



cmos028fdsoi Technology

SG models

DK1.2\_RF\_mmW

Comparison with DK1.1\_RF\_mmW model(s)

Focus on analog/RF performance

Please use the bookmark to navigate

Sep 21, 2018

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

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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.

## Output parameters definitions

- Model(s): lvtmfet\_rf, lvtmfet\_rfseg, lvtpfet\_rf, lvtpfet\_rfseg, nfet\_rf, nfet\_rfseg, pfet\_rf, pfet\_rfseg
  - ✓  $V_{t\_lin}$  : 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  $V_{ds} = 0.05V$ .
  - ✓  $G_{m\_ana}$  : Drain transconductance at  $I_{ds} = i_{ana} \cdot M \cdot W / L$ ,  $V_{ds} = V_{dd}/4V$ ,  $f = 100kHz$ .
  - ✓  $F_{t\_max}$  : Maximum transition frequency at  $V_{ds} = V_{dd}V$ ,  $f = 100kHz$ .
  - ✓  $G_{ds\_ana}$  : Drain conductance at  $I_{ds} = i_{ana} \cdot M \cdot W / L$ ,  $V_{ds} = V_{dd}/4$ ,  $f = 100k$
  - ✓  $V_{gs\_ana}$  :  $V_{gs}$  value for which drain current is  $i_{ana} \cdot M \cdot 1 \cdot W / (1 \cdot L + 0 + 0 \cdot p\_la)$  at  $V_{ds} = V_{dd}/4V$ .
  - ✓  $I_{lin}$  : Drain current at  $V_{gs} = 1V$ ,  $V_{ds} = 0.05V$ .
  - ✓  $F_{maxmax}$  : Maximum oscillation frequency at  $V_{ds} = V_{dd}V$ ,  $f = 10GHz$
  - ✓  $R_g$  : Total gate resistance at  $V_{gs} = 1V$ ,  $V_{ds} = 0V$ ,  $f = 10GHz$
  - ✓  $V_{t\_sat}$  : 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  $V_{ds} = v_{ds\_sat}V$ .
  - ✓  $C_{gg\_inv}$  : Total gate capacitance at  $V_{gs} = 1V$ ,  $V_{ds} = 0V$ ,  $f = 100kHz$ .
  - ✓  $F_{t\_ana}$  : Transition frequency at  $I_{ds} = i_{ana} \cdot M \cdot W / L$ ,  $V_{ds} = V_{dd}/4V$
  - ✓  $G_{dc\_ana}$  : Voltage gain at  $I_{ds} = i_{ana} \cdot M \cdot W / L$ ,  $V_{ds} = V_{dd}/4V$ ,  $f = 100kHz$
  - ✓  $I_{sat}$  : Drain current at  $V_{gs} = 1V$ ,  $V_{ds} = V_{dd}V$ .
  - ✓  $C_{gd\_0v}$  : Gate-to-Drain capacitance at  $V_{gs} = 0V$ ,  $V_{ds} = 0V$ ,  $f = 100kHz$ .
  - ✓  $V_{tgmmax}$  : Threshold voltage at  $V_{ds} = 0.05$  derived from  $G_m$  max method.

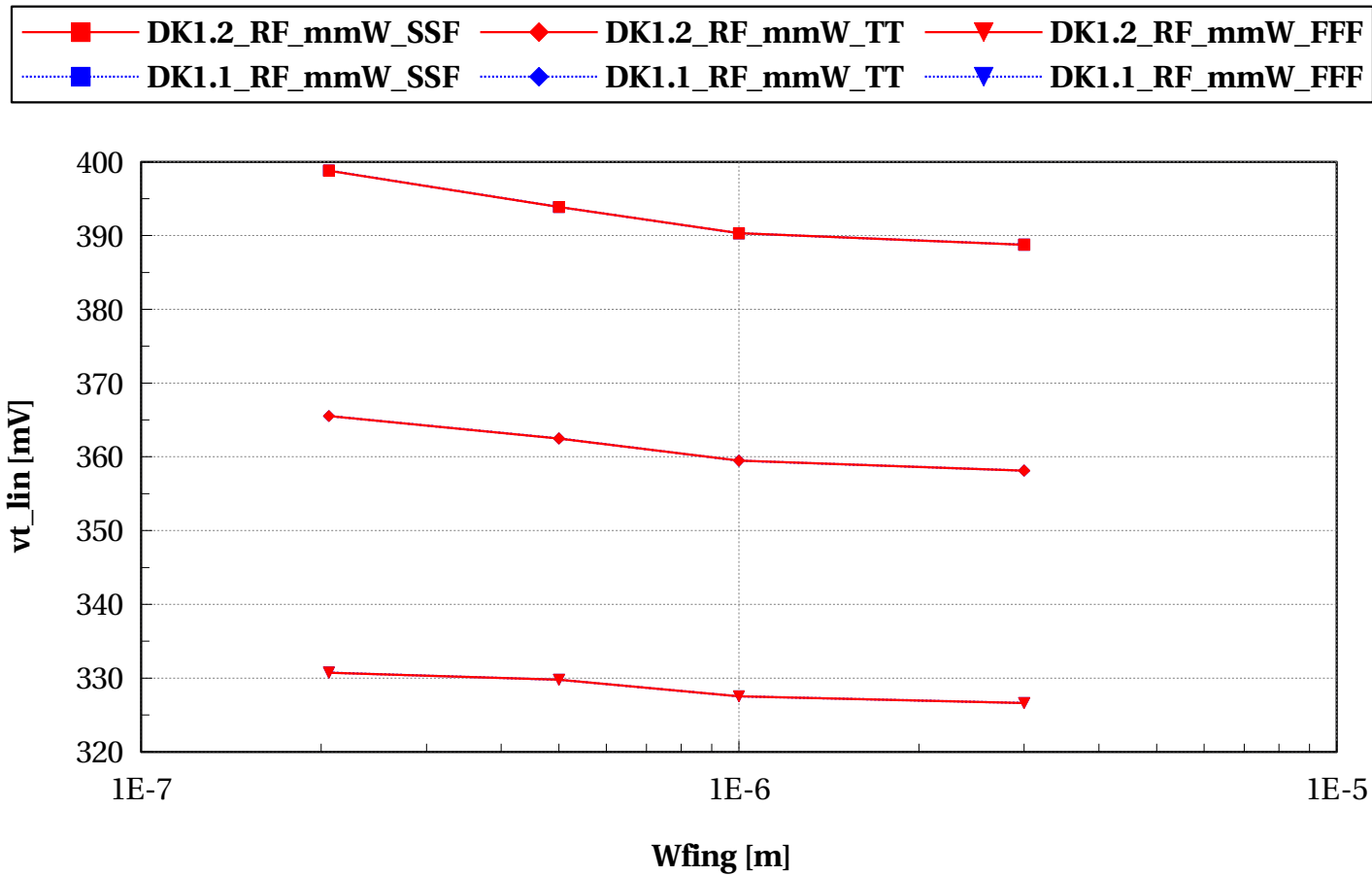
# lvtnfet\_rf

## Electrical characteristics scaling

## Scaling versus width $L=30\text{nm}$ - DC

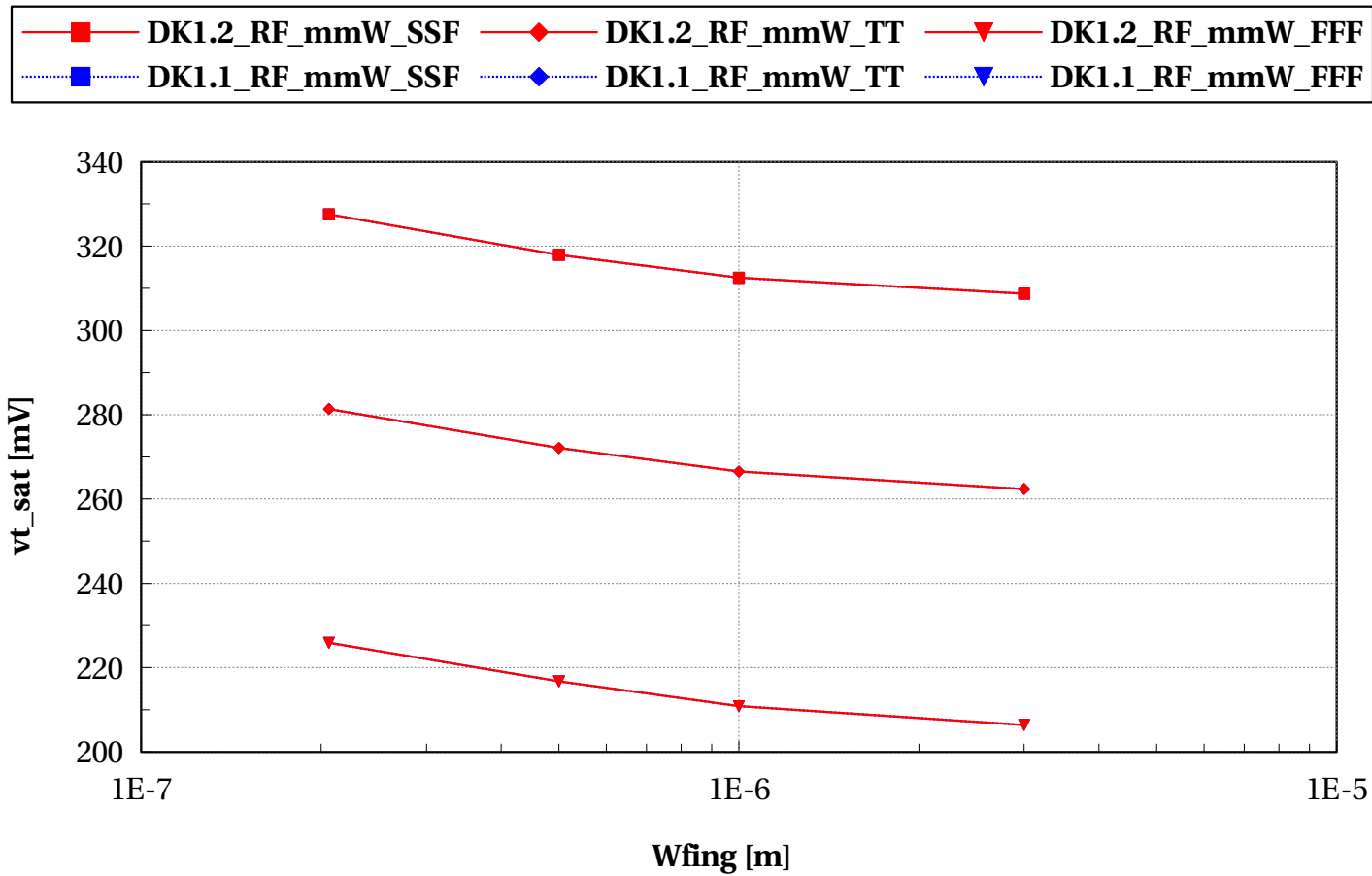
# lvtnfet\_rf, vt\_lin [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# lvtnfet\_rf, vt\_sat [mV] vs Wfing [m]

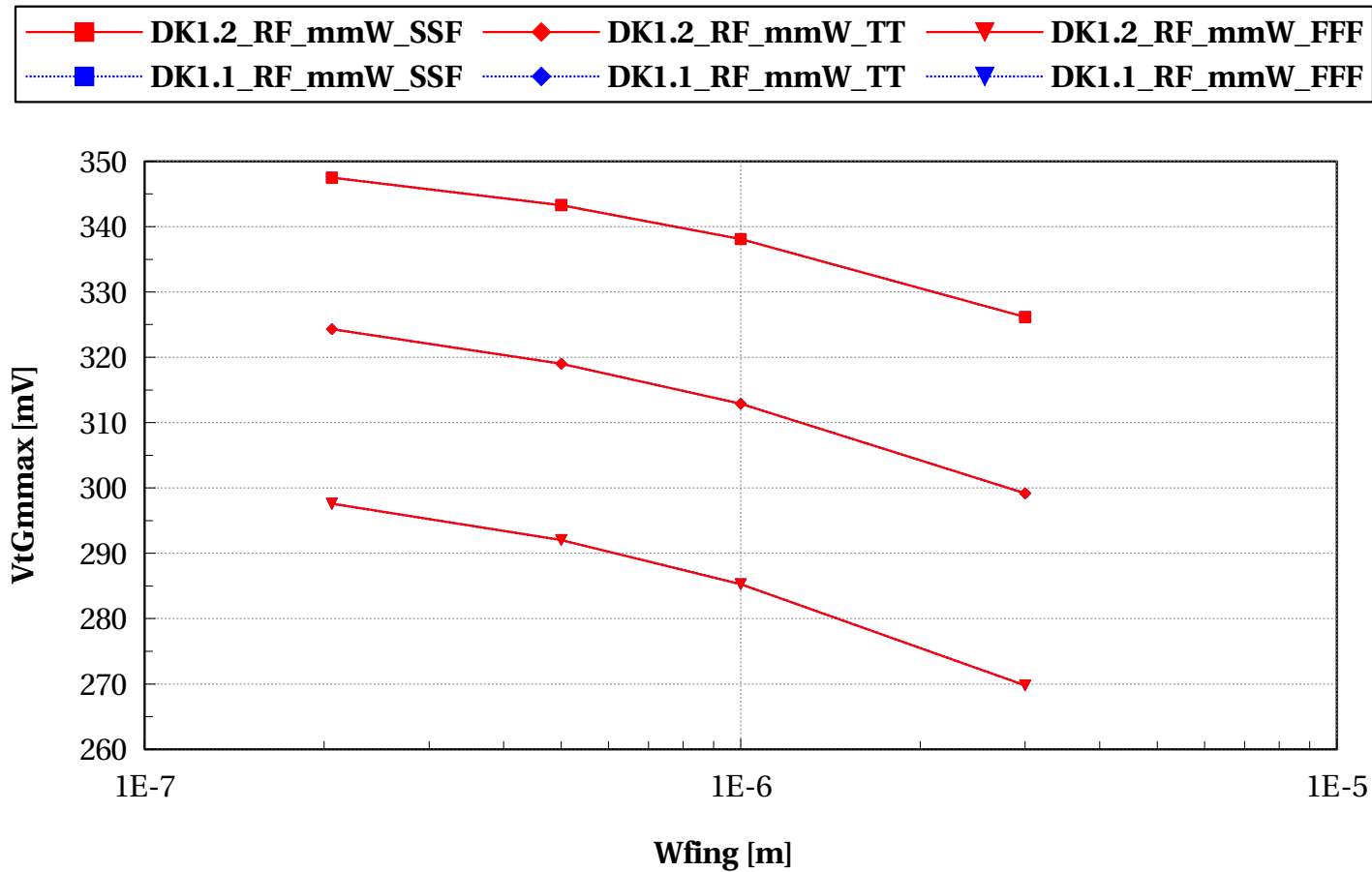
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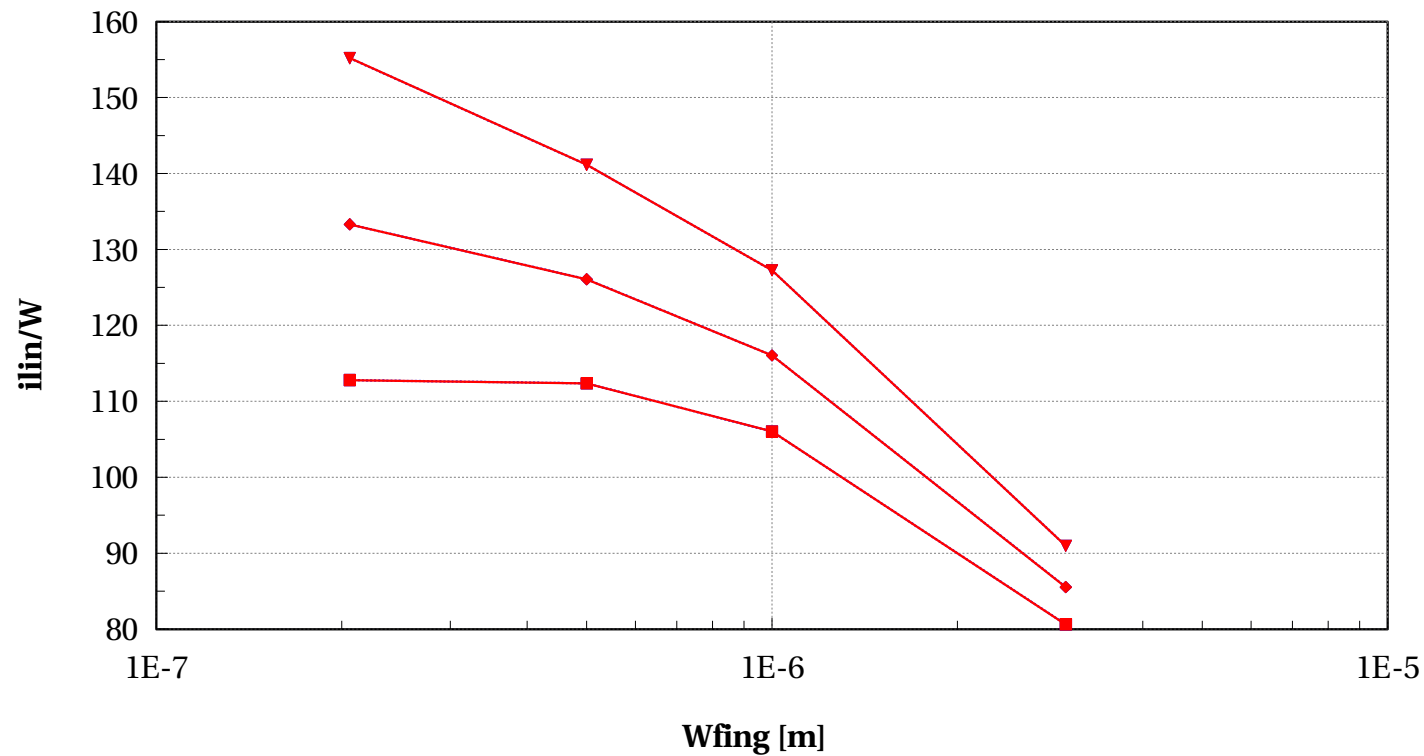
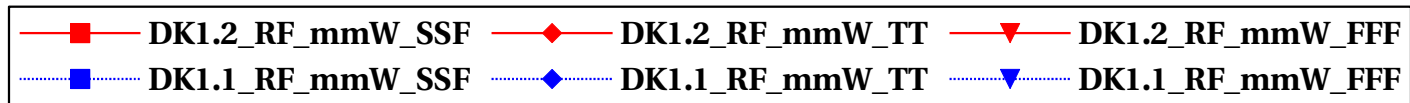
# lvtnfet\_rf, VtGmmax [mV] vs Wfing [m]

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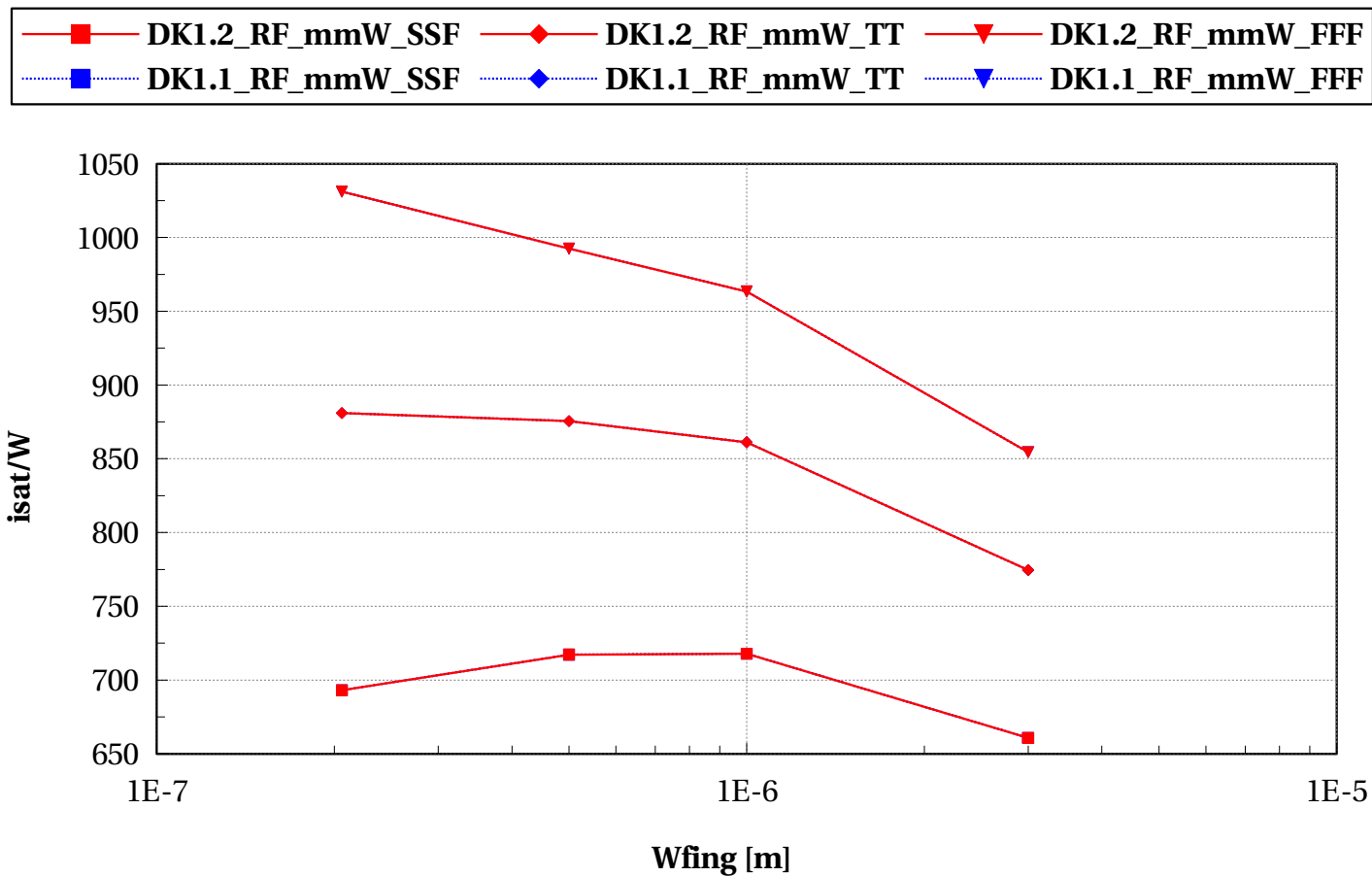
# lvtnfet\_rf, $i_{lin}/W$ vs $W_{fing}$ [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and  $l=30e-9$



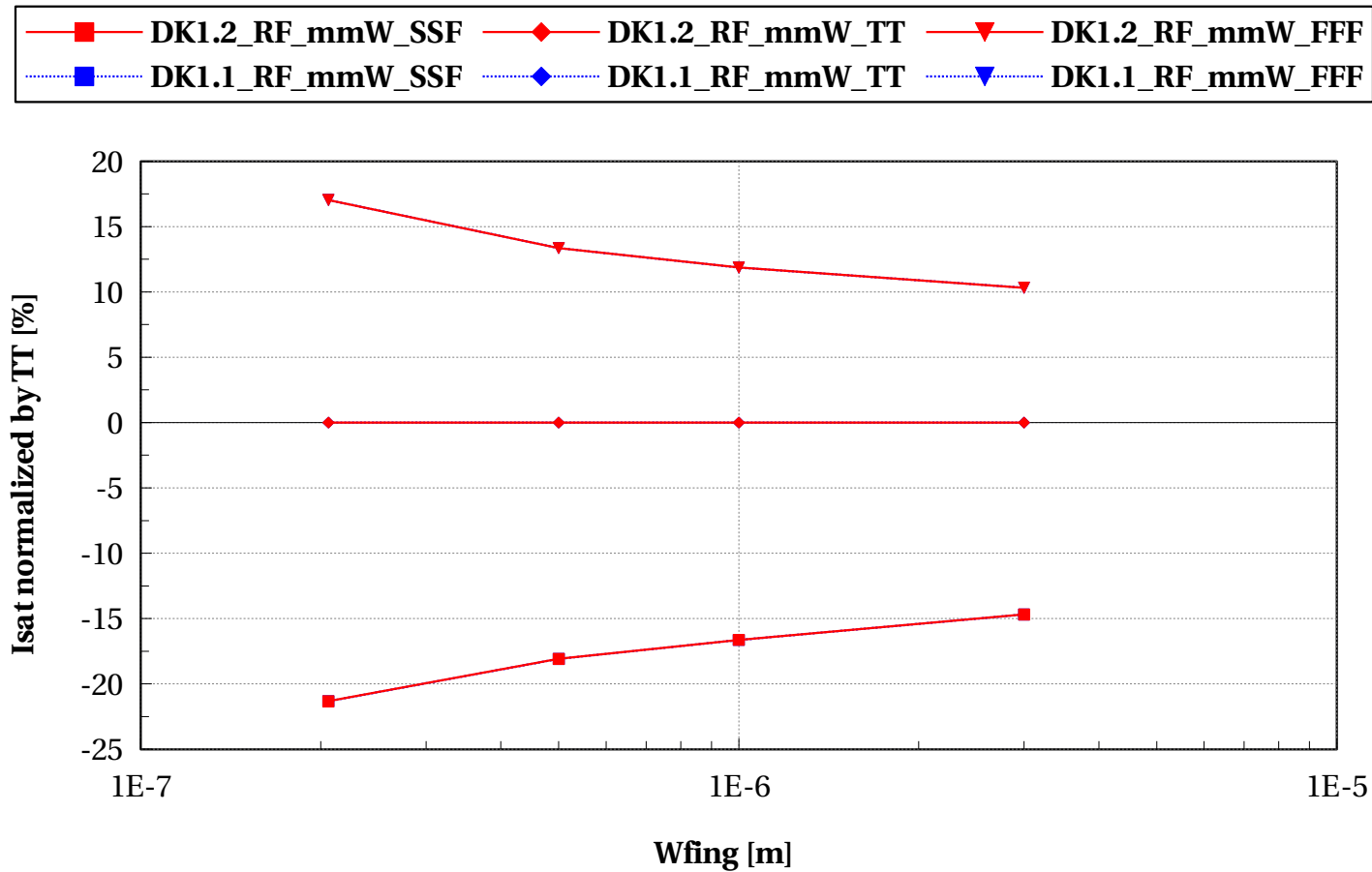
# lvtnfet\_rf, isat/W vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



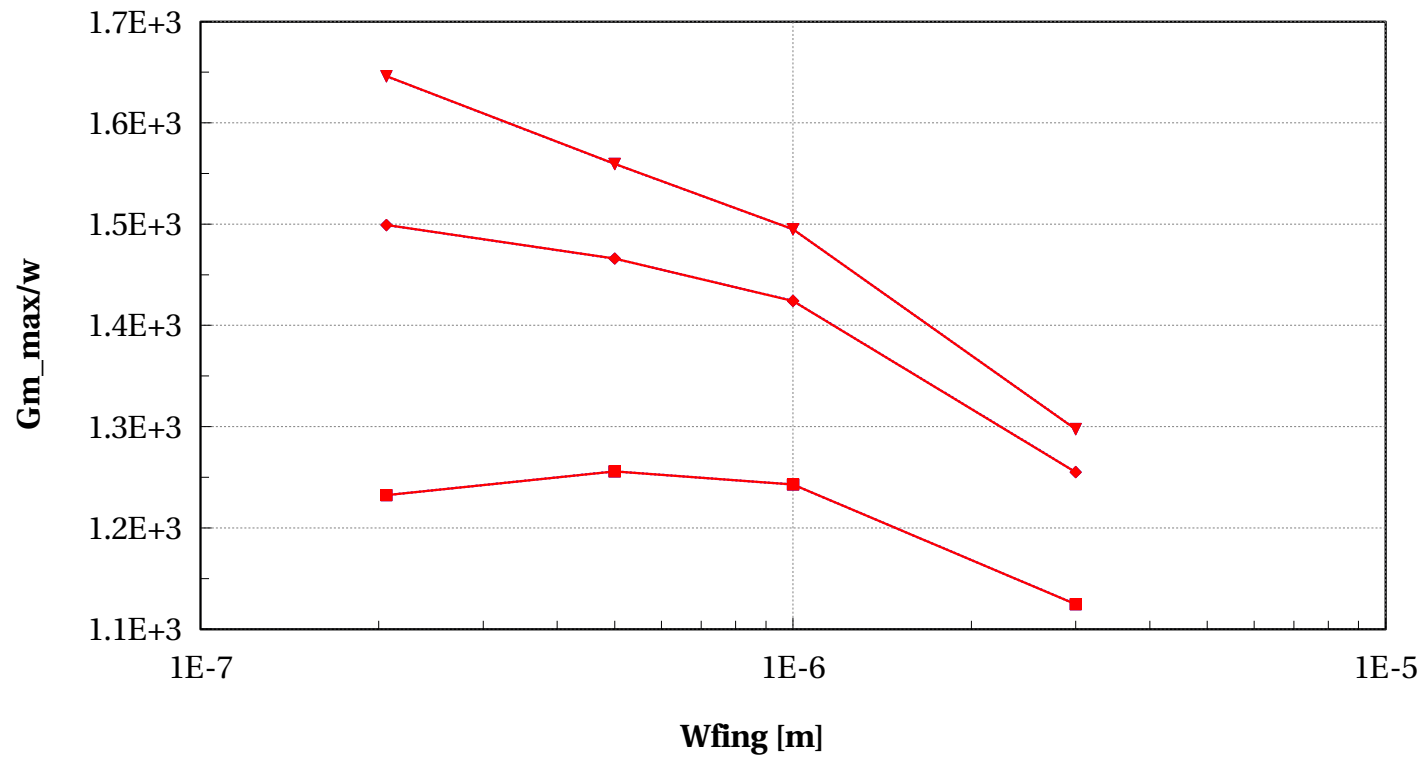
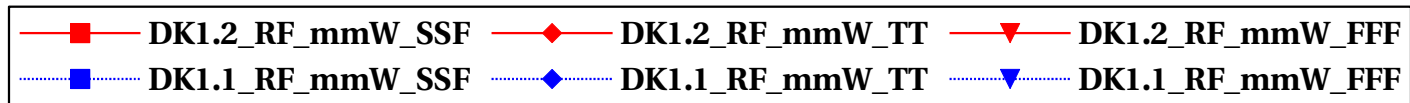
## lvtnfet\_rf, Isat normalized by TT [%] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# lvtnfet\_rf, Gm\_max/w vs Wfing [m]

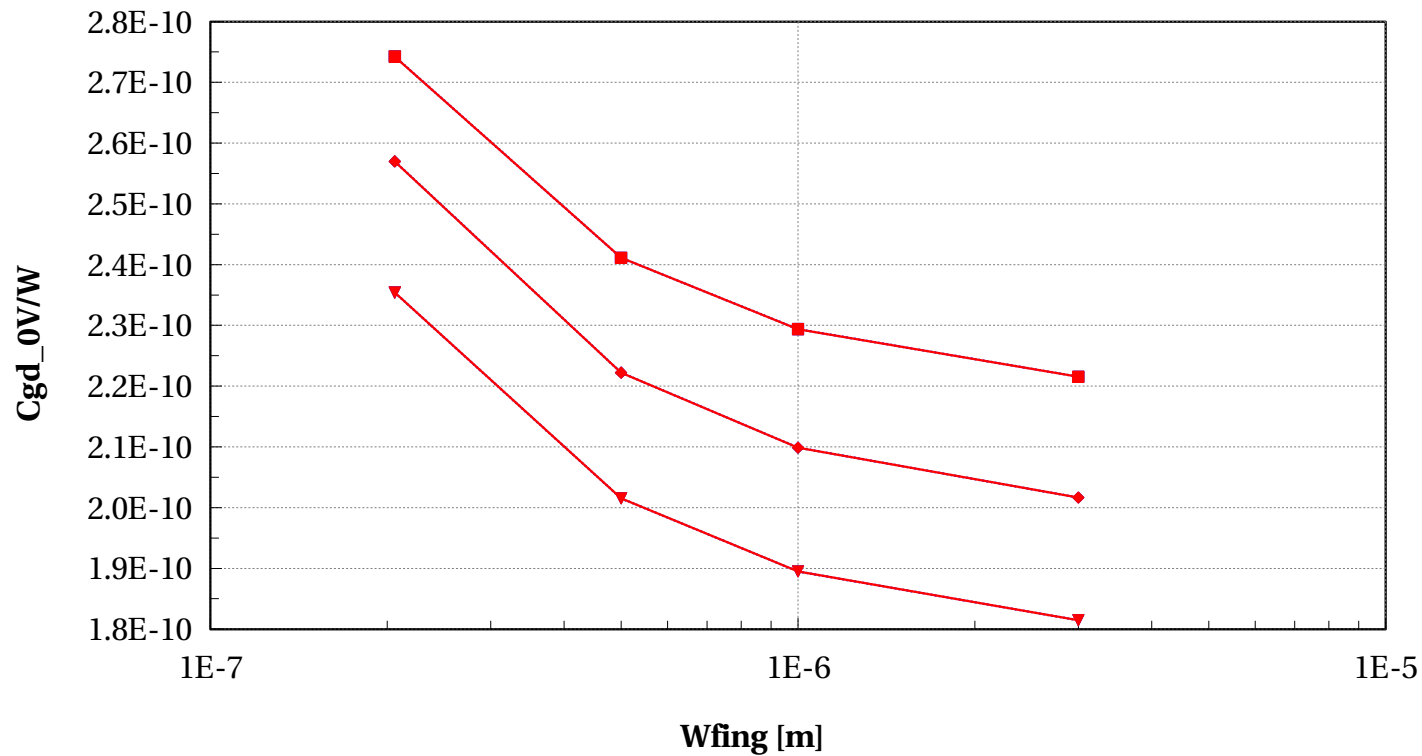
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



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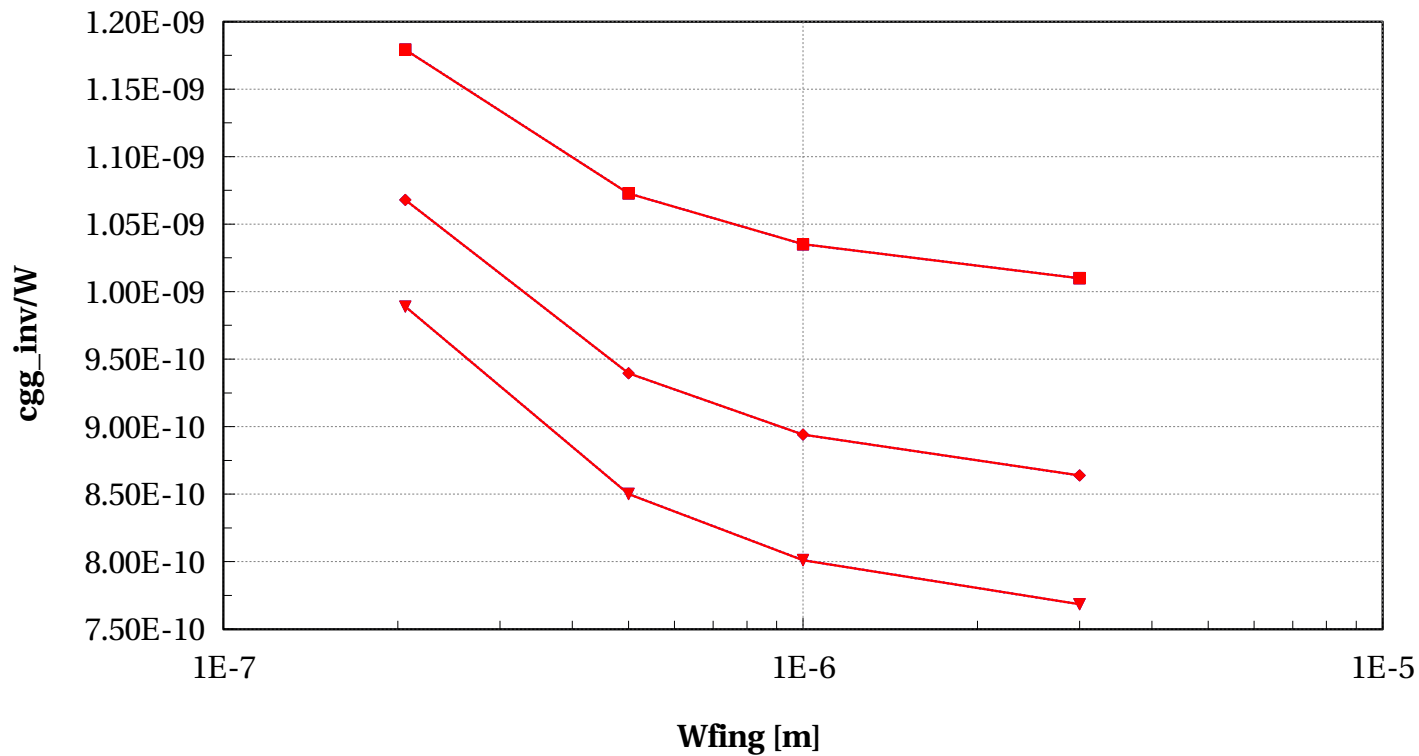
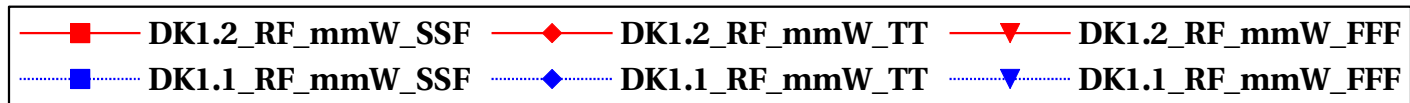
# lvtnfet\_rf, Cgd\_0V/W vs Wfing [m]

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# lvtnfet\_rf, cgg\_inv/W vs Wfing [m]

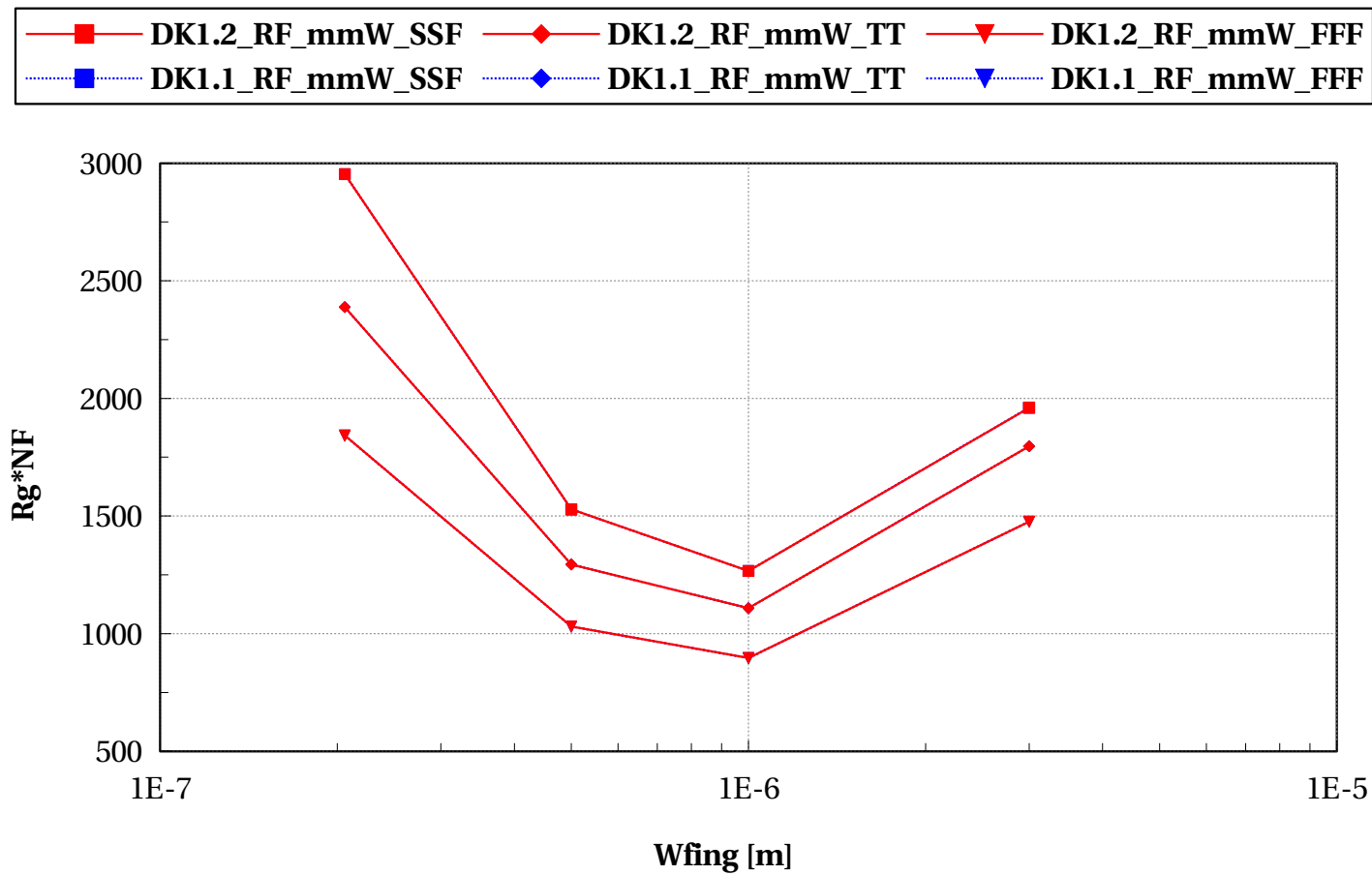
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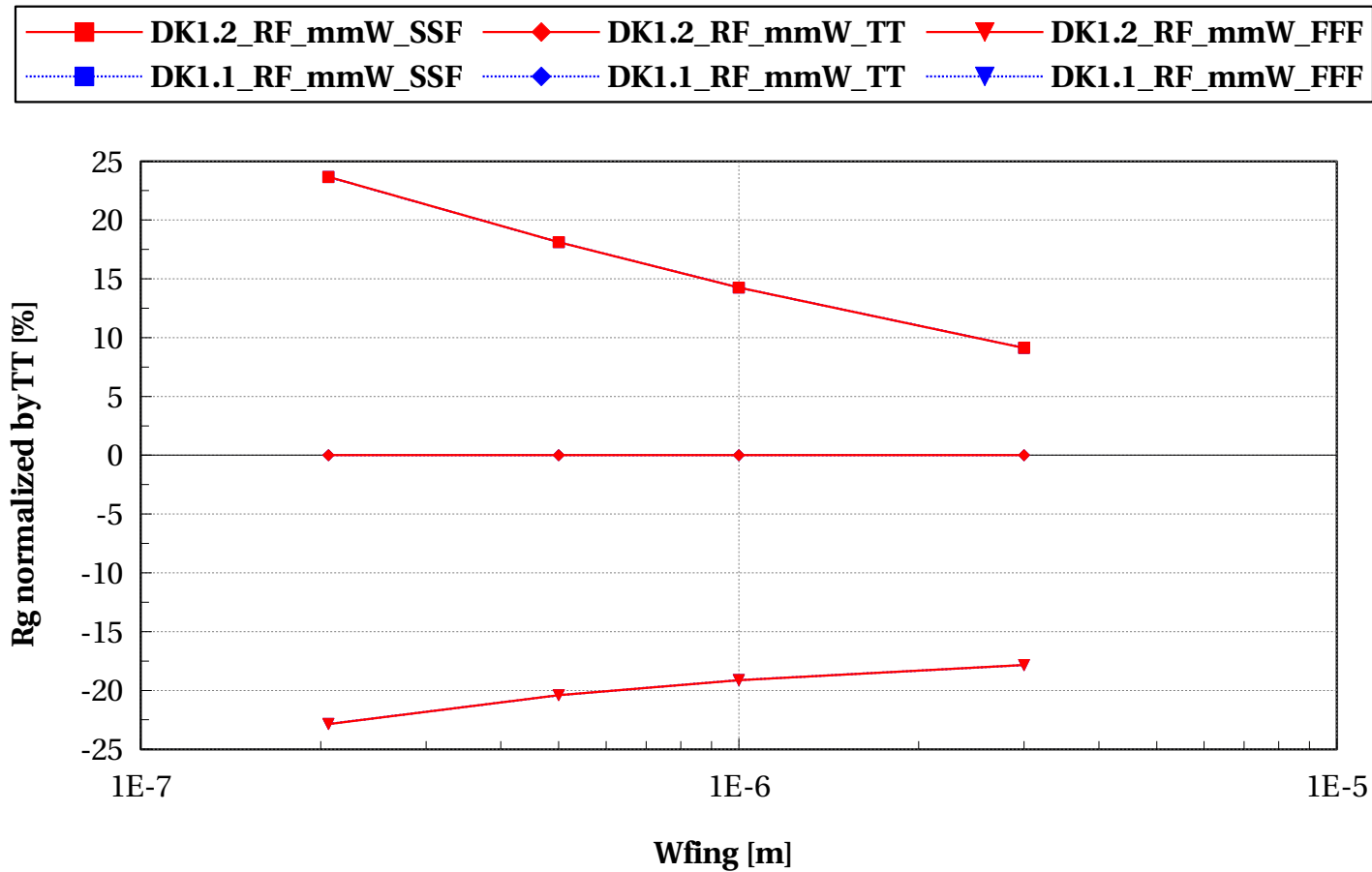
# lvtnfet\_rf, $R_g \cdot NF$ vs $W_{fing}$ [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and  $l=30e-9$



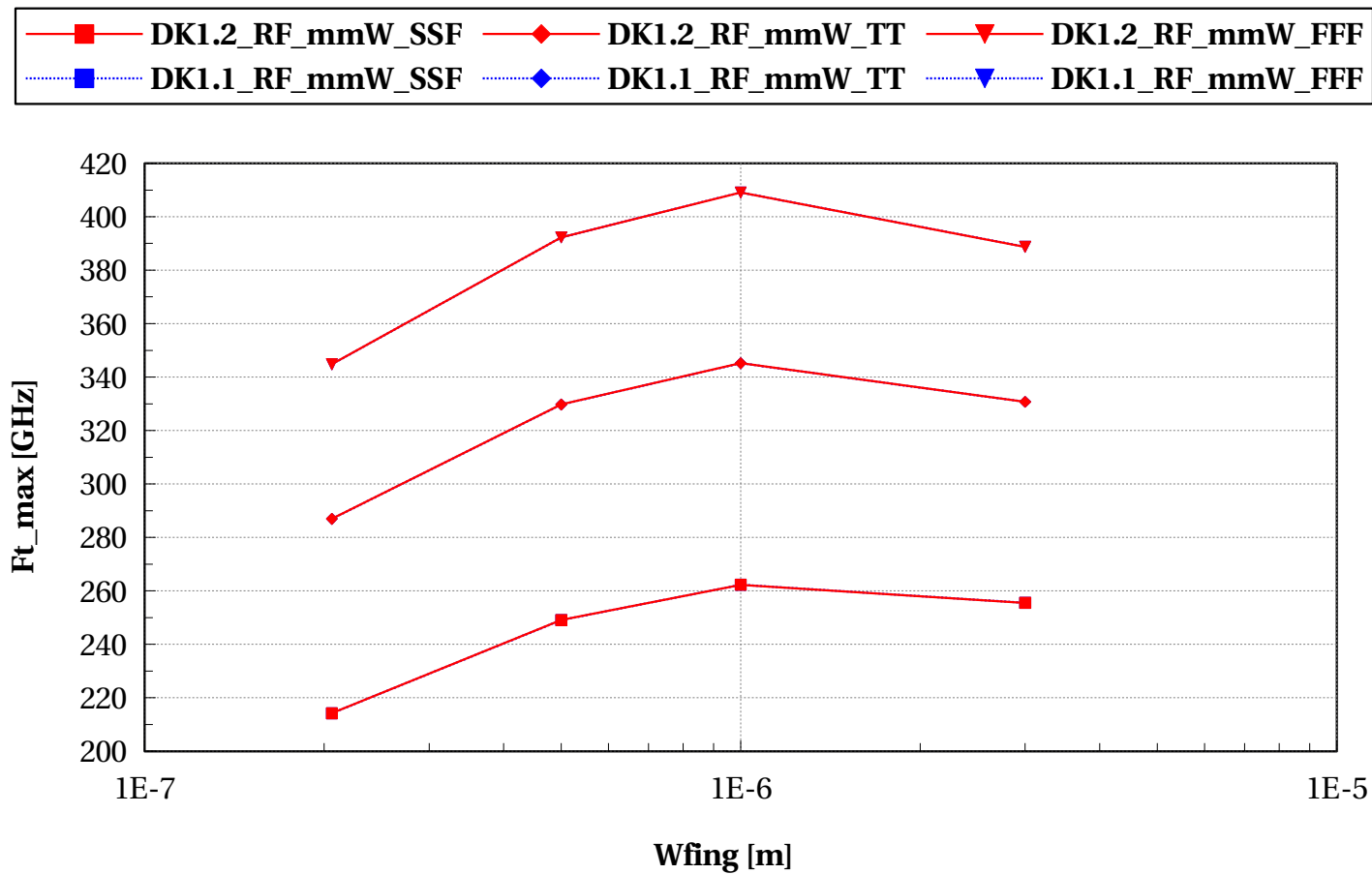
## lvtnfet\_rf, Rg normalized by TT [%] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



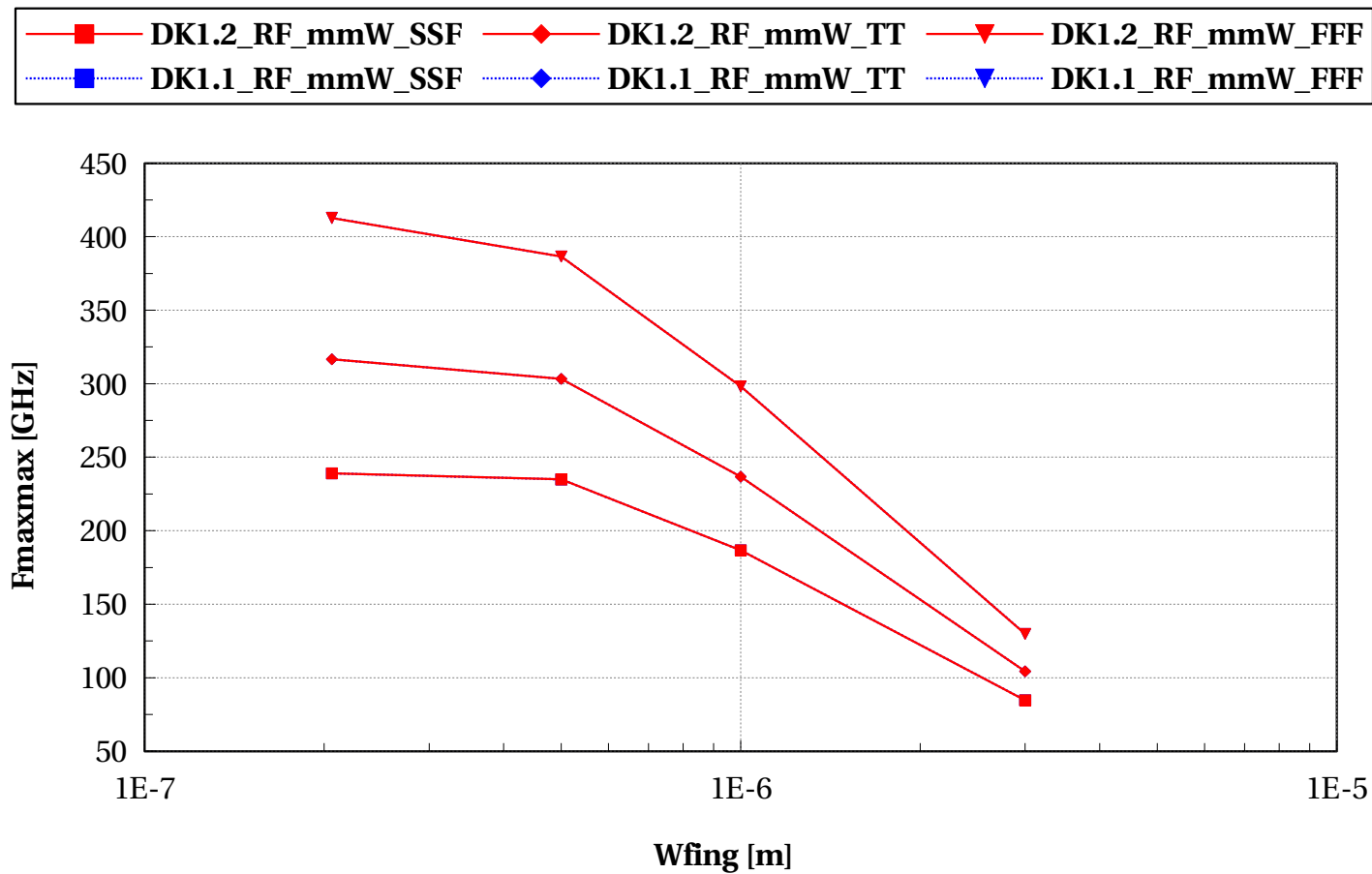
# lvtnfet\_rf, Ft\_max [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



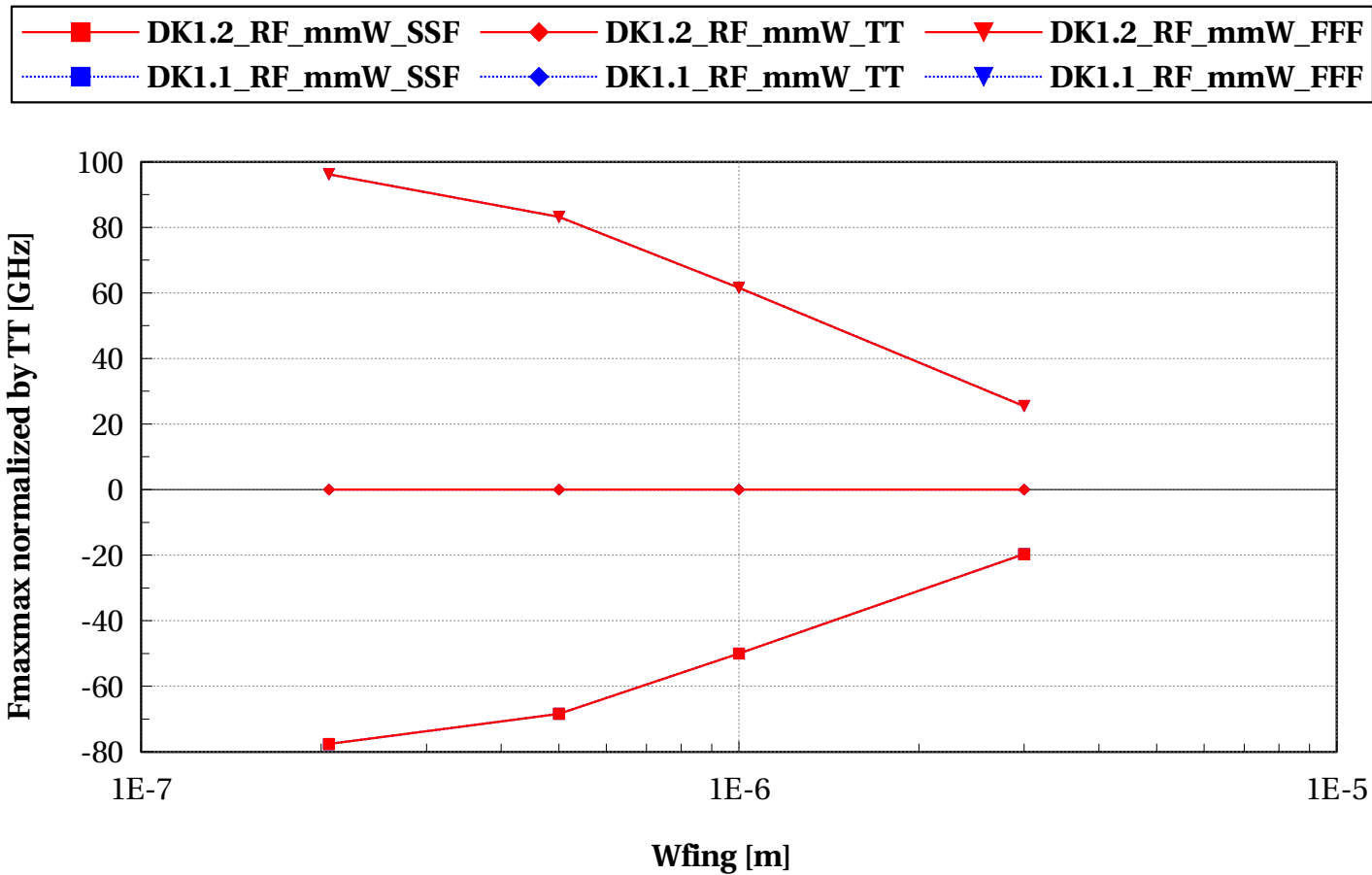
# lvtnfet\_rf, Fmaxmax [GHz] vs Wfing [m]

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# lvtnfet\_rf, Fmaxmax normalized by TT [GHz] vs Wfing [m]

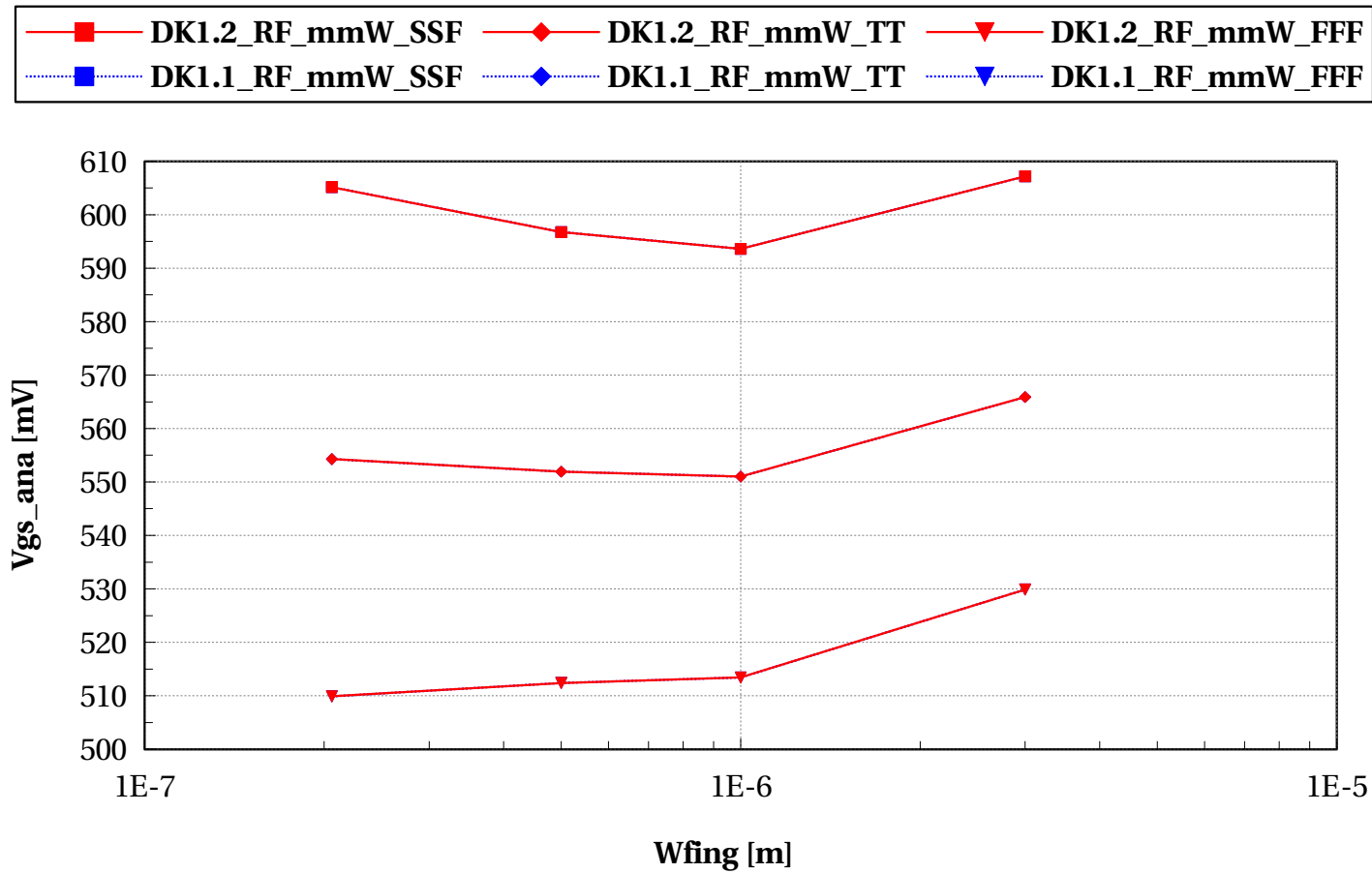
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## Scaling versus width $L=30\text{nm}$ - Analog

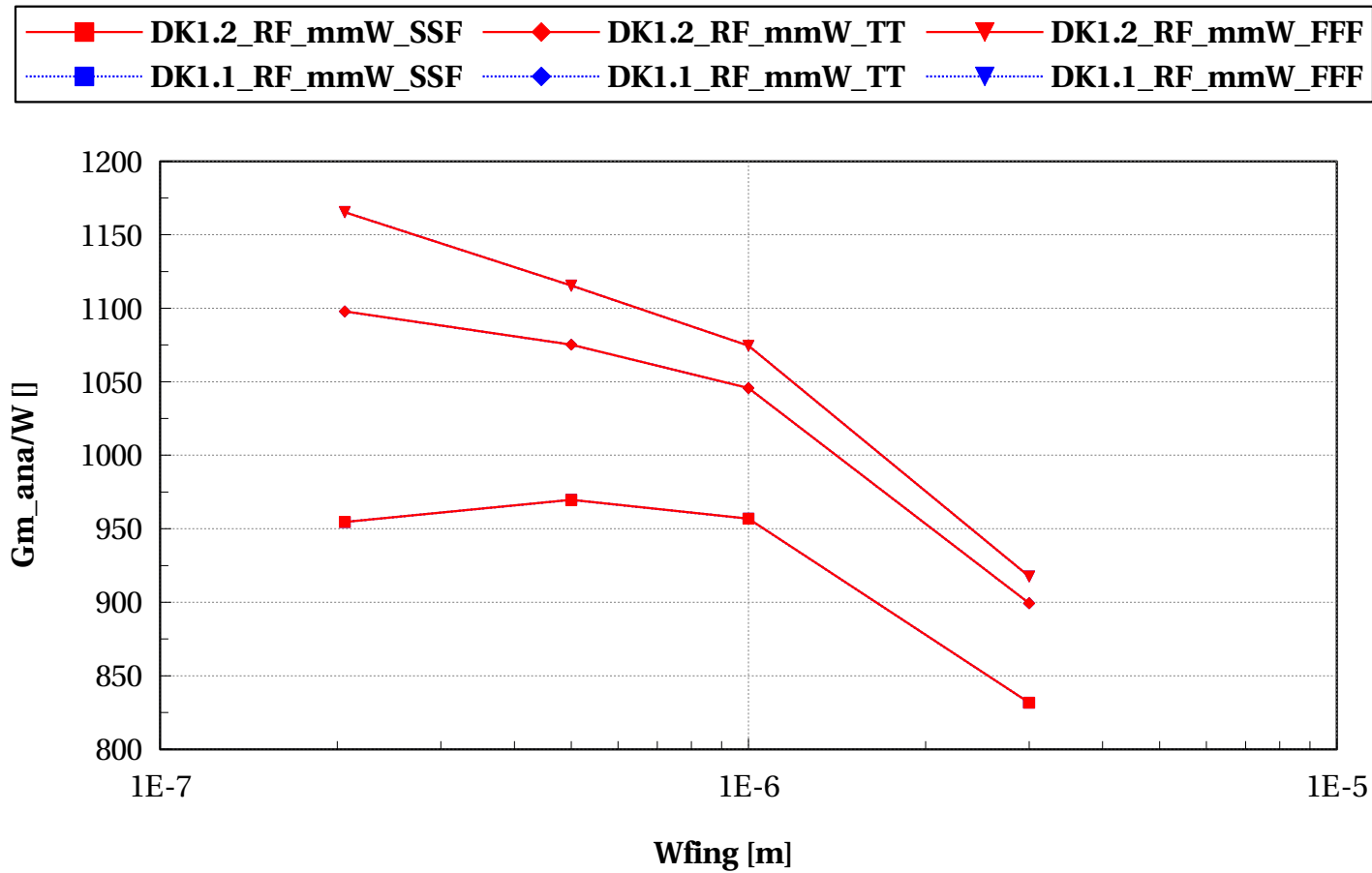
# lvtnfet\_rf, Vgs\_ana [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# lvtnfet\_rf, Gm\_ana/W [] vs Wfing [m]

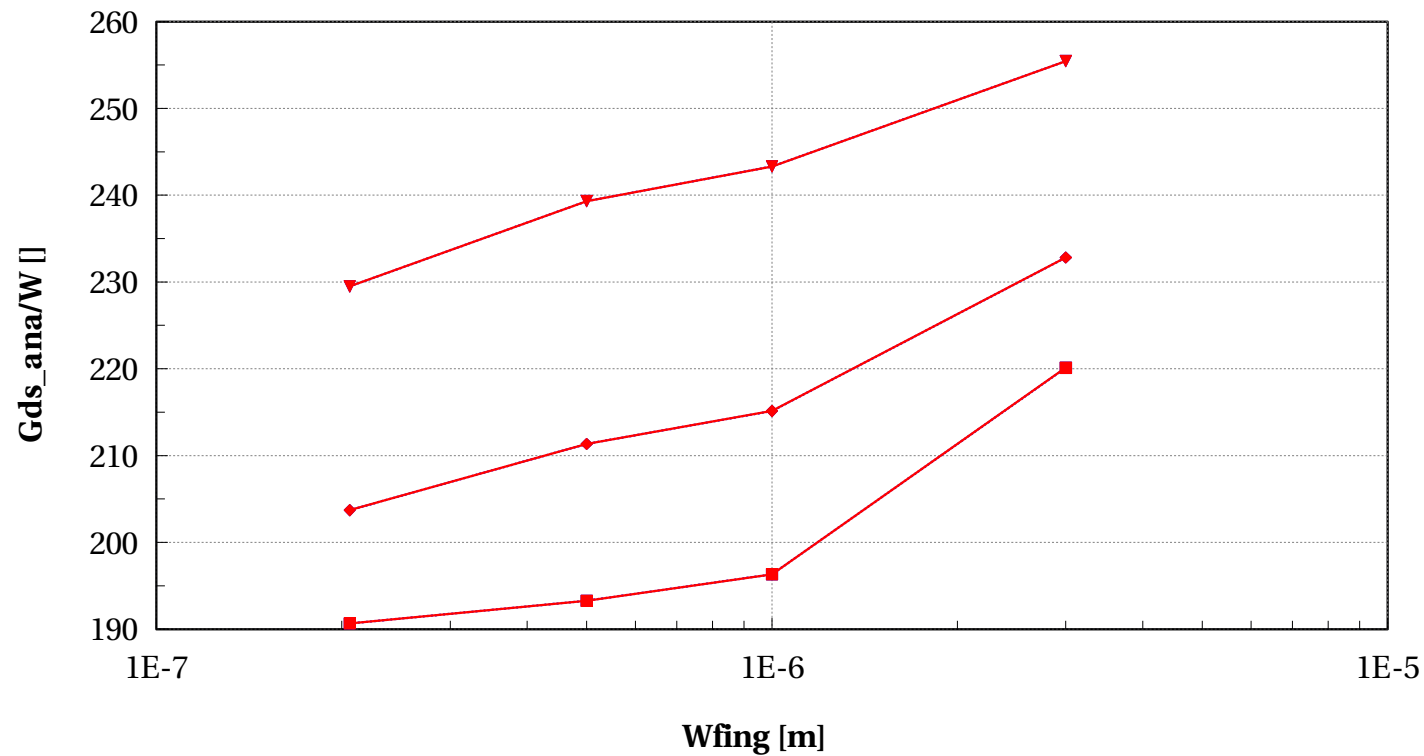
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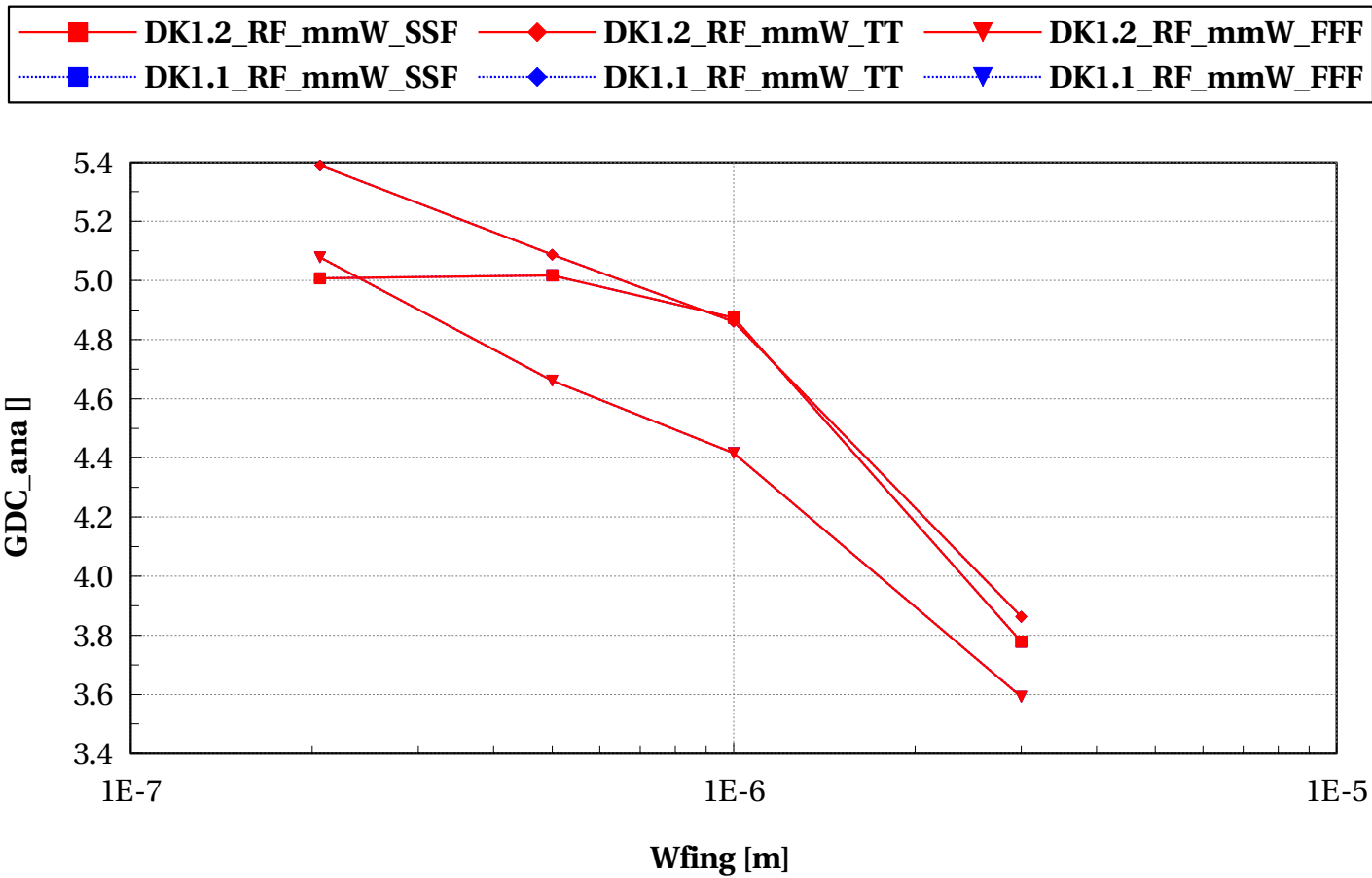
# lvtnfet\_rf, Gds\_ana/W [] vs Wfing [m]

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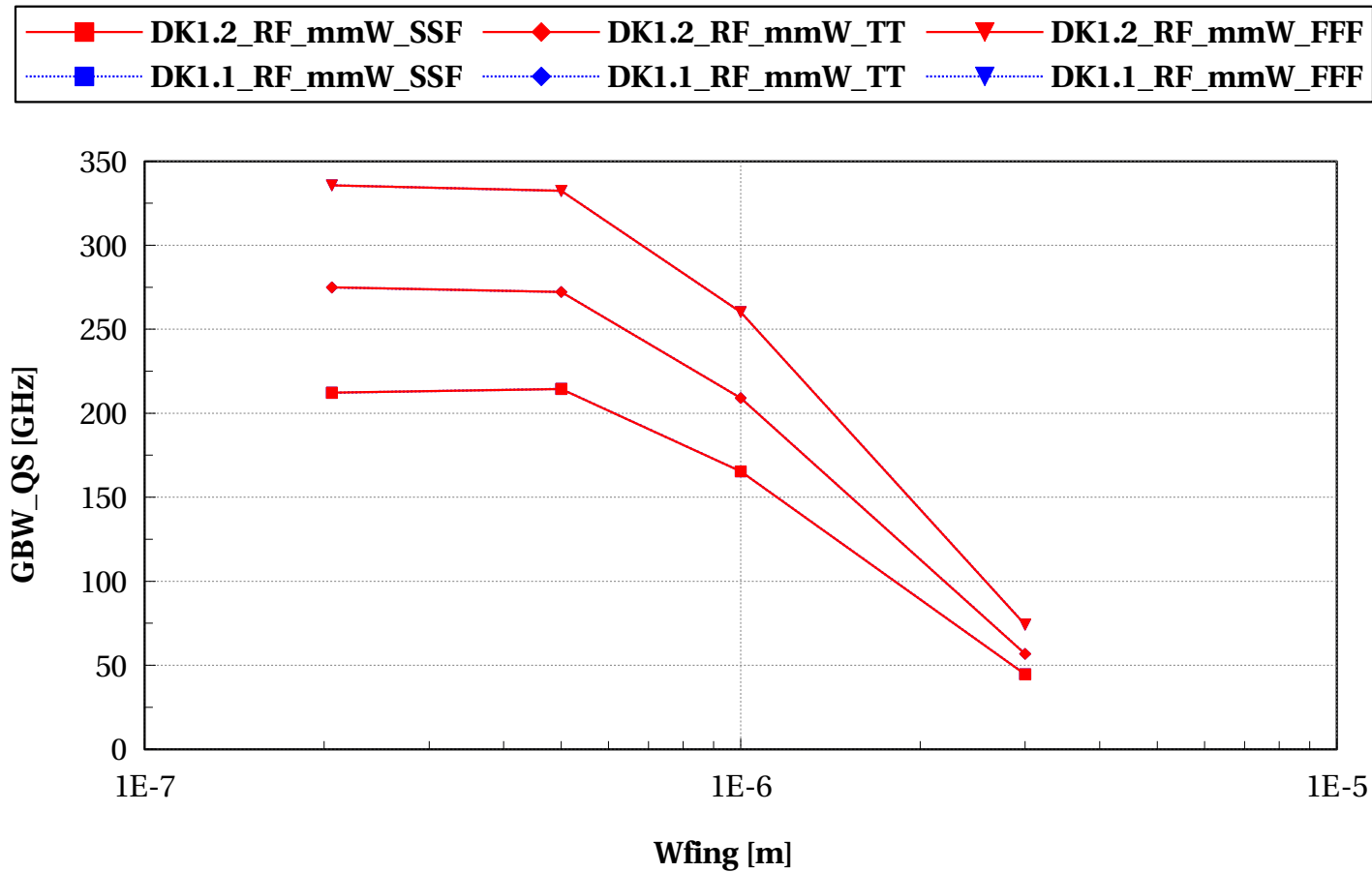
# lvtnfet\_rf, GDC\_ana [] vs Wfing [m]

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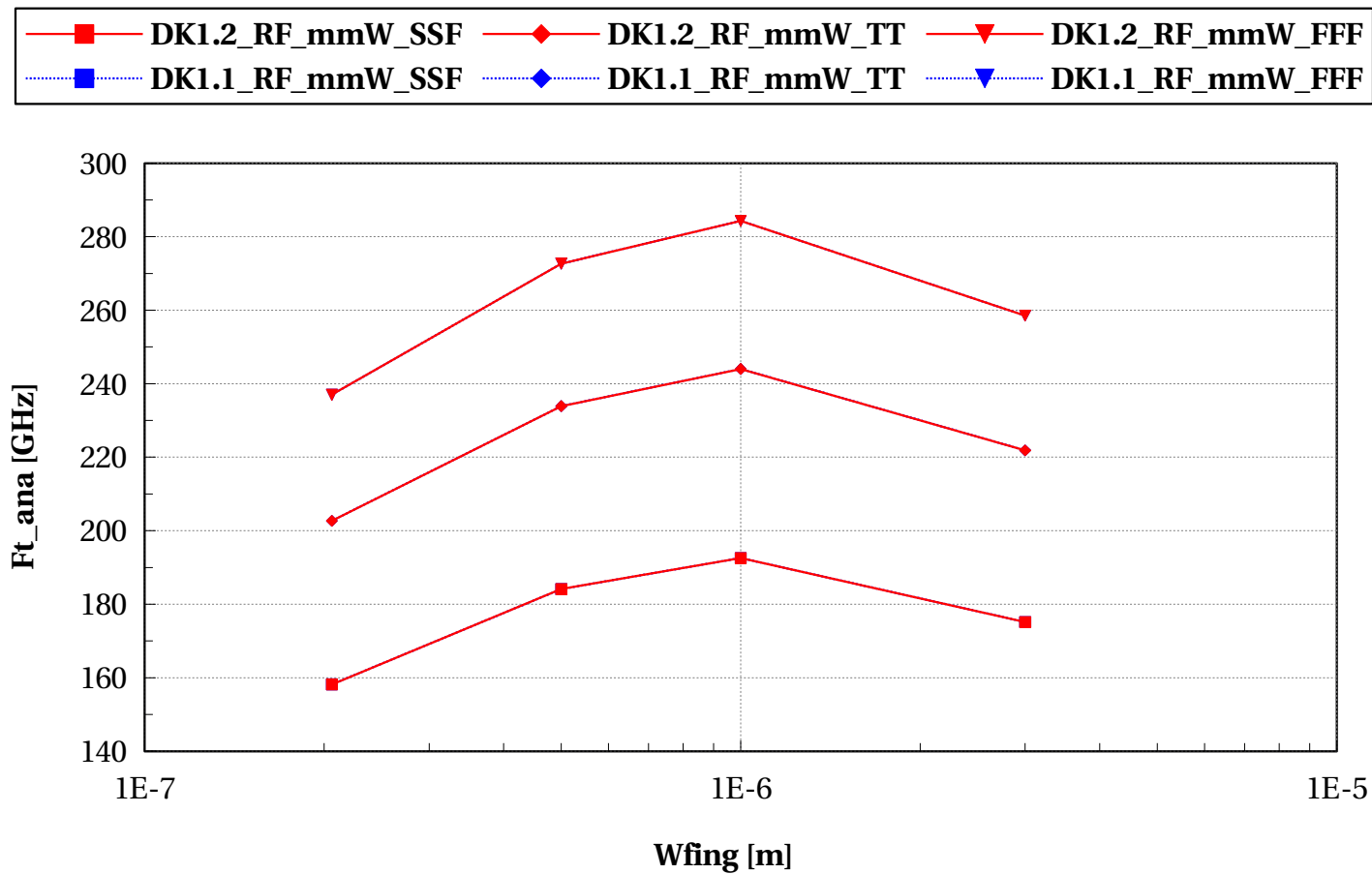
# lvtnfet\_rf, GBW\_QS [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# lvtnfet\_rf, Ft\_ana [GHz] vs Wfing [m]

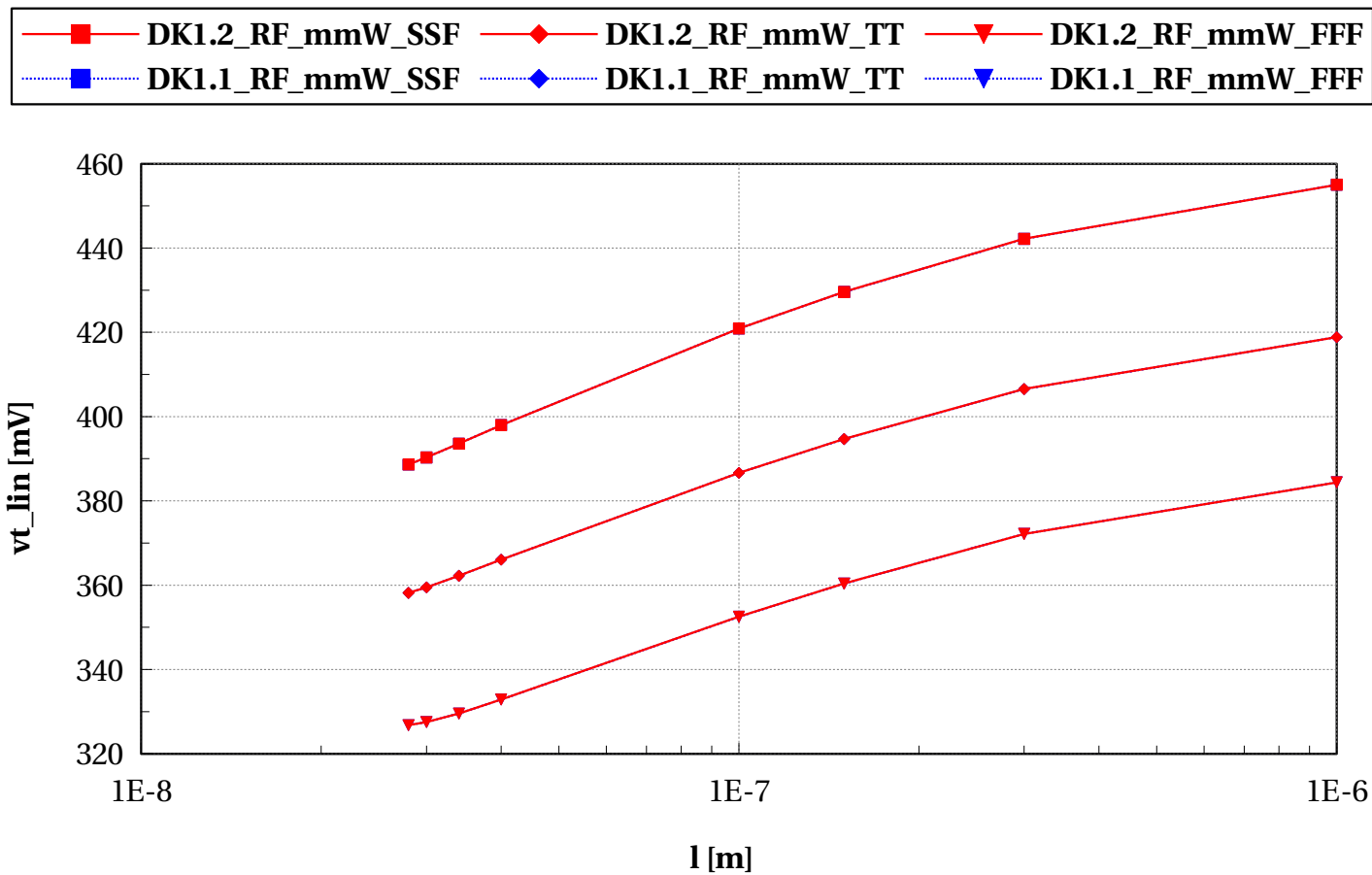
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



## Scaling versus length $W_{\text{fing}}=1\mu\text{m}$ - DC

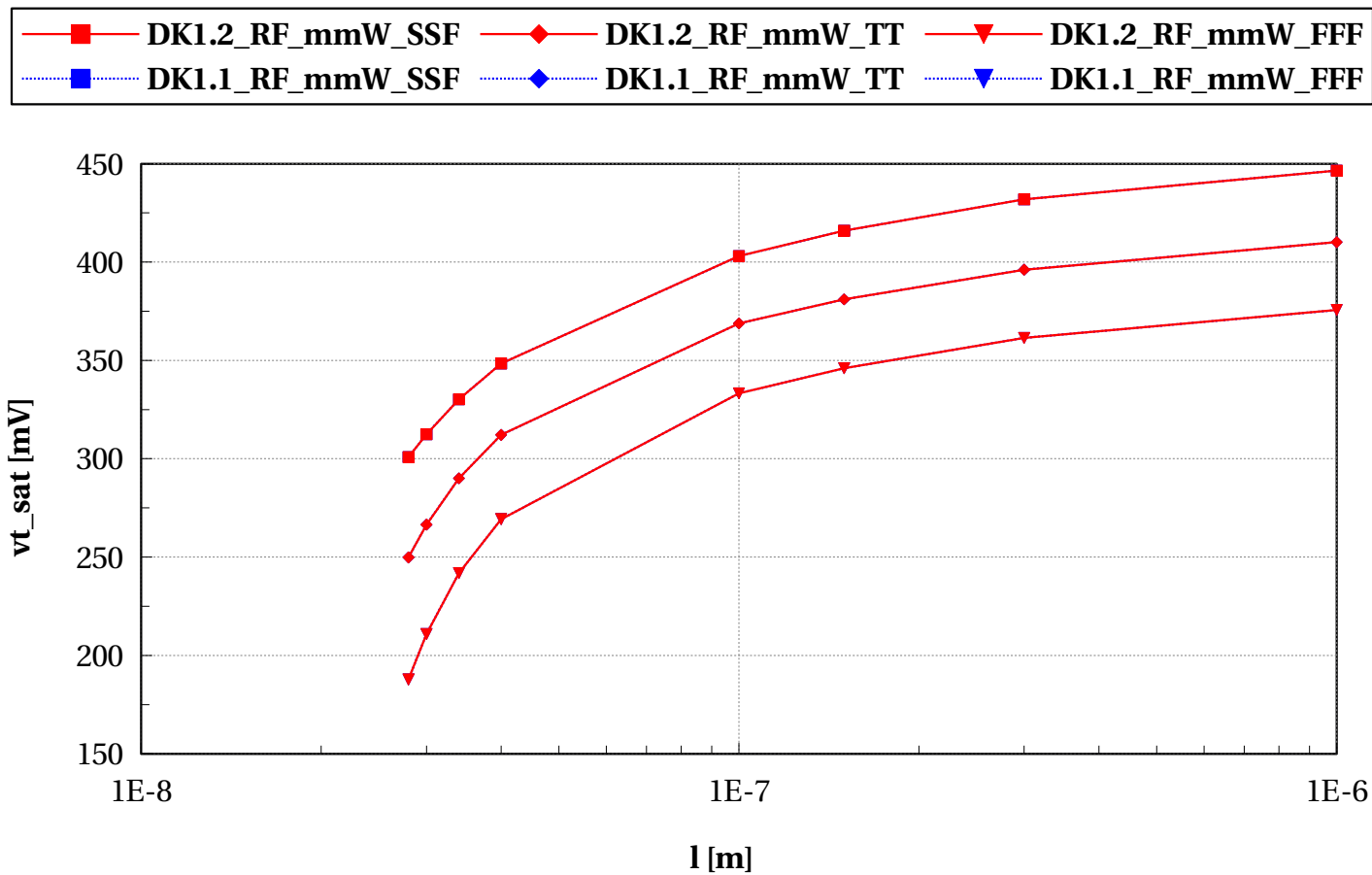
# lvtnfet\_rf, vt\_lin [mV] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



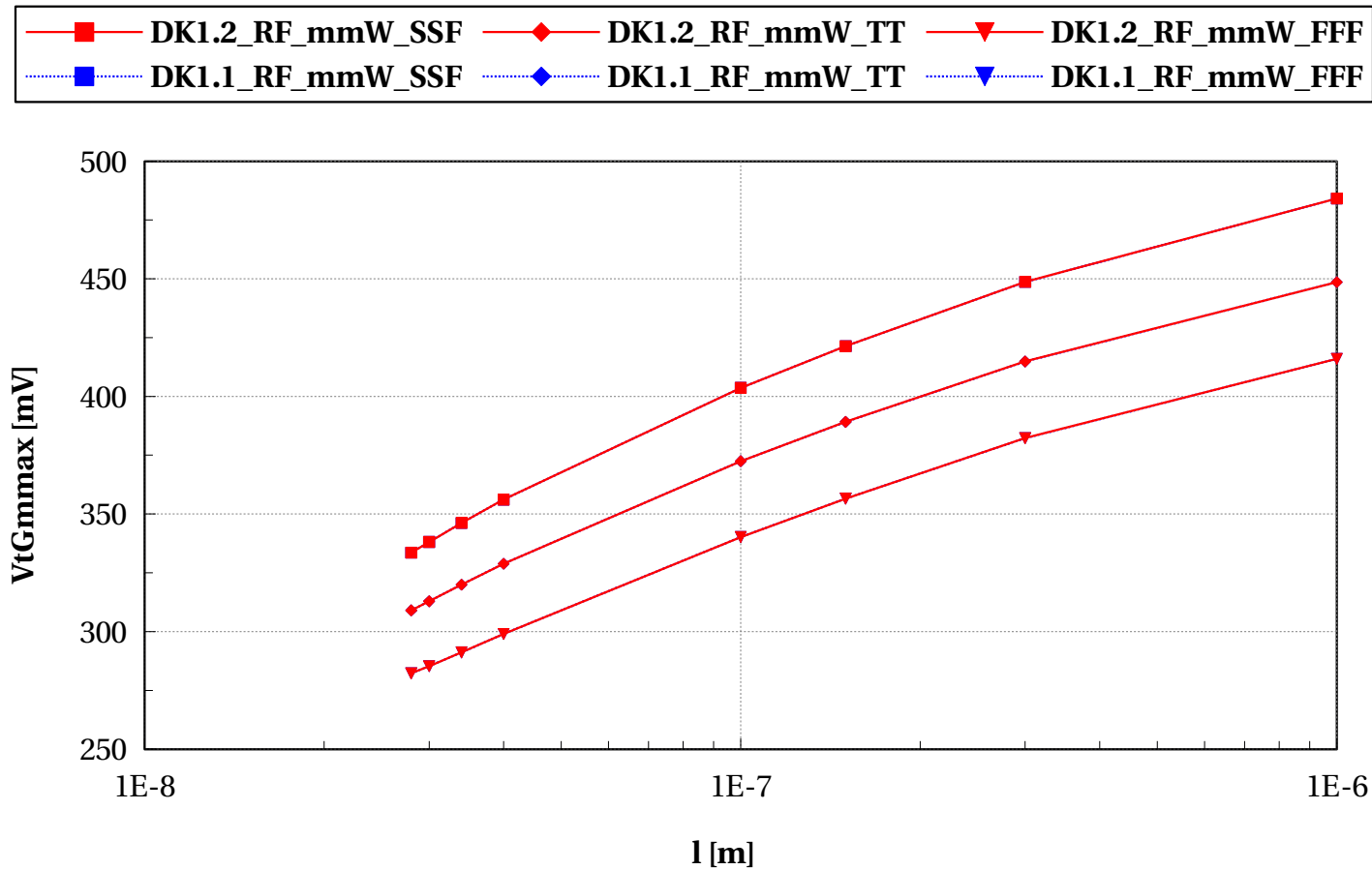
# lvtnfet\_rf, vt\_sat [mV] vs l [m]

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# lvtnfet\_rf, VtGmmax [mV] vs l [m]

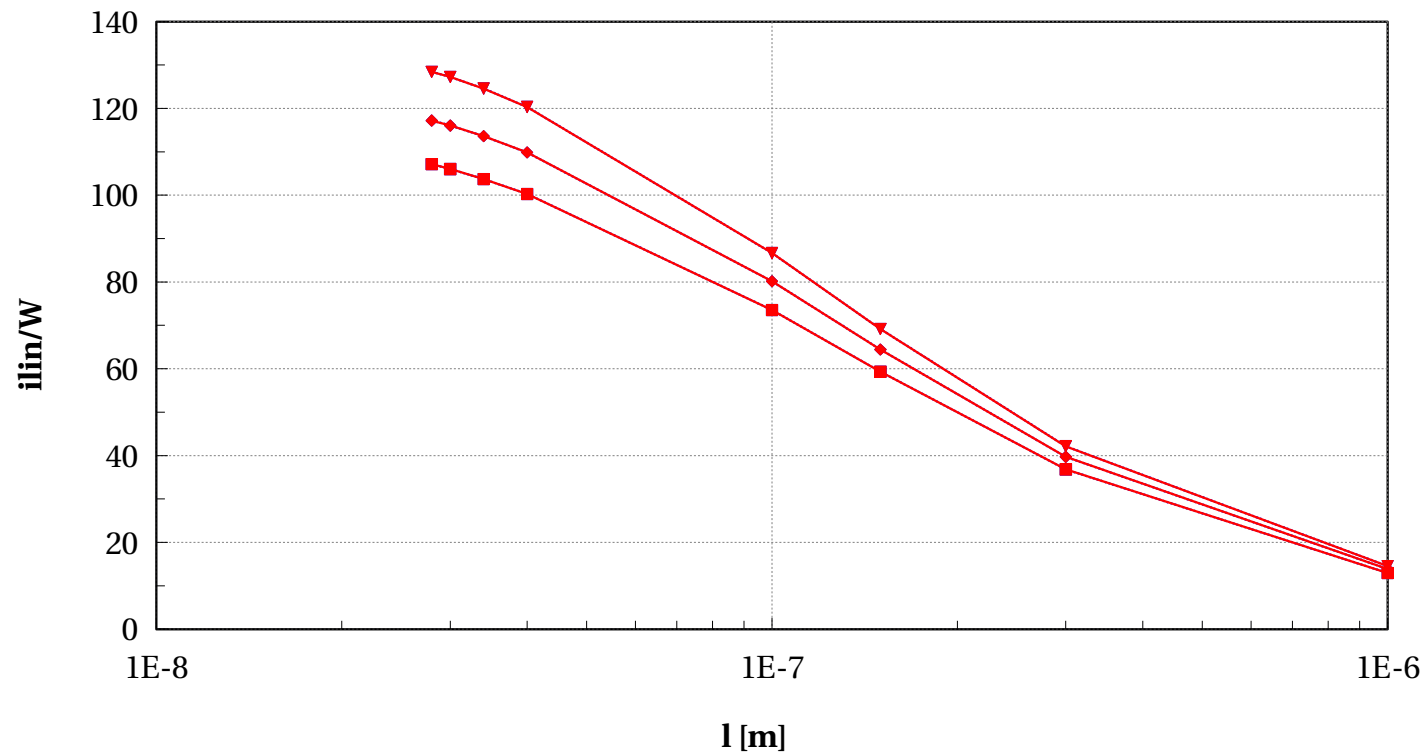
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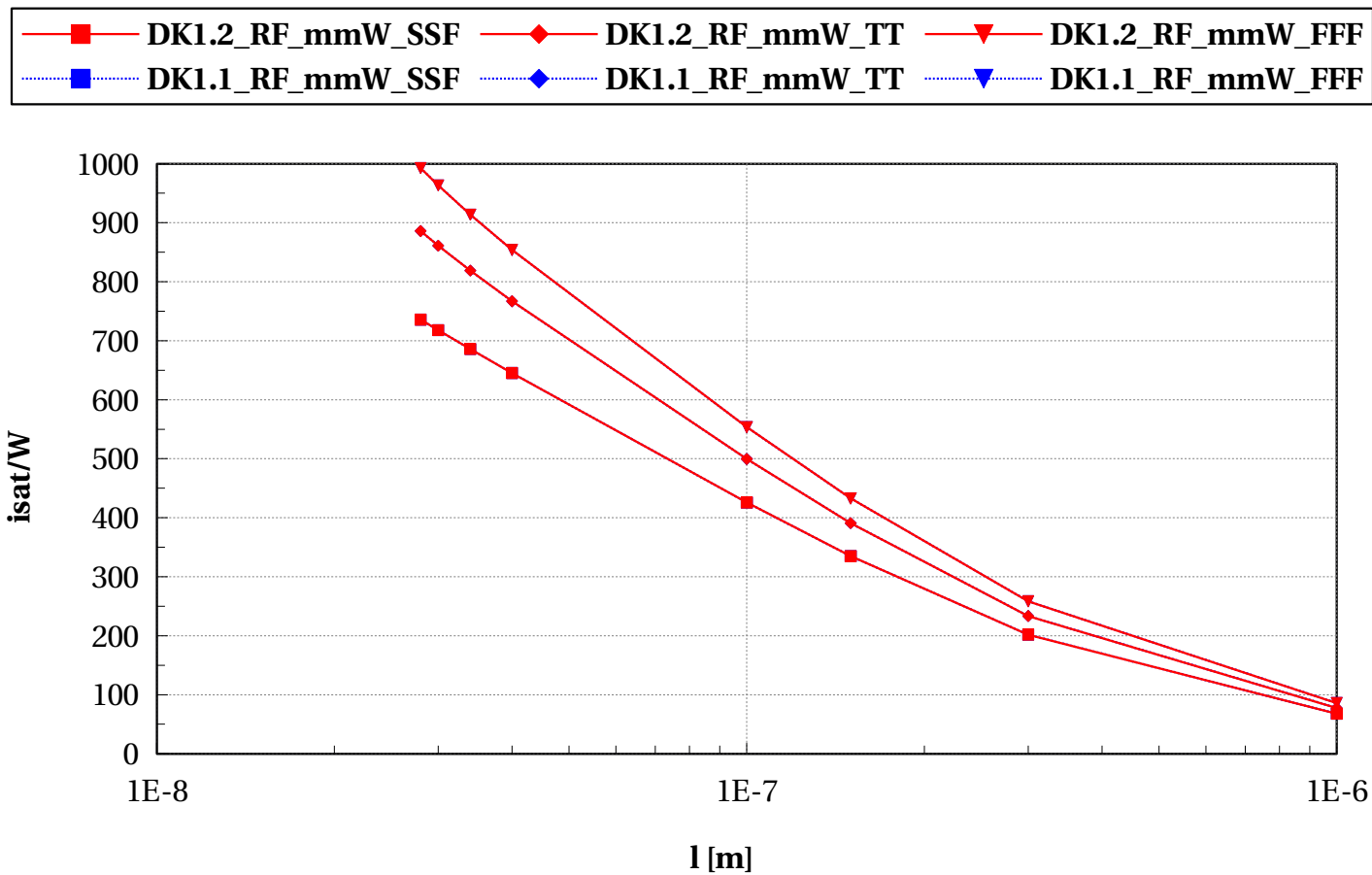
# lvtnfet\_rf, ilin/W vs l [m]

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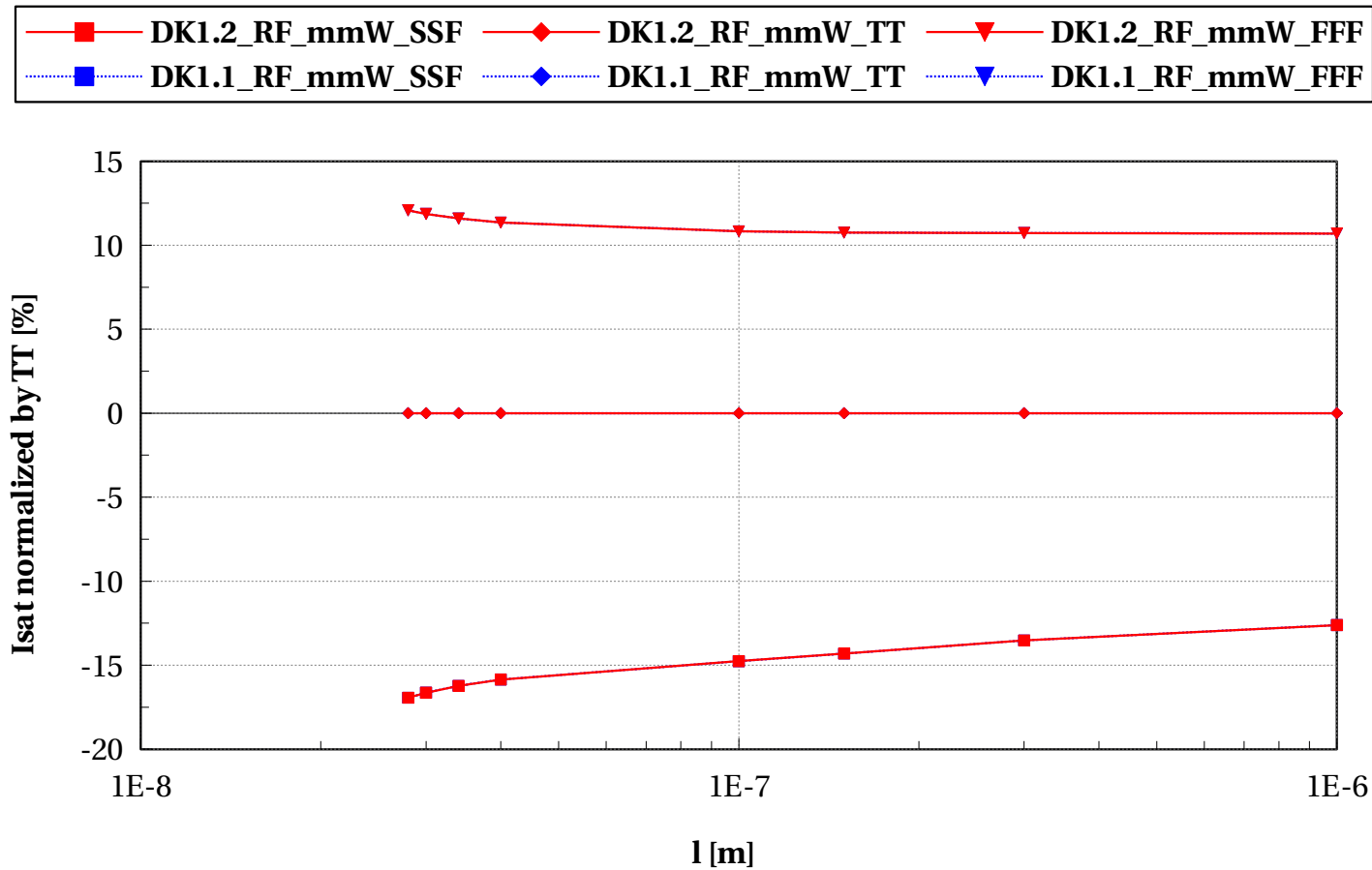
# lvtnfet\_rf, isat/W vs l [m]

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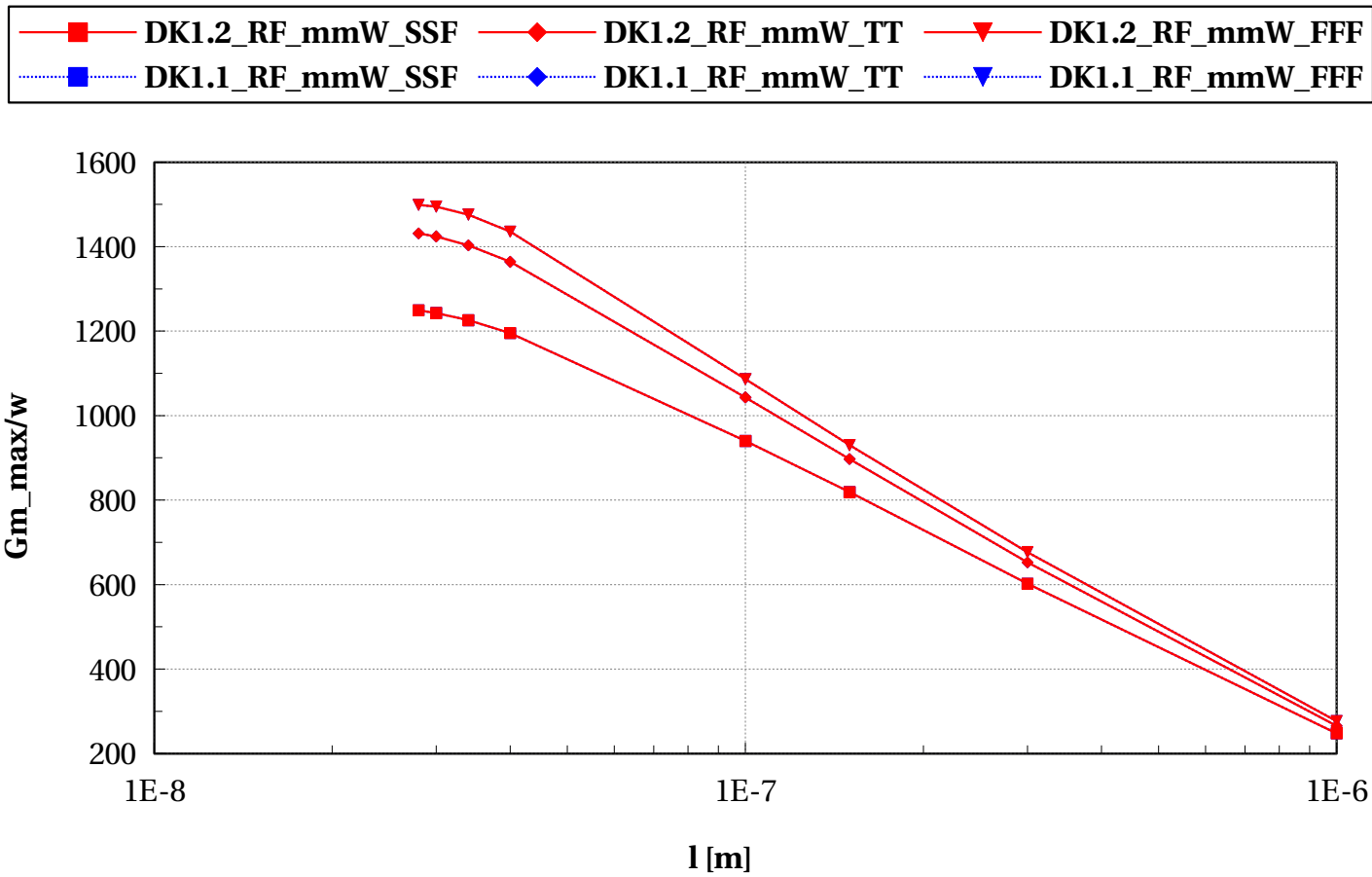
## lvtnfet\_rf, Isat normalized by TT [%] vs l [m]

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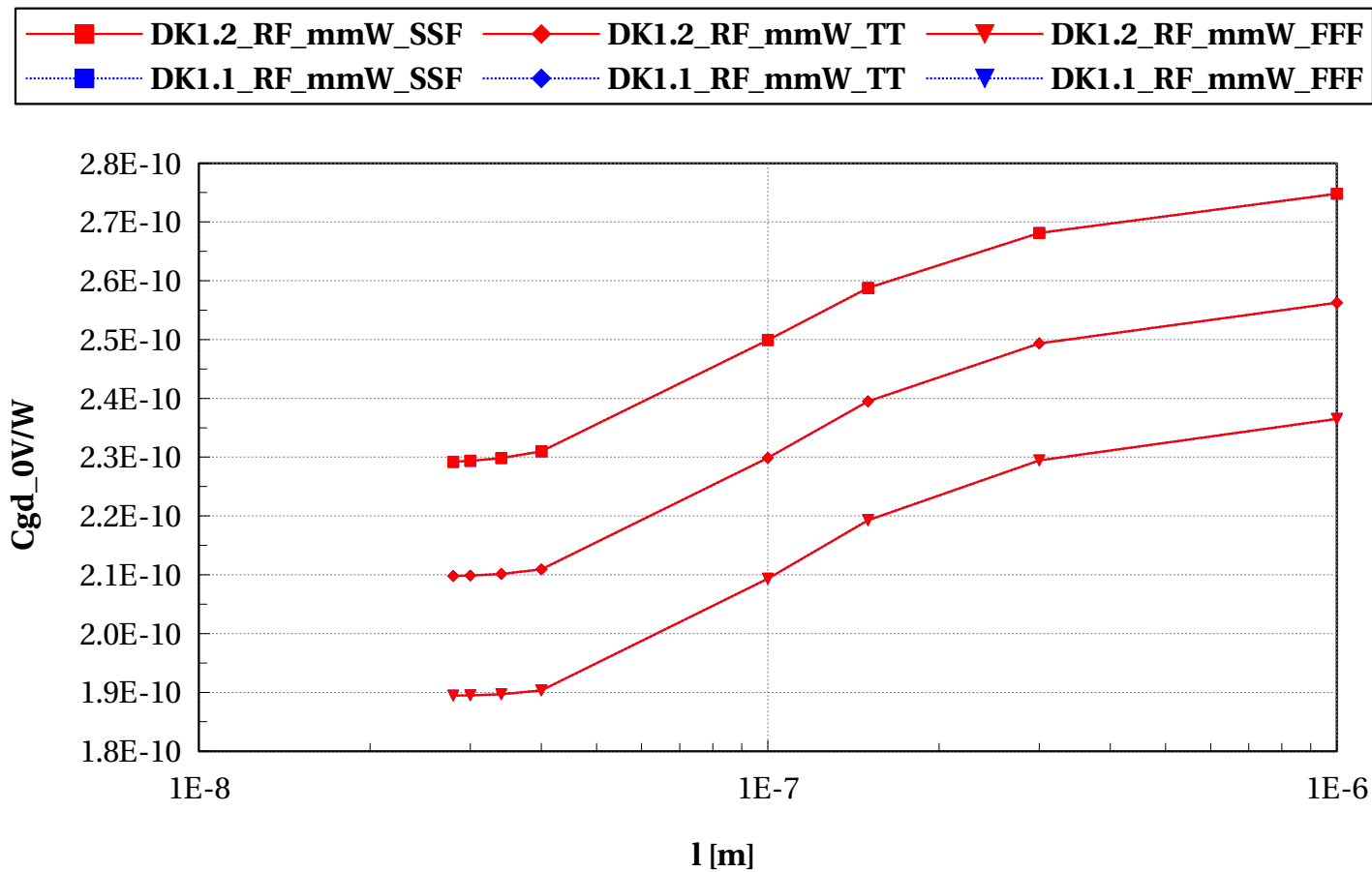
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# Scaling versus length $W_{\text{fing}}=1\text{ }\mu\text{m}$ - RF

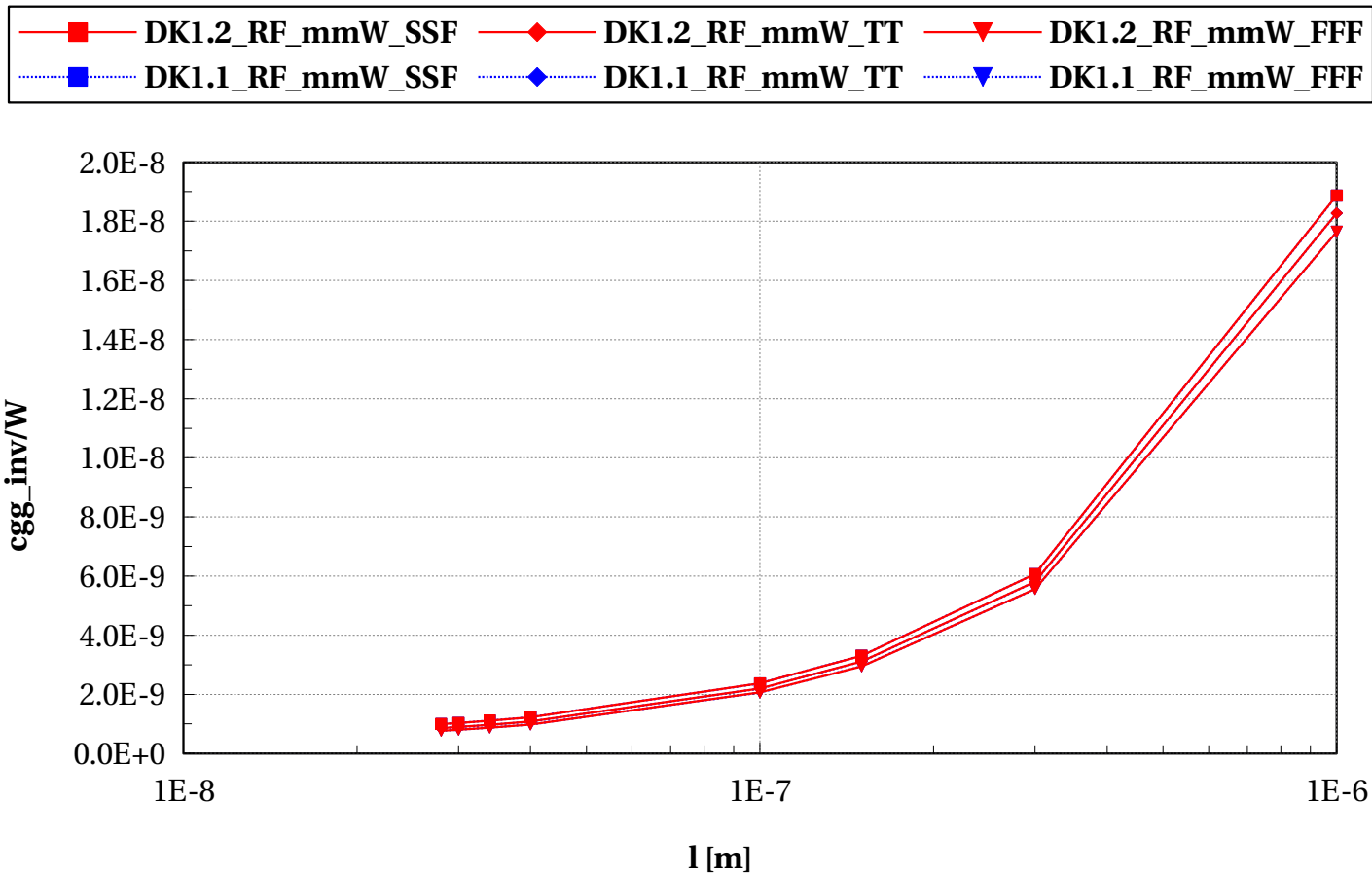
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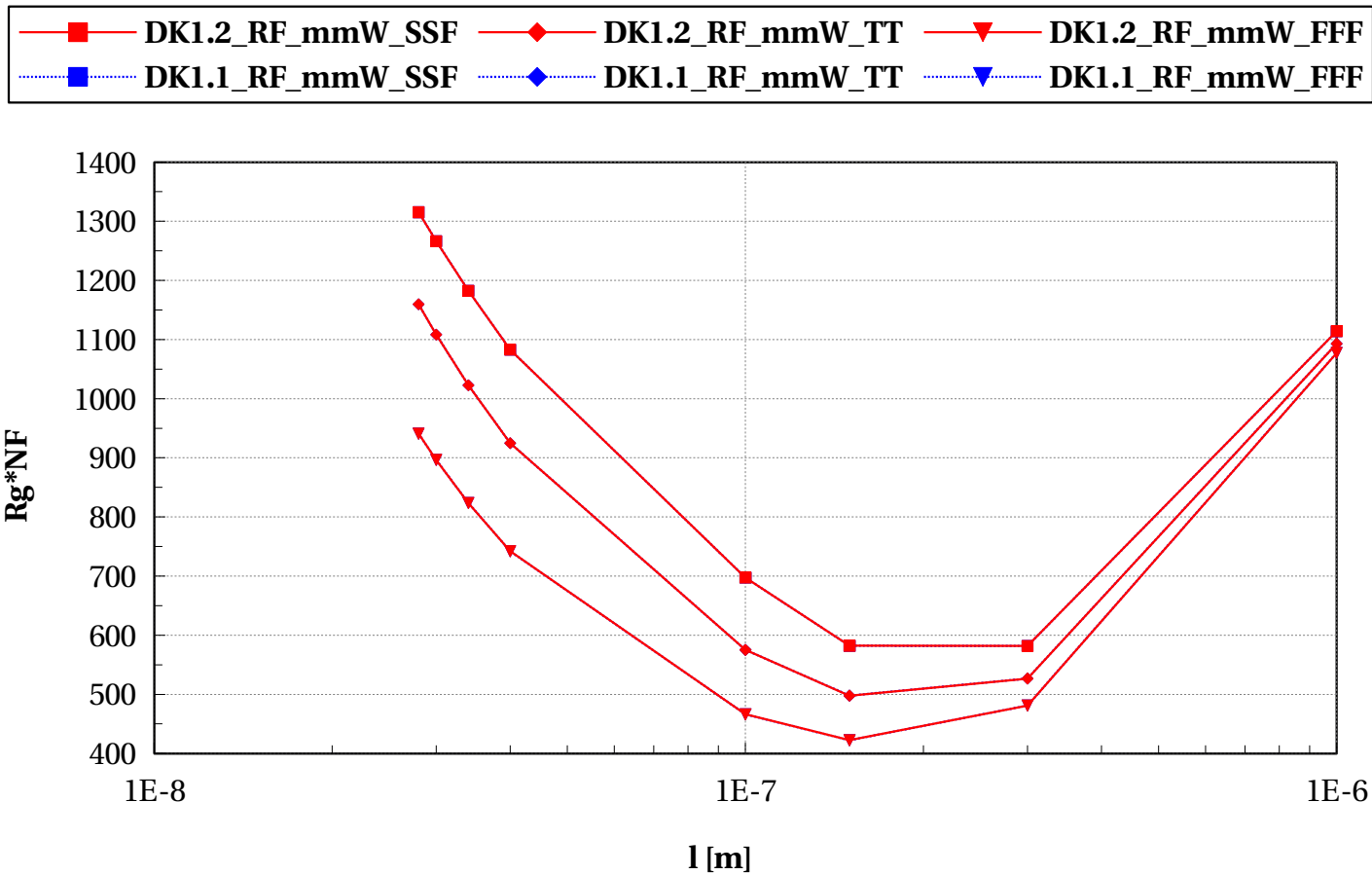
# lvtnfet\_rf, cgg\_inv/W vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



# lvtnfet\_rf, $R_g * NF$ vs $l$ [m]

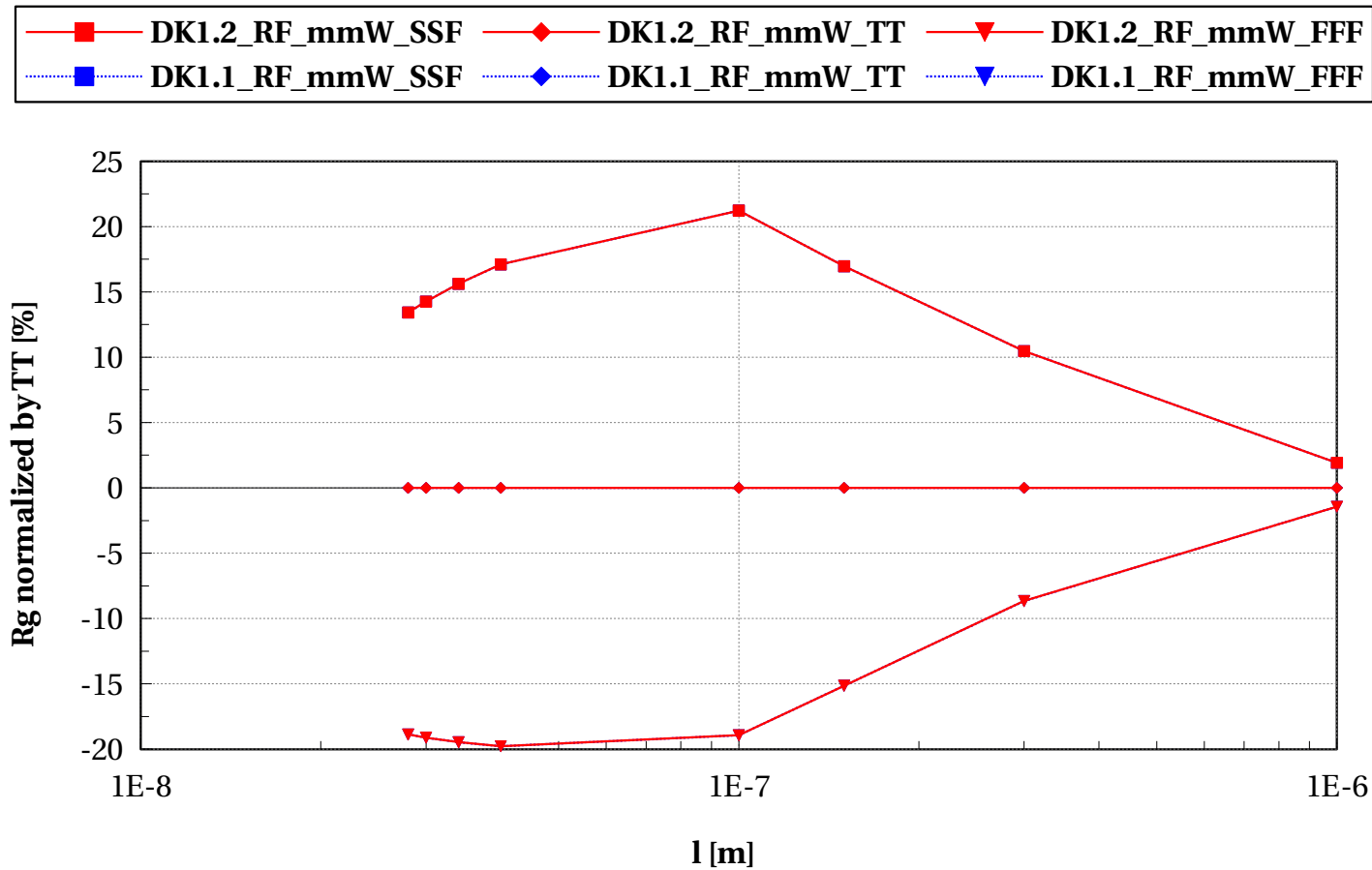
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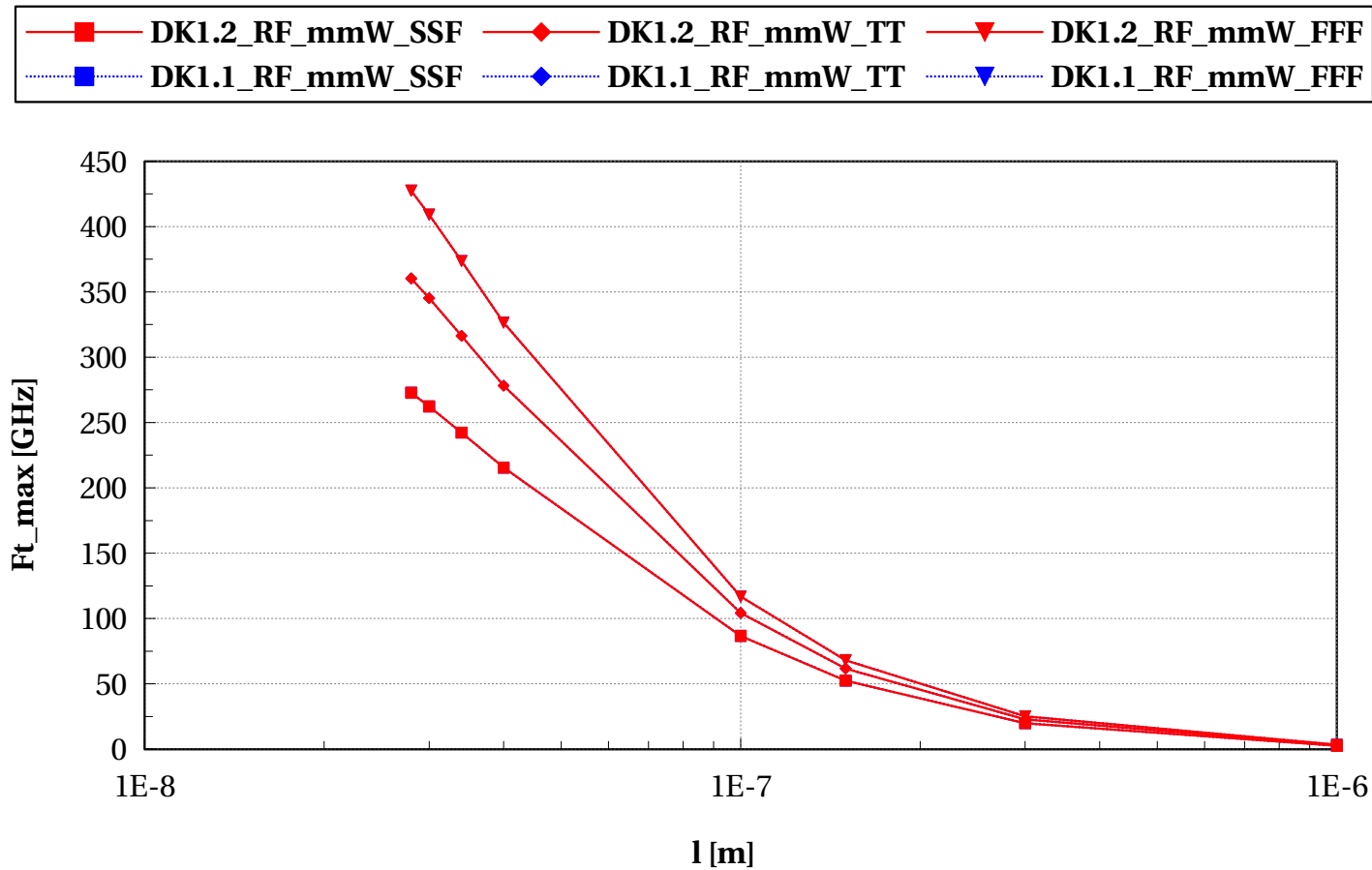
## lvtnfet\_rf, Rg normalized by TT [%] vs l [m]

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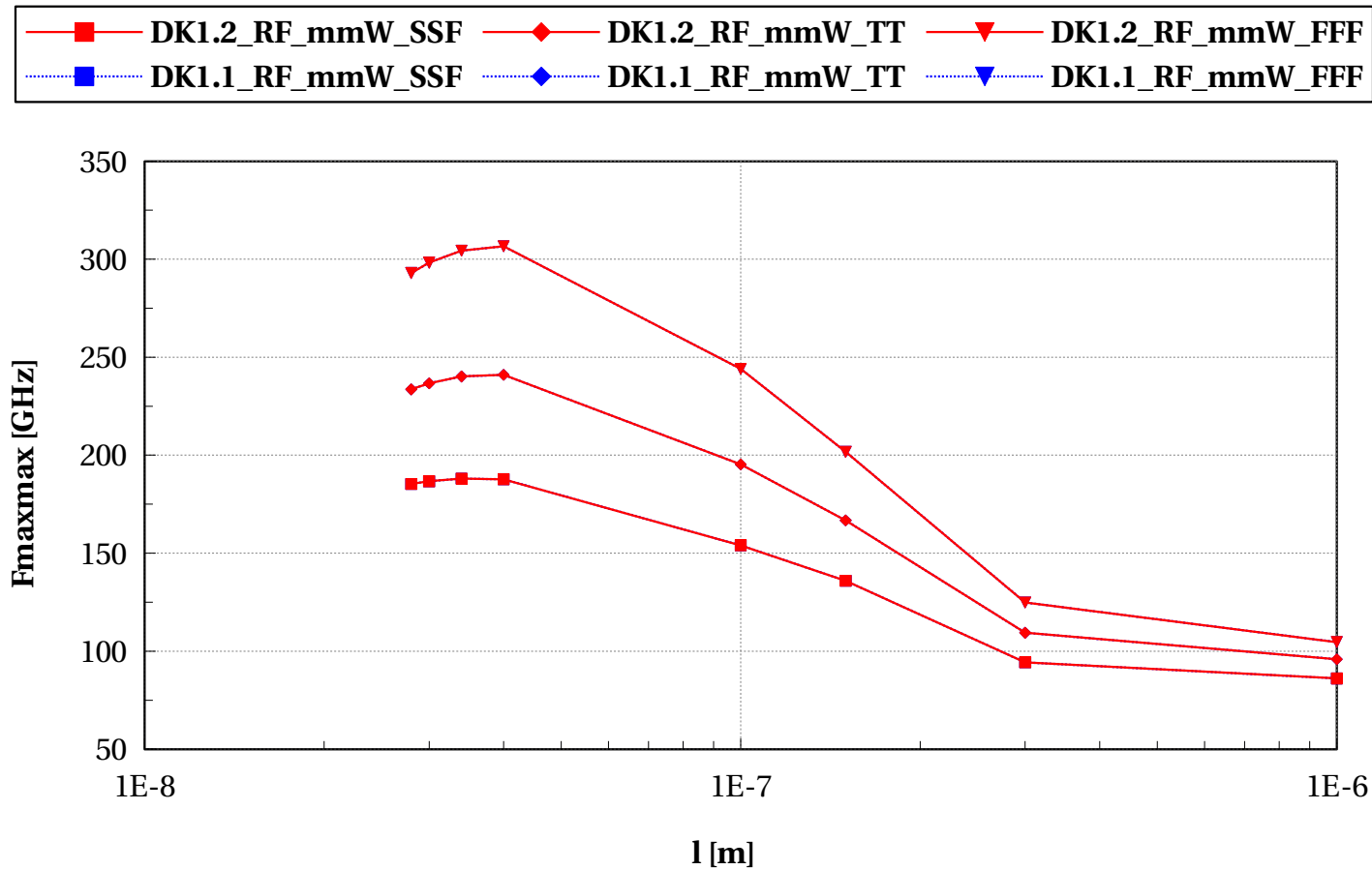
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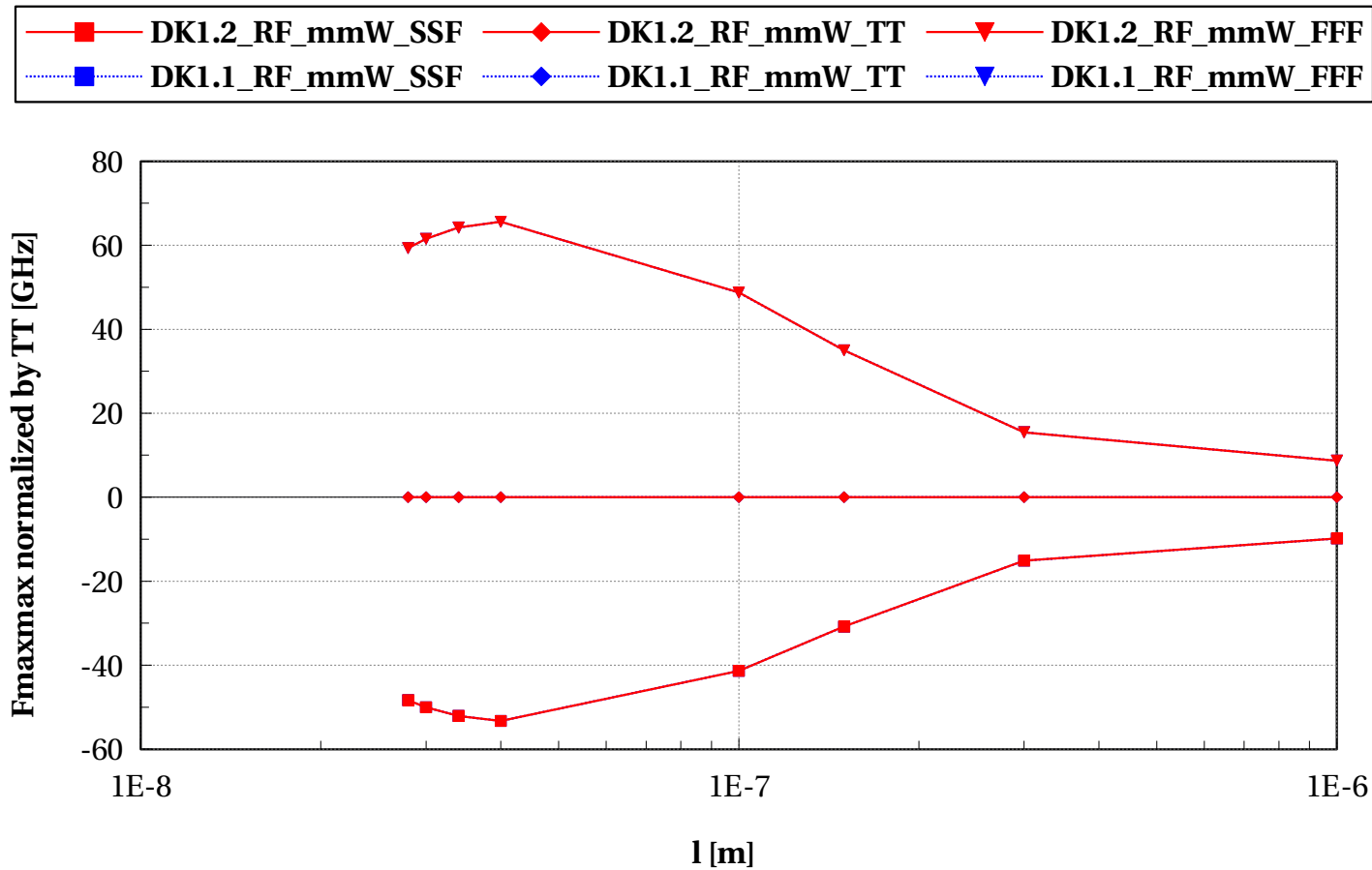
## lvtnfet\_rf, Fmaxmax [GHz] vs l [m]

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# lvtnfet\_rf, Fmaxmax normalized by TT [GHz] vs l [m]

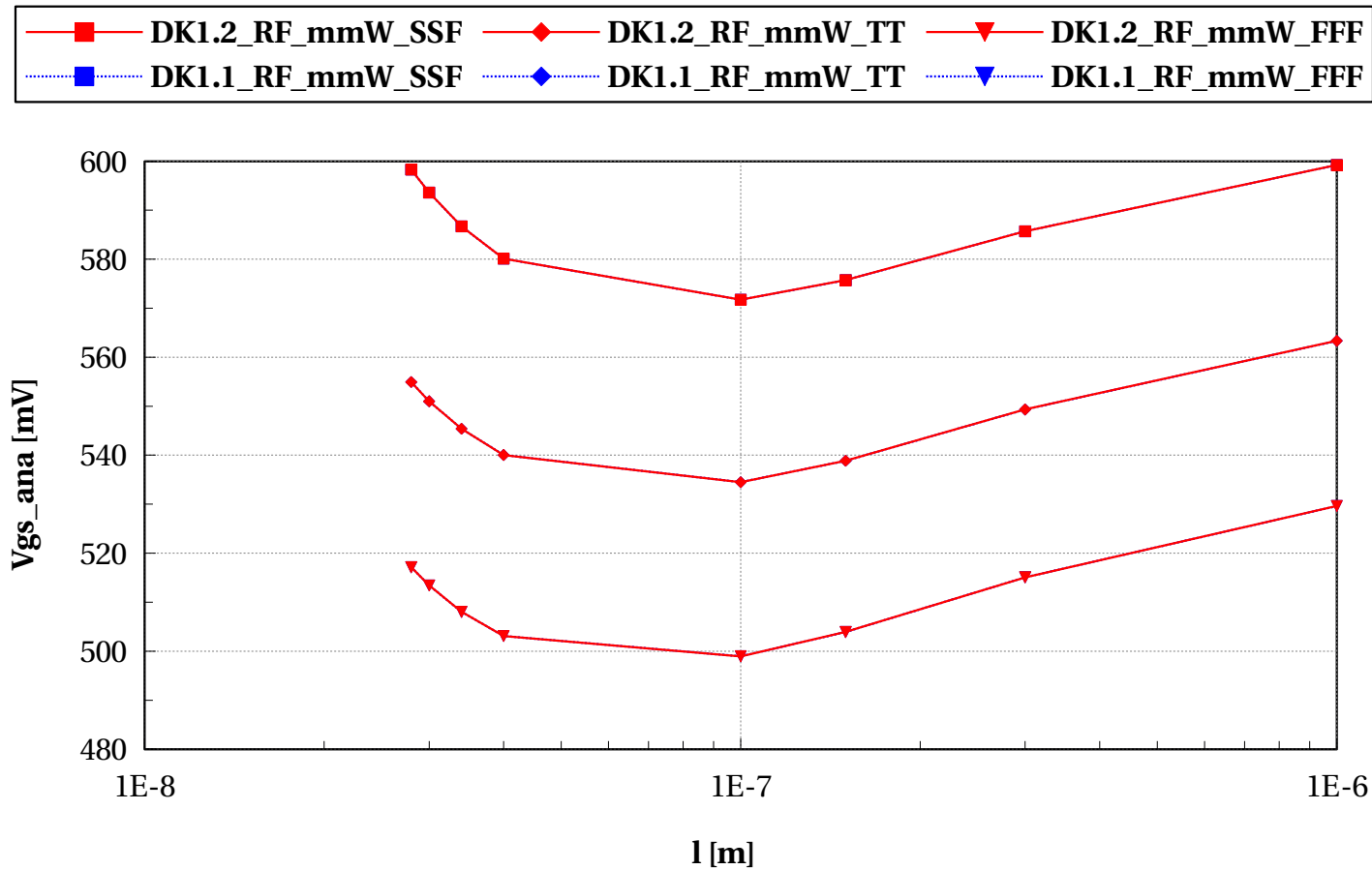
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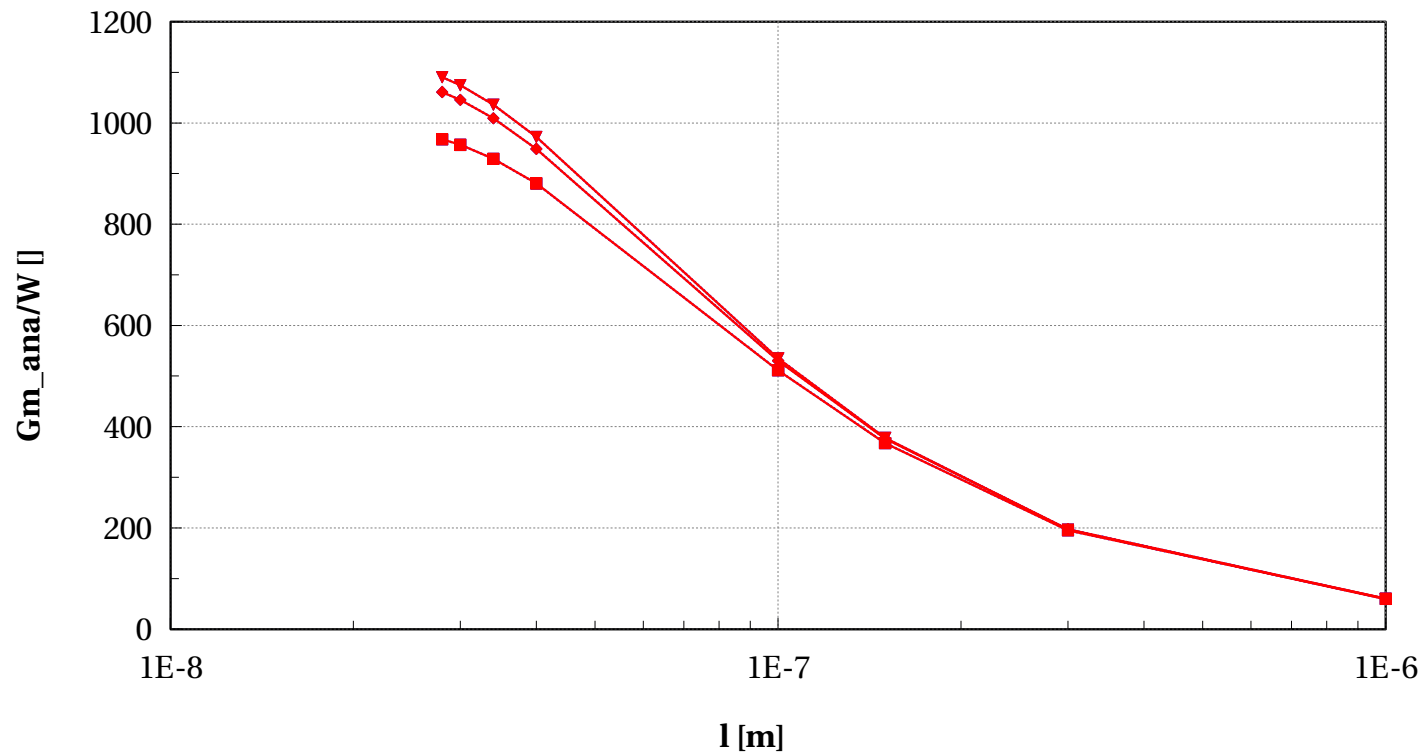
# lvtnfet\_rf, Vgs\_ana [mV] vs I [m]

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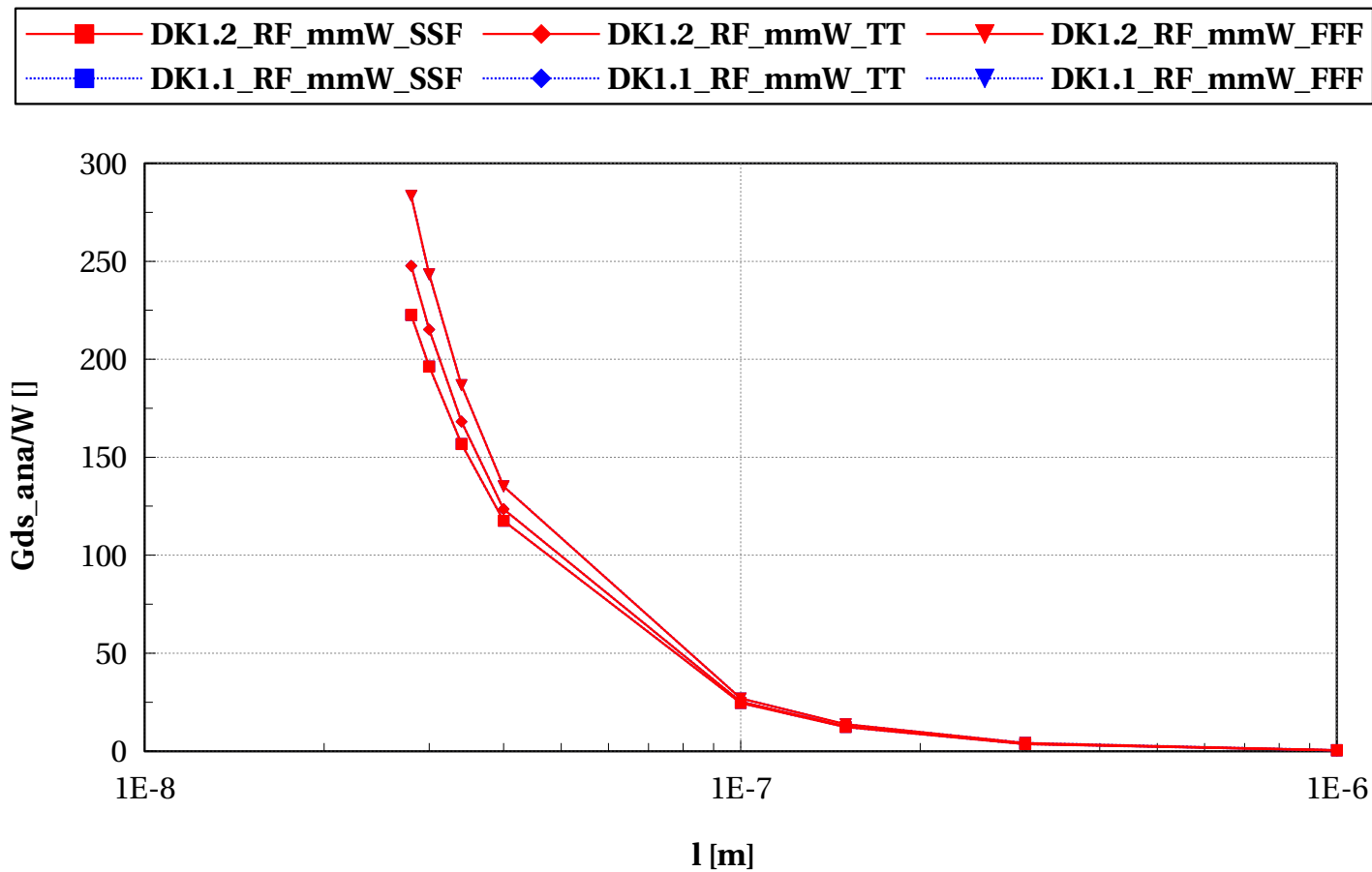
# lvtnfet\_rf, Gm\_ana/W [] vs l [m]

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# lvtnfet\_rf, Gds\_ana/W [] vs l [m]

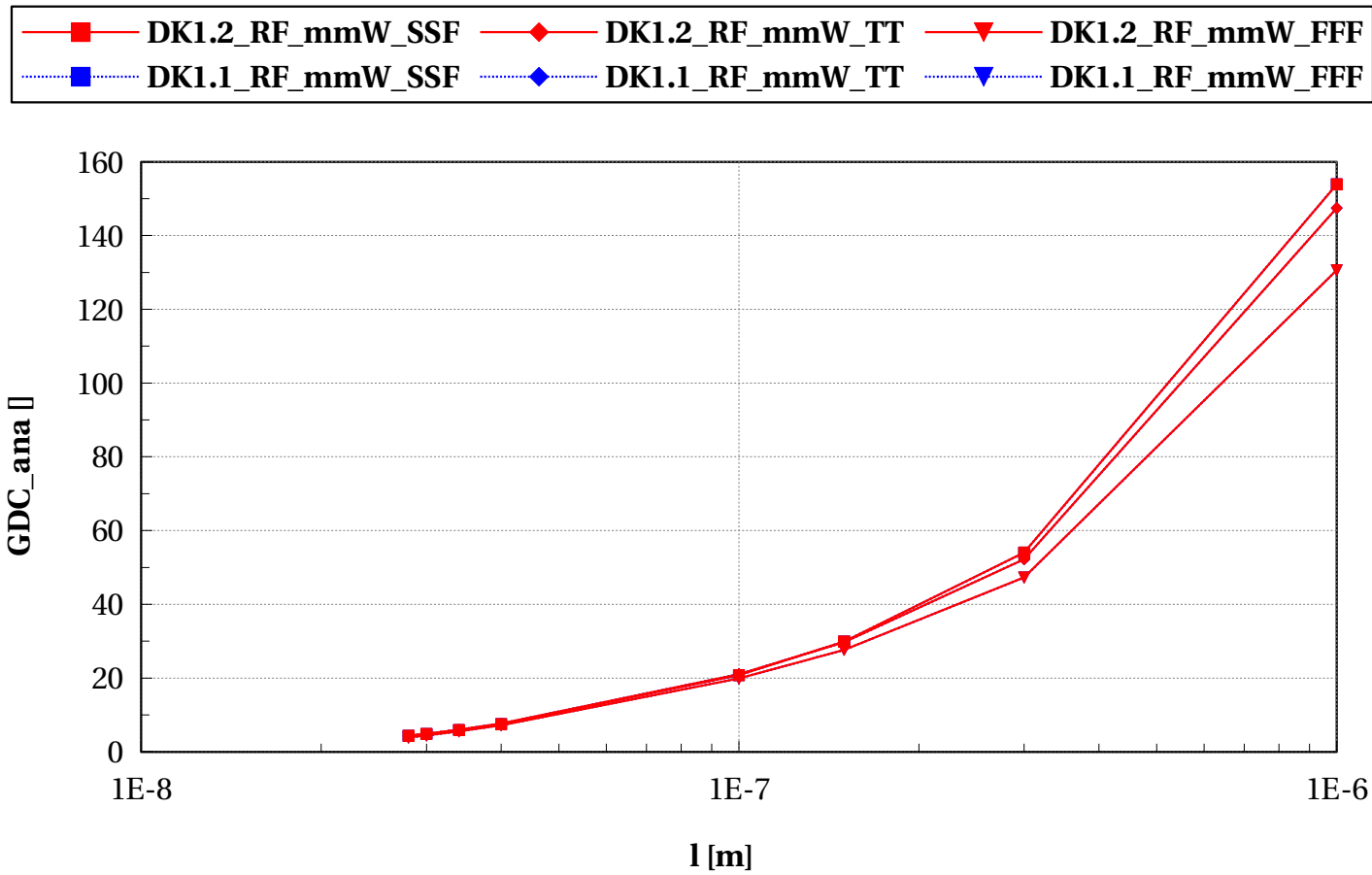
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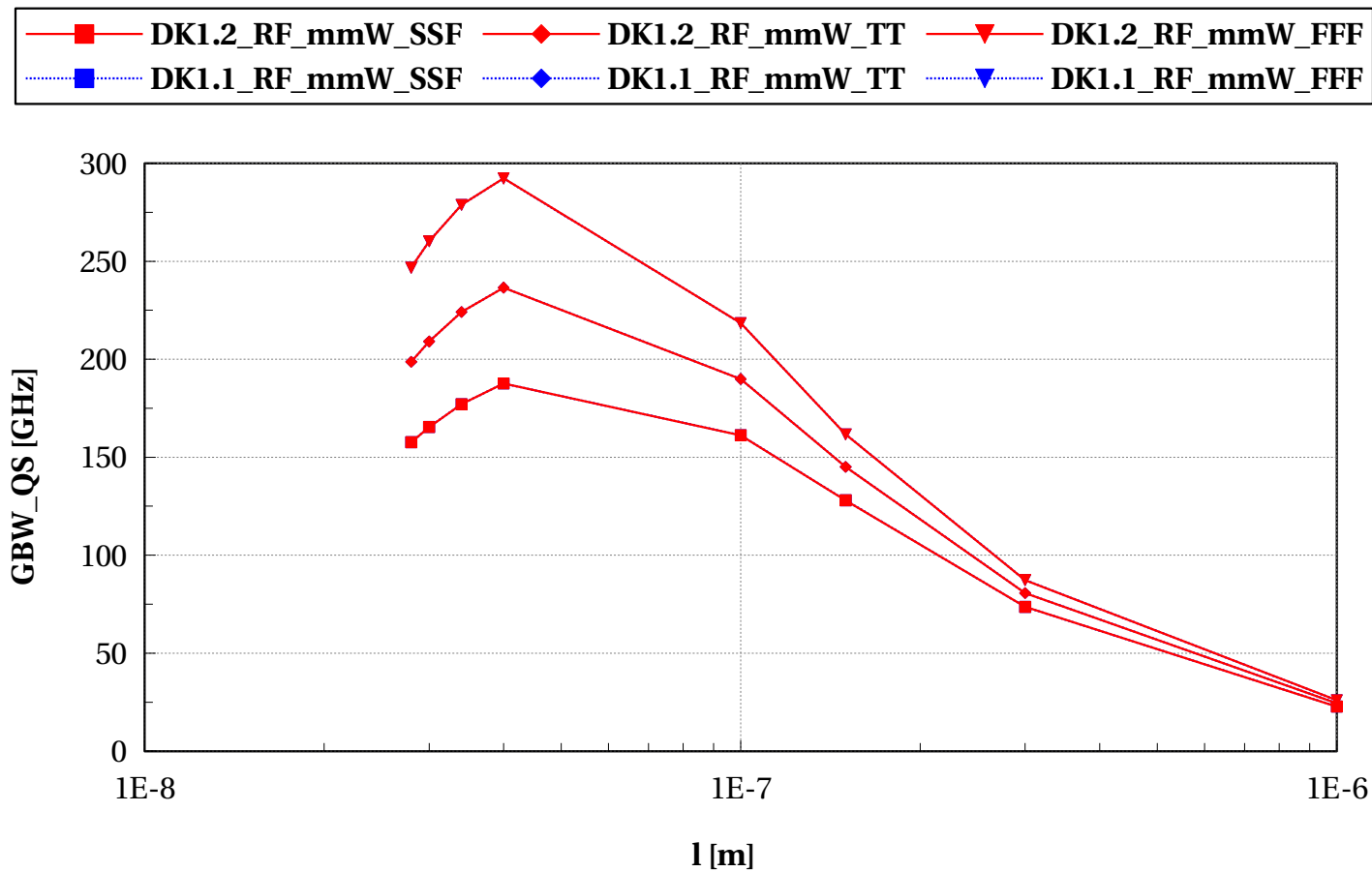
# lvtnfet\_rf, GDC\_ana [] vs l [m]

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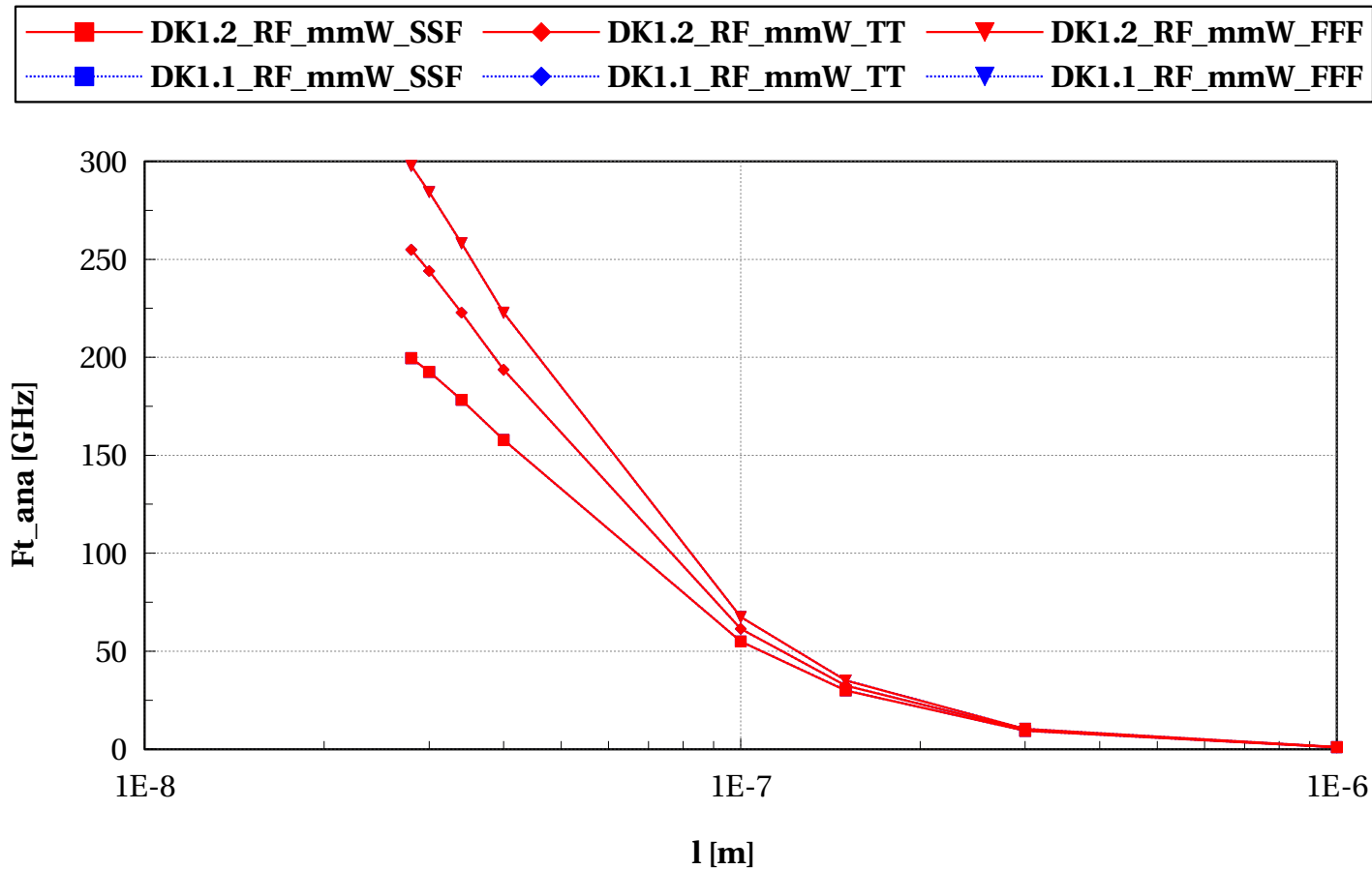
# lvtnfet\_rf, GBW\_QS [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



# lvtnfet\_rf, Ft\_ana [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



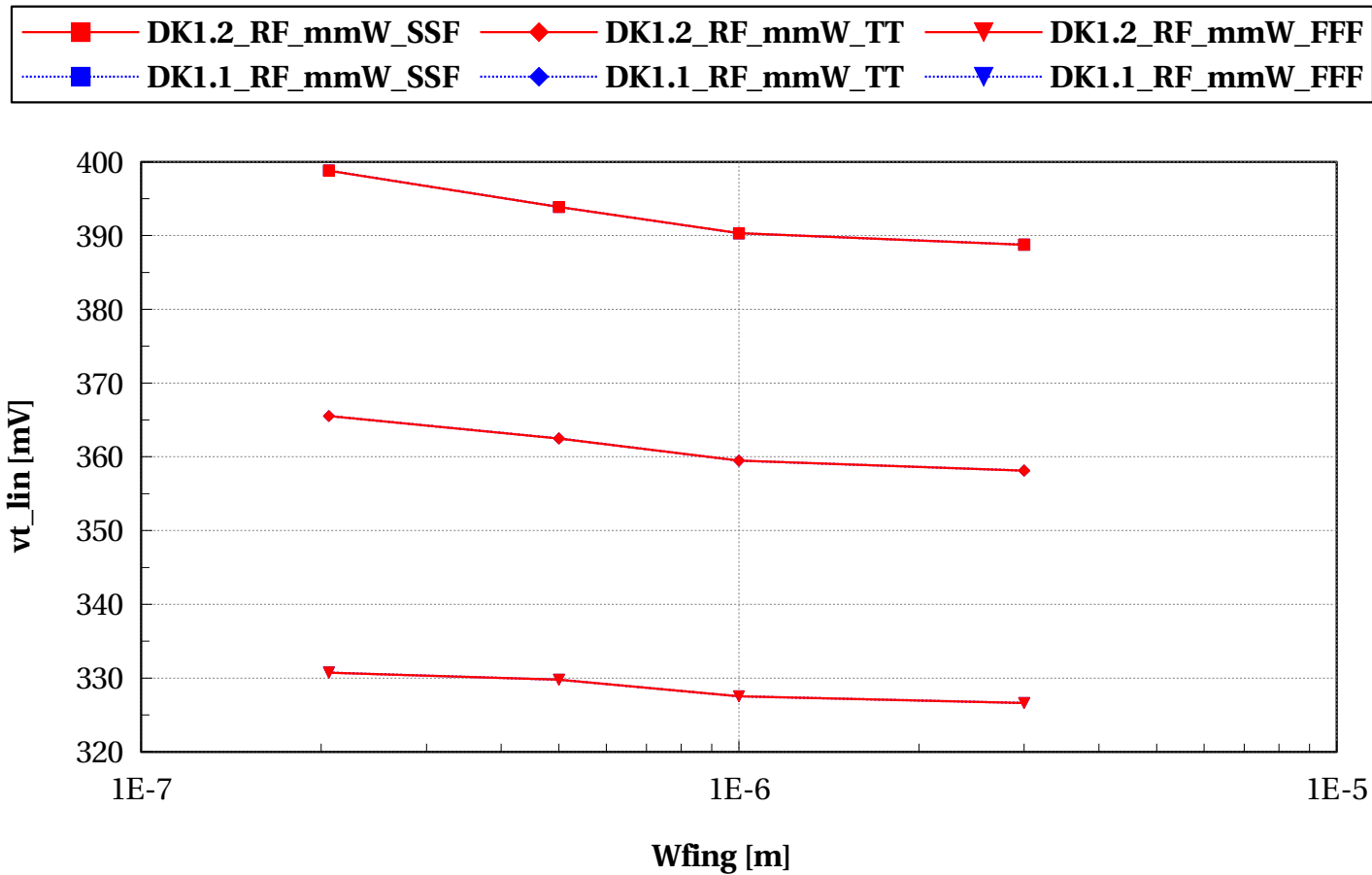
# lvtnfet\_rfseg

## Electrical characteristics scaling

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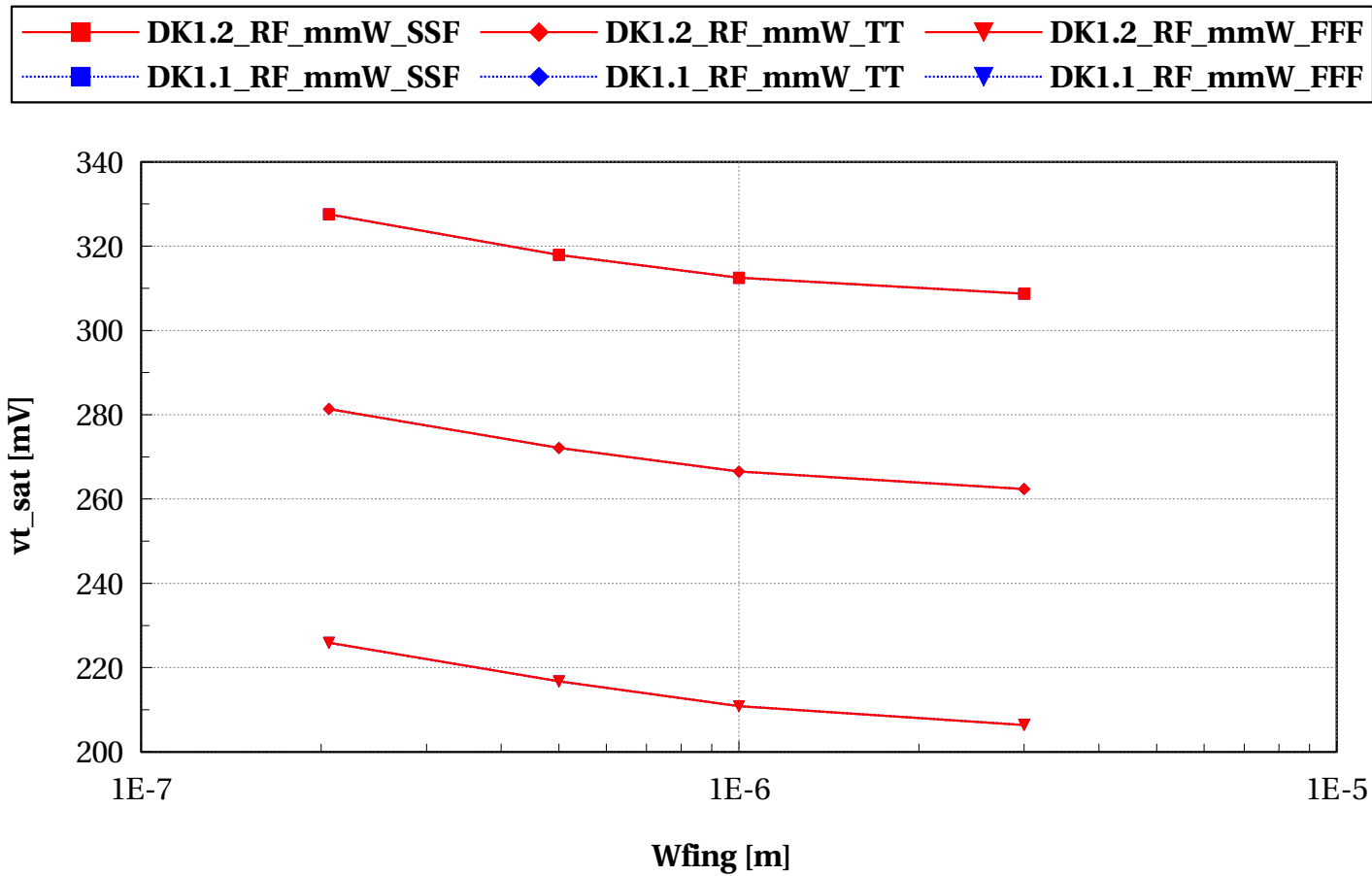
## lvtnfet\_rfseg, vt\_lin [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



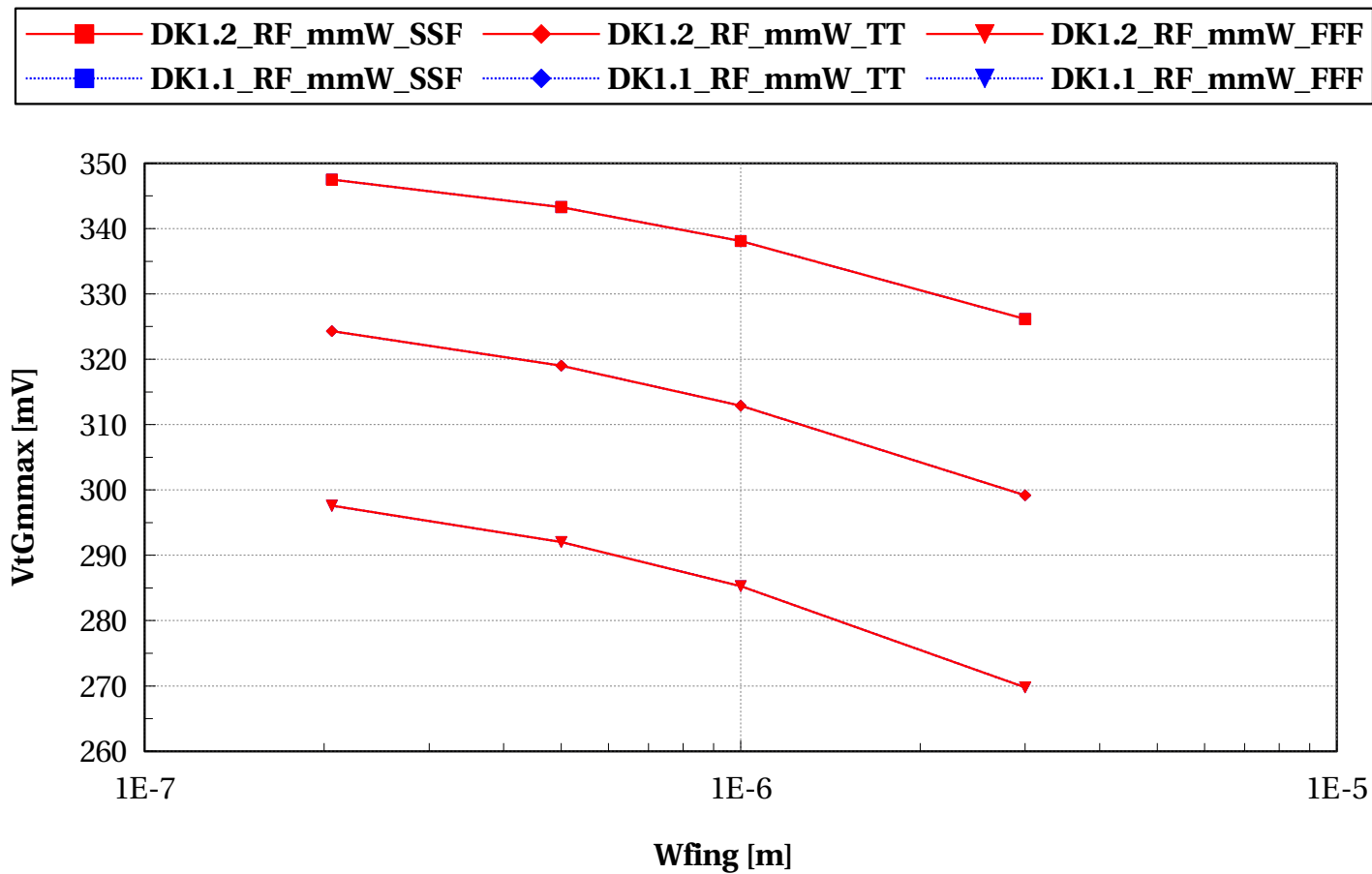
# lvtnfet\_rfseg, vt\_sat [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# lvtinfet\_rfseg, VtGmmax [mV] vs Wfing [m]

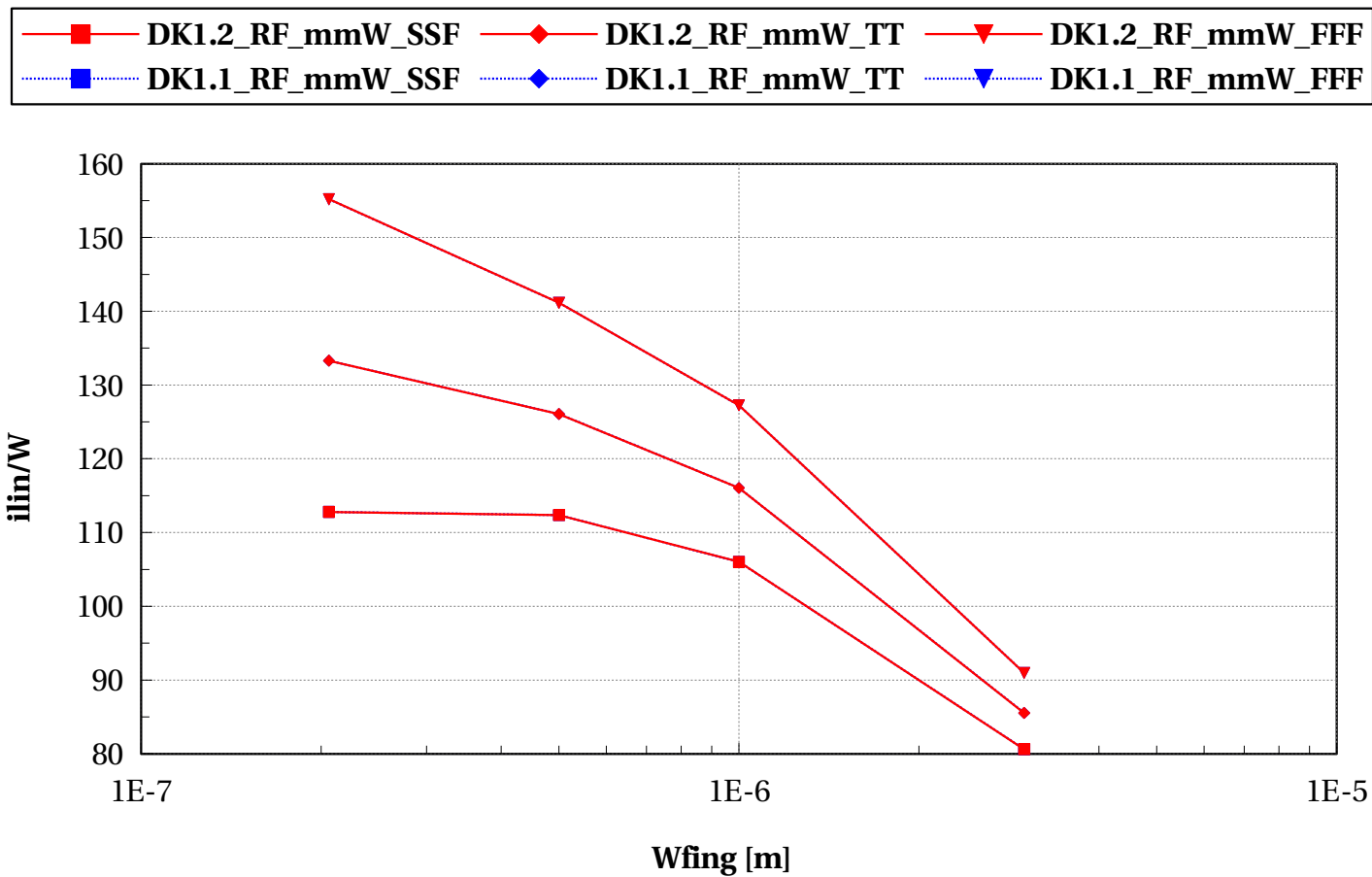
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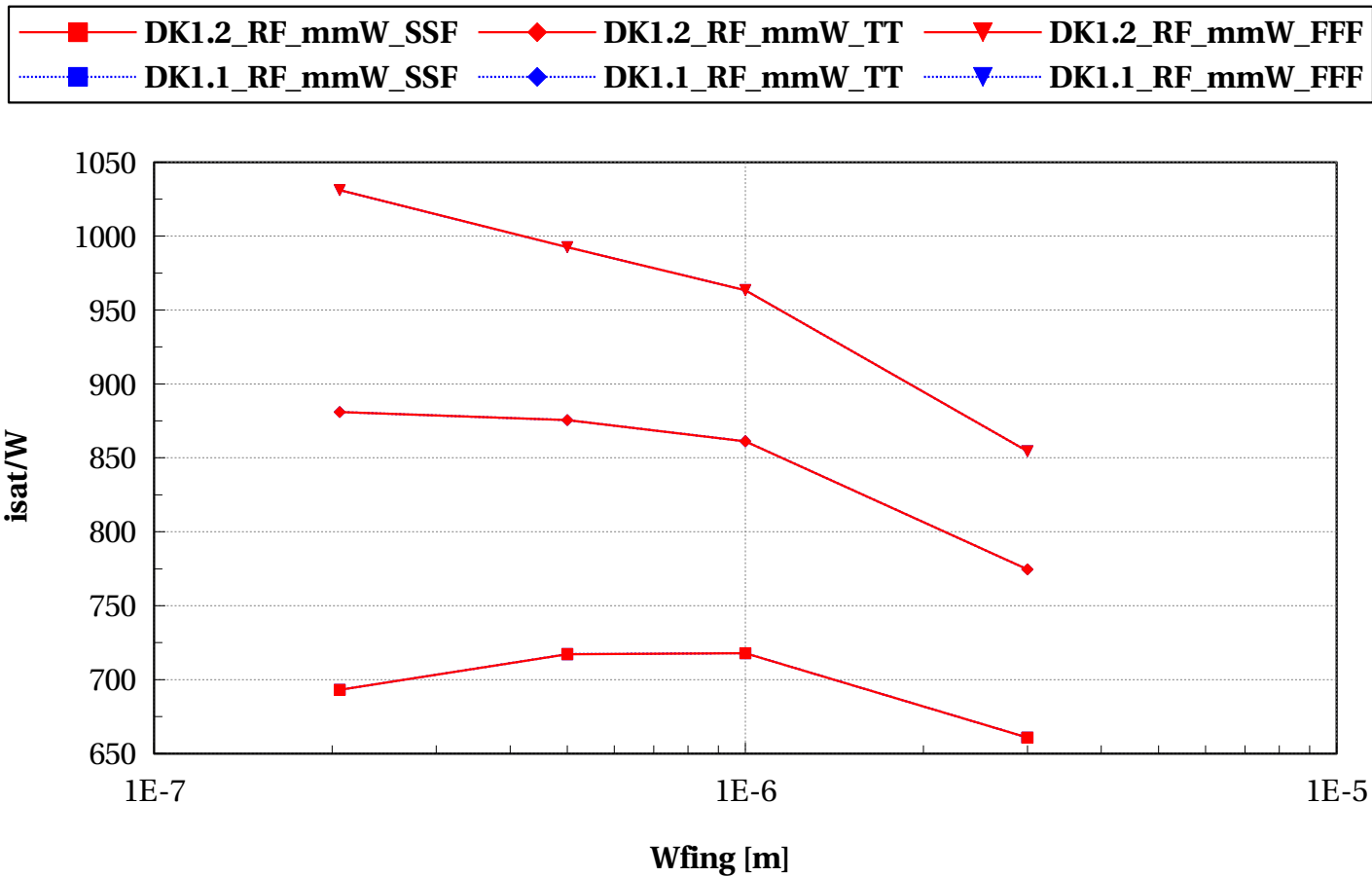
# lvtnfet\_rfseg, $i_{lin}/W$ vs $W_{fing}$ [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and  $l=30e-9$



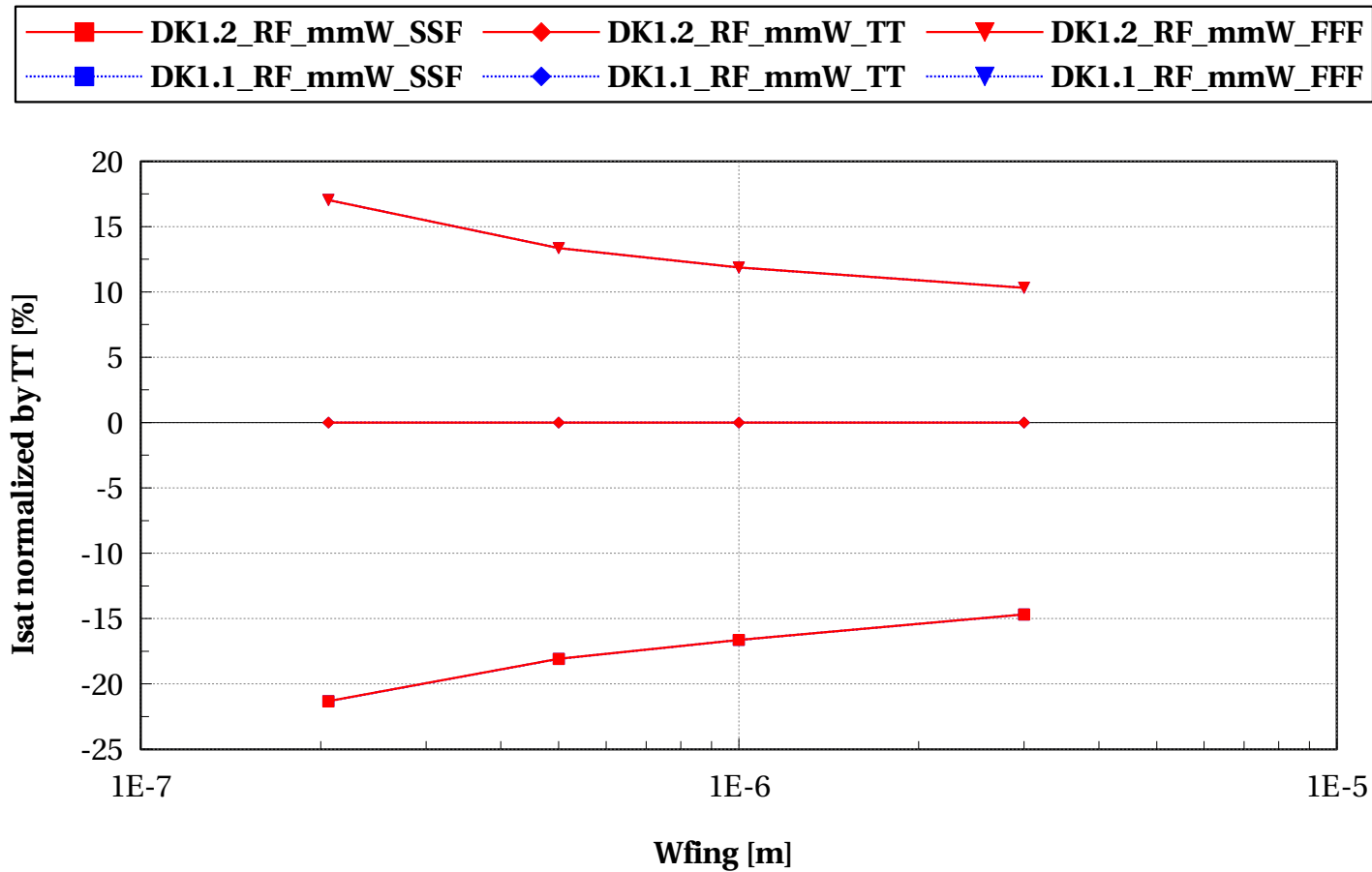
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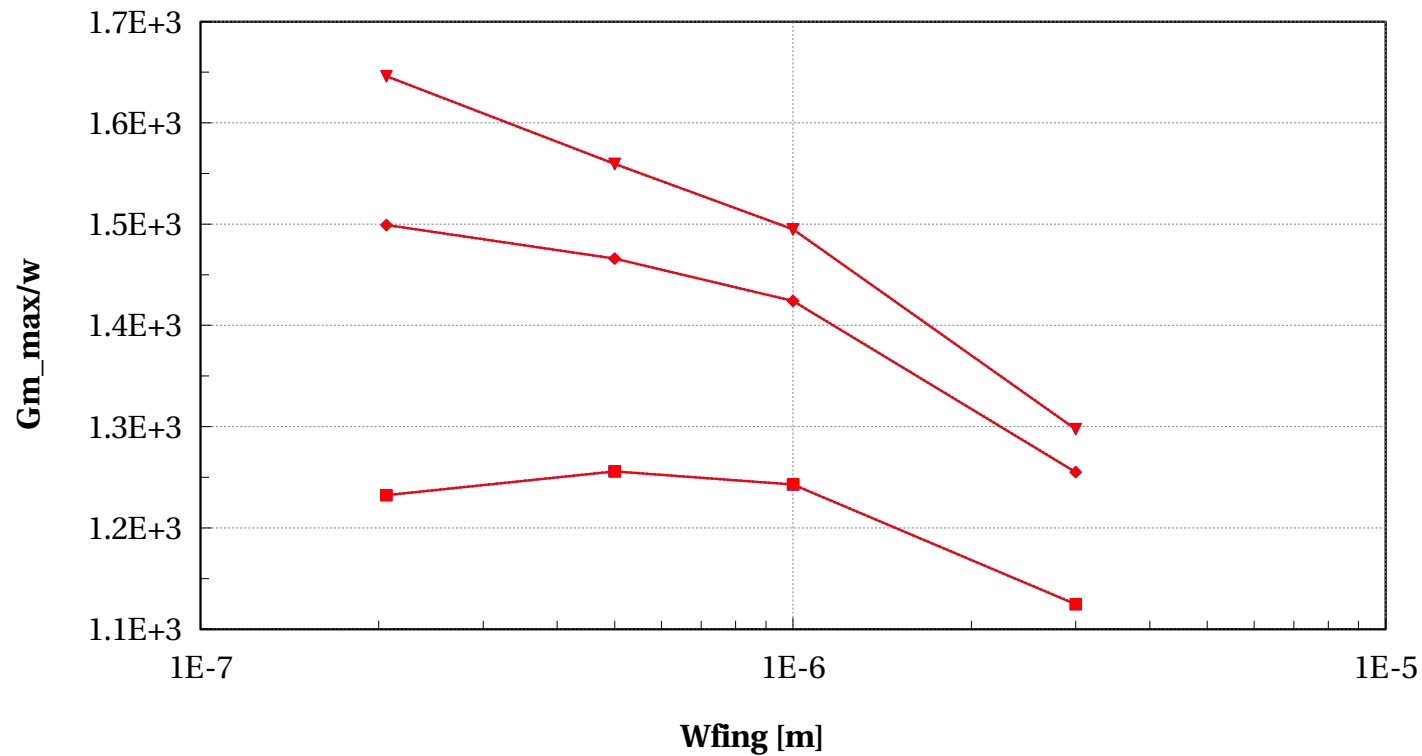
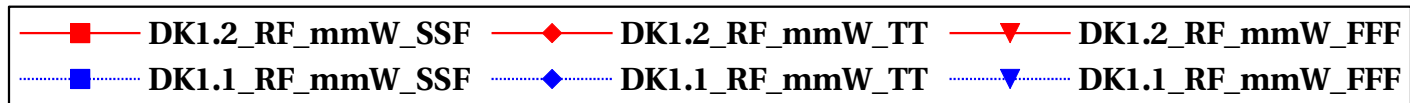
# lvtnfet\_rfseg, Isat normalized by TT [%] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



## lvtnfet\_rfseg, Gm\_max/w vs Wfing [m]

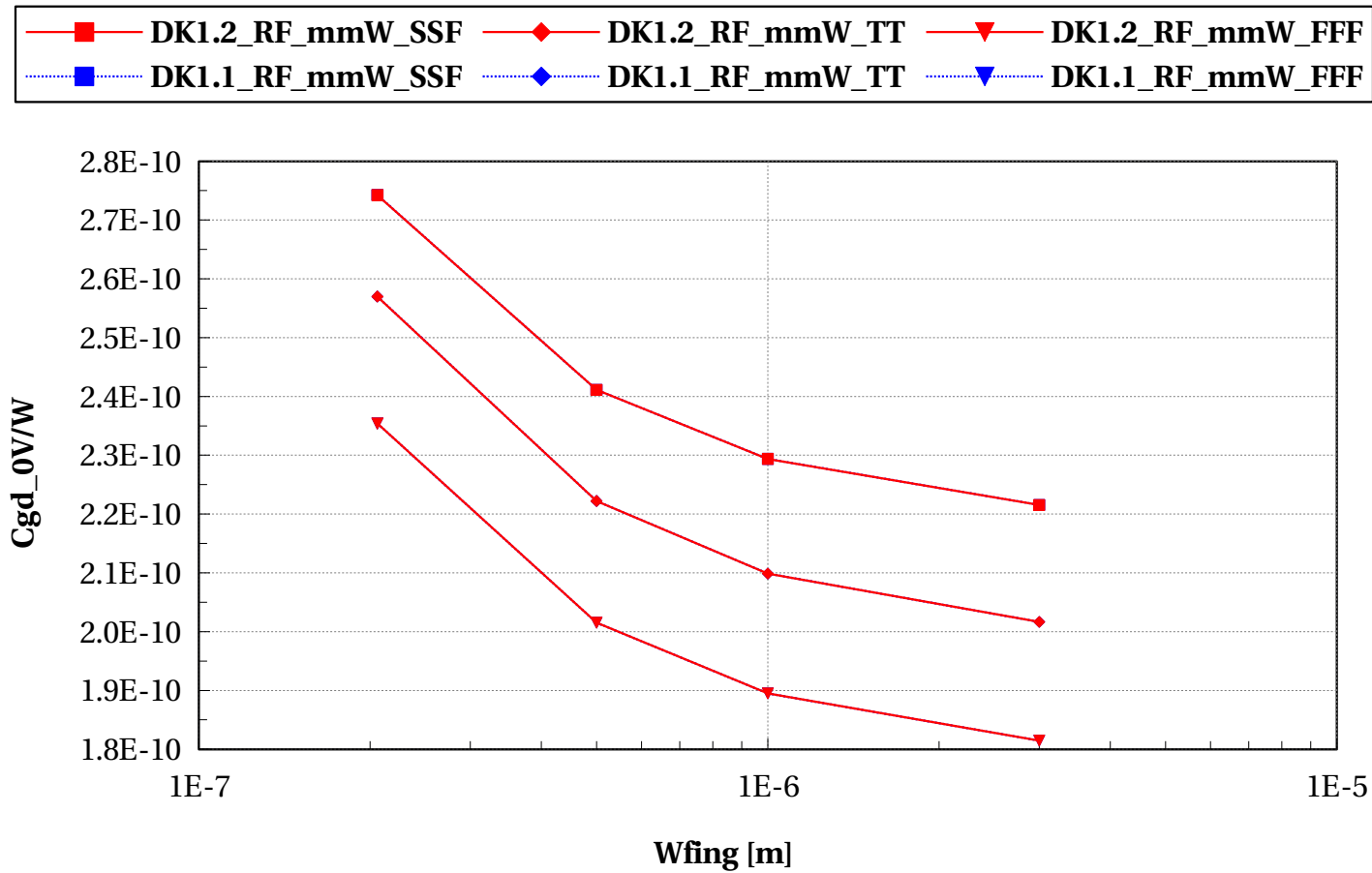
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



## Scaling versus width $L=30\text{nm}$ - RF

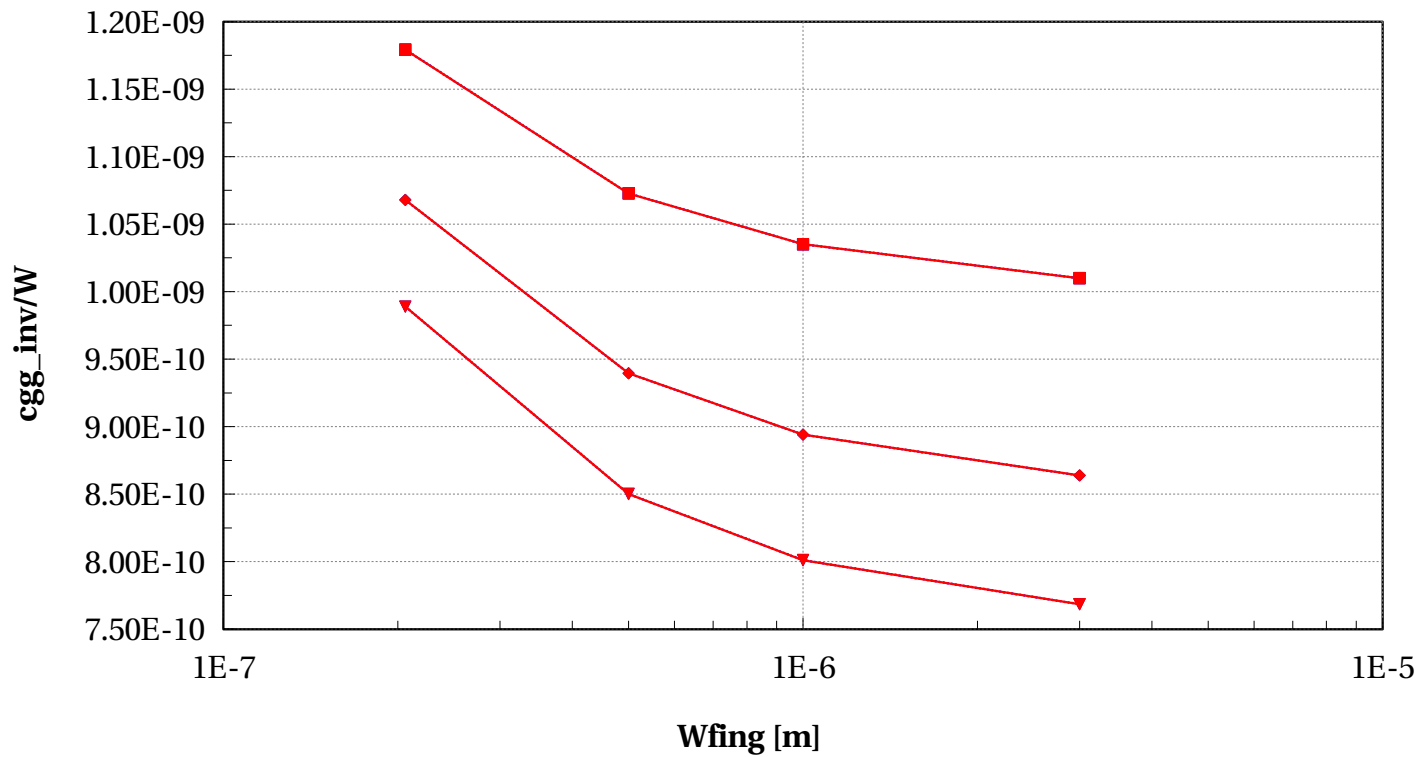
# lvtnfet\_rfseg, Cgd\_0V/W vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



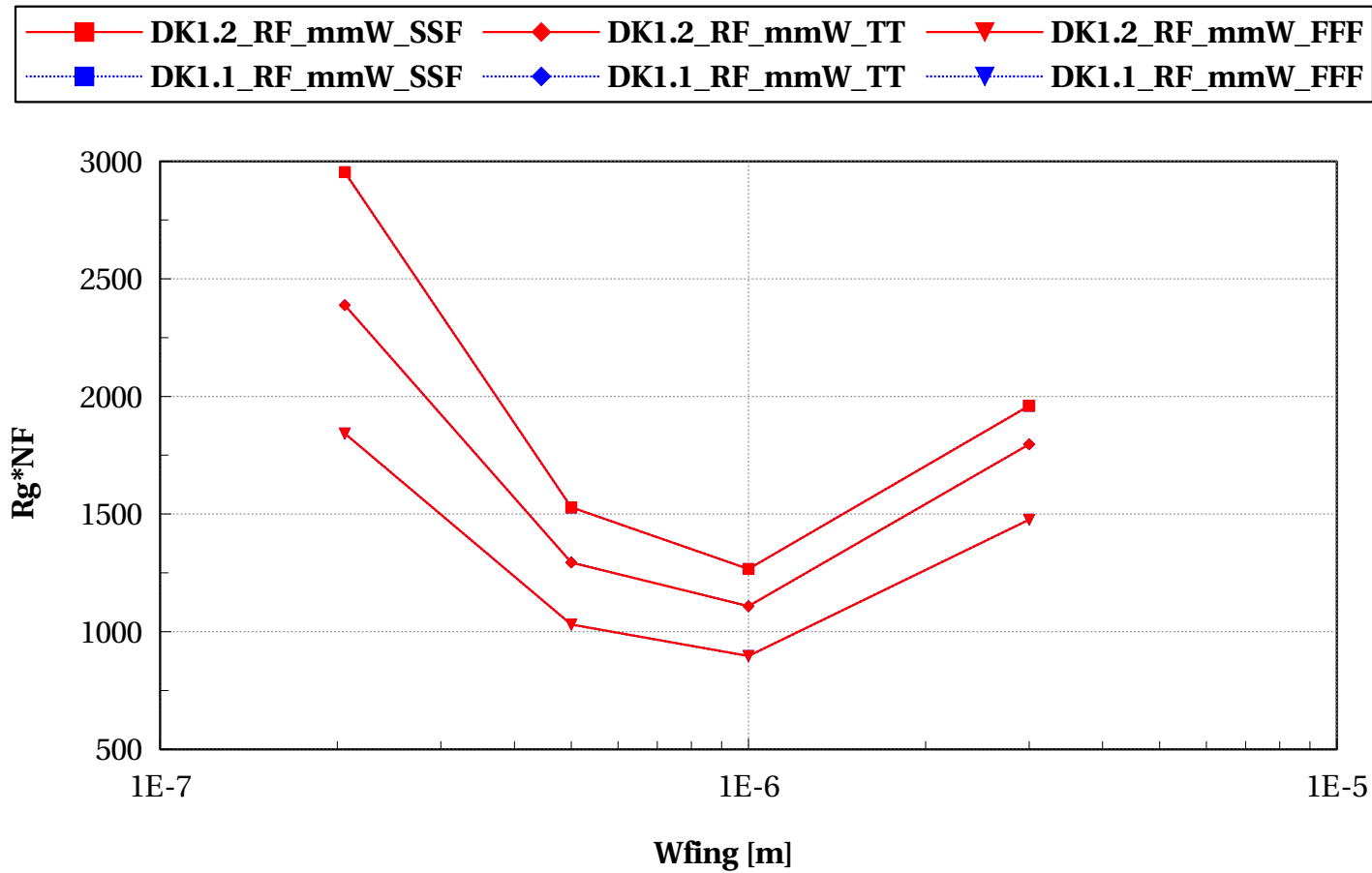
# lvtnfet\_rfseg, cgg\_inv/W vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# lvtnfet\_rfseg, $R_g \cdot NF$ vs $W_{fing}$ [m]

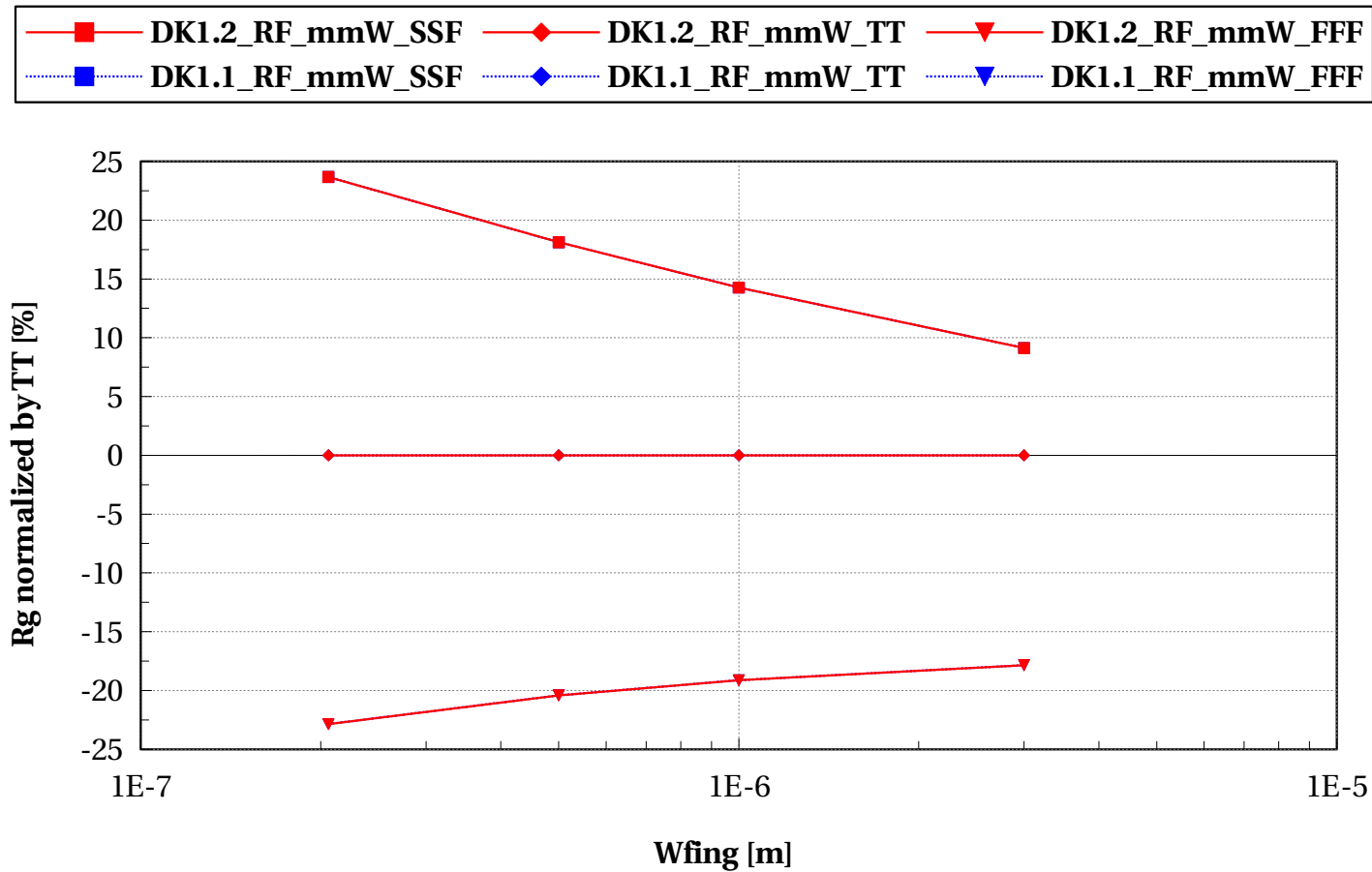
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and  $l=30e-9$





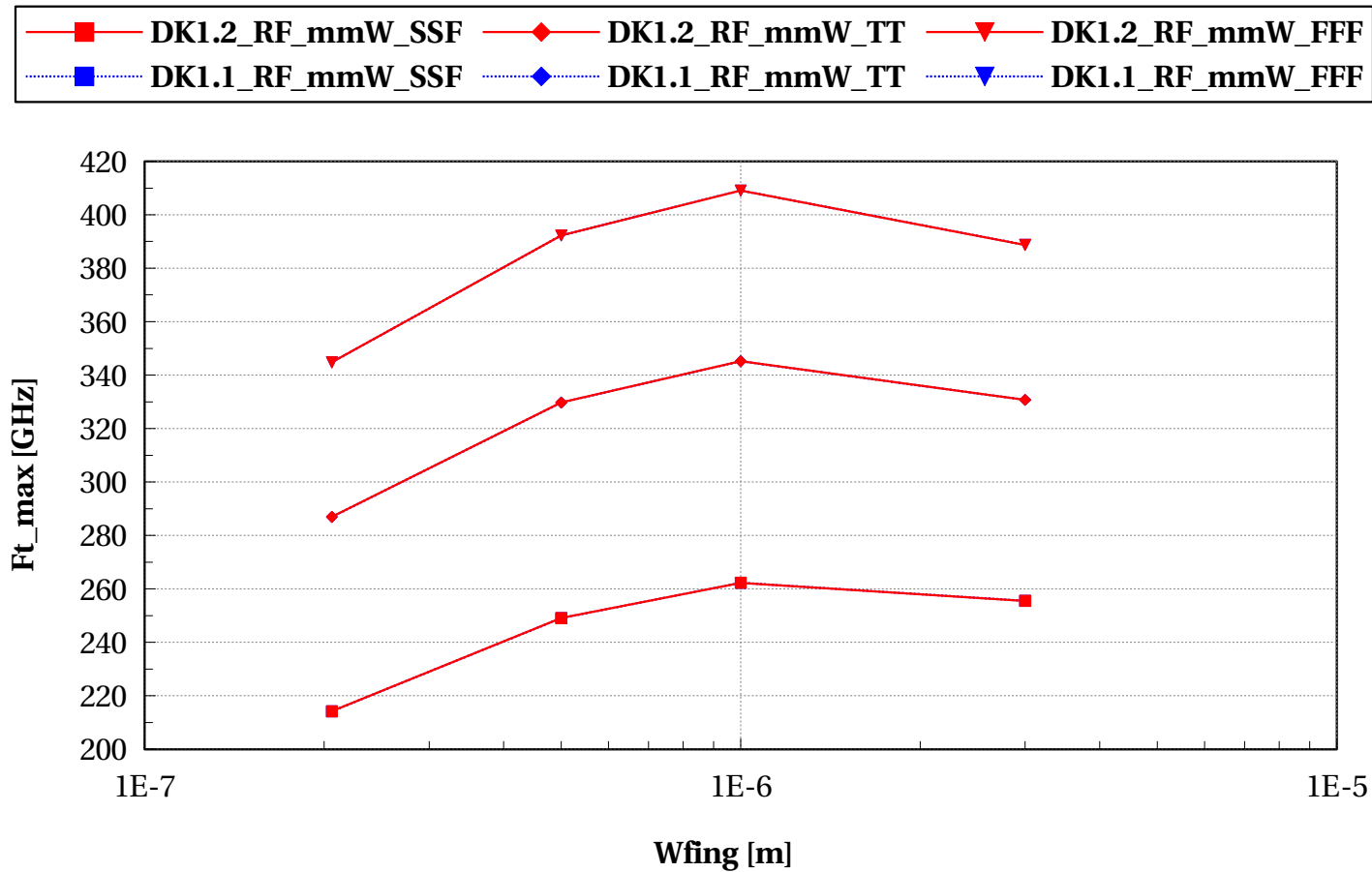
## lvtnfet\_rfseg, Rg normalized by TT [%] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



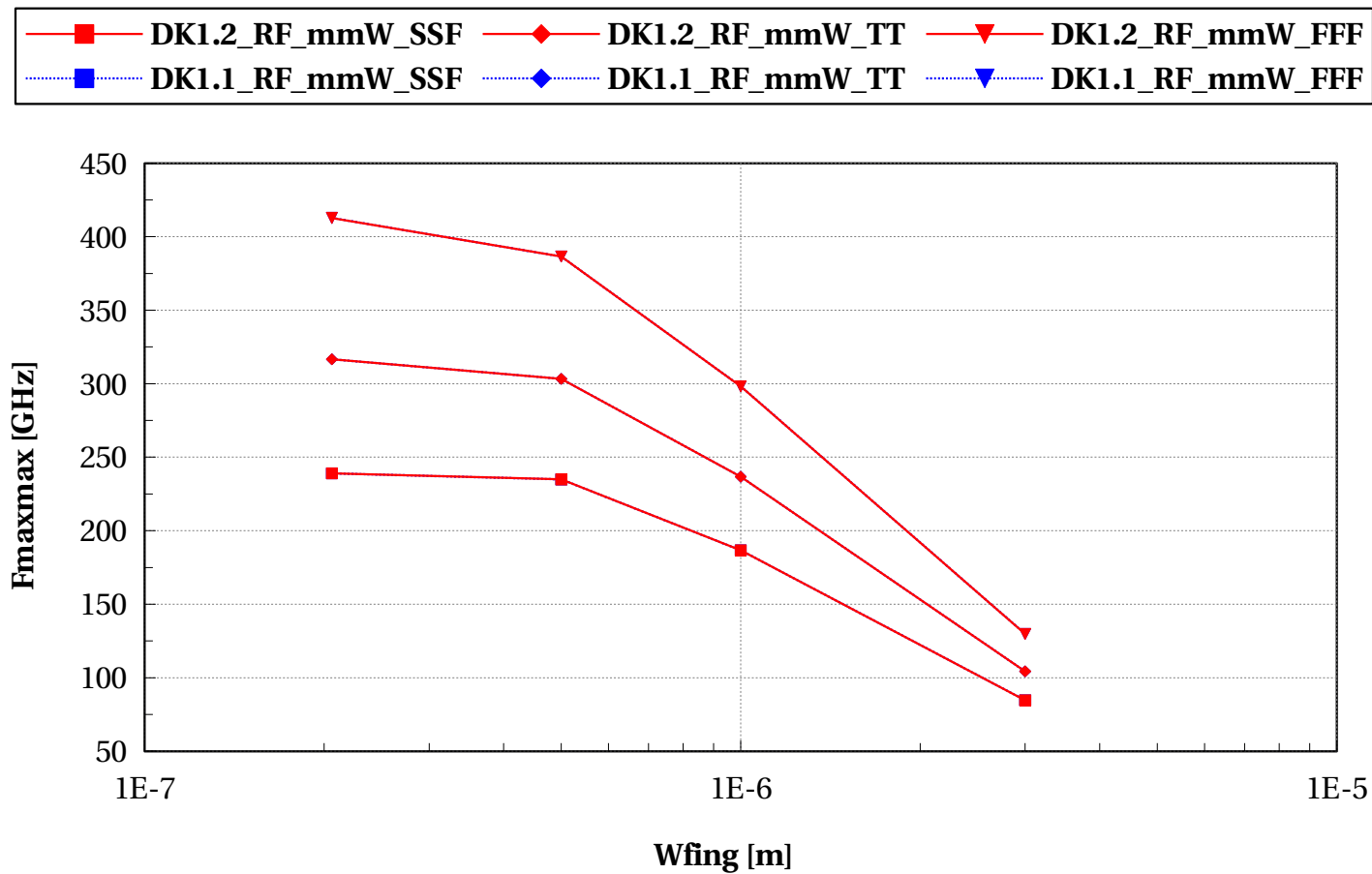
## Ivtnfet\_rfseg, Ft\_max [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



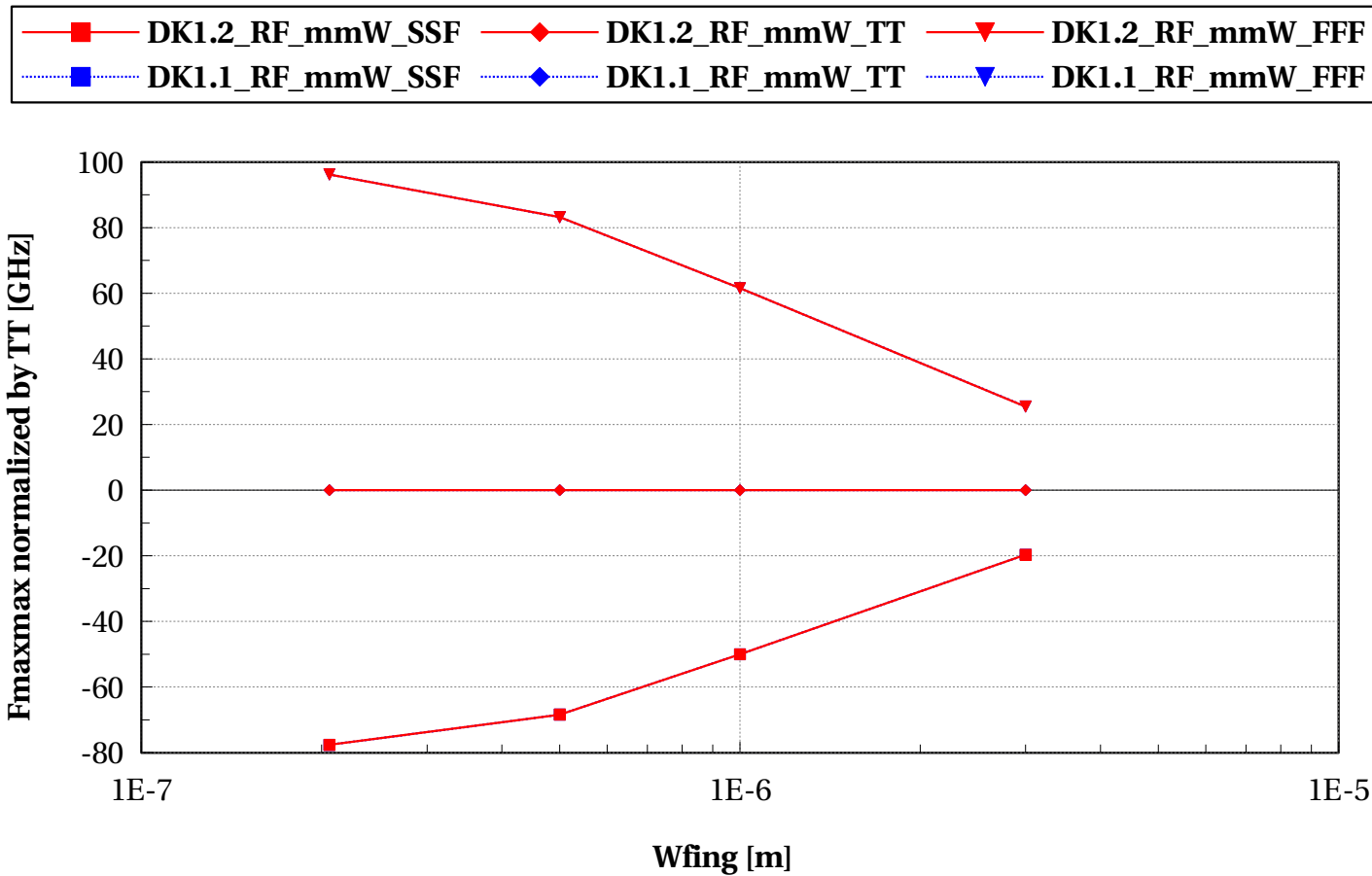
# lvtnfet\_rfseg, Fmaxmax [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# lvtnfet\_rfseg, Fmaxmax normalized by TT [GHz] vs Wfing [m]

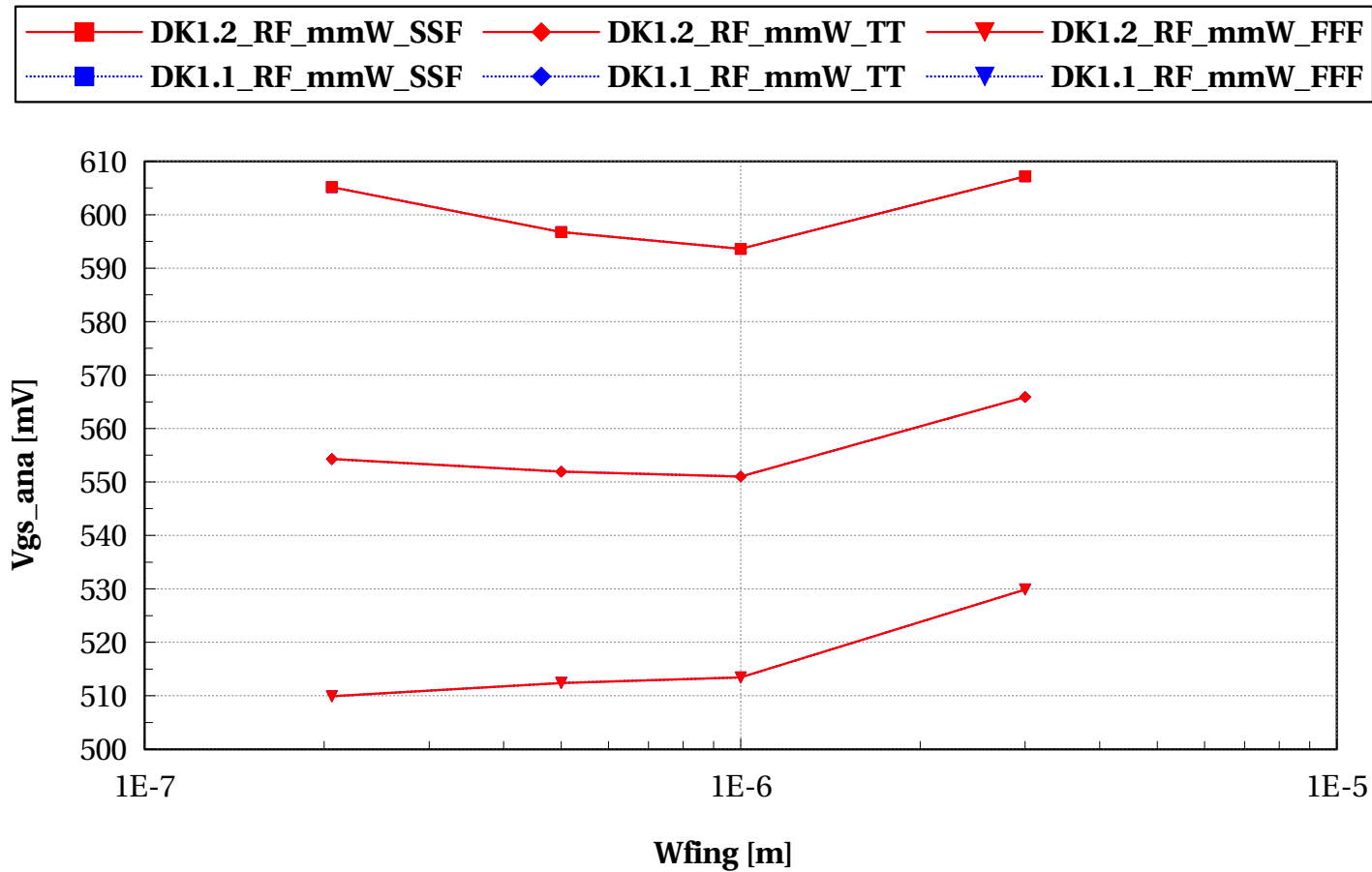
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



## Scaling versus width $L=30\text{nm}$ - Analog

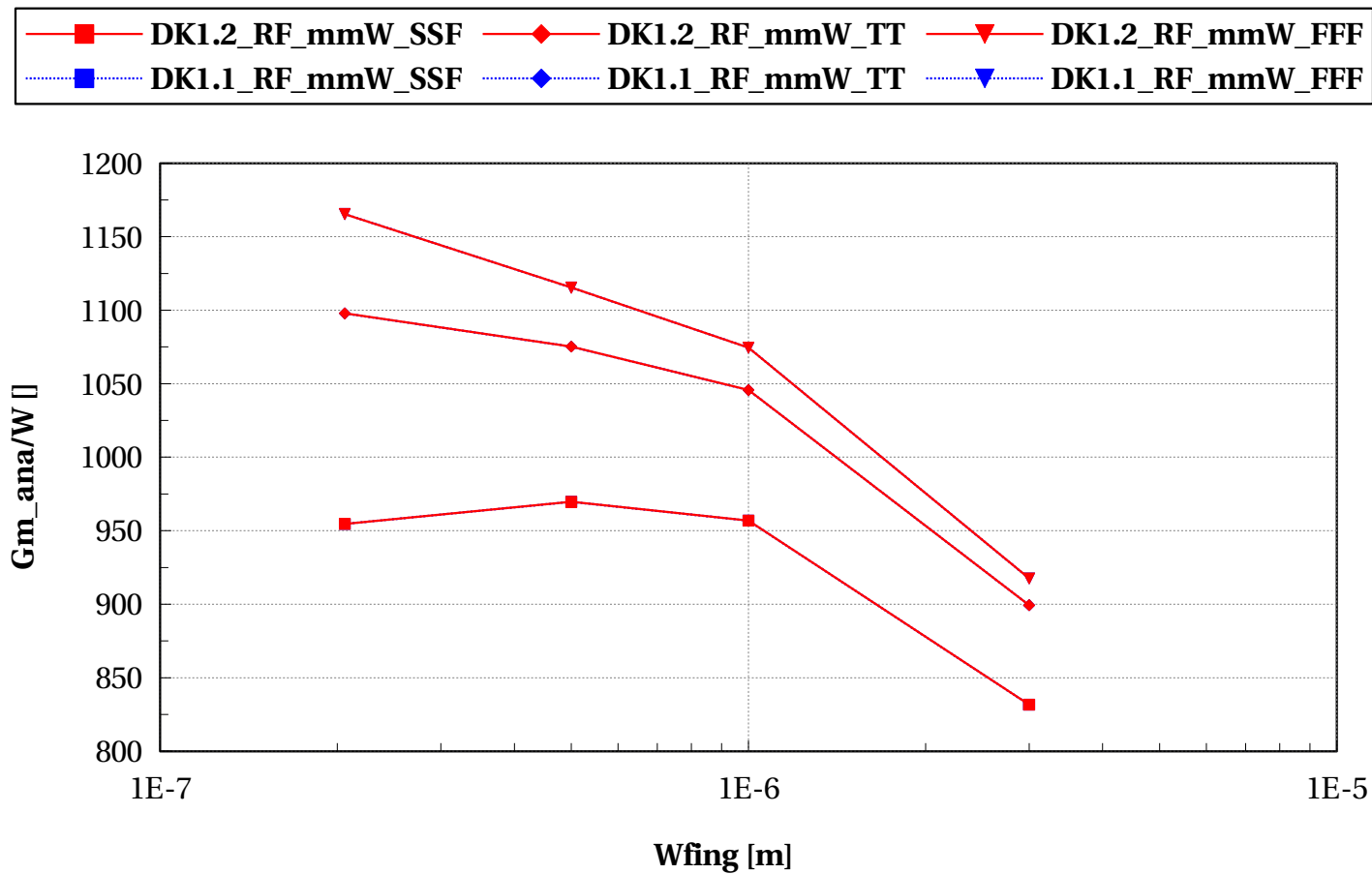
# lvtnfet\_rfseg, Vgs\_ana [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



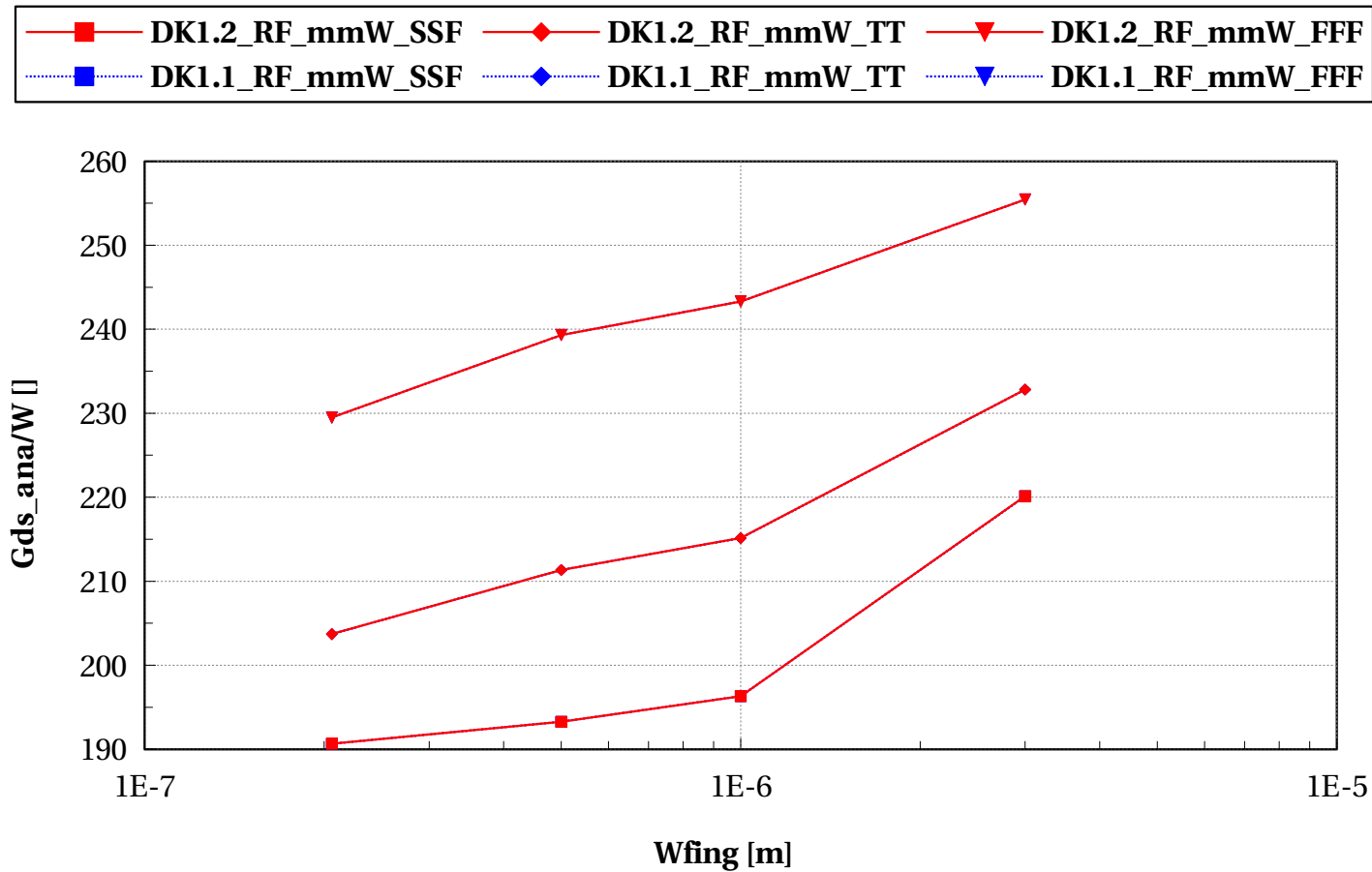
# lvtnfet\_rfseg, Gm\_ana/W [] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# lvtnfet\_rfseg, Gds\_ana/W [] vs Wfing [m]

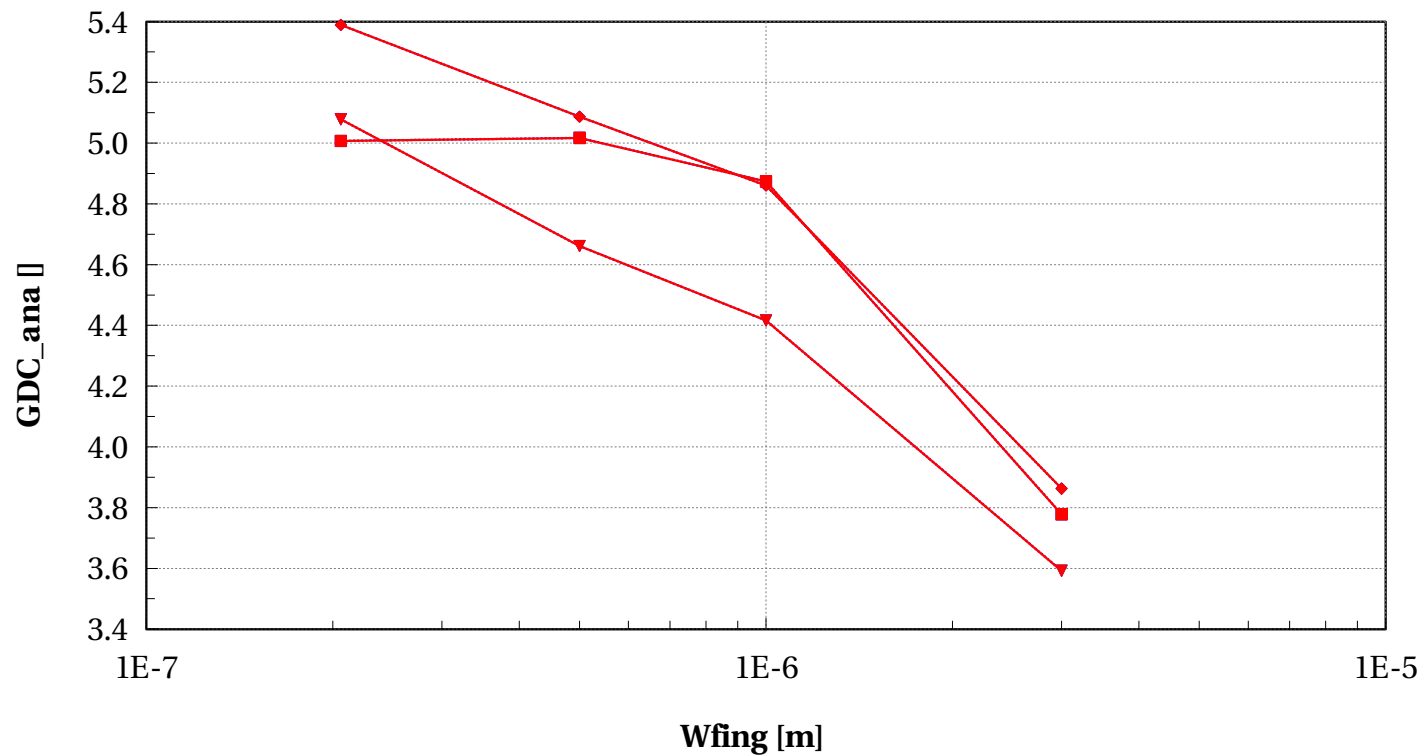
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9





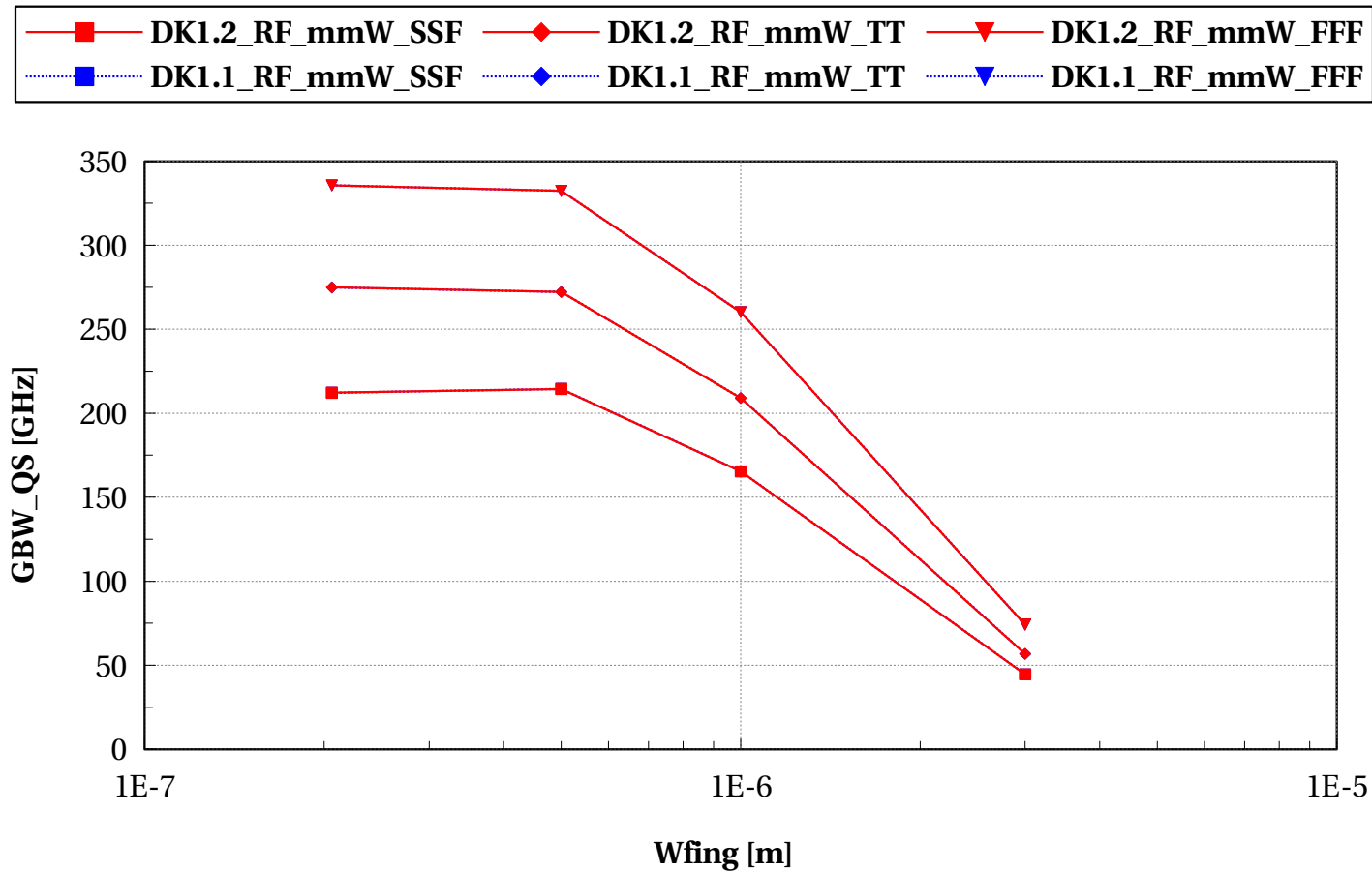
# lvtnfet\_rfseg, GDC\_ana [] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



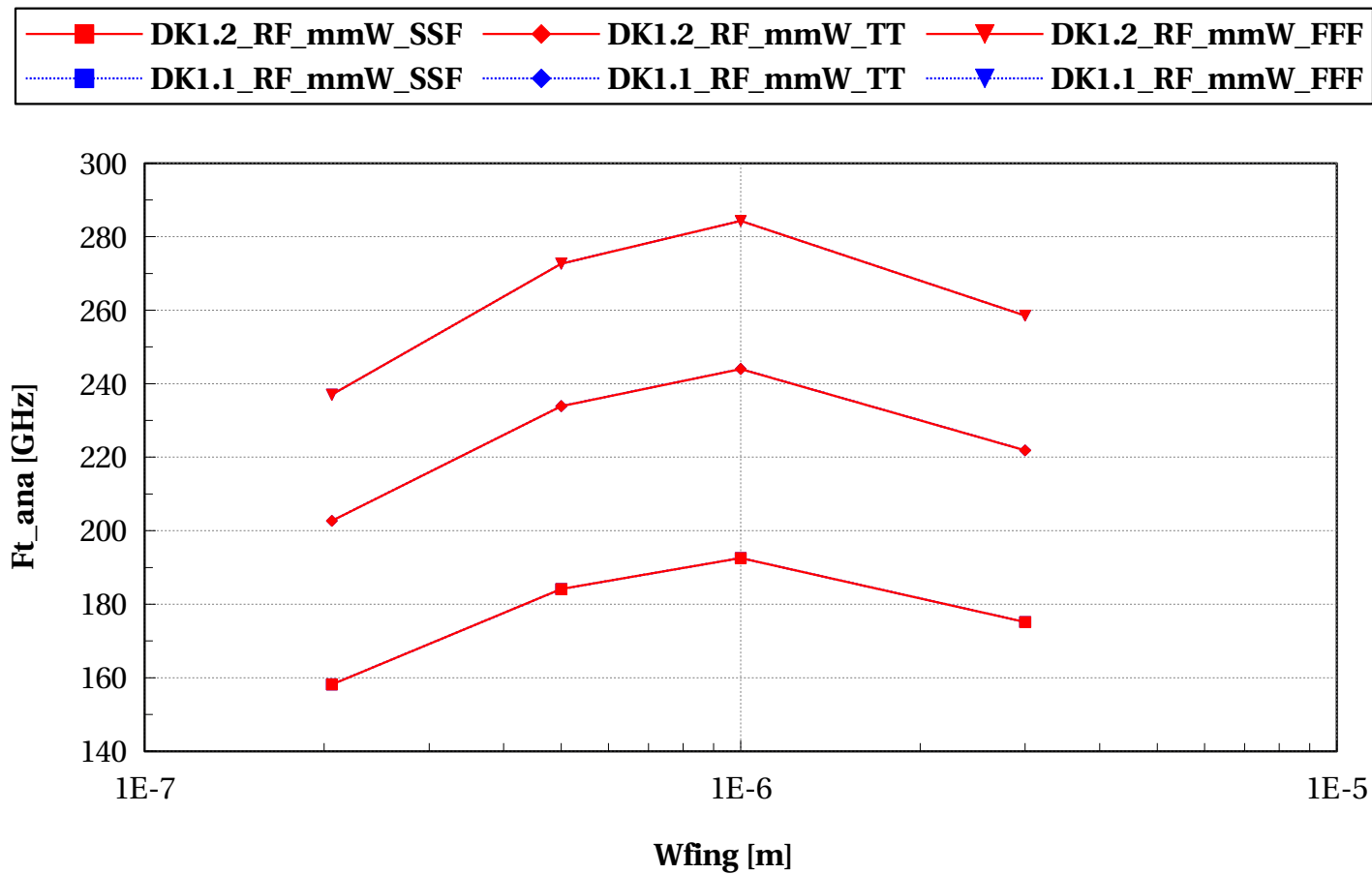
# lvtnfet\_rfseg, GBW\_QS [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# lvtnfet\_rfseg, Ft\_ana [GHz] vs Wfing [m]

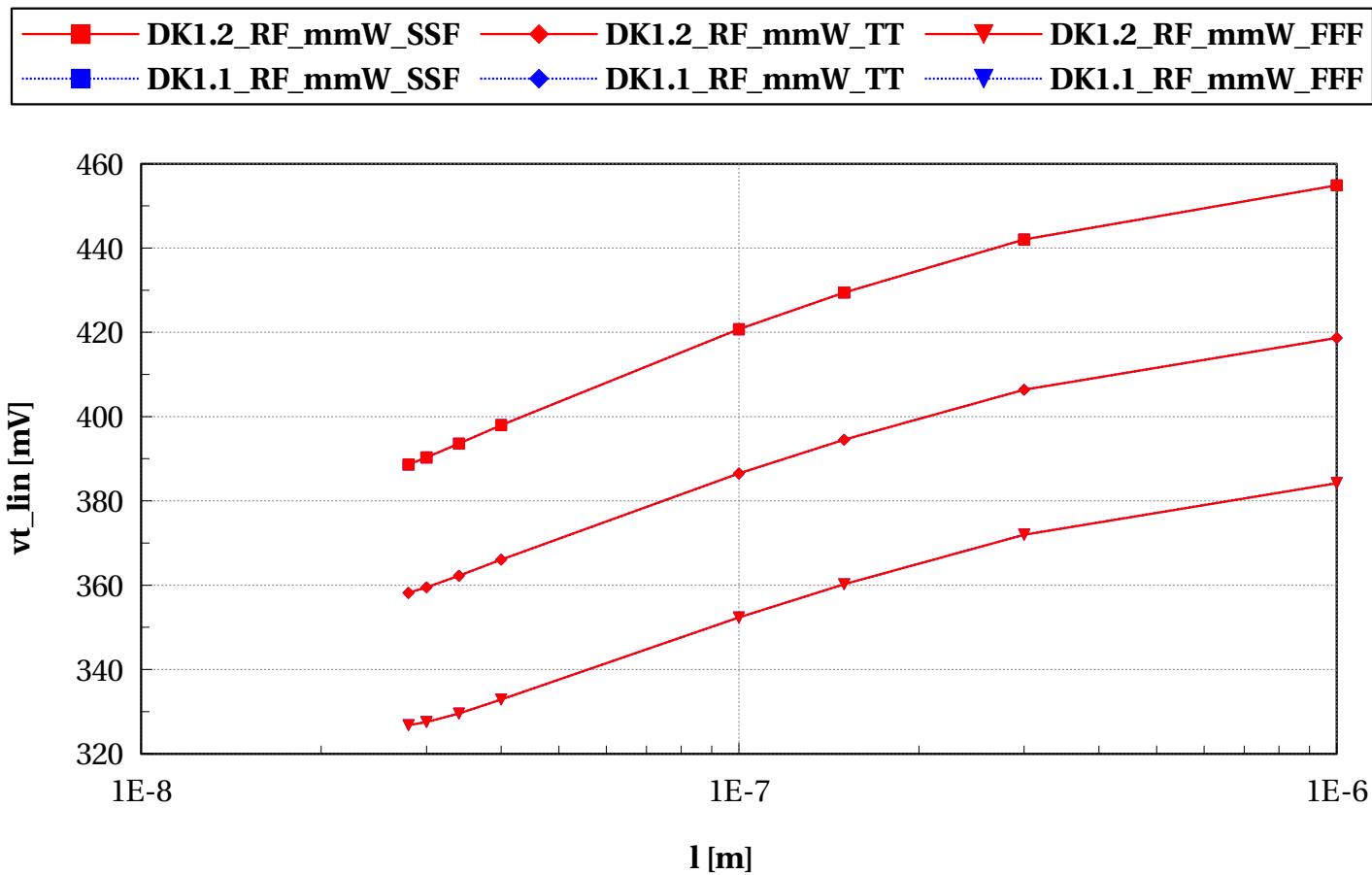
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



## Scaling versus length $W_{\text{fing}}=1\mu\text{m}$ - DC

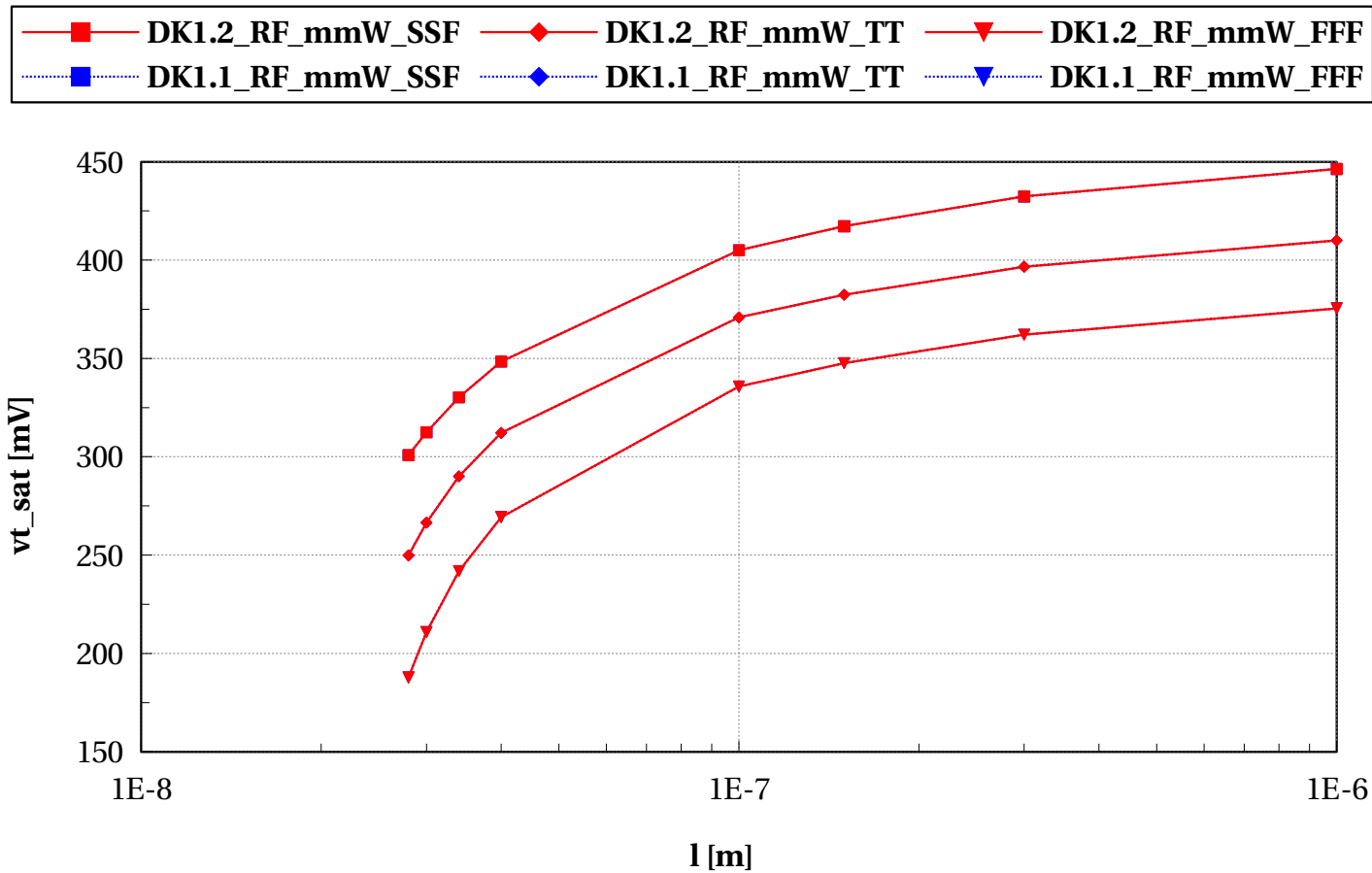
# lvtnfet\_rfseg, vt\_lin [mV] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



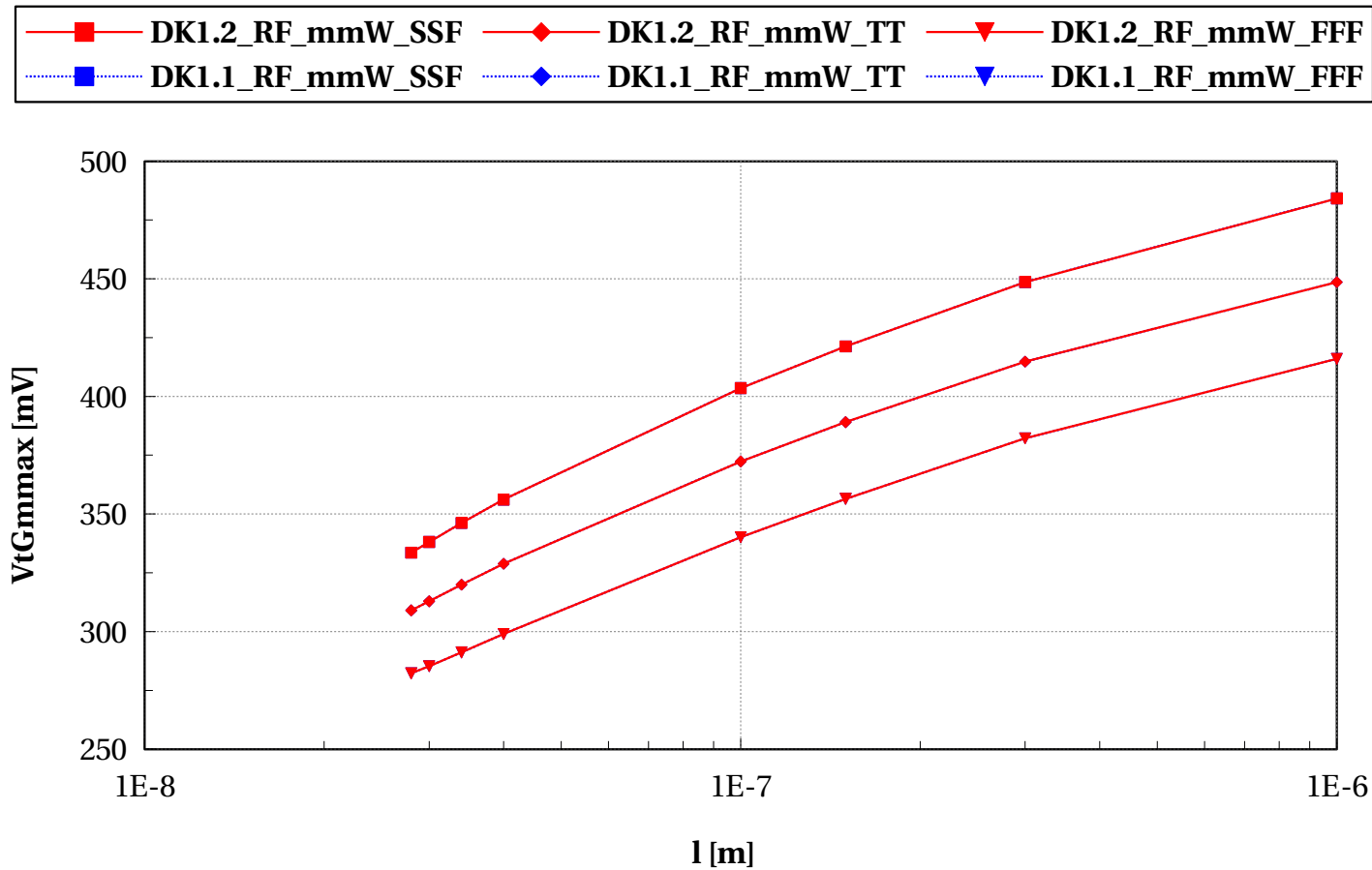
# lvtnfet\_rfseg, vt\_sat [mV] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



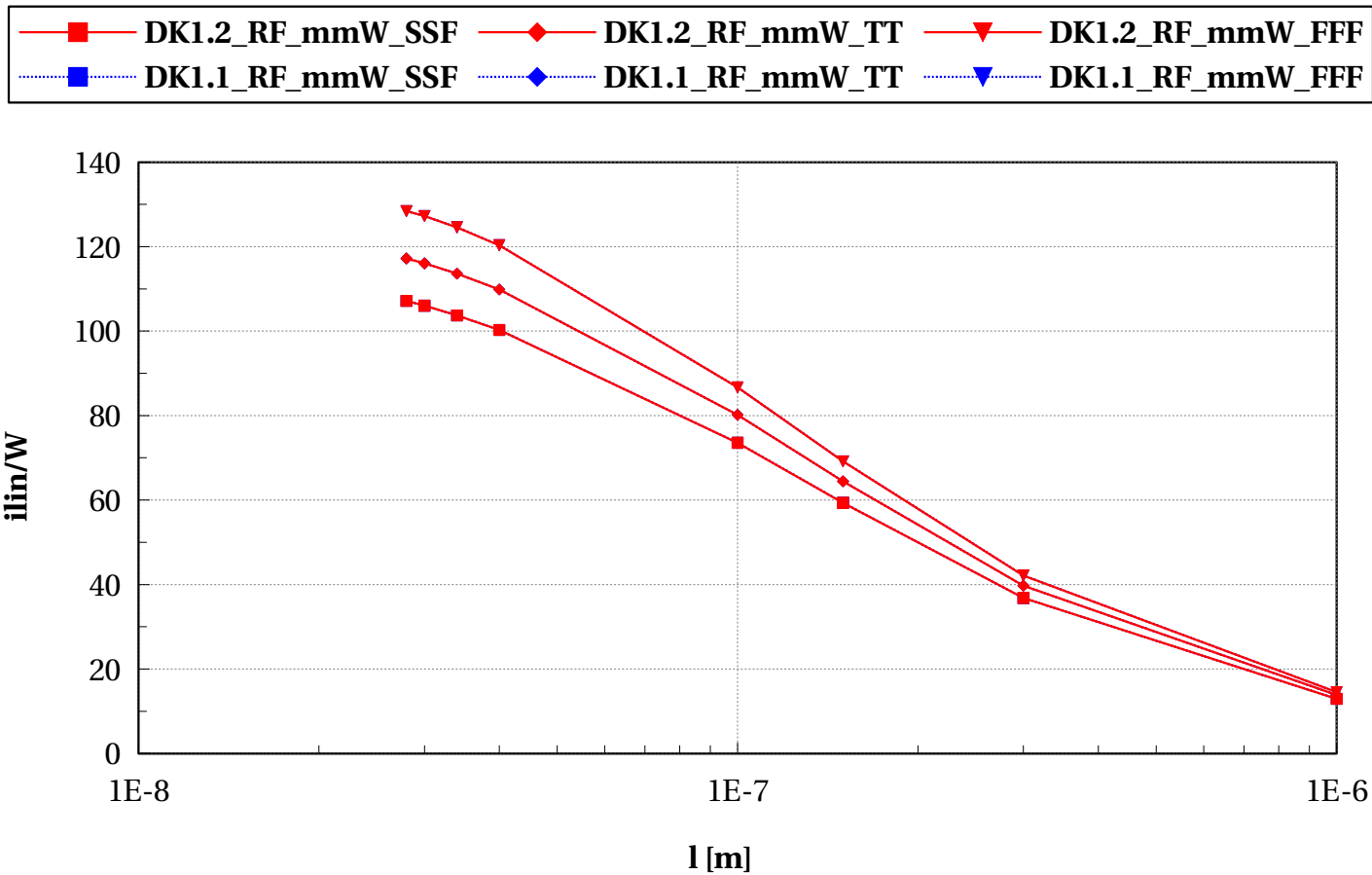
# lvtnfet\_rfseg, VtGmmax [mV] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



# lvtnfet\_rfseg, $i_{lin}/W$ vs $l$ [m]

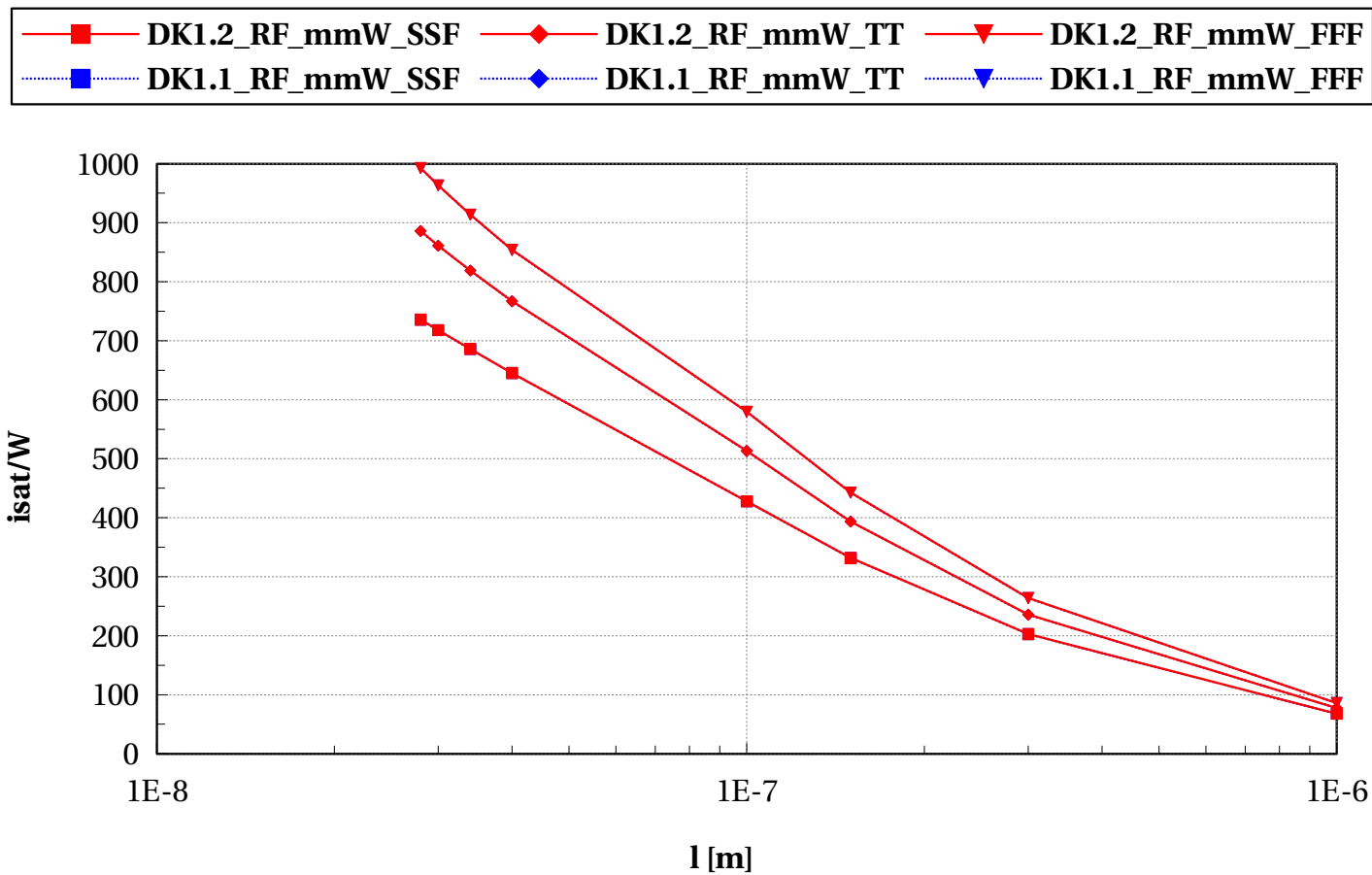
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6





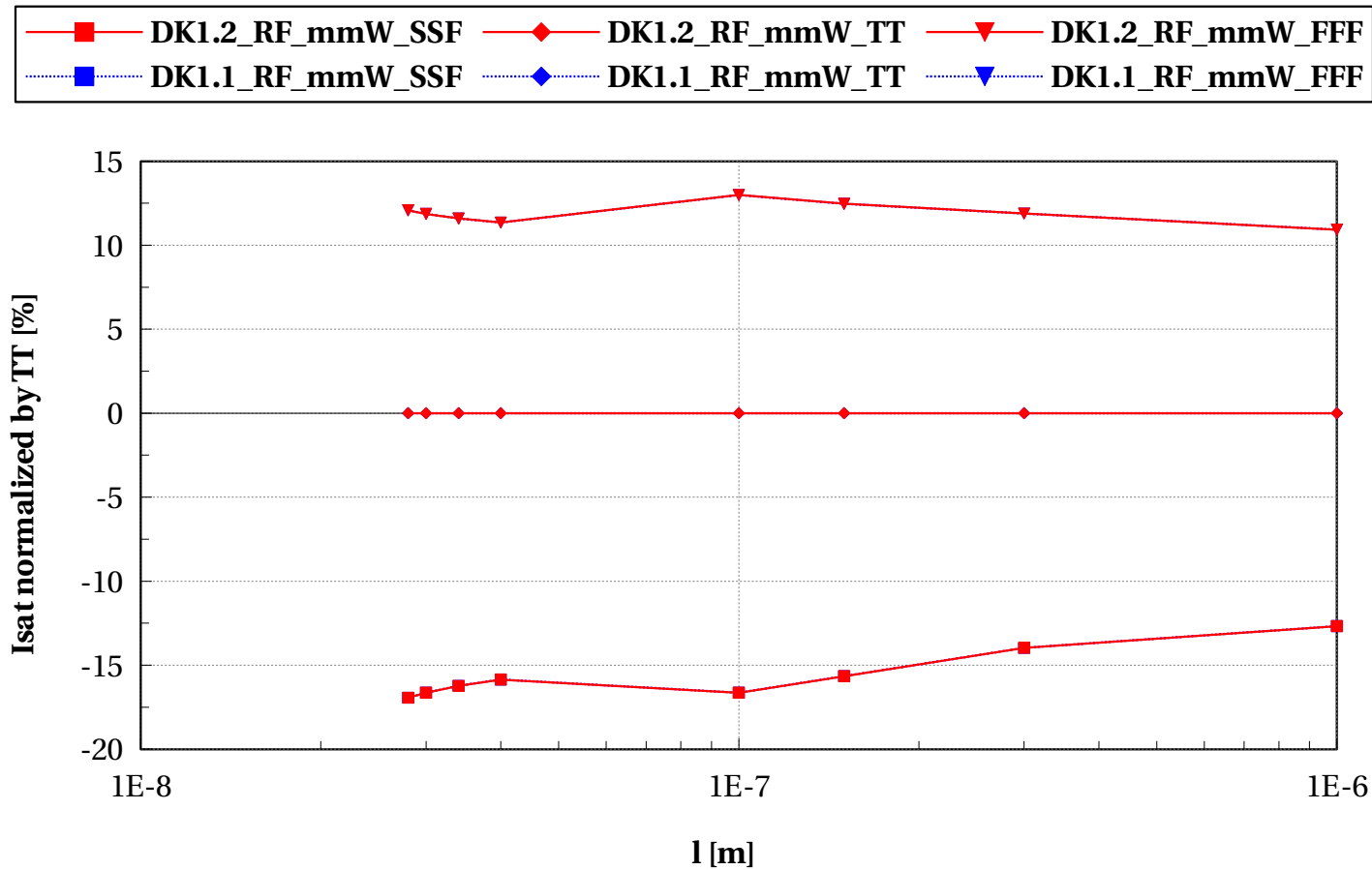
# lvtnfet\_rfseg, isat/W vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



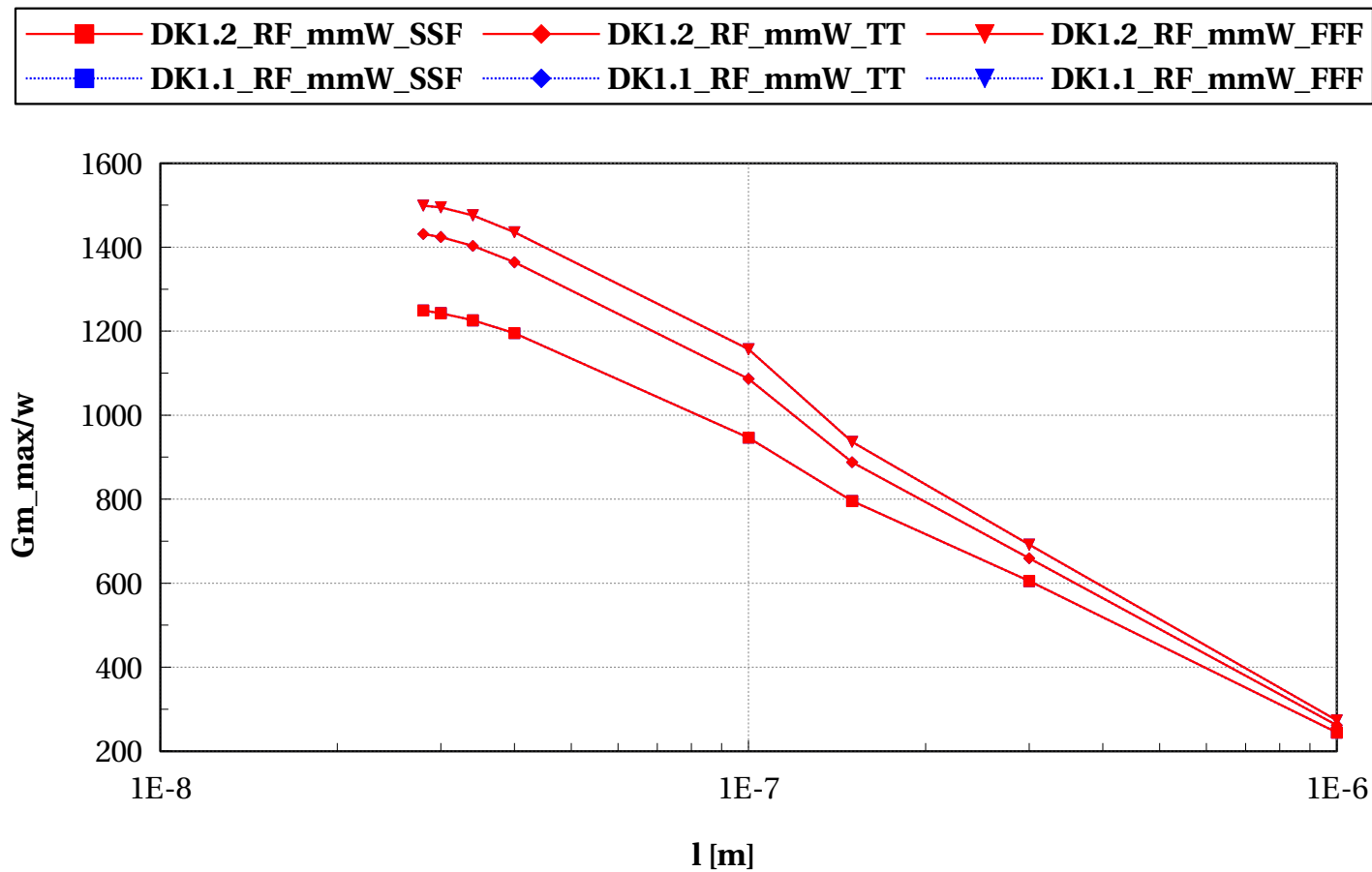
# lvtnfet\_rfseg, Isat normalized by TT [%] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



# lvtnfet\_rfseg, Gm\_max/w vs l [m]

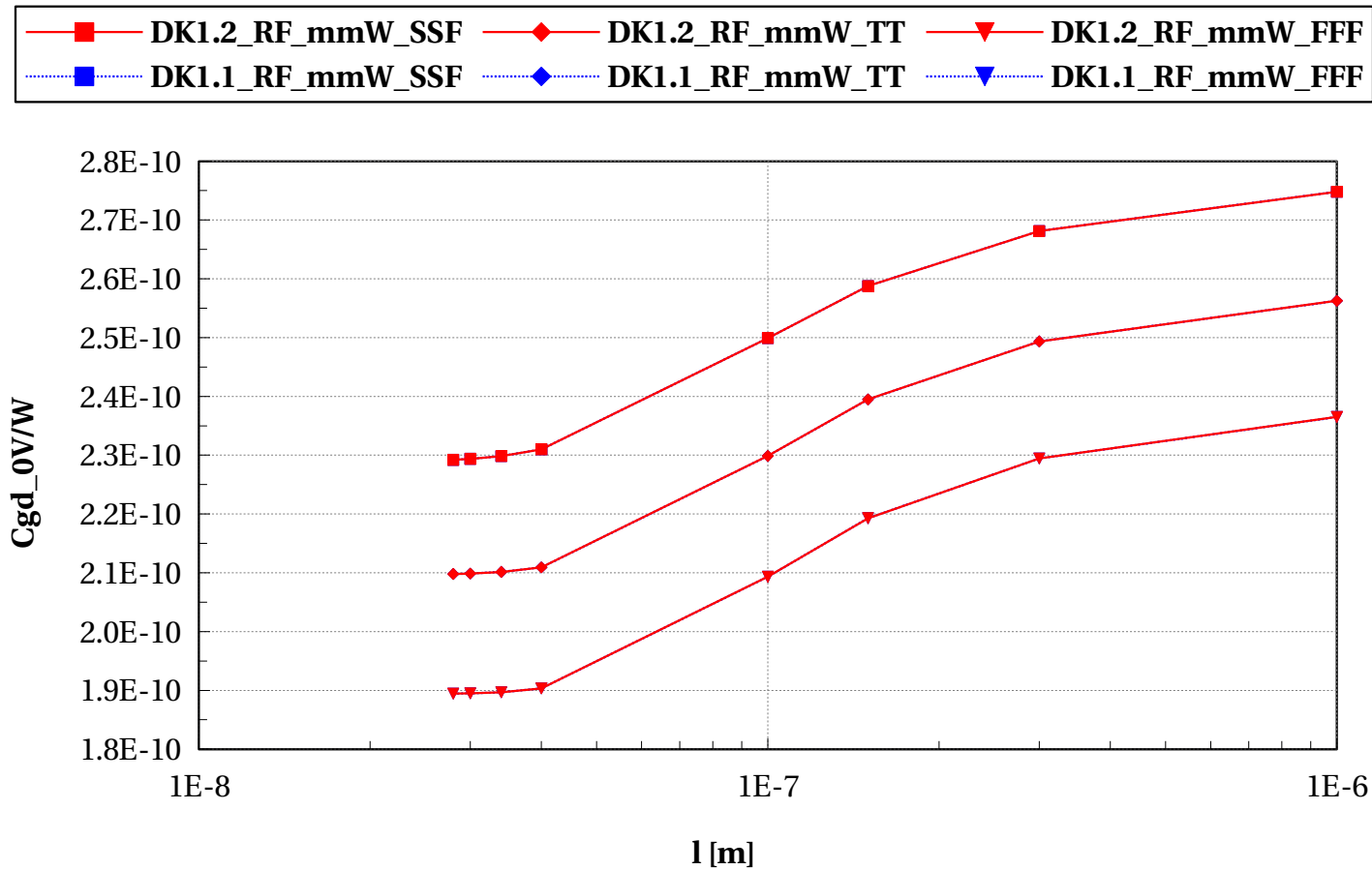
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



## Scaling versus length $W_{\text{fing}}=1\text{ }\mu\text{m}$ - RF

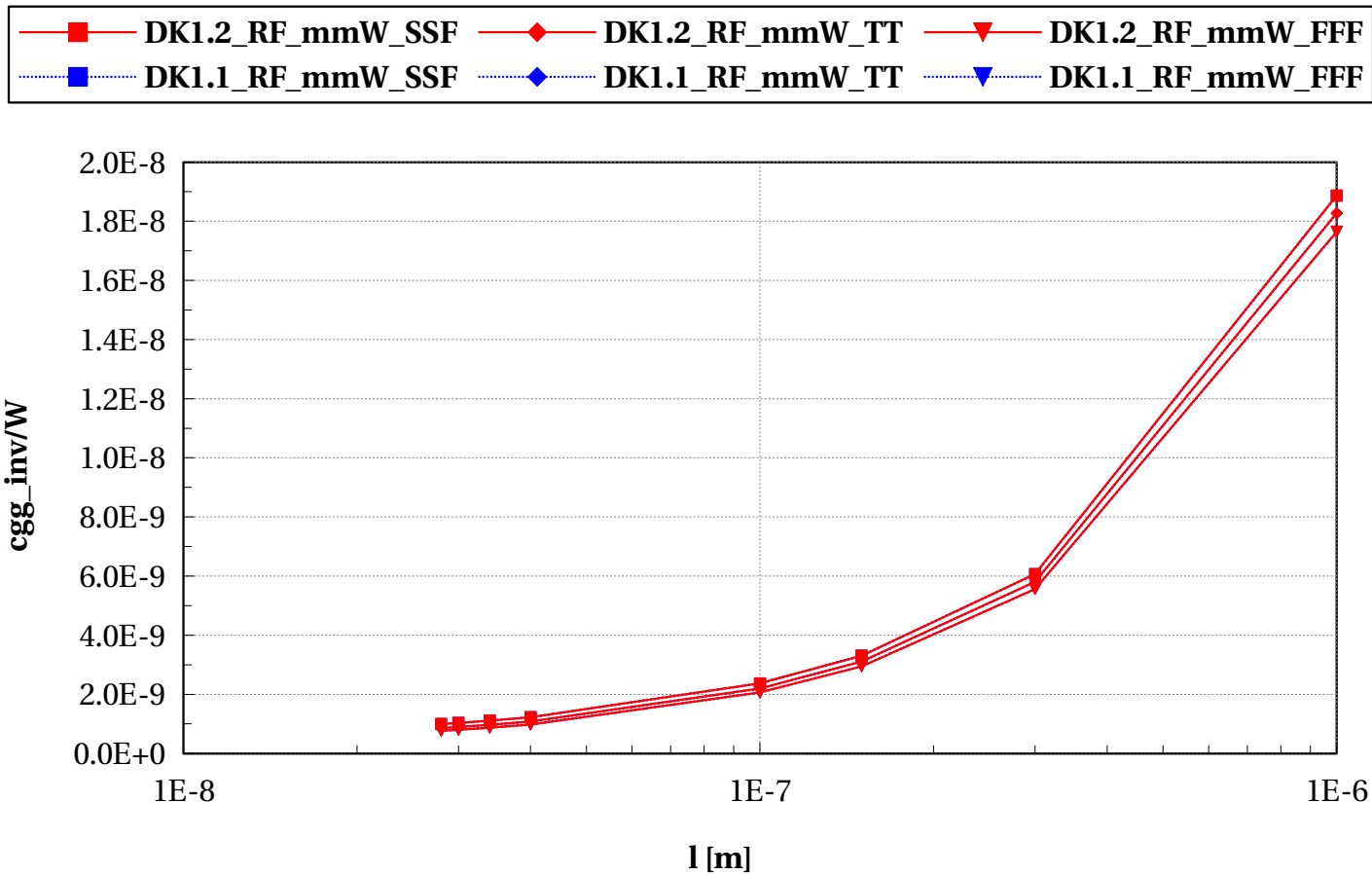
# lvtnfet\_rfseg, Cgd\_0V/W vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



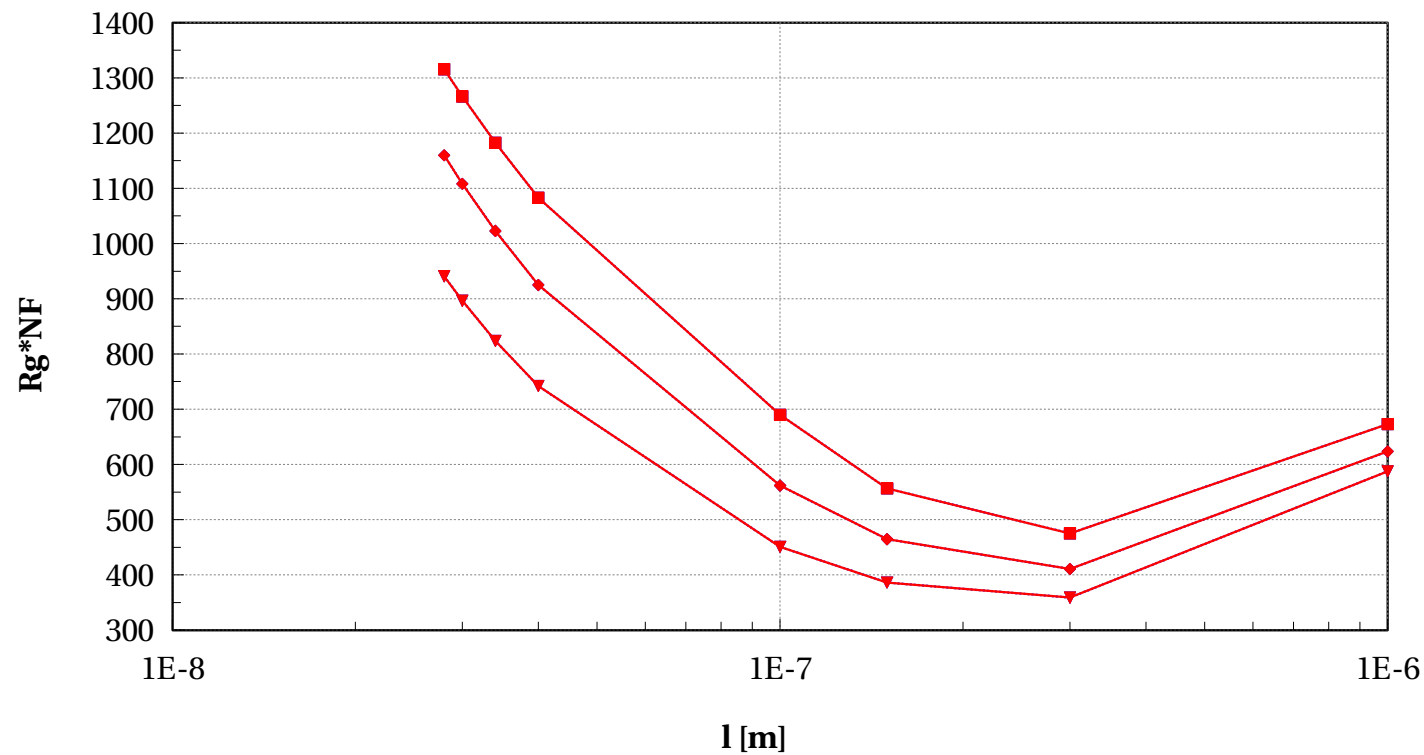
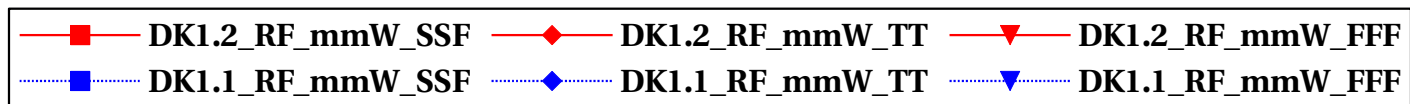
# lvtnfet\_rfseg, cgg\_inv/W vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



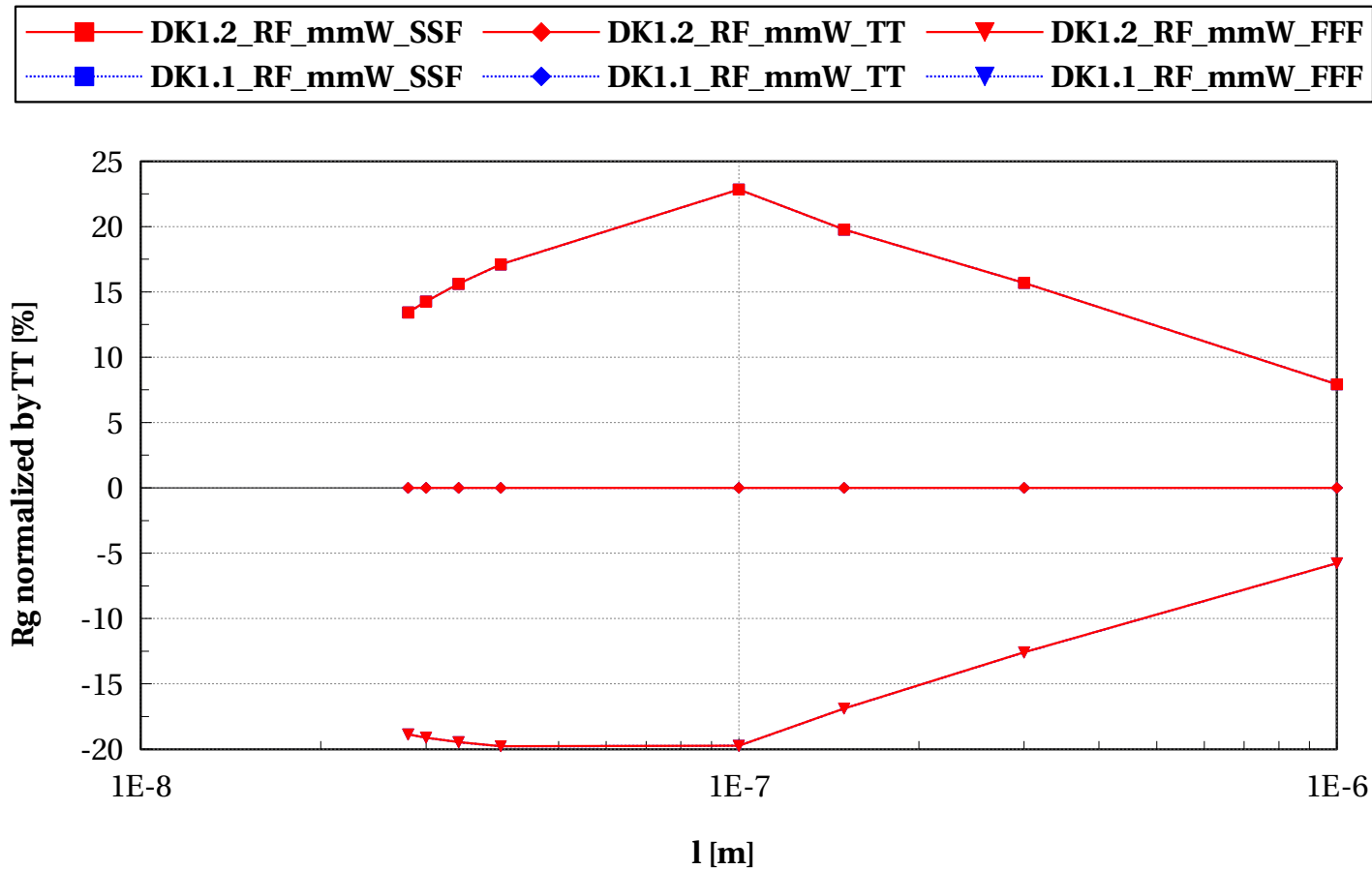
# lvtnfet\_rfseg, $R_g * NF$ vs $l$ [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



## lvtnfet\_rfseg, Rg normalized by TT [%] vs l [m]

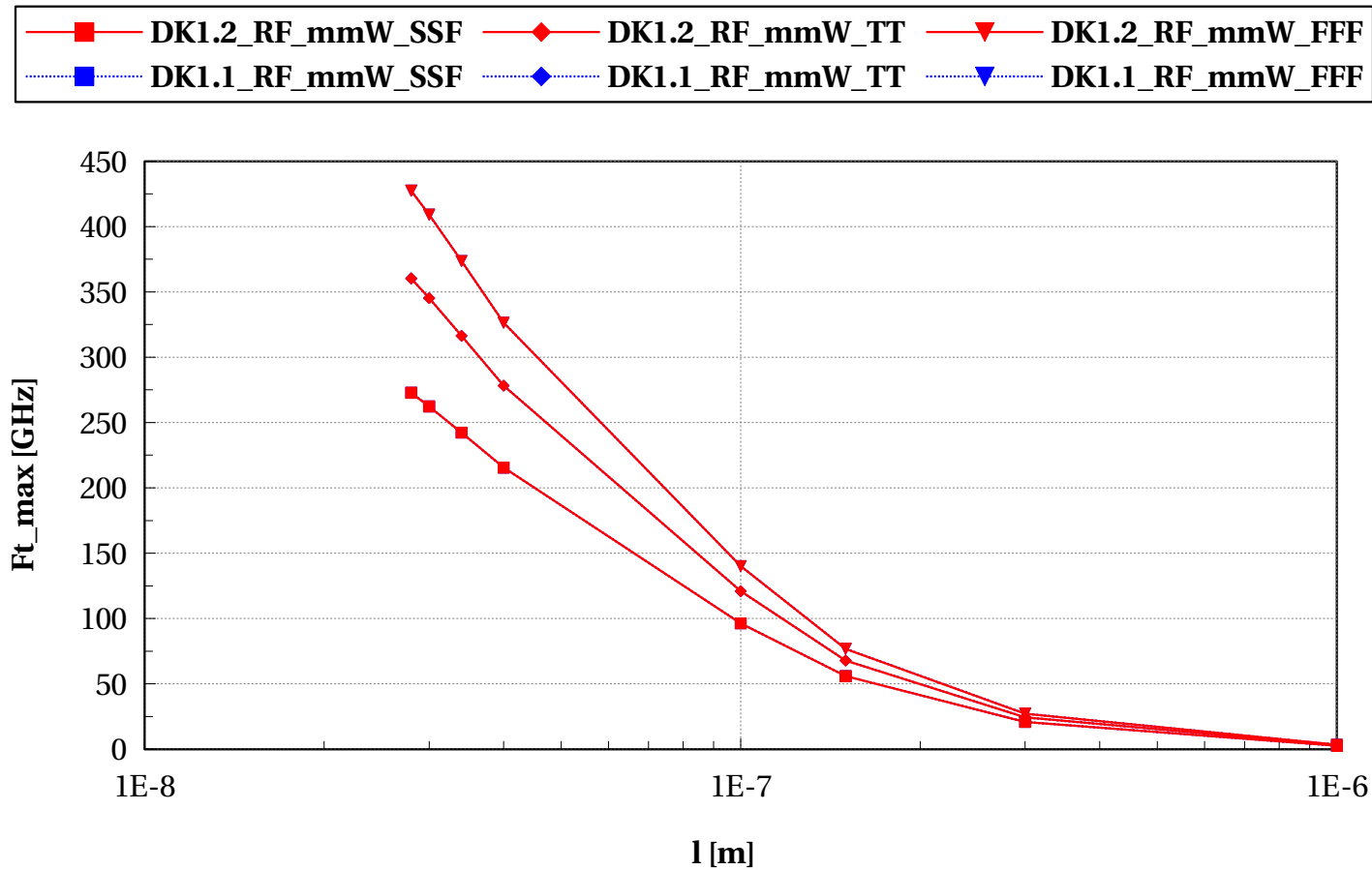
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6





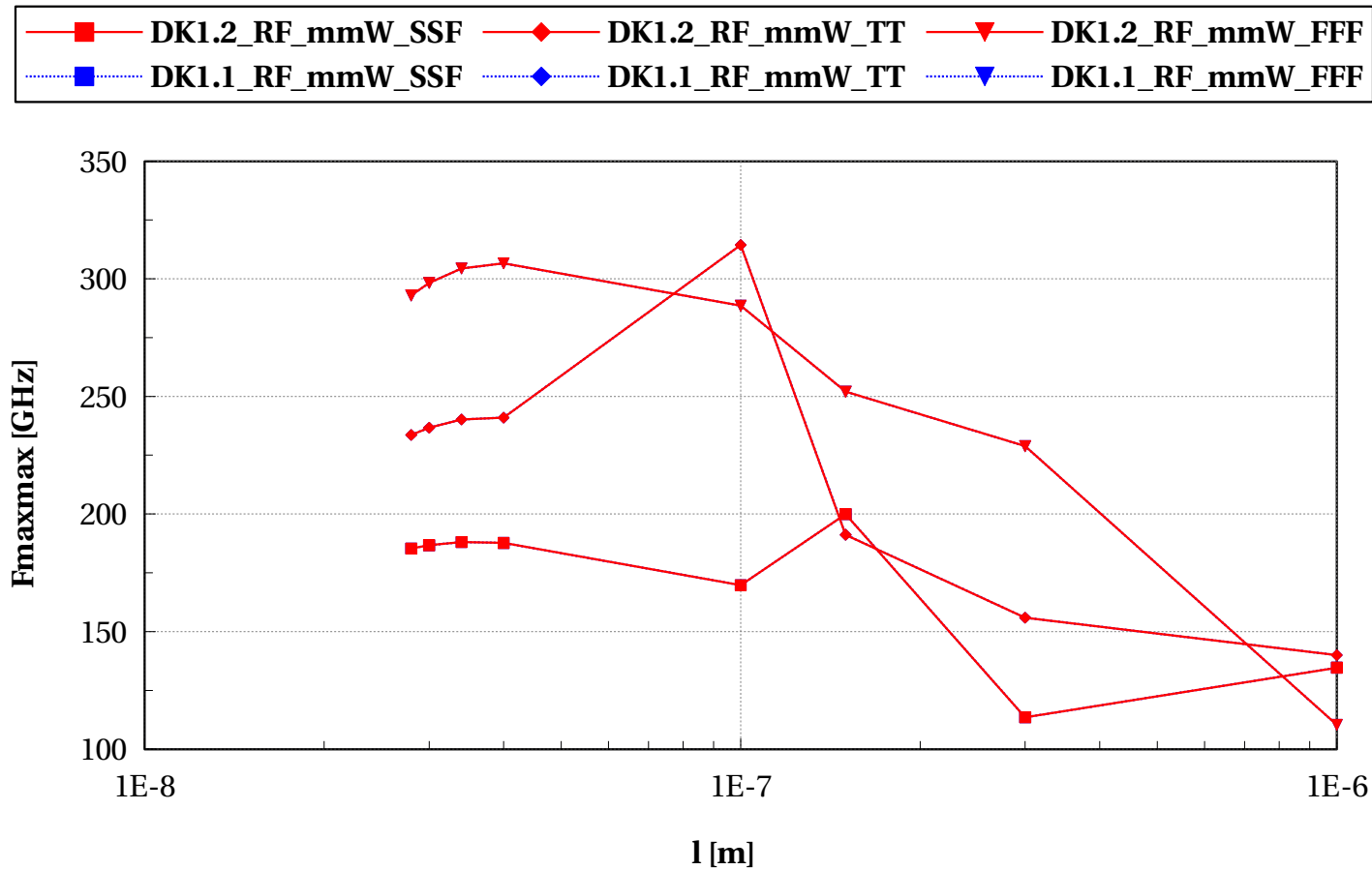
# lvtnfet\_rfseg, Ft\_max [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



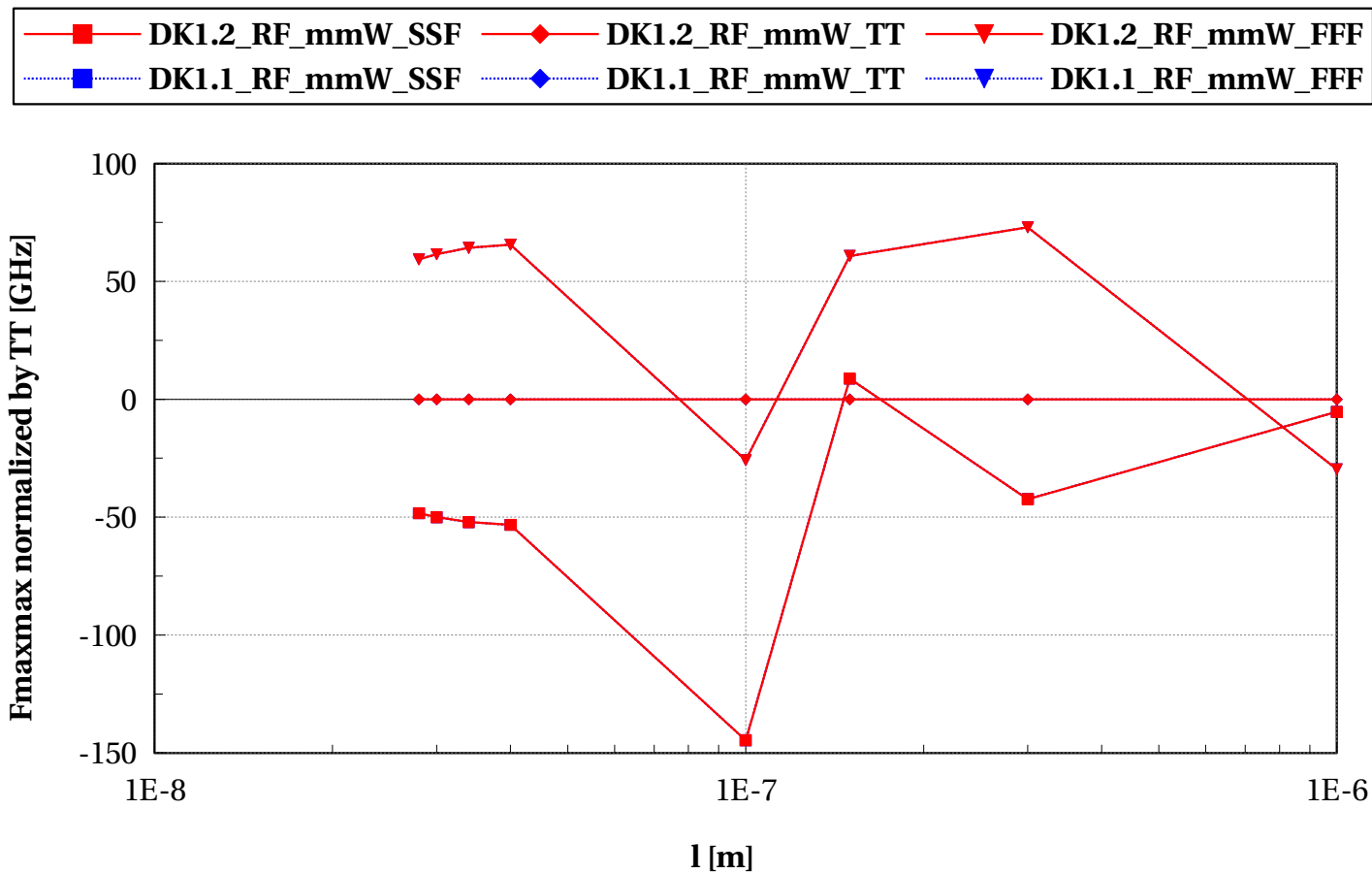
# lvtnfet\_rfseg, Fmaxmax [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6



# lvtnfet\_rfseg, Fmaxmax normalized by TT [GHz] vs l [m]

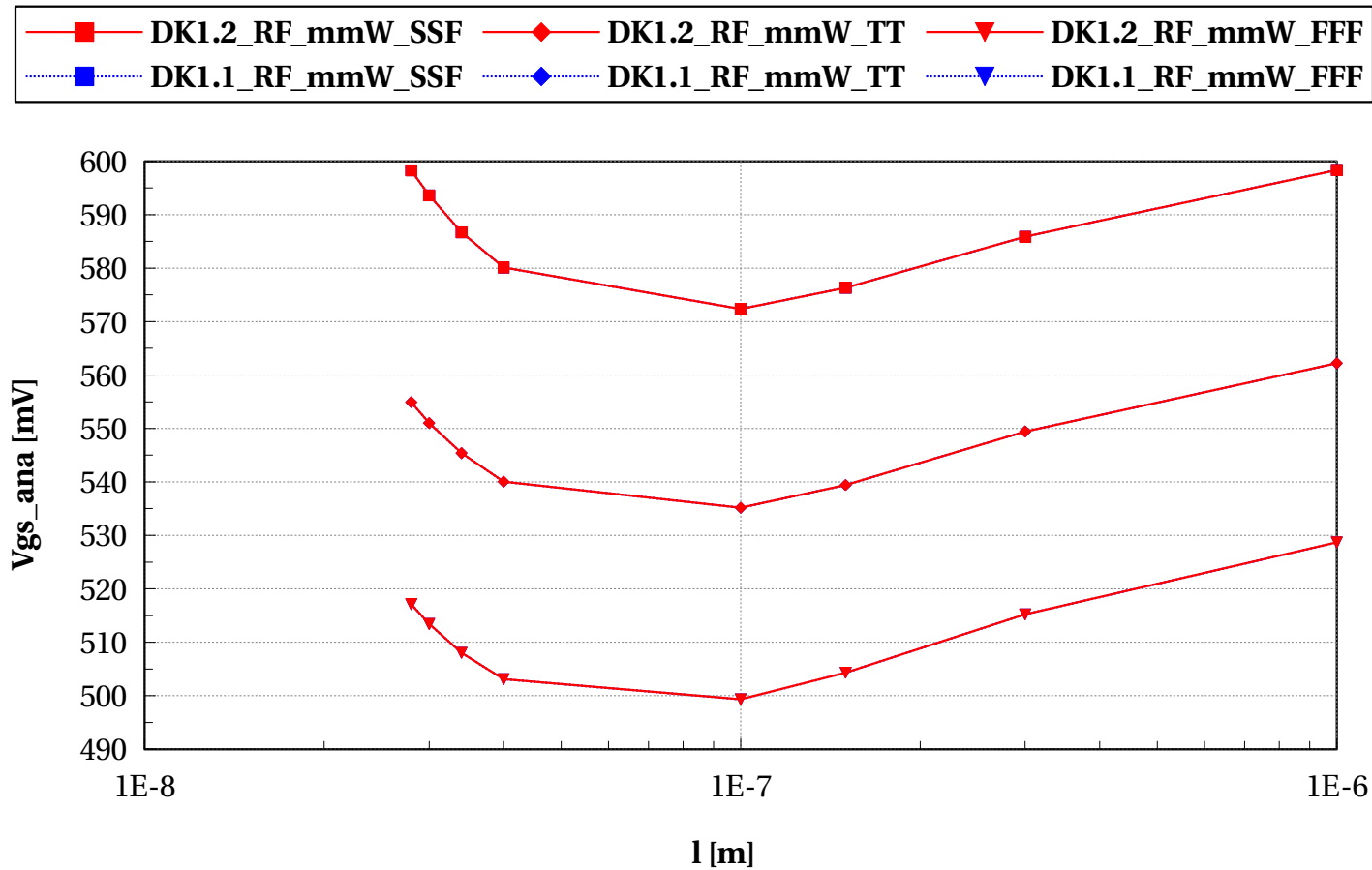
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



## Scaling versus length $W_{\text{fing}}=1\mu\text{m}$ - Analog

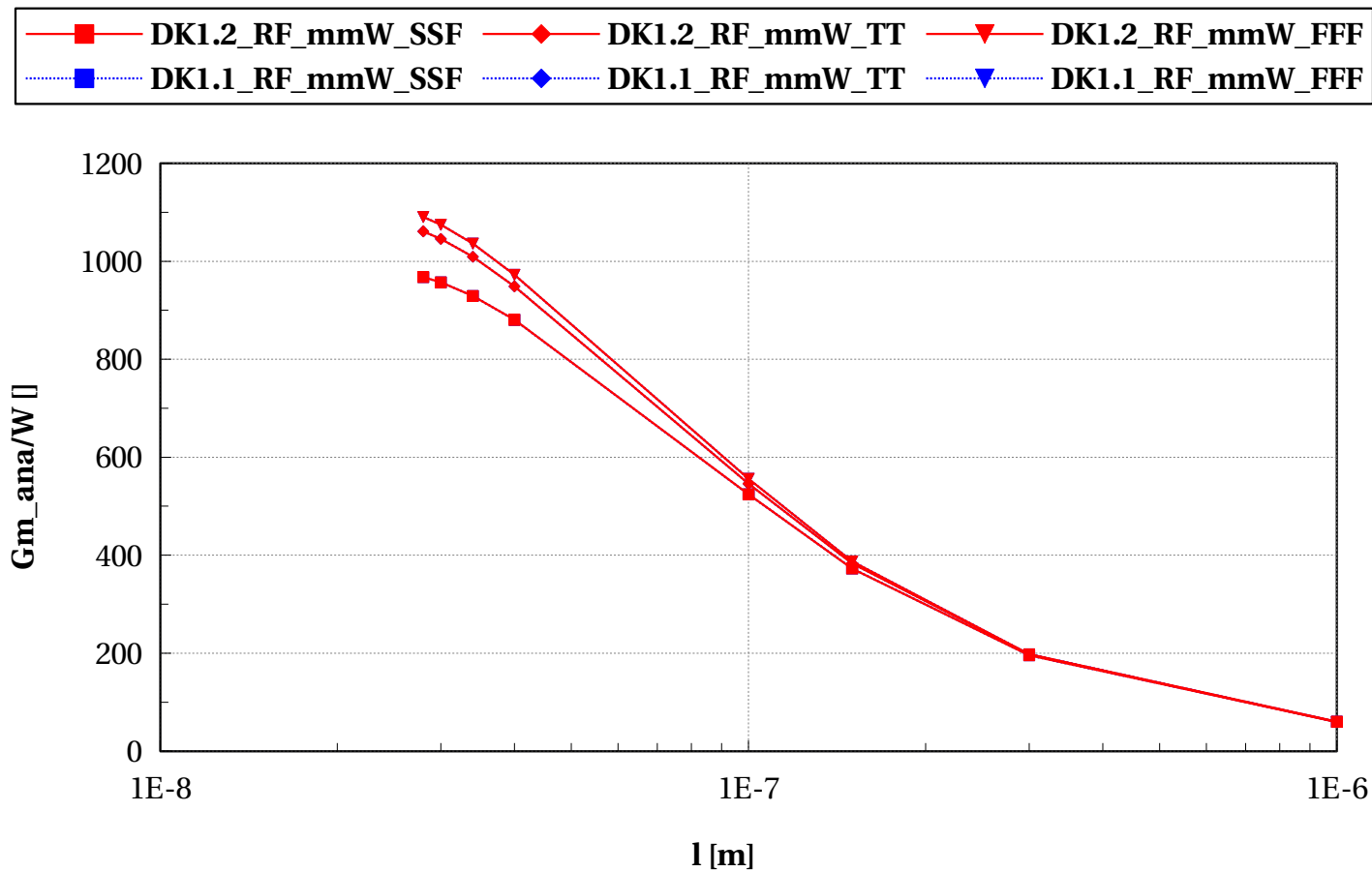
# lvtnfet\_rfseg, Vgs\_ana [mV] vs I [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



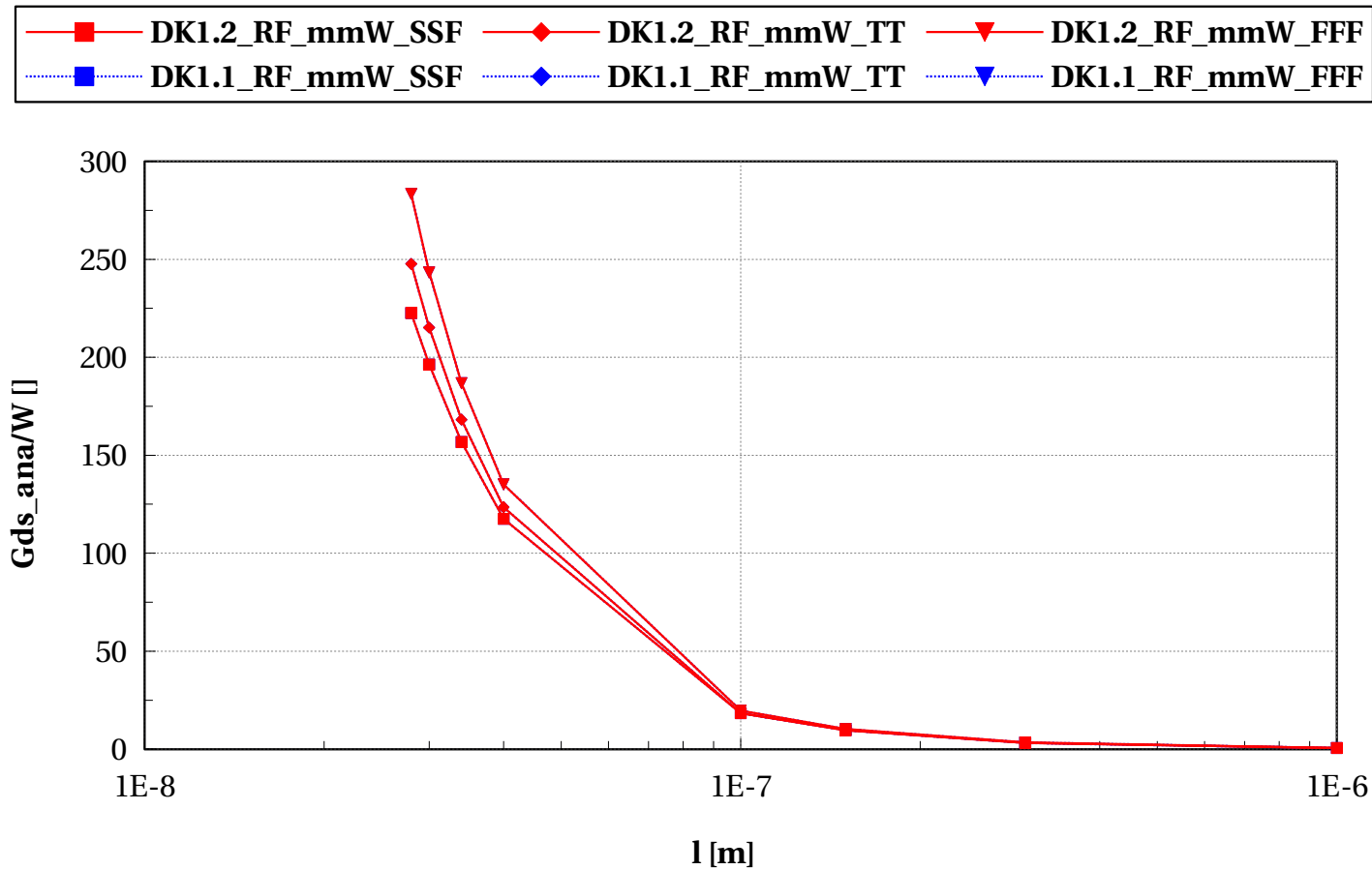
# lvtnfet\_rfseg, Gm\_ana/W [] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6



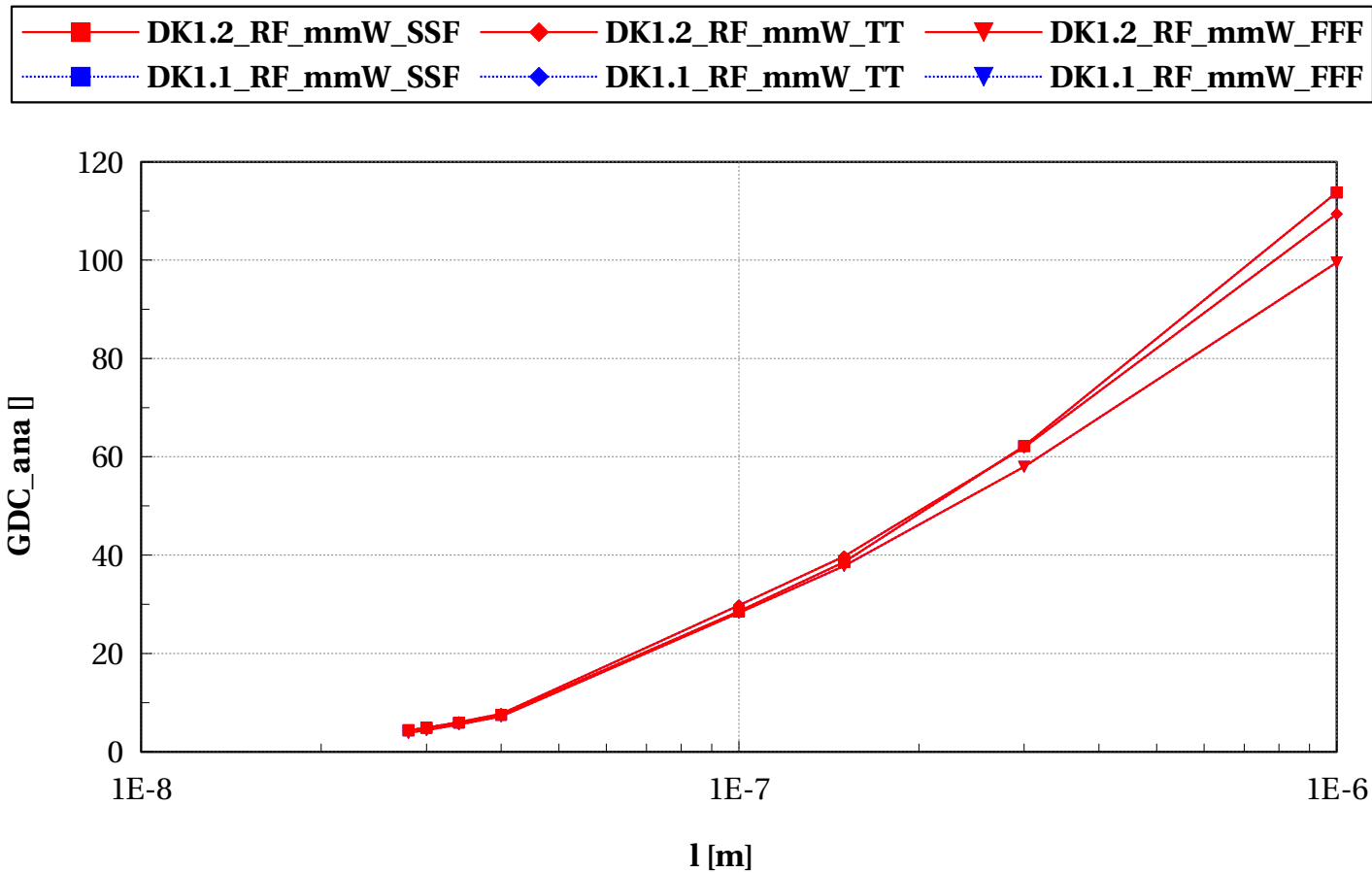
# lvtnfet\_rfseg, Gds\_ana/W [] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



# lvtnfet\_rfseg, GDC\_ana [] vs l [m]

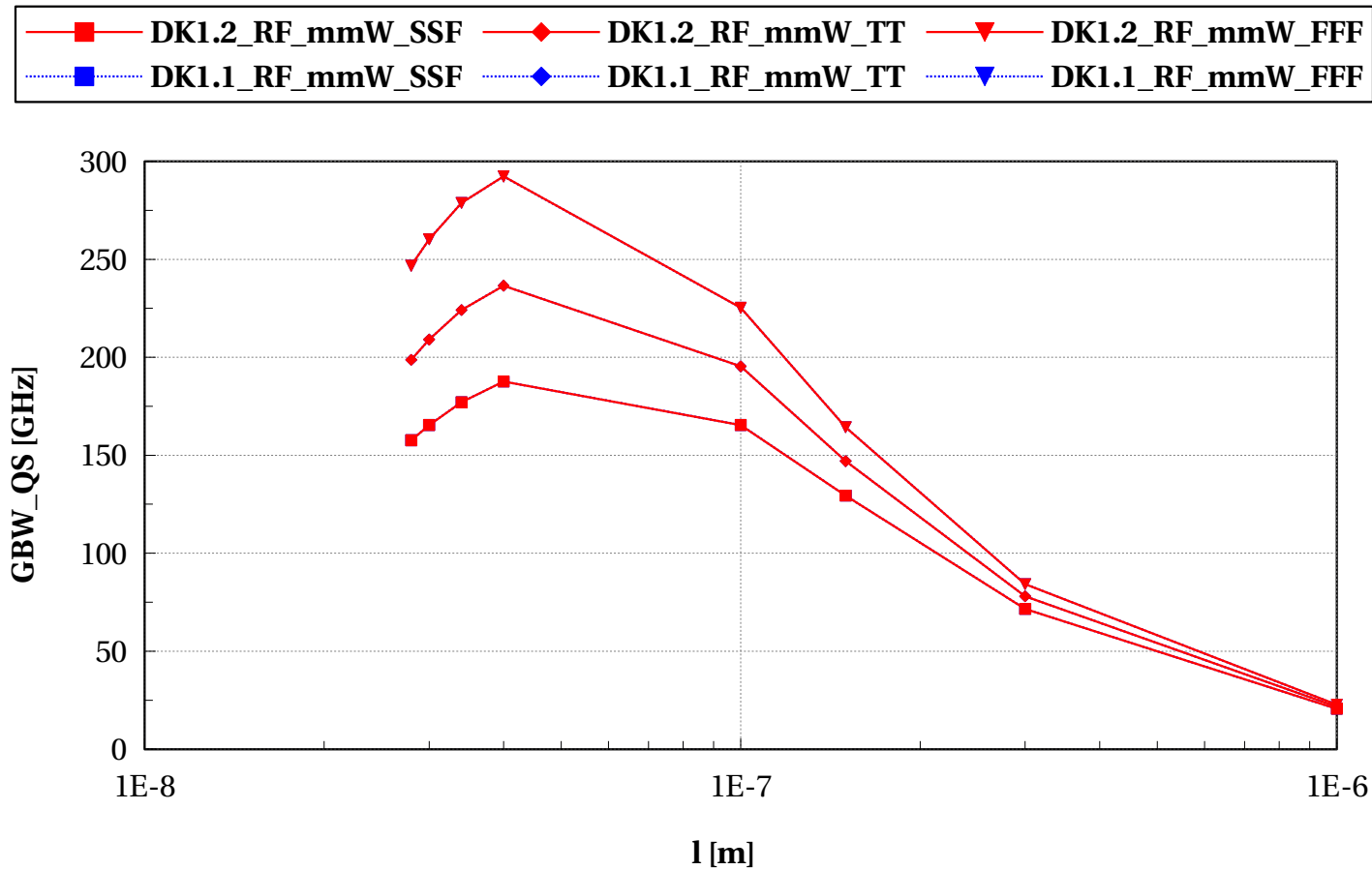
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6





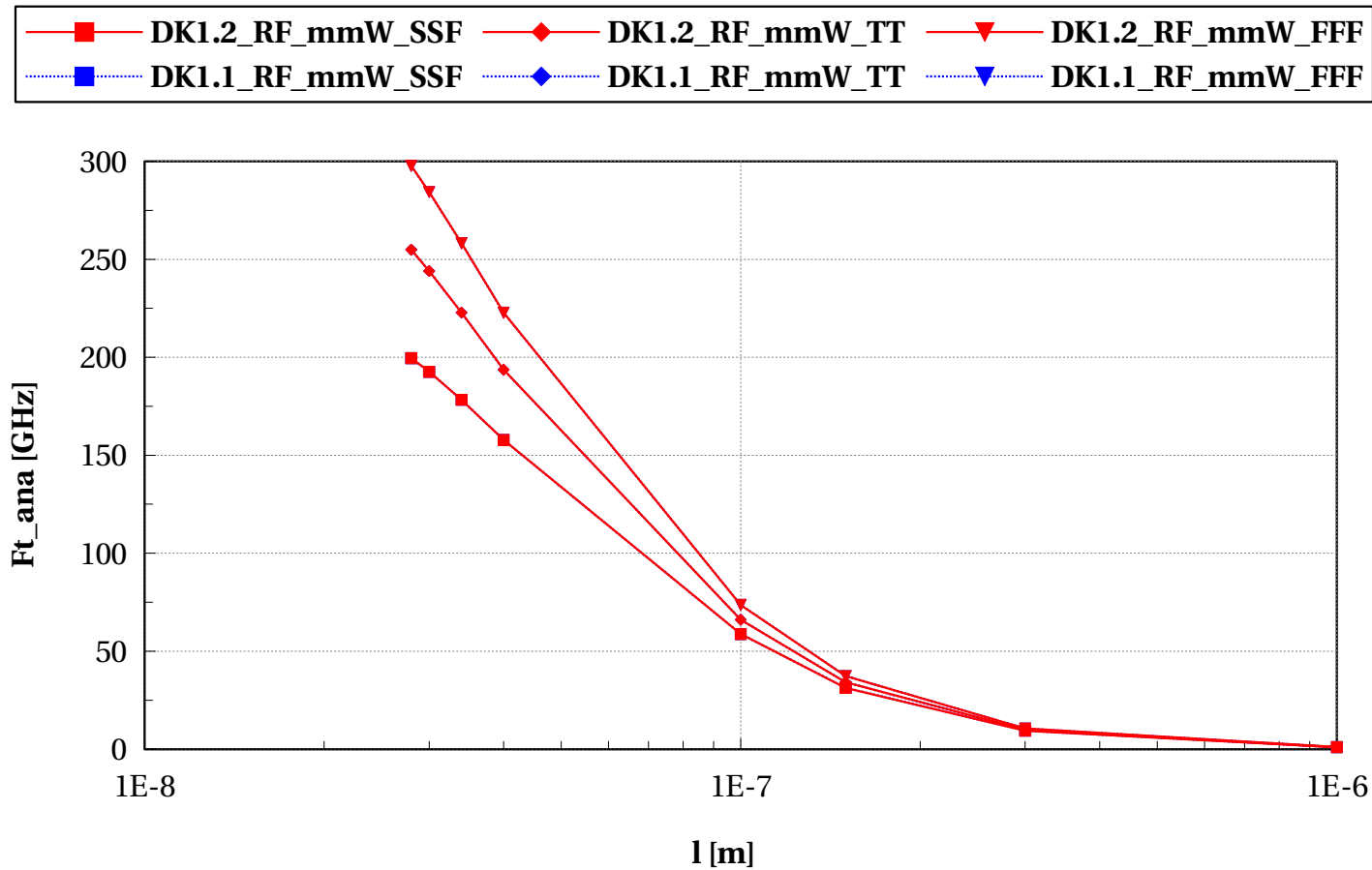
# lvtinfet\_rfseg, GBW\_QS [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



# lvtnfet\_rfseg, Ft\_ana [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



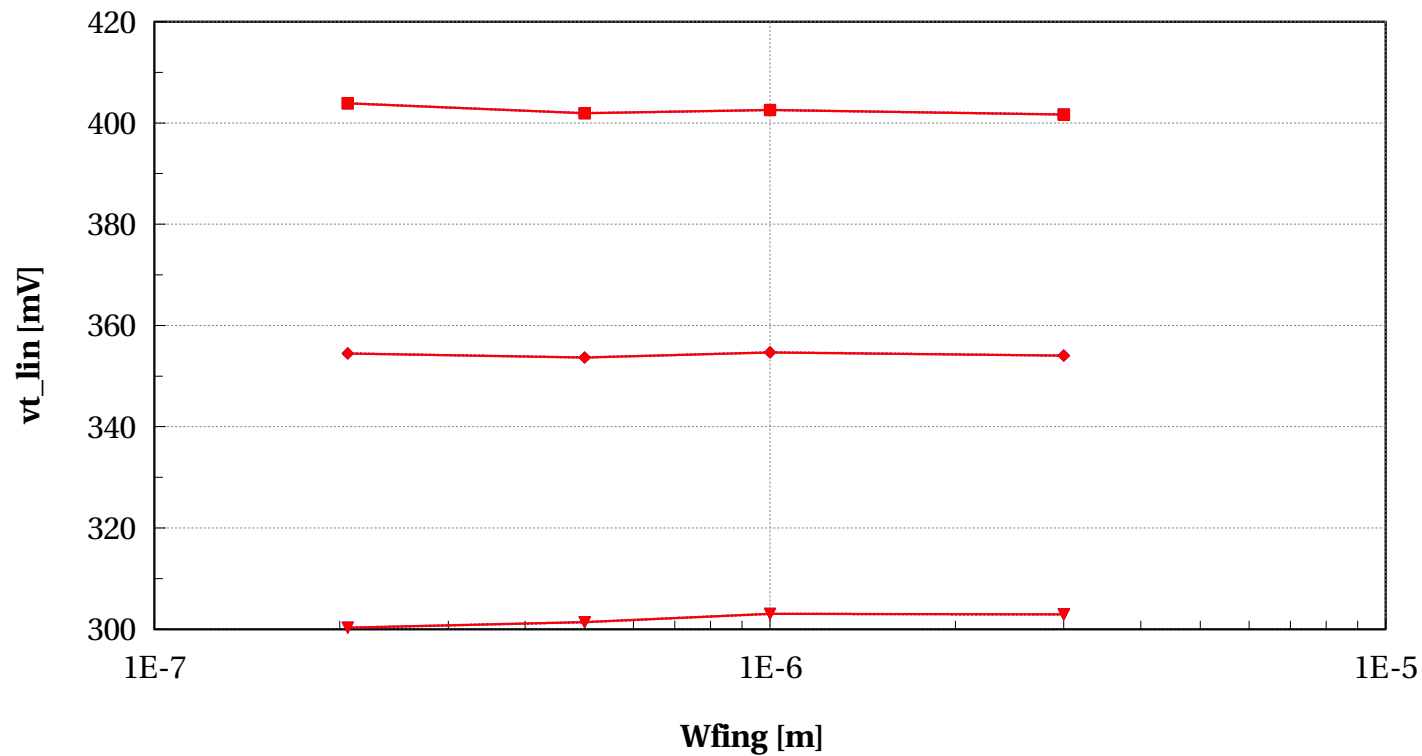
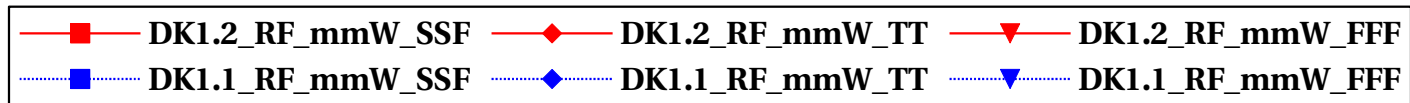
# lvtpfet\_rf

## Electrical characteristics scaling

## Scaling versus width $L=30\text{nm}$ - DC

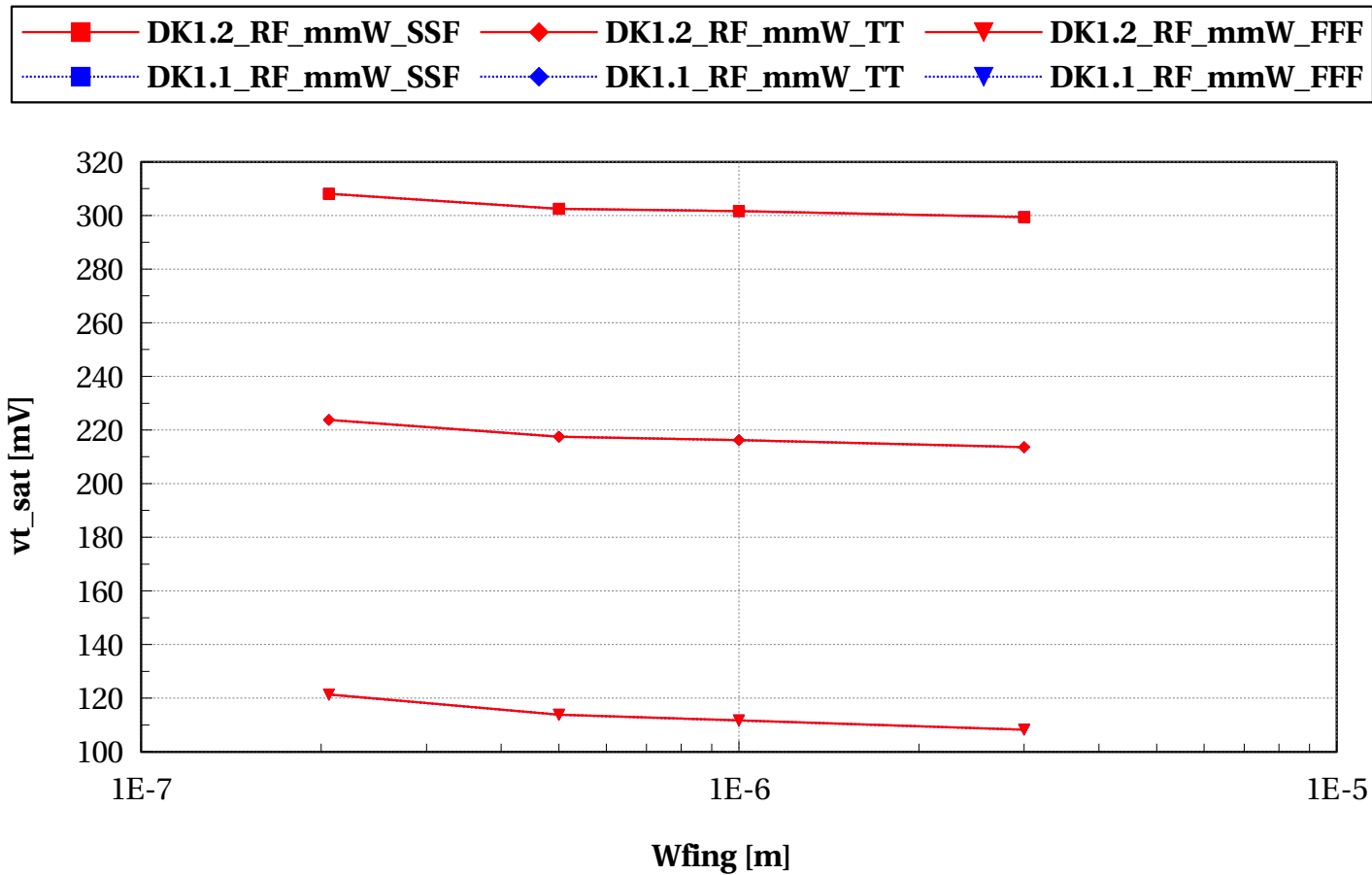
# lvtpfet\_rf, vt\_lin [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



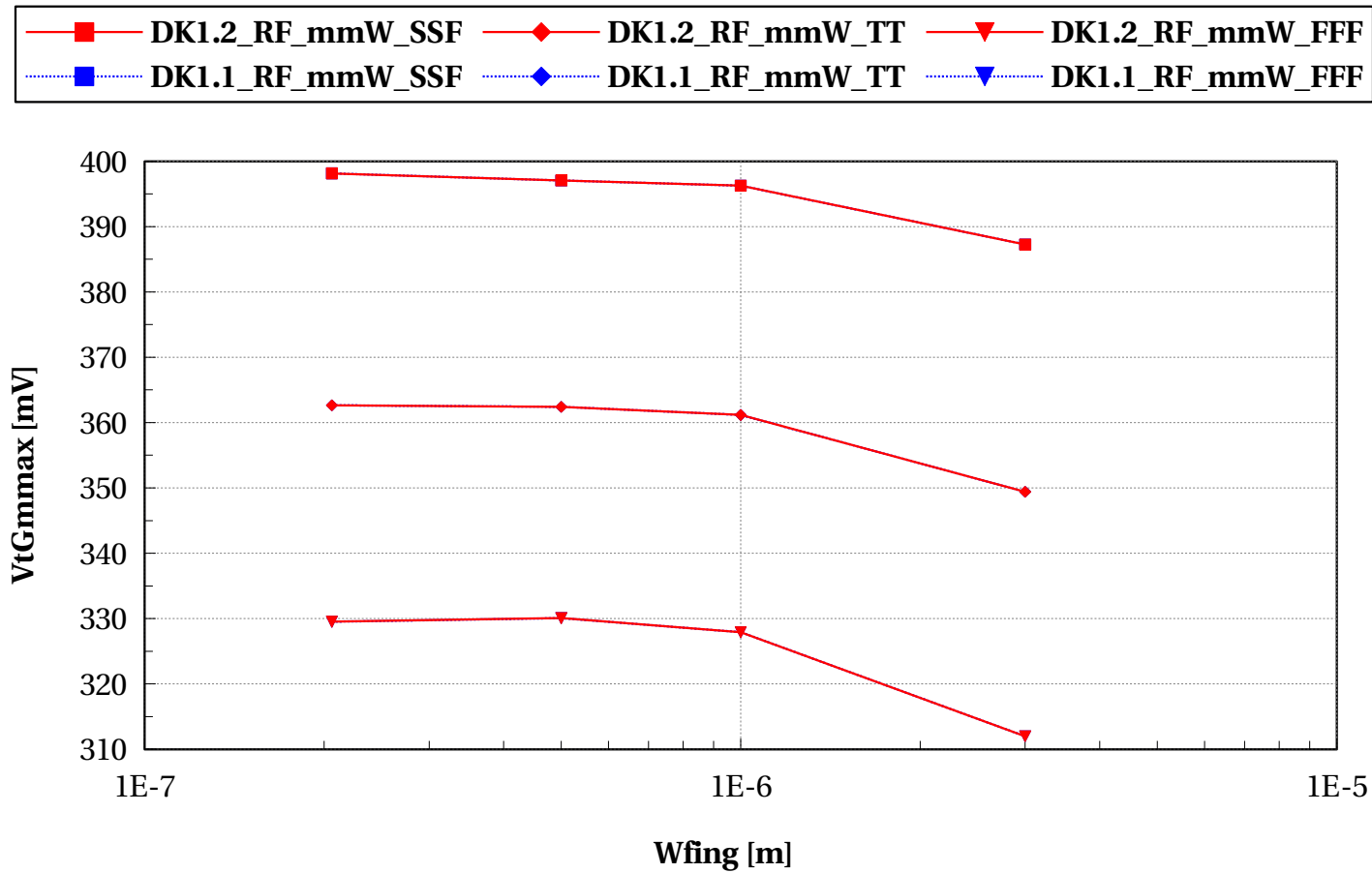
# lvtpfet\_rf, vt\_sat [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



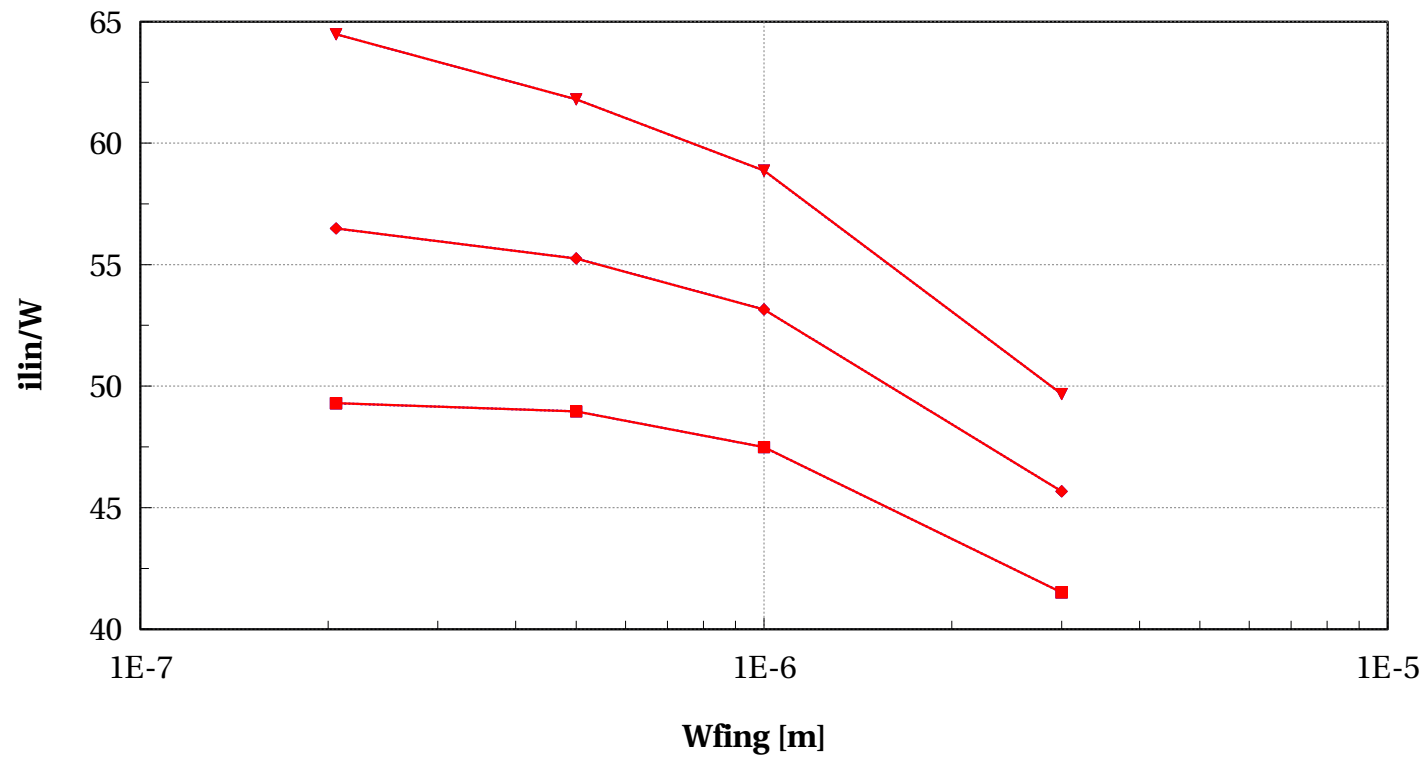
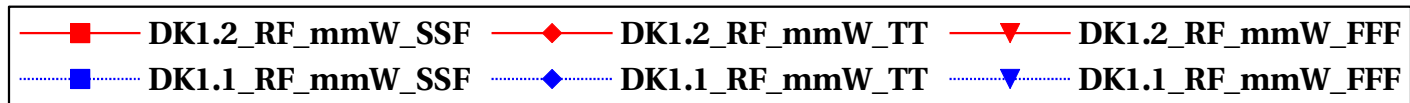
# lvtpfet\_rf, VtGmmax [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# lvtpfet\_rf, ilin/W vs Wfing [m]

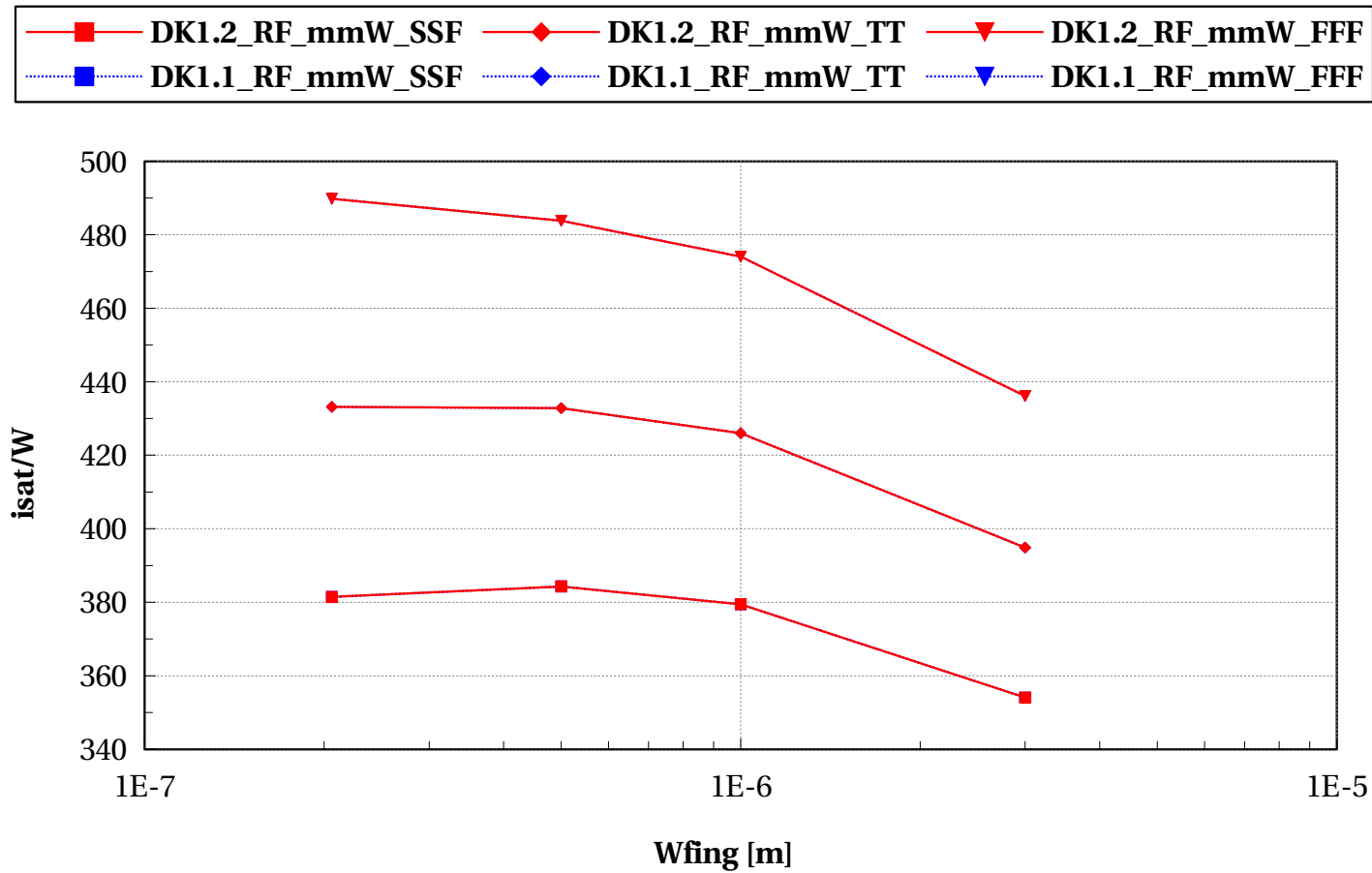
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9





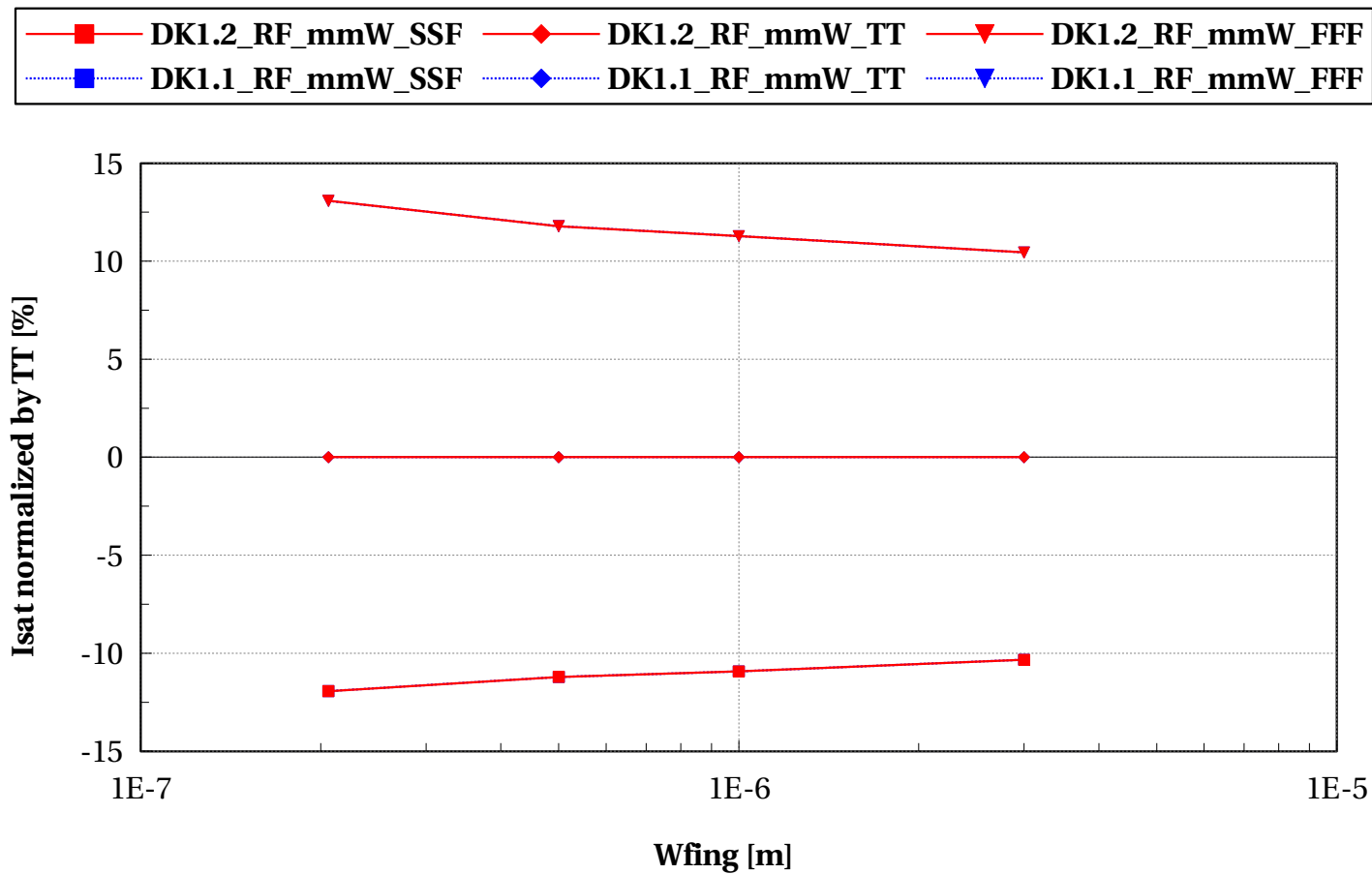
# lvtpfet\_rf, isat/W vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



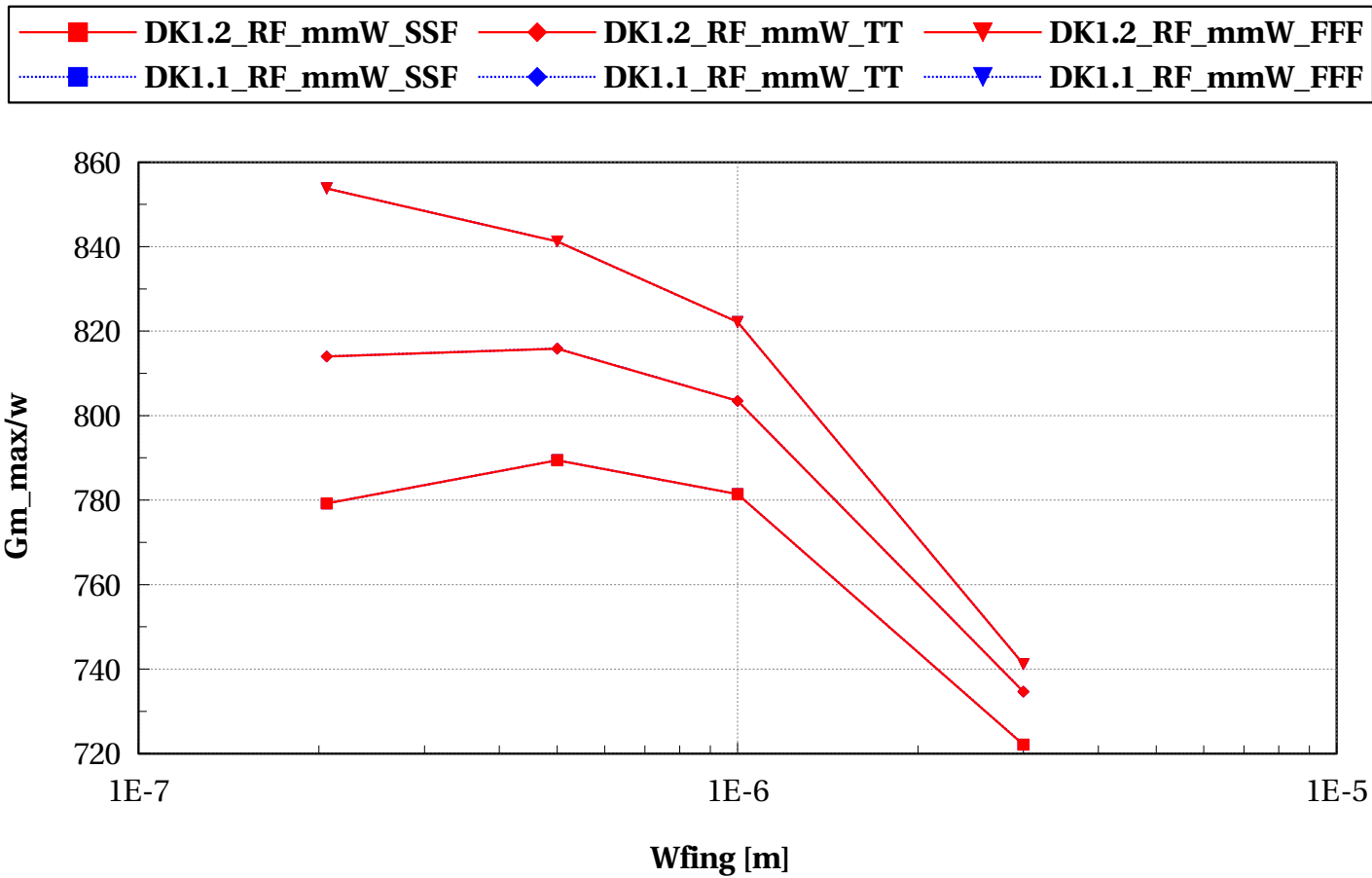
# lvtpfet\_rf, Isat normalized by TT [%] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# lvtpfet\_rf, Gm\_max/w vs Wfing [m]

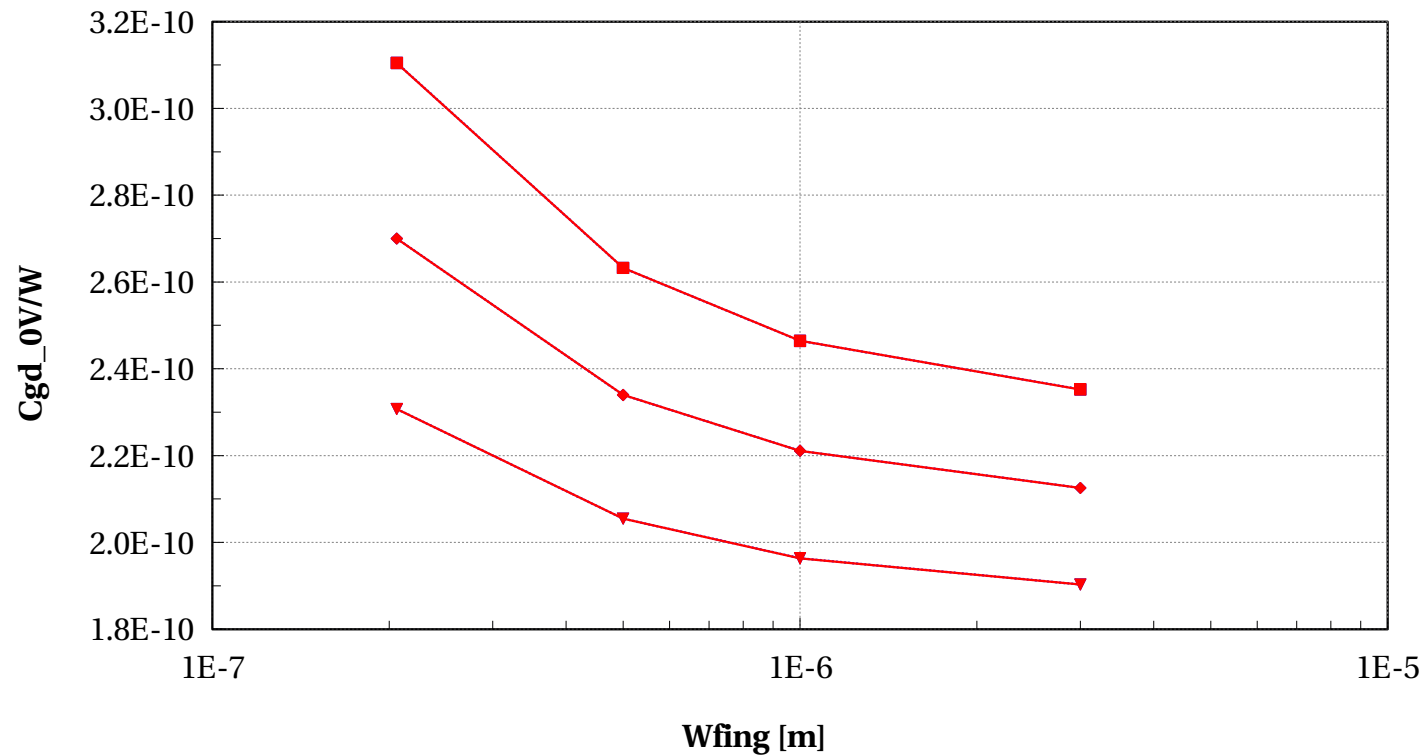
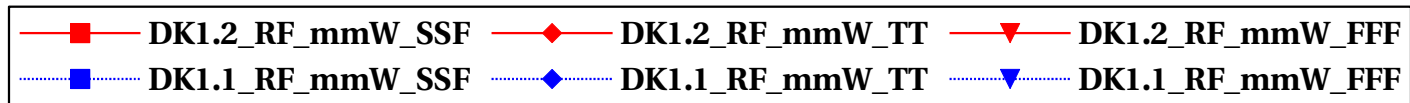
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



## Scaling versus width $L=30\text{nm}$ - RF

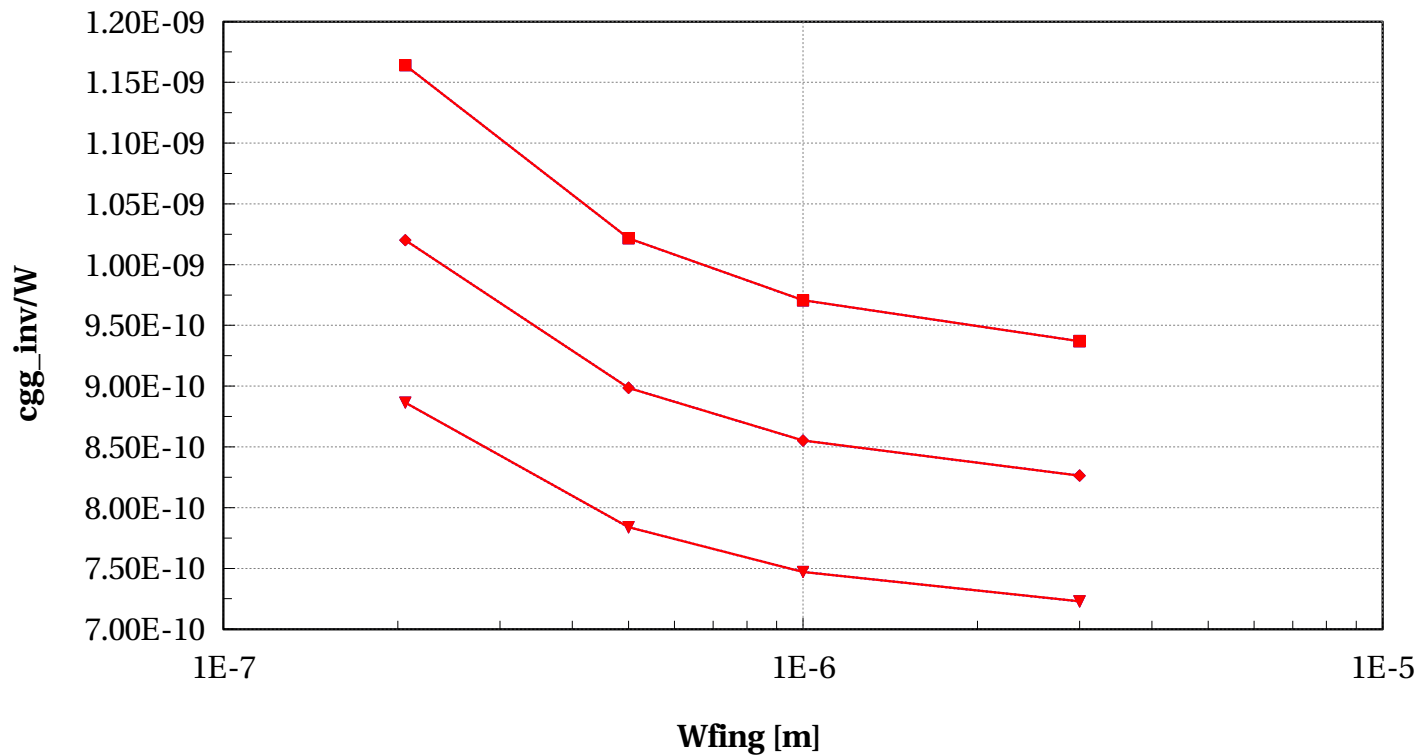
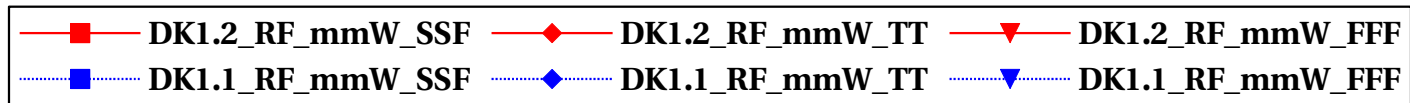
# lvtpfet\_rf, Cgd\_0V/W vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



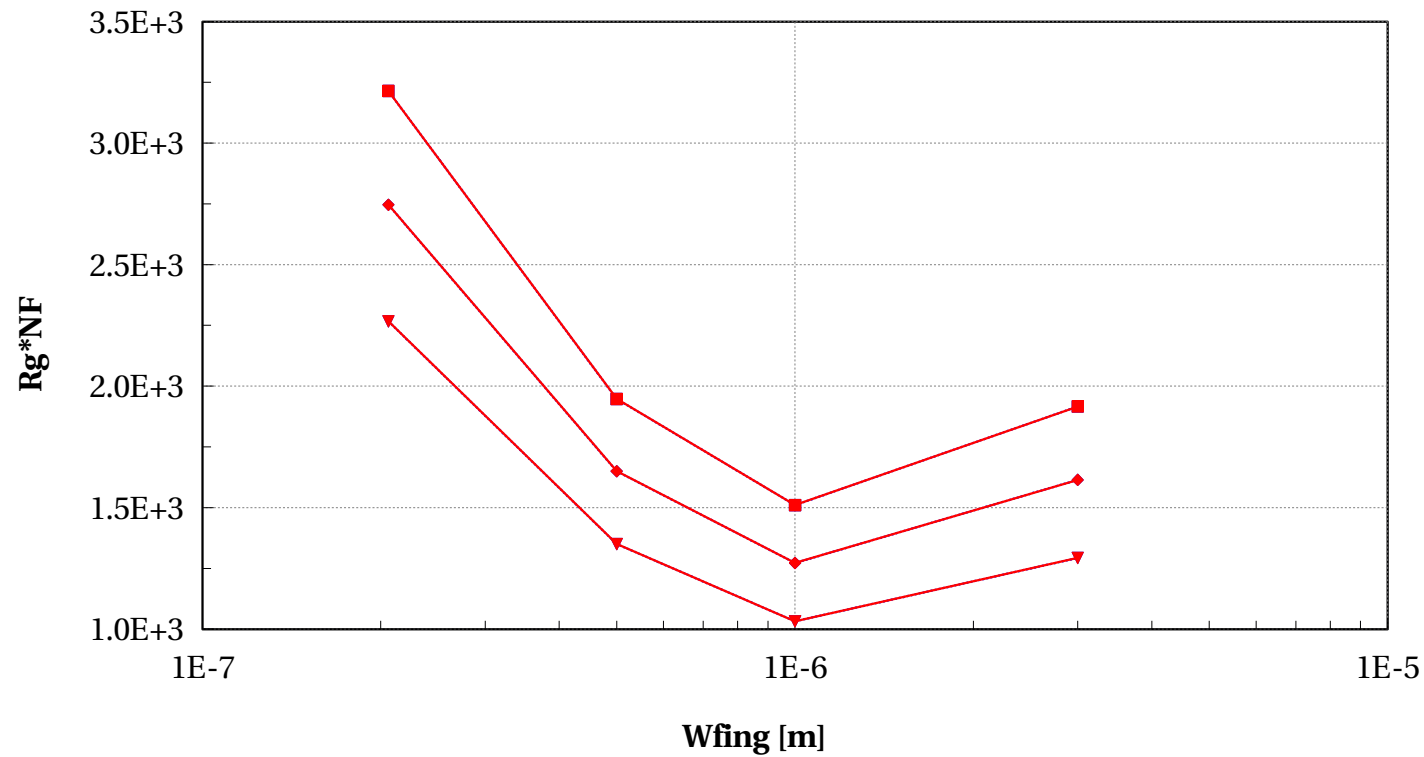
# lvtpfet\_rf, cgg\_inv/W vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



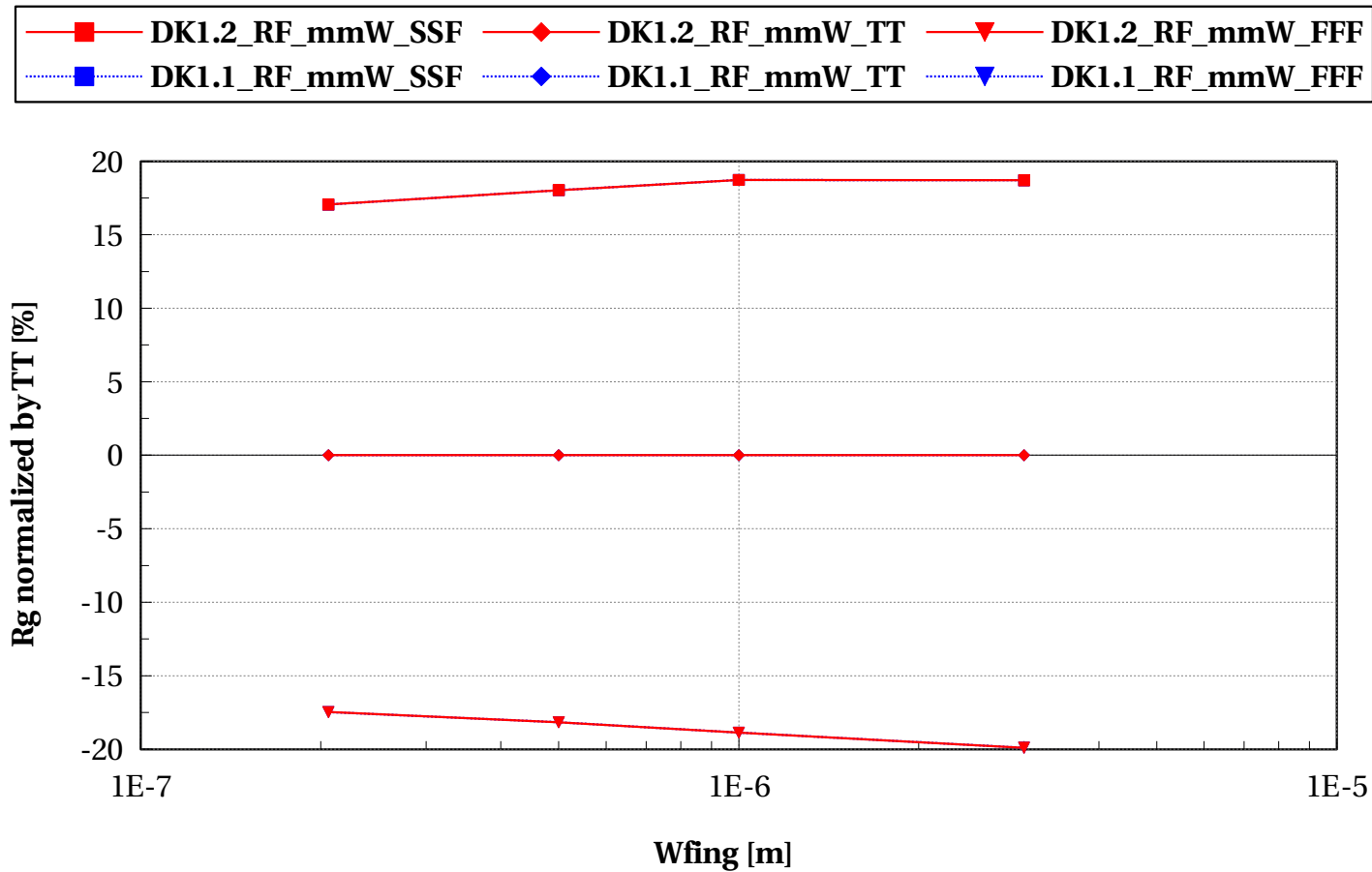
# lvtpfet\_rf, $R_g \cdot NF$ vs $W_{fing}$ [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and  $l=30e-9$



# lvtpfet\_rf, Rg normalized by TT [%] vs Wfing [m]

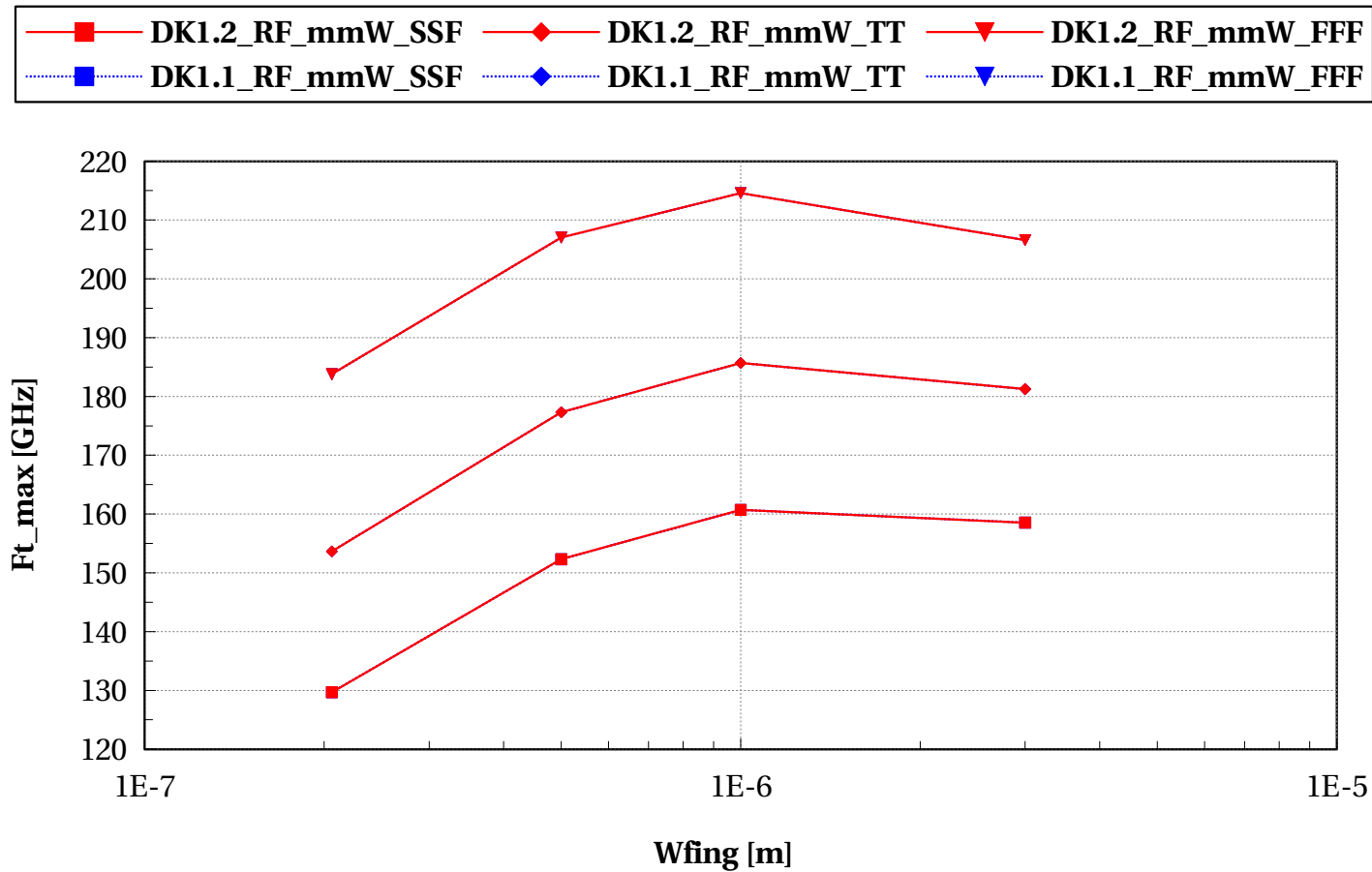
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9





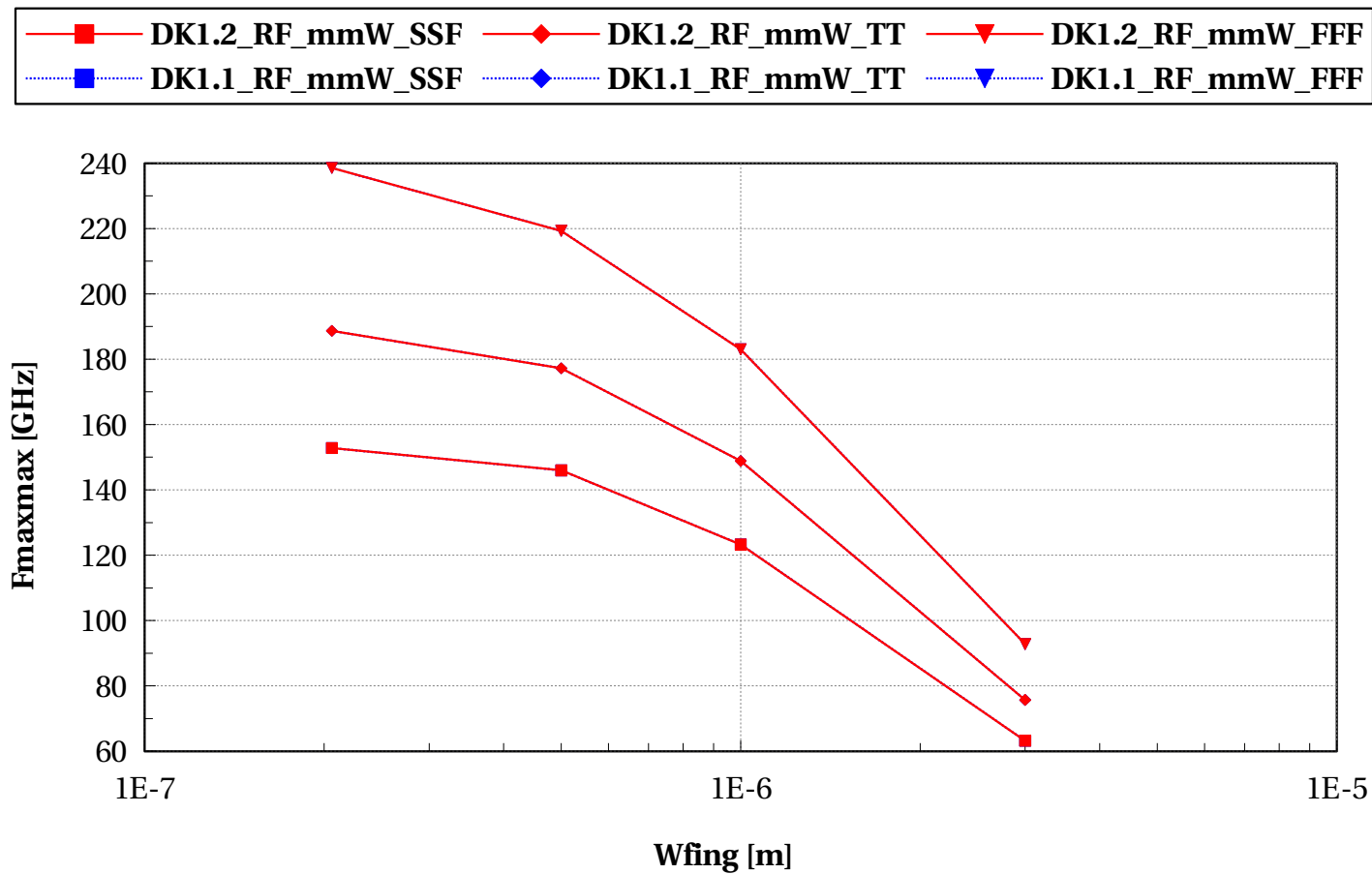
# lvtpfet\_rf, Ft\_max [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



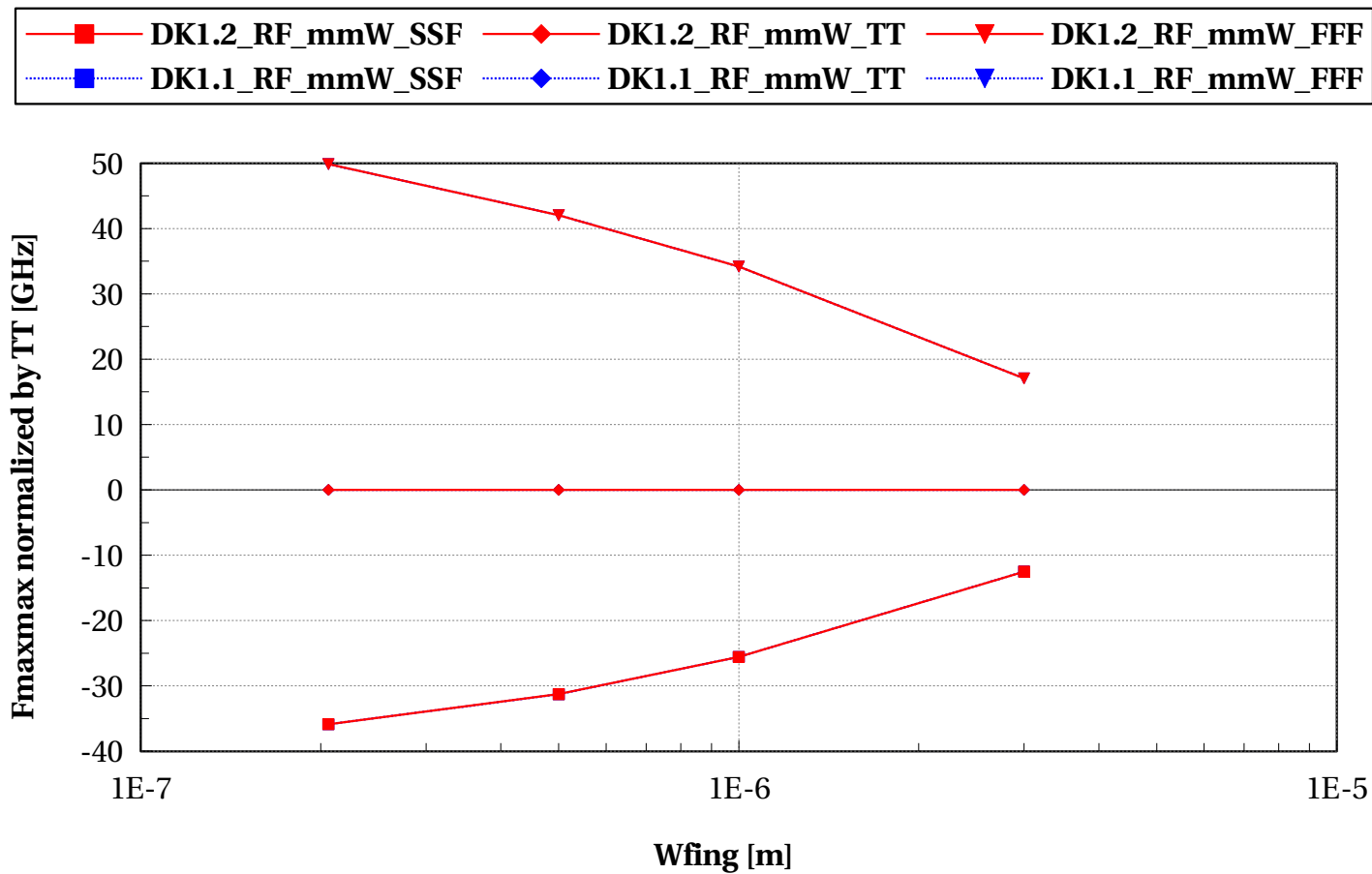
# lvtpfet\_rf, Fmaxmax [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# lvtpfet\_rf, Fmaxmax normalized by TT [GHz] vs Wfing [m]

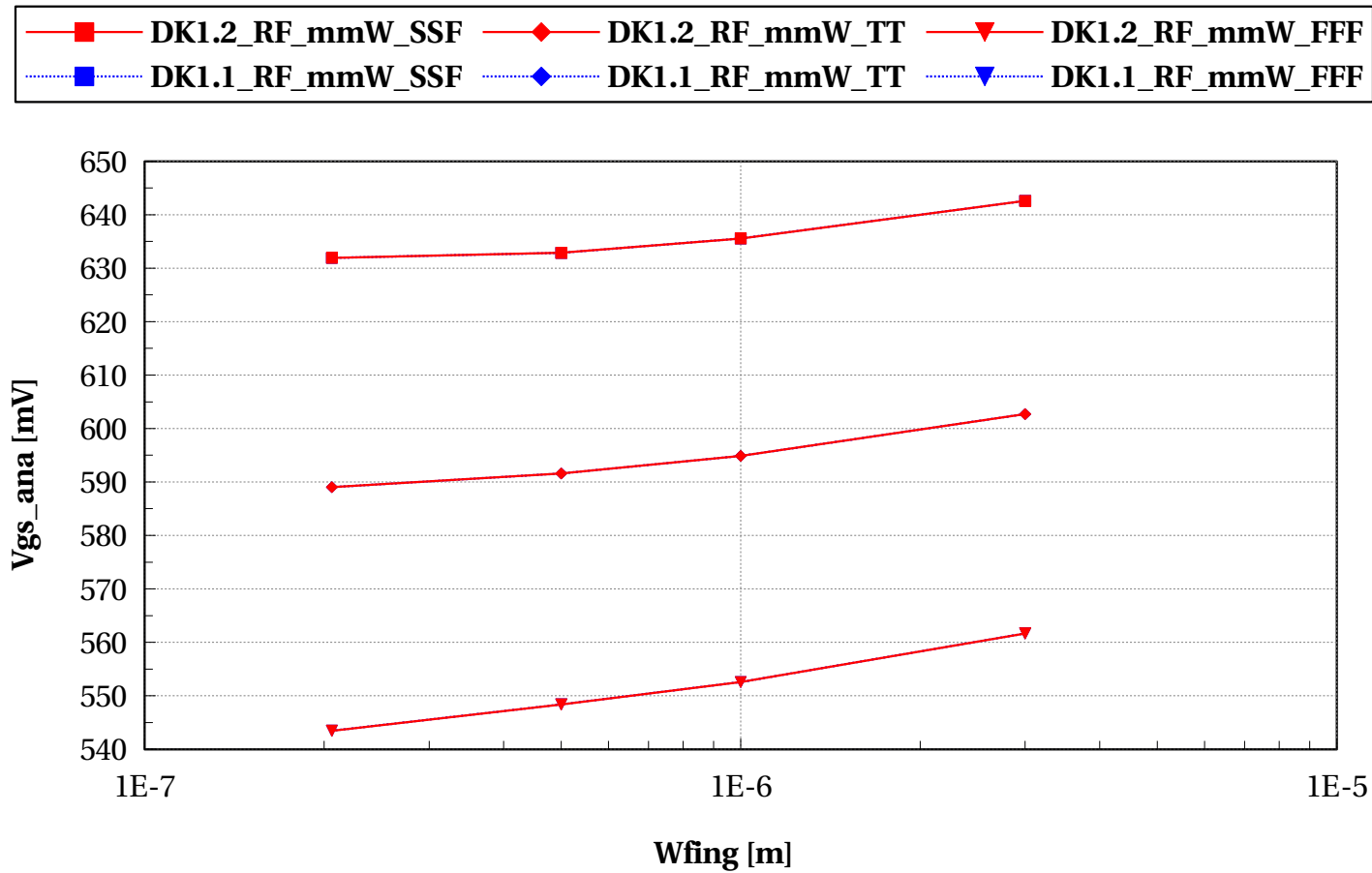
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# Scaling versus width $L=30\text{nm}$ - Analog

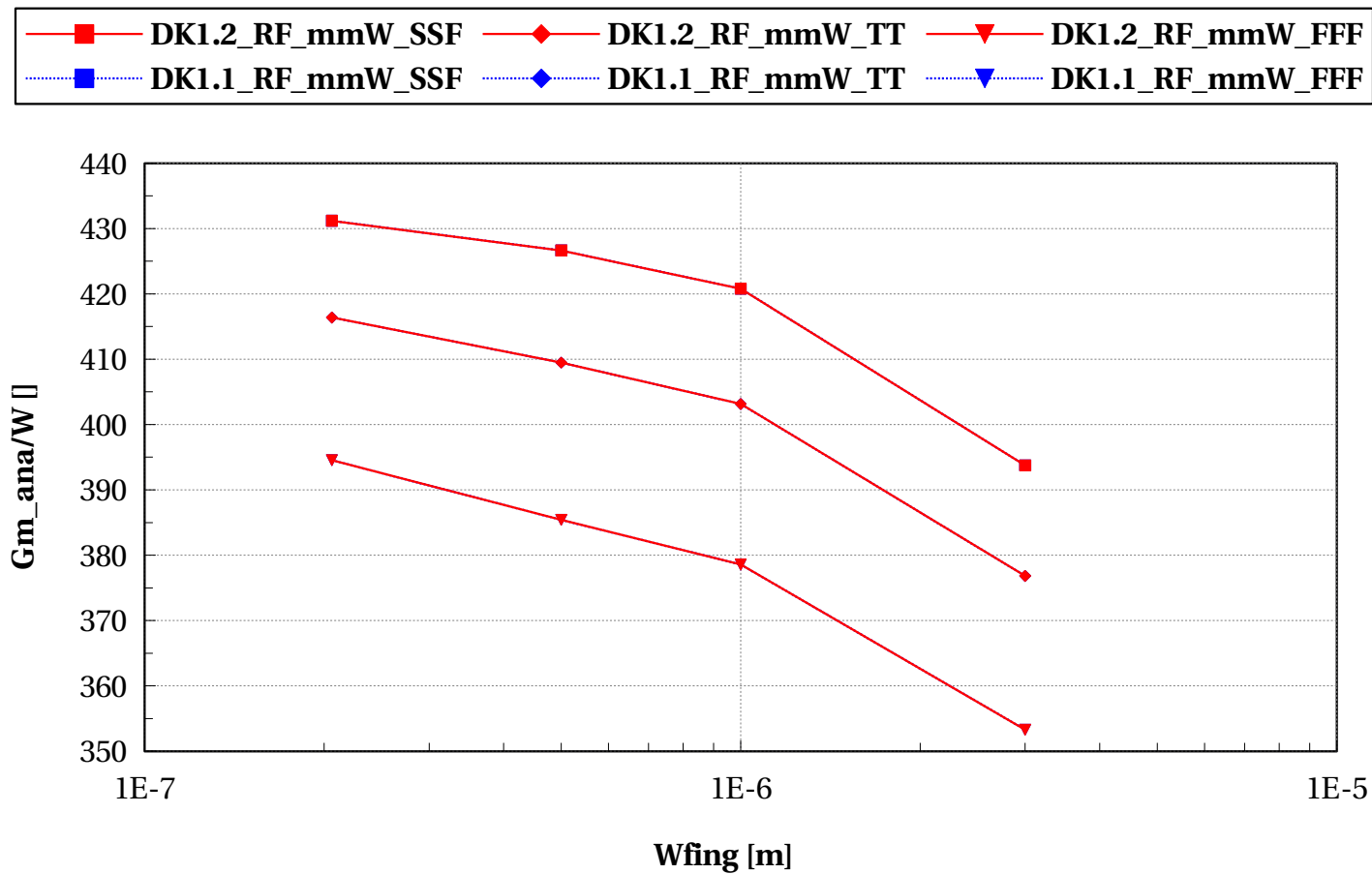
# lvtpfet\_rf, Vgs\_ana [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



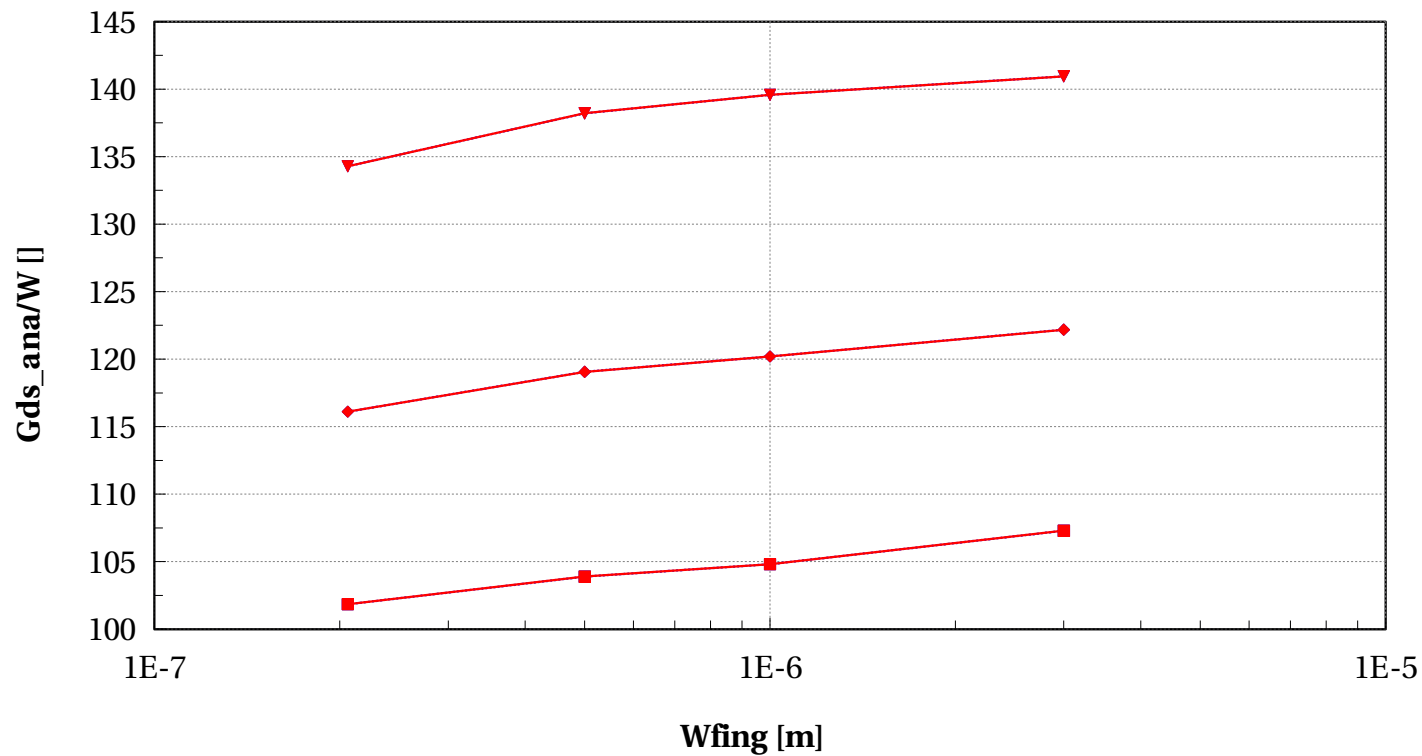
# lvtpfet\_rf, Gm\_ana/W [] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



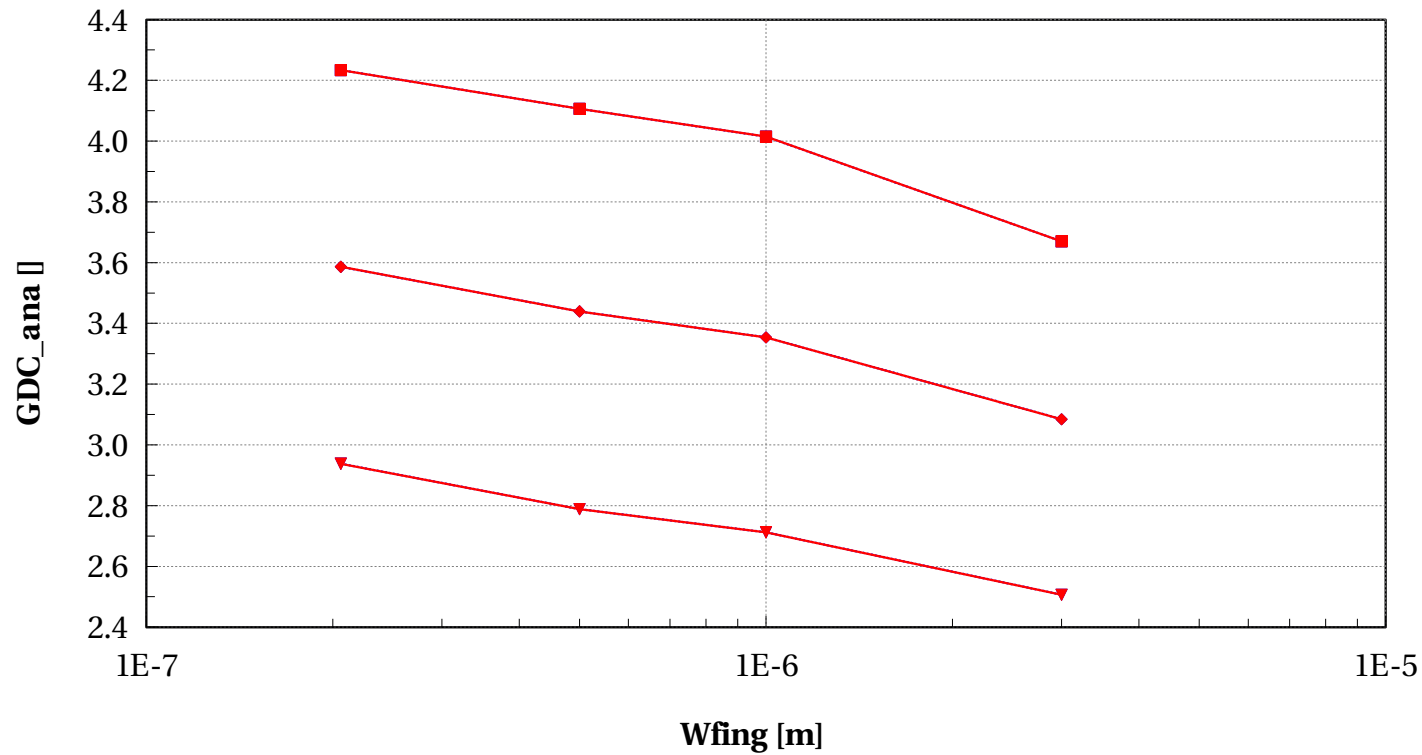
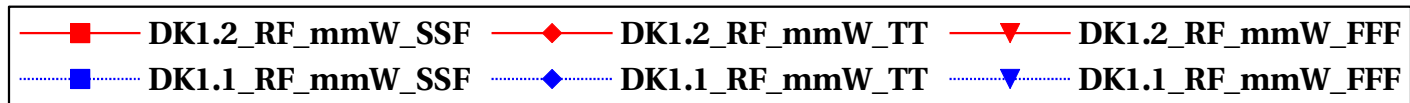
# lvtpfet\_rf, Gds\_ana/W [] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# lvtpfet\_rf, GDC\_ana [] vs Wfing [m]

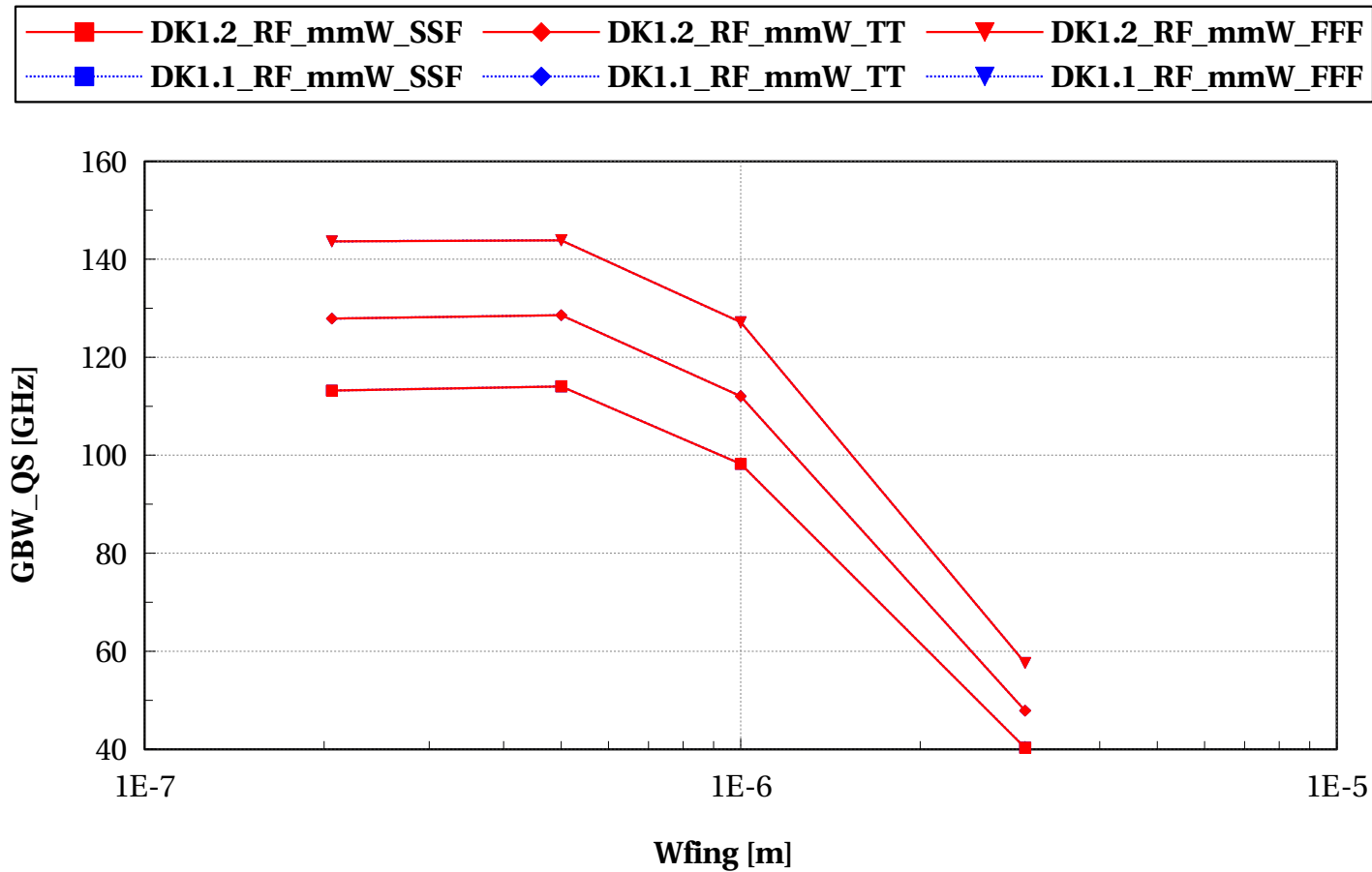
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9





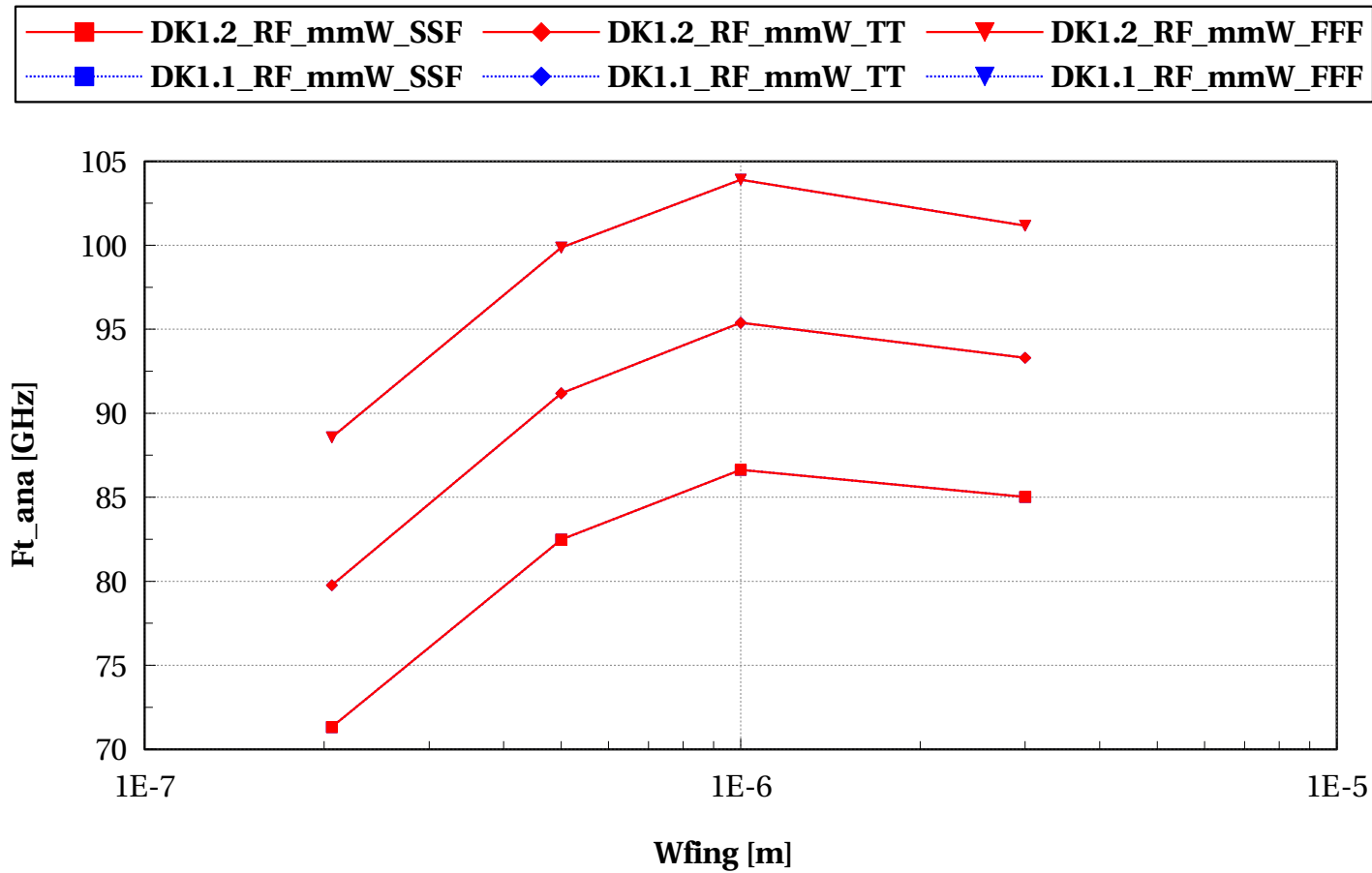
# lvtpfet\_rf, GBW\_QS [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# lvtpfet\_rf, Ft\_ana [GHz] vs Wfing [m]

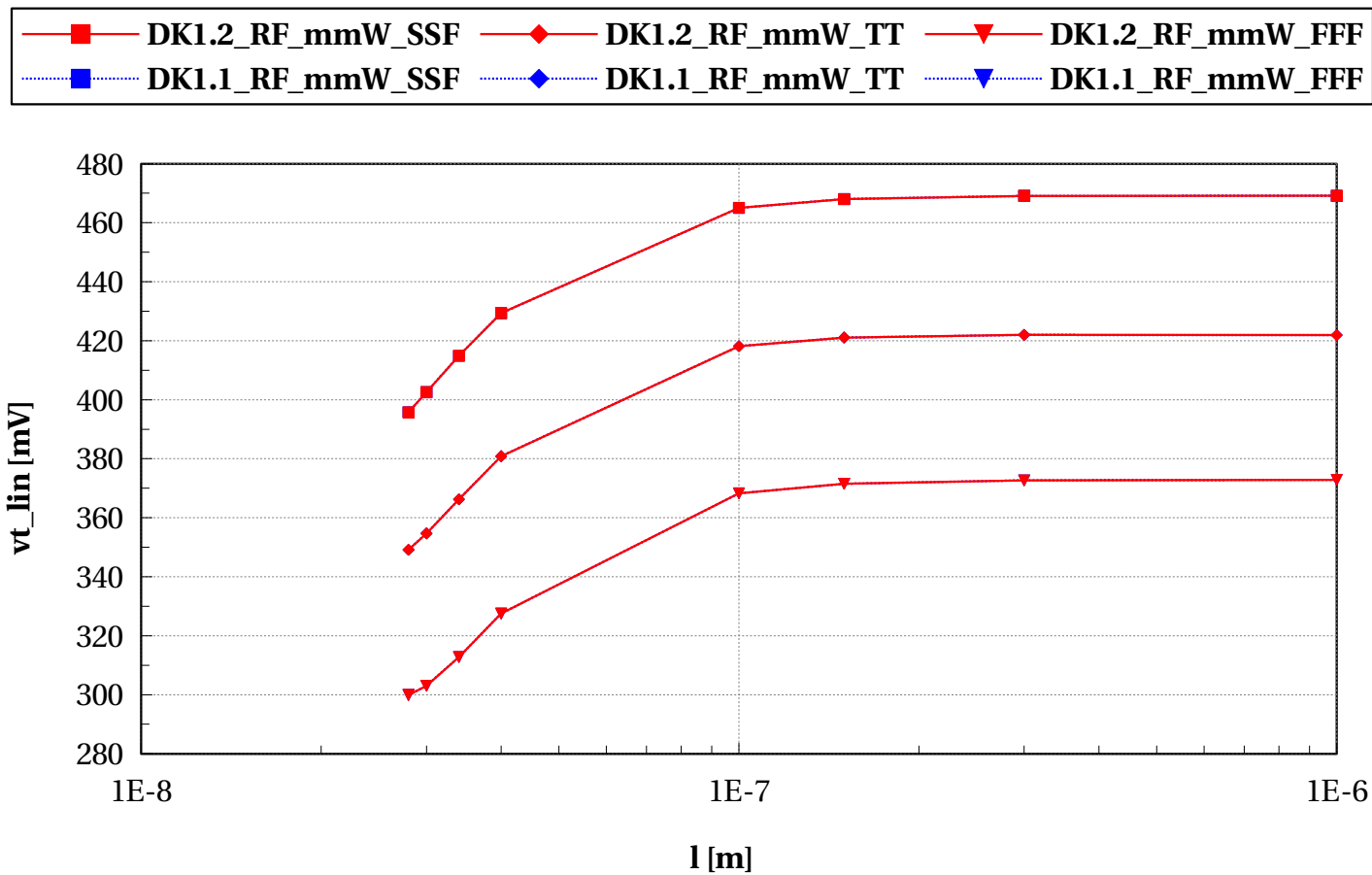
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



## Scaling versus length $W_{\text{fing}}=1\mu\text{m}$ - DC

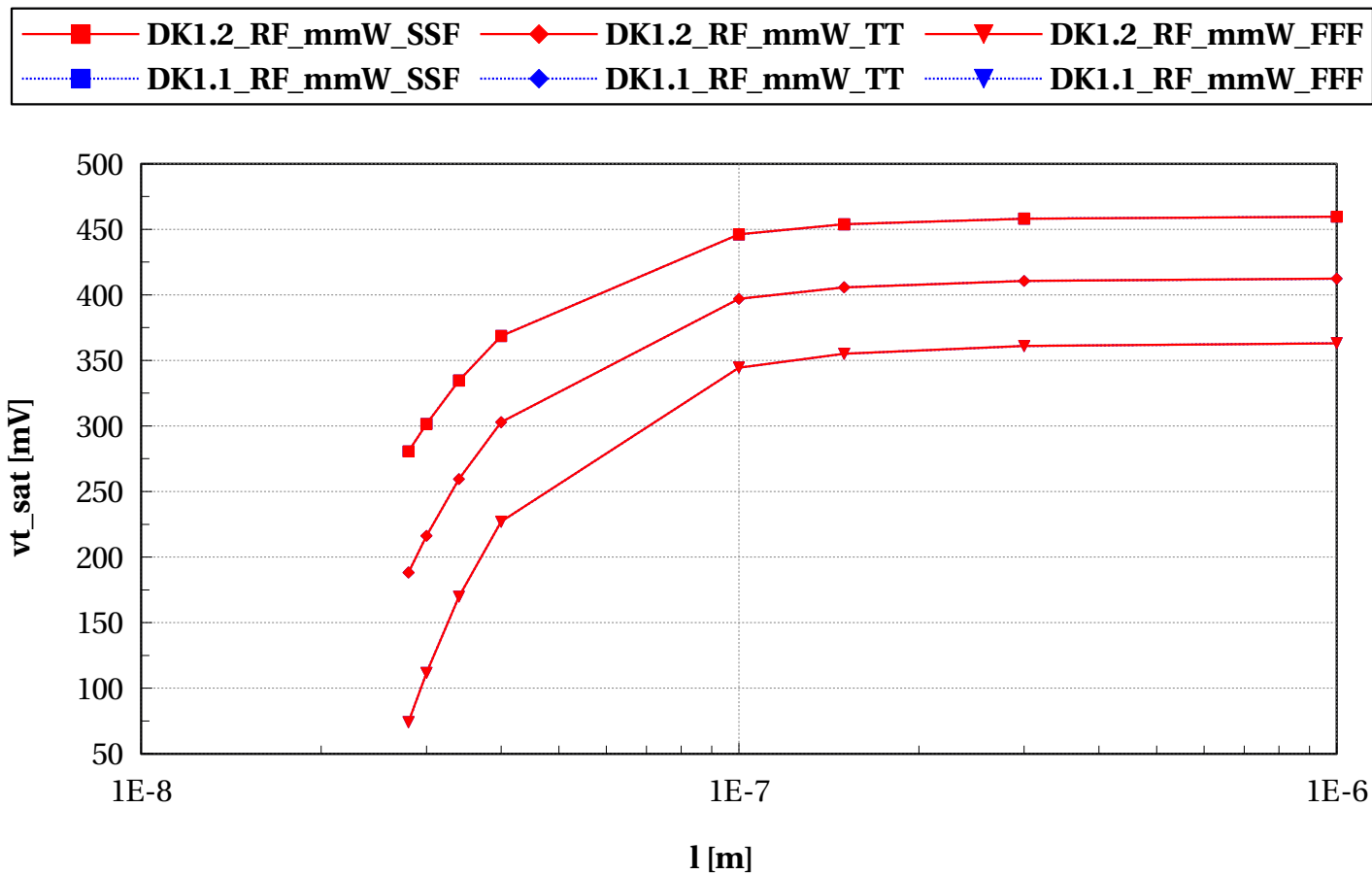
# lvtpfet\_rf, vt\_lin [mV] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



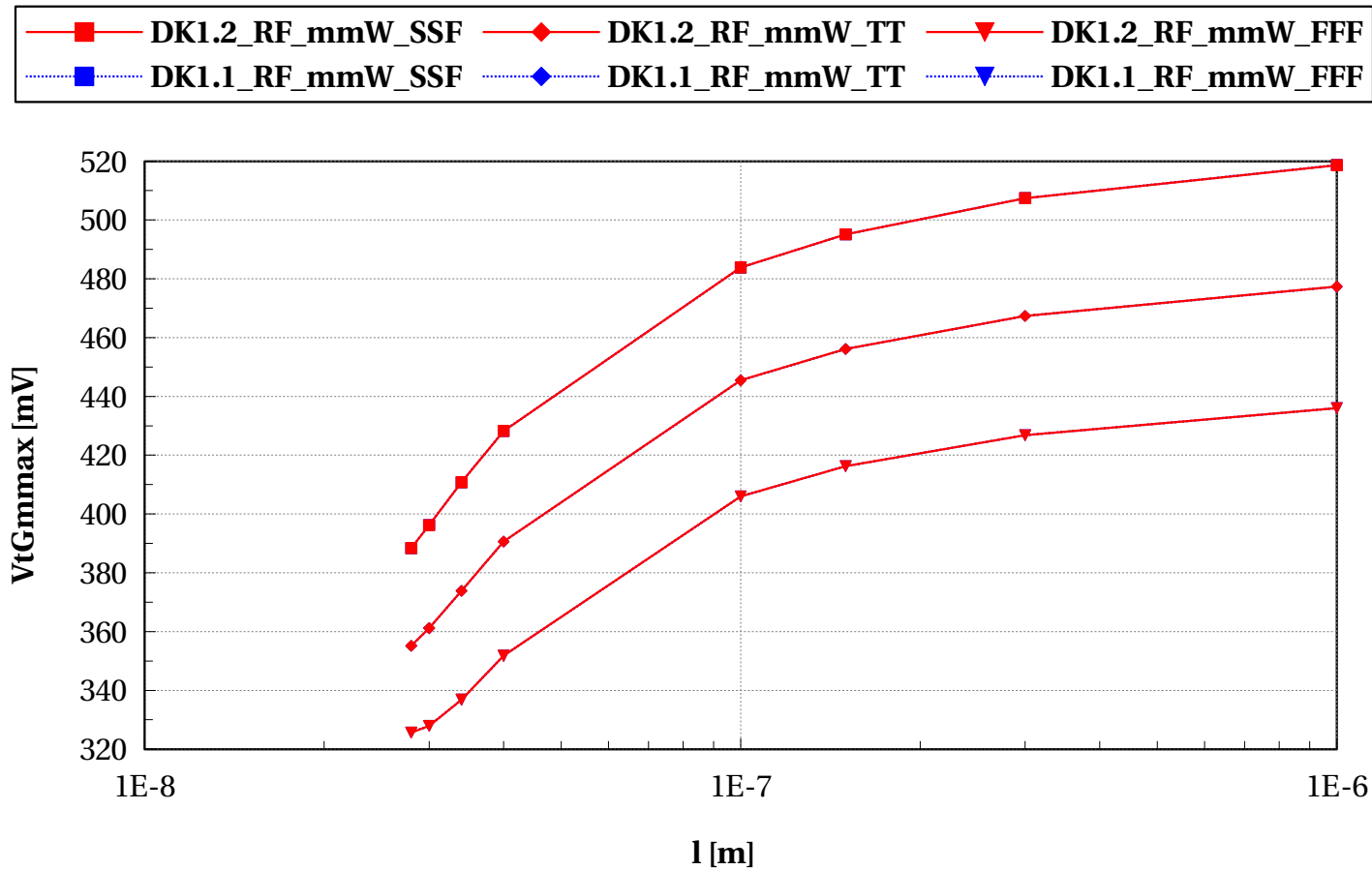
# lvtpfet\_rf, vt\_sat [mV] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



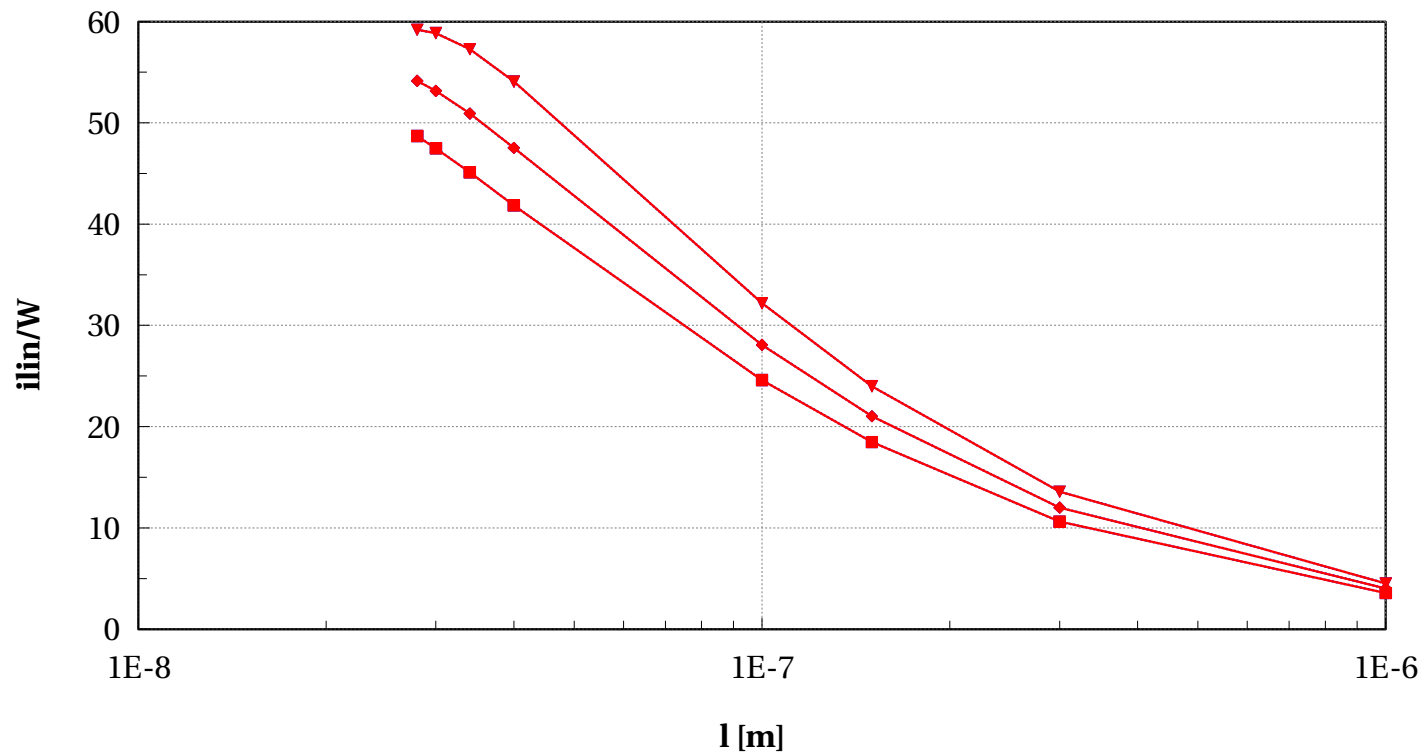
# lvtpfet\_rf, VtGmmax [mV] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6



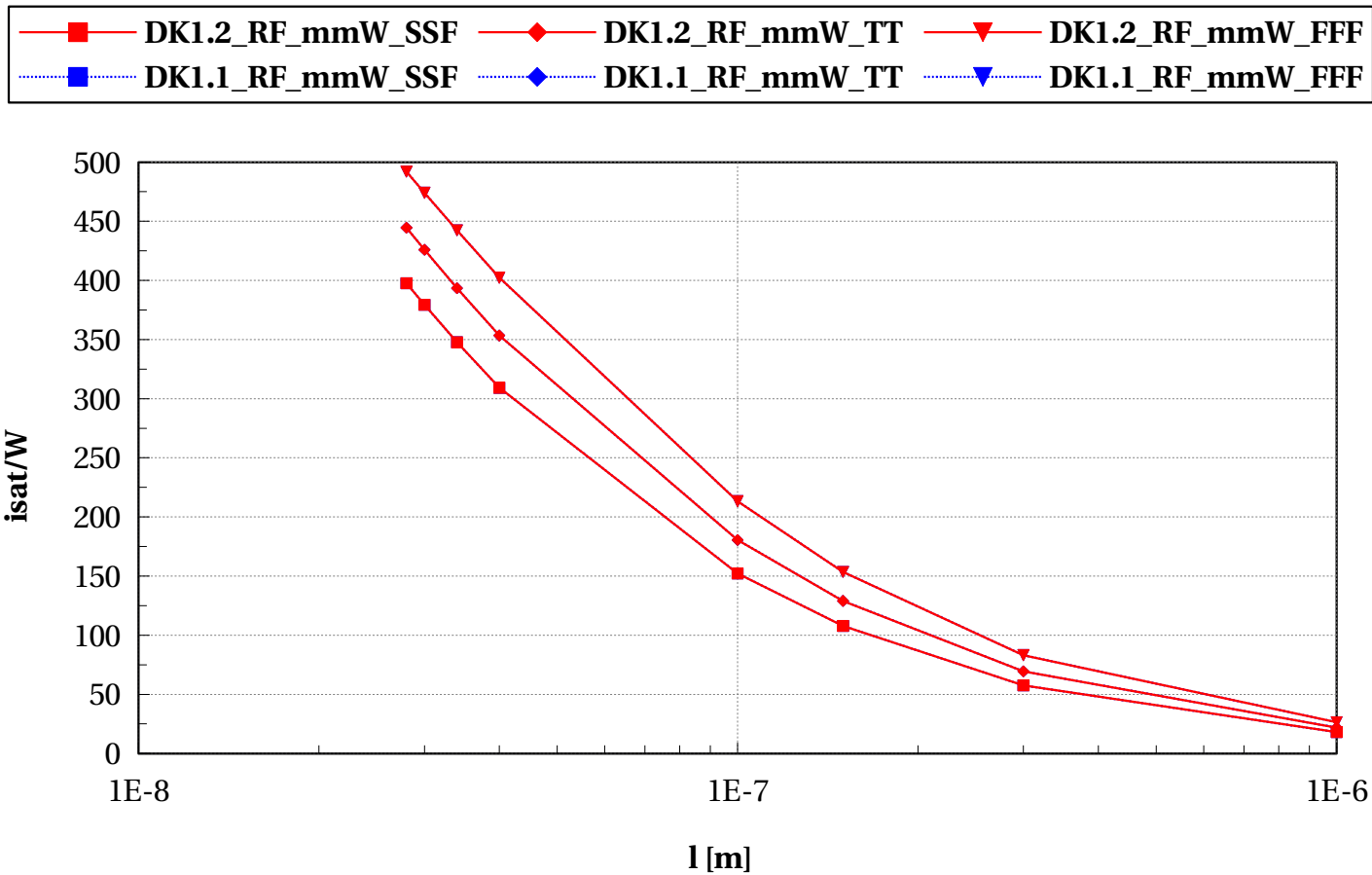
# lvtpfet\_rf, ilin/W vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



# lvtpfet\_rf, isat/W vs l [m]

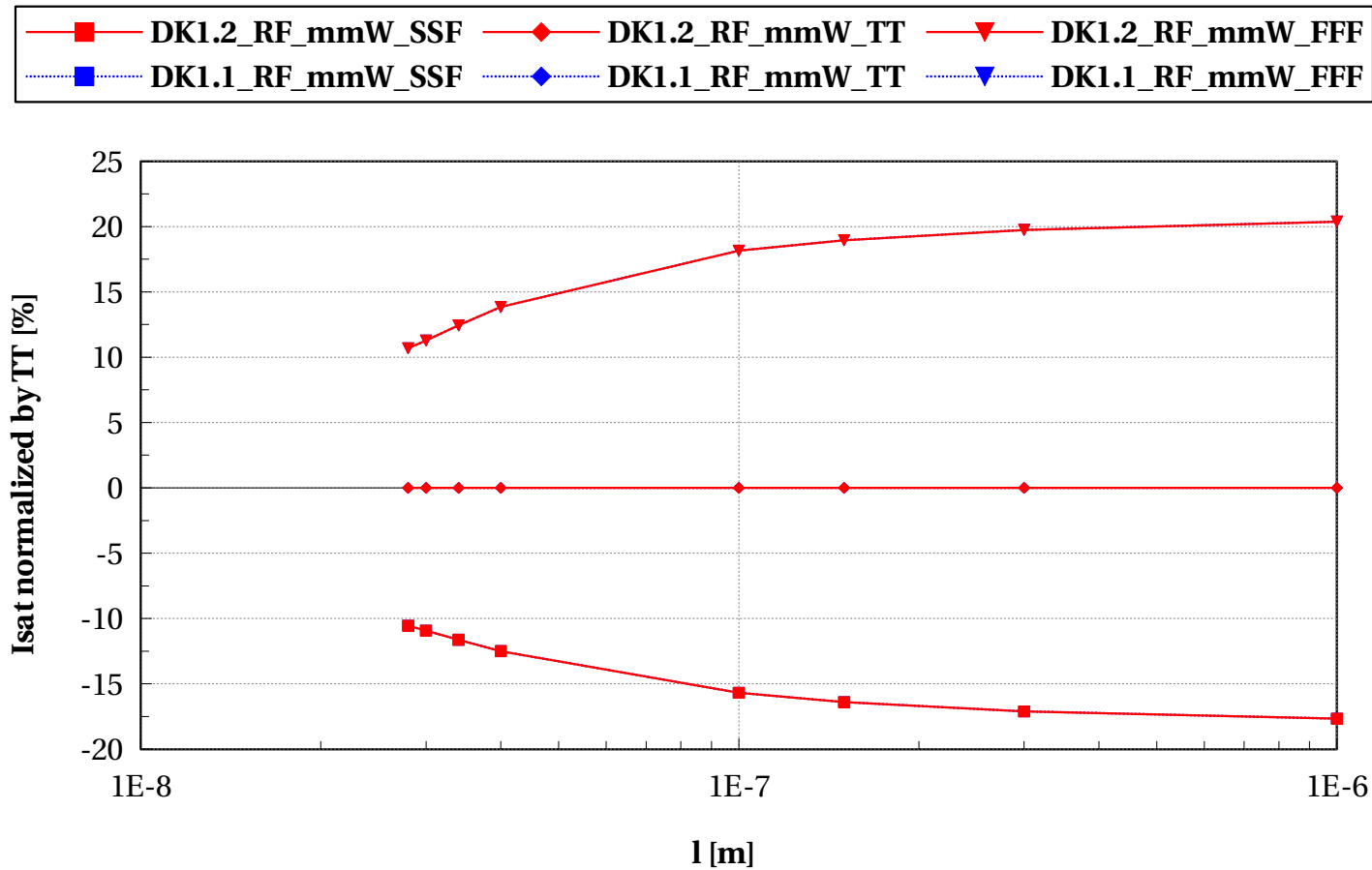
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6





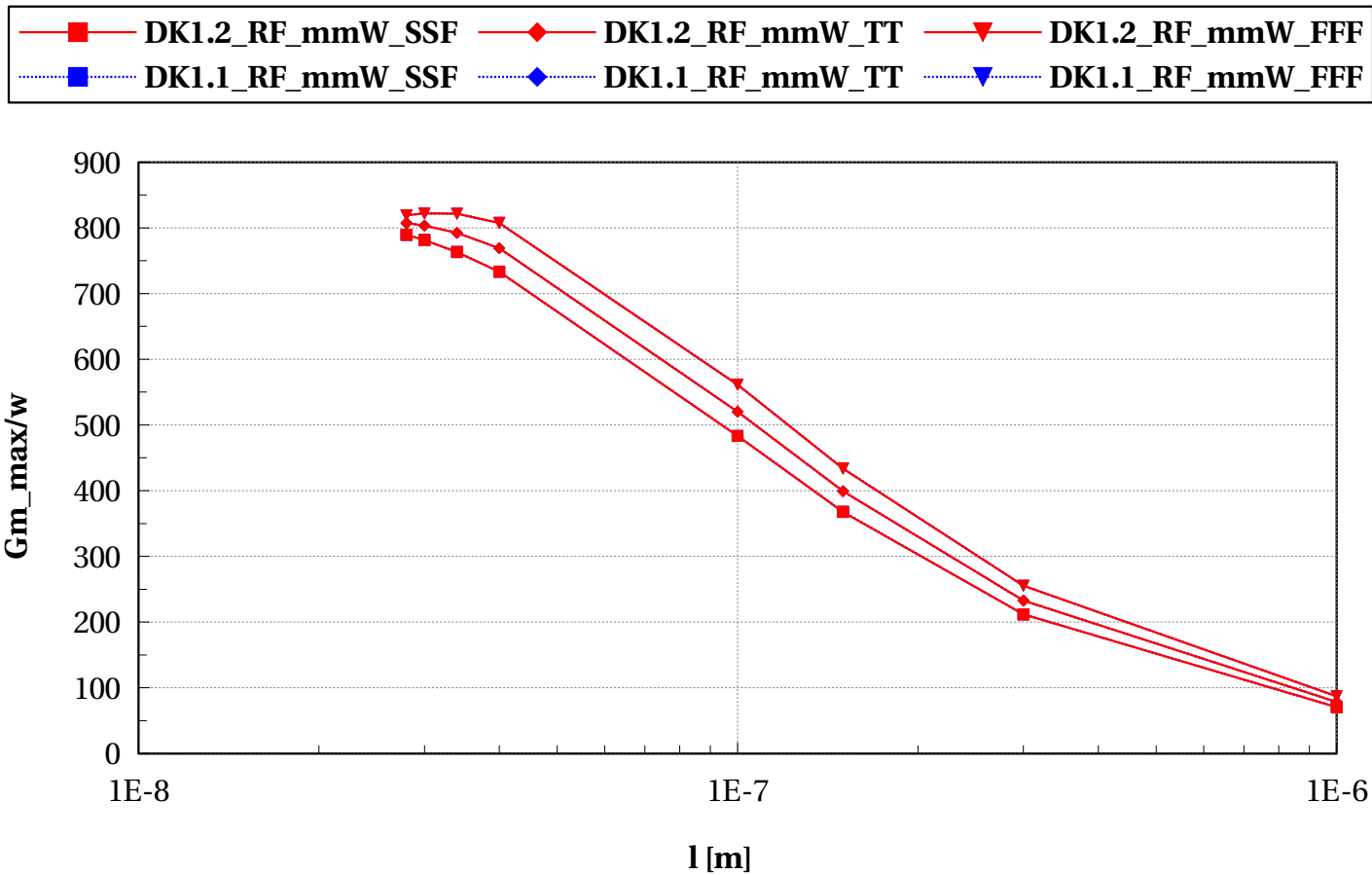
## lvtpfet\_rf, Isat normalized by TT [%] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6



# lvtpfet\_rf, Gm\_max/w vs l [m]

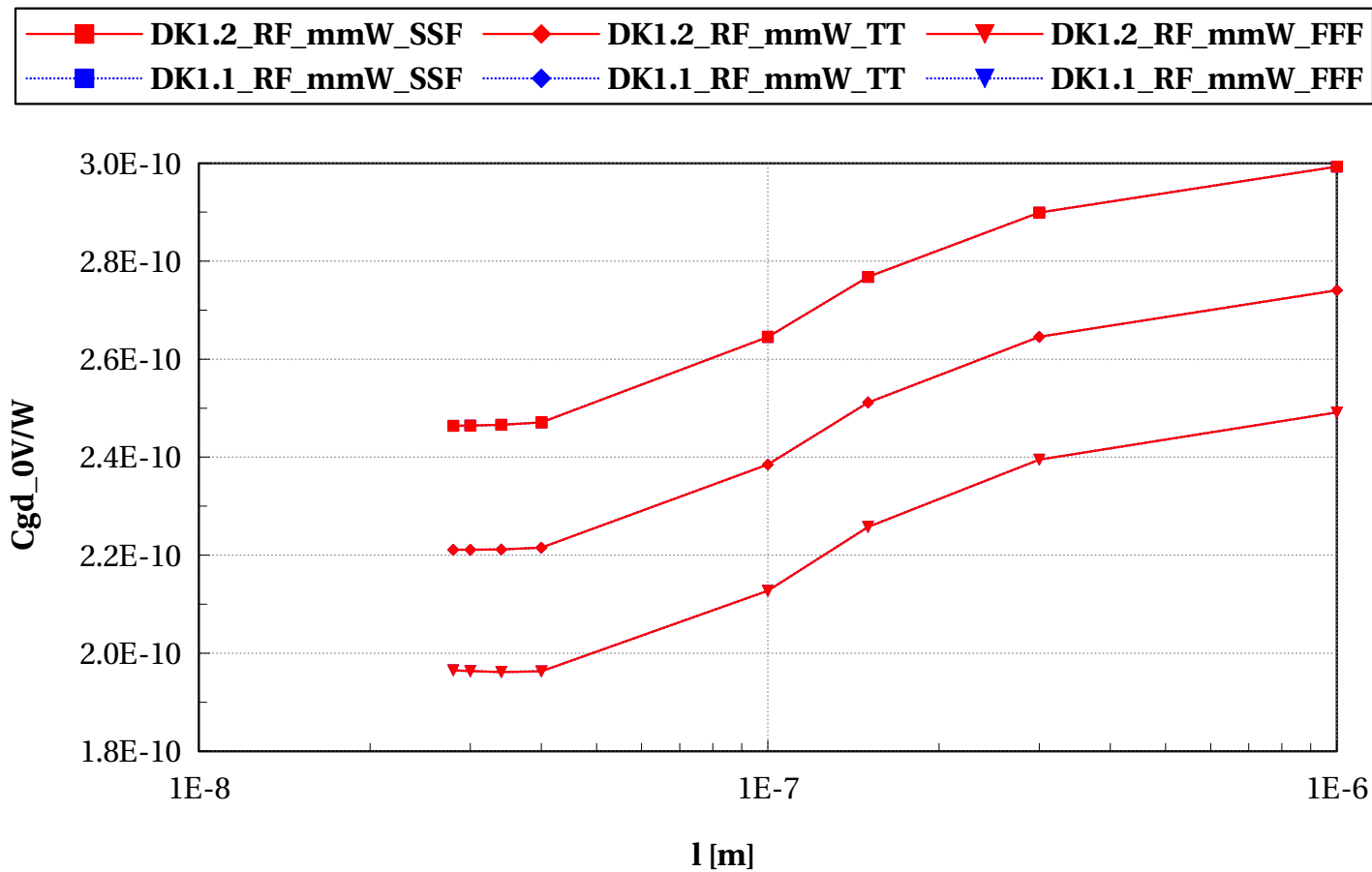
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



# Scaling versus length $W_{\text{fing}}=1\text{ }\mu\text{m}$ - RF

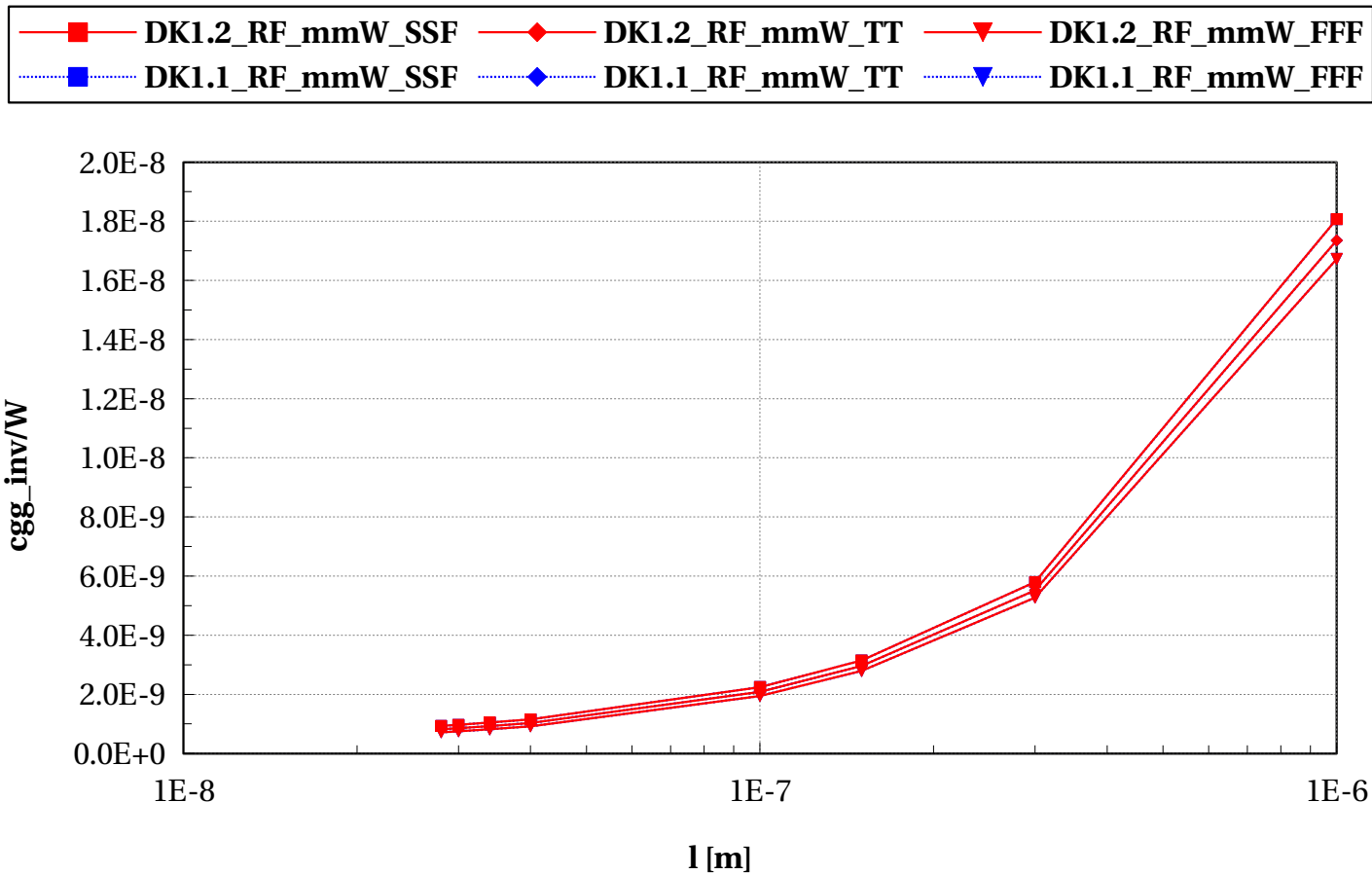
# lvtpfet\_rf, Cgd\_0V/W vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6



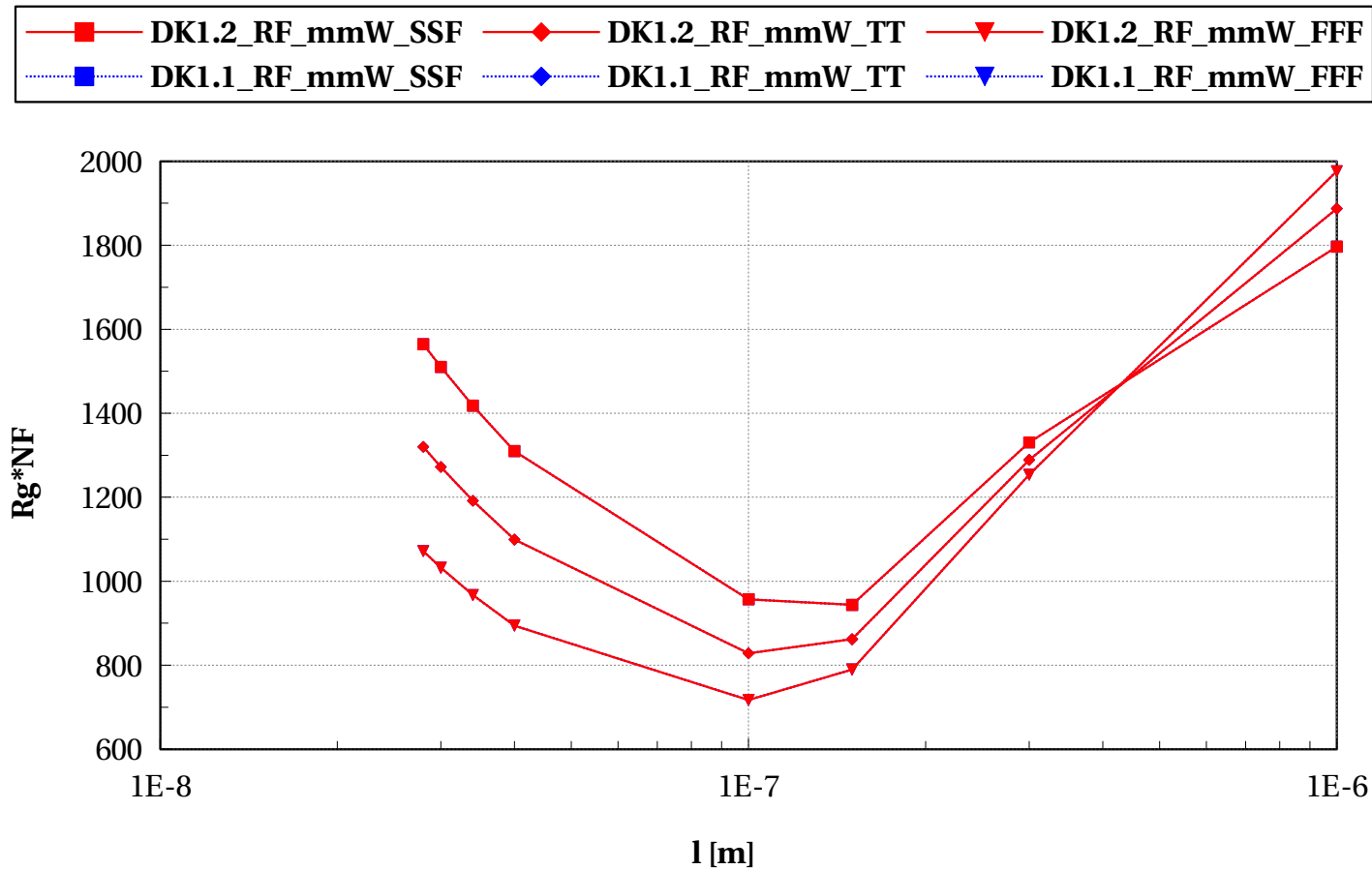
# lvtpfet\_rf, cgg\_inv/W vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



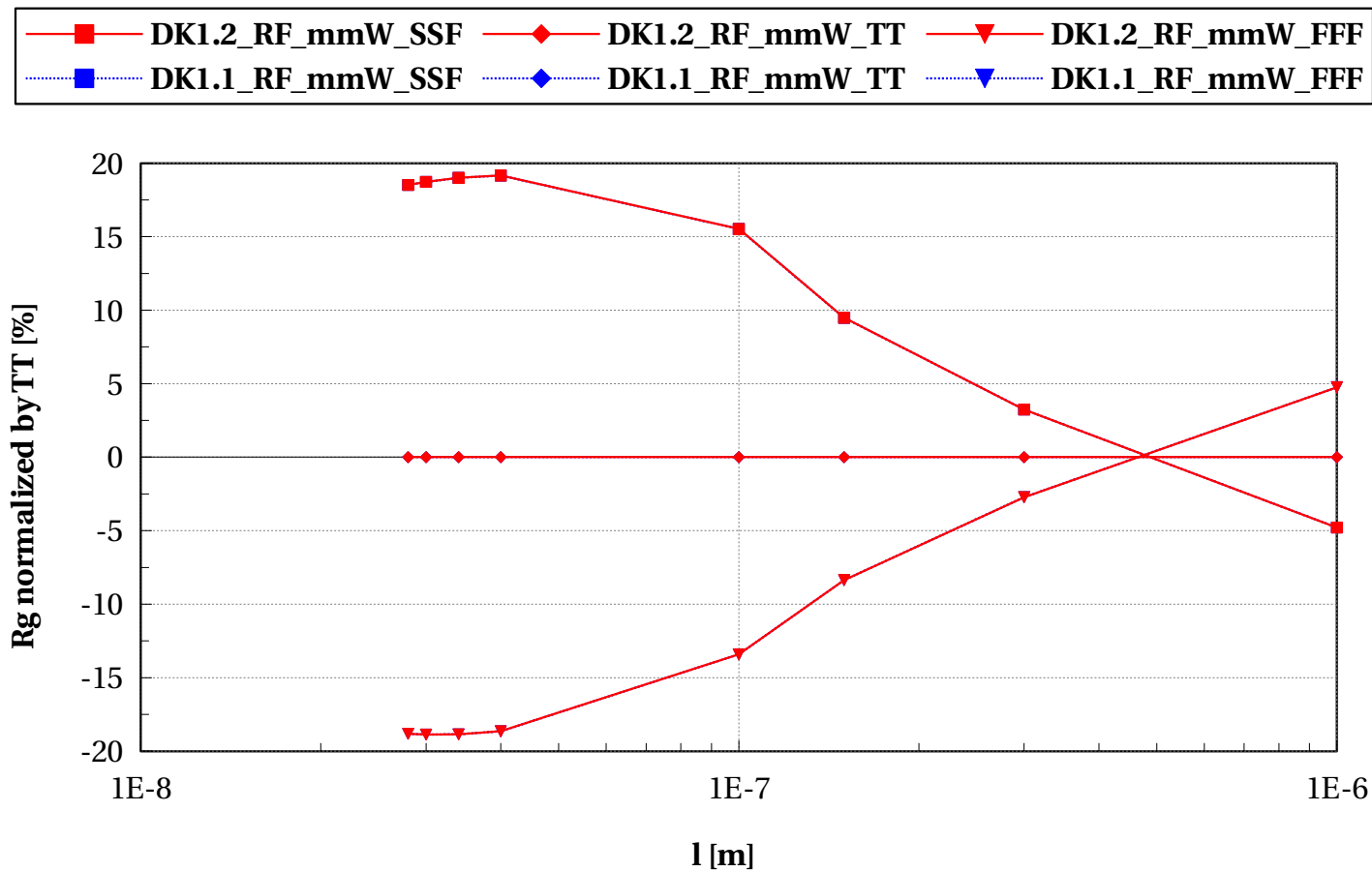
# lvtpfet\_rf, $R_g * NF$ vs $l$ [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



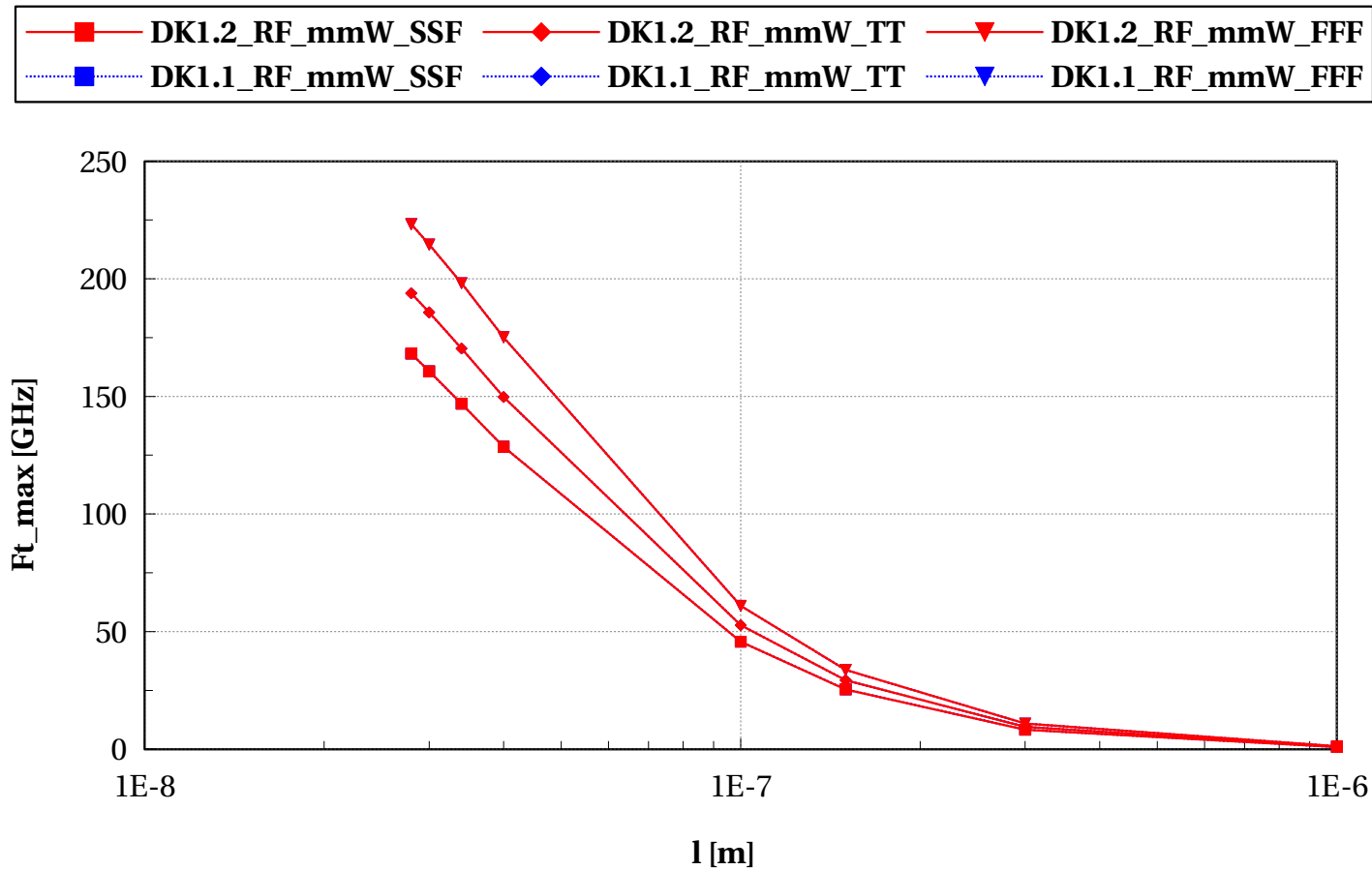
# lvtpfet\_rf, Rg normalized by TT [%] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



# lvtpfet\_rf, Ft\_max [GHz] vs l [m]

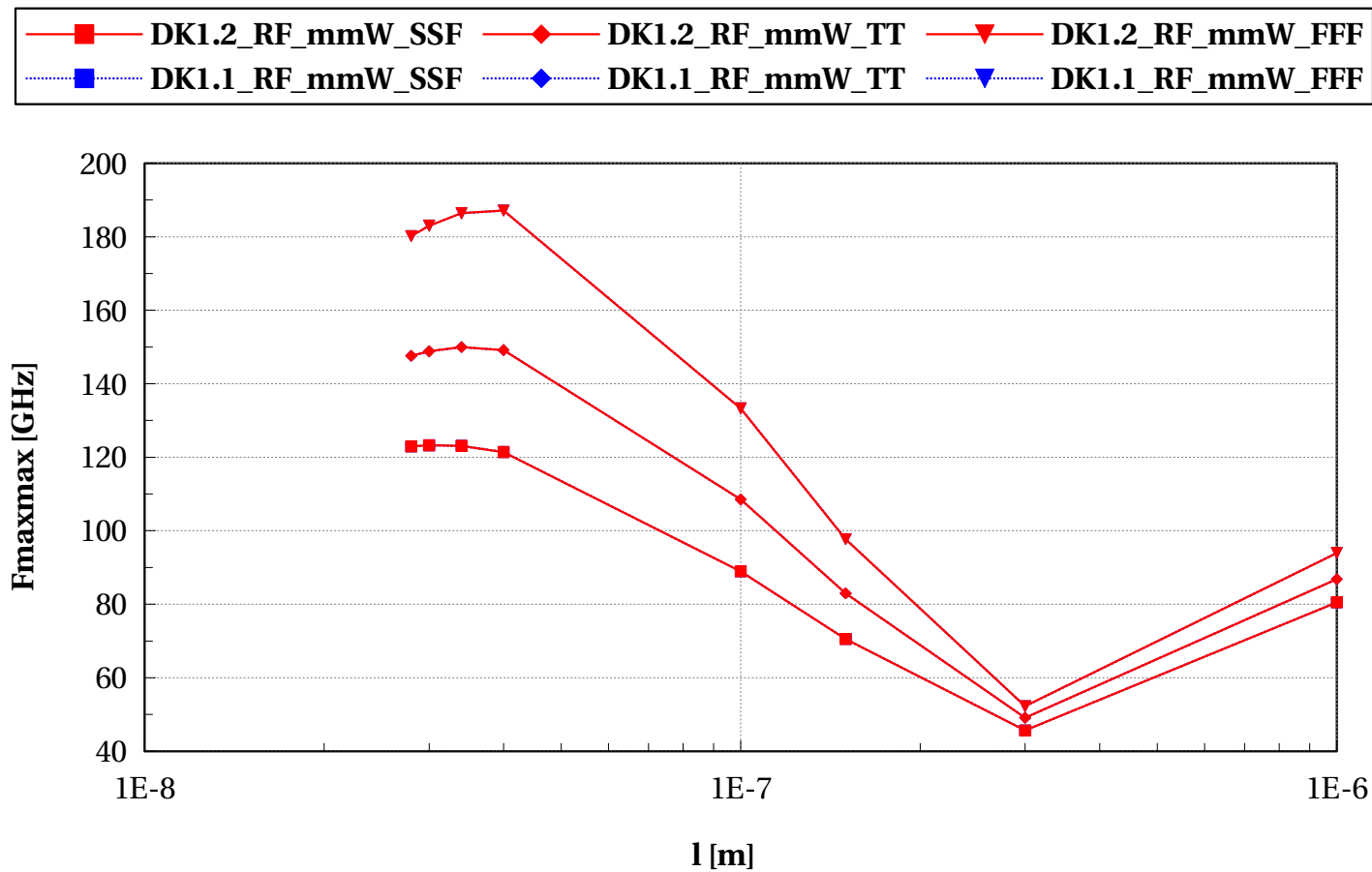
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6





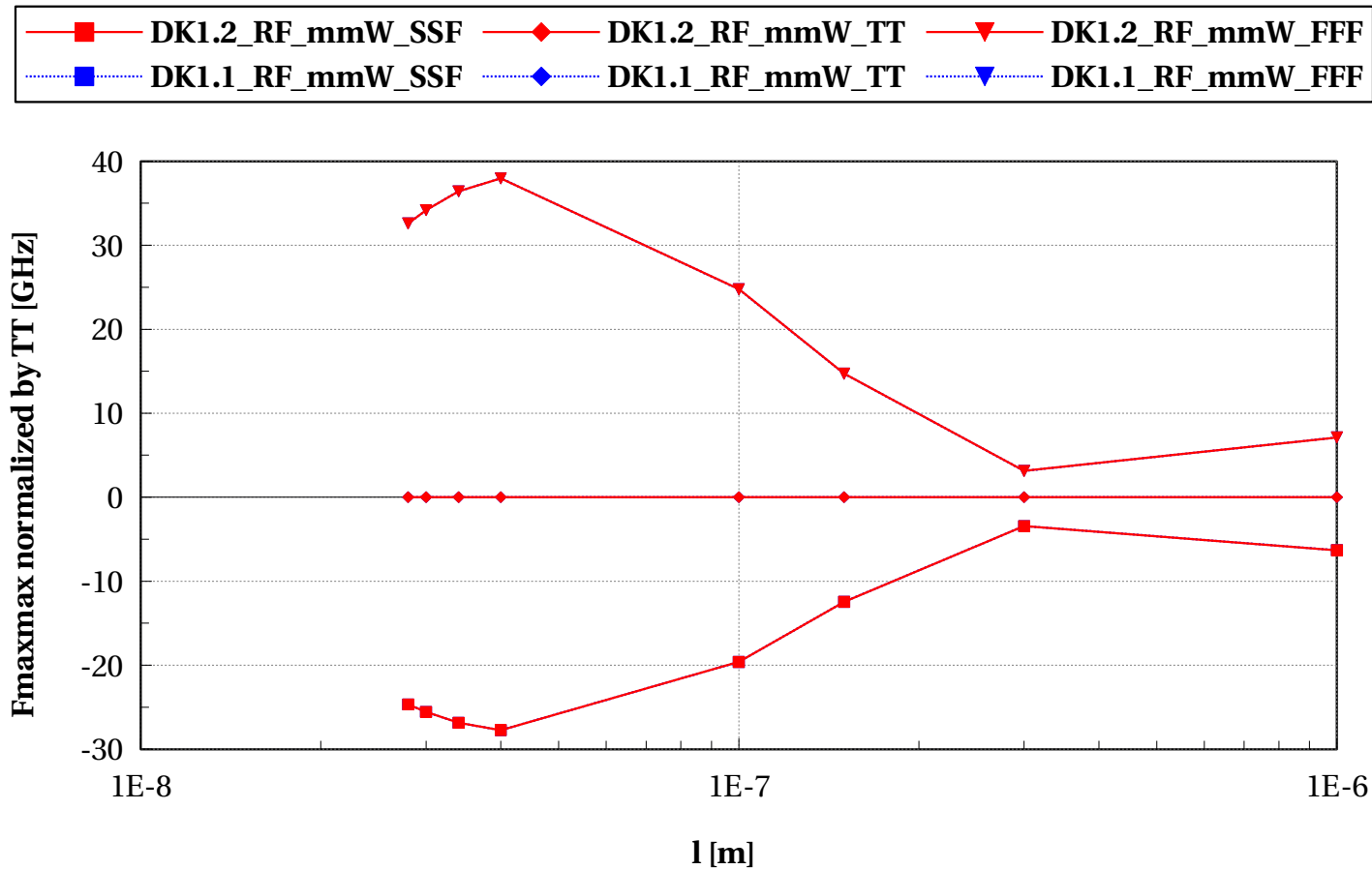
# lvtpfet\_rf, Fmaxmax [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



# lvtpfet\_rf, Fmaxmax normalized by TT [GHz] vs l [m]

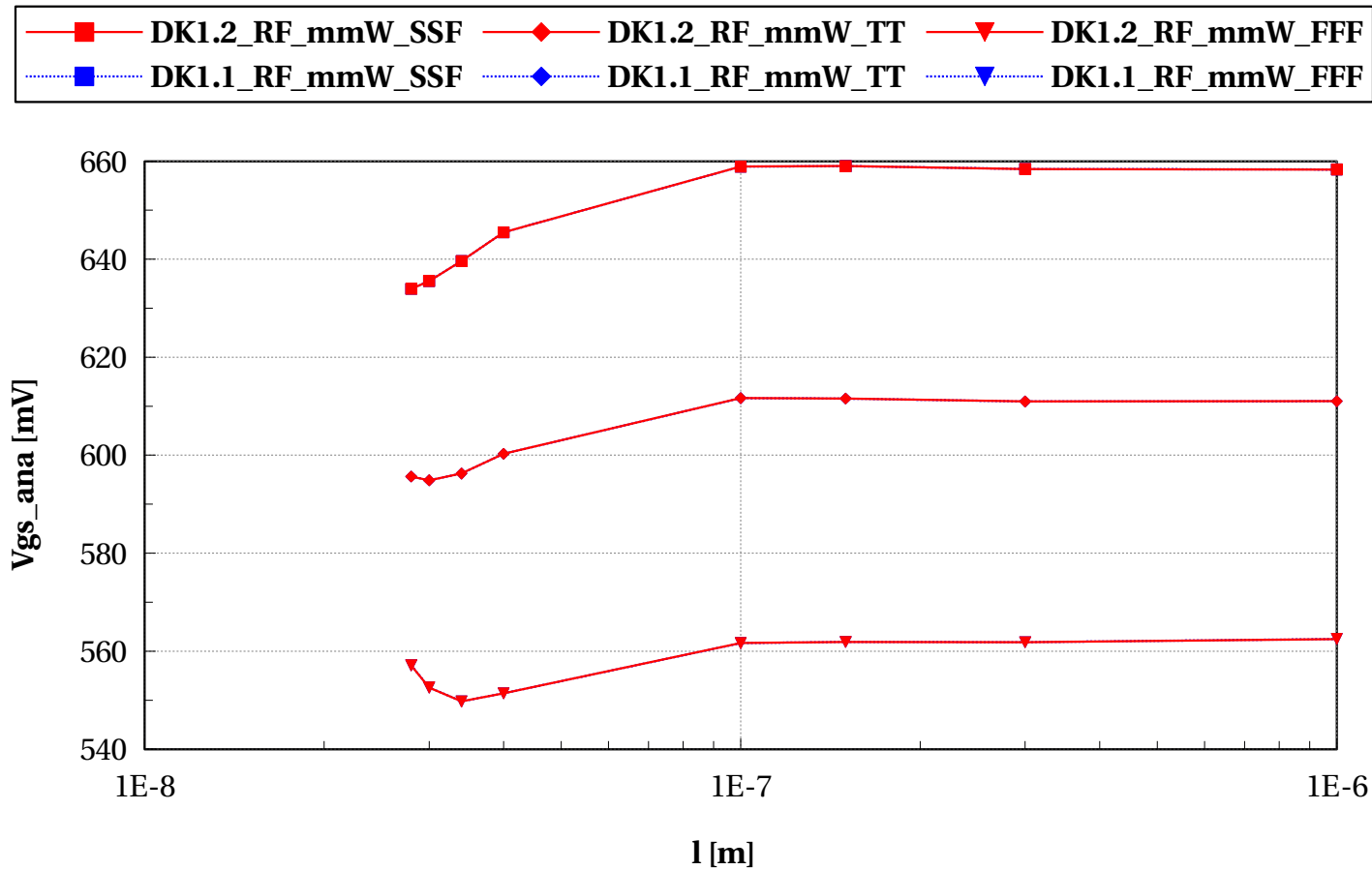
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6



# Scaling versus length $W_{\text{fing}}=1\mu\text{m}$ - Analog

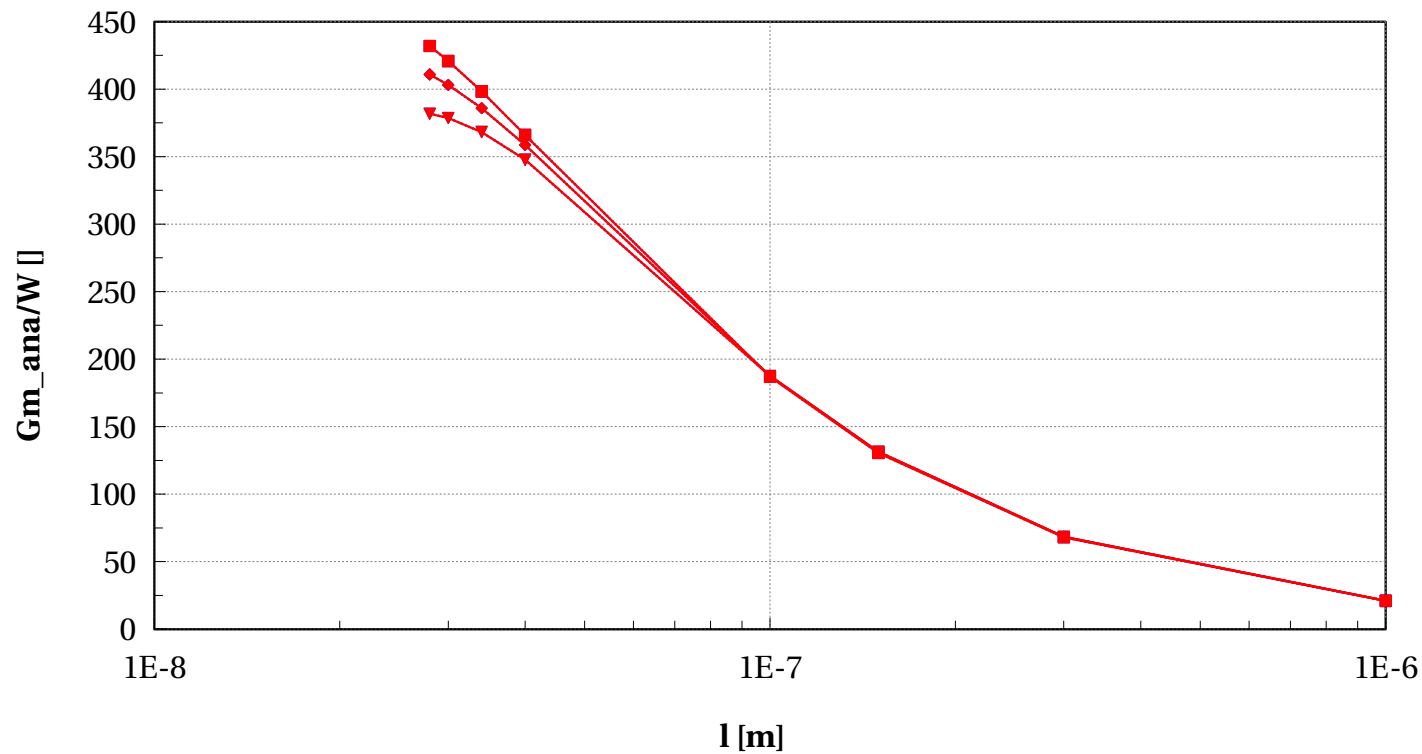
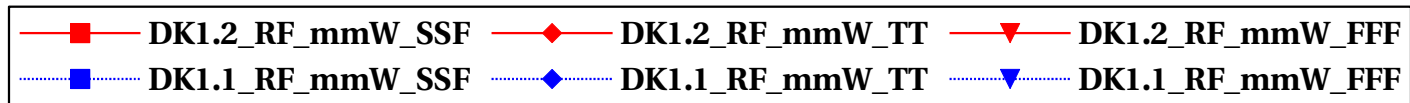
# lvtpfet\_rf, Vgs\_ana [mV] vs I [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



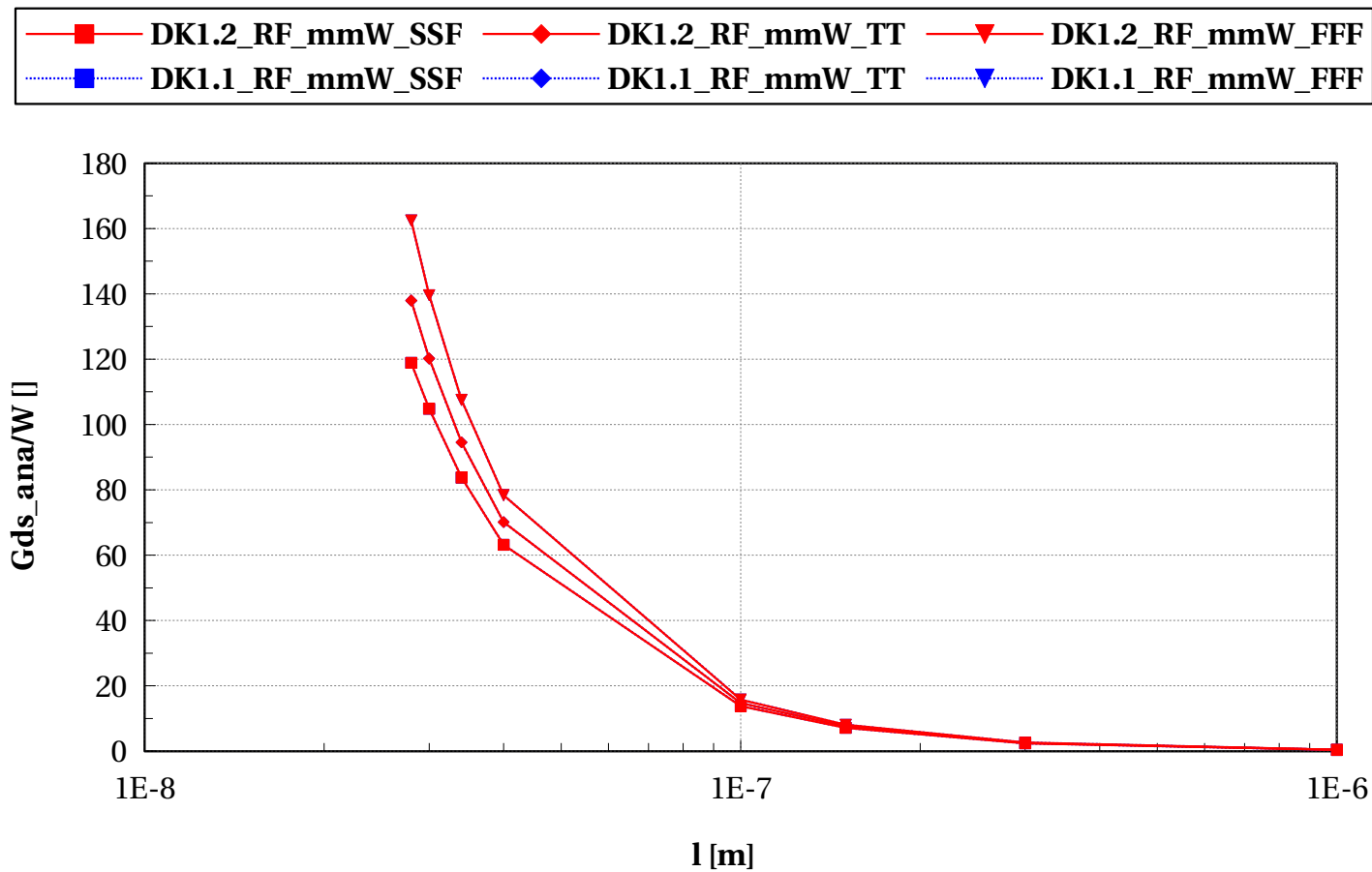
# lvtpfet\_rf, Gm\_ana/W [] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6



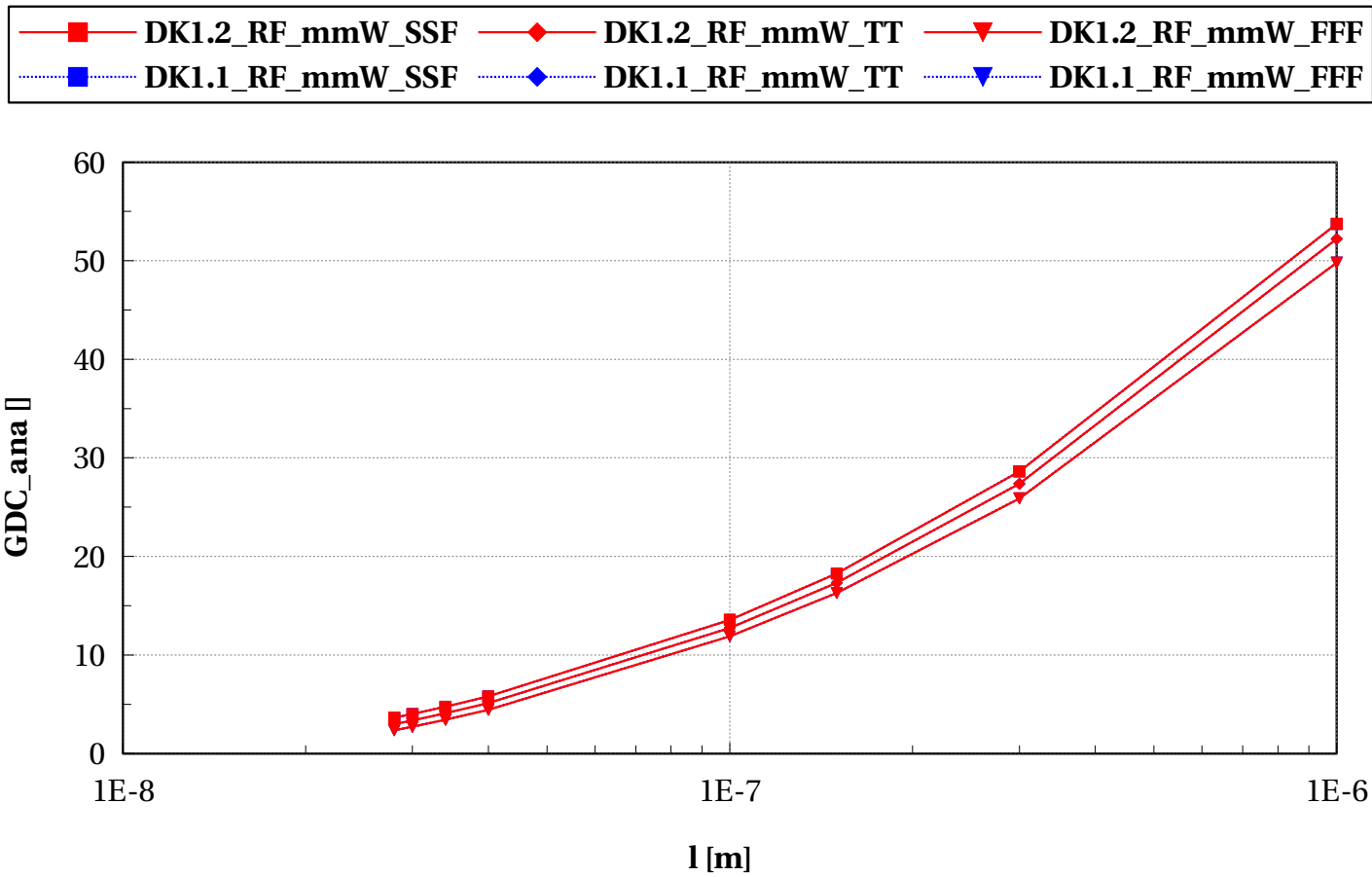
# lvtpfet\_rf, Gds\_ana/W [] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



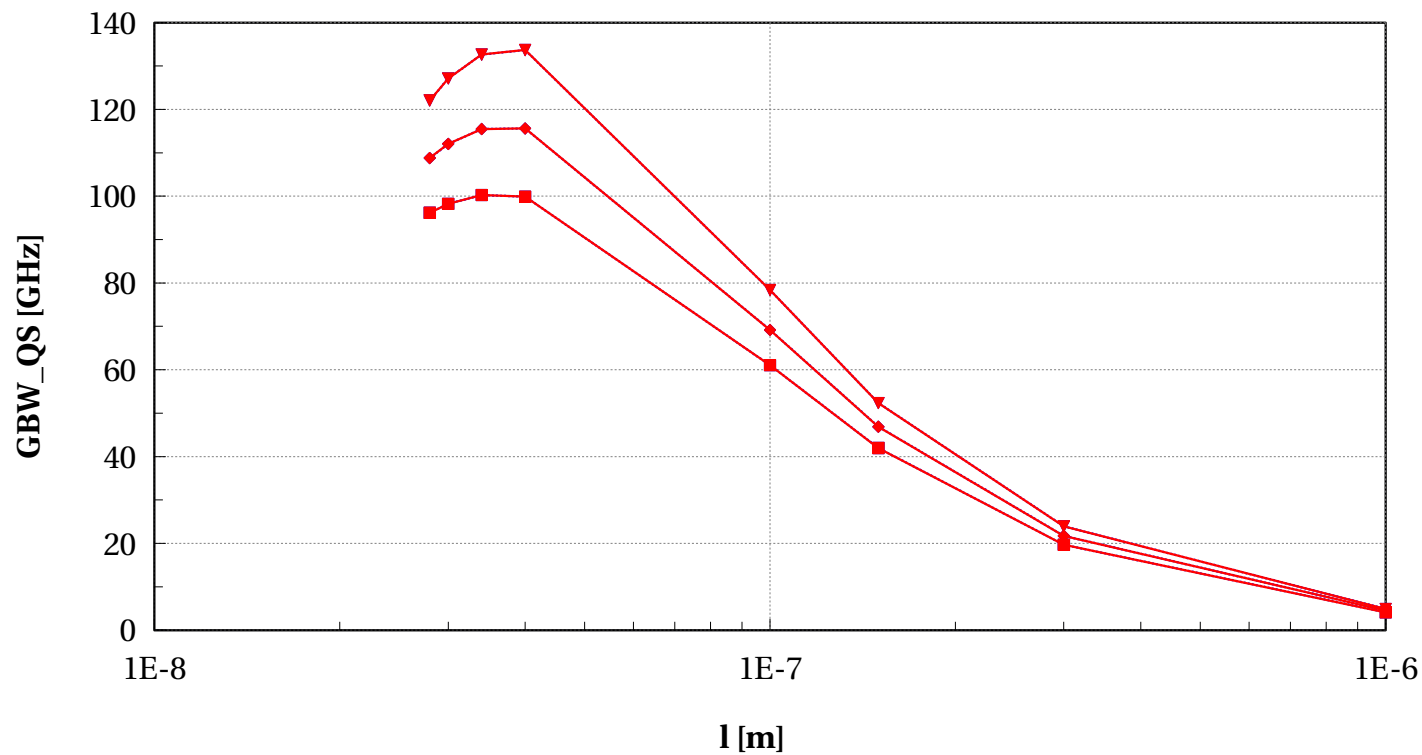
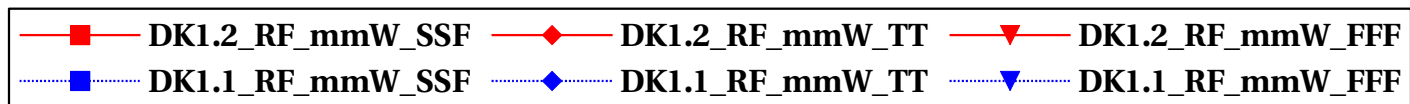
# lvtpfet\_rf, GDC\_ana [] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



# lvtpfet\_rf, GBW\_QS [GHz] vs l [m]

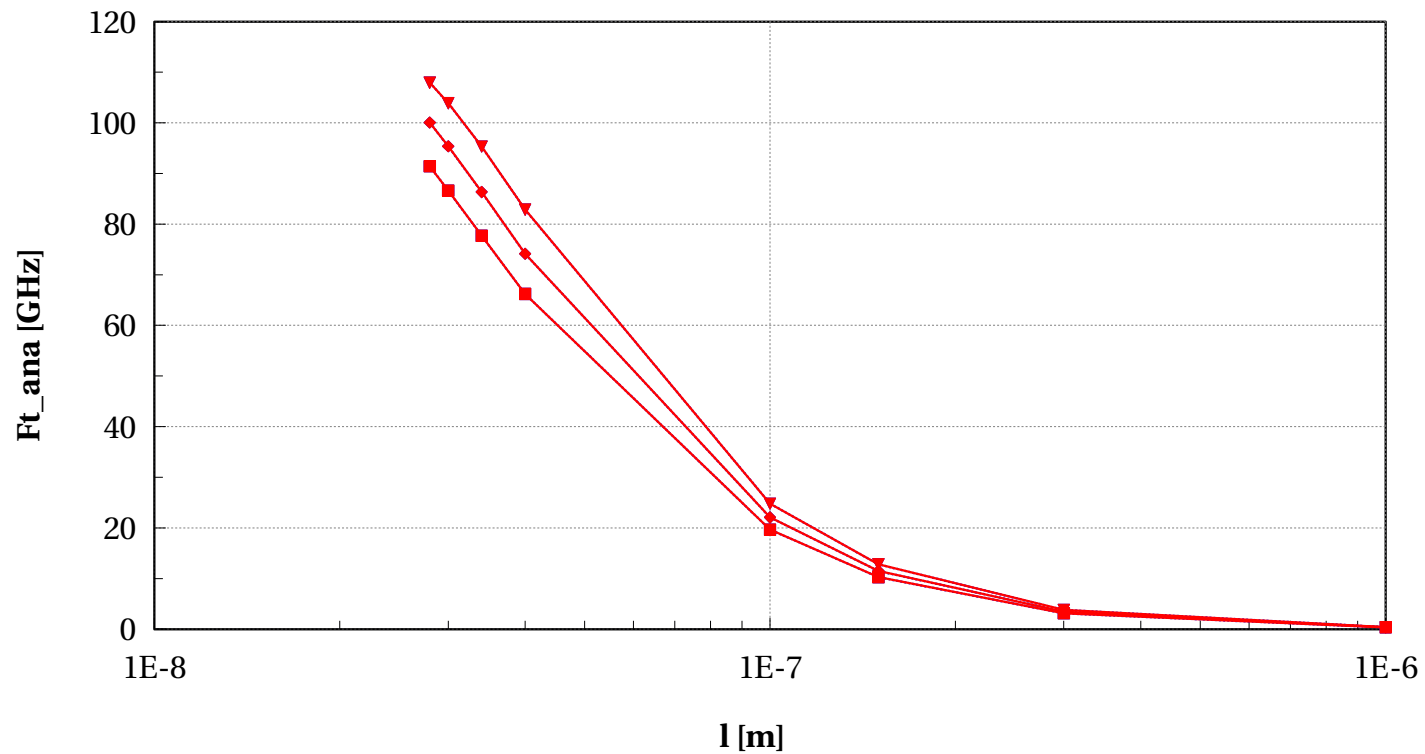
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6





# lvtpfet\_rf, Ft\_ana [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6



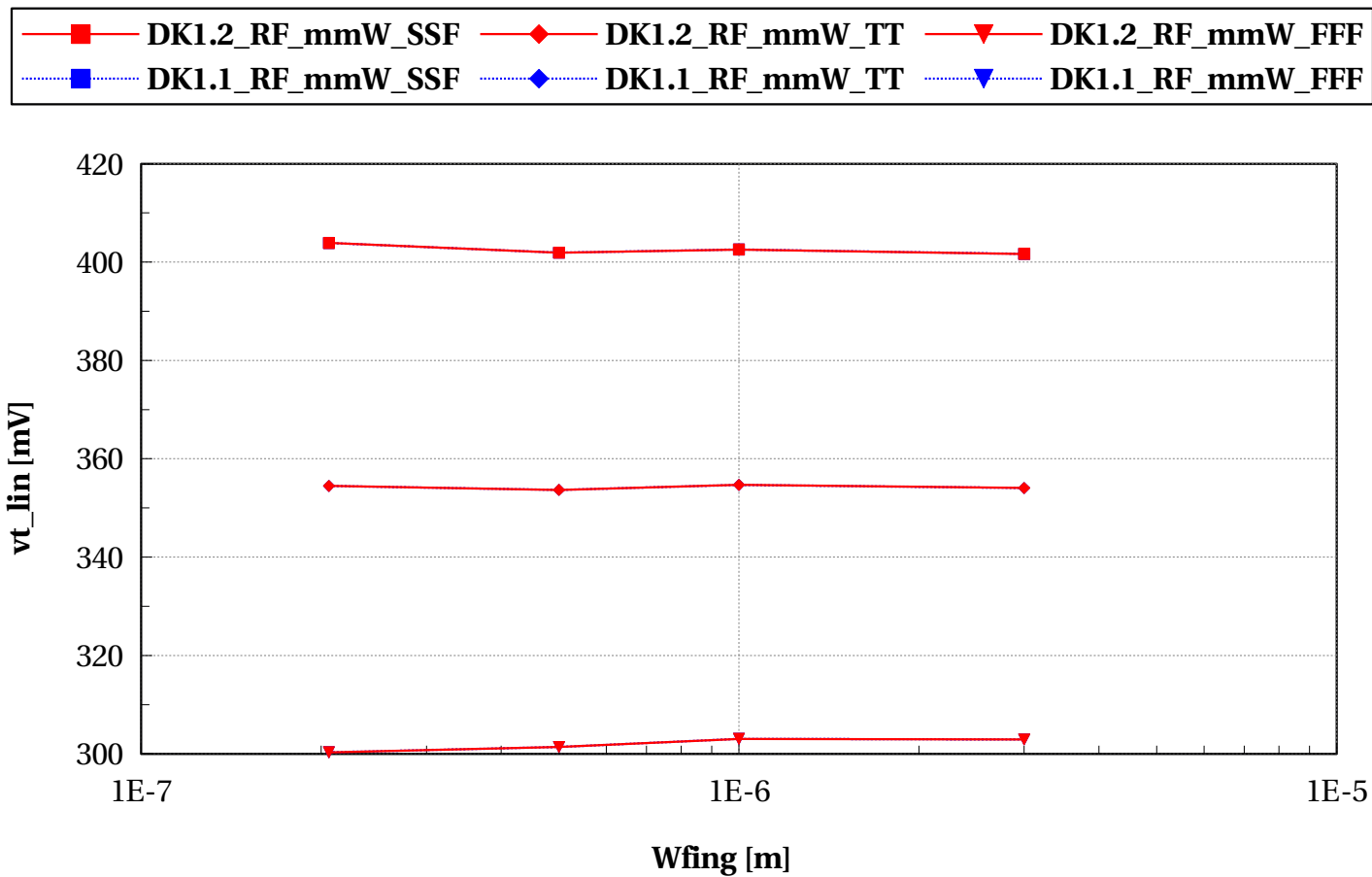
# lvtpfet\_rfseg

## Electrical characteristics scaling

## Scaling versus width $L=30\text{nm}$ - DC

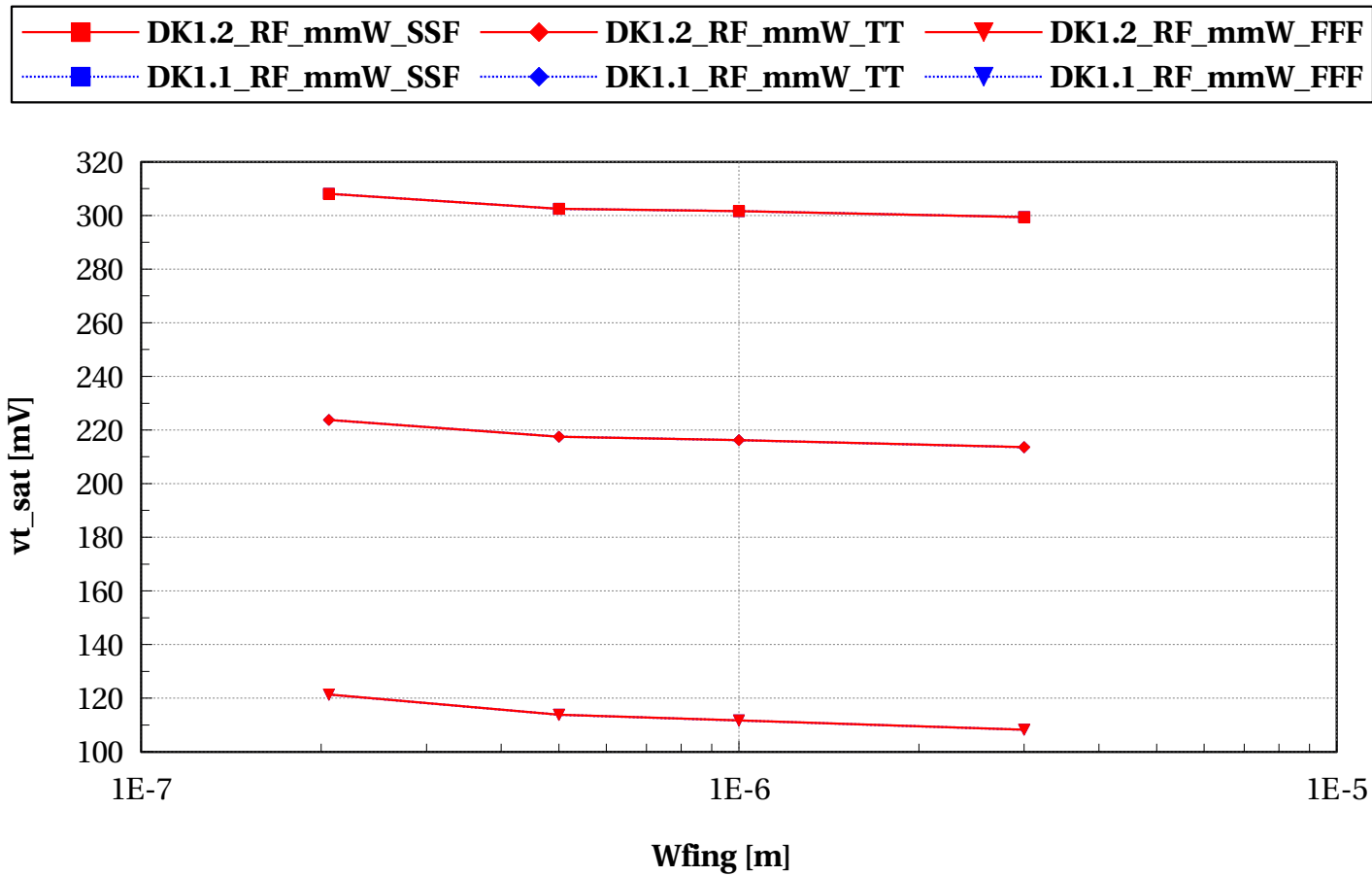
# lvtpfet\_rfseg, vt\_lin [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



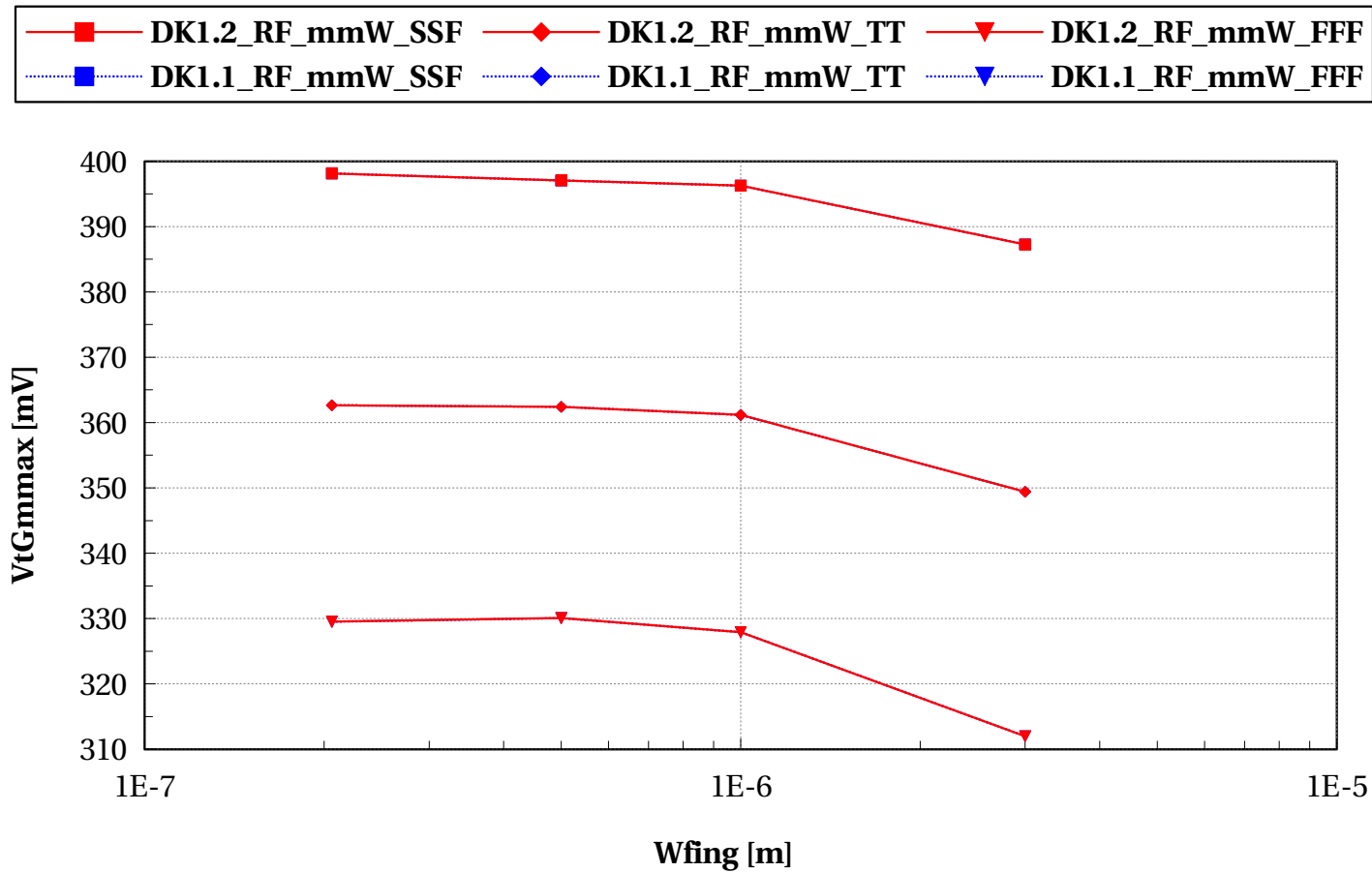
# lvtpfet\_rfseg, vt\_sat [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



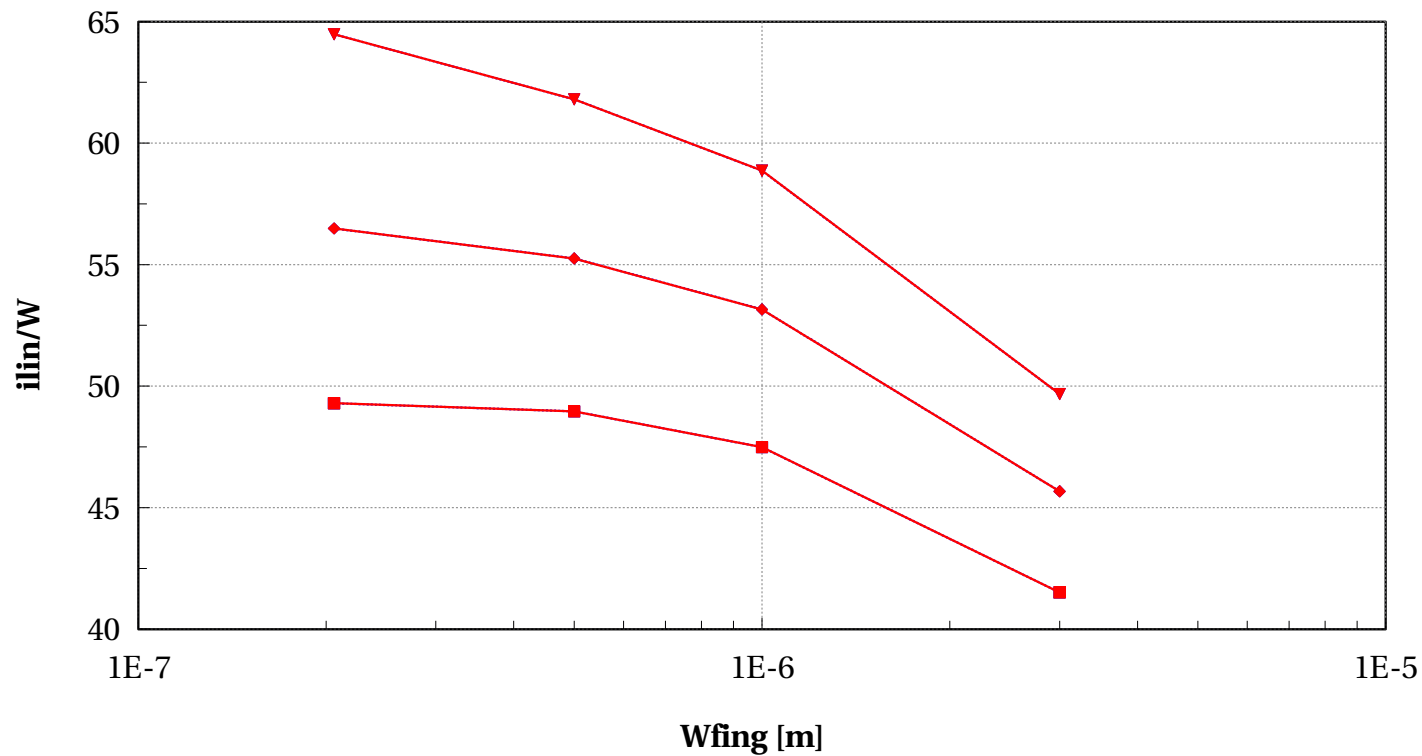
# lvtpfet\_rfseg, VtGmmax [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



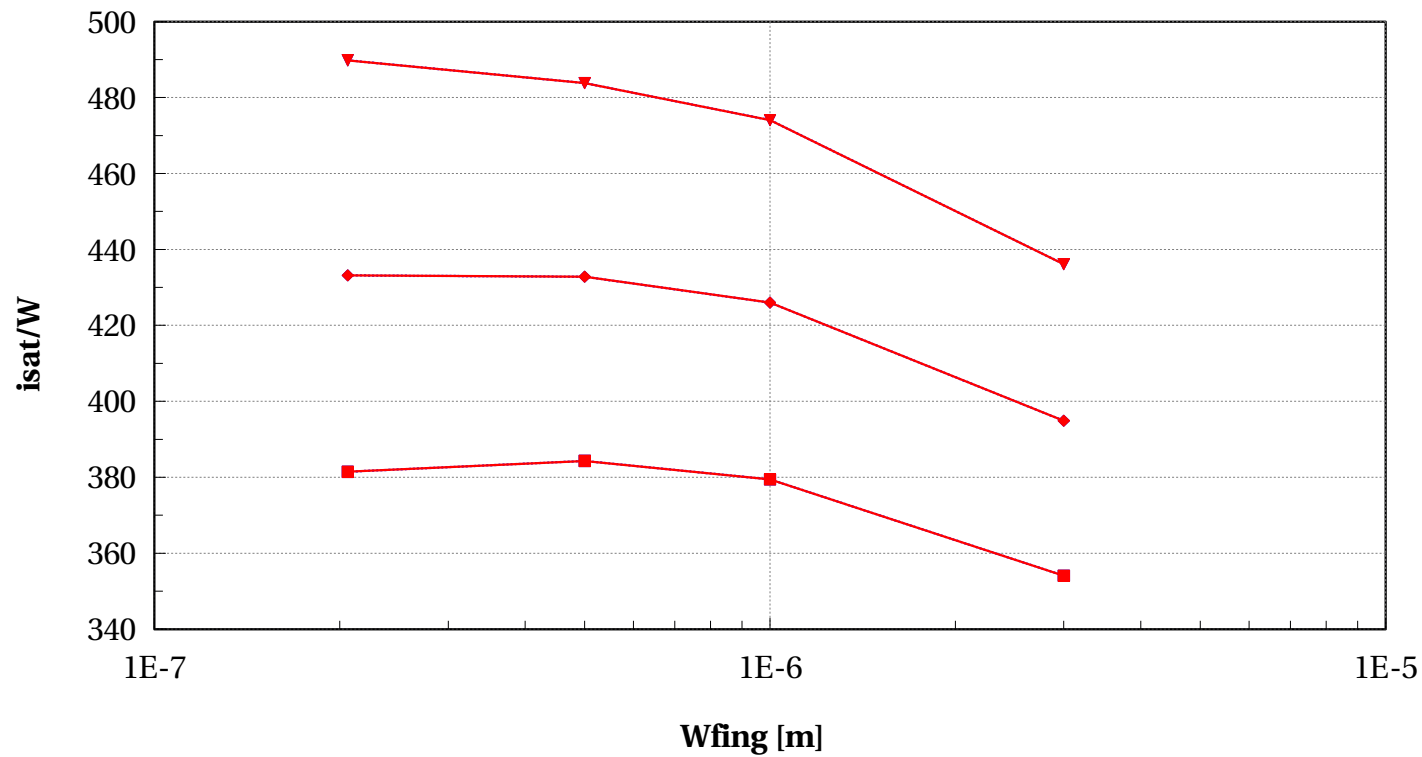
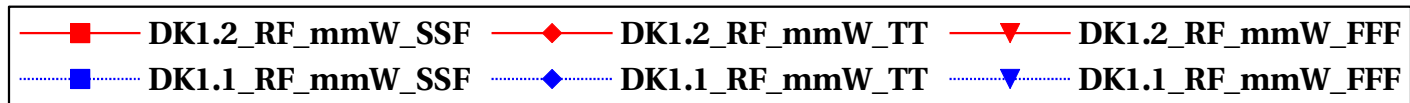
# lvtpfet\_rfseg, ilin/W vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# lvtpfet\_rfseg, isat/W vs Wfing [m]

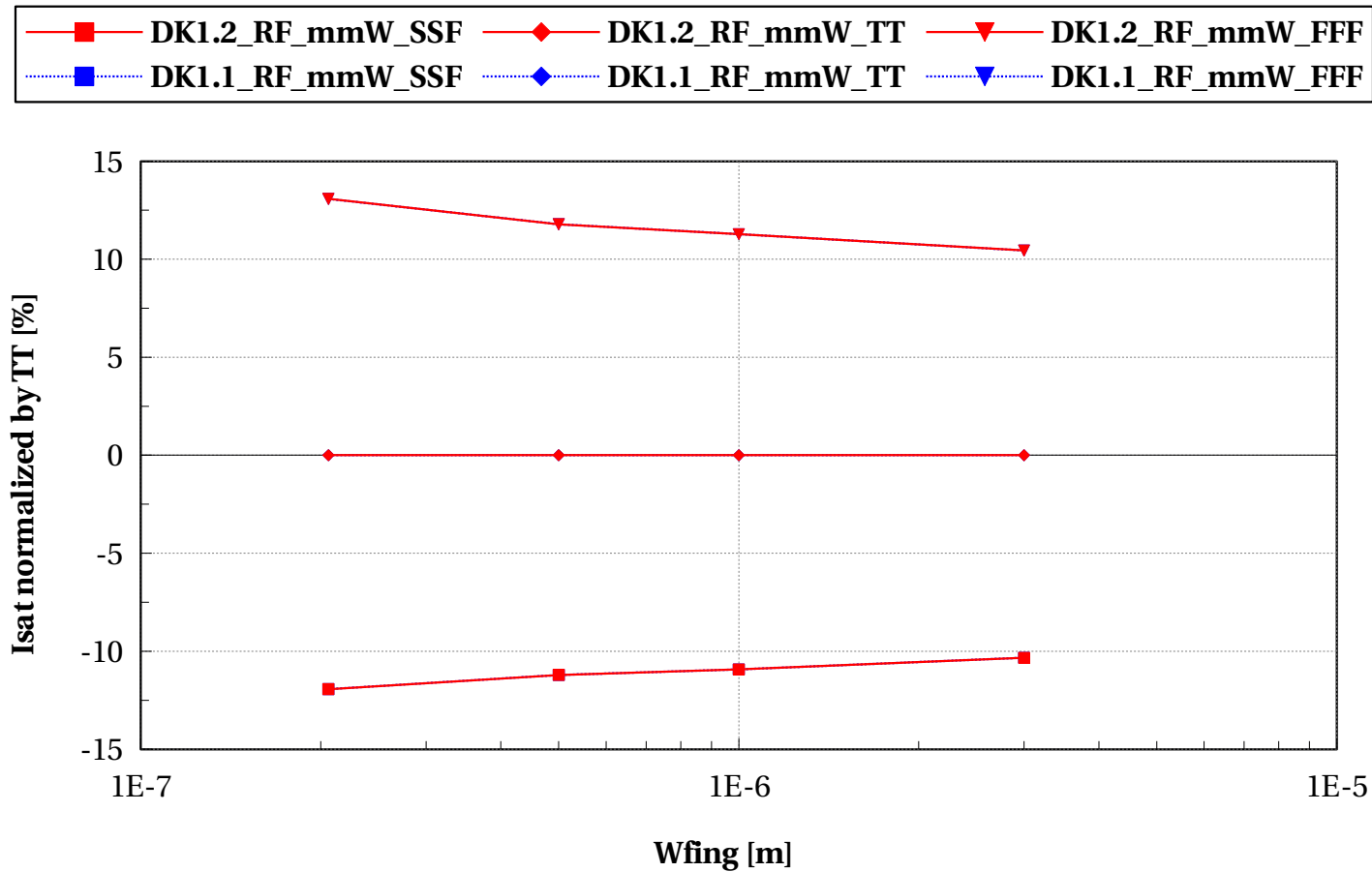
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9





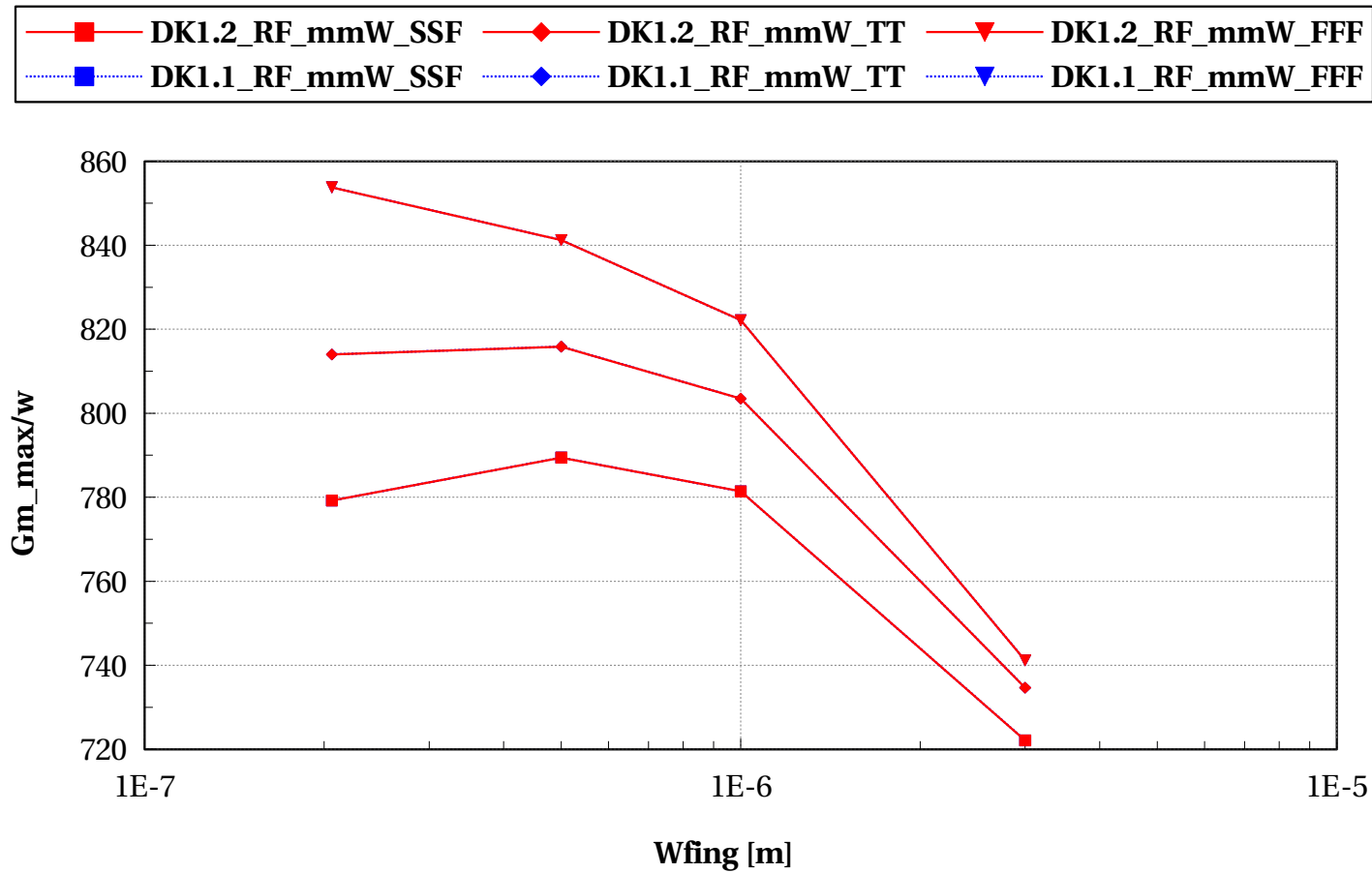
## lvtpfet\_rfseg, Isat normalized by TT [%] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



## lvtpfet\_rfseg, Gm\_max/w vs Wfing [m]

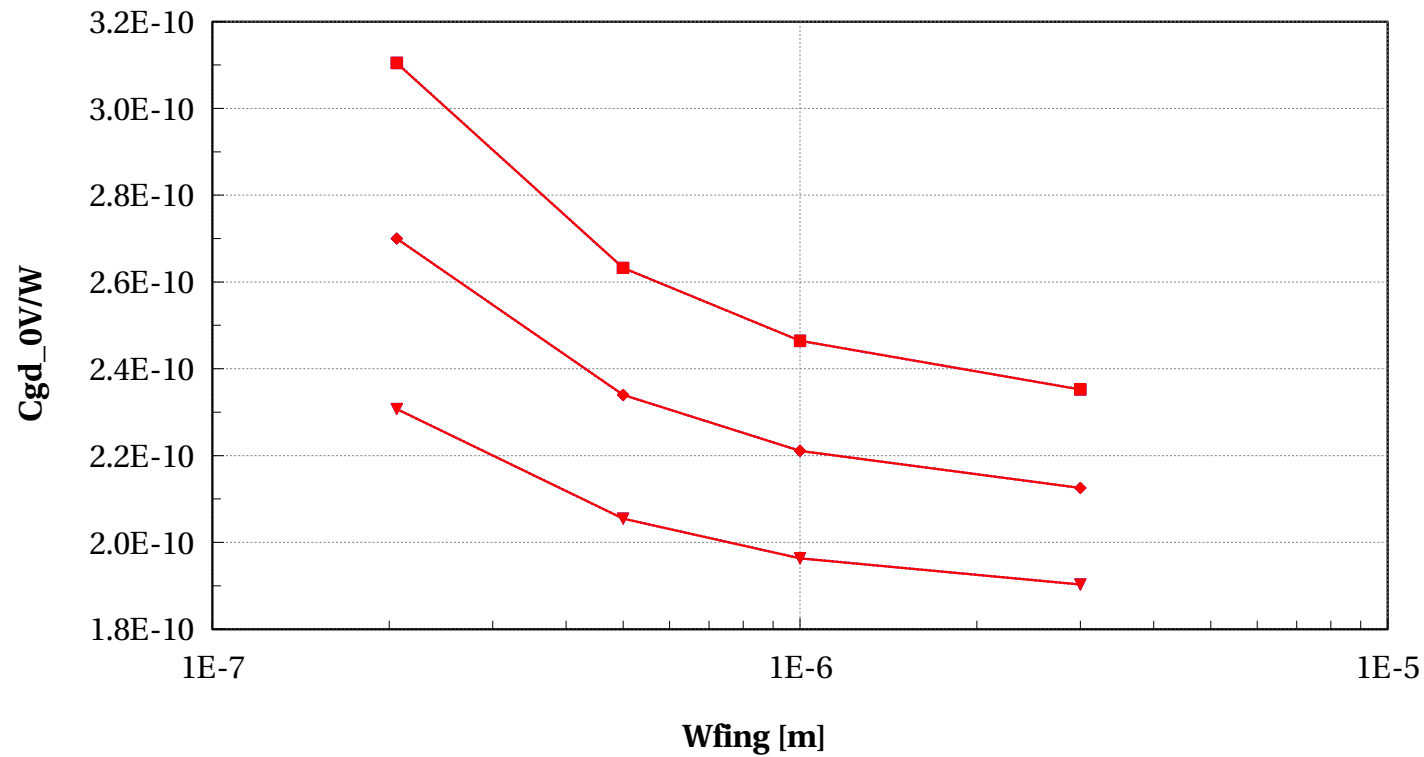
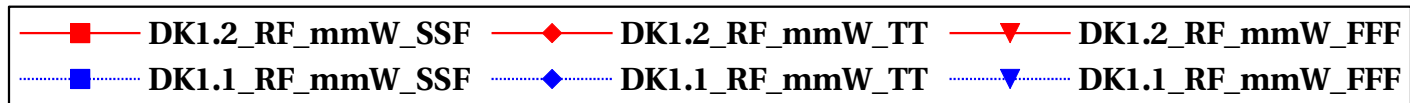
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



## Scaling versus width $L=30\text{nm}$ - RF

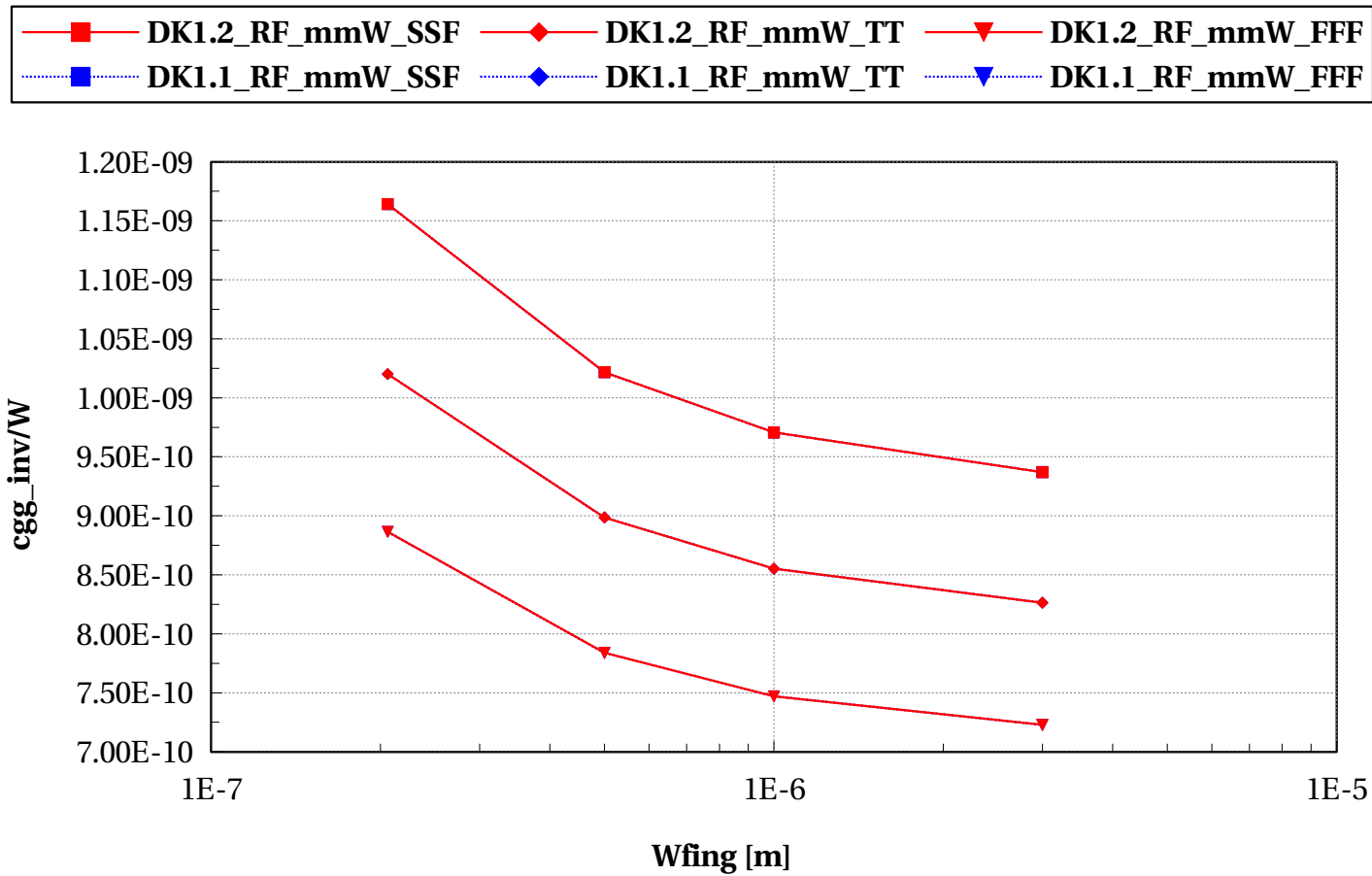
# lvtpfet\_rfseg, Cgd\_0V/W vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



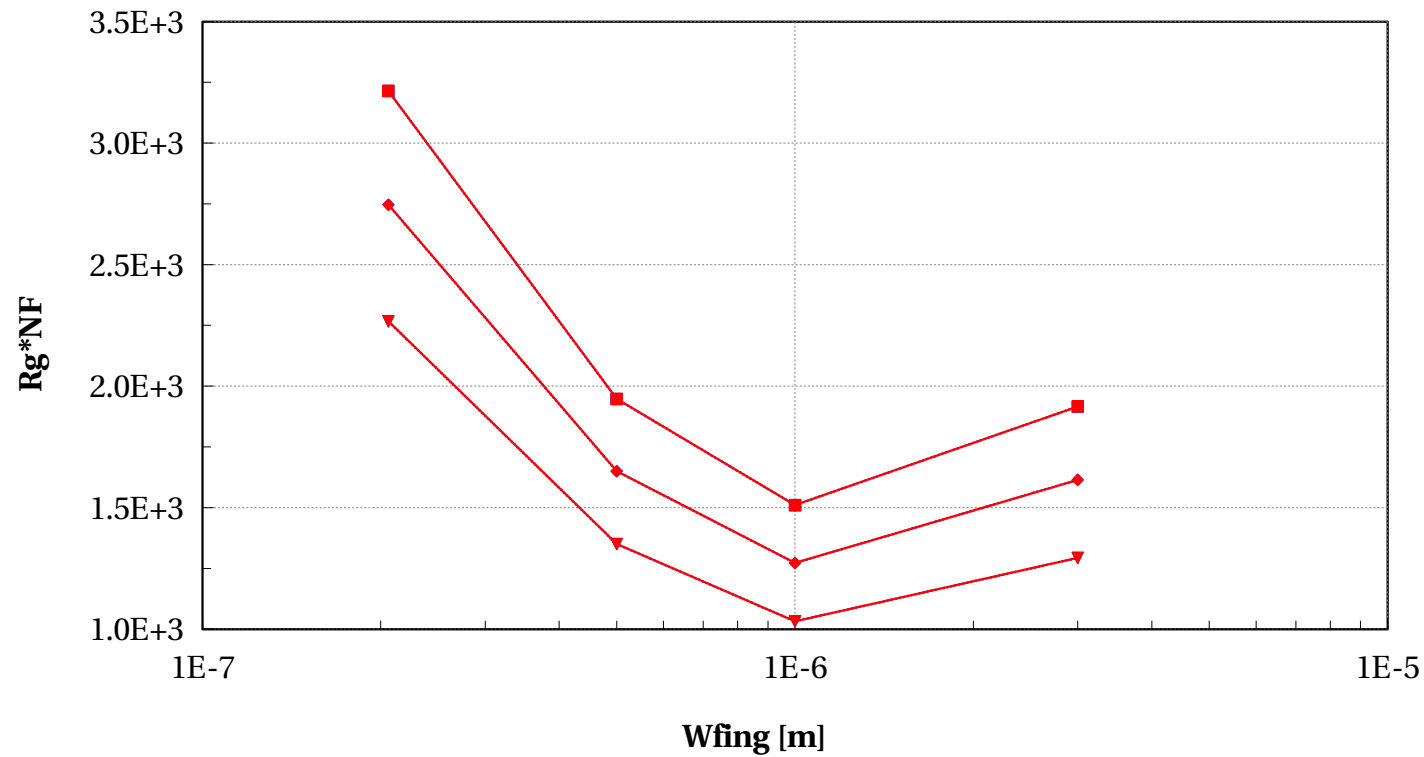
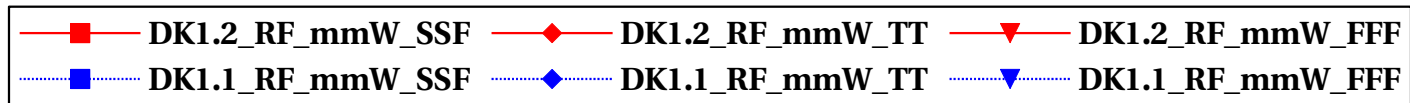
# lvtpfet\_rfseg, cgg\_inv/W vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



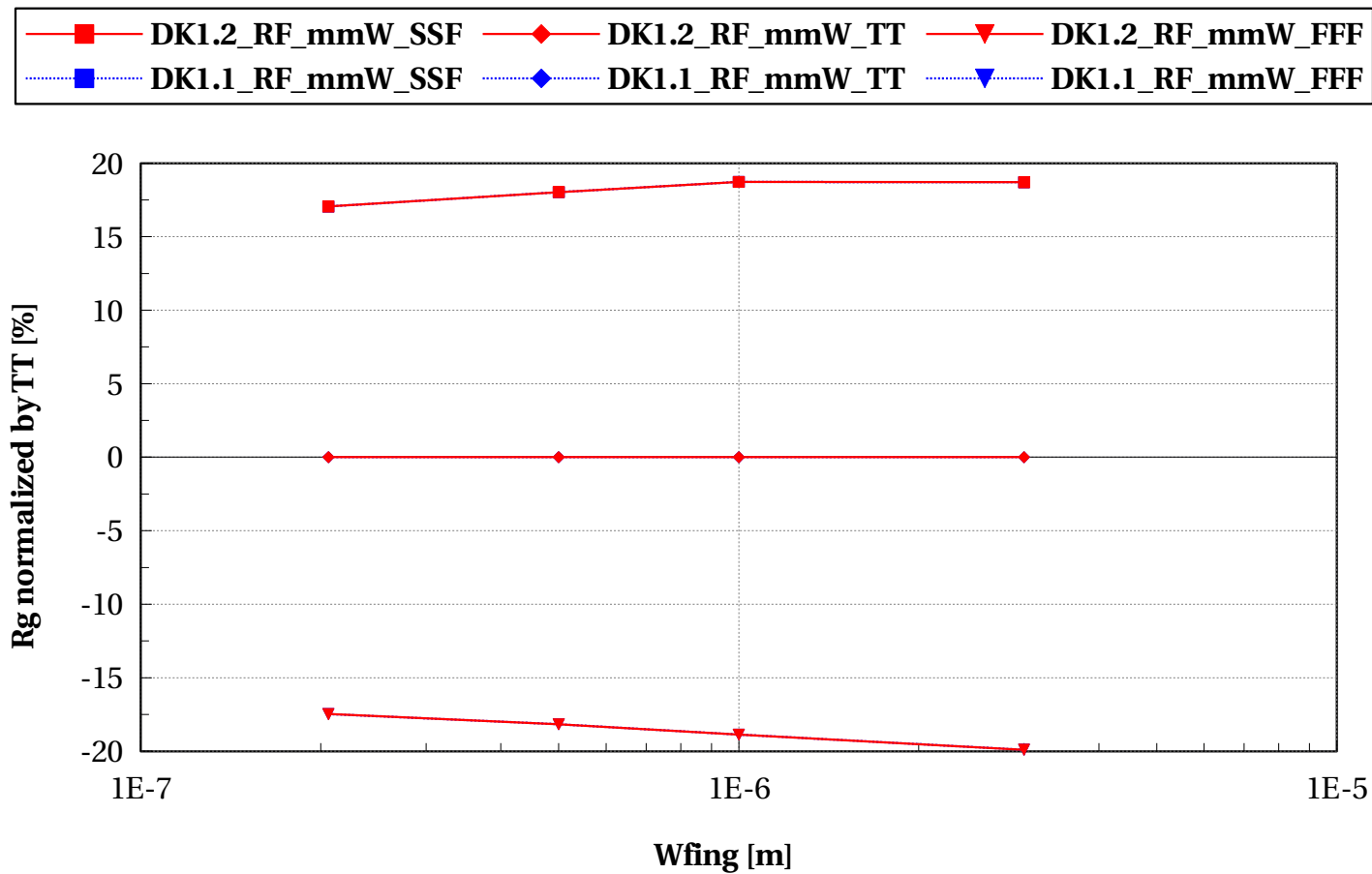
# lvtpfet\_rfseg, $R_g * NF$ vs $W_{fing}$ [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and  $l=30e-9$



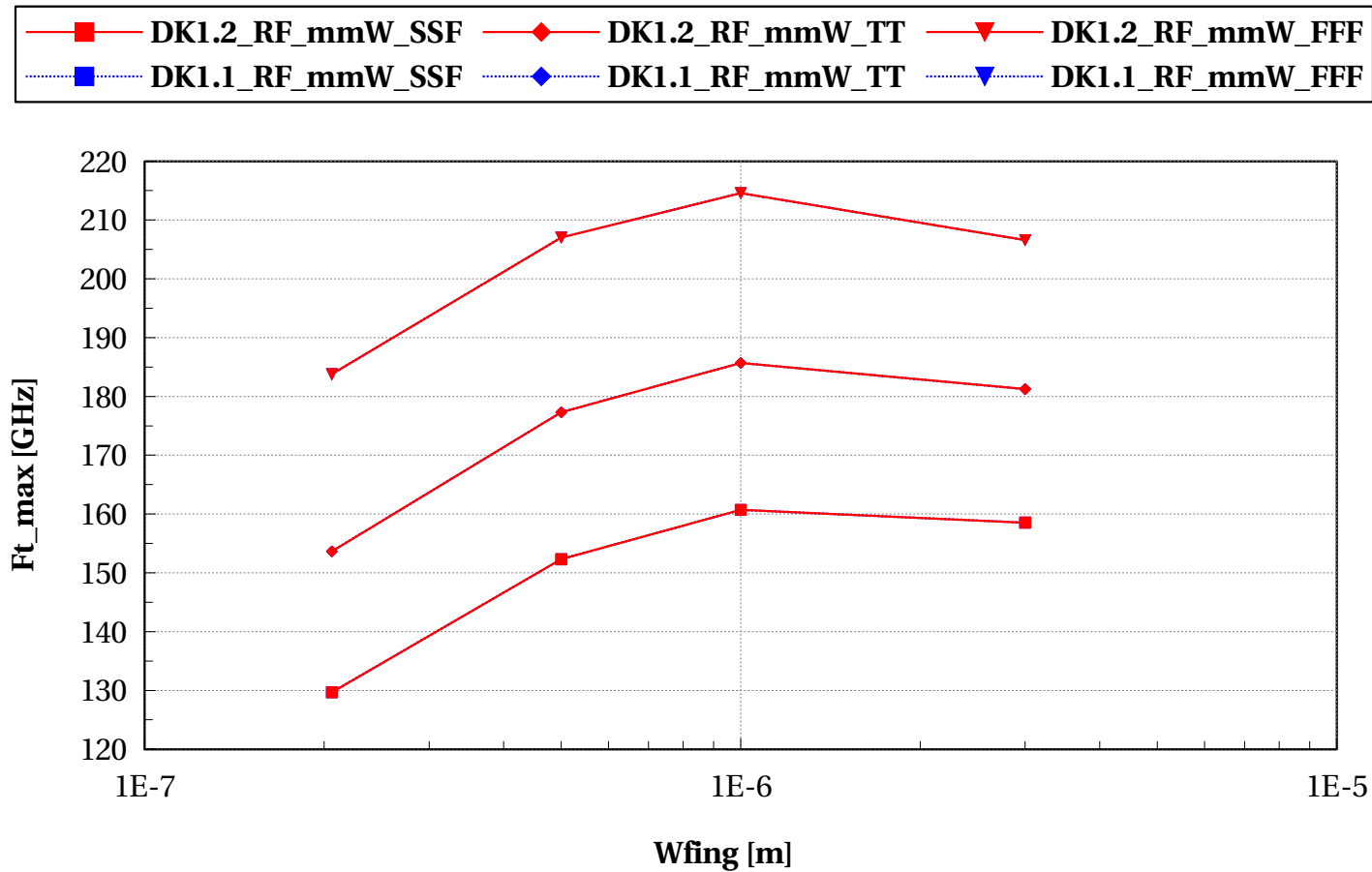
## lvtpfet\_rfseg, Rg normalized by TT [%] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# lvtpfet\_rfseg, Ft\_max [GHz] vs Wfing [m]

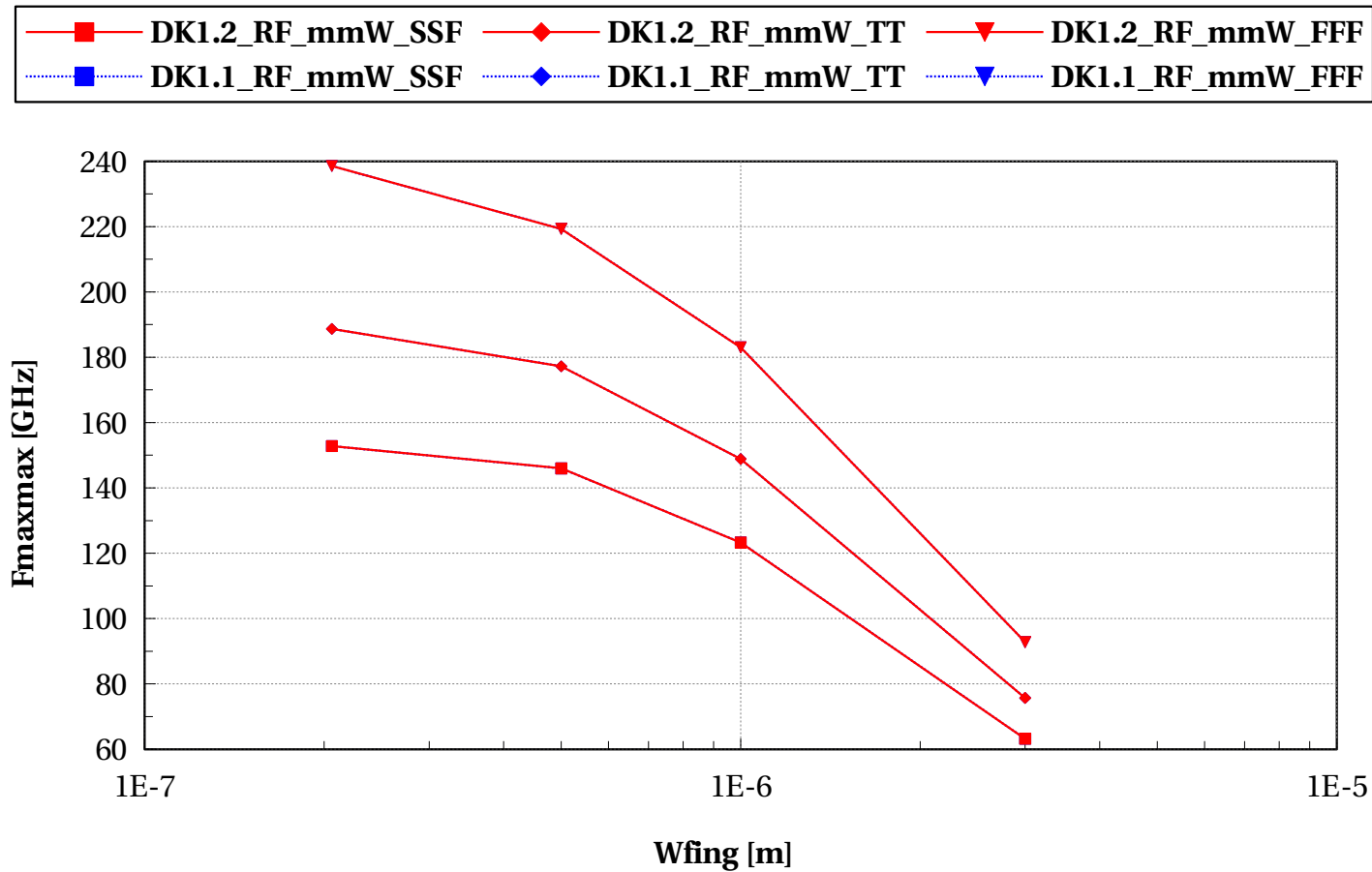
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9





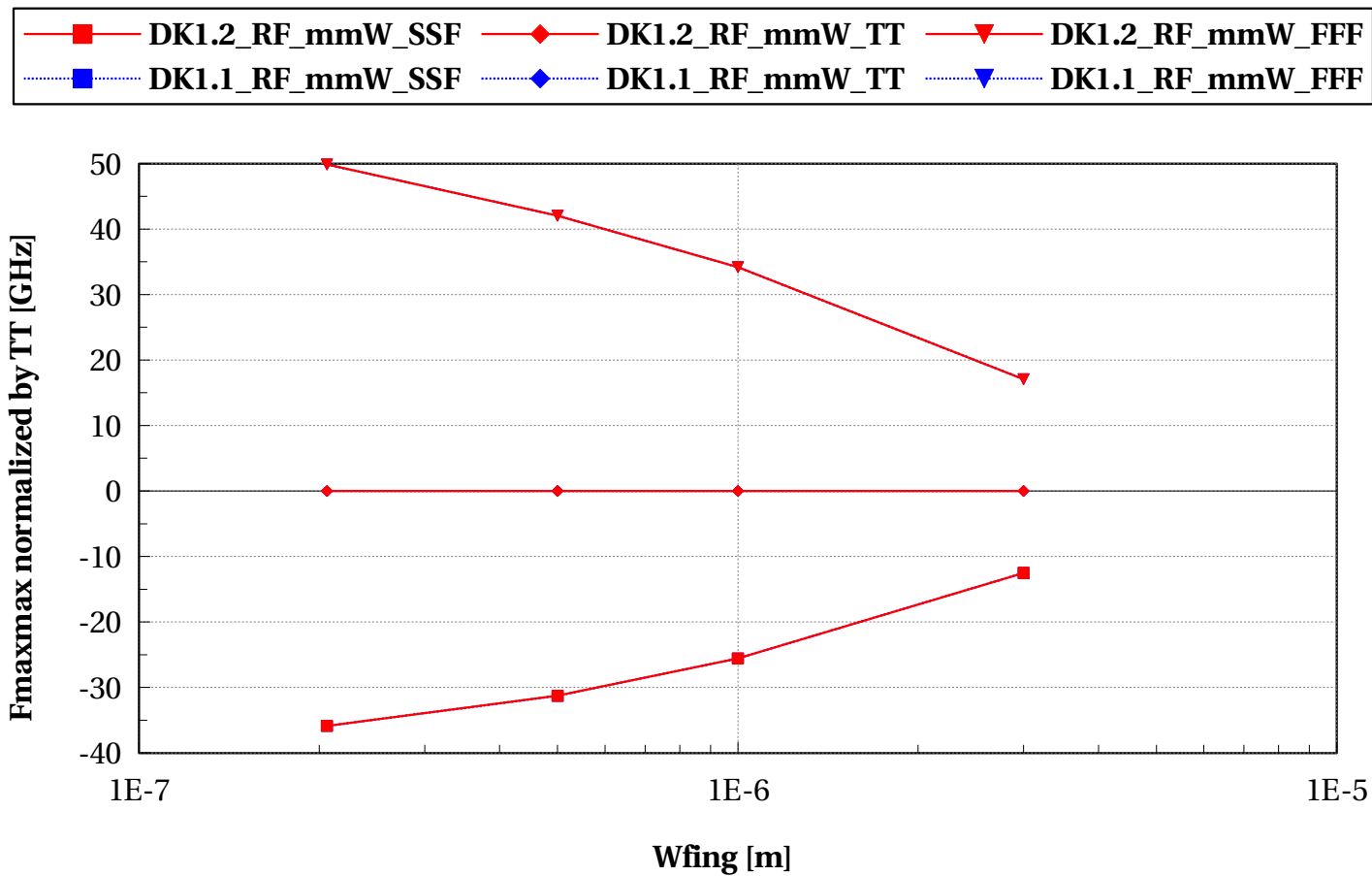
# lvtpfet\_rfseg, Fmaxmax [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# lvtpfet\_rfseg, Fmaxmax normalized by TT [GHz] vs Wfing [m]

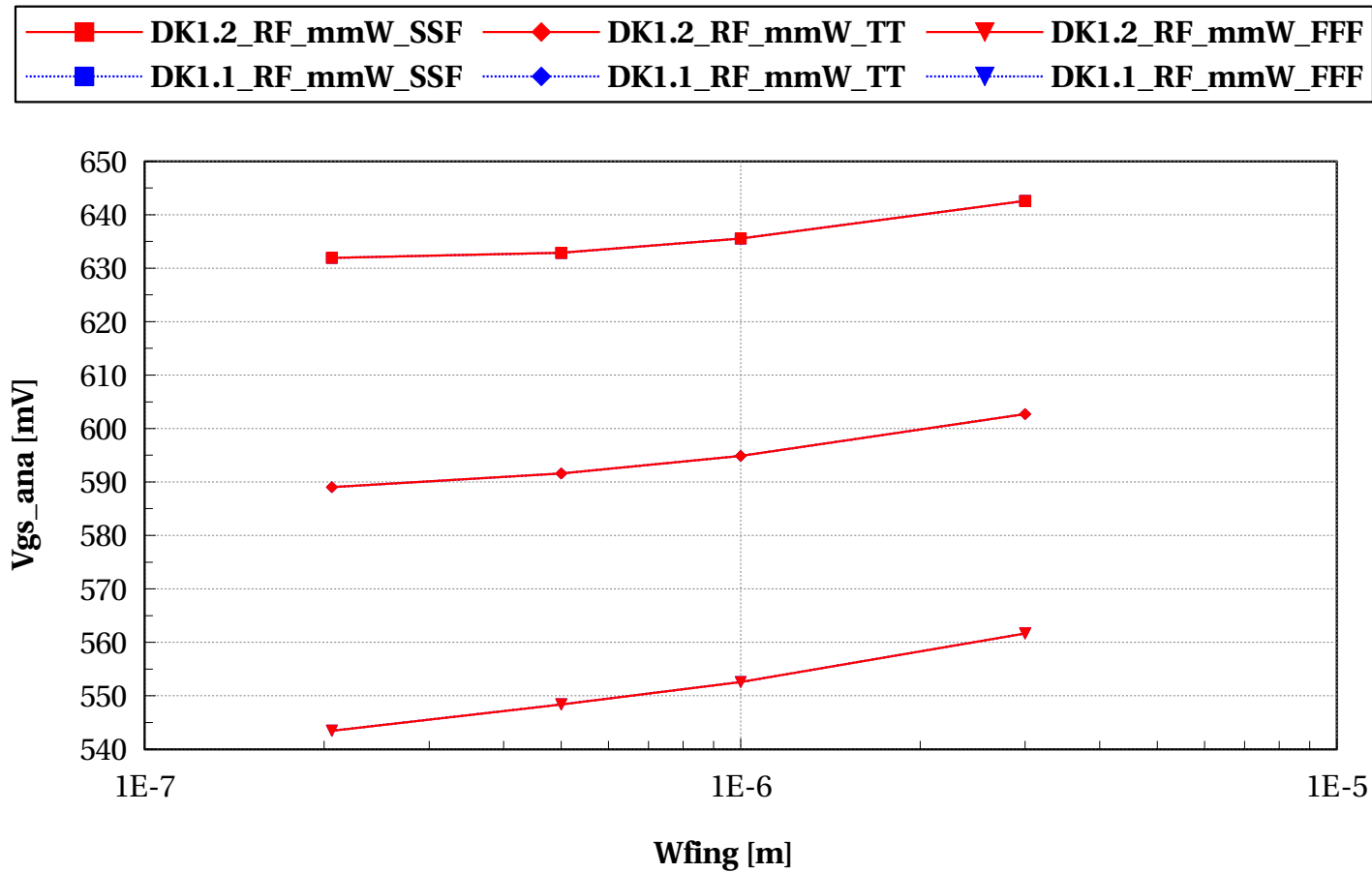
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



## Scaling versus width $L=30\text{nm}$ - Analog

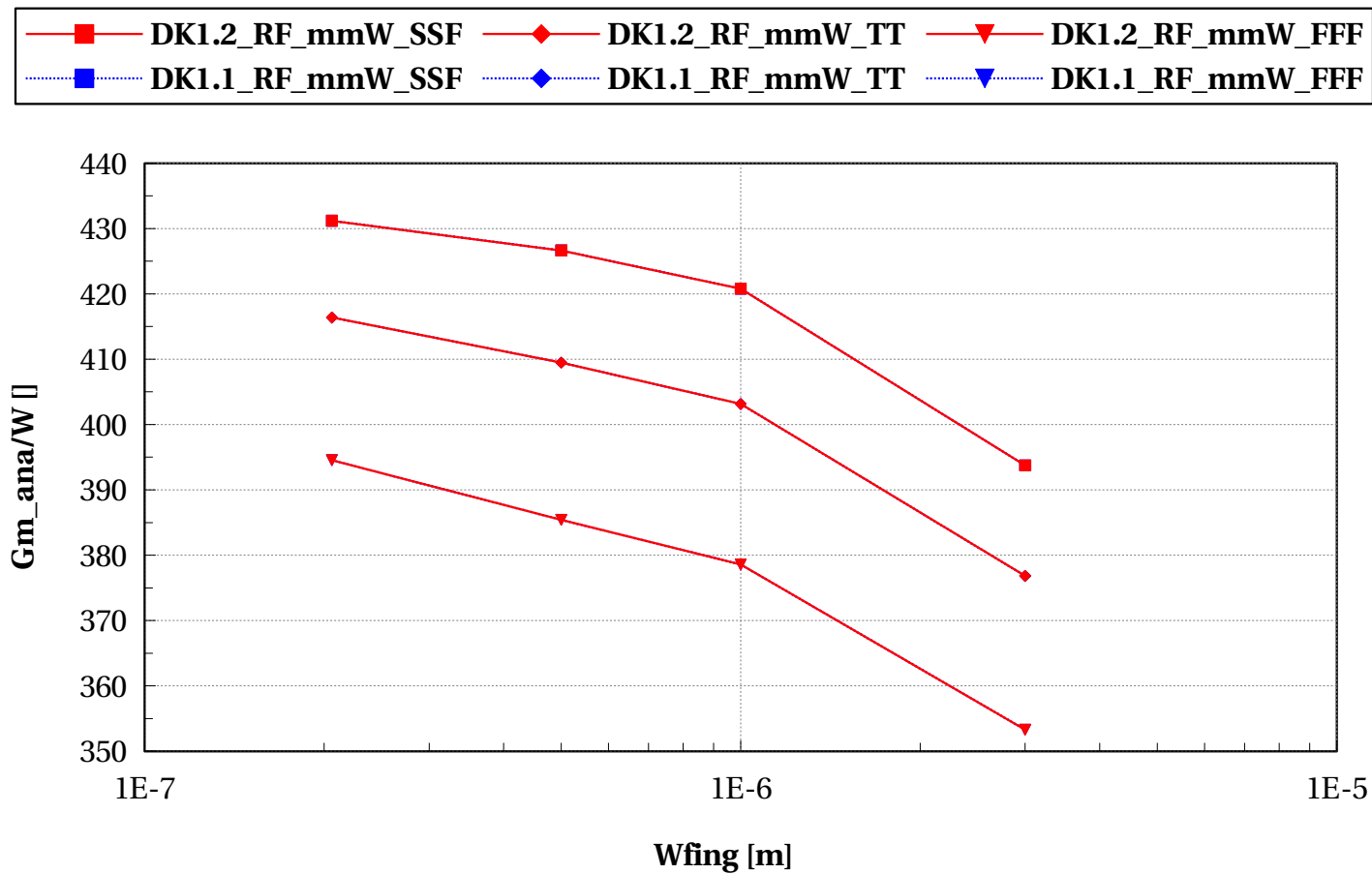
# lvtpfet\_rfseg, Vgs\_ana [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



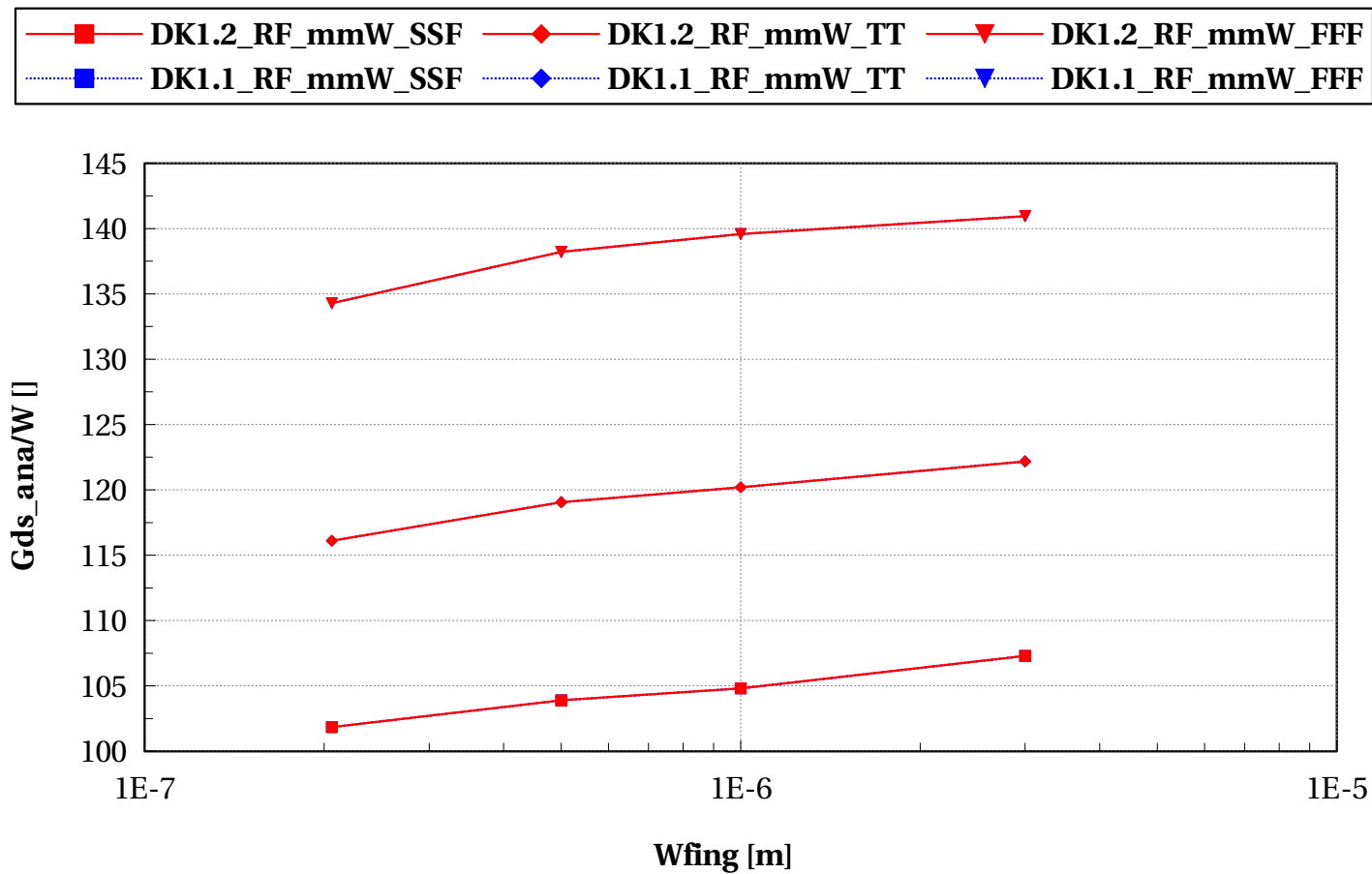
# lvtpfet\_rfseg, Gm\_ana/W [] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



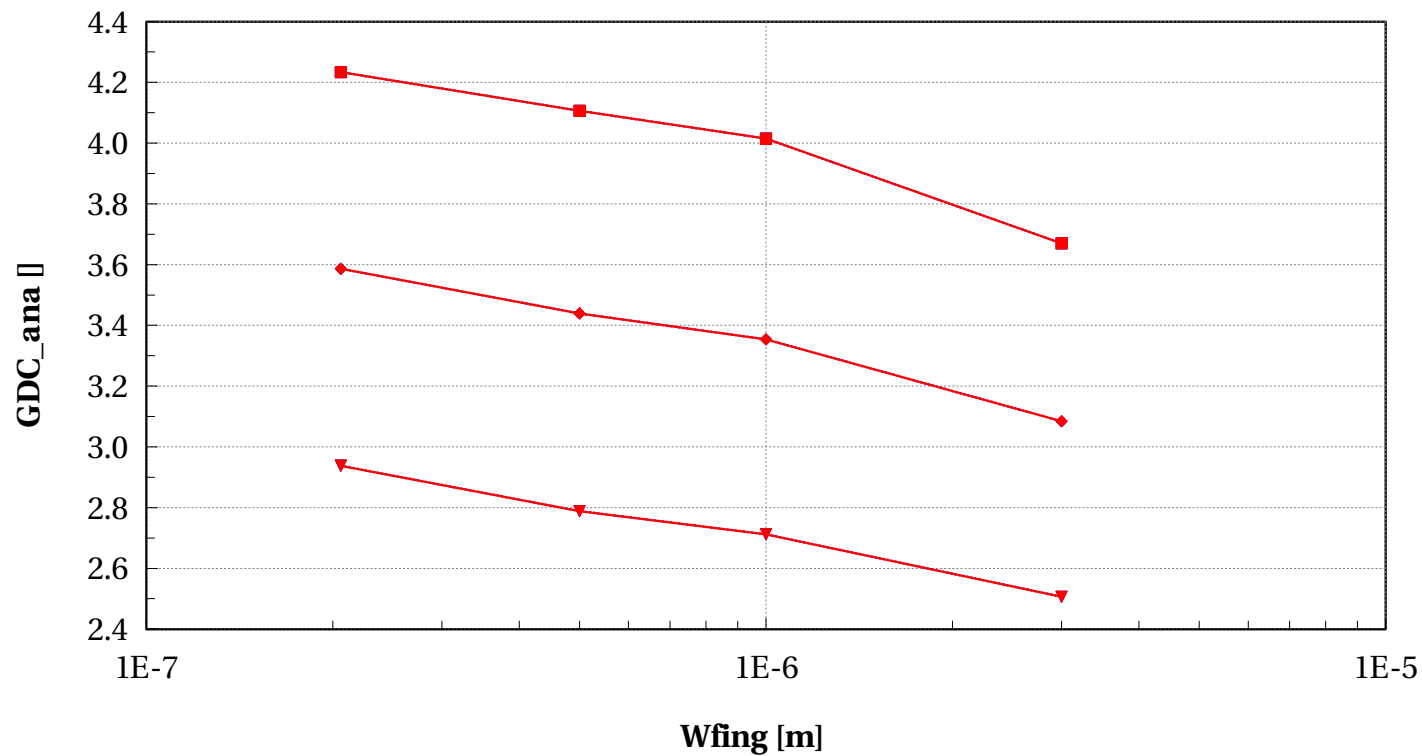
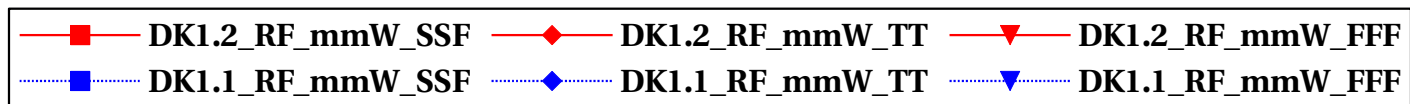
# lvtpfet\_rfseg, Gds\_ana/W [] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



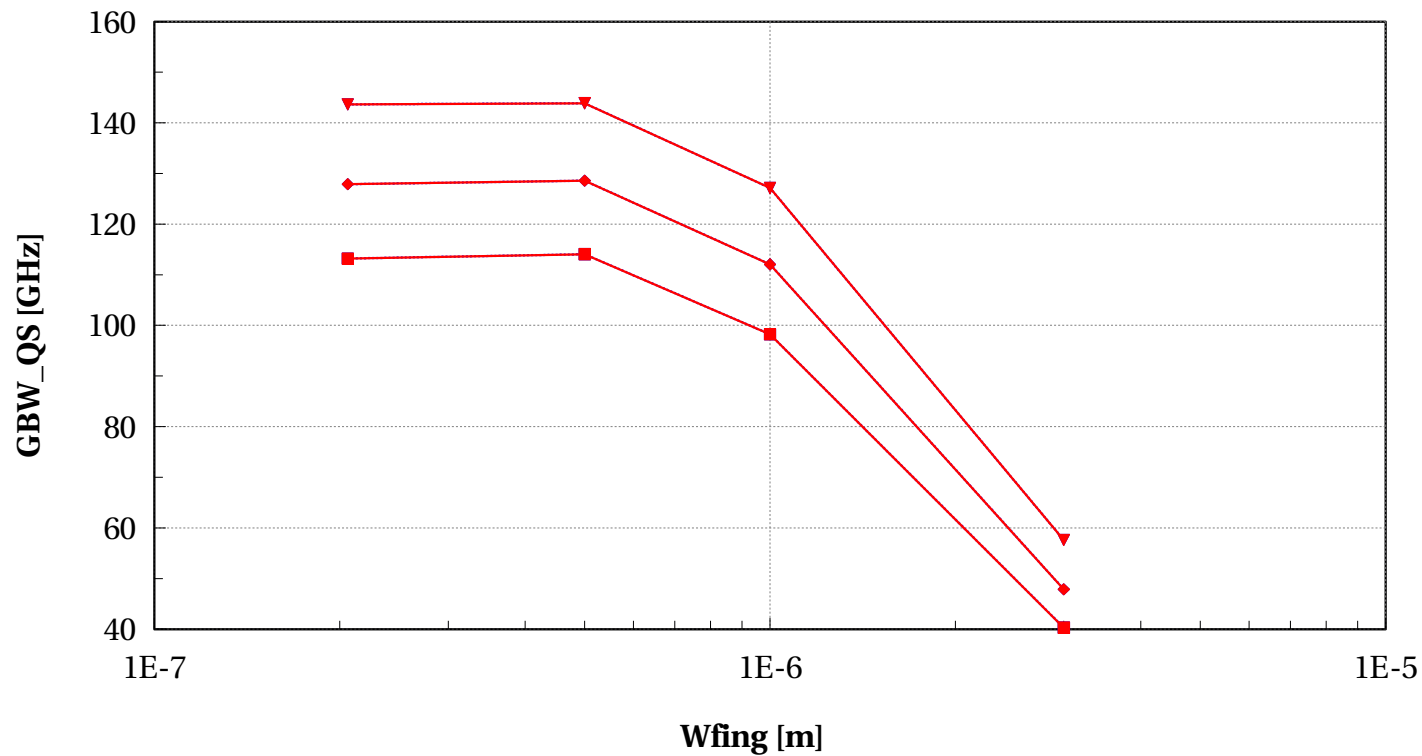
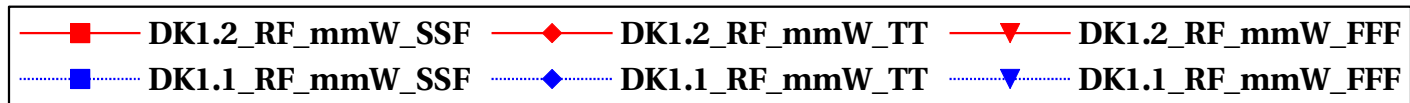
# lvtpfet\_rfseg, GDC\_ana [] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# lvtpfet\_rfseg, GBW\_QS [GHz] vs Wfing [m]

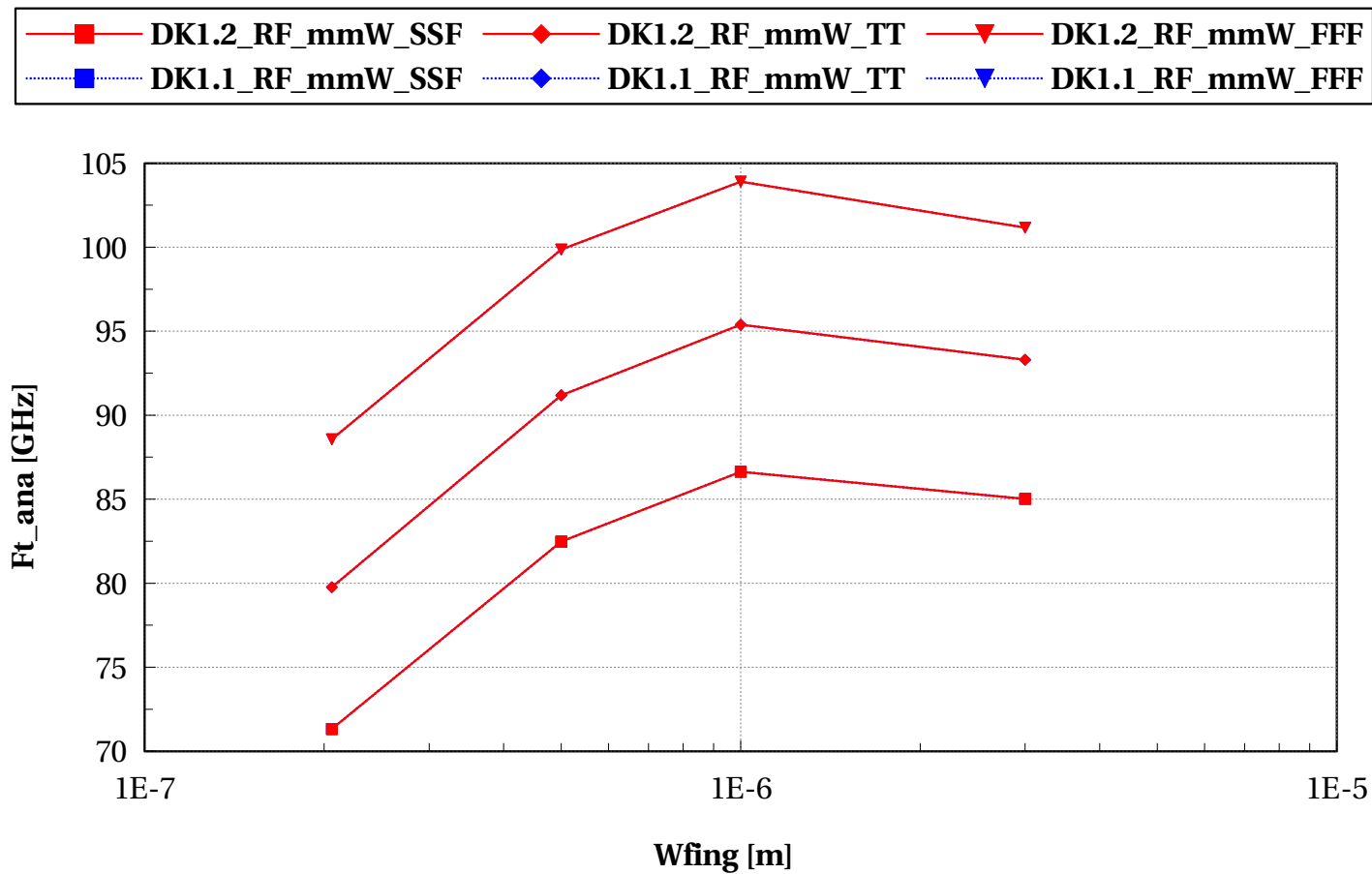
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9





# lvtpfet\_rfseg, Ft\_ana [GHz] vs Wfing [m]

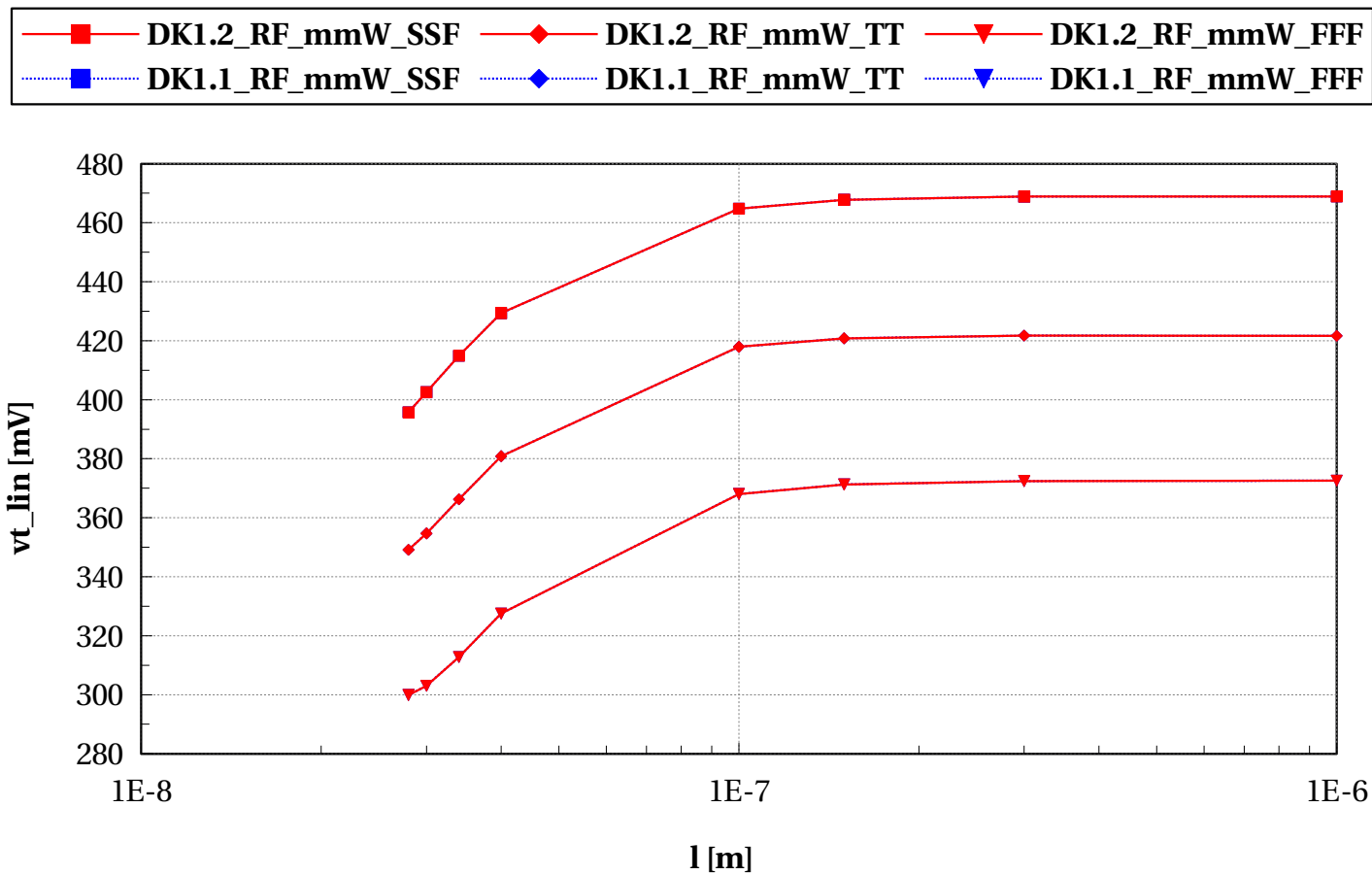
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



## Scaling versus length $W_{\text{fing}}=1\mu\text{m}$ - DC

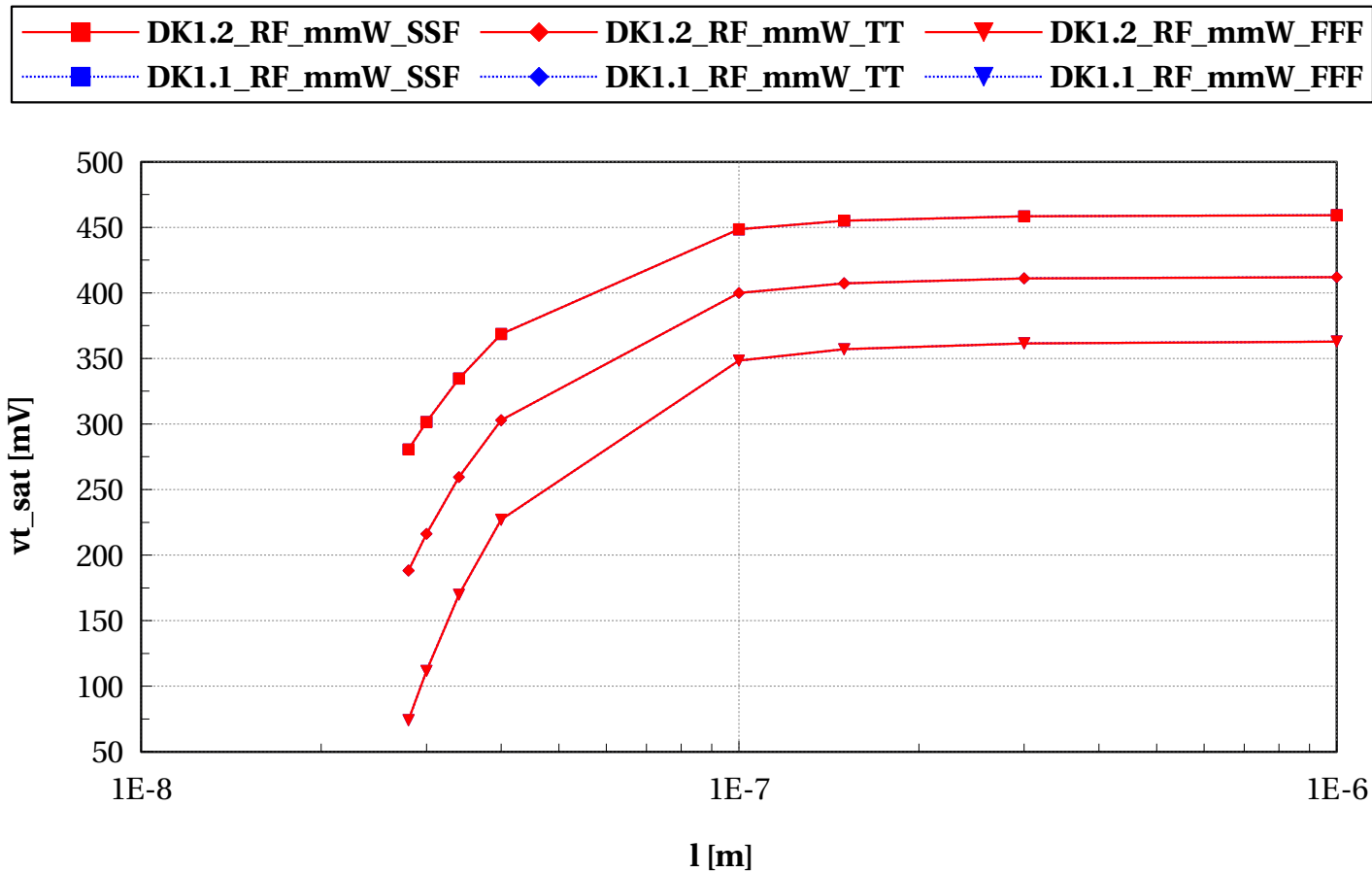
# lvtpfet\_rfseg, vt\_lin [mV] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



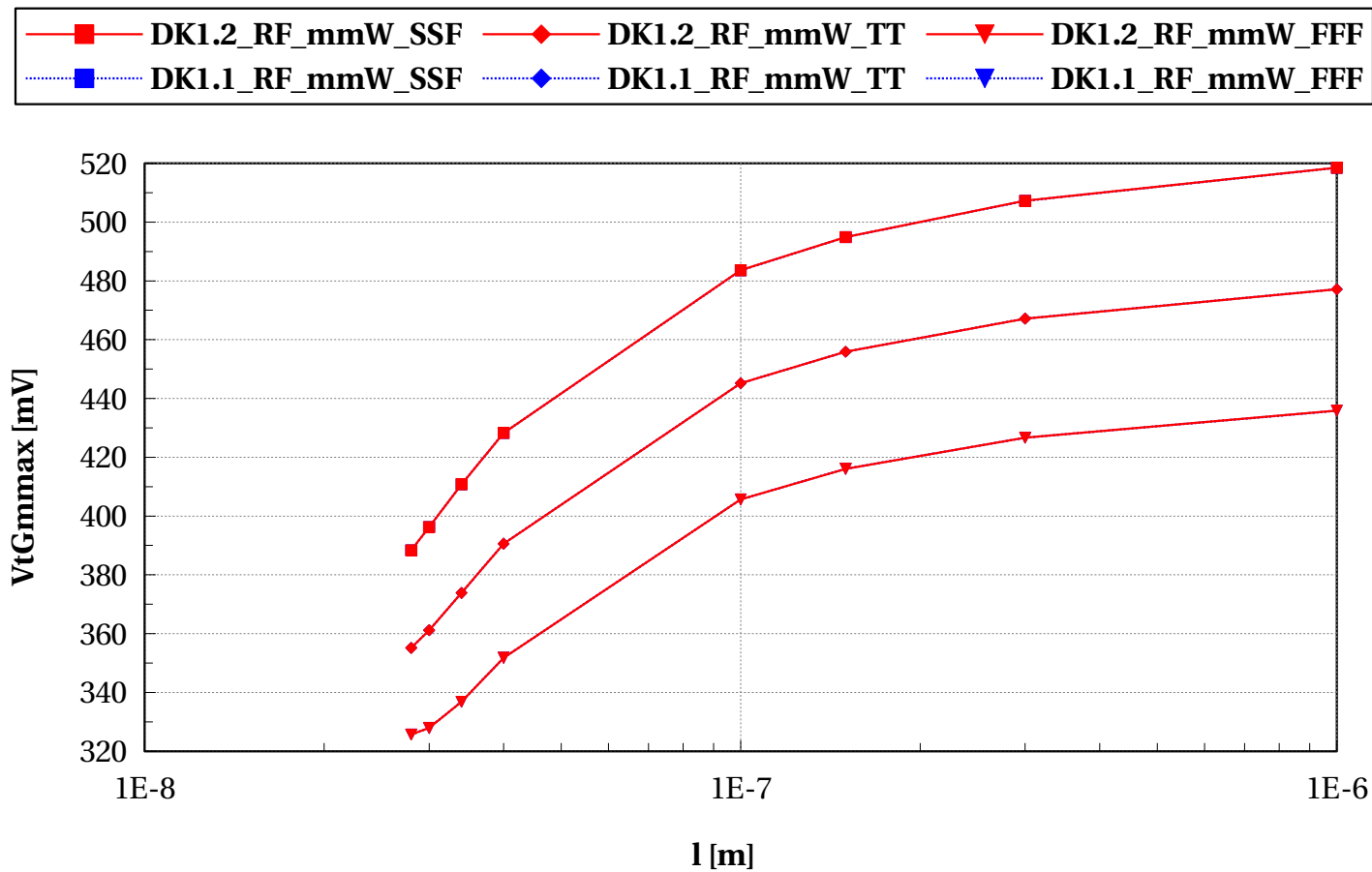
# lvtpfet\_rfseg, vt\_sat [mV] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



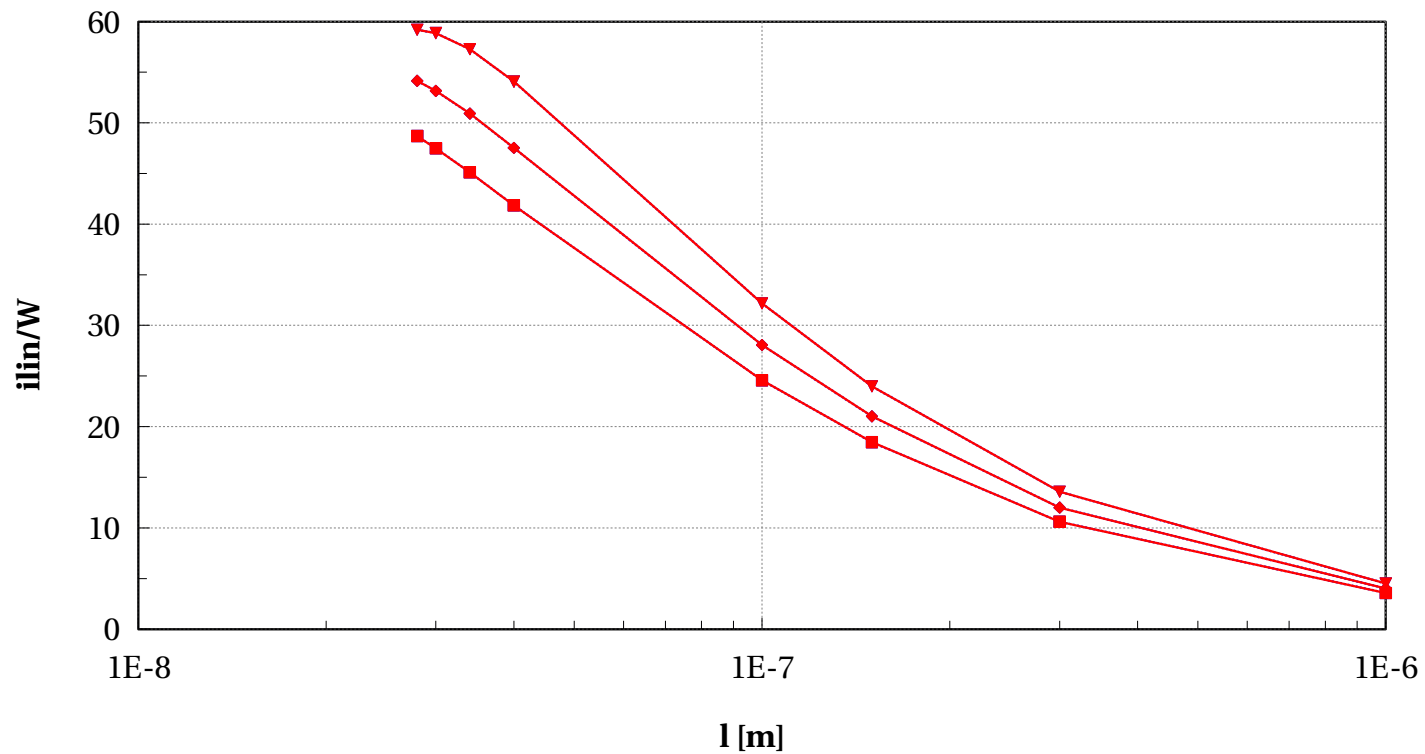
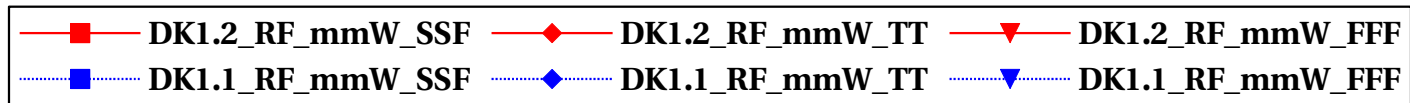
# lvtpfet\_rfseg, VtGmmax [mV] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



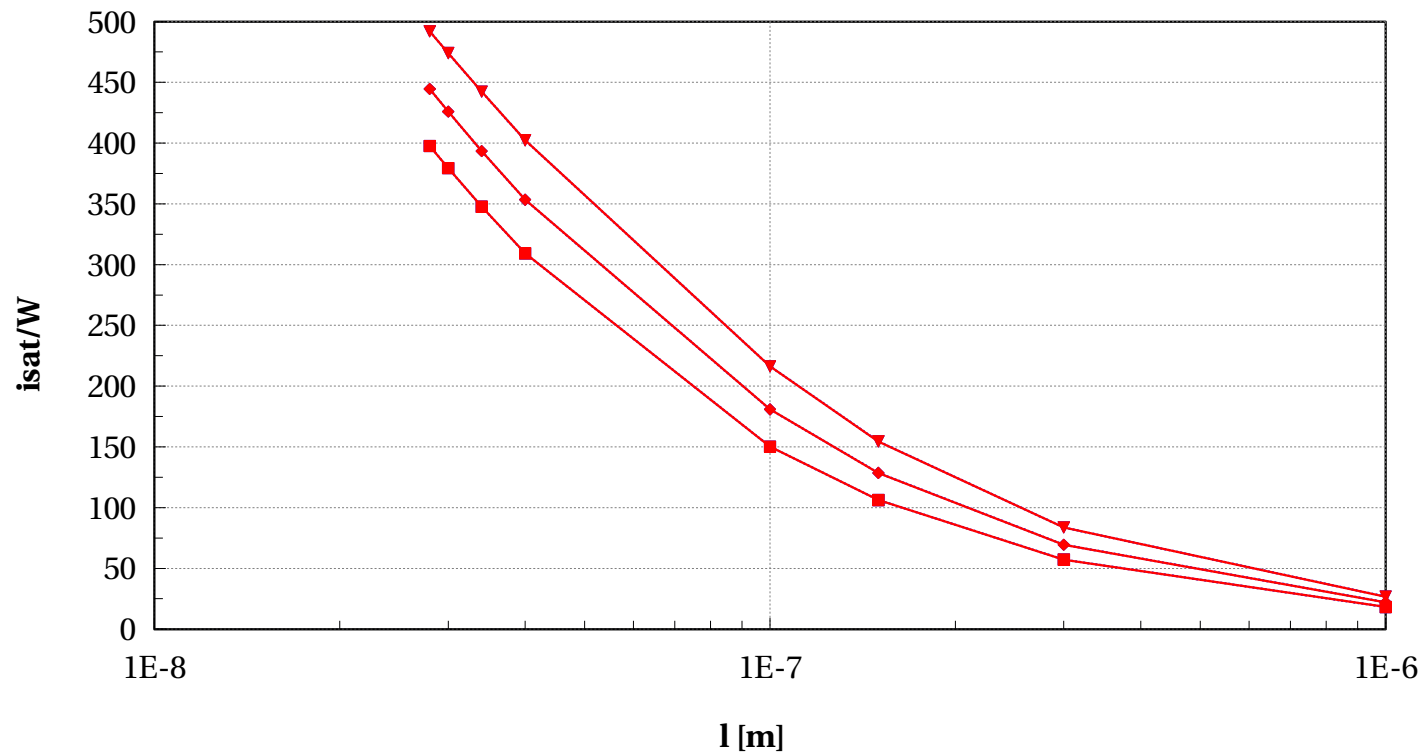
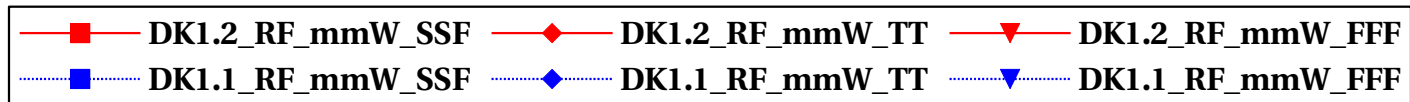
# lvtpfet\_rfseg, ilin/W vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



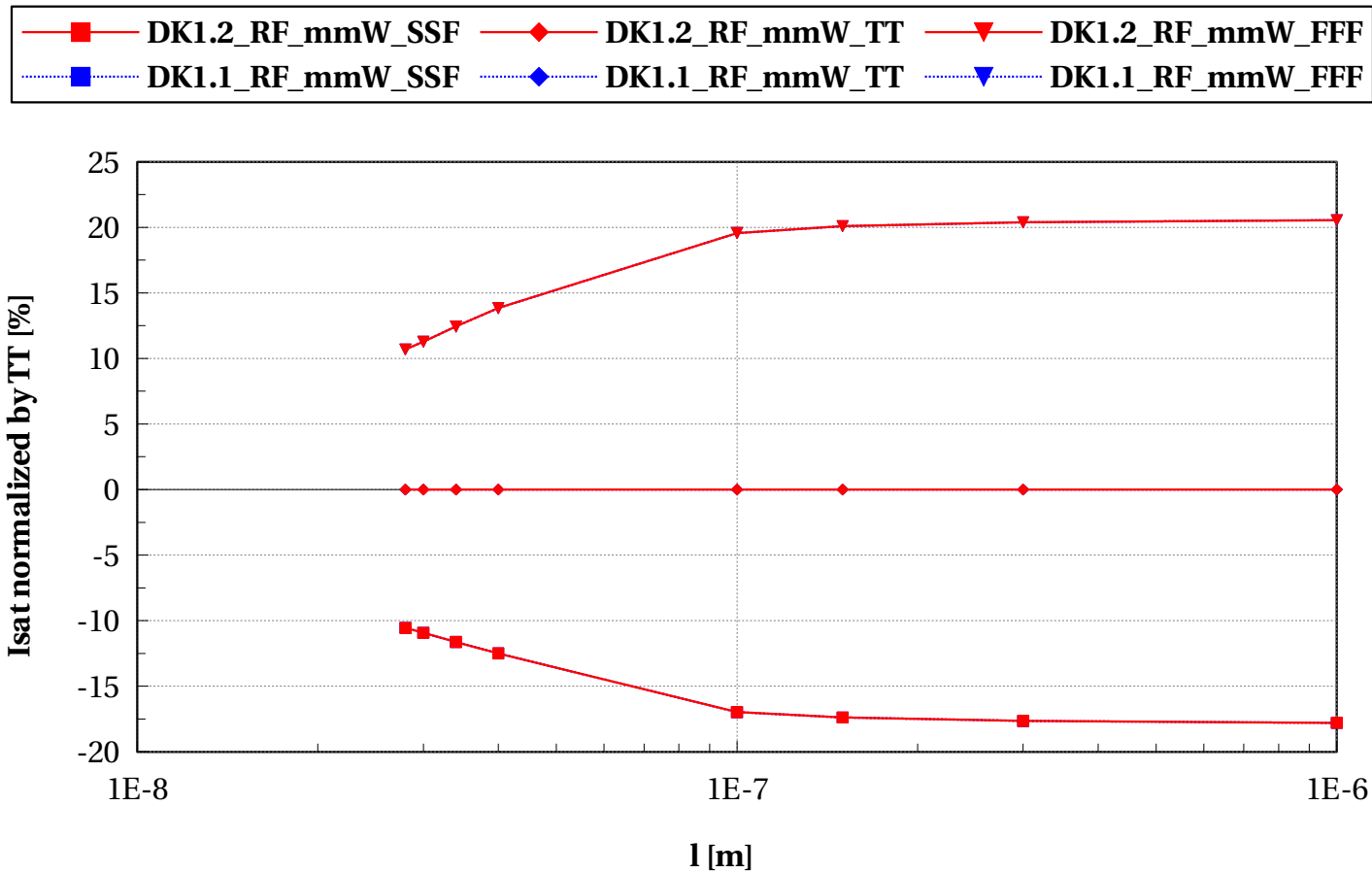
# lvtpfet\_rfseg, isat/W vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



# lvtpfet\_rfseg, Isat normalized by TT [%] vs l [m]

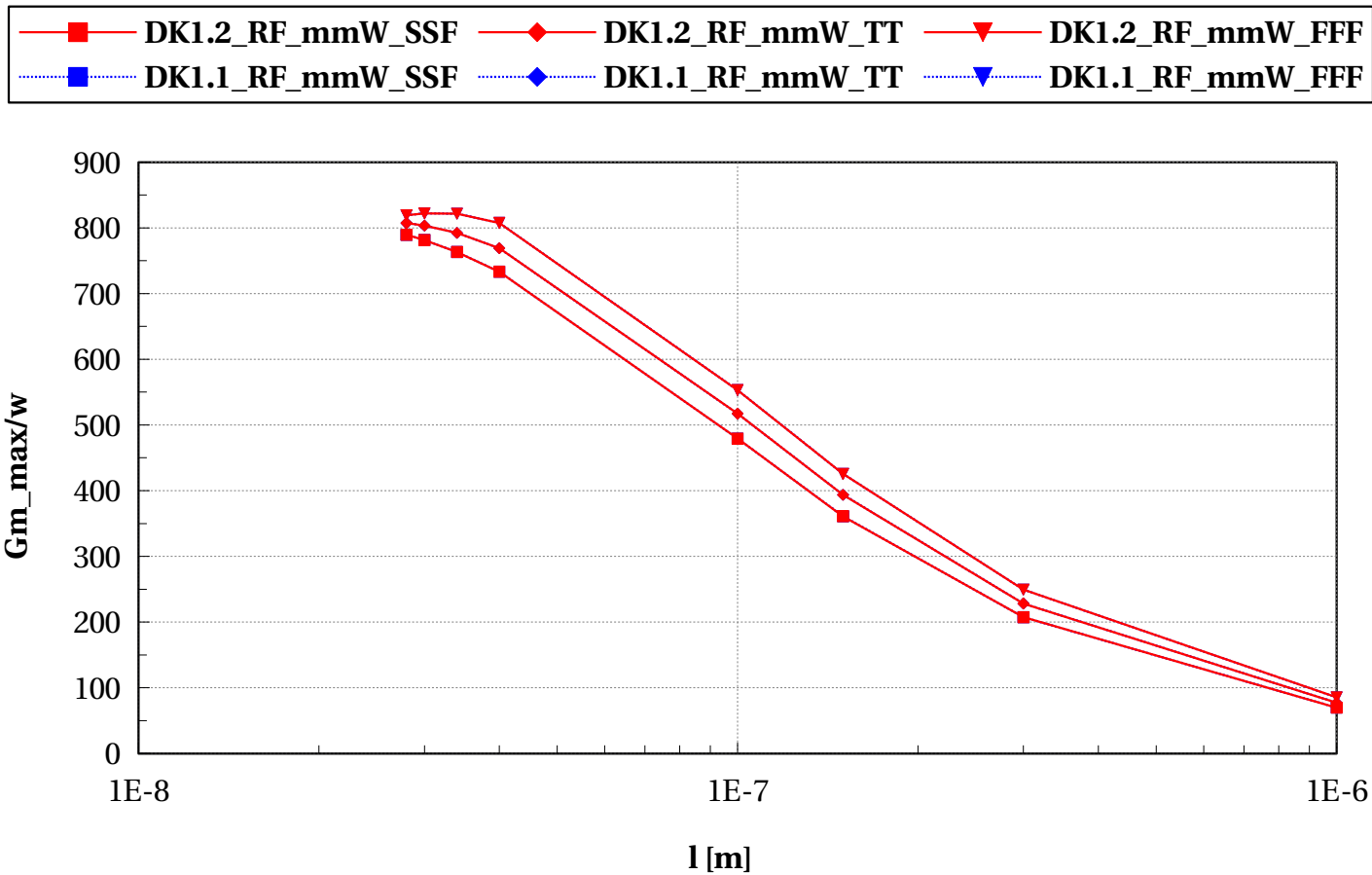
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6





# lvtpfet\_rfseg, Gm\_max/w vs l [m]

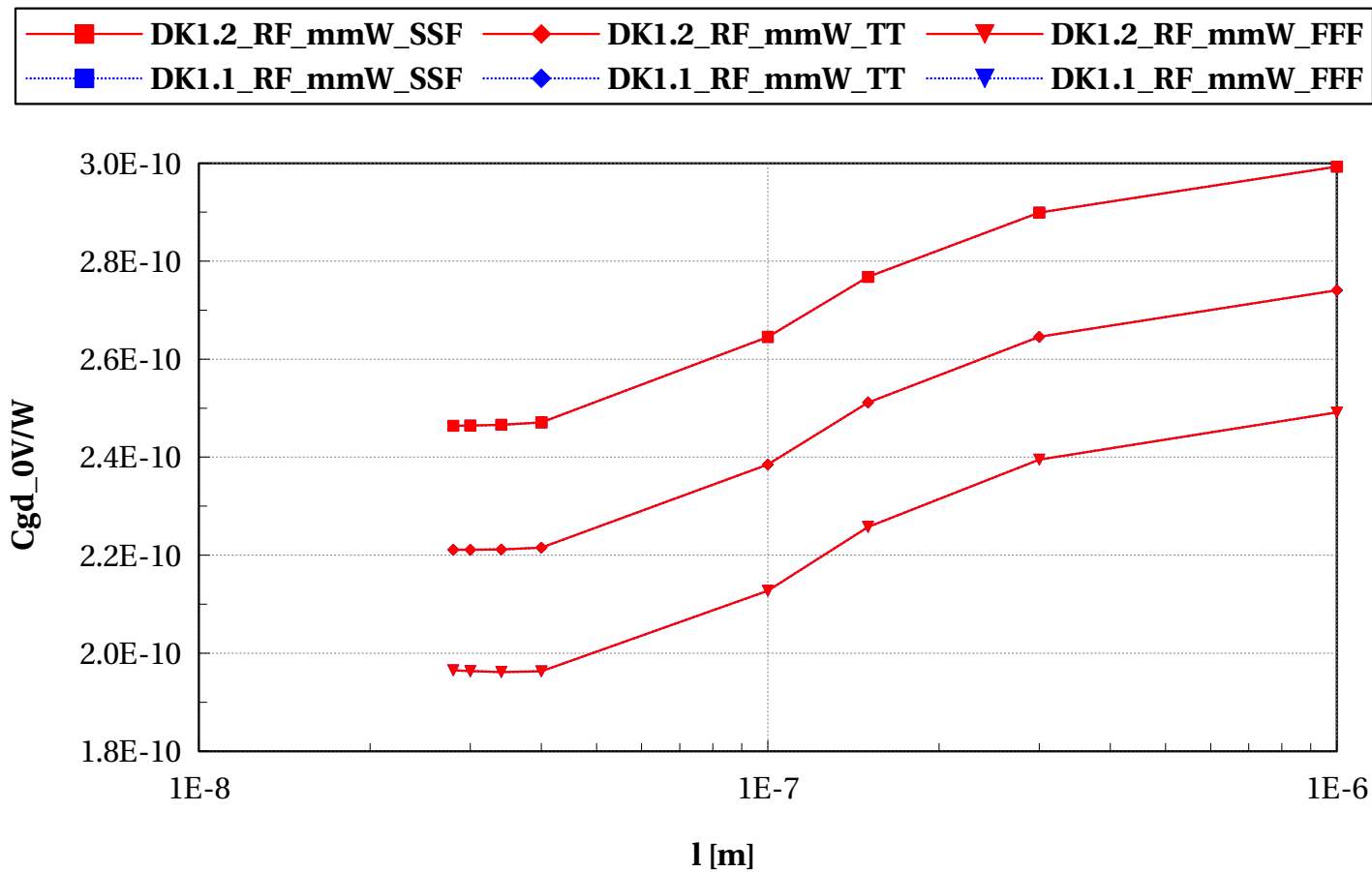
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



# Scaling versus length $W_{\text{fing}}=1\text{ }\mu\text{m}$ - RF

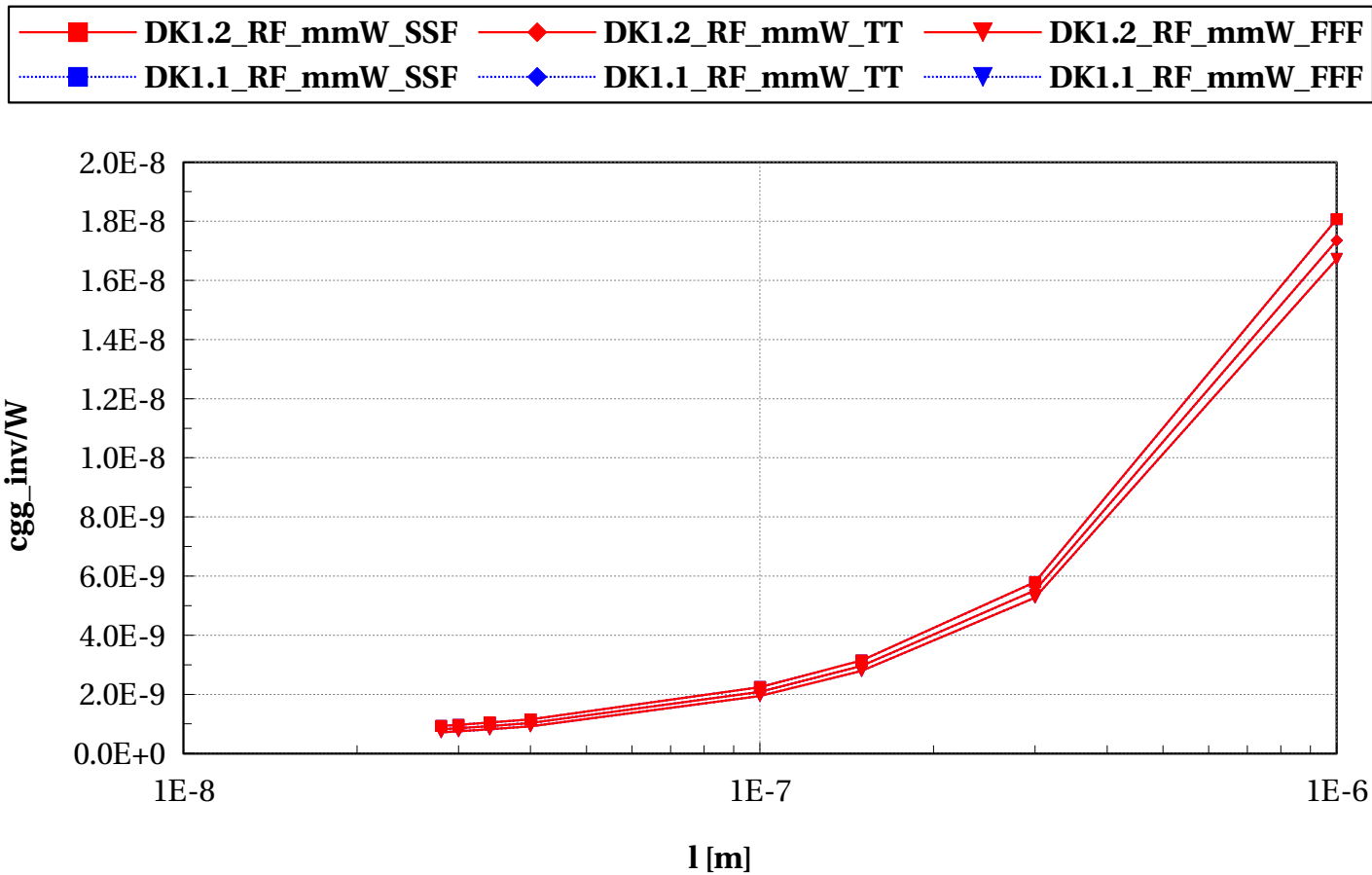
# lvtpfet\_rfseg, Cgd\_0V/W vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6



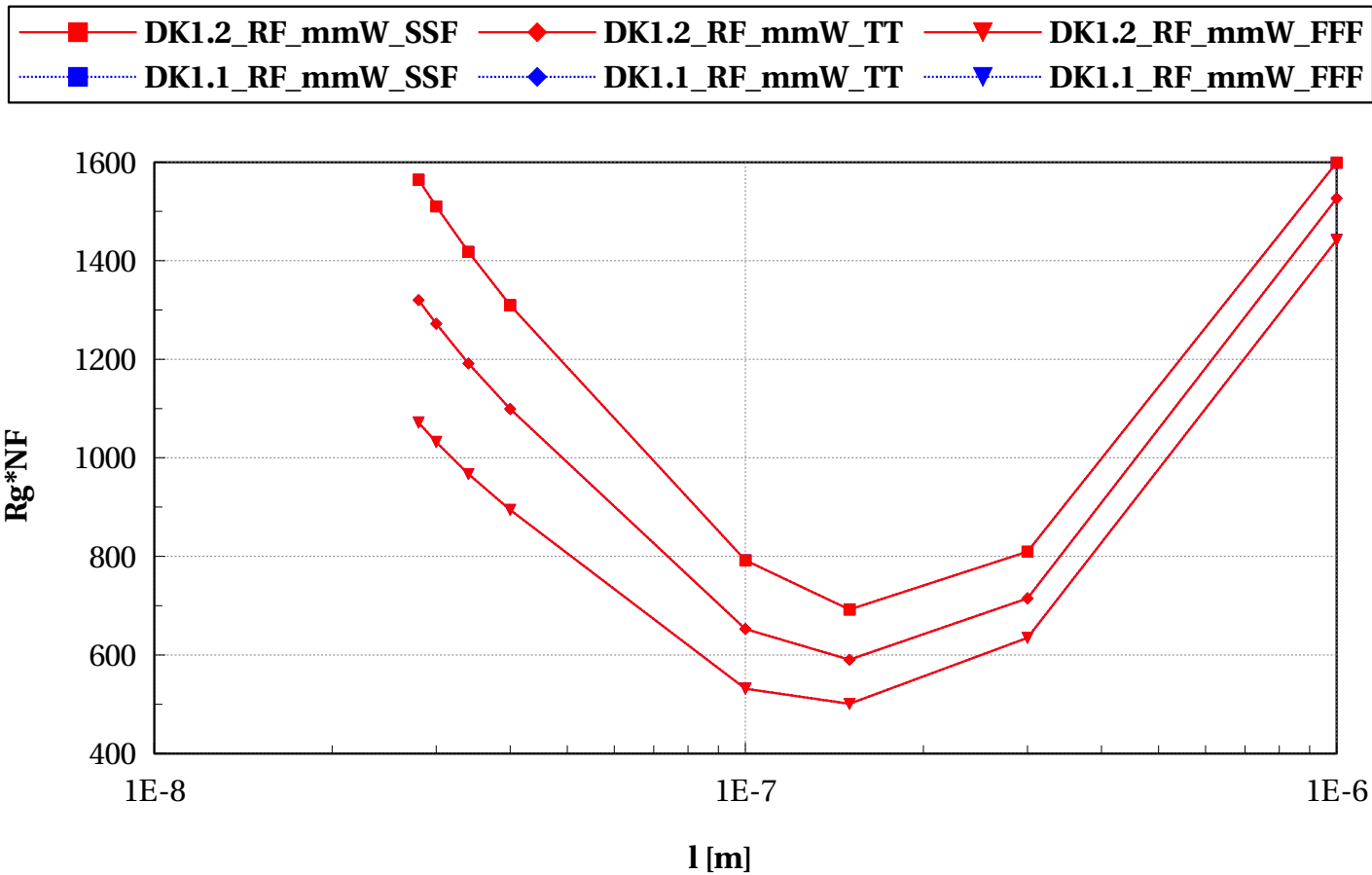
# lvtpfet\_rfseg, cgg\_inv/W vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



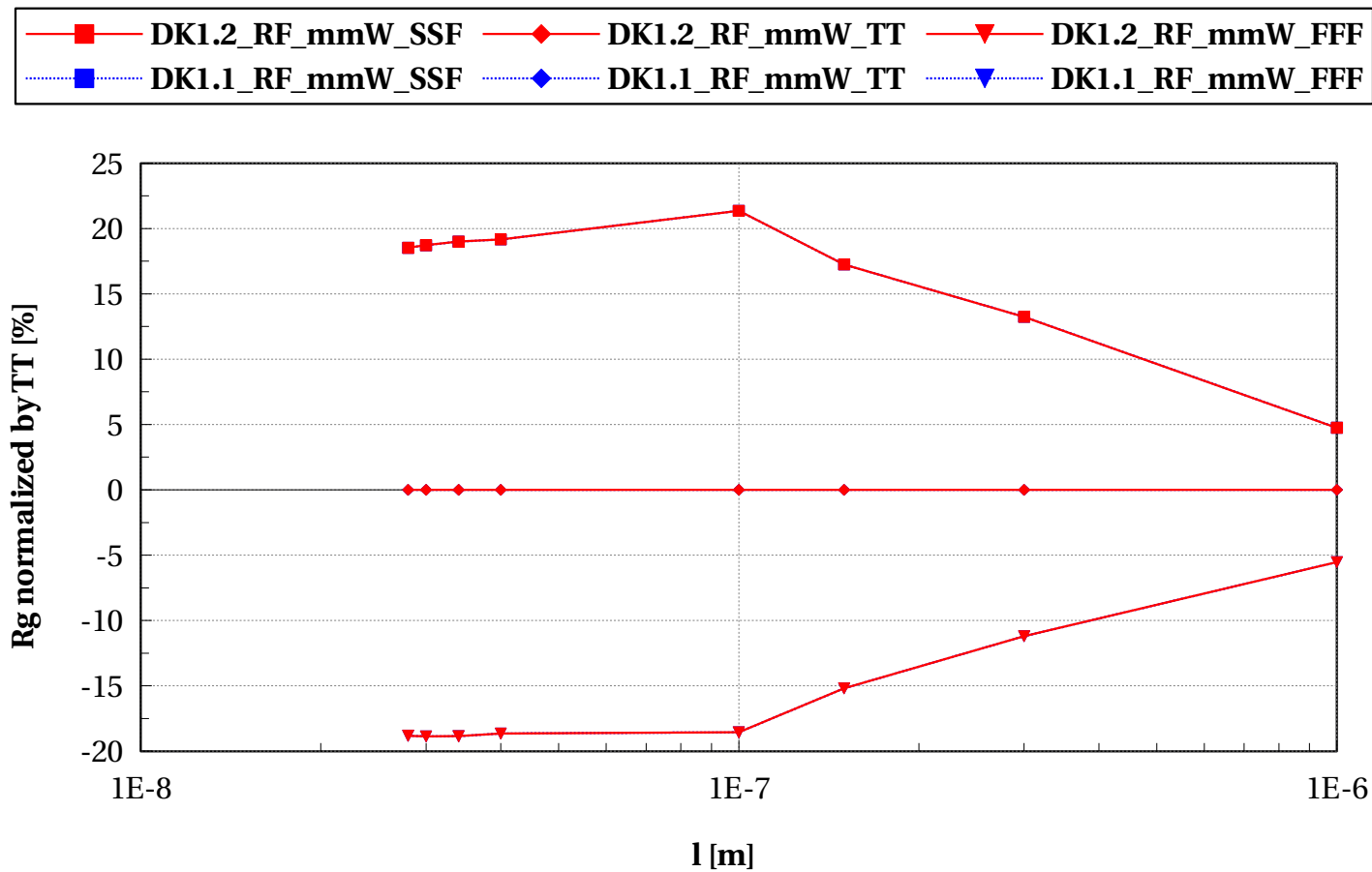
# lvtpfet\_rfseg, $R_g * NF$ vs $l$ [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6



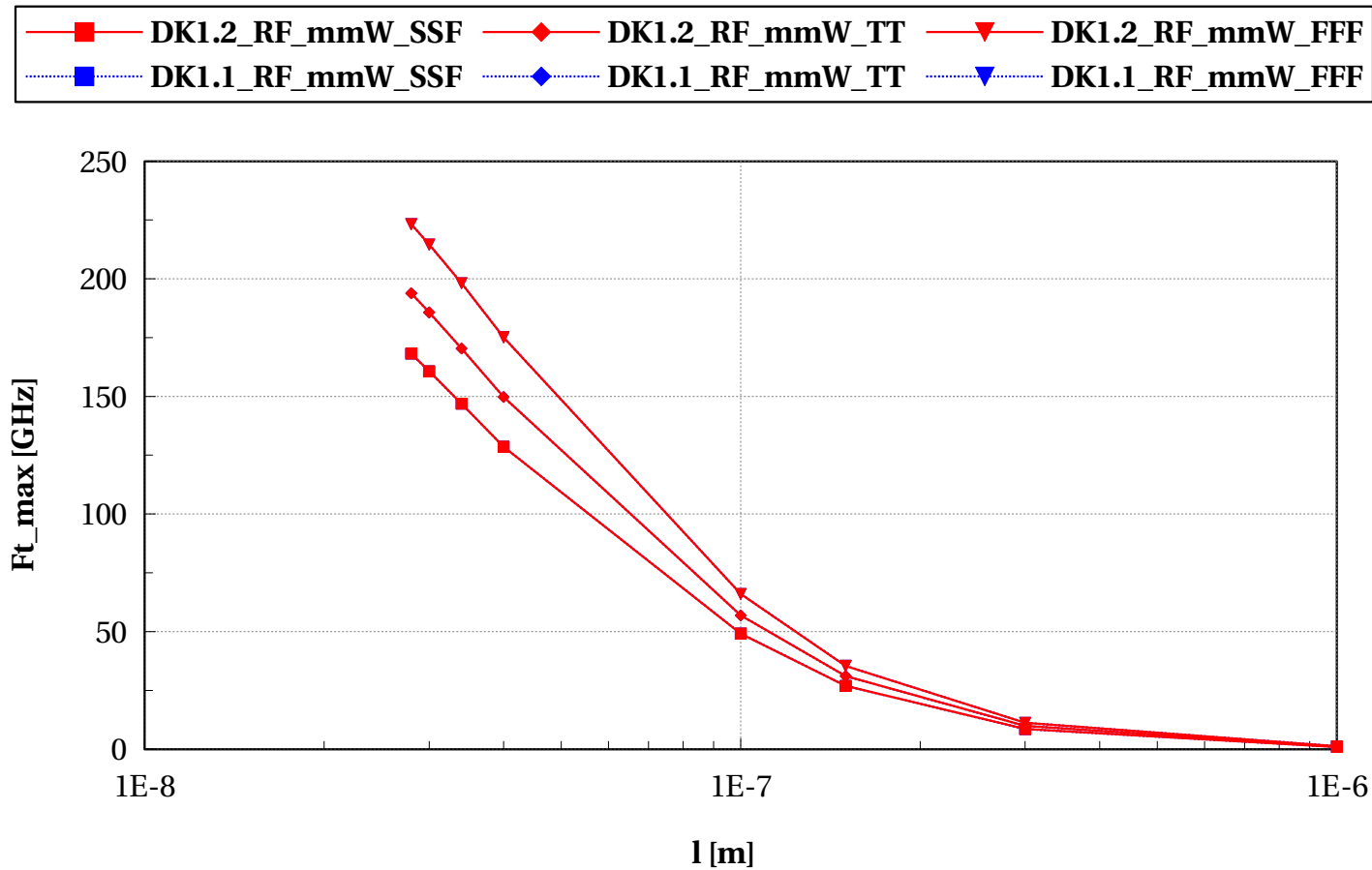
# lvtpfet\_rfseg, Rg normalized by TT [%] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6



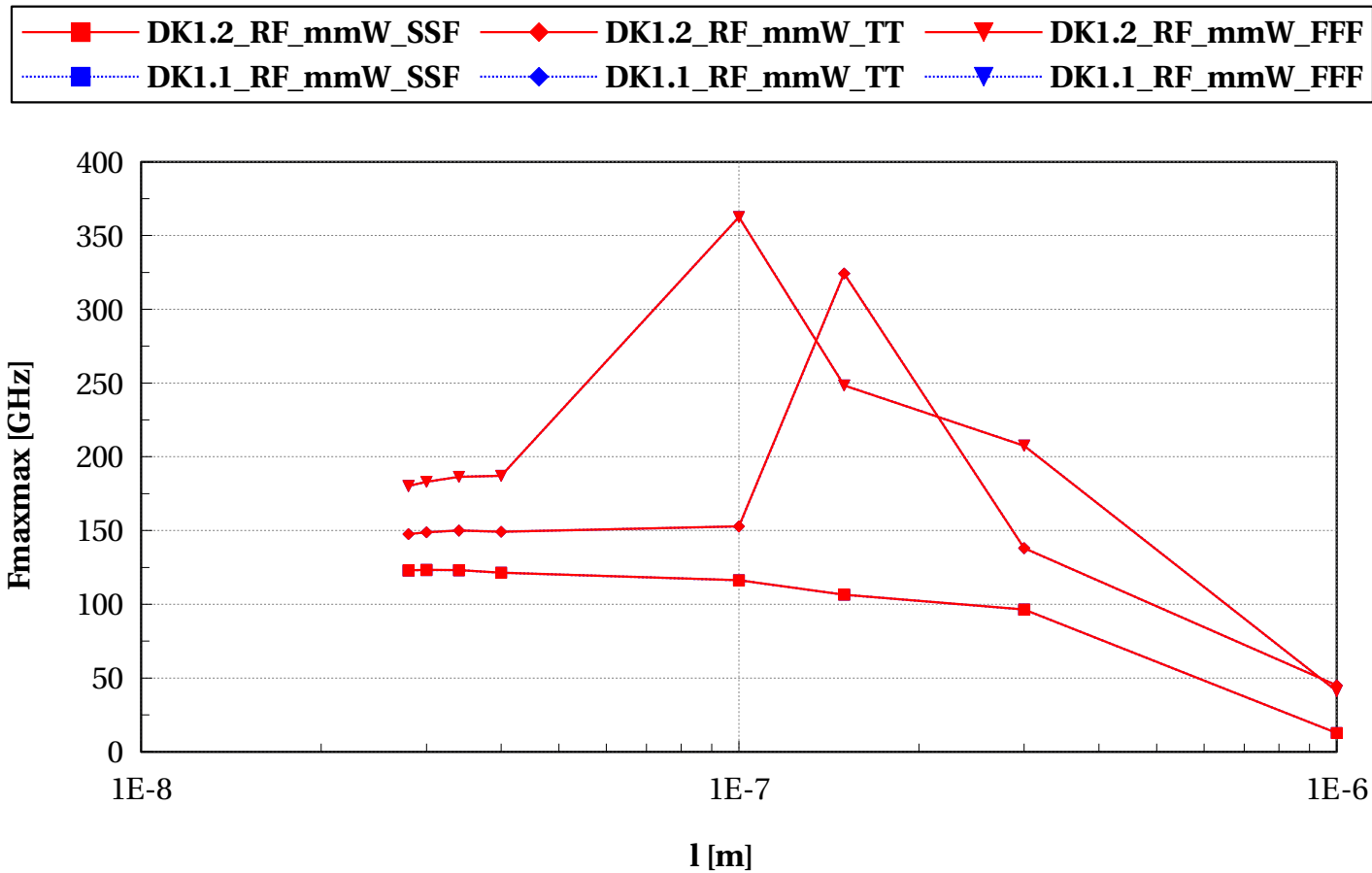
# lvtpfet\_rfseg, Ft\_max [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



# lvtpfet\_rfseg, Fmaxmax [GHz] vs l [m]

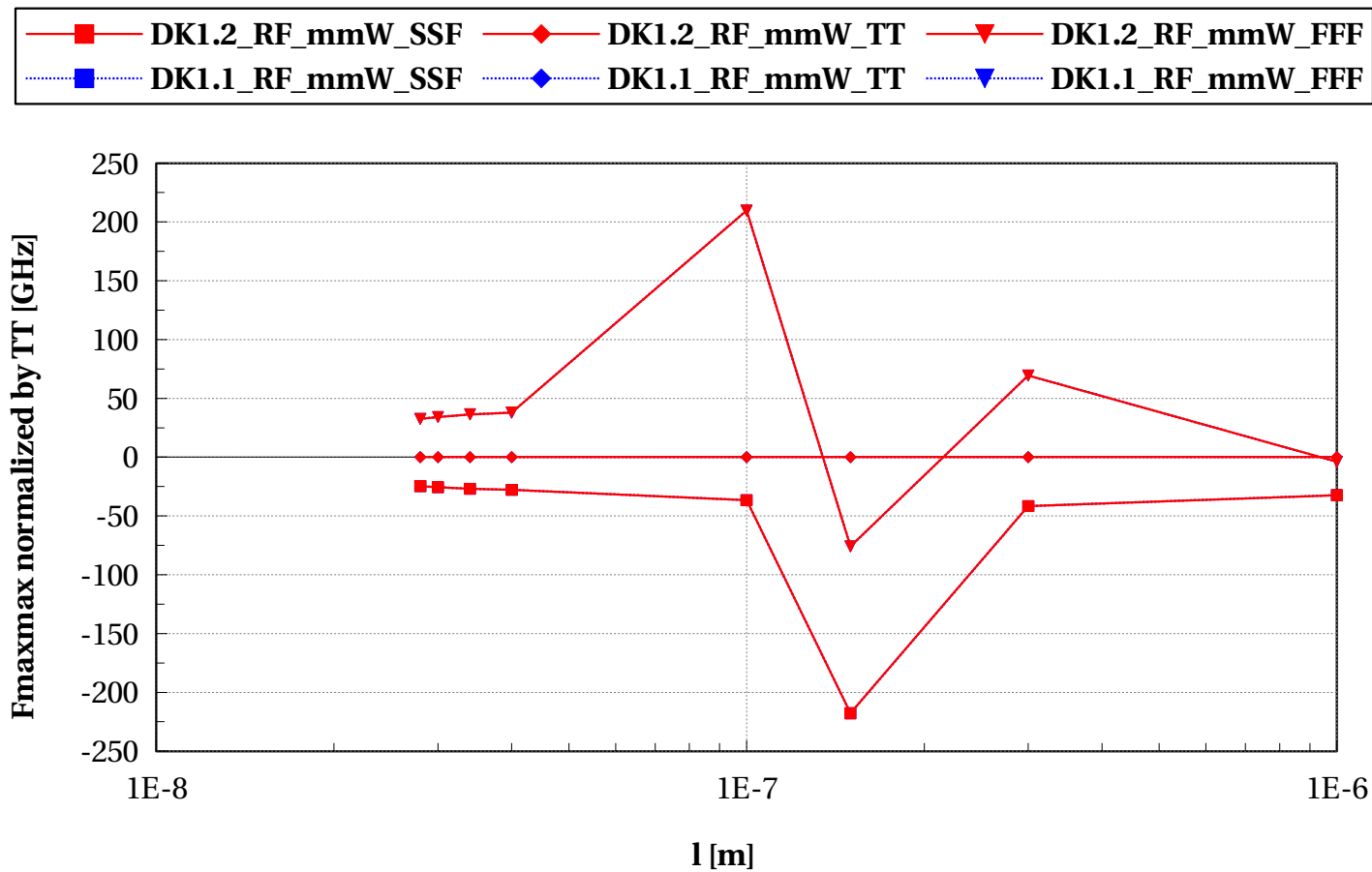
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6





# lvtpfet\_rfseg, Fmaxmax normalized by TT [GHz] vs l [m]

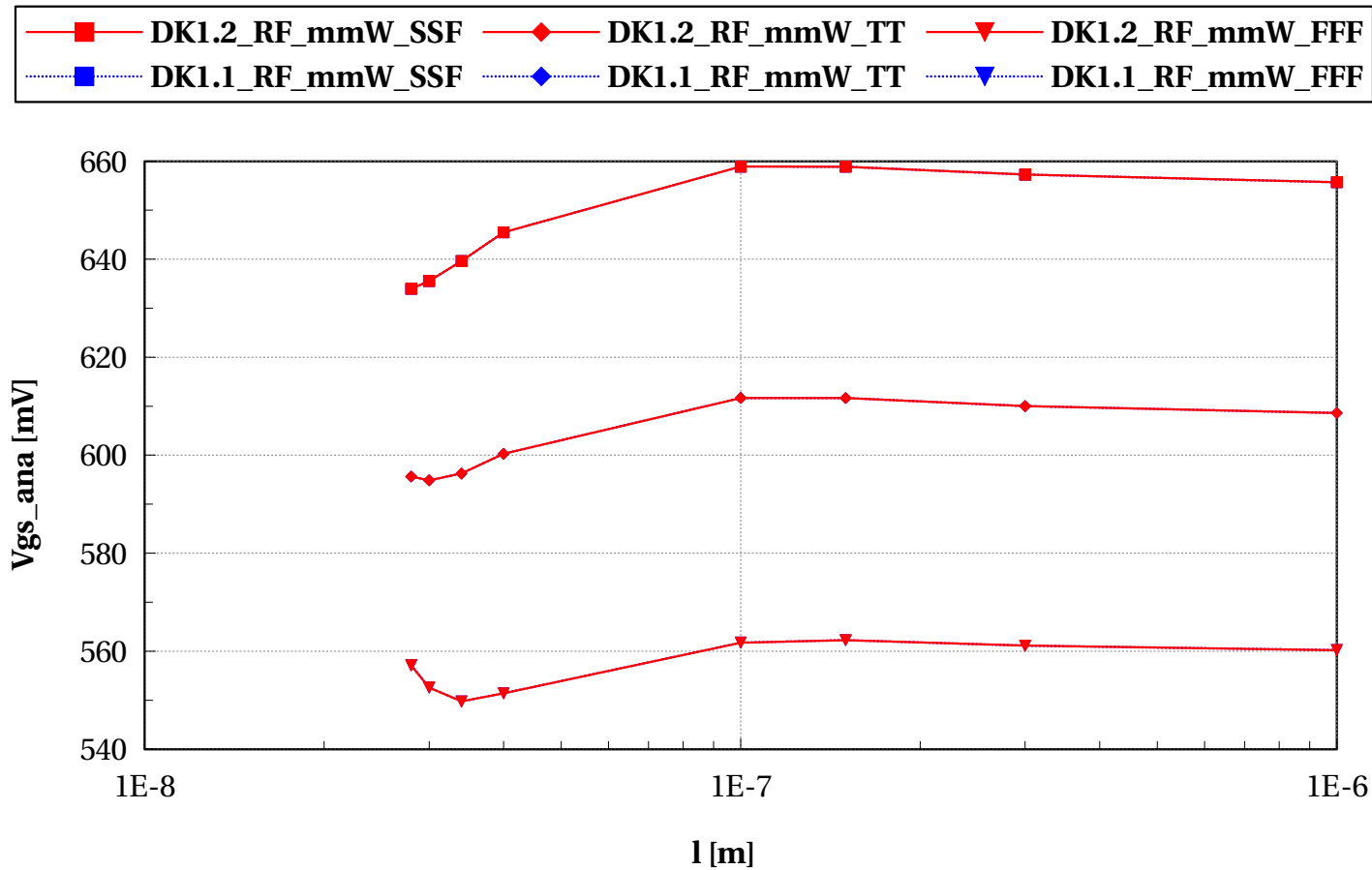
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



# Scaling versus length $W_{\text{fing}}=1\mu\text{m}$ - Analog

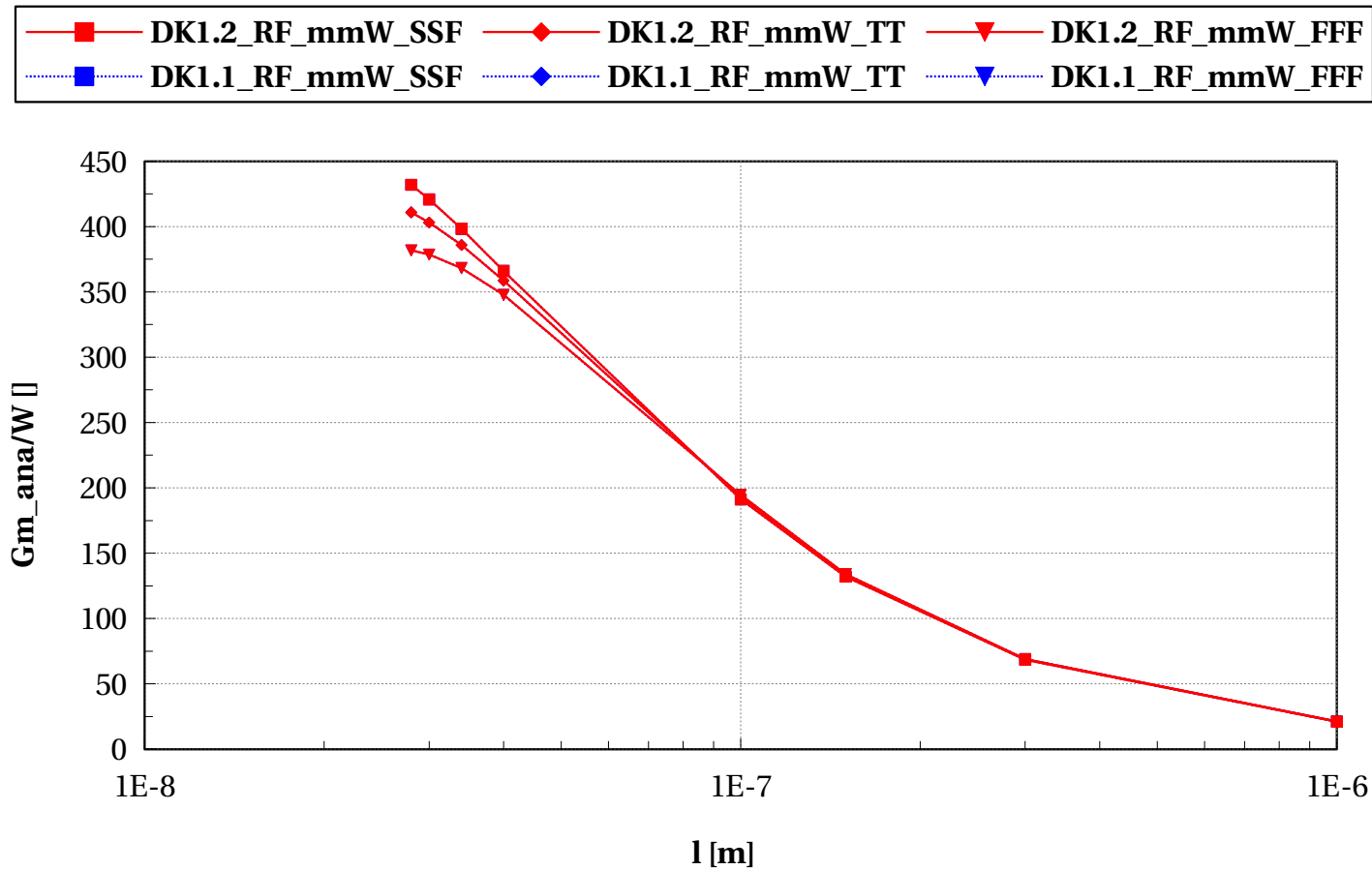
# lvtpfet\_rfseg, Vgs\_ana [mV] vs I [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



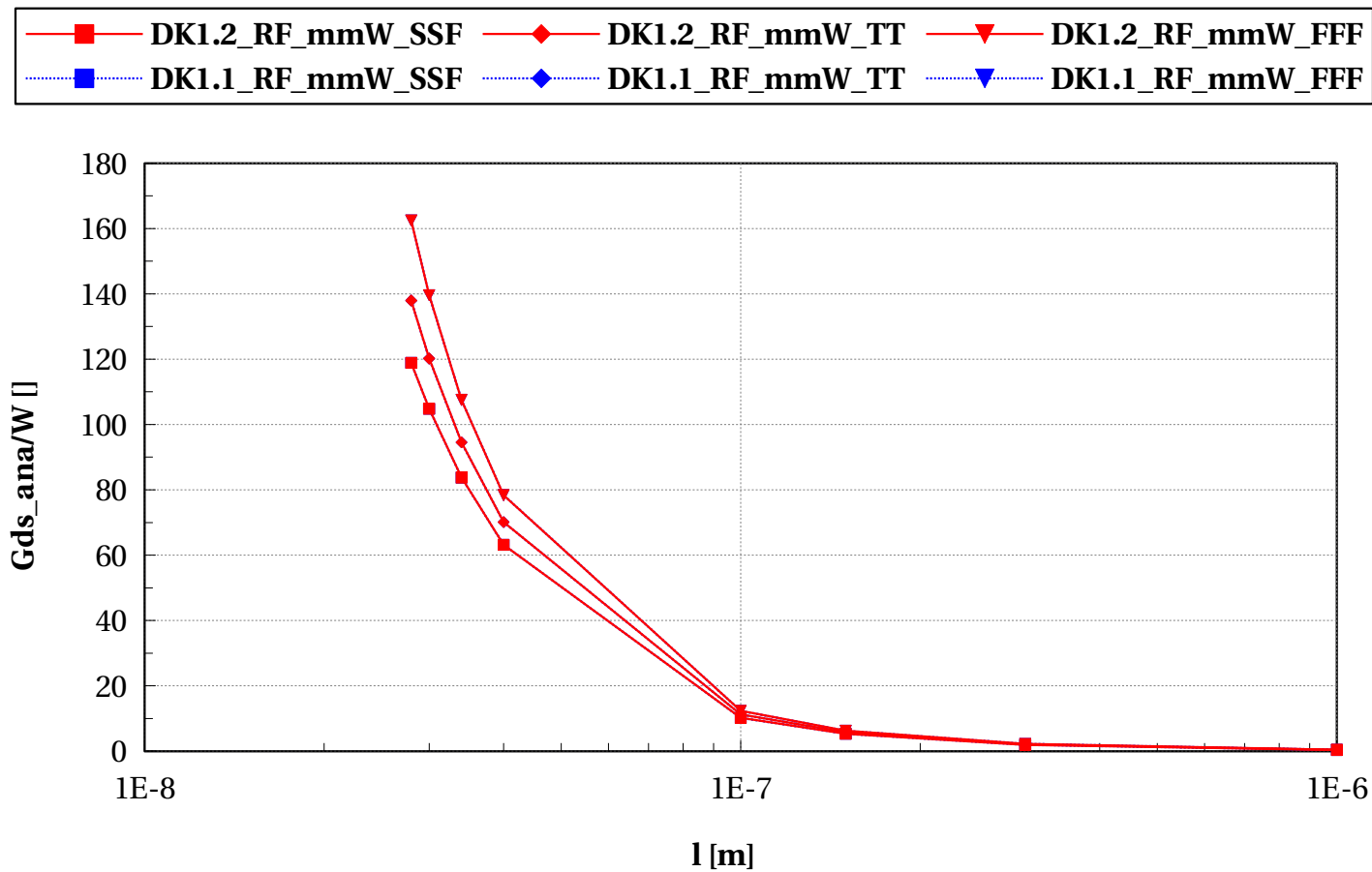
# lvtpfet\_rfseg, Gm\_ana/W [] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



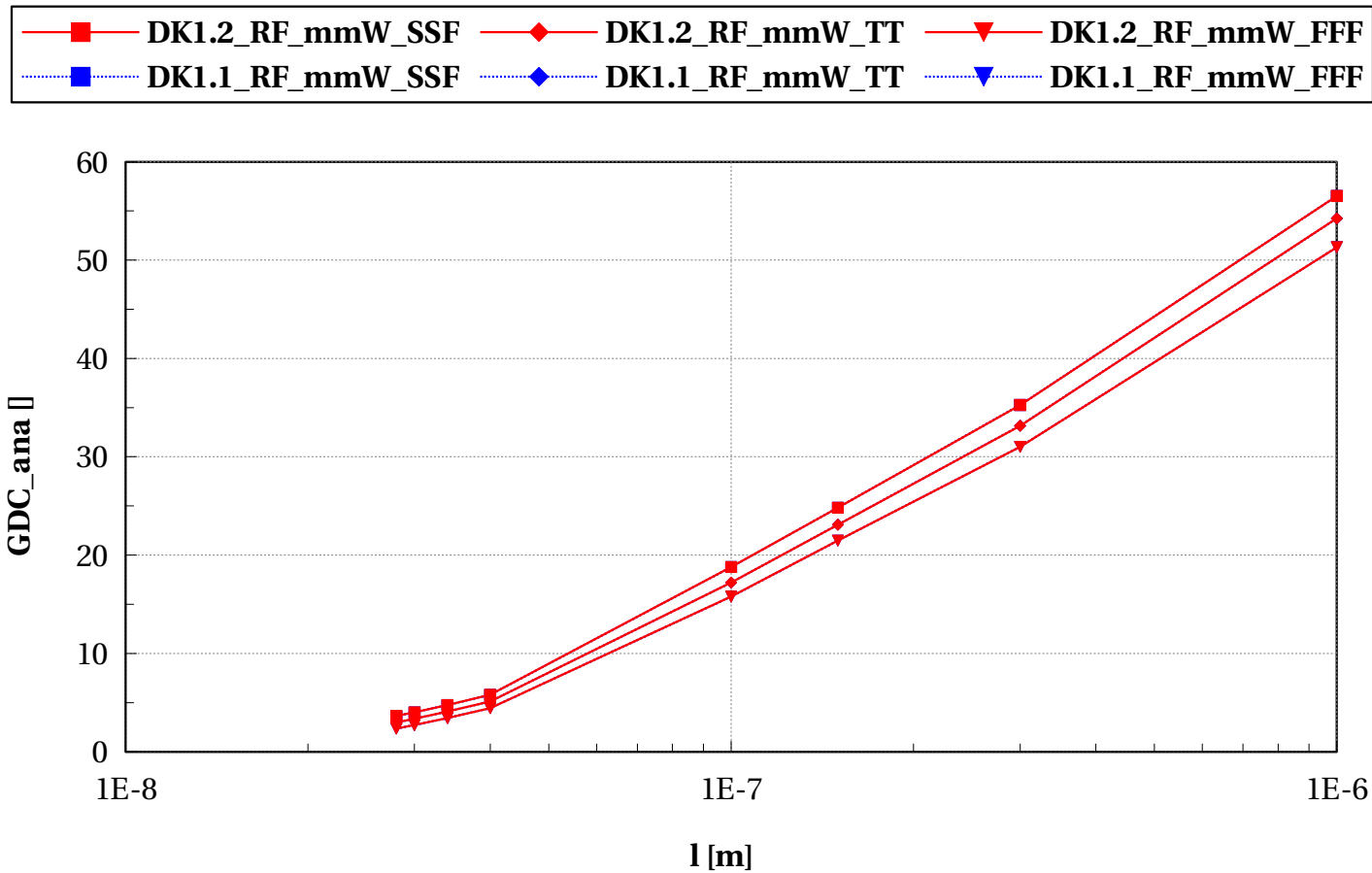
# lvtpfet\_rfseg, Gds\_ana/W [] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



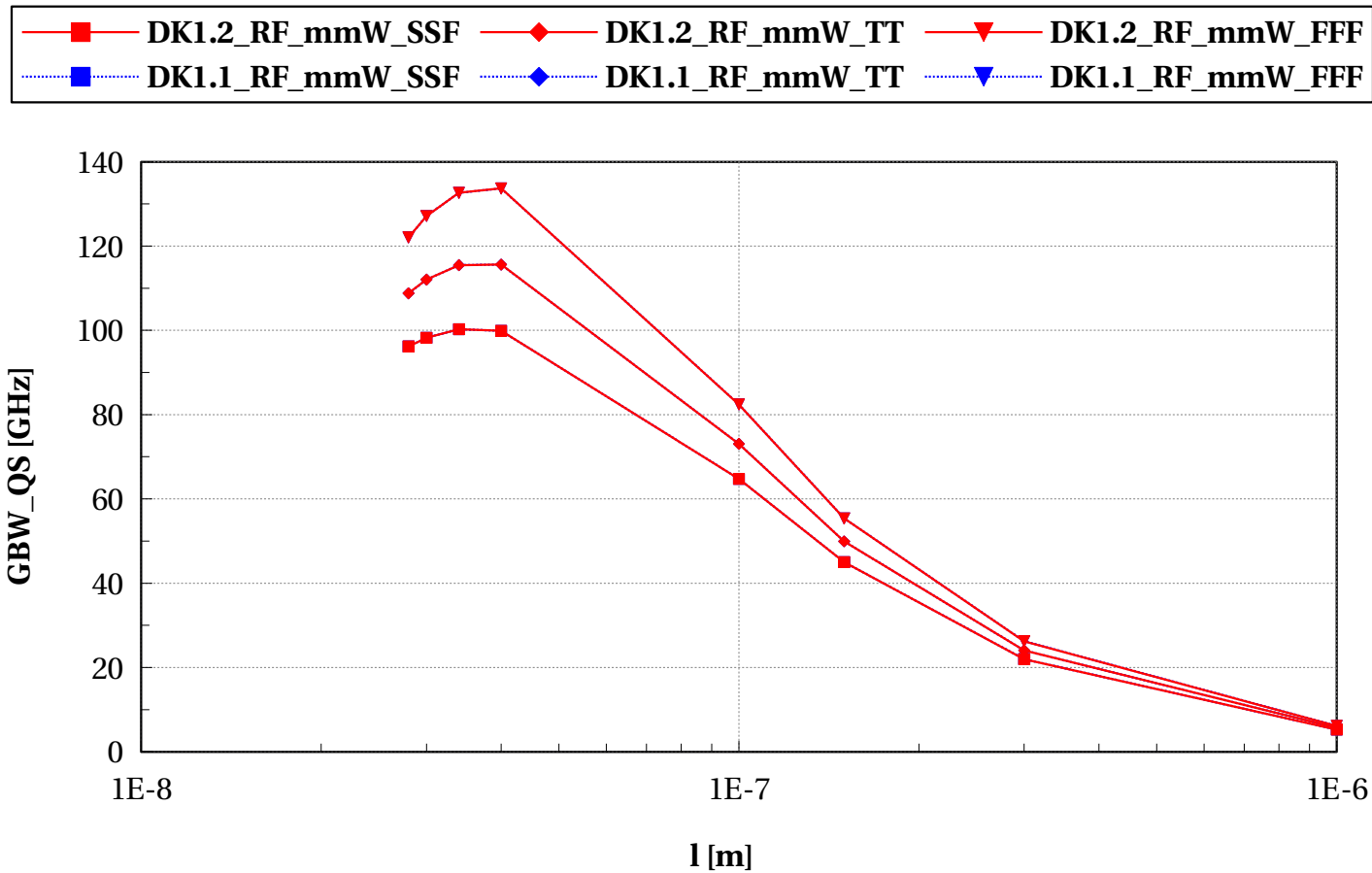
# lvtpfet\_rfseg, GDC\_ana [] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



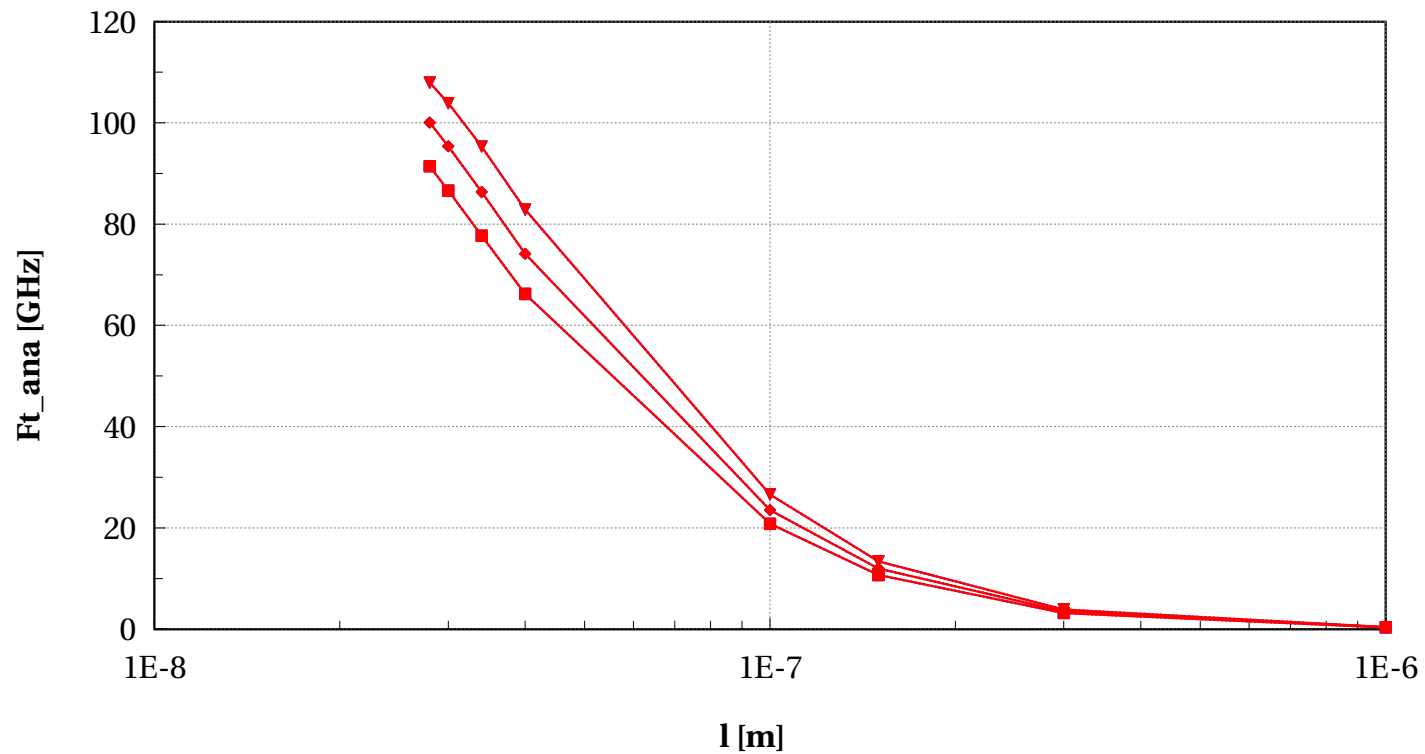
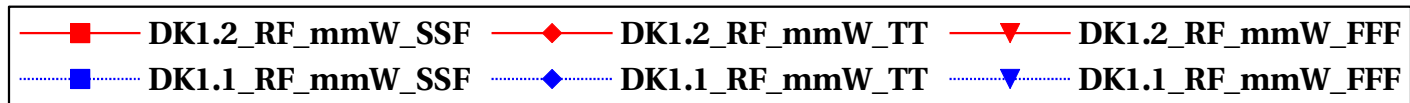
# lvtpfet\_rfseg, GBW\_QS [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



# lvtpfet\_rfseg, Ft\_ana [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6





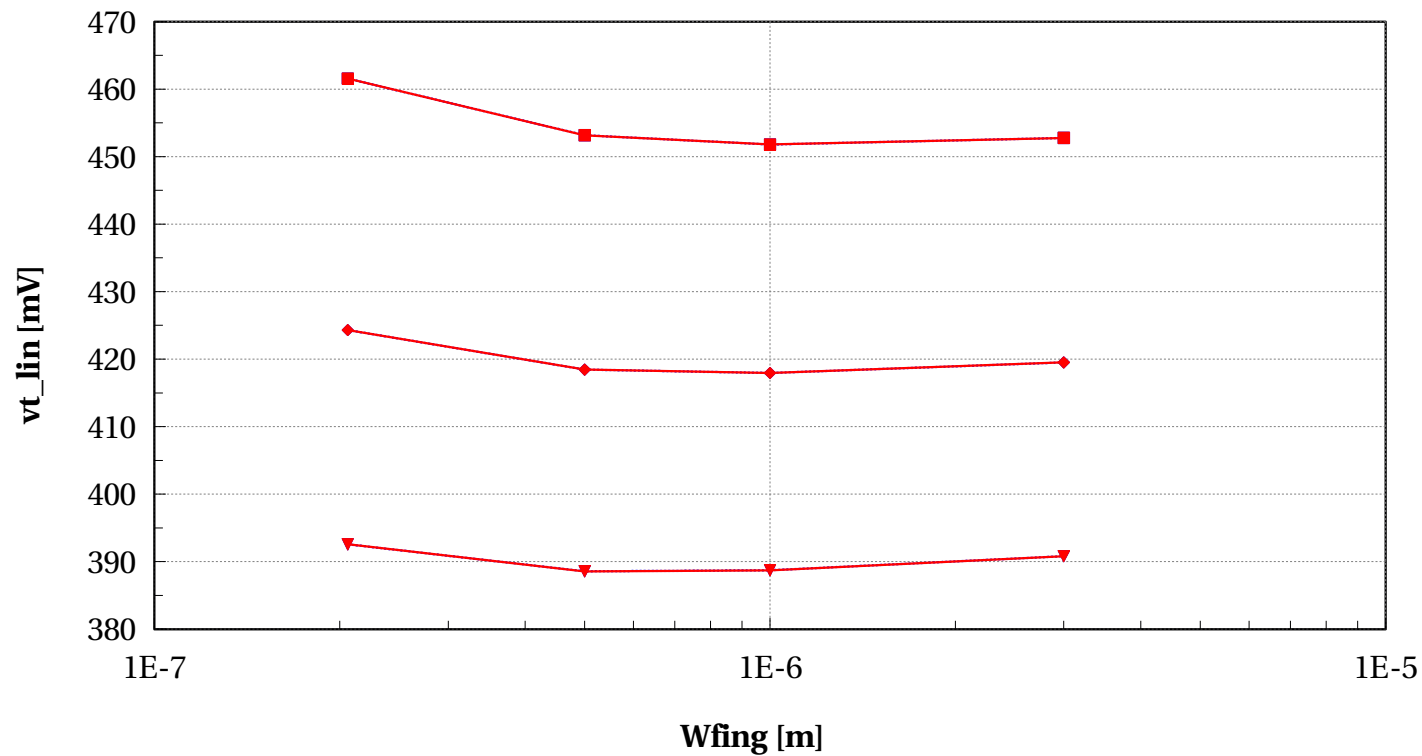
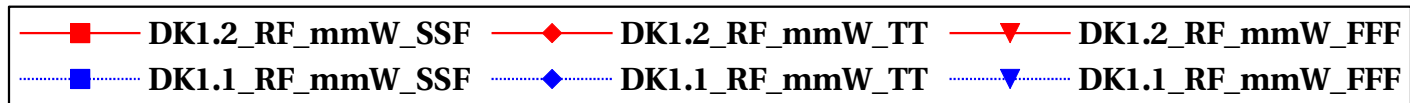
# **nfet\_rf**

## **Electrical characteristics scaling**

## Scaling versus width $L=30\text{nm}$ - DC

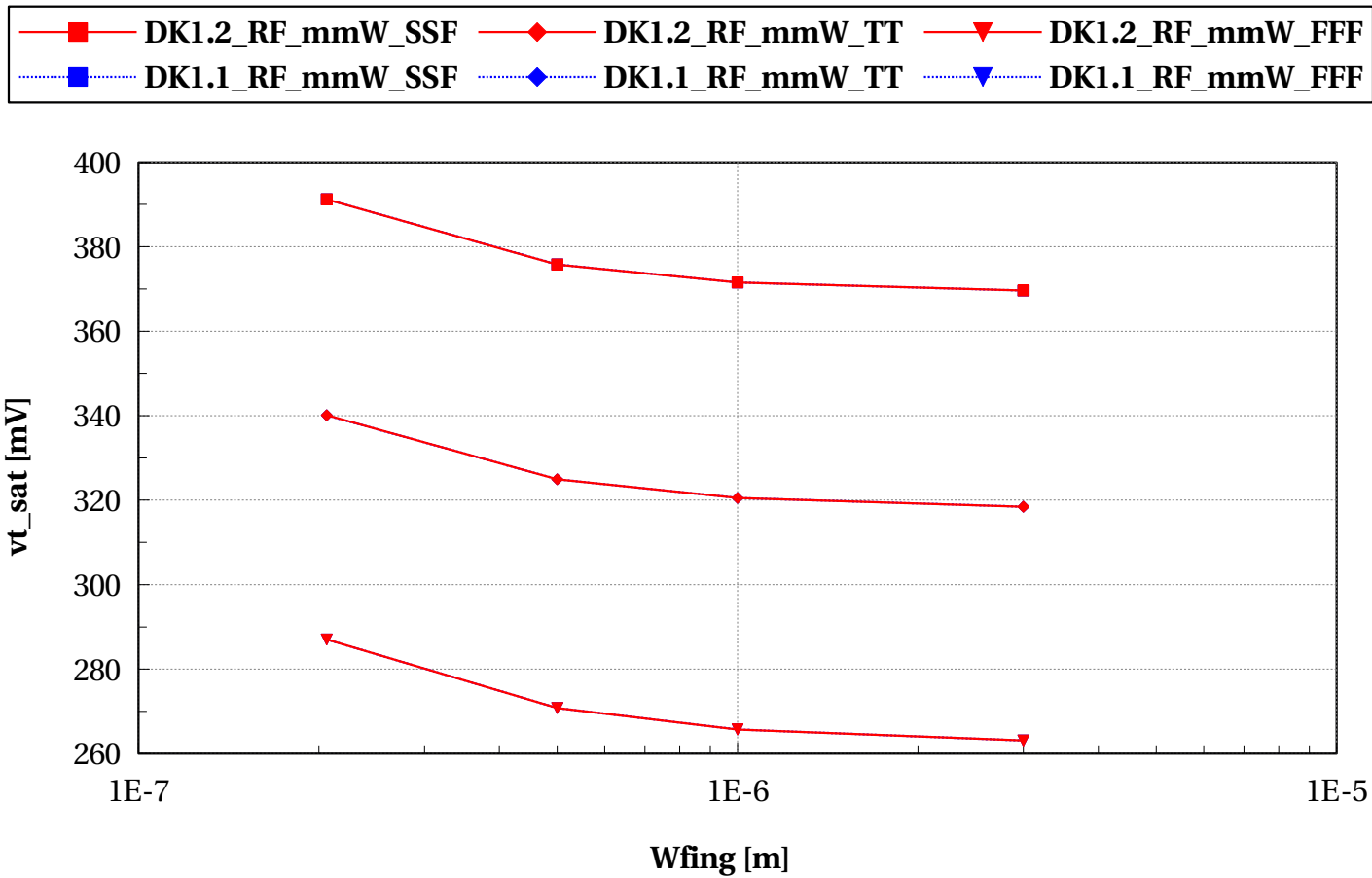
# nfet\_rf, vt\_lin [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



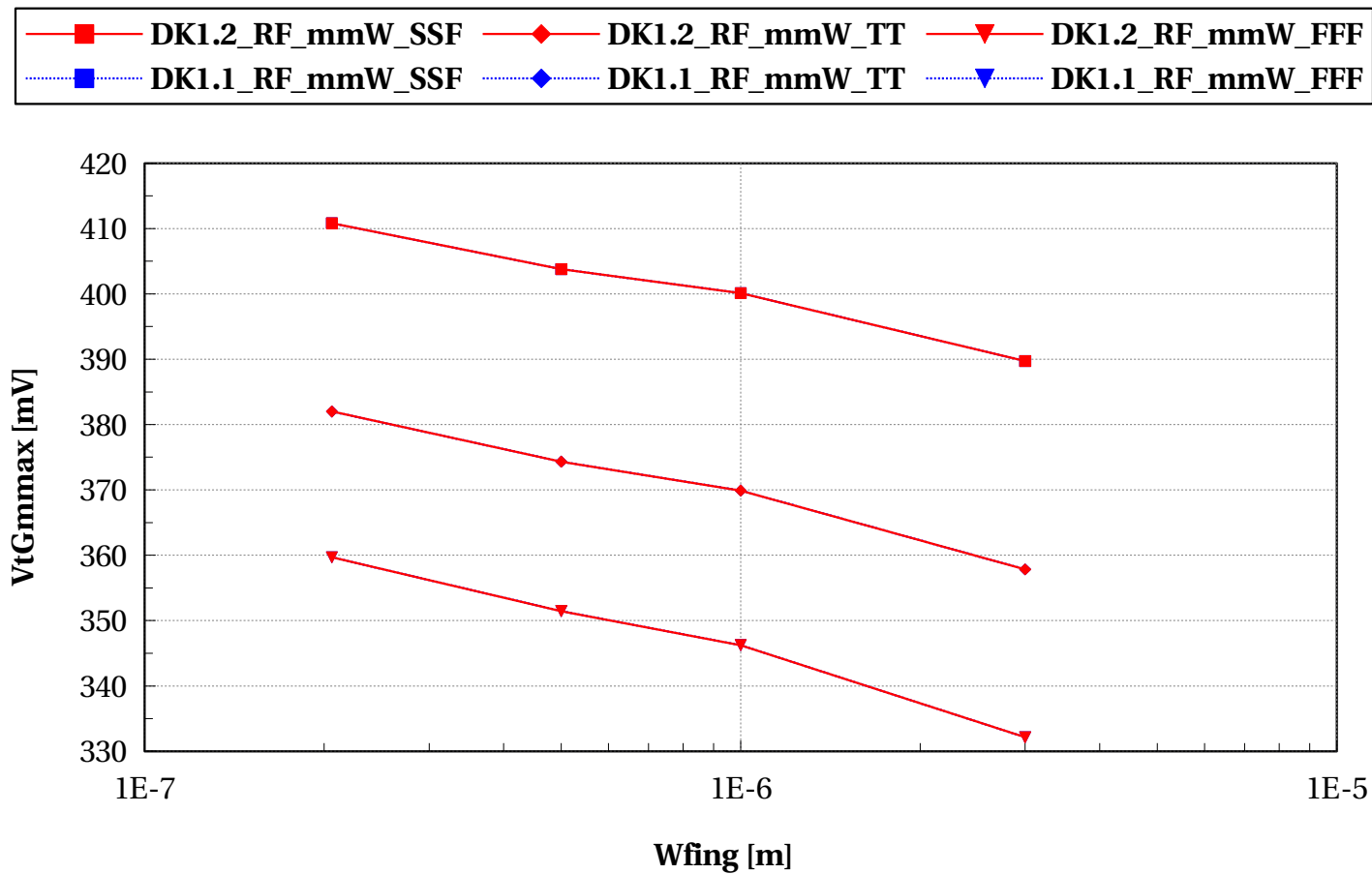
# nfet\_rf, vt\_sat [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



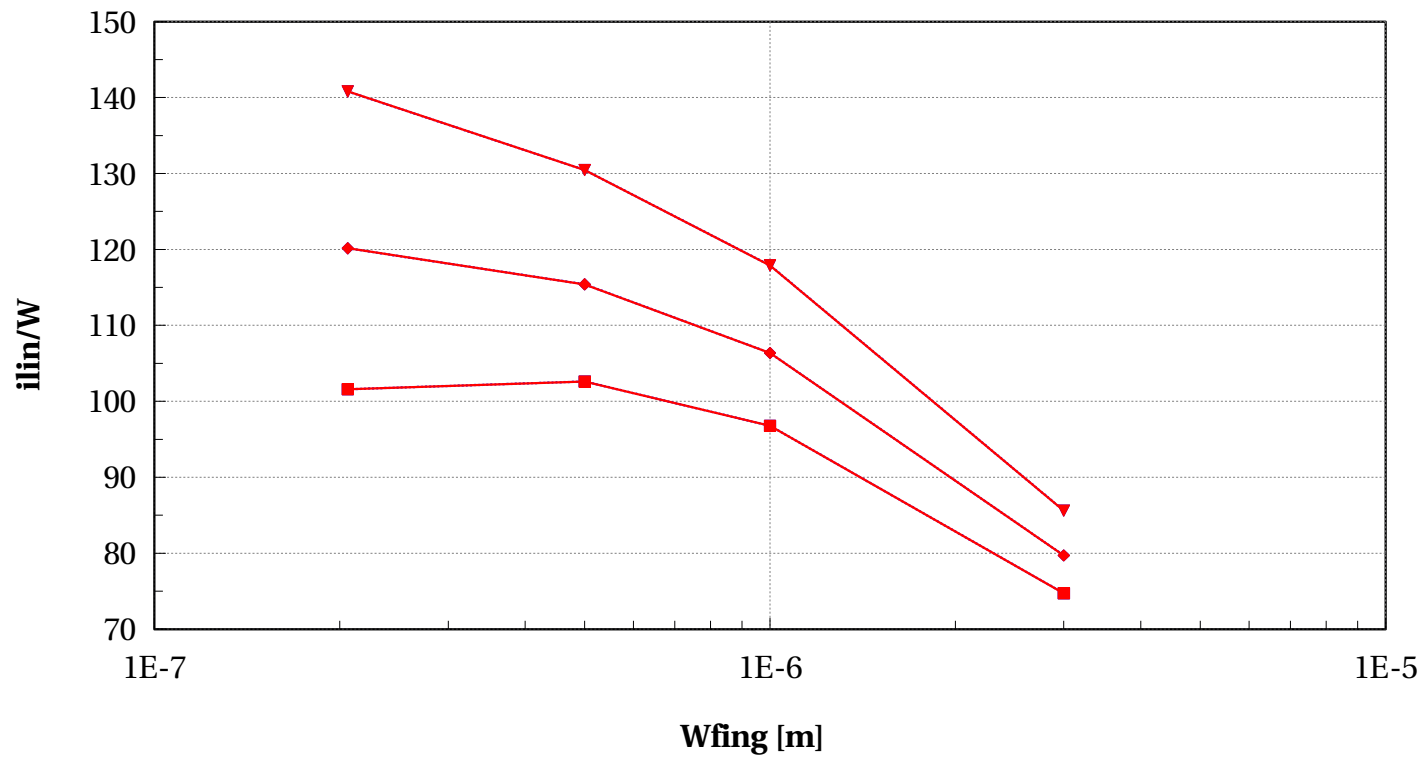
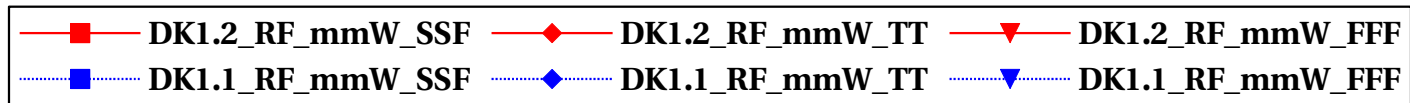
# nfet\_rf, VtGmmax [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



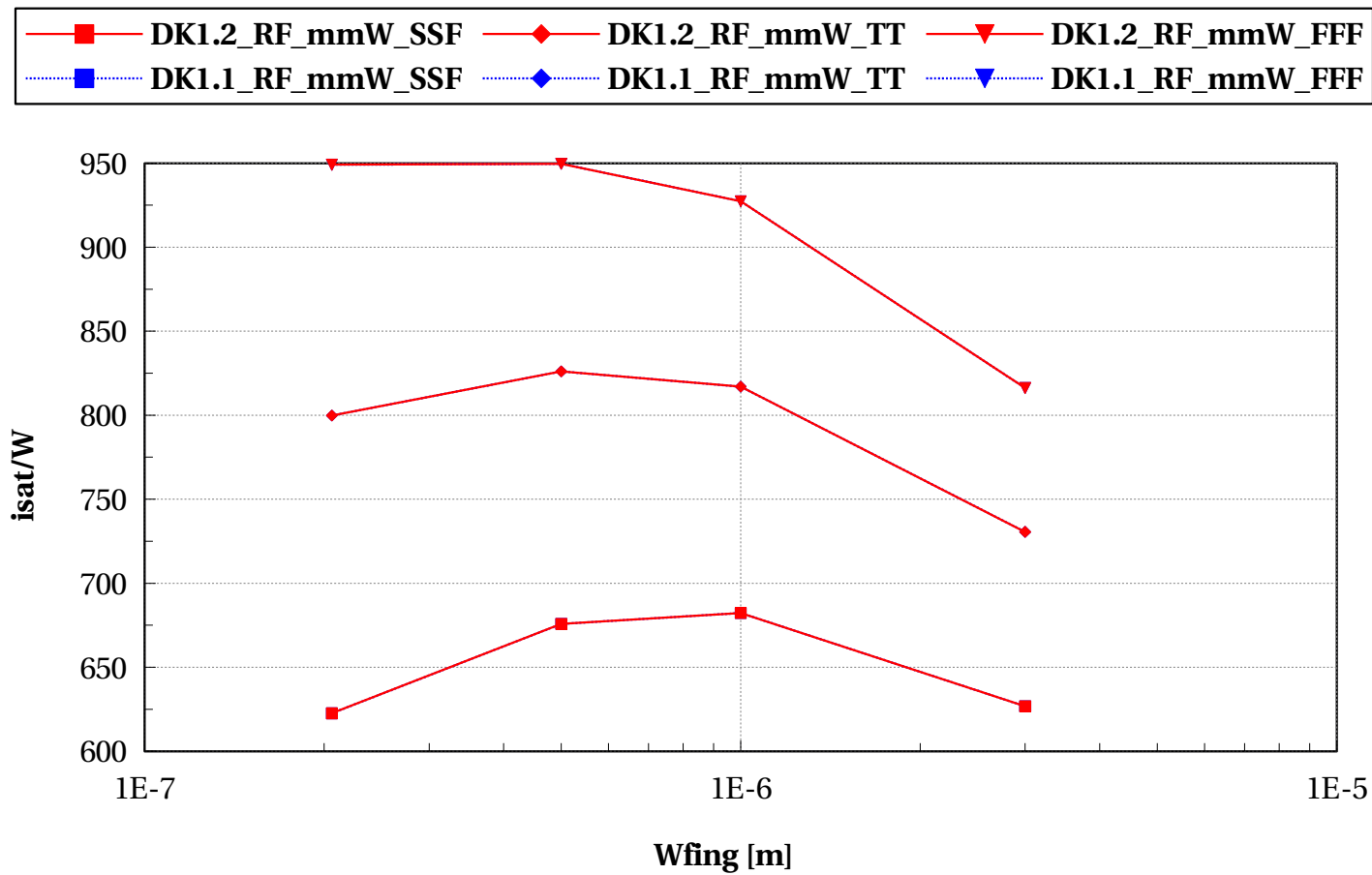
# nfet\_rf, ilin/W vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



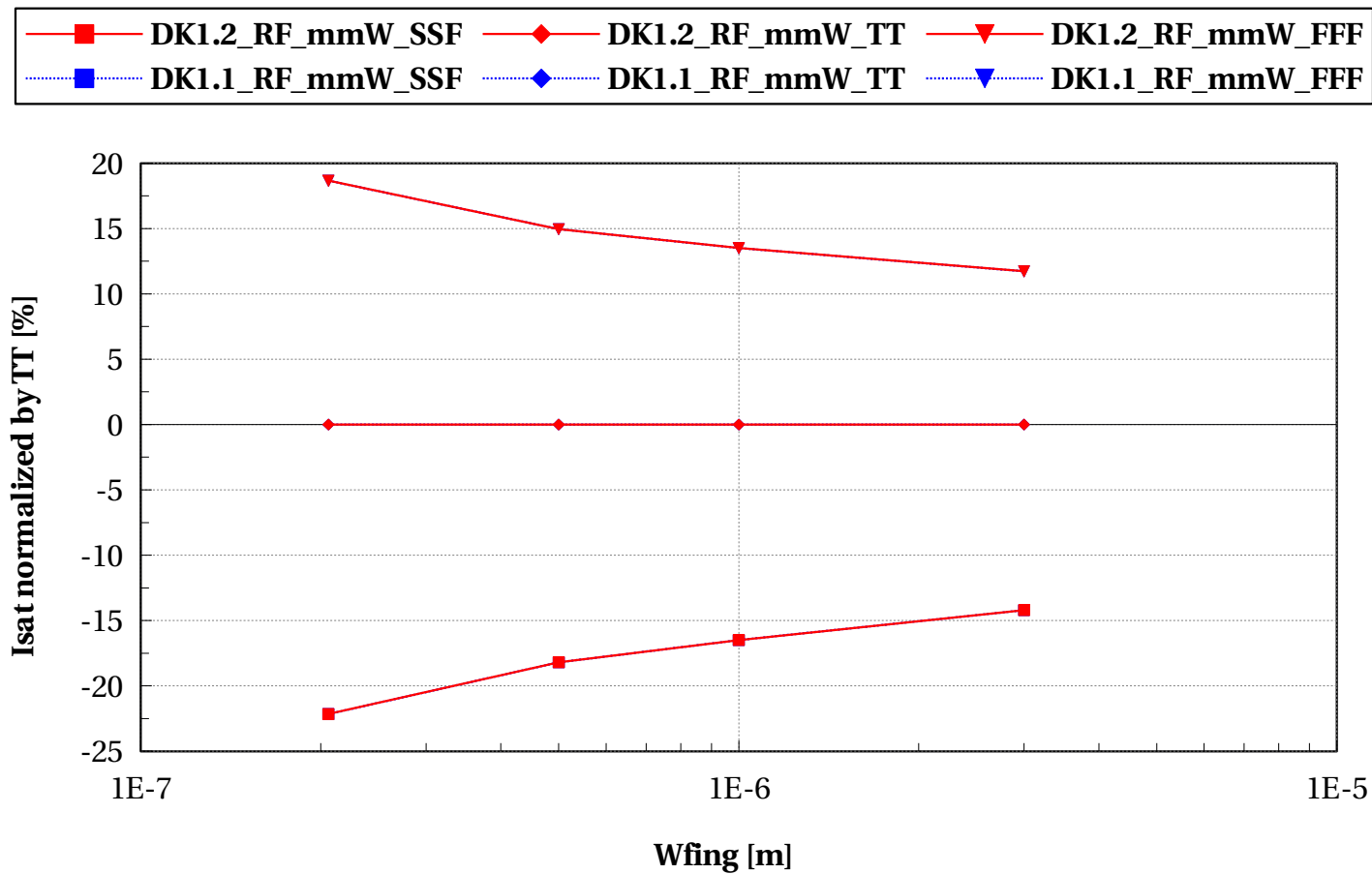
# nfet\_rf, isat/W vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



## nfet\_rf, Isat normalized by TT [%] vs Wfing [m]

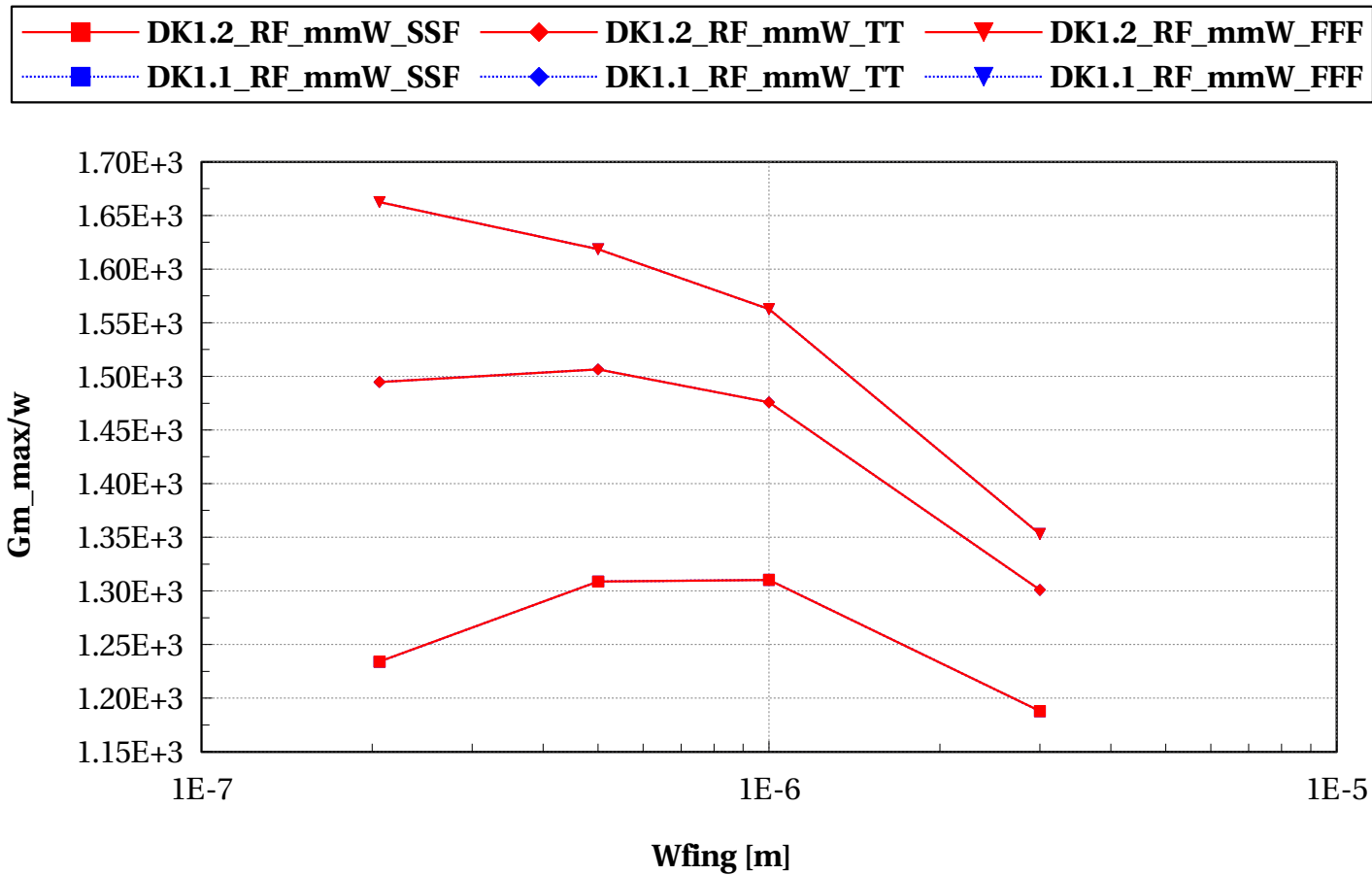
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9





# nfet\_rf, Gm\_max/w vs Wfing [m]

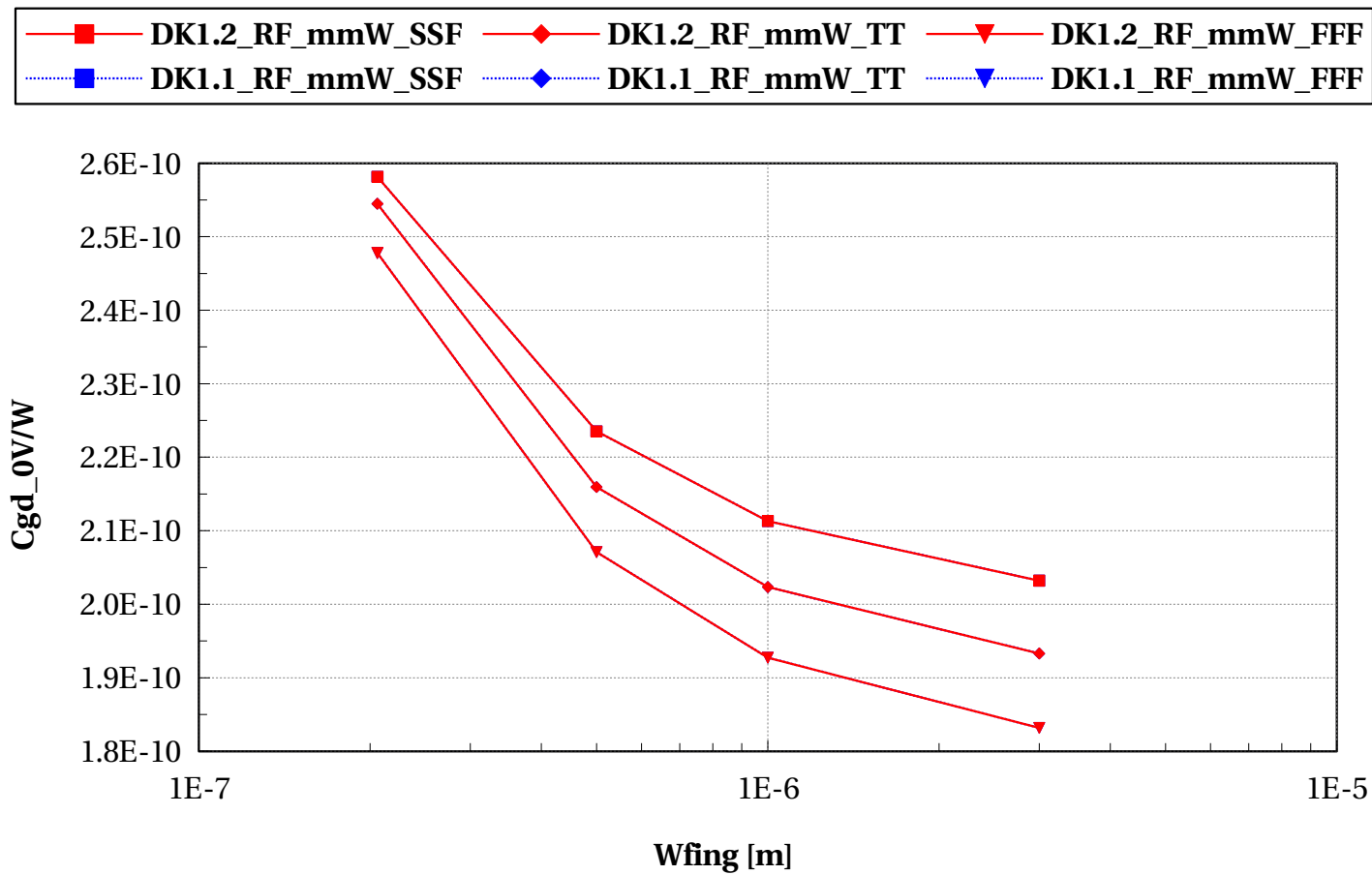
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# Scaling versus width $L=30\text{nm}$ - RF

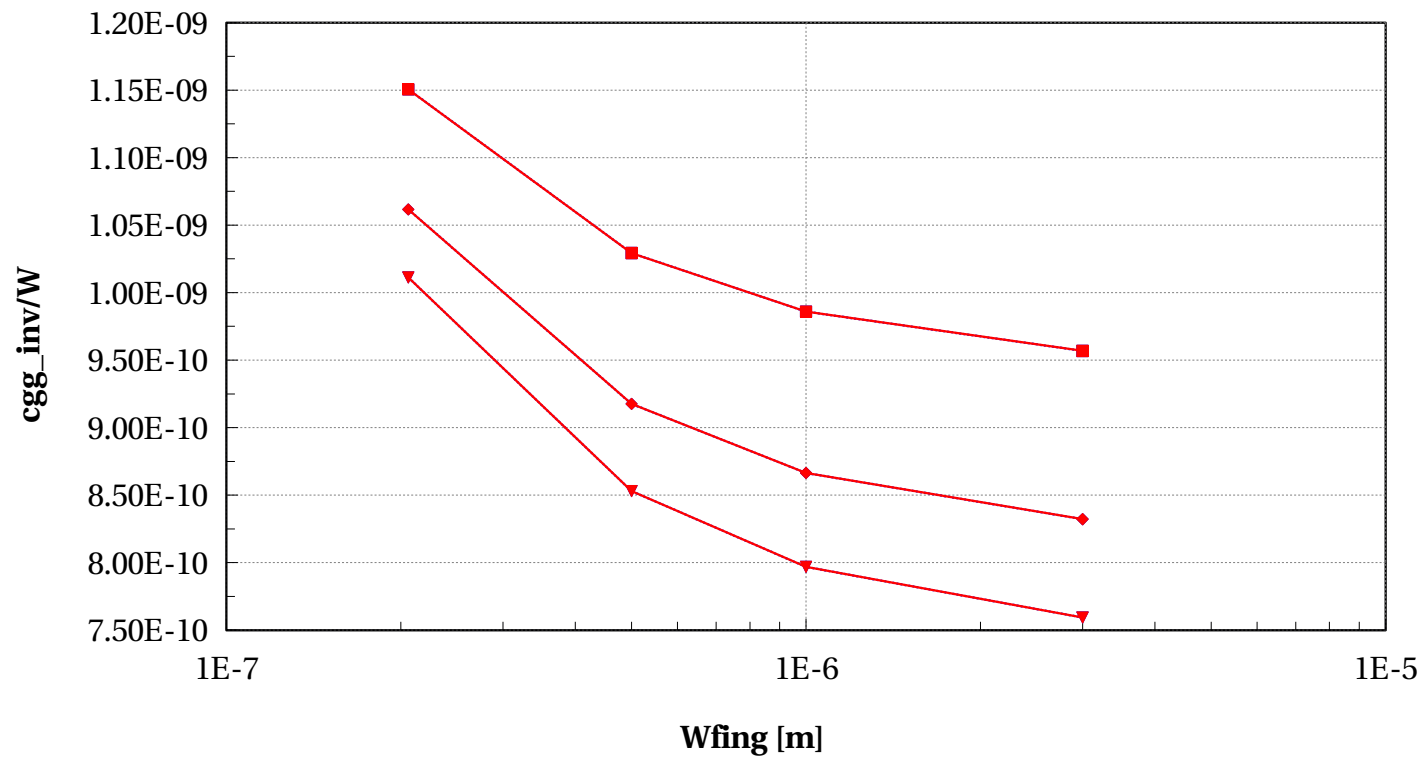
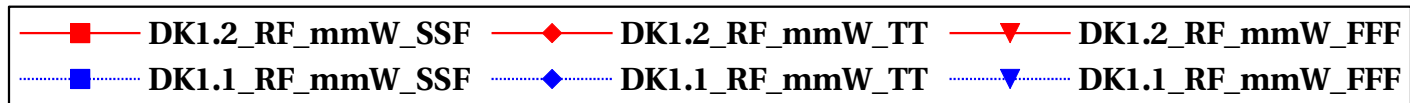
# nfet\_rf, Cgd\_0V/W vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



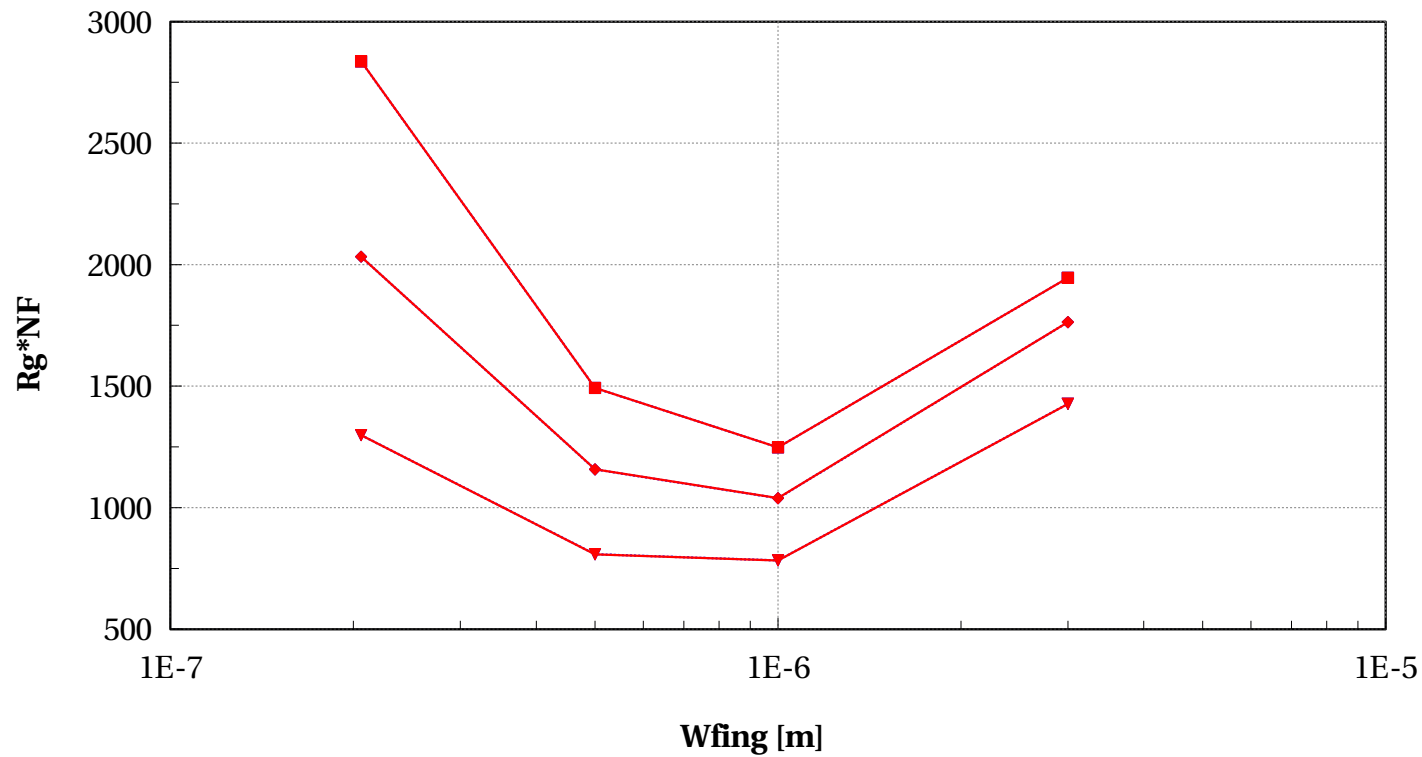
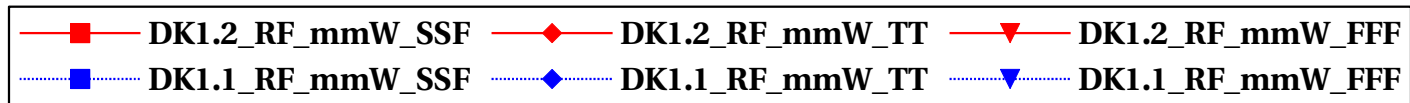
# nfet\_rf, cgg\_inv/W vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



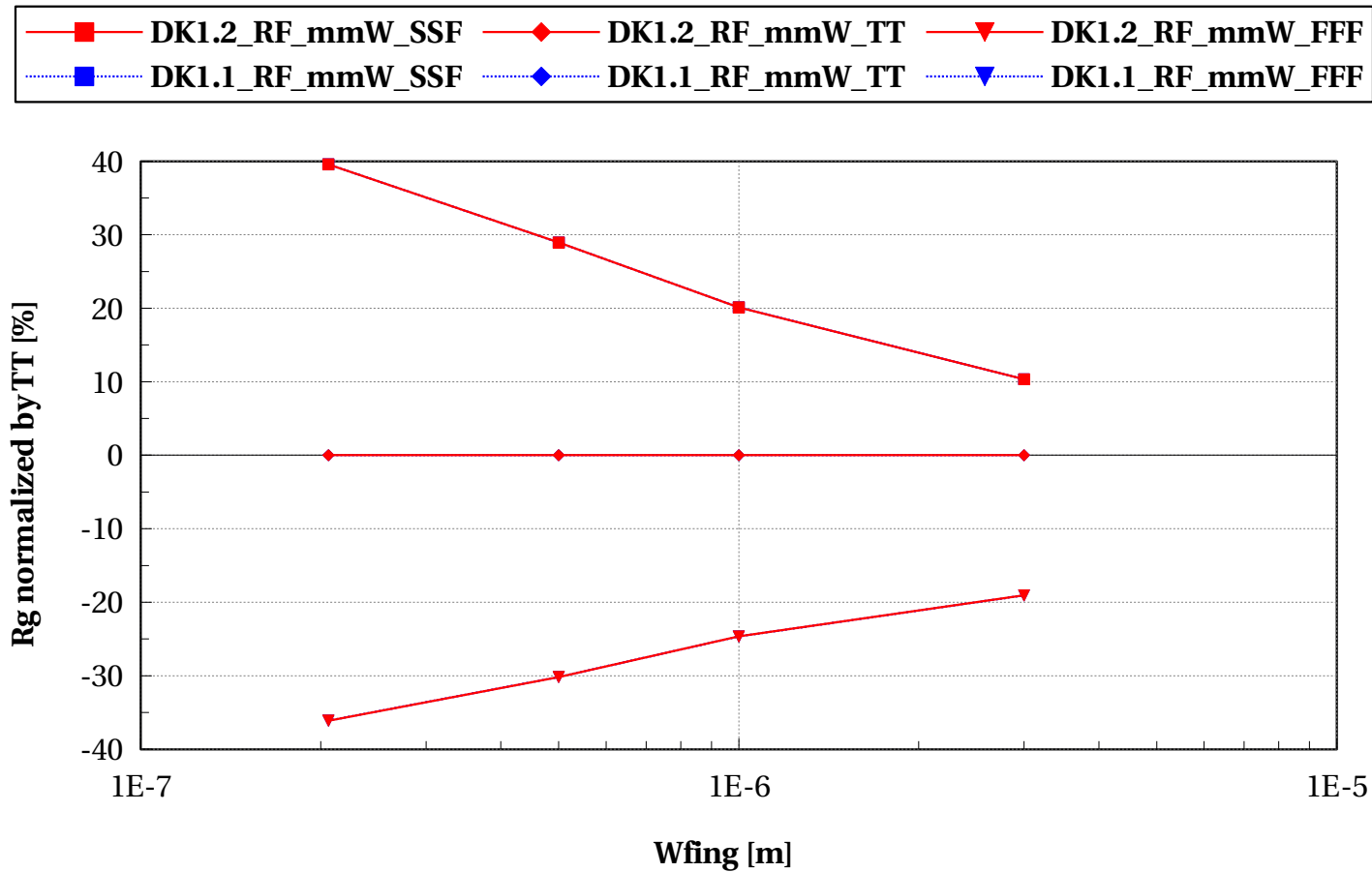
# nfet\_rf, $R_g \cdot NF$ vs $W_{fing}$ [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and  $l=30e-9$



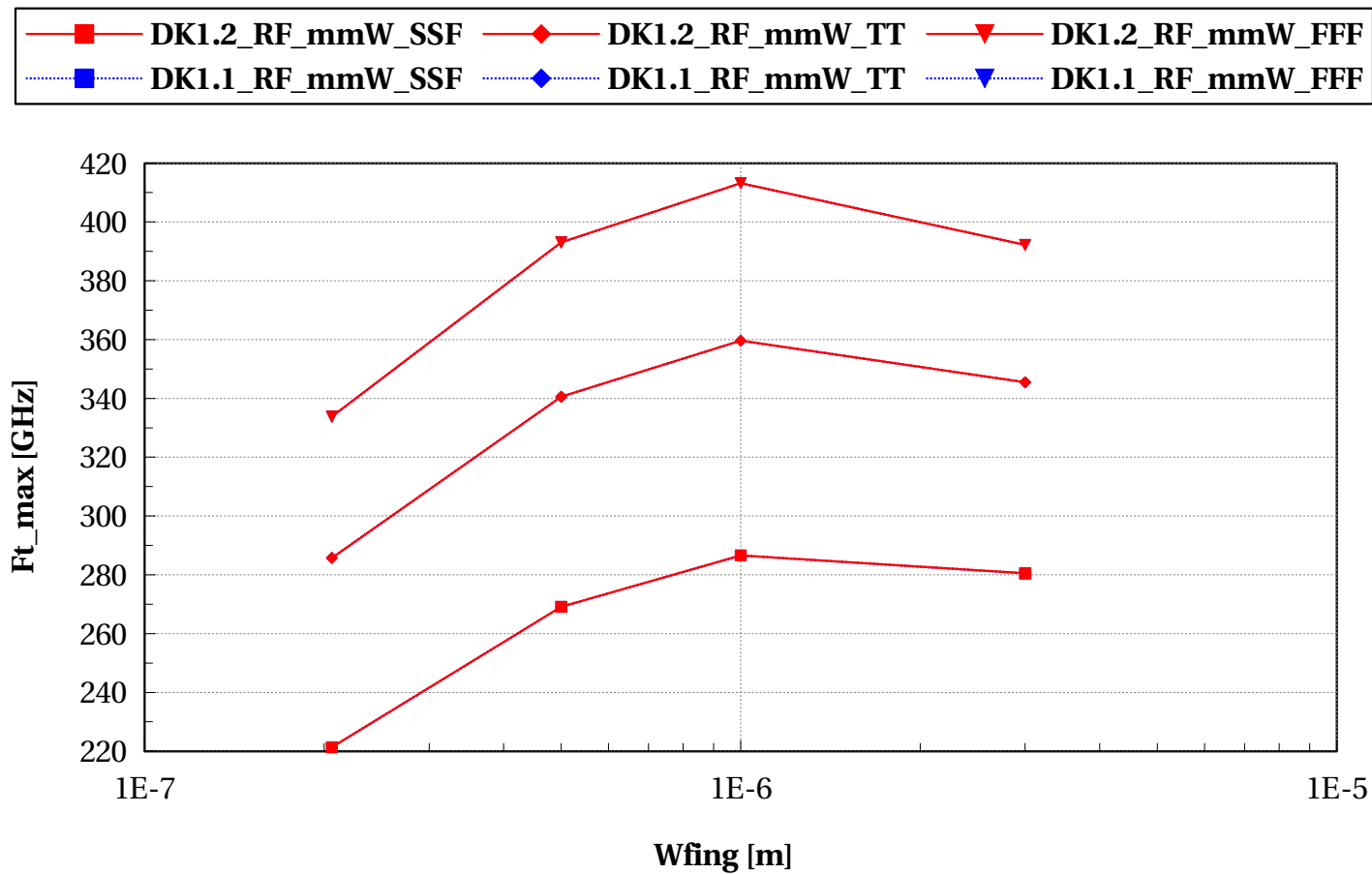
## nfet\_rf, Rg normalized by TT [%] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



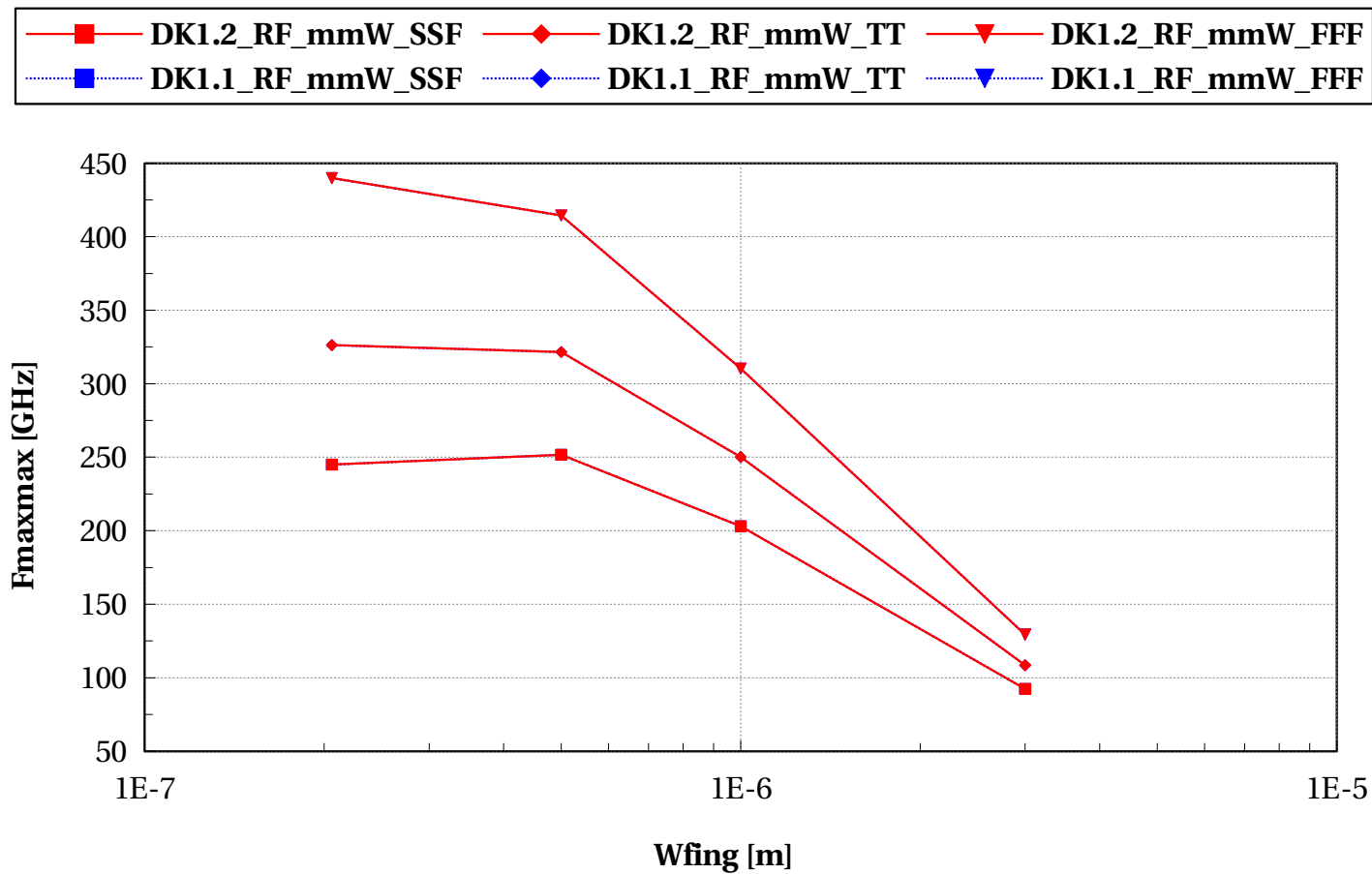
# nfet\_rf, Ft\_max [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# nfet\_rf, Fmaxmax [GHz] vs Wfing [m]

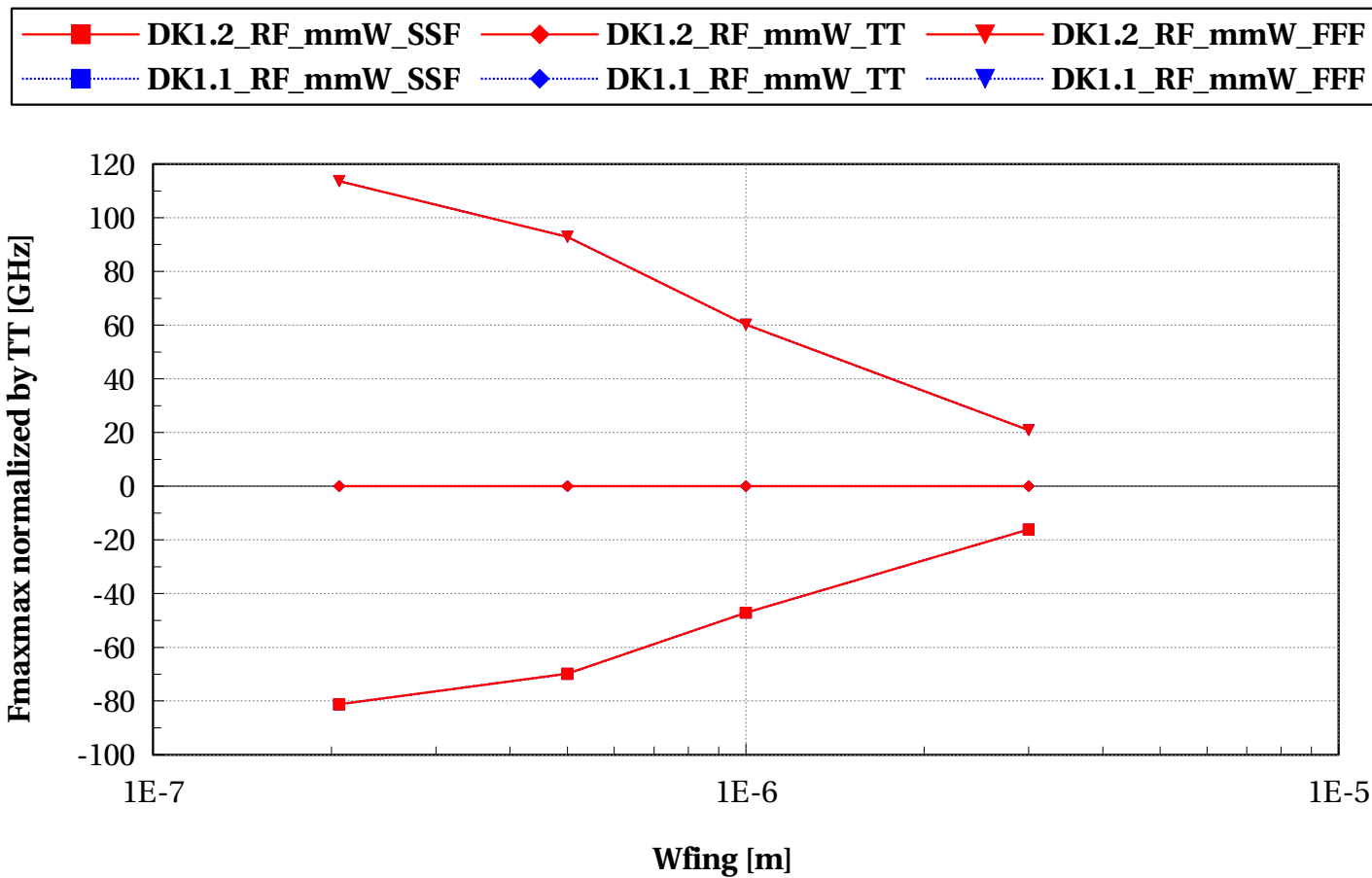
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9





# nfet\_rf, Fmaxmax normalized by TT [GHz] vs Wfing [m]

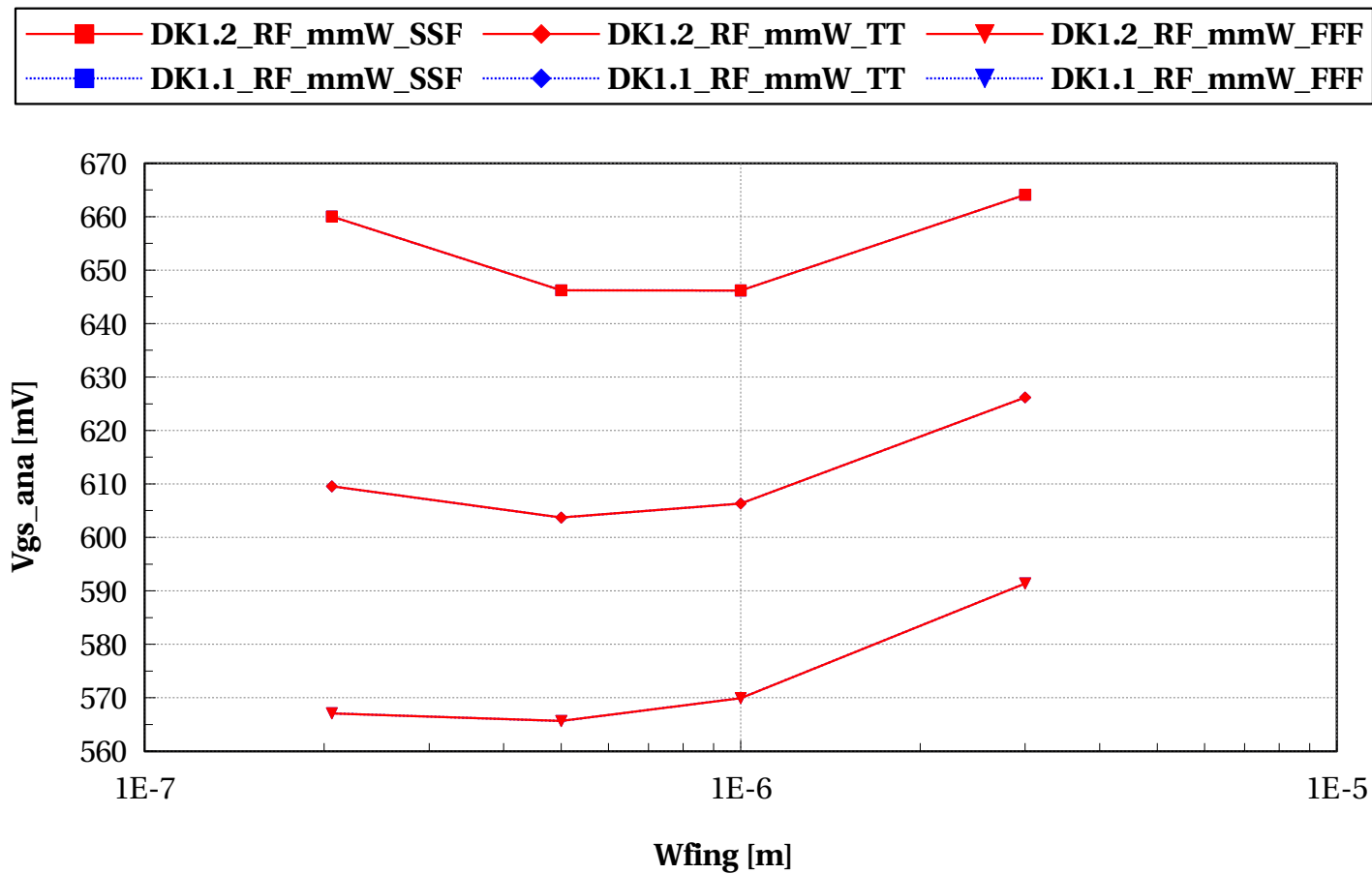
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# Scaling versus width $L=30\text{nm}$ - Analog

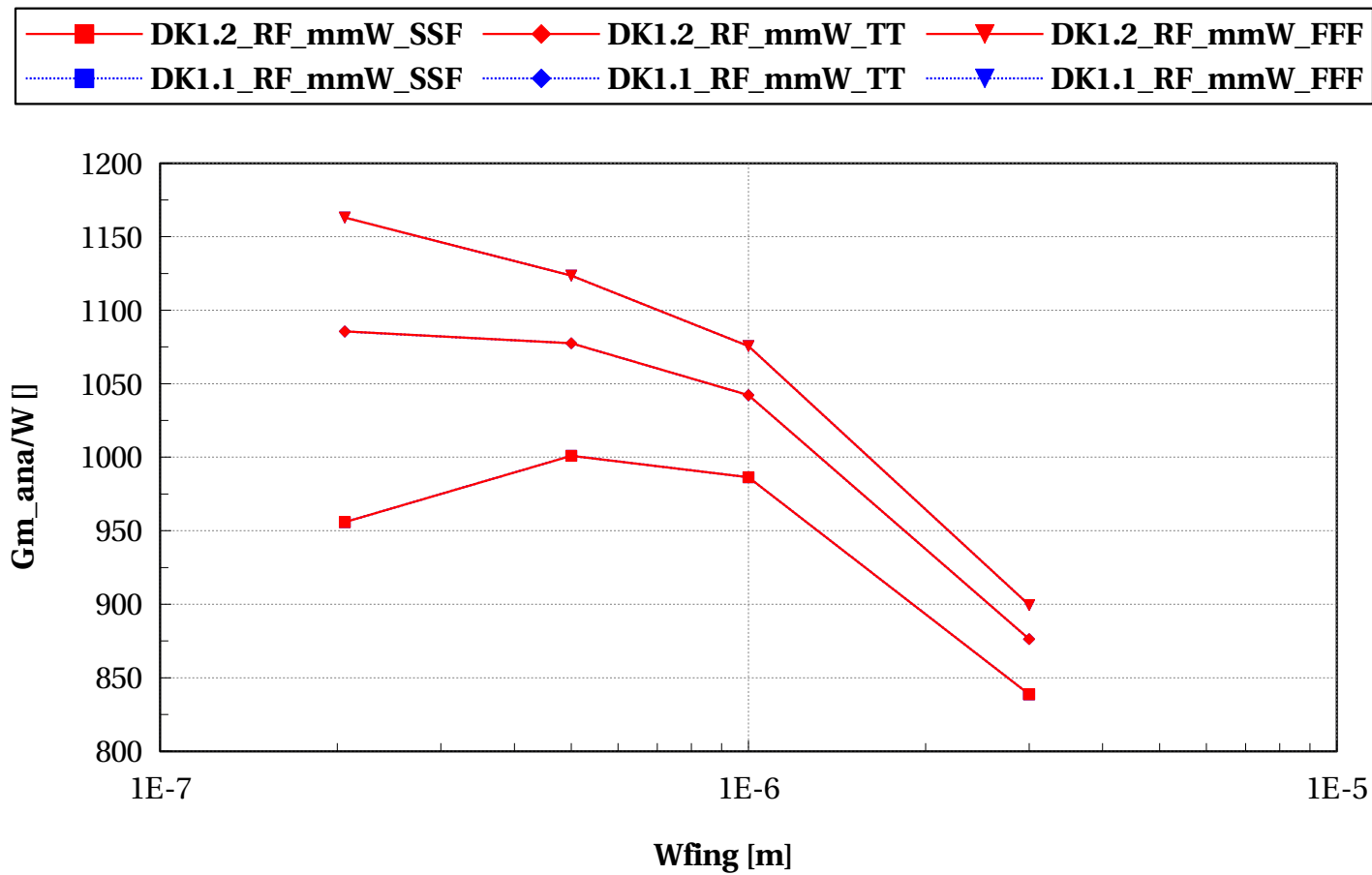
# nfet\_rf, Vgs\_ana [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



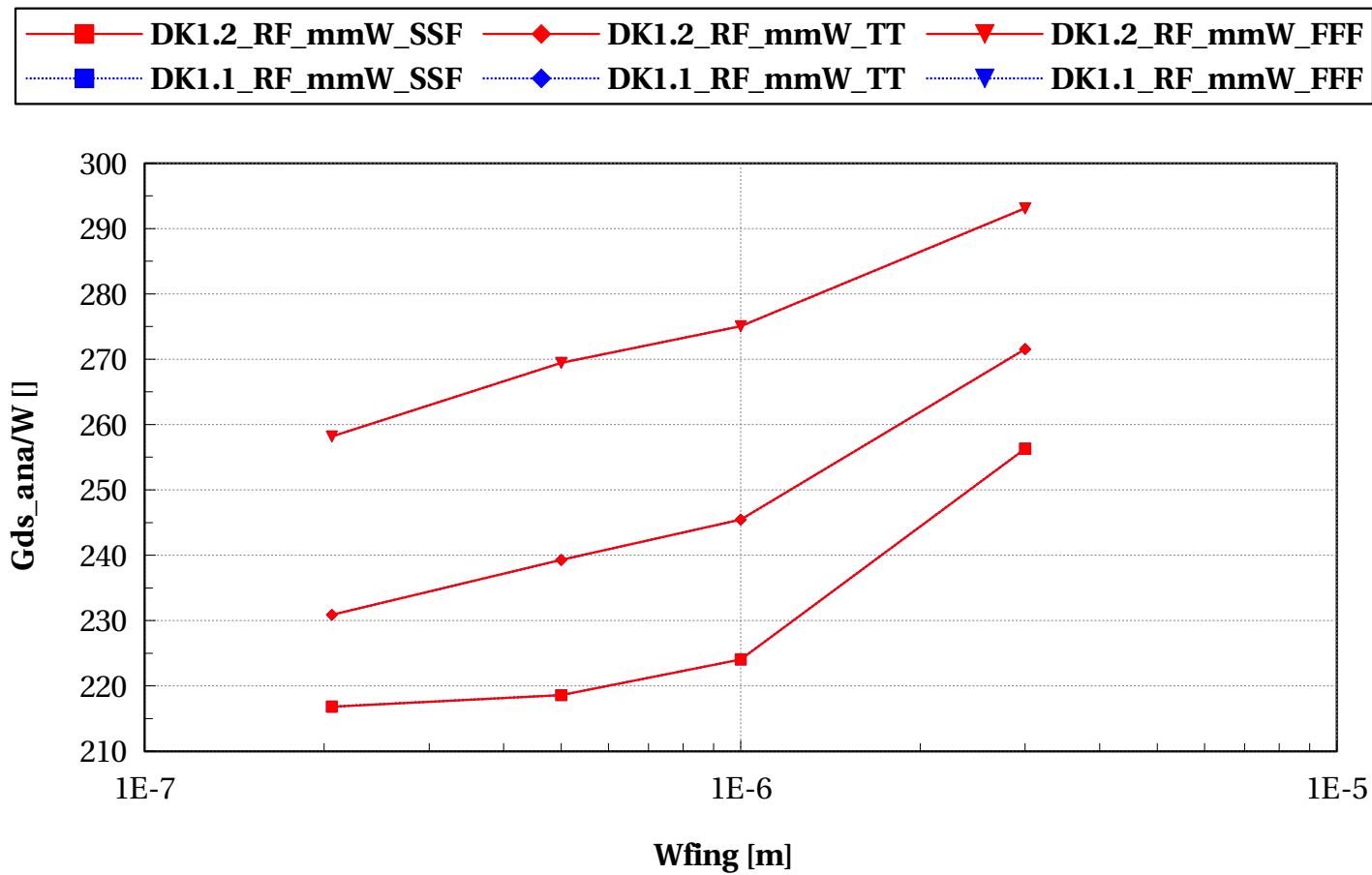
# nfet\_rf, Gm\_ana/W [] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



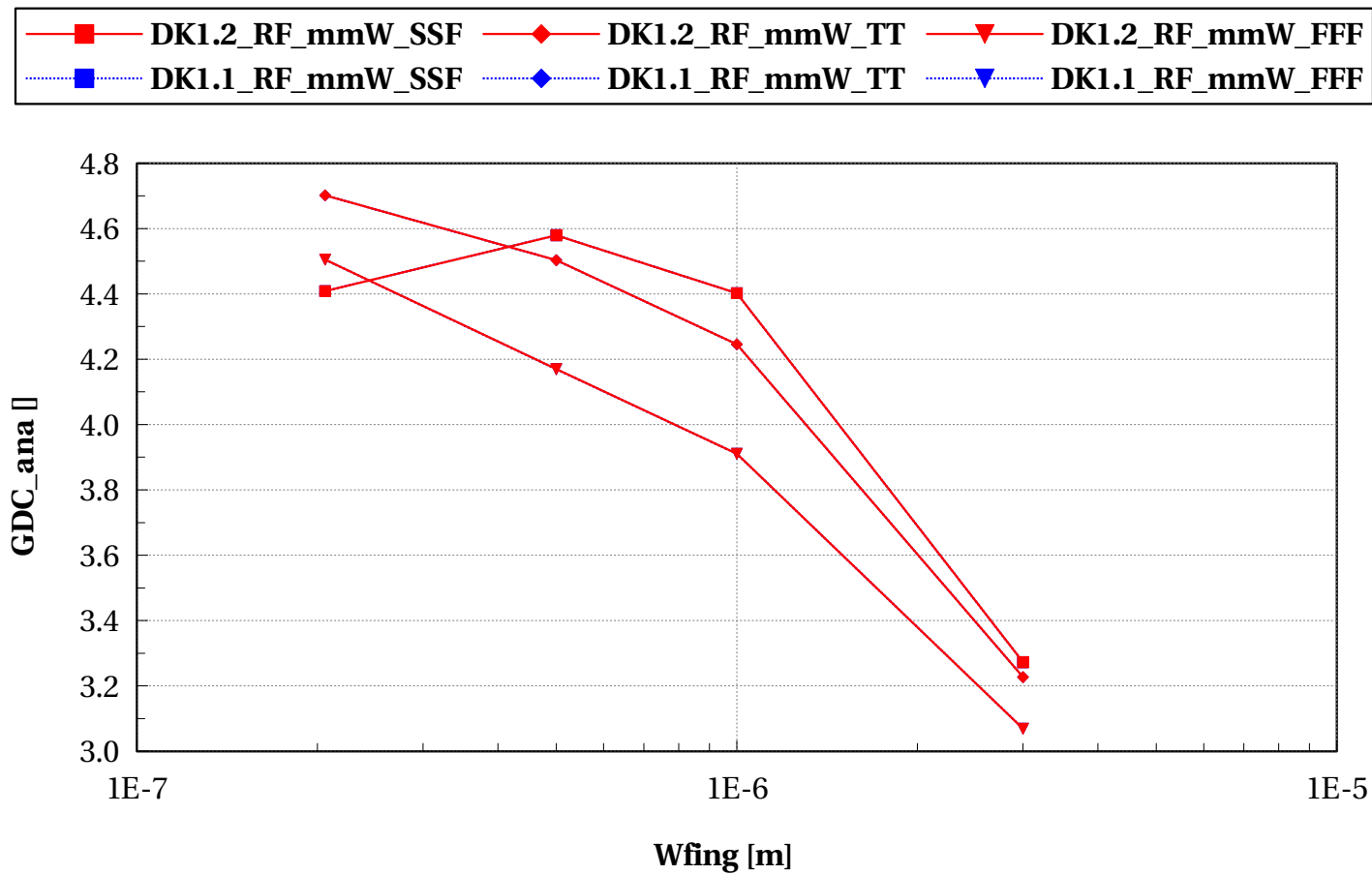
# nfet\_rf, Gds\_ana/W [] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



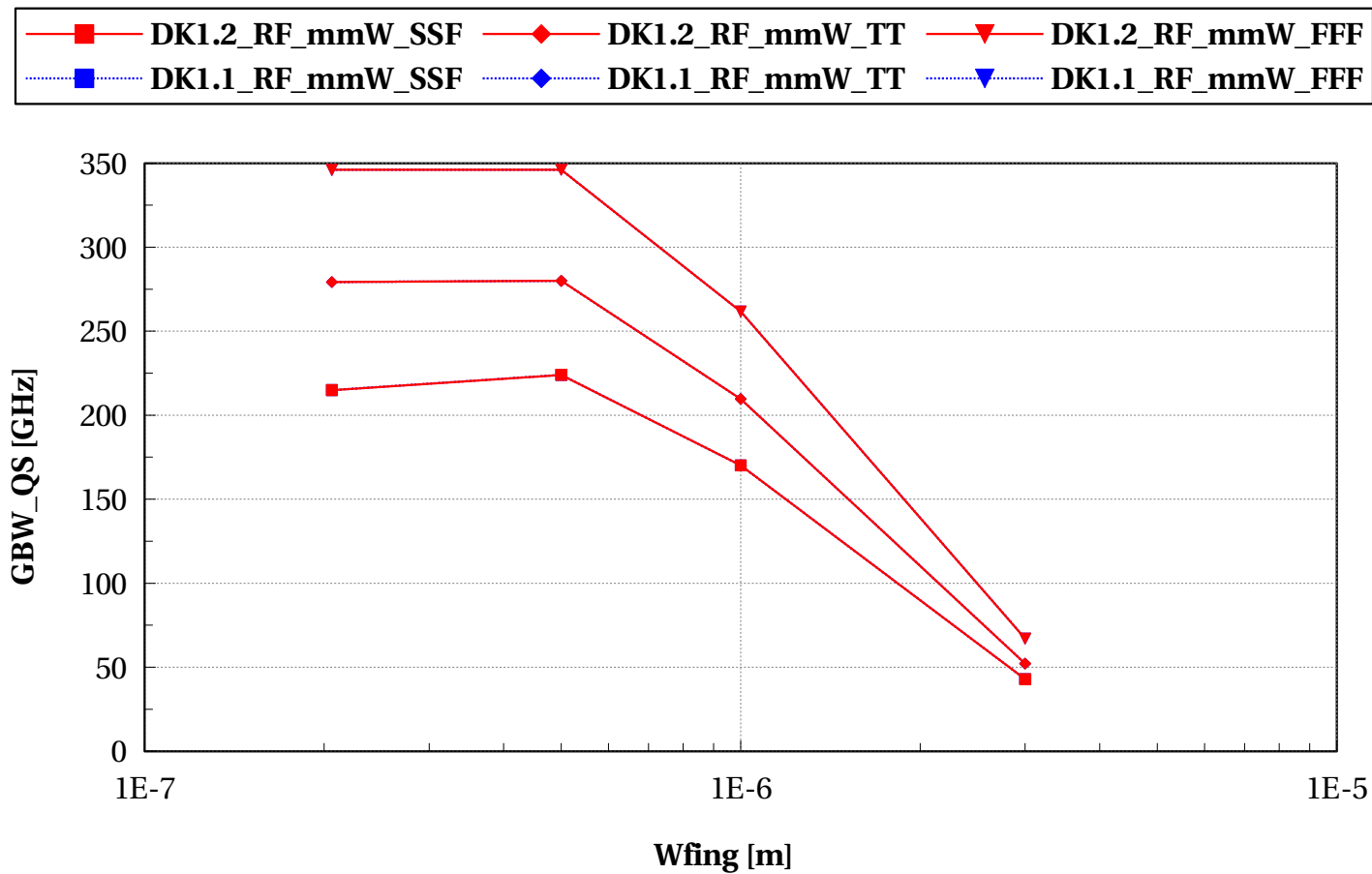
# nfet\_rf, GDC\_ana [] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



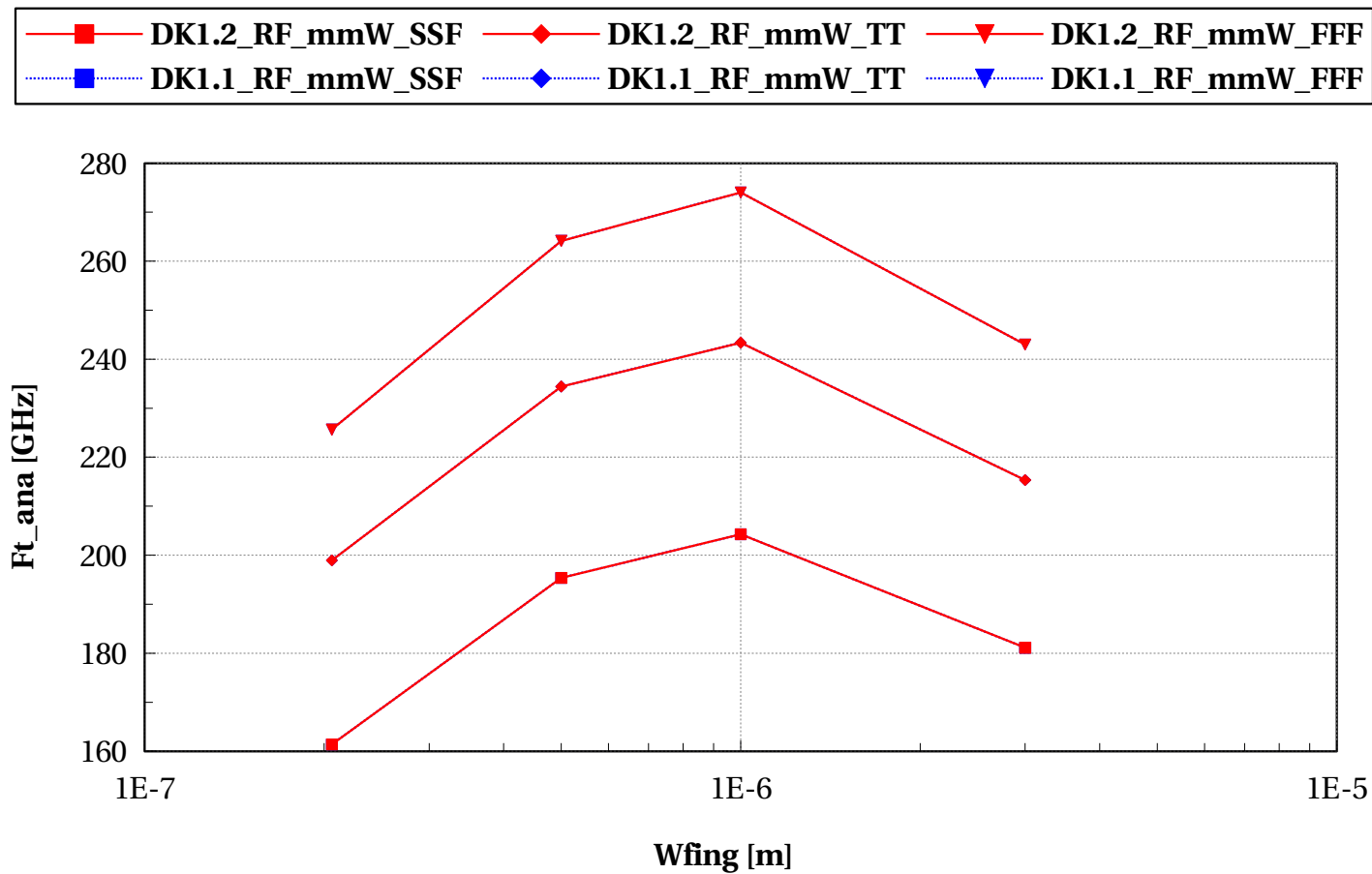
# nfet\_rf, GBW\_QS [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# nfet\_rf, Ft\_ana [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9

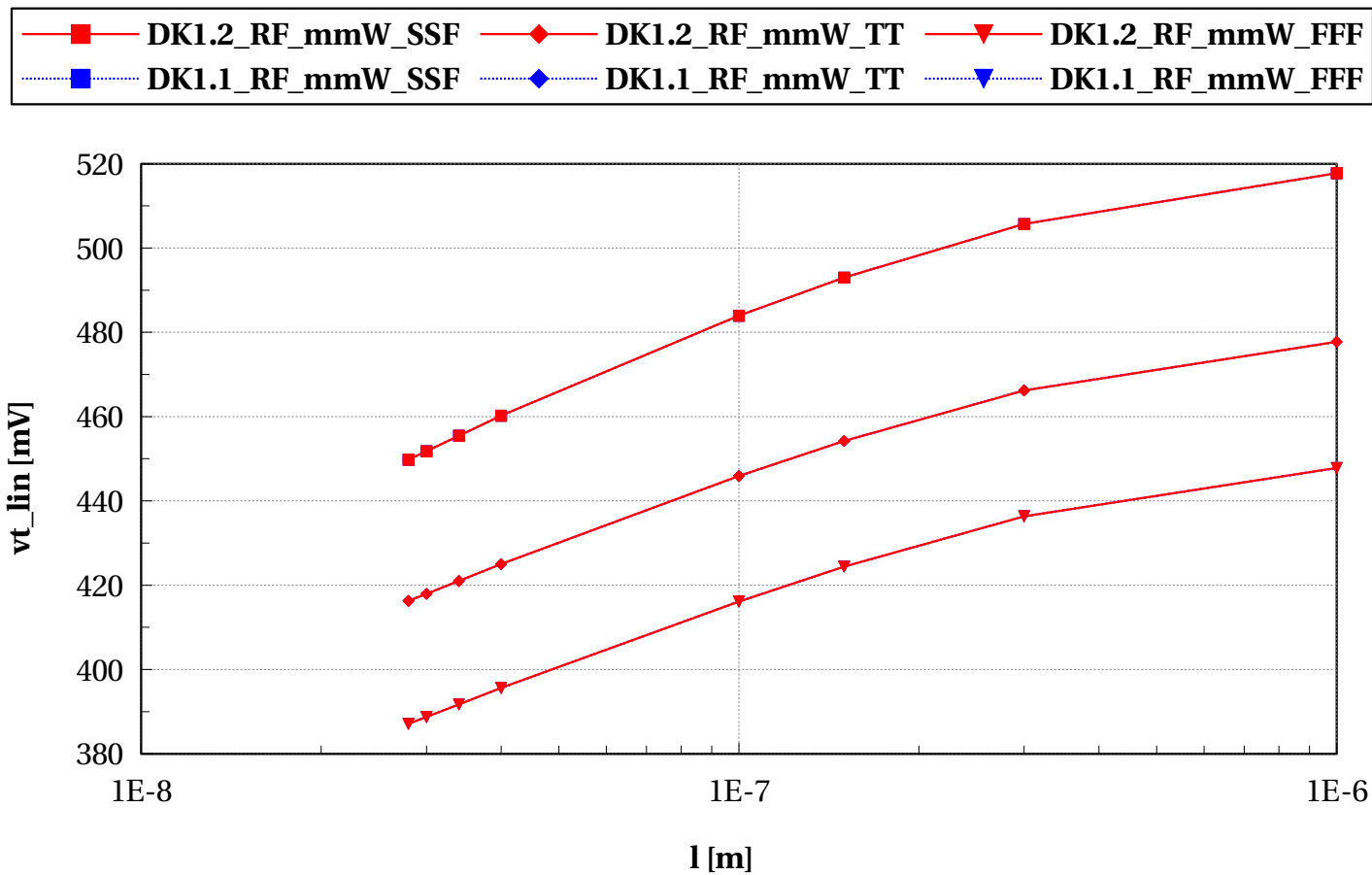




## Scaling versus length $W_{\text{fing}}=1\mu\text{m}$ - DC

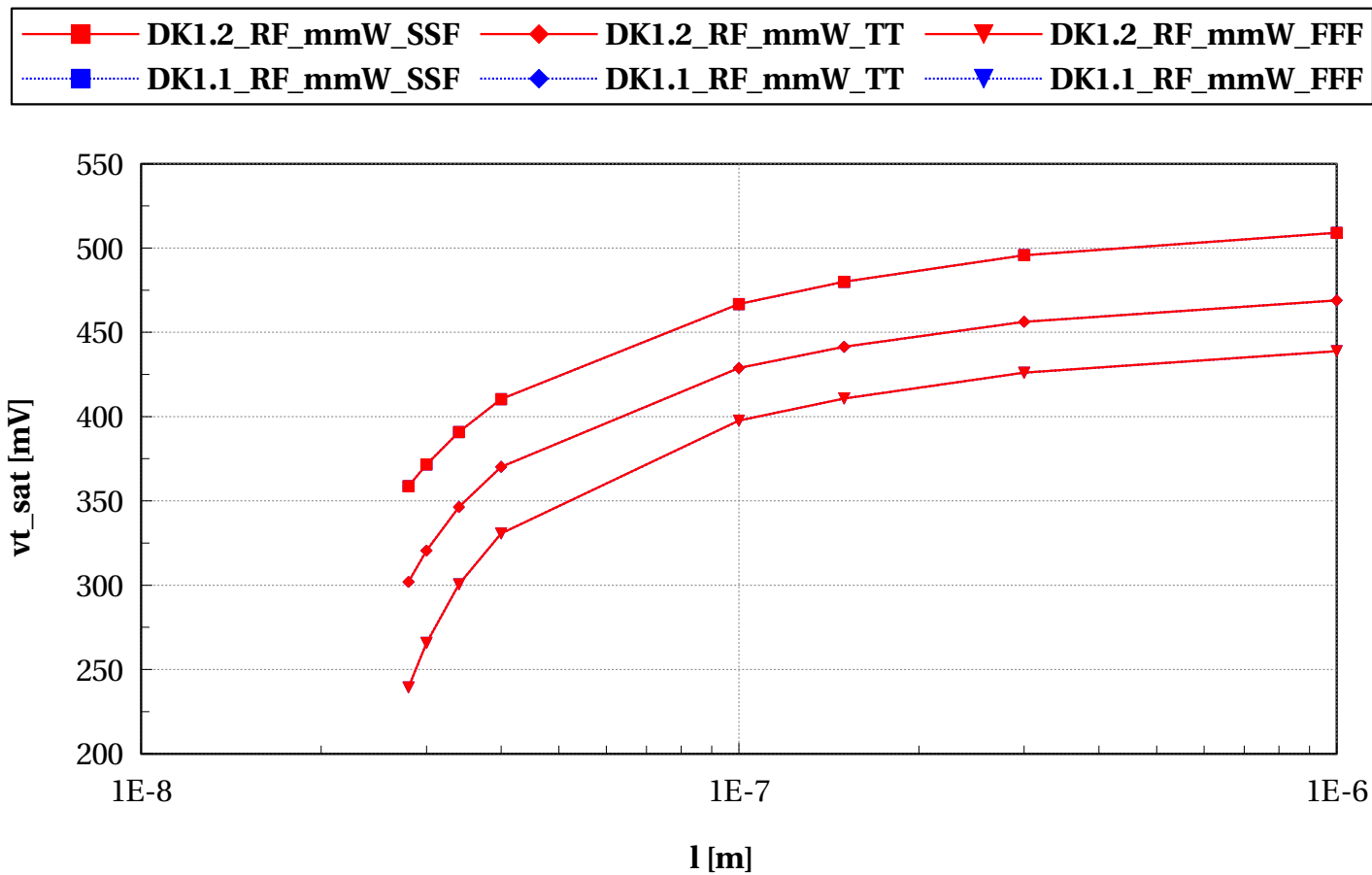
# nfet\_rf, vt\_lin [mV] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



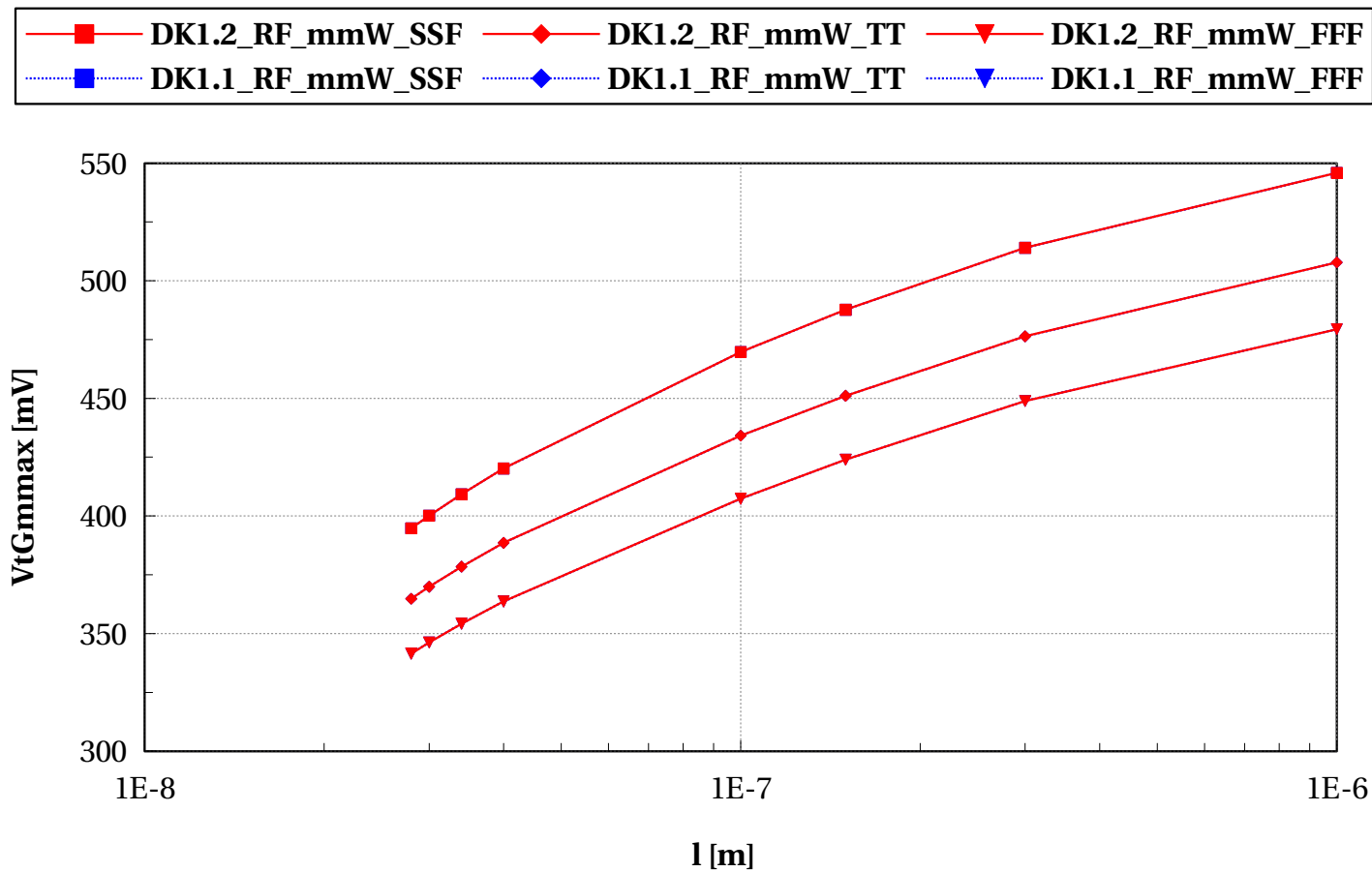
# nfet\_rf, vt\_sat [mV] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



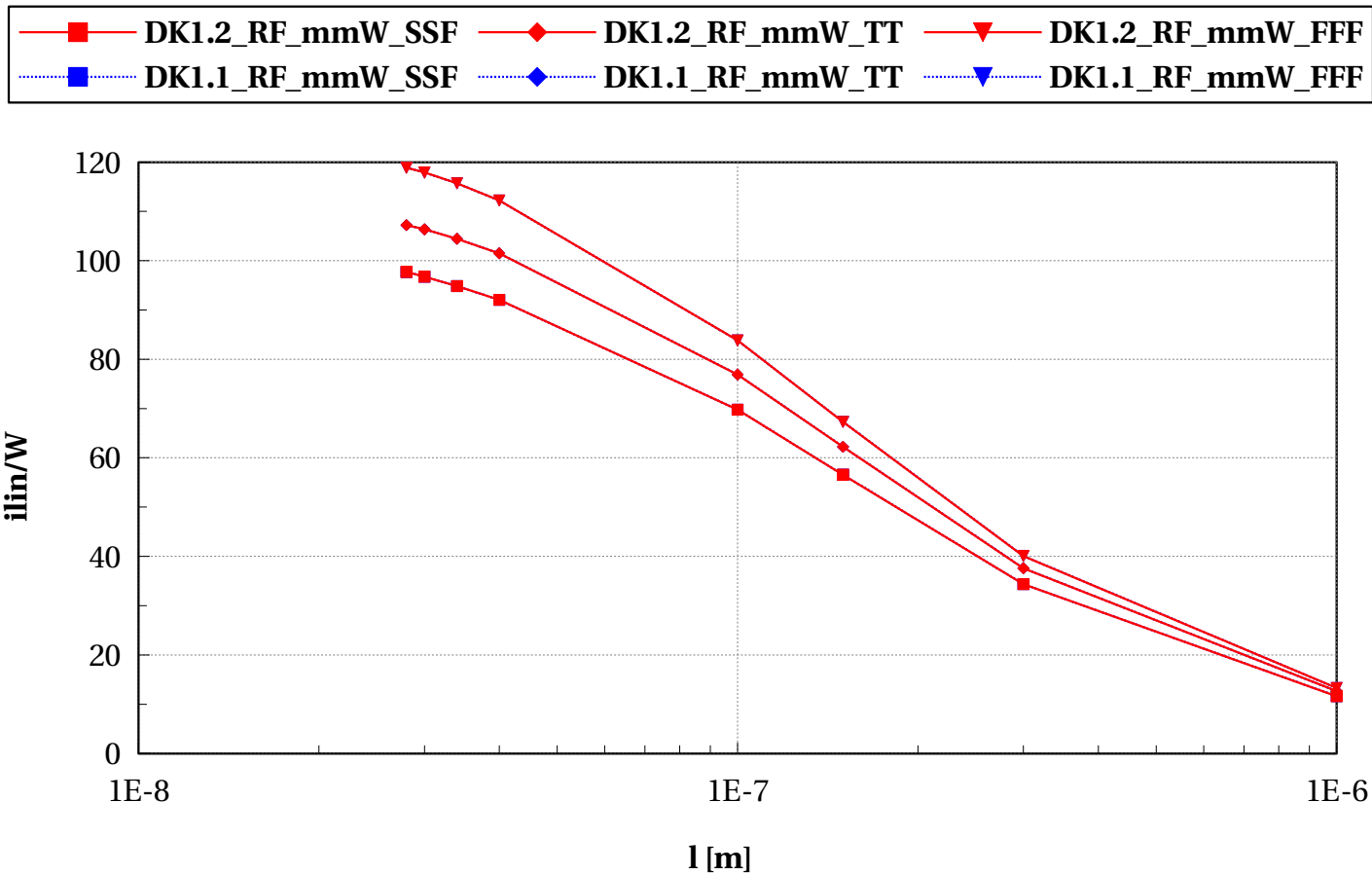
# nfet\_rf, VtGmmax [mV] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



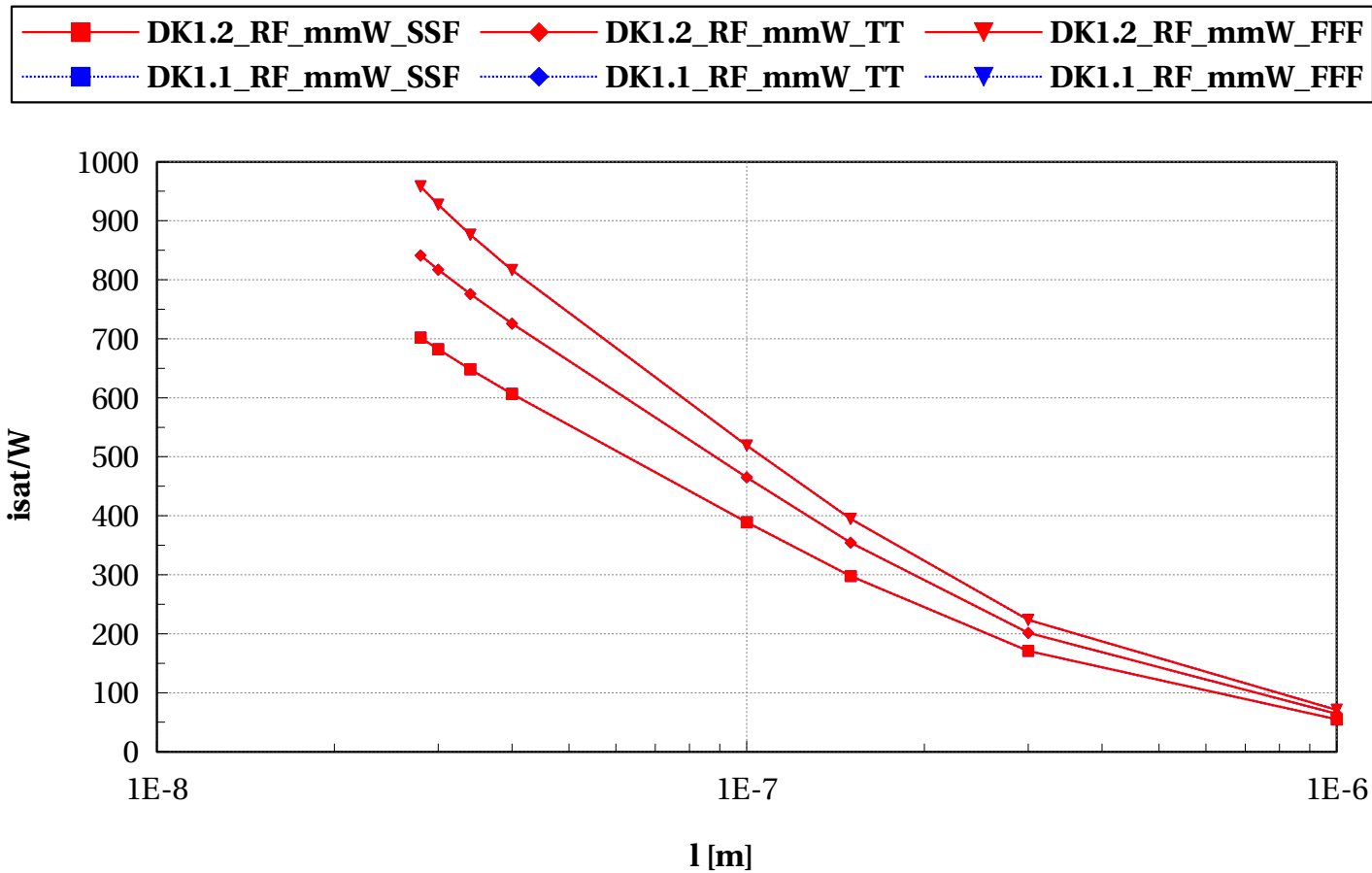
# nfet\_rf, $i_{lin}/W$ vs $l$ [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



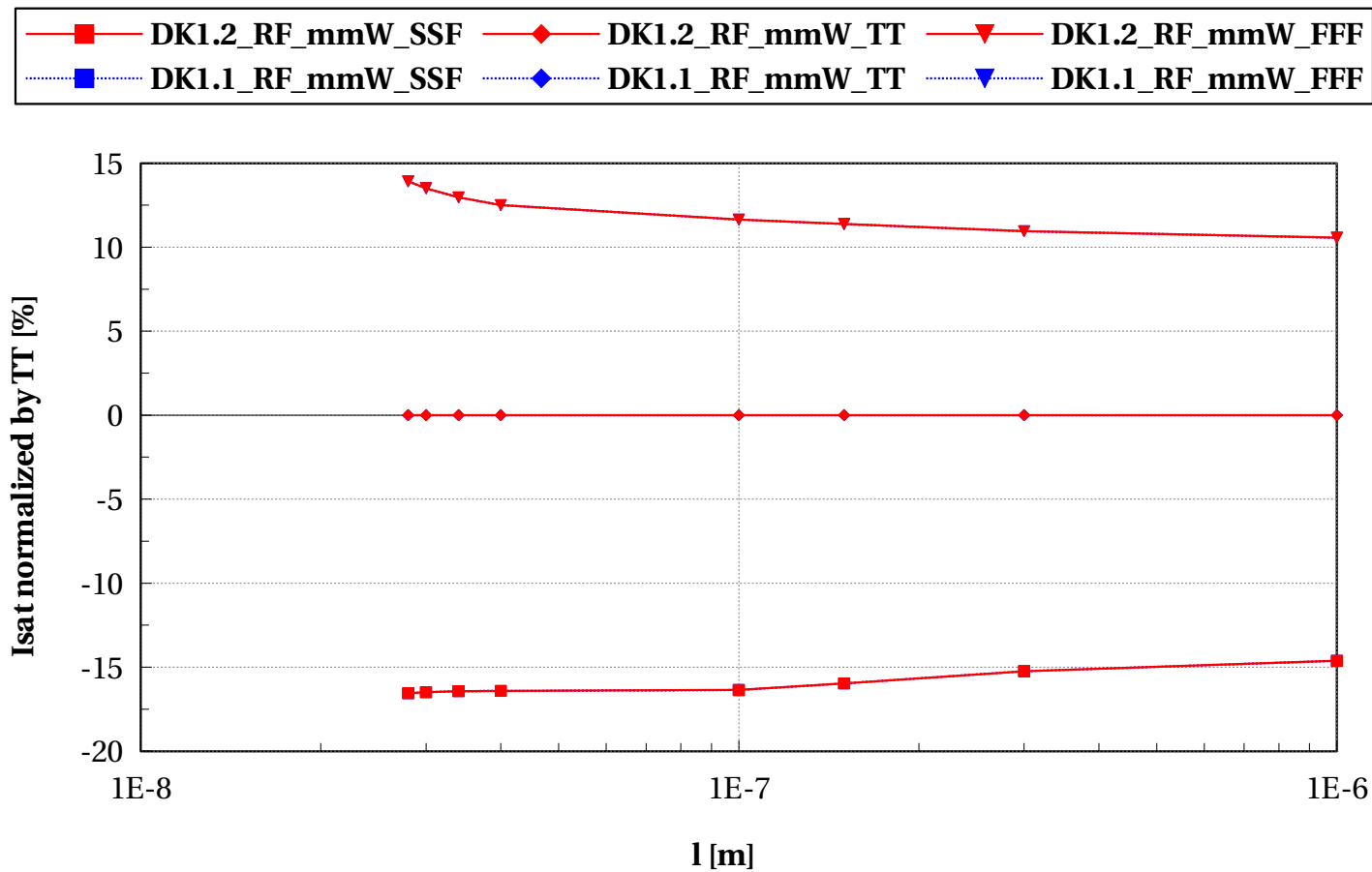
# nfet\_rf, isat/W vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



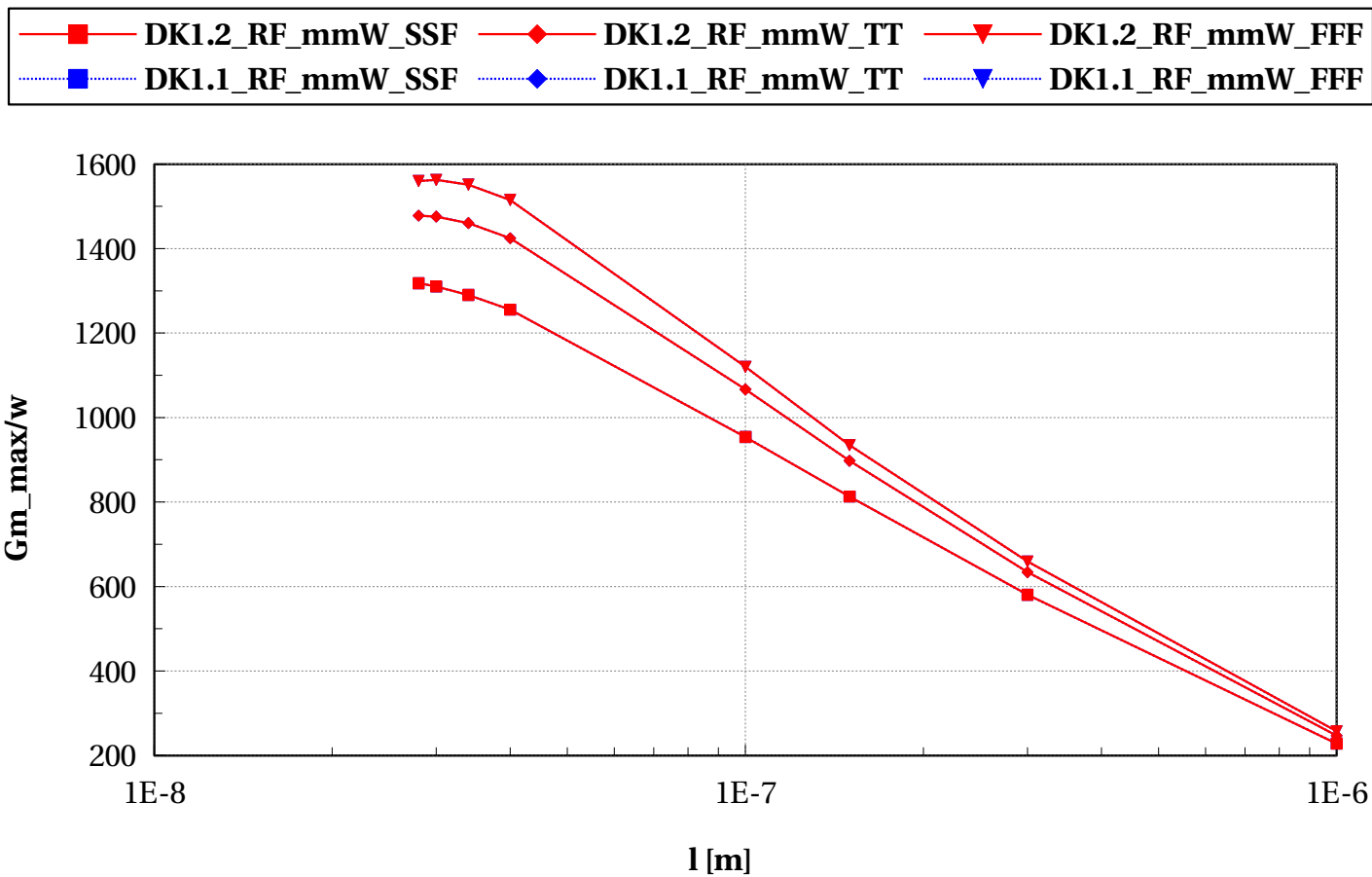
## nfet\_rf, Isat normalized by TT [%] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



# nfet\_rf, Gm\_max/w vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6

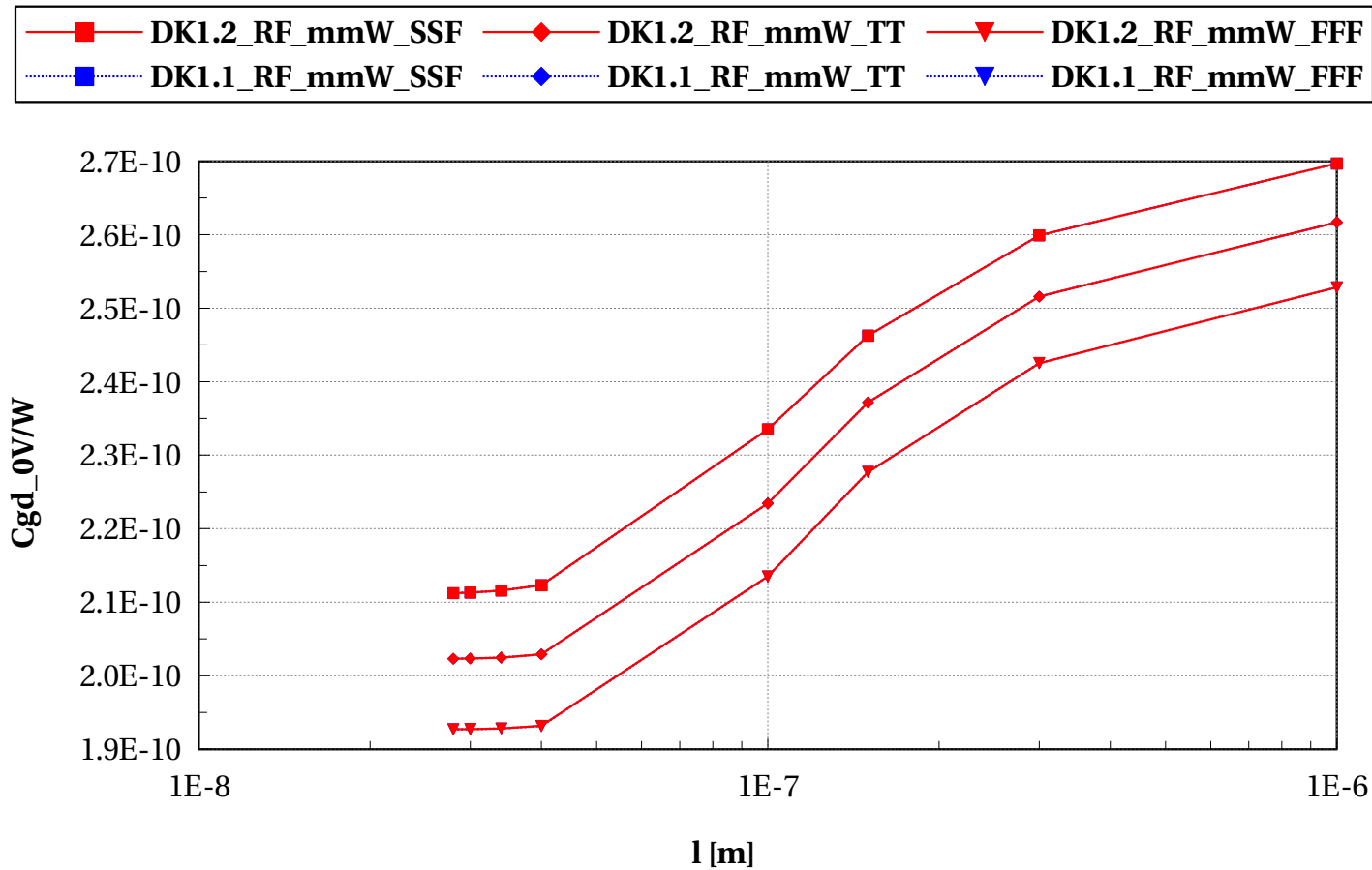




# Scaling versus length $W_{\text{fing}}=1\text{ }\mu\text{m}$ - RF

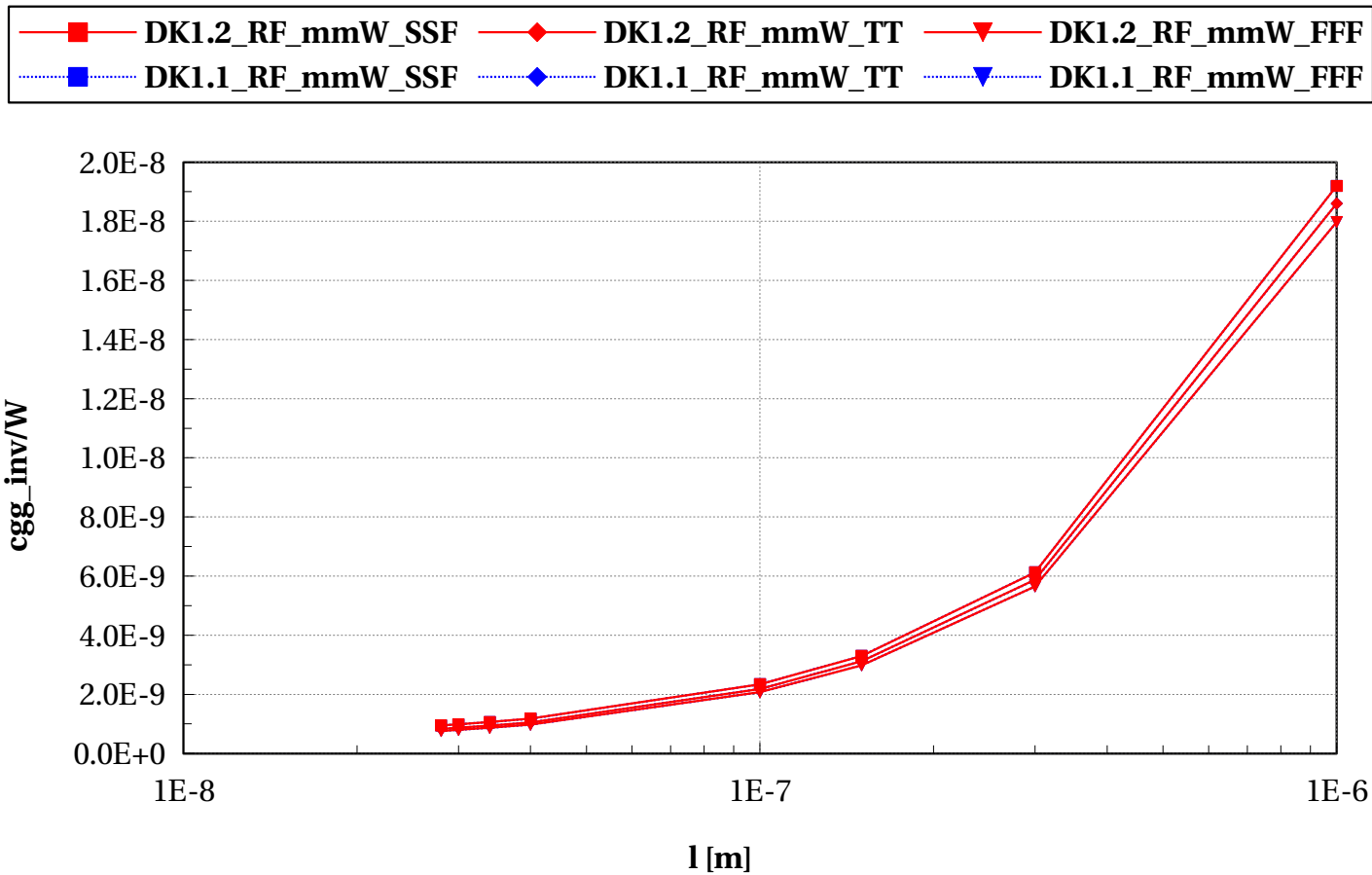
# nfet\_rf, Cgd\_0V/W vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



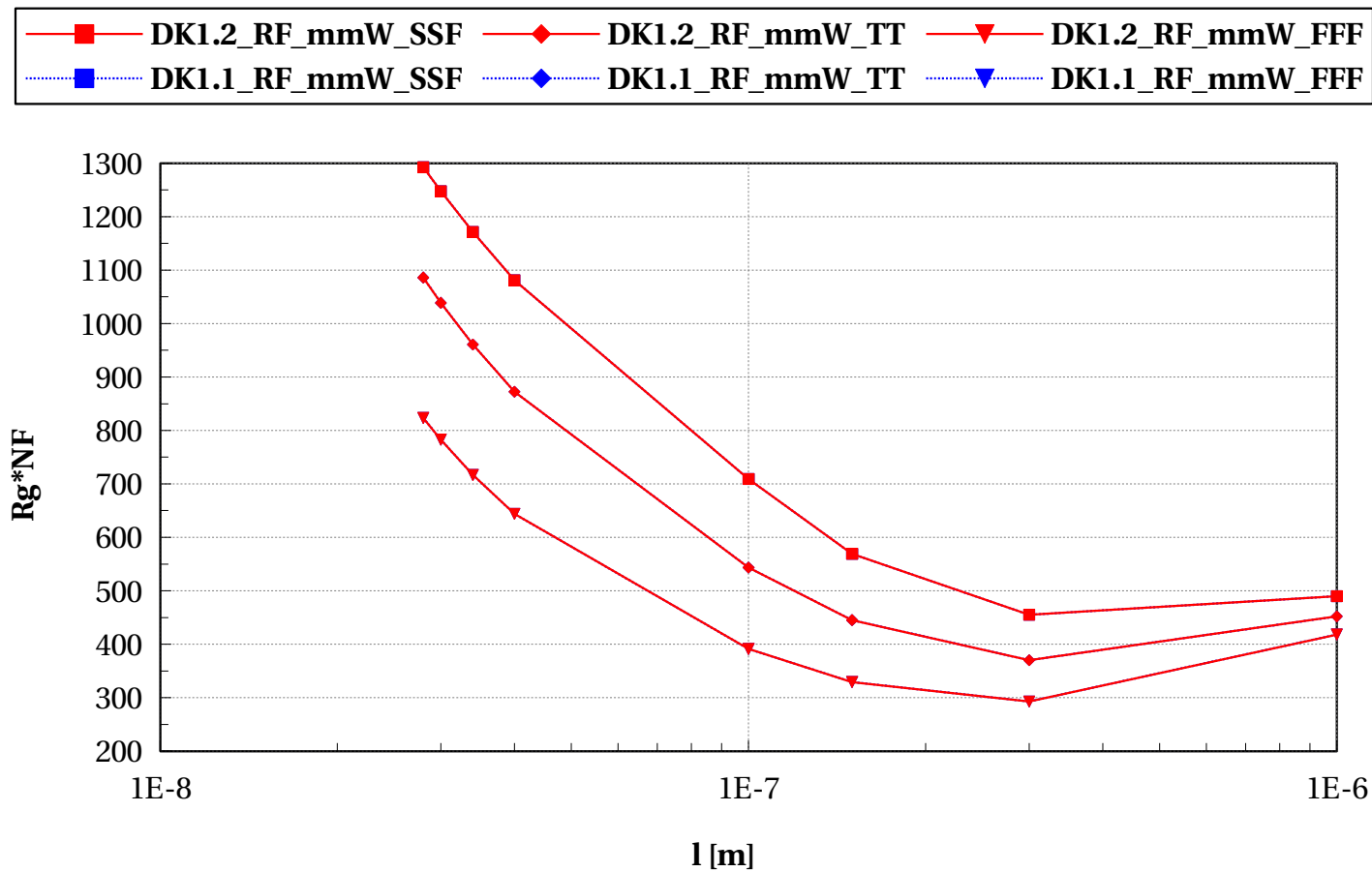
# nfet\_rf, cgg\_inv/W vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



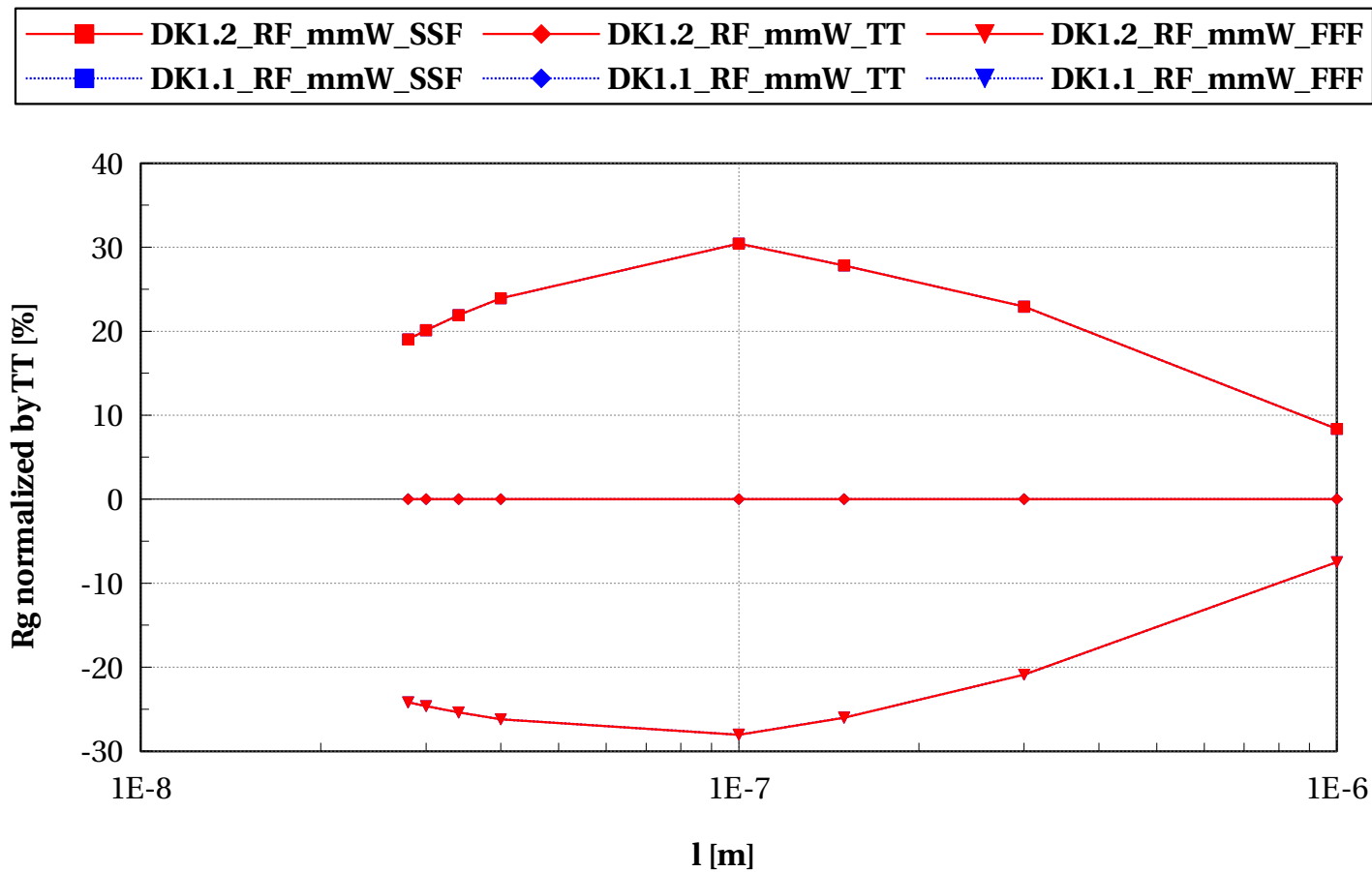
# nfet\_rf, $R_g * NF$ vs $l$ [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6



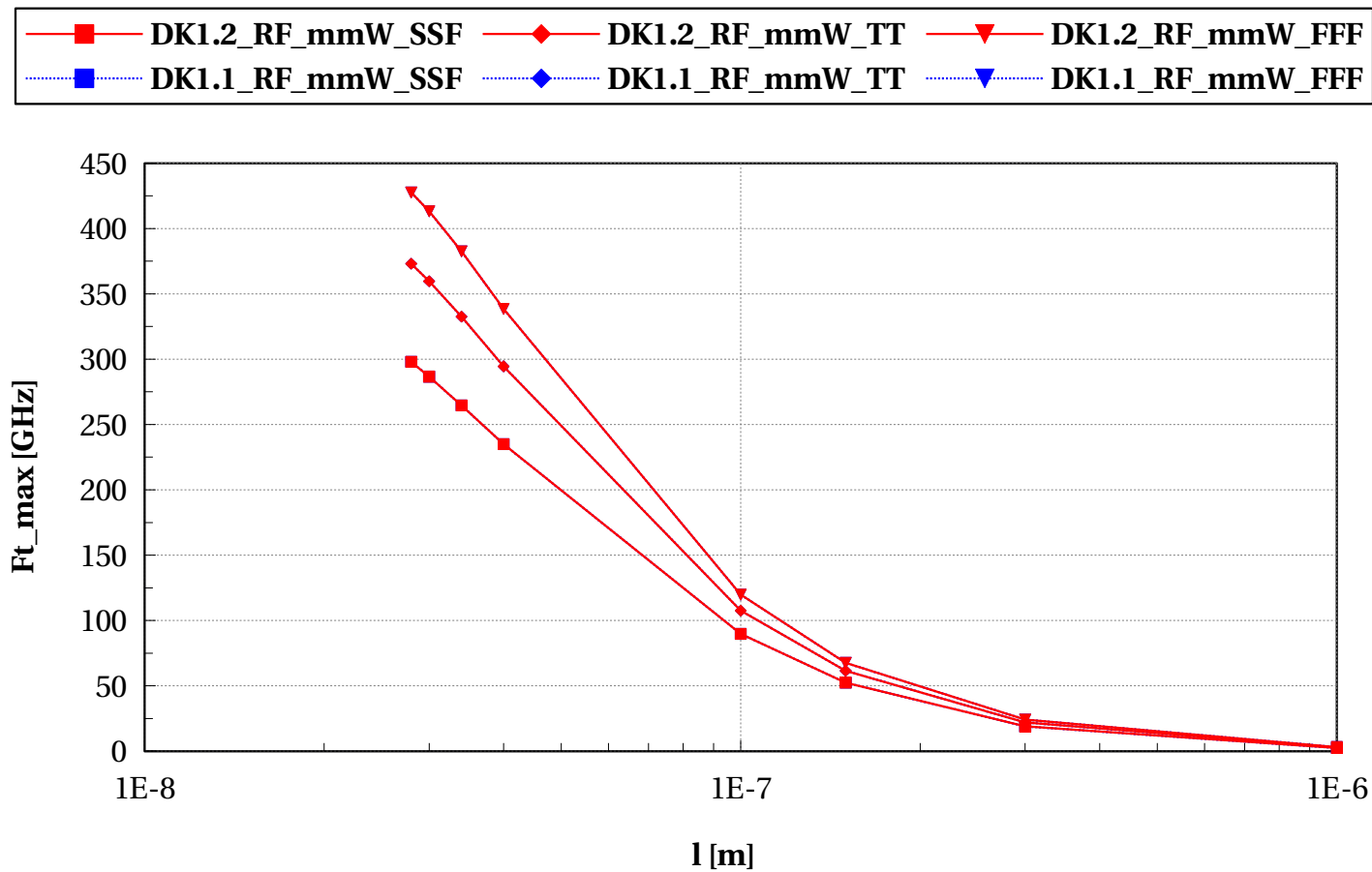
# nfet\_rf, Rg normalized by TT [%] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6



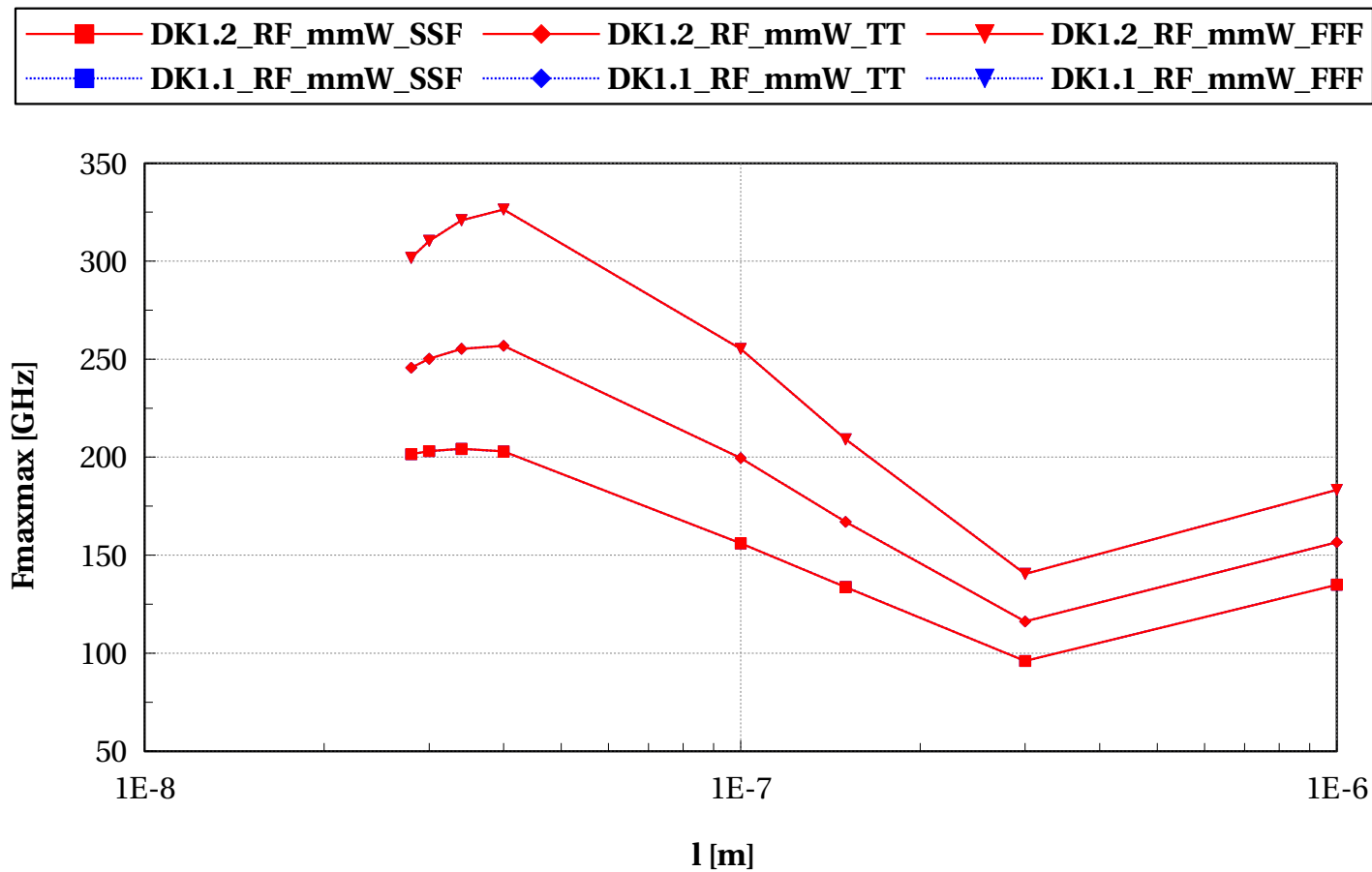
# nfet\_rf, Ft\_max [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



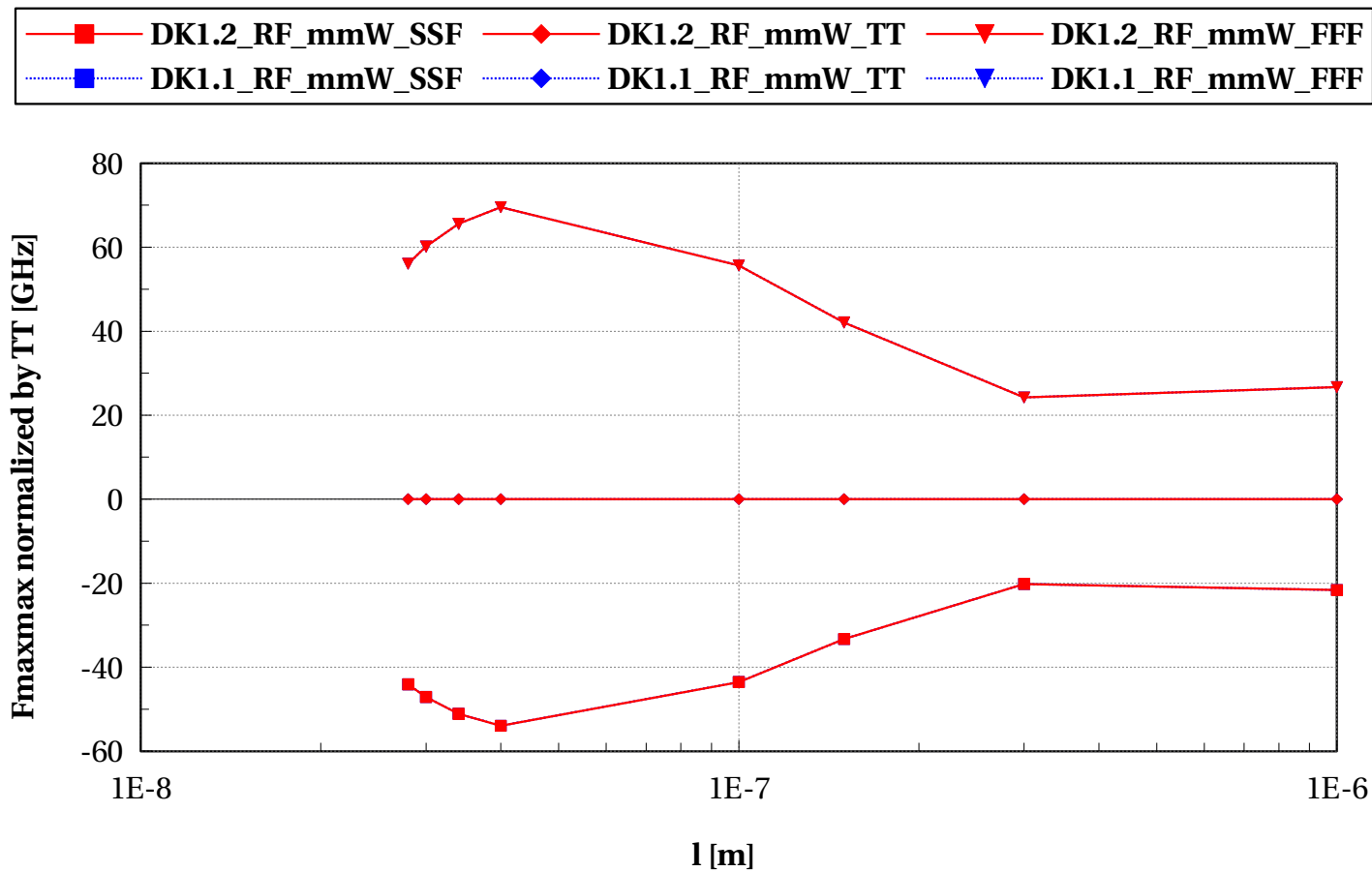
# nfet\_rf, Fmaxmax [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6



# nfet\_rf, Fmaxmax normalized by TT [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6

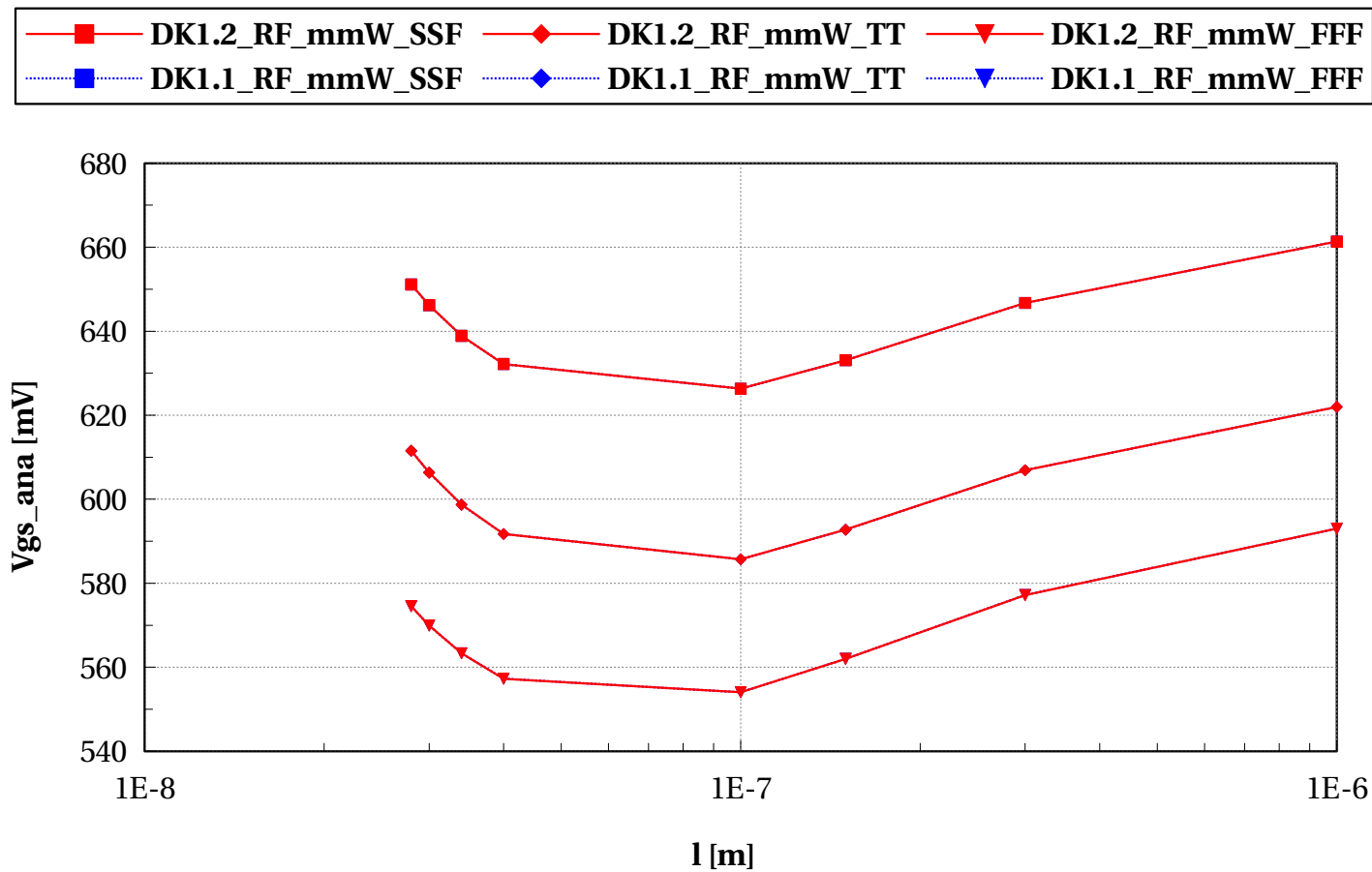




# Scaling versus length $W_{\text{fing}}=1\mu\text{m}$ - Analog

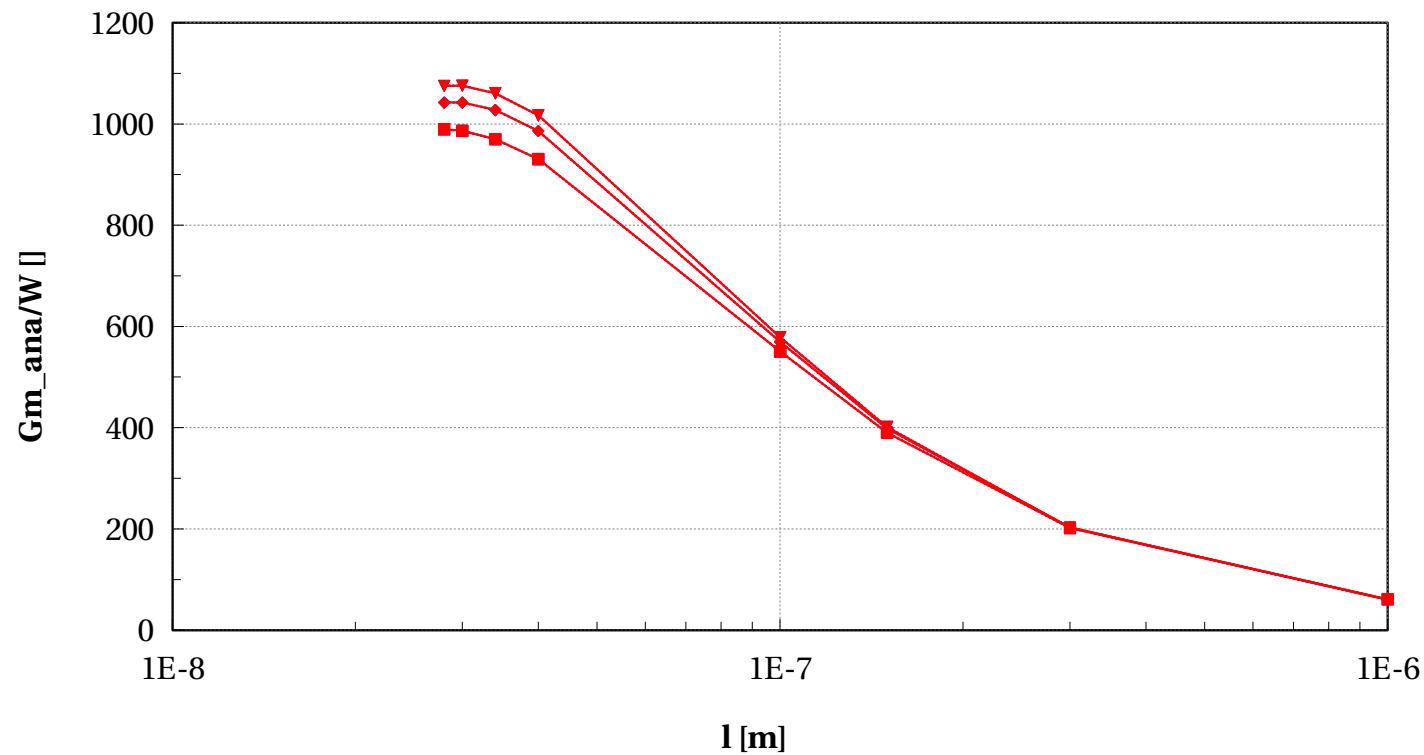
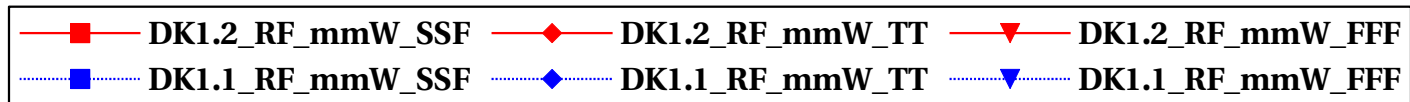
# nfet\_rf, Vgs\_ana [mV] vs I [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6



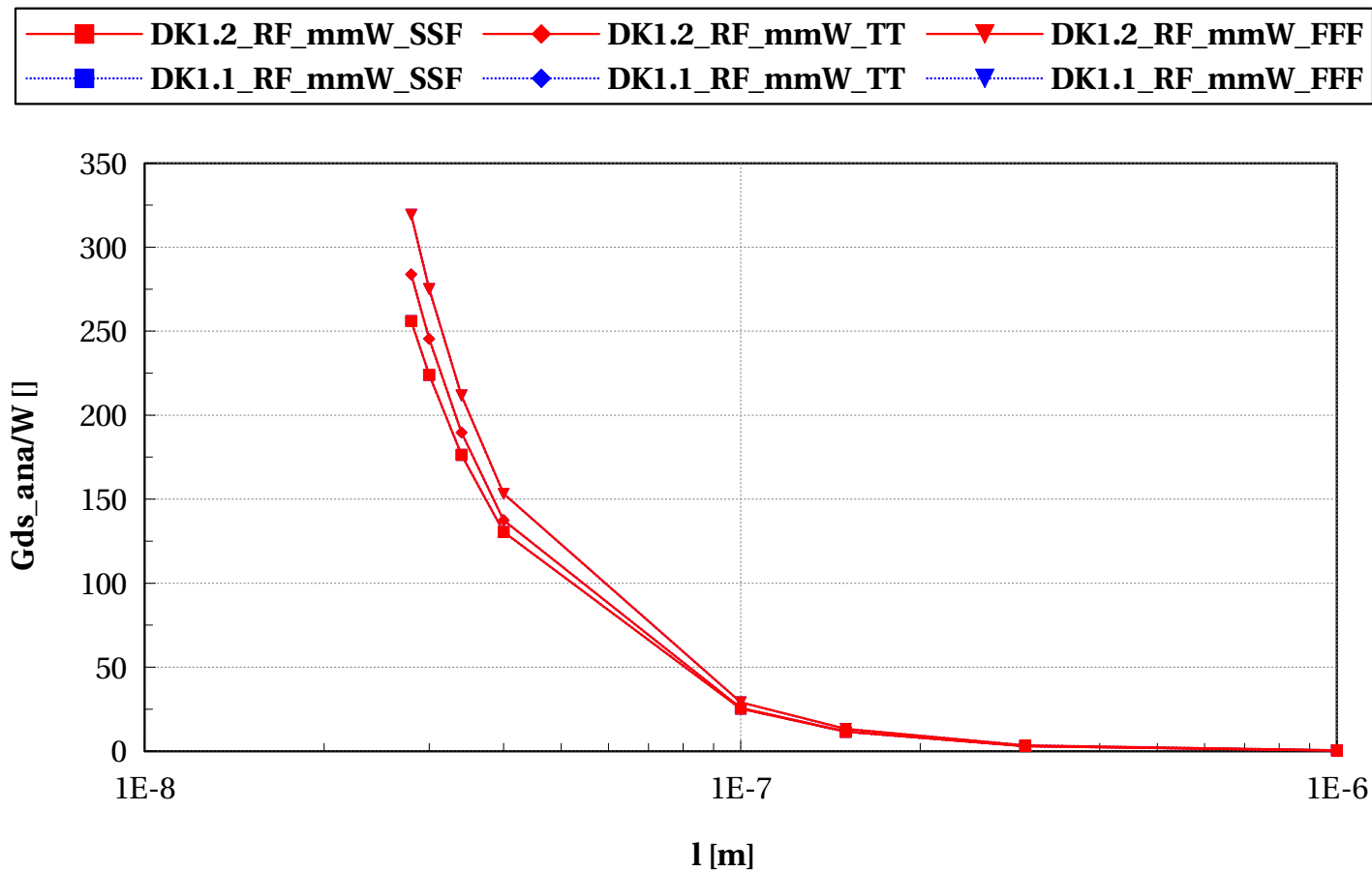
# nfet\_rf, Gm\_ana/W [] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6



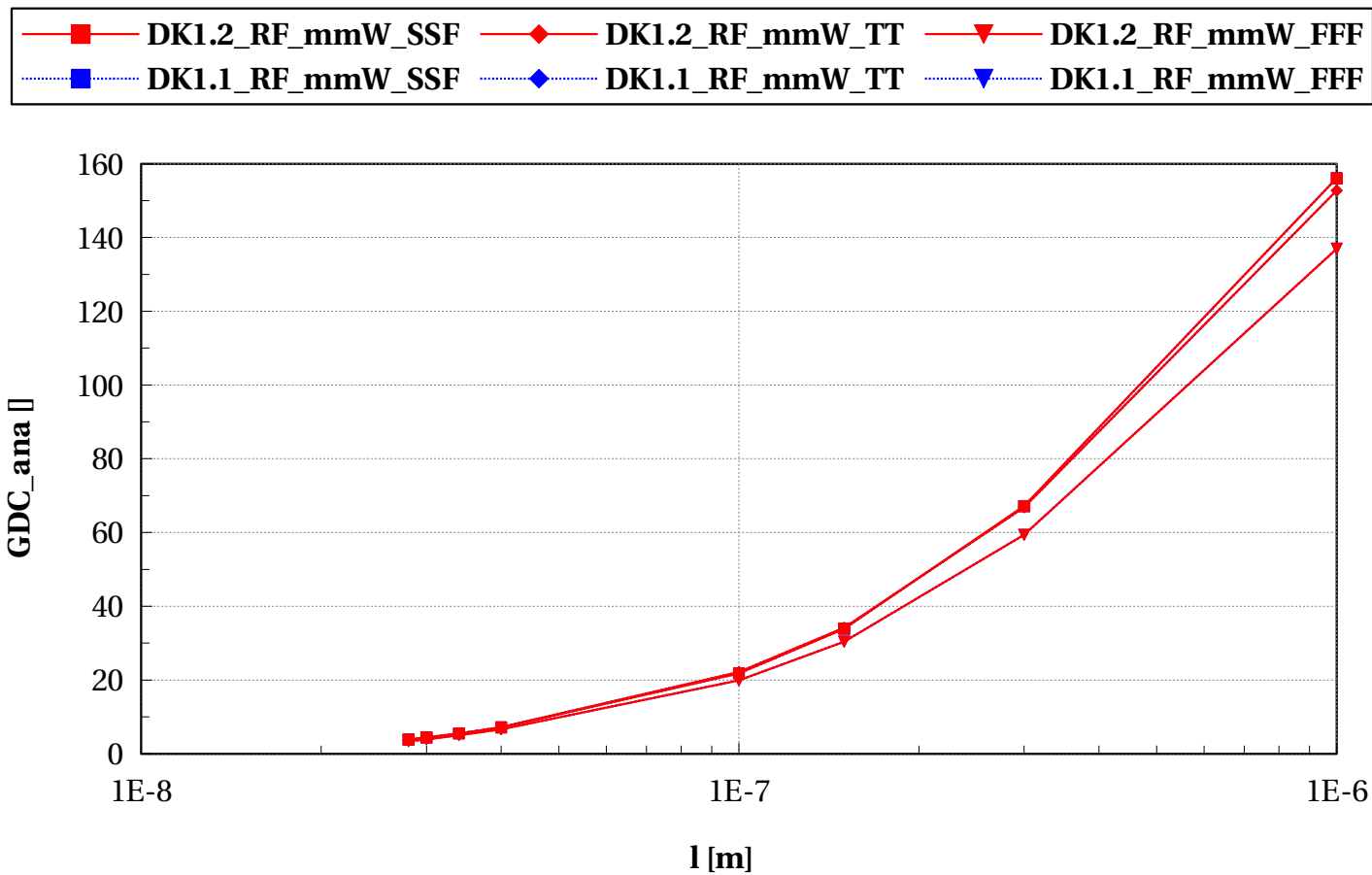
# nfet\_rf, Gds\_ana/W [] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



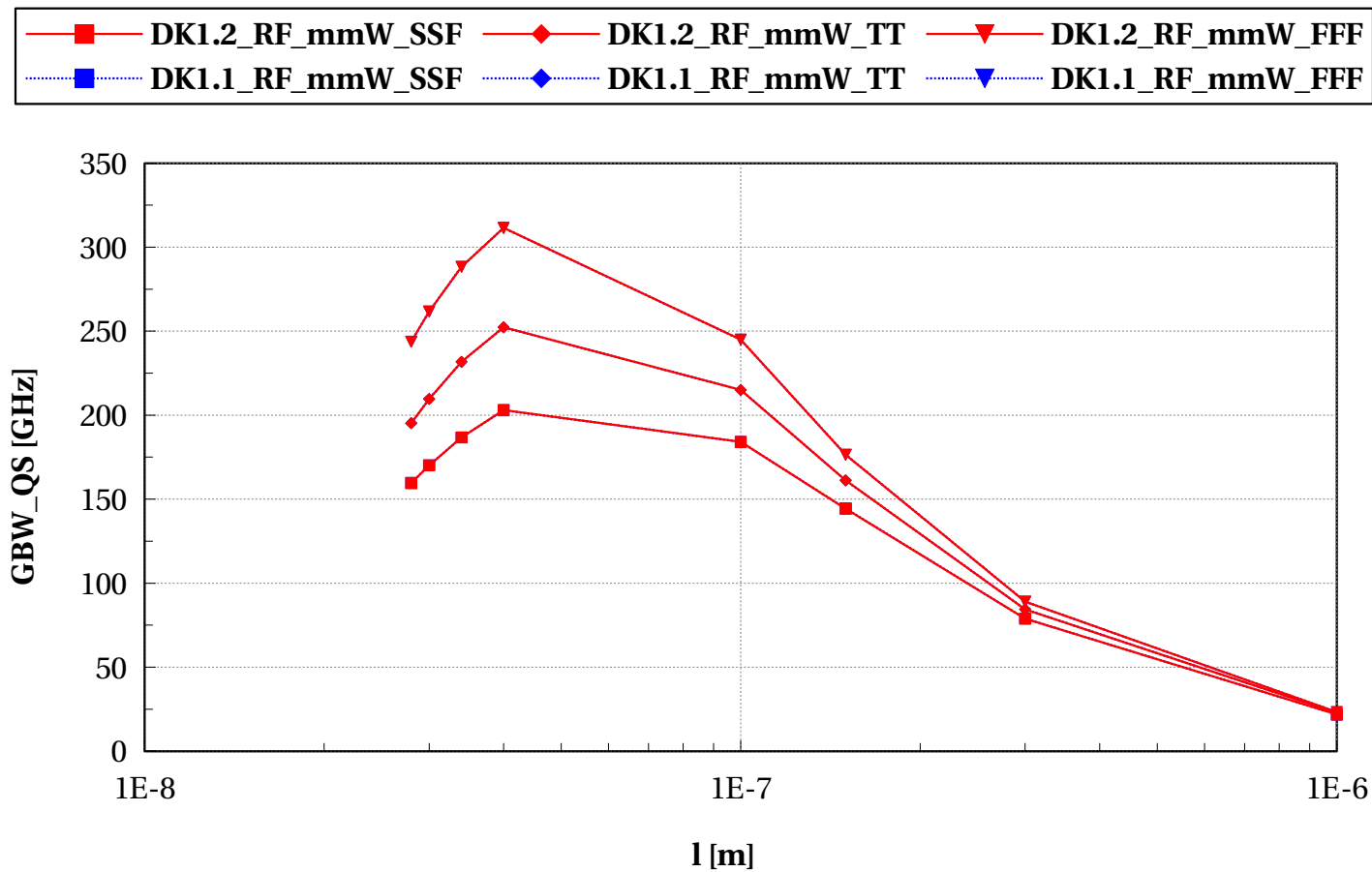
# nfet\_rf, GDC\_ana [] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6



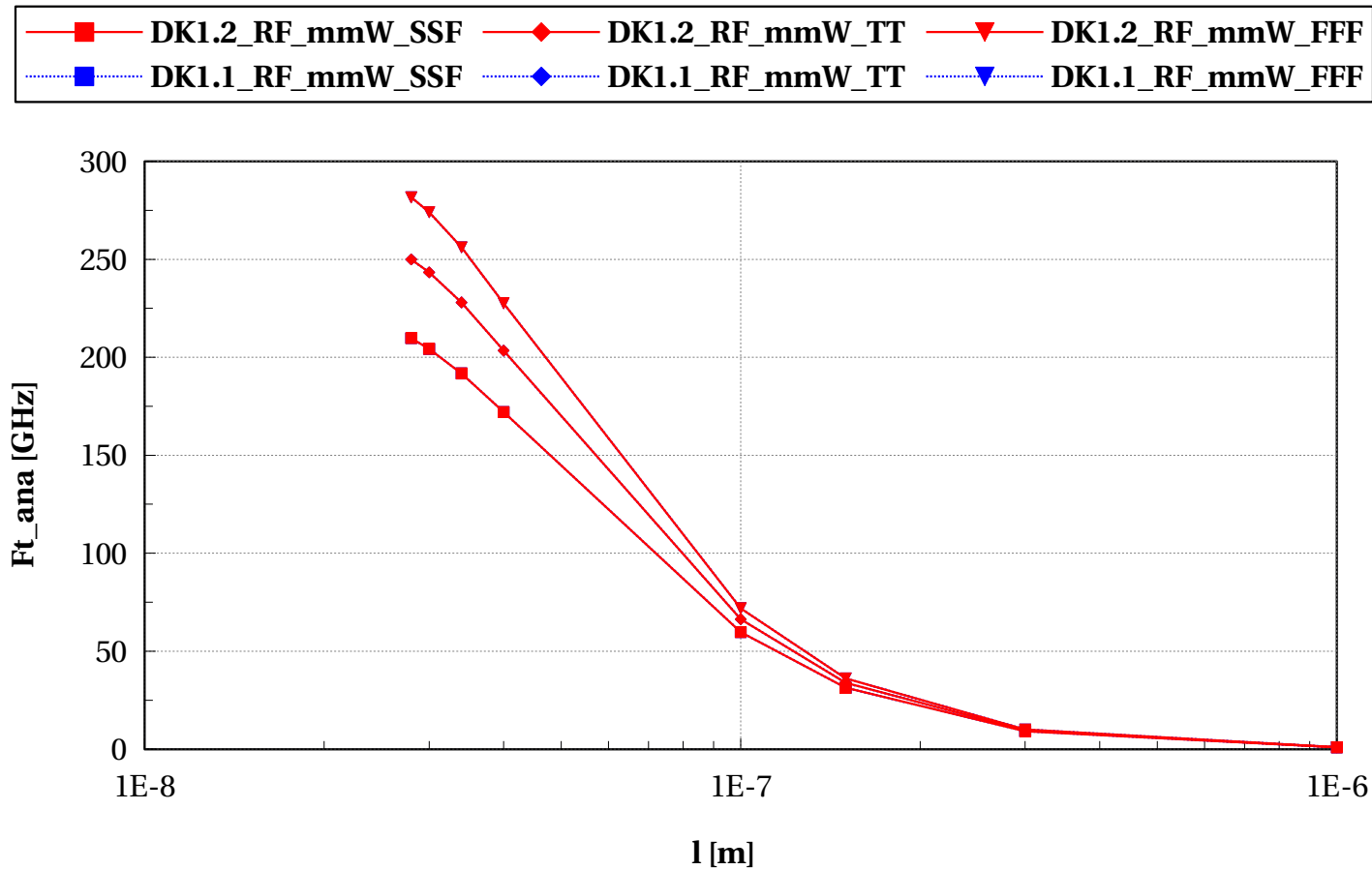
# nfet\_rf, GBW\_QS [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



# nfet\_rf, Ft\_ana [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



# **nfet\_rfseg**

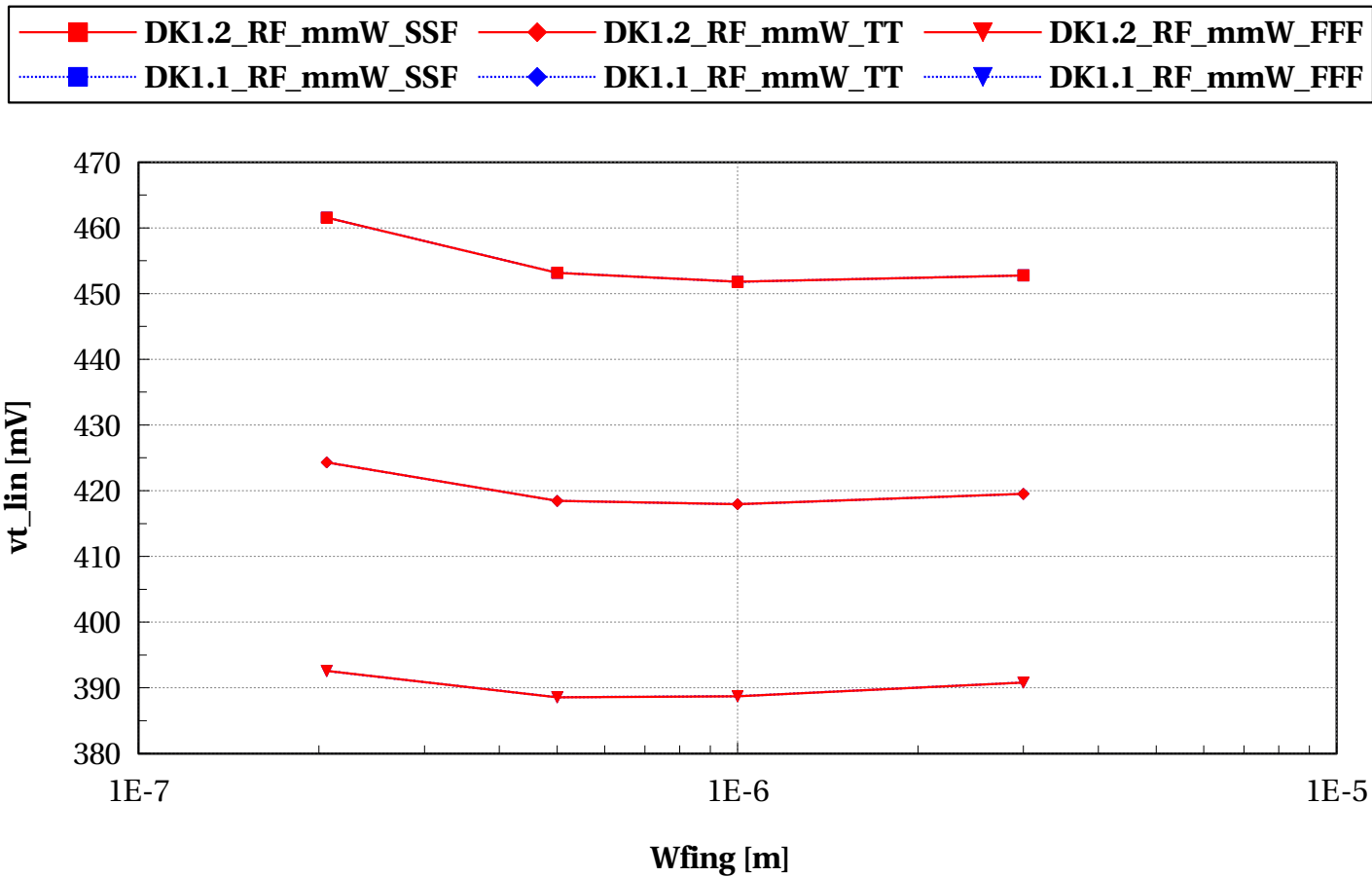
## **Electrical characteristics scaling**



## Scaling versus width $L=30\text{nm}$ - DC

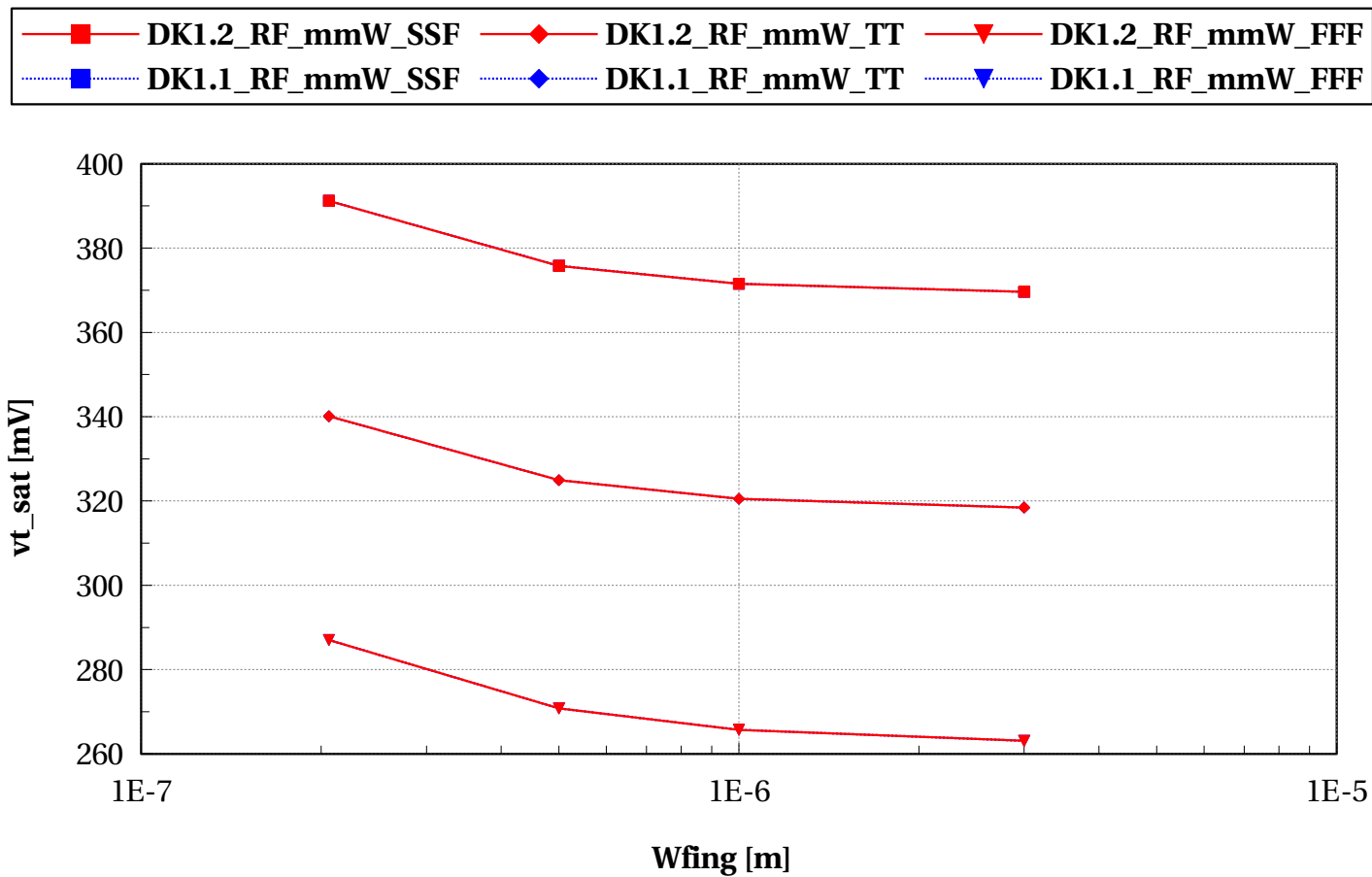
# nfet\_rfseg, vt\_lin [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



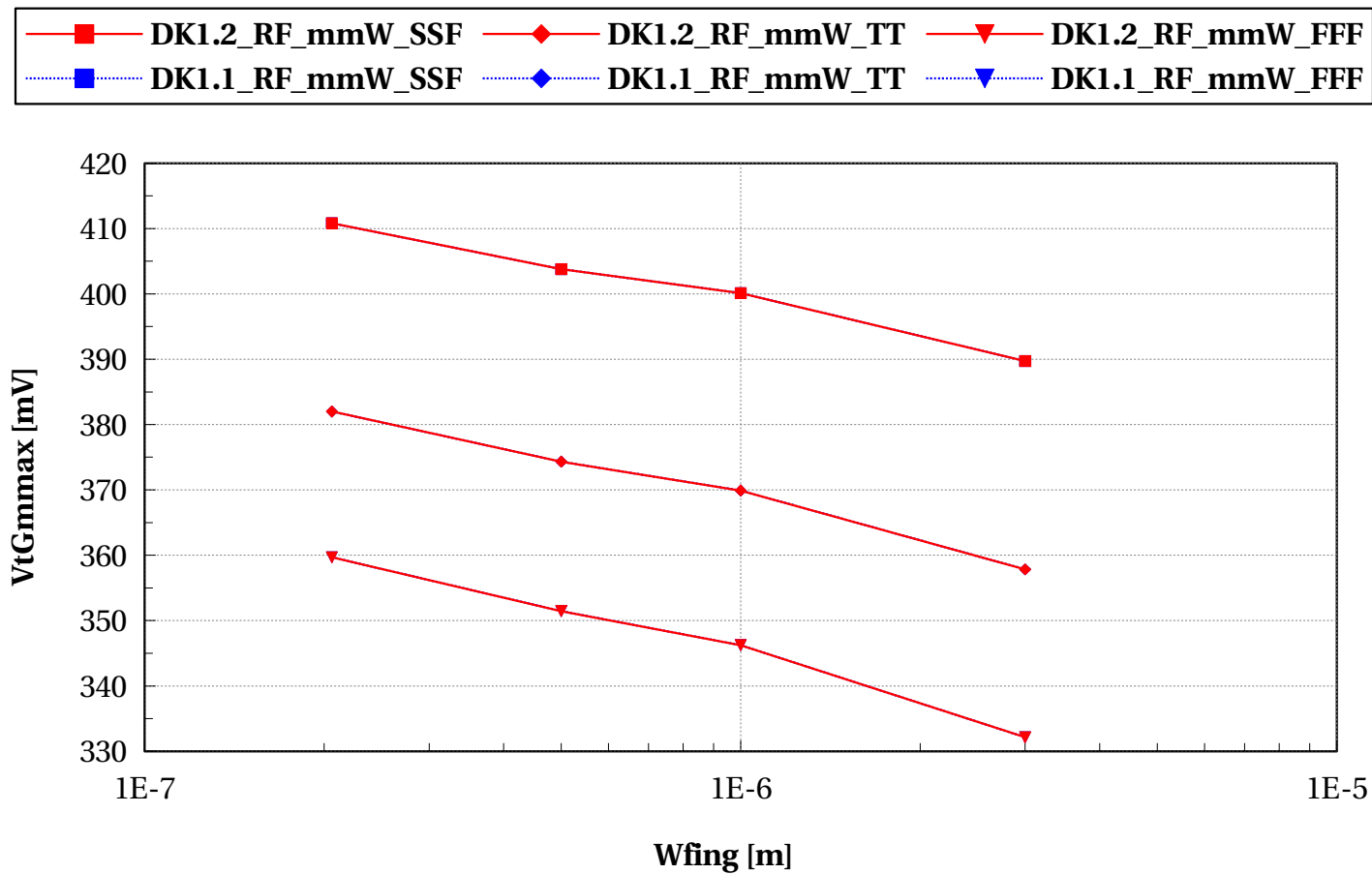
## nfet\_rfseg, vt\_sat [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



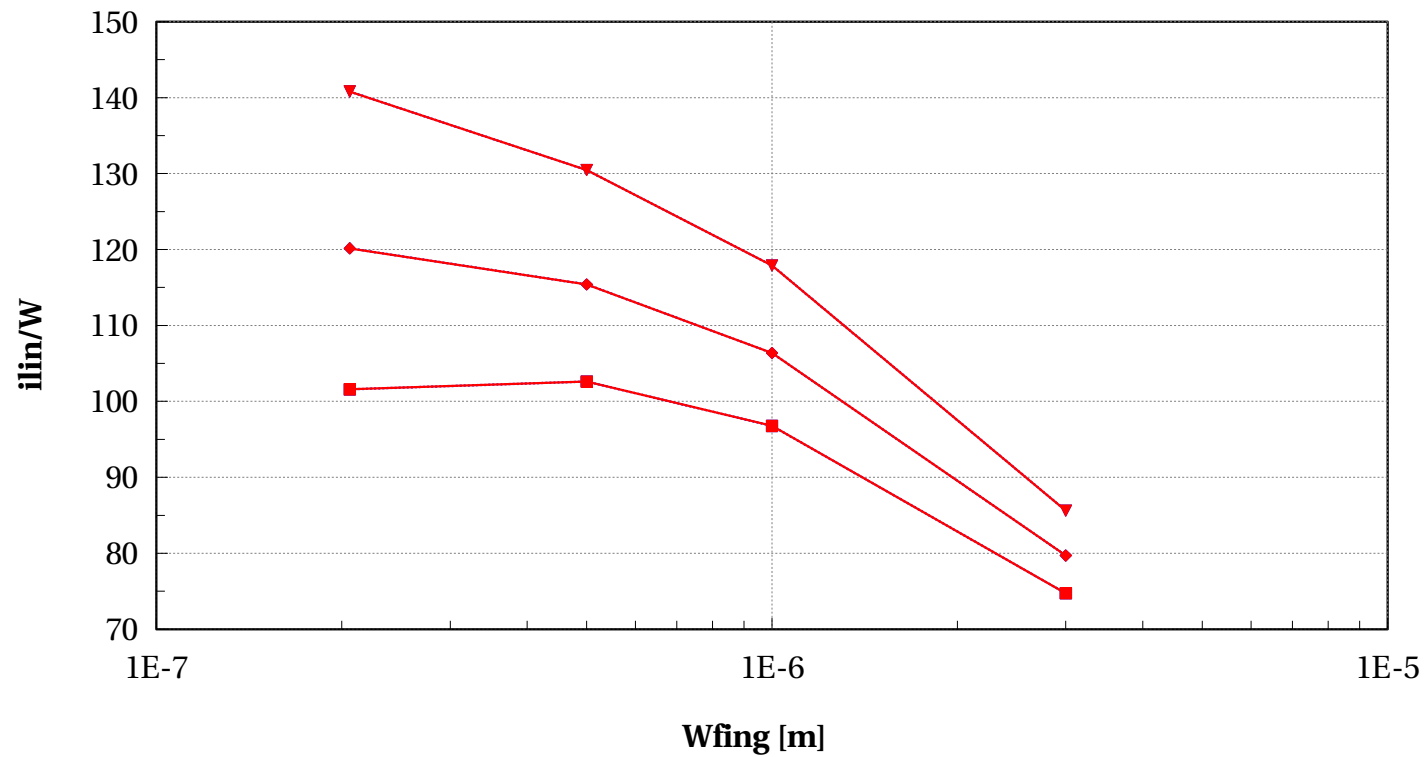
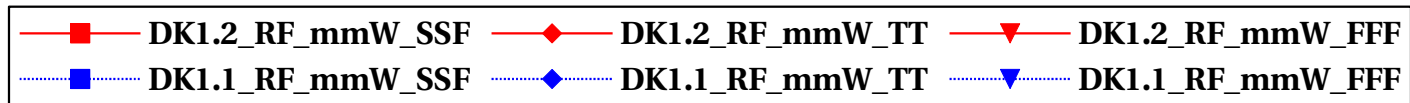
# nfet\_rfseg, VtGmmax [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



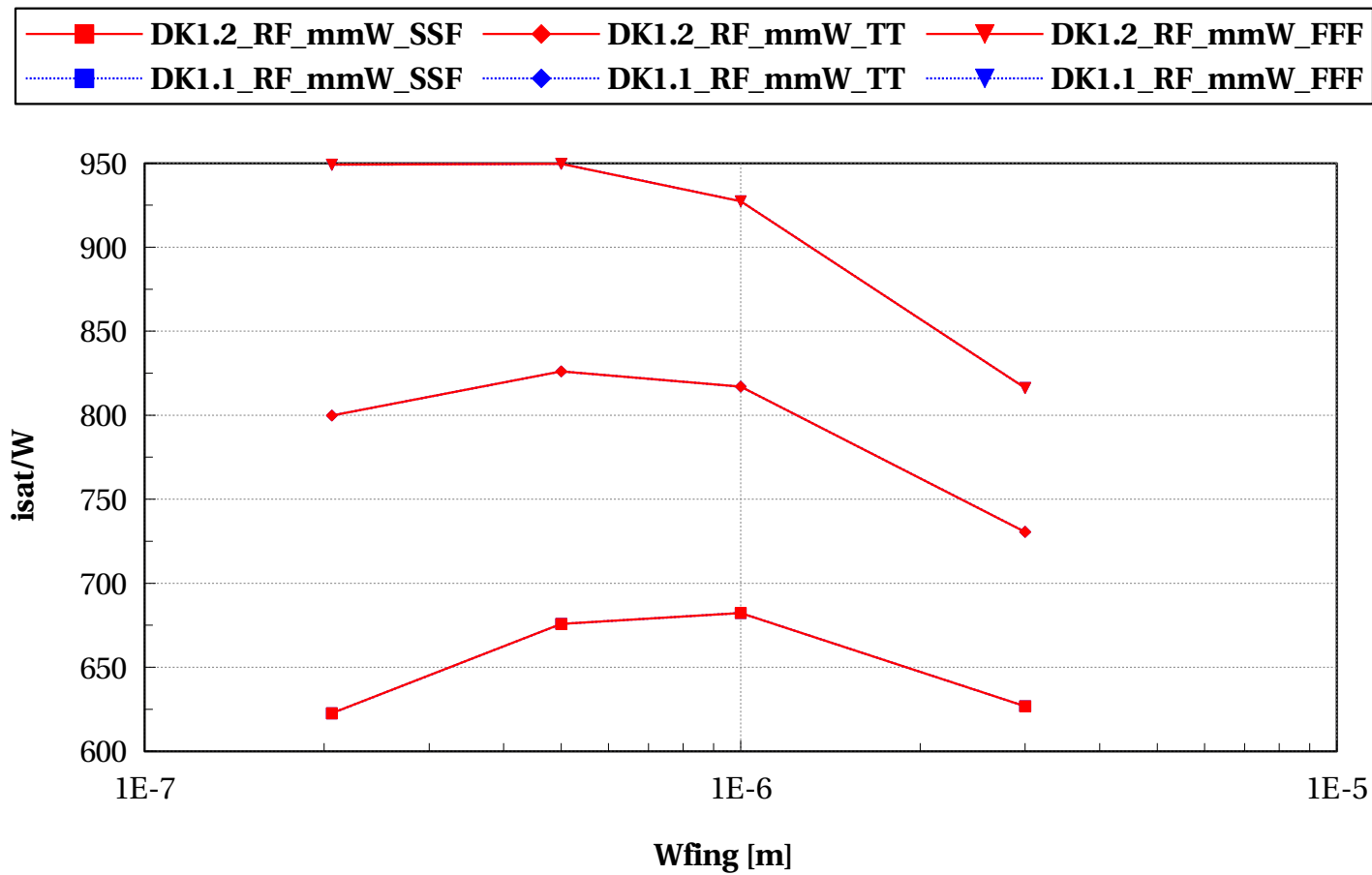
## nfet\_rfseg, $i_{lin}/W$ vs $W_{fing}$ [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and  $l=30e-9$



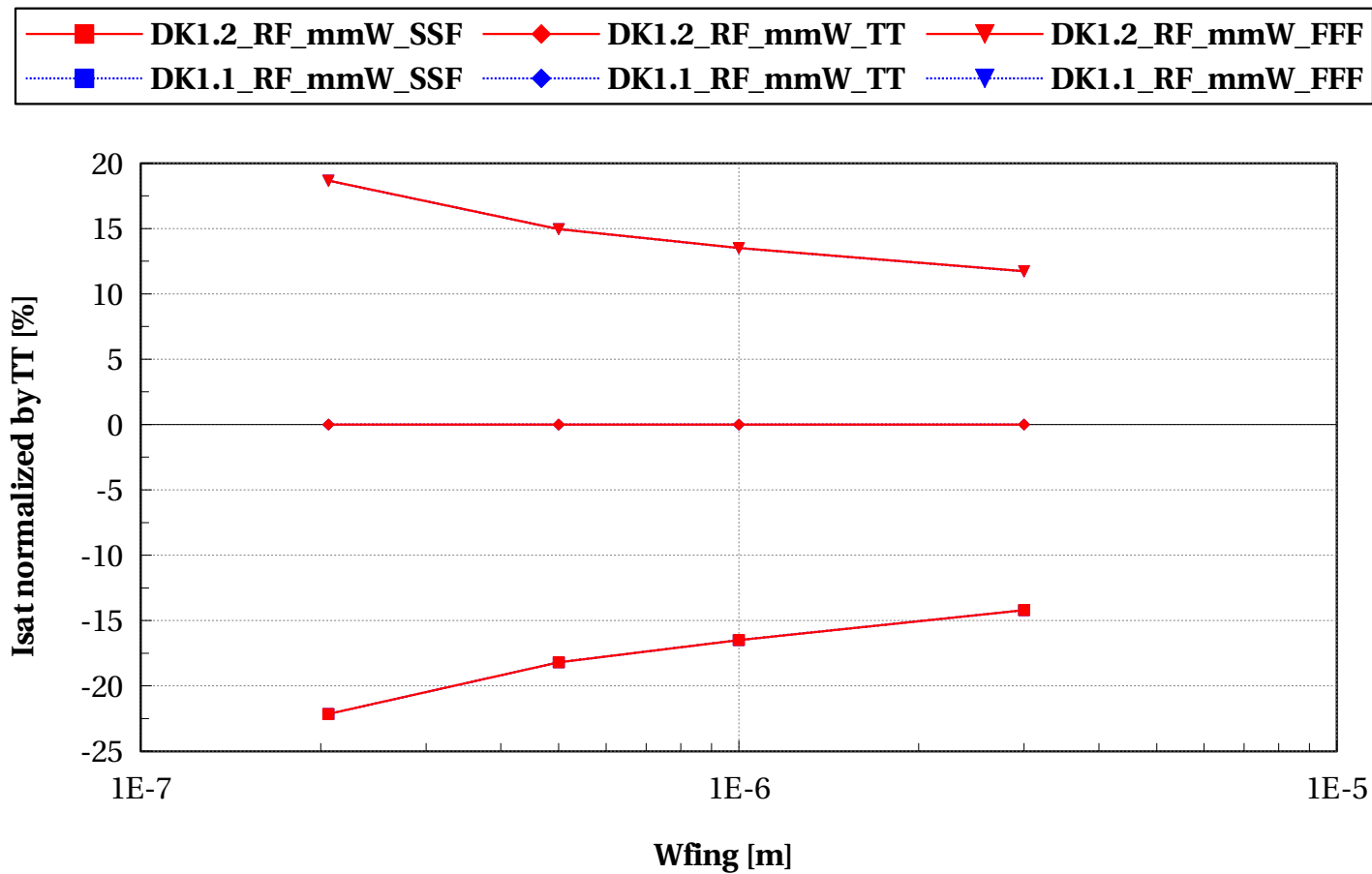
## nfet\_rfseg, isat/W vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



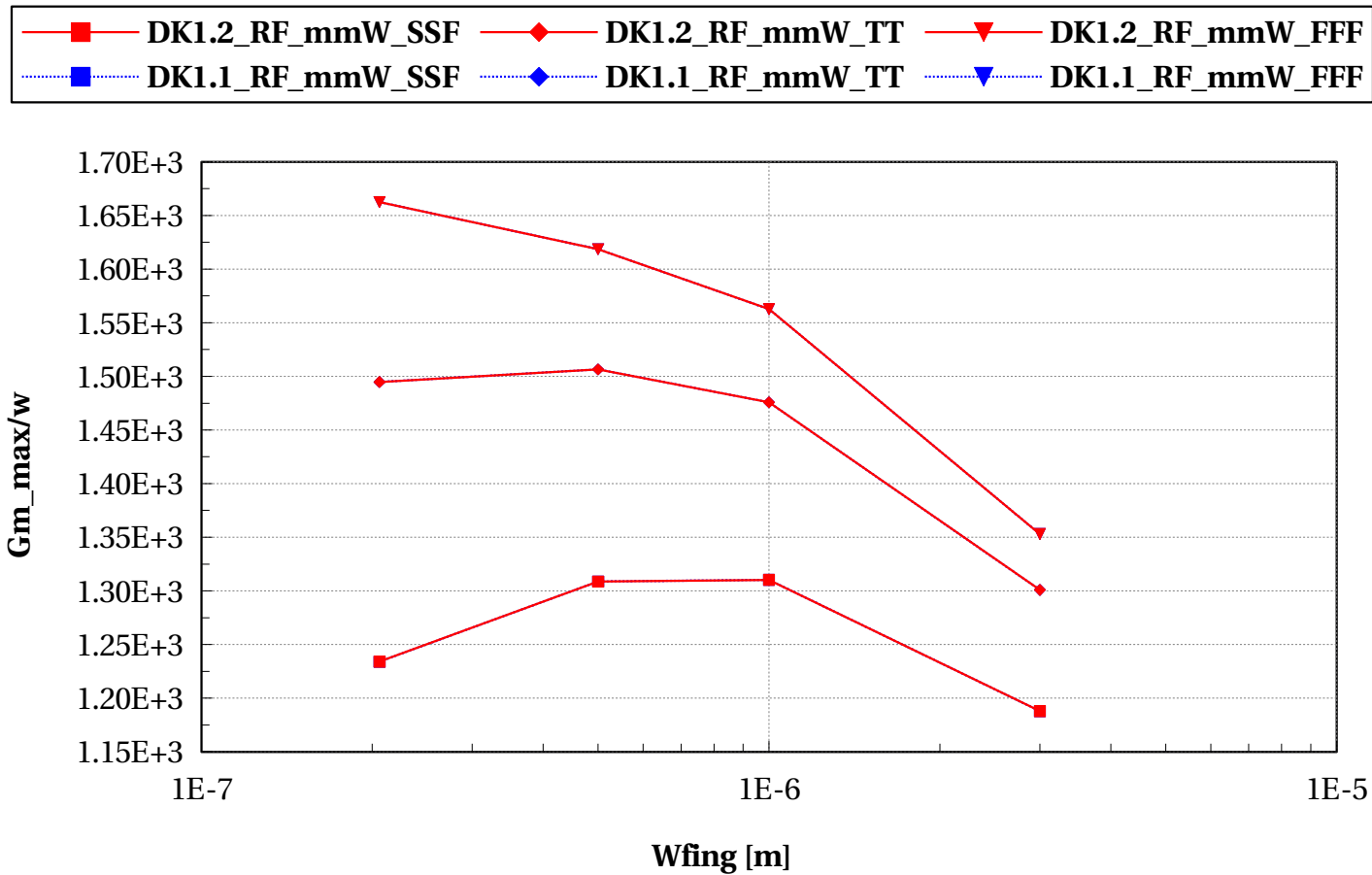
## nfet\_rfseg, Isat normalized by TT [%] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



## nfet\_rfseg, Gm\_max/w vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9

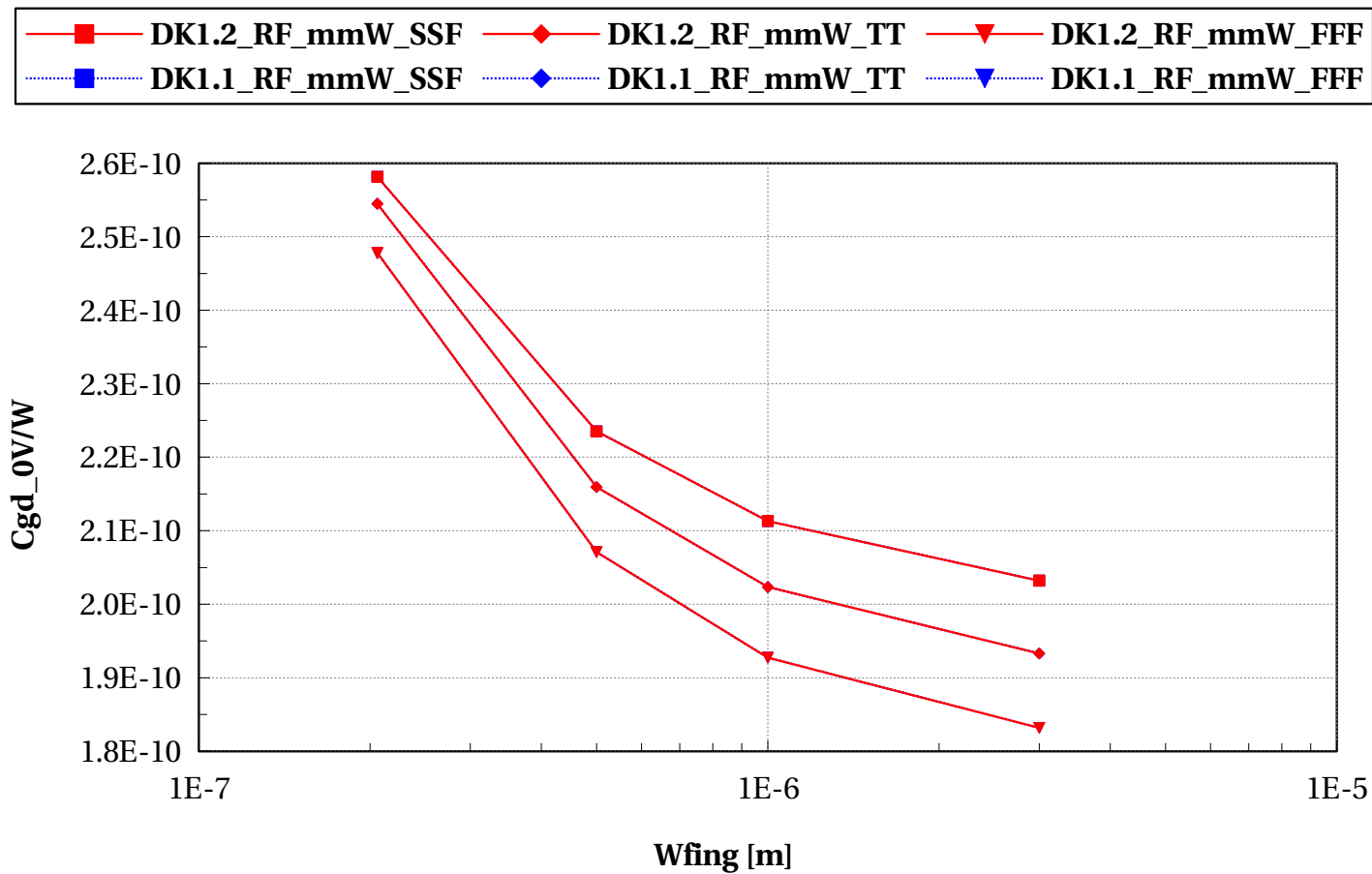




# Scaling versus width $L=30\text{nm}$ - RF

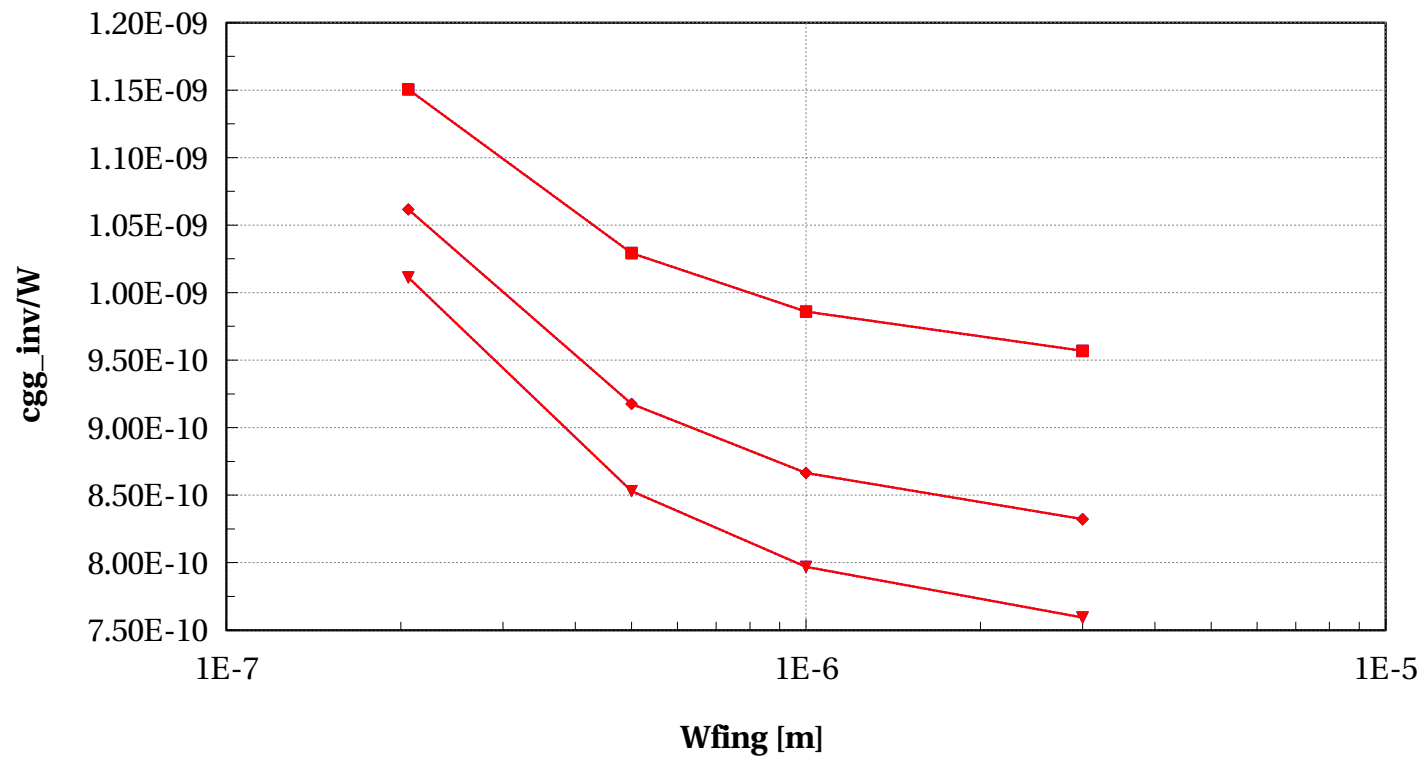
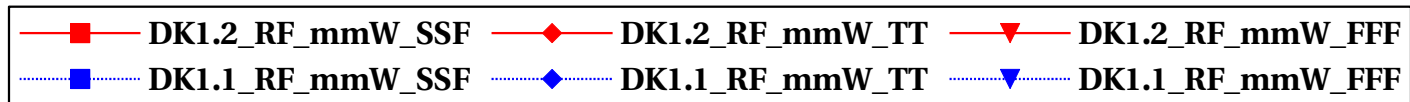
# nfet\_rfseg, Cgd\_0V/W vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



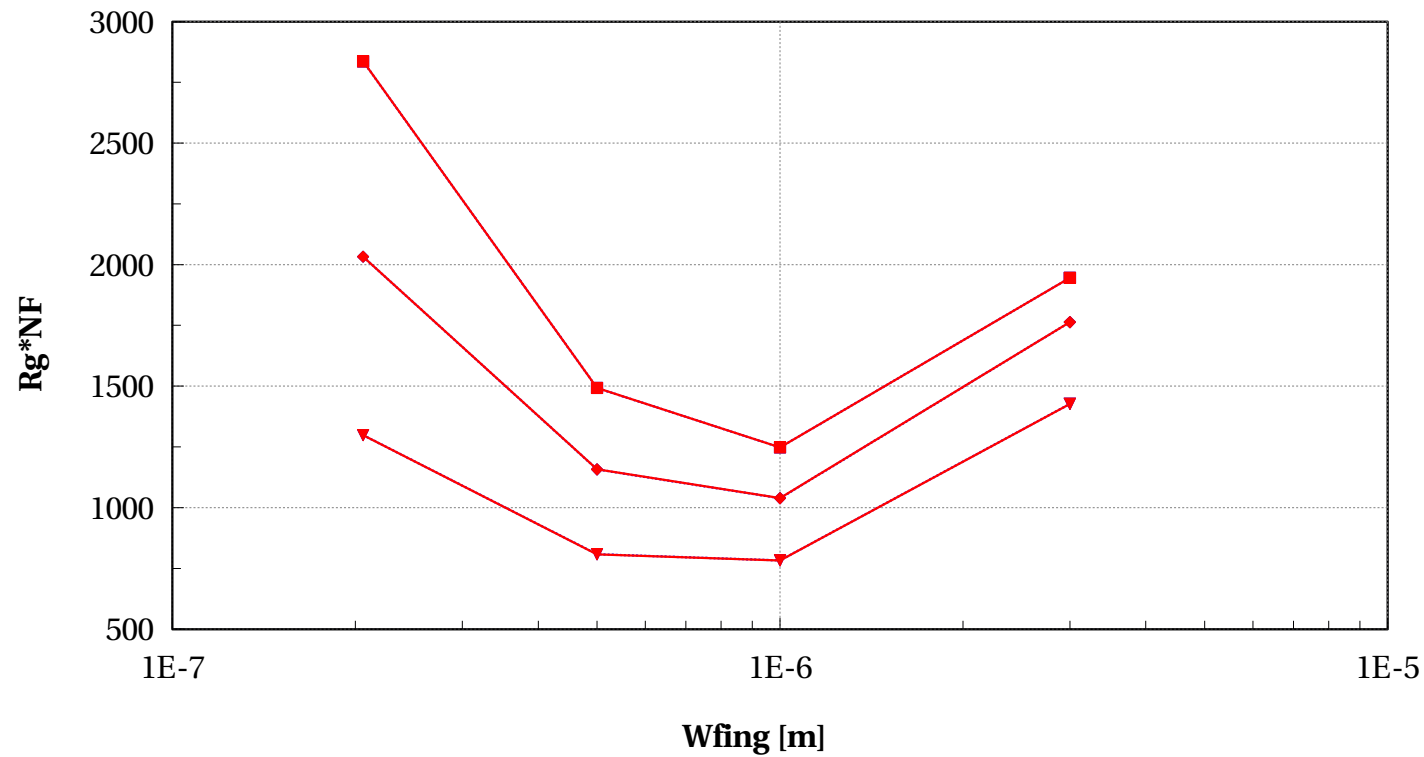
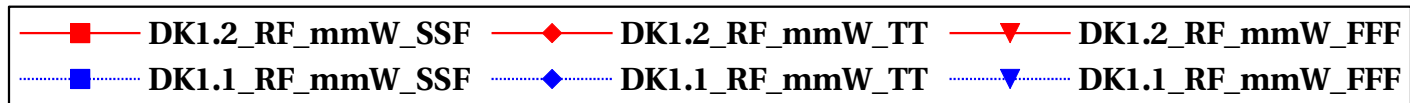
# nfet\_rfseg, cgg\_inv/W vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



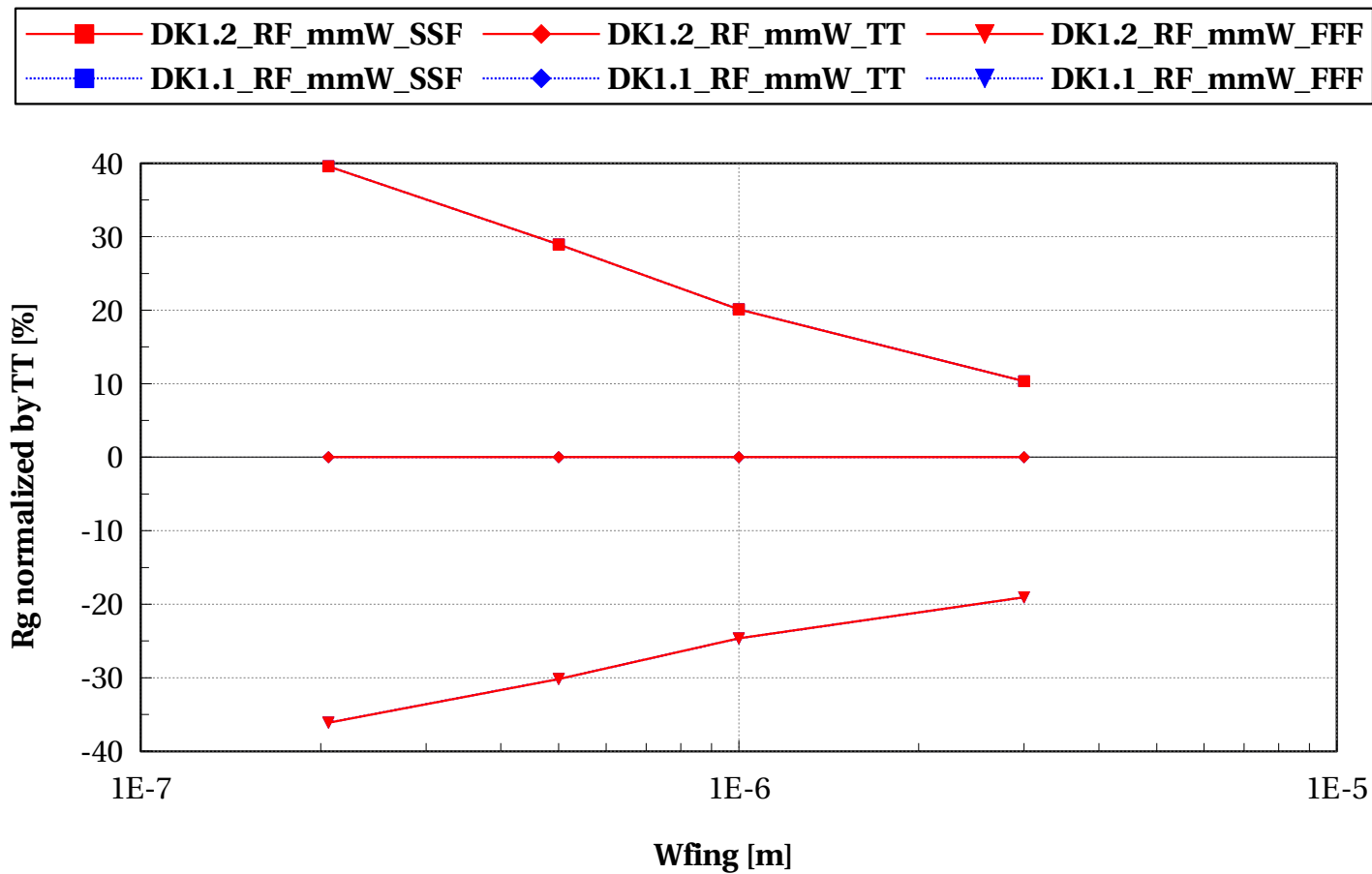
# nfet\_rfseg, $R_g * NF$ vs $W_{fing}$ [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and  $l=30e-9$



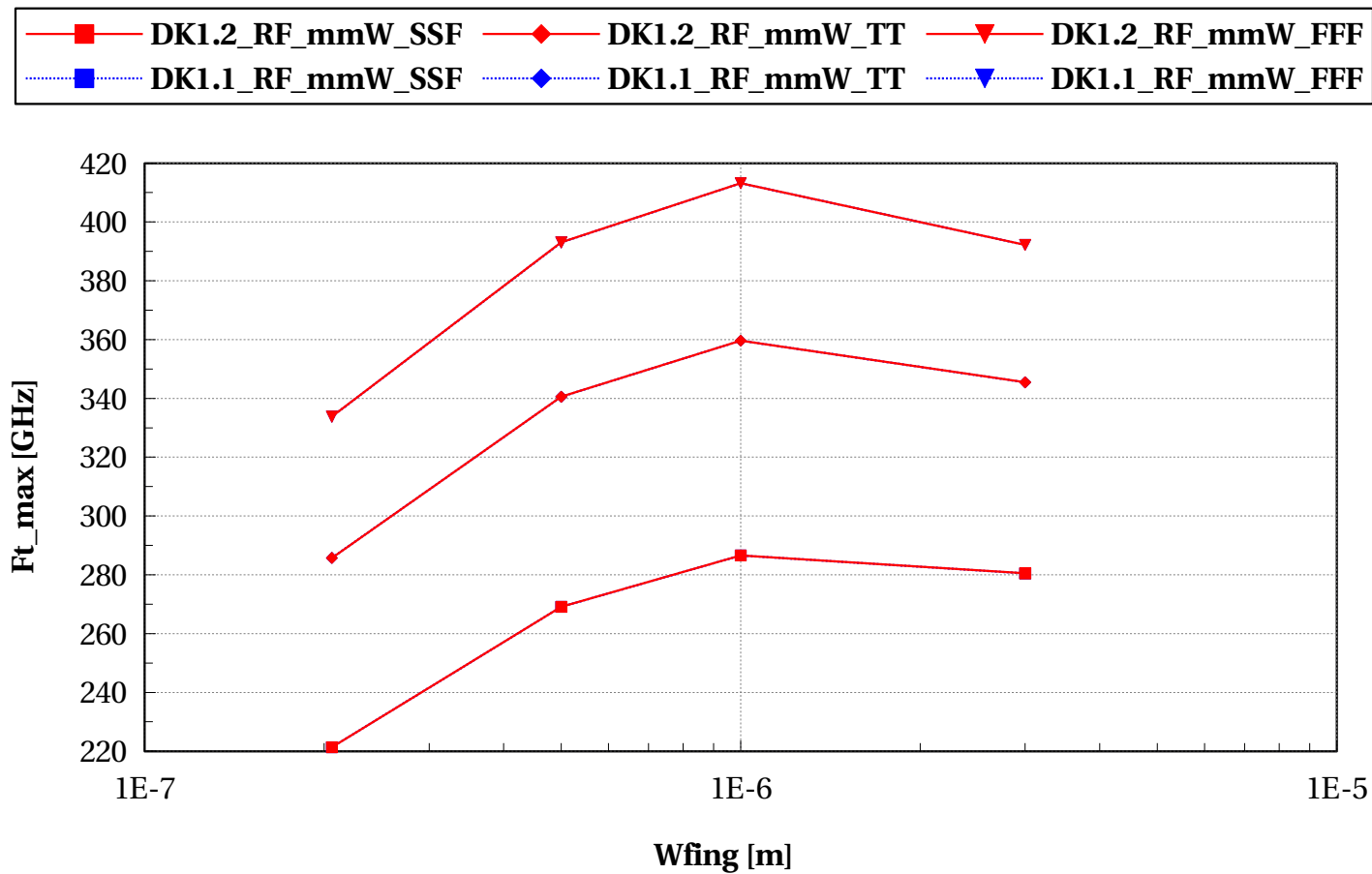
## nfet\_rfseg, Rg normalized by TT [%] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



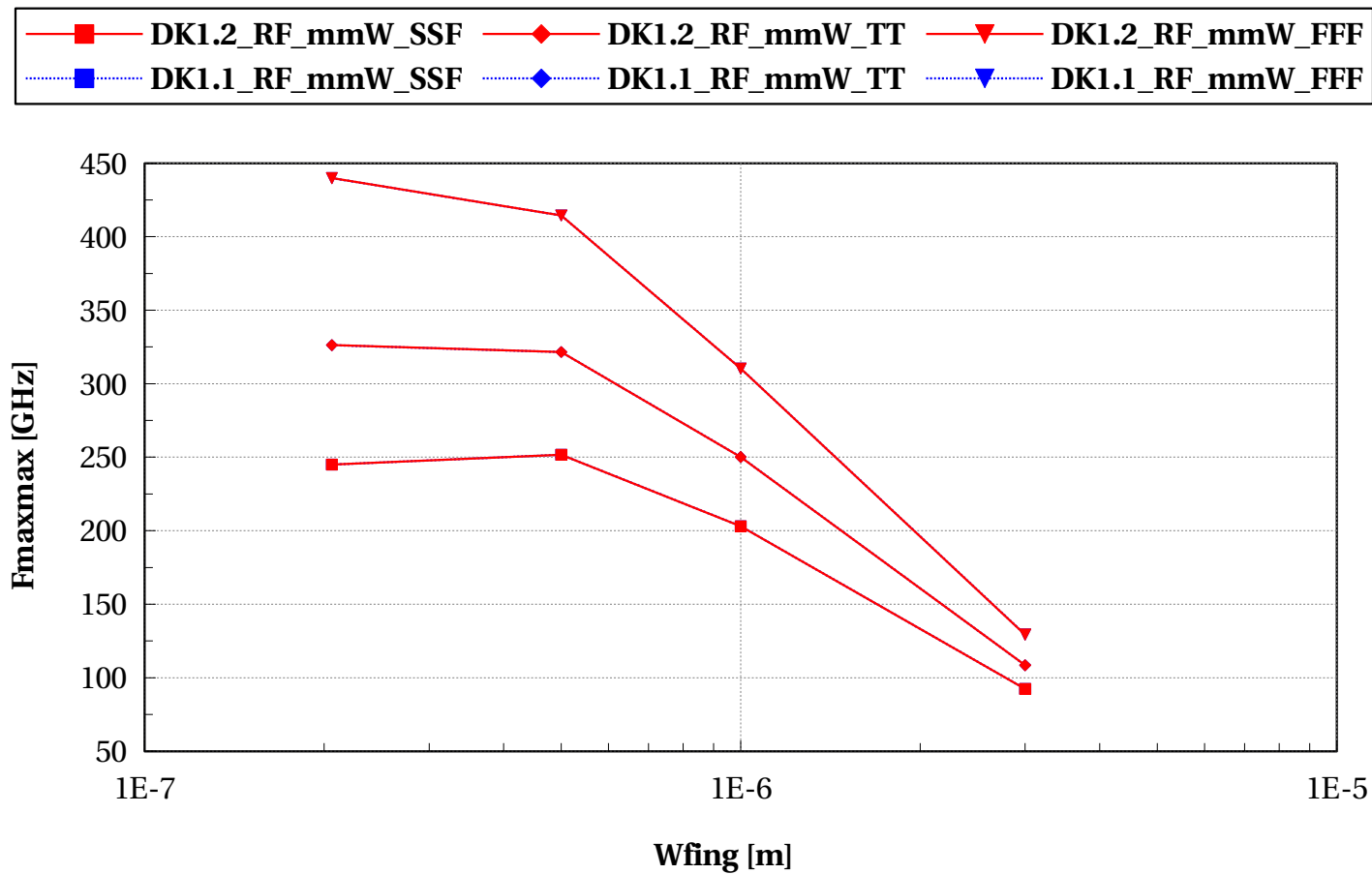
# nfet\_rfseg, Ft\_max [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



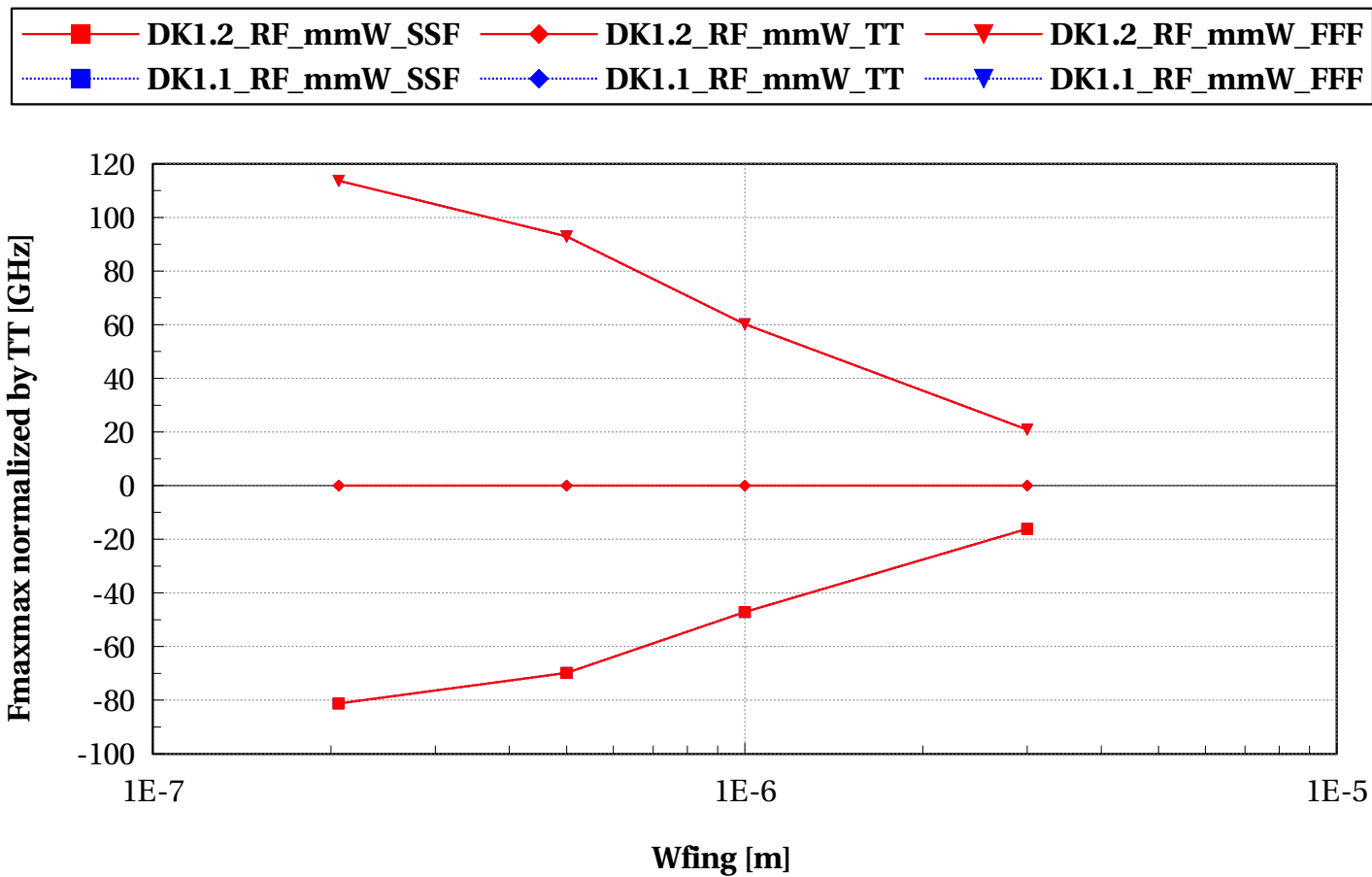
# nfet\_rfseg, Fmaxmax [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# nfet\_rfseg, Fmaxmax normalized by TT [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9

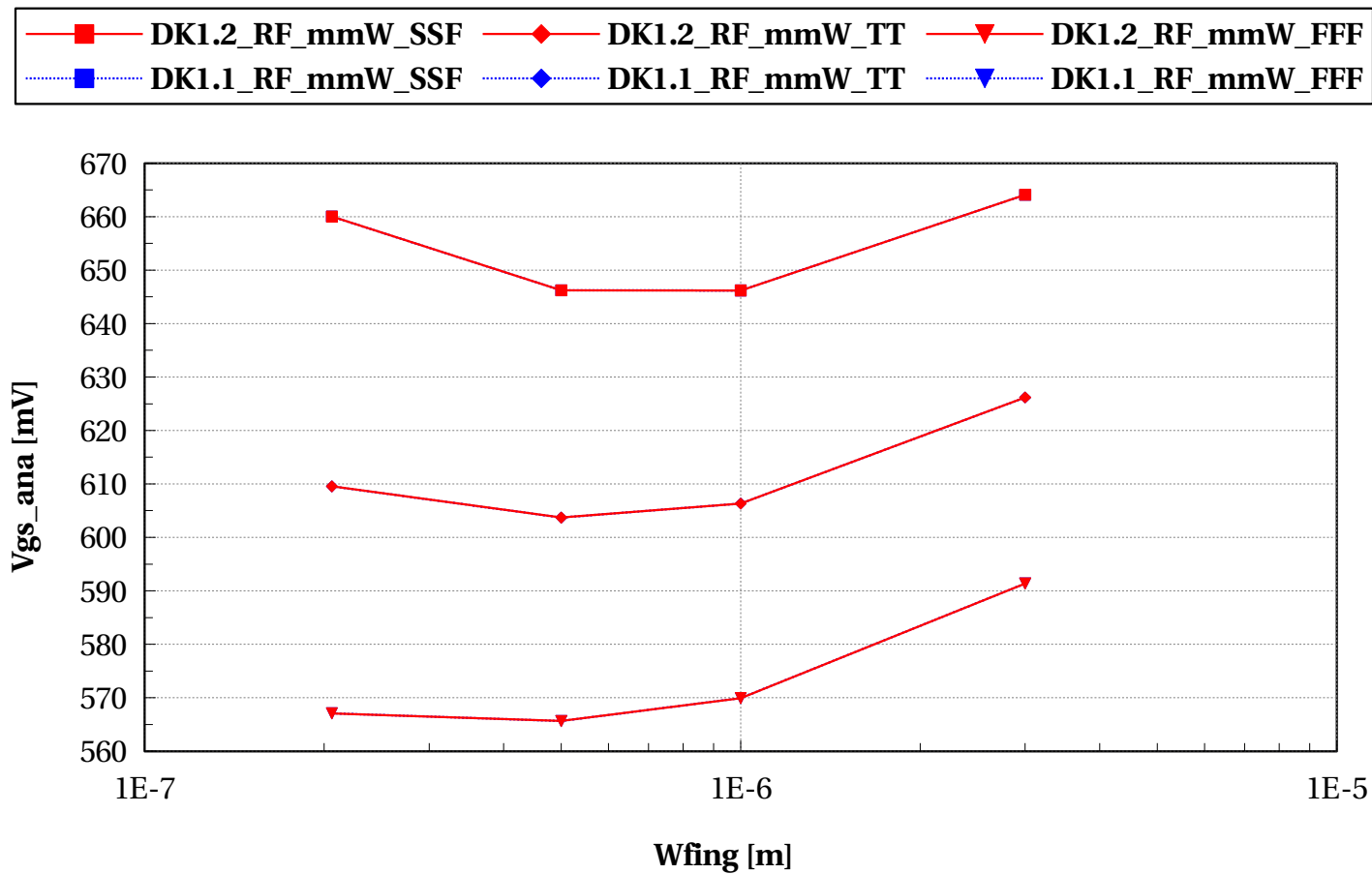




# Scaling versus width $L=30\text{nm}$ - Analog

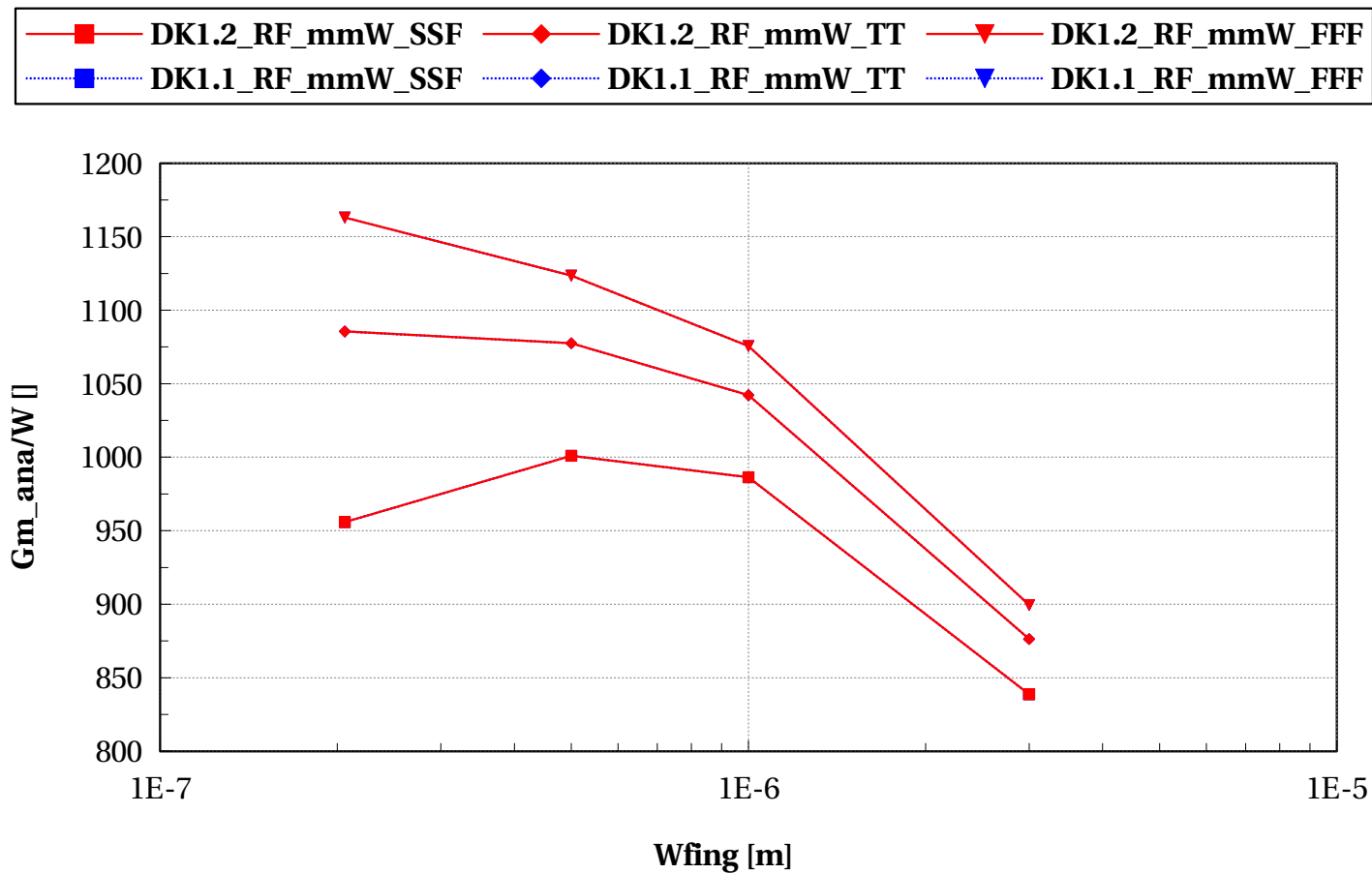
# nfet\_rfseg, Vgs\_ana [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



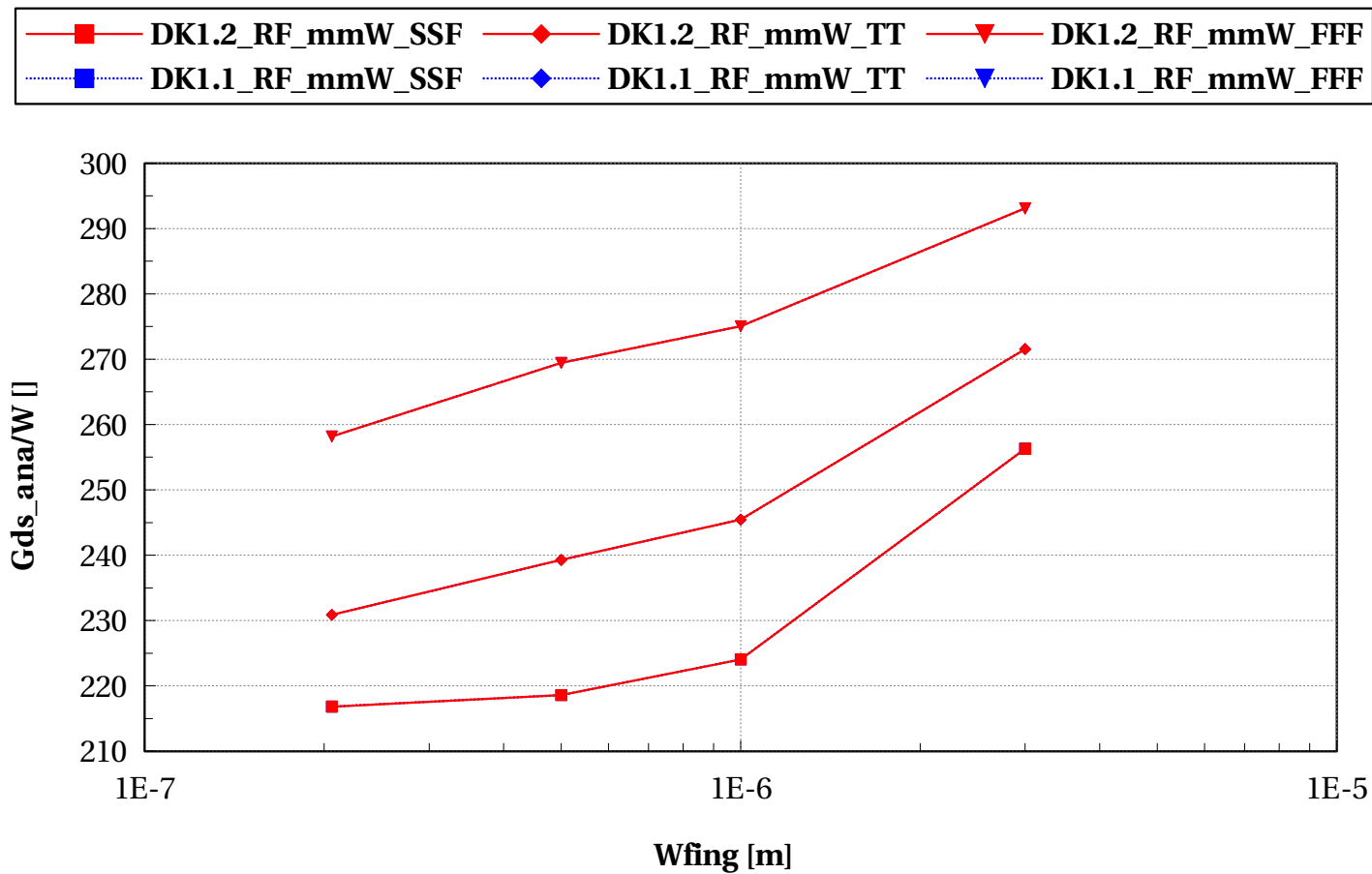
# nfet\_rfseg, Gm\_ana/W [] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



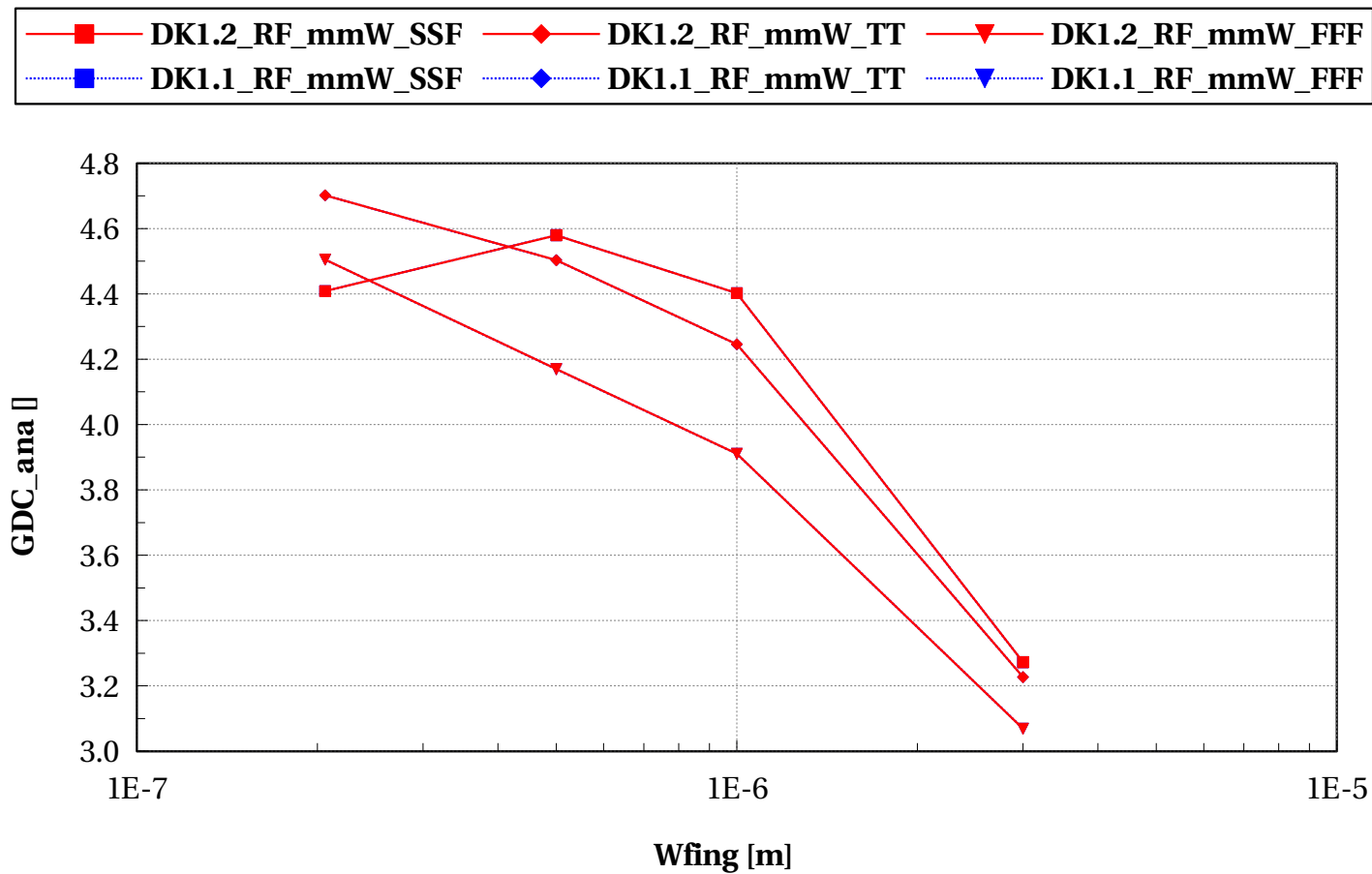
# nfet\_rfseg, Gds\_ana/W [] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



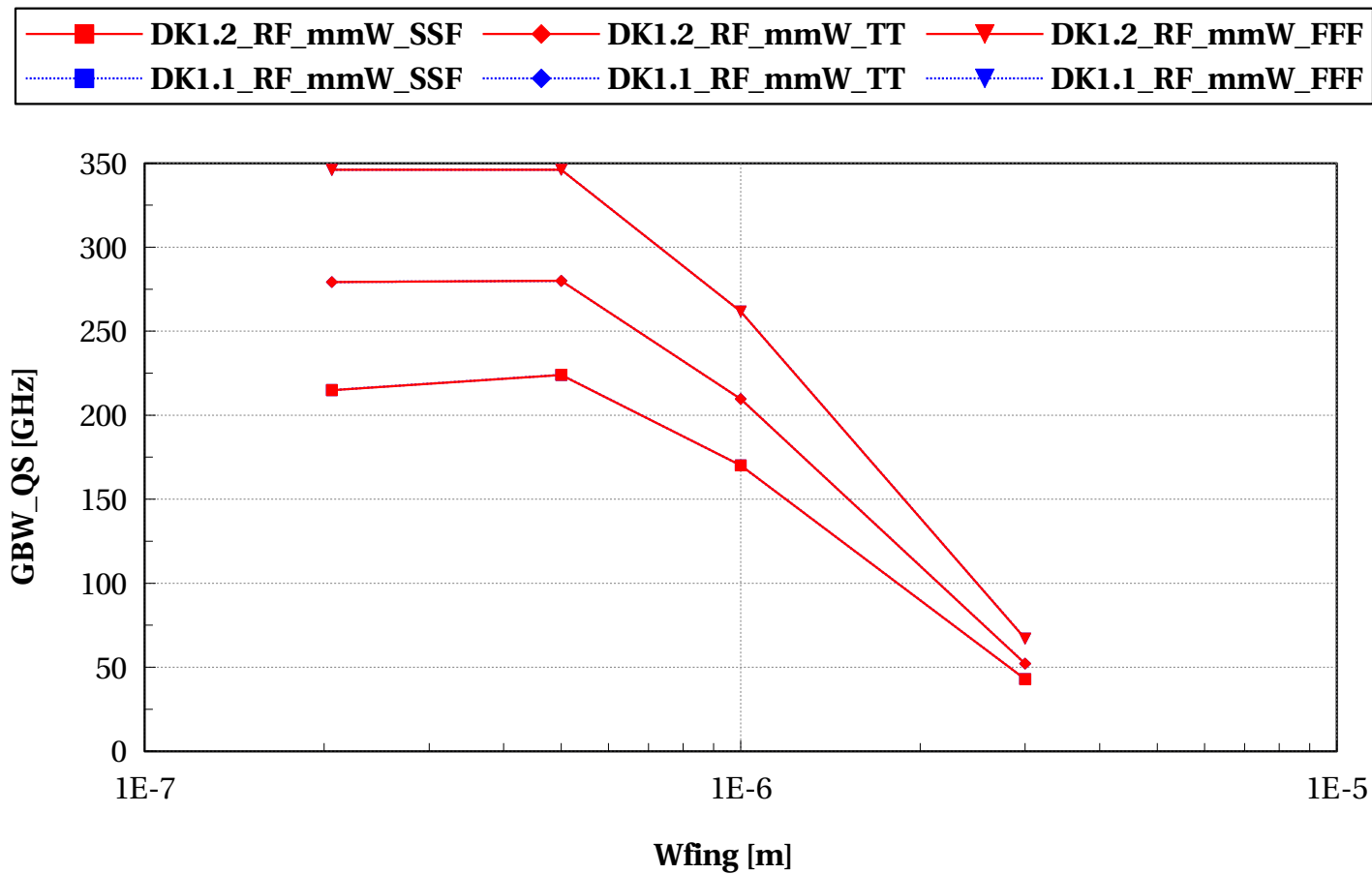
# nfet\_rfseg, GDC\_ana [] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



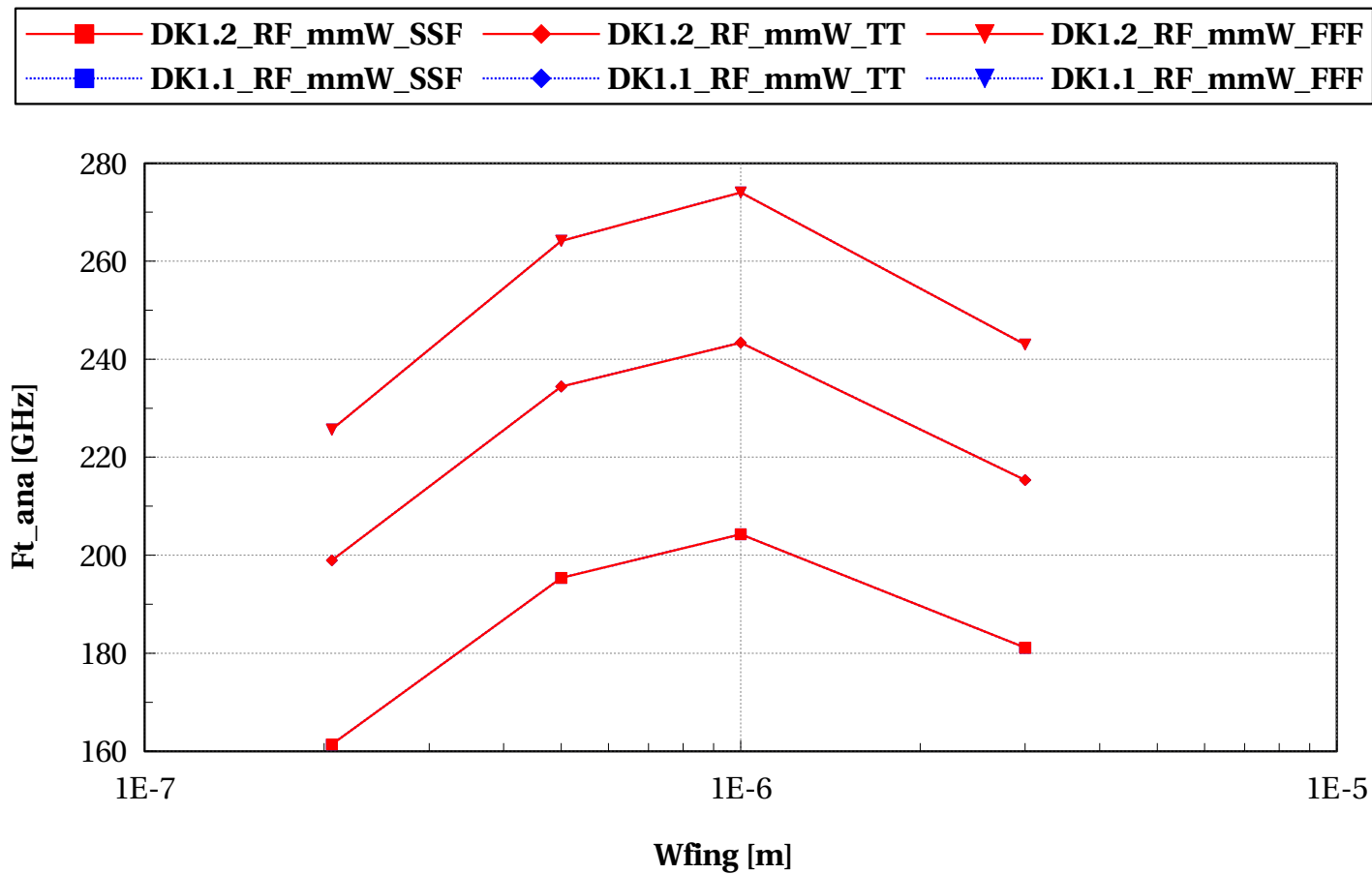
# nfet\_rfseg, GBW\_QS [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# nfet\_rfseg, Ft\_ana [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9

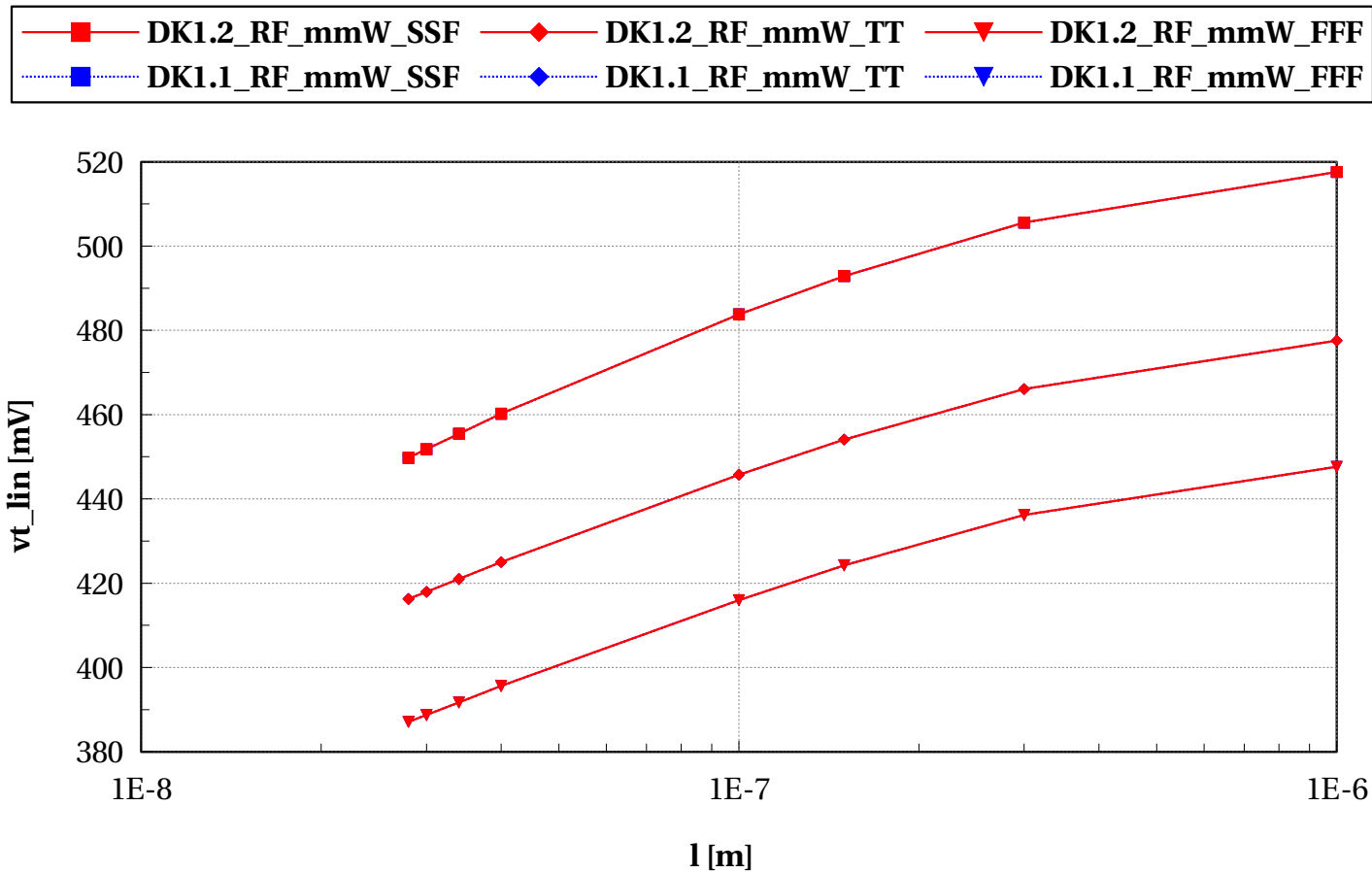


## Scaling versus length $W_{\text{fing}}=1\mu\text{m}$ - DC



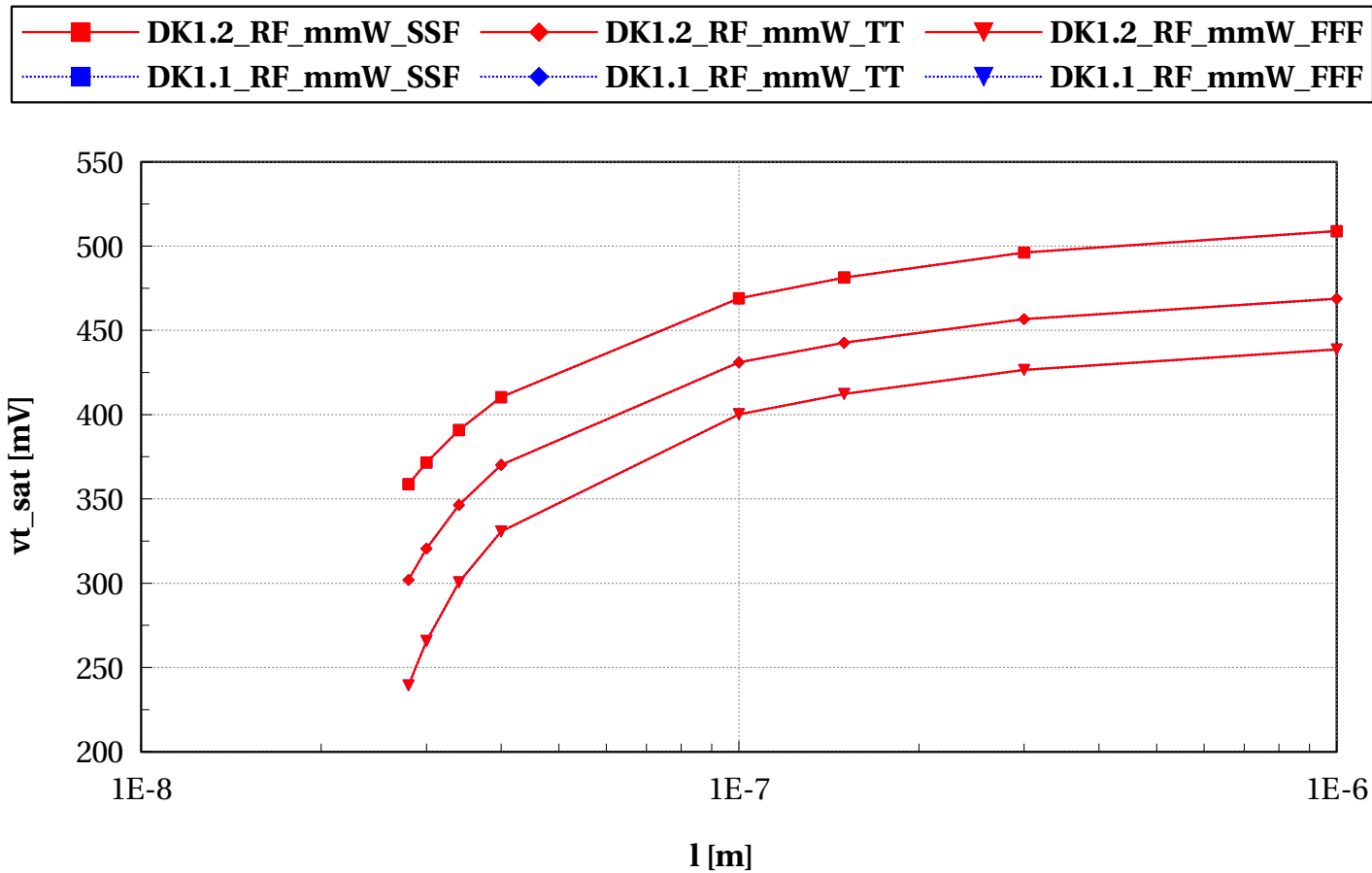
# nfet\_rfseg, vt\_lin [mV] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



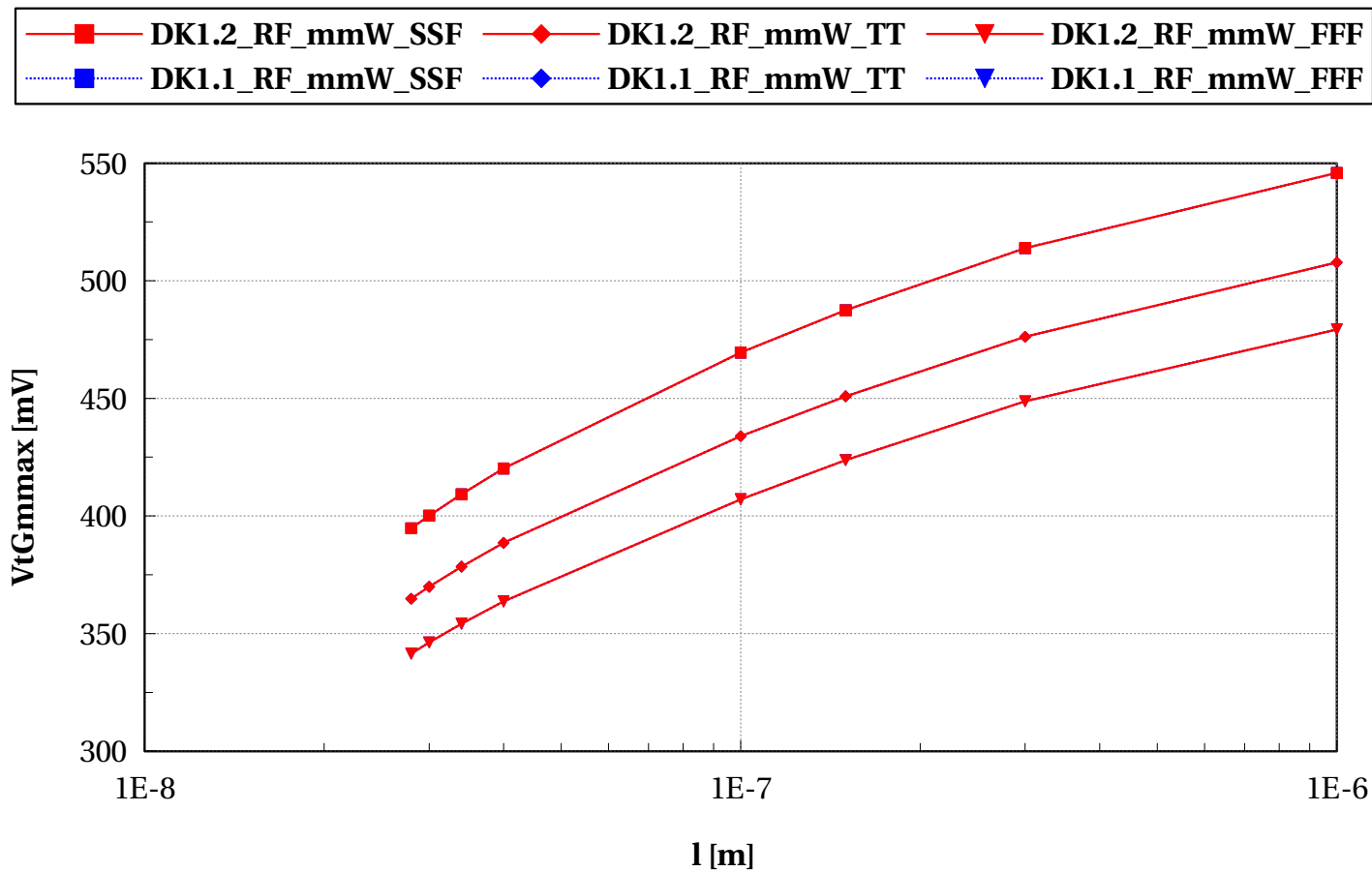
# nfet\_rfseg, vt\_sat [mV] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



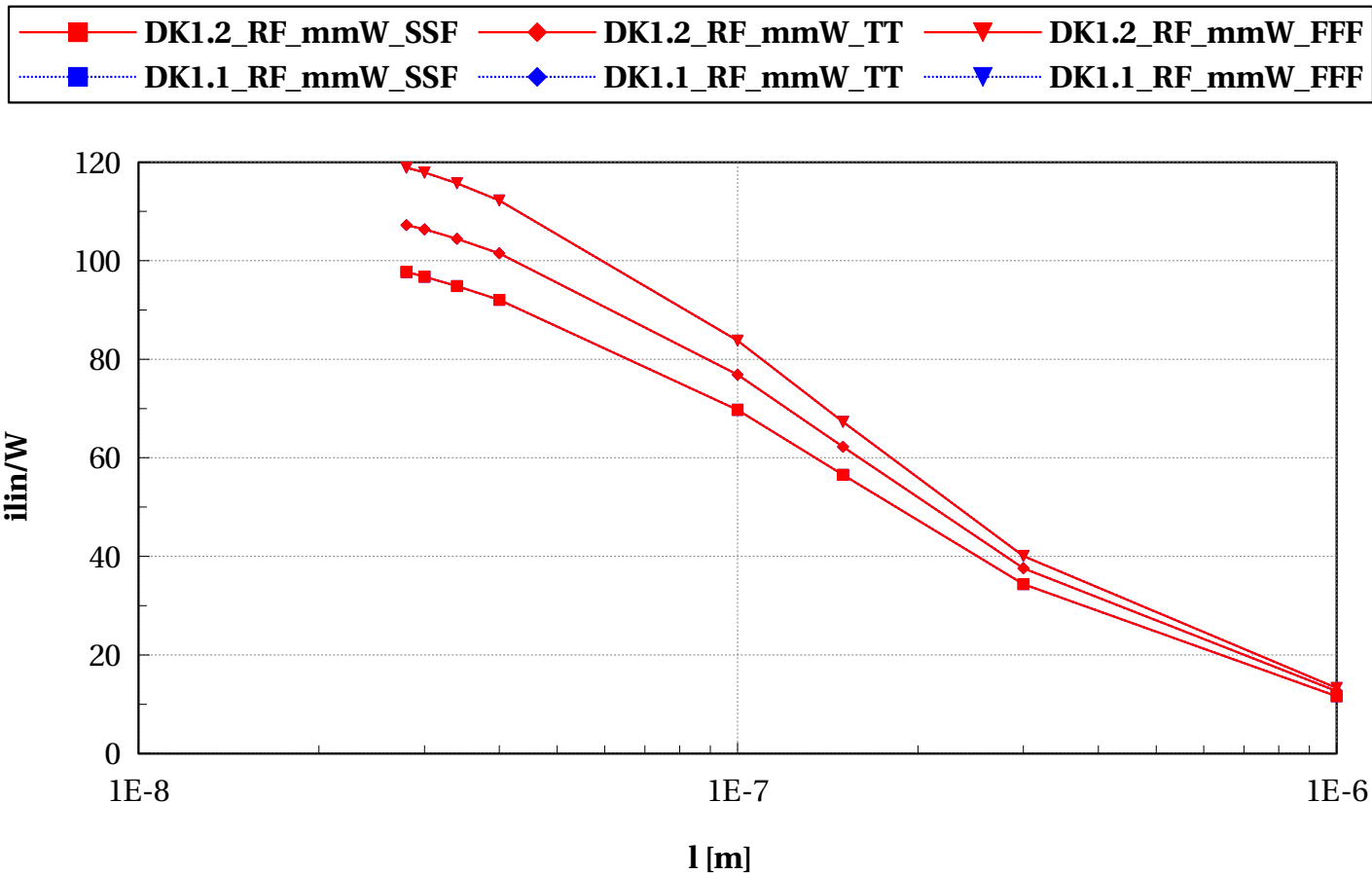
# nfet\_rfseg, VtGmmax [mV] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



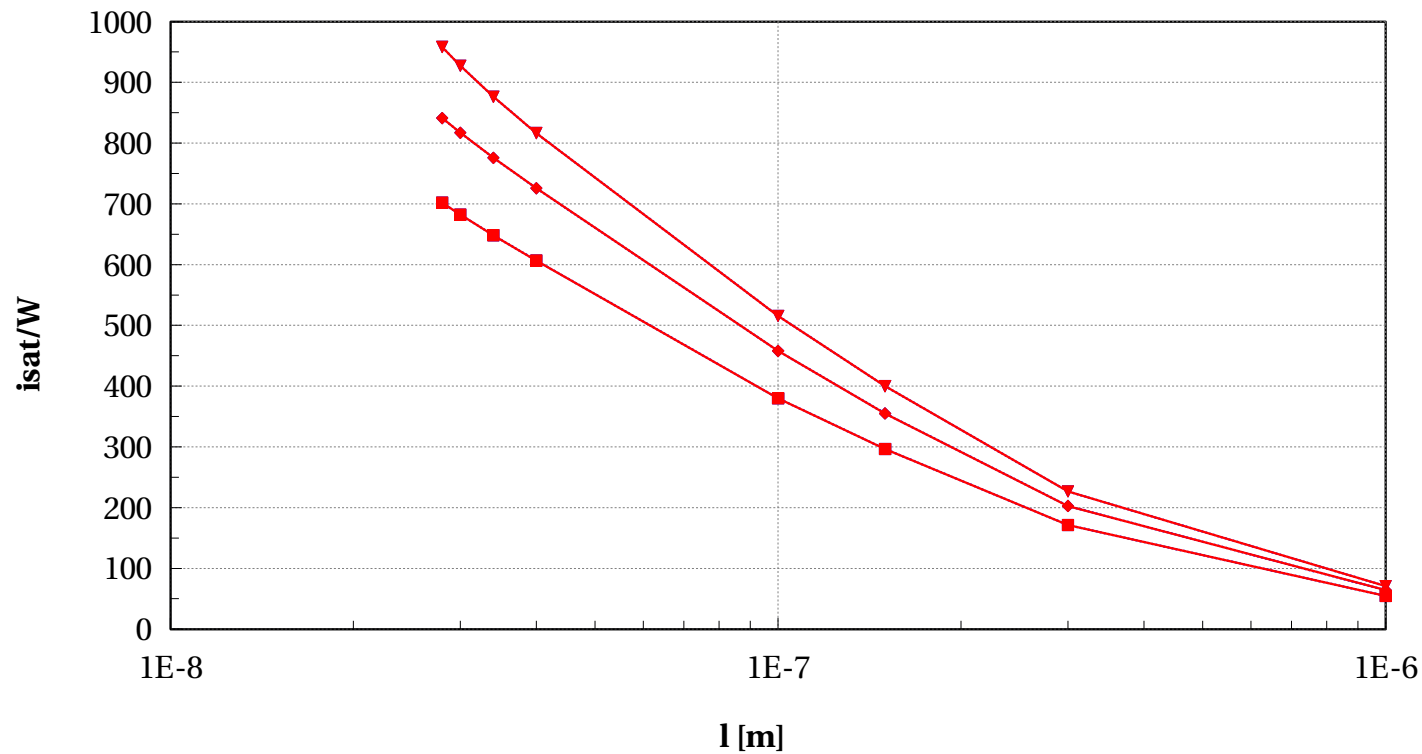
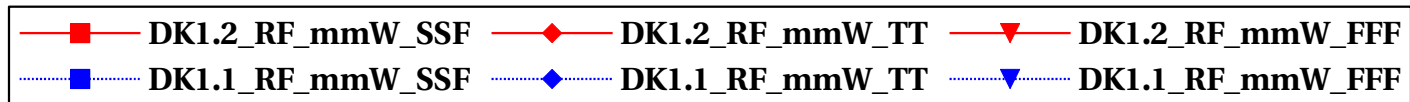
# nfet\_rfseg, $i_{lin}/W$ vs $l$ [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



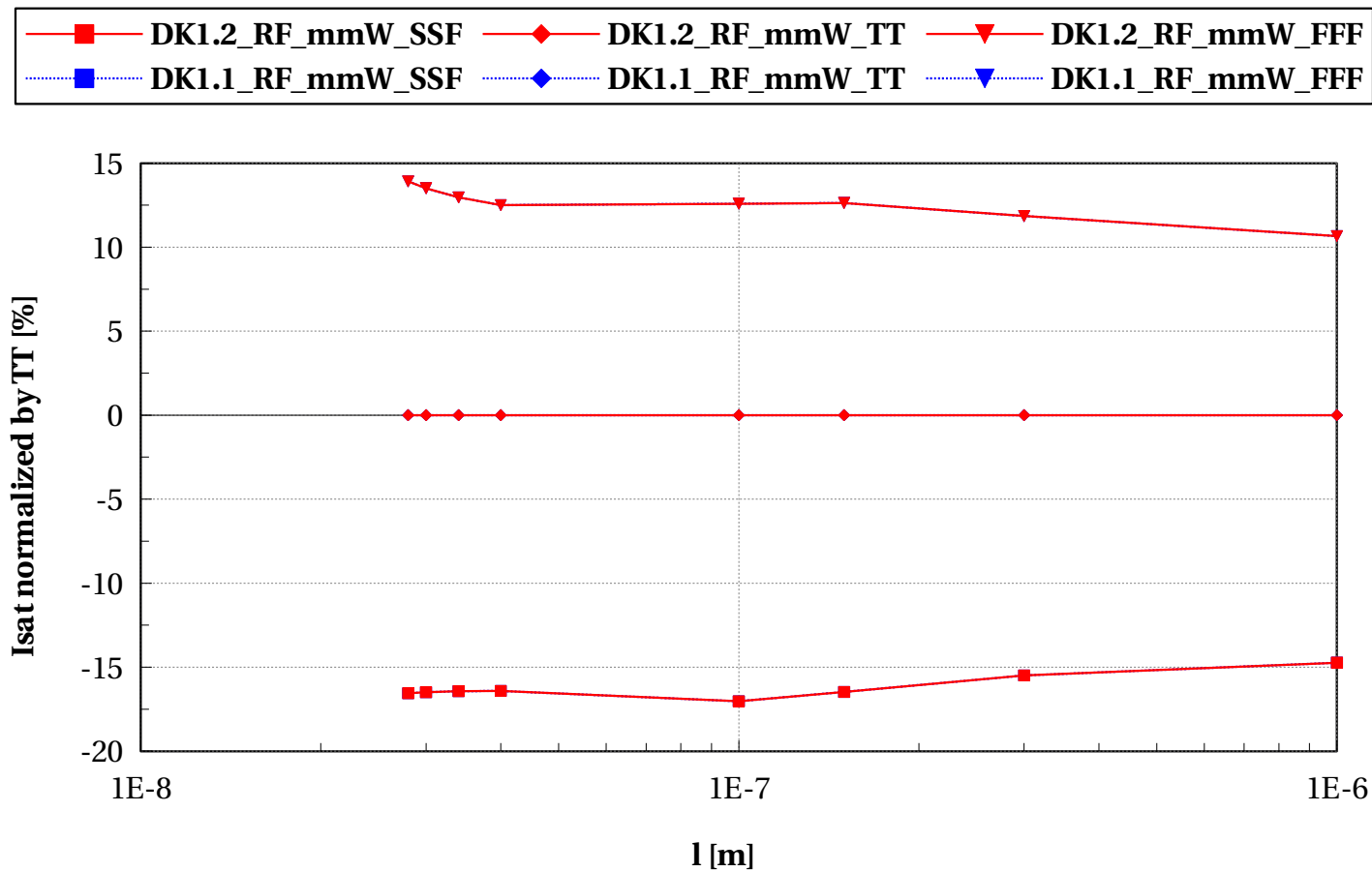
# nfet\_rfseg, isat/W vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



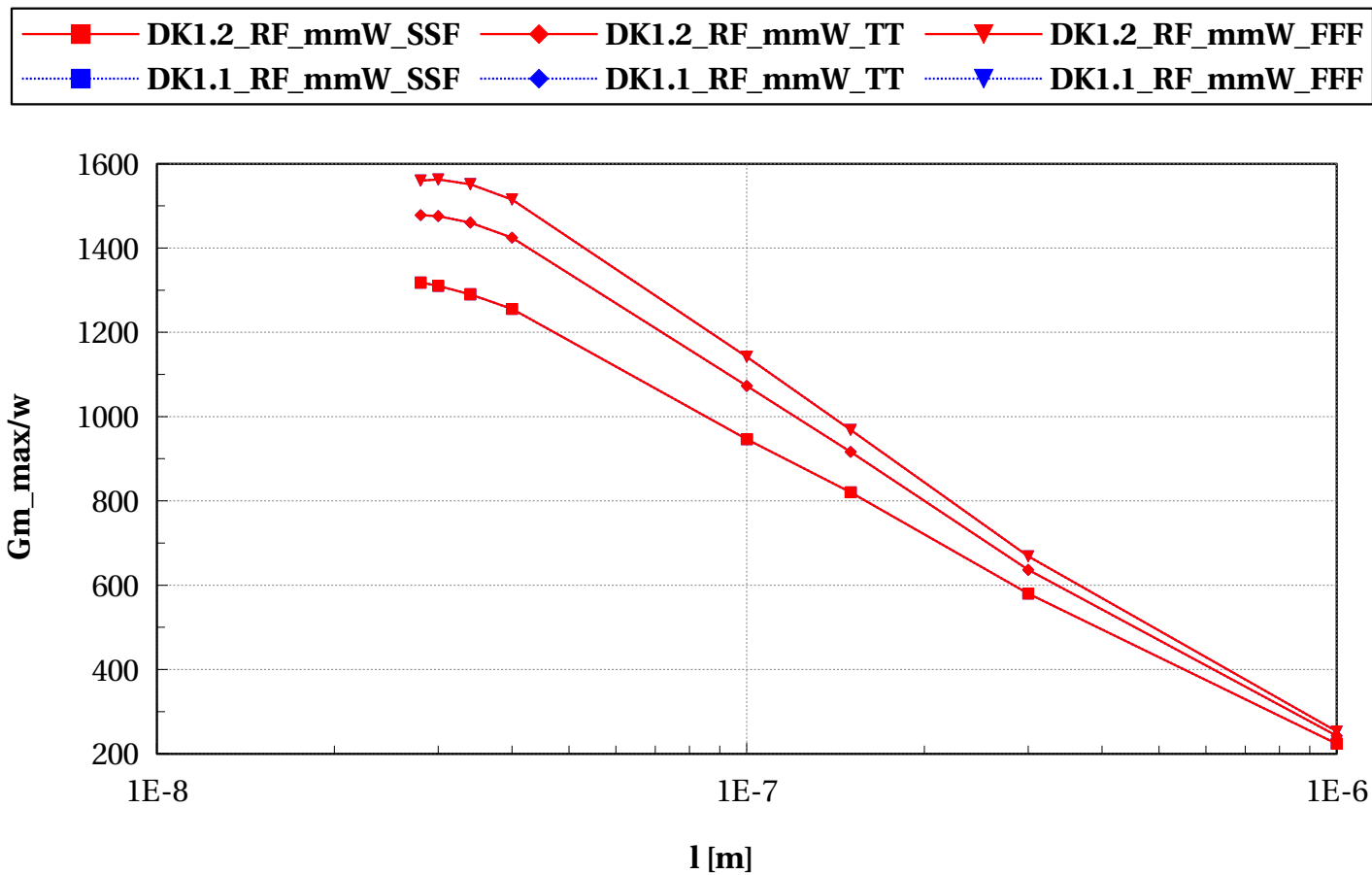
## nfet\_rfseg, Isat normalized by TT [%] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



# nfet\_rfseg, Gm\_max/w vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6

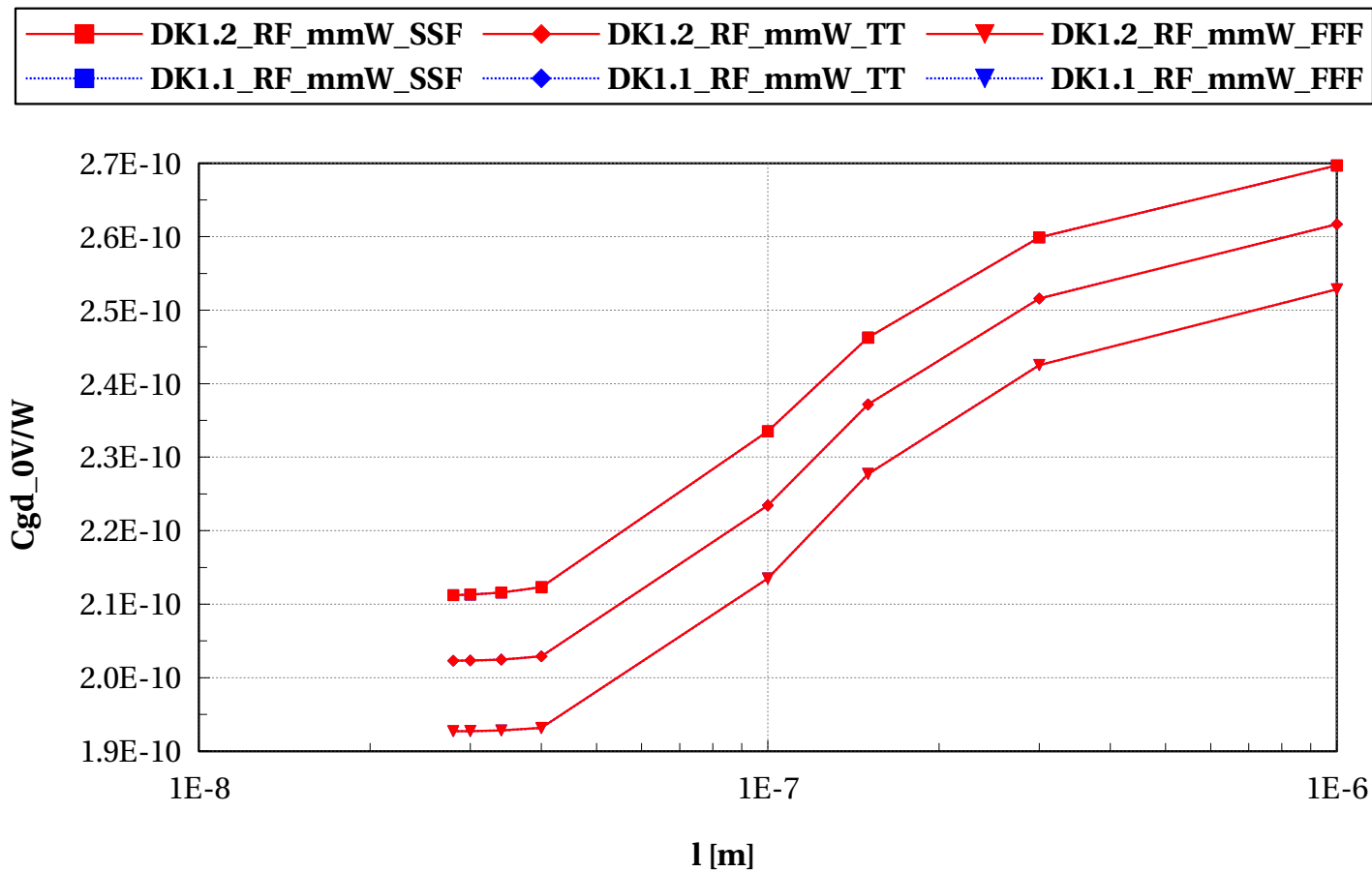


# Scaling versus length $W_{\text{fing}}=1\text{ }\mu\text{m}$ - RF



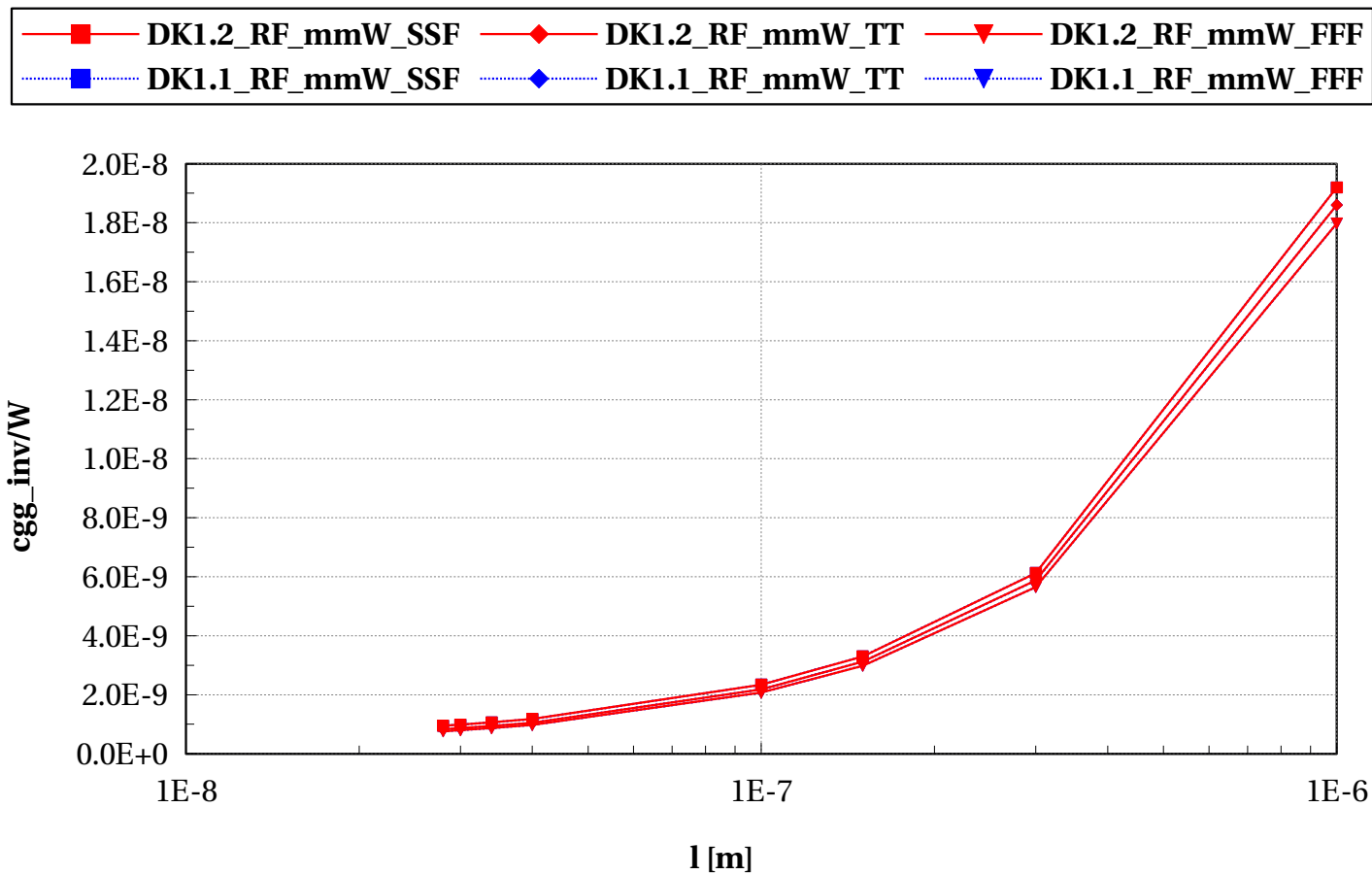
# nfet\_rfseg, Cgd\_0V/W vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



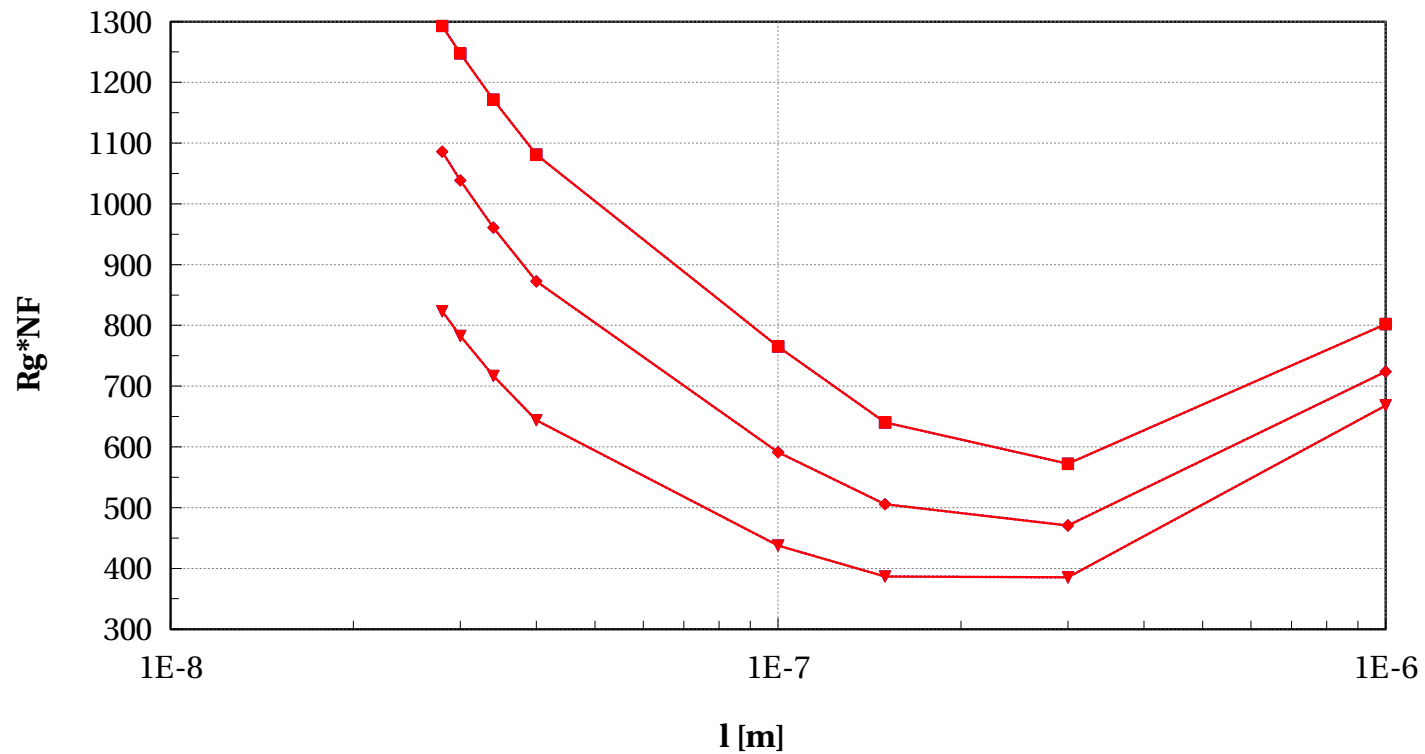
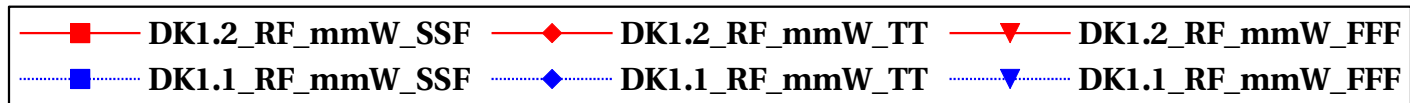
# nfet\_rfseg, cgg\_inv/W vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



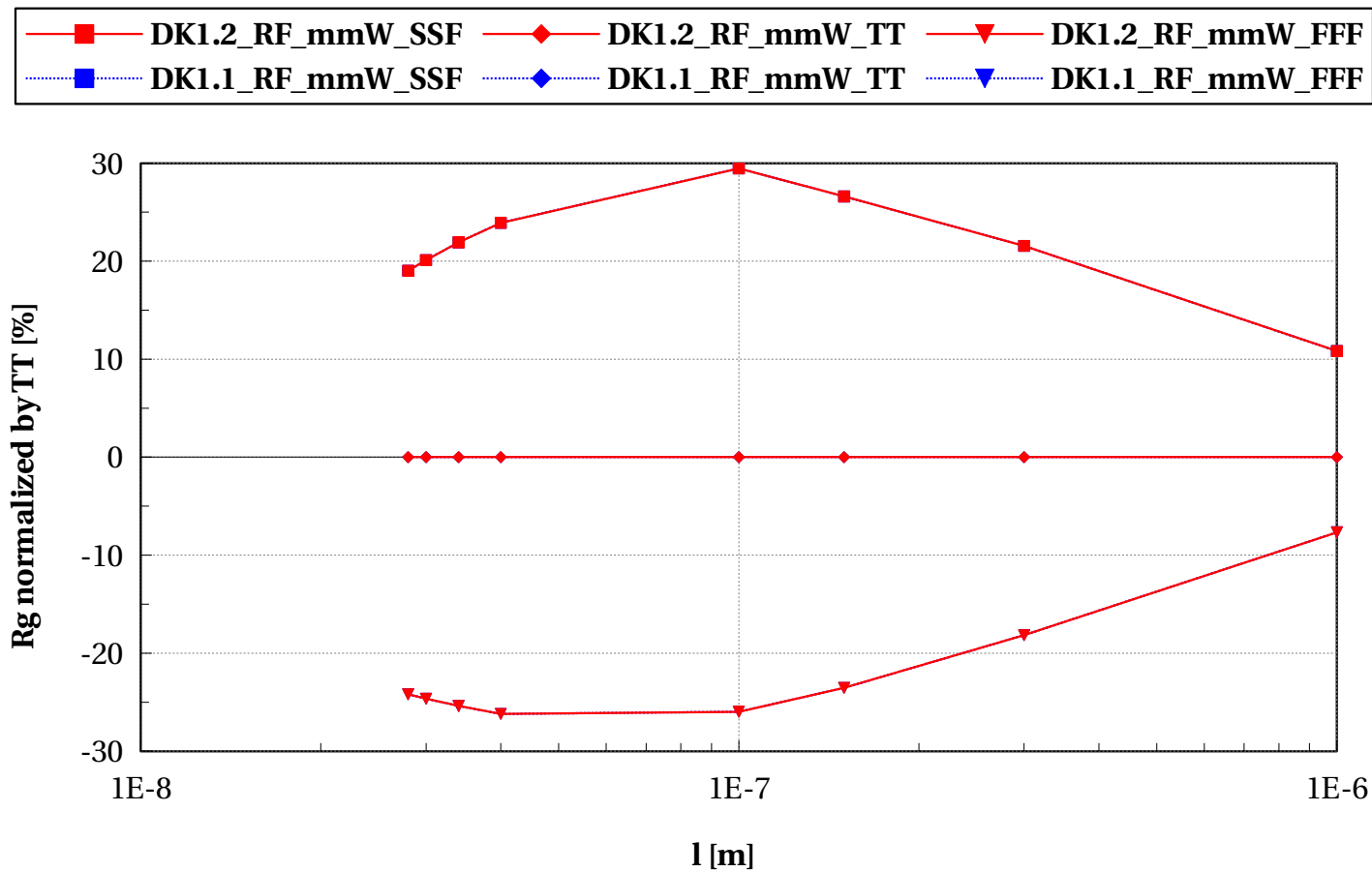
# nfet\_rfseg, $R_g \cdot NF$ vs $l$ [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6



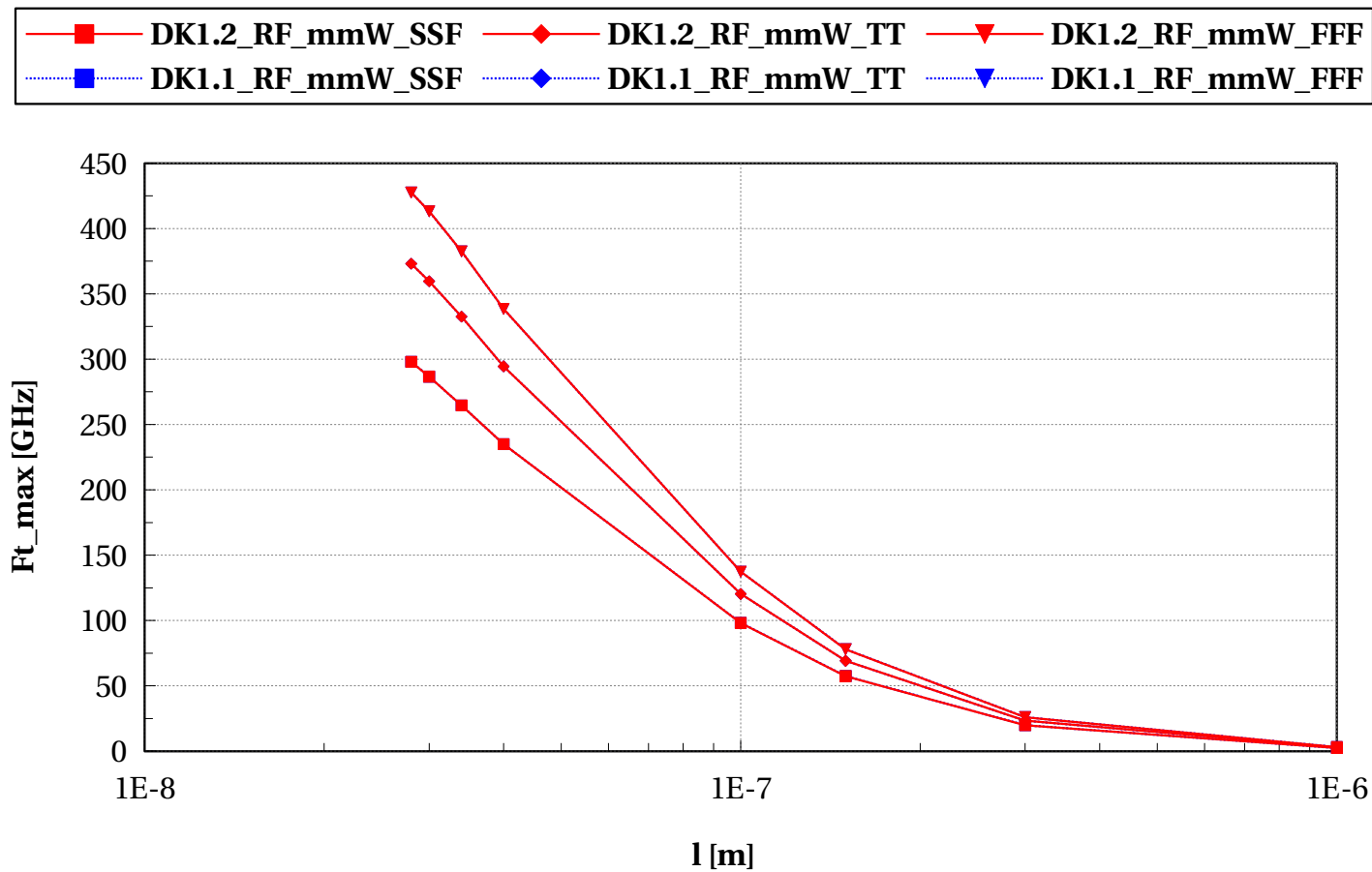
## nfet\_rfseg, Rg normalized by TT [%] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6



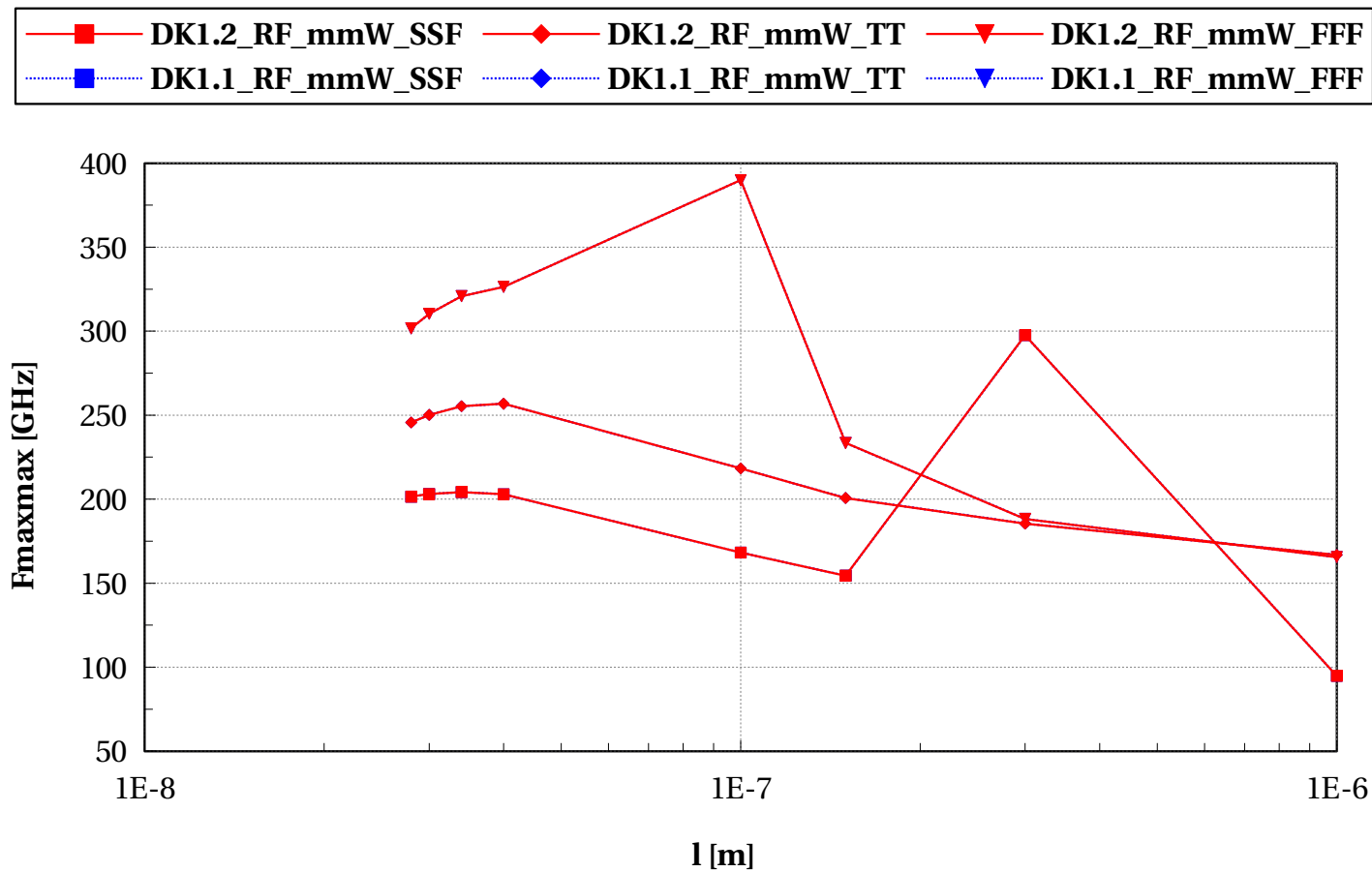
# nfet\_rfseg, Ft\_max [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



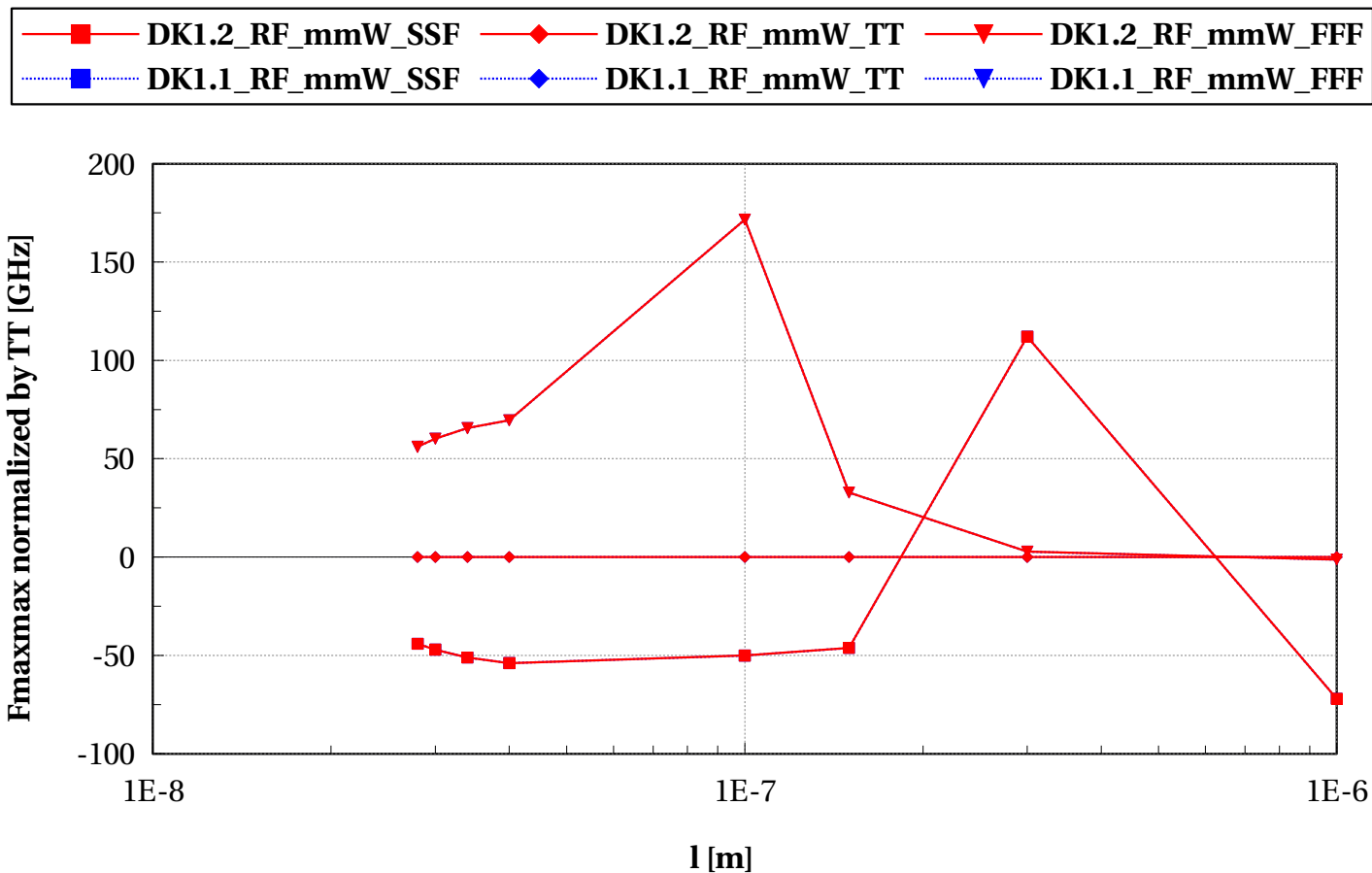
# nfet\_rfseg, Fmaxmax [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



# nfet\_rfseg, Fmaxmax normalized by TT [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6

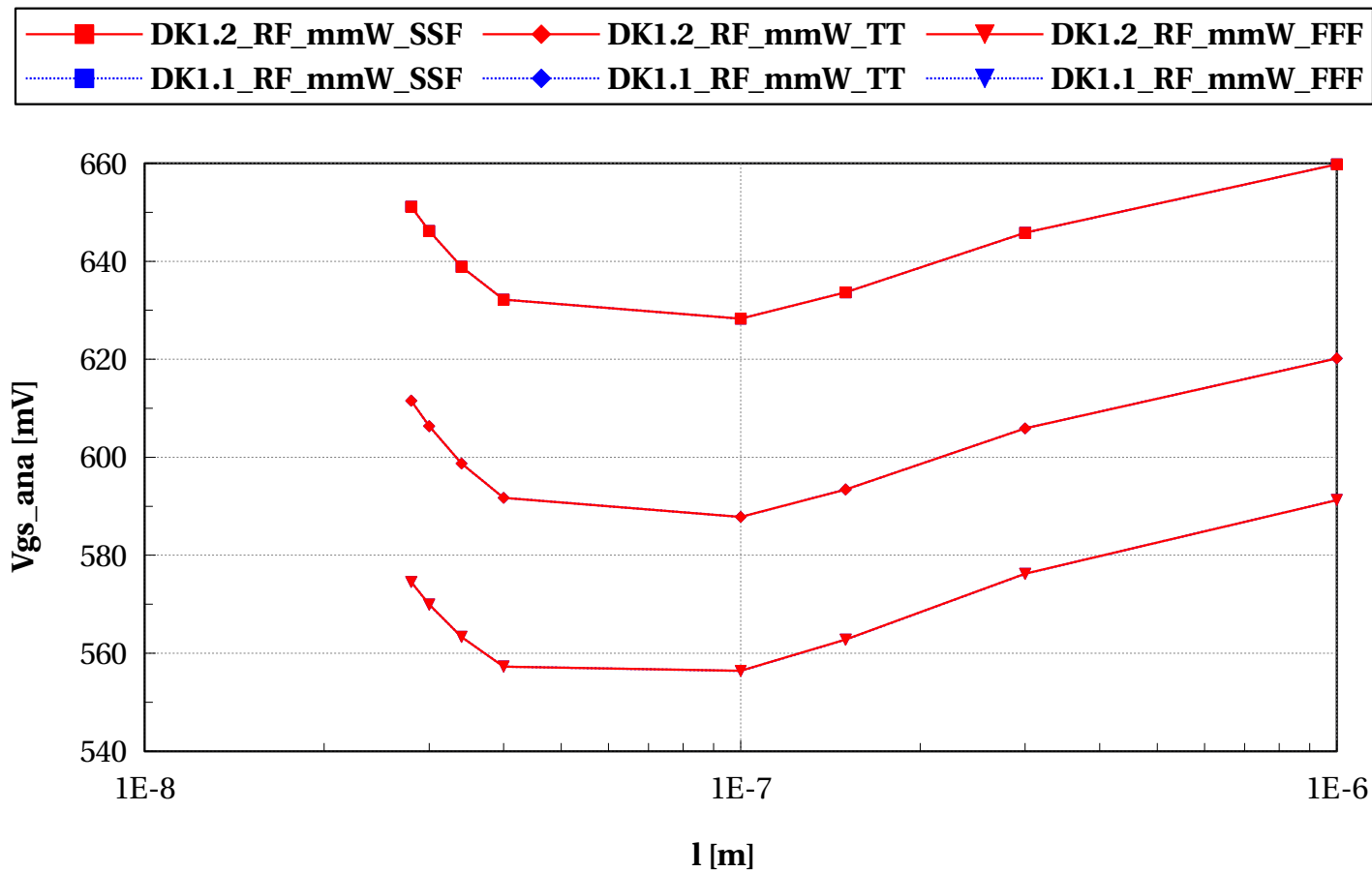


# Scaling versus length $W_{\text{fing}}=1\mu\text{m}$ - Analog



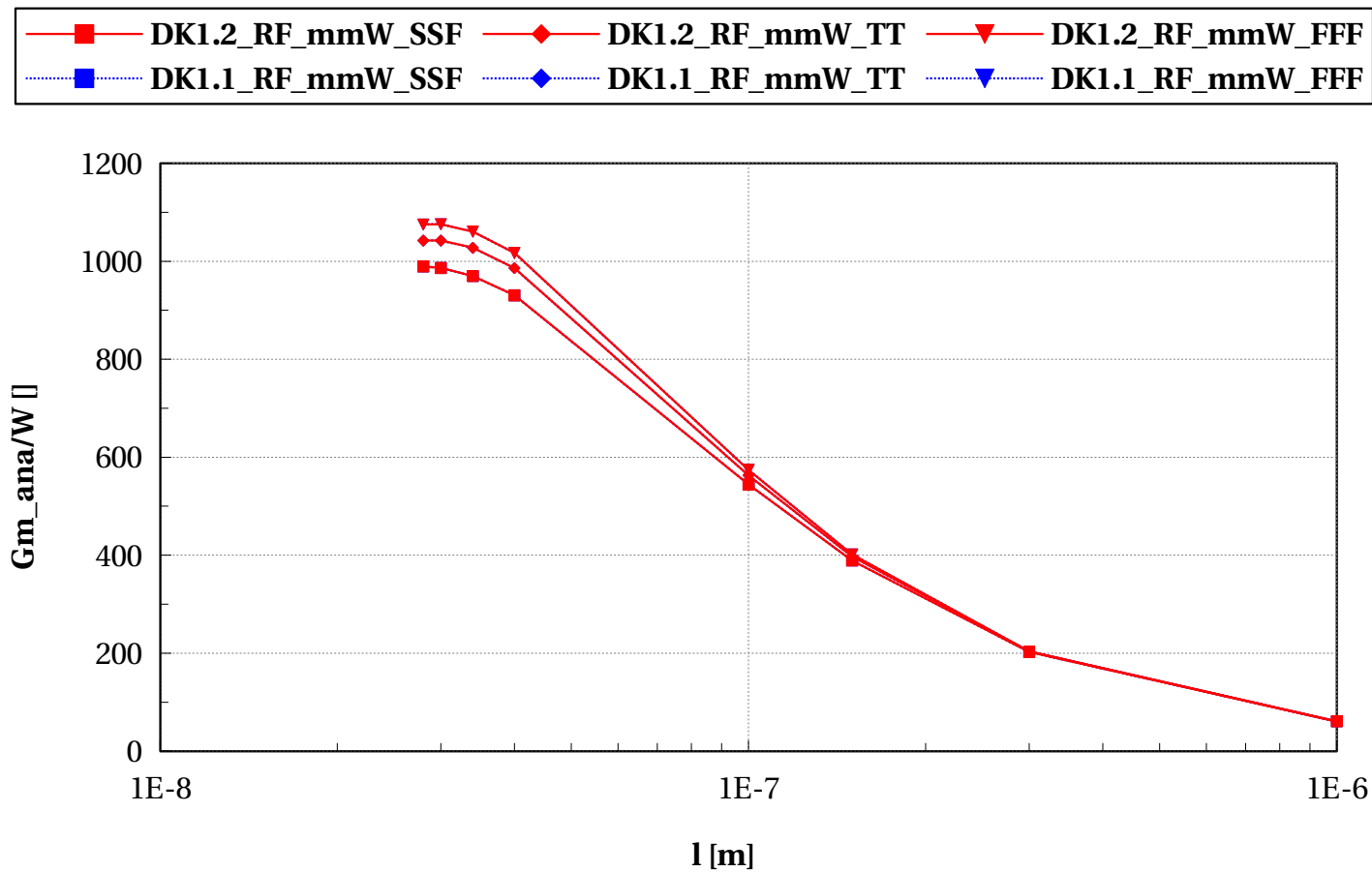
# nfet\_rfseg, Vgs\_ana [mV] vs I [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6



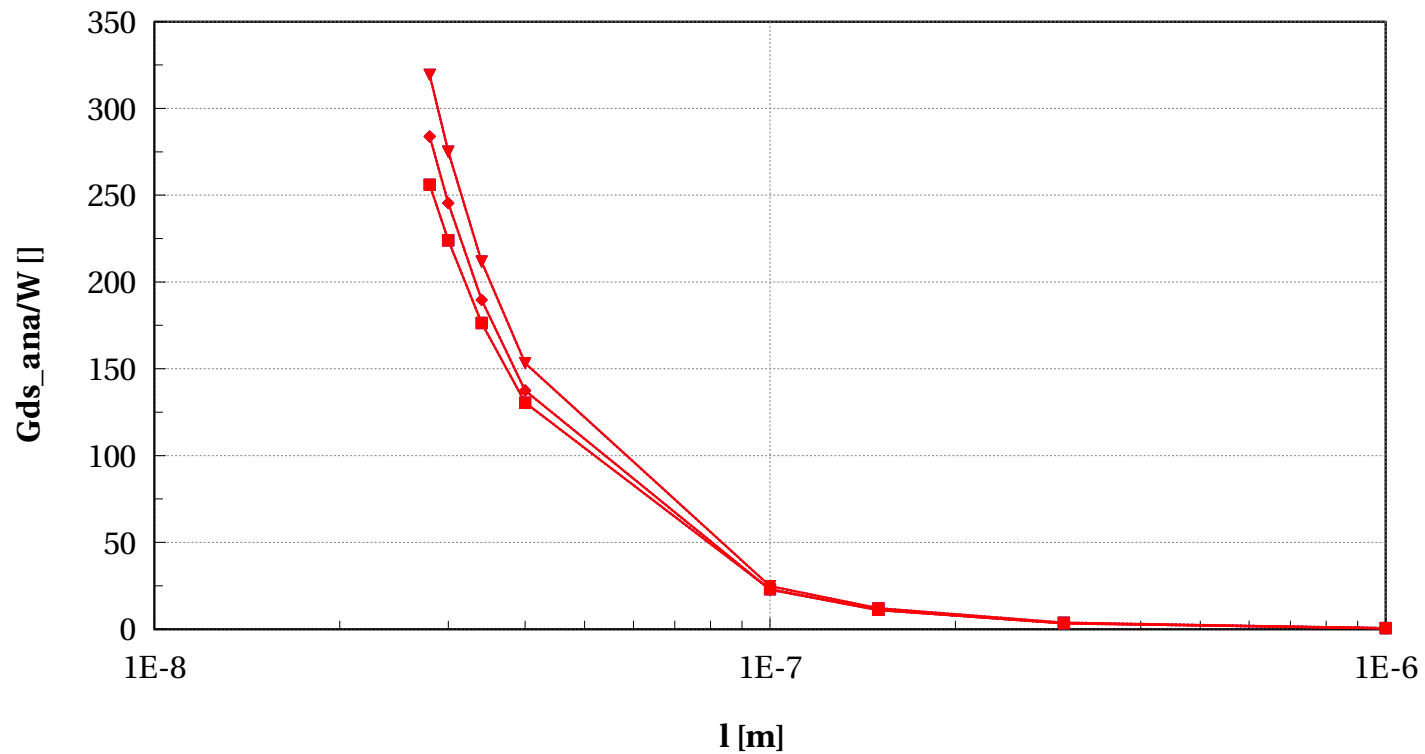
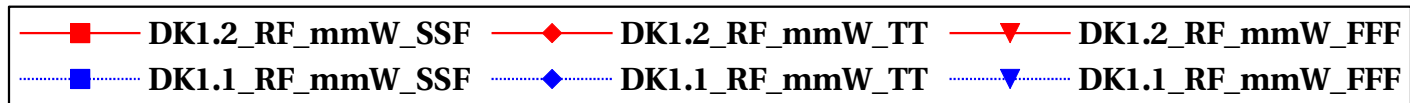
# nfet\_rfseg, Gm\_ana/W [] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6



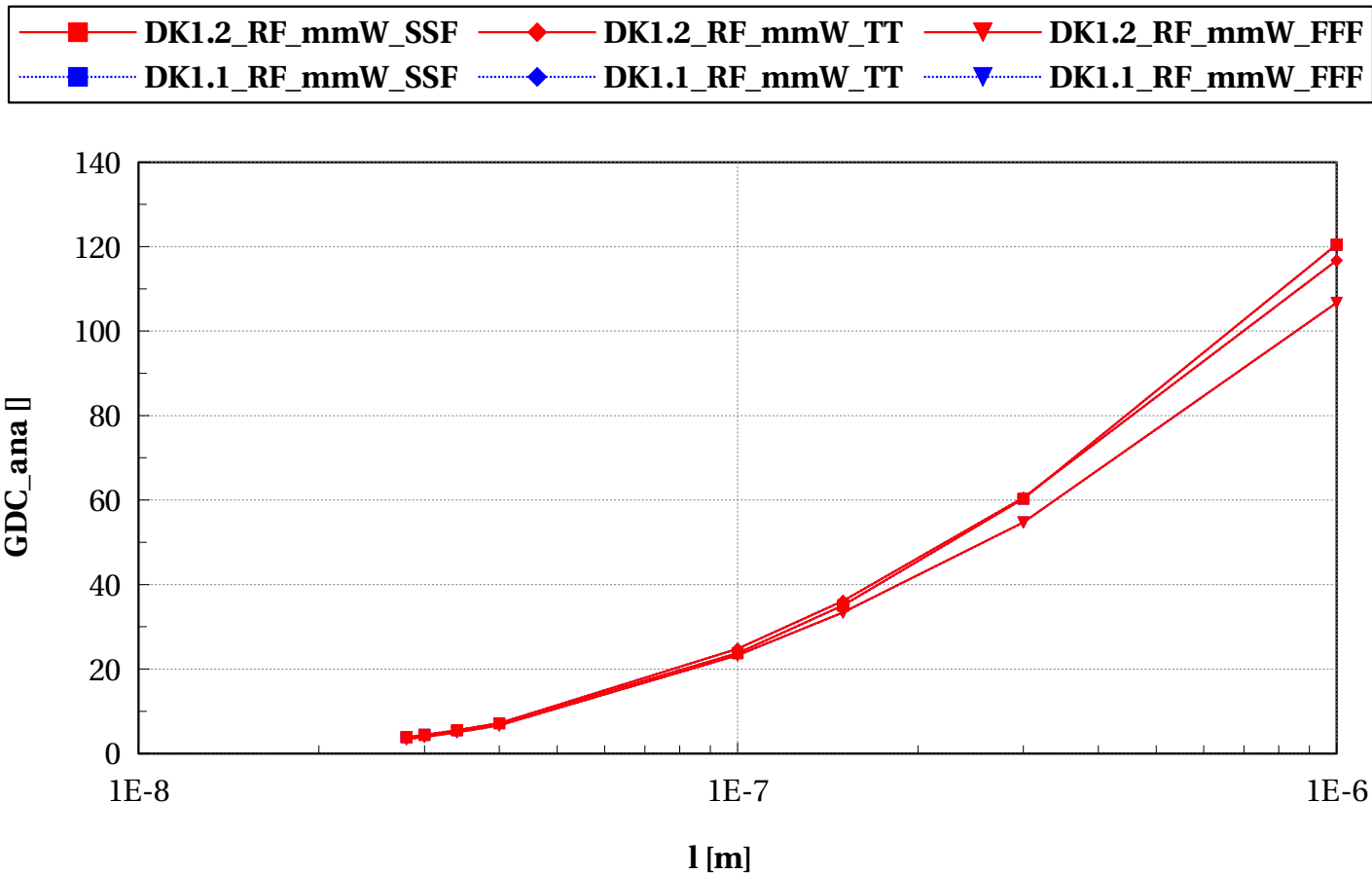
# nfet\_rfseg, Gds\_ana/W [] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



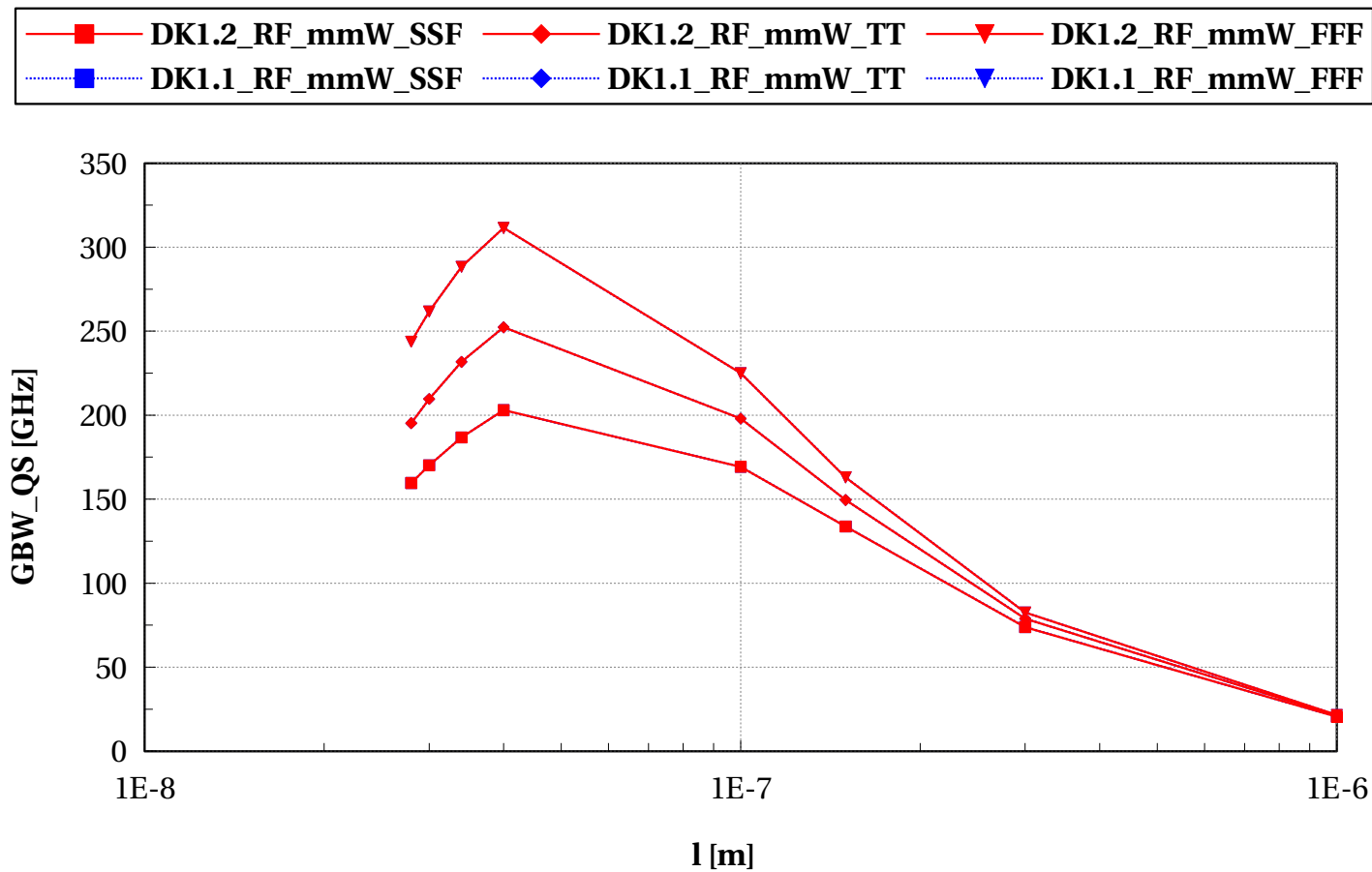
# nfet\_rfseg, GDC\_ana [] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



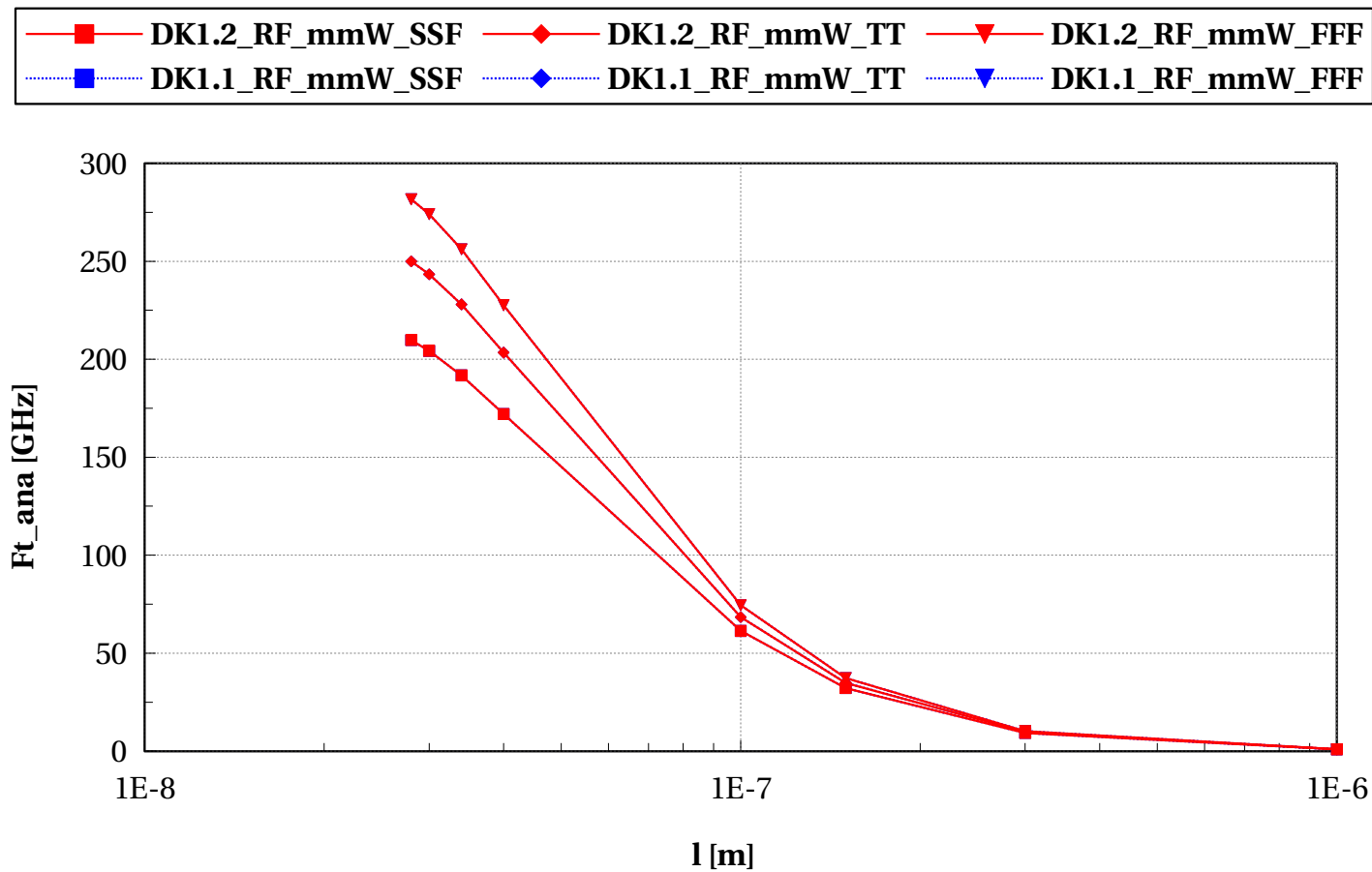
# nfet\_rfseg, GBW\_QS [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



# nfet\_rfseg, Ft\_ana [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



# pfet\_rf

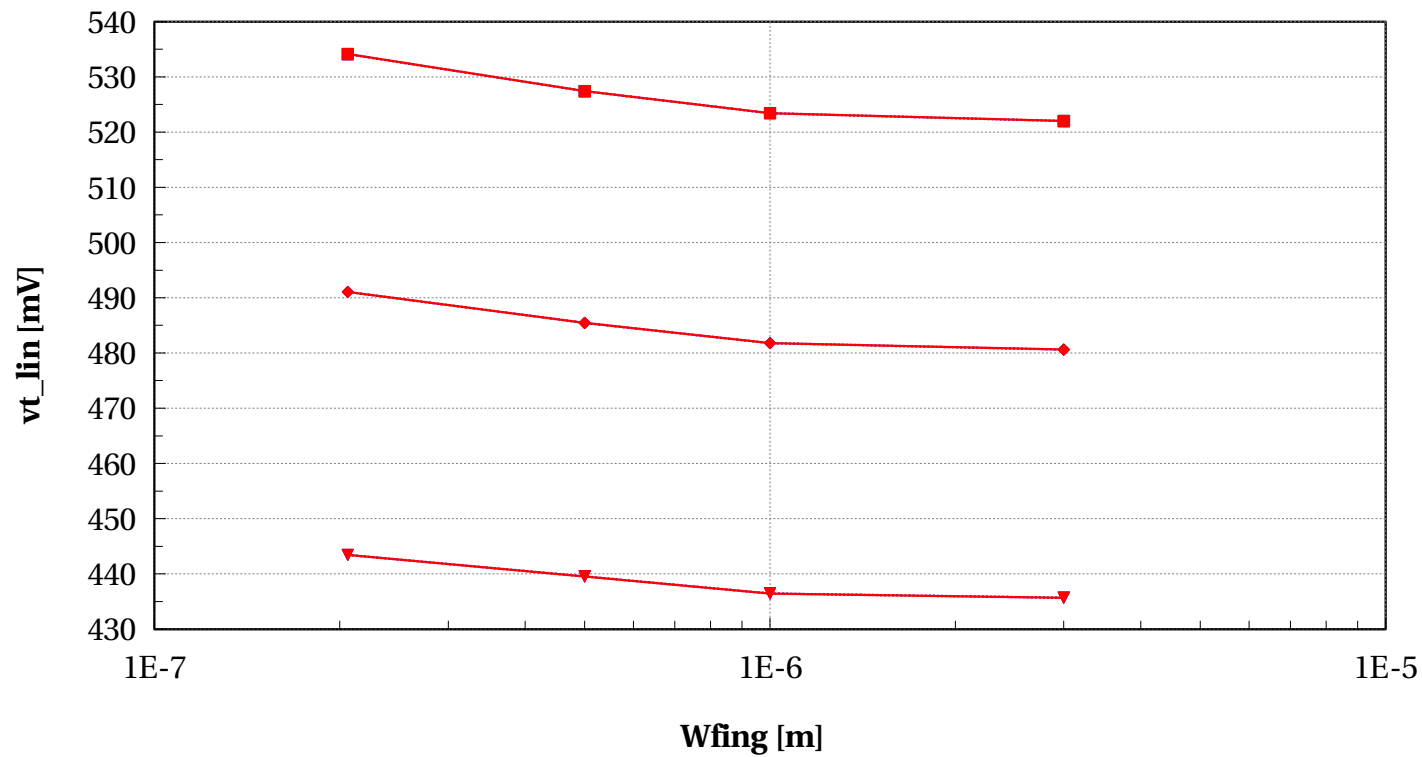
## Electrical characteristics scaling

## Scaling versus width $L=30\text{nm}$ - DC



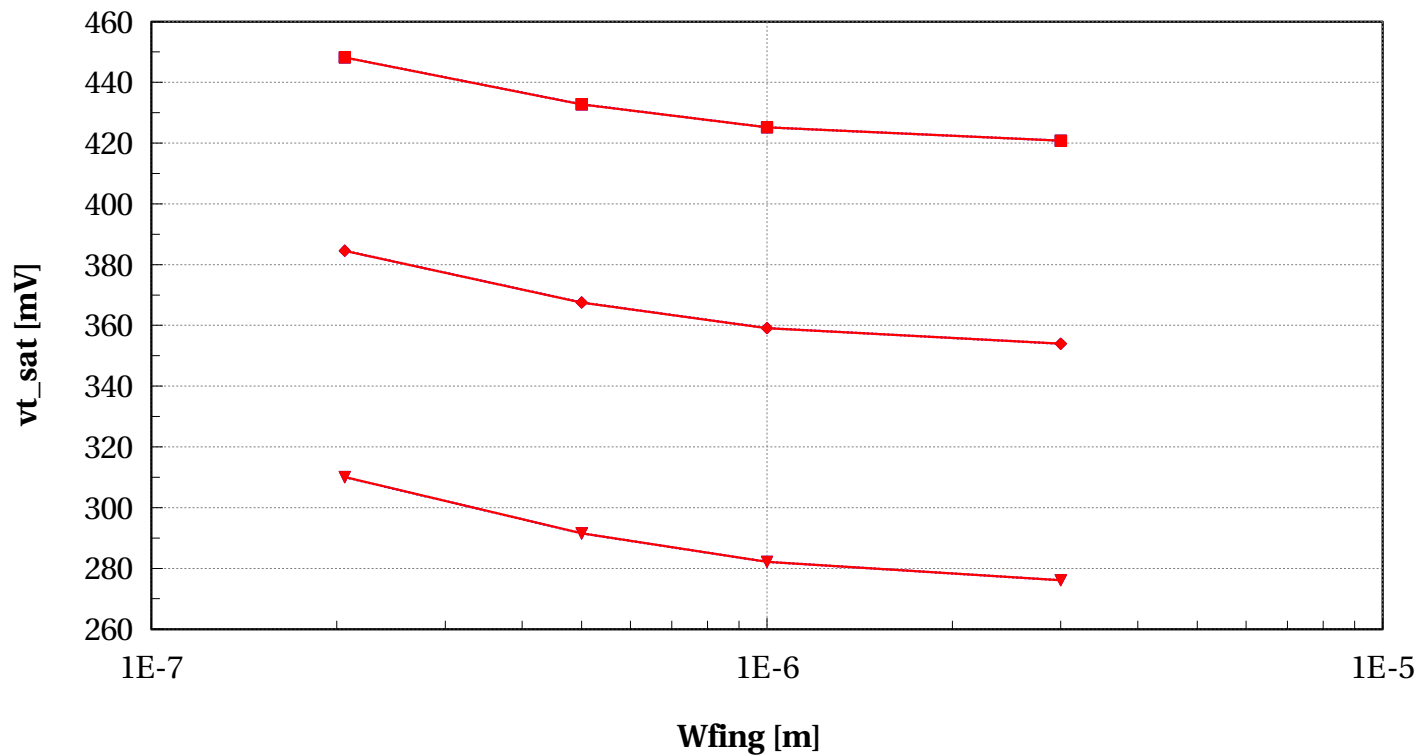
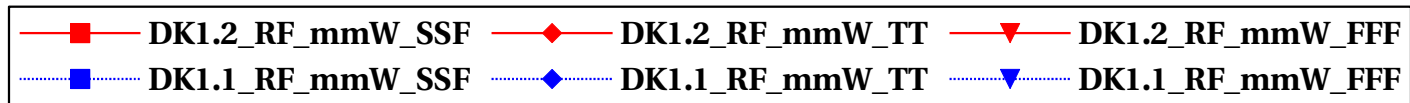
# pfet\_rf, vt\_lin [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



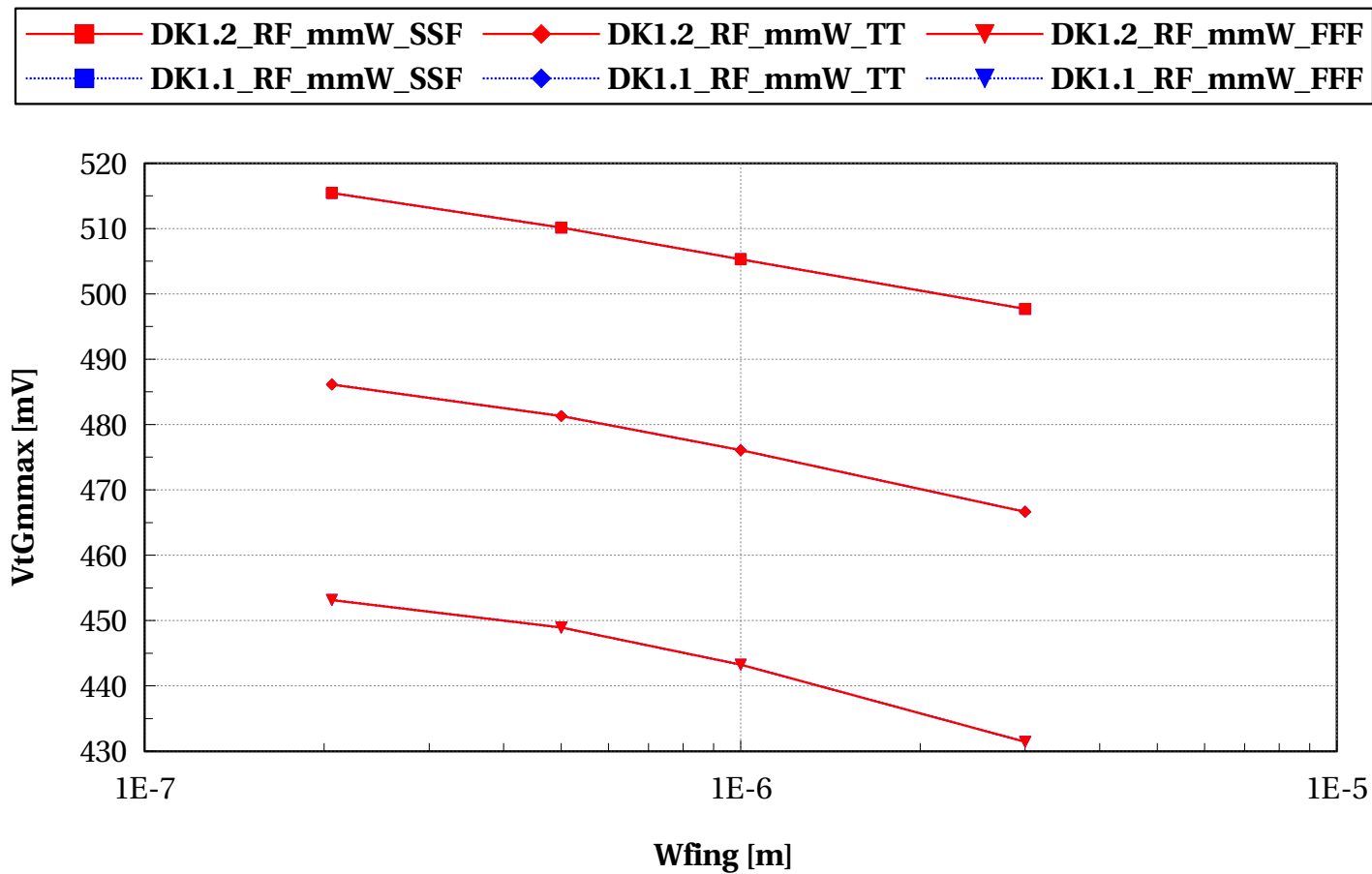
# pfet\_rf, vt\_sat [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



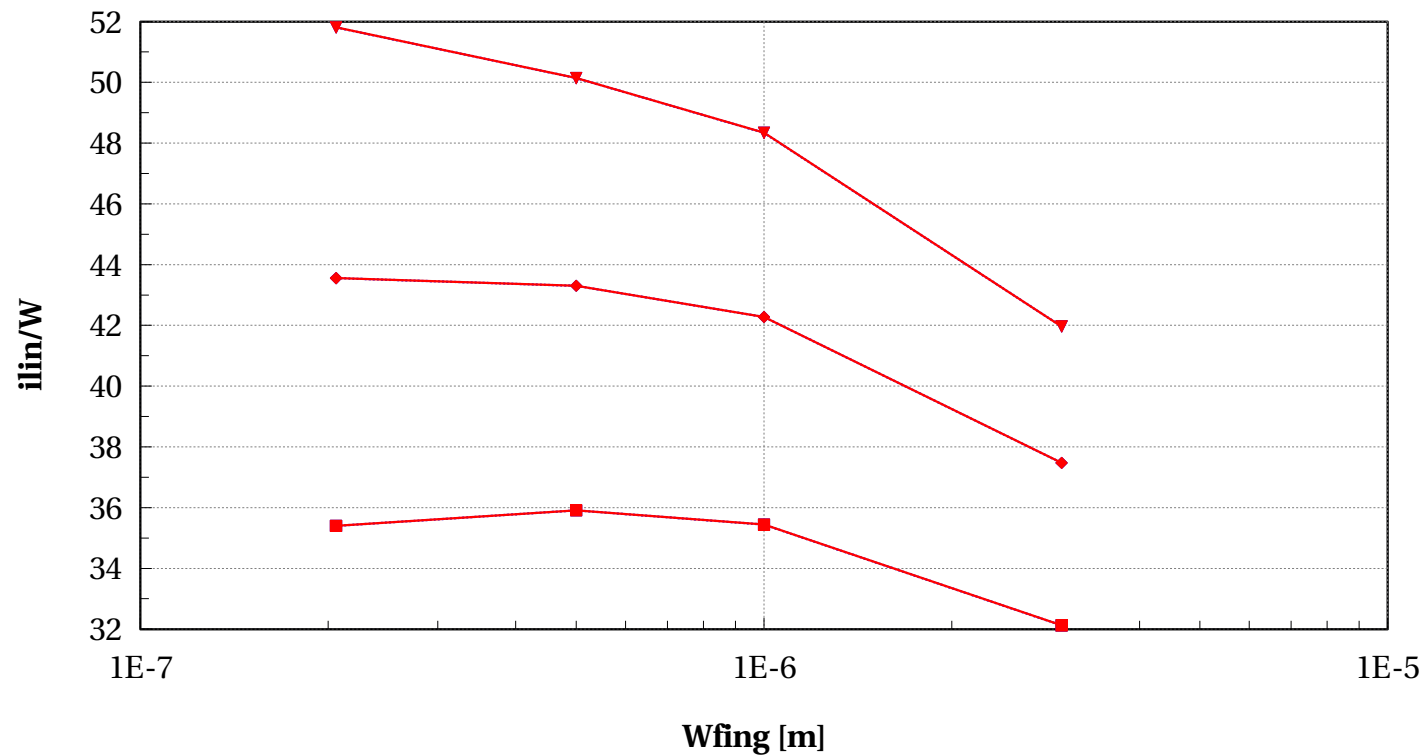
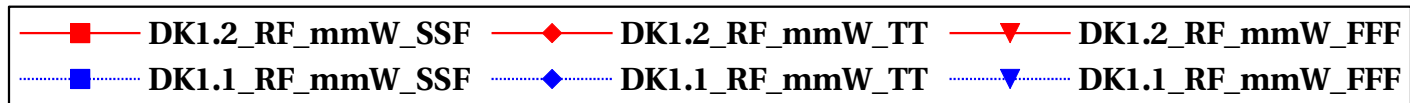
# pfet\_rf, VtGmmax [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



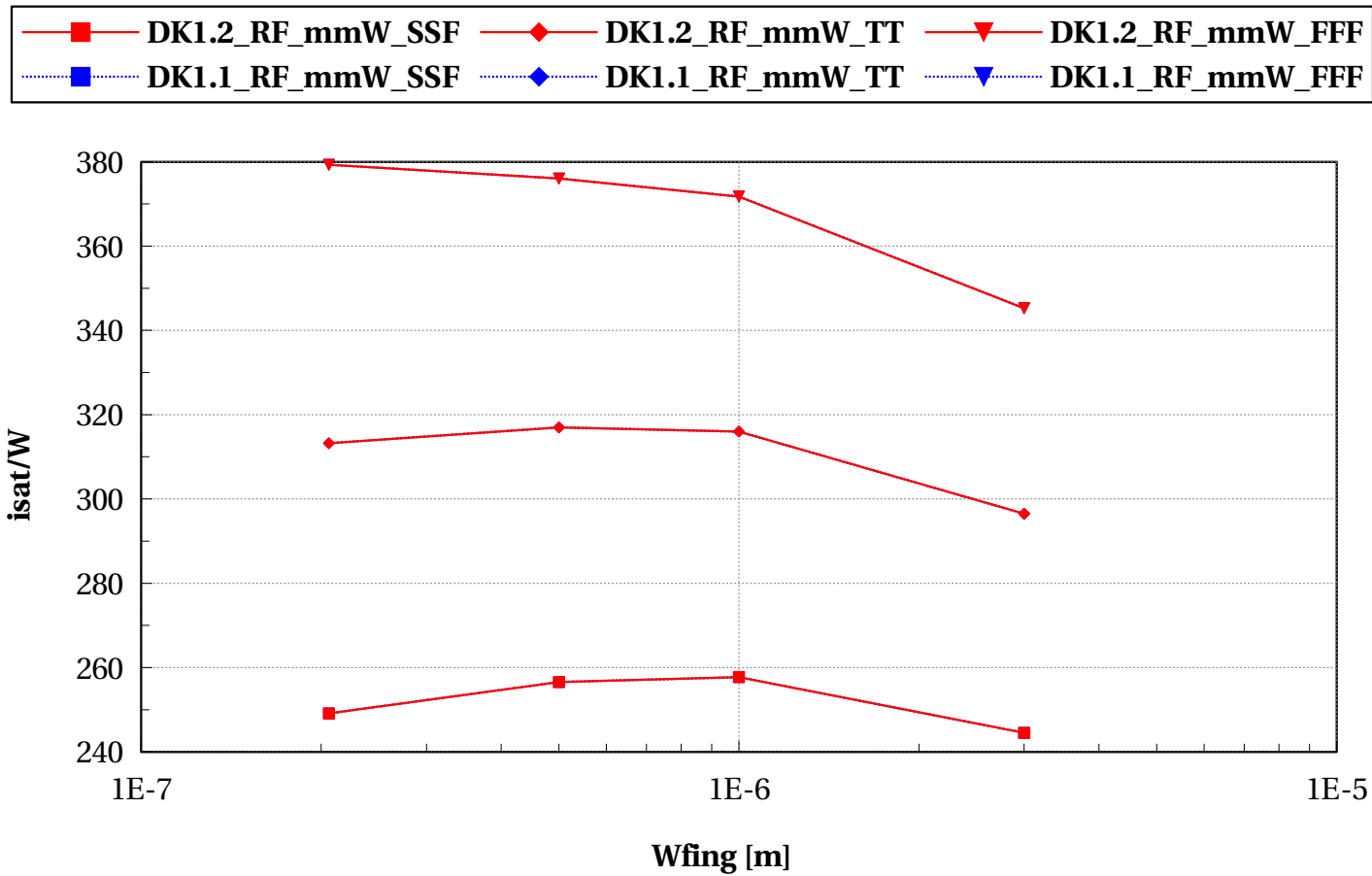
# pfet\_rf, ilin/W vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



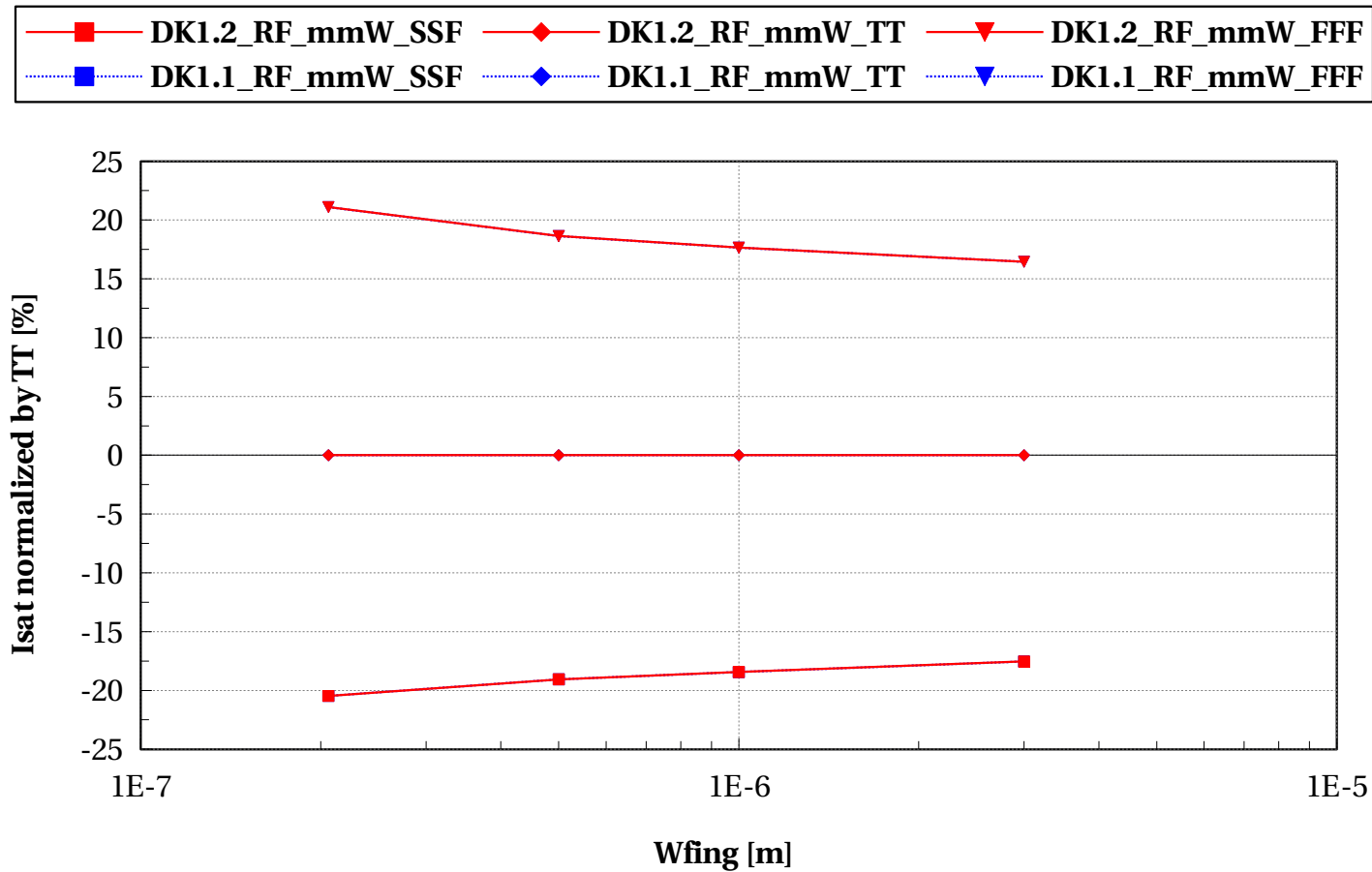
# pfet\_rf, isat/W vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



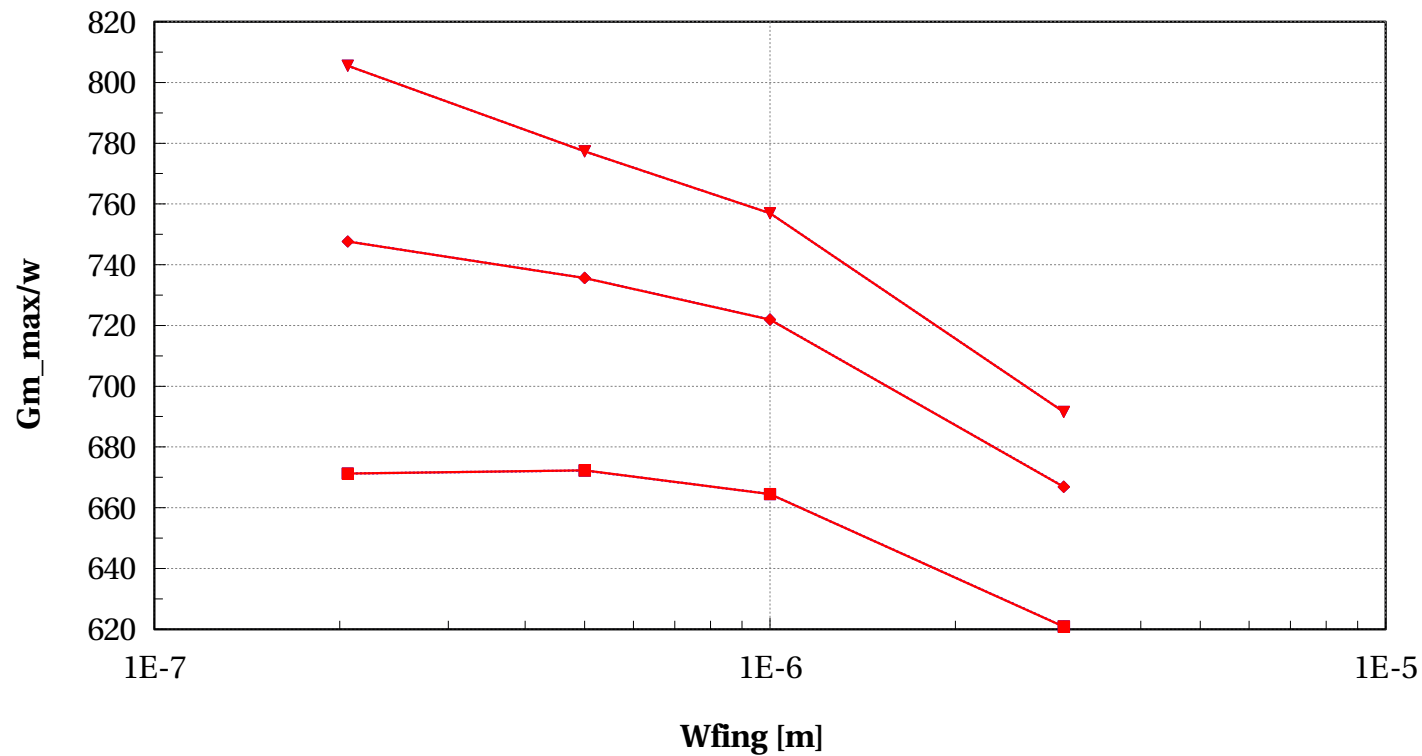
## pfet\_rf, Isat normalized by TT [%] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# pfet\_rf, Gm\_max/w vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9

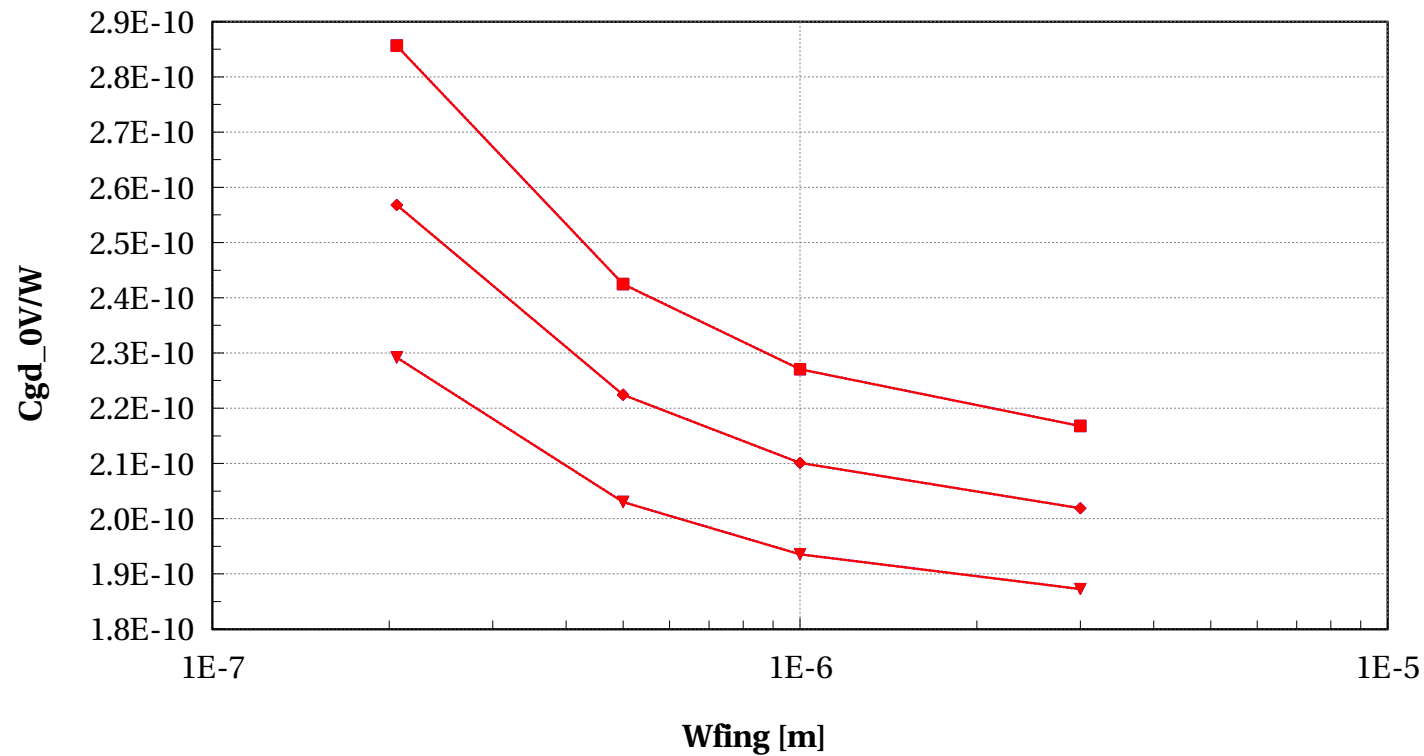


# Scaling versus width $L=30\text{nm}$ - RF



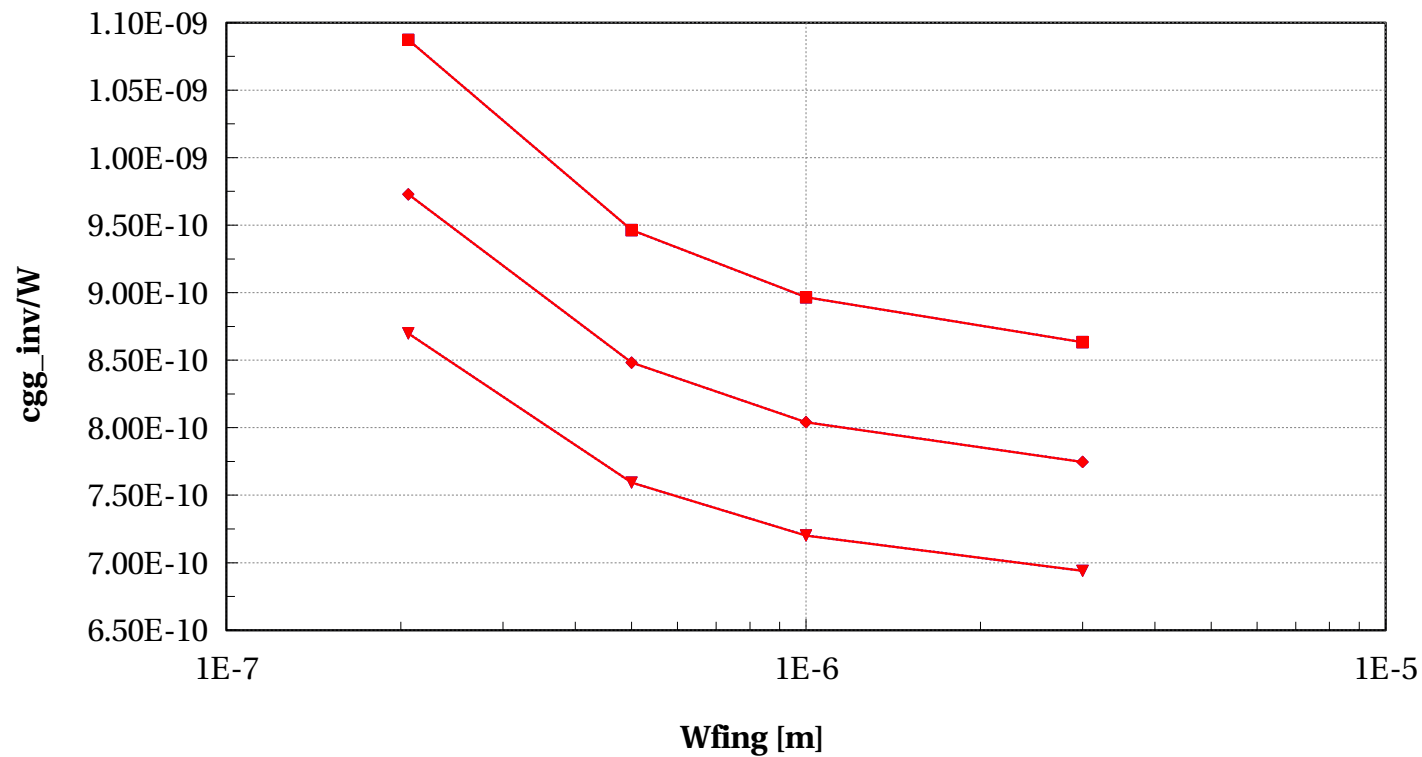
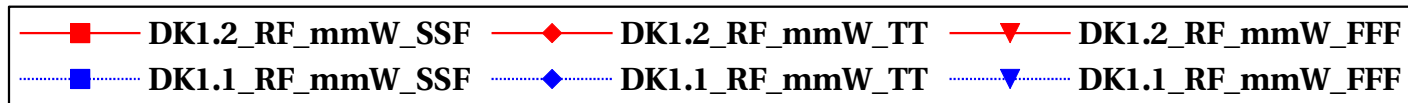
# pfet\_rf, Cgd\_0V/W vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



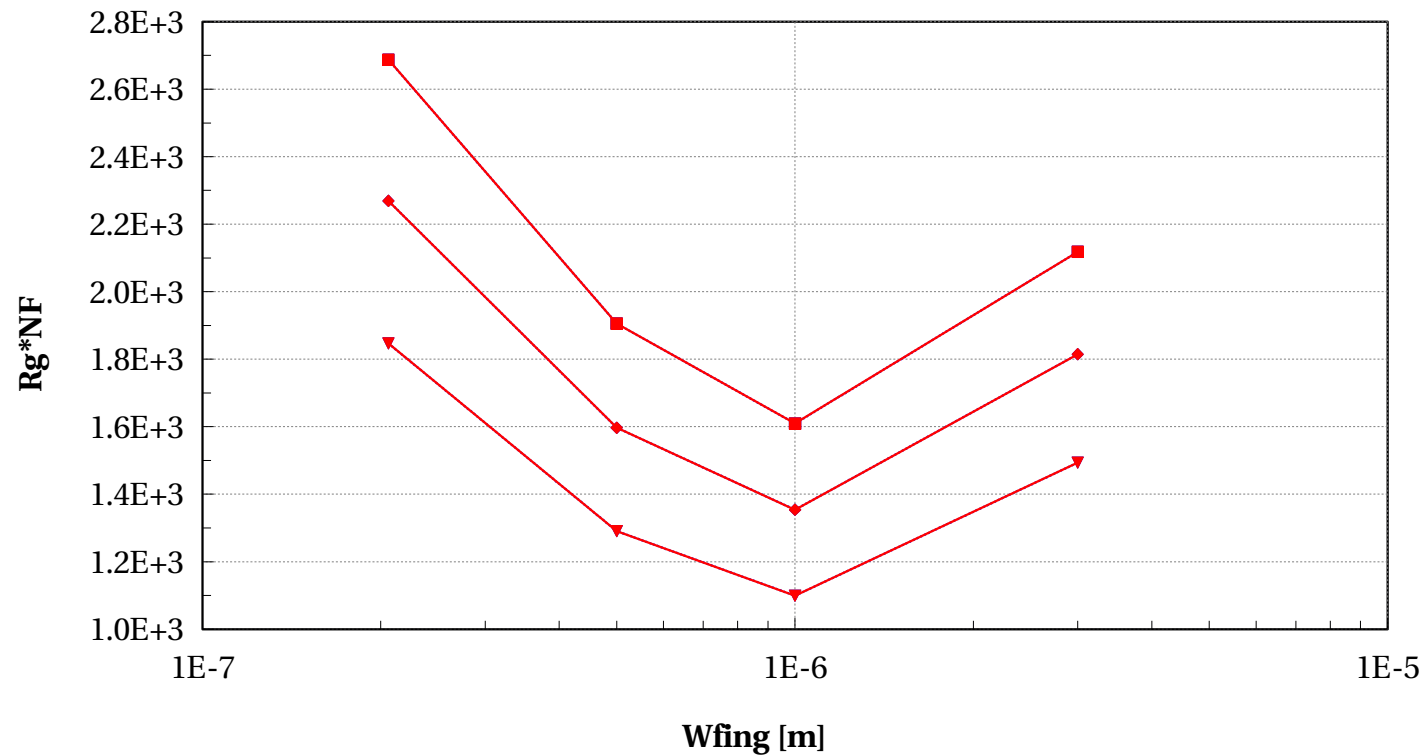
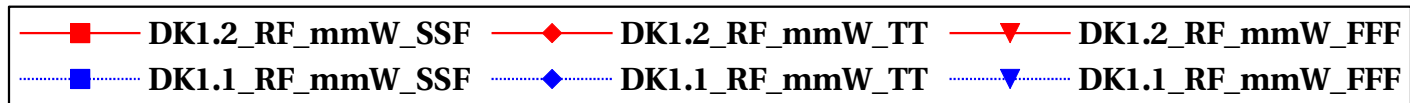
# pfet\_rf, cgg\_inv/W vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



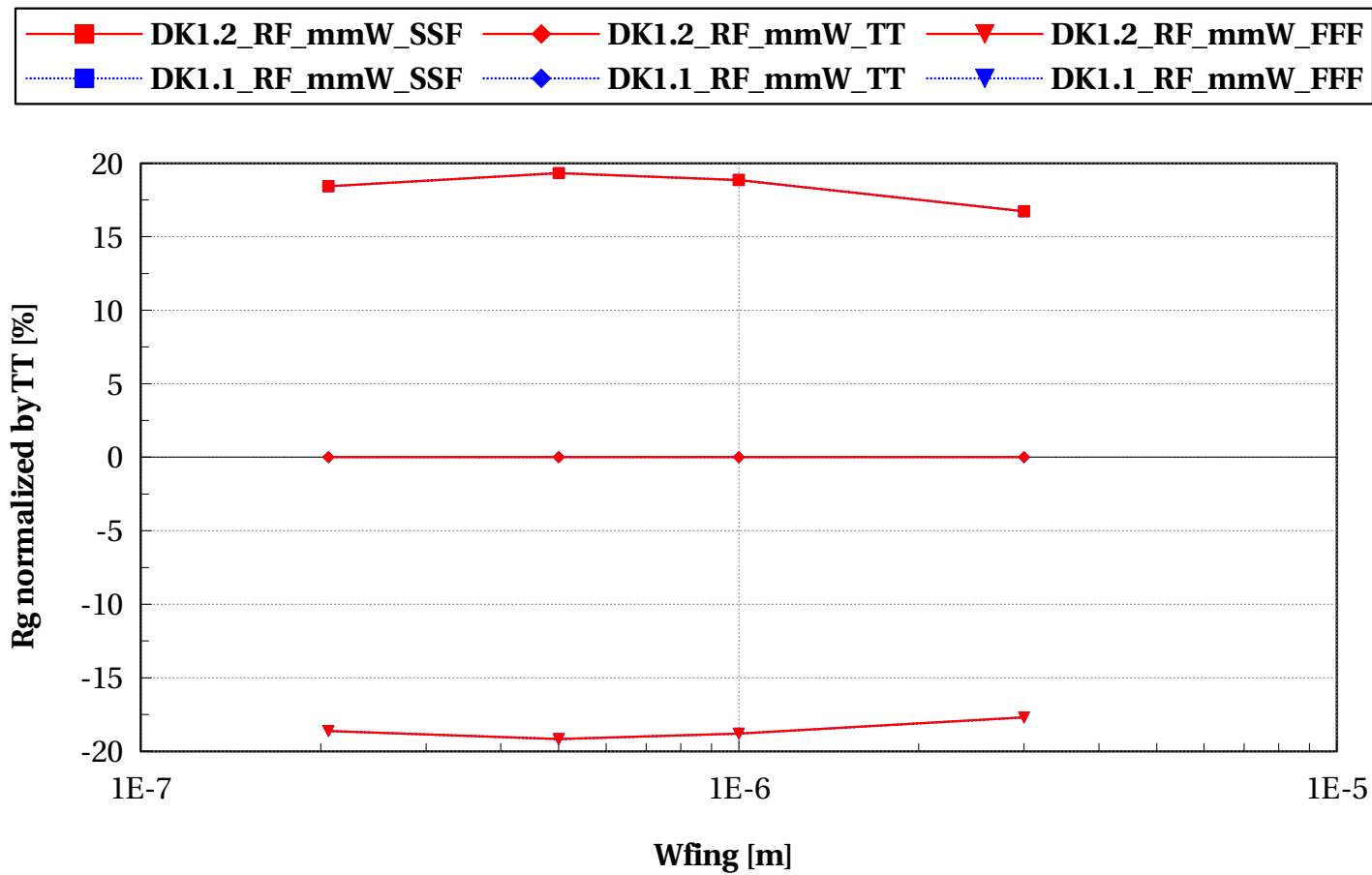
# pfet\_rf, $R_g \cdot NF$ vs $W_{fing}$ [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and  $l=30e-9$



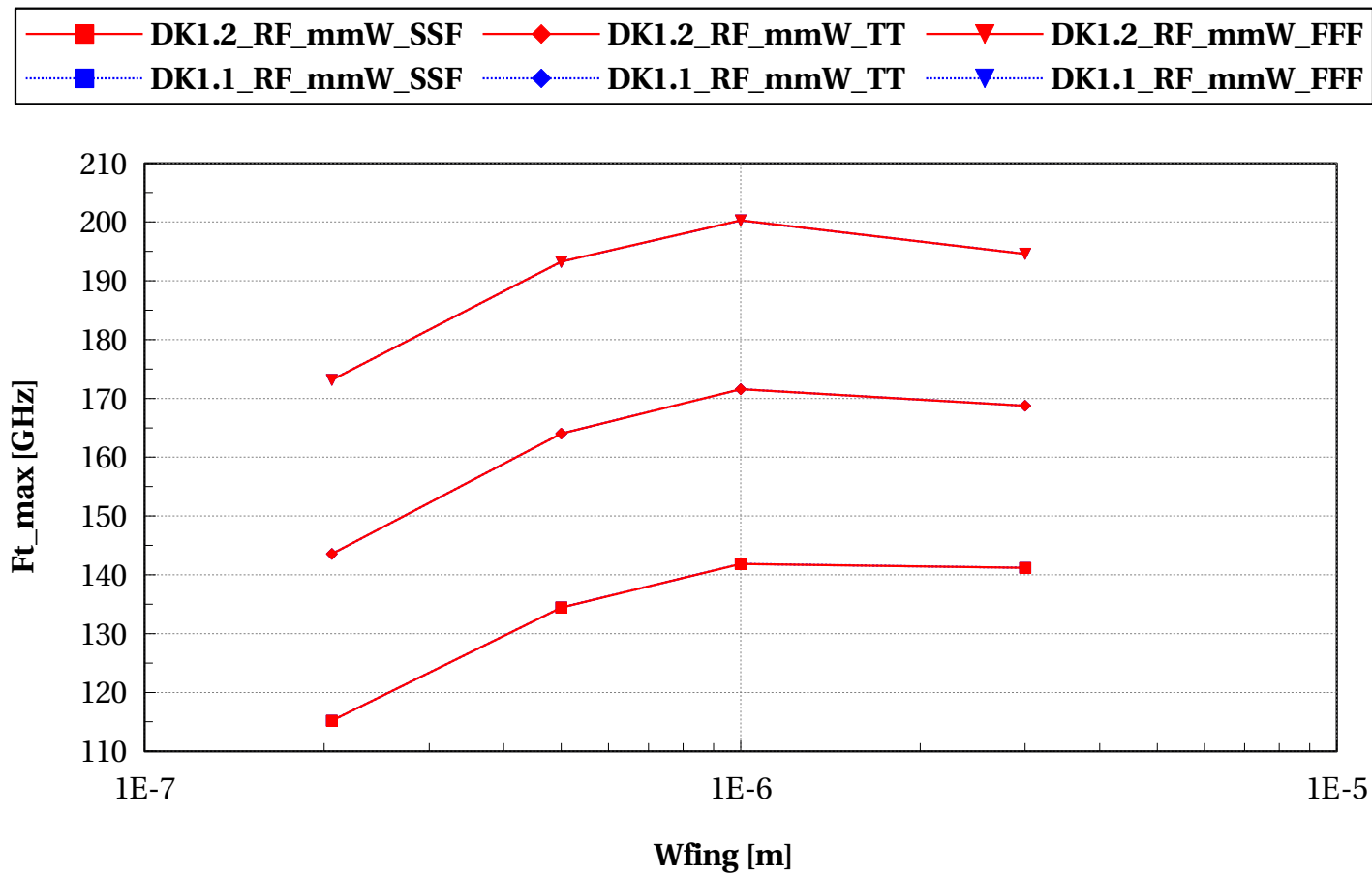
## pfet\_rf, Rg normalized by TT [%] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



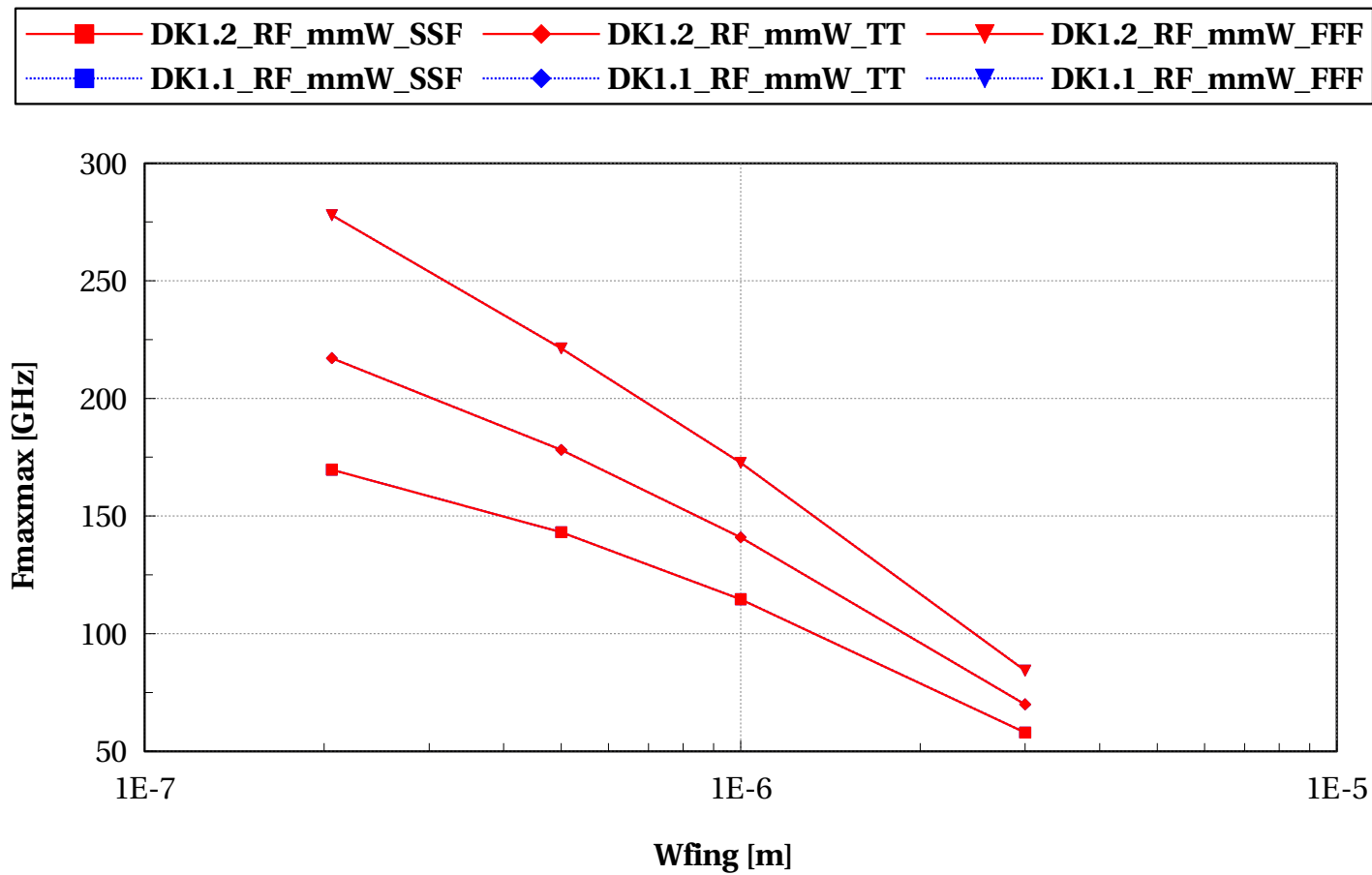
# pfet\_rf, Ft\_max [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



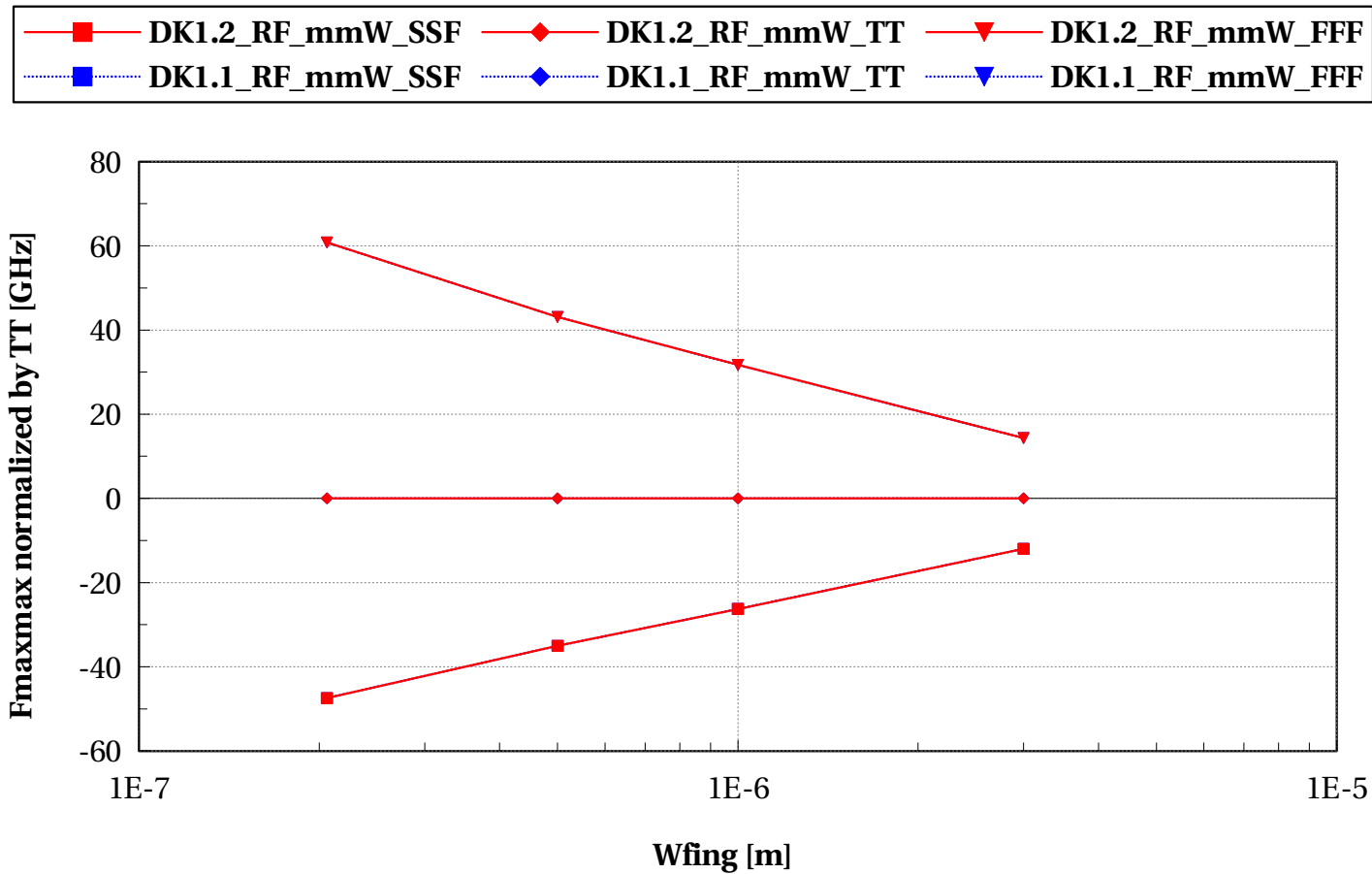
# pfet\_rf, Fmaxmax [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# pfet\_rf, Fmaxmax normalized by TT [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9

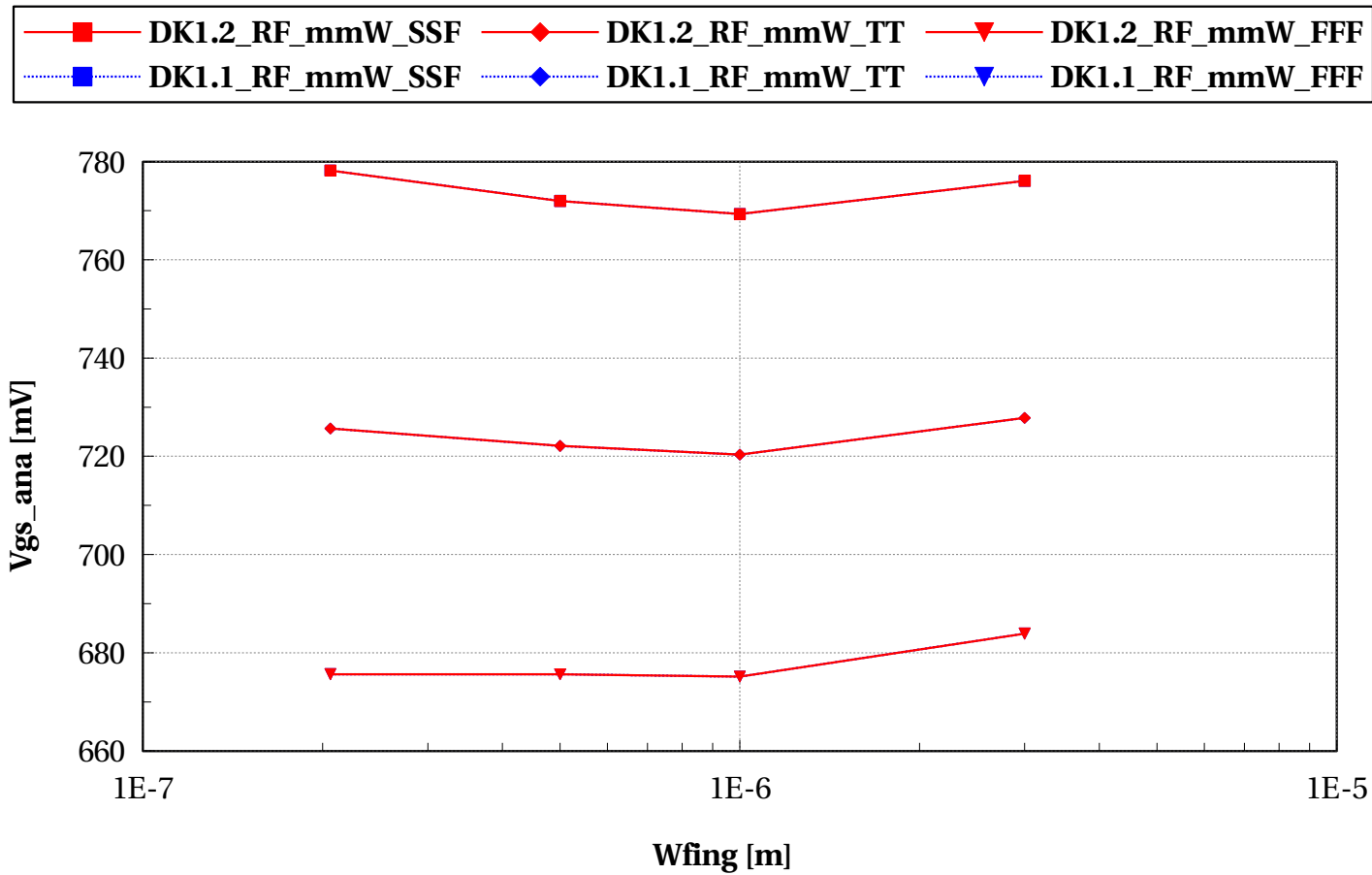


# Scaling versus width $L=30\text{nm}$ - Analog



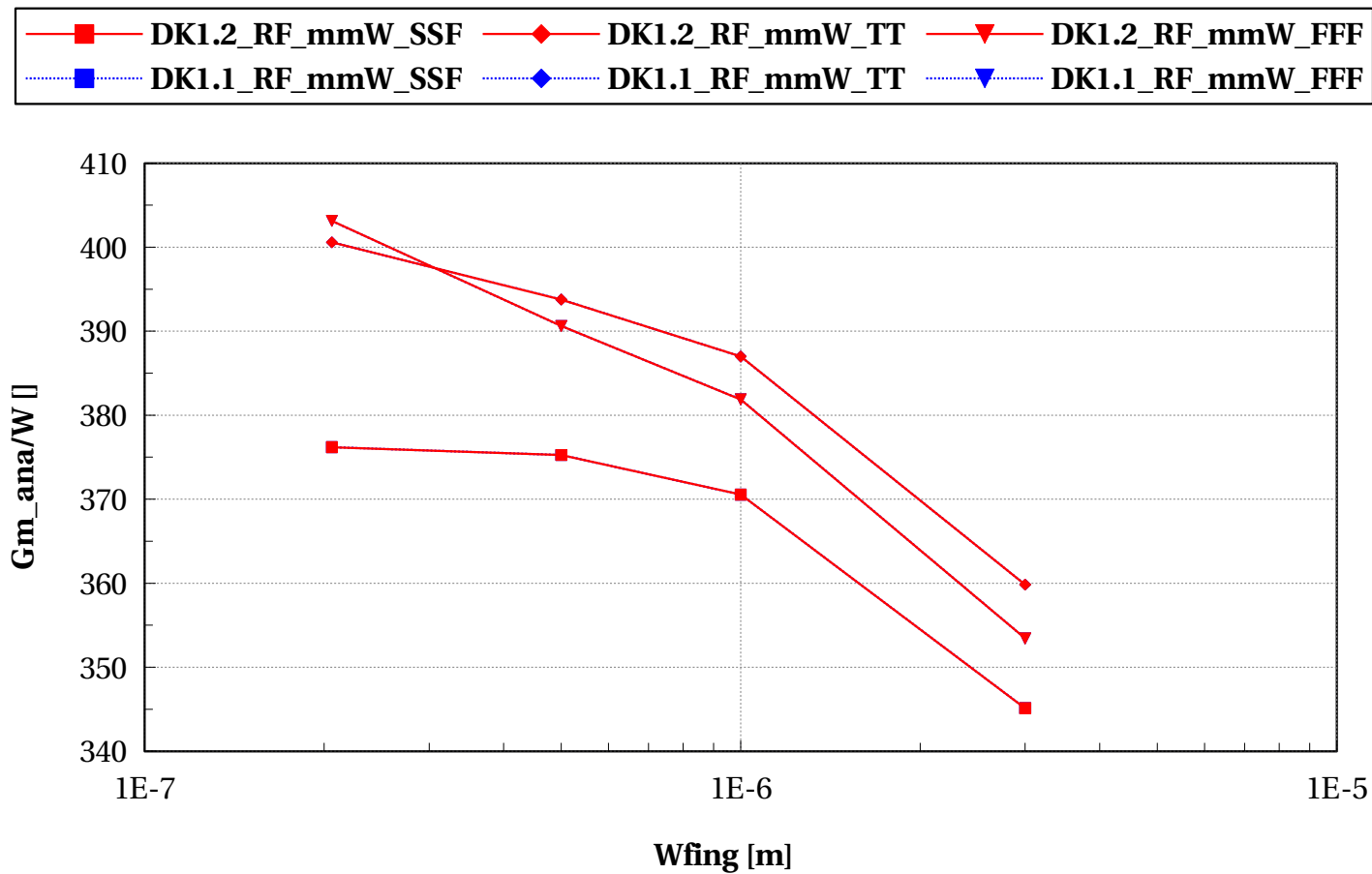
# pfet\_rf, Vgs\_ana [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



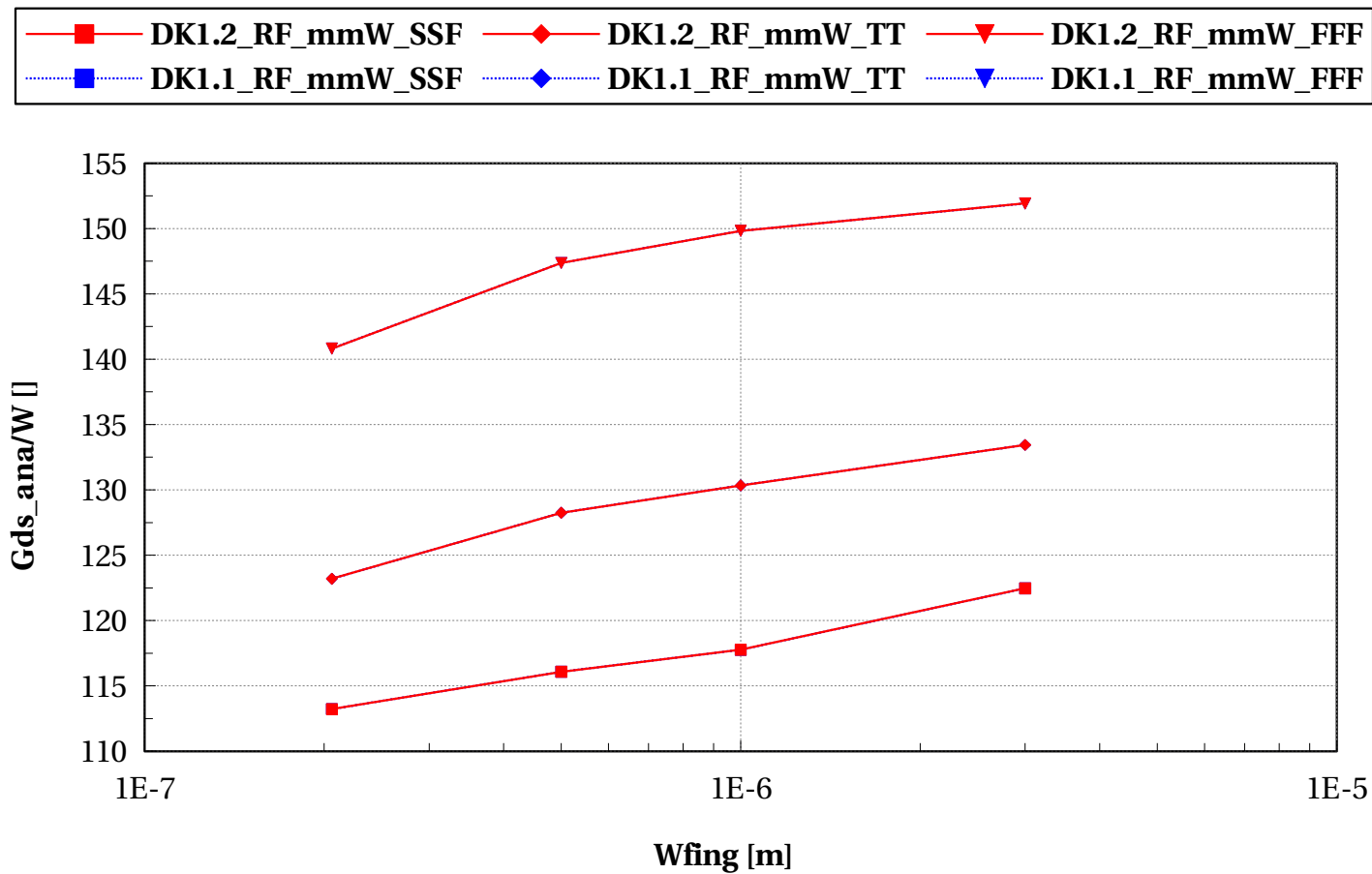
# pfet\_rf, Gm\_ana/W [] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



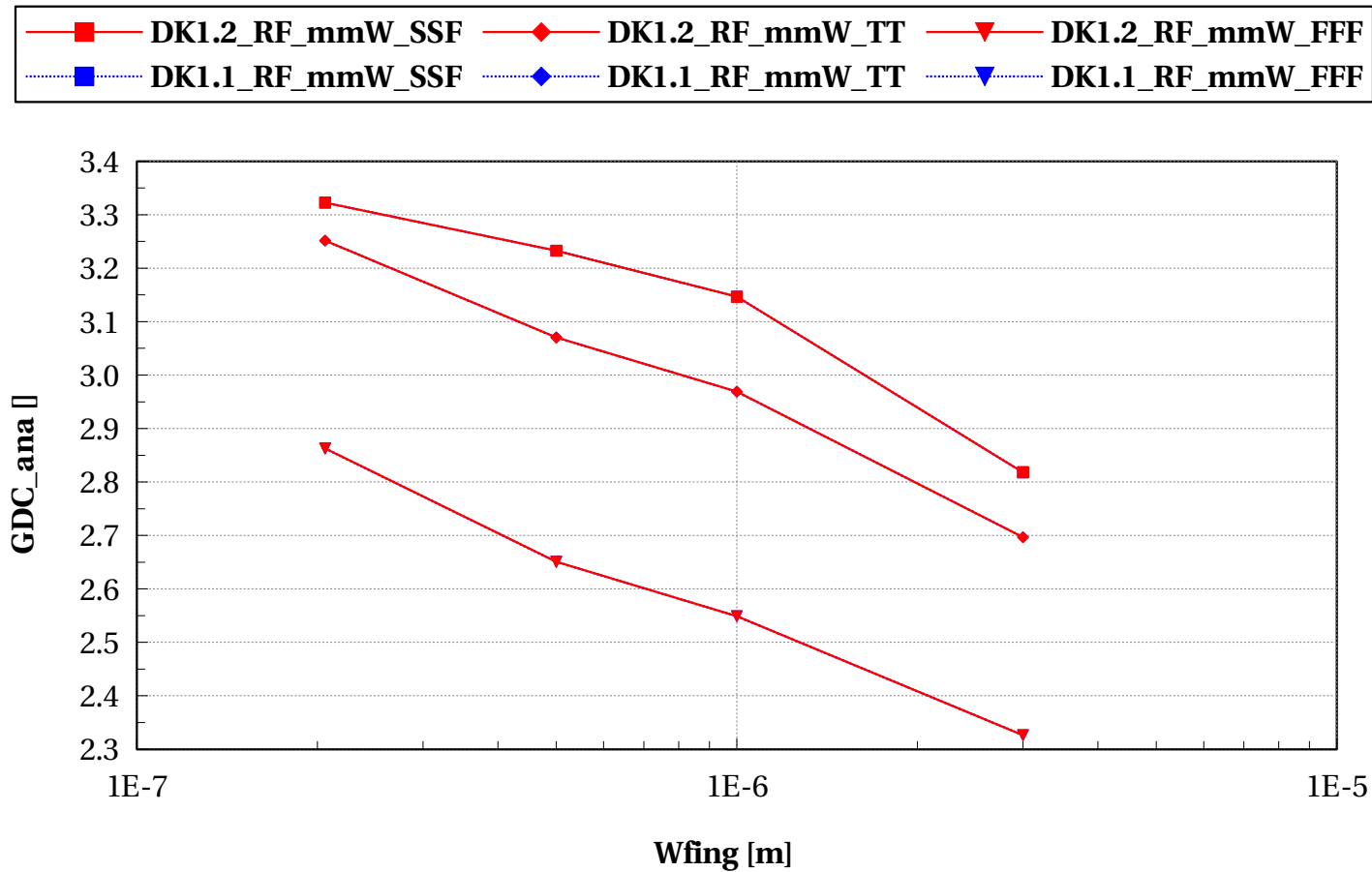
# pfet\_rf, Gds\_ana/W [] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



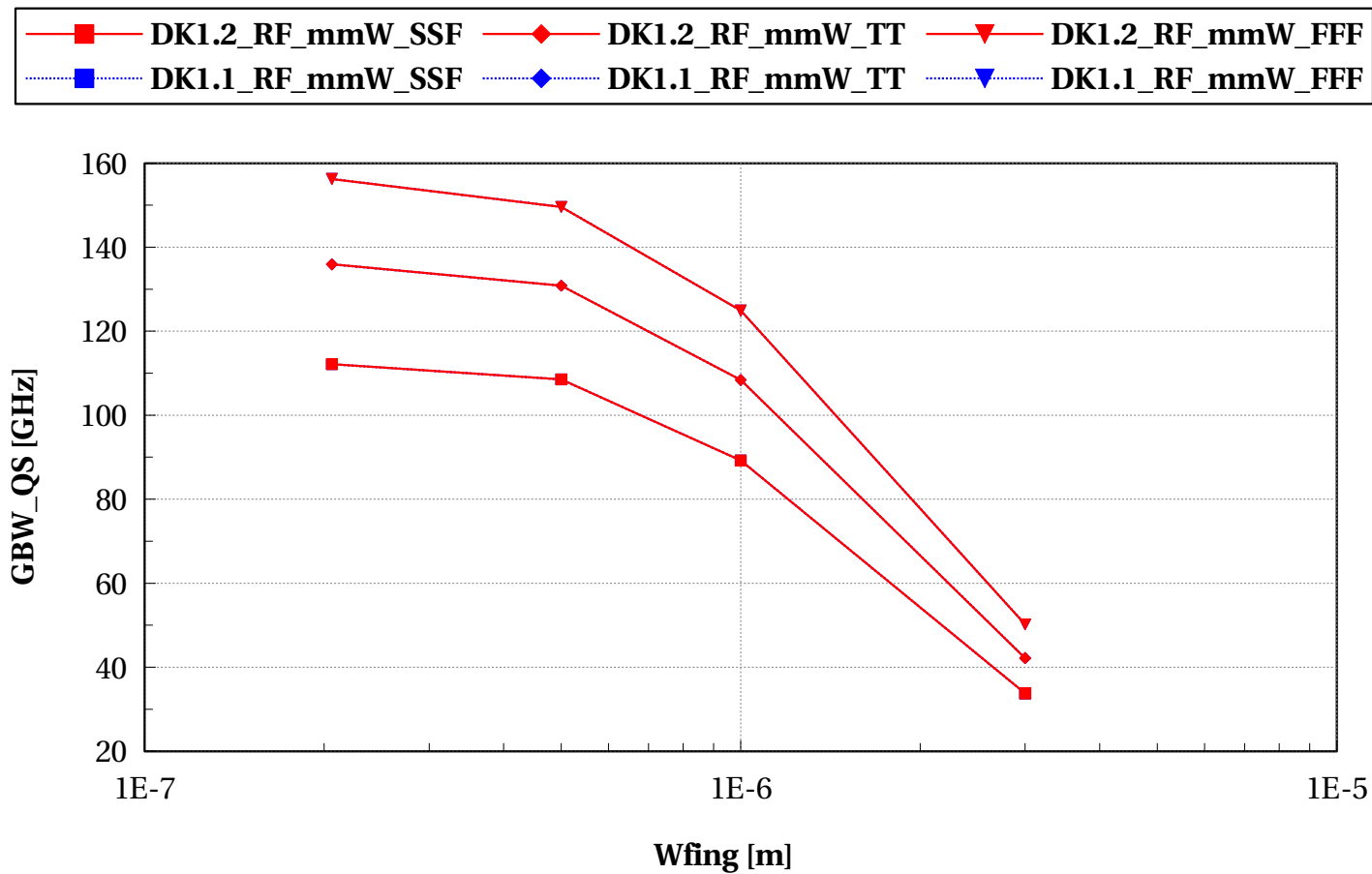
## pfet\_rf, GDC\_ana [] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



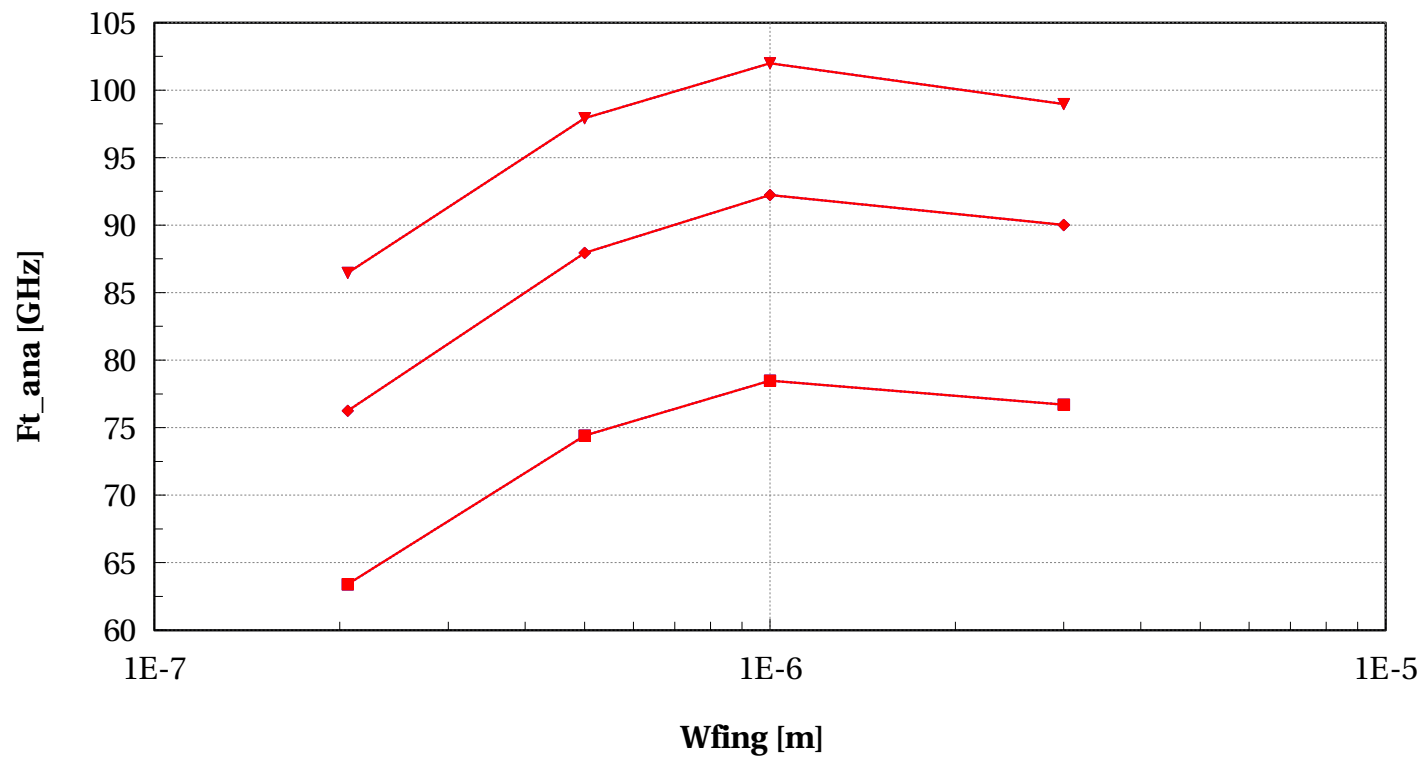
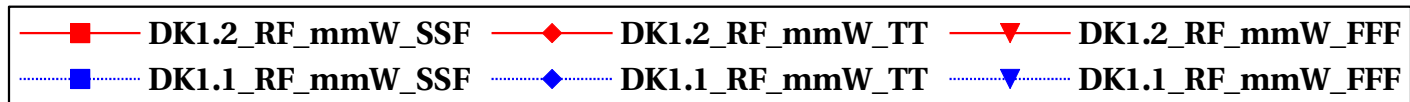
# pfet\_rf, GBW\_QS [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# pfet\_rf, Ft\_ana [GHz] vs Wfing [m]

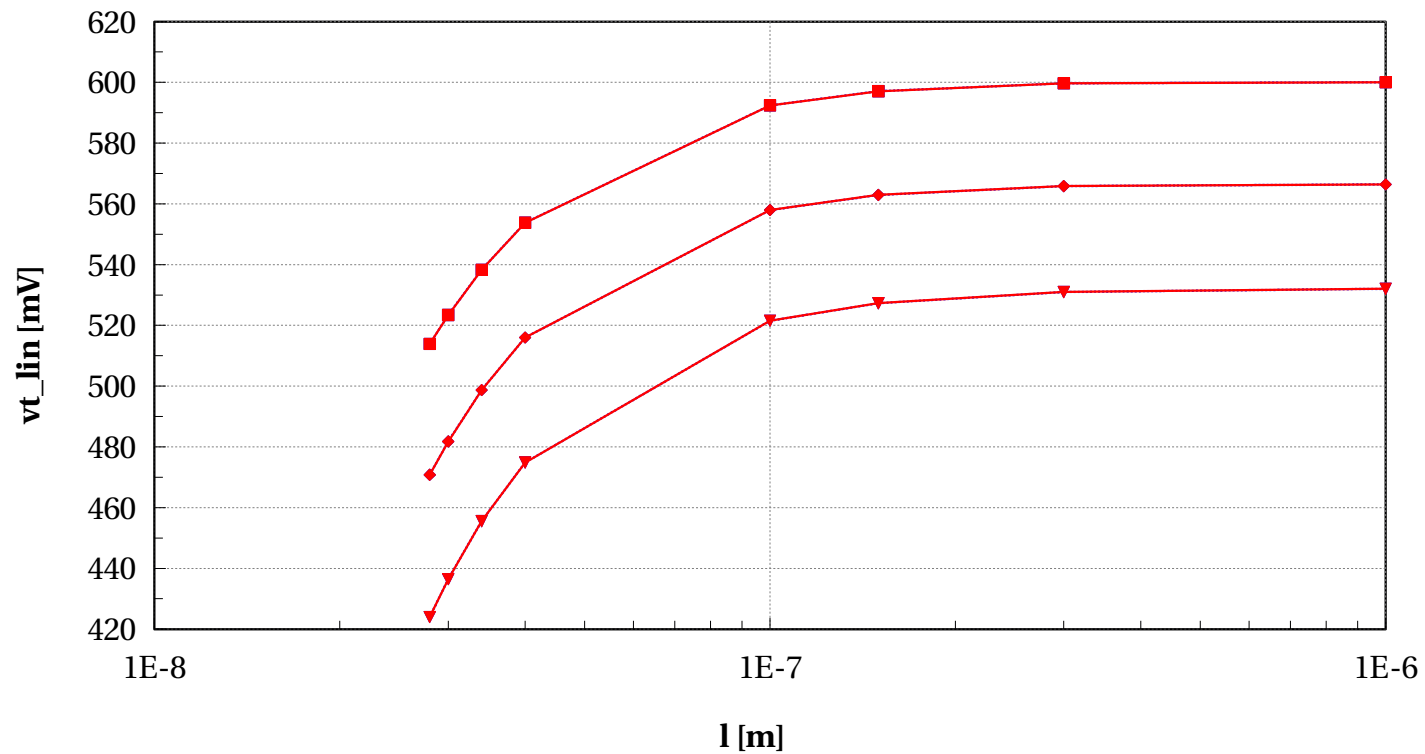
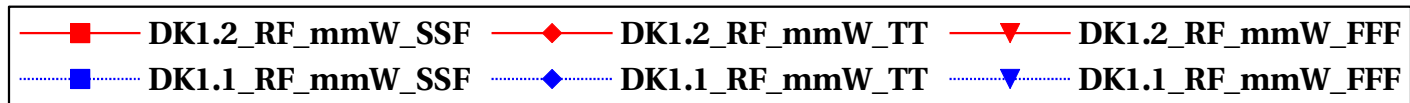
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



## Scaling versus length $W_{\text{fing}}=1\mu\text{m}$ - DC

# pfet\_rf, vt\_lin [mV] vs l [m]

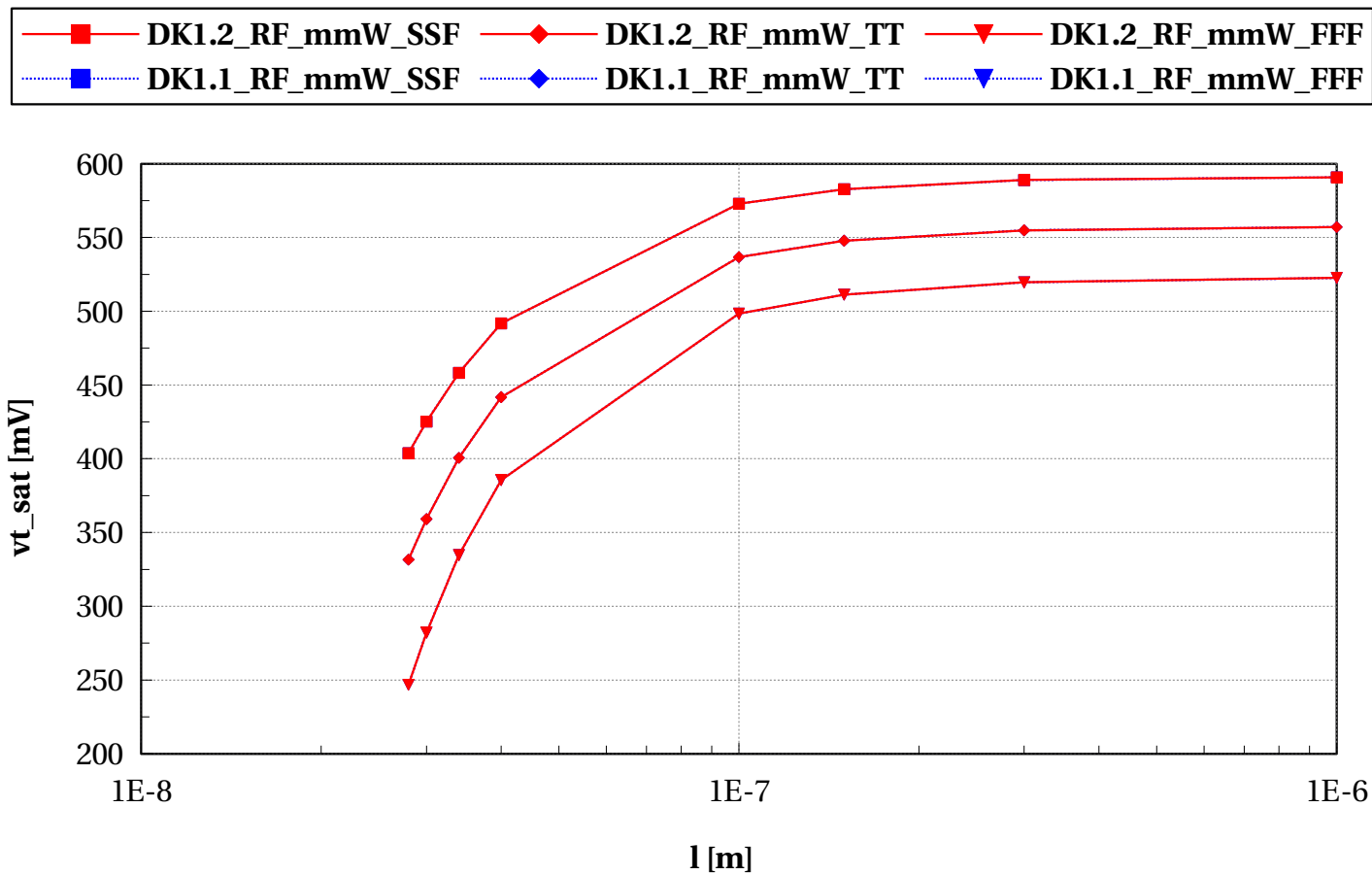
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6





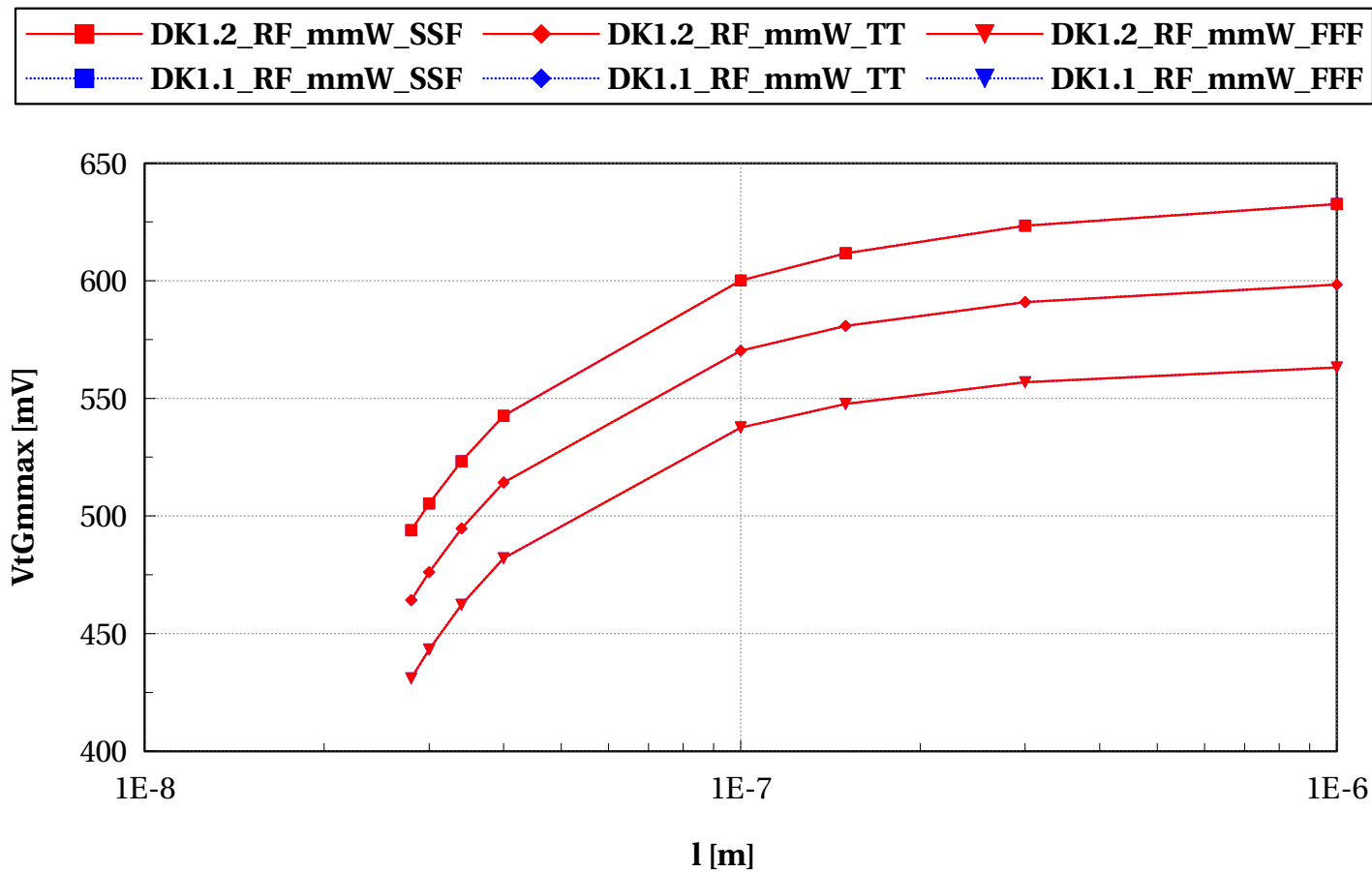
# pfet\_rf, vt\_sat [mV] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



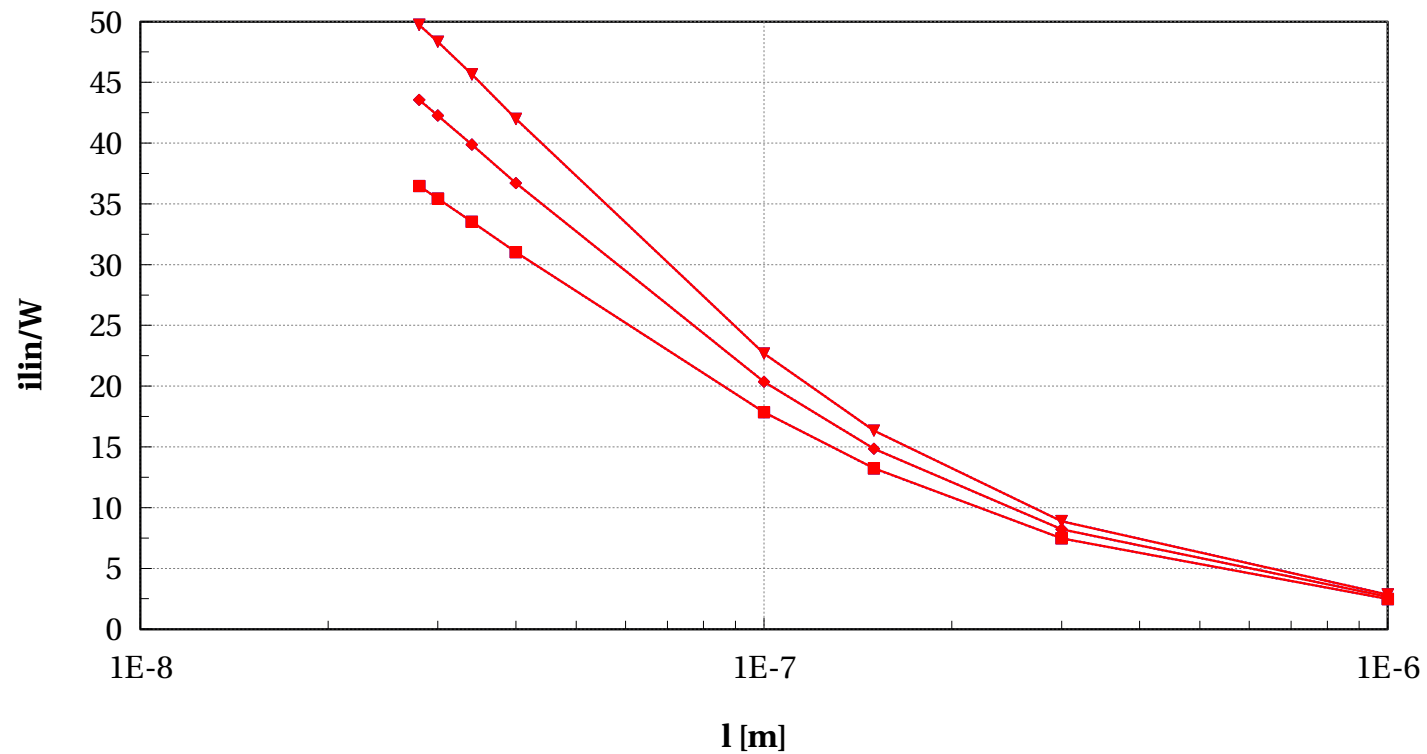
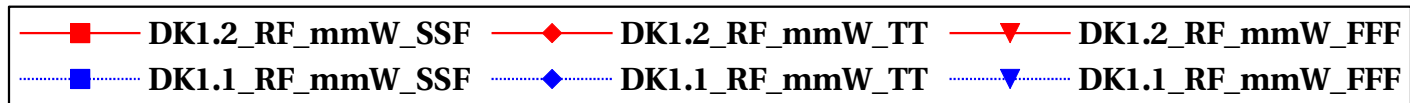
# pfet\_rf, VtGmmax [mV] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



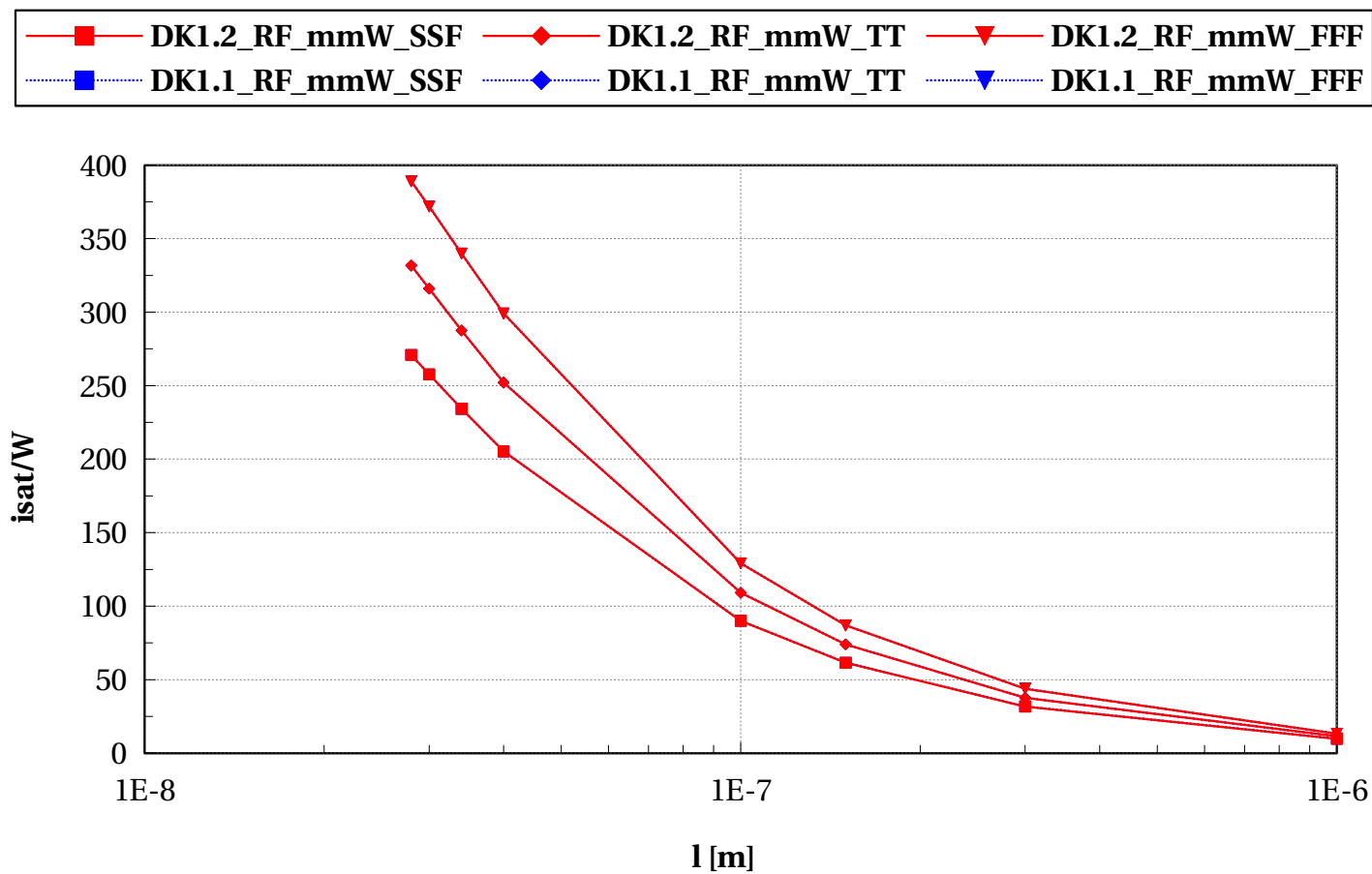
# pfet\_rf, $i_{lin}/W$ vs $l$ [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



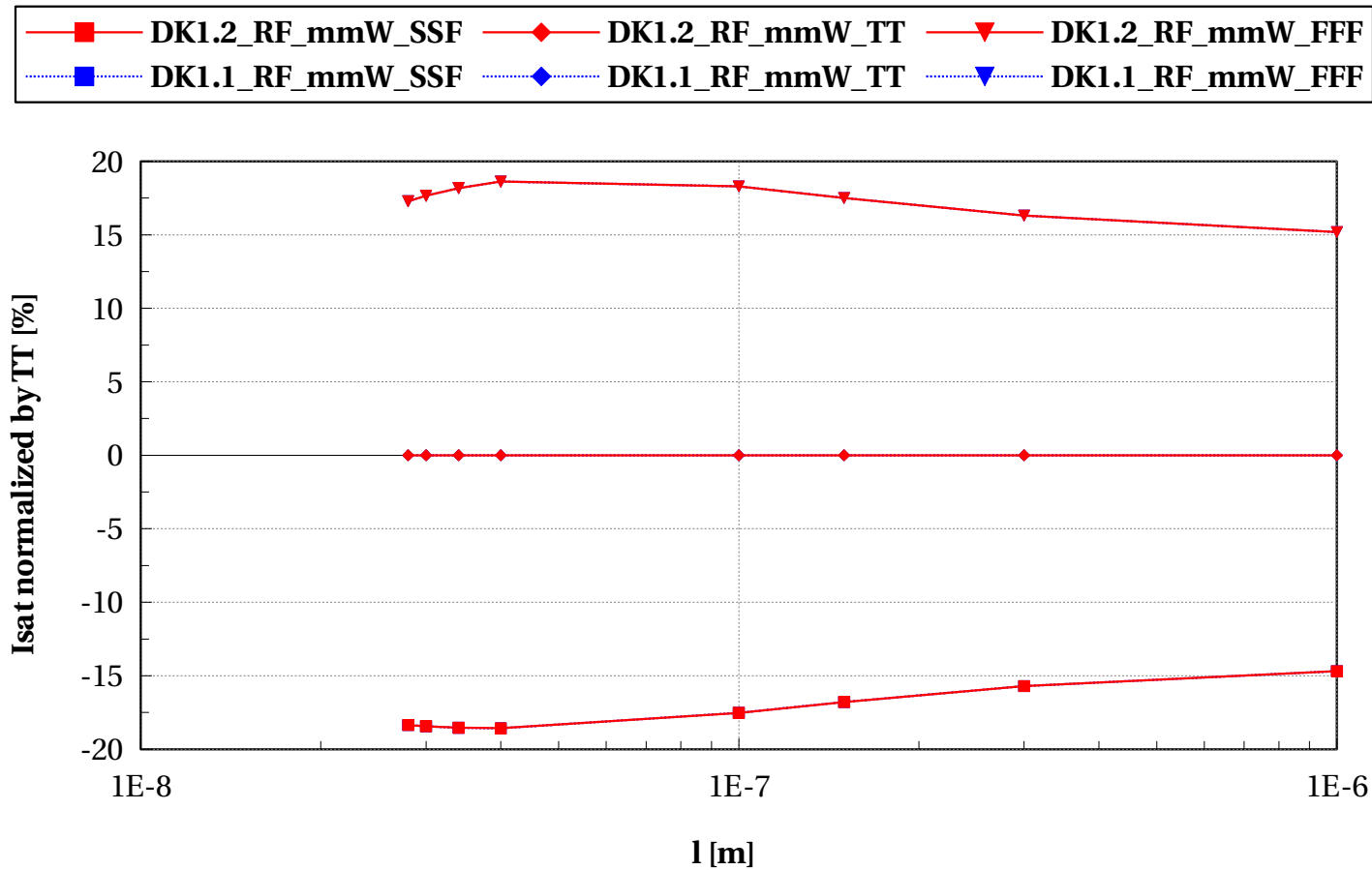
# pfet\_rf, isat/W vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



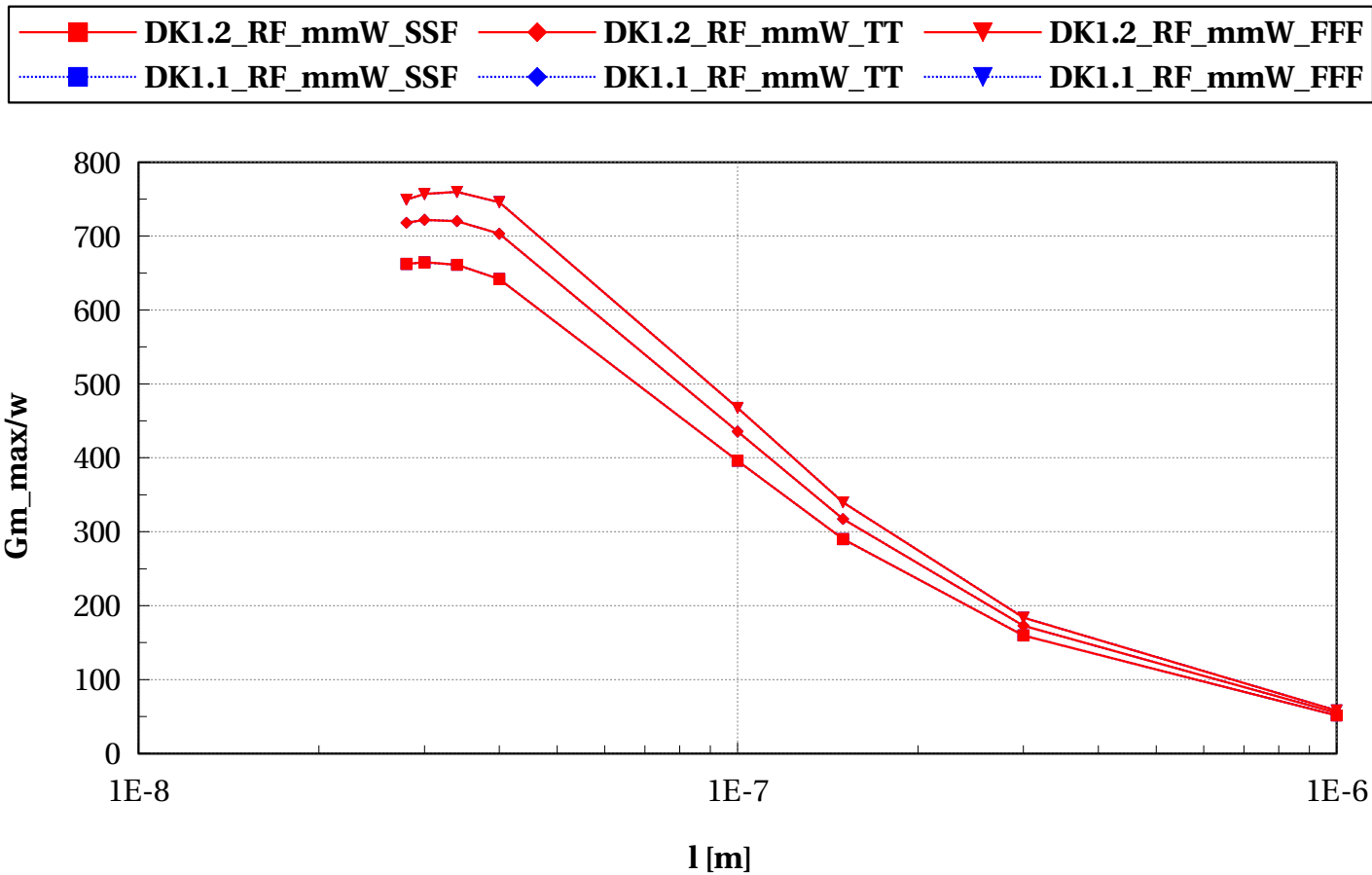
## pfet\_rf, Isat normalized by TT [%] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



# pfet\_rf, Gm\_max/w vs l [m]

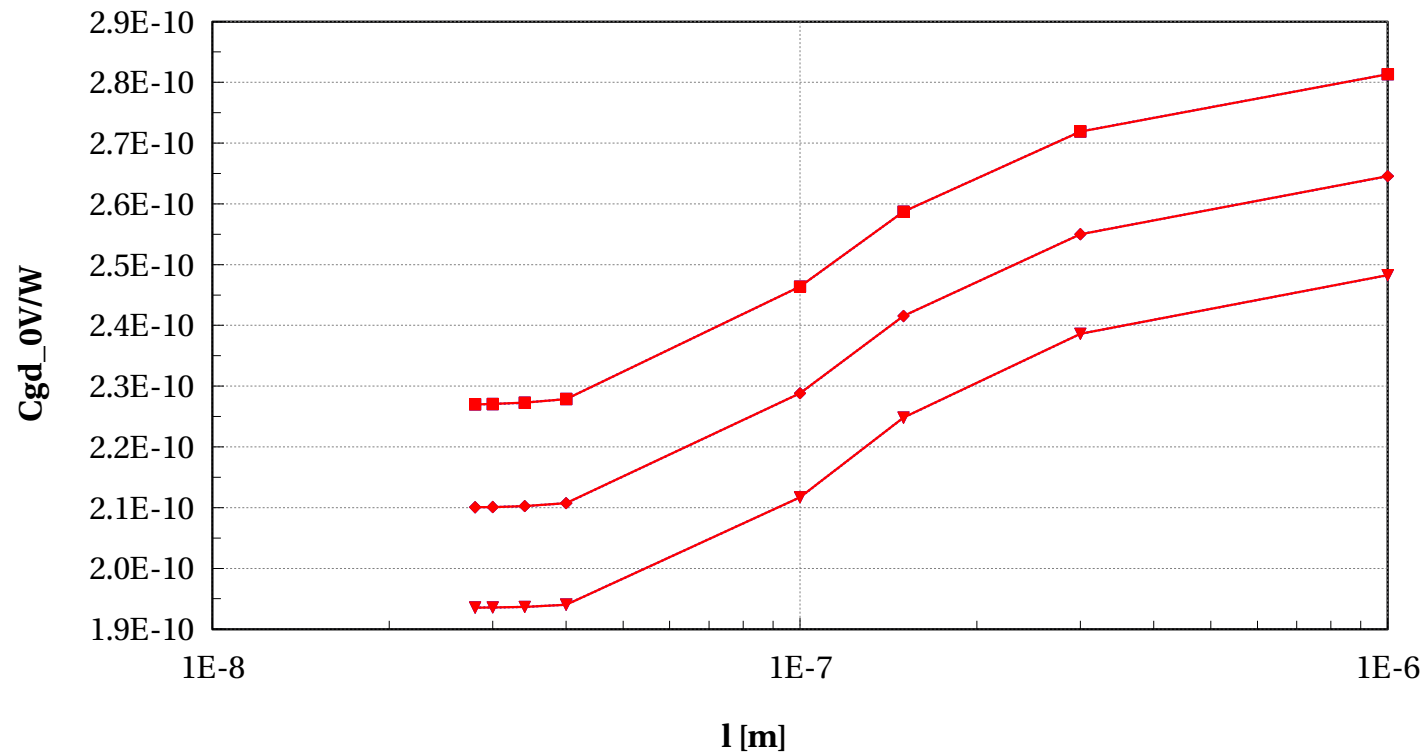
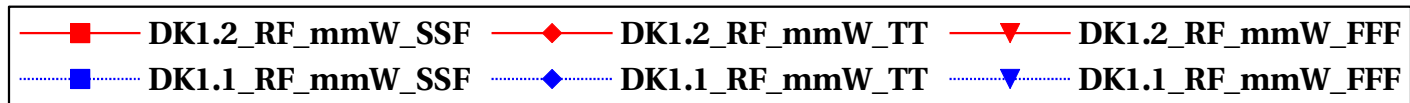
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



# Scaling versus length $W_{\text{fing}}=1\text{ }\mu\text{m}$ - RF

# pfet\_rf, Cgd\_0V/W vs l [m]

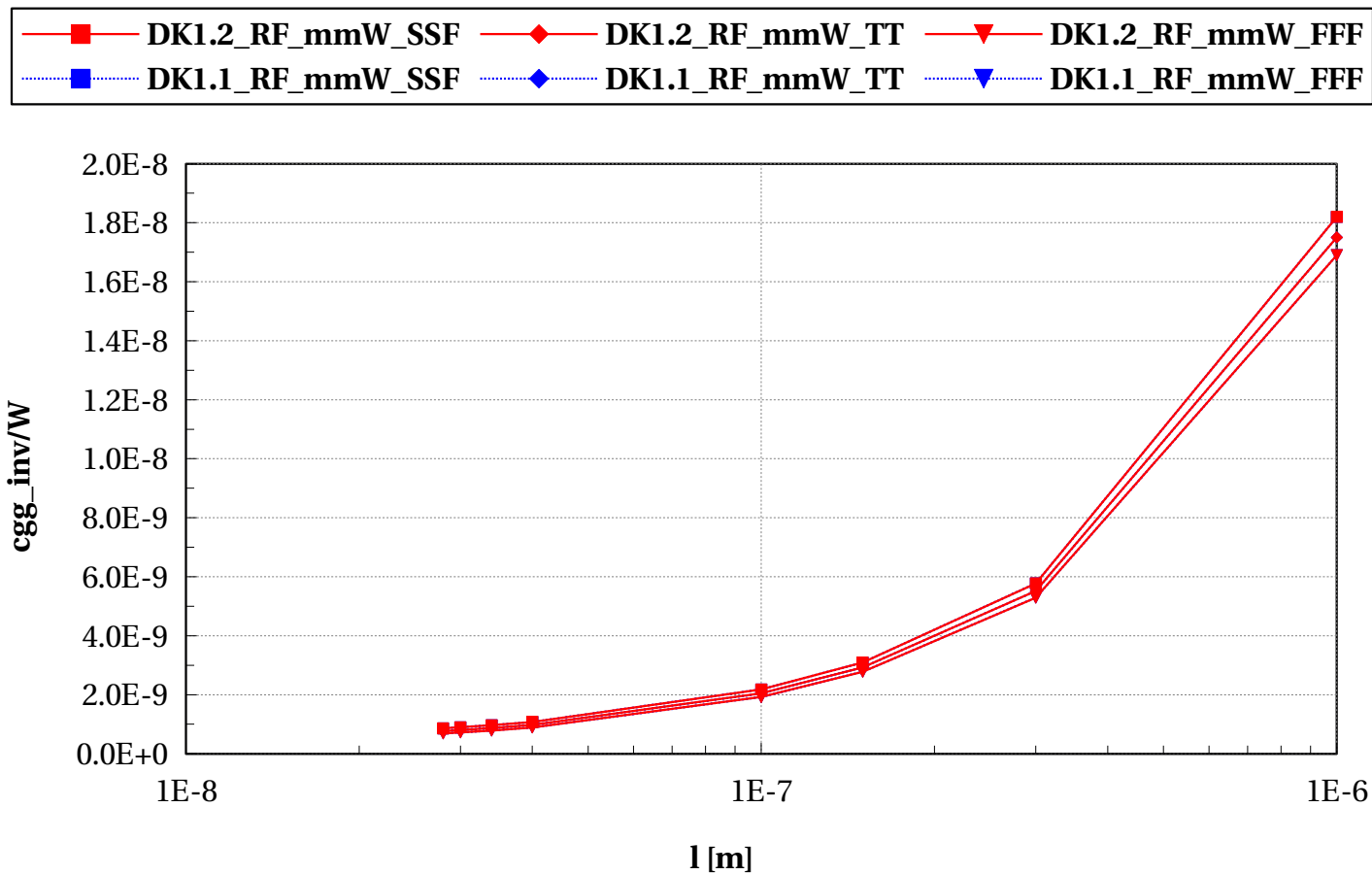
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6





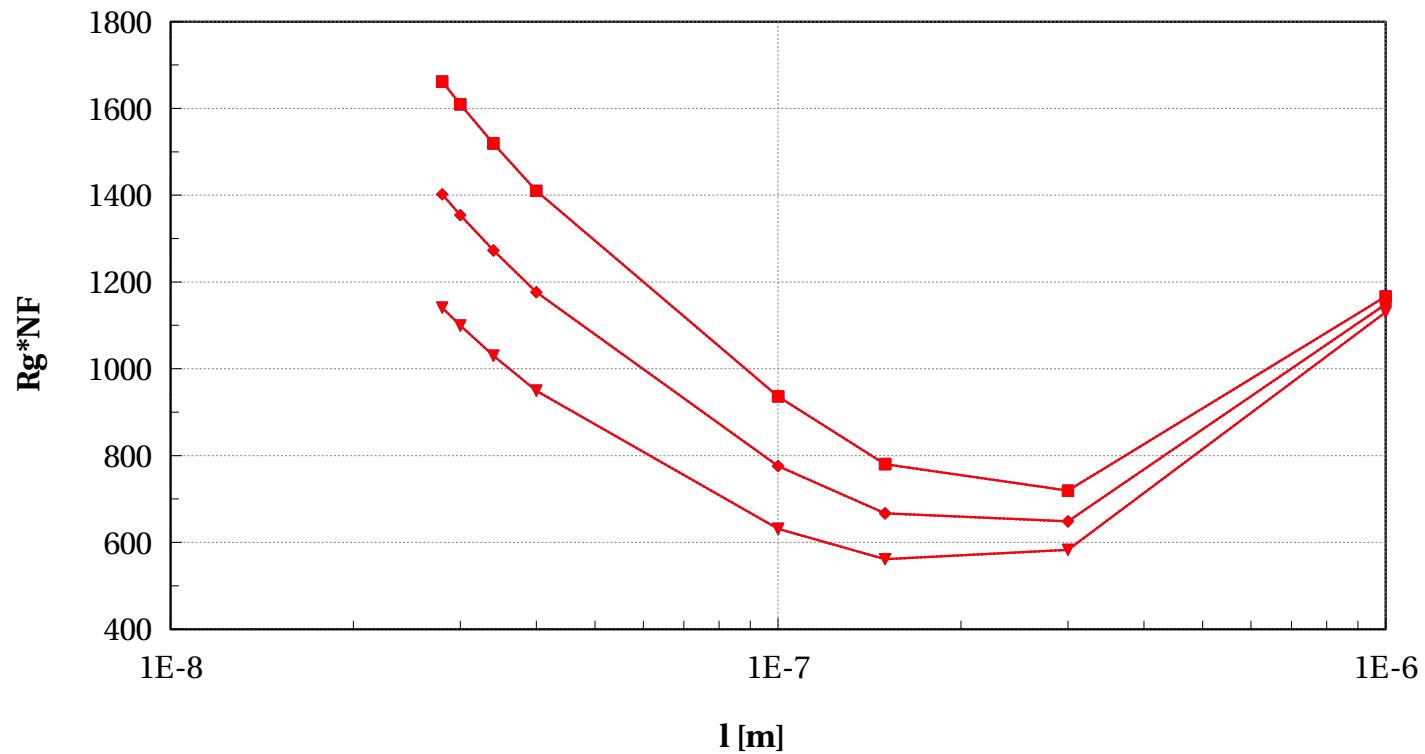
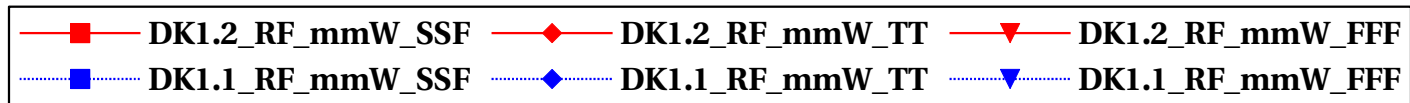
## pfet\_rf, cgg\_inv/W vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



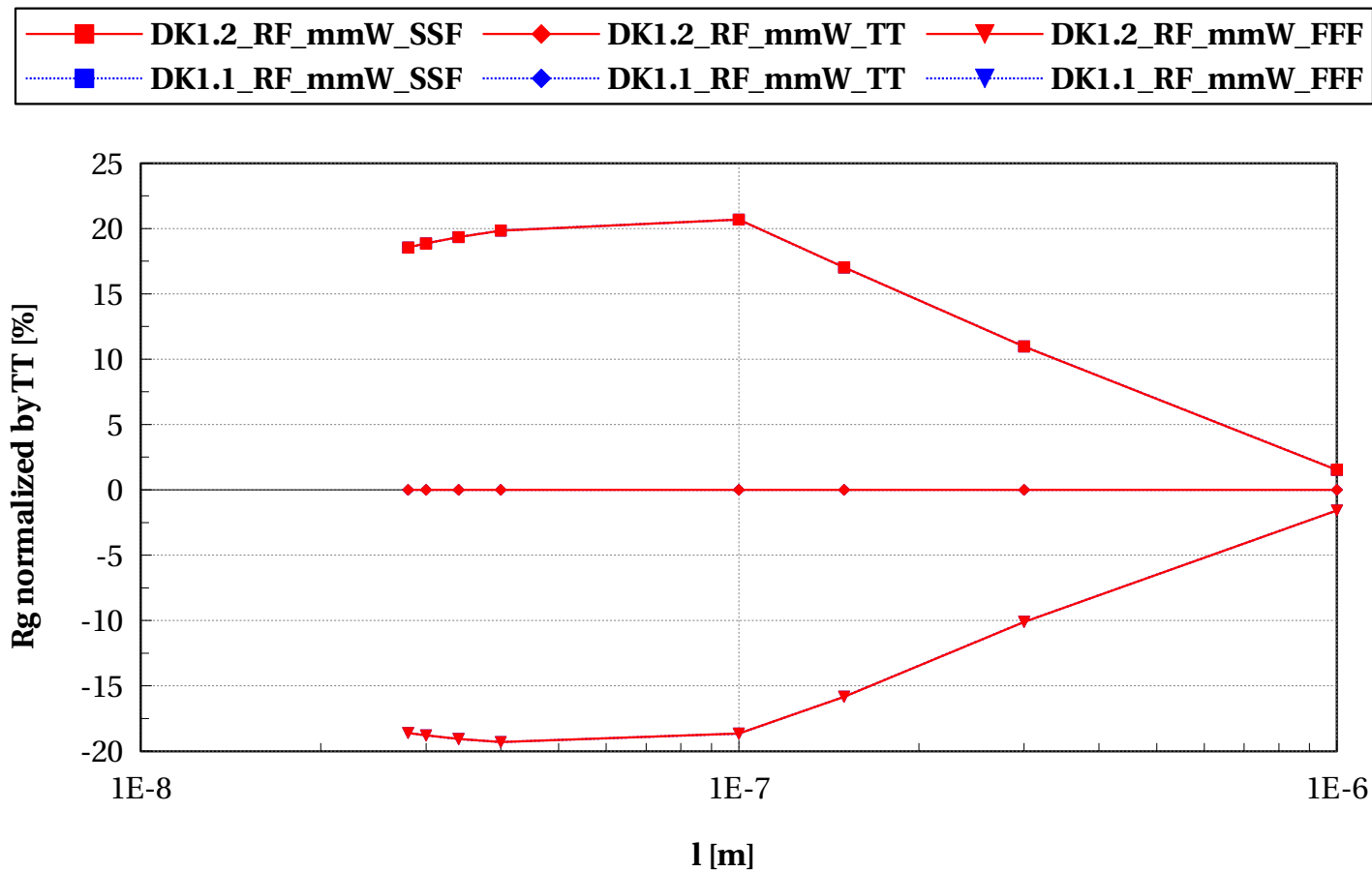
# pfet\_rf, $R_g * NF$ vs $l$ [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6



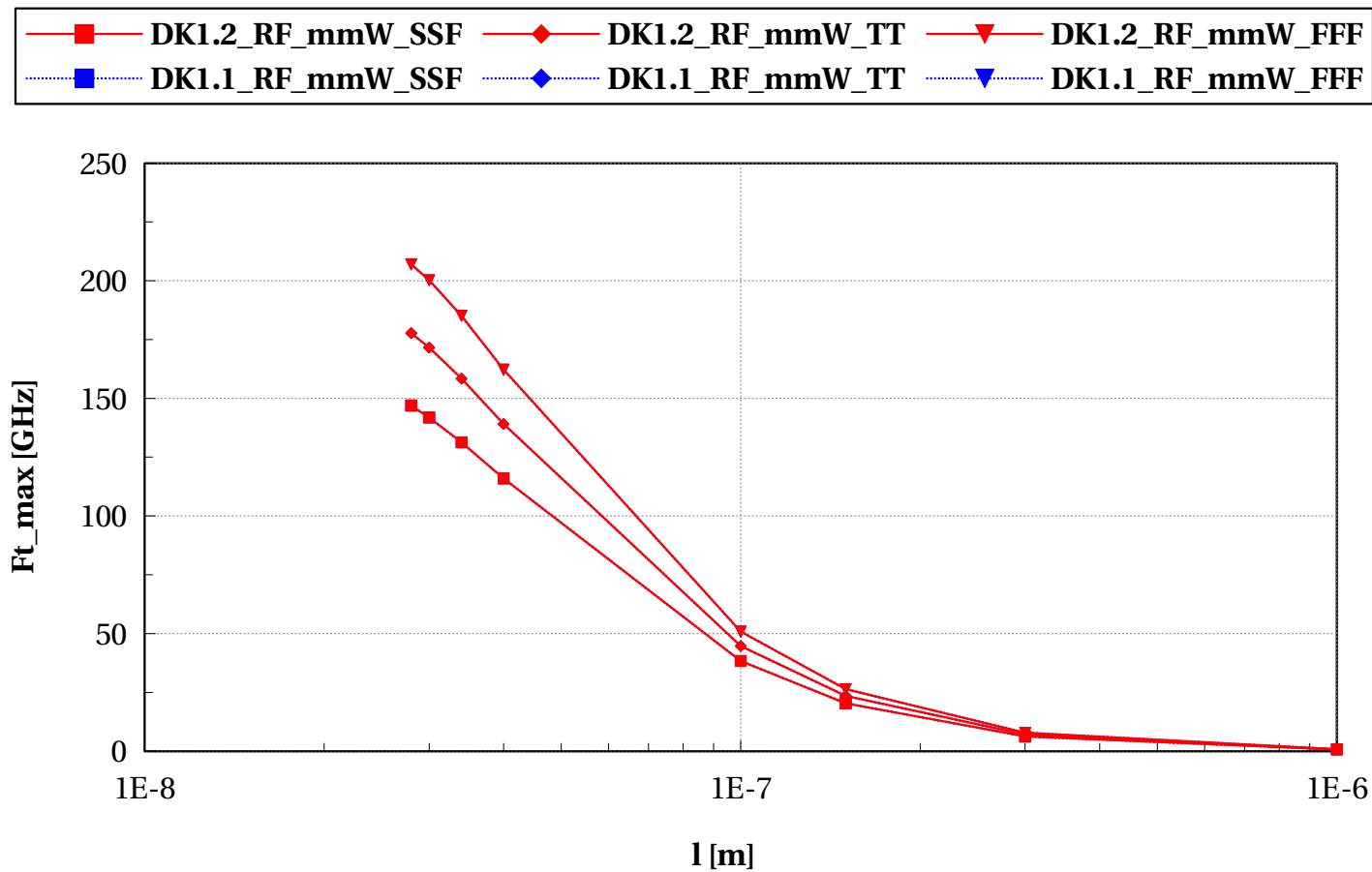
## pfet\_rf, Rg normalized by TT [%] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



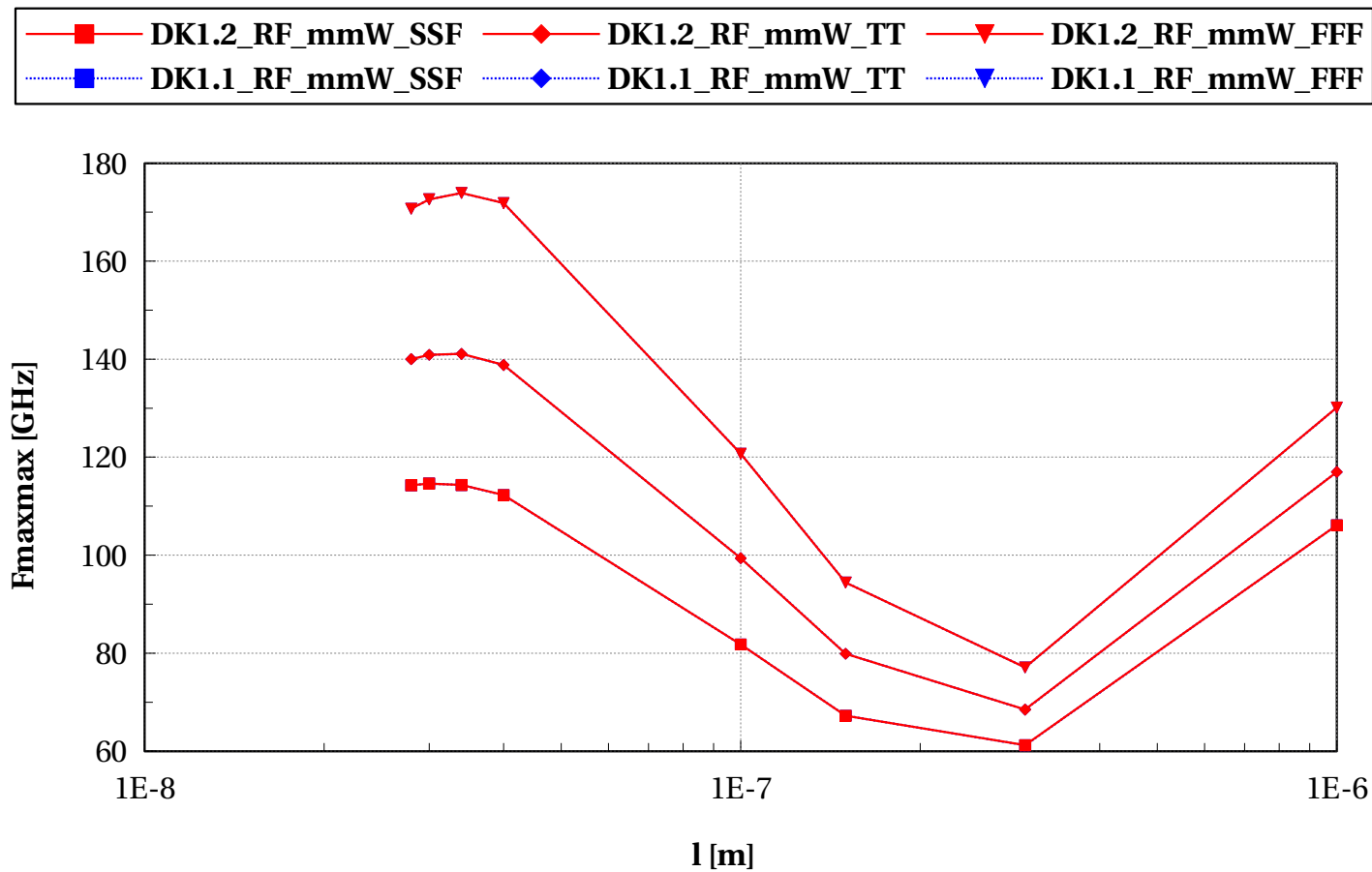
# pfet\_rf, Ft\_max [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



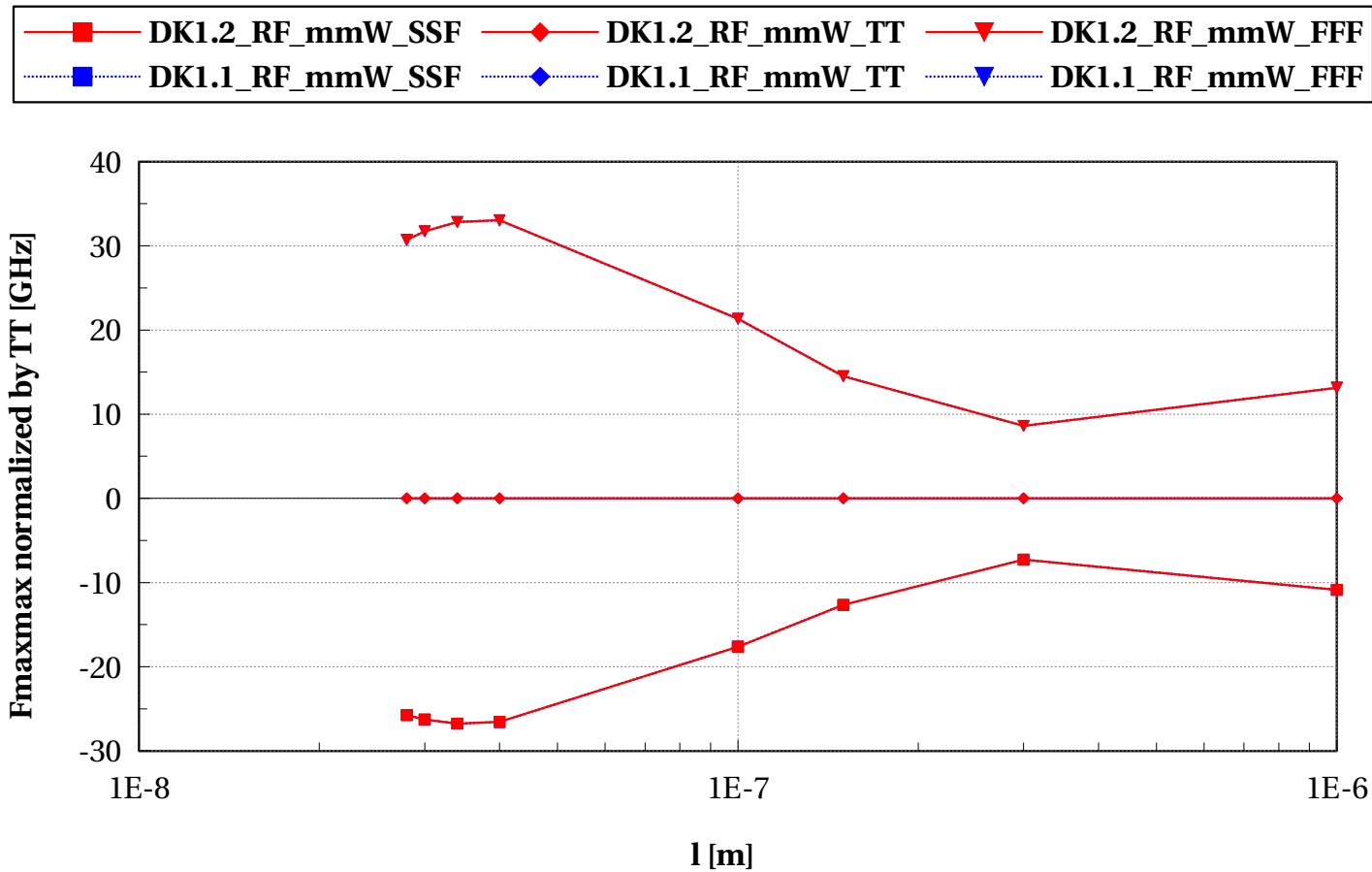
# pfet\_rf, Fmaxmax [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



## pfet\_rf, Fmaxmax normalized by TT [GHz] vs l [m]

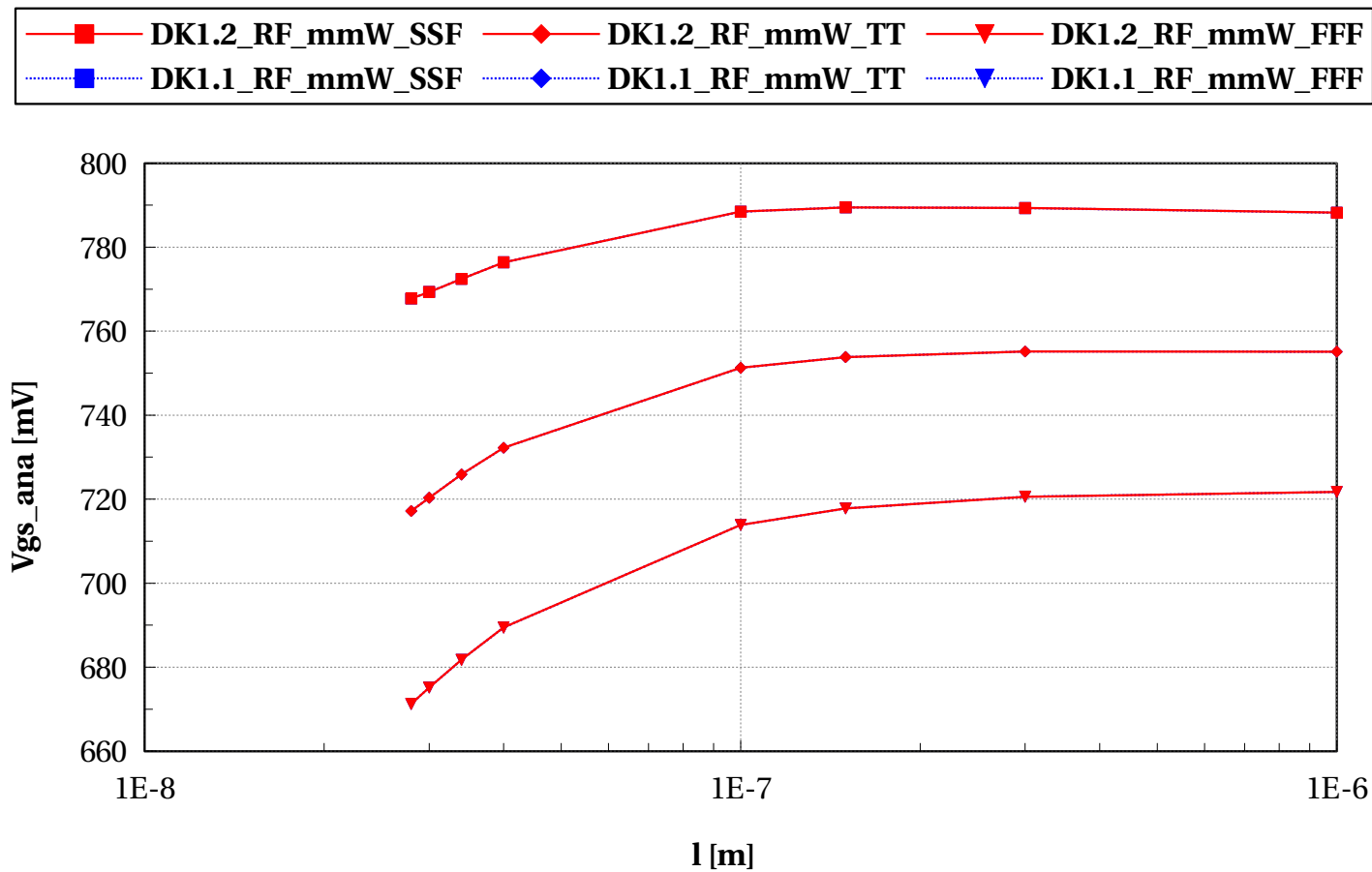
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



# Scaling versus length $W_{\text{fing}}=1\mu\text{m}$ - Analog

# pfet\_rf, Vgs\_ana [mV] vs I [m]

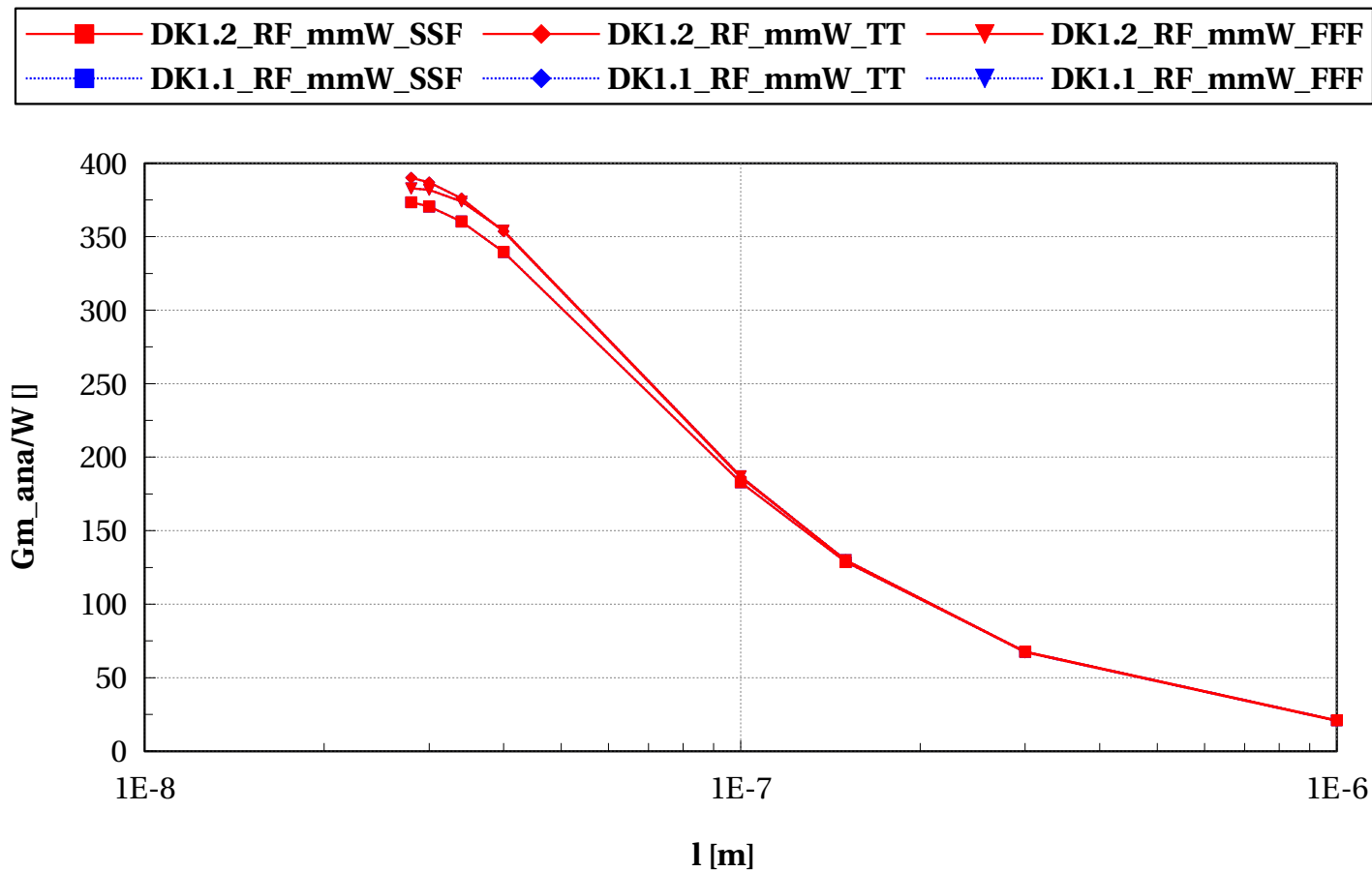
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6





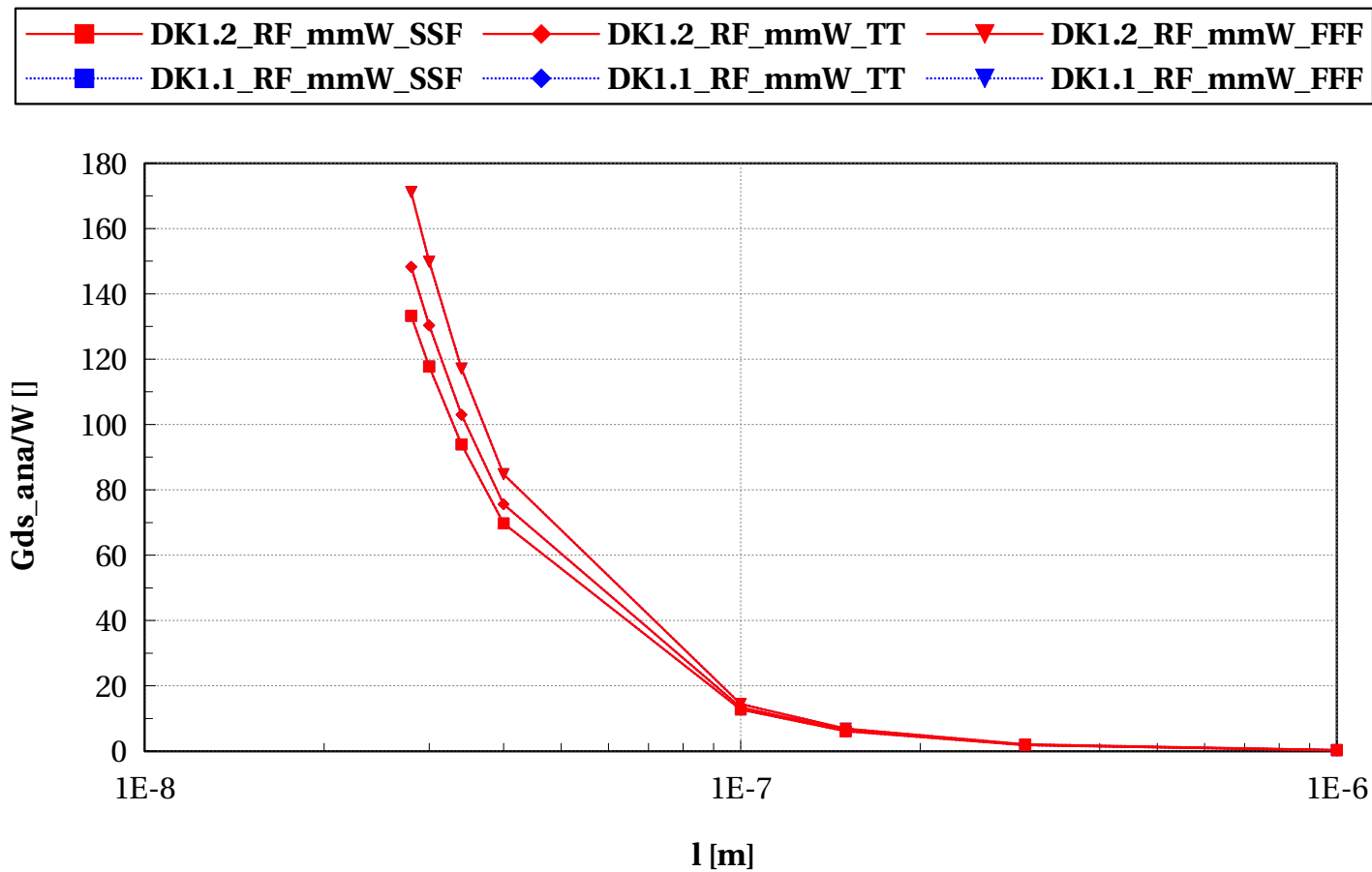
# pfet\_rf, Gm\_ana/W [] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



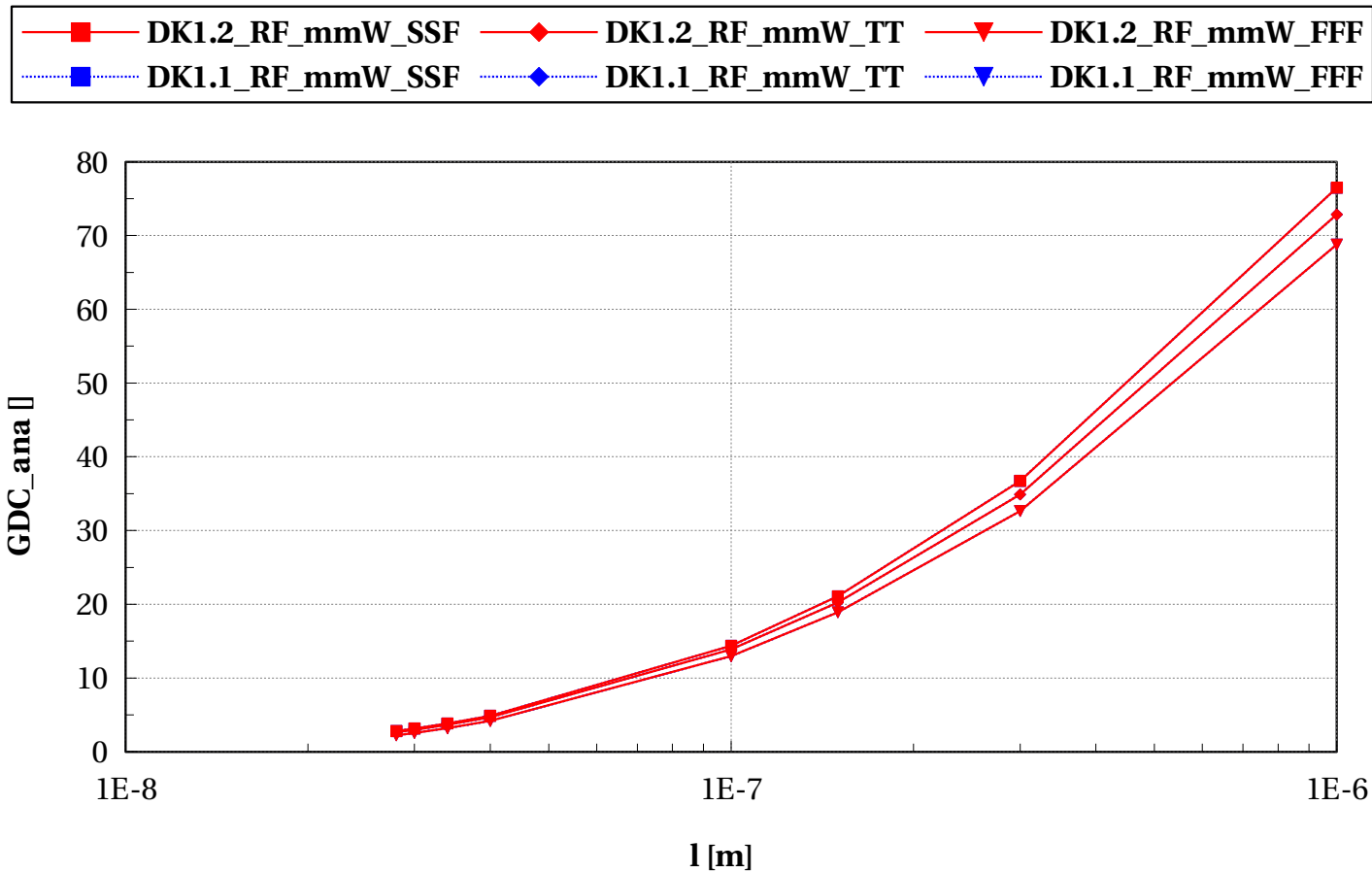
# pfet\_rf, Gds\_ana/W [] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



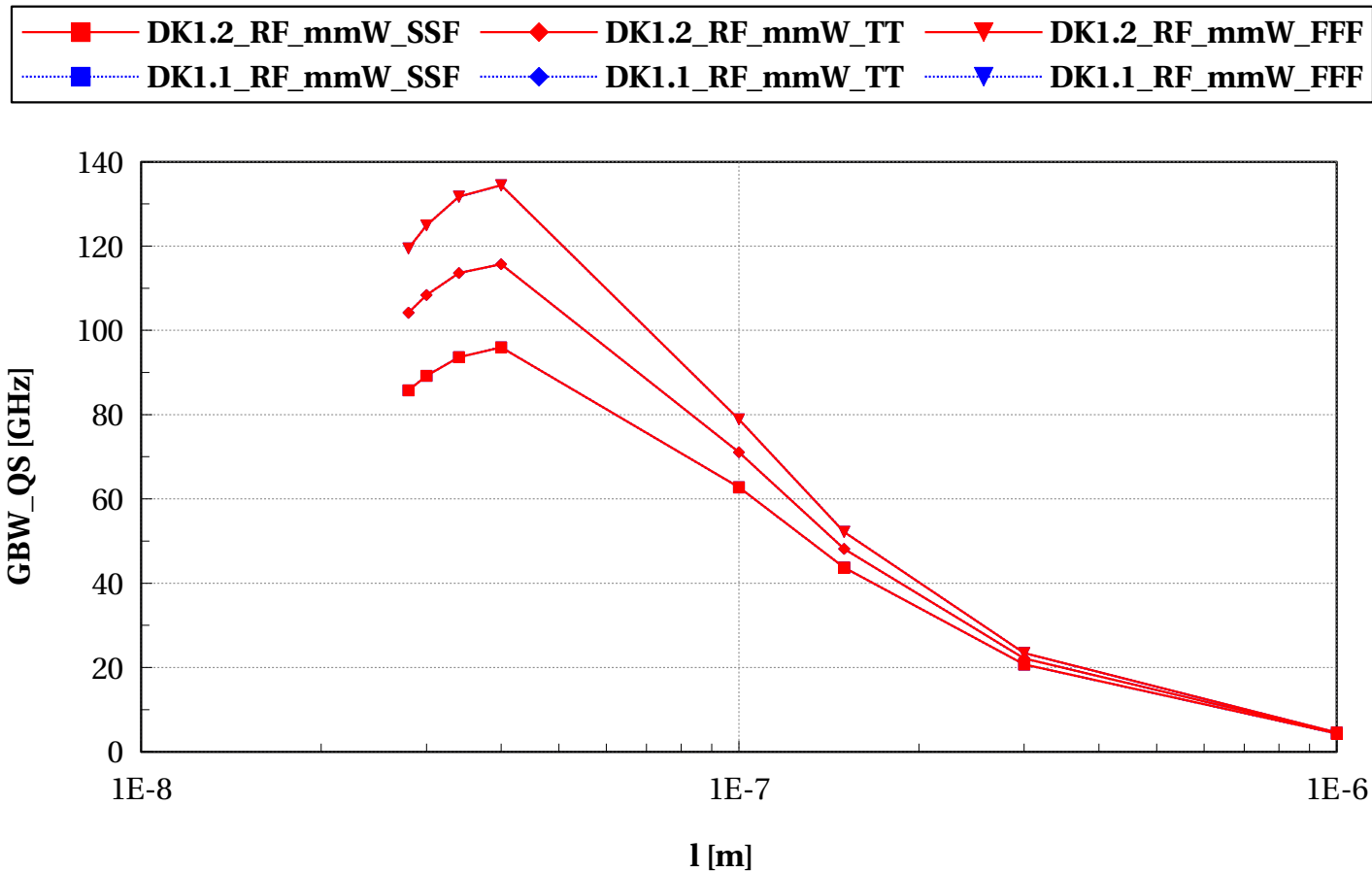
# pfet\_rf, GDC\_ana [] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



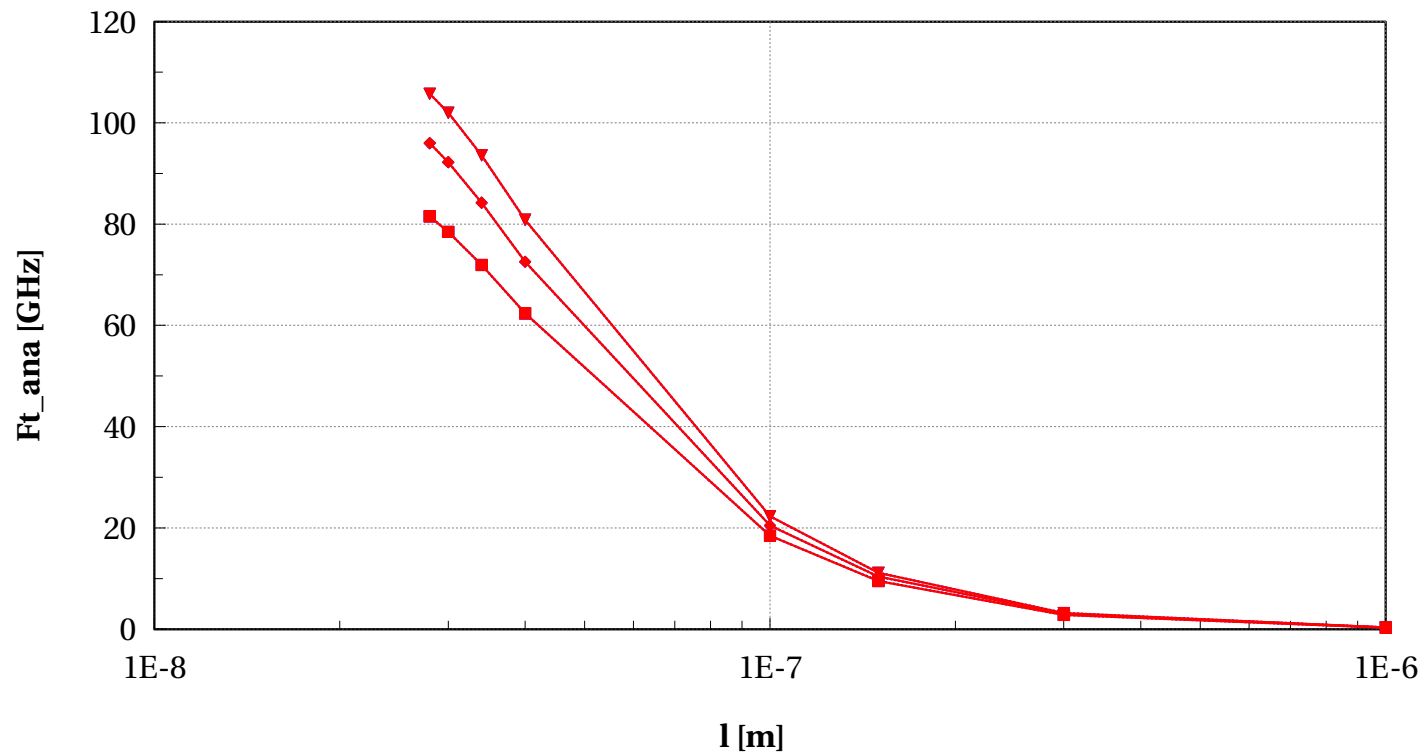
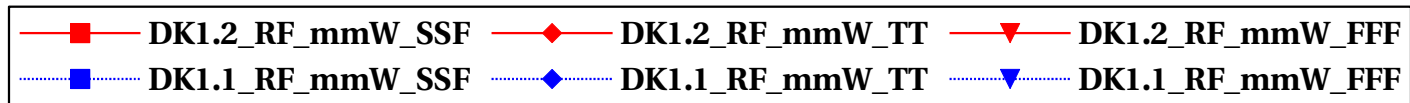
# pfet\_rf, GBW\_QS [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



# pfet\_rf, Ft\_ana [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



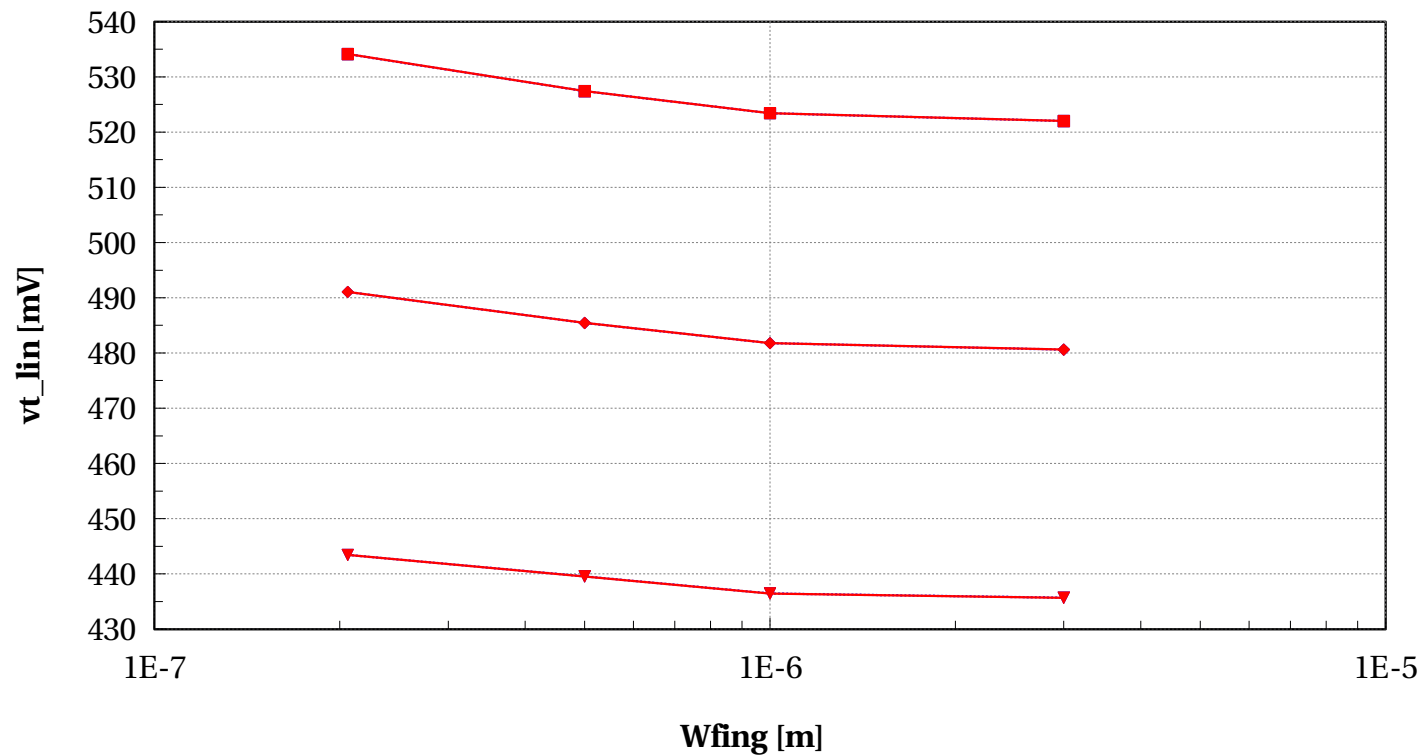
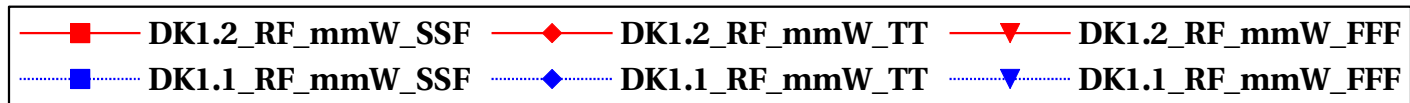
# pfet\_rfseg

## Electrical characteristics scaling

## Scaling versus width $L=30\text{nm}$ - DC

# pfet\_rfseg, vt\_lin [mV] vs Wfing [m]

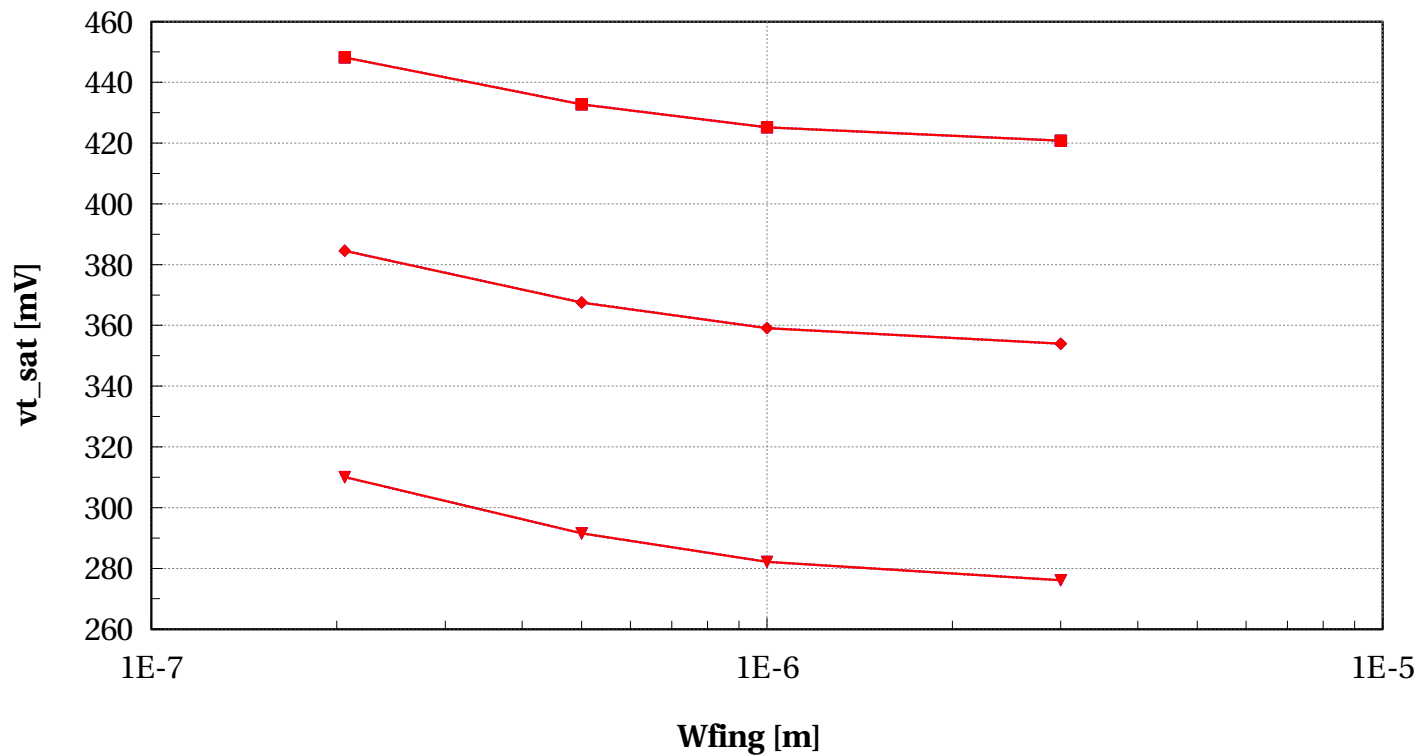
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9





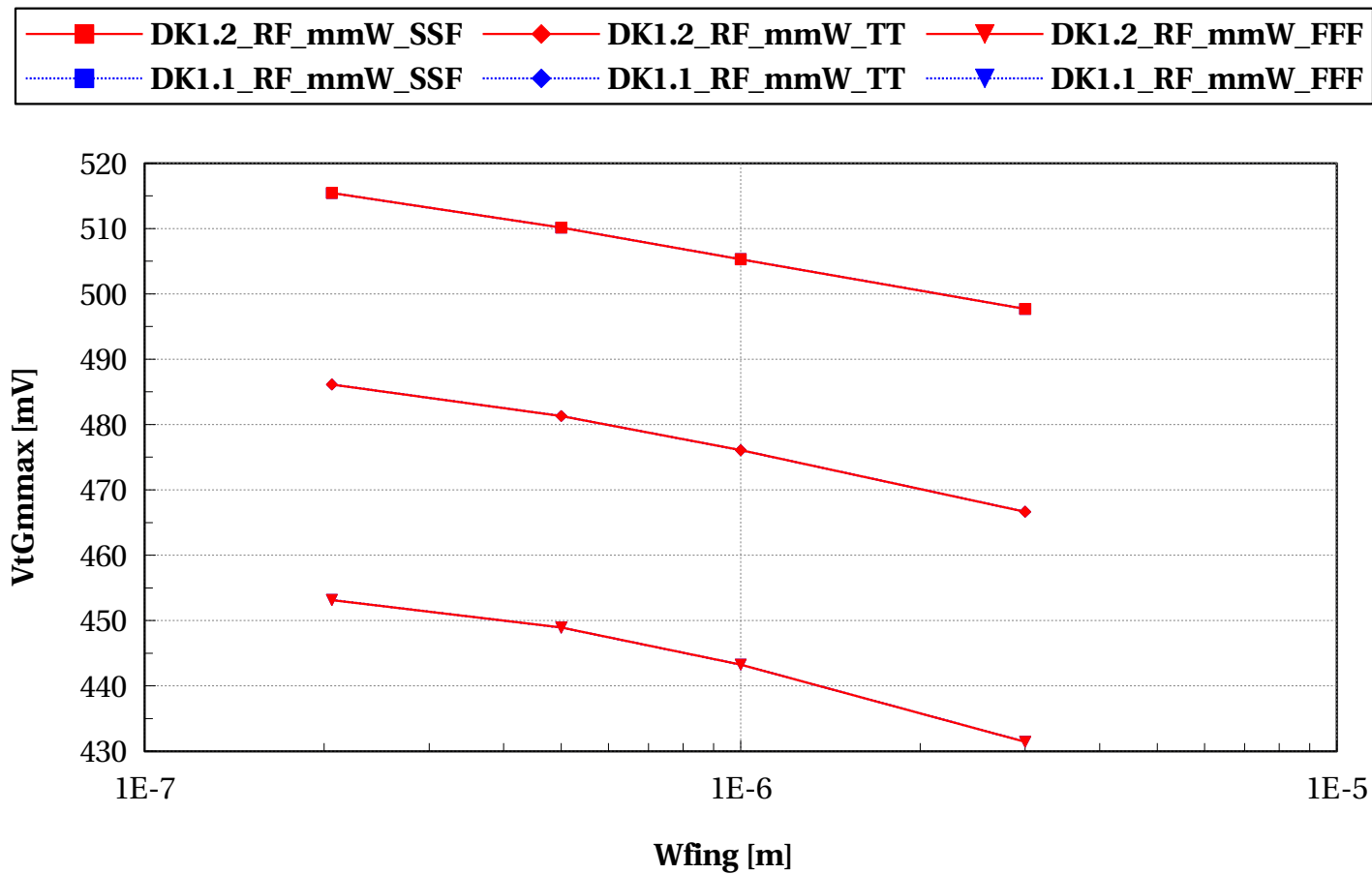
# pfet\_rfseg, vt\_sat [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



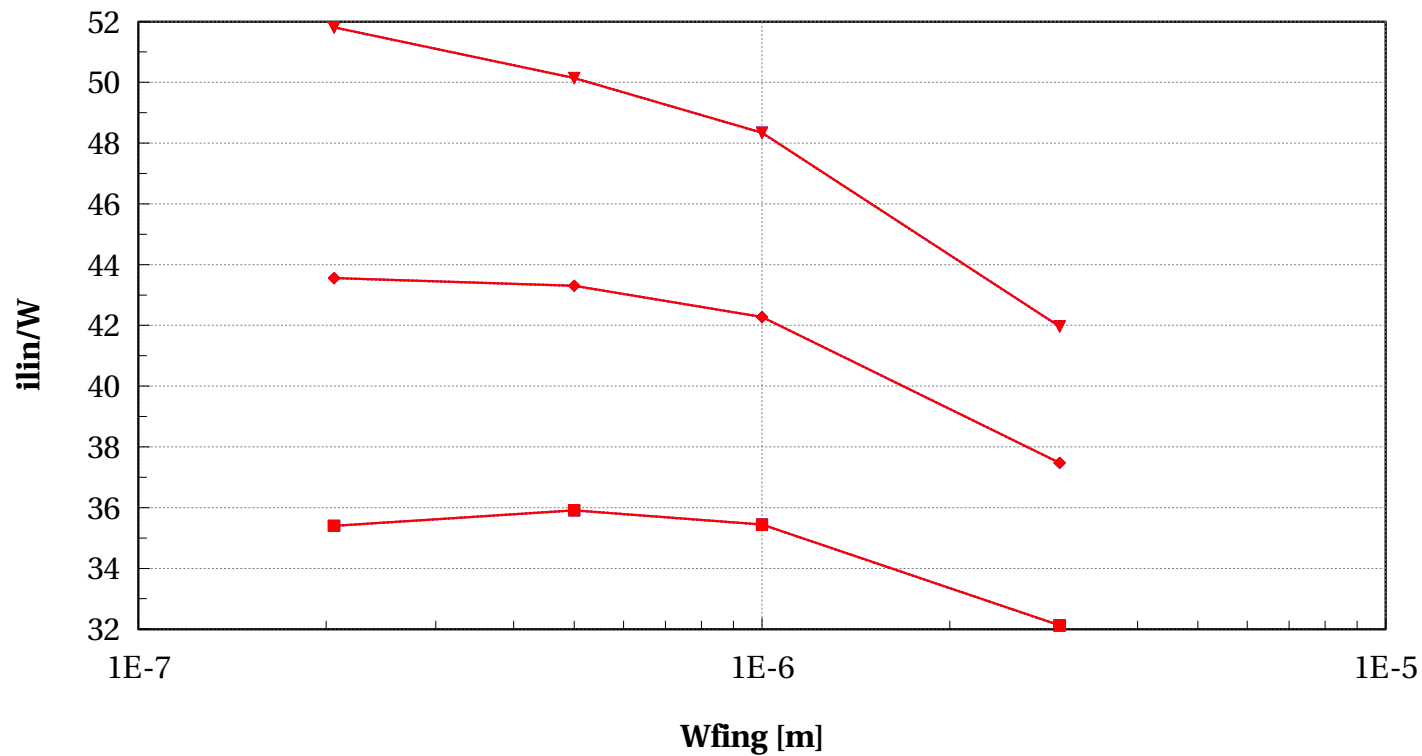
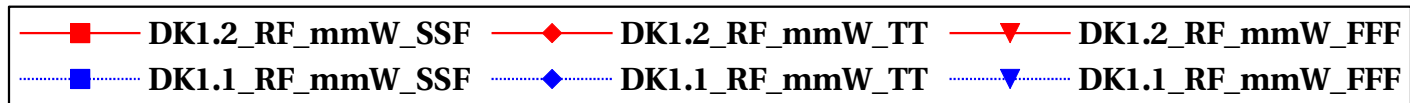
# pfet\_rfseg, VtGmmax [mV] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



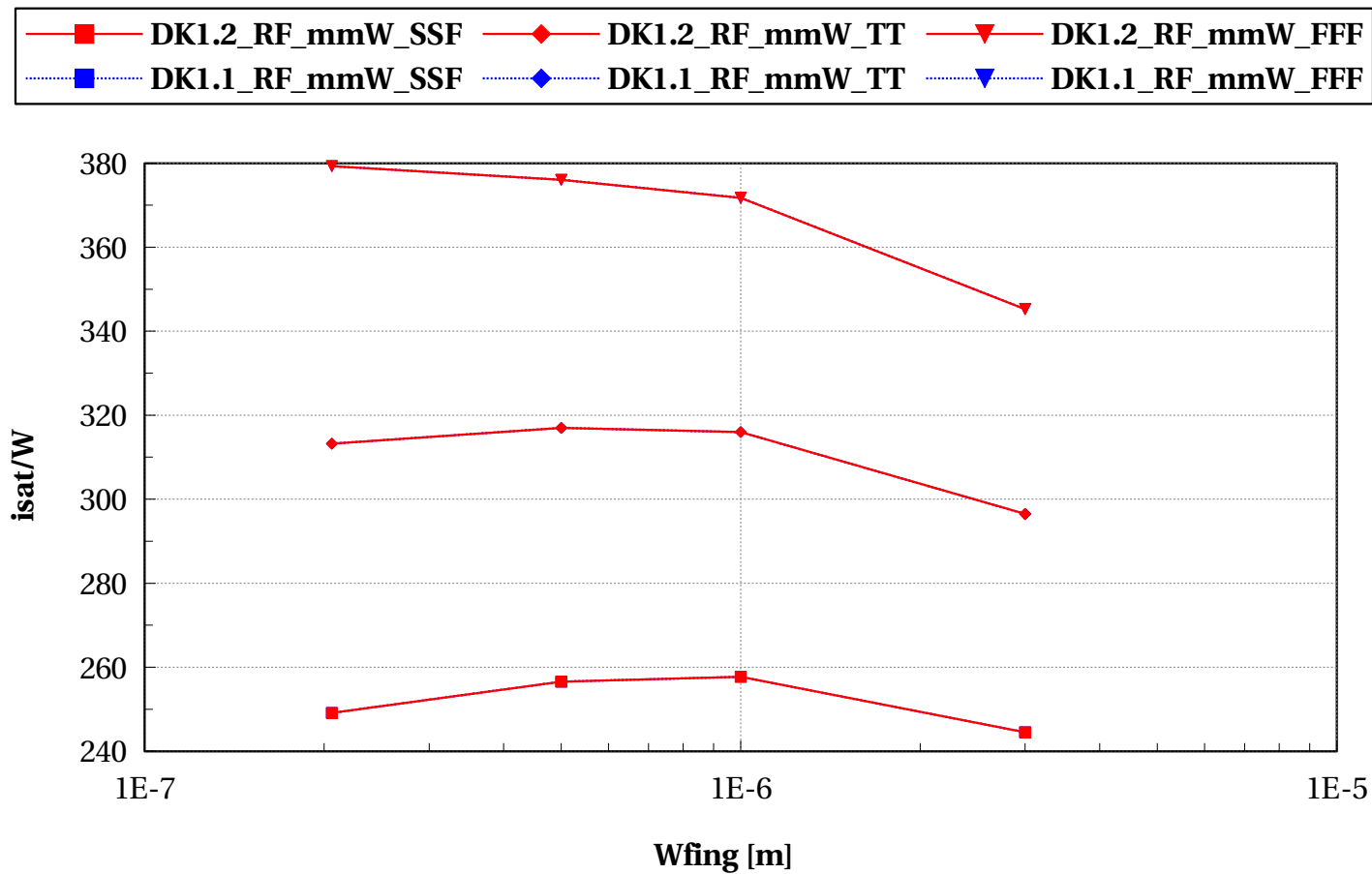
## pfet\_rfseg, ilin/W vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



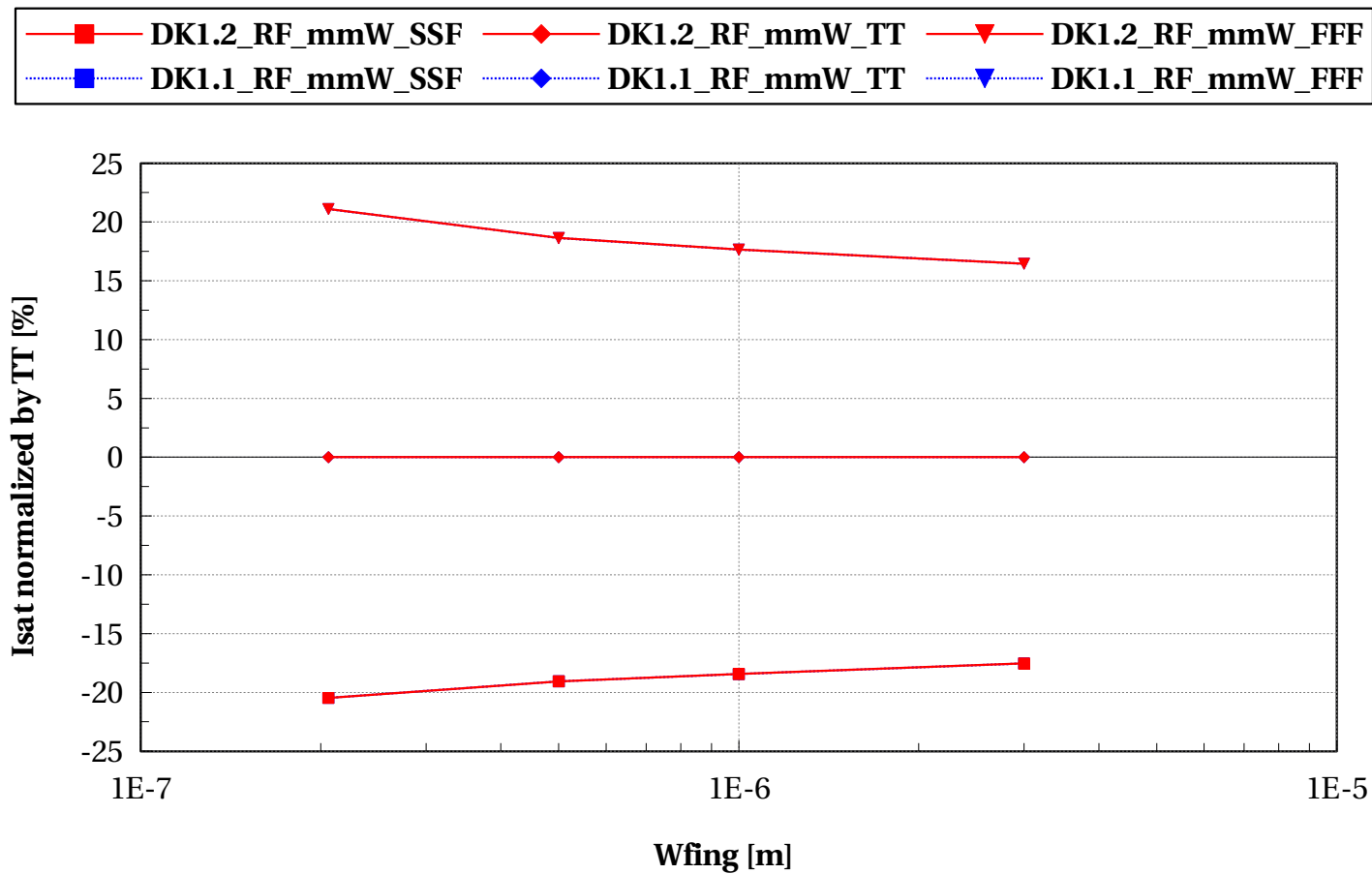
## pfet\_rfseg, isat/W vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



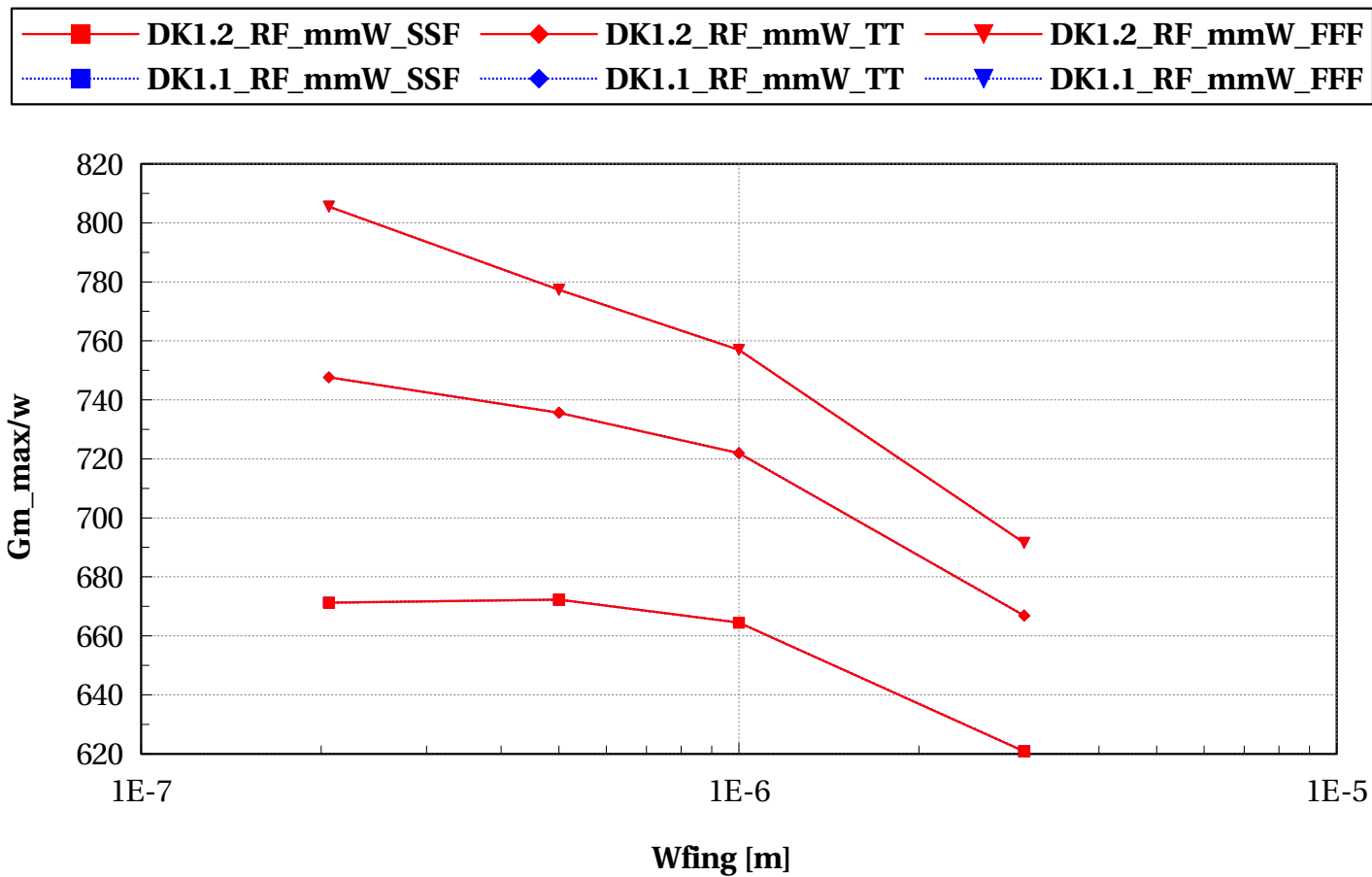
## pfet\_rfseg, Isat normalized by TT [%] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



## pfet\_rfseg, Gm\_max/w vs Wfing [m]

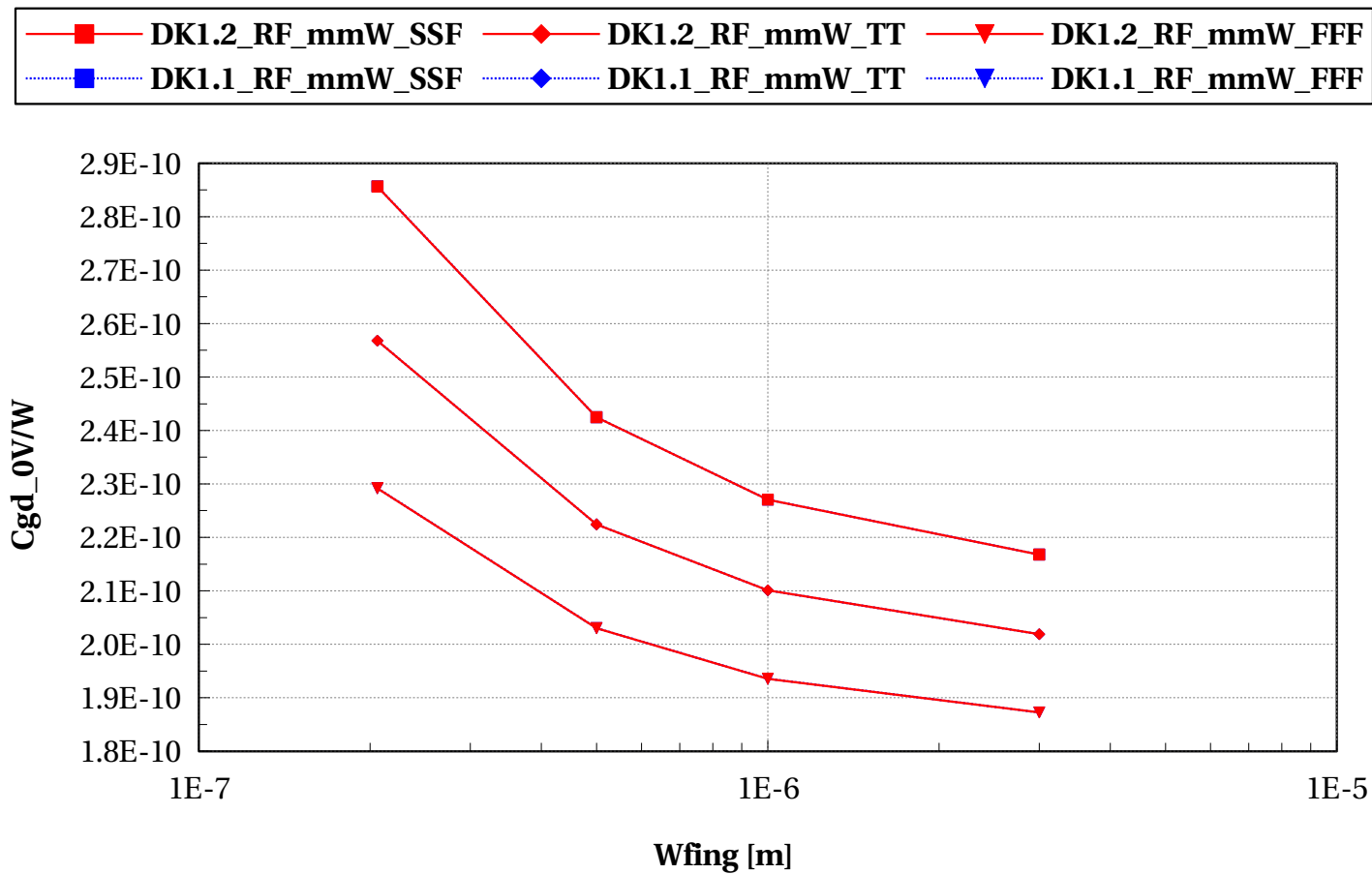
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



## Scaling versus width $L=30\text{nm}$ - RF

# pfet\_rfseg, Cgd\_0V/W vs Wfing [m]

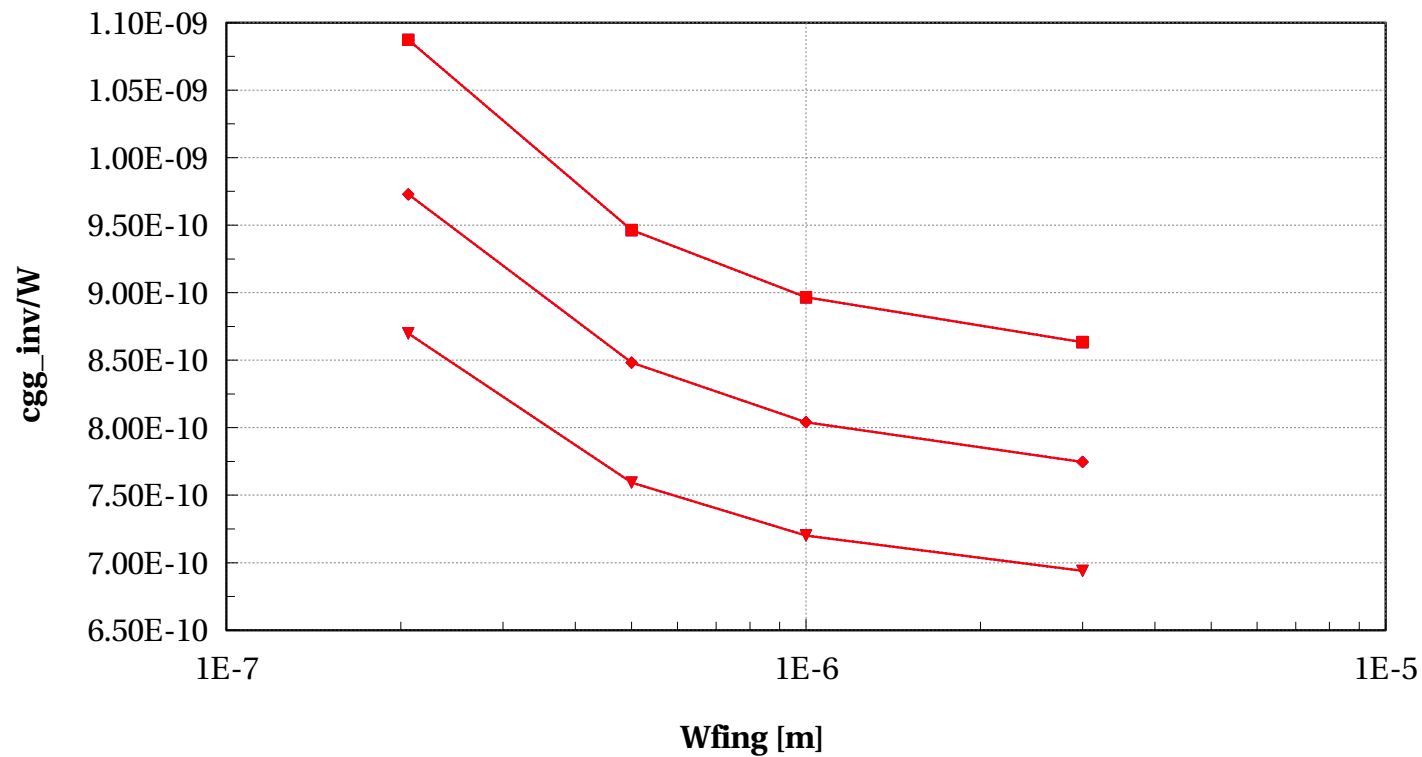
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9





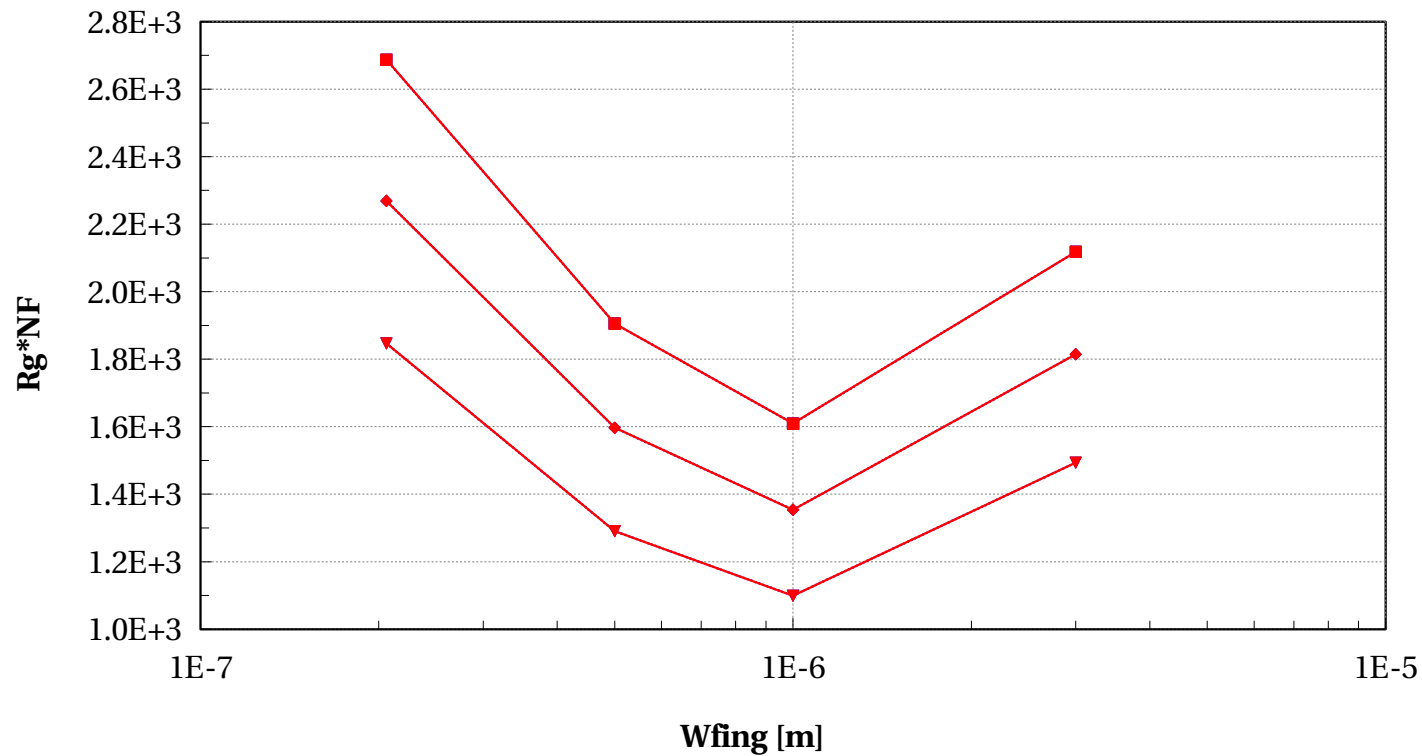
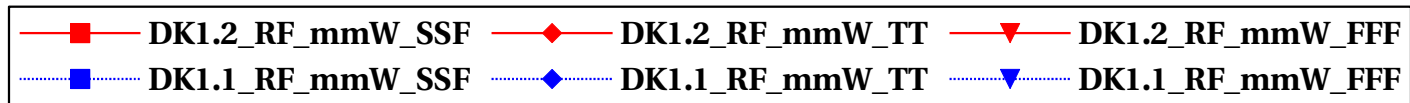
# pfet\_rfseg, cgg\_inv/W vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



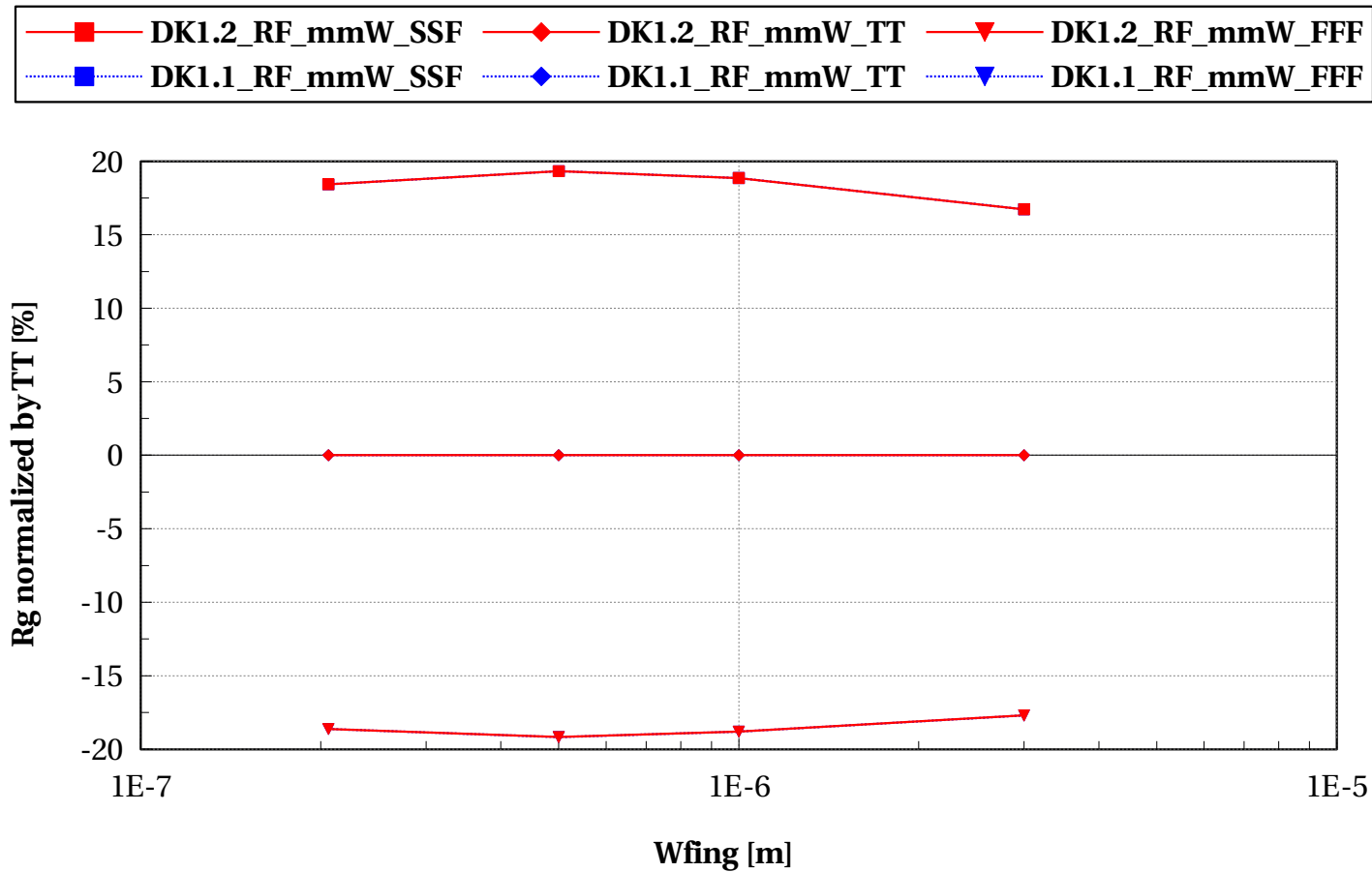
# pfet\_rfseg, $R_g \cdot NF$ vs $W_{fing}$ [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and  $l=30e-9$



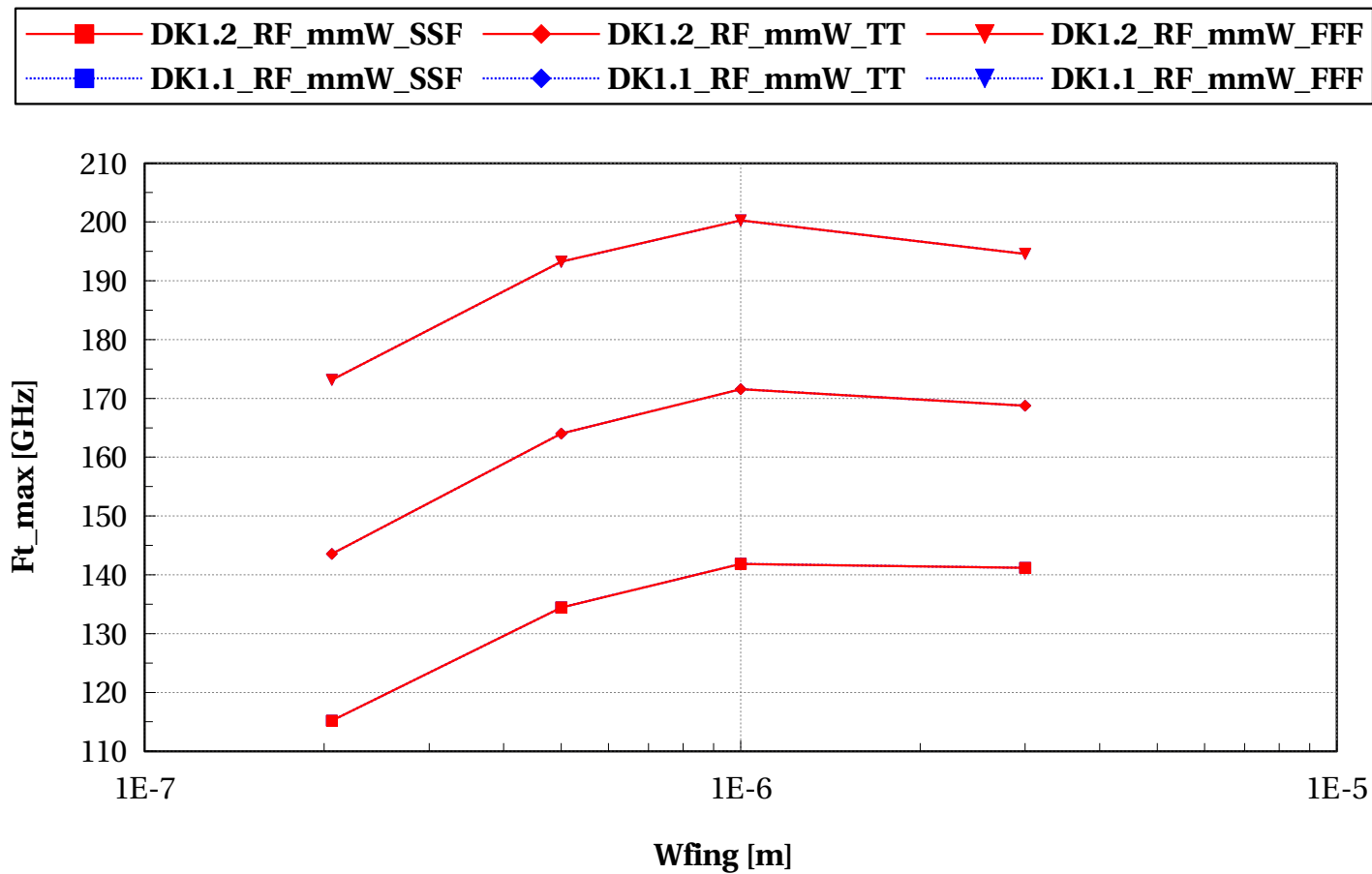
## pfet\_rfseg, Rg normalized by TT [%] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



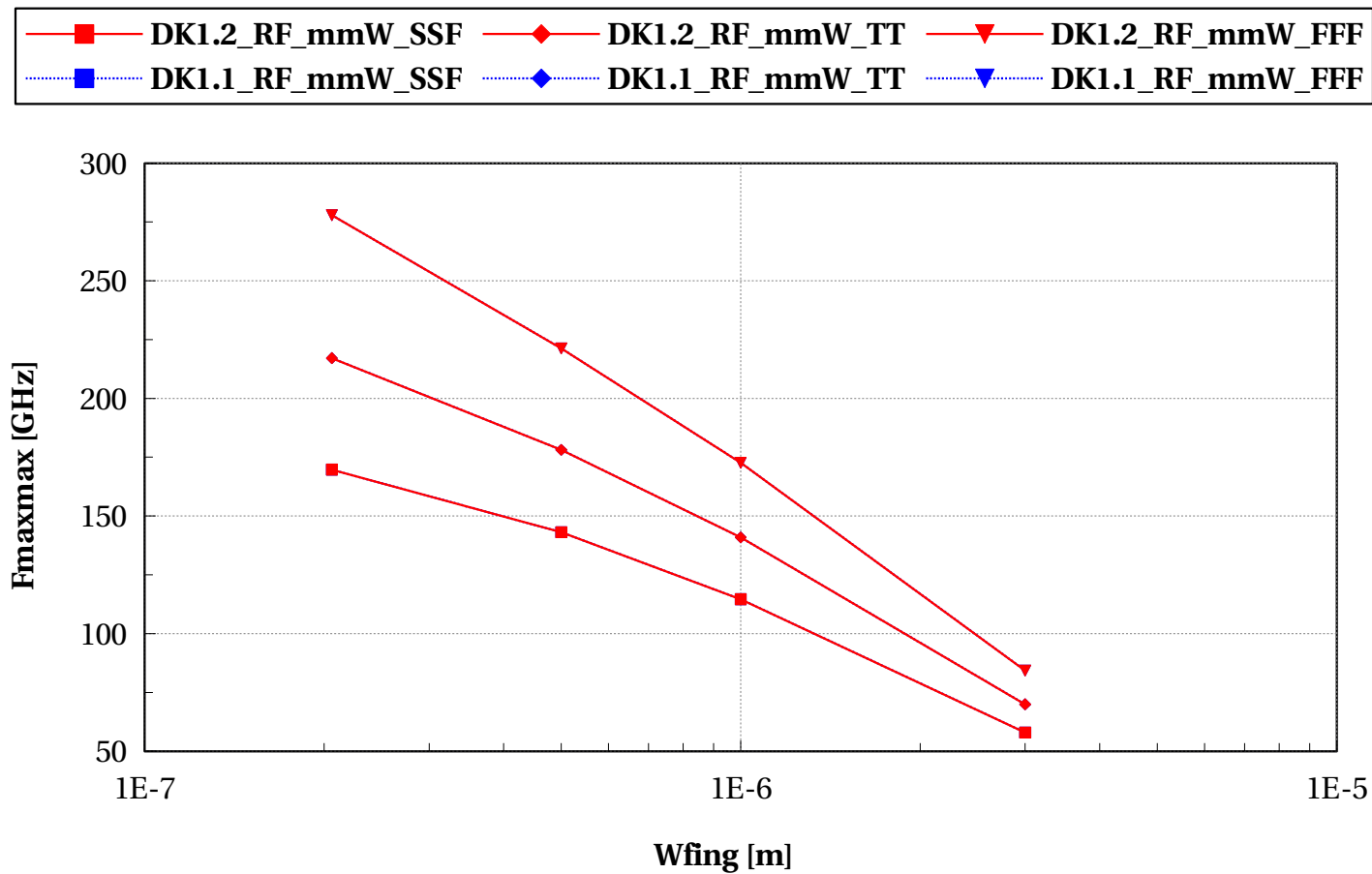
# pfet\_rfseg, Ft\_max [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



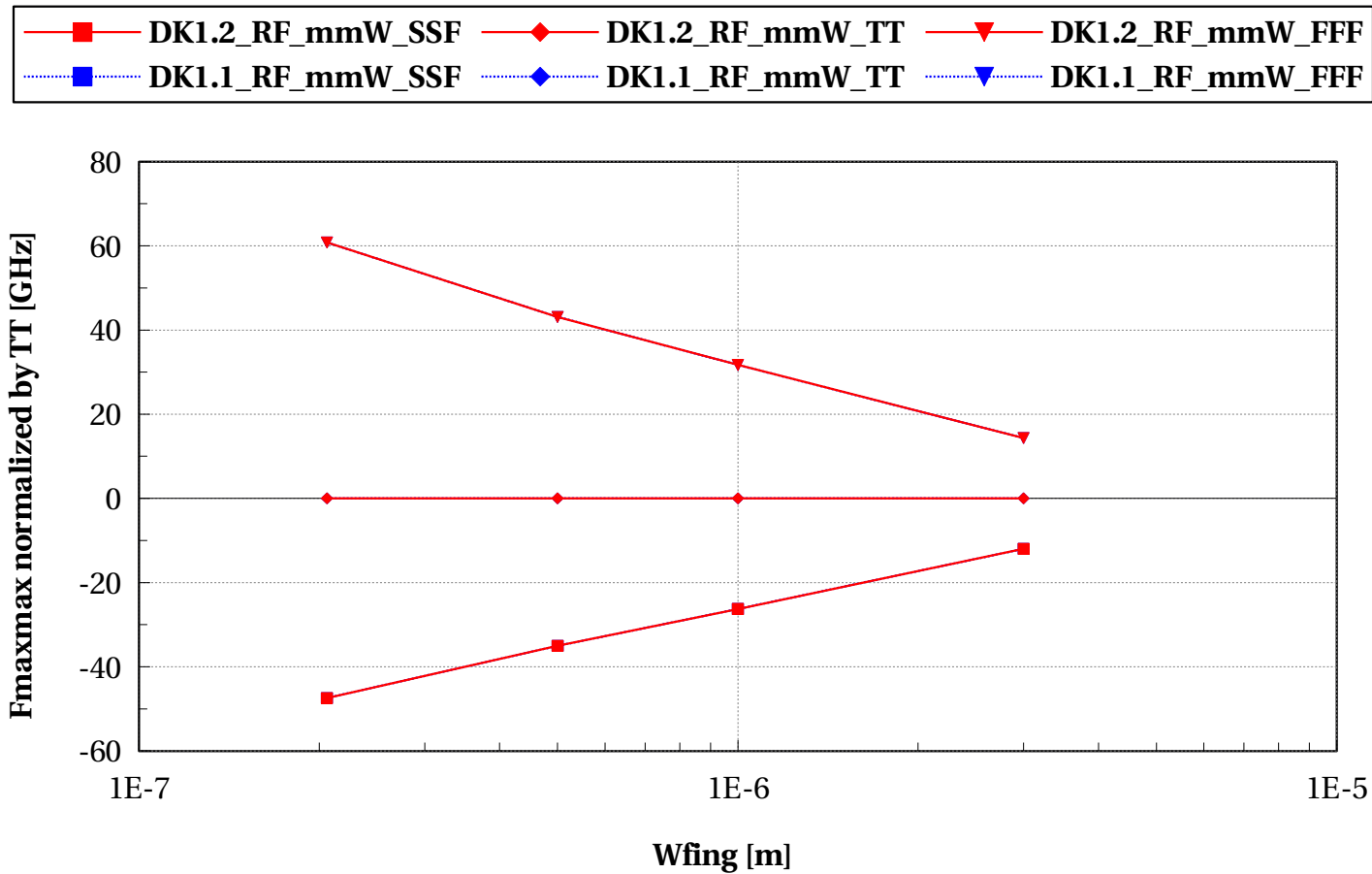
# pfet\_rfseg, Fmaxmax [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# pfet\_rfseg, Fmaxmax normalized by TT [GHz] vs Wfing [m]

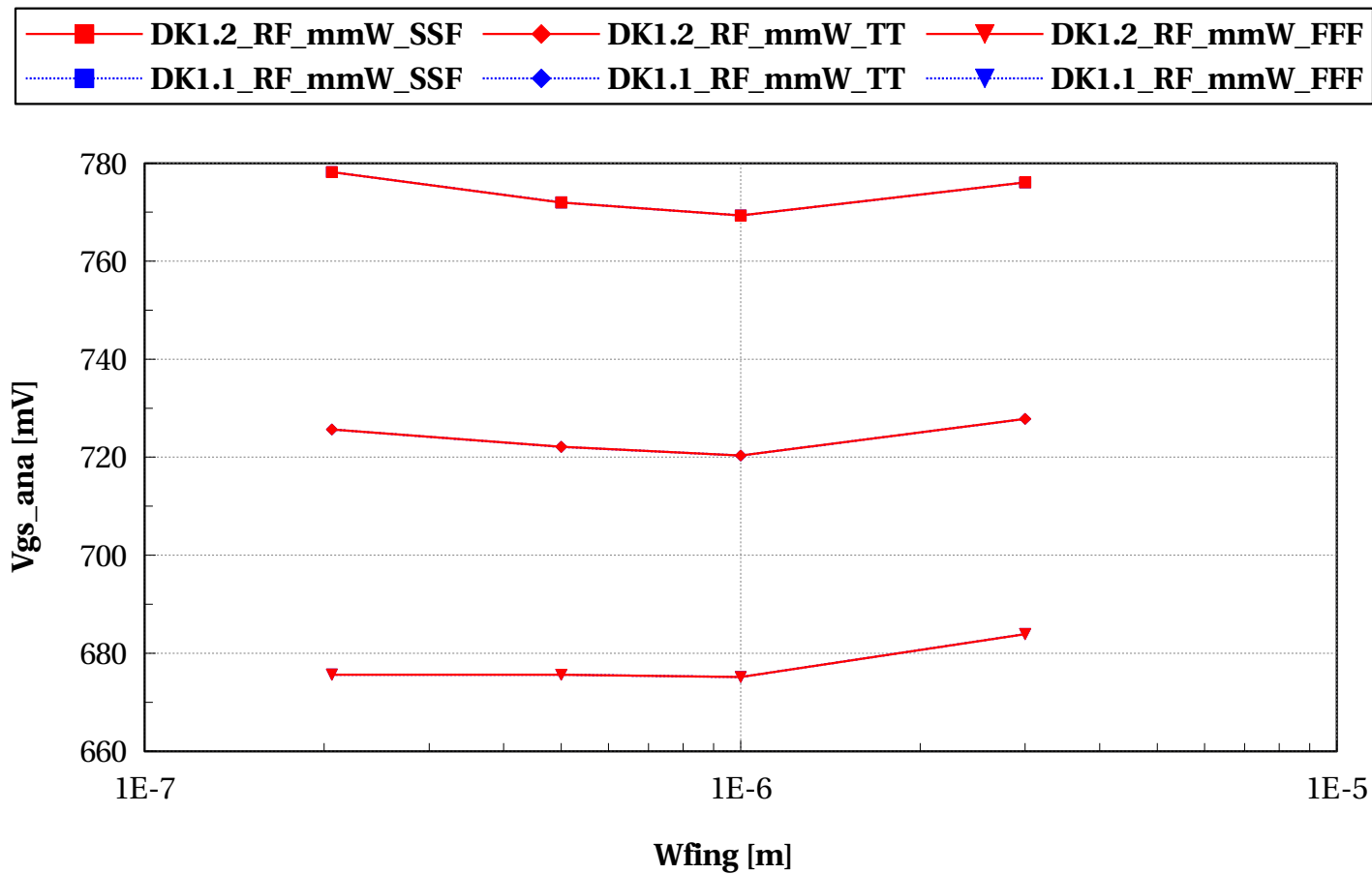
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# Scaling versus width $L=30\text{nm}$ - Analog

# pfet\_rfseg, Vgs\_ana [mV] vs Wfing [m]

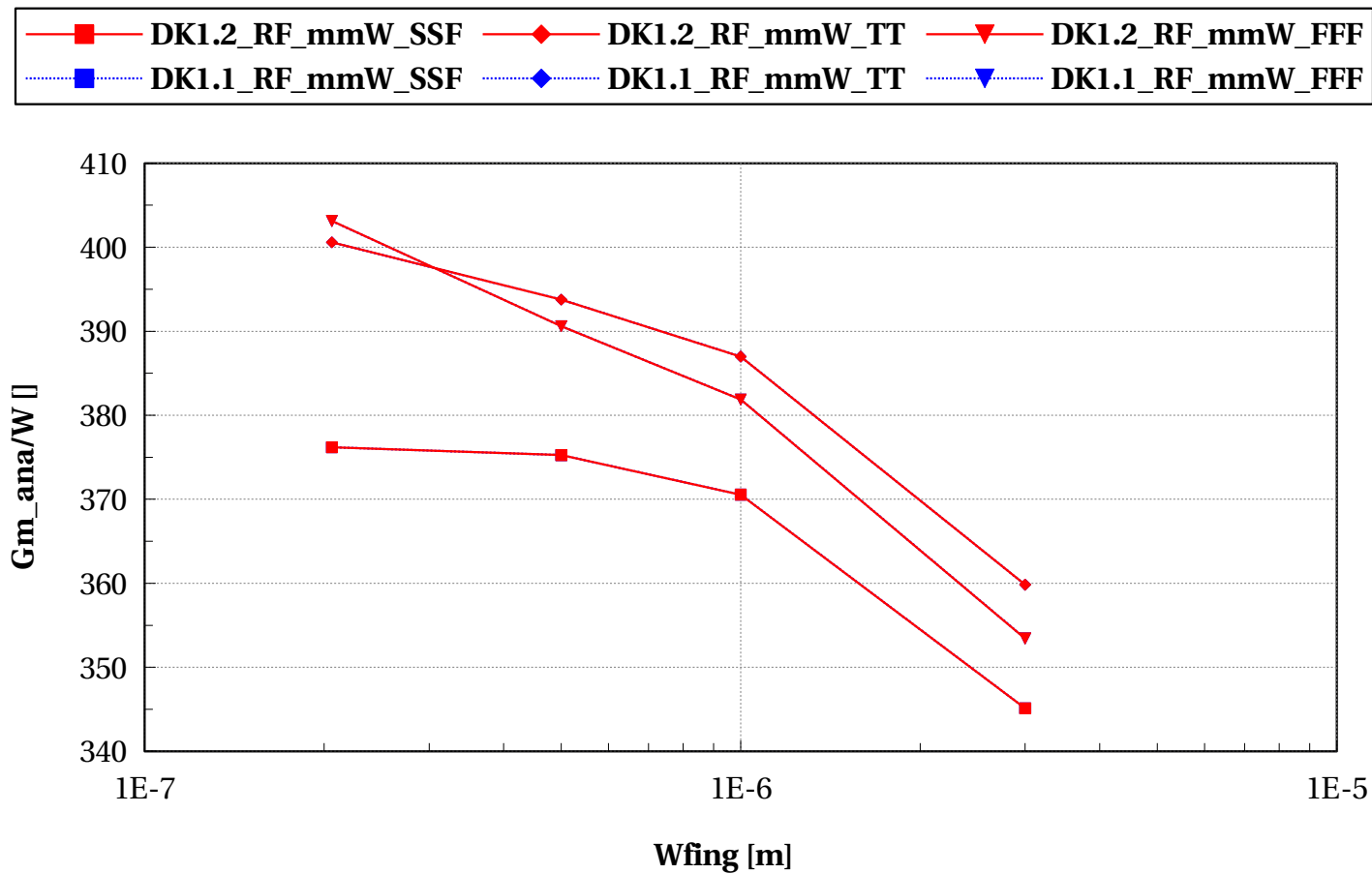
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9





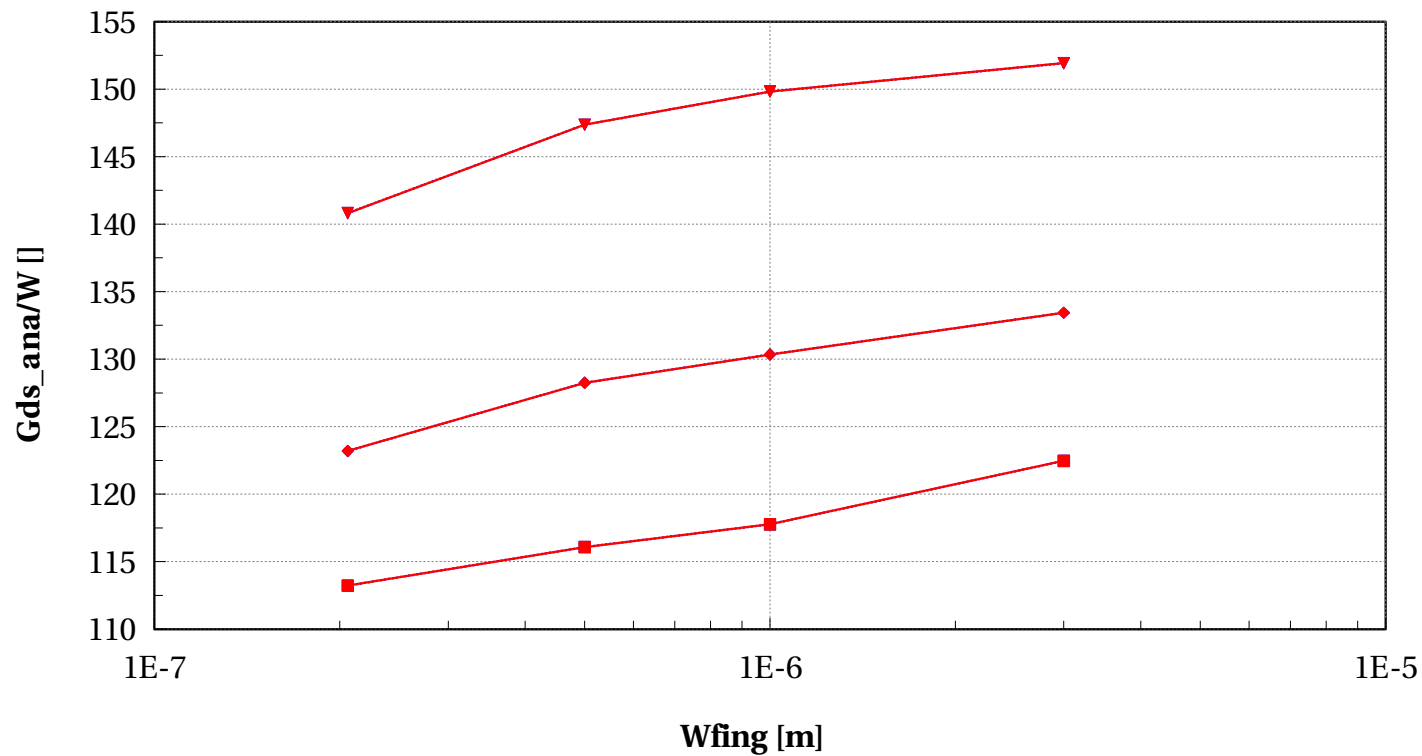
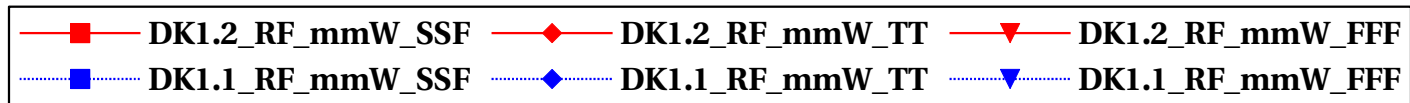
# pfet\_rfseg, Gm\_ana/W [] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



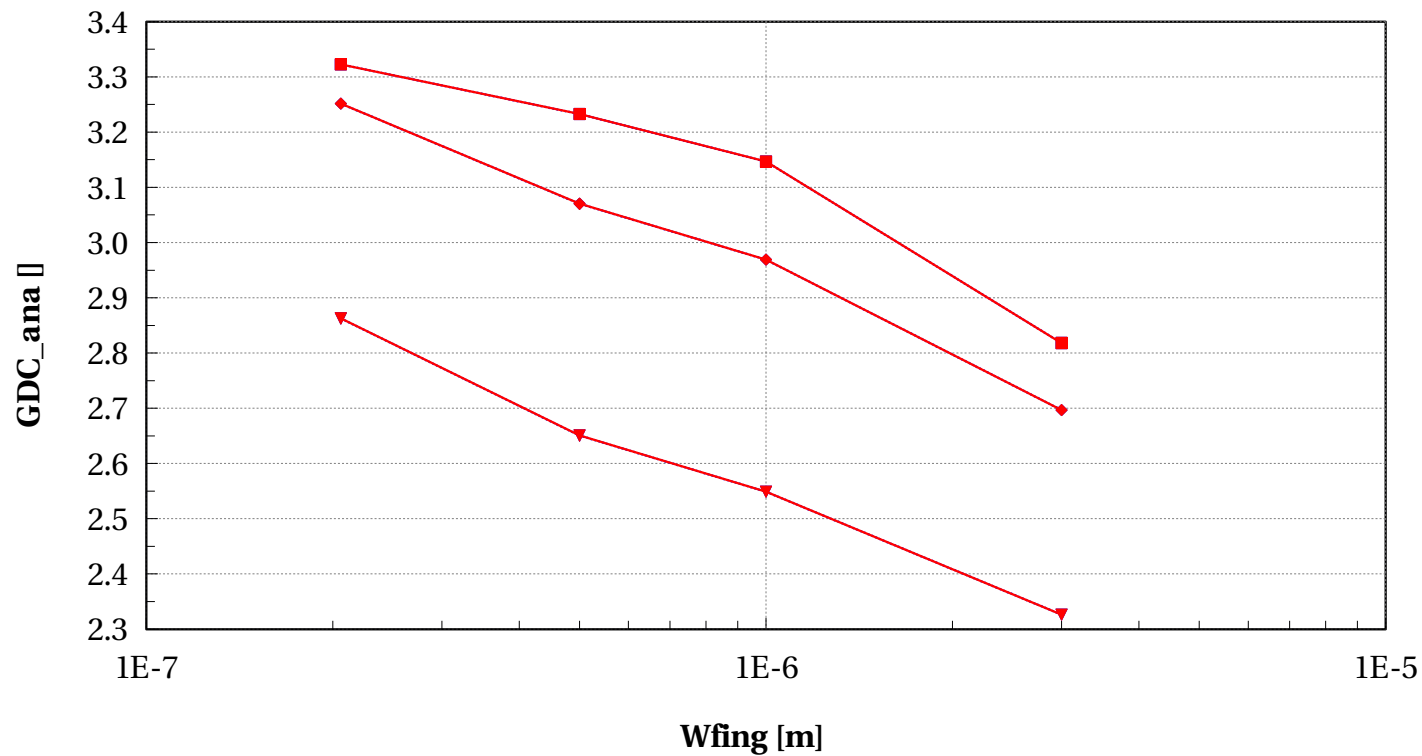
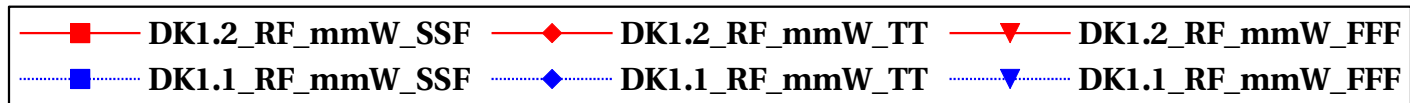
# pfet\_rfseg, Gds\_ana/W [] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



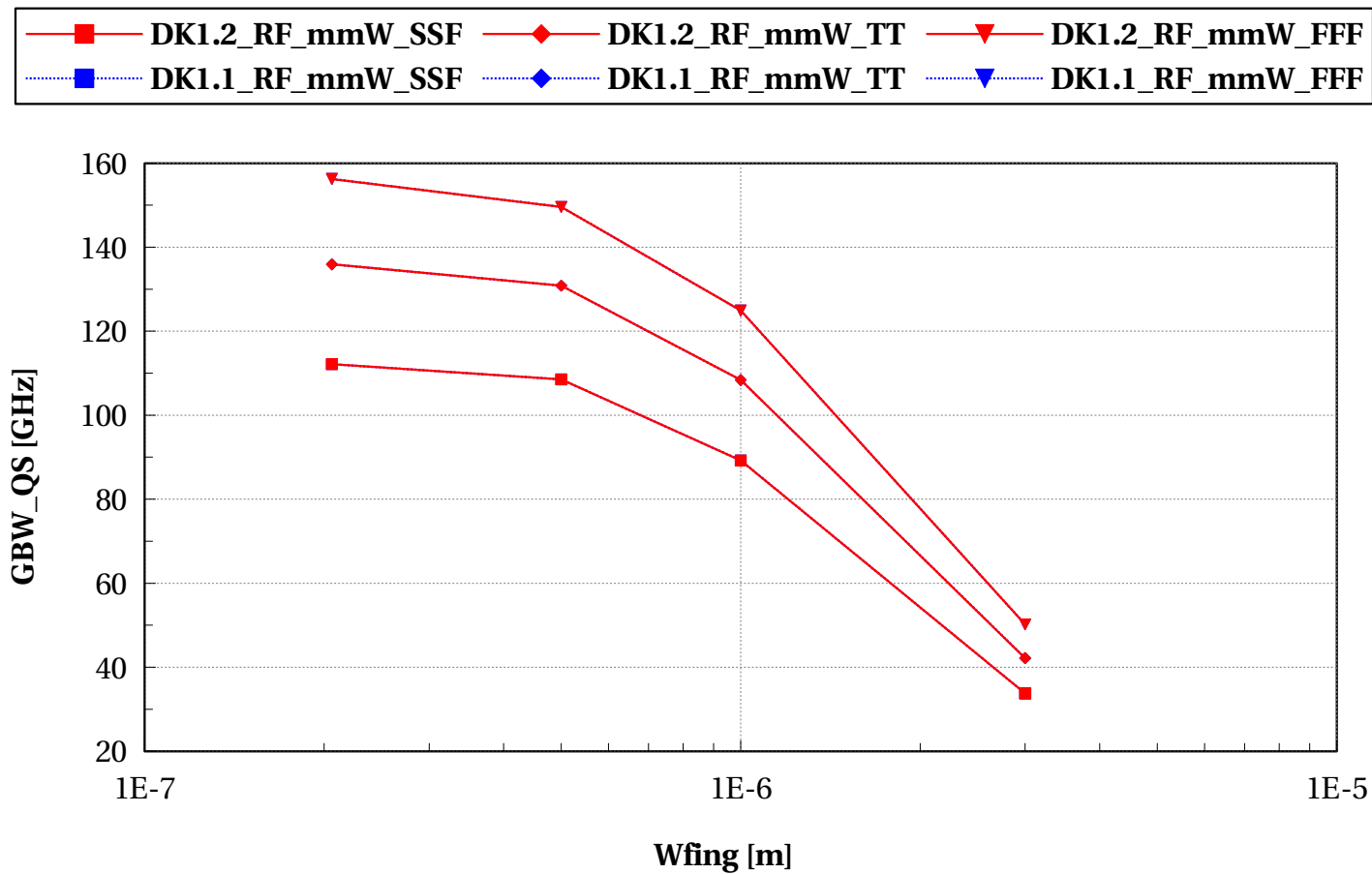
# pfet\_rfseg, GDC\_ana [] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



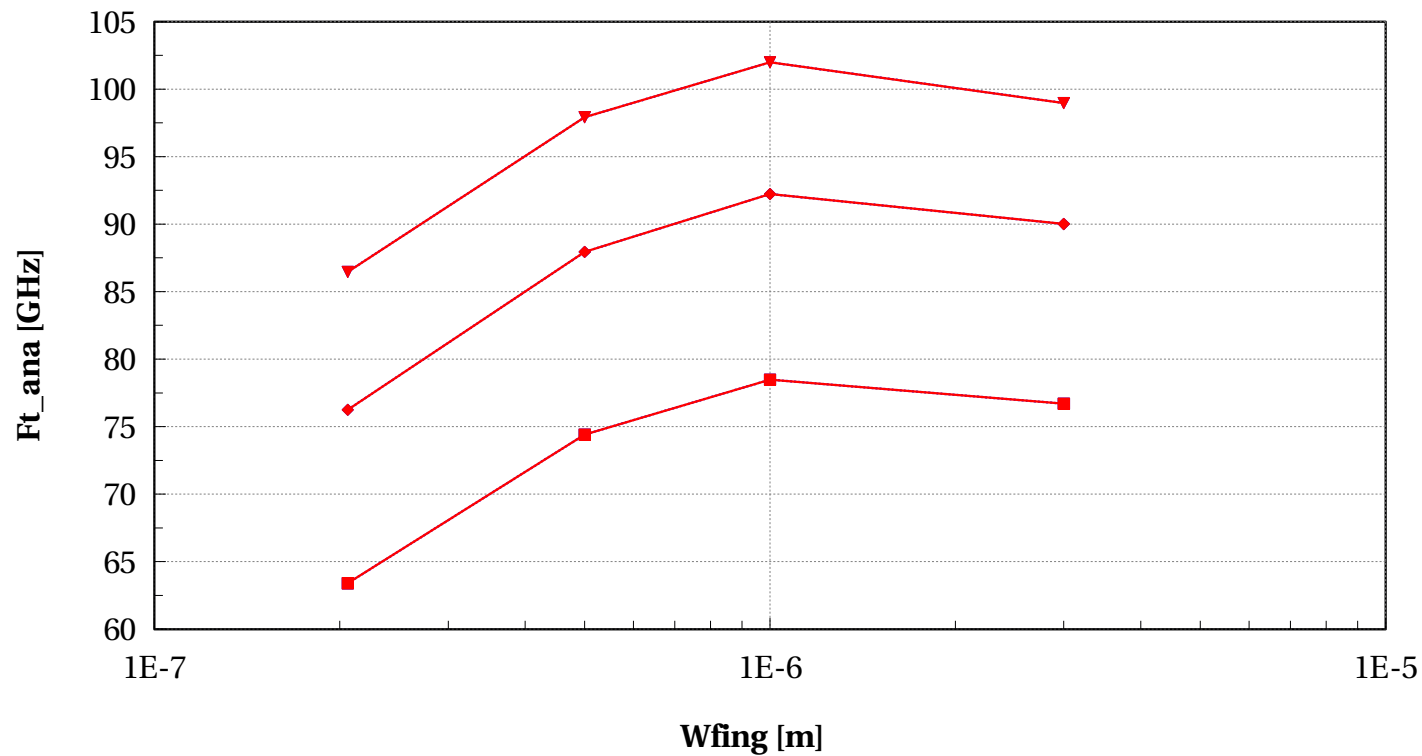
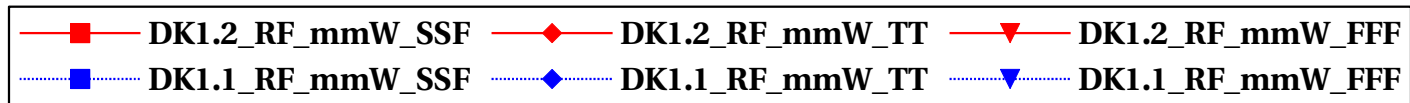
# pfet\_rfseg, GBW\_QS [GHz] vs Wfing [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



# pfet\_rfseg, Ft\_ana [GHz] vs Wfing [m]

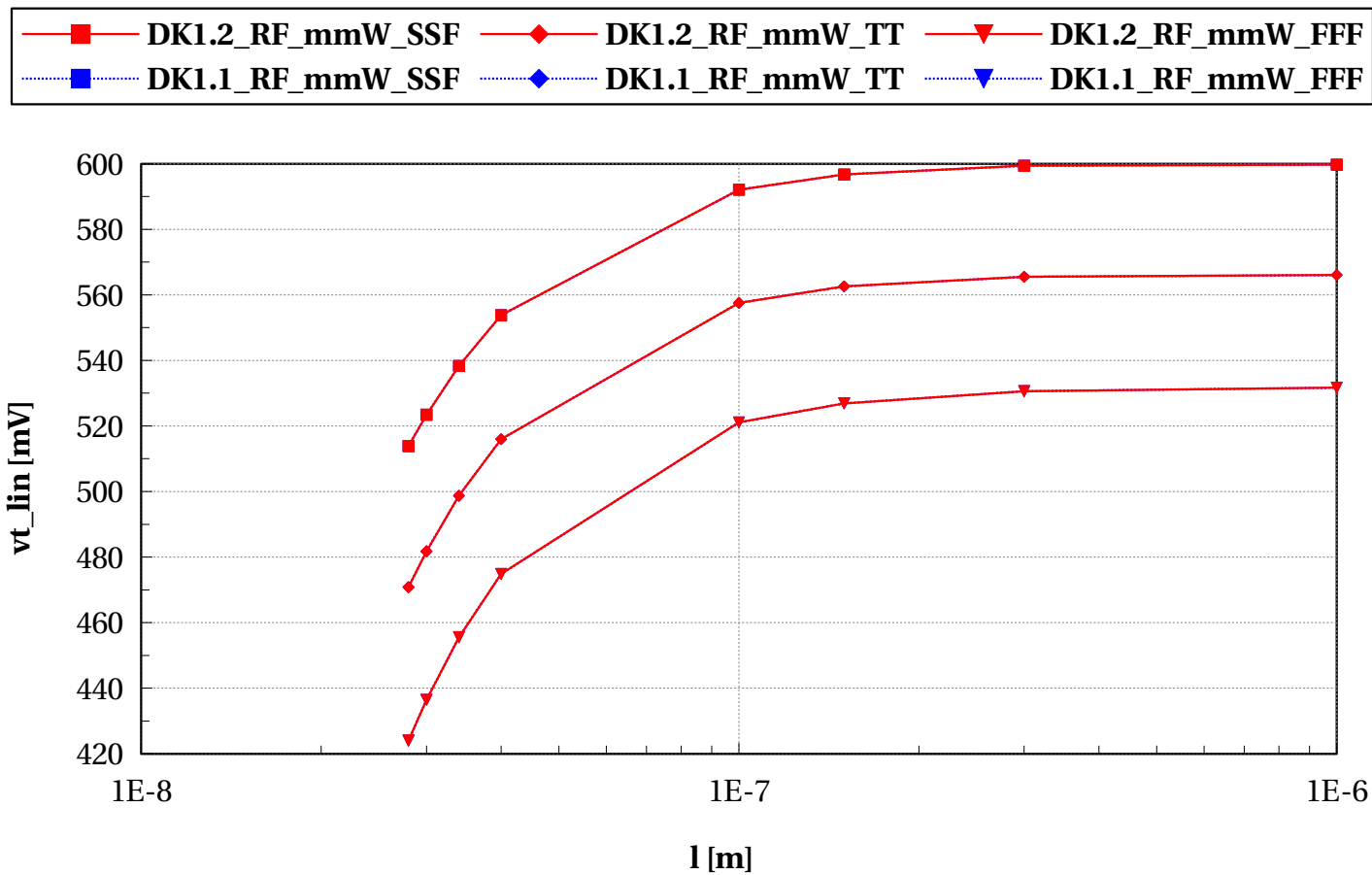
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and l==30e-9



## Scaling versus length $W_{\text{fing}}=1\mu\text{m}$ - DC

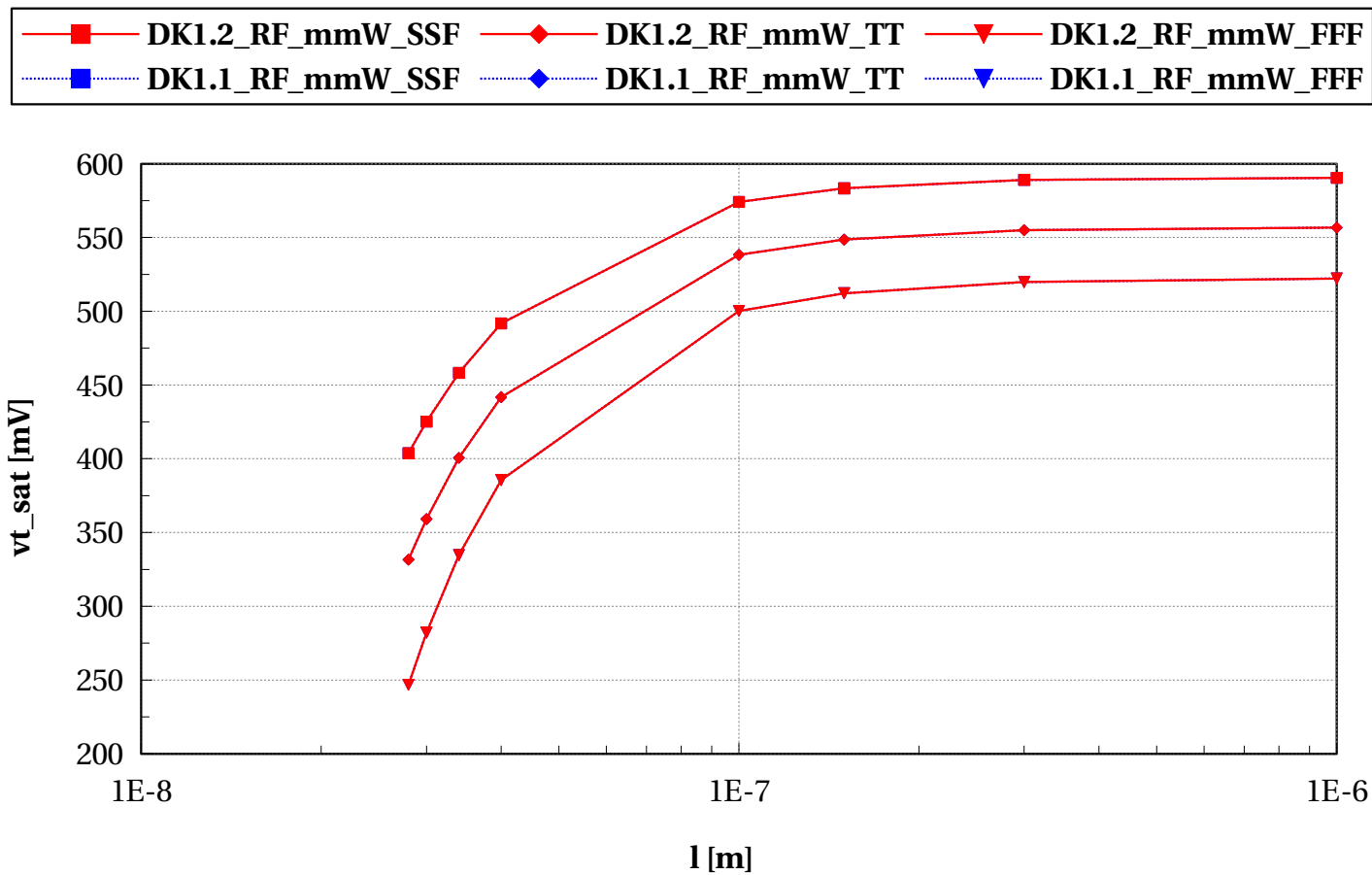
# pfet\_rfseg, vt\_lin [mV] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



# pfet\_rfseg, vt\_sat [mV] vs l [m]

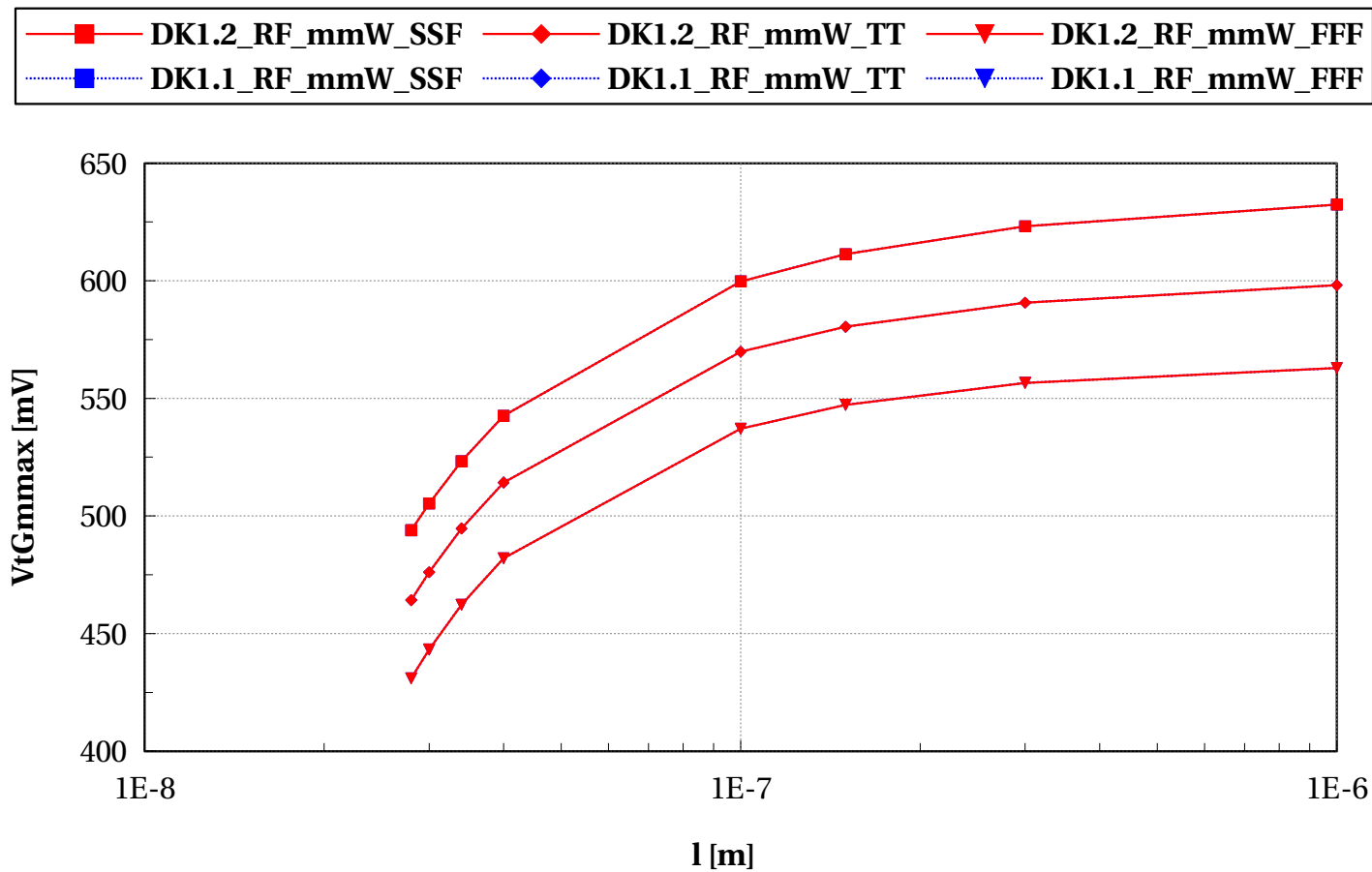
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6





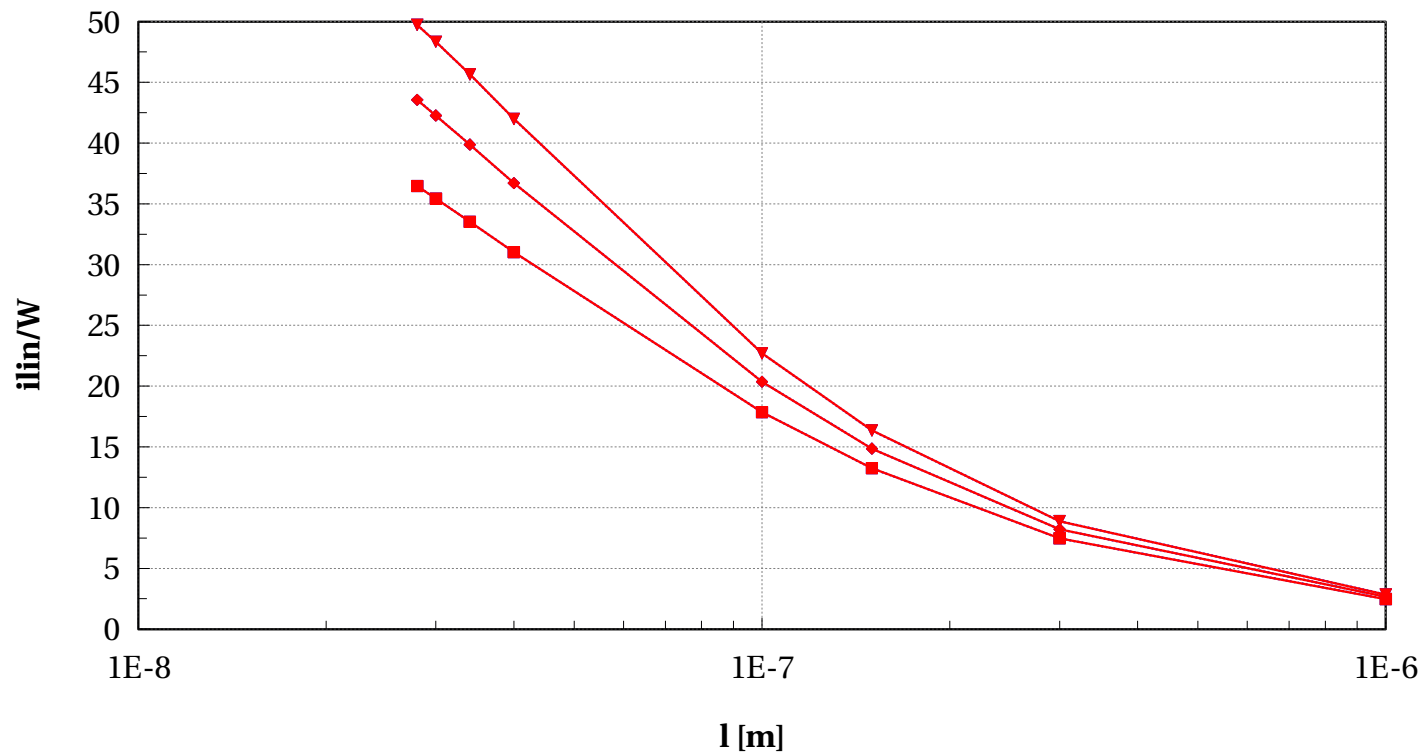
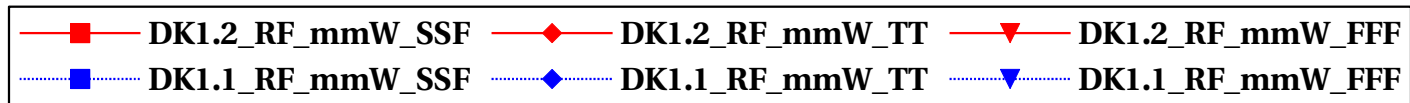
# pfet\_rfseg, VtGmmax [mV] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



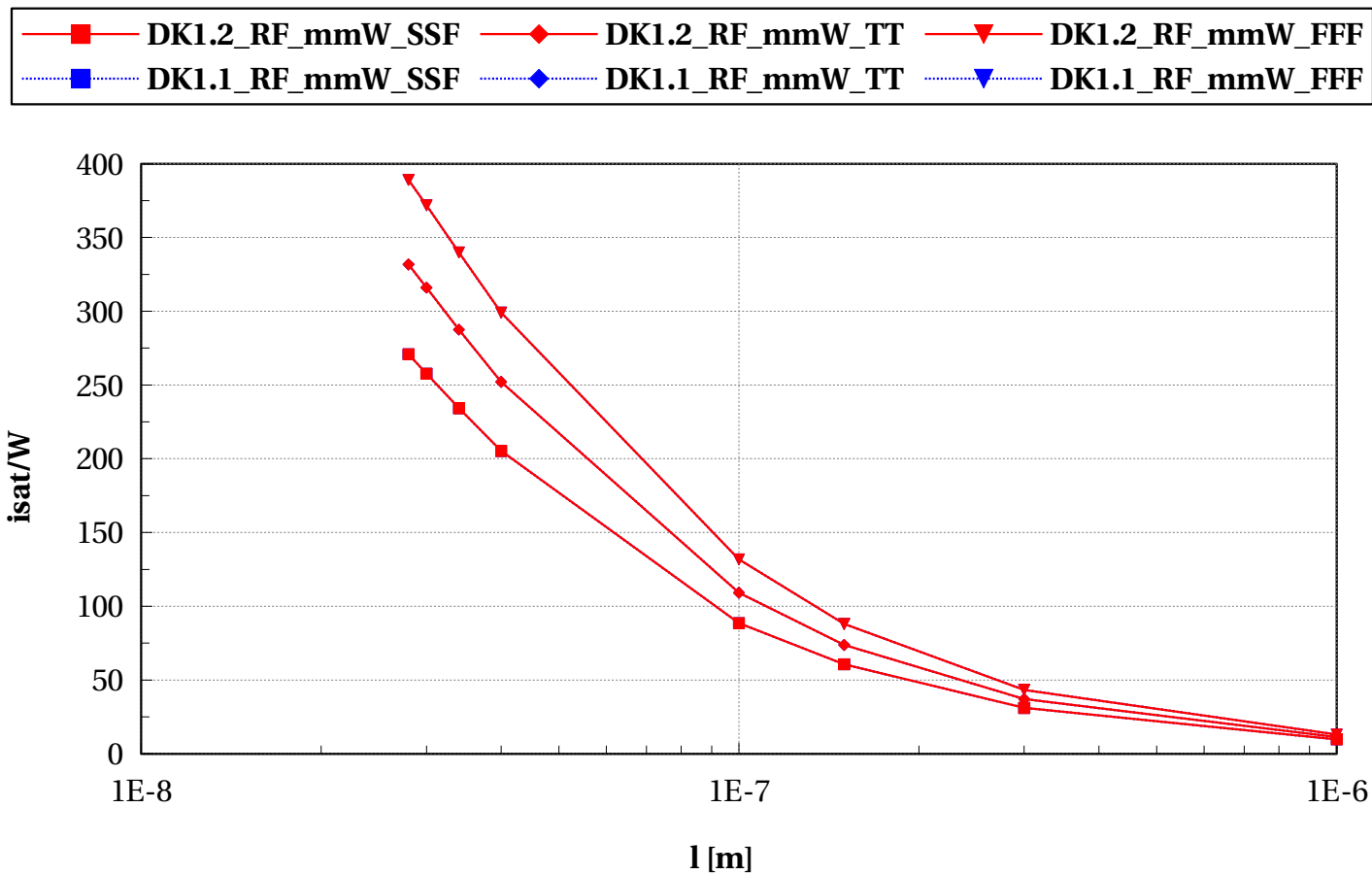
# pfet\_rfseg, $i_{lin}/W$ vs $l$ [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



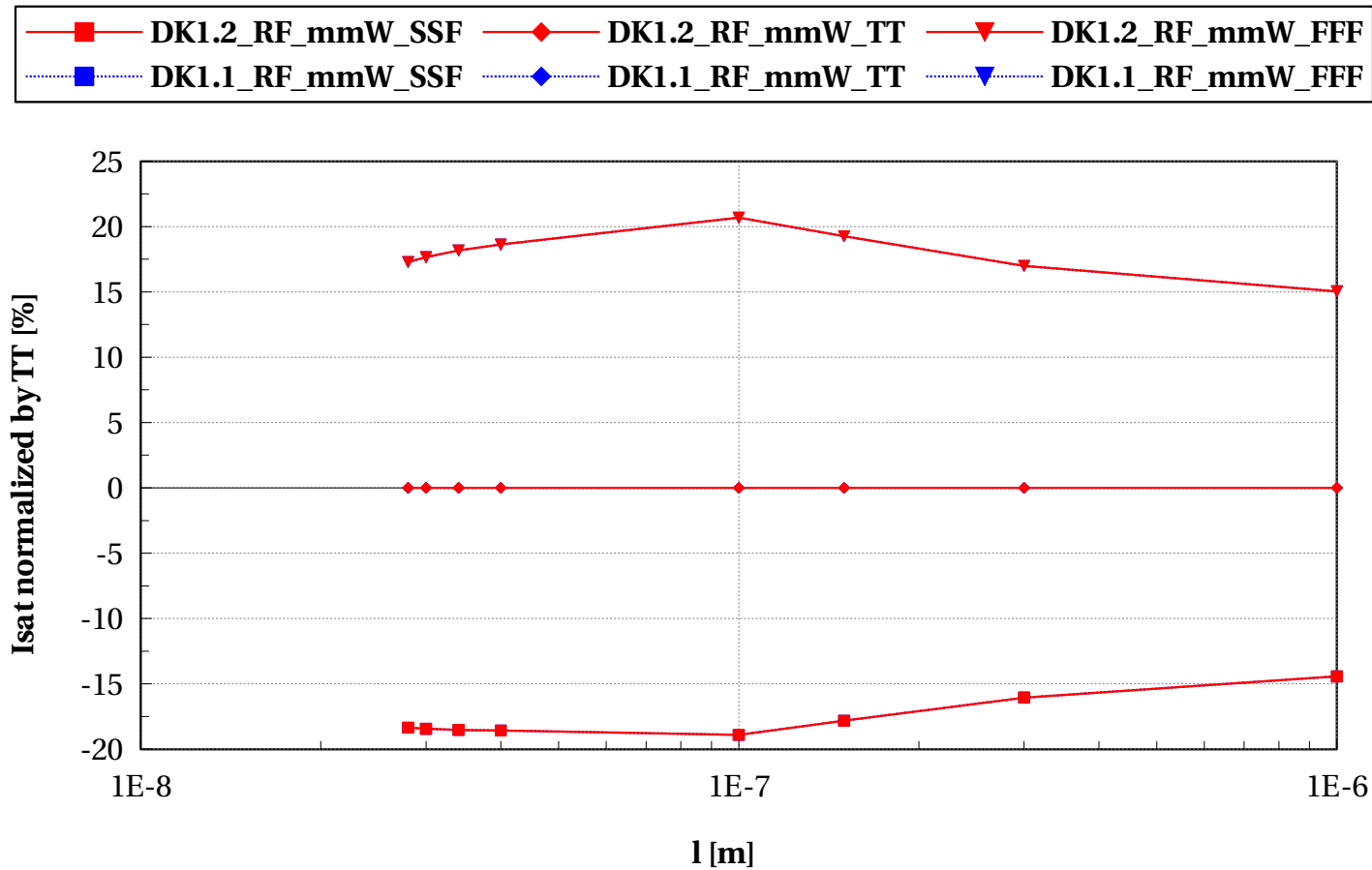
## pfet\_rfseg, isat/W vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



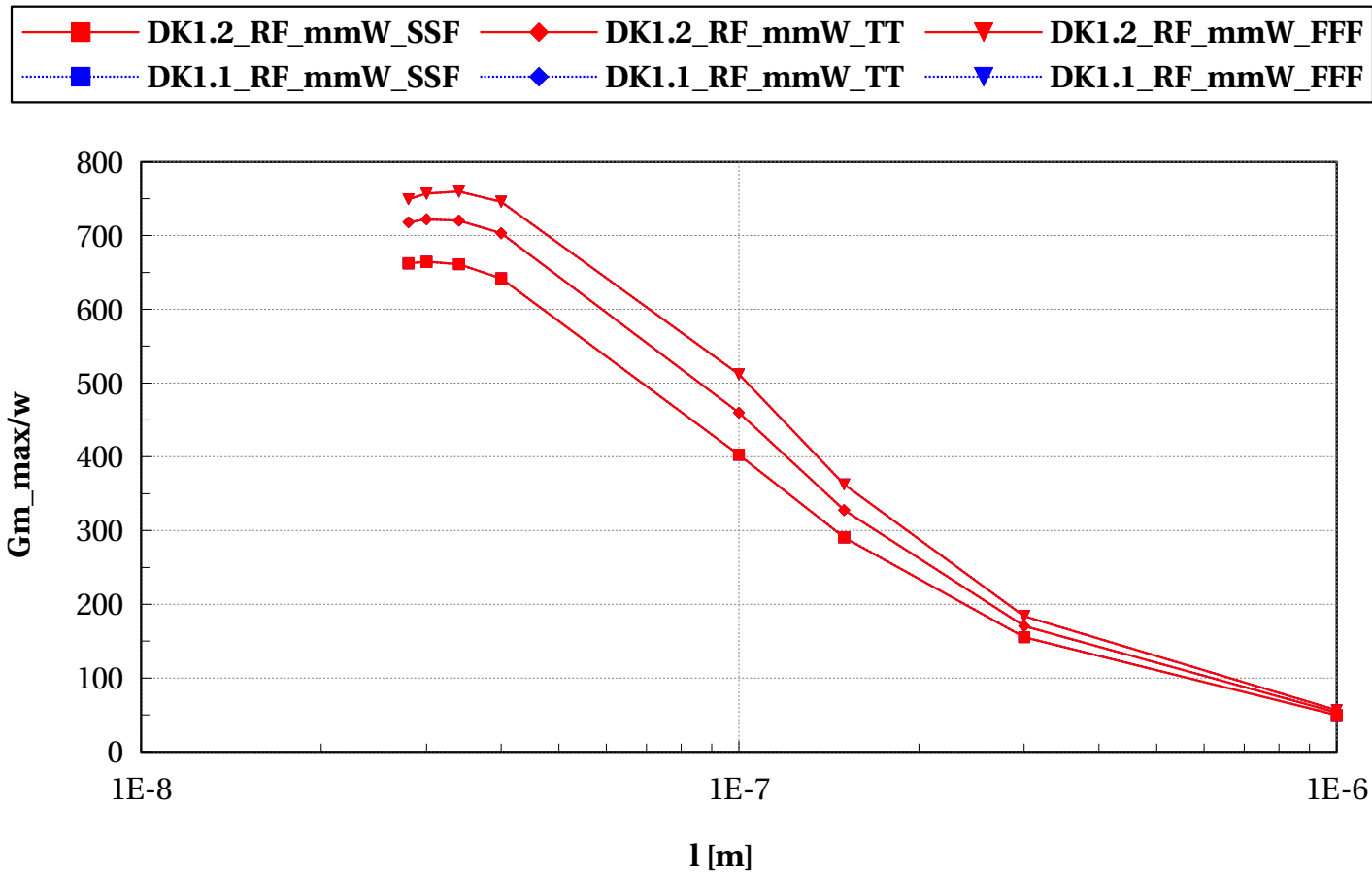
## pfet\_rfseg, Isat normalized by TT [%] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



# pfet\_rfseg, Gm\_max/w vs l [m]

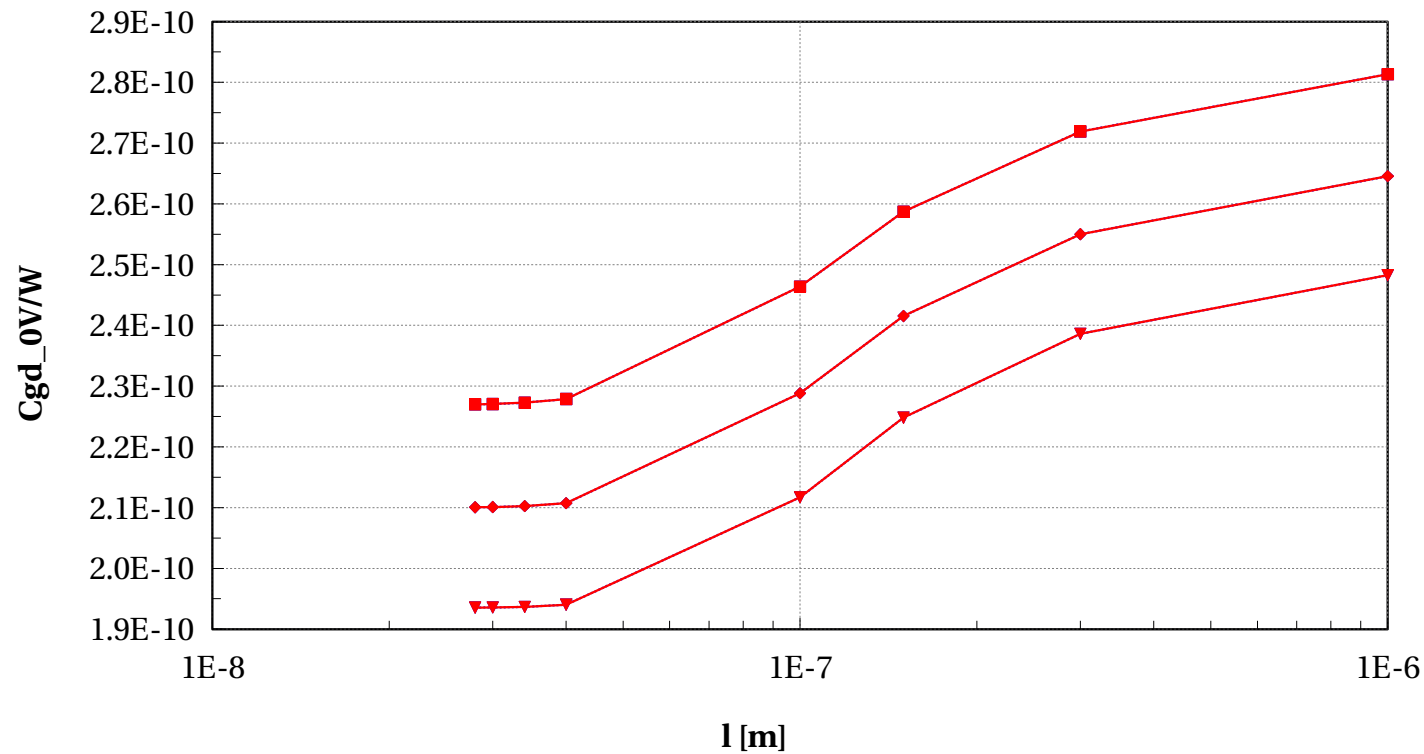
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



# Scaling versus length $W_{\text{fing}}=1\text{ }\mu\text{m}$ - RF

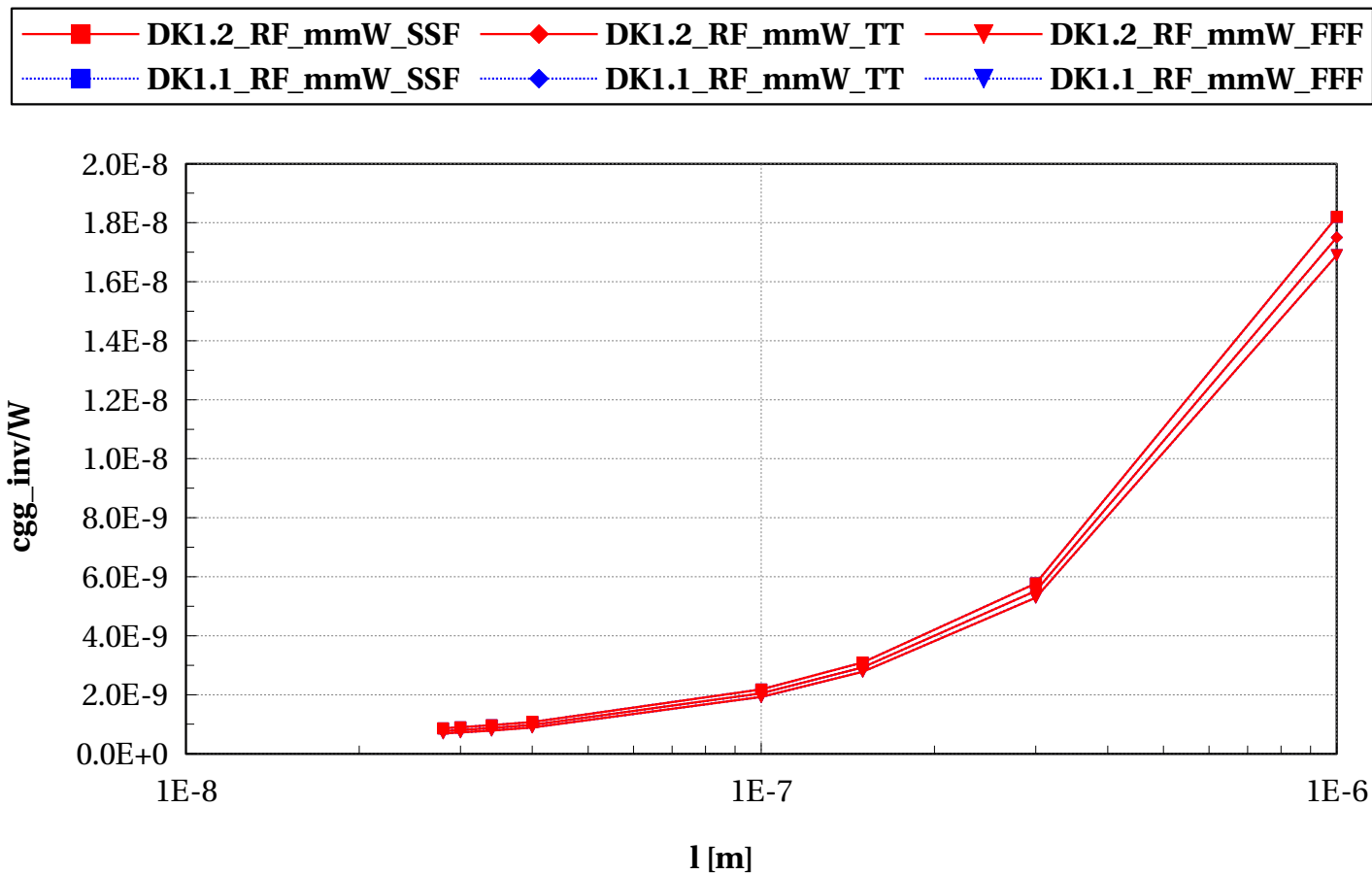
# pfet\_rfseg, Cgd\_0V/W vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



# pfet\_rfseg, cgg\_inv/W vs l [m]

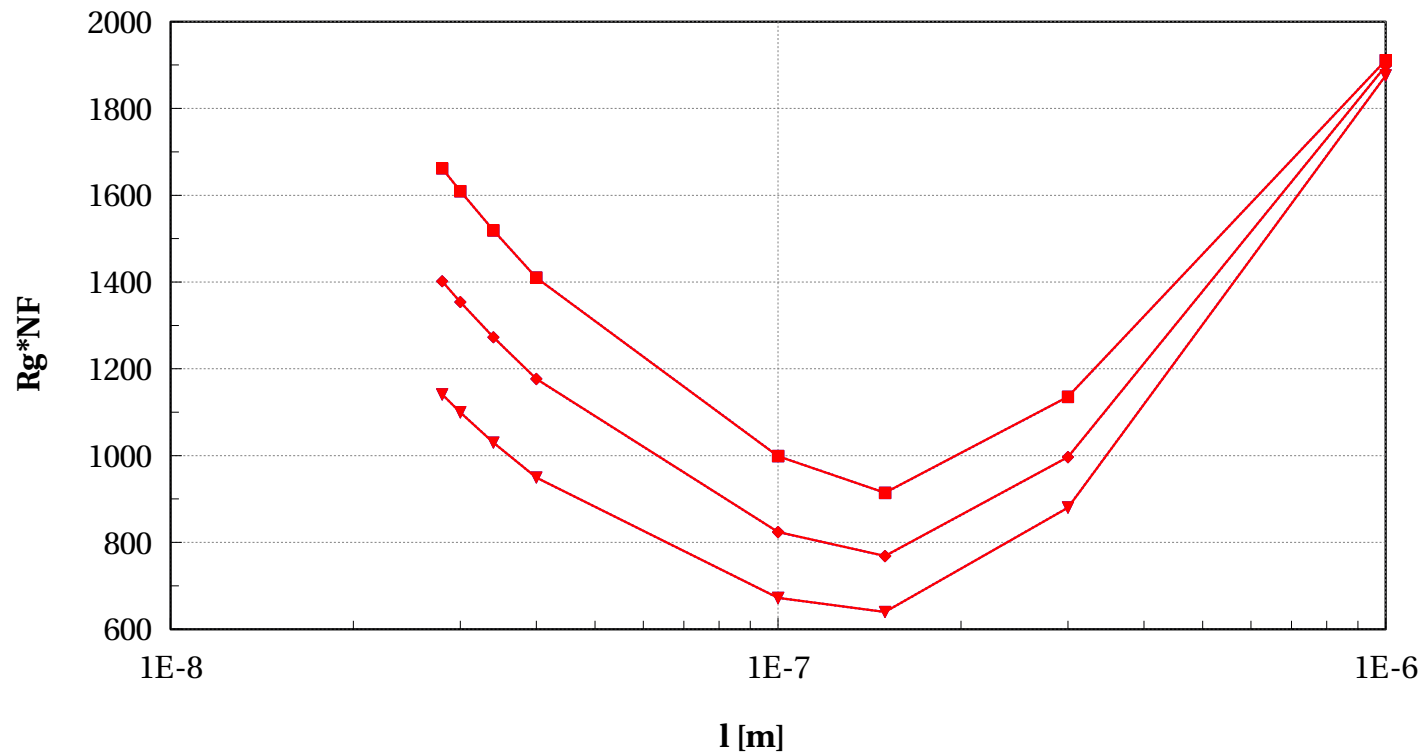
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6





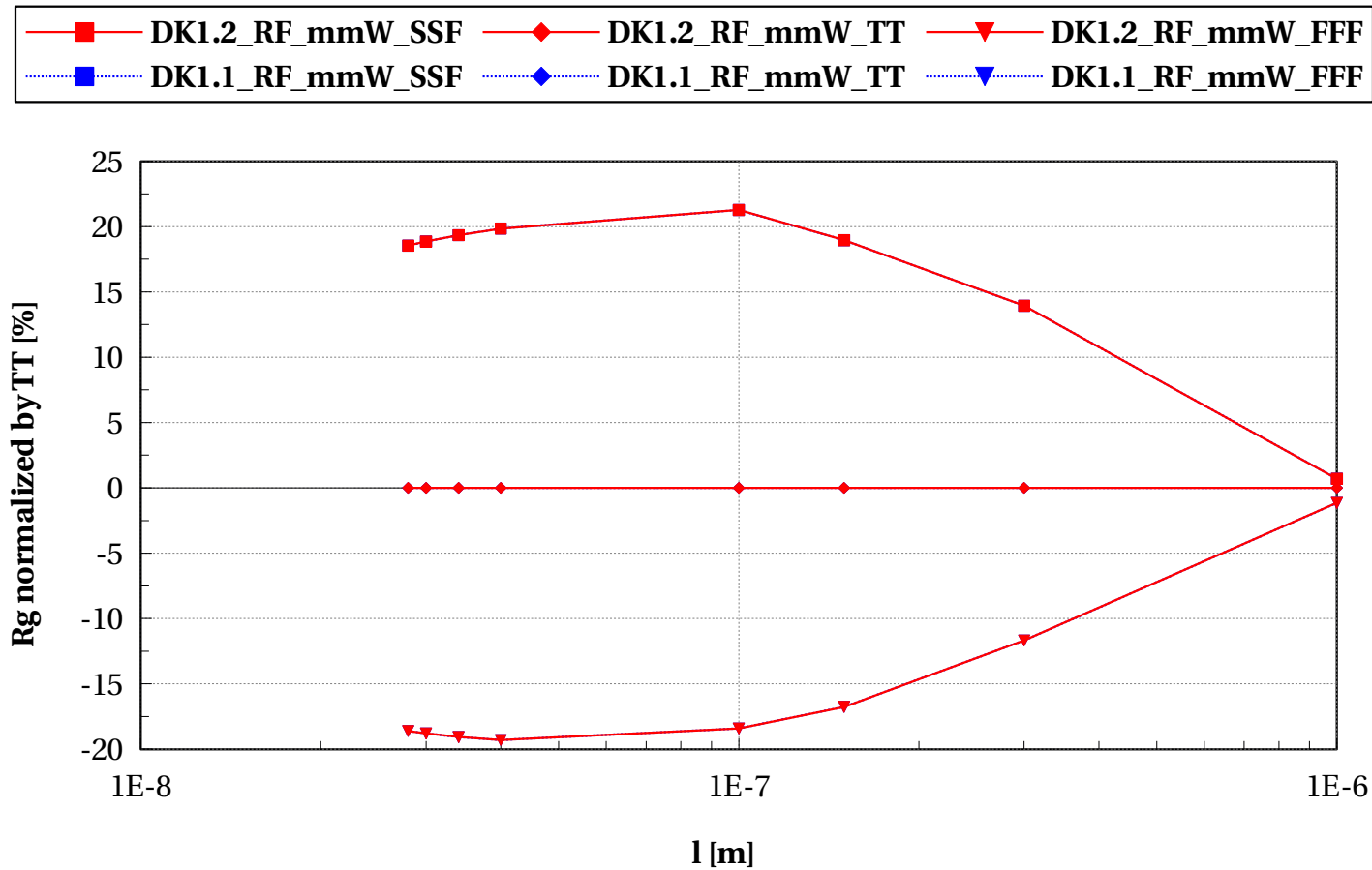
# pfet\_rfseg, $R_g * NF$ vs $l$ [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



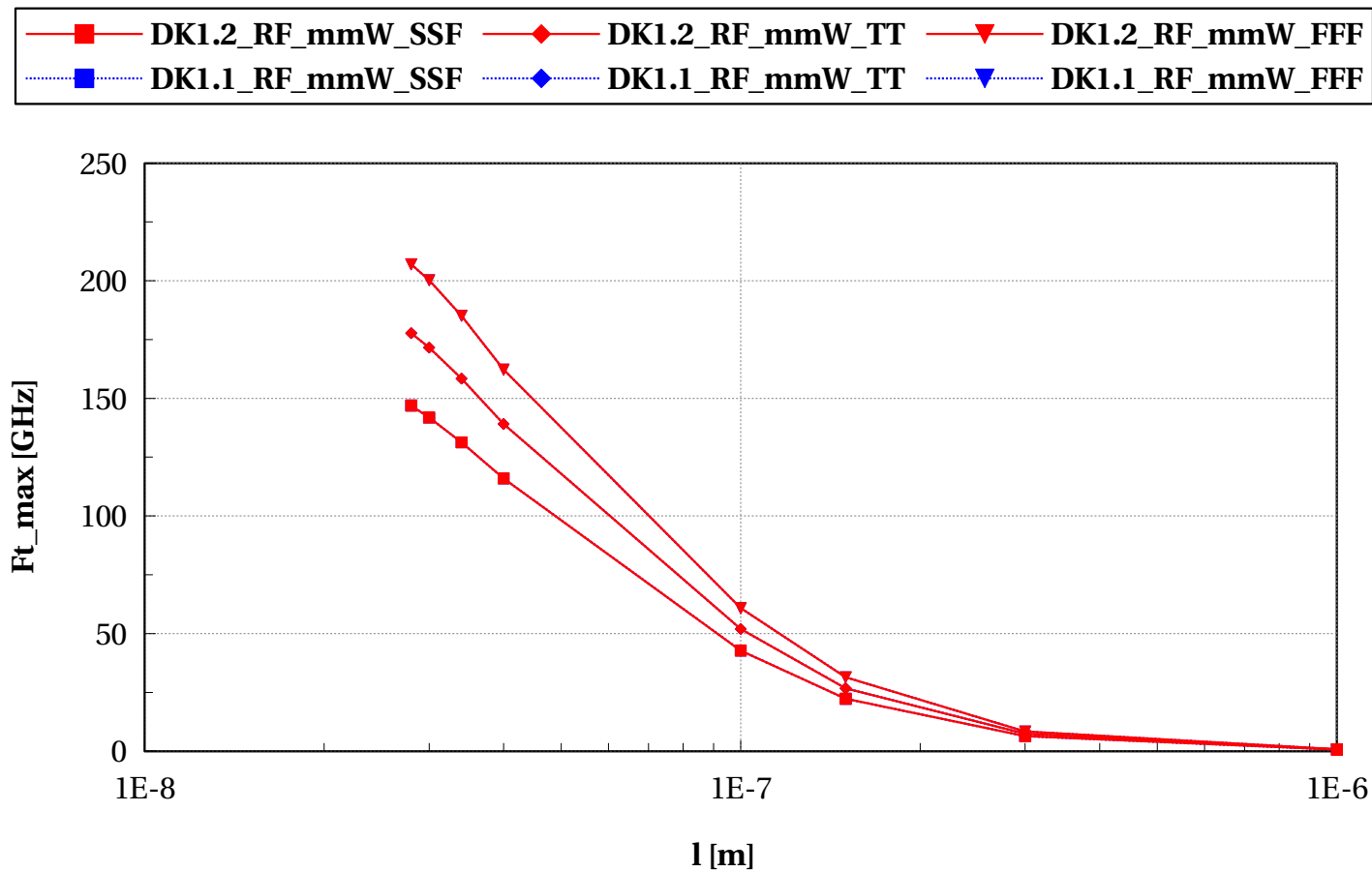
## pfet\_rfseg, Rg normalized by TT [%] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



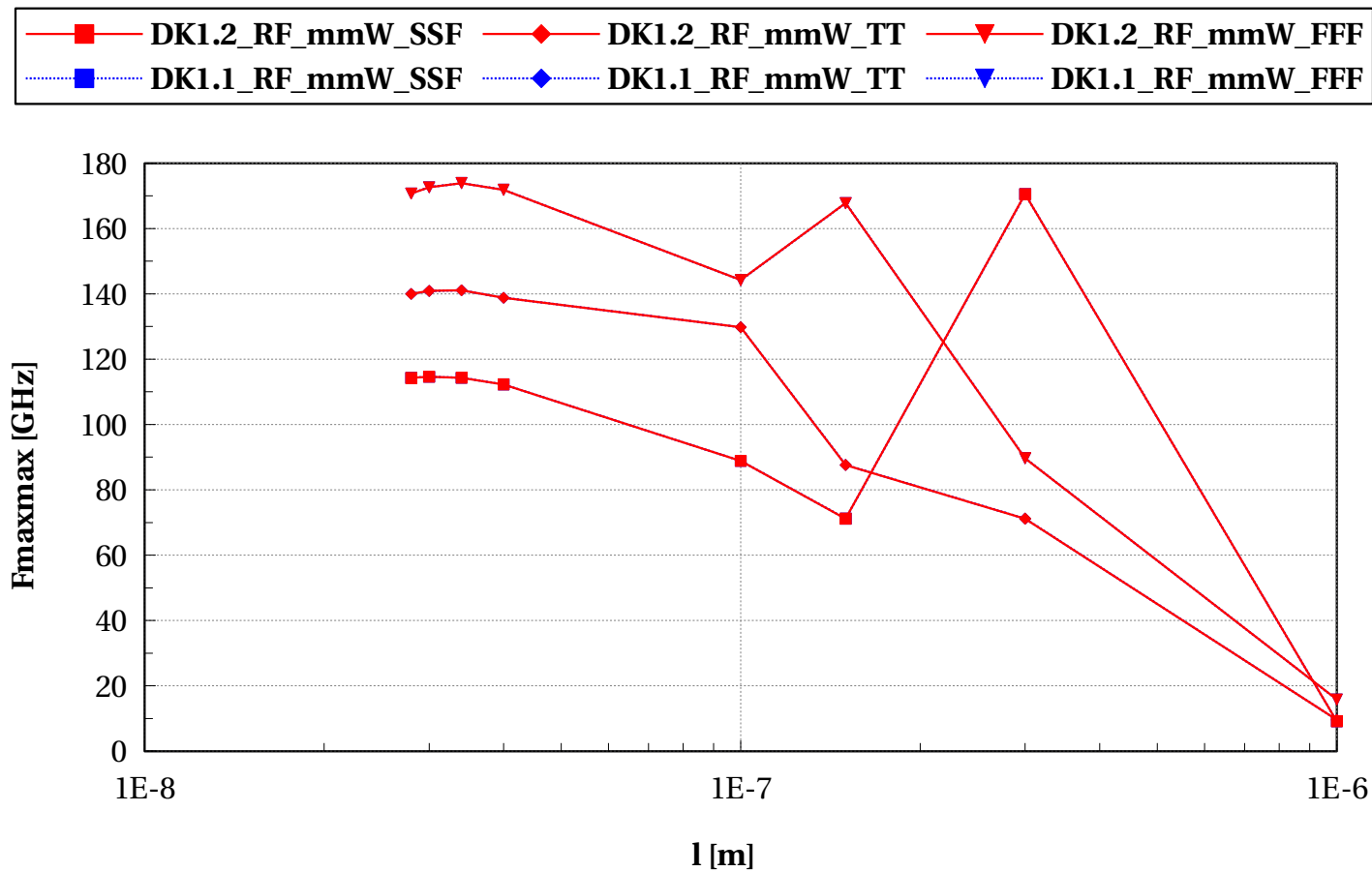
# pfet\_rfseg, Ft\_max [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



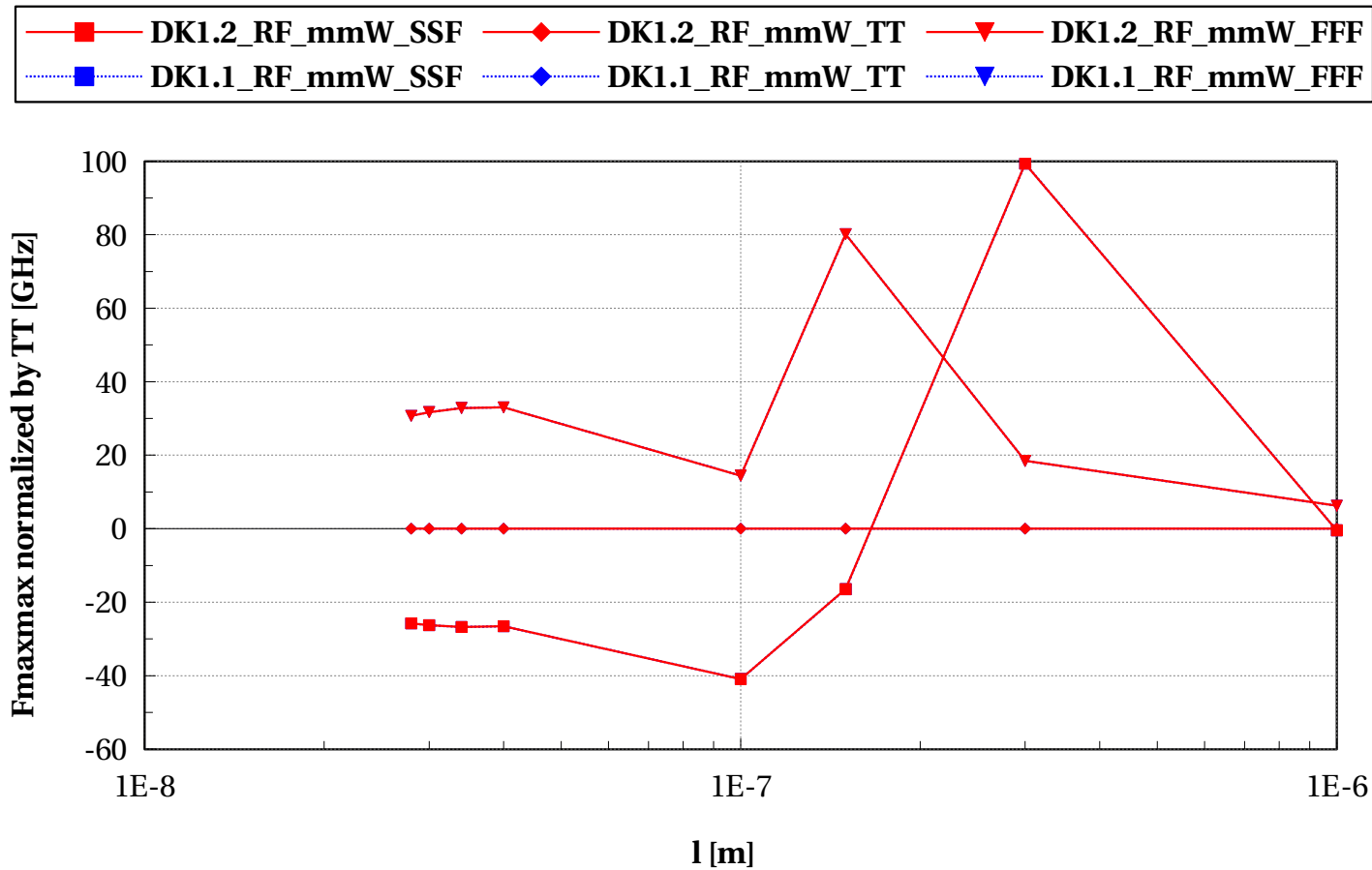
# pfet\_rfseg, Fmaxmax [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfreq==1e-6



# pfet\_rfseg, Fmaxmax normalized by TT [GHz] vs l [m]

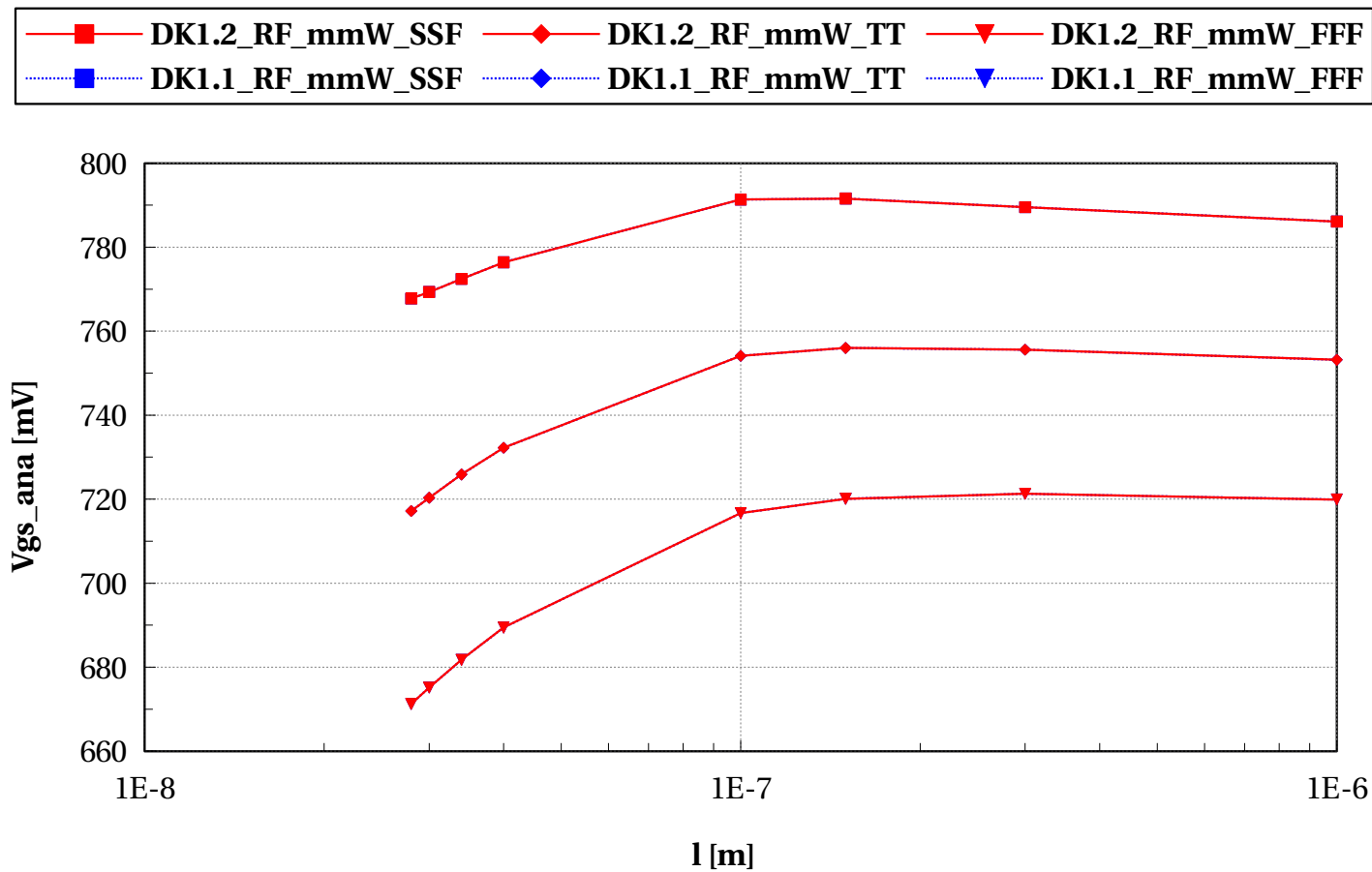
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



# Scaling versus length $W_{\text{fing}}=1\mu\text{m}$ - Analog

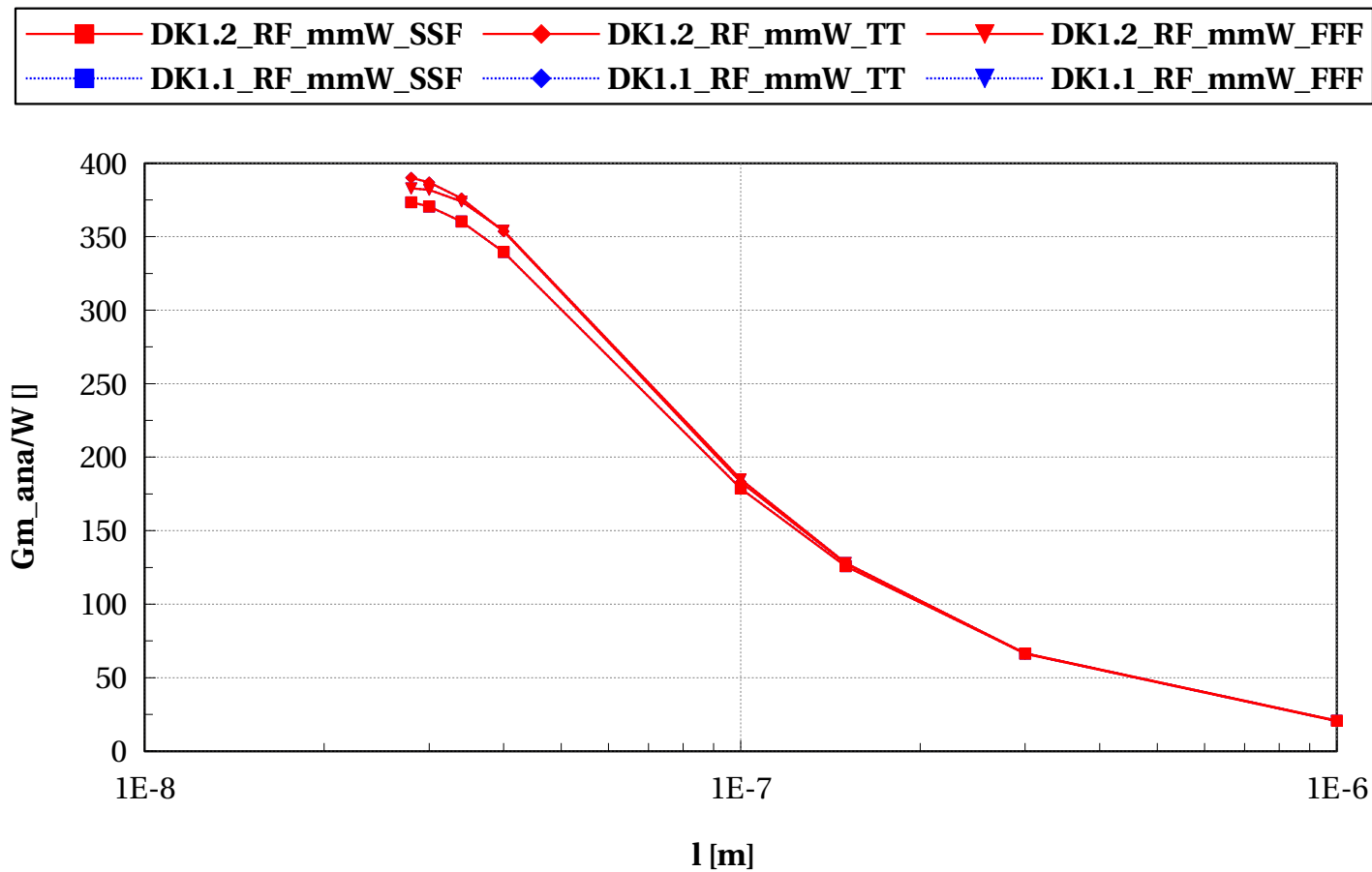
# pfet\_rfseg, Vgs\_ana [mV] vs I [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



# pfet\_rfseg, Gm\_ana/W [] vs l [m]

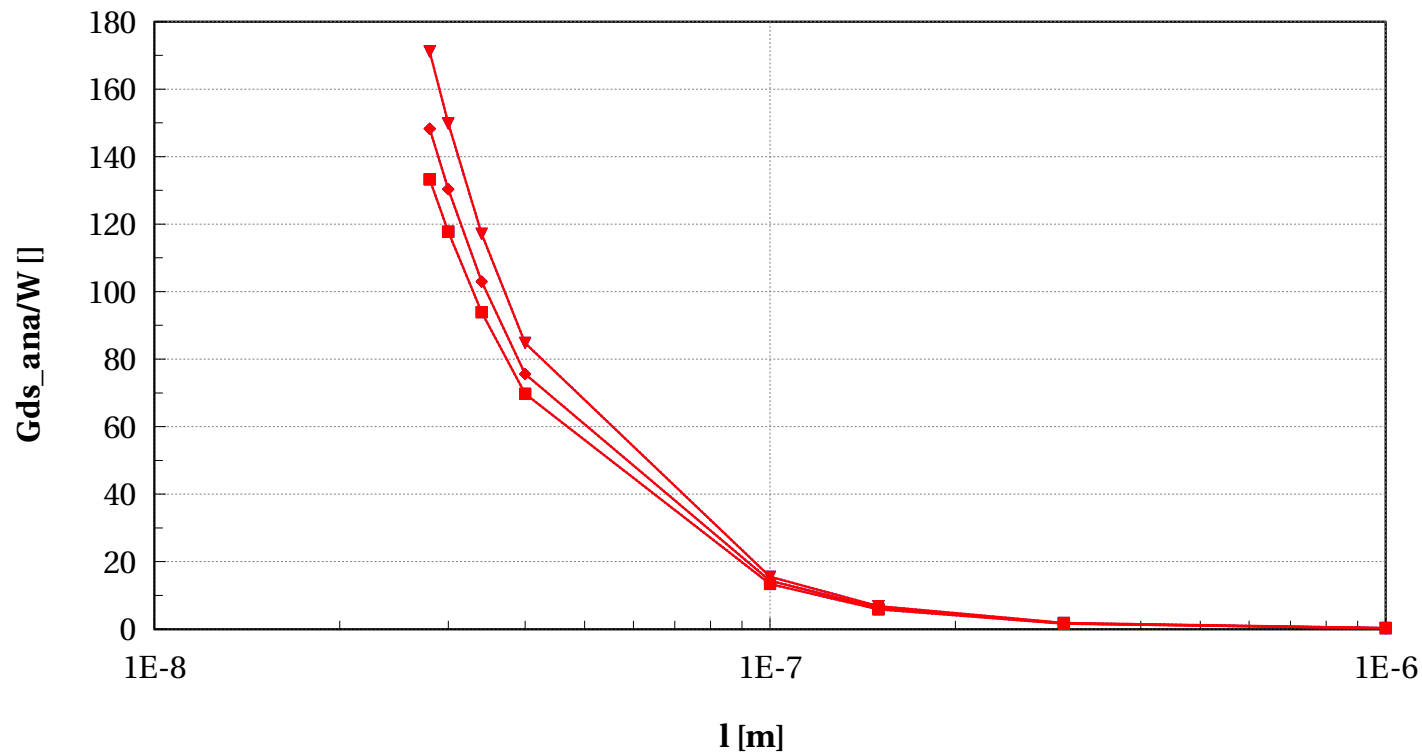
(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6





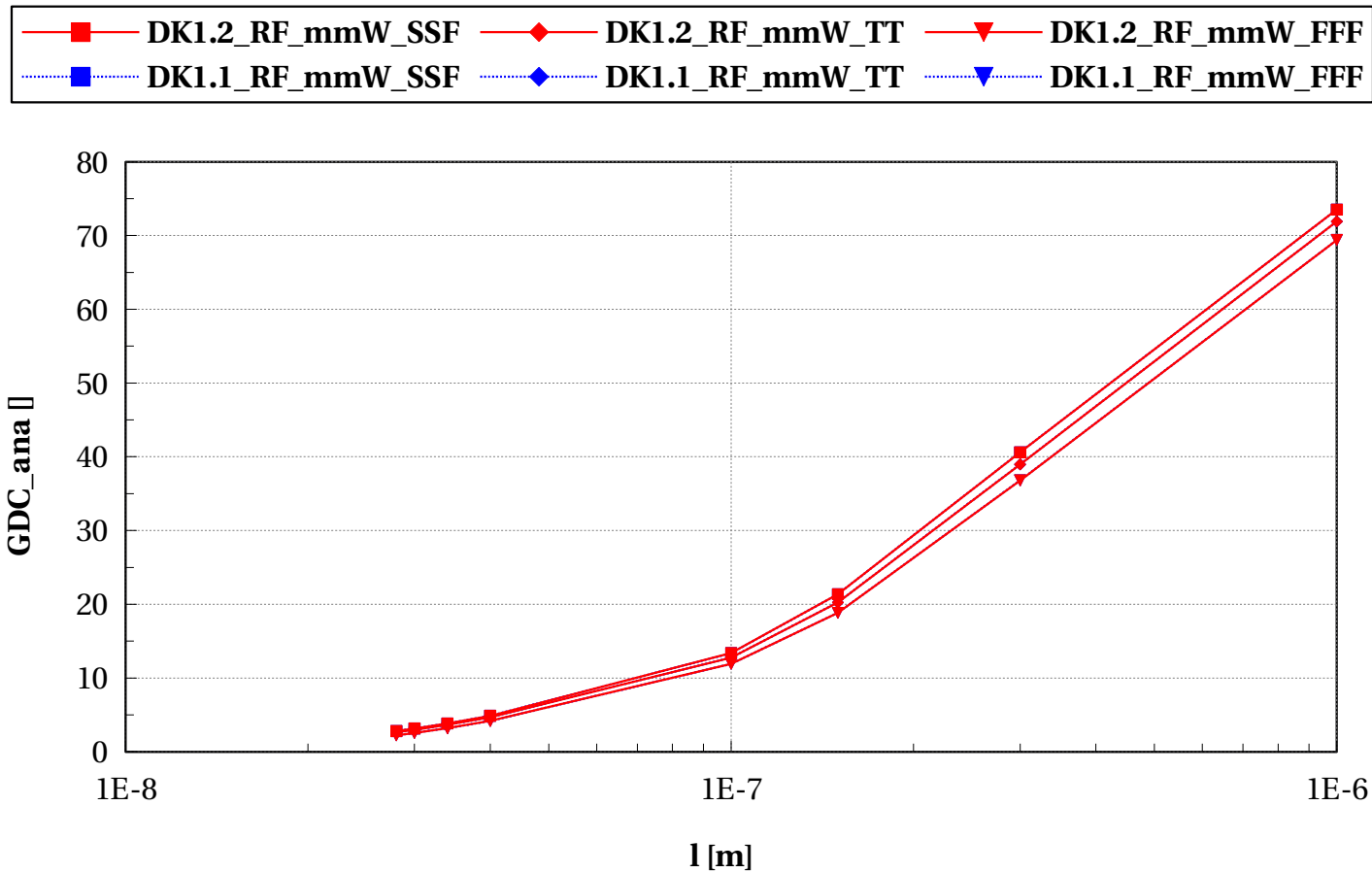
# pfet\_rfseg, Gds\_ana/W [] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



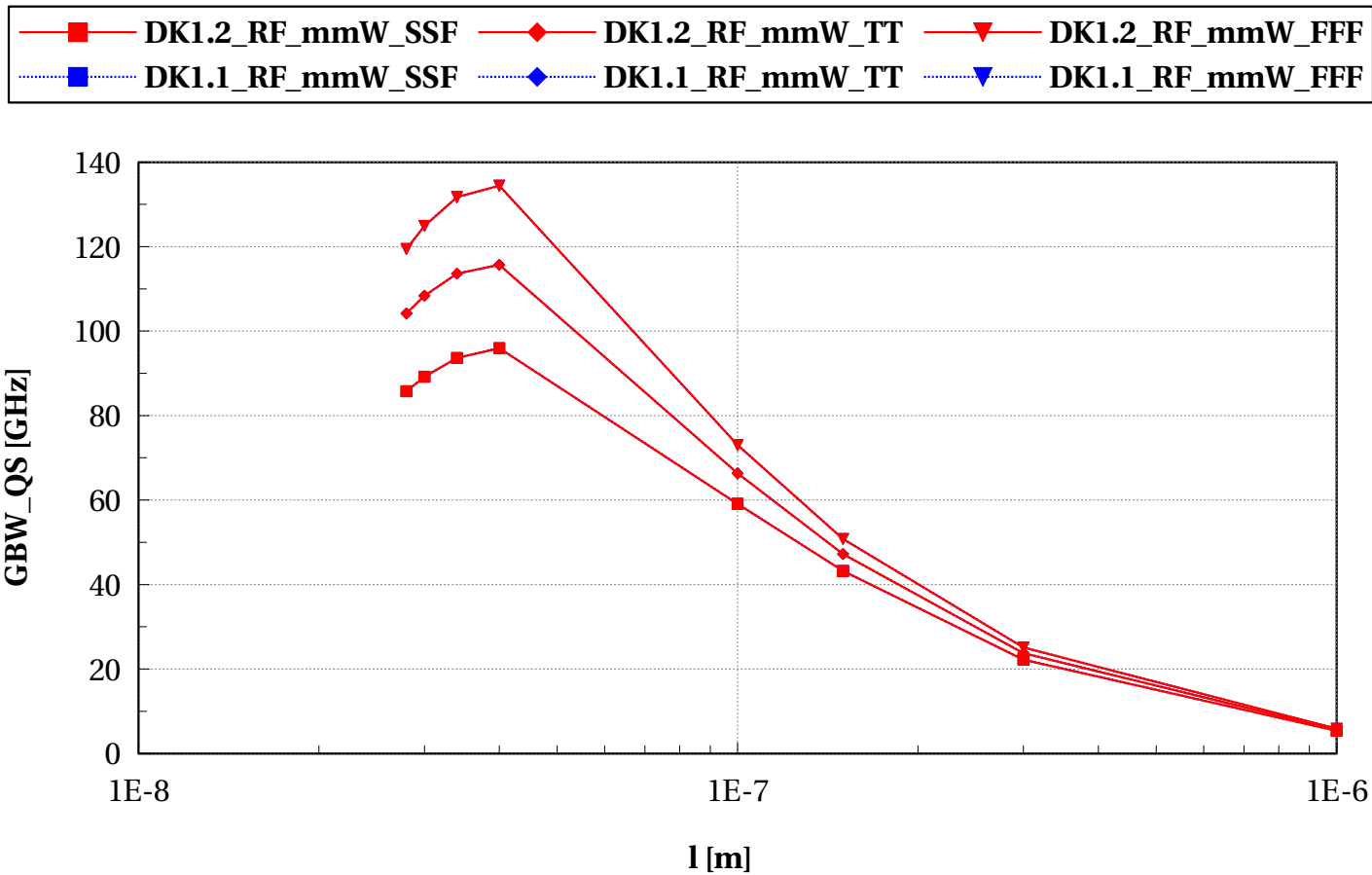
# pfet\_rfseg, GDC\_ana [] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



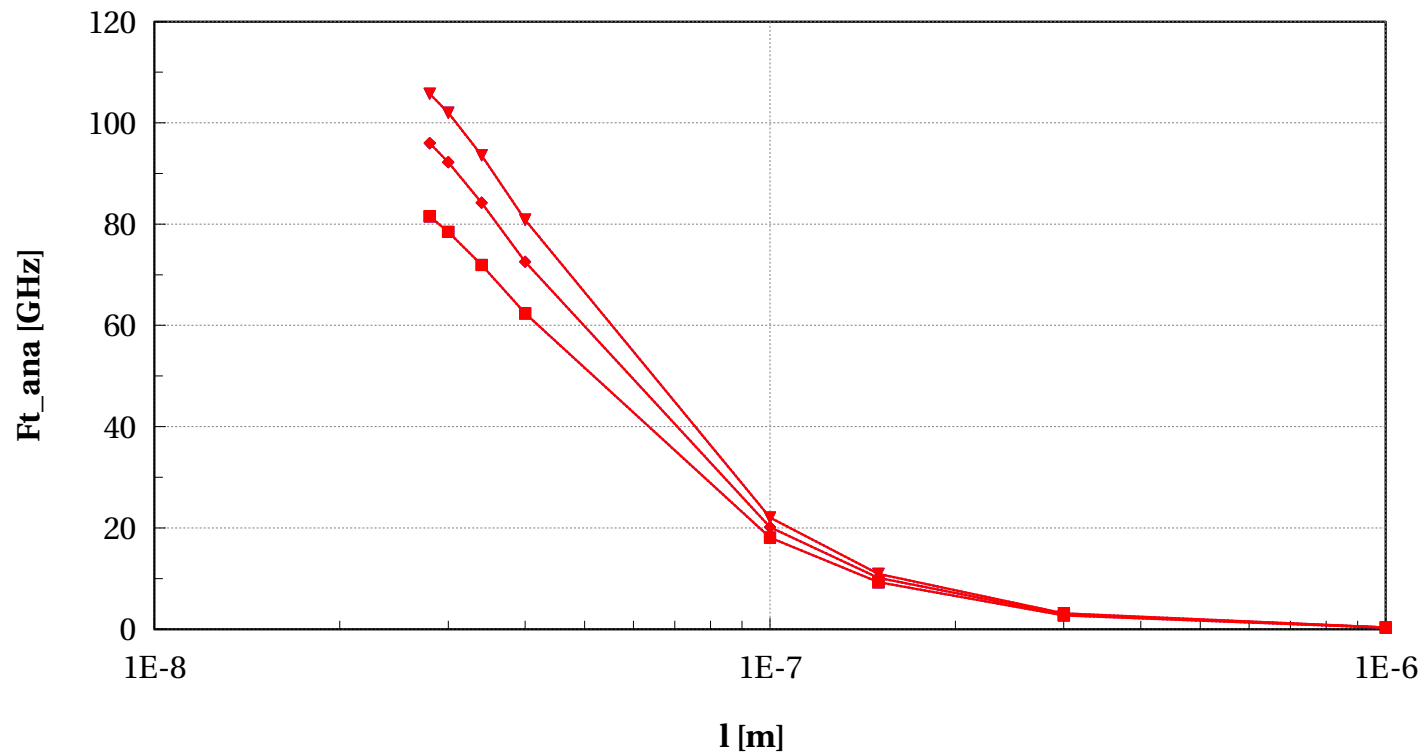
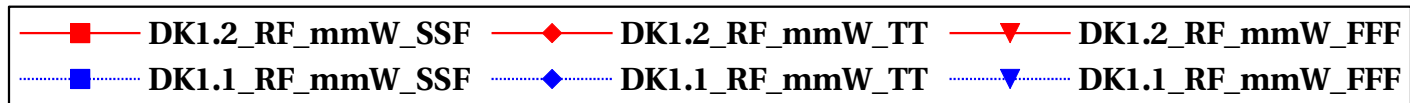
# pfet\_rfseg, GBW\_QS [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfling==1e-6



# pfet\_rfseg, Ft\_ana [GHz] vs l [m]

(Study=="WScaling\_L30n" or Study=="LScaling\_W1u") and wfing==1e-6



# Annex

## Conditions of simulations

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

- Model lvtmfet\_rf (DK1.2\_RF\_mmW)

- ✓ Input Parameters

- ✗ vds\_ft = Vdd V
    - ✗ iana = 5e-6 A
    - ✗ vds\_cgg = 0 V
    - ✗ f\_ext\_rg = 10G Hz
    - ✗ mc\_sens = 0
    - ✗ vds\_lin = 0.05 V
    - ✗ ivt = 300e-9 A
    - ✗ model\_version = 1.0.e
    - ✗ vds\_off = vds\_sat V
    - ✗ vds\_cgd = 0 V
    - ✗ ams\_release = 2018.3
    - ✗ plashrink\_iana = 0
    - ✗ vgs\_stop = vdd V
    - ✗ dlshrink\_ivt = 0

- ✗  $\text{sbenchlsf\_release} = \text{Alpha}$
- ✗  $\text{vds\_sat} = \text{Vdd V}$
- ✗  $\text{shrink\_iana} = 1$
- ✗  $\text{mc\_nsigma} = 3$
- ✗  $\text{shrink\_ivt} = 1$
- ✗  $\text{dlshrink\_tinv} = 0$
- ✗  $\text{vstep\_iana} = 0.01 \text{ V}$
- ✗  $\text{vgs\_start} = 0 \text{ V}$
- ✗  $\text{plashrink\_ivt} = 1$
- ✗  $\text{dlshrink\_iana} = 0$
- ✗  $\text{ithslwi} = 10\text{e-}9 \text{ A}$
- ✗  $\text{vds\_ana} = \text{Vdd}/4 \text{ V}$
- ✗  $\text{vds\_cbd} = 0 \text{ V}$
- ✗  $\text{vddmax} = \text{vdd}$
- ✗  $\text{mc\_runs} = 500$
- ✗  $\text{vstep\_ivt} = 0.005 \text{ V}$
- ✗  $\text{vgs\_off} = 0 \text{ V}$
- ✗  $\text{temp} = 25 \text{ }^\circ\text{C}$
- ✗  $\text{f\_ext} = 100\text{k Hz}$
- ✗  $\text{vbs} = 0 \text{ V}$
- ✗  $\text{vdd} = 1 \text{ V}$
- ✗  $\text{shrink\_tinv} = 1$
- ✓ Sweep Parameters
- ✓ Extra parameters
  - ✗  $\text{lvt\_dev} = 0$

- ✗ rvt\_dev = 0
- Model lvtinfet\_rfseg (DK1.2\_RF\_mmW)
  - ✓ Input Parameters
    - ✗ vds\_ft = Vdd V
    - ✗ iana = 5e-6 A
    - ✗ vds\_cgg = 0 V
    - ✗ f\_ext\_rg = 10G Hz
    - ✗ mc\_sens = 0
    - ✗ vds\_lin = 0.05 V
    - ✗ ivt = 300e-9 A
    - ✗ model\_version = 1.0.e
    - ✗ vds\_off = vds\_sat V
    - ✗ vds\_cgd = 0 V
    - ✗ ams\_release = 2018.3
    - ✗ plashrink\_iana = 0
    - ✗ vgs\_stop = vdd V
    - ✗ dlshrink\_ivt = 0
    - ✗ sbenchlsf\_release = Alpha
    - ✗ vds\_sat = Vdd V
    - ✗ shrink\_iana = 1
    - ✗ mc\_nsigma = 3
    - ✗ shrink\_ivt = 1
    - ✗ dlshrink\_tinv = 0
    - ✗ vstep\_iana = 0.01 V
    - ✗ vgs\_start = 0 V



- ✗  $\text{plashrink\_ivt} = 1$
- ✗  $\text{dlshrink\_iana} = 0$
- ✗  $\text{ithslwi} = 10\text{e-}9 \text{ A}$
- ✗  $\text{vds\_ana} = \text{Vdd}/4 \text{ V}$
- ✗  $\text{vds\_cbd} = 0 \text{ V}$
- ✗  $\text{vddmax} = \text{vdd}$
- ✗  $\text{mc\_runs} = 500$
- ✗  $\text{vstep\_ivt} = 0.005 \text{ V}$
- ✗  $\text{vgs\_off} = 0 \text{ V}$
- ✗  $\text{temp} = 25 \text{ }^{\circ}\text{C}$
- ✗  $\text{f\_ext} = 100\text{k Hz}$
- ✗  $\text{vbs} = 0 \text{ V}$
- ✗  $\text{vdd} = 1 \text{ V}$
- ✗  $\text{shrink\_tinv} = 1$
- ✓ Sweep Parameters
- ✓ Extra parameters
  - ✗  $\text{lvt\_dev} = 0$
  - ✗  $\text{rvt\_dev} = 0$
- Model  $\text{lvtpfet\_rf}$  (DK1.2\_RF\_mmW)
  - ✓ Input Parameters
    - ✗  $\text{vds\_ft} = \text{Vdd V}$
    - ✗  $\text{iana} = 2\text{e-}6 \text{ A}$
    - ✗  $\text{vds\_cgg} = 0 \text{ V}$
    - ✗  $\text{f\_ext\_rg} = 10\text{G Hz}$
    - ✗  $\text{mc\_sens} = 0$

- ✗  $vds\_lin = 0.05\text{ V}$
- ✗  $ivt = 70e-9\text{ A}$
- ✗  $model\_version = 1.0.e$
- ✗  $vds\_off = vds\_sat\text{ V}$
- ✗  $vds\_cgd = 0\text{ V}$
- ✗  $ams\_release = 2018.3$
- ✗  $plashrink\_iana = 0$
- ✗  $vgs\_stop = vdd\text{ V}$
- ✗  $dlshrink\_ivt = 0$
- ✗  $sbenchlsf\_release = \text{Alpha}$
- ✗  $vds\_sat = Vdd\text{ V}$
- ✗  $shrink\_iana = 1$
- ✗  $mc\_nsigma = 3$
- ✗  $shrink\_ivt = 1$
- ✗  $dlshrink\_tinv = 0$
- ✗  $vstep\_iana = 0.01\text{ V}$
- ✗  $vgs\_start = 0\text{ V}$
- ✗  $plashrink\_ivt = 1$
- ✗  $dlshrink\_iana = 0$
- ✗  $ithslwi = 10e-9\text{ A}$
- ✗  $vds\_ana = Vdd/4\text{ V}$
- ✗  $vds\_cbd = 0\text{ V}$
- ✗  $vddmax = vdd$
- ✗  $mc\_runs = 500$
- ✗  $vstep\_ivt = 0.005\text{ V}$

- ✗  $v_{sub1} = 0$
- ✗  $v_{gs\_off} = 0 \text{ V}$
- ✗  $temp = 25 \text{ }^{\circ}\text{C}$
- ✗  $f_{ext} = 100\text{k Hz}$
- ✗  $v_{bs} = 1 \text{ V}$
- ✗  $v_{dd} = 1 \text{ V}$
- ✗  $shrink\_tinv = 1$
- ✓ Sweep Parameters
- ✓ Extra parameters
  - ✗  $lvt\_dev = 0$
  - ✗  $rvt\_dev = 0$
- Model `lvtpfet_rfseg` (DK1.2\_RF\_mmW)
  - ✓ Input Parameters
    - ✗  $v_{ds\_ft} = V_{dd} \text{ V}$
    - ✗  $i_{ana} = 2\text{e-}6 \text{ A}$
    - ✗  $v_{ds\_cgg} = 0 \text{ V}$
    - ✗  $f_{ext\_rg} = 10\text{G Hz}$
    - ✗  $mc\_sens = 0$
    - ✗  $v_{ds\_lin} = 0.05 \text{ V}$
    - ✗  $i_{vt} = 70\text{e-}9 \text{ A}$
    - ✗  $model\_version = 1.0.e$
    - ✗  $v_{ds\_off} = v_{ds\_sat} \text{ V}$
    - ✗  $v_{ds\_cgd} = 0 \text{ V}$
    - ✗  $ams\_release = 2018.3$
    - ✗  $plashrink\_iana = 0$

- ✗  $v_{gs\_stop} = v_{dd}$  V
- ✗  $dlshrink_{ivt} = 0$
- ✗  $sbenchlsf\_release = \text{Alpha}$
- ✗  $v_{ds\_sat} = V_{dd}$  V
- ✗  $shrink_{iana} = 1$
- ✗  $mc\_nsigma = 3$
- ✗  $shrink_{ivt} = 1$
- ✗  $dlshrink_{tinv} = 0$
- ✗  $v_{step\_iana} = 0.01$  V
- ✗  $v_{gs\_start} = 0$  V
- ✗  $plashrink_{ivt} = 1$
- ✗  $dlshrink_{iana} = 0$
- ✗  $i_{thslwi} = 10e-9$  A
- ✗  $v_{ds\_ana} = V_{dd}/4$  V
- ✗  $v_{ds\_cbd} = 0$  V
- ✗  $v_{ddmax} = v_{dd}$
- ✗  $mc\_runs = 500$
- ✗  $v_{step\_ivt} = 0.005$  V
- ✗  $v_{sub1} = 0$
- ✗  $v_{gs\_off} = 0$  V
- ✗  $temp = 25$  °C
- ✗  $f_{ext} = 100k$  Hz
- ✗  $v_{bs} = 1$  V
- ✗  $v_{dd} = 1$  V
- ✗  $shrink_{tinv} = 1$

- ✓ Sweep Parameters
- ✓ Extra parameters
  - ✗ lvt\_dev = 0
  - ✗ rvt\_dev = 0
- Model nfet\_rf (DK1.2\_RF\_mmW)
  - ✓ Input Parameters
    - ✗ vds\_ft = Vdd V
    - ✗ iana = 5e-6 A
    - ✗ vds\_cgg = 0 V
    - ✗ f\_ext\_rg = 10G Hz
    - ✗ mc\_sens = 0
    - ✗ vds\_lin = 0.05 V
    - ✗ ivt = 300e-9 A
    - ✗ model\_version = 1.0.c
    - ✗ vds\_off = vds\_sat V
    - ✗ vds\_cgd = 0 V
    - ✗ ams\_release = 2018.3
    - ✗ plashrink\_iana = 0
    - ✗ vgs\_stop = vdd V
    - ✗ dlshrink\_ivt = 0
    - ✗ sbenchlsf\_release = Alpha
    - ✗ vds\_sat = Vdd V
    - ✗ shrink\_iana = 1
    - ✗ mc\_nsigma = 3
    - ✗ shrink\_ivt = 1

- ✗  $\text{dlshrink\_tinv} = 0$
- ✗  $\text{vstep\_iana} = 0.01 \text{ V}$
- ✗  $\text{vgs\_start} = 0 \text{ V}$
- ✗  $\text{plashrink\_ivt} = 1$
- ✗  $\text{dlshrink\_iana} = 0$
- ✗  $\text{ithslwi} = 10\text{e-}9 \text{ A}$
- ✗  $\text{vds\_ana} = \text{Vdd}/4 \text{ V}$
- ✗  $\text{vds\_cbd} = 0 \text{ V}$
- ✗  $\text{vddmax} = \text{vdd}$
- ✗  $\text{mc\_runs} = 500$
- ✗  $\text{vstep\_ivt} = 0.005 \text{ V}$
- ✗  $\text{vsub1} = 0$
- ✗  $\text{vgs\_off} = 0 \text{ V}$
- ✗  $\text{temp} = 25 \text{ }^{\circ}\text{C}$
- ✗  $\text{f\_ext} = 100\text{k Hz}$
- ✗  $\text{vbs} = 0 \text{ V}$
- ✗  $\text{vdd} = 1 \text{ V}$
- ✗  $\text{shrink\_tinv} = 1$
- ✓ Sweep Parameters
- ✓ Extra parameters
  - ✗  $\text{lvt\_dev} = 0$
  - ✗  $\text{rvt\_dev} = 0$
- Model `nfet_rfseg` (DK1.2\_RF\_mmW)
  - ✓ Input Parameters
    - ✗  $\text{vds\_ft} = \text{Vdd V}$

- ✗  $i_{ana} = 5e-6 \text{ A}$
- ✗  $v_{ds\_cgg} = 0 \text{ V}$
- ✗  $f_{ext\_rg} = 10 \text{ GHz}$
- ✗  $mc\_sens = 0$
- ✗  $v_{ds\_lin} = 0.05 \text{ V}$
- ✗  $i_{vt} = 300e-9 \text{ A}$
- ✗  $model\_version = 1.0.c$
- ✗  $v_{ds\_off} = v_{ds\_sat} \text{ V}$
- ✗  $v_{ds\_cgd} = 0 \text{ V}$
- ✗  $ams\_release = 2018.3$
- ✗  $plashrink\_iana = 0$
- ✗  $v_{gs\_stop} = v_{dd} \text{ V}$
- ✗  $dlshrink\_ivt = 0$
- ✗  $sbenchlsf\_release = \text{Alpha}$
- ✗  $v_{ds\_sat} = V_{dd} \text{ V}$
- ✗  $shrink\_iana = 1$
- ✗  $mc\_nsigma = 3$
- ✗  $shrink\_ivt = 1$
- ✗  $dlshrink\_tinv = 0$
- ✗  $v_{step\_iana} = 0.01 \text{ V}$
- ✗  $v_{gs\_start} = 0 \text{ V}$
- ✗  $plashrink\_ivt = 1$
- ✗  $dlshrink\_iana = 0$
- ✗  $i_{thslwi} = 10e-9 \text{ A}$
- ✗  $v_{ds\_ana} = V_{dd}/4 \text{ V}$

- ✗  $v_{ds\_cbd} = 0\text{ V}$
- ✗  $v_{ddmax} = v_{dd}$
- ✗  $mc\_runs = 500$
- ✗  $v_{step\_ivt} = 0.005\text{ V}$
- ✗  $v_{sub1} = 0$
- ✗  $v_{gs\_off} = 0\text{ V}$
- ✗  $temp = 25\text{ °C}$
- ✗  $f_{ext} = 100\text{k Hz}$
- ✗  $v_{bs} = 0\text{ V}$
- ✗  $v_{dd} = 1\text{ V}$
- ✗  $shrink\_tinv = 1$
- ✓ Sweep Parameters
- ✓ Extra parameters
  - ✗  $lvt\_dev = 0$
  - ✗  $rvt\_dev = 0$
- Model pfet\_rf (DK1.2\_RF\_mmW)
  - ✓ Input Parameters
    - ✗  $v_{ds\_ft} = V_{dd}\text{ V}$
    - ✗  $i_{ana} = 2\text{e-}6\text{ A}$
    - ✗  $v_{ds\_cgg} = 0\text{ V}$
    - ✗  $f_{ext\_rg} = 10\text{G Hz}$
    - ✗  $mc\_sens = 0$
    - ✗  $v_{ds\_lin} = 0.05\text{ V}$
    - ✗  $i_{vt} = 70\text{e-}9\text{ A}$
    - ✗  $model\_version = 1.0.c$



- ✗  $vds\_off = vds\_sat$  V
- ✗  $vds\_cgd = 0$  V
- ✗  $ams\_release = 2018.3$
- ✗  $plashrink\_iana = 0$
- ✗  $vgs\_stop = vdd$  V
- ✗  $dlshrink\_ivt = 0$
- ✗  $sbenchlsf\_release = \text{Alpha}$
- ✗  $vds\_sat = Vdd$  V
- ✗  $shrink\_iana = 1$
- ✗  $mc\_nsigma = 3$
- ✗  $shrink\_ivt = 1$
- ✗  $dlshrink\_tinv = 0$
- ✗  $vstep\_iana = 0.01$  V
- ✗  $vgs\_start = 0$  V
- ✗  $plashrink\_ivt = 1$
- ✗  $dlshrink\_iana = 0$
- ✗  $ithslwi = 10e-9$  A
- ✗  $vds\_ana = Vdd/4$  V
- ✗  $vds\_cbd = 0$  V
- ✗  $vddmax = vdd$
- ✗  $mc\_runs = 500$
- ✗  $vstep\_ivt = 0.005$  V
- ✗  $vgs\_off = 0$  V
- ✗  $temp = 25$  °C
- ✗  $f\_ext = 100k$  Hz

- ✗  $v_{bs} = 0\text{ V}$
- ✗  $v_{dd} = 1\text{ V}$
- ✗  $\text{shrink\_tinv} = 1$
- ✓ Sweep Parameters
- ✓ Extra parameters
  - ✗  $\text{lv}_{t\_dev} = 0$
  - ✗  $\text{rv}_{t\_dev} = 0$
- Model pfet\_rfseg (DK1.2\_RF\_mmW)
  - ✓ Input Parameters
    - ✗  $v_{ds\_ft} = V_{dd}\text{ V}$
    - ✗  $i_{ana} = 2\text{e-}6\text{ A}$
    - ✗  $v_{ds\_cgg} = 0\text{ V}$
    - ✗  $f_{\text{ext\_rg}} = 10\text{G Hz}$
    - ✗  $mc\_sens = 0$
    - ✗  $v_{ds\_lin} = 0.05\text{ V}$
    - ✗  $i_{vt} = 70\text{e-}9\text{ A}$
    - ✗  $\text{model\_version} = 1.0.c$
    - ✗  $v_{ds\_off} = v_{ds\_sat}\text{ V}$
    - ✗  $v_{ds\_cgd} = 0\text{ V}$
    - ✗  $\text{ams\_release} = 2018.3$
    - ✗  $\text{plashrink\_iana} = 0$
    - ✗  $v_{gs\_stop} = v_{dd}\text{ V}$
    - ✗  $\text{dlshrink\_ivt} = 0$
    - ✗  $\text{sbenchlsf\_release} = \text{Alpha}$
    - ✗  $v_{ds\_sat} = V_{dd}\text{ V}$

- ✗ shrink\_iana = 1
- ✗ mc\_nsigma = 3
- ✗ shrink\_ivt = 1
- ✗ dlshrink\_tinv = 0
- ✗ vstep\_iana = 0.01 V
- ✗ vgs\_start = 0 V
- ✗ plashrink\_ivt = 1
- ✗ dlshrink\_iana = 0
- ✗ ithslwi = 10e-9 A
- ✗ vds\_ana = Vdd/4 V
- ✗ vds\_cbd = 0 V
- ✗ vddmax = vdd
- ✗ mc\_runs = 500
- ✗ vstep\_ivt = 0.005 V
- ✗ vgs\_off = 0 V
- ✗ temp = 25 °C
- ✗ f\_ext = 100k Hz
- ✗ vbs = 0 V
- ✗ vdd = 1 V
- ✗ shrink\_tinv = 1
- ✓ Sweep Parameters
- ✓ Extra parameters
  - ✗ lvt\_dev = 0
  - ✗ rvt\_dev = 0
- Model lvtmfet\_rf (DK1.1\_RF\_mmW)

## ✓ Input Parameters

- ✗  $v_{ds\_ft} = V_{dd}$  V
- ✗  $i_{ana} = 5e-6$  A
- ✗  $v_{ds\_cgg} = 0$  V
- ✗  $f_{ext\_rg} = 10$  GHz
- ✗  $mc\_sens = 0$
- ✗  $v_{ds\_lin} = 0.05$  V
- ✗  $i_{vt} = 300e-9$  A
- ✗  $model\_version = 1.0.d$
- ✗  $v_{ds\_off} = v_{ds\_sat}$  V
- ✗  $v_{ds\_cgd} = 0$  V
- ✗  $ams\_release = 2018.3$
- ✗  $plashrink\_iana = 0$
- ✗  $v_{gs\_stop} = v_{dd}$  V
- ✗  $dlshrink\_ivt = 0$
- ✗  $sbenchlsf\_release = \text{Alpha}$
- ✗  $v_{ds\_sat} = V_{dd}$  V
- ✗  $shrink\_iana = 1$
- ✗  $mc\_nsigma = 3$
- ✗  $shrink\_ivt = 1$
- ✗  $dlshrink\_tinv = 0$
- ✗  $v_{step\_iana} = 0.01$  V
- ✗  $v_{gs\_start} = 0$  V
- ✗  $plashrink\_ivt = 1$
- ✗  $dlshrink\_iana = 0$

- ✗  $\text{ithslwi} = 10\text{e-}9 \text{ A}$
- ✗  $\text{vds\_ana} = \text{Vdd}/4 \text{ V}$
- ✗  $\text{vds\_cbd} = 0 \text{ V}$
- ✗  $\text{vddmax} = \text{vdd}$
- ✗  $\text{mc\_runs} = 500$
- ✗  $\text{vstep\_ivt} = 0.005 \text{ V}$
- ✗  $\text{vgs\_off} = 0 \text{ V}$
- ✗  $\text{temp} = 25 \text{ }^\circ\text{C}$
- ✗  $\text{f\_ext} = 100\text{k Hz}$
- ✗  $\text{vbs} = 0 \text{ V}$
- ✗  $\text{vdd} = 1 \text{ V}$
- ✗  $\text{shrink\_tinv} = 1$
- ✓ Sweep Parameters
- ✓ Extra parameters
  - ✗  $\text{lvt\_dev} = 0$
  - ✗  $\text{rvt\_dev} = 0$
- Model  $\text{lvtinfet\_rfseg}$  (DK1.1\_RF\_mmW)
  - ✓ Input Parameters
    - ✗  $\text{vds\_ft} = \text{Vdd V}$
    - ✗  $\text{iana} = 5\text{e-}6 \text{ A}$
    - ✗  $\text{vds\_cgg} = 0 \text{ V}$
    - ✗  $\text{f\_ext\_rg} = 10\text{G Hz}$
    - ✗  $\text{mc\_sens} = 0$
    - ✗  $\text{vds\_lin} = 0.05 \text{ V}$
    - ✗  $\text{ivt} = 300\text{e-}9 \text{ A}$

- ✗ model\_version = 1.0.d
- ✗ vds\_off = vds\_sat V
- ✗ vds\_cgd = 0 V
- ✗ ams\_release = 2018.3
- ✗ plashrink\_iana = 0
- ✗ vgs\_stop = vdd V
- ✗ dlshrink\_ivt = 0
- ✗ sbenchlsf\_release = Alpha
- ✗ vds\_sat = Vdd V
- ✗ shrink\_iana = 1
- ✗ mc\_nsigma = 3
- ✗ shrink\_ivt = 1
- ✗ dlshrink\_tinv = 0
- ✗ vstep\_iana = 0.01 V
- ✗ vgs\_start = 0 V
- ✗ plashrink\_ivt = 1
- ✗ dlshrink\_iana = 0
- ✗ ithslwi = 10e-9 A
- ✗ vds\_ana = Vdd/4 V
- ✗ vds\_cbd = 0 V
- ✗ vddmax = vdd
- ✗ mc\_runs = 500
- ✗ vstep\_ivt = 0.005 V
- ✗ vgs\_off = 0 V
- ✗ temp = 25 °C

- ✗  $f_{\text{ext}} = 100\text{k Hz}$
- ✗  $v_{\text{bs}} = 0\text{ V}$
- ✗  $v_{\text{dd}} = 1\text{ V}$
- ✗  $\text{shrink\_tinv} = 1$
- ✓ Sweep Parameters
- ✓ Extra parameters
  - ✗  $\text{ltv\_dev} = 0$
  - ✗  $\text{rvt\_dev} = 0$
- Model `lvtpfet_rf` (DK1.1\_RF\_mmW)
  - ✓ Input Parameters
    - ✗  $v_{\text{ds\_ft}} = V_{\text{dd}}\text{ V}$
    - ✗  $i_{\text{ana}} = 2\text{e-}6\text{ A}$
    - ✗  $v_{\text{ds\_cgg}} = 0\text{ V}$
    - ✗  $f_{\text{ext\_rg}} = 10\text{G Hz}$
    - ✗  $m_{\text{c\_sens}} = 0$
    - ✗  $v_{\text{ds\_lin}} = 0.05\text{ V}$
    - ✗  $i_{\text{vt}} = 70\text{e-}9\text{ A}$
    - ✗  $\text{model\_version} = 1.0.\text{d}$
    - ✗  $v_{\text{ds\_off}} = v_{\text{ds\_sat}}\text{ V}$
    - ✗  $v_{\text{ds\_cgd}} = 0\text{ V}$
    - ✗  $\text{ams\_release} = 2018.3$
    - ✗  $\text{plashrink\_iana} = 0$
    - ✗  $v_{\text{gs\_stop}} = v_{\text{dd}}\text{ V}$
    - ✗  $\text{dlshrink\_ivt} = 0$
    - ✗  $\text{sbenchlsf\_release} = \text{Alpha}$

- ✗  $v_{ds\_sat} = V_{dd}$  V
- ✗  $shrink\_iana = 1$
- ✗  $mc\_nsigma = 3$
- ✗  $shrink\_ivt = 1$
- ✗  $dlshrink\_tinv = 0$
- ✗  $vstep\_iana = 0.01$  V
- ✗  $vgs\_start = 0$  V
- ✗  $plashrink\_ivt = 1$
- ✗  $dlshrink\_iana = 0$
- ✗  $ithslwi = 10e-9$  A
- ✗  $vds\_ana = V_{dd}/4$  V
- ✗  $vds\_cbd = 0$  V
- ✗  $vddmax = vdd$
- ✗  $mc\_runs = 500$
- ✗  $vstep\_ivt = 0.005$  V
- ✗  $vsub1 = 0$
- ✗  $vgs\_off = 0$  V
- ✗  $temp = 25$  °C
- ✗  $f\_ext = 100k$  Hz
- ✗  $vbs = 1$  V
- ✗  $vdd = 1$  V
- ✗  $shrink\_tinv = 1$
- ✓ Sweep Parameters
- ✓ Extra parameters
  - ✗  $lvt\_dev = 0$



- ✗  $rvt\_dev = 0$
- Model lvtpfet\_rfseg (DK1.1\_RF\_mmW)
  - ✓ Input Parameters
    - ✗  $vds\_ft = Vdd\text{ V}$
    - ✗  $iana = 2e-6\text{ A}$
    - ✗  $vds\_cgg = 0\text{ V}$
    - ✗  $f\_ext\_rg = 10G\text{ Hz}$
    - ✗  $mc\_sens = 0$
    - ✗  $vds\_lin = 0.05\text{ V}$
    - ✗  $ivt = 70e-9\text{ A}$
    - ✗  $model\_version = 1.0.d$
    - ✗  $vds\_off = vds\_sat\text{ V}$
    - ✗  $vds\_cgd = 0\text{ V}$
    - ✗  $ams\_release = 2018.3$
    - ✗  $plashrink\_iana = 0$
    - ✗  $vgs\_stop = vdd\text{ V}$
    - ✗  $dlshrink\_ivt = 0$
    - ✗  $sbenchlsf\_release = \text{Alpha}$
    - ✗  $vds\_sat = Vdd\text{ V}$
    - ✗  $shrink\_iana = 1$
    - ✗  $mc\_nsigma = 3$
    - ✗  $shrink\_ivt = 1$
    - ✗  $dlshrink\_tinv = 0$
    - ✗  $vstep\_iana = 0.01\text{ V}$
    - ✗  $vgs\_start = 0\text{ V}$

- ✗ plashrink\_ivt = 1
- ✗ dlshrink\_iana = 0
- ✗ ithslwi = 10e-9 A
- ✗ vds\_ana = Vdd/4 V
- ✗ vds\_cbd = 0 V
- ✗ vddmax = vdd
- ✗ mc\_runs = 500
- ✗ vstep\_ivt = 0.005 V
- ✗ vsub1 = 0
- ✗ vgs\_off = 0 V
- ✗ temp = 25 °C
- ✗ f\_ext = 100k Hz
- ✗ vbs = 1 V
- ✗ vdd = 1 V
- ✗ shrink\_tinv = 1
- ✓ Sweep Parameters
- ✓ Extra parameters
  - ✗ lvt\_dev = 0
  - ✗ rvt\_dev = 0
- Model nfet\_rf (DK1.1\_RF\_mmW)
  - ✓ Input Parameters
    - ✗ vds\_ft = Vdd V
    - ✗ iana = 5e-6 A
    - ✗ vds\_cgg = 0 V
    - ✗ f\_ext\_rg = 10G Hz

- ✗ mc\_sens = 0
- ✗ vds\_lin = 0.05 V
- ✗ ivt = 300e-9 A
- ✗ model\_version = 1.0.b
- ✗ vds\_off = vds\_sat V
- ✗ vds\_cgd = 0 V
- ✗ ams\_release = 2018.3
- ✗ plashrink\_iana = 0
- ✗ vgs\_stop = vdd V
- ✗ dlshrink\_ivt = 0
- ✗ sbenchlsf\_release = Alpha
- ✗ vds\_sat = Vdd V
- ✗ shrink\_iana = 1
- ✗ mc\_nsigma = 3
- ✗ shrink\_ivt = 1
- ✗ dlshrink\_tinv = 0
- ✗ vstep\_iana = 0.01 V
- ✗ vgs\_start = 0 V
- ✗ plashrink\_ivt = 1
- ✗ dlshrink\_iana = 0
- ✗ ithslwi = 10e-9 A
- ✗ vds\_ana = Vdd/4 V
- ✗ vds\_cbd = 0 V
- ✗ vddmax = vdd
- ✗ mc\_runs = 500

- ✗ vstep\_ivt = 0.005 V
- ✗ vsub1 = 0
- ✗ vgs\_off = 0 V
- ✗ temp = 25 °C
- ✗ f\_ext = 100k Hz
- ✗ vbs = 0 V
- ✗ vdd = 1 V
- ✗ shrink\_tinv = 1
- ✓ Sweep Parameters
- ✓ Extra parameters
  - ✗ lvt\_dev = 0
  - ✗ rvt\_dev = 0
- Model nfet\_rfseg (DK1.1\_RF\_mmW)
  - ✓ Input Parameters
    - ✗ vds\_ft = Vdd V
    - ✗ iana = 5e-6 A
    - ✗ vds\_cgg = 0 V
    - ✗ f\_ext\_rg = 10G Hz
    - ✗ mc\_sens = 0
    - ✗ vds\_lin = 0.05 V
    - ✗ ivt = 300e-9 A
    - ✗ model\_version = 1.0.b
    - ✗ vds\_off = vds\_sat V
    - ✗ vds\_cgd = 0 V
    - ✗ ams\_release = 2018.3

- ✗  $\text{plashrink\_iana} = 0$
- ✗  $\text{vgs\_stop} = \text{vdd V}$
- ✗  $\text{dlshrink\_ivt} = 0$
- ✗  $\text{sbenchlsf\_release} = \text{Alpha}$
- ✗  $\text{vds\_sat} = \text{Vdd V}$
- ✗  $\text{shrink\_iana} = 1$
- ✗  $\text{mc\_nsigma} = 3$
- ✗  $\text{shrink\_ivt} = 1$
- ✗  $\text{dlshrink\_tinv} = 0$
- ✗  $\text{vstep\_iana} = 0.01 \text{ V}$
- ✗  $\text{vgs\_start} = 0 \text{ V}$
- ✗  $\text{plashrink\_ivt} = 1$
- ✗  $\text{dlshrink\_iana} = 0$
- ✗  $\text{ithslwi} = 10\text{e-}9 \text{ A}$
- ✗  $\text{vds\_ana} = \text{Vdd}/4 \text{ V}$
- ✗  $\text{vds\_cbd} = 0 \text{ V}$
- ✗  $\text{vddmax} = \text{vdd}$
- ✗  $\text{mc\_runs} = 500$
- ✗  $\text{vstep\_ivt} = 0.005 \text{ V}$
- ✗  $\text{vsub1} = 0$
- ✗  $\text{vgs\_off} = 0 \text{ V}$
- ✗  $\text{temp} = 25 \text{ }^{\circ}\text{C}$
- ✗  $\text{f\_ext} = 100\text{k Hz}$
- ✗  $\text{vbs} = 0 \text{ V}$
- ✗  $\text{vdd} = 1 \text{ V}$

- ✗ shrink\_tinv = 1
- ✓ Sweep Parameters
- ✓ Extra parameters
  - ✗ lvt\_dev = 0
  - ✗ rvt\_dev = 0
- Model pfet\_rf (DK1.1\_RF\_mmW)
  - ✓ Input Parameters
    - ✗ vds\_ft = Vdd V
    - ✗ iana = 2e-6 A
    - ✗ vds\_cgg = 0 V
    - ✗ f\_ext\_rg = 10G Hz
    - ✗ mc\_sens = 0
    - ✗ vds\_lin = 0.05 V
    - ✗ ivt = 70e-9 A
    - ✗ model\_version = 1.0.b
    - ✗ vds\_off = vds\_sat V
    - ✗ vds\_cgd = 0 V
    - ✗ ams\_release = 2018.3
    - ✗ plashrink\_iana = 0
    - ✗ vgs\_stop = vdd V
    - ✗ dlshrink\_ivt = 0
    - ✗ sbenchlsf\_release = Alpha
    - ✗ vds\_sat = Vdd V
    - ✗ shrink\_iana = 1
    - ✗ mc\_nsigma = 3

- ✗ shrink\_ivt = 1
- ✗ dlshrink\_tinv = 0
- ✗ vstep\_iana = 0.01 V
- ✗ vgs\_start = 0 V
- ✗ plashrink\_ivt = 1
- ✗ dlshrink\_iana = 0
- ✗ ithslwi = 10e-9 A
- ✗ vds\_ana = Vdd/4 V
- ✗ vds\_cbd = 0 V
- ✗ vddmax = vdd
- ✗ mc\_runs = 500
- ✗ vstep\_ivt = 0.005 V
- ✗ vgs\_off = 0 V
- ✗ temp = 25 °C
- ✗ f\_ext = 100k Hz
- ✗ vbs = 0 V
- ✗ vdd = 1 V
- ✗ shrink\_tinv = 1
- ✓ Sweep Parameters
- ✓ Extra parameters
  - ✗ lvt\_dev = 0
  - ✗ rvt\_dev = 0
- Model pfet\_rfseg (DK1.1\_RF\_mmW)
  - ✓ Input Parameters
    - ✗ vds\_ft = Vdd V

- ✗  $i_{ana} = 2e-6 \text{ A}$
- ✗  $v_{ds\_cgg} = 0 \text{ V}$
- ✗  $f_{ext\_rg} = 10 \text{ GHz}$
- ✗  $mc\_sens = 0$
- ✗  $v_{ds\_lin} = 0.05 \text{ V}$
- ✗  $i_{vt} = 70e-9 \text{ A}$
- ✗  $model\_version = 1.0.b$
- ✗  $v_{ds\_off} = v_{ds\_sat} \text{ V}$
- ✗  $v_{ds\_cgd} = 0 \text{ V}$
- ✗  $ams\_release = 2018.3$
- ✗  $plashrink\_iana = 0$
- ✗  $v_{gs\_stop} = v_{dd} \text{ V}$
- ✗  $dlshrink\_ivt = 0$
- ✗  $sbenchlsf\_release = \text{Alpha}$
- ✗  $v_{ds\_sat} = V_{dd} \text{ V}$
- ✗  $shrink\_iana = 1$
- ✗  $mc\_nsigma = 3$
- ✗  $shrink\_ivt = 1$
- ✗  $dlshrink\_tinv = 0$
- ✗  $v_{step\_iana} = 0.01 \text{ V}$
- ✗  $v_{gs\_start} = 0 \text{ V}$
- ✗  $plashrink\_ivt = 1$
- ✗  $dlshrink\_iana = 0$
- ✗  $i_{thslwi} = 10e-9 \text{ A}$
- ✗  $v_{ds\_ana} = V_{dd}/4 \text{ V}$



- ✗  $v_{ds\_cbd} = 0\text{ V}$
- ✗  $v_{ddmax} = v_{dd}$
- ✗  $mc\_runs = 500$
- ✗  $v_{step\_ivt} = 0.005\text{ V}$
- ✗  $v_{gs\_off} = 0\text{ V}$
- ✗  $temp = 25\text{ }^{\circ}\text{C}$
- ✗  $f_{ext} = 100\text{k Hz}$
- ✗  $v_{bs} = 0\text{ V}$
- ✗  $v_{dd} = 1\text{ V}$
- ✗  $shrink\_tinv = 1$
- ✓ Sweep Parameters
- ✓ Extra parameters
  - ✗  $lvt\_dev = 0$
  - ✗  $rvt\_dev = 0$