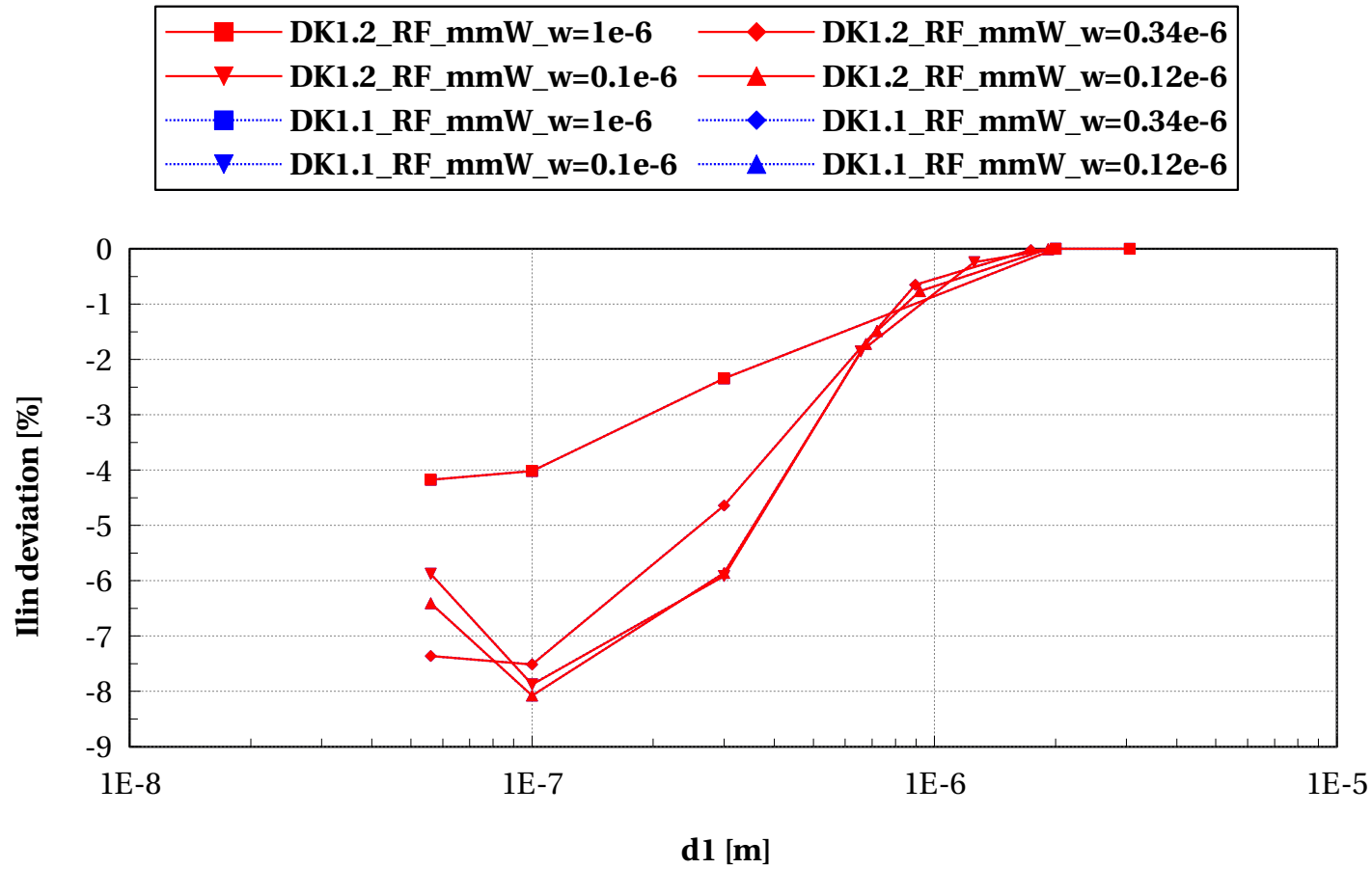
nfet_acc, Vt_lin shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and L==1e-6



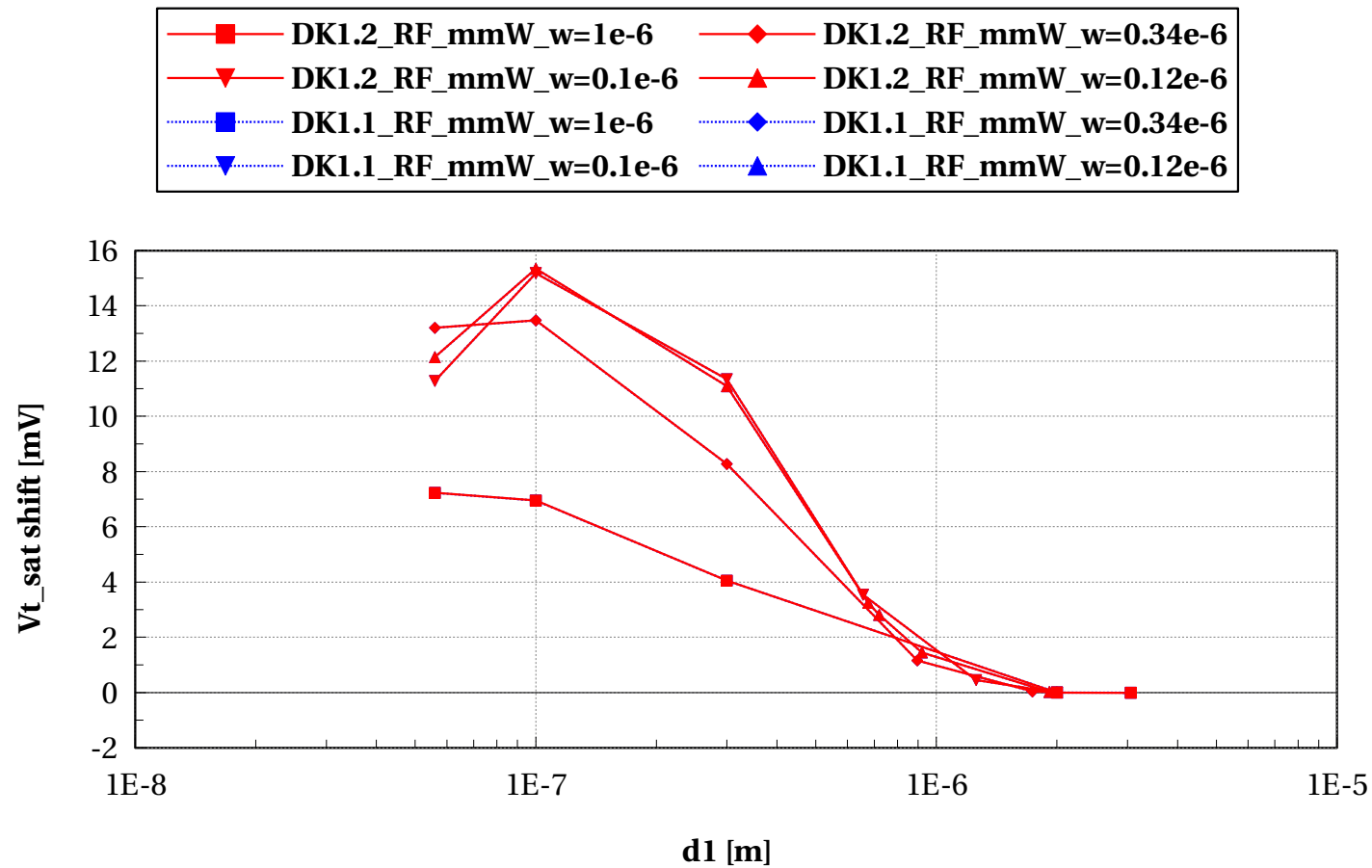
nfet_acc, Ilin deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and L==1e-6



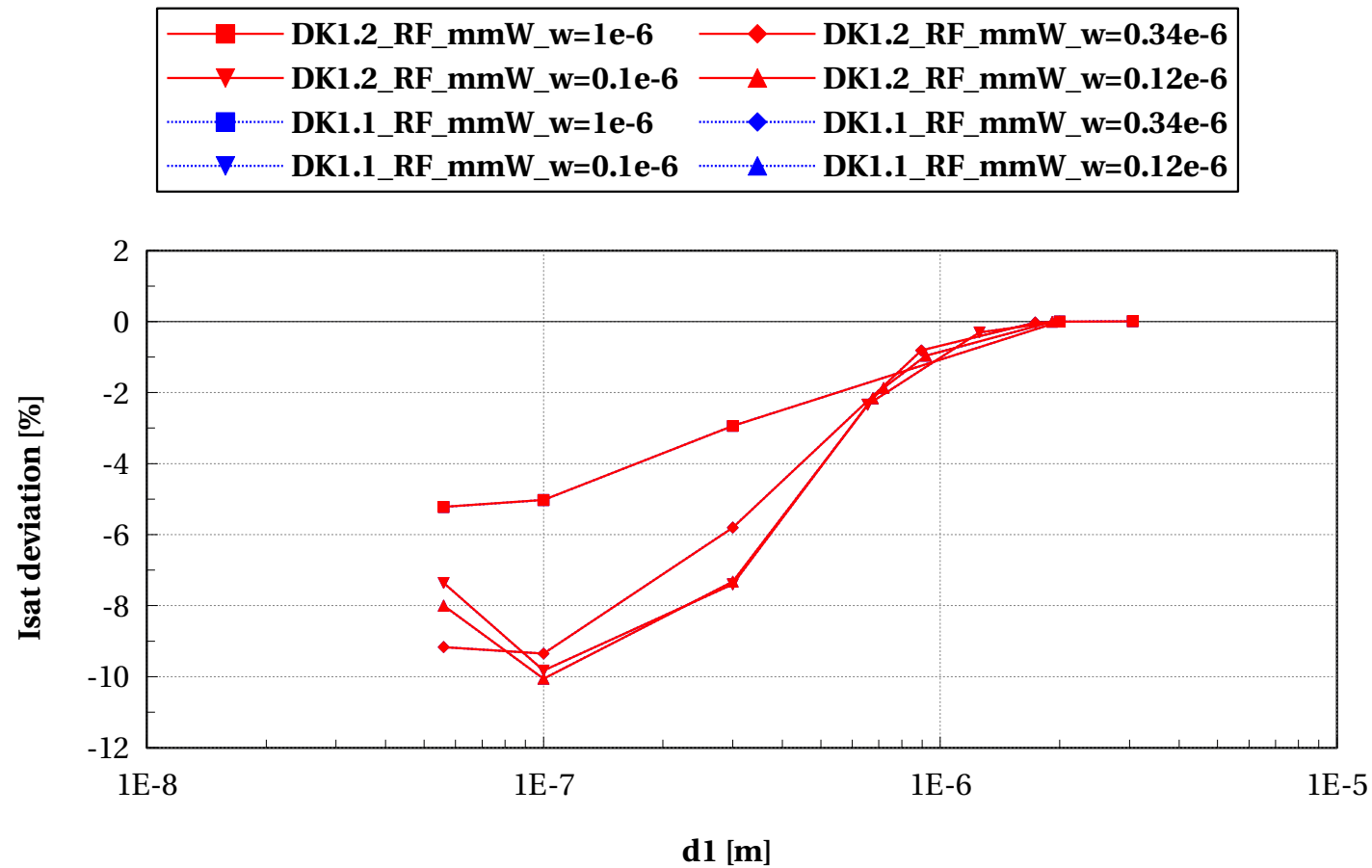
nfet_acc, Vt_sat shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and L==1e-6



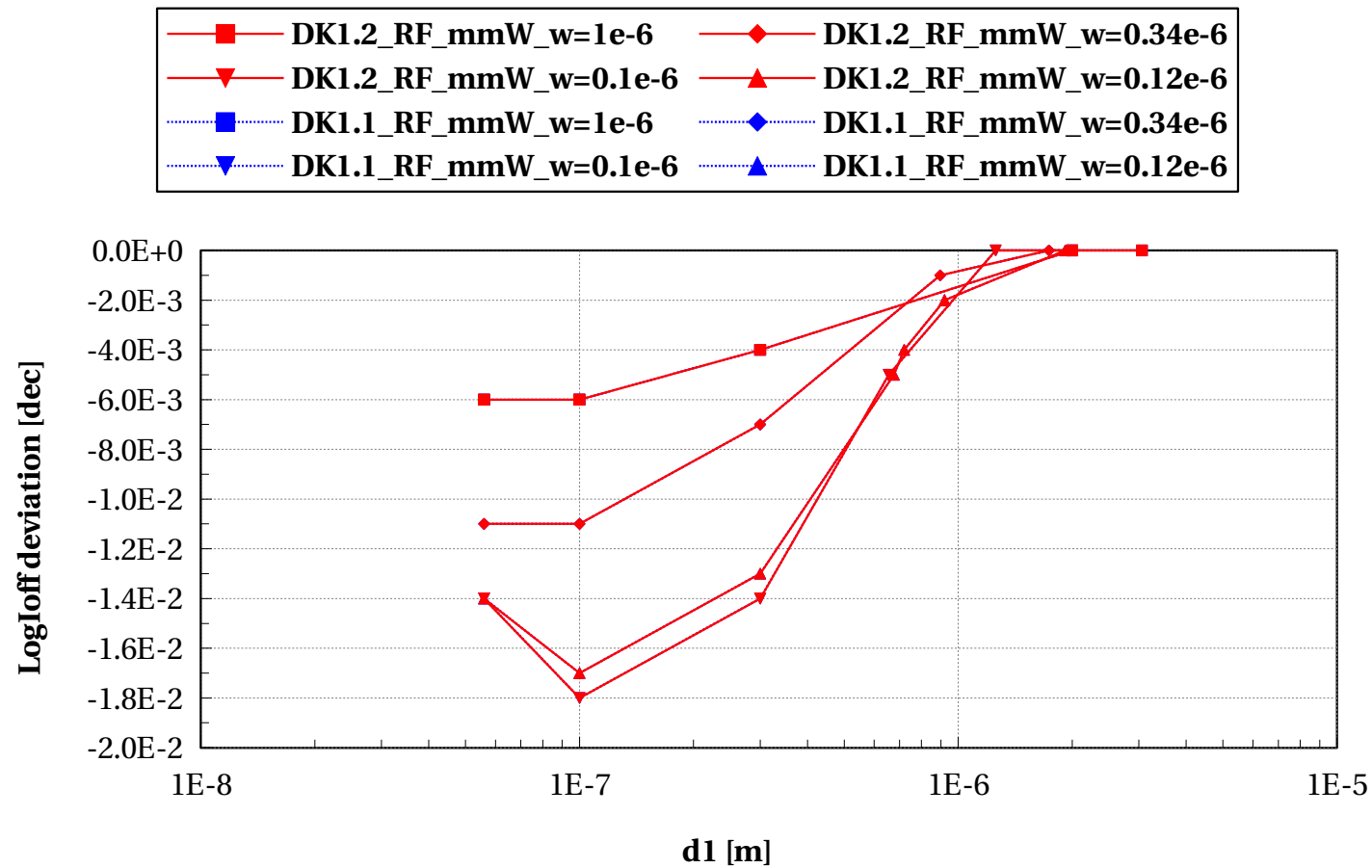
nfet_acc, Isat deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and L==1e-6



nfet_acc, Logloff deviation [dec] vs d1 [m]

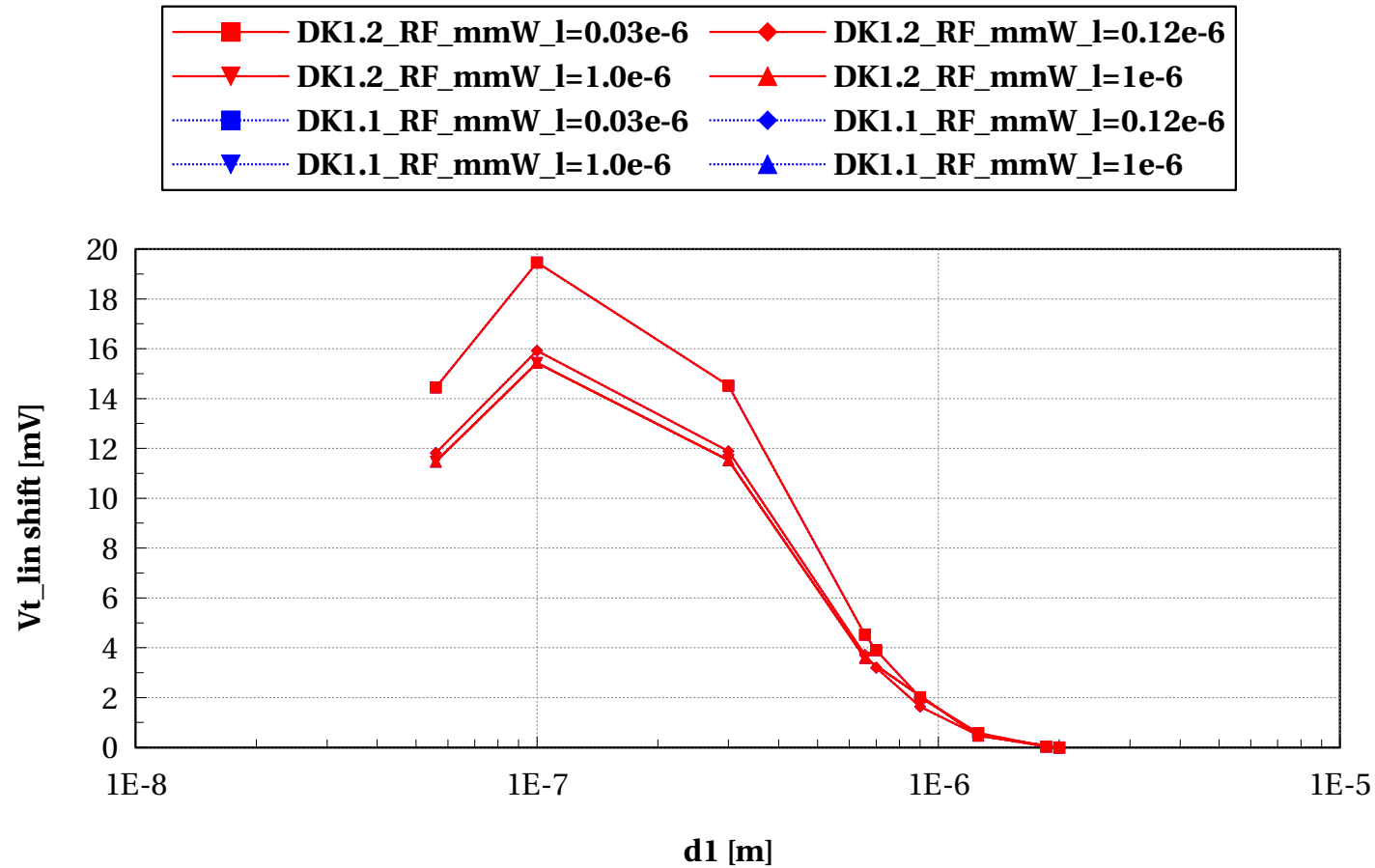
temp==25 and d0==10e-6 and L==1e-6



- WPE effect w.r.t d1 - Lscaling at $W=0.1\mu$

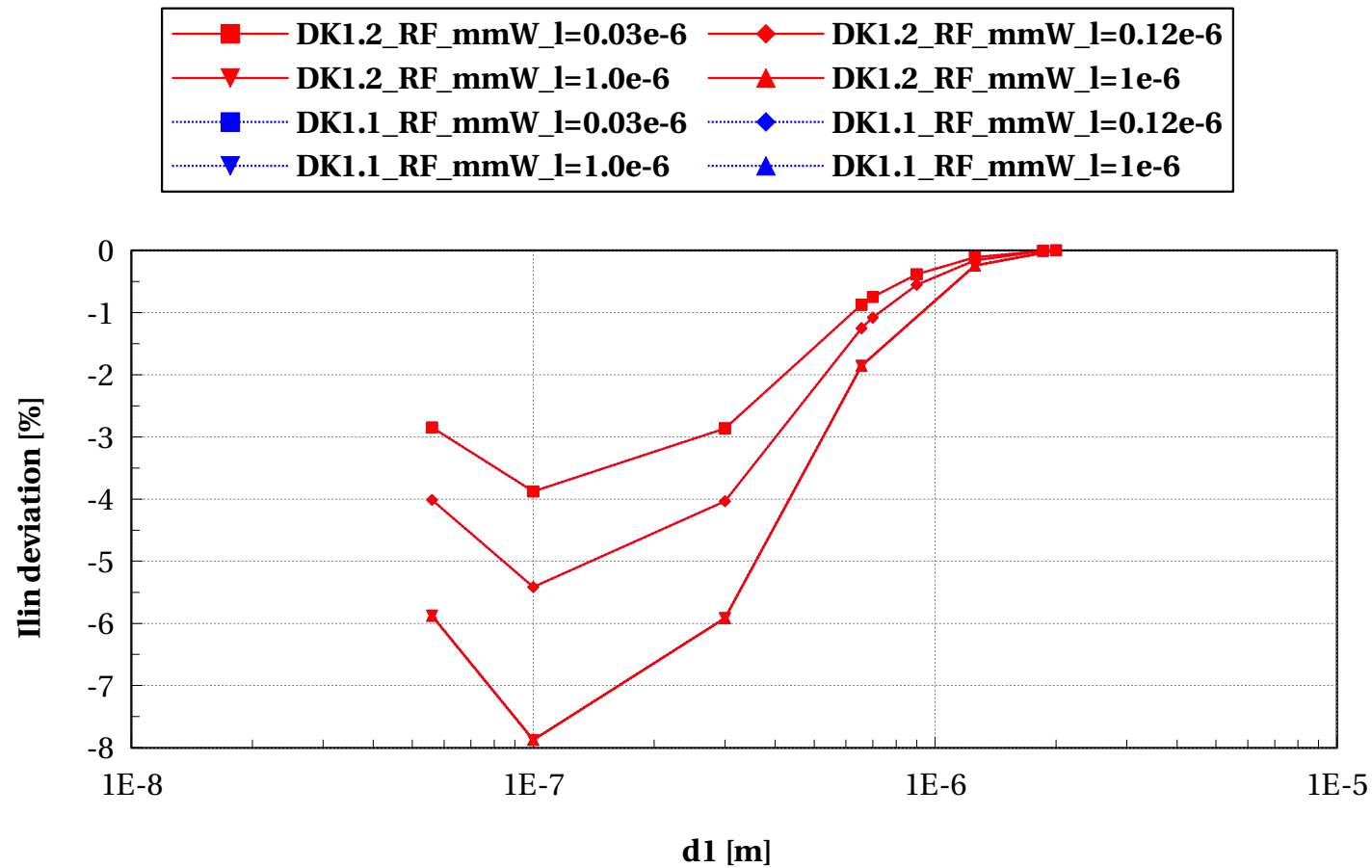
nfet_acc, Vt_lin shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and W==0.1e-6



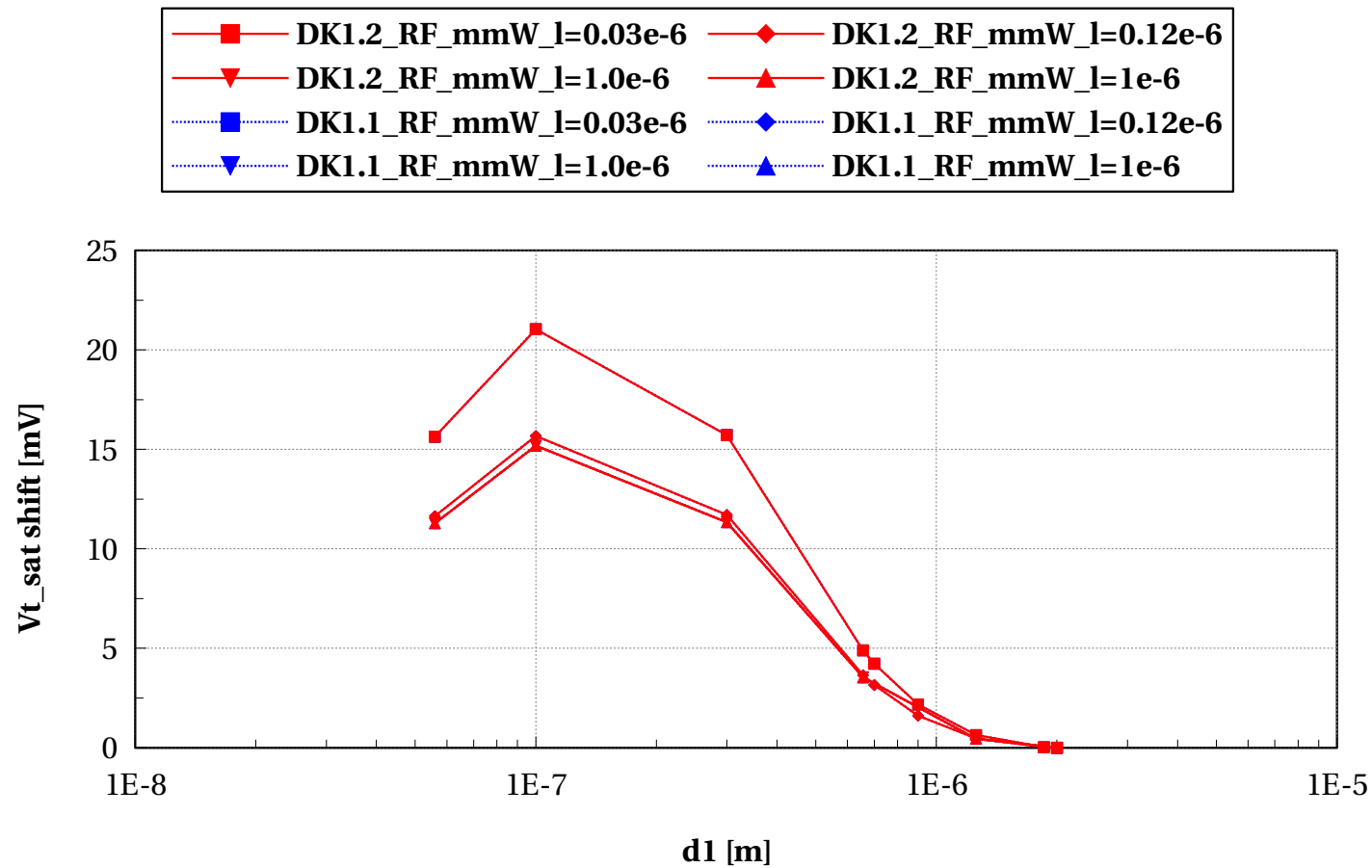
nfet_acc, Ilin deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and W==0.1e-6



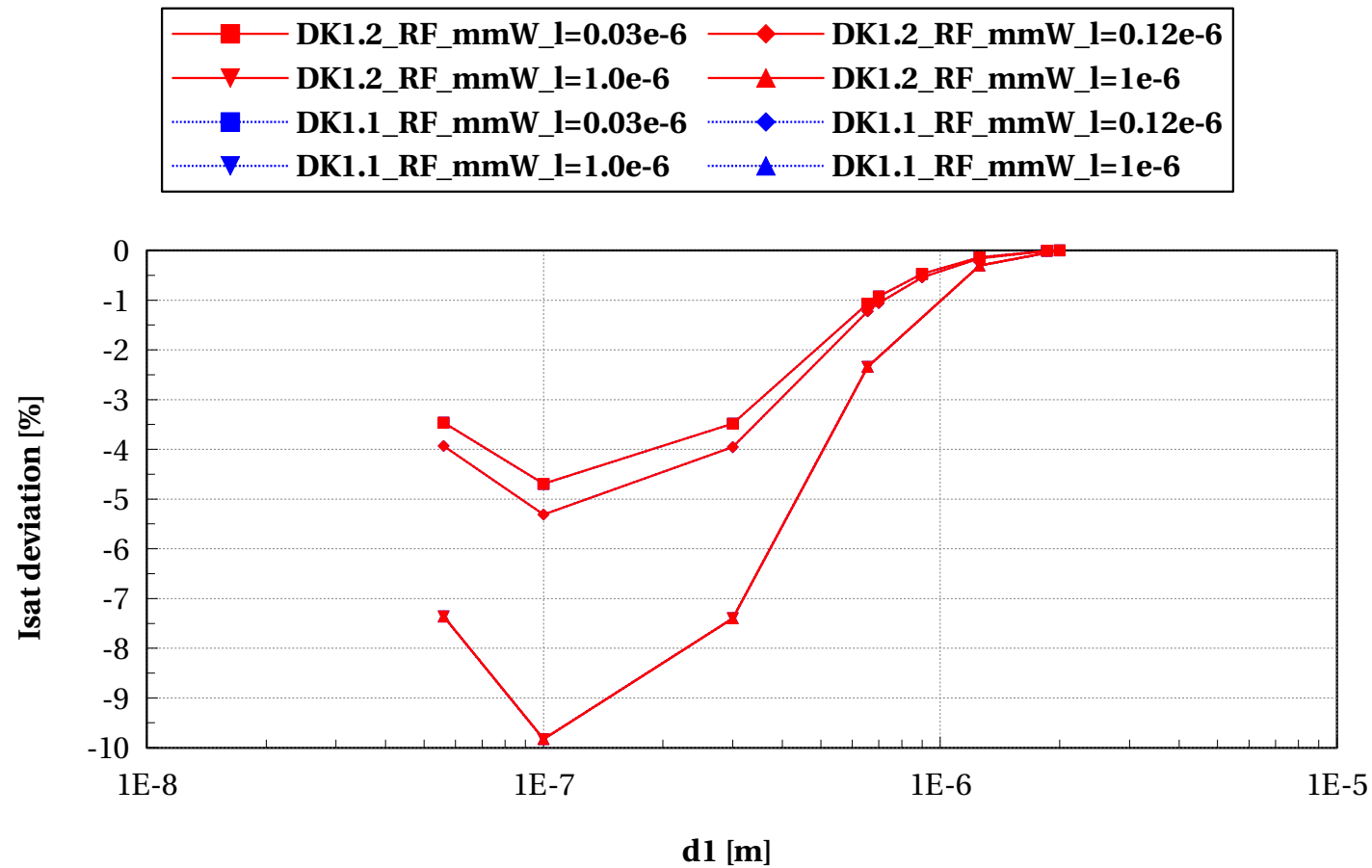
nfet_acc, Vt_sat shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and W==0.1e-6



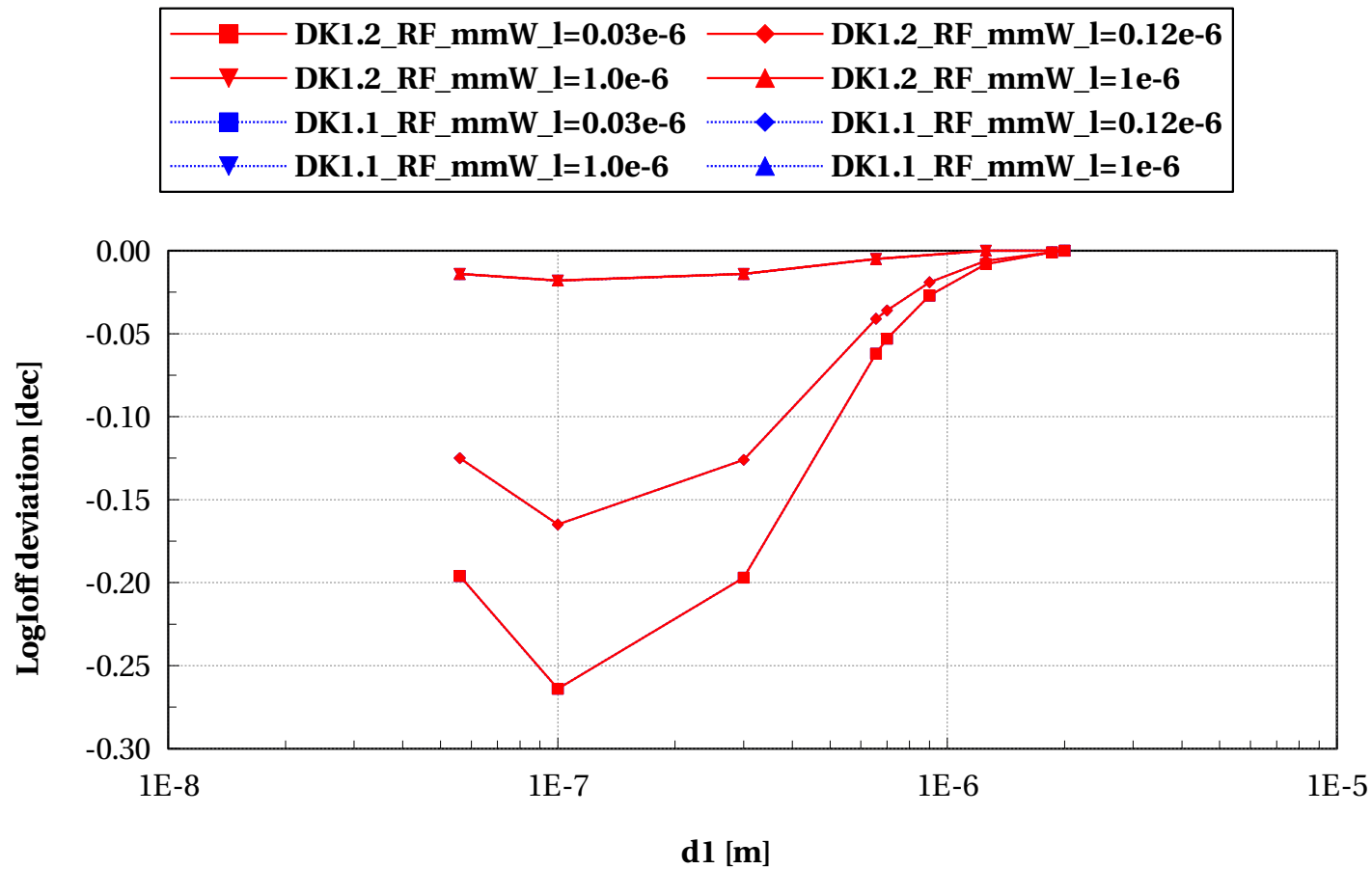
nfet_acc, Isat deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and W==0.1e-6



nfet_acc, Logloff deviation [dec] vs d1 [m]

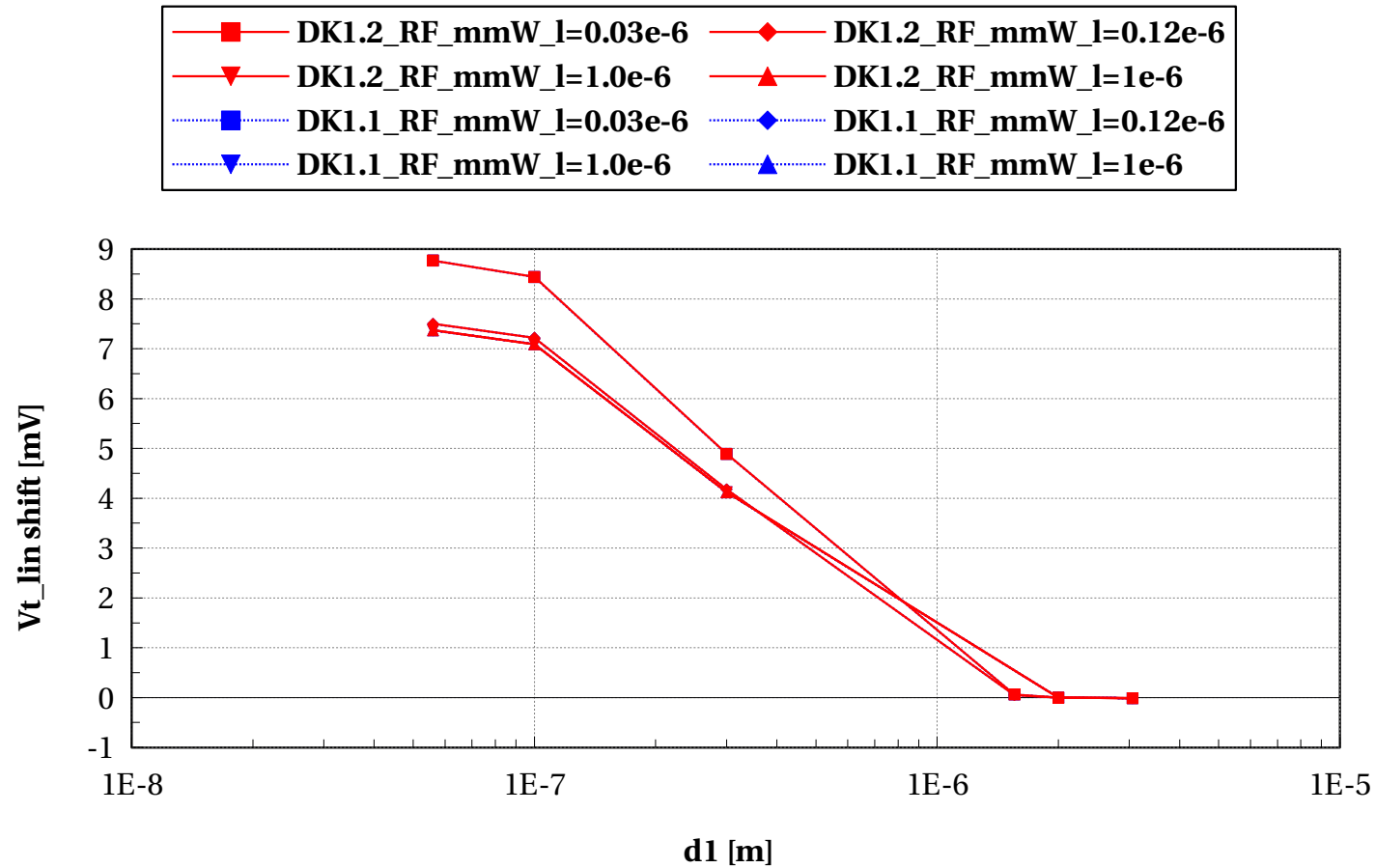
temp==25 and d0==10e-6 and W==0.1e-6



- WPE effect w.r.t d1 - Lscaling at W=1u

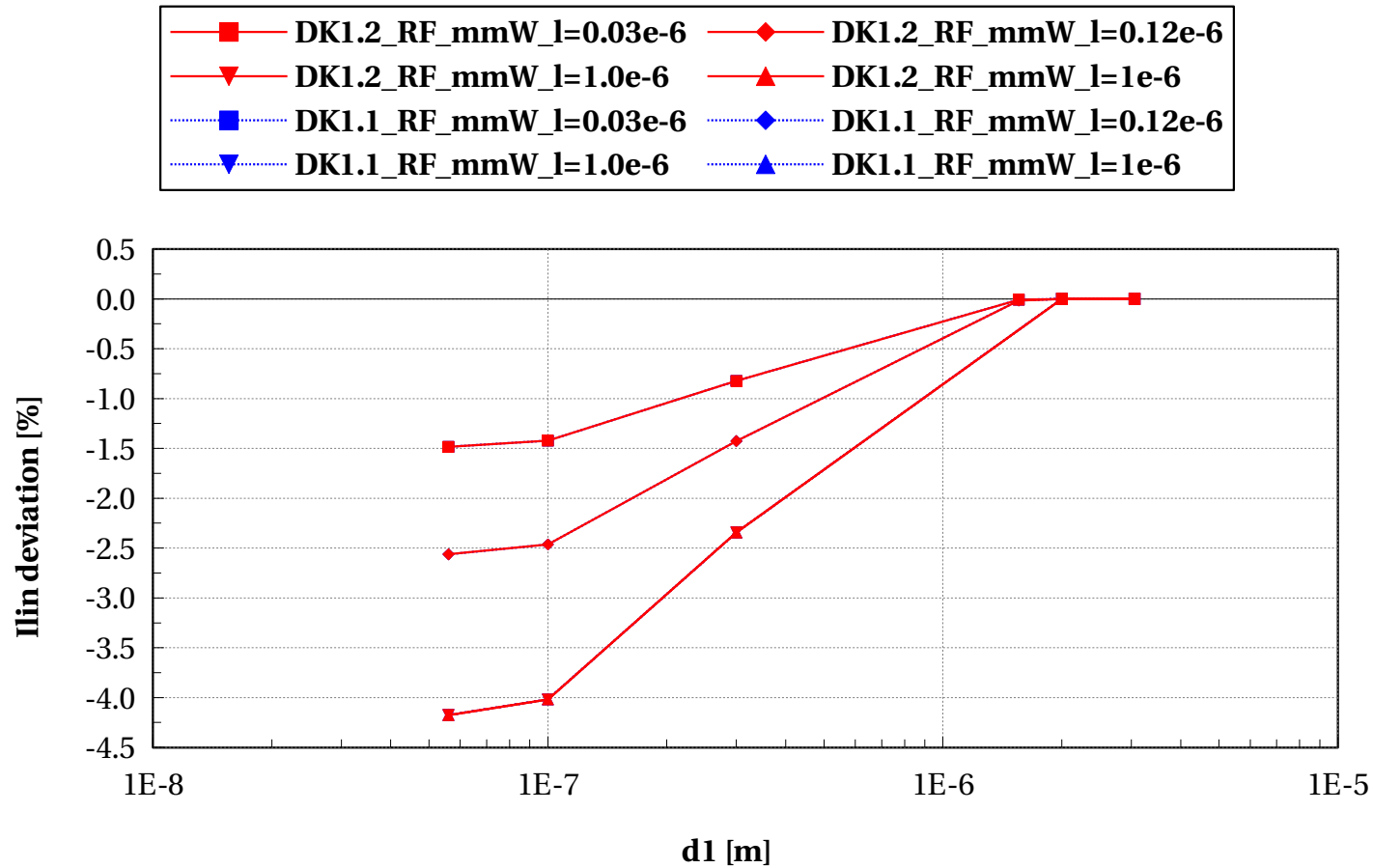
nfet_acc, Vt_lin shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and W==1e-6



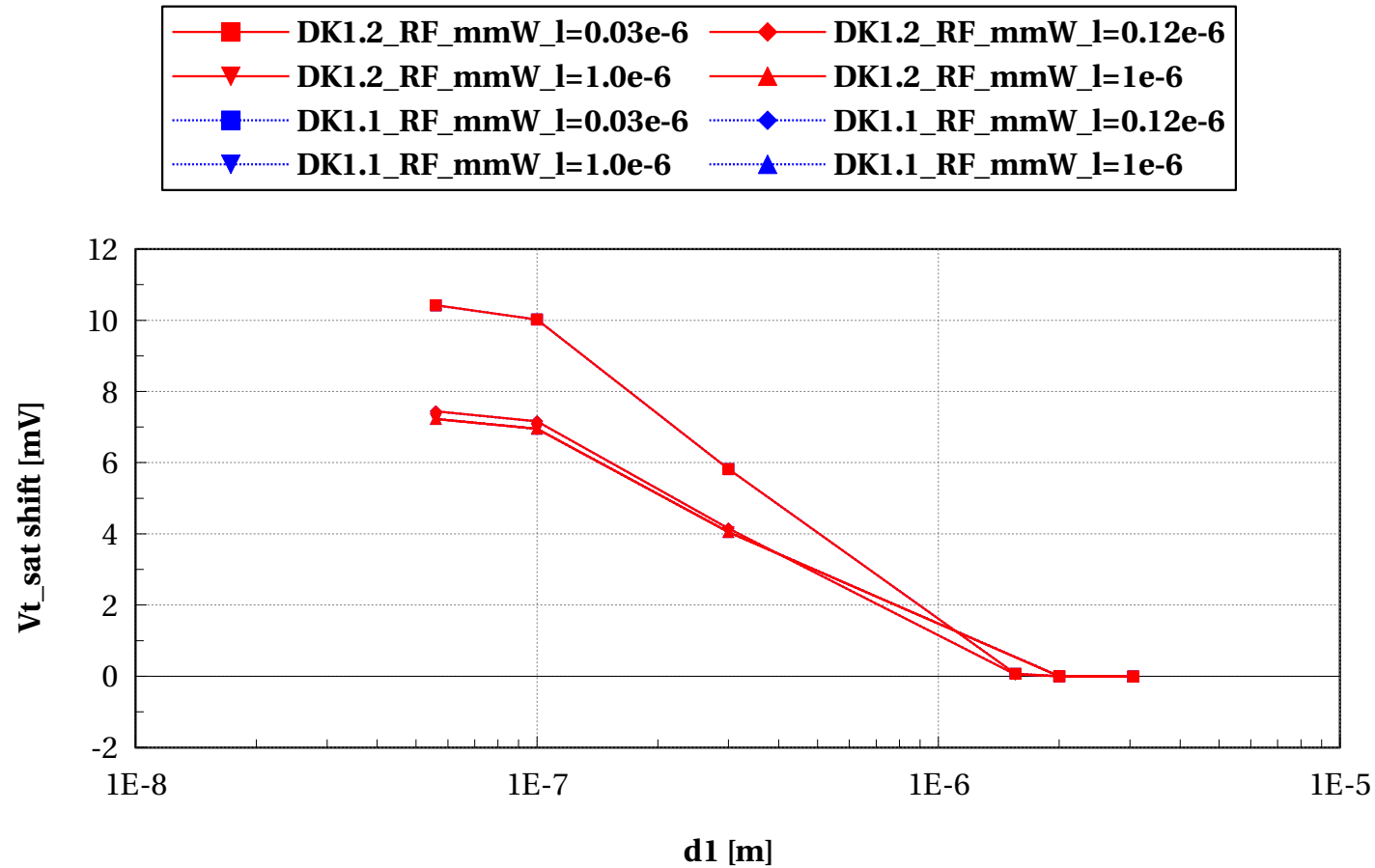
nfet_acc, Ilin deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and W==1e-6



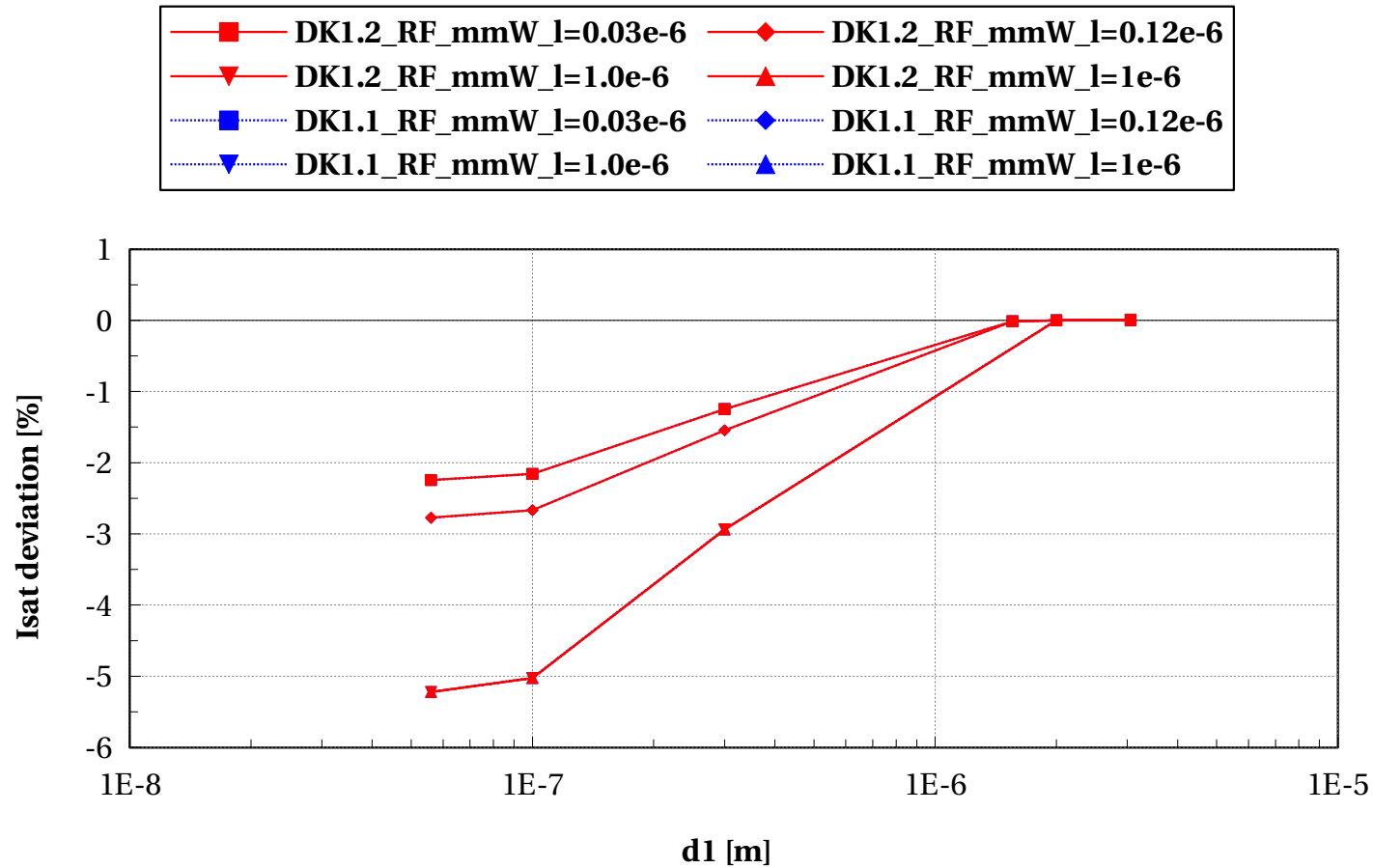
nfet_acc, Vt_sat shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and W==1e-6



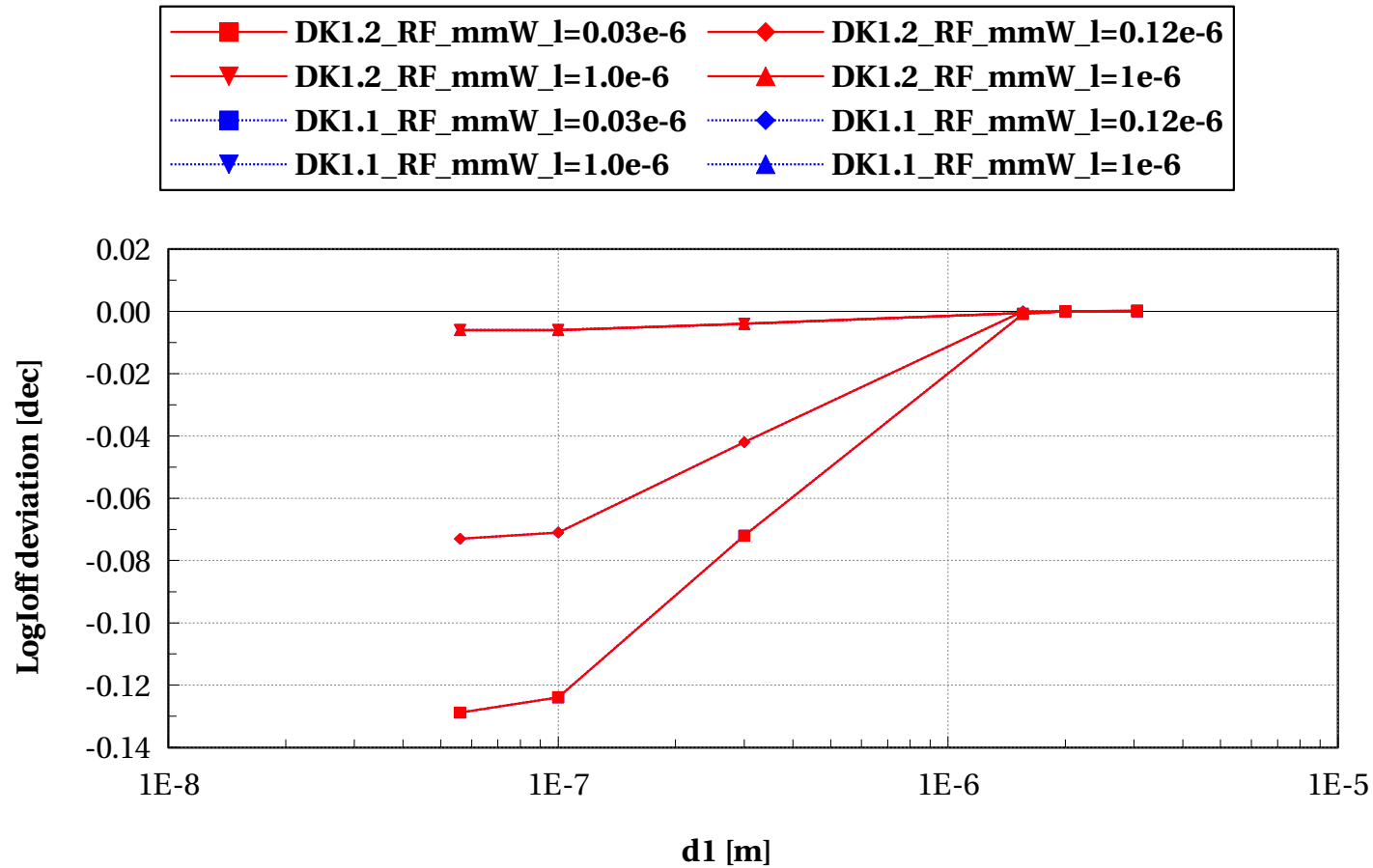
nfet_acc, Isat deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and W==1e-6



nfet_acc, Logloff deviation [dec] vs d1 [m]

temp==25 and d0==10e-6 and W==1e-6



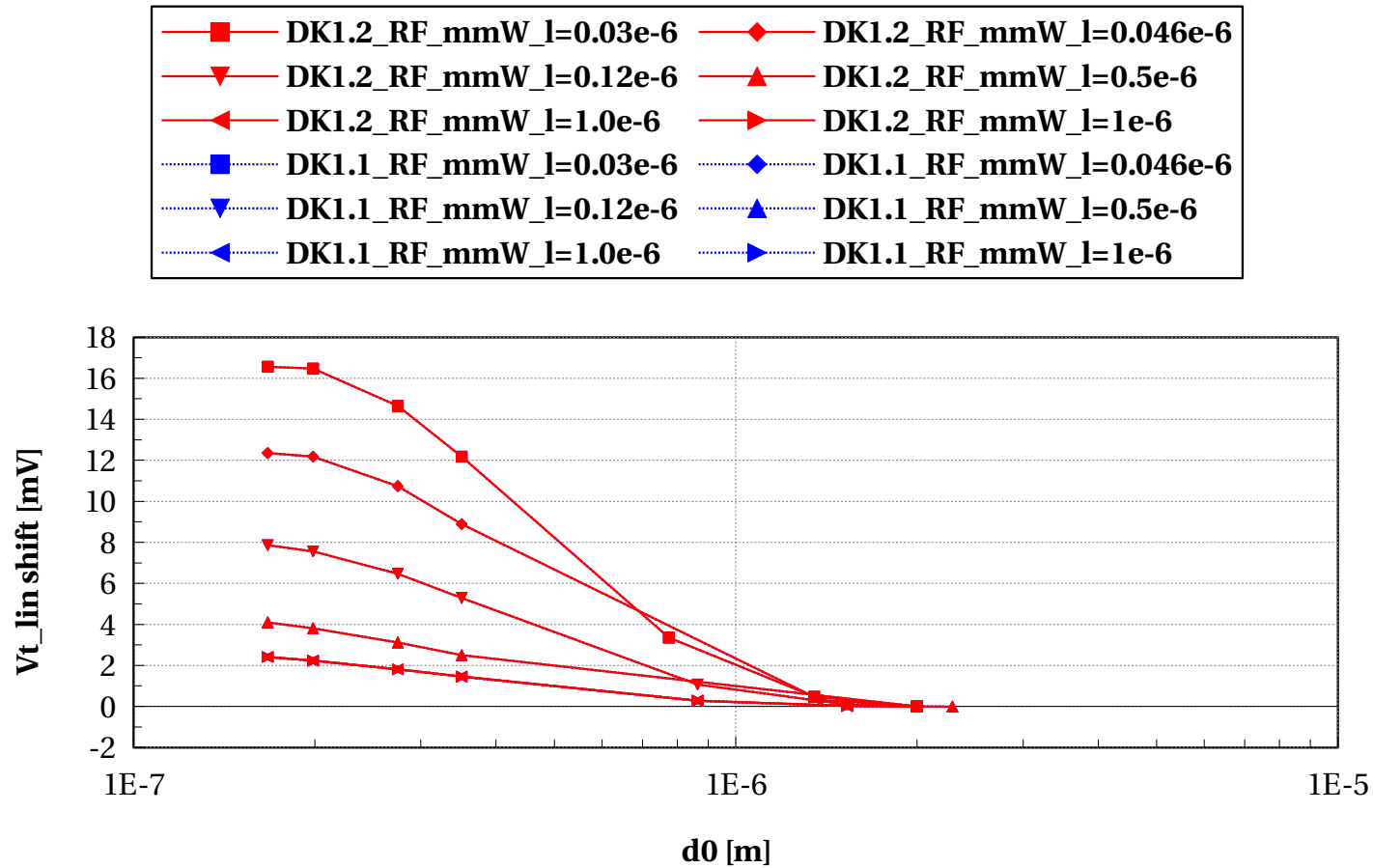
pfet_acc

Electrical characteristics scaling

- WPE effect w.r.t d0 - Lscaling at W=1u

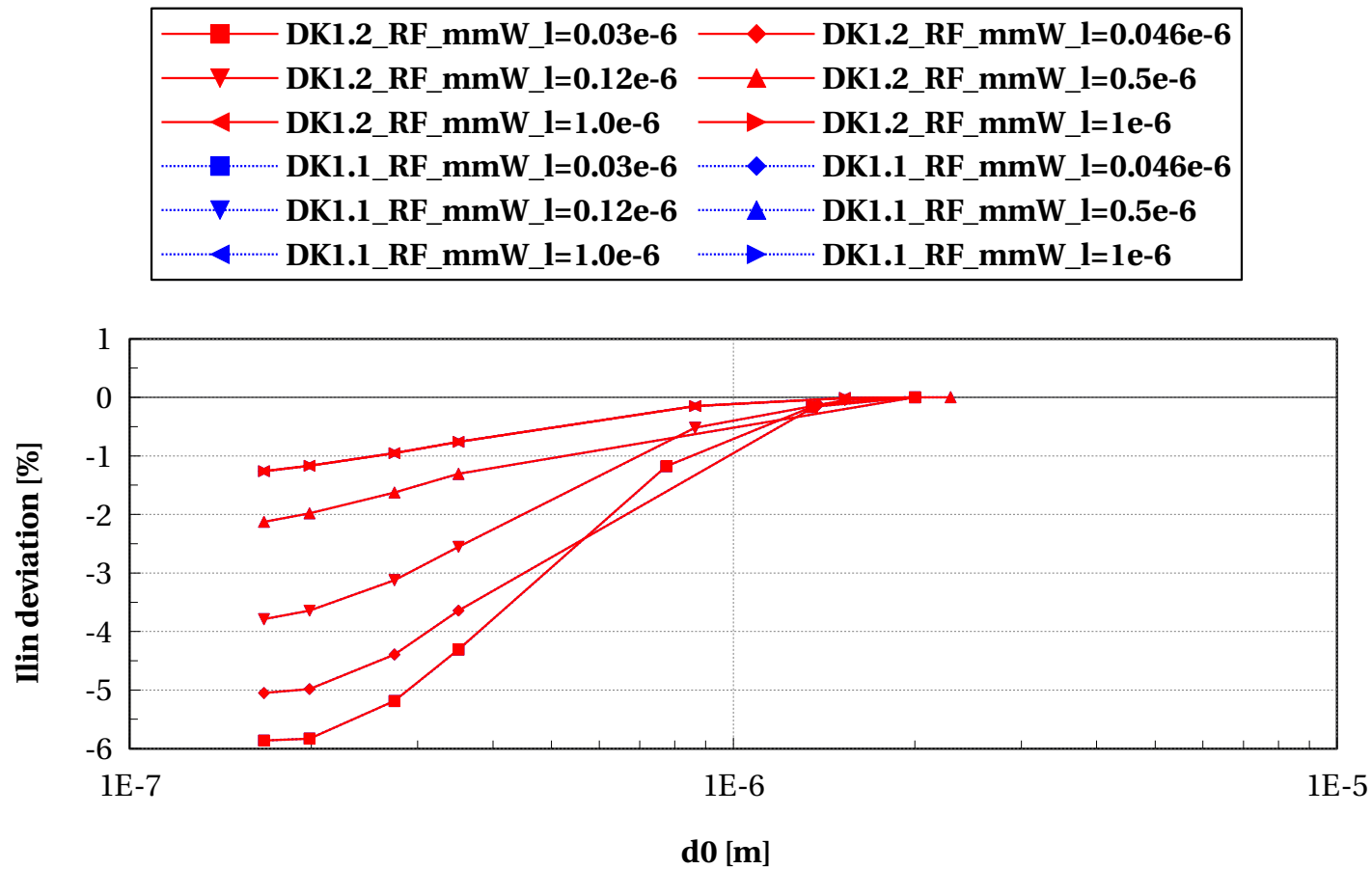
pfet_acc, Vt_lin shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and W==1e-6



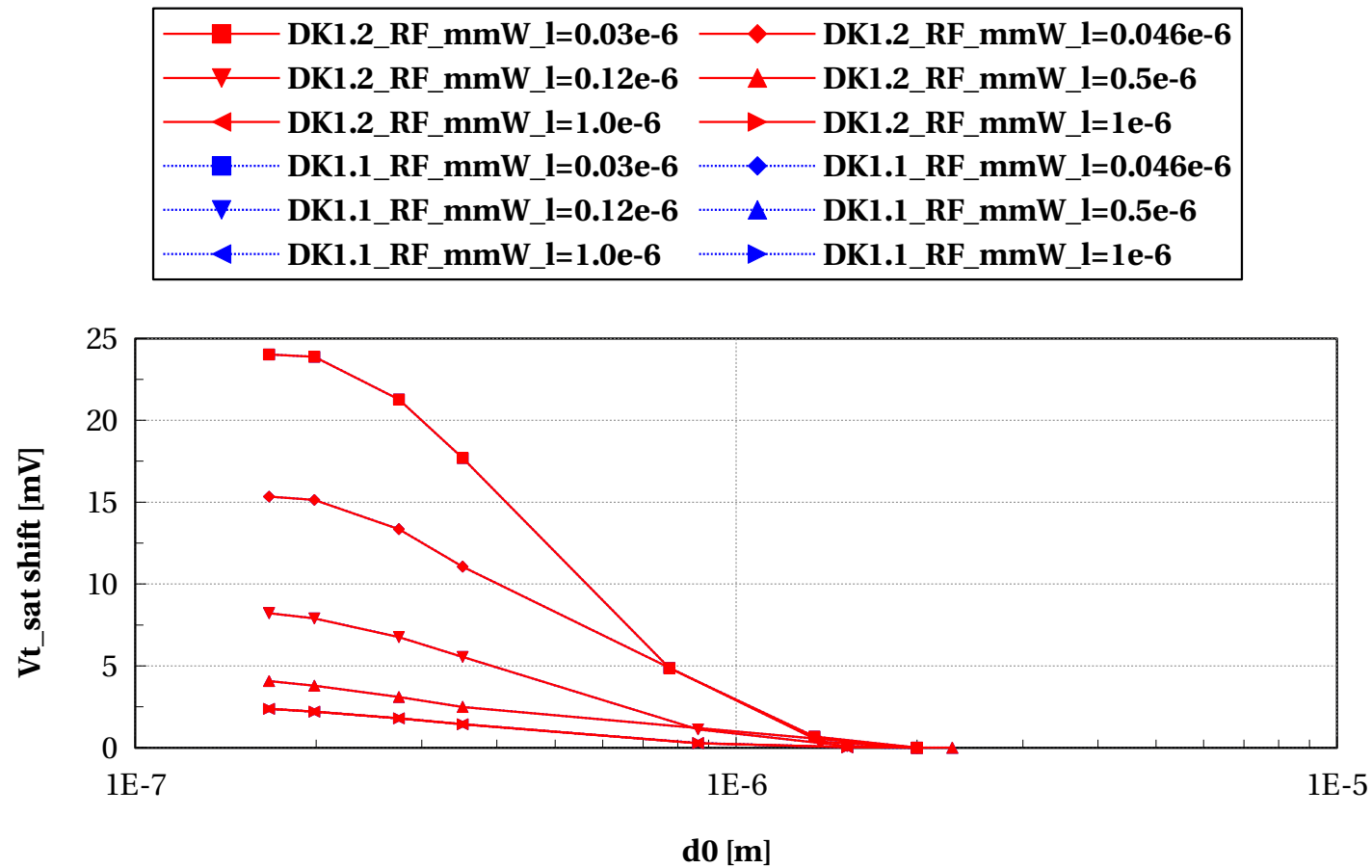
pfet_acc, Ilin deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and W==1e-6



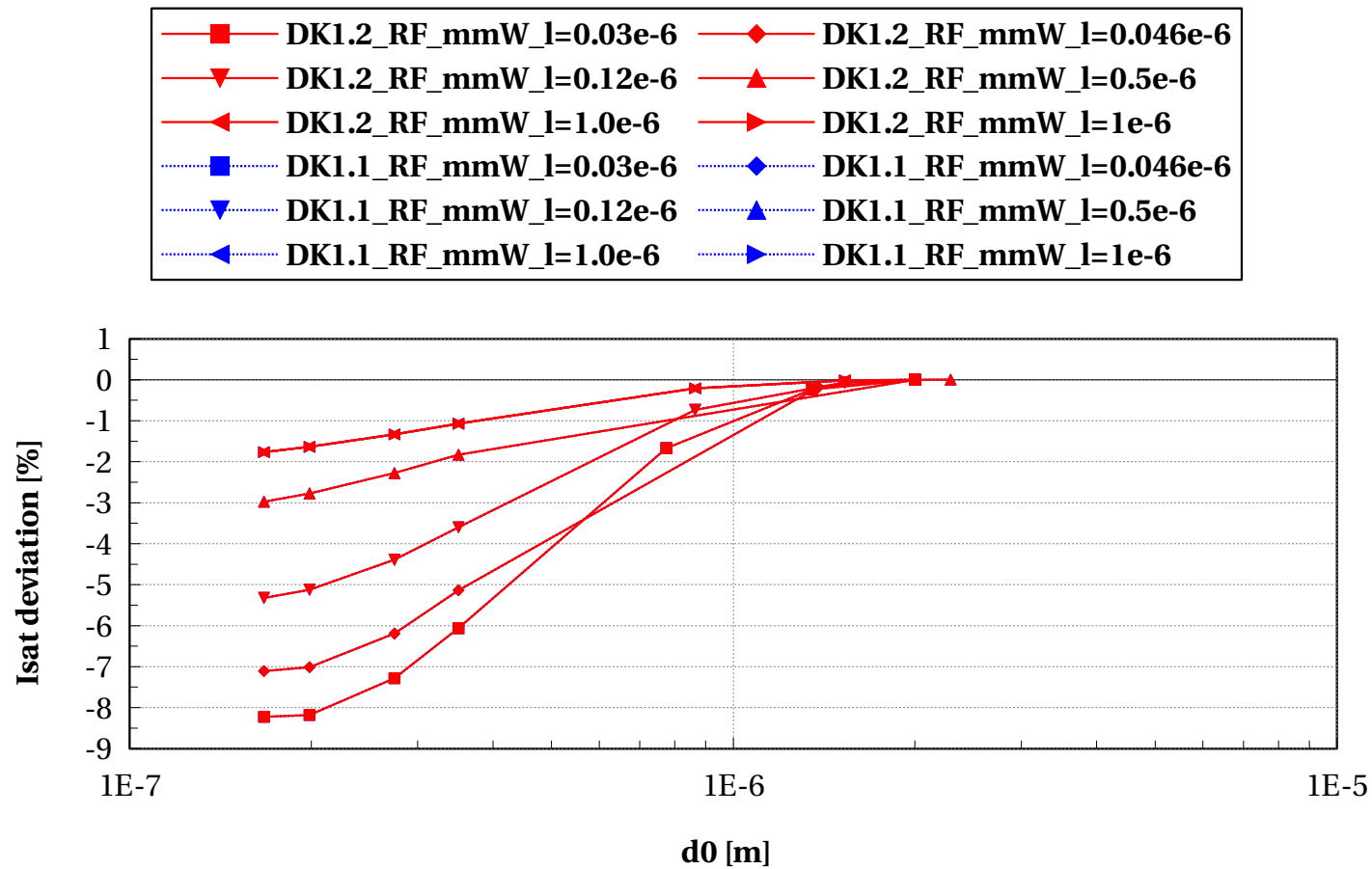
pfet_acc, Vt_sat shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and W==1e-6



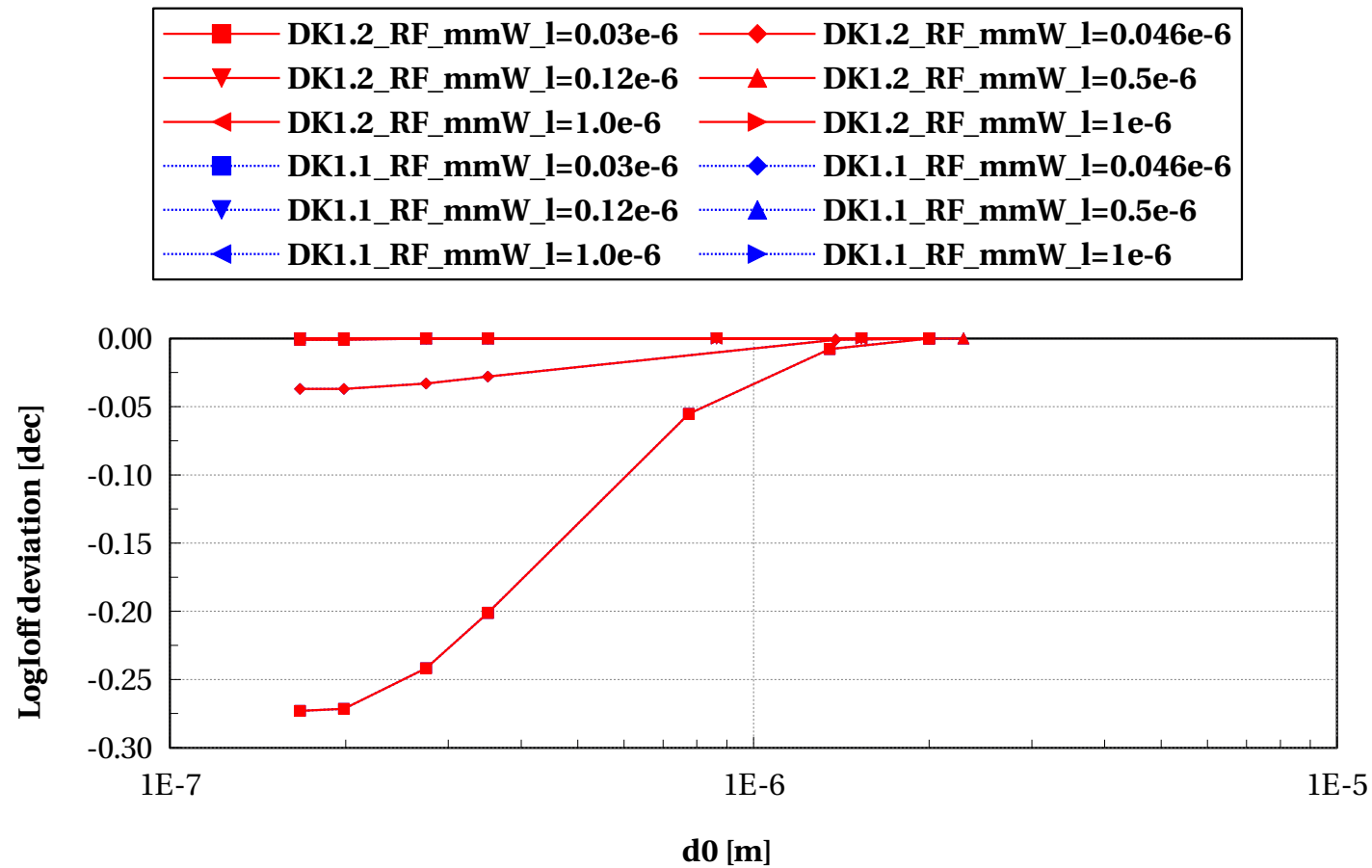
pfet_acc, Isat deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and W==1e-6



pfet_acc, Logloff deviation [dec] vs d0 [m]

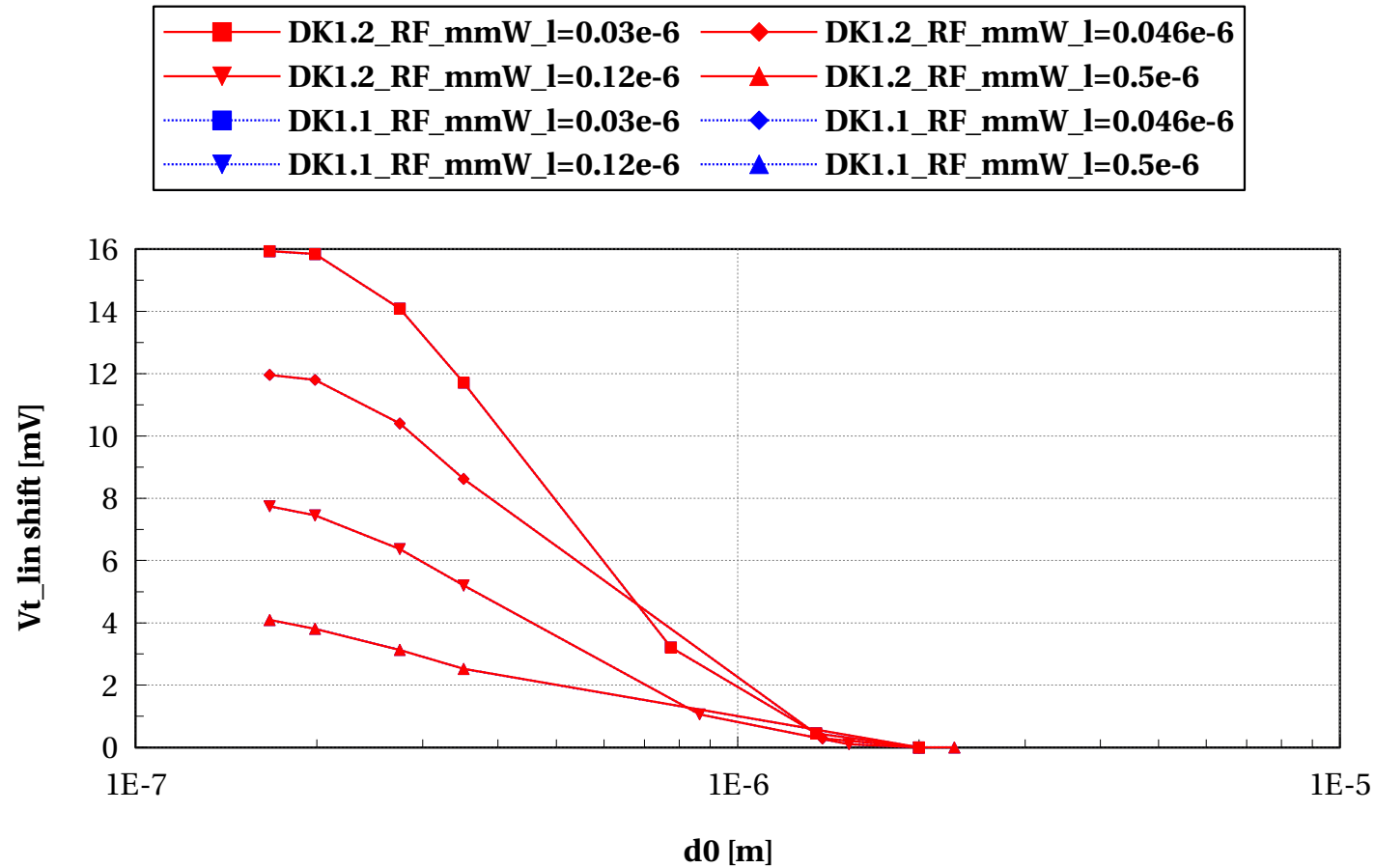
temp==25 and d1==10e-6 and W==1e-6



- WPE effect w.r.t d0 - Lscaling at $W=0.34u$

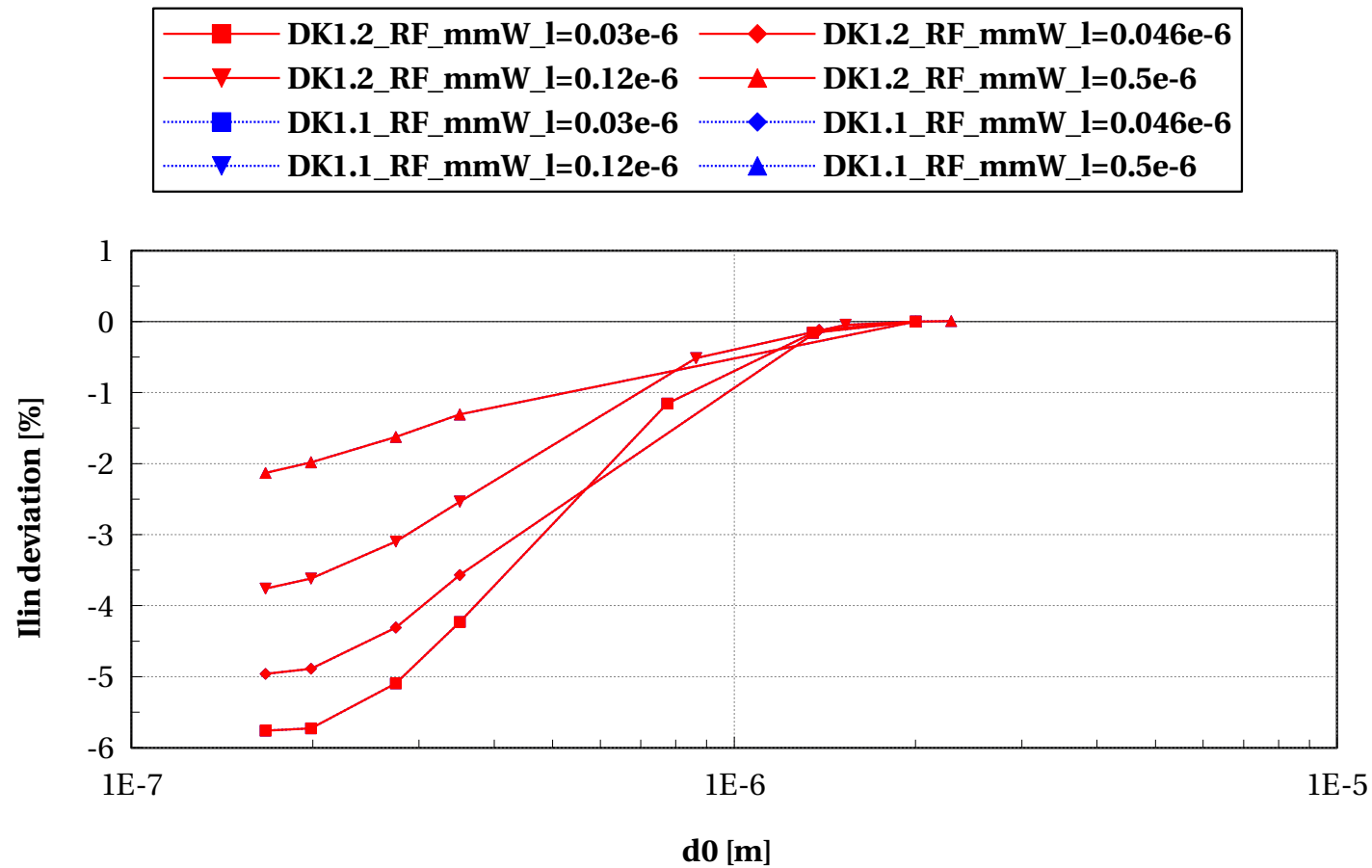
pfet_acc, Vt_lin shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and W==0.34e-6



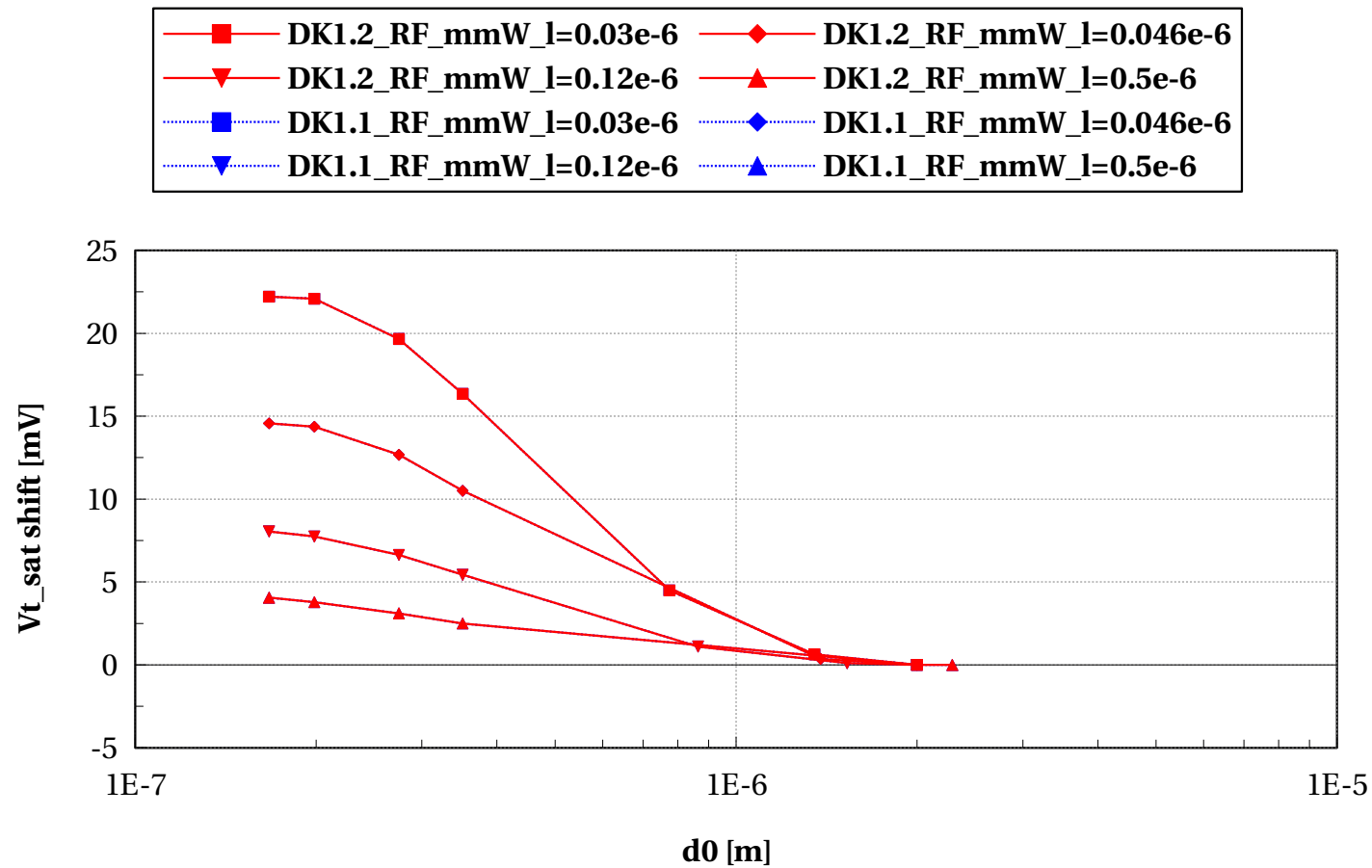
pfet_acc, Ilin deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and W==0.34e-6



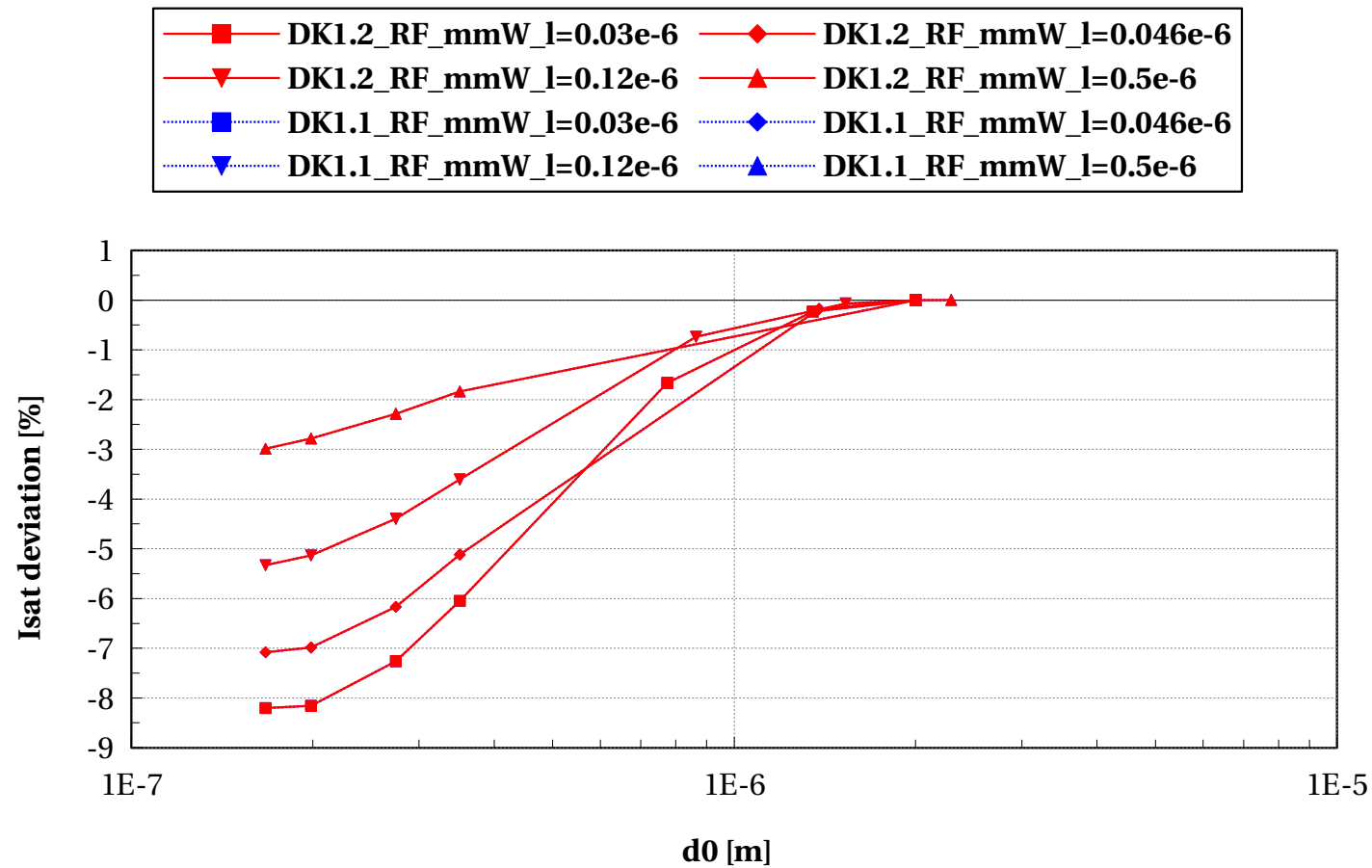
pfet_acc, Vt_sat shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and W==0.34e-6



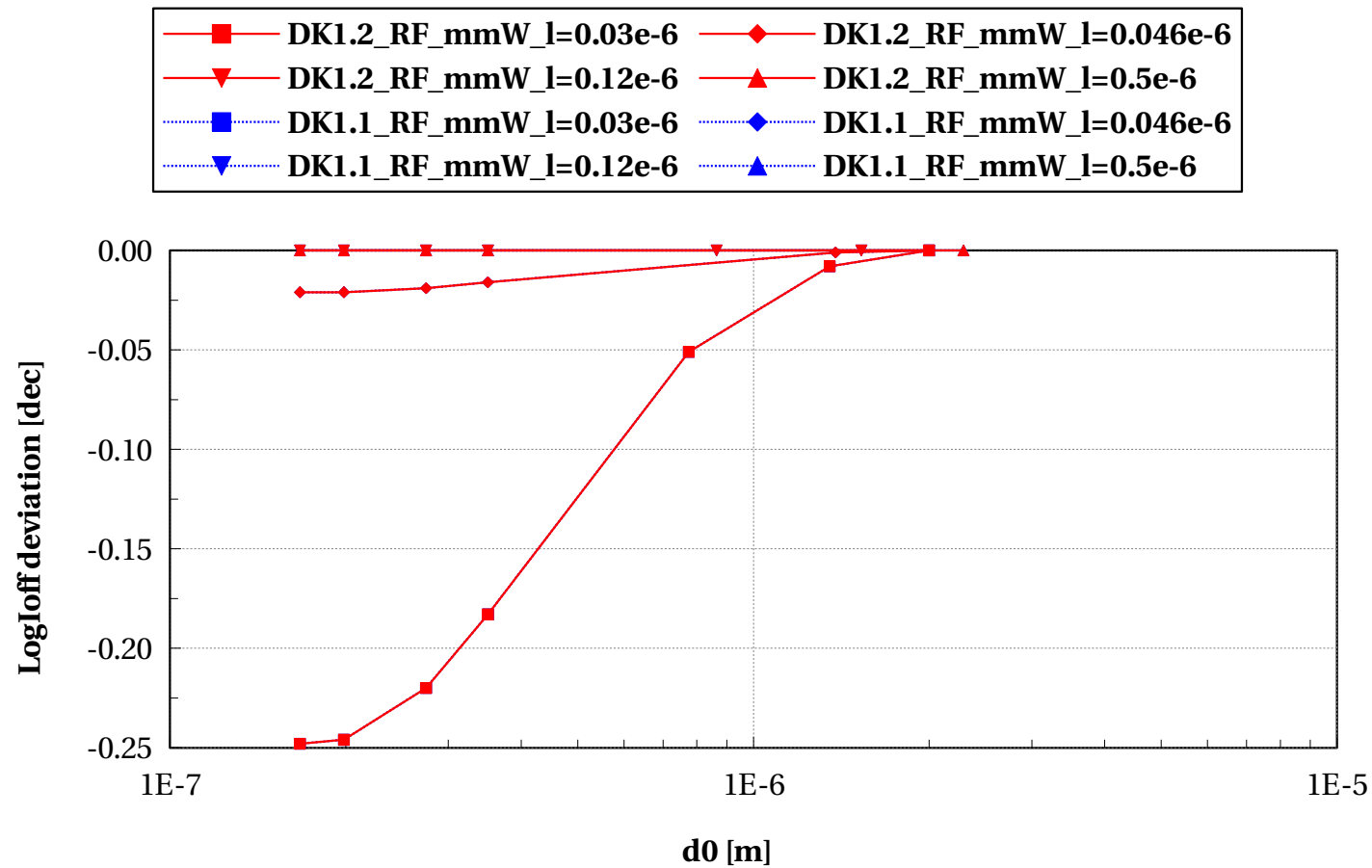
pfet_acc, Isat deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and W==0.34e-6



pfet_acc, Logloff deviation [dec] vs d0 [m]

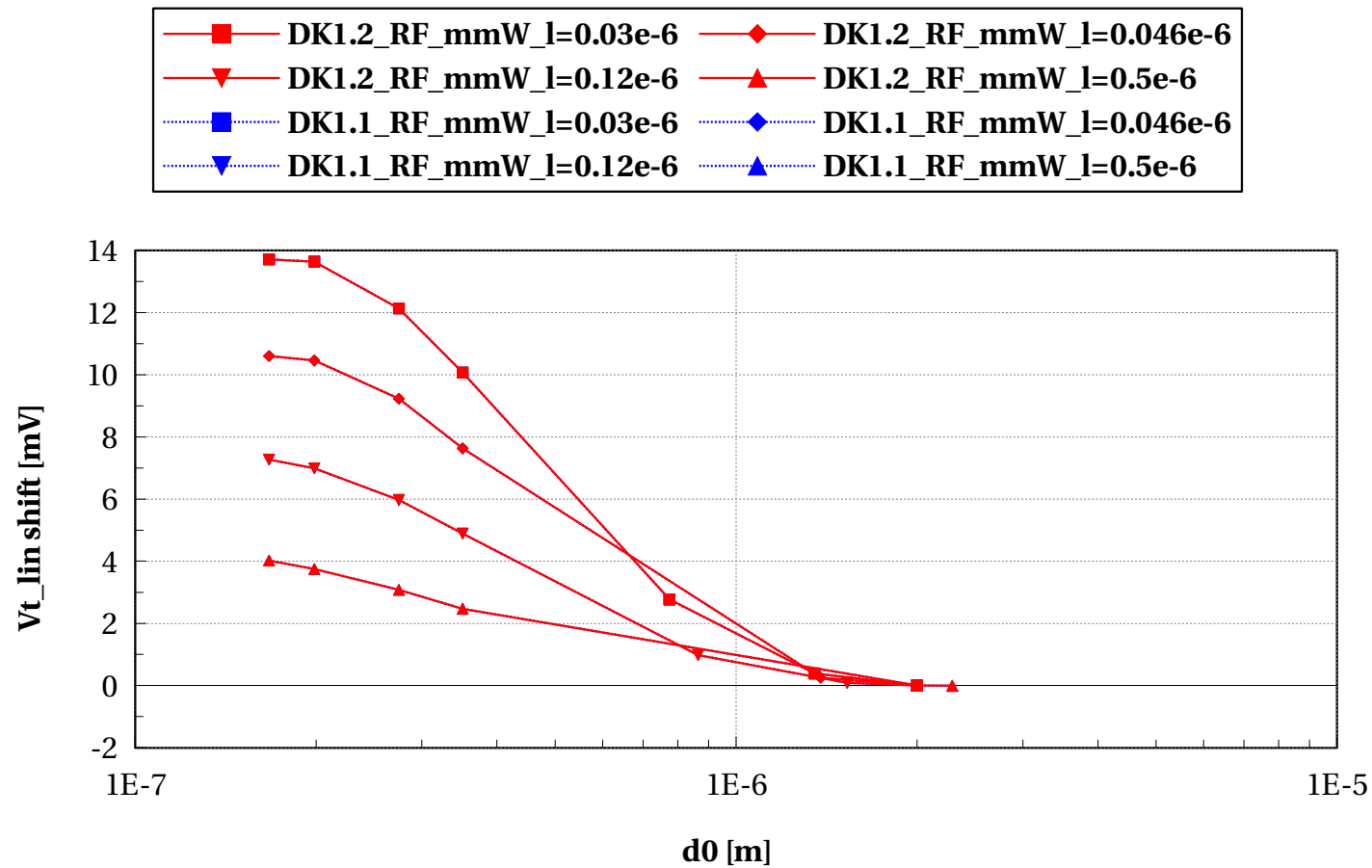
temp==25 and d1==10e-6 and W==0.34e-6



- WPE effect w.r.t d0 - Lscaling at $W=0.1\mu$

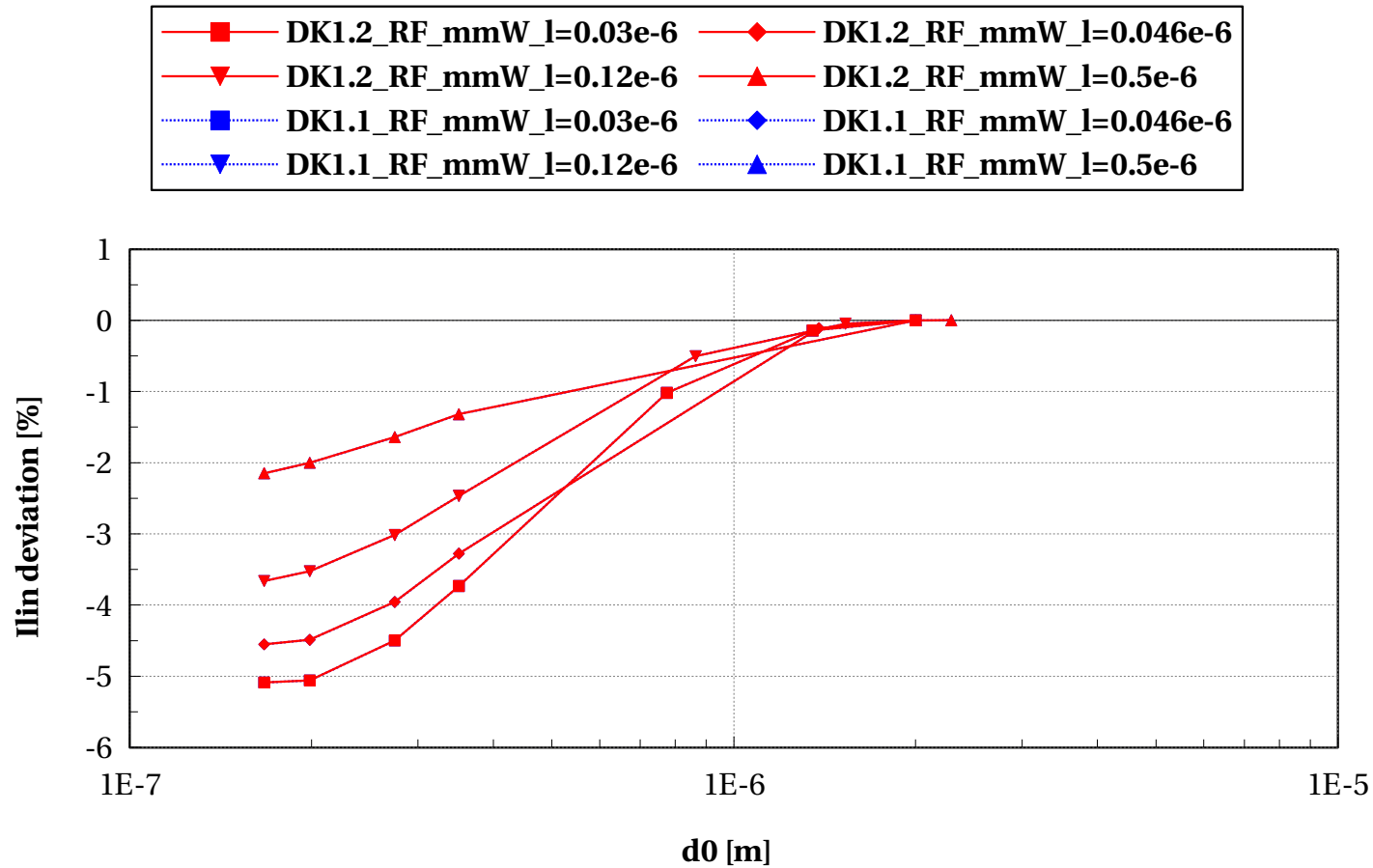
pfet_acc, Vt_lin shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and W==0.1e-6



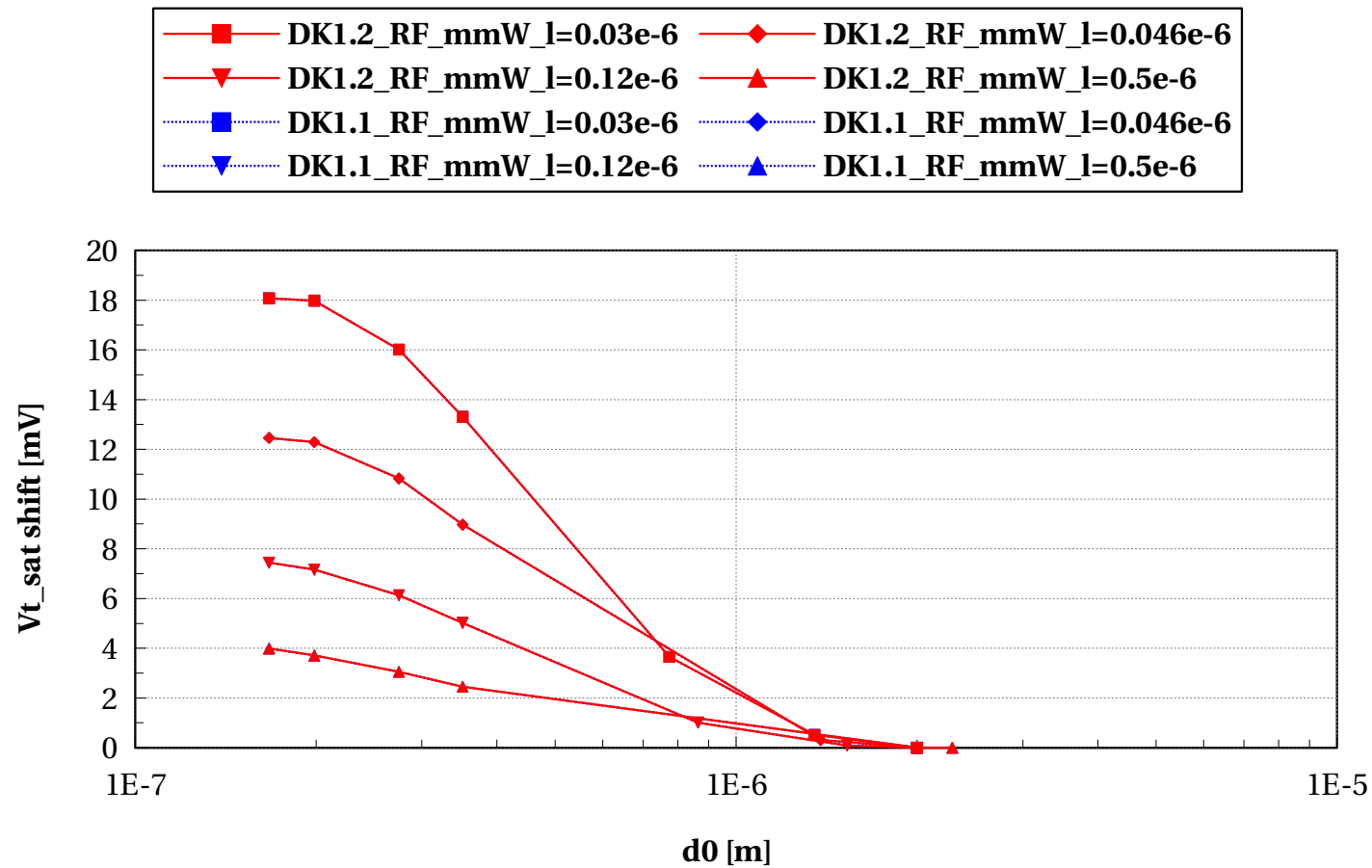
pfet_acc, Ilin deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and W==0.1e-6



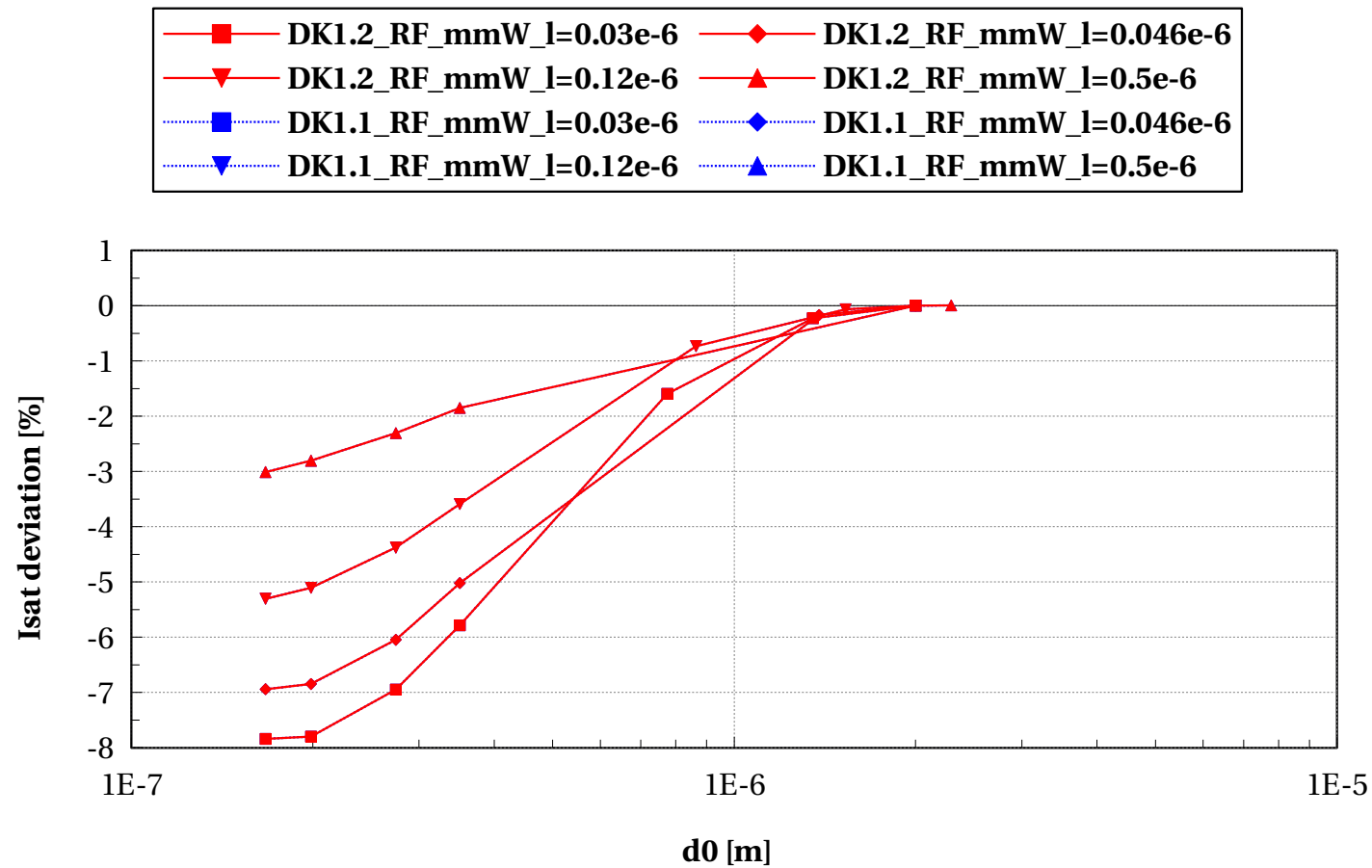
pfet_acc, Vt_sat shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and W==0.1e-6



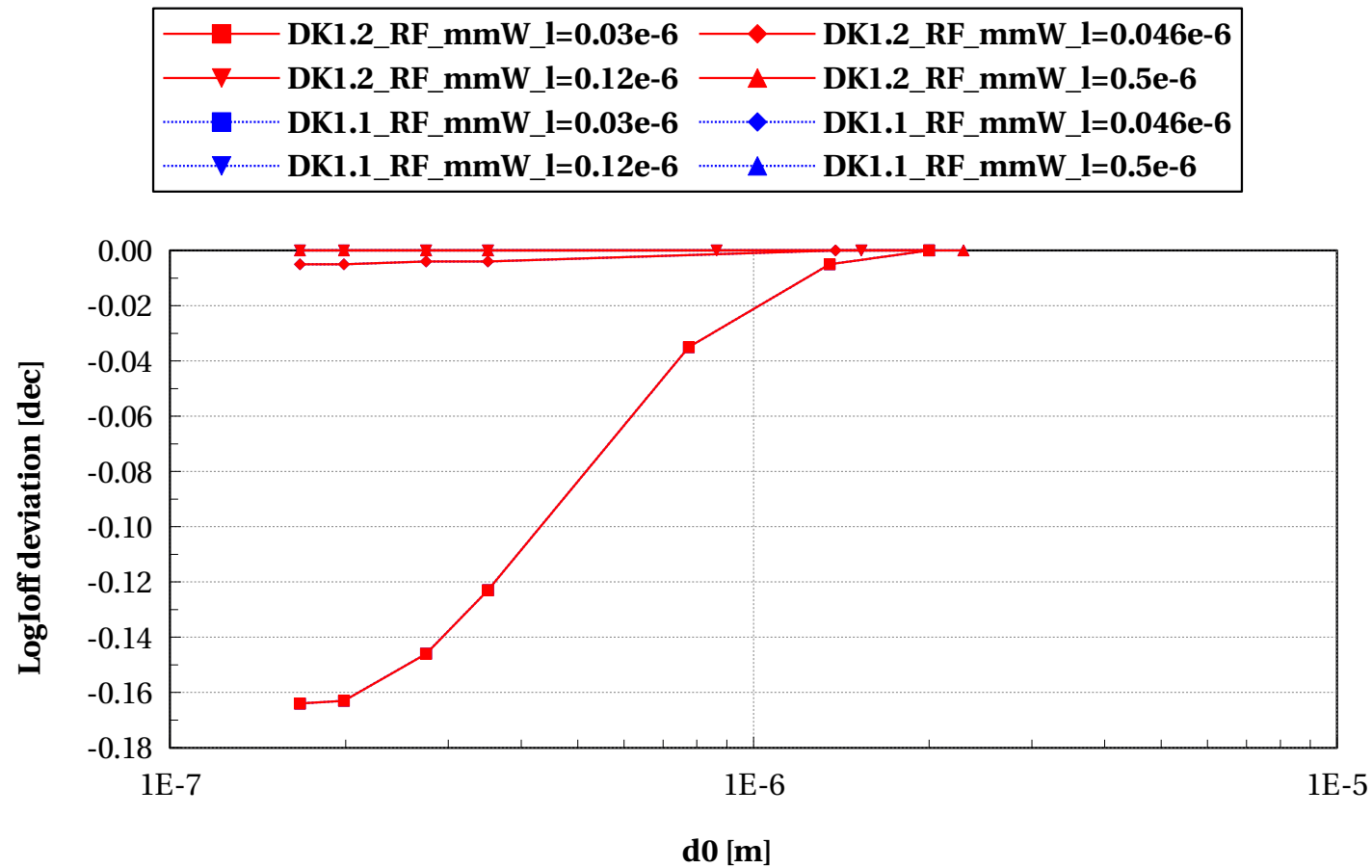
pfet_acc, Isat deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and W==0.1e-6



pfet_acc, Logloff deviation [dec] vs d0 [m]

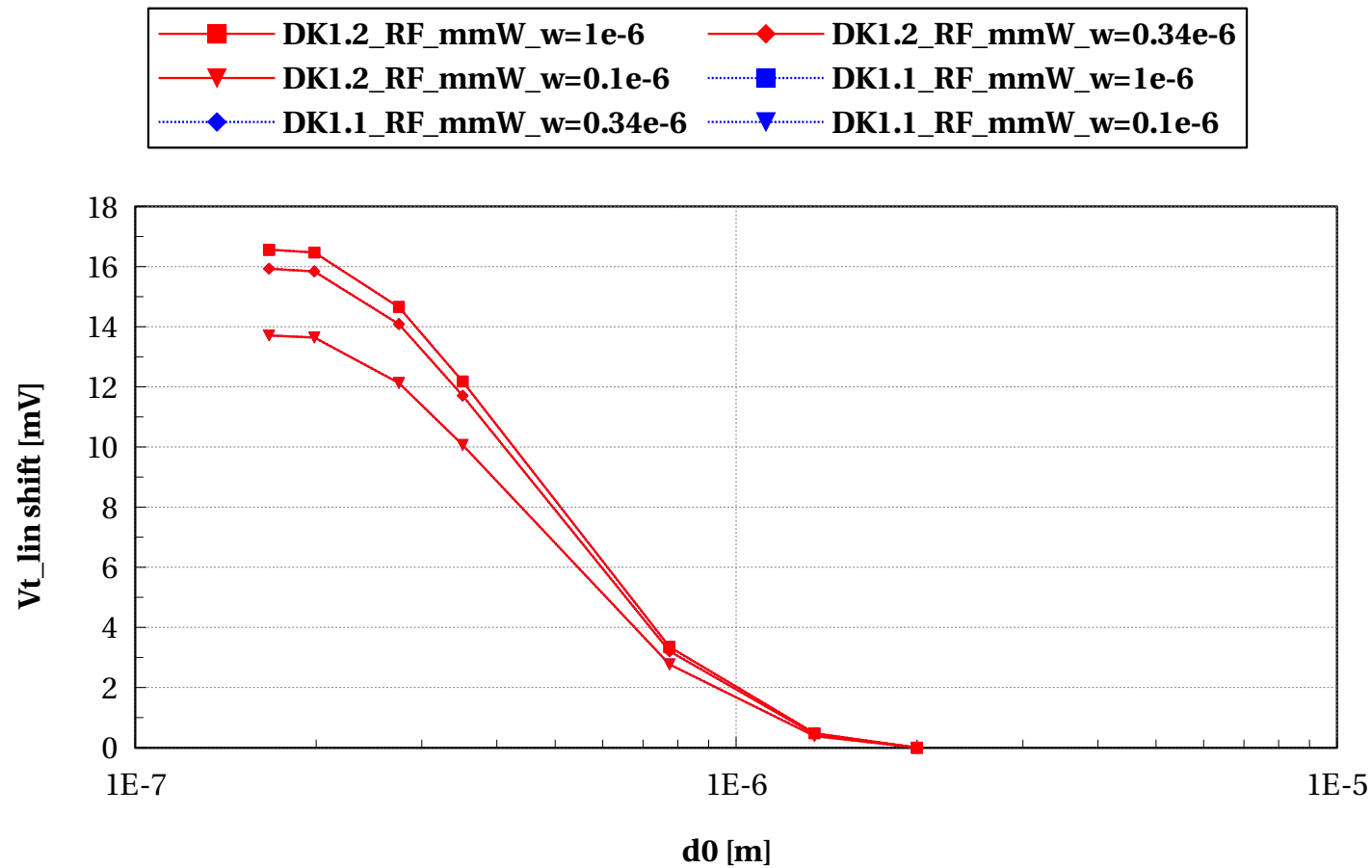
temp==25 and d1==10e-6 and W==0.1e-6



- WPE effect w.r.t d0 - Wscaling at $L=0.03u$

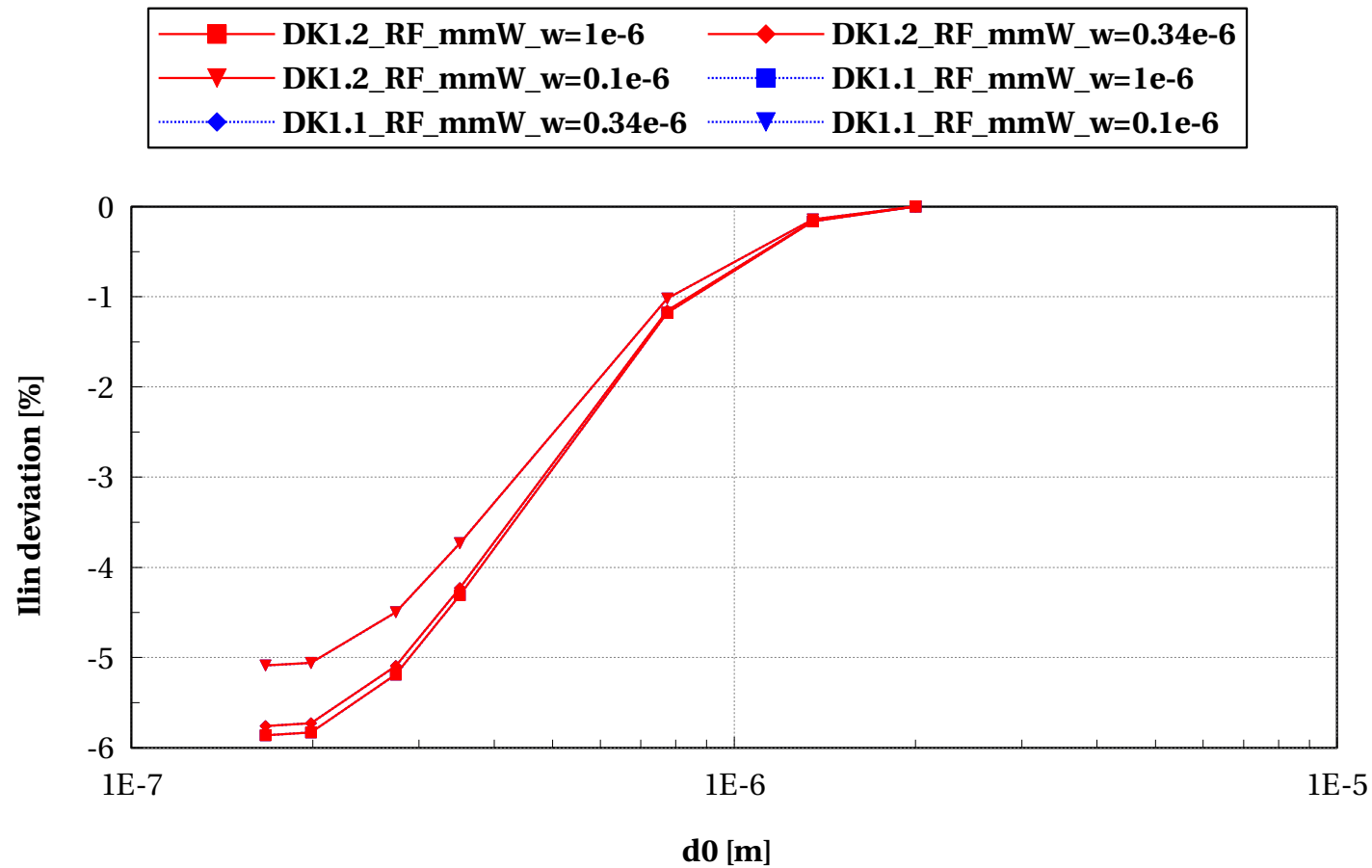
pfet_acc, Vt_lin shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and L==0.03e-6



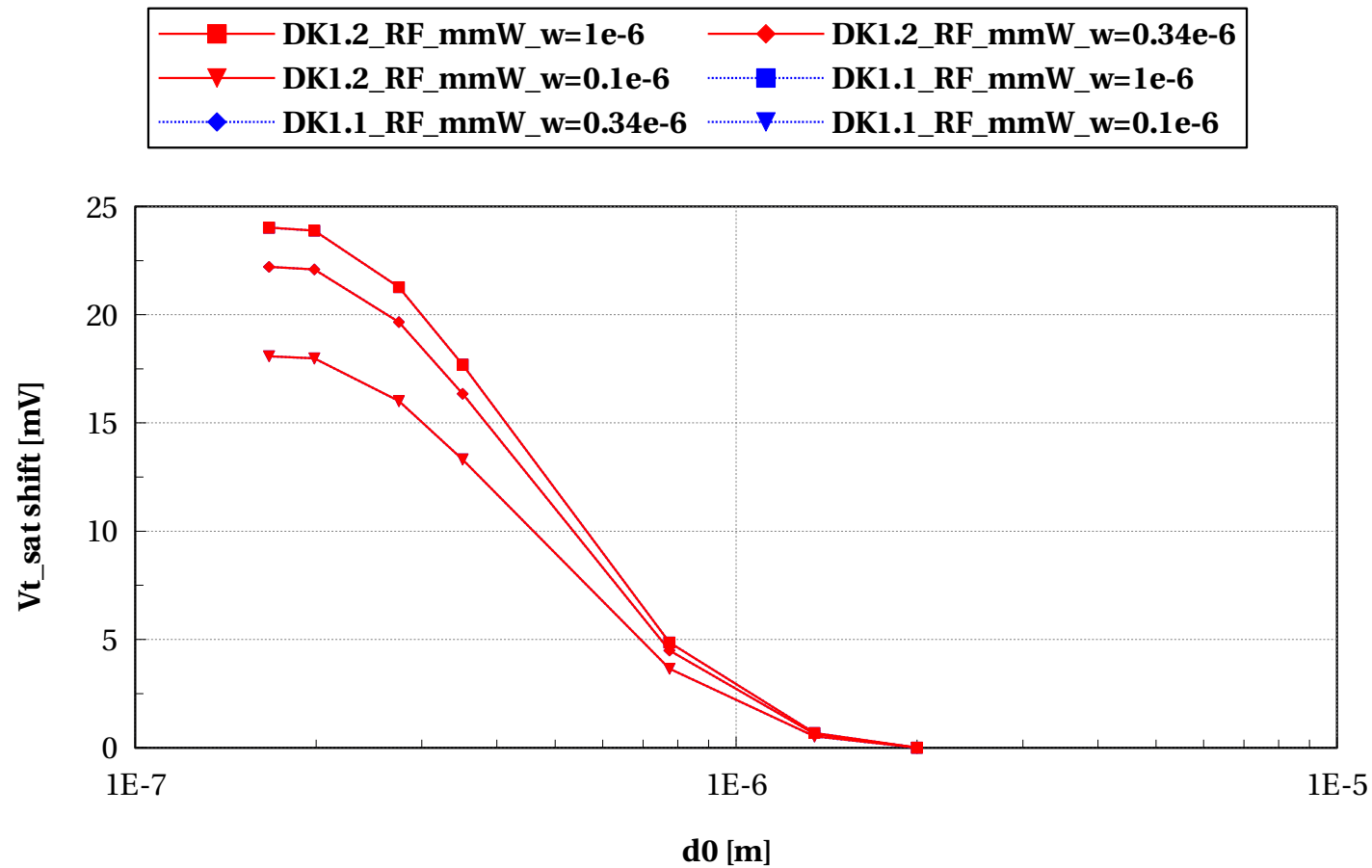
pfet_acc, Ilin deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and L==0.03e-6



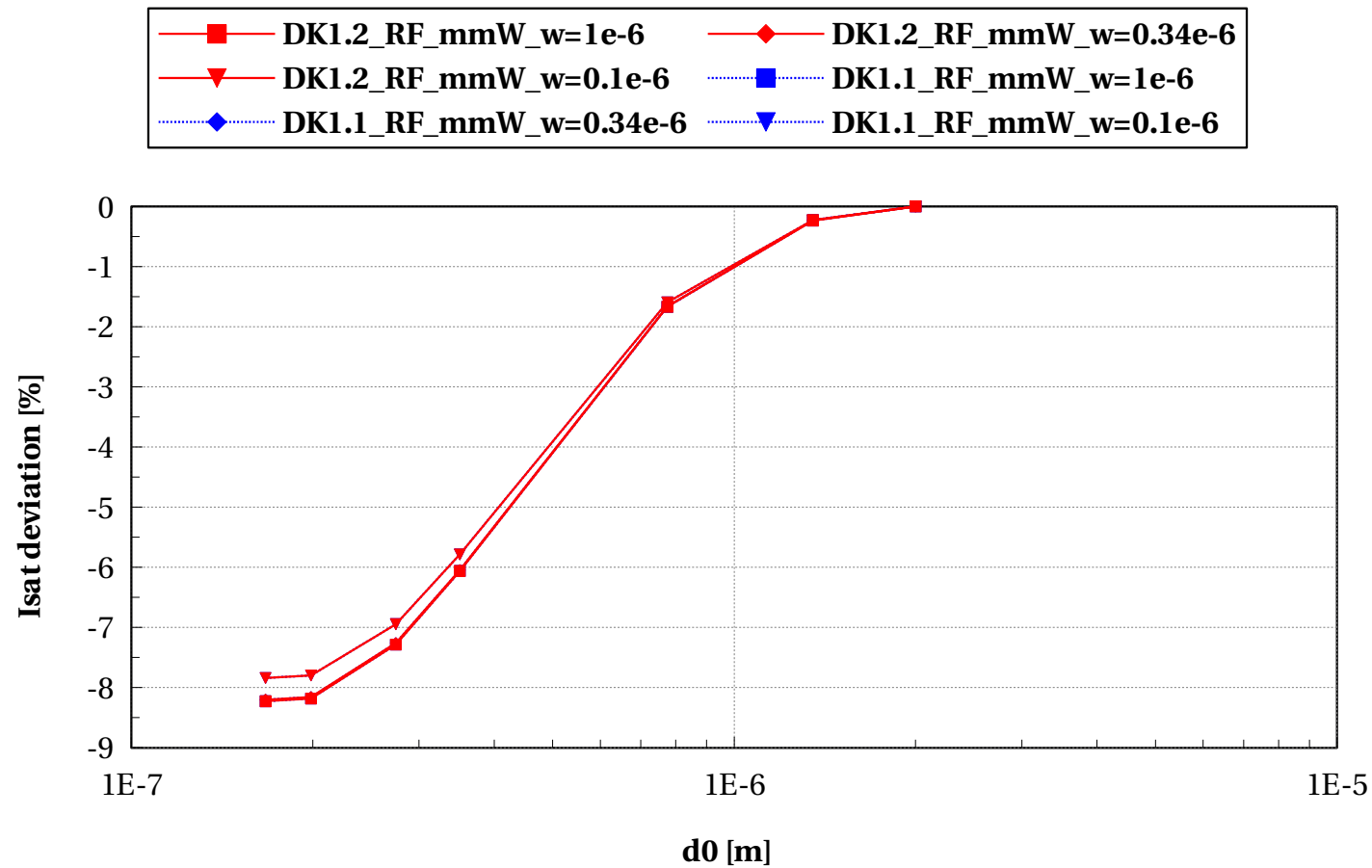
pfet_acc, Vt_sat shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and L==0.03e-6



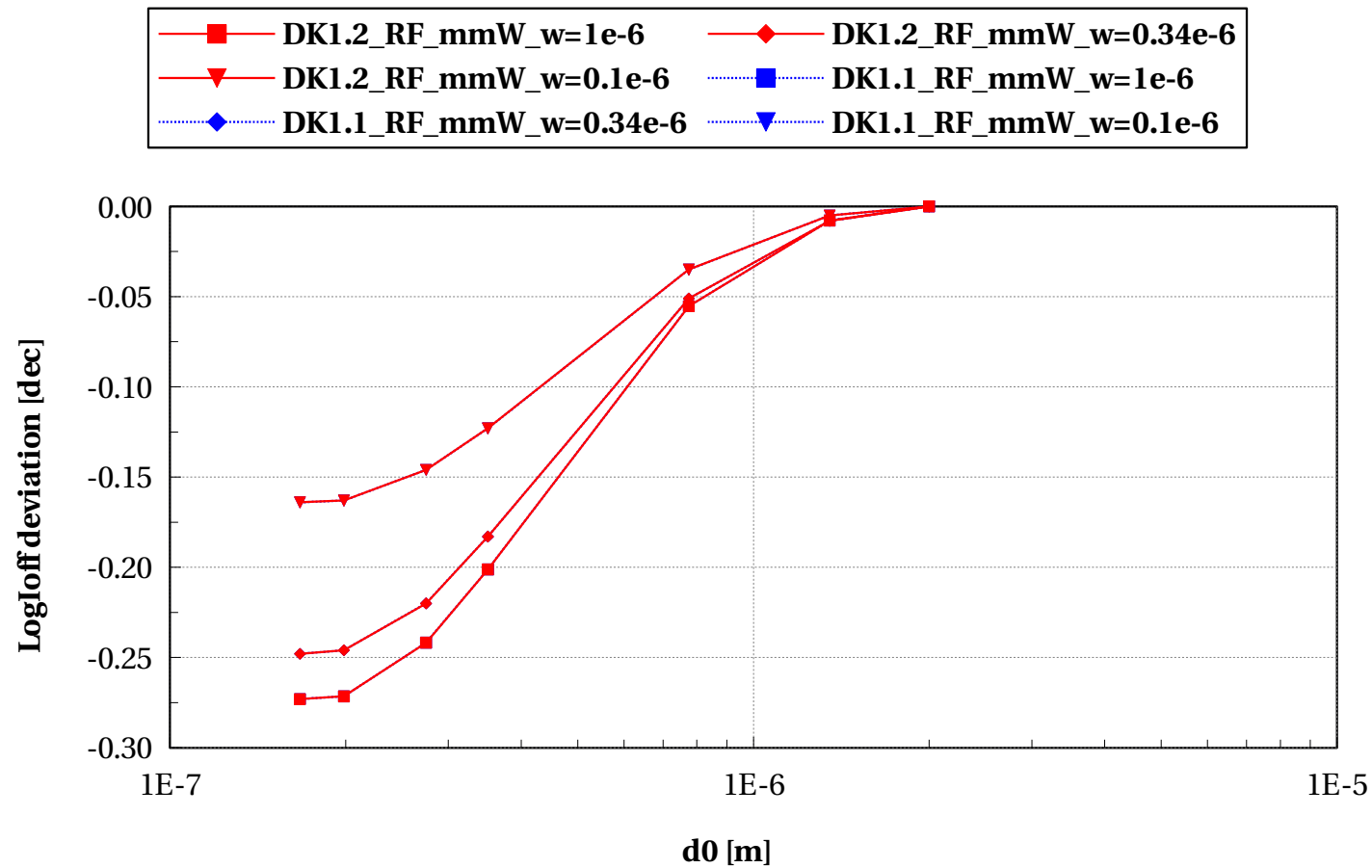
pfet_acc, Isat deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and L==0.03e-6



pfet_acc, Logloff deviation [dec] vs d0 [m]

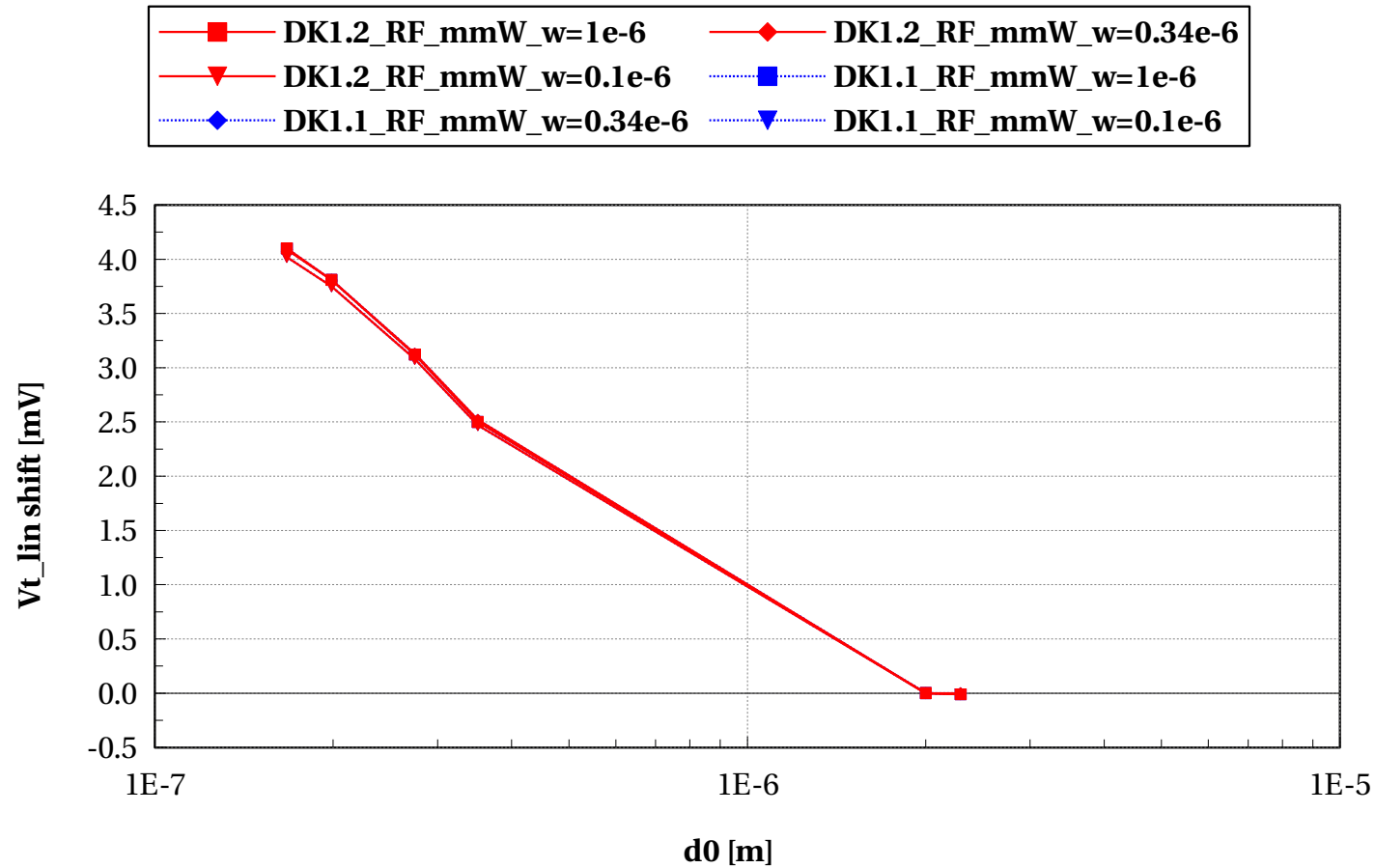
temp==25 and d1==10e-6 and L==0.03e-6



- WPE effect w.r.t d0 - Wscaling at $L=0.5u$

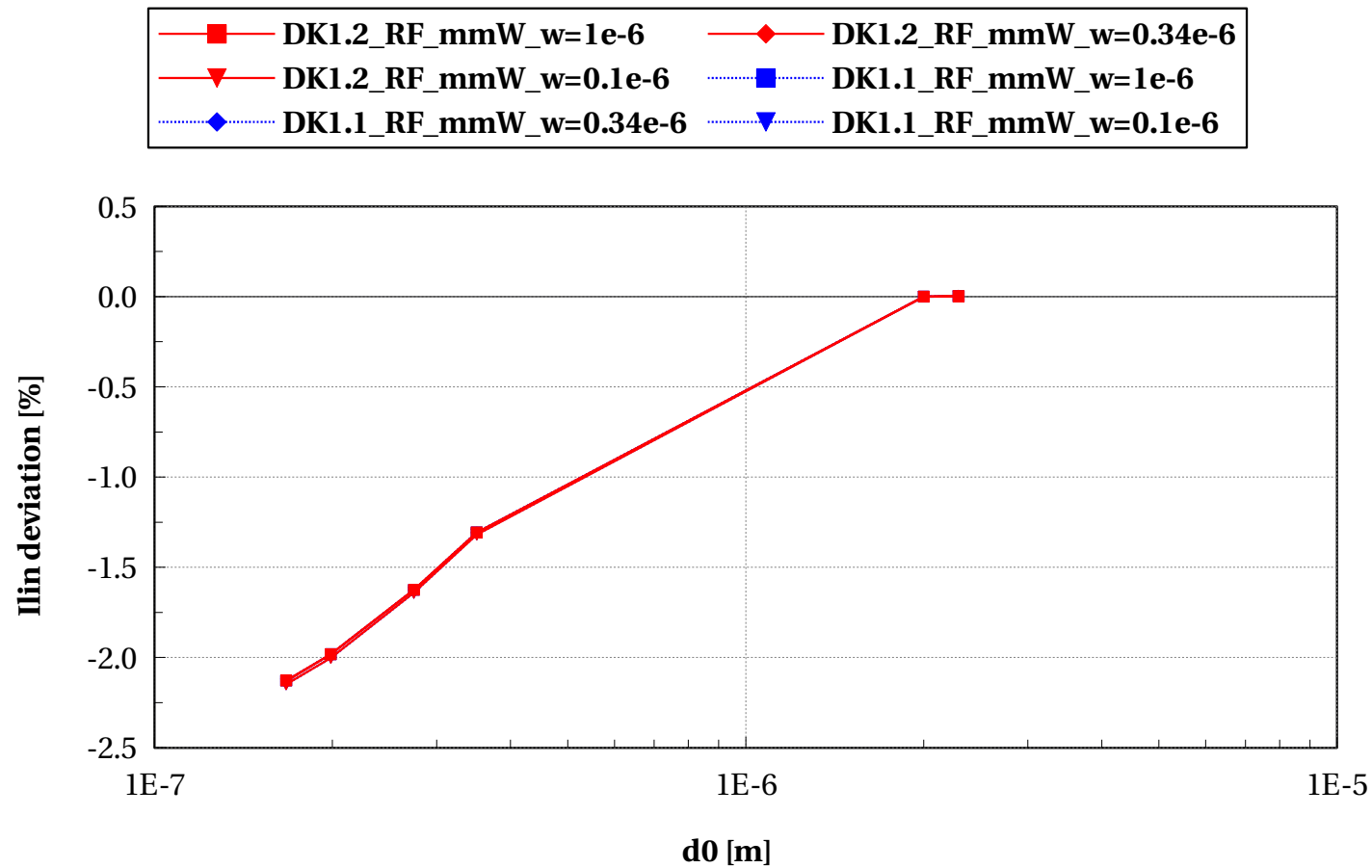
pfet_acc, Vt_lin shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and L==0.5e-6



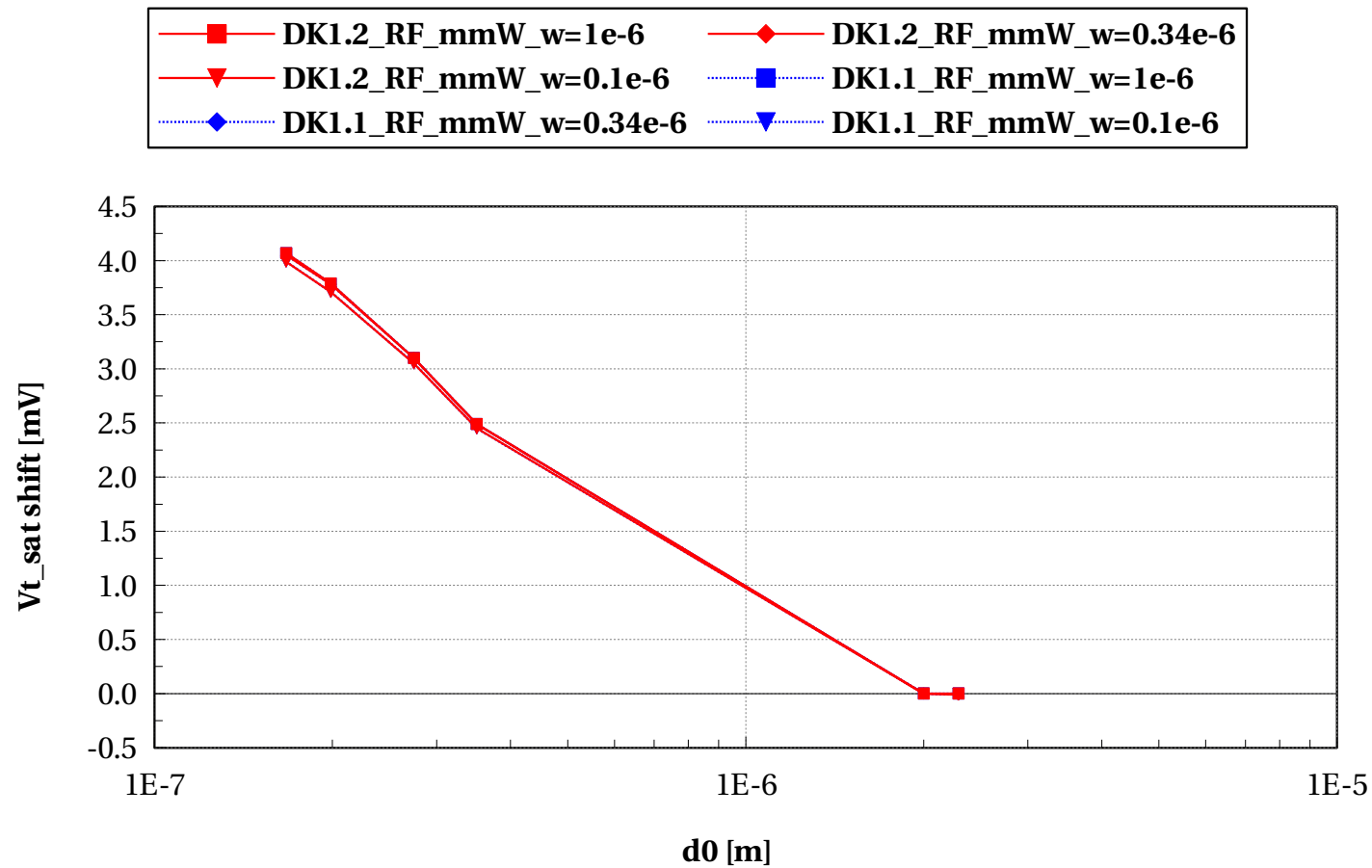
pfet_acc, Ilin deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and L==0.5e-6



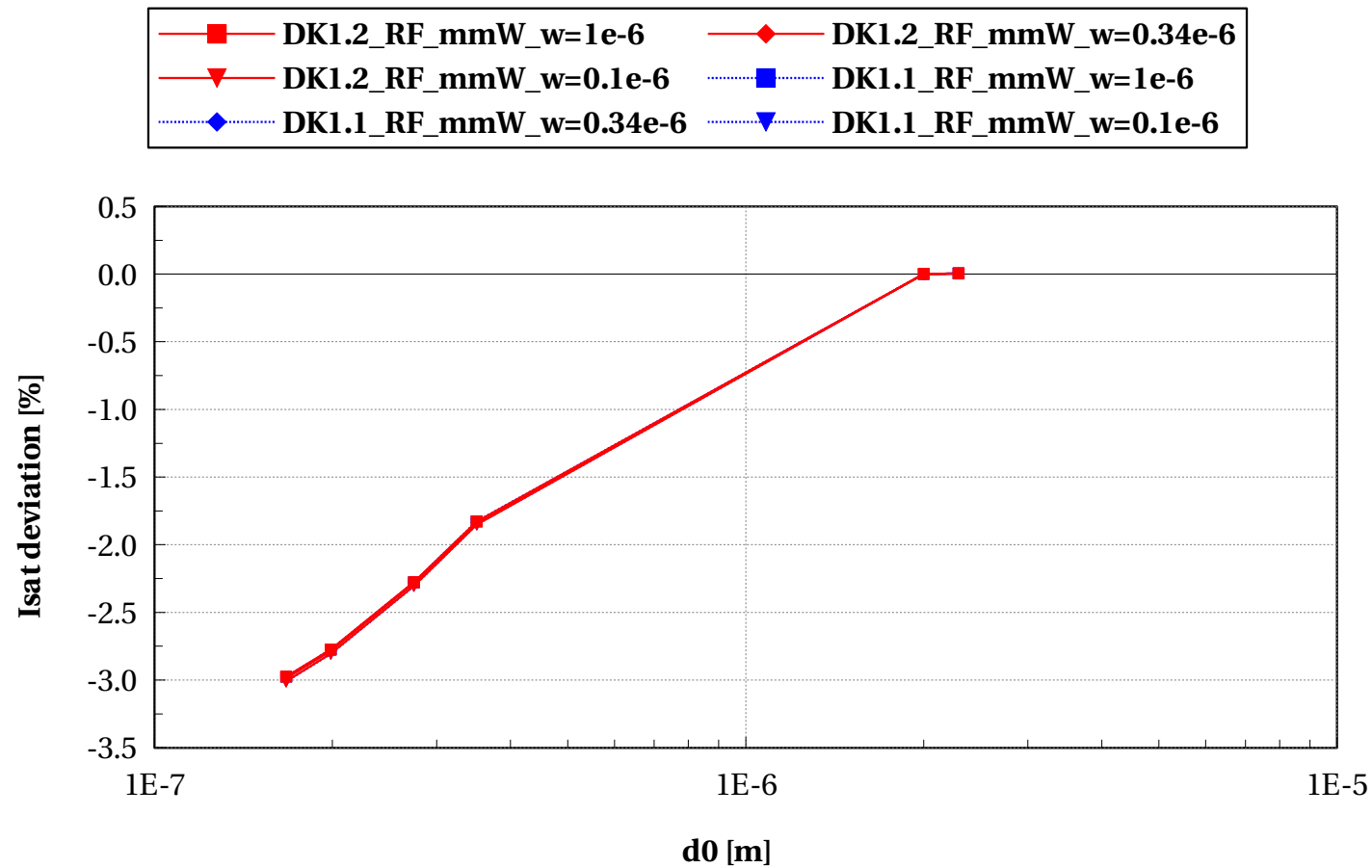
pfet_acc, Vt_sat shift [mV] vs d0 [m]

temp==25 and d1==10e-6 and L==0.5e-6



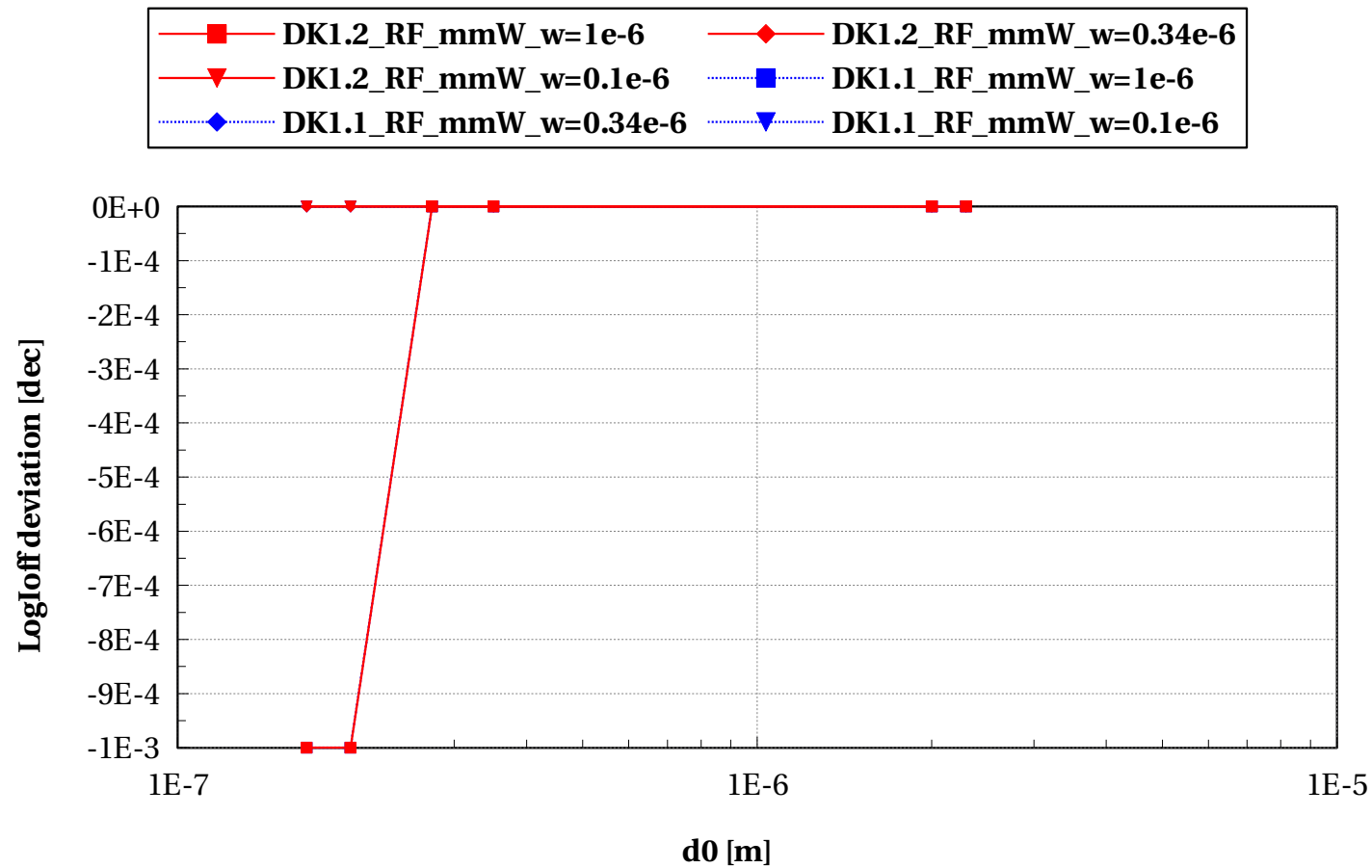
pfet_acc, Isat deviation [%] vs d0 [m]

temp==25 and d1==10e-6 and L==0.5e-6



pfet_acc, Logloff deviation [dec] vs d0 [m]

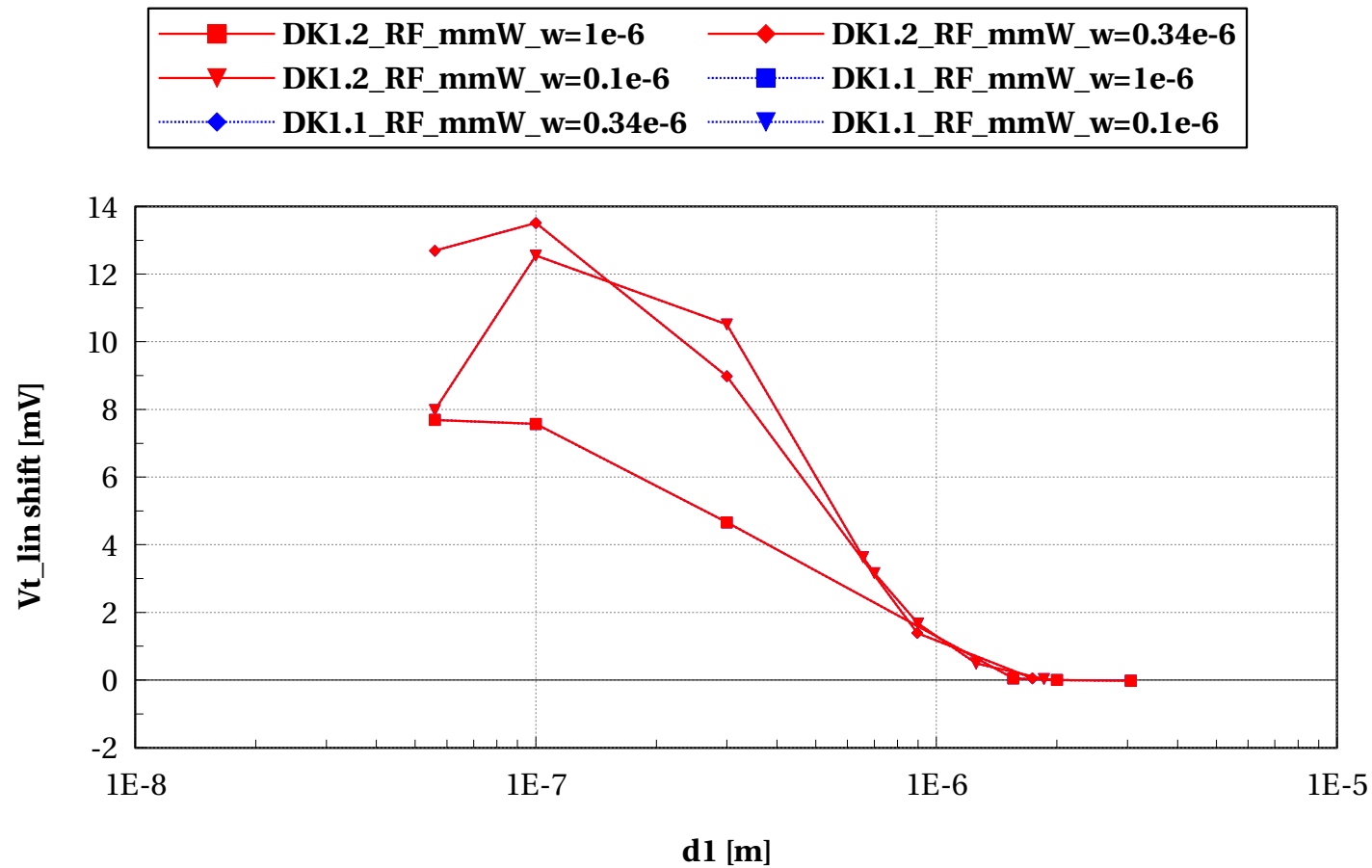
temp==25 and d1==10e-6 and L==0.5e-6



- WPE effect w.r.t d1 - Wscaling at $L=0.03u$

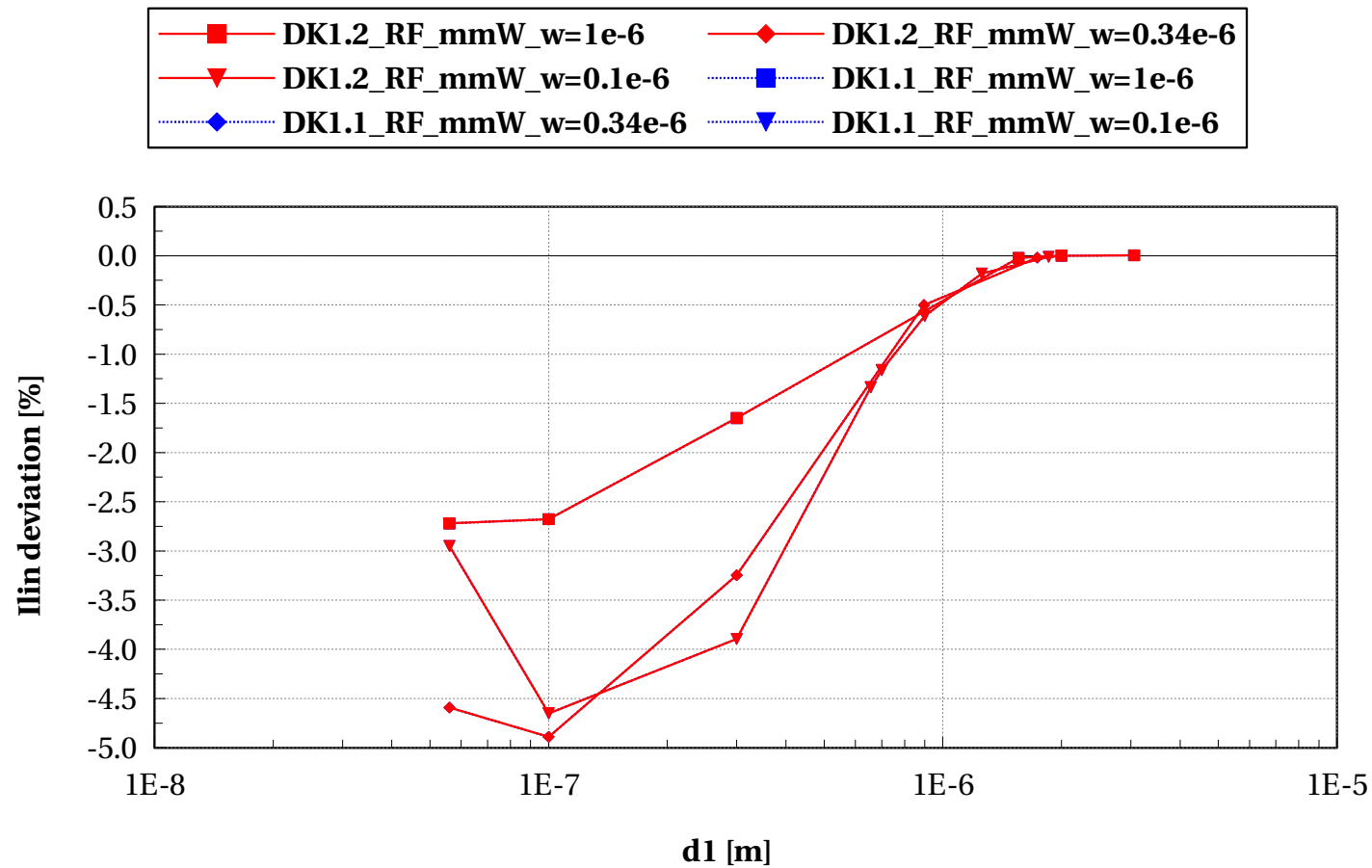
pfet_acc, Vt_lin shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and L==0.03e-6



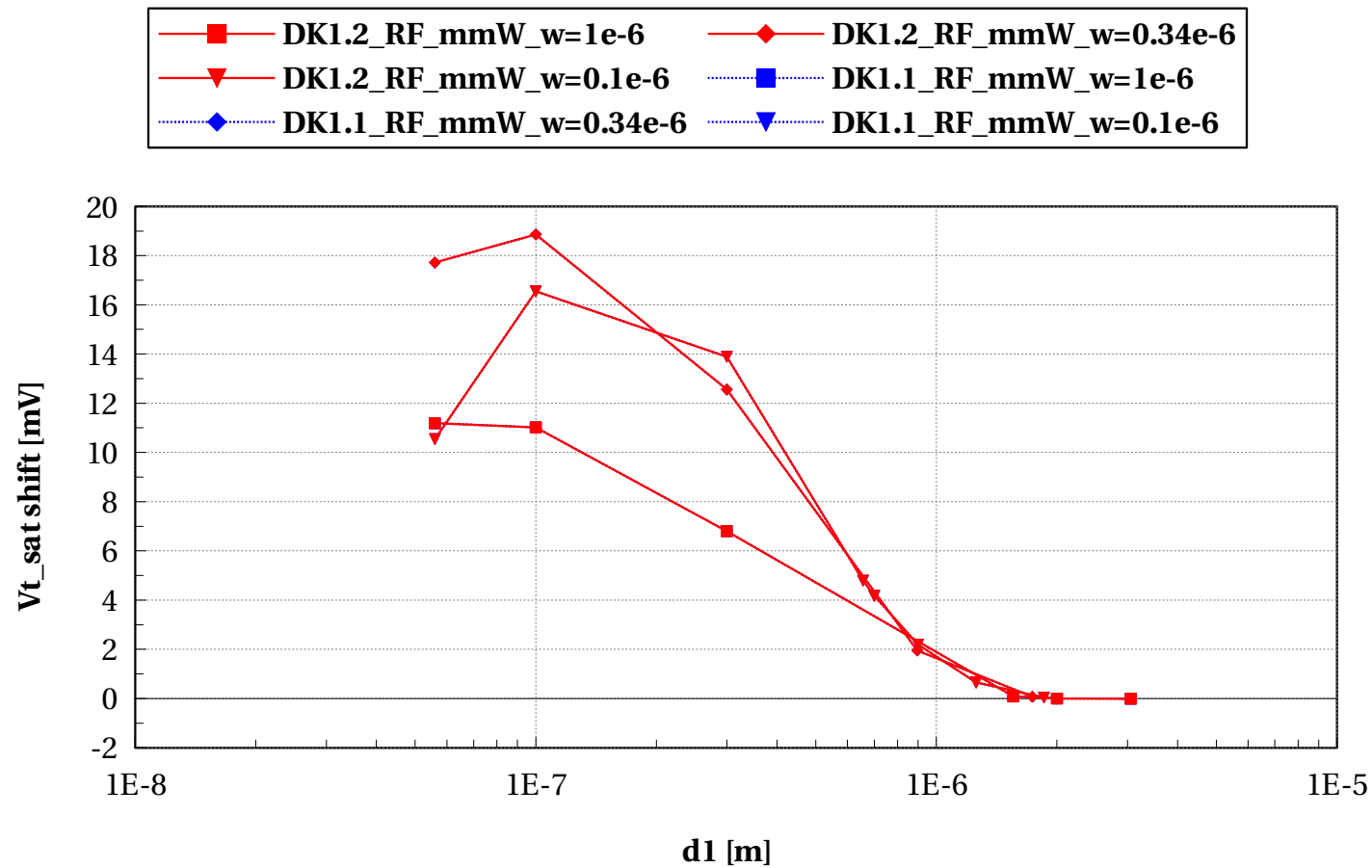
pfet_acc, Ilin deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and L==0.03e-6



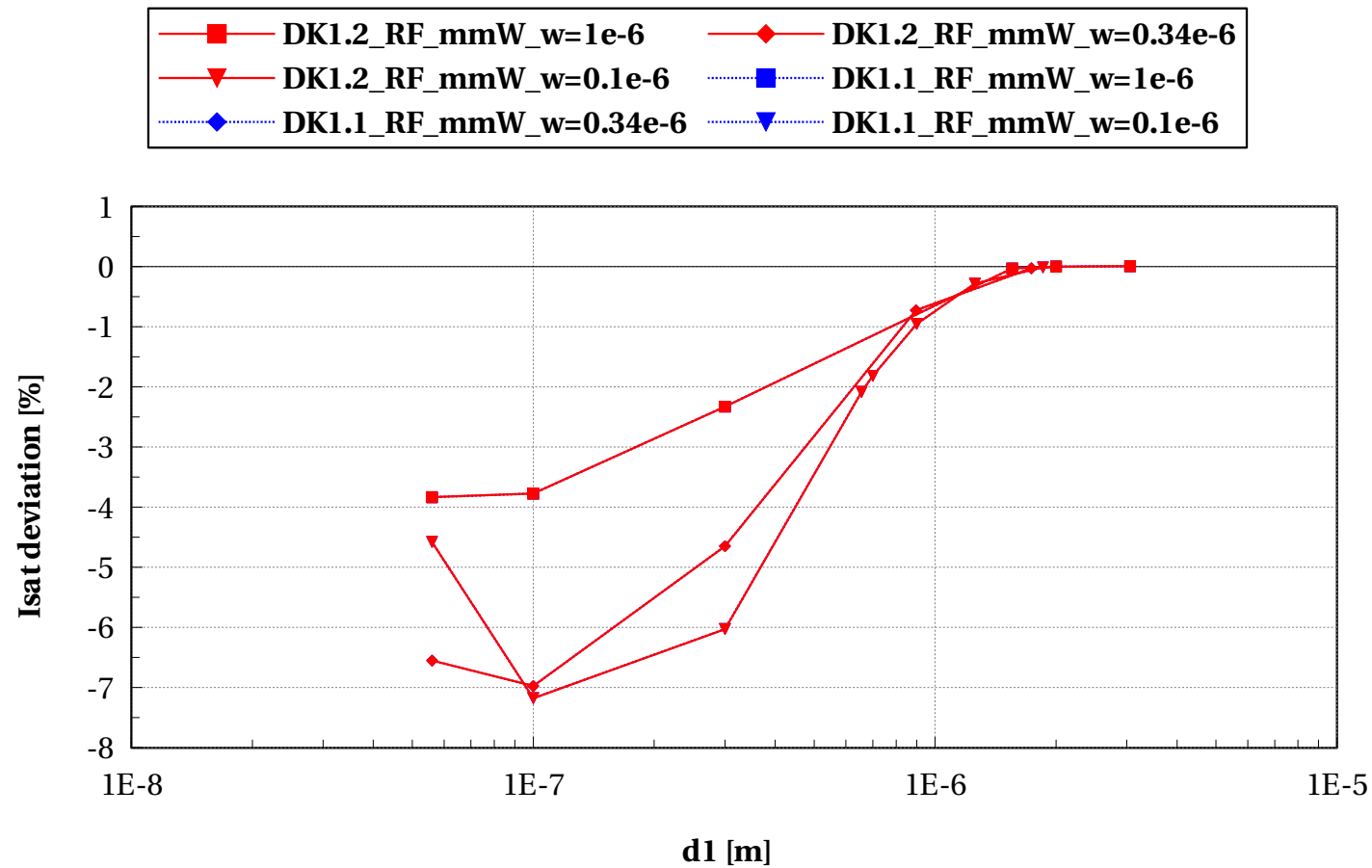
pfet_acc, Vt_sat shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and L==0.03e-6



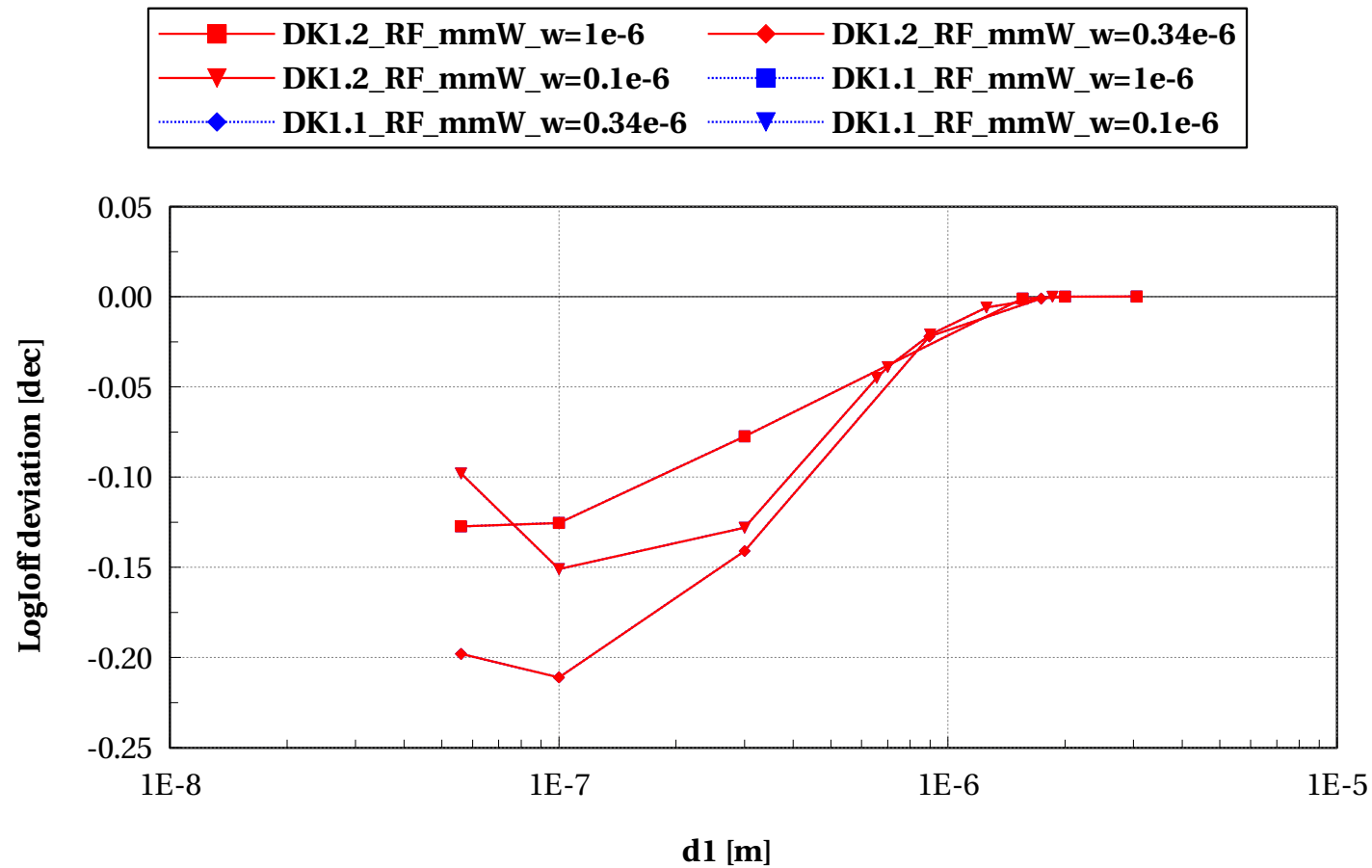
pfet_acc, Isat deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and L==0.03e-6



pfet_acc, Logloff deviation [dec] vs d1 [m]

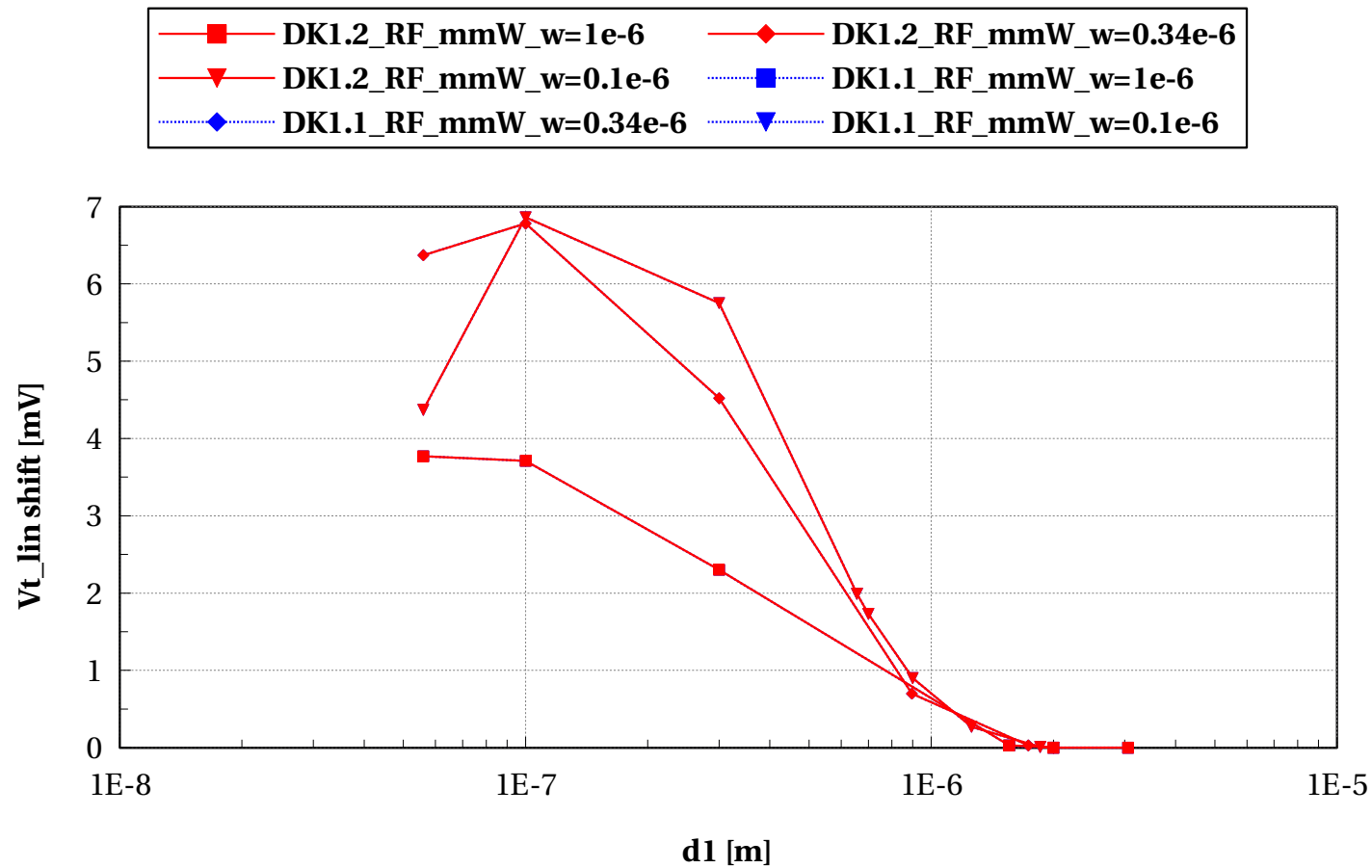
temp==25 and d0==10e-6 and L==0.03e-6



- WPE effect w.r.t d1 - Wscaling at $L=0.12u$

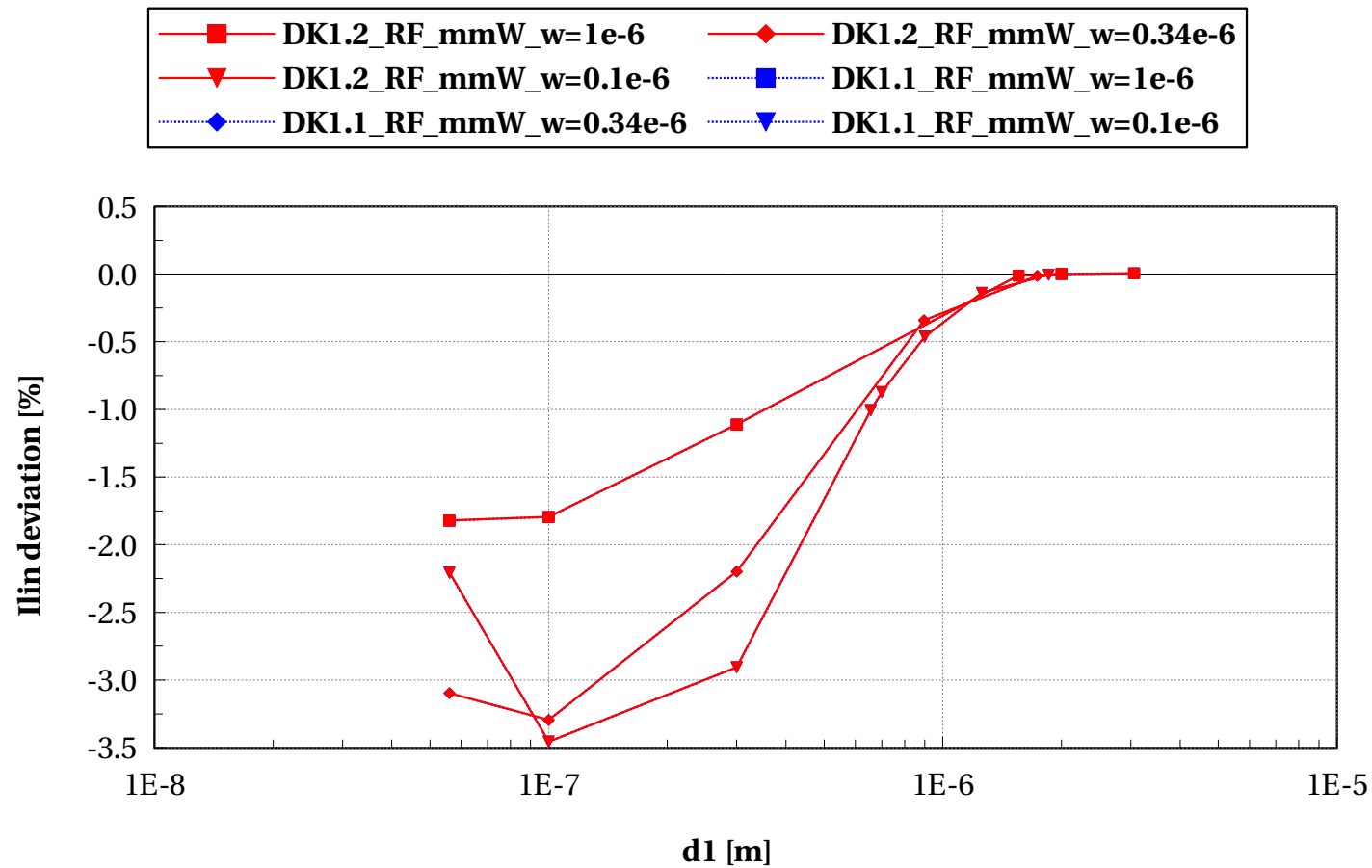
pfet_acc, Vt_lin shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and L==0.12e-6



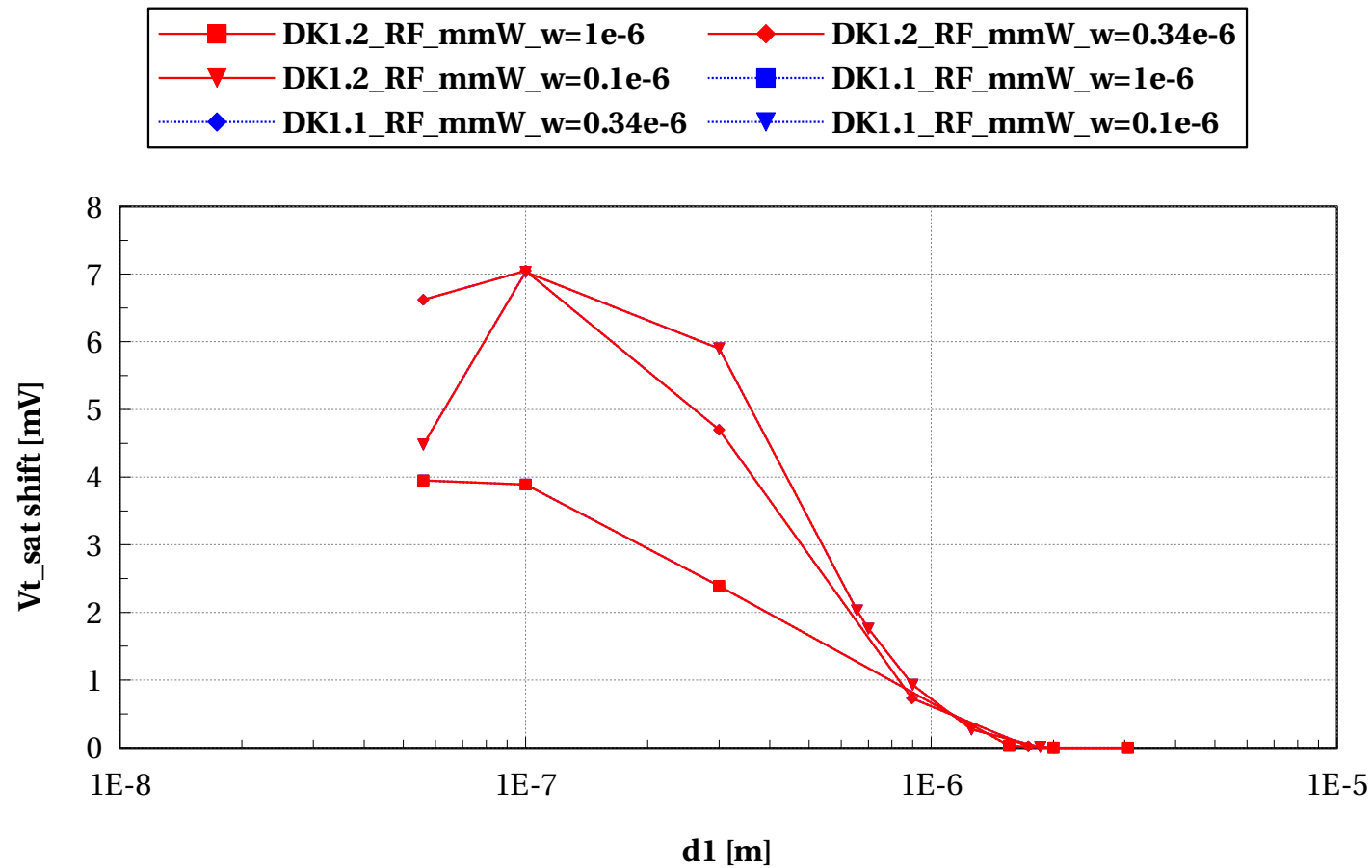
pfet_acc, Ilin deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and L==0.12e-6



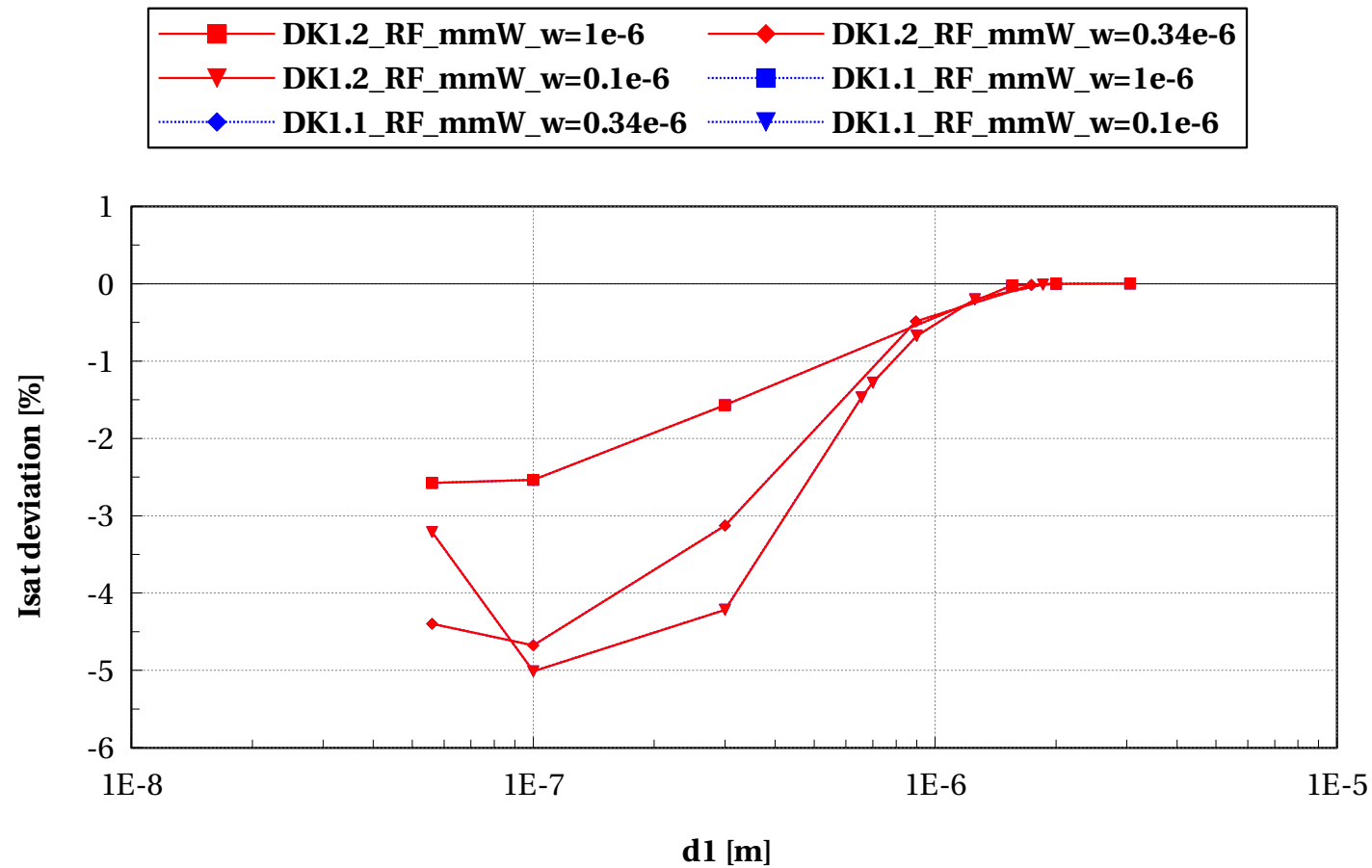
pfet_acc, Vt_sat shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and L==0.12e-6



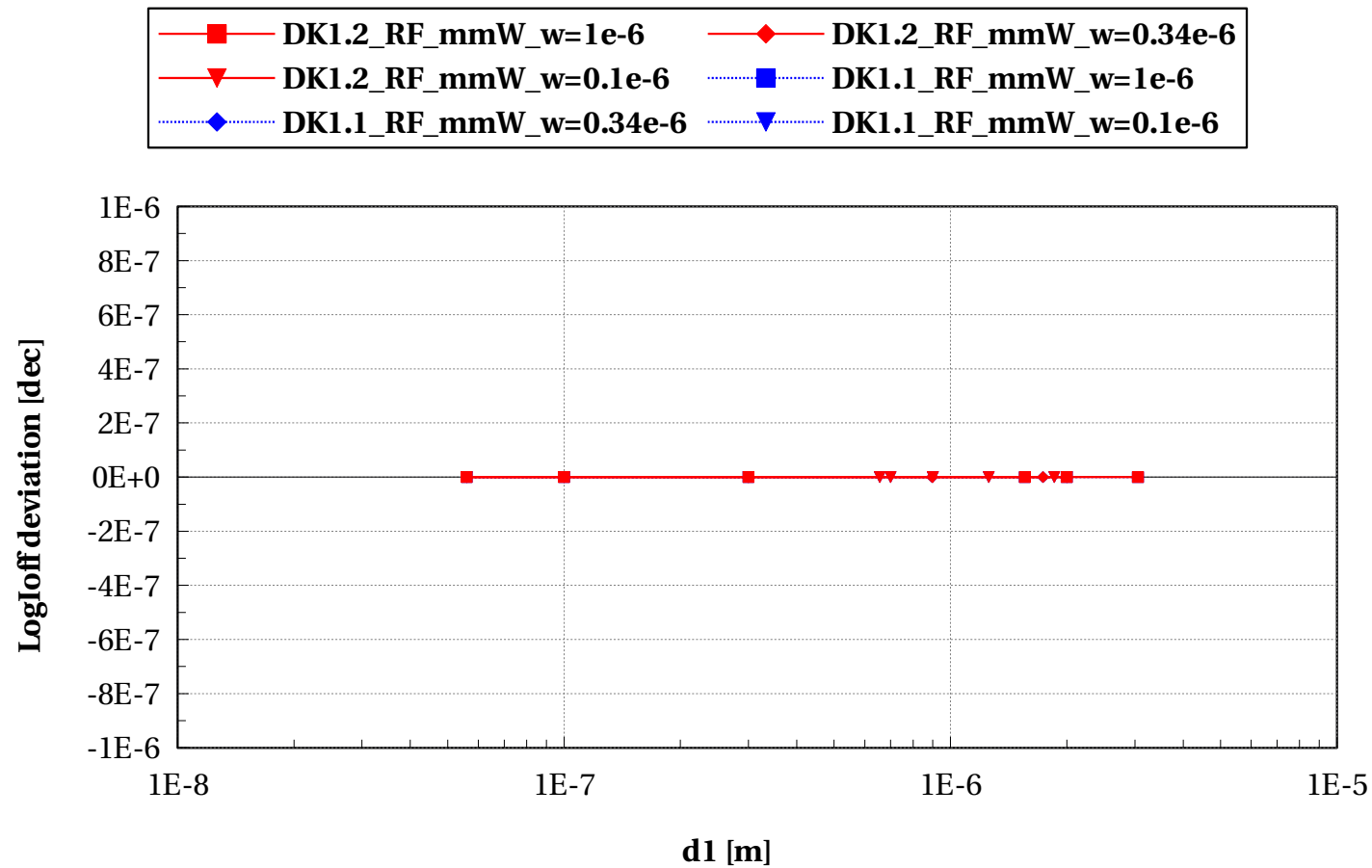
pfet_acc, Isat deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and L==0.12e-6



pfet_acc, Logloff deviation [dec] vs d1 [m]

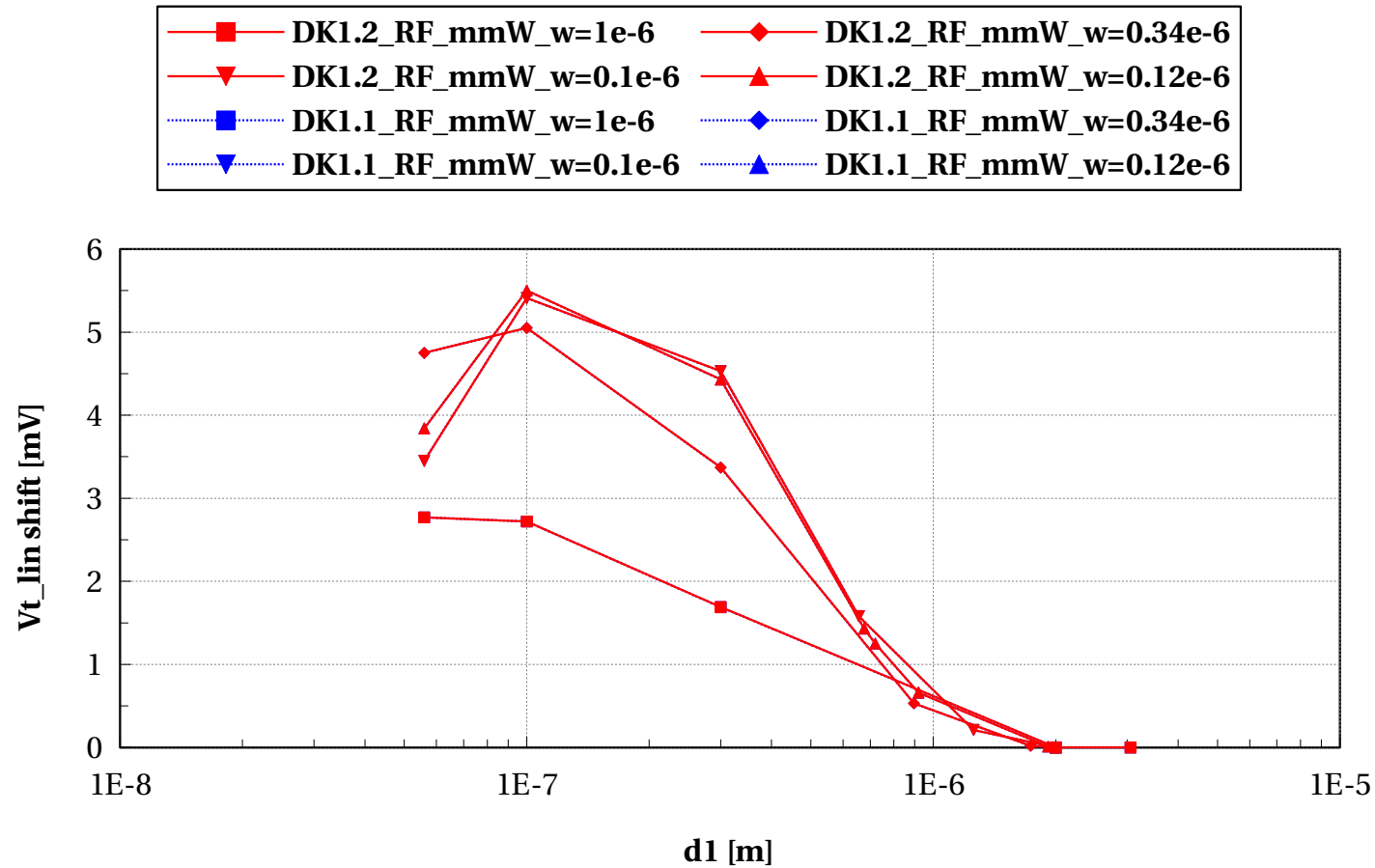
temp==25 and d0==10e-6 and L==0.12e-6



- WPE effect w.r.t d1 - Wscaling at L=1u

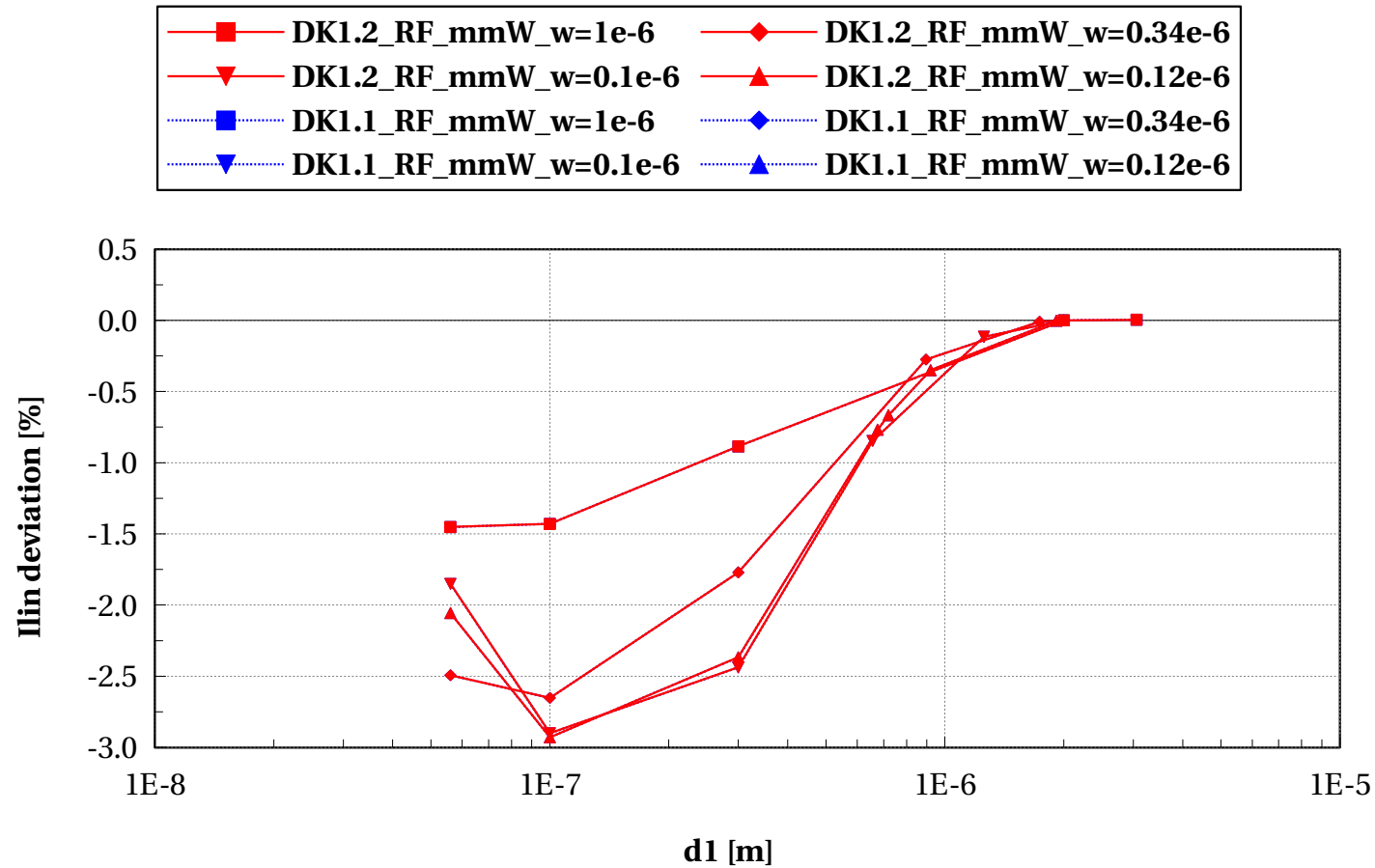
pfet_acc, Vt_lin shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and L==1e-6



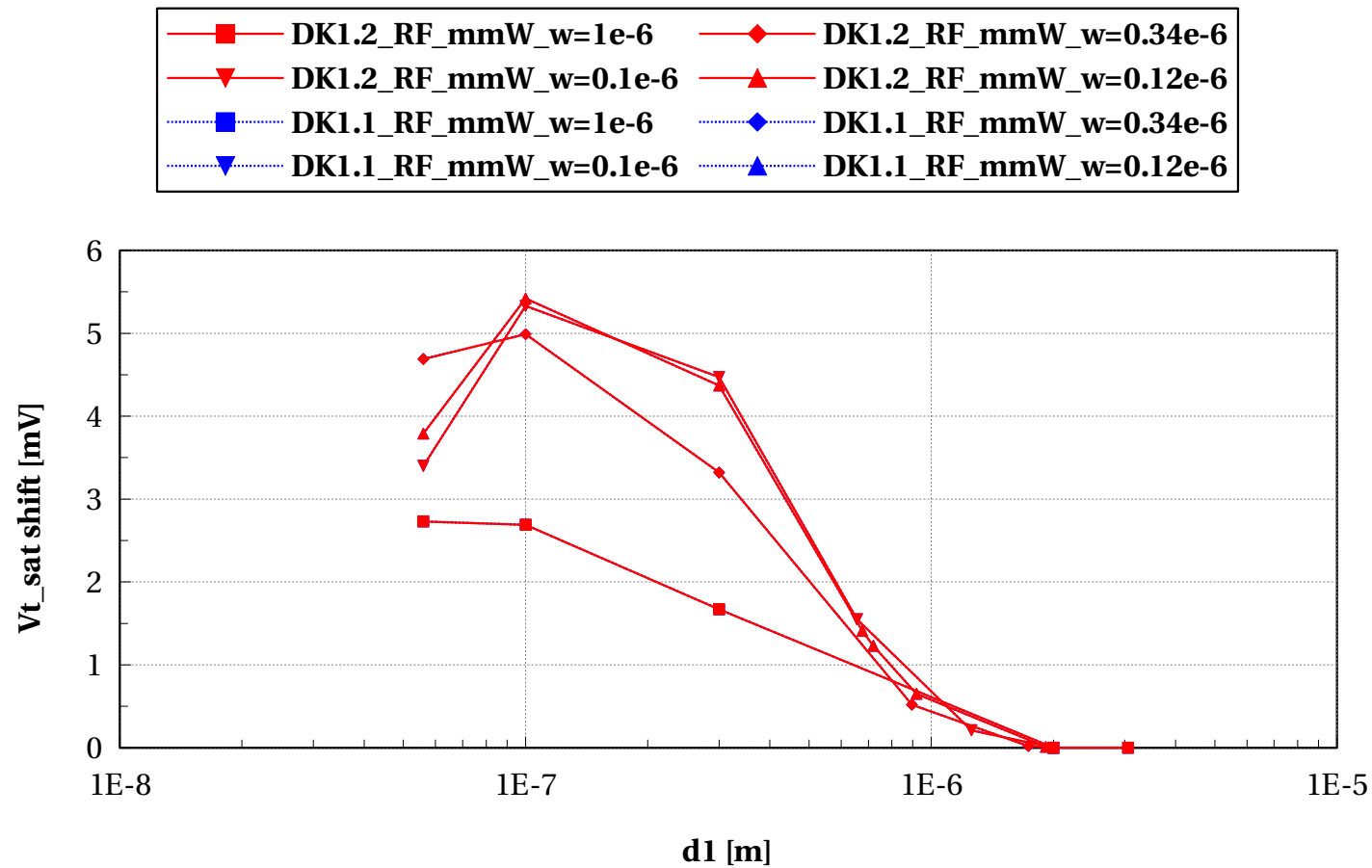
pfet_acc, Ilin deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and L==1e-6



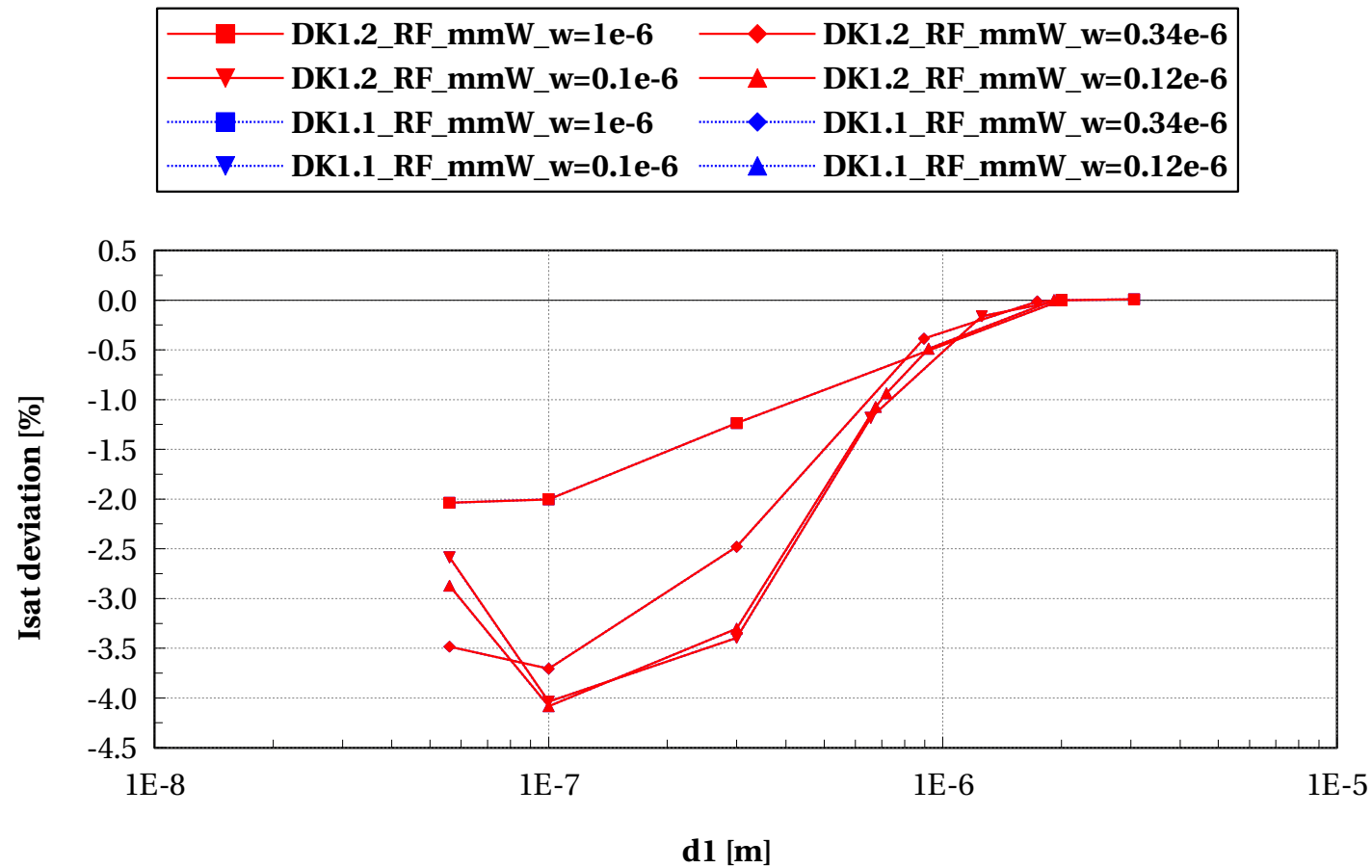
pfet_acc, Vt_sat shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and L==1e-6



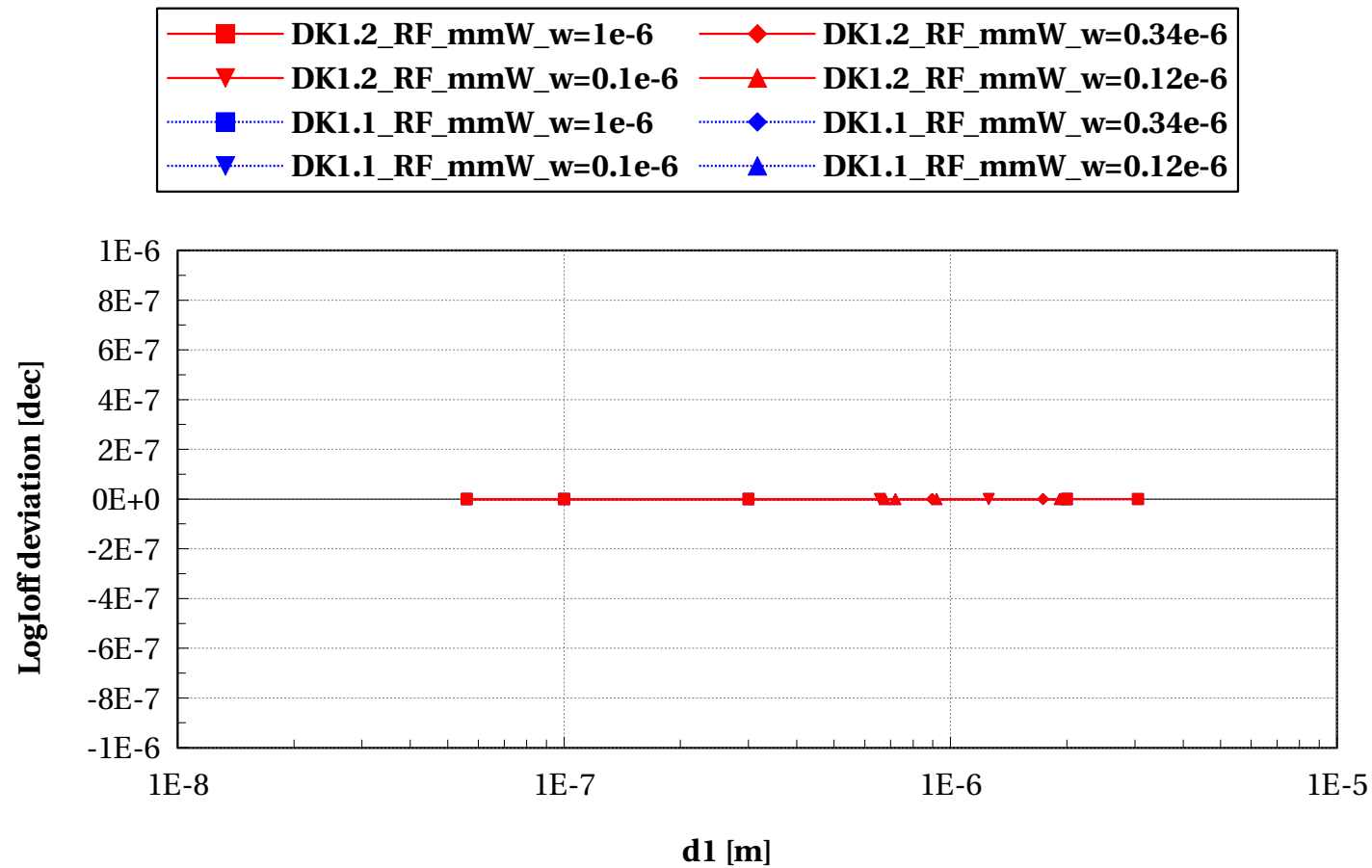
pfet_acc, Isat deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and L==1e-6



pfet_acc, Logloff deviation [dec] vs d1 [m]

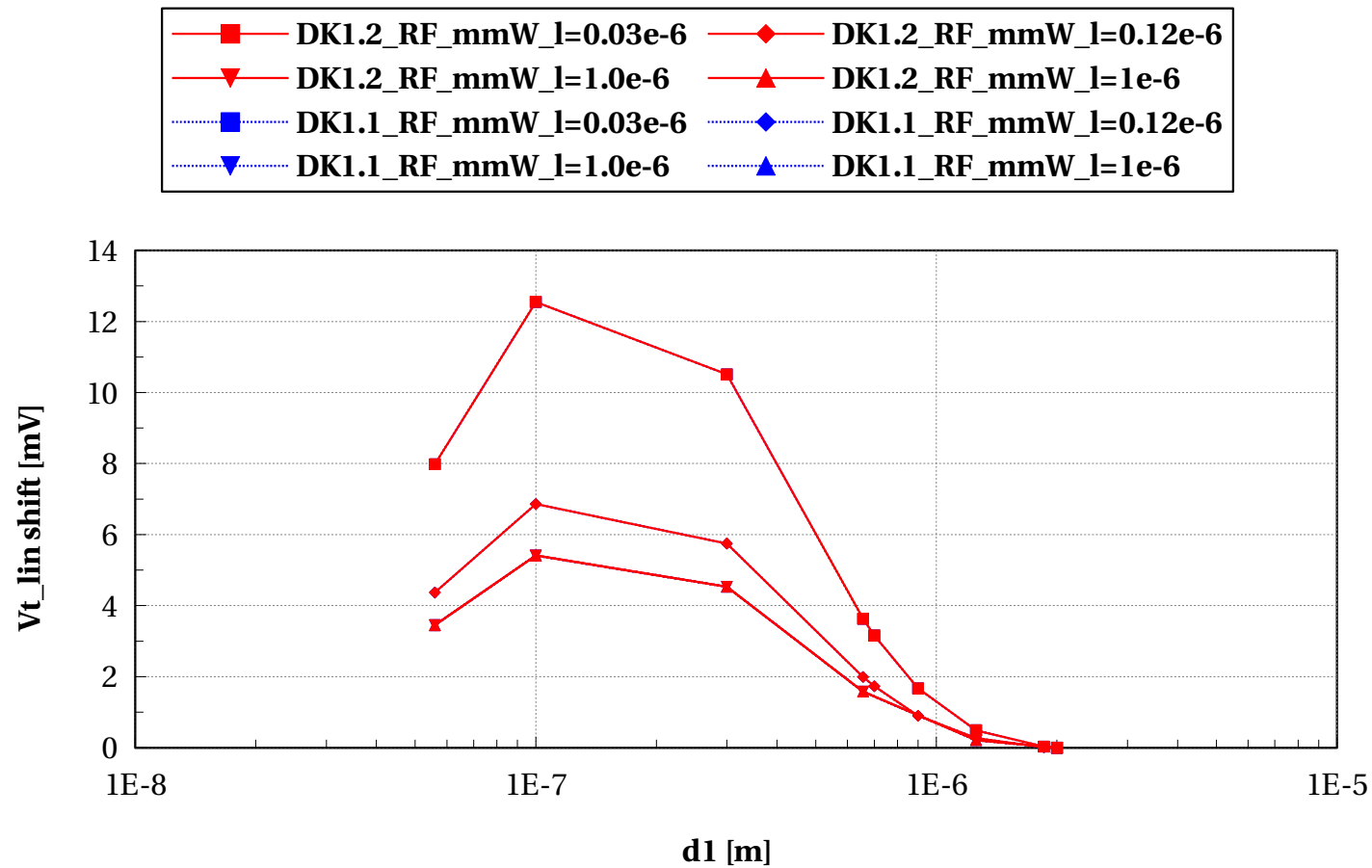
temp==25 and d0==10e-6 and L==1e-6



- WPE effect w.r.t d1 - Lscaling at $W=0.1u$

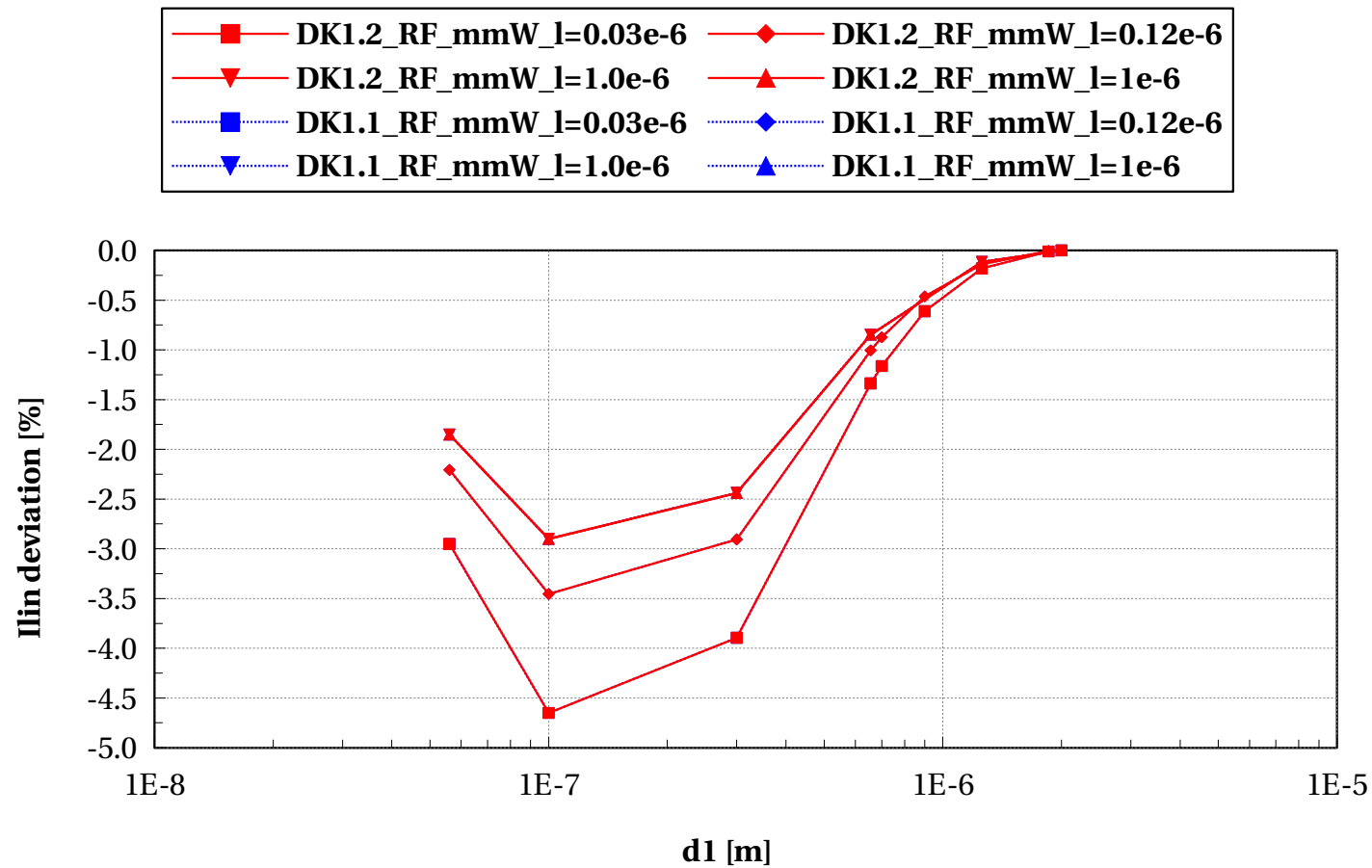
pfet_acc, Vt_lin shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and W==0.1e-6



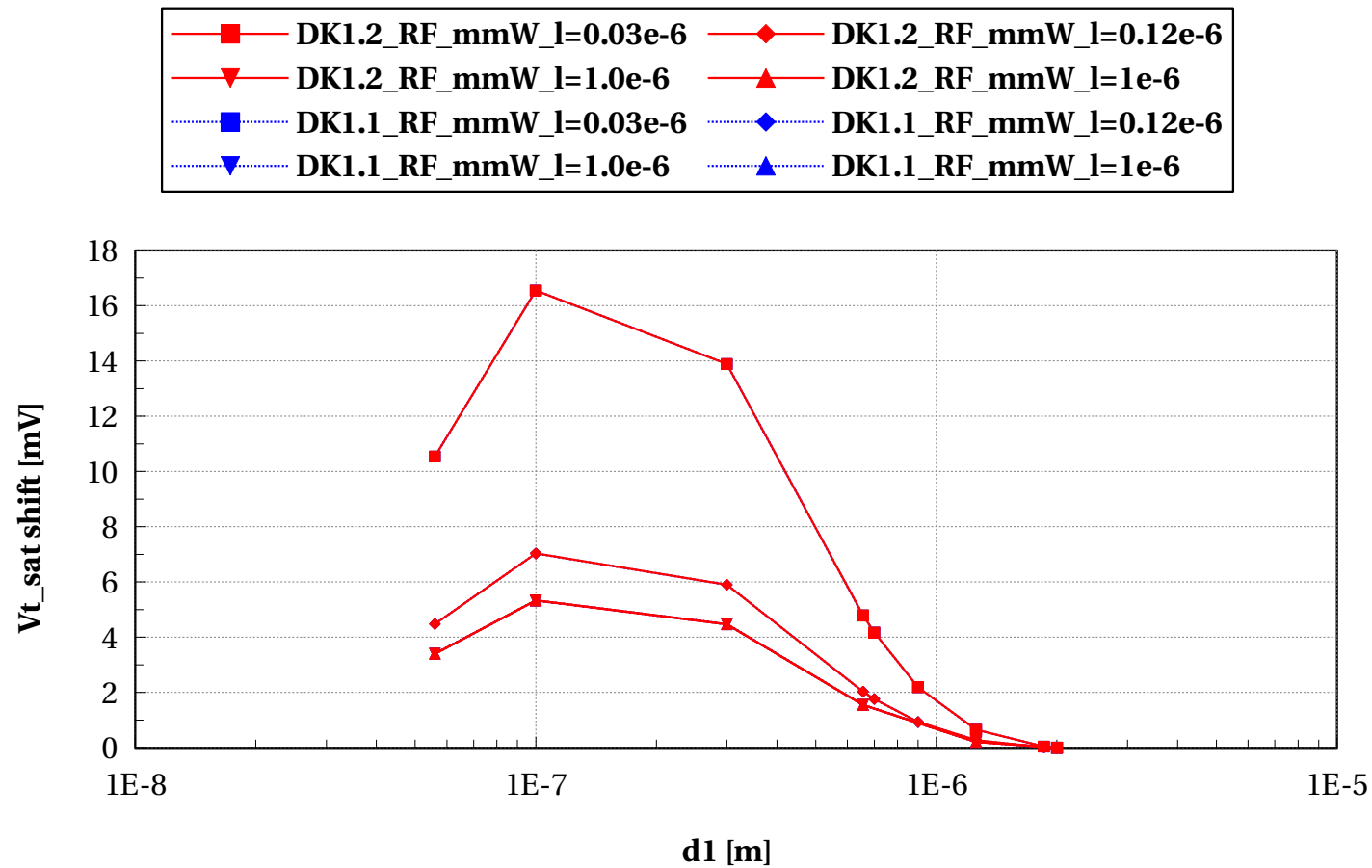
pfet_acc, Ilin deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and W==0.1e-6



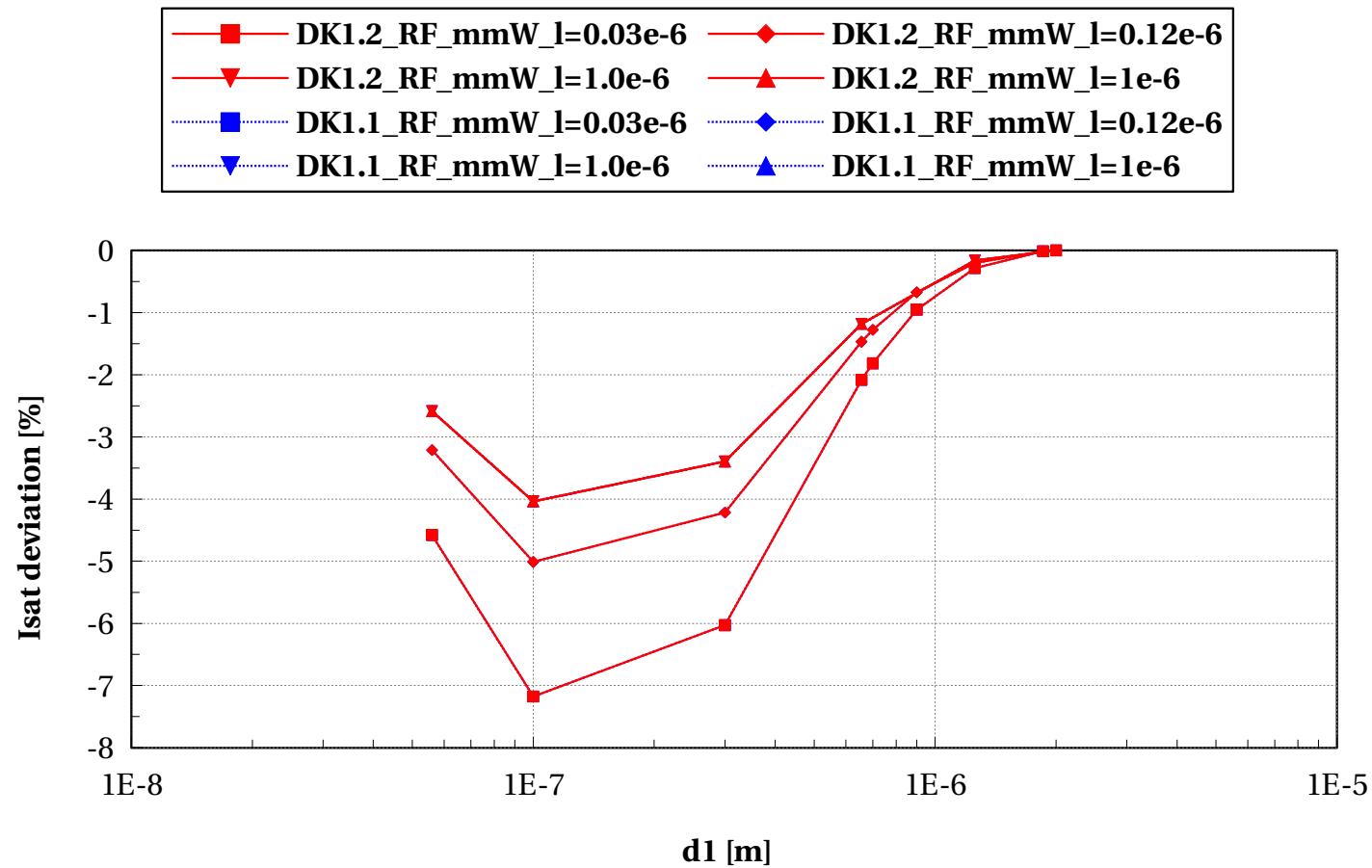
pfet_acc, Vt_sat shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and W==0.1e-6



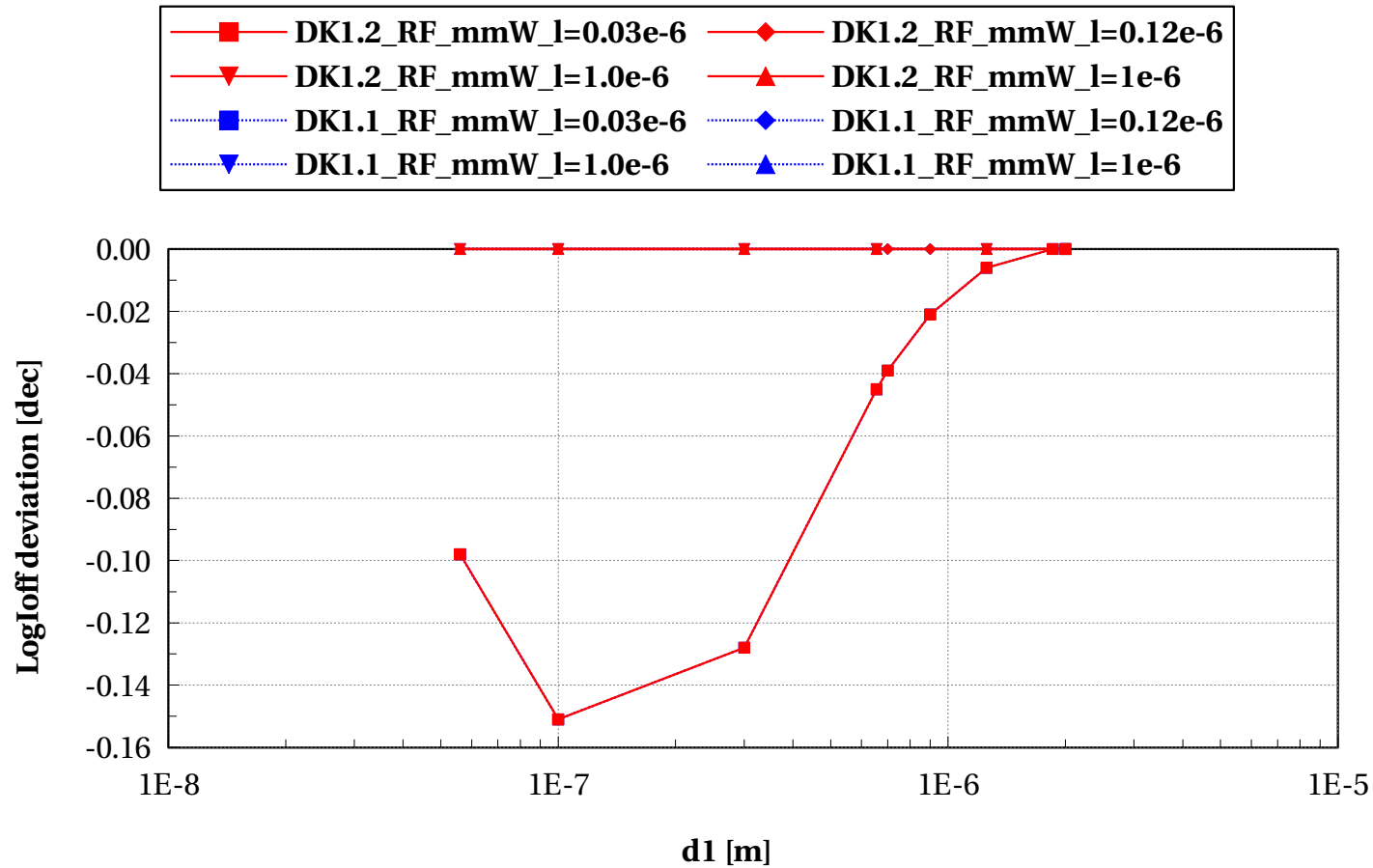
pfet_acc, Isat deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and W==0.1e-6



pfet_acc, Logloff deviation [dec] vs d1 [m]

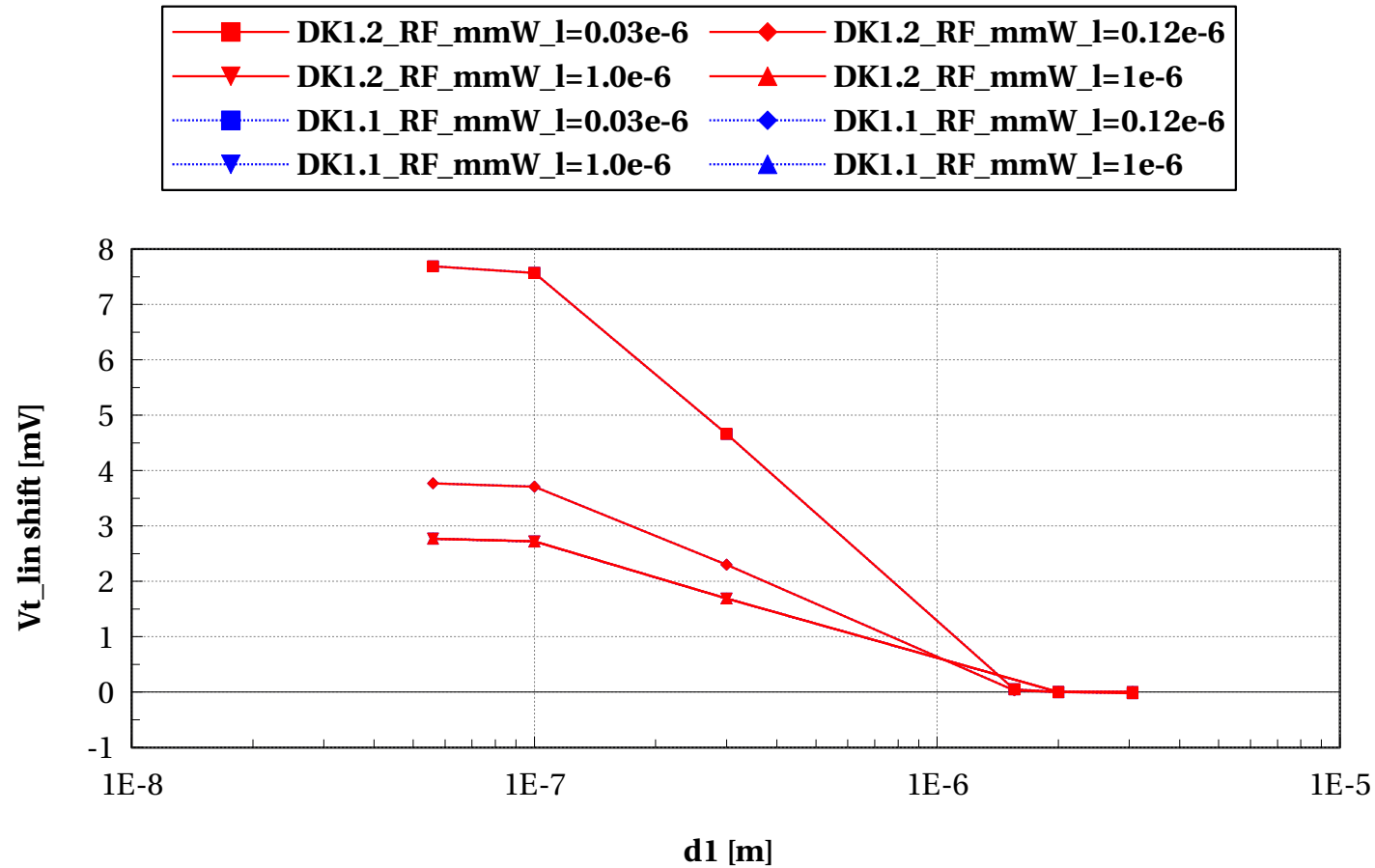
temp==25 and d0==10e-6 and W==0.1e-6



- WPE effect w.r.t d1 - Lscaling at W=1u

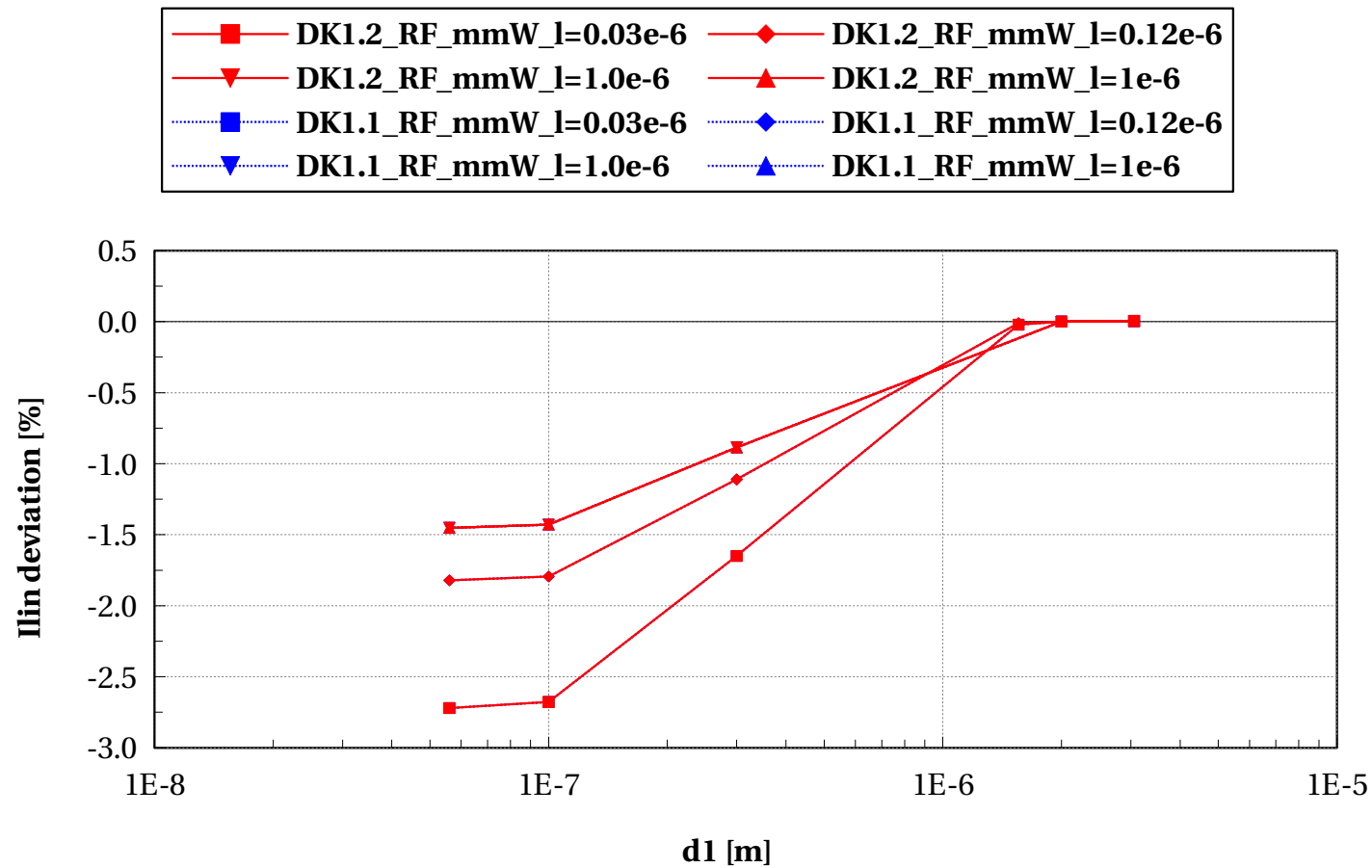
pfet_acc, Vt_lin shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and W==1e-6



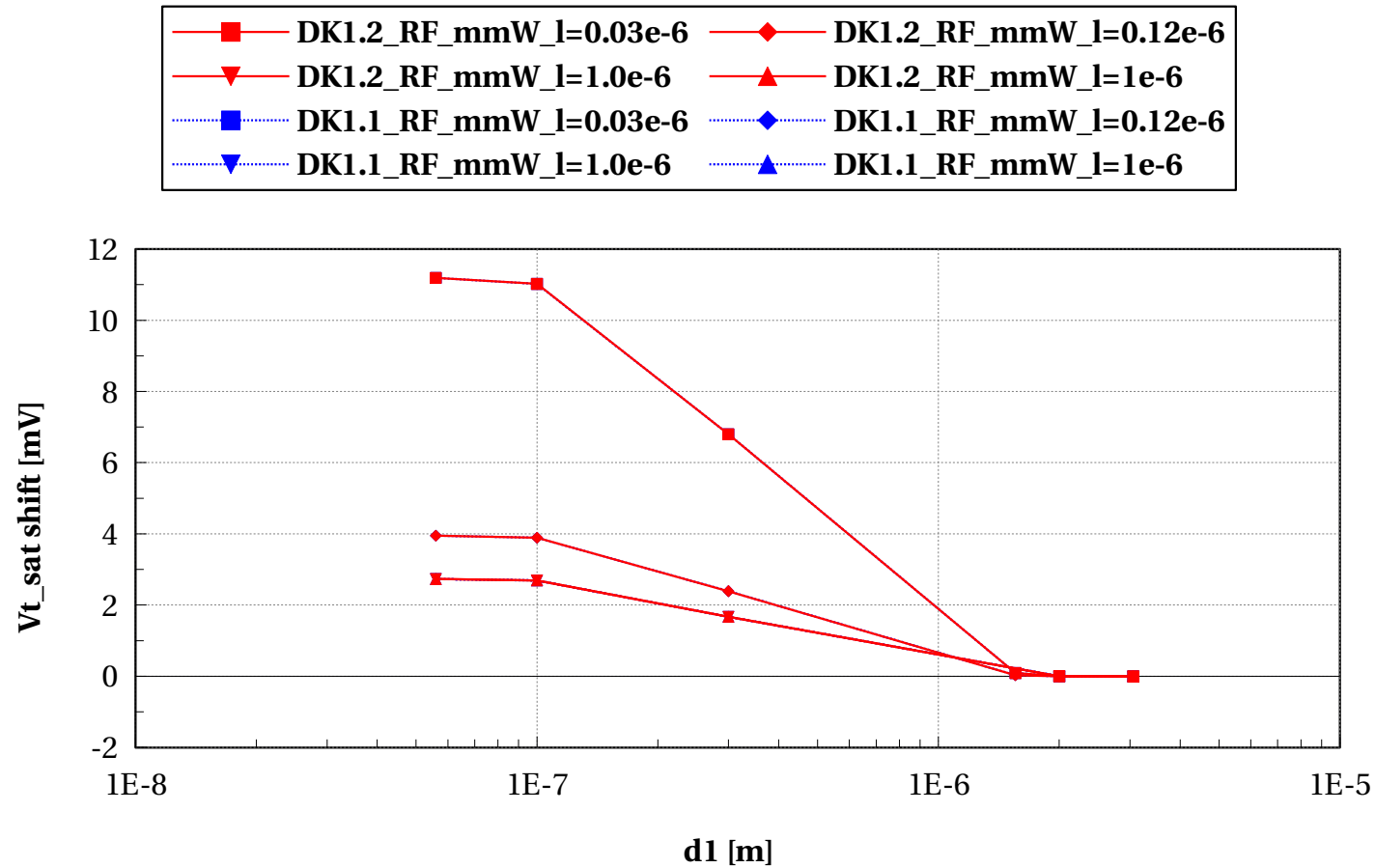
pfet_acc, Ilin deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and W==1e-6



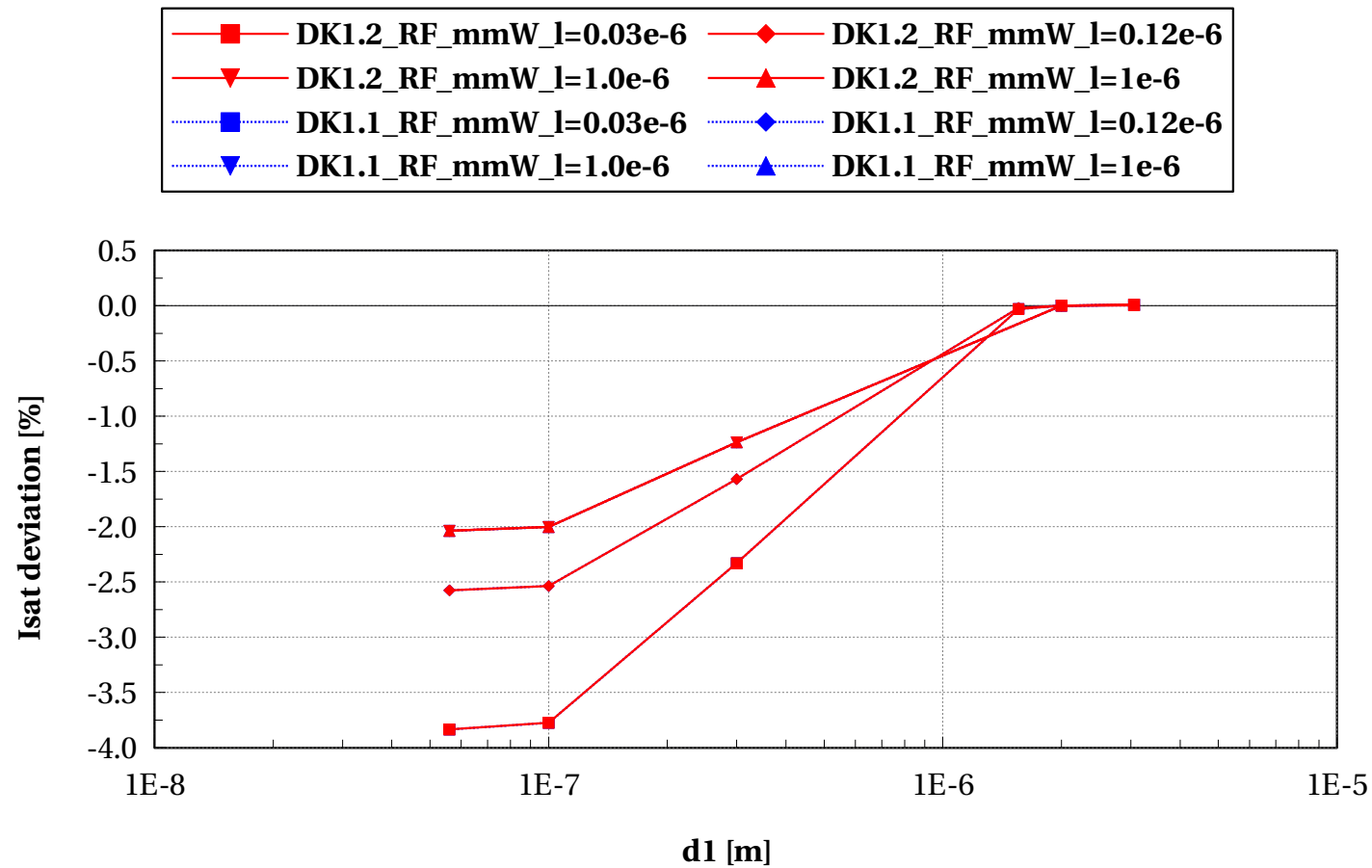
pfet_acc, Vt_sat shift [mV] vs d1 [m]

temp==25 and d0==10e-6 and W==1e-6



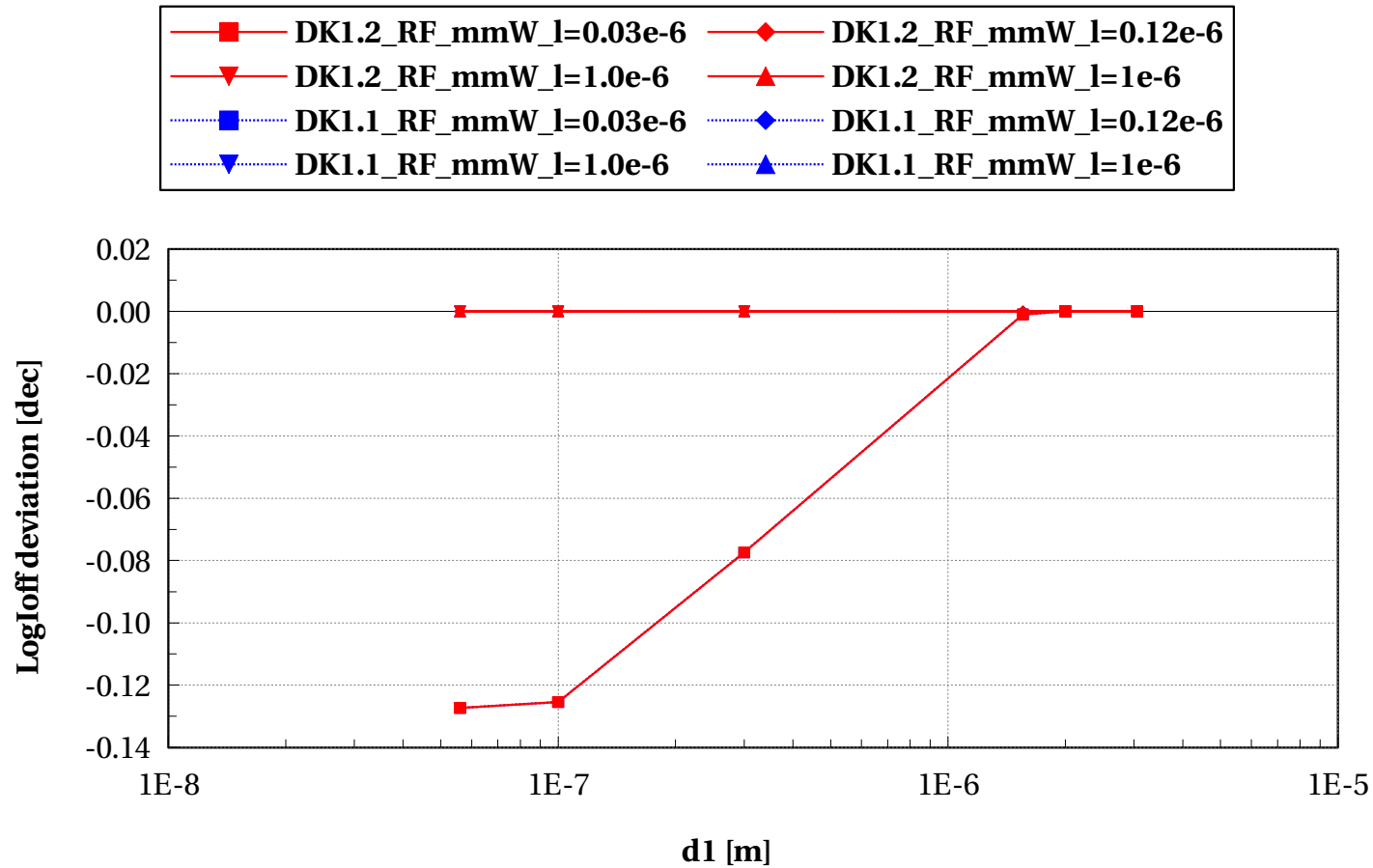
pfet_acc, Isat deviation [%] vs d1 [m]

temp==25 and d0==10e-6 and W==1e-6



pfet_acc, Logloff deviation [dec] vs d1 [m]

temp==25 and d0==10e-6 and W==1e-6



Annex

Conditions of simulations

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

- Model lvtmfet_acc (DK1.2_RF_mmW)

- ✓ Input Parameters

- ✗ $i_{vt} = 300e-9$ A
 - ✗ $mc_runs = 1000$
 - ✗ $v_{gs_stop} = v_{dd}$ V
 - ✗ $v_{ds_off} = v_{ds_sat}$ V
 - ✗ $v_{gs_off} = 0$ V
 - ✗ $temp = 25$ °C
 - ✗ $v_{gs_start} = -0.5$ V
 - ✗ $mc_sens = 0$
 - ✗ $v_{ds_lin} = 0.05$ V
 - ✗ $sbenchlsf_release = Alpha$
 - ✗ $plashrink_i_{vt} = 1$
 - ✗ $v_{bs} = 0$ V
 - ✗ $ams_release = 2018.3$
 - ✗ $model_version = 1.3.e$

- ✗ $mc_nsigma = 3$
- ✗ $ithslwi = 10e-9 \text{ A}$
- ✗ $vstep_ivt = 0.005 \text{ V}$
- ✗ $vds_sat = Vdd \text{ V}$
- ✗ $shrink_ivt = 1$
- ✗ $vdd = 1 \text{ V}$
- ✗ $dlshrink_ivt = 0$
- ✓ Sweep Parameters
- ✓ Extra parameters
 - ✗ $lvt_dev = 0$
 - ✗ $gflag_noisedev_rvt_cmos028fdsoi = 0$
 - ✗ $gflag_noisedev_lvt_cmos028fdsoi = 0$
 - ✗ $rvt_dev = 0$
- Model `lvtpfet_acc` (DK1.2_RF_mmW)
 - ✓ Input Parameters
 - ✗ $ivt = 70e-9 \text{ A}$
 - ✗ $mc_runs = 1000$
 - ✗ $vgs_stop = vdd \text{ V}$
 - ✗ $vds_off = vds_sat \text{ V}$
 - ✗ $vgs_off = 0 \text{ V}$
 - ✗ $temp = 25 \text{ °C}$
 - ✗ $vgs_start = -0.5 \text{ V}$
 - ✗ $mc_sens = 0$
 - ✗ $vds_lin = 0.05 \text{ V}$
 - ✗ $sbenchlsf_release = \text{Alpha}$

- ✗ plashrink_ivt = 1
- ✗ vbs = 1 V
- ✗ ams_release = 2018.3
- ✗ model_version = 1.3.e
- ✗ mc_nsigma = 3
- ✗ ithslwi = 10e-9 A
- ✗ vstep_ivt = 0.005 V
- ✗ vds_sat = Vdd V
- ✗ shrink_ivt = 1
- ✗ vdd = 1 V
- ✗ dlshrink_ivt = 0
- ✓ Sweep Parameters
- ✓ Extra parameters
 - ✗ lvt_dev = 0
 - ✗ gflag__noisedev__rvt__cmos028fdsoi = 0
 - ✗ gflag__noisedev__lvt__cmos028fdsoi = 0
 - ✗ rvt_dev = 0
- Model nfet_acc (DK1.2_RF_mmW)
 - ✓ Input Parameters
 - ✗ ivt = 300e-9 A
 - ✗ mc_runs = 1000
 - ✗ vgs_stop = vdd V
 - ✗ vds_off = vds_sat V
 - ✗ vgs_off = 0 V
 - ✗ temp = 25 °C

- ✗ vgs_start = -0.5 V
- ✗ mc_sens = 0
- ✗ vds_lin = 0.05 V
- ✗ sbenchlsf_release = Alpha
- ✗ plashrink_ivt = 1
- ✗ vbs = 0 V
- ✗ ams_release = 2018.3
- ✗ model_version = 1.2.d
- ✗ mc_nsigma = 3
- ✗ ithslwi = 10e-9 A
- ✗ vstep_ivt = 0.005 V
- ✗ vds_sat = Vdd V
- ✗ shrink_ivt = 1
- ✗ vdd = 1 V
- ✗ dlshrink_ivt = 0
- ✓ Sweep Parameters
- ✓ Extra parameters
 - ✗ lvt_dev = 0
 - ✗ gflag__noisedev__rvt__cmos028fdsoi = 0
 - ✗ gflag__noisedev__lvt__cmos028fdsoi = 0
 - ✗ rvt_dev = 0
- Model pfet_acc (DK1.2_RF_mmW)
 - ✓ Input Parameters
 - ✗ ivt = 70e-9 A
 - ✗ mc_runs = 1000

- ✗ vgs_stop = vdd V
- ✗ vds_off = vds_sat V
- ✗ vgs_off = 0 V
- ✗ temp = 25 °C
- ✗ vgs_start = -0.5 V
- ✗ mc_sens = 0
- ✗ vds_lin = 0.05 V
- ✗ sbenchlsf_release = Alpha
- ✗ plashrink_ivt = 1
- ✗ vbs = 0 V
- ✗ ams_release = 2018.3
- ✗ model_version = 1.2.d
- ✗ mc_nsigma = 3
- ✗ ithslwi = 10e-9 A
- ✗ vstep_ivt = 0.005 V
- ✗ vds_sat = Vdd V
- ✗ shrink_ivt = 1
- ✗ vdd = 1 V
- ✗ dlshrink_ivt = 0
- ✓ Sweep Parameters
- ✓ Extra parameters
 - ✗ lvt_dev = 0
 - ✗ gflag__noisedev__rvt__cmos028fdsoi = 0
 - ✗ gflag__noisedev__lvt__cmos028fdsoi = 0
 - ✗ rvt_dev = 0

● Model lvtinfet_acc (DK1.1_RF_mmW)

✓ Input Parameters

- ✗ $ivt = 300e-9$ A
- ✗ $mc_runs = 1000$
- ✗ $vgs_stop = vdd$ V
- ✗ $vds_off = vds_sat$ V
- ✗ $vgs_off = 0$ V
- ✗ $temp = 25$ °C
- ✗ $vgs_start = -0.5$ V
- ✗ $mc_sens = 0$
- ✗ $vds_lin = 0.05$ V
- ✗ $sbenchlsf_release = Alpha$
- ✗ $plashrink_ivt = 1$
- ✗ $vbs = 0$ V
- ✗ $ams_release = 2018.3$
- ✗ $model_version = 1.3.d$
- ✗ $mc_nsigma = 3$
- ✗ $ithslwi = 10e-9$ A
- ✗ $vstep_ivt = 0.005$ V
- ✗ $vds_sat = Vdd$ V
- ✗ $shrink_ivt = 1$
- ✗ $vdd = 1$ V
- ✗ $dlshrink_ivt = 0$

✓ Sweep Parameters

✓ Extra parameters

- ✗ lvt_dev = 0
- ✗ gflag__noisedev__rvt__cmos028fdsoi = 0
- ✗ gflag__noisedev__lvt__cmos028fdsoi = 0
- ✗ rvt_dev = 0

● Model lvtpfet_acc (DK1.1_RF_mmW)

✓ Input Parameters

- ✗ ivt = 70e-9 A
- ✗ mc_runs = 1000
- ✗ vgs_stop = vdd V
- ✗ vds_off = vds_sat V
- ✗ vgs_off = 0 V
- ✗ temp = 25 °C
- ✗ vgs_start = -0.5 V
- ✗ mc_sens = 0
- ✗ vds_lin = 0.05 V
- ✗ sbenchlsf_release = Alpha
- ✗ plashrink_ivt = 1
- ✗ vbs = 1 V
- ✗ ams_release = 2018.3
- ✗ model_version = 1.3.d
- ✗ mc_nsigma = 3
- ✗ ithslwi = 10e-9 A
- ✗ vstep_ivt = 0.005 V
- ✗ vds_sat = Vdd V
- ✗ shrink_ivt = 1

- ✗ vdd = 1 V
- ✗ dlshrink_ivt = 0
- ✓ Sweep Parameters
- ✓ Extra parameters
 - ✗ lvt_dev = 0
 - ✗ gflag__noisedev__rvt__cmos028fdsoi = 0
 - ✗ gflag__noisedev__lvt__cmos028fdsoi = 0
 - ✗ rvt_dev = 0
- Model nfet_acc (DK1.1_RF_mmW)
 - ✓ Input Parameters
 - ✗ ivt = 300e-9 A
 - ✗ mc_runs = 1000
 - ✗ vgs_stop = vdd V
 - ✗ vds_off = vds_sat V
 - ✗ vgs_off = 0 V
 - ✗ temp = 25 °C
 - ✗ vgs_start = -0.5 V
 - ✗ mc_sens = 0
 - ✗ vds_lin = 0.05 V
 - ✗ sbenchlsf_release = Alpha
 - ✗ plashrink_ivt = 1
 - ✗ vbs = 0 V
 - ✗ ams_release = 2018.3
 - ✗ model_version = 1.2.c
 - ✗ mc_nsigma = 3

- ✗ $\text{ithslwi} = 10\text{e-}9 \text{ A}$
- ✗ $\text{vstep_ivt} = 0.005 \text{ V}$
- ✗ $\text{vds_sat} = \text{Vdd V}$
- ✗ $\text{shrink_ivt} = 1$
- ✗ $\text{vdd} = 1 \text{ V}$
- ✗ $\text{dlshrink_ivt} = 0$
- ✓ Sweep Parameters
- ✓ Extra parameters
 - ✗ $\text{lv_dev} = 0$
 - ✗ $\text{gflag_noisedev_rvt_cmos028fdsoi} = 0$
 - ✗ $\text{gflag_noisedev_lv_cmos028fdsoi} = 0$
 - ✗ $\text{rvt_dev} = 0$
- Model pfet_acc (DK1.1_RF_mmW)
 - ✓ Input Parameters
 - ✗ $\text{ivt} = 70\text{e-}9 \text{ A}$
 - ✗ $\text{mc_runs} = 1000$
 - ✗ $\text{vgs_stop} = \text{vdd V}$
 - ✗ $\text{vds_off} = \text{vds_sat V}$
 - ✗ $\text{vgs_off} = 0 \text{ V}$
 - ✗ $\text{temp} = 25 \text{ }^\circ\text{C}$
 - ✗ $\text{vgs_start} = -0.5 \text{ V}$
 - ✗ $\text{mc_sens} = 0$
 - ✗ $\text{vds_lin} = 0.05 \text{ V}$
 - ✗ $\text{sbenchlsf_release} = \text{Alpha}$
 - ✗ $\text{plashrink_ivt} = 1$

- ✗ vbs = 0 V
- ✗ ams_release = 2018.3
- ✗ model_version = 1.2.c
- ✗ mc_nsigma = 3
- ✗ ithslwi = 10e-9 A
- ✗ vstep_ivt = 0.005 V
- ✗ vds_sat = Vdd V
- ✗ shrink_ivt = 1
- ✗ vdd = 1 V
- ✗ dlshrink_ivt = 0
- ✓ Sweep Parameters
- ✓ Extra parameters
 - ✗ lvt_dev = 0
 - ✗ gflag__noisedev__rvt__cmos028fdsoi = 0
 - ✗ gflag__noisedev__lvt__cmos028fdsoi = 0
 - ✗ rvt_dev = 0