cmos028fdsoi Technology

EG DK1.2_RF_mmW models

LVT

Comparison with RVT model(s)

Please use the bookmark to navigate

General information on EG DK1.2_RF_mmW models

- Maximum supply voltage is 1.8 V.
- Validity domain is defined as follows:
  - ✔ Drawn gate length varies from 150nm to 10um.
  - ✔ Drawn transistor width varies from 0.16um to 10um.
  - ✔ Device temperature varies from -40 °C to 125 °C.

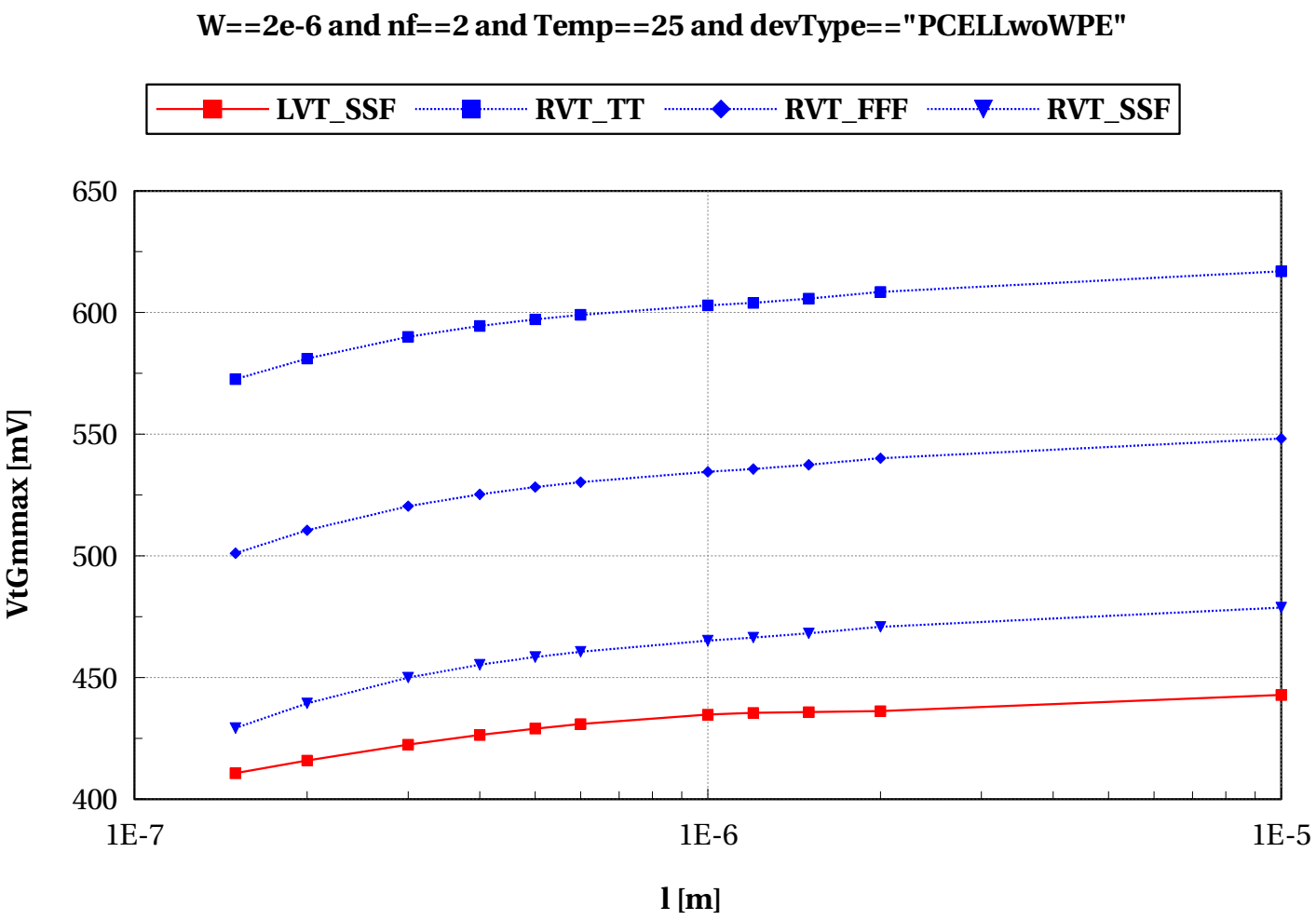
Output parameters definitions

- Model(s): eglvtnfet_acc, eglvtpfet_acc
  - ✔ Gm_ana : Drain transconductance at Ids = iana*M*W/L, Vds = Vdd/4V, f = 100kHz.
  - ✔ Sv@1hz : Gate noise voltage spectral density at 1Hz, Vgs = Vgs_ana, Vds = Vdd/4V
  - ✔ Aid : delta_Id/Id * sqrt(W.L)
  - ✔ Gds_ana : Drain conductance at Ids = iana*M*W/L, Vds = Vdd/4, f = 100k
  - ✔ Vgs_ana : Vgs value for which drain current is iana*M*1*W/(1*L+0+0*p_la) at Vds=Vdd/4V.
  - ✔ Avt : delta_Vt * sqrt(W.L)
  - ✔ Id_sv : Drain current at Vgs = Vgs_ana and Vds = Vdd/4V for which noise voltage and current spectral densities Sv, Si are extracted.
  - ✔ Cbd_off : Bulk-to-Drain capacitance at Vgs = 0V, Vds = 0V, f = 100kHz.
  - ✔ Cdg_ana : Drain-to-Gate transcapacitance at Ids = iana*M*W/L, Vds = Vdd/4V, f = 100kHz.
  - ✔ Ft_ana : Transition frequency at Ids = iana*M*W/L, Vds = Vdd/4V
  - ✔ Sv@th : Gate thermal noise voltage spectral density, Vgs = Vgs_ana, Vds = Vdd/4V
  - ✔ Abeta : delta_GmMax/GmMax * sqrt(w/L)
  - ✔ Cdd_ana : Total drain capacitance at Ids = iana*M*W/L, Vds = Vdd/4V, f = 100kHz.
  - ✔ Gdc_ana : Voltage gain at Ids = iana*M*W/L, Vds = Vdd/4V, f = 100kHz
  - ✔ Cgg_ana : Total gate capacitance at Ids = iana*M*W/L, Vds = Vdd/4V, f = 100kHz
  - ✔ Cgd_0v : Gate-to-Drain capacitance at Vgs = 0V, Vds = vds_cggV, f = 100kHz.
  - ✔ Vtgmmax : Threshold voltage at Vds = 0.05 derived from Gm max method.

eglvtnfet_acc
Electrical characteristics scaling

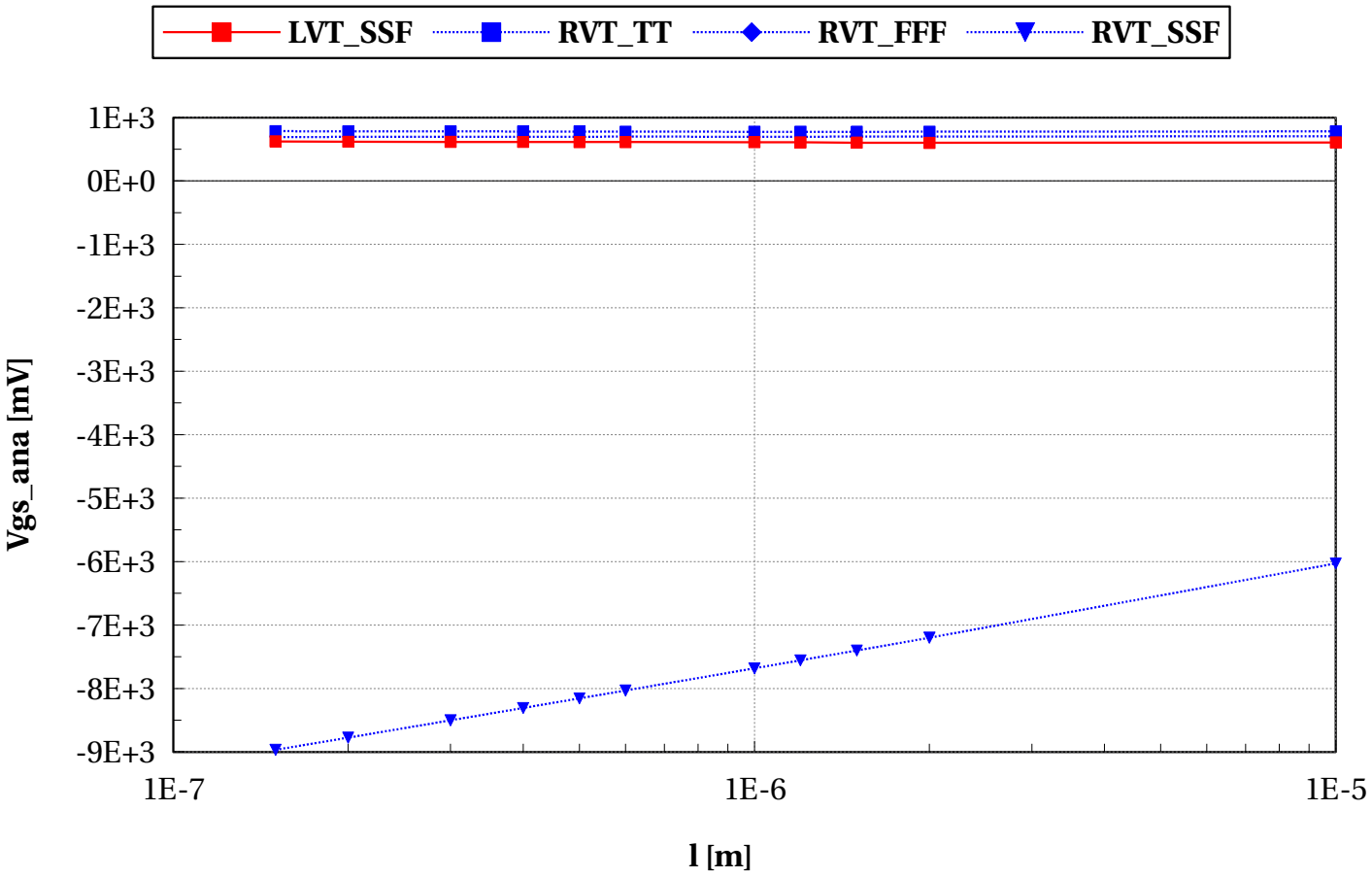
Scaling versus Length (T=25C)

eglvtnfet_acc, VtGmmax [mV] vs l [m]

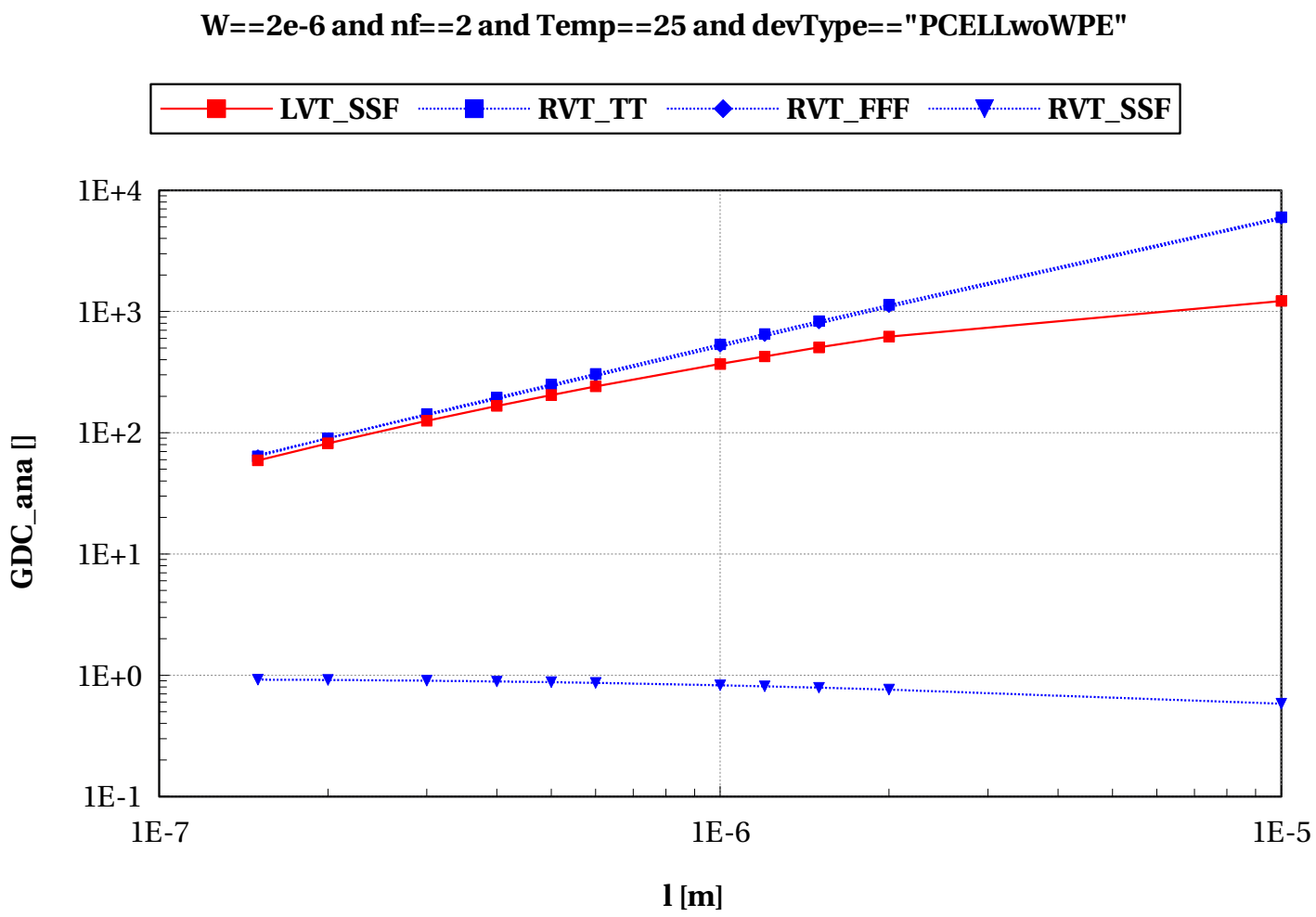


eglvtnfet_acc, Vgs_ana [mV] vs l [m]

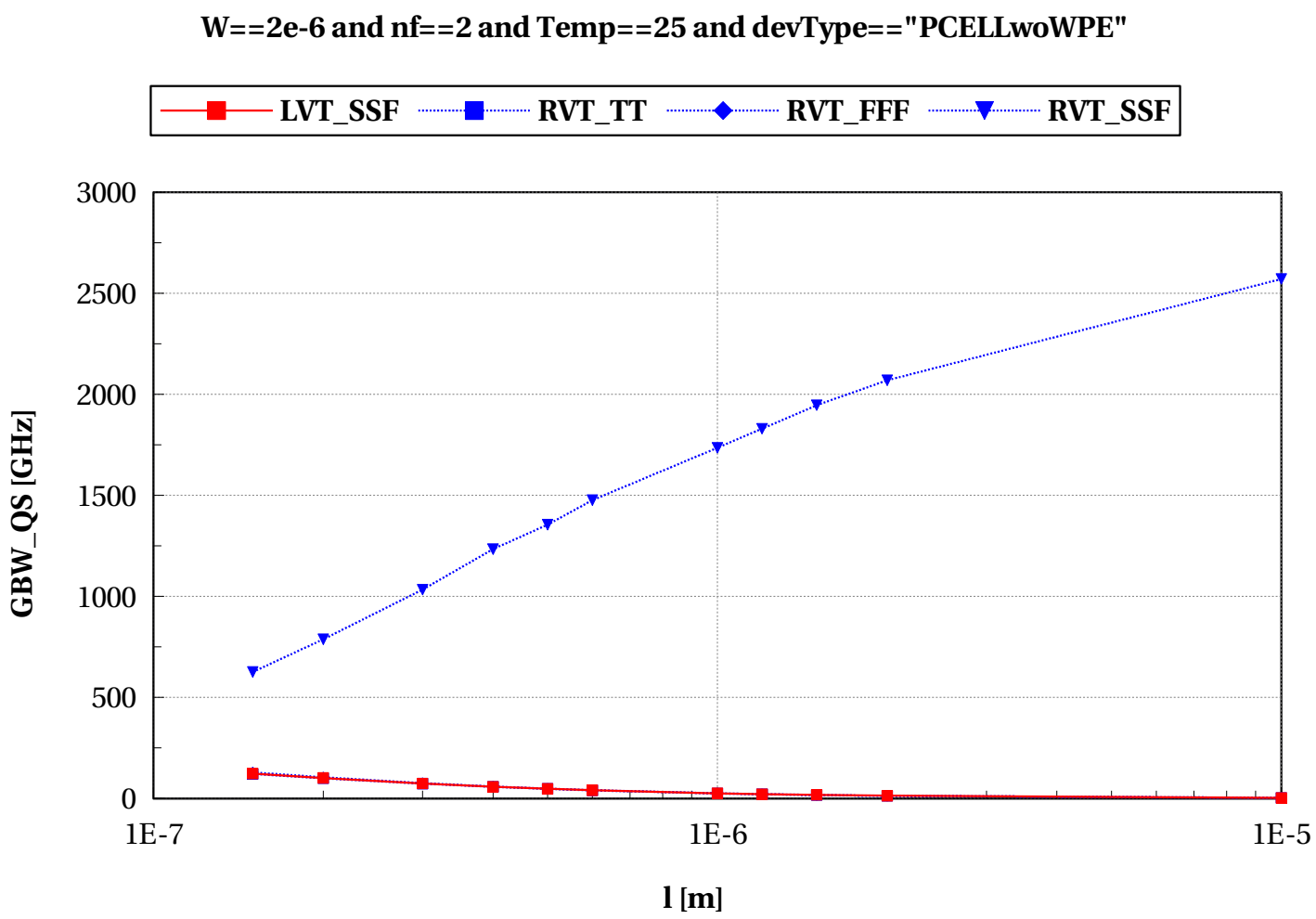
W==2e-6 and nf==2 and Temp==25 and devType=="PCELLwoWPE"



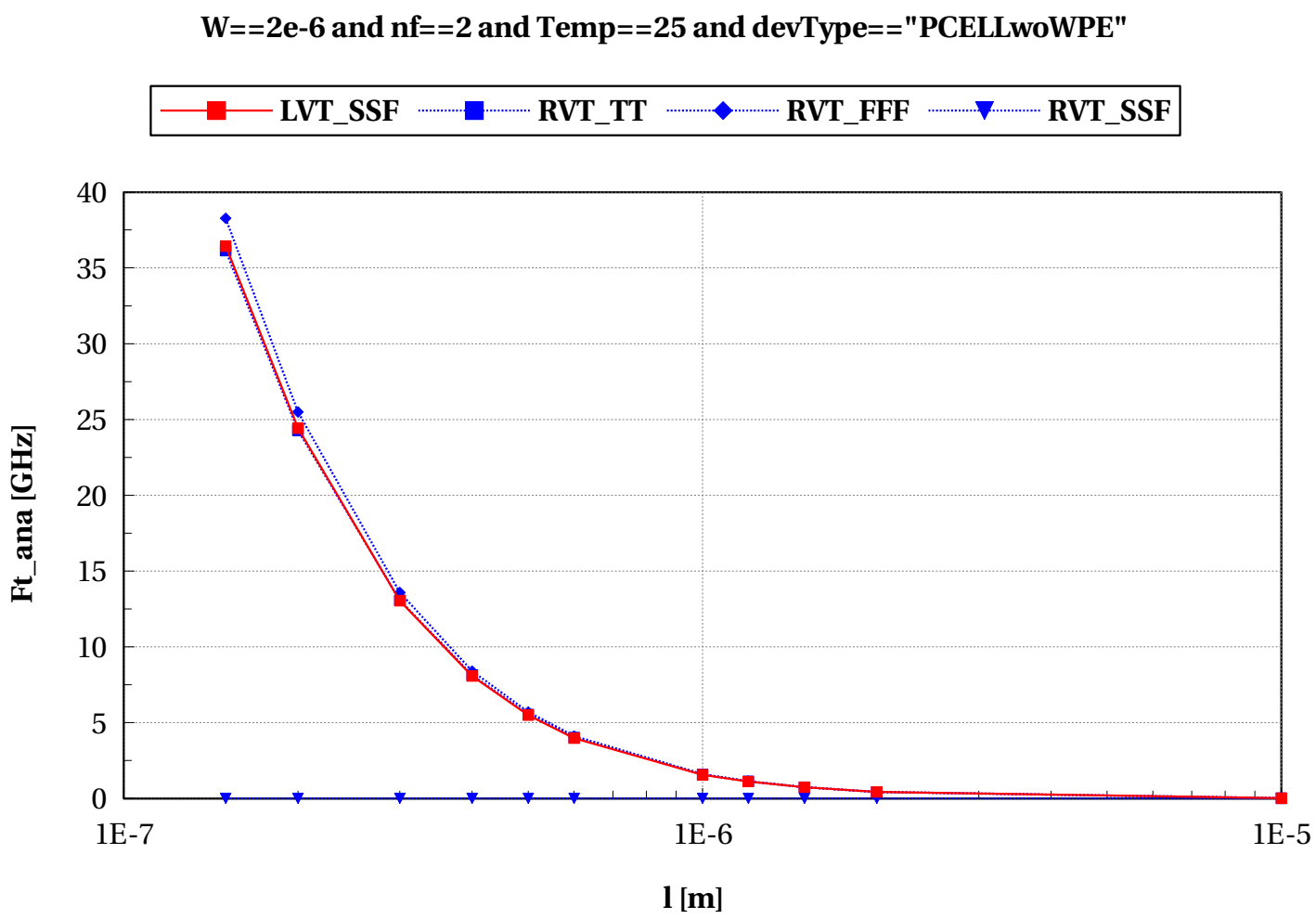
eglvtnfet_acc, GDC_ana [] vs l [m]



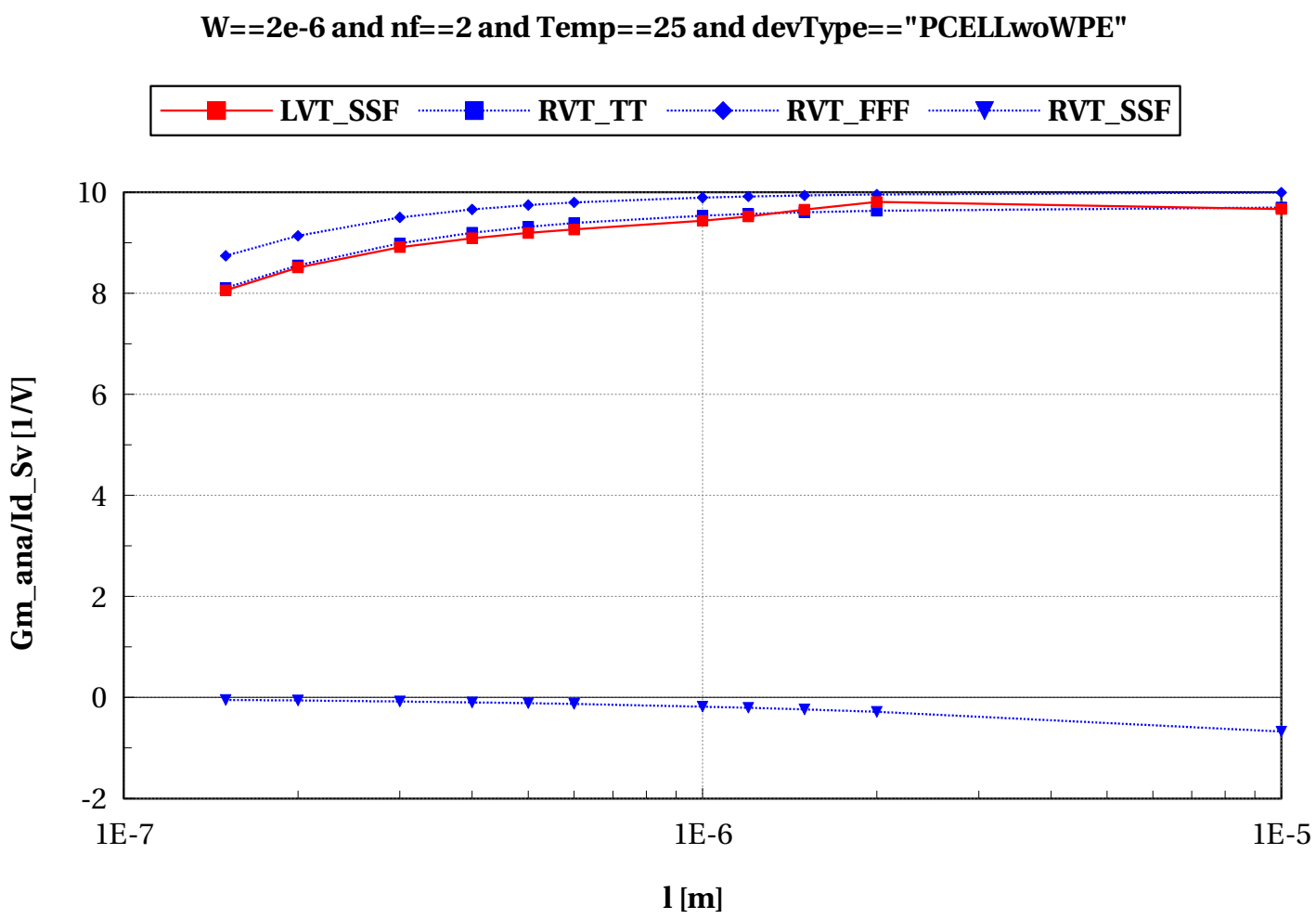
eglvtnfet_acc, GBW_QS [GHz] vs l [m]



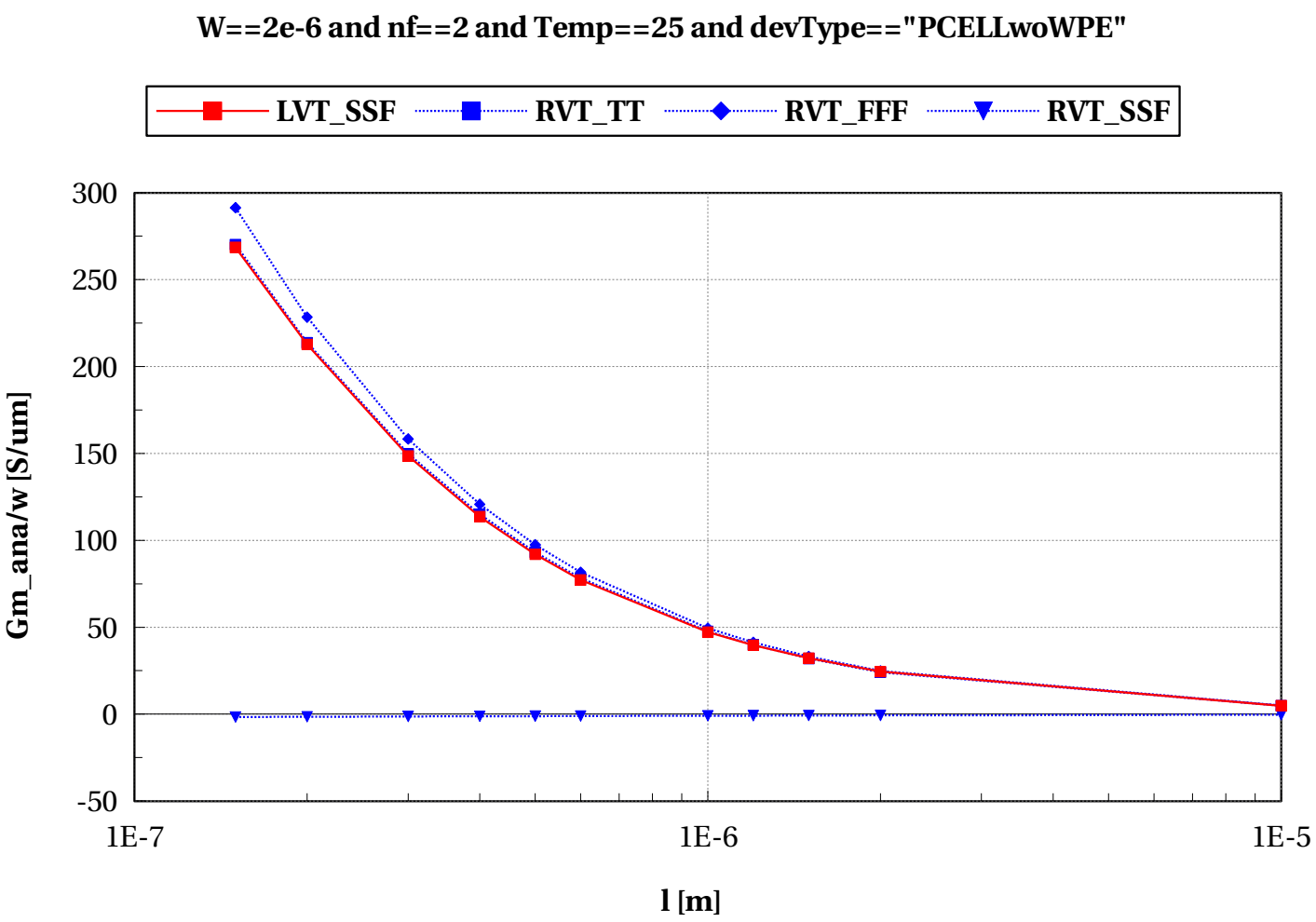
eglvtnfet_acc, Ft_ana [GHz] vs l [m]



eglvtnfet_acc, Gm_ana/Id_Sv [1/V] vs l [m]

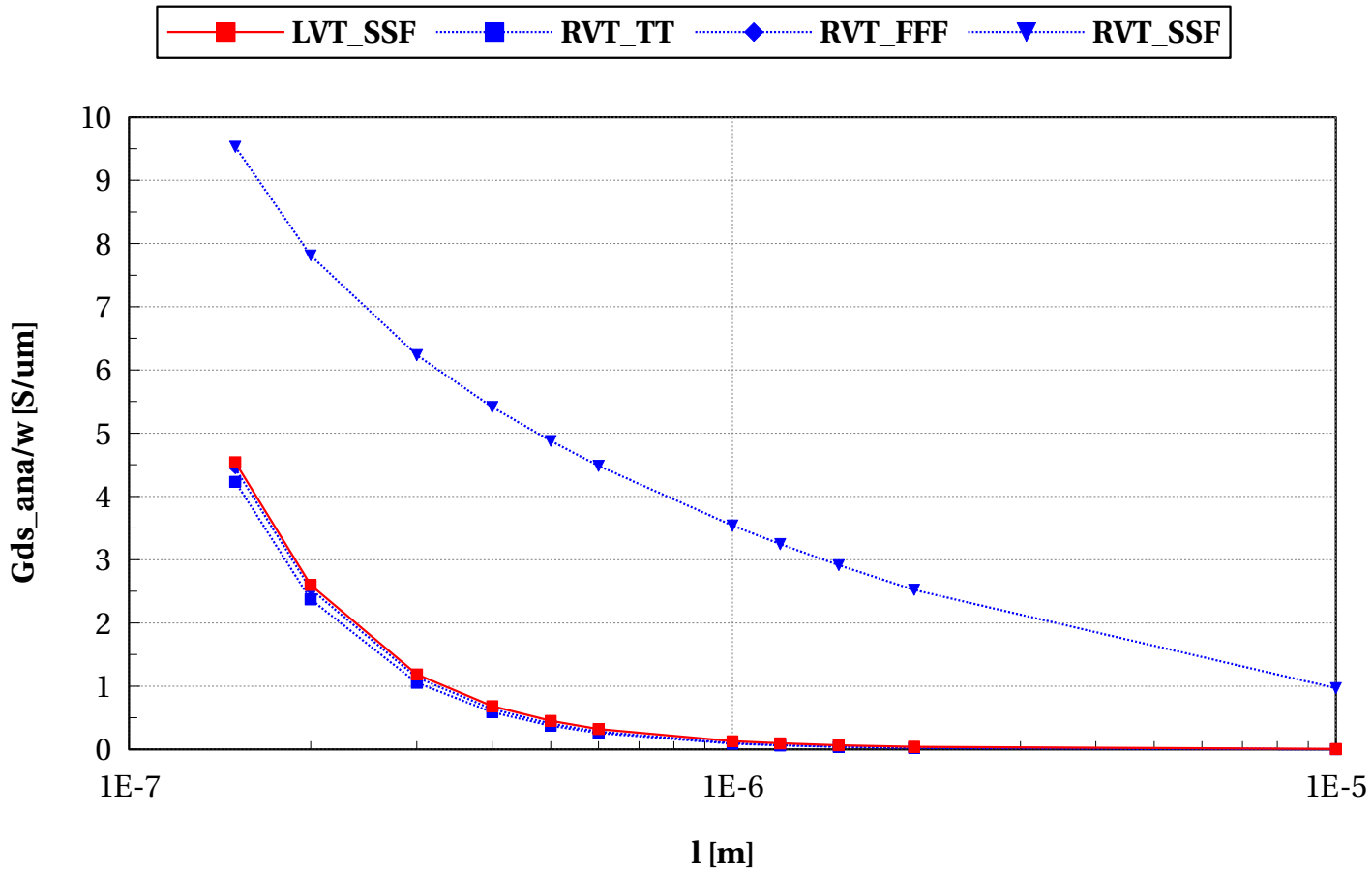


eglvtnfet_acc, Gm_ana/w [S/um] vs l [m]

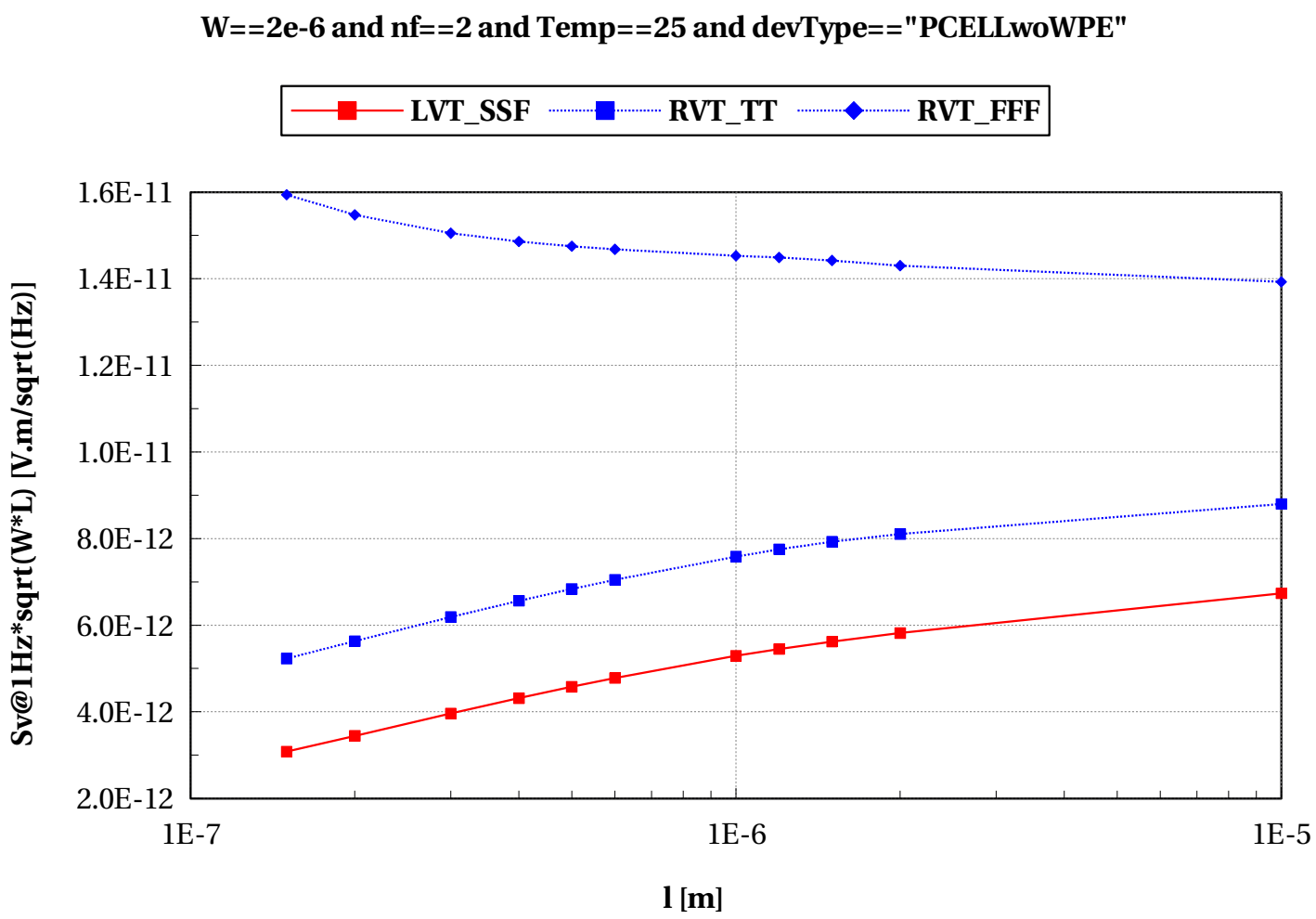


eglvtnfet_acc, Gds_ana/w [S/um] vs l [m]

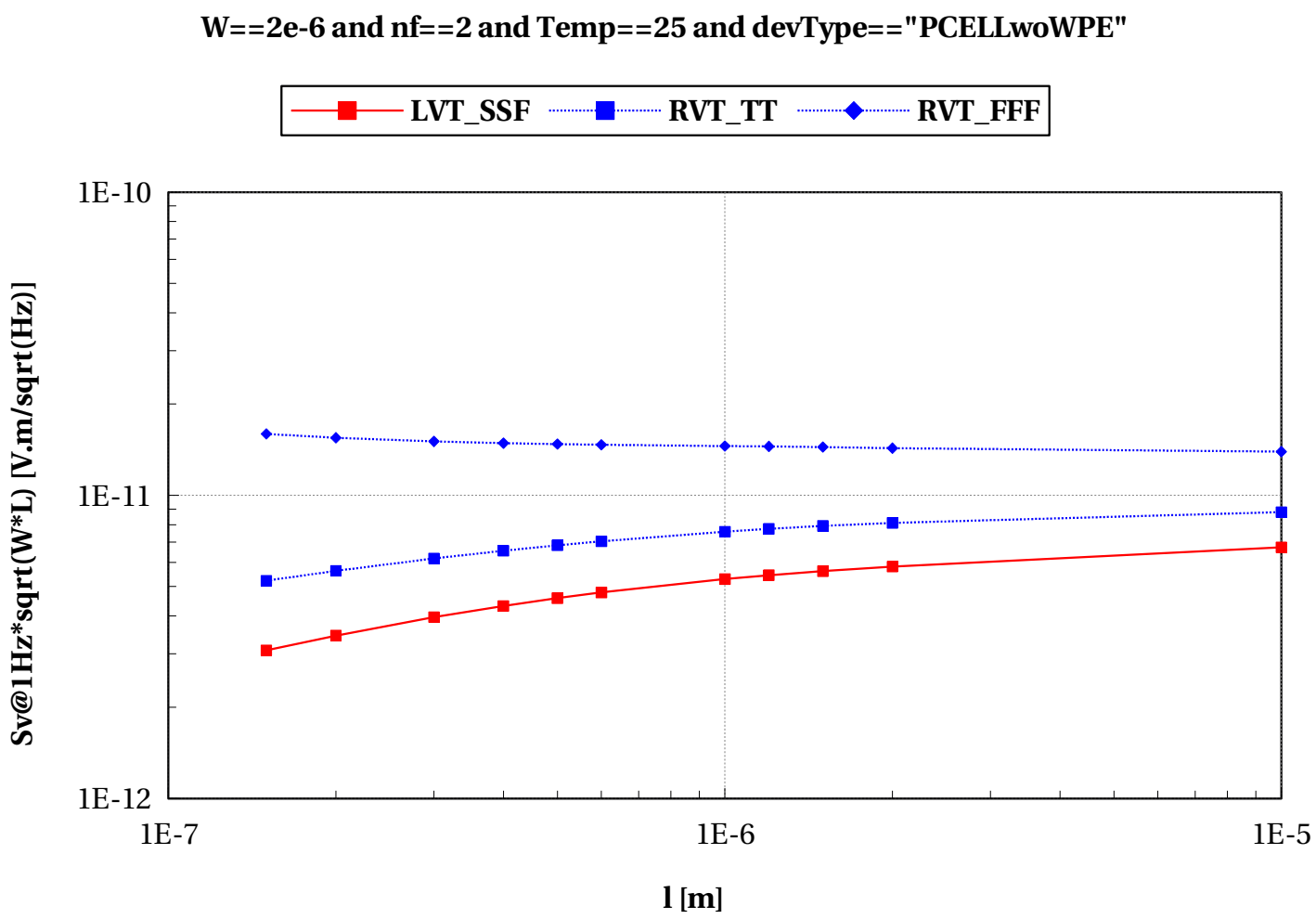
W==2e-6 and nf==2 and Temp==25 and devType=="PCELLwoWPE"



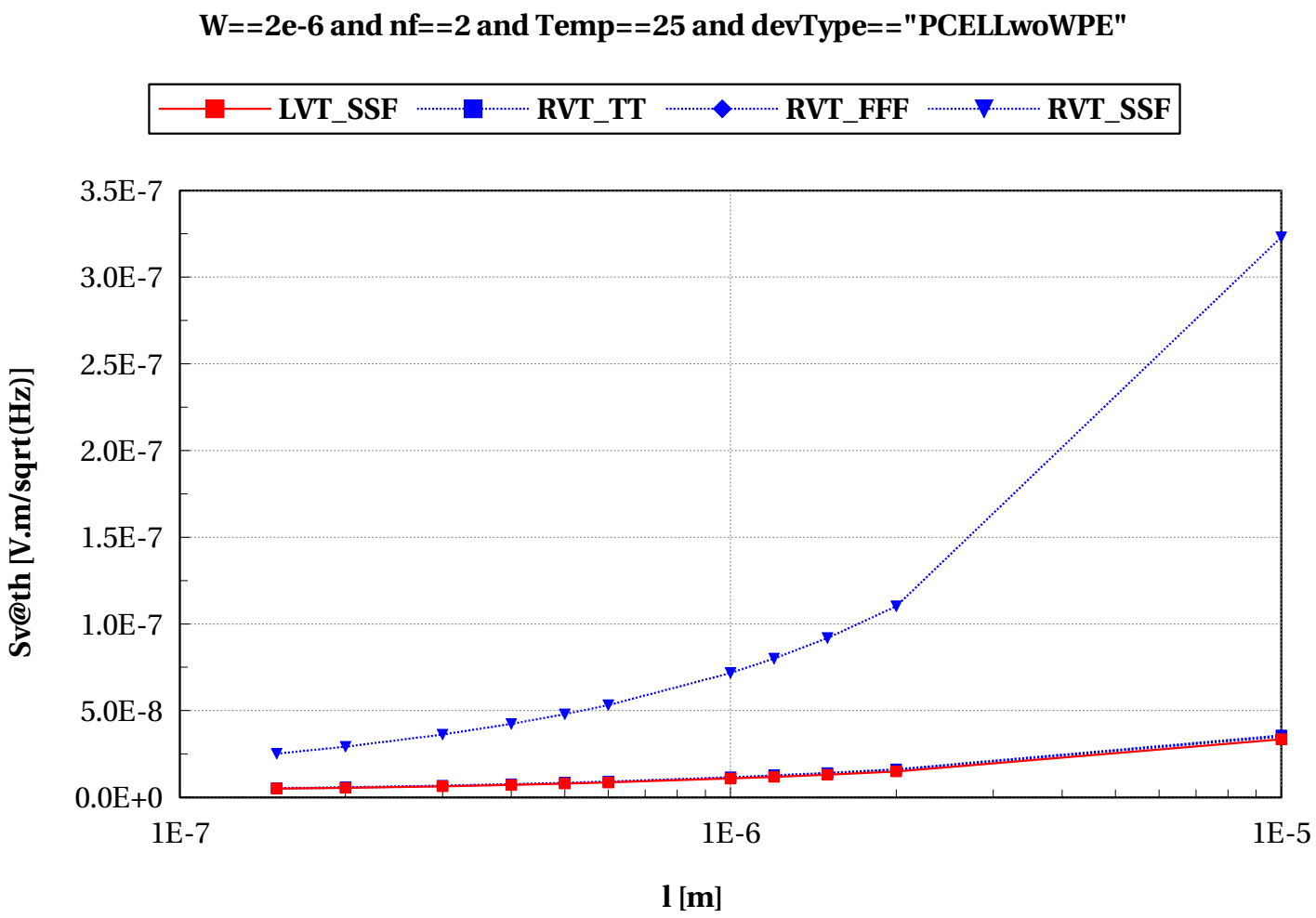
eglvtnfet_acc, Sv@1Hz*sqrt(W*L) [V.m/sqrt(Hz)] vs l [m]



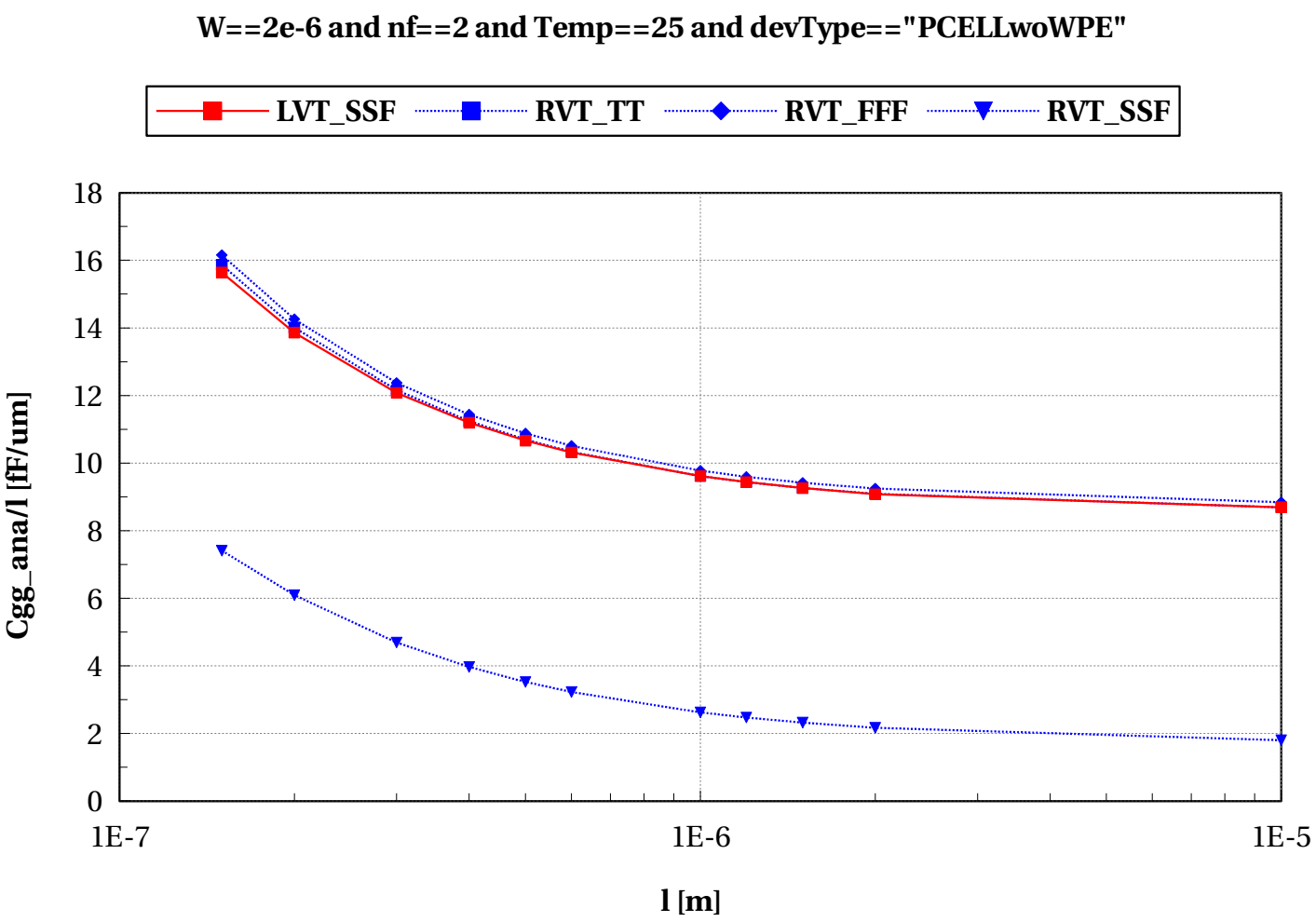
eglvtnfet_acc, Sv@1Hz*sqrt(W*L) [V.m/sqrt(Hz)] vs l [m]



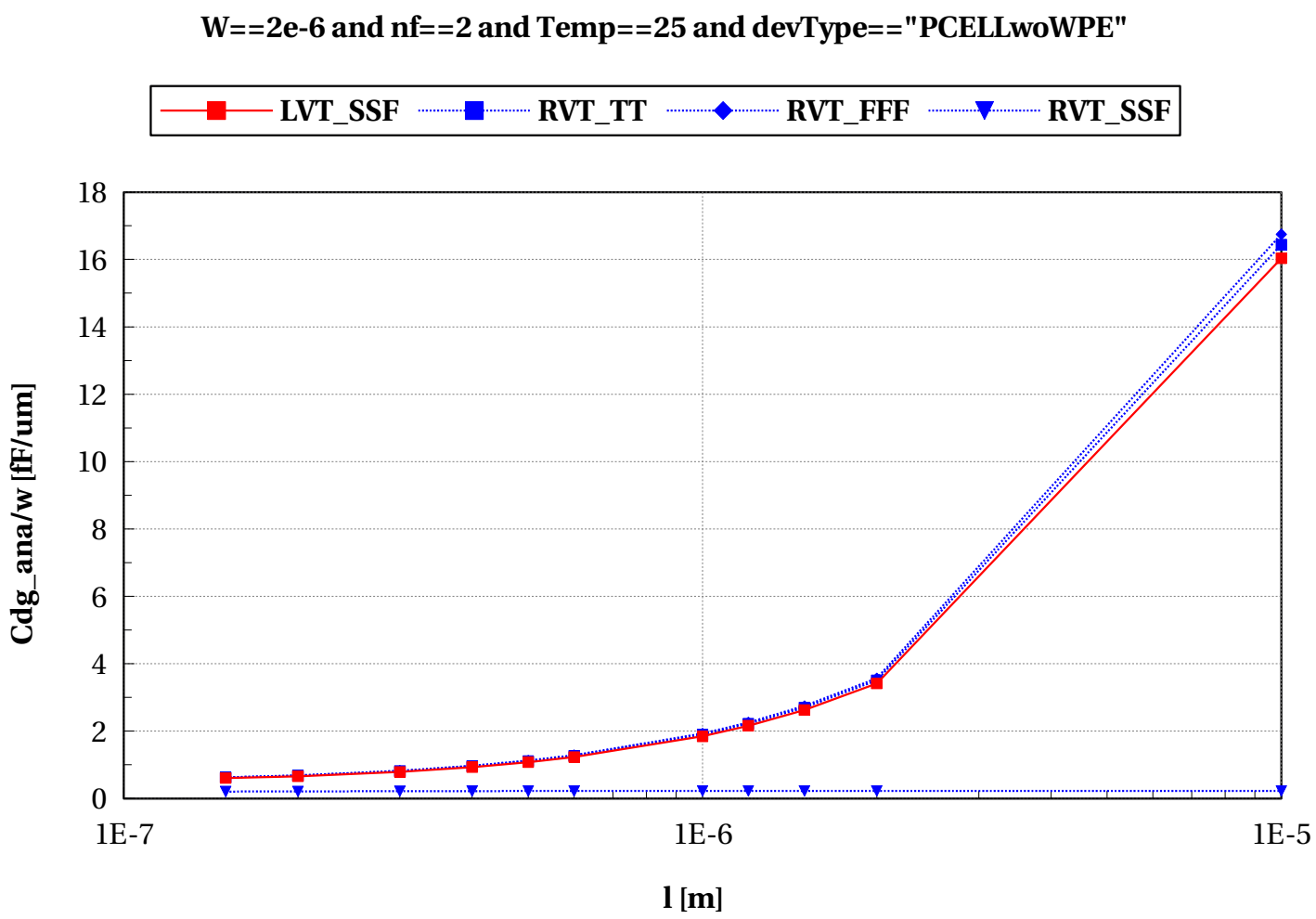
eglvtnfet_acc, Sv@th [V.m/sqrt(Hz)] vs l [m]



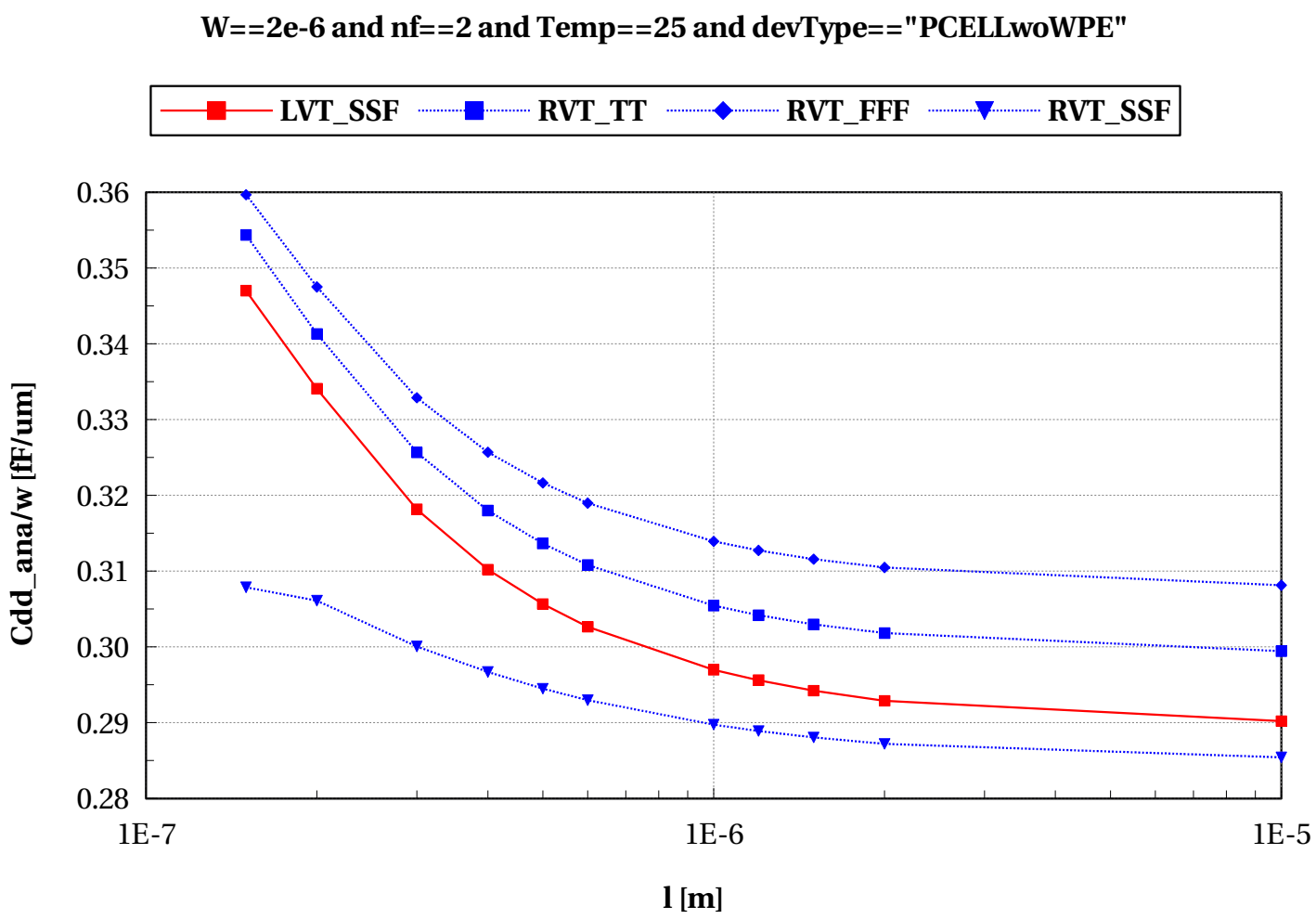
eglvtnfet_acc, Cgg_ana/l [fF/um] vs l [m]



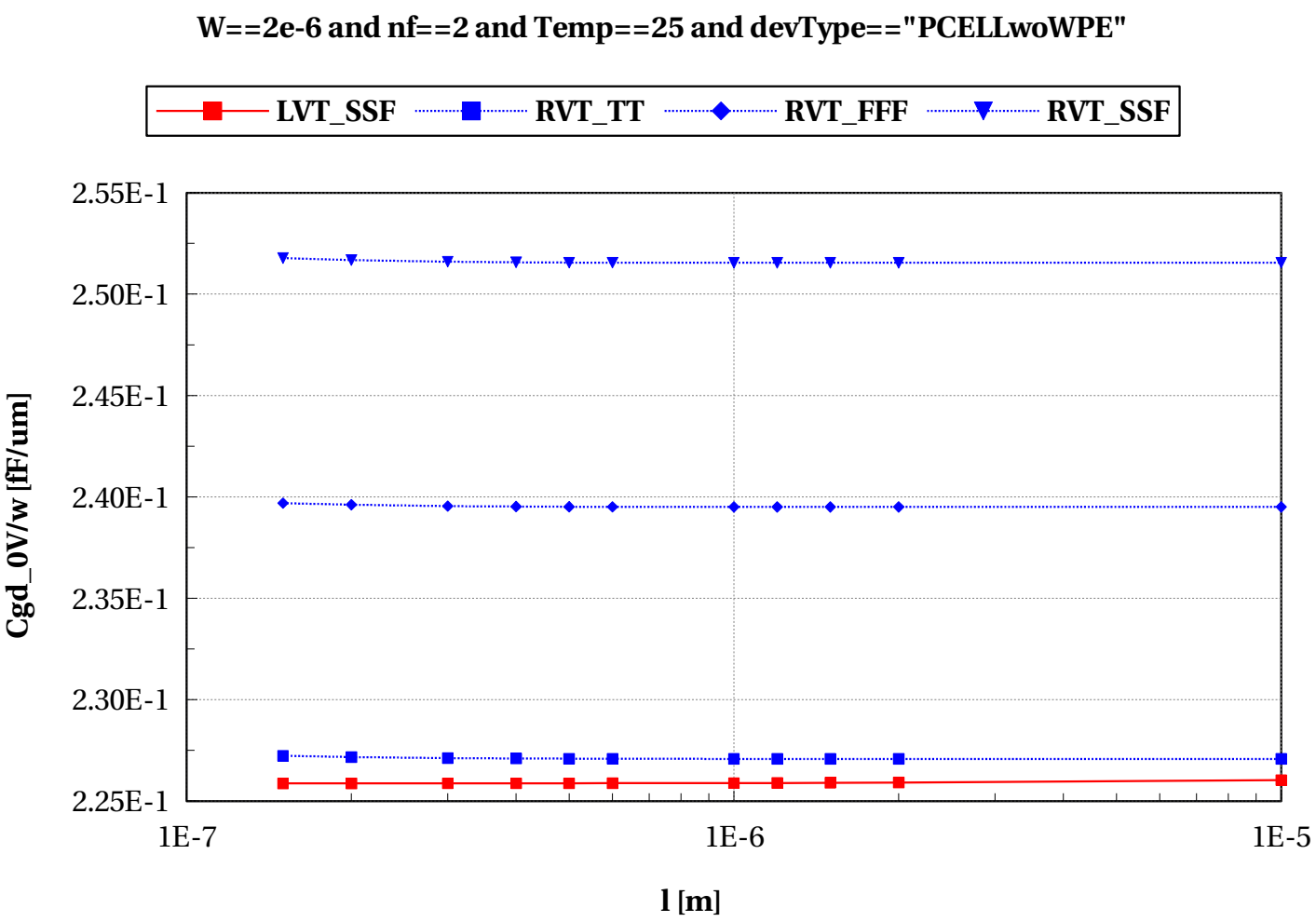
eglvtnfet_acc, Cdg_ana/w [fF/um] vs l [m]



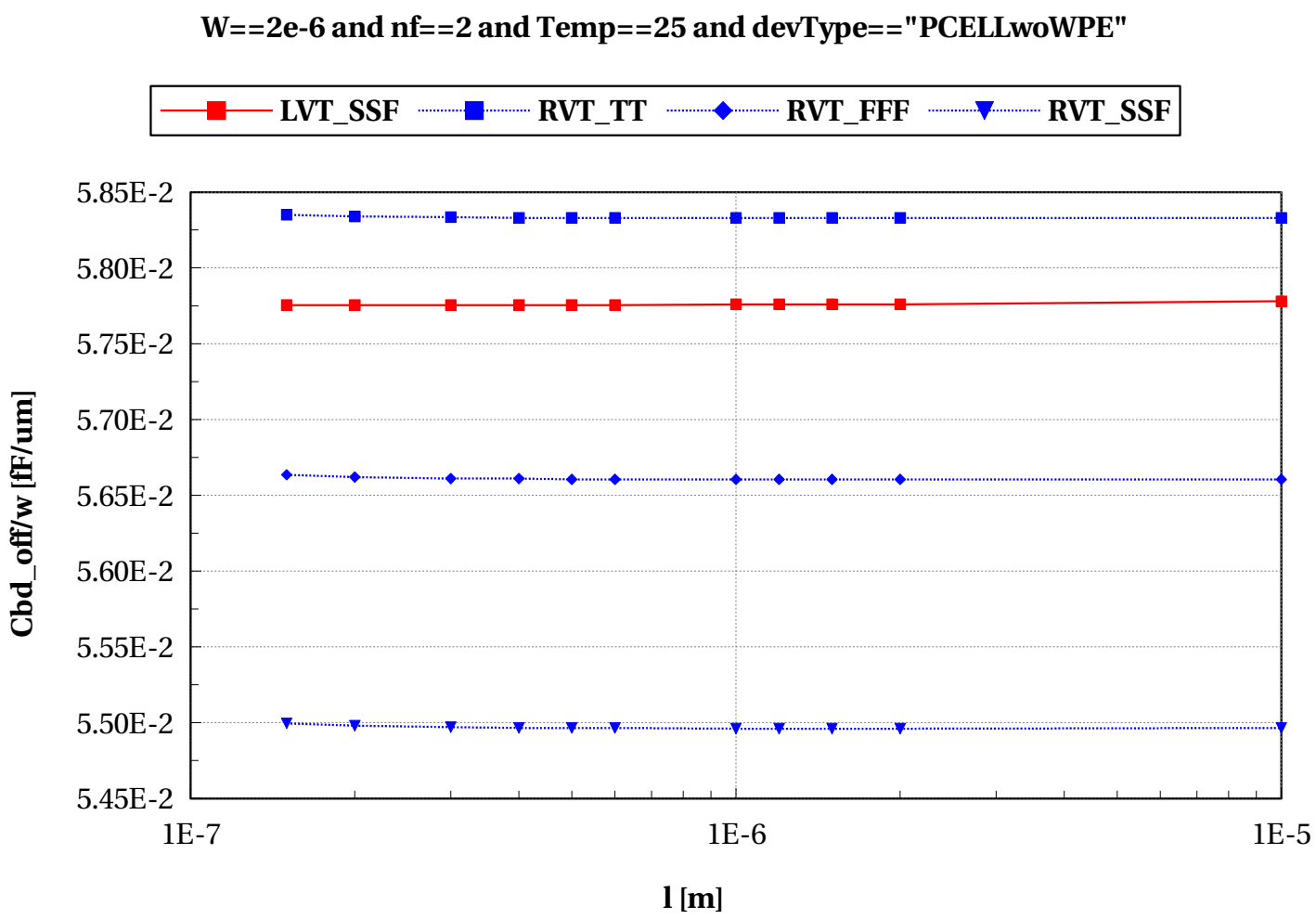
eglvtnfet_acc, Cdd_ana/w [fF/um] vs l [m]



eglvtnfet_acc, Cgd_0V/w [fF/um] vs l [m]

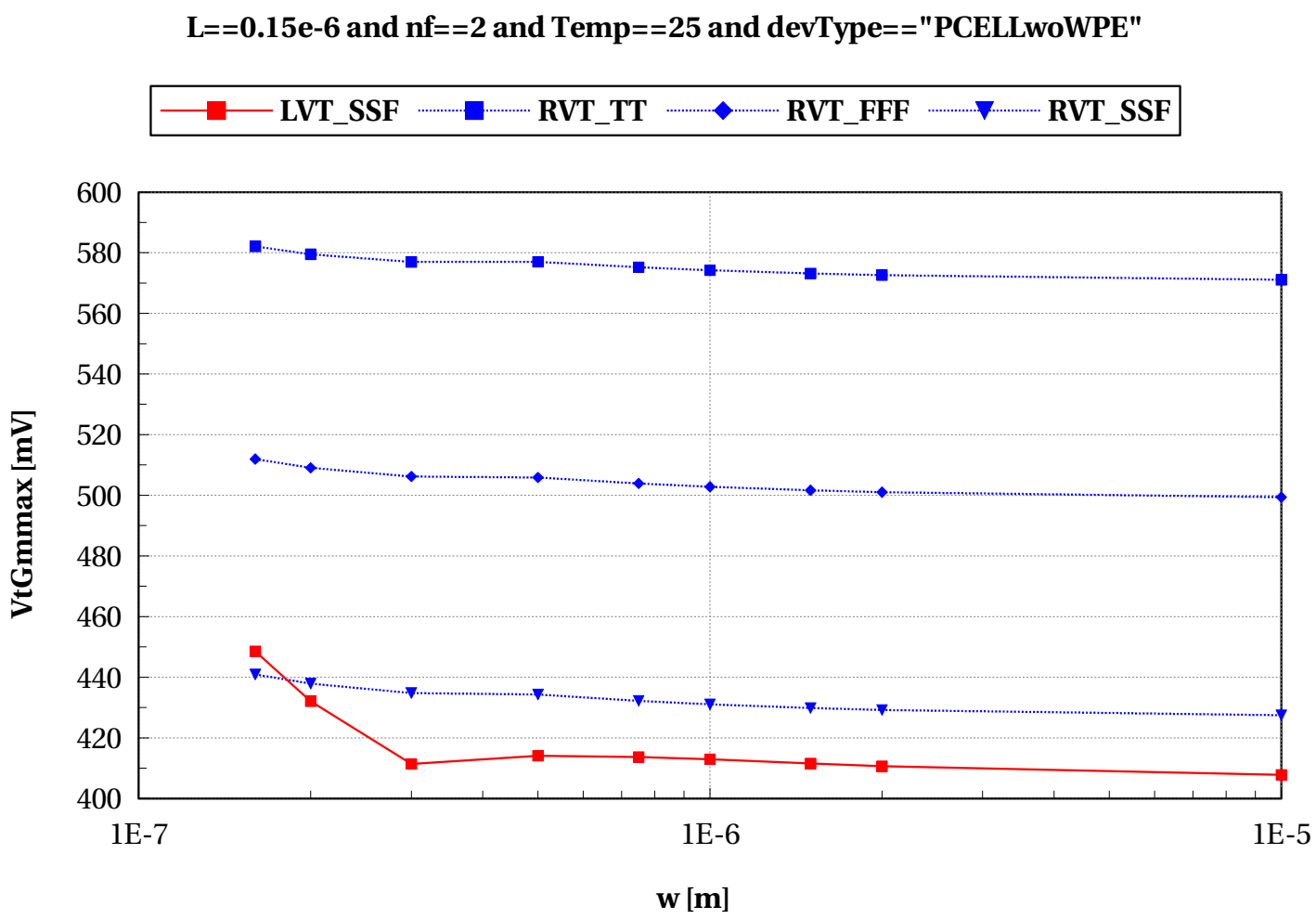


eglvtnfet_acc, Cbd_off/w [fF/um] vs l [m]



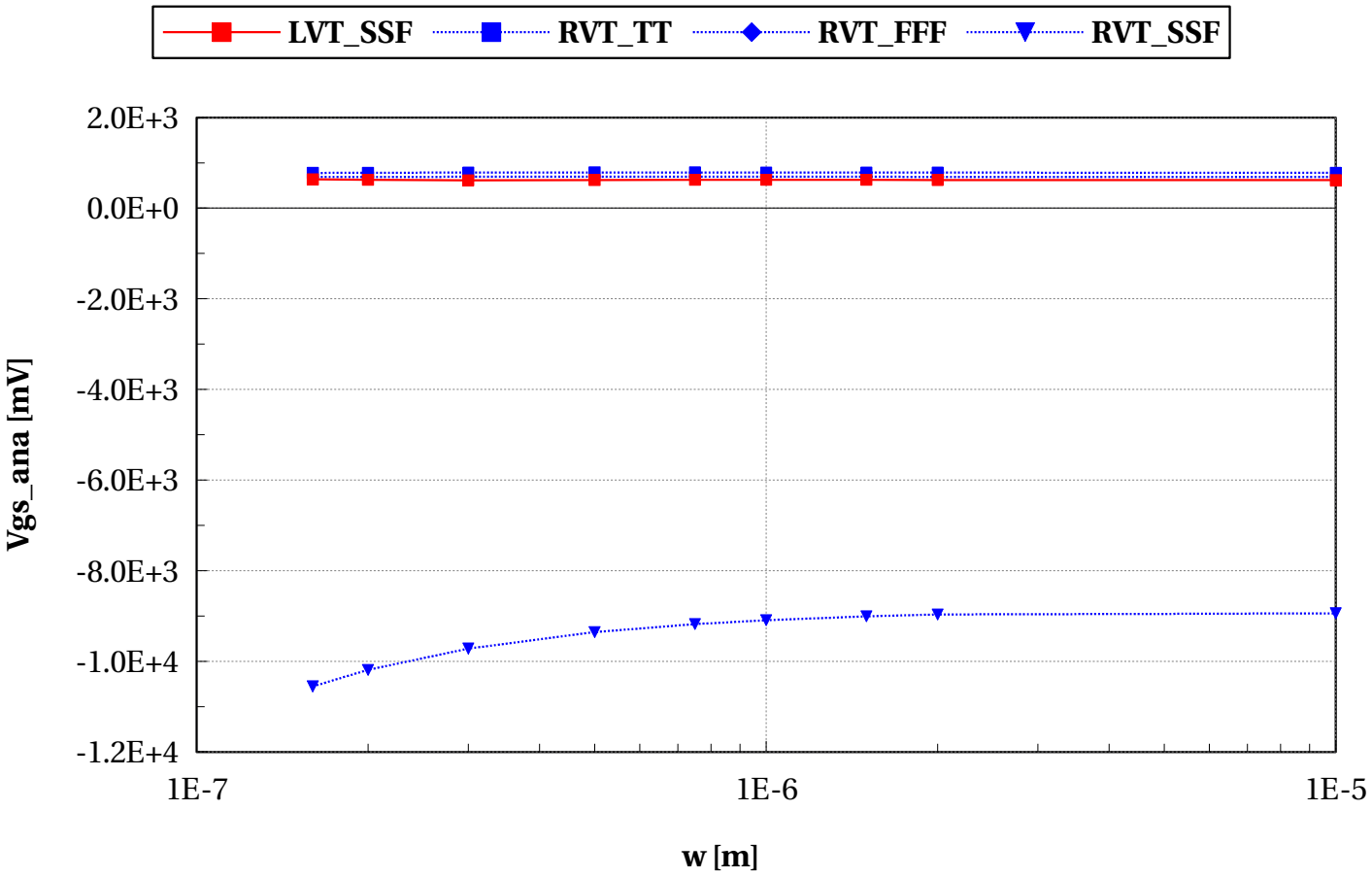
Scaling versus Width (T=25C)

eglvtnfet_acc, VtGmmax [mV] vs w [m]



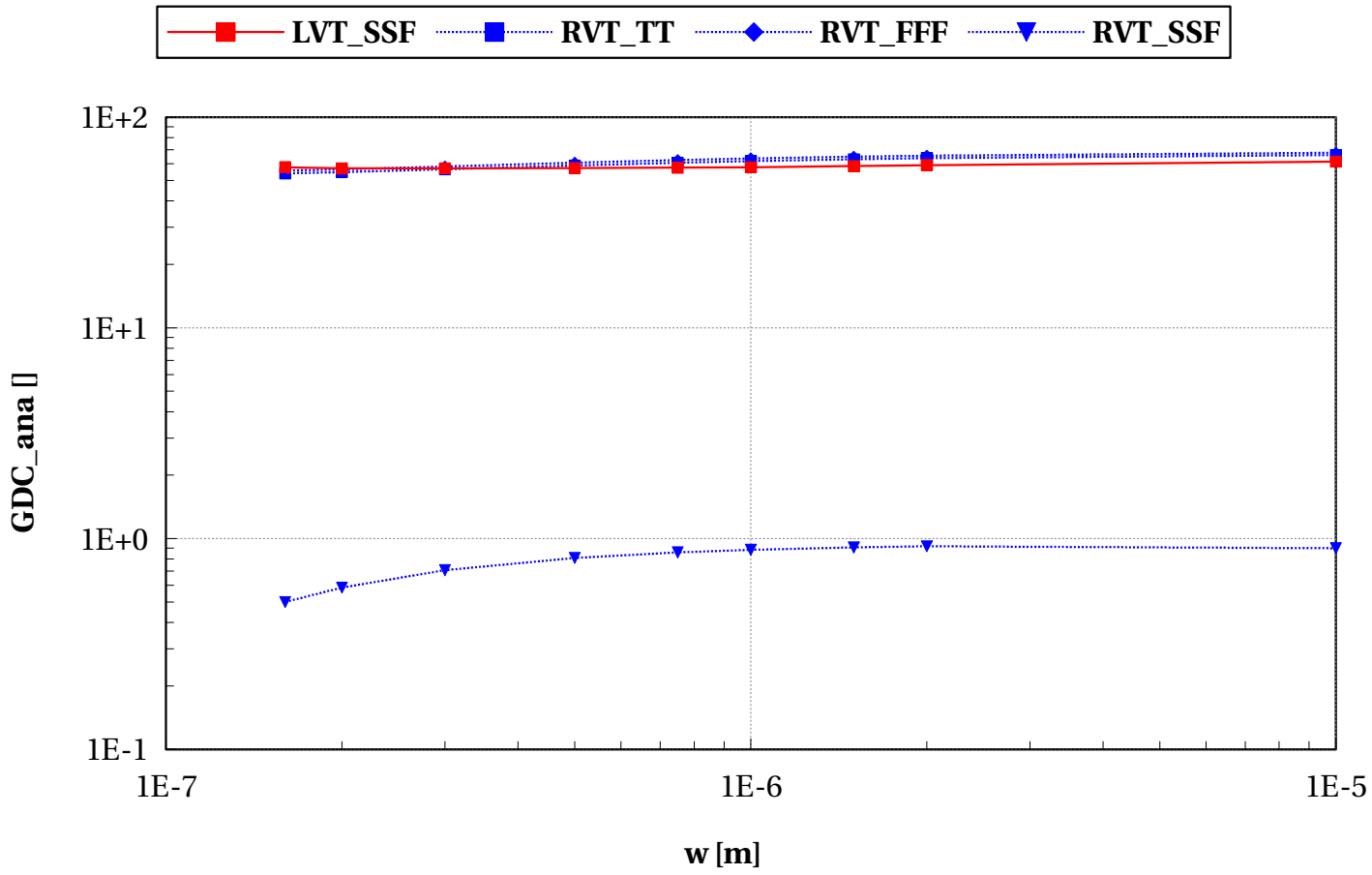
eglvtnfet_acc, Vgs_ana [mV] vs w [m]

L==0.15e-6 and nf==2 and Temp==25 and devType=="PCELLwoWPE"



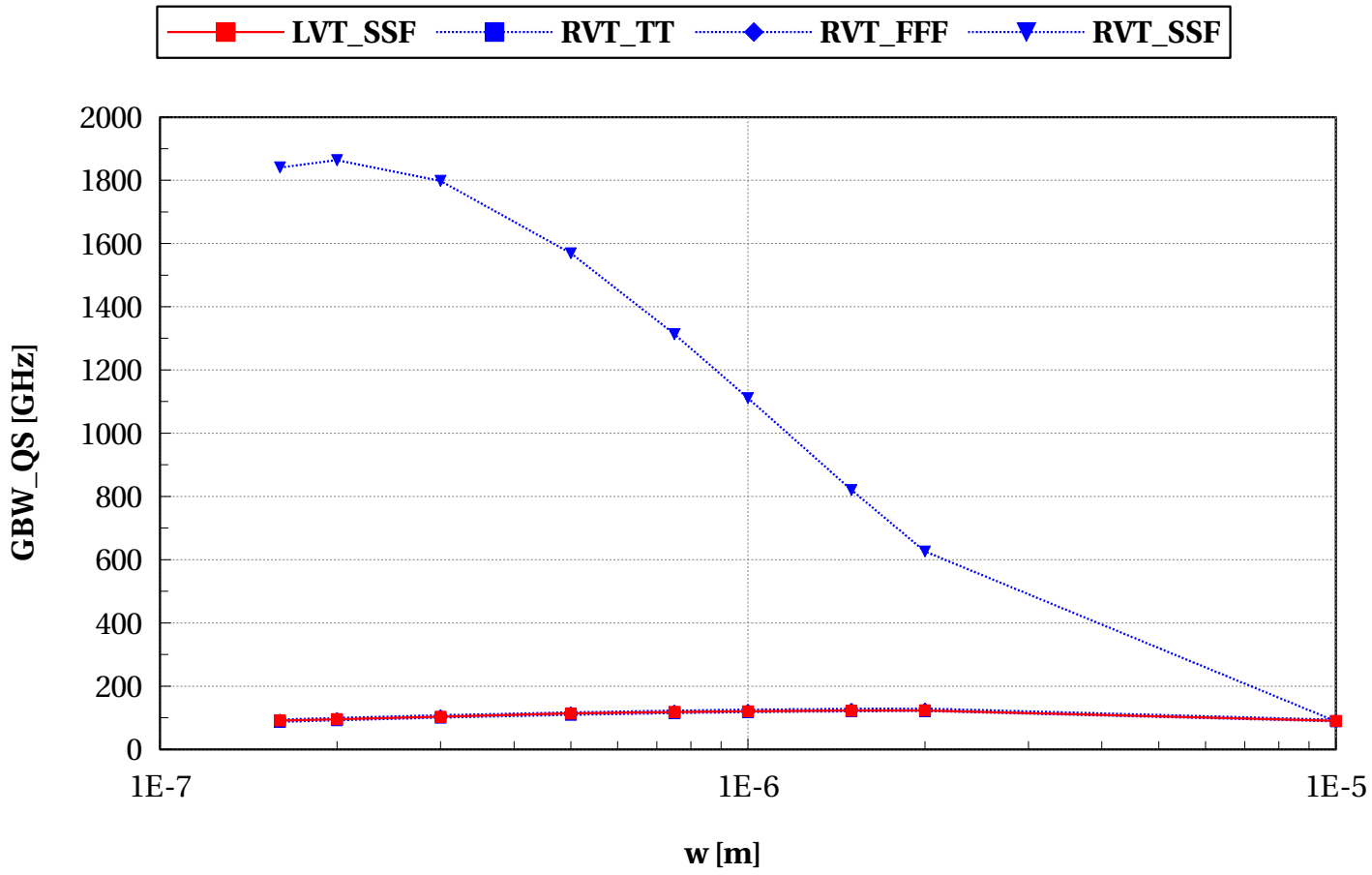
eglvtnfet_acc, GDC_ana [] vs w [m]

L==0.15e-6 and nf==2 and Temp==25 and devType=="PCELLwoWPE"



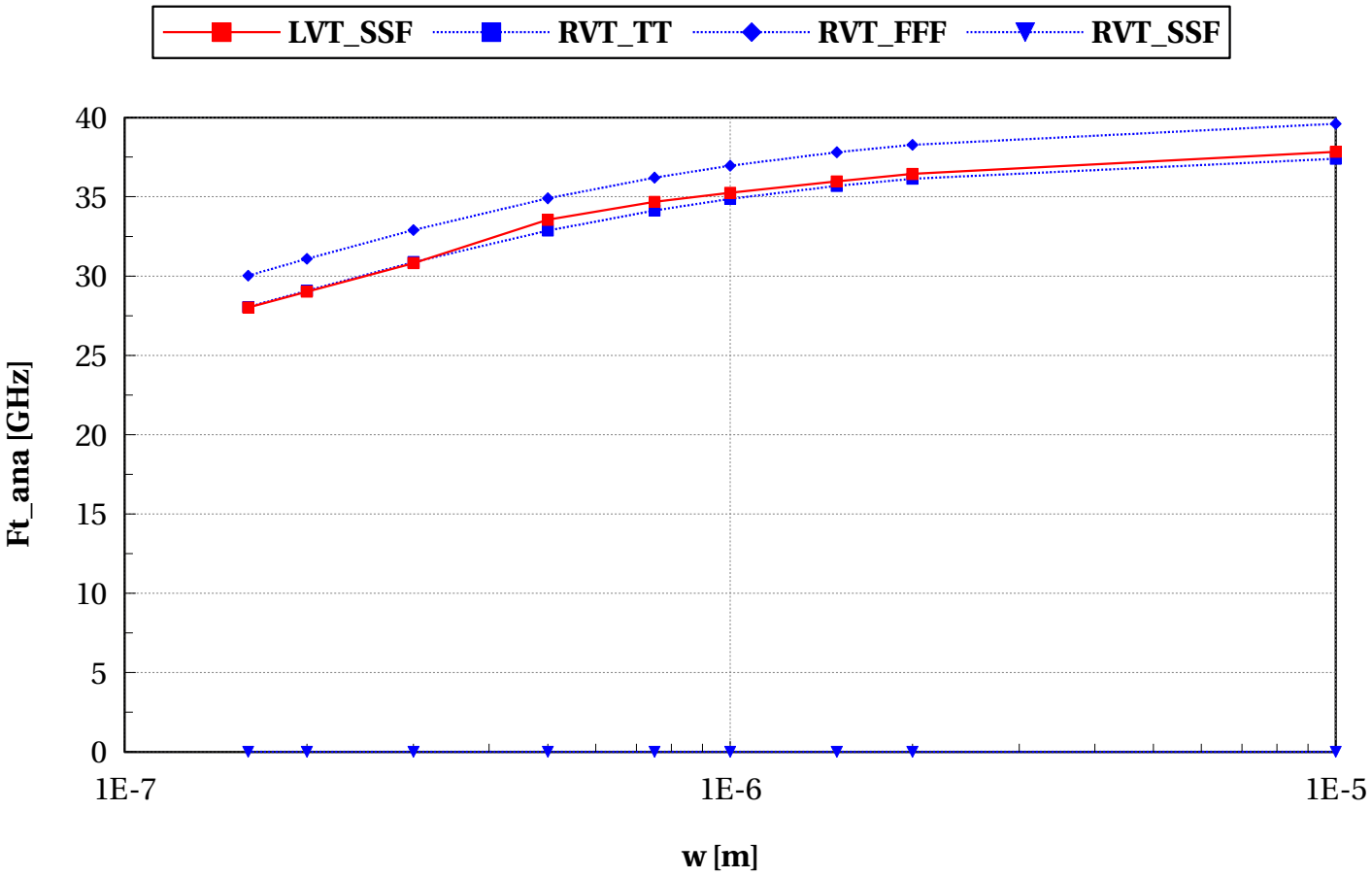
eglvtnfet_acc, GBW_QS [GHz] vs w [m]

L==0.15e-6 and nf==2 and Temp==25 and devType=="PCELLwoWPE"



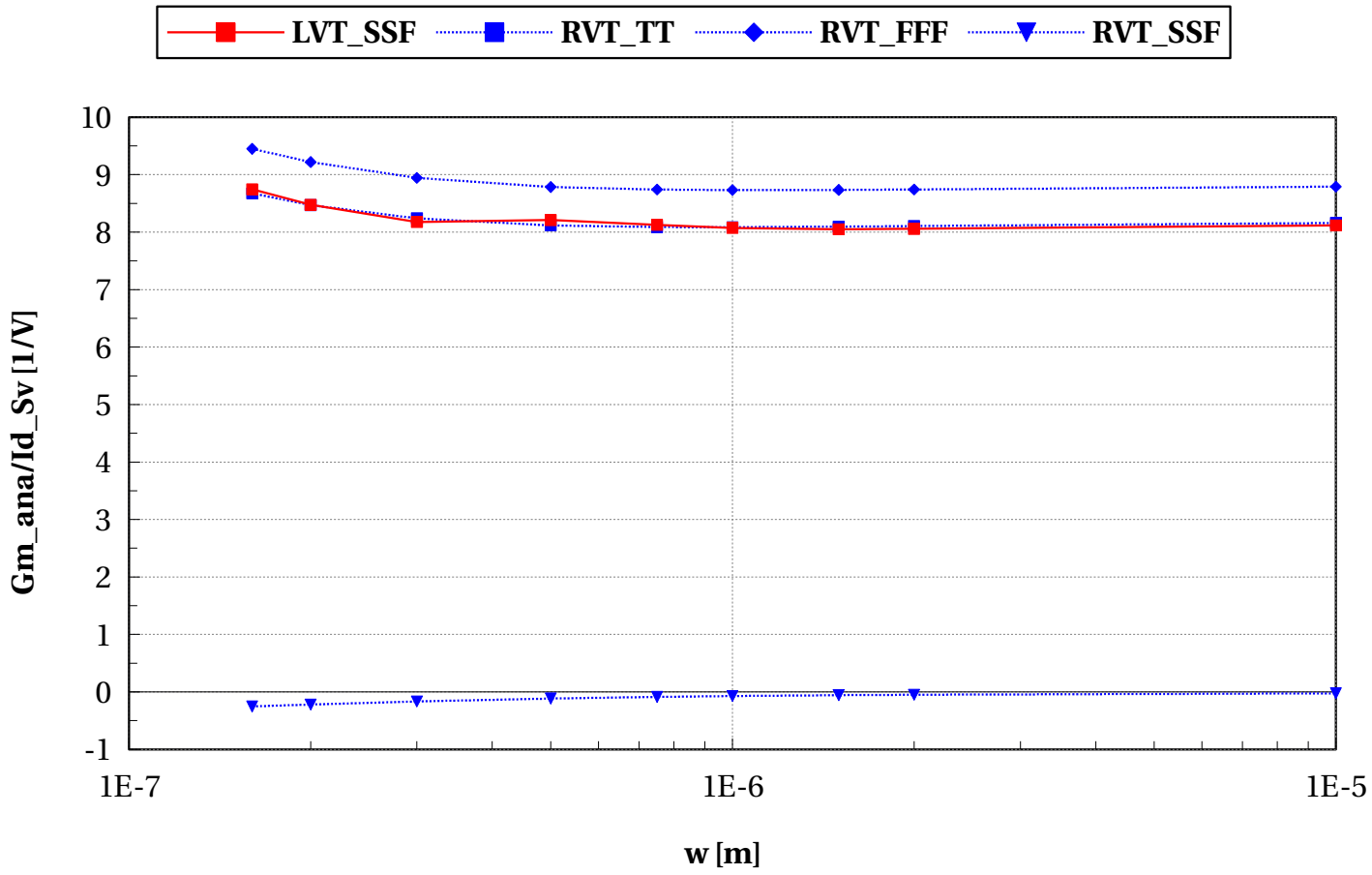
eglvtnfet_acc, Ft_ana [GHz] vs w [m]

L==0.15e-6 and nf==2 and Temp==25 and devType=="PCELLwoWPE"



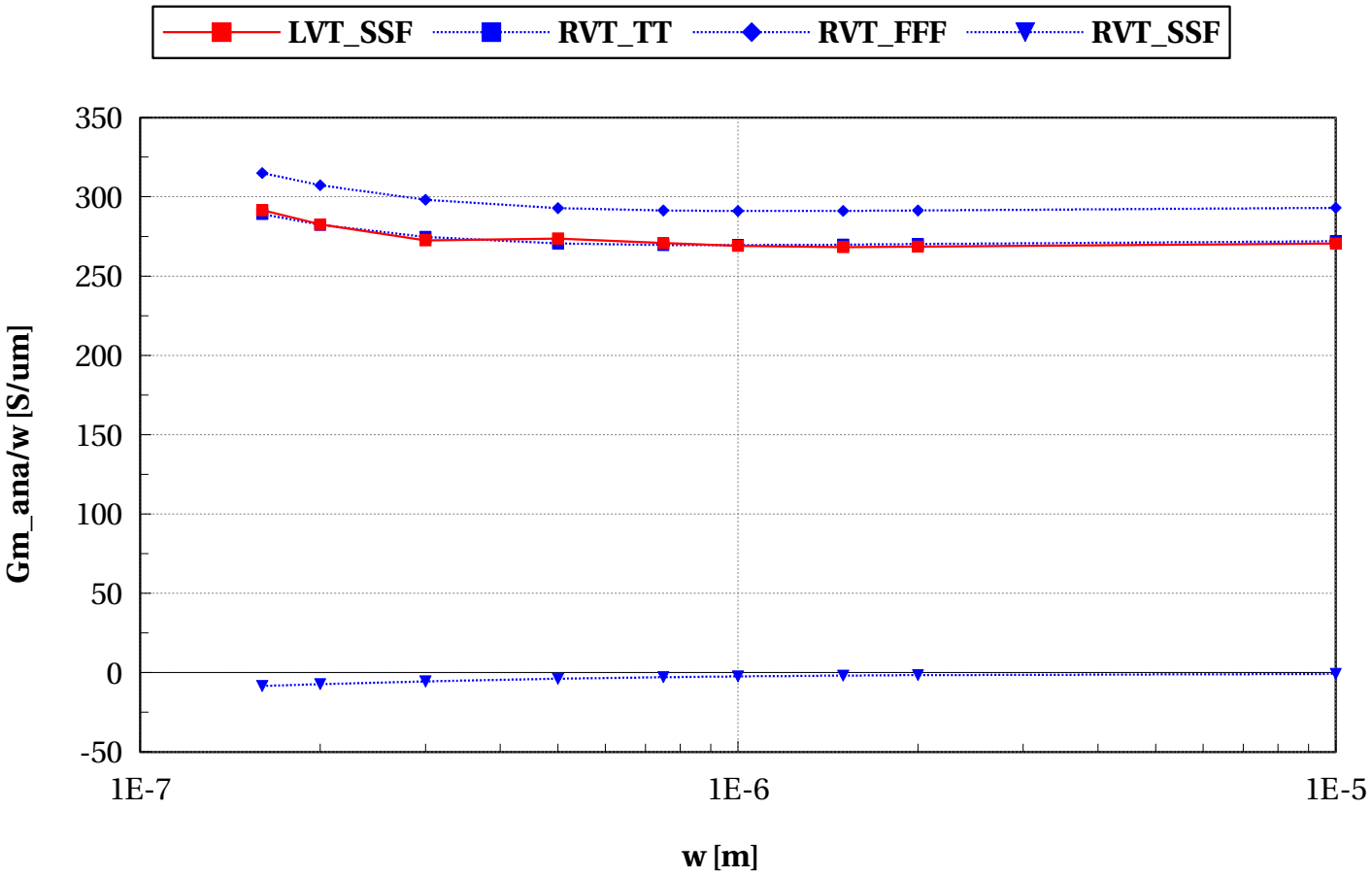
eglvtnfet_acc, Gm_ana/Id_Sv [1/V] vs w [m]

L==0.15e-6 and nf==2 and Temp==25 and devType=="PCELLwoWPE"



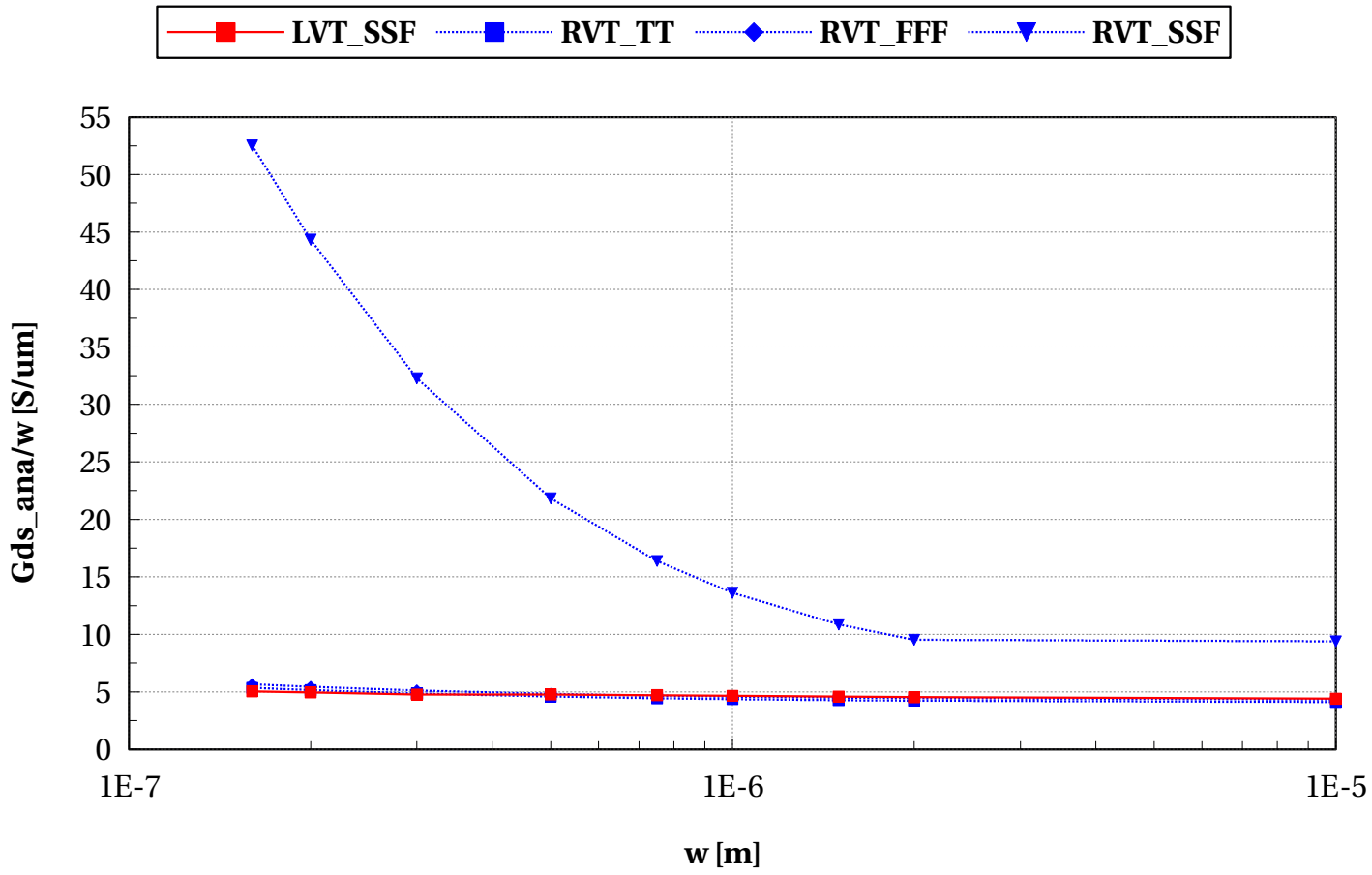
eglvtnfet_acc, Gm_ana/w [S/um] vs w [m]

L==0.15e-6 and nf==2 and Temp==25 and devType=="PCELLwoWPE"

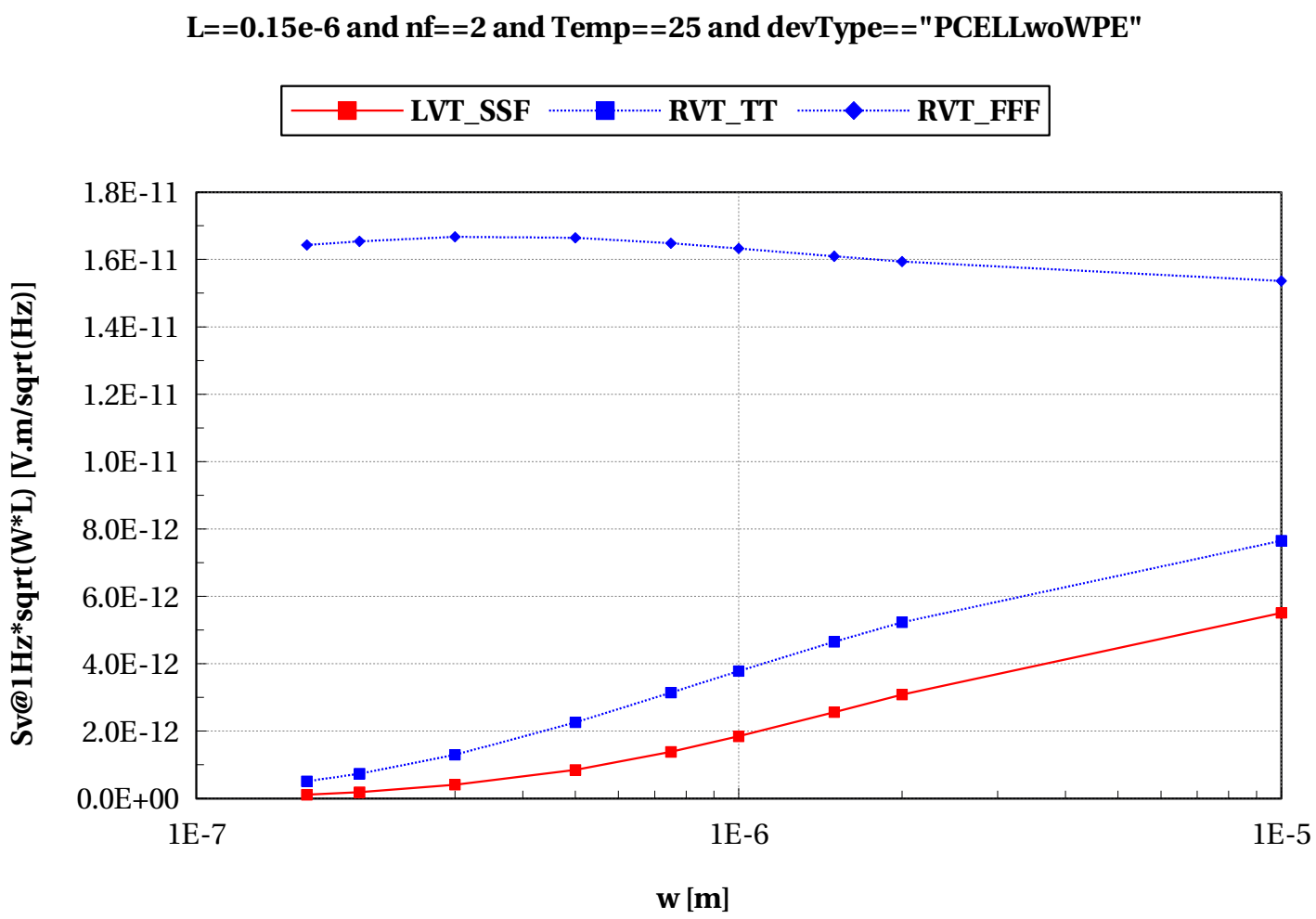


eglvtnfet_acc, Gds_ana/w [S/um] vs w [m]

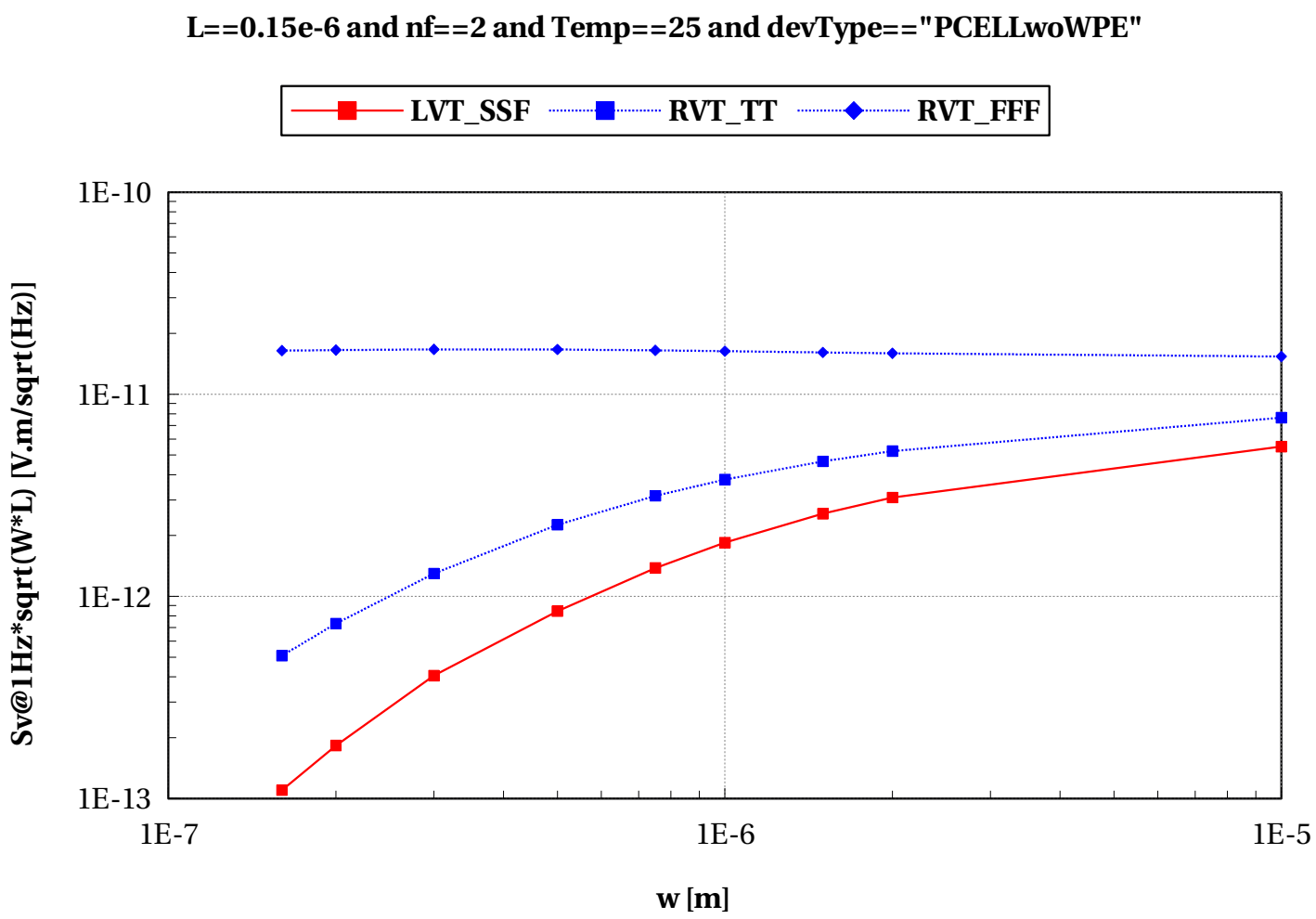
L==0.15e-6 and nf==2 and Temp==25 and devType=="PCELLwoWPE"



eglvtnfet_acc, Sv@1Hz*sqrt(W*L) [V.m/sqrt(Hz)] vs w [m]

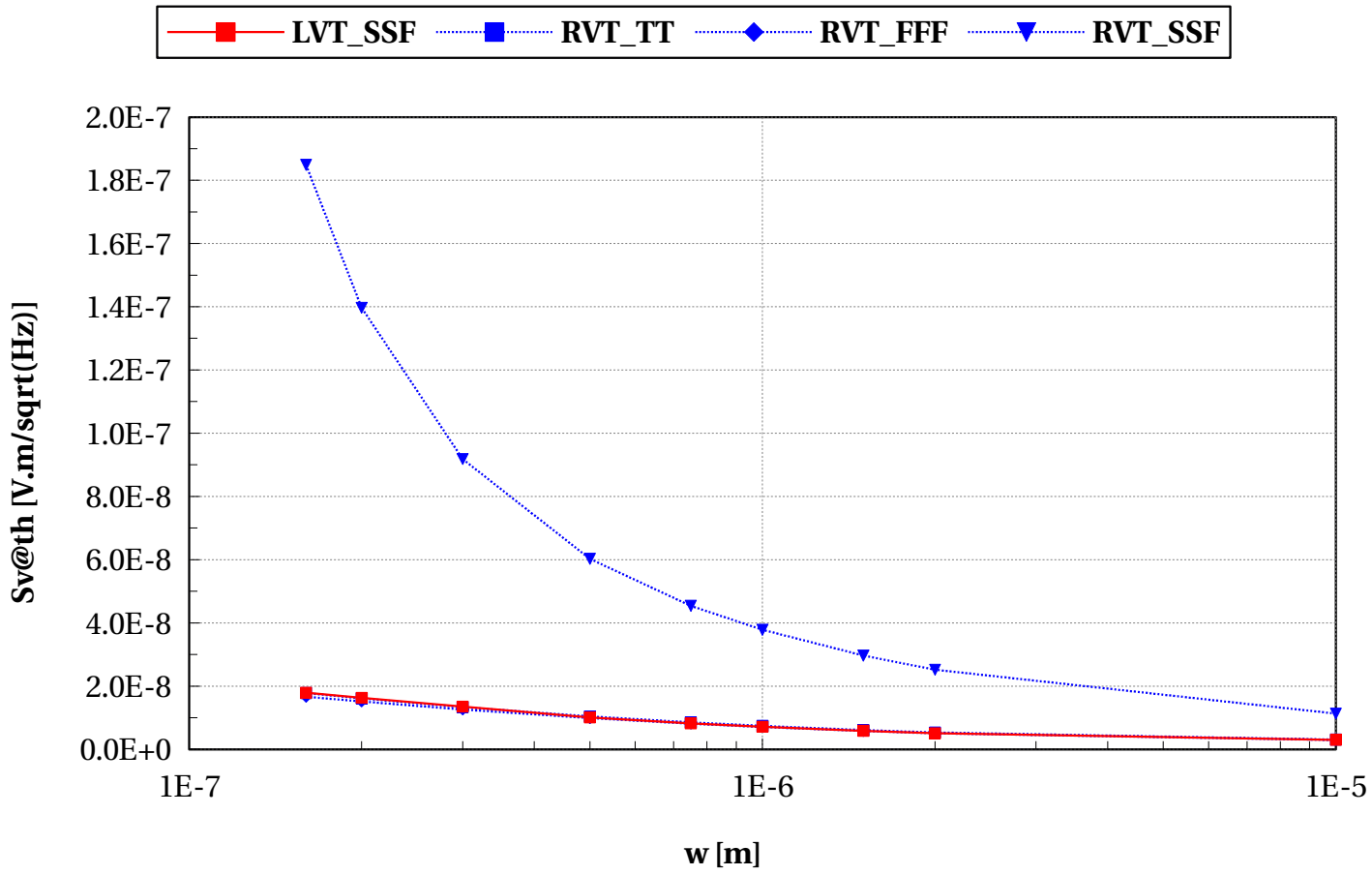


eglvtnfet_acc, Sv@1Hz*sqrt(W*L) [V.m/sqrt(Hz)] vs w [m]

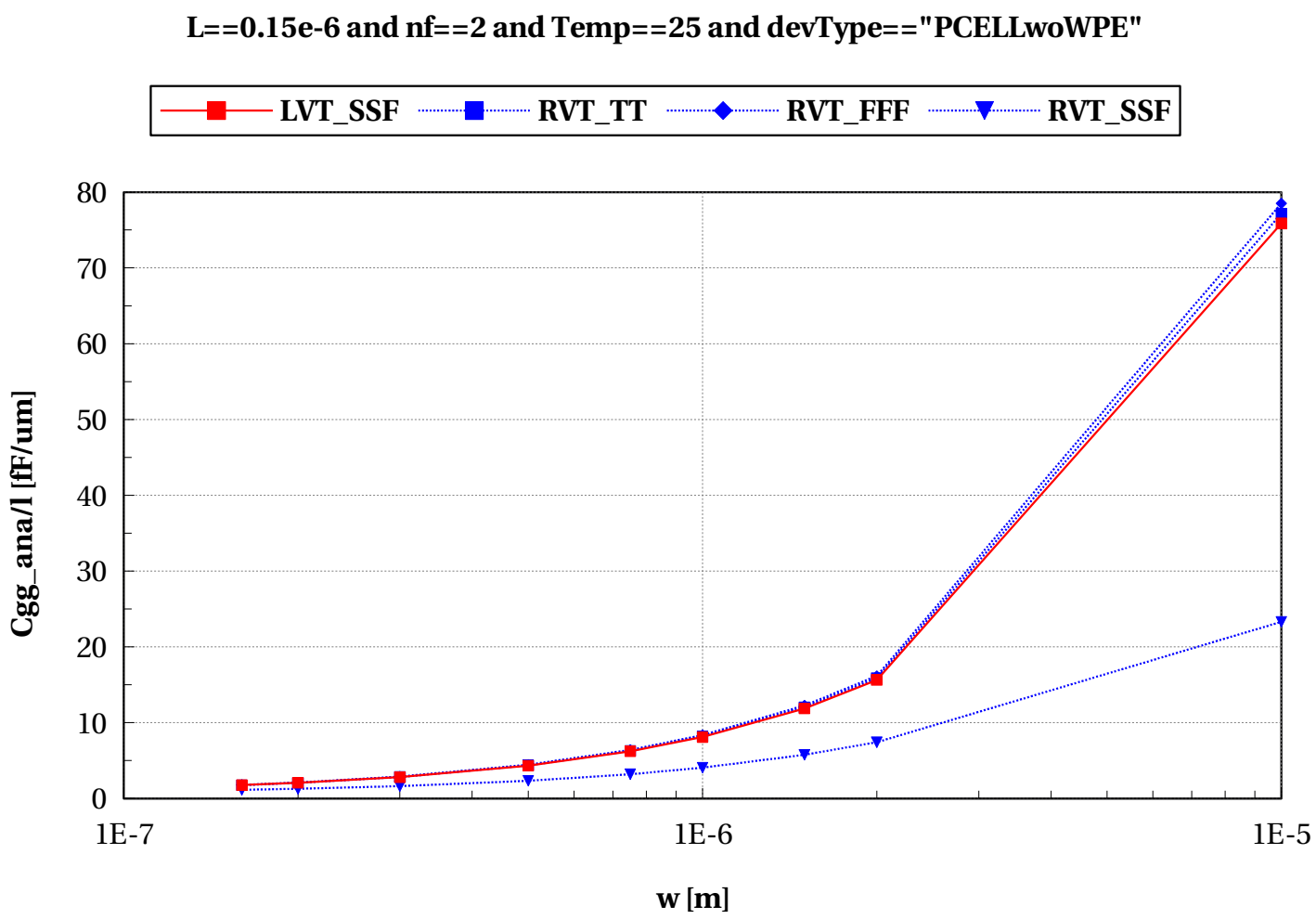


eglvtnfet_acc, Sv@th [V.m/sqrt(Hz)] vs w [m]

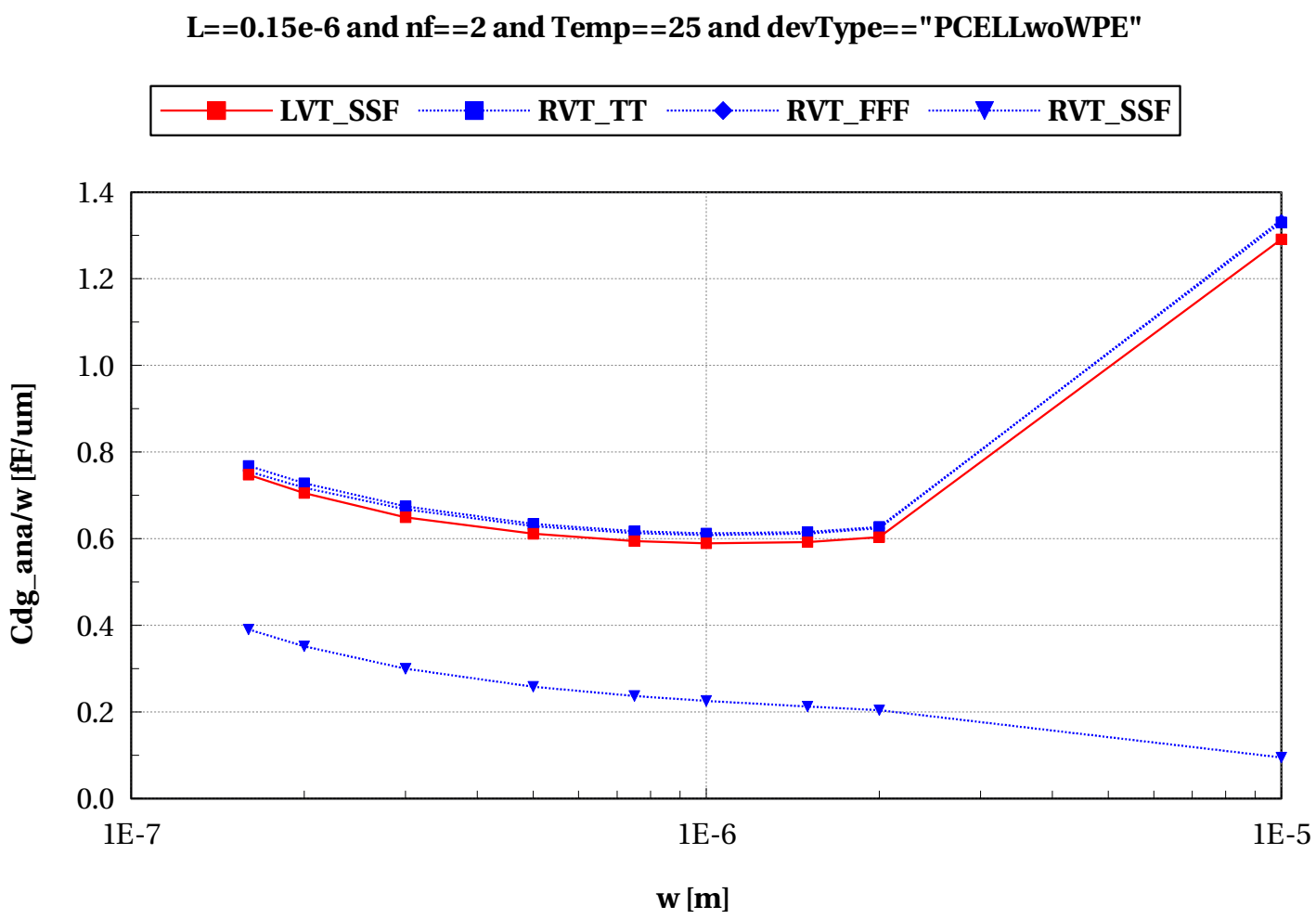
L==0.15e-6 and nf==2 and Temp==25 and devType=="PCELLwoWPE"



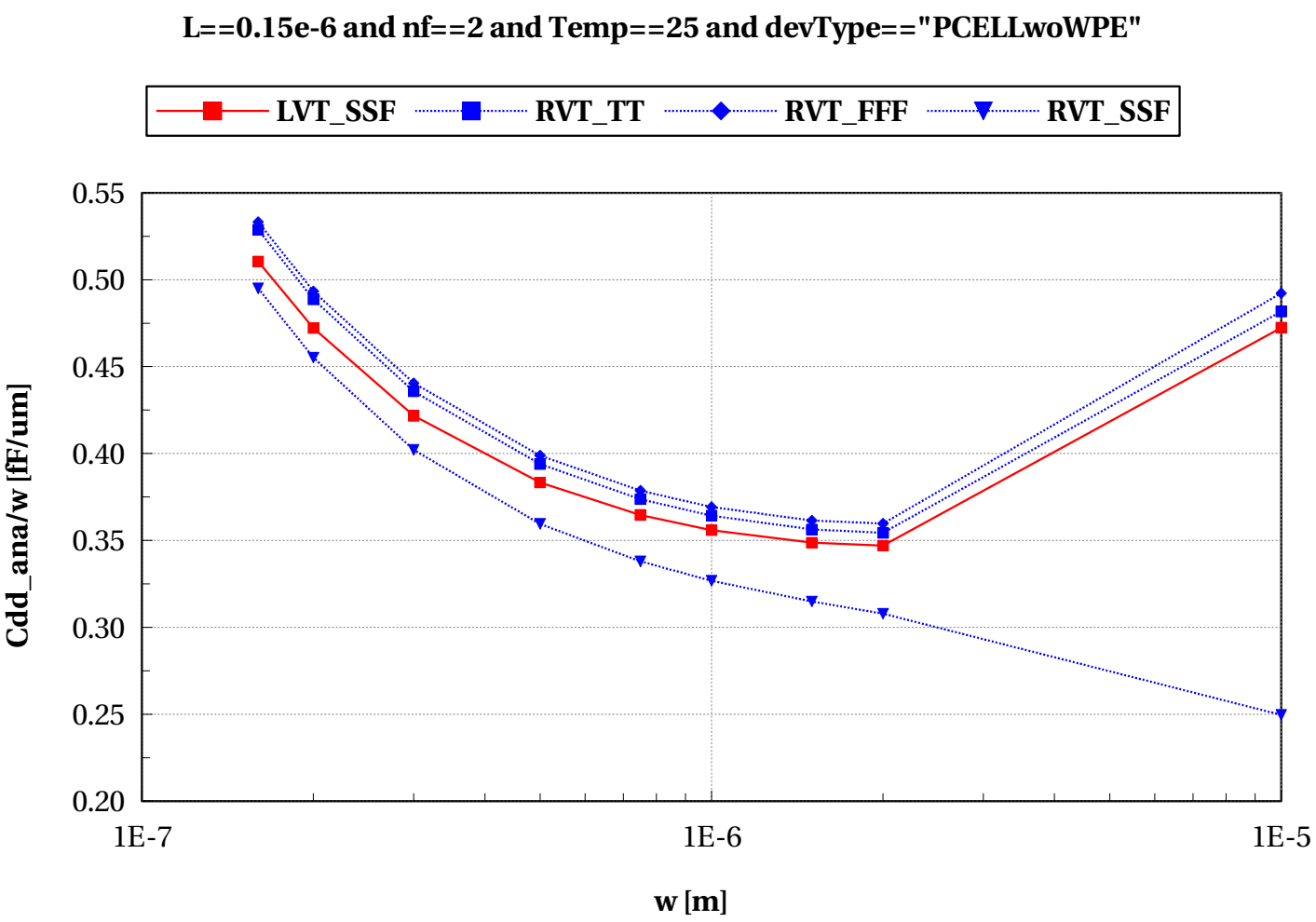
eglvtnfet_acc, Cgg_ana/l [fF/um] vs w [m]



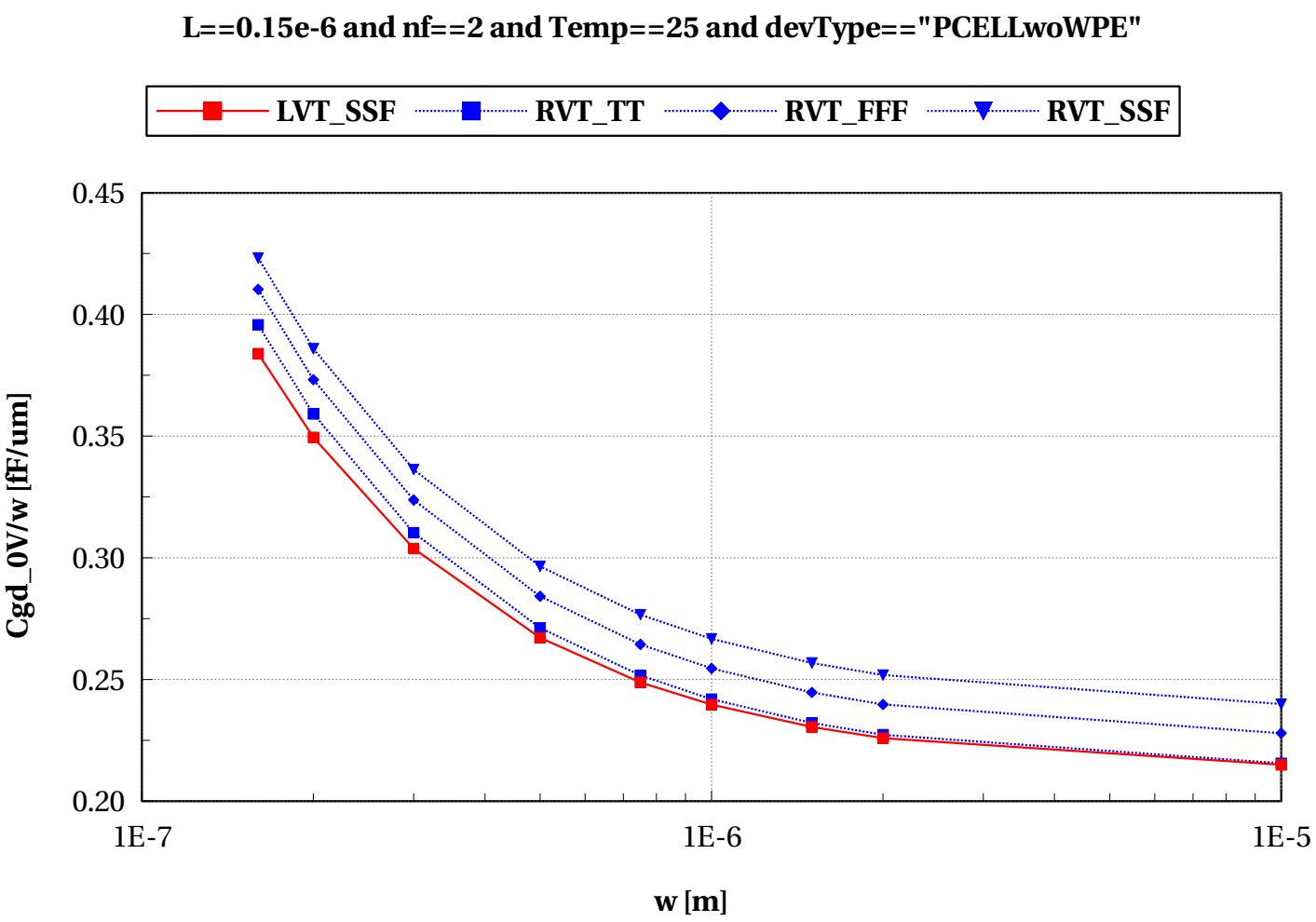
eglvtnfet_acc, Cdg_ana/w [fF/um] vs w [m]



eglvtnfet_acc, Cdd_ana/w [fF/um] vs w [m]

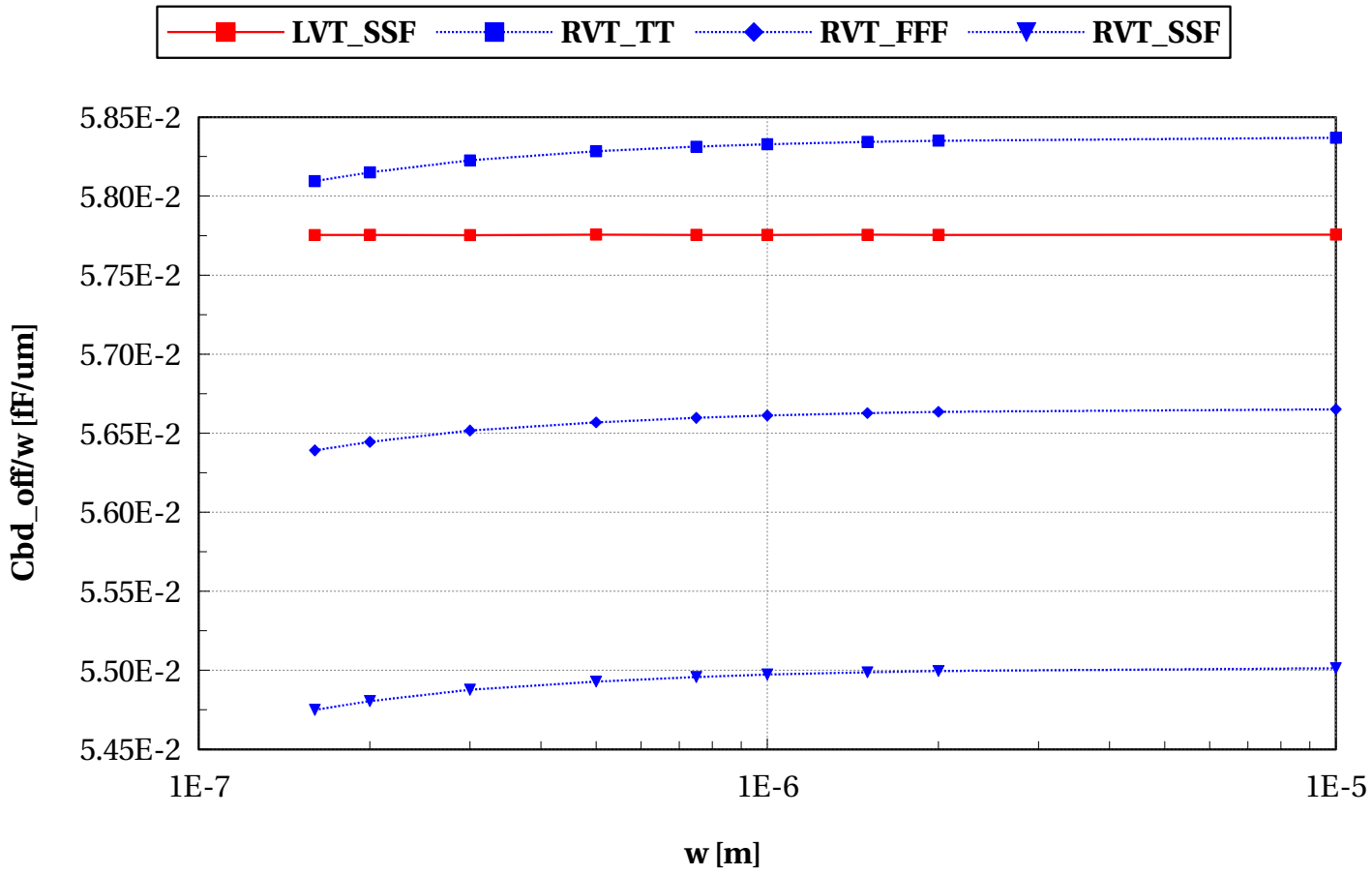


eglvtnfet_acc, Cgd_0V/w [fF/um] vs w [m]



eglvtnfet_acc, Cbd_off/w [fF/um] vs w [m]

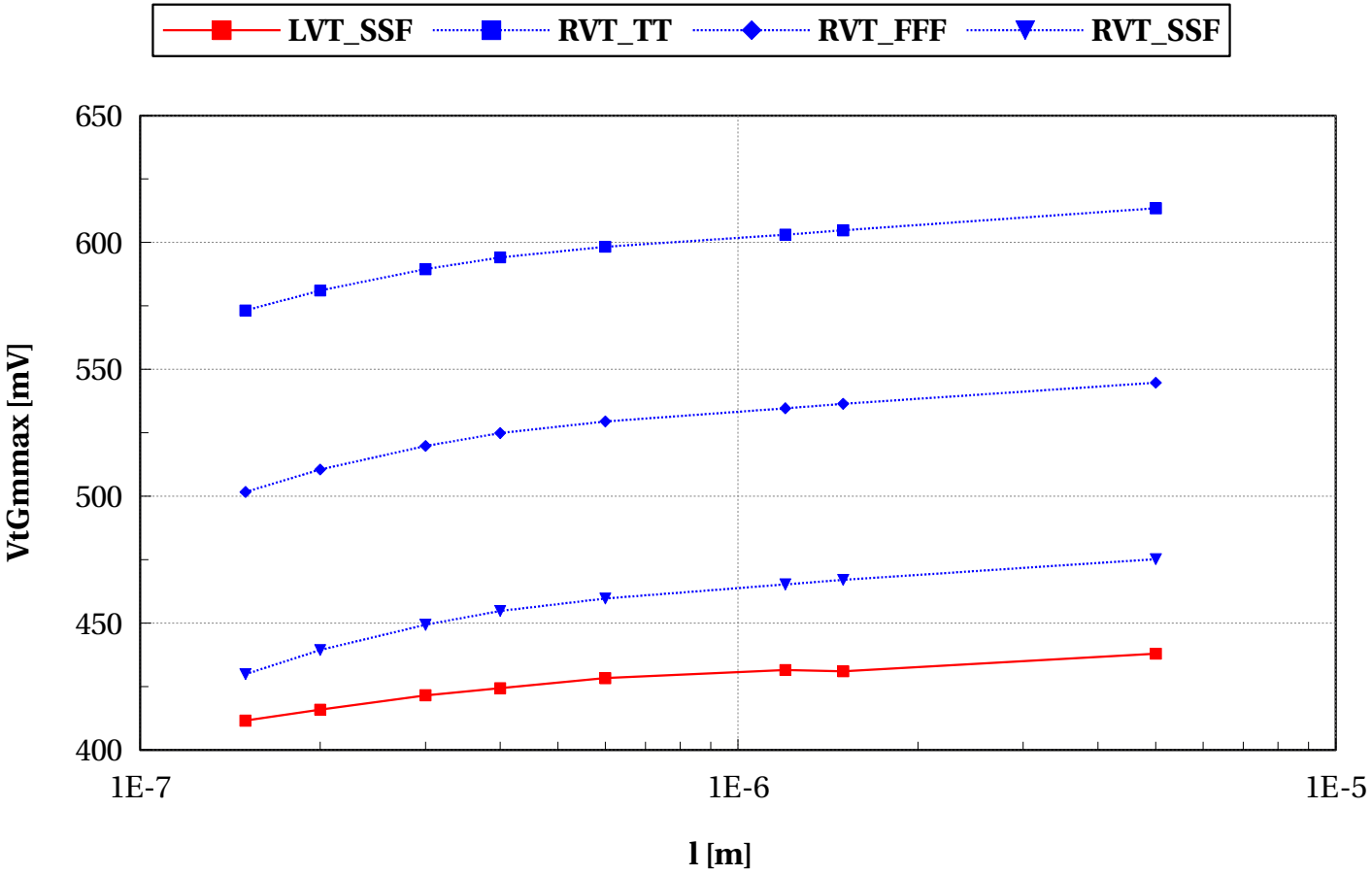
L==0.15e-6 and nf==2 and Temp==25 and devType=="PCELLwoWPE"



Scaling versus Length @ W/L=10&&W/nf<5um

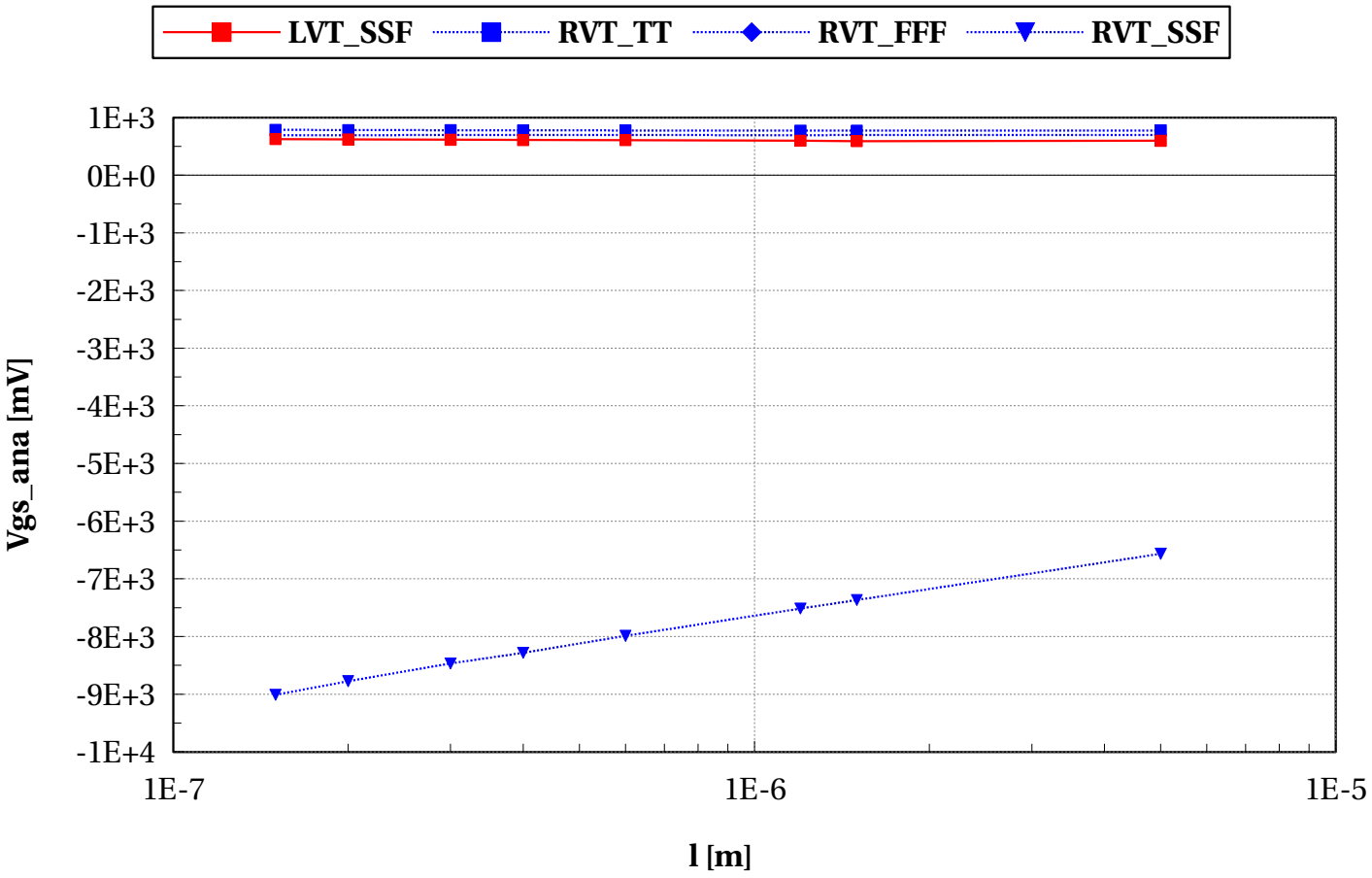
eglvtnfet_acc, VtGmmax [mV] vs l [m]

W/L==10 and w/nf<5 and Temp==25 and devType=="PCELLwoWPE"



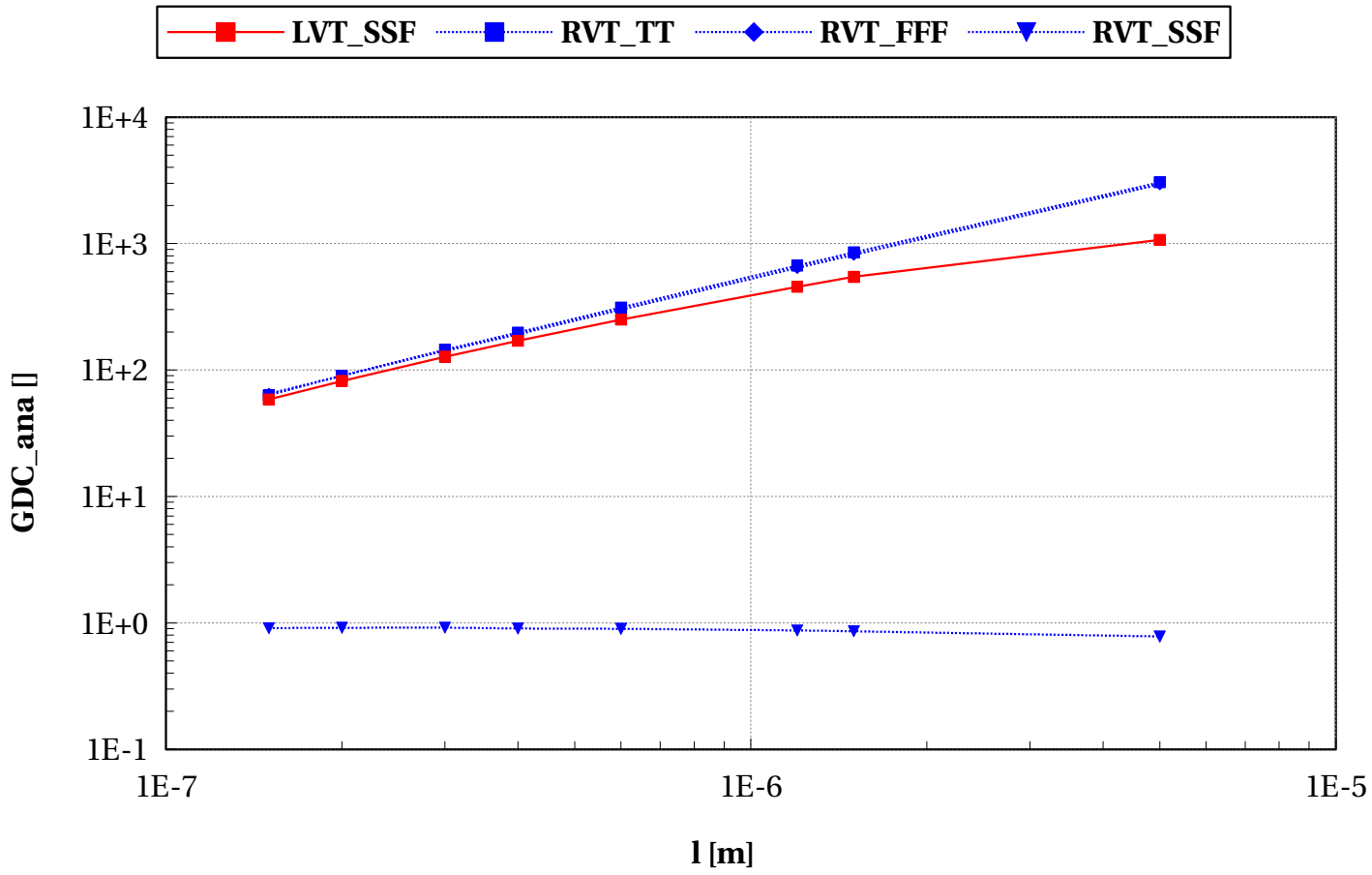
eglvtnfet_acc, Vgs_ana [mV] vs l [m]

W/L==10 and w/nf<5 and Temp==25 and devType=="PCELLwoWPE"



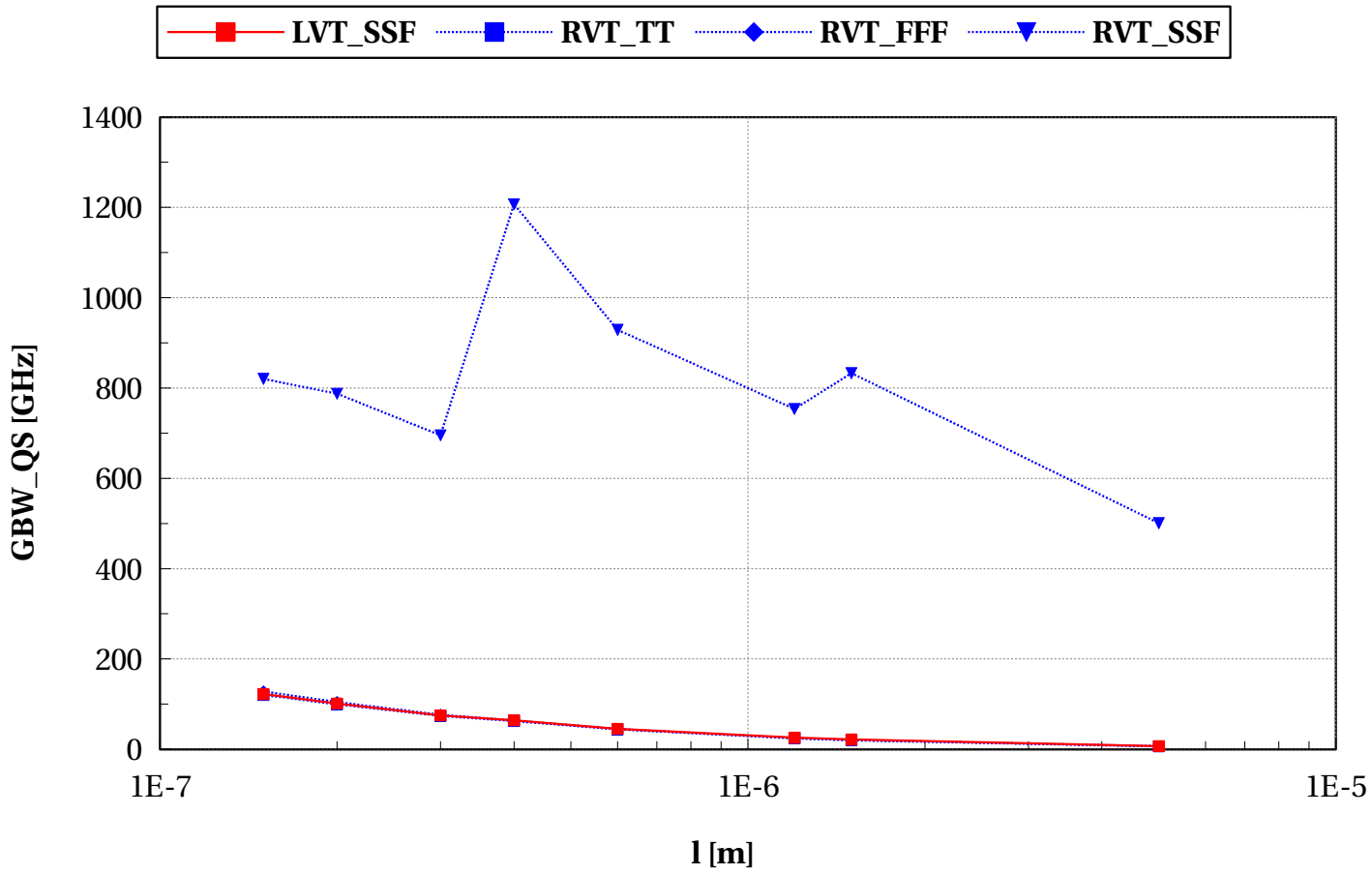
eglvtnfet_acc, GDC_ana [] vs l [m]

W/L==10 and w/nf<5 and Temp==25 and devType=="PCELLwoWPE"

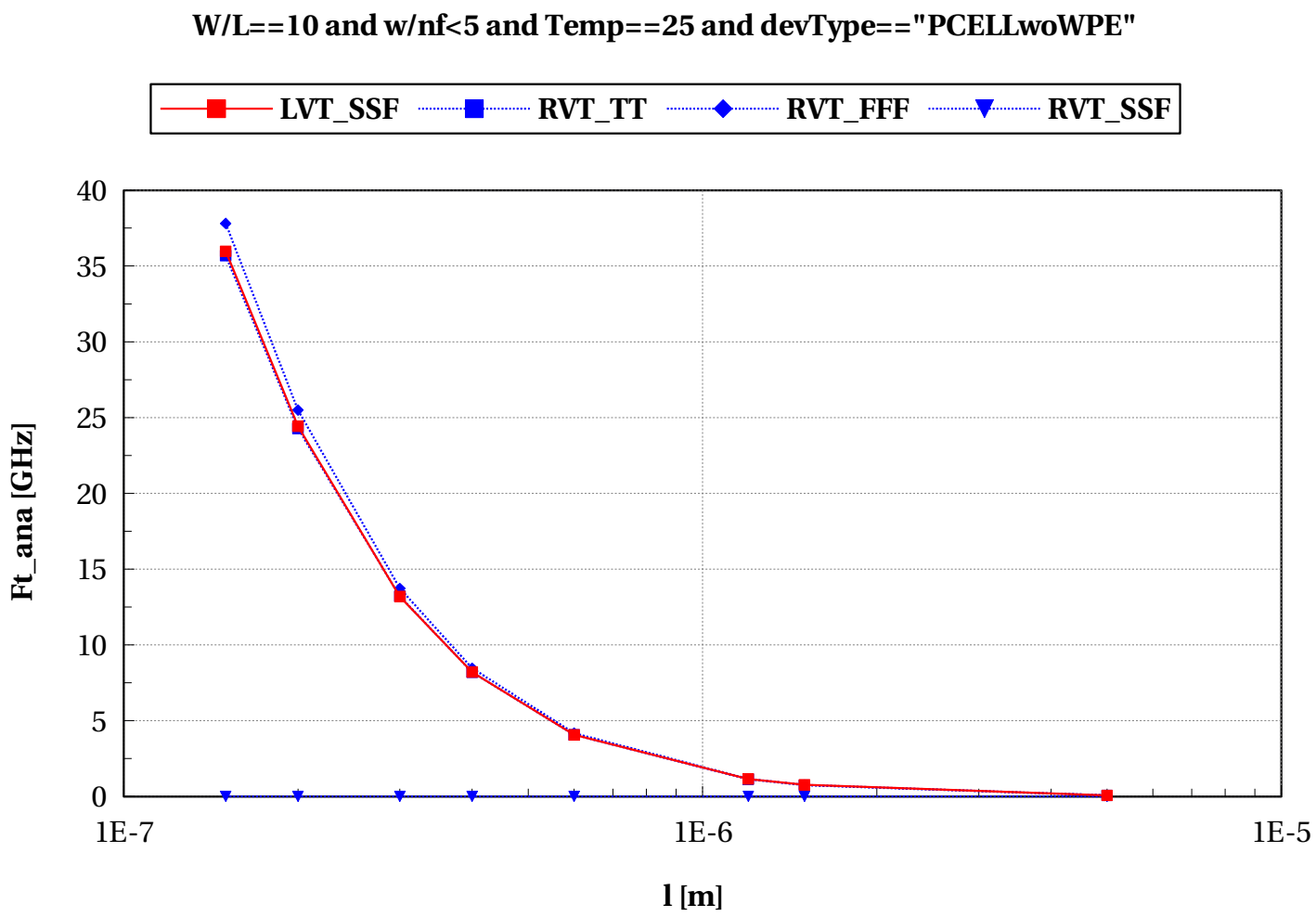


eglvtnfet_acc, GBW_QS [GHz] vs l [m]

W/L==10 and w/nf<5 and Temp==25 and devType=="PCELLwoWPE"

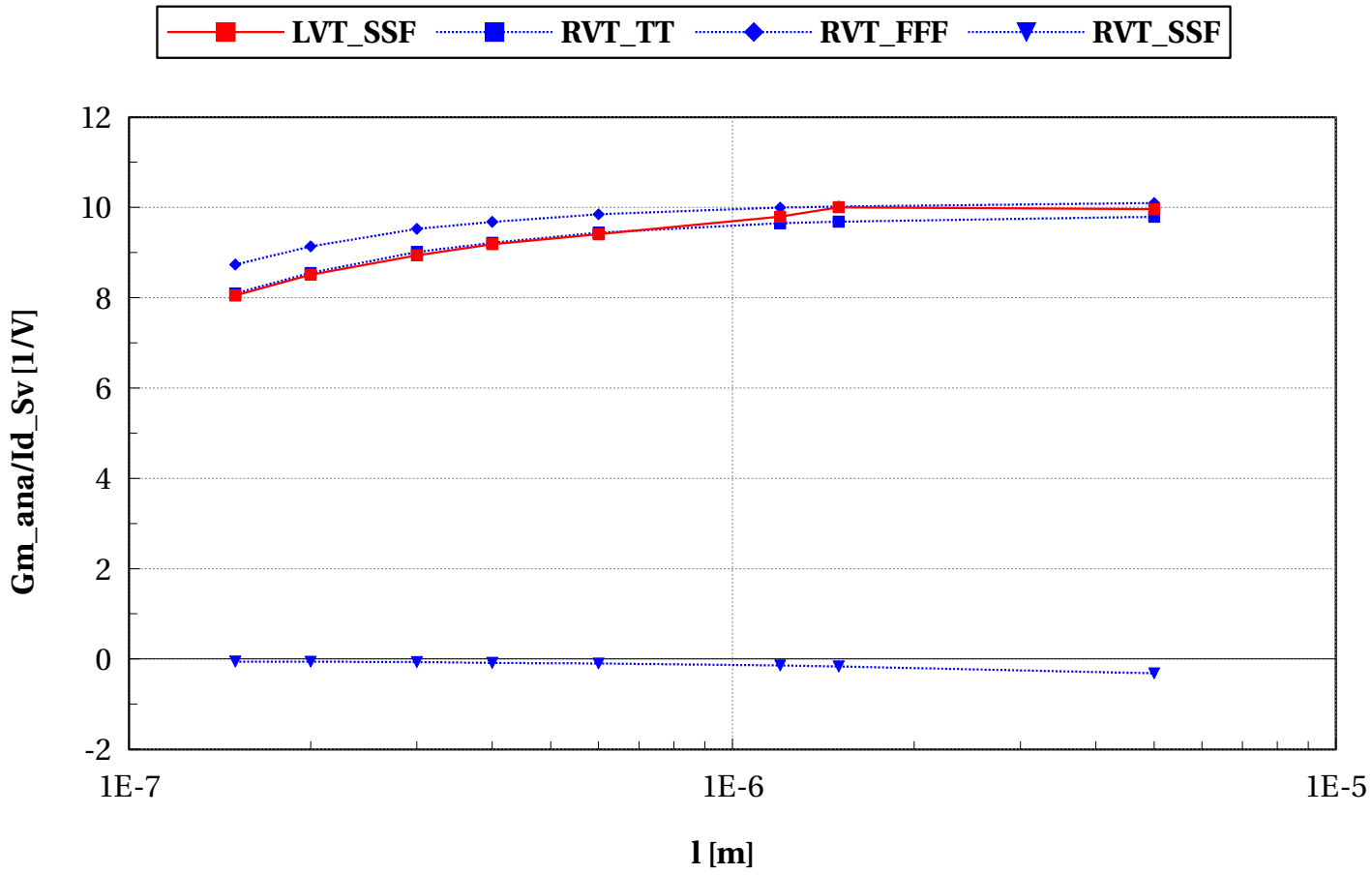


eglvtnfet_acc, Ft_ana [GHz] vs l [m]

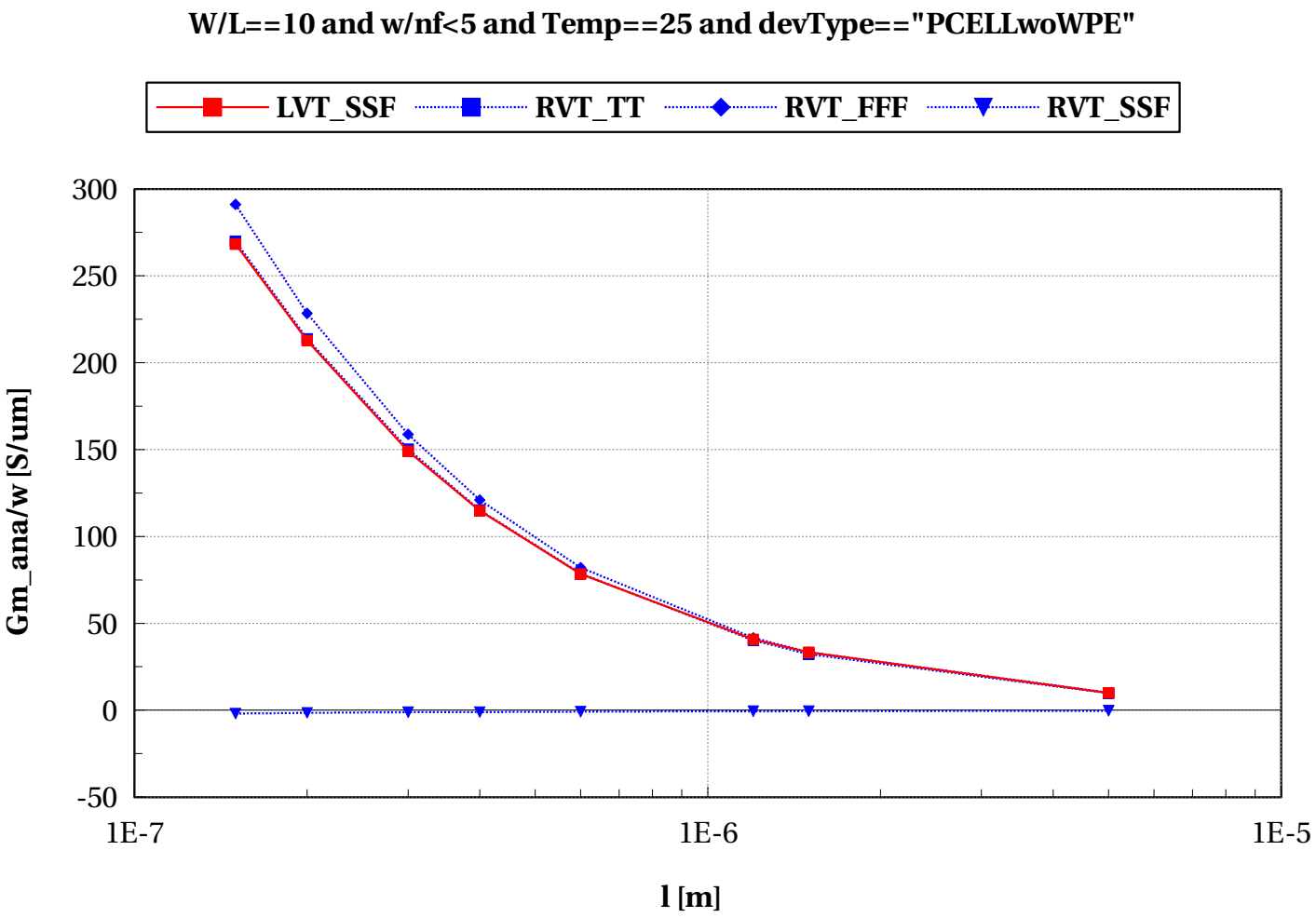


eglvtnfet_acc, Gm_ana/Id_Sv [1/V] vs l [m]

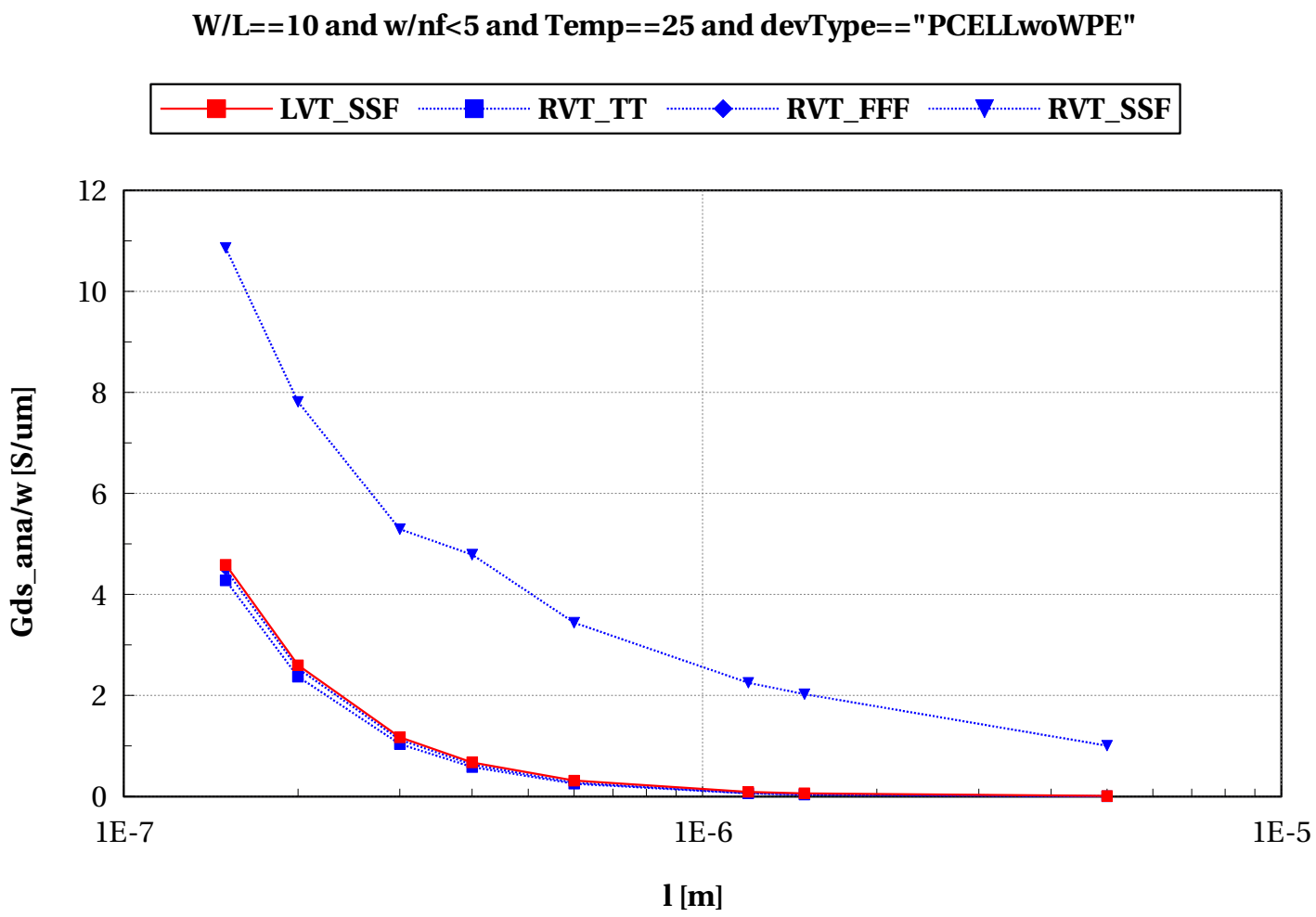
W/L==10 and w/nf<5 and Temp==25 and devType=="PCELLwoWPE"



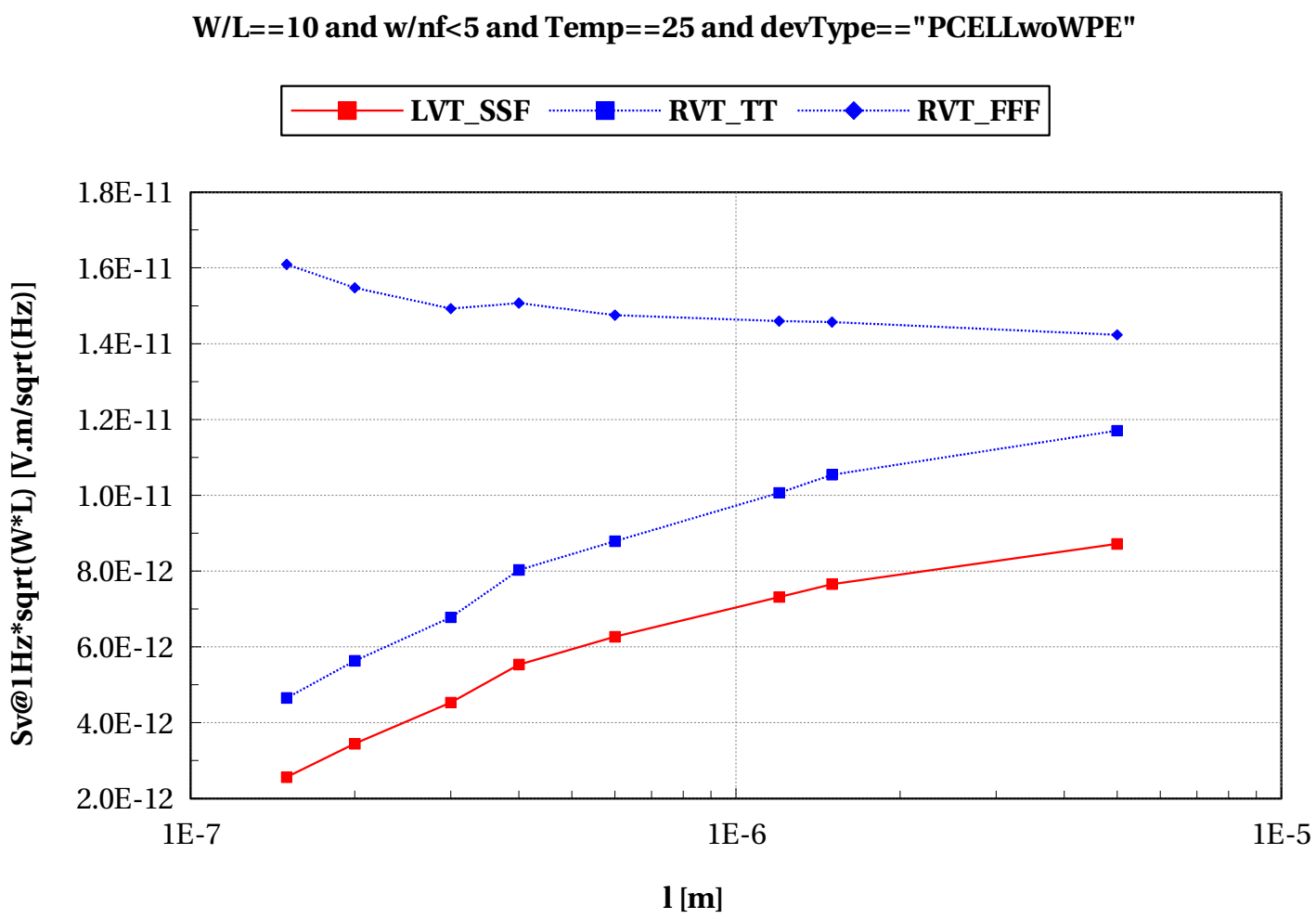
eglvtnfet_acc, Gm_ana/w [S/um] vs l [m]



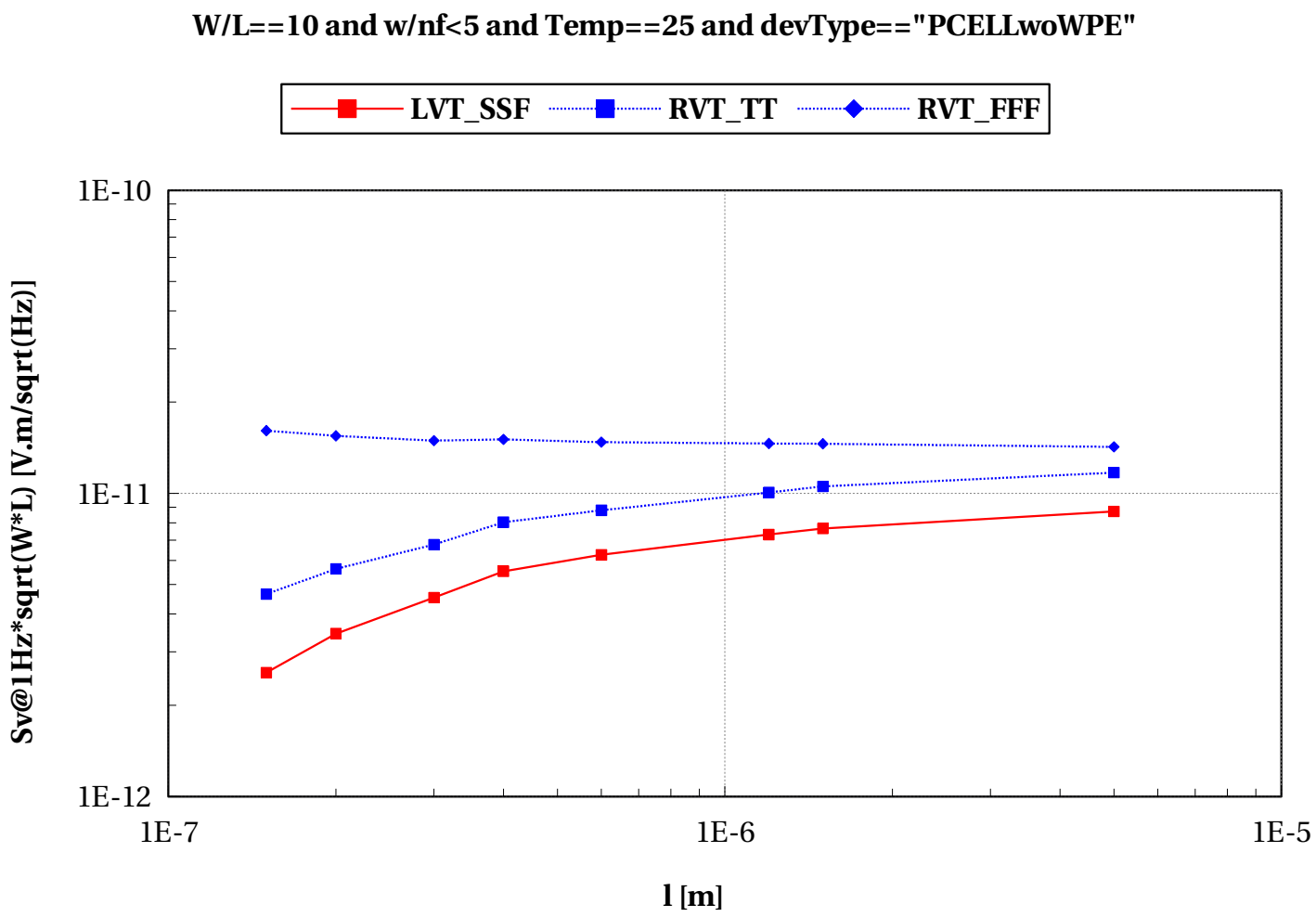
eglvtnfet_acc, Gds_ana/w [S/um] vs l [m]



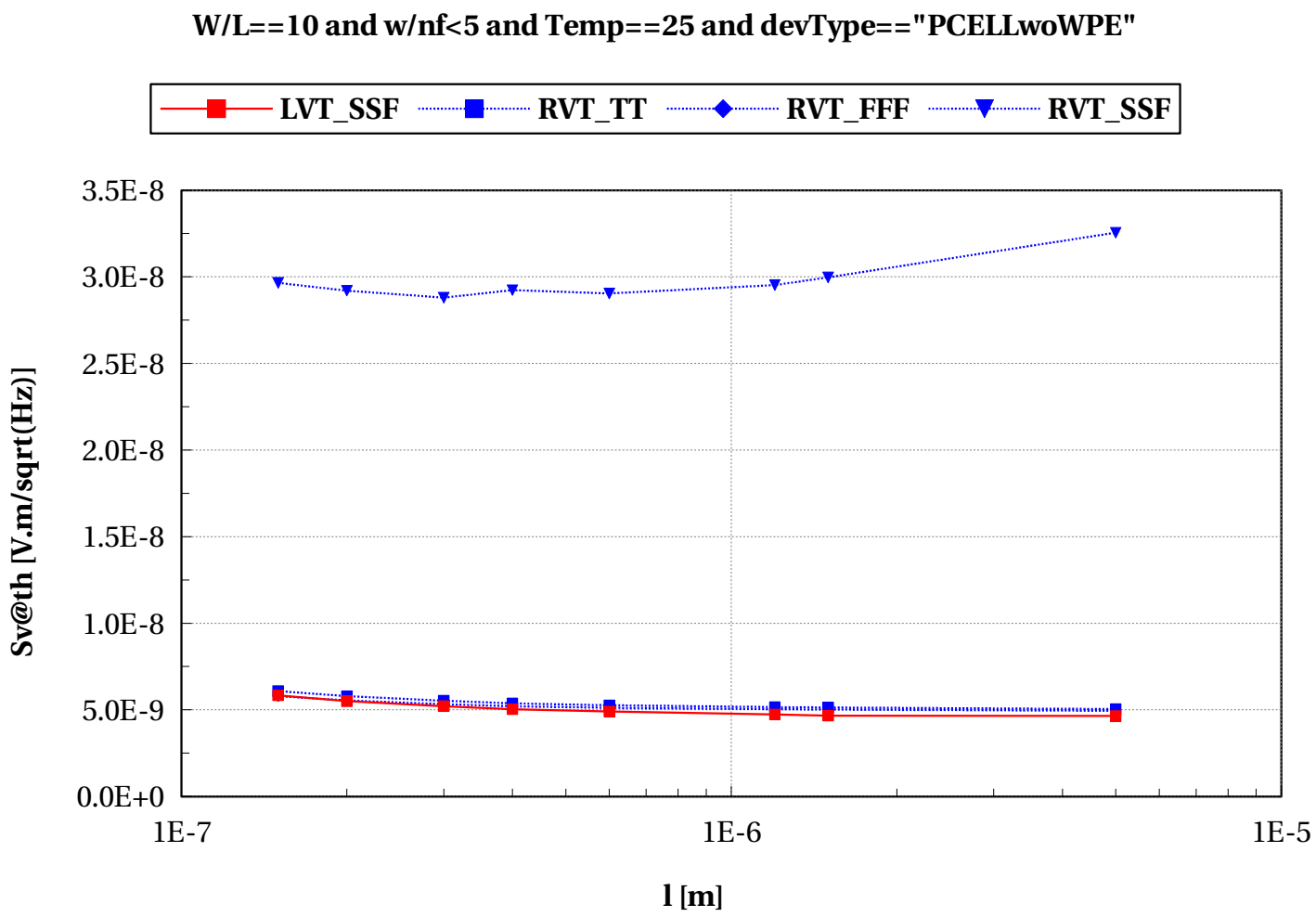
eglvtnfet_acc, Sv@1Hz*sqrt(W*L) [V.m/sqrt(Hz)] vs l [m]



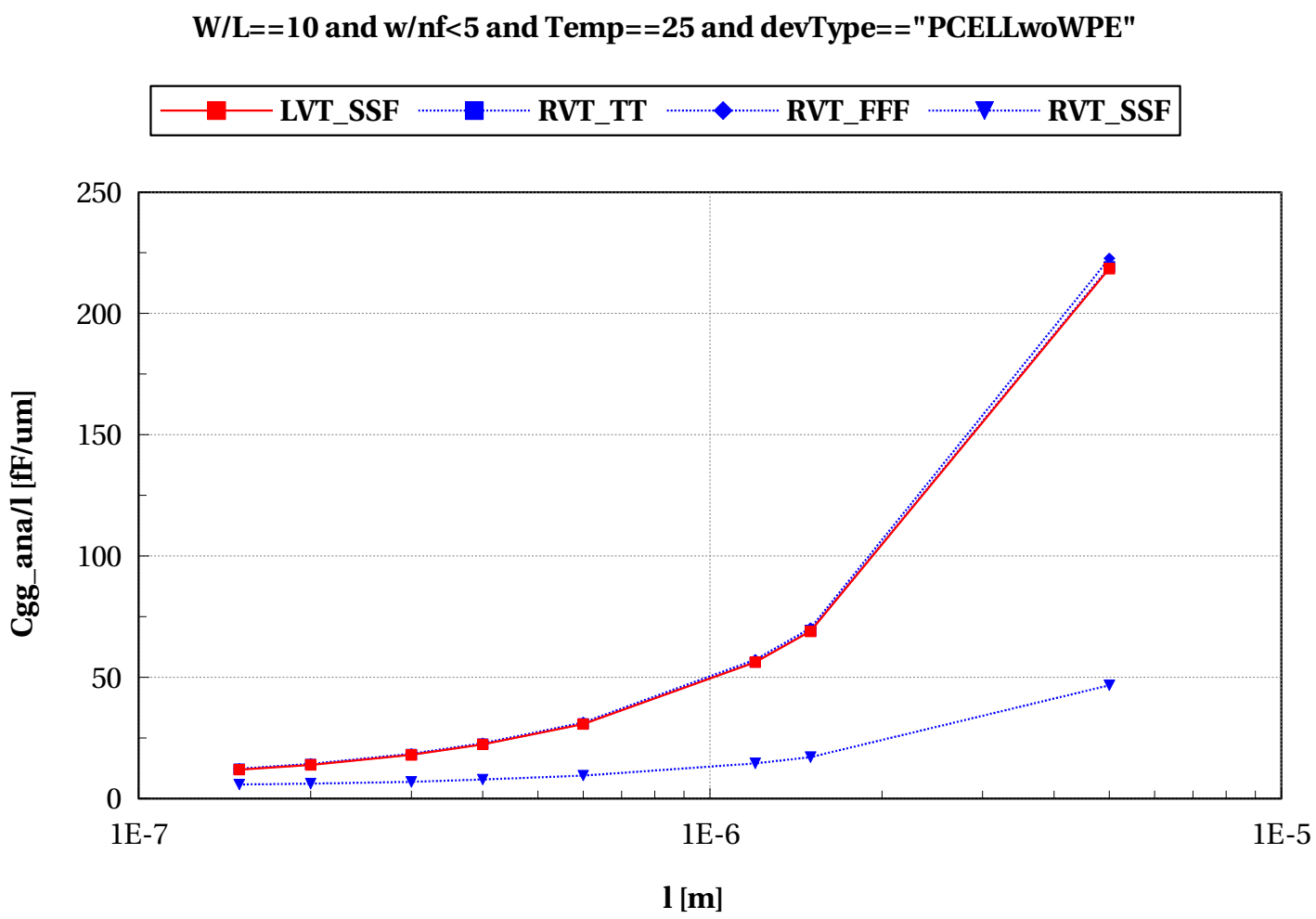
eglvtnfet_acc, Sv@1Hz*sqrt(W*L) [V.m/sqrt(Hz)] vs l [m]



eglvtnfet_acc, Sv@th [V.m/sqrt(Hz)] vs l [m]

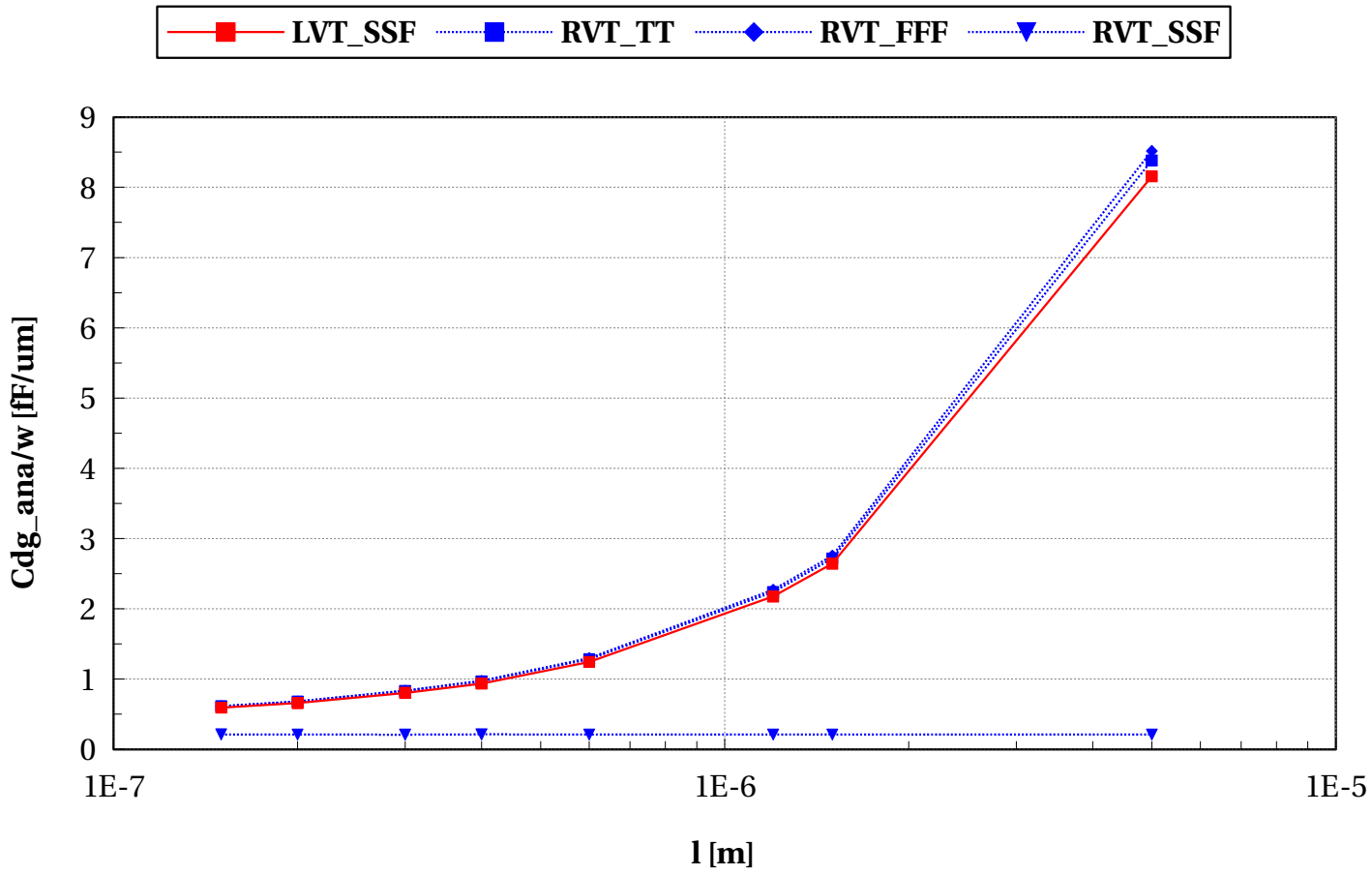


eglvtnfet_acc, Cgg_ana/l [fF/um] vs l [m]



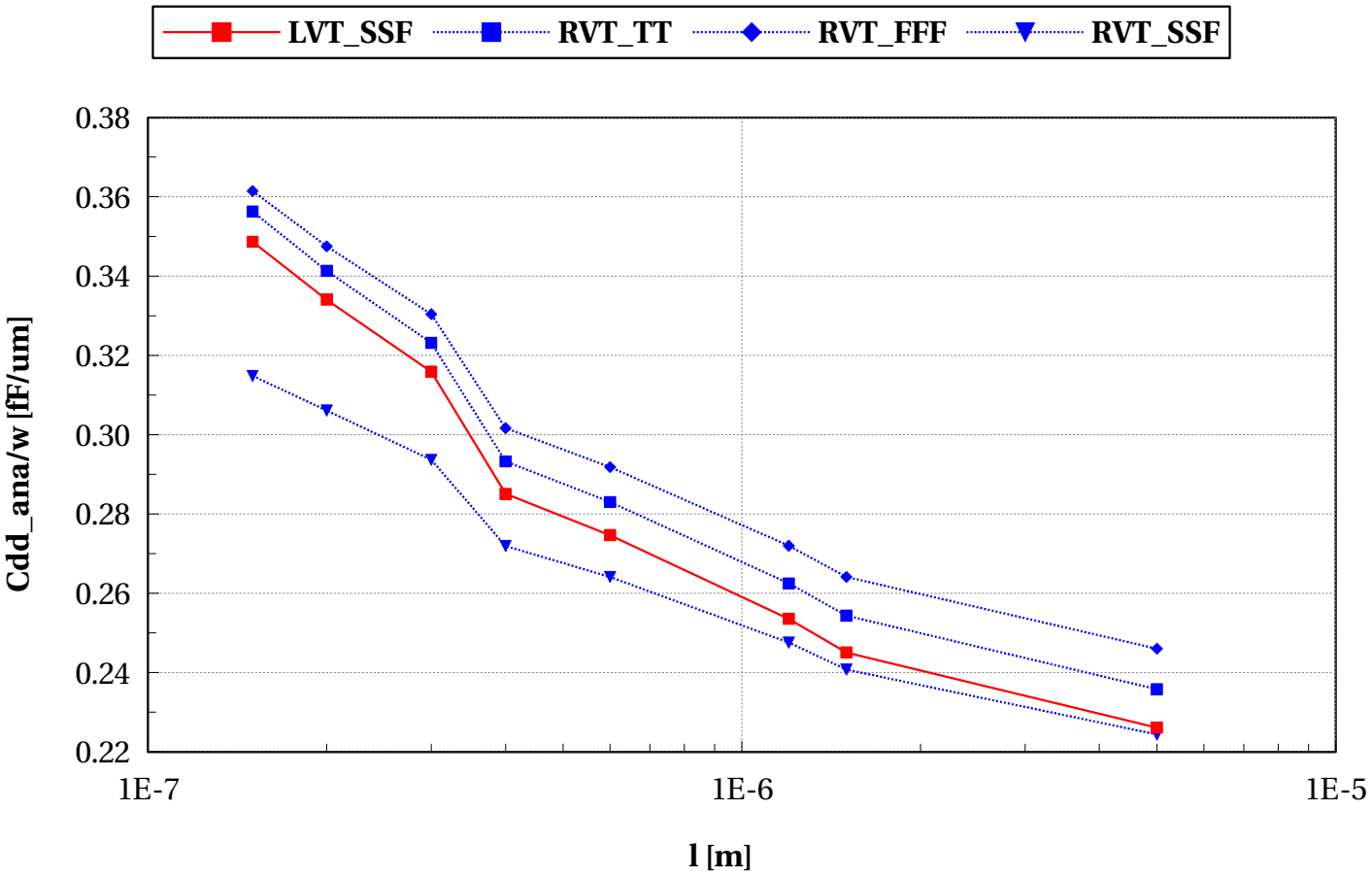
eglvtnfet_acc, Cdg_ana/w [fF/um] vs l [m]

W/L==10 and w/nf<5 and Temp==25 and devType=="PCELLwoWPE"



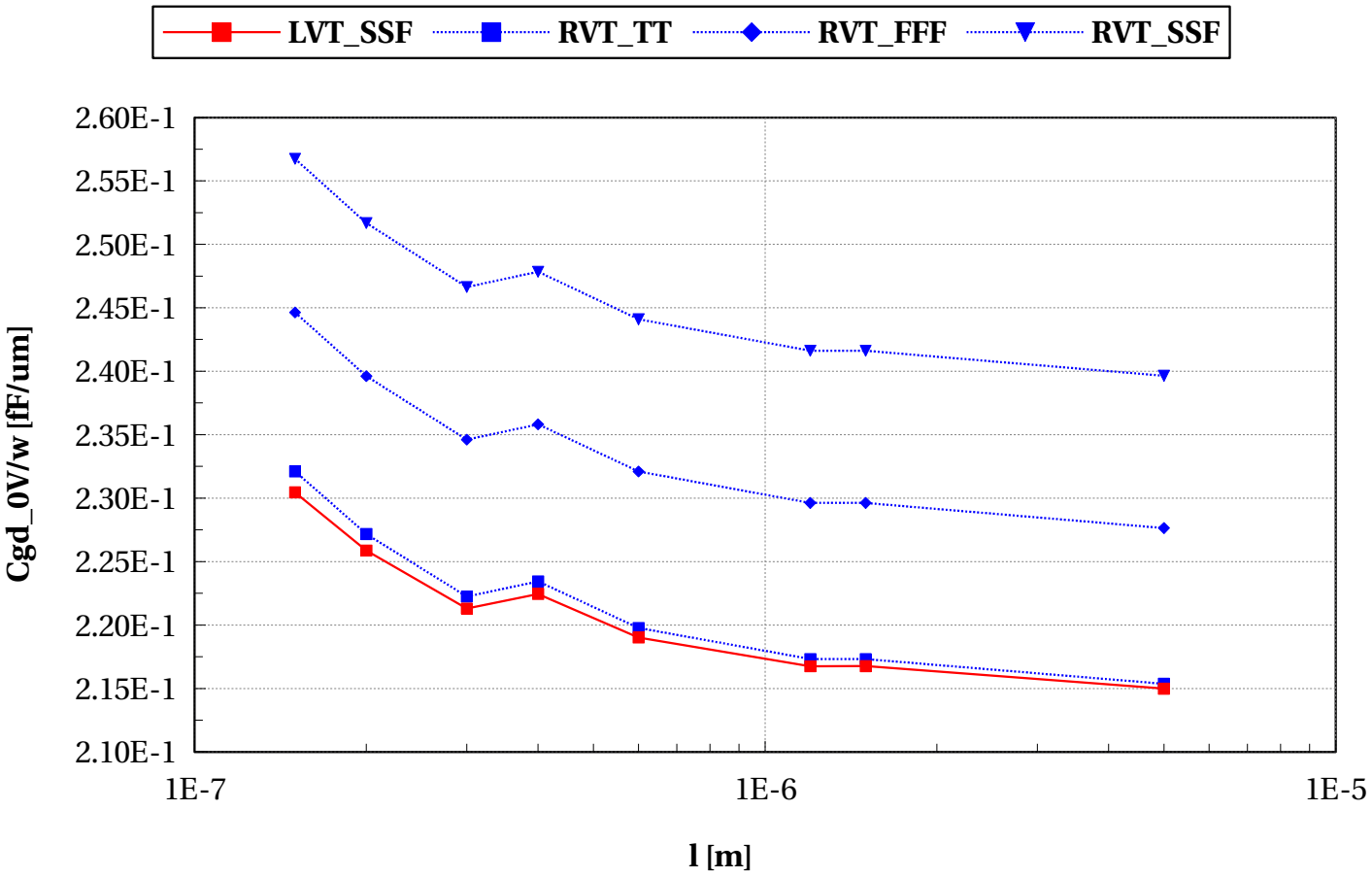
eglvtnfet_acc, Cdd_ana/w [fF/um] vs l [m]

W/L==10 and w/nf<5 and Temp==25 and devType=="PCELLwoWPE"

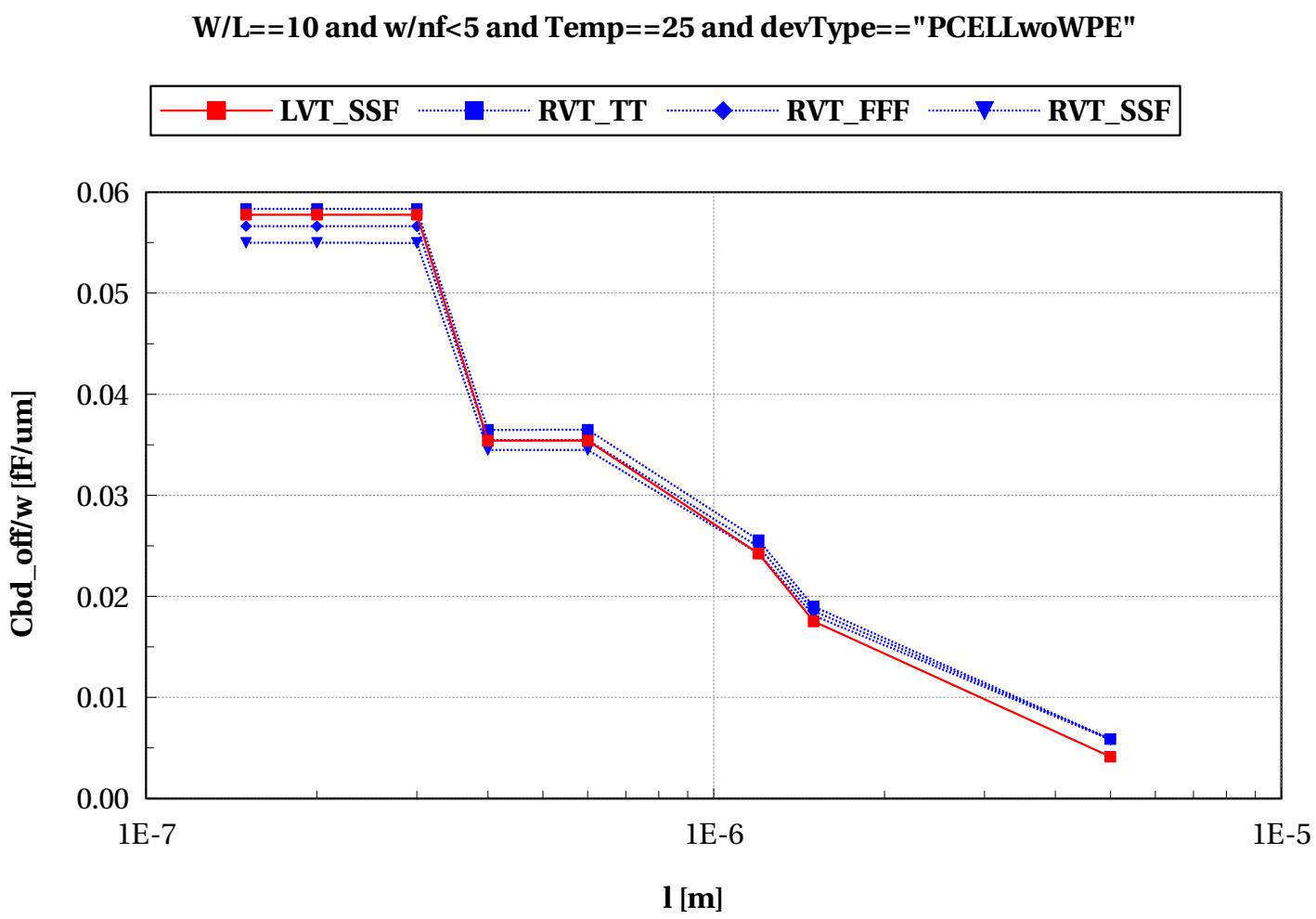


eglvtnfet_acc, Cgd_0V/w [fF/um] vs l [m]

W/L==10 and w/nf<5 and Temp==25 and devType=="PCELLwoWPE"



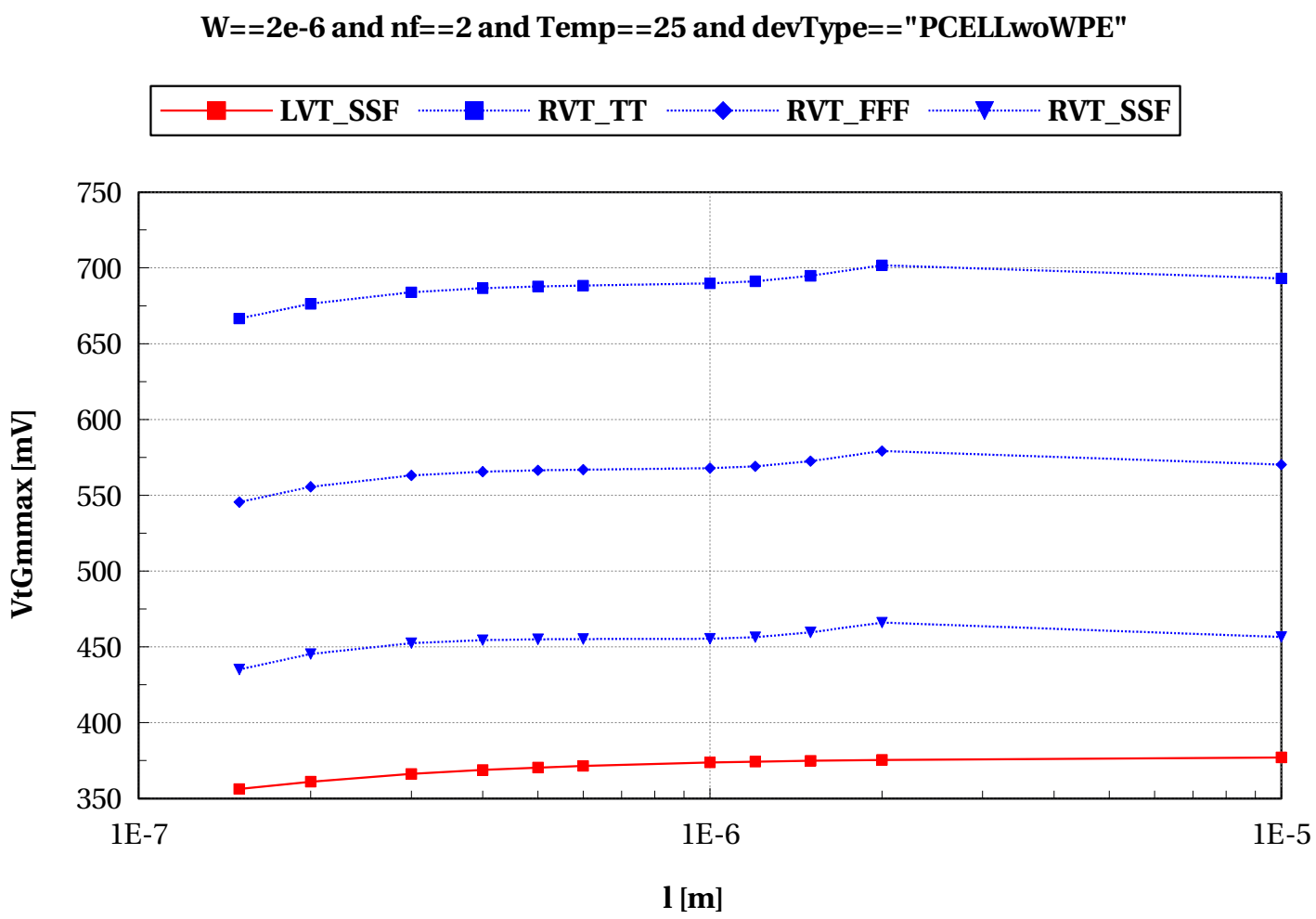
eglvtnfet_acc, Cbd_off/w [fF/um] vs l [m]



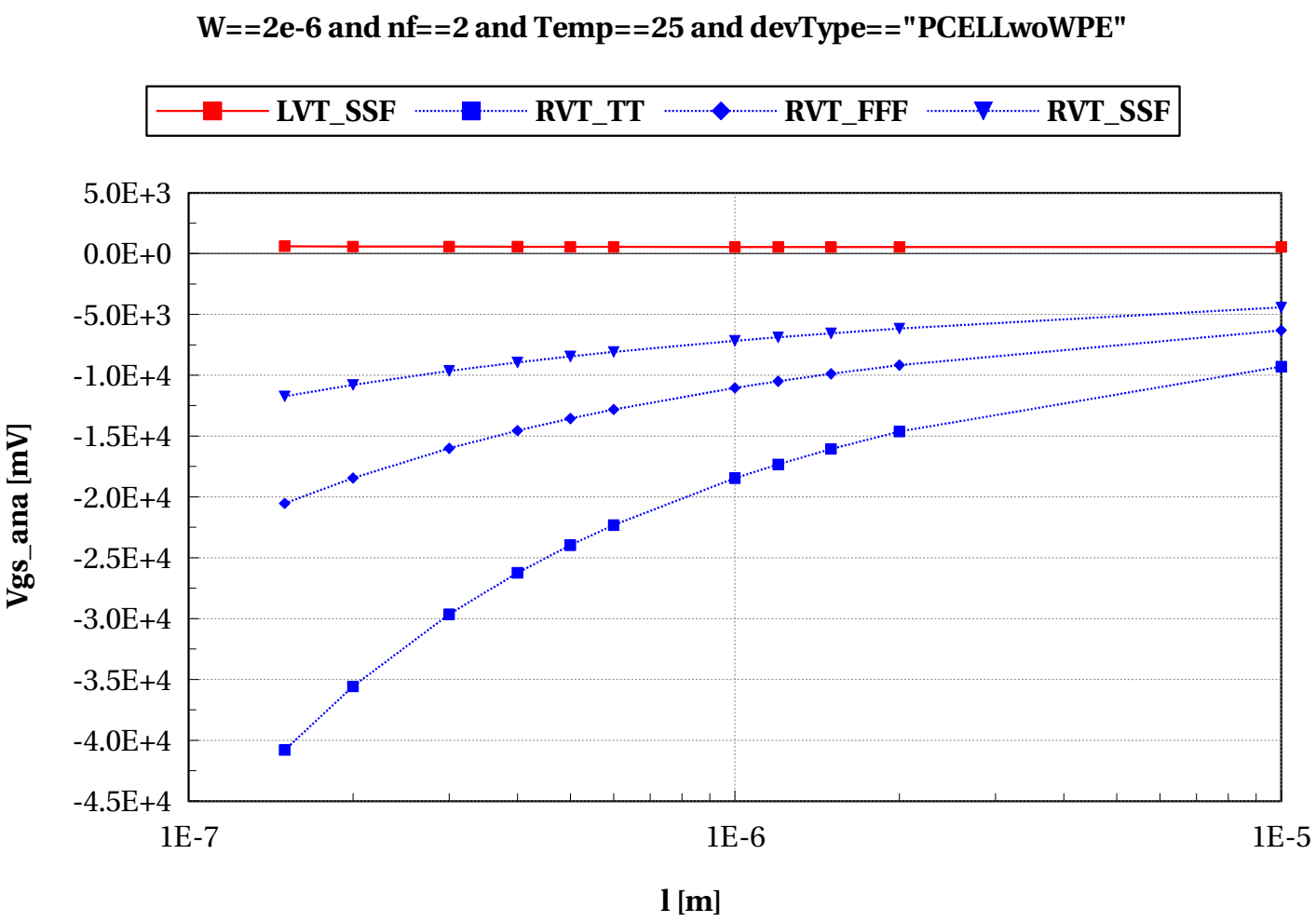
eglvtpfet_acc
Electrical characteristics scaling

Scaling versus Length (T=25C)

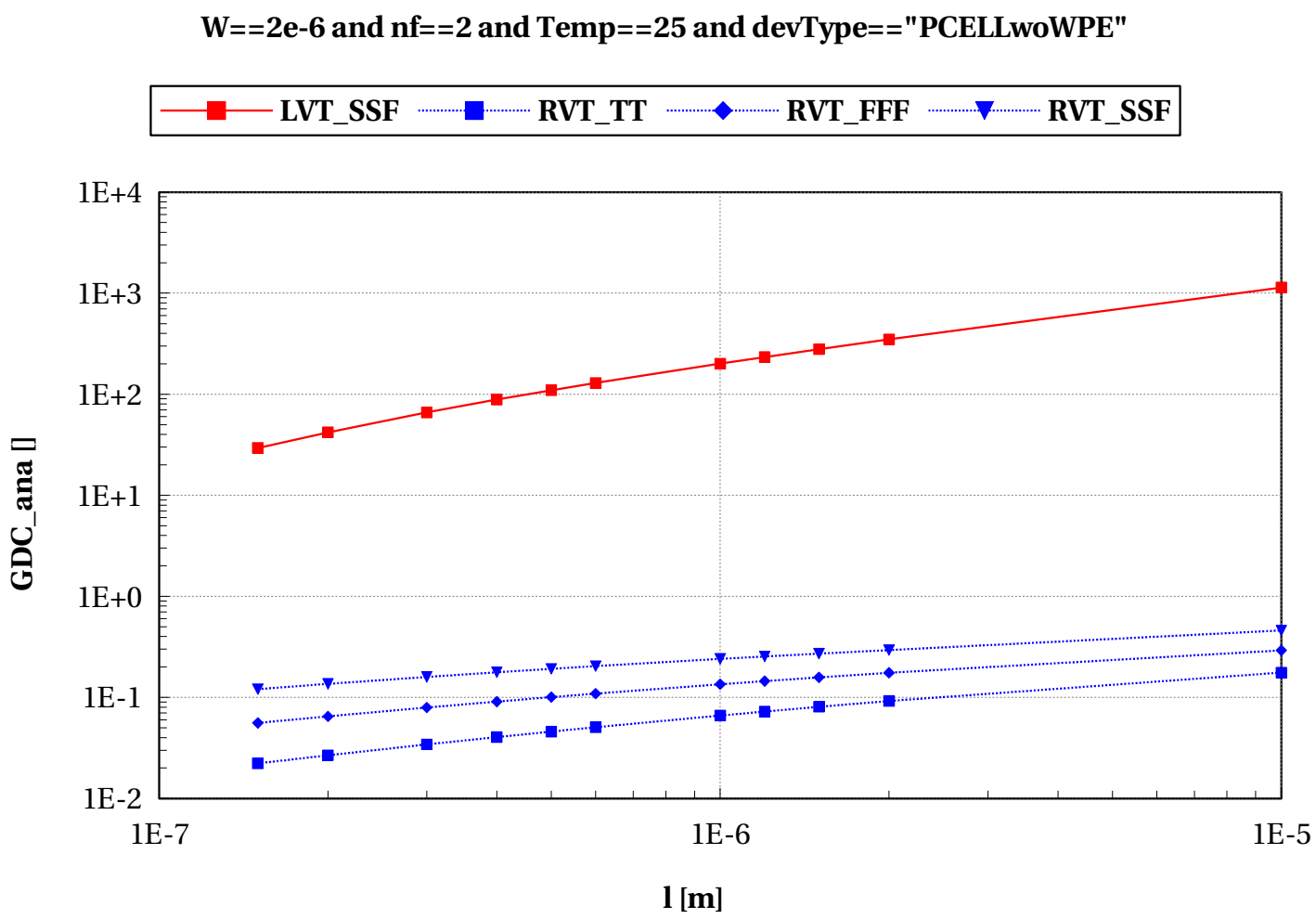
eglvtpfet_acc, VtGmmax [mV] vs l [m]



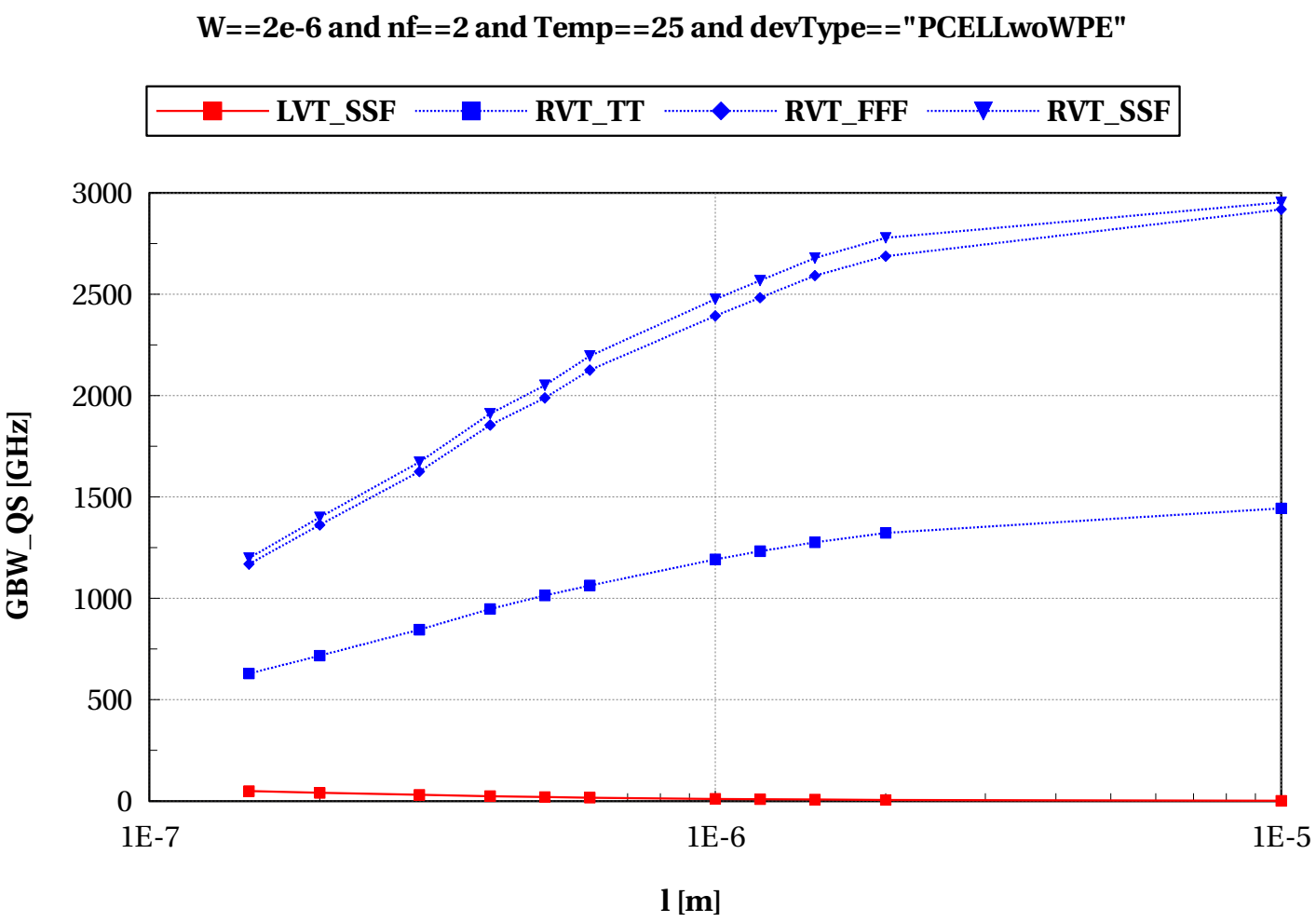
eglvtpfet_acc, Vgs_ana [mV] vs l [m]



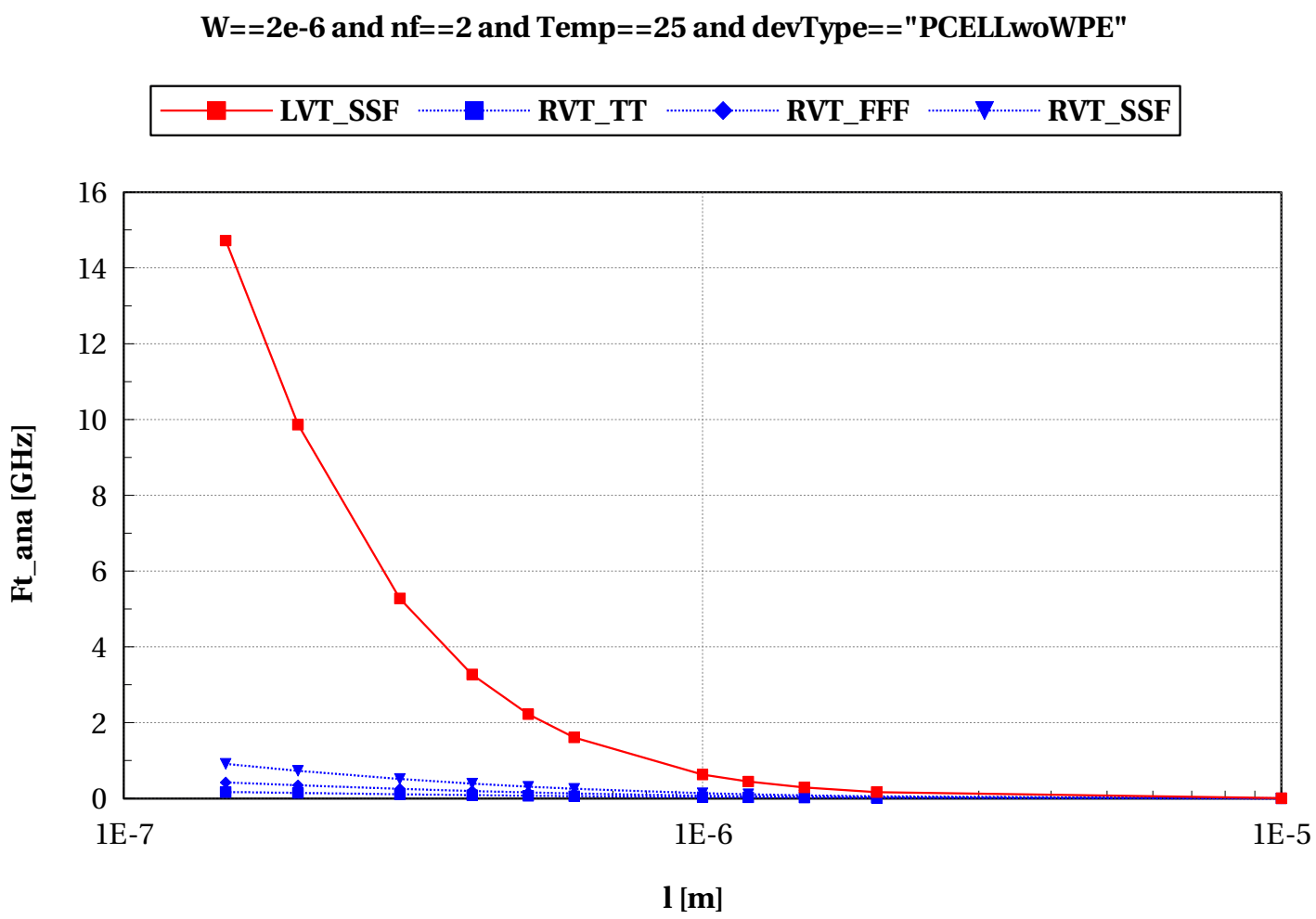
eglvtpfet_acc, GDC_ana [] vs l [m]



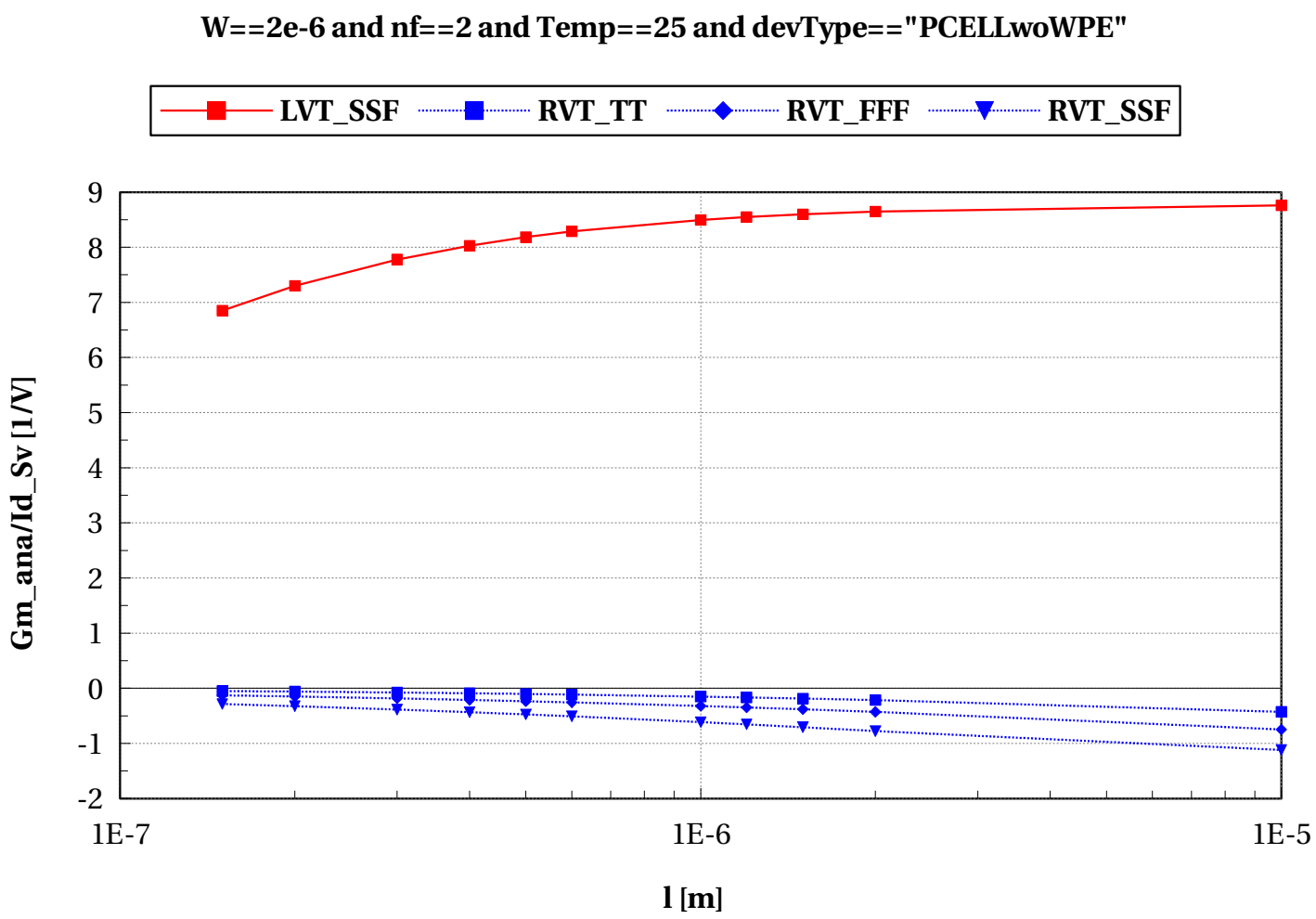
eglvtpfet_acc, GBW_QS [GHz] vs l [m]



eglvtpfet_acc, Ft_ana [GHz] vs l [m]

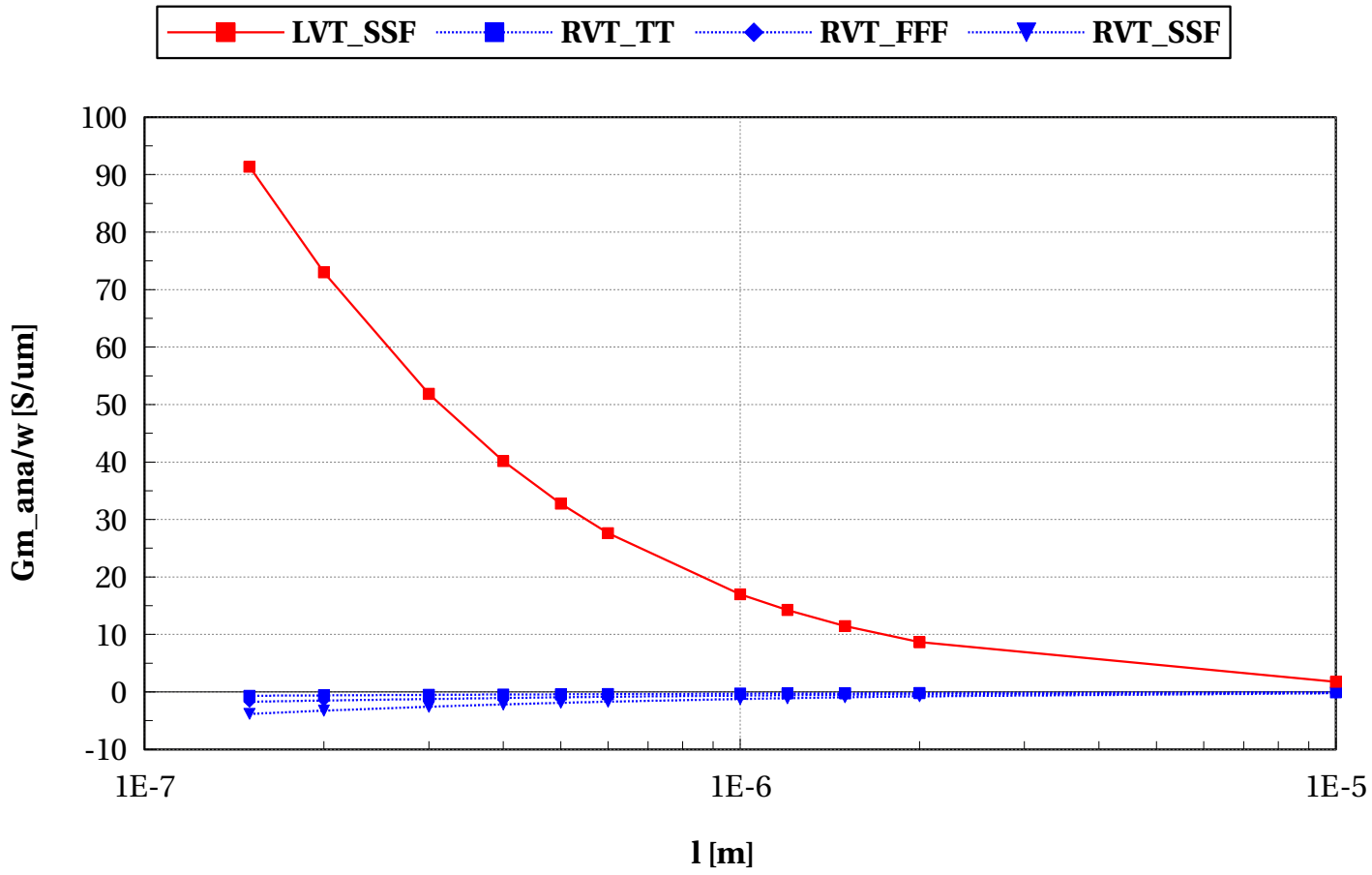


eglvtpfet_acc, Gm_ana/Id_Sv [1/V] vs l [m]



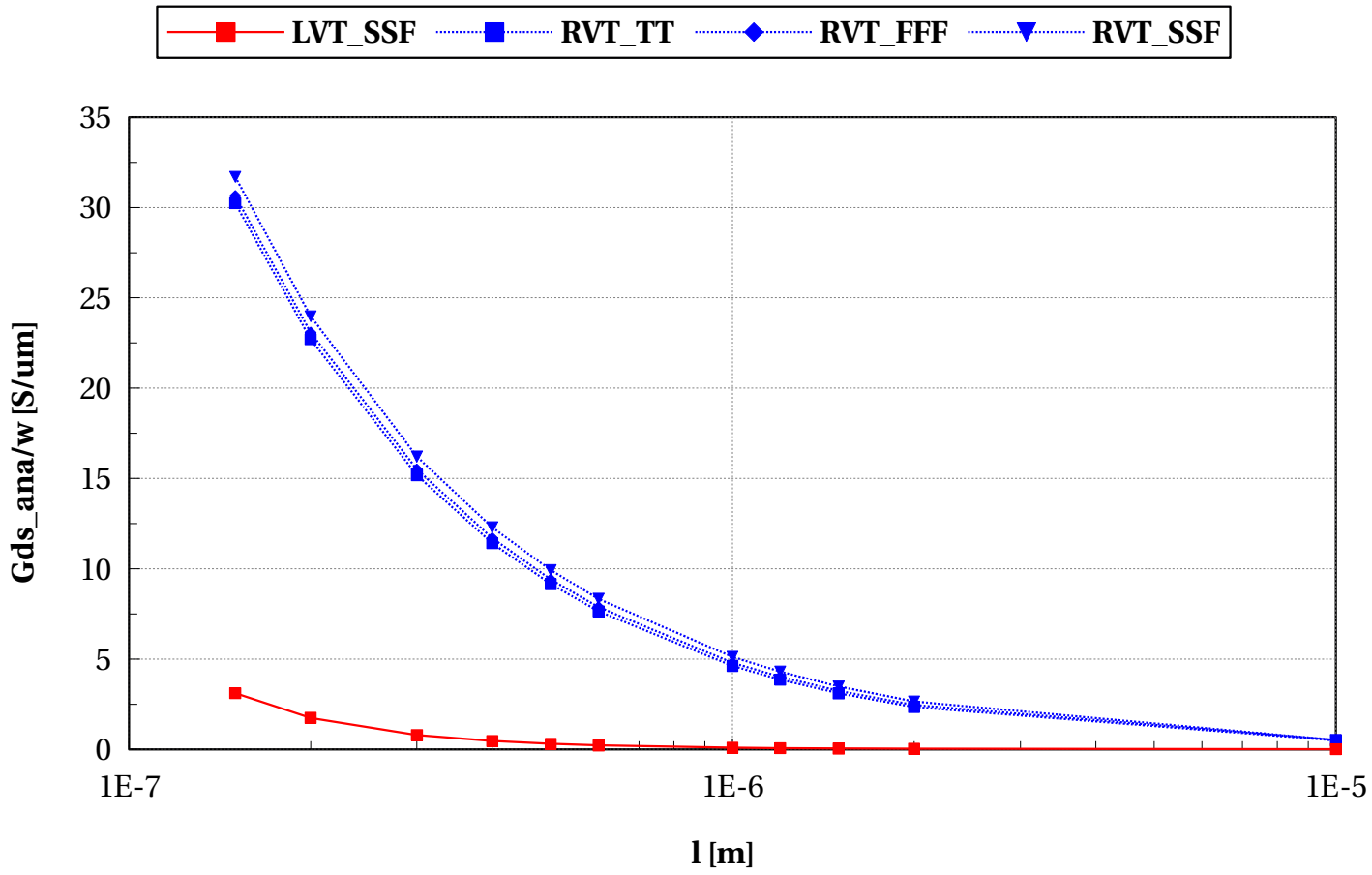
eglvtpfet_acc, Gm_ana/w [S/um] vs l [m]

W==2e-6 and nf==2 and Temp==25 and devType=="PCELLwoWPE"

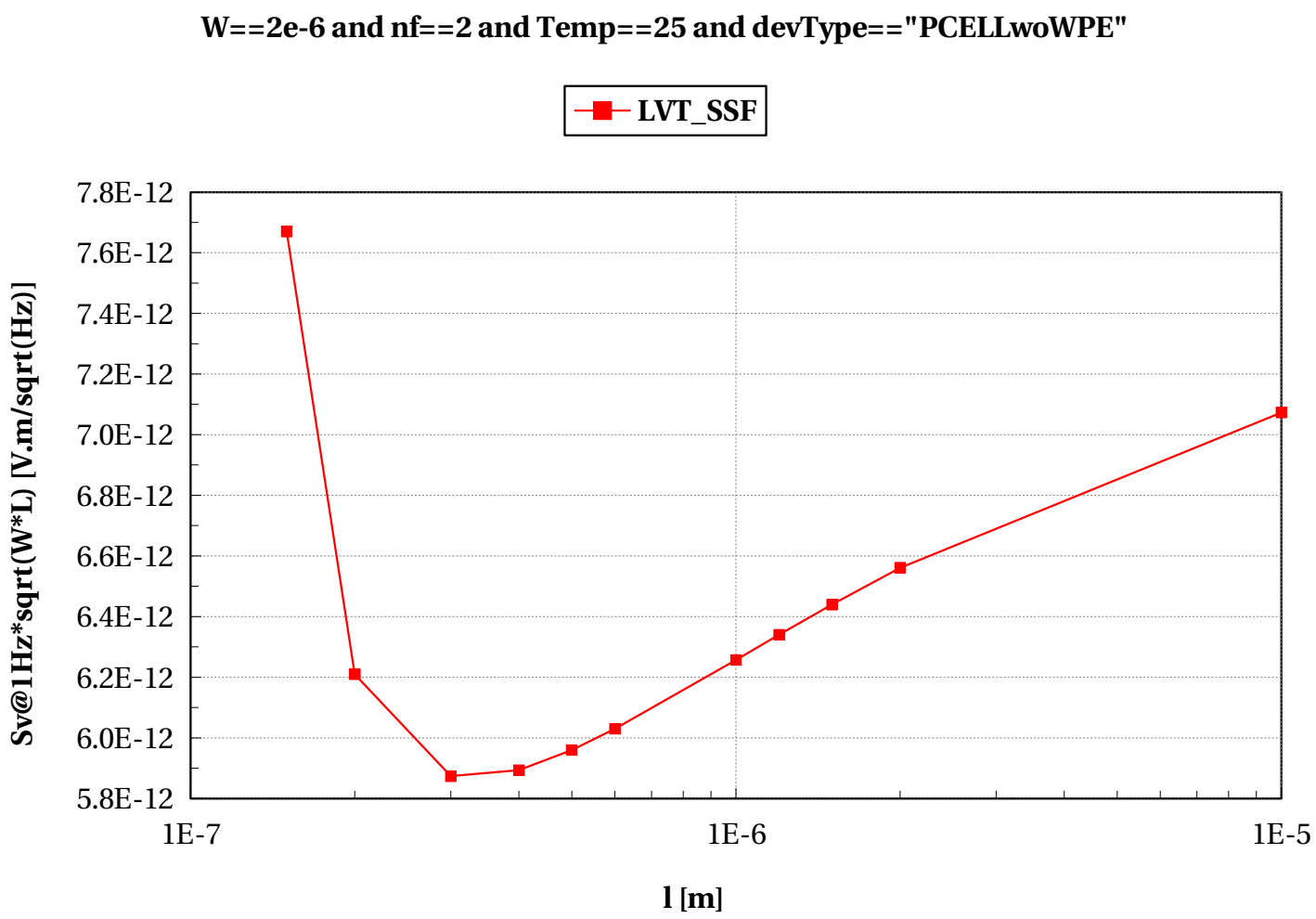


eglvtpfet_acc, Gds_ana/w [S/um] vs l [m]

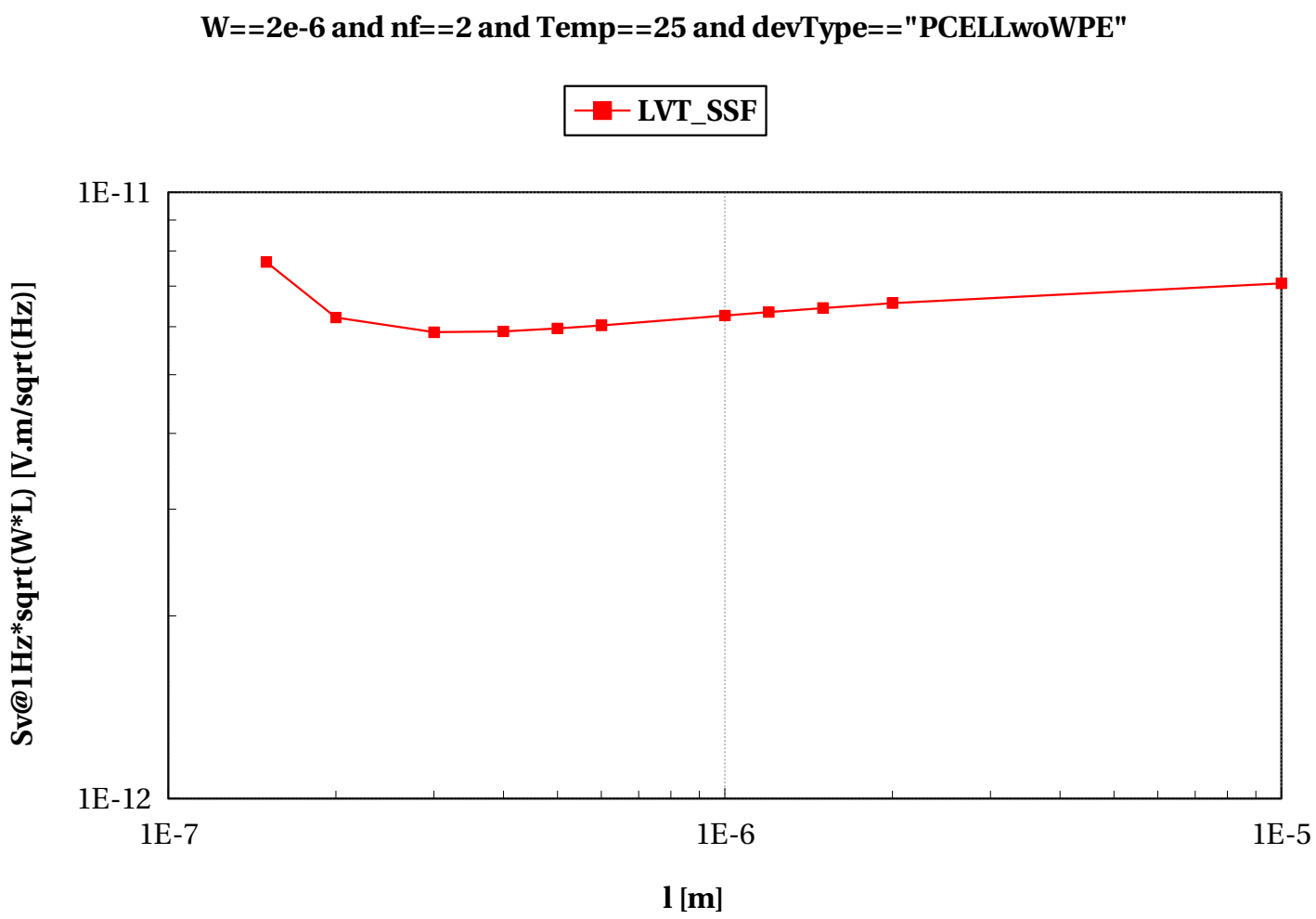
W==2e-6 and nf==2 and Temp==25 and devType=="PCELLwoWPE"



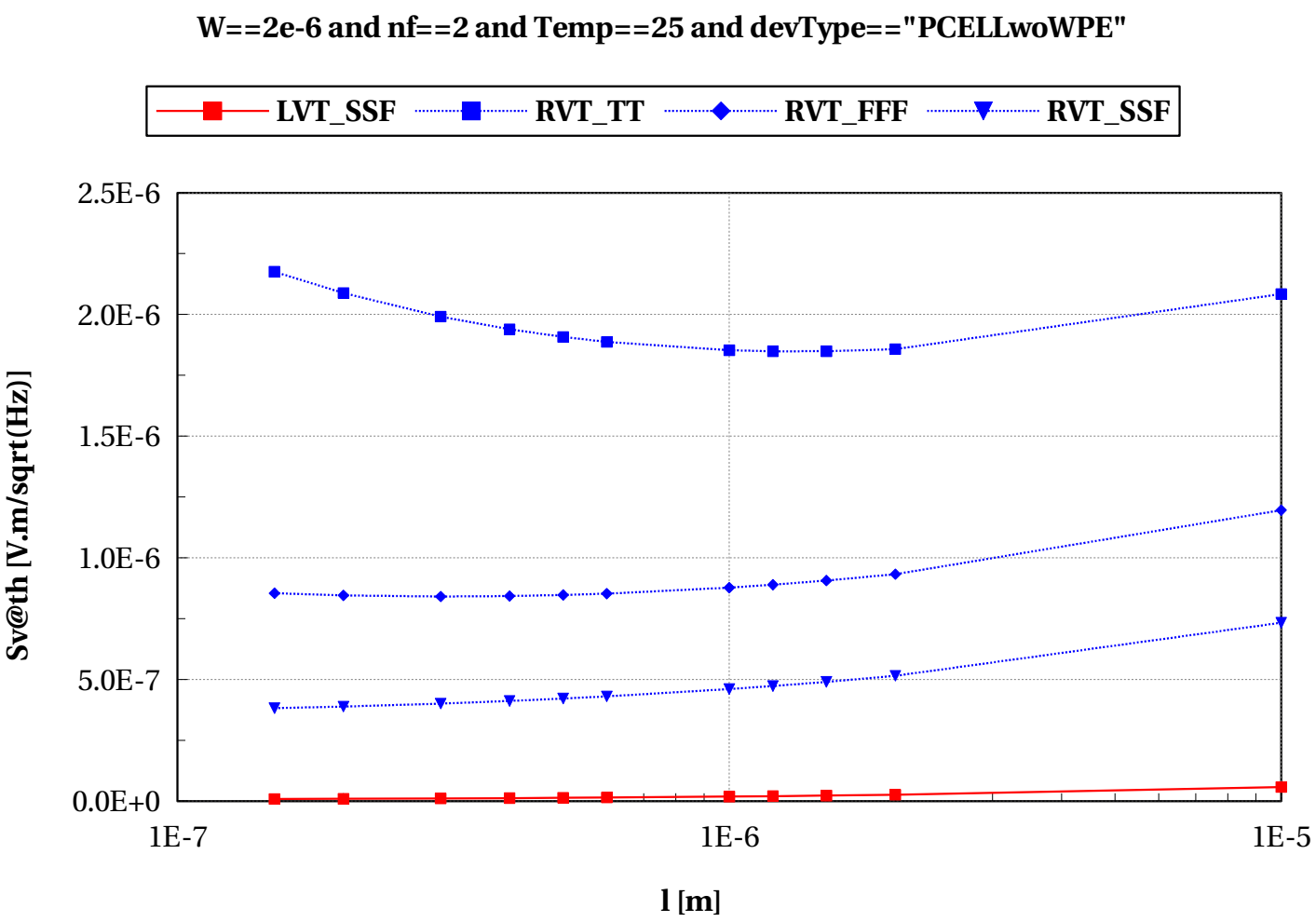
eglvtpfet_acc, Sv@1Hz*sqrt(W*L) [V.m/sqrt(Hz)] vs l [m]



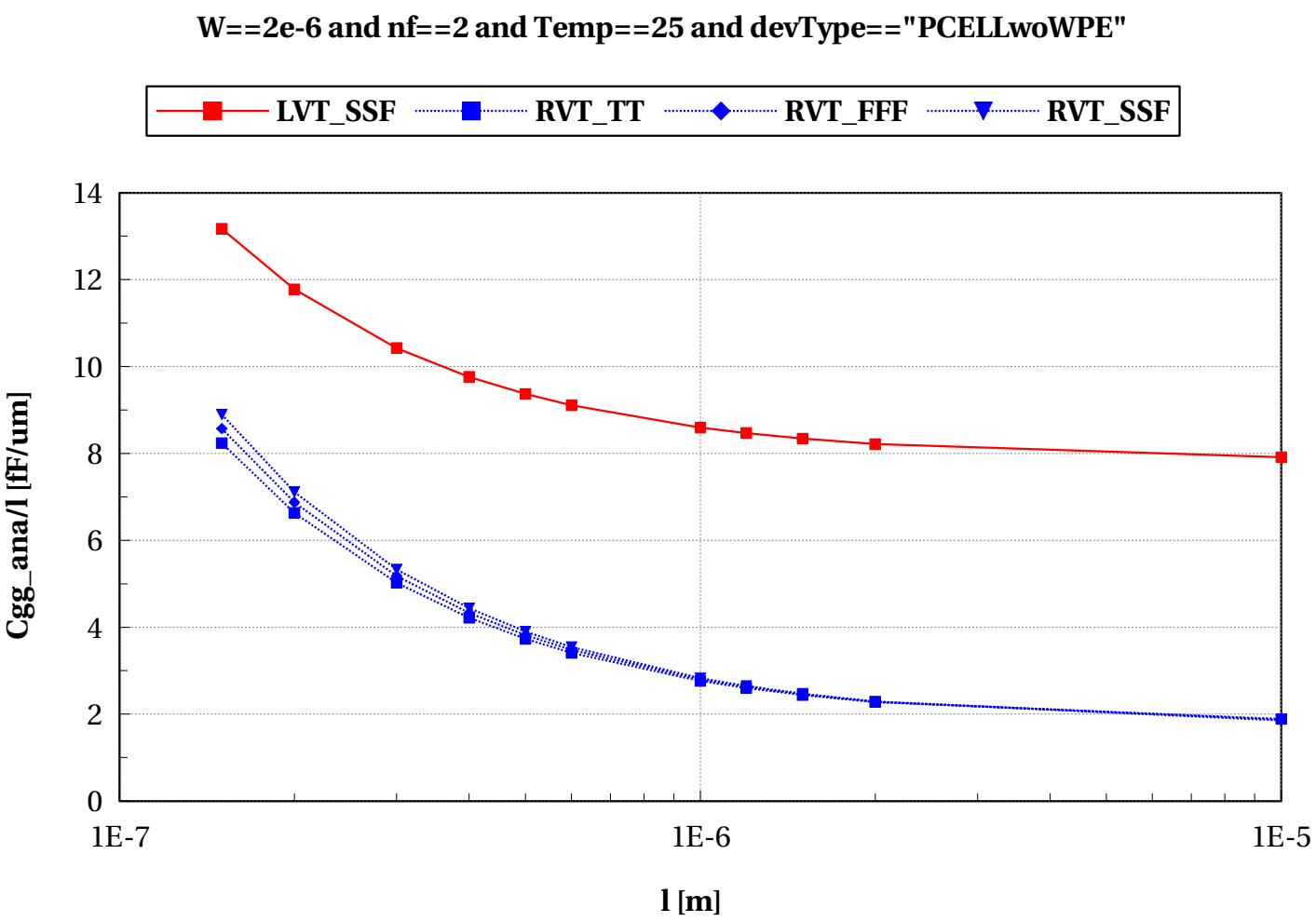
eglvtpfet_acc, Sv@1Hz*sqrt(W*L) [V.m/sqrt(Hz)] vs l [m]



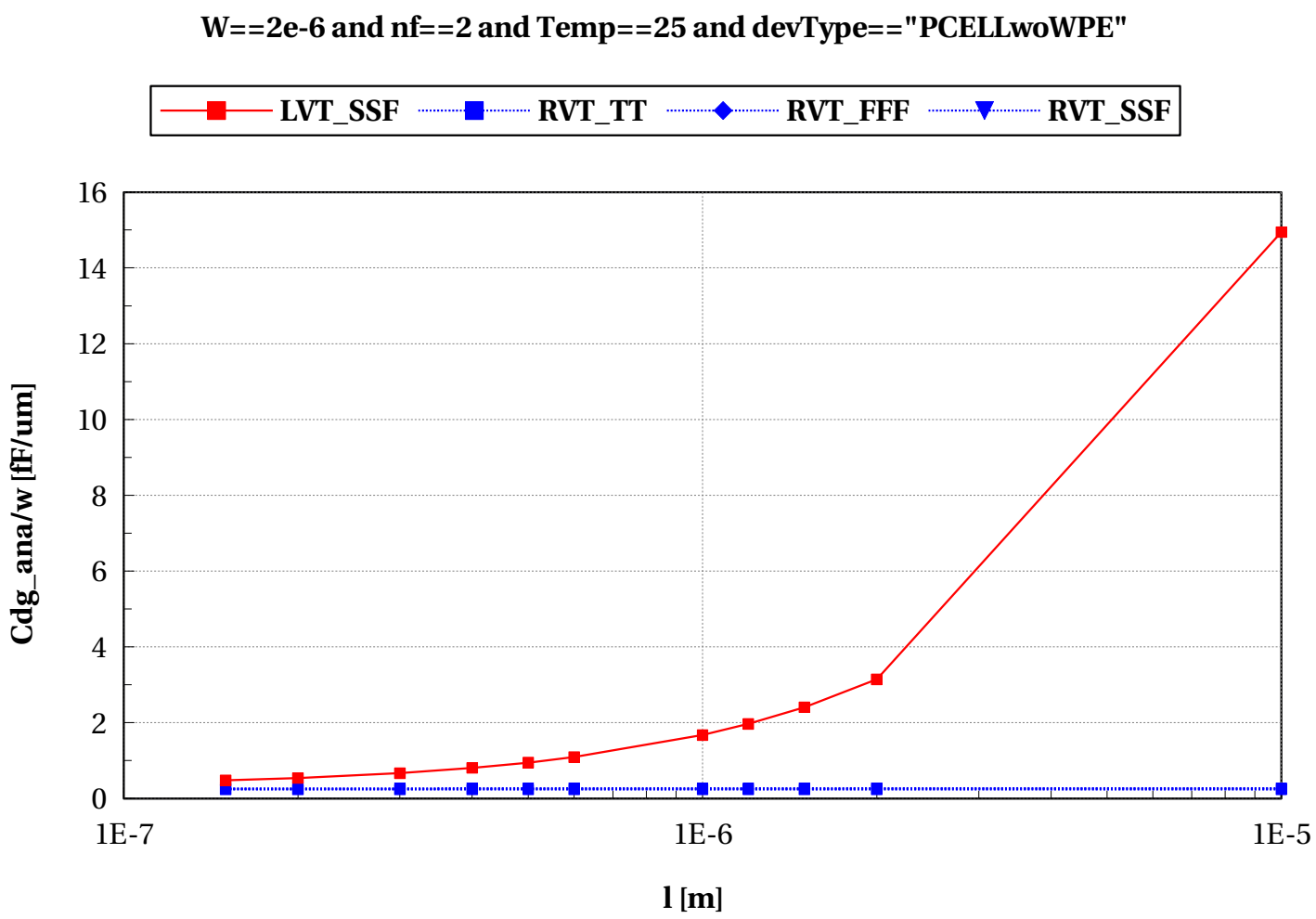
eglvtpfet_acc, Sv@th [V.m/sqrt(Hz)] vs l [m]



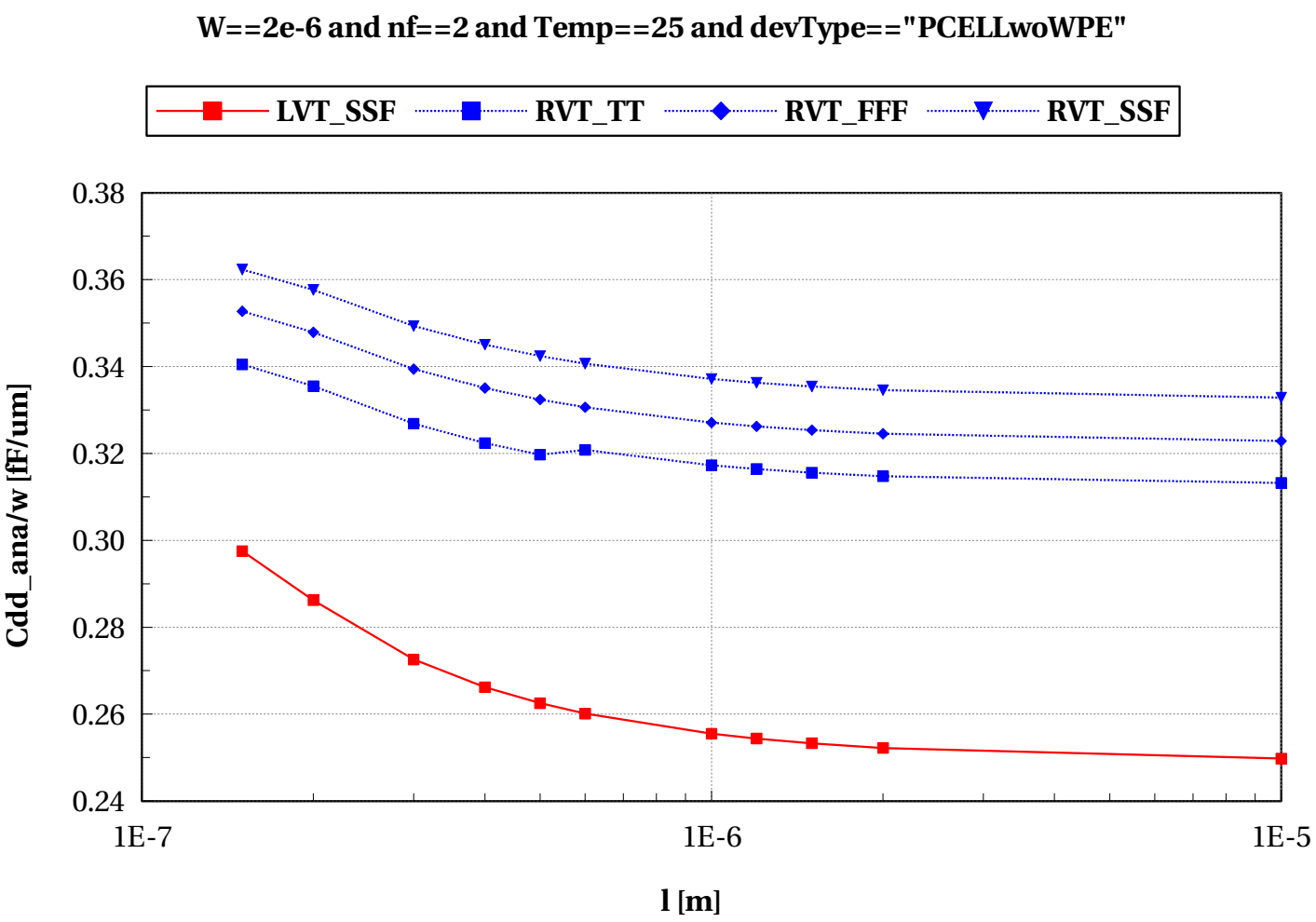
eglvtpfet_acc, Cgg_ana/l [fF/um] vs l [m]



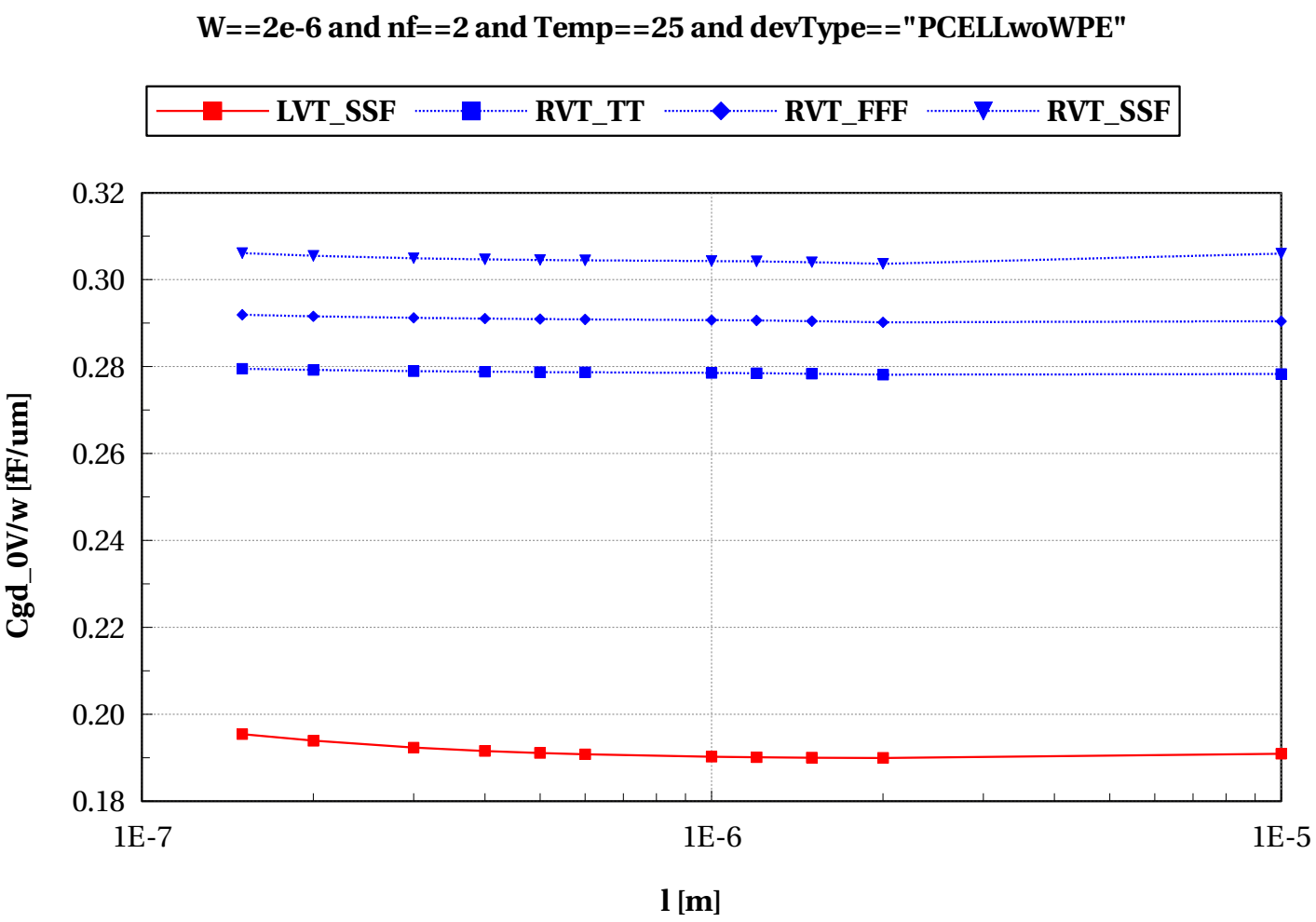
eglvtpfet_acc, Cdg_ana/w [fF/um] vs l [m]



eglvtpfet_acc, Cdd_ana/w [fF/um] vs l [m]

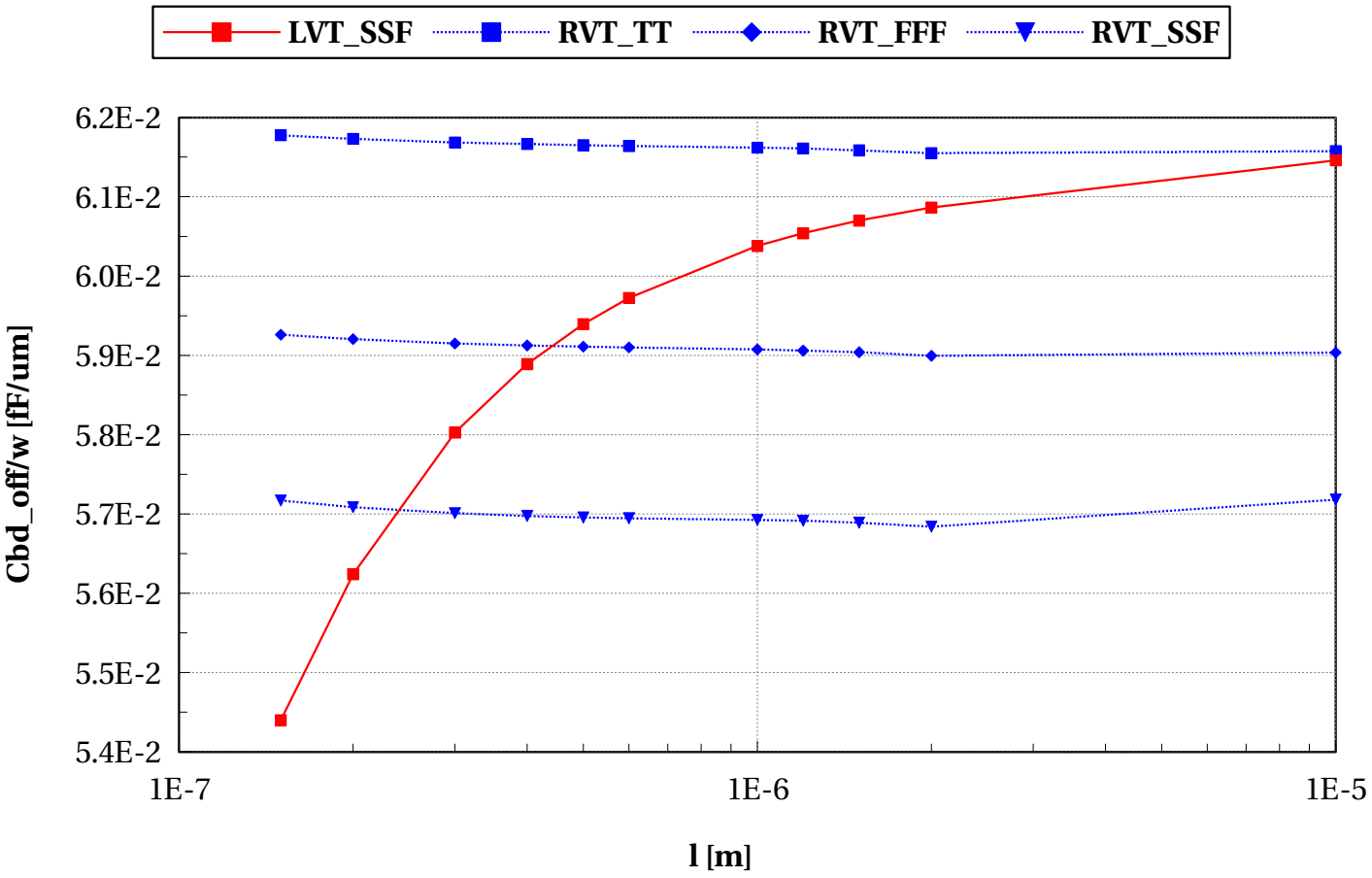


eglvtpfet_acc, Cgd_0V/w [fF/um] vs l [m]



eglvtpfet_acc, Cbd_off/w [fF/um] vs l [m]

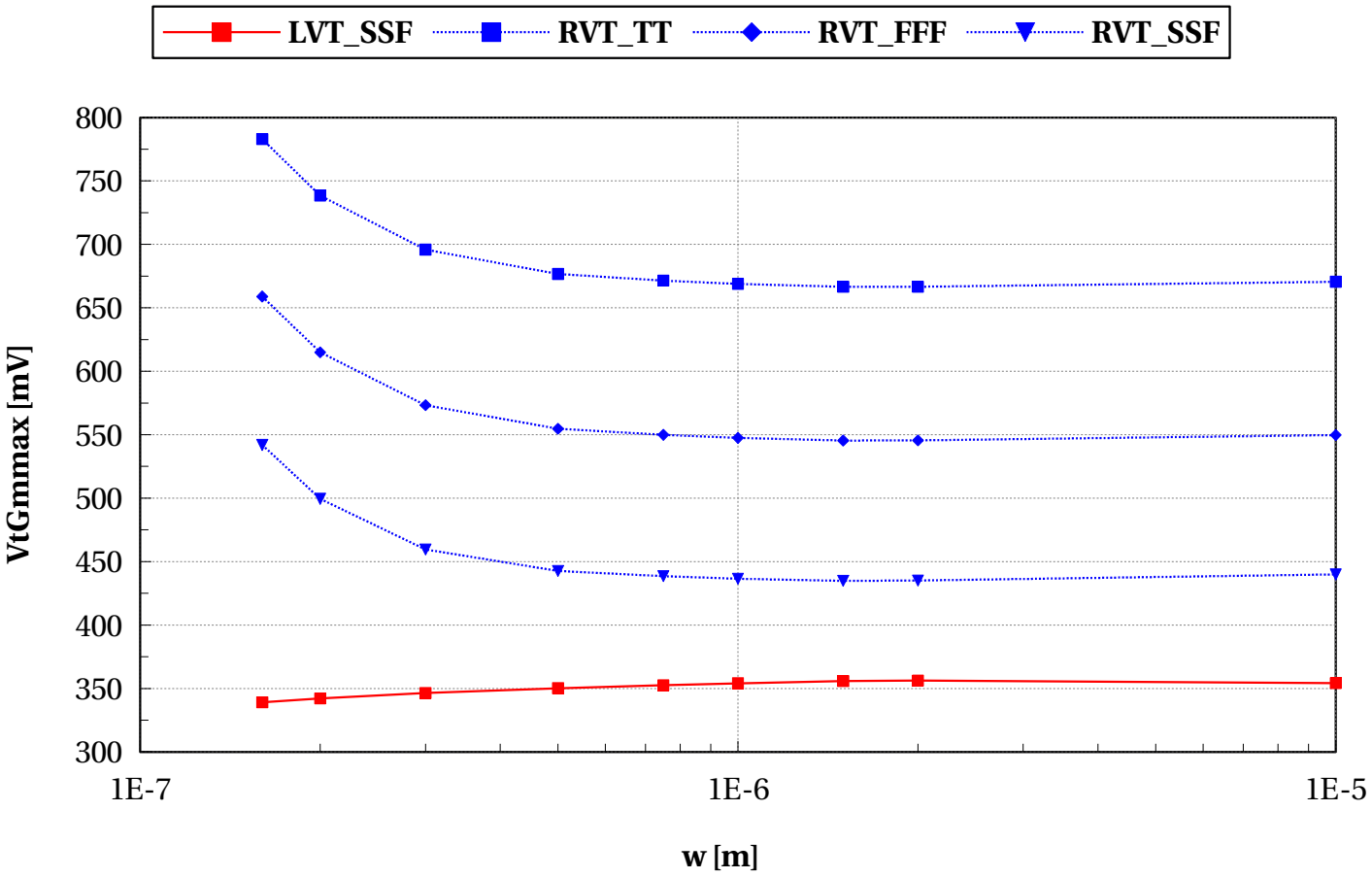
W==2e-6 and nf==2 and Temp==25 and devType=="PCELLwoWPE"



Scaling versus Width (T=25C)

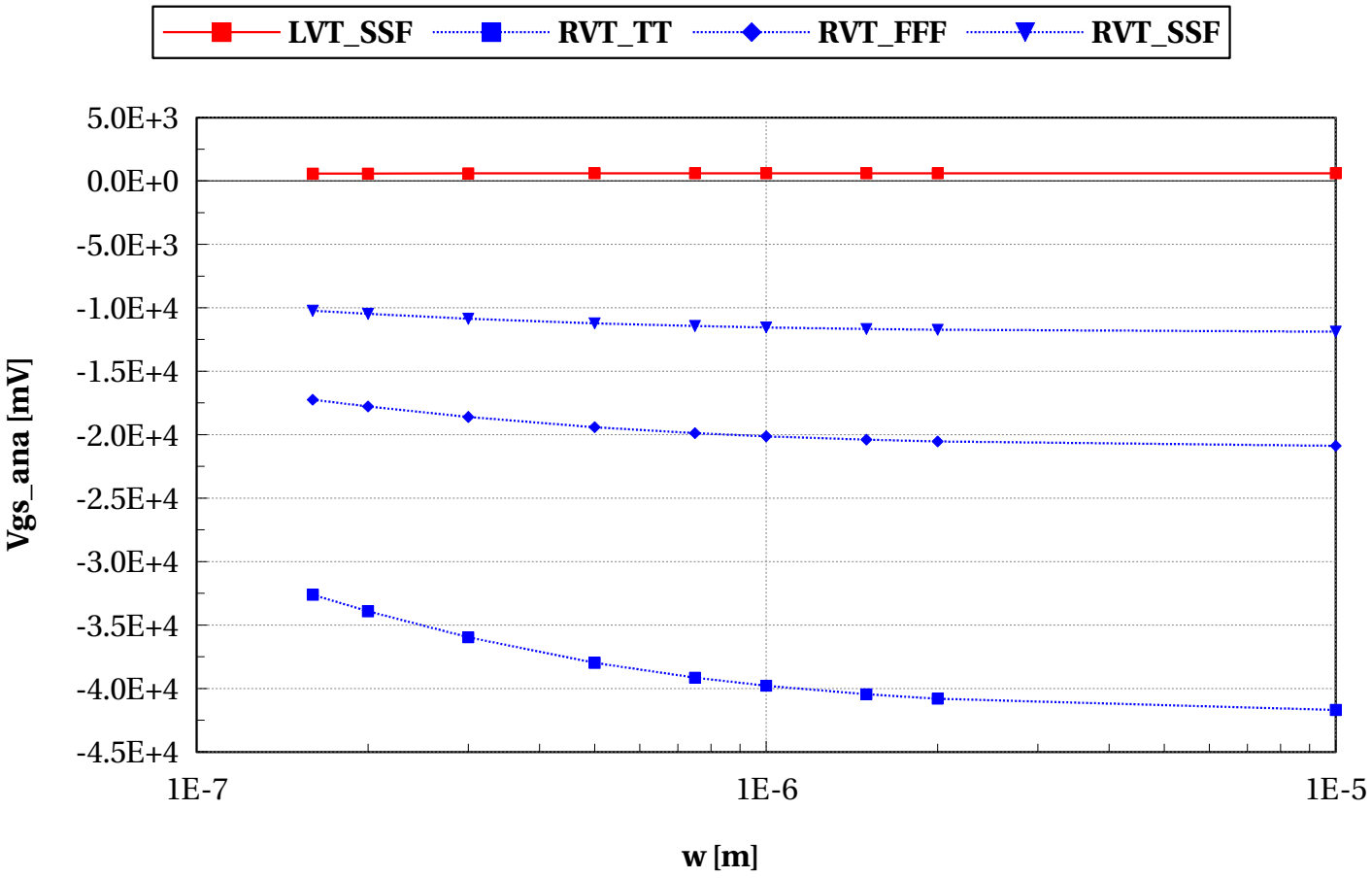
eglvtpfet_acc, VtGmmax [mV] vs w [m]

L==0.15e-6 and nf==2 and Temp==25 and devType=="PCELLwoWPE"

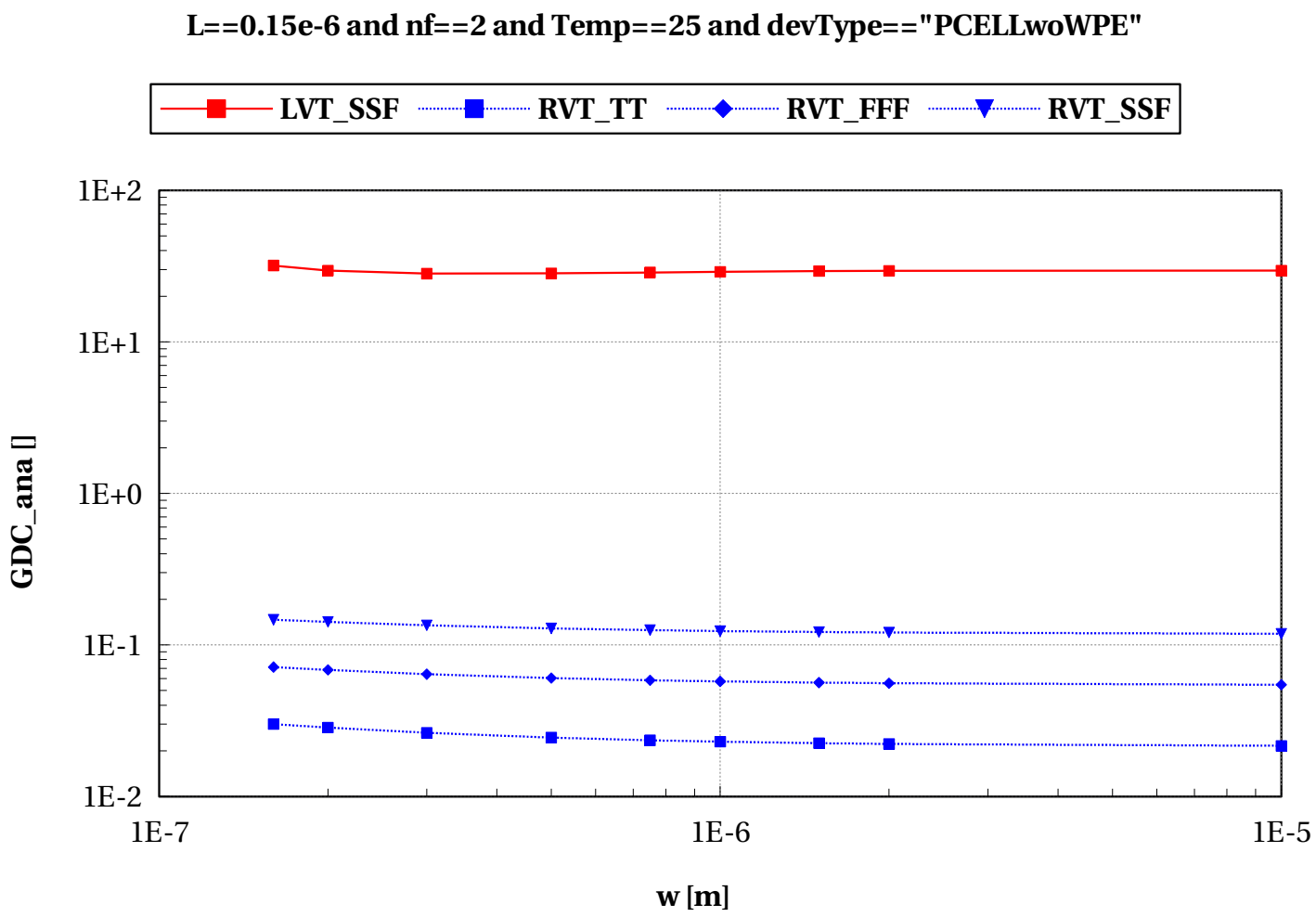


eglvtpfet_acc, Vgs_ana [mV] vs w [m]

L==0.15e-6 and nf==2 and Temp==25 and devType=="PCELLwoWPE"

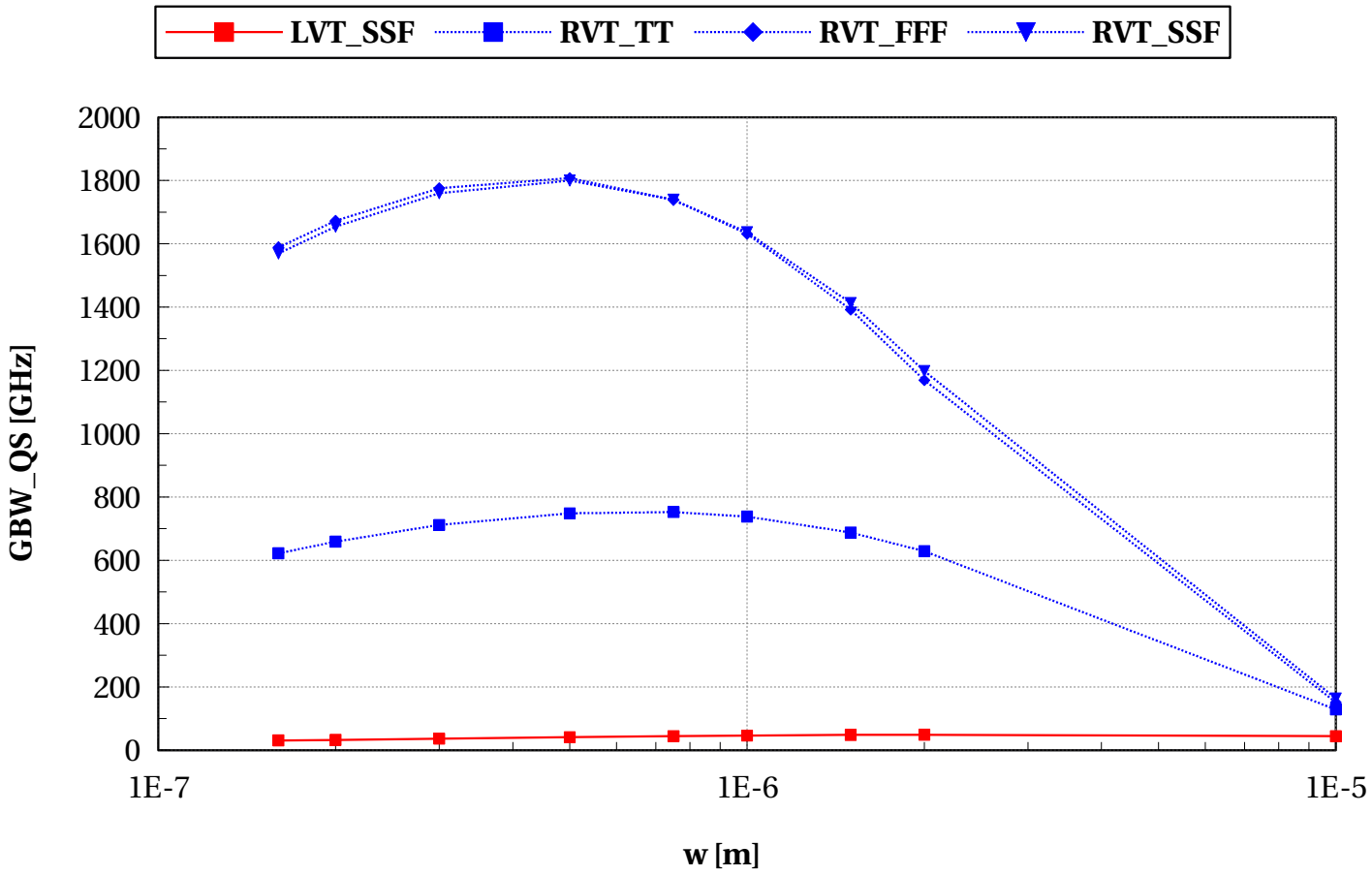


eglvtpfet_acc, GDC_ana [] vs w [m]

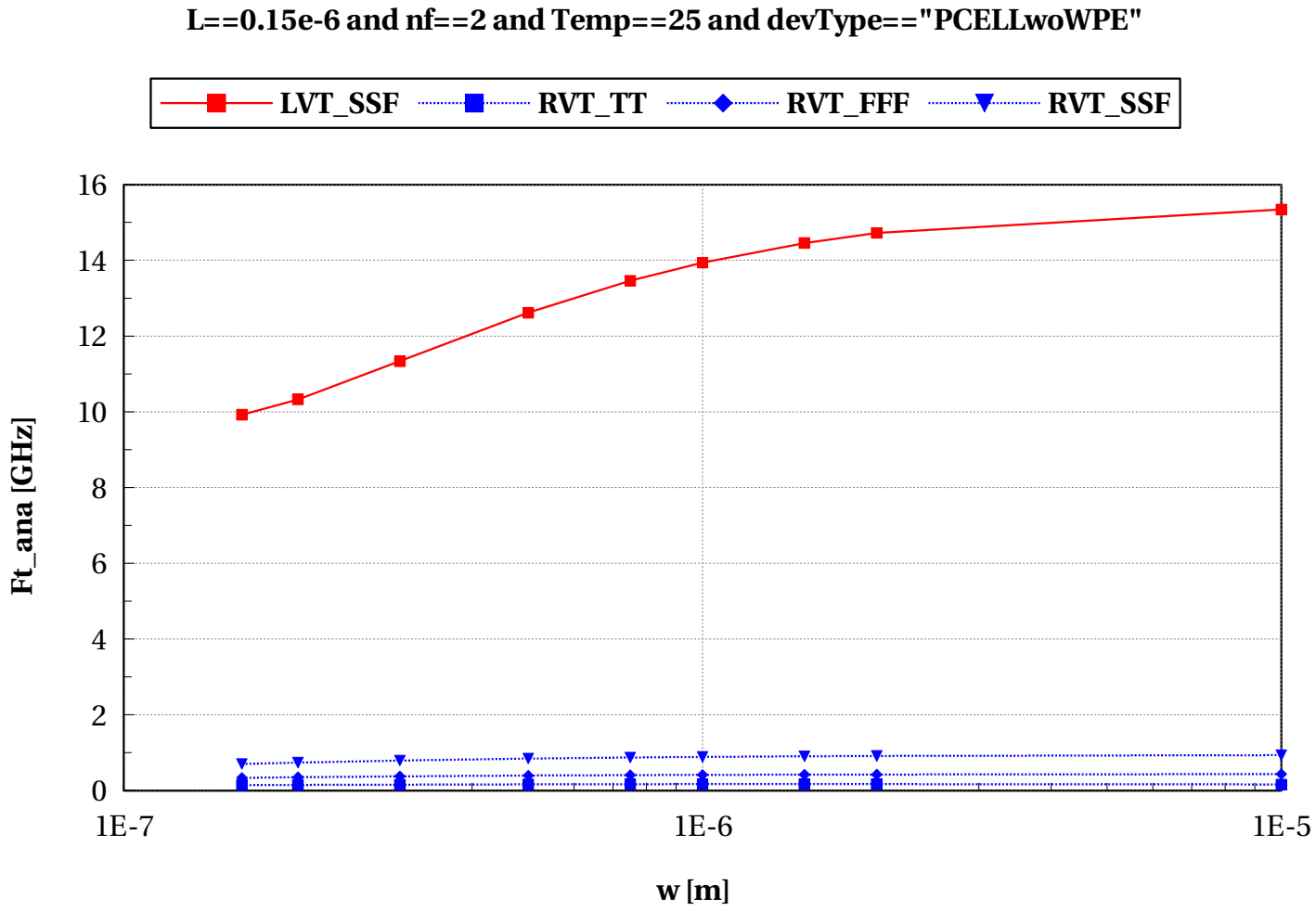


eglvtpfet_acc, GBW_QS [GHz] vs w [m]

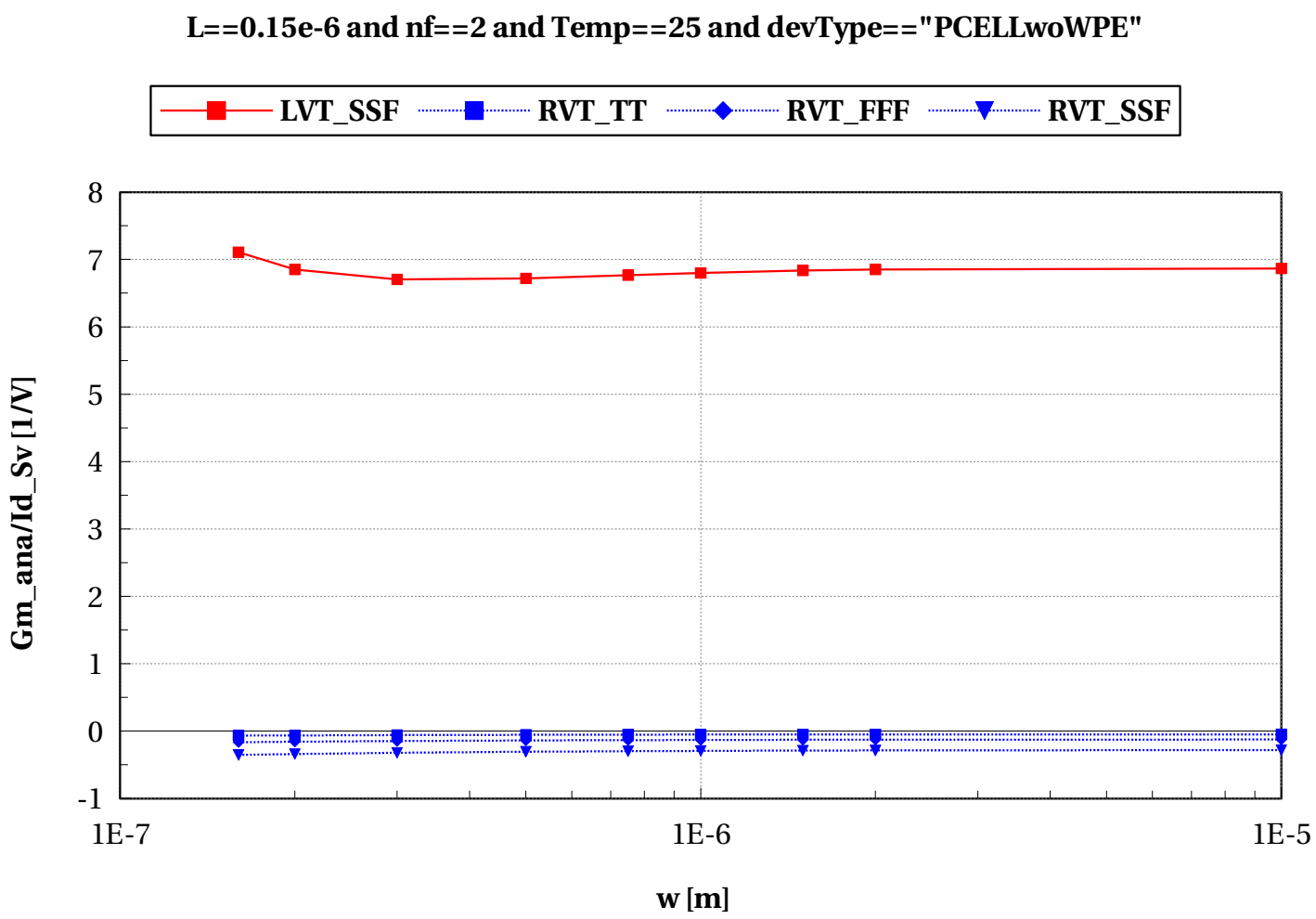
L==0.15e-6 and nf==2 and Temp==25 and devType=="PCELLwoWPE"



eglvtpfet_acc, Ft_ana [GHz] vs w [m]

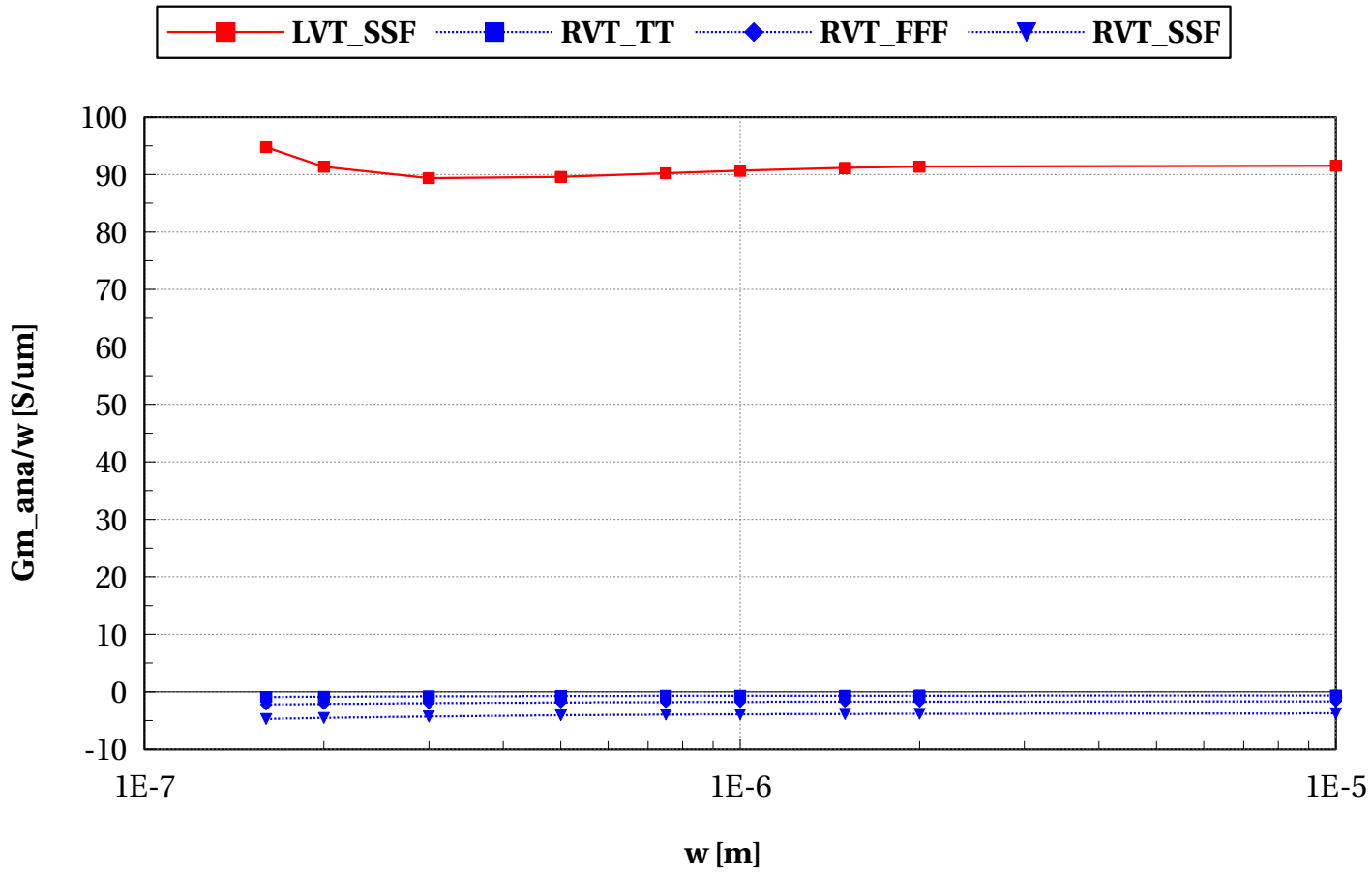


eglvtpfet_acc, Gm_ana/Id_Sv [1/V] vs w [m]

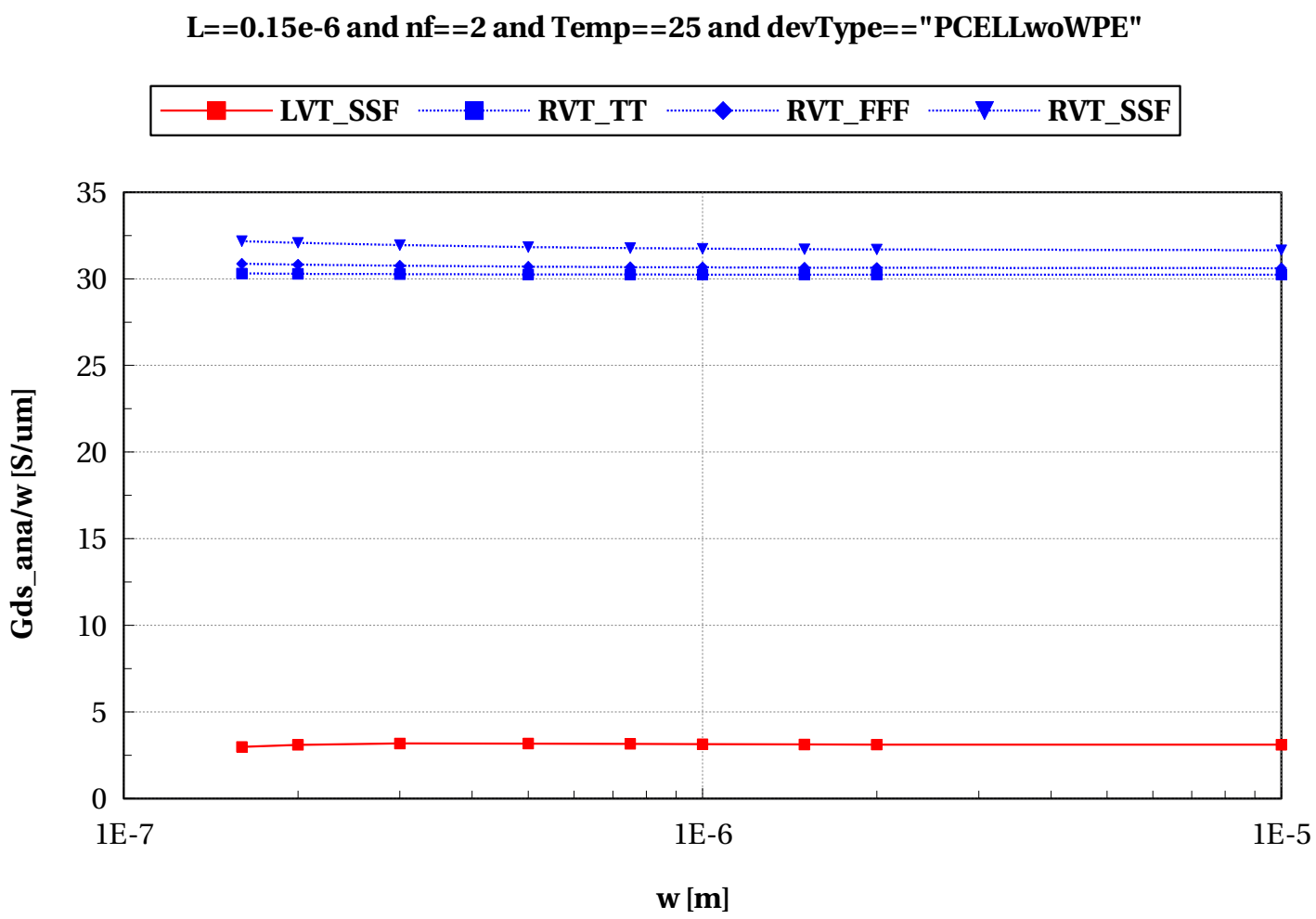


eglvtpfet_acc, Gm_ana/w [S/um] vs w [m]

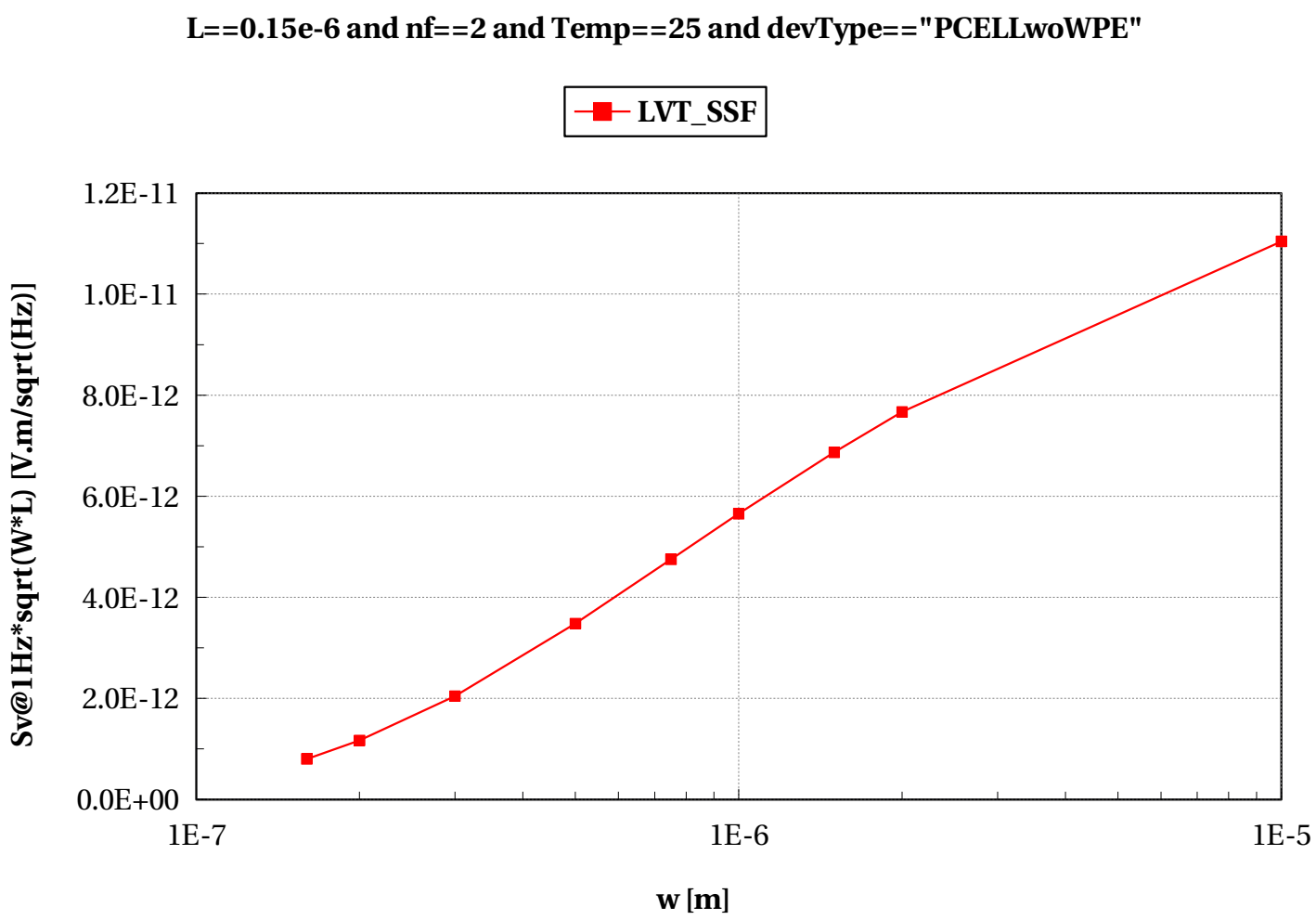
L==0.15e-6 and nf==2 and Temp==25 and devType=="PCELLwoWPE"



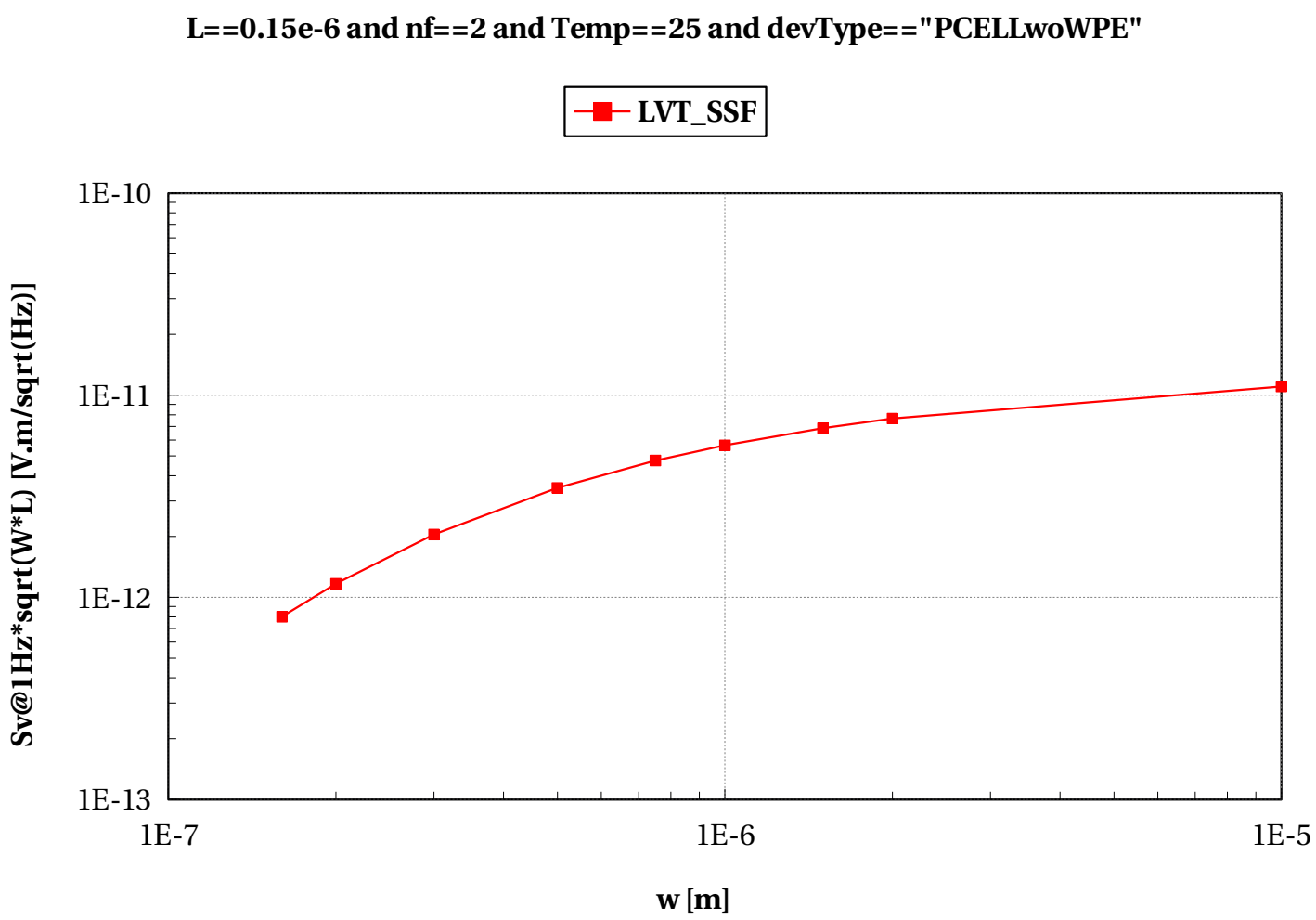
eglvtpfet_acc, Gds_ana/w [S/um] vs w [m]



eglvtpfet_acc, Sv@1Hz*sqrt(W*L) [V.m/sqrt(Hz)] vs w [m]

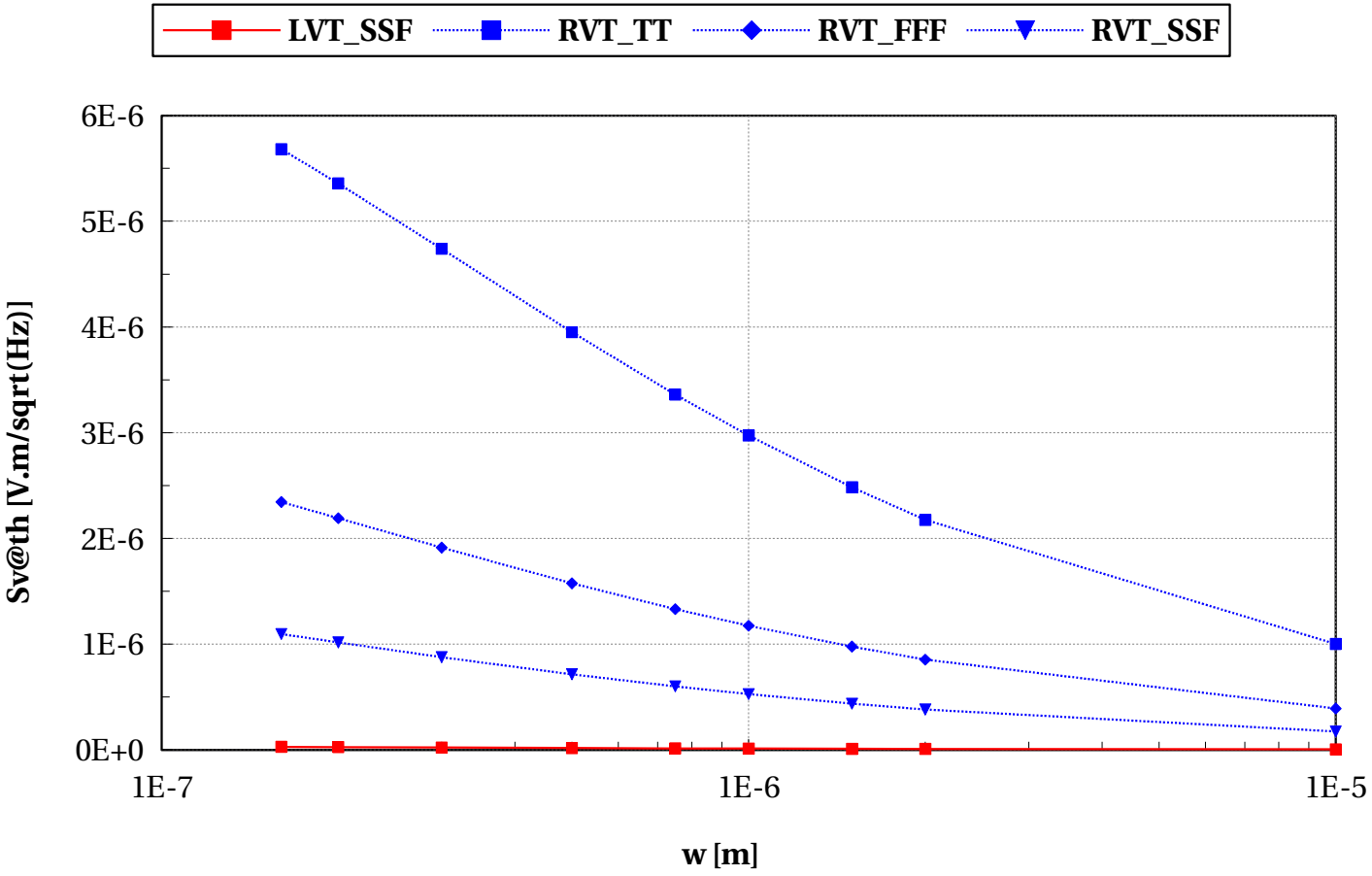


eglvtpfet_acc, Sv@1Hz*sqrt(W*L) [V.m/sqrt(Hz)] vs w [m]

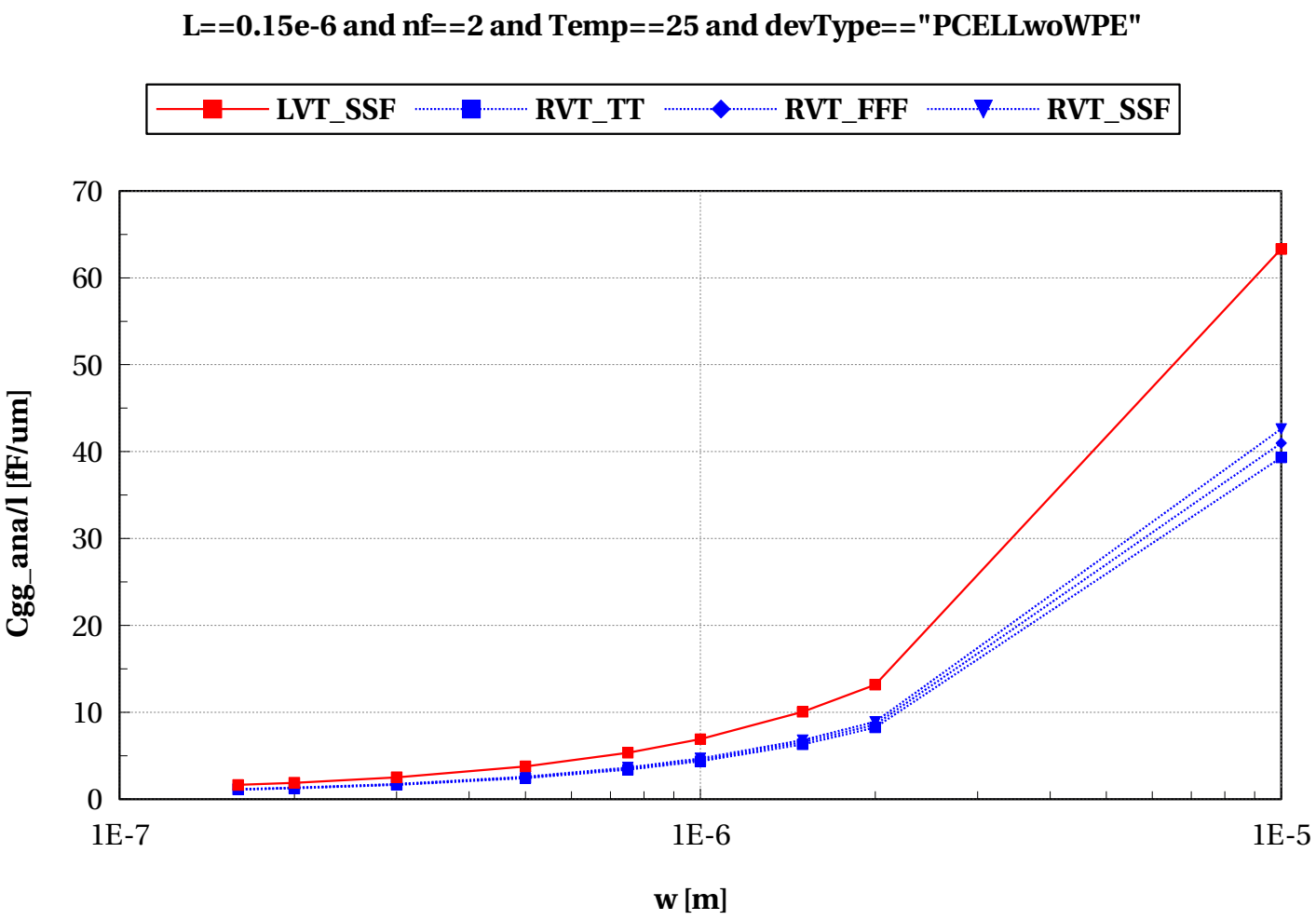


eglvtpfet_acc, Sv@th [V.m/sqrt(Hz)] vs w [m]

L==0.15e-6 and nf==2 and Temp==25 and devType=="PCELLwoWPE"

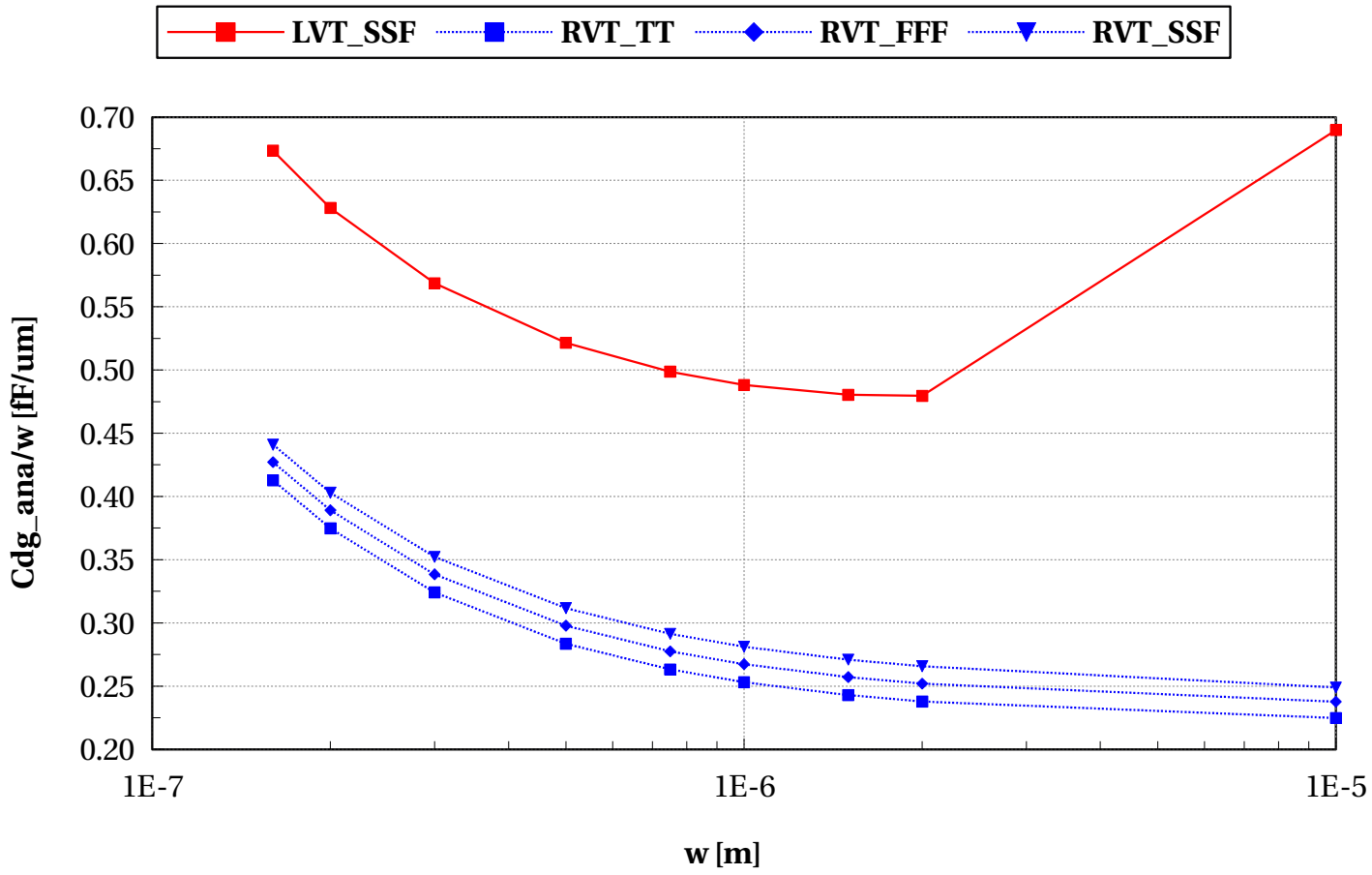


eglvtpfet_acc, Cgg_ana/l [fF/um] vs w [m]

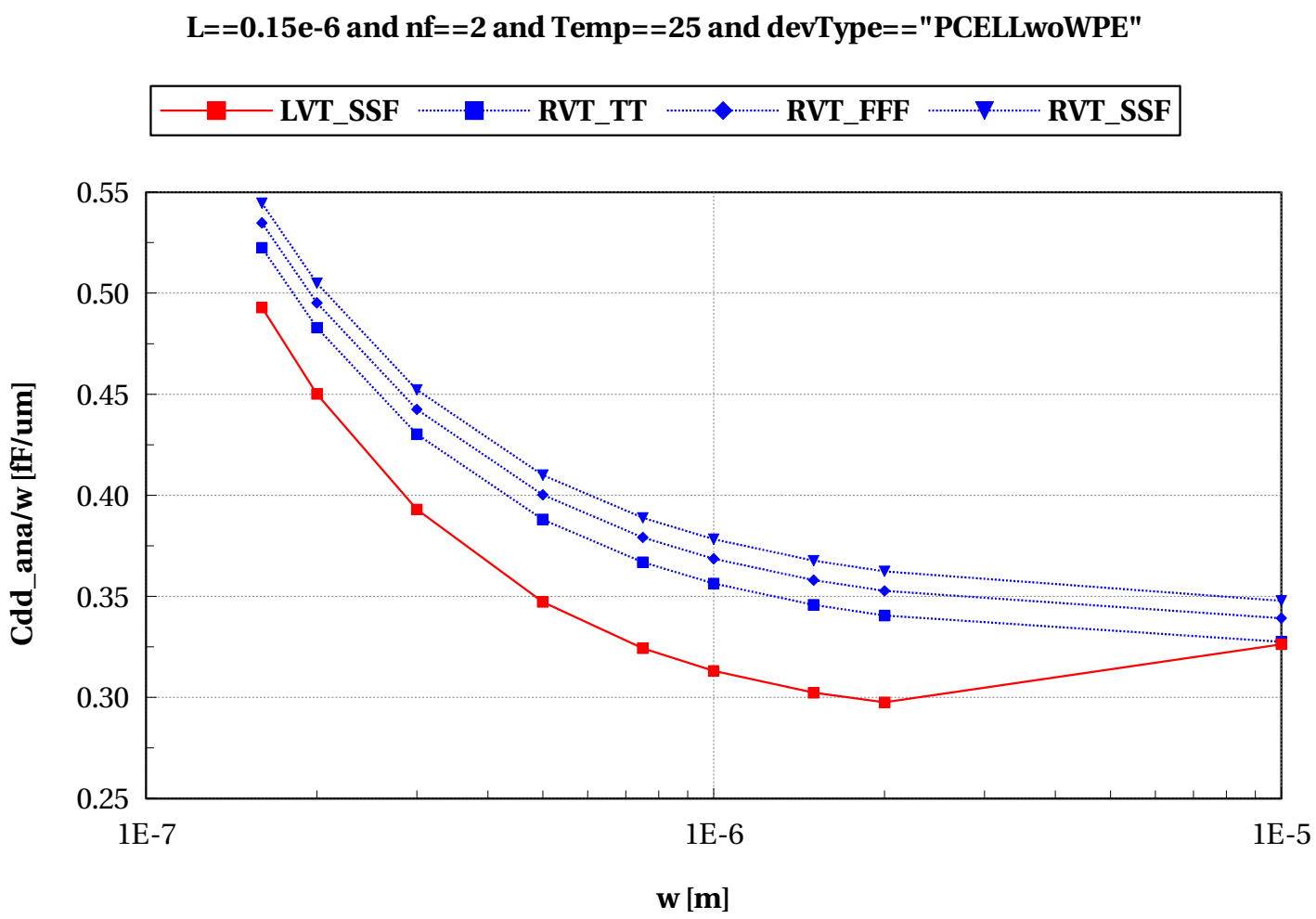


eglvtpfet_acc, Cdg_ana/w [fF/um] vs w [m]

L==0.15e-6 and nf==2 and Temp==25 and devType=="PCELLwoWPE"

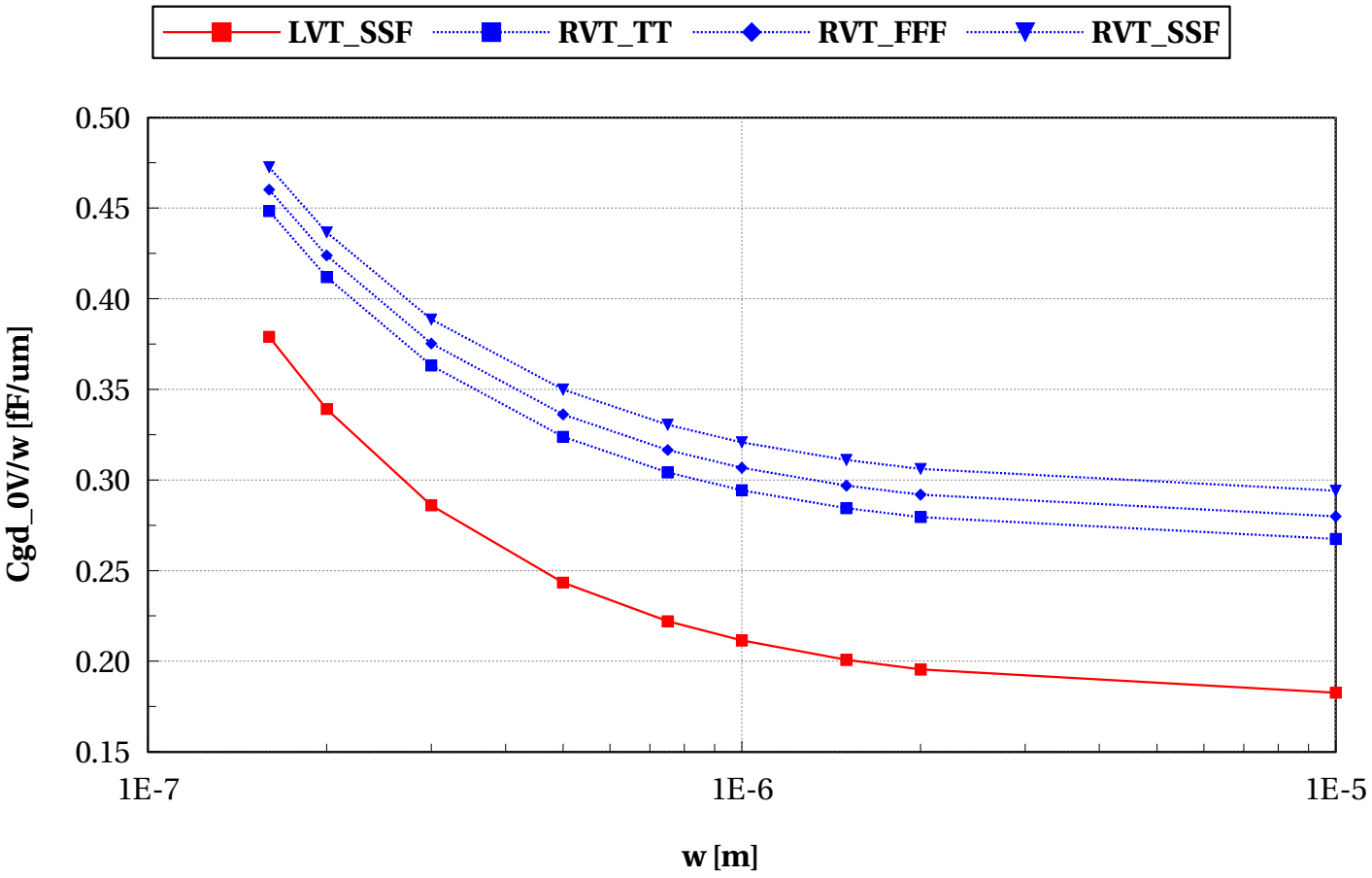


eglvtpfet_acc, Cdd_ana/w [fF/um] vs w [m]



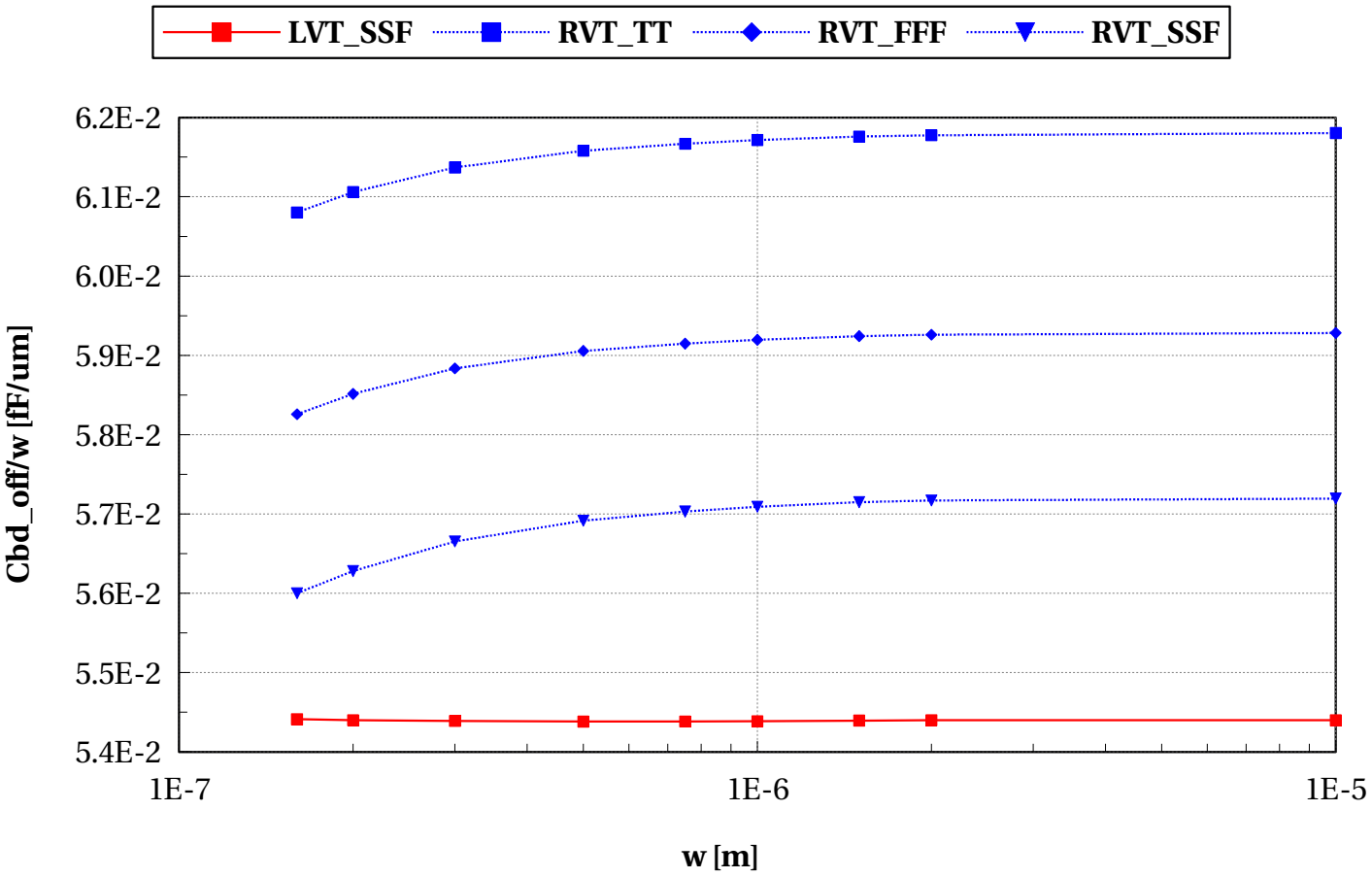
eglvtpfet_acc, Cgd_0V/w [fF/um] vs w [m]

L==0.15e-6 and nf==2 and Temp==25 and devType=="PCELLwoWPE"



eglvtpfet_acc, Cbd_off/w [fF/um] vs w [m]

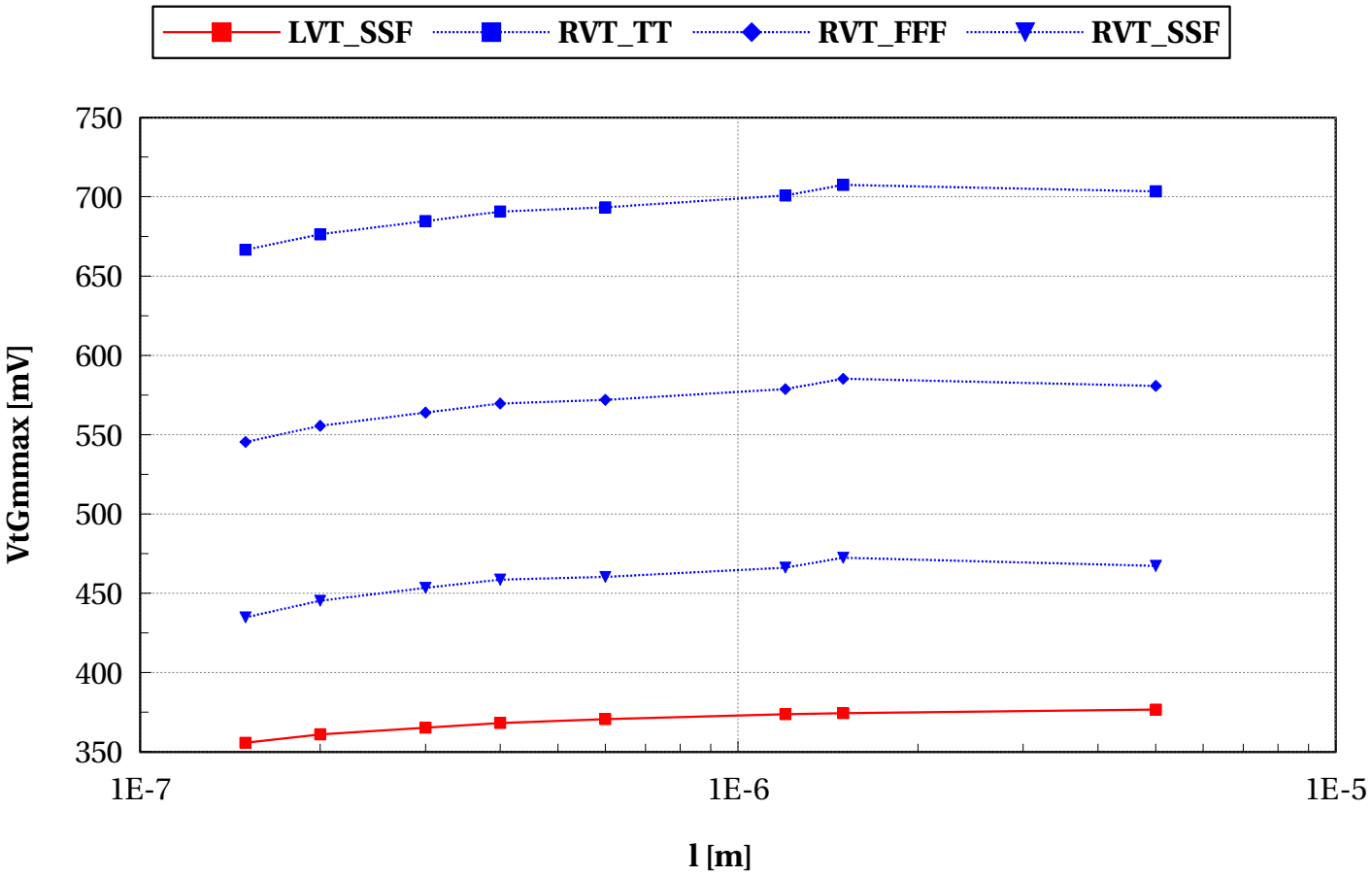
L==0.15e-6 and nf==2 and Temp==25 and devType=="PCELLwoWPE"



Scaling versus Length @ W/L=10&&W/nf<5um

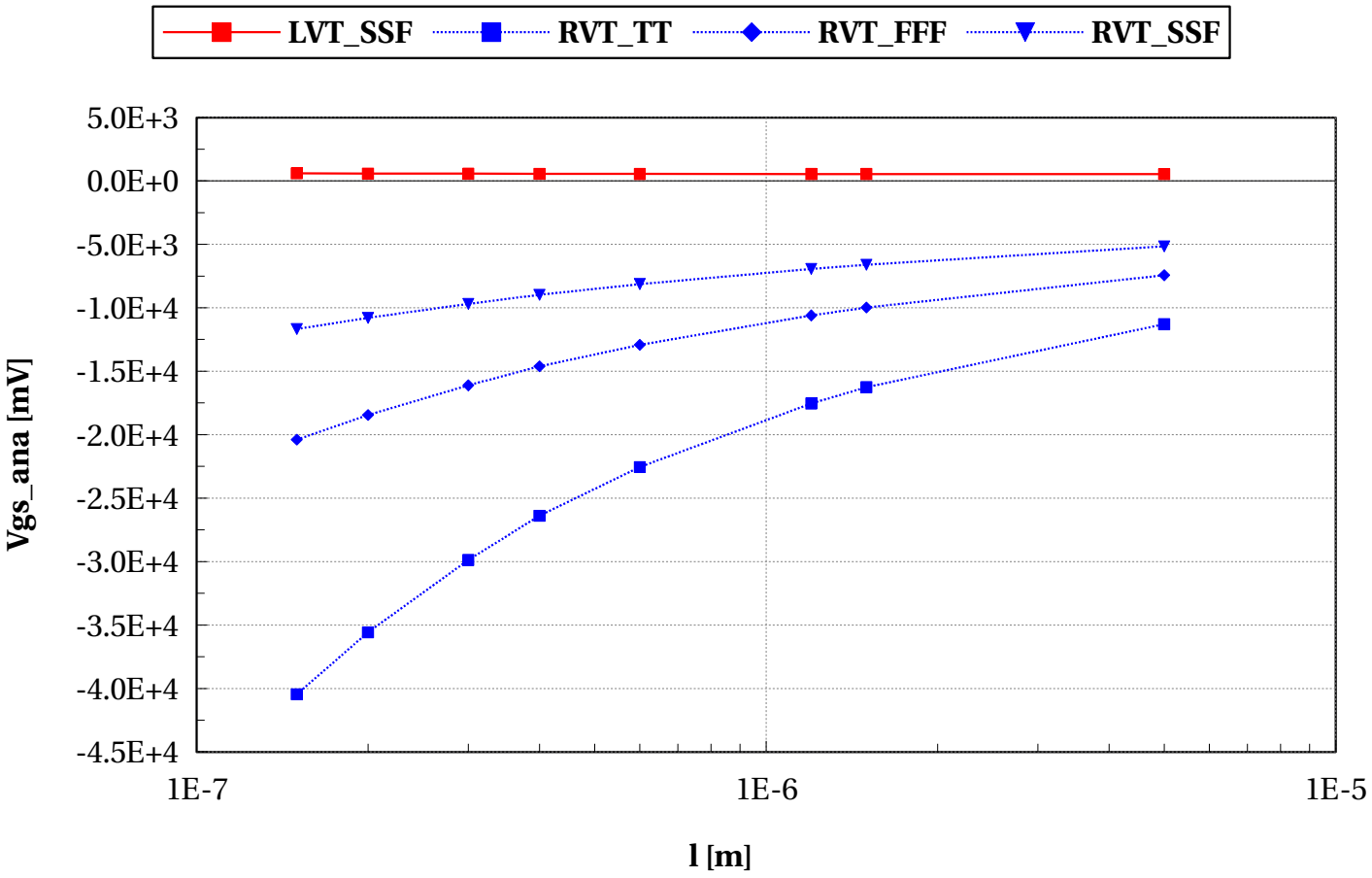
eglvtpfet_acc, VtGmmax [mV] vs l [m]

W/L==10 and w/nf<5 and Temp==25 and devType=="PCELLwoWPE"



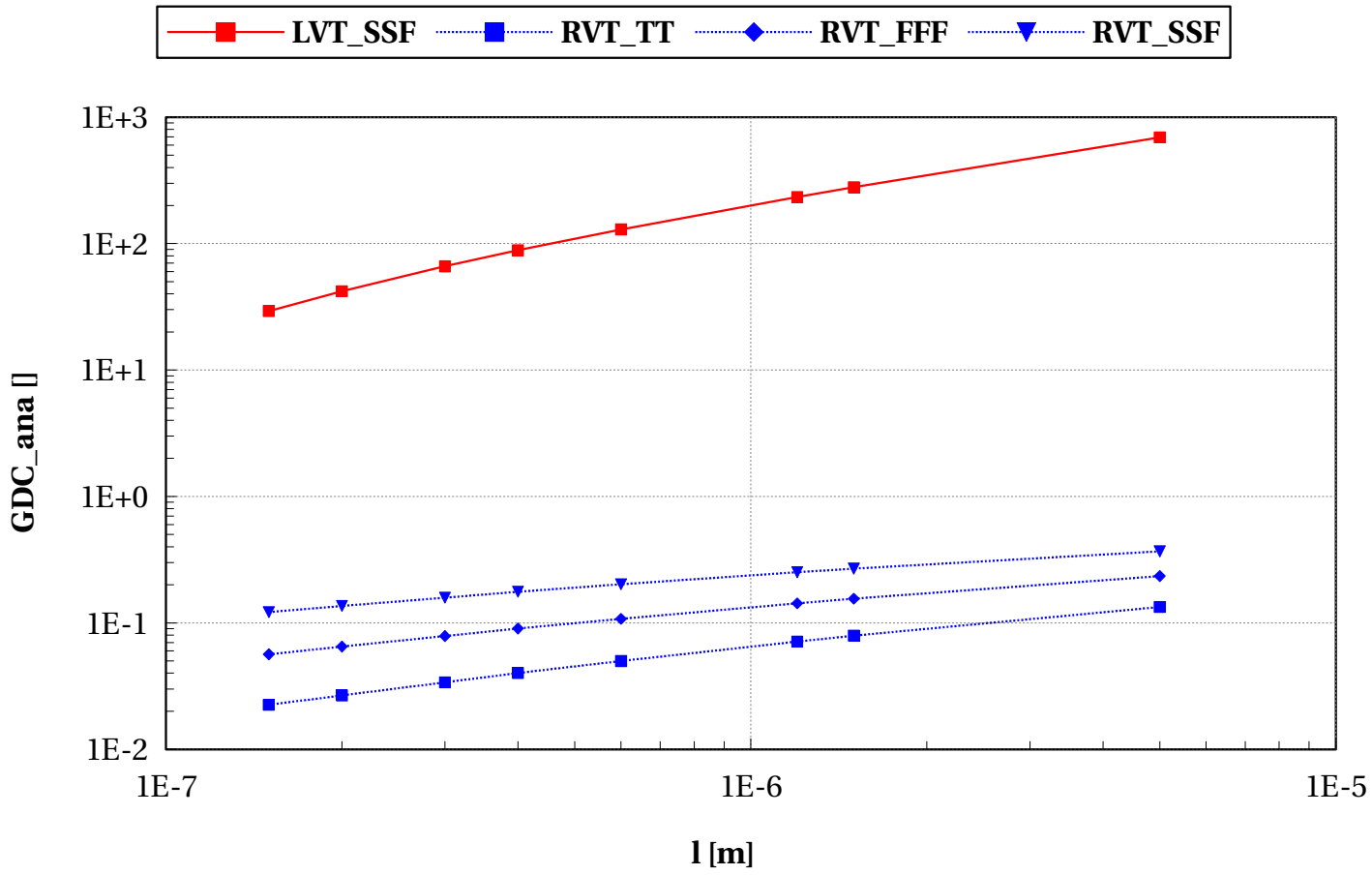
eglvtpfet_acc, Vgs_ana [mV] vs l [m]

W/L==10 and w/nf<5 and Temp==25 and devType=="PCELLwoWPE"



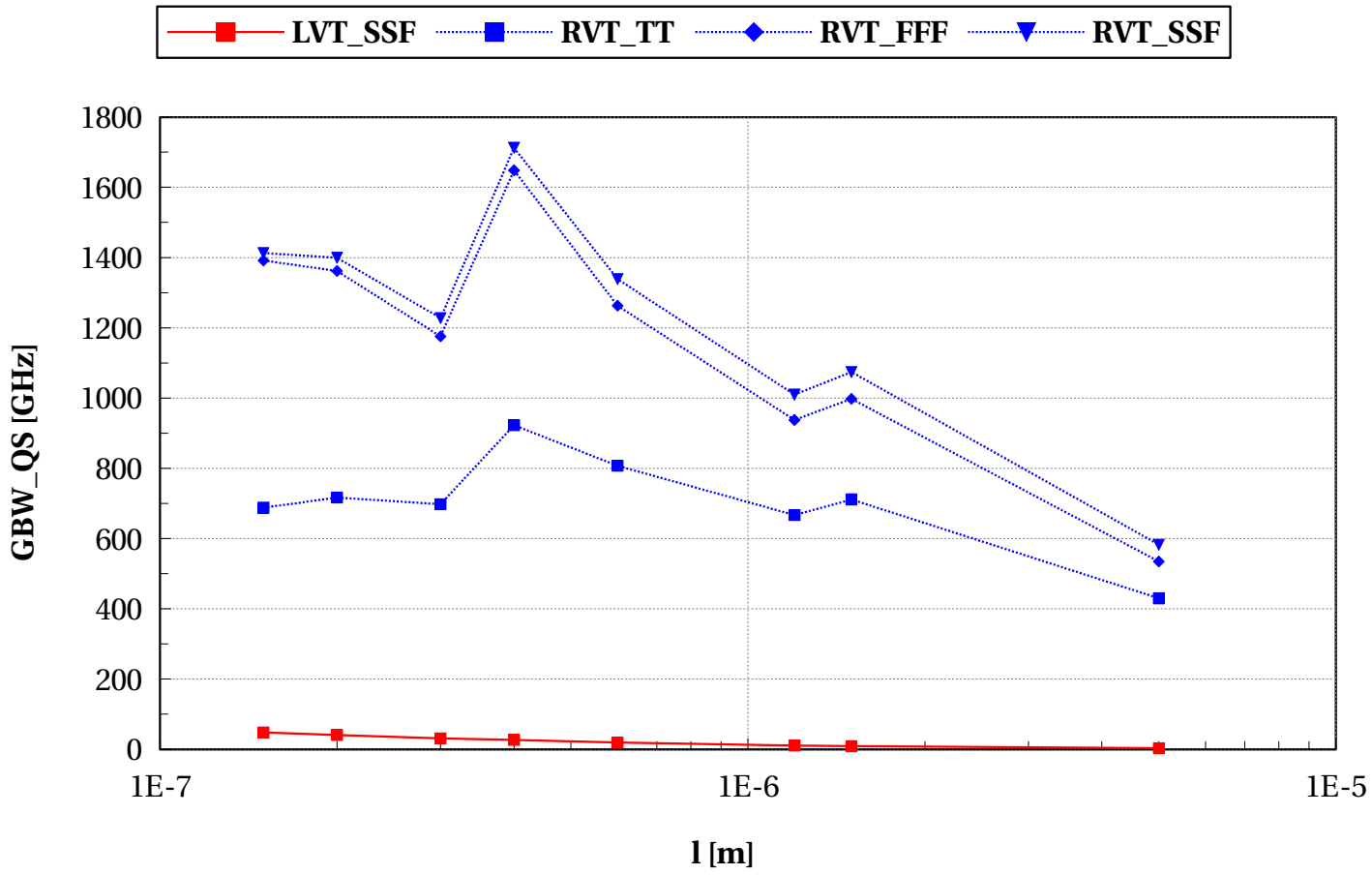
eglvtpfet_acc, GDC_ana [] vs l [m]

W/L==10 and w/nf<5 and Temp==25 and devType=="PCELLwoWPE"



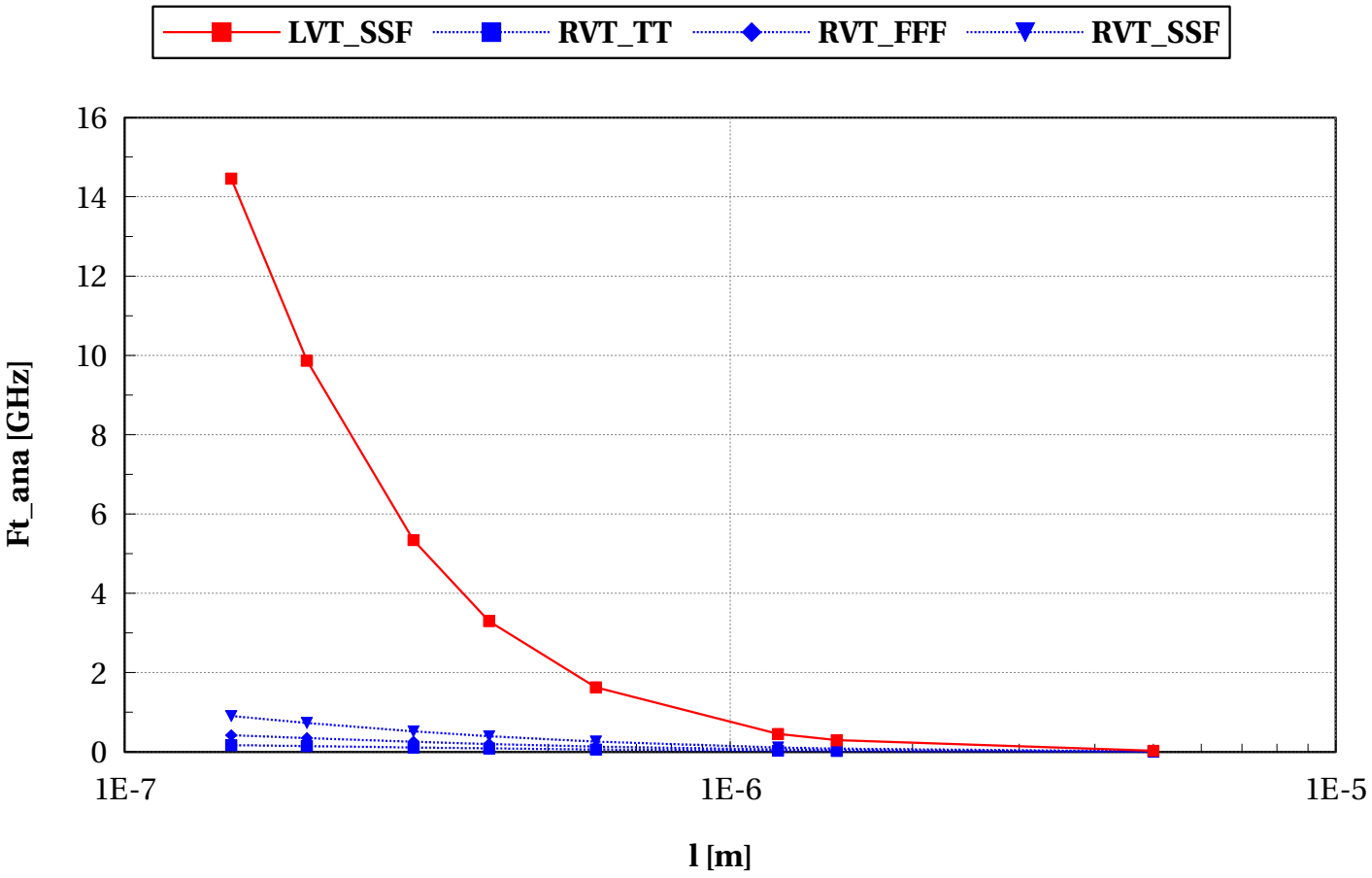
eglvtpfet_acc, GBW_QS [GHz] vs l [m]

W/L==10 and w/nf<5 and Temp==25 and devType=="PCELLwoWPE"

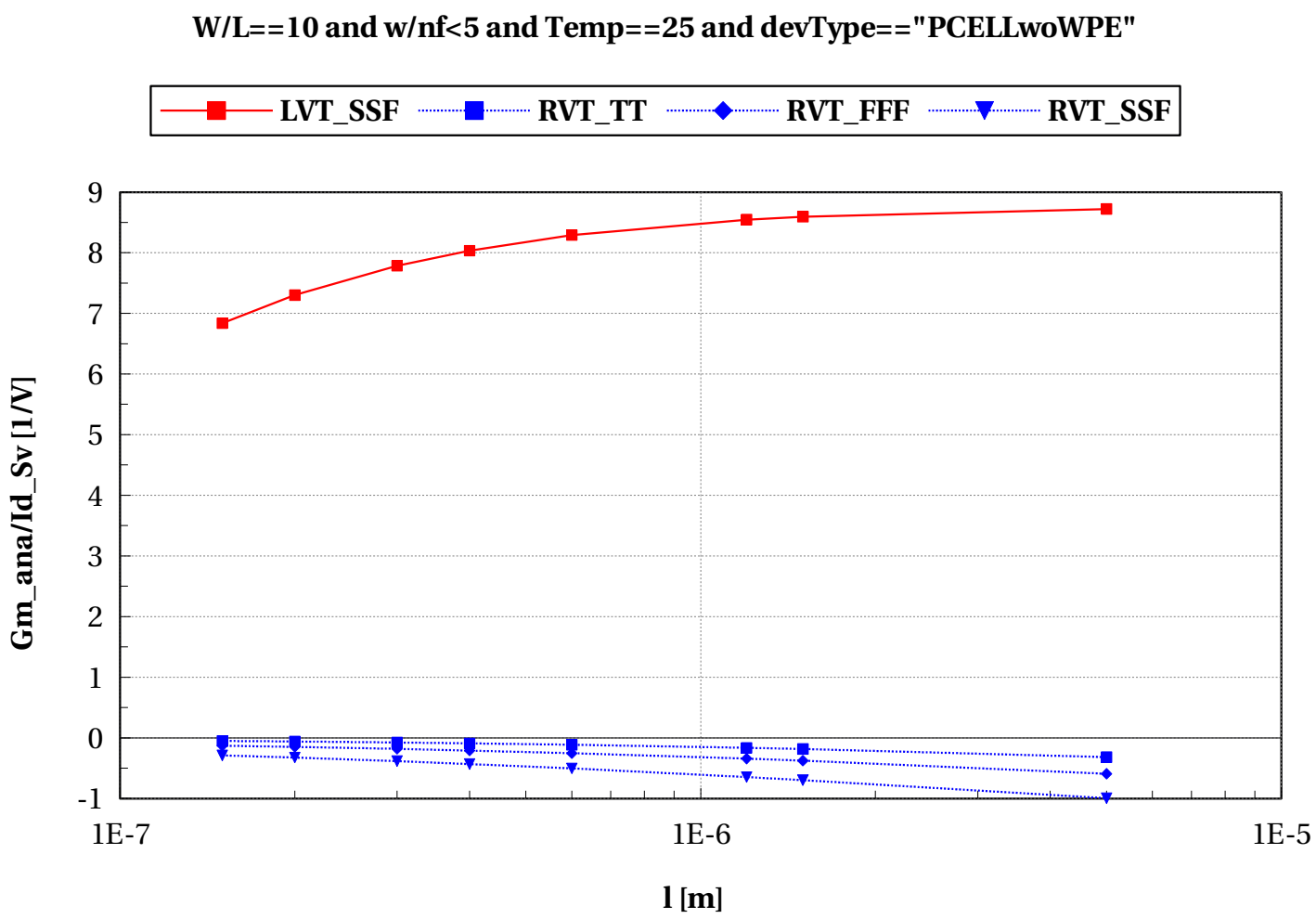


eglvtpfet_acc, Ft_ana [GHz] vs l [m]

W/L==10 and w/nf<5 and Temp==25 and devType=="PCELLwoWPE"

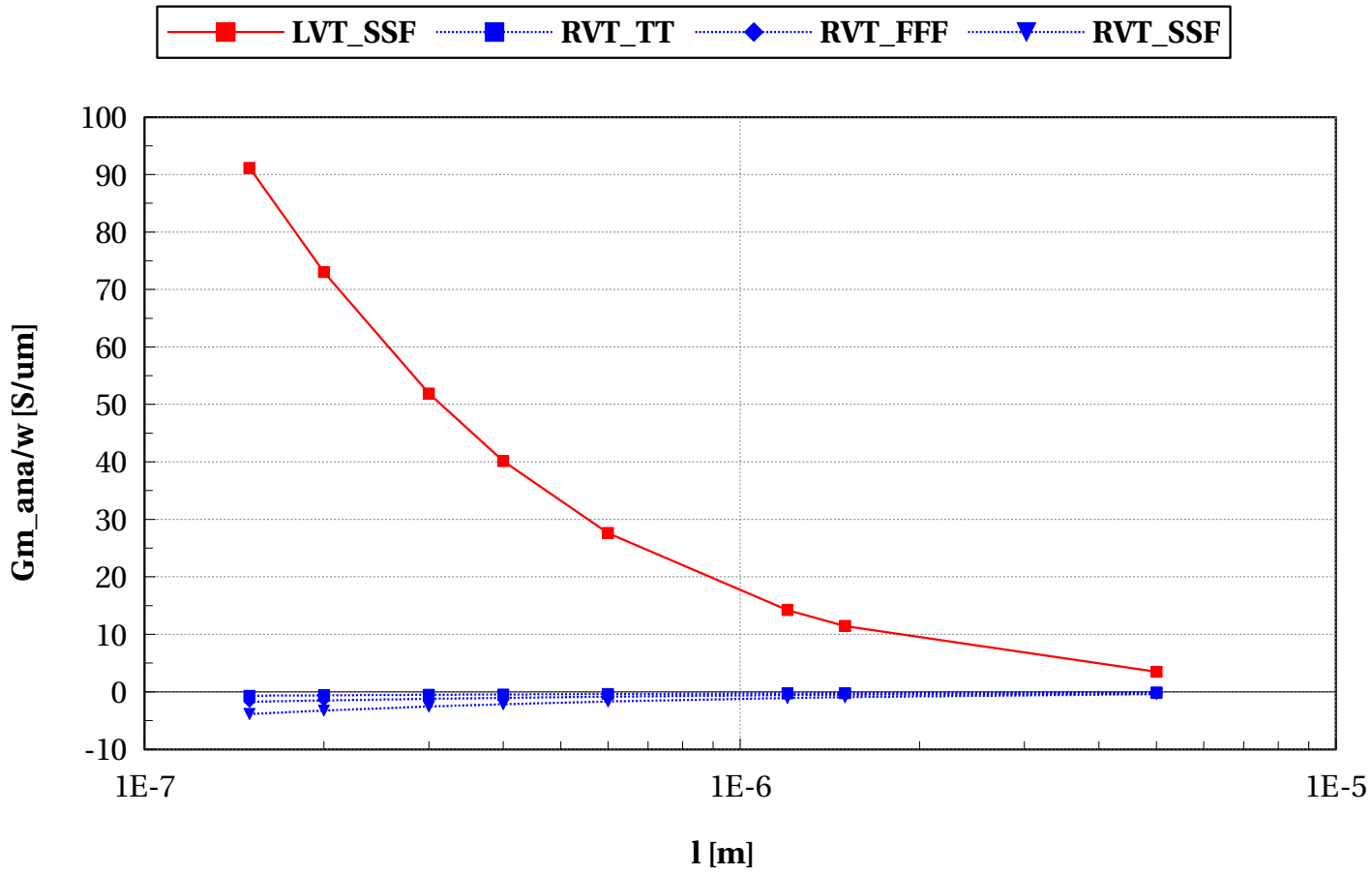


eglvtpfet_acc, Gm_ana/Id_Sv [1/V] vs l [m]

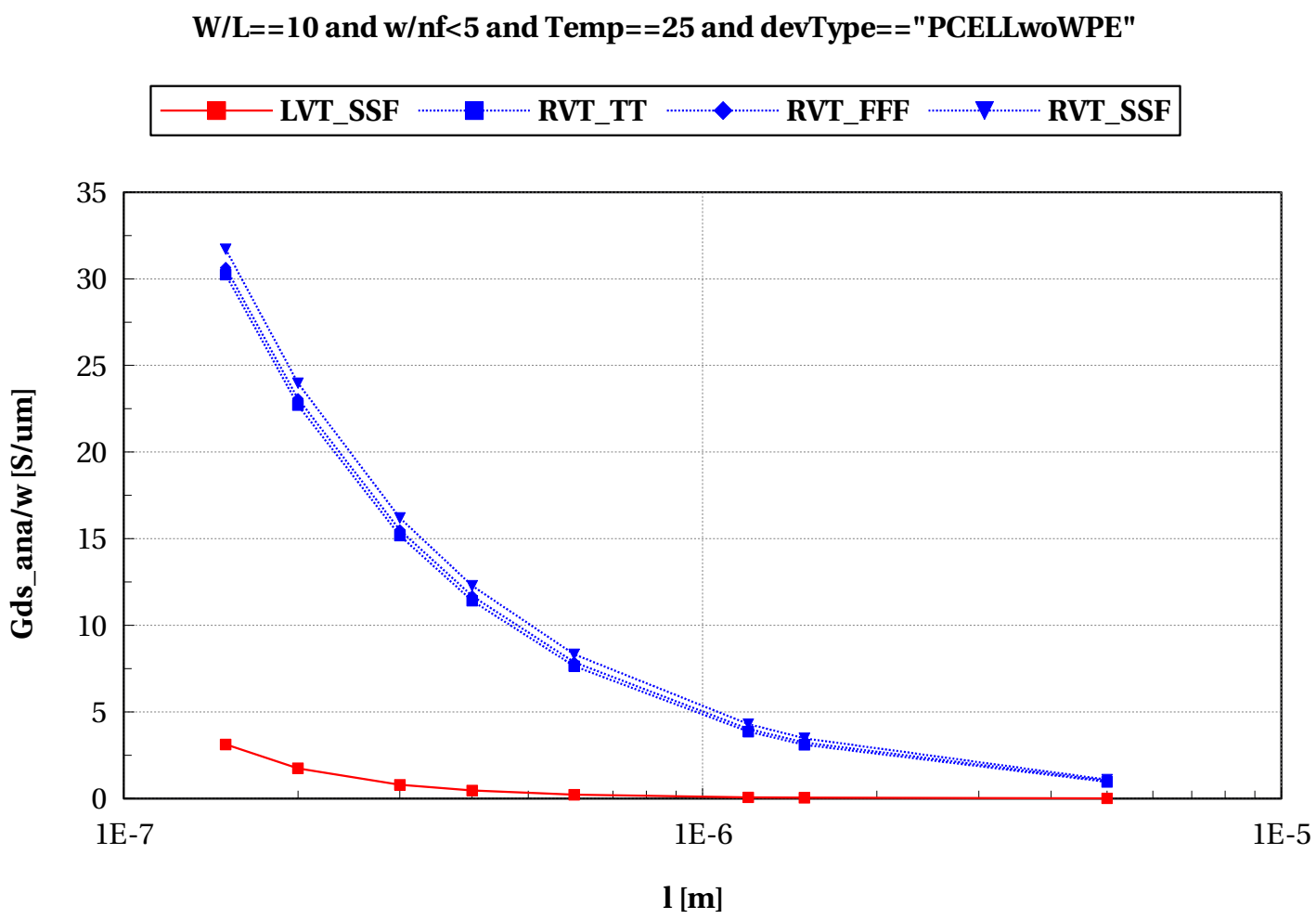


eglvtpfet_acc, Gm_ana/w [S/um] vs l [m]

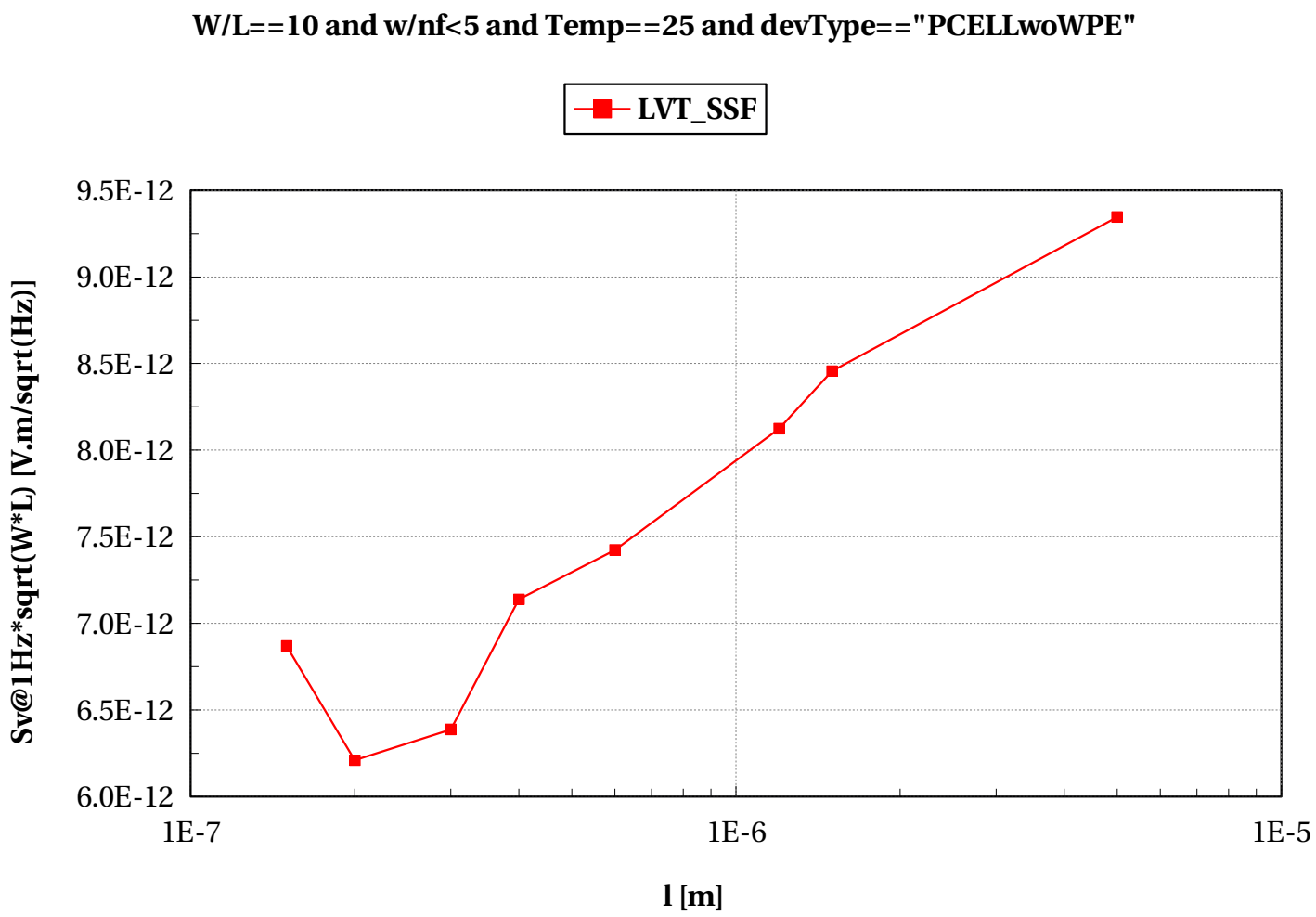
W/L==10 and w/nf<5 and Temp==25 and devType=="PCELLwoWPE"



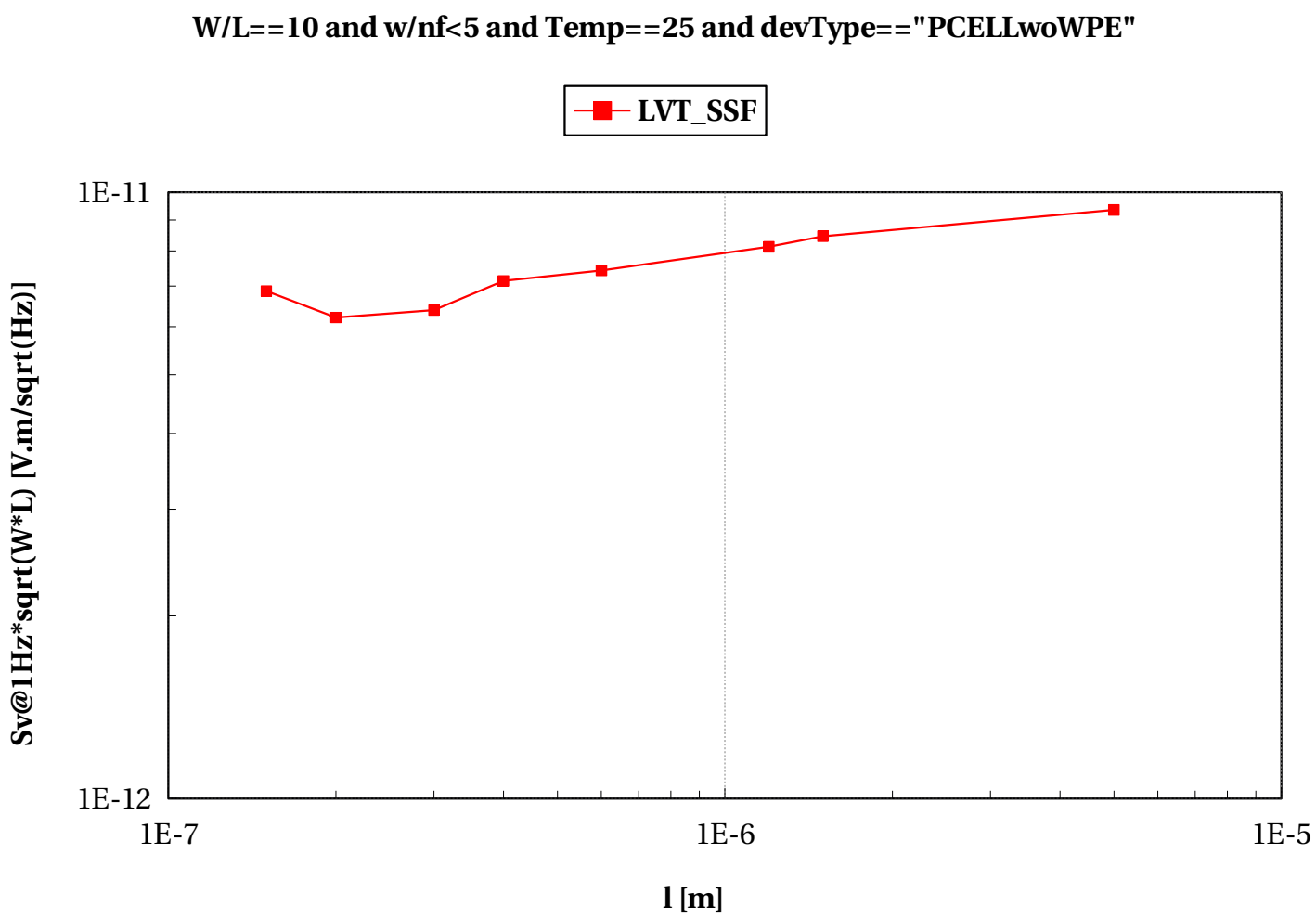
eglvtpfet_acc, Gds_ana/w [S/um] vs l [m]



eglvtpfet_acc, Sv@1Hz*sqrt(W*L) [V.m/sqrt(Hz)] vs l [m]

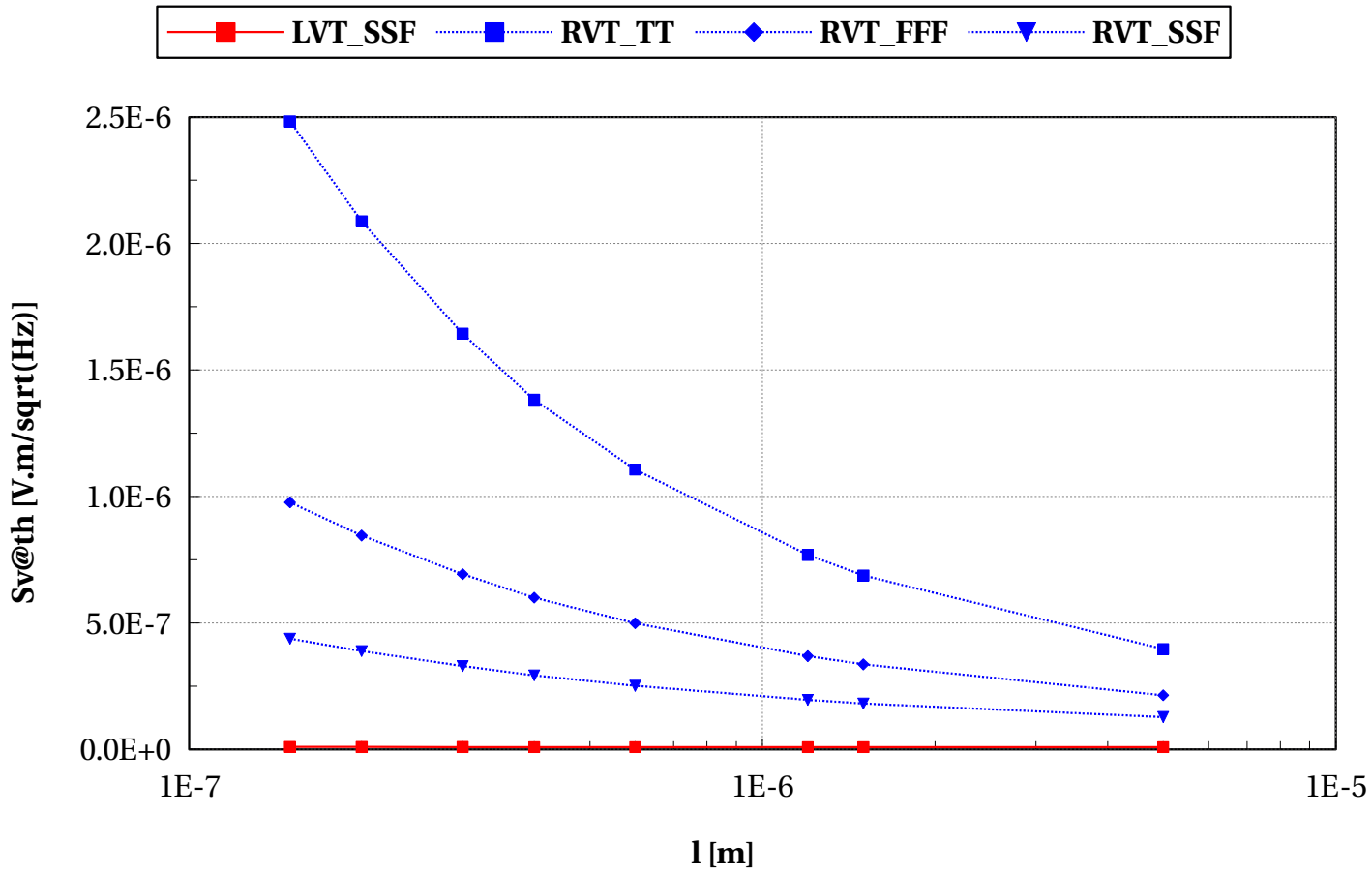


eglvtpfet_acc, Sv@1Hz*sqrt(W*L) [V.m/sqrt(Hz)] vs l [m]

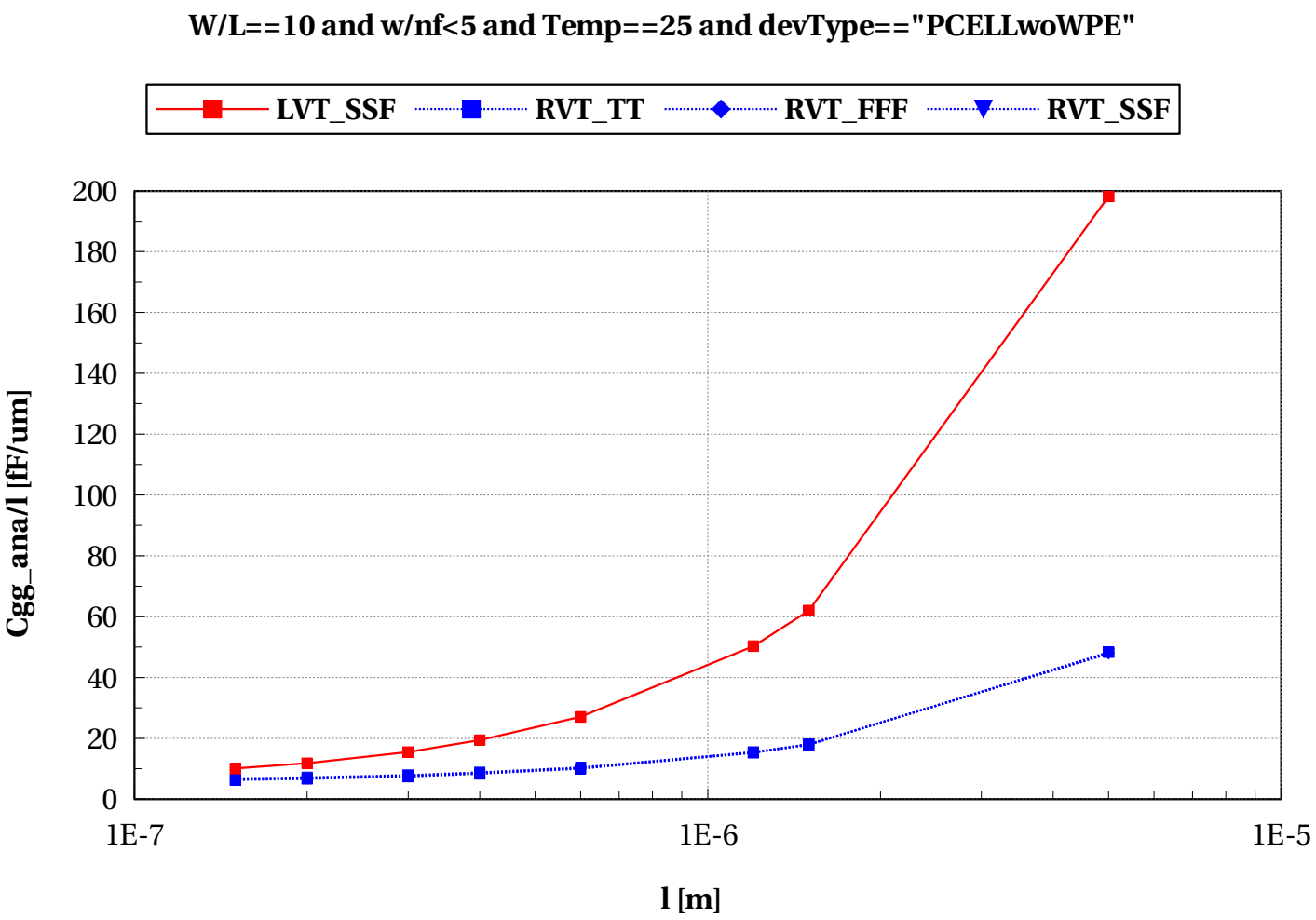


eglvtpfet_acc, Sv@th [V.m/sqrt(Hz)] vs l [m]

W/L==10 and w/nf<5 and Temp==25 and devType=="PCELLwoWPE"

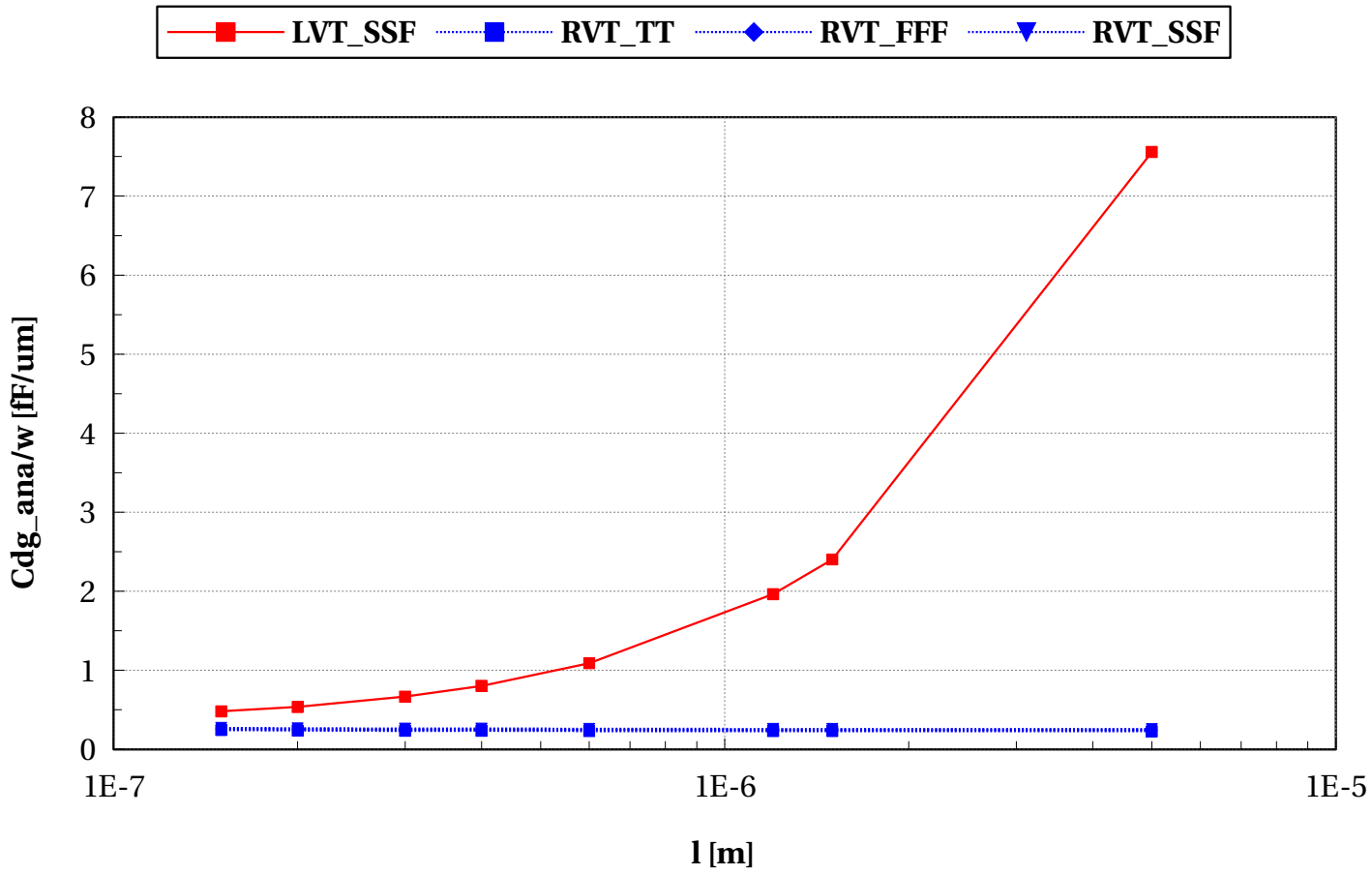


eglvtpfet_acc, Cgg_ana/l [fF/um] vs l [m]



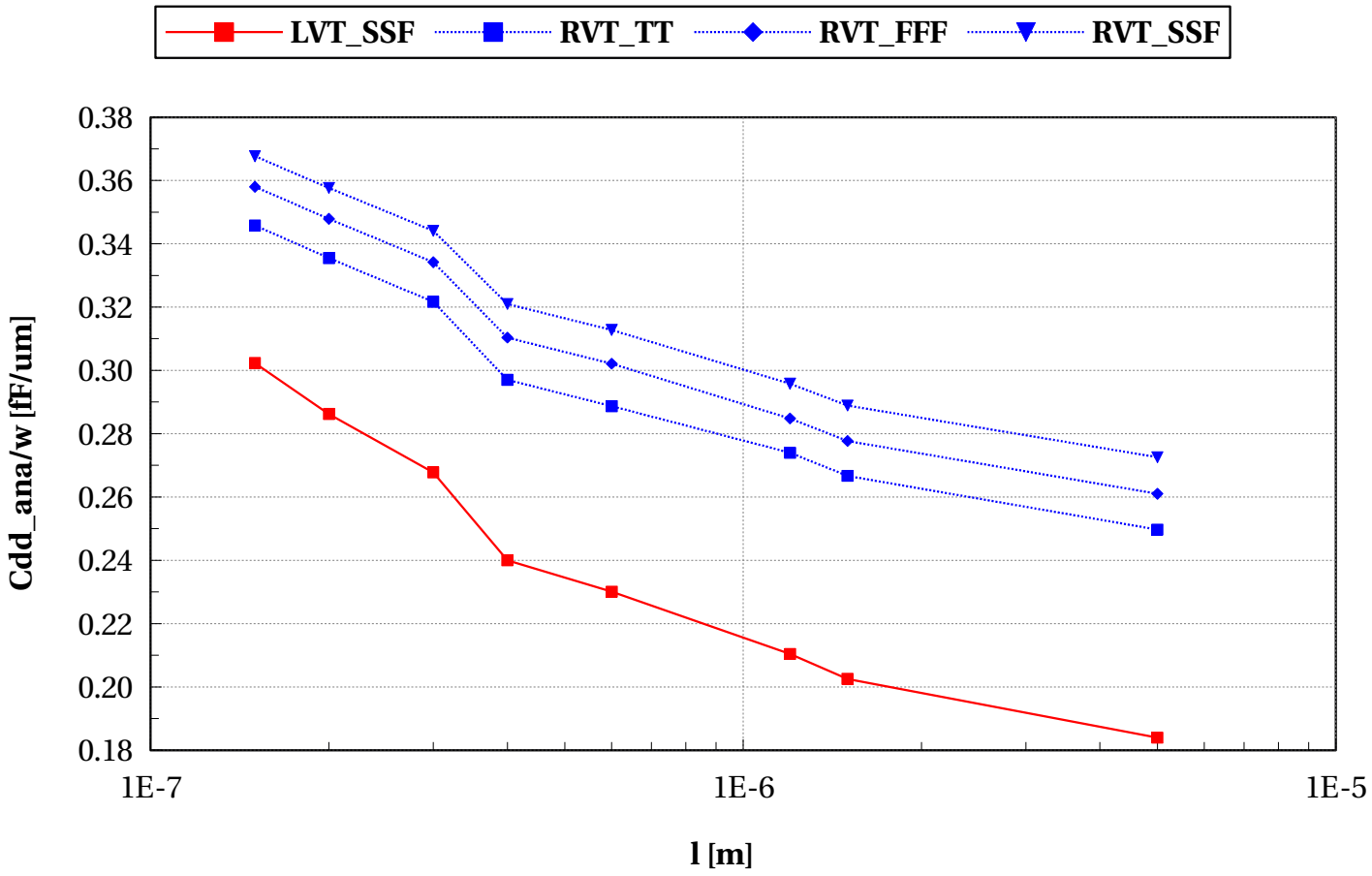
eglvtpfet_acc, Cdg_ana/w [fF/um] vs l [m]

W/L==10 and w/nf<5 and Temp==25 and devType=="PCELLwoWPE"



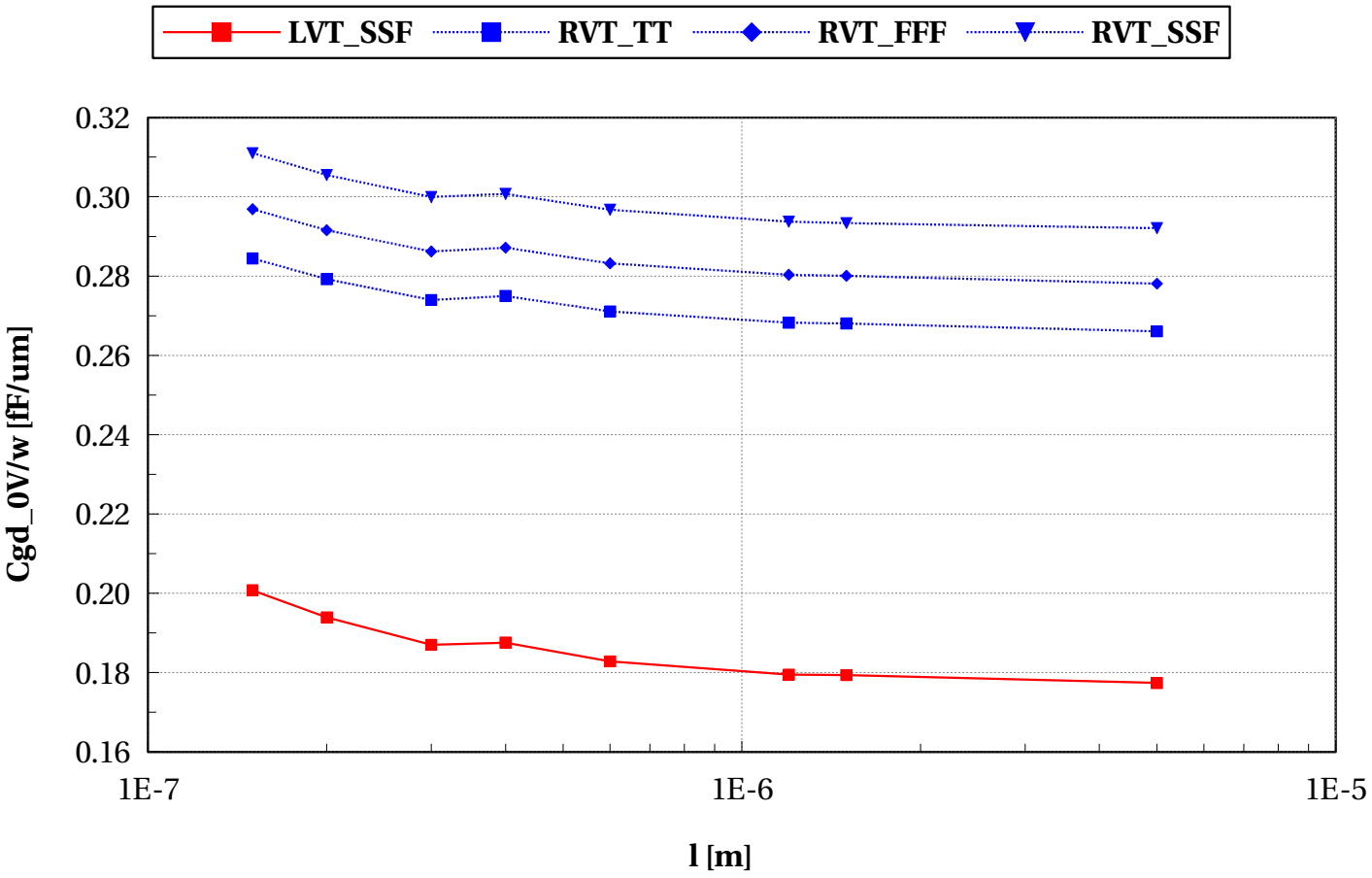
eglvtpfet_acc, Cdd_ana/w [fF/um] vs l [m]

W/L==10 and w/nf<5 and Temp==25 and devType=="PCELLwoWPE"

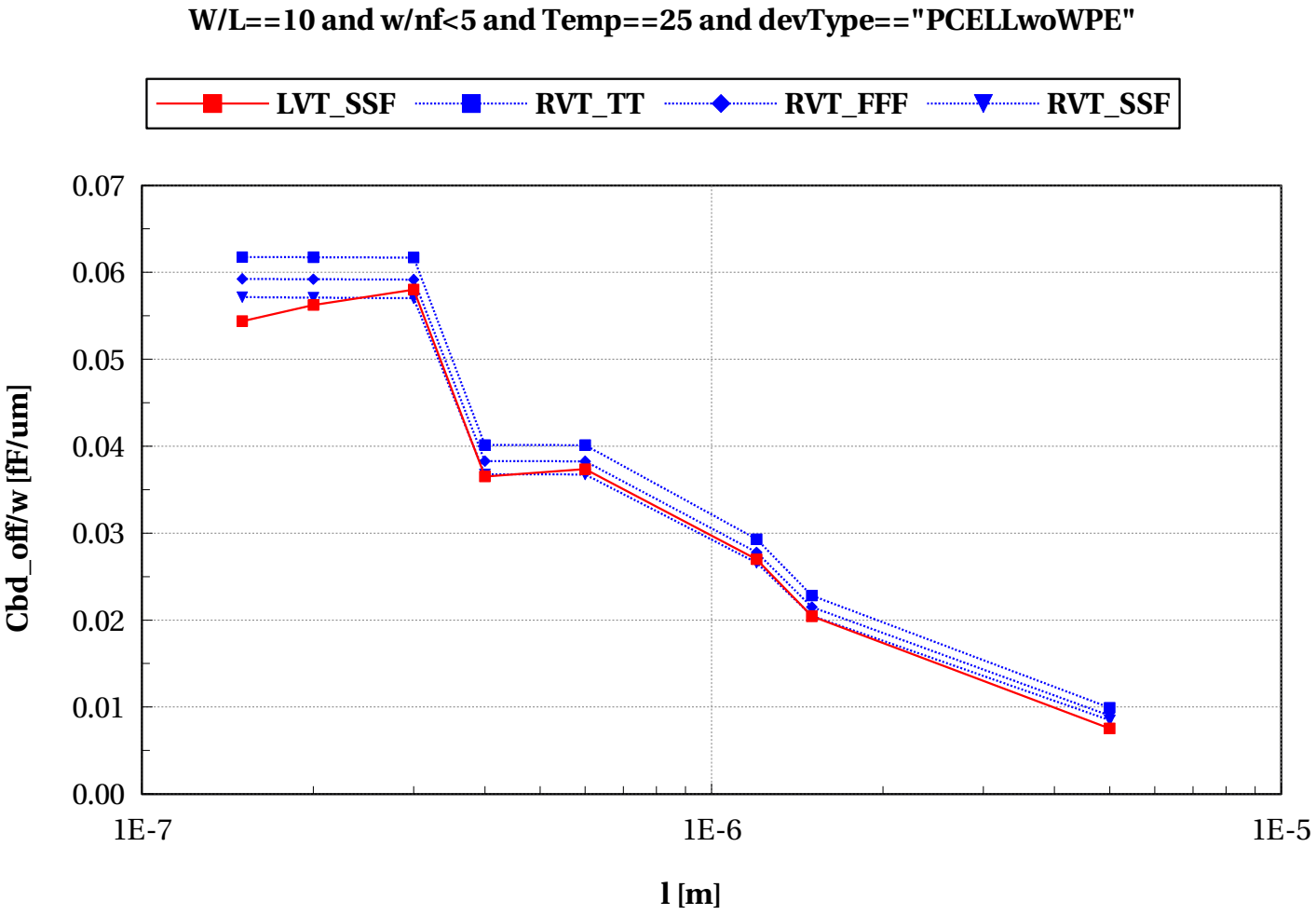


eglvtpfet_acc, Cgd_0V/w [fF/um] vs l [m]

W/L==10 and w/nf<5 and Temp==25 and devType=="PCELLwoWPE"



eglvtpfet_acc, Cbd_off/w [fF/um] vs l [m]



Annex

Conditions of simulations

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

- Model eglvtnfet_acc (LVT)
  - ✔ Input Parameters
    - ✘ vds_off = vds_sat V
    - ✘ iana = 5e-6 A
    - ✘ shrink_iana = 1
    - ✘ mc_sens = 0
    - ✘ vds_lin = 0.05 V
    - ✘ ivt = 300e-9 A
    - ✘ model_version = 1.2.e
    - ✘ vds_cgd = 0 V
    - ✘ vds_mm = 0.05 V
    - ✘ ams_release = 2018.3
    - ✘ plashrink_iana = 0
    - ✘ vgs_stop = vdd V
    - ✘ dlshrink_ivt = 0
    - ✘ sbenchlsf_release = Alpha

- ✘ vds_sat = Vdd V
- ✘ mc_nsigma = 3
- ✘ shrink_ivt = 1
- ✘ 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 = 5000
- ✘ vstep_ivt = 0.005 V
- ✘ vgs_off = 0 V
- ✘ temp = 25 °C
- ✘ f_ext = 100k Hz
- ✘ vbs = 0 V
- ✘ vdd = 1.8 V

✔ Sweep Parameters

✔ Extra parameters

- ✘ eglvt_dev = 1

● Model eglvtpfet_acc (LVT)

✔ Input Parameters

- ✘ vds_off = vds_sat V
- ✘ iana = 2e-6 A

- ✘ shrink_iana = 1
- ✘ mc_sens = 0
- ✘ vds_lin = 0.05 V
- ✘ ivt = 70e-9 A
- ✘ model_version = 1.2.e
- ✘ vds_cgd = 0 V
- ✘ vds_mm = 0.05 V
- ✘ ams_release = 2018.3
- ✘ plashrink_iana = 0
- ✘ vgs_stop = vdd V
- ✘ dlshrink_ivt = 0
- ✘ sbenchlsf_release = Alpha
- ✘ vds_sat = Vdd V
- ✘ mc_nsigma = 3
- ✘ shrink_ivt = 1
- ✘ 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 = 5000
- ✘ vstep_ivt = 0.005 V

- ✘ vgs_off = 0 V
- ✘ temp = 25 °C
- ✘ f_ext = 100k Hz
- ✘ vbs = 1.8 V
- ✘ vdd = 1.8 V

✔ Sweep Parameters

✔ Extra parameters

- ✘ eglvt_dev = 1

● Model egnfet_acc (RVT)

✔ Input Parameters

- ✘ vds_ft = Vdd V
- ✘ vds_cgd = 0 V
- ✘ f_ext_rg = 1G Hz
- ✘ mc_sens = 0
- ✘ vds_lin = 0.05 V
- ✘ ivt = 300e-9 A
- ✘ model_version = 1.2.c
- ✘ vds_off = vds_sat V
- ✘ iana = 5e-6 A
- ✘ ams_release = 2018.3
- ✘ vgs_stop = vdd V
- ✘ dlshrink_ivt = 0
- ✘ sbenchlsf_release = Alpha
- ✘ vds_sat = Vdd V
- ✘ mc_nsigma = 3

- ✘ shrink_ivt = 1
- ✘ vgs_start = 0 V
- ✘ plashrink_ivt = 1
- ✘ ithslwi = 10e-9 A
- ✘ vds_ana = Vdd/4 V
- ✘ vds_cbd = 0 V
- ✘ vddmax = vdd
- ✘ mc_runs = 5000
- ✘ vstep_ivt = 0.005 V
- ✘ vgs_off = 0 V
- ✘ temp = 25 °C
- ✘ f_ext = 100k Hz
- ✘ vbs = 0 V
- ✘ vdd = 1.8 V

✔ Sweep Parameters

✔ Extra parameters

- ✘ eg_dev = 1
- ✘ eglvt_dev = 1

● Model egpfet_acc (RVT)

✔ Input Parameters

- ✘ vds_ft = Vdd V
- ✘ vds_cgd = 0 V
- ✘ f_ext_rg = 1G Hz
- ✘ mc_sens = 0
- ✘ vds_lin = 0.05 V

- ✘ ivt = 70e-9 A
- ✘ model_version = 1.2.c
- ✘ vds_off = vds_sat V
- ✘ iana = 2e-6 A
- ✘ ams_release = 2018.3
- ✘ vgs_stop = vdd V
- ✘ dlshrink_ivt = 0
- ✘ sbenchlsf_release = Alpha
- ✘ vds_sat = Vdd V
- ✘ mc_nsigma = 3
- ✘ shrink_ivt = 1
- ✘ vgs_start = 0 V
- ✘ plashrink_ivt = 1
- ✘ ithslwi = 10e-9 A
- ✘ vds_ana = Vdd/4 V
- ✘ vds_cbd = 0 V
- ✘ vddmax = vdd
- ✘ mc_runs = 5000
- ✘ vstep_ivt = 0.005 V
- ✘ vgs_off = 0 V
- ✘ temp = 25 °C
- ✘ f_ext = 100k Hz
- ✘ vbs = 0 V
- ✘ vdd = 1.8 V

✔ Sweep Parameters

- ✔ Extra parameters
  - ✘ eg_dev = 1
  - ✘ eglvt_dev = 1