

**IHP**  
**SG13G2**  
**SG13G2 DC CV NMOS LV**

**Rev. 1.2 (190924)**

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# 1 Documentation

## 1.1 Included Effects in Simulation Model

General	Date, Version	24.09.2019
	Processversion	SG13G2
	Simulator	ADS 2019, Spectre 18.1
	Simulation model	PSP 103.6
	Warning Boundaries	On

Statistic	Corner	x
	Process variations for Monte Carlo Simulation	e
	Mismatch	x
Transistor	DC behavior	x
	Drain diode	x
	Overlap cap.	x
	Junction cap.	x
	1/f Noise	x <sub>1</sub>
	HF / Thermal Noise	-
	Substrate resistance (RF)	x <sub>2</sub>
	Gate resistance (RF)	x <sub>2</sub>
Temperature	-40°C, 25°C, 70°C, 125°C	x

x measured and modelled

x<sub>1</sub> parameters taken from SG13

x<sub>2</sub> measurements are done from a different wafer run than DC model which leads to slight offsets

e estimated and modelled

o not included

- not applicable

## 1.2 Time range measurement

The verification of the time range measurements is done by the standard IHP verification procedure.

## 2 Setup

### 2.1 Measurement Conditions

#### 2.1.1 Measurement Conditions for Transistors

	Sweep	Start[V]	Stop[V]	No. Points	List or f(Vth)
idvg	vg	-500m	1.35	38	
	vb	0	-1.2	5	
	vd	List		3	0.05, 0.6, 1.2
	vs	0		1	
idvd	vd	0	1.35	28	
	vg	Lin f(Vth)	1.35	5	Ref. Setup: idvg Idref: 100.0n Offset: 100.0m Resolution: 1.000m
	vb	0		1	
	vs	0		1	
idvd_vbmin	vd	0	1.35	28	
	vg	Lin f(Vth)	1.35	5	Ref. Setup: idvg Idref: 100.0n Offset: 100.0m Resolution: 1.000m
	vb	-1.2		1	
	vs	0		1	
idvd_vth	vd	0	1.35	28	
	vg	List f(Vth)		3	Ref. Setup: idvg Idref: 100.0n Offset: -200.0m Resolution: 1.000m Steps: 200.0m 200.0m
	vb	0		1	
	vs	0		1	
idvd_vth_vbmin	vd	0	1.35	28	
	vg	List		3	Ref. Setup: idvg

		f(Vth)			Idref: 100.0n Offset: -200.0m Resolution: 1.000m Steps: 200.0m 200.0m
	vb	-1.2		1	
	vs	0		1	
RF idvg	vg	-500m	1.35	38	
	vd	List		3	0.05, 0.6, 1.2
RF idvd	vd	0	1.35	28	
	vg	0	1.35	5	
RF sdut	freq	100MEG	47.6G	31	
	vd	0	1.35	10	
	vg	0	1.35	10	
spad	freq	100MEG	47.6G	31	
	Port1	0		1	
	Port2	0		1	

## 2.1.2 Measurement Conditions for Capacitance

	Sweep	Start[V]	Step[V]	Stop[V]	High Node	Low Node
Junction Bulk-Drain	1 VHI	-5	200m	200m	B	D
Junction Bulk-Source	1 VHI	-1	20m	300m	B	S
Oxide	1 VHI	1.35	-50m	-1.35	B	G
Overlap	1 VHI	-1.35	50m	1.35	G	D

## 2.2 Devices

### 2.2.1 Setup of DC Test Devices

Name	W[um]	L[um]	AD[um <sup>2</sup> ]	AS[um <sup>2</sup> ]	PD[um]	PS[um]	NRD	NRS	NF	Comment	Size Category
W10u0_L10u0_S541_5	10	10	3.4	3.4	20.7	20.7	0	0	1		Large
W0u15_L10u0_S547_3	150 m	10	101 m	101 m	1.34	1.34	0	0	1		Narrow
W10u0_L0u13_T356_S380_2	10	130 m	0	0	0	0	0	0	1		Short
W10u0_L0u13_S540_2	10	130 m	3.4	3.4	20.7	20.7	0	0	1		Short
W10u0_L0u13_S380_2	10	130 m	0	0	0	0	0	0	1		Short
W0u15_L0u13_S546_3	150 m	130 m	101 m	101 m	1.34	1.34	0	0	1		Small
W10u0_L0u18_S540_5	10	180 m	3.4	3.4	20.7	20.7	0	0	1		L Scale
W10u0_L0u5_S541_1	10	500 m	3.4	3.4	20.7	20.7	0	0	1		L Scale
W10u0_L1u2_S541_2	10	1.2	3.4	3.4	20.7	20.7	0	0	1		L Scale
W10u0_L2u0_S541_3	10	2	3.4	3.4	20.7	20.7	0	0	1		L Scale
W10u0_L5u0_S541_4	10	5	3.4	3.4	20.7	20.7	0	0	1		L Scale
W10u0_L0u15_S540_4	10	150 m	3.4	3.4	20.7	20.7	0	0	1		L Scale
W10u0_L0u14_S540_3	10	140 m	3.4	3.4	20.7	20.7	0	0	1		L Scale
W0u3_L10u0_S545_2	300 m	10	102 m	102 m	1.28	1.28	0	0	1		W Scale
W0u18_L10u0_S546_1	180 m	10	103 m	103 m	1.34	1.34	0	0	1		W Scale
W05u0_L10u0_S542_3	5	10	1.7	1.7	10.7	10.7	0	0	1		W Scale
W02u0_L10u0_S543_1	2	10	680	680	4.6	4.6	0	0	1		W

			m	m	8	8					Scale
W0u6_L10u0_S544_1	600 m	10	204 m	204 m	1.8 8	1.8 8	0	0	1		W Scale
W0u3_L0u13_S544_2	300 m	130	102 m	102 m	1.2 8	1.2 8	0	0	1		LW Scale
W0u15_L0u5_S547_2	150 m	500	101 m	101 m	1.3 4	1.3 4	0	0	1		LW Scale
W05u0_L5u0_S542_2	5	5	1.7	1.7	10. 7	10. 7	0	0	1		LW Scale
W0u6_L0u18_S543_3	600 m	180	204 m	204 m	1.8 8	1.8 8	0	0	1		LW Scale
W0u3_L0u14_S544_3	300 m	140	102 m	102 m	1.2 8	1.2 8	0	0	1		LW Scale
W0u18_L0u14_S545_4	180 m	140	103 m	103 m	1.3 4	1.3 4	0	0	1		LW Scale
W0u18_L0u13_S545_3	180 m	130	103 m	103 m	1.3 4	1.3 4	0	0	1		LW Scale
W0u3_L0u15_S544_4	300 m	150	102 m	102 m	1.2 8	1.2 8	0	0	1		LW Scale
W02u0_L2u0_S542_5	2	2	680 m	680 m	4.6 8	4.6 8	0	0	1		LW Scale
W0u15_L0u15_S546_5	150 m	150	101 m	101 m	1.3 4	1.3 4	0	0	1		LW Scale
W0u6_L0u5_S543_4	600 m	500	204 m	204 m	1.8 8	1.8 8	0	0	1		LW Scale
W0u18_L0u15_S545_5	180 m	150	103 m	103 m	1.3 4	1.3 4	0	0	1		LW Scale
W0u3_L0u5_S545_1	300 m	500	102 m	102 m	1.2 8	1.2 8	0	0	1		LW Scale
W0u6_L0u13_S543_2	600 m	130	204 m	204 m	1.8 8	1.8 8	0	0	1		LW Scale
W0u15_L0u18_S547_1	150 m	180	101 m	101 m	1.3 4	1.3 4	0	0	1		LW Scale
W0u6_L1u2_S543_5	600 m	1.2	204 m	204 m	1.8 8	1.8 8	0	0	1		LW Scale
W0u15_L0u14_S546_4	150 m	140	101 m	101 m	1.3 4	1.3 4	0	0	1		LW Scale
W02u0_L0u13_S542_4	2	130	680 m	680 m	4.6 8	4.6 8	0	0	1		LW Scale
W0u3_L0u18_S544_5	300 m	180	102 m	102 m	1.2 8	1.2 8	0	0	1		LW Scale

W05u0_L0u13_S542_1	5	130 m	1.7	1.7	10. 7	10. 7	0	0	1		LW Scale
W0u15_L0u12_S546_2	150 m	120 m	101 m	101 m	1.3 4	1.3 4	0	0	1		Addition al
W10u0_L0u12_S540_1	10	120 m	3.4	3.4	20. 7	20. 7	0	0	1		Addition al

## 2.2.2 Setup of CV Test Devices

Name	W[um]	L[um]	NF	AD[um <sup>2</sup> ]	AS[um <sup>2</sup> ]	PD[um]	PS[um]	Comment	Size Category
Junction Capacitance Bulk - Drain									
CJBDarea_S350B_1			1	37.5 K		850		B- High, S/D- Low	BD Area
CJBDperim_S350B_2			1	28.6 K		102K		B- High, S/D- Low	BD Perim
Junction Capacitance Bulk - Source									
CJBSarea_S350B_1			1	0		0		B- High, S/D- Low	BS Area
CJBSperim_S350B_2			1	0		0		B- High, S/D- Low	BS Perim
Oxide Capacitance									
Cox_S346K_3	160	250	1					B- High, G-Low	Oxide
Overlap Capacitance									
Cgds1_S350B_11	8K	130 m	80 0	1.52 K	1.52 K	8.32 K	8.32 K	G- High, S/D-	Overlap GDS

								Low, B+Sub -GND	
Cgdsb1_S350B_11	8K	130 m	80 0	1.52 K	1.52 K	8.32 K	8.32 K	G- High, S/D+B -Low	Overlap GDSB
Cgds2_S350B_12	6.6 K	250 m	66 0	1.26 K	1.26 K	6.87 K	6.87 K	G- High, S/D- Low, B+Sub -GND	Overlap 1 GDS
Cgdsb2_S350B_12	6.6 K	250 m	66 0	1.26 K	1.26 K	6.87 K	6.87 K	G- High, S/D+B -Low	Overlap 1 GDSB
Cgds3_S350B_13	400	10	40	79.8	79.8	436	436	G- High, S/D- Low, B+Sub -GND	Overlap 2 GDS
Cgdsb3_S350B_13	400	10	40	79.8	79.8	436	436	G- High, S/D+B -Low	Overlap 2 GDSB

### 3 Corner Devices

#### 3.1 Target Values vs. Simulated Values

##### 3.1.1 W = 10.00u, L = 130.0n, NF = 1

	Slow			Typic.			Fast		
	Target	Sim.	Error [%]	Target	Sim.	Error [%]	Target	Sim.	Error [%]
VT	550m	550m	0	500m	498m	0.38	440m	436m	0.99
Ron*W	-	-	-	650m	656m	0.93	-	-	-
Ion/W	380	382	-0.6	480	479	0.18	580	581	-0.1
log(Ioff/W)	-11.3	-11.4	2.26	-10.1	-10.2	2.25	-9.3	-9.43	2.24

##### 3.1.2 W = 10.00u, L = 10.00u, NF = 1

	Slow			Typic.			Fast		
	Target	Sim.	Error [%]	Target	Sim.	Error [%]	Target	Sim.	Error [%]
VT	230m	230m	0	200m	200m	0	170m	171m	-0.64
Ion/W	16.7	16.6	0.39	18.1	18	0.39	19.5	19.5	0

##### 3.1.3 W = 150.0n, L = 130.0n, NF = 1

	Slow			Typic.			Fast		
	Target	Sim.	Error [%]	Target	Sim.	Error [%]	Target	Sim.	Error [%]
VT	620m	618m	0.41	530m	529m	0.19	440m	436m	0.85
Ion/W	420	420	0	550	548	0.37	680	683	-0.4

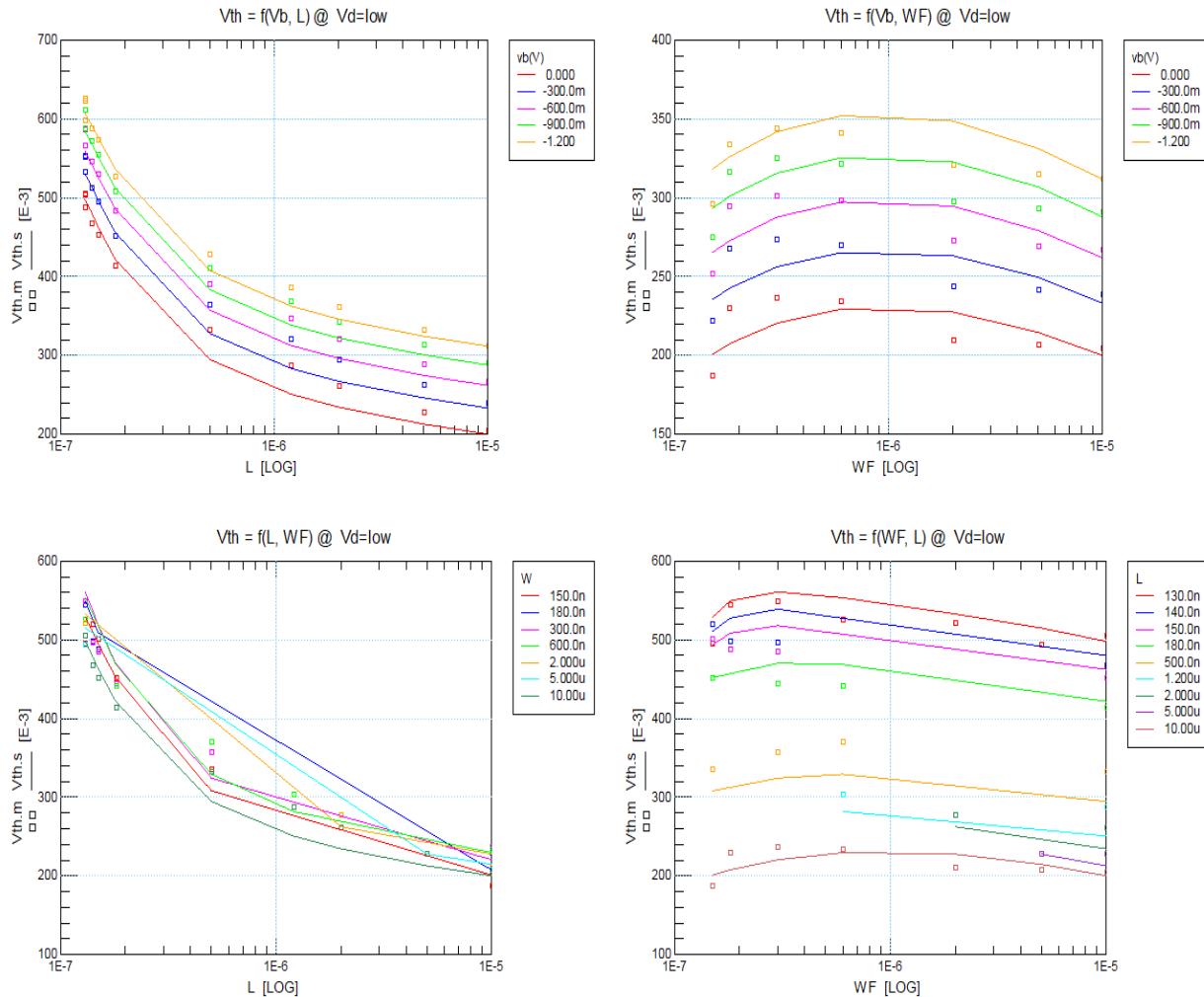
##### 3.1.4 W = 150.0n, L = 10.00u, NF = 1

	Slow			Typic.			Fast		
	Target	Sim.	Error [%]	Target	Sim.	Error [%]	Target	Sim.	Error [%]
VT	270m	270m	0	200m	201m	-0.51	130m	131m	-1.01
Ion/W	13	13.1	-0.52	15.5	15.5	0.26	18	18	-0.12

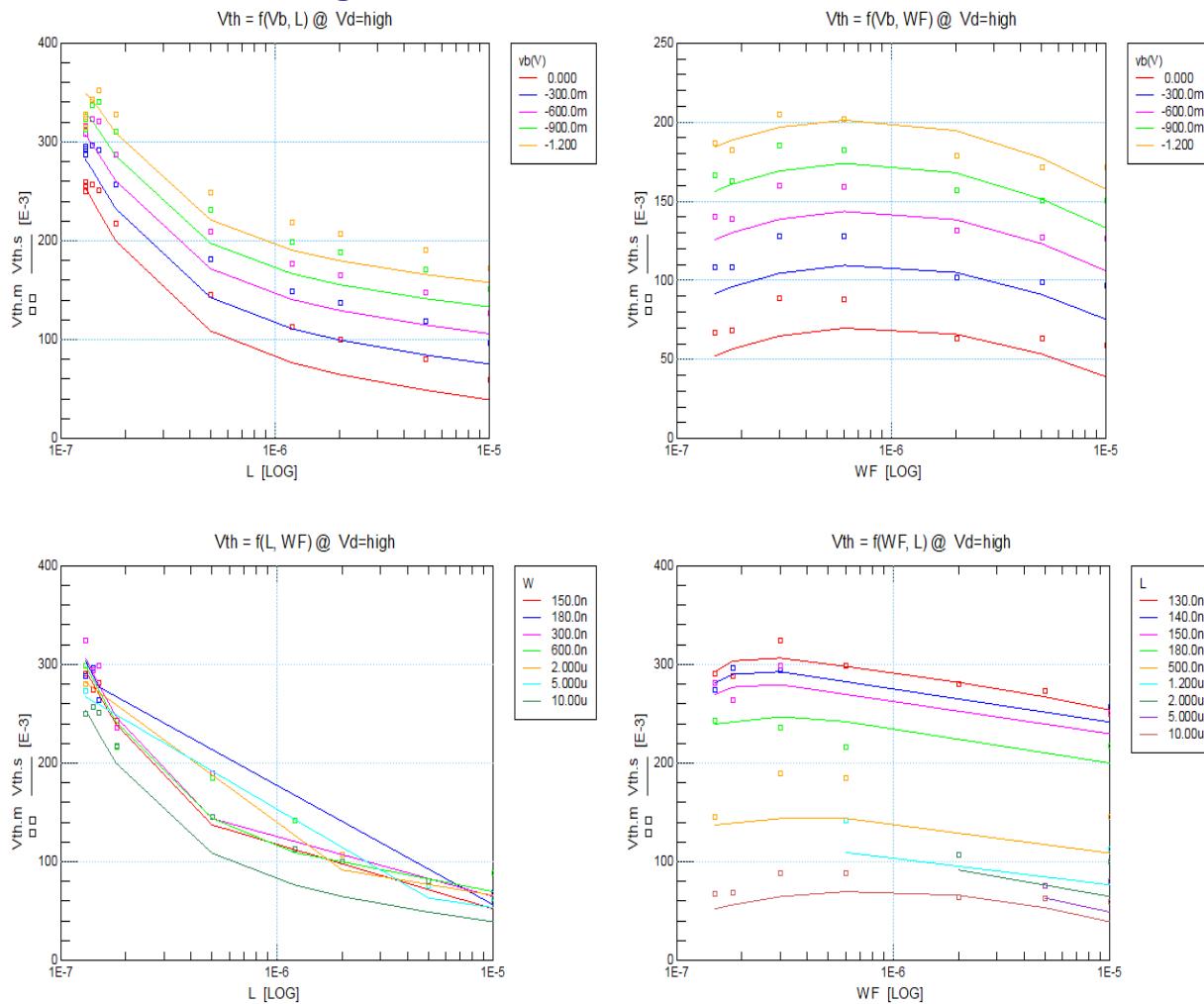
## 4 DC Transistors

### 4.1 Summarized Results

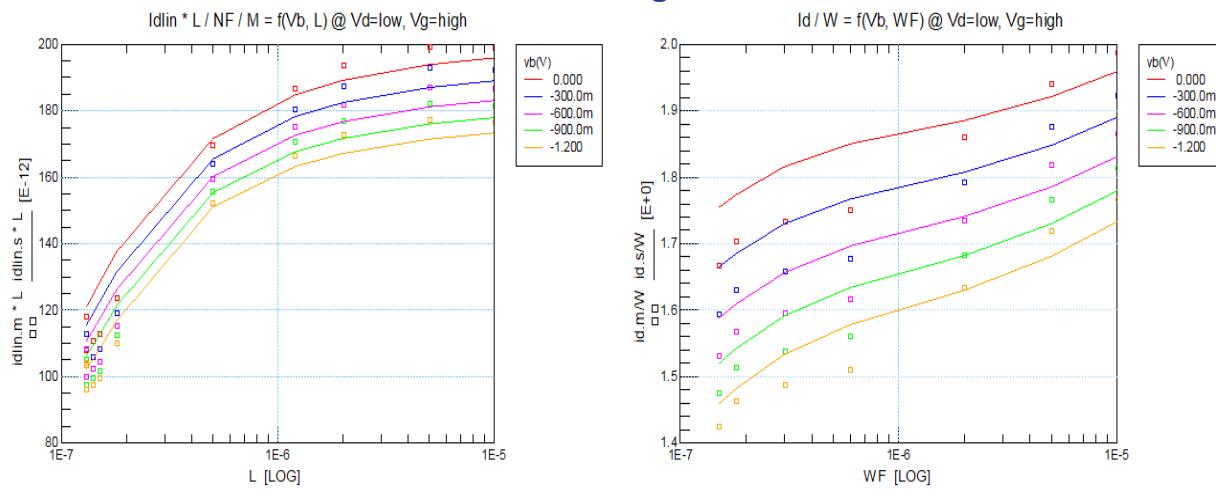
#### 4.1.1 Threshold Voltage Linear Region

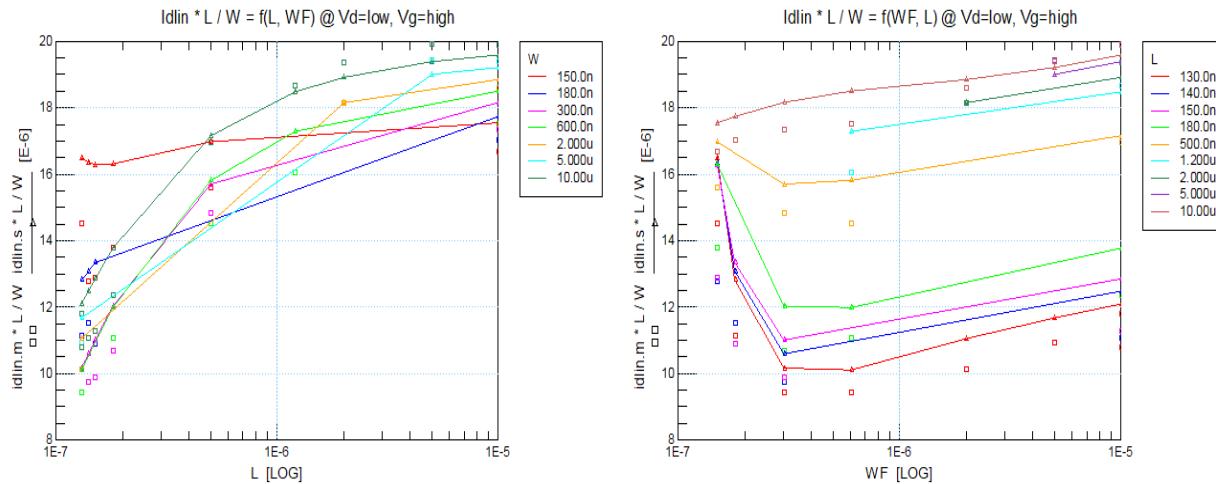


#### 4.1.2 Threshold Voltage in Saturation

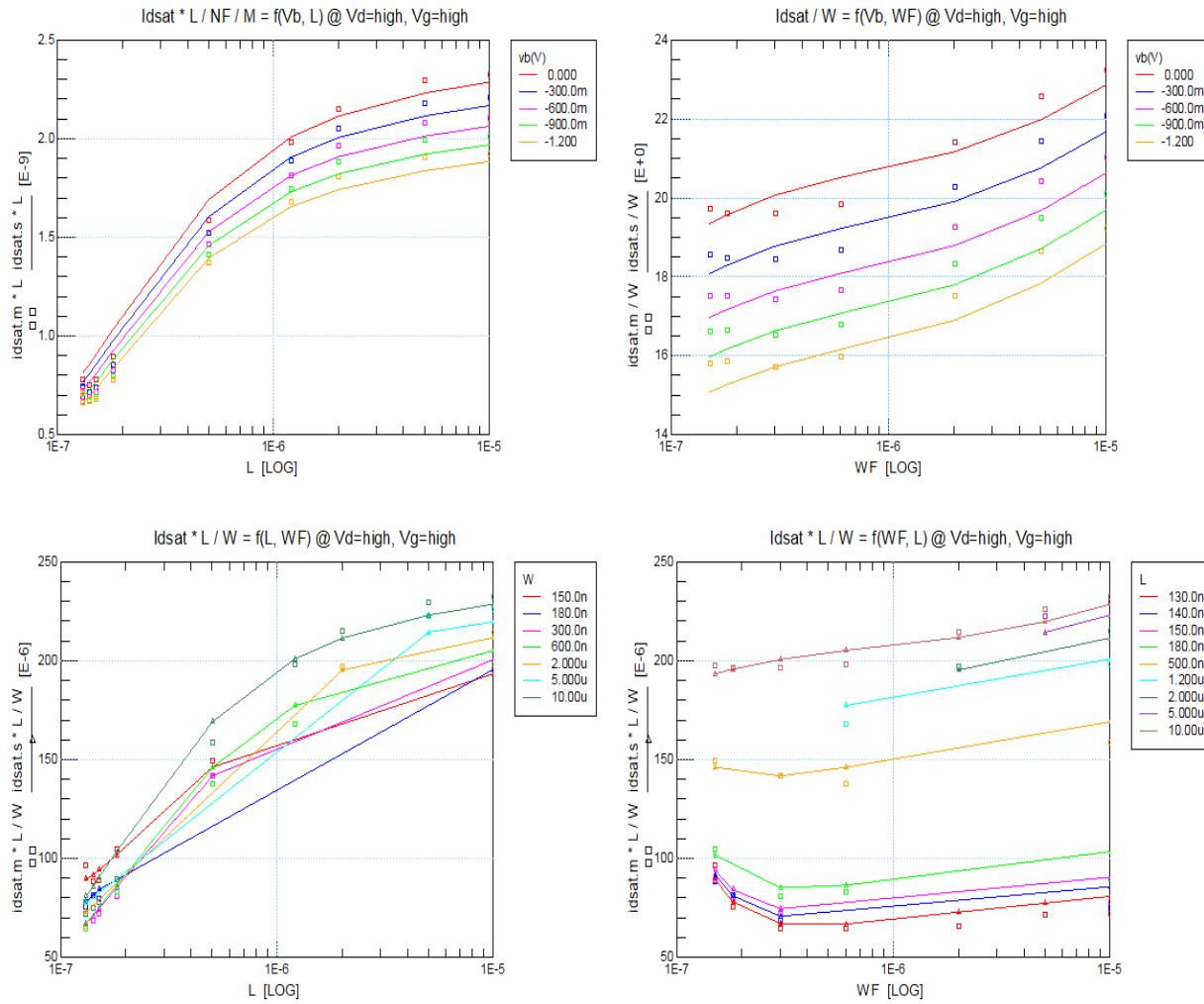


#### 4.1.3 Maximum Drain Current in Linear Region



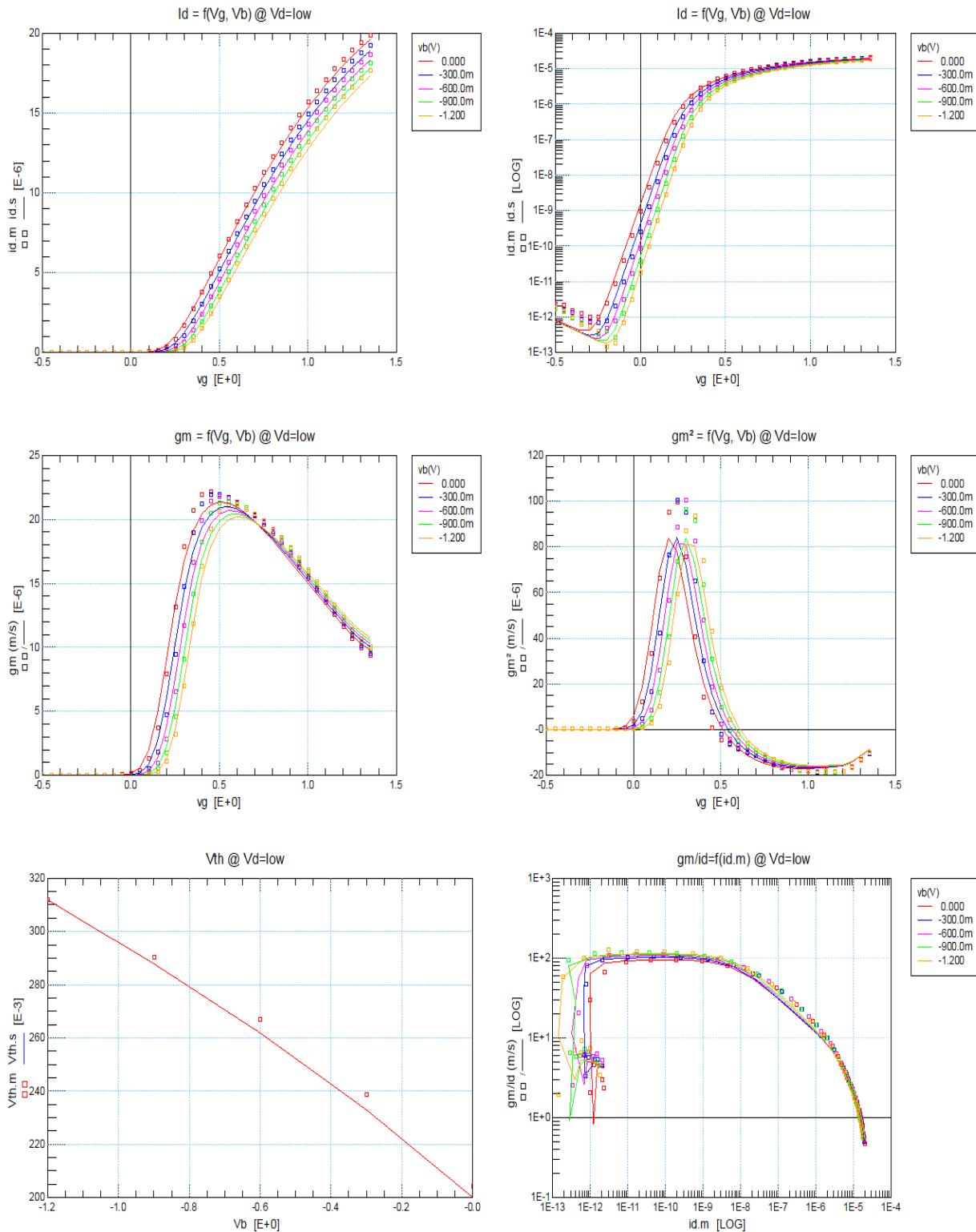


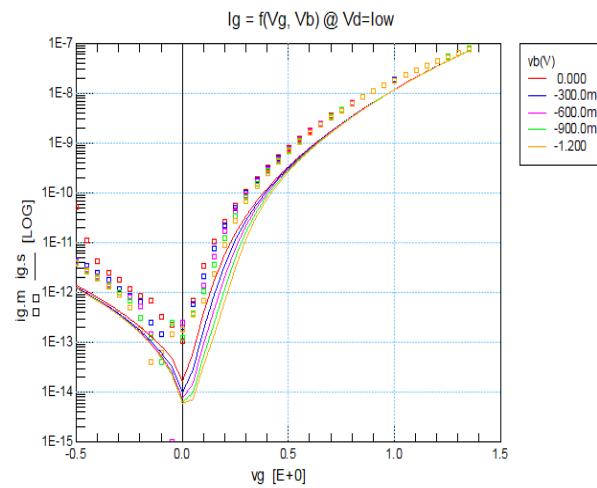
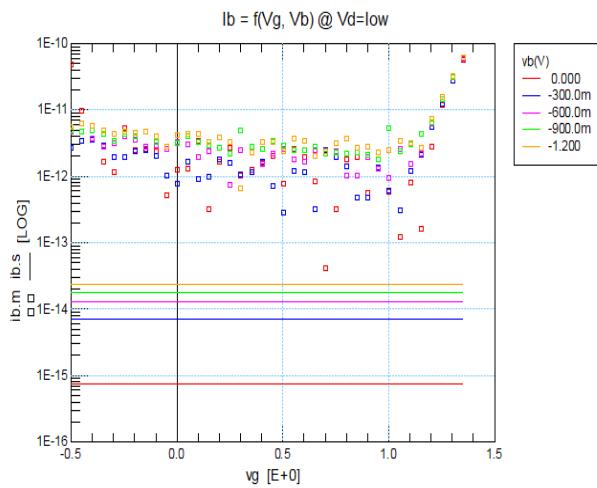
#### 4.1.4 Maximum Drain Current in Saturation Region



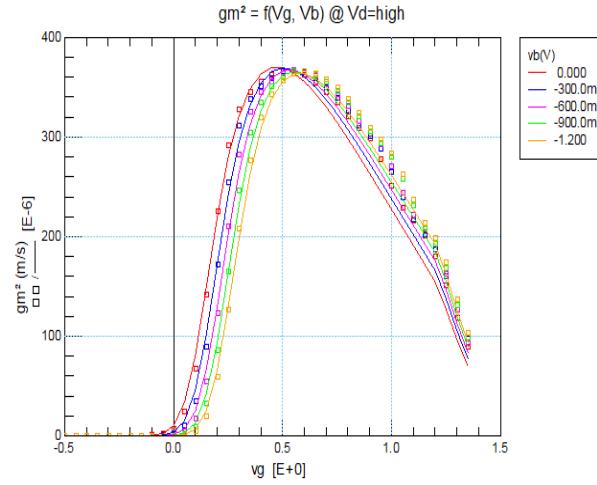
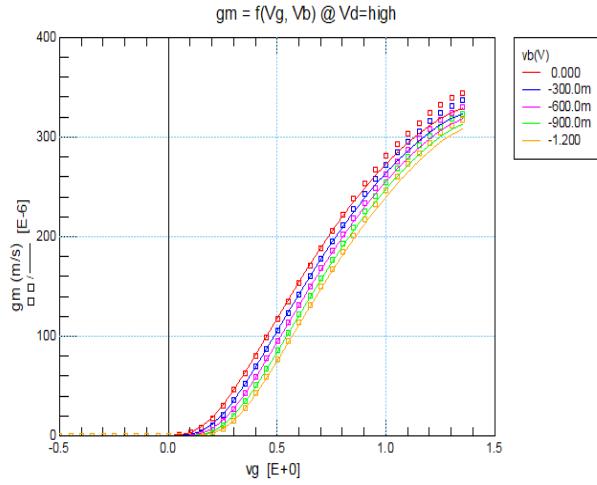
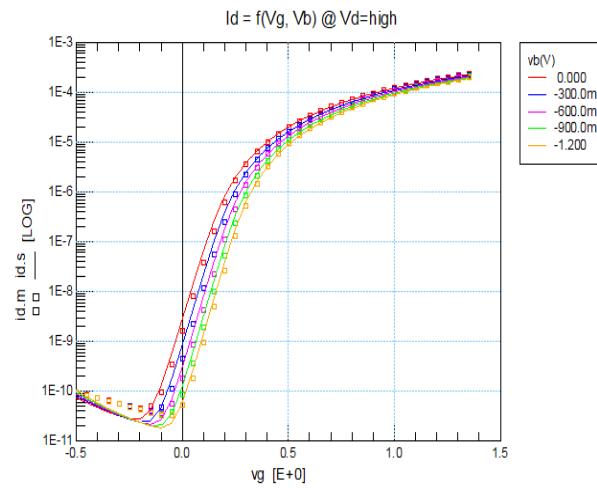
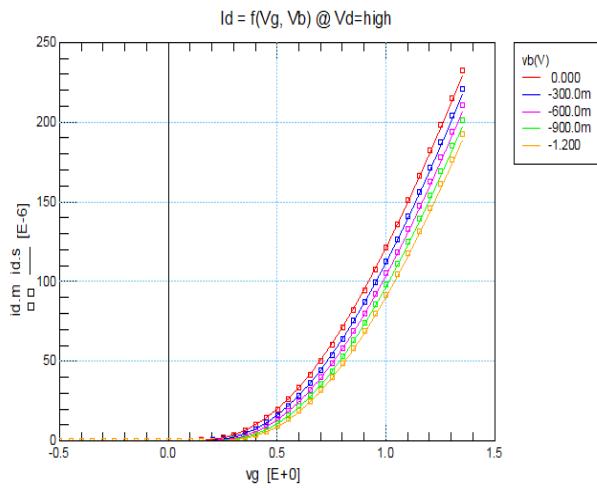
## 4.2 W10u0\_L10u0\_S541\_5

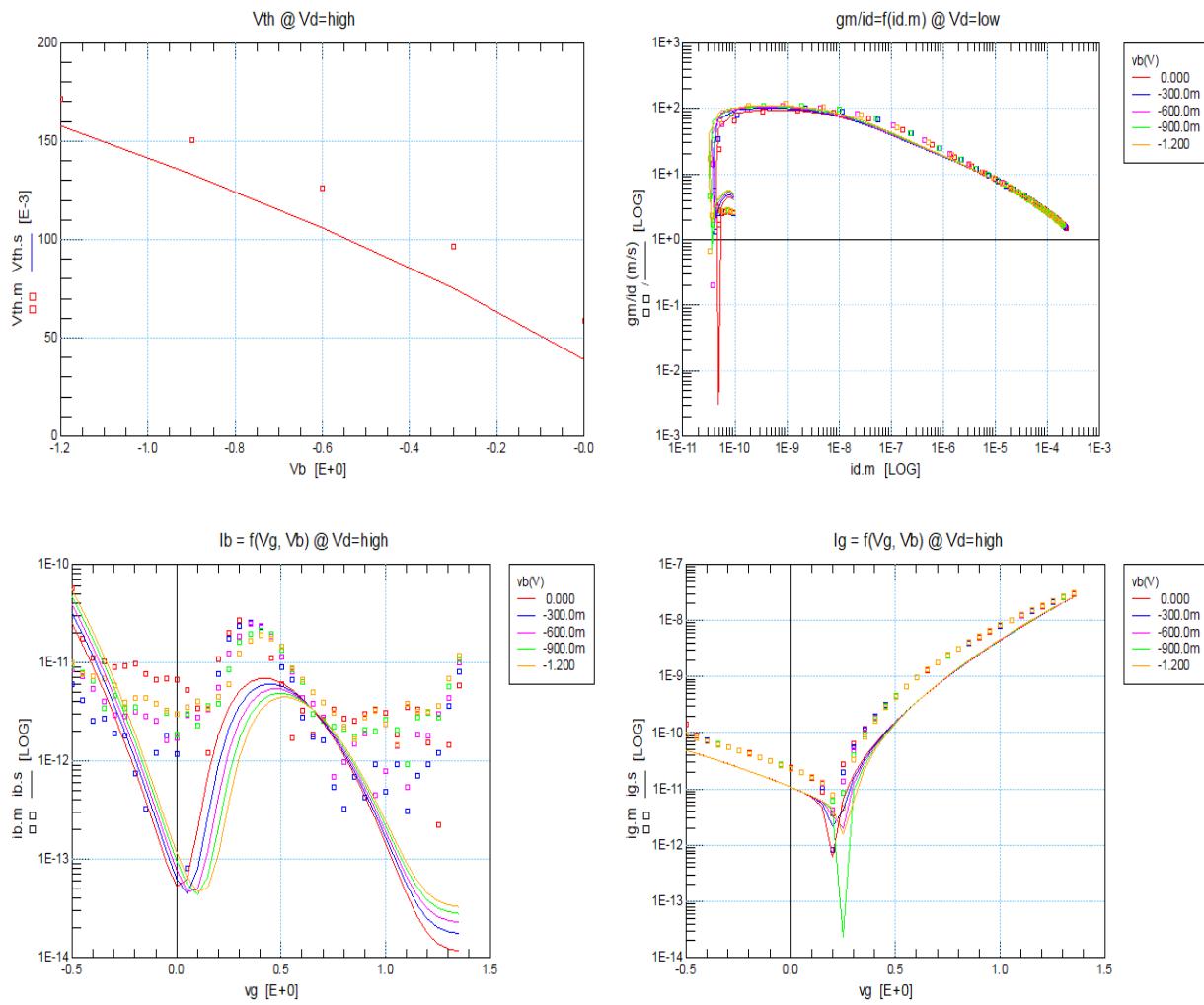
$idvg$ ,  $Vd = 0.05V$ ,  $T = 27^\circ C$



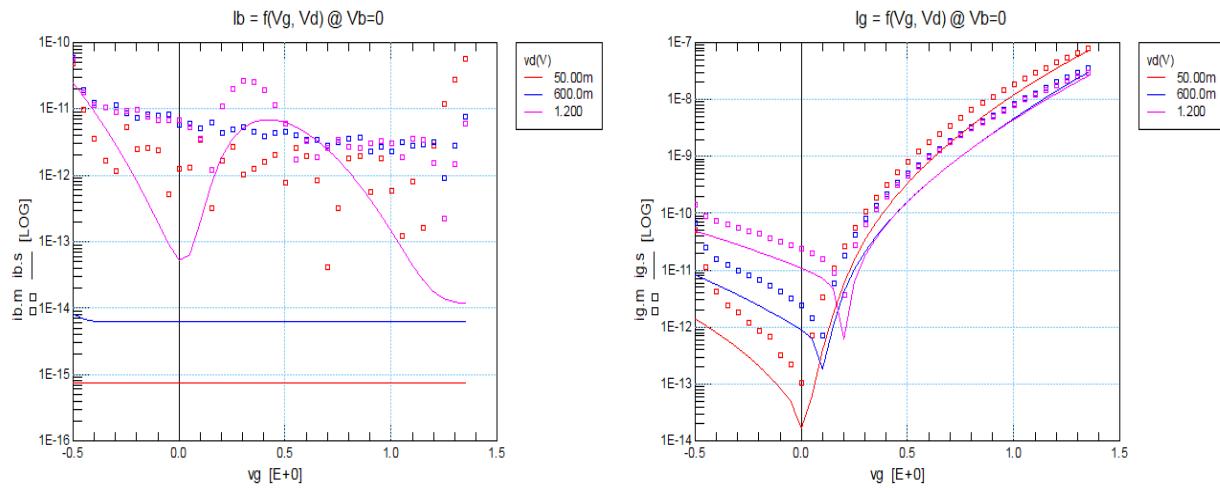


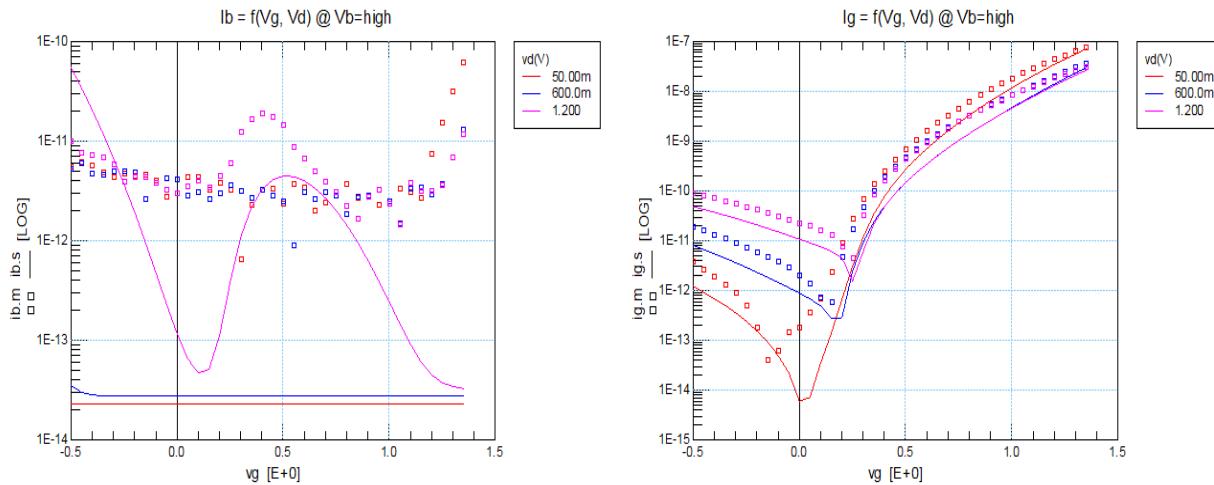
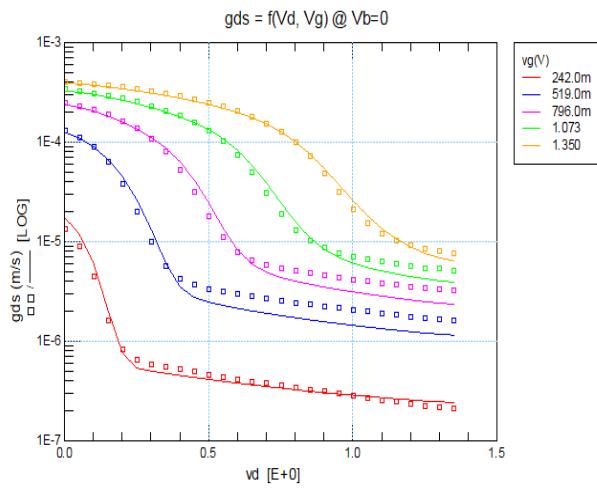
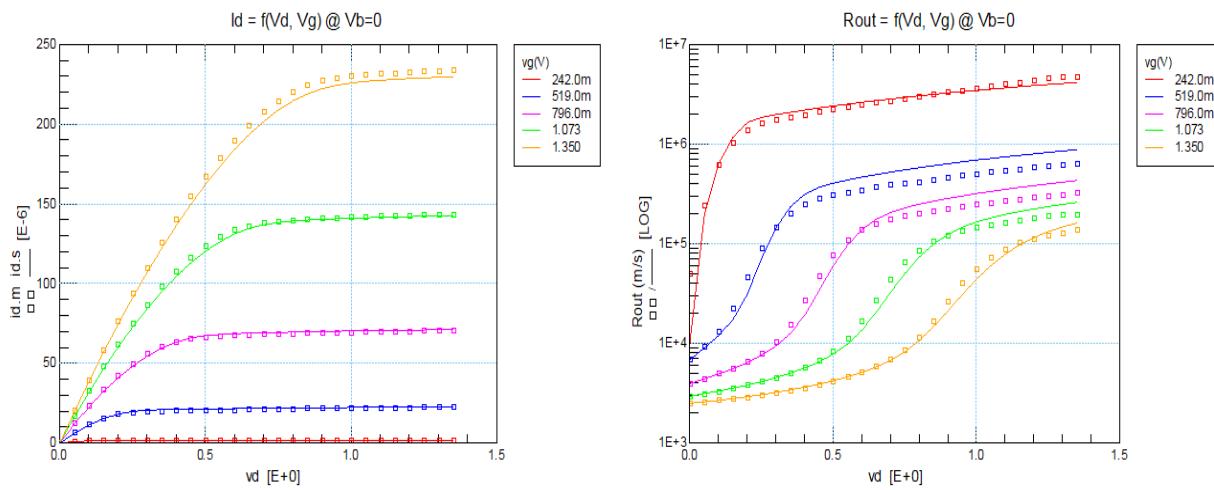
$i_d v_g, V_d = 1.2V, T = 27^\circ C$

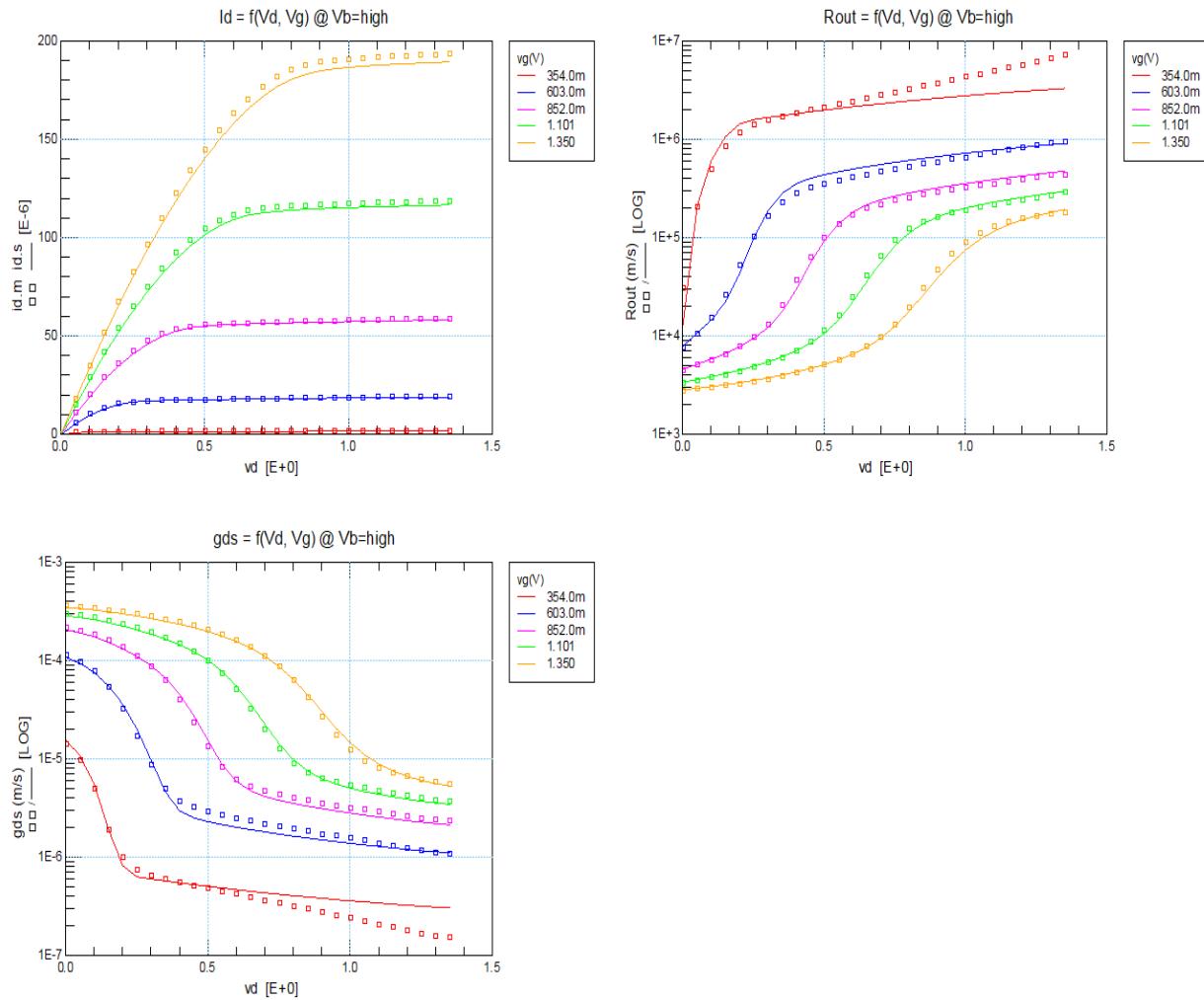
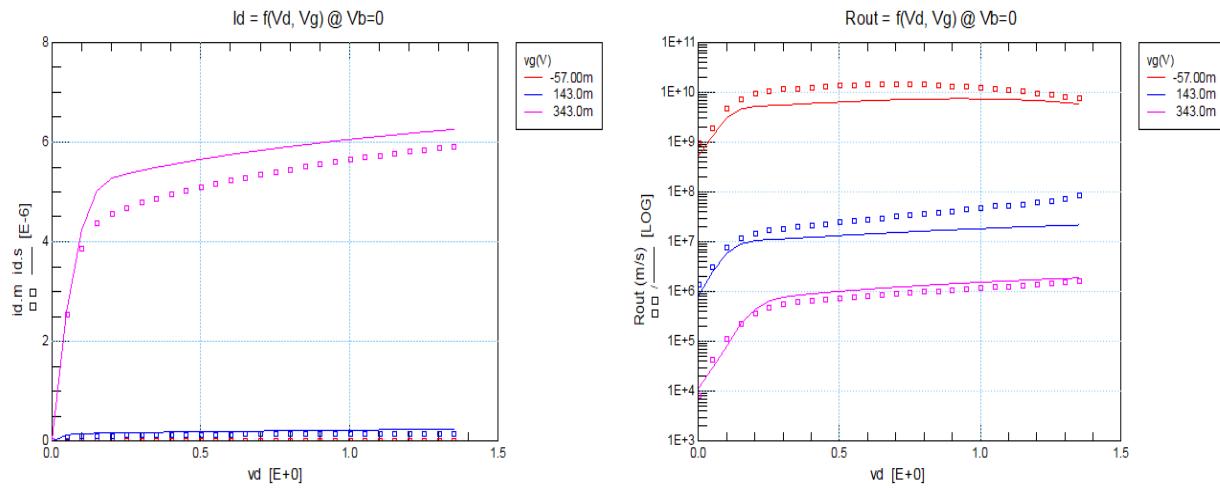


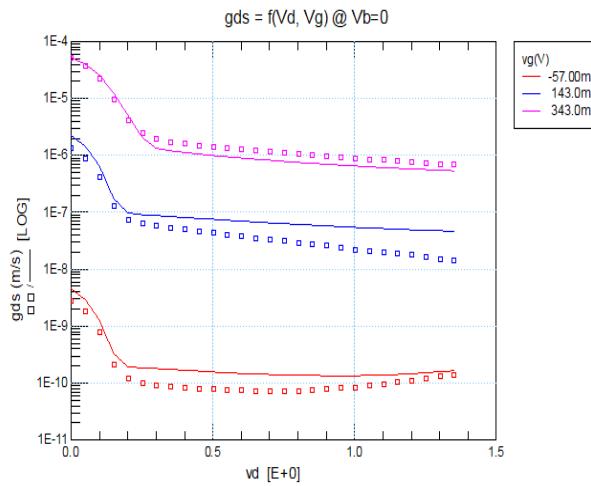


### idvg, Ib, Ig, Vb = 0V, T = 27°C

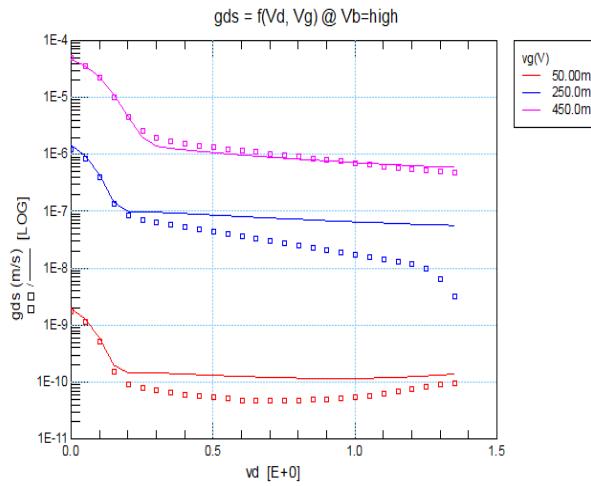
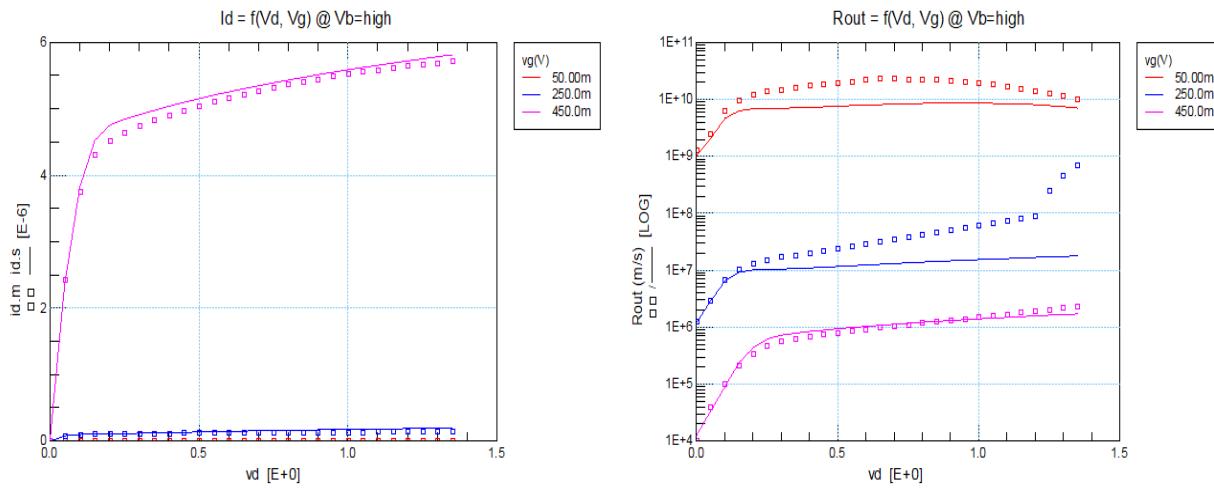


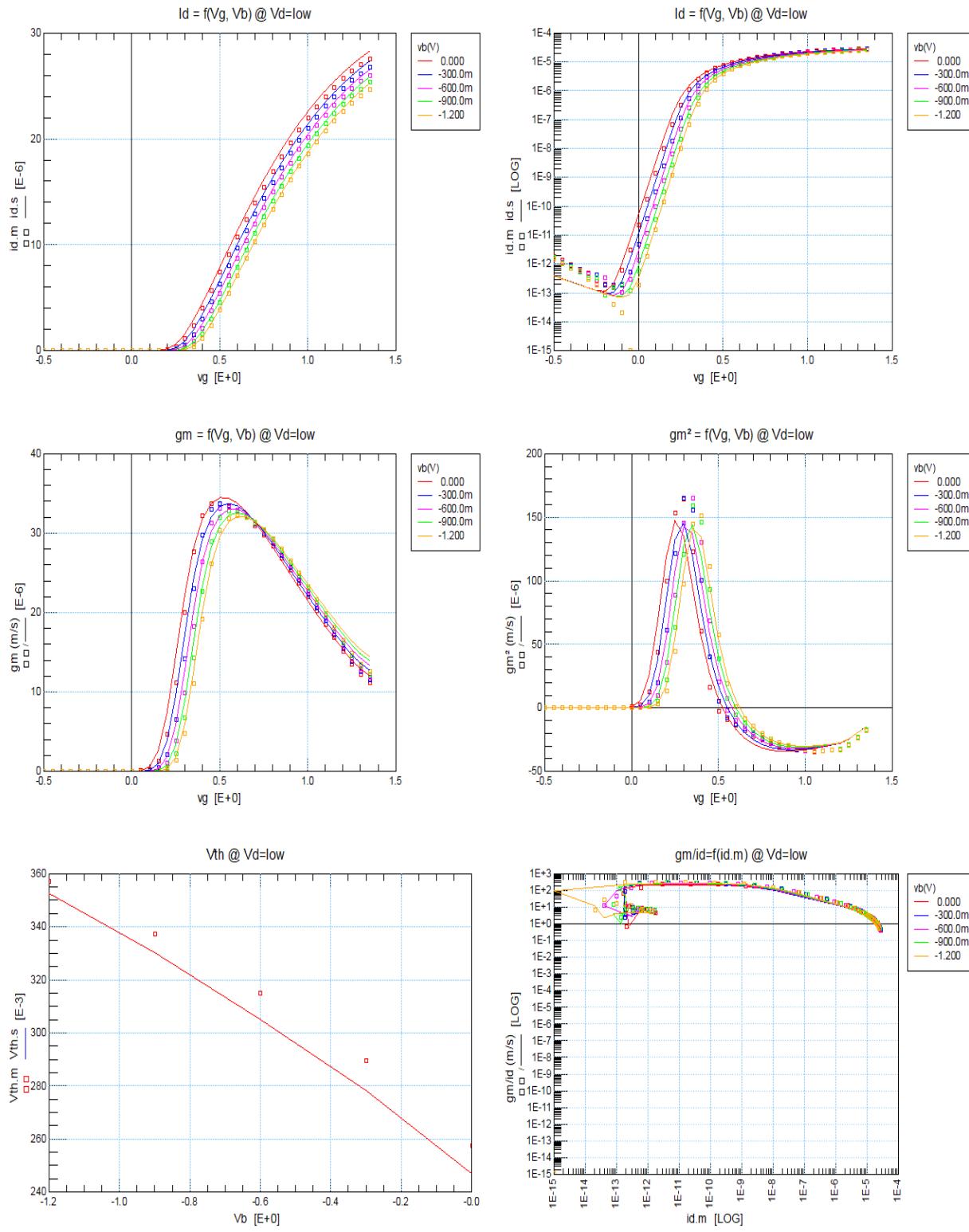
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


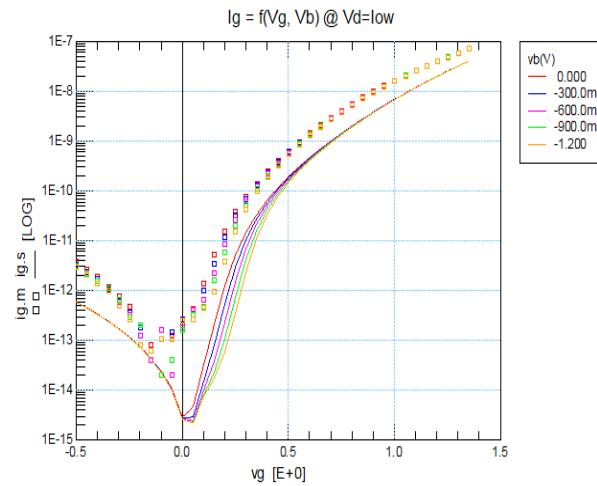
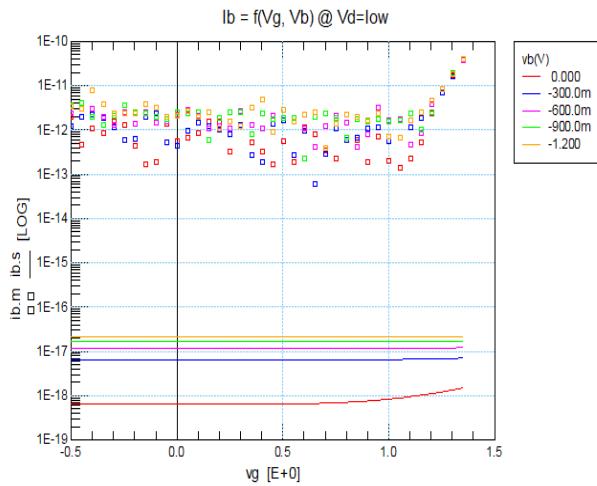
**idvd\_vbmin, Vb = -1.2V, T = 27°C****idvd\_vth, Vb = 0V, T = 27°C**



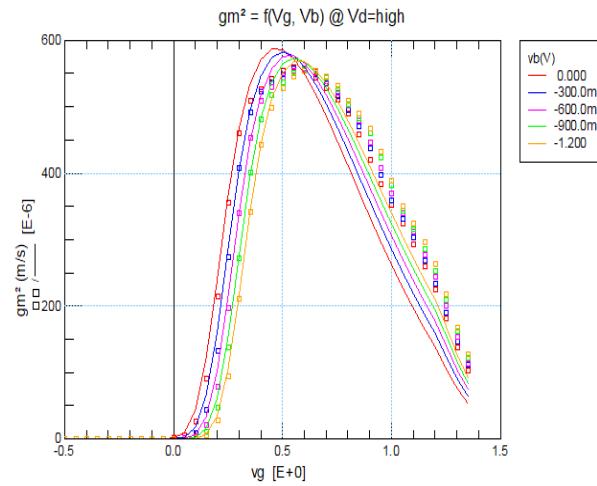
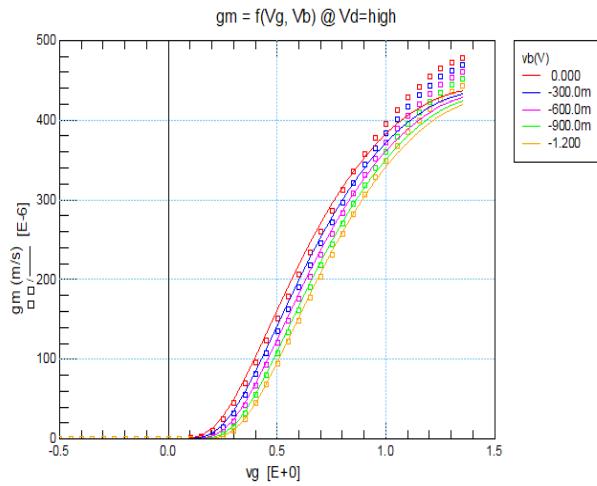
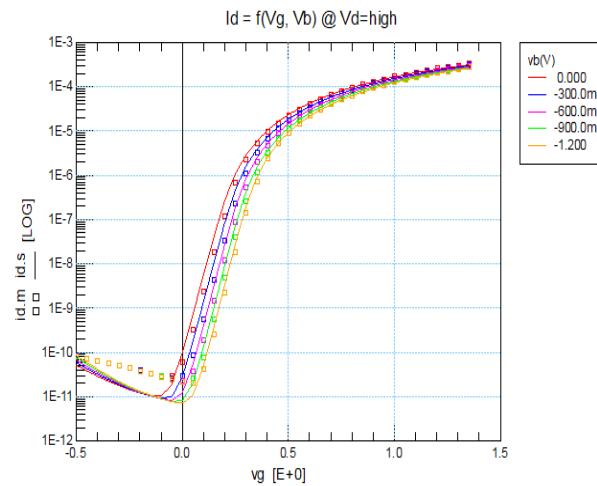
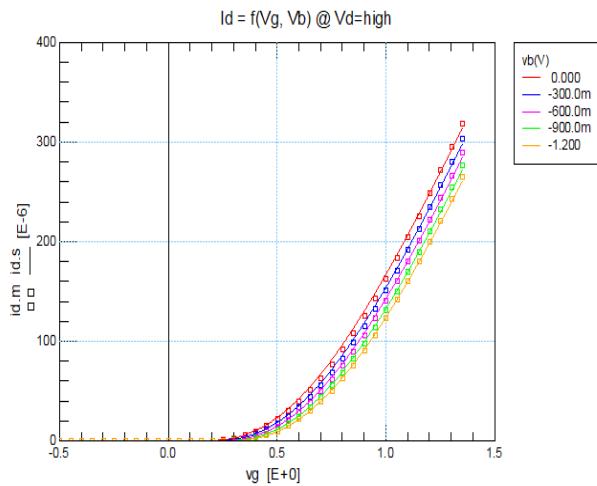
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

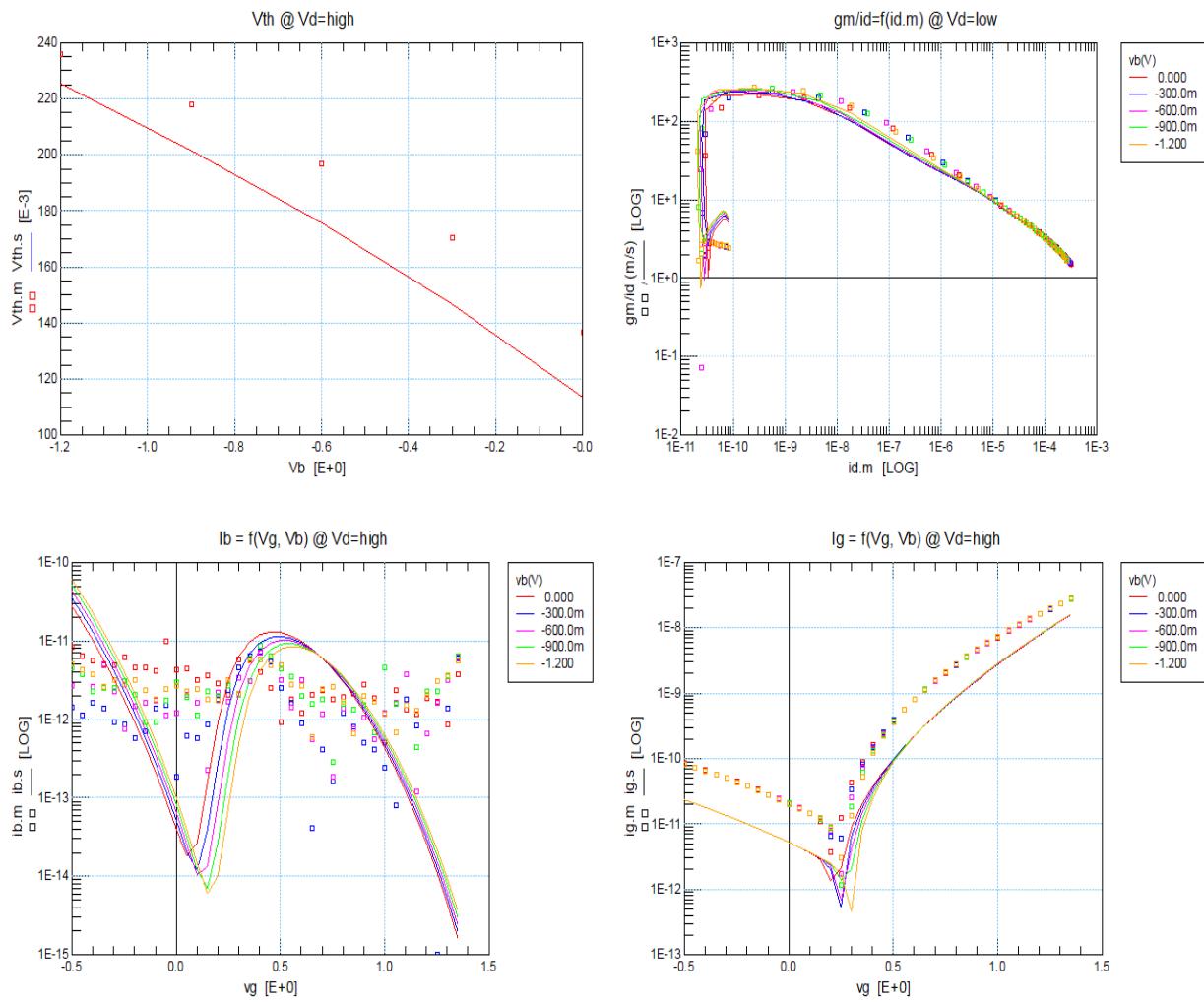


**idvg, Vd = 0.05V, T = -40°C**


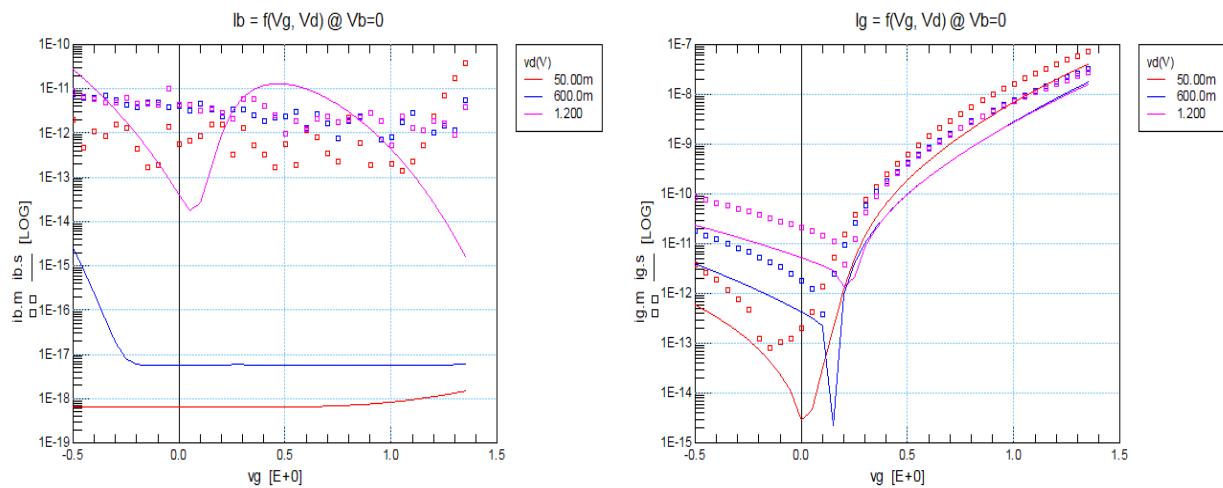


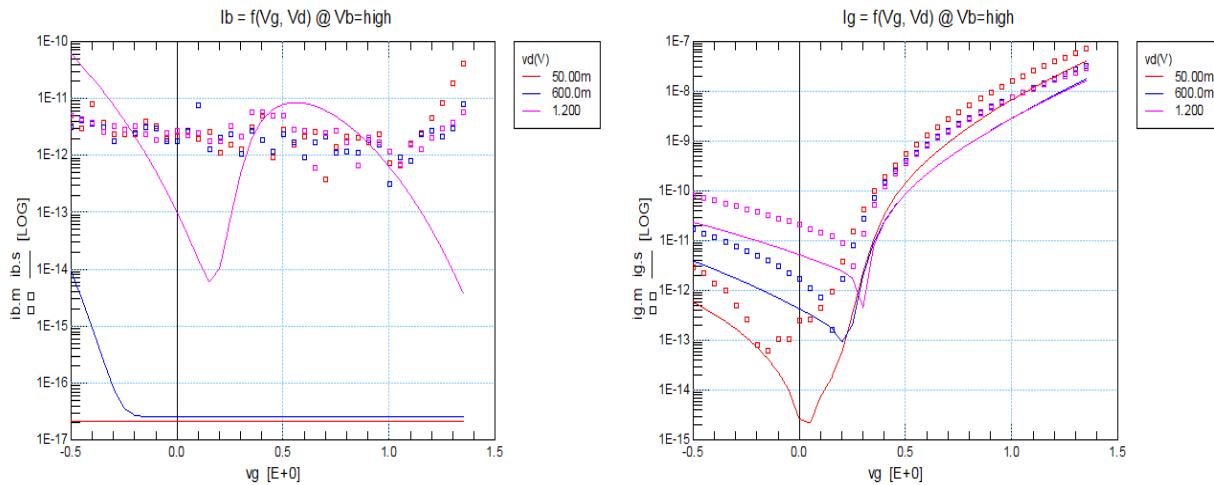
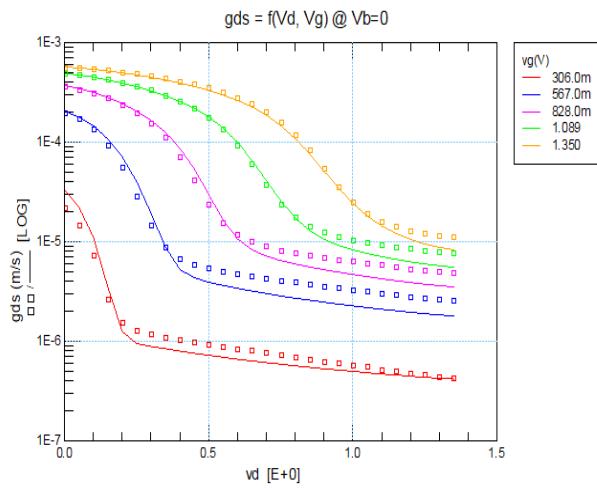
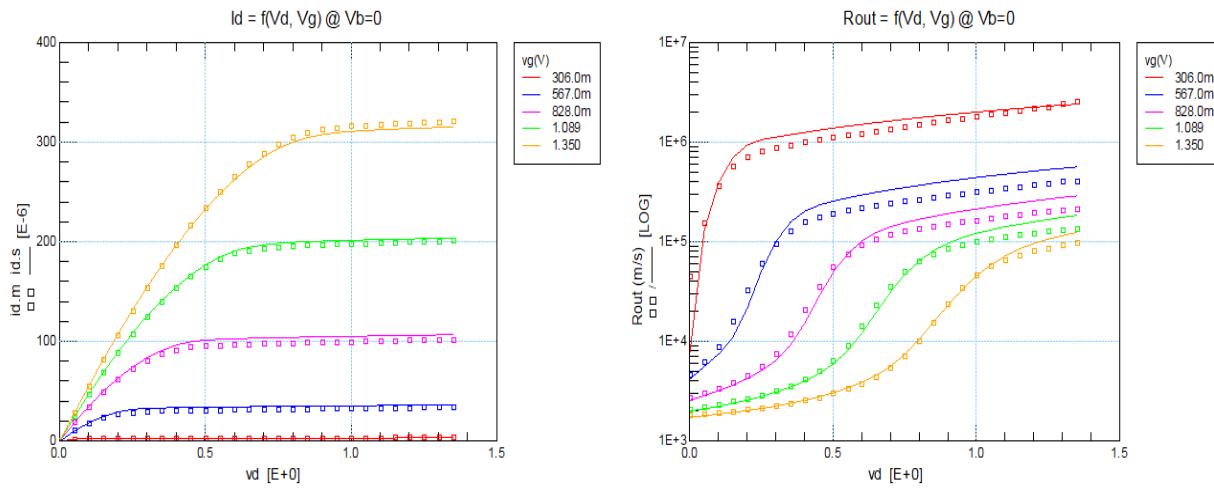
$i_{dvg}, V_d = 1.2V, T = -40^\circ C$

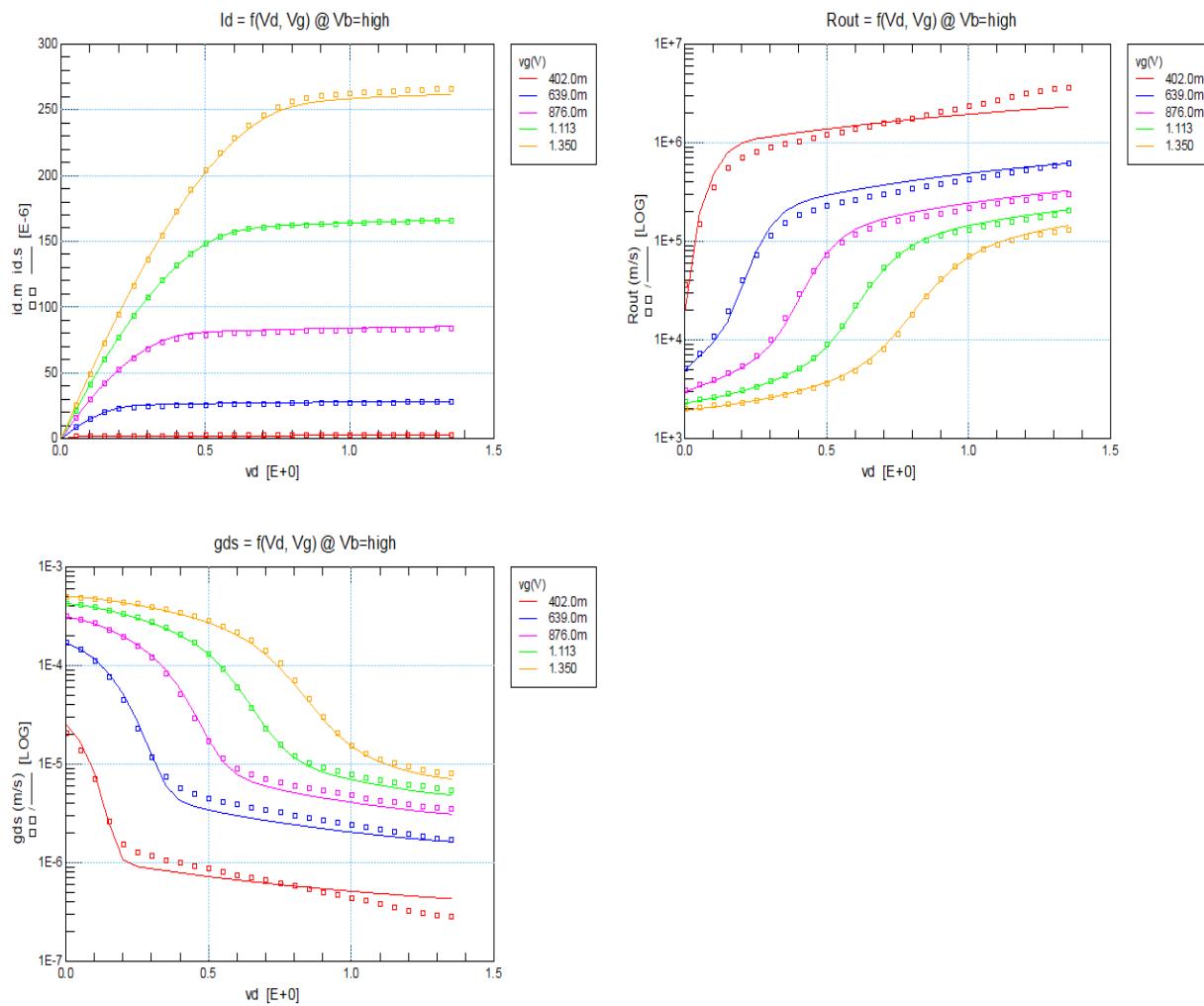
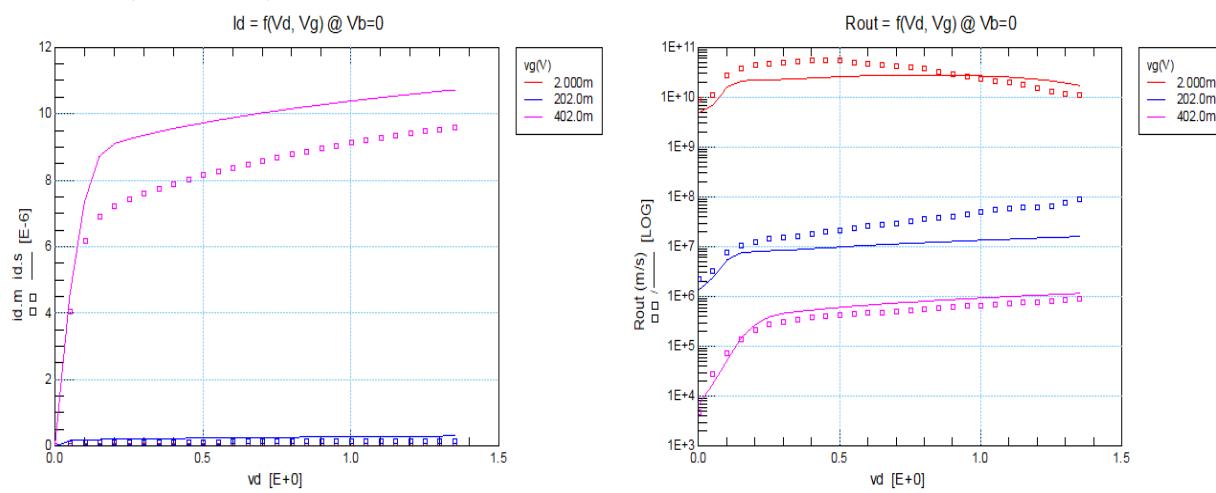


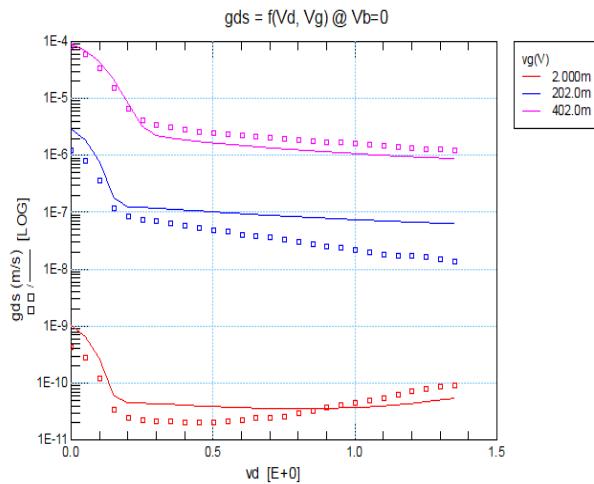


$id_{vg}, I_b, I_g, V_b = 0V, T = -40^\circ\text{C}$

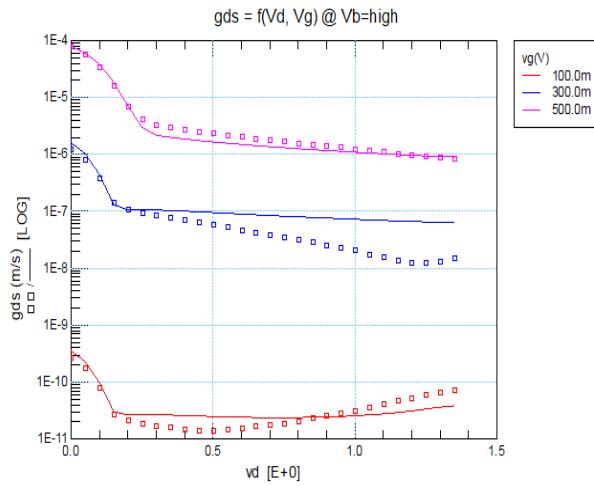
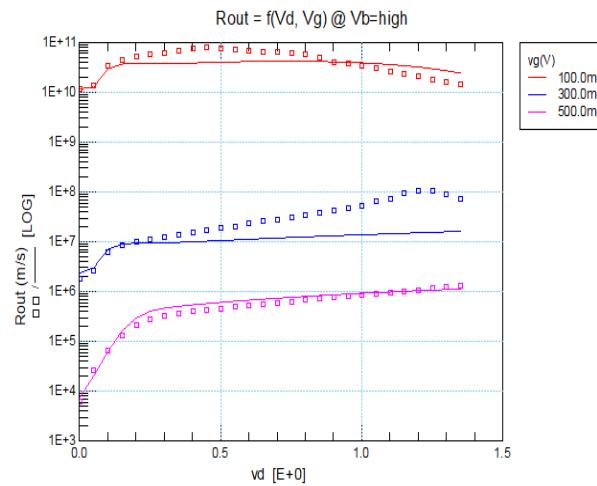
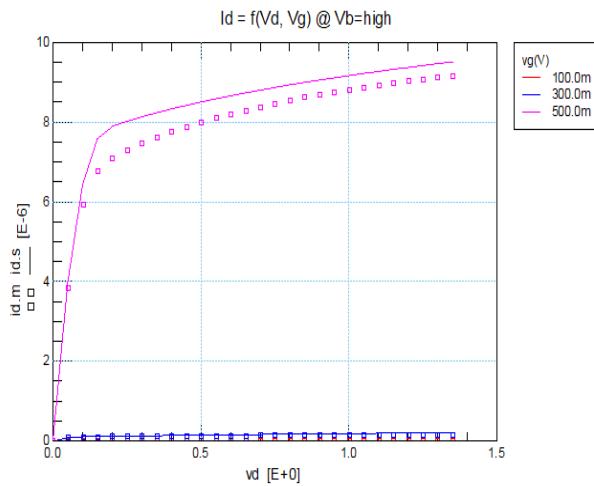


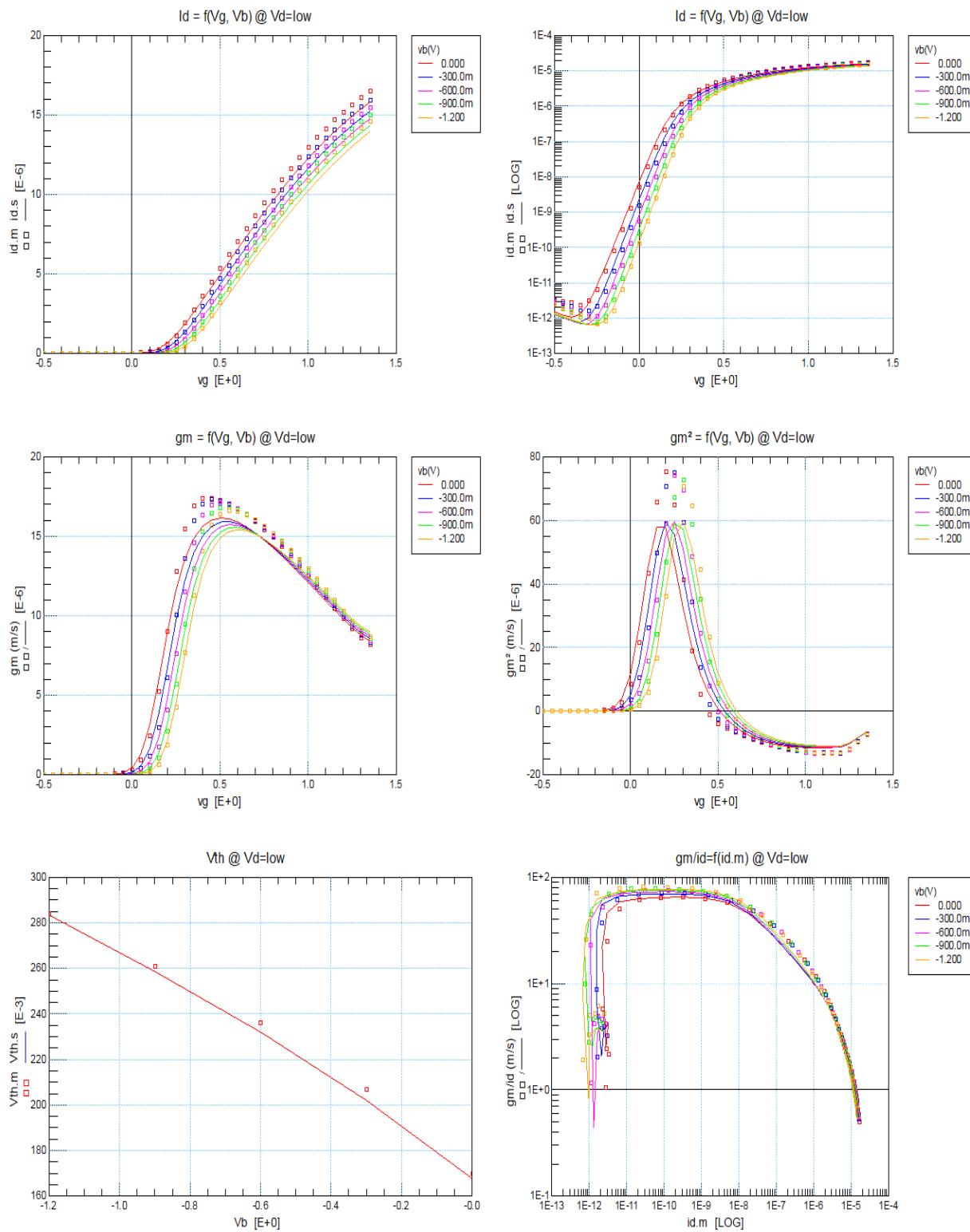
**idvg, Ib,Ig, Vb = -1.2V, T = -40°C**

**idvd, Vb = 0V, T = -40°C**


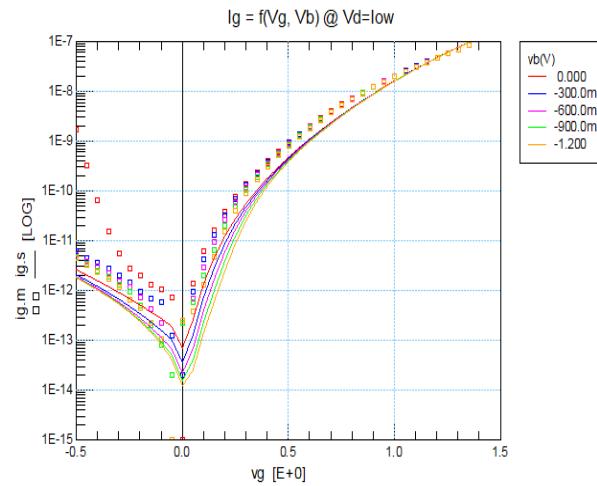
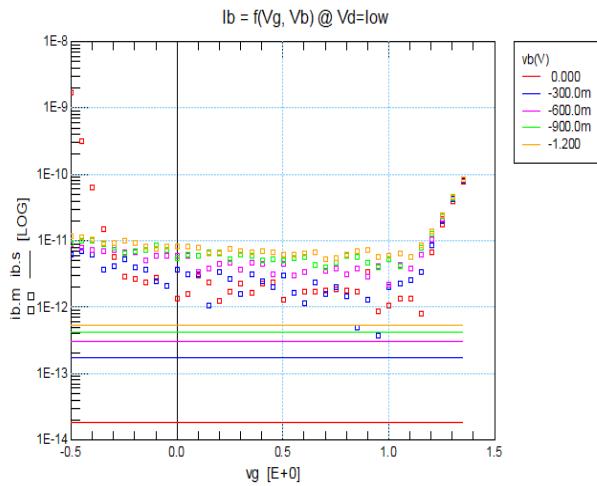
**idvd\_vbmin, Vb = -1.2V, T = -40°C**

**idvd\_vth, Vb = 0V, T = -40°C**




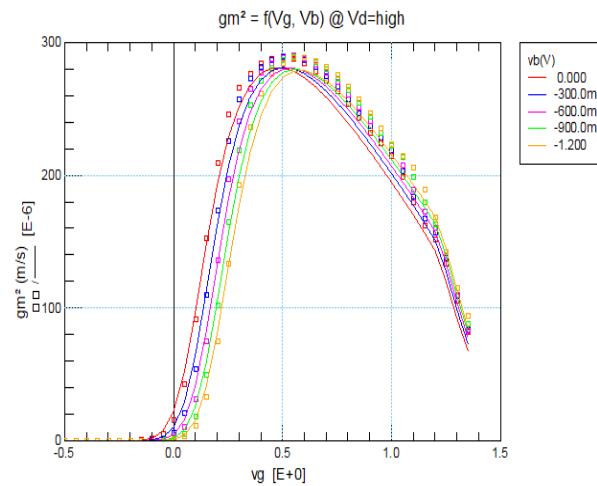
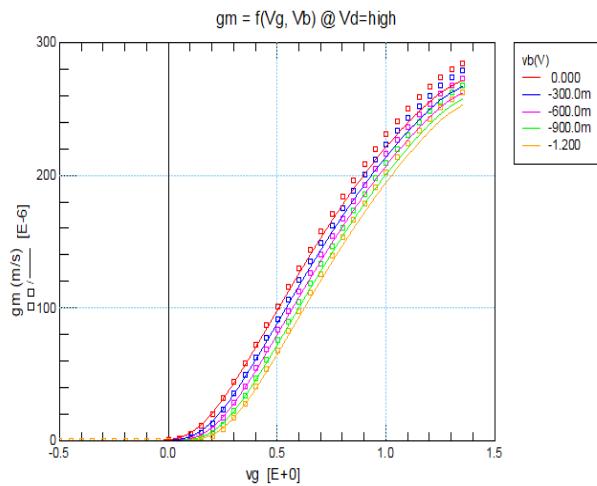
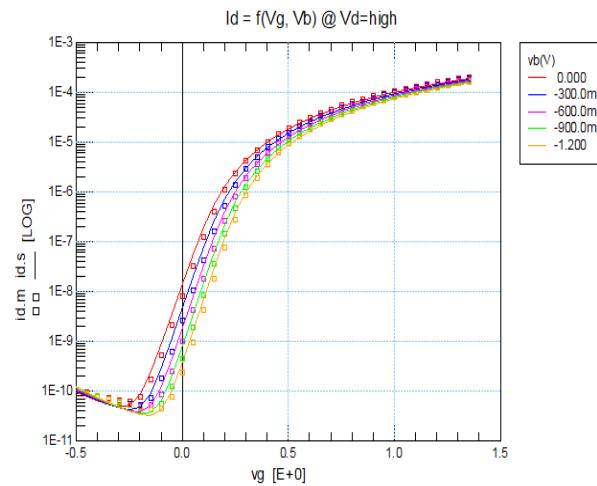
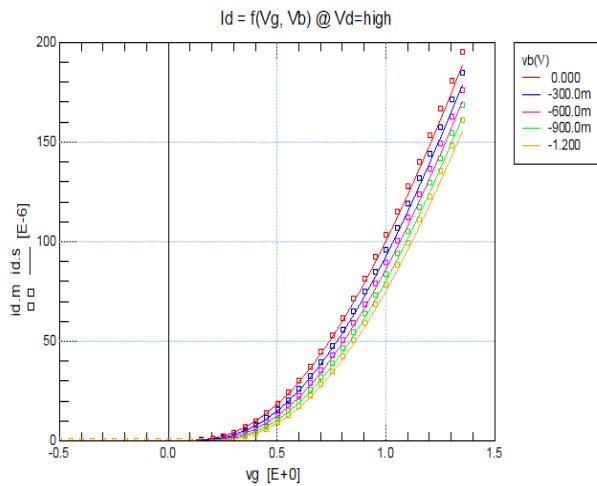
### idvd\_vth\_vbmin, Vb = -1.2V, T = -40°C

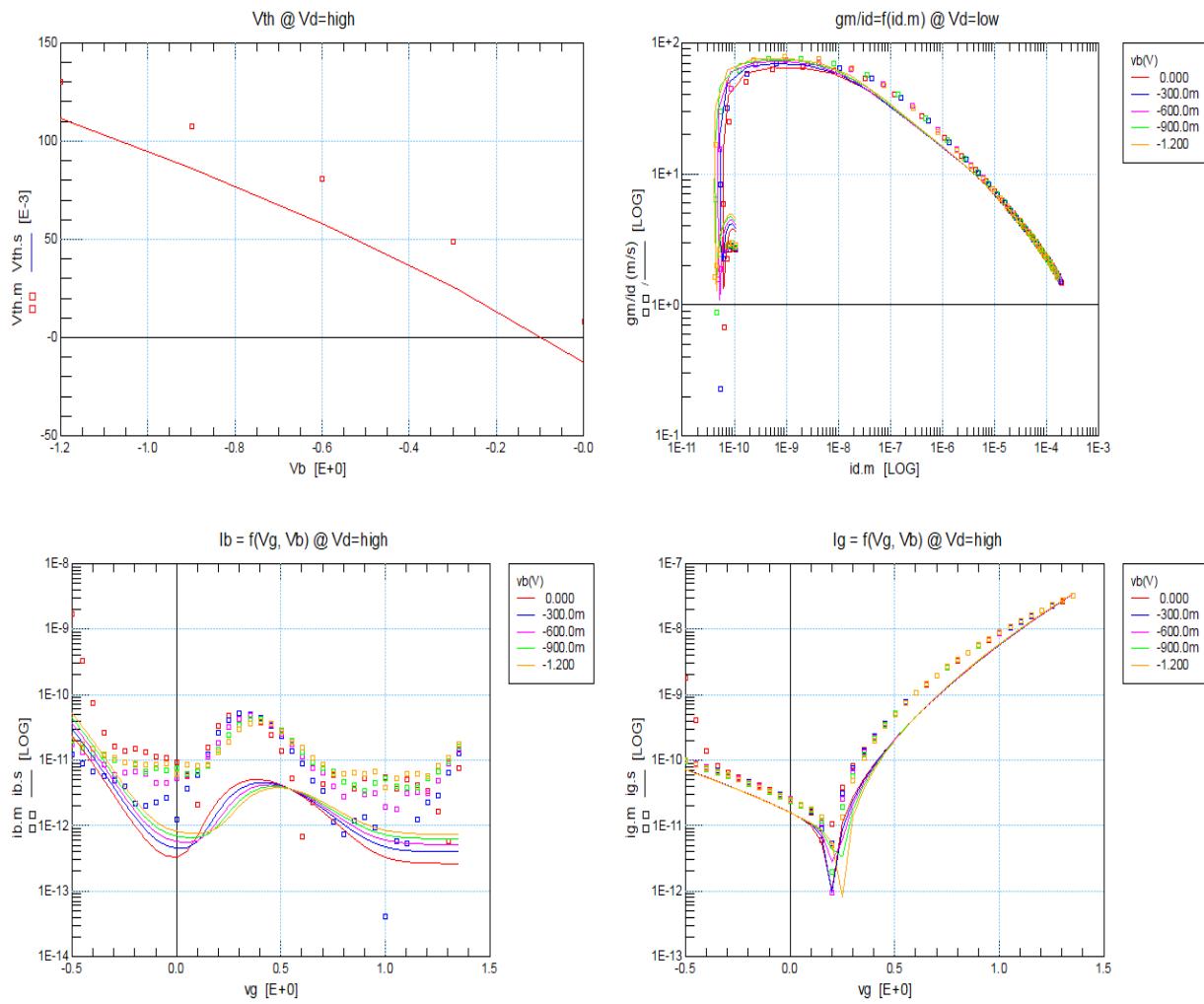


**idvg, Vd = 0.05V, T = 70°C**


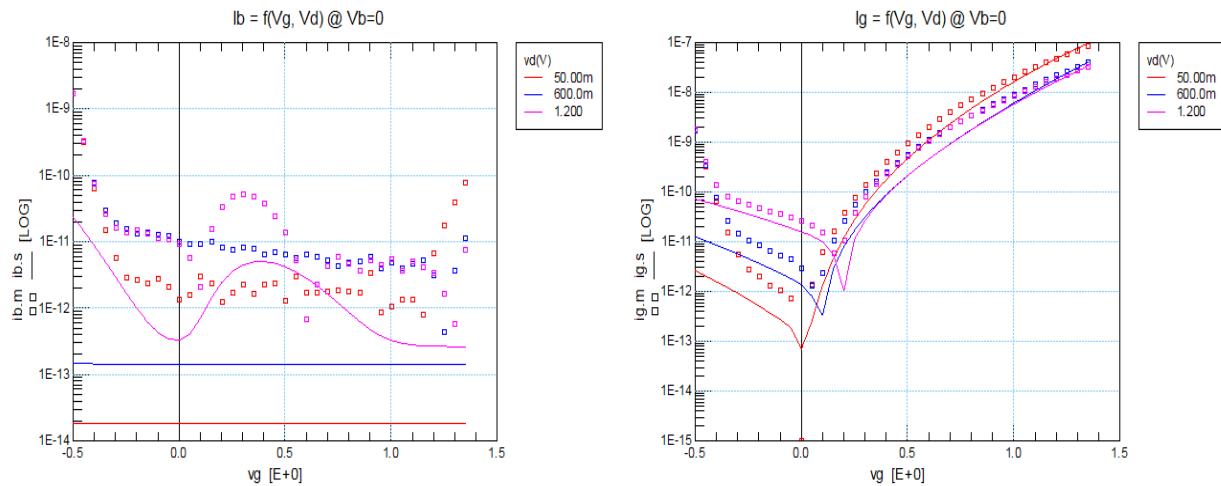


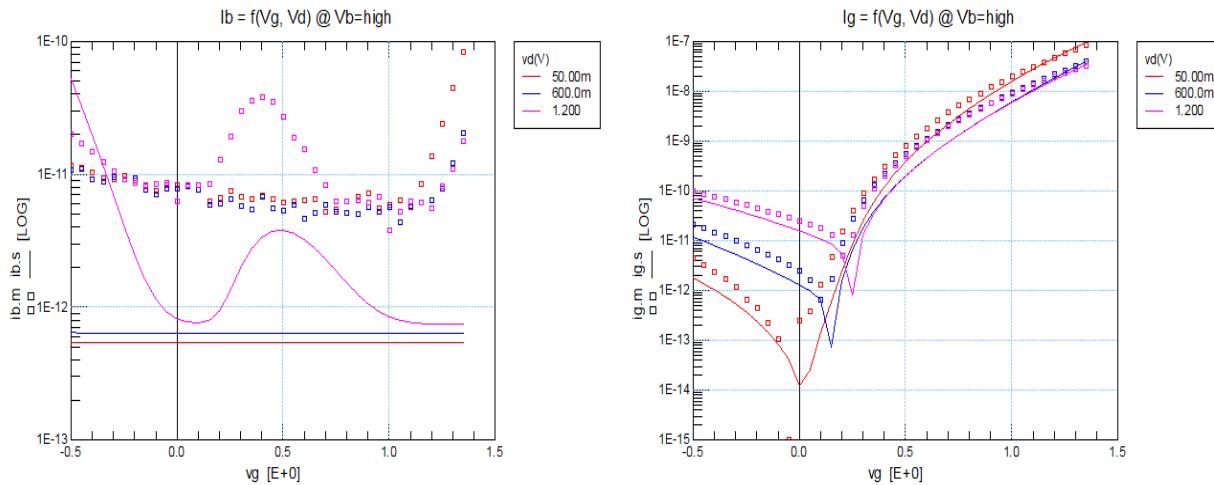
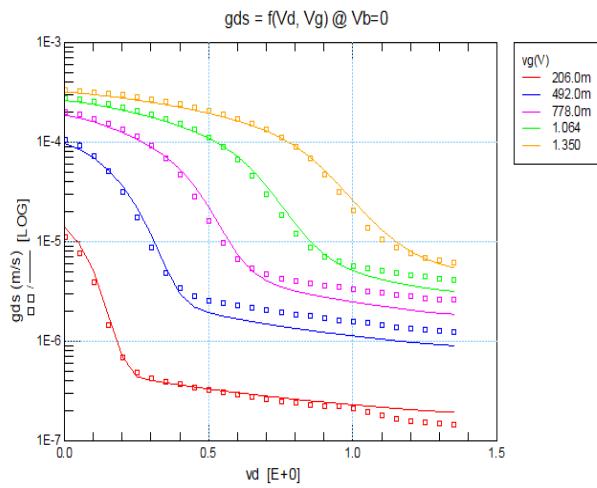
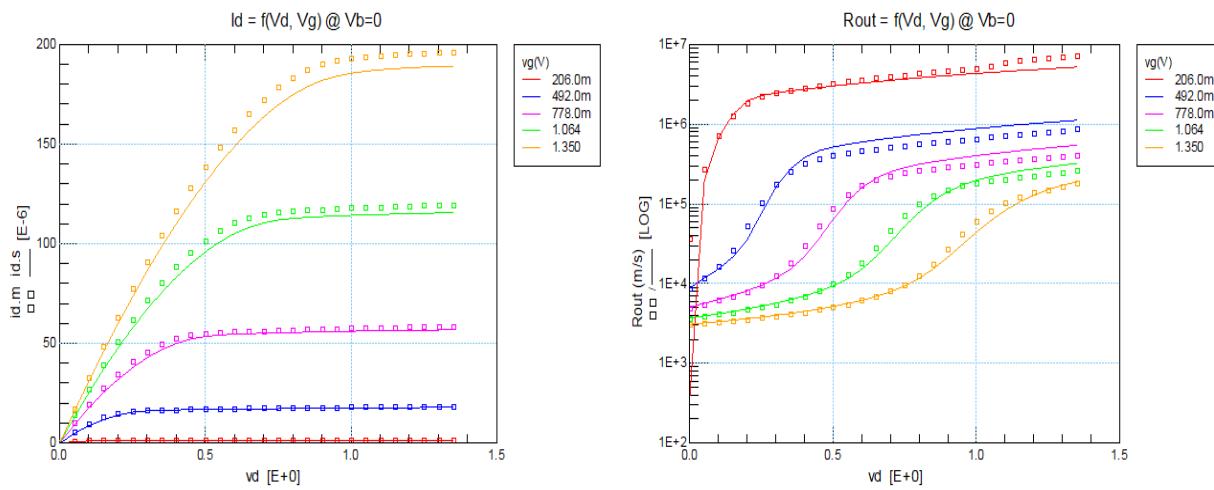
$i_d v_g, V_d = 1.2V, T = 70^\circ C$

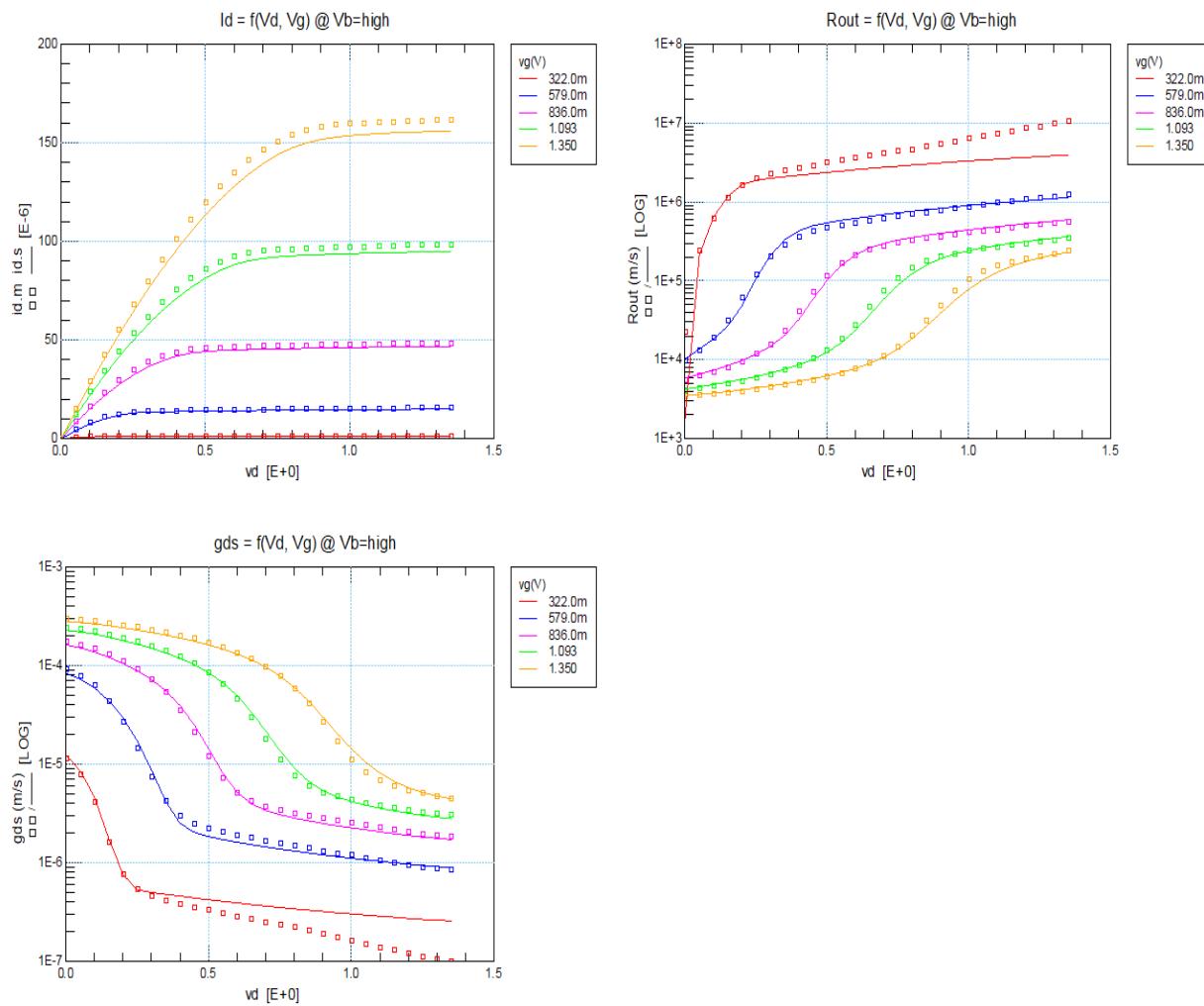
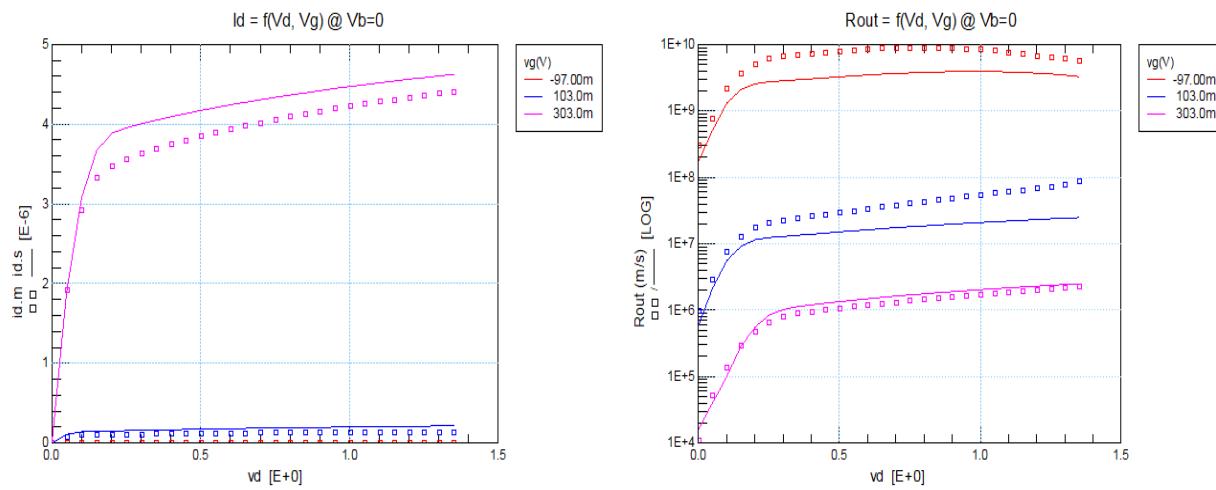


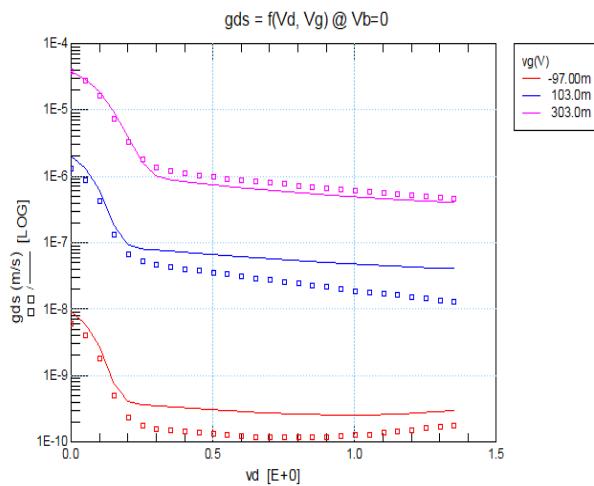


### $I_{dvg}, I_b, I_g, V_b = 0V, T = 70^\circ C$

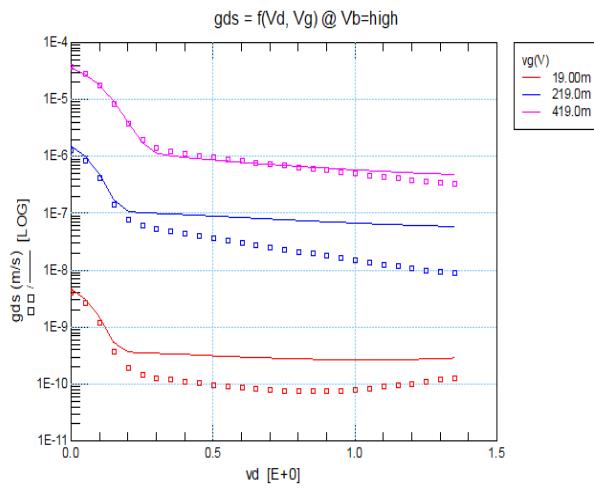
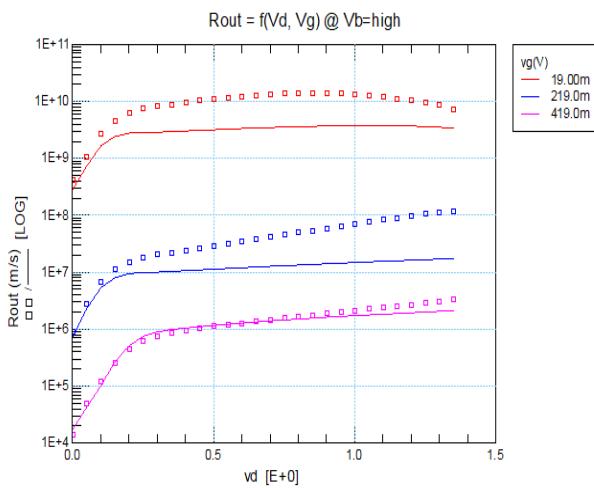
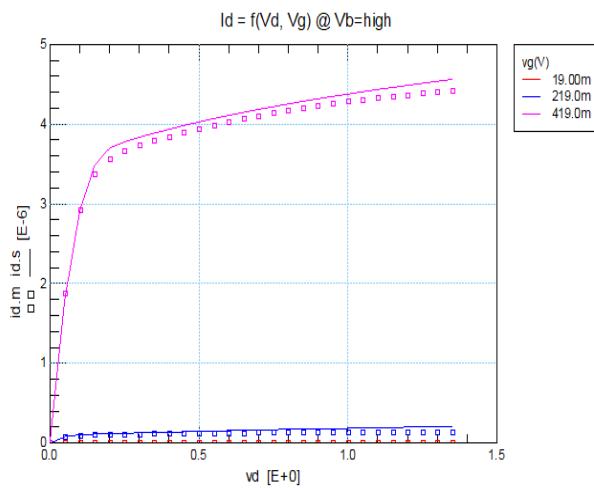


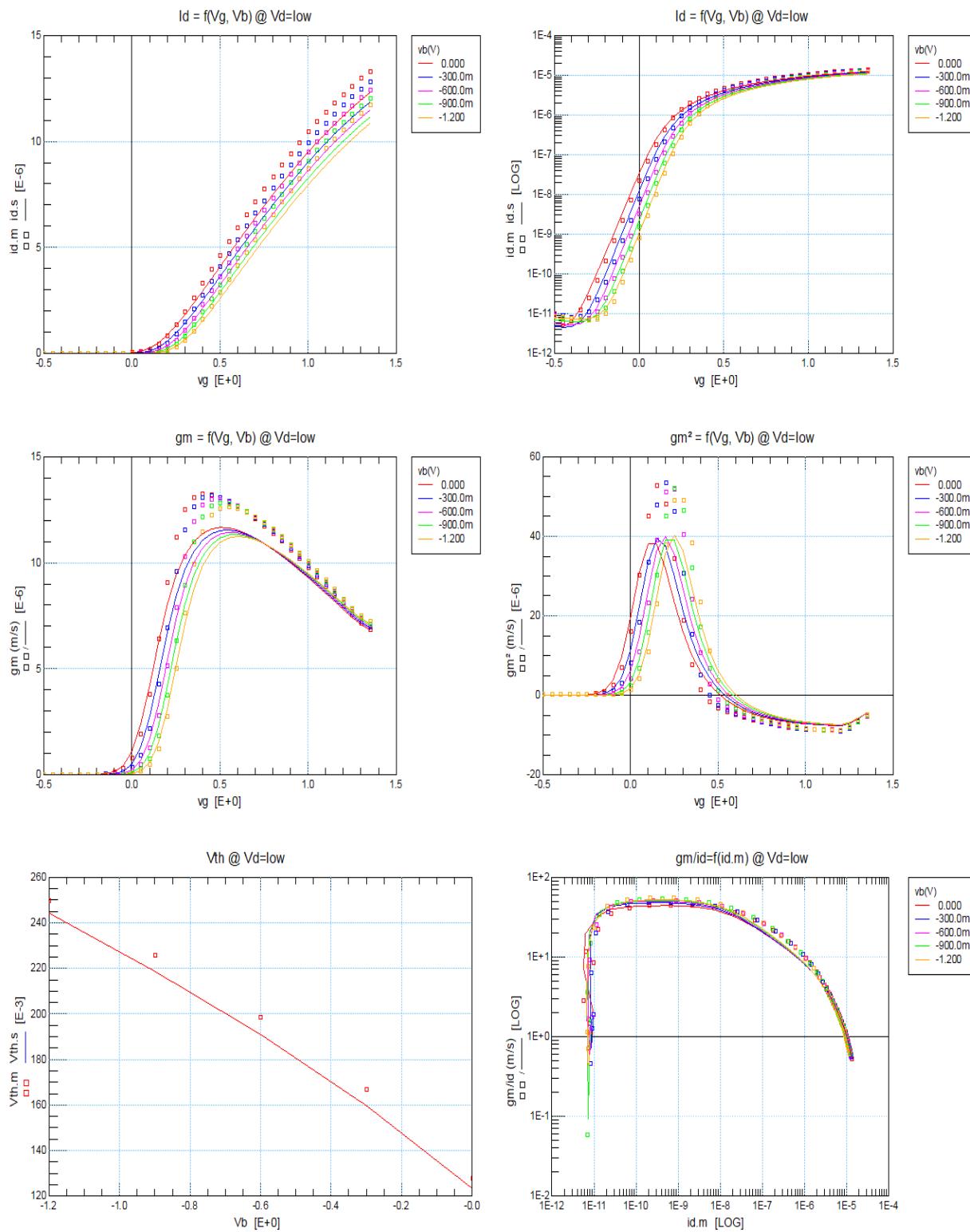
**idvg, Ib,Ig, Vb = -1.2V, T = 70°C**

**idvd, Vb = 0V, T = 70°C**


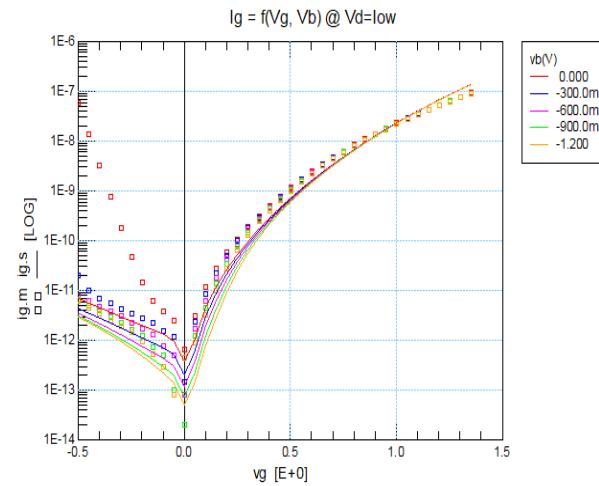
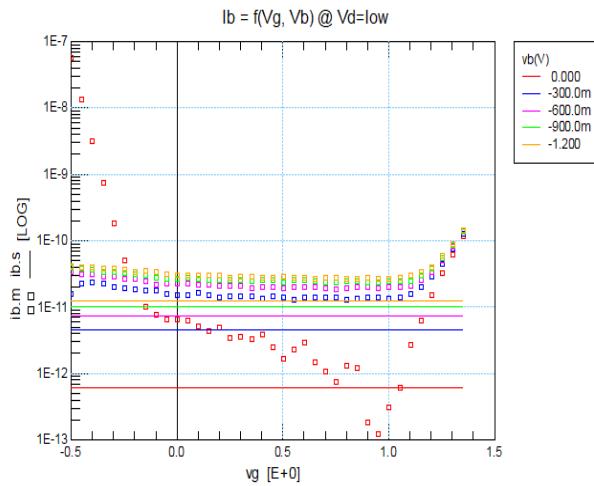
**idvd\_vbmin, Vb = -1.2V, T = 70°C**

**idvd\_vth, Vb = 0V, T = 70°C**




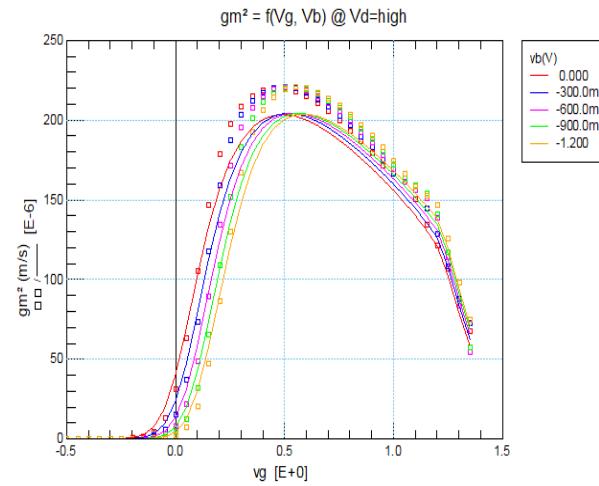
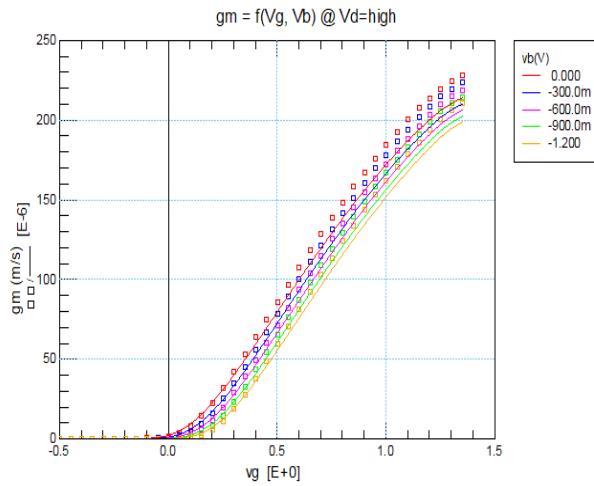
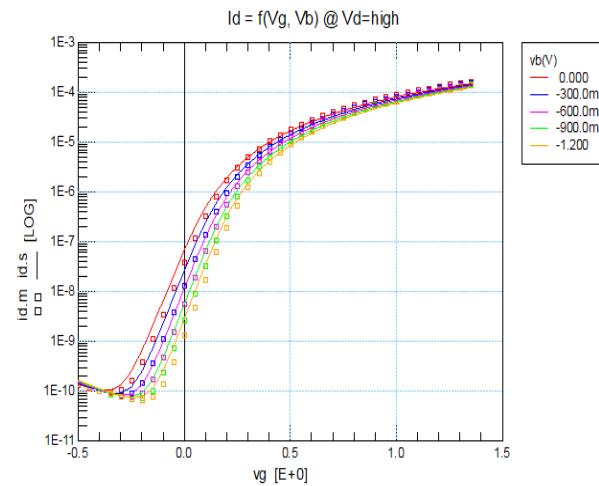
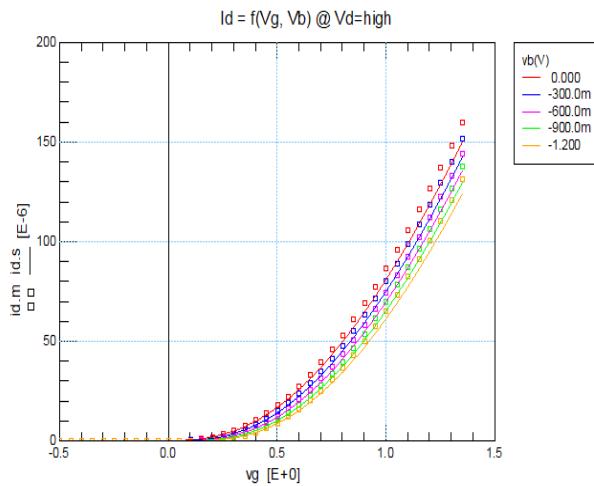
### idvd\_vth\_vbmin, Vb = -1.2V, T = 70°C

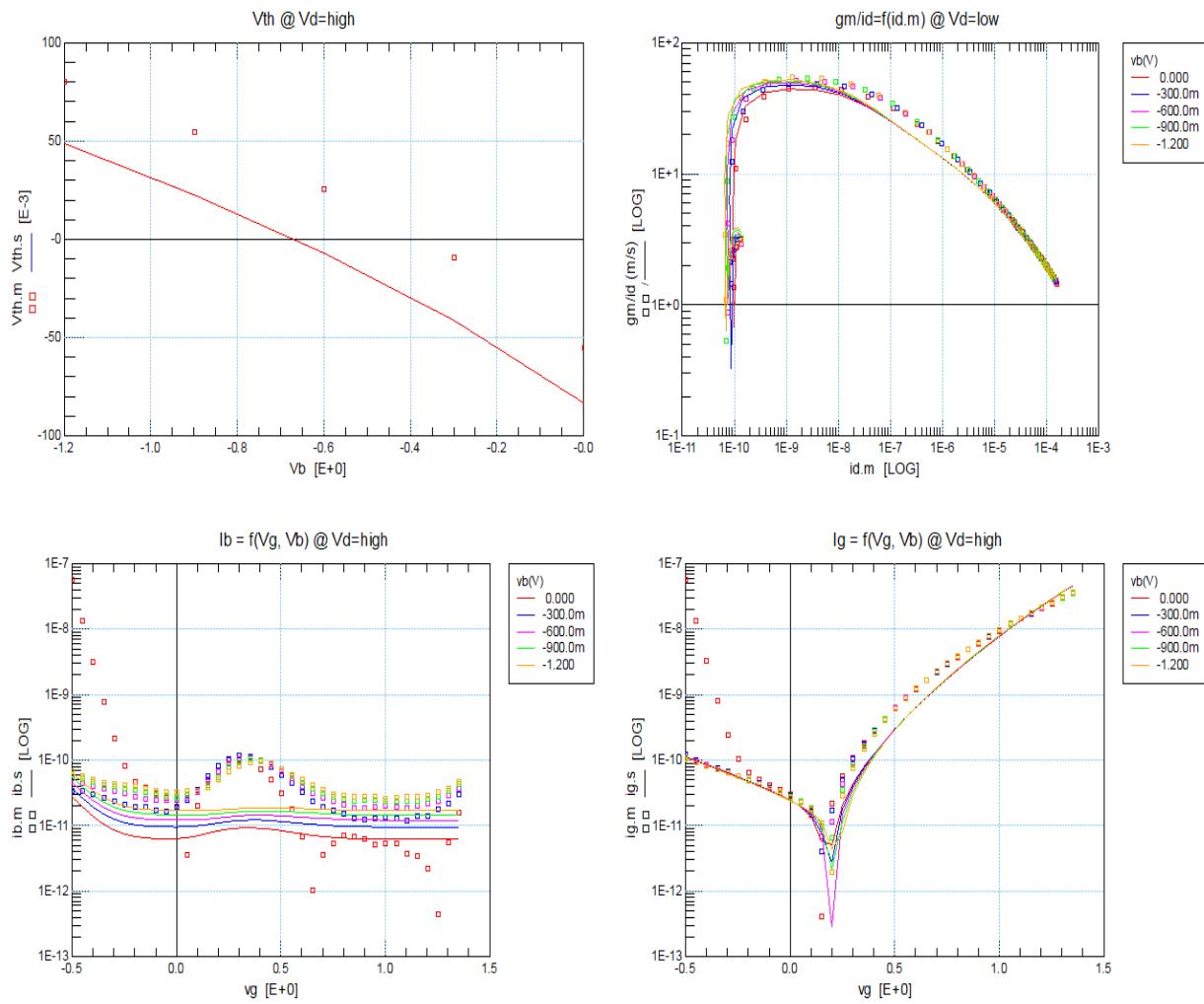


**idvg, Vd = 0.05V, T = 125°C**


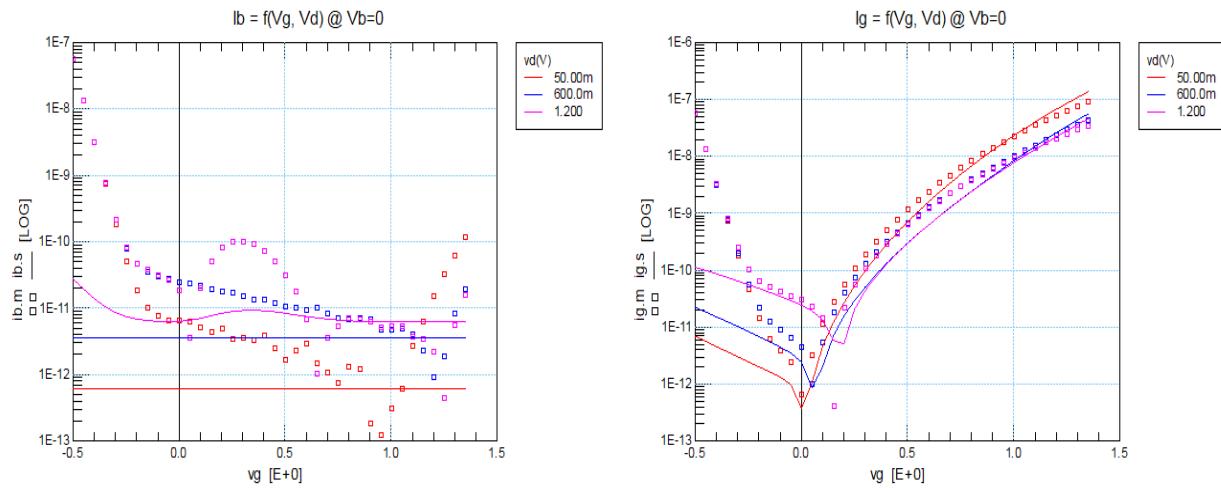


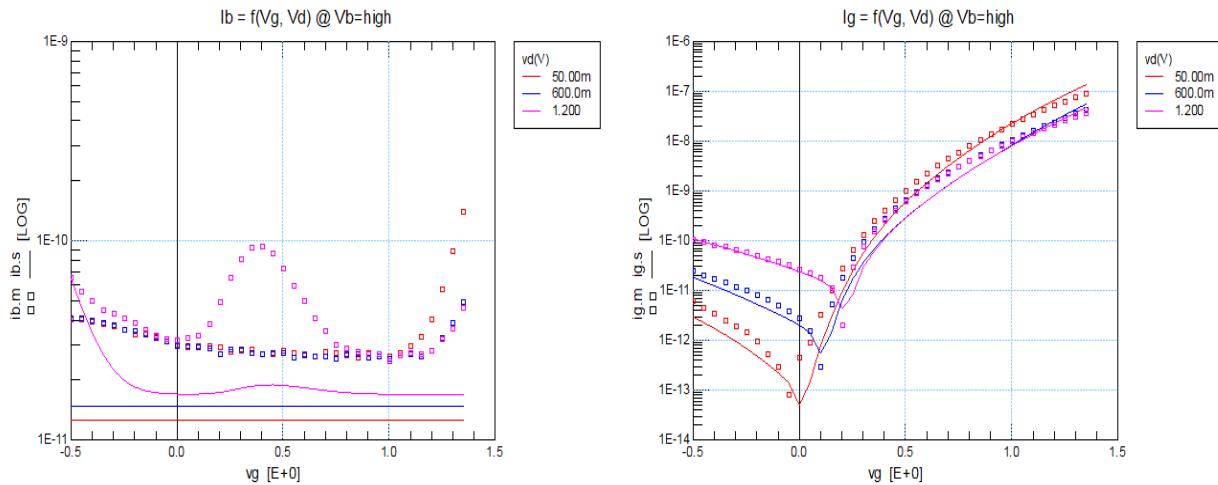
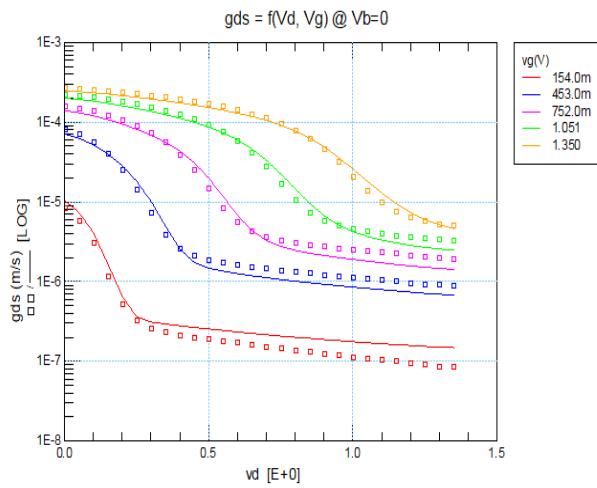
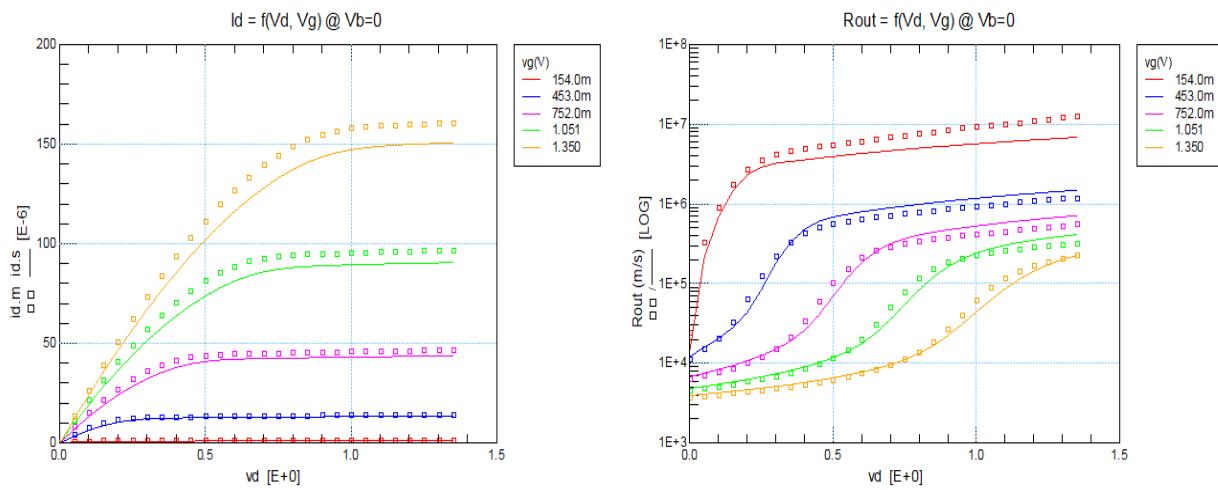
$i_d v_g, V_d = 1.2V, T = 125^\circ C$

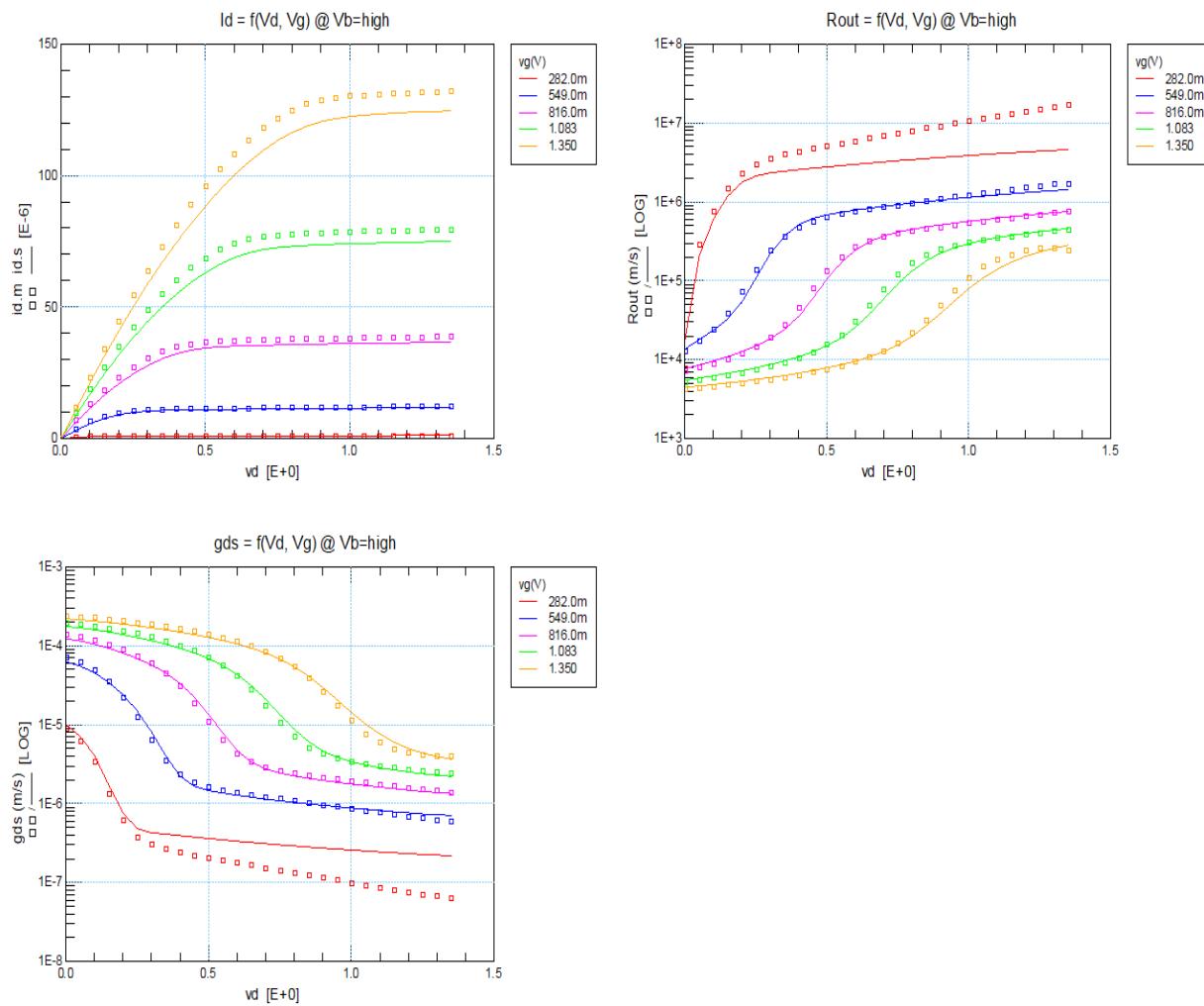
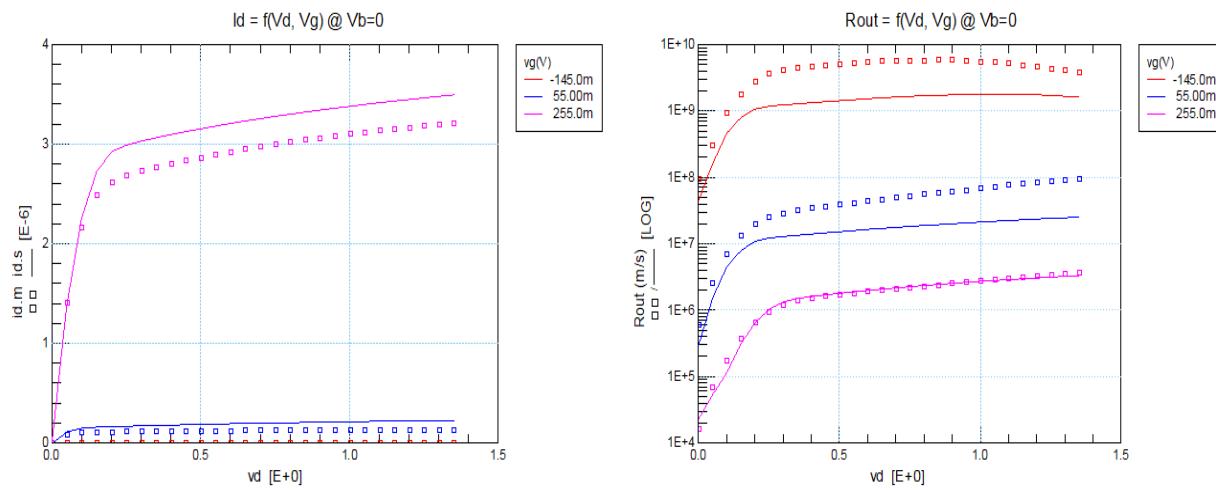


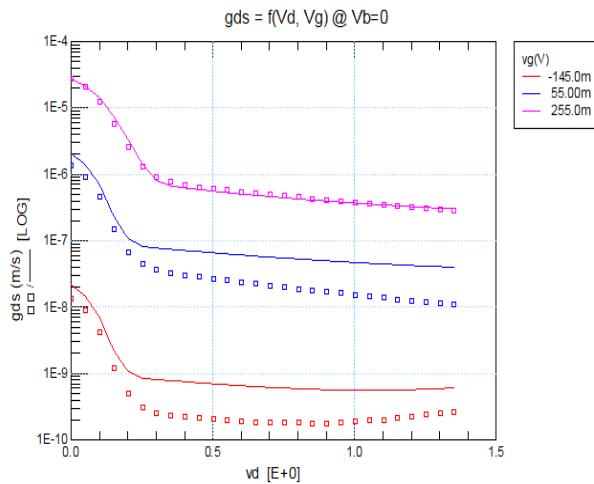


$id_{vg}, I_b, Ig, V_b = 0V, T = 125^\circ\text{C}$

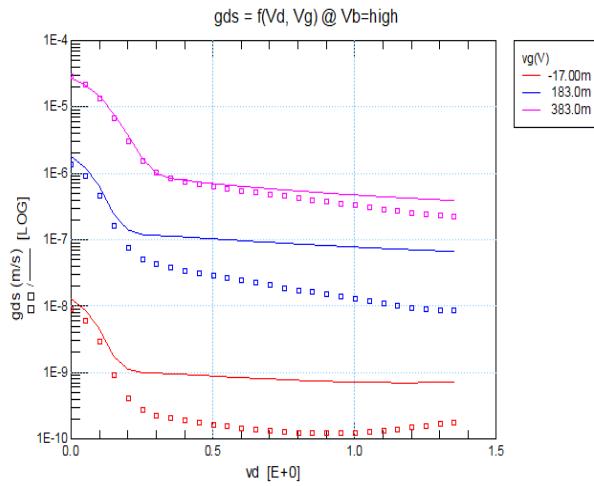
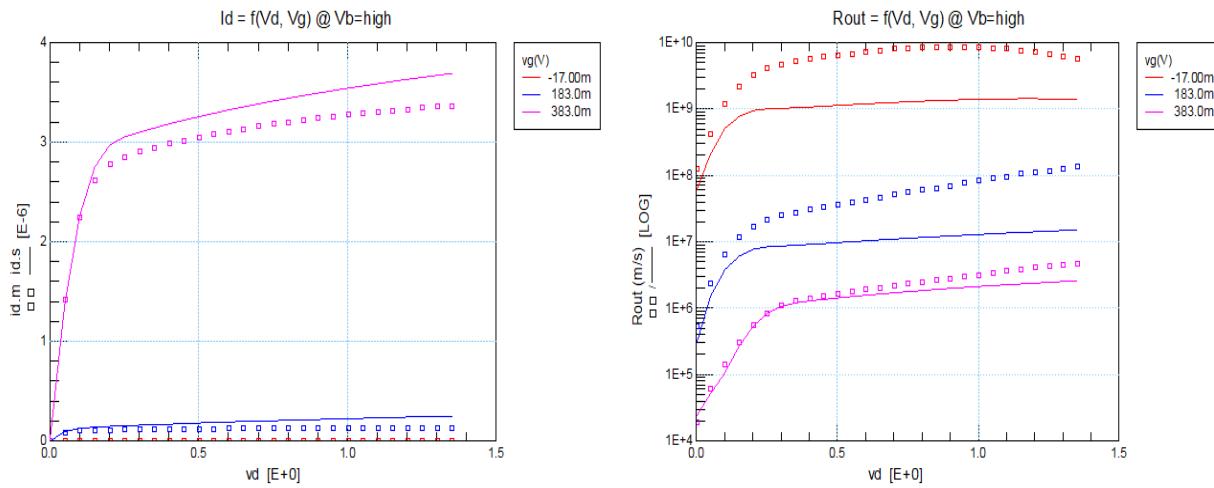


**idvg, Ib,Ig, Vb = -1.2V, T = 125°C**

**idvd, Vb = 0V, T = 125°C**


**idvd\_vbmin, Vb = -1.2V, T = 125°C****idvd\_vth, Vb = 0V, T = 125°C**

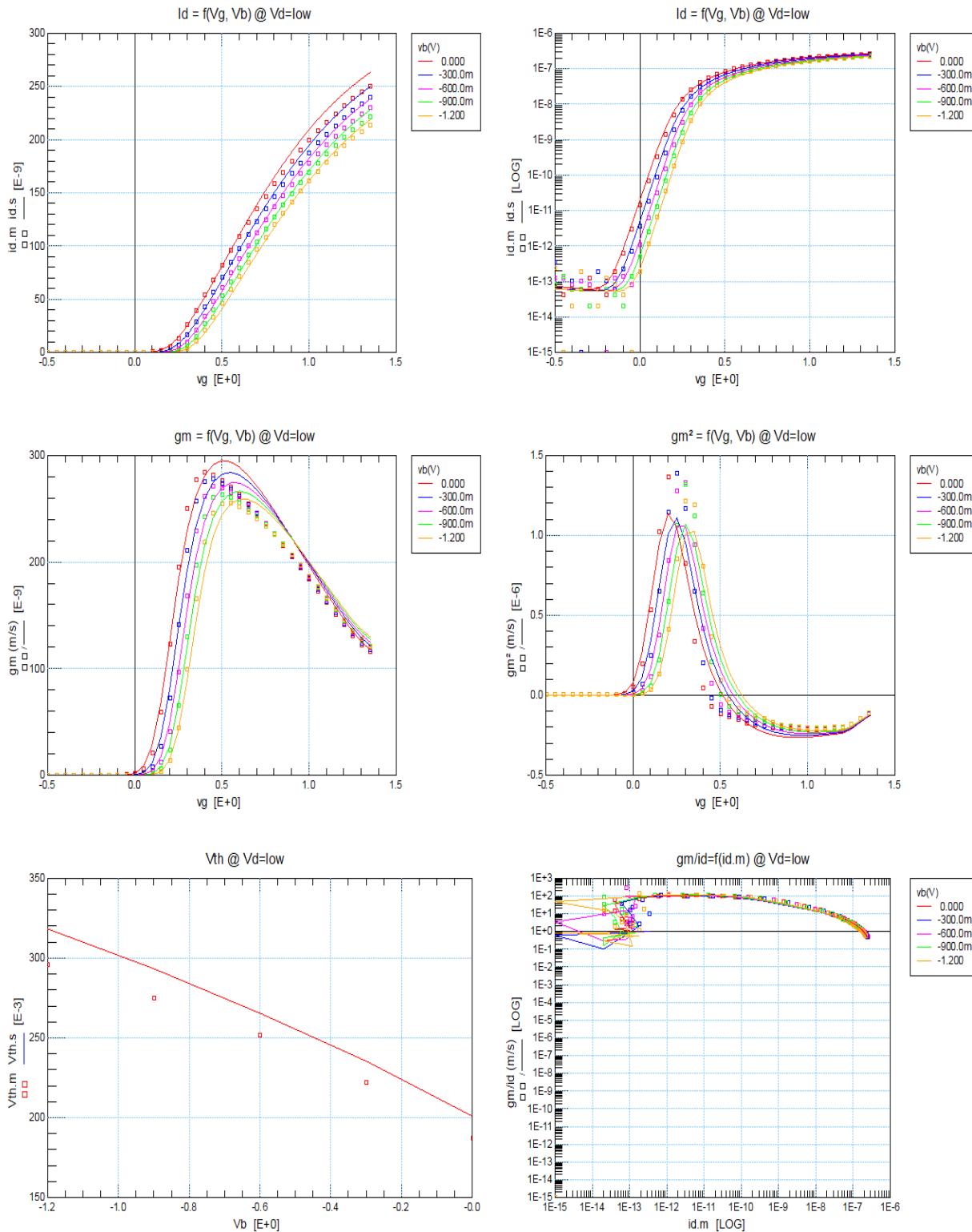


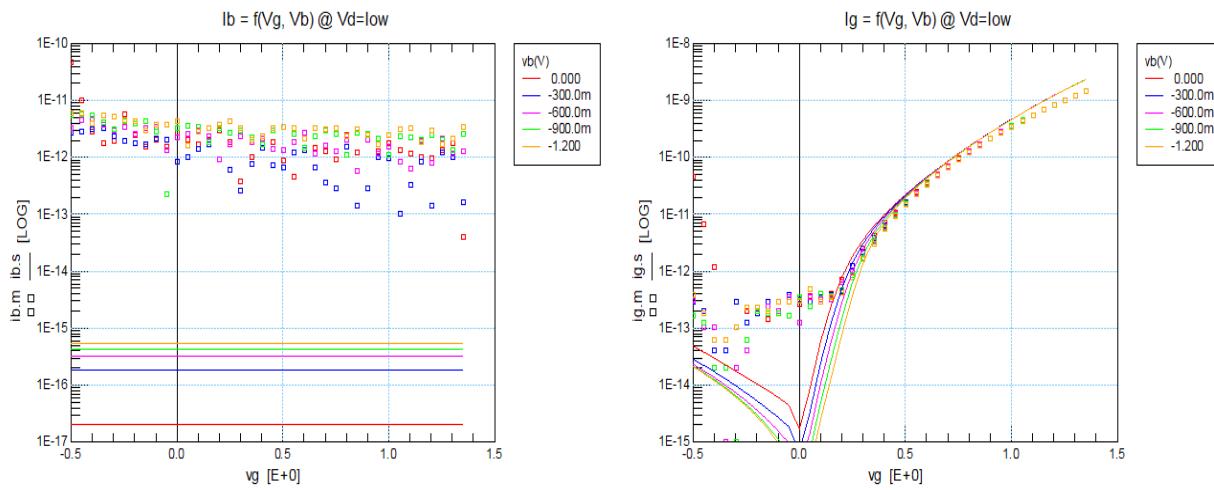
### idvd\_vth\_vbmin, Vb = -1.2V, T = 125°C



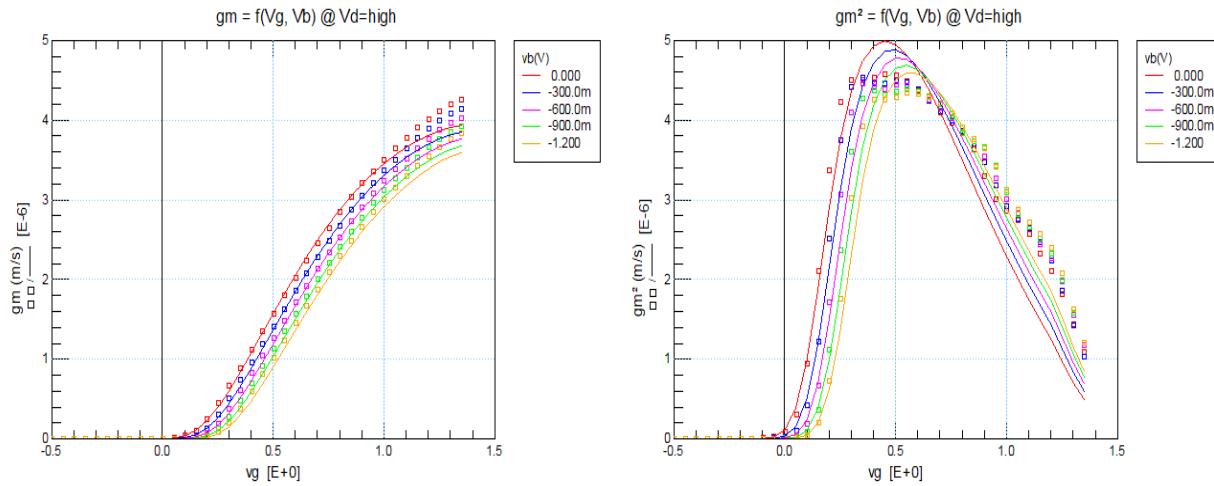
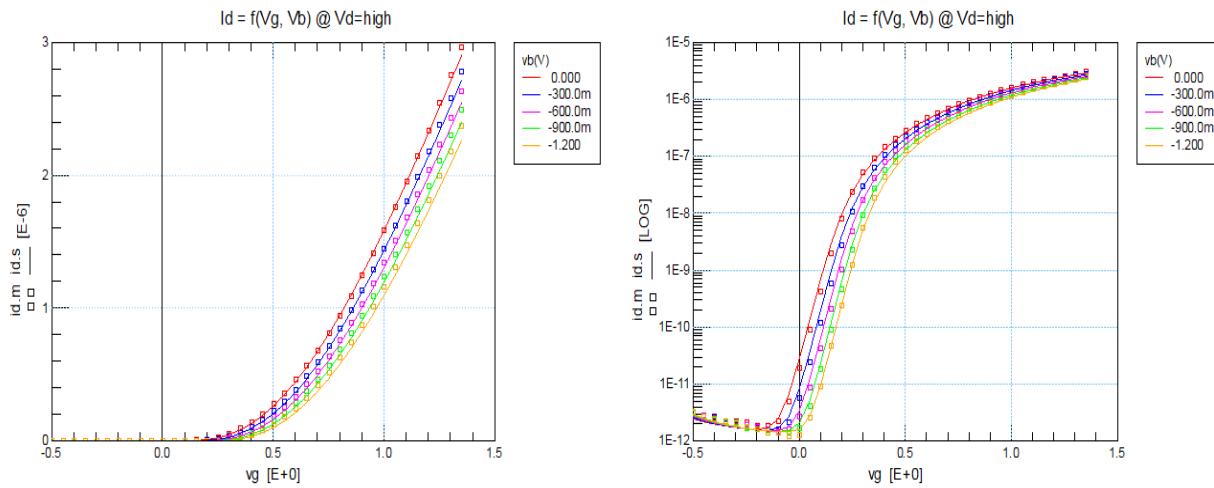
### 4.3 W0u15\_L10u0\_S547\_3

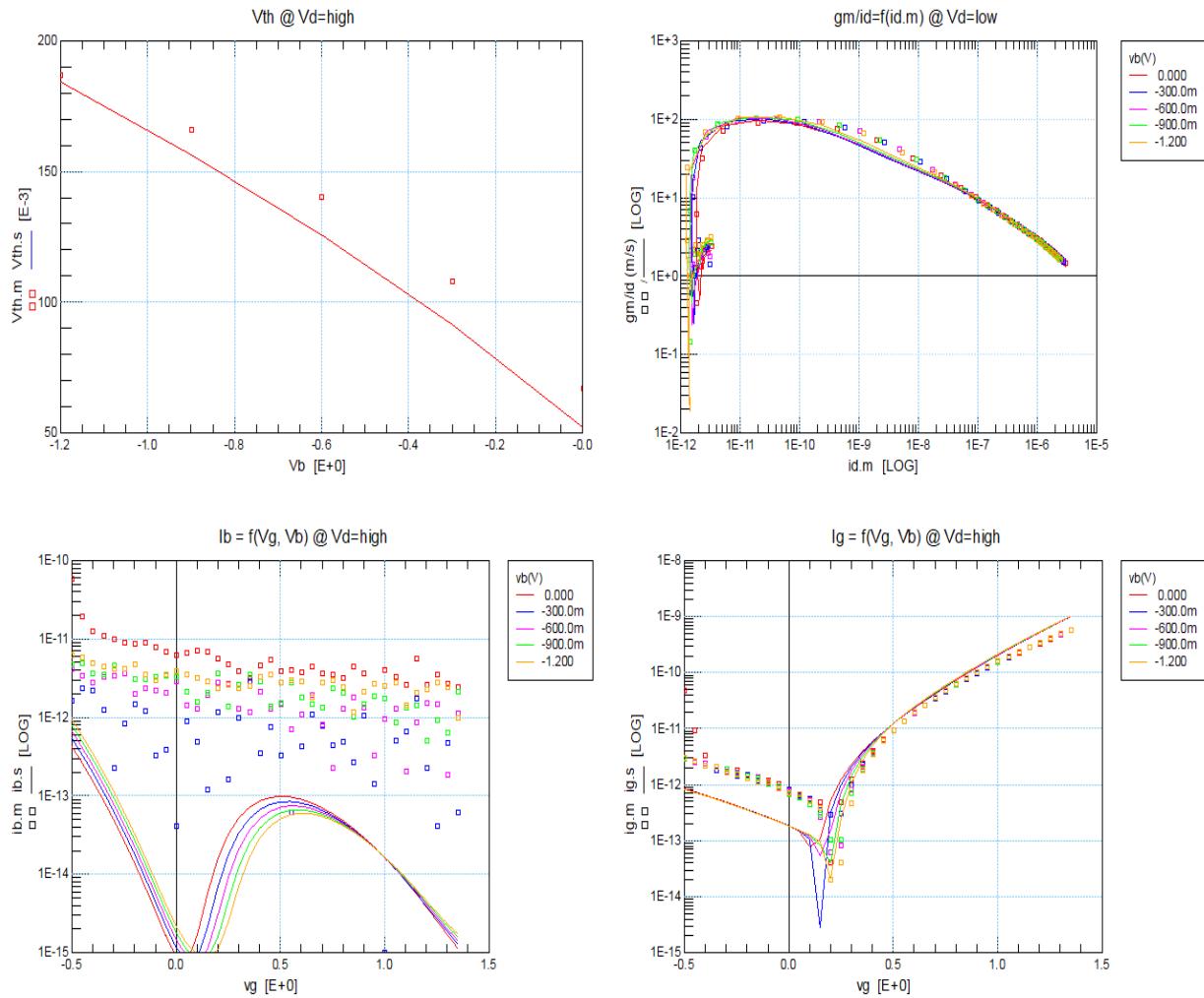
idvg, Vd = 0.05V, T = 27°C



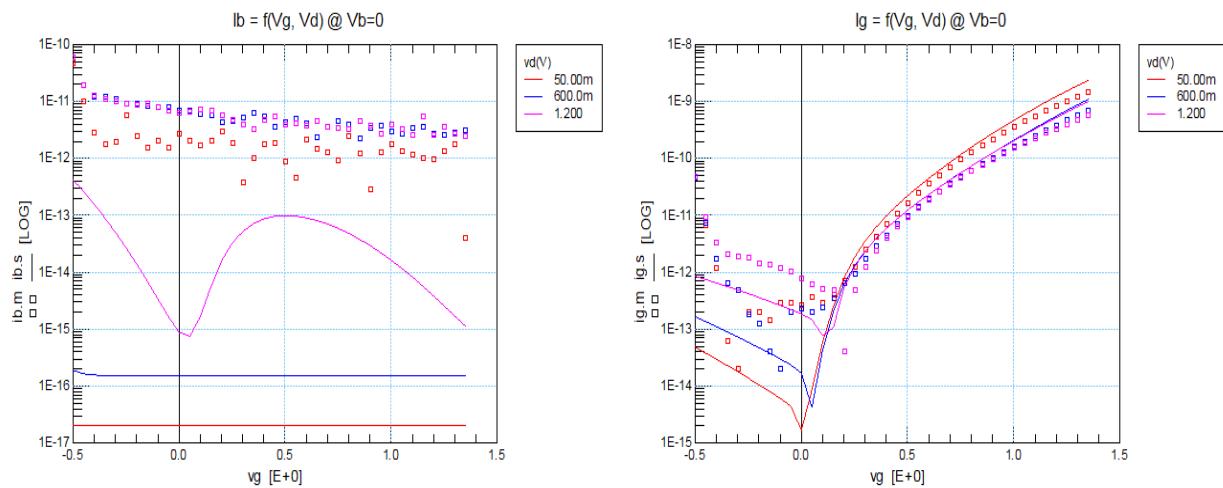


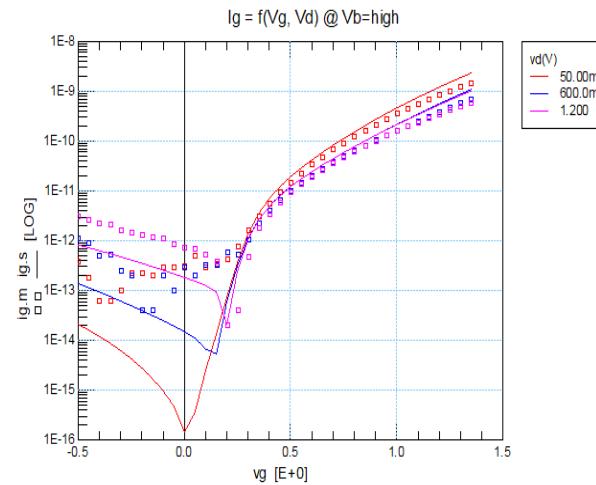
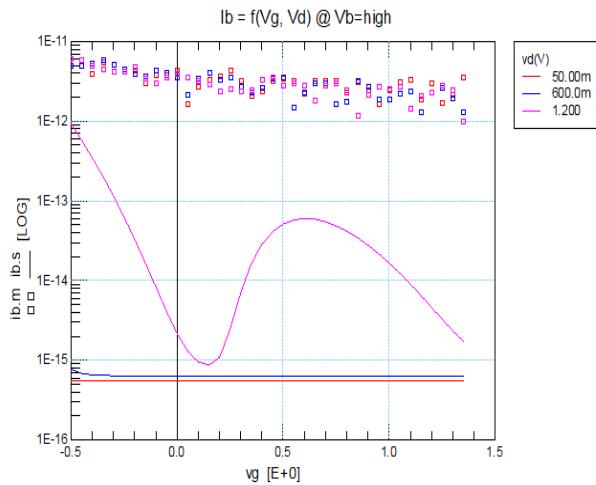
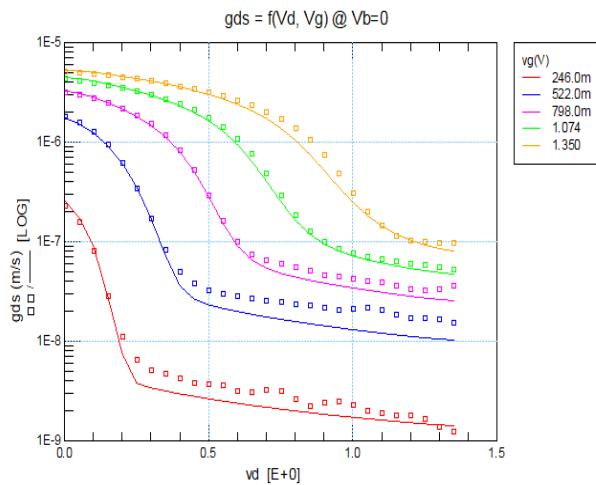
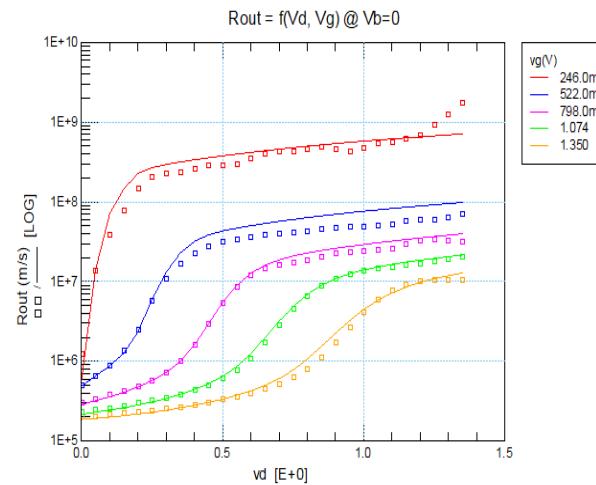
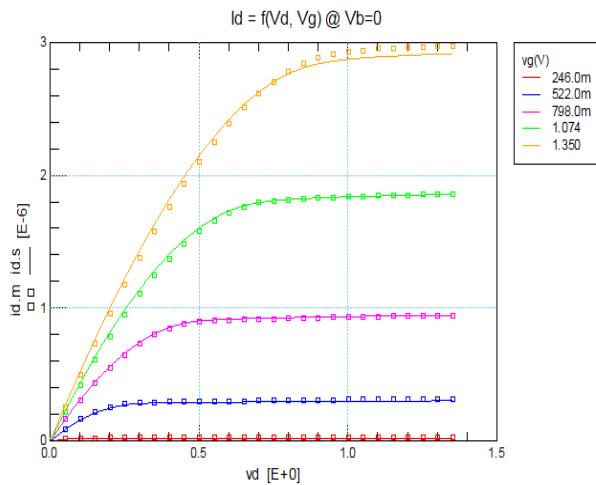
**idvg, Vd = 1.2V, T = 27°C**

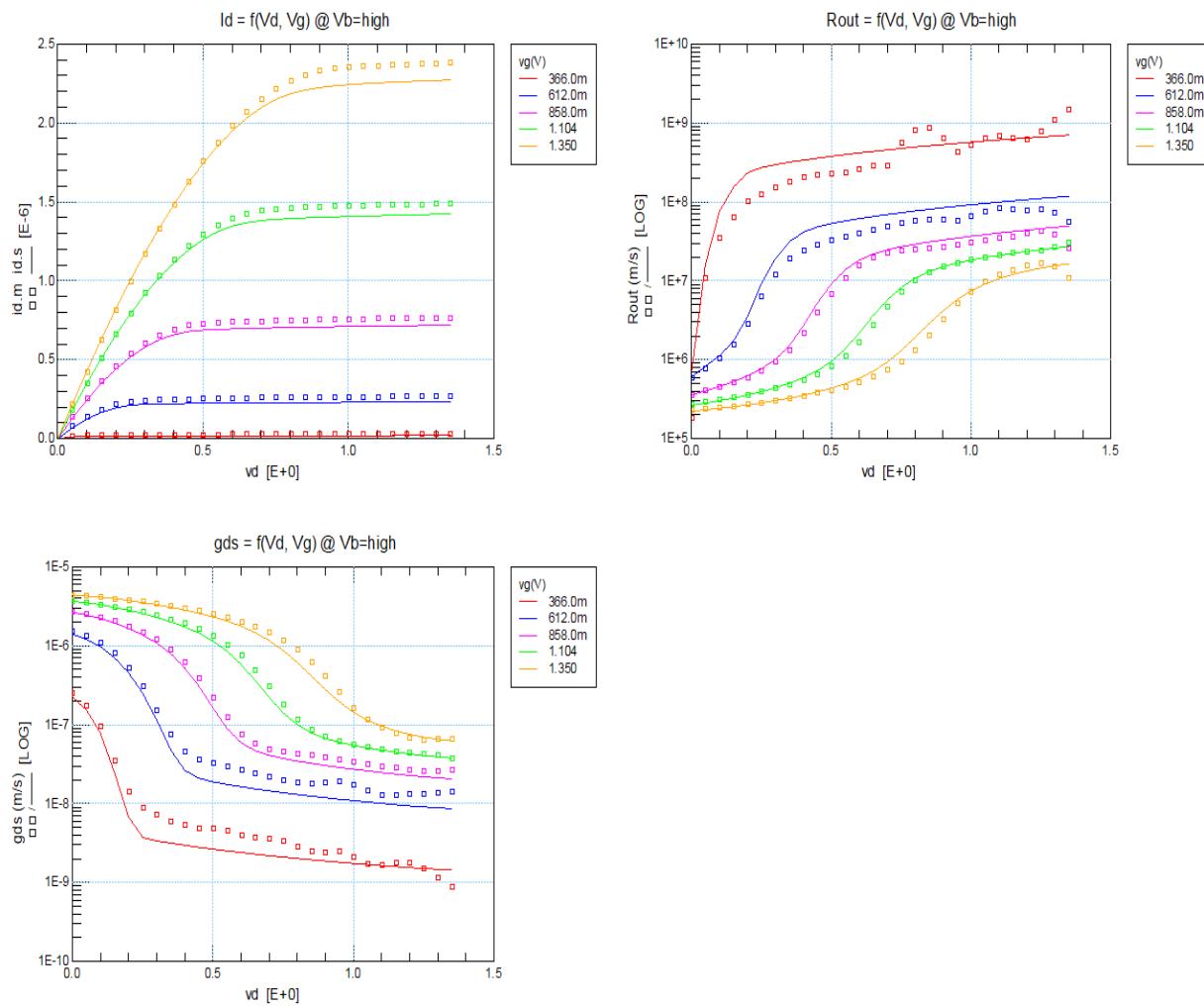
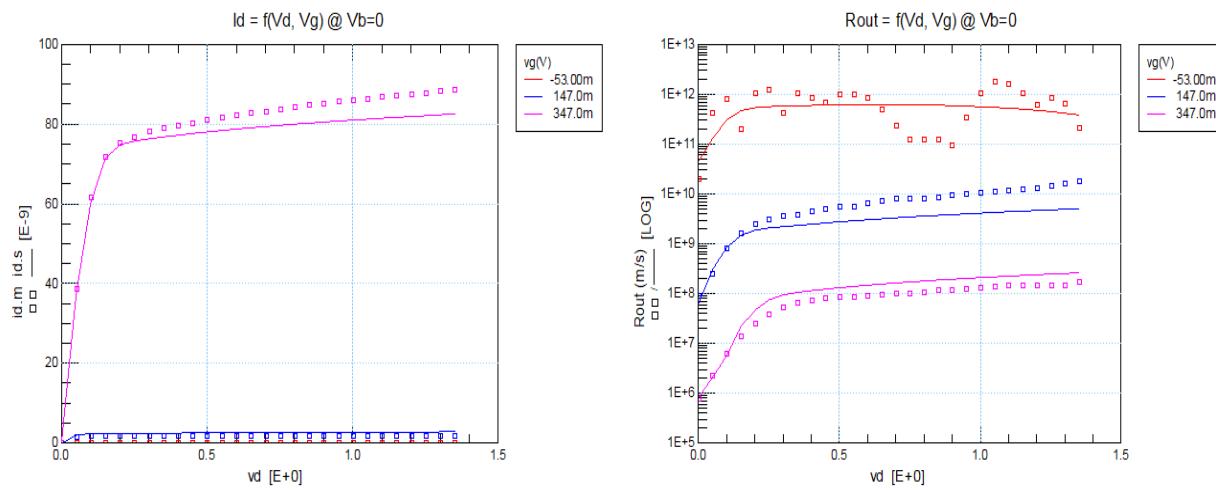


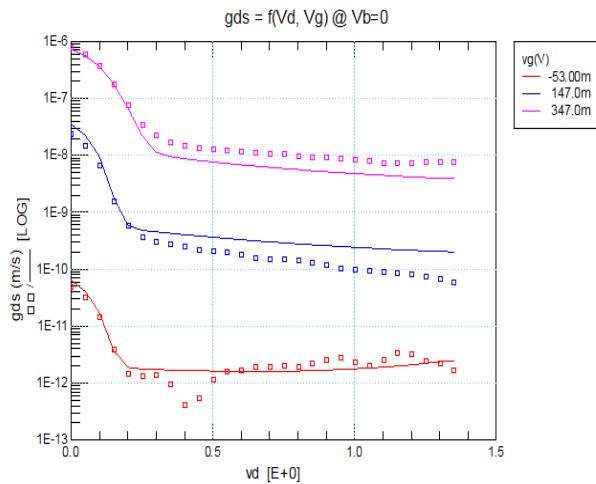


### $id_{vg}, I_b, Ig, V_b = 0V, T = 27^\circ C$

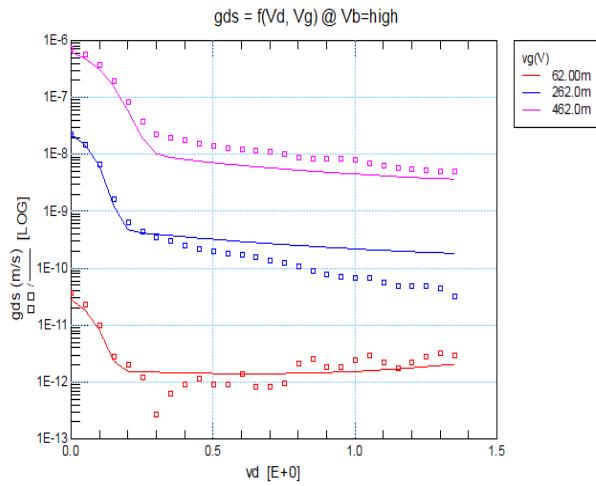
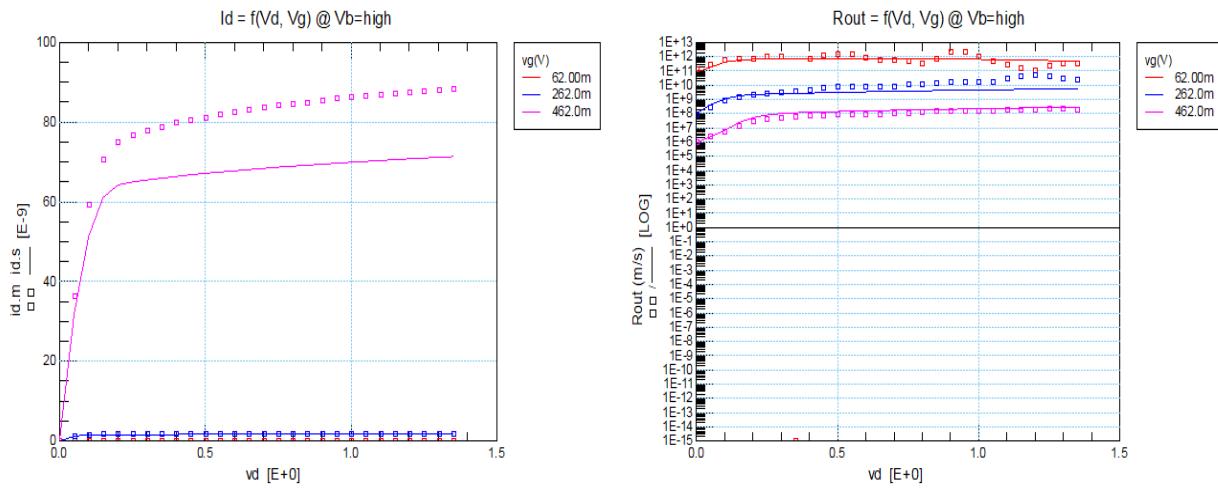


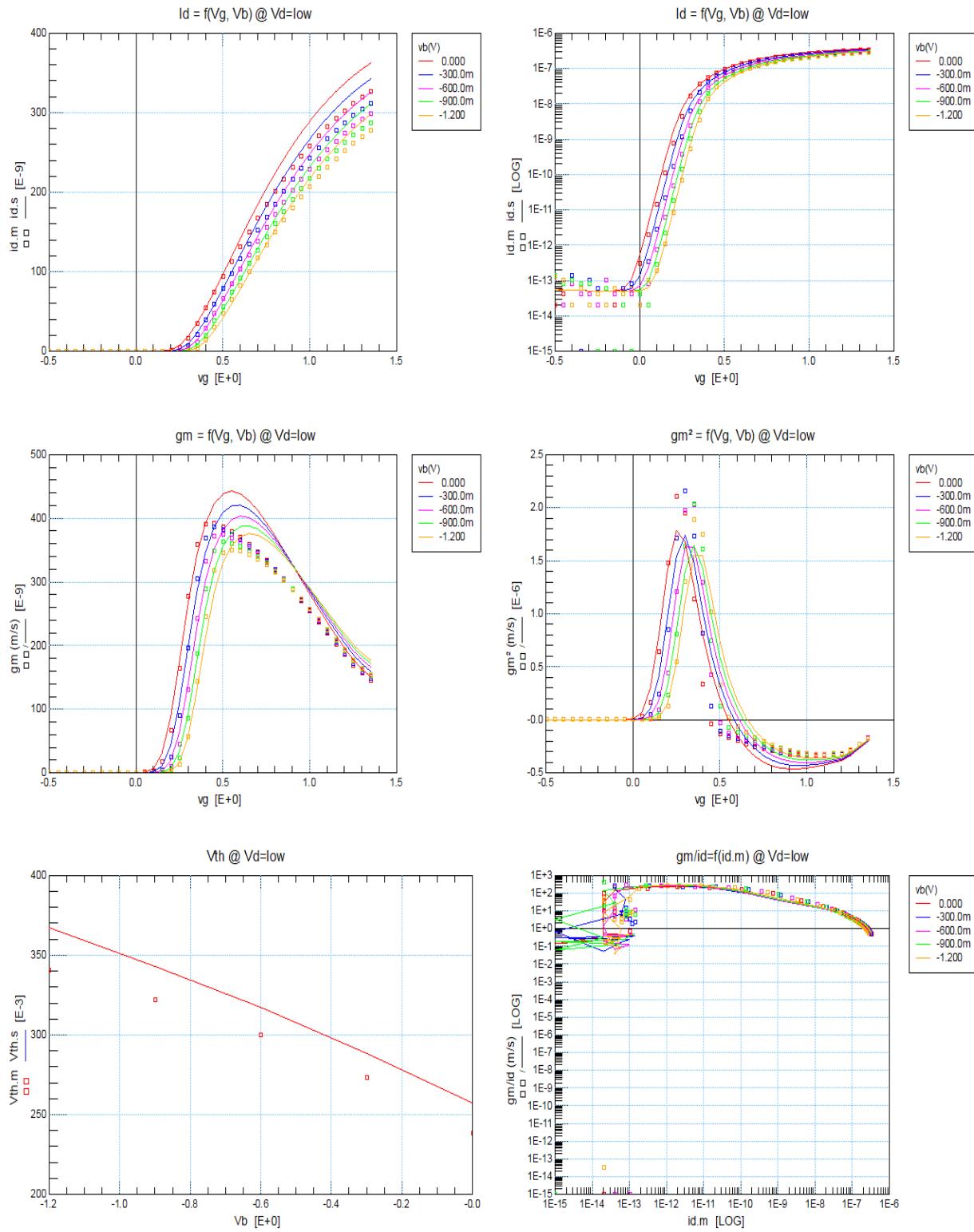
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


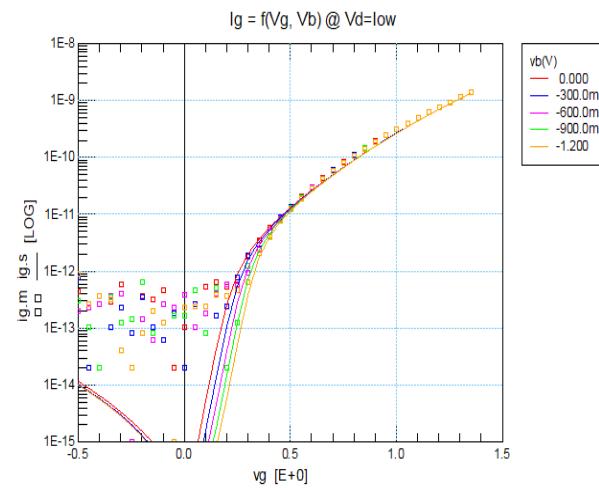
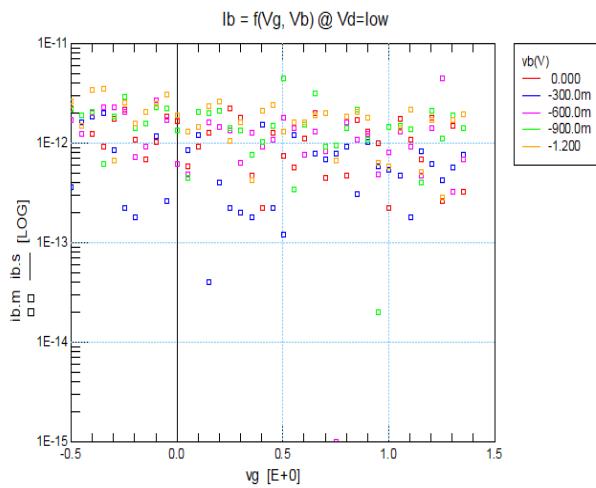
**idvd\_vbmin, Vb = -1.2V, T = 27°C**

**idvd\_vth, Vb = 0V, T = 27°C**




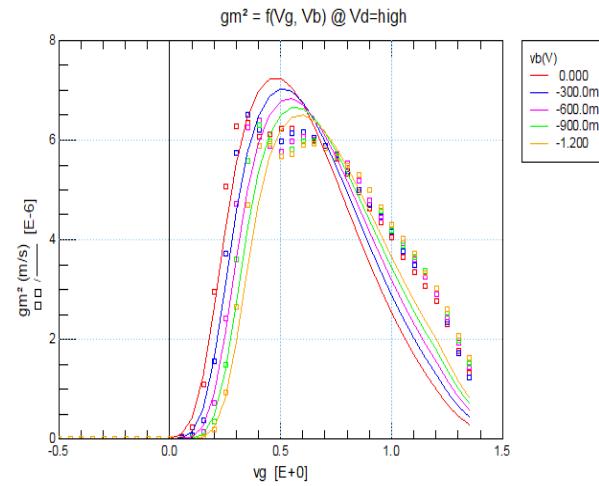
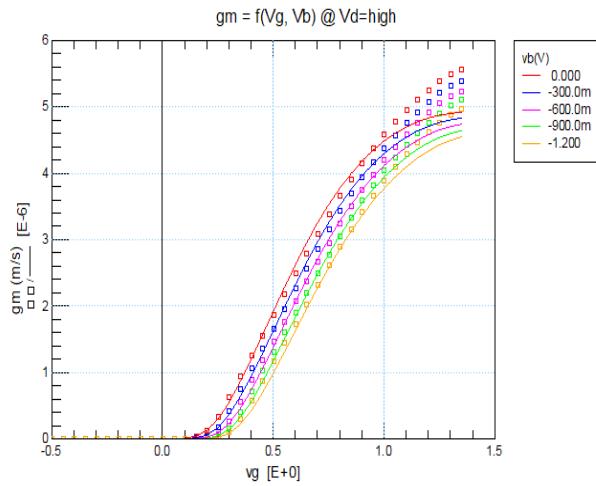
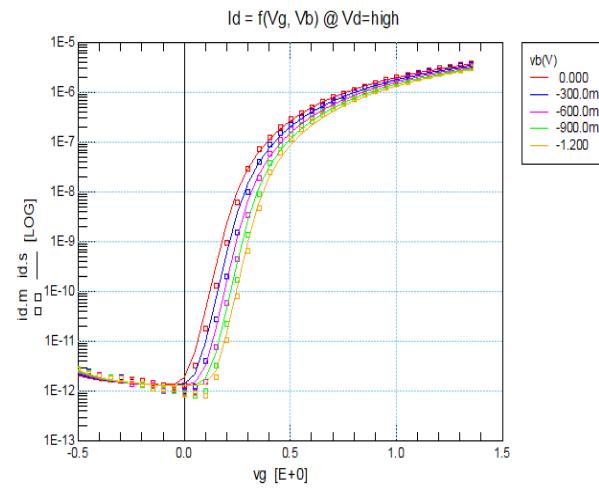
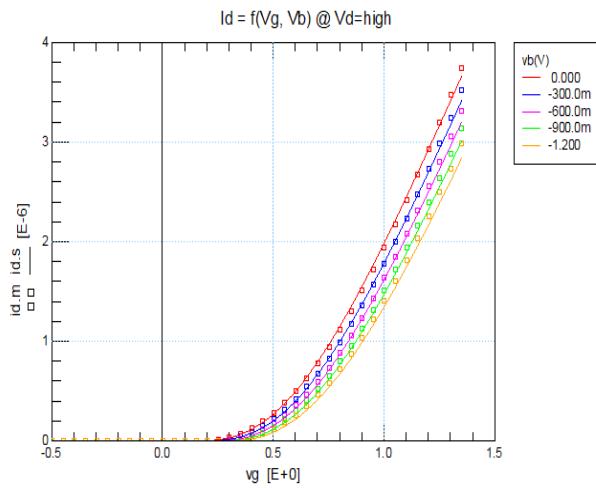
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

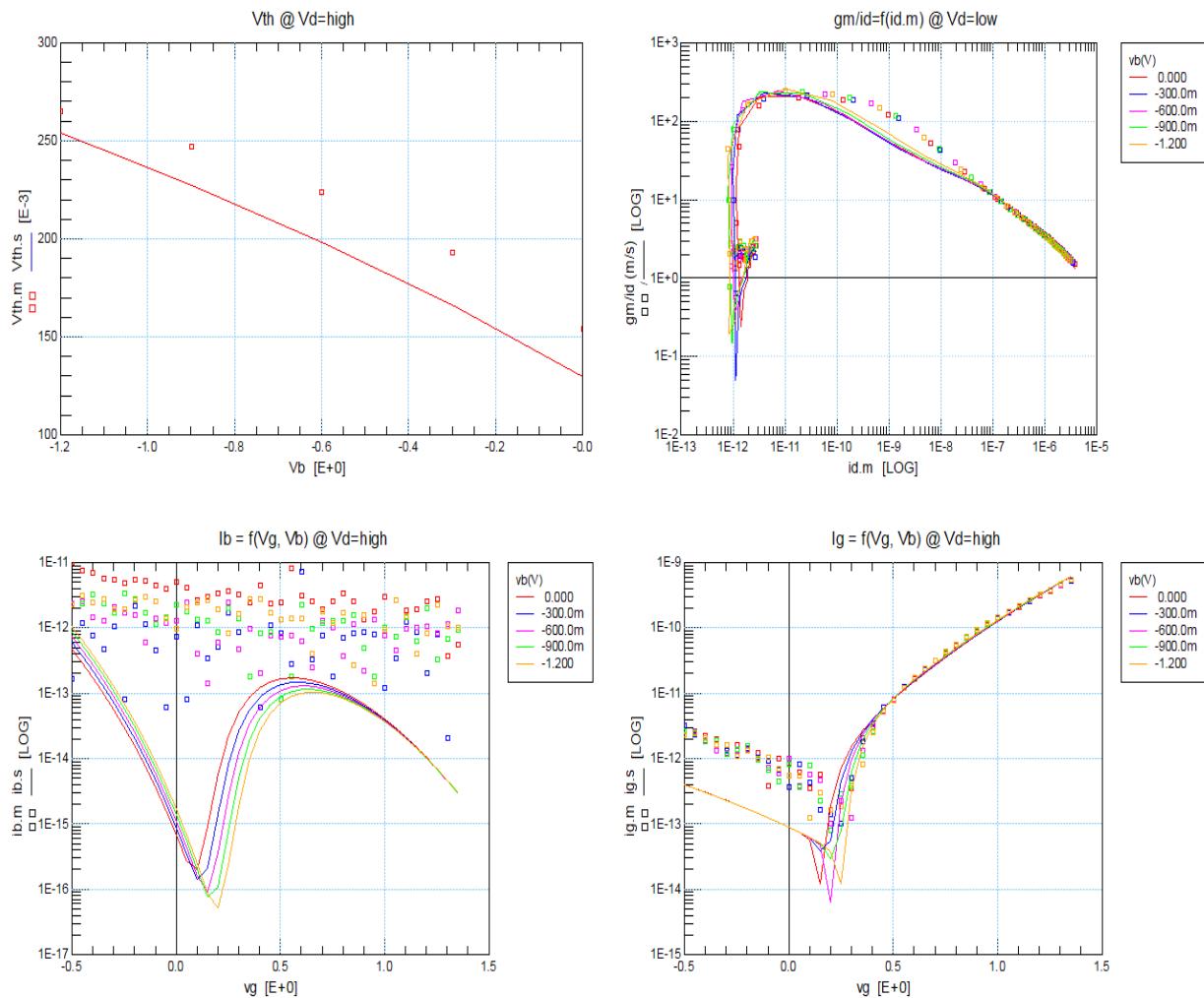


**idvg, Vd = 0.05V, T = -40°C**


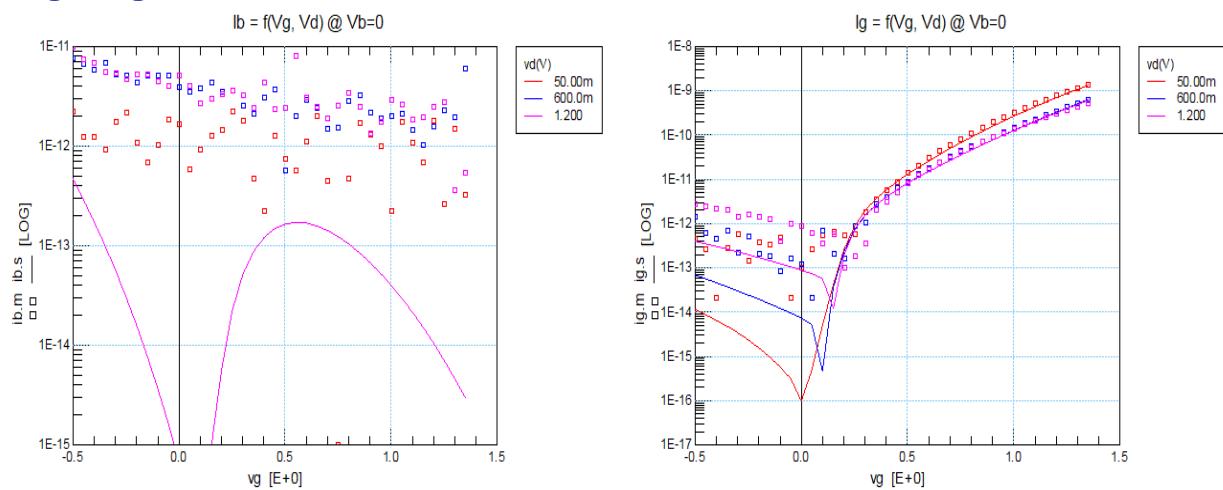


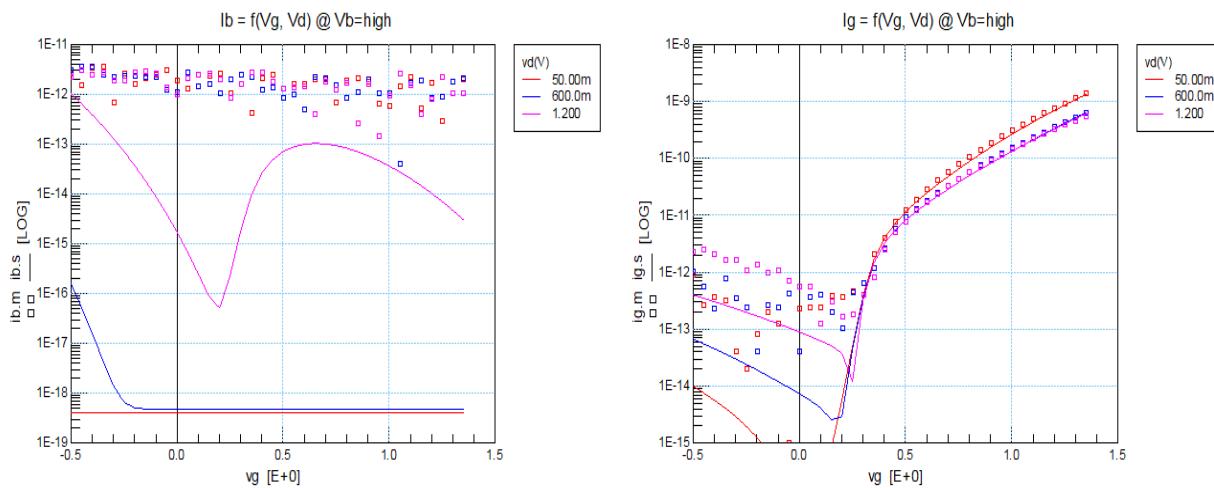
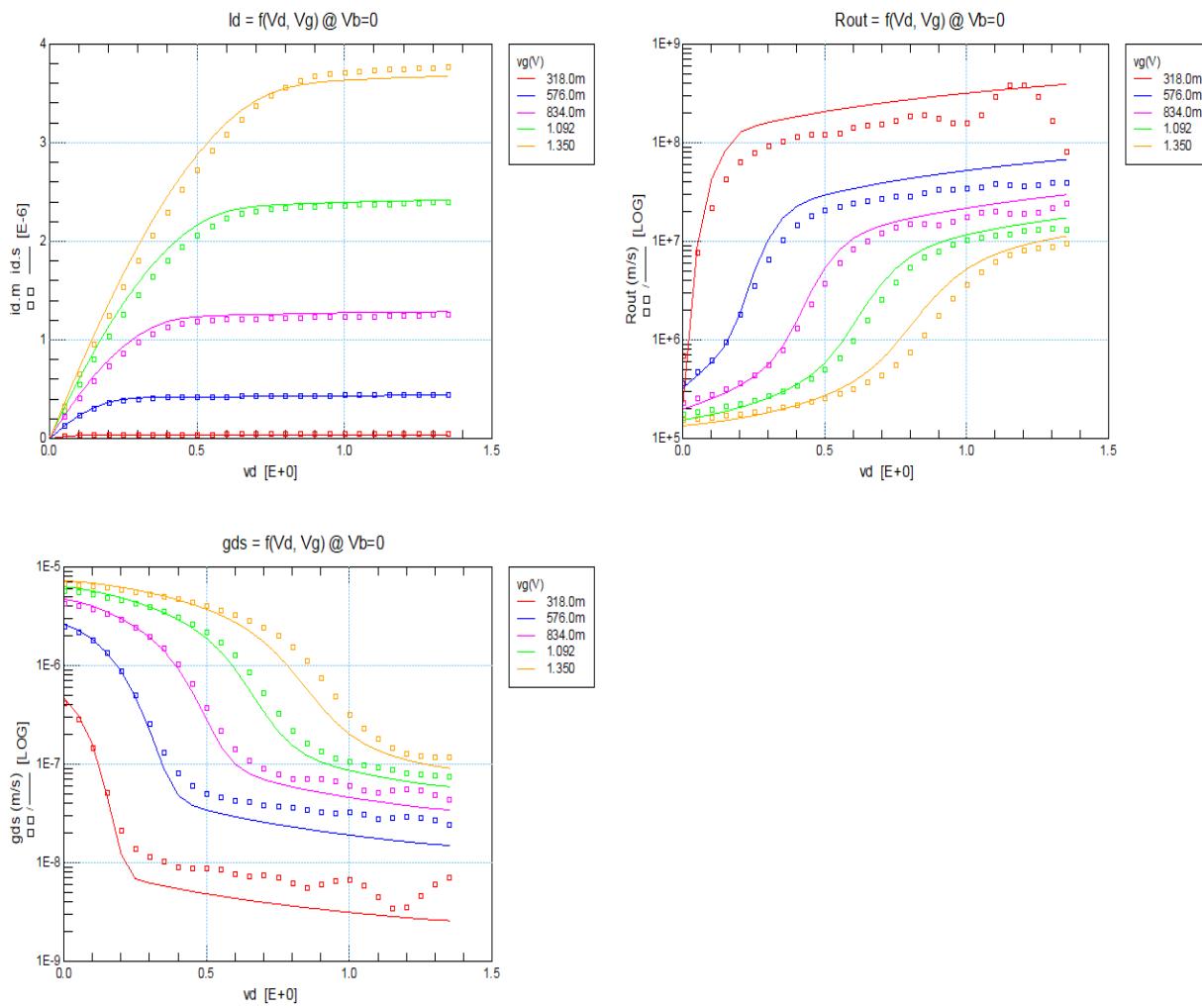
$i_d v_g, V_d = 1.2V, T = -40^{\circ}C$

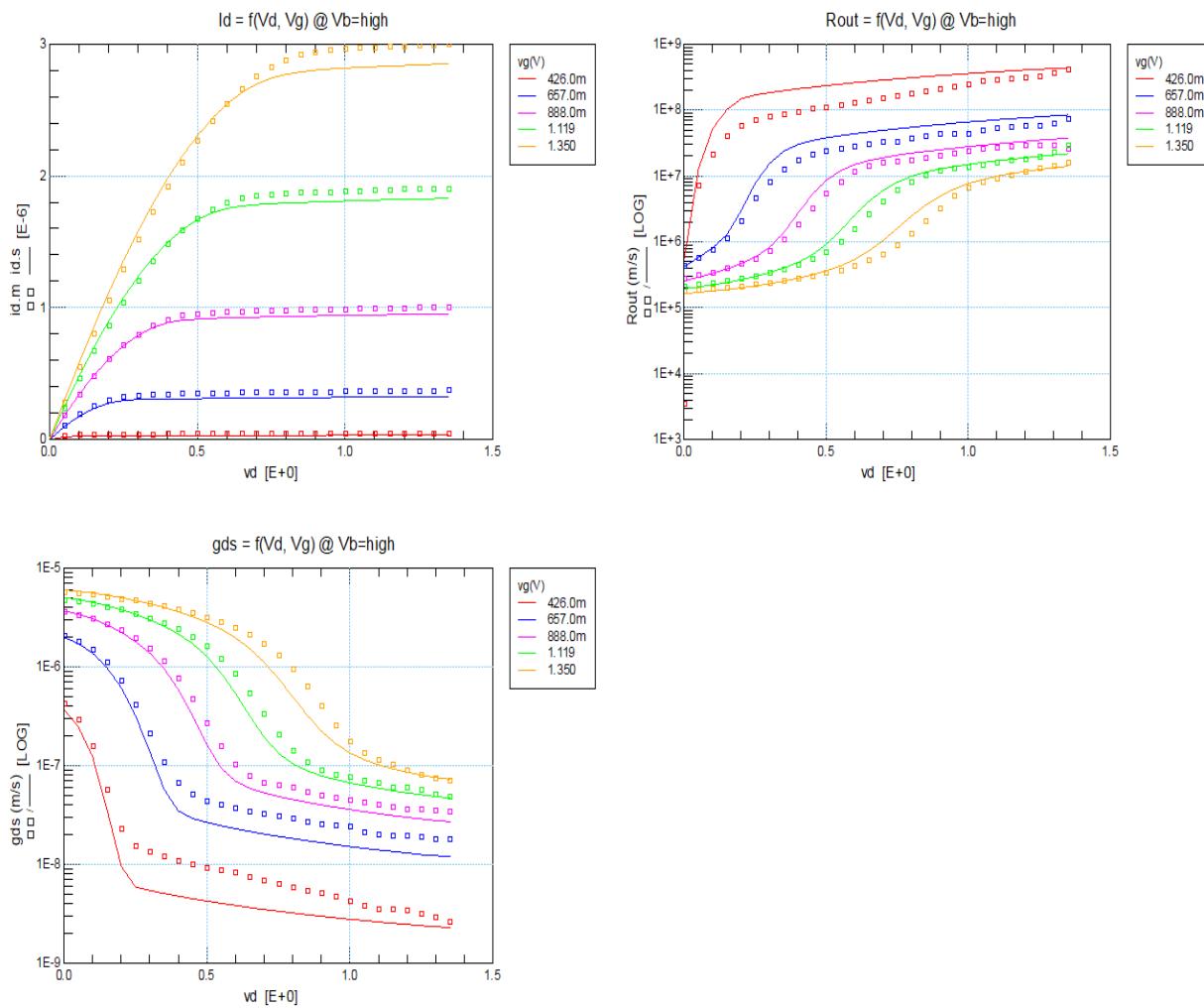
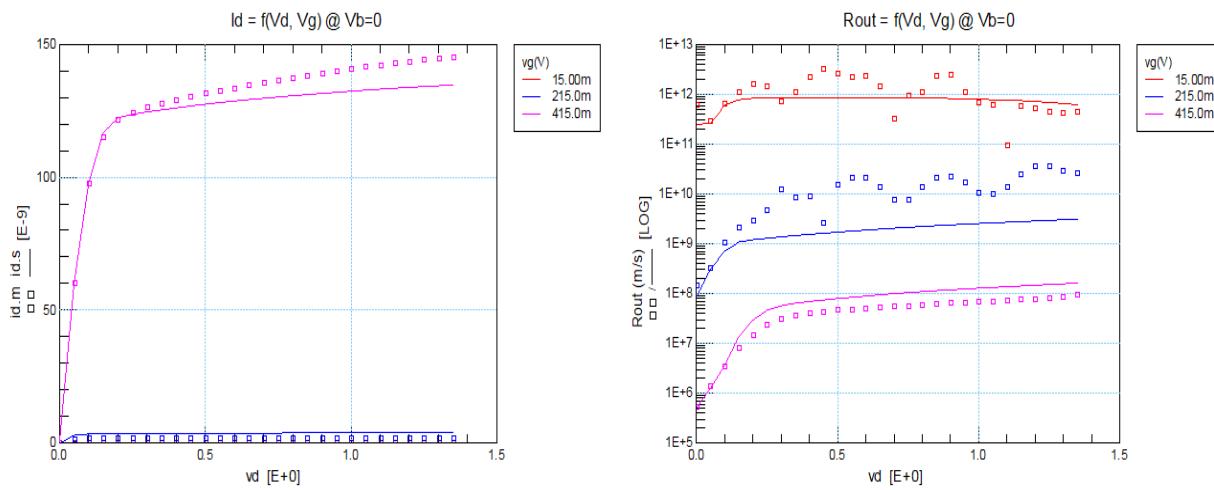


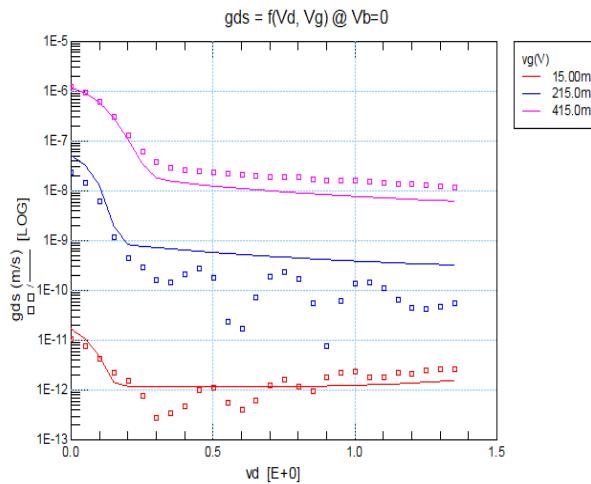


**idvg, Ib, Ig, Vb = 0V, T = -40°C**

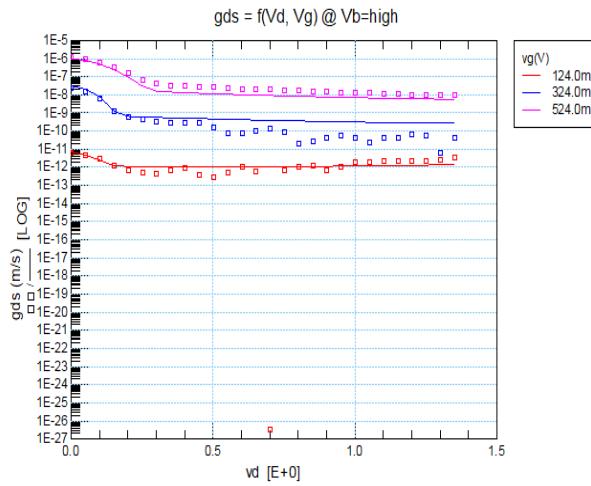
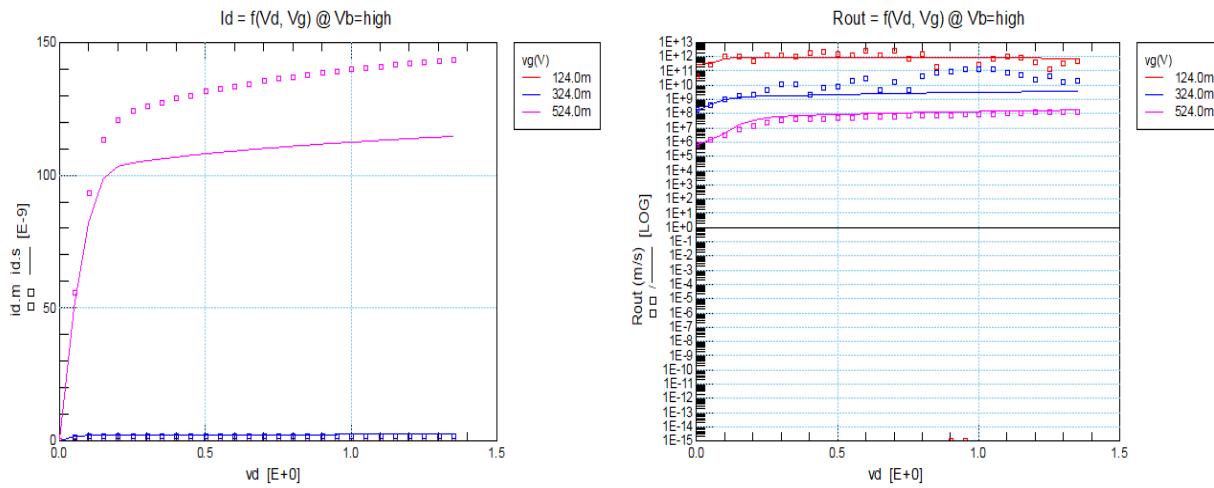


**idvg, Ib,Ig, Vb = -1.2V, T = -40°C**

**idvd, Vb = 0V, T = -40°C**


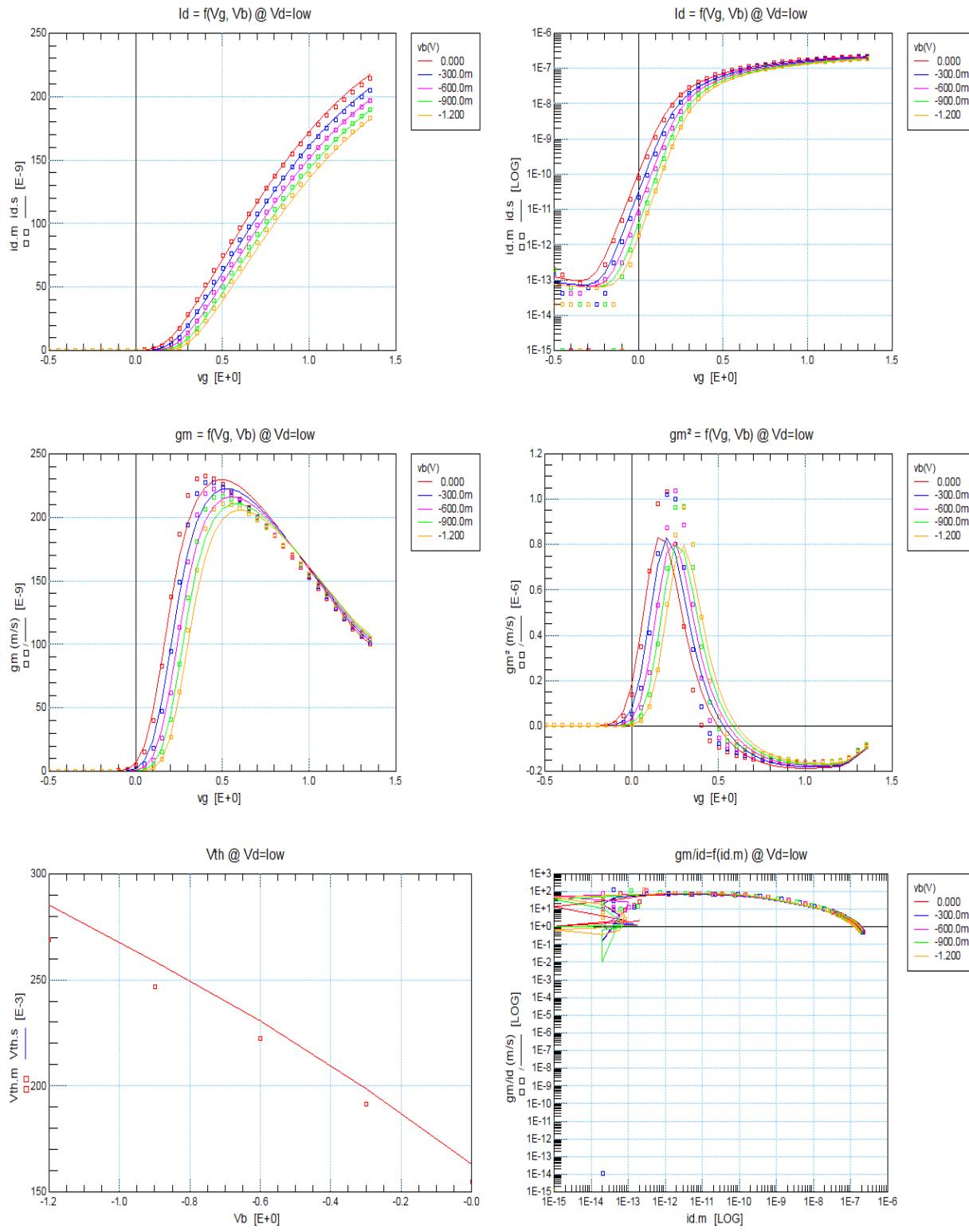
**idvd\_vbmin, Vb = -1.2V, T = -40°C****idvd\_vth, Vb = 0V, T = -40°C**

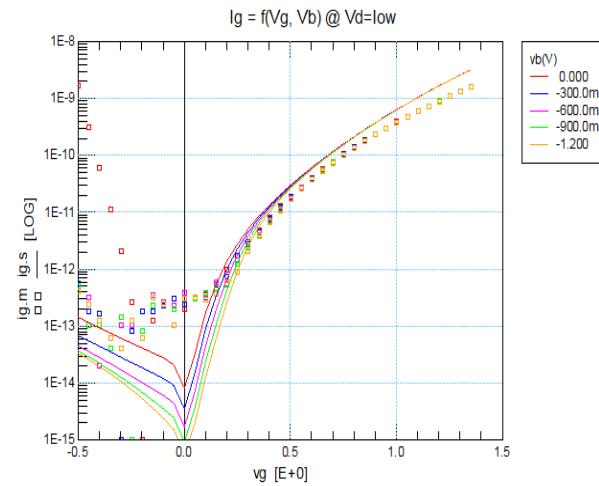
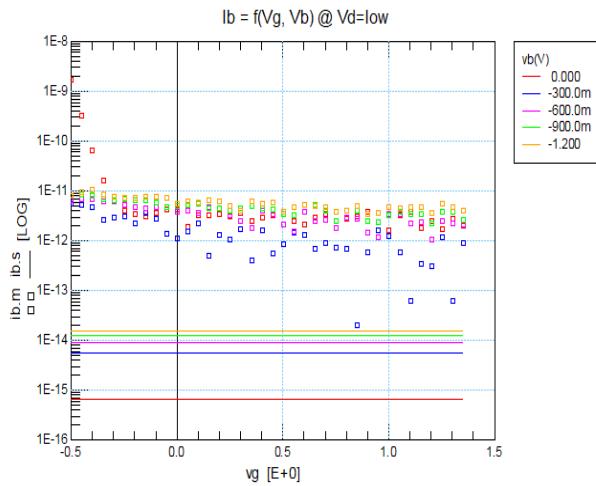


### idvd\_vth\_vbmin, Vb = -1.2V, T = -40°C

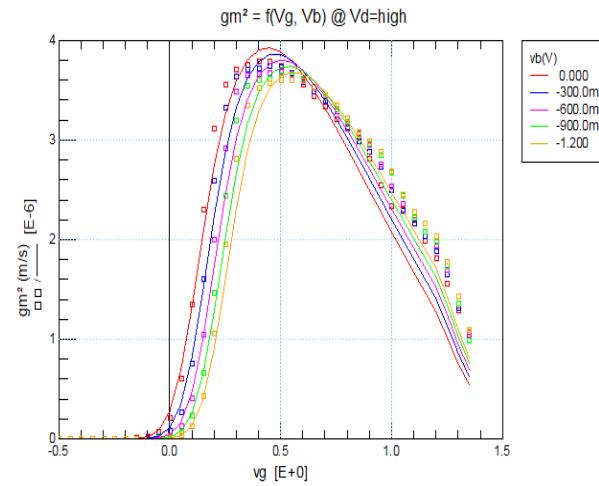
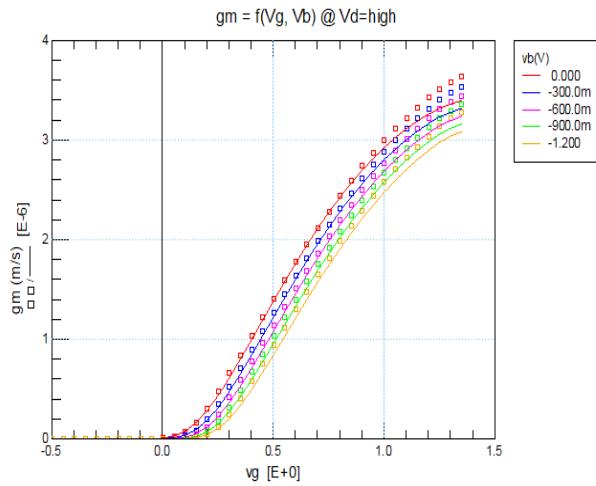
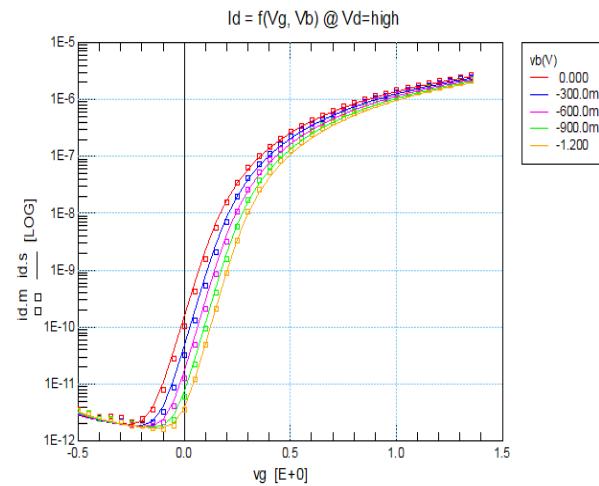
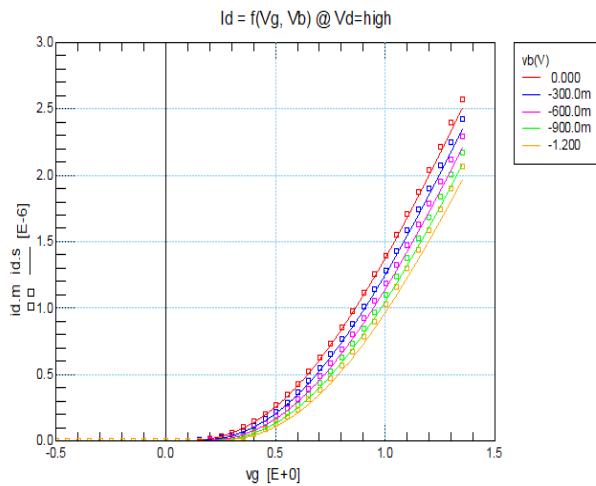


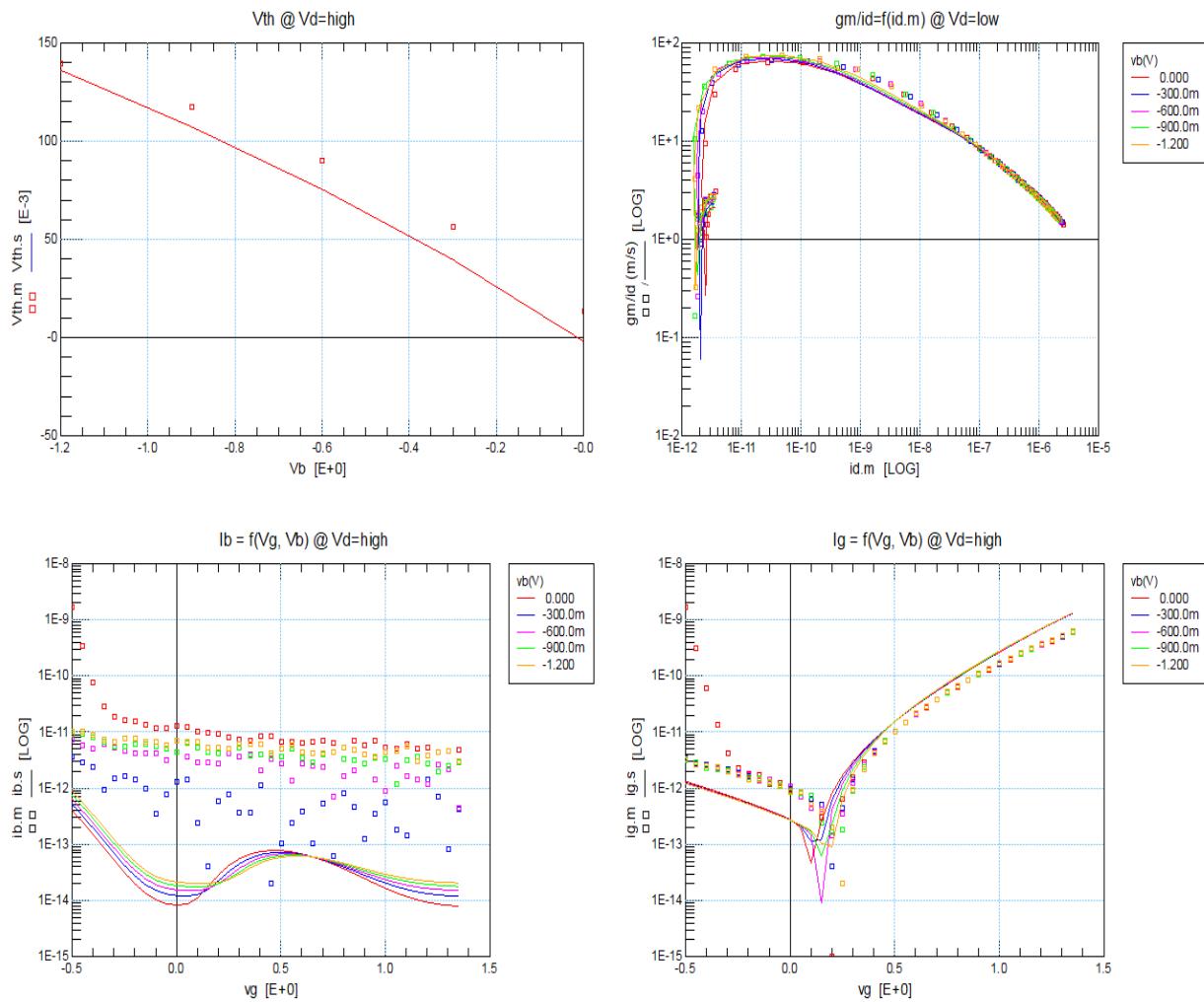
**idvg, Vd = 0.05V, T = 70°C**



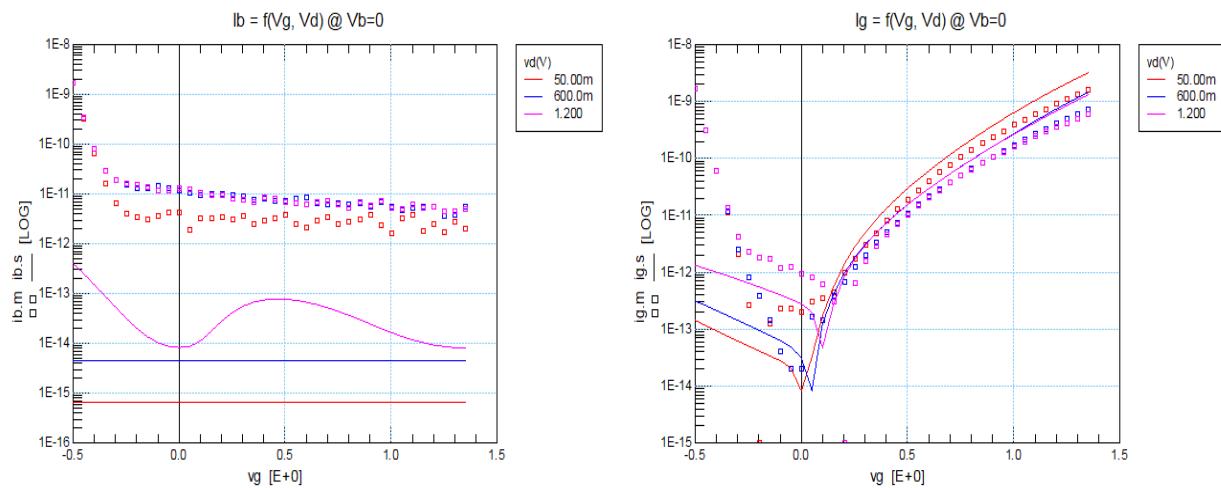


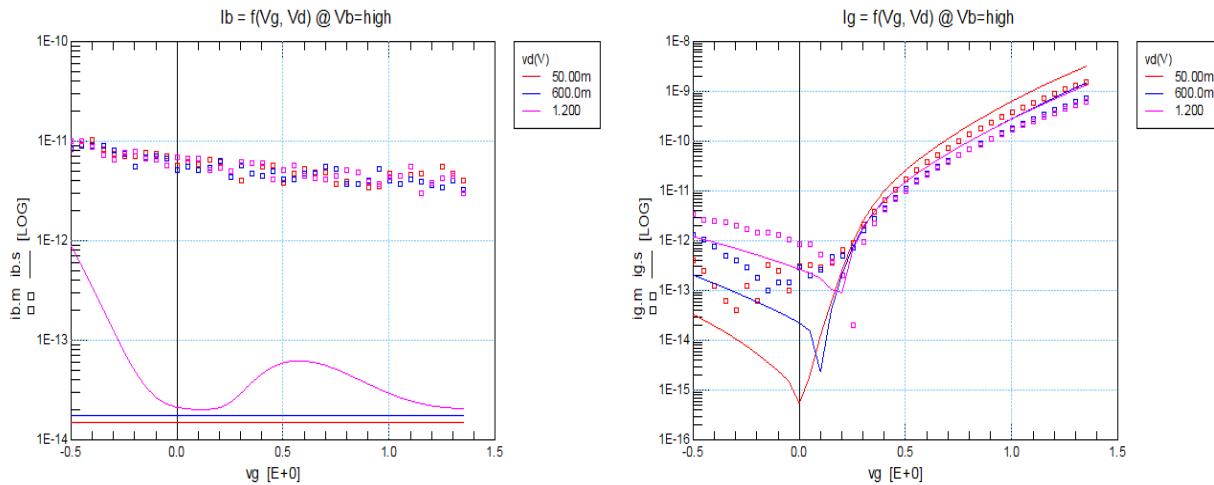
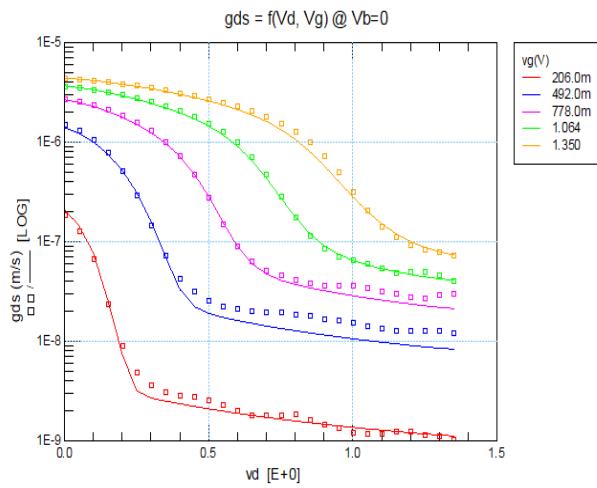
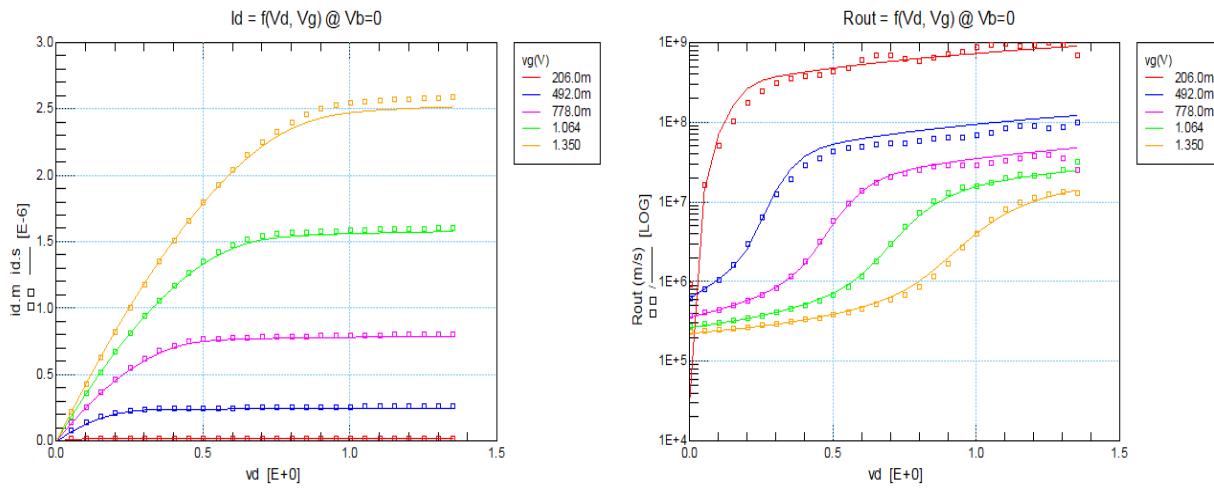
$i_{dvg}, V_d = 1.2V, T = 70^\circ C$

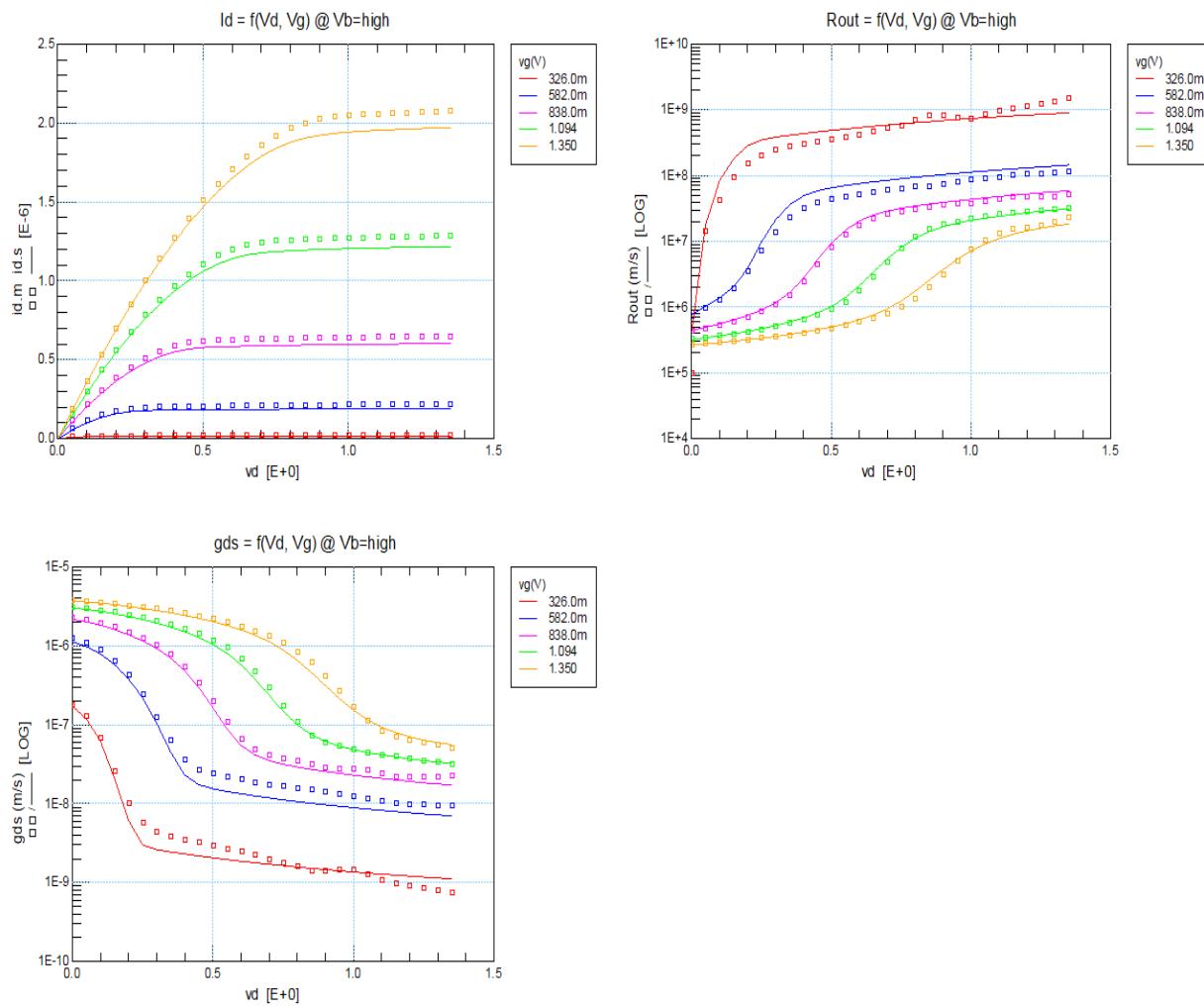
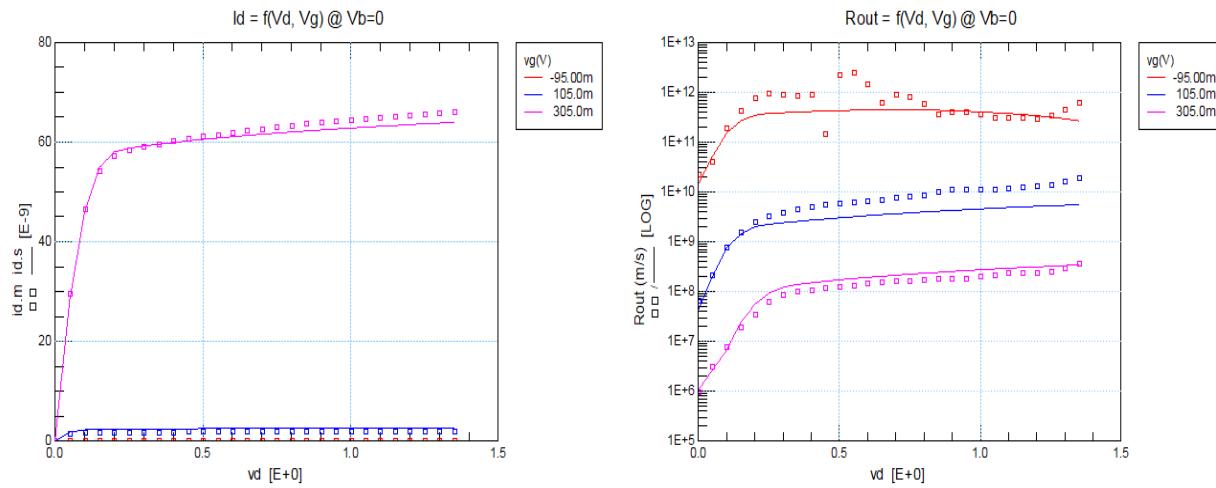


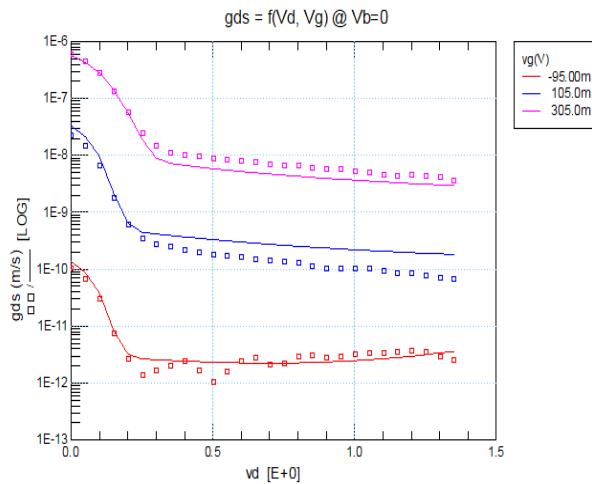


### $id_{vg}, I_b, I_g, V_b = 0V, T = 70^\circ C$

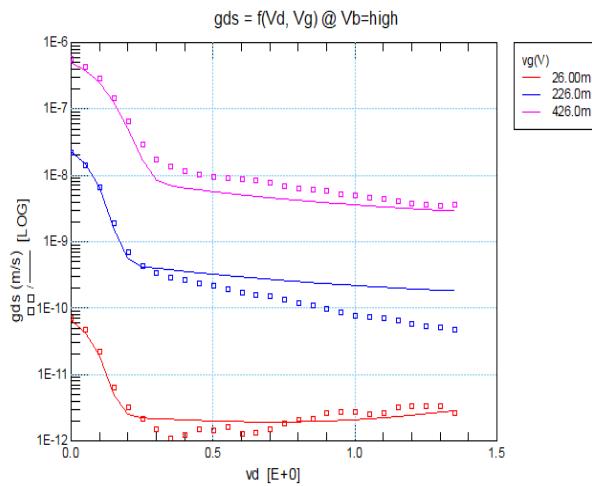
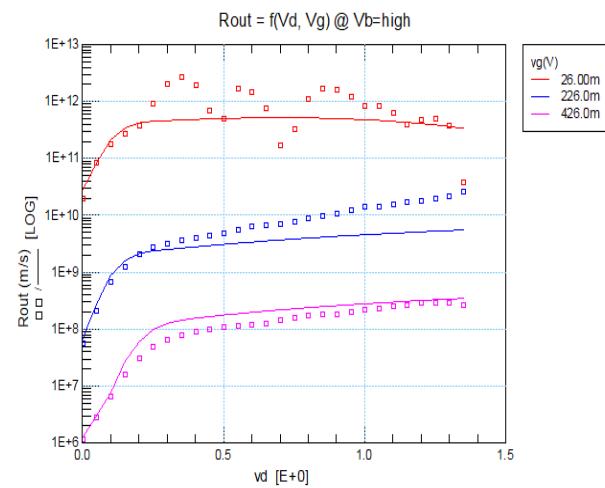
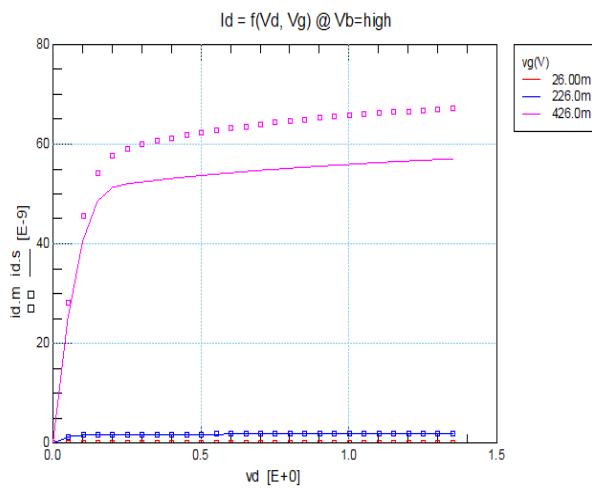


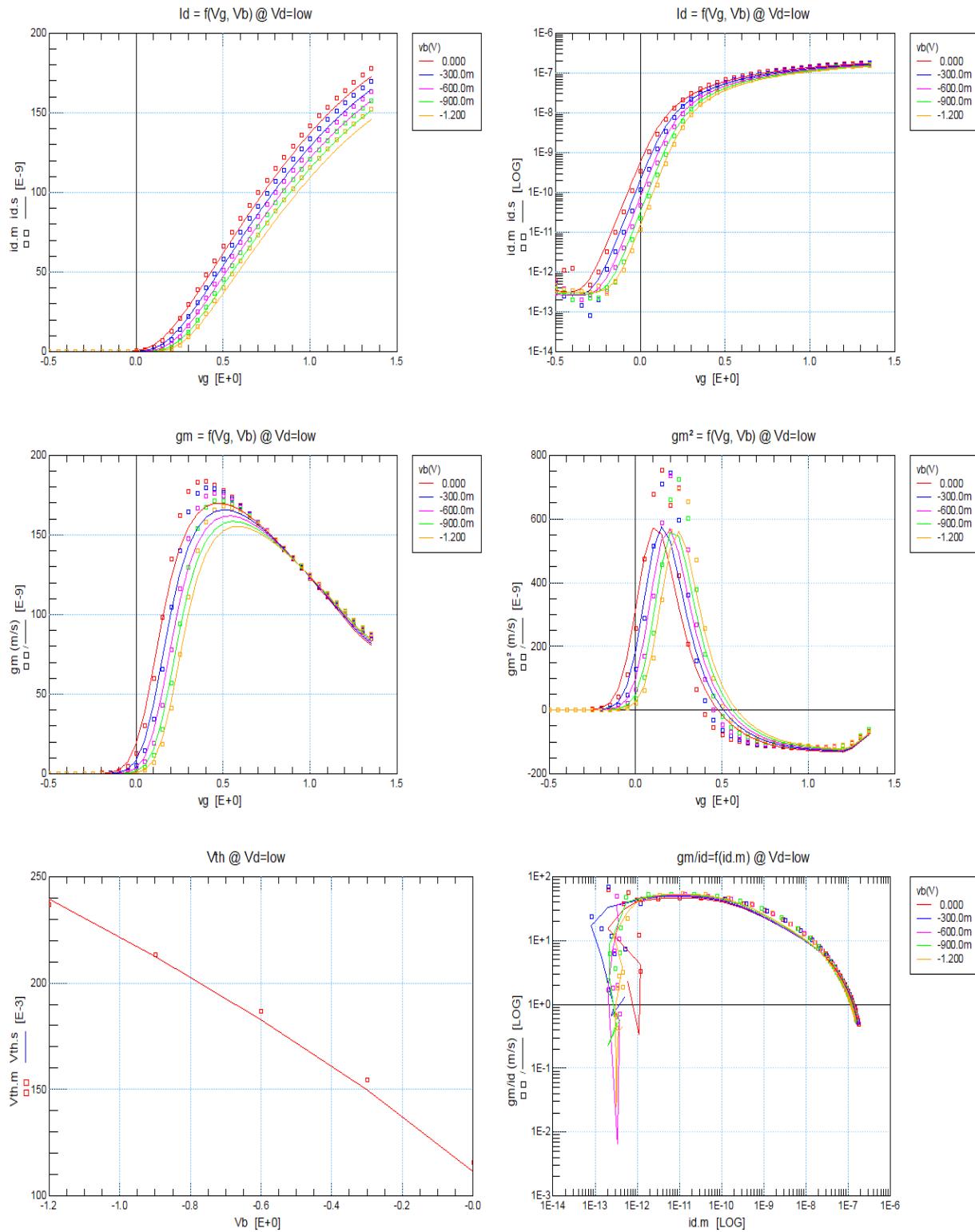
**idvg, Ib,Ig, Vb = -1.2V, T = 70°C**

**idvd, Vb = 0V, T = 70°C**


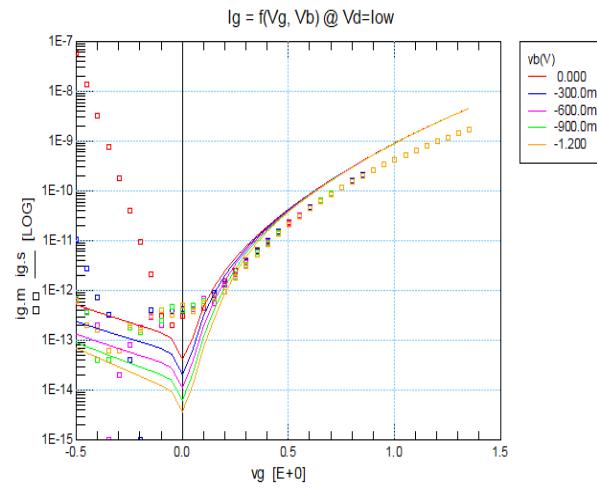
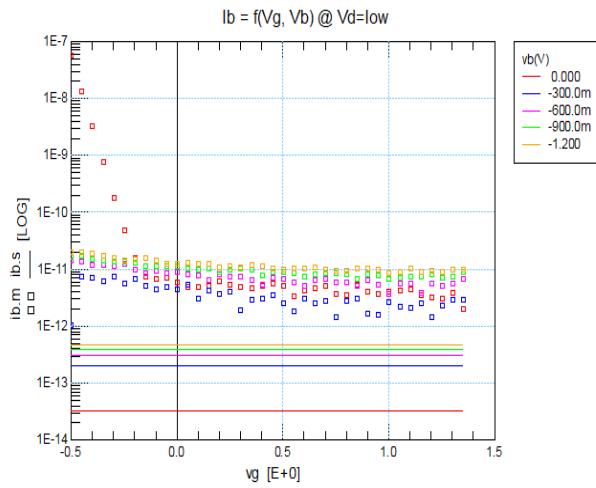
**idvd\_vbmin, Vb = -1.2V, T = 70°C****idvd\_vth, Vb = 0V, T = 70°C**



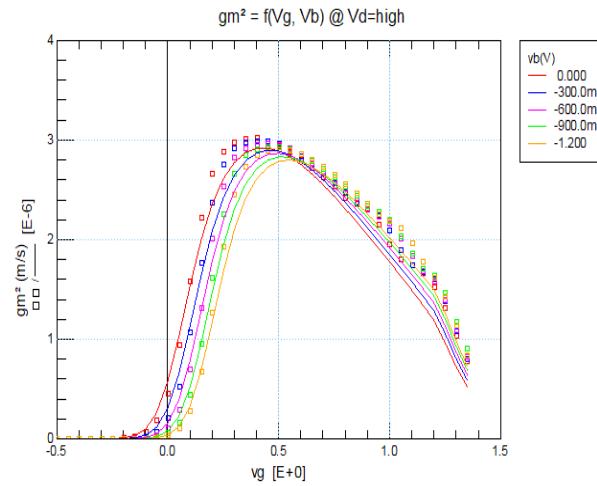
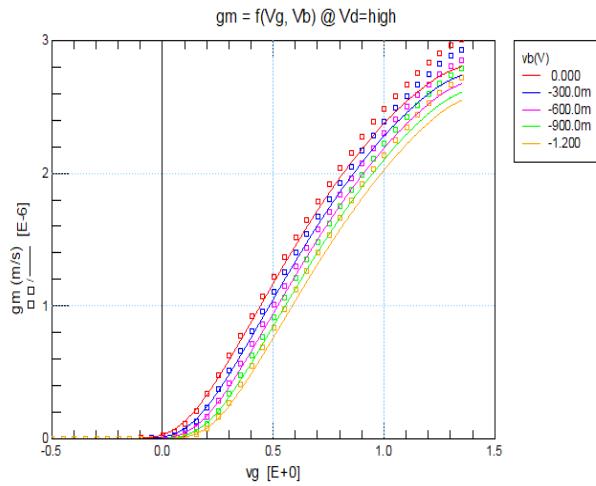
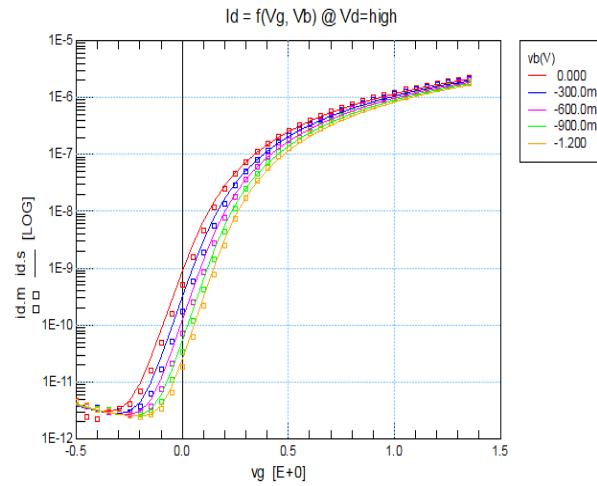
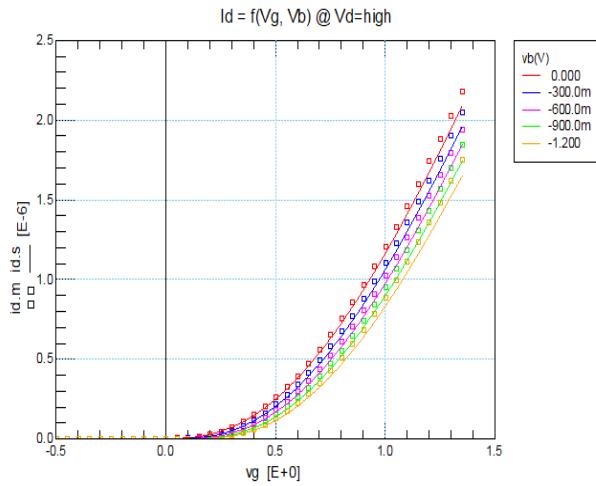
idvd\_vth\_vbmin, Vb = -1.2V, T = 70°C

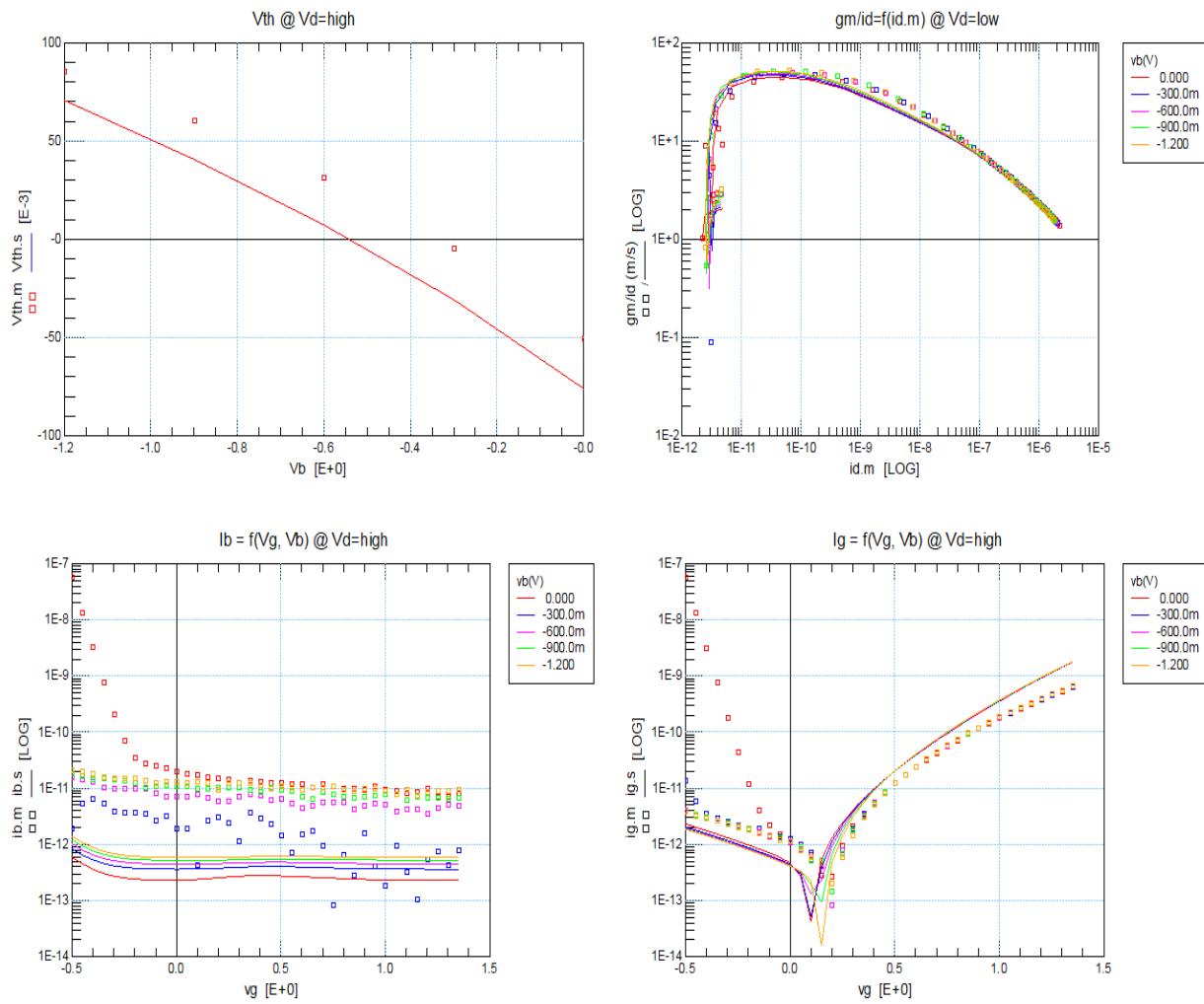


**idvg, Vd = 0.05V, T = 125°C**


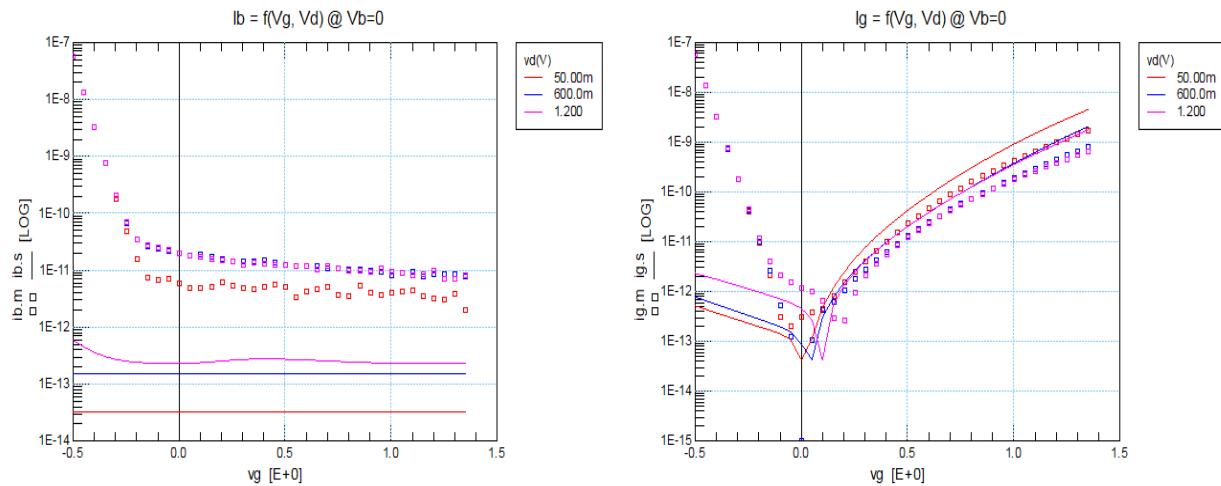


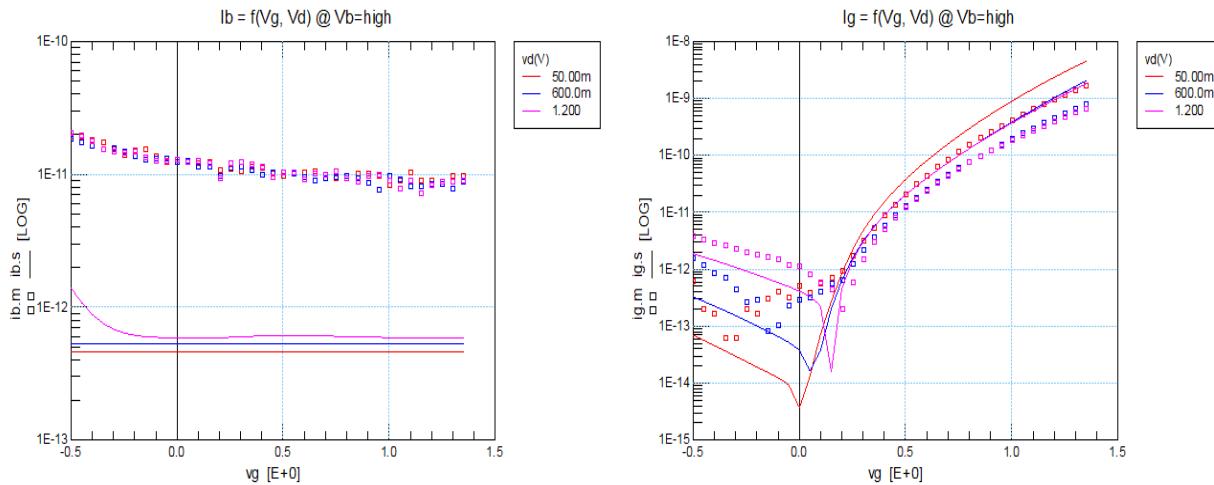
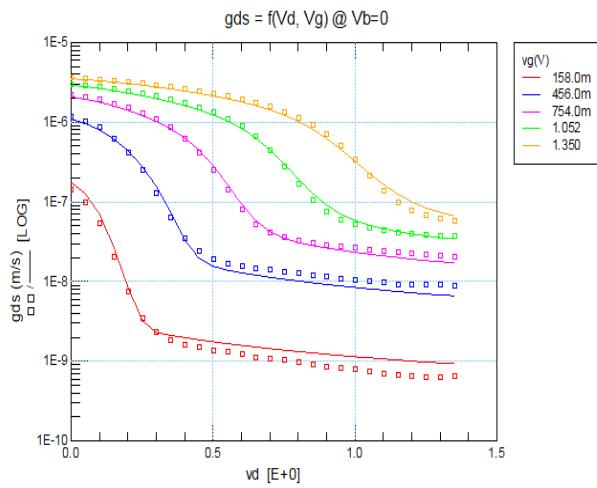
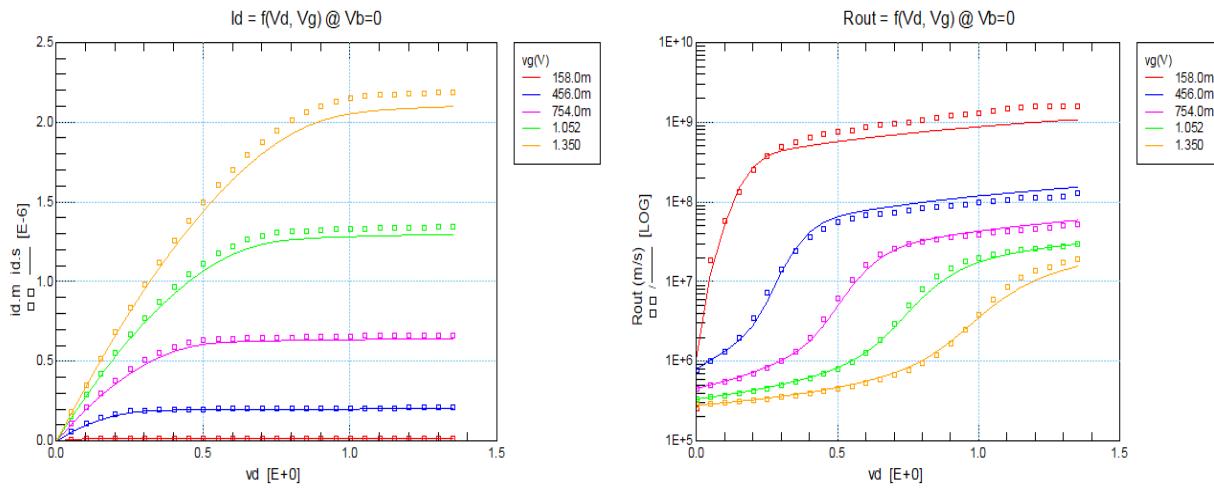
$i_d v_g, V_d = 1.2V, T = 125^\circ C$

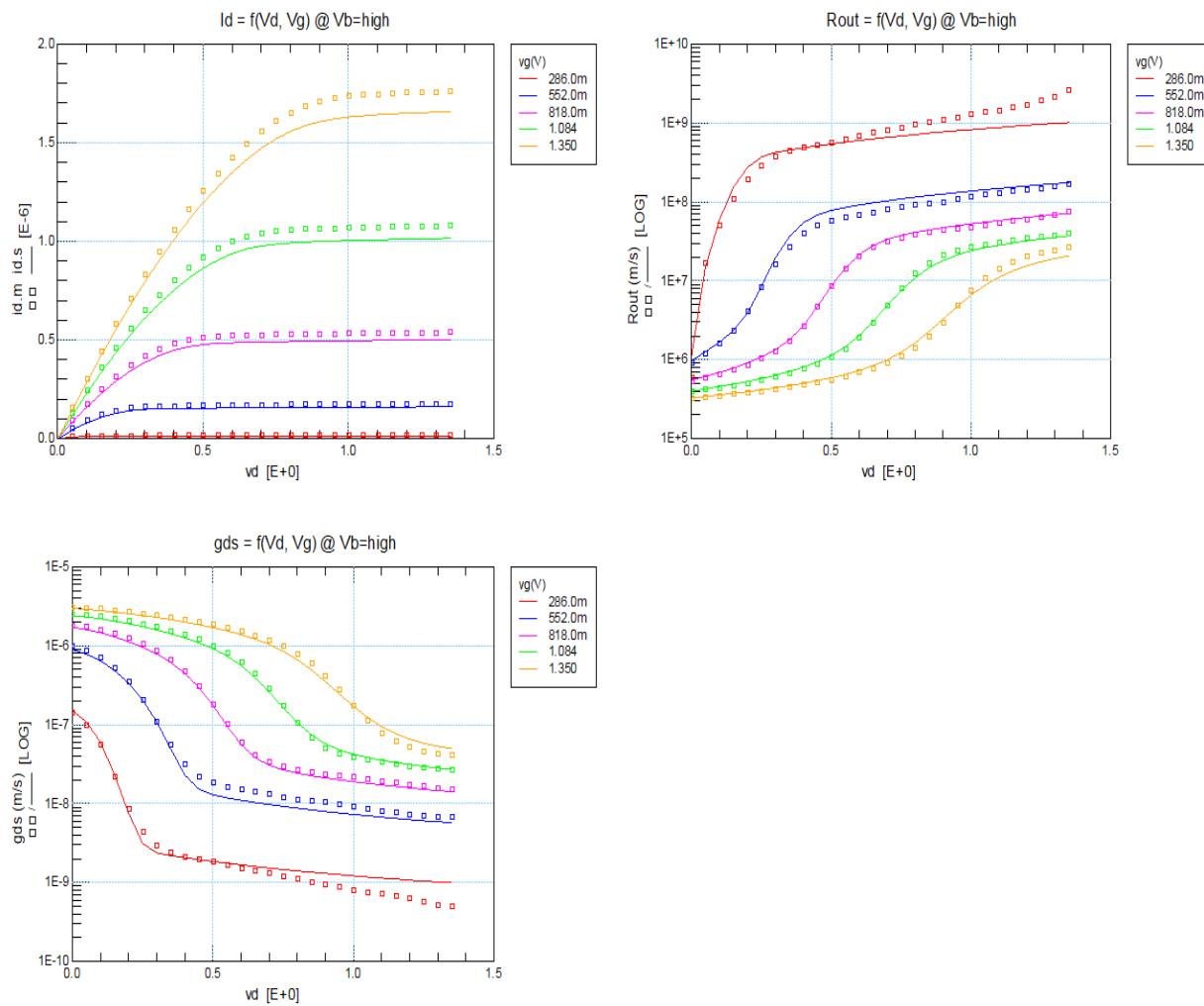
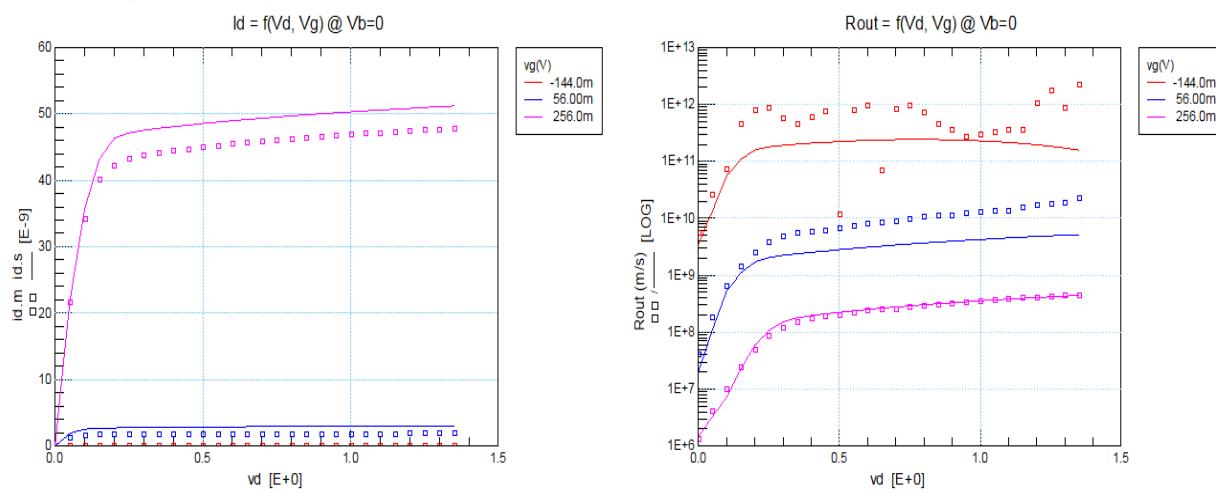


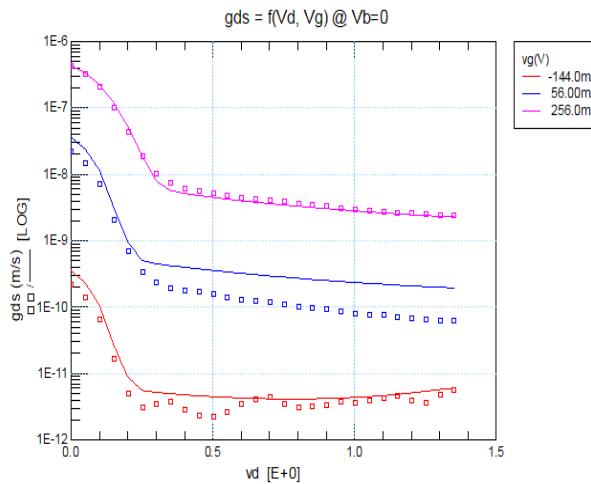


**$id_{vg}, I_b, Ig, V_b = 0V, T = 125^\circ C$**

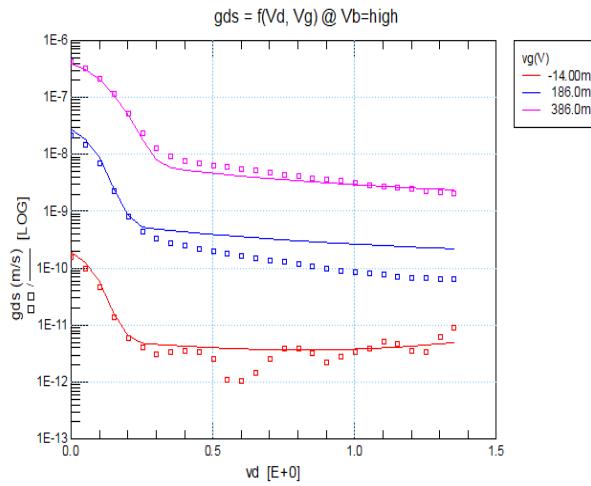
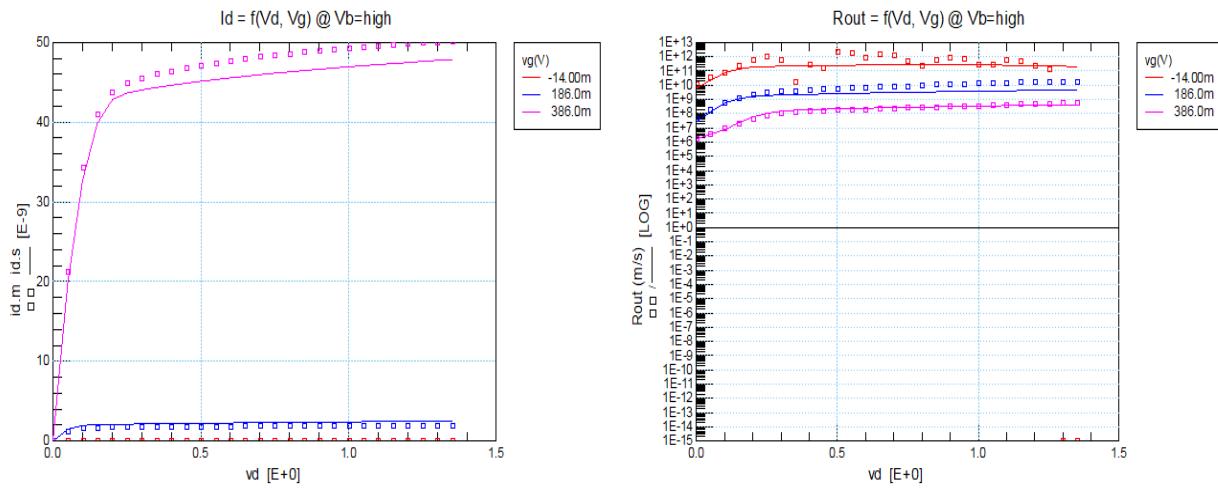


**idvg, Ib,Ig, Vb = -1.2V, T = 125°C**

**idvd, Vb = 0V, T = 125°C**


**idvd\_vbmin, Vb = -1.2V, T = 125°C**

**idvd\_vth, Vb = 0V, T = 125°C**


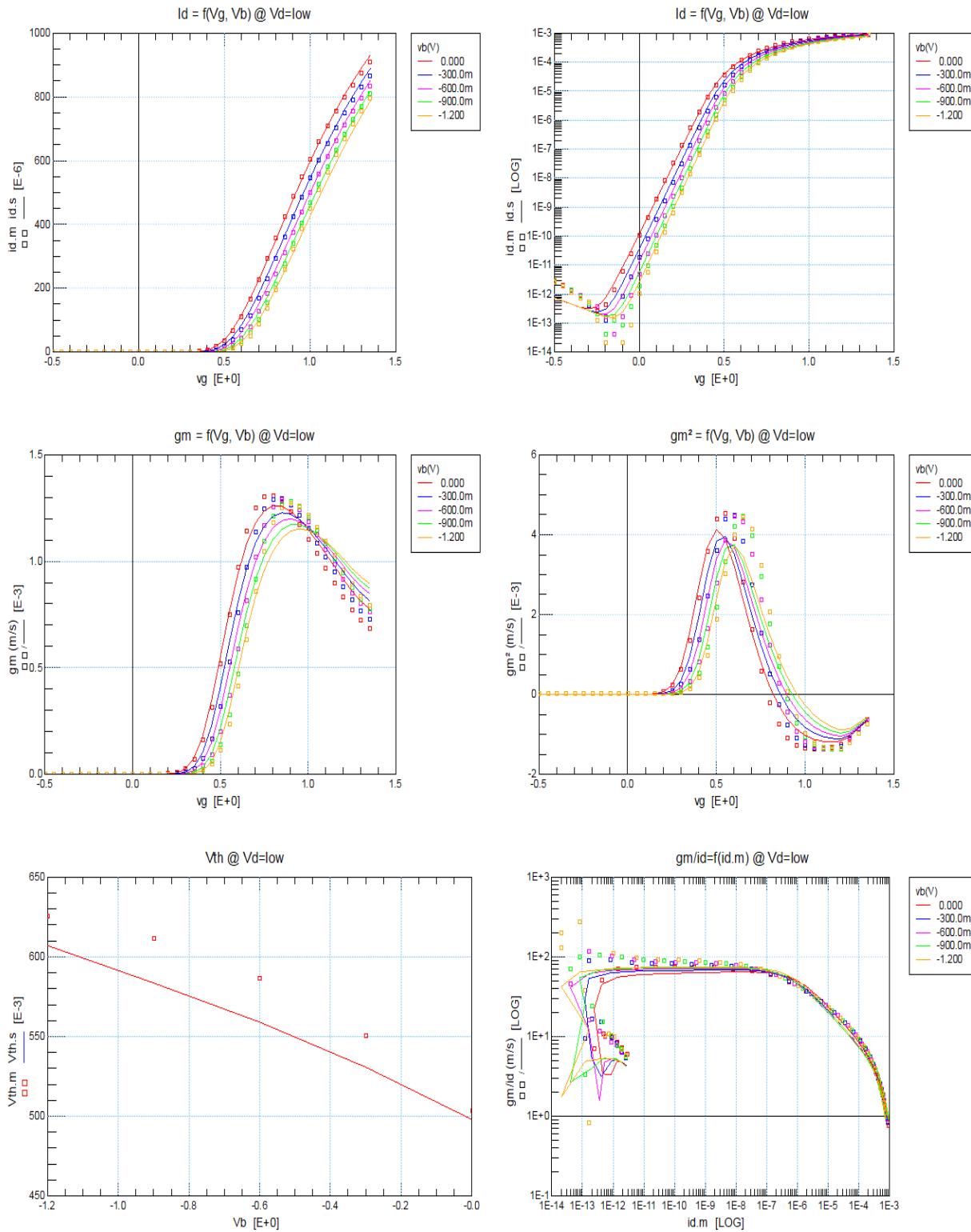


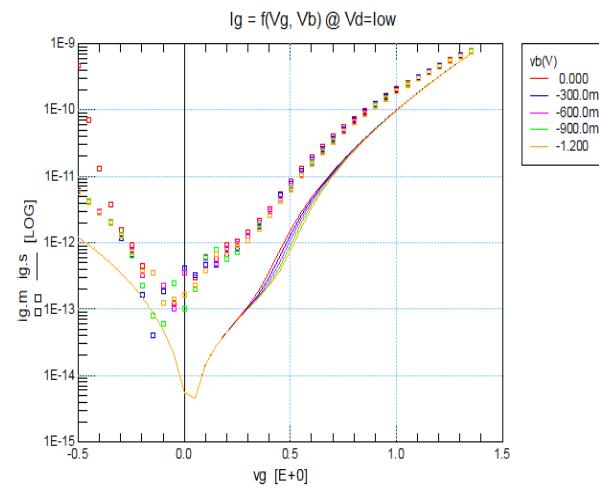
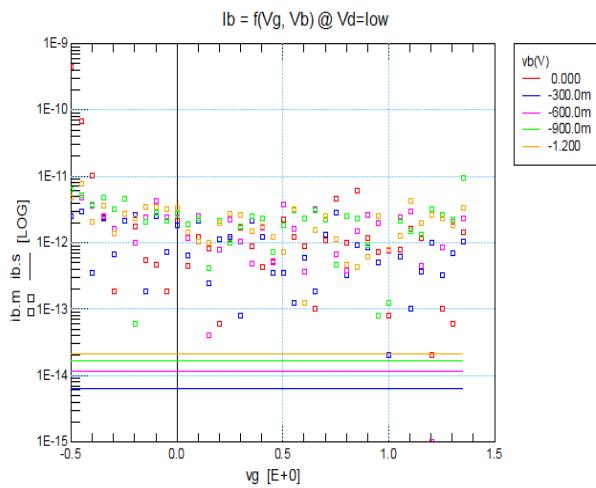
idvd\_vth\_vbmin, Vb = -1.2V, T = 125°C



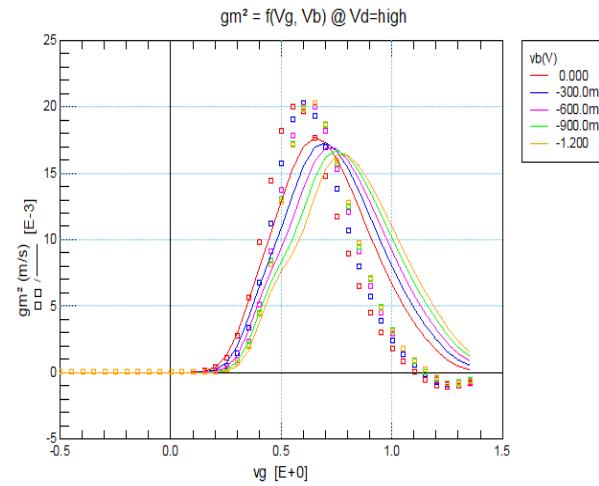
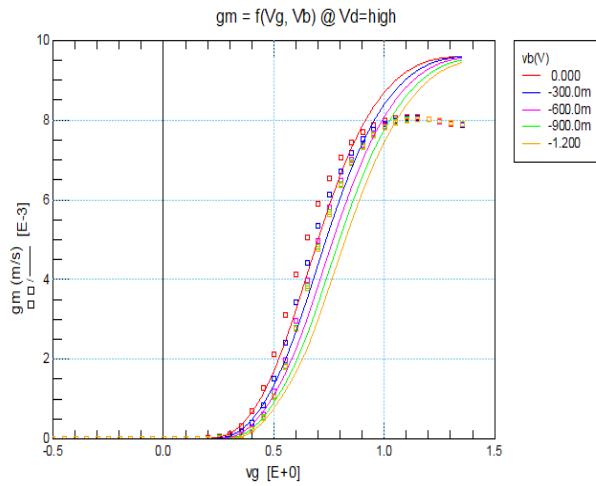
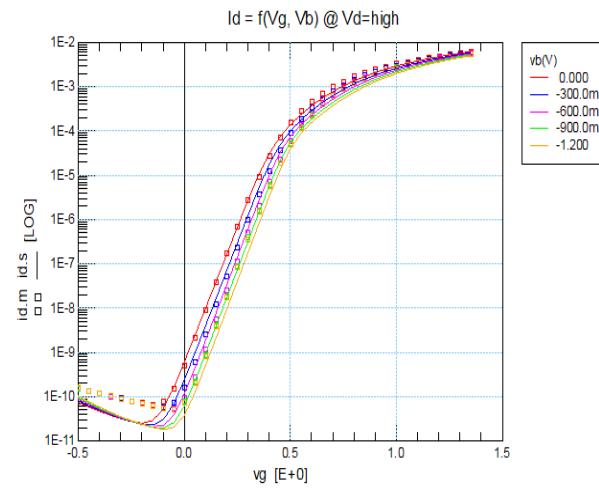
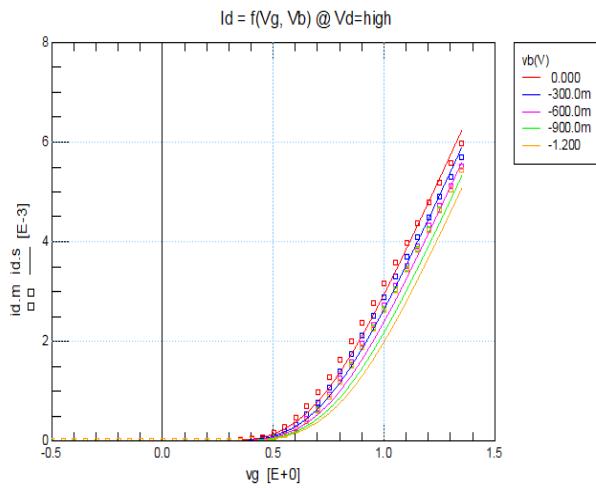
#### 4.4 W10u0\_L0u13\_T356\_S380\_2

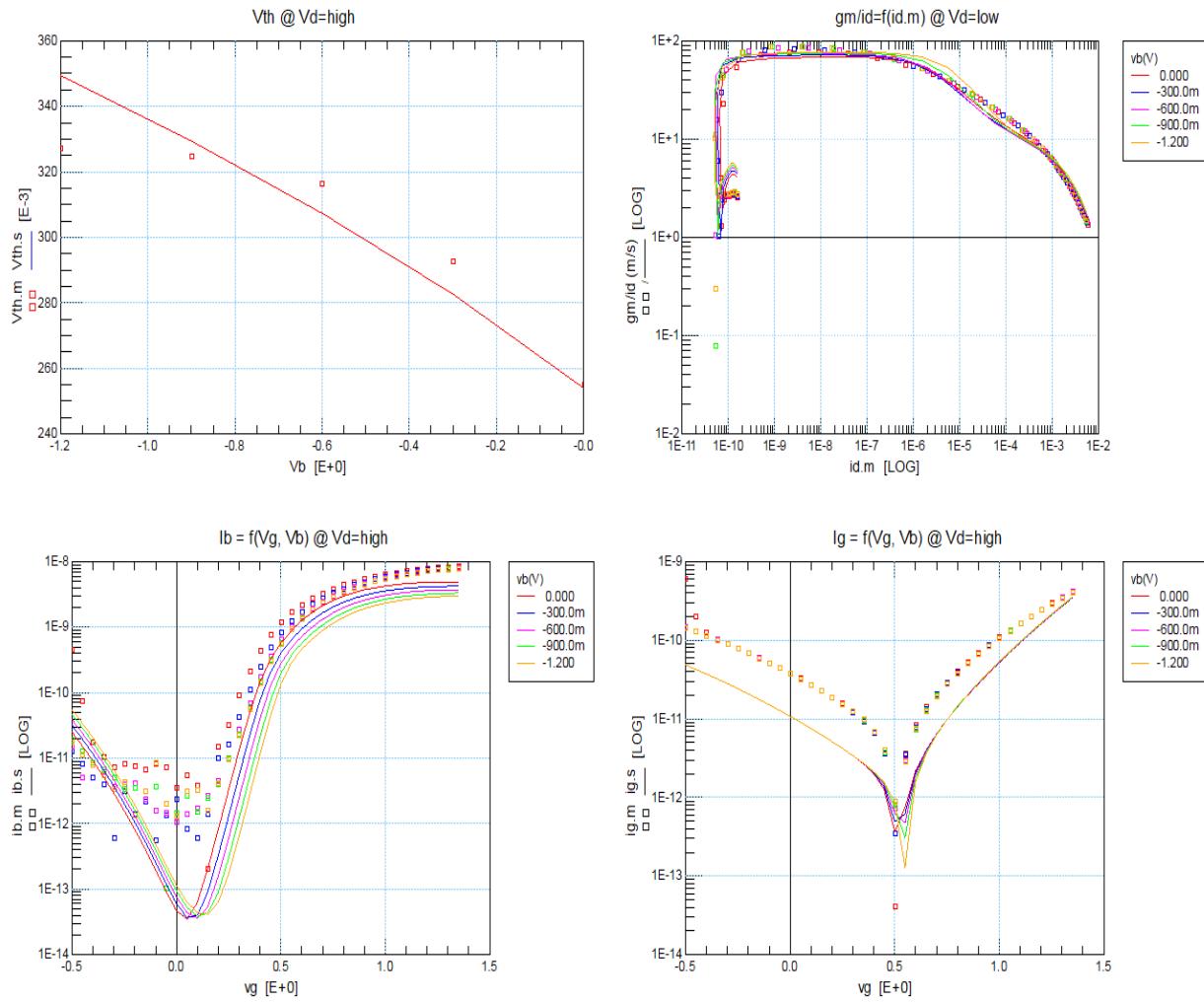
idvg, Vd = 0.05V, T = 27°C



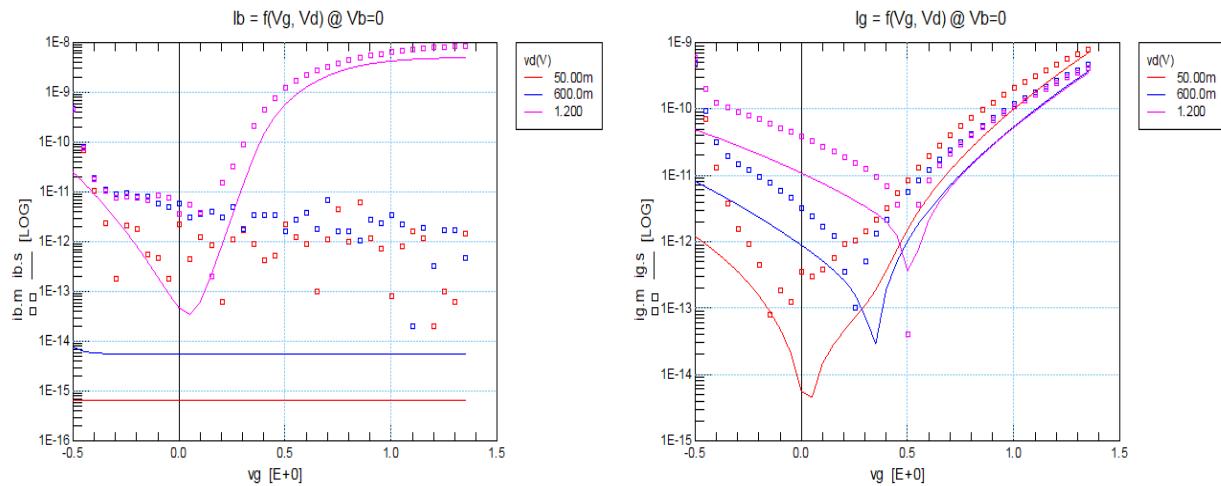


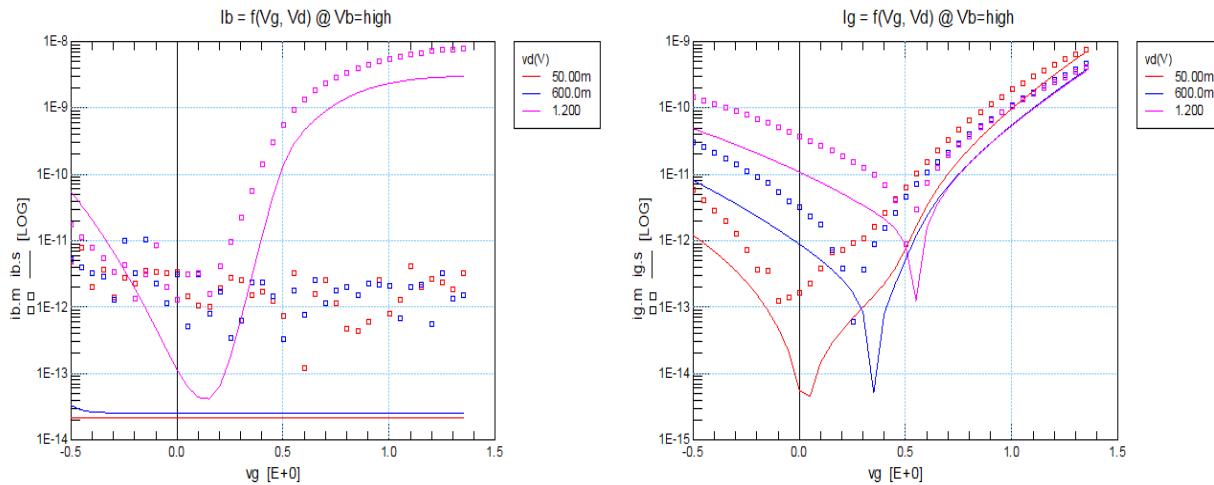
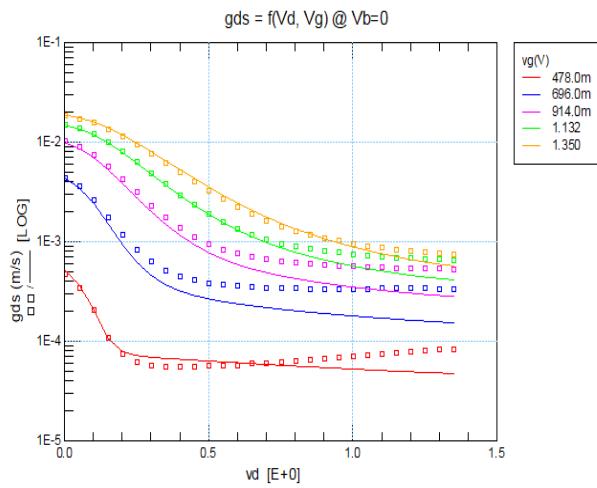
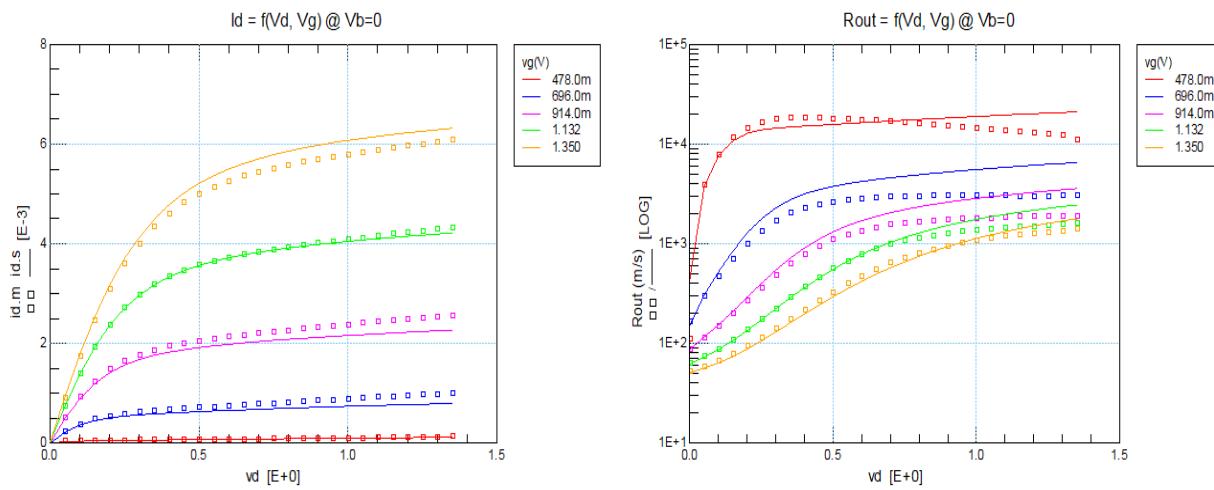
### $i_{dvg}, V_d = 1.2V, T = 27^\circ C$

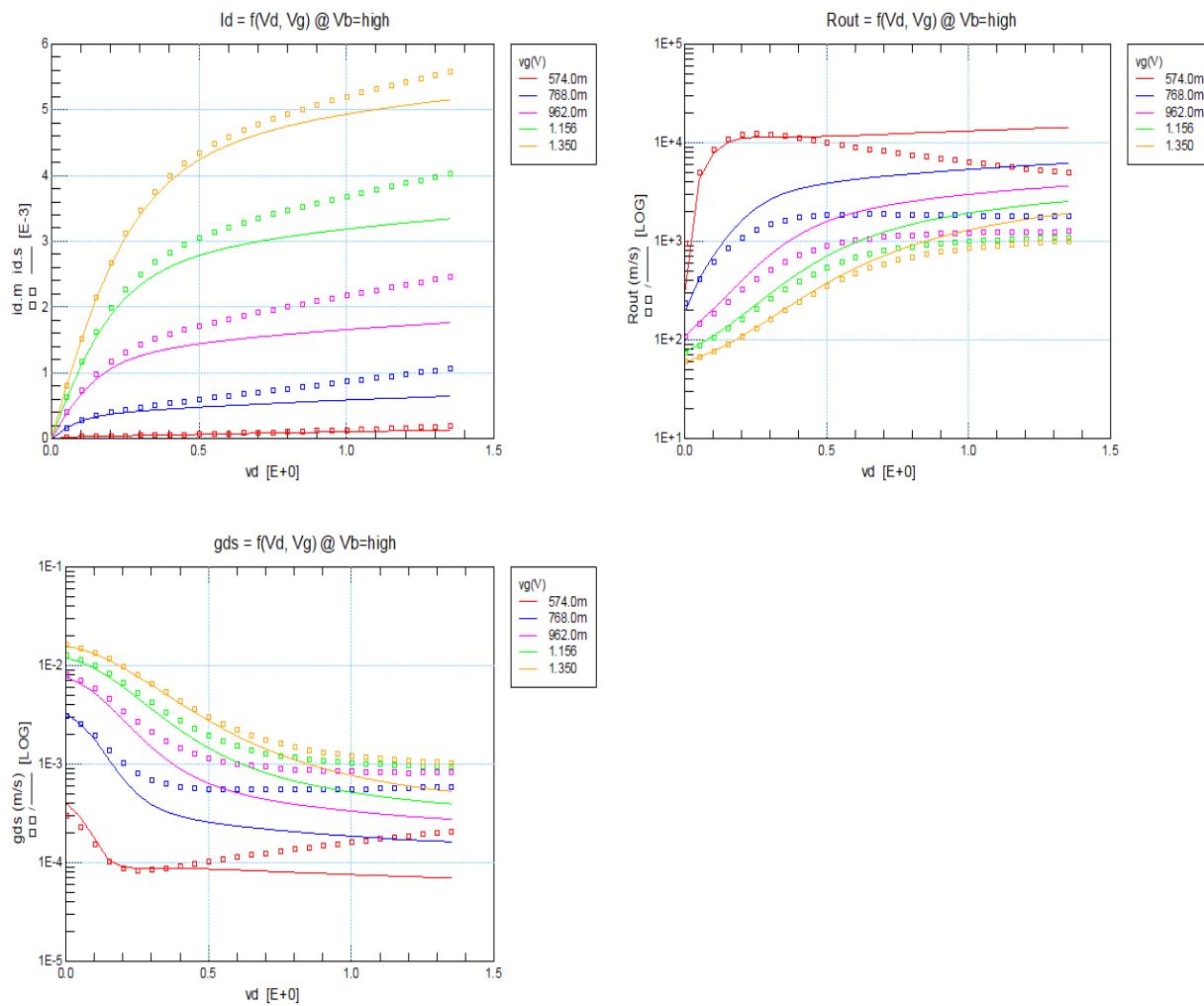
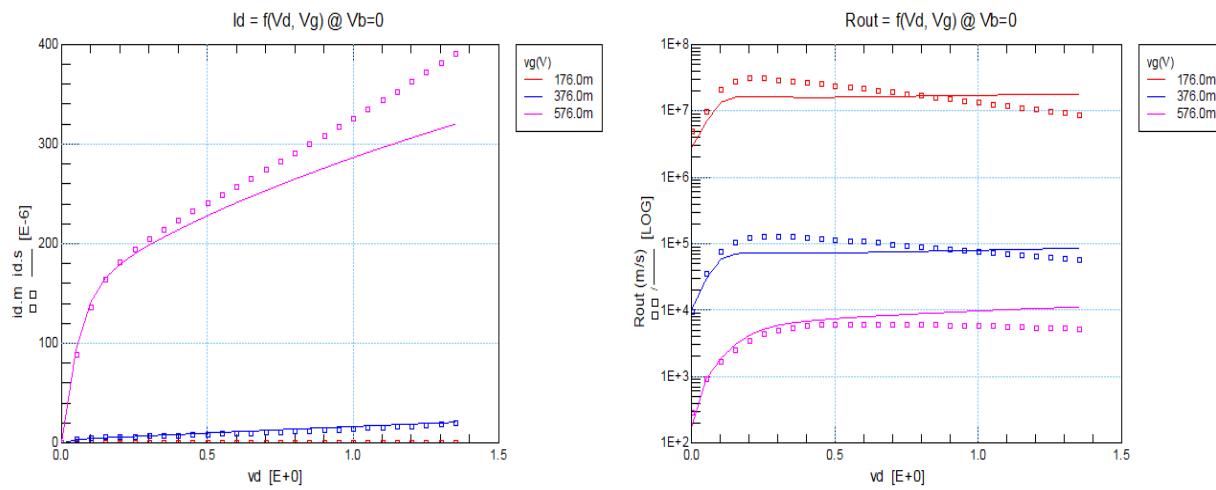


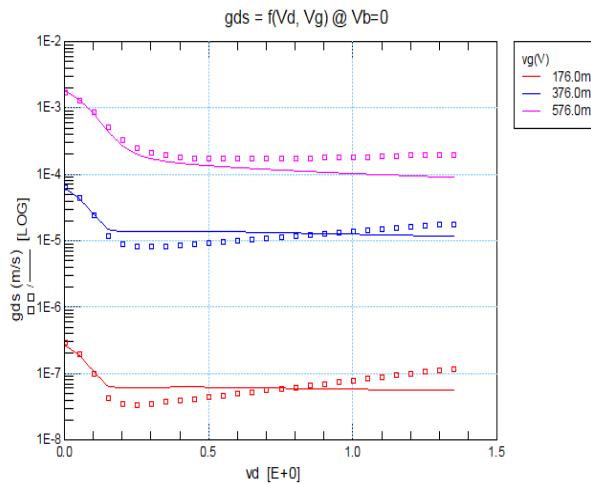


**idvg, Ib,Ig, Vb = 0V, T = 27°C**

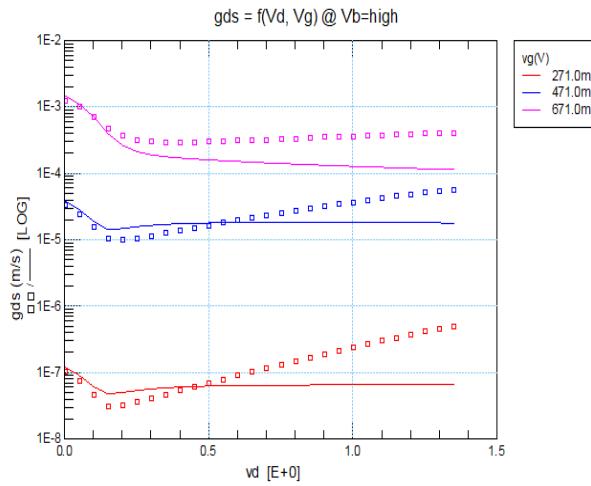
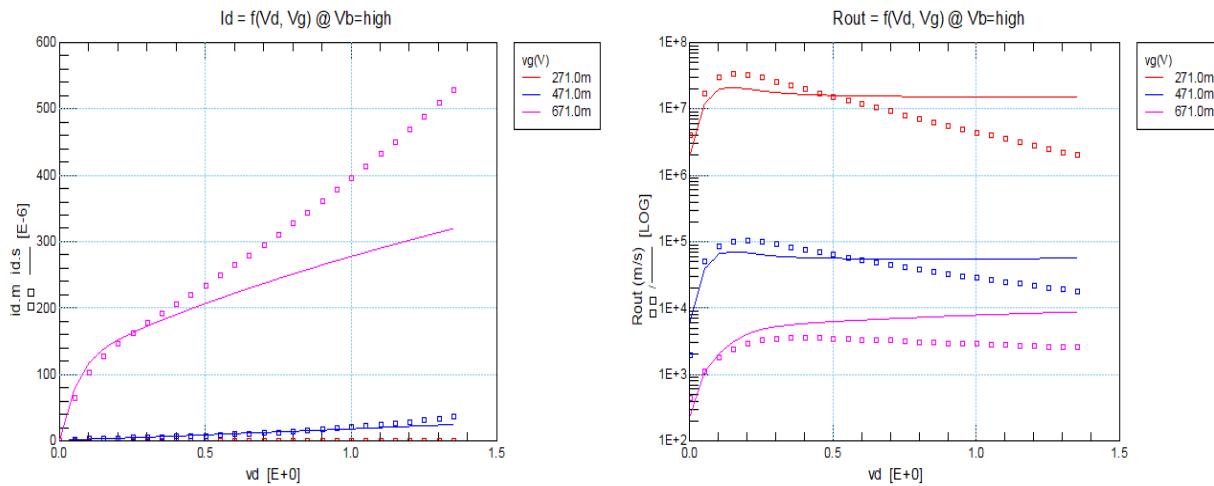


**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


**idvd\_vbmin, Vb = -1.2V, T = 27°C****idvd\_vth, Vb = 0V, T = 27°C**

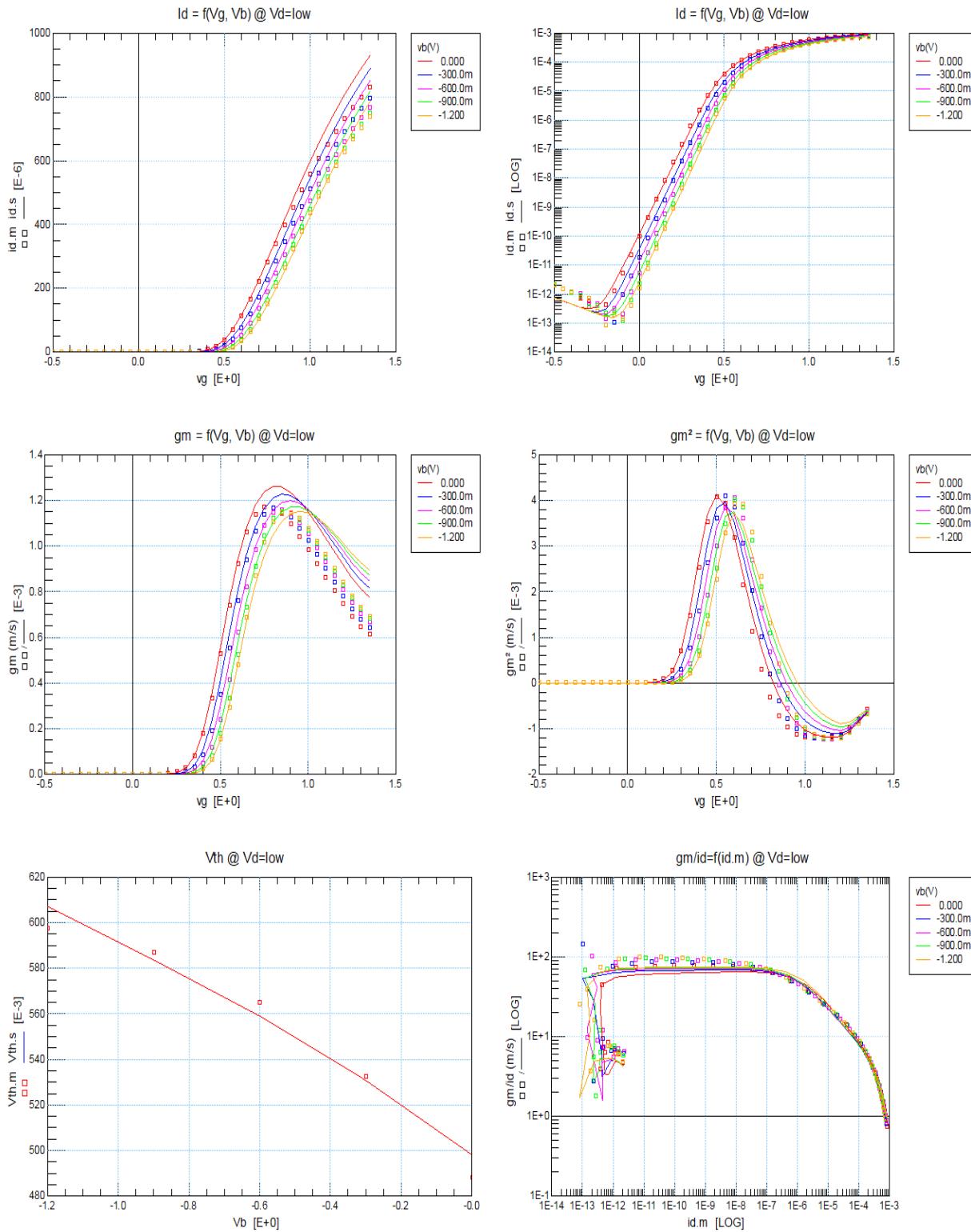


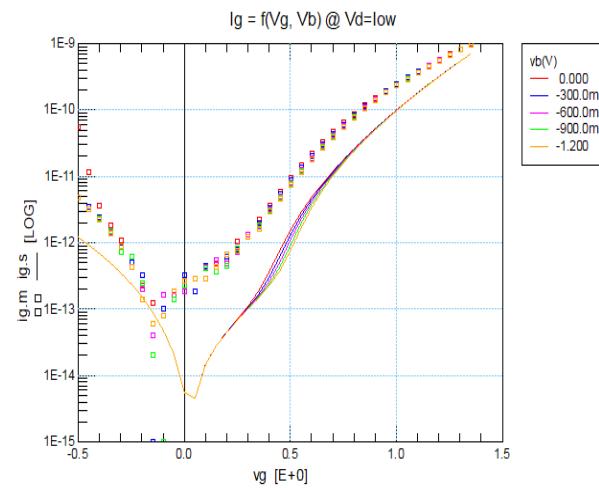
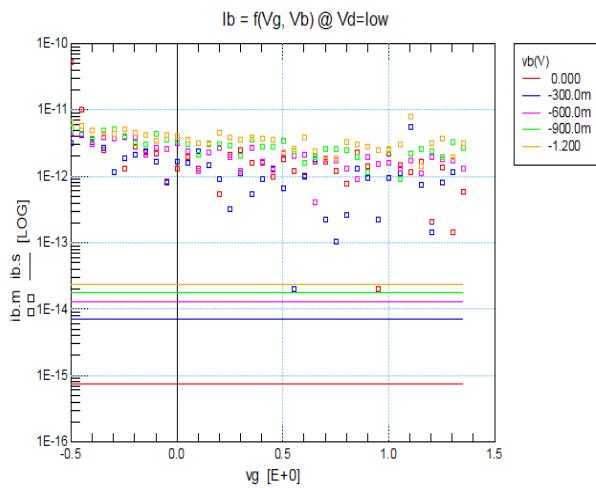
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C



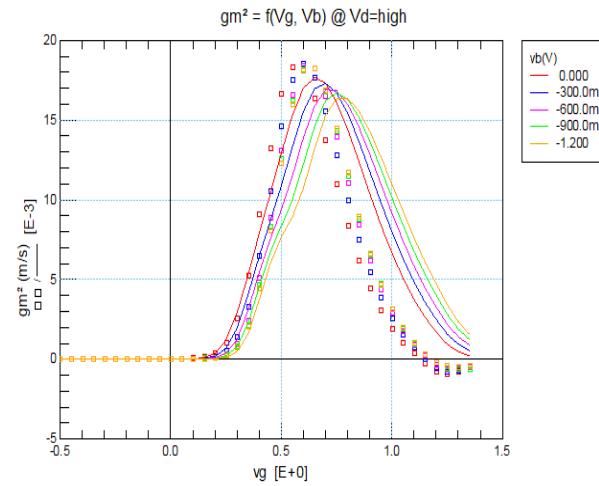
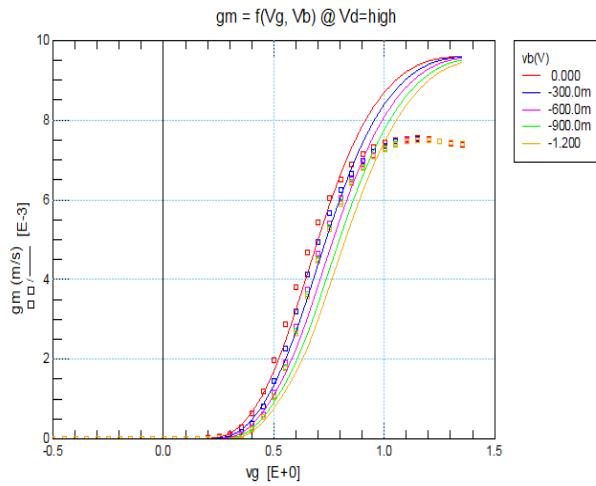
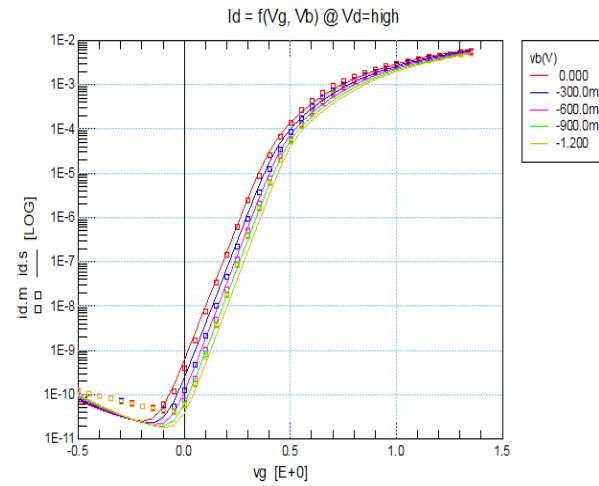
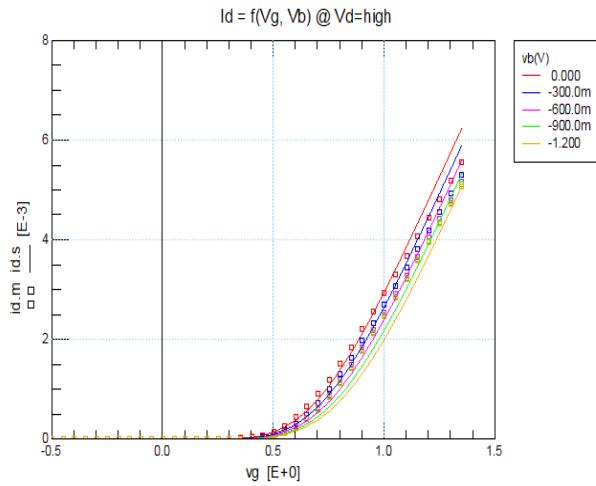
## 4.5 W10u0\_L0u13\_S540\_2

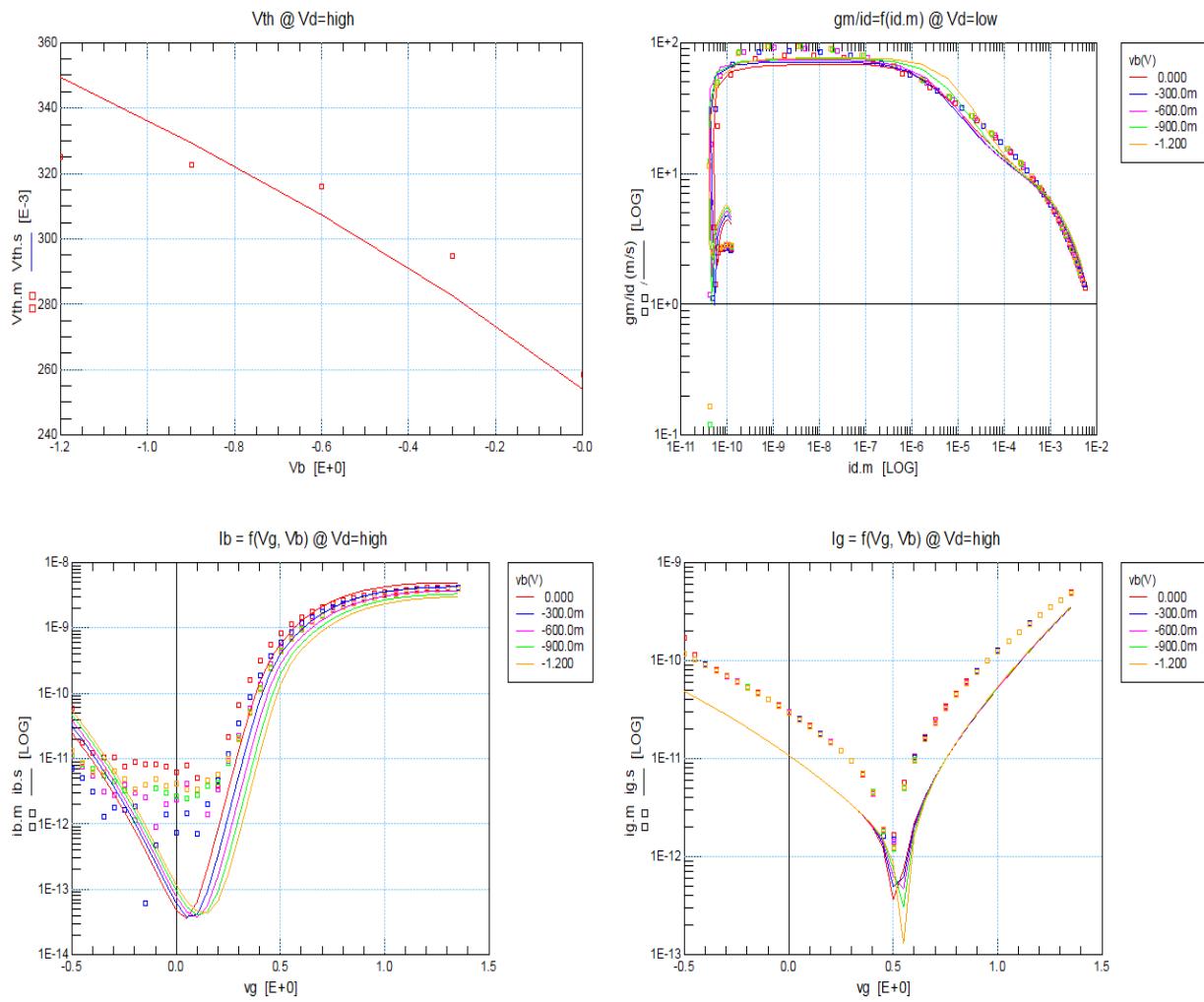
$idvg$ ,  $Vd = 0.05V$ ,  $T = 27^\circ C$



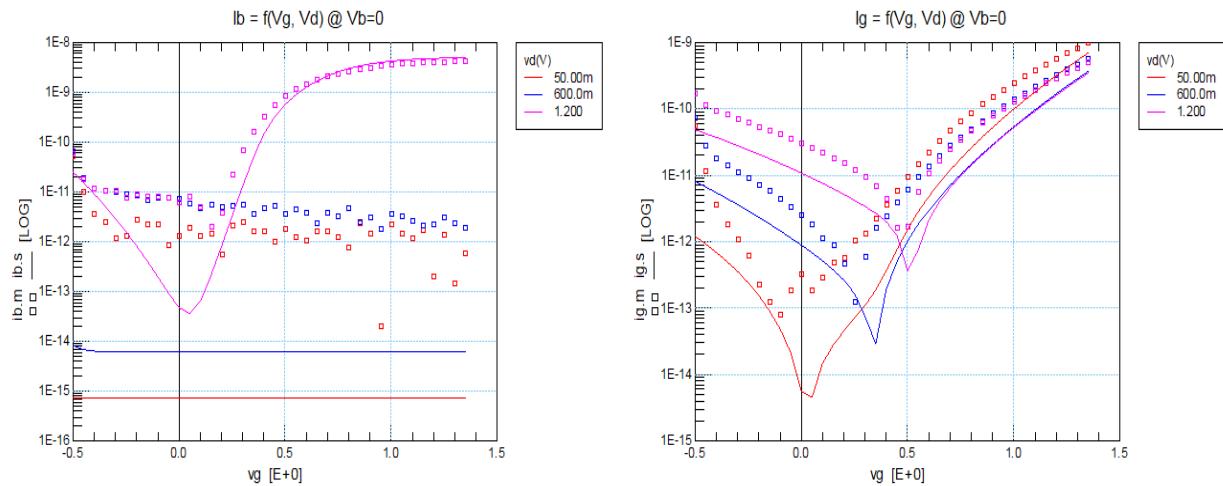


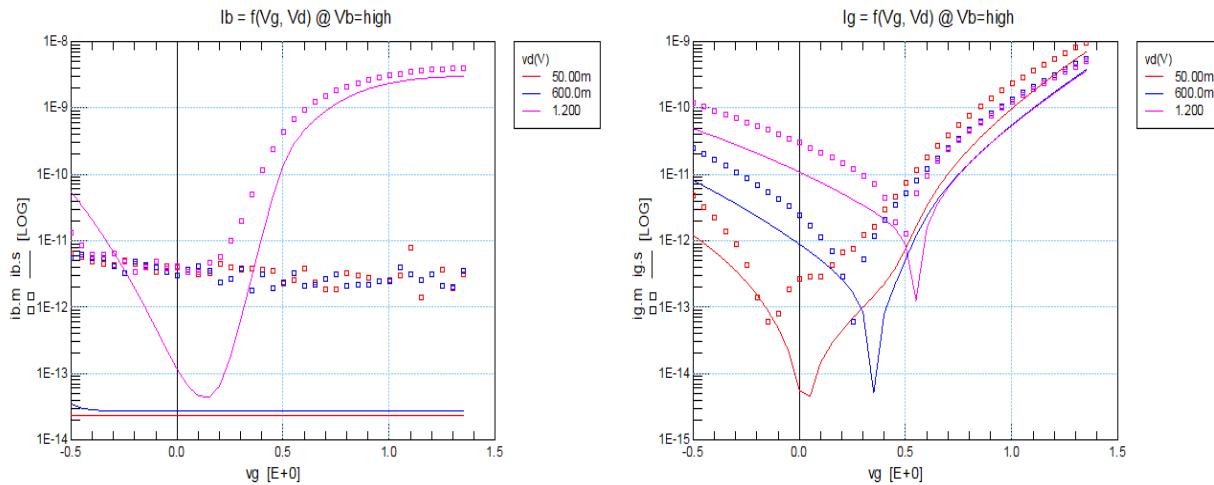
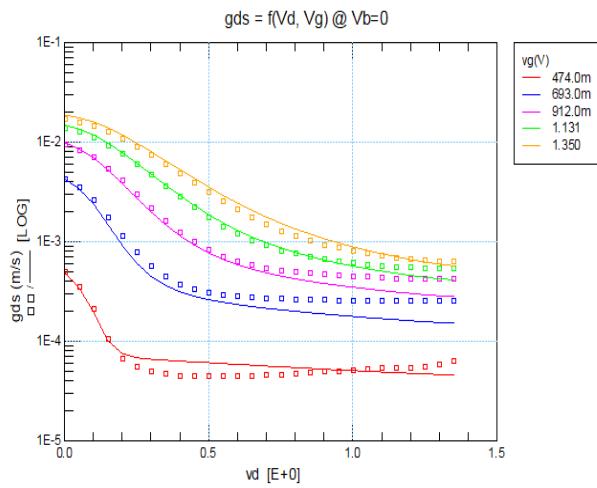
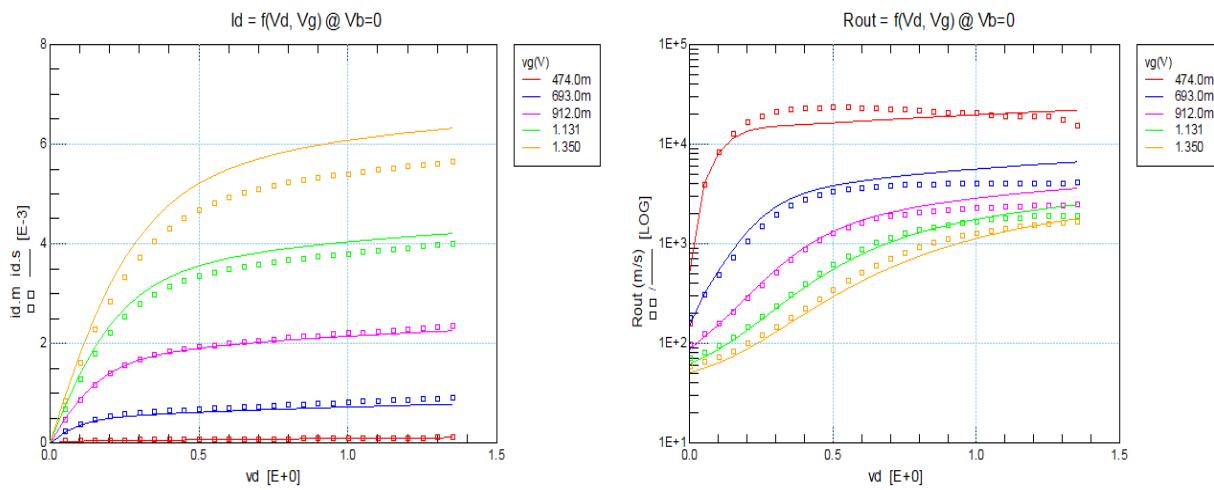
### $i_{dvg}, V_d = 1.2V, T = 27^\circ C$

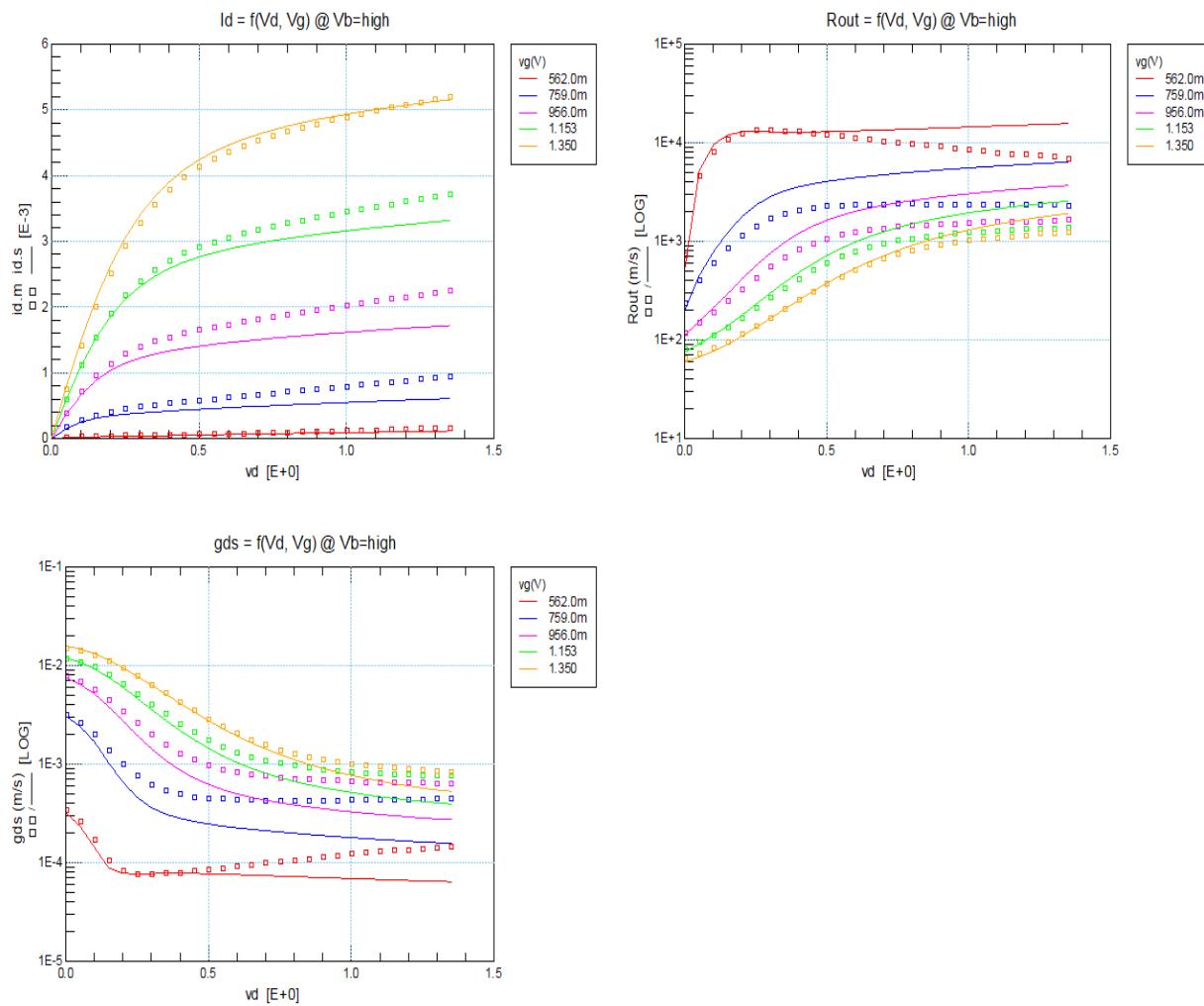
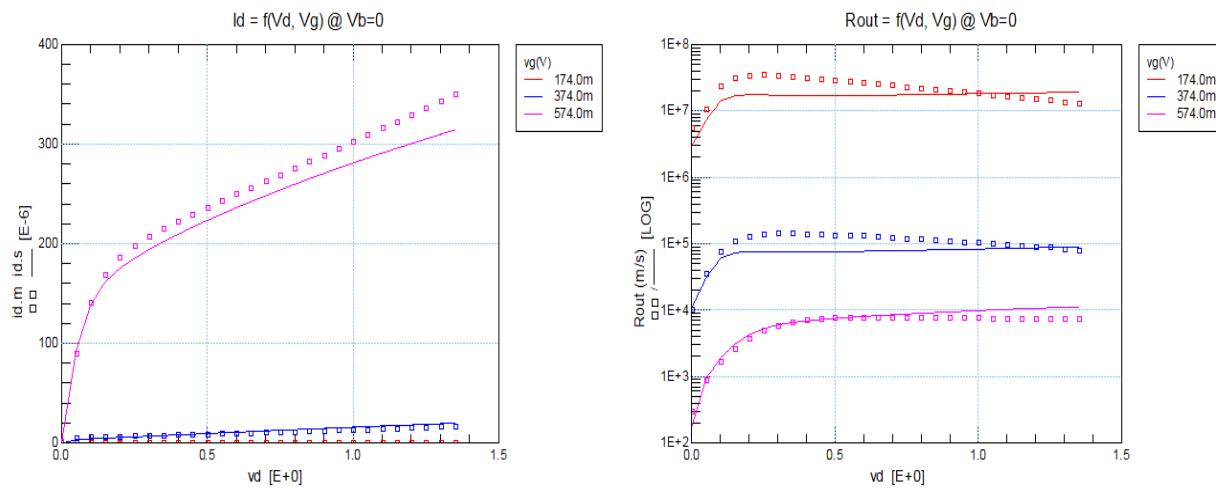


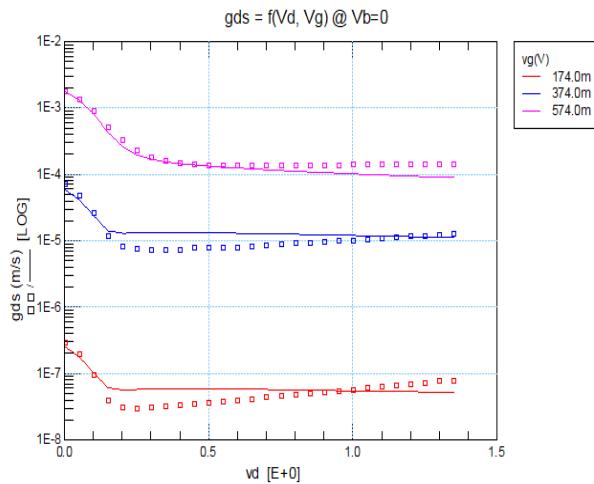


**idvg, Ib, Ig, Vb = 0V, T = 27°C**

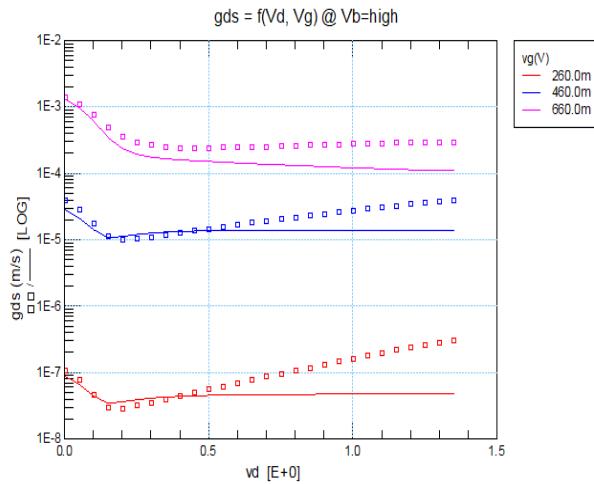
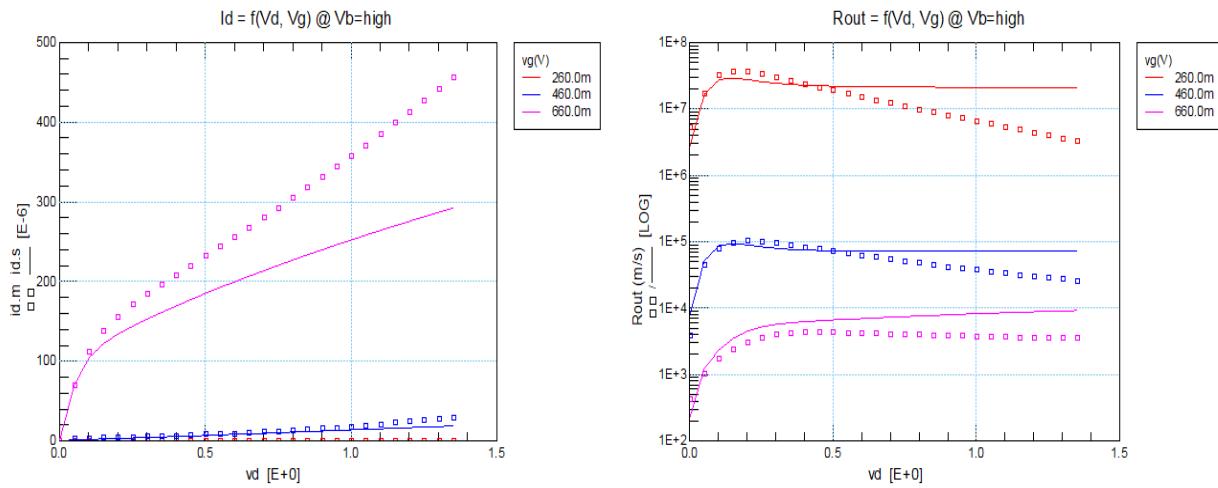


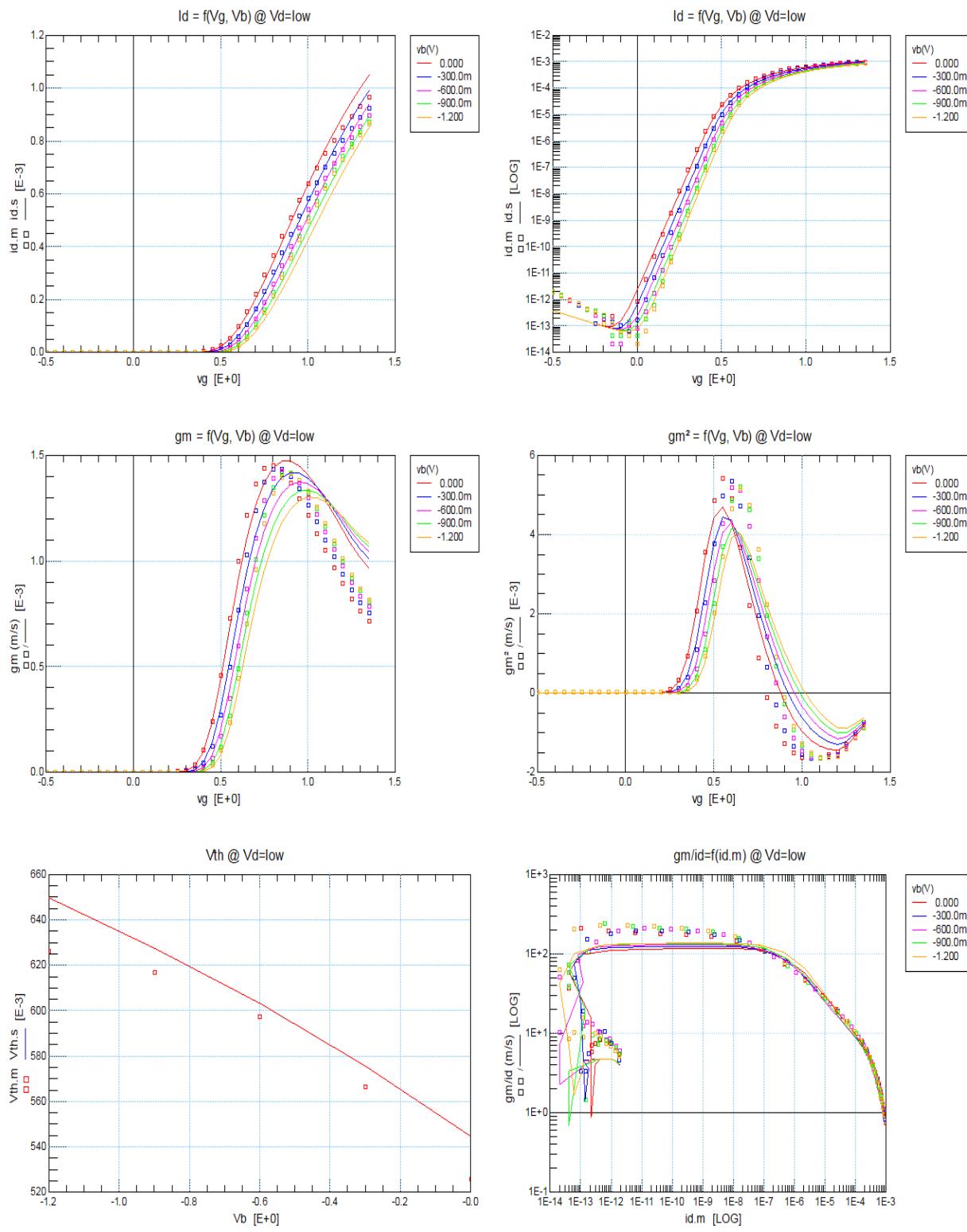
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


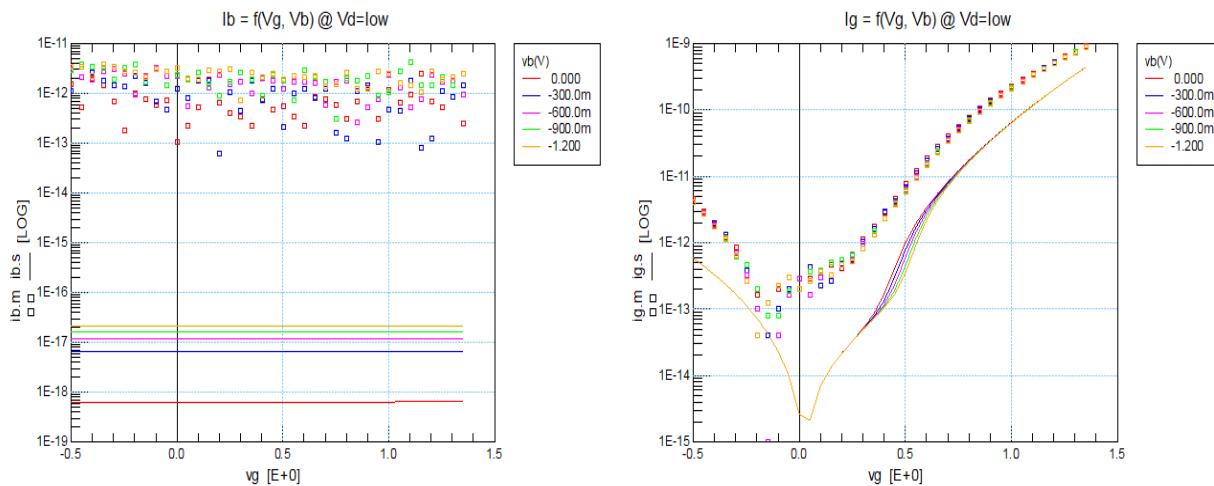
**idvd\_vbmin, Vb = -1.2V, T = 27°C****idvd\_vth, Vb = 0V, T = 27°C**



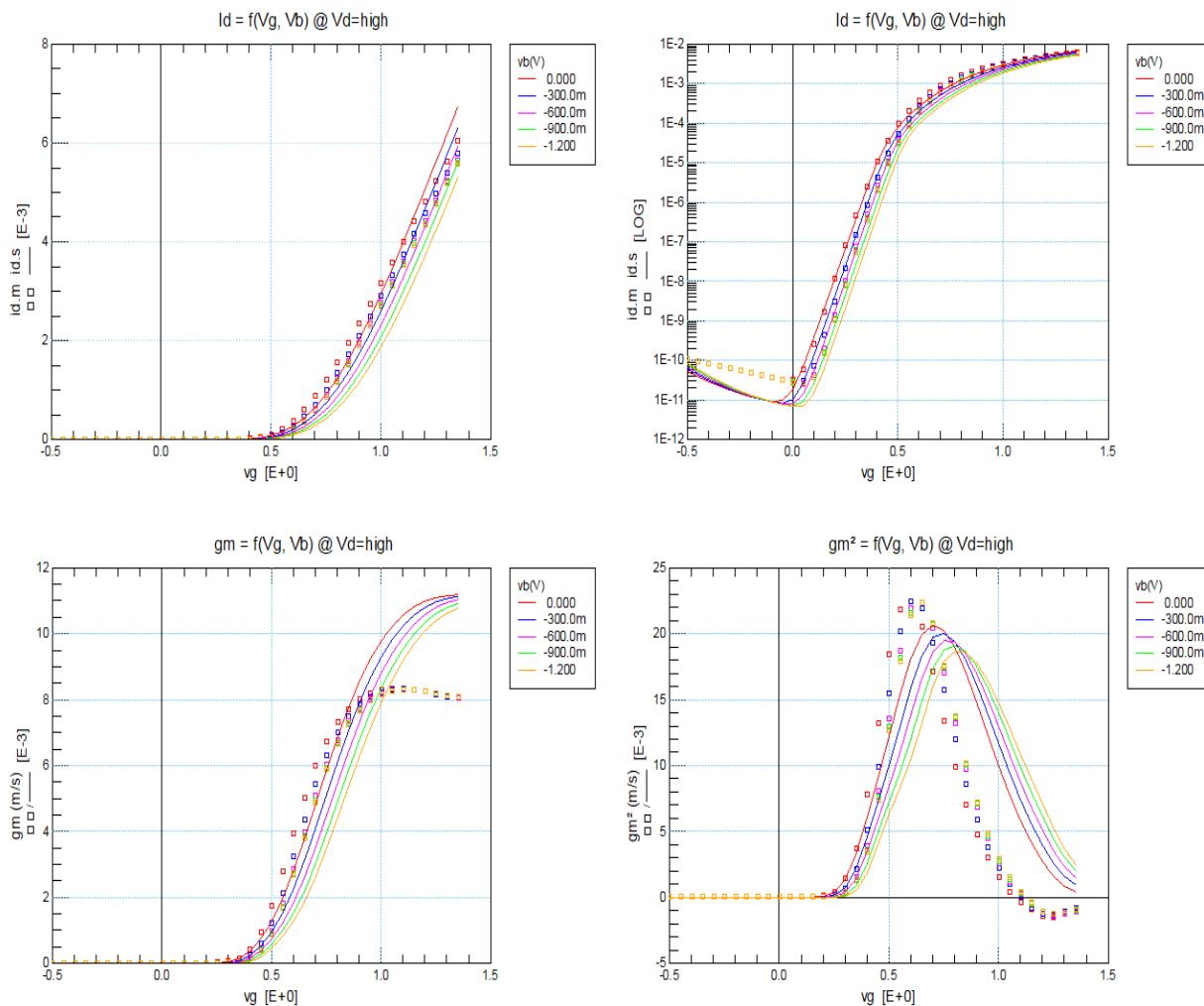
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

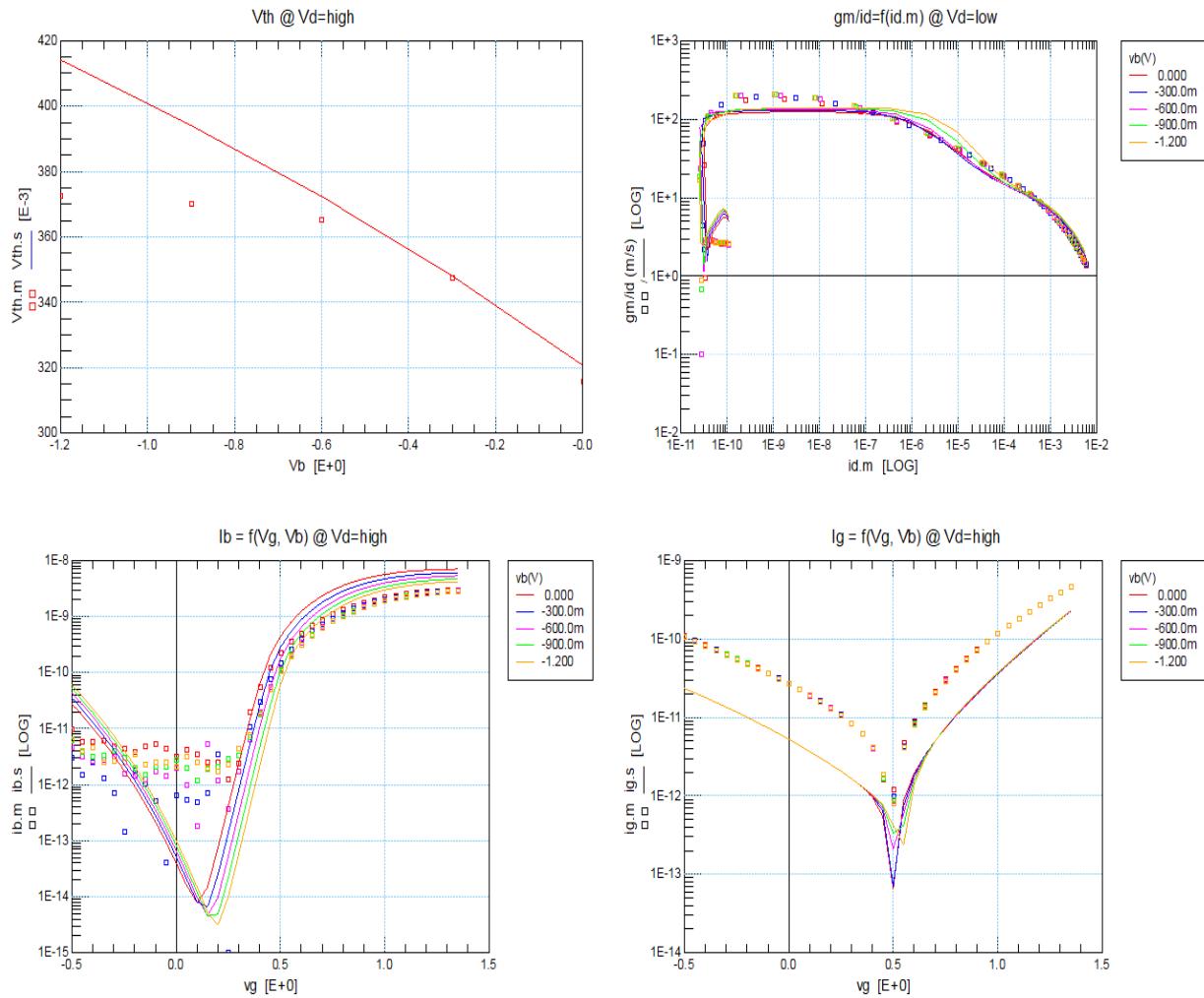


**idvg, Vd = 0.05V, T = -40°C**


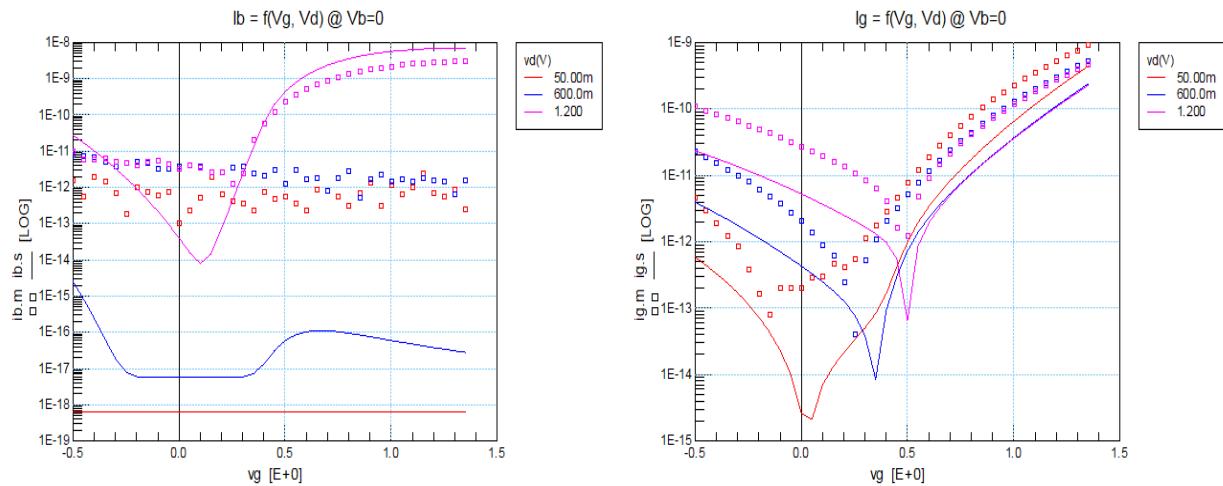


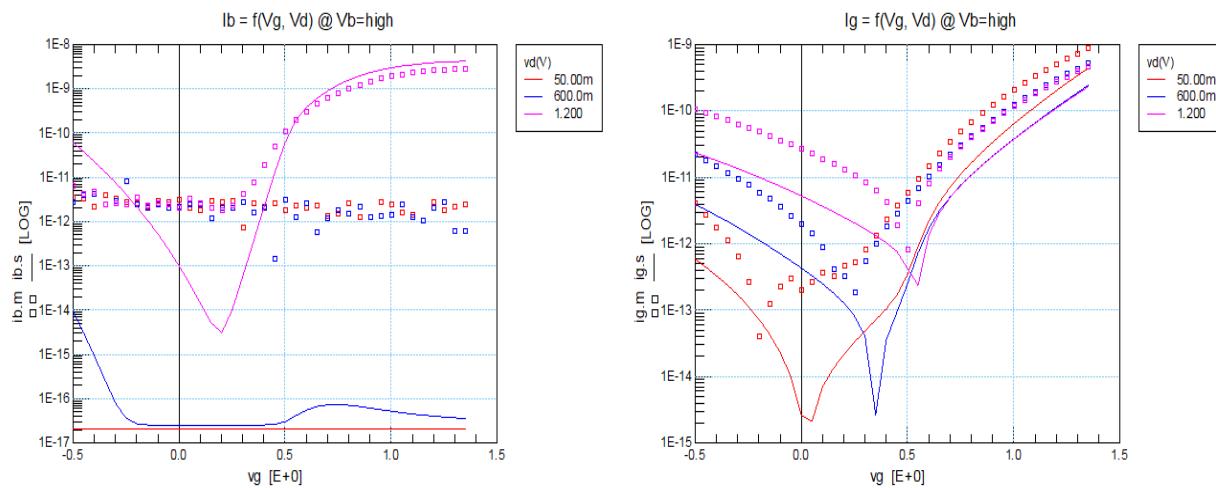
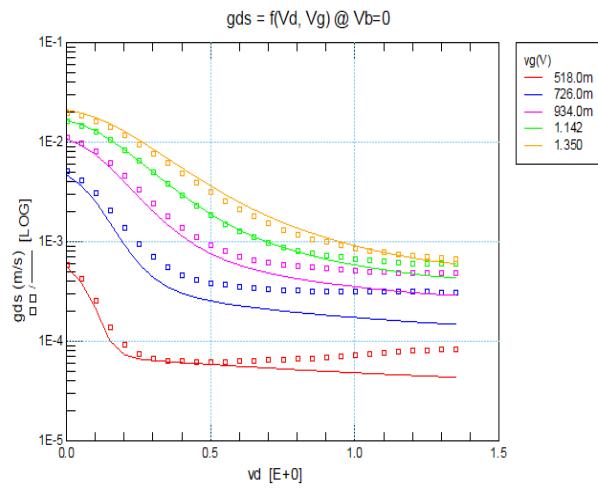
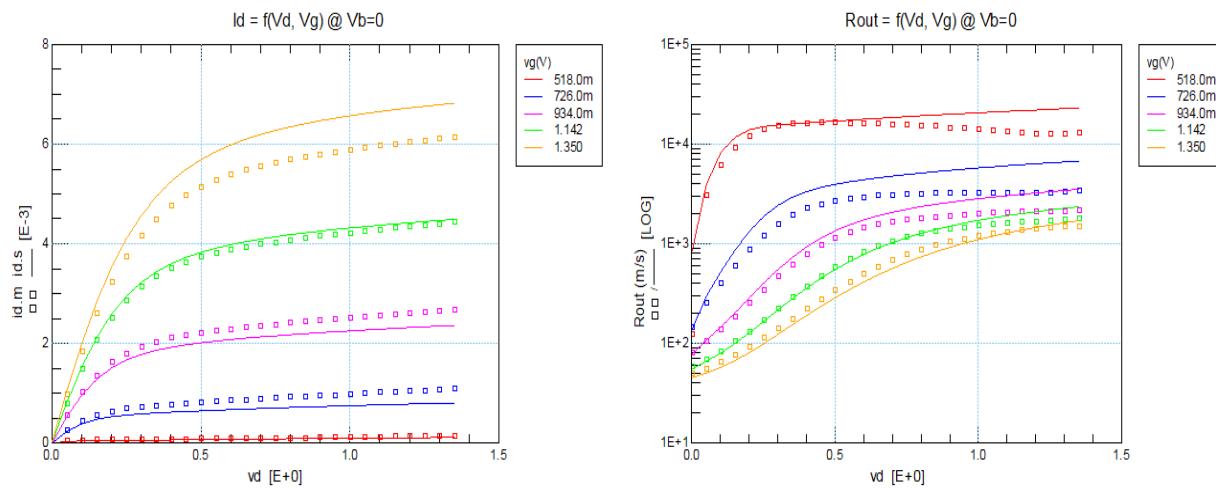
$idvg, Vd = 1.2V, T = -40^{\circ}C$

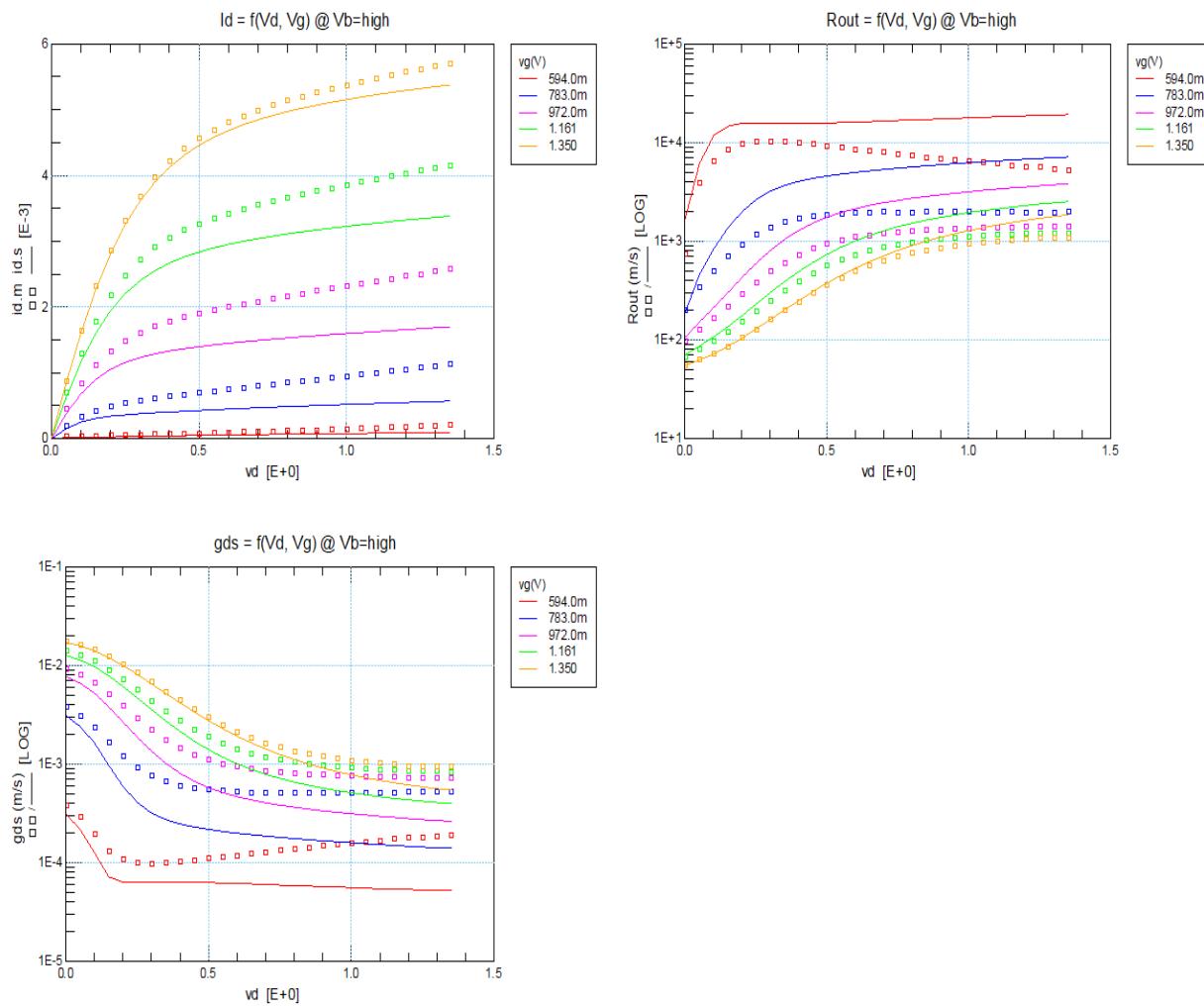
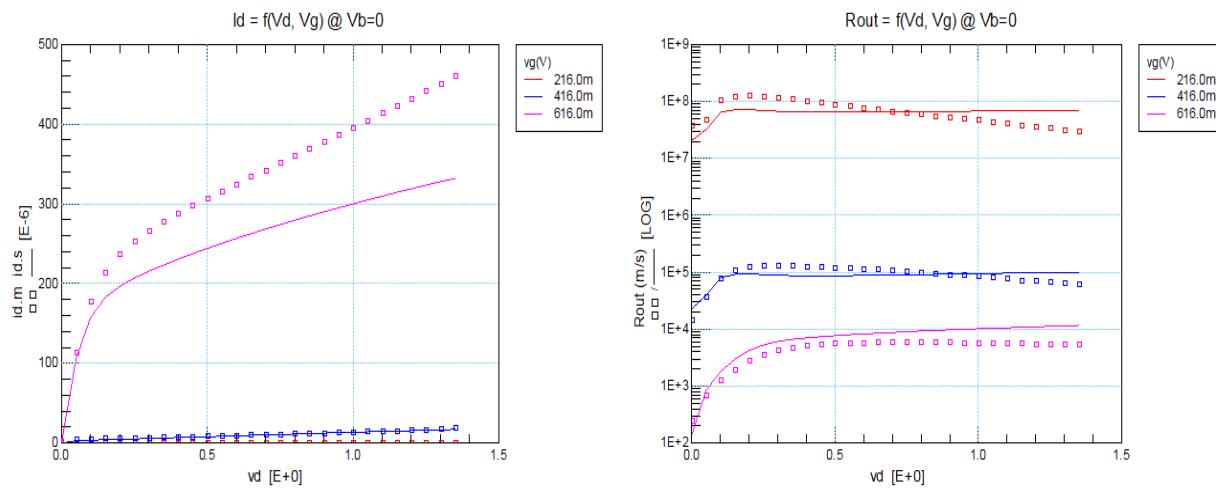


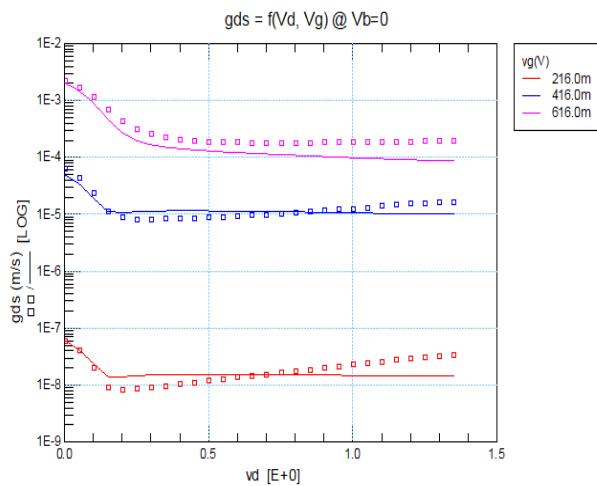


$idvg, Ib, Ig, Vb = 0V, T = -40^{\circ}C$

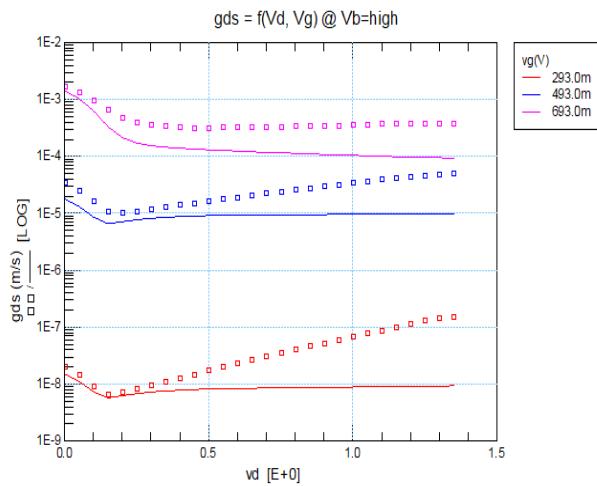
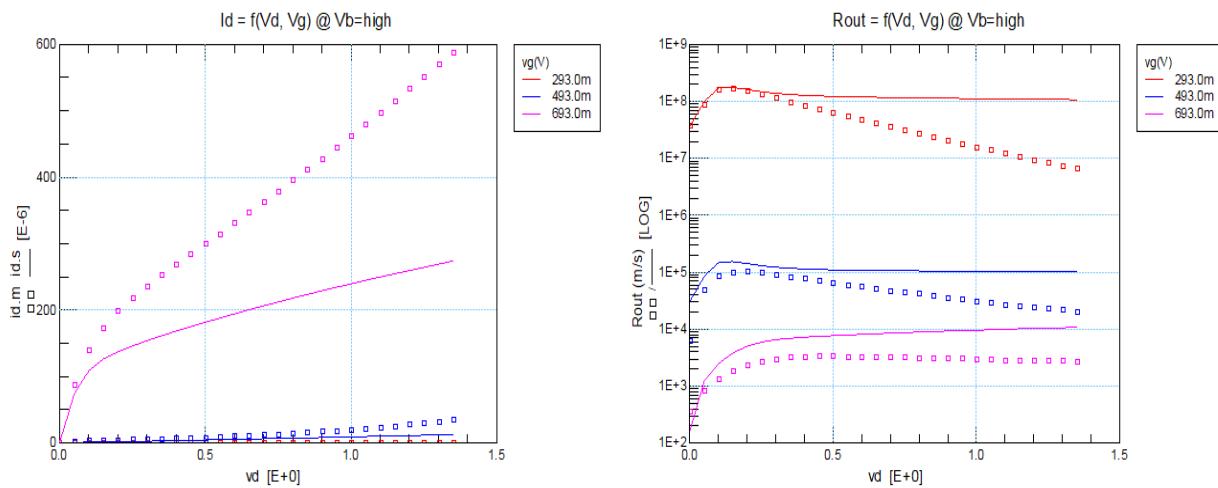


**idvg, Ib,Ig, Vb = -1.2V, T = -40°C**

**idvd, Vb = 0V, T = -40°C**


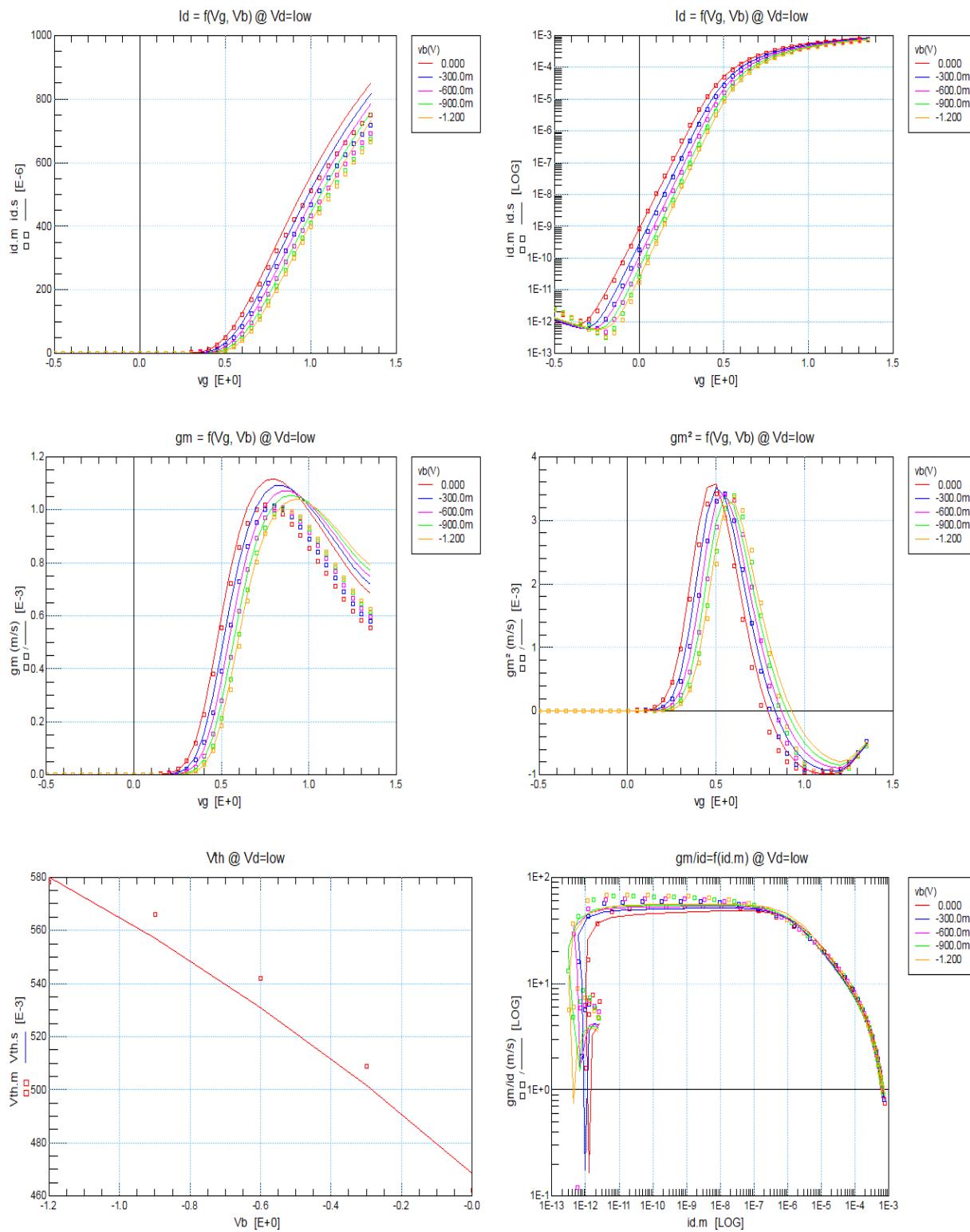
**idvd\_vbmin, Vb = -1.2V, T = -40°C****idvd\_vth, Vb = 0V, T = -40°C**

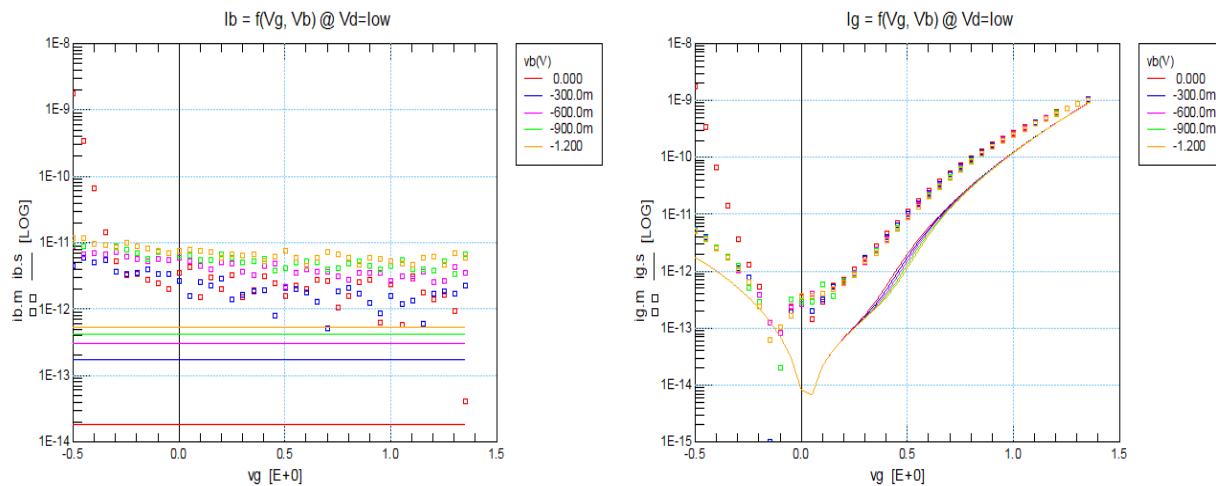


### idvd\_vth\_vbmin, Vb = -1.2V, T = -40°C

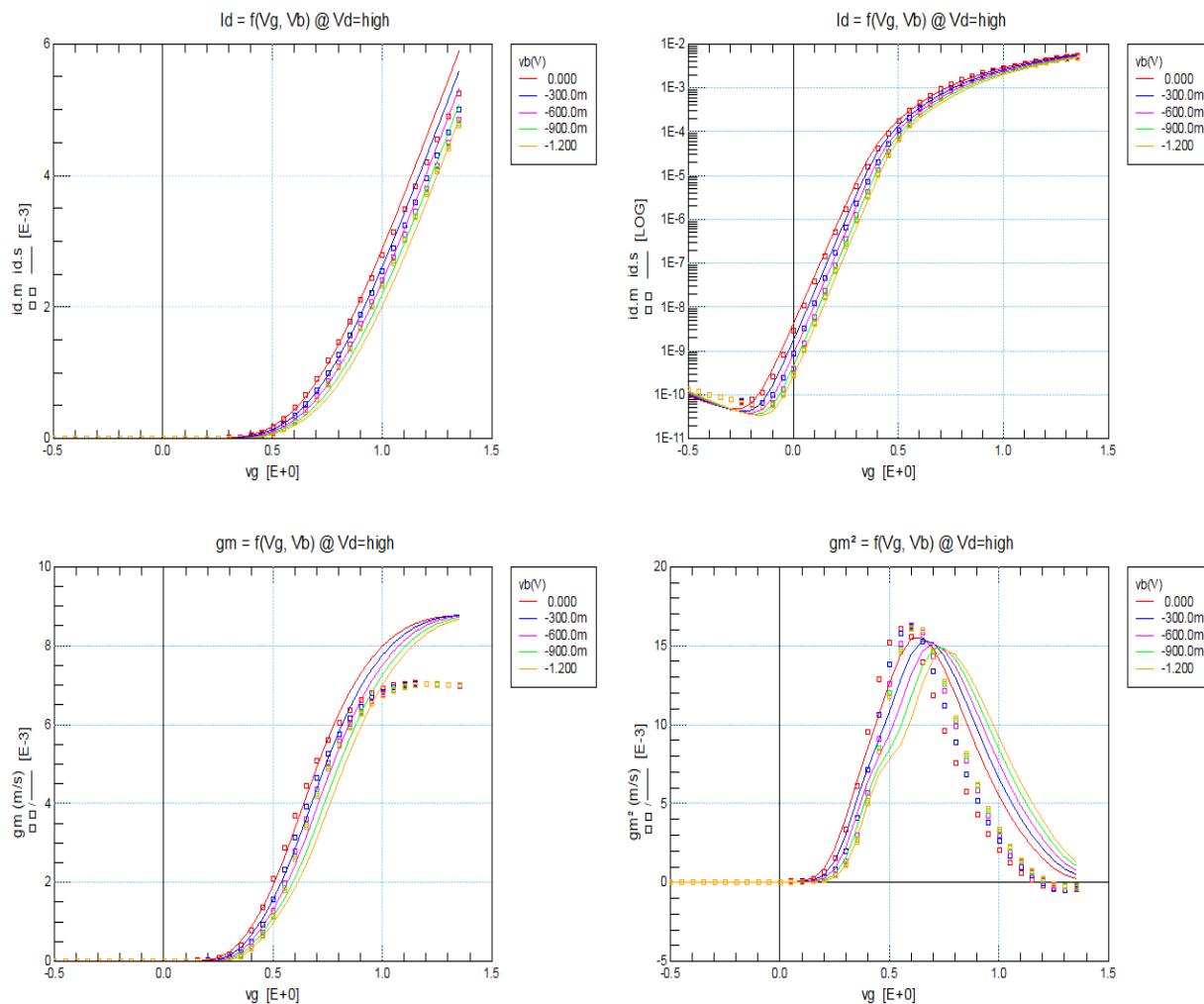


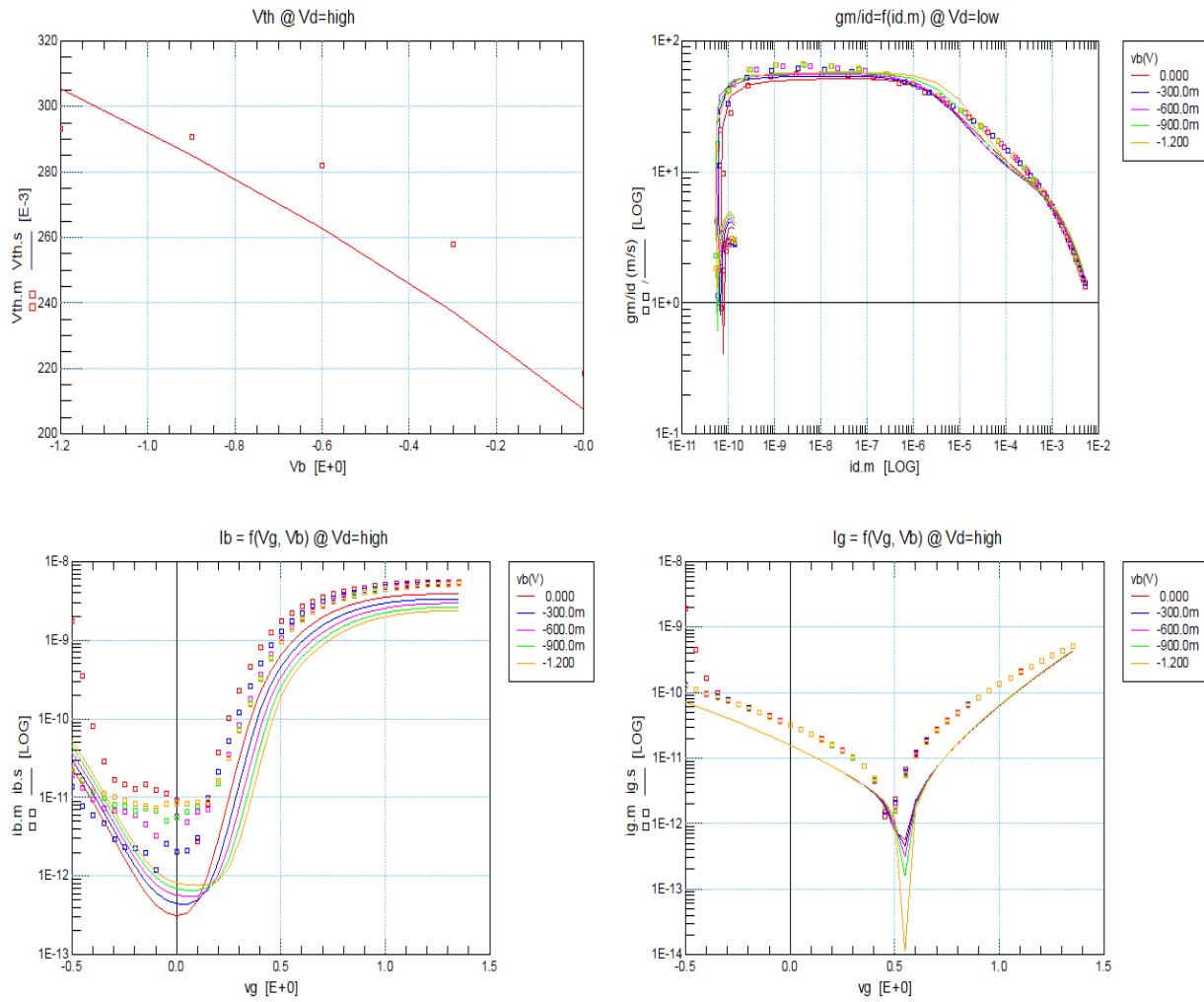
**idvg, Vd = 0.05V, T = 70°C**



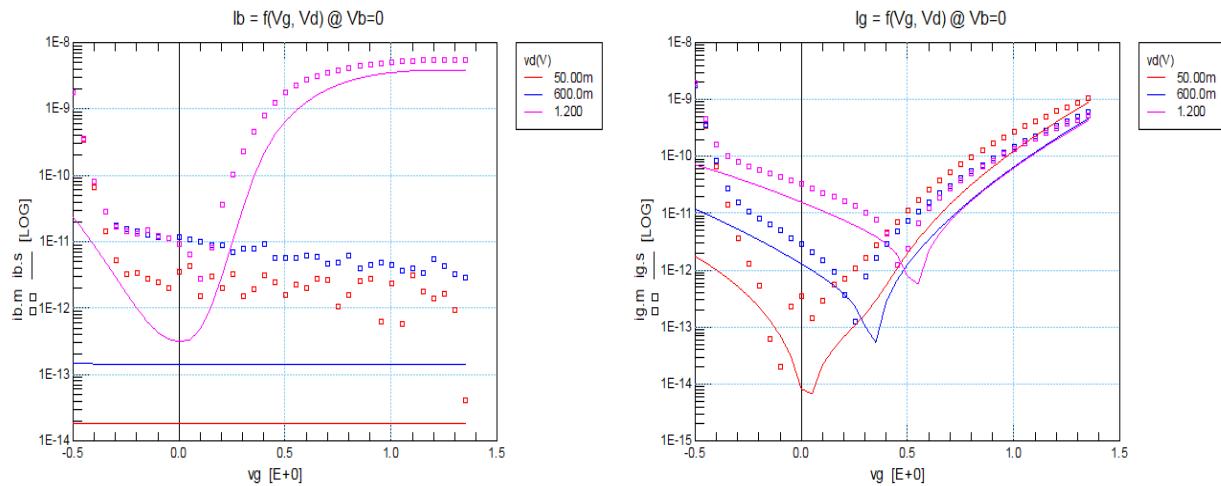


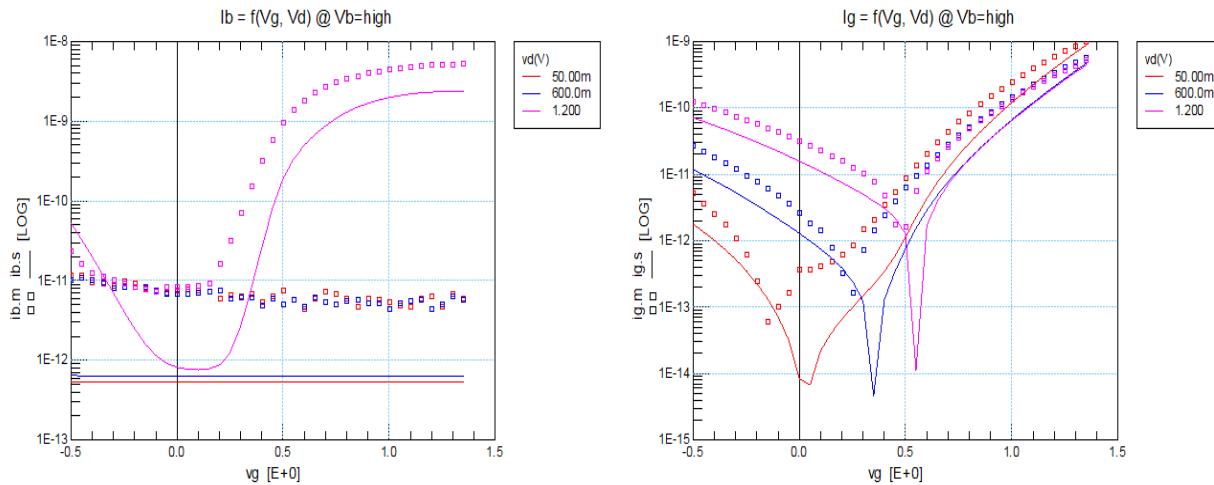
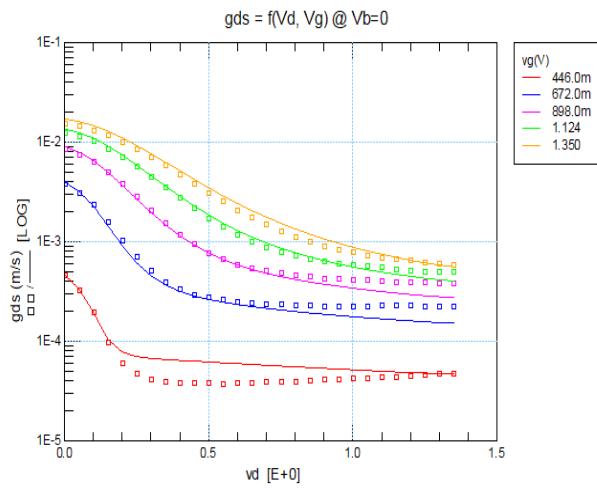
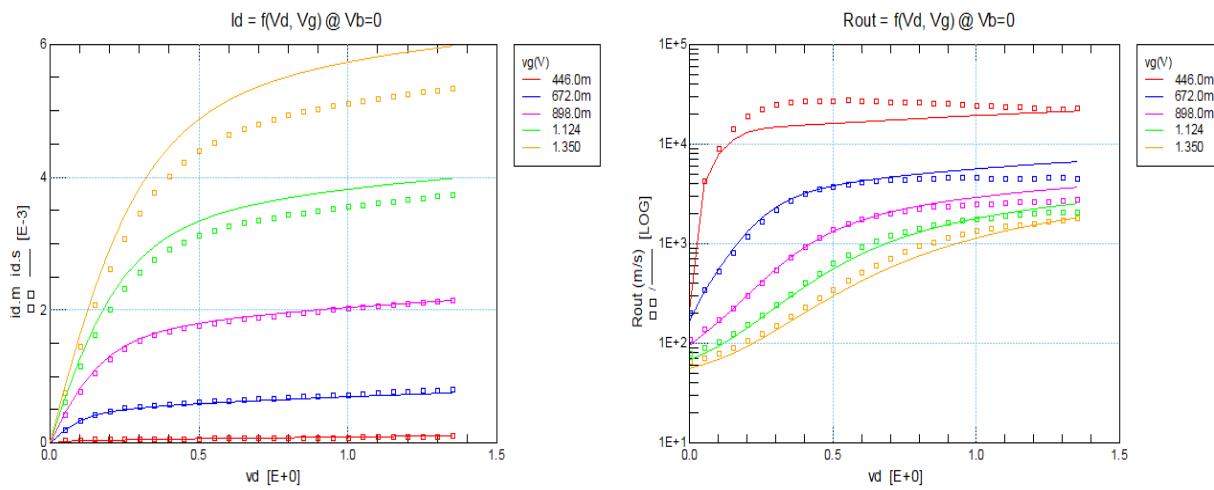
$idvg, Vd = 1.2V, T = 70^\circ C$

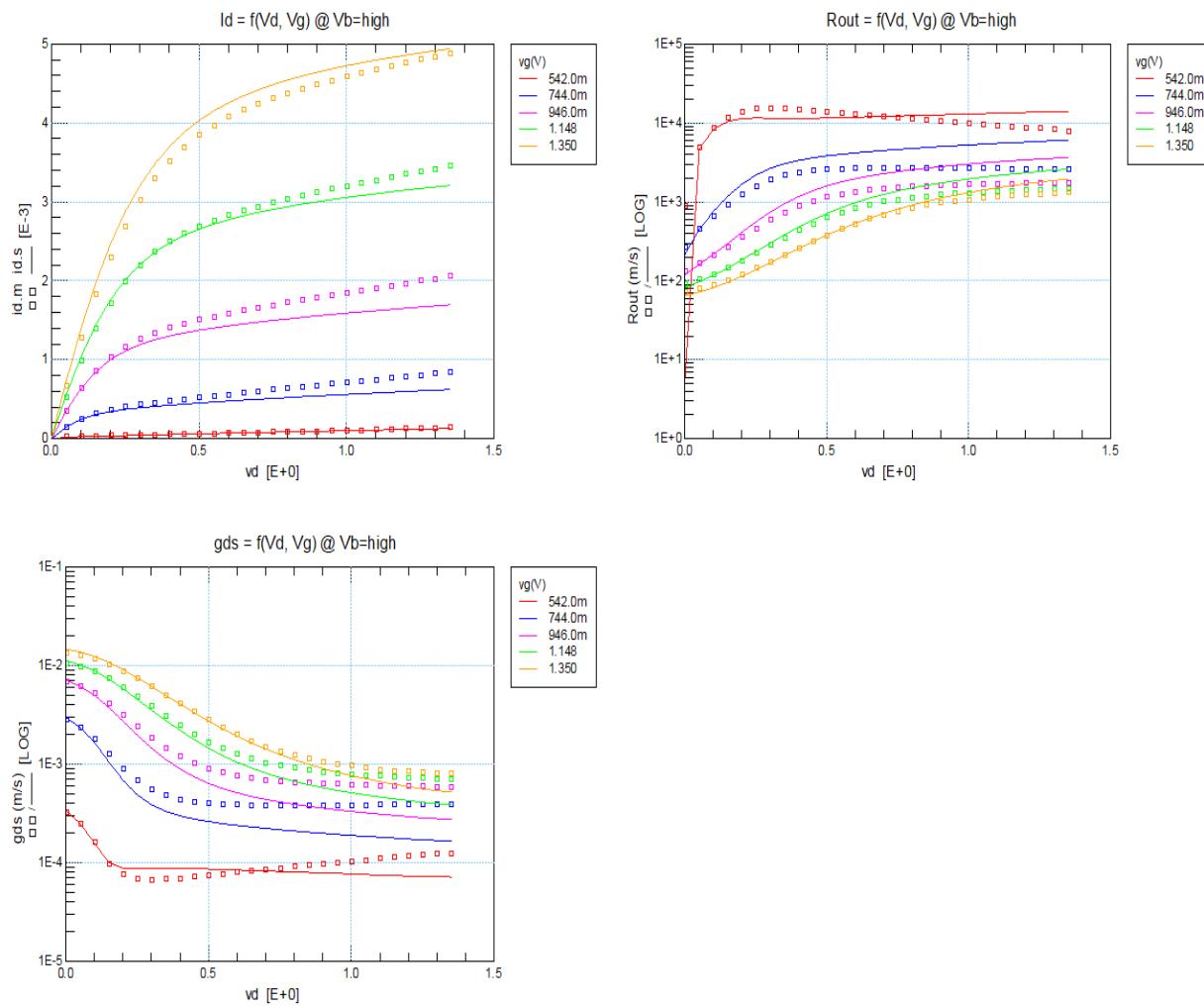
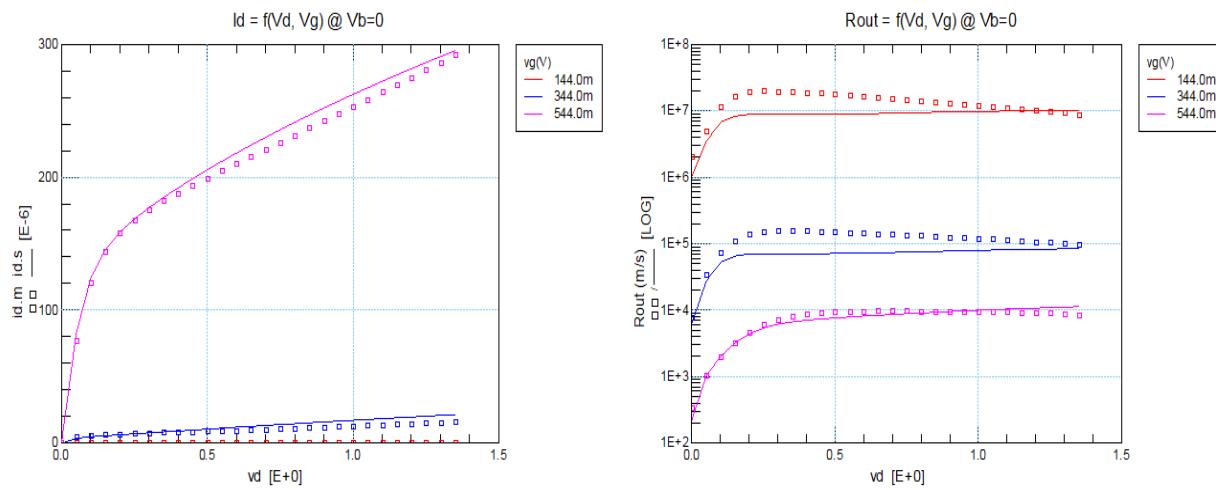


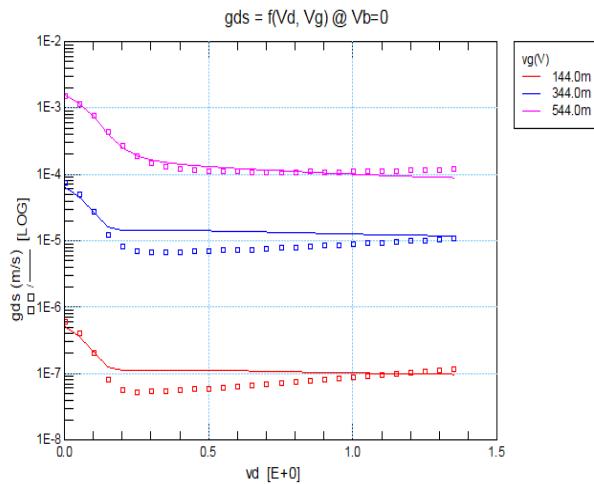


### idvg, Ib,Ig, Vb = 0V, T = 70°C

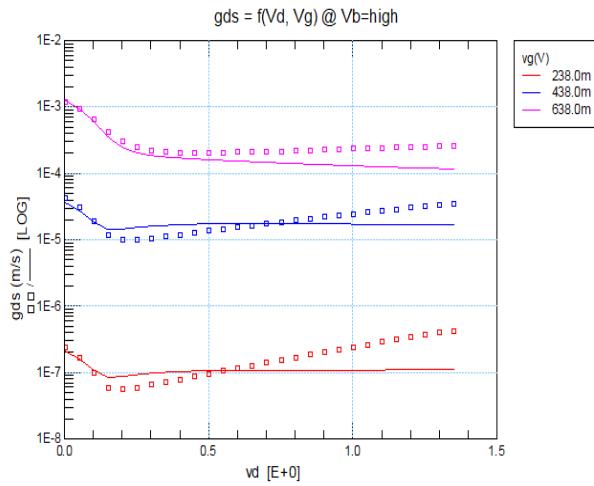
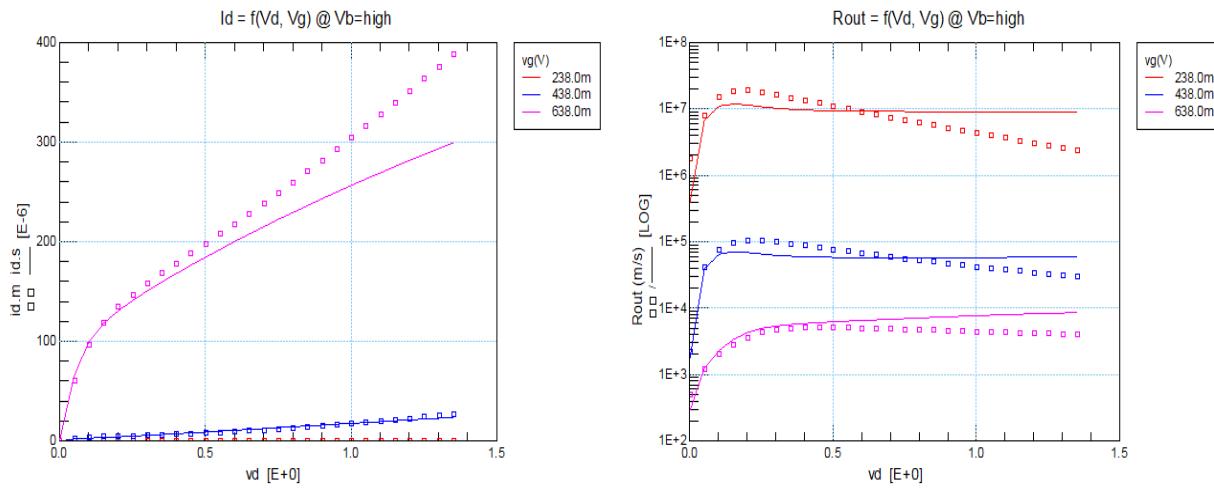


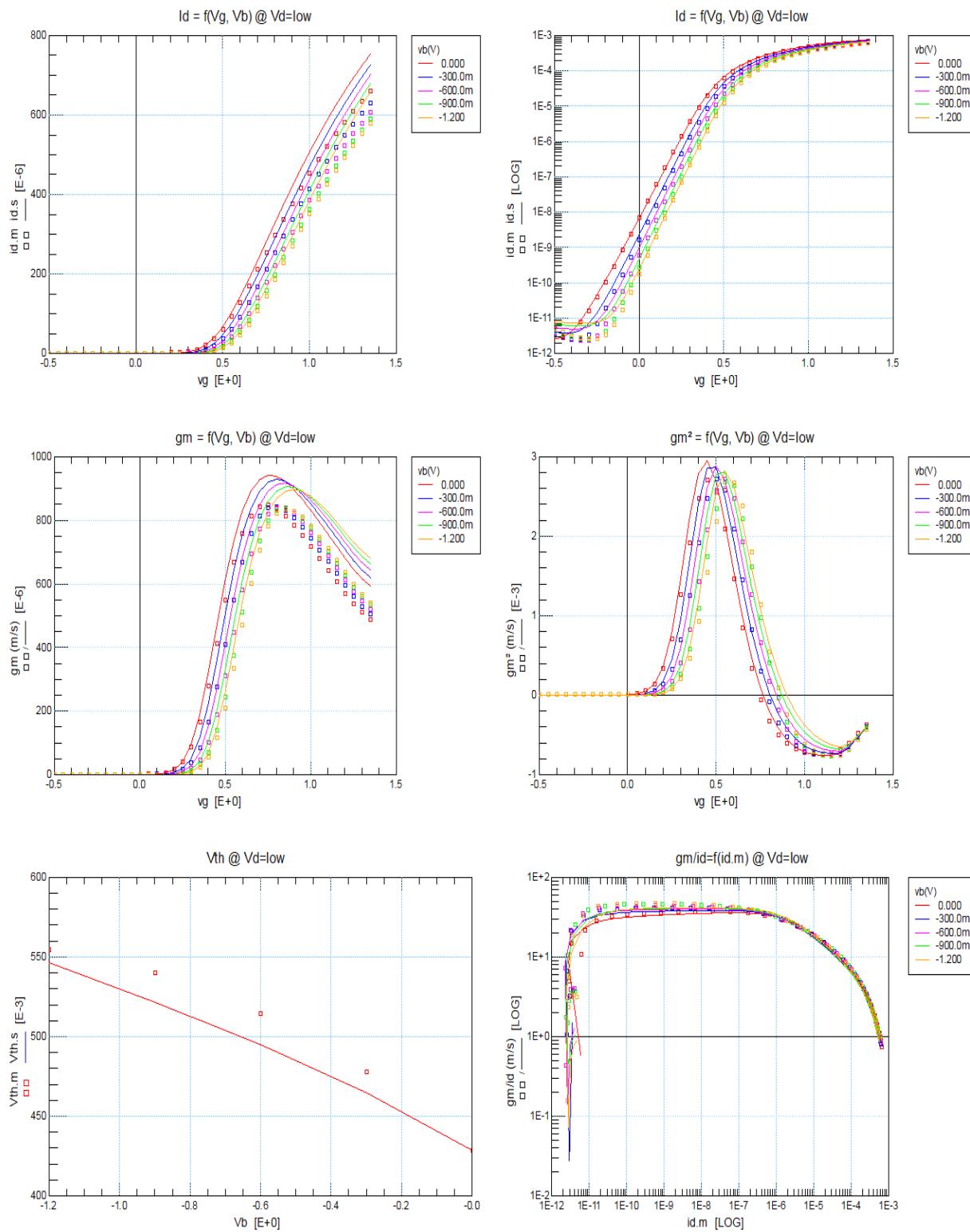
**idvg, Ib,Ig, Vb = -1.2V, T = 70°C**

**idvd, Vb = 0V, T = 70°C**


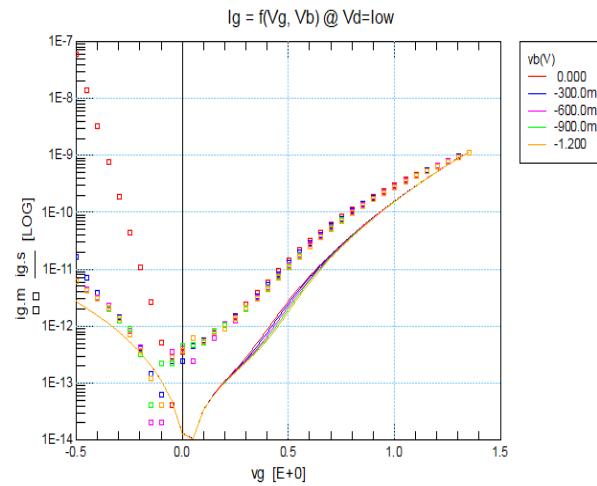
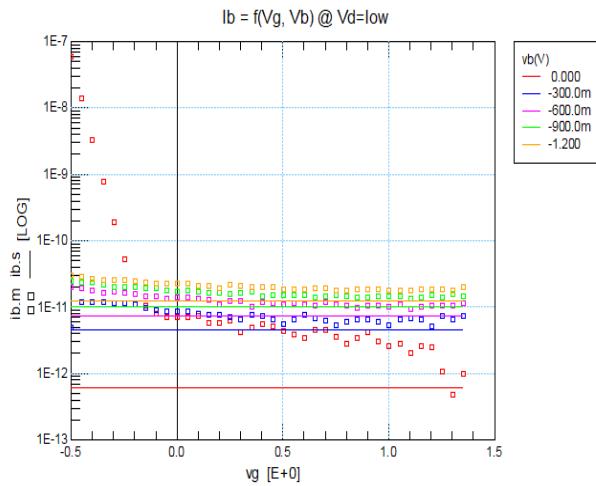
**idvd\_vbmin, Vb = -1.2V, T = 70°C**

**idvd\_vth, Vb = 0V, T = 70°C**




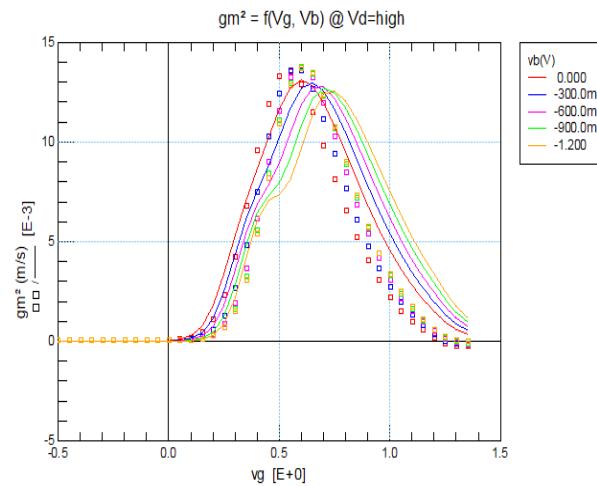
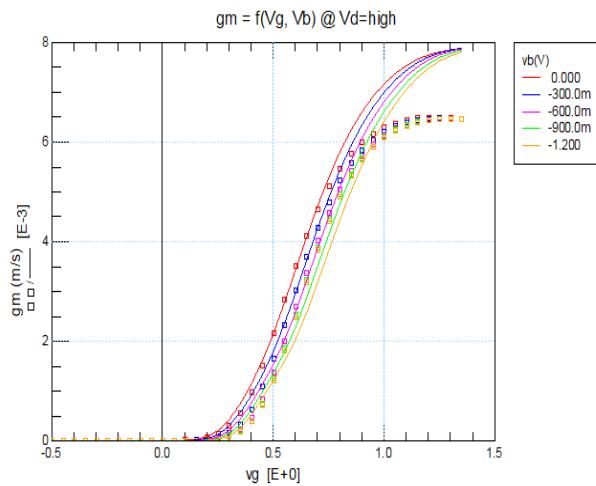
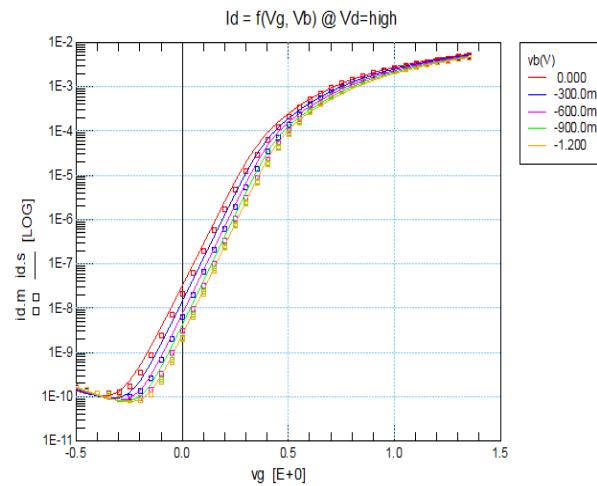
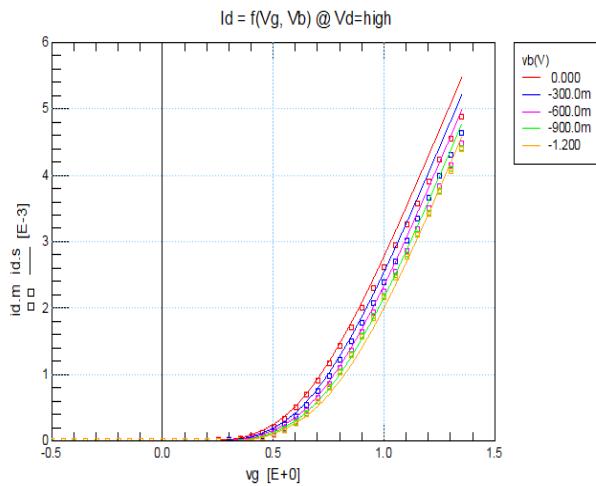
### idvd\_vth\_vbmin, Vb = -1.2V, T = 70°C

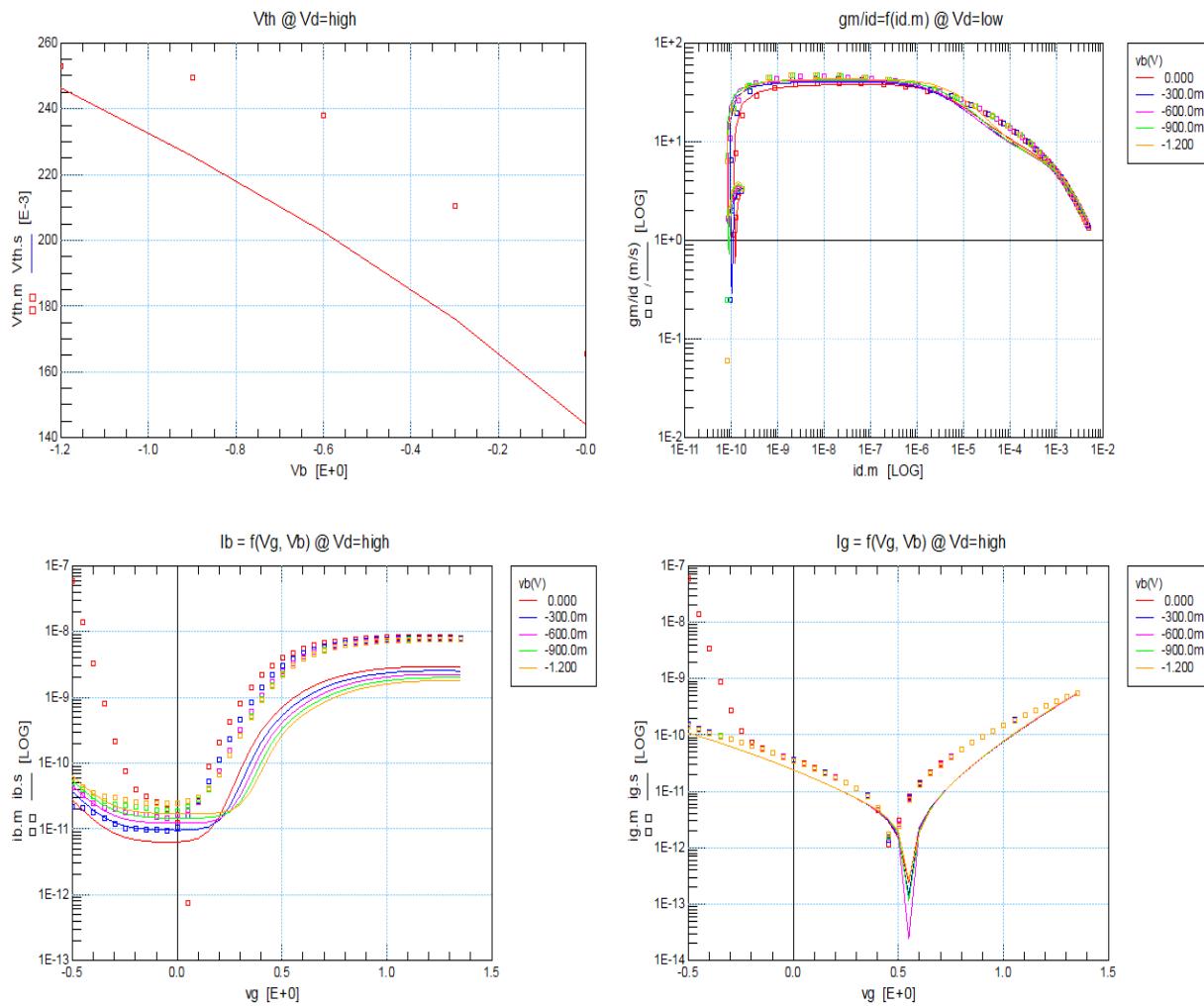


**idvg, Vd = 0.05V, T = 125°C**


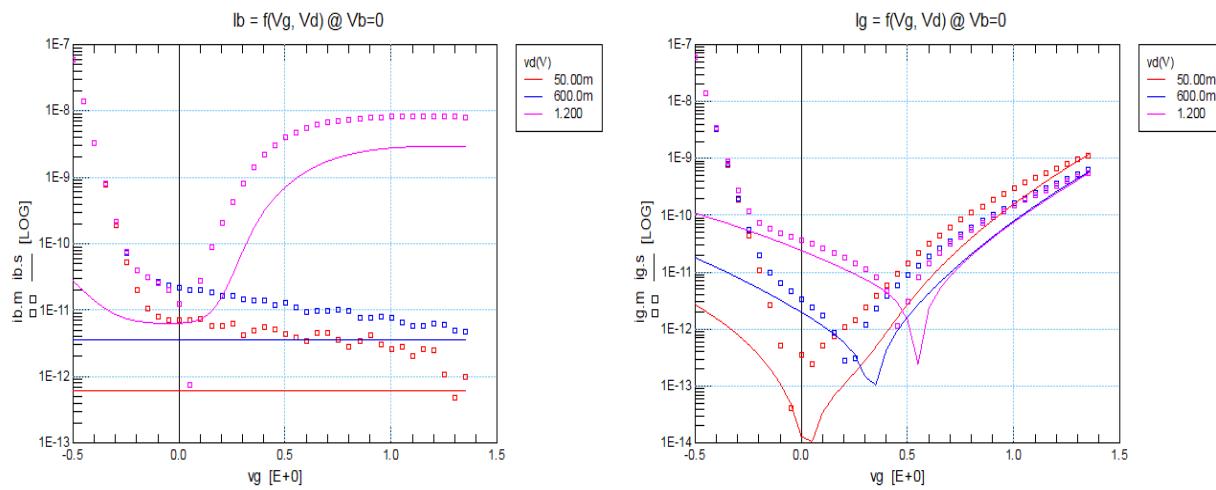


$i_{dvg}, V_d = 1.2V, T = 125^{\circ}C$

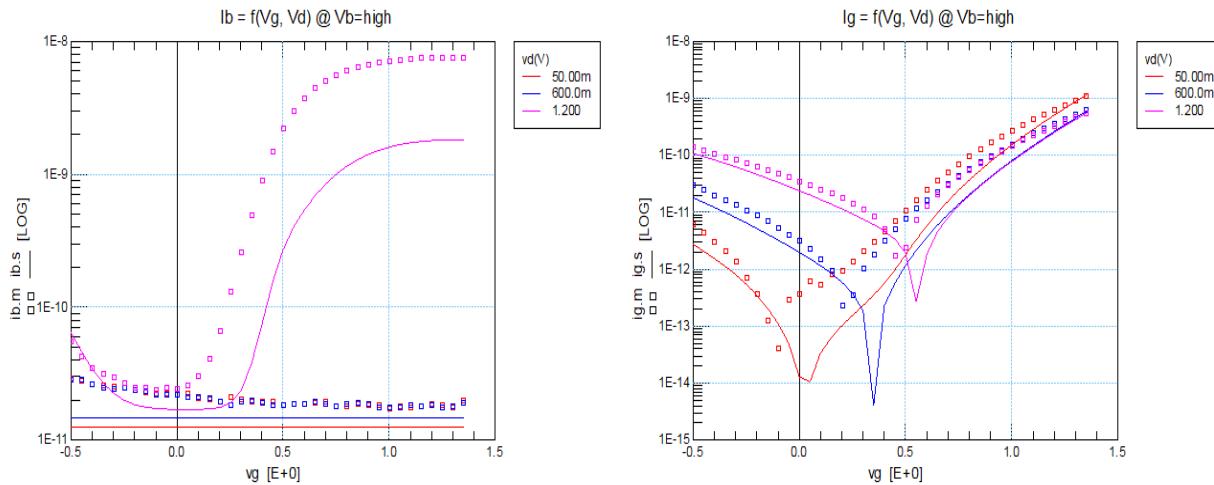




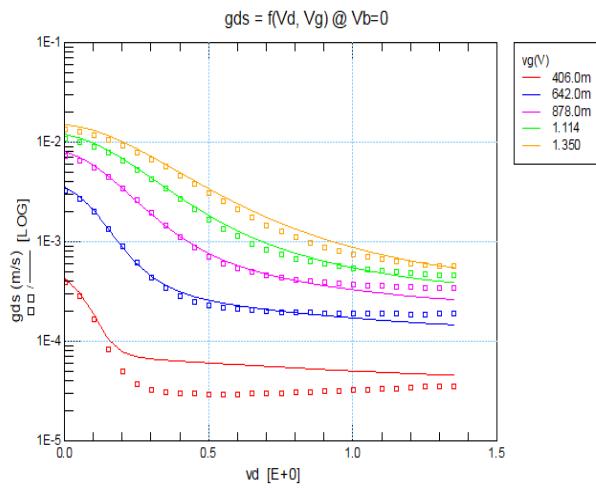
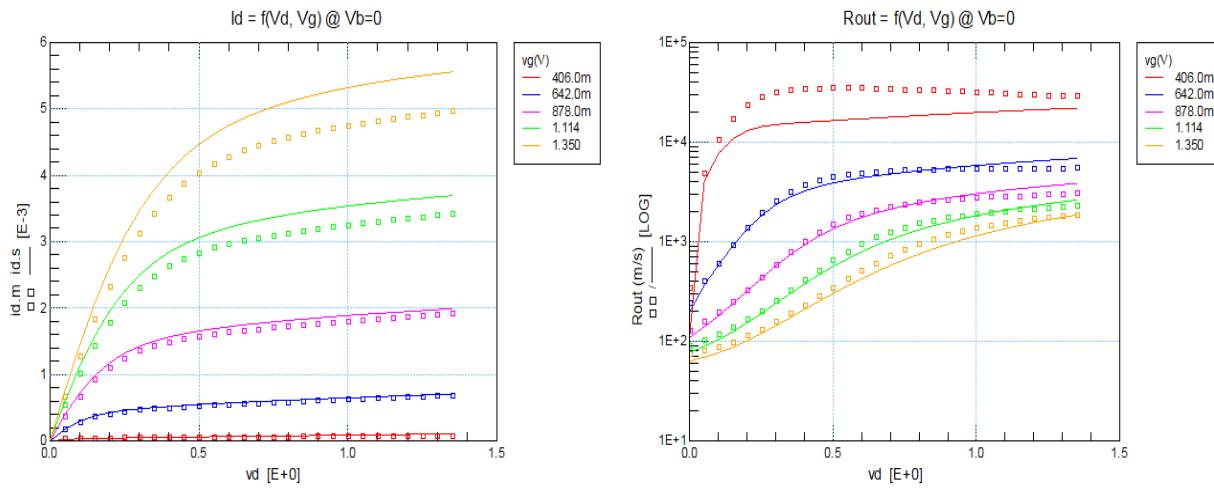
**idvg, Ib,Ig, Vb = 0V, T = 125°C**

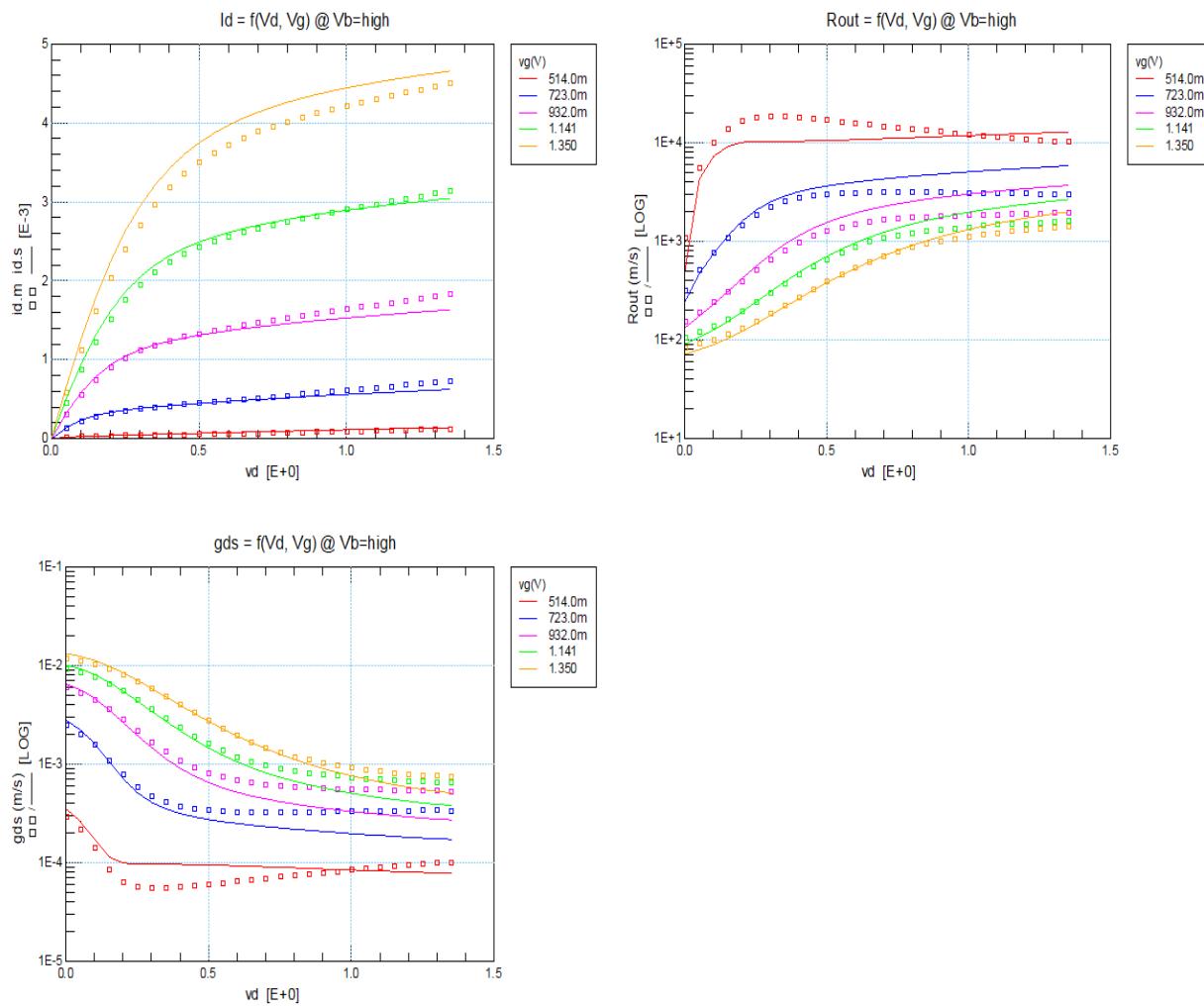
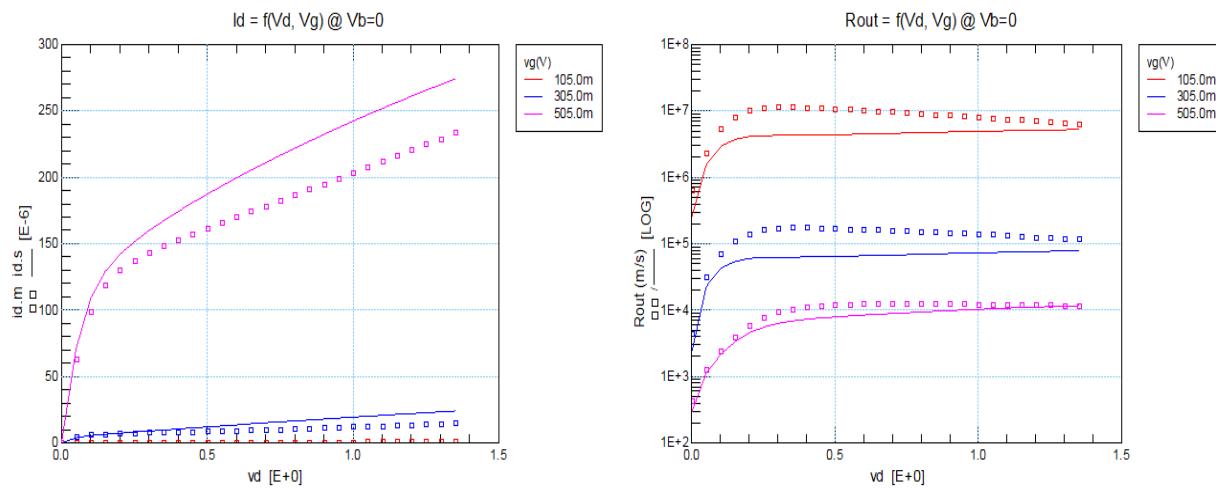


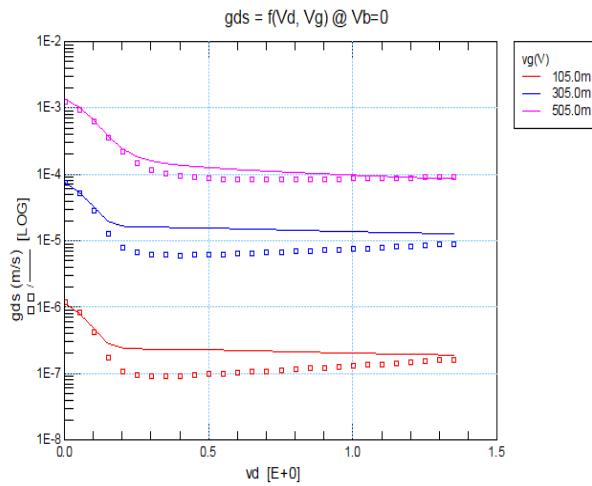
**idvg, Ib,Ig, Vb = -1.2V, T = 125°C**



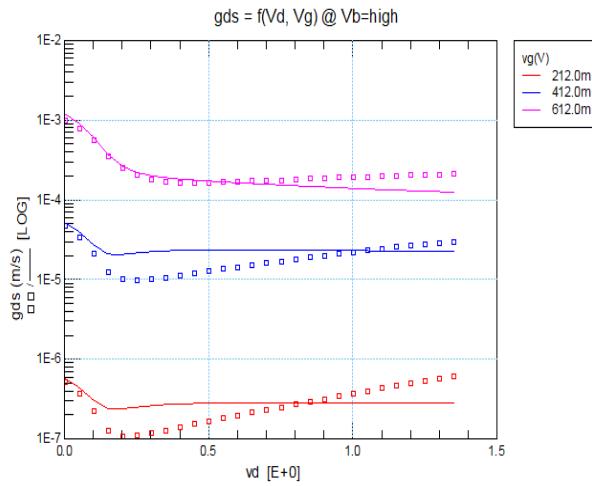
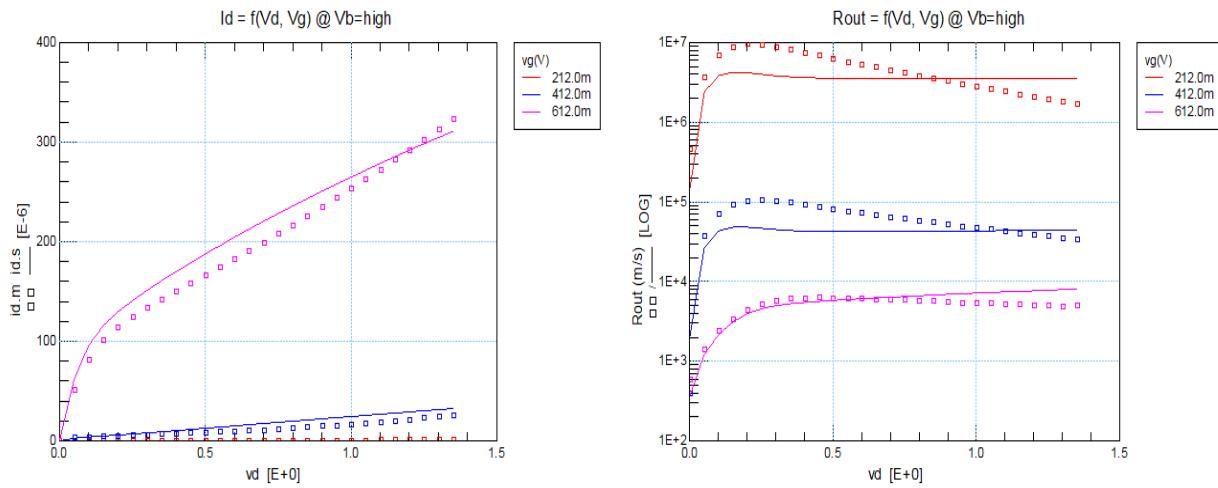
**idvd, Vb = 0V, T = 125°C**



**idvd\_vbmin, Vb = -1.2V, T = 125°C****idvd\_vth, Vb = 0V, T = 125°C**

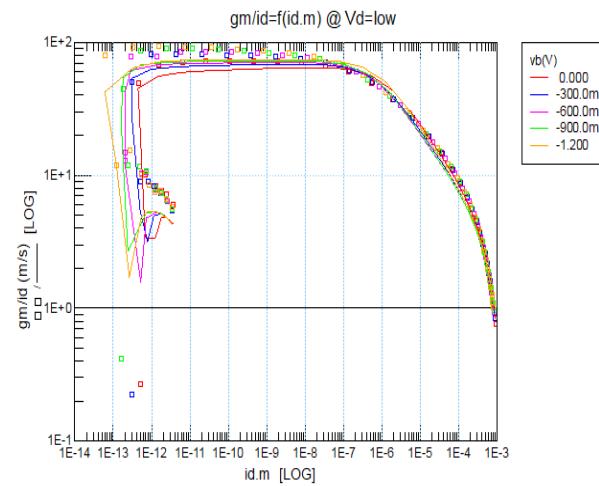
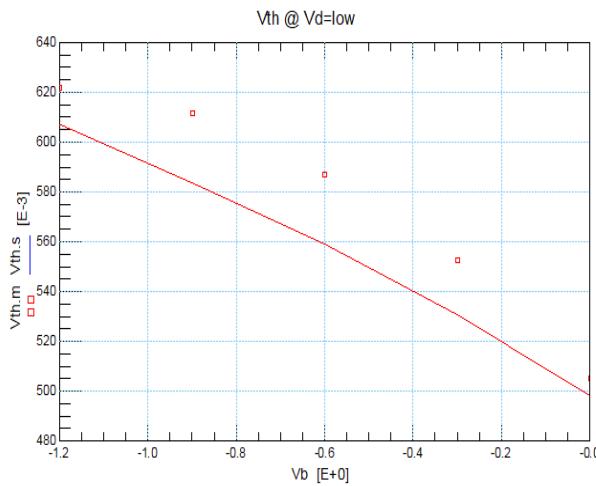
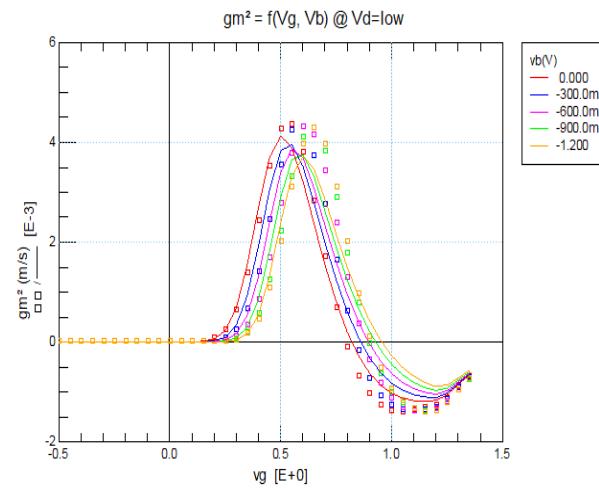
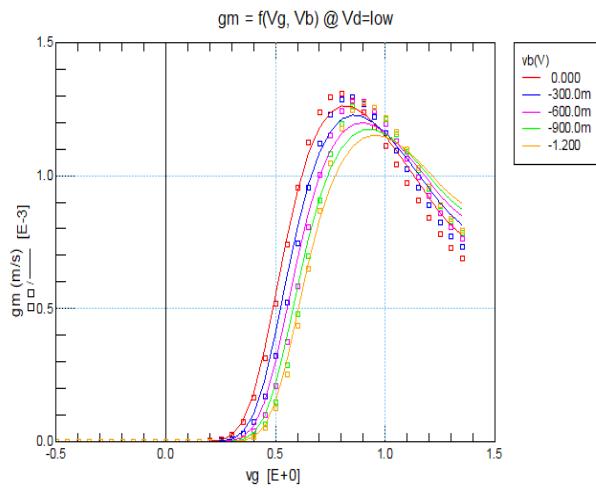
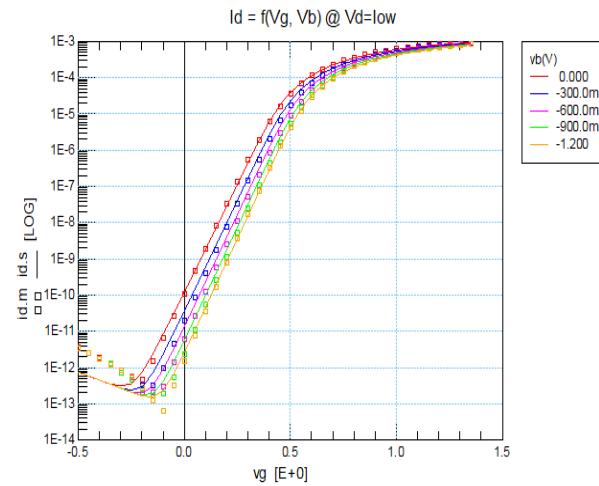
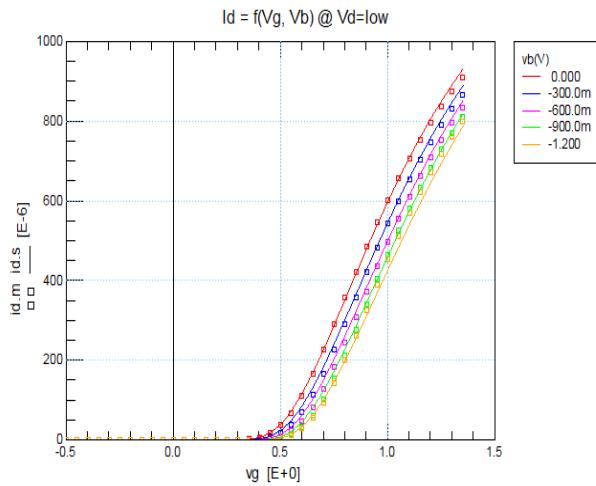


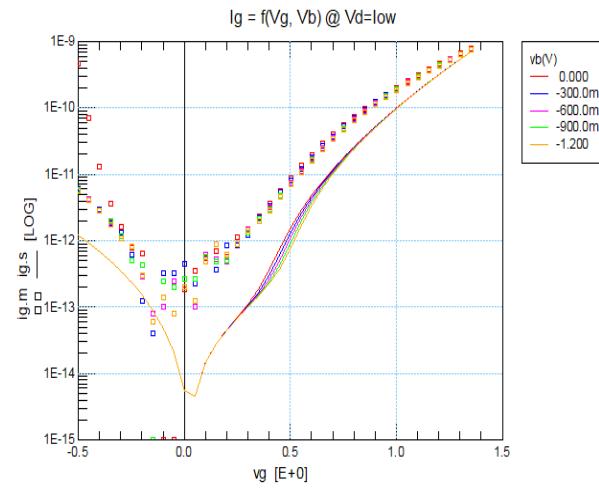
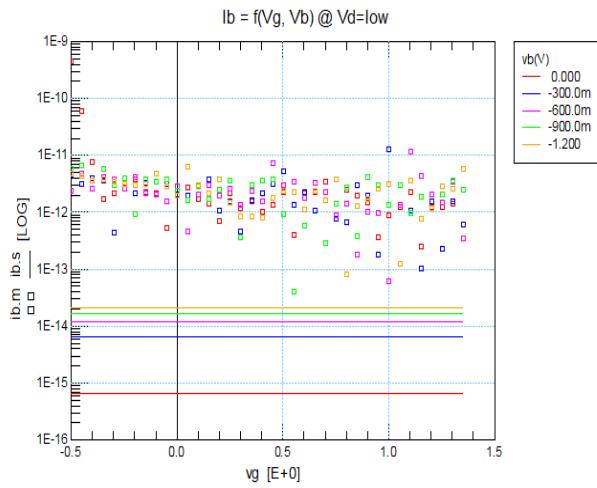
**idvd\_vth\_vbmin, Vb = -1.2V, T = 125°C**



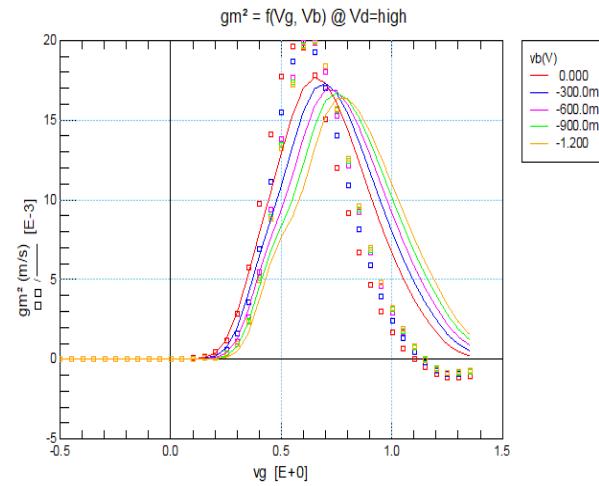
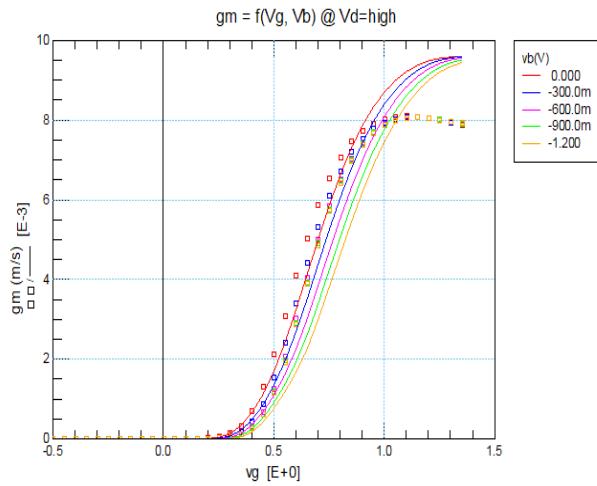
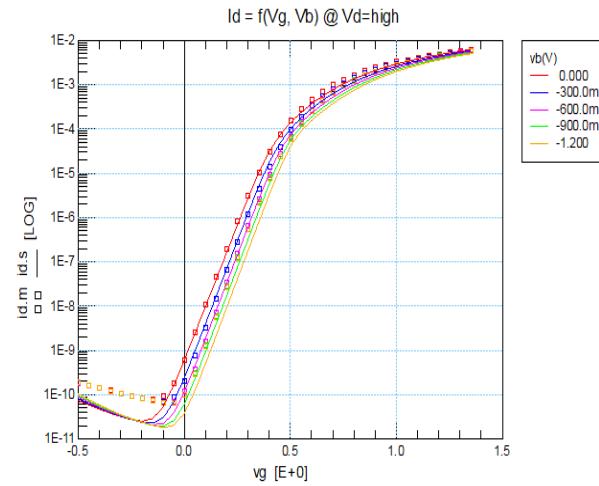
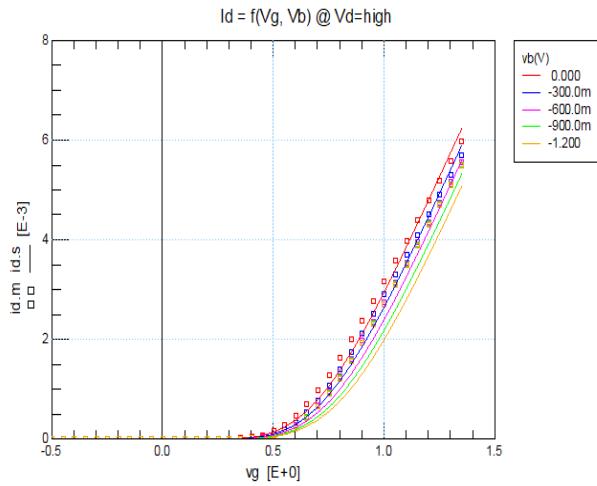
## 4.6 W10u0\_L0u13\_S380\_2

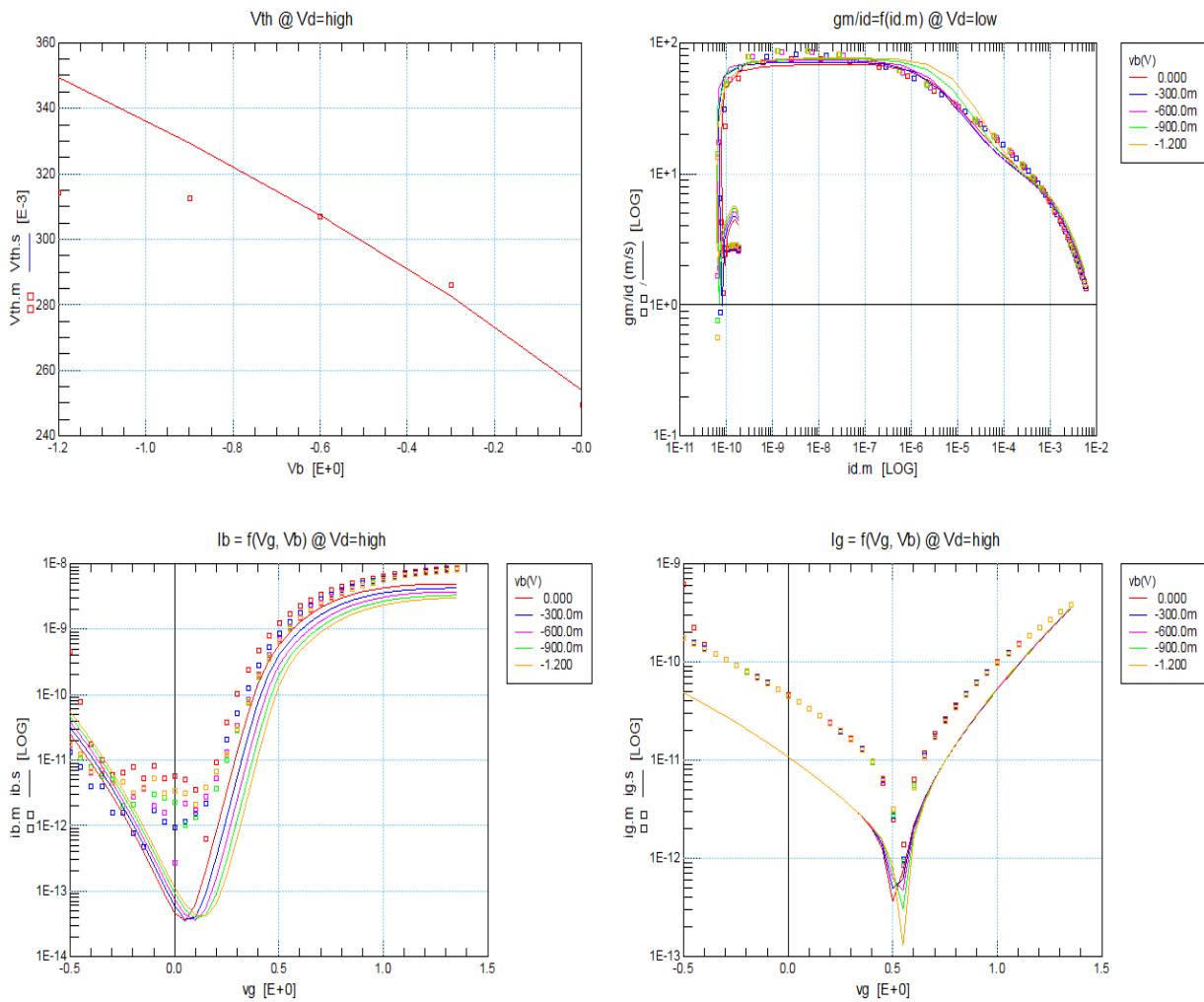
idvg, Vd = 0.05V, T = 27°C



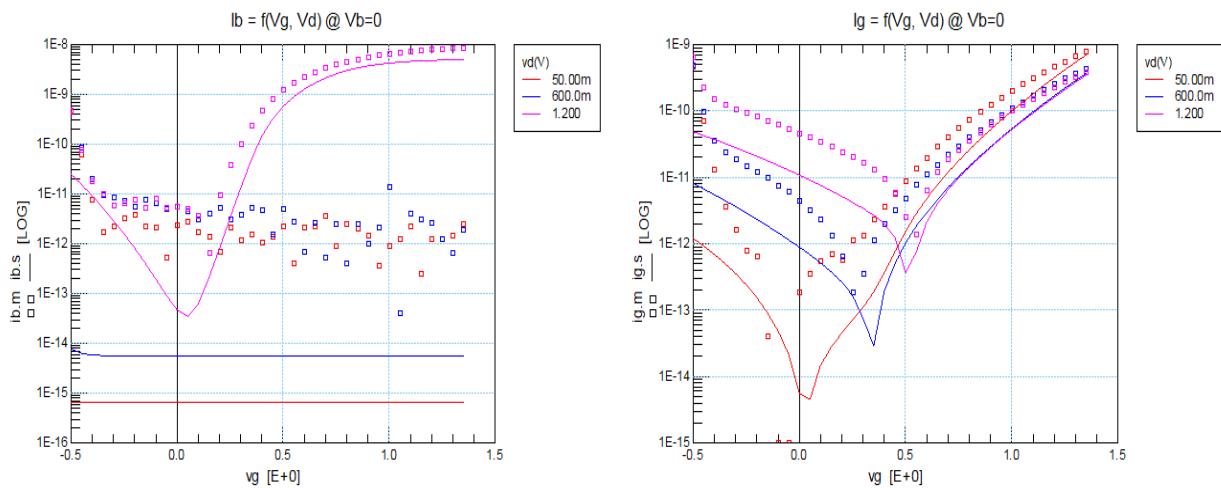


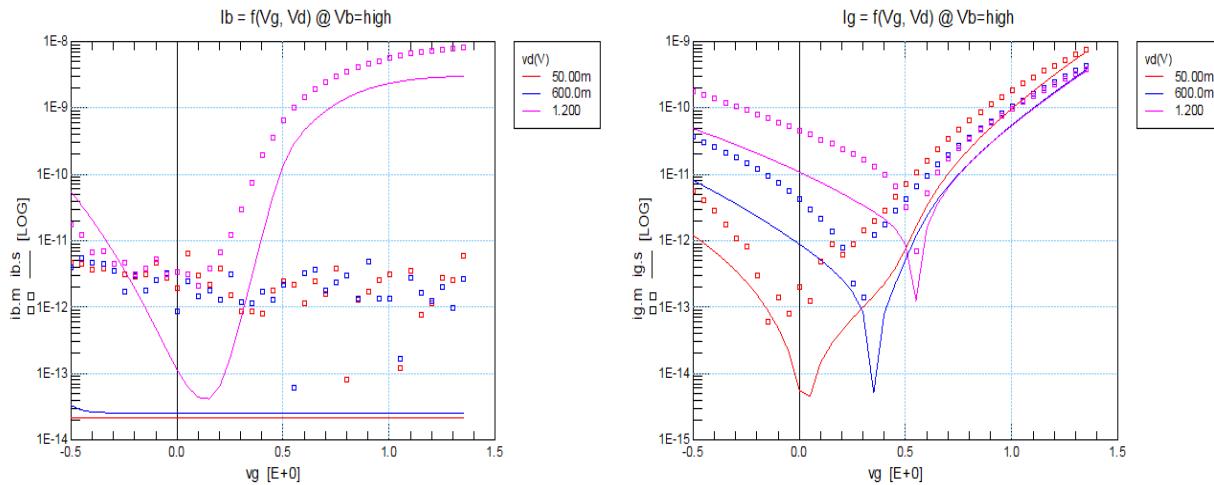
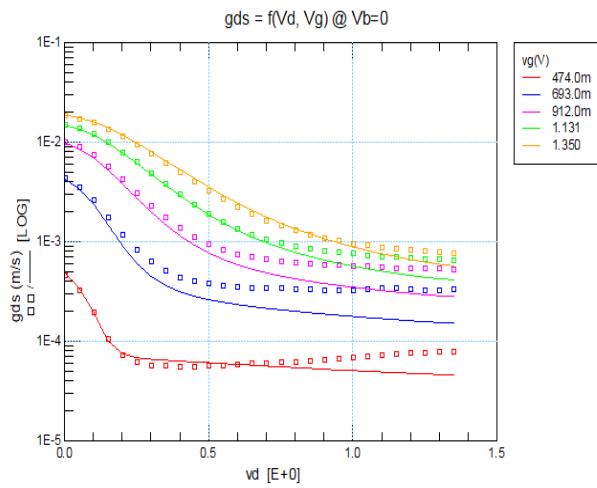
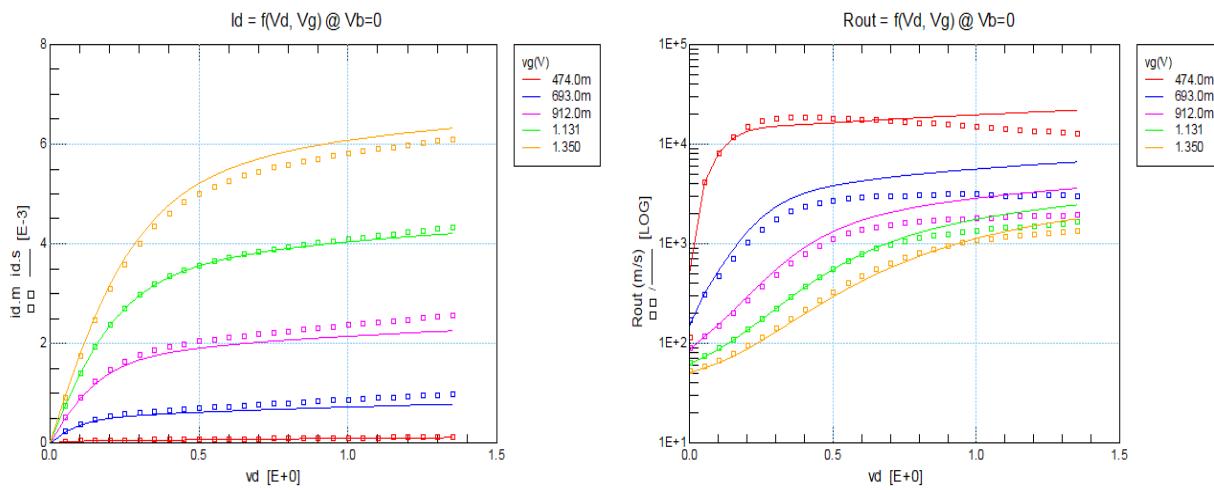
### $i_{dvg}, V_d = 1.2V, T = 27^\circ C$

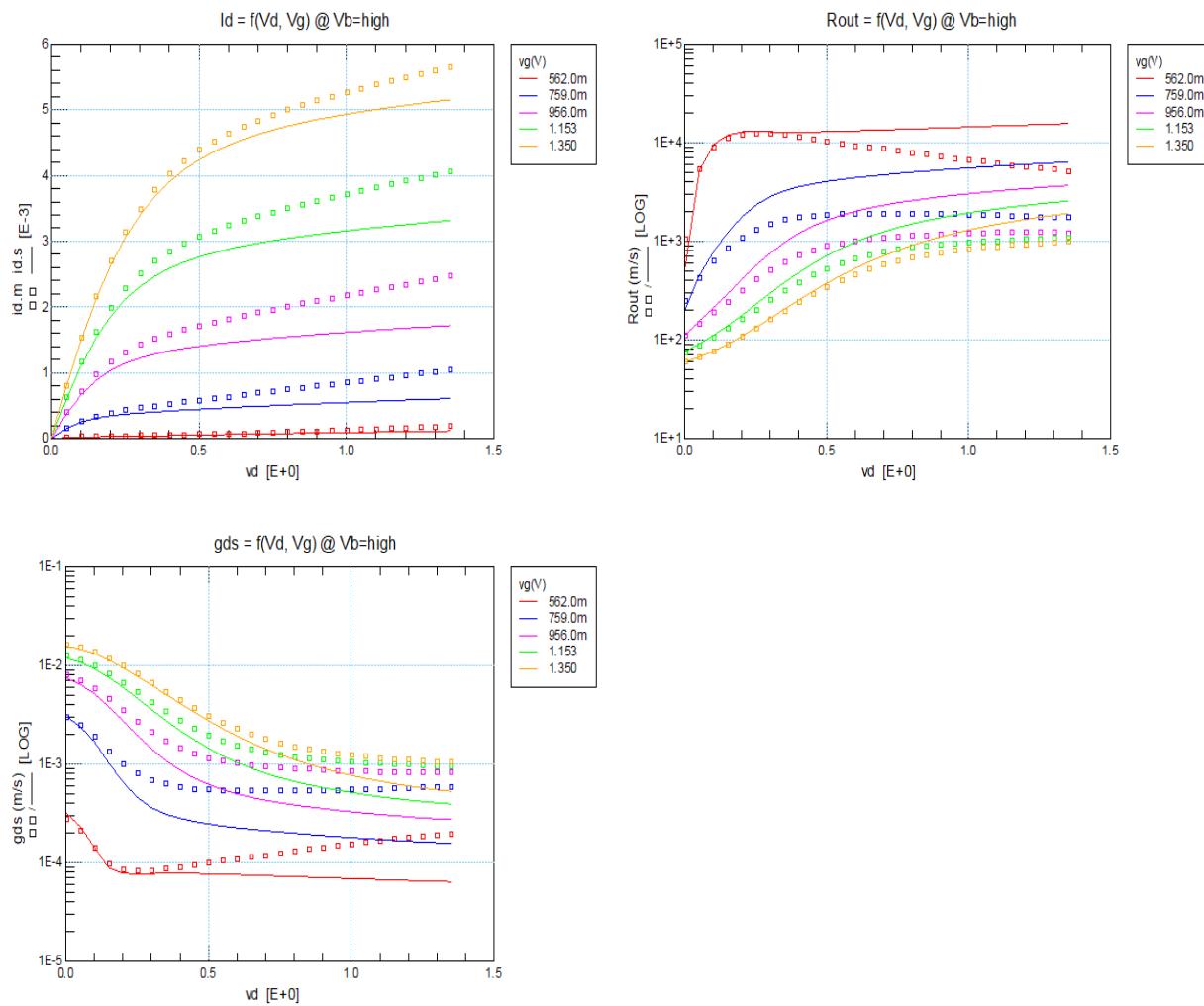
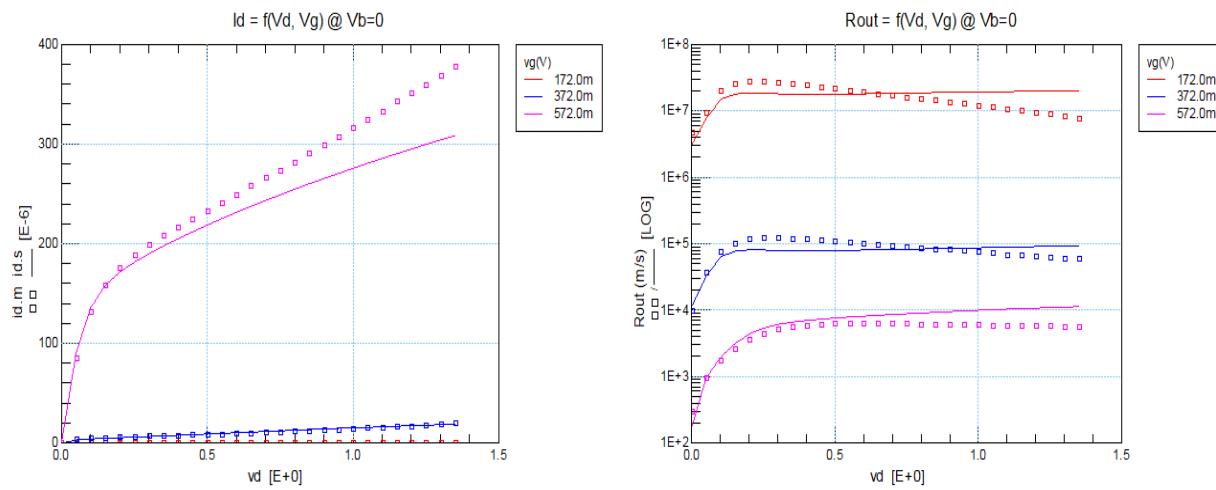


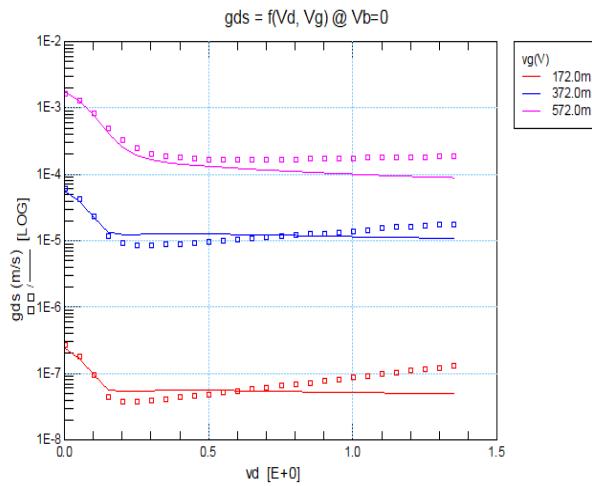


**idvg, Ib,Ig, Vb = 0V, T = 27°C**

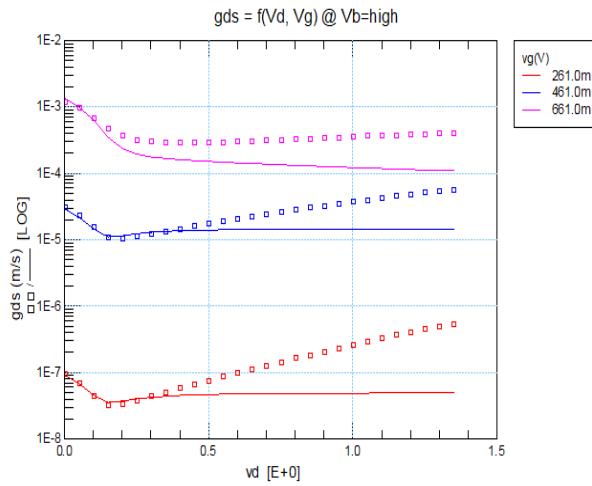
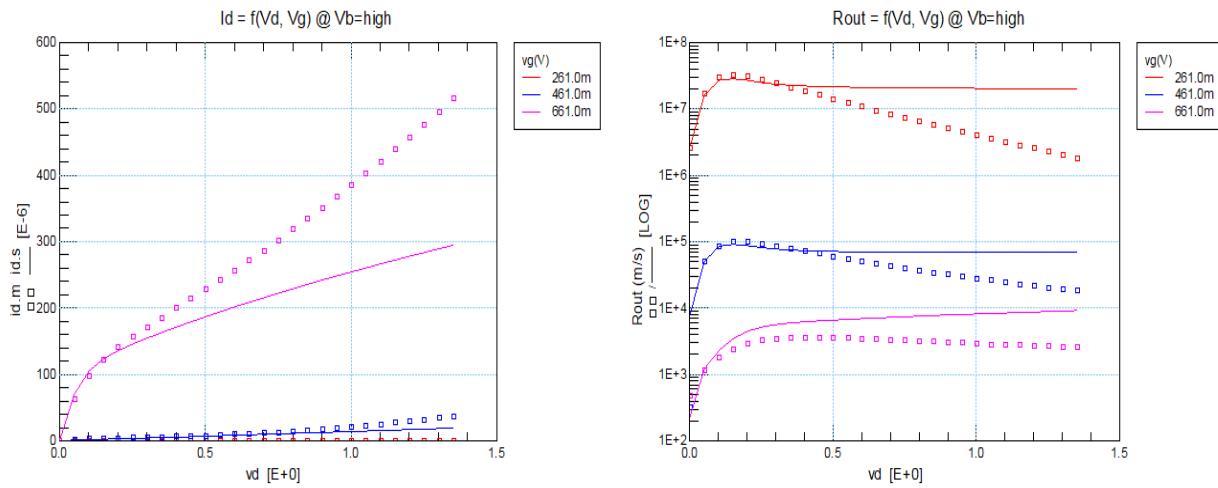


**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


**idvd\_vbmin, Vb = -1.2V, T = 27°C**

**idvd\_vth, Vb = 0V, T = 27°C**


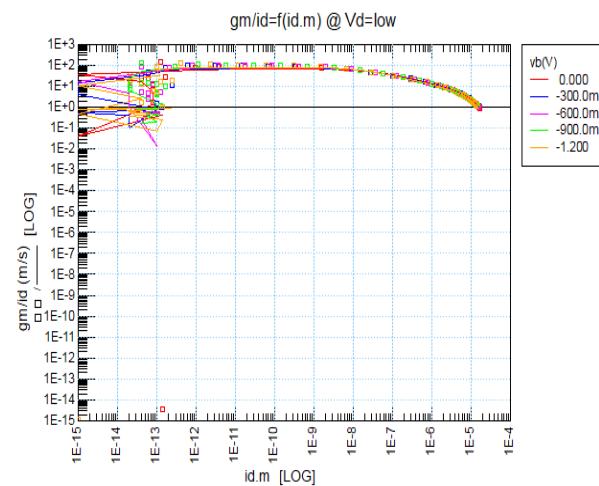
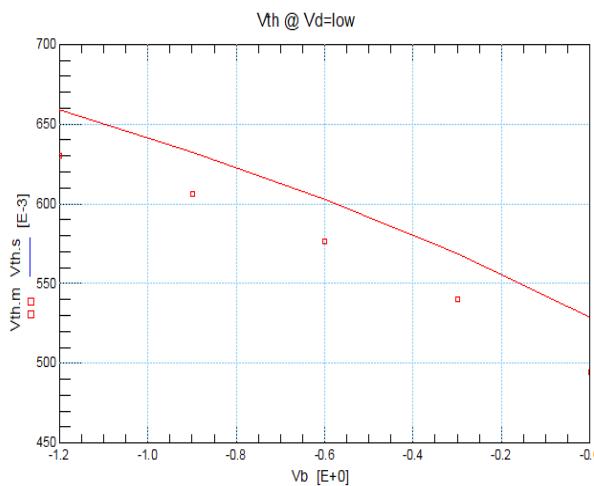
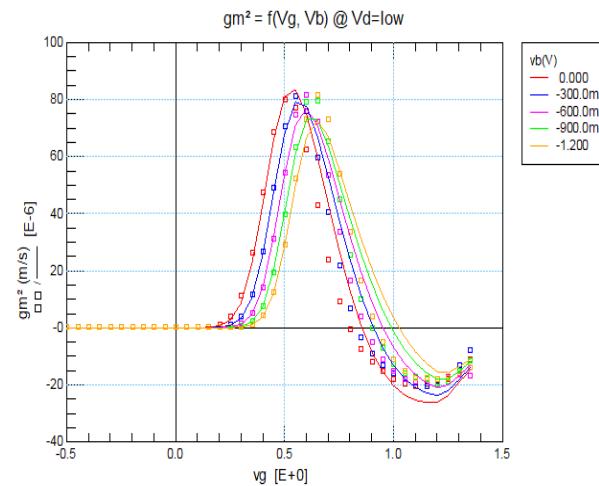
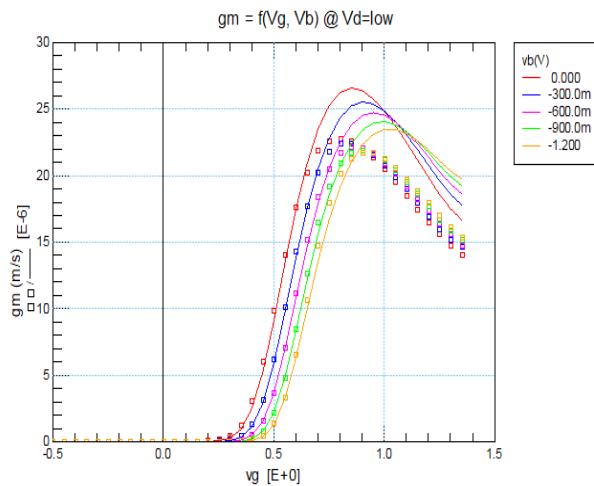
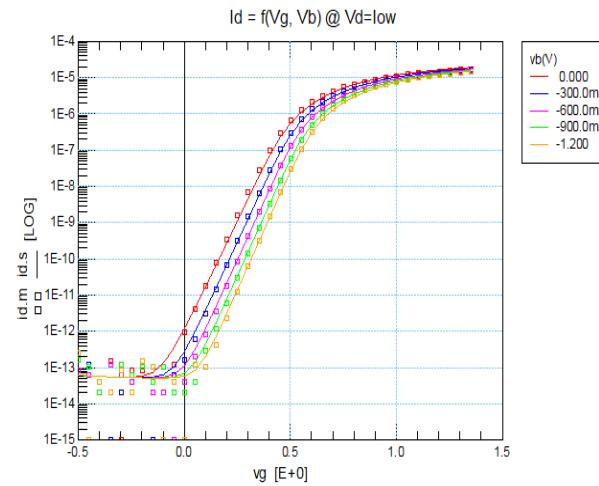
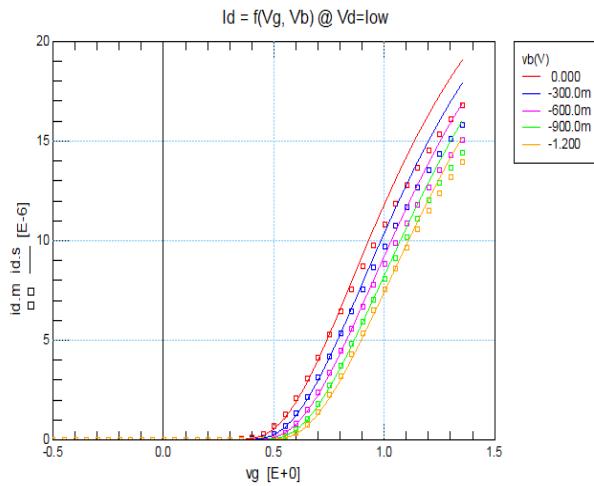


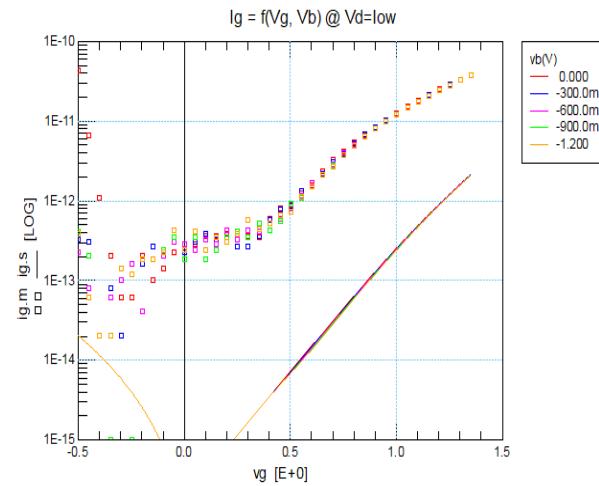
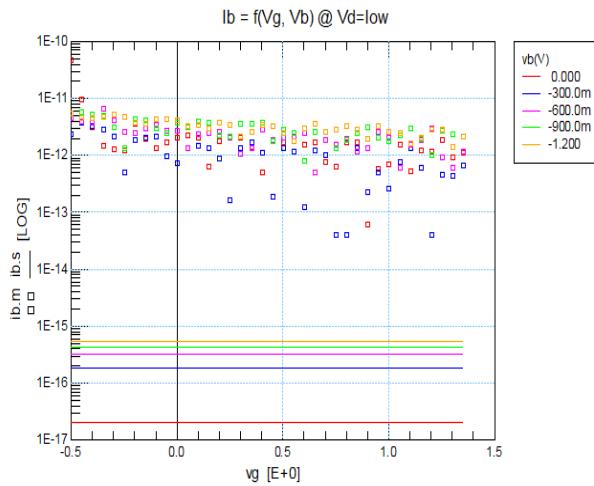
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C



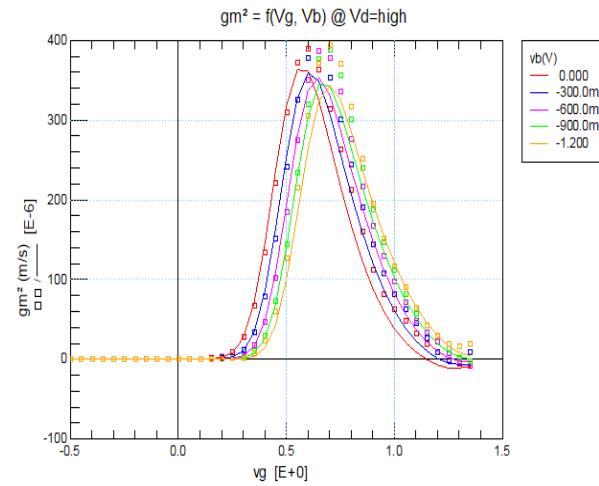
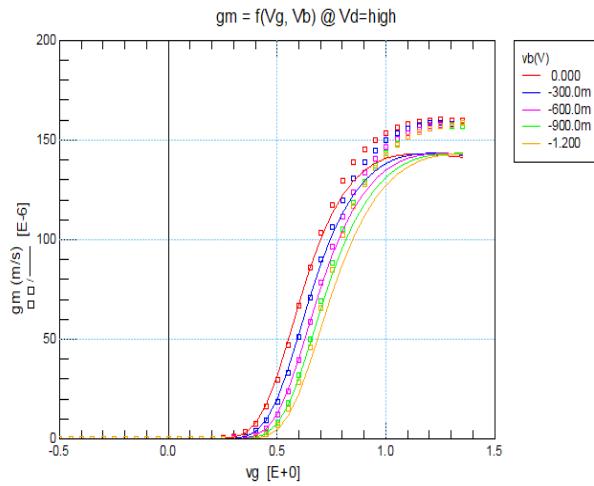
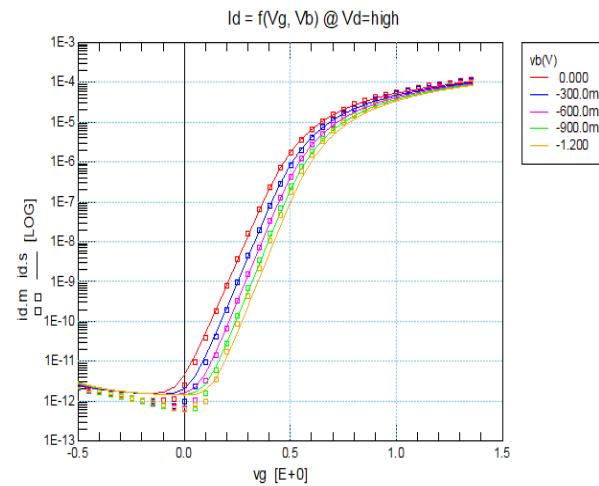
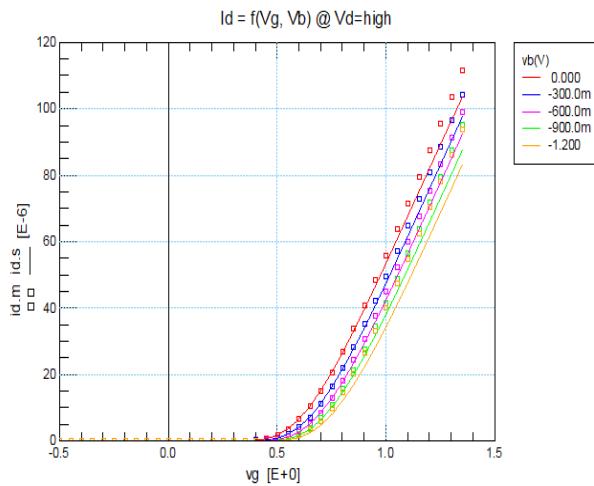
## 4.7 W0u15\_L0u13\_S546\_3

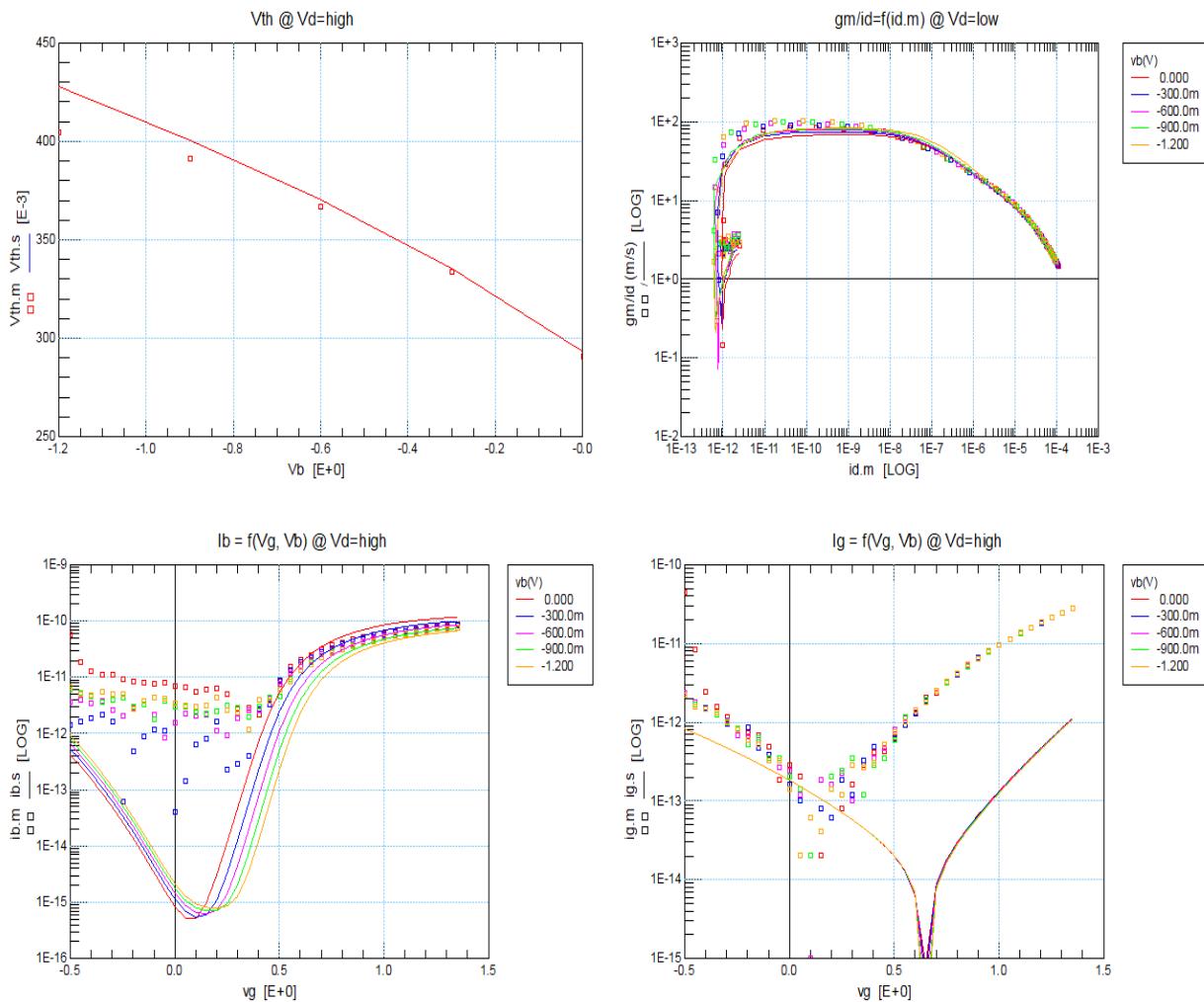
idvg, Vd = 0.05V, T = 27°C



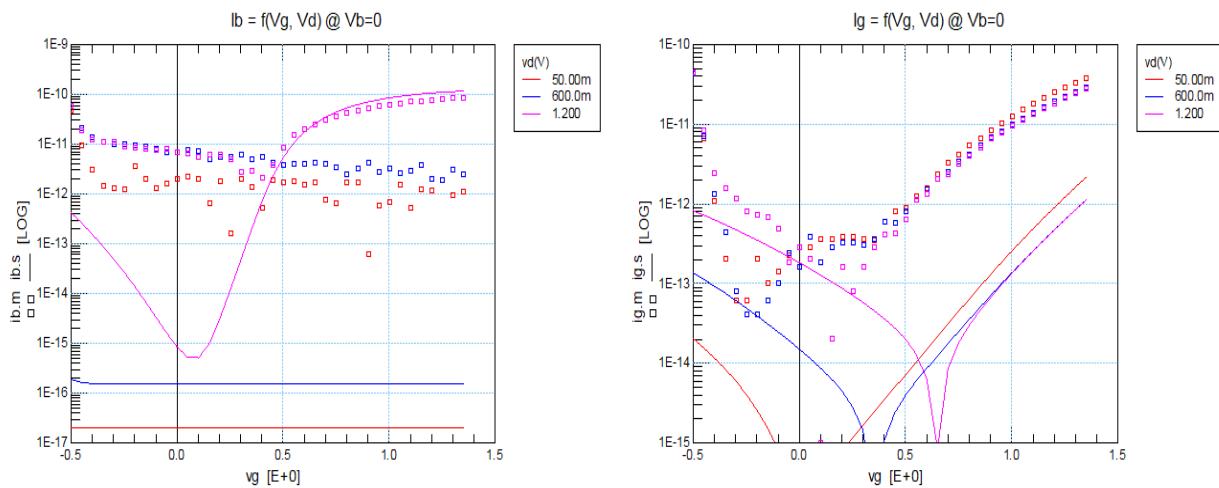


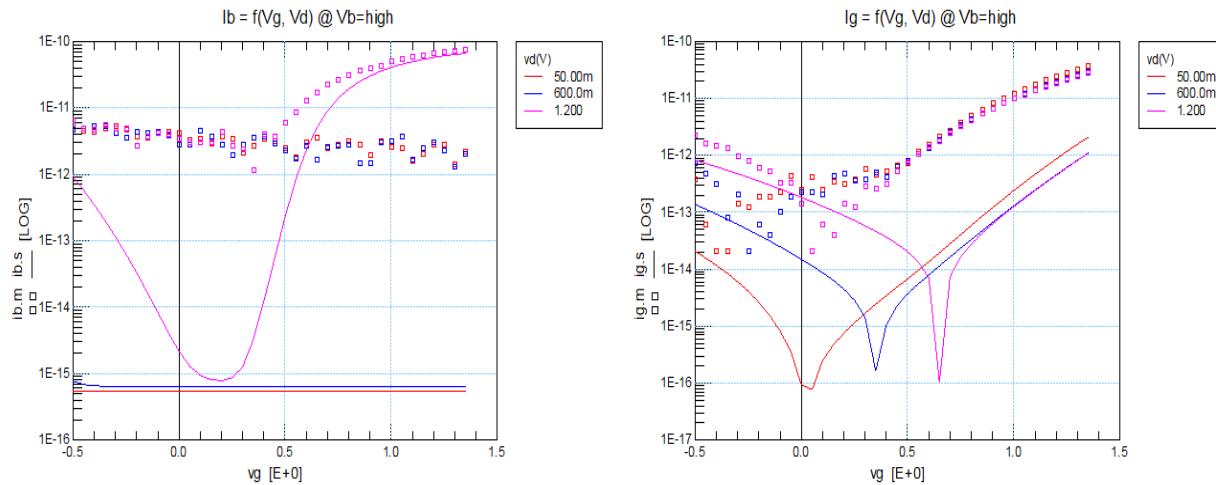
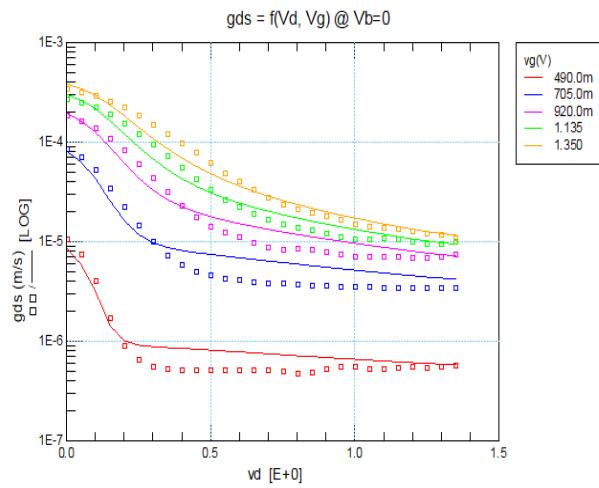
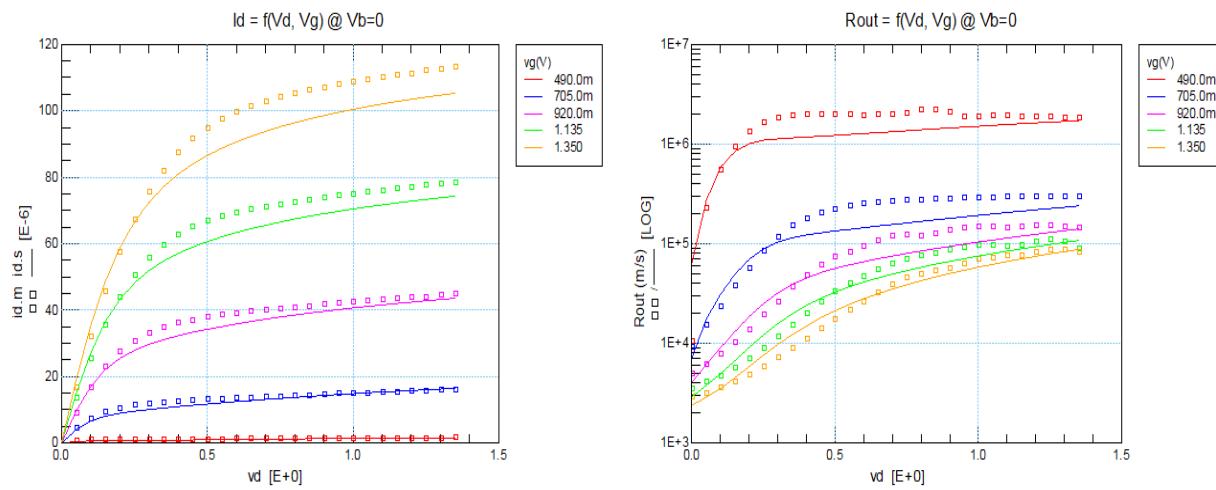
### $i_{dvg}, V_d = 1.2V, T = 27^\circ C$

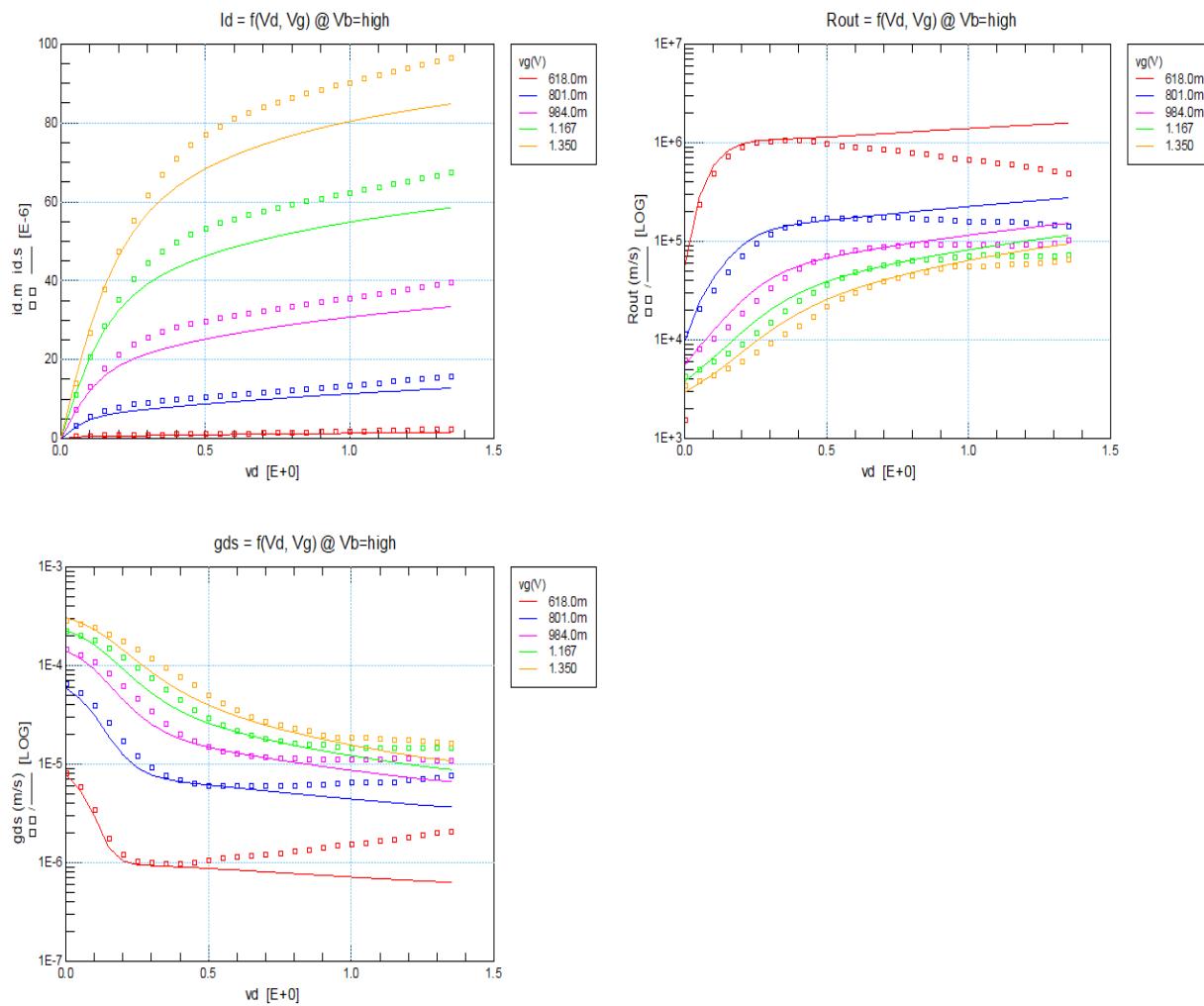
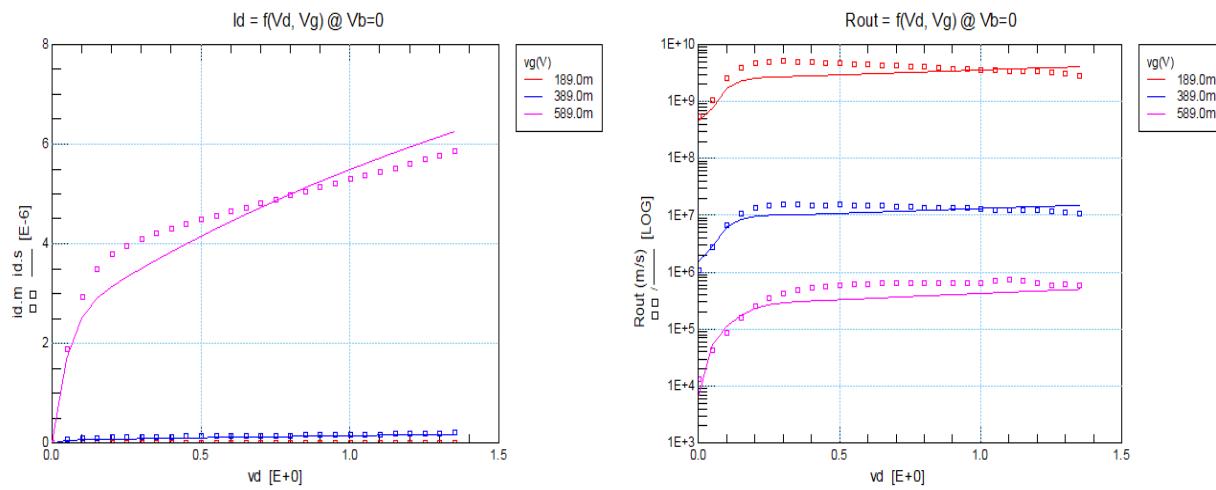


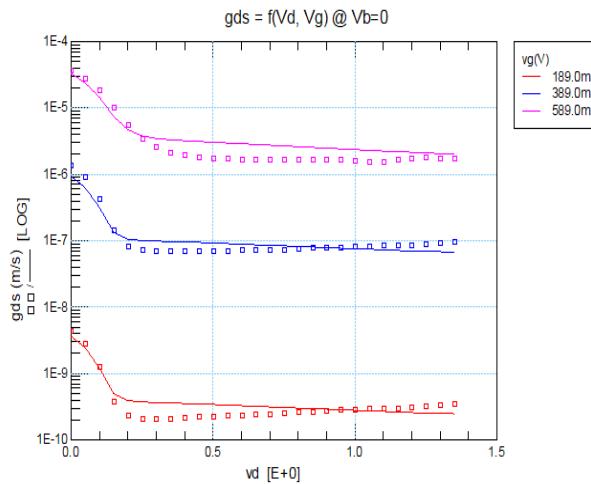


**idvg, Ib,Ig, Vb = 0V, T = 27°C**

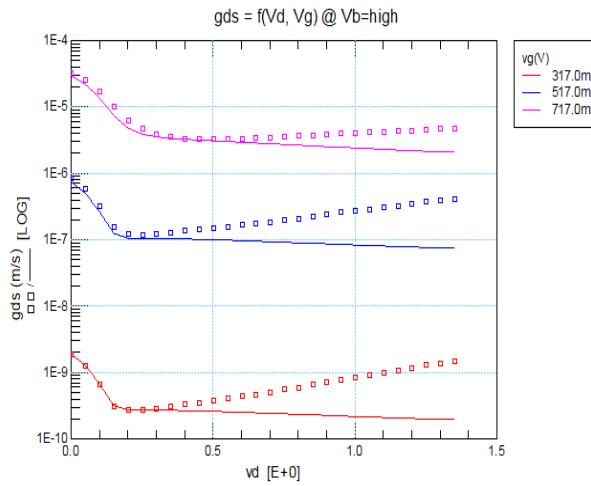
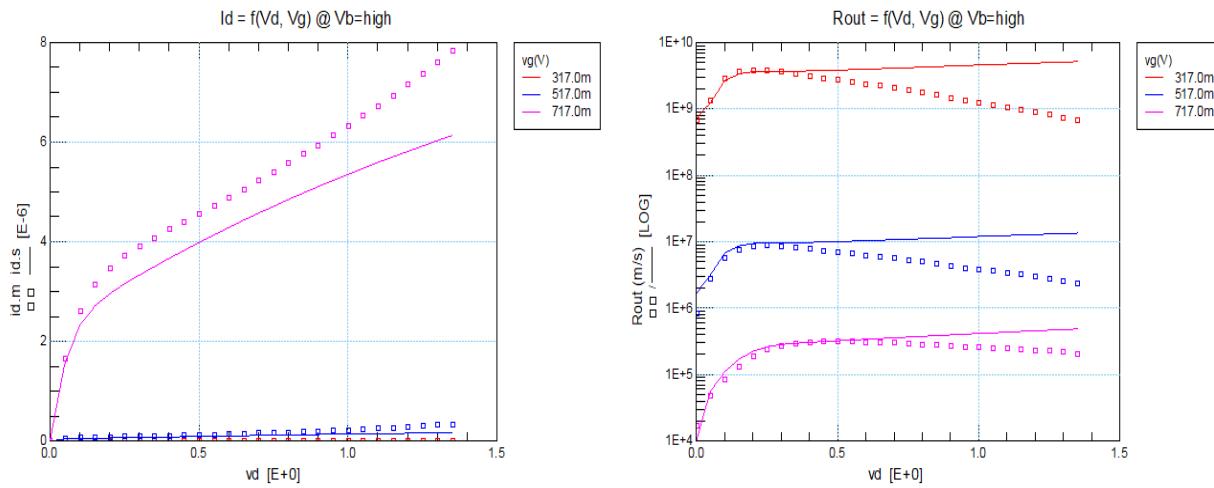


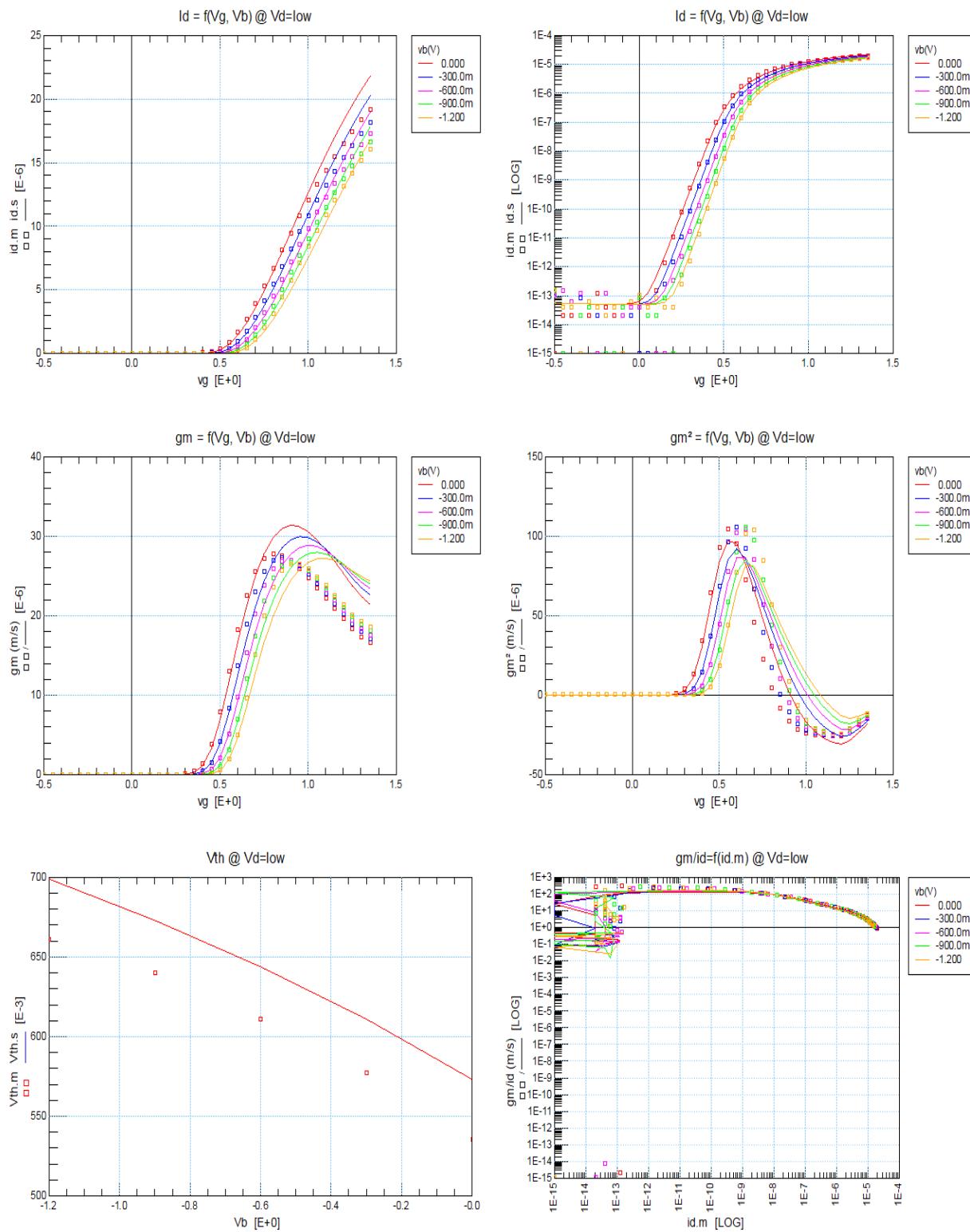
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


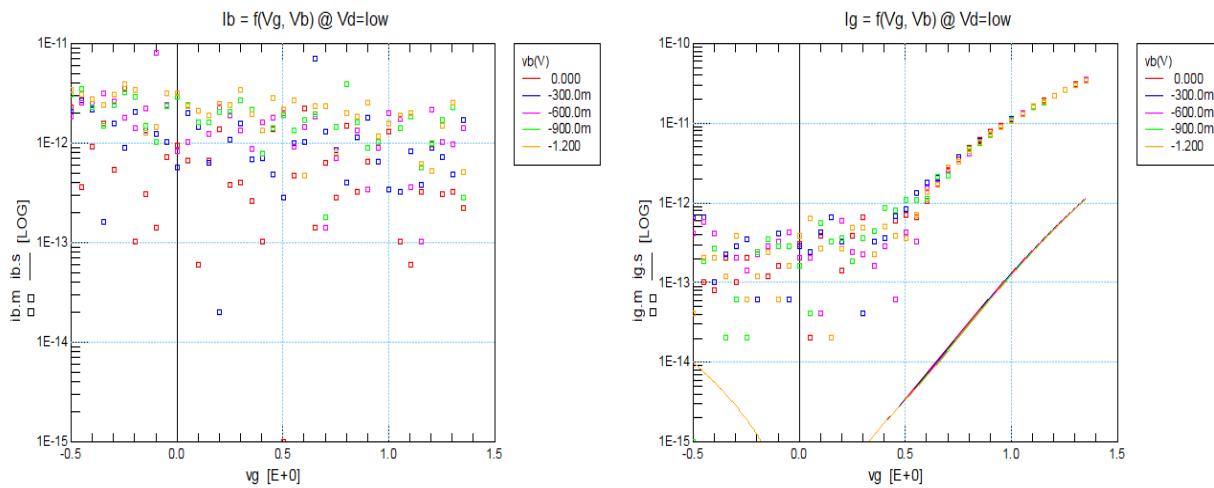
**idvd\_vbmin, Vb = -1.2V, T = 27°C****idvd\_vth, Vb = 0V, T = 27°C**



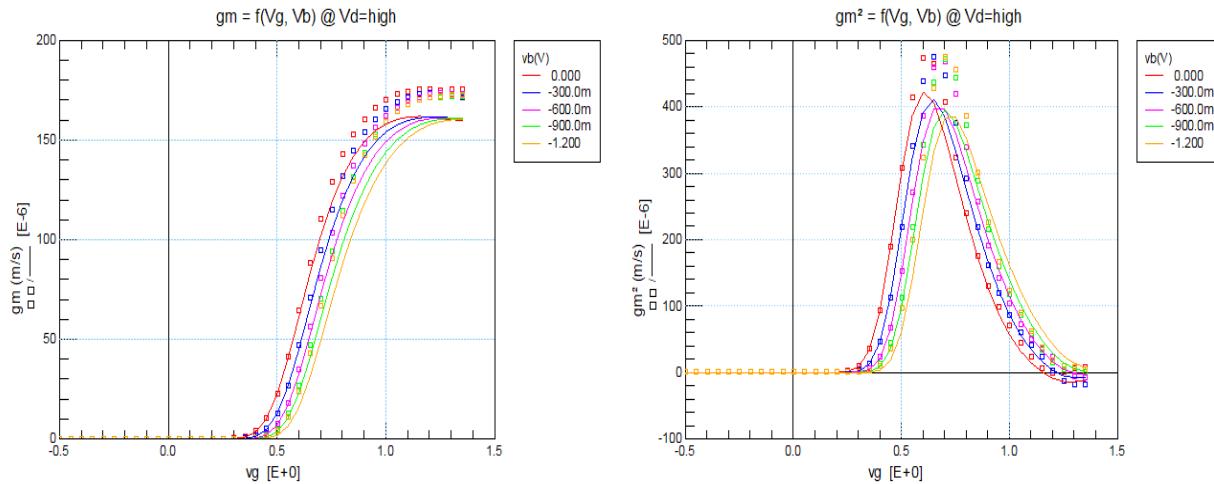
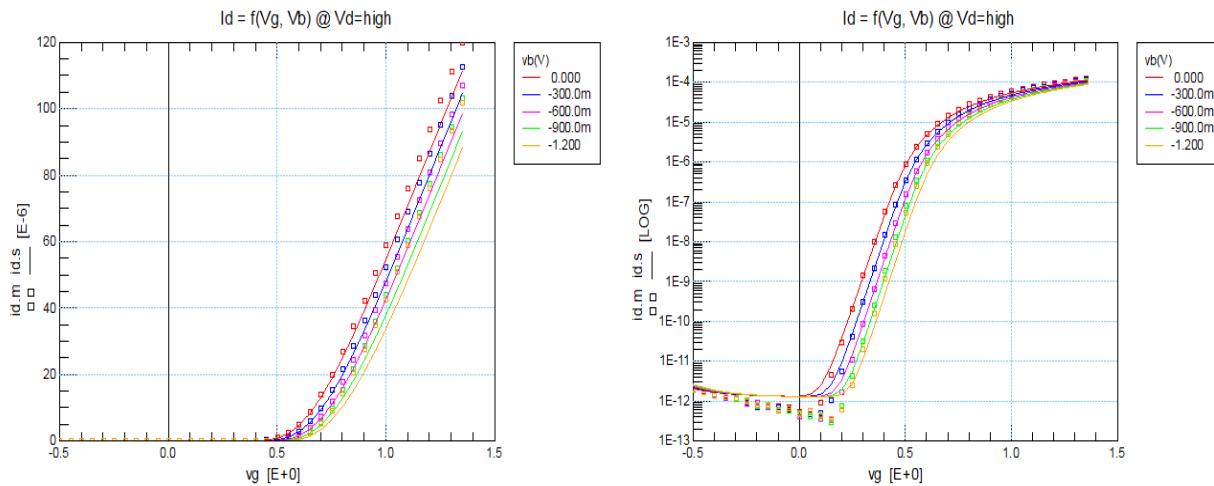
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

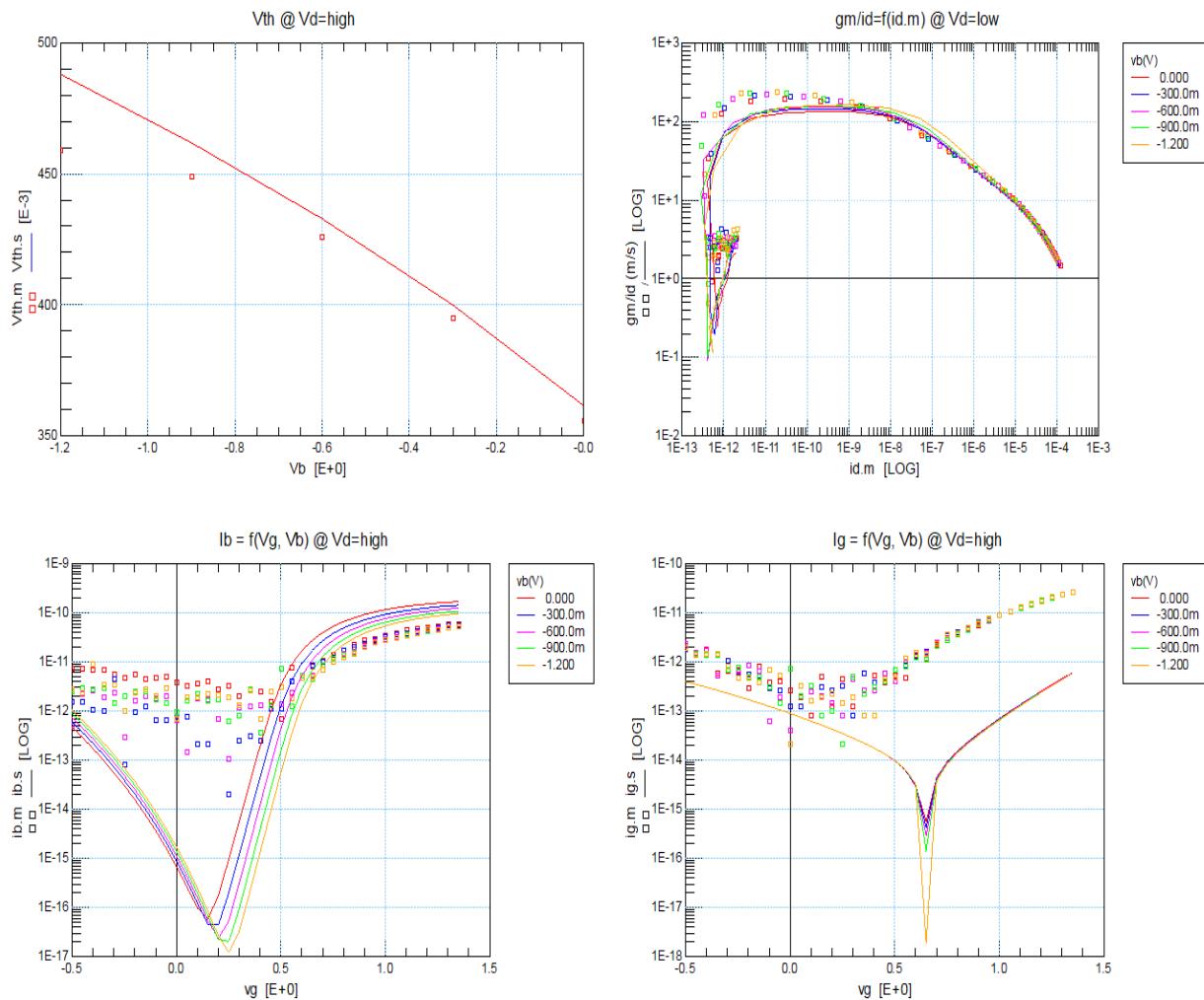


**idvg, Vd = 0.05V, T = -40°C**


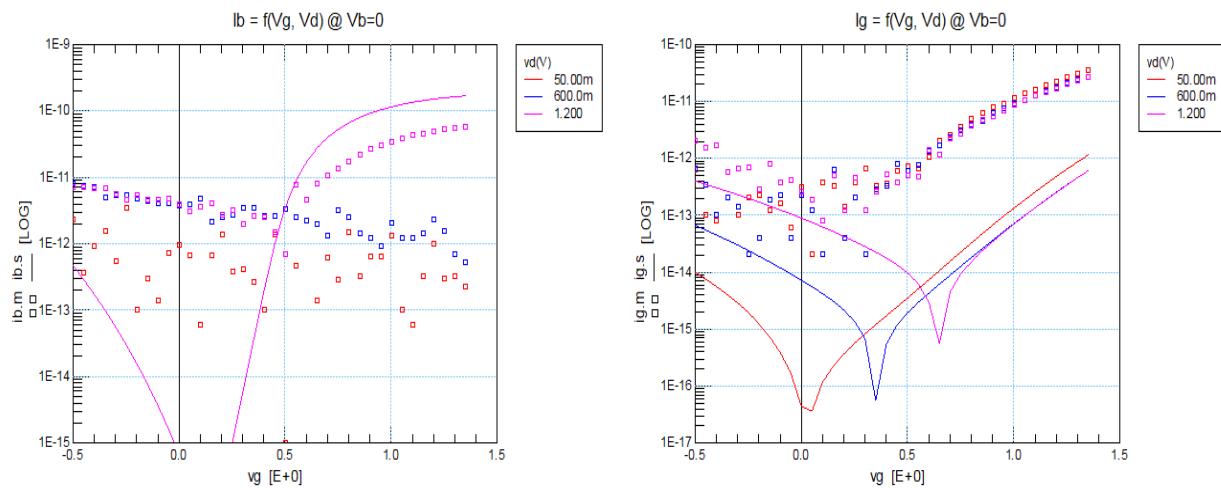


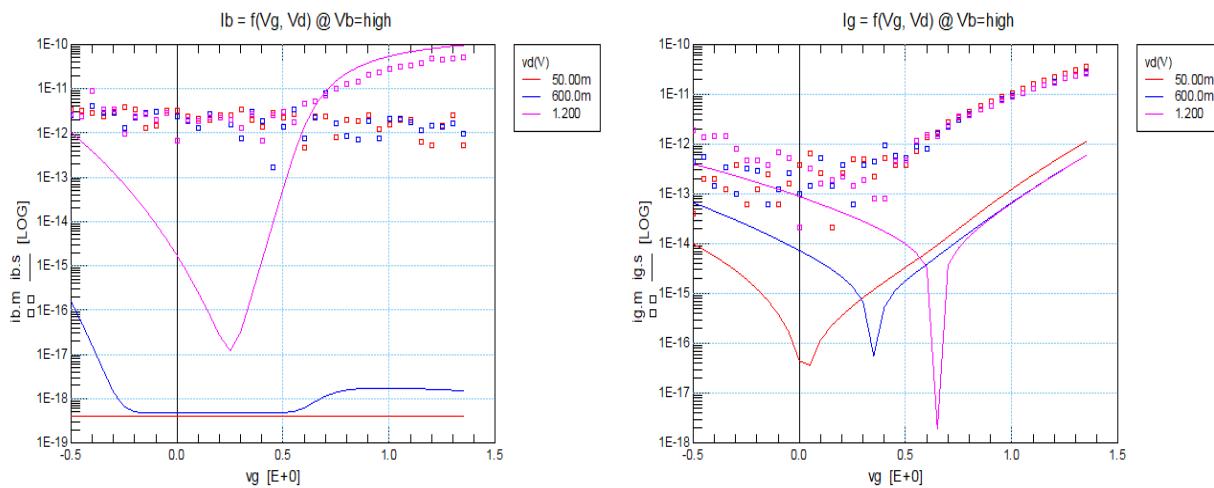
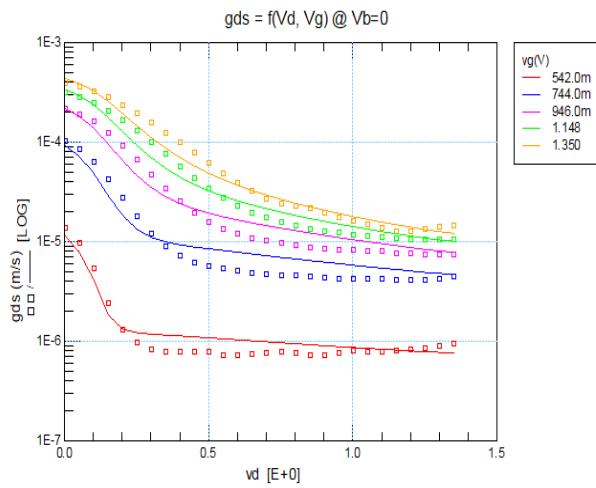
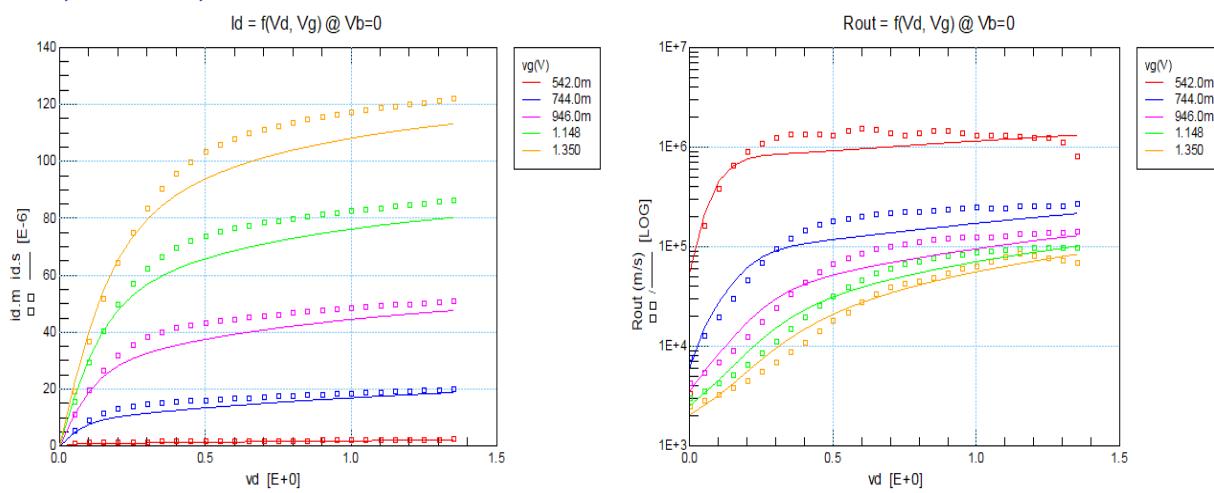
$idvg, Vd = 1.2V, T = -40^\circ C$

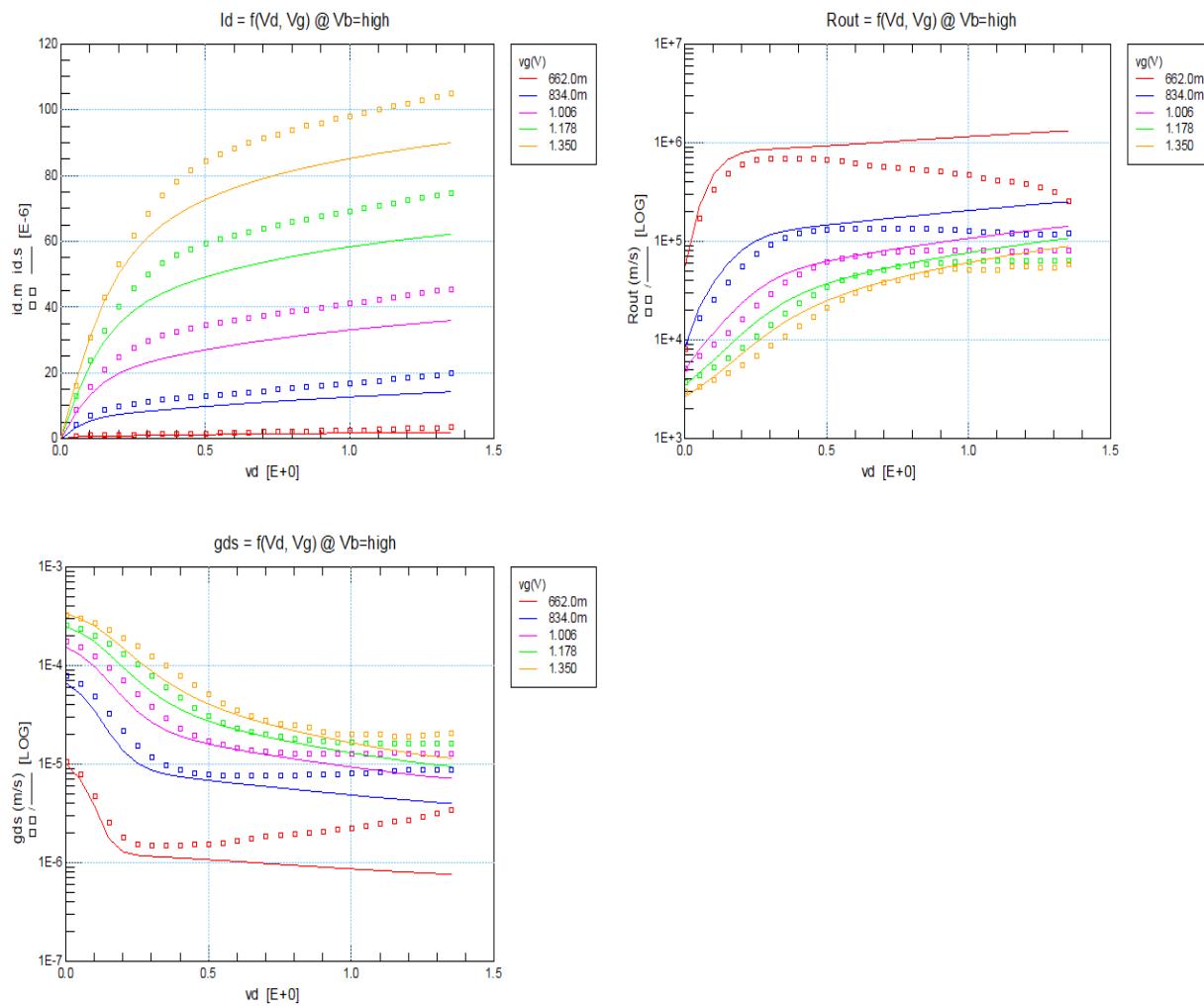
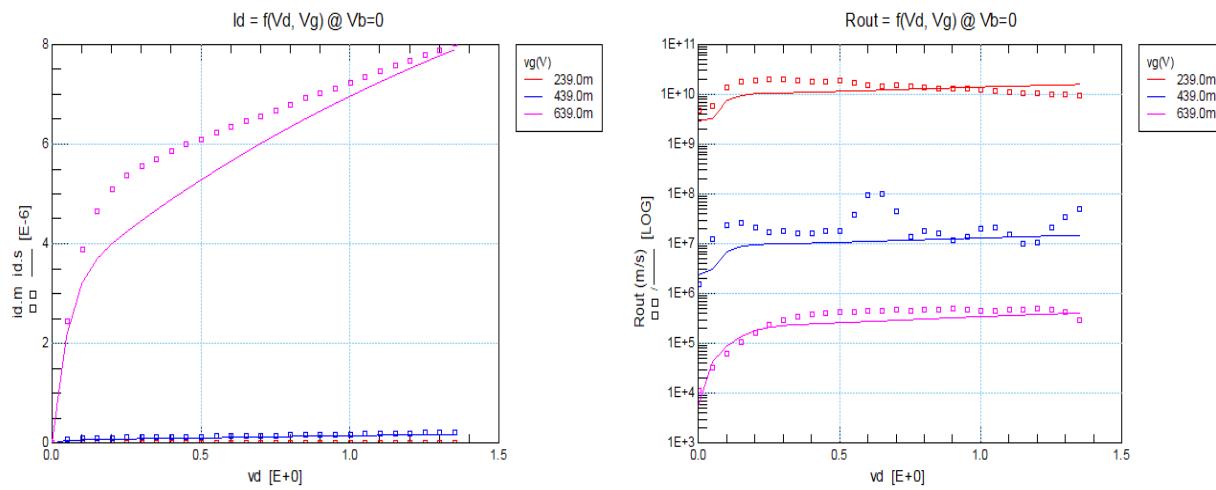


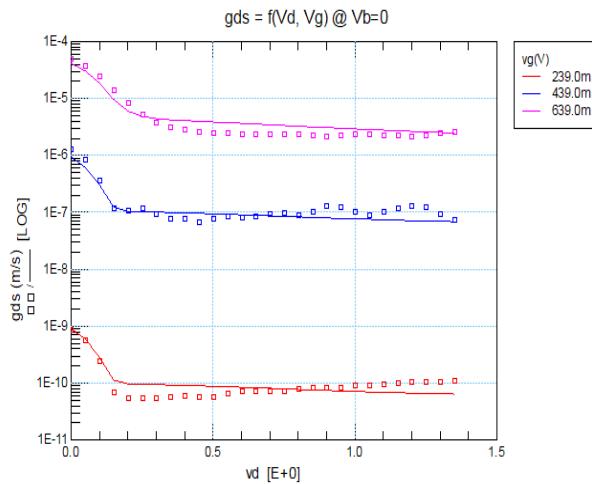


$idvg, Ib, Ig, Vb = 0V, T = -40^\circ C$

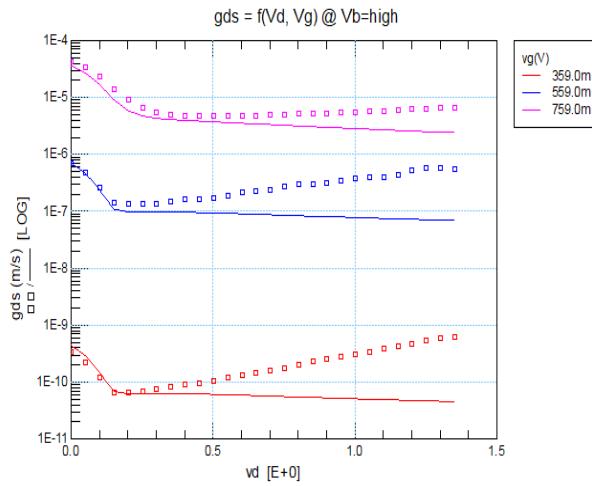
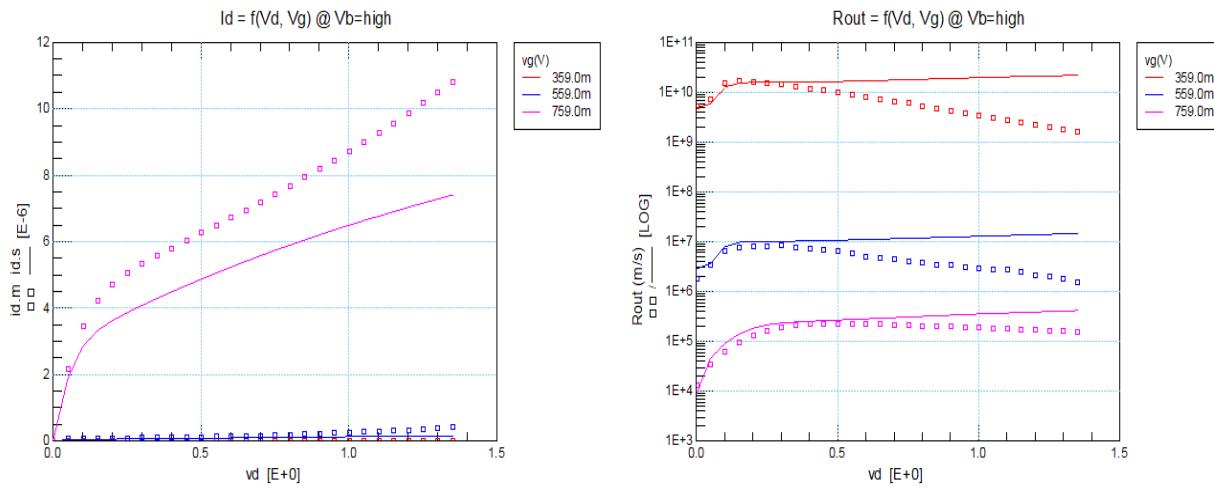


**idvg, Ib,Ig, Vb = -1.2V, T = -40°C**

**idvd, Vb = 0V, T = -40°C**


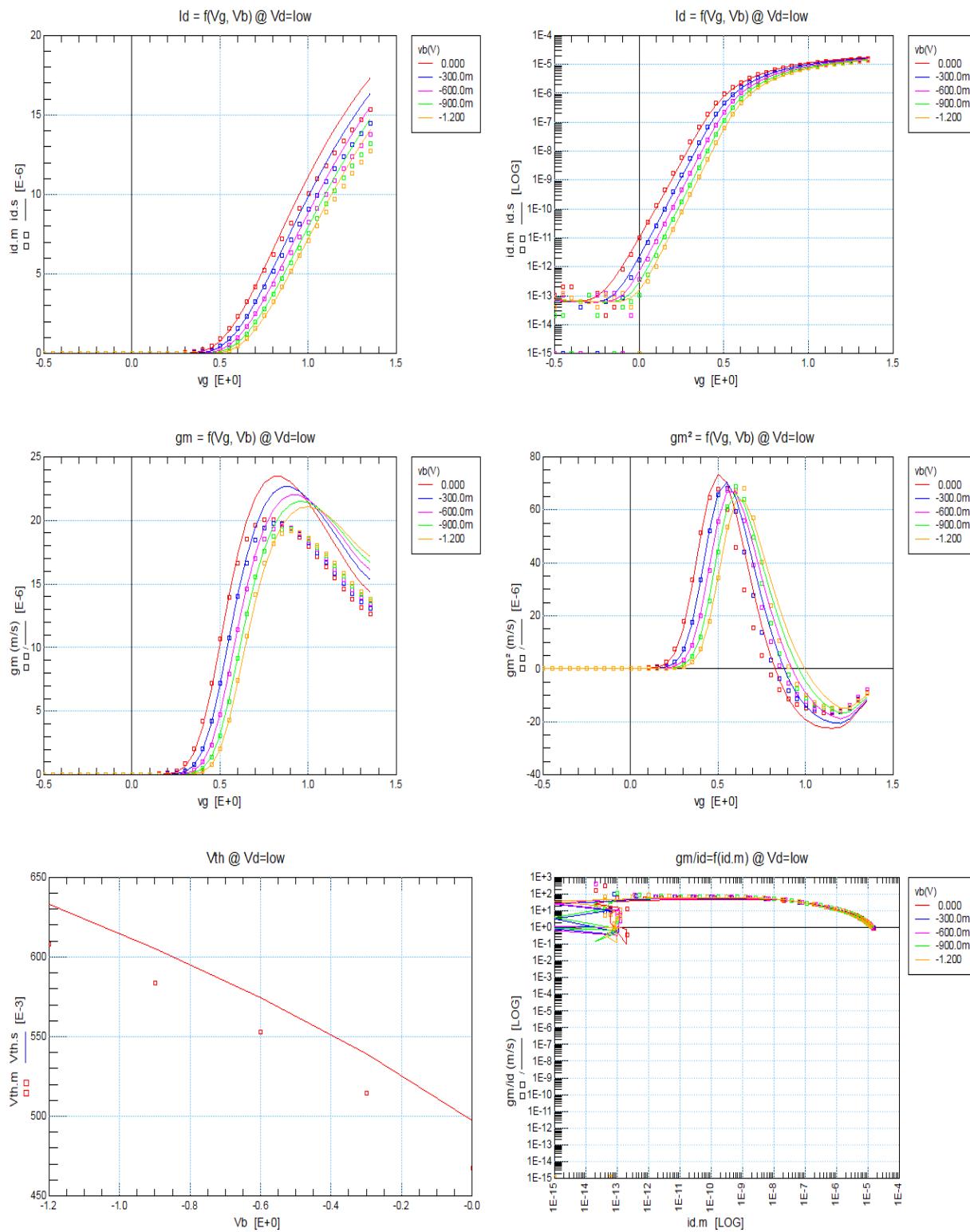
**idvd\_vbmin, Vb = -1.2V, T = -40°C**

**idvd\_vth, Vb = 0V, T = -40°C**


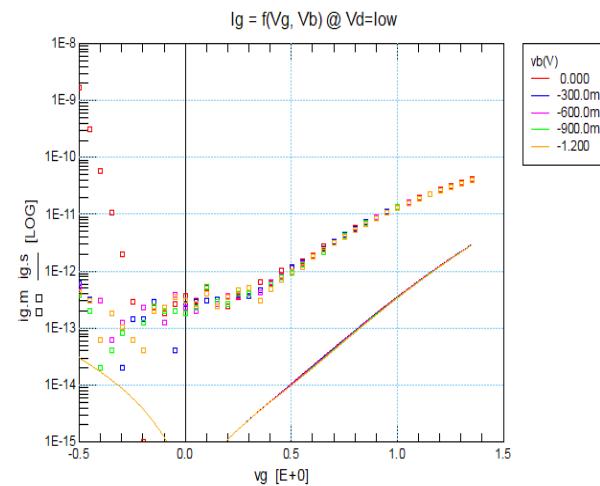
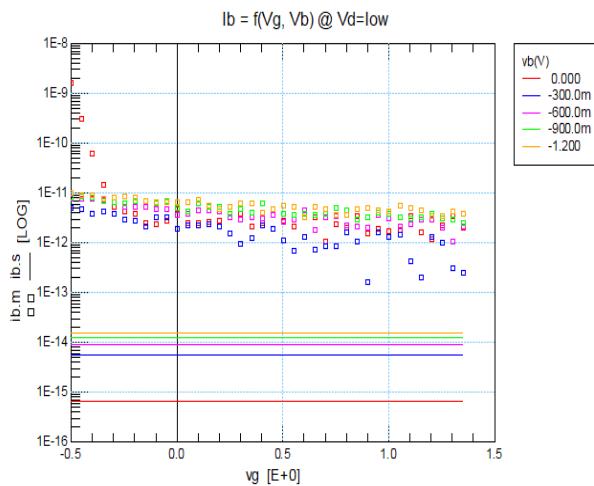


### idvd\_vth\_vbmin, Vb = -1.2V, T = -40°C

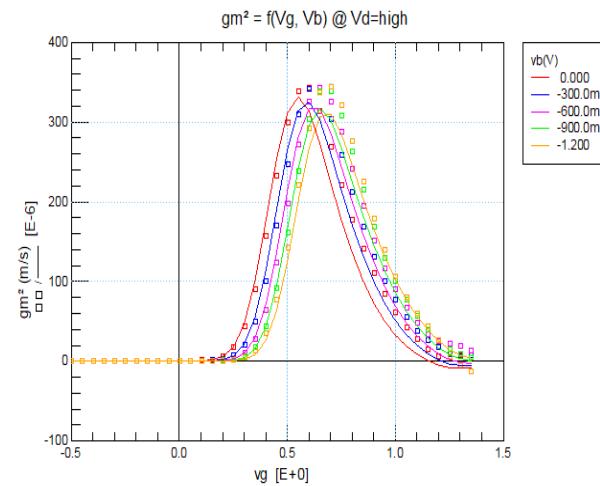
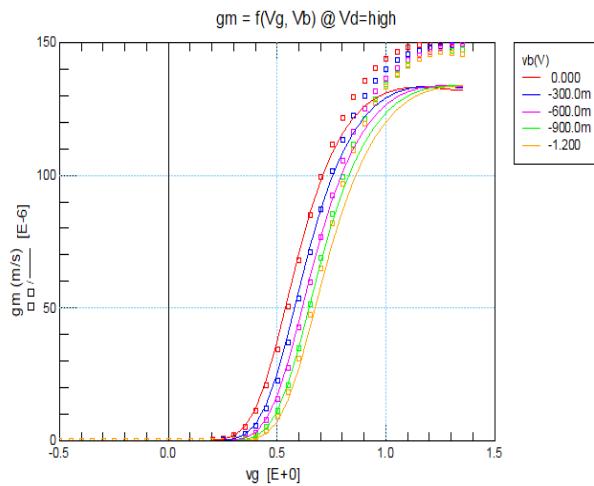
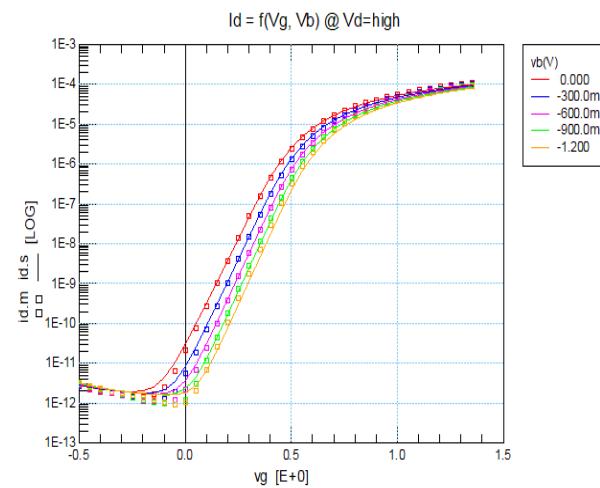
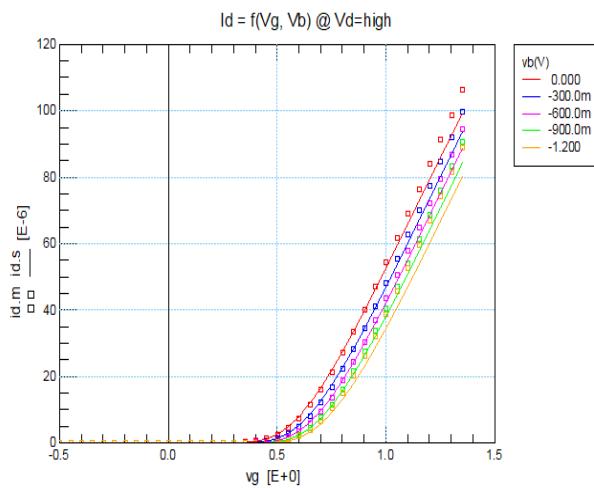


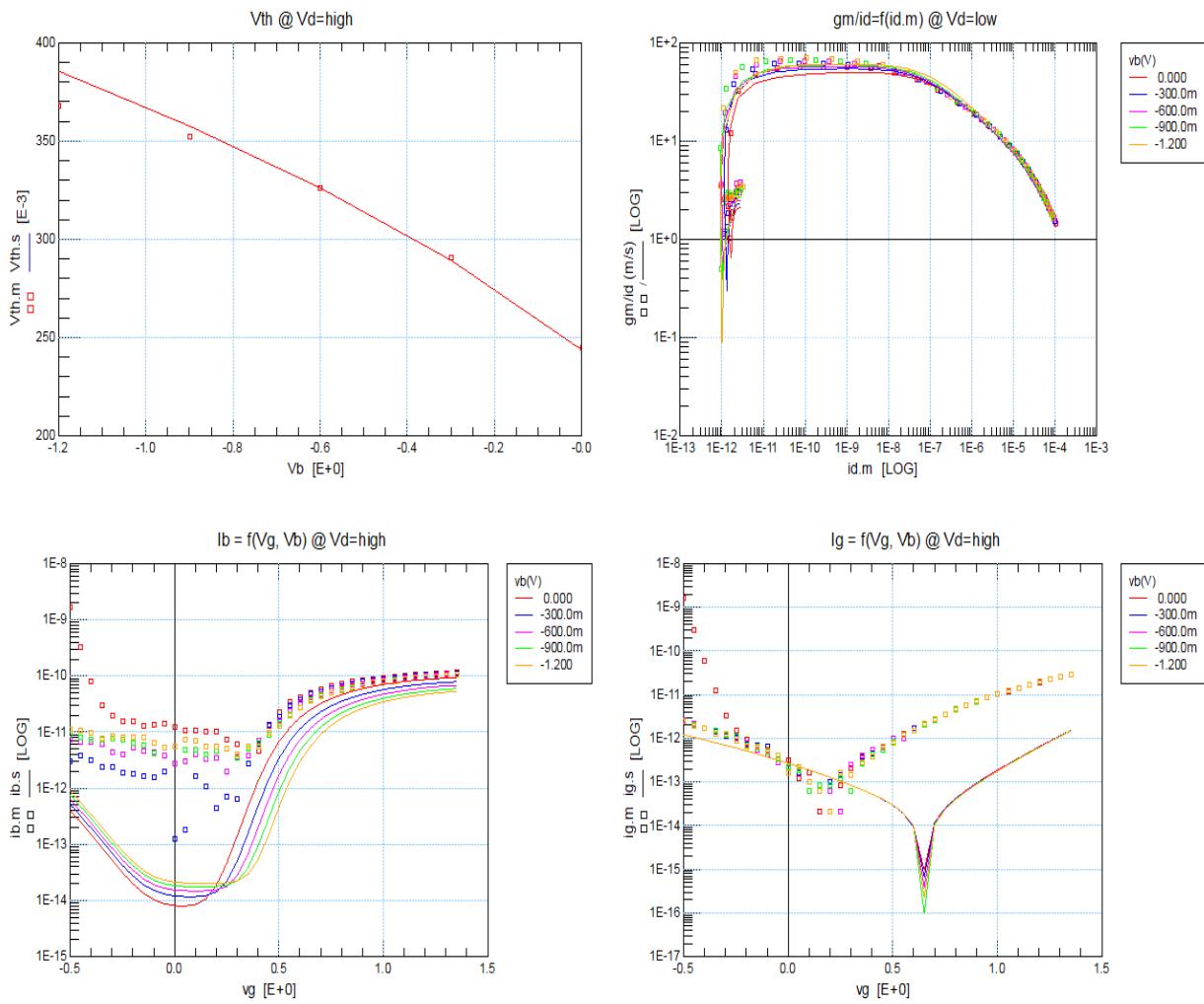
**idvg, Vd = 0.05V, T = 70°C**



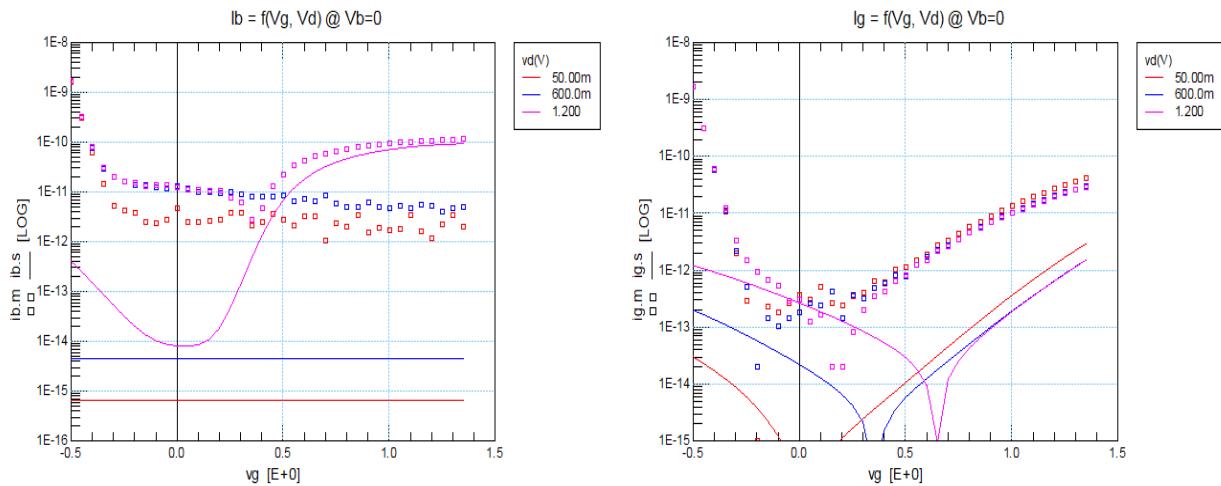


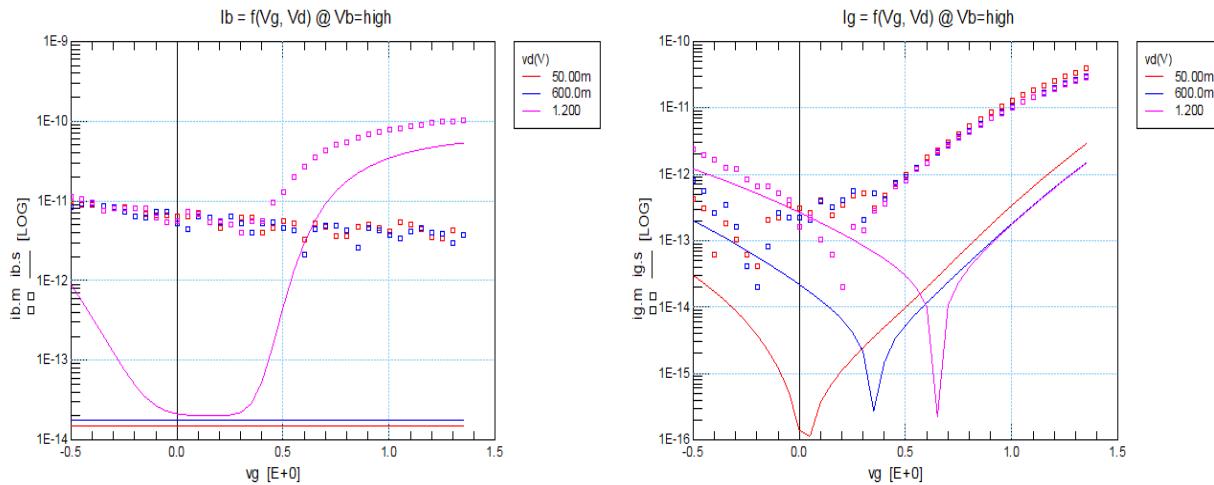
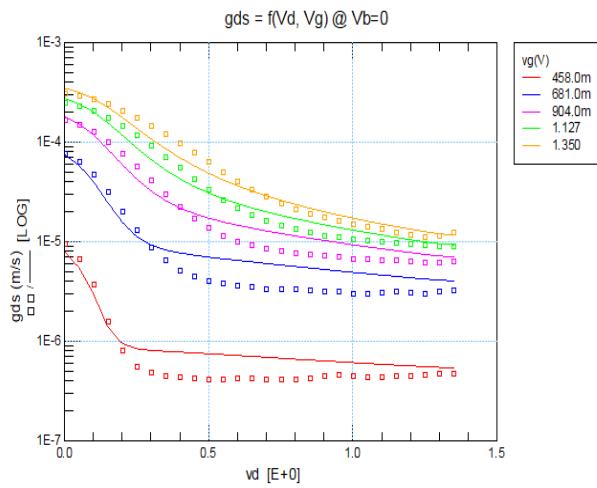
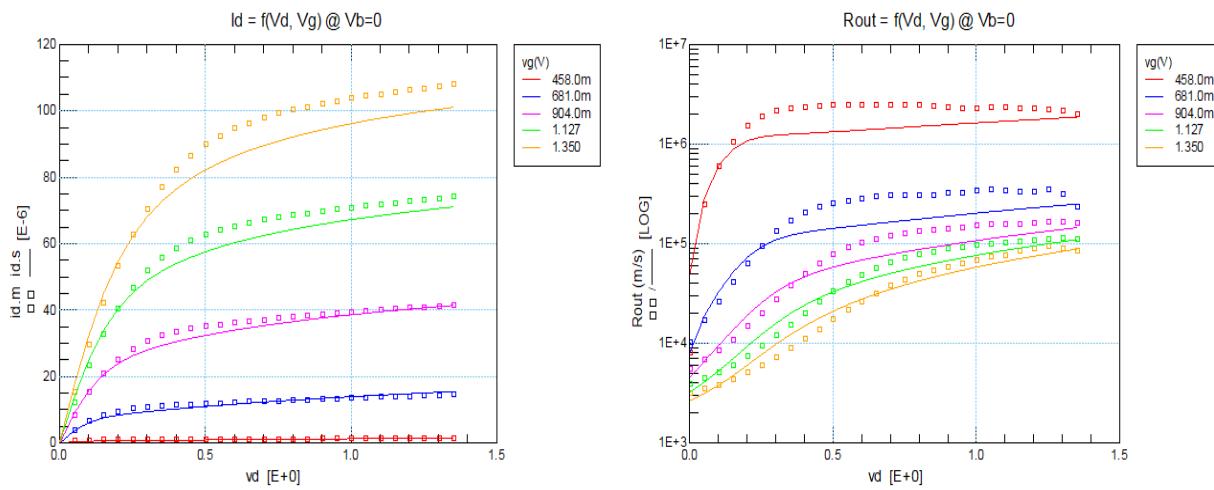
### $i_{dvg}, V_d = 1.2V, T = 70^\circ C$

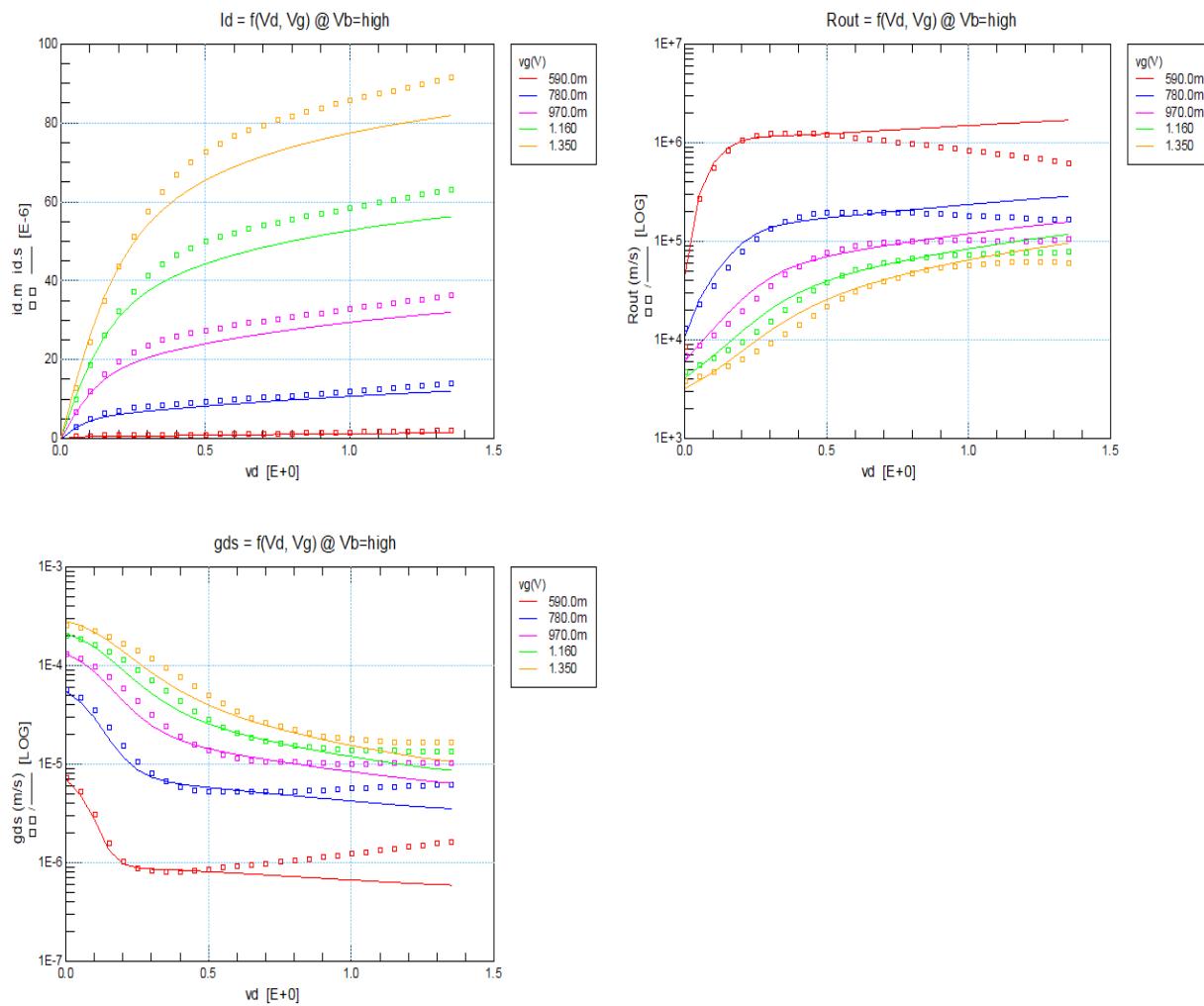
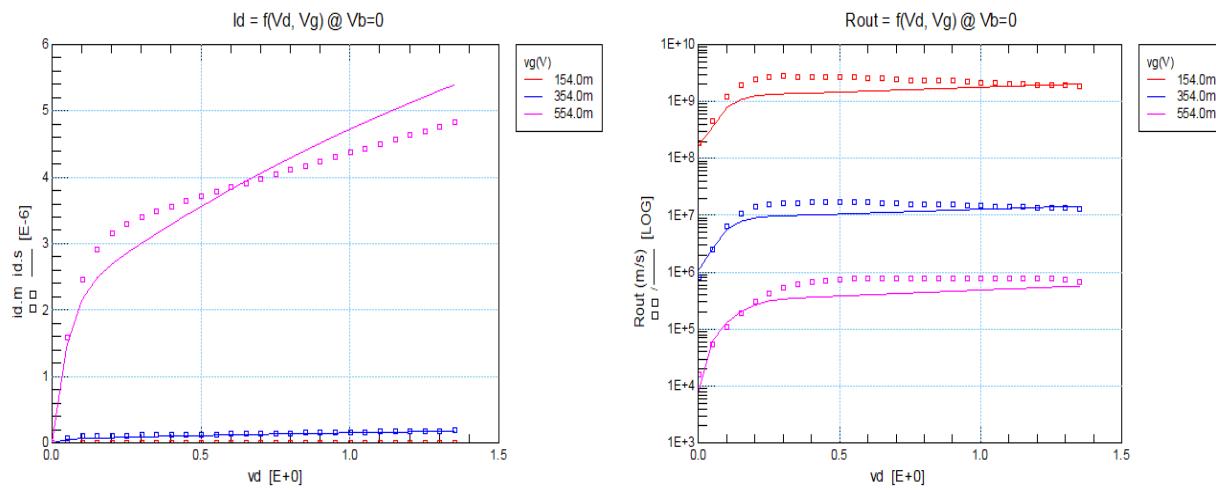


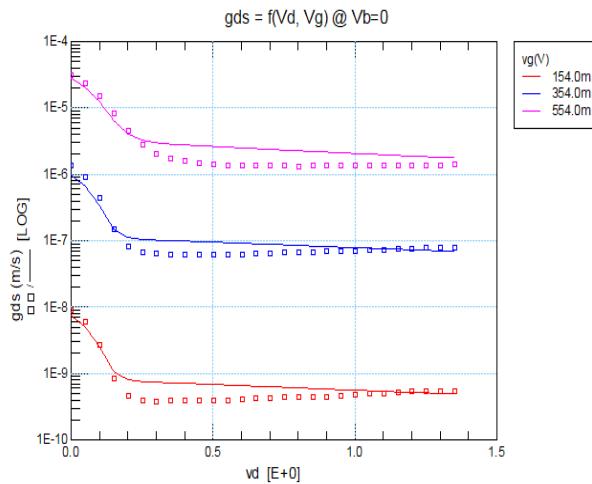


### $idvg, Ib, Ig, Vb = 0V, T = 70^\circ\text{C}$

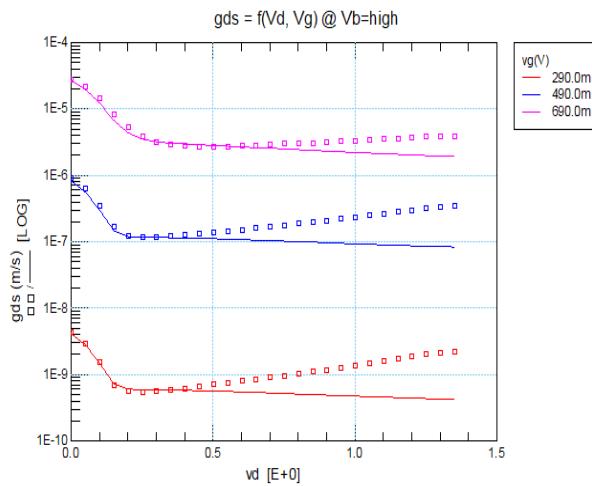
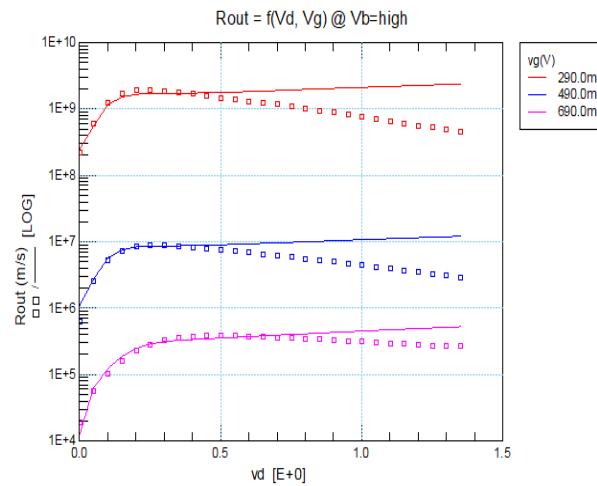
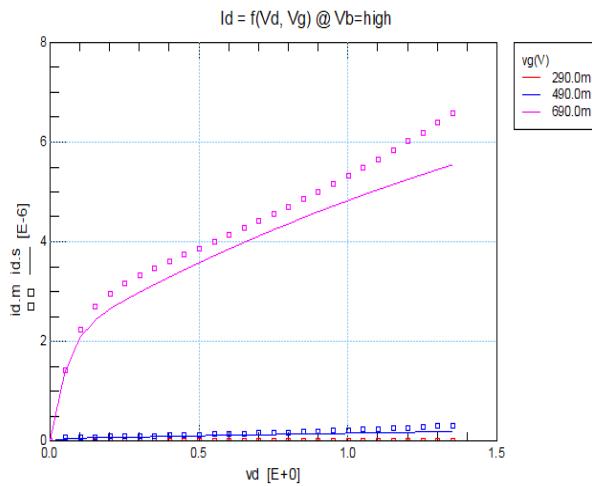


**idvg, Ib,Ig, Vb = -1.2V, T = 70°C**

**idvd, Vb = 0V, T = 70°C**


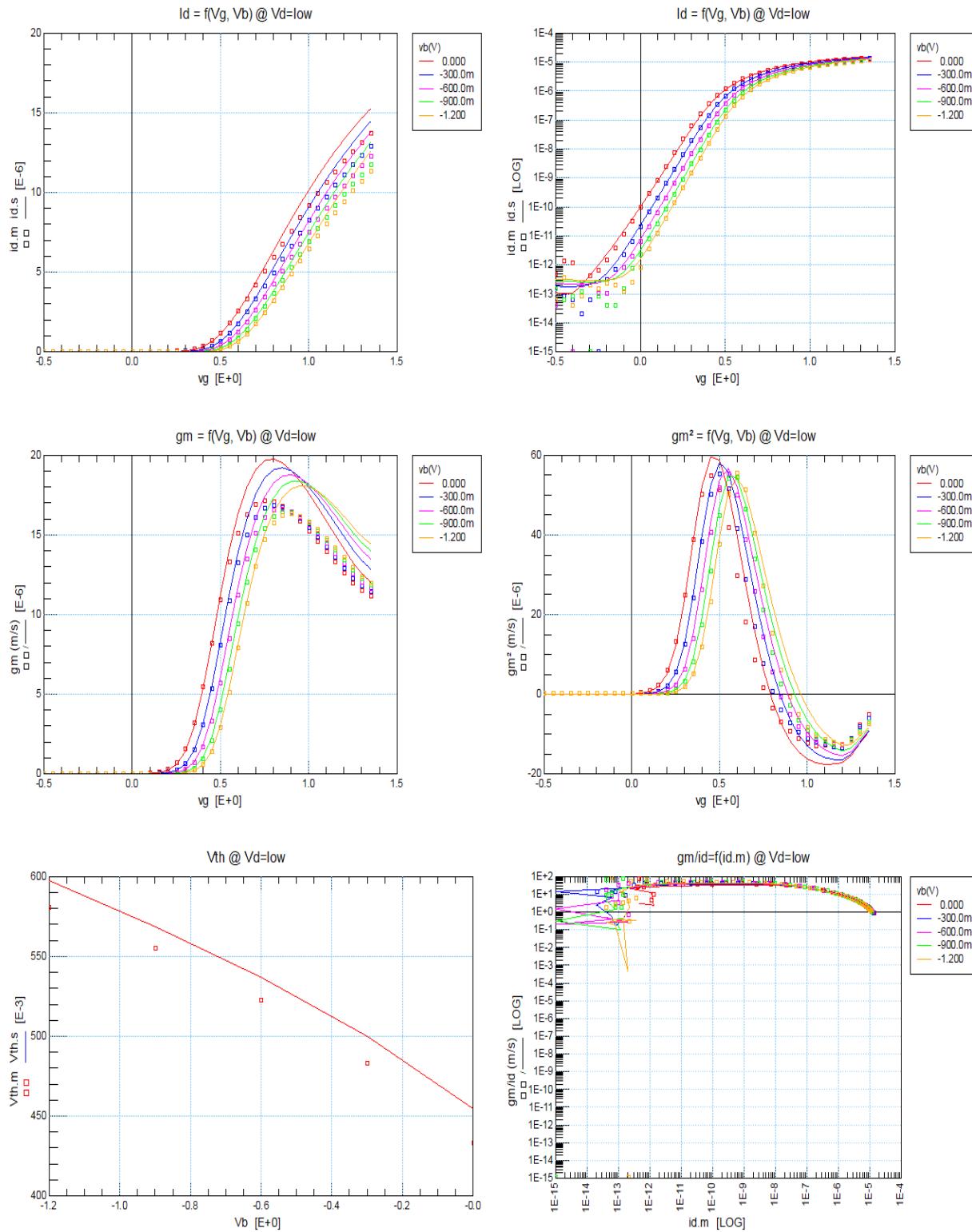
**idvd\_vbmin, Vb = -1.2V, T = 70°C****idvd\_vth, Vb = 0V, T = 70°C**

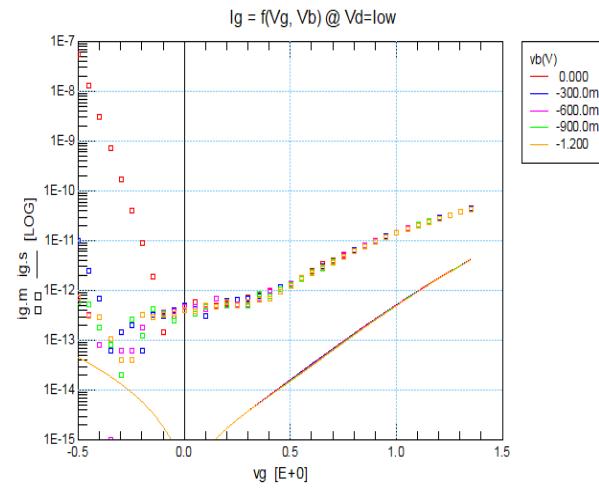
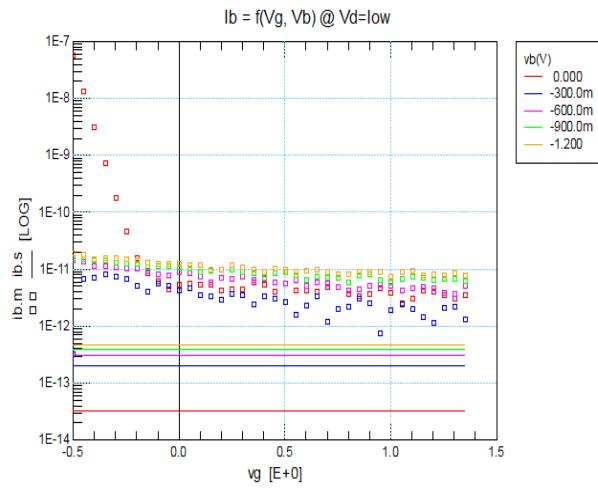


### idvd\_vth\_vbmin, Vb = -1.2V, T = 70°C

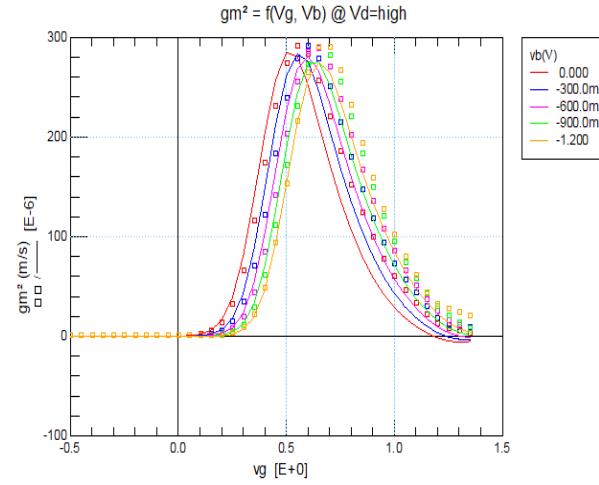
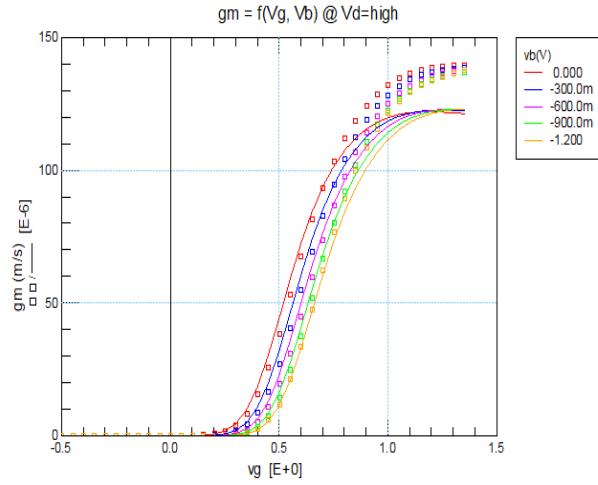
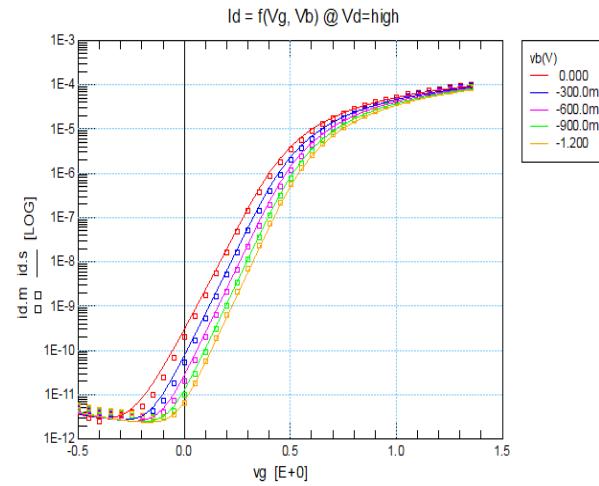
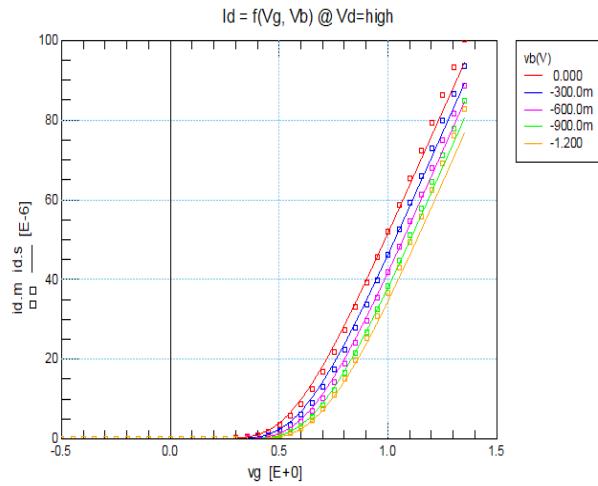


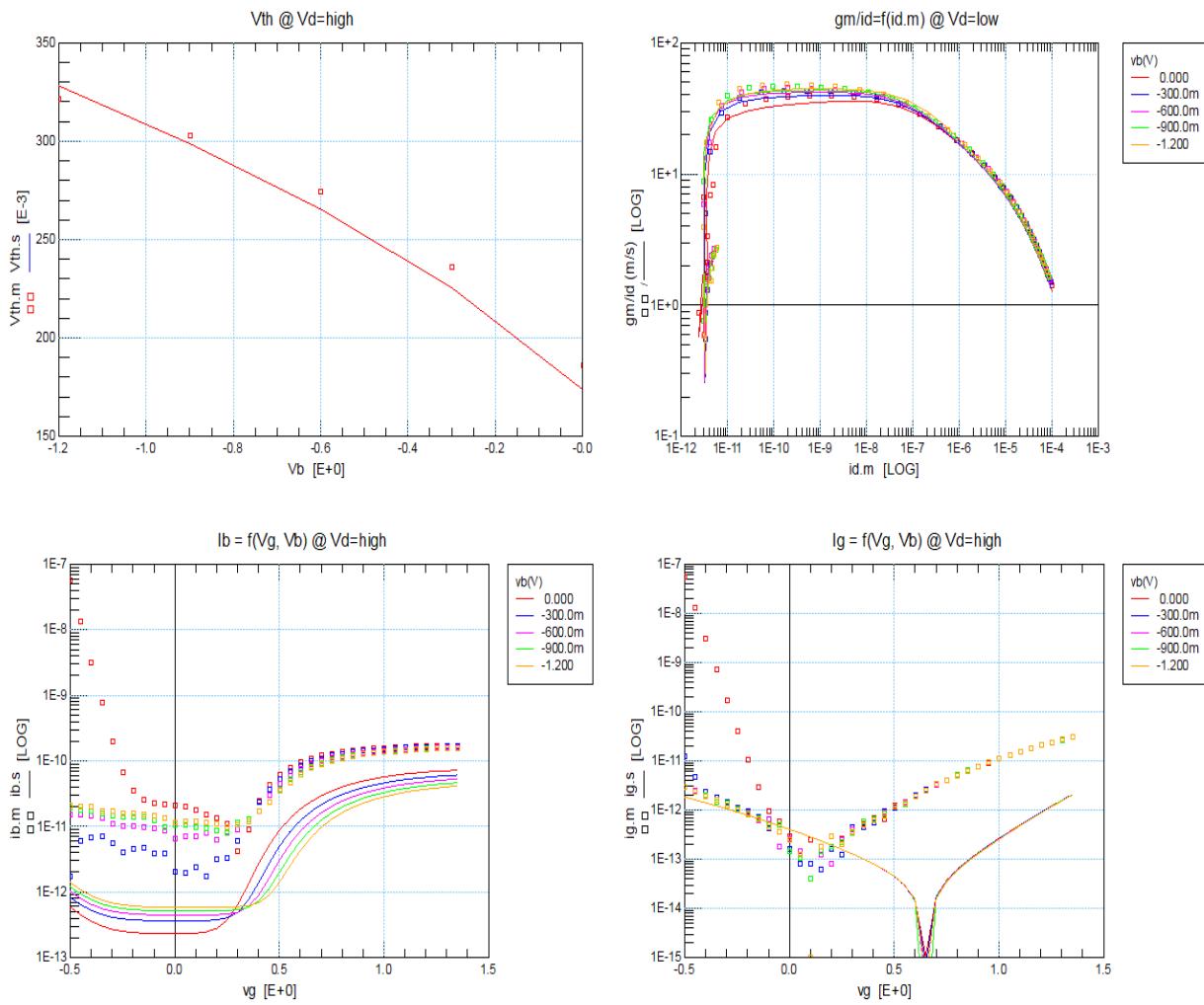
**idvg, Vd = 0.05V, T = 125°C**



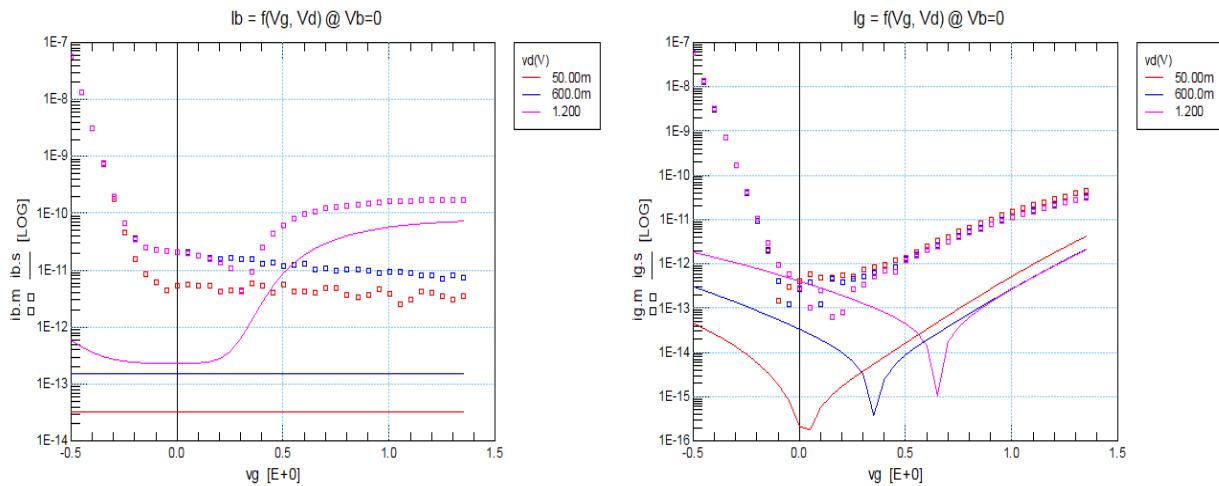


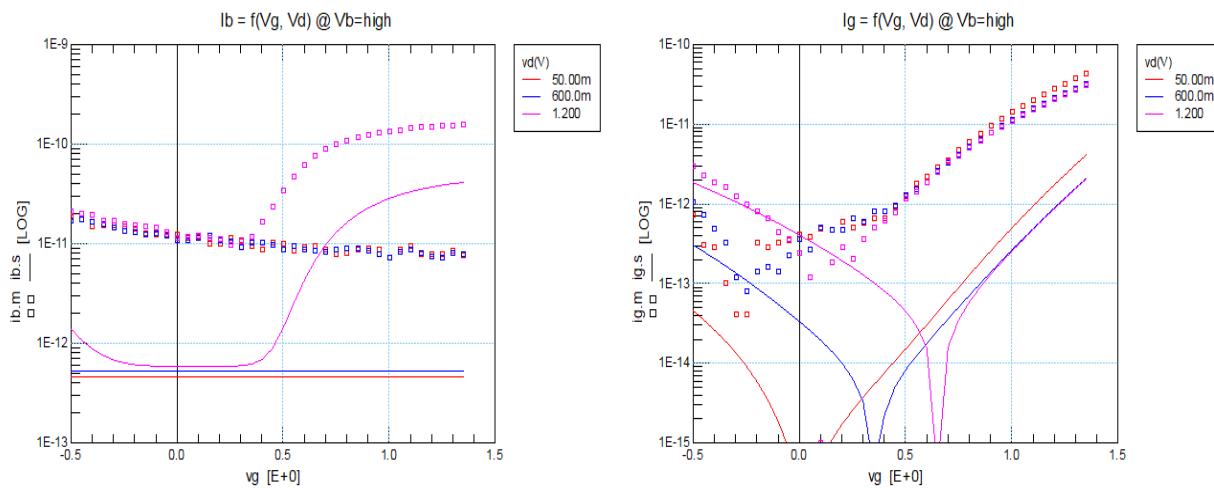
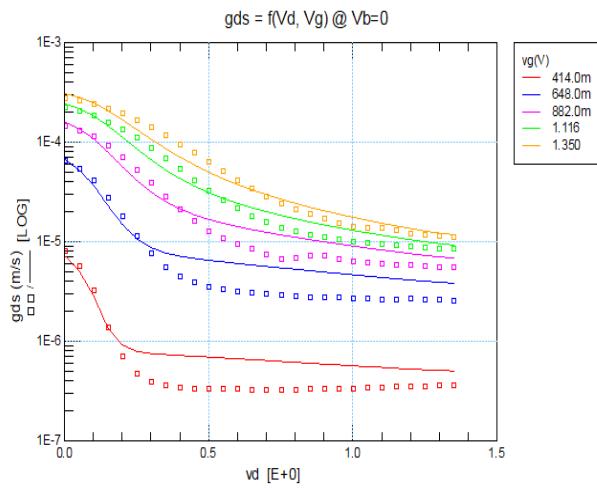
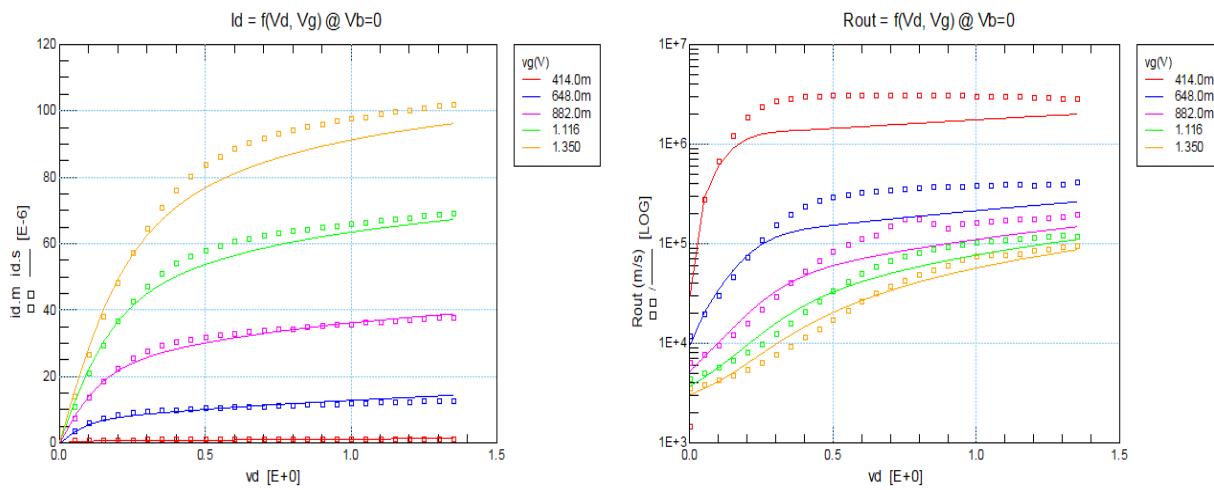
$i_{dvg}, V_d = 1.2V, T = 125^\circ C$

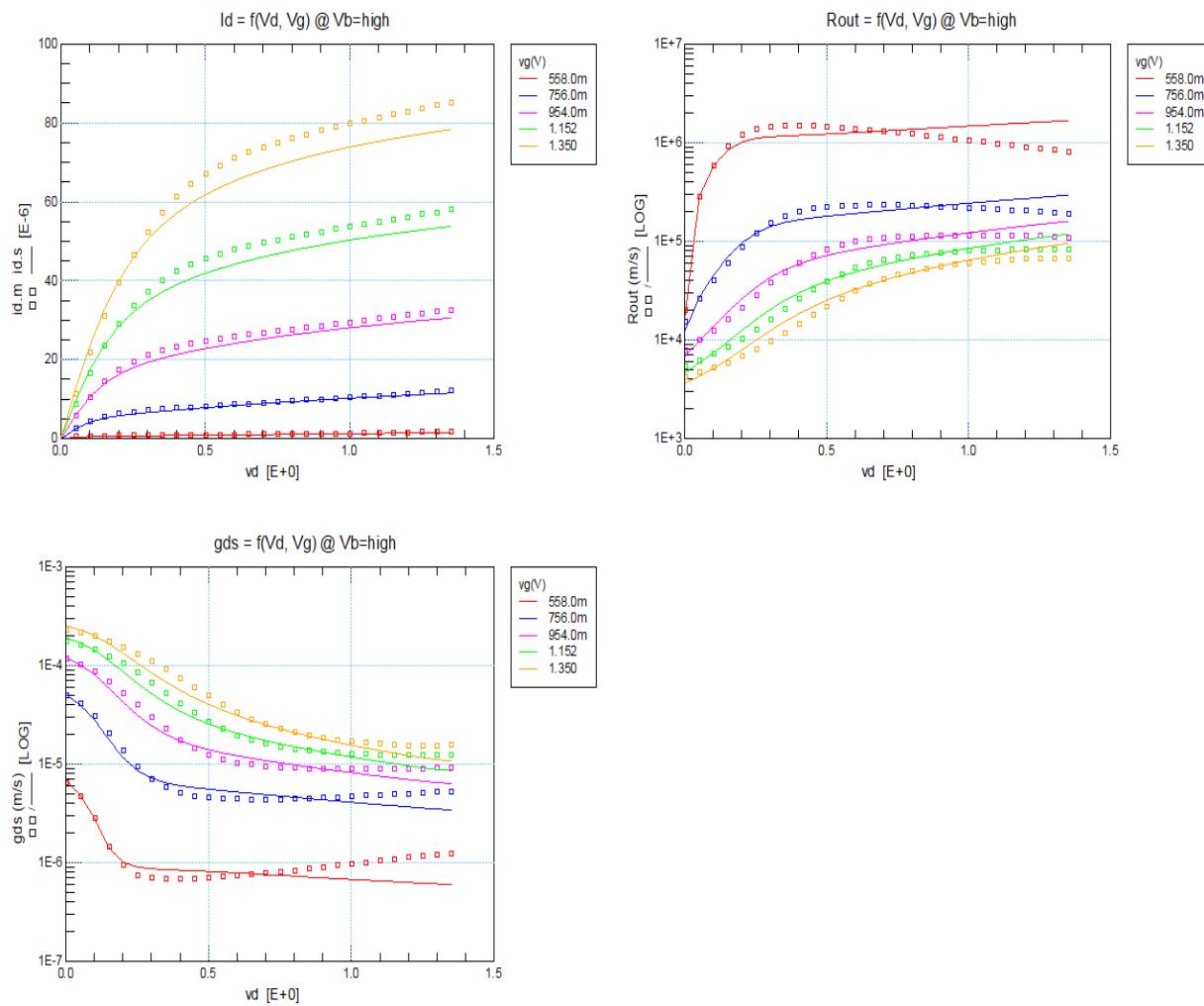
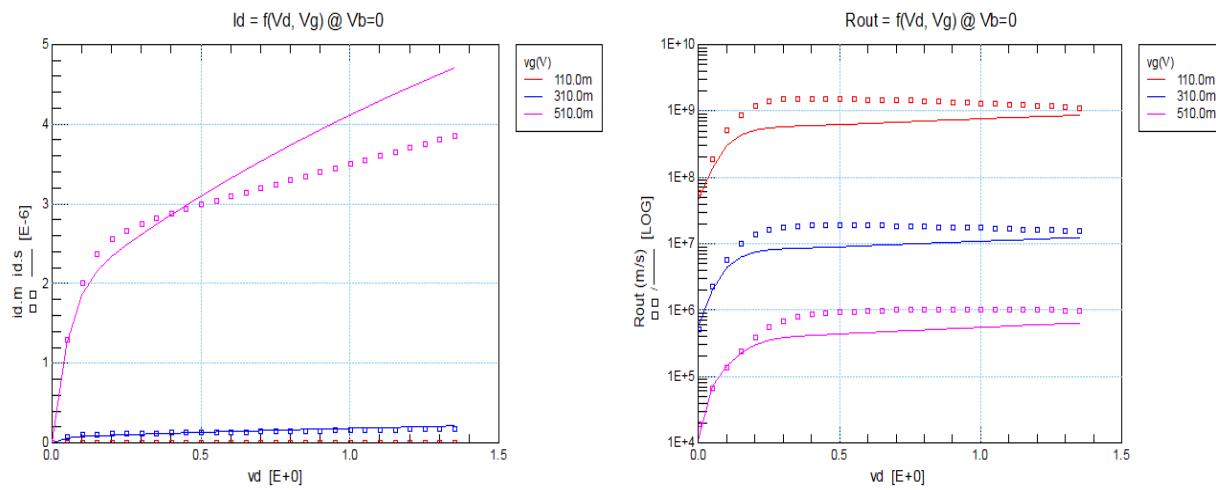


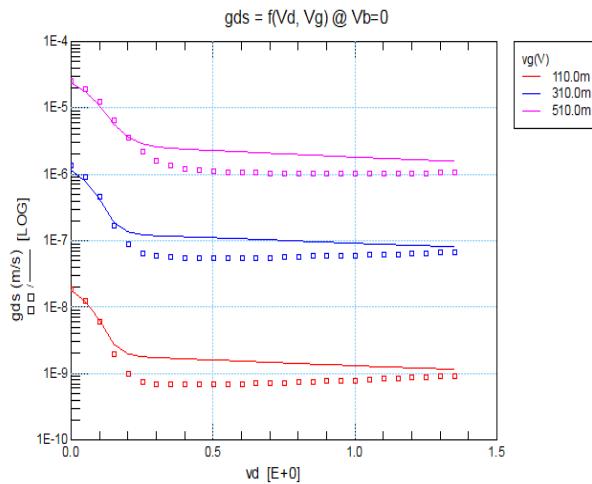


$id_{vg}$ ,  $I_b$ ,  $I_g$ ,  $V_b = 0V$ ,  $T = 125^\circ C$

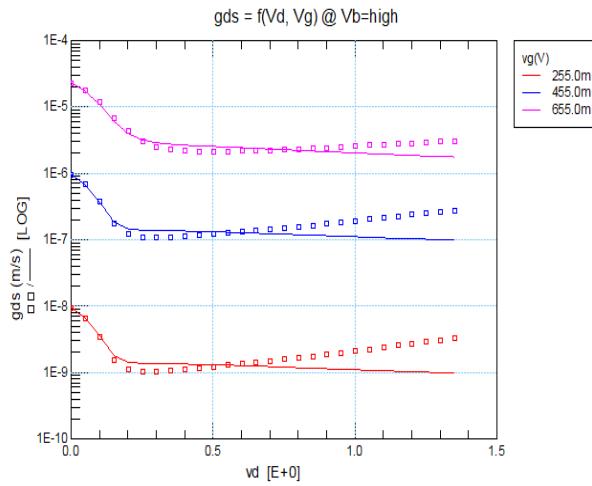
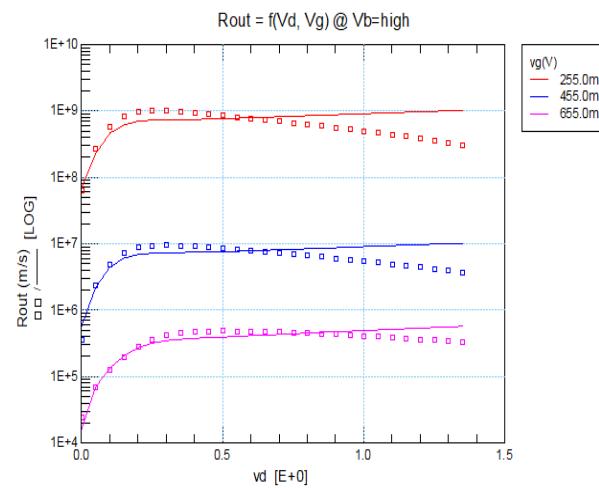
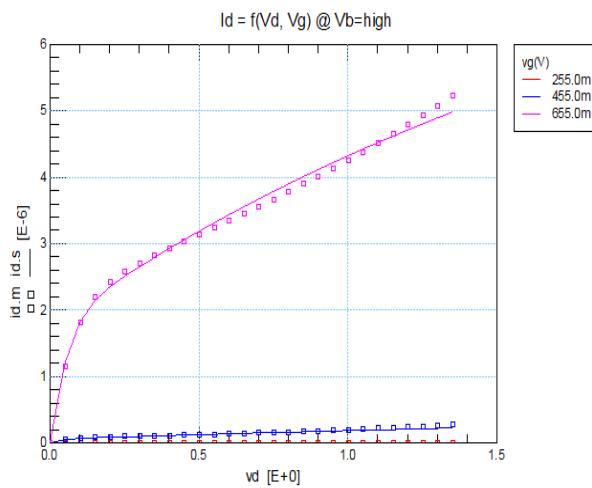


**idvg, Ib,Ig, Vb = -1.2V, T = 125°C**

**idvd, Vb = 0V, T = 125°C**


**idvd\_vbmin, Vb = -1.2V, T = 125°C****idvd\_vth, Vb = 0V, T = 125°C**

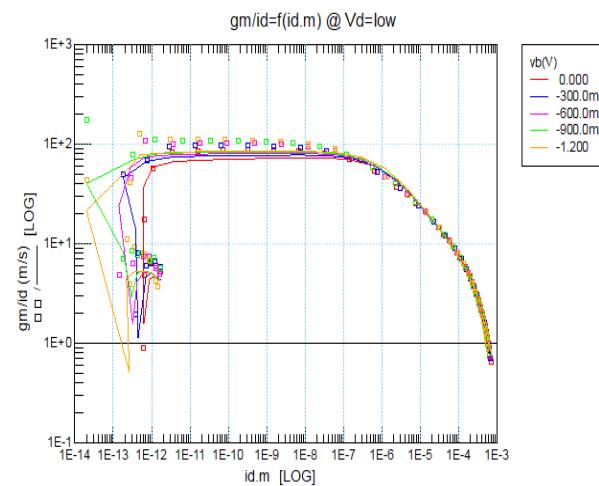
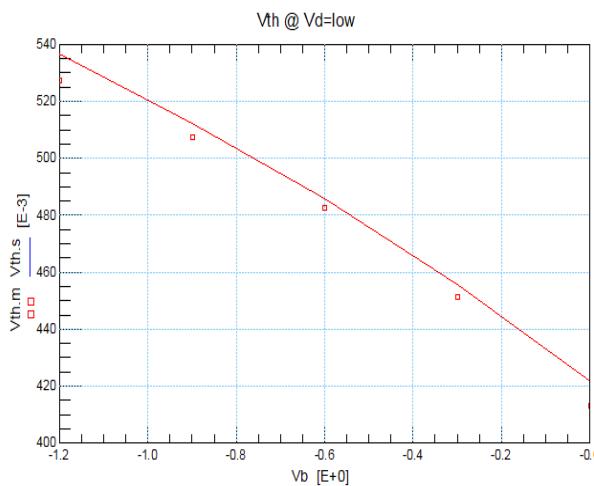
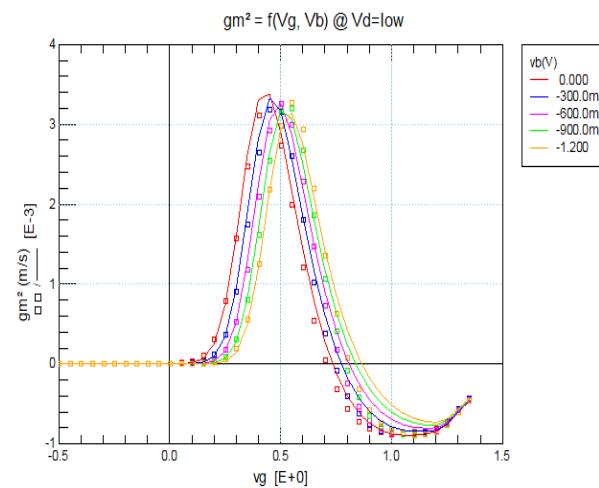
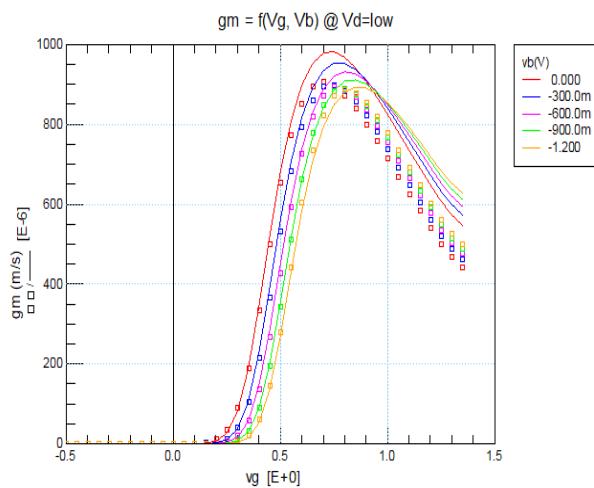
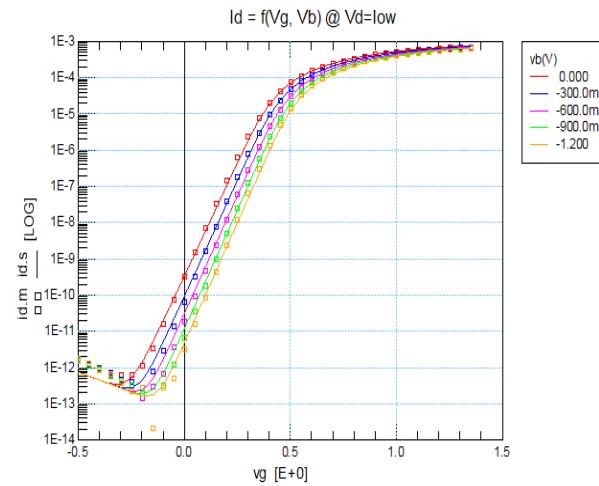
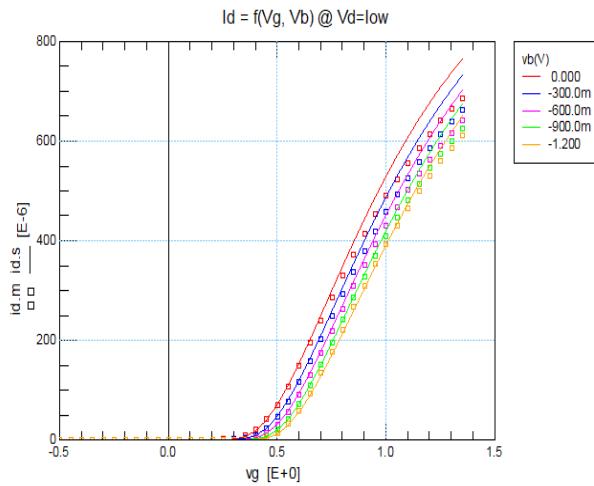


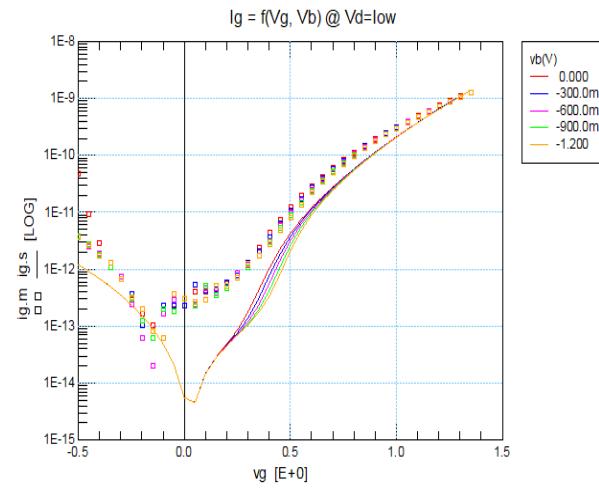
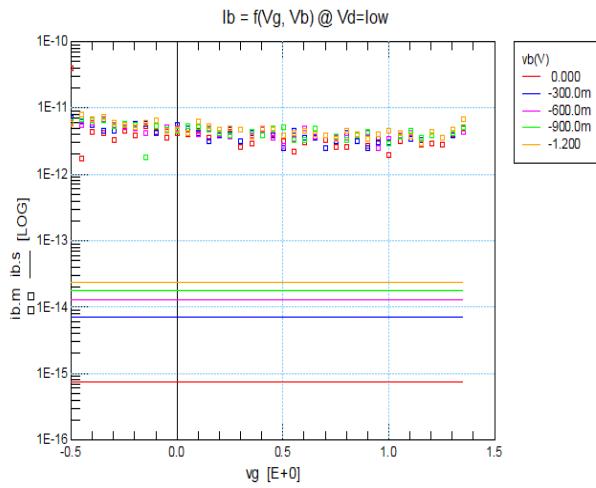
### idvd\_vth\_vbmin, Vb = -1.2V, T = 125°C



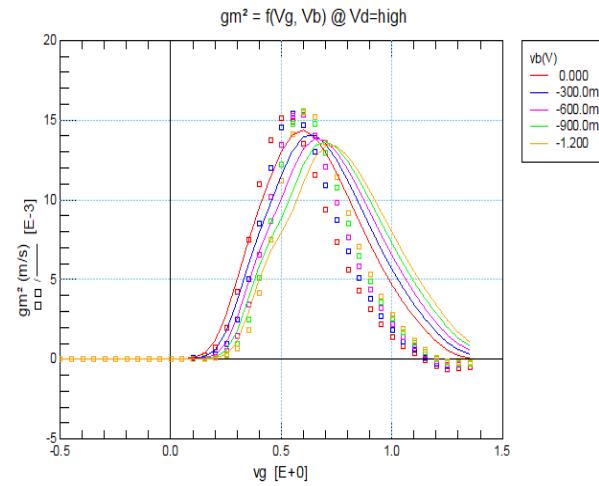
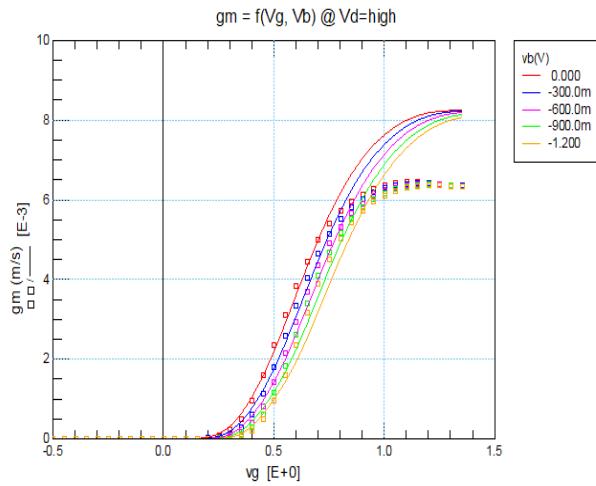
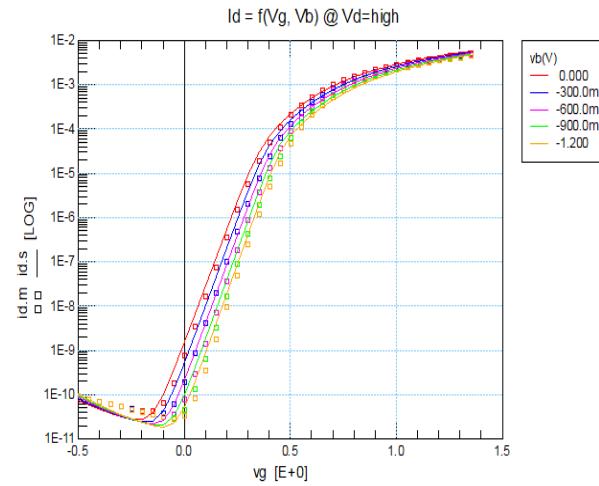
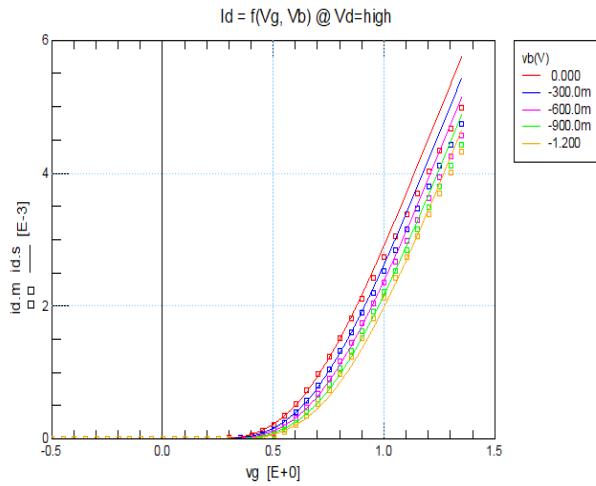
## 4.8 W10u0\_L0u18\_S540\_5

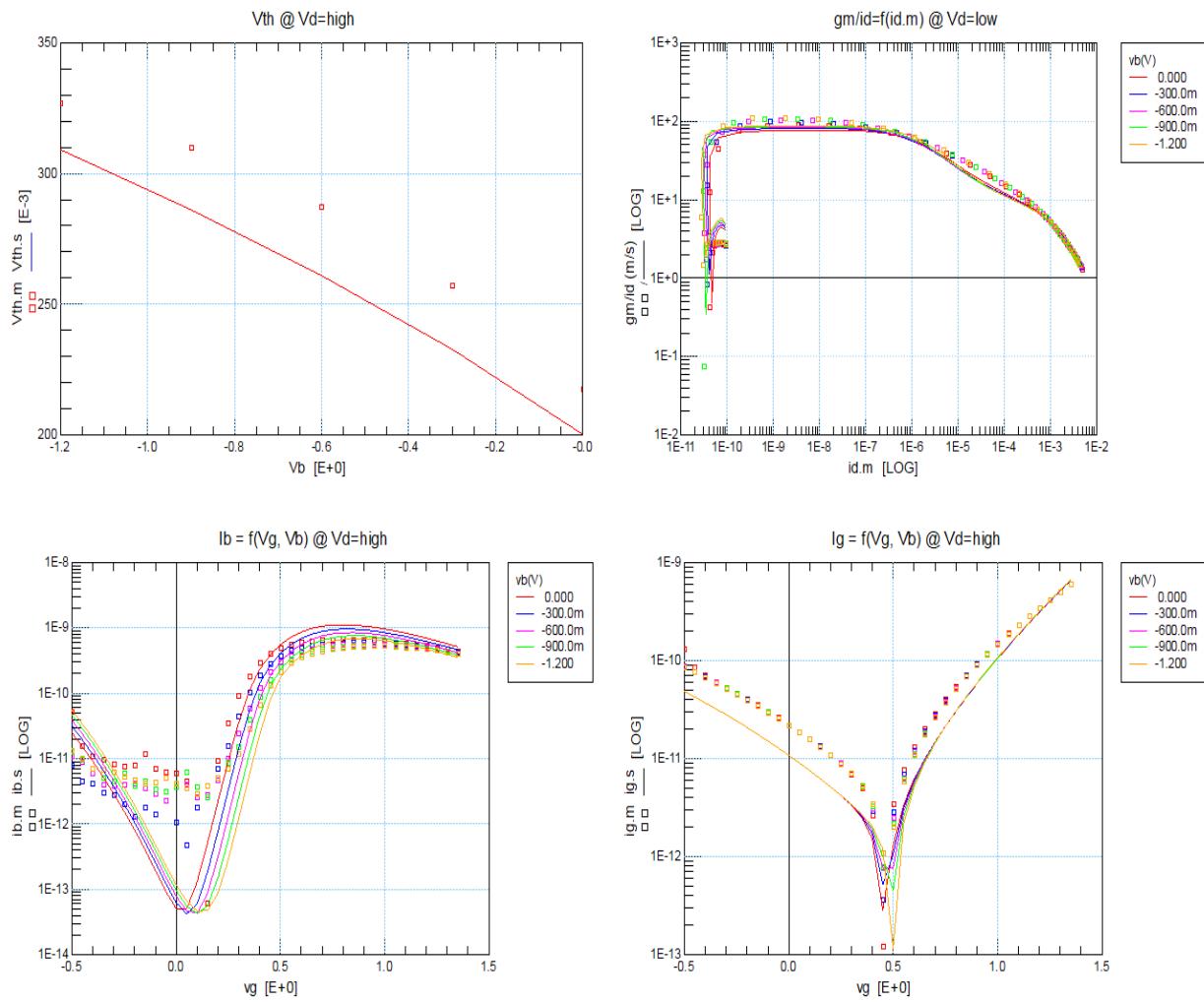
$idvg$ ,  $Vd = 0.05V$ ,  $T = 27^\circ C$



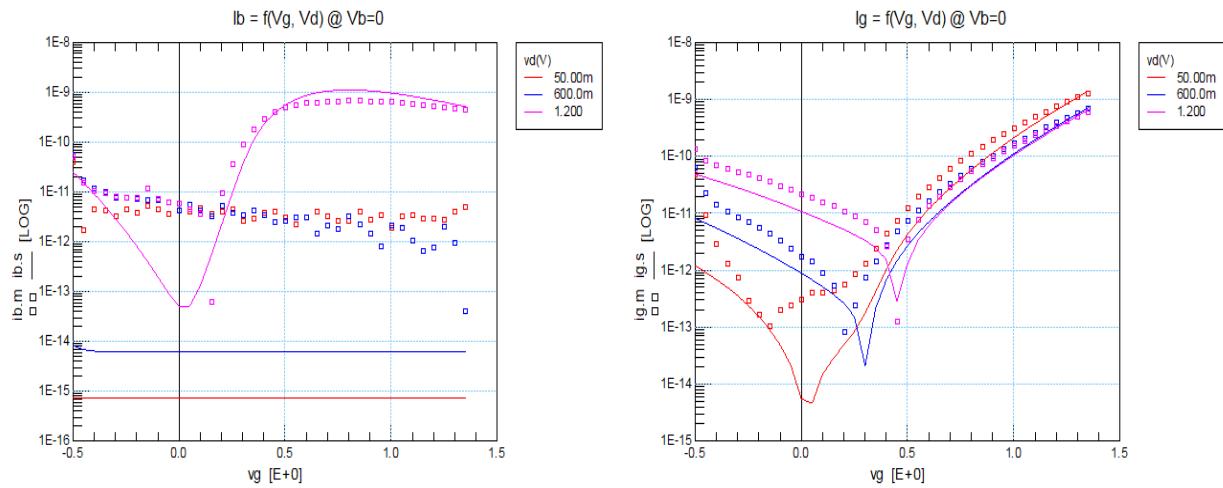


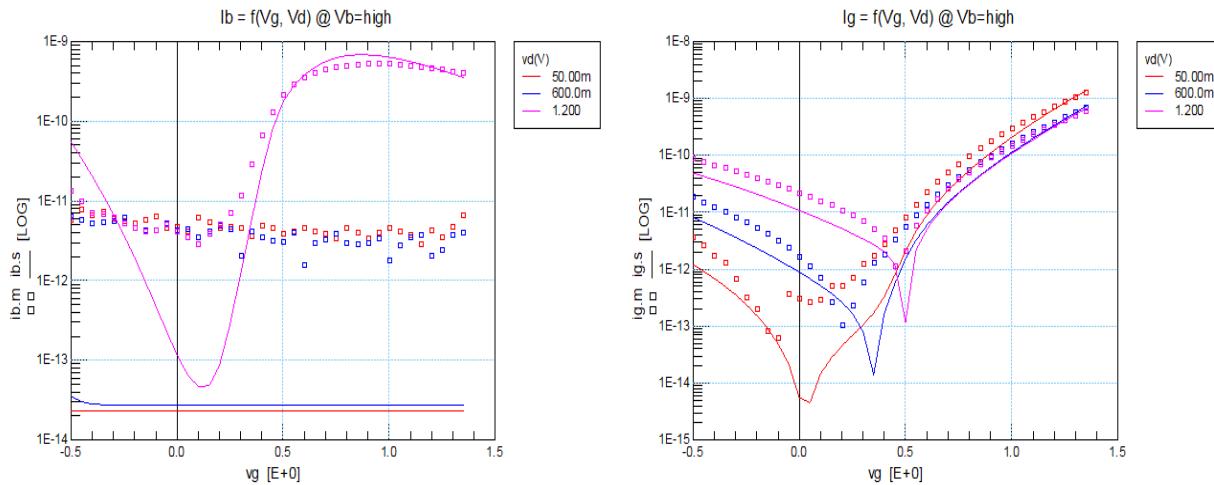
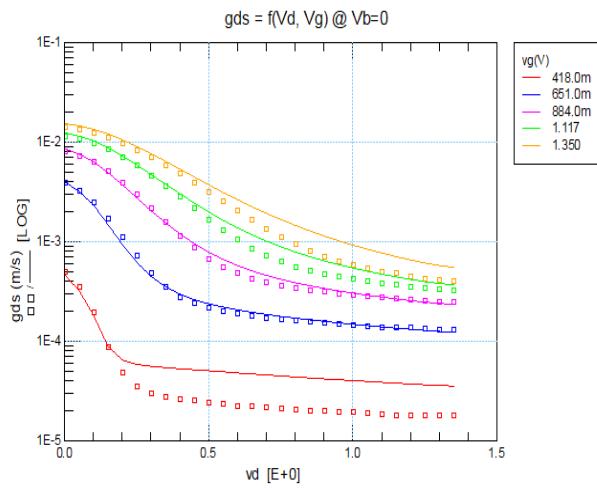
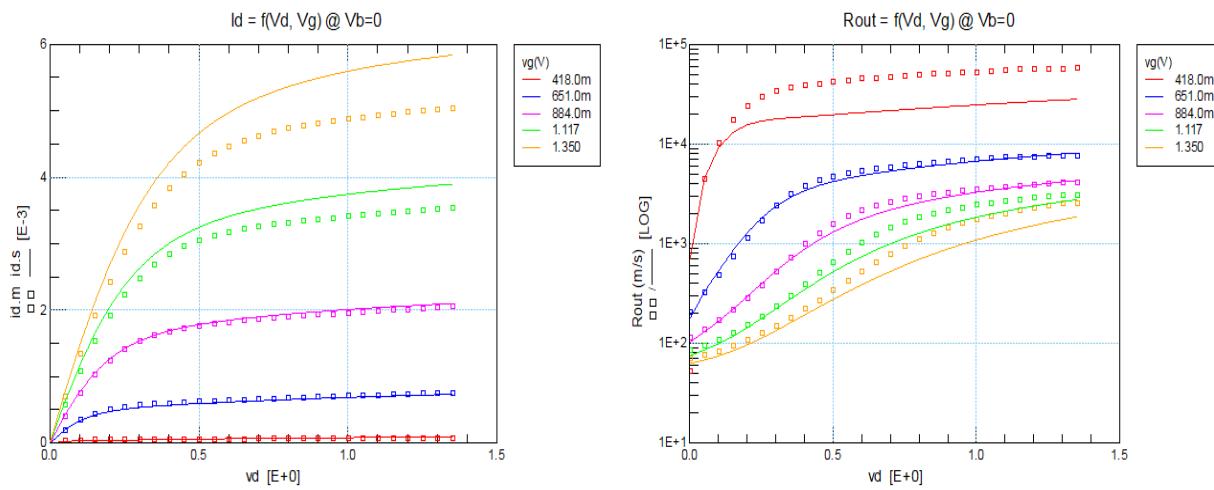
### $i_{dvg}, V_d = 1.2V, T = 27^\circ C$

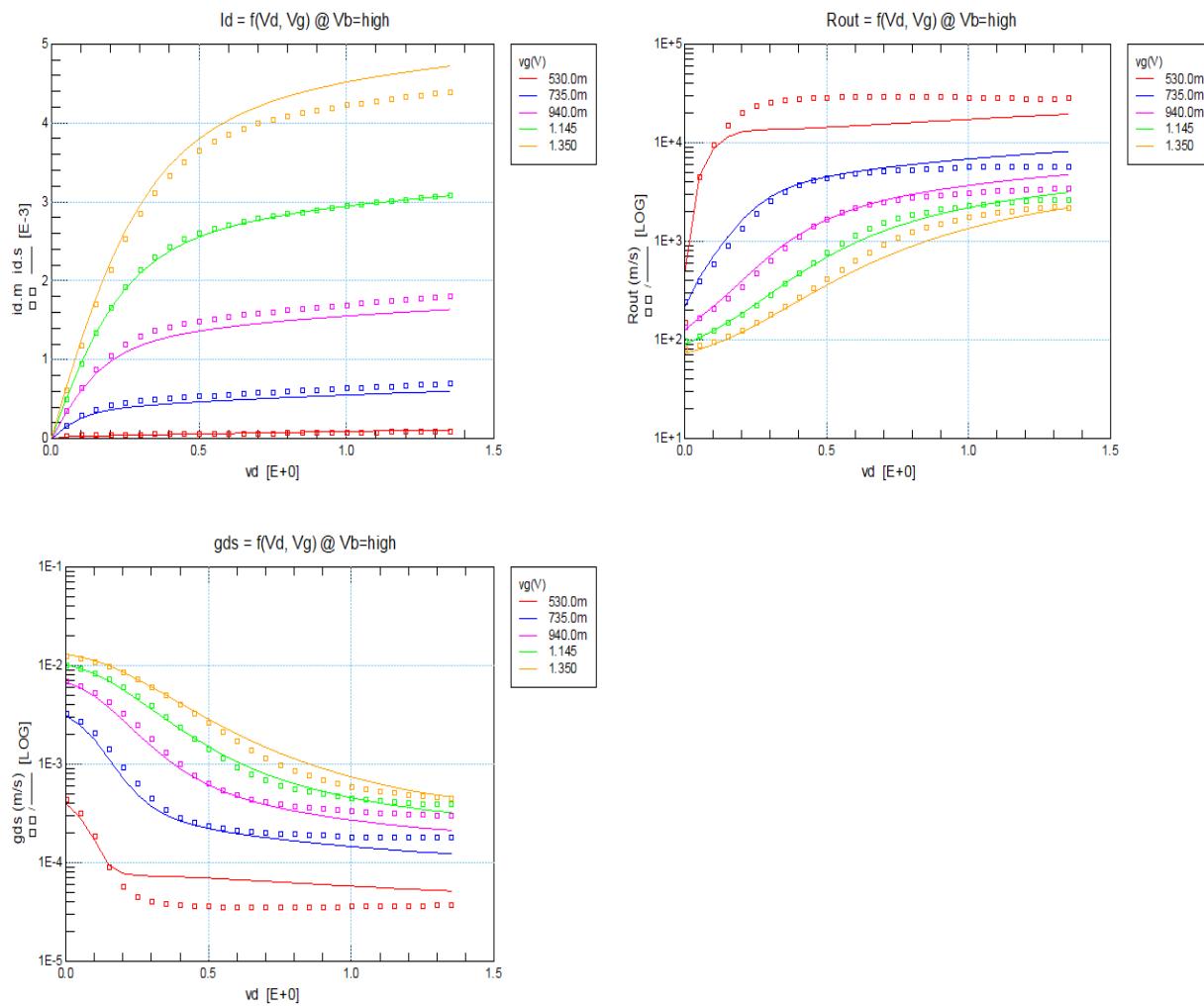
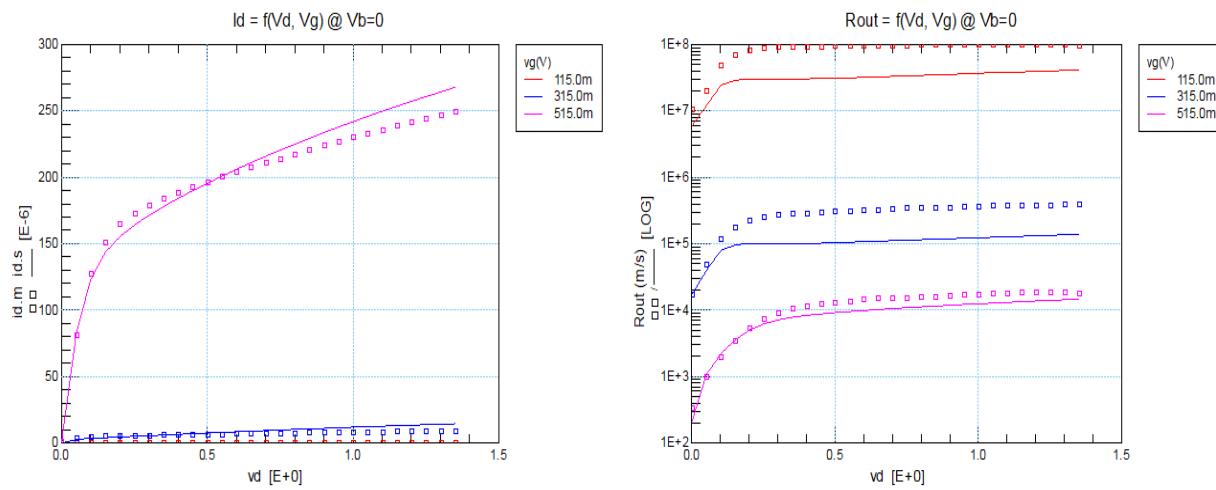


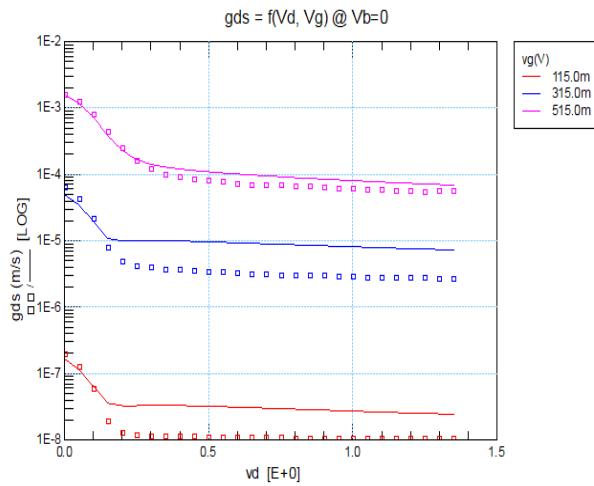


### $id_{vg}, I_b, Ig, V_b = 0V, T = 27^\circ C$

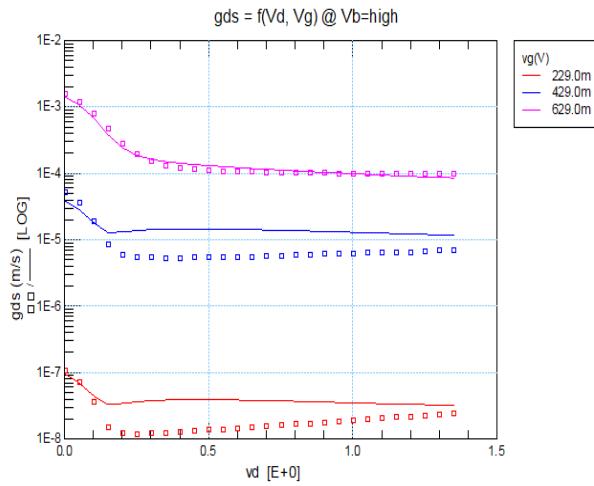
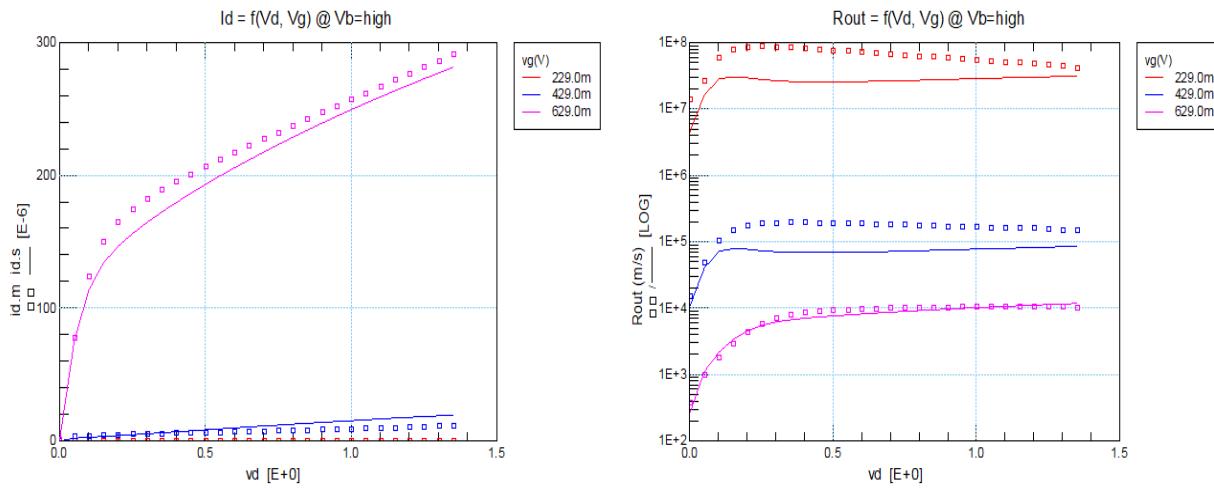


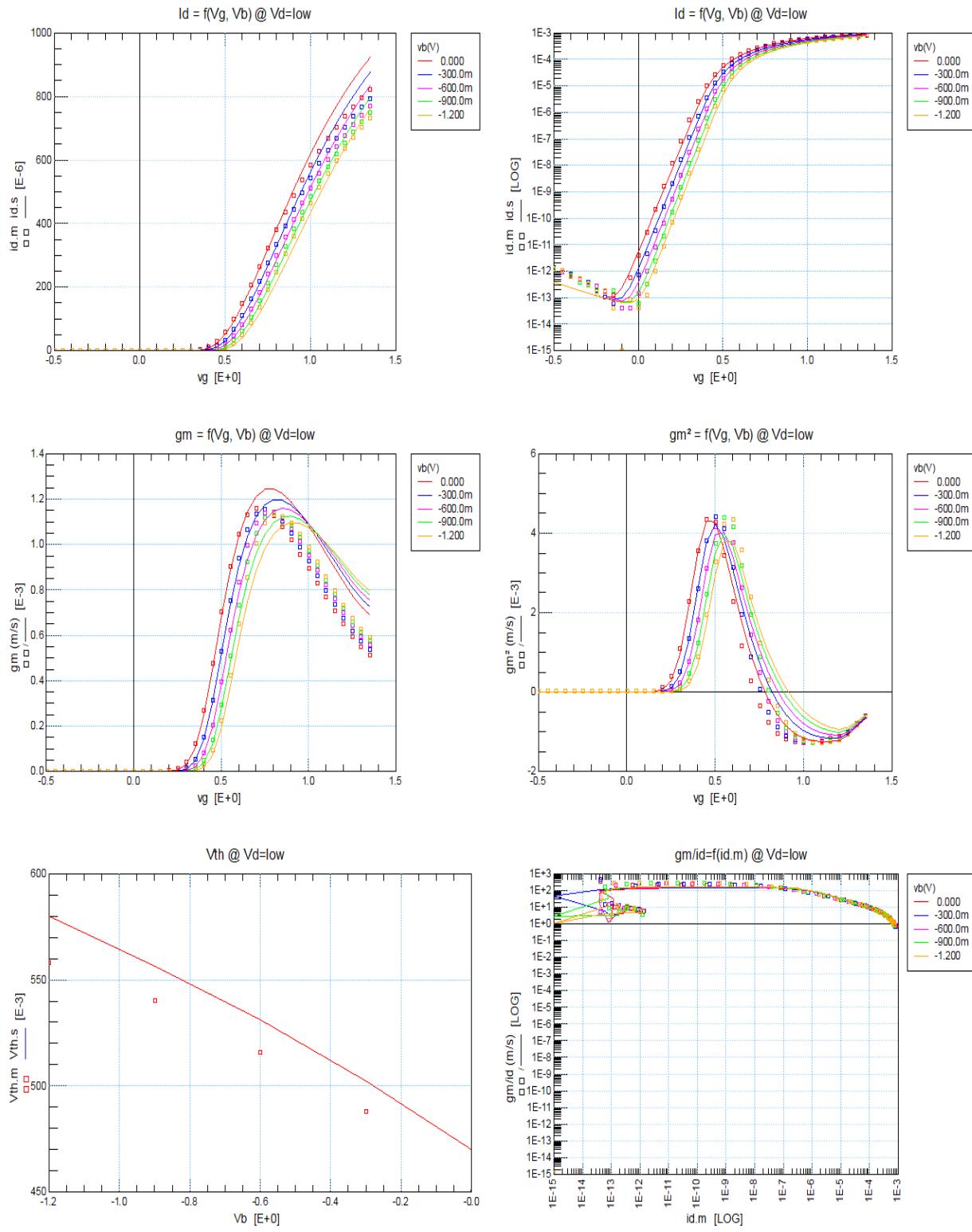
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


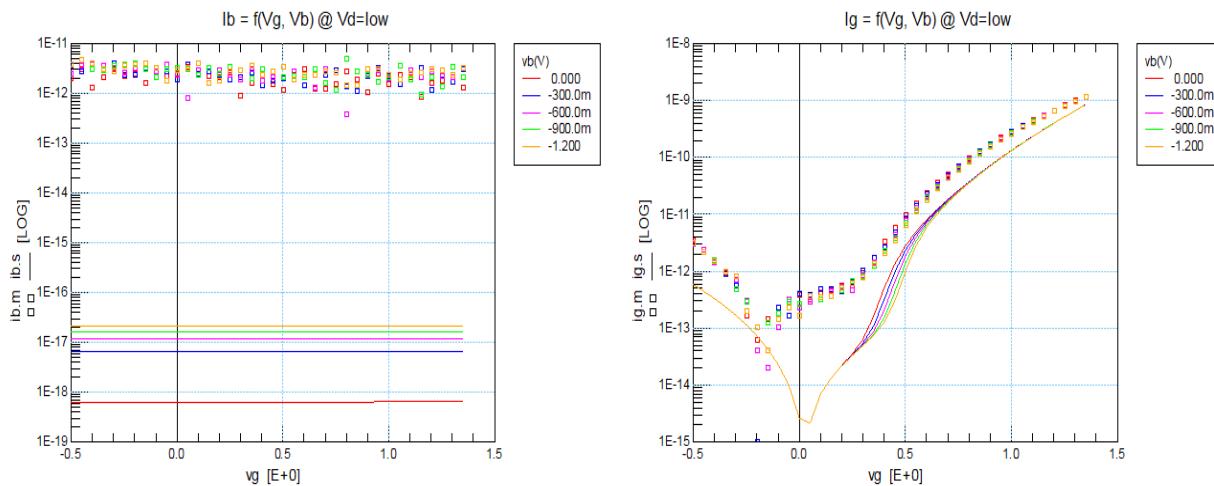
**idvd\_vbmin, Vb = -1.2V, T = 27°C**

**idvd\_vth, Vb = 0V, T = 27°C**




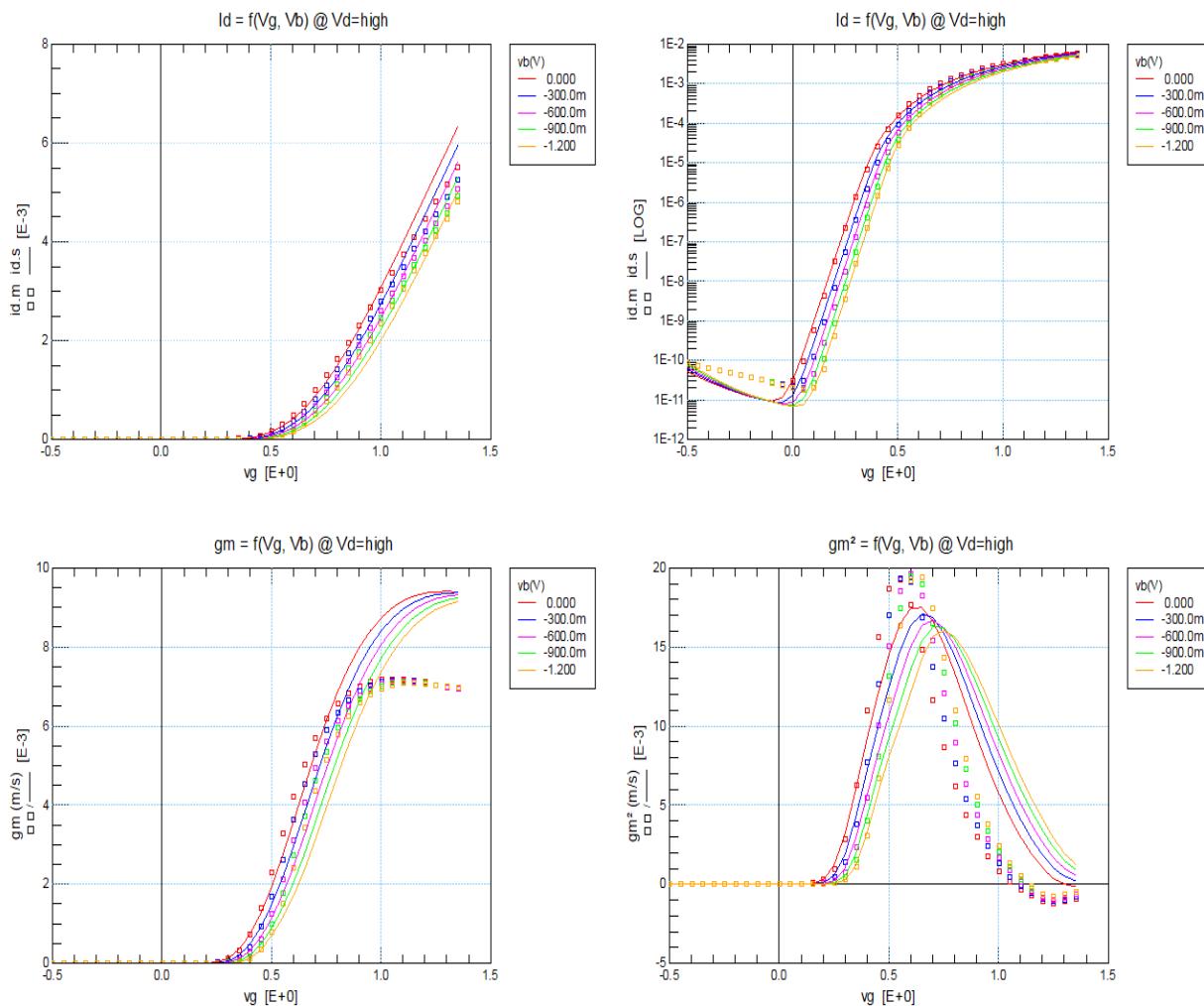
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

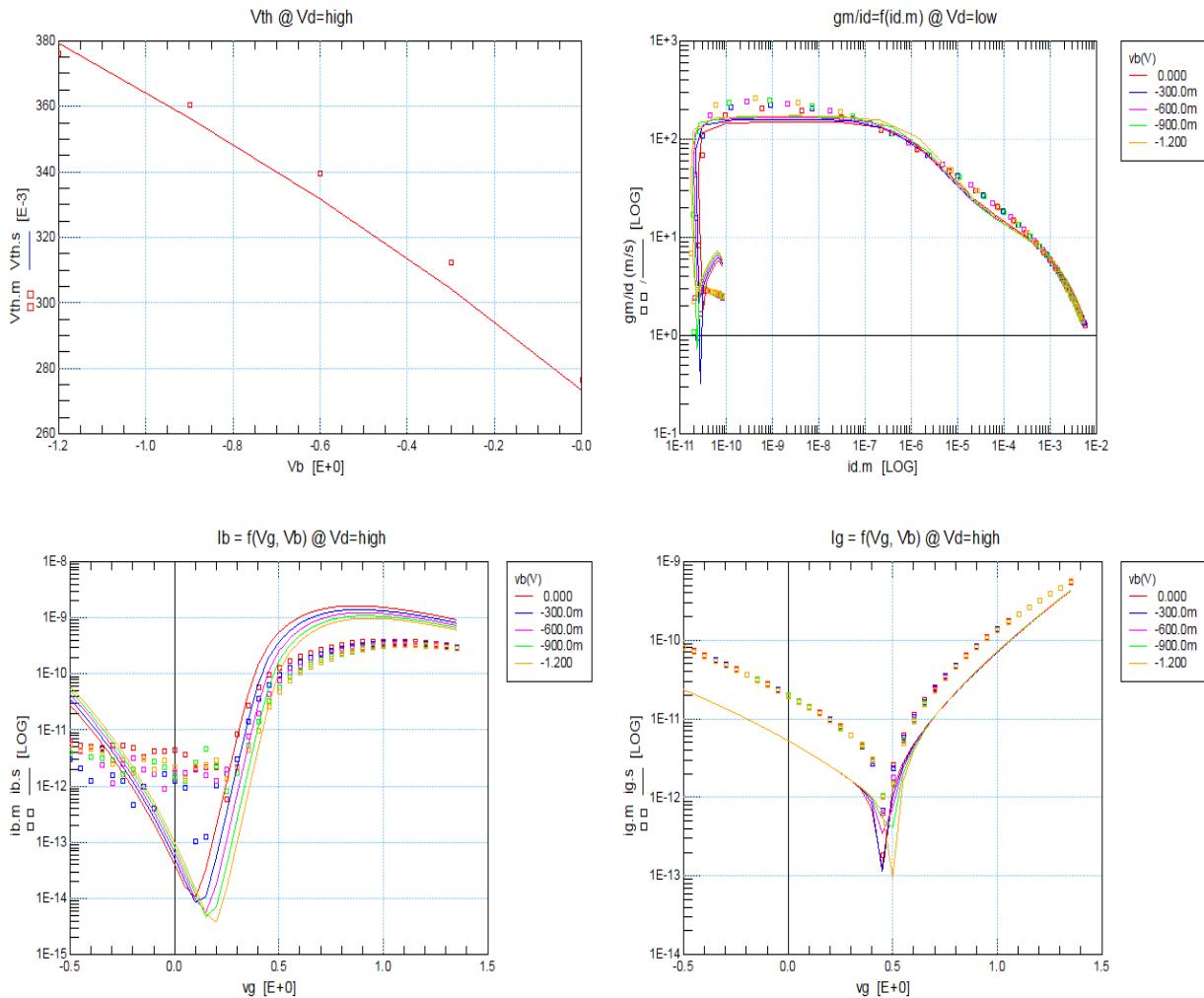


**idvg, Vd = 0.05V, T = -40°C**


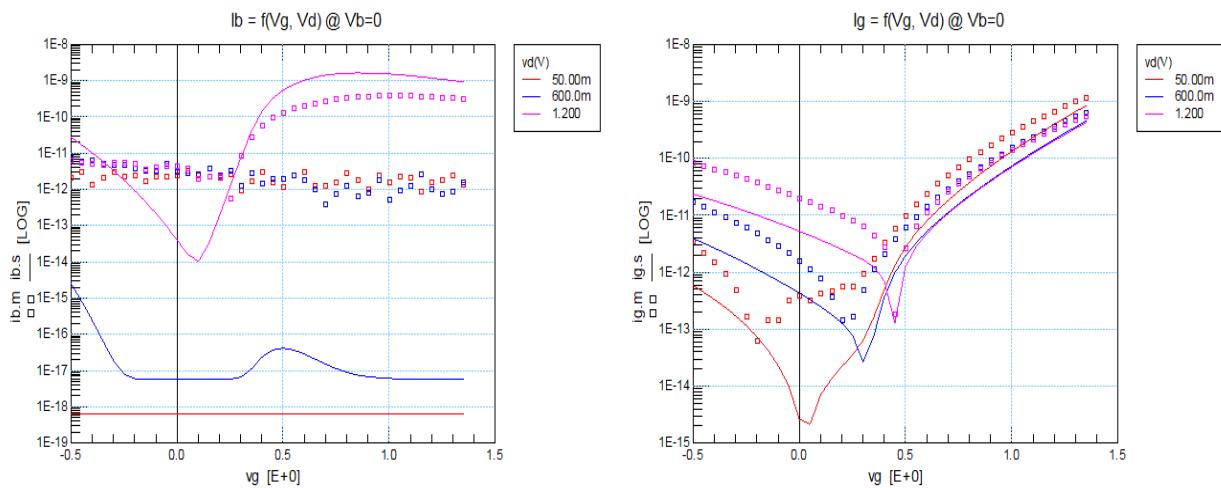


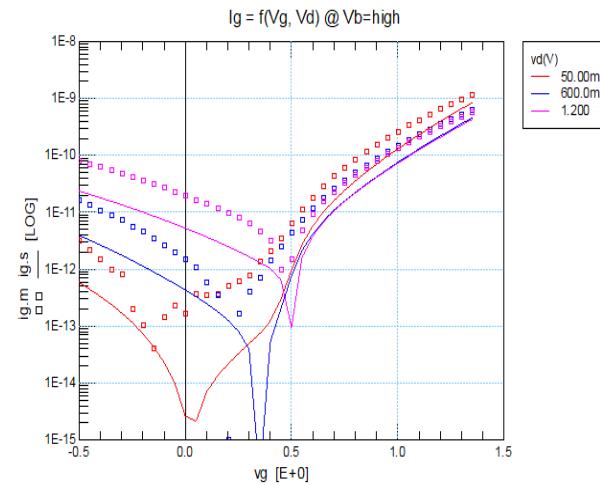
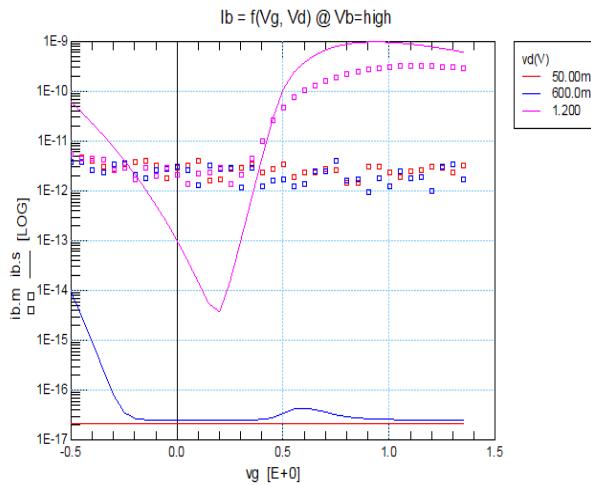
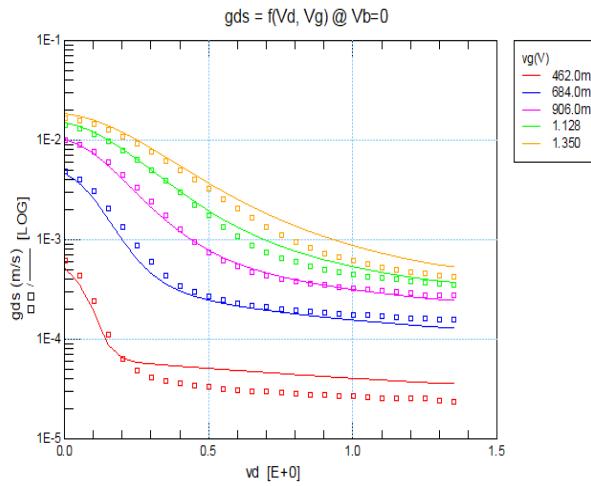
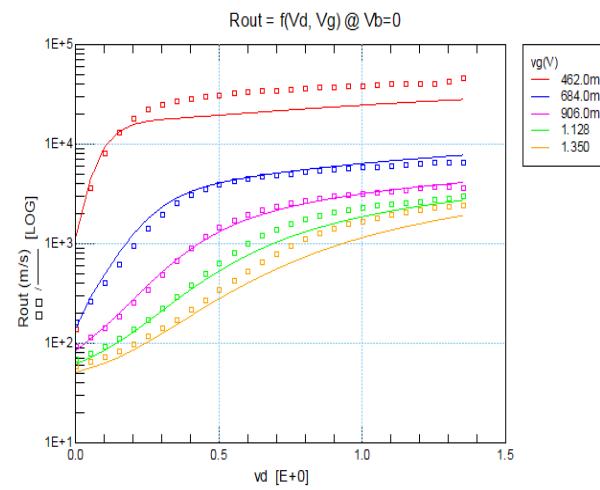
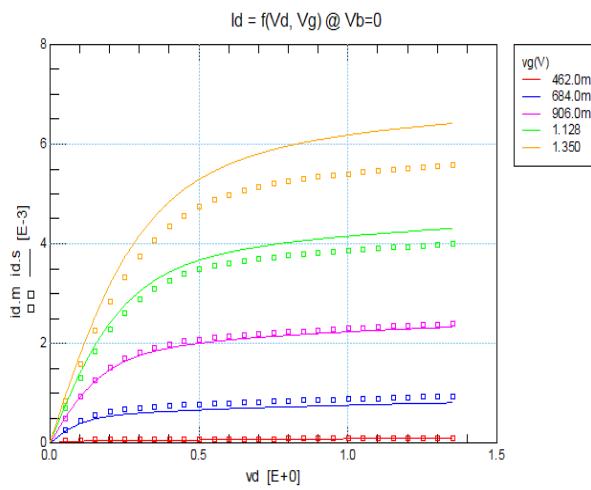
$idvg, Vd = 1.2V, T = -40^\circ C$

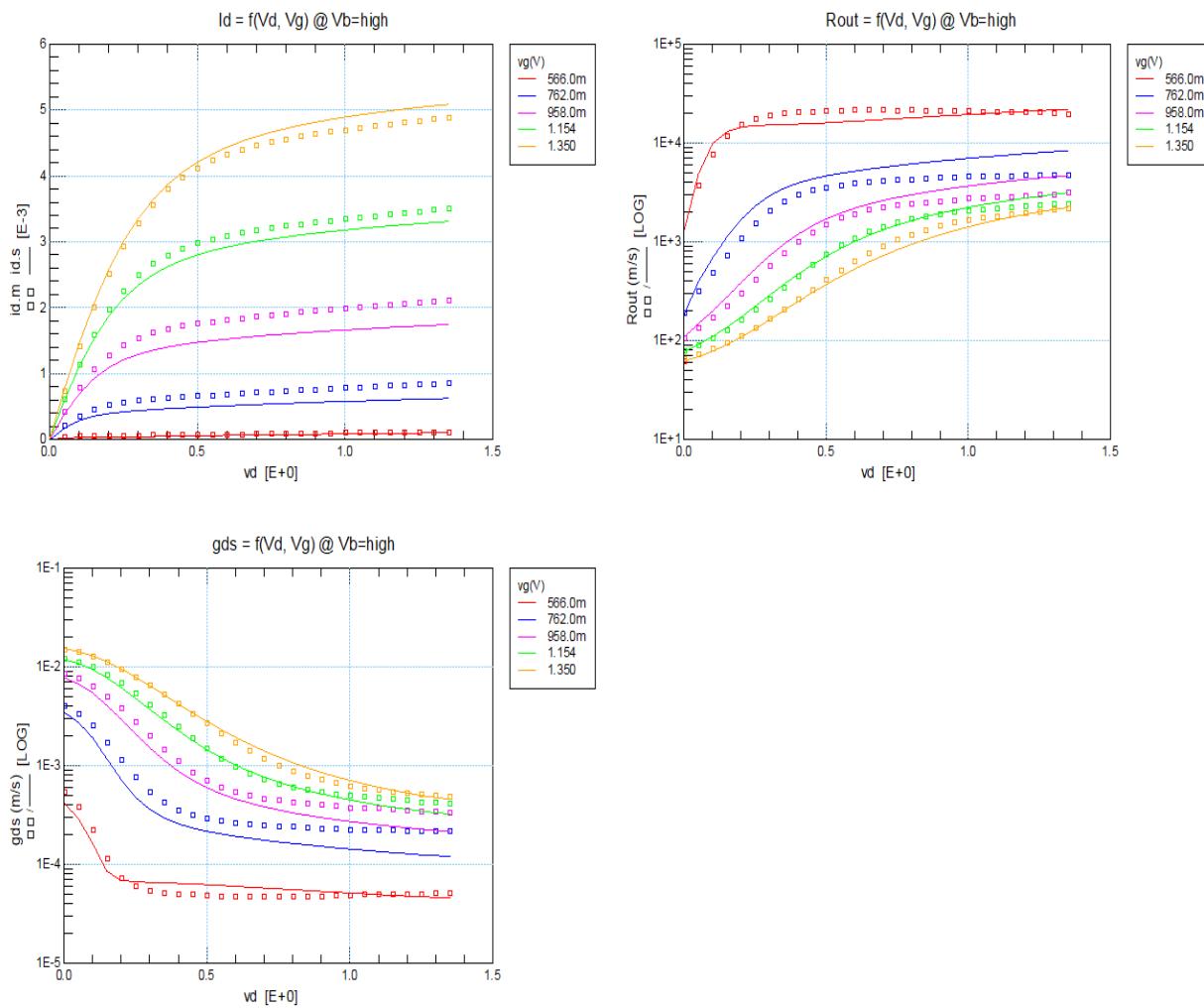
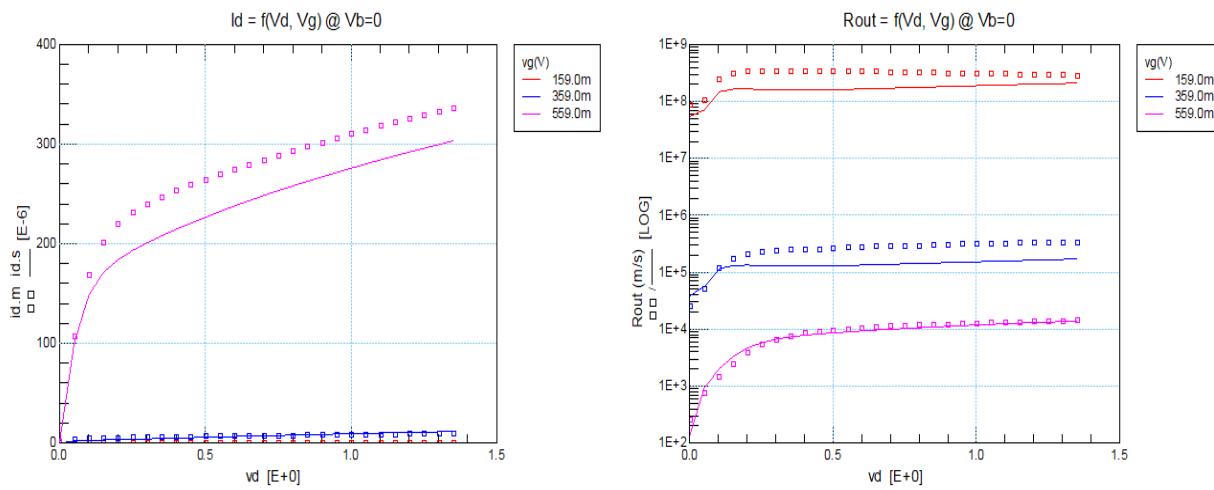


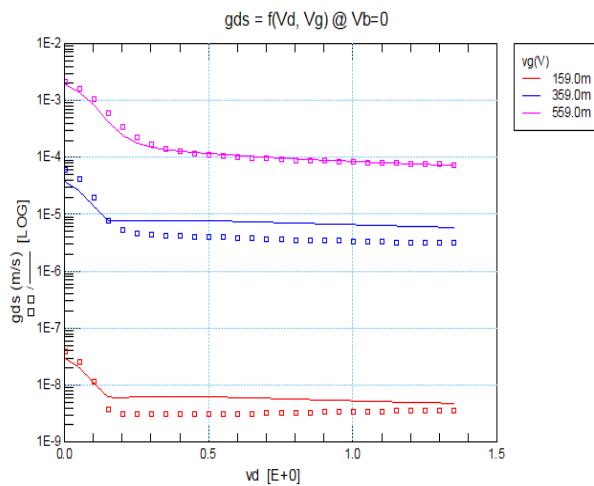


$id_{vg}, I_b, Ig, V_b = 0V, T = -40^\circ C$

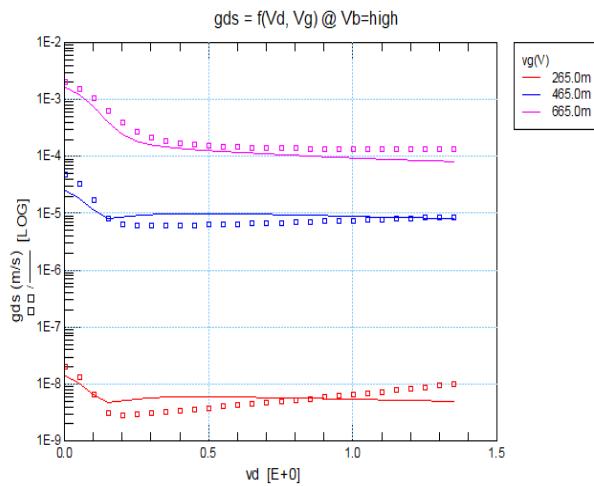
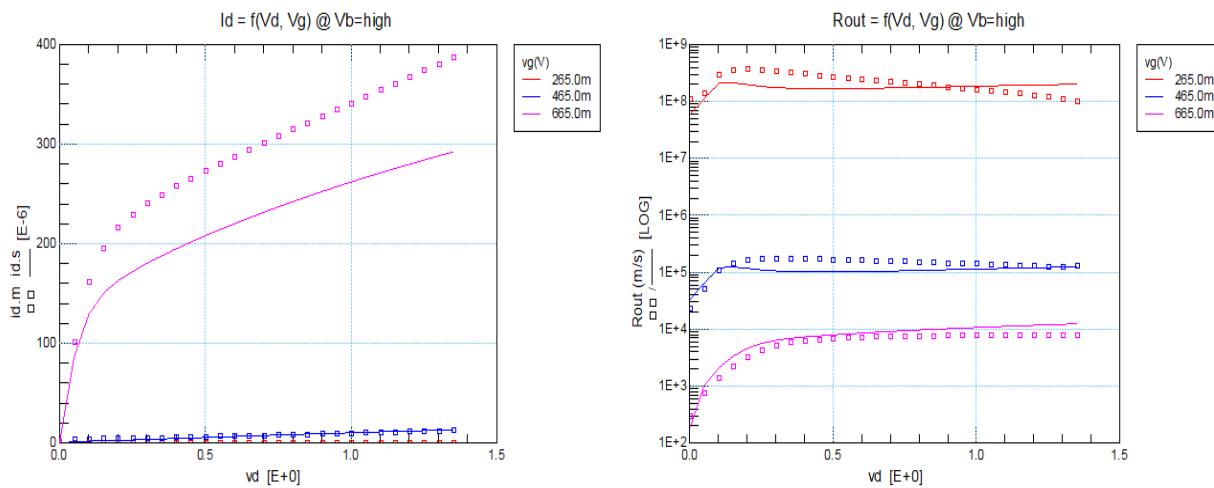


**idvg, Ib,Ig, Vb = -1.2V, T = -40°C**

**idvd, Vb = 0V, T = -40°C**


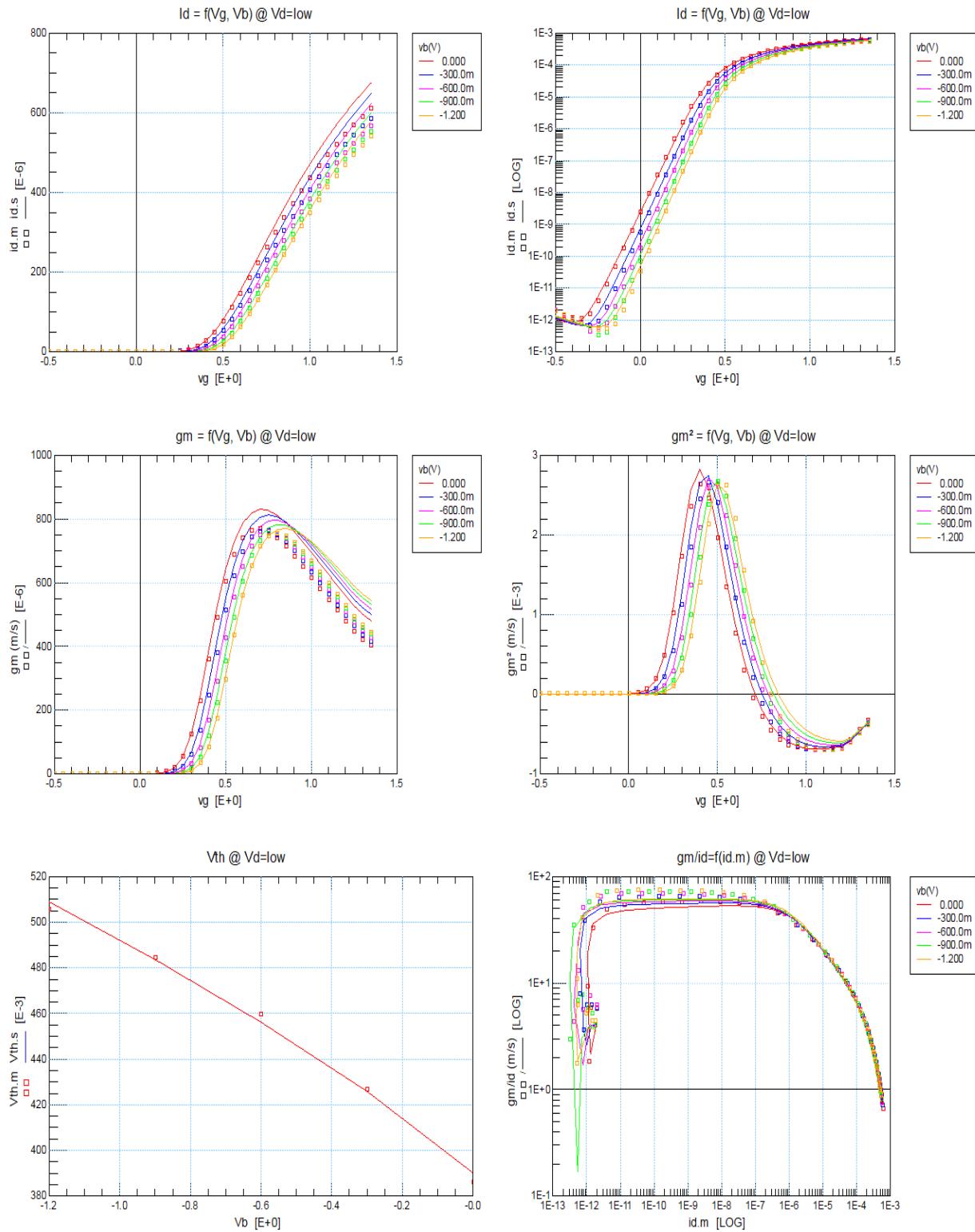
**idvd\_vbmin, Vb = -1.2V, T = -40°C****idvd\_vth, Vb = 0V, T = -40°C**

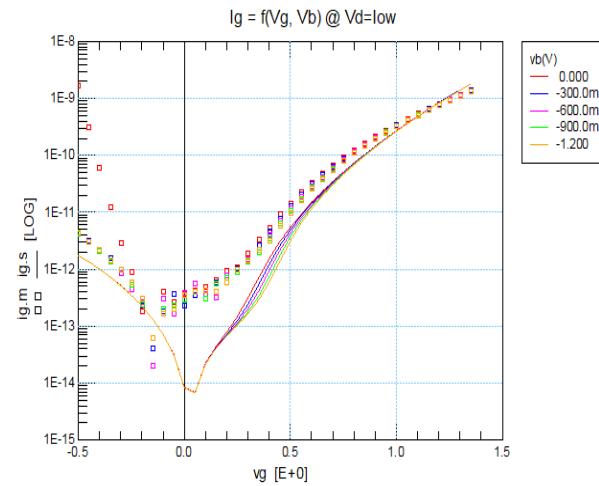
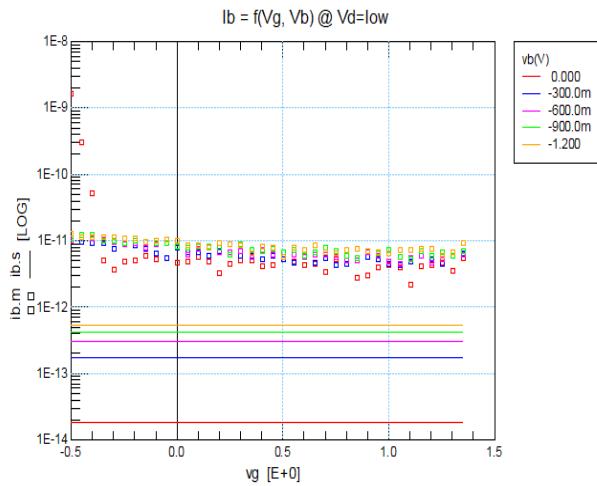


idvd\_vth\_vbmin, Vb = -1.2V, T = -40°C

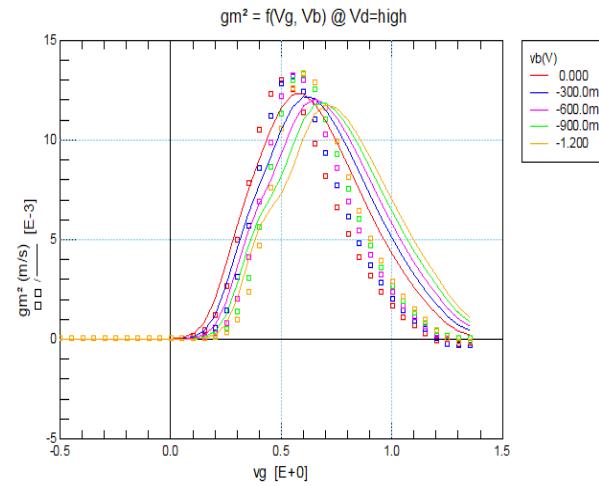
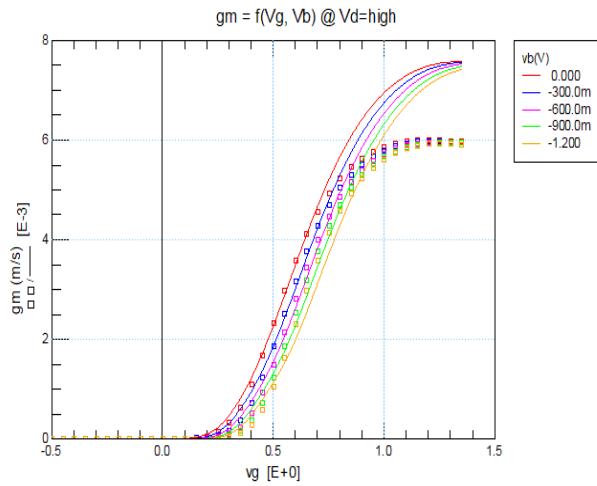
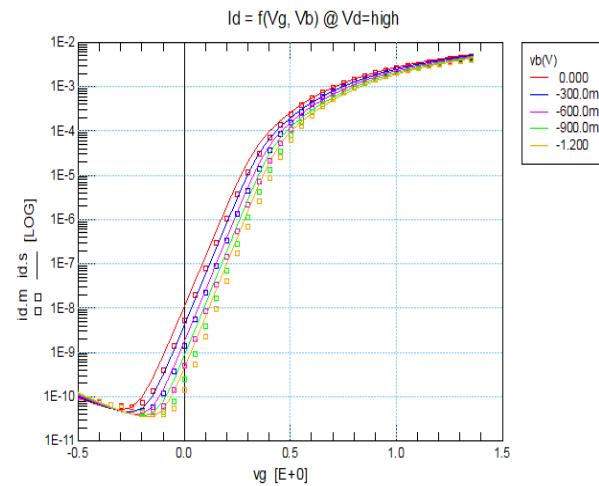
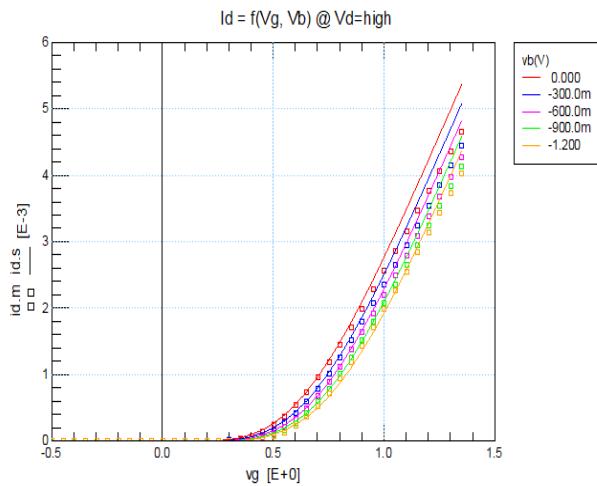


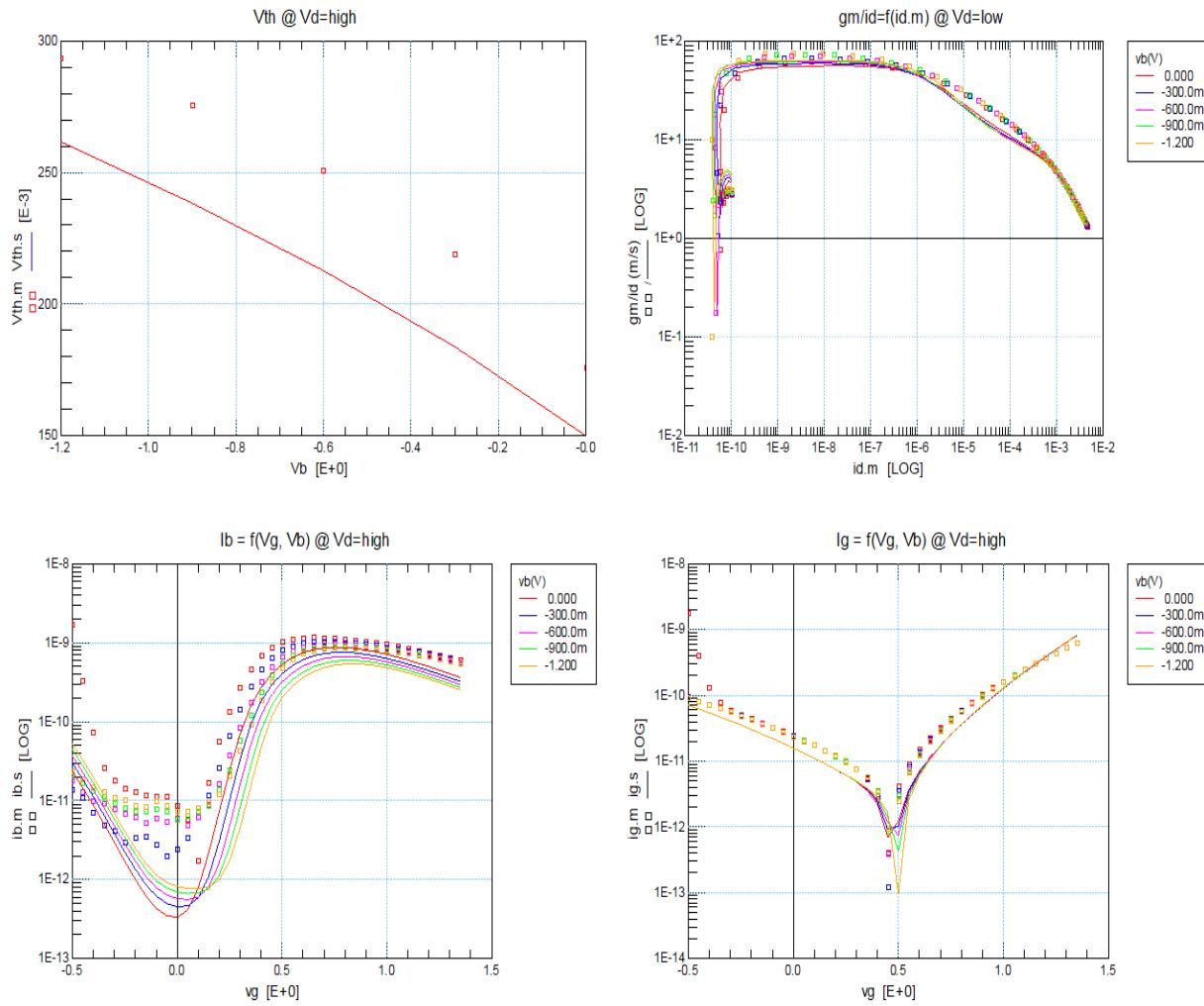
**idvg, Vd = 0.05V, T = 70°C**



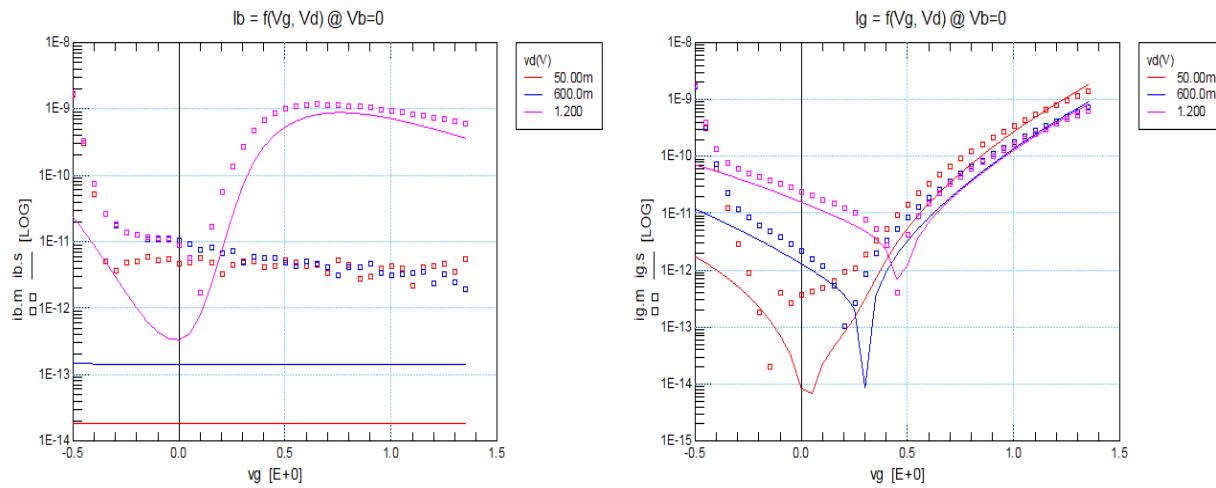


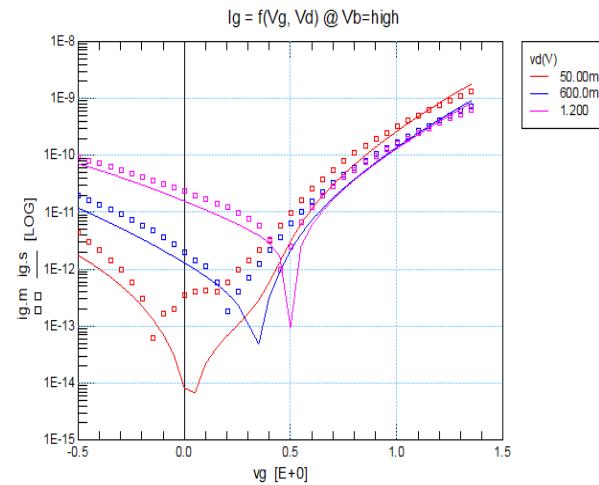
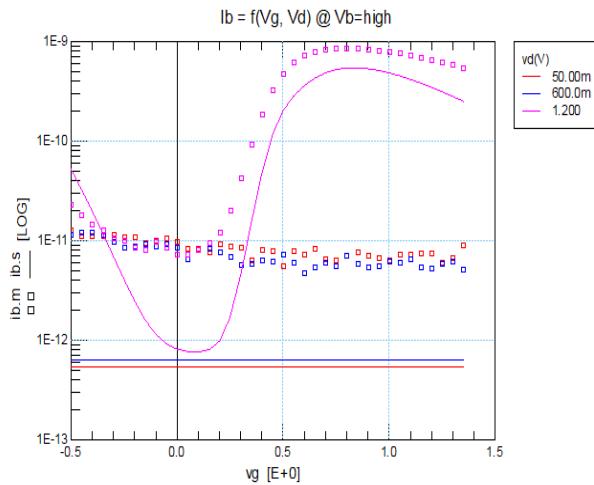
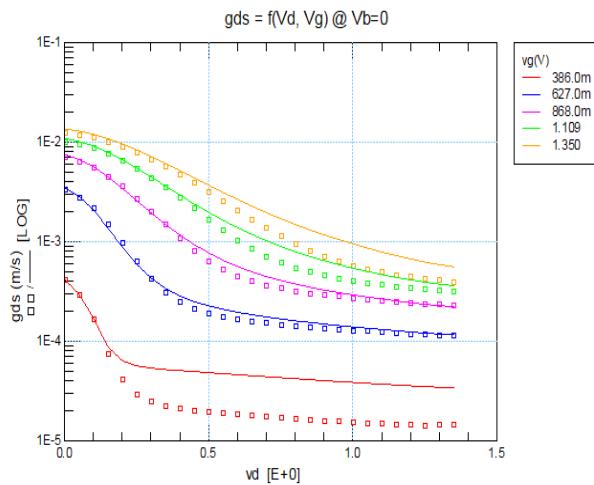
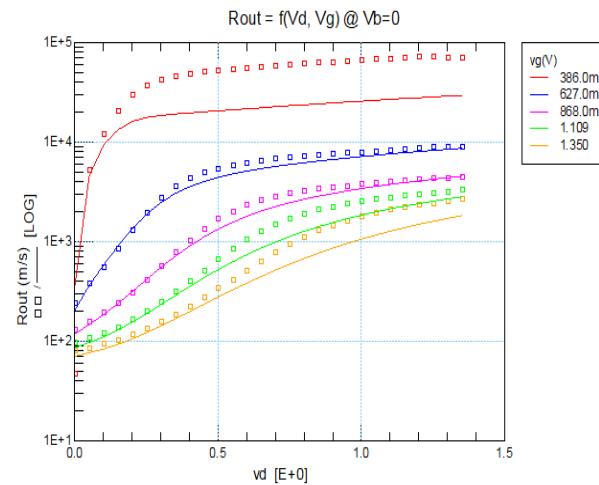
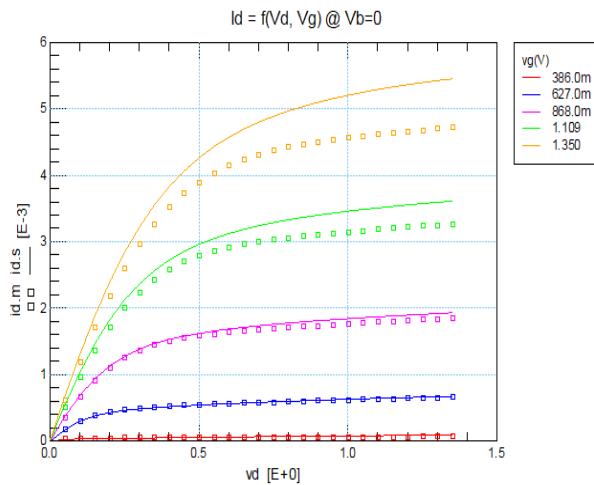
### $i_{dvg}, V_d = 1.2V, T = 70^\circ C$

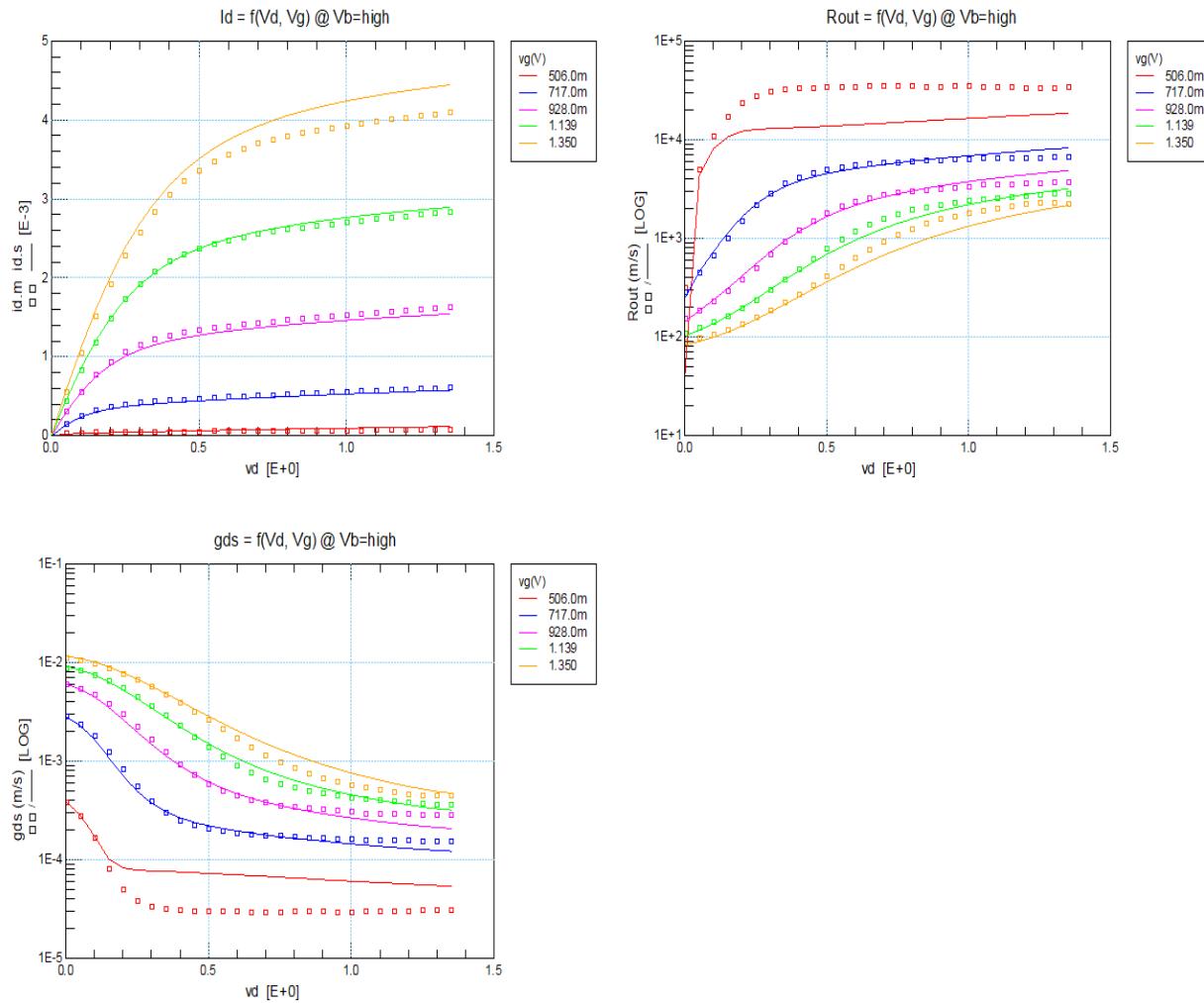
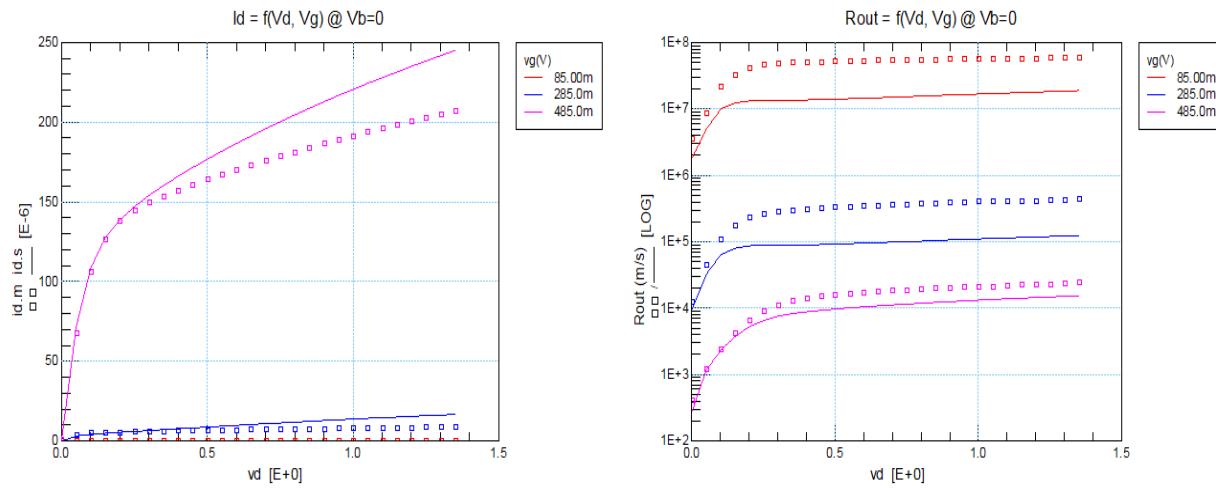


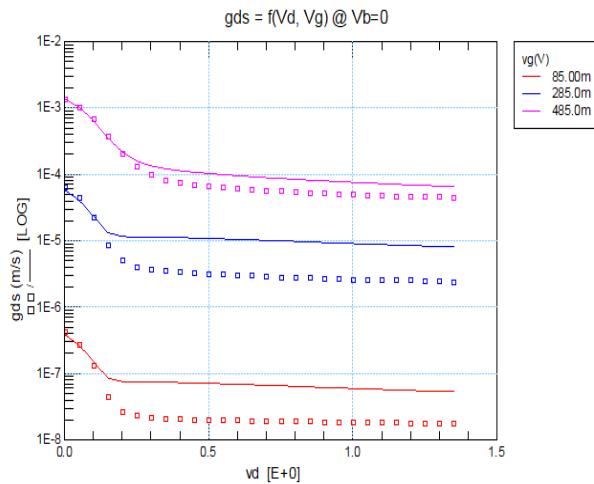


### $idvg, I_b, I_g, V_b = 0V, T = 70^\circ C$

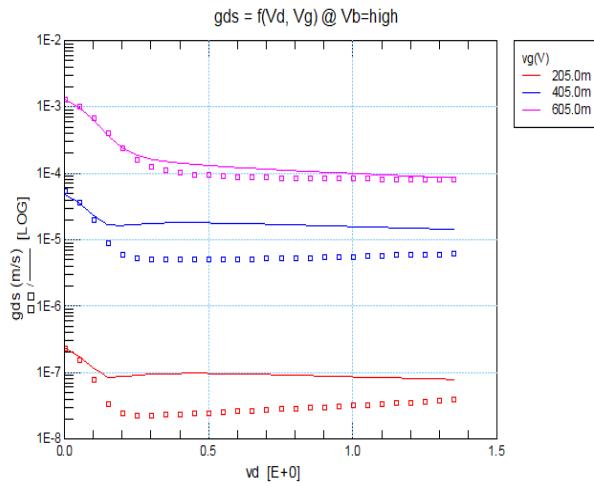
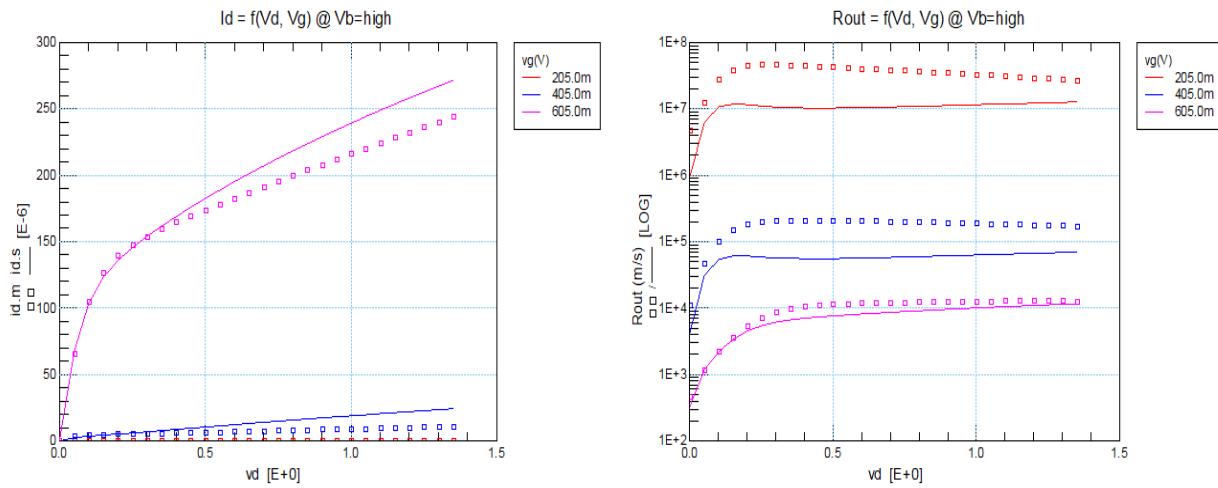


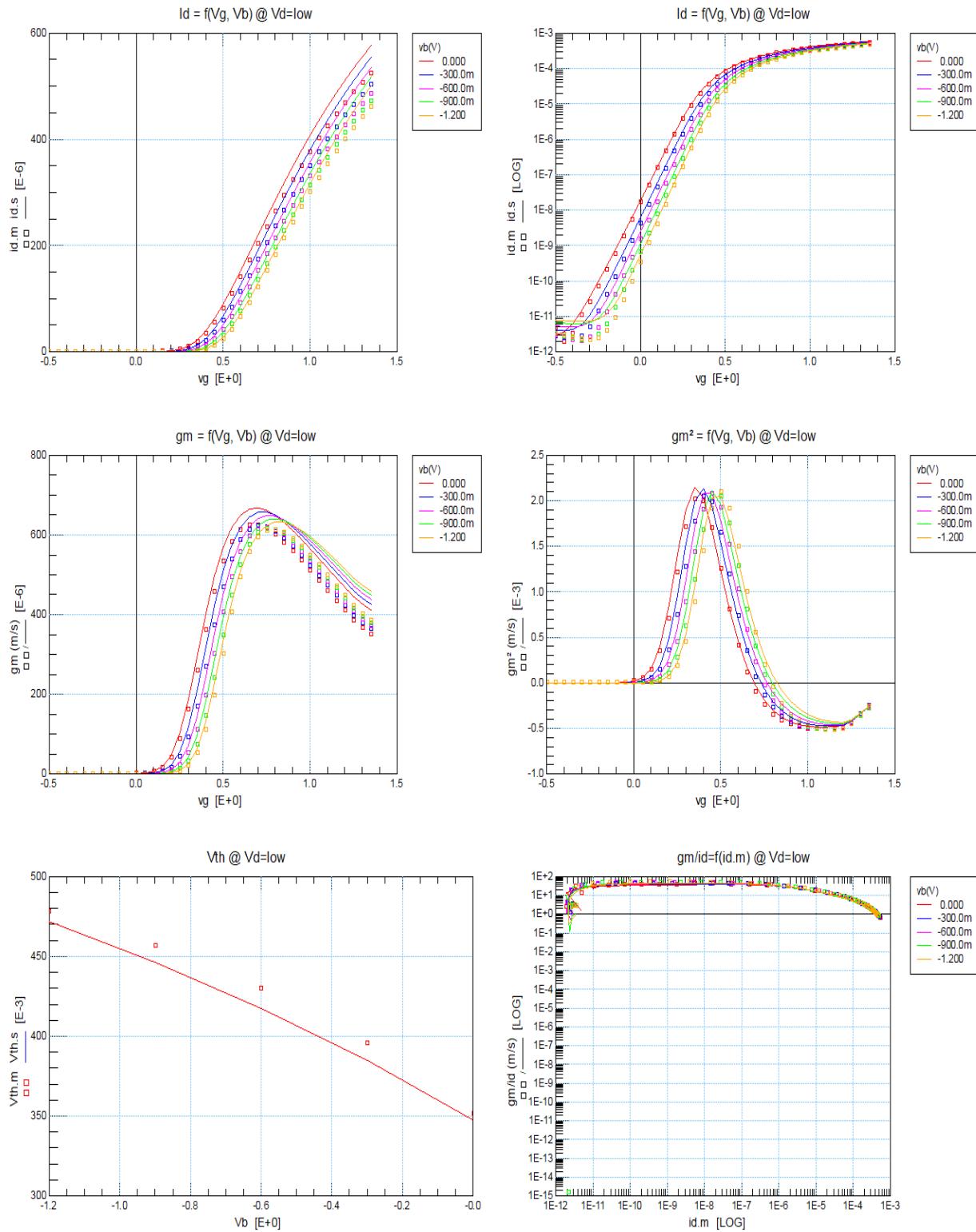
**idvg, Ib,Ig, Vb = -1.2V, T = 70°C**

**idvd, Vb = 0V, T = 70°C**


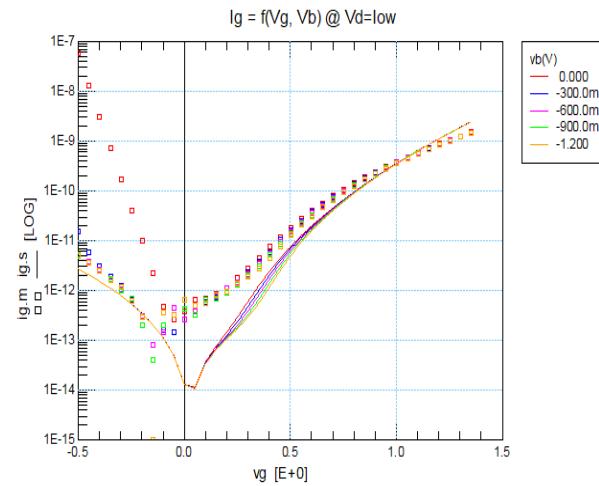
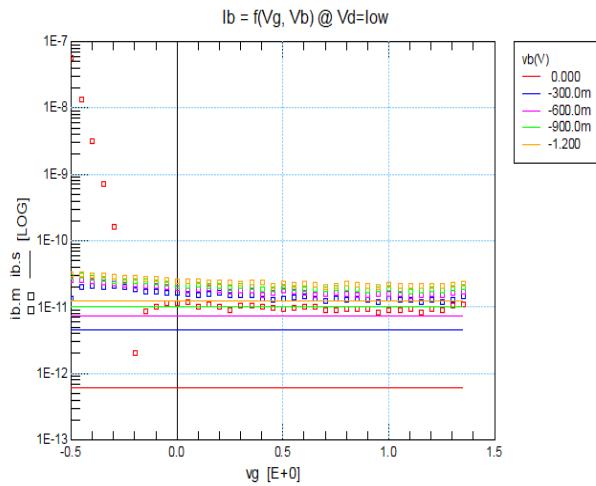
**idvd\_vbmin, Vb = -1.2V, T = 70°C**

**idvd\_vth, Vb = 0V, T = 70°C**




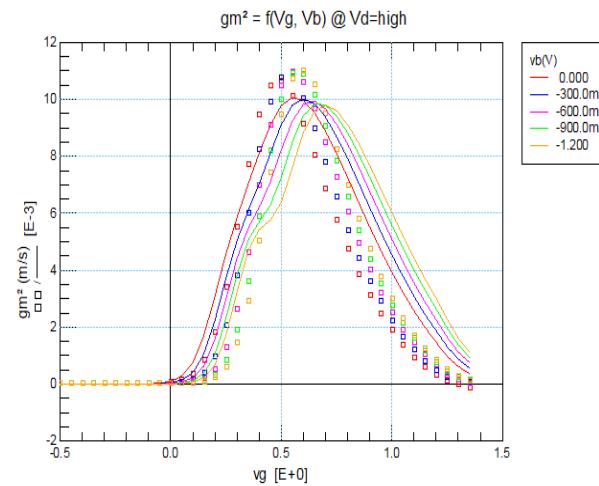
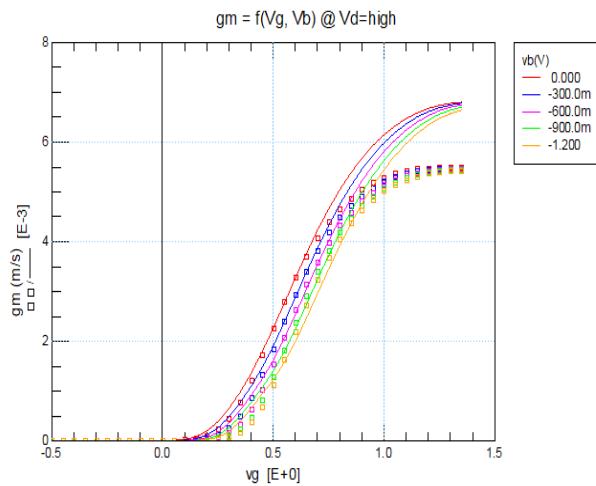
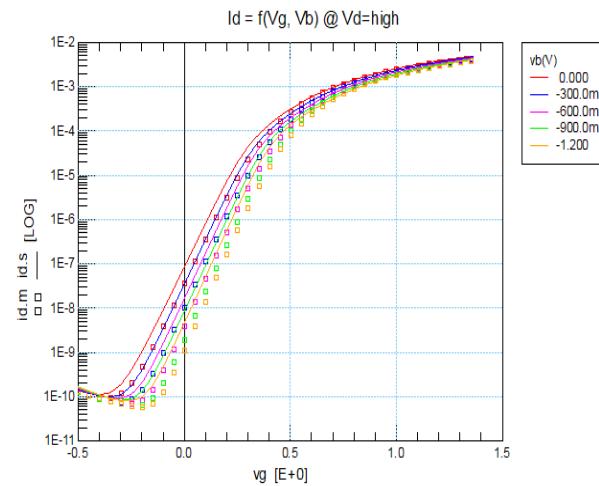
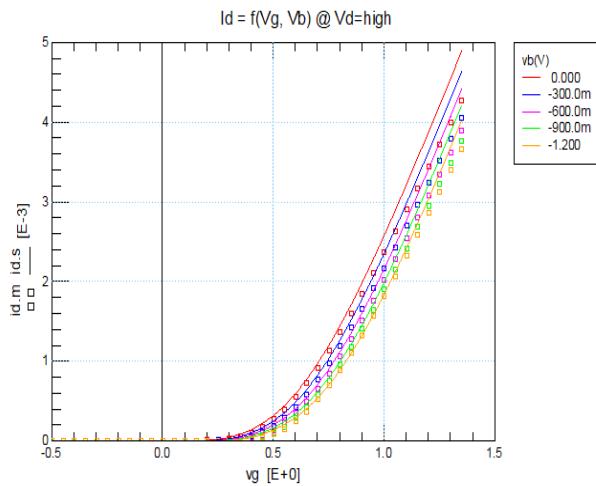
### idvd\_vth\_vbmin, Vb = -1.2V, T = 70°C

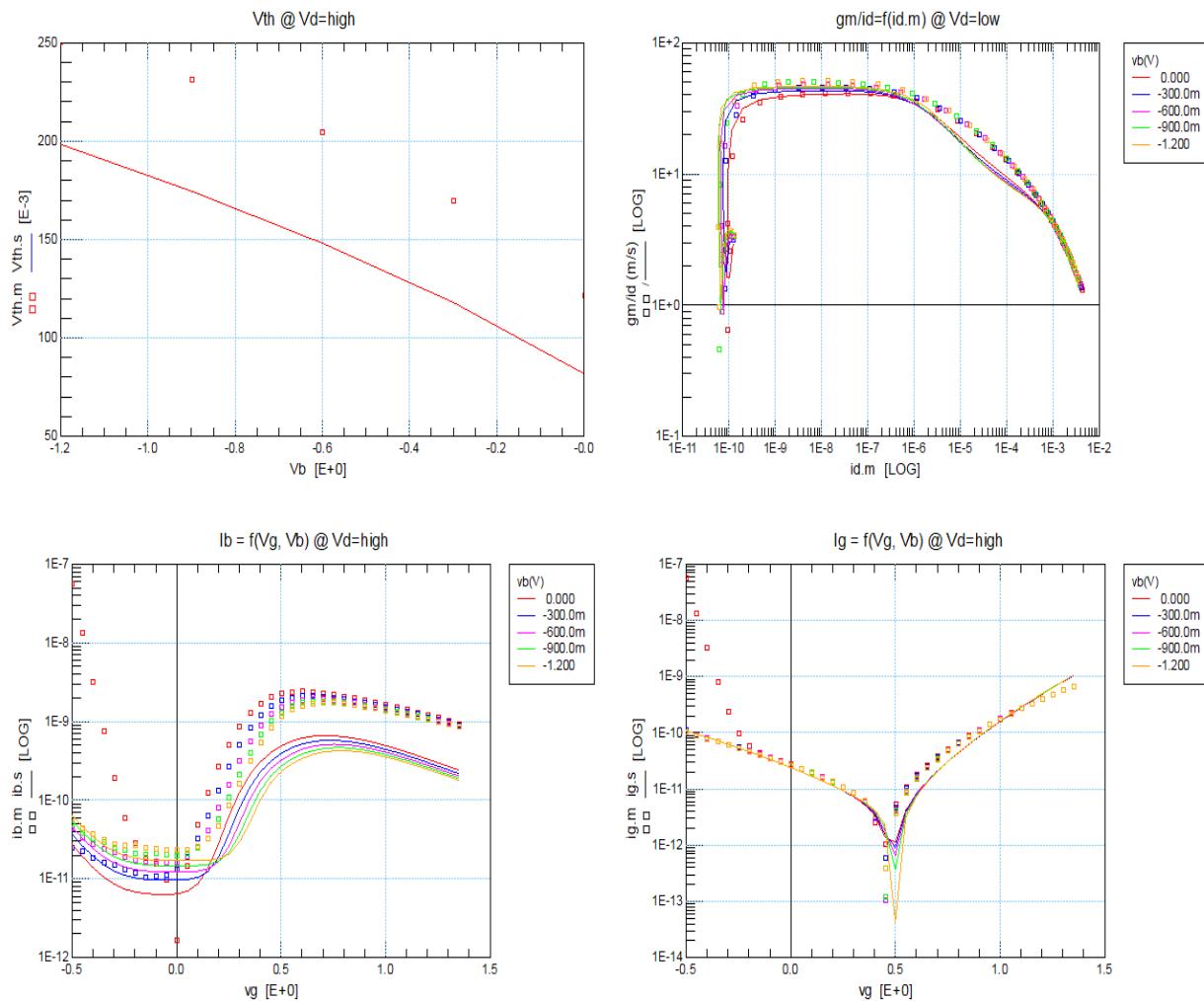


**idvg, Vd = 0.05V, T = 125°C**


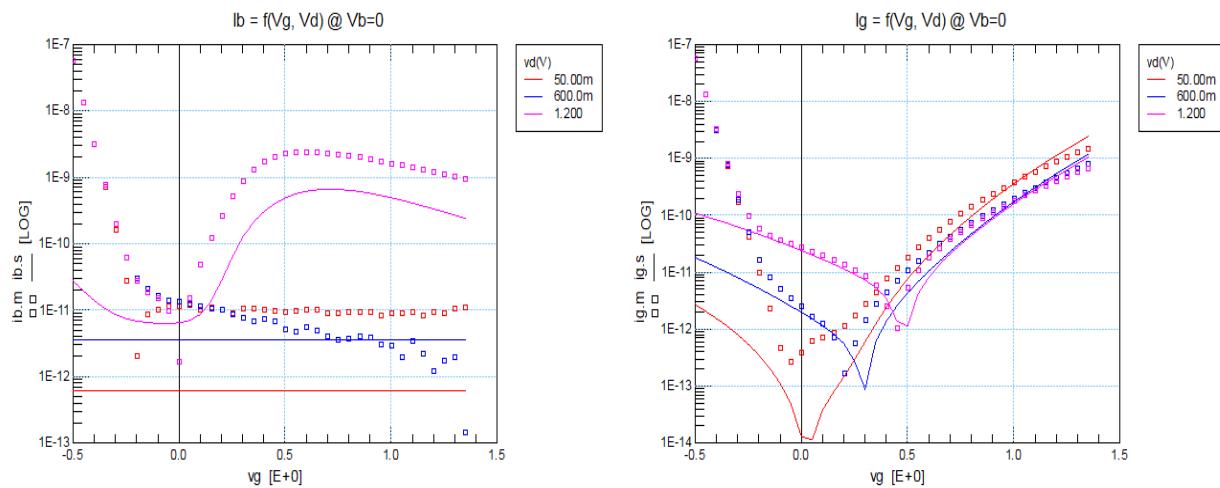


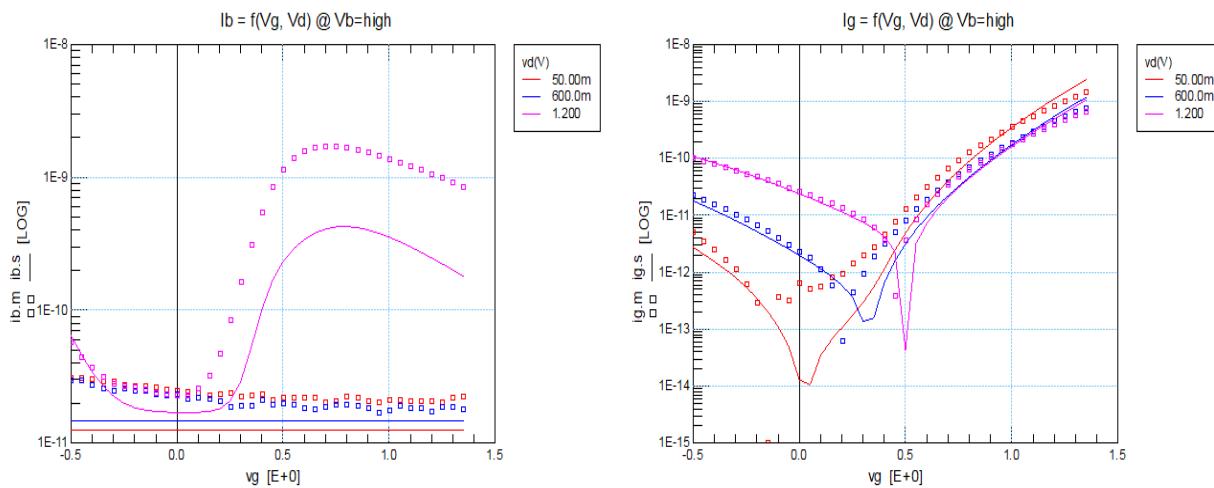
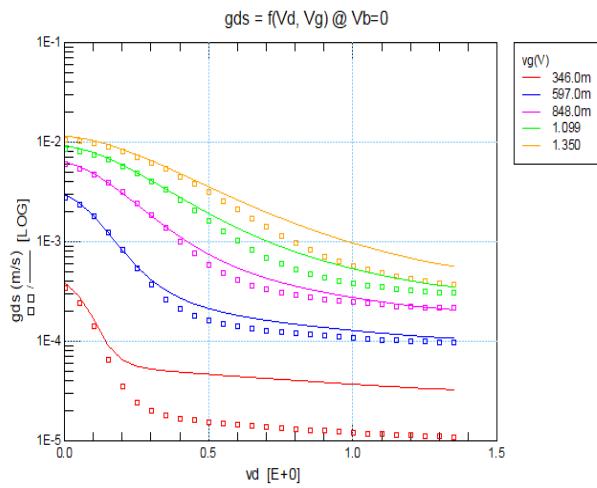
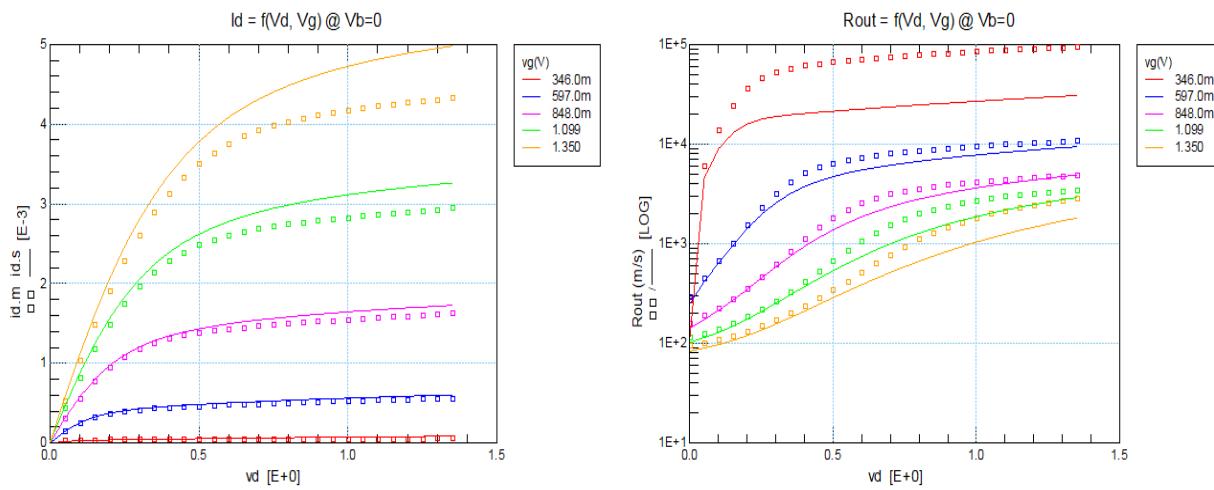
$i_{dvg}, V_d = 1.2V, T = 125^{\circ}C$

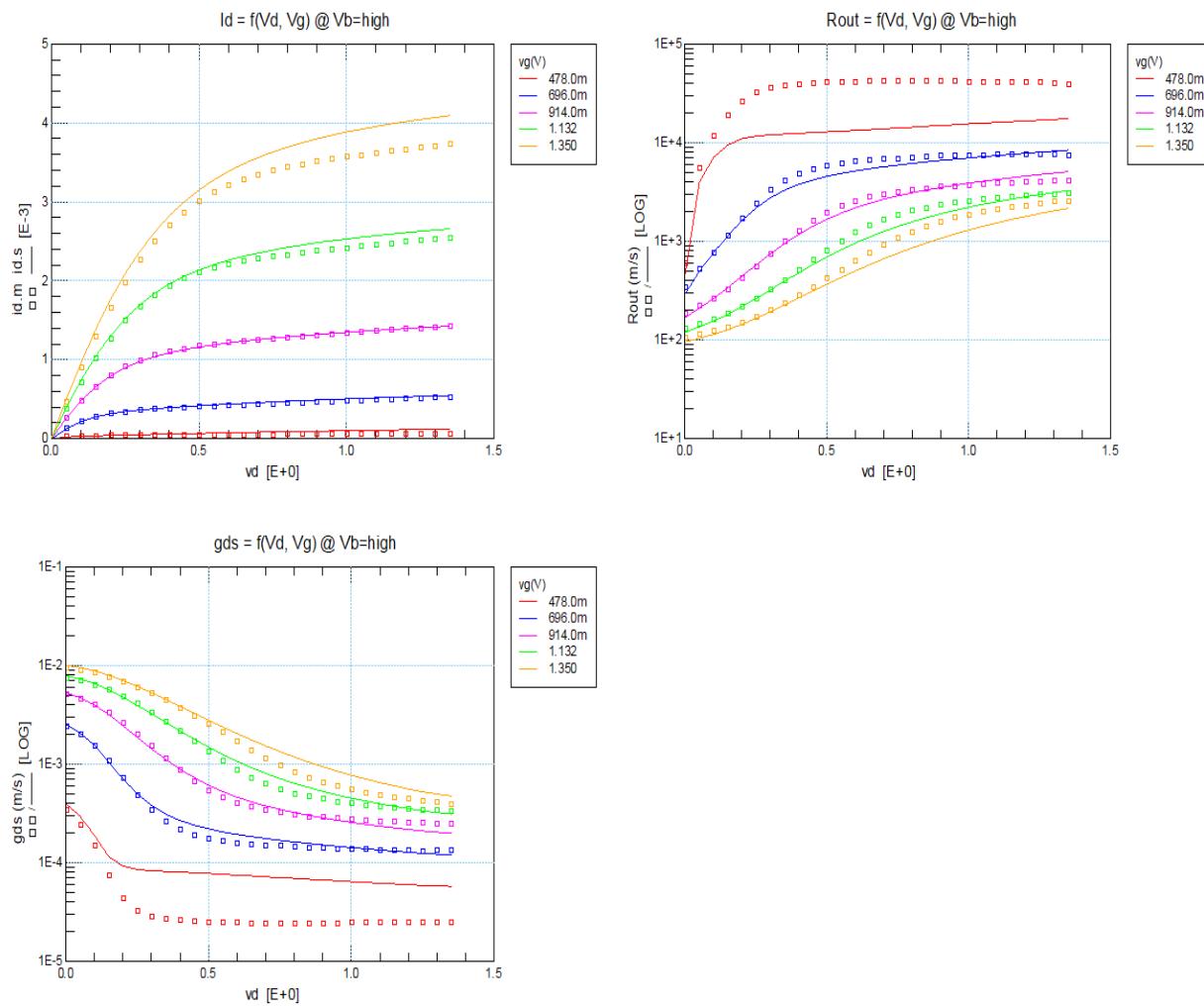
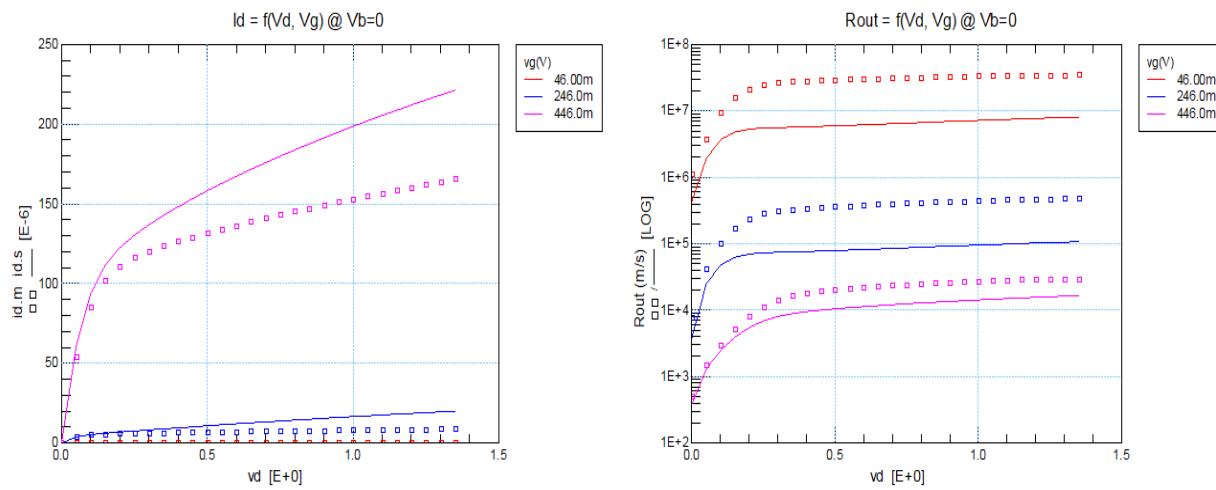


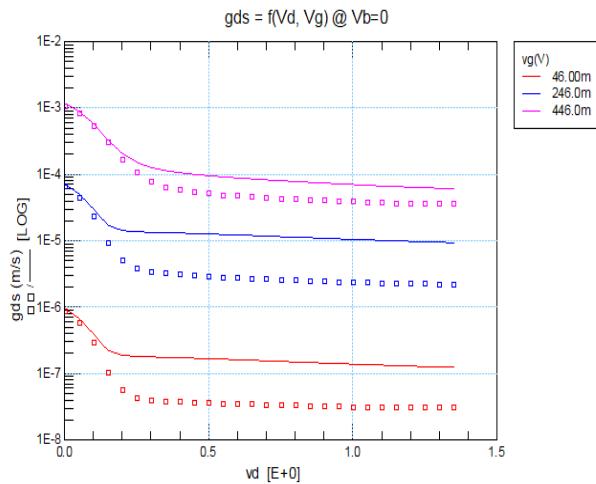


$i_{dvg}, I_b, I_g, V_b = 0V, T = 125^\circ\text{C}$

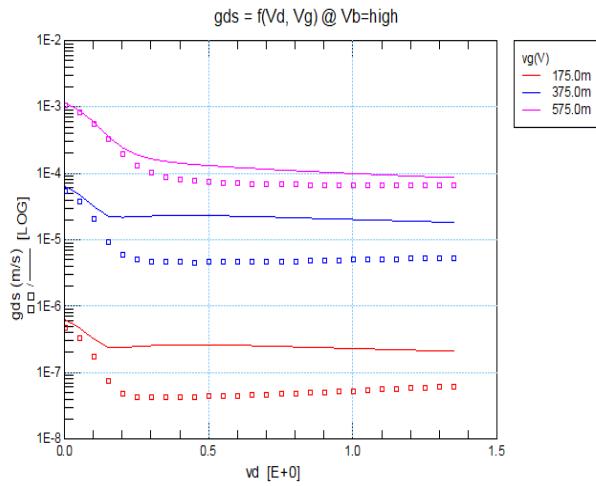
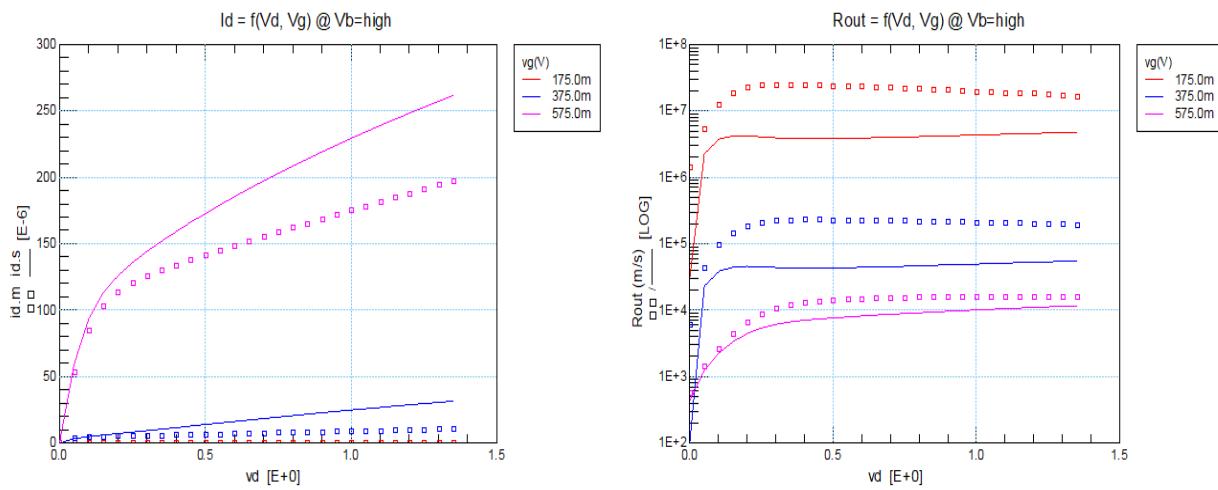


**idvg, Ib,Ig, Vb = -1.2V, T = 125°C**

**idvd, Vb = 0V, T = 125°C**


**idvd\_vbmin, Vb = -1.2V, T = 125°C****idvd\_vth, Vb = 0V, T = 125°C**

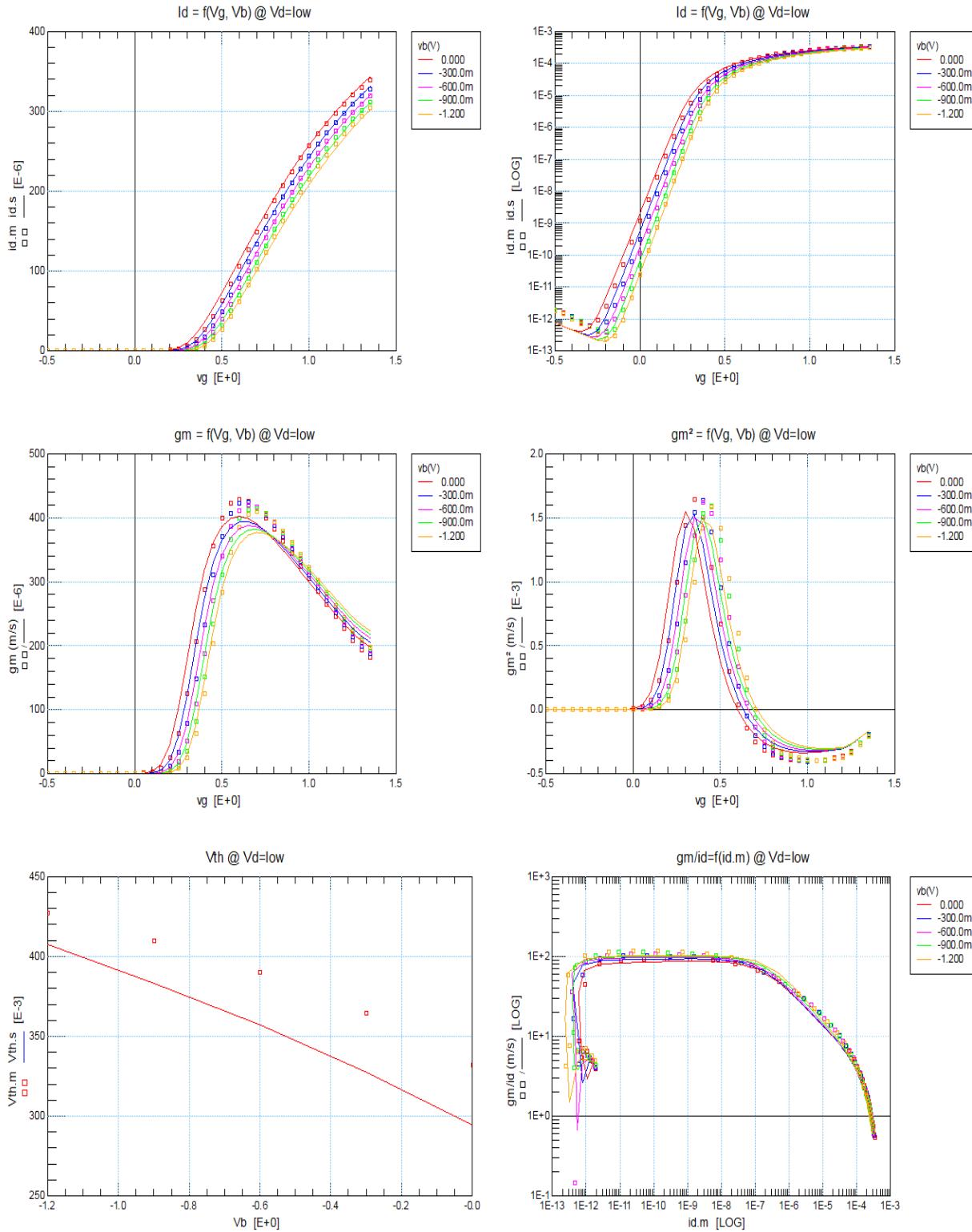


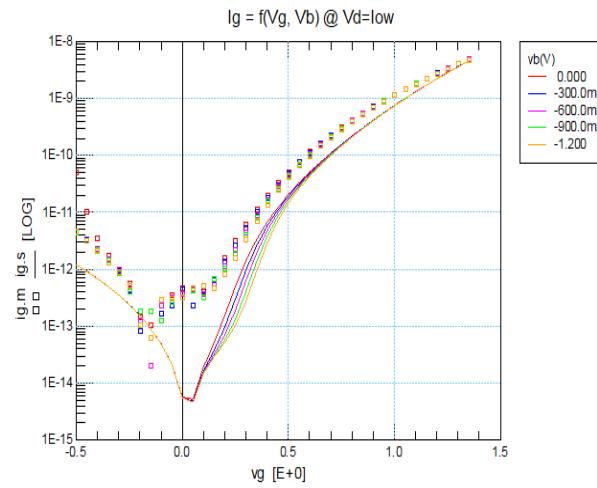
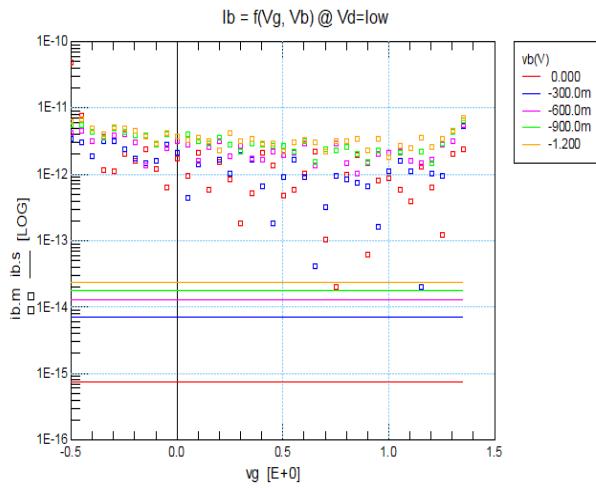
### idvd\_vth\_vbmin, Vb = -1.2V, T = 125°C



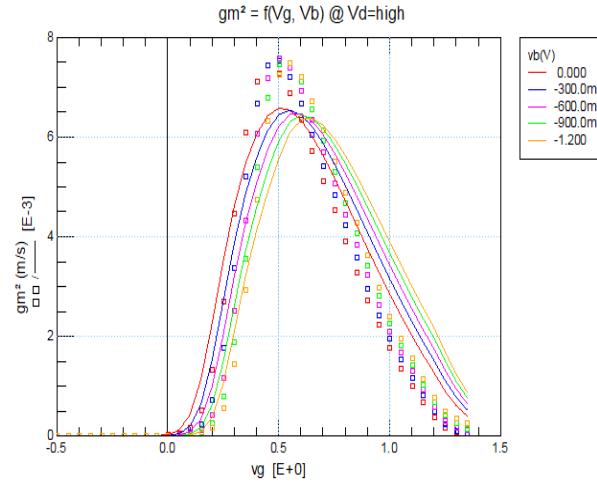
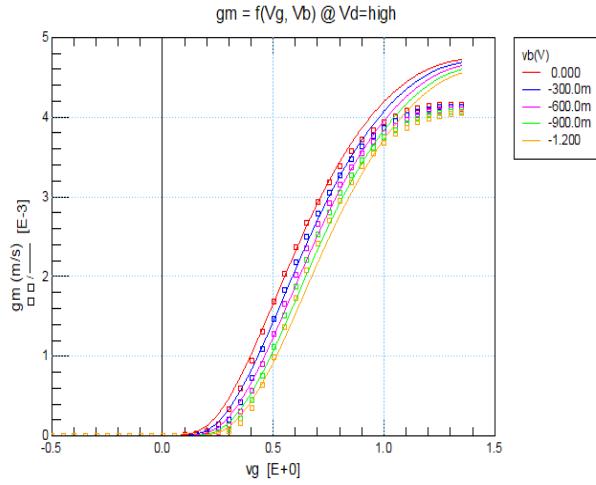
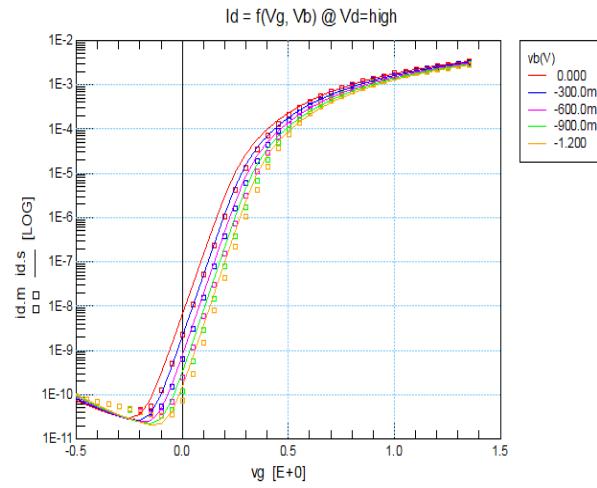
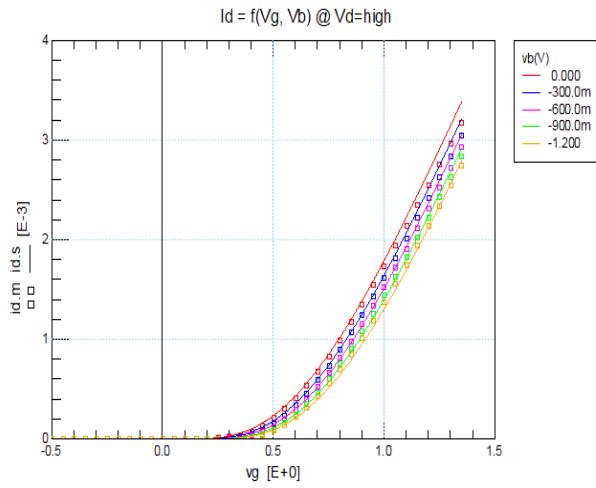
## 4.9 W10u0\_L0u5\_S541\_1

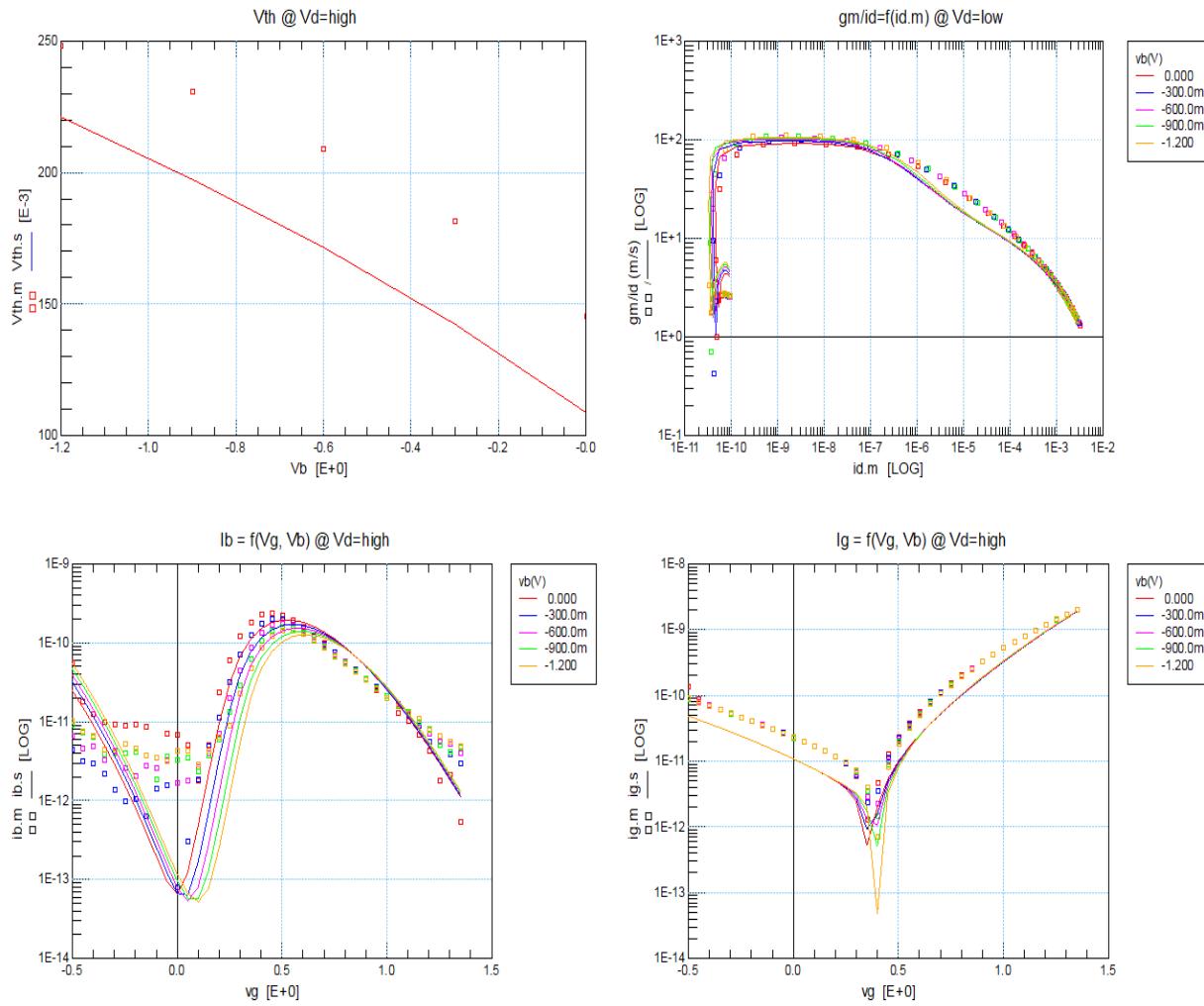
$idvg$ ,  $Vd = 0.05V$ ,  $T = 27^\circ C$



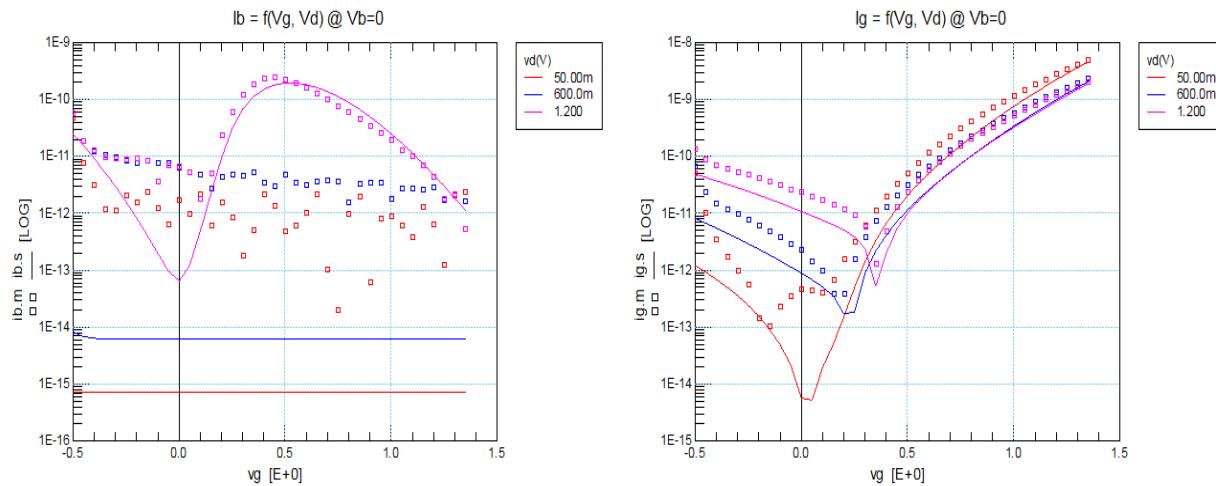


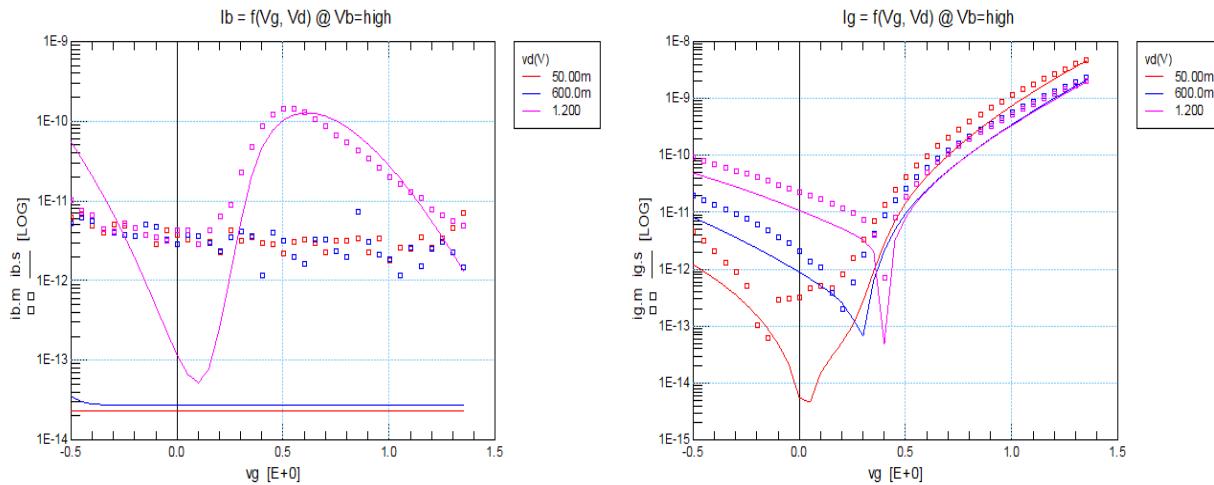
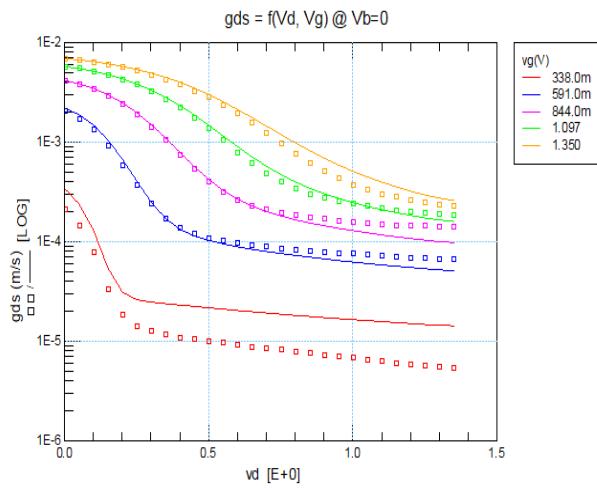
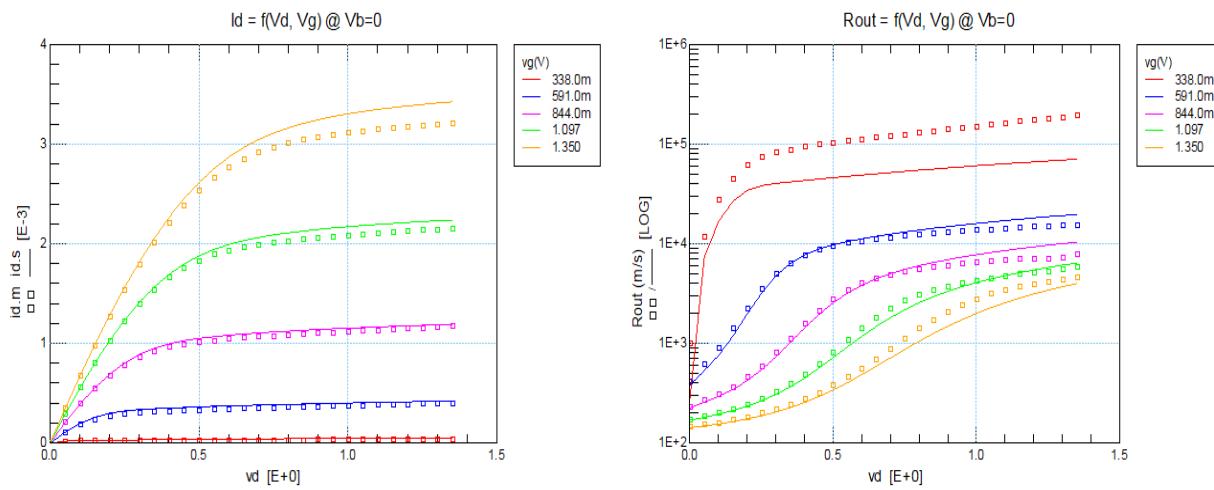
### $i_{dvg}, V_d = 1.2V, T = 27^\circ C$

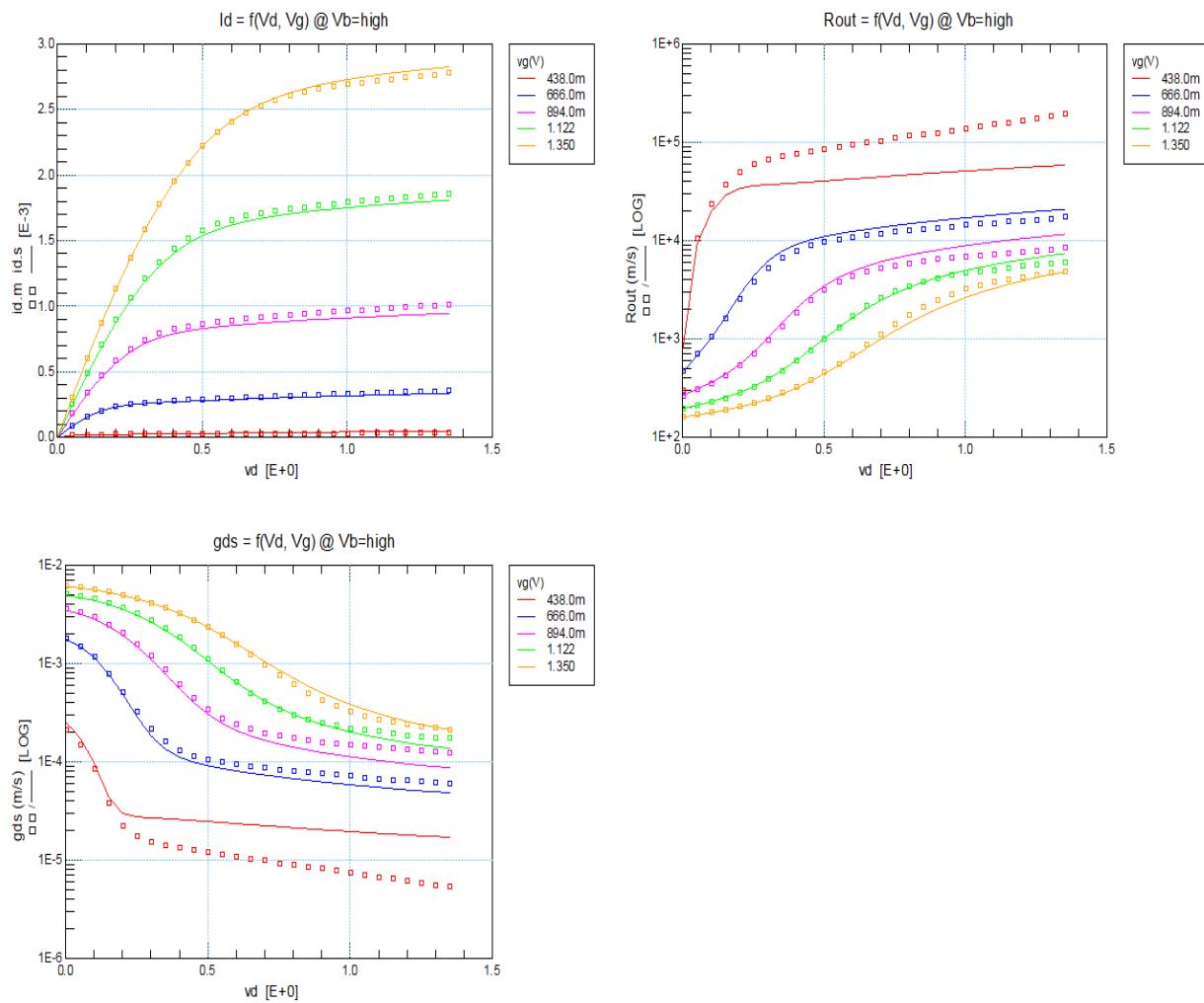
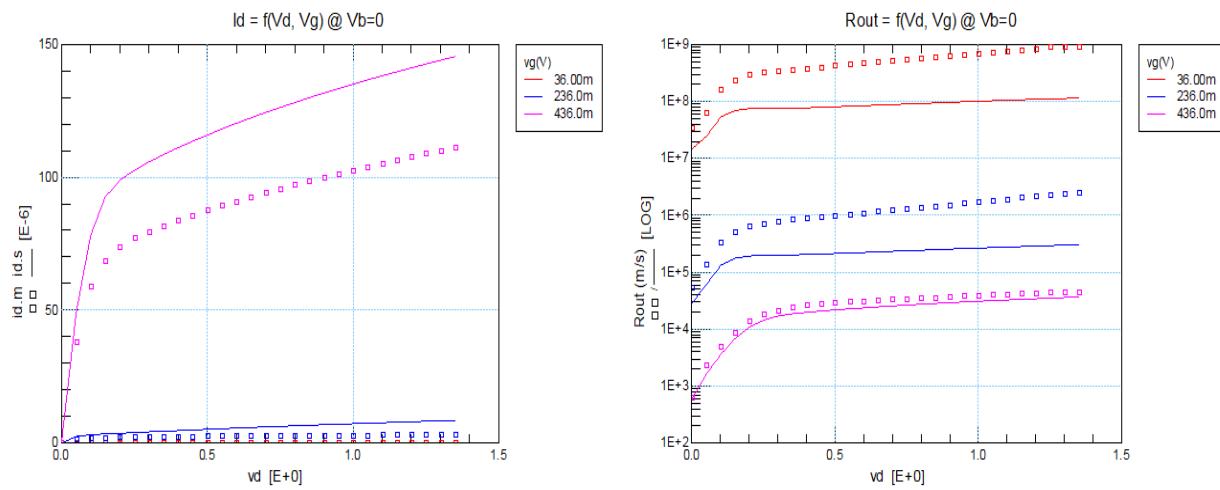


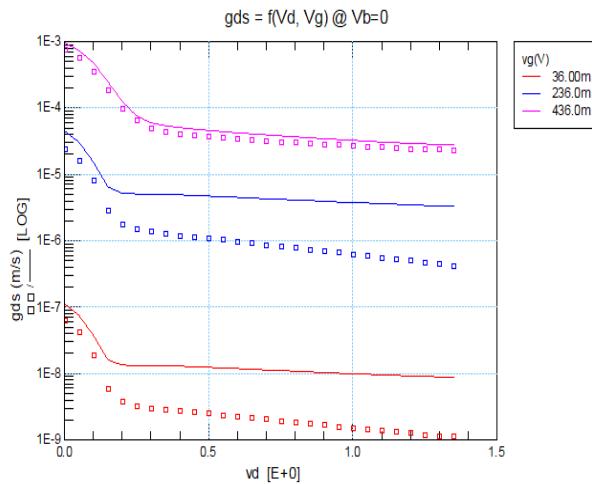


### $idvg, Ib, Ig, Vb = 0V, T = 27^\circ C$

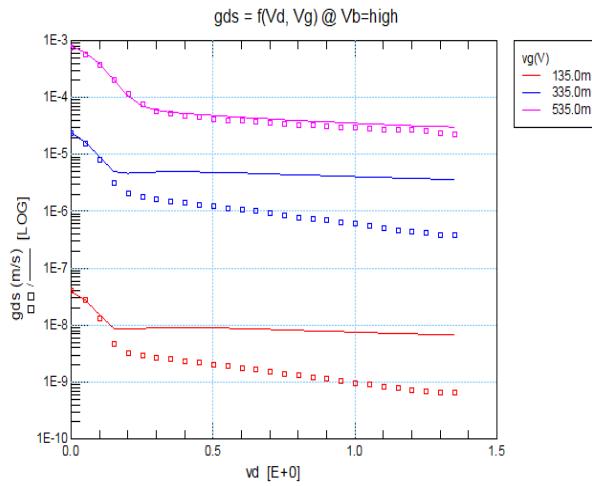
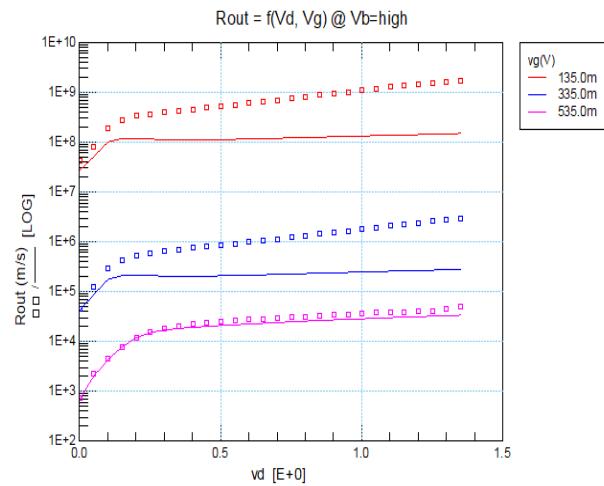
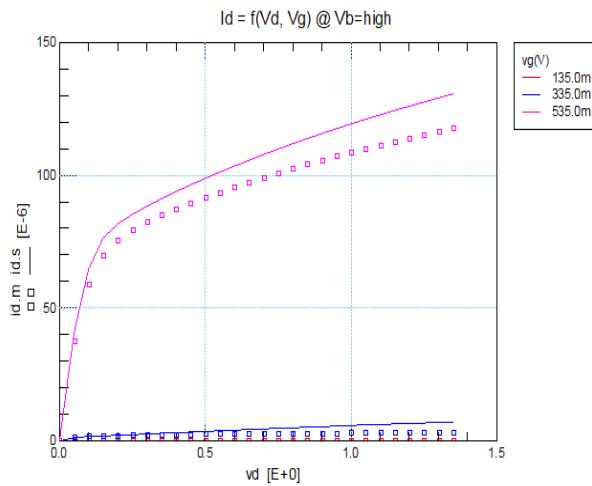


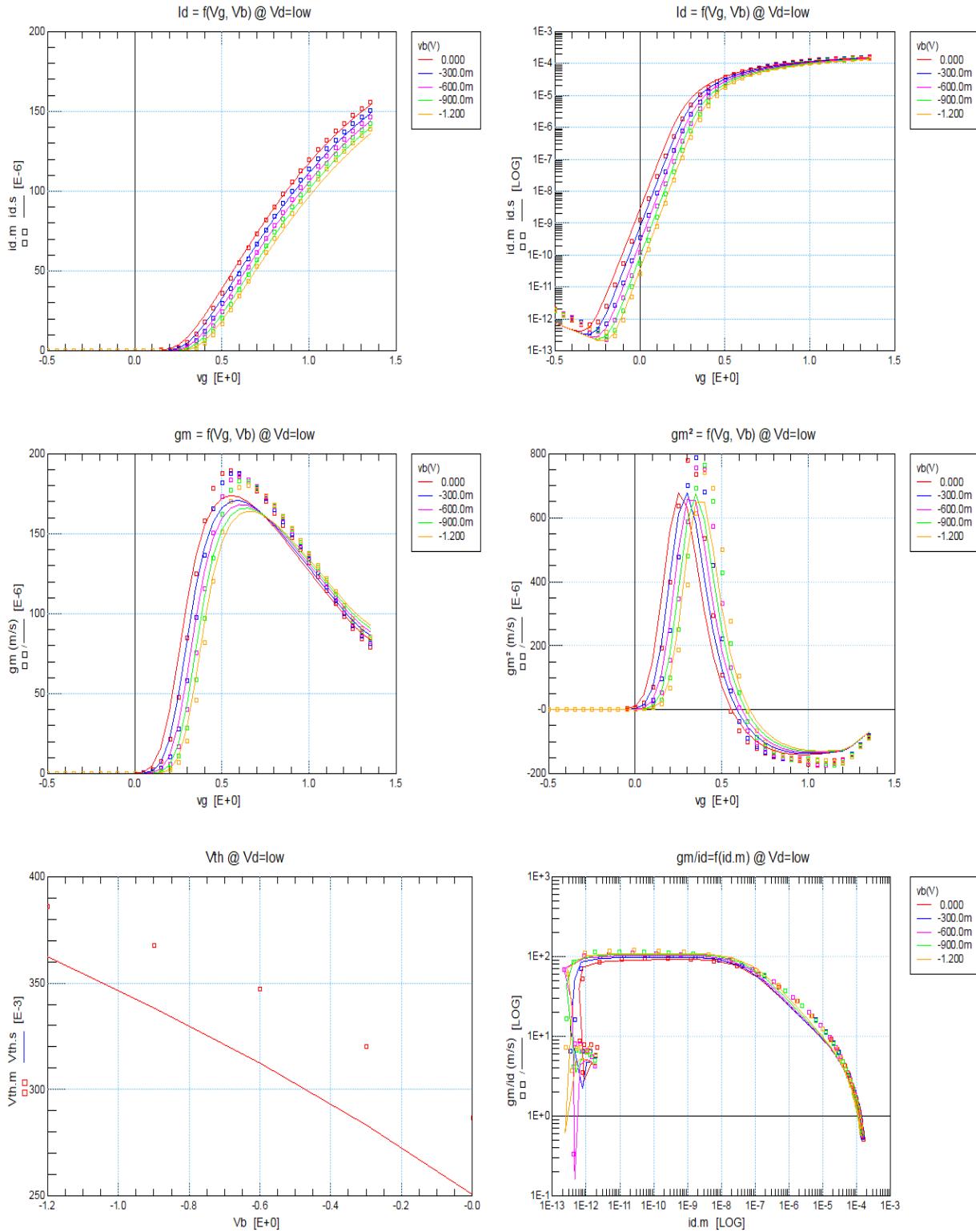
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


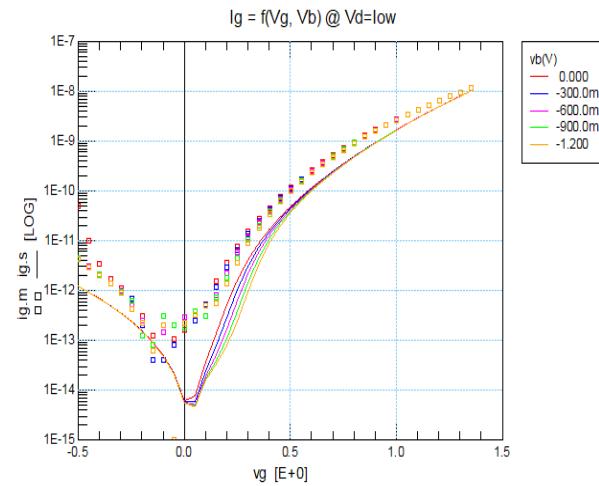
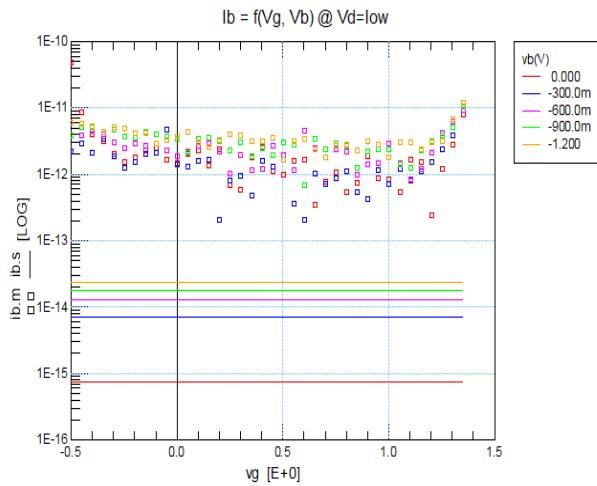
**idvd\_vbmin, Vb = -1.2V, T = 27°C**

**idvd\_vth, Vb = 0V, T = 27°C**




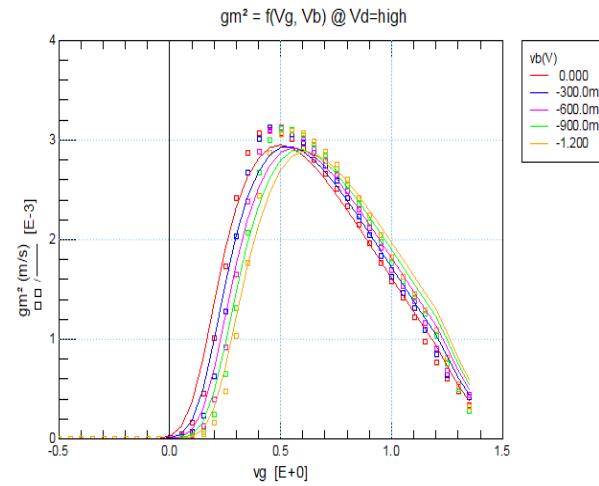
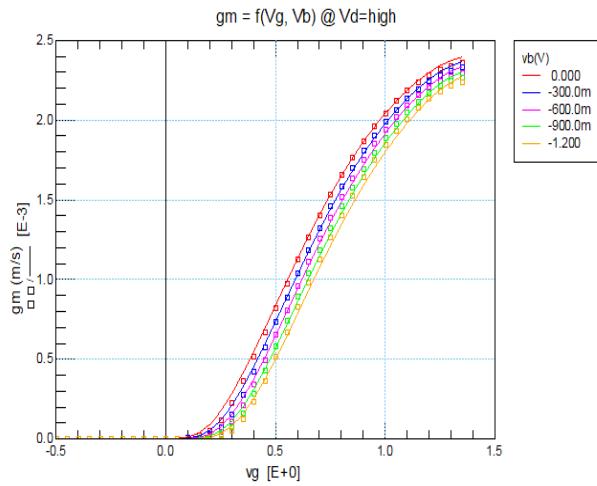
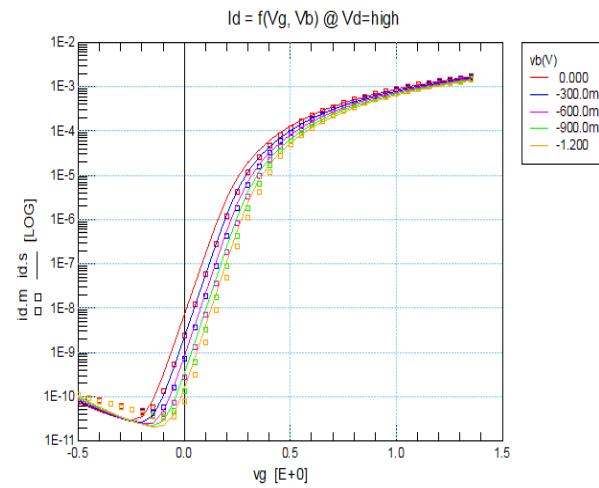
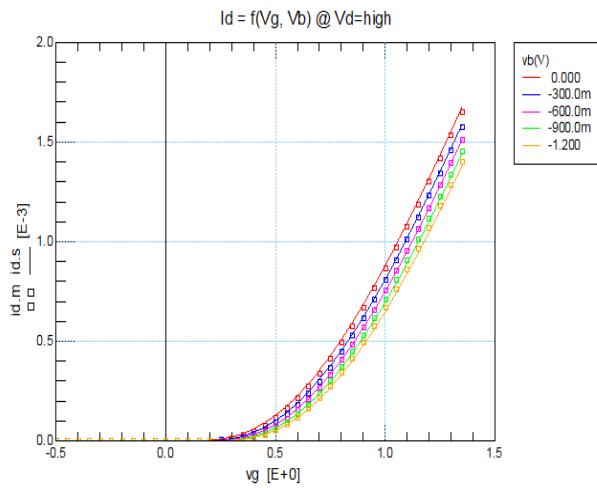
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

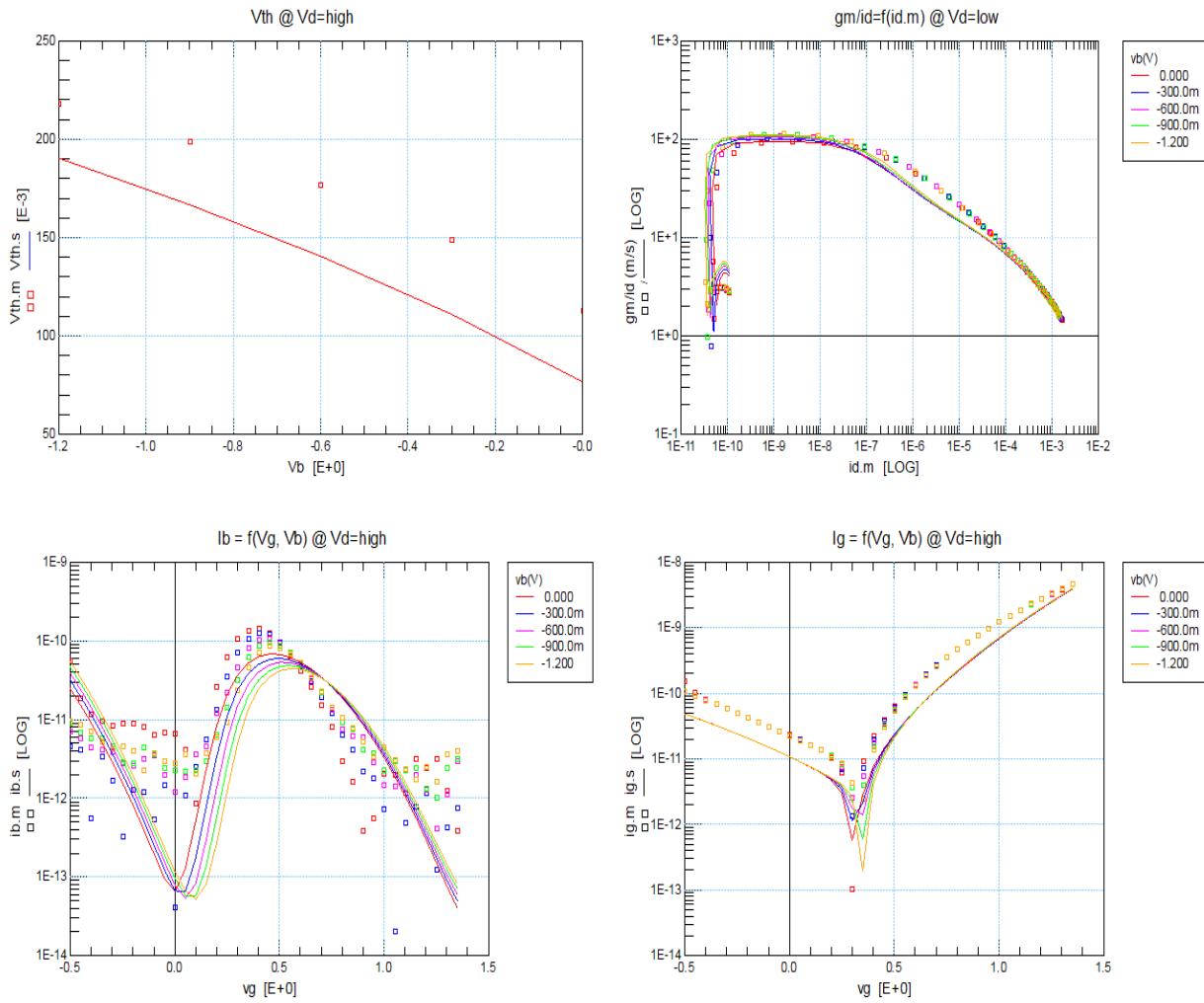


**4.10W10u0\_L1u2\_S541\_2****idvg, Vd = 0.05V, T = 27°C**

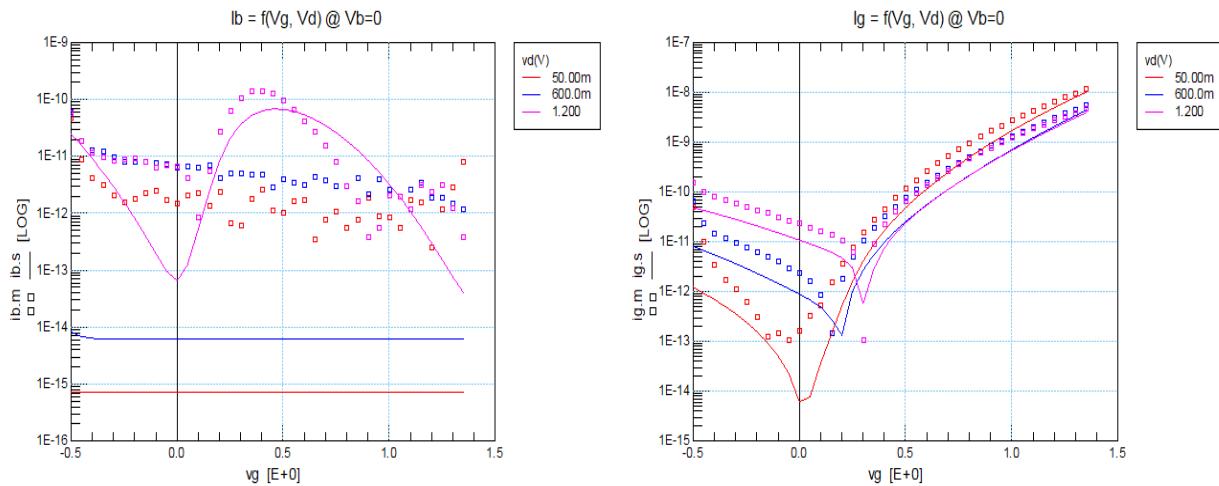


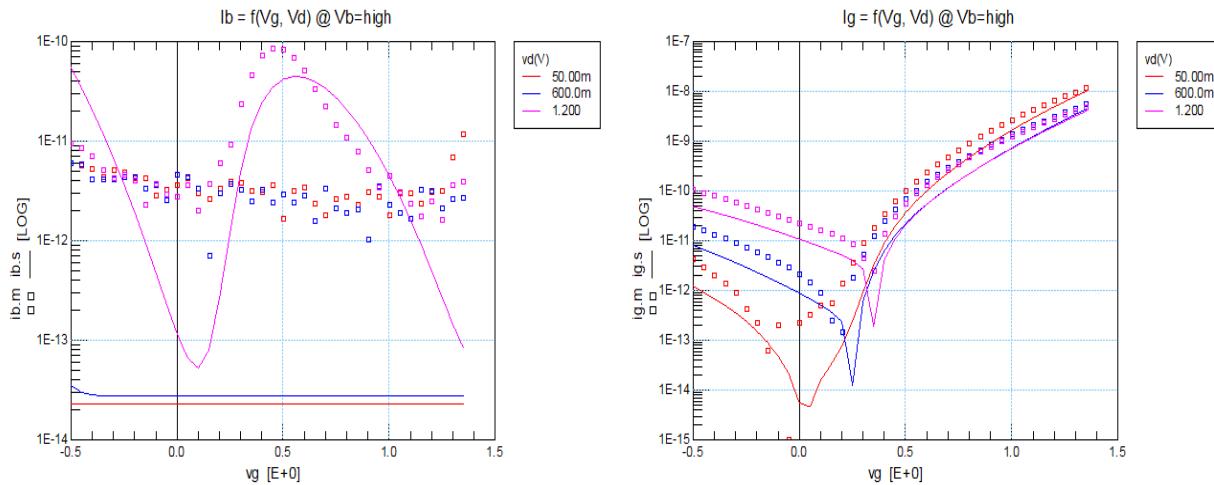
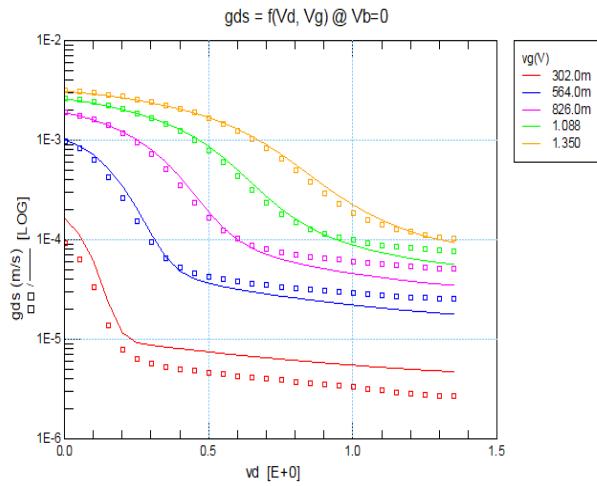
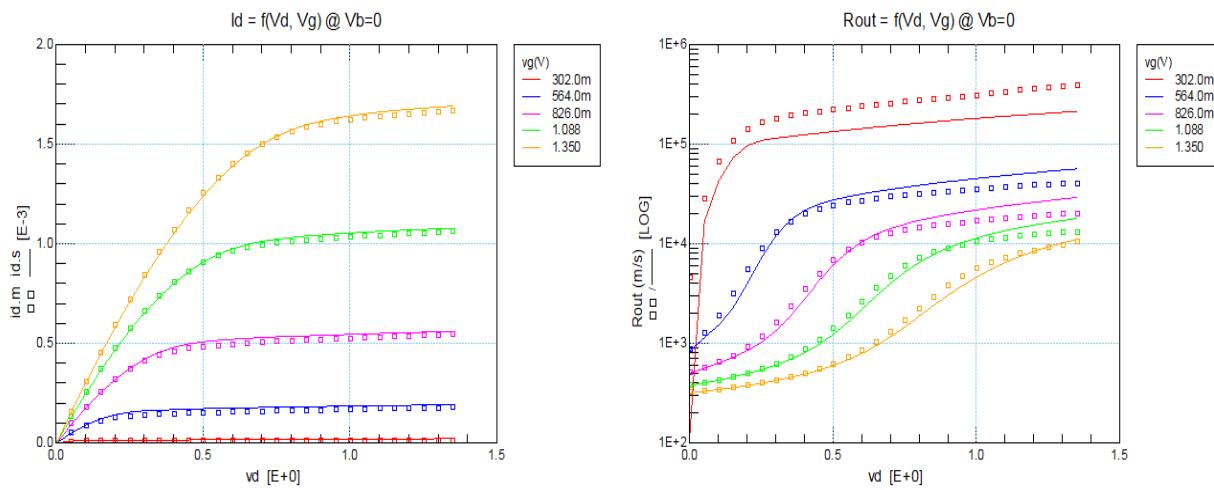
### $i_{dvg}, V_d = 1.2V, T = 27^\circ C$

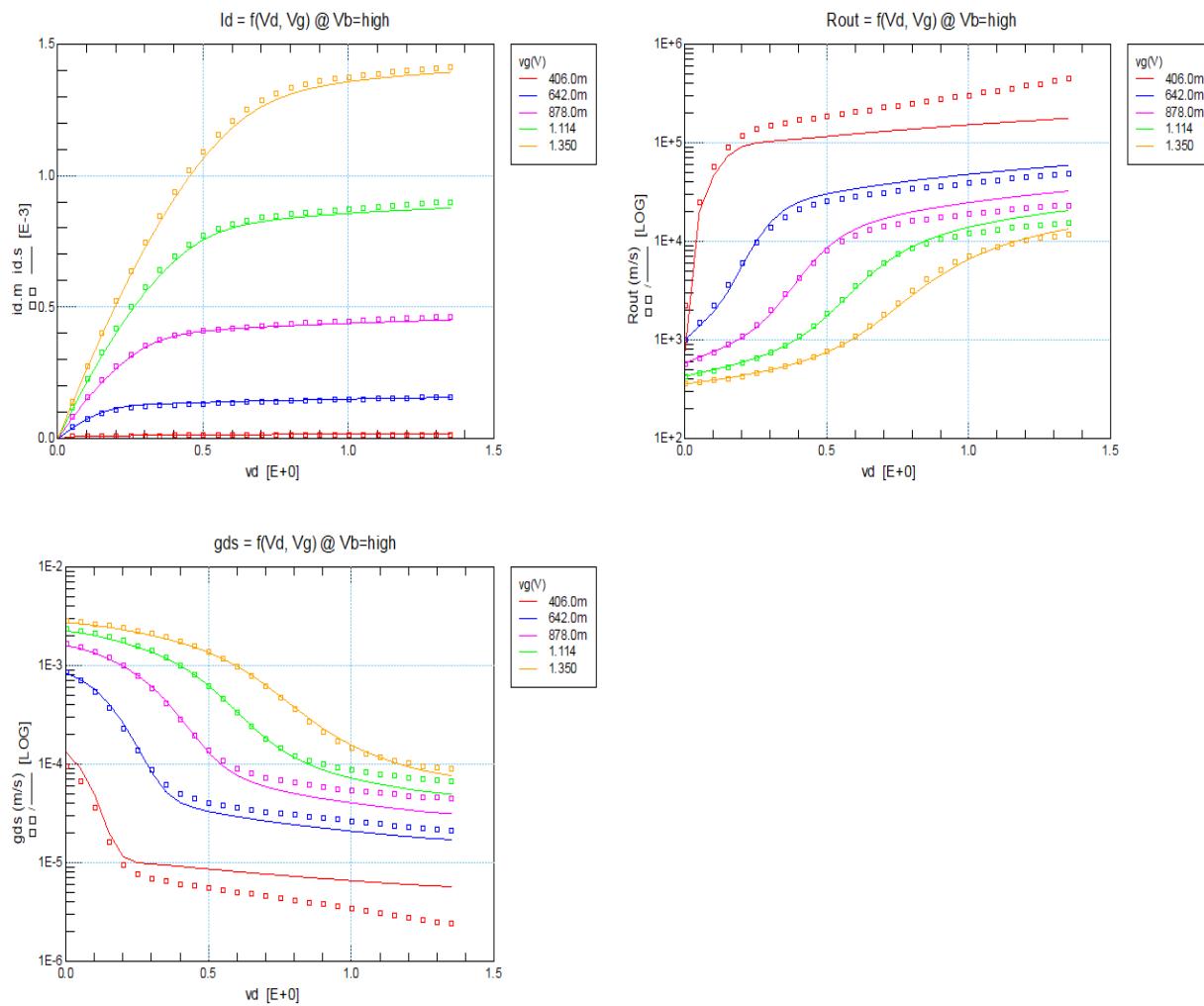
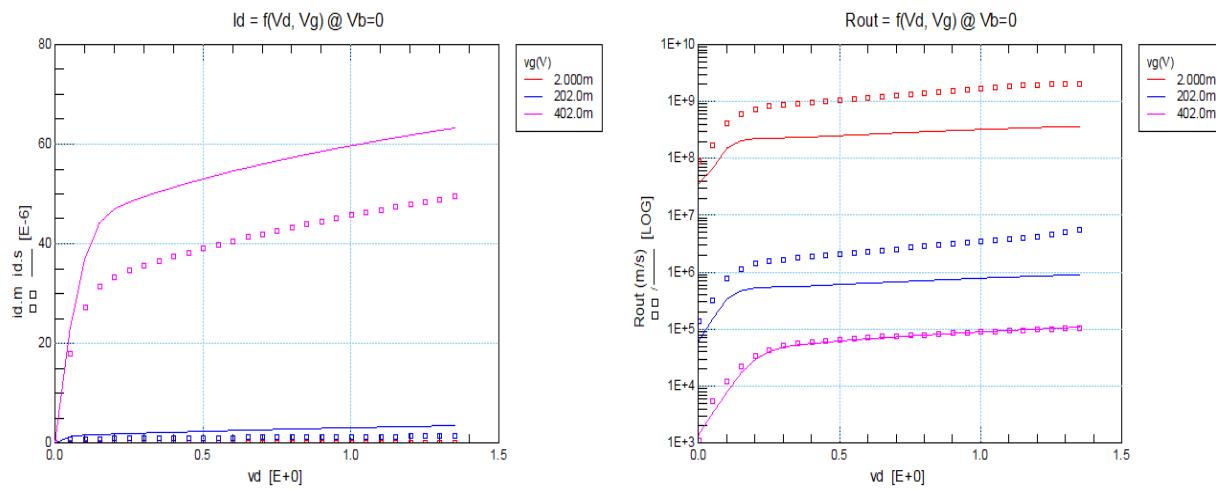


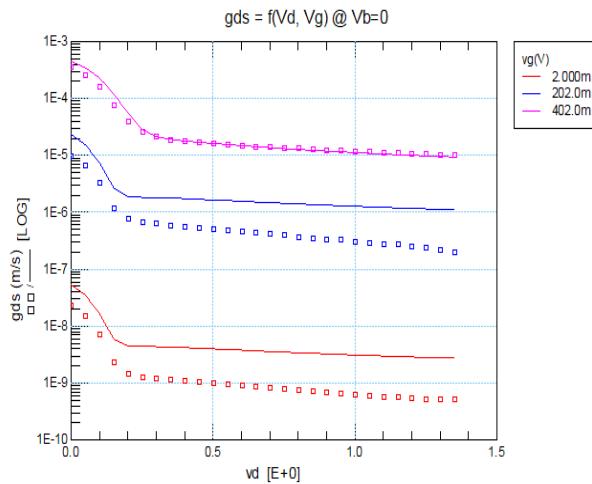


### $id_{vg}, I_b, Ig, V_b = 0V, T = 27^\circ C$

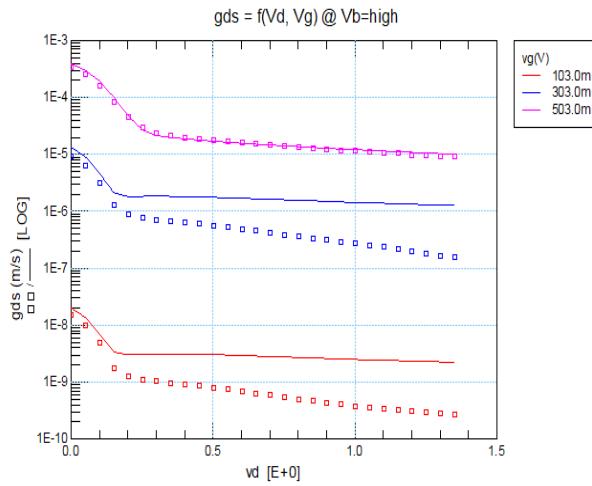
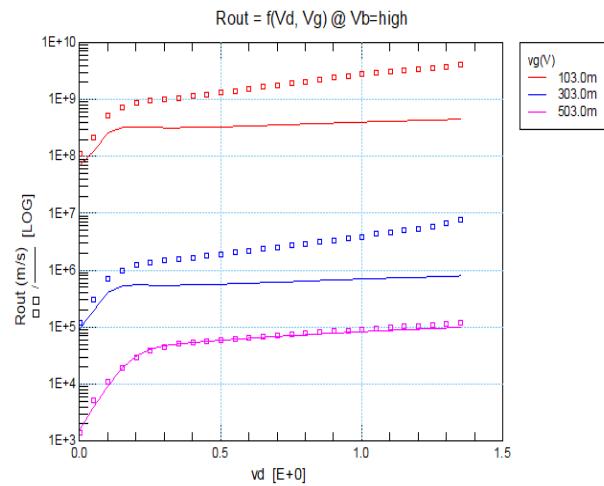
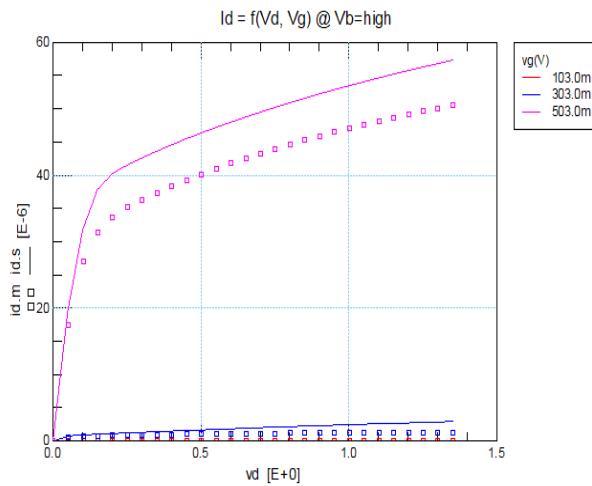


**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


**idvd\_vbmin, Vb = -1.2V, T = 27°C****idvd\_vth, Vb = 0V, T = 27°C**

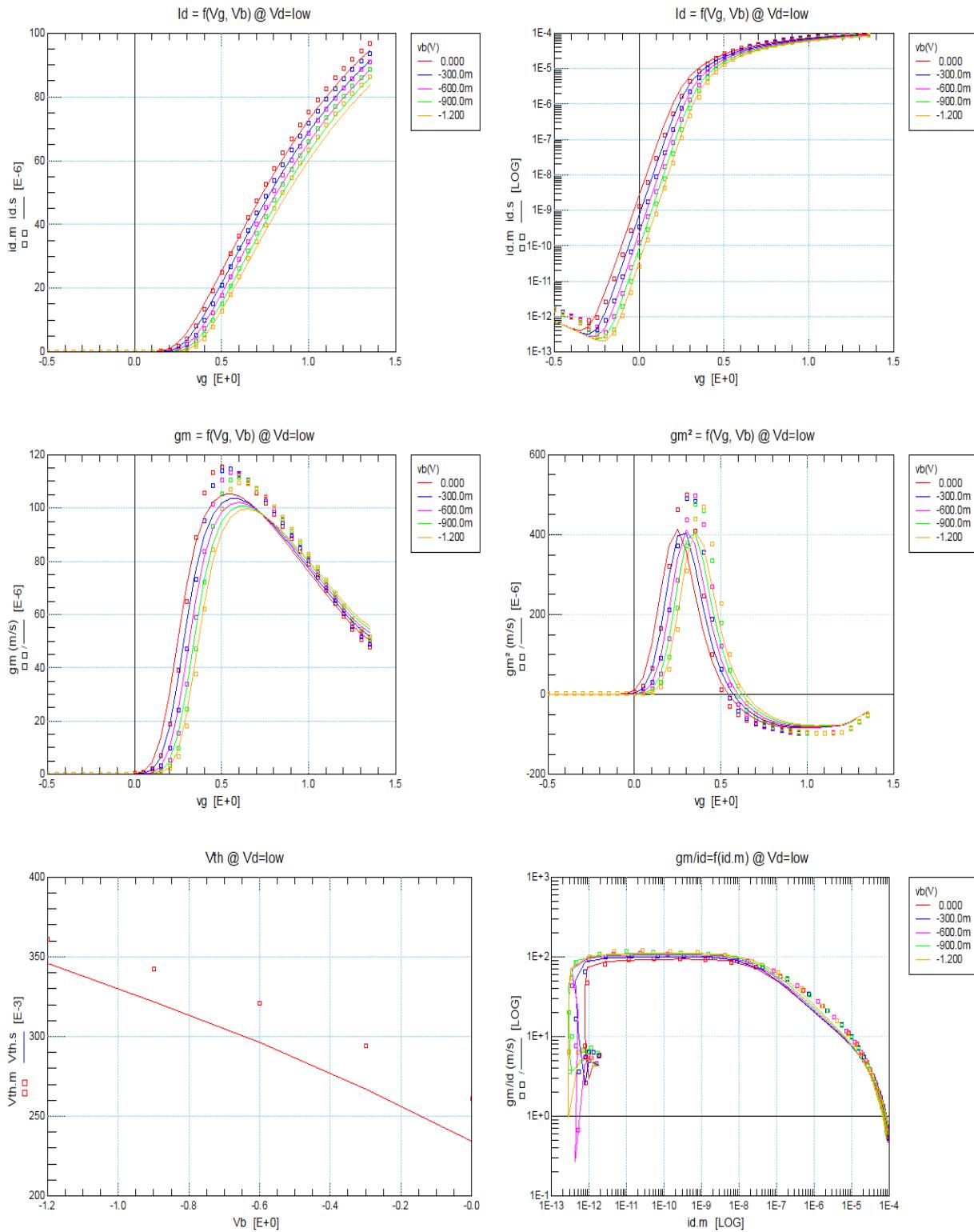


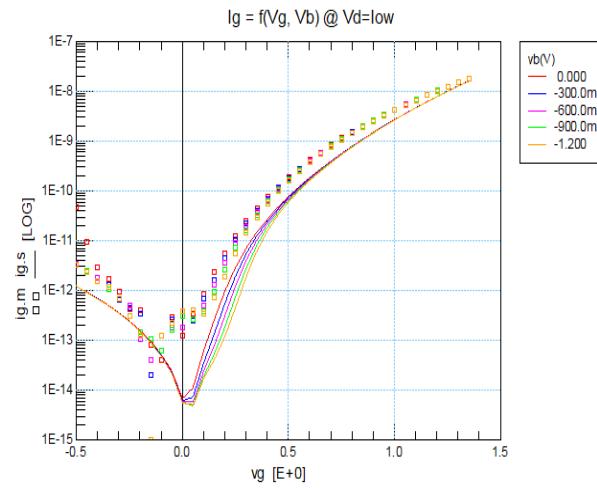
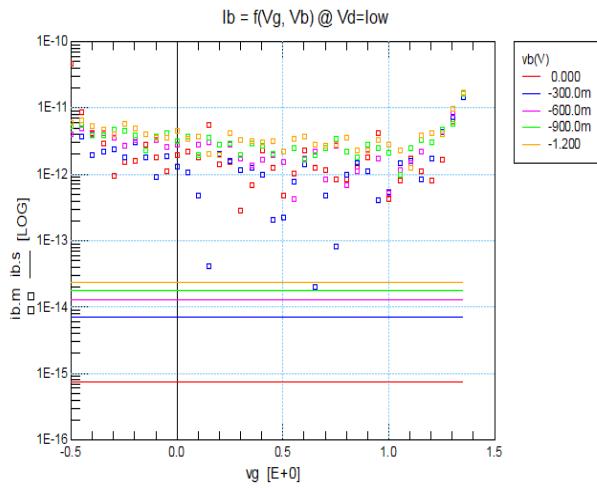
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C



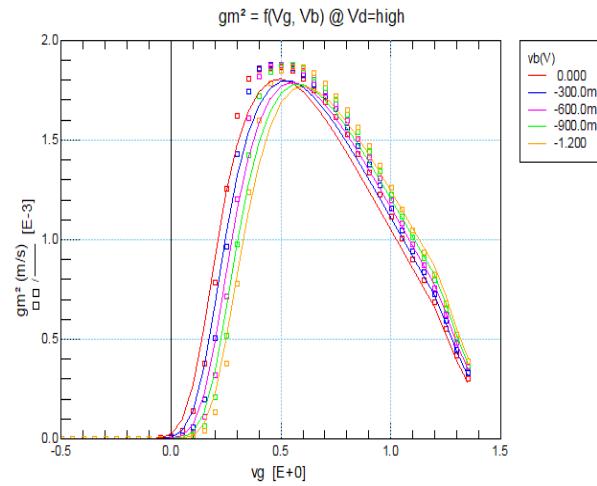
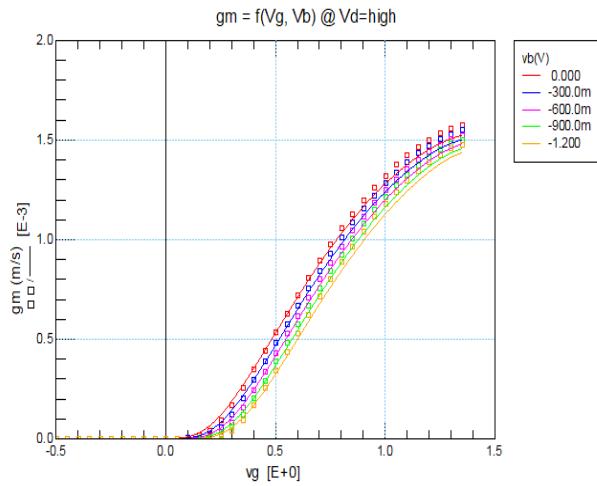
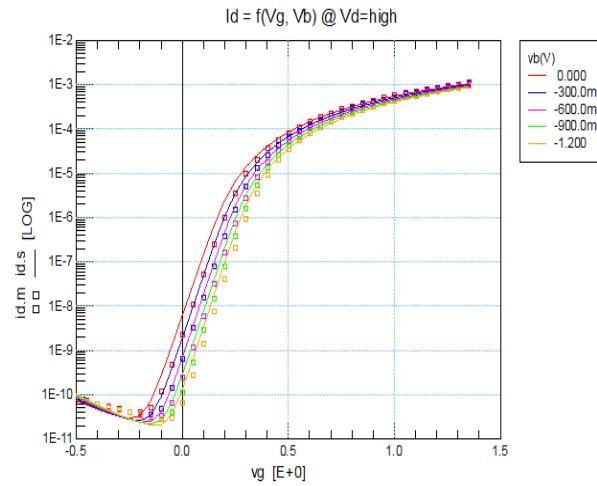
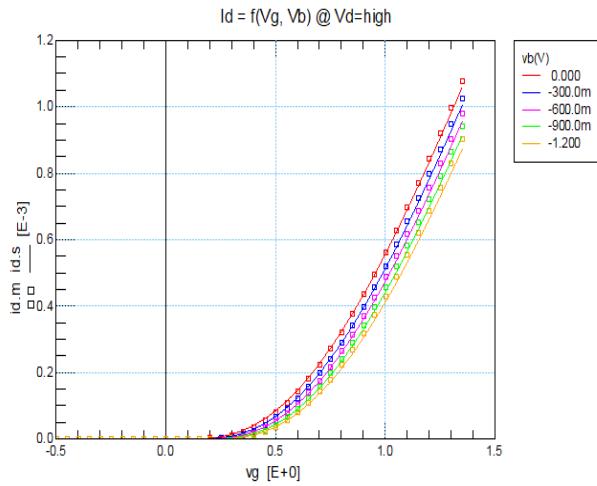
## 4.11 W10u0\_L2u0\_S541\_3

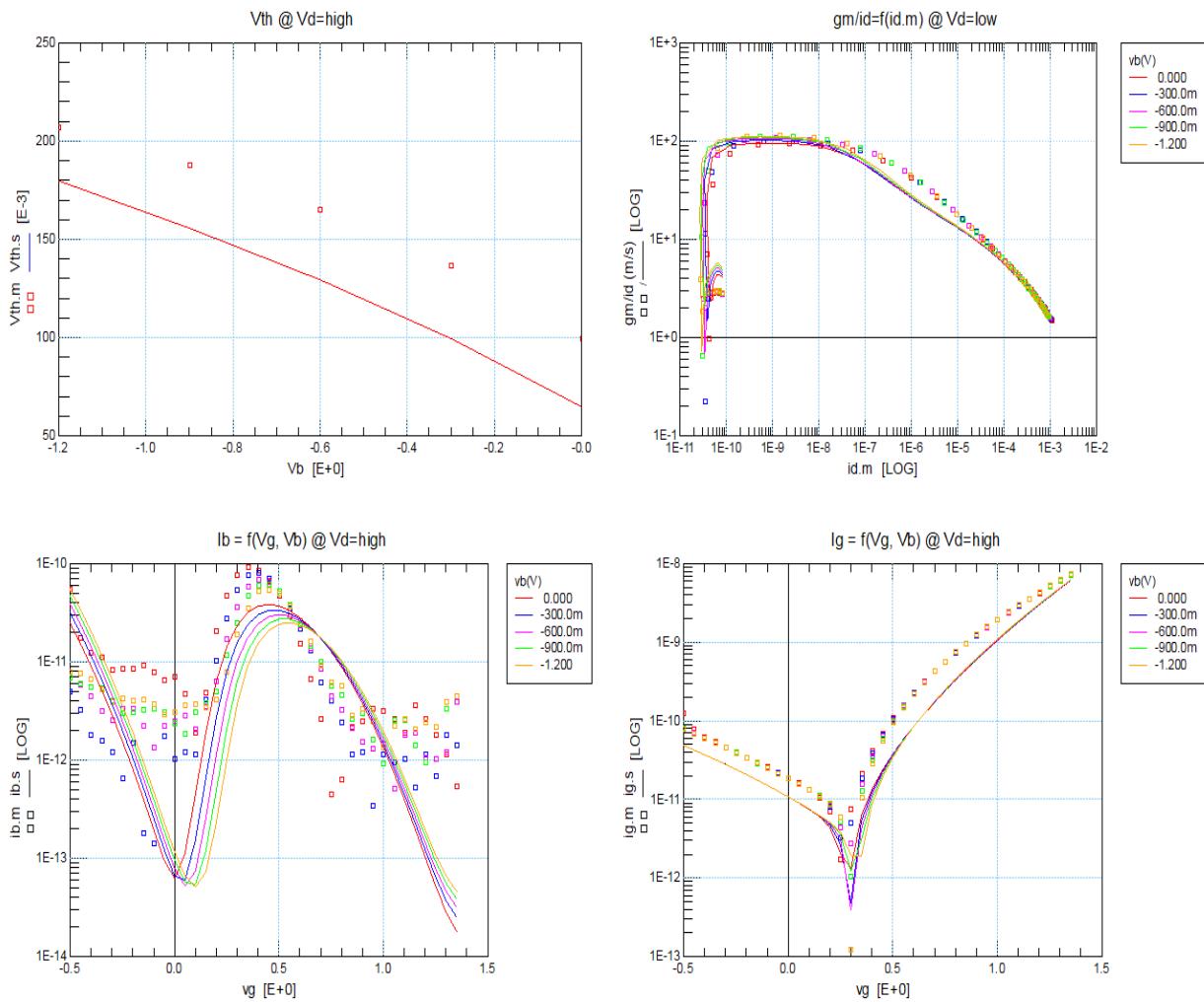
$idv_g, V_d = 0.05V, T = 27^\circ C$



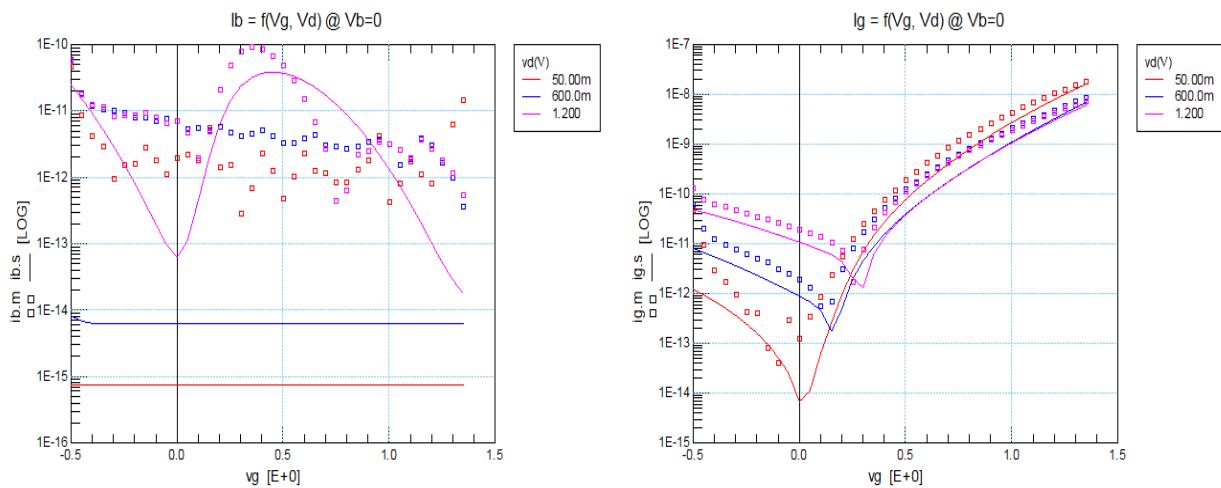


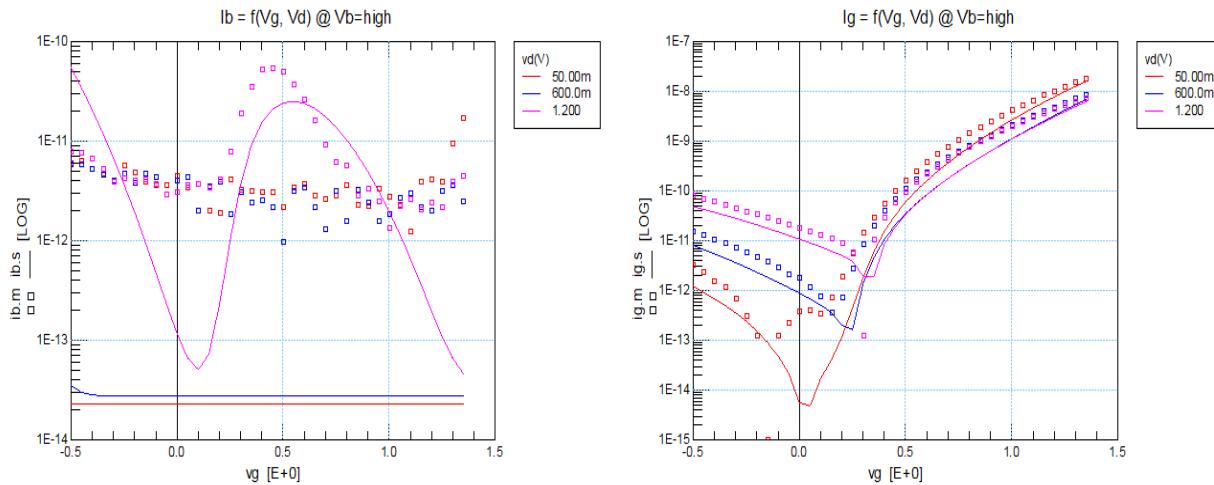
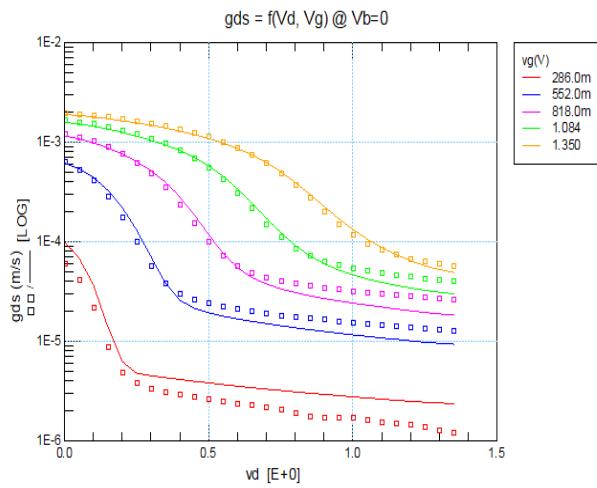
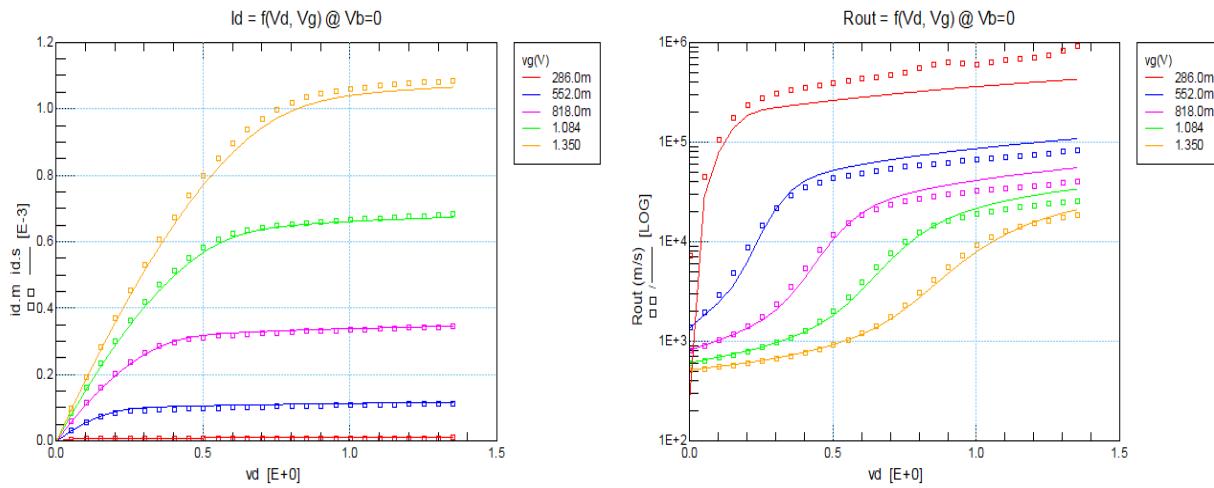
### $i_{dvg}, V_d = 1.2V, T = 27^\circ C$

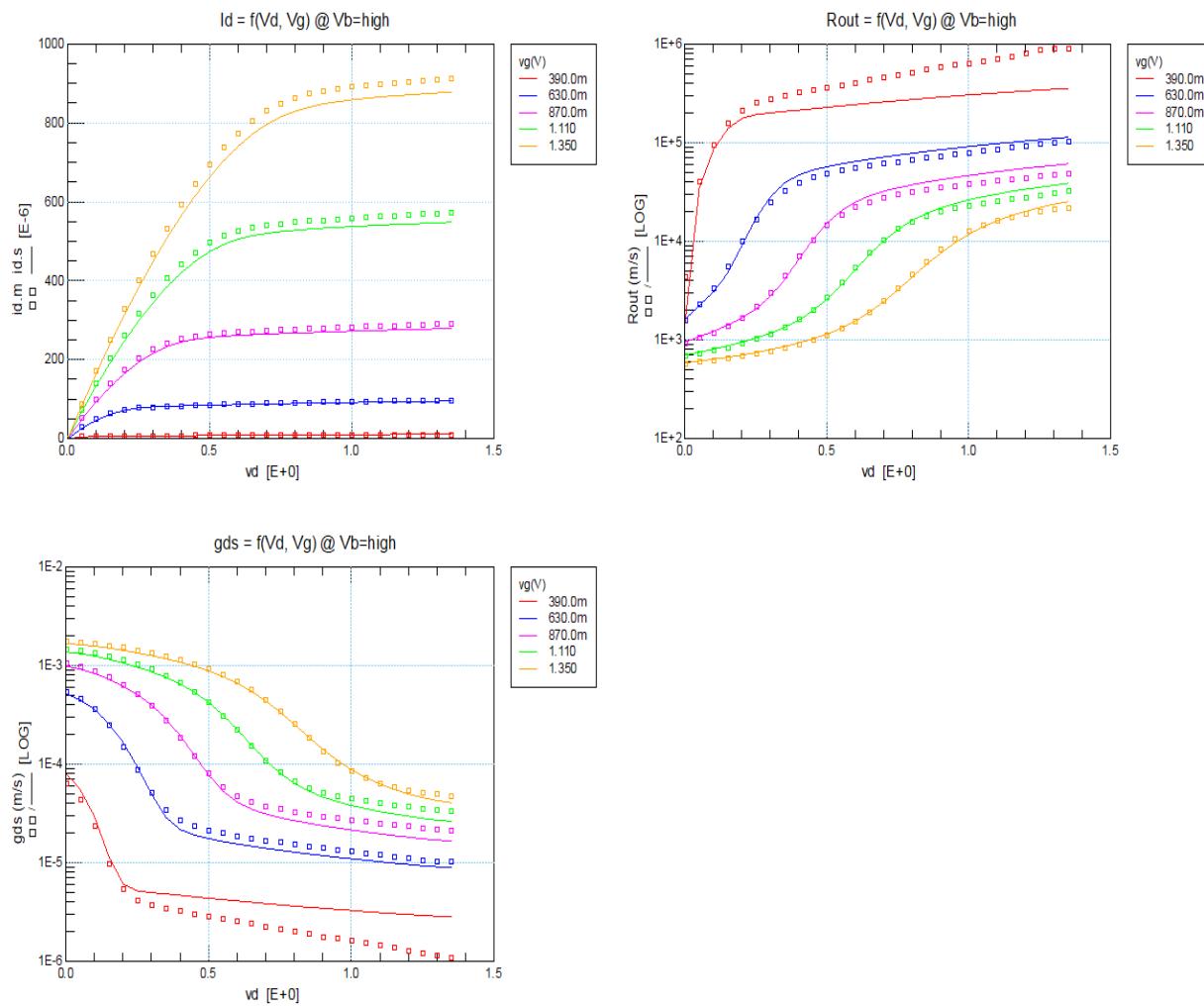
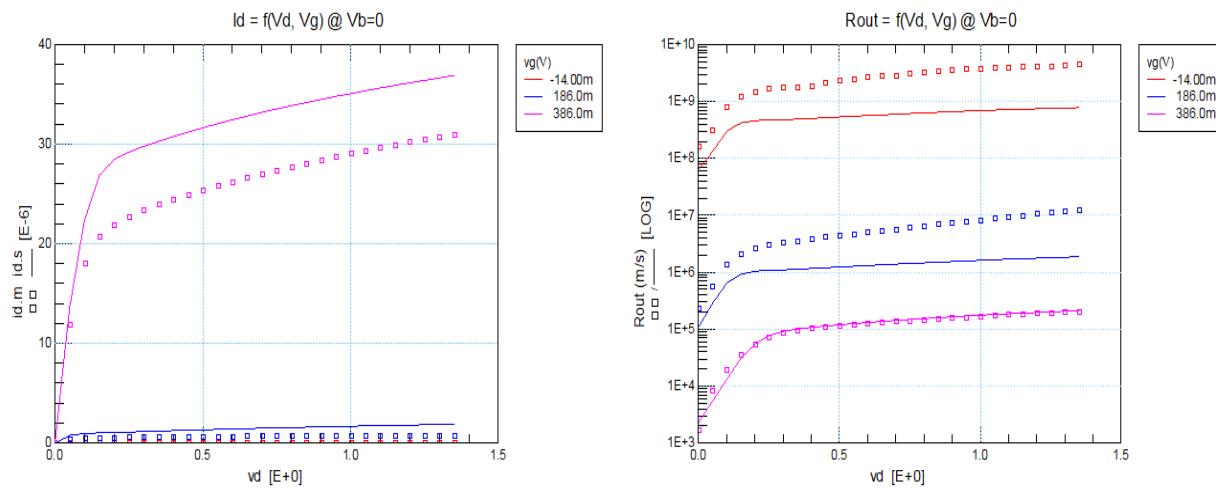


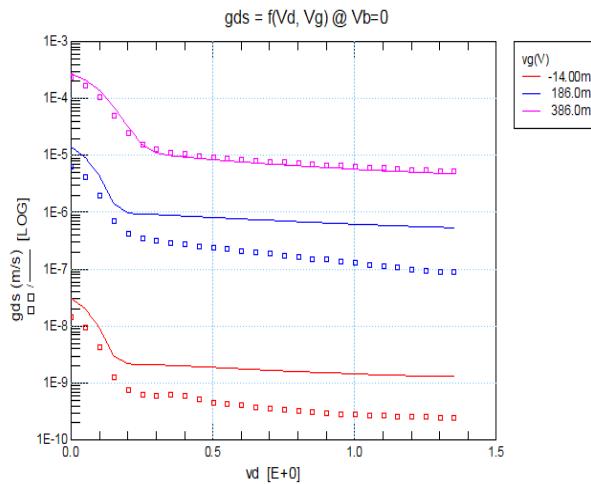


### $idvg, I_b, I_g, V_b = 0V, T = 27^\circ C$

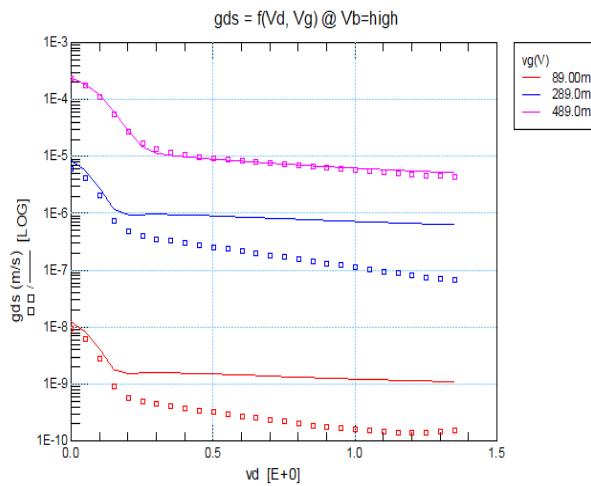
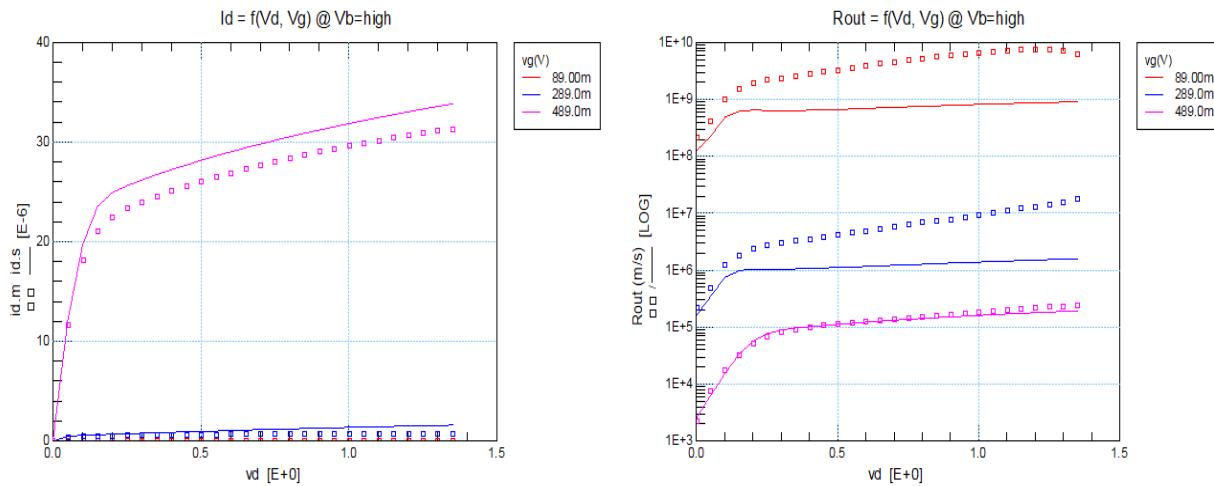


**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


**idvd\_vbmin, Vb = -1.2V, T = 27°C****idvd\_vth, Vb = 0V, T = 27°C**

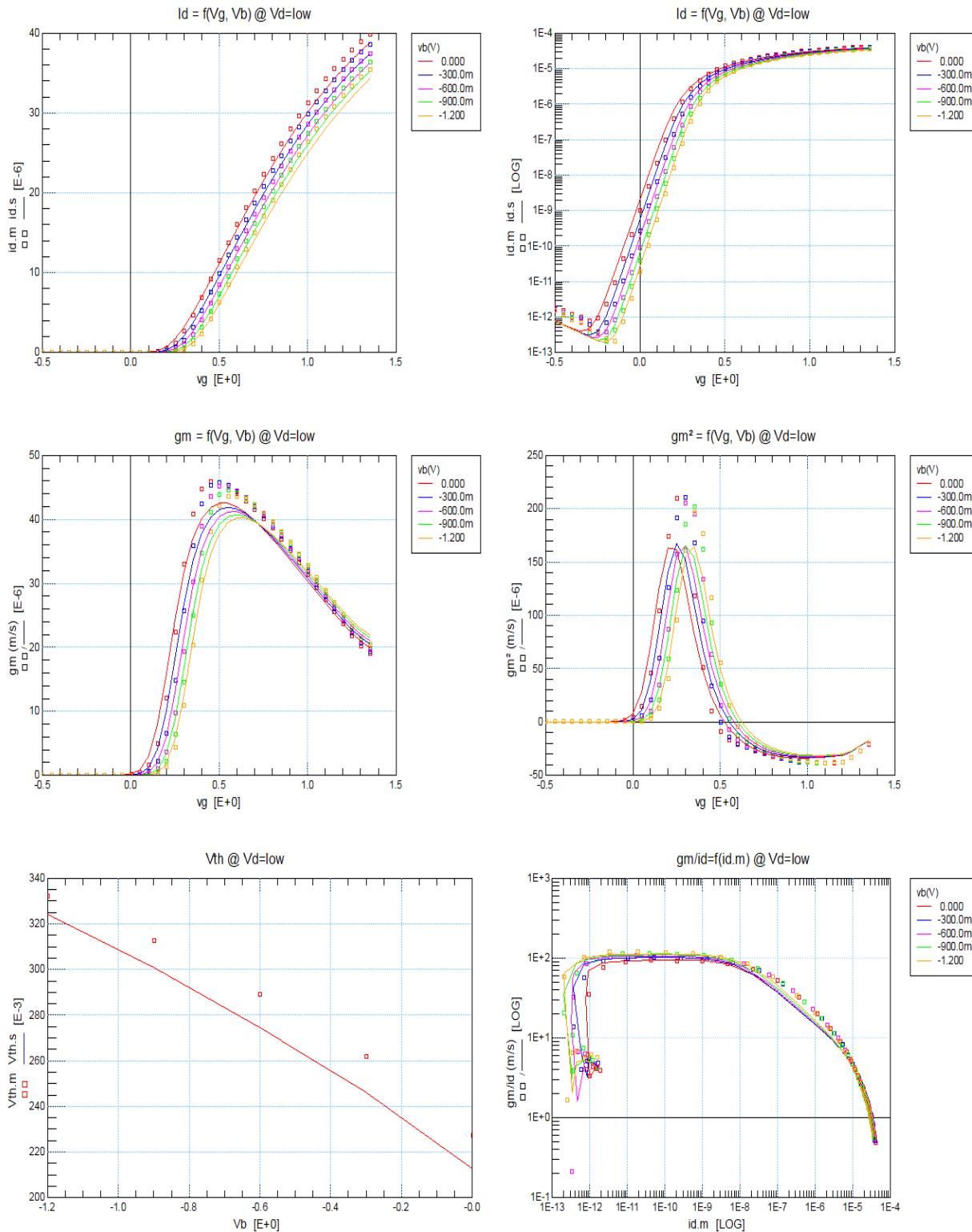


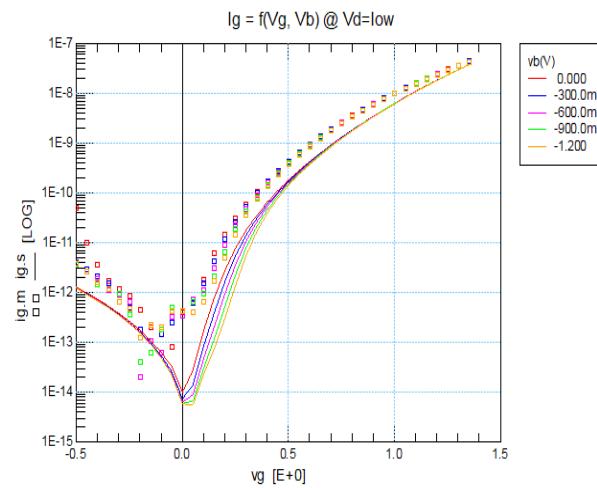
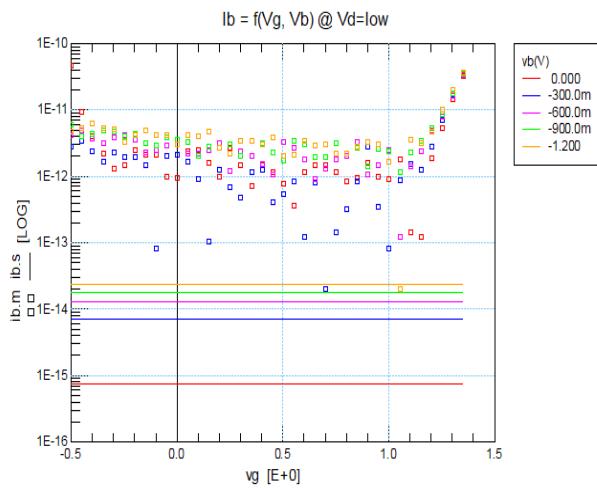
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C



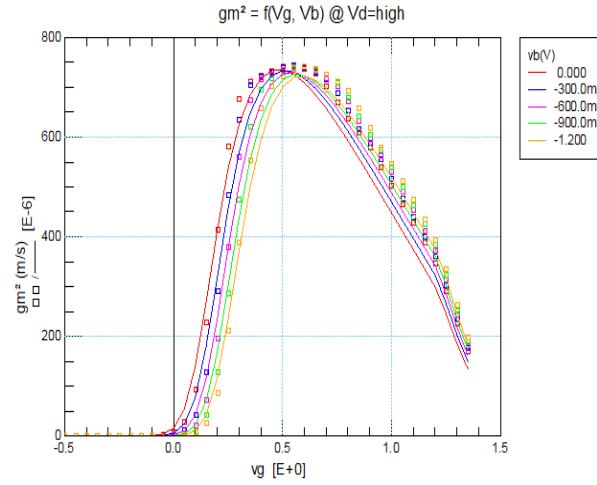
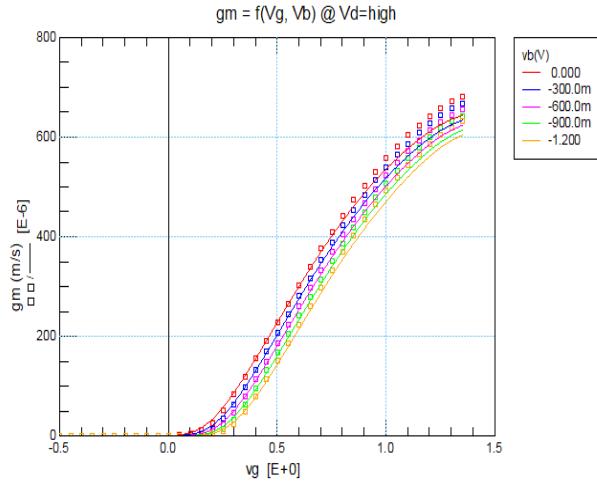
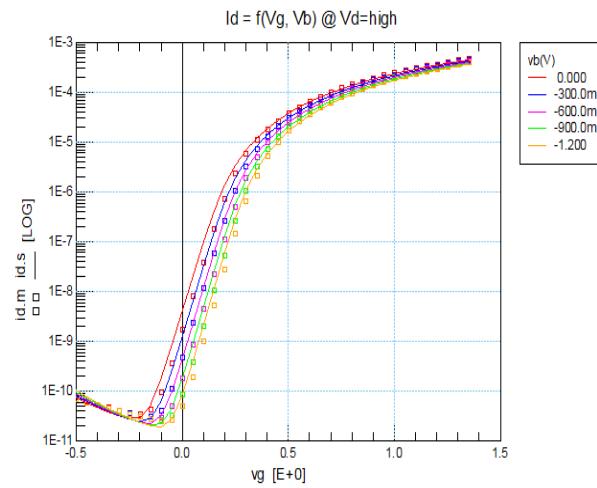
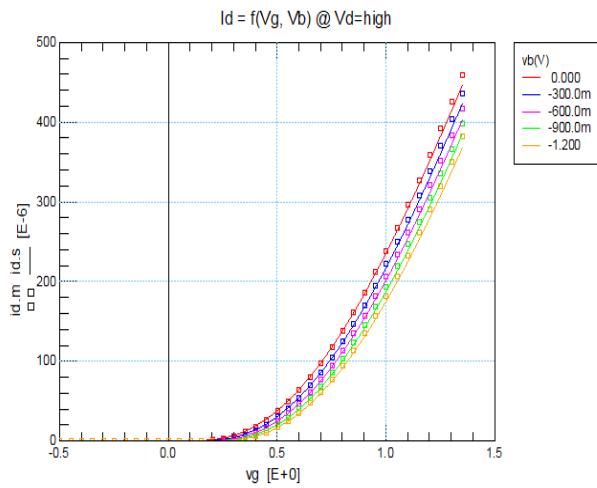
## 4.12 W10u0\_L5u0\_S541\_4

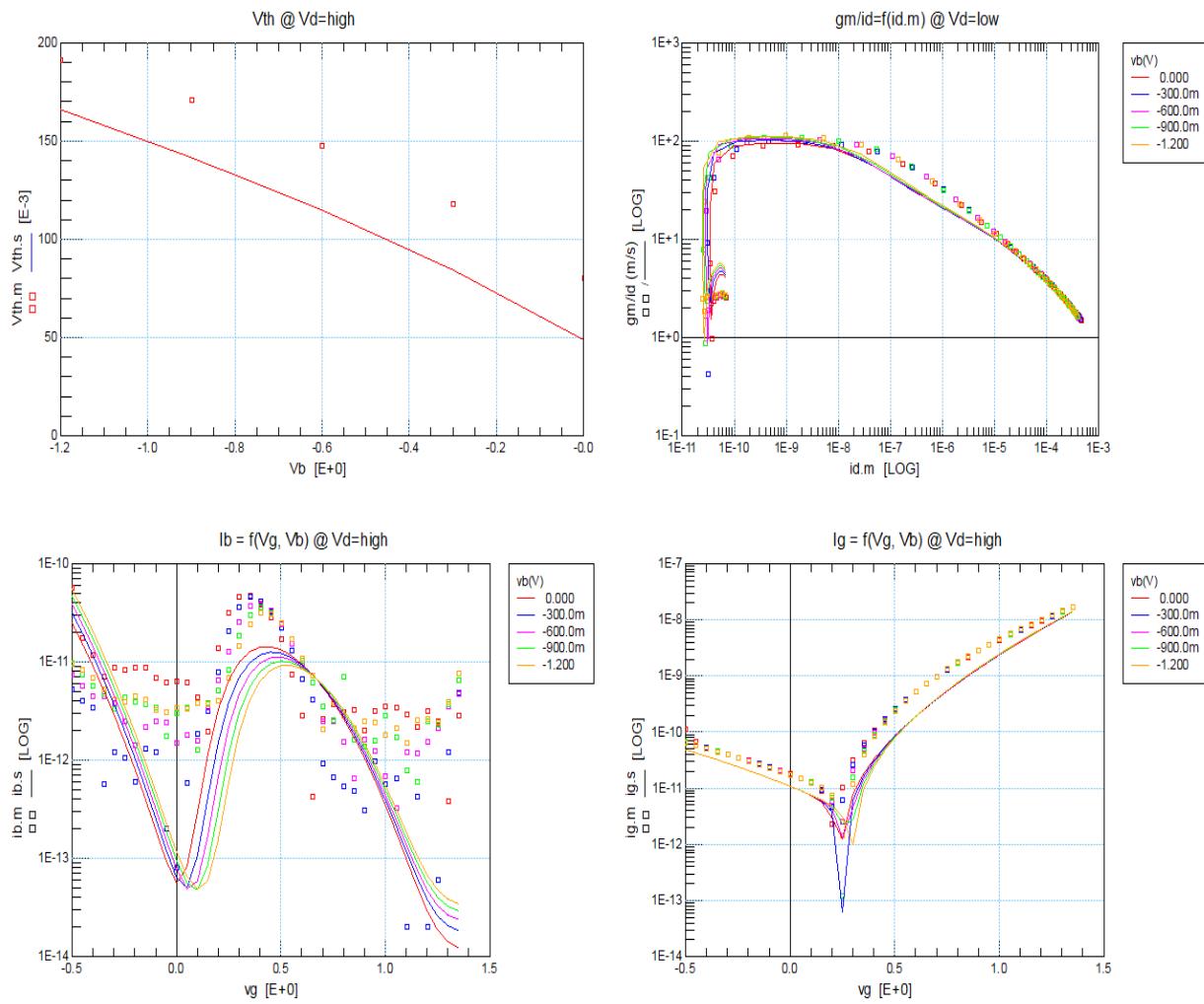
$idvg$ ,  $Vd = 0.05V$ ,  $T = 27^\circ C$



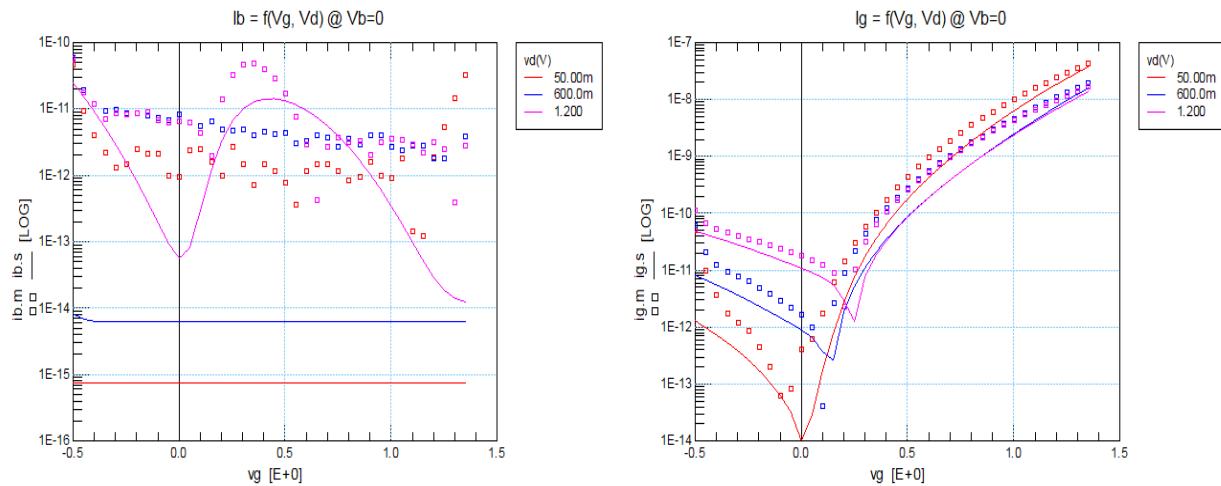


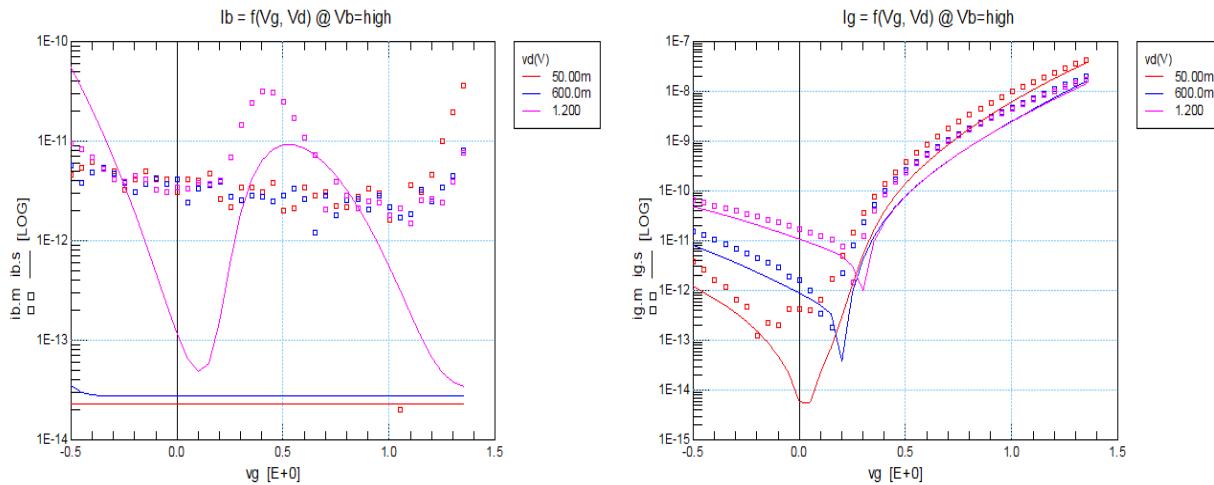
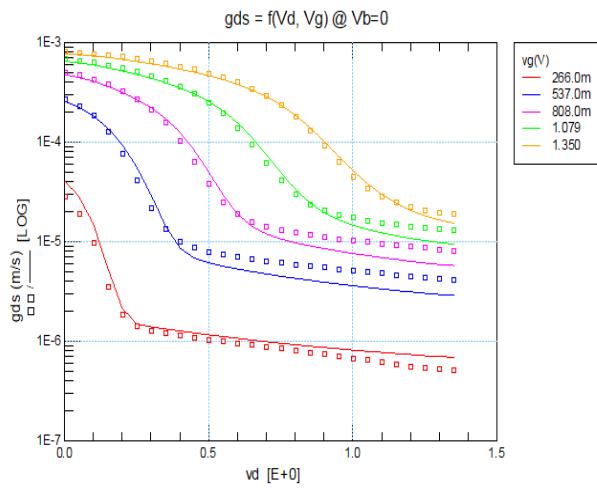
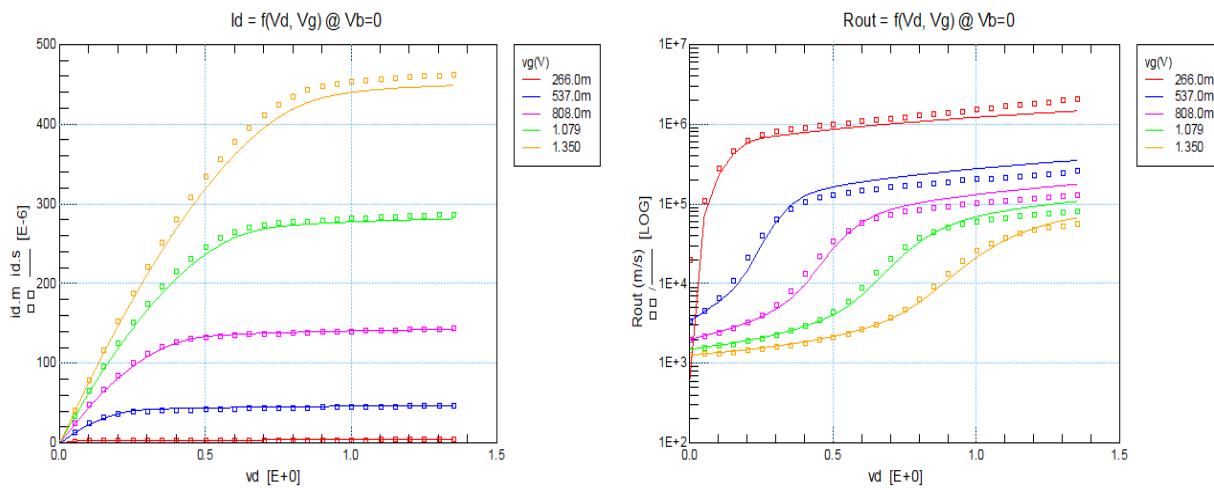
### $i_{dvg}, V_d = 1.2V, T = 27^\circ C$

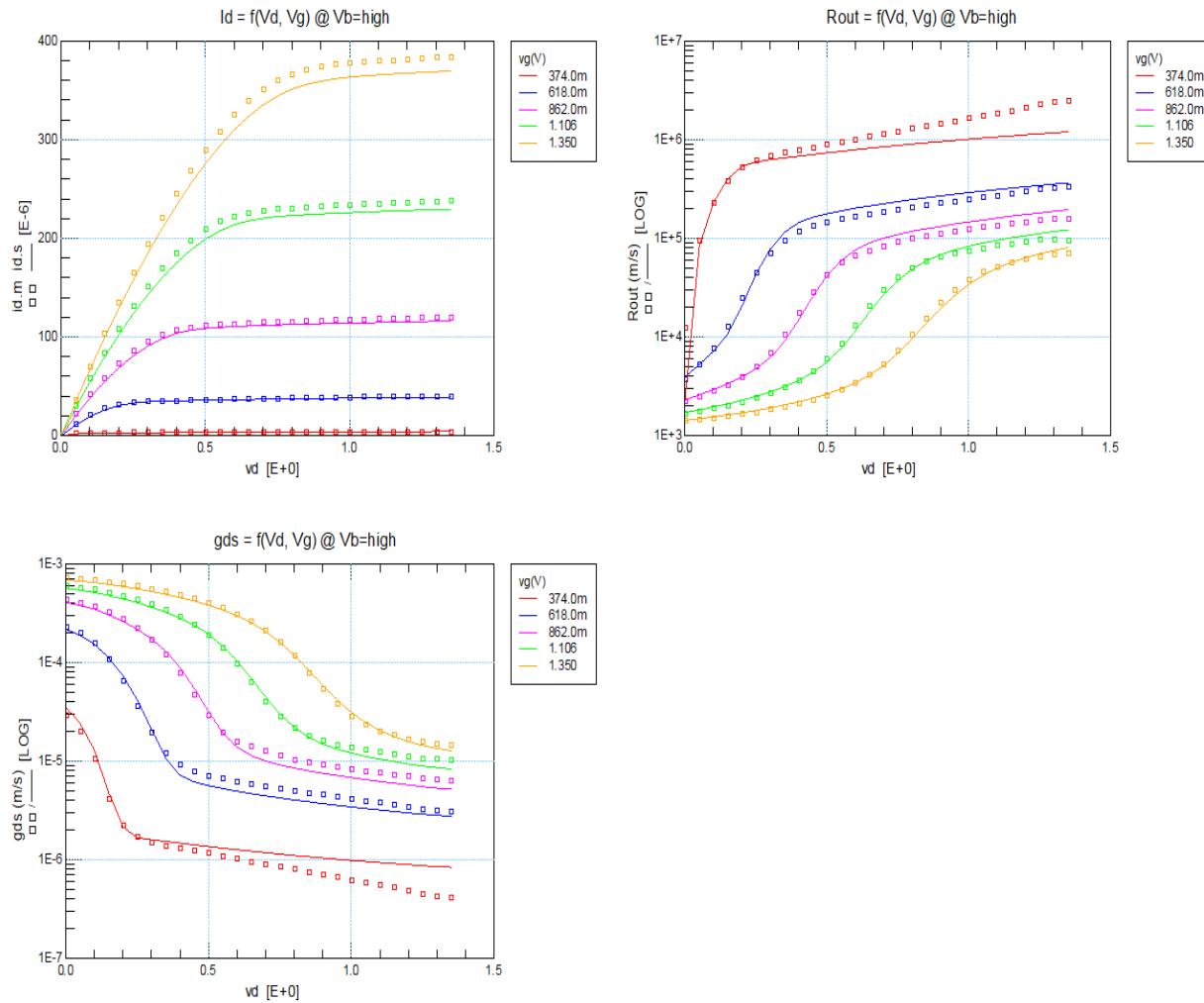
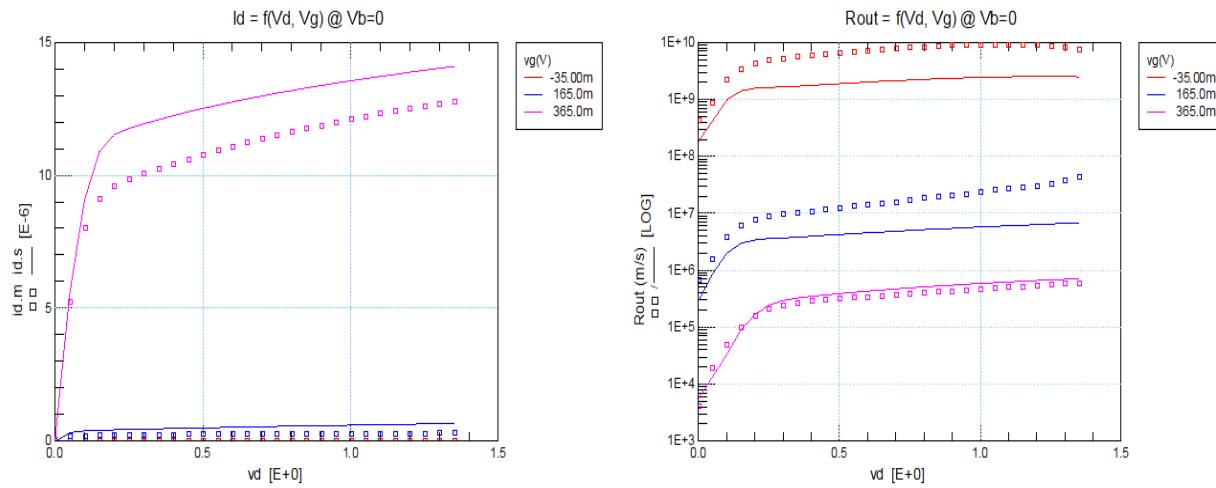


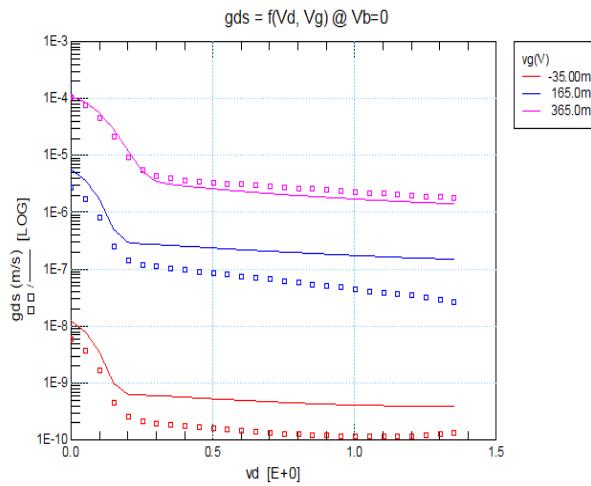


$id_{vg}$ ,  $ib$ ,  $ig$ ,  $V_b = 0V$ ,  $T = 27^\circ C$

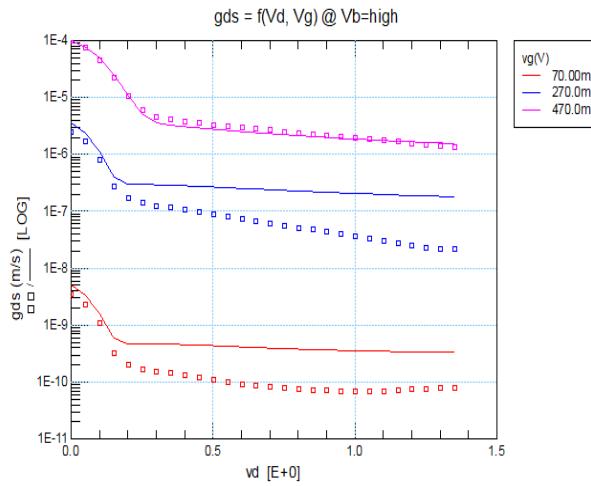
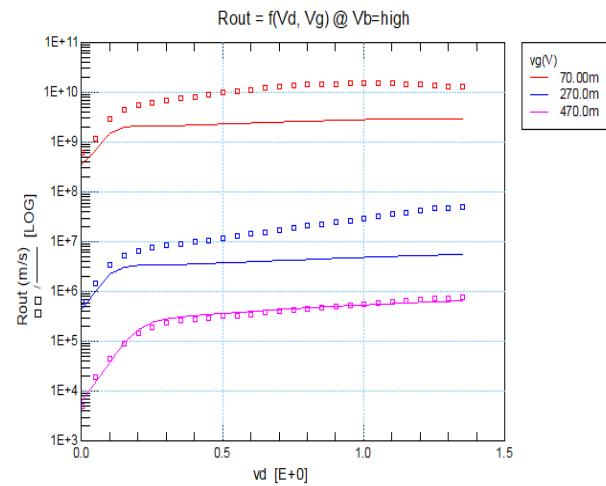
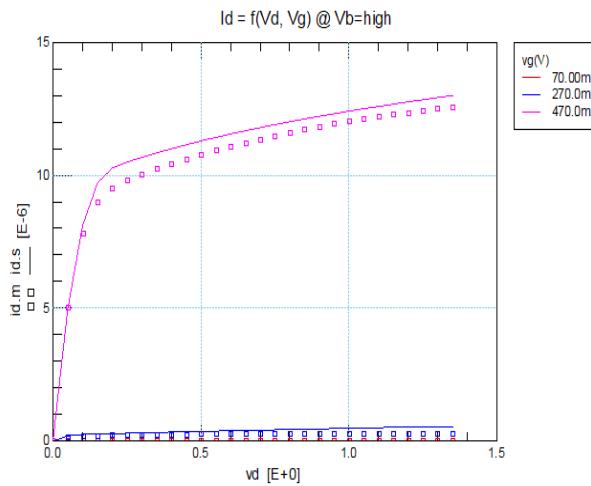


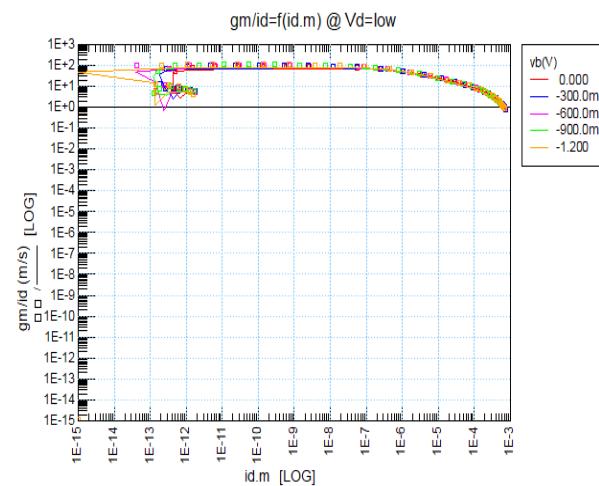
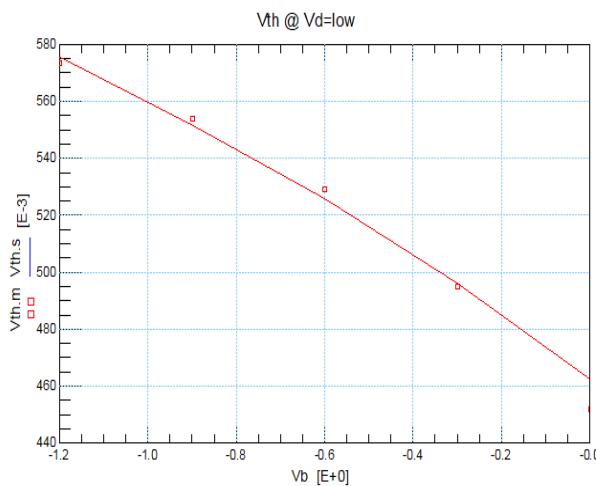
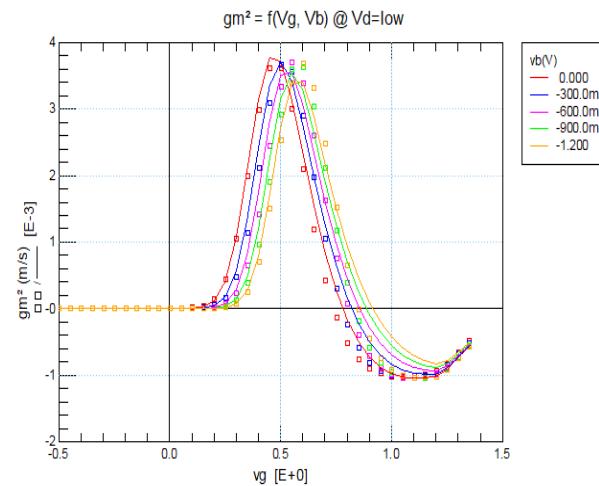
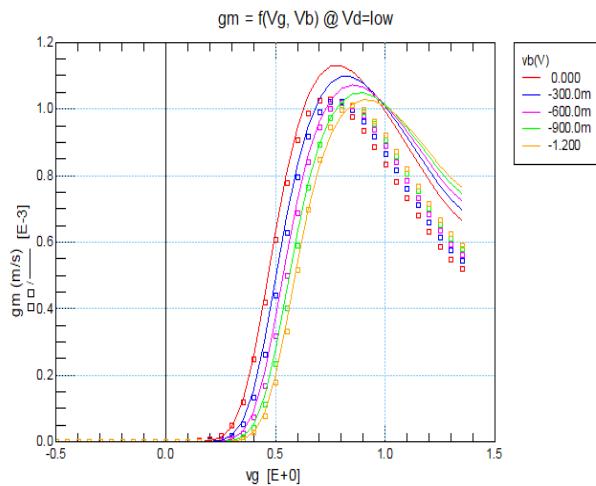
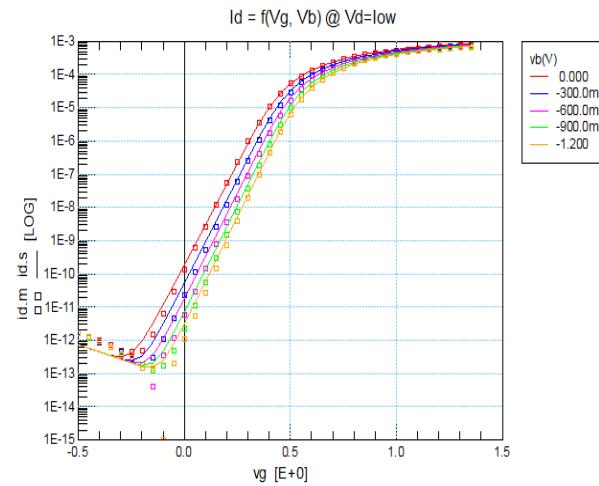
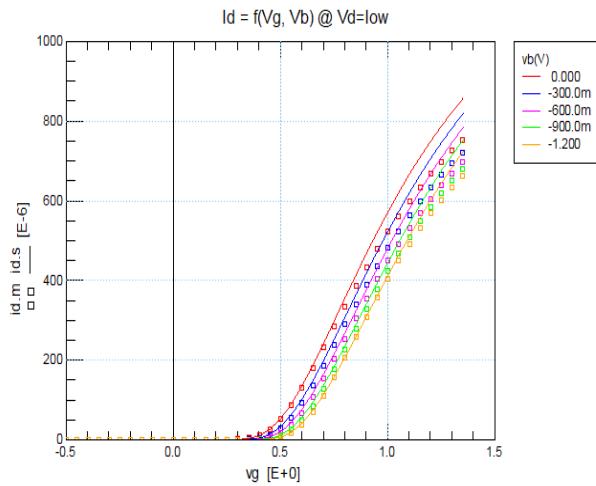
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


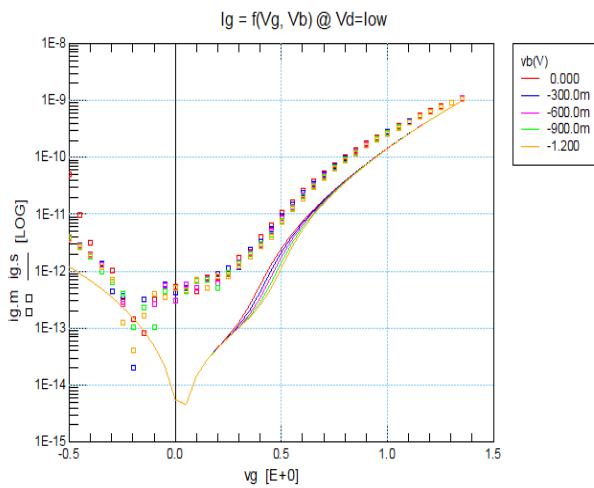
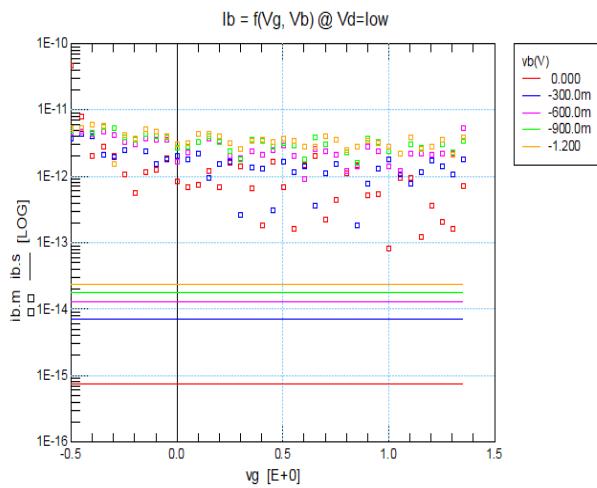
**idvd\_vbmin, Vb = -1.2V, T = 27°C****idvd\_vth, Vb = 0V, T = 27°C**



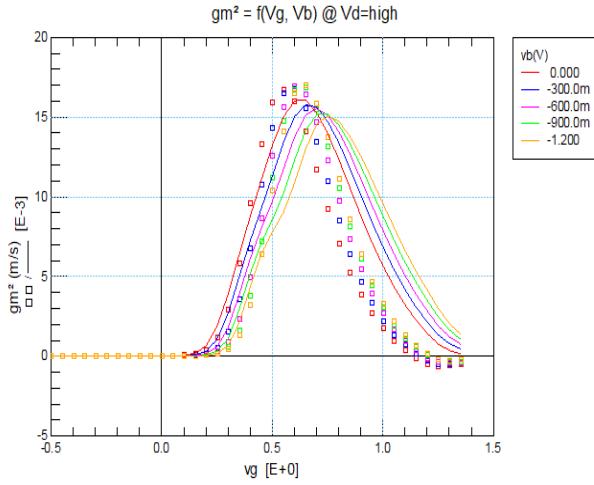
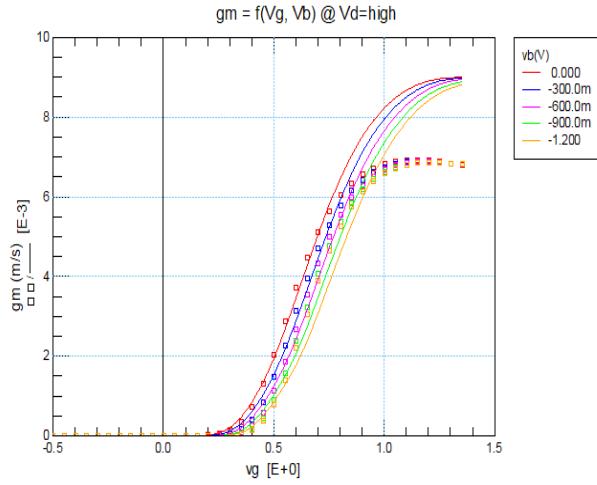
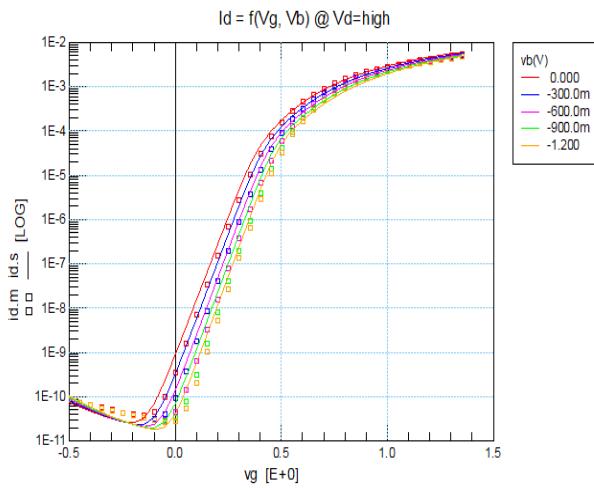
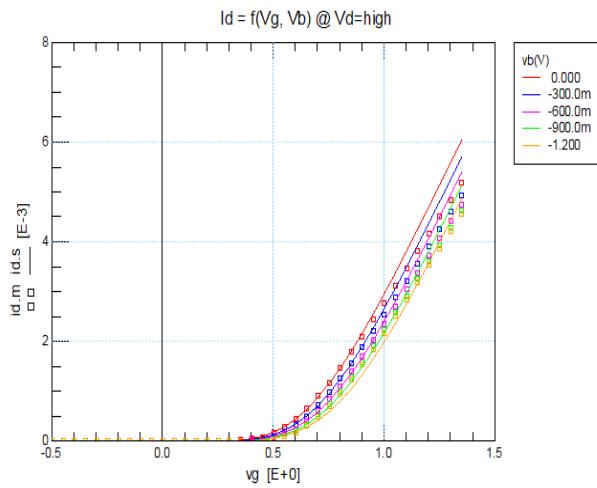
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

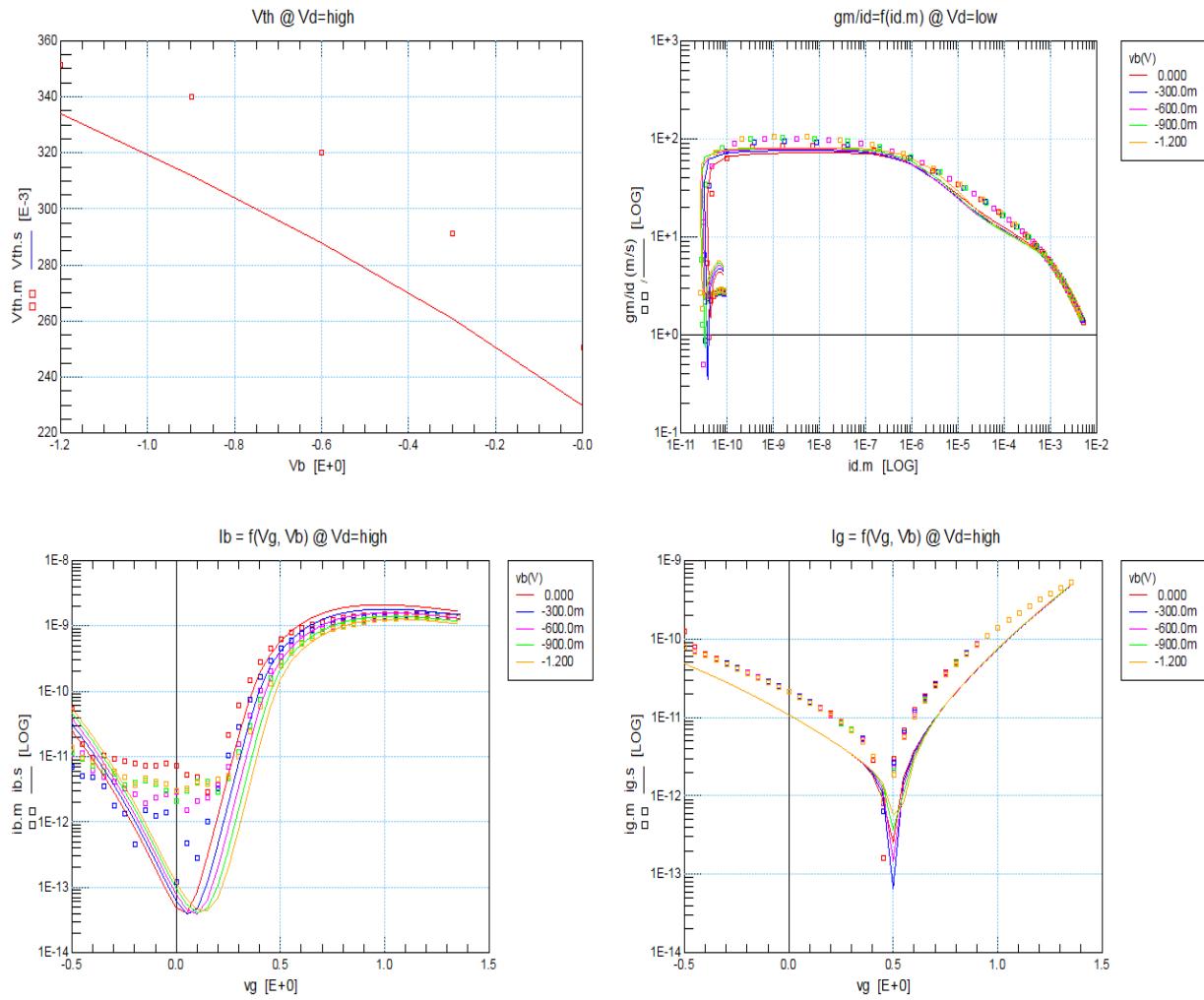


**4.13W10u0\_L0u15\_S540\_4****idvg, Vd = 0.05V, T = 27°C**

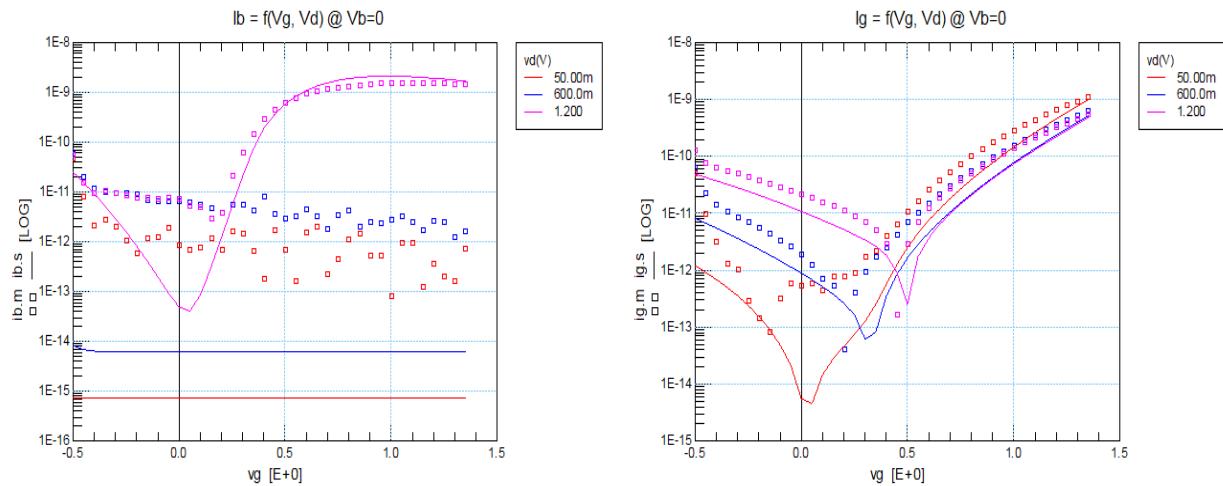


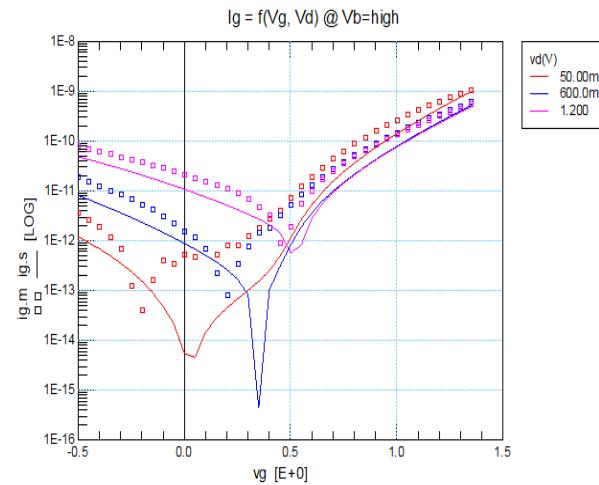
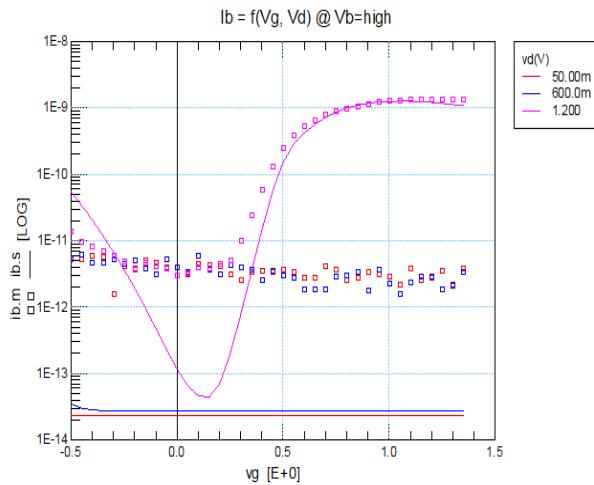
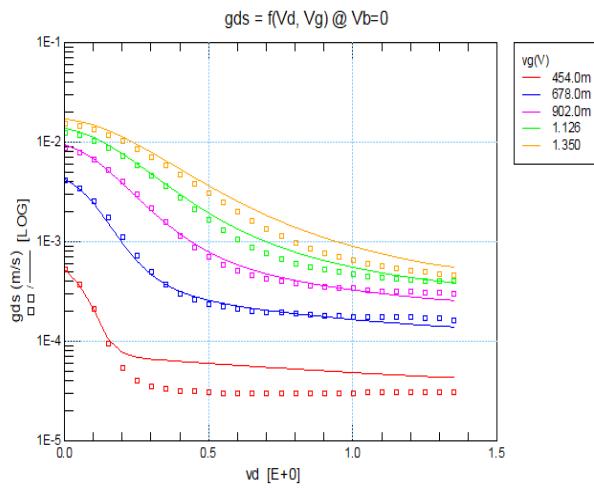
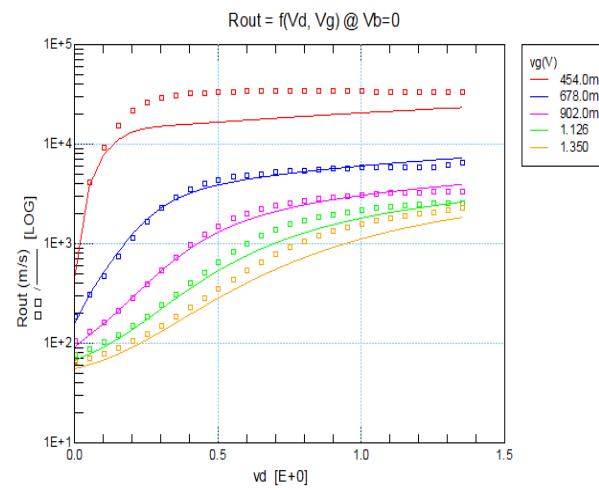
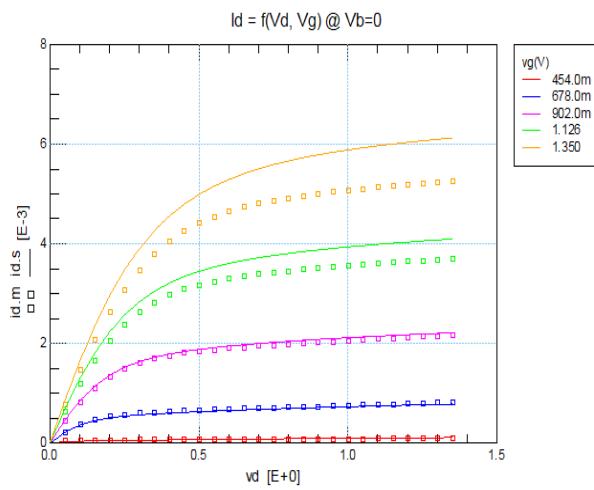
$i_{dvg}, V_d = 1.2V, T = 27^\circ C$

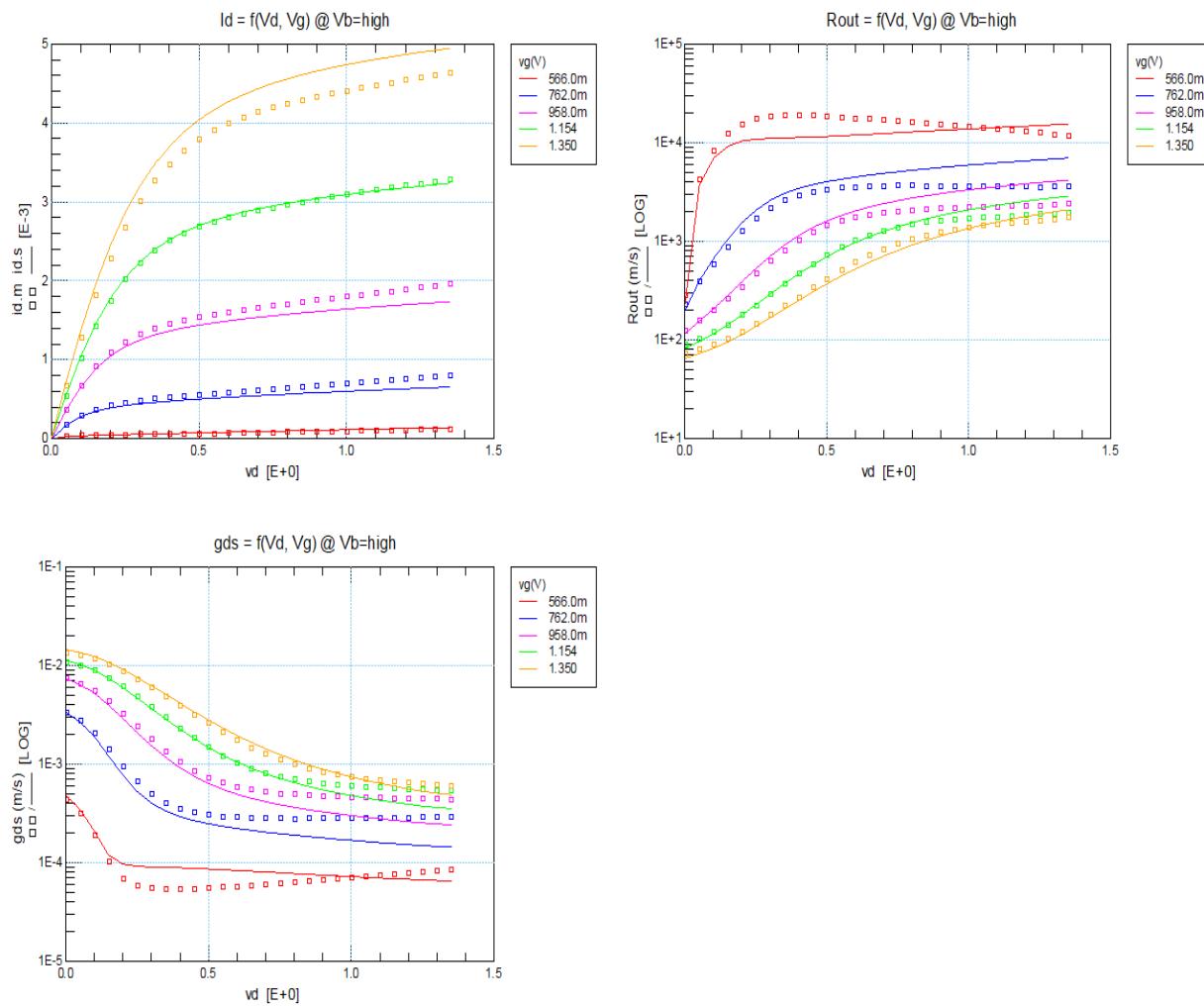
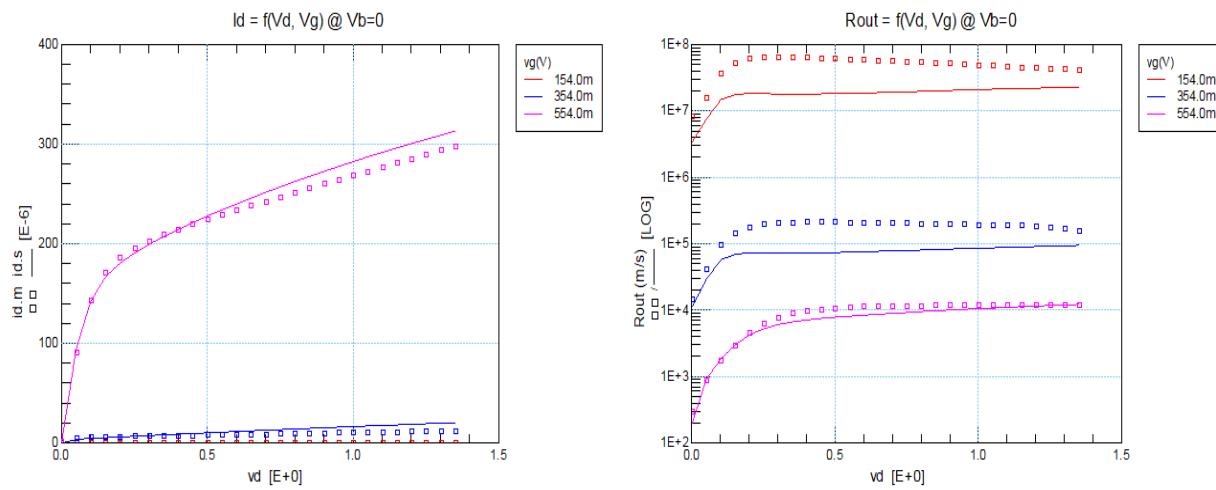


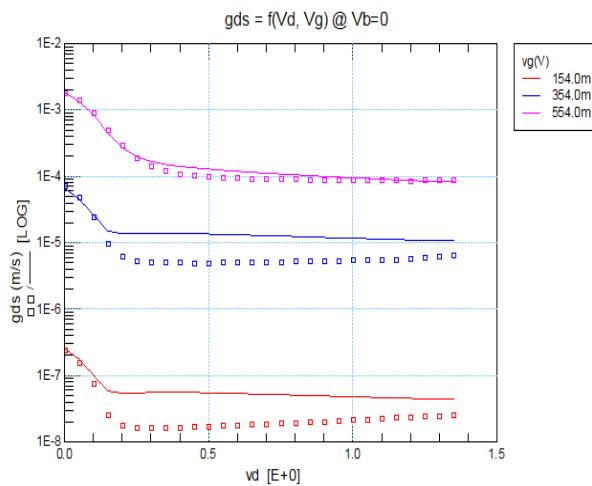


$id_{vg}$ ,  $I_b$ ,  $I_g$ ,  $V_b = 0V$ ,  $T = 27^\circ C$

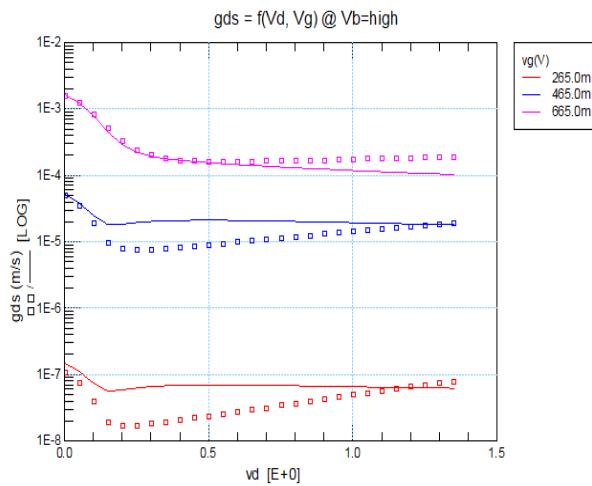
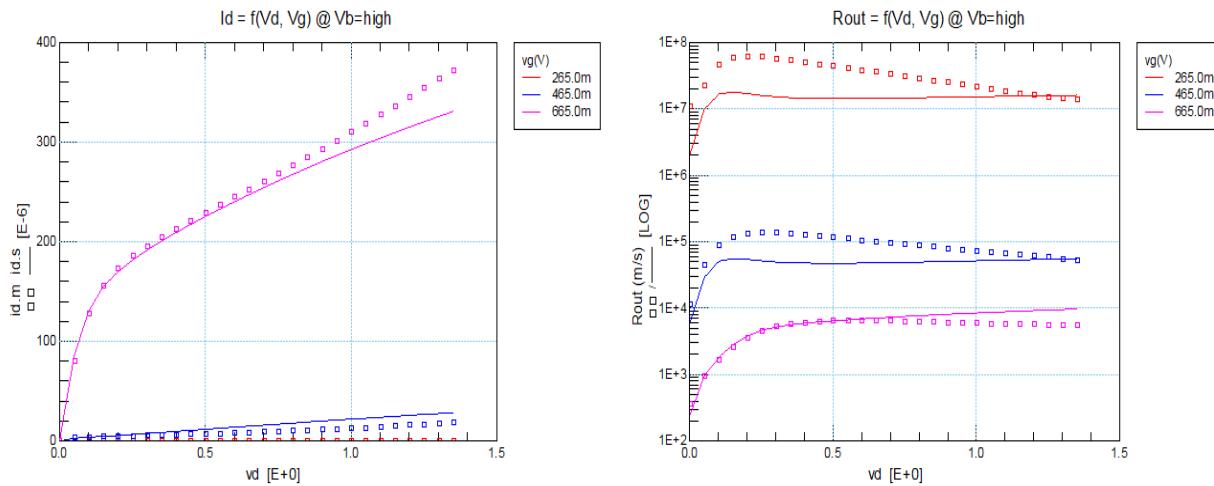


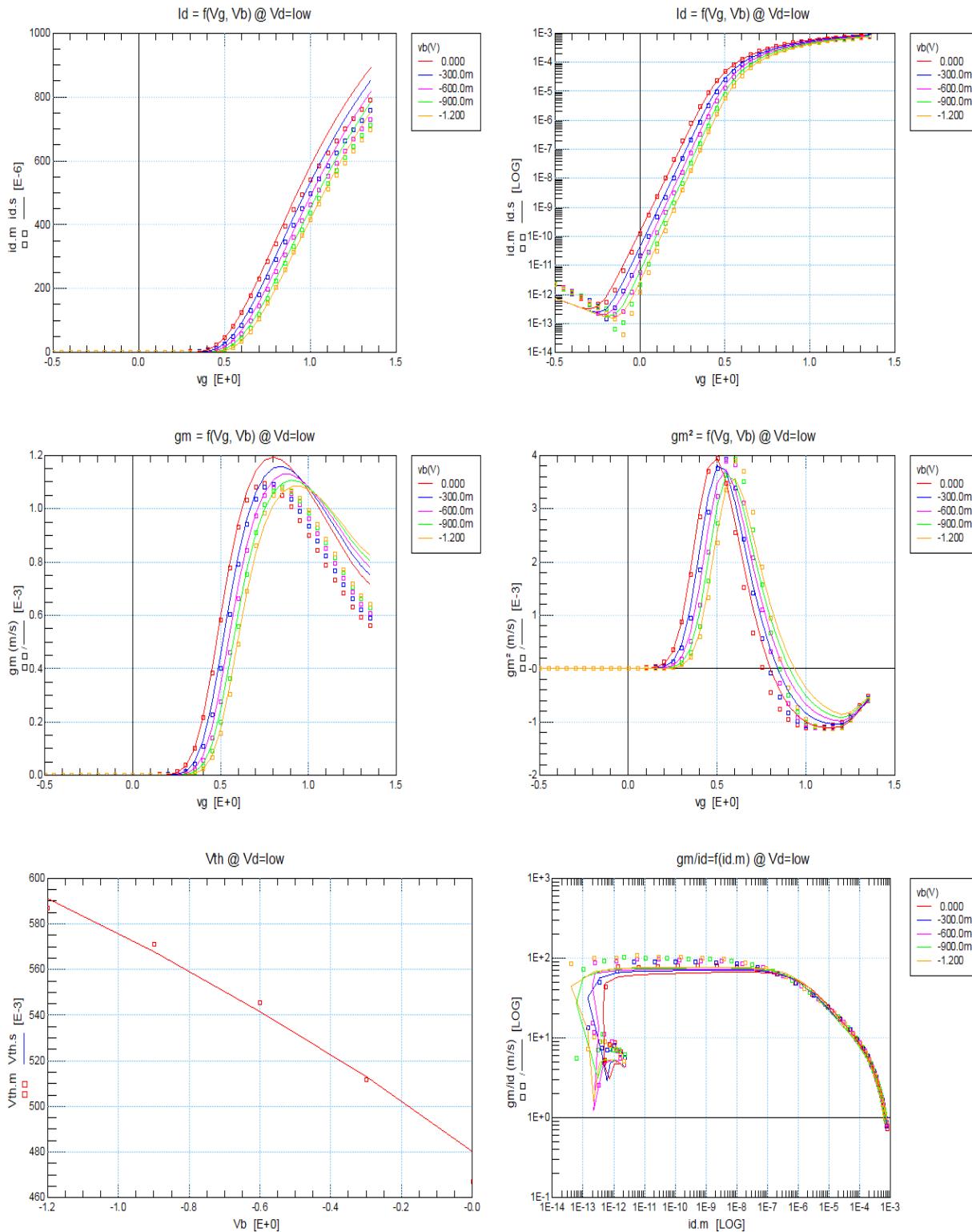
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


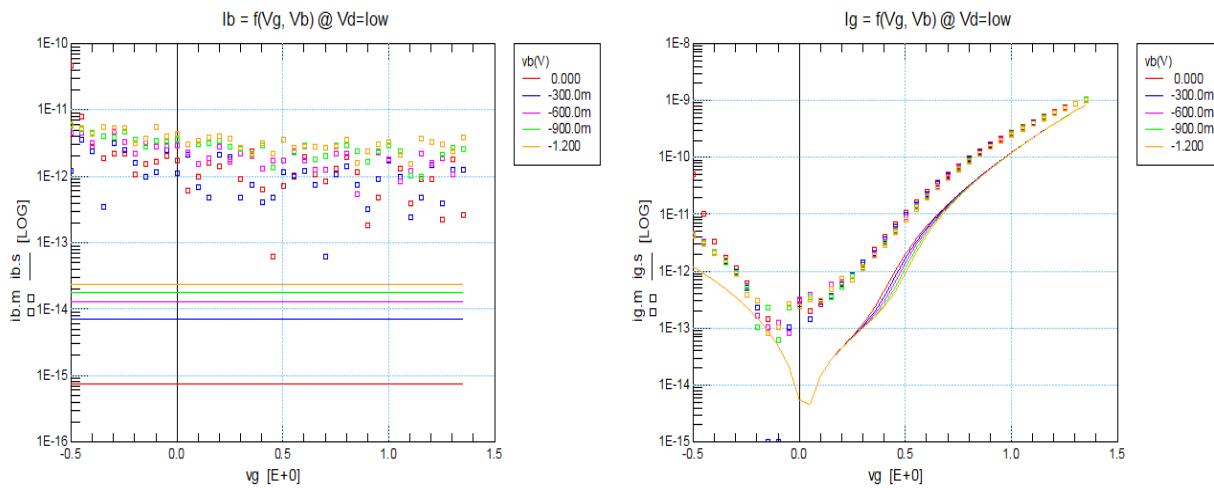
**idvd\_vbmin, Vb = -1.2V, T = 27°C**

**idvd\_vth, Vb = 0V, T = 27°C**




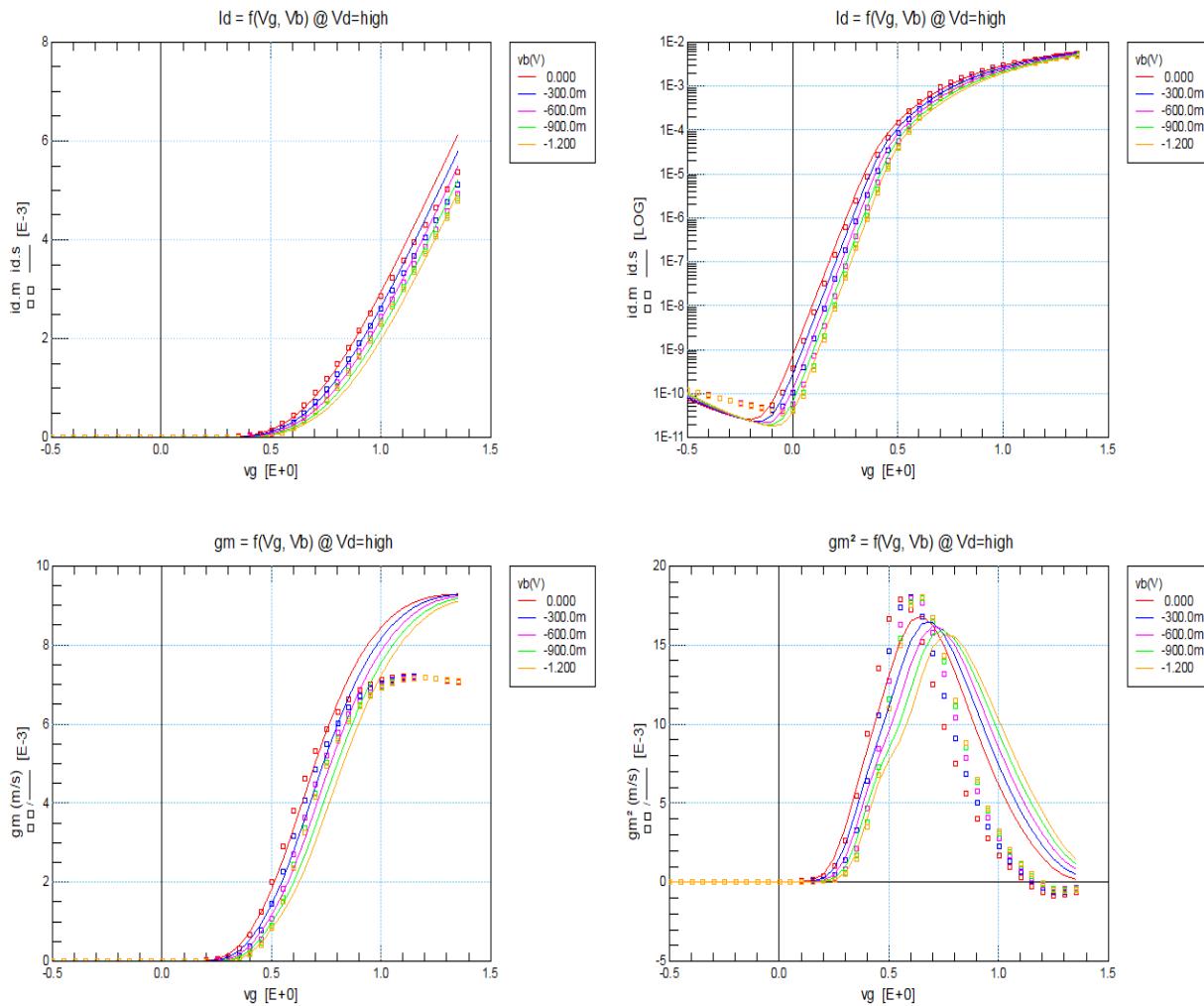
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

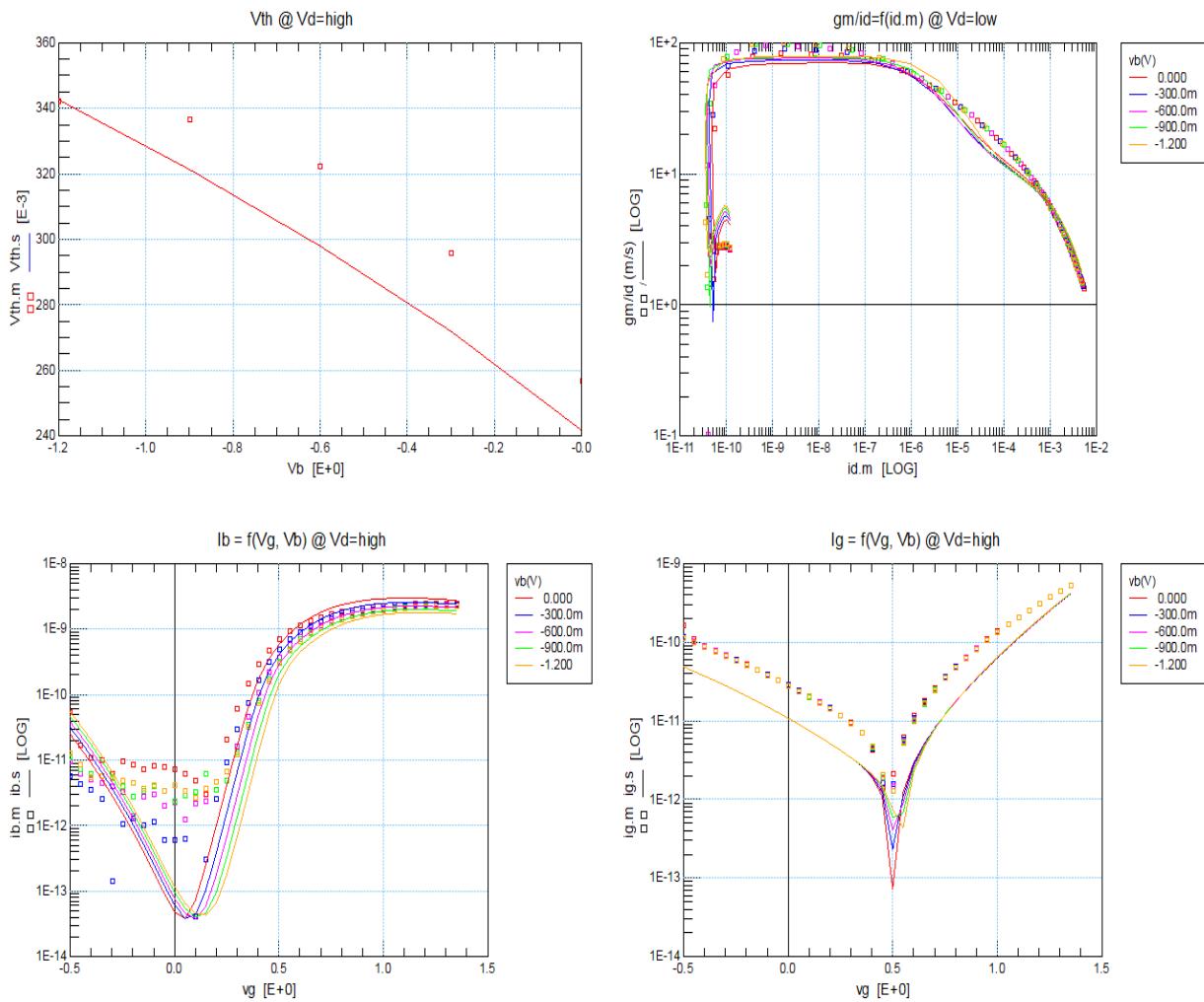


**4.14 W10u0\_L0u14\_S540\_3****idvg, Vd = 0.05V, T = 27°C**

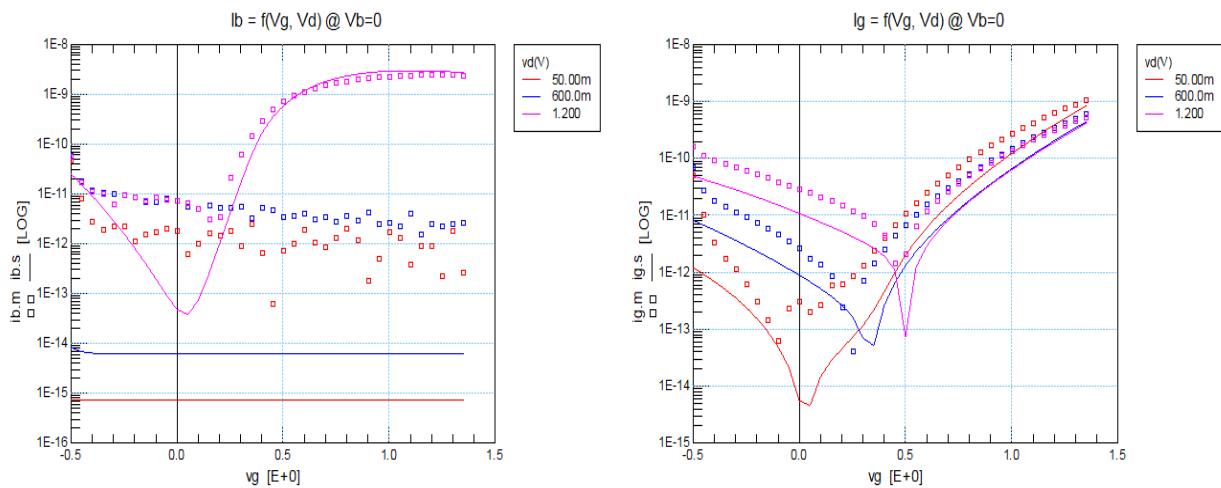


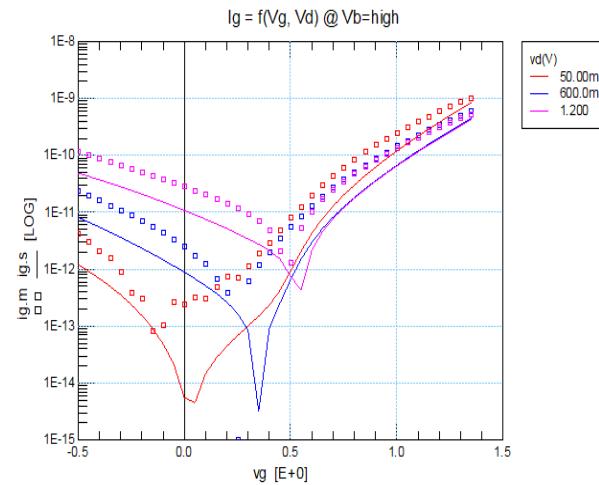
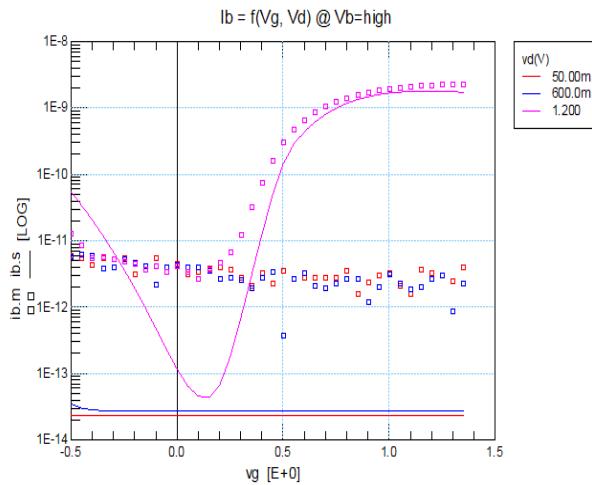
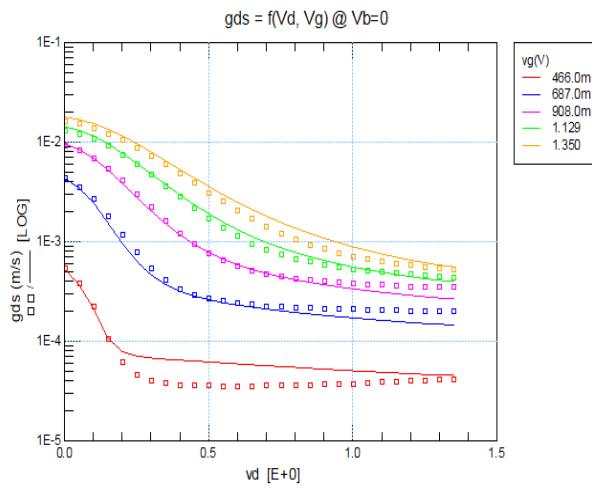
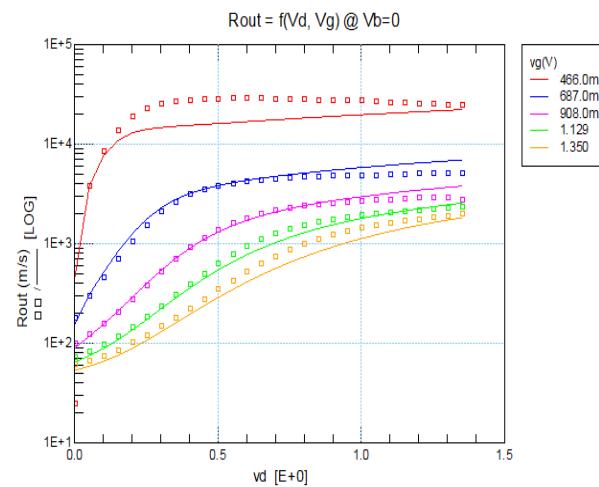
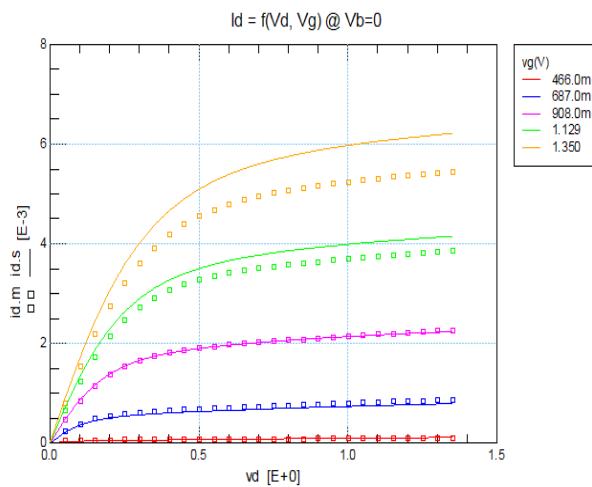
### $i_{dvg}, V_d = 1.2V, T = 27^\circ\text{C}$

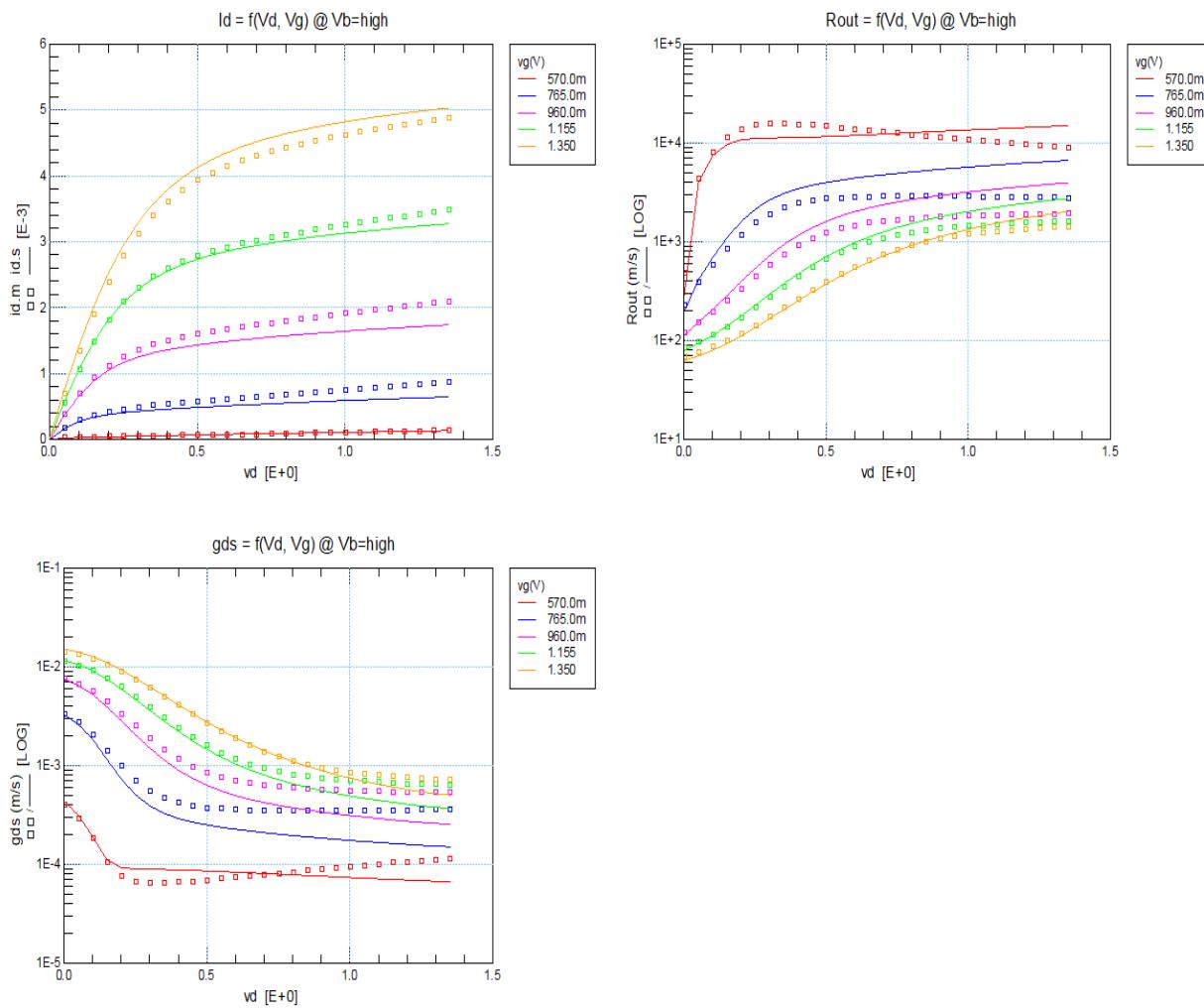
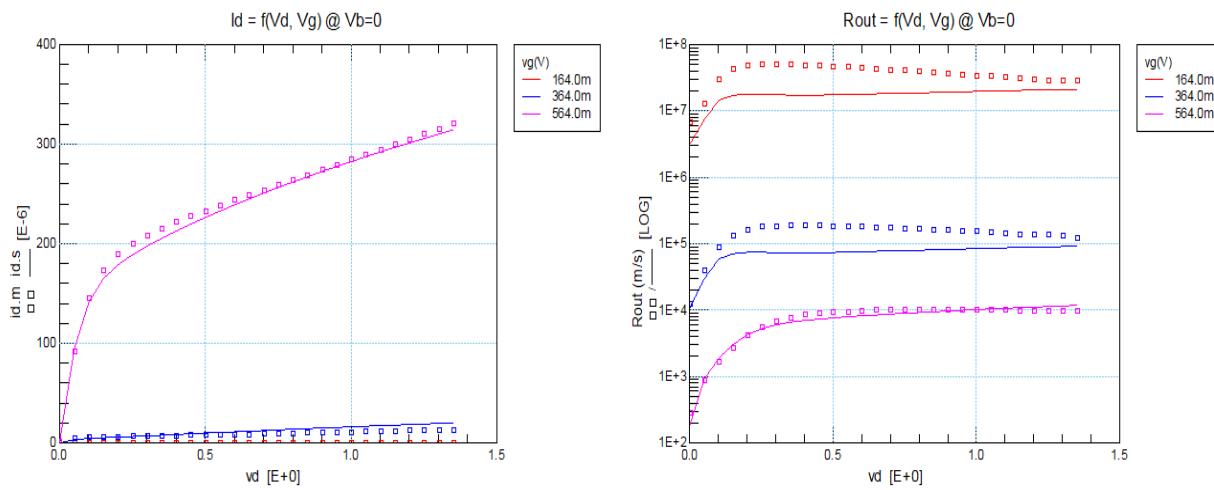


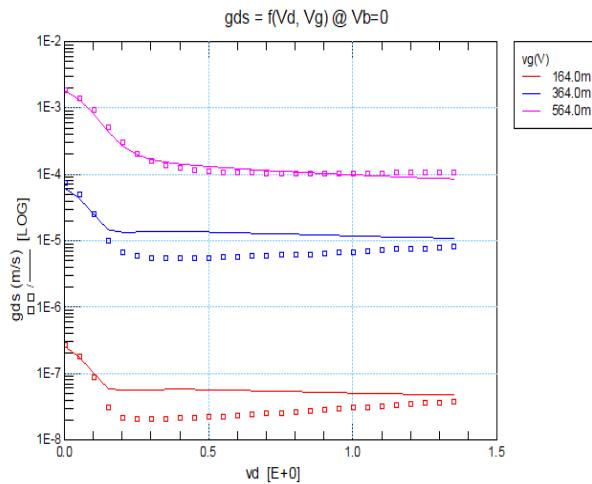


**$idvg, Ib, Ig, Vb = 0V, T = 27^\circ C$**

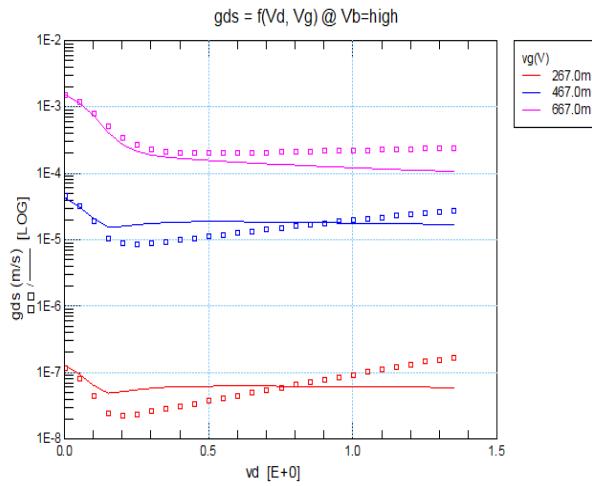
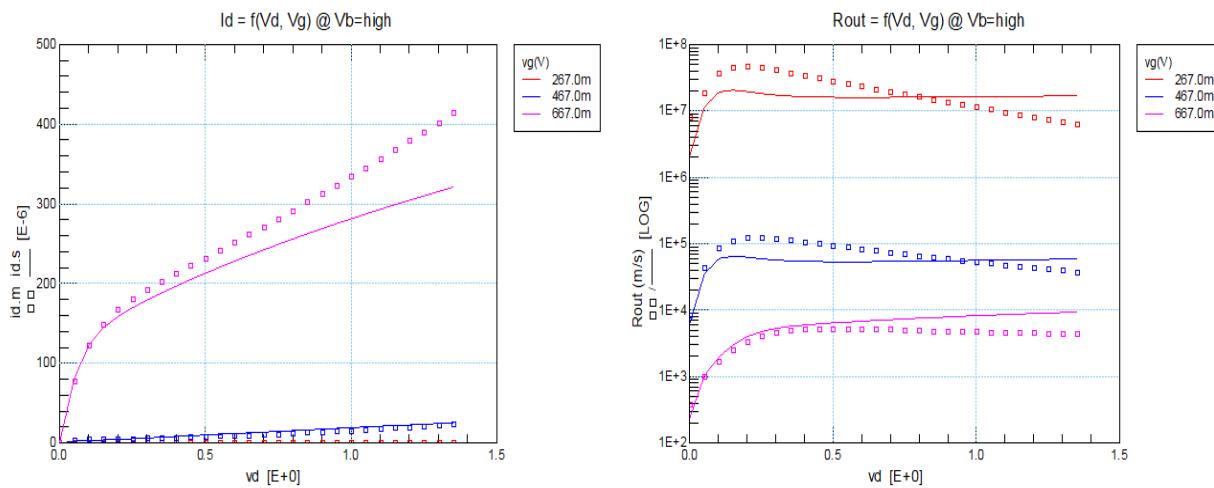


**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


**idvd\_vbmin, Vb = -1.2V, T = 27°C**

**idvd\_vth, Vb = 0V, T = 27°C**


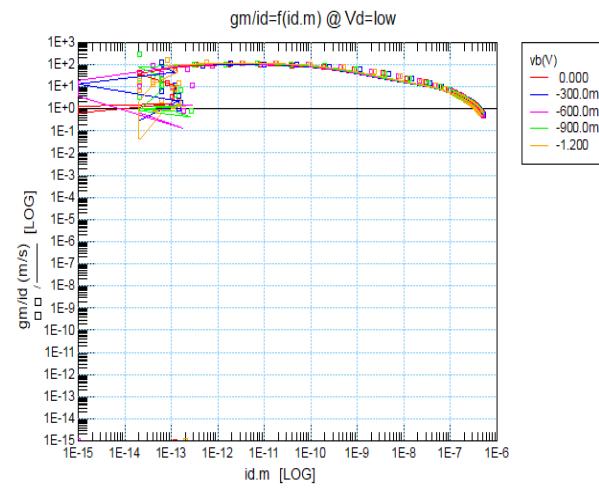
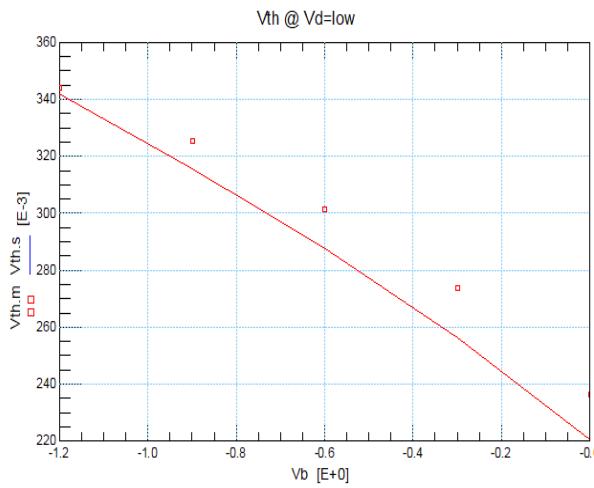
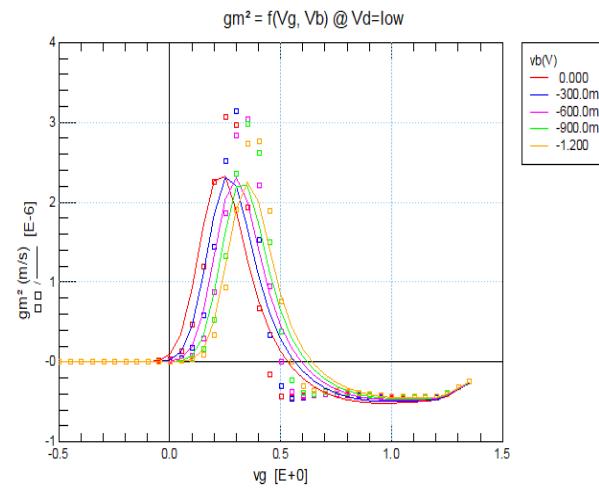
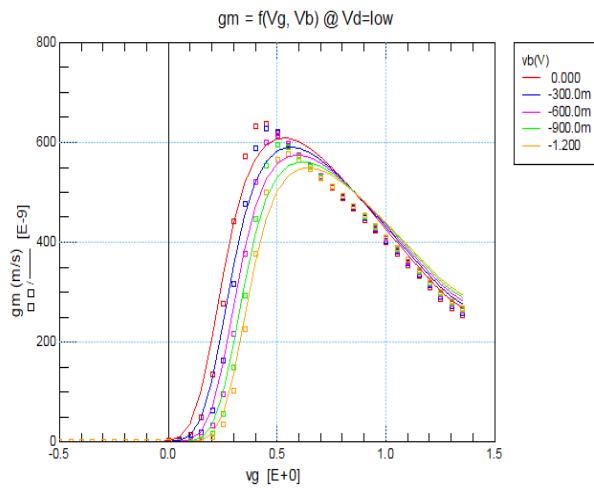
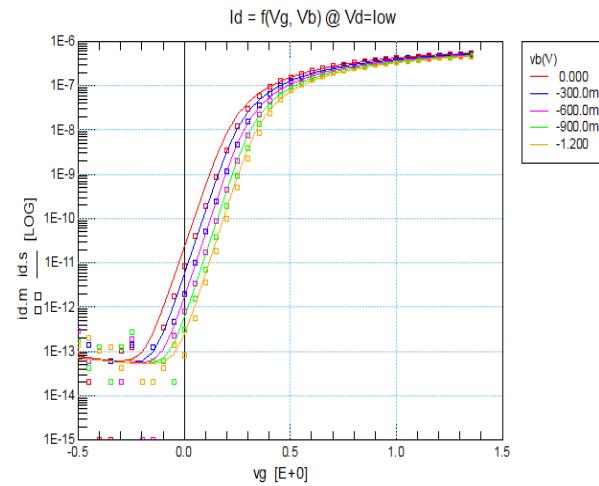
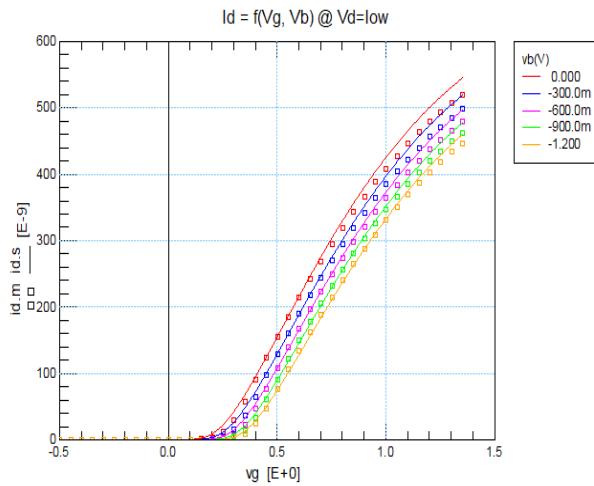


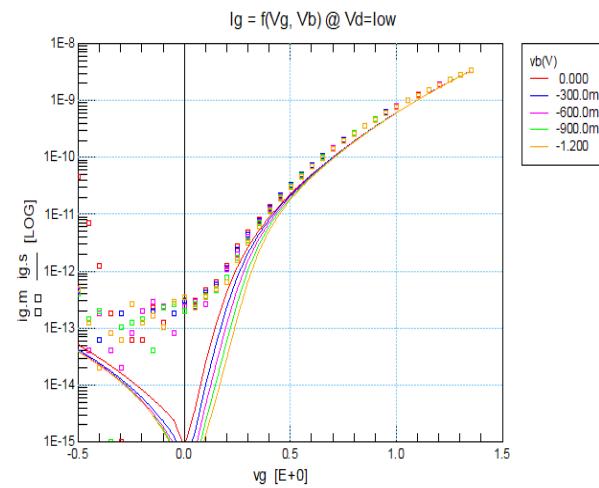
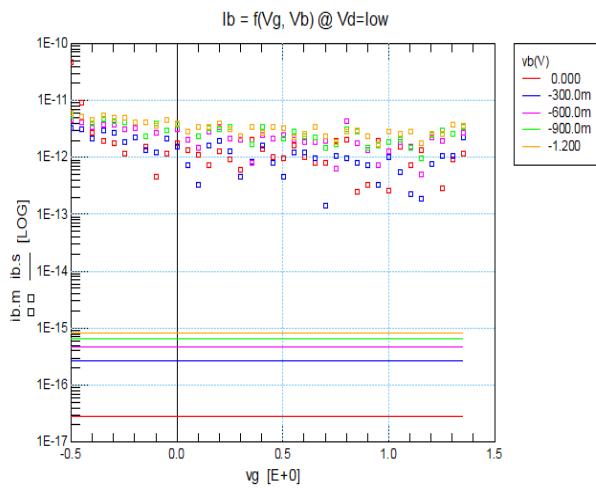
idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C



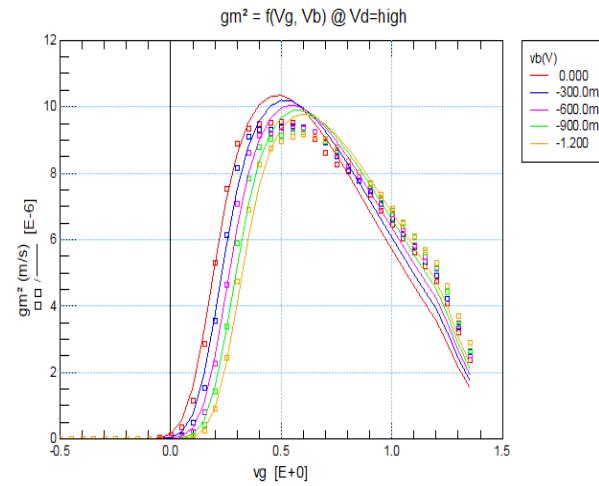
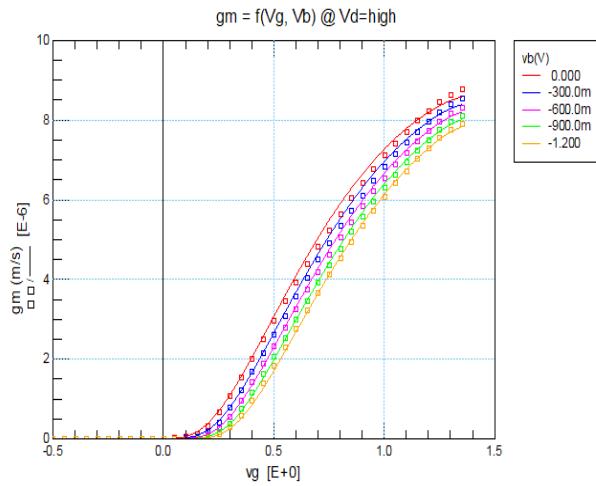
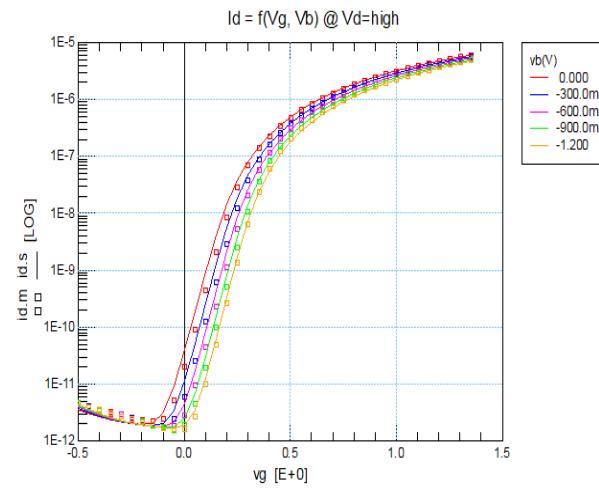
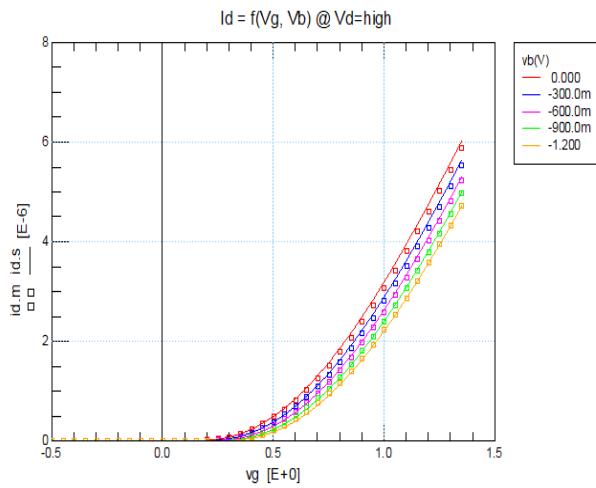
## 4.15 W0u3\_L10u0\_S545\_2

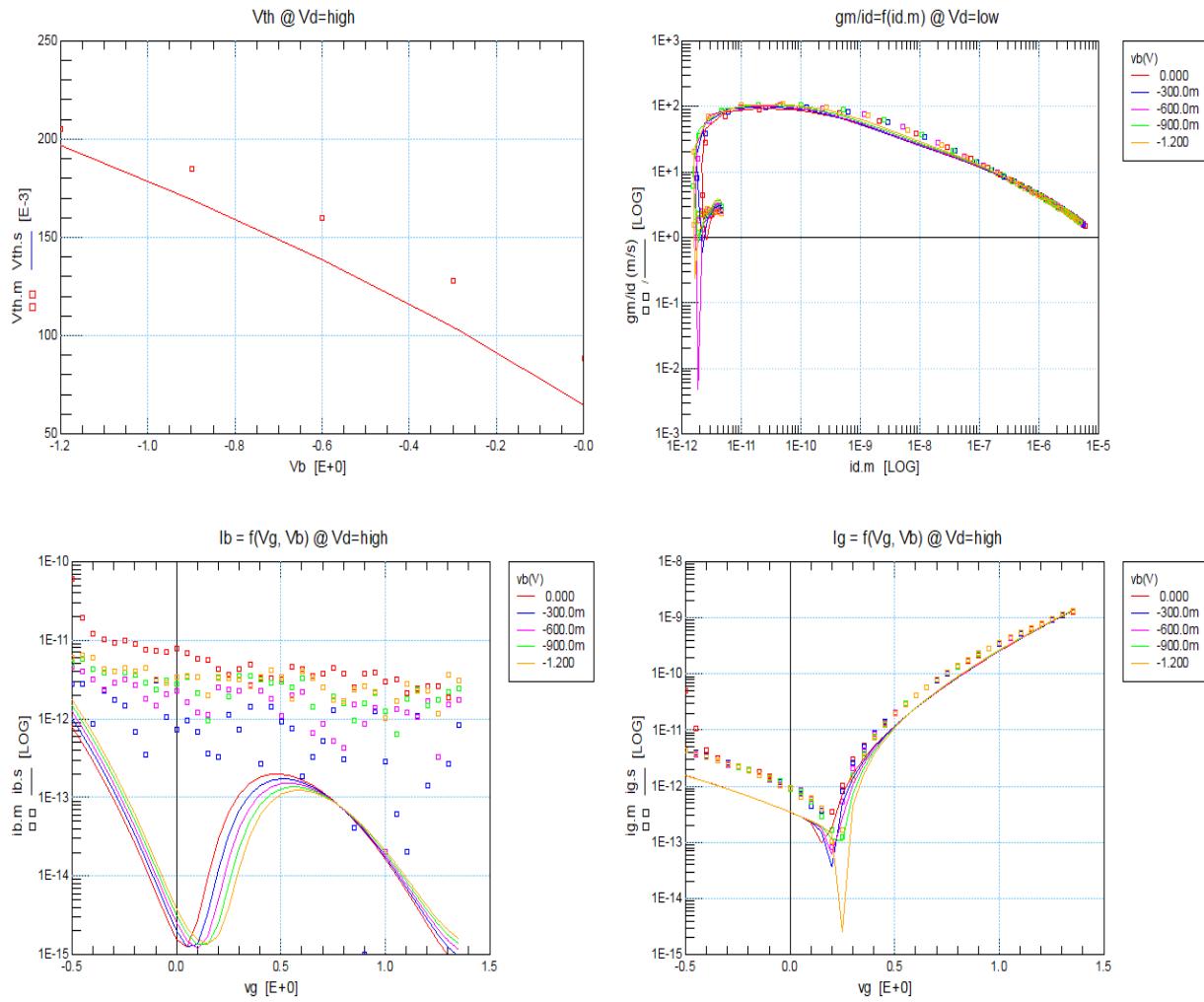
$idvg$ ,  $Vd = 0.05V$ ,  $T = 27^\circ C$



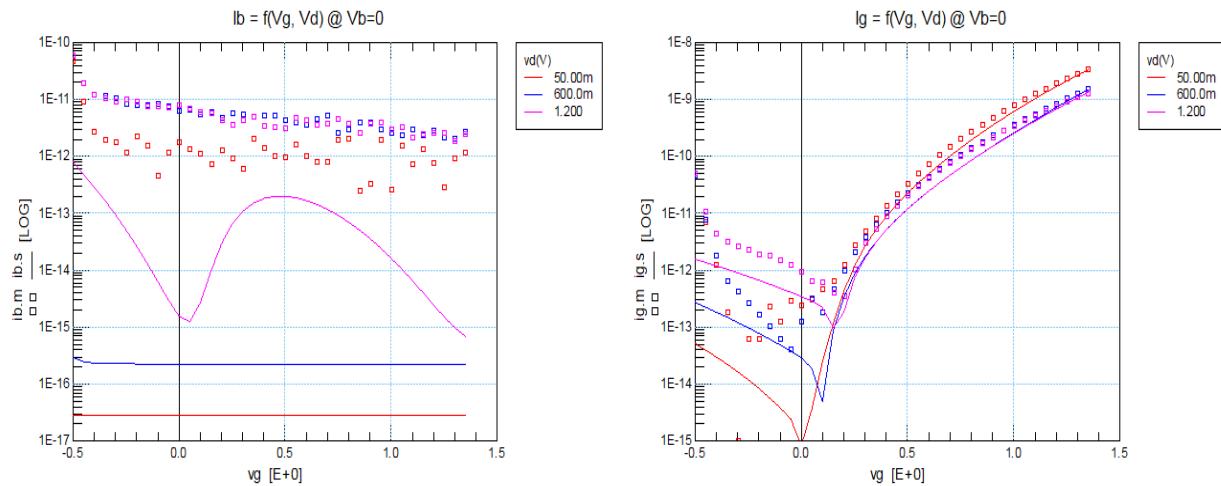


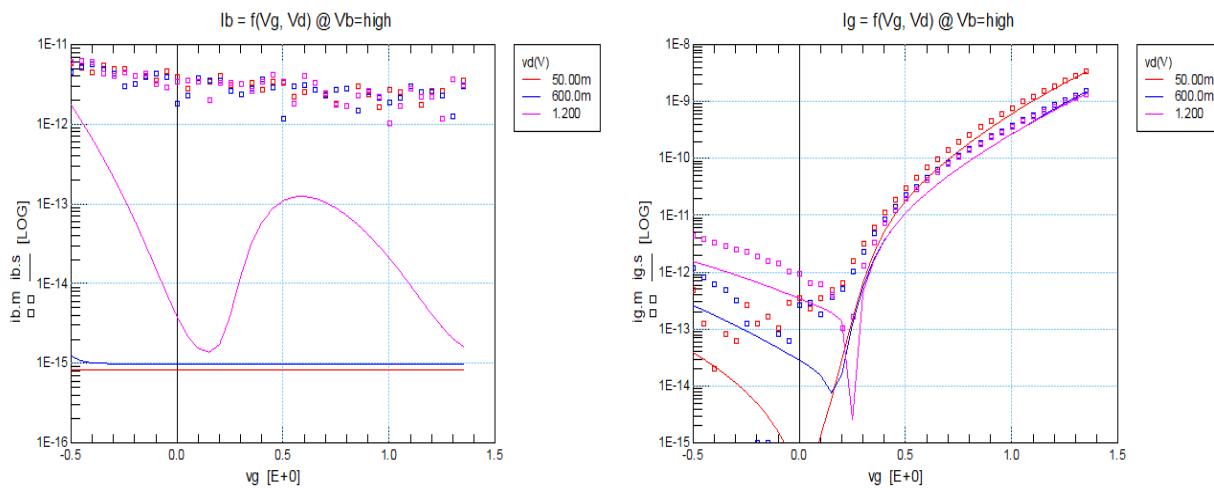
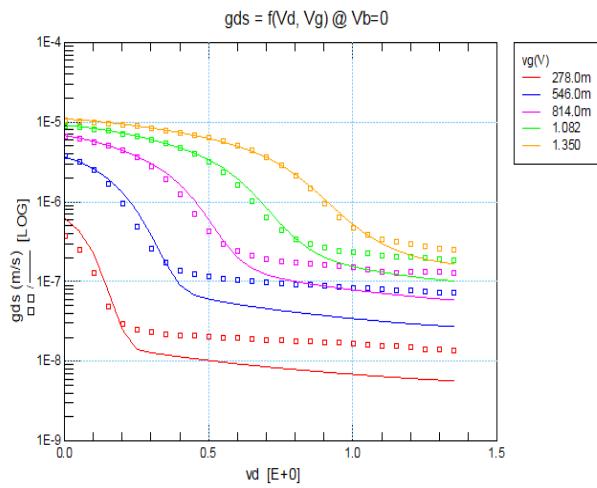
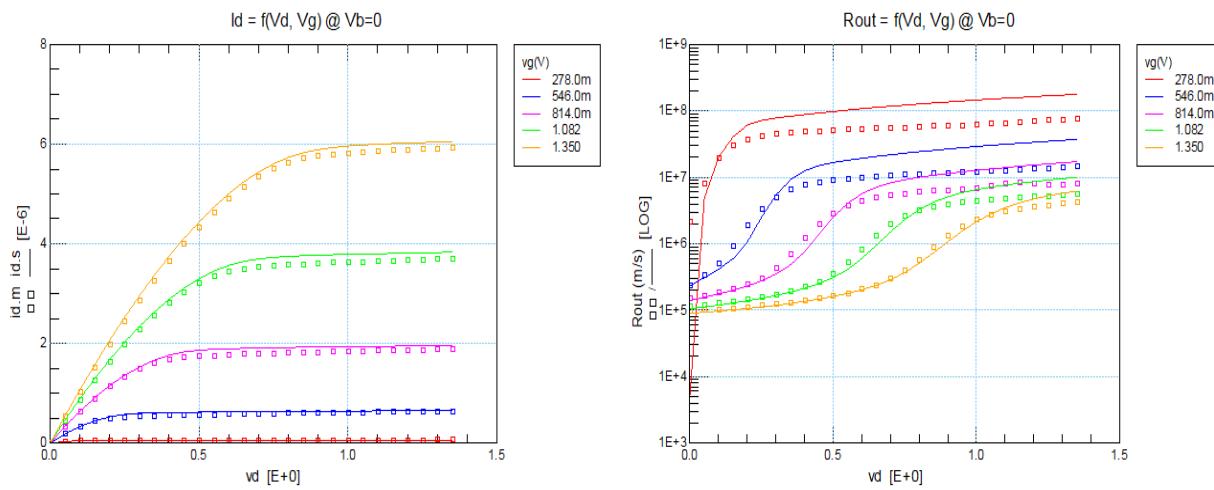
$i_d v_g, V_d = 1.2V, T = 27^\circ C$

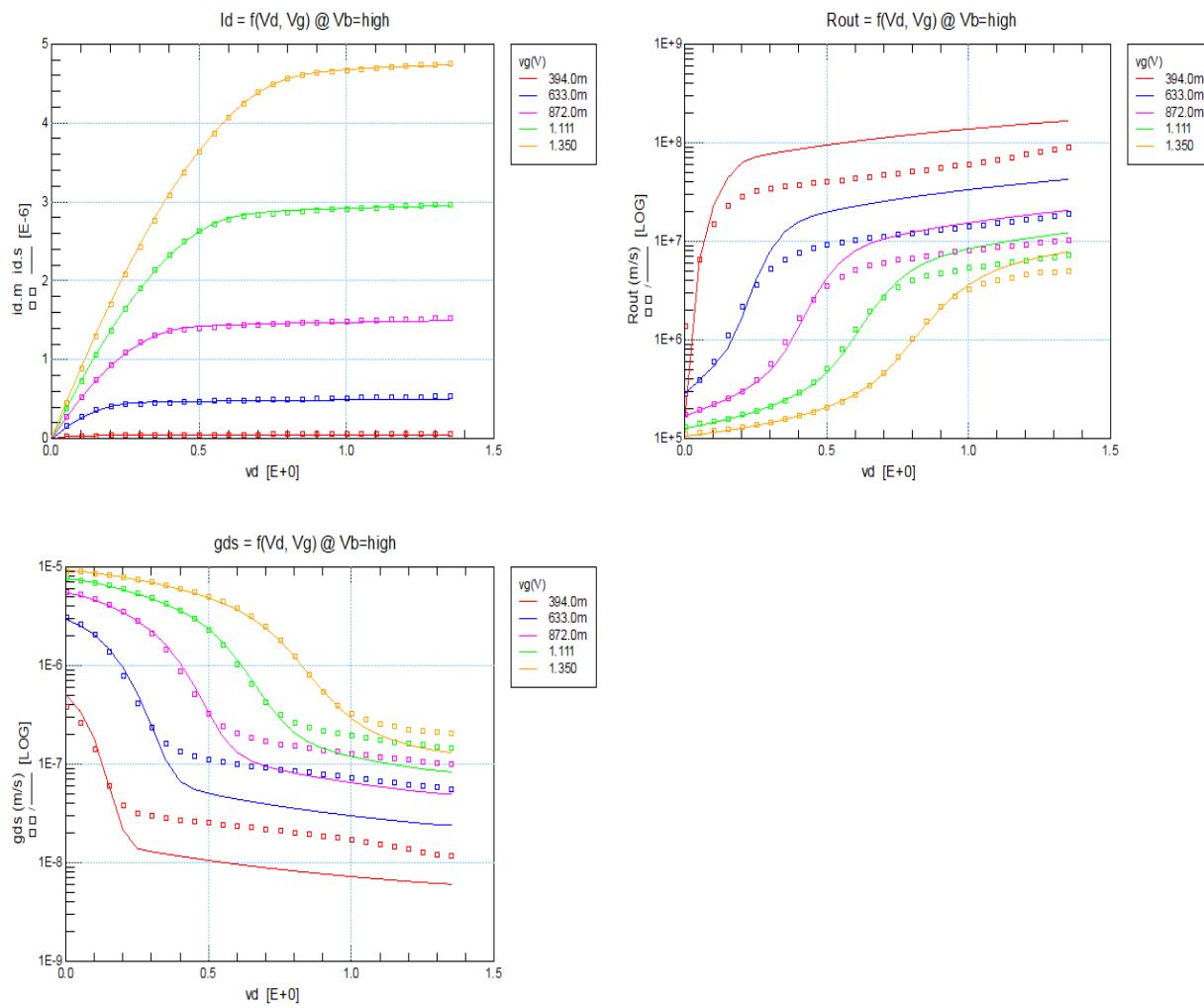
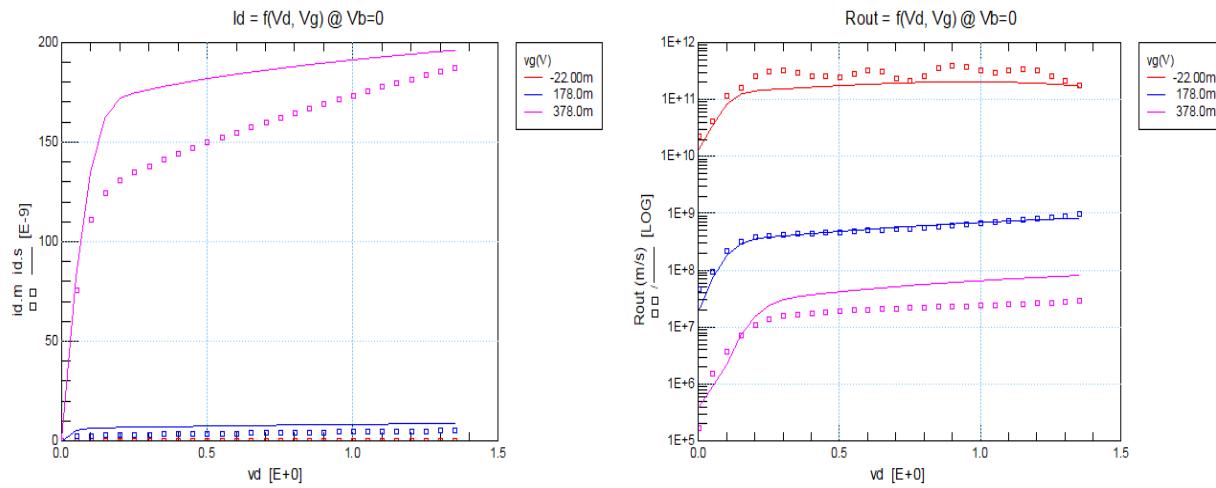


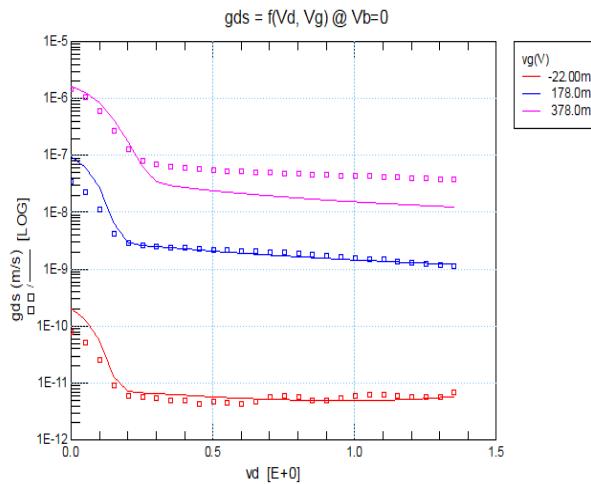


### $i_{dvg}, I_b, I_g, V_b = 0V, T = 27^\circ C$

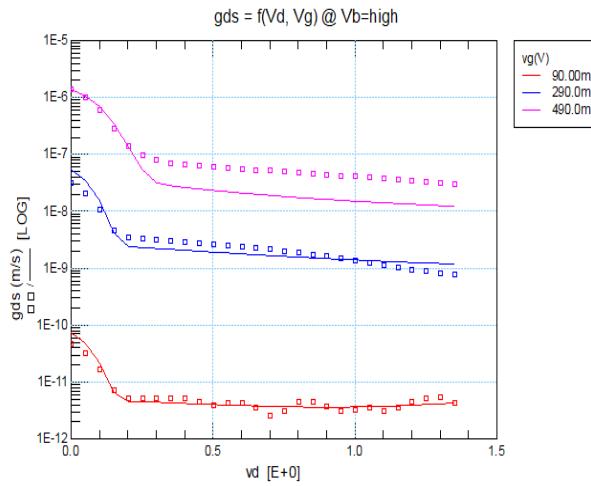
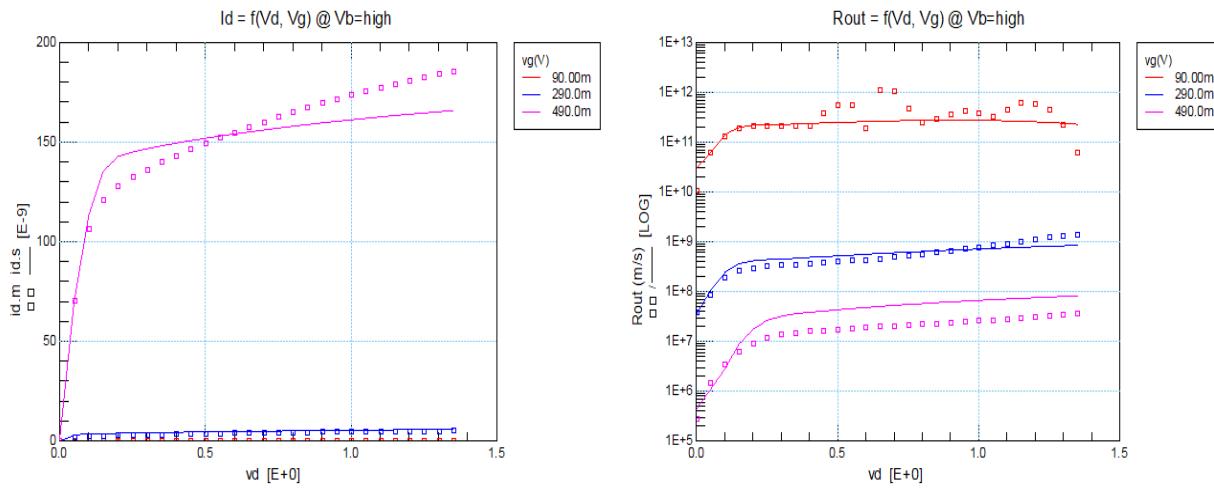


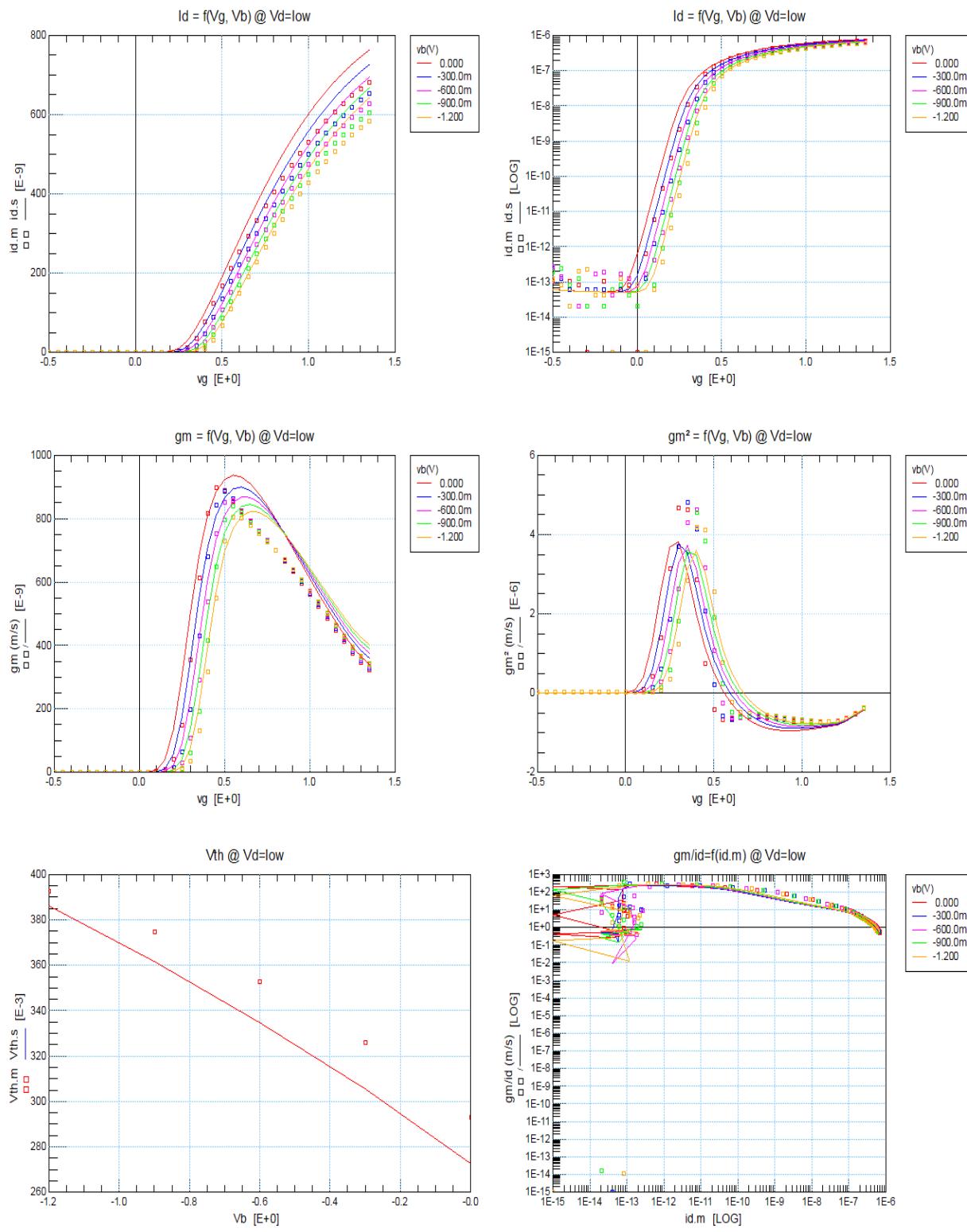
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


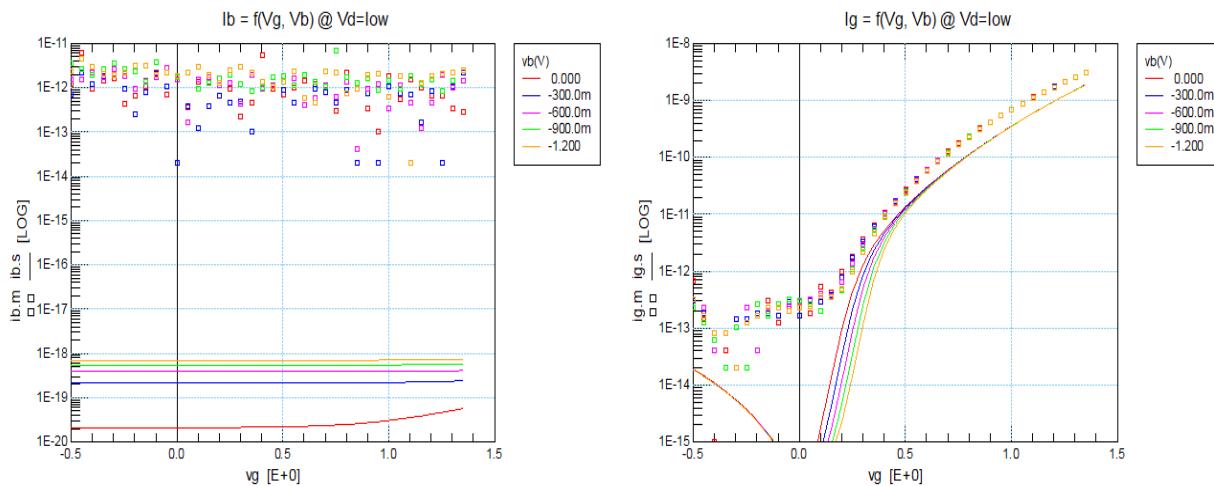
**idvd\_vbmin, Vb = -1.2V, T = 27°C**

**idvd\_vth, Vb = 0V, T = 27°C**




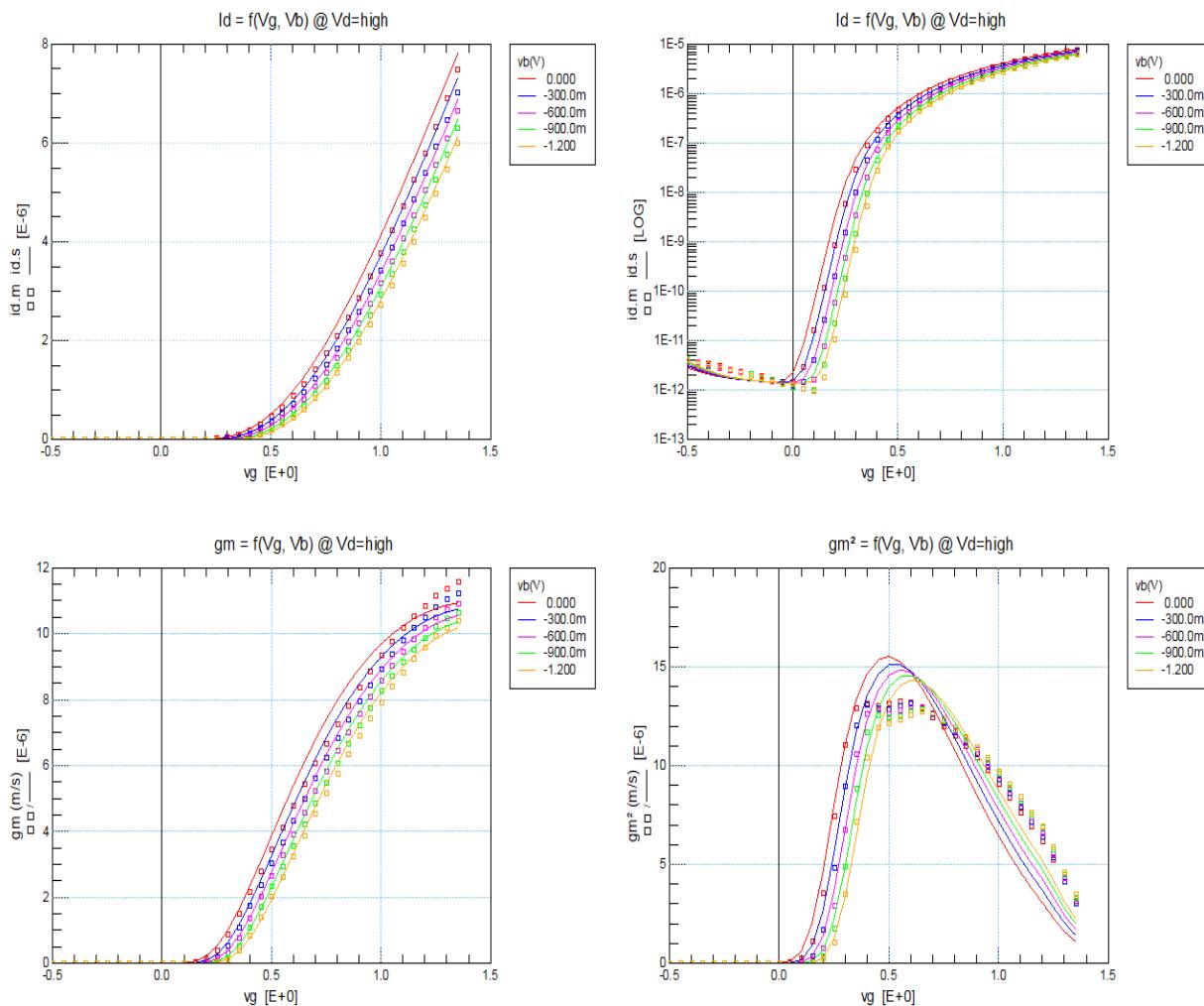
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

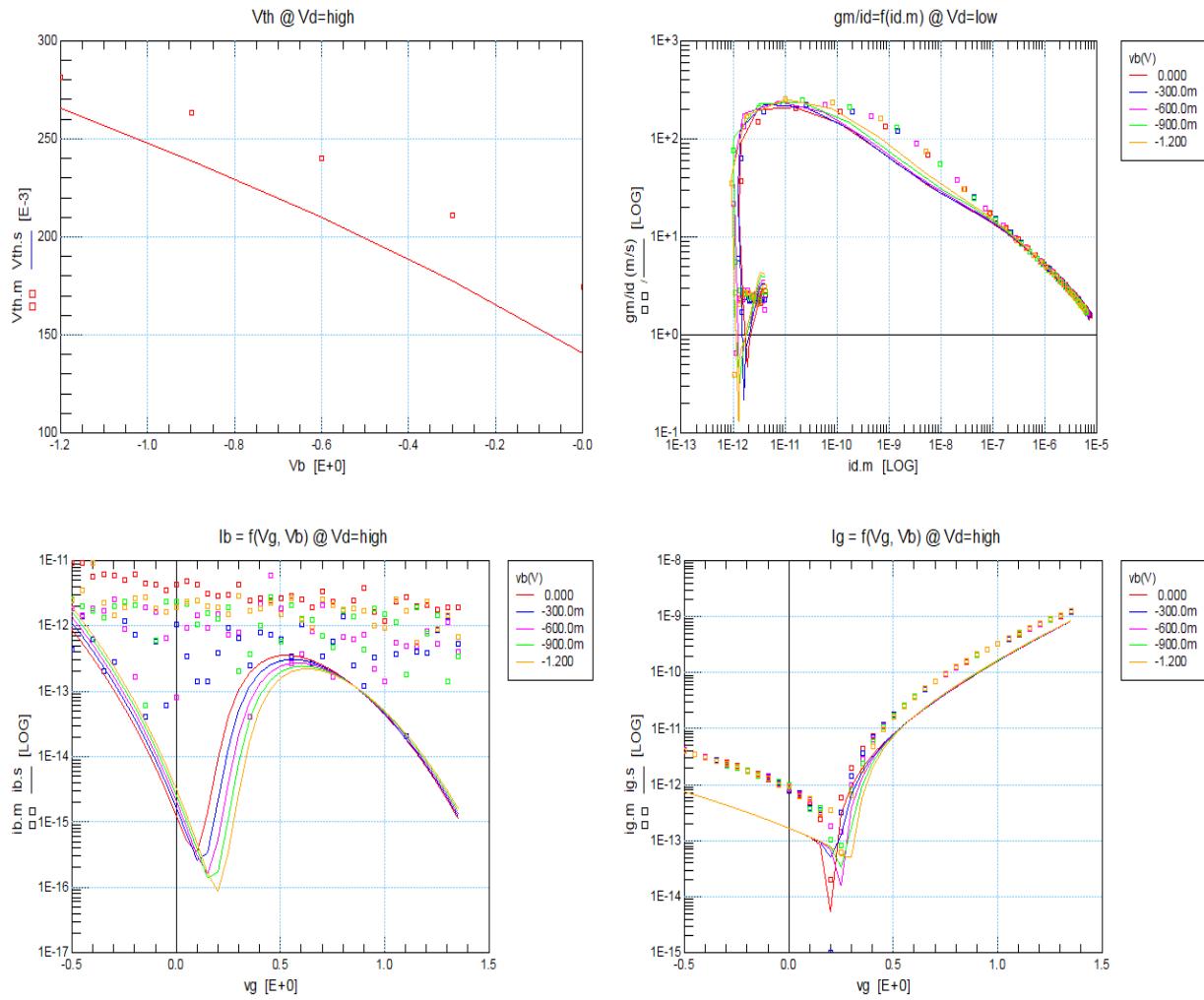


**idvg, Vd = 0.05V, T = -40°C**


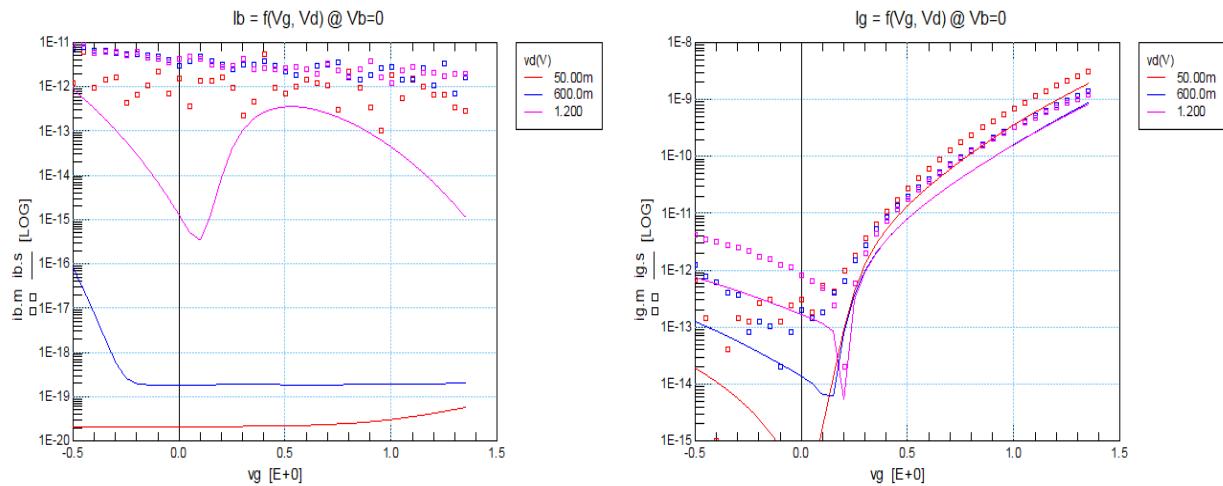


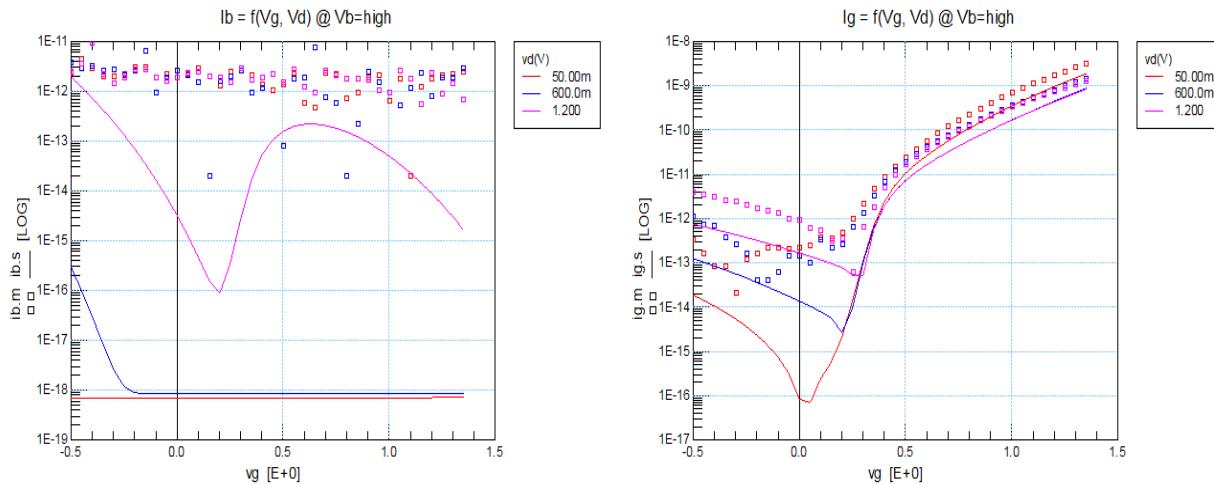
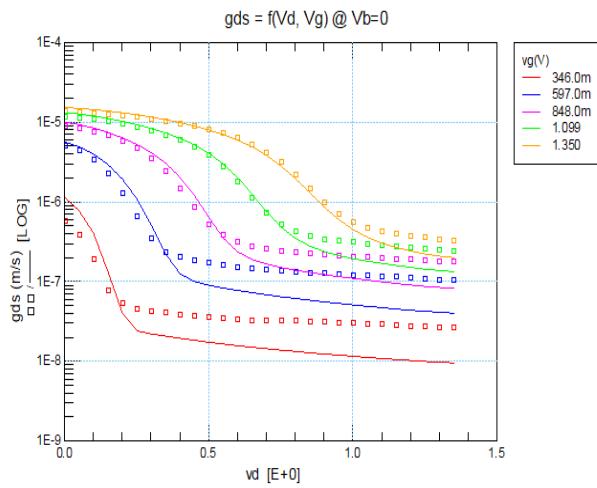
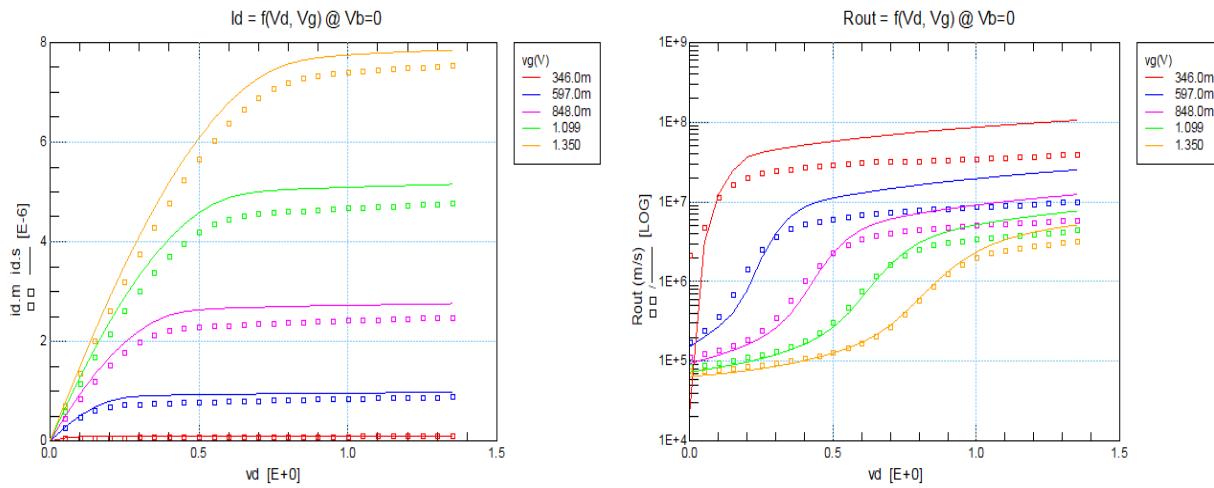
$i_{dvg}, V_d = 1.2V, T = -40^\circ C$

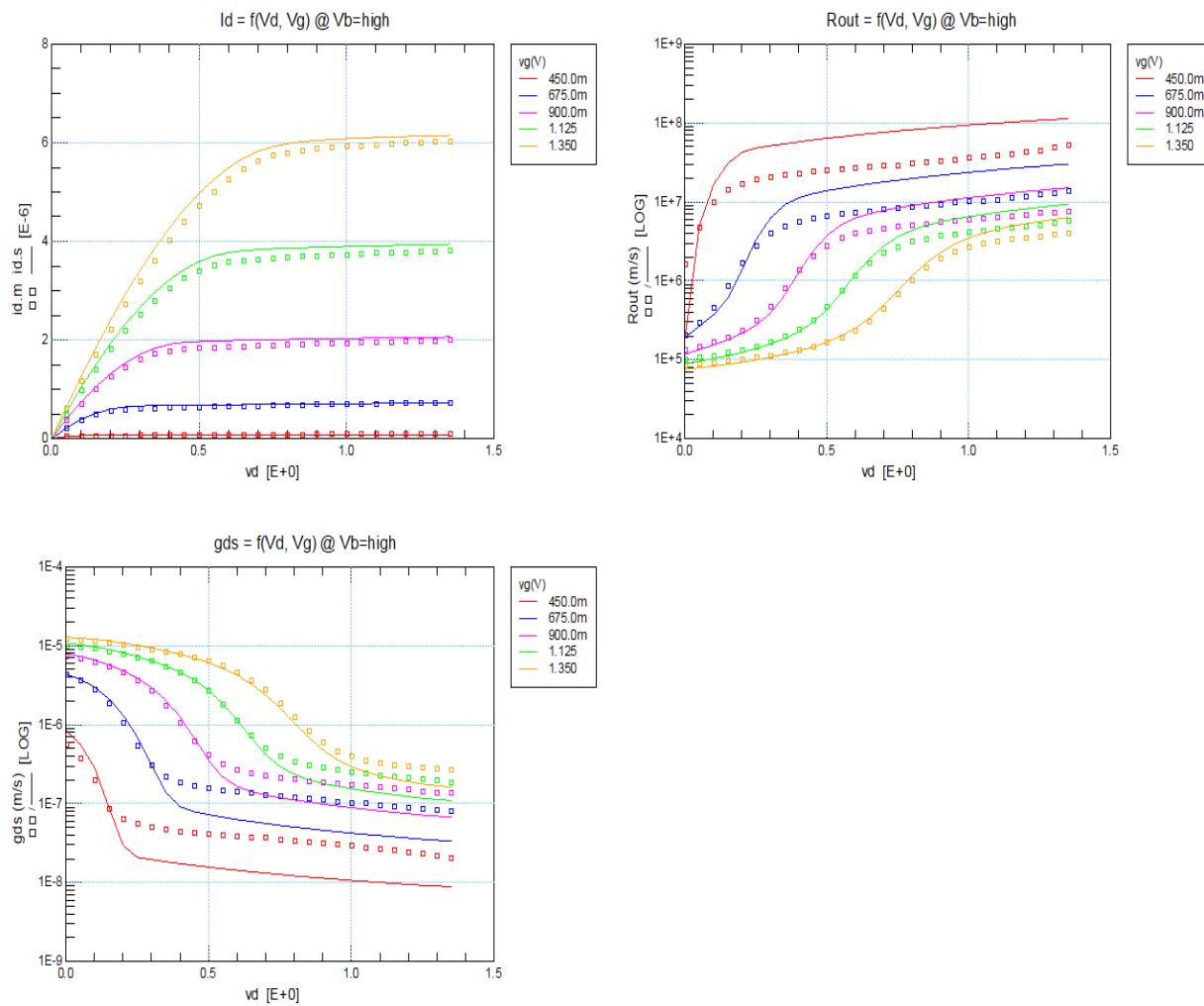
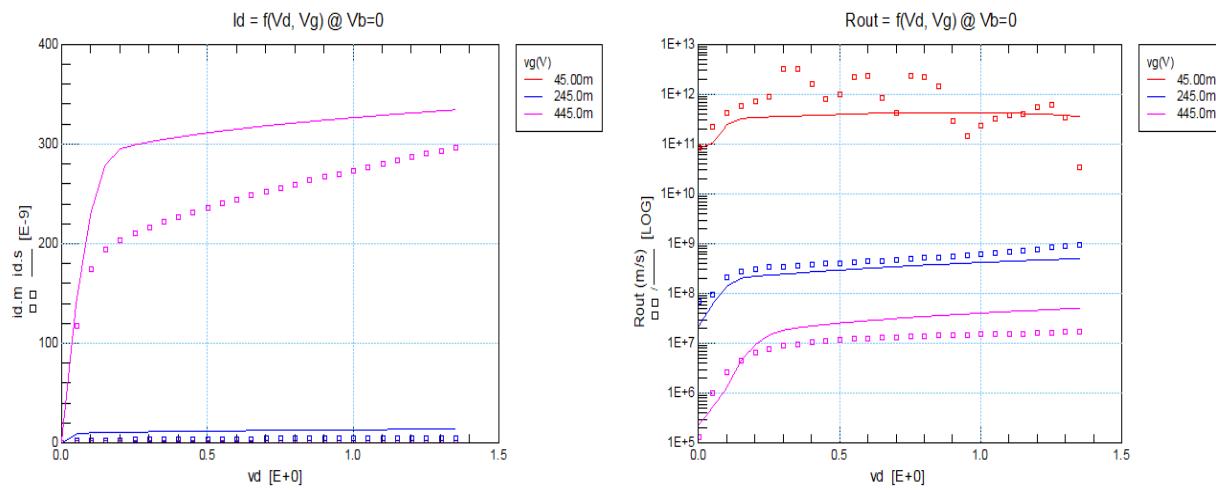


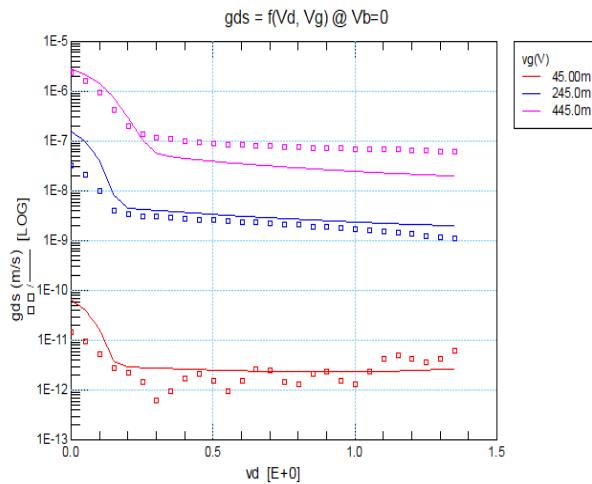


$i_{dvg}, I_b, I_g, V_b = 0V, T = -40^\circ\text{C}$

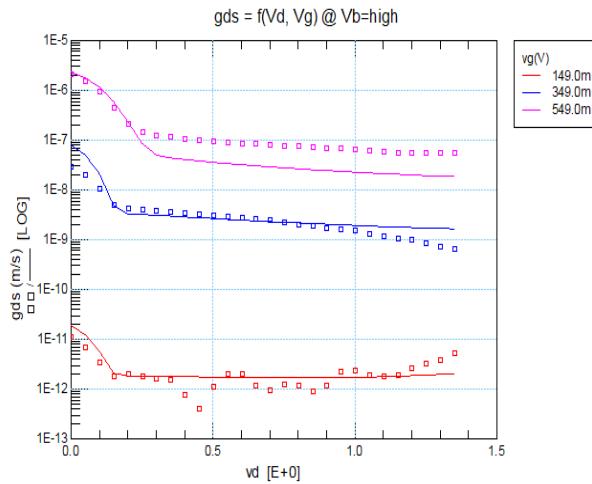
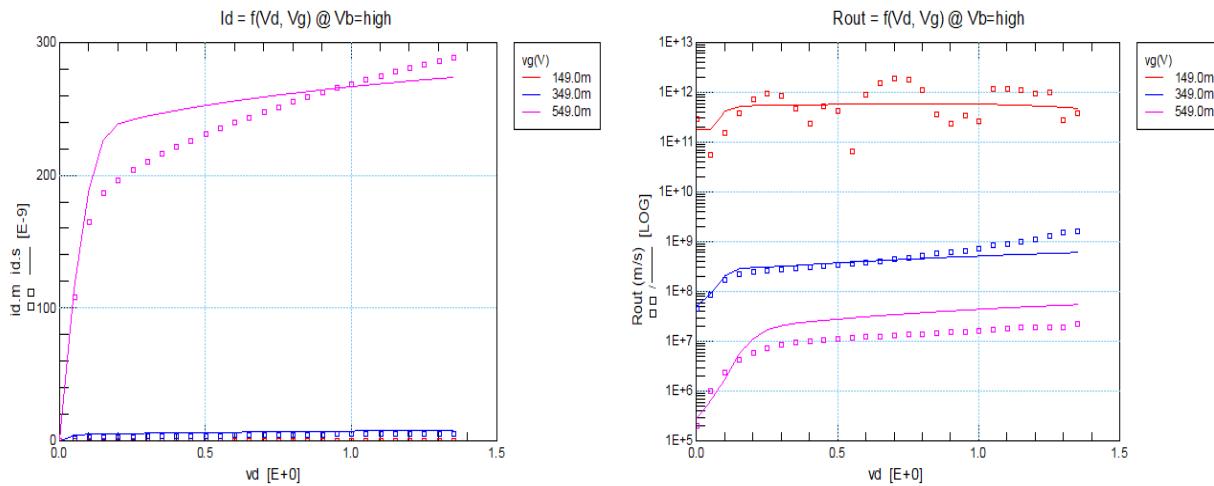


**idvg, Ib,Ig, Vb = -1.2V, T = -40°C**

**idvd, Vb = 0V, T = -40°C**


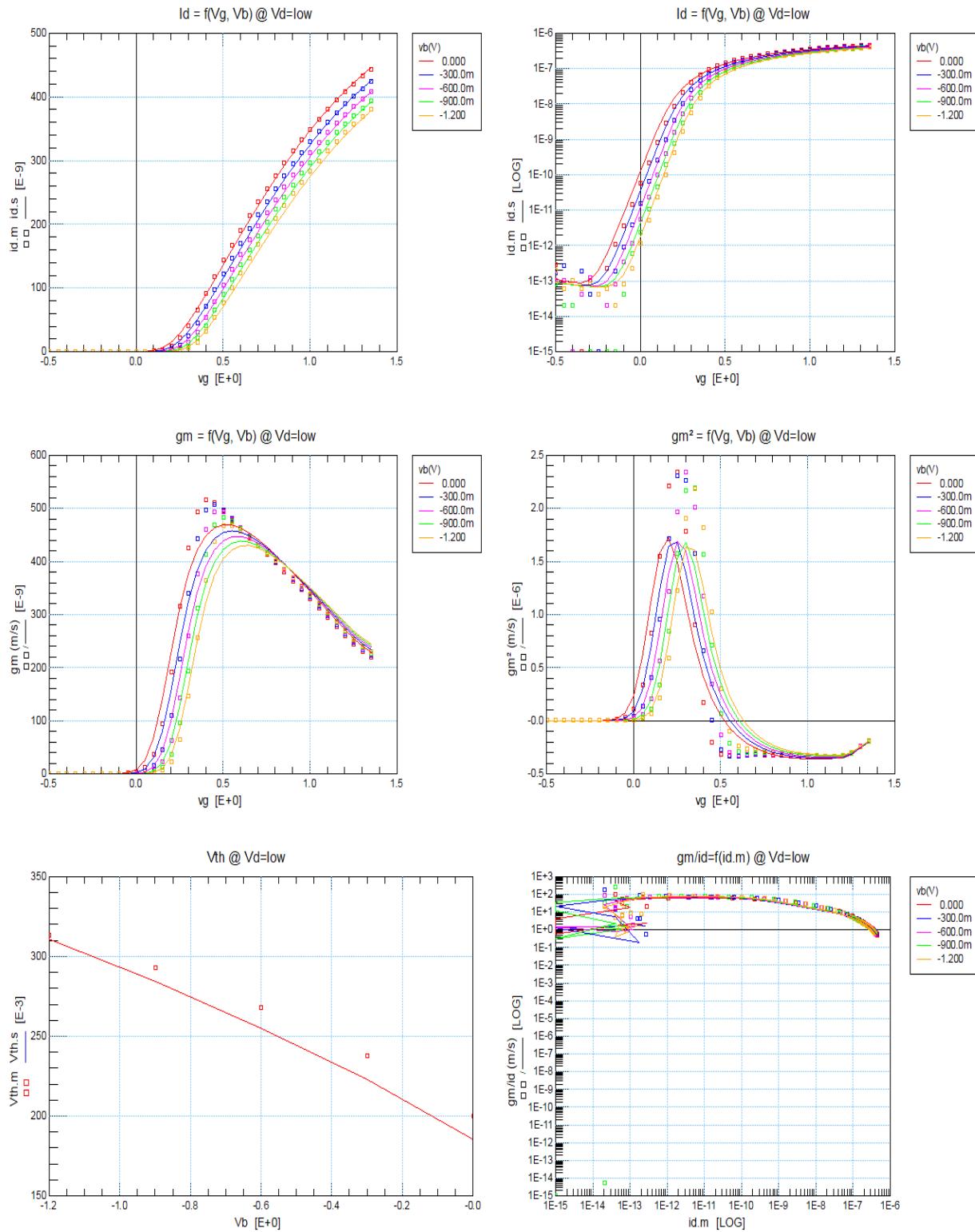
**idvd\_vbmin, Vb = -1.2V, T = -40°C****idvd\_vth, Vb = 0V, T = -40°C**

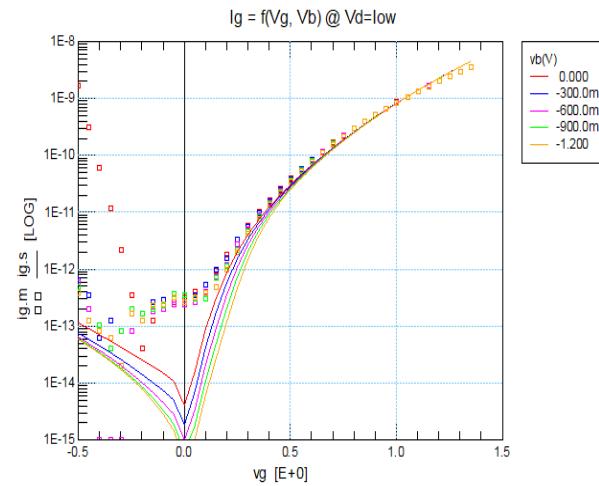
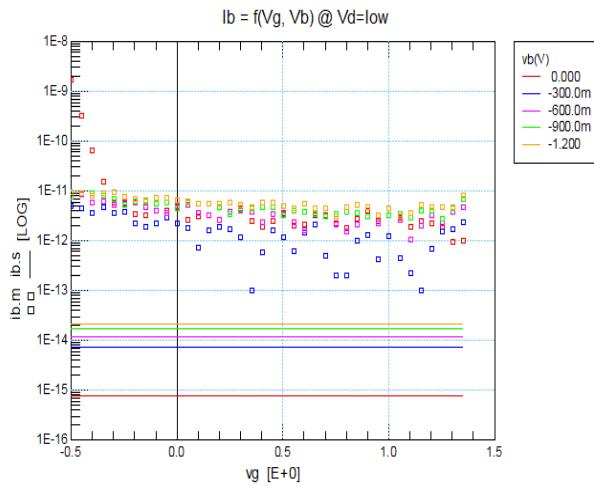


idvd\_vth\_vbmin, Vb = -1.2V, T = -40°C

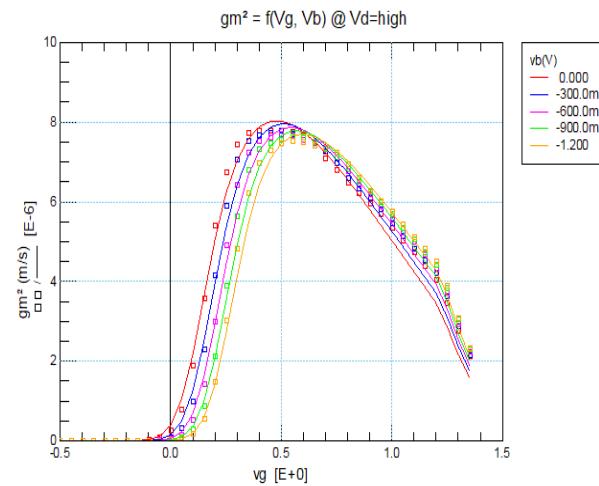
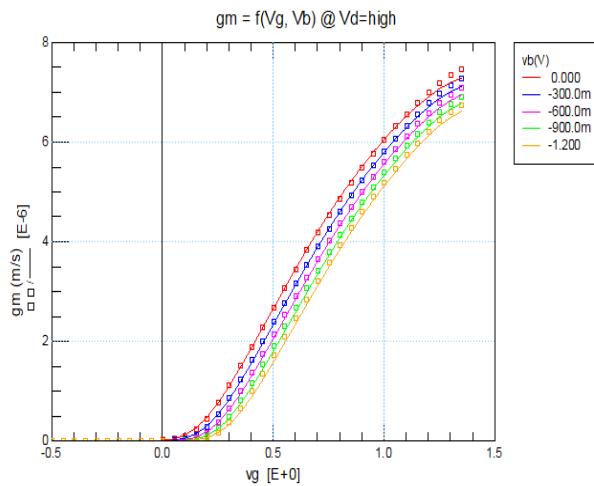
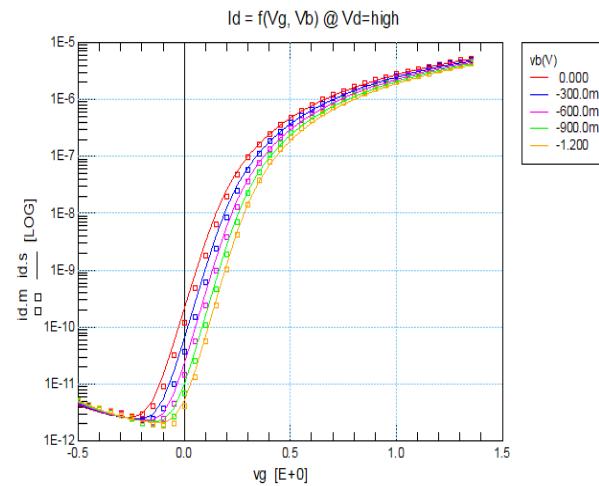
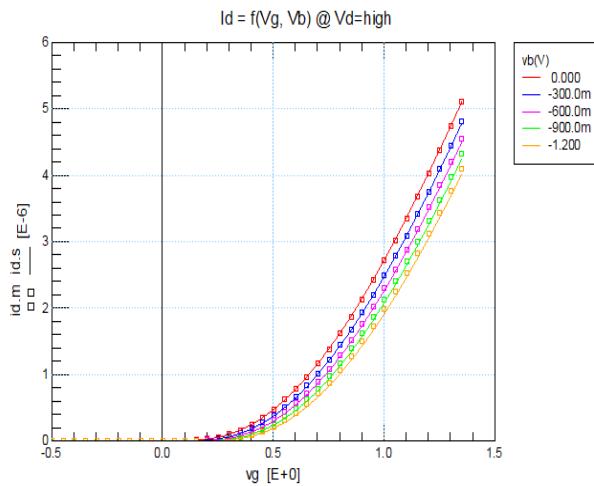


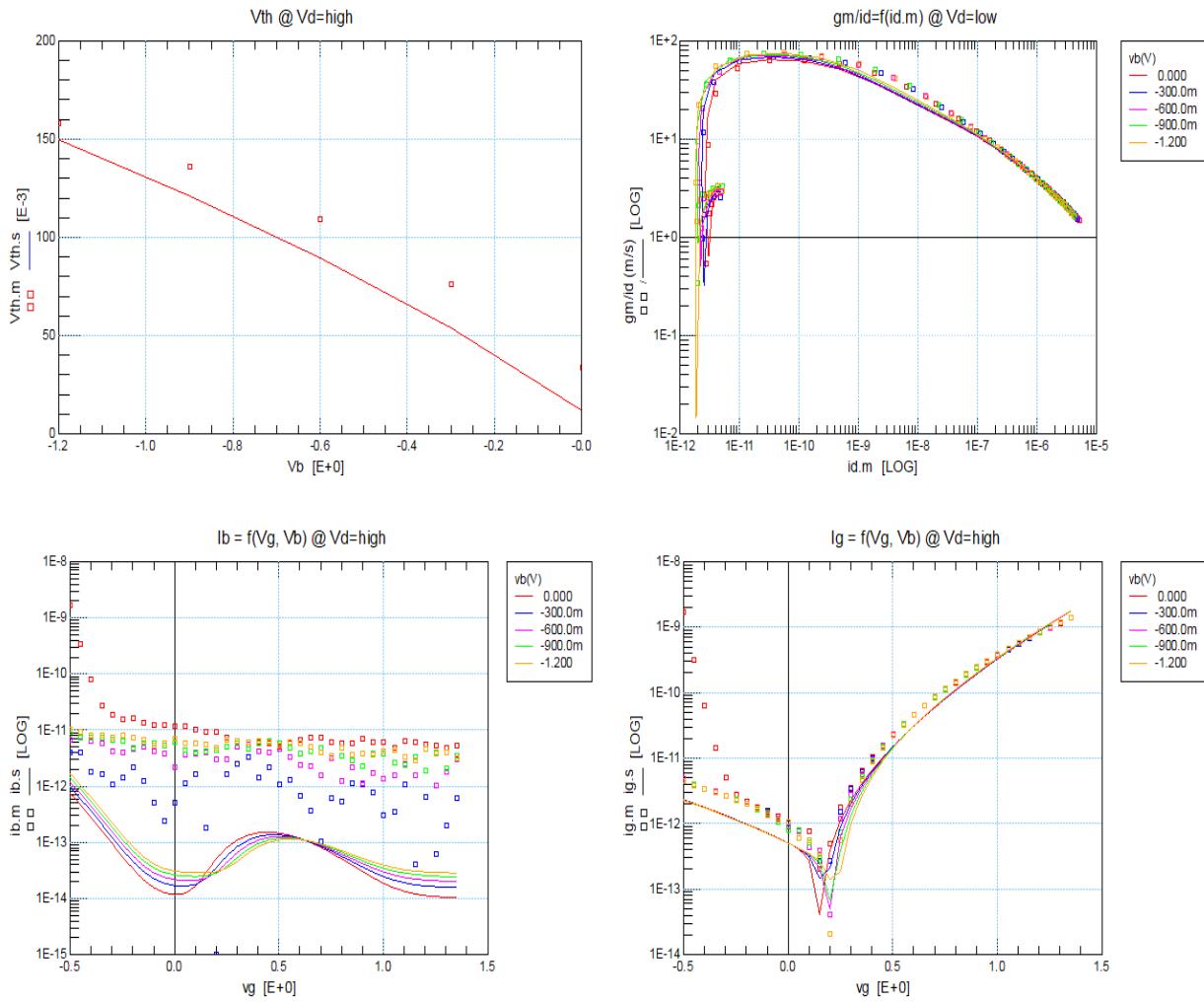
**idvg, Vd = 0.05V, T = 70°C**



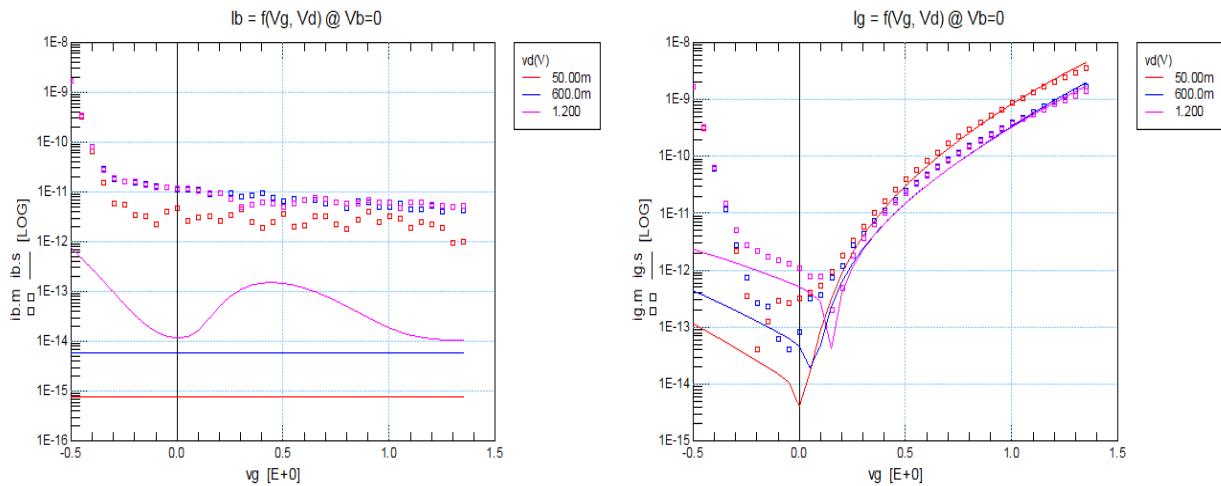


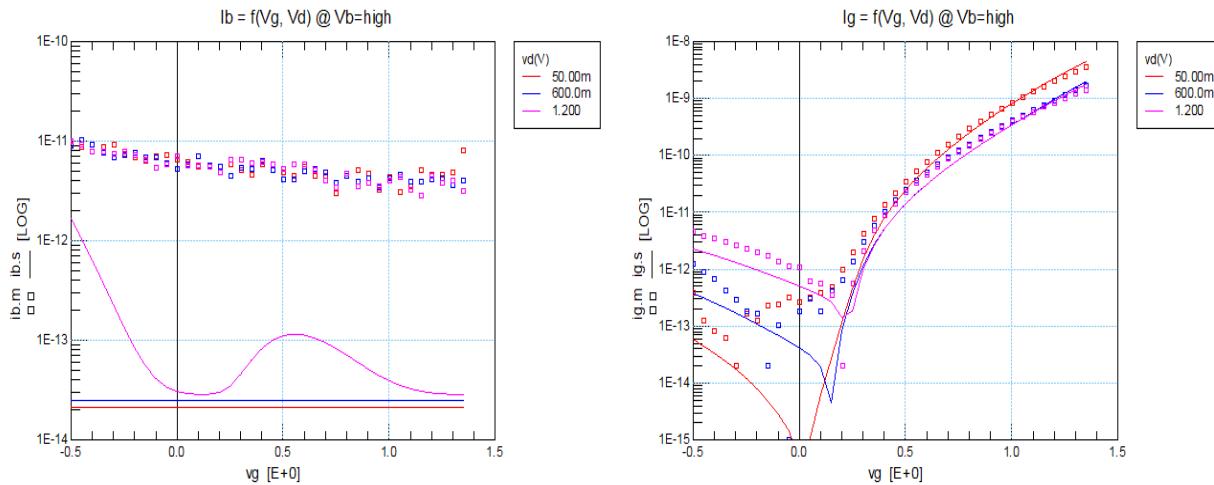
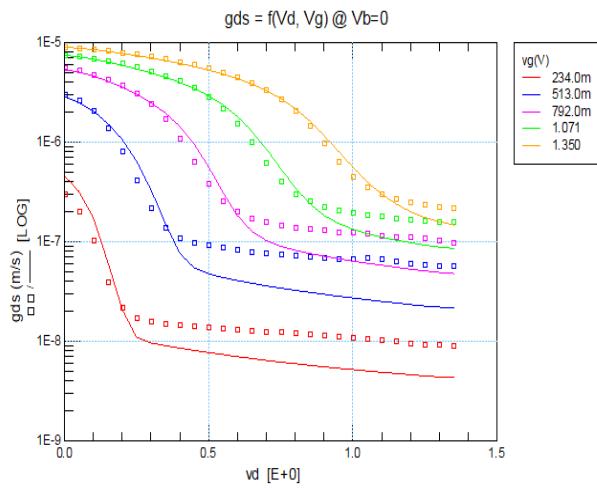
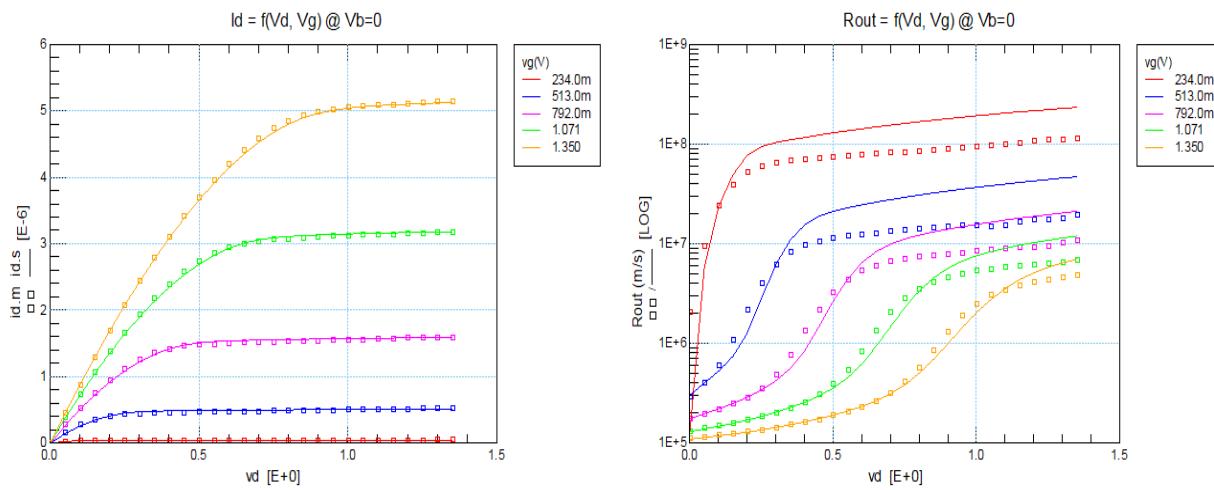
### $i_{dvg}, V_d = 1.2V, T = 70^\circ C$

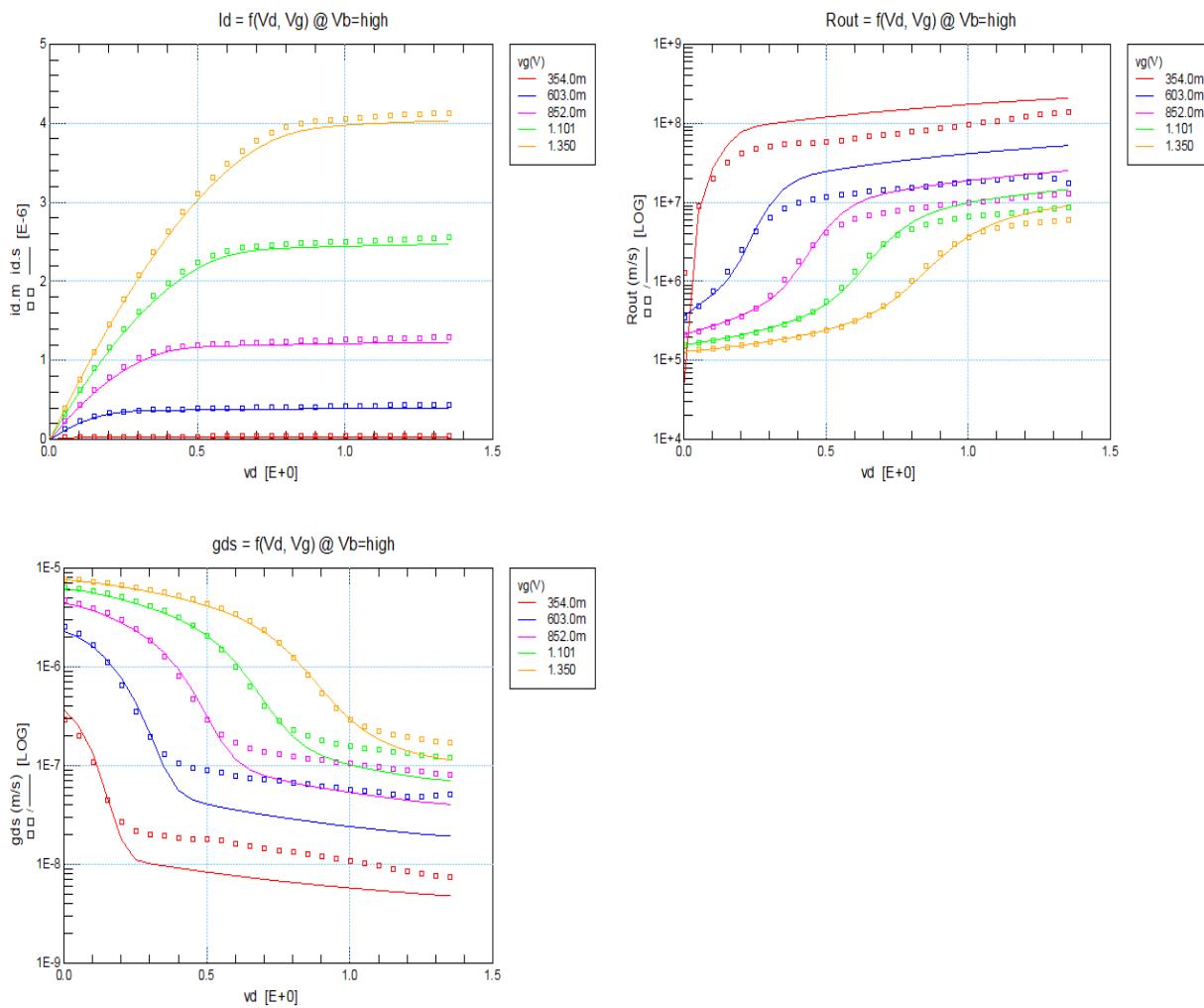
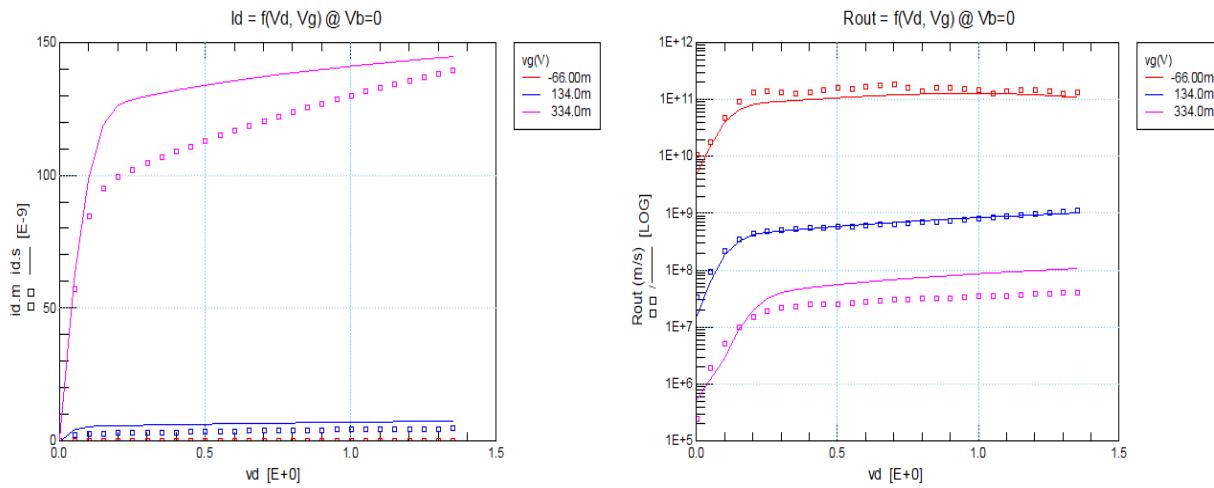


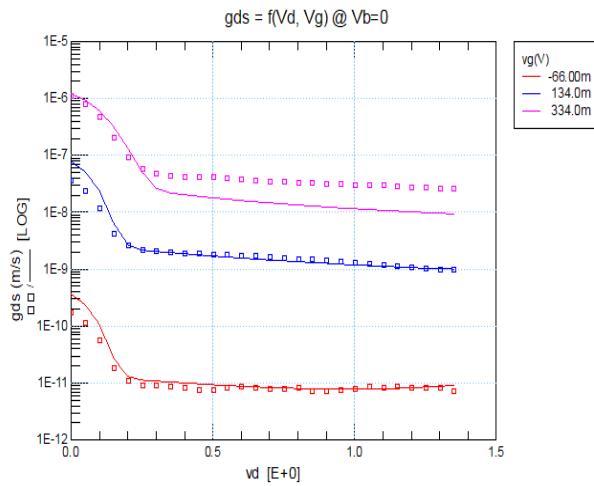


### $i_{dvg}, I_b, I_g, V_b = 0V, T = 70^\circ C$

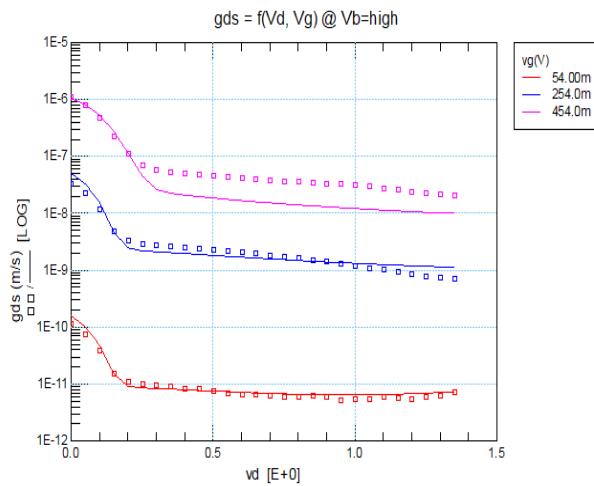
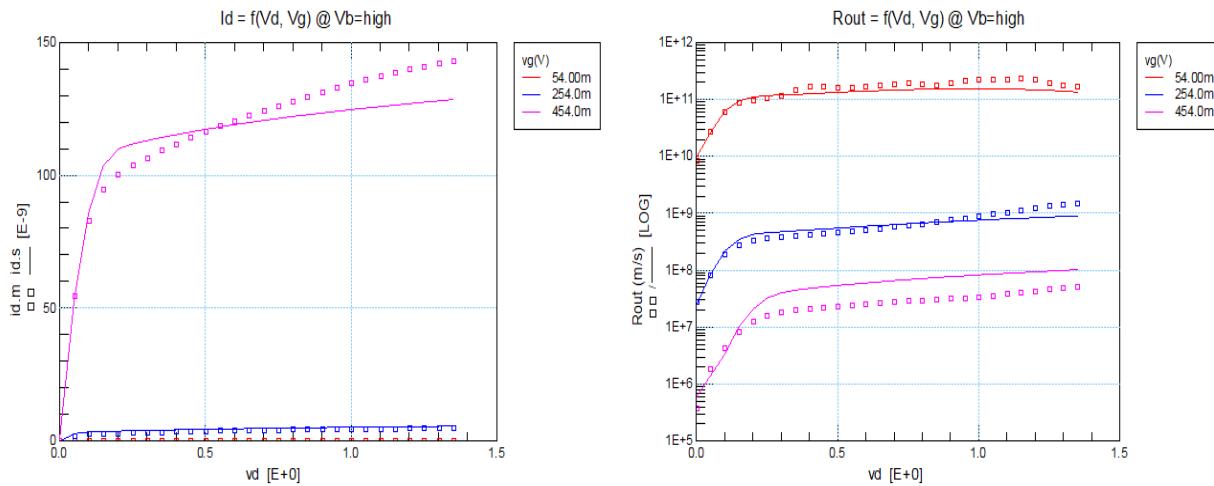


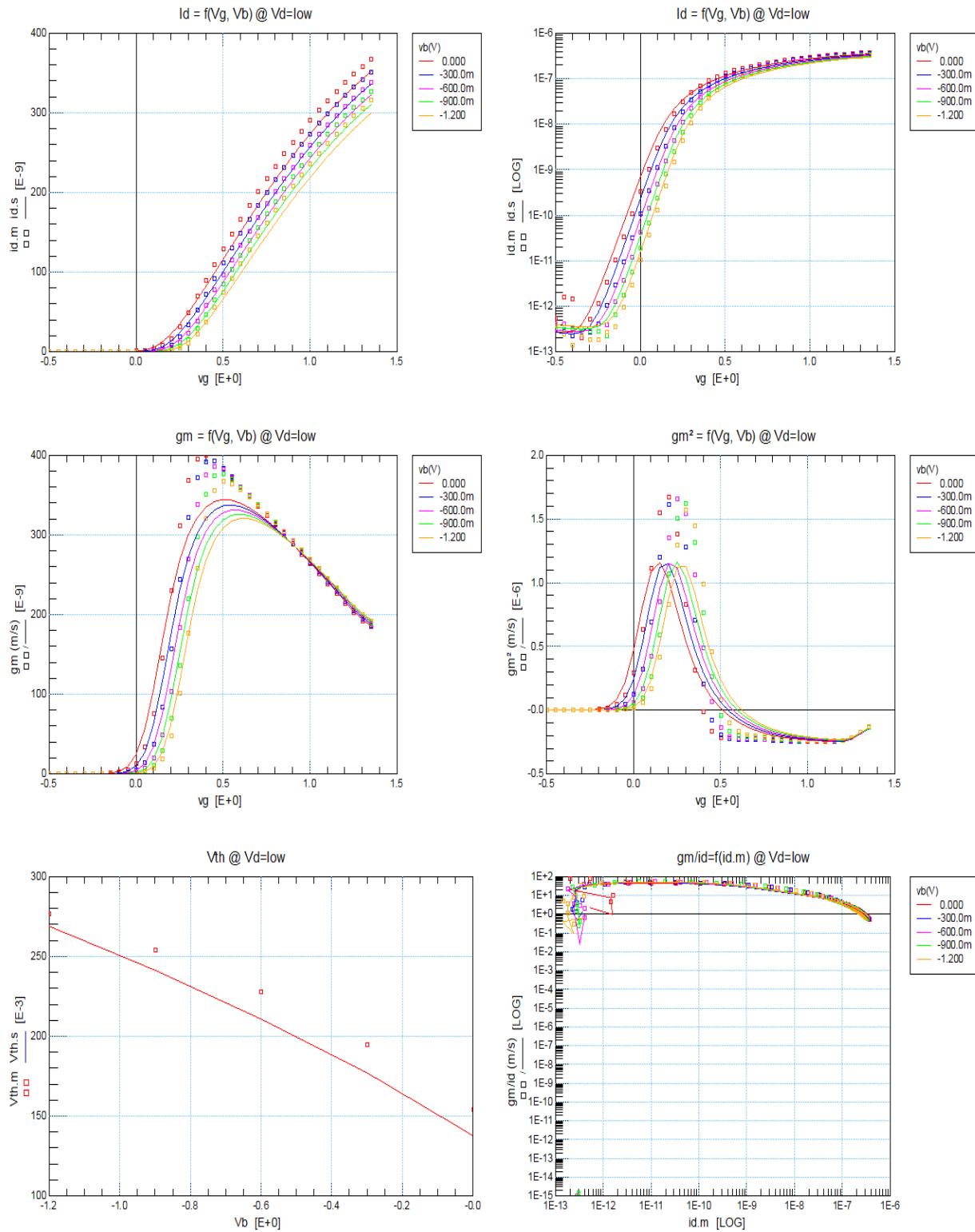
**idvg, Ib,Ig, Vb = -1.2V, T = 70°C**

**idvd, Vb = 0V, T = 70°C**


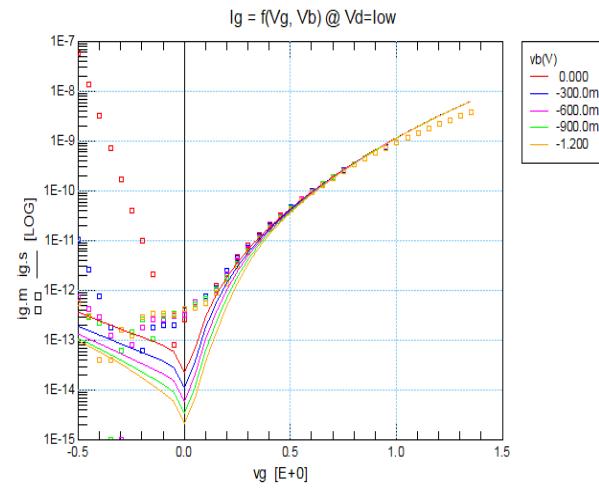
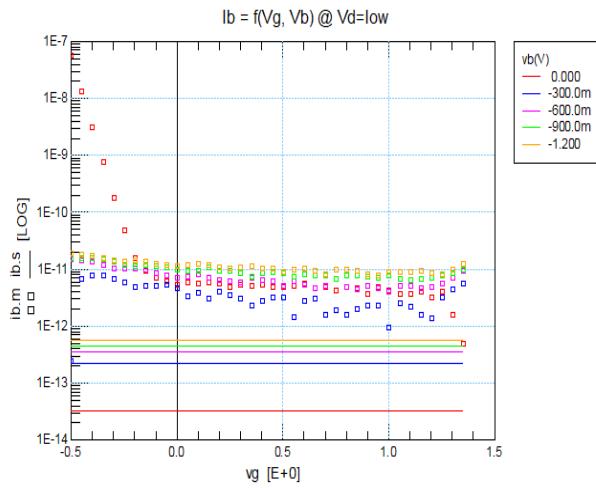
**idvd\_vbmin, Vb = -1.2V, T = 70°C****idvd\_vth, Vb = 0V, T = 70°C**



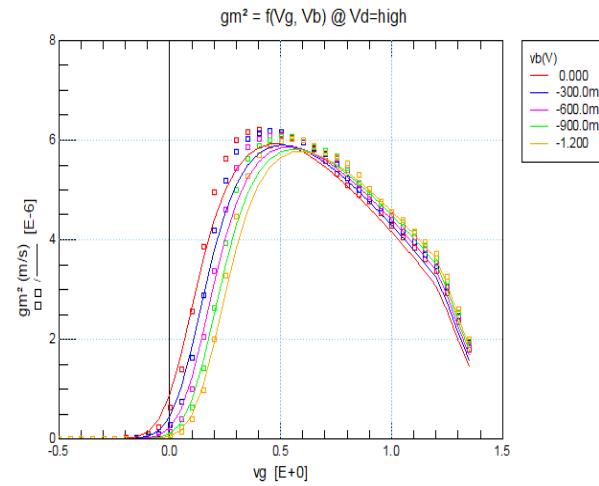
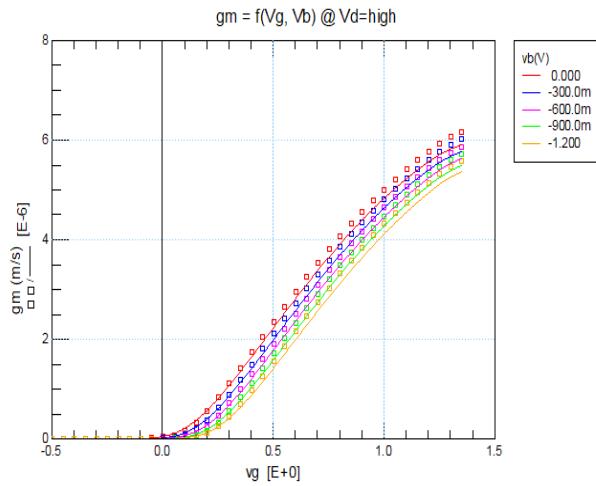
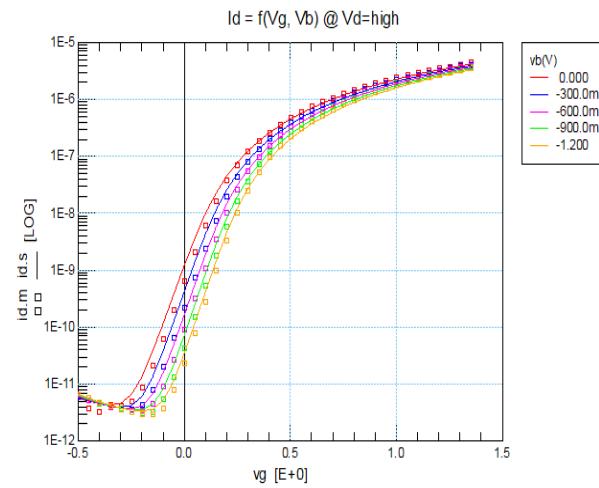
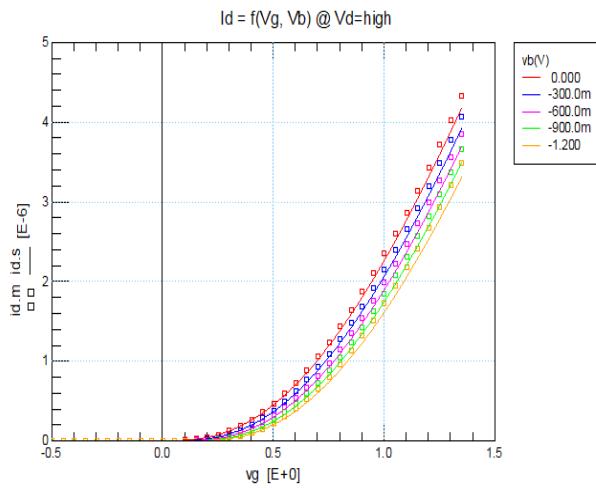
idvd\_vth\_vbmin, Vb = -1.2V, T = 70°C

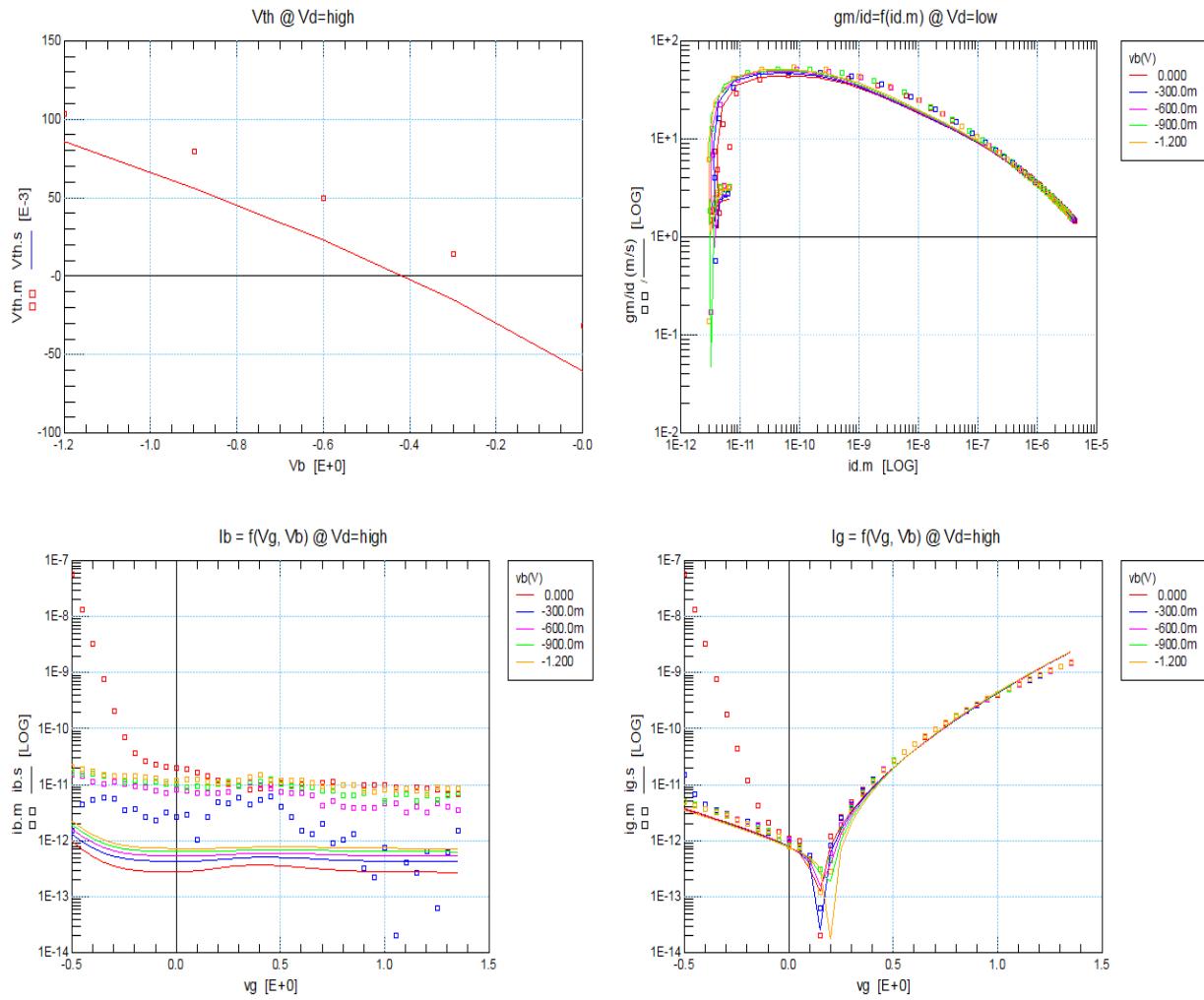


**idvg, Vd = 0.05V, T = 125°C**


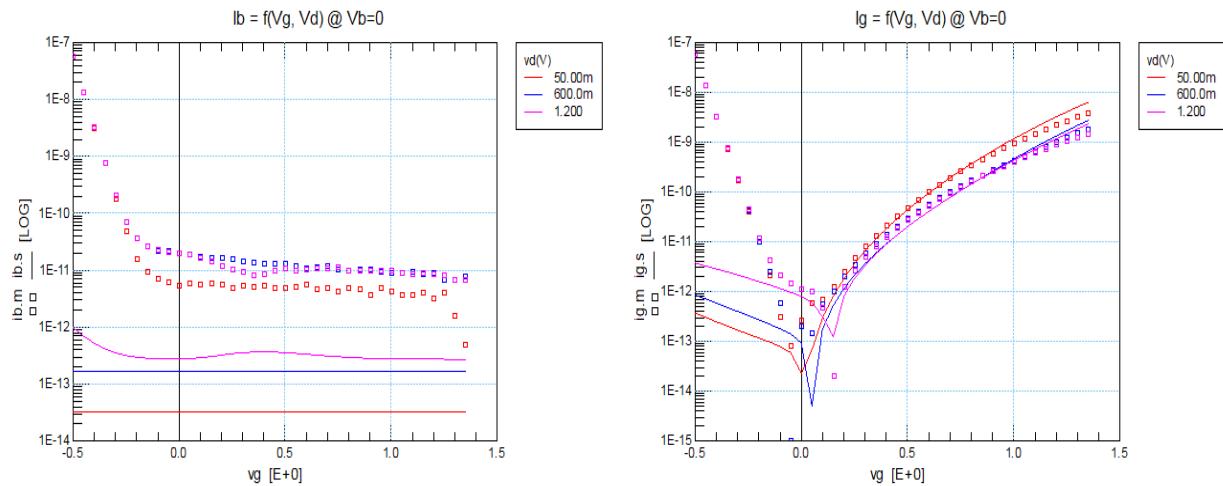


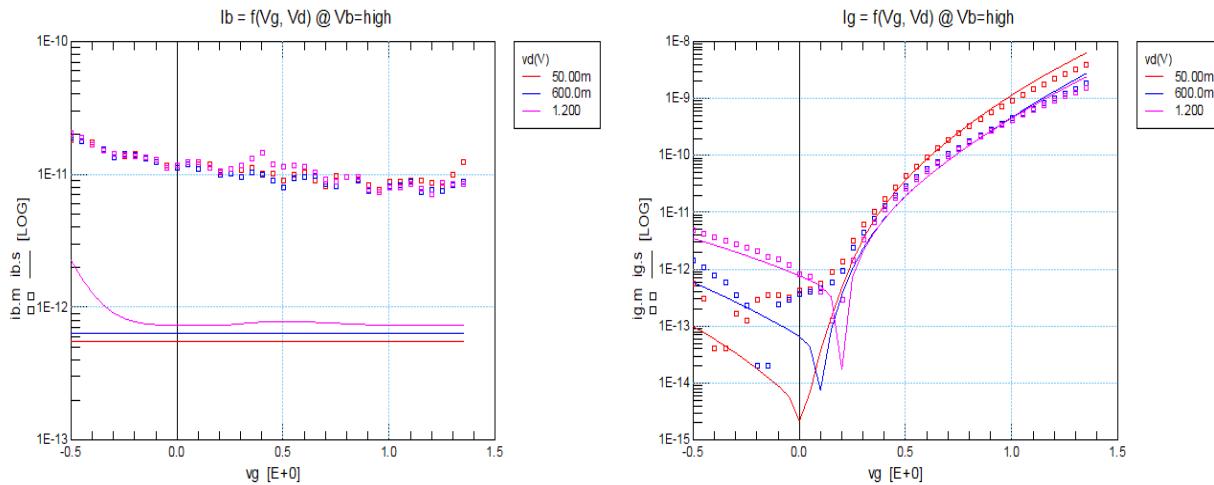
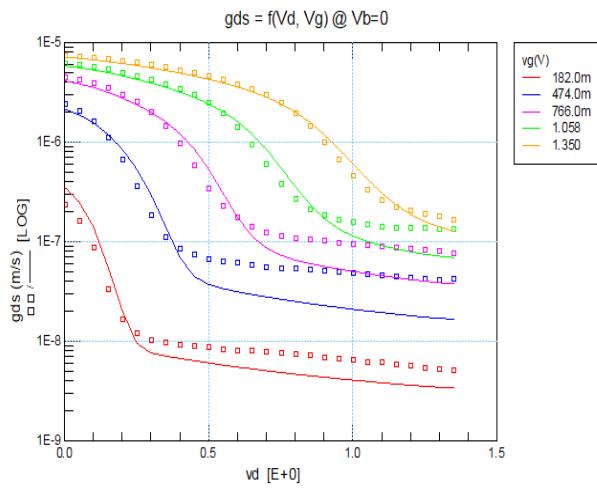
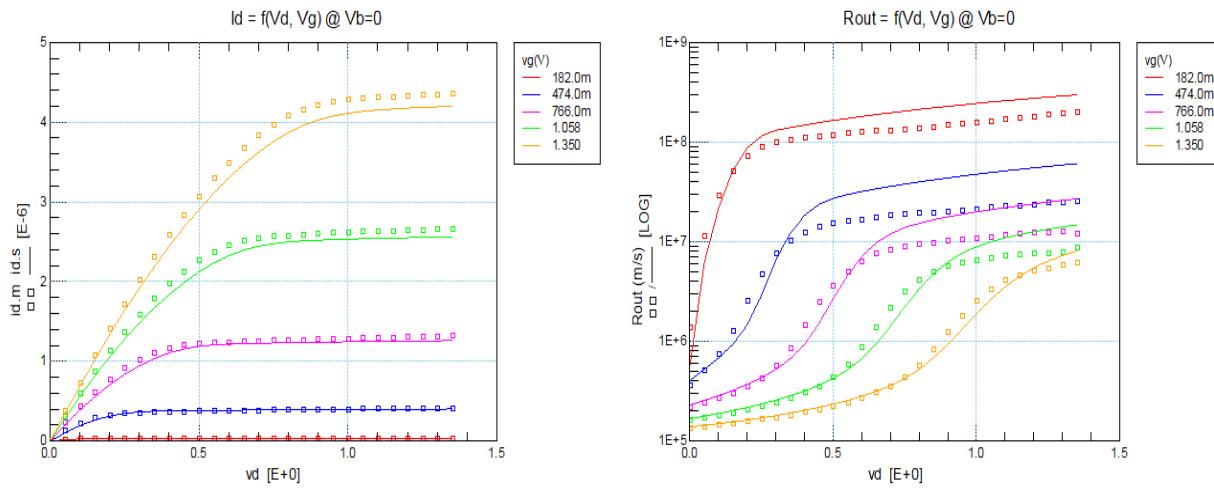
$i_d v_g, V_d = 1.2V, T = 125^\circ C$

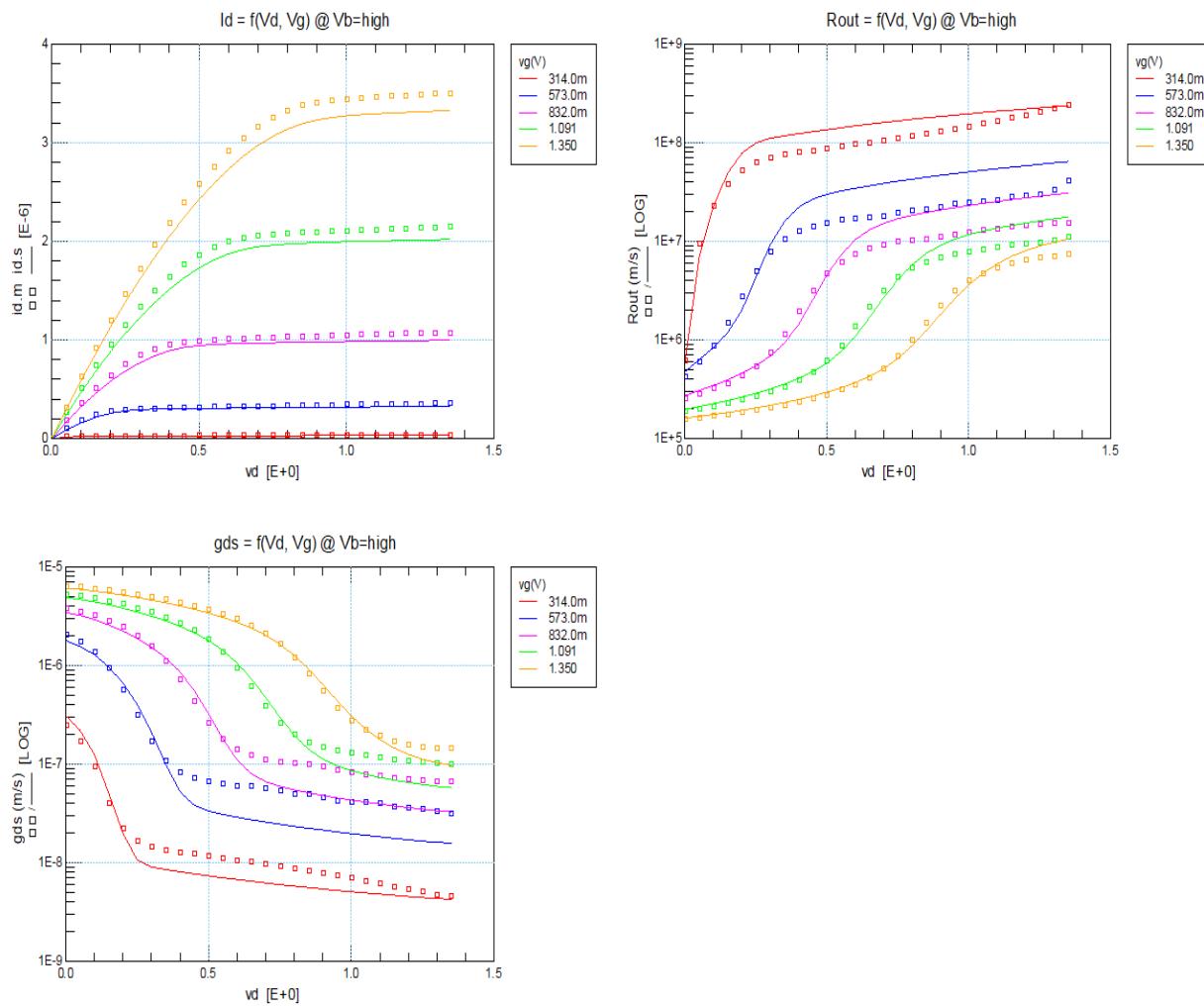
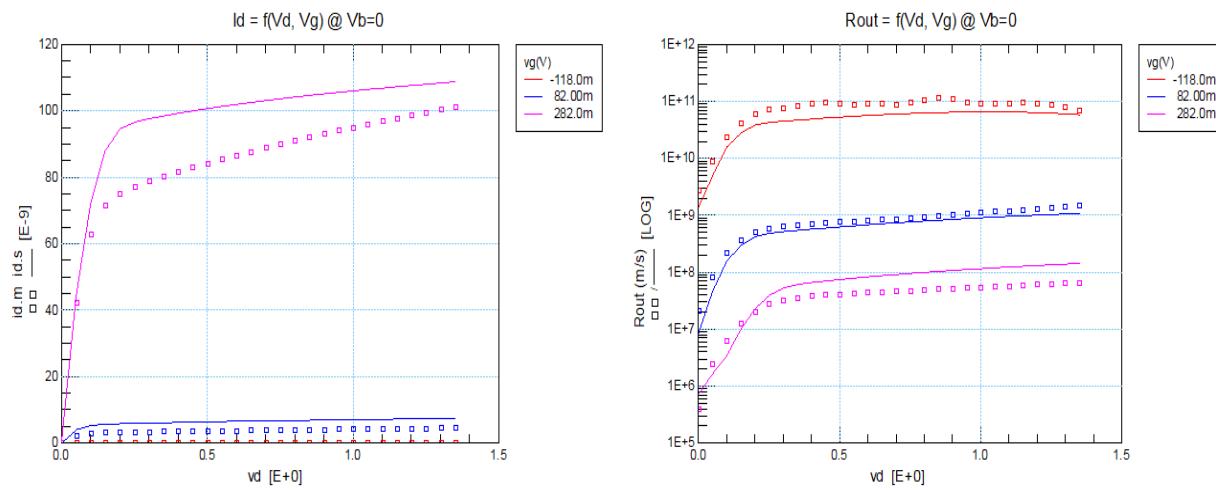


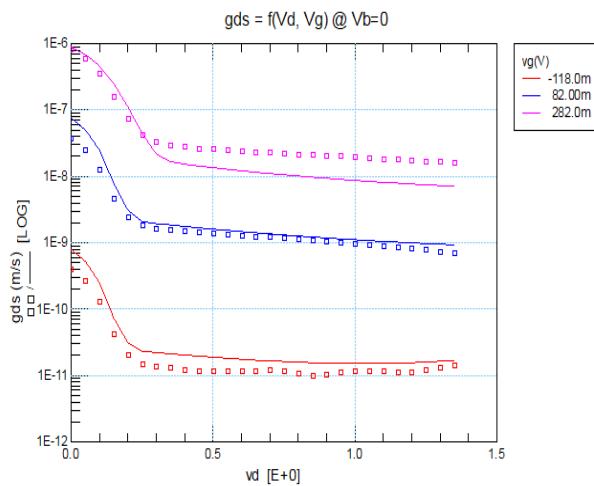


$id_{vg}, I_b, I_g, V_b = 0V, T = 125^{\circ}C$

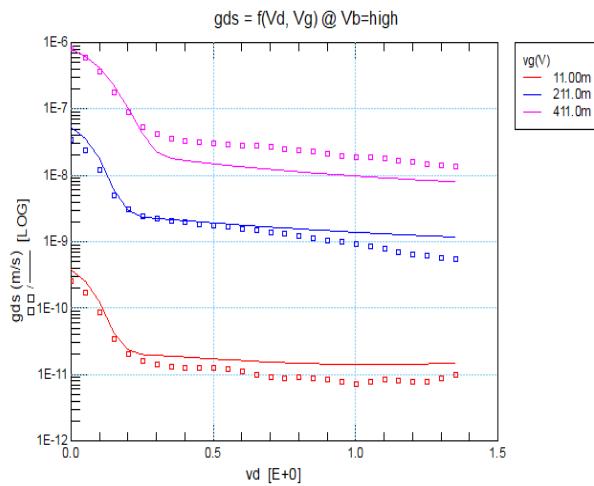
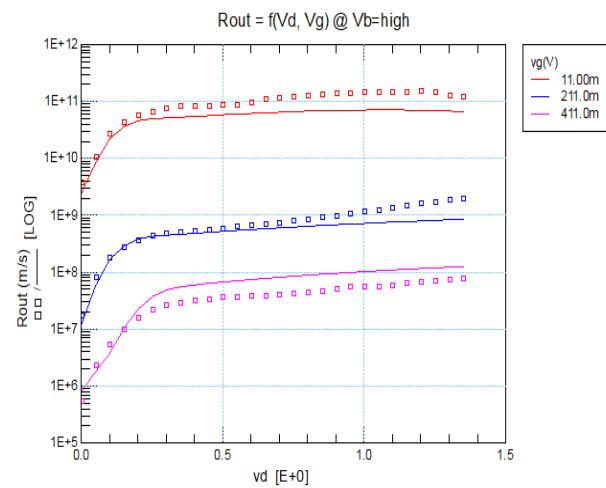
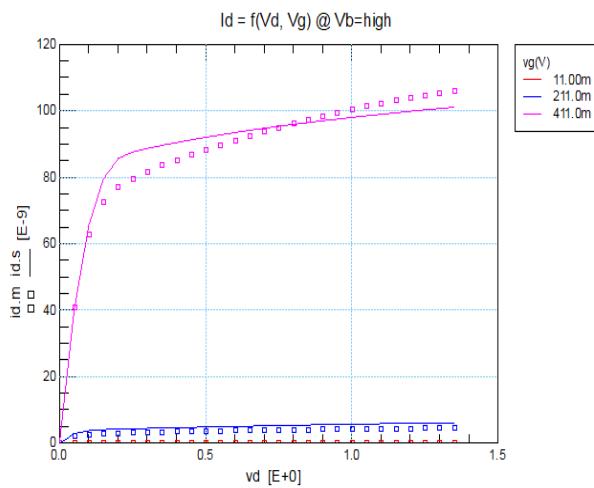


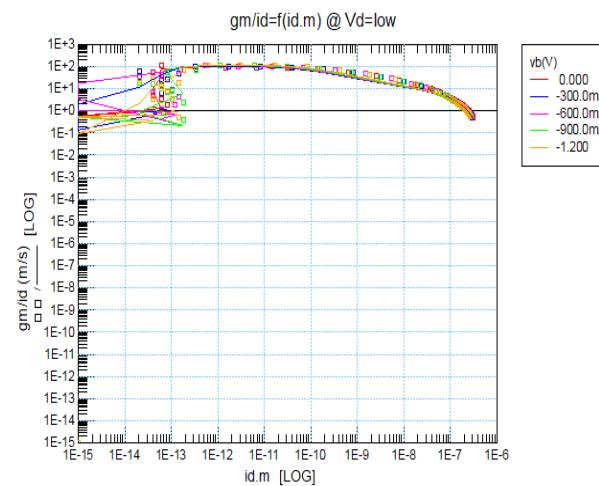
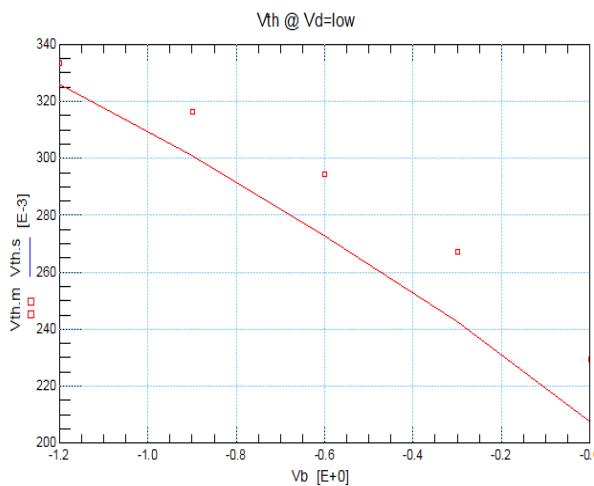
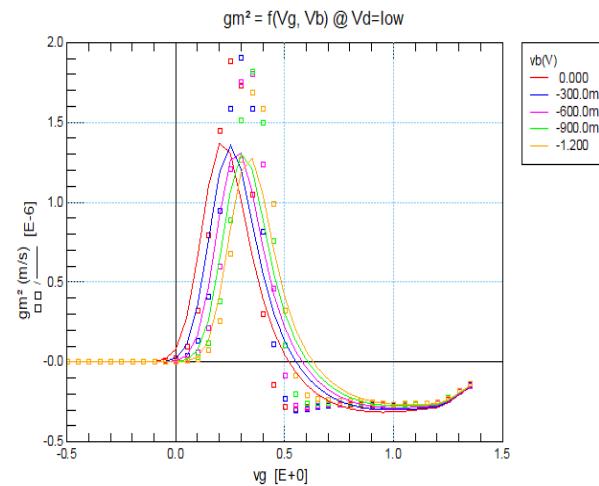
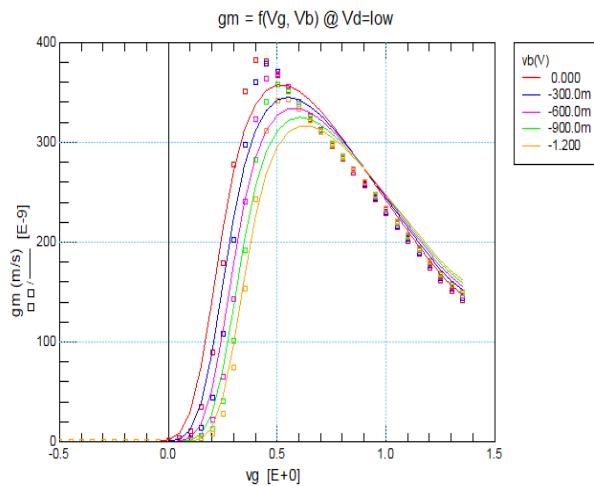
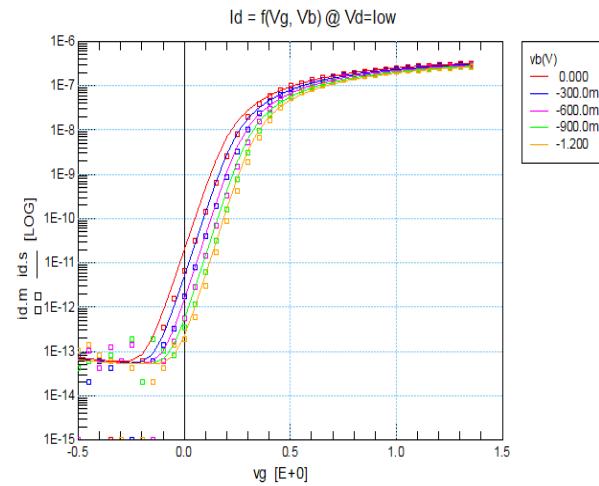
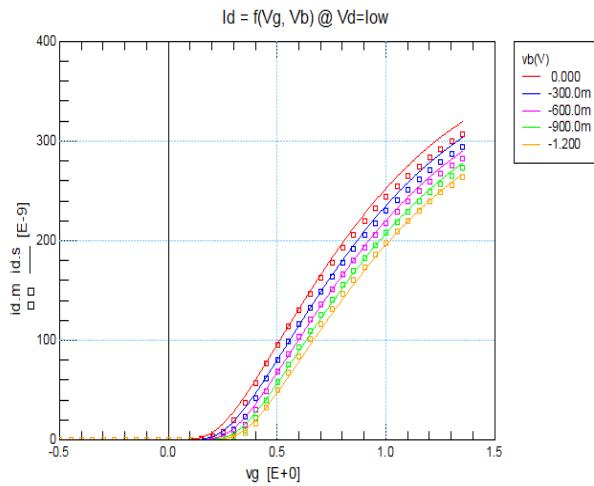
**idvg, Ib,Ig, Vb = -1.2V, T = 125°C**

**idvd, Vb = 0V, T = 125°C**


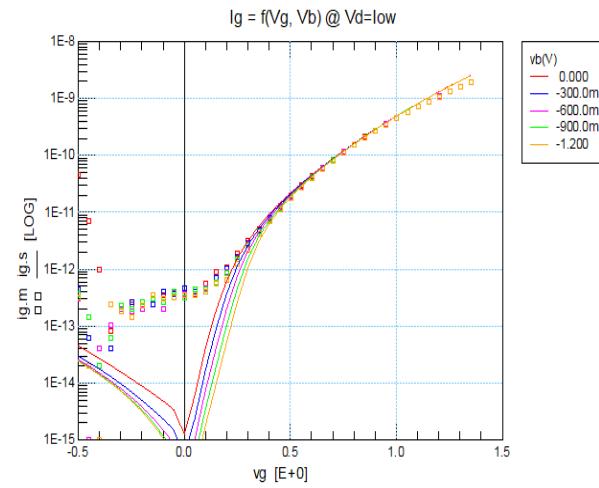
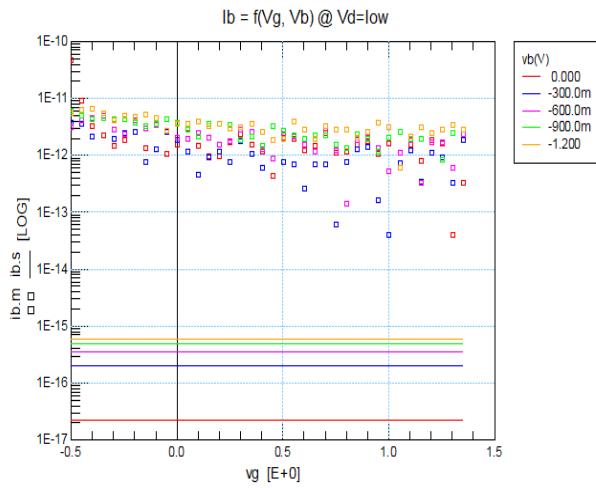
**idvd\_vbmin, Vb = -1.2V, T = 125°C****idvd\_vth, Vb = 0V, T = 125°C**



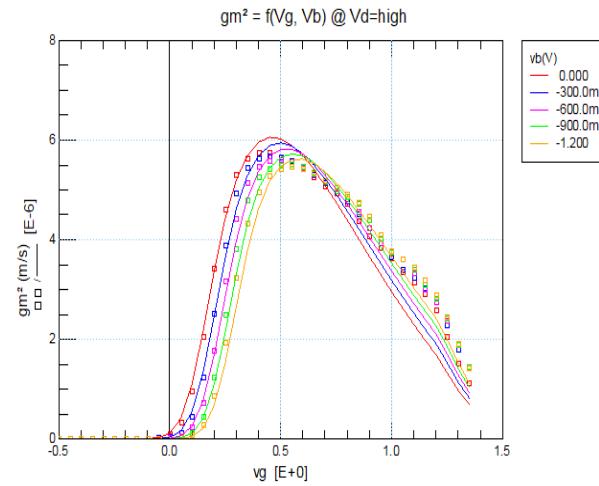
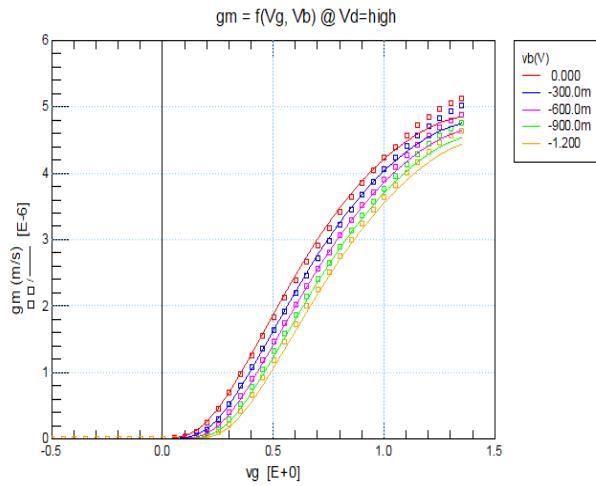
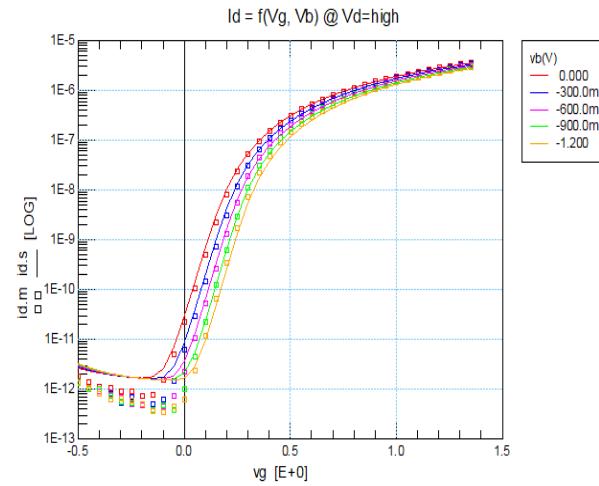
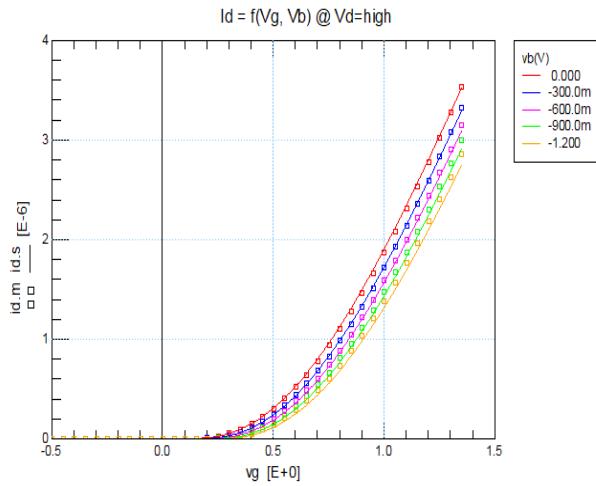
### idvd\_vth\_vbmin, Vb = -1.2V, T = 125°C

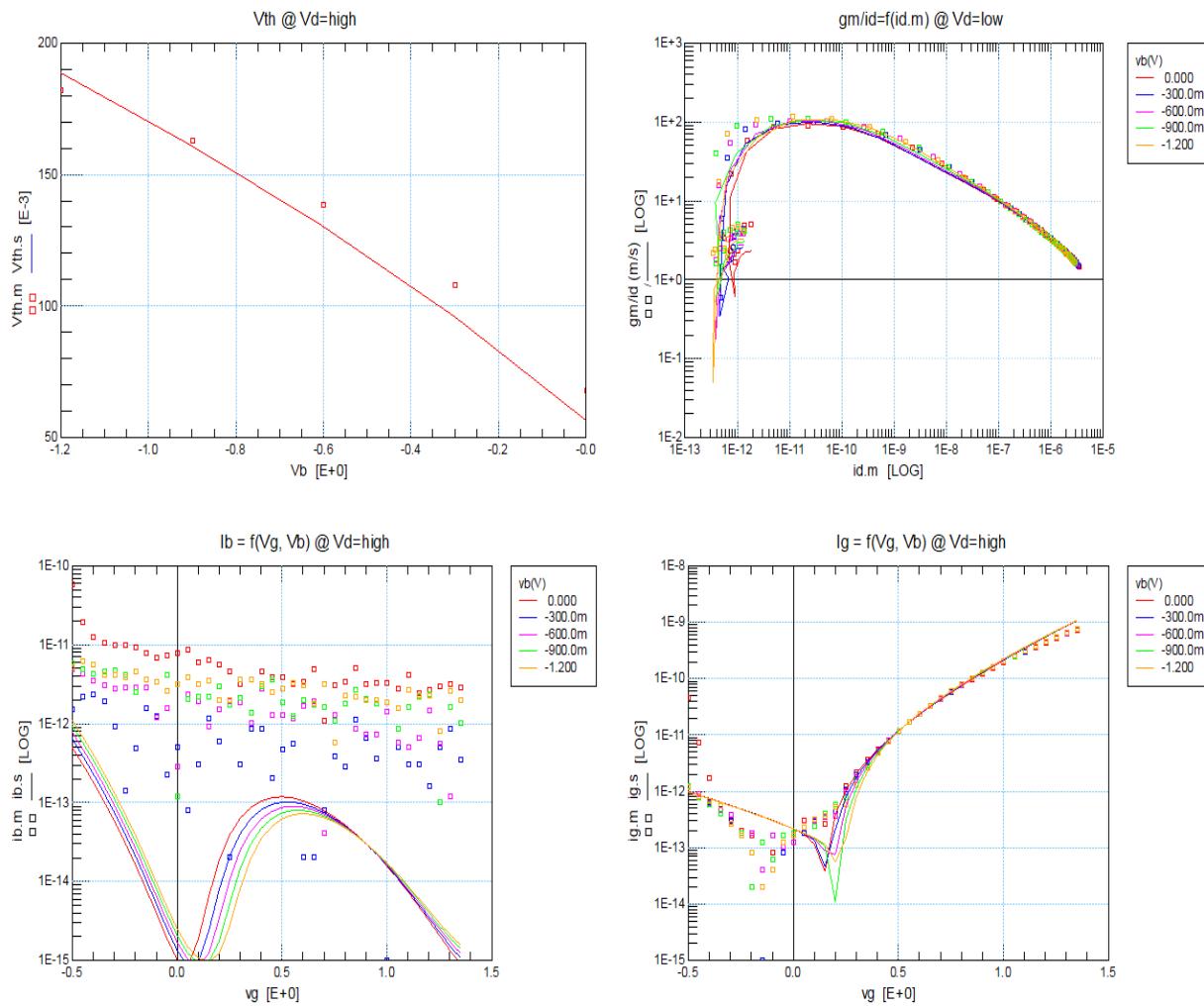


**4.16 W0u18\_L10u0\_S546\_1****idvg, Vd = 0.05V, T = 27°C**

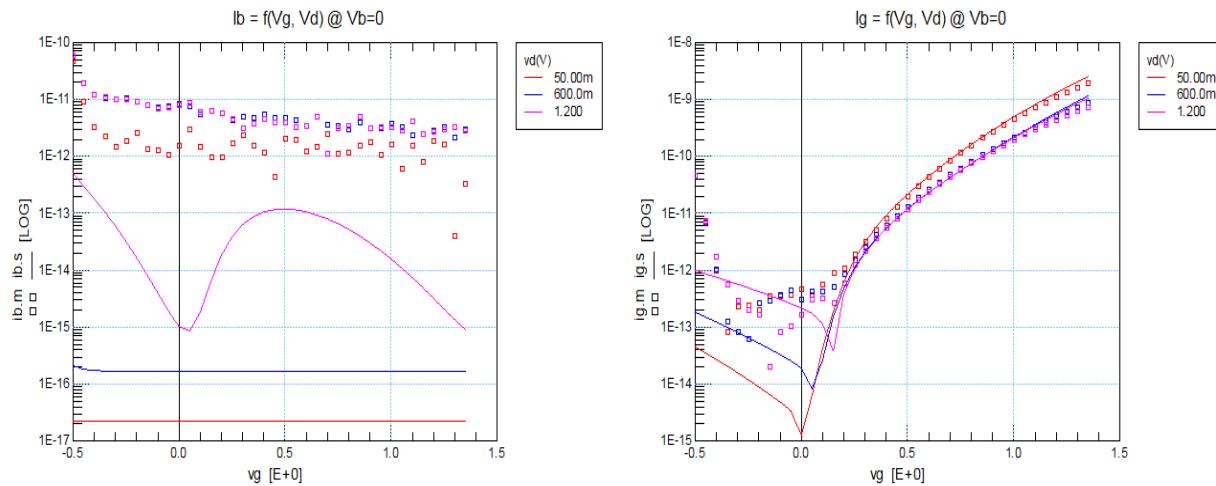


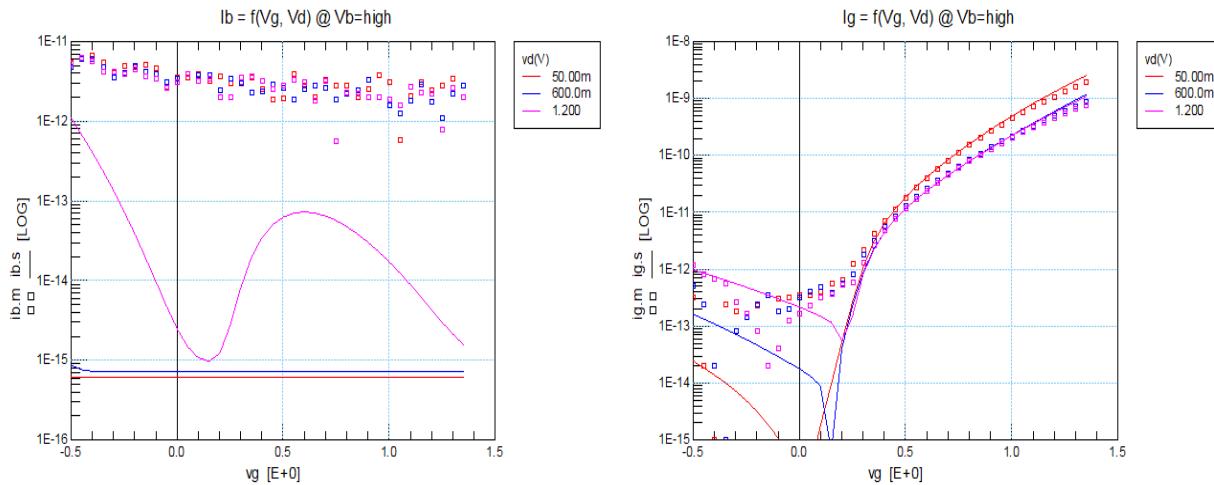
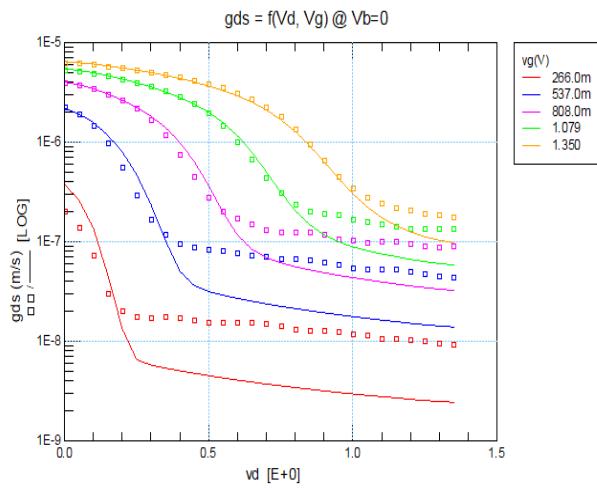
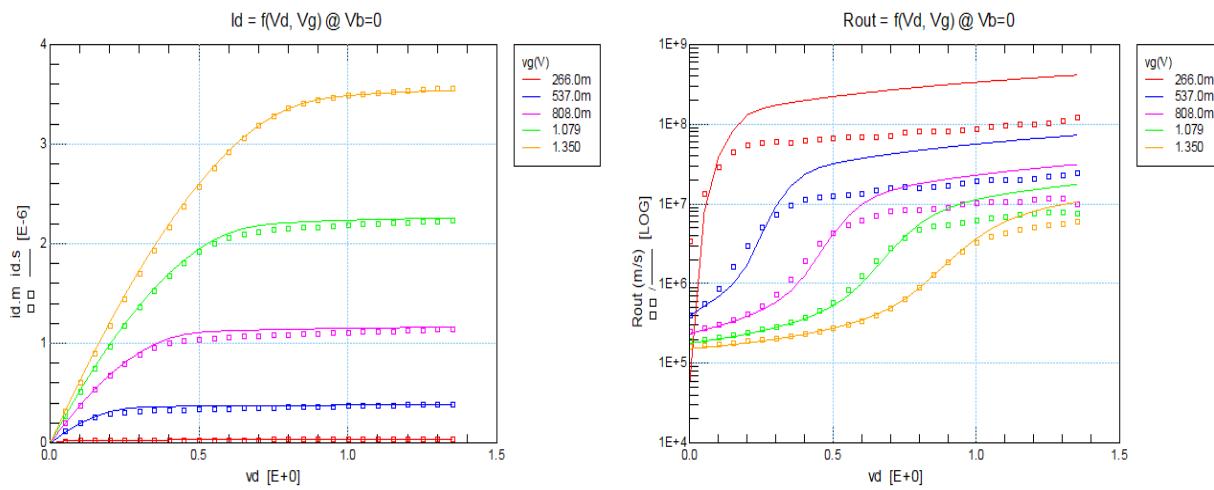
$i_d v_g, V_d = 1.2V, T = 27^\circ C$

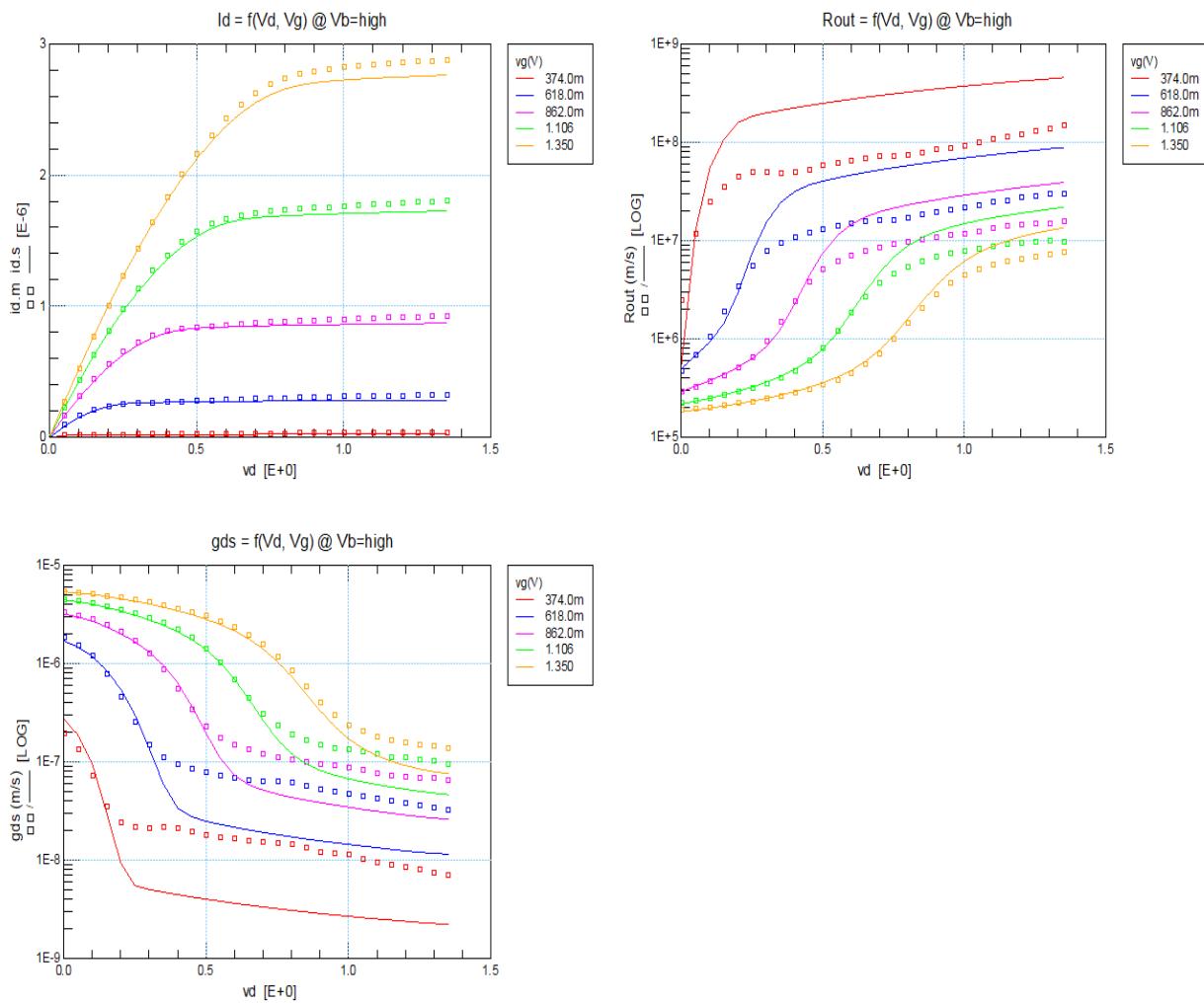
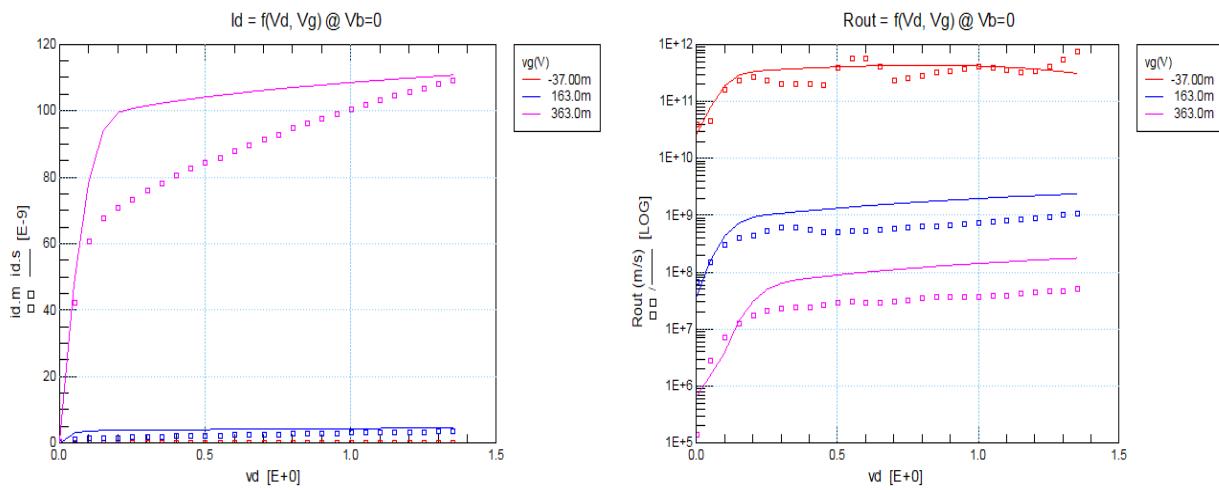


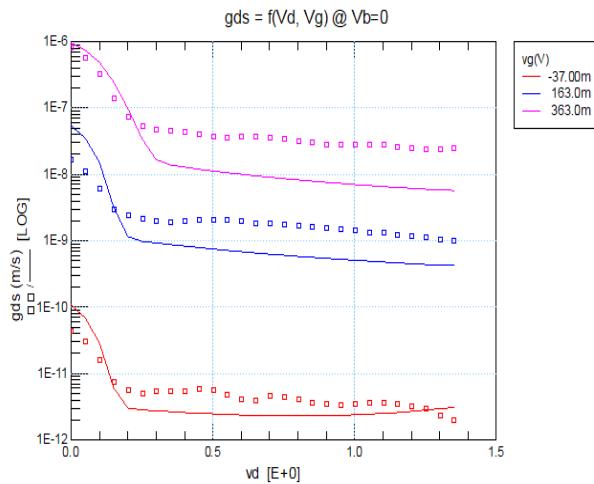


### $id_{vg}, I_b, Ig, V_b = 0V, T = 27^\circ\text{C}$

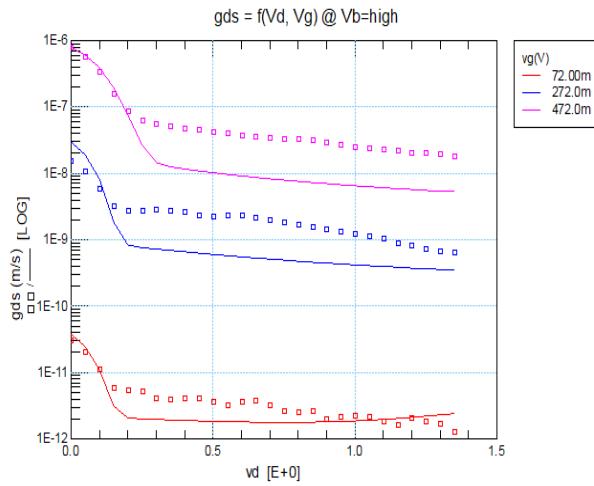
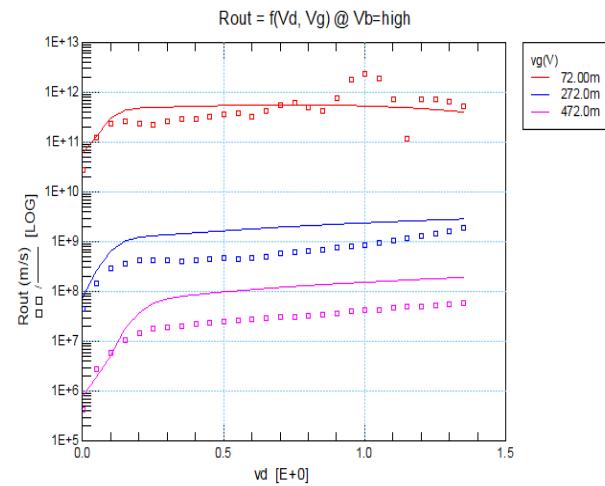
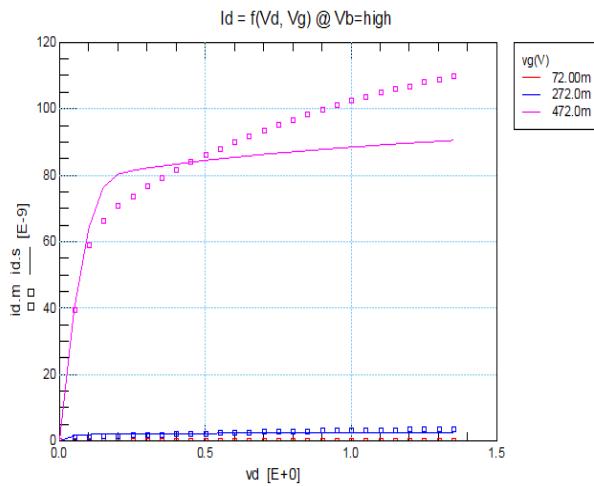


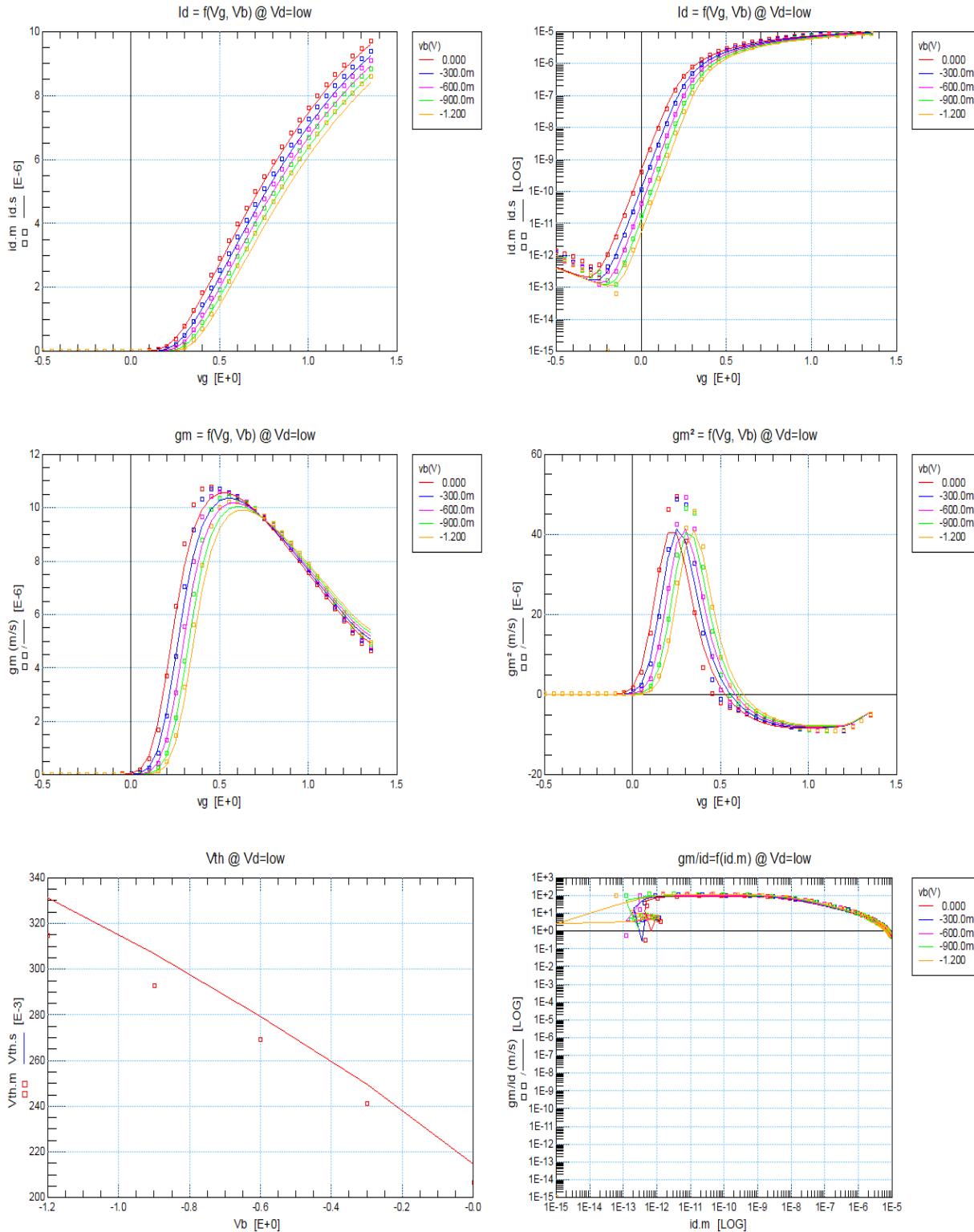
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


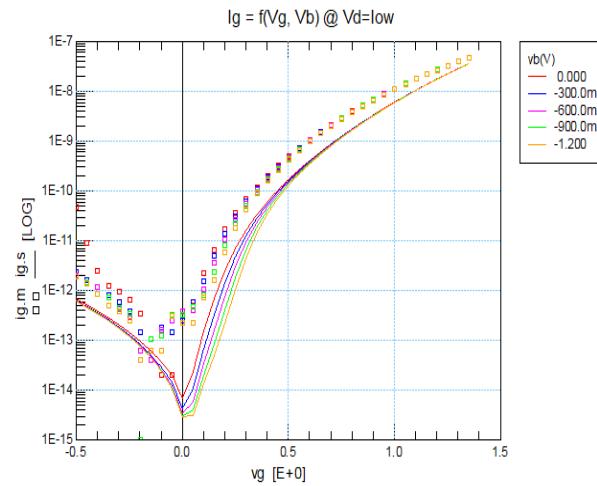
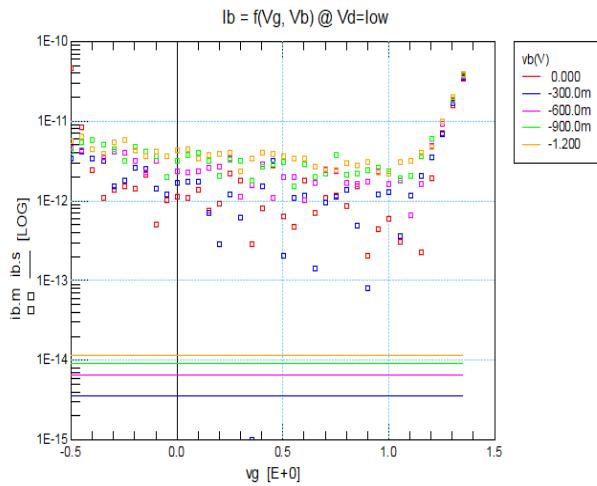
**idvd\_vbmin, Vb = -1.2V, T = 27°C**

**idvd\_vth, Vb = 0V, T = 27°C**




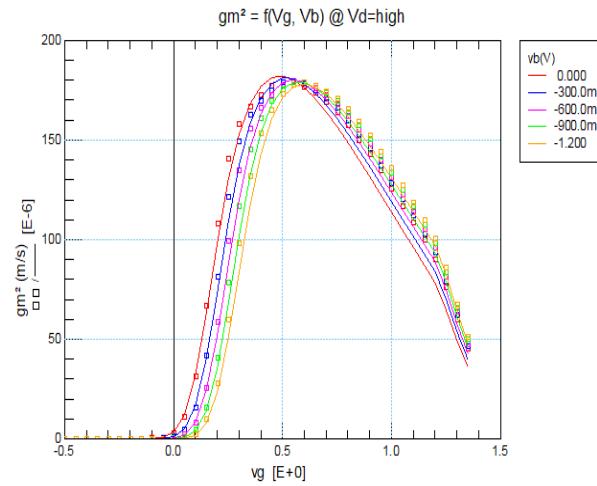
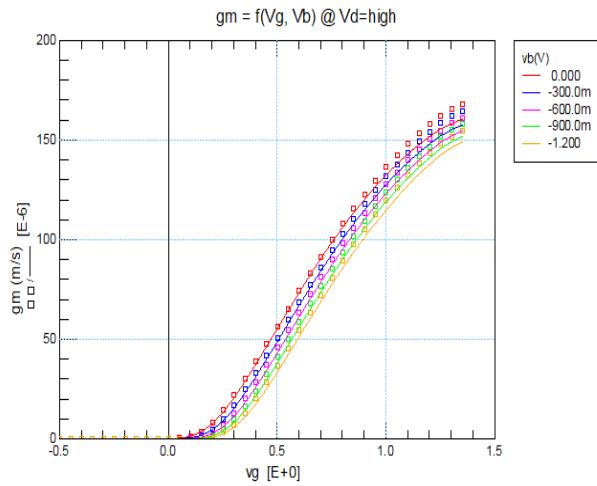
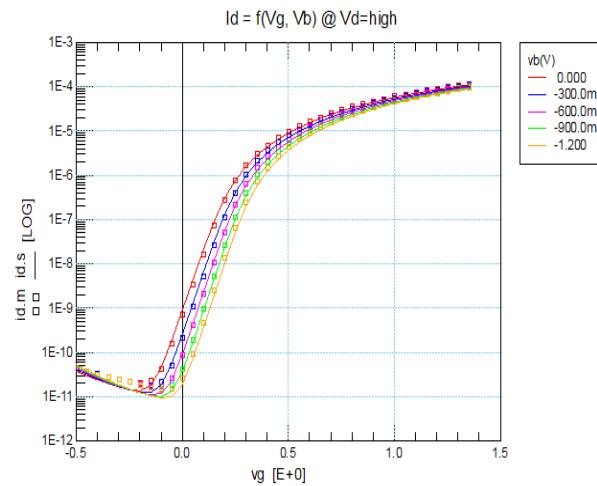
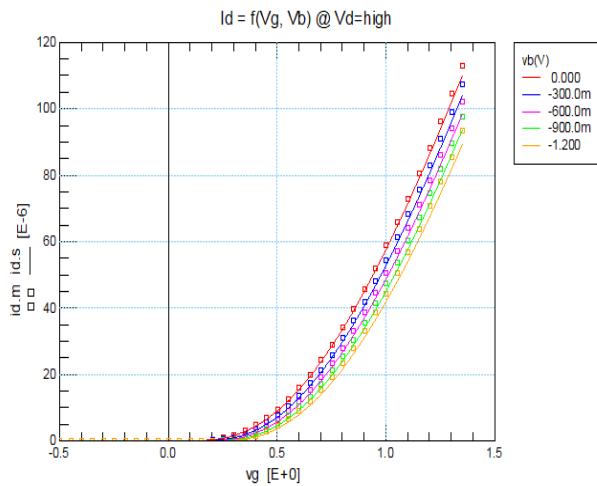
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

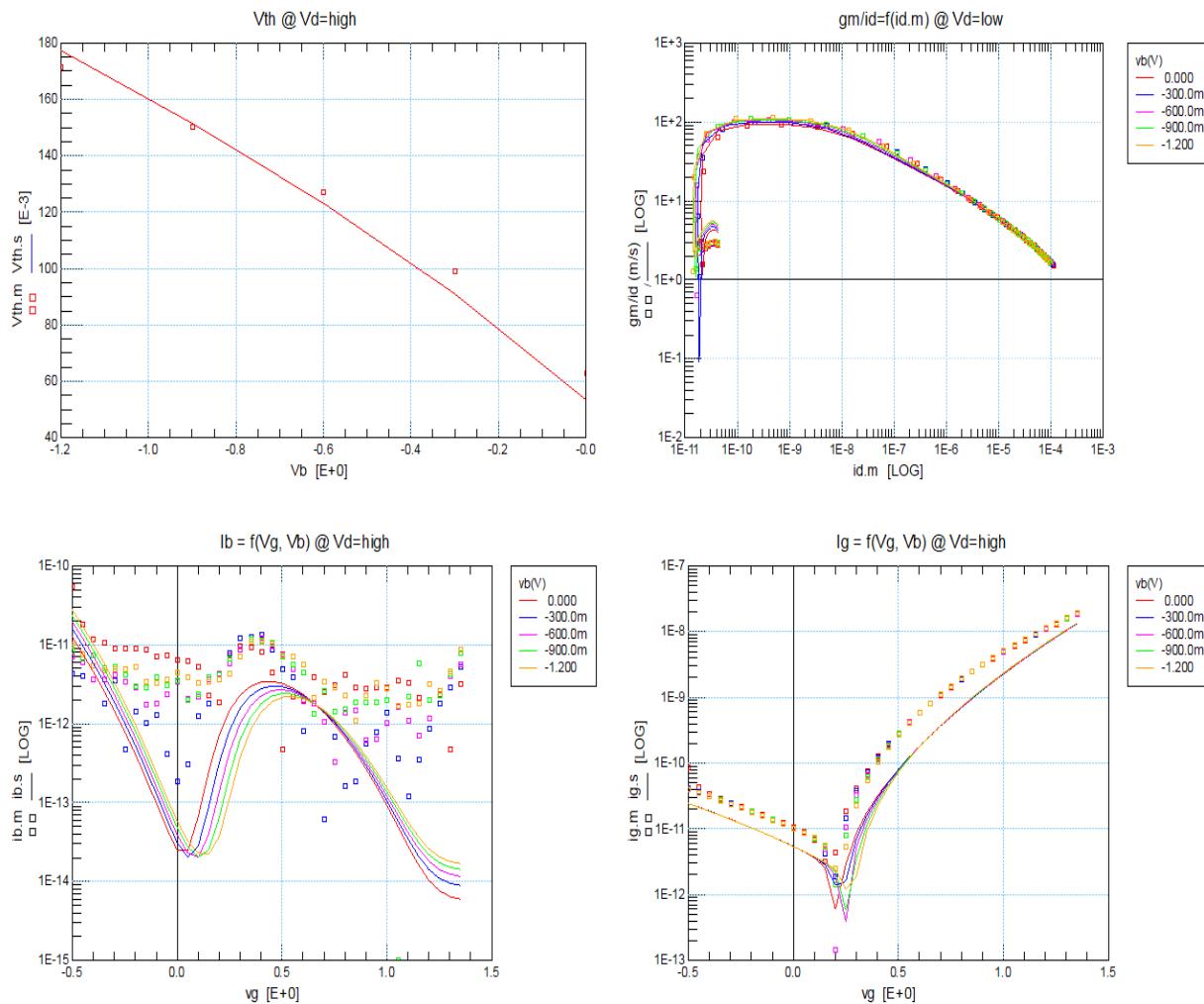


**4.17W05u0\_L10u0\_S542\_3****idvg, Vd = 0.05V, T = 27°C**

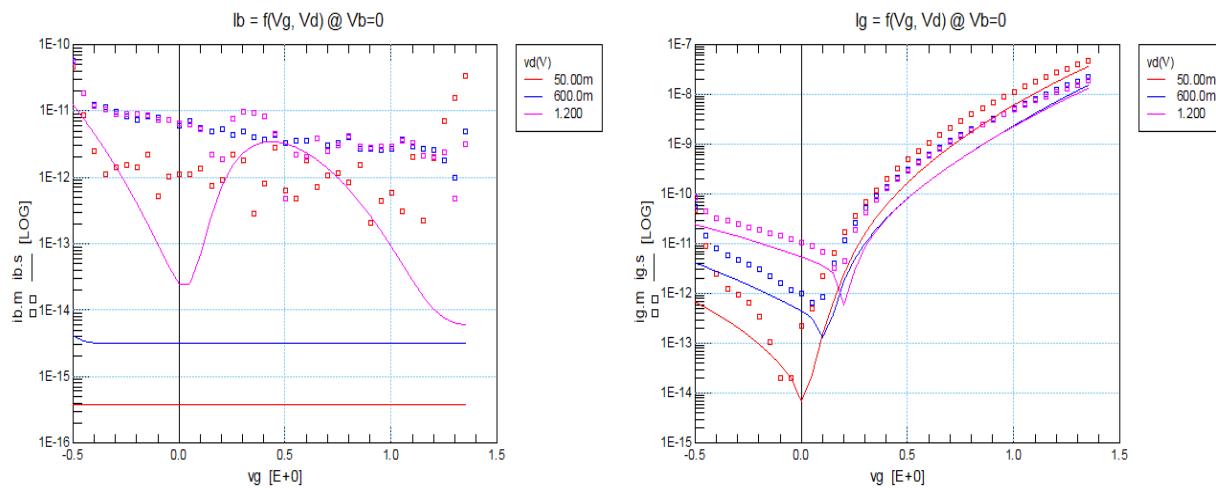


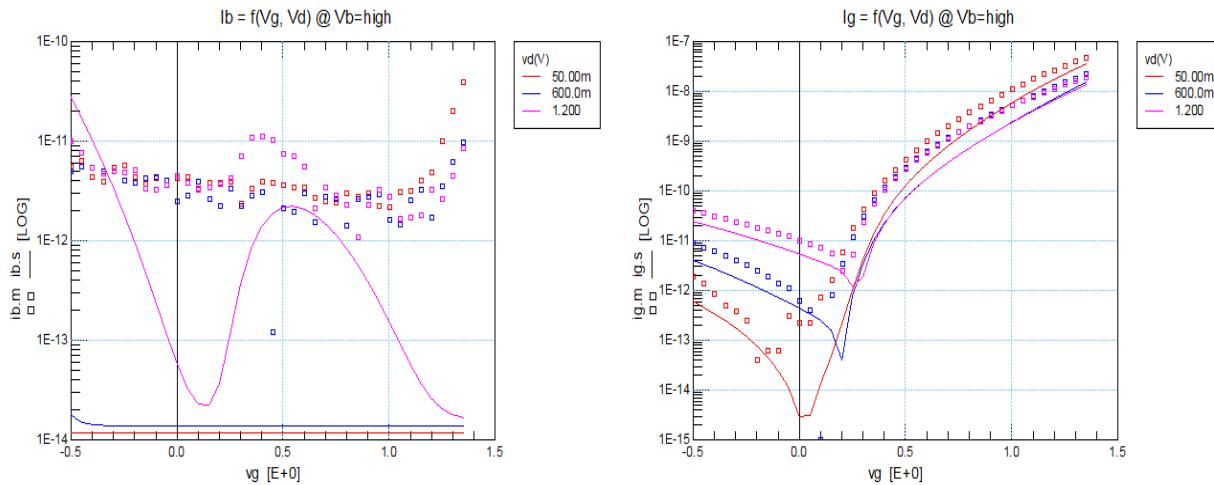
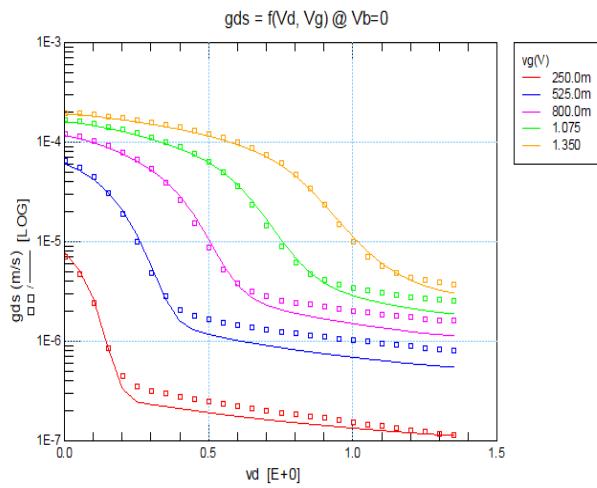
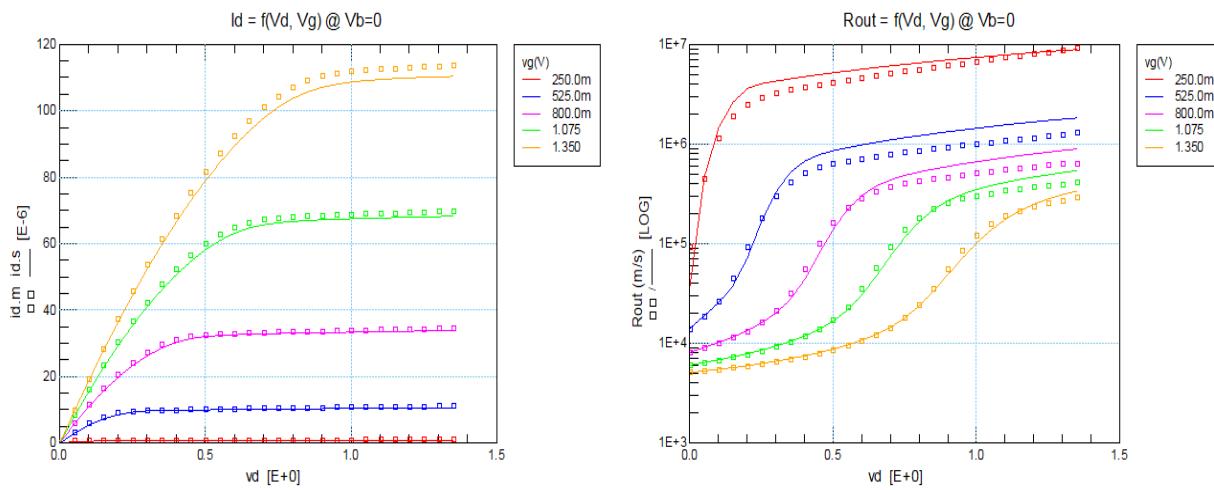
### $i_{dvg}, V_d = 1.2V, T = 27^\circ C$

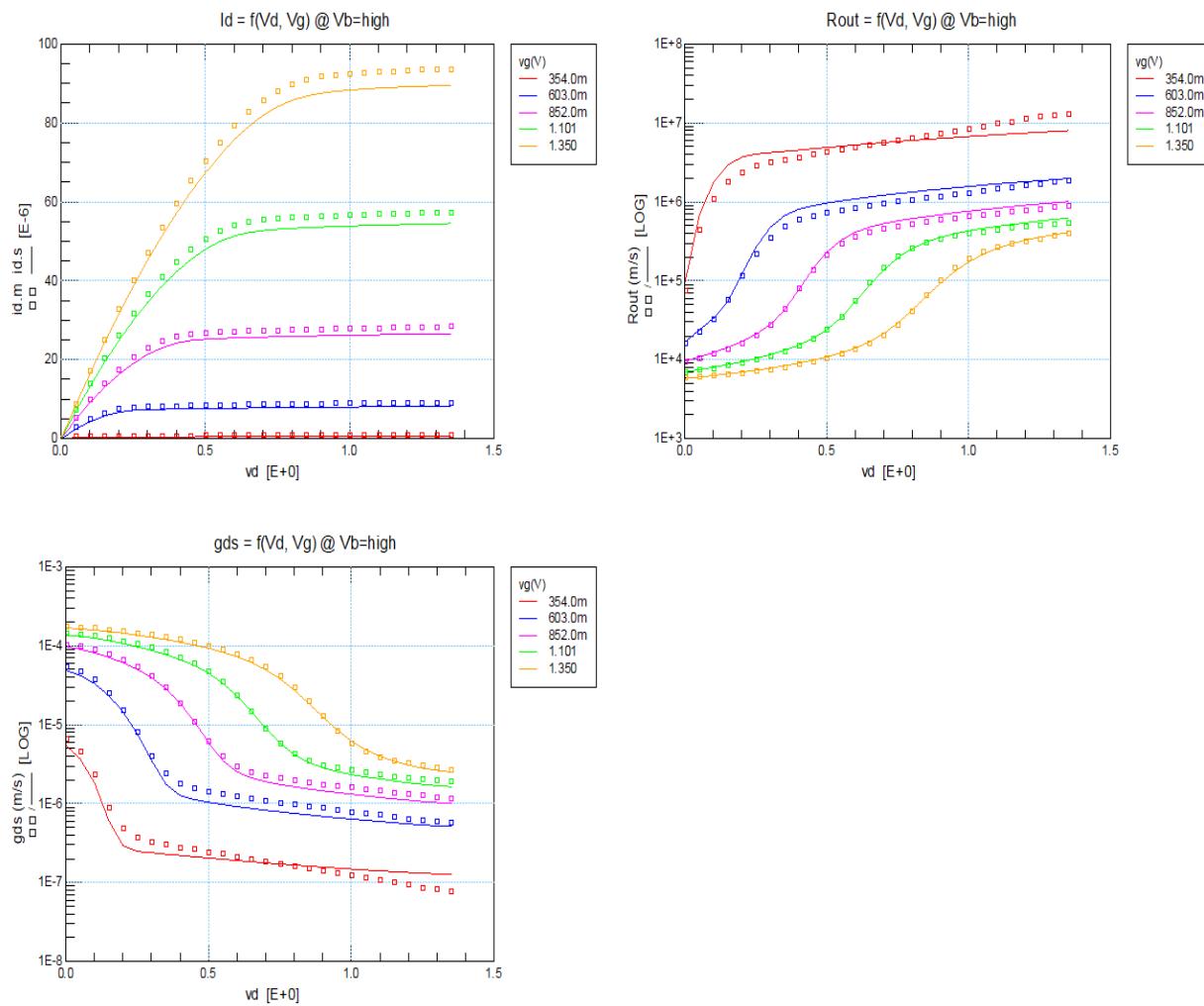
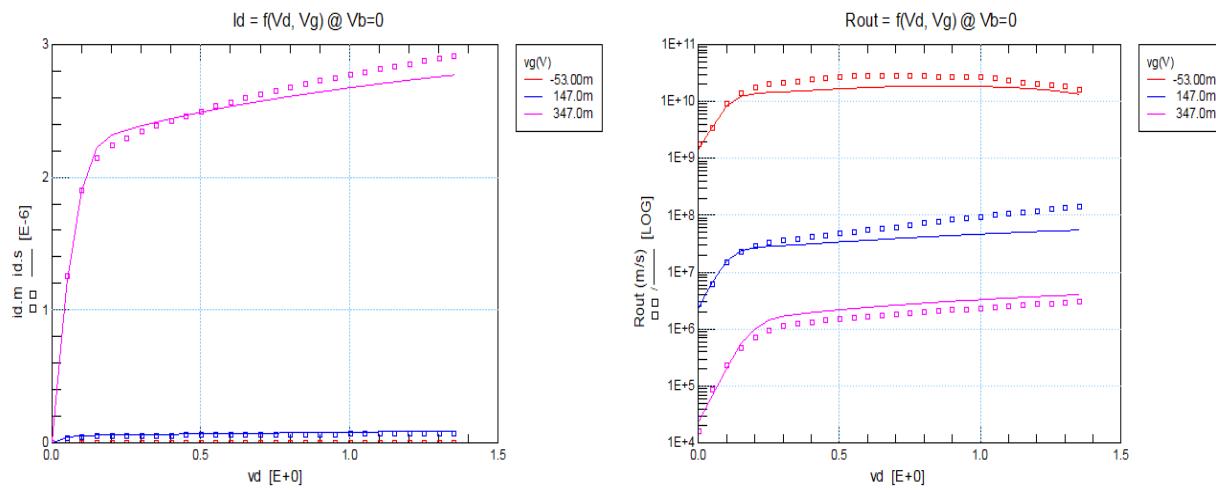


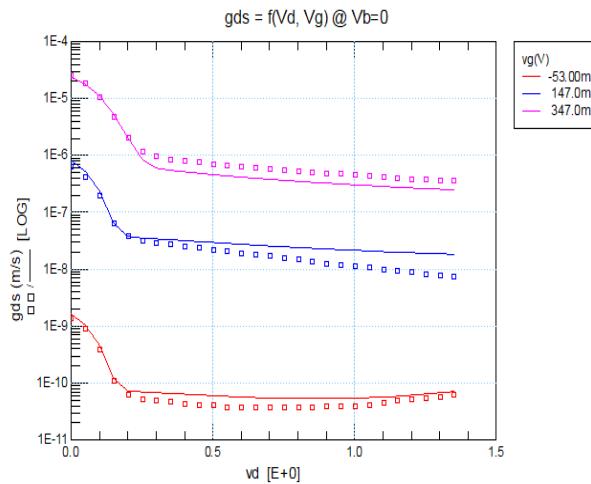


### $id_{vg}, I_b, I_g, V_b = 0\text{V}, T = 27^\circ\text{C}$

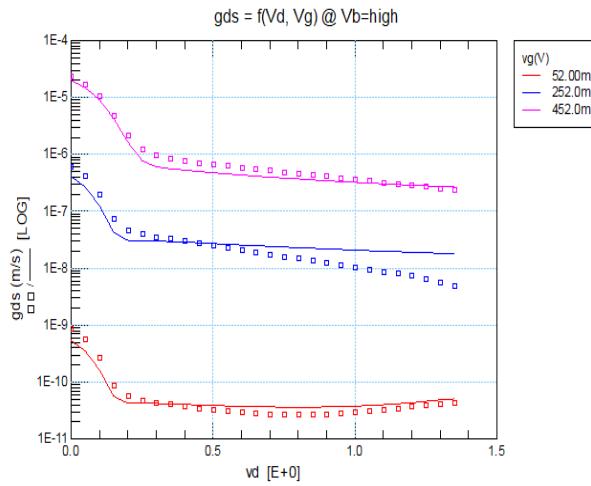
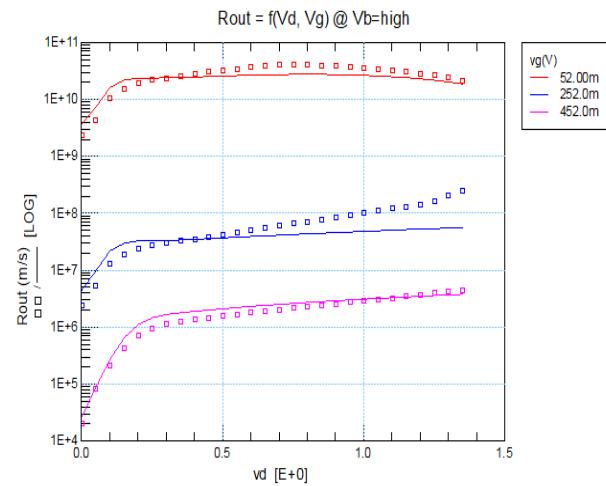
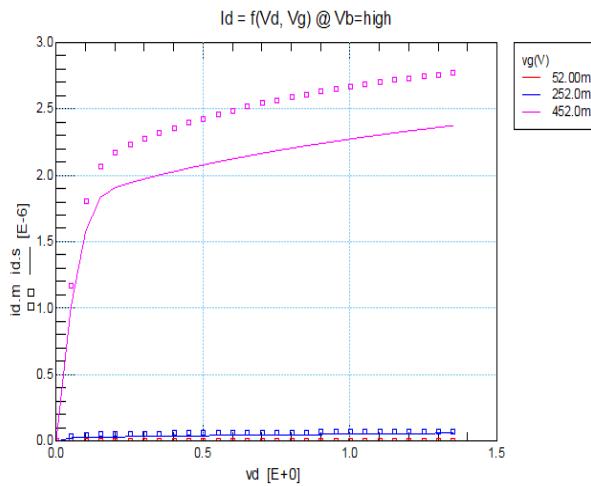


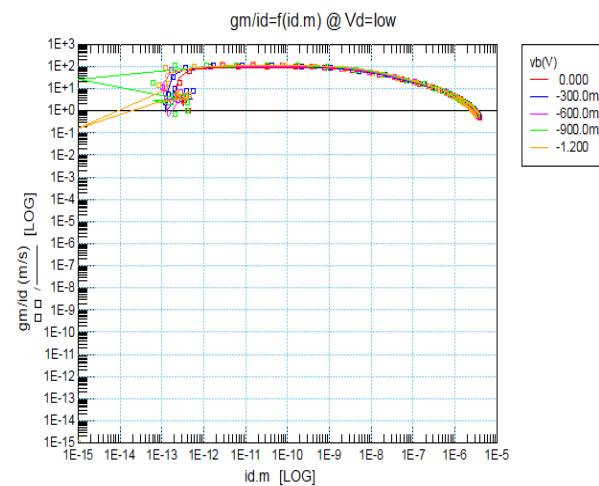
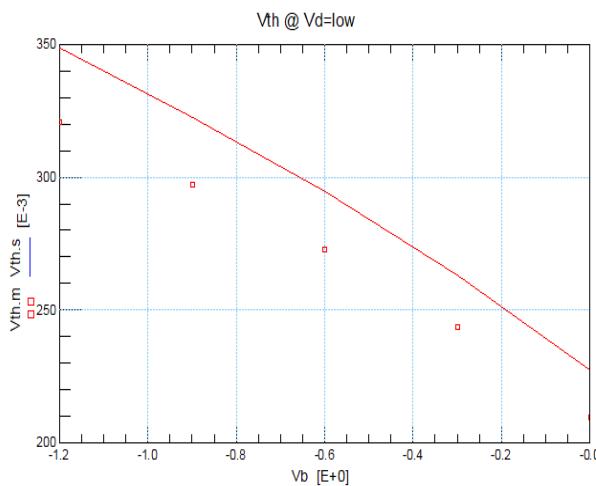
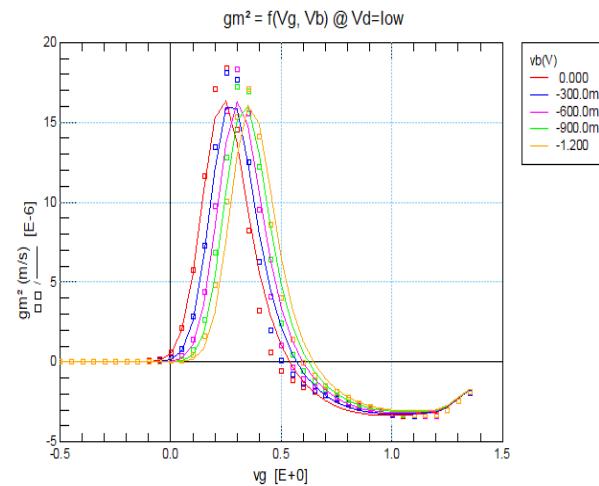
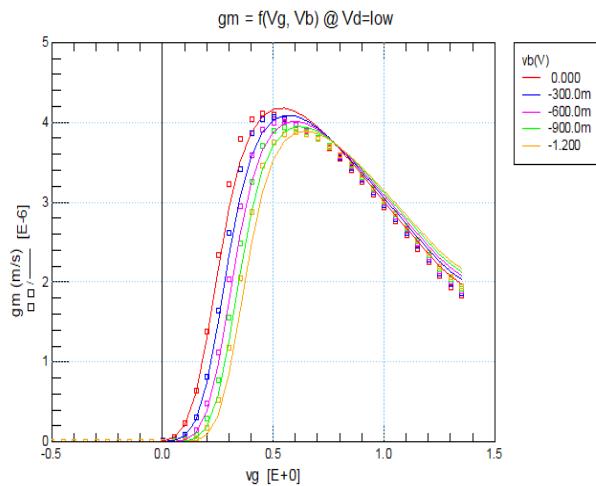
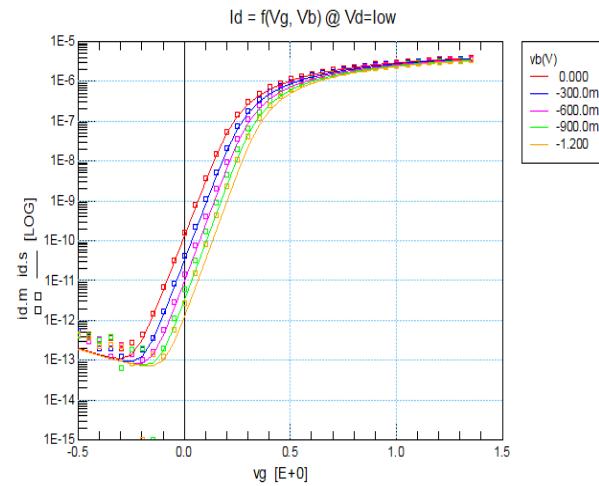
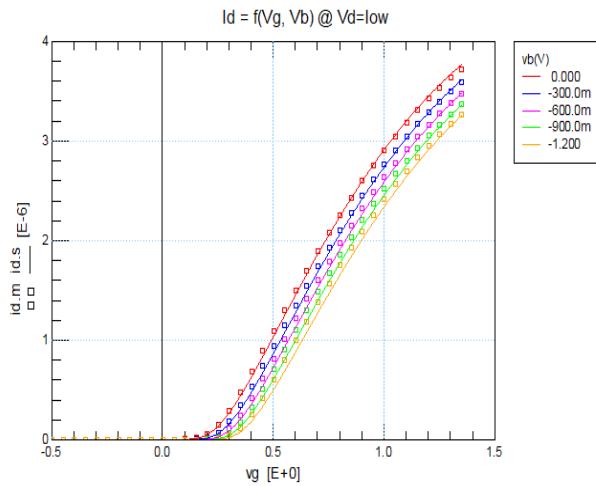
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


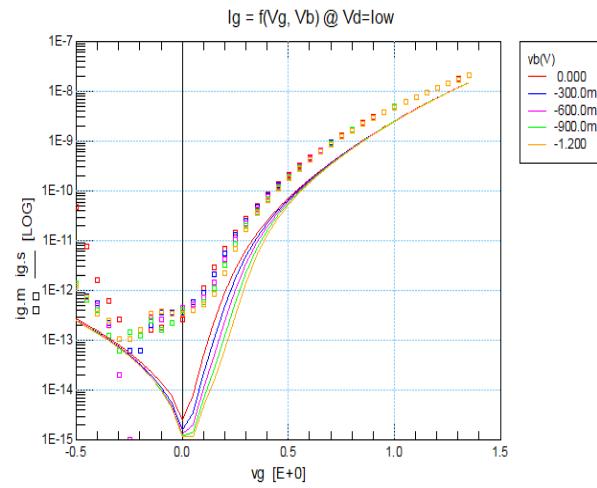
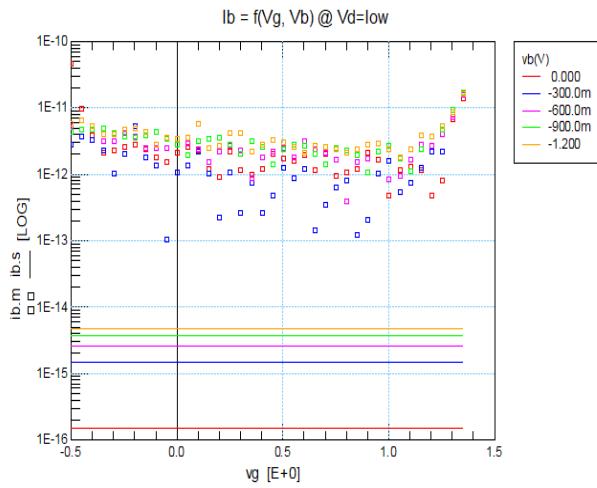
**idvd\_vbmin, Vb = -1.2V, T = 27°C**

**idvd\_vth, Vb = 0V, T = 27°C**




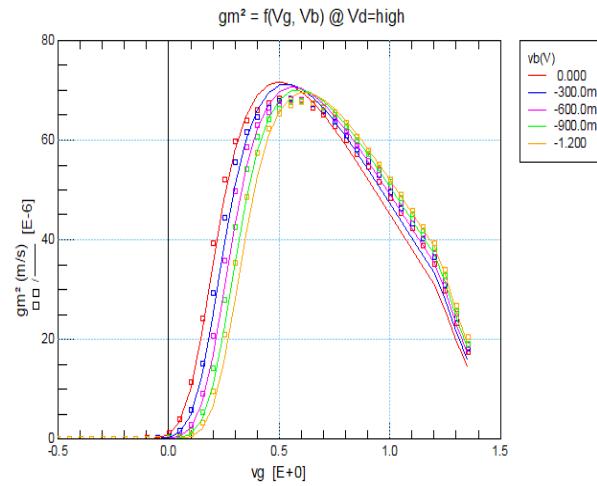
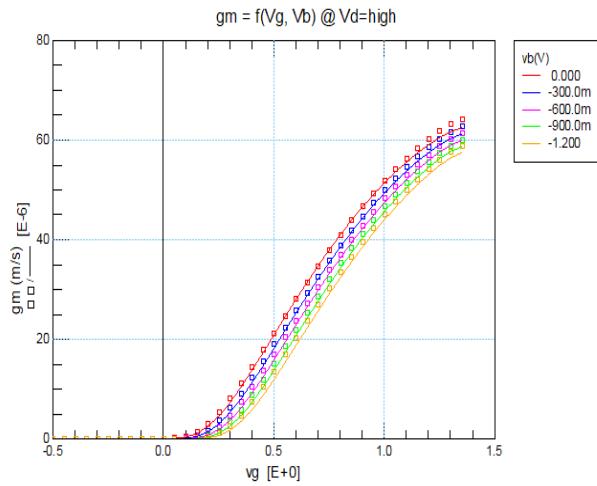
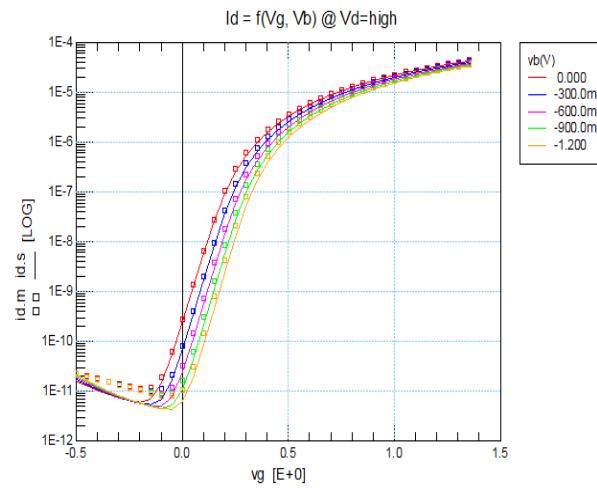
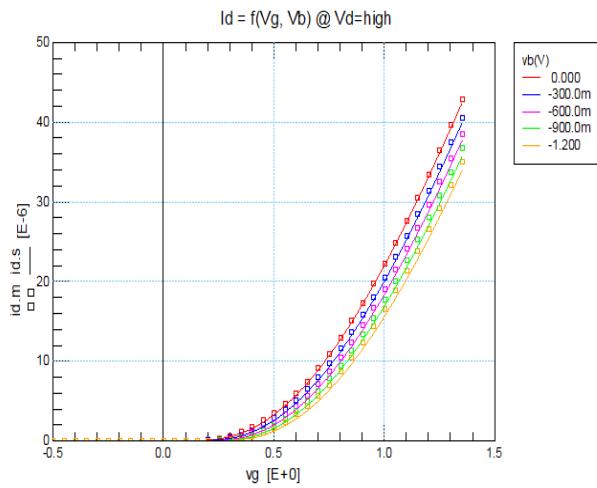
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

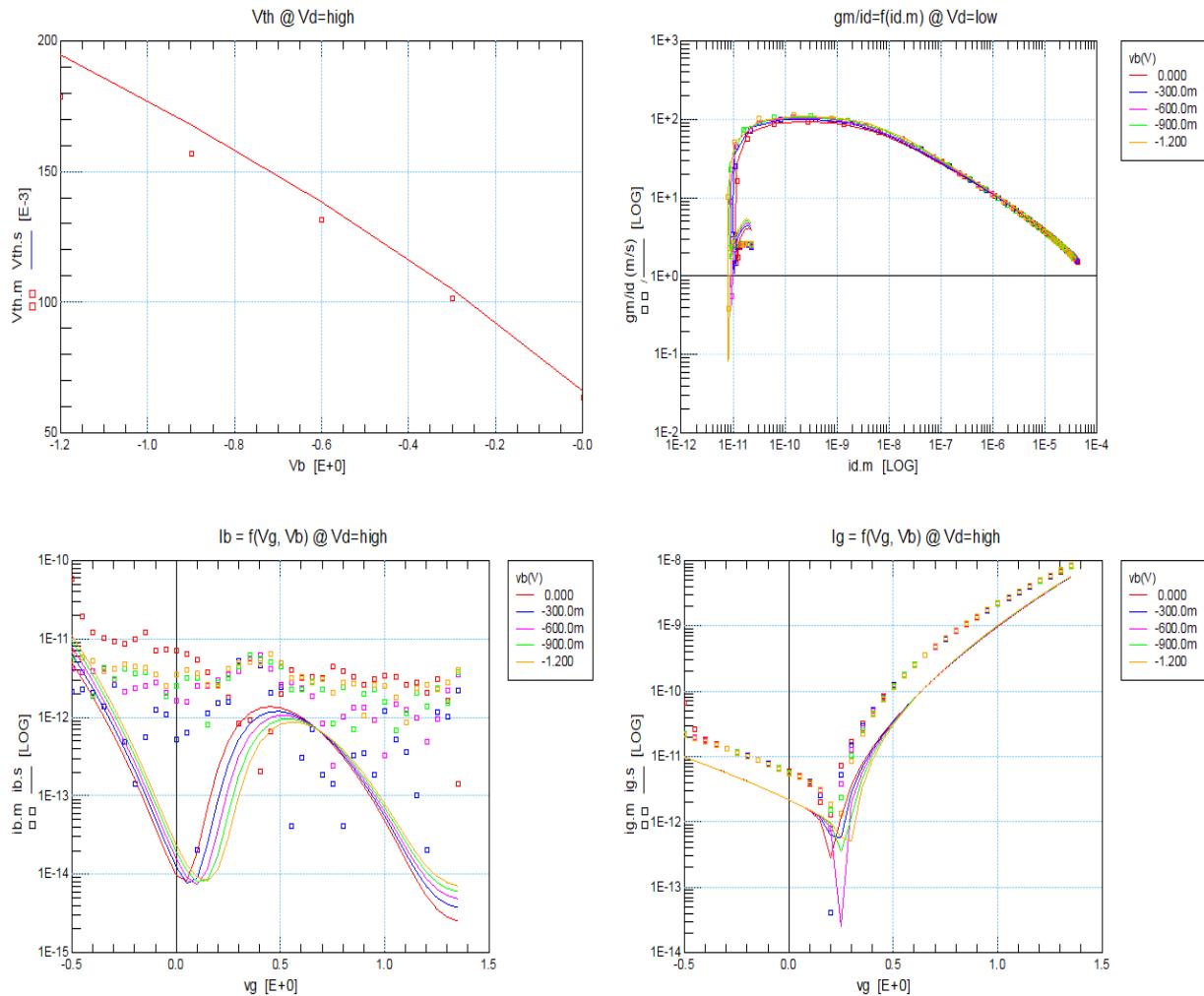


**4.18W02u0\_L10u0\_S543\_1****idvg, Vd = 0.05V, T = 27°C**

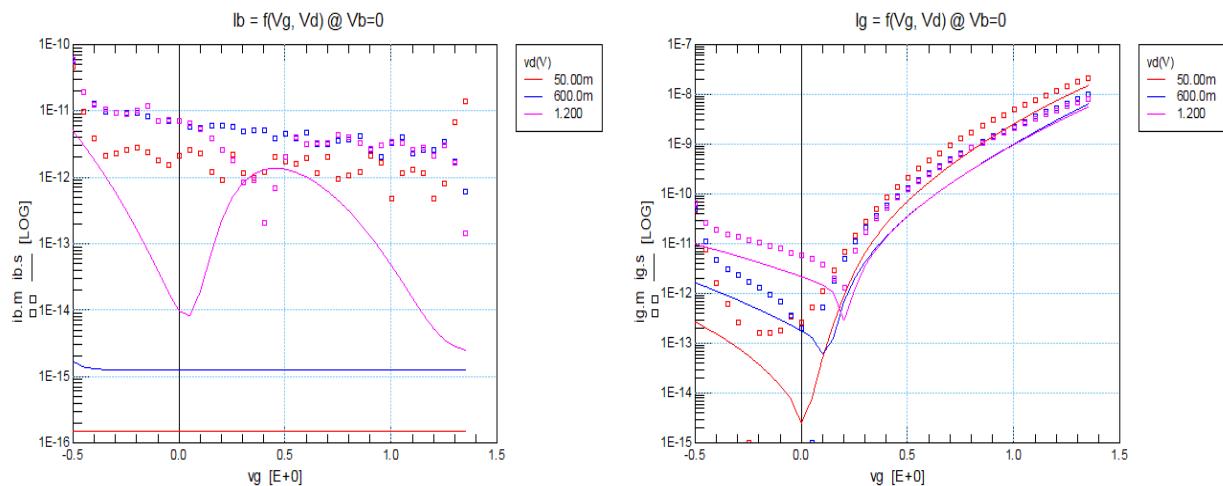


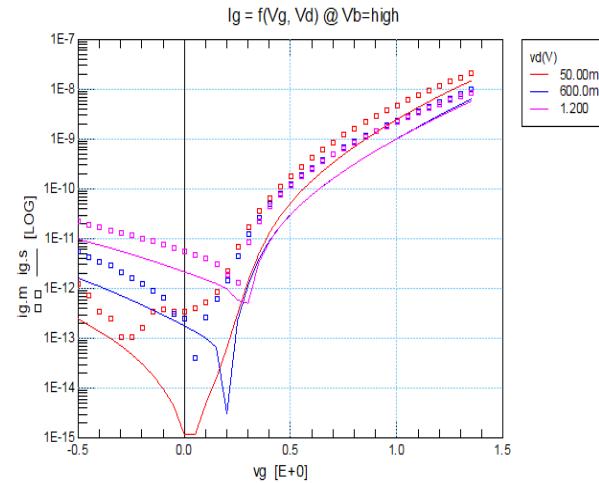
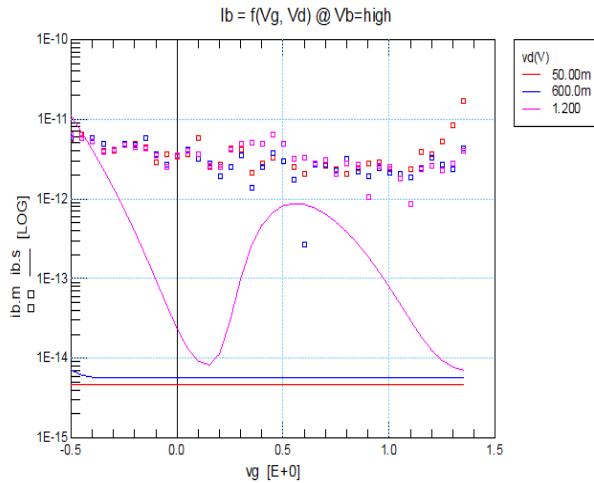
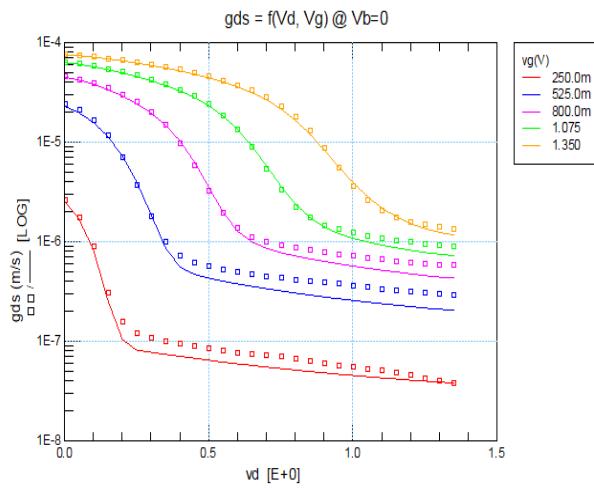
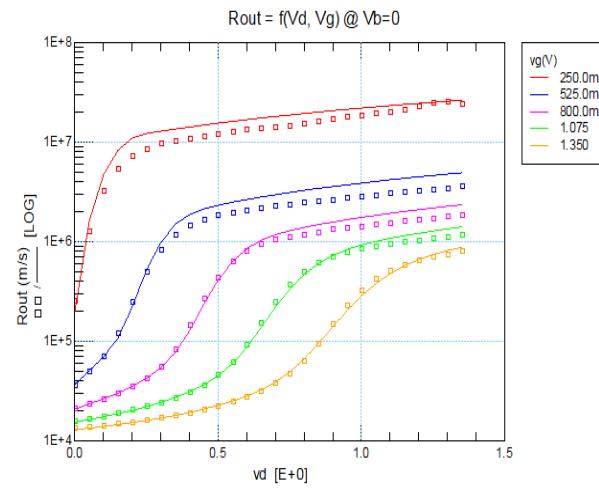
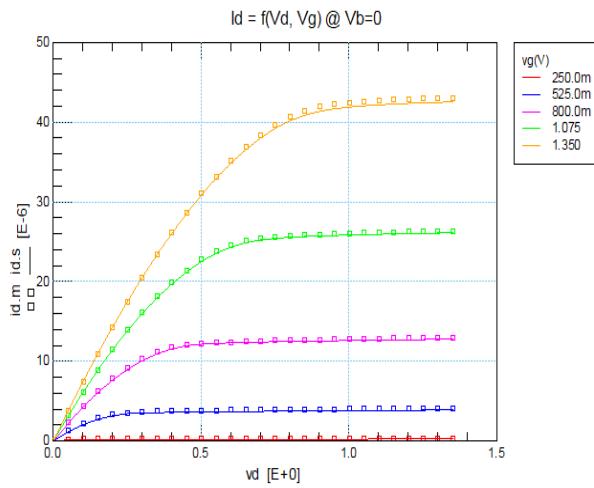
### $i_{dvg}, V_d = 1.2V, T = 27^\circ C$

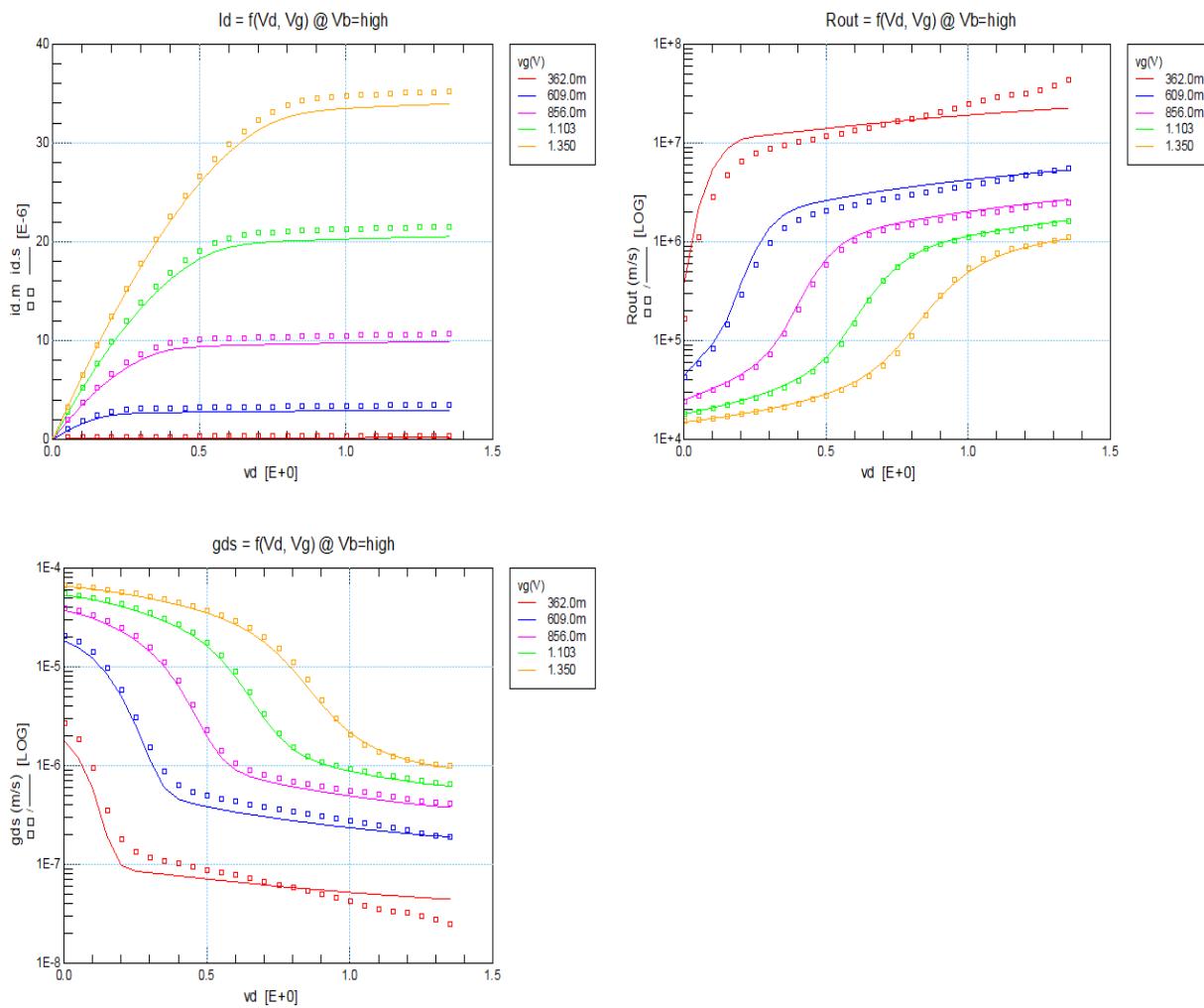
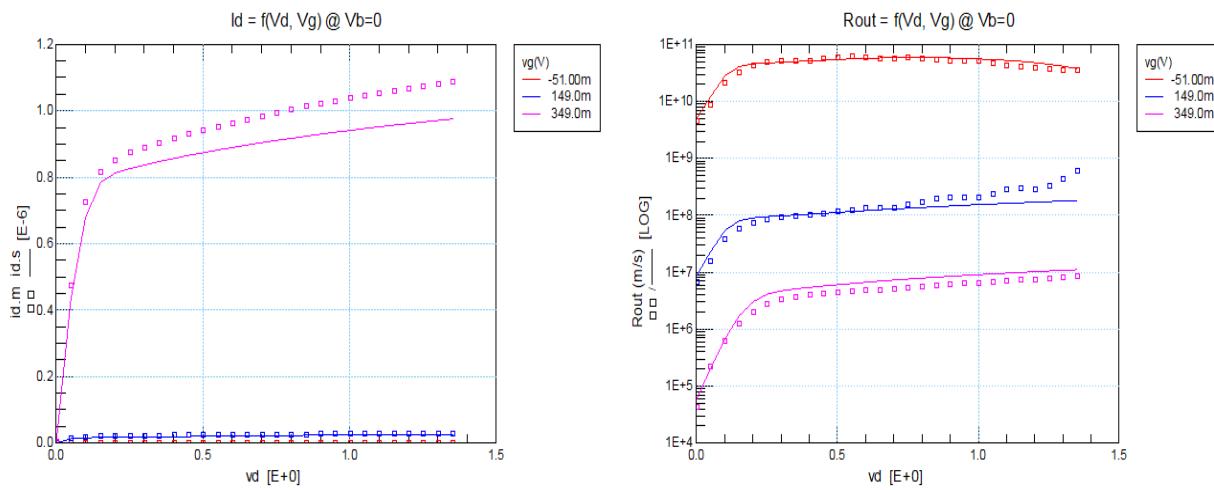


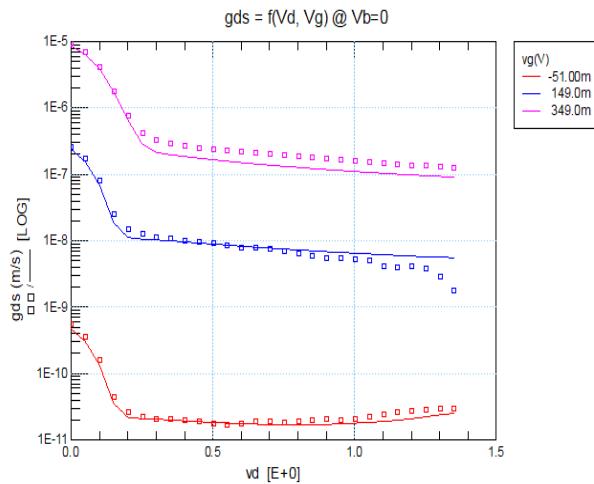


### $I_dVg$ , $I_b$ , $I_g$ , $V_b = 0V$ , $T = 27^\circ C$

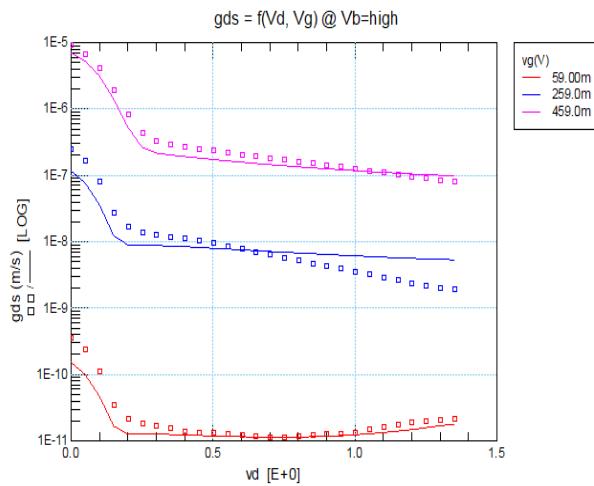
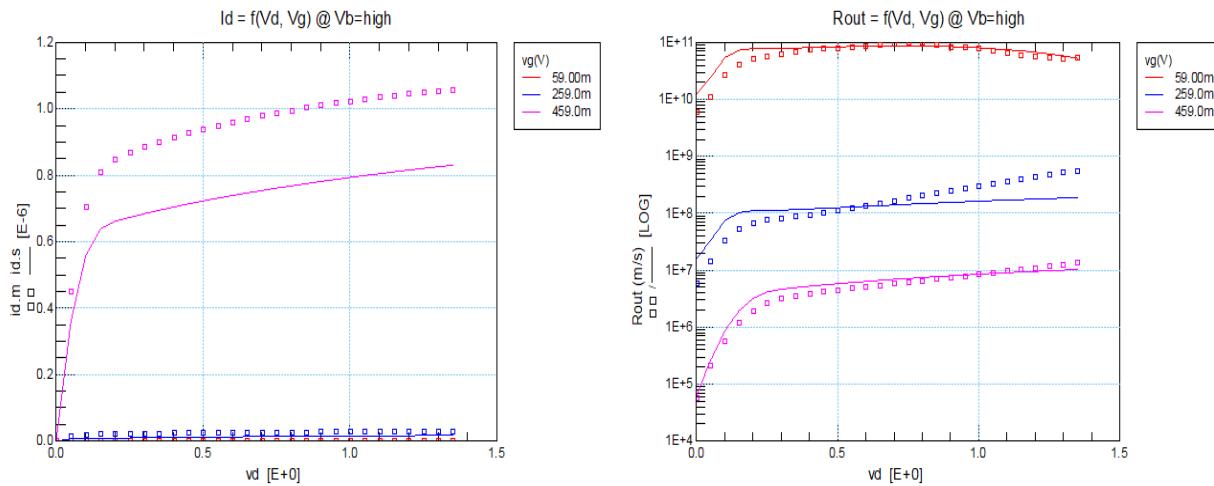


**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


**idvd\_vbmin, Vb = -1.2V, T = 27°C****idvd\_vth, Vb = 0V, T = 27°C**

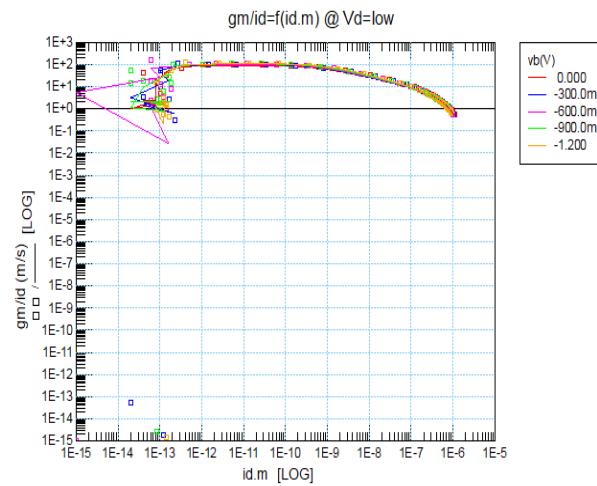
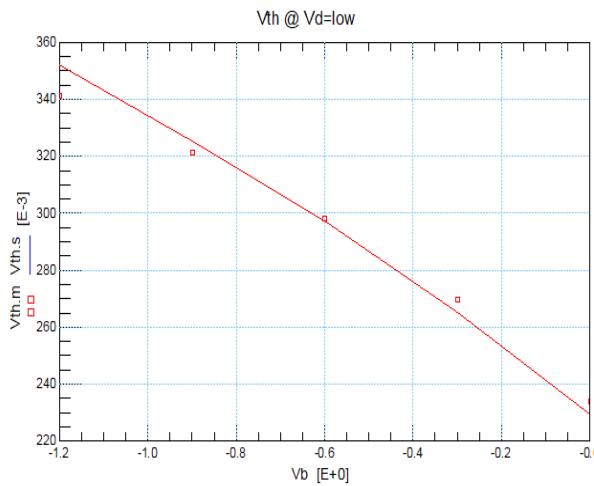
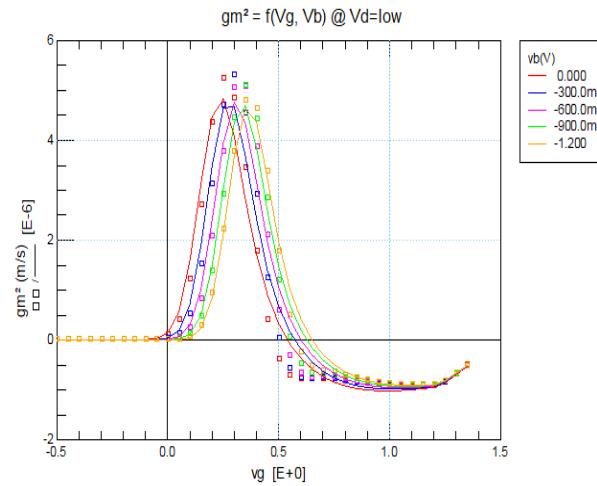
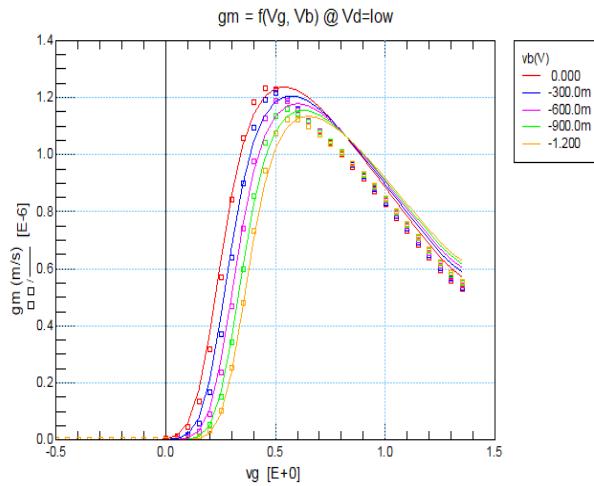
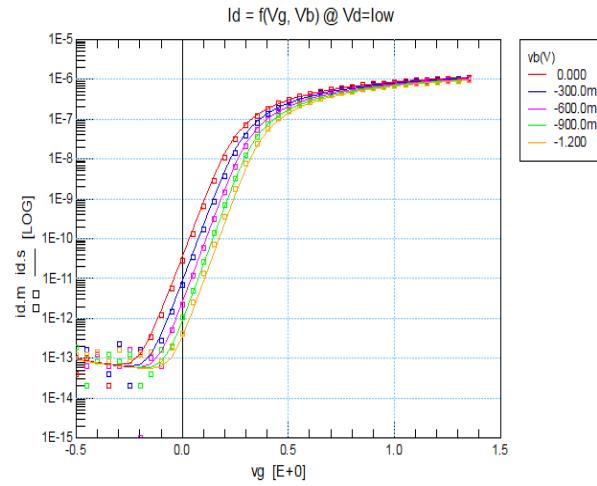
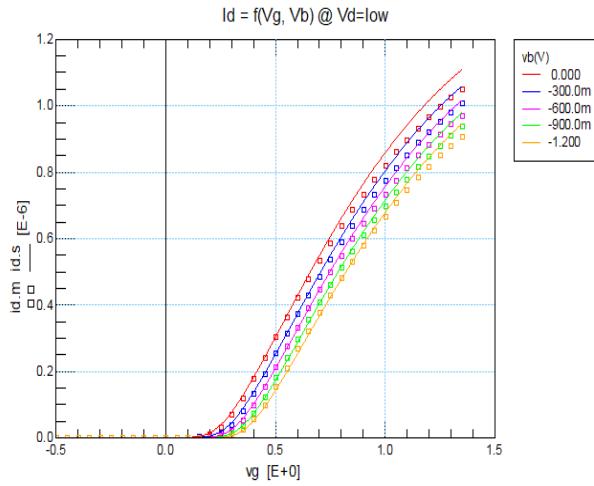


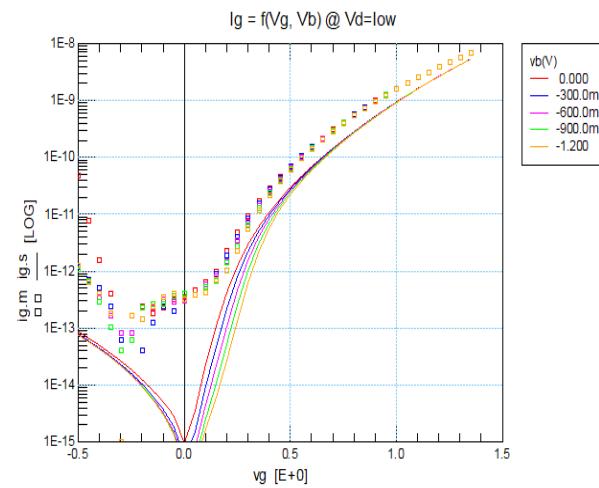
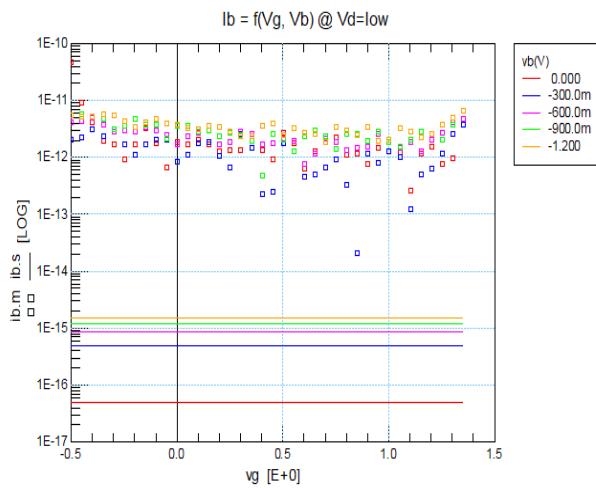
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C



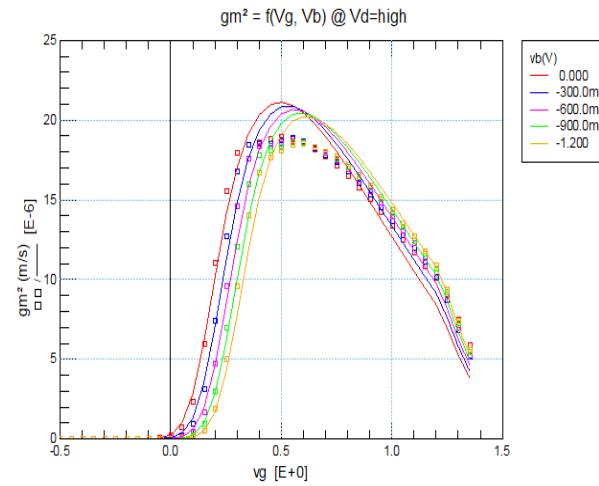
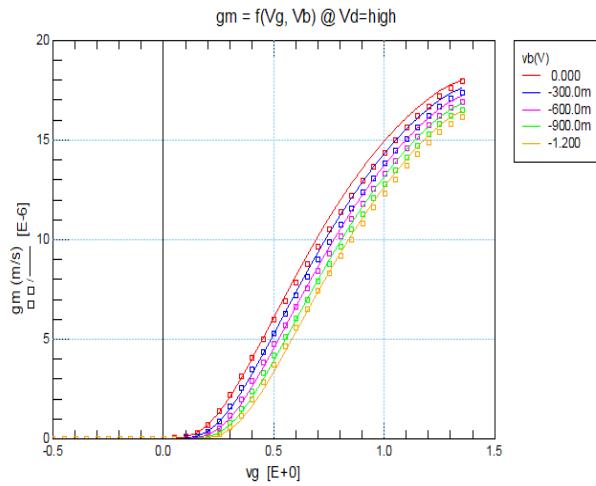
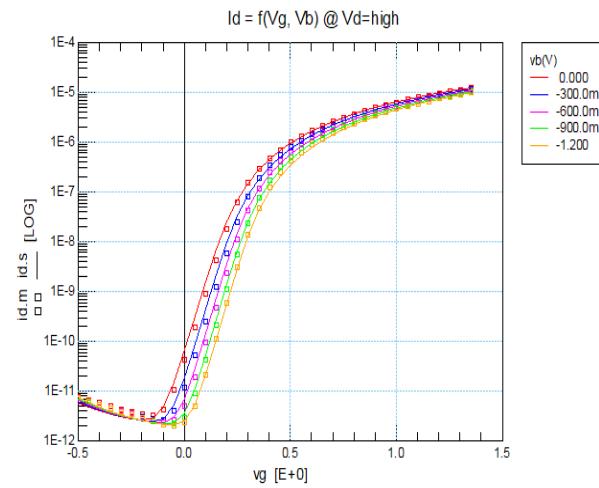
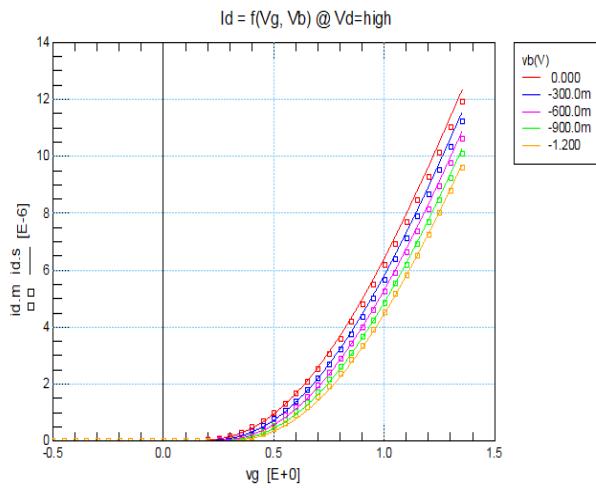
## 4.19 W0u6\_L10u0\_S544\_1

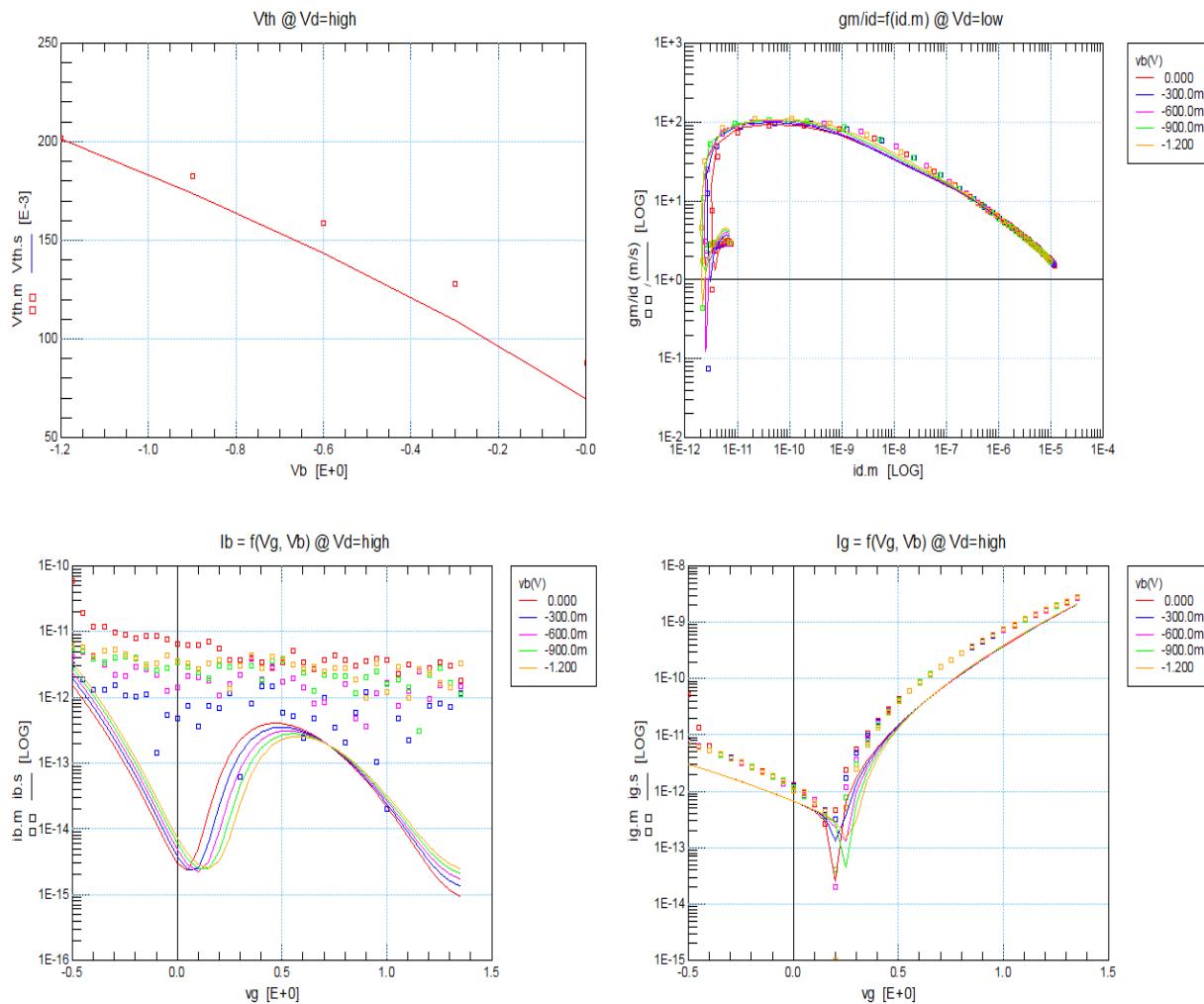
idvg, Vd = 0.05V, T = 27°C



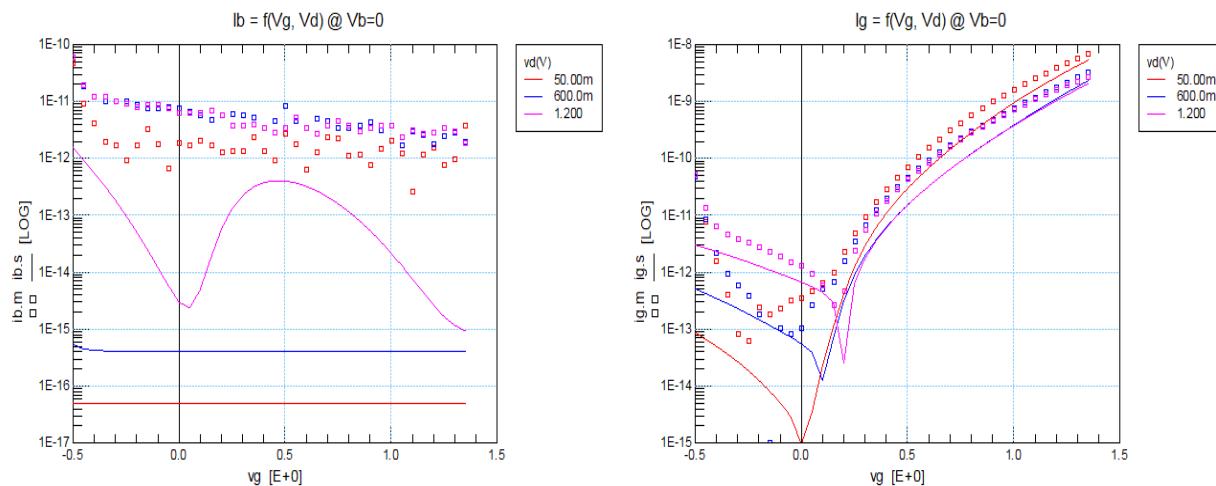


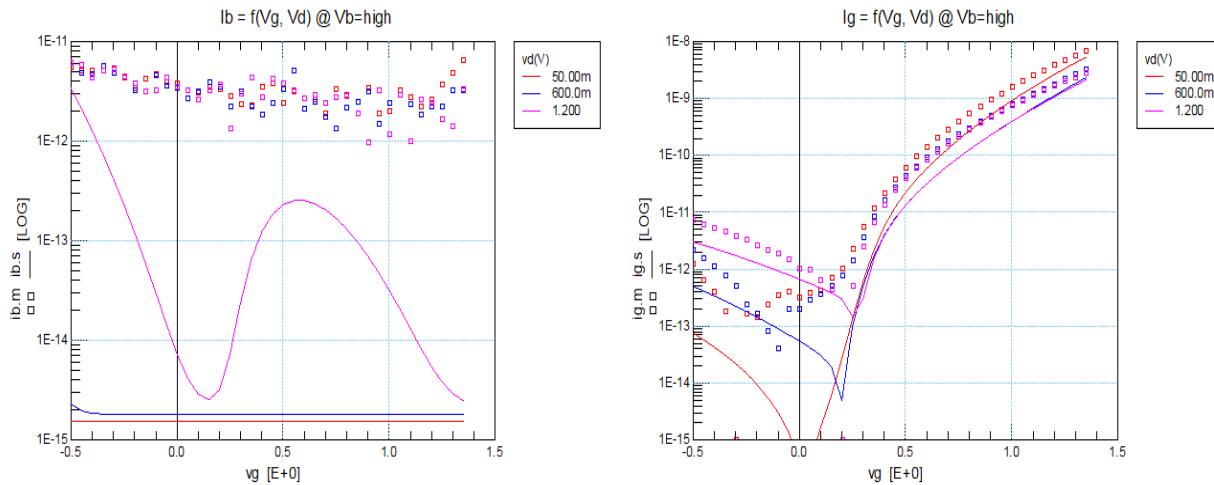
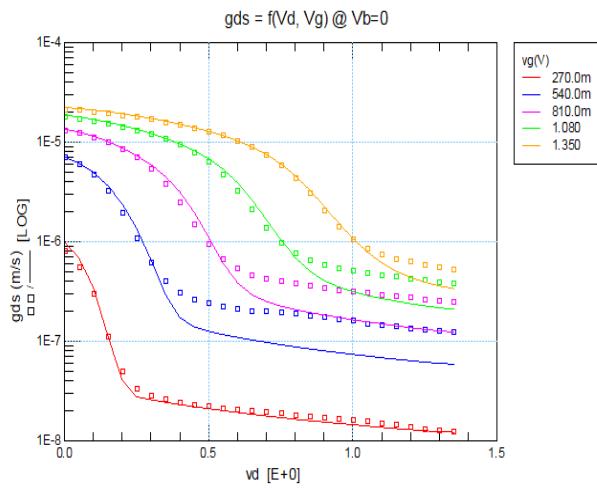
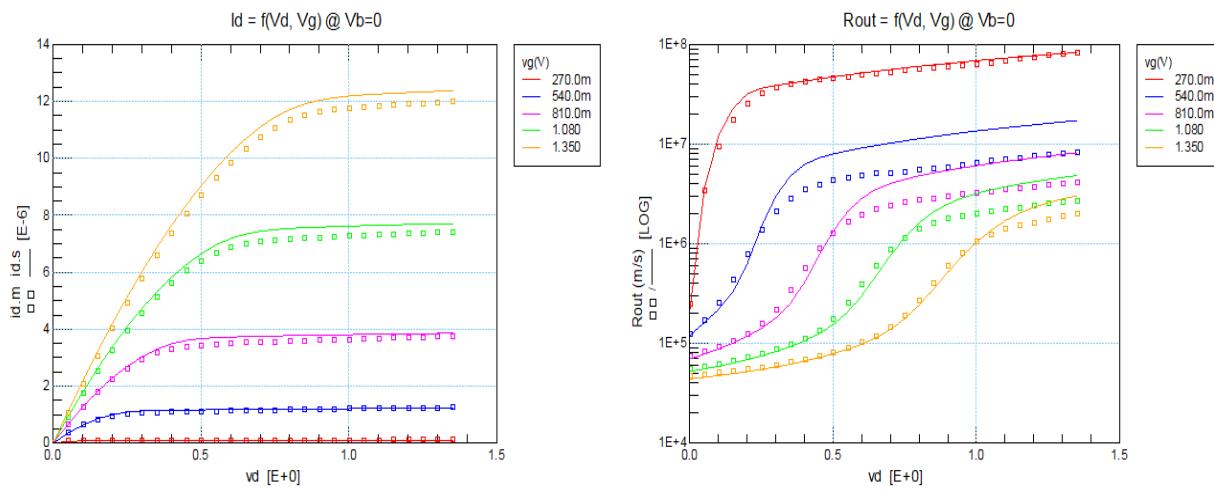
$i_{dvg}, V_d = 1.2V, T = 27^\circ C$

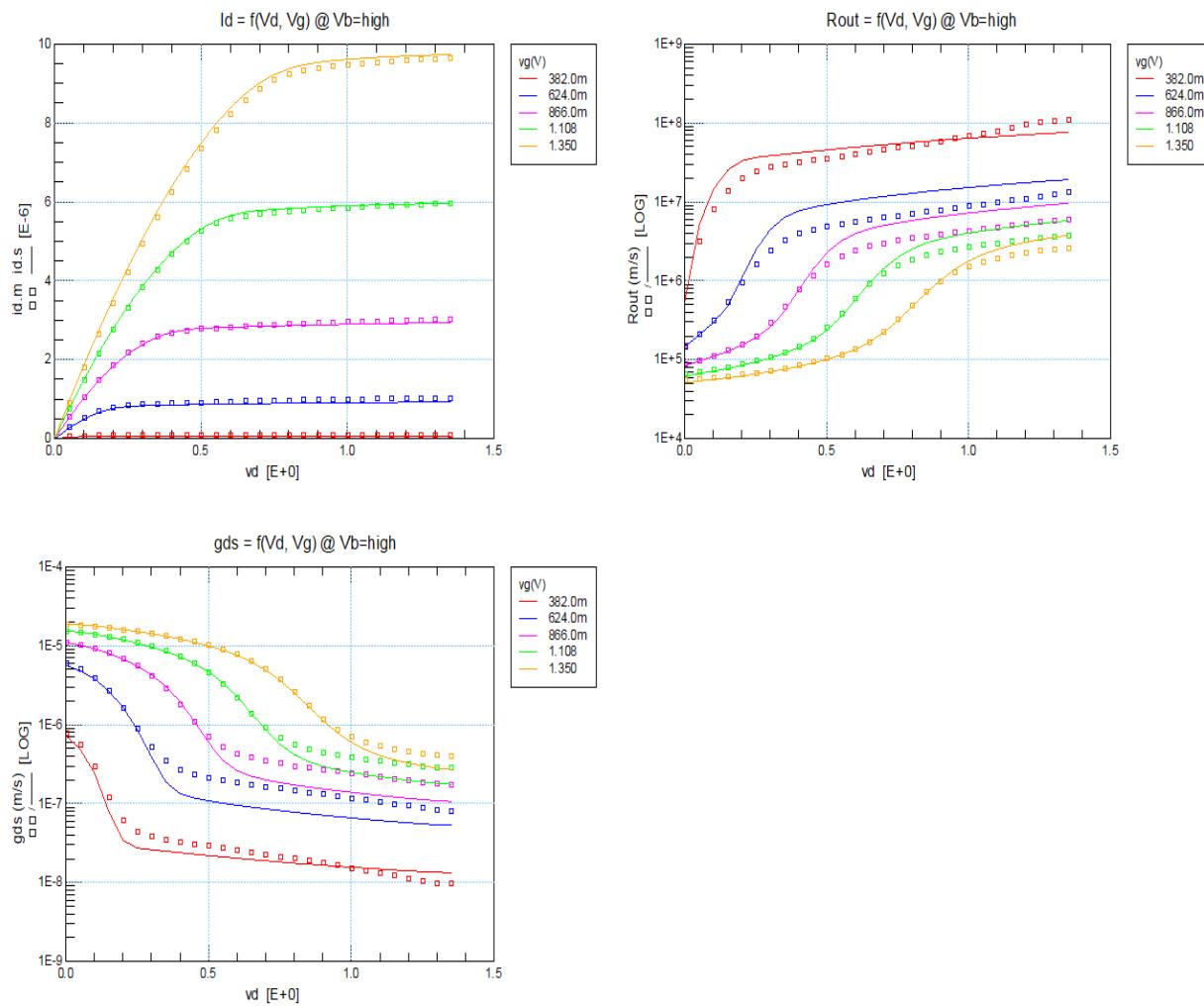
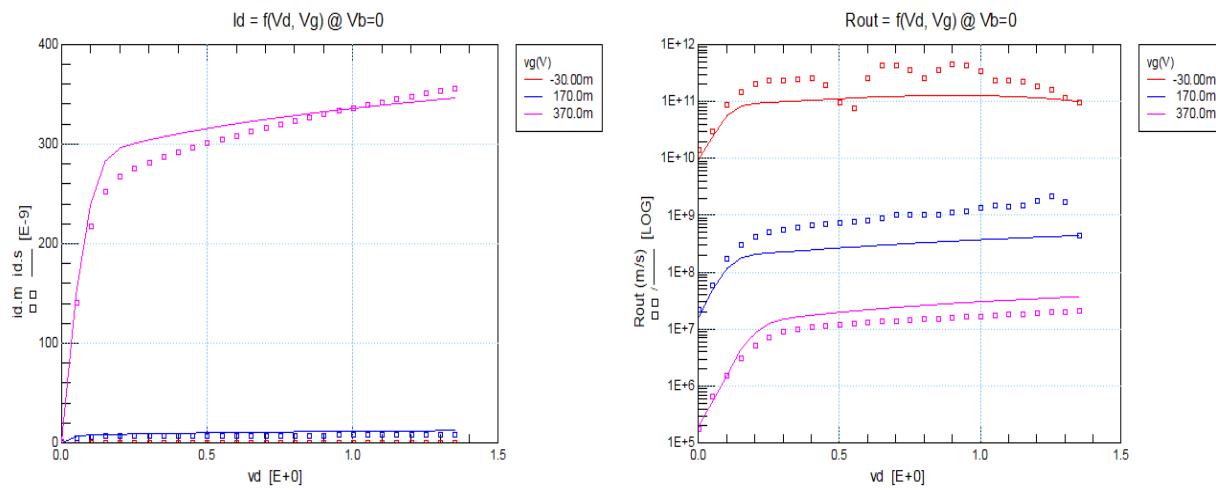


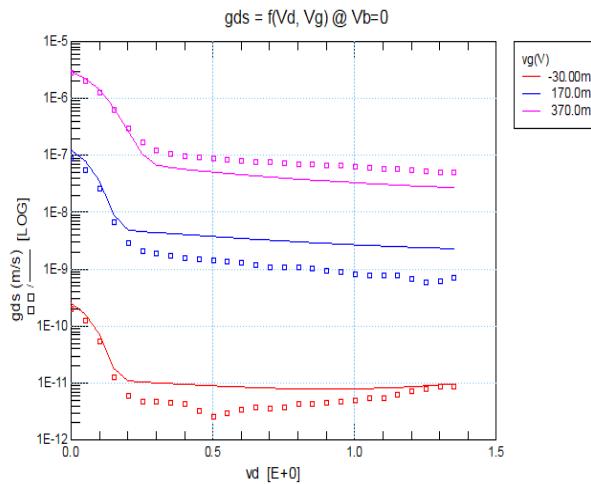


**idvg, Ib, Ig, Vb = 0V, T = 27°C**

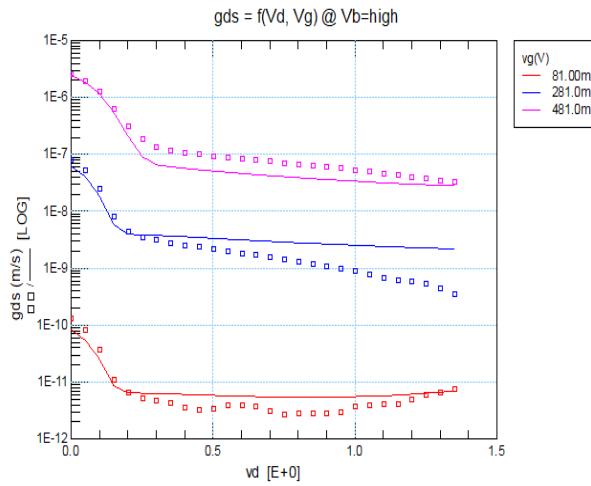
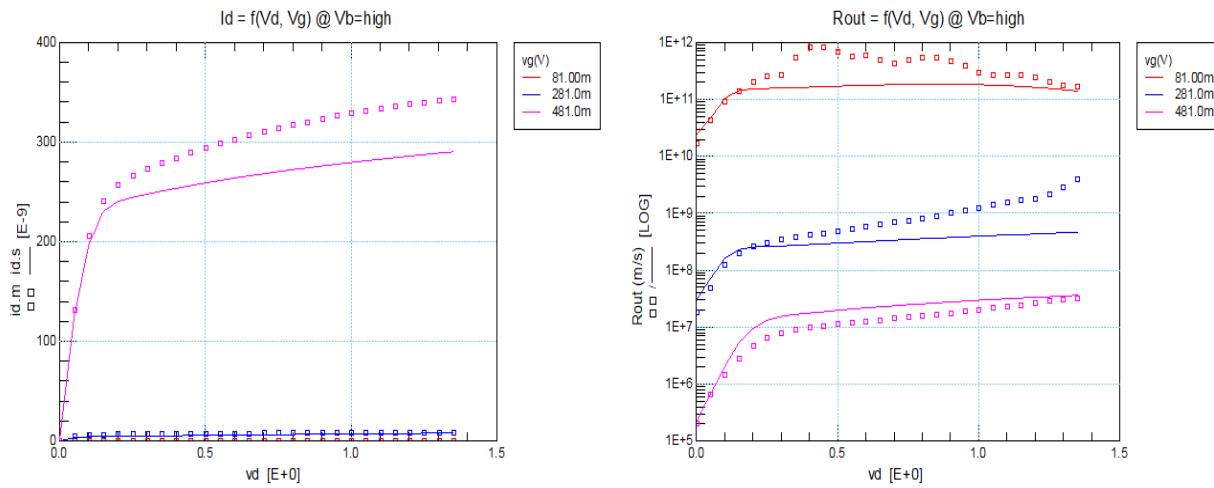


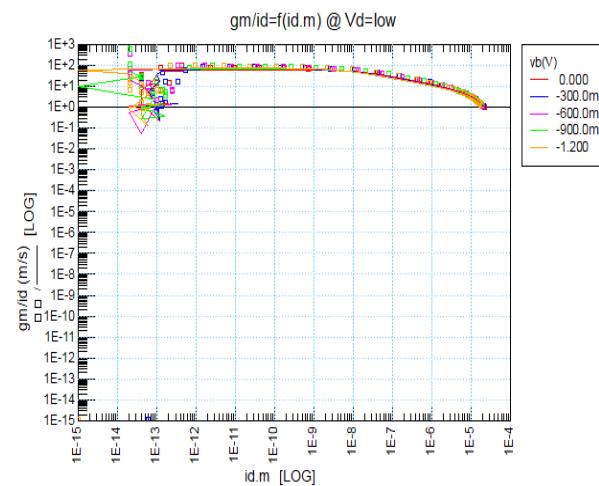
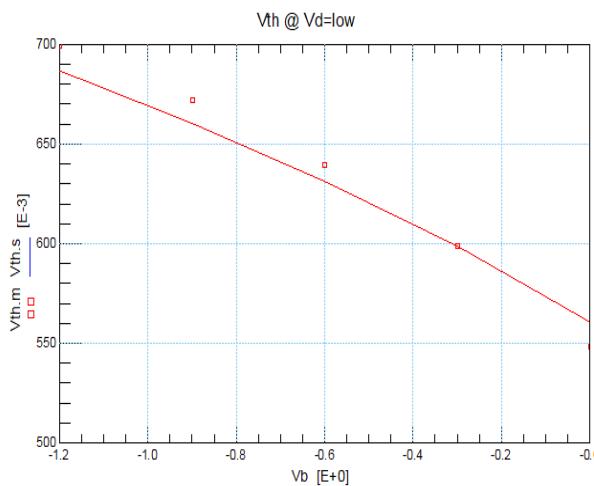
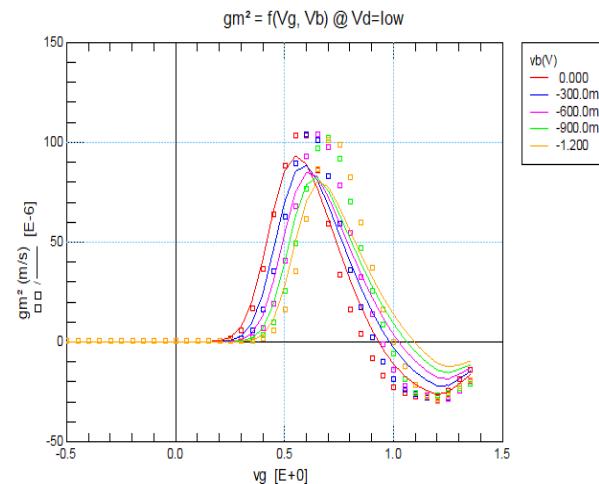
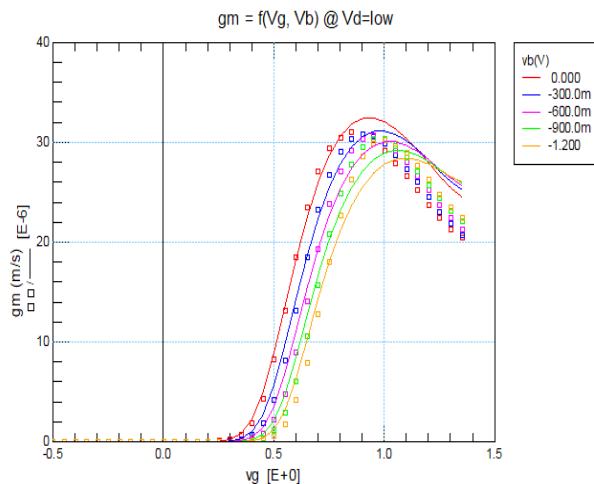
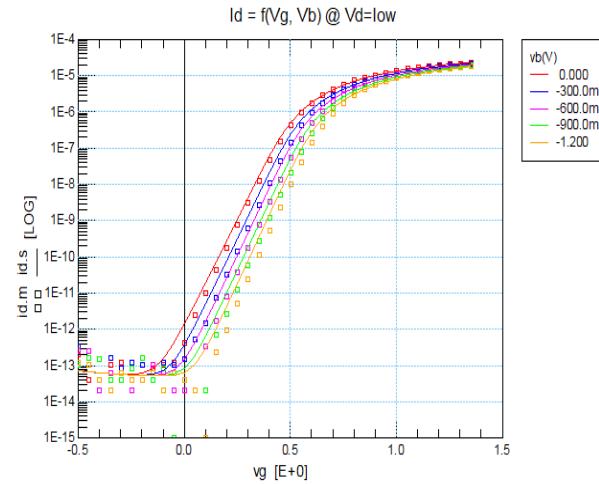
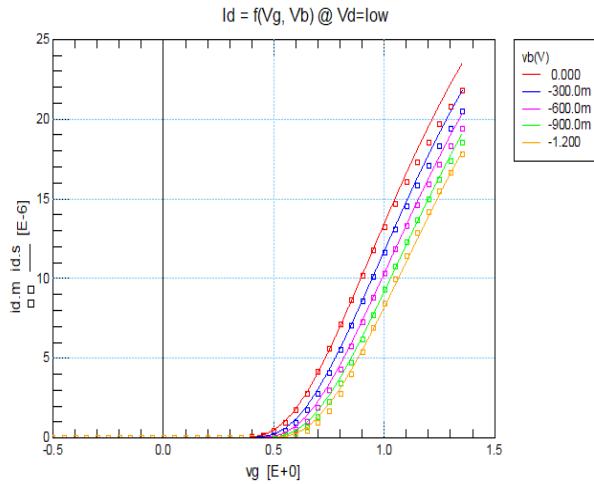
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


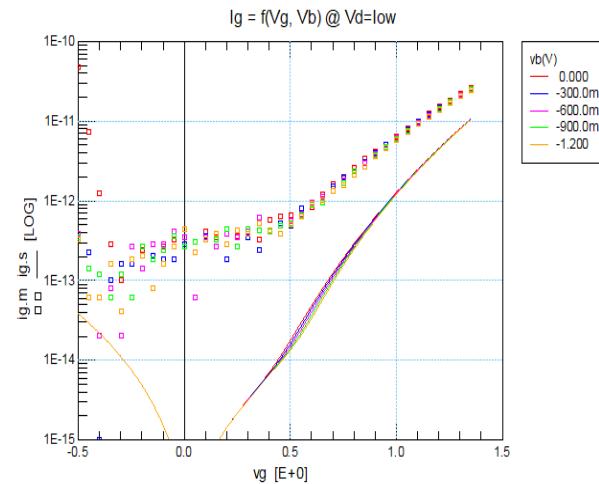
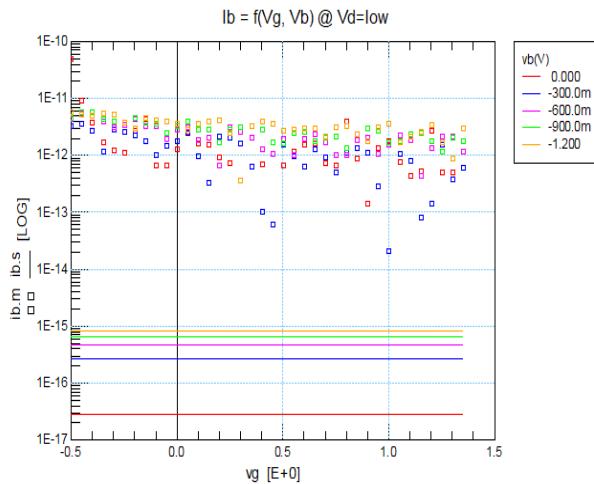
**idvd\_vbmin, Vb = -1.2V, T = 27°C**

**idvd\_vth, Vb = 0V, T = 27°C**




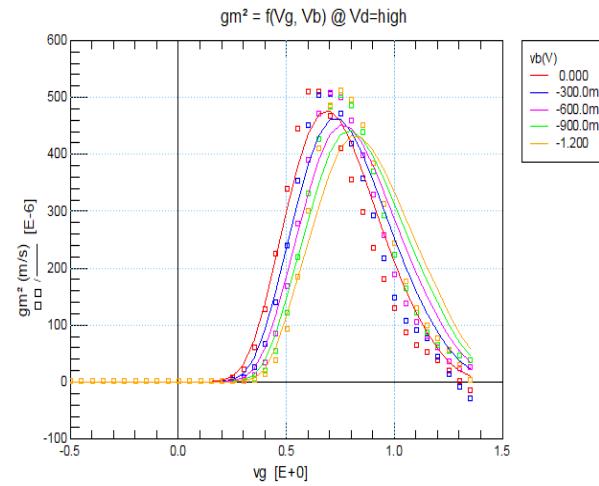
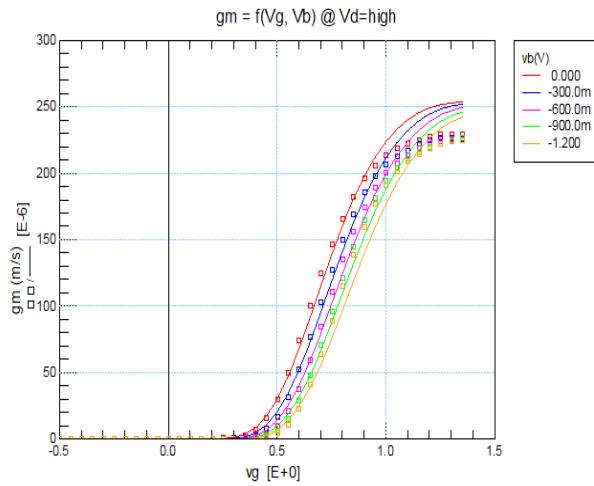
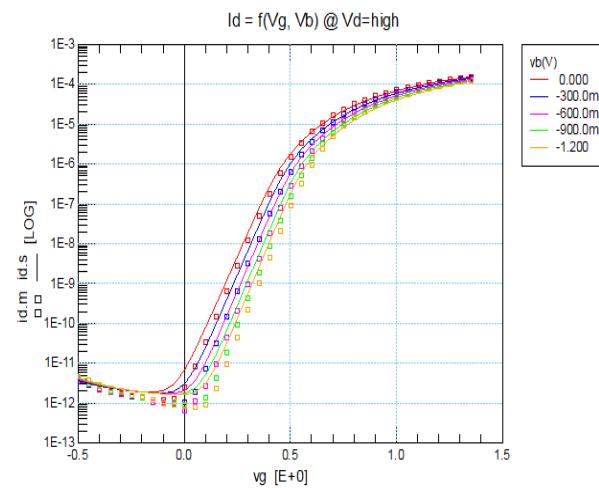
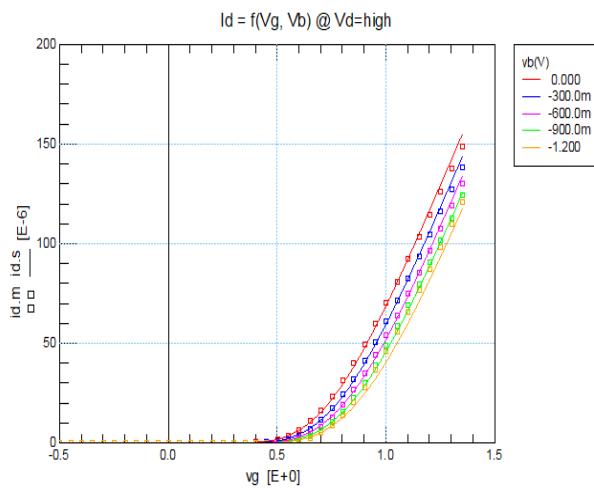
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

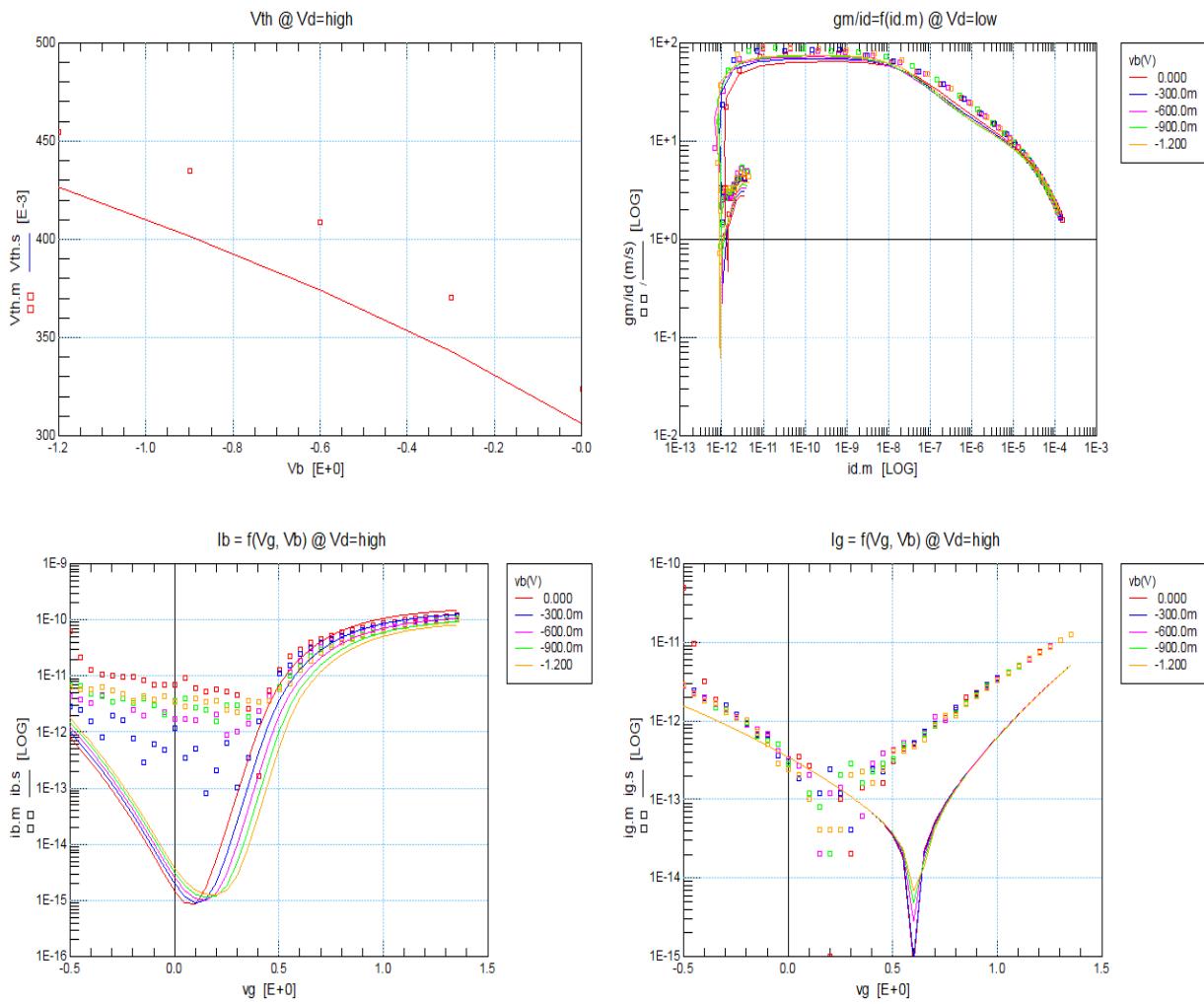


**4.20 W0u3\_L0u13\_S544\_2****idvg, Vd = 0.05V, T = 27°C**

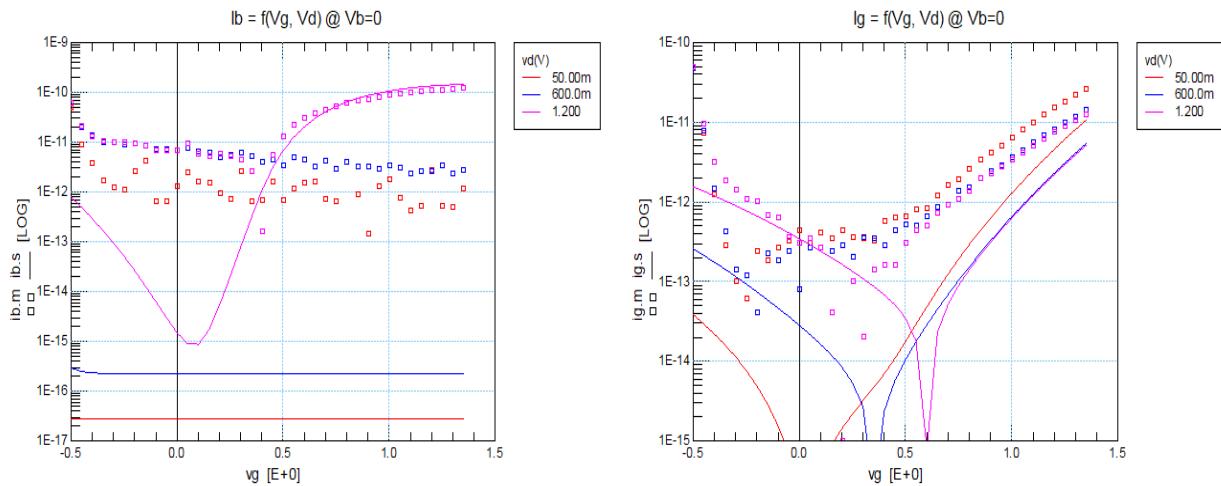


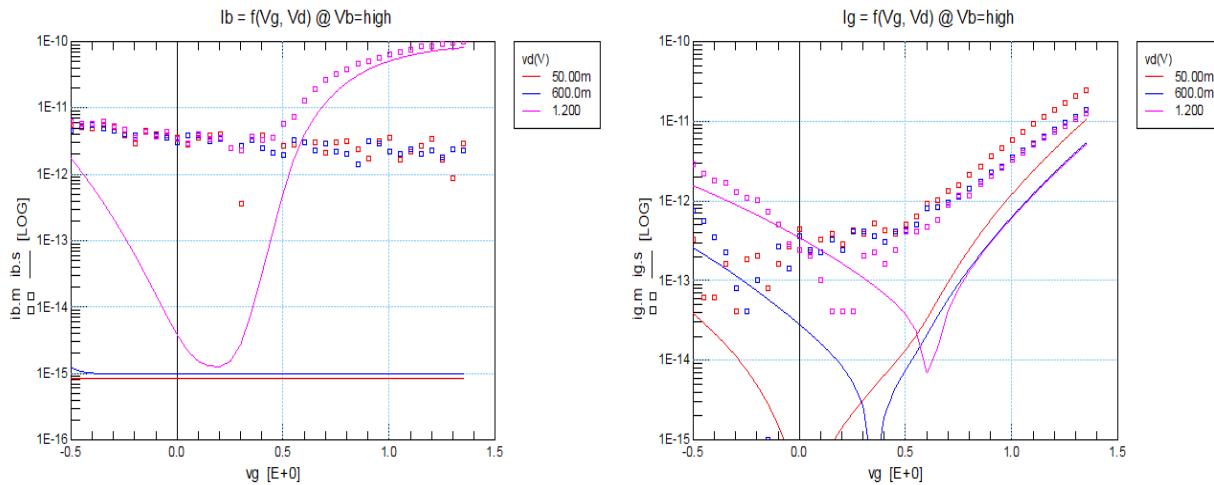
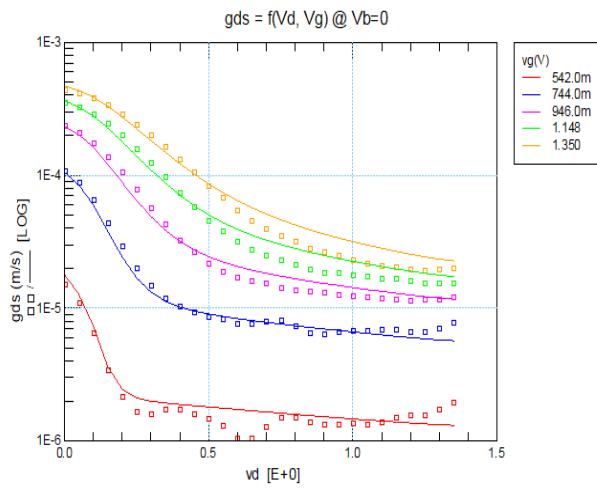
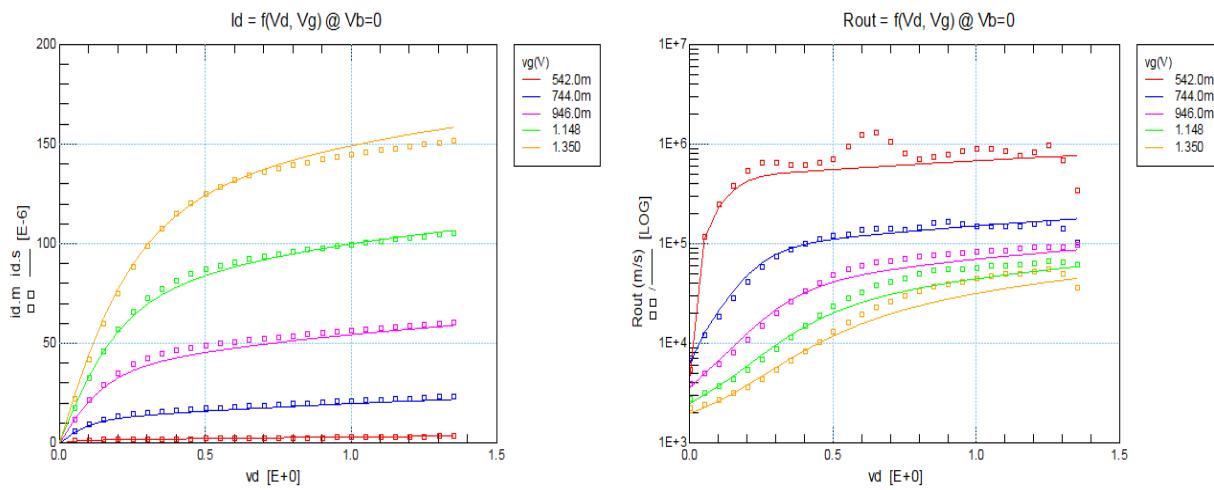
### $i_{dvg}, V_d = 1.2V, T = 27^\circ C$

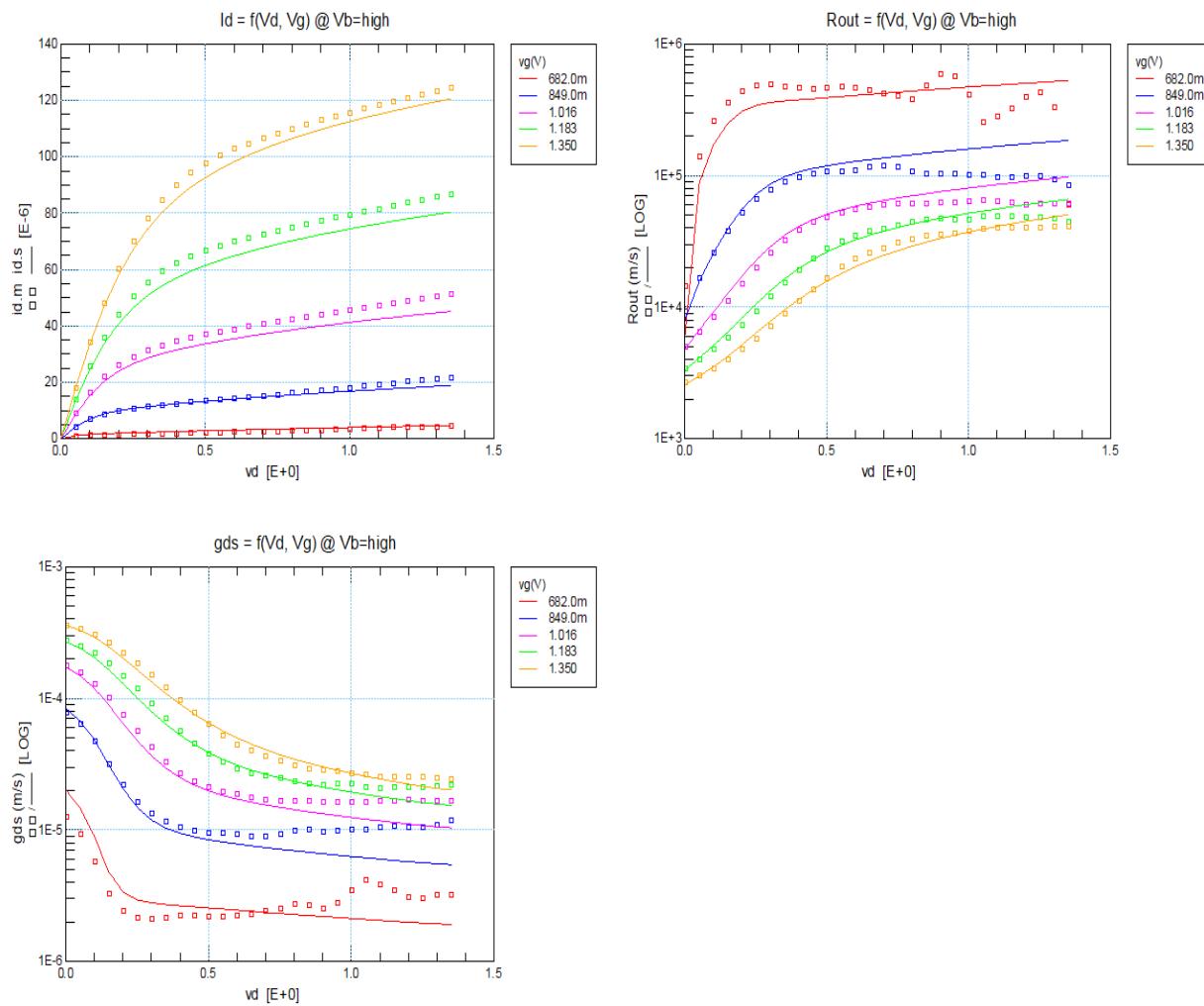
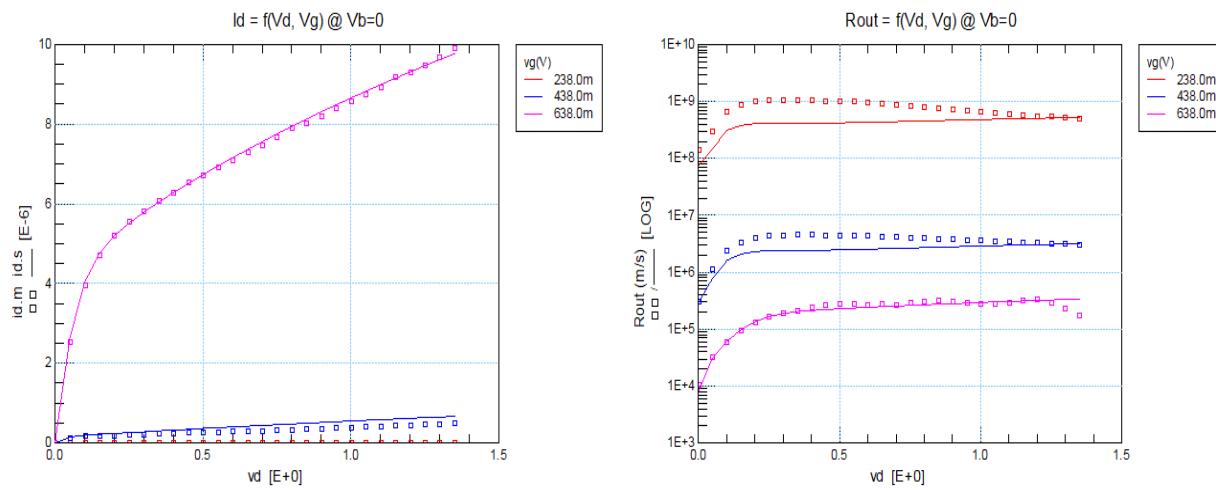


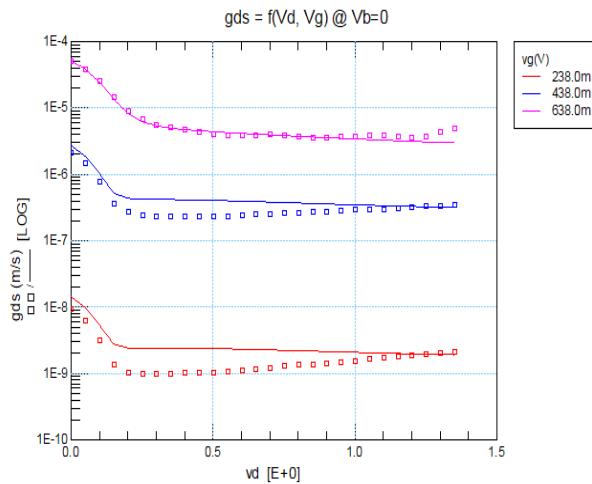


**idvg, Ib,Ig, Vb = 0V, T = 27°C**

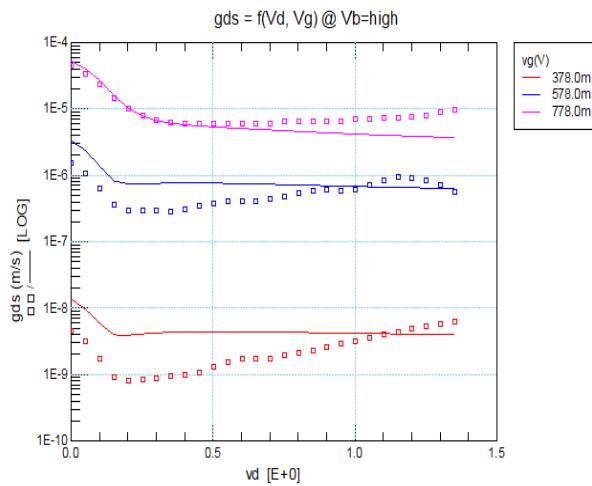
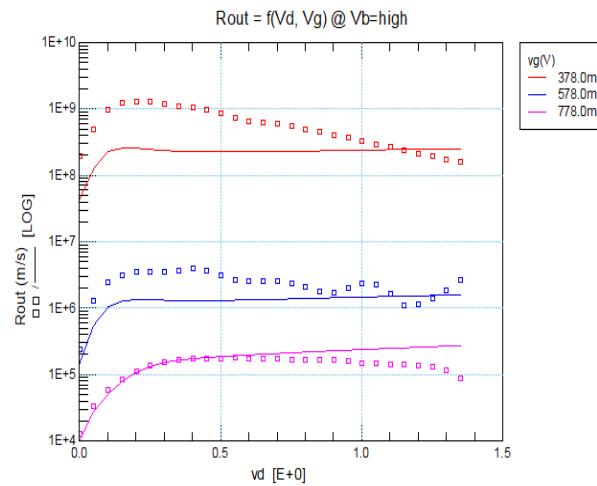
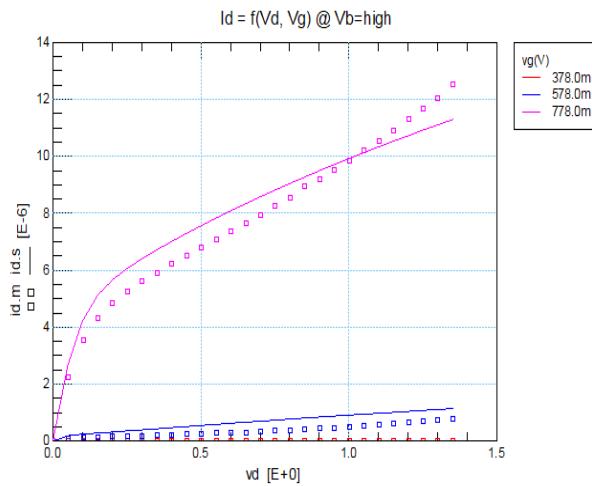


**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


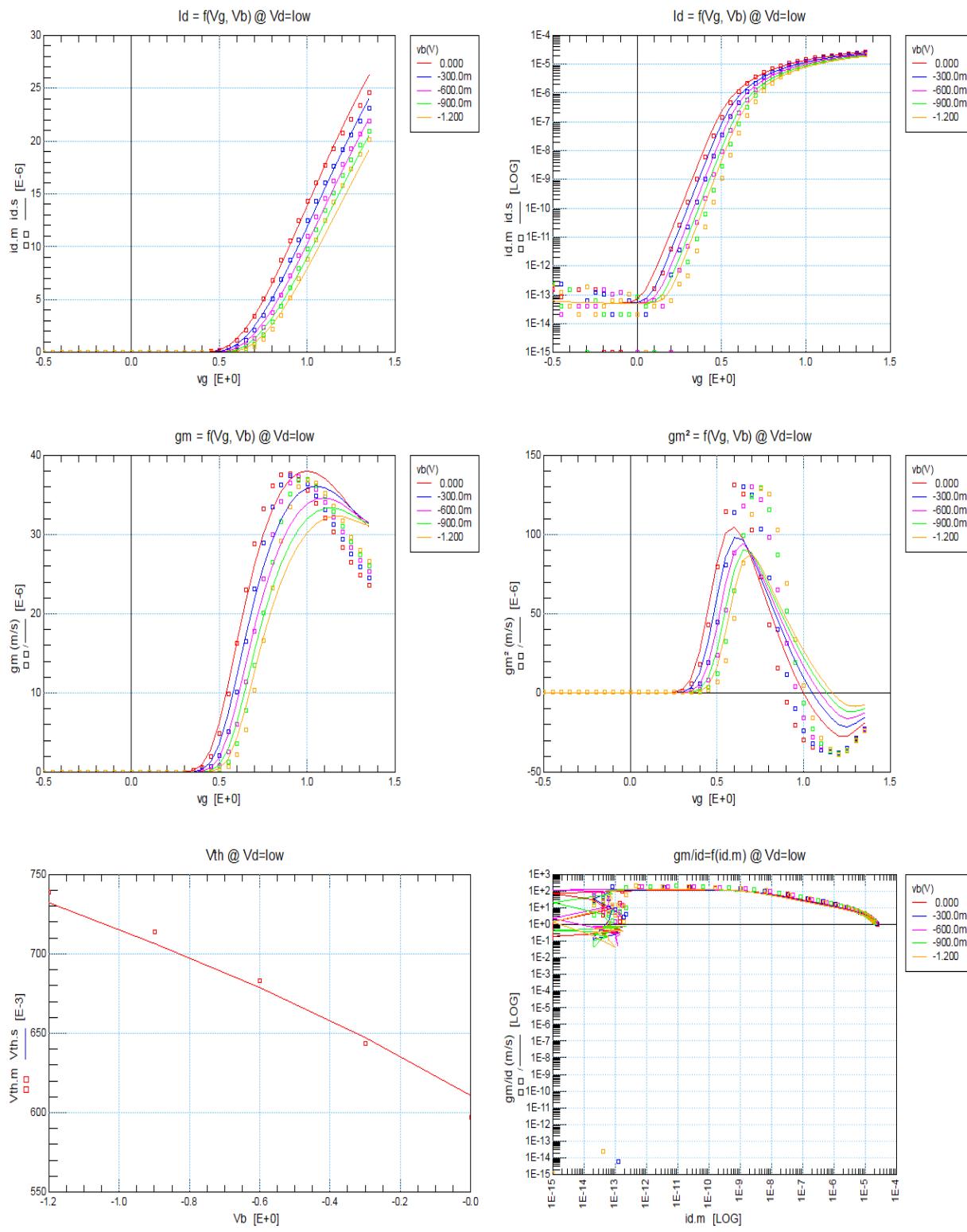
**idvd\_vbmin, Vb = -1.2V, T = 27°C**

**idvd\_vth, Vb = 0V, T = 27°C**


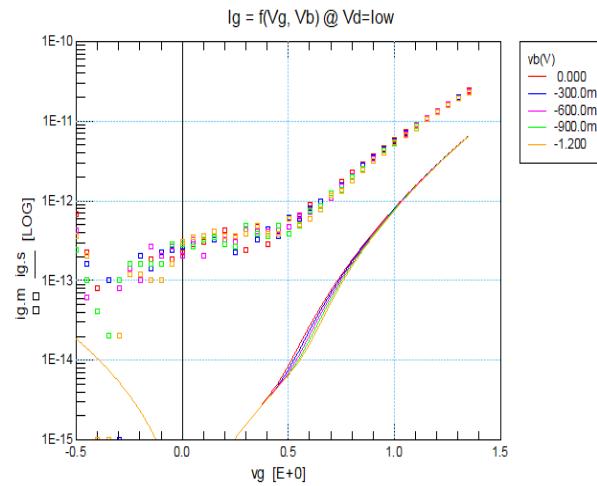
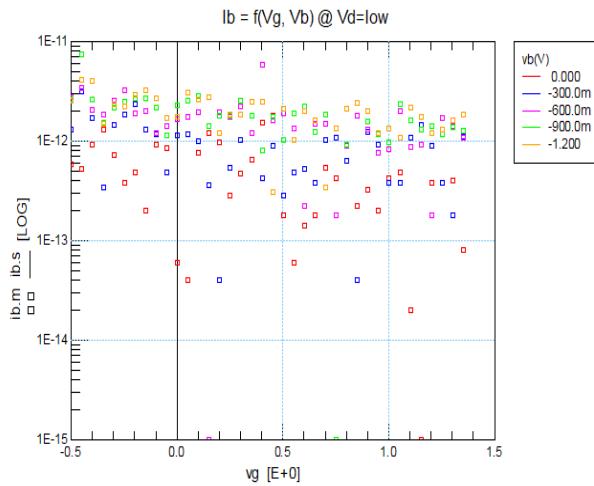


### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

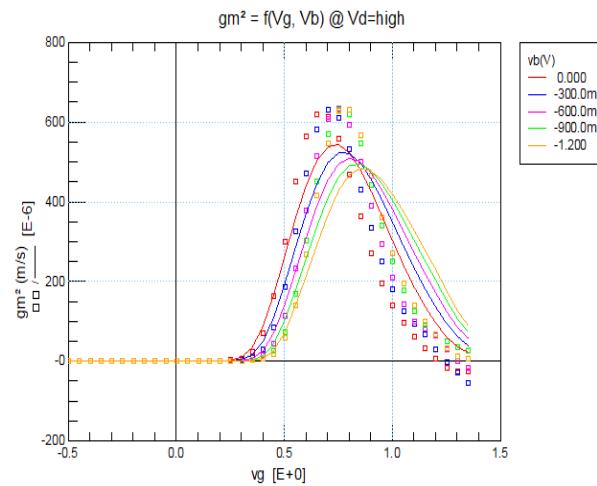
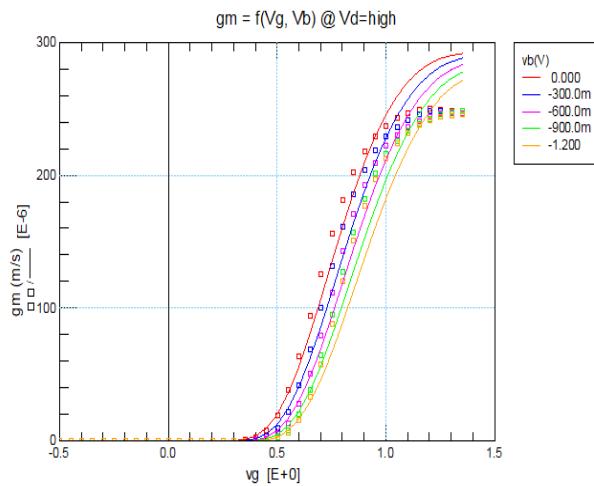
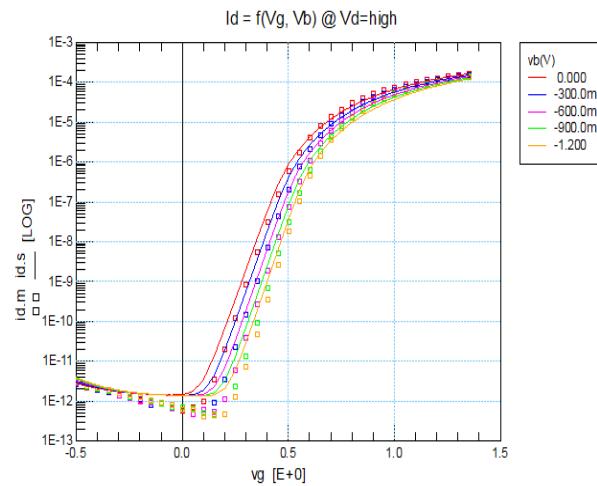
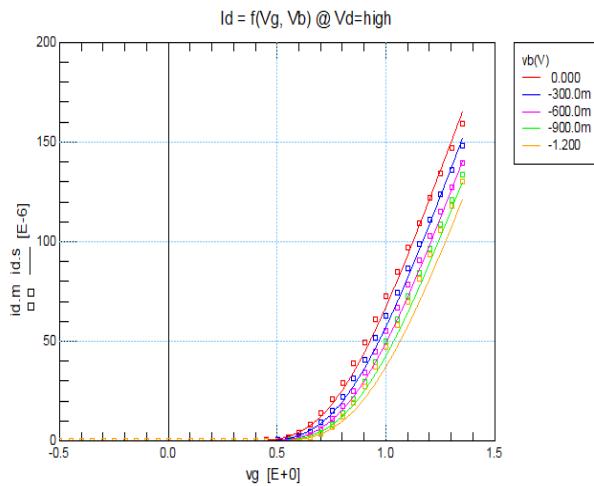


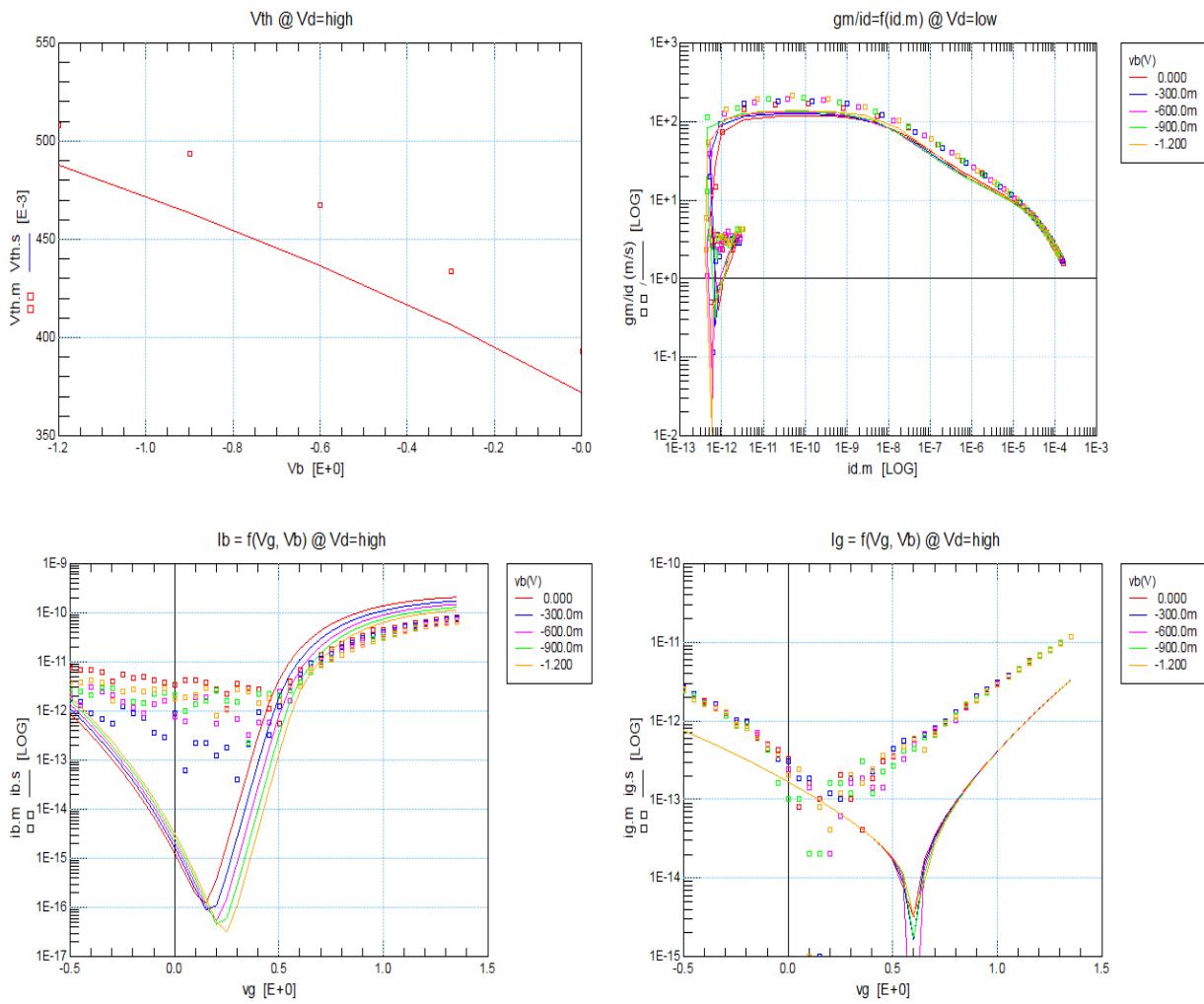
**idvg, Vd = 0.05V, T = -40°C**



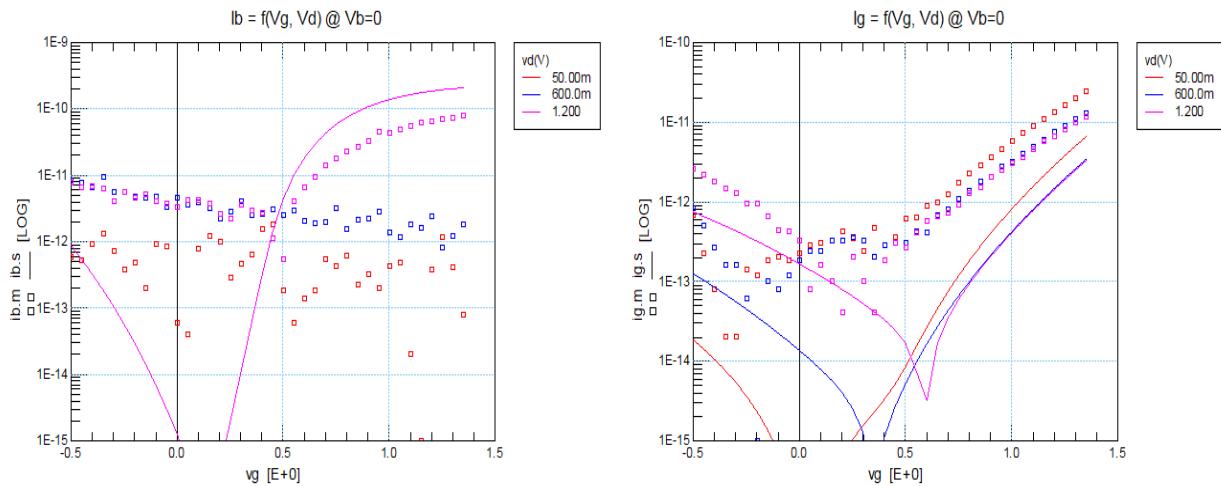


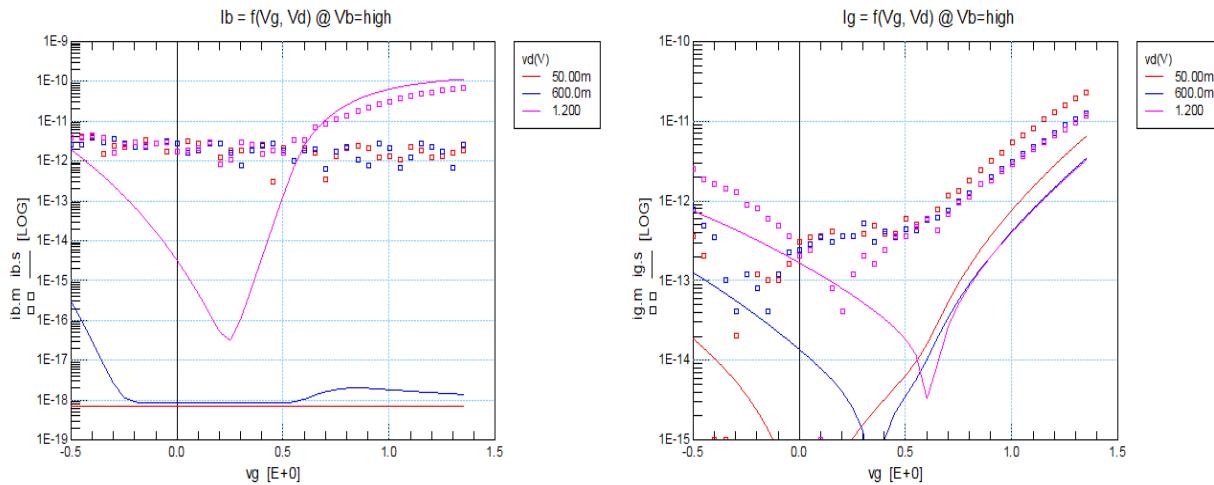
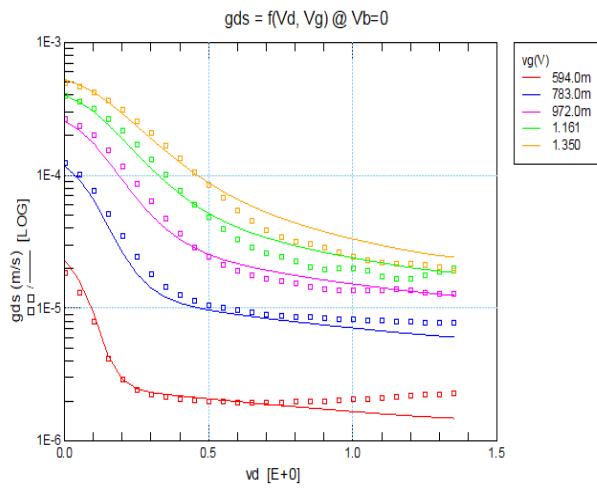
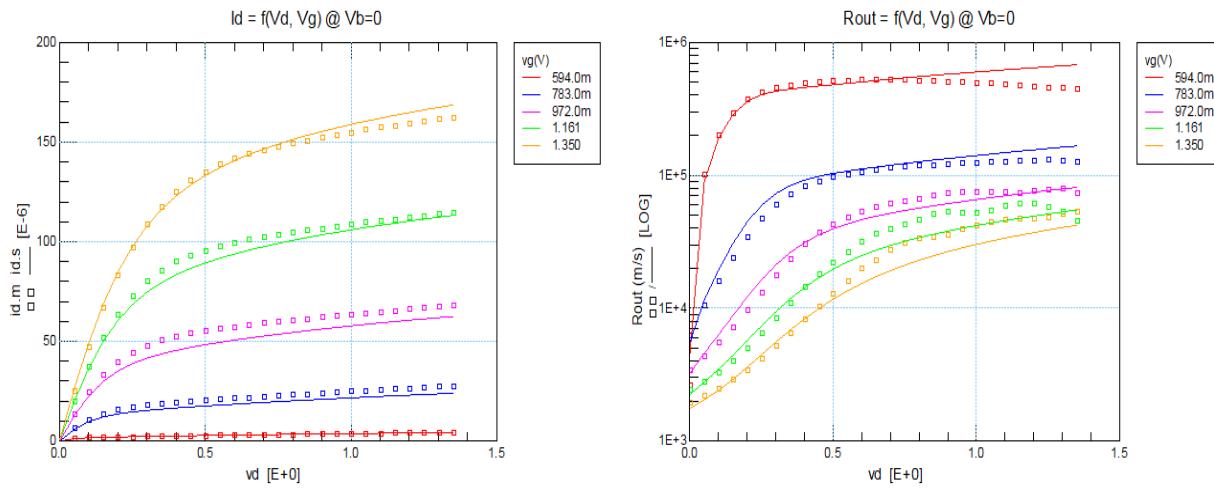
$i_d v_g, V_d = 1.2V, T = -40^\circ C$

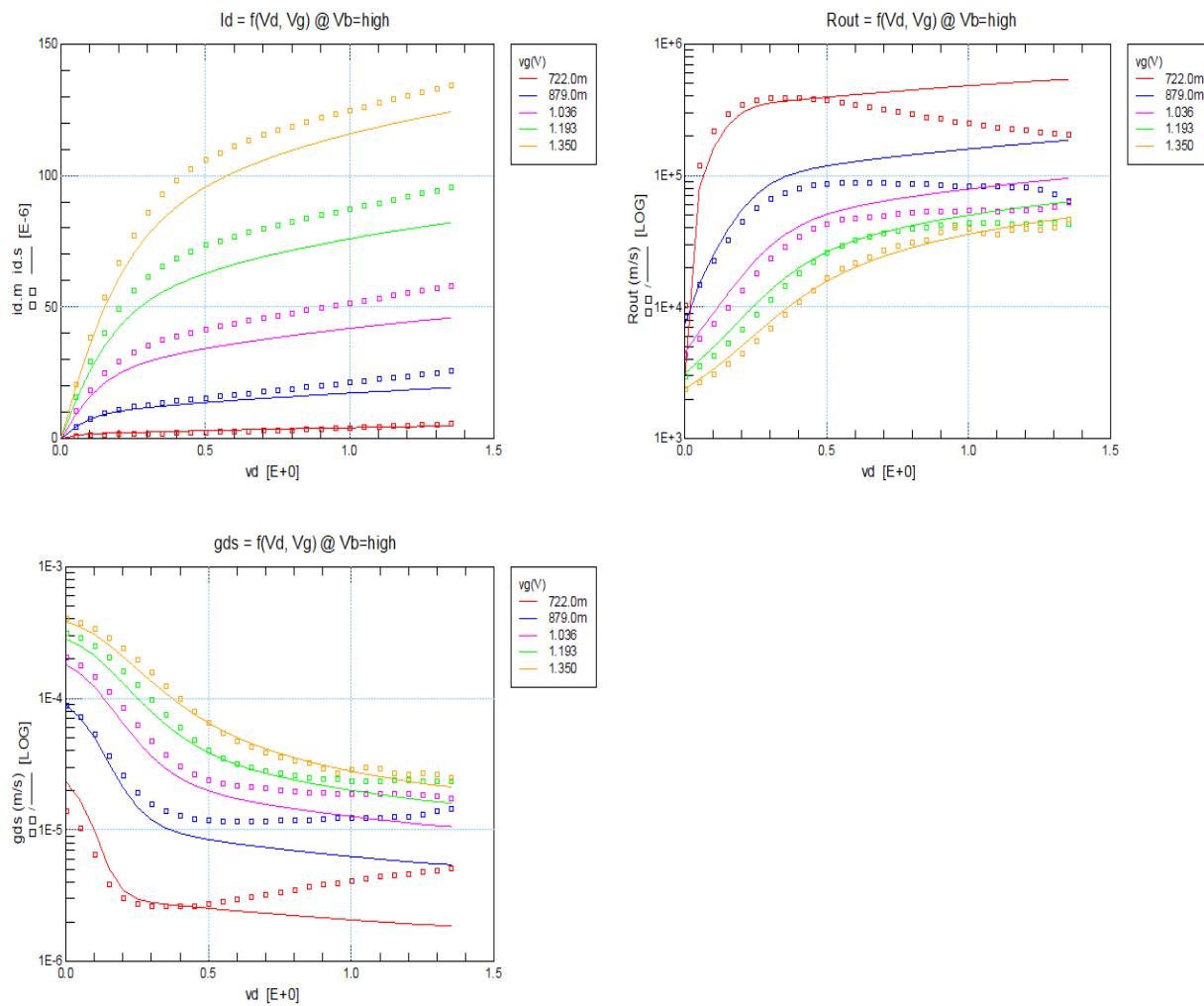
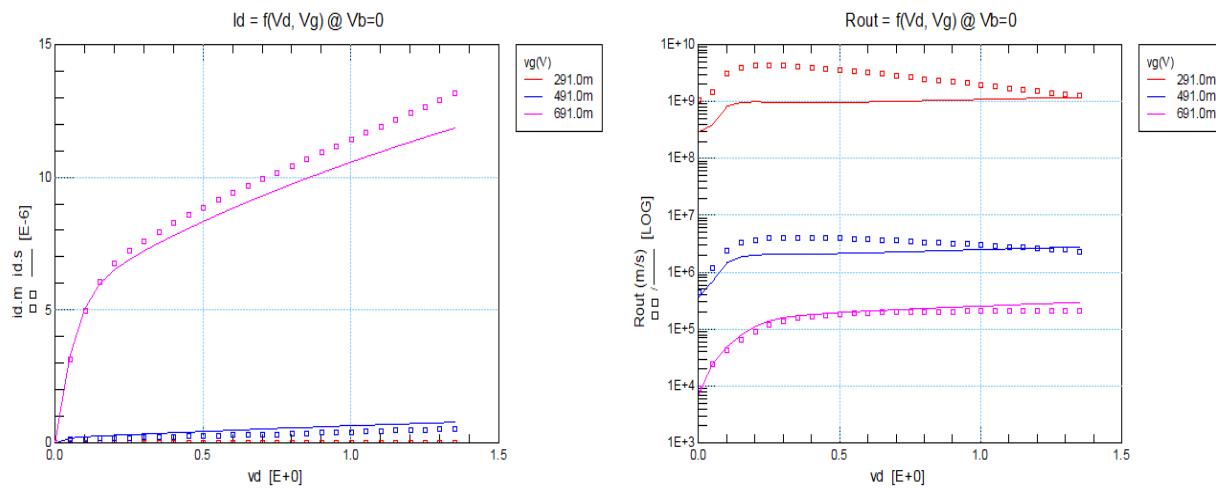


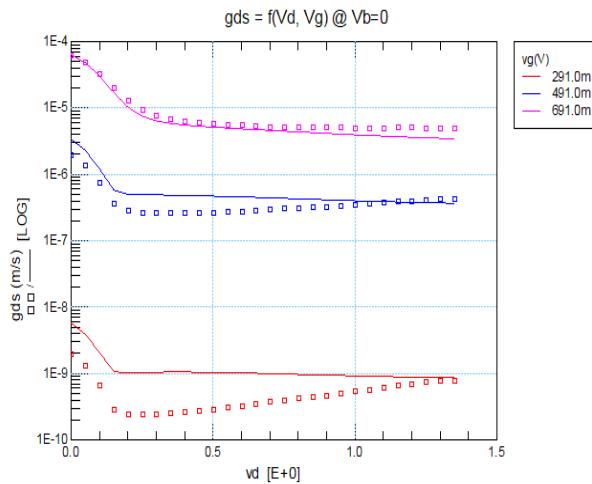


**idvg, Ib,Ig, Vb = 0V, T = -40°C**

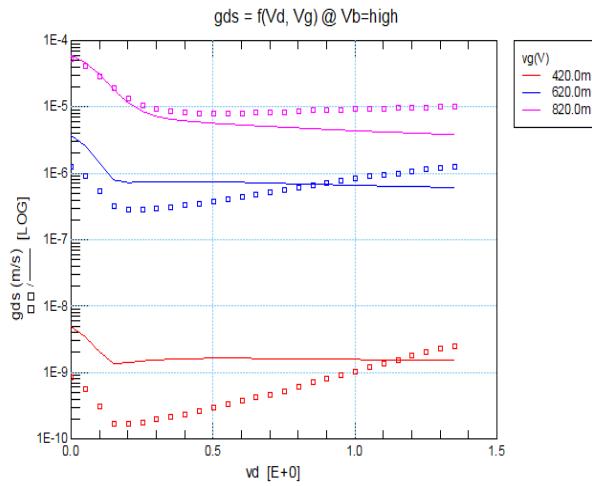
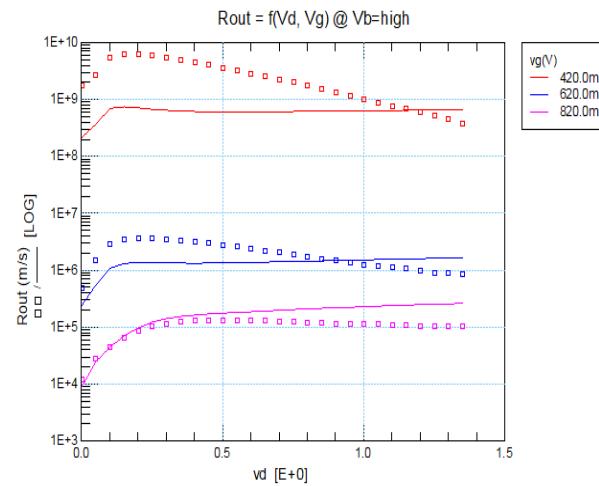
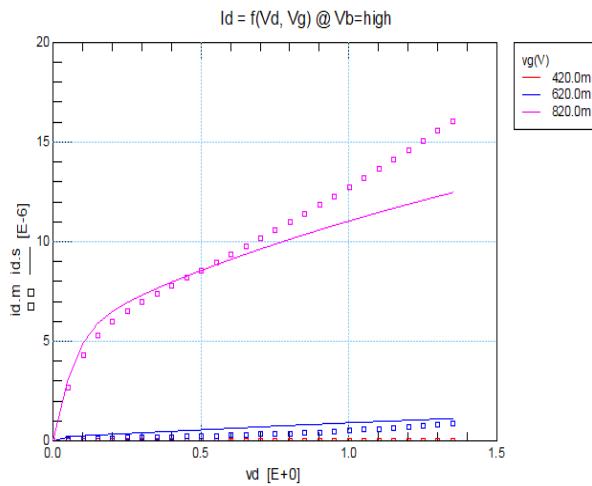


**idvg, Ib,Ig, Vb = -1.2V, T = -40°C**

**idvd, Vb = 0V, T = -40°C**


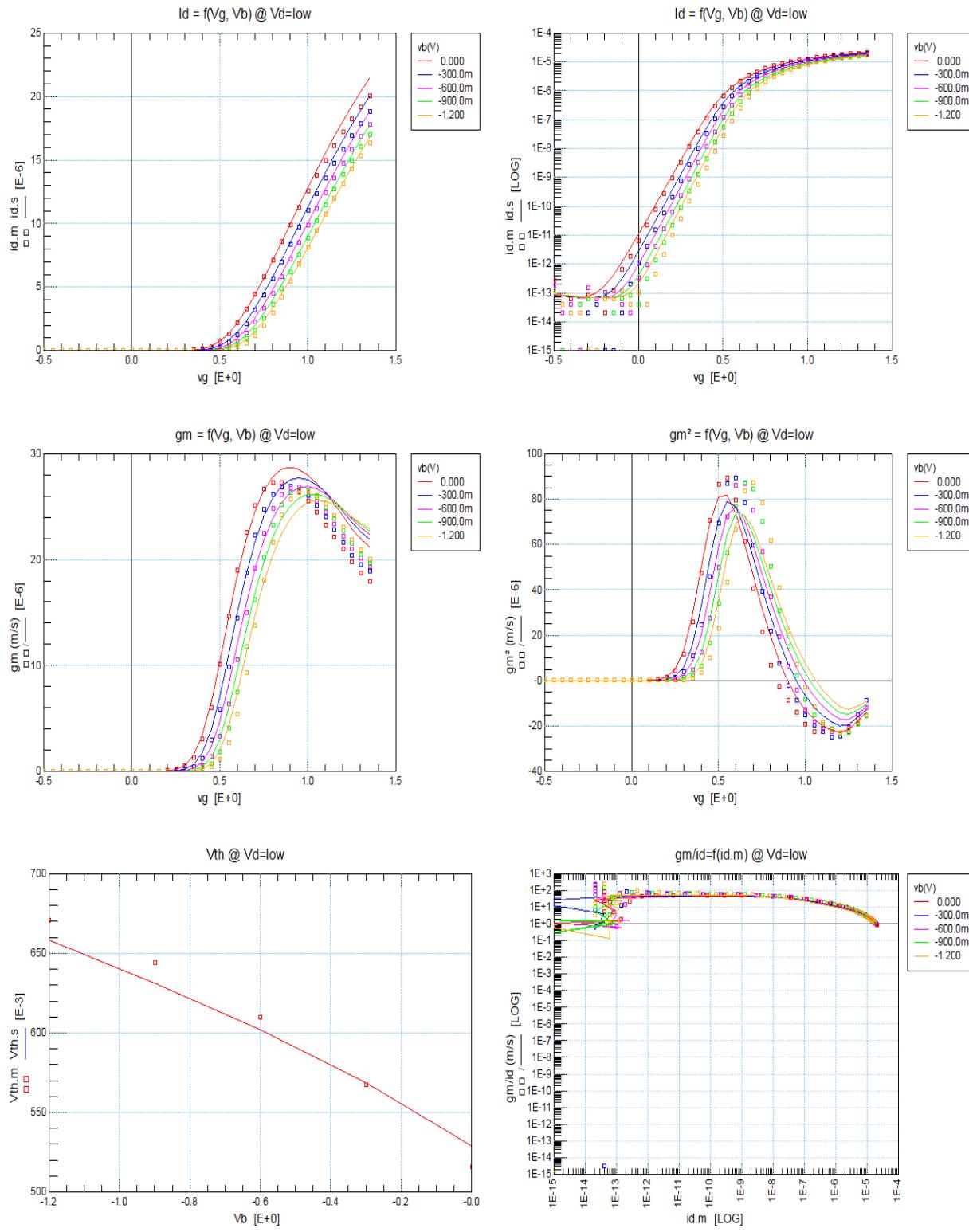
**idvd\_vbmin, Vb = -1.2V, T = -40°C****idvd\_vth, Vb = 0V, T = -40°C**

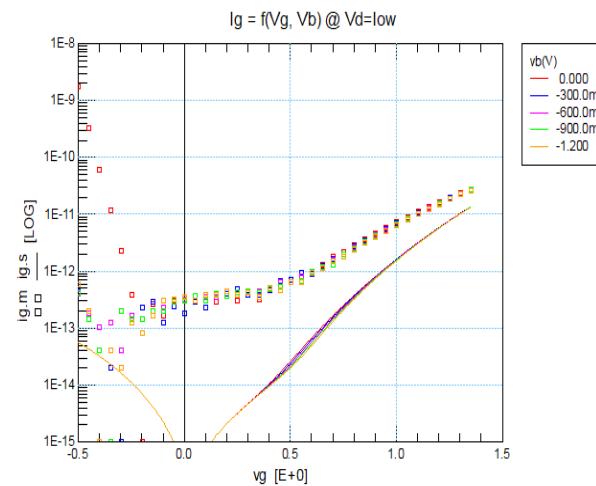
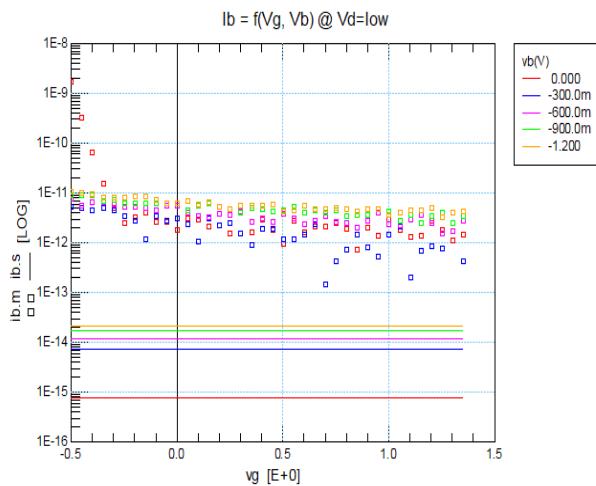


### idvd\_vth\_vbmin, Vb = -1.2V, T = -40°C

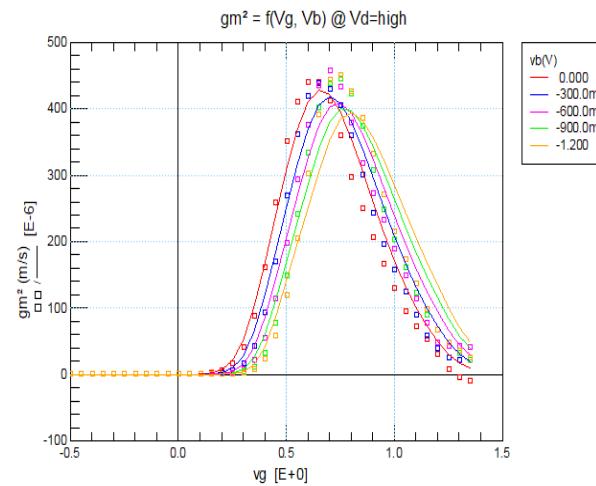
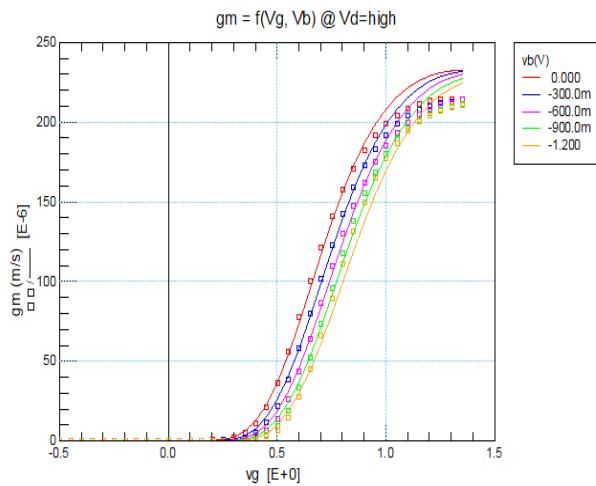
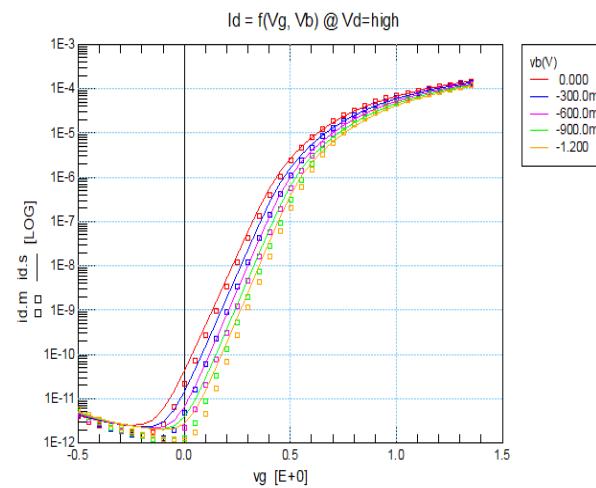
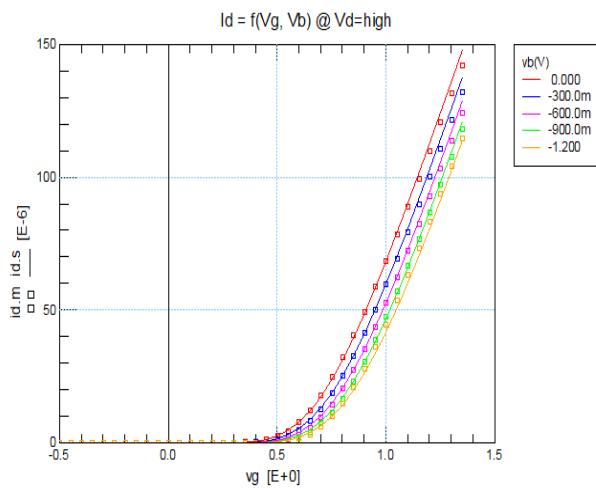


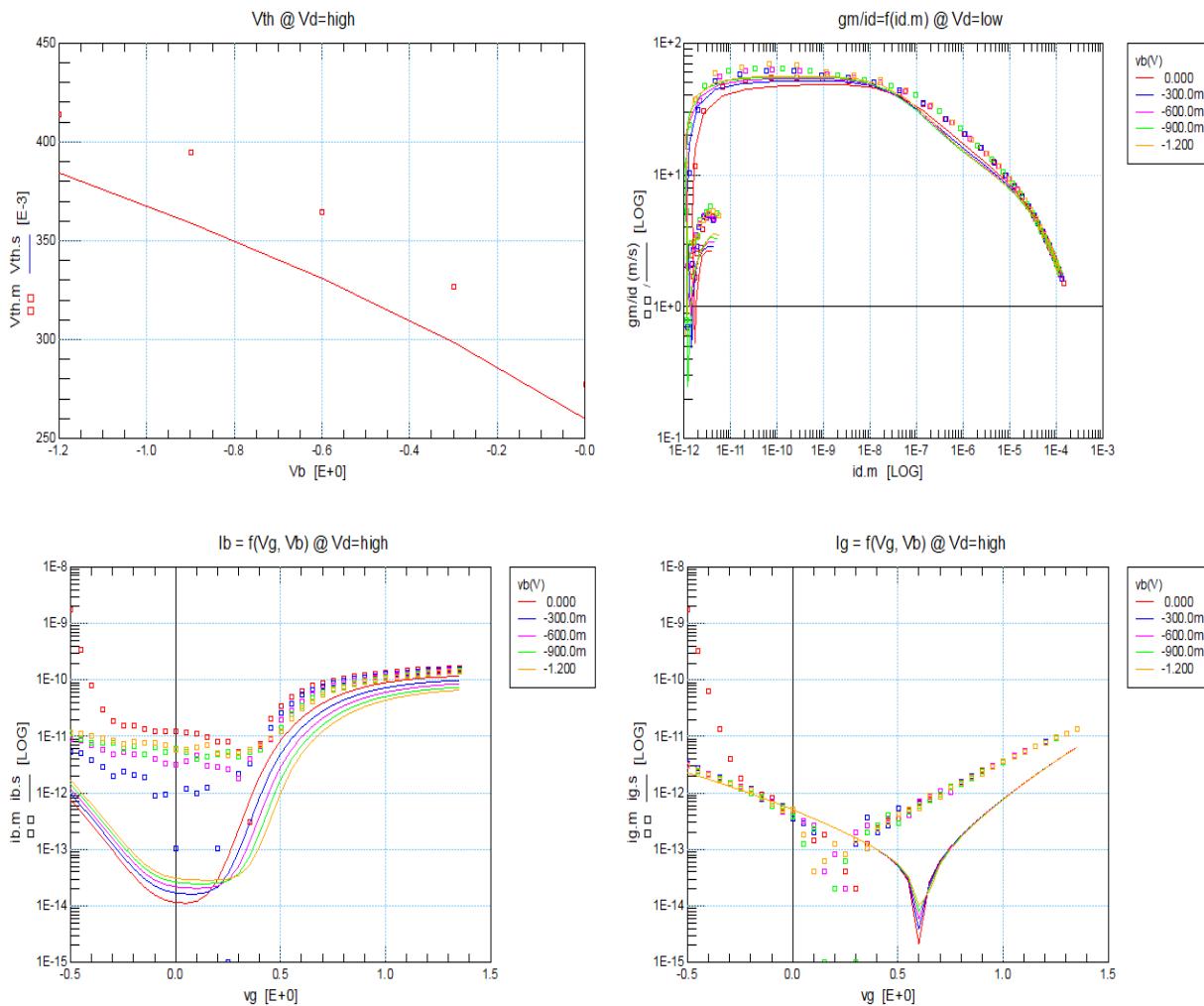
**idvg, Vd = 0.05V, T = 70°C**



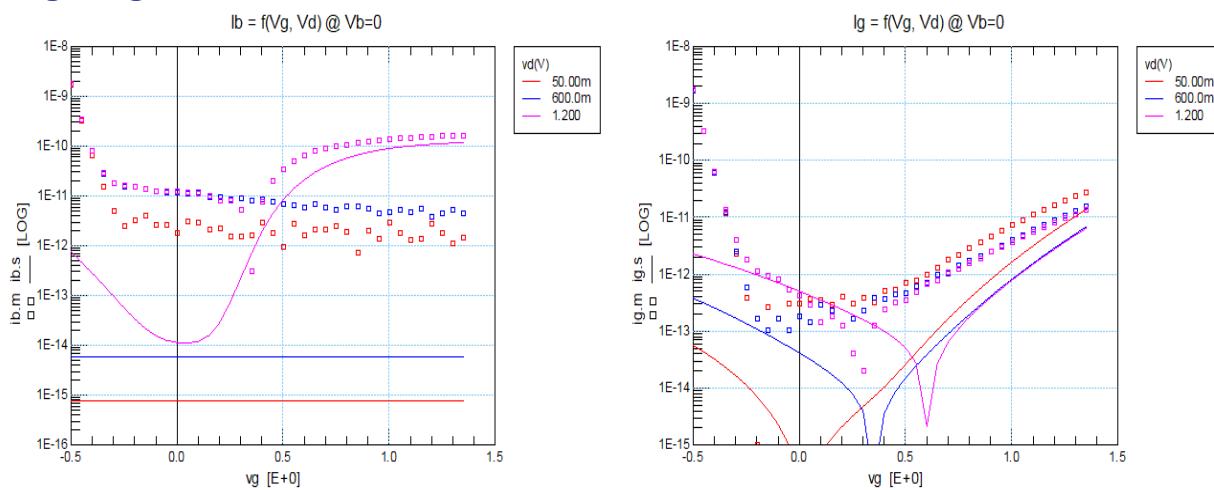


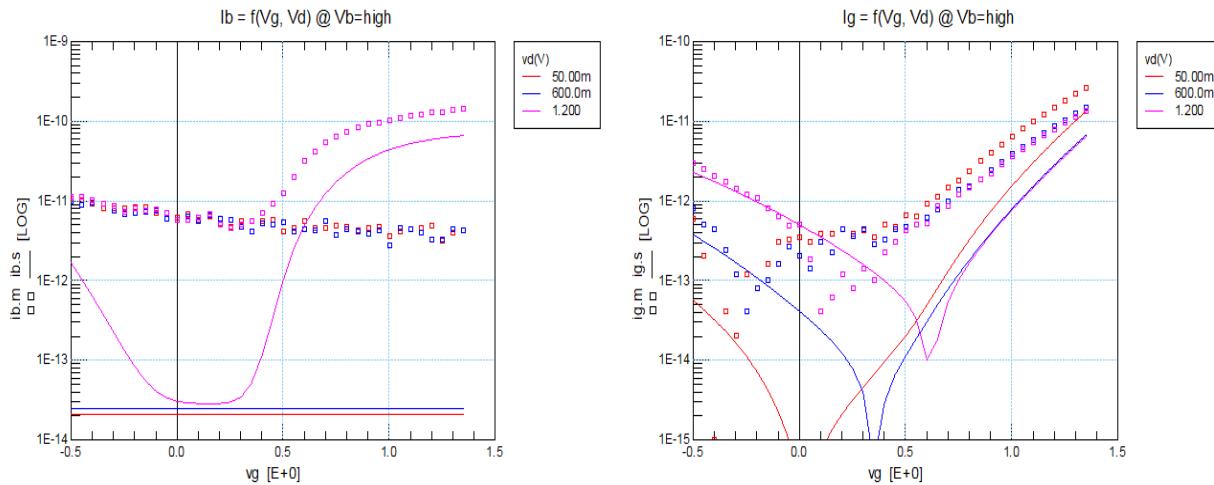
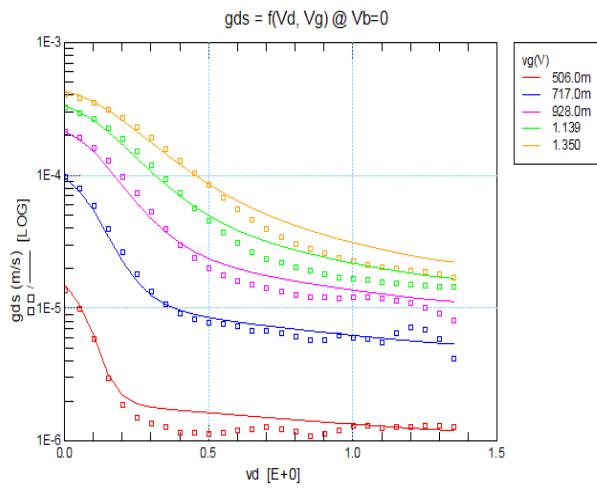
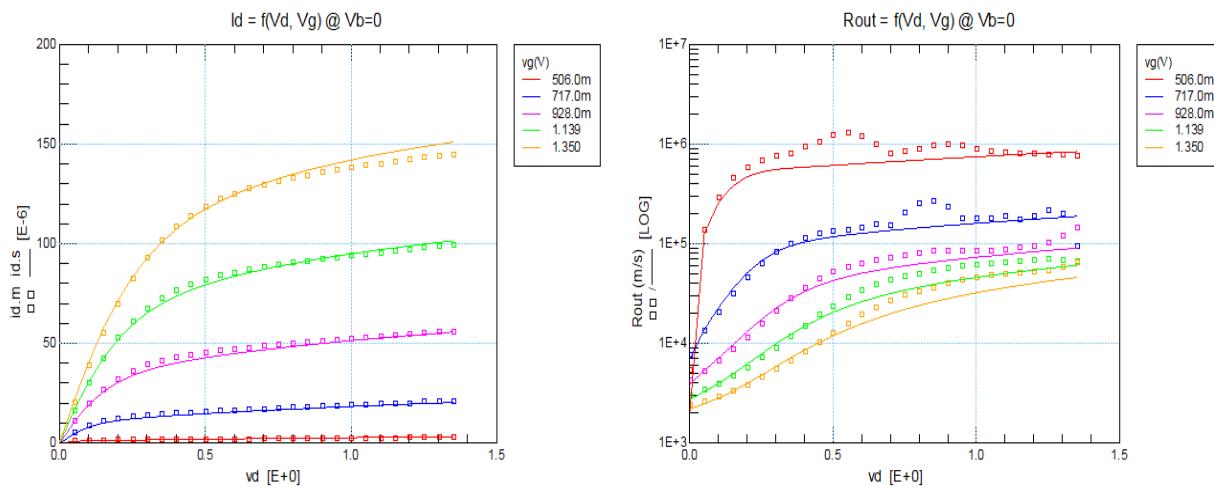
$i_{dvg}, V_d = 1.2V, T = 70^\circ C$

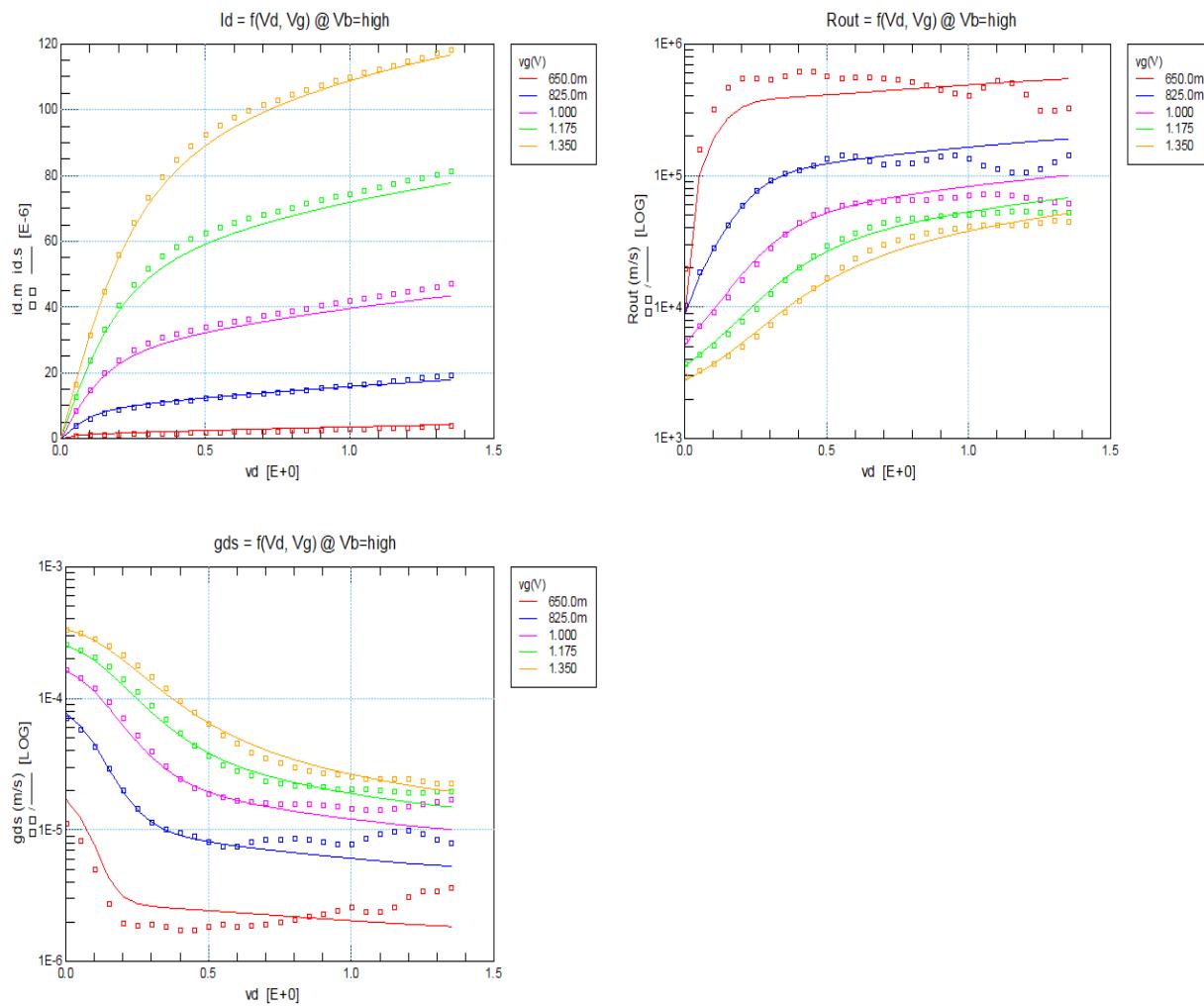
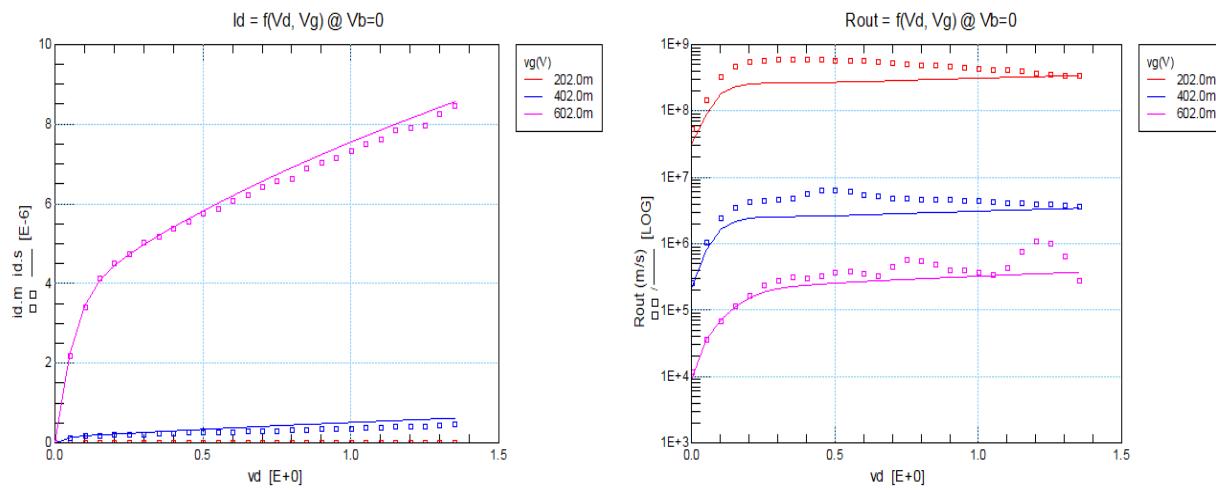


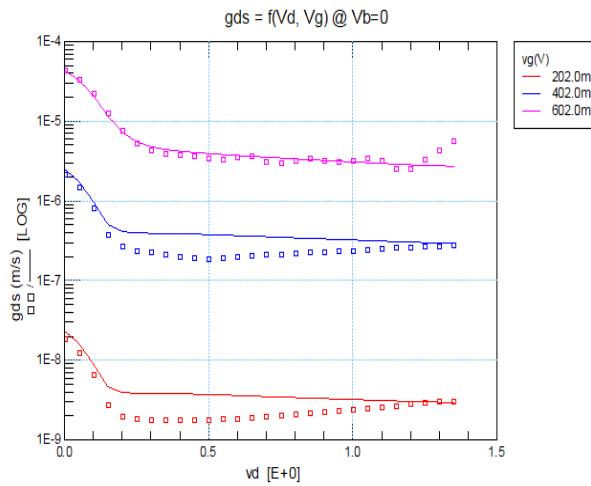


### idvg, Ib,Ig, Vb = 0V, T = 70°C

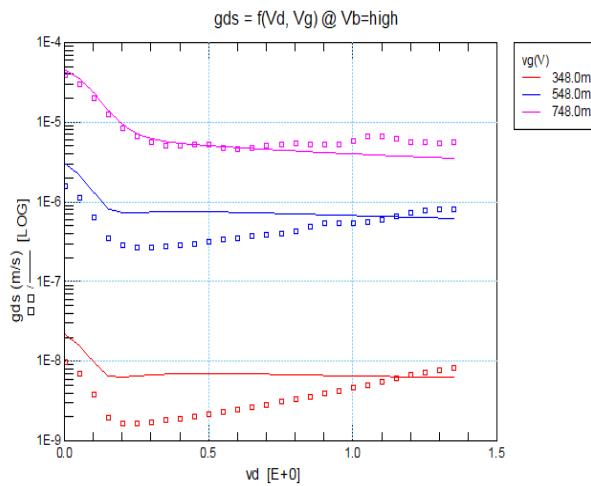
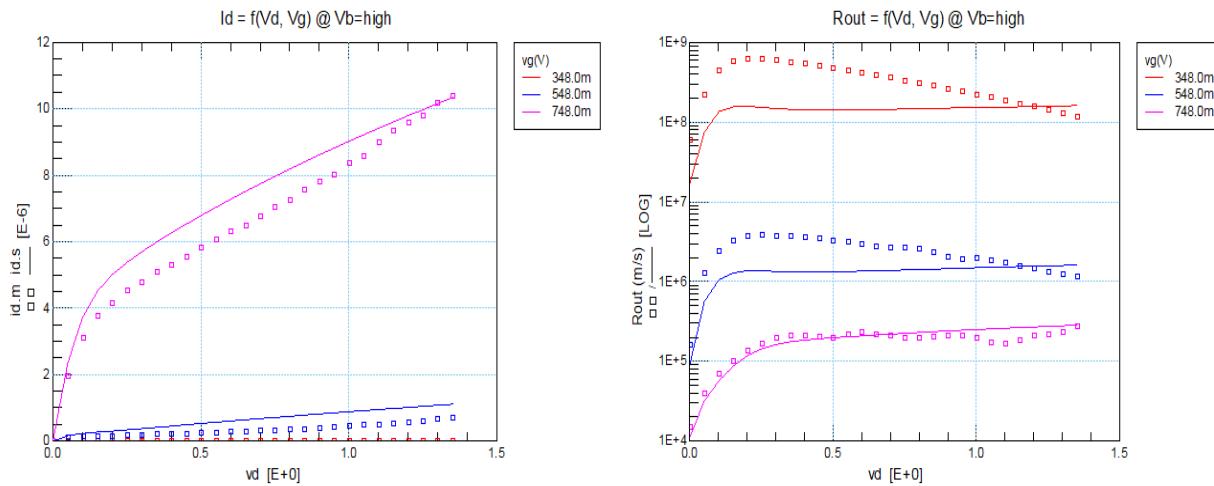


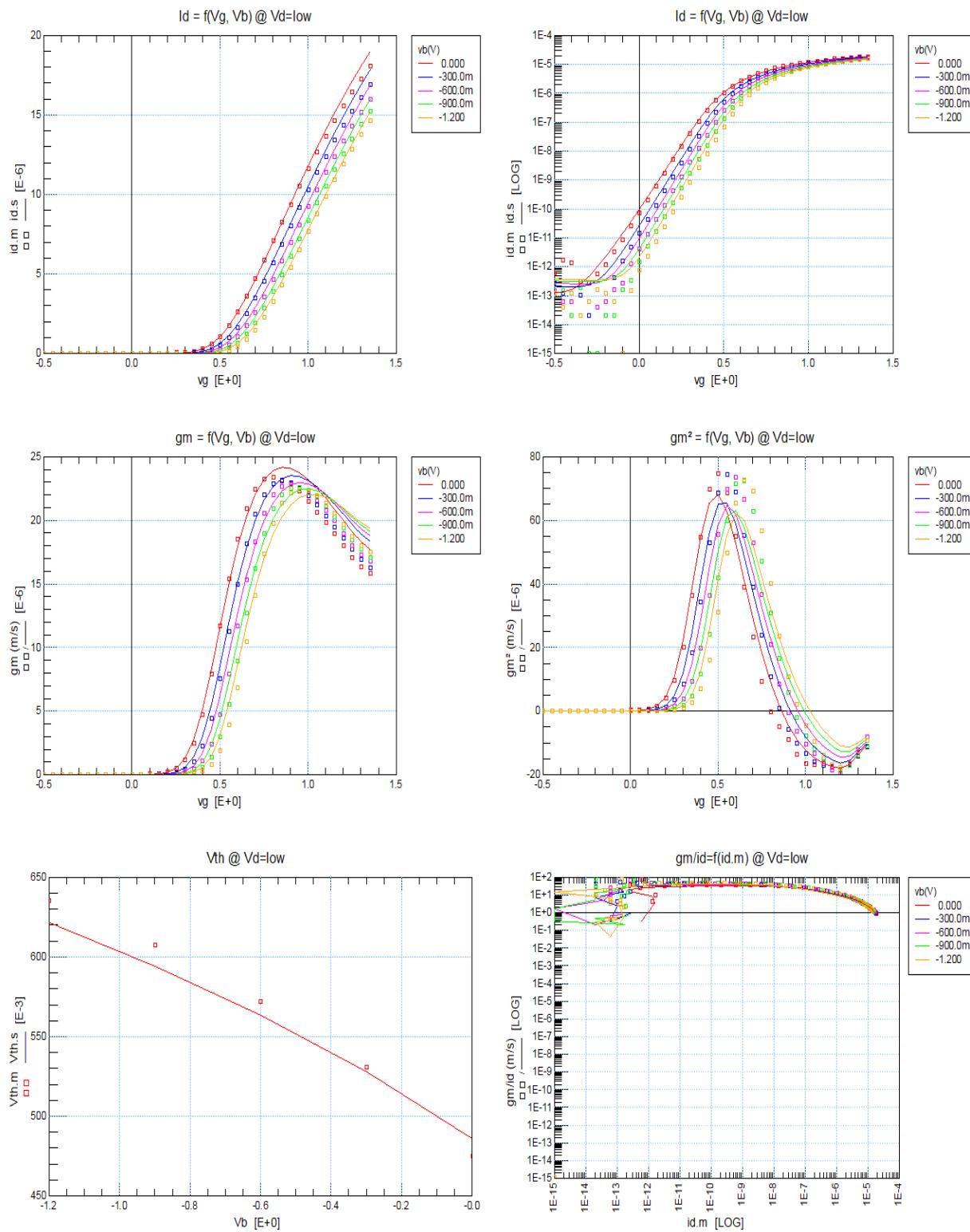
**idvg, Ib,Ig, Vb = -1.2V, T = 70°C**

**idvd, Vb = 0V, T = 70°C**


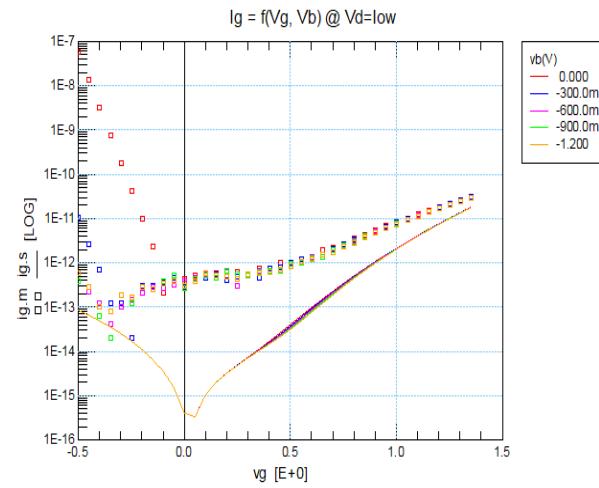
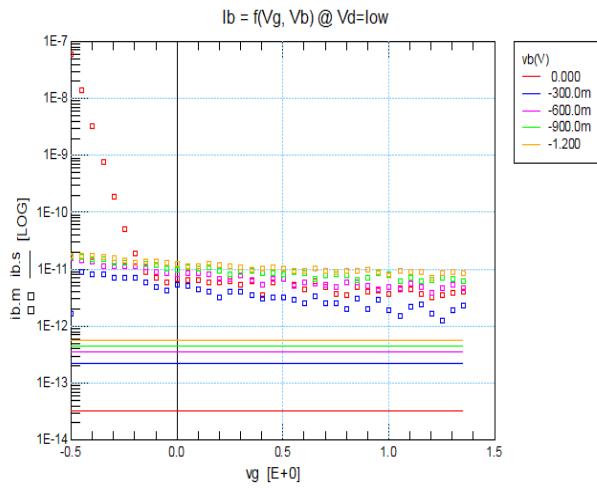
**idvd\_vbmin, Vb = -1.2V, T = 70°C****idvd\_vth, Vb = 0V, T = 70°C**



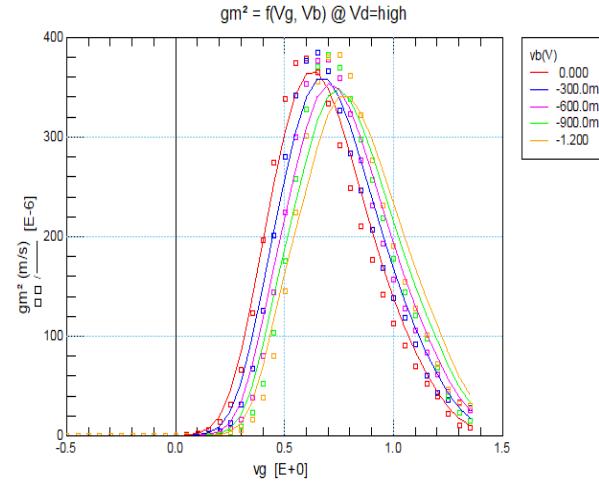
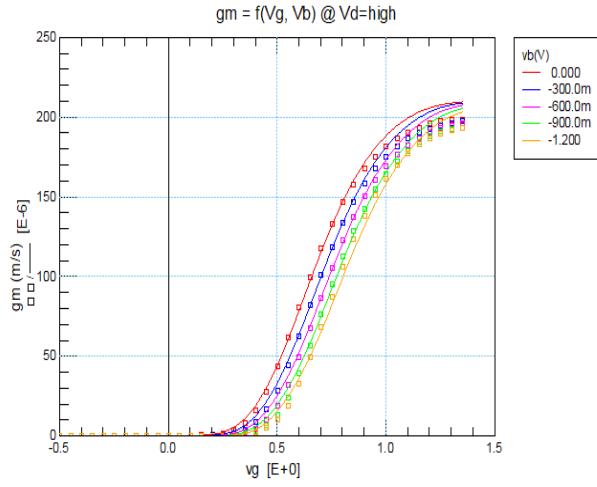
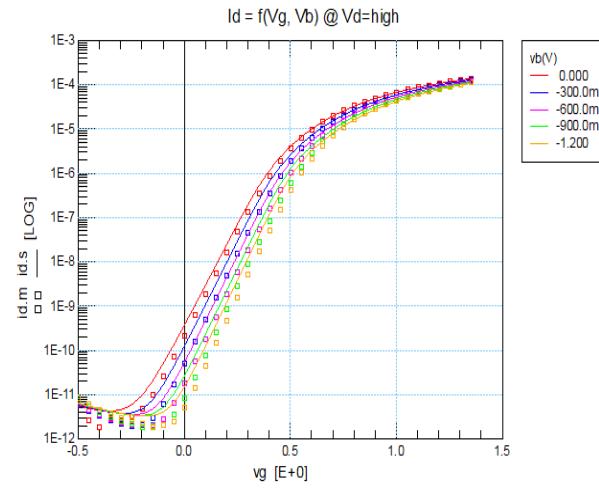
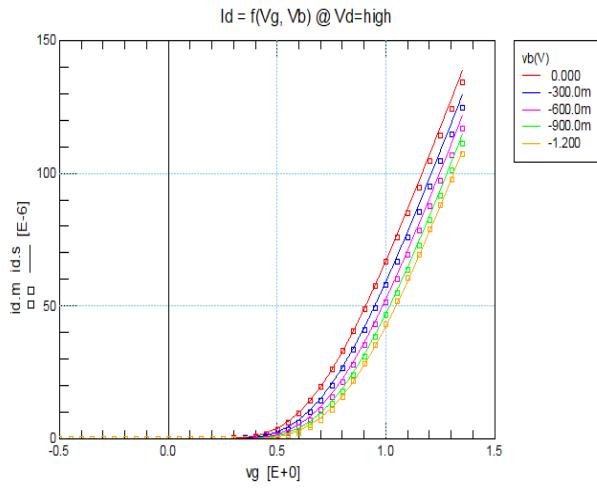
### idvd\_vth\_vbmin, Vb = -1.2V, T = 70°C

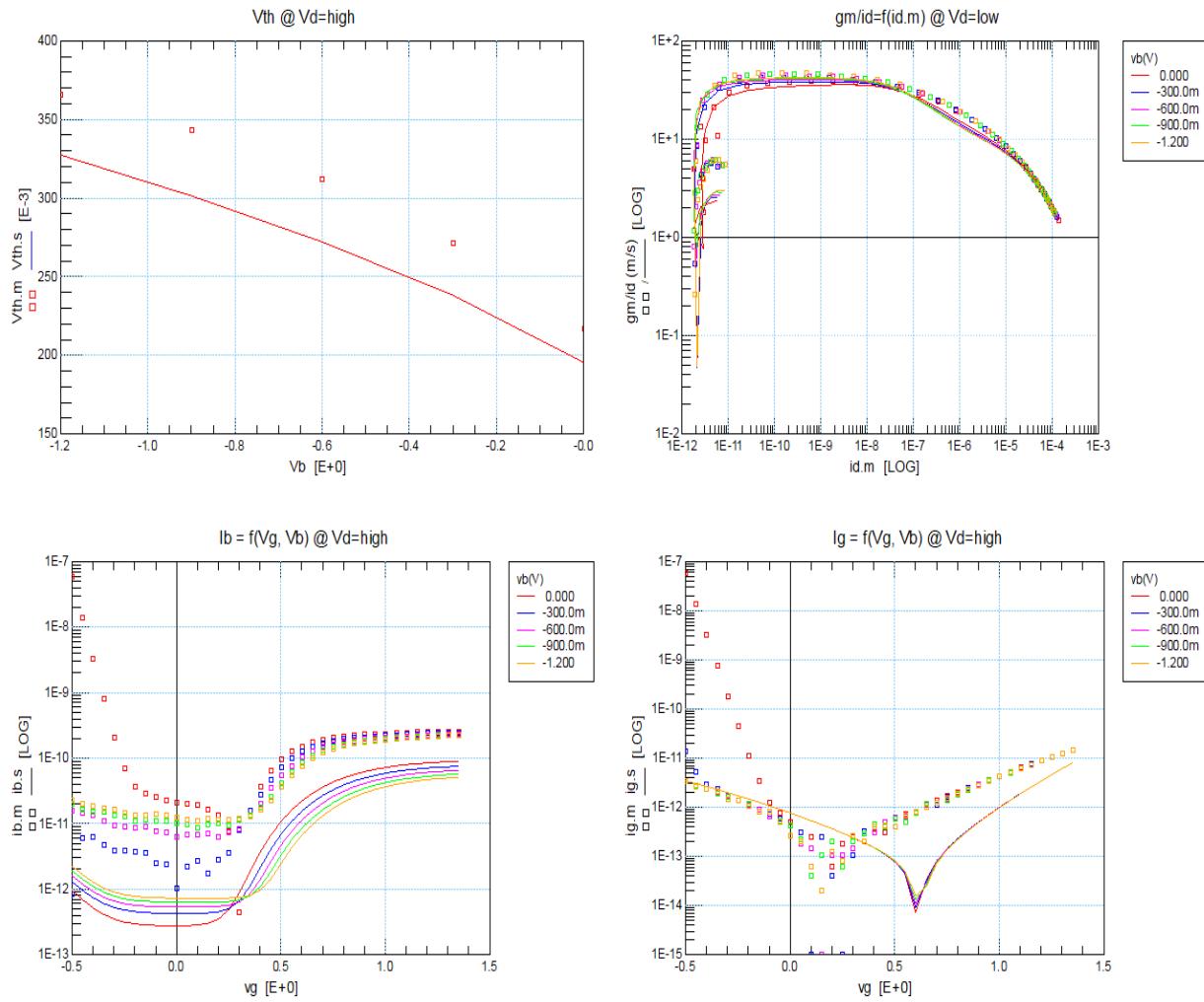


**idvg, Vd = 0.05V, T = 125°C**


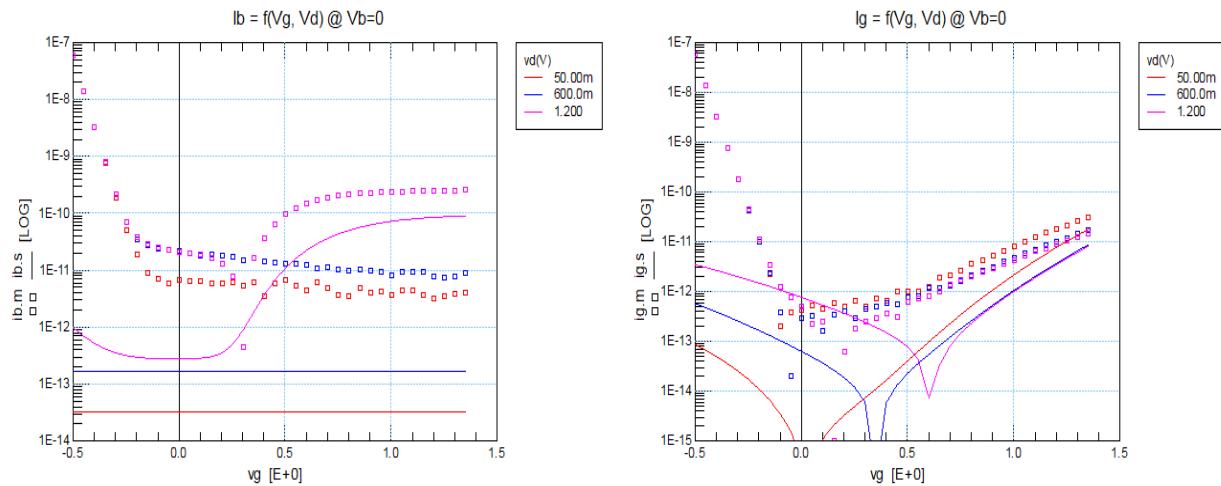


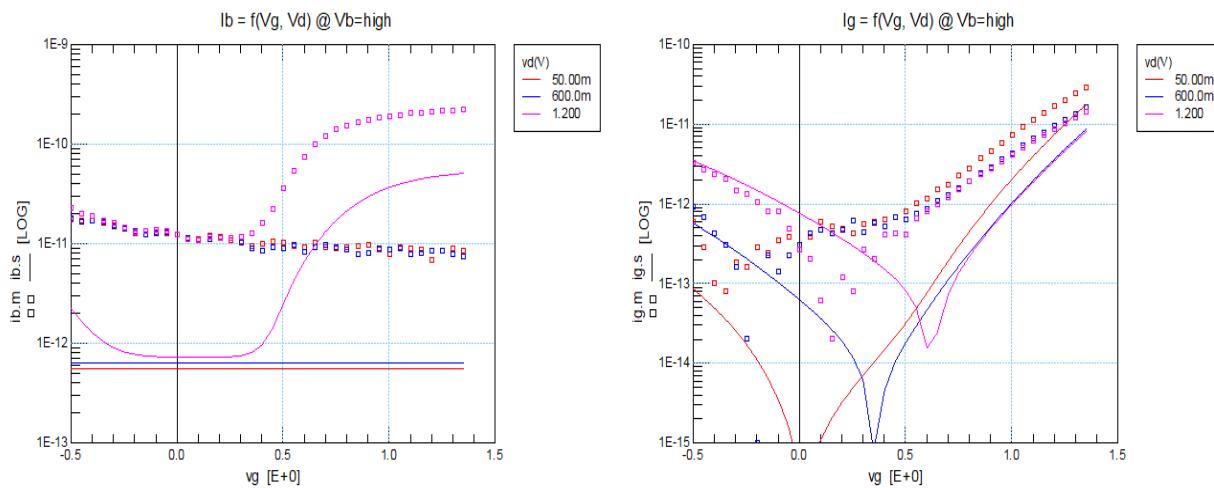
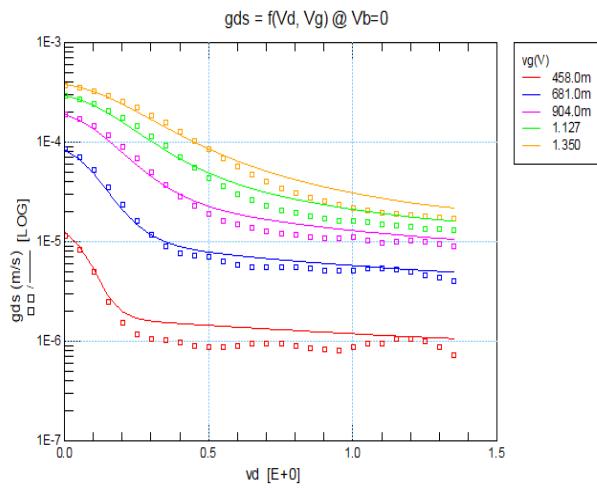
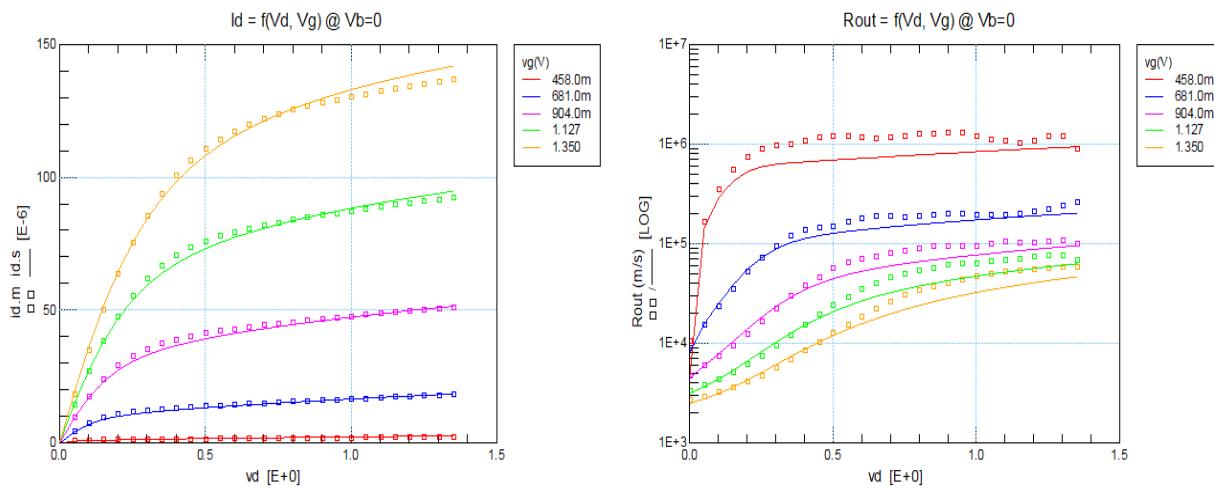
$i_{dvg}, V_d = 1.2V, T = 125^\circ C$

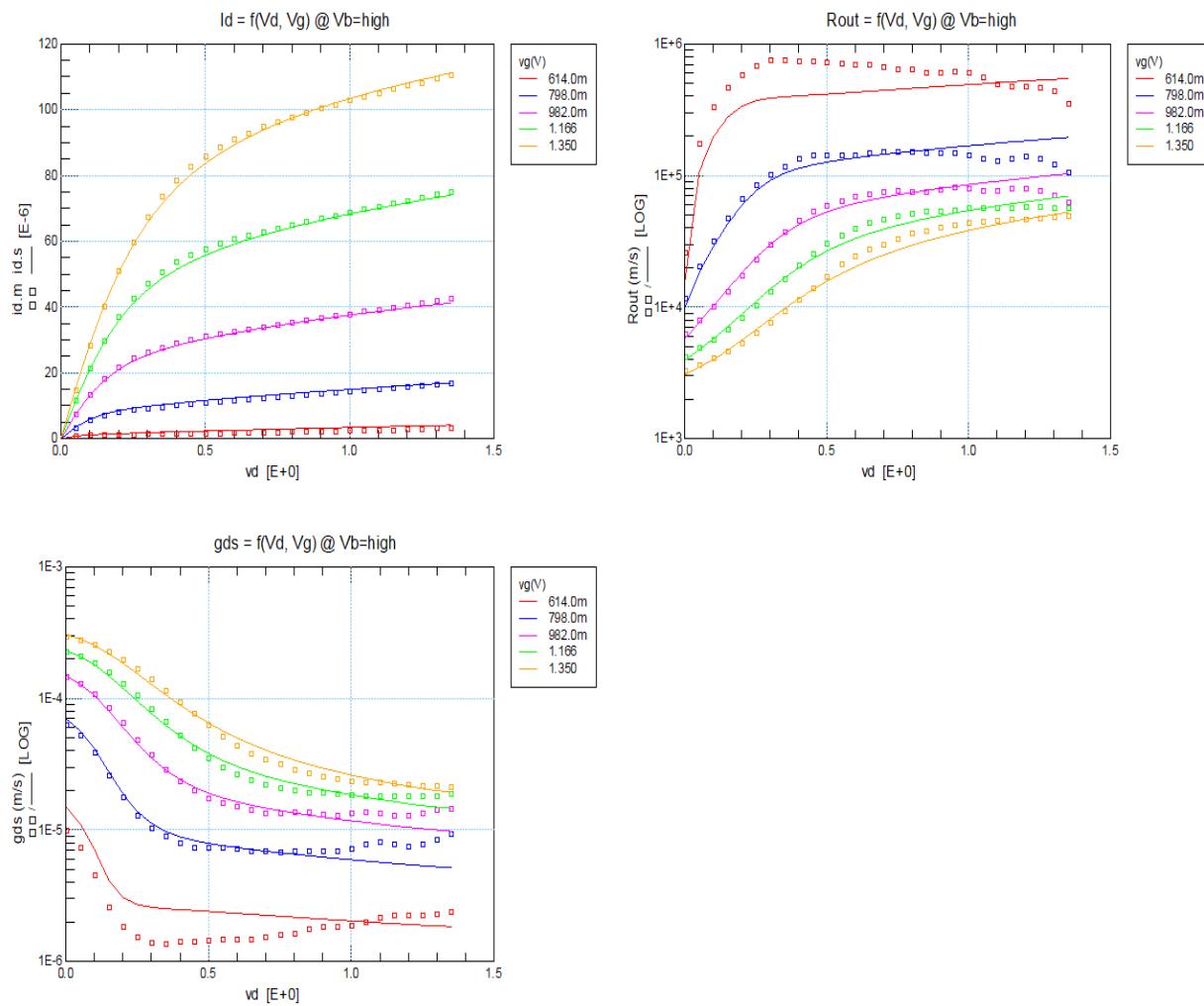
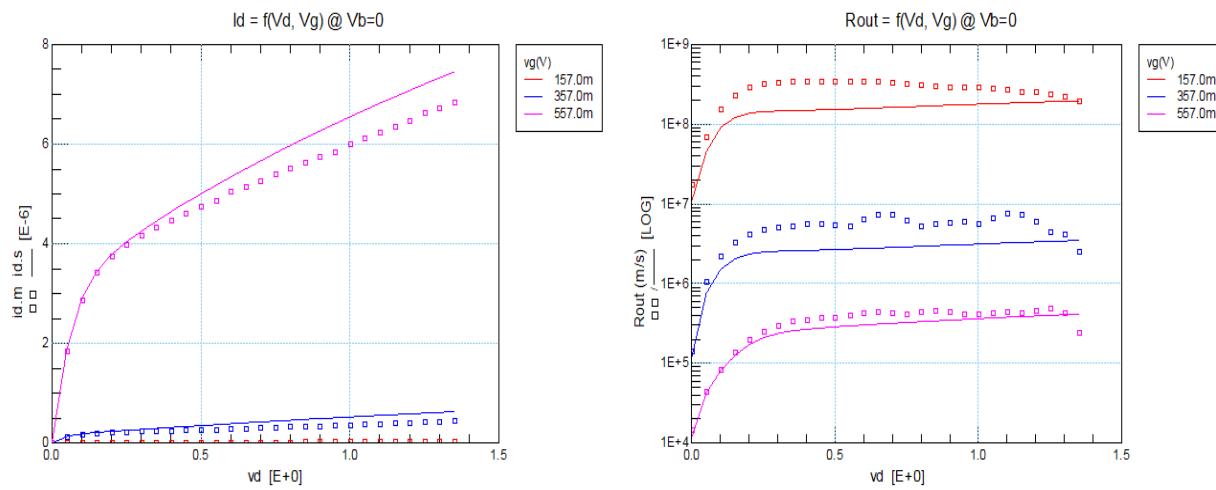


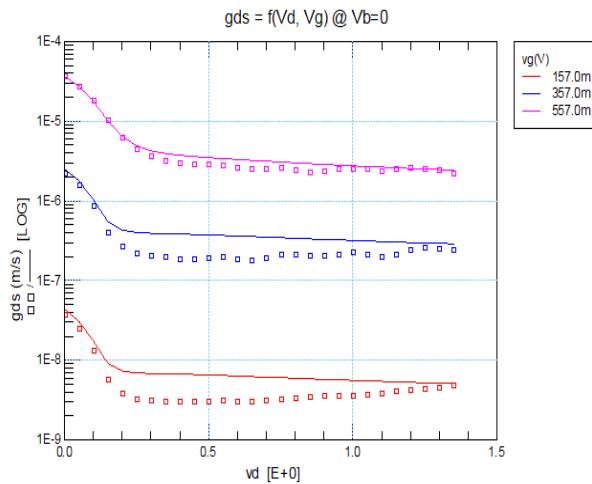


### $id_{vg}, I_b, I_g, V_b = 0V, T = 125^\circ C$

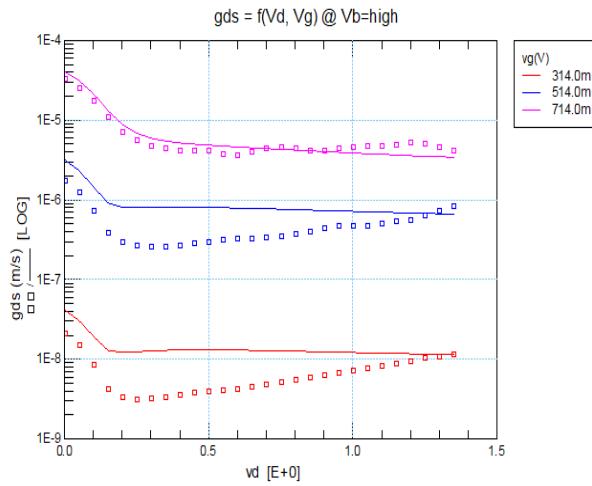
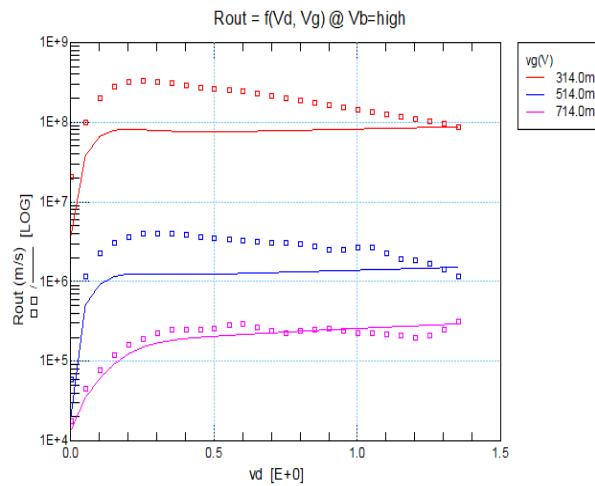
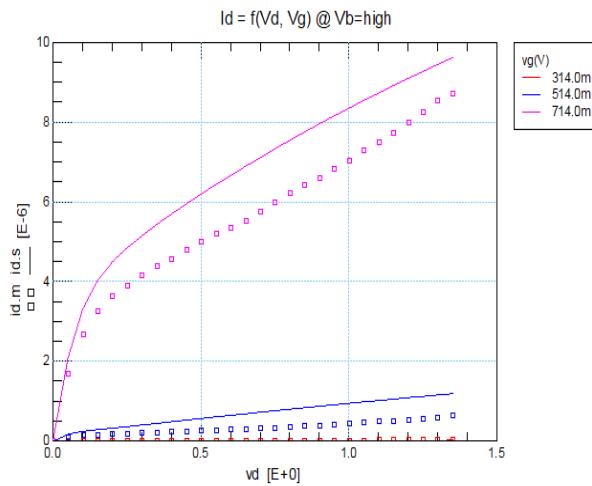


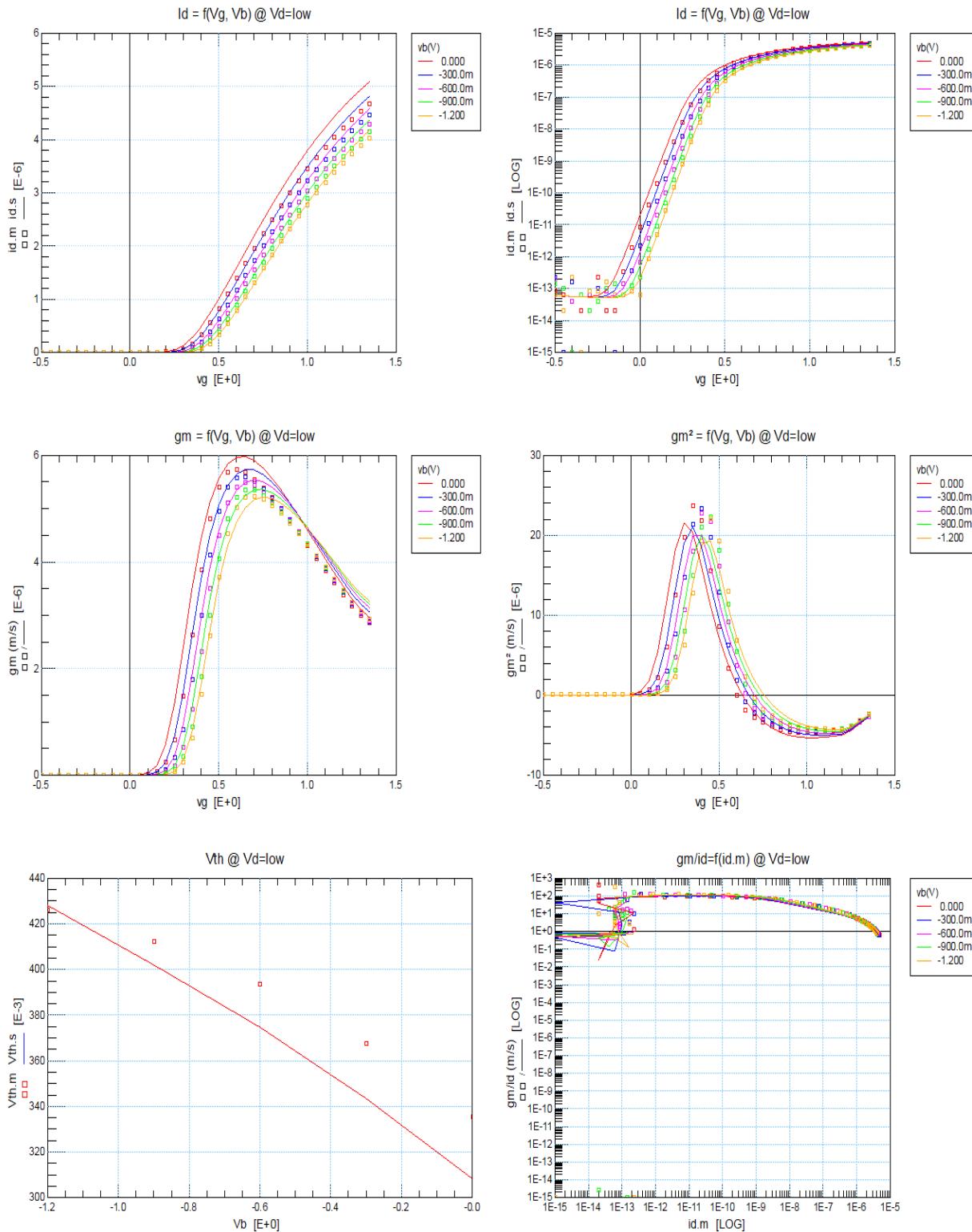
**idvg, Ib,Ig, Vb = -1.2V, T = 125°C**

**idvd, Vb = 0V, T = 125°C**


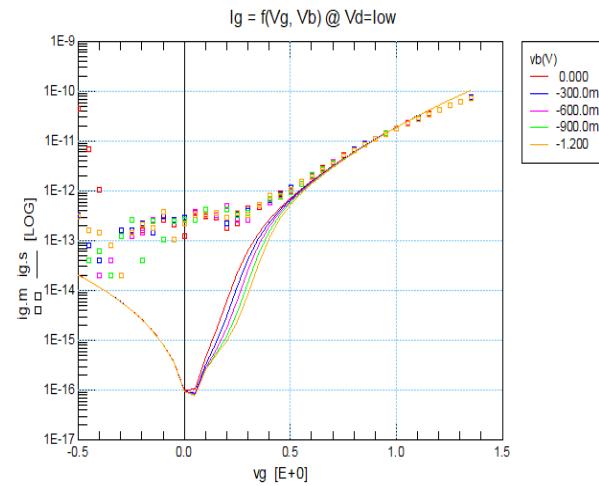
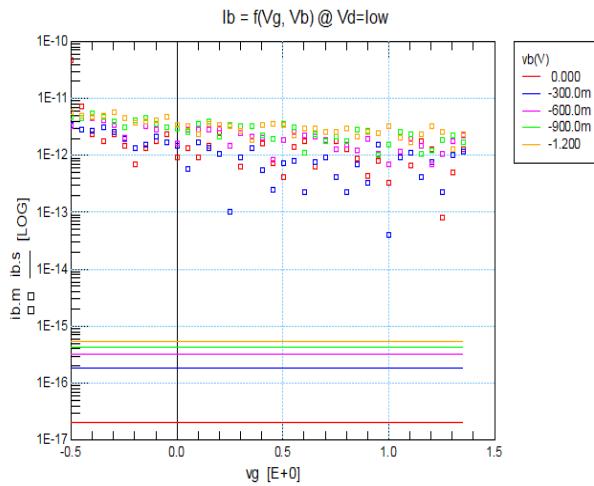
**idvd\_vbmin, Vb = -1.2V, T = 125°C**

**idvd\_vth, Vb = 0V, T = 125°C**




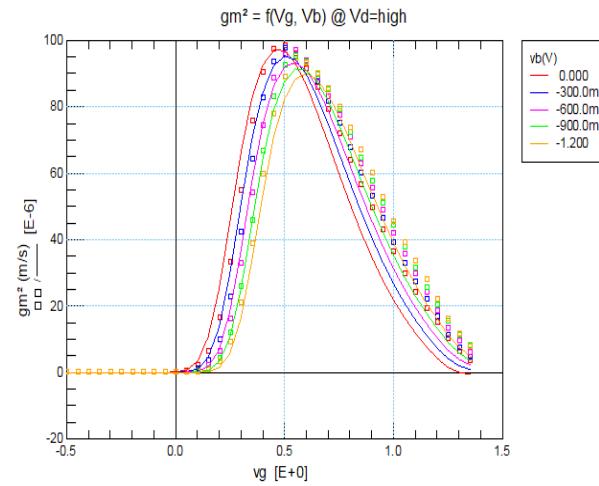
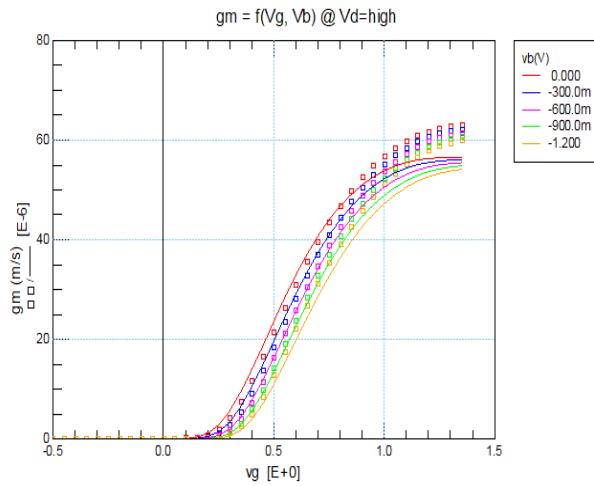
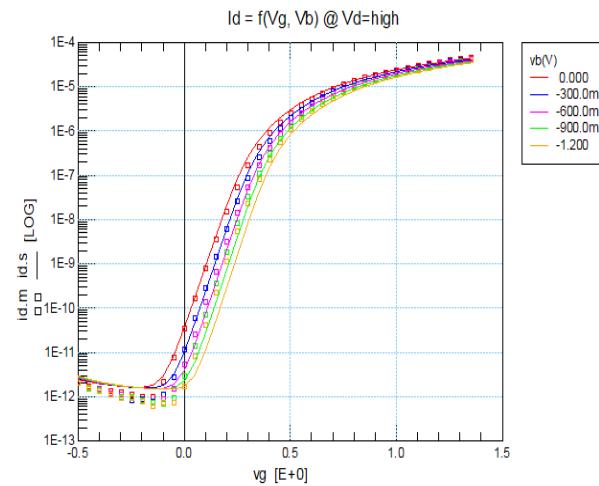
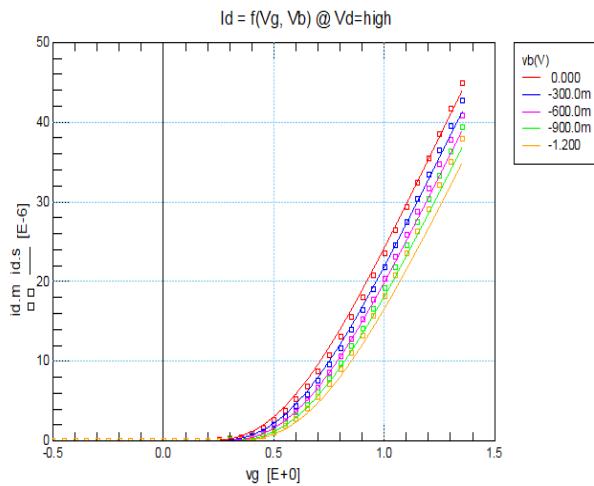
### idvd\_vth\_vbmin, Vb = -1.2V, T = 125°C

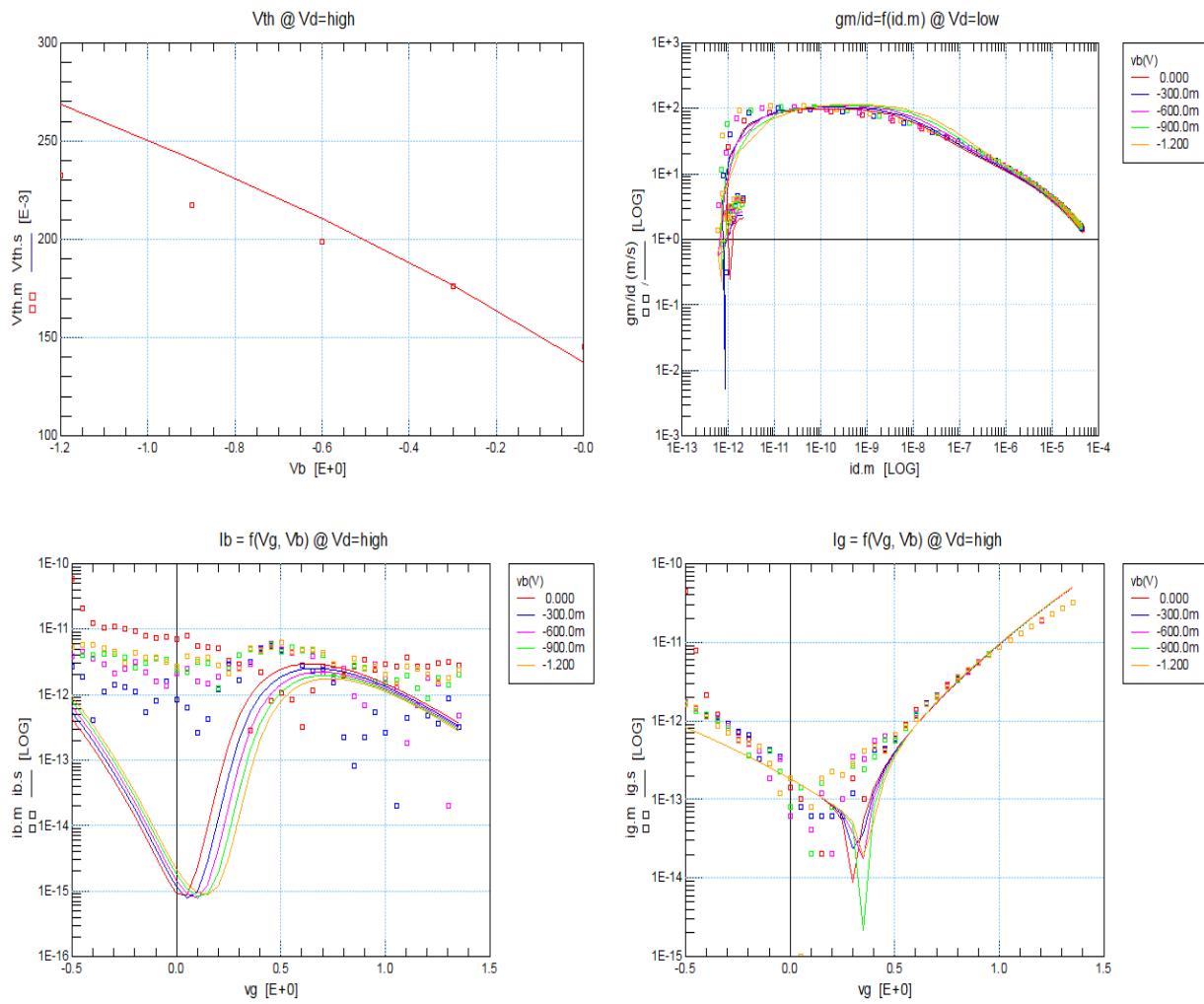


**4.21 W0u15\_L0u5\_S547\_2****idvg, Vd = 0.05V, T = 27°C**

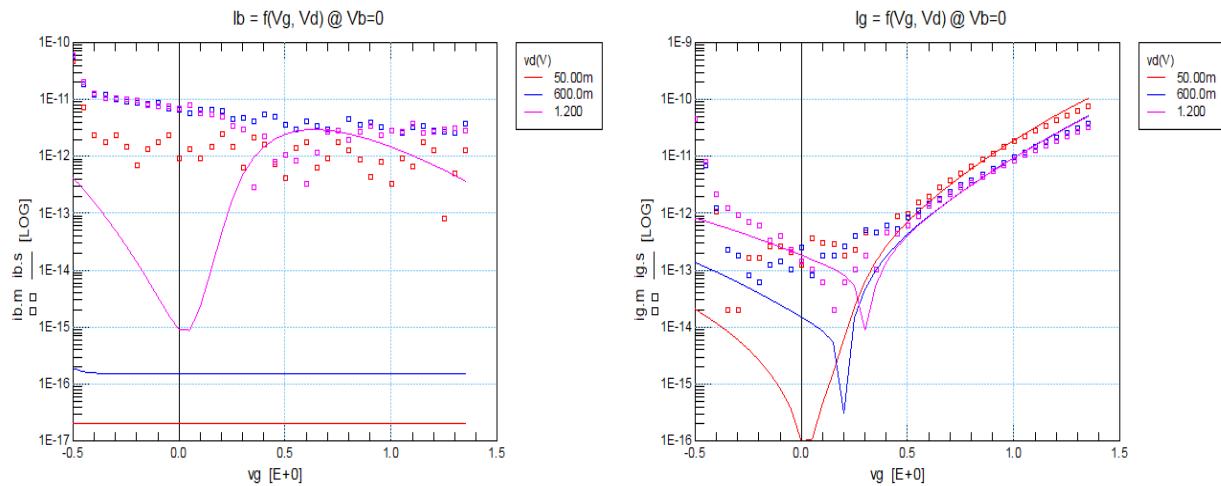


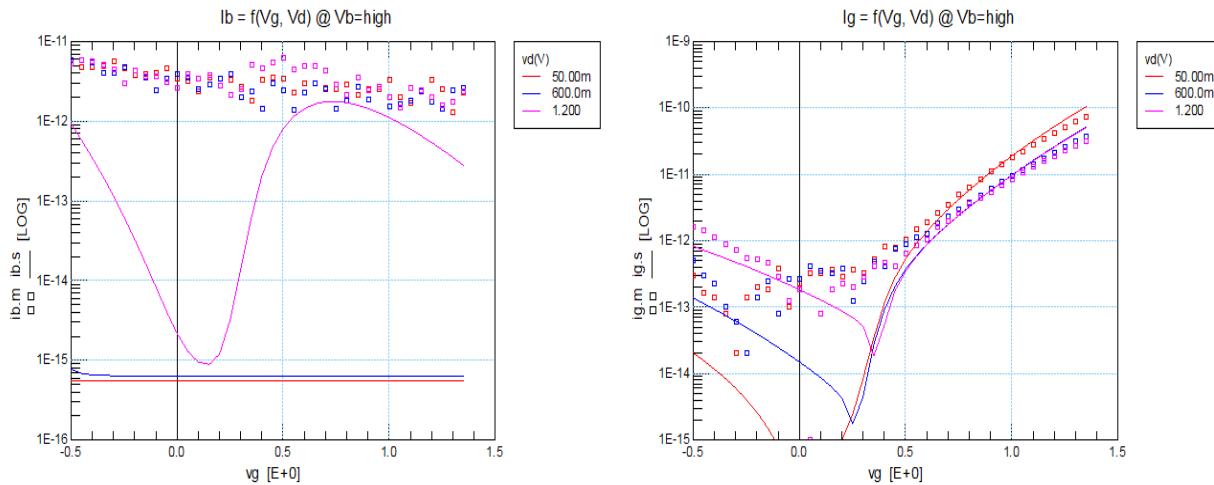
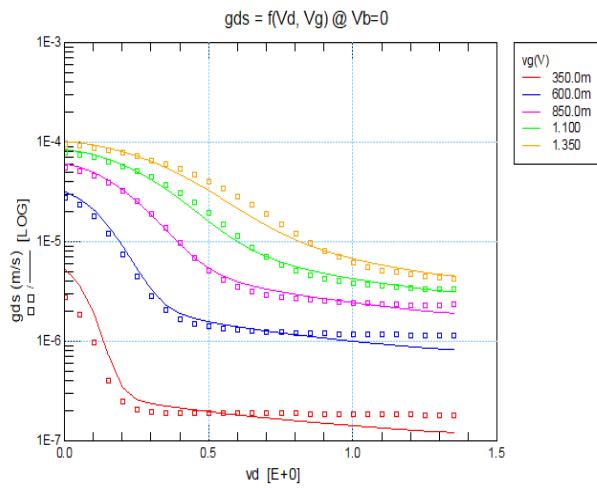
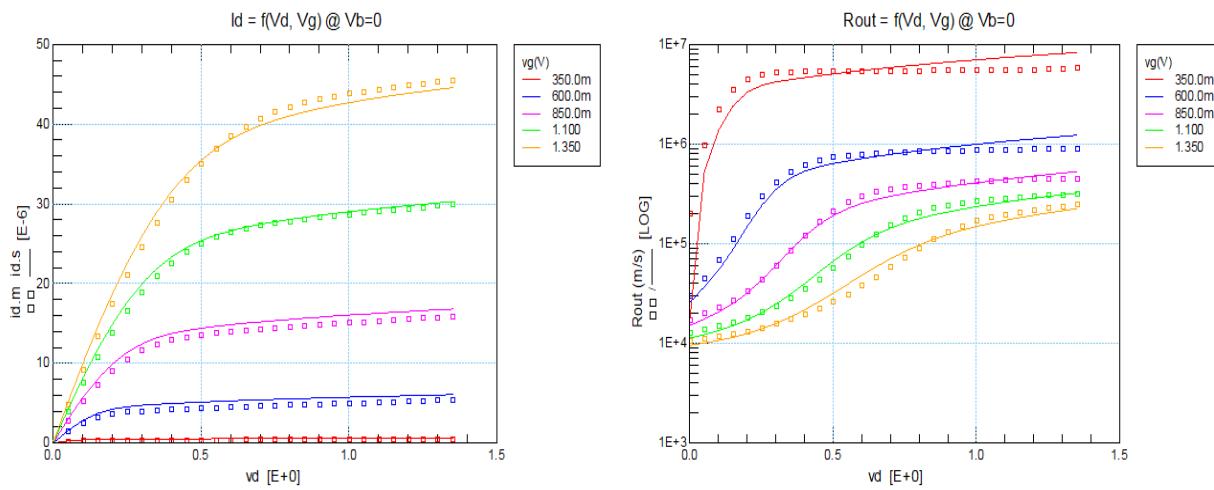
$i_d v_g, V_d = 1.2V, T = 27^\circ C$

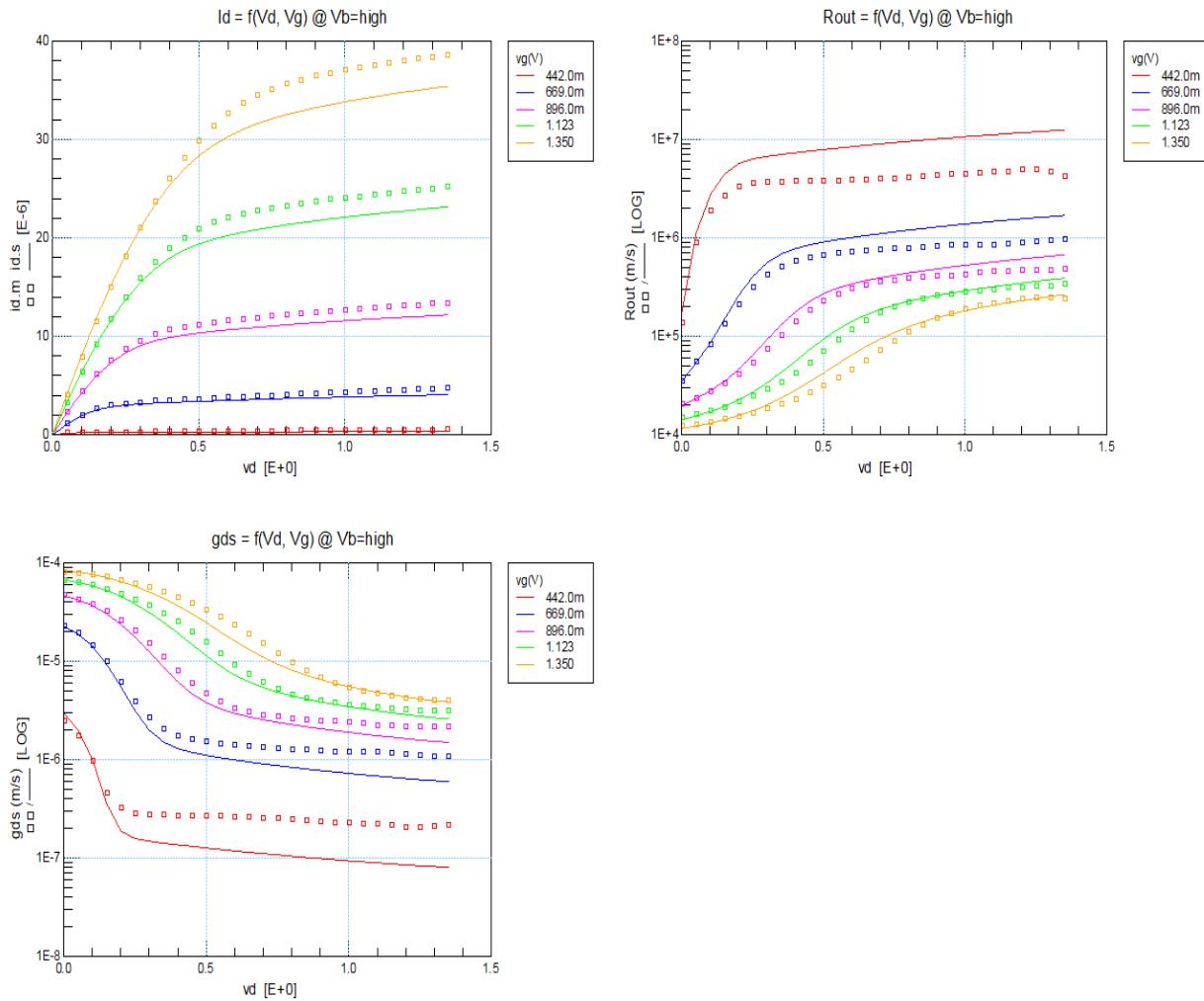
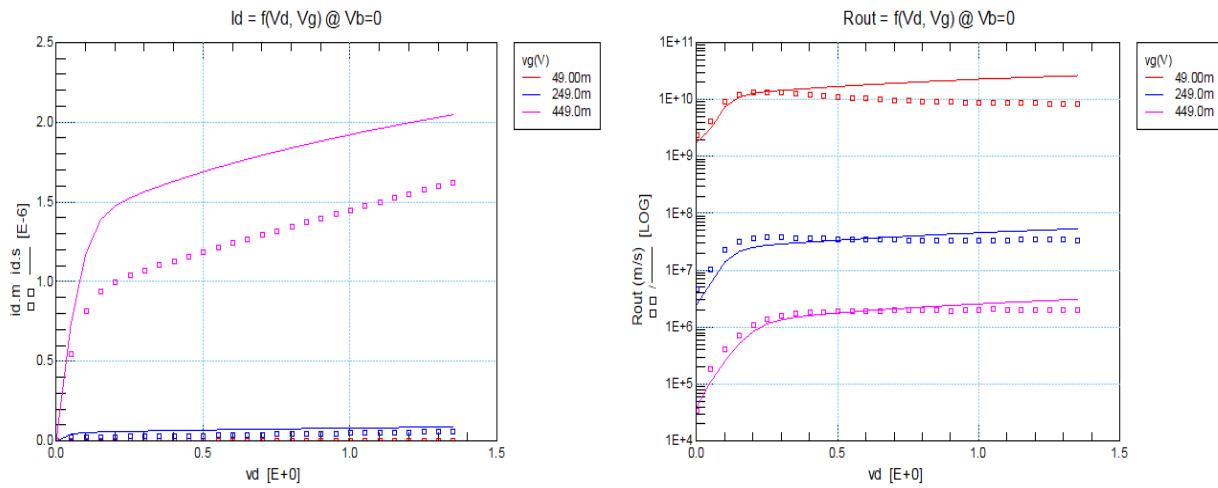


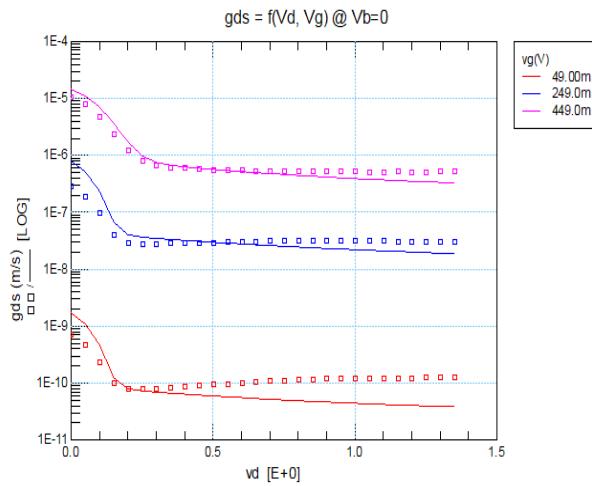


$I_dVg, I_b, Ig, V_b = 0V, T = 27^\circ C$

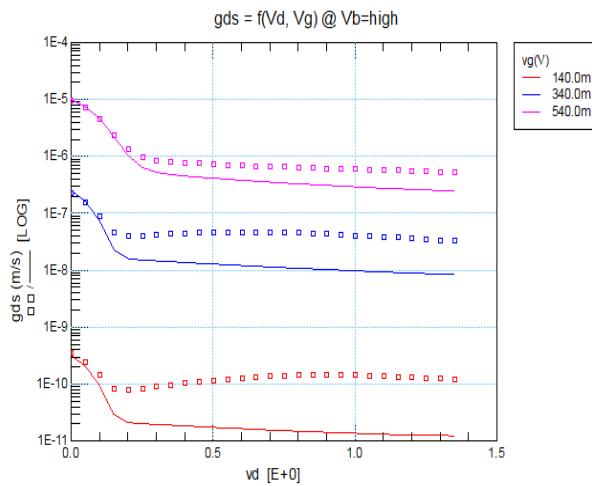
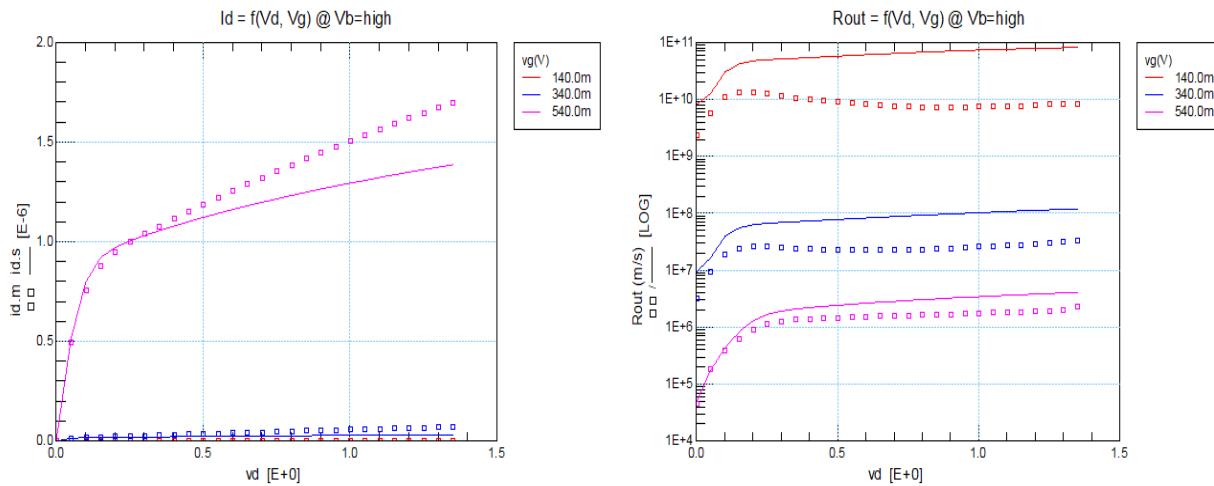


**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


**idvd\_vbmin, Vb = -1.2V, T = 27°C****idvd\_vth, Vb = 0V, T = 27°C**

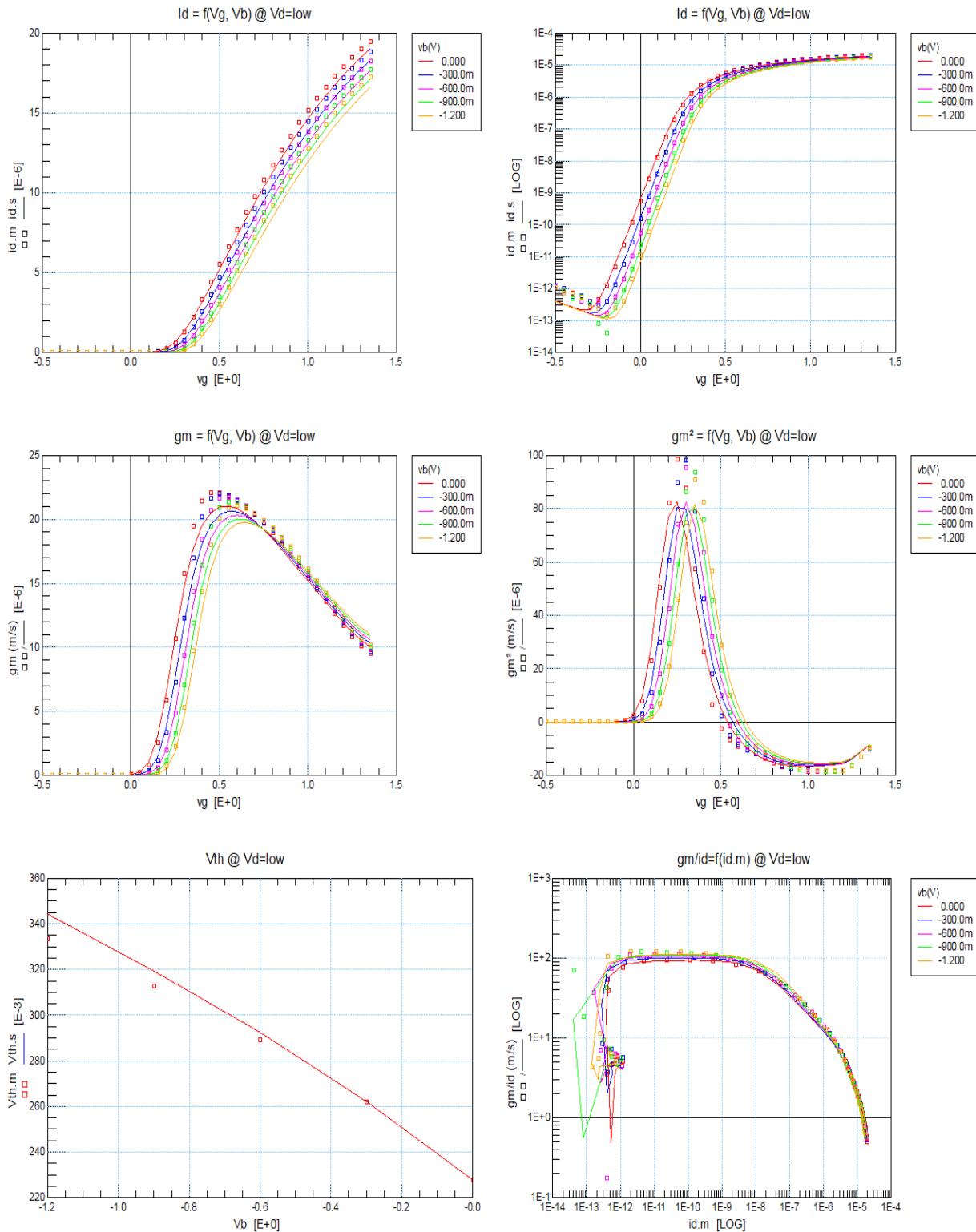


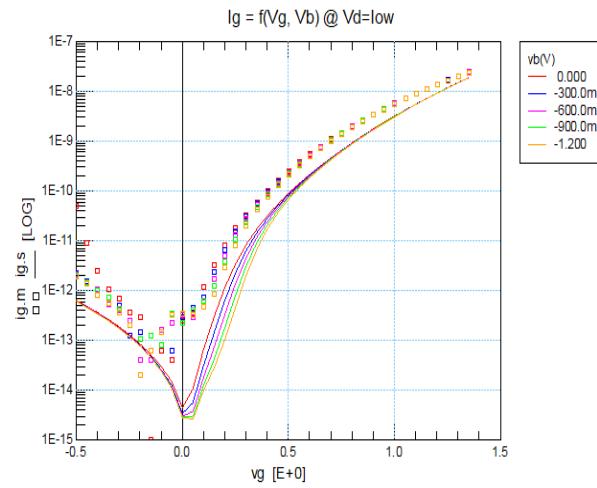
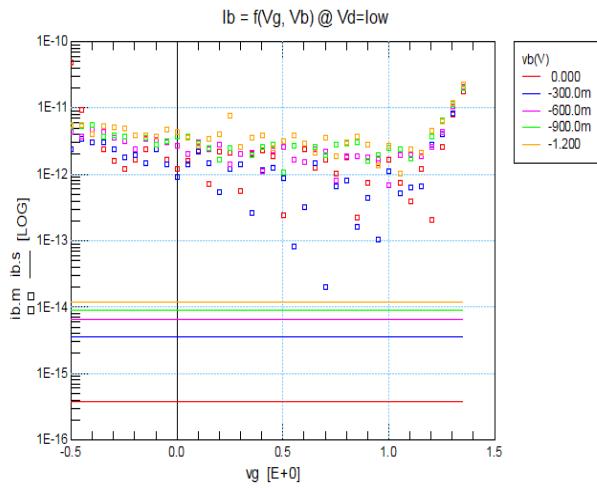
idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C



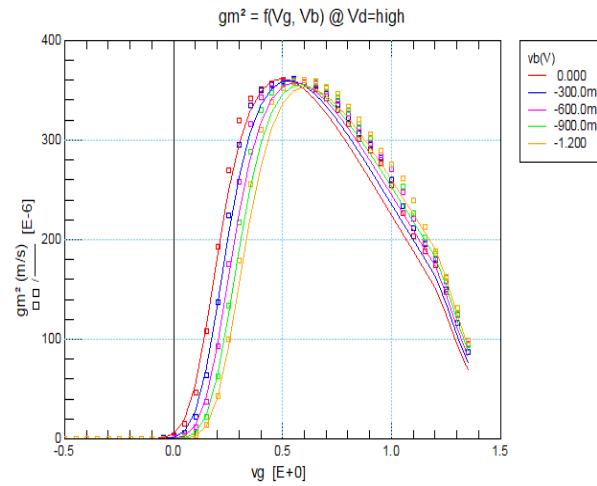
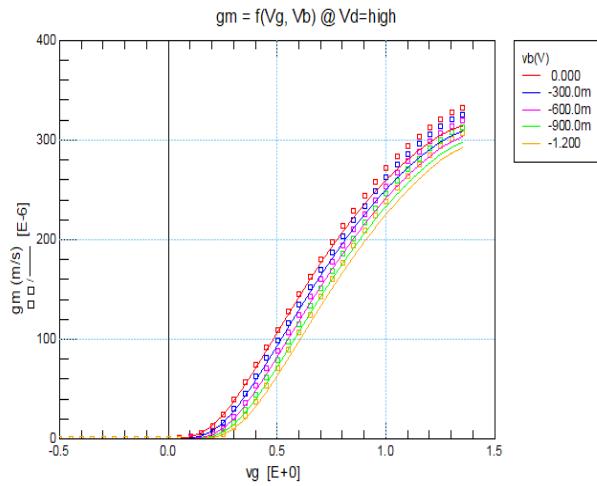
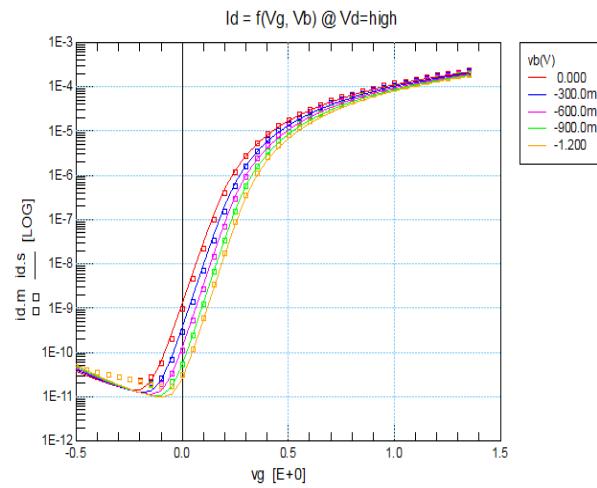
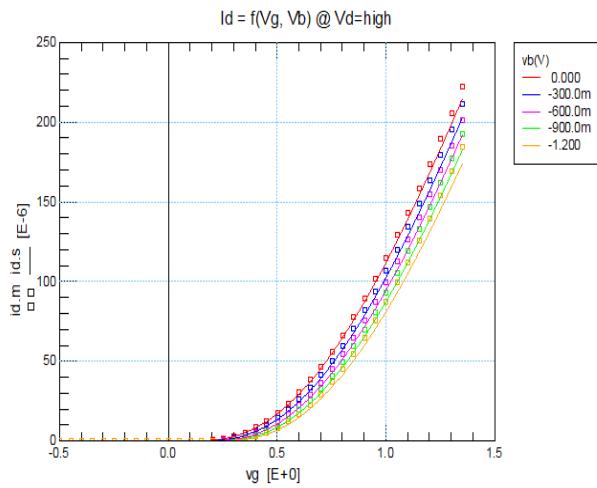
## 4.22 W05u0\_L5u0\_S542\_2

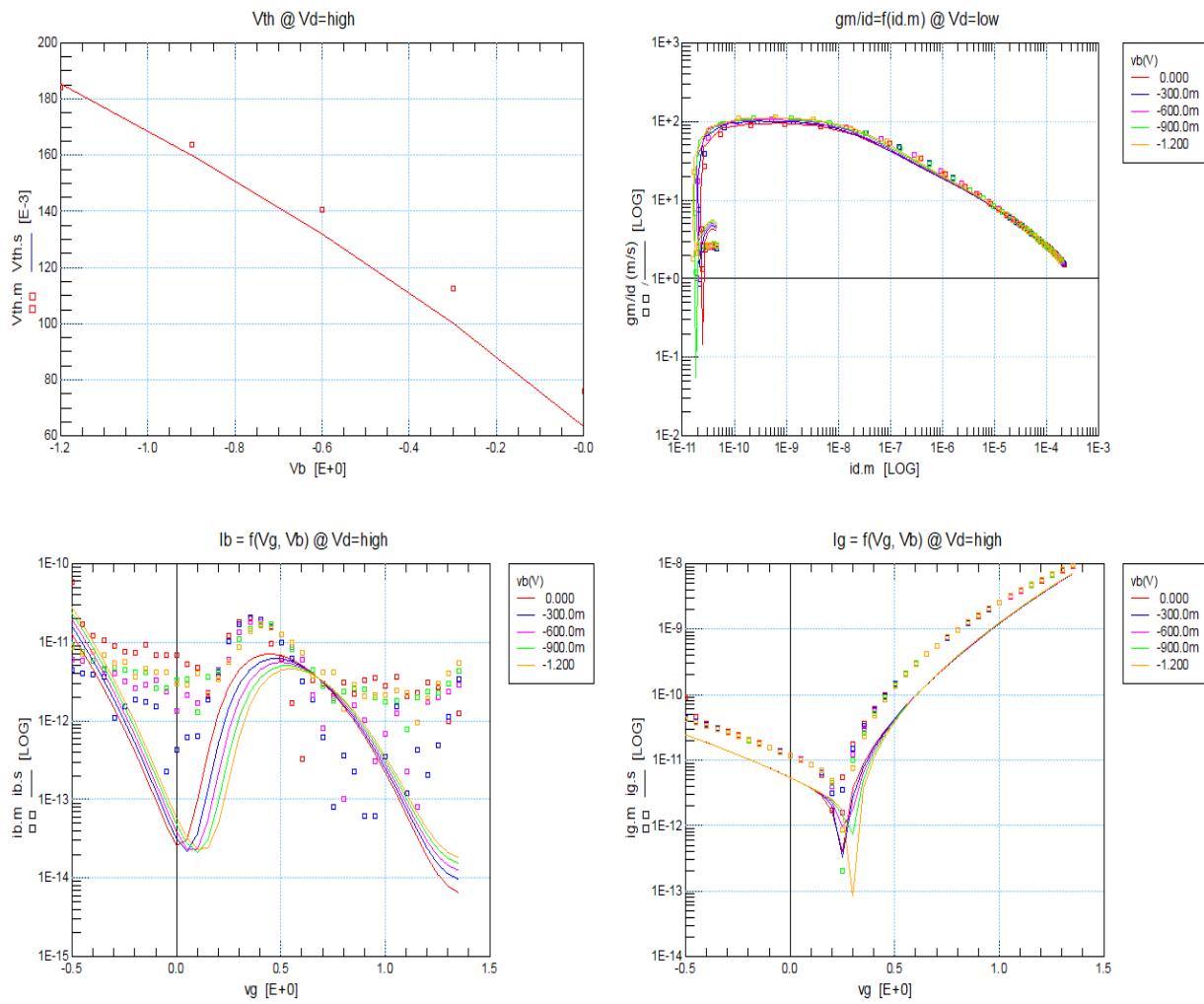
idvg, Vd = 0.05V, T = 27°C



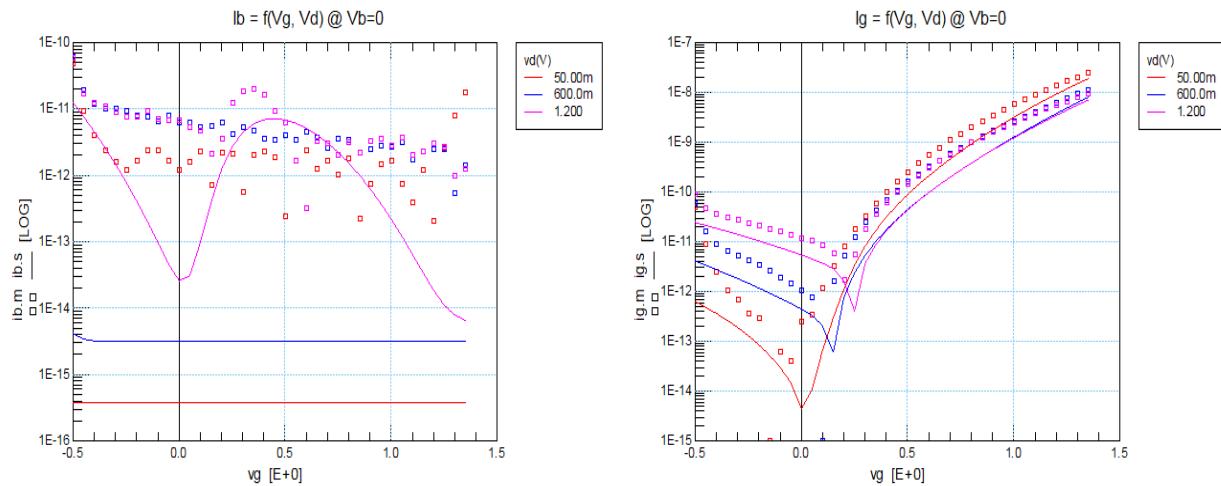


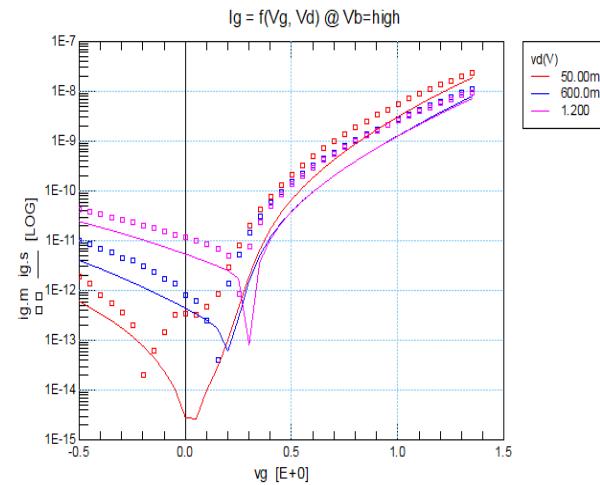
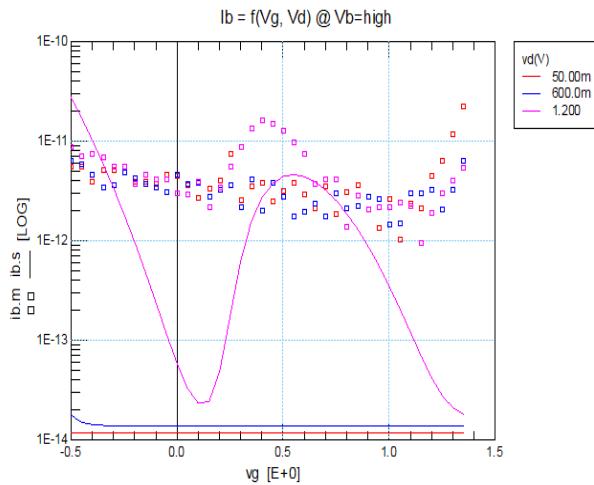
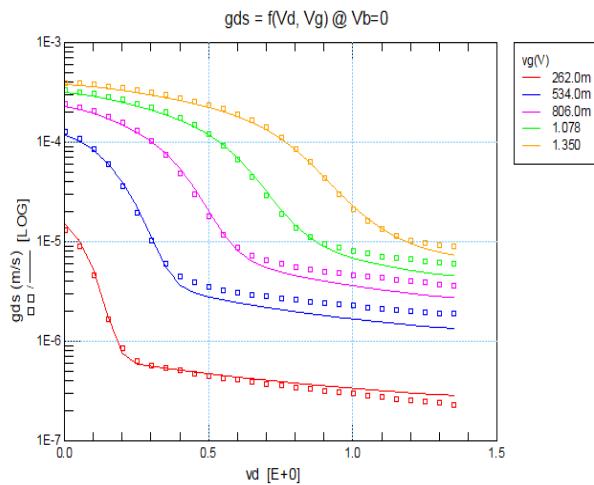
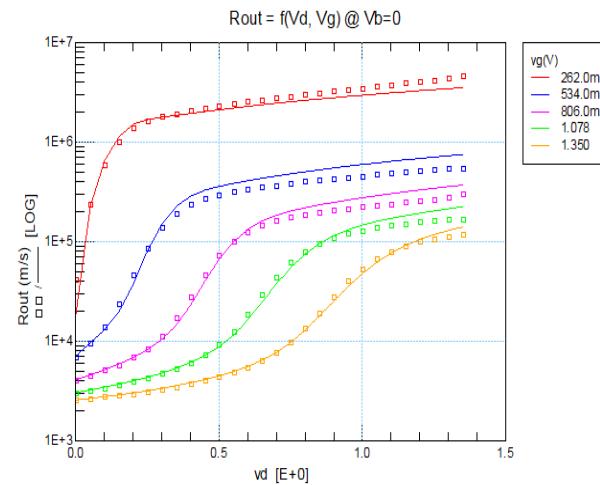
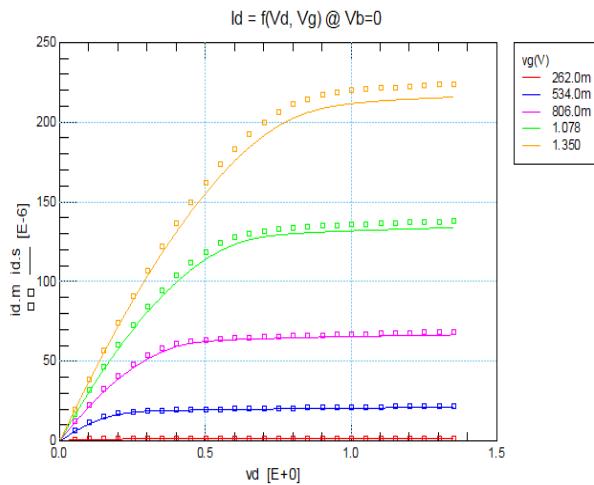
### $i_d v_g, V_d = 1.2V, T = 27^\circ C$

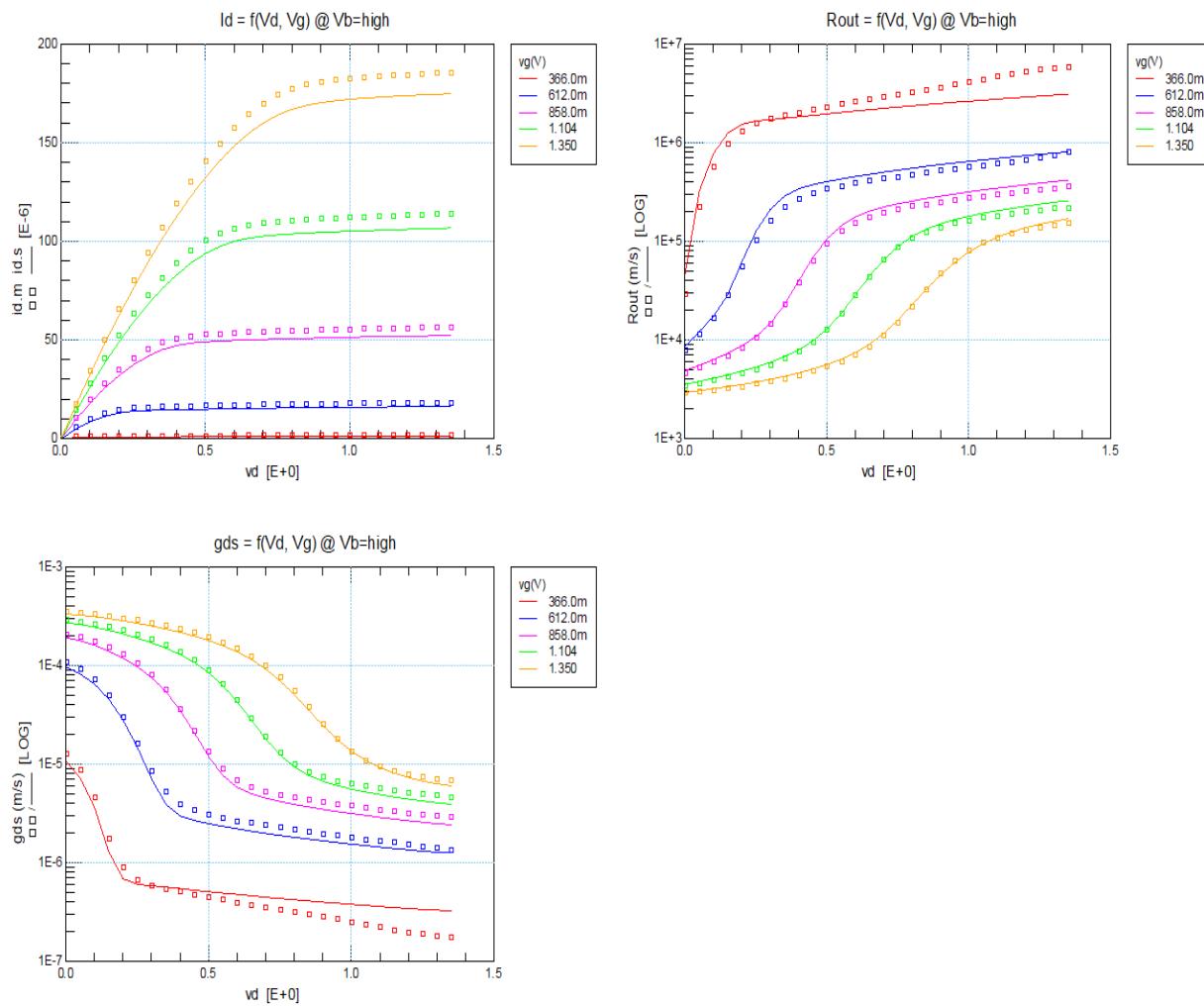
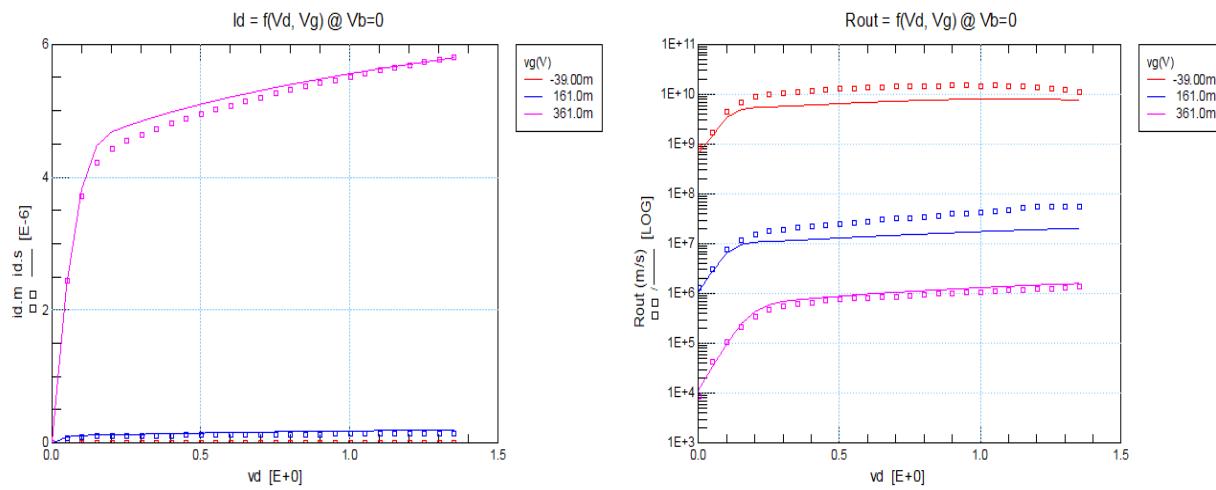


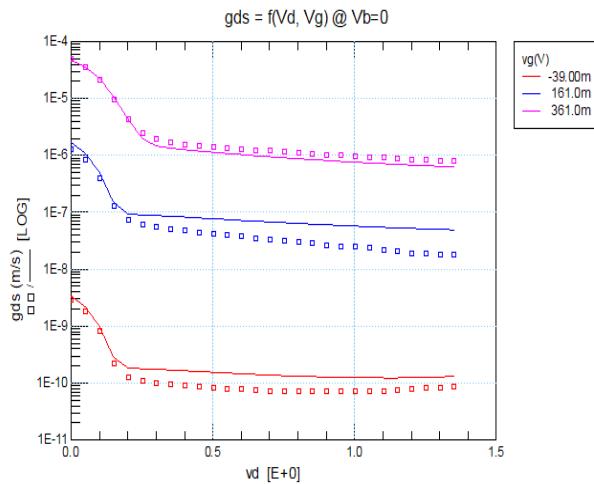


**idvg, Ib,Ig, Vb = 0V, T = 27°C**

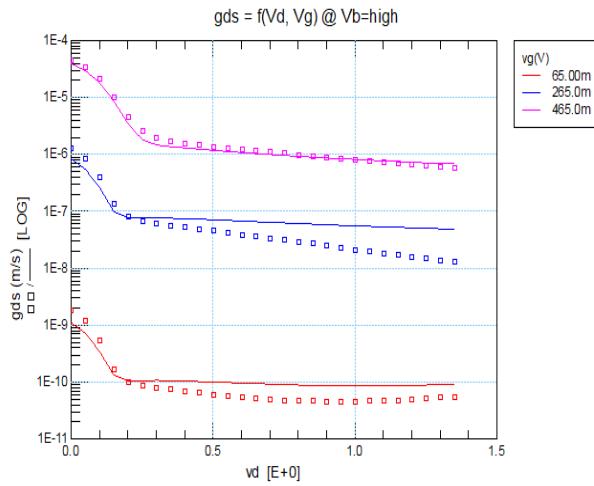
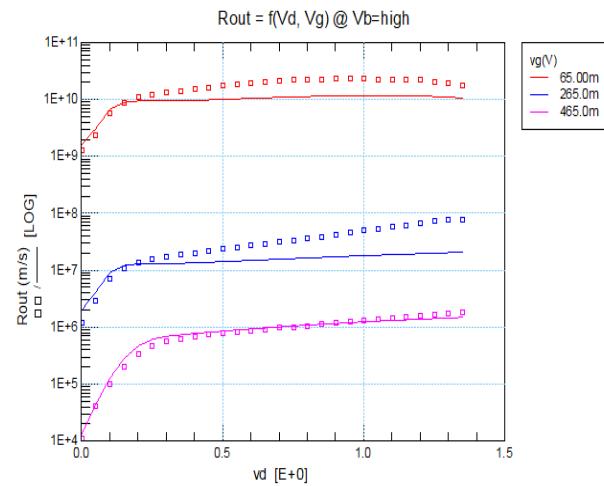
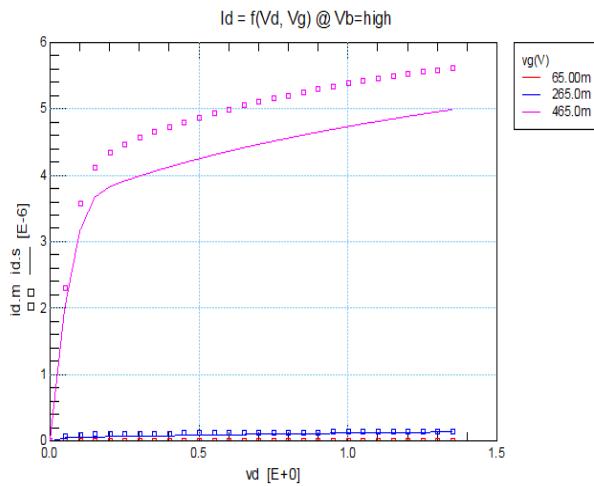


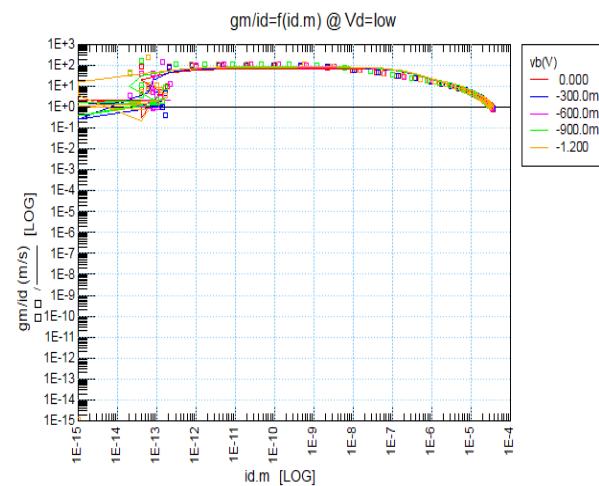
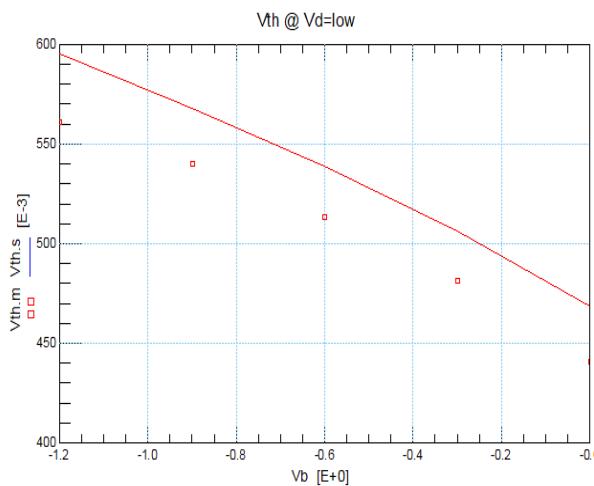
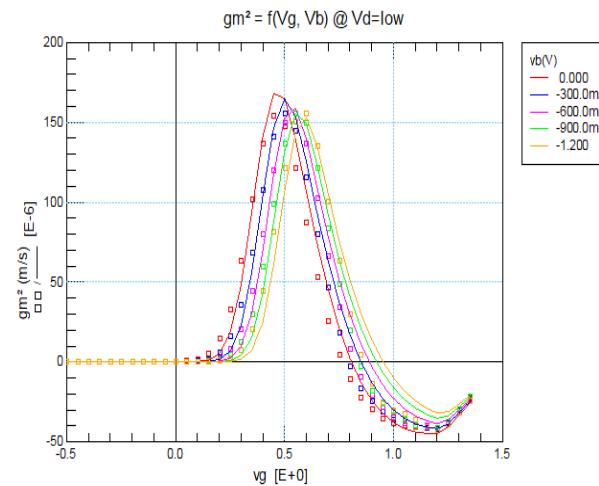
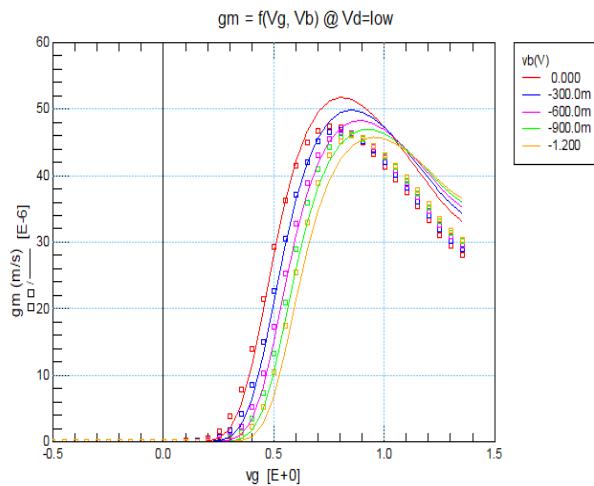
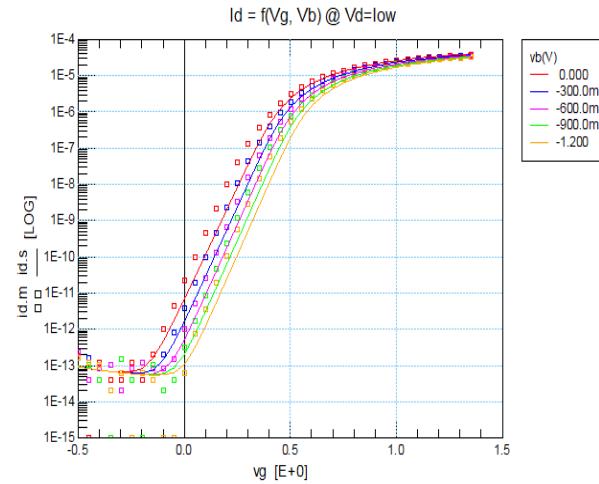
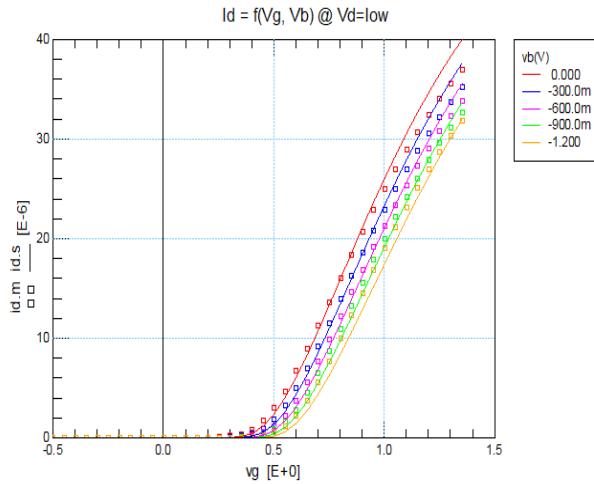
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


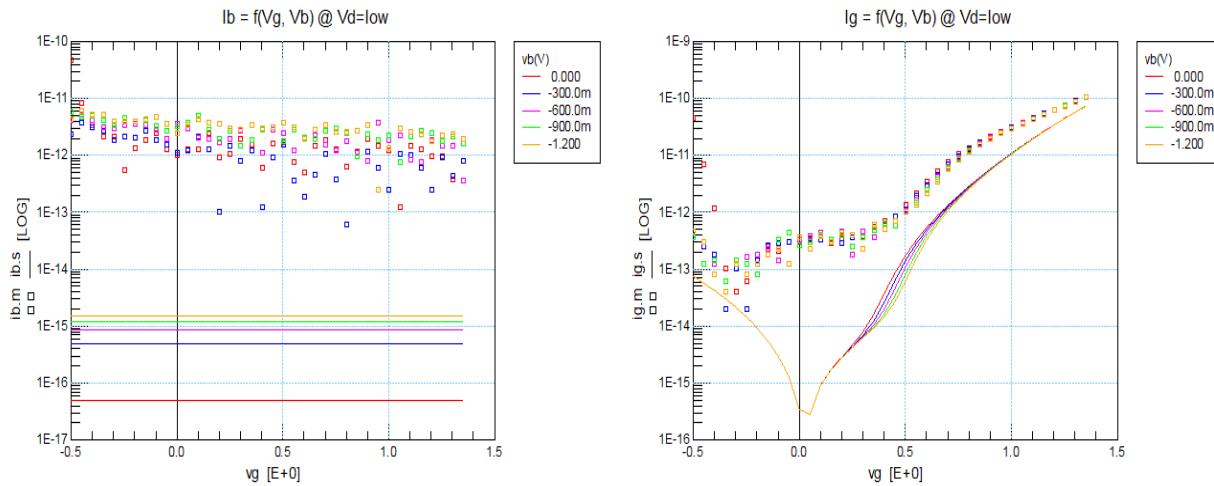
**idvd\_vbmin, Vb = -1.2V, T = 27°C**

**idvd\_vth, Vb = 0V, T = 27°C**




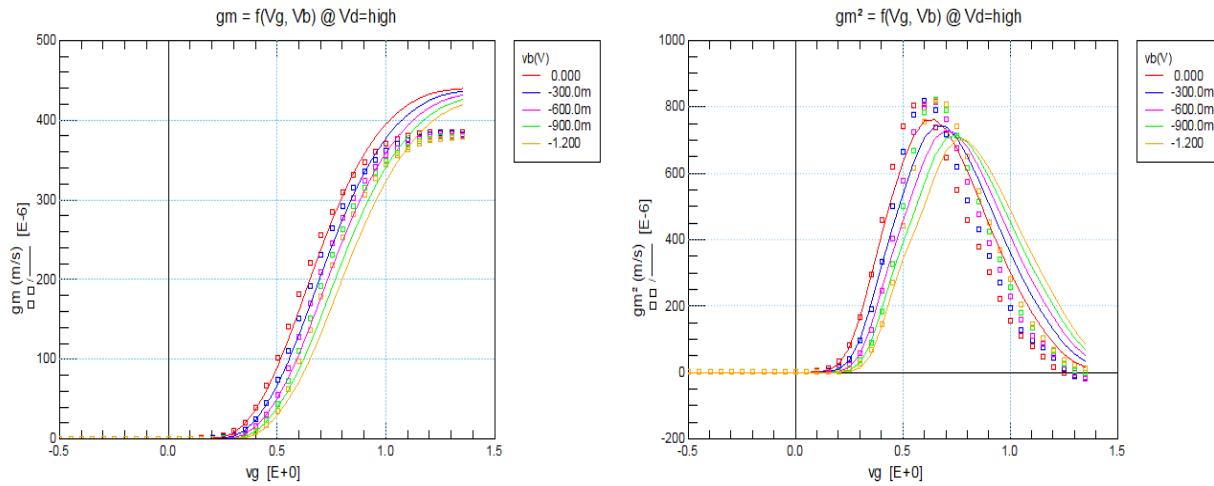
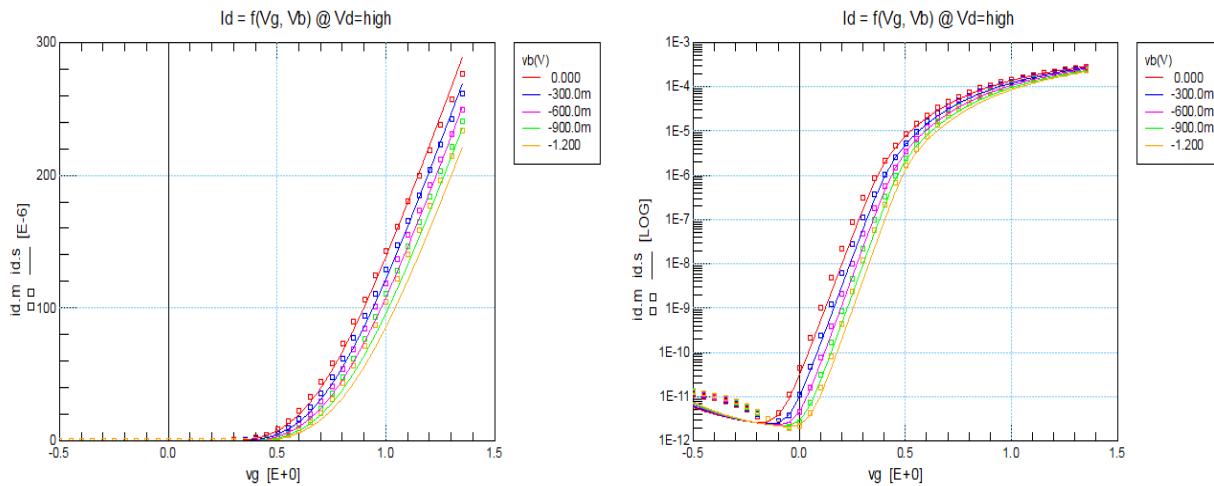
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

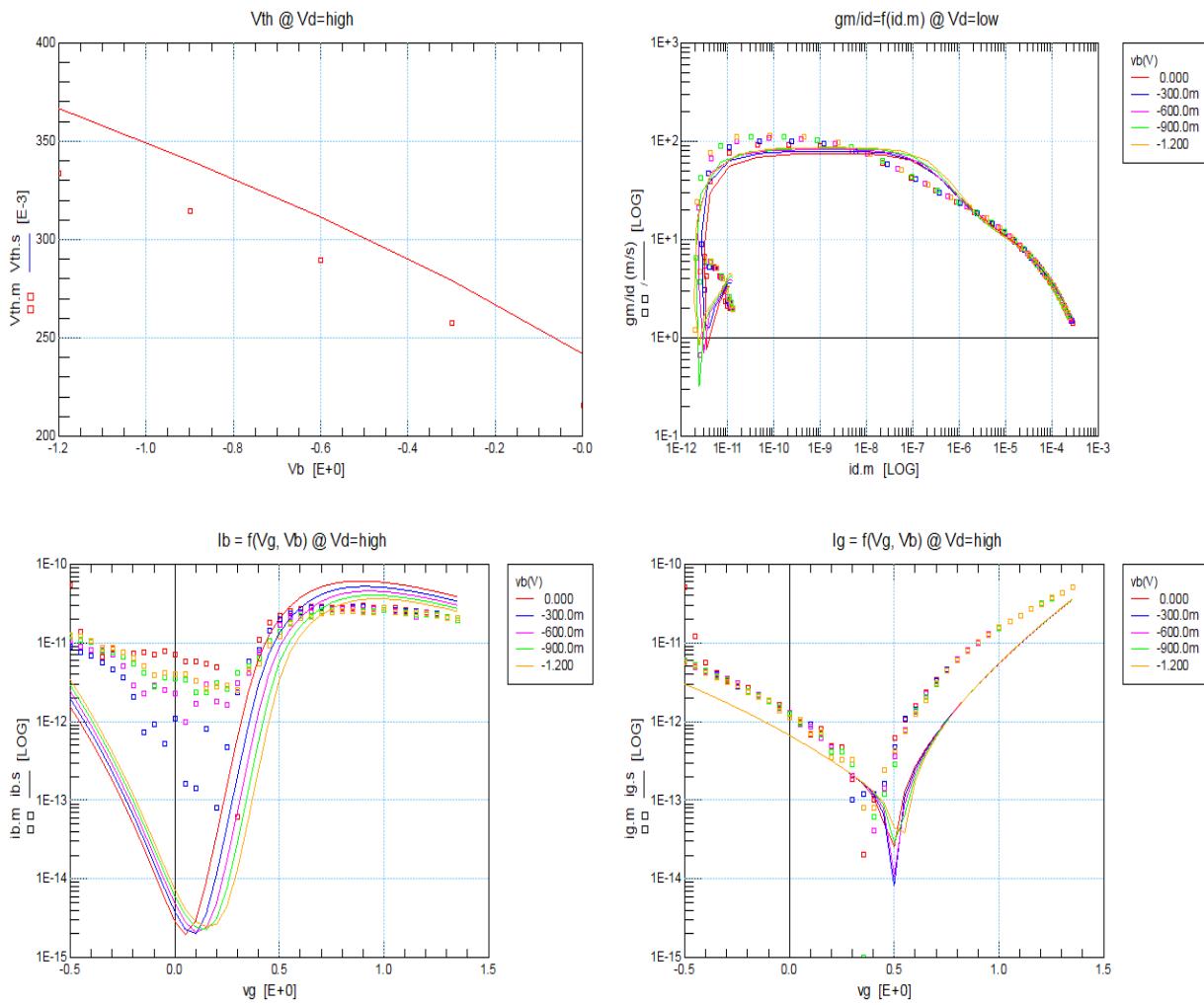


**4.23 W0u6\_L0u18\_S543\_3****idvg, Vd = 0.05V, T = 27°C**

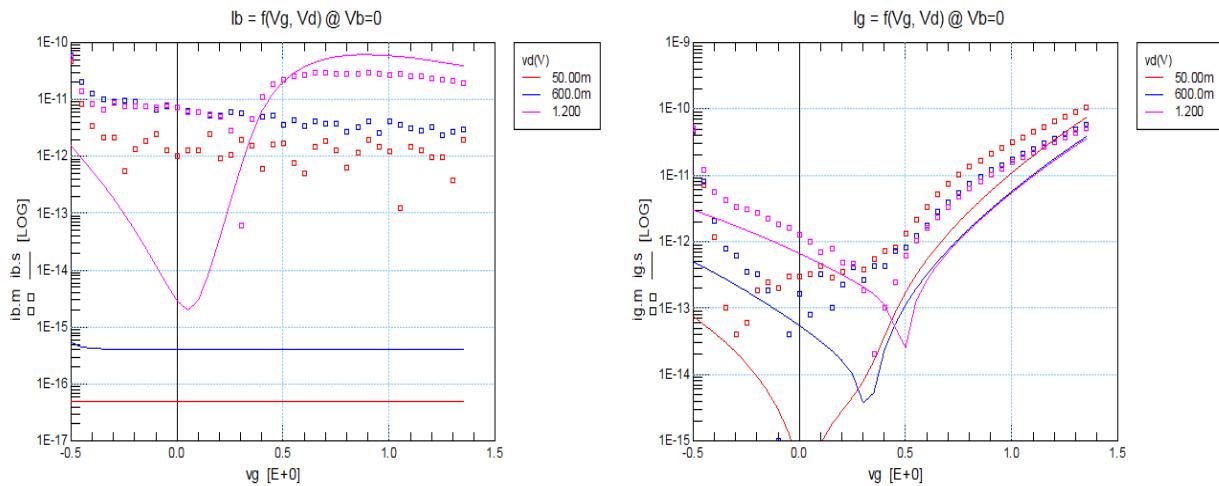


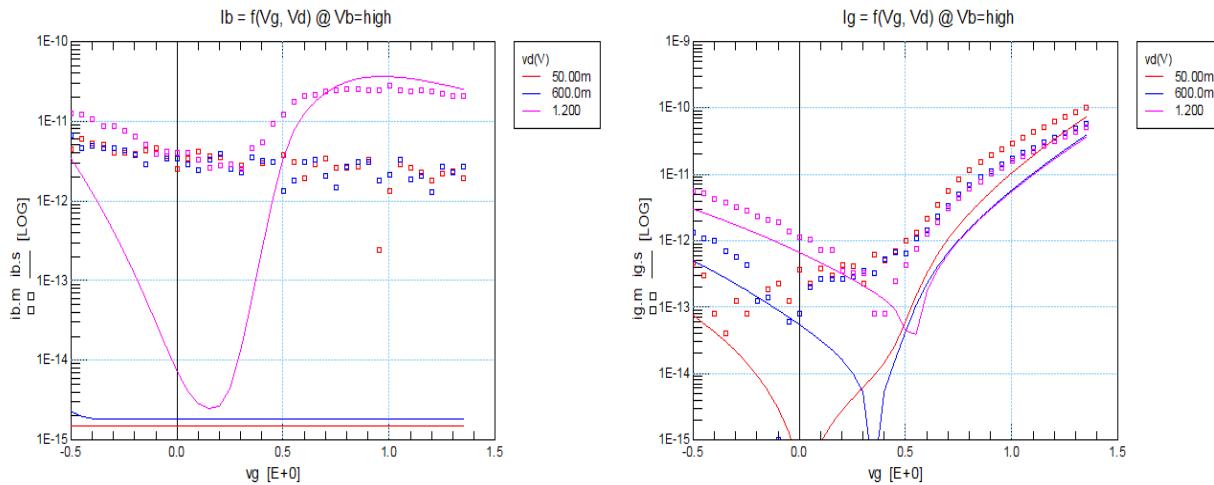
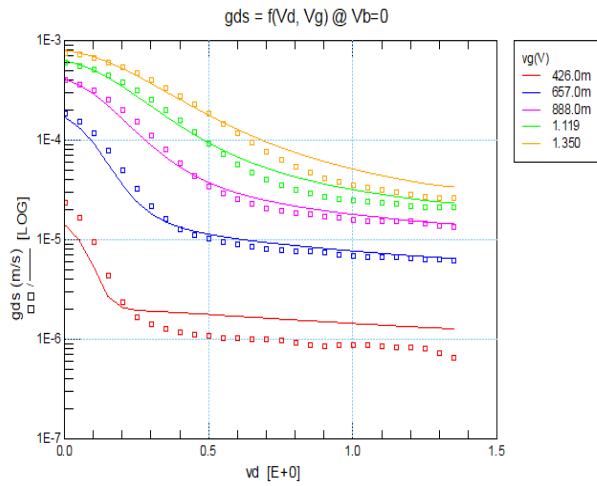
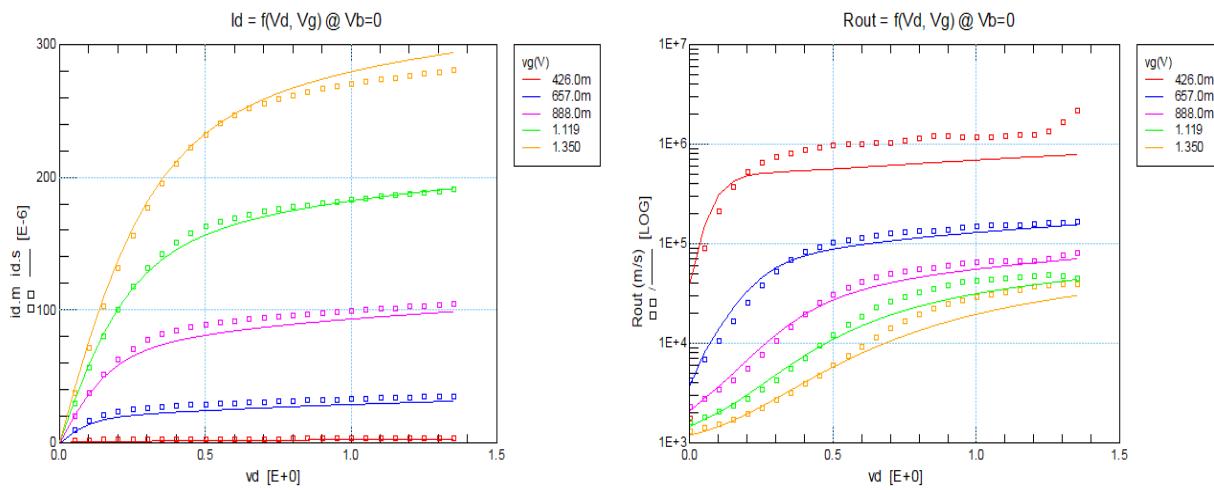
$i_{dvg}, V_d = 1.2V, T = 27^\circ C$

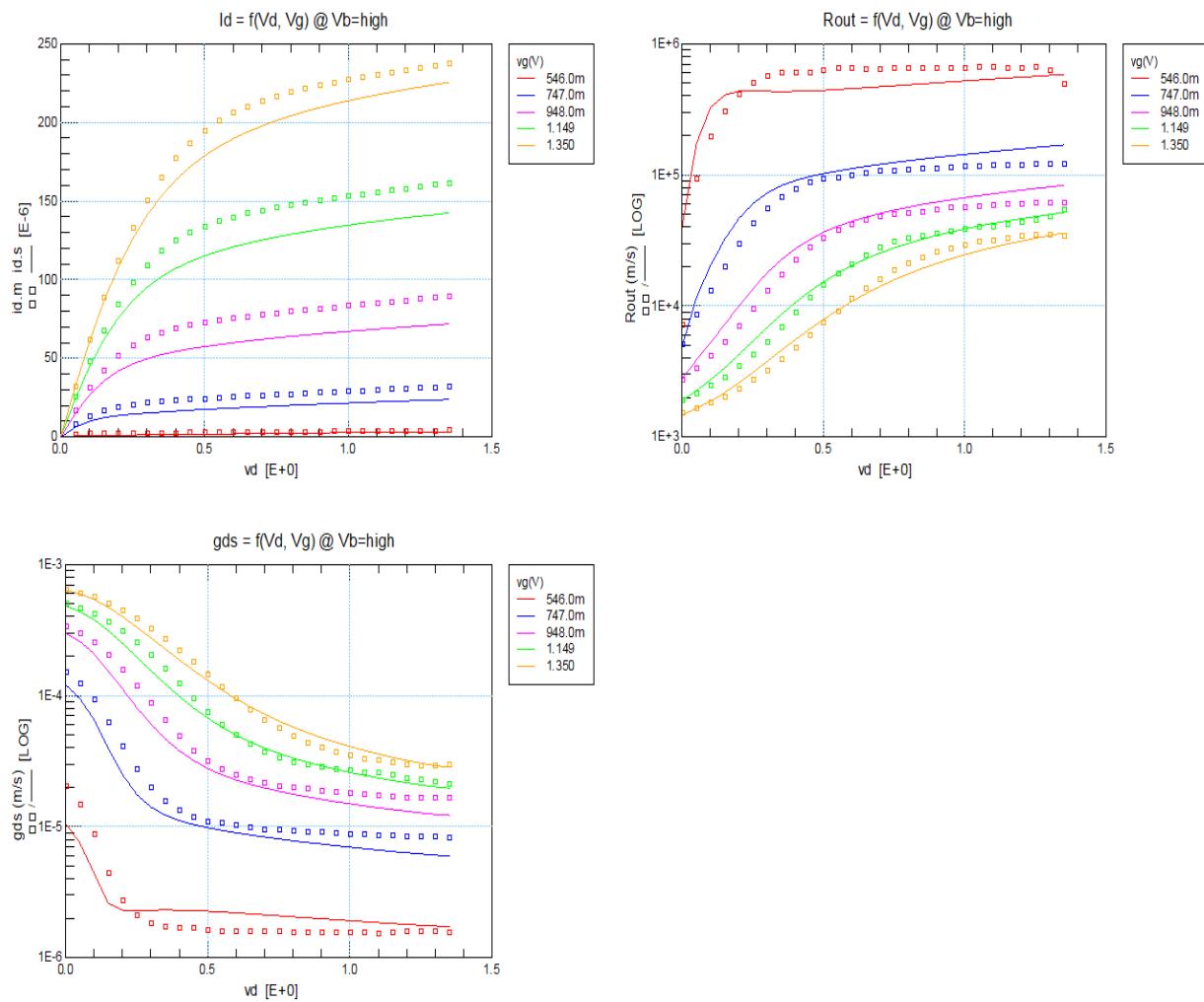
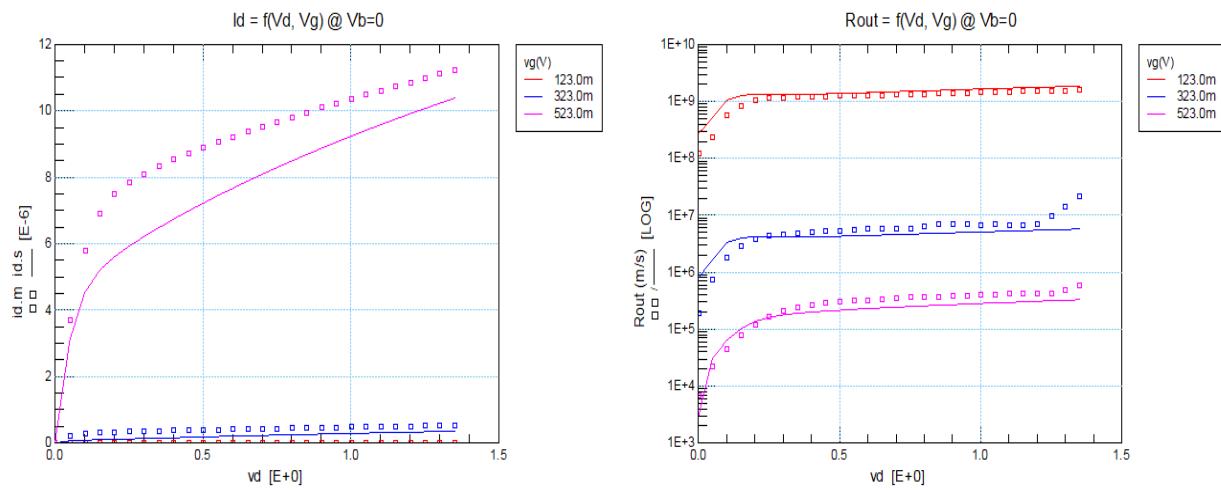


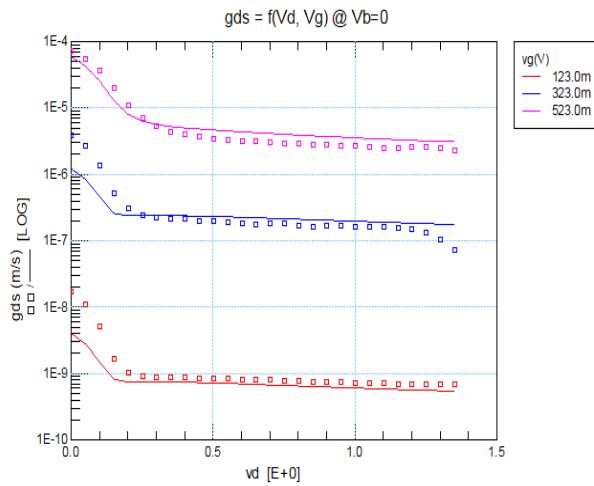


$idvg, Ib, Ig, Vb = 0V, T = 27^\circ C$

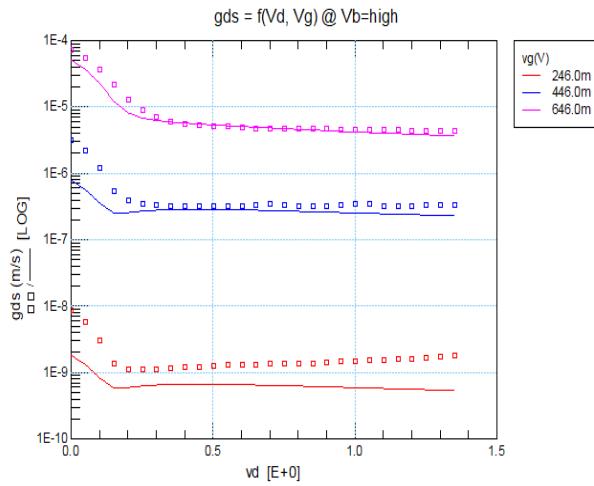
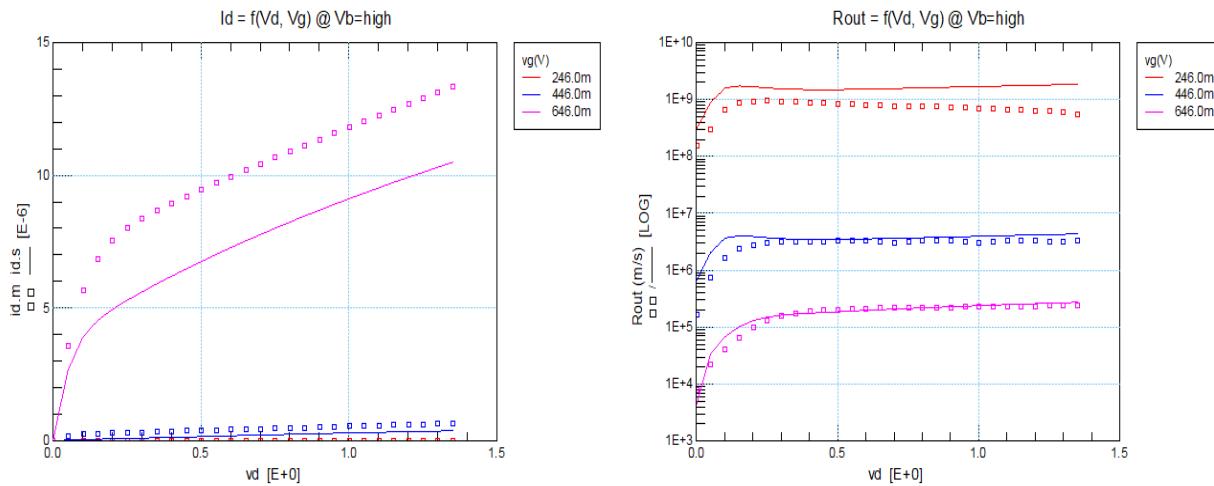


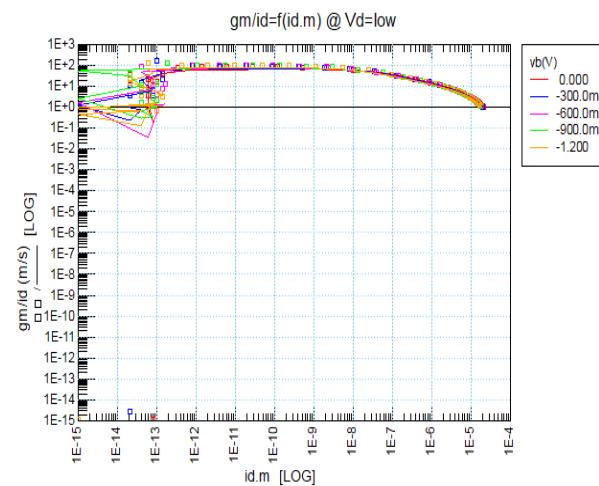
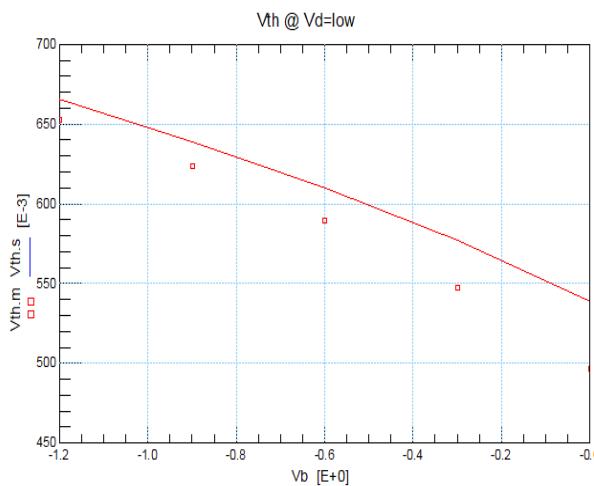
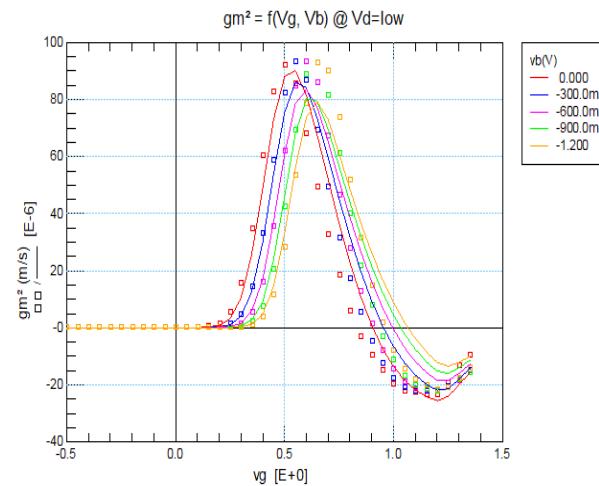
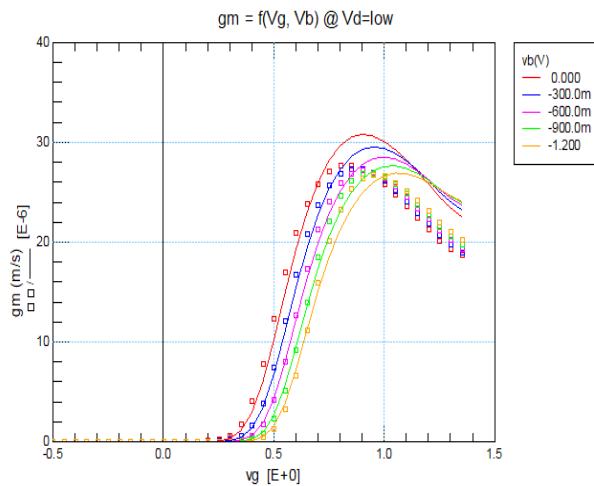
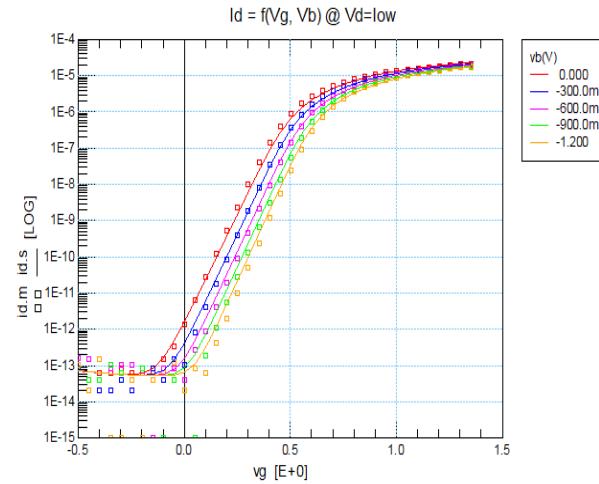
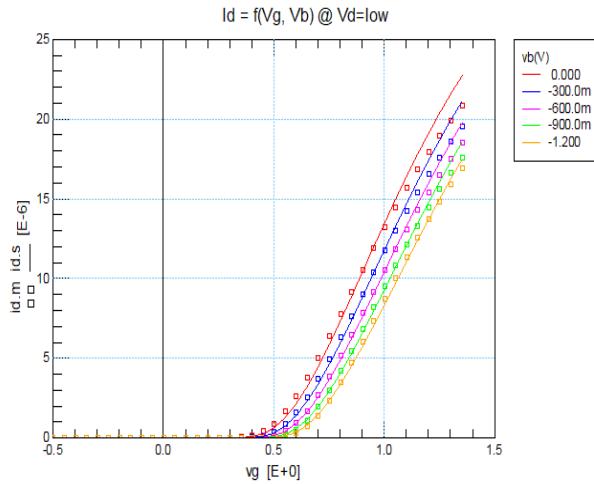
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


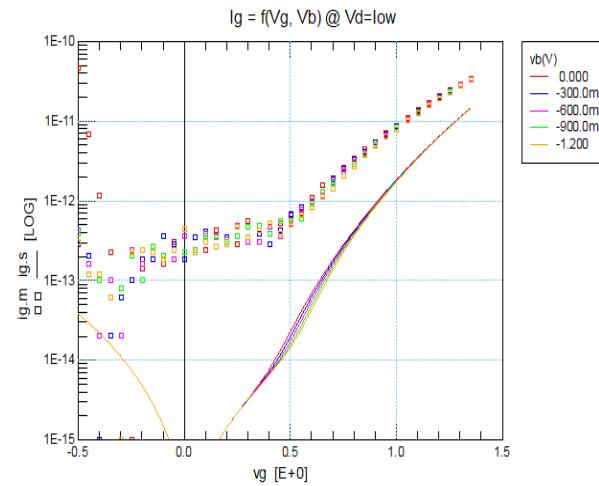
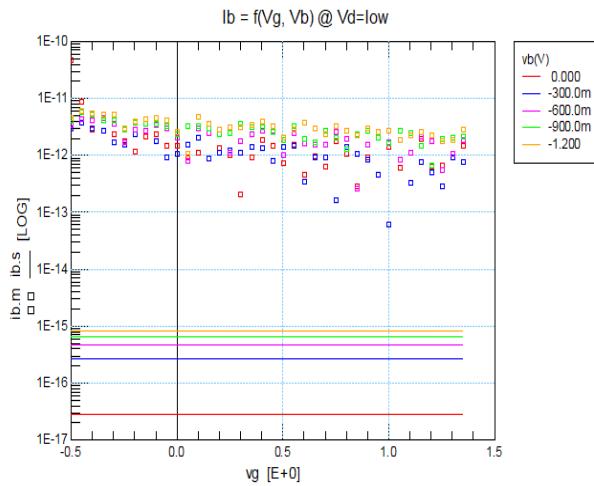
**idvd\_vbmin, Vb = -1.2V, T = 27°C****idvd\_vth, Vb = 0V, T = 27°C**



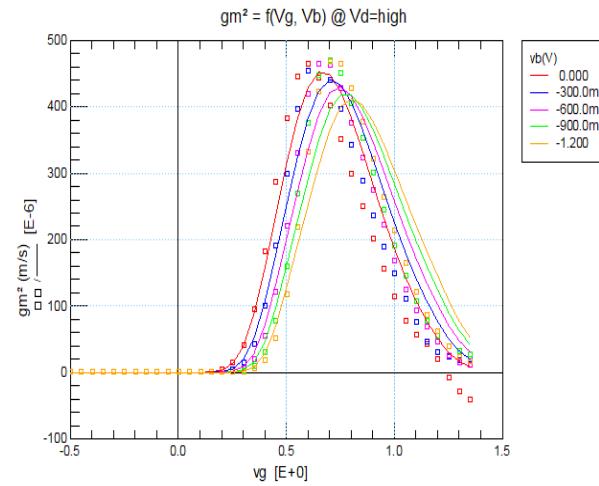
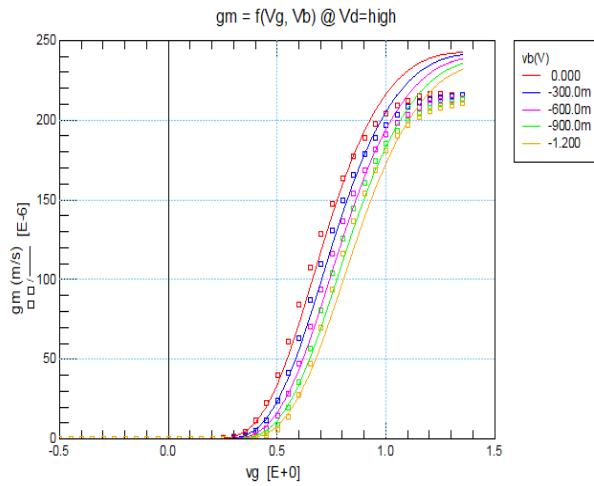
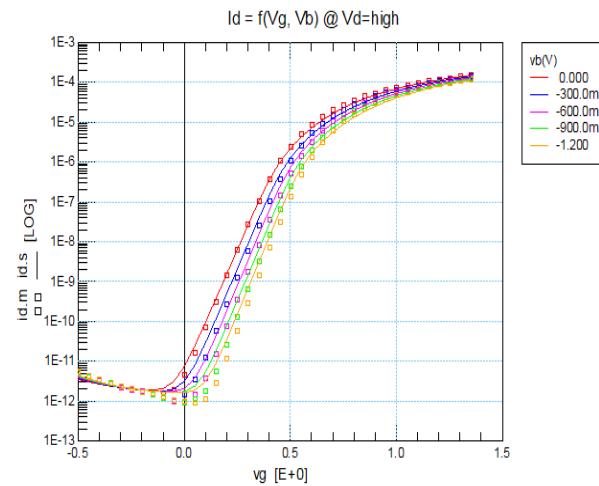
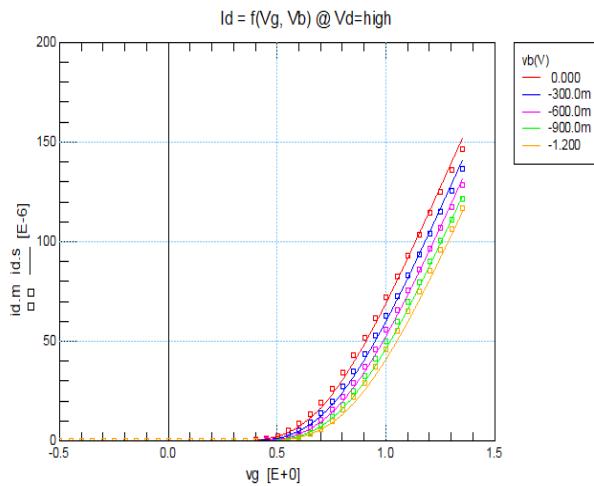
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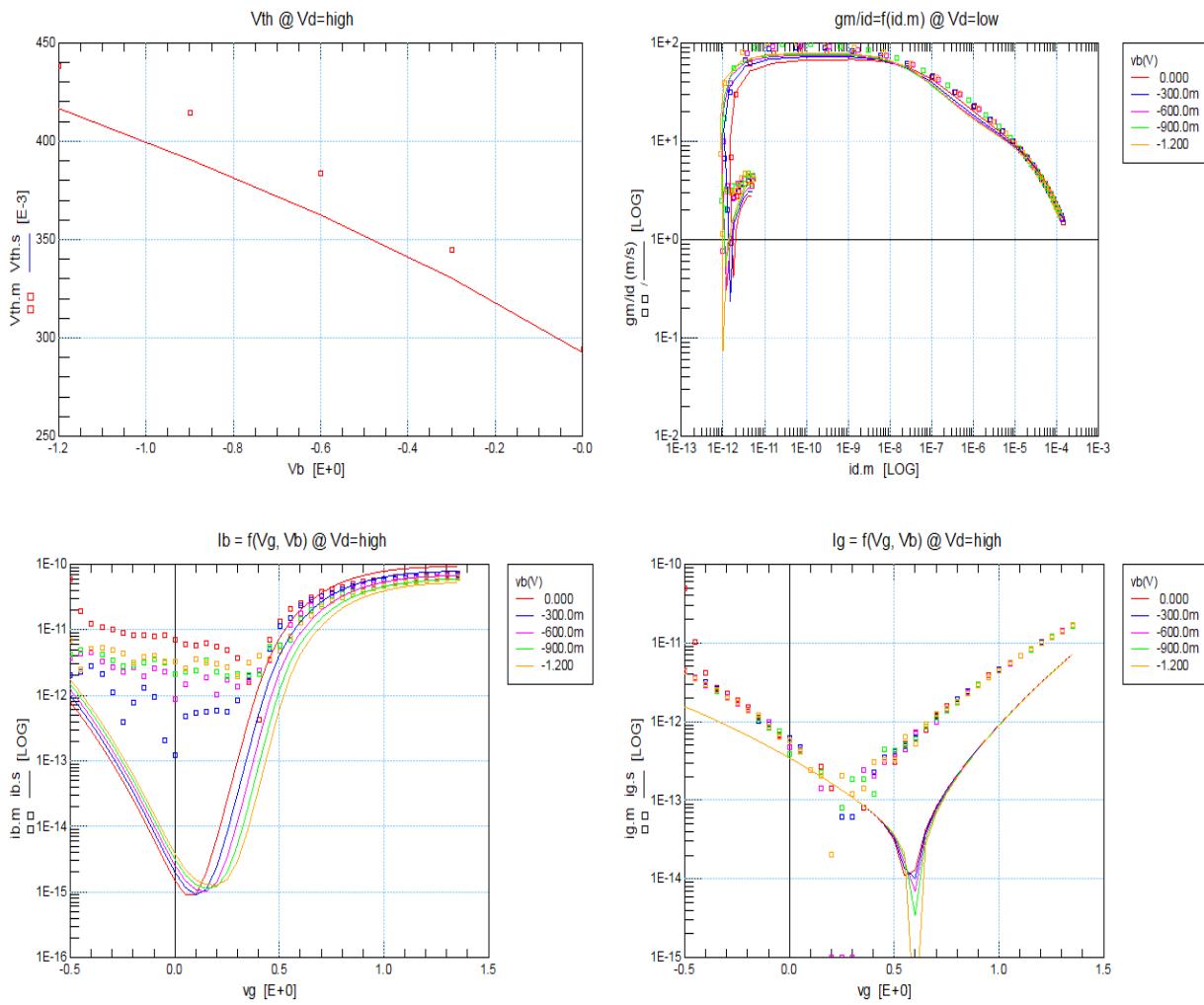


**4.24 W0u3\_L0u14\_S544\_3****idvg, Vd = 0.05V, T = 27°C**

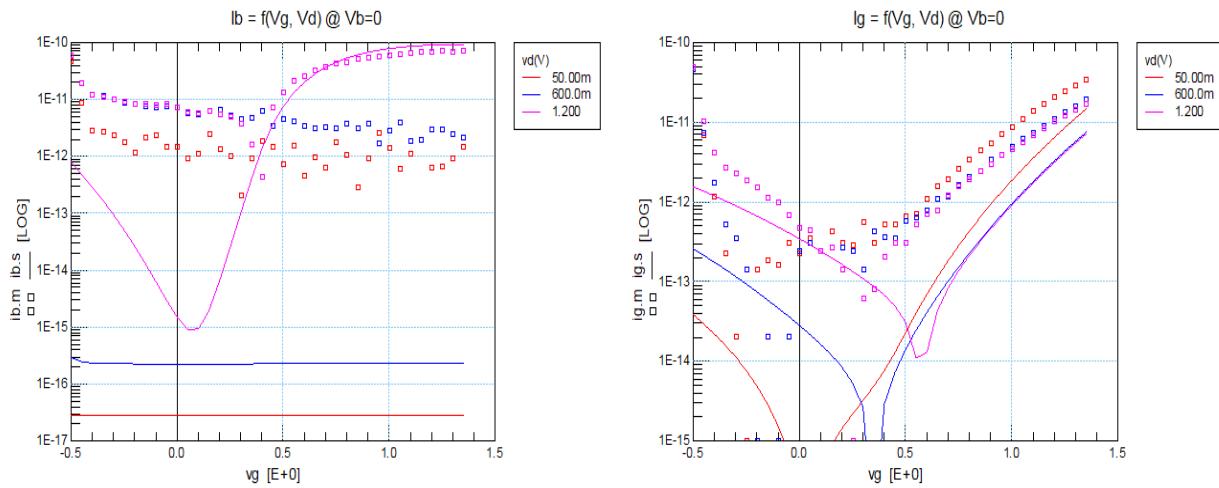


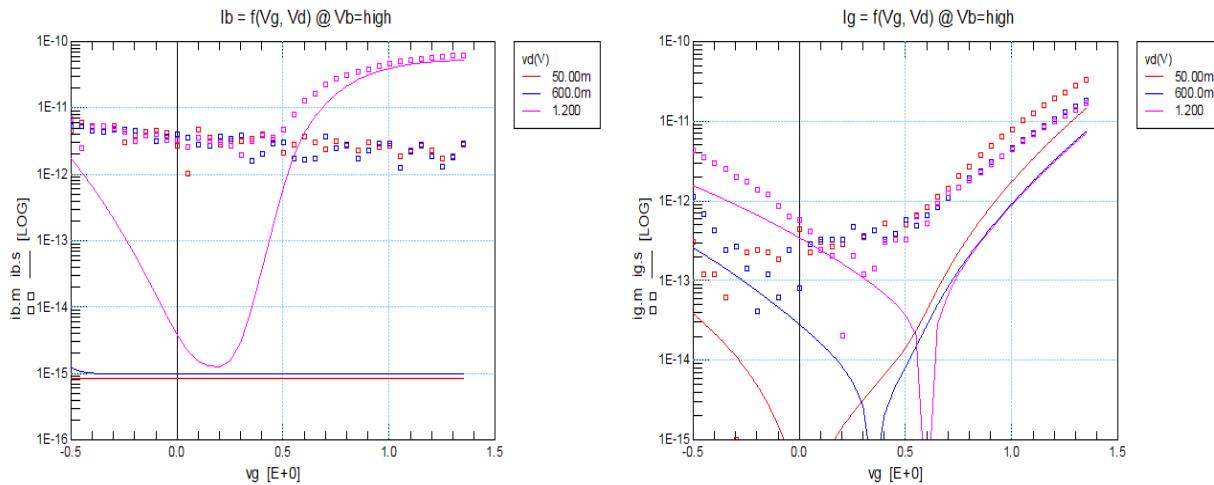
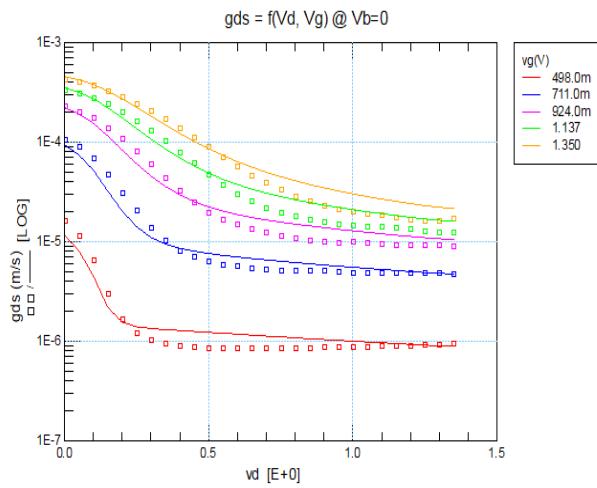
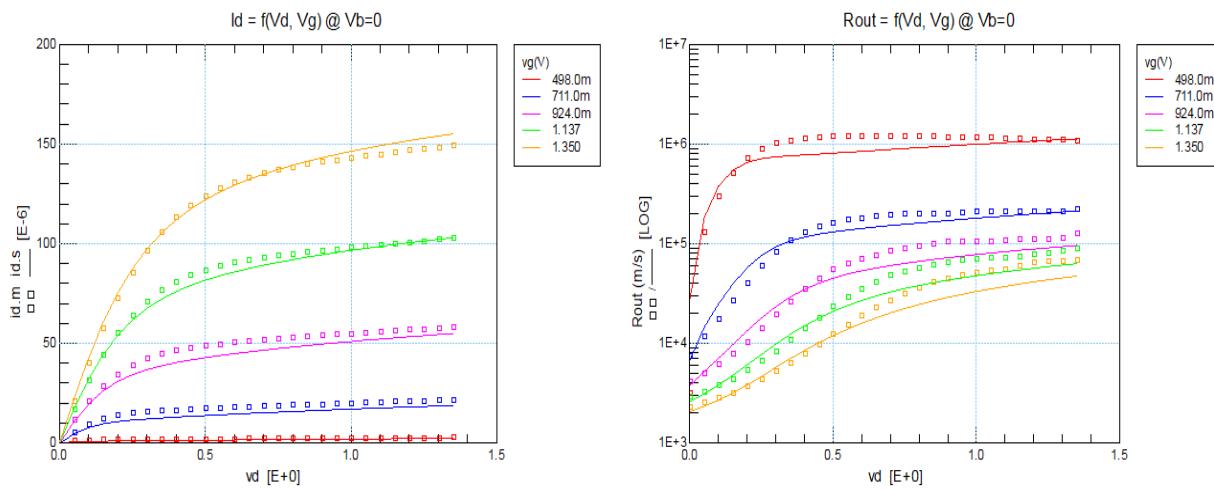
### $i_{dvg}, V_d = 1.2V, T = 27^\circ C$

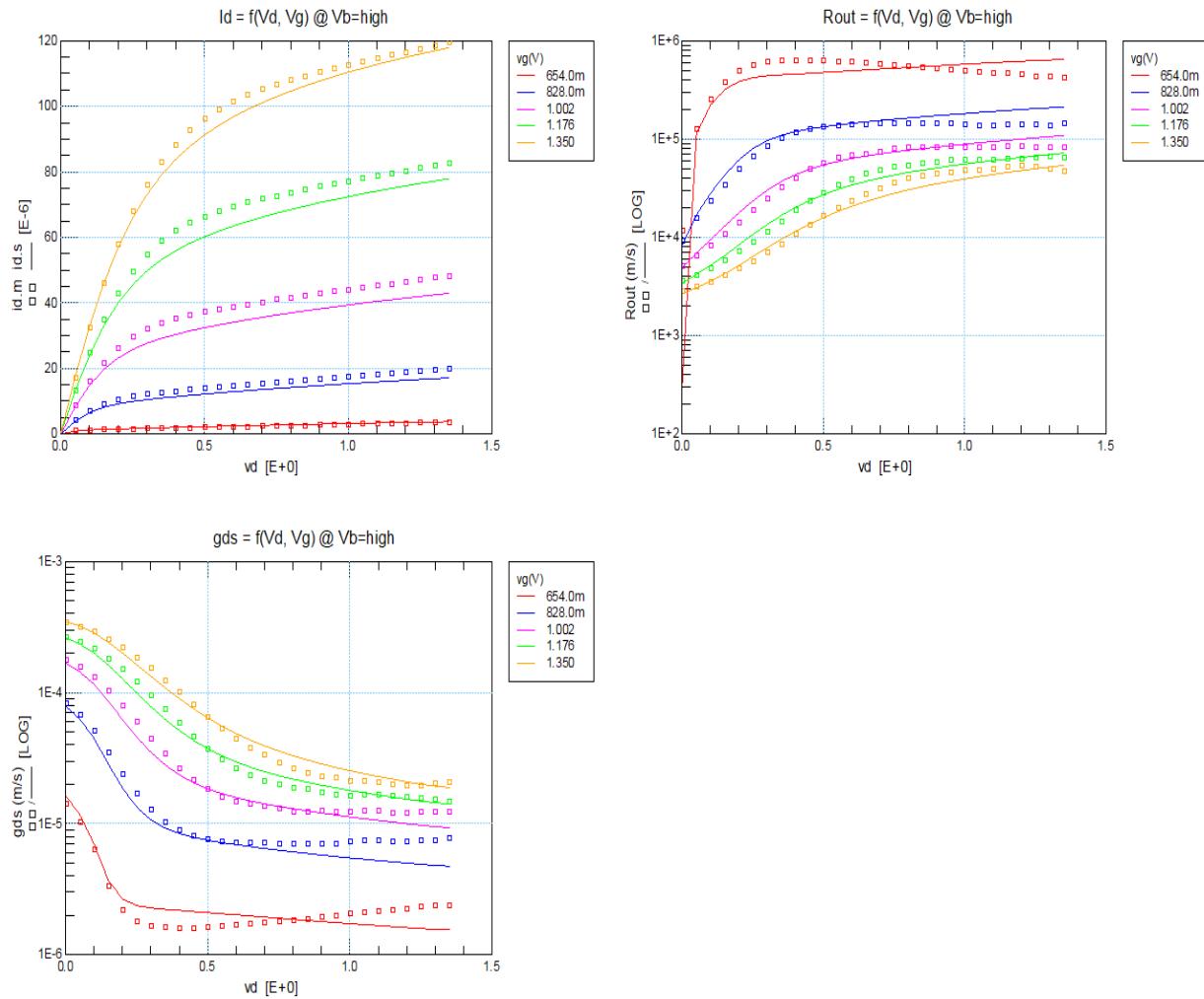
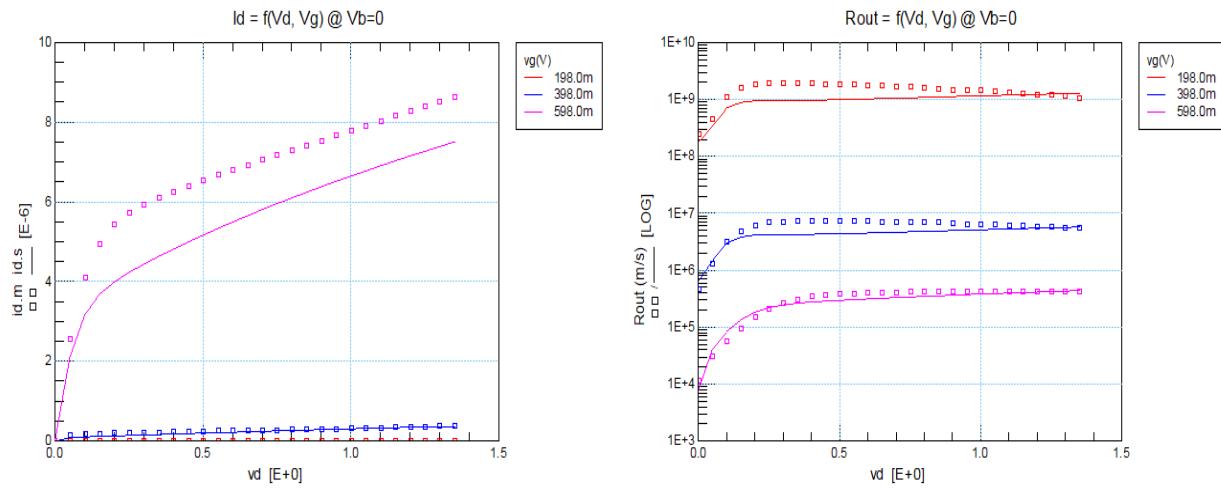


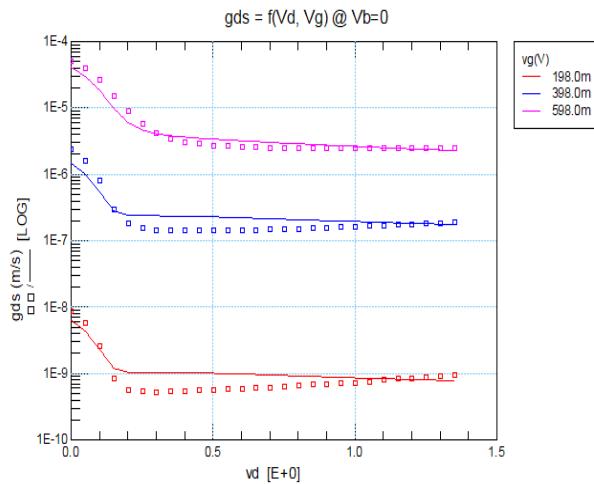


### idvg, Ib, Ig, Vb = 0V, T = 27°C

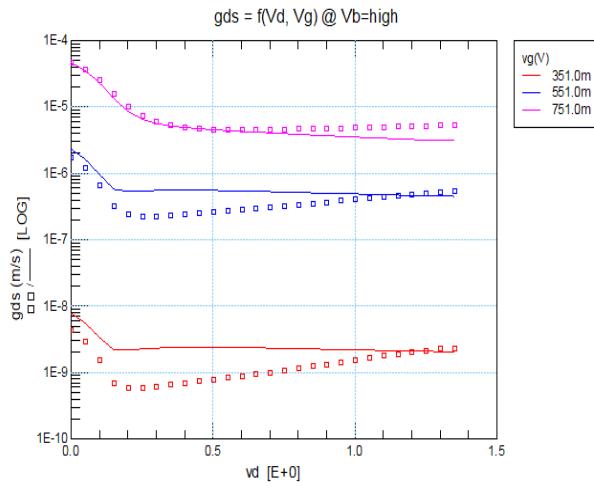
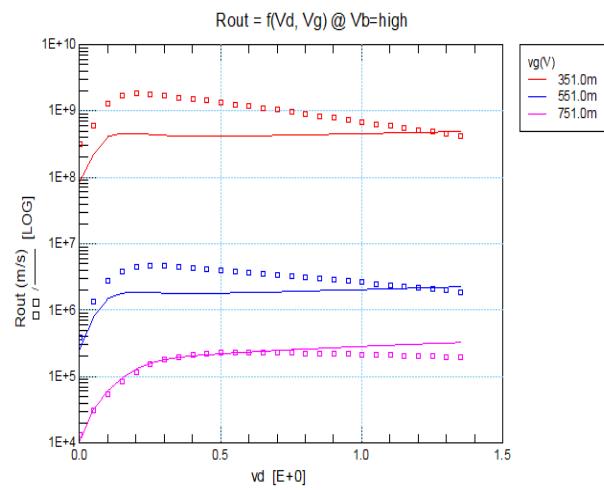
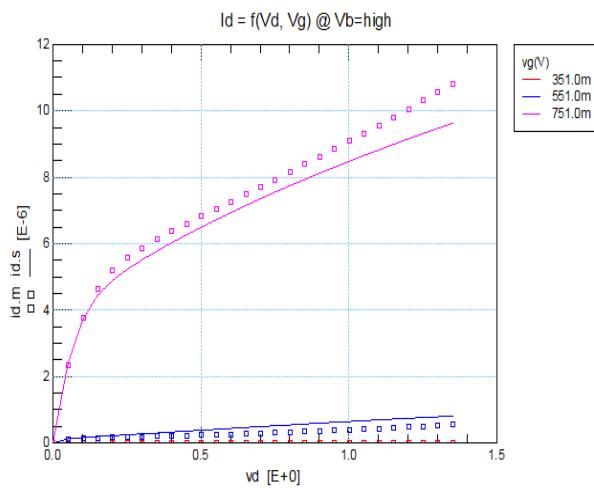


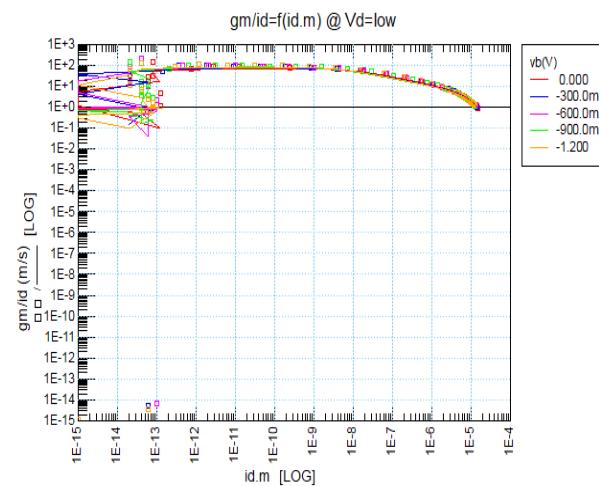
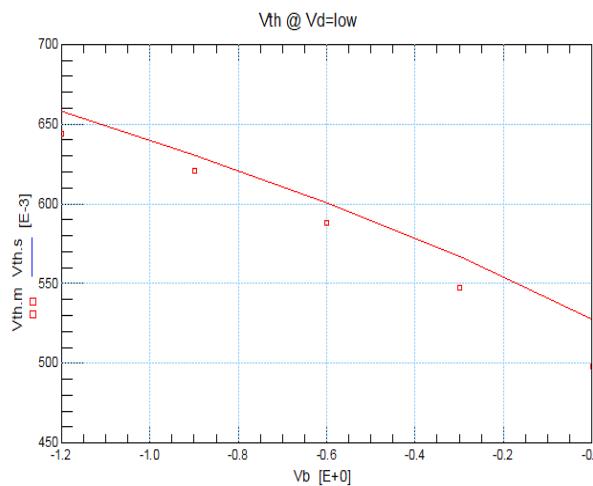
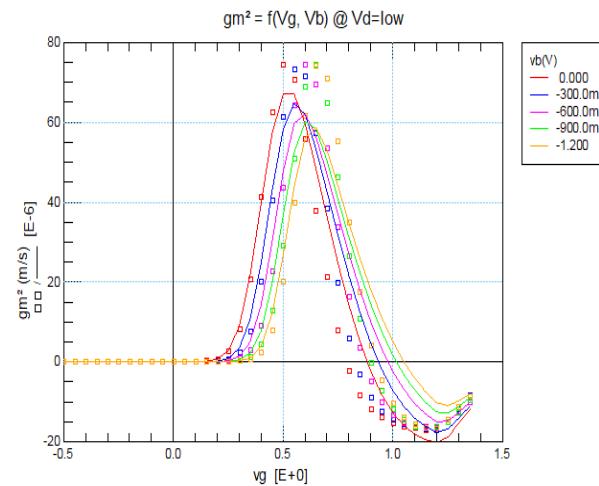
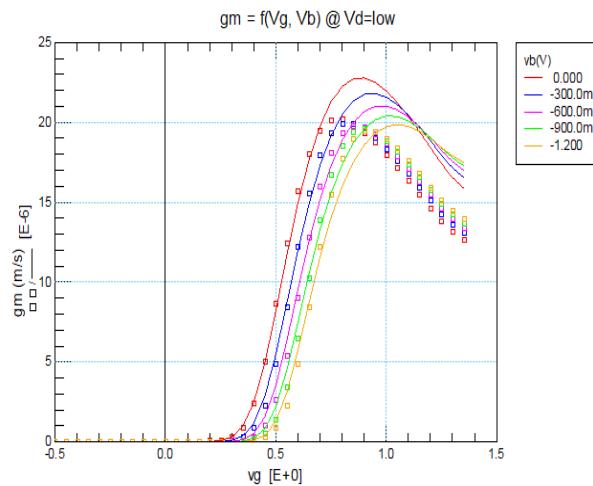
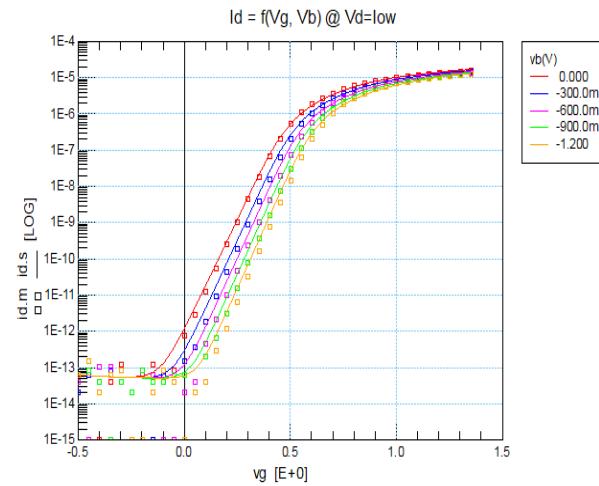
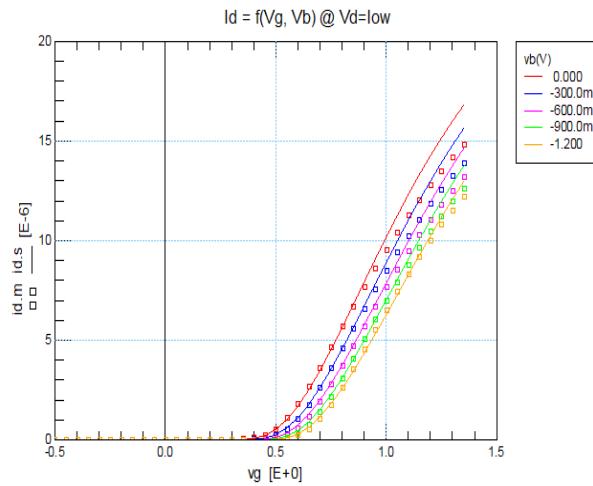
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


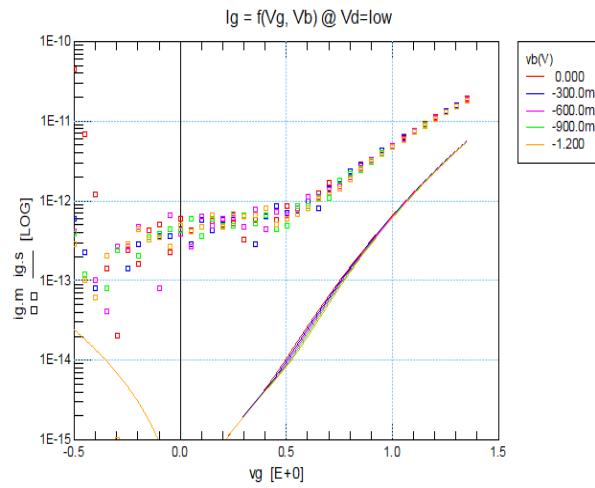
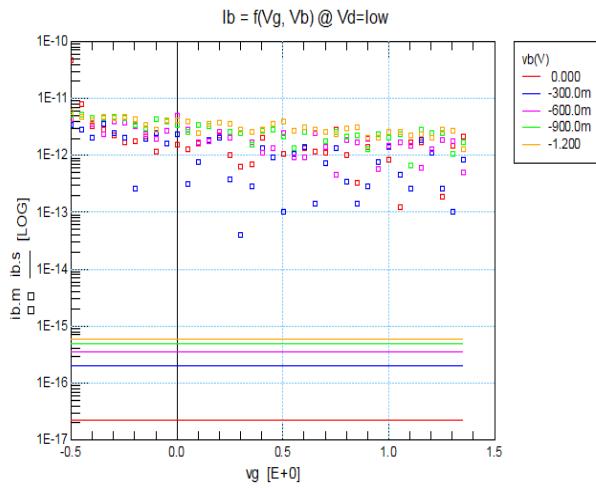
**idvd\_vbmin, Vb = -1.2V, T = 27°C**

**idvd\_vth, Vb = 0V, T = 27°C**




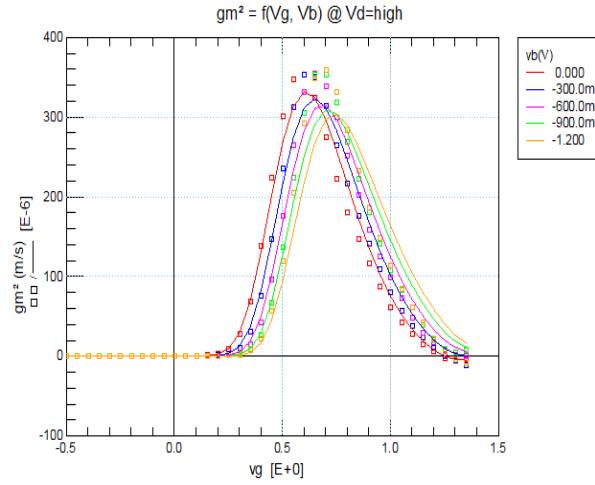
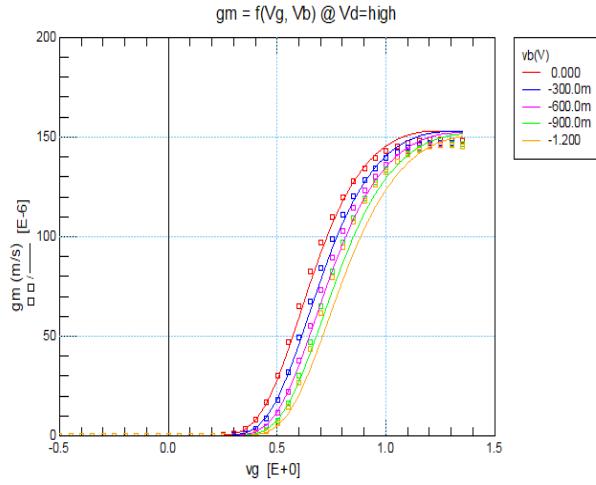
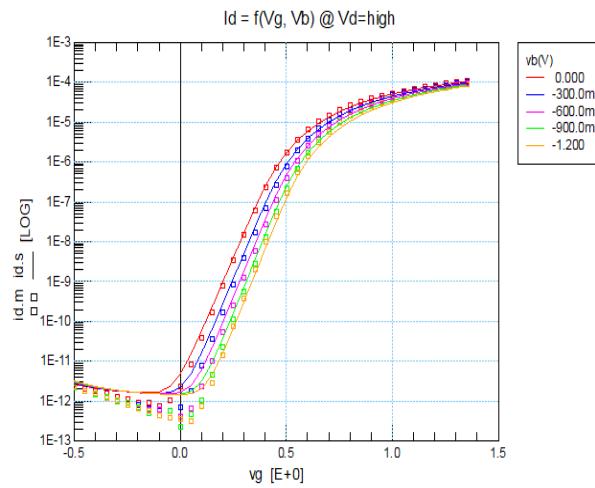
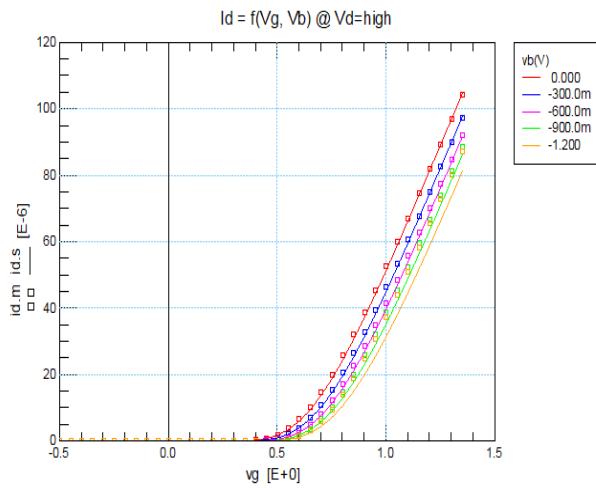
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

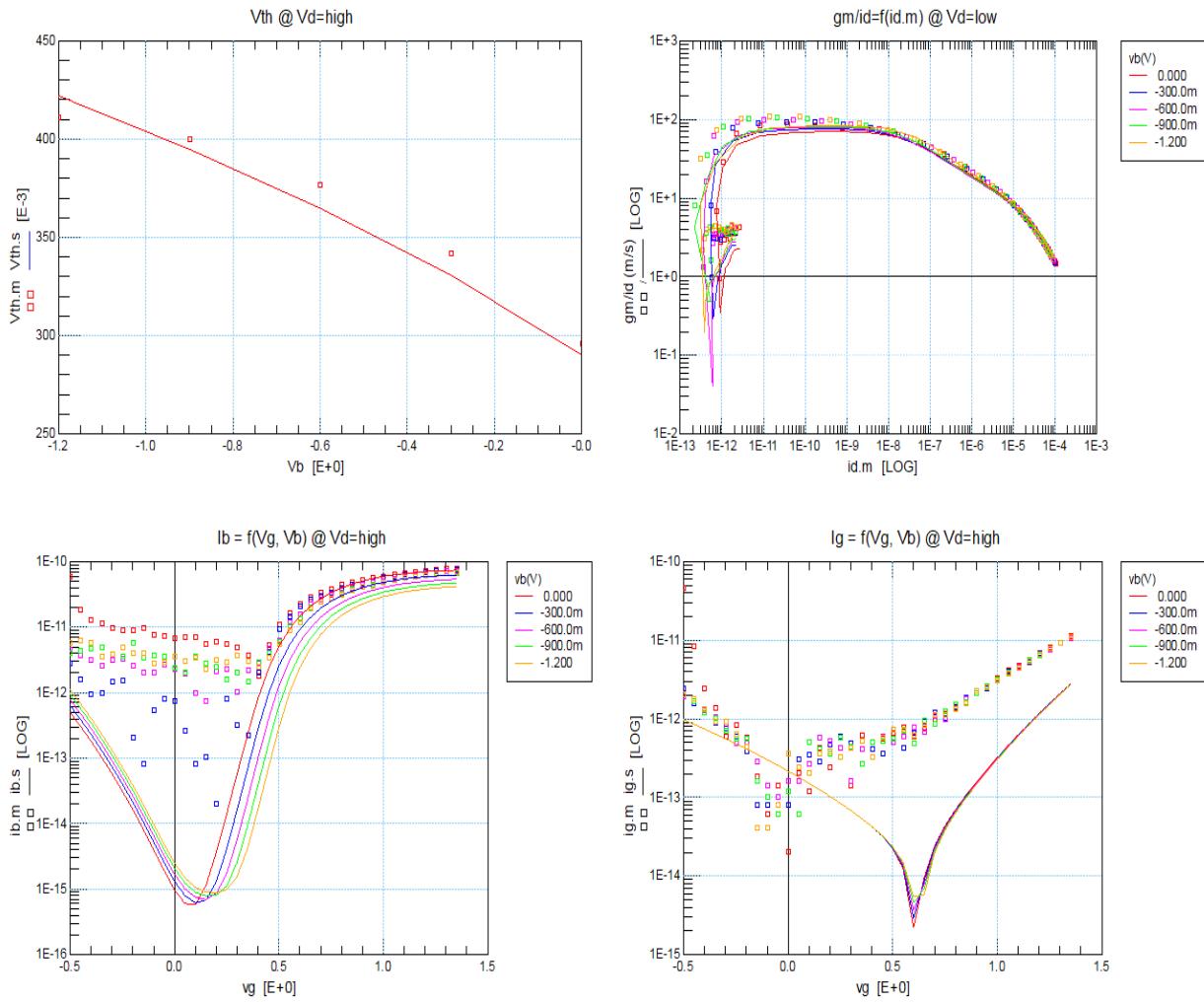


**4.25 W0u18\_L0u14\_S545\_4****idvg, Vd = 0.05V, T = 27°C**

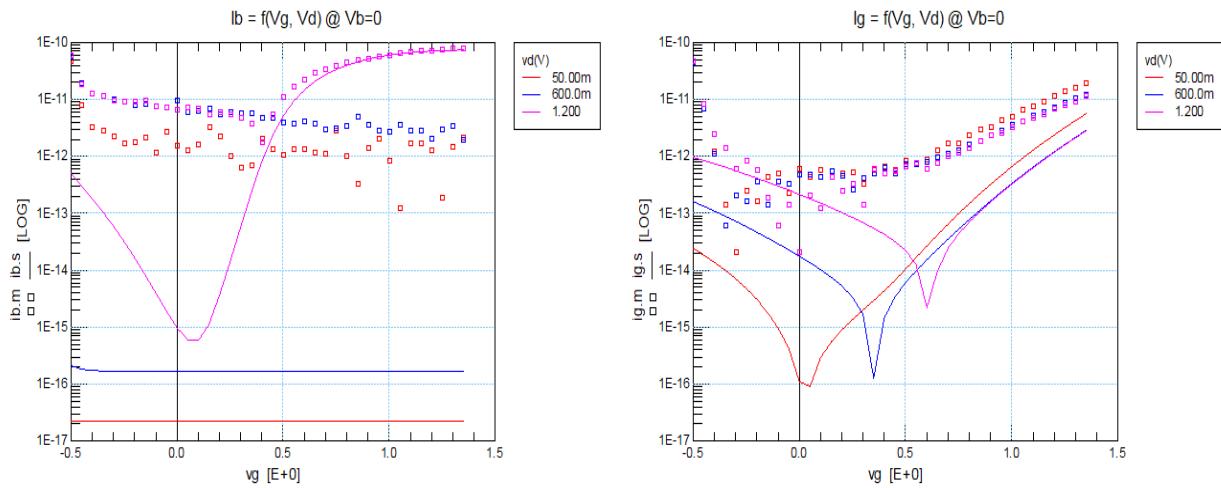


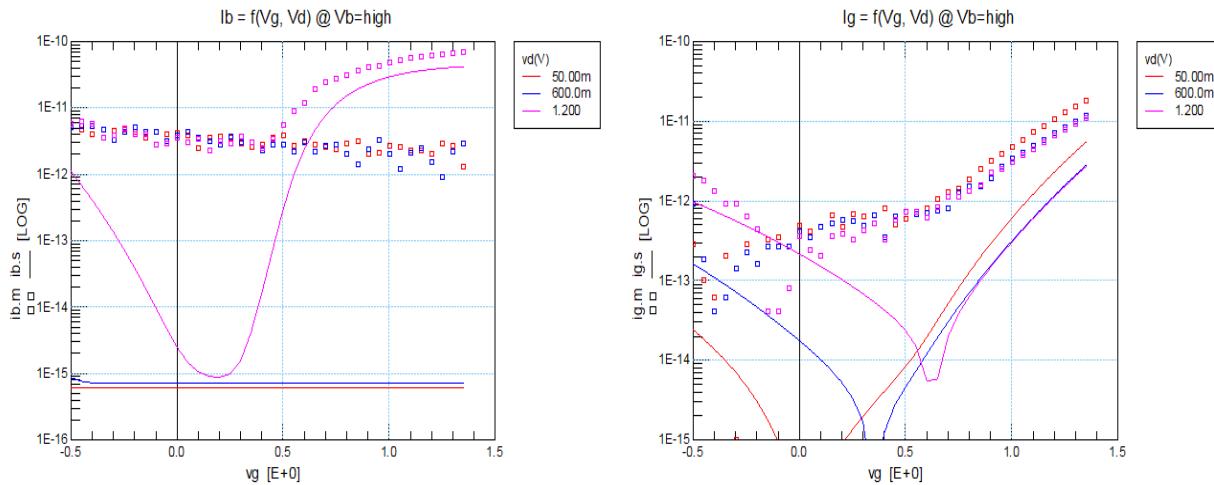
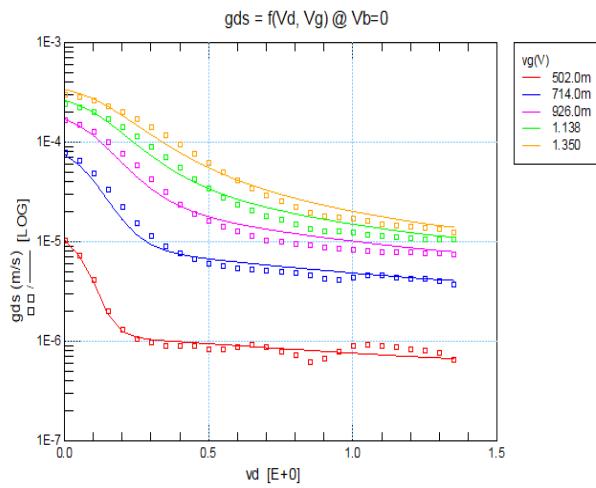
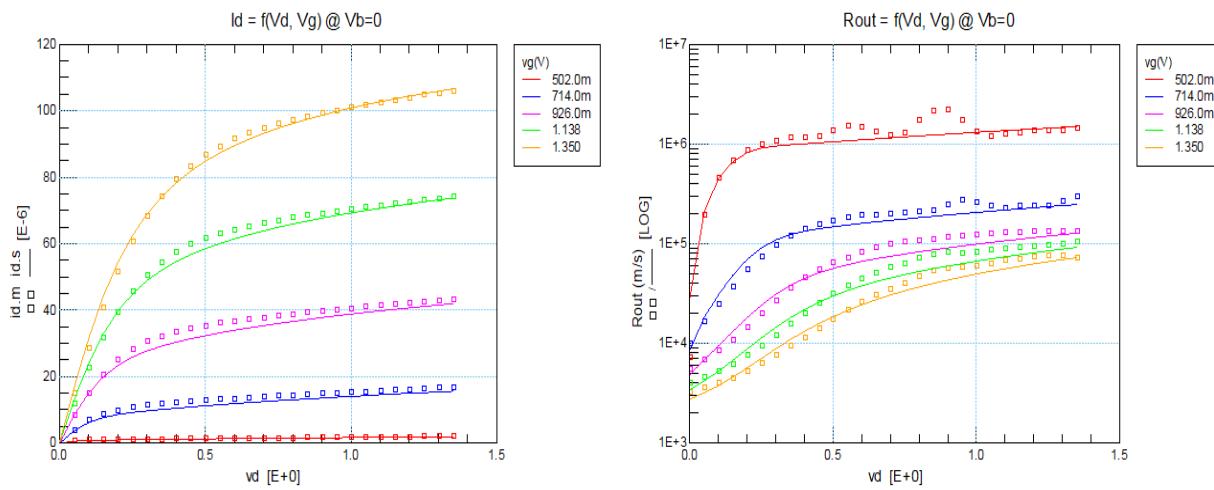
### $i_{dvg}, V_d = 1.2V, T = 27^\circ C$

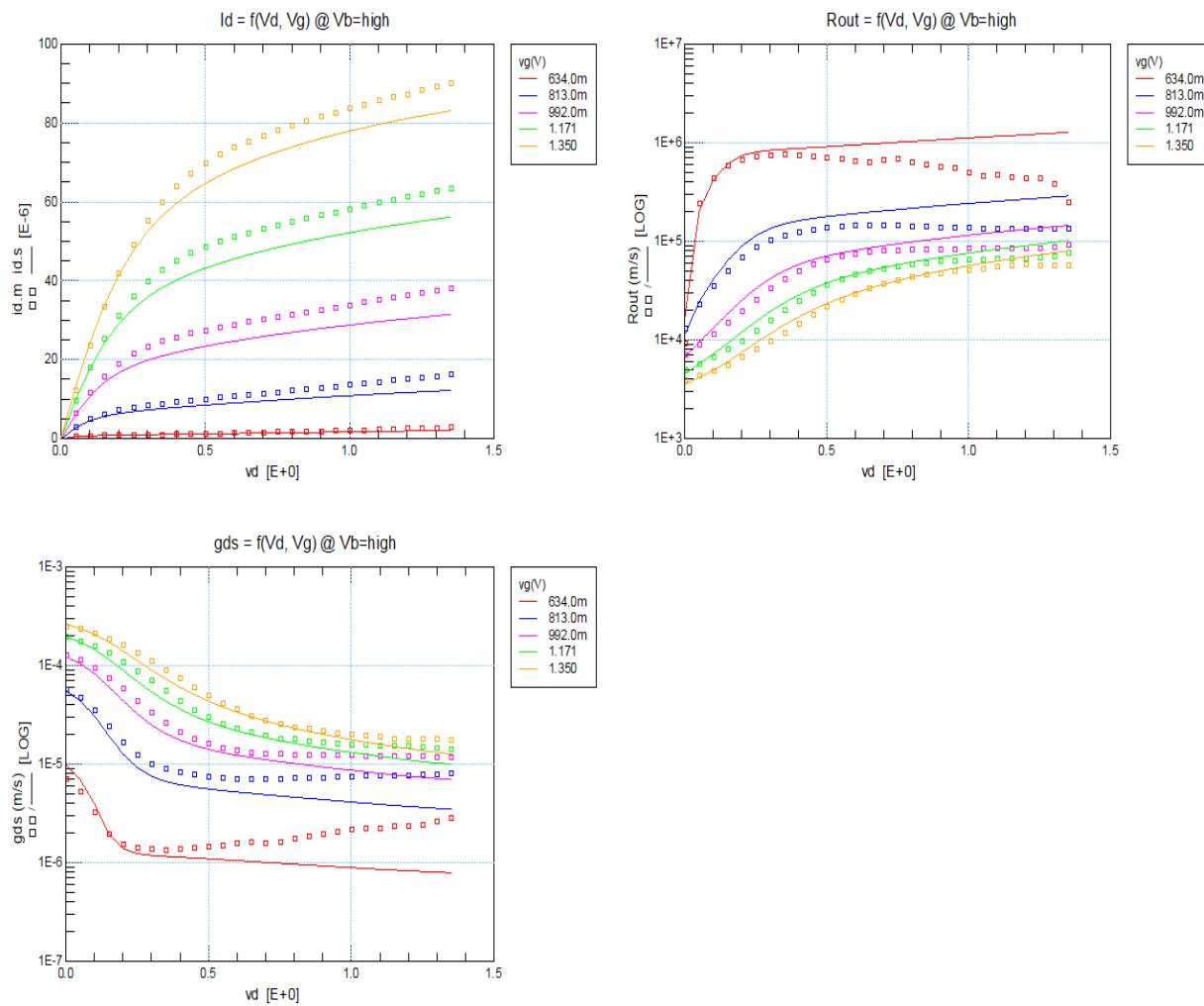
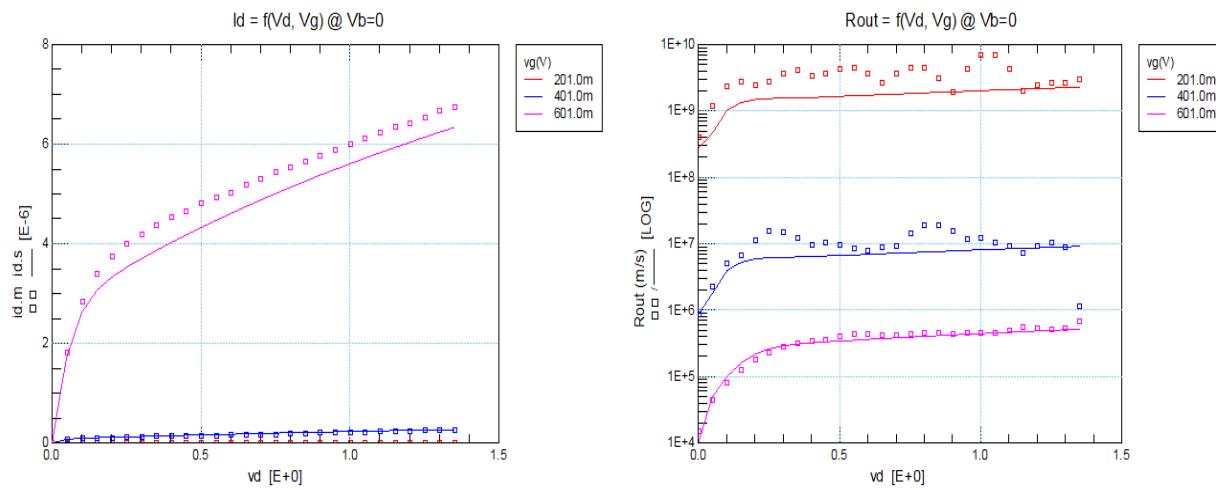


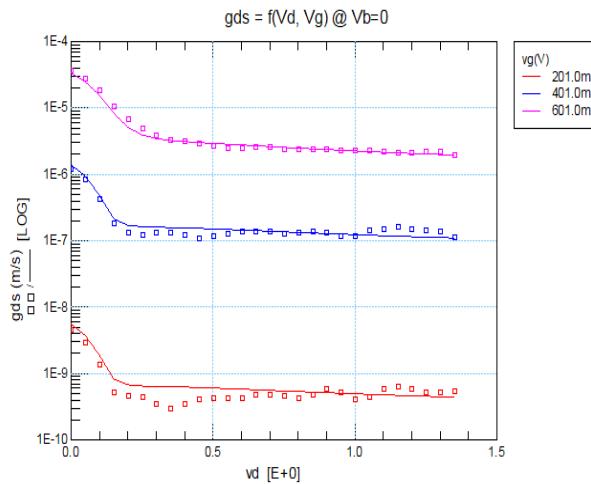


$idvg, I_b, Ig, V_b = 0V, T = 27^\circ C$

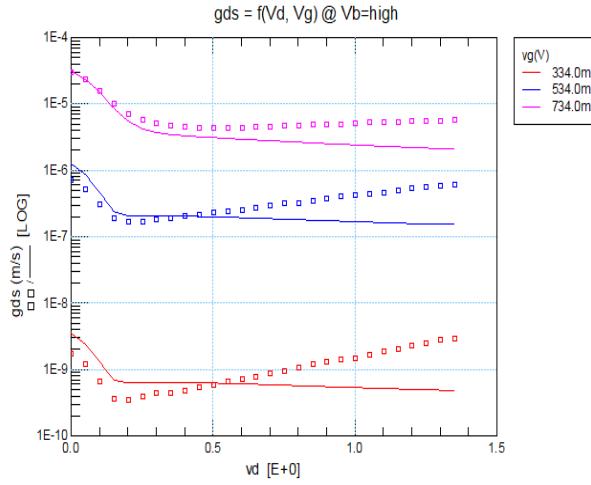
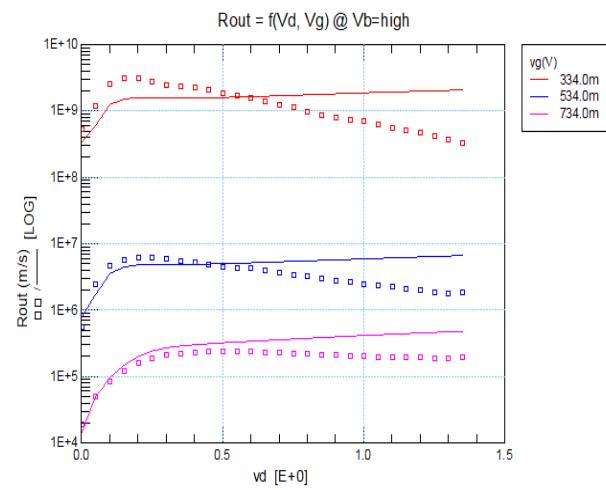
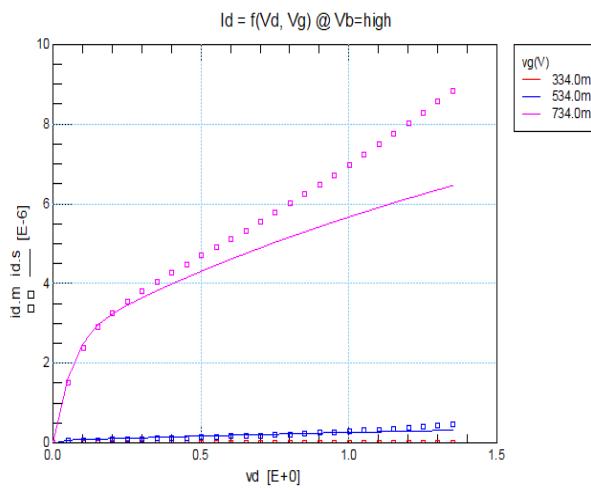


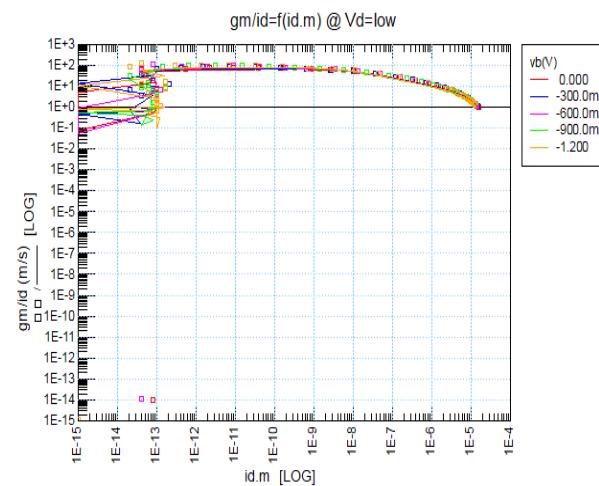
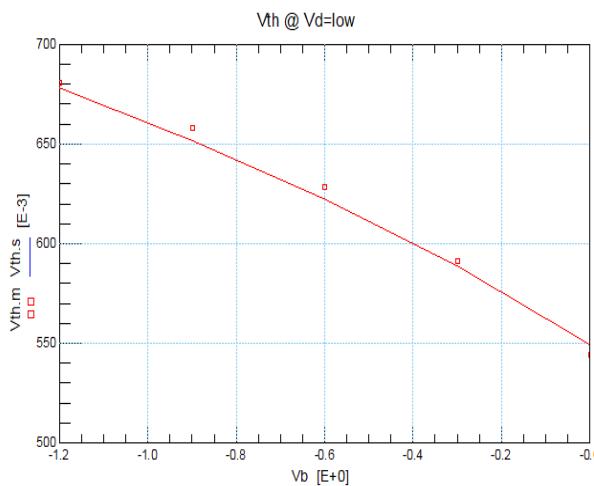
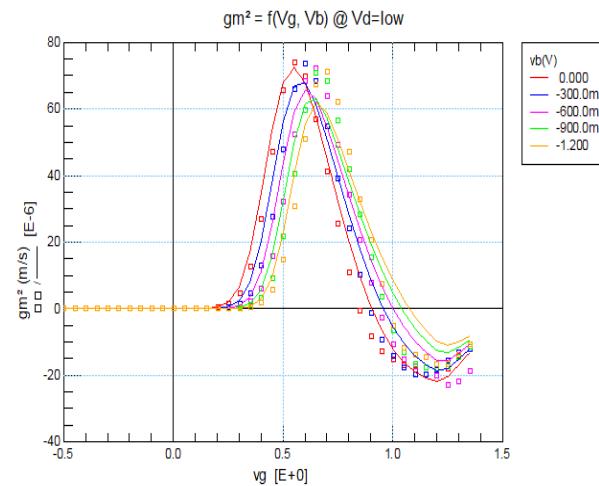
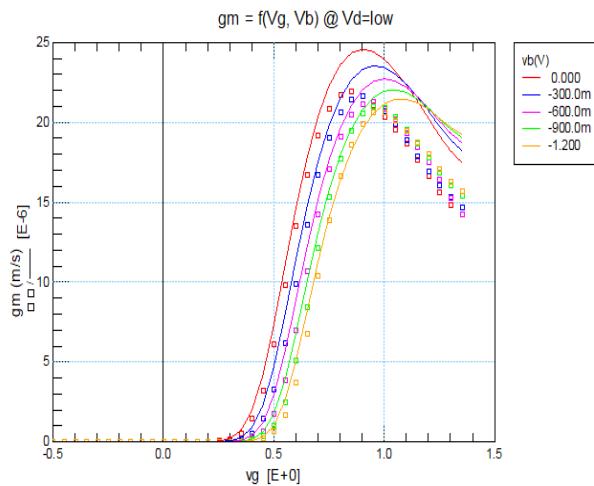
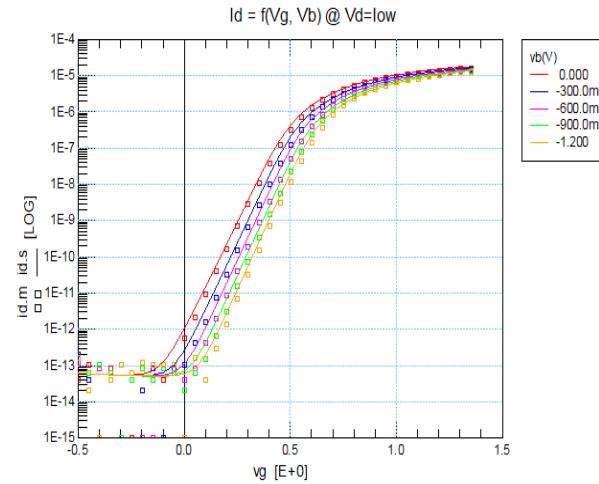
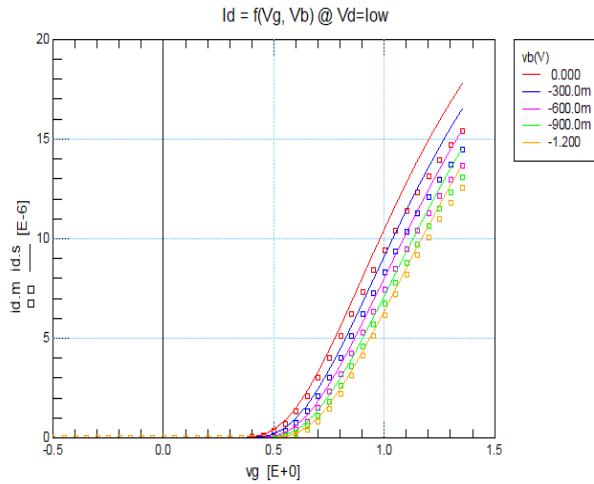
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


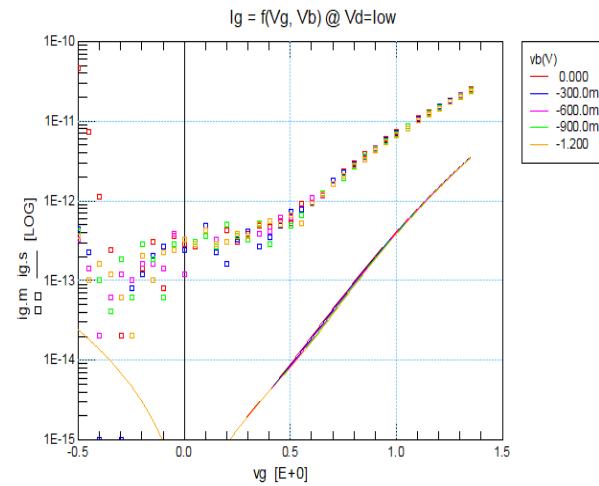
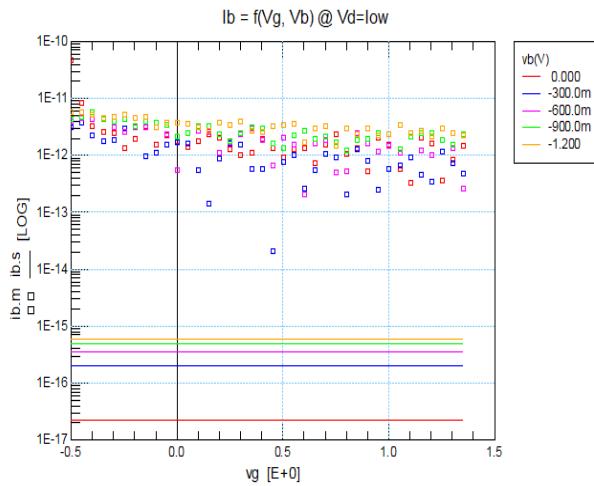
**idvd\_vbmin, Vb = -1.2V, T = 27°C****idvd\_vth, Vb = 0V, T = 27°C**



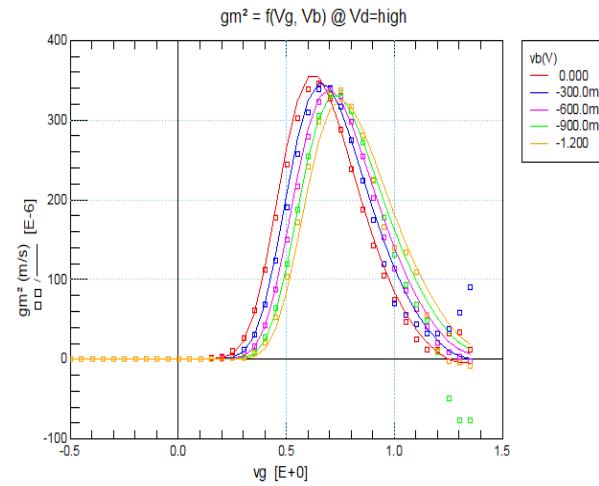
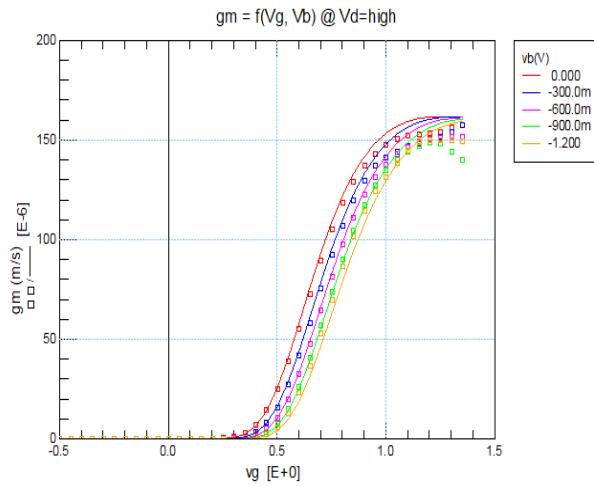
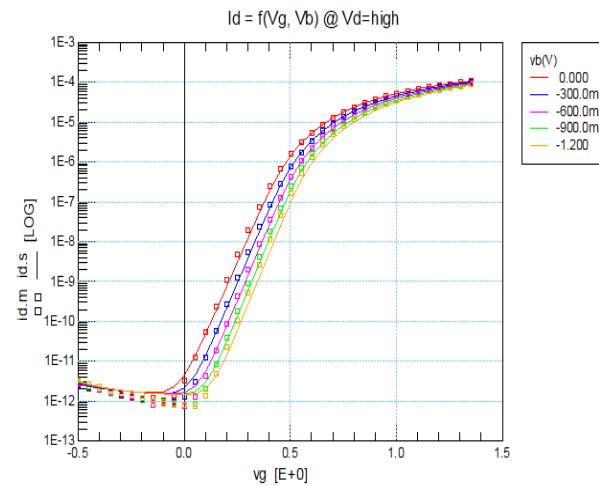
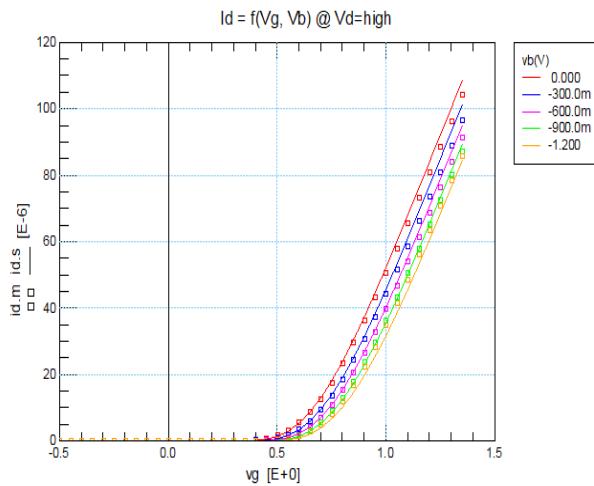
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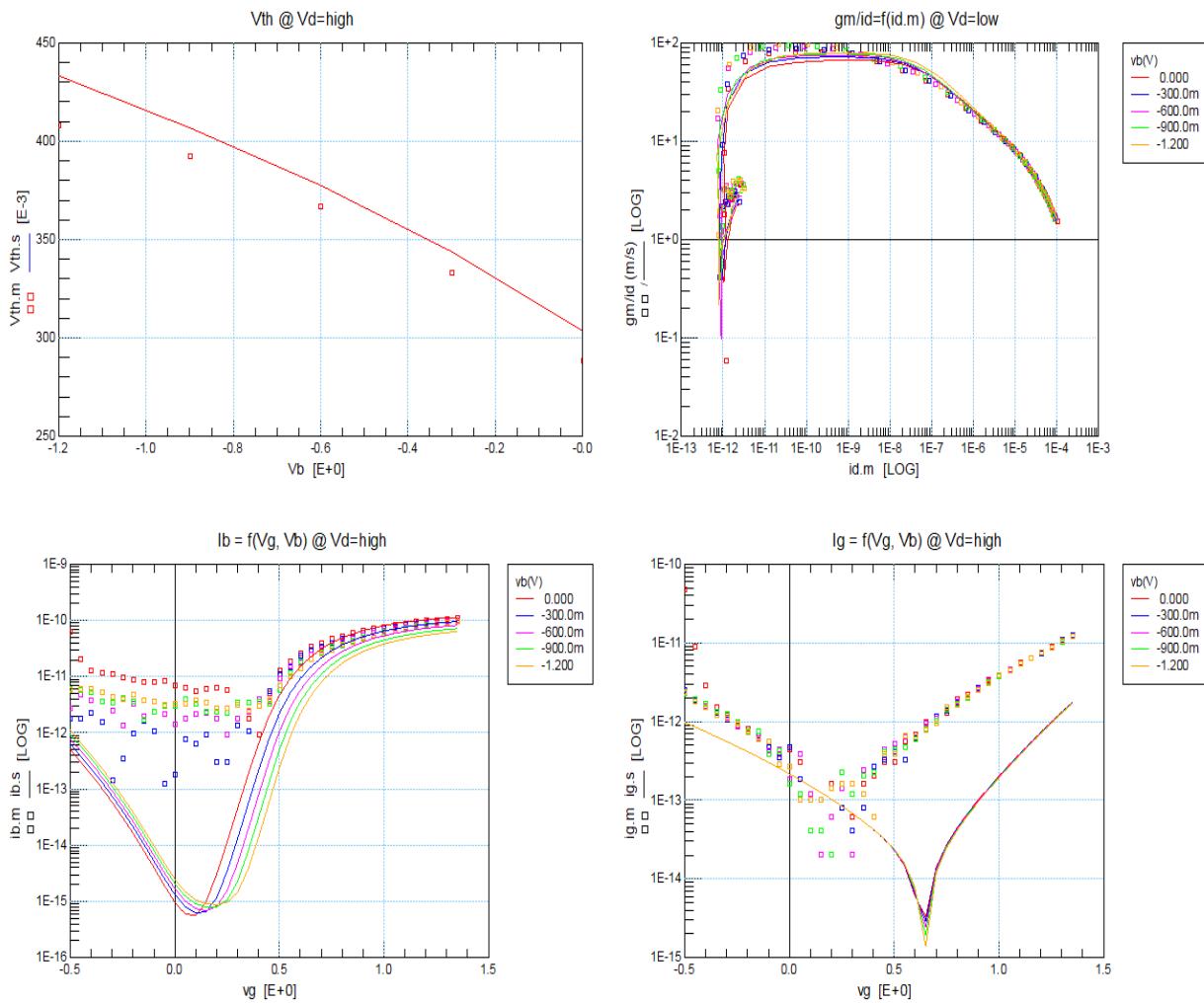


**4.26 W0u18\_L0u13\_S545\_3****idvg, Vd = 0.05V, T = 27°C**

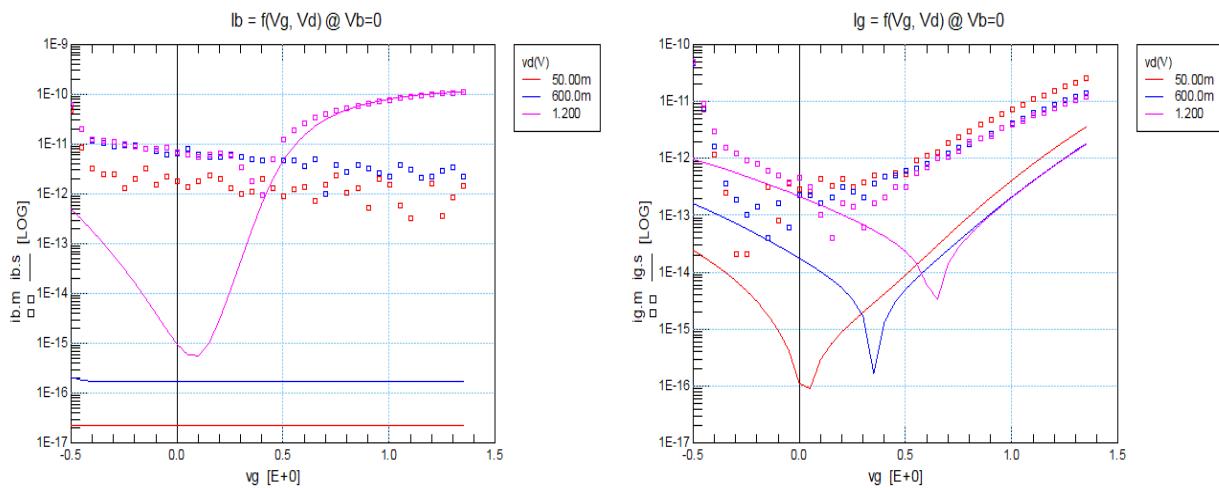


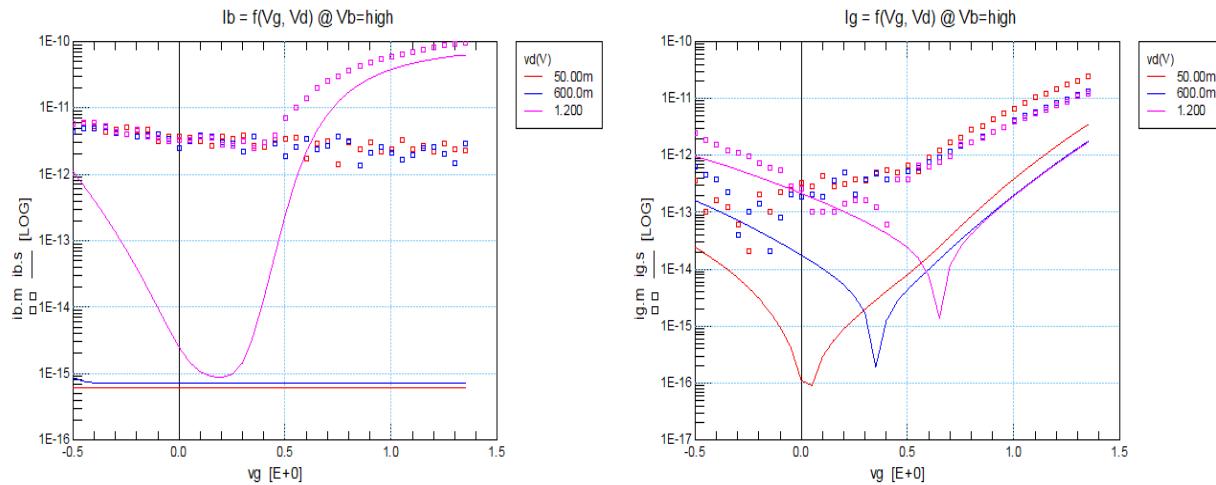
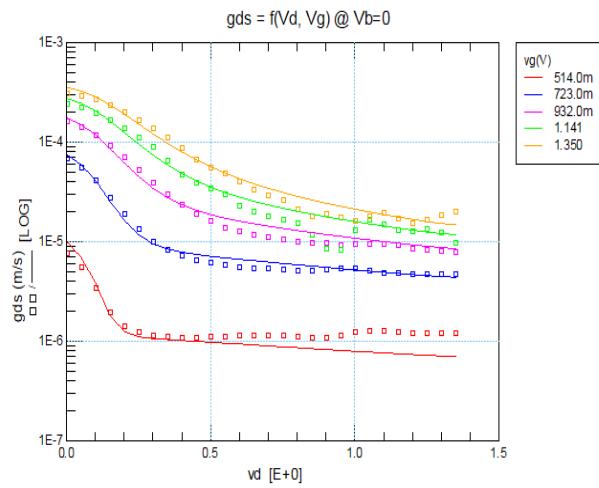
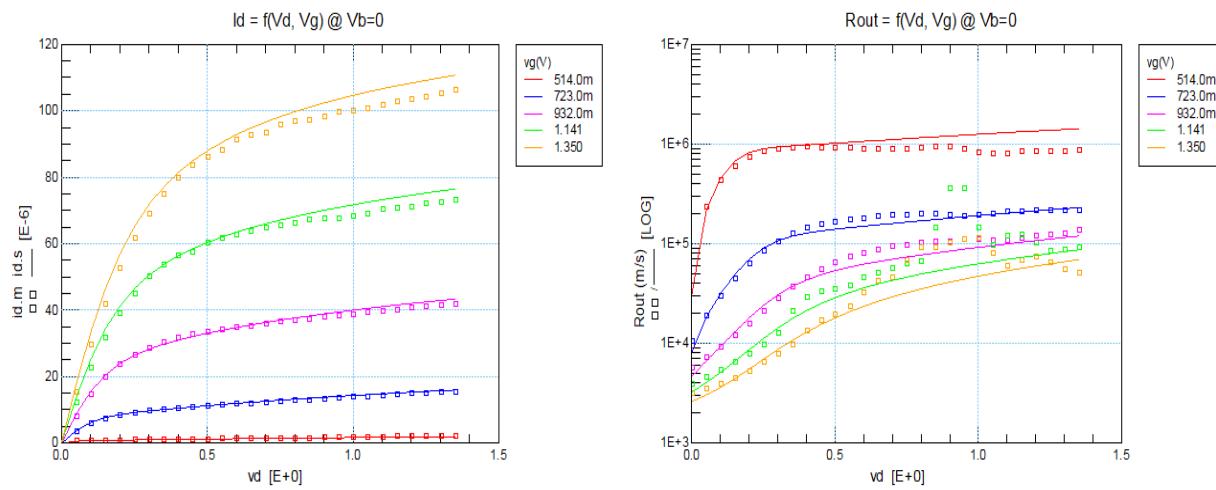
### $i_{dvg}, V_d = 1.2V, T = 27^\circ C$

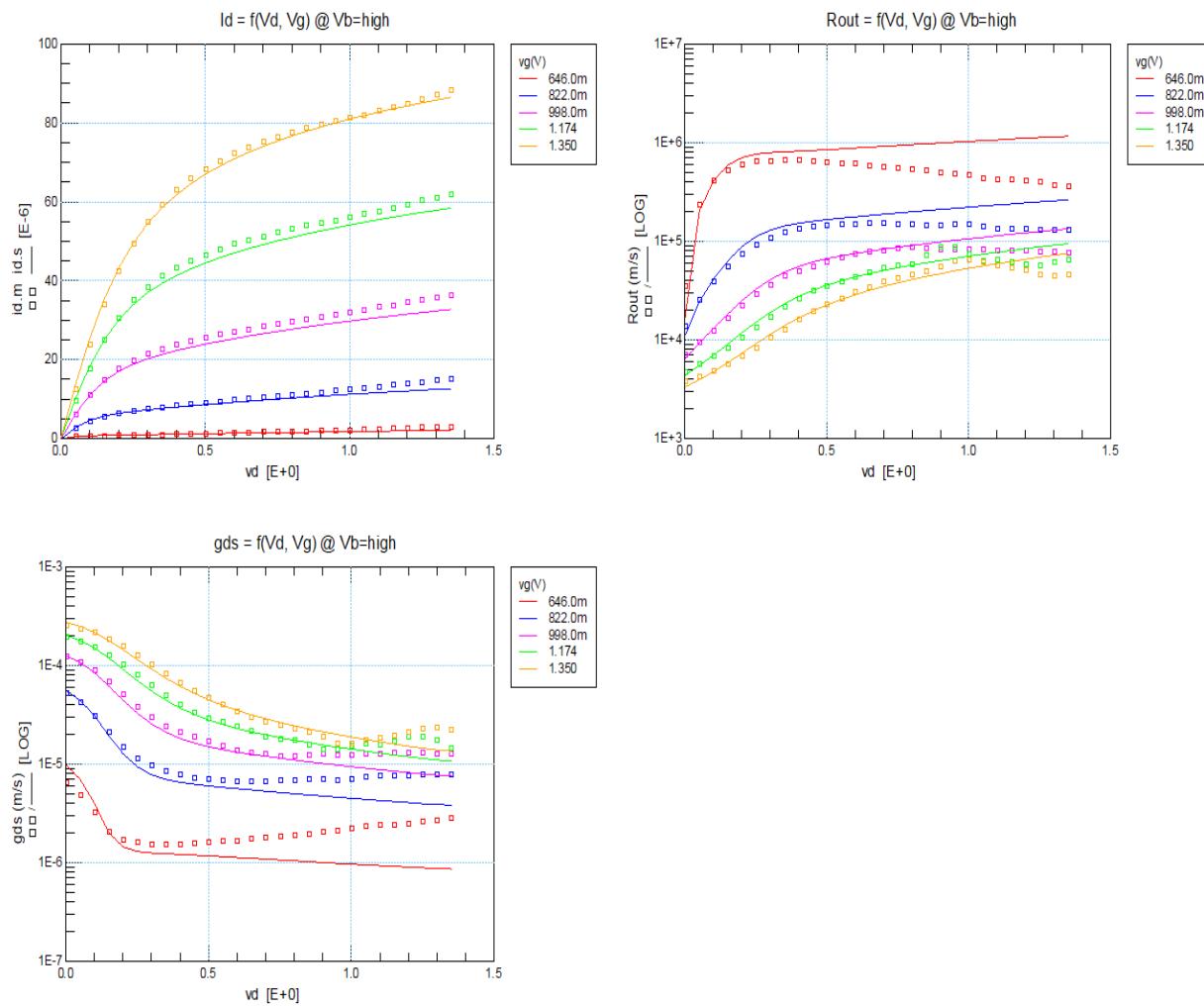
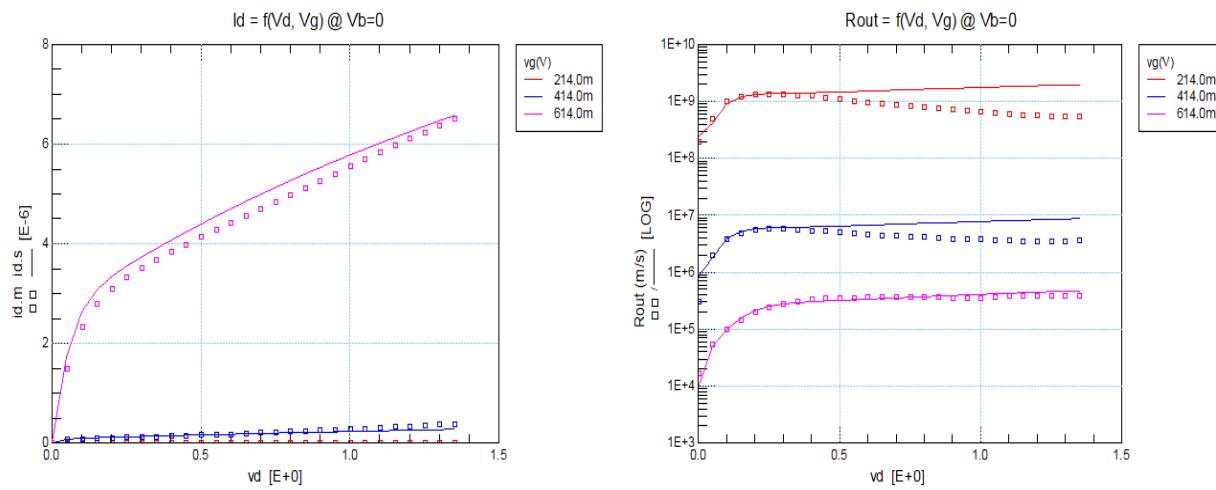


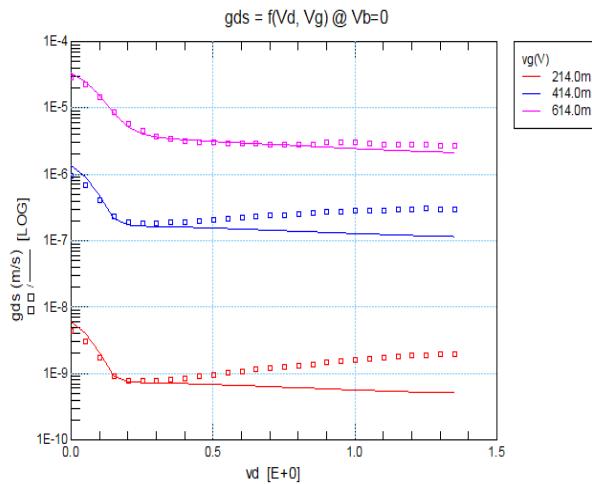


$idvg, Ib, Ig, Vb = 0V, T = 27^\circ C$

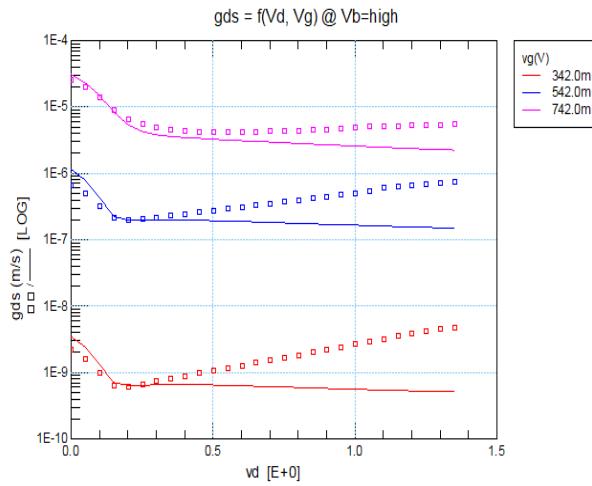
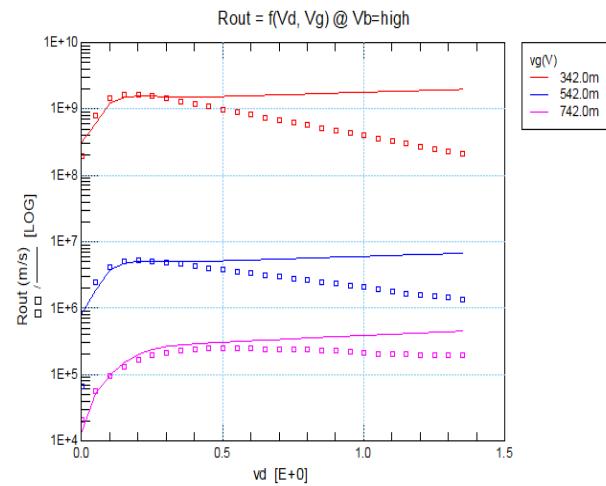
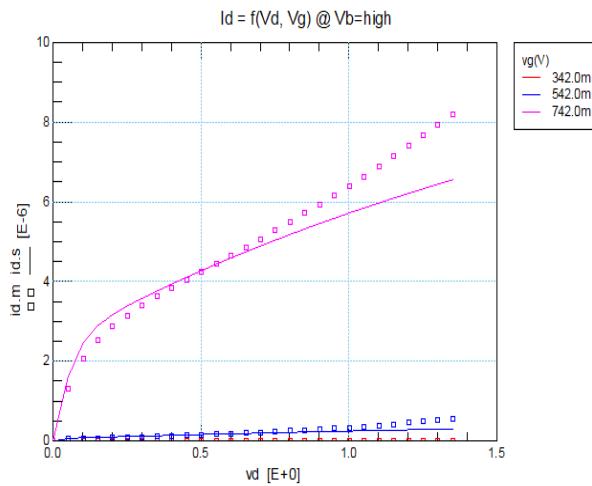


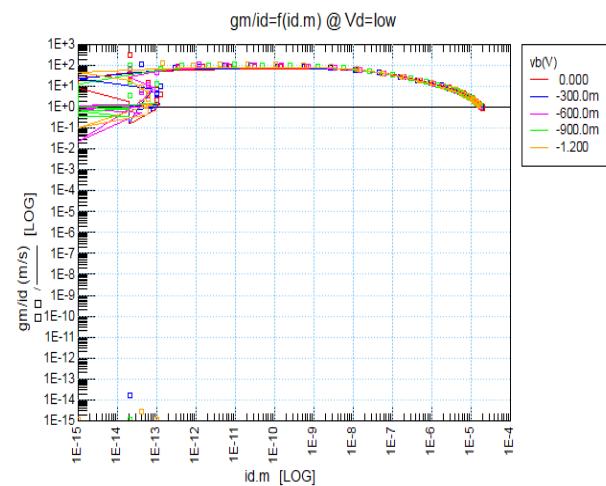
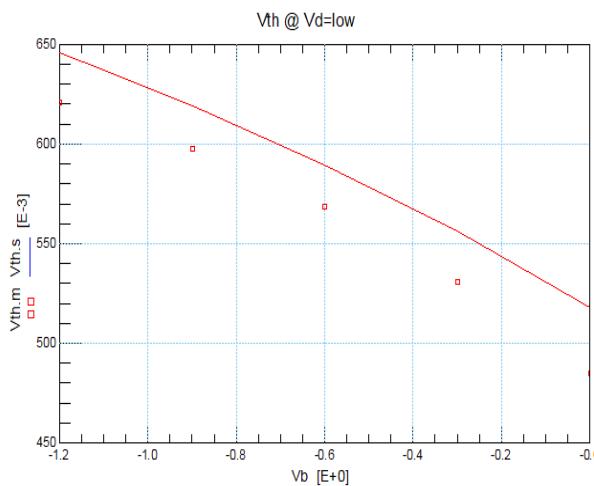
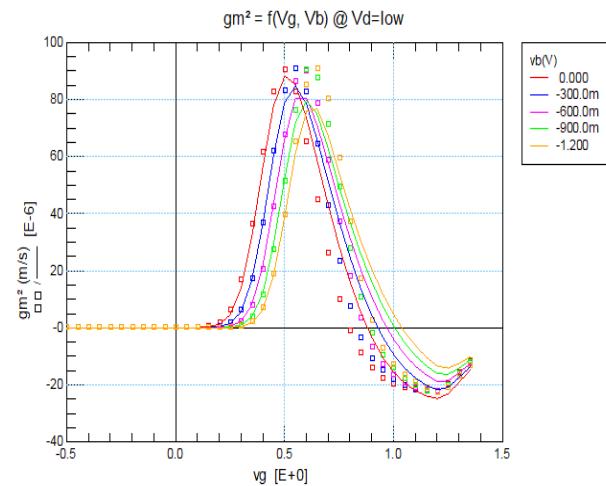
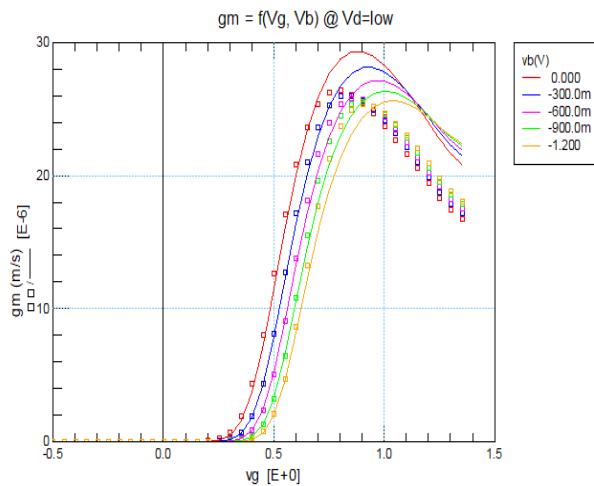
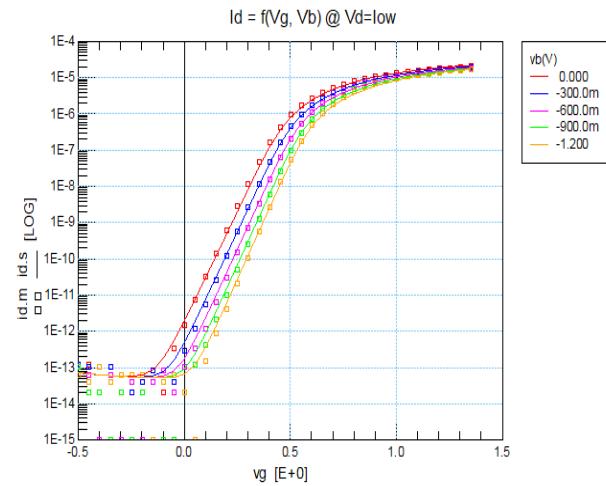
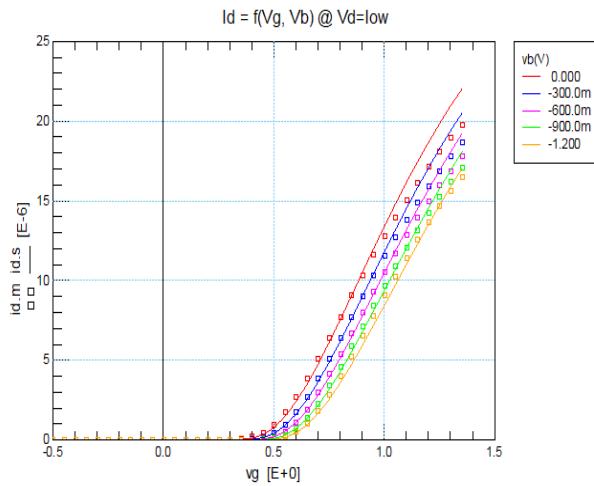
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


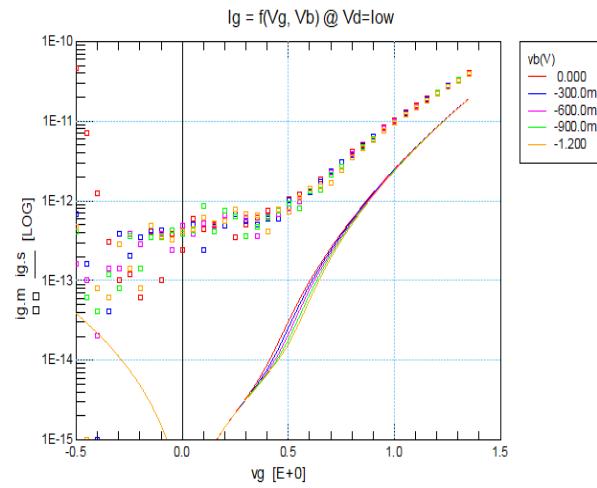
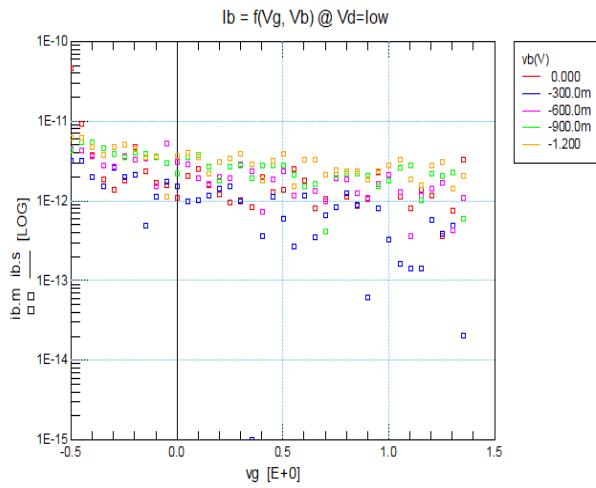
**idvd\_vbmin, Vb = -1.2V, T = 27°C**

**idvd\_vth, Vb = 0V, T = 27°C**




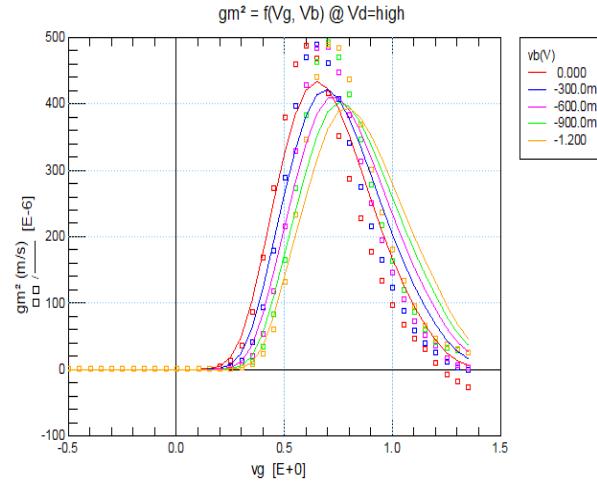
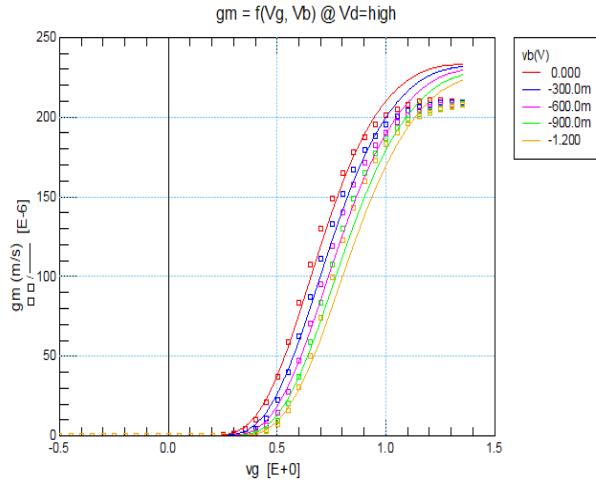
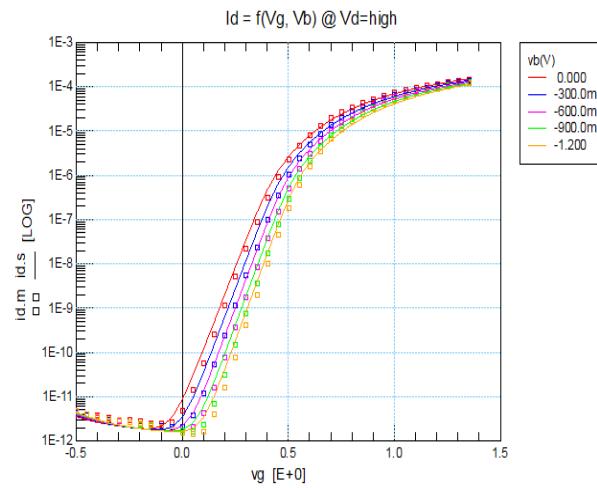
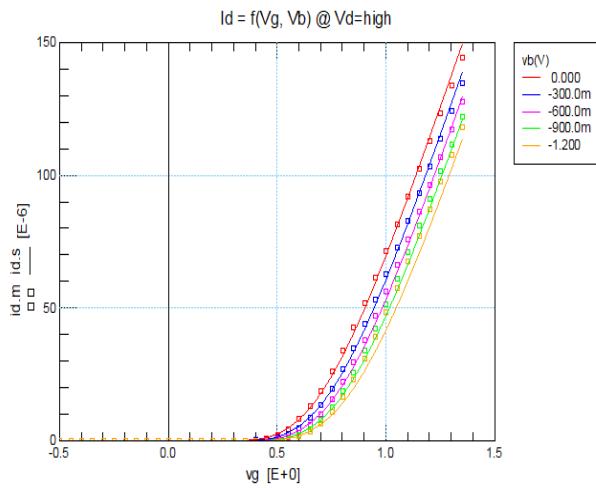
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

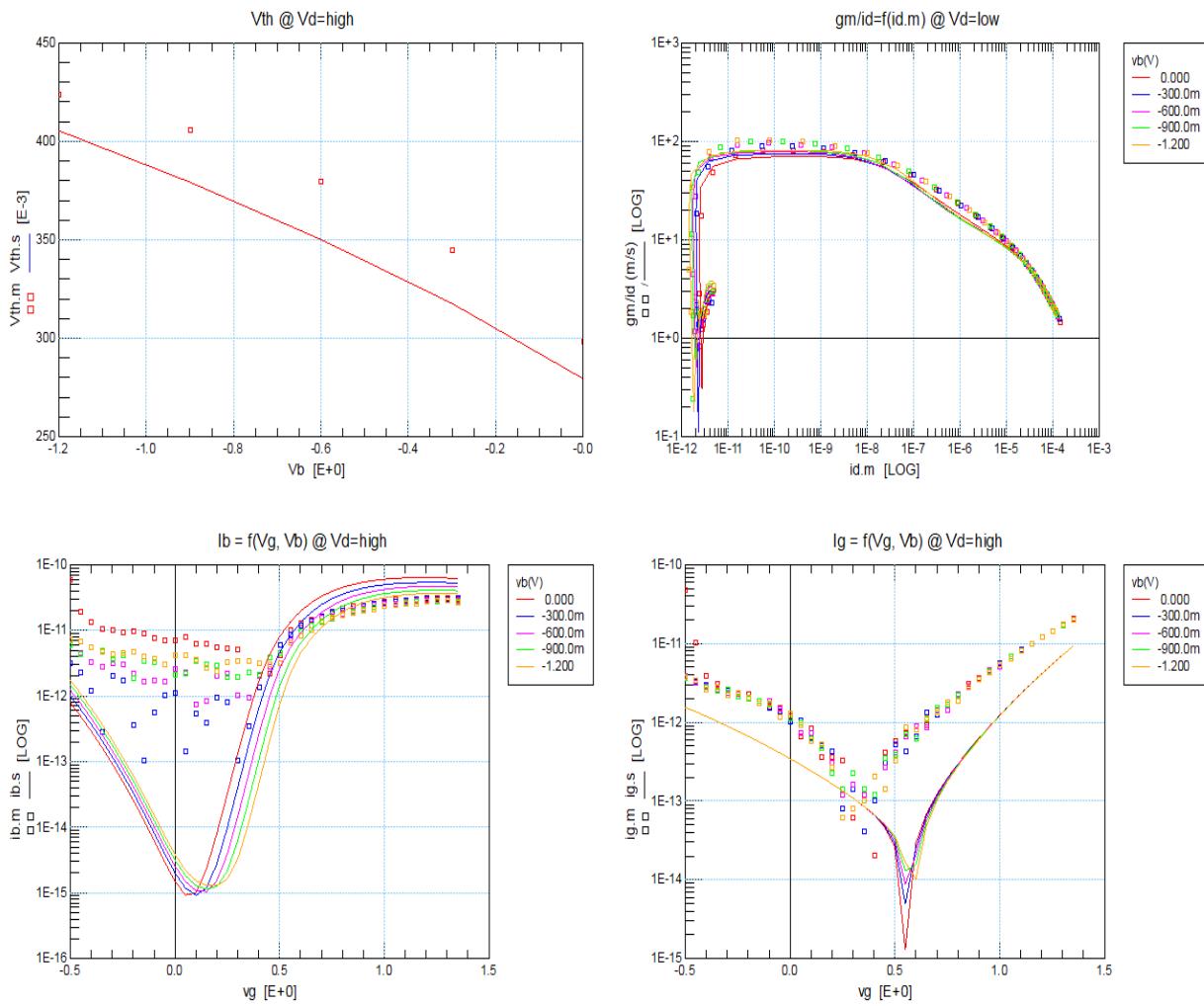


**4.27W0u3\_L0u15\_S544\_4****idvg, Vd = 0.05V, T = 27°C**

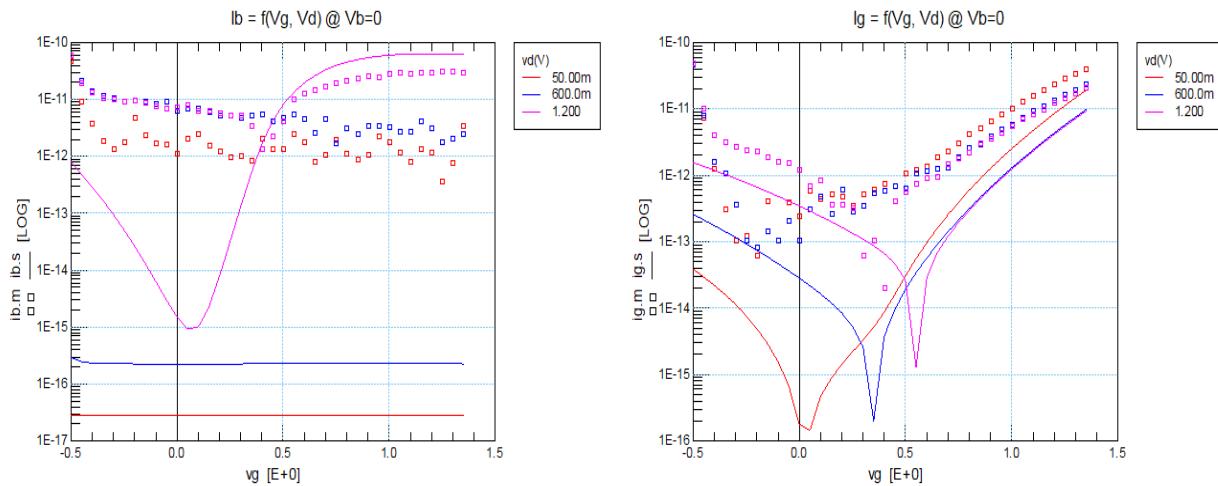


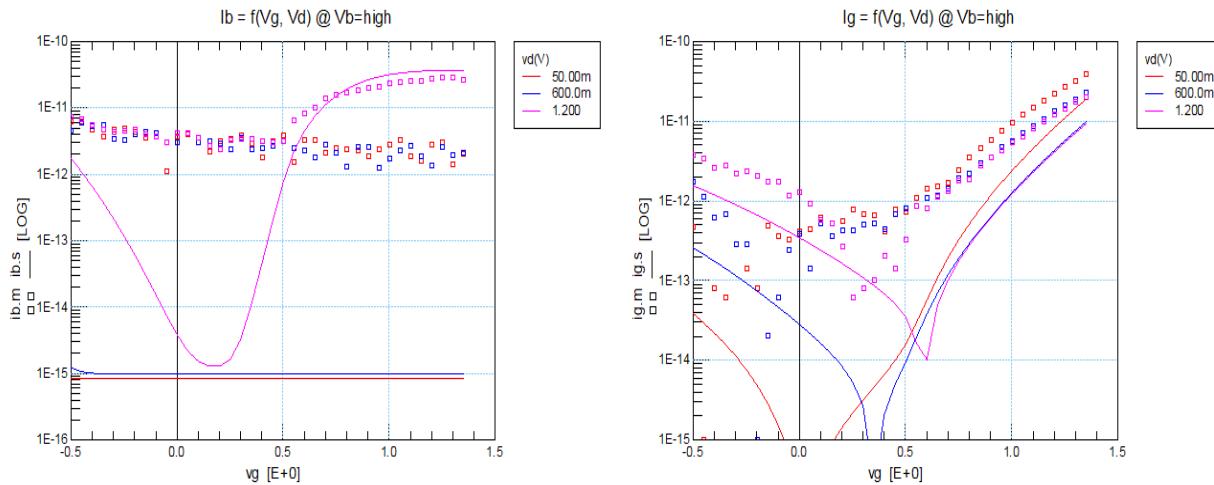
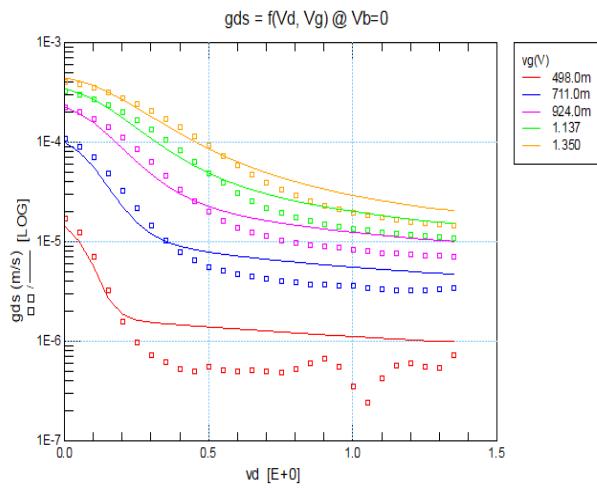
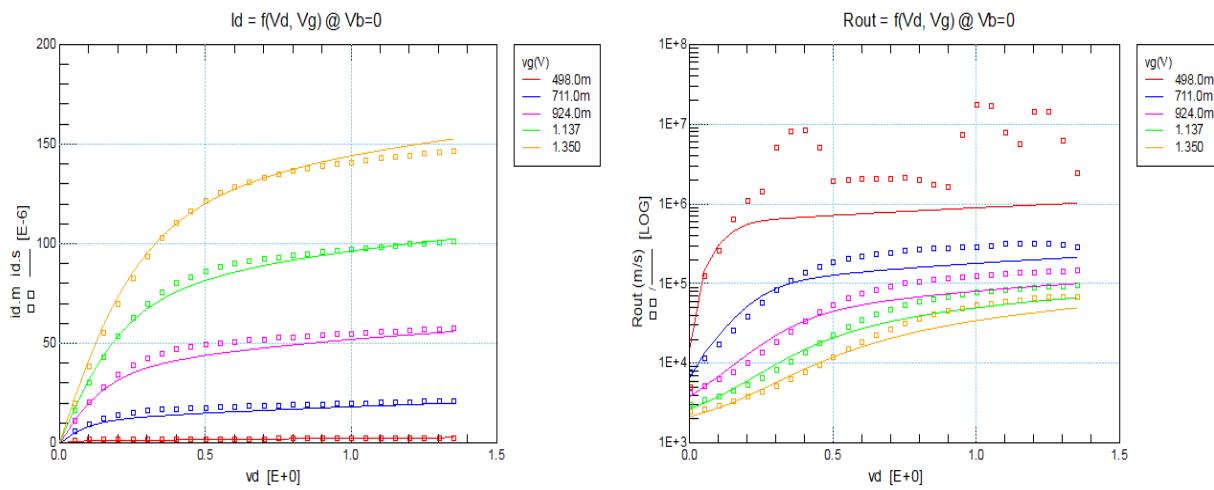
### $i_{dvg}, V_d = 1.2V, T = 27^\circ C$

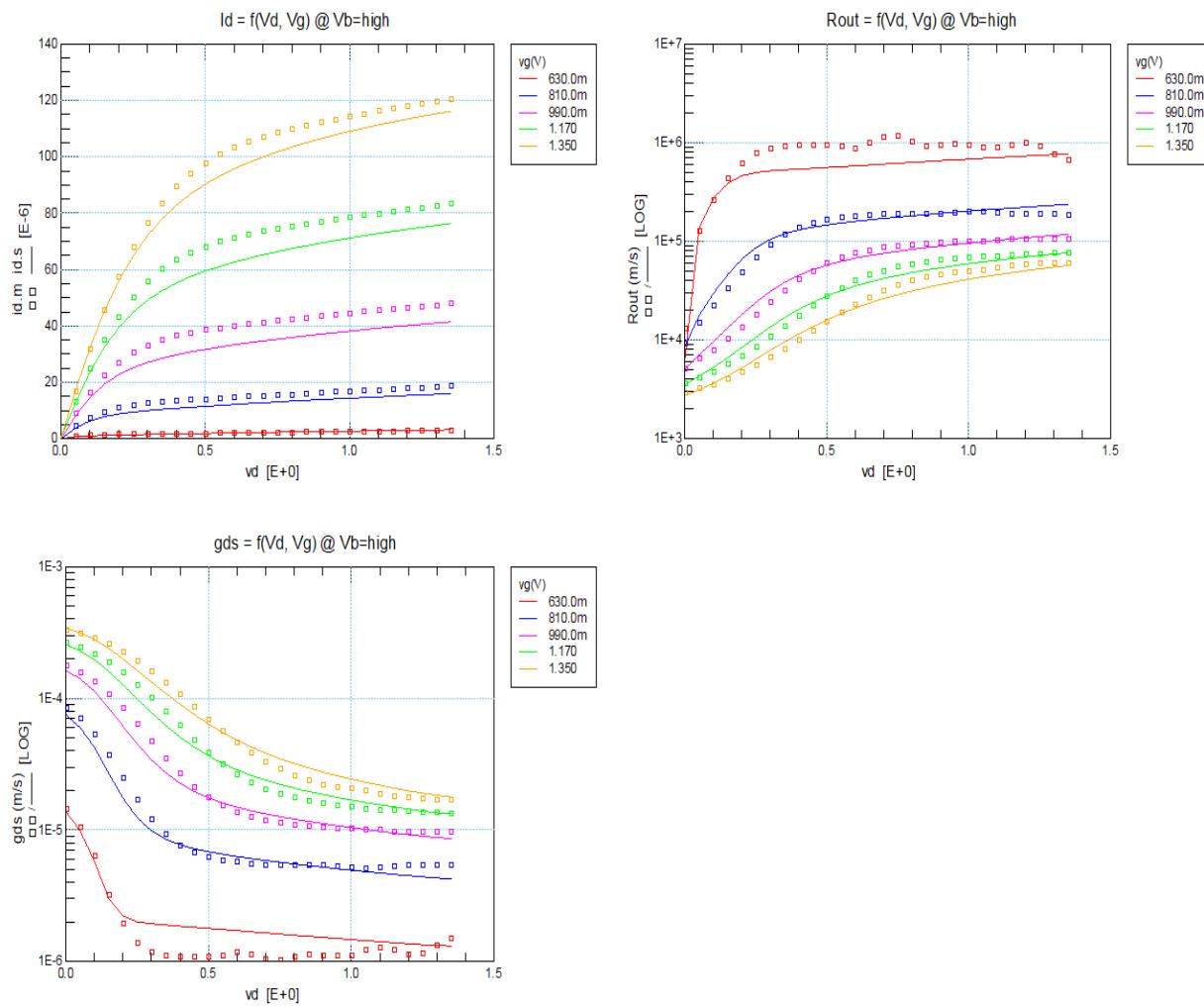
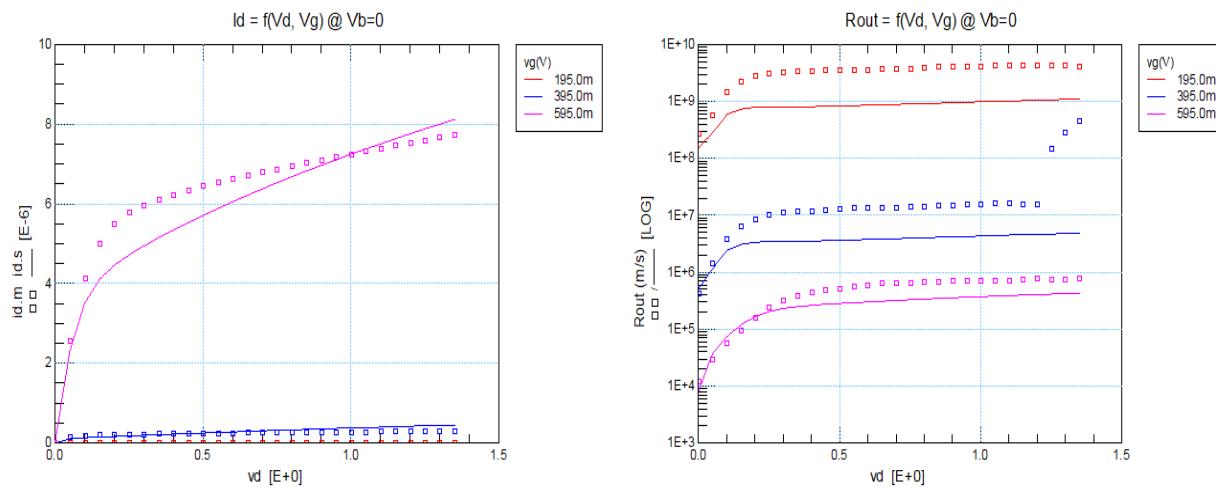


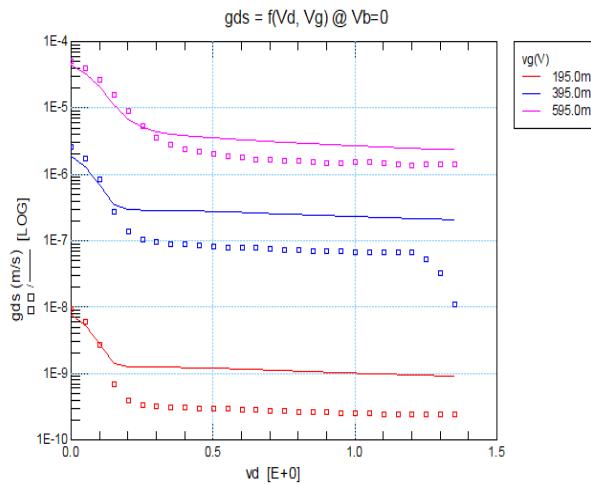


### $i_{dvg}, I_b, I_g, V_b = 0V, T = 27^\circ C$

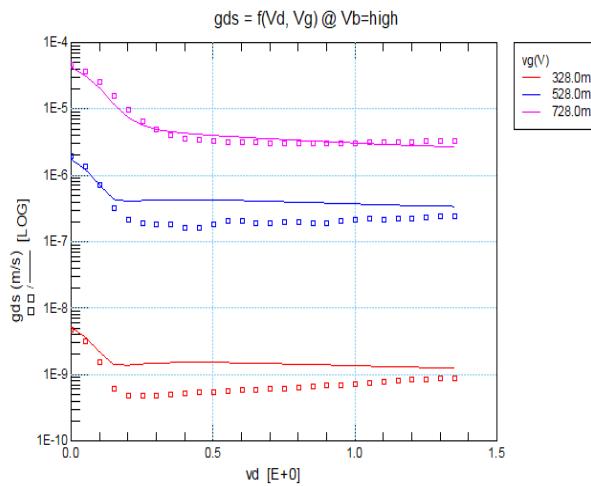
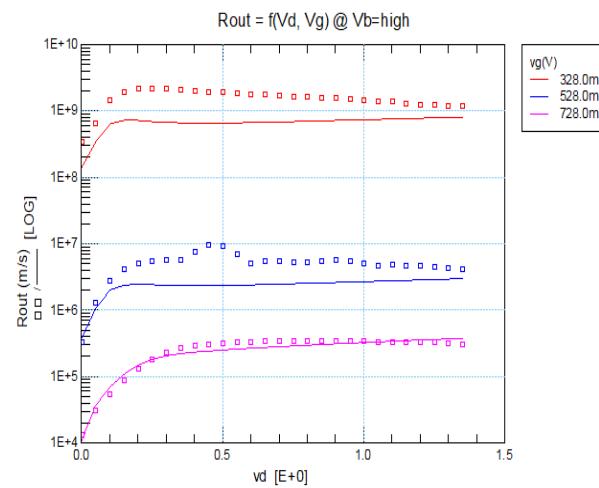
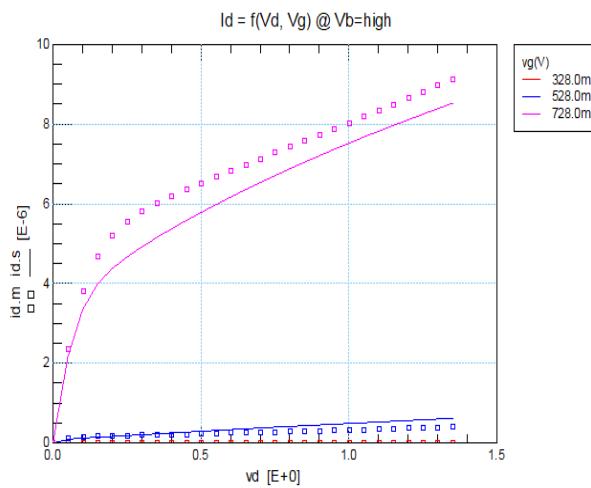


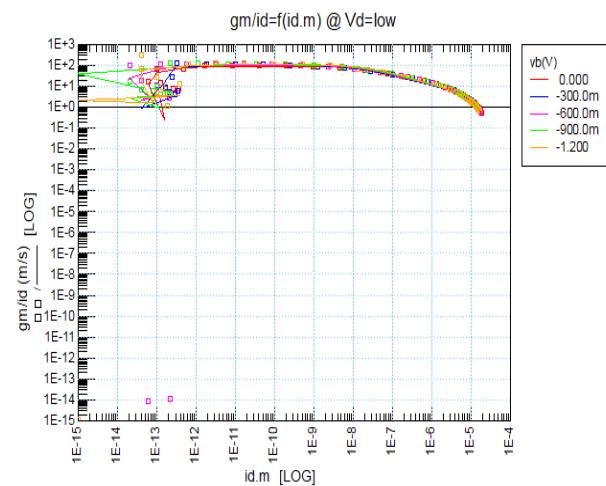
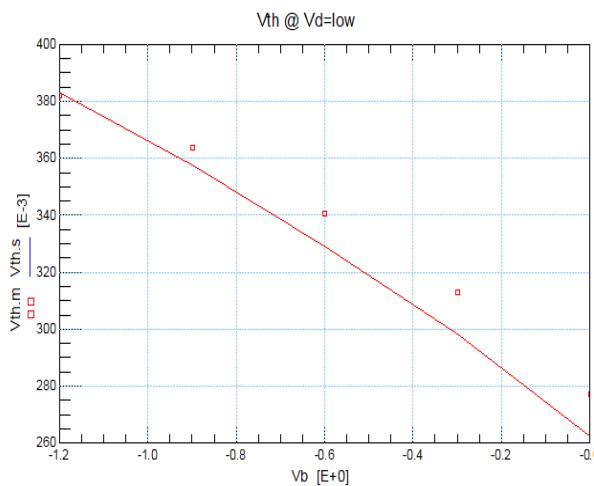
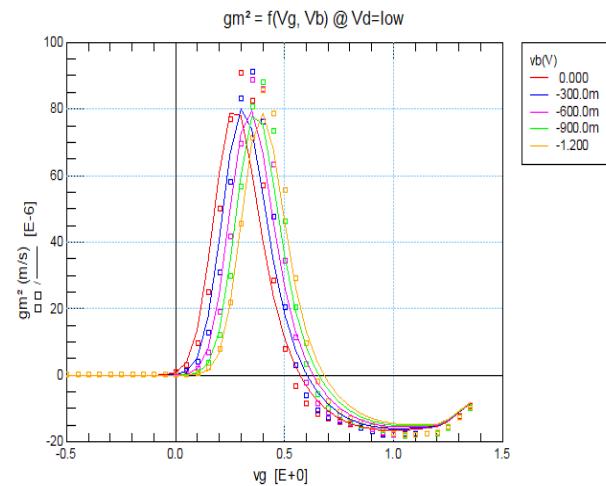
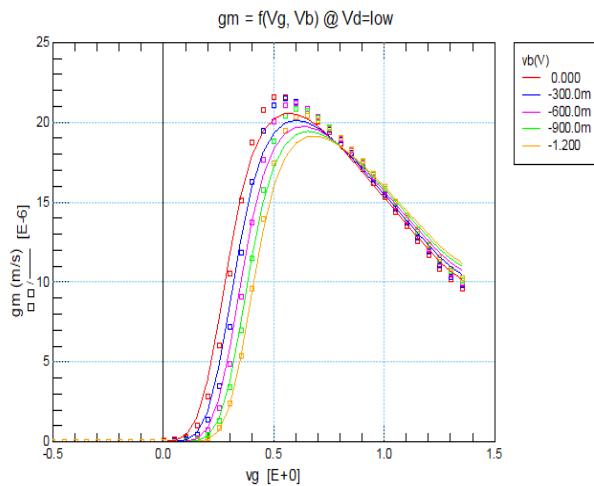
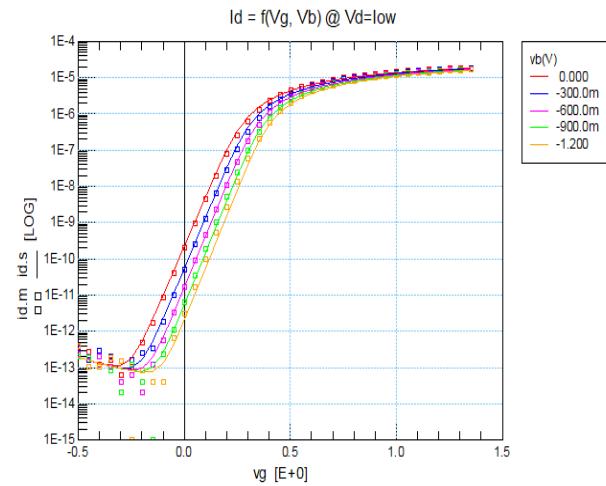
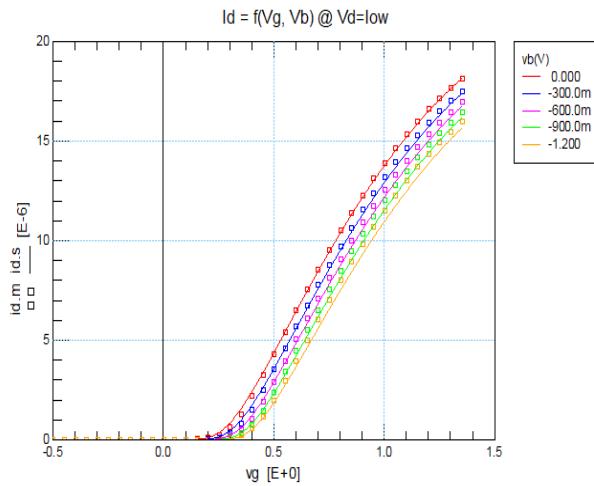
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


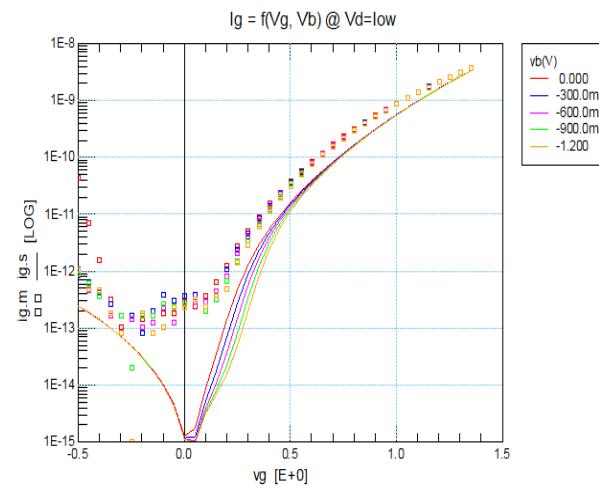
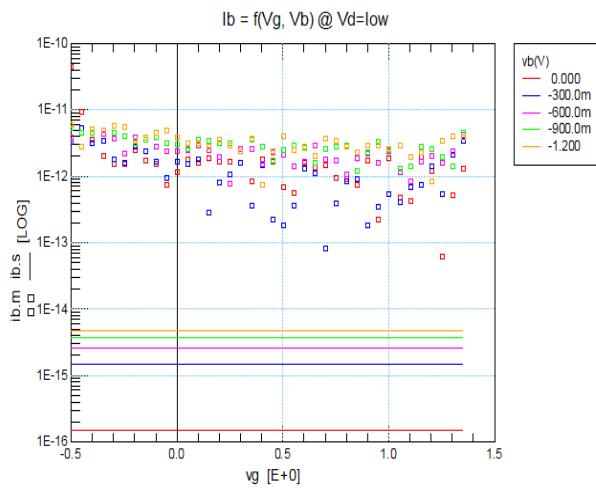
**idvd\_vbmin, Vb = -1.2V, T = 27°C**

**idvd\_vth, Vb = 0V, T = 27°C**




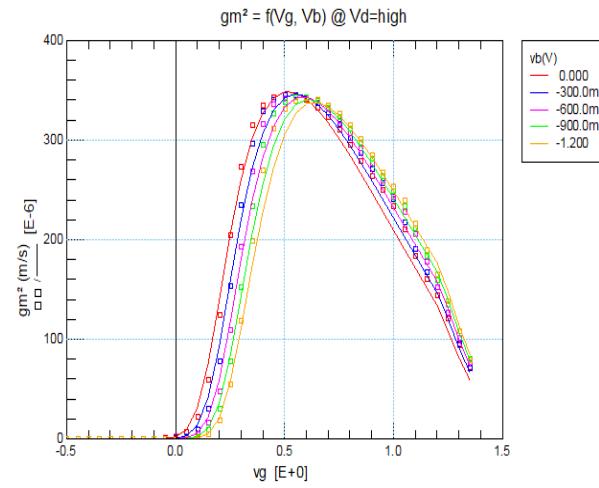
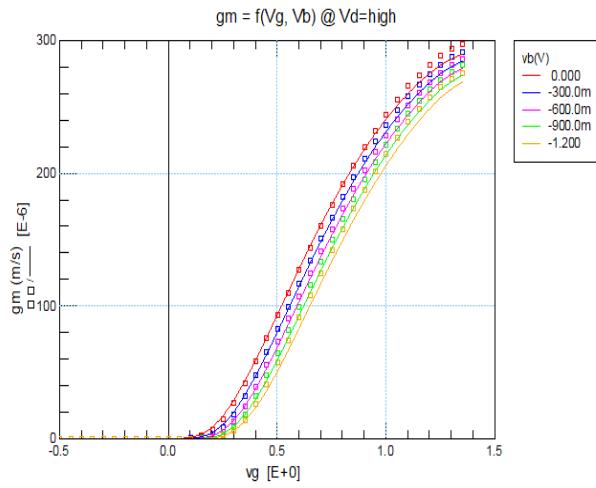
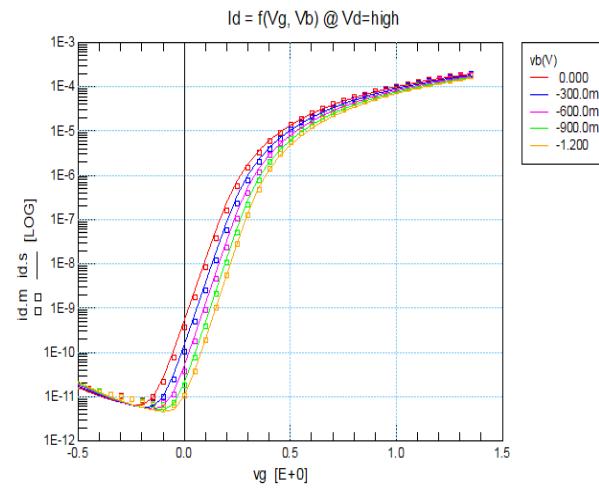
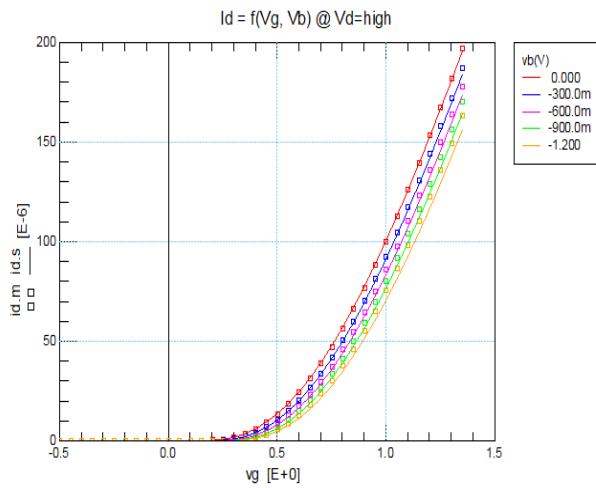
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

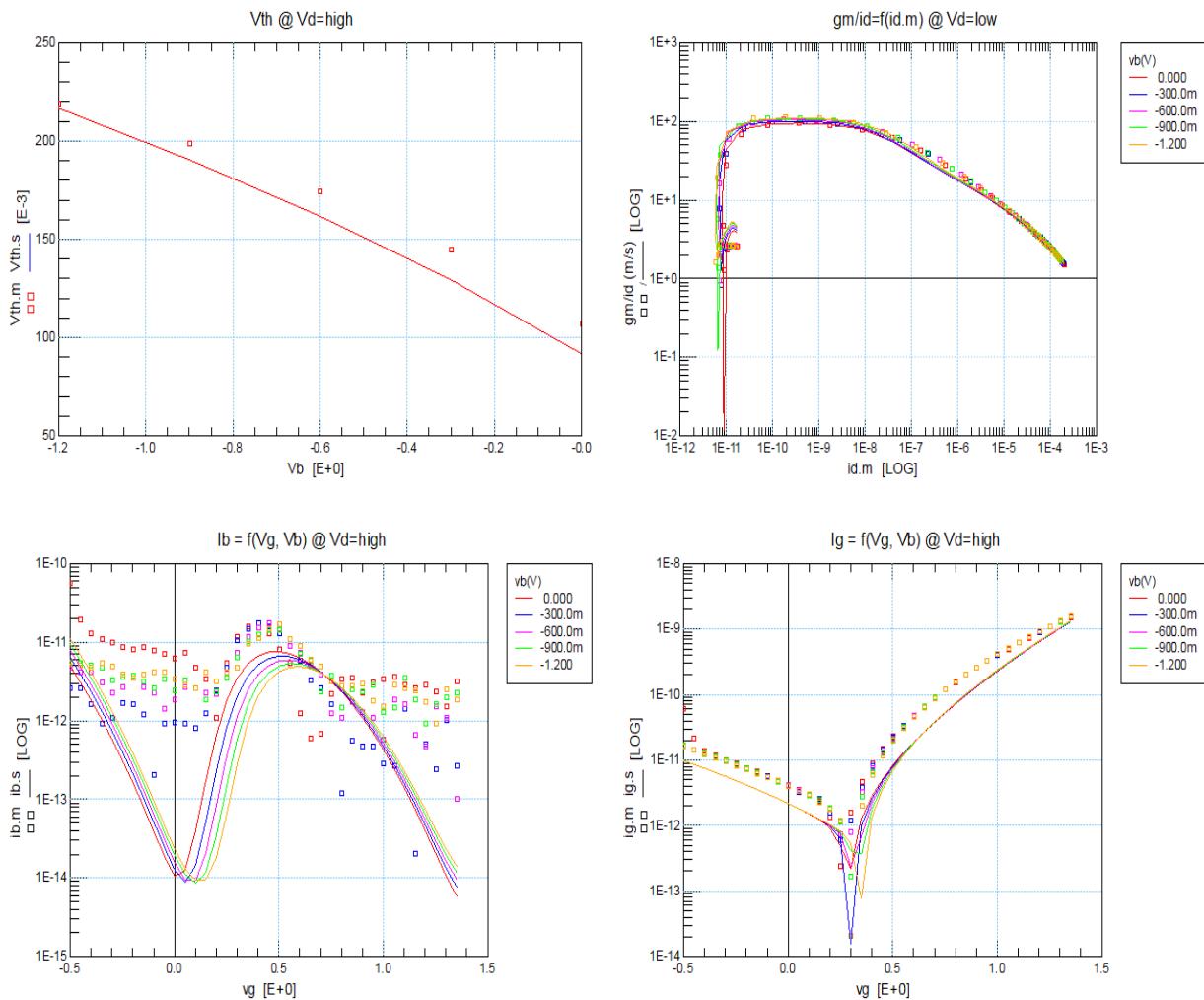


**4.28W02u0\_L2u0\_S542\_5****idvg, Vd = 0.05V, T = 27°C**

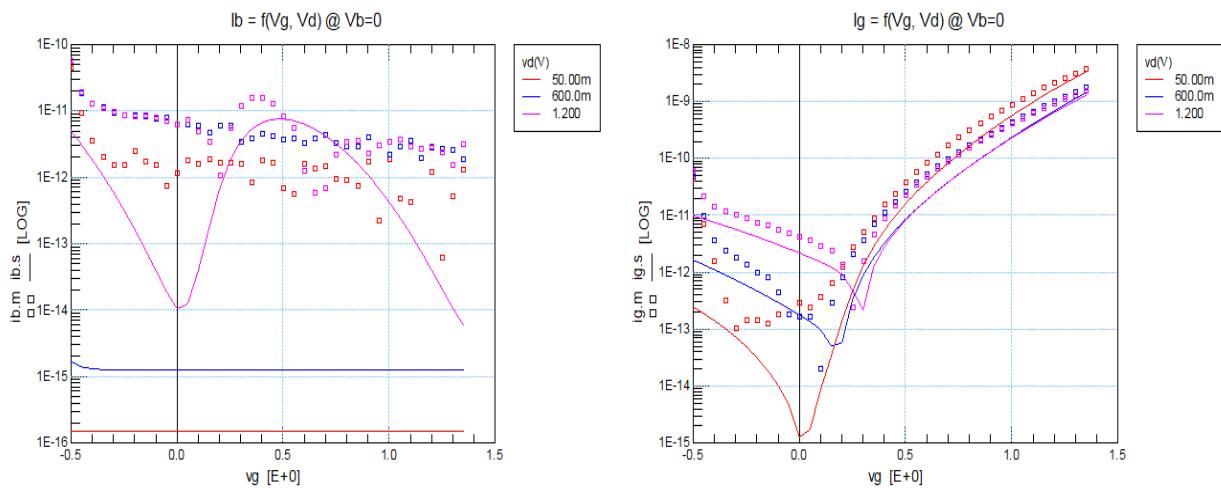


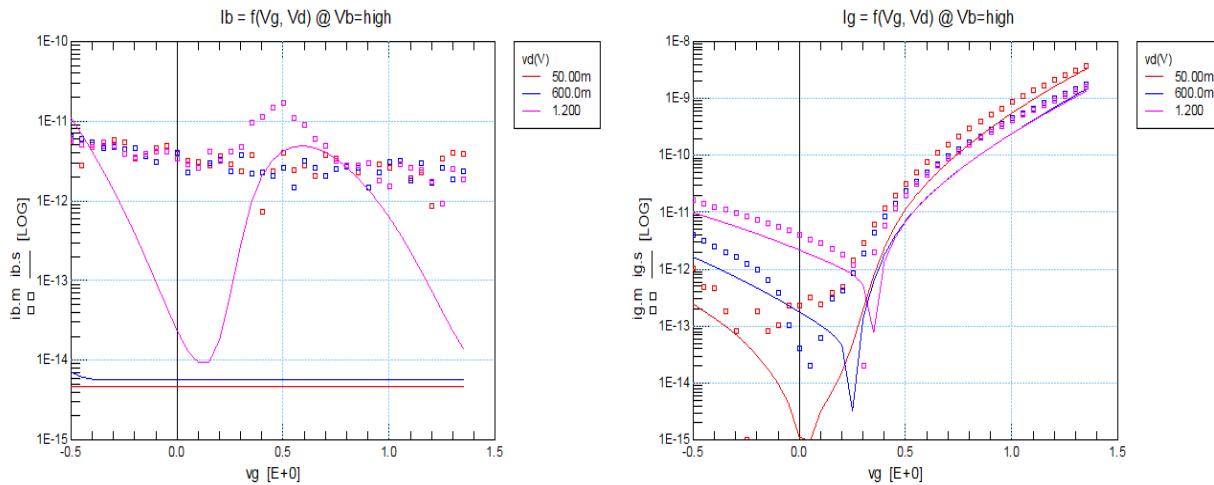
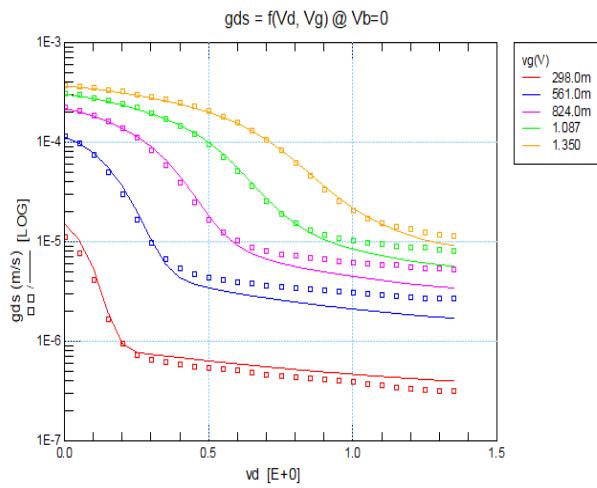
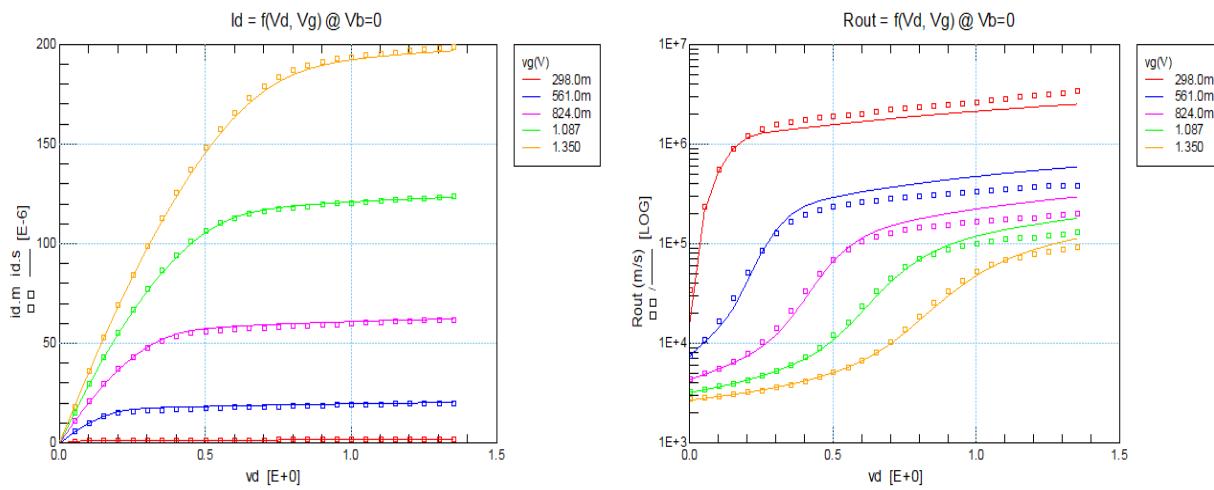
### $i_{dvg}, V_d = 1.2V, T = 27^\circ C$

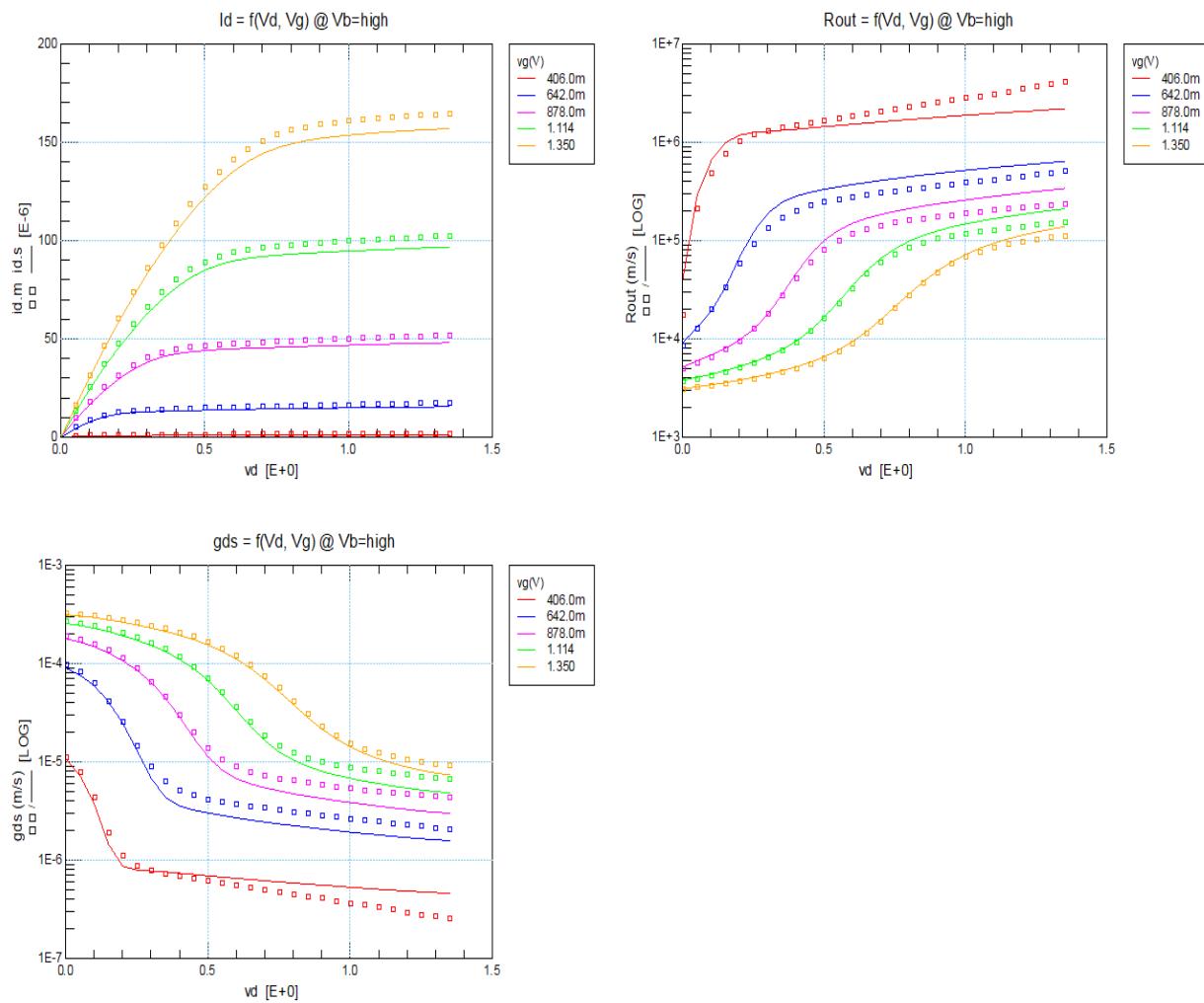
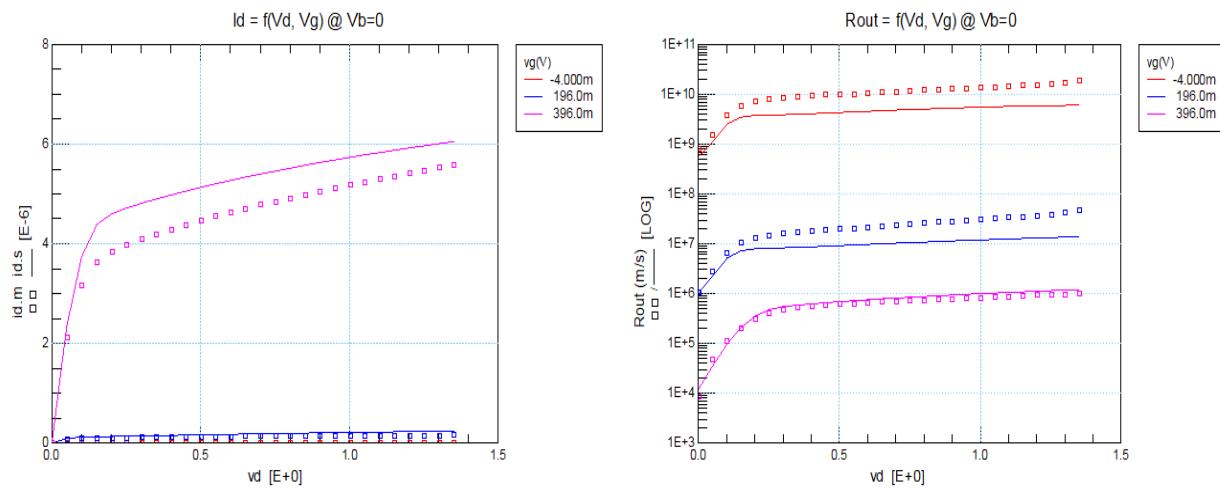


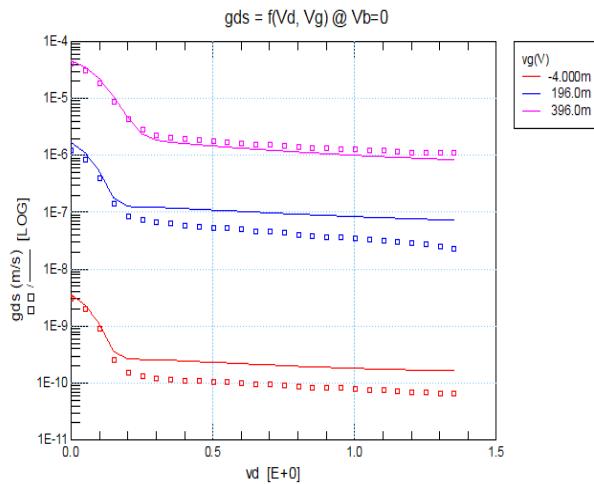


$idvg, Ib, Ig, Vb = 0V, T = 27^\circ\text{C}$

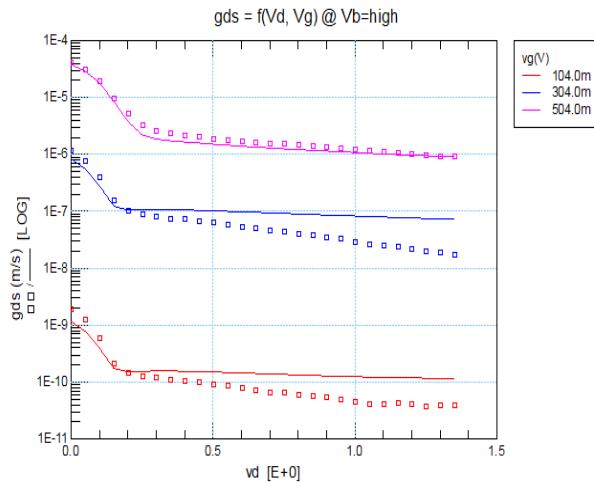
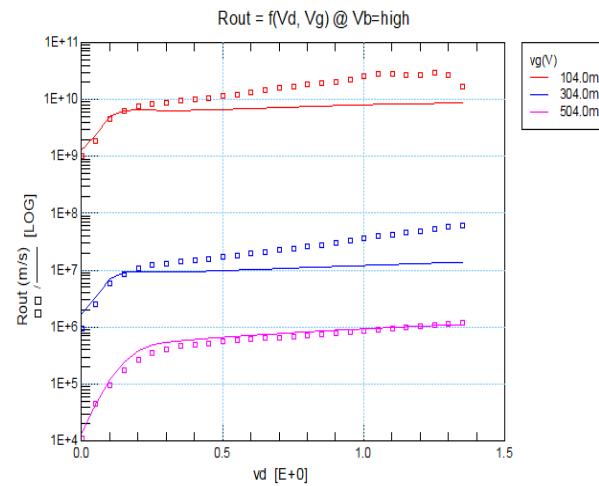
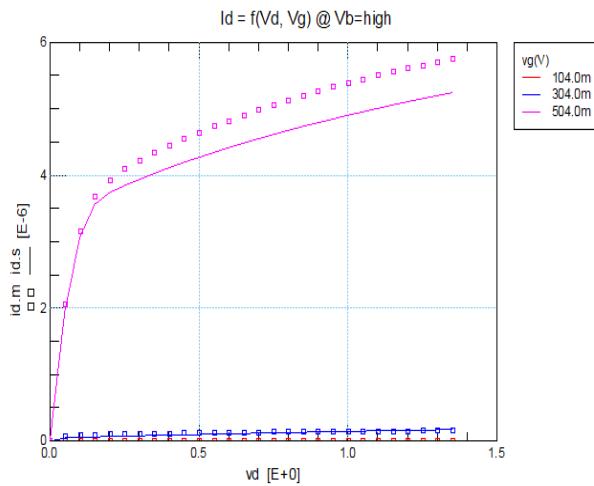


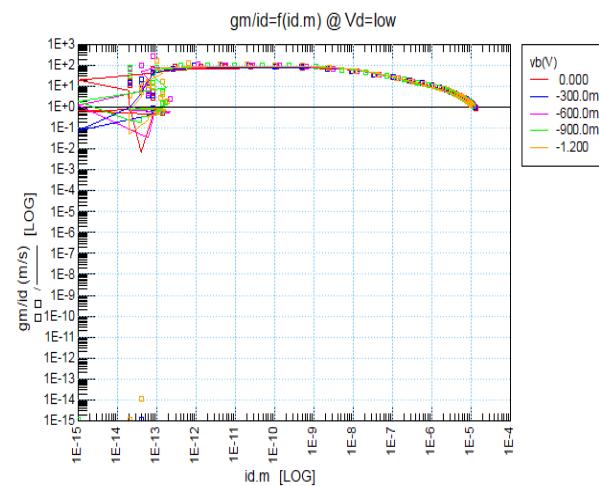
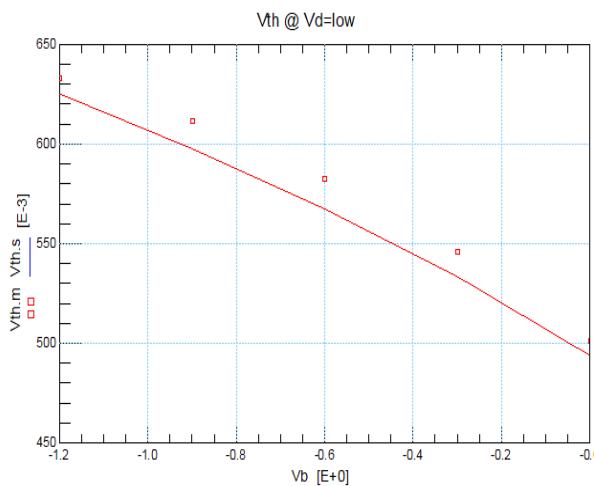
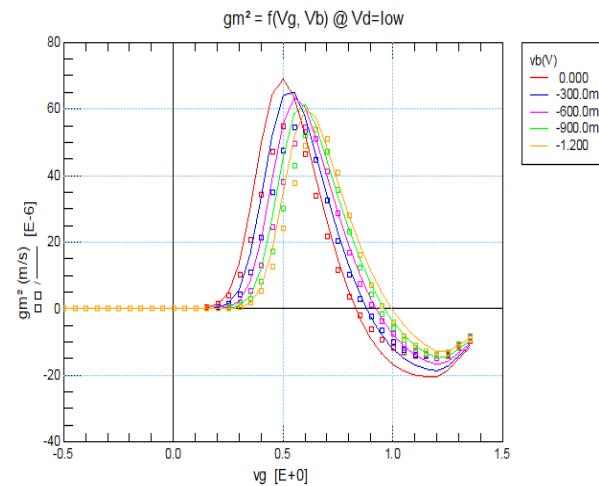
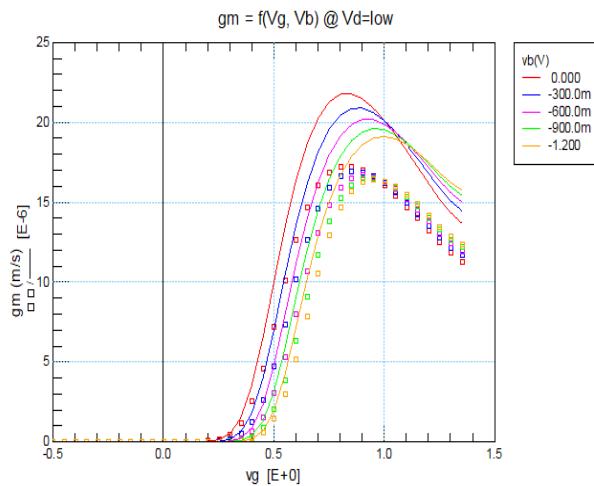
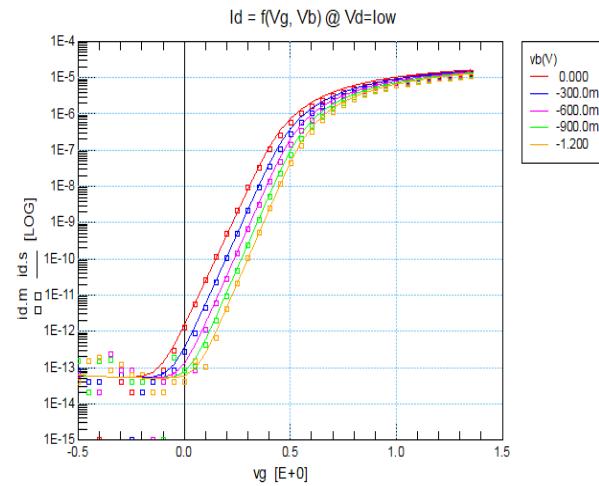
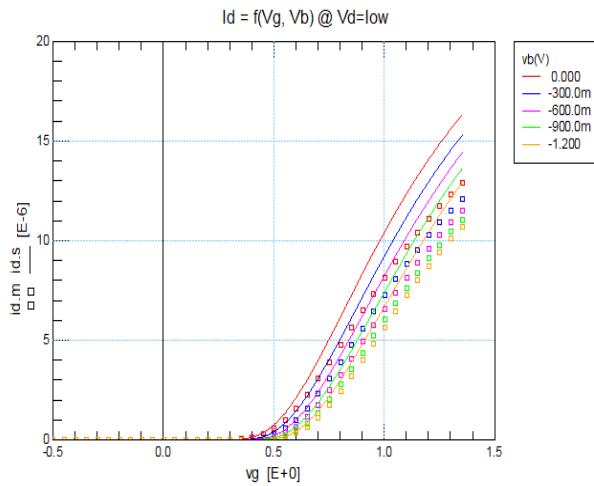
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


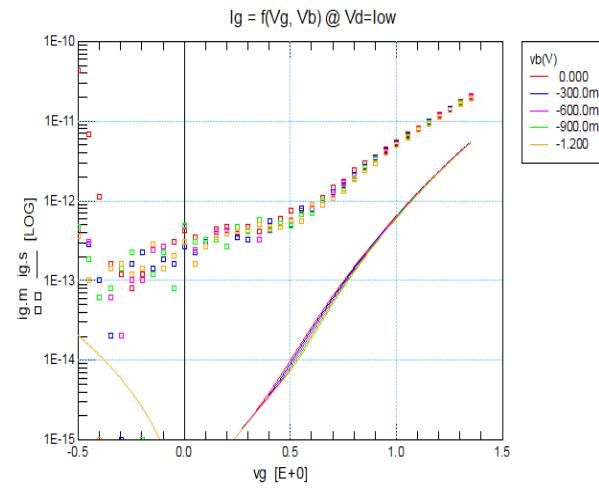
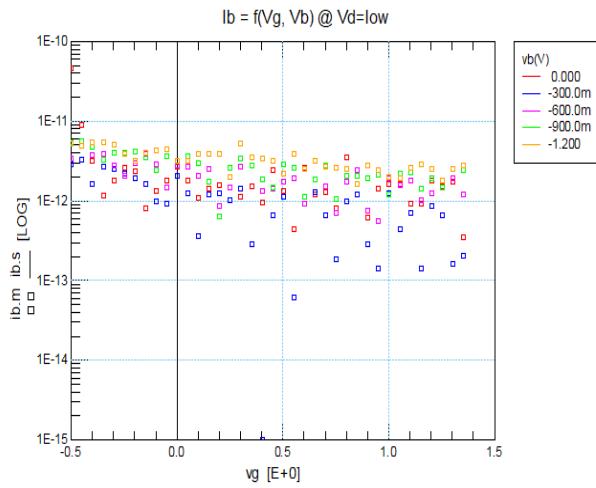
**idvd\_vbmin, Vb = -1.2V, T = 27°C**

**idvd\_vth, Vb = 0V, T = 27°C**




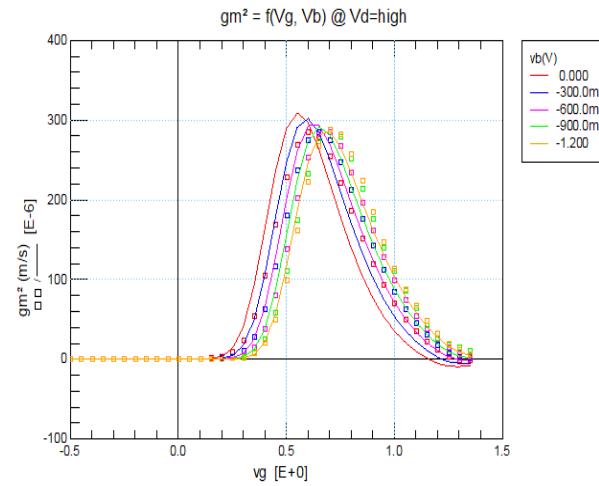
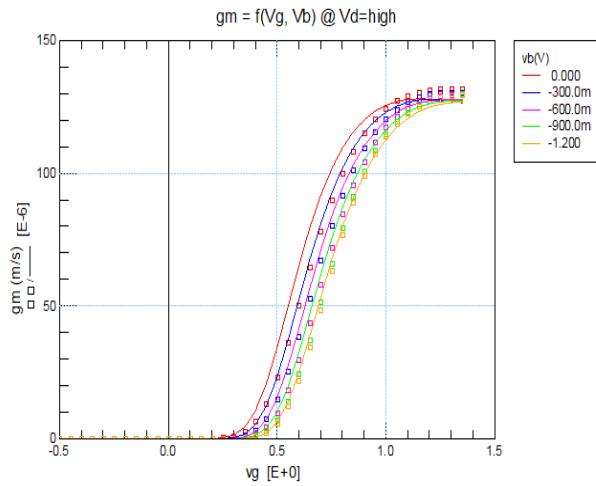
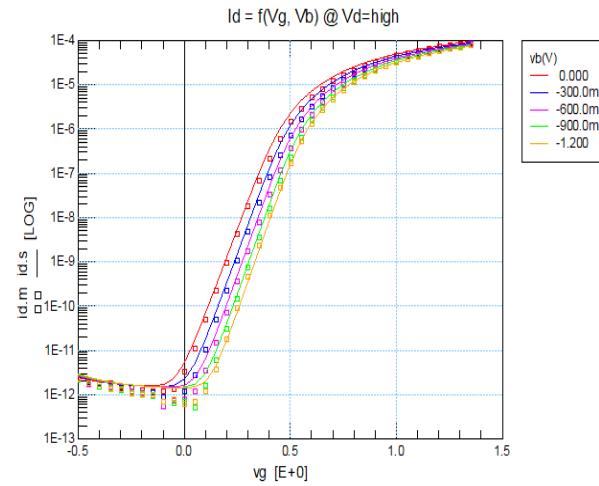
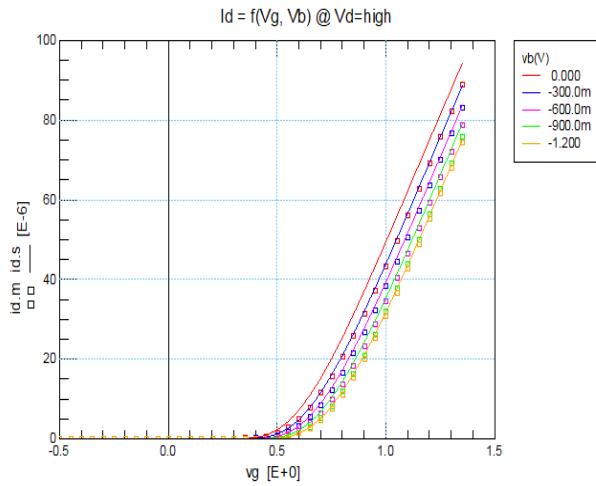
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

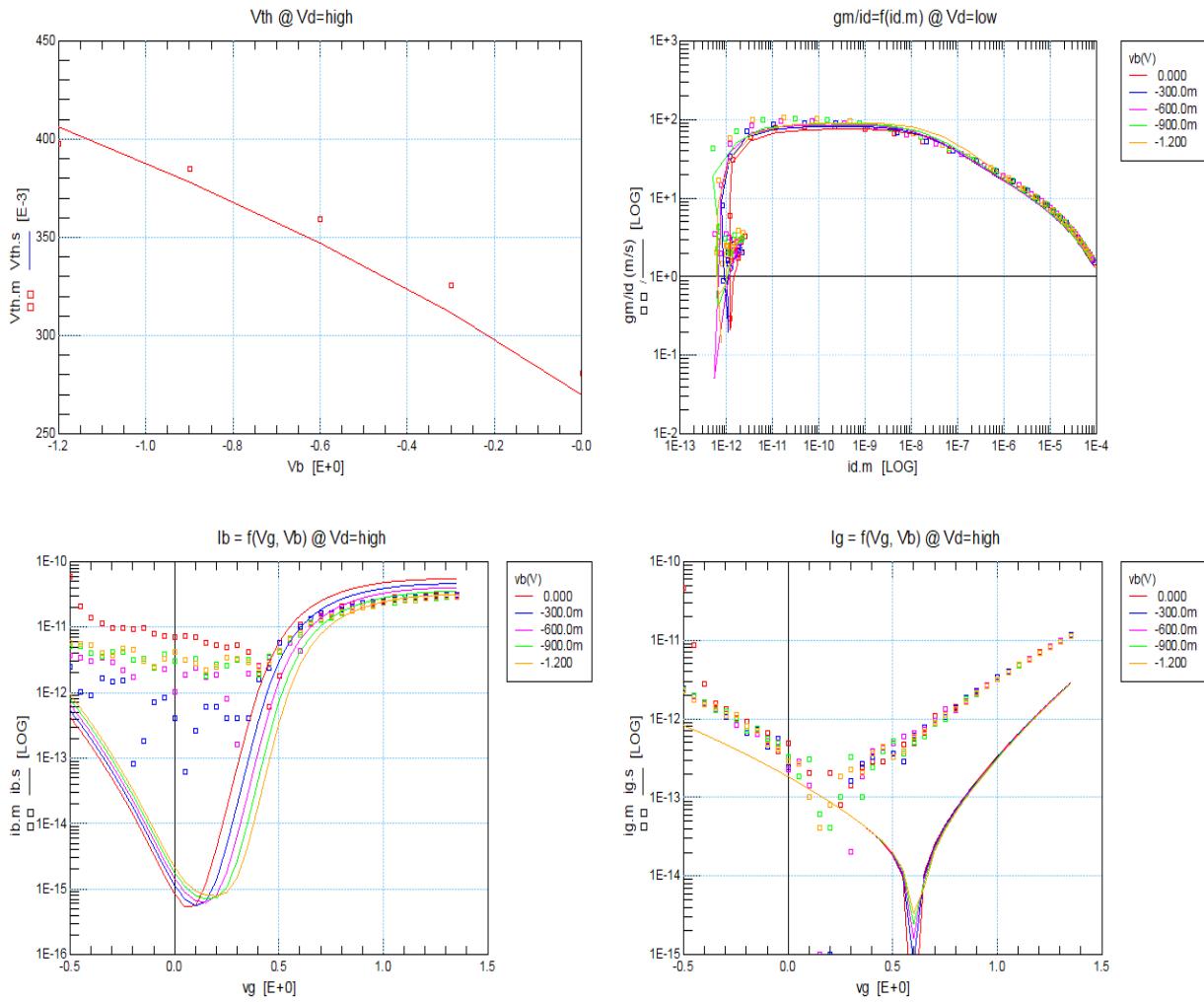


**4.29 W0u15\_L0u15\_S546\_5****idvg, Vd = 0.05V, T = 27°C**

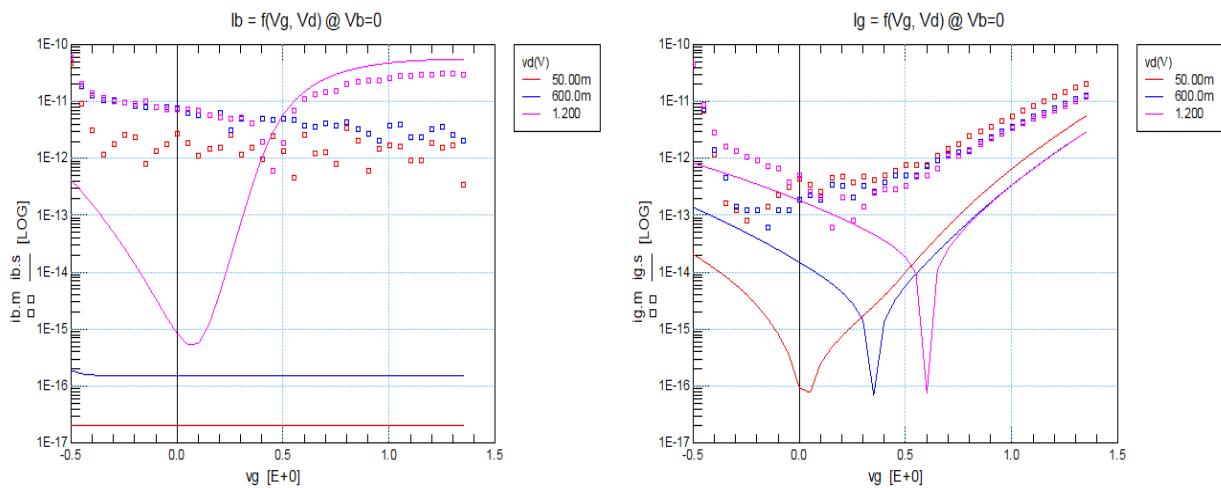


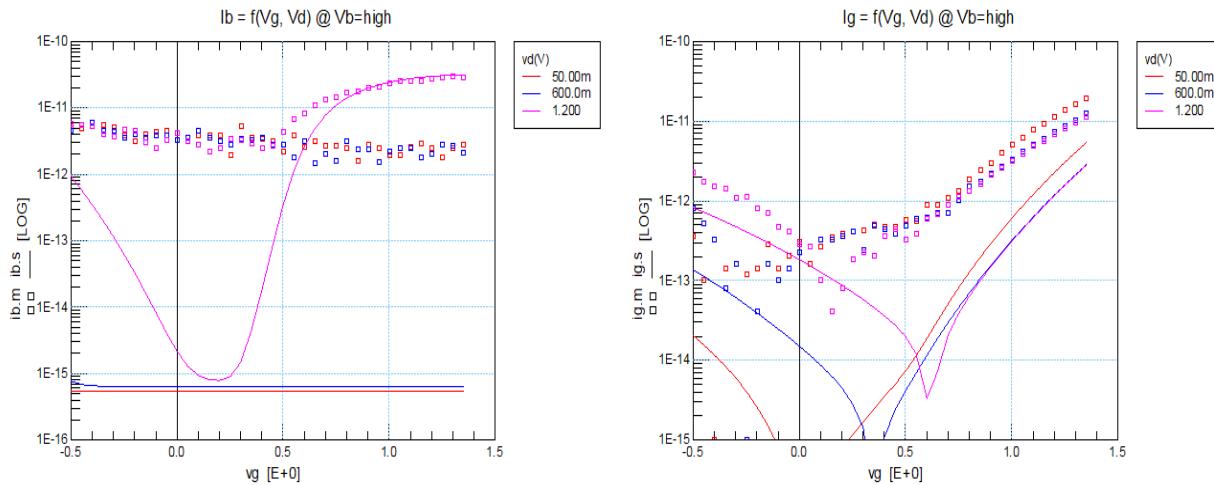
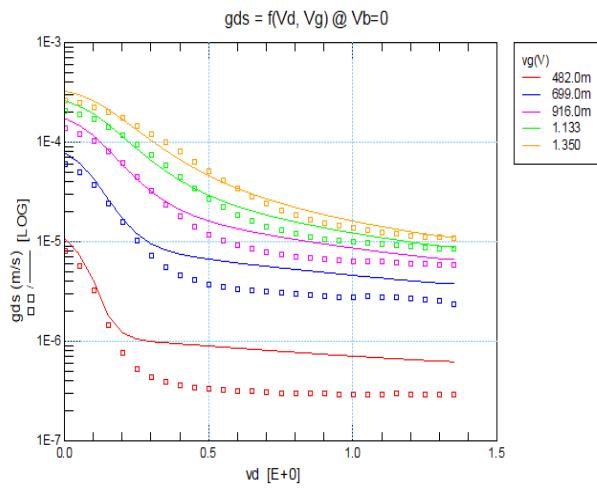
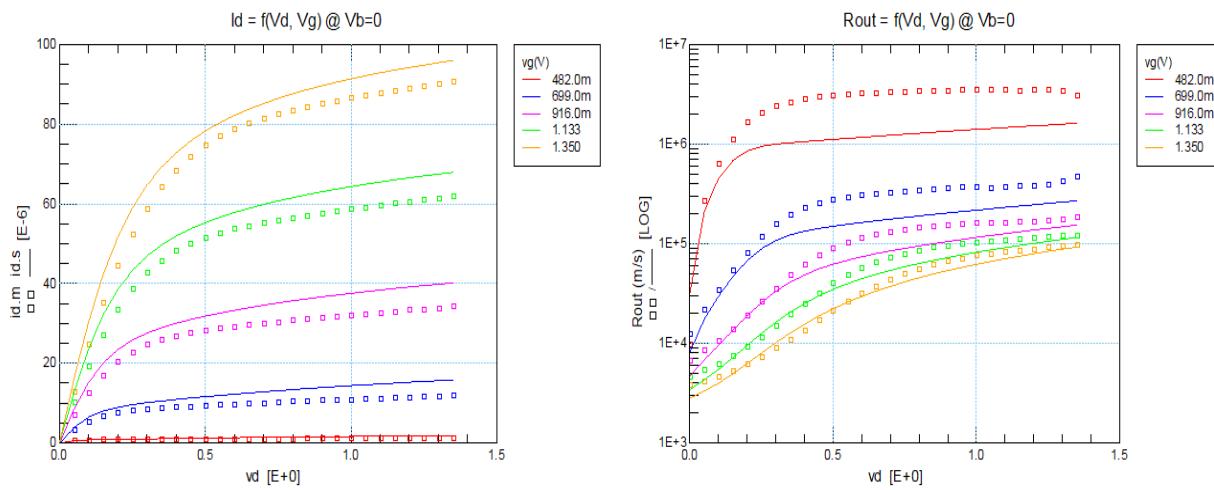
### $i_{dvg}, V_d = 1.2V, T = 27^\circ C$

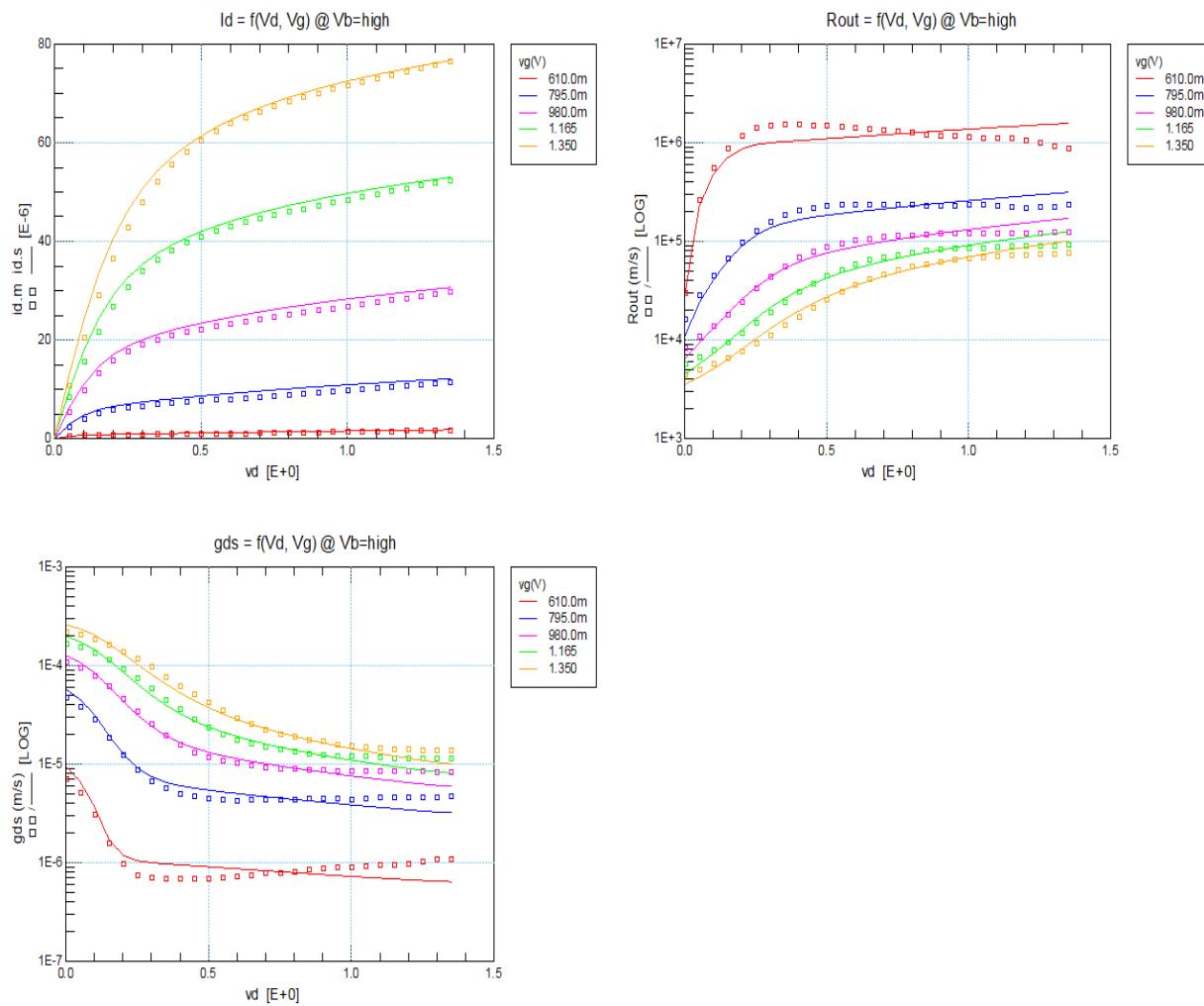
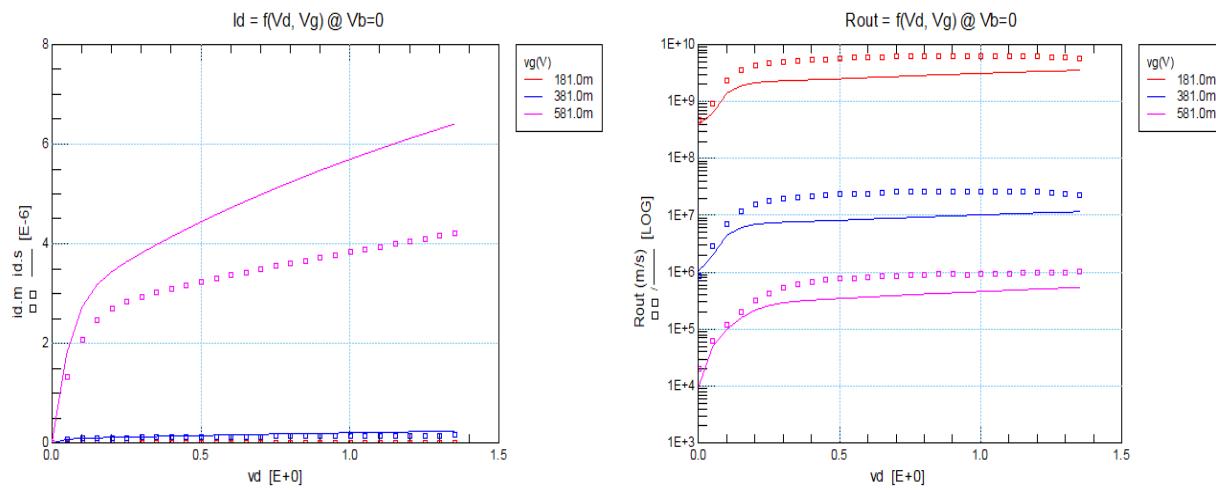


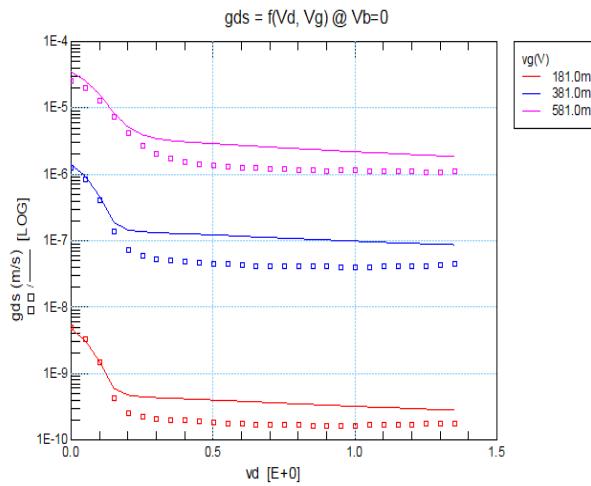


### $idvG, Ib, Ig, Vb = 0V, T = 27^{\circ}C$

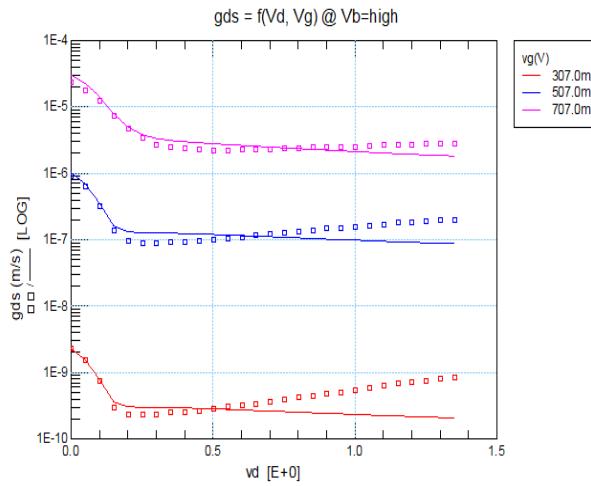
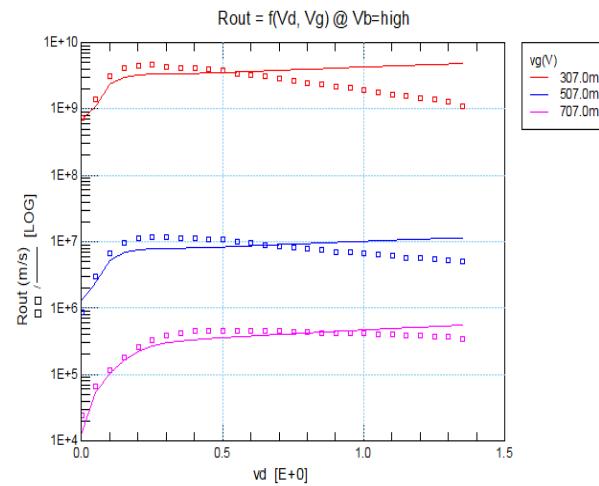
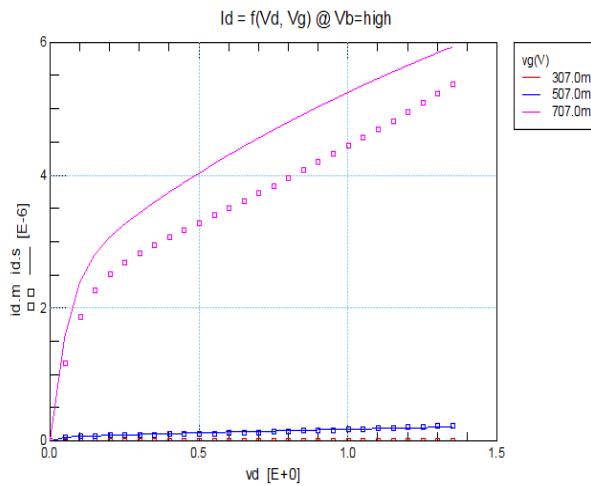


**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


**idvd\_vbmin, Vb = -1.2V, T = 27°C****idvd\_vth, Vb = 0V, T = 27°C**

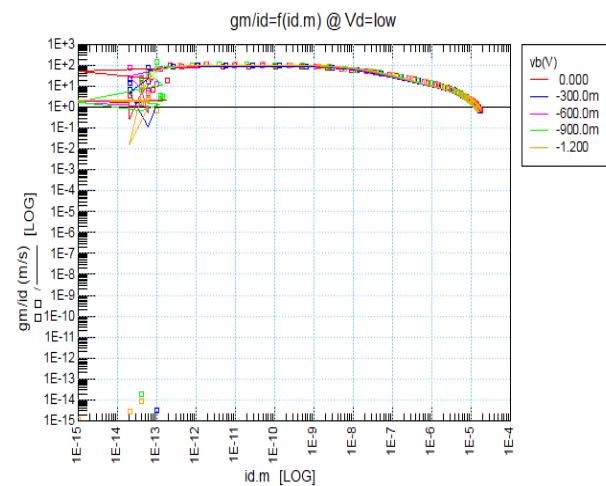
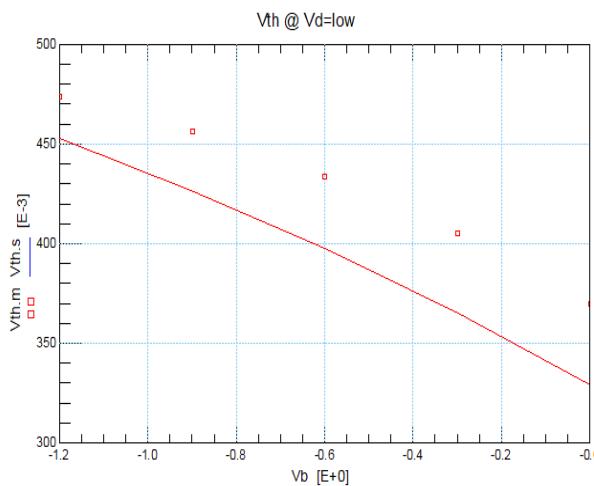
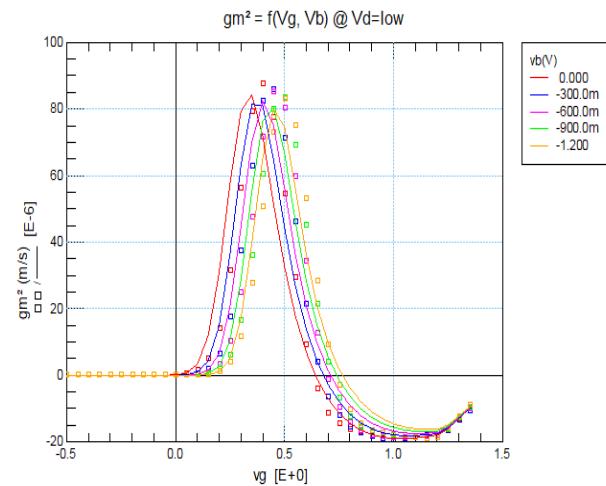
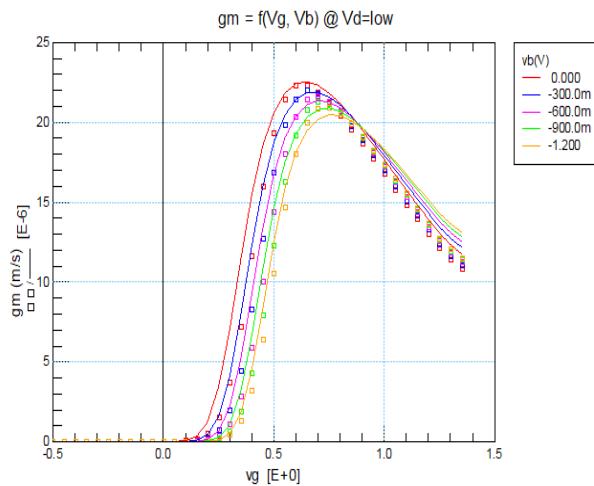
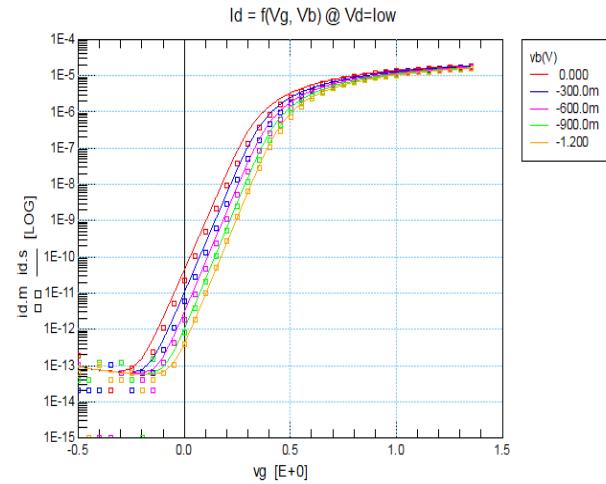
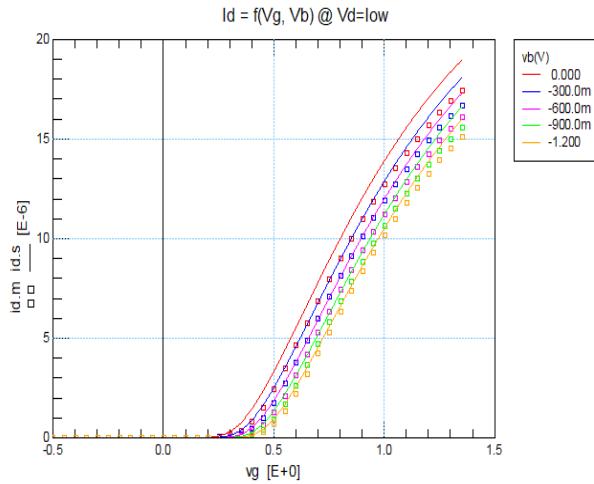


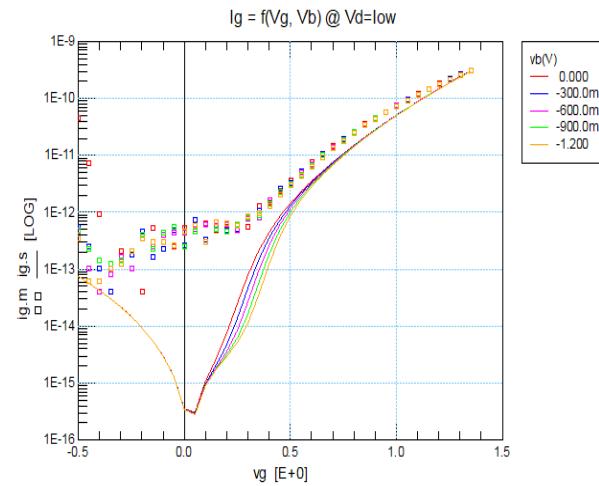
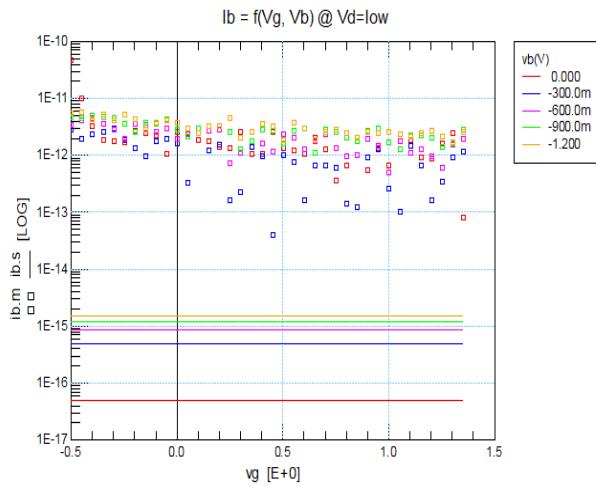
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C



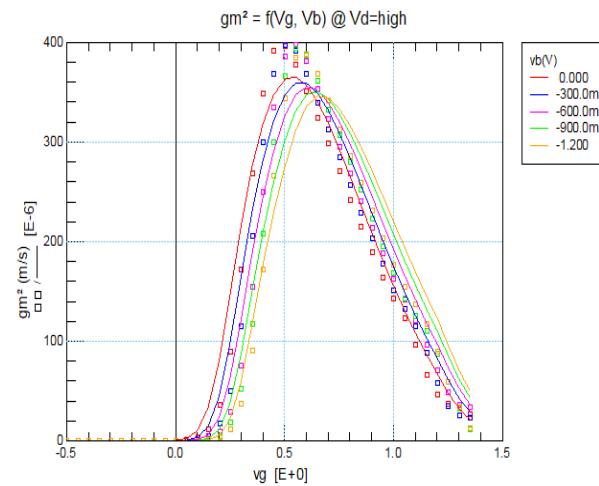
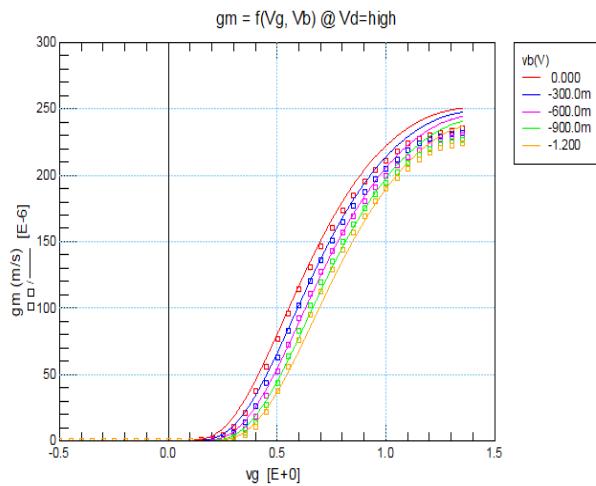
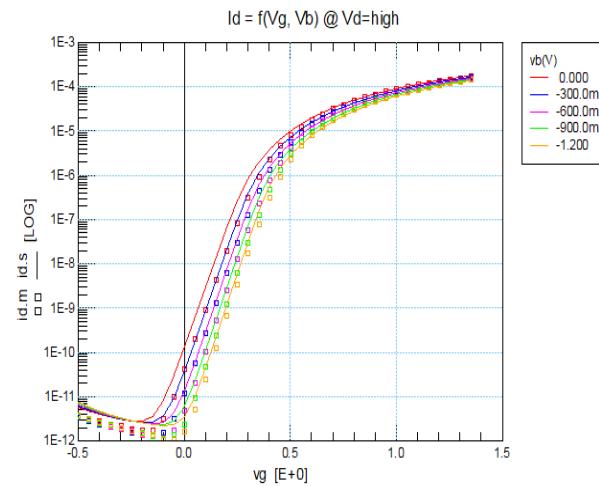
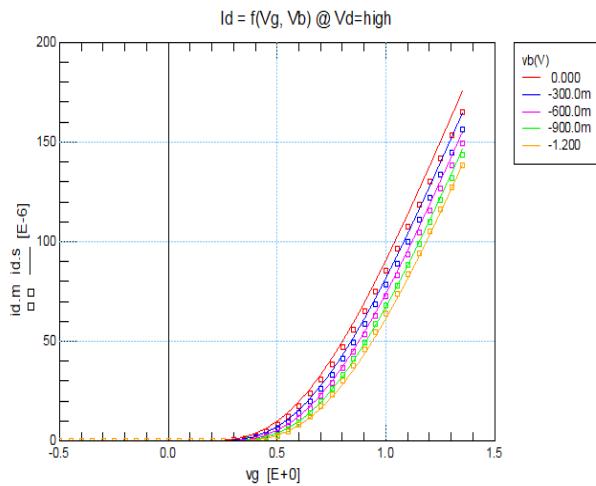
## 4.30 W0u6\_L0u5\_S543\_4

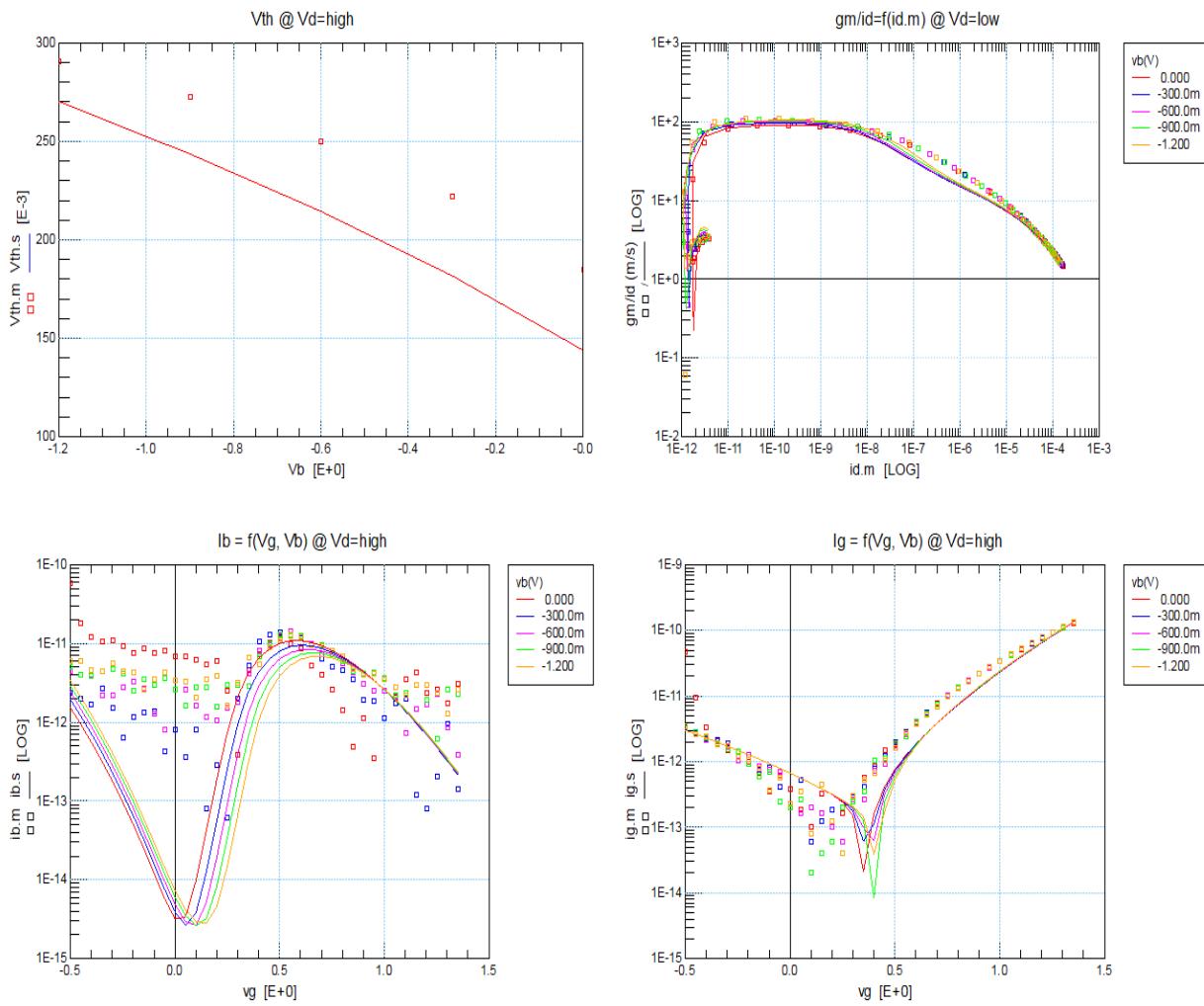
idvg, Vd = 0.05V, T = 27°C



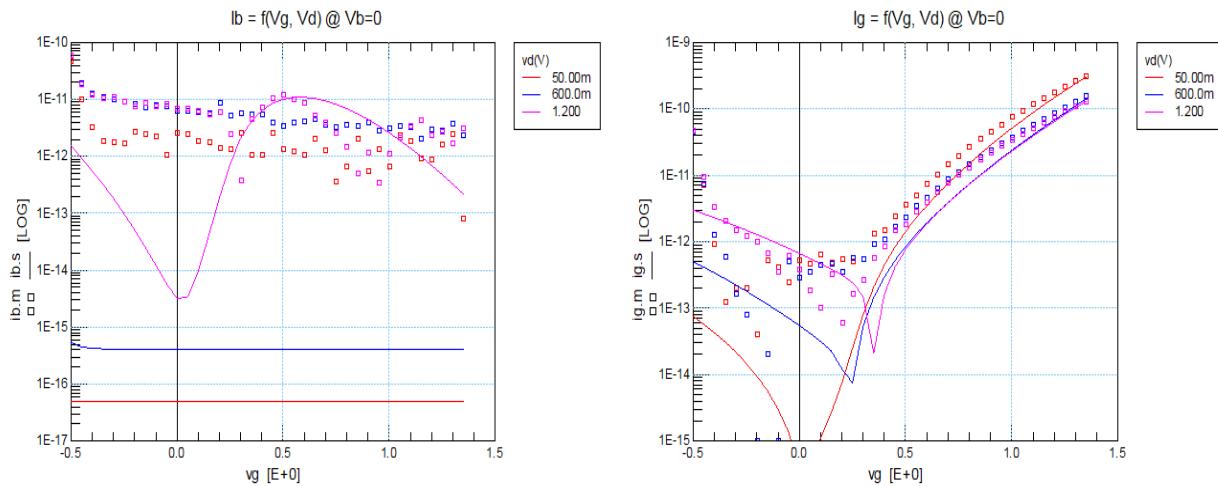


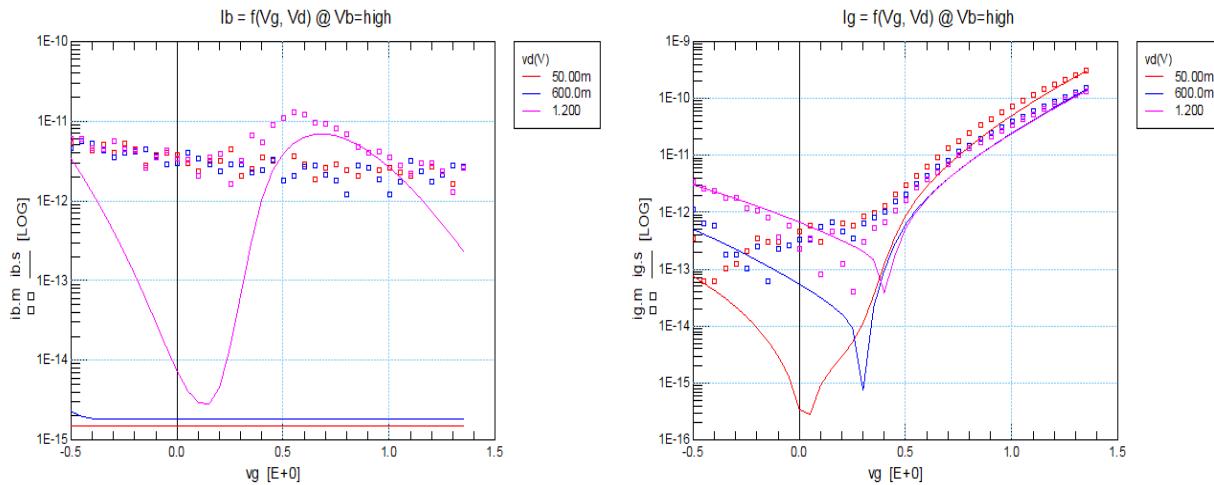
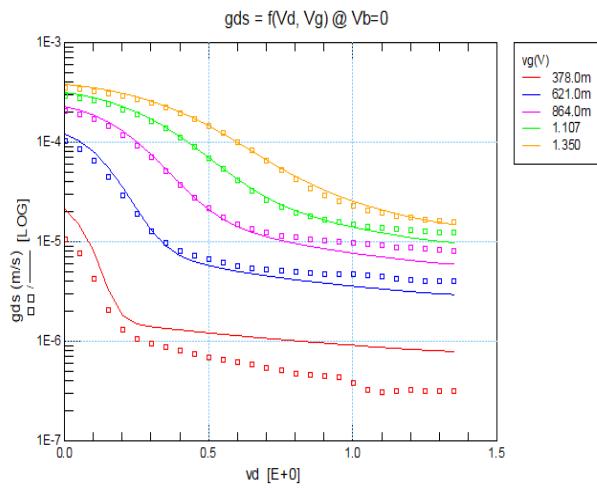
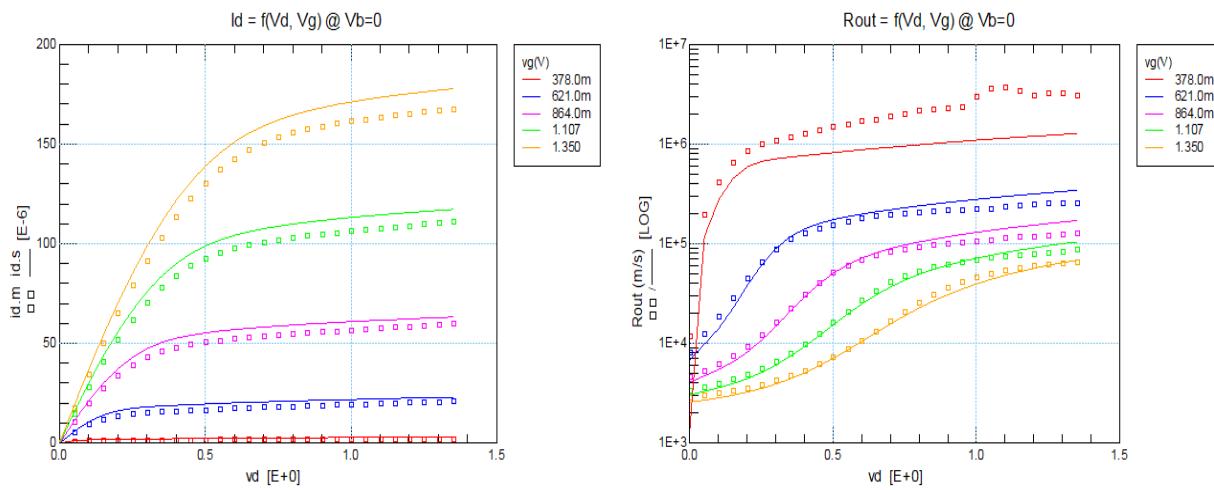
### $i_{dvg}, V_d = 1.2V, T = 27^\circ\text{C}$

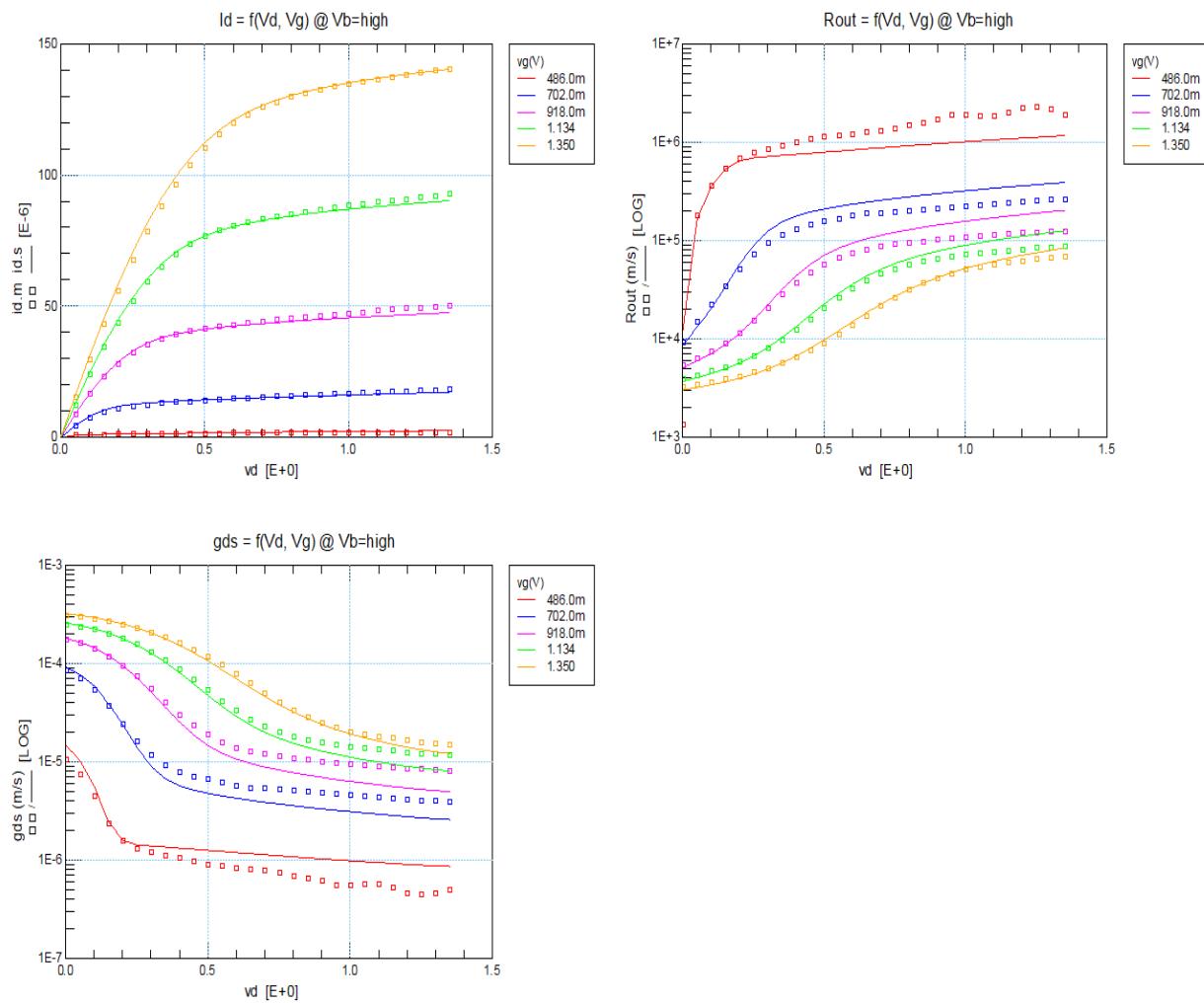
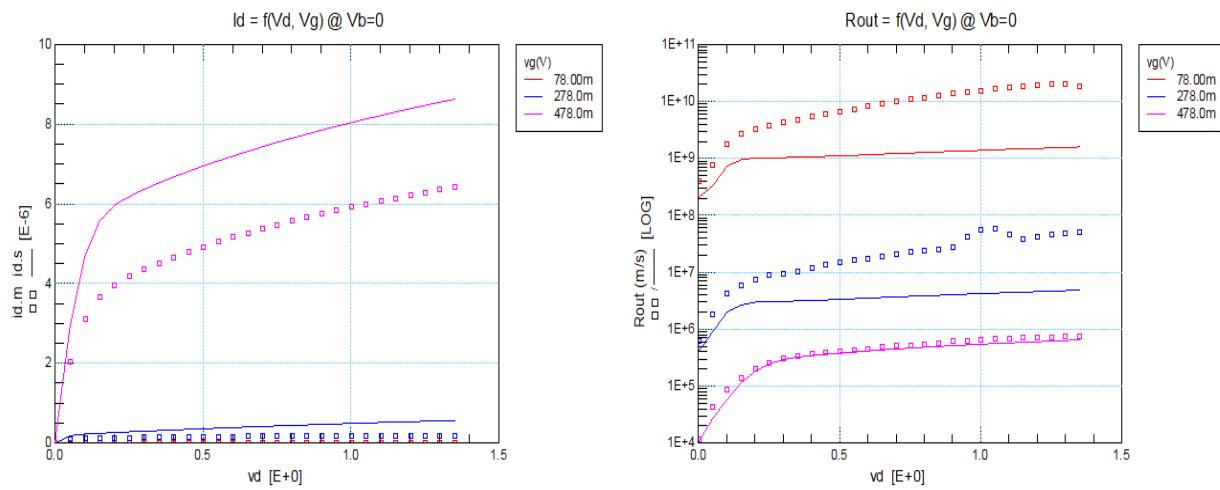


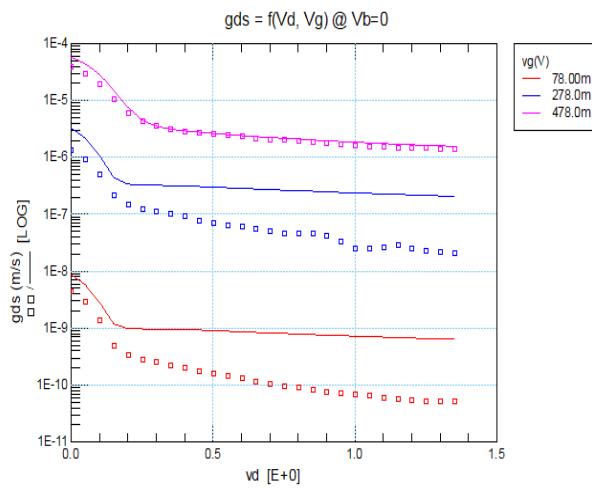


### $id_{vg}, I_b, Ig, V_b = 0V, T = 27^\circ C$

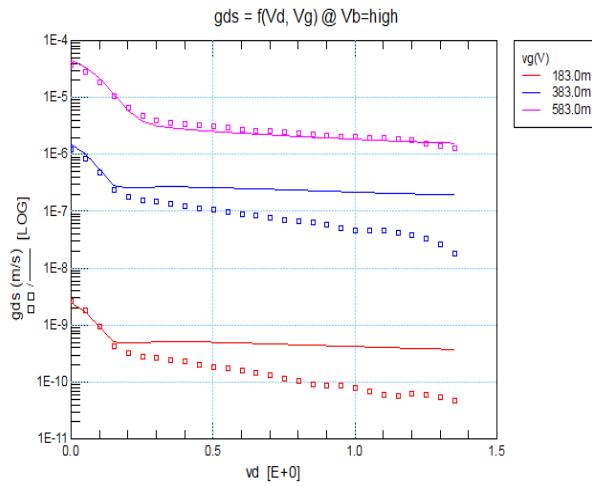
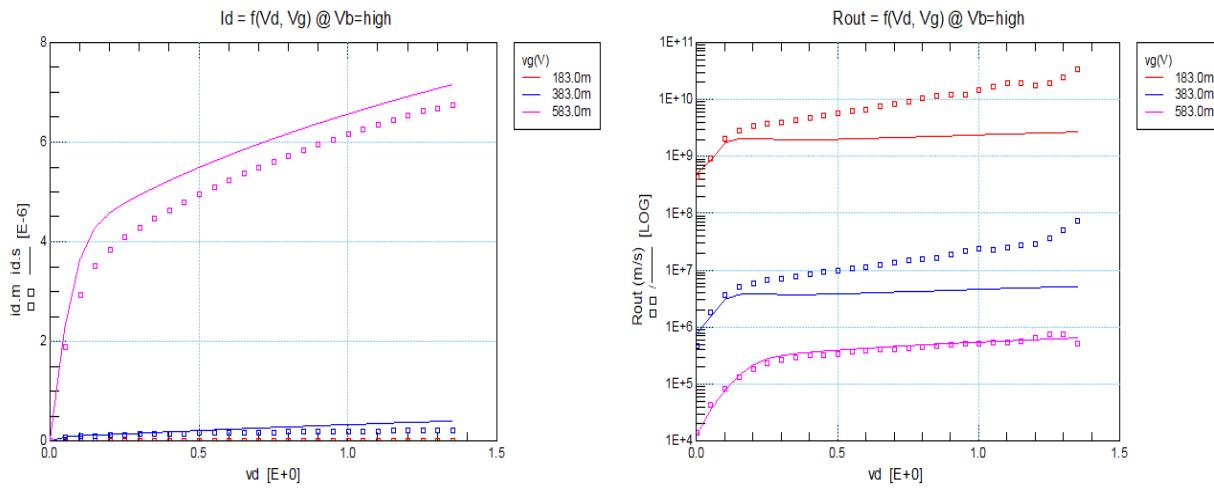


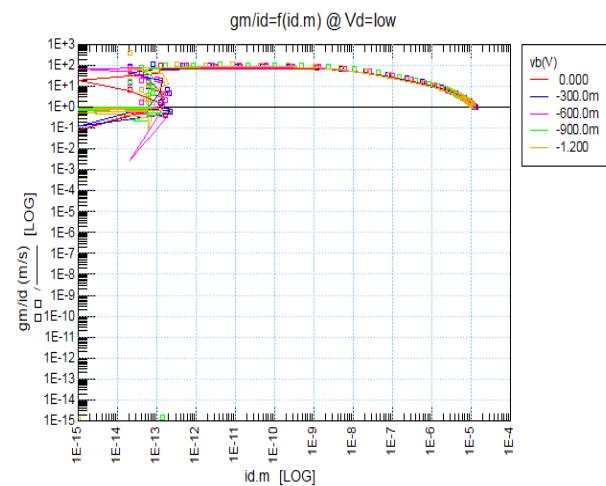
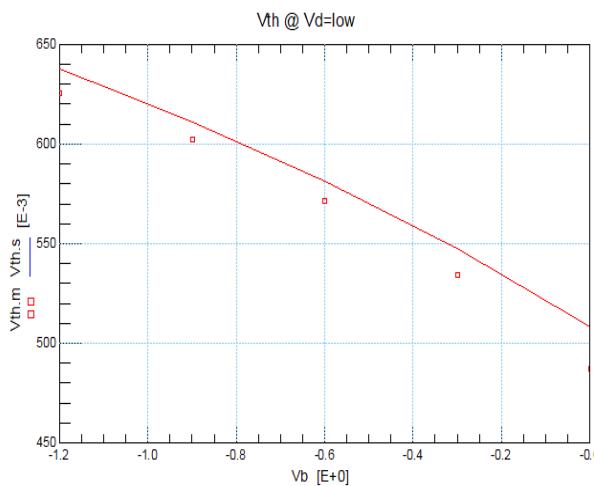
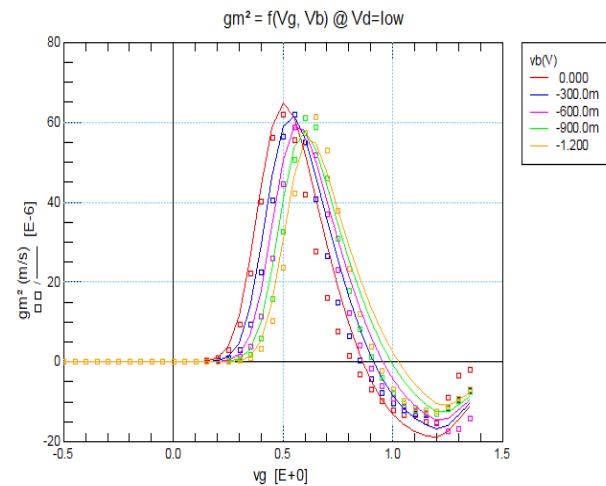
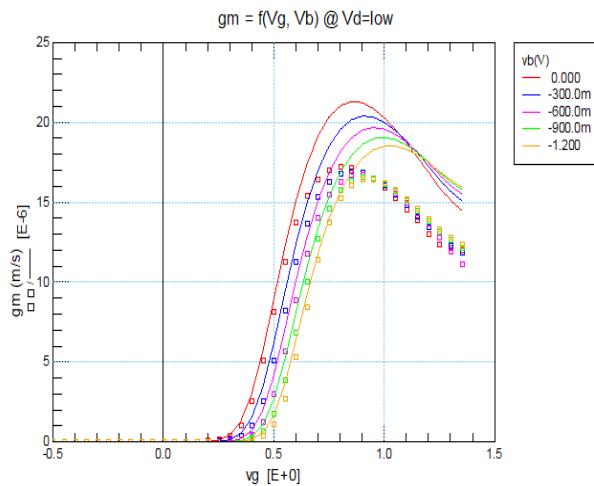
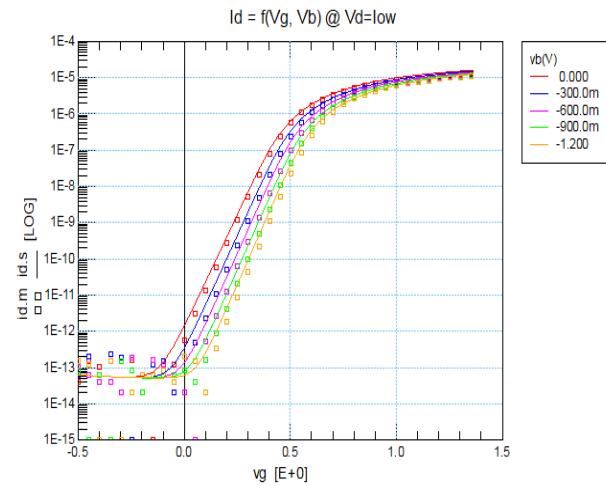
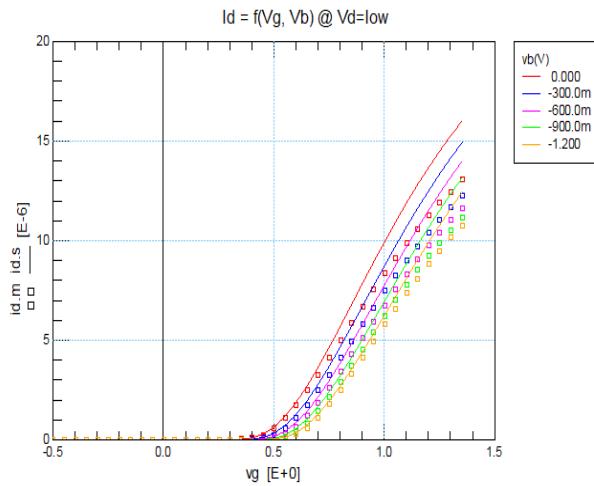
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


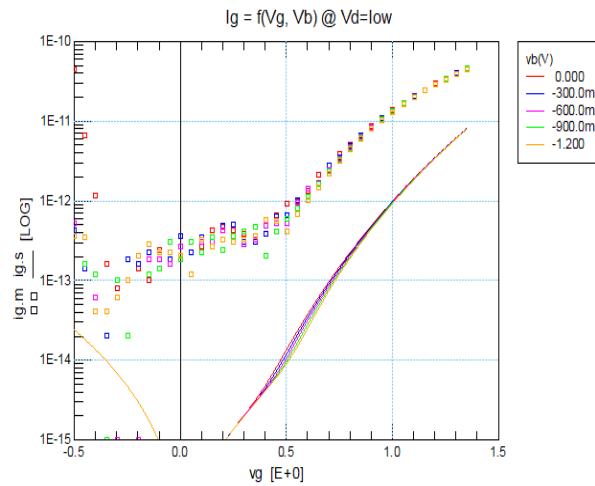
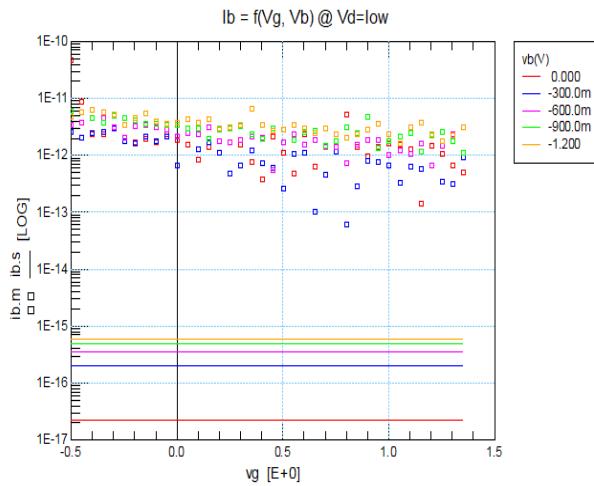
**idvd\_vbmin, Vb = -1.2V, T = 27°C**

**idvd\_vth, Vb = 0V, T = 27°C**




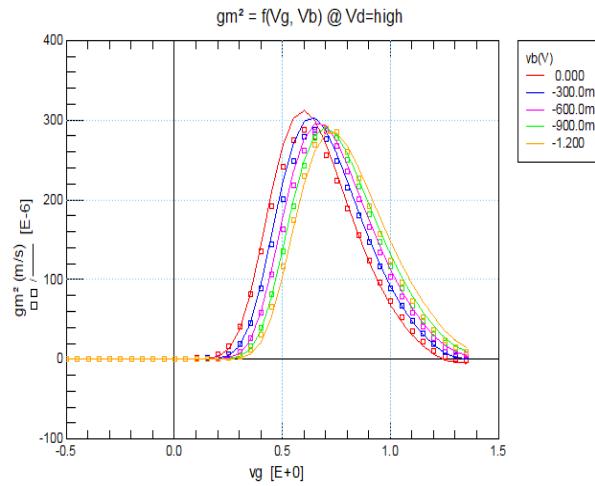
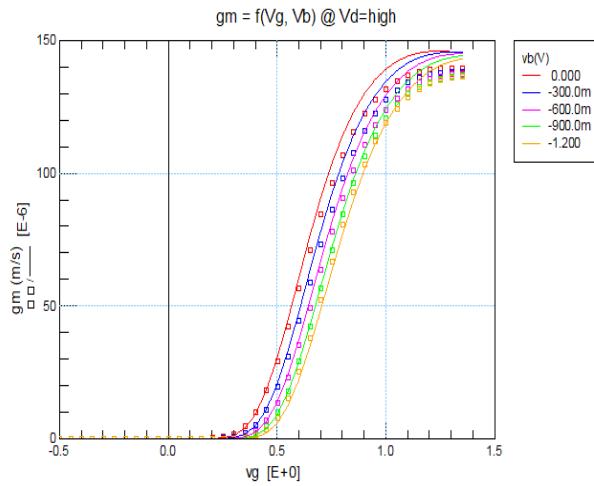
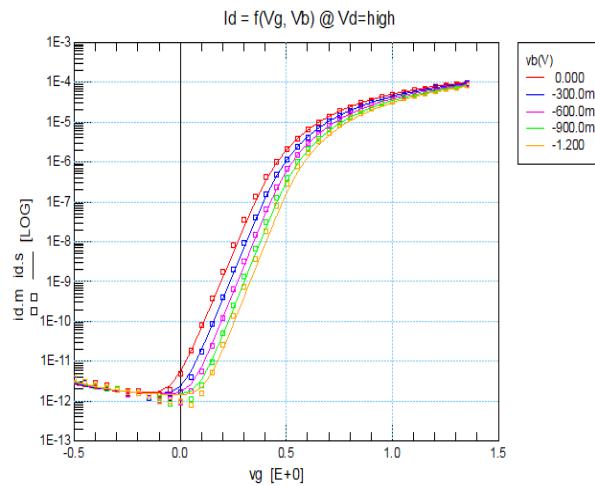
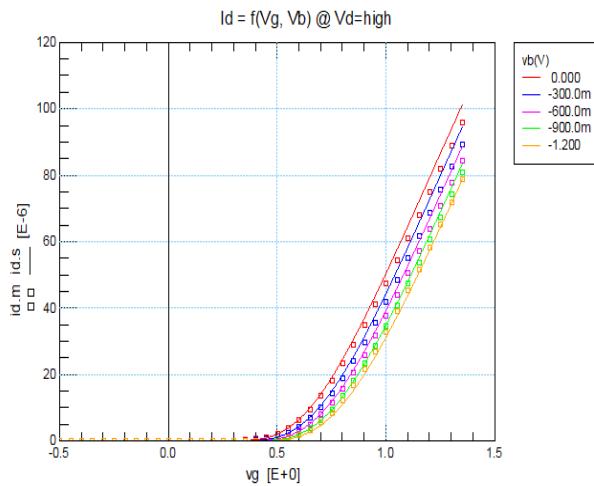
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

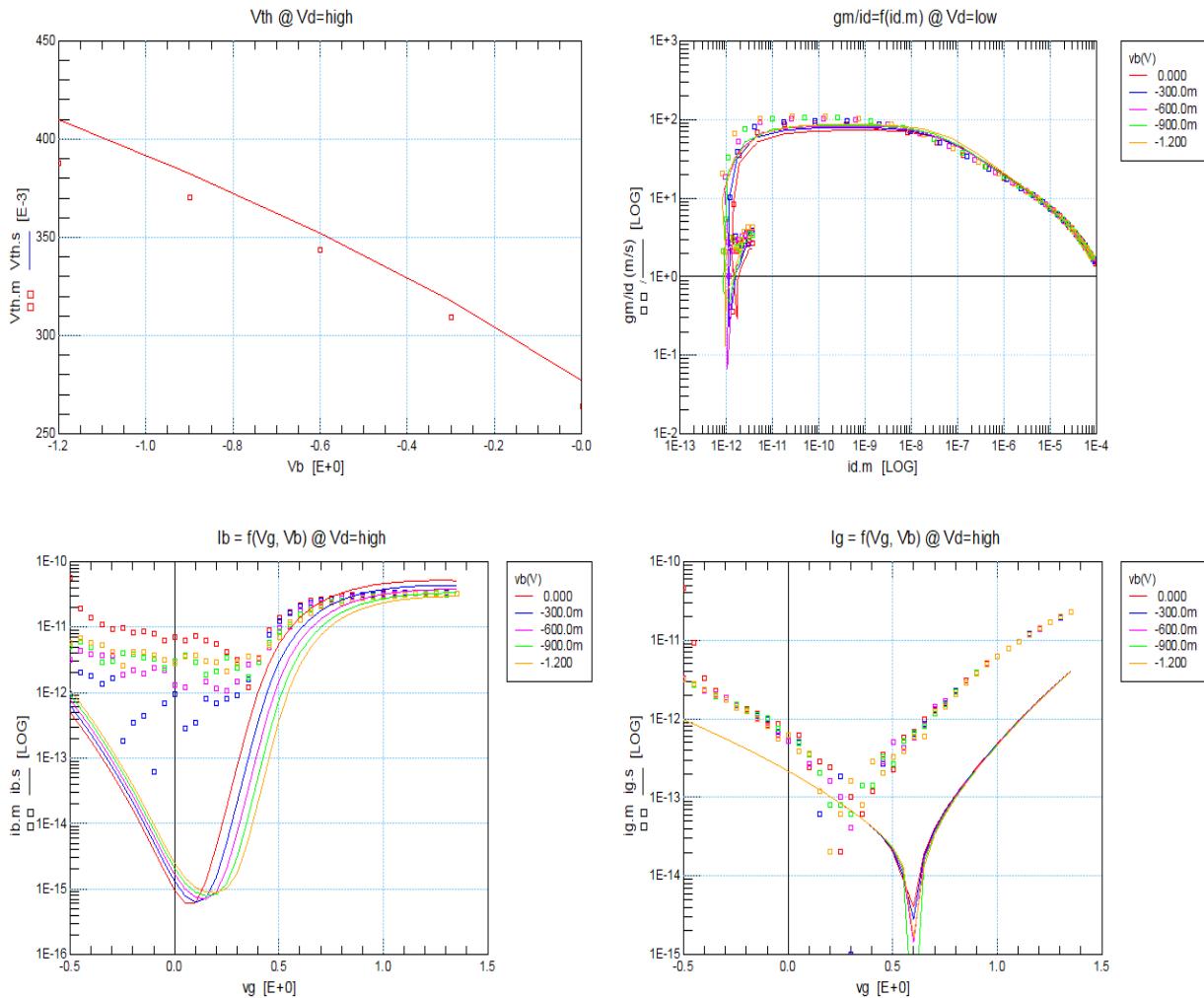


**4.31 W0u18\_L0u15\_S545\_5****idvg, Vd = 0.05V, T = 27°C**

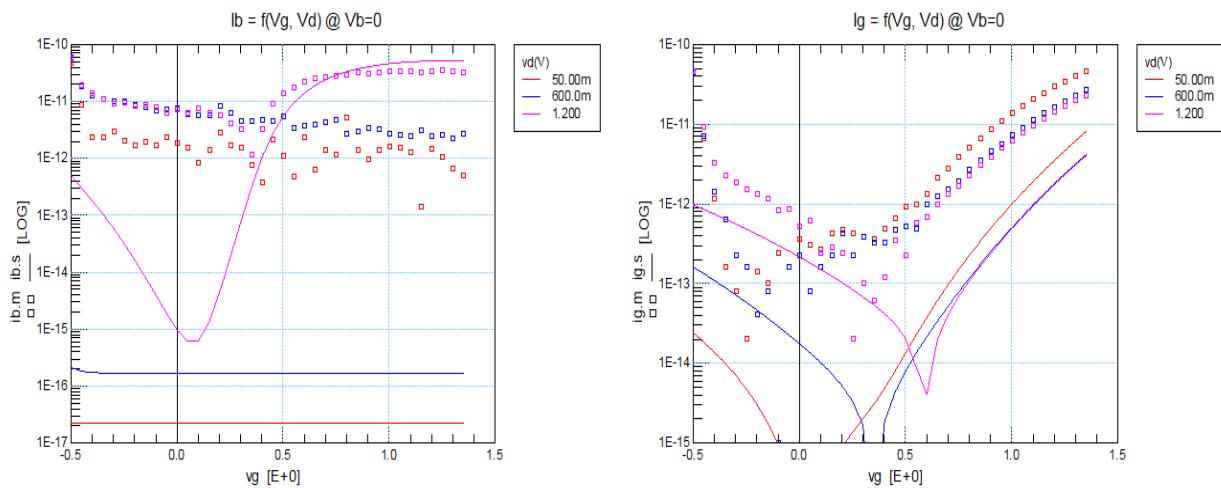


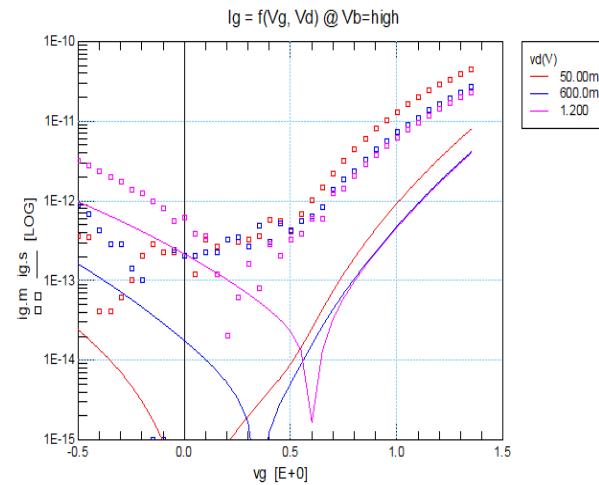
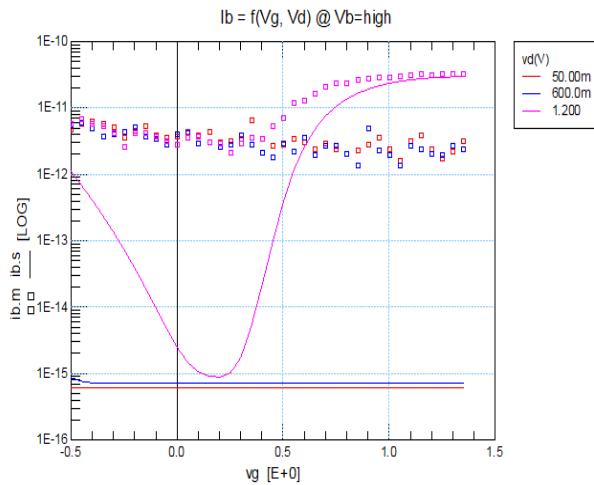
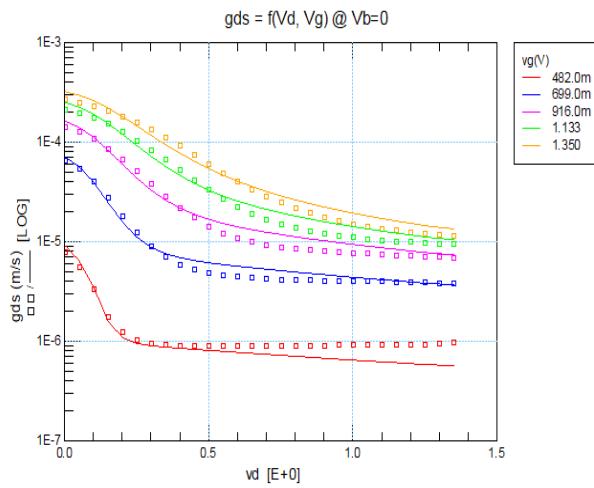
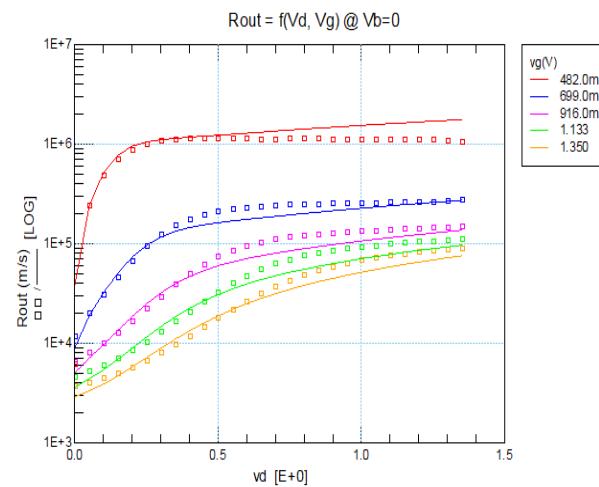
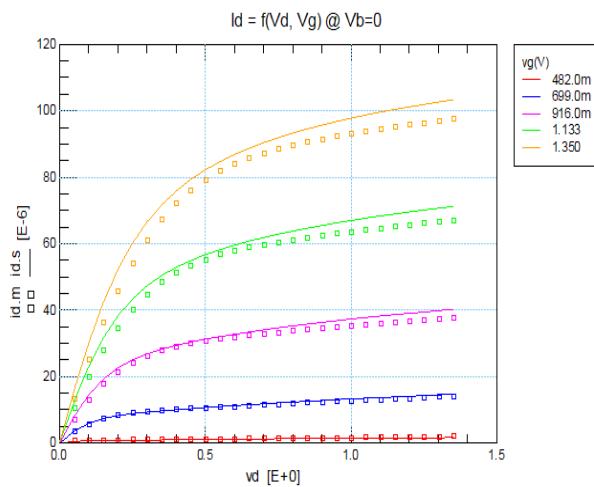
$i_d v_g, V_d = 1.2V, T = 27^\circ C$

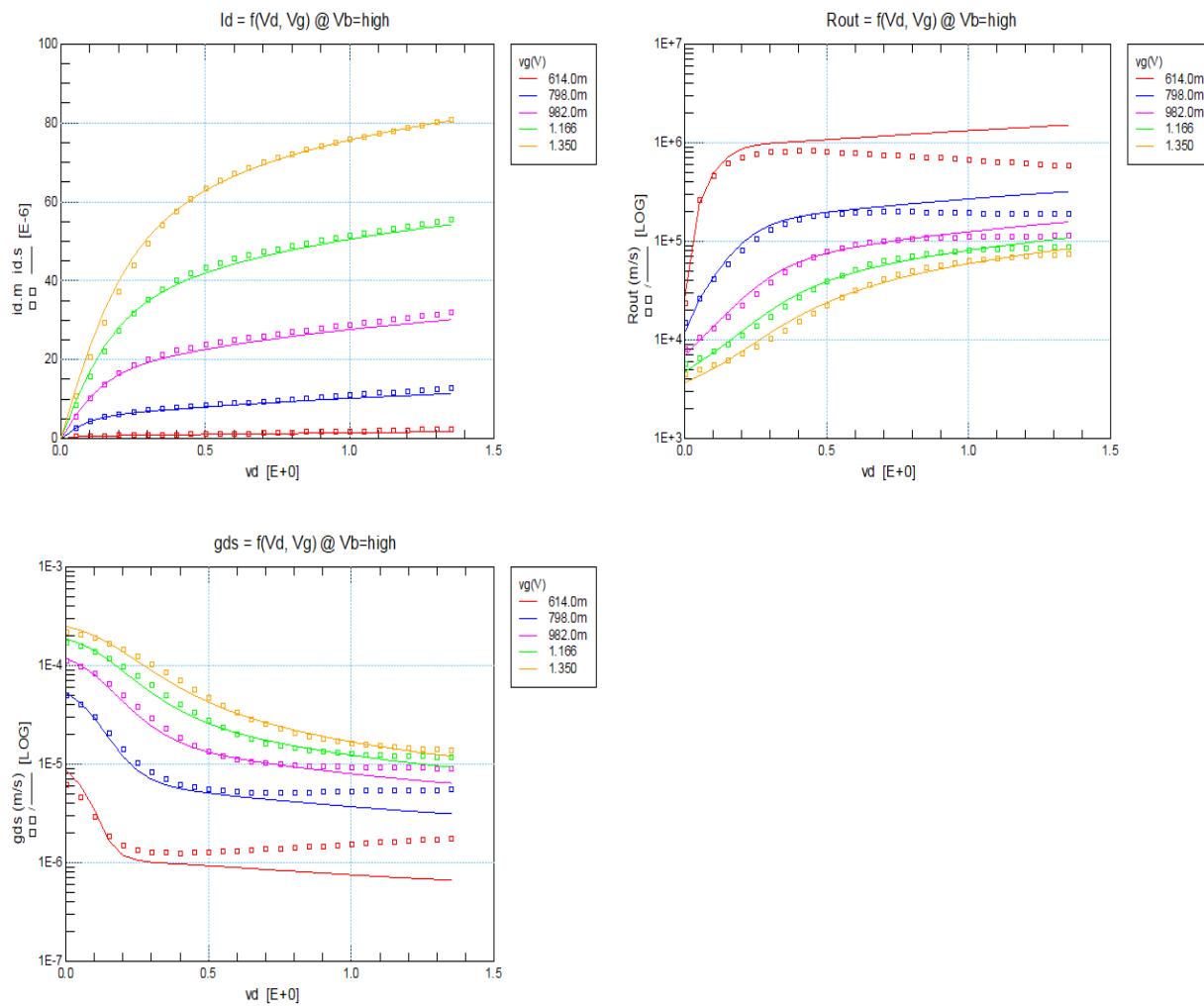
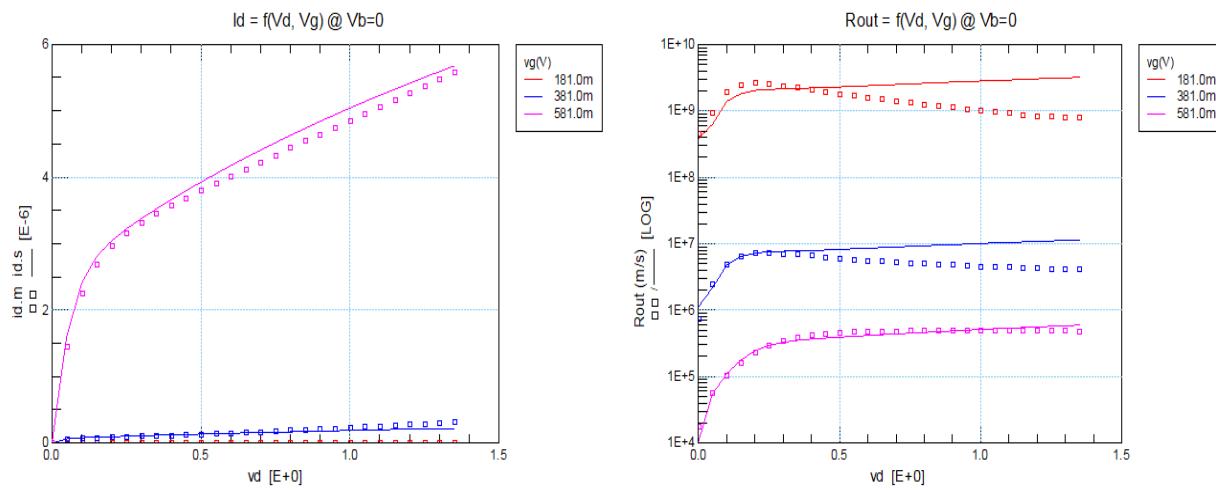


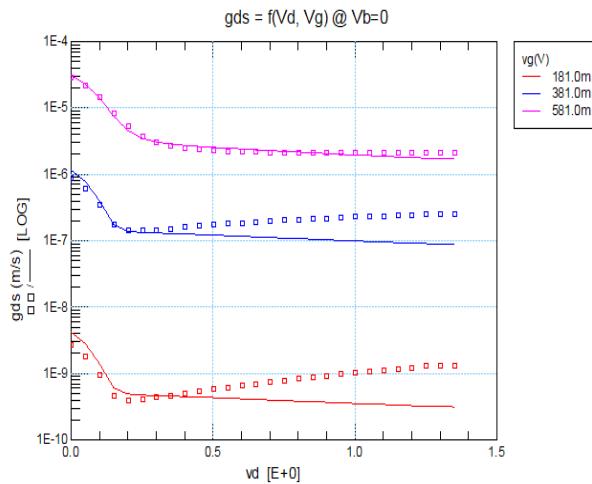


### $id_{vg}, I_b, I_g, V_b = 0V, T = 27^\circ C$

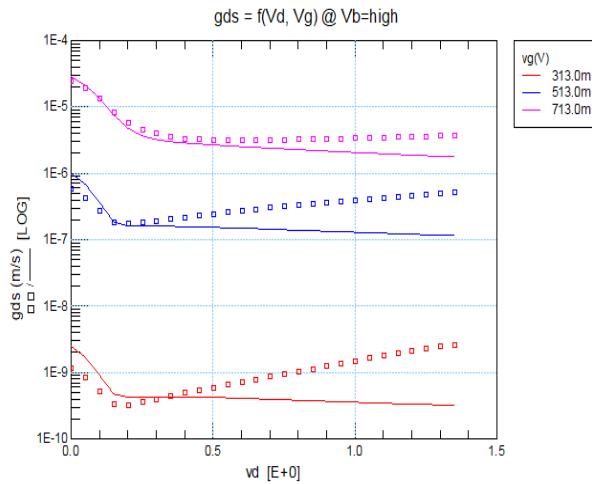
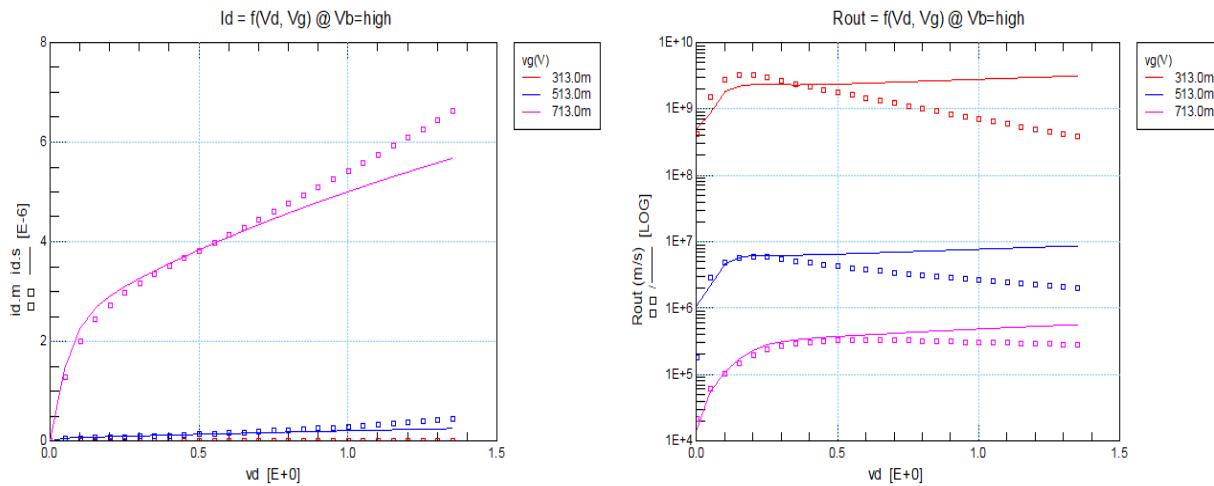


**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


**idvd\_vbmin, Vb = -1.2V, T = 27°C**

**idvd\_vth, Vb = 0V, T = 27°C**


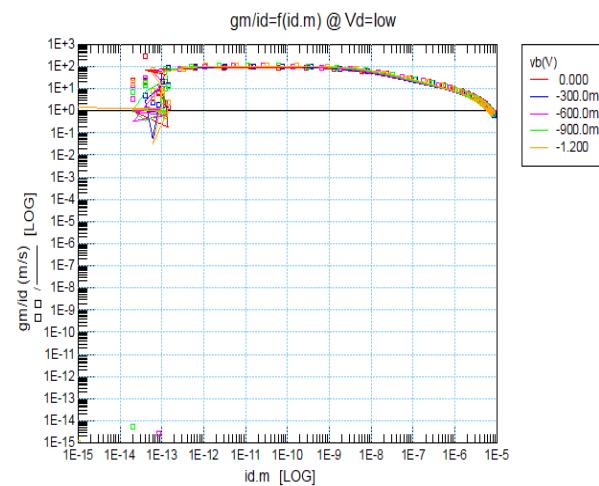
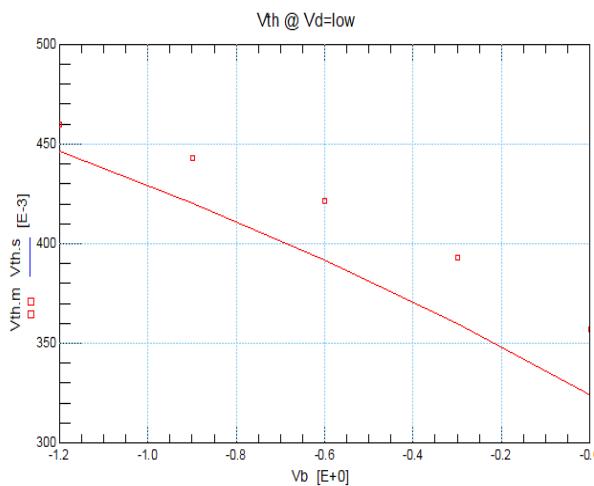
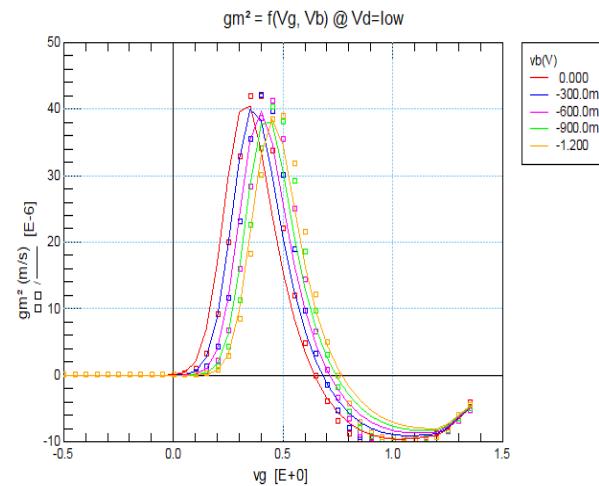
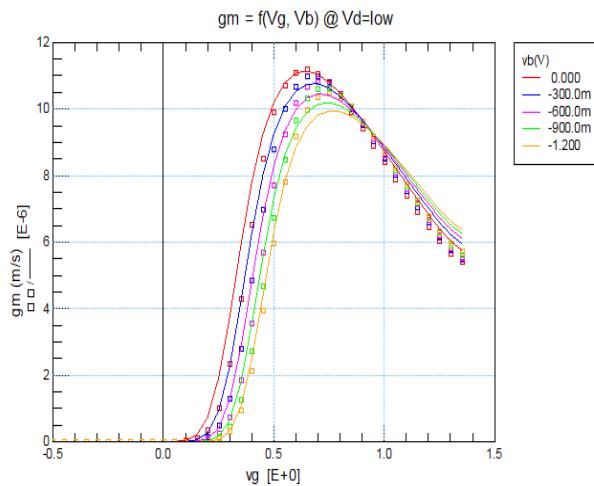
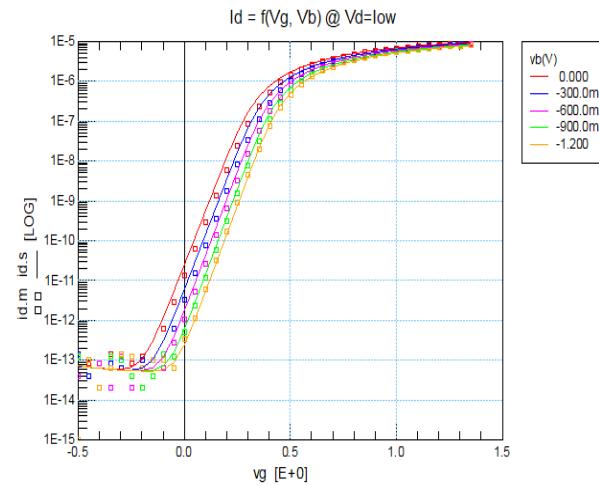
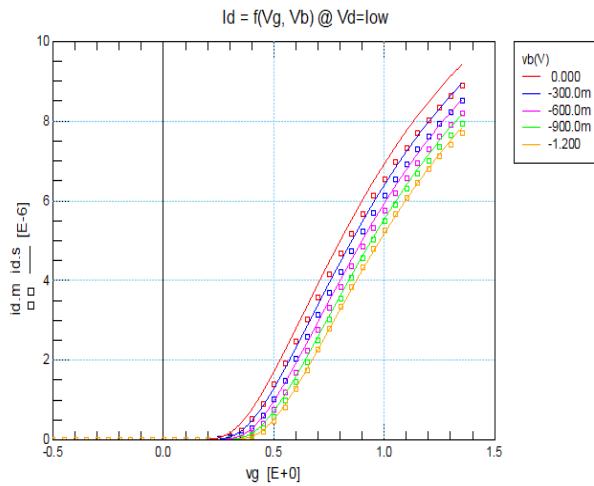


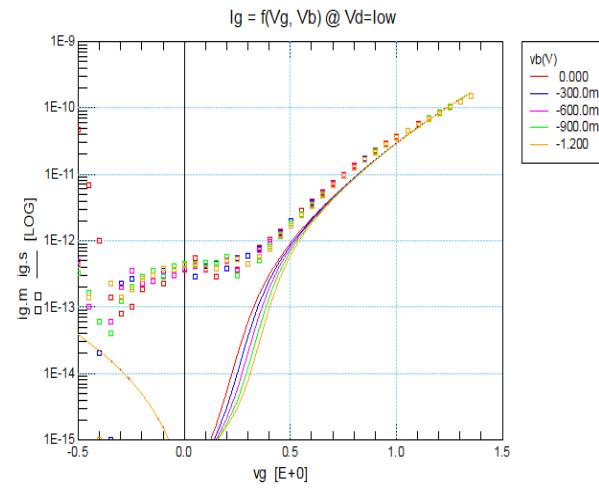
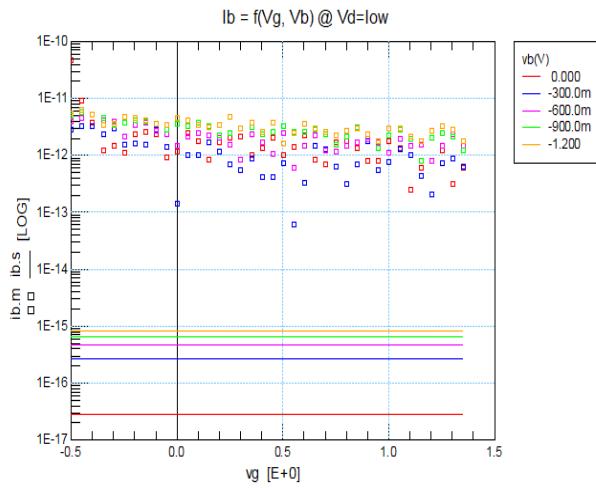
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C



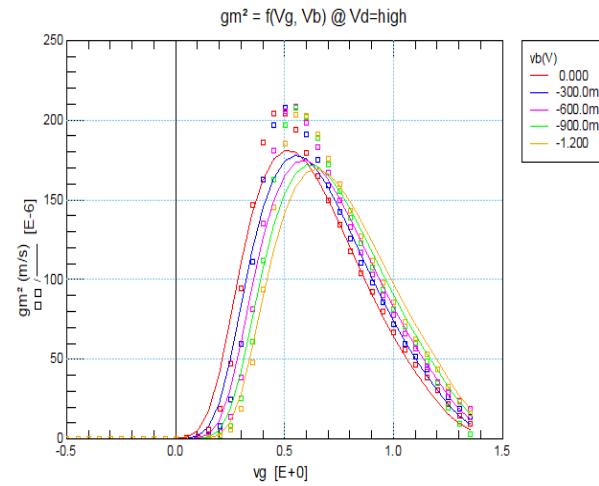
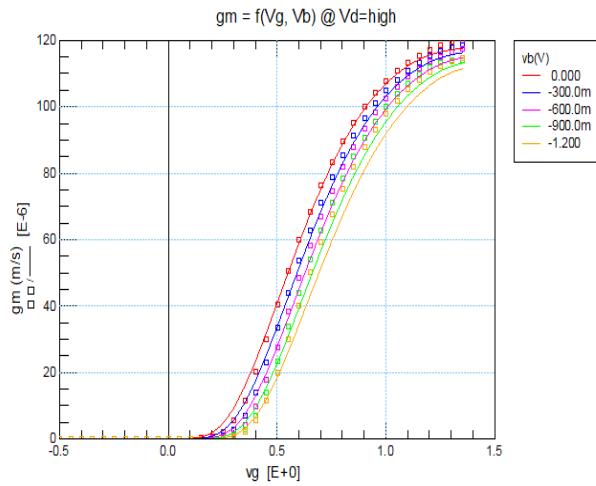
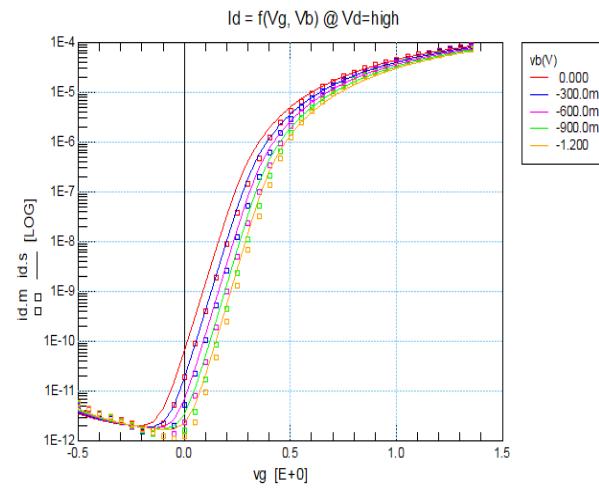
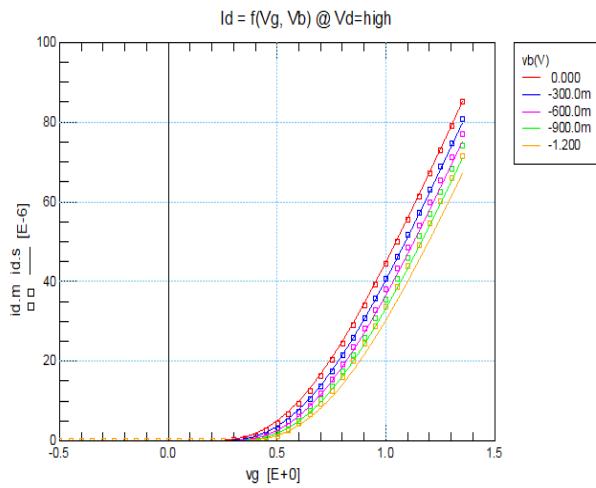
## 4.32 W0u3\_L0u5\_S545\_1

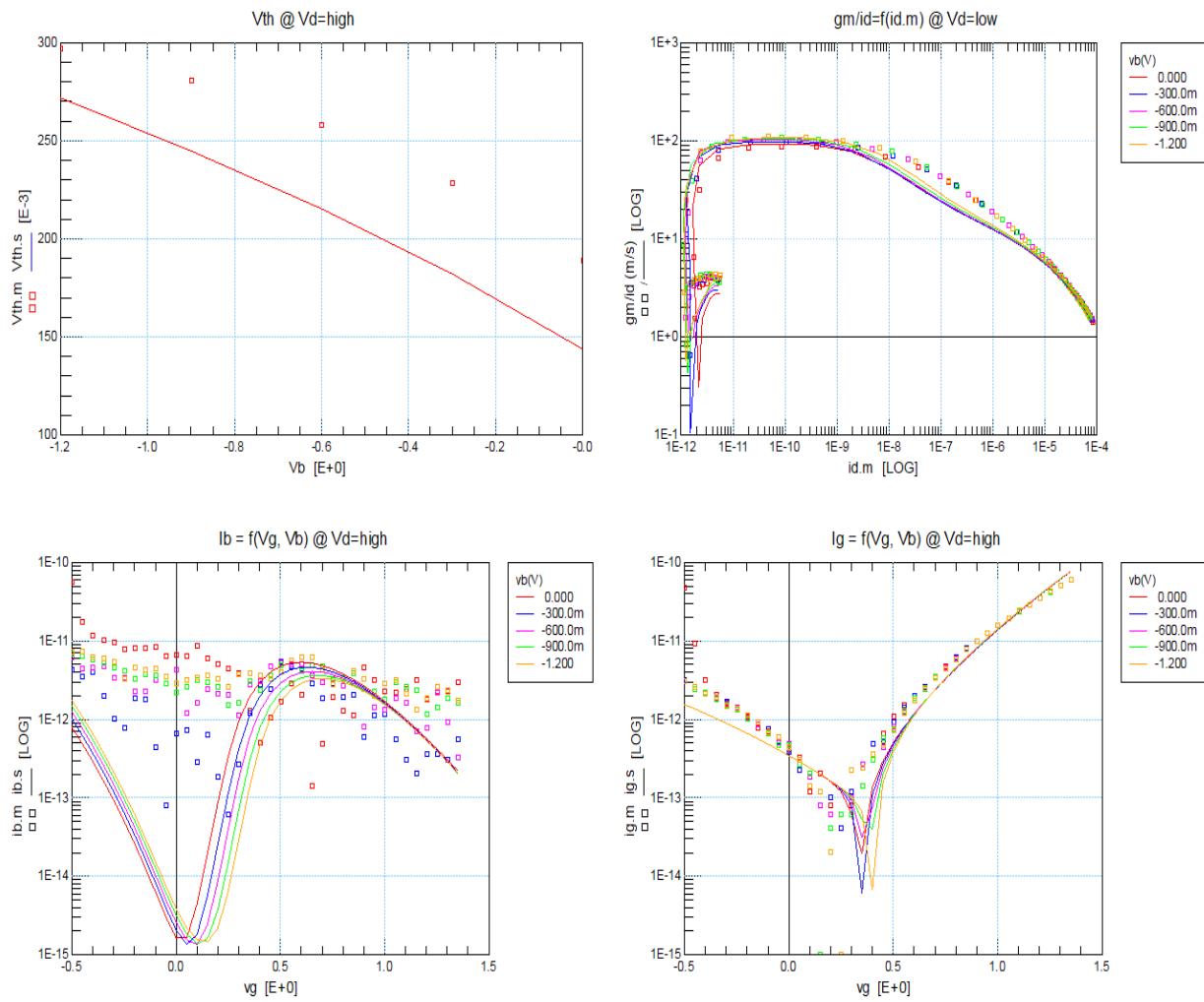
idvg, Vd = 0.05V, T = 27°C



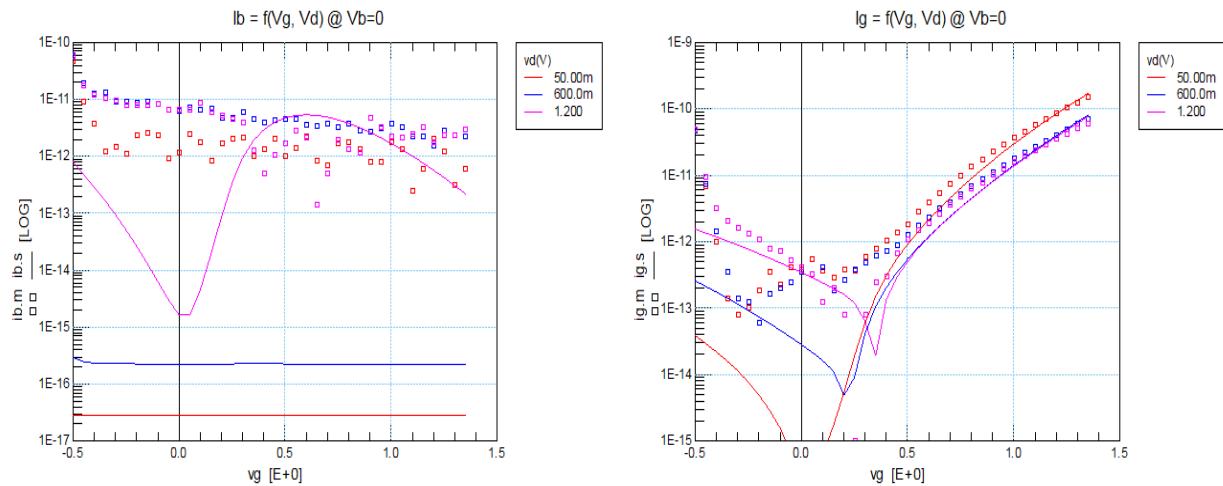


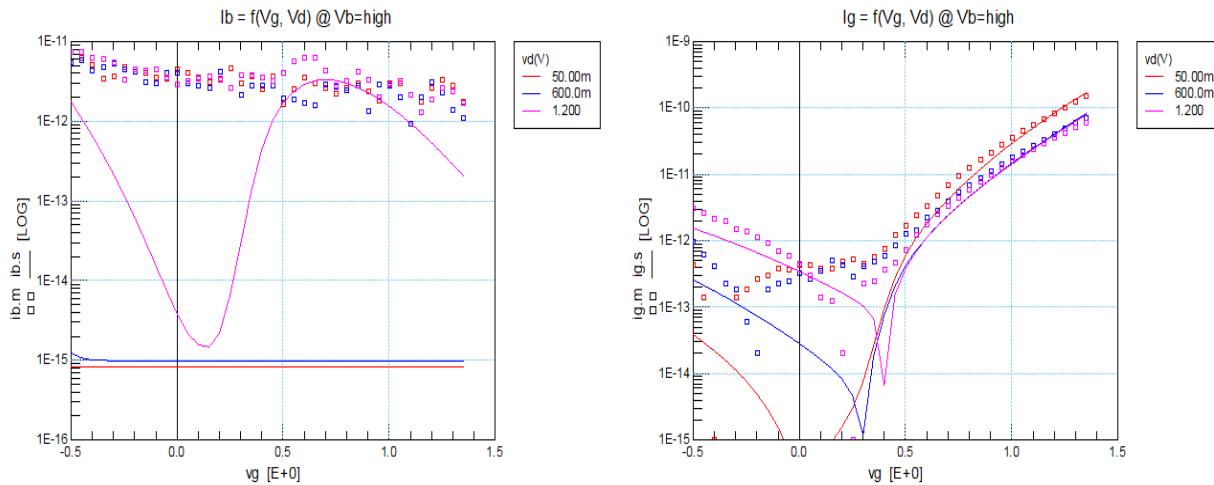
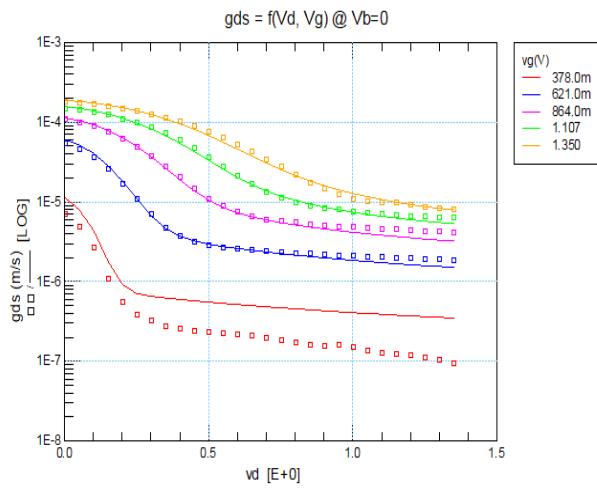
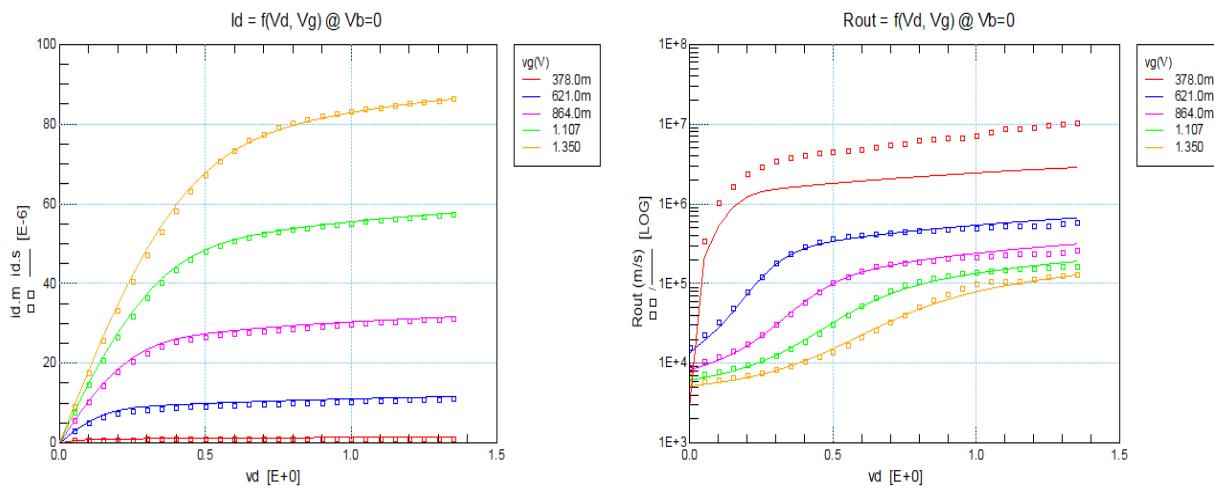
### $i_{dvg}, V_d = 1.2V, T = 27^\circ C$

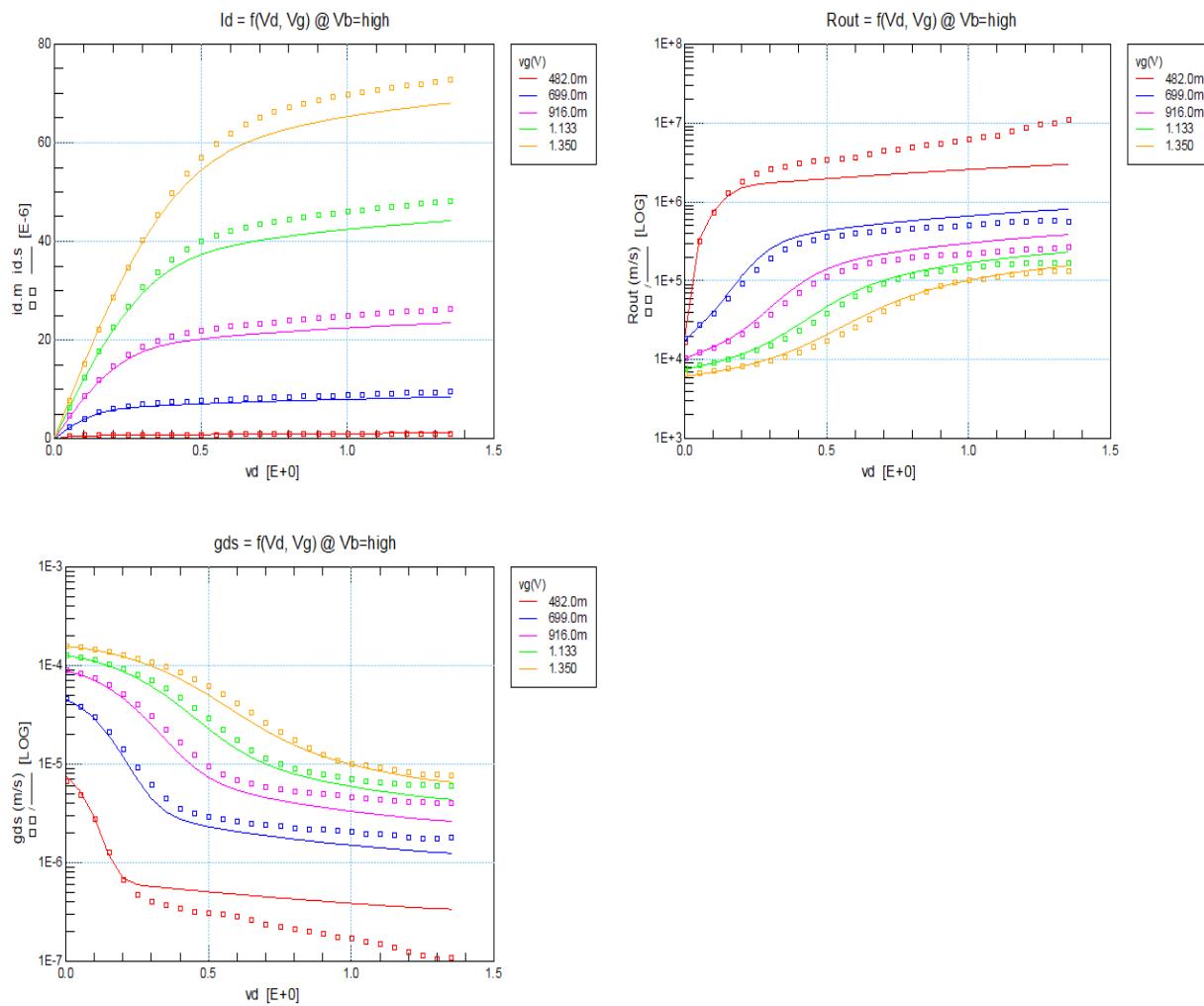
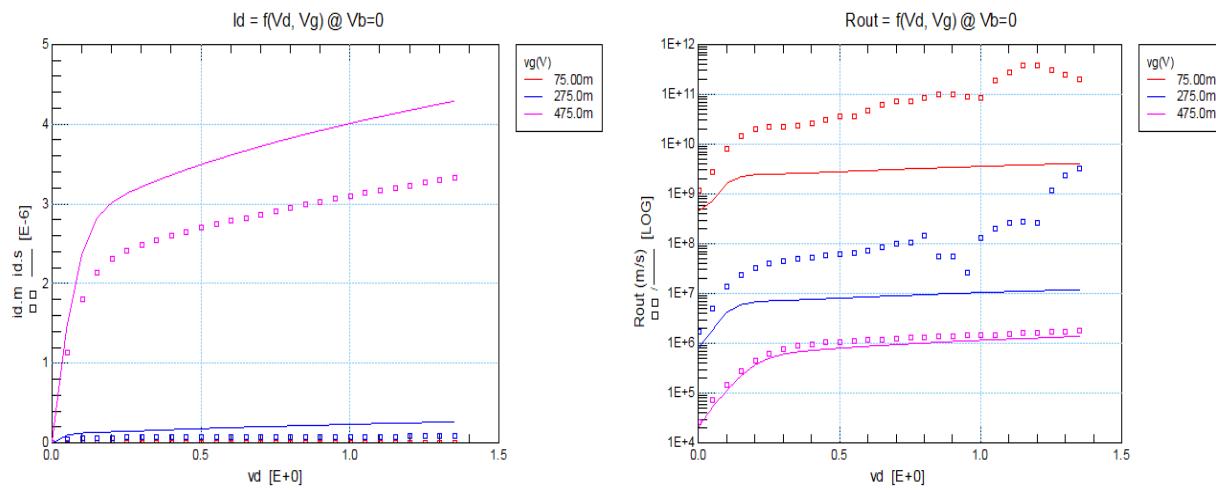


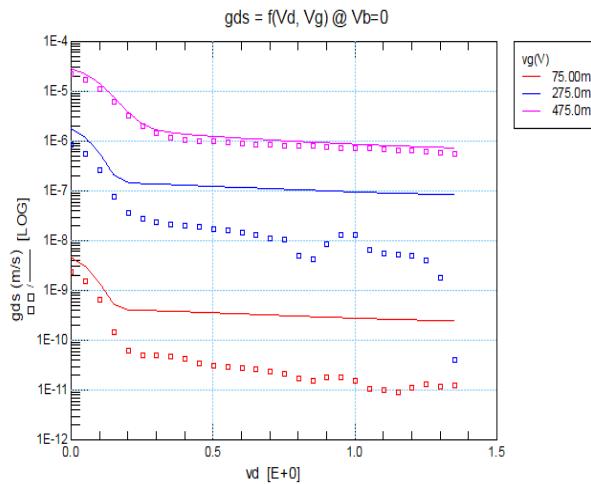


### $i_{dvg}, I_b, I_g, V_b = 0V, T = 27^\circ C$

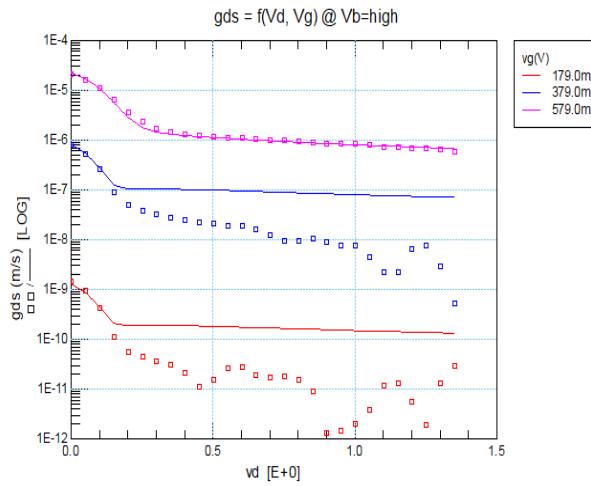
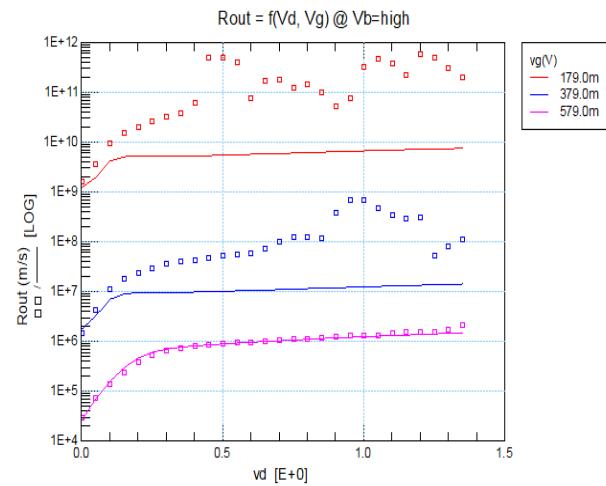
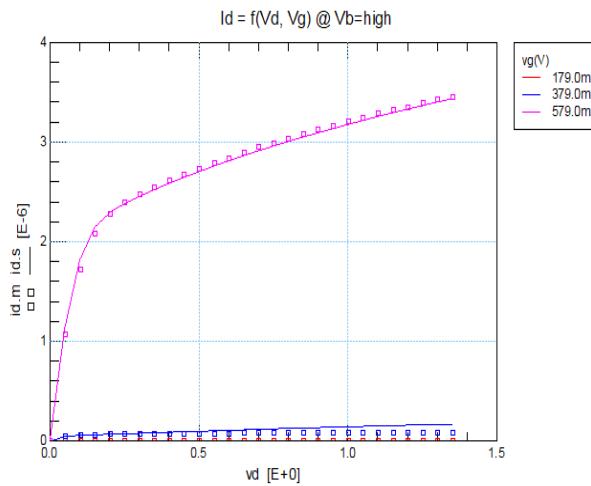


**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


**idvd\_vbmin, Vb = -1.2V, T = 27°C****idvd\_vth, Vb = 0V, T = 27°C**

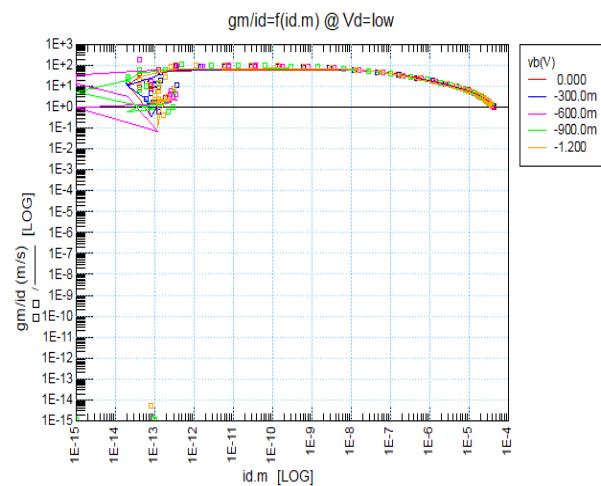
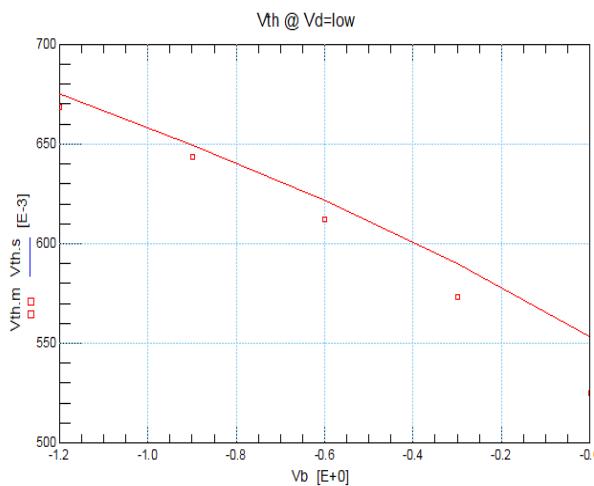
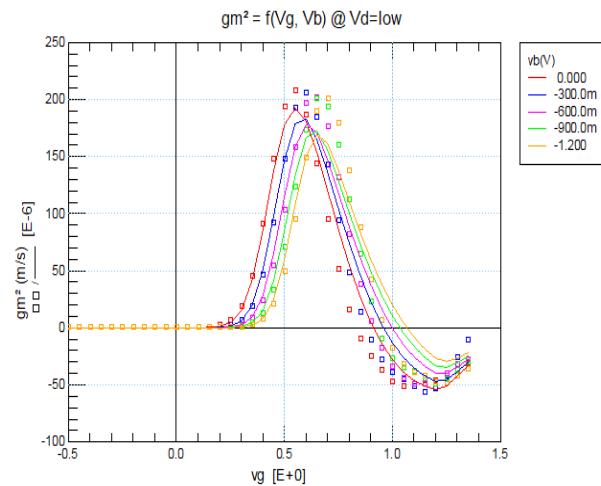
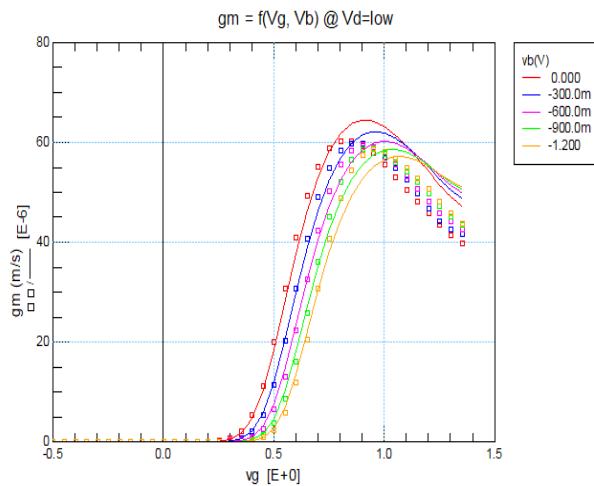
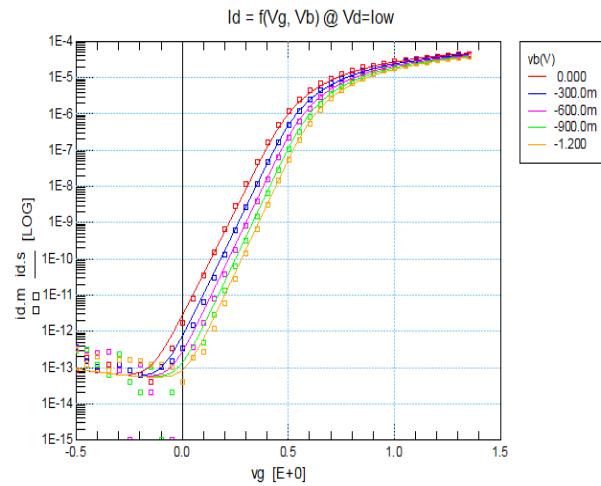
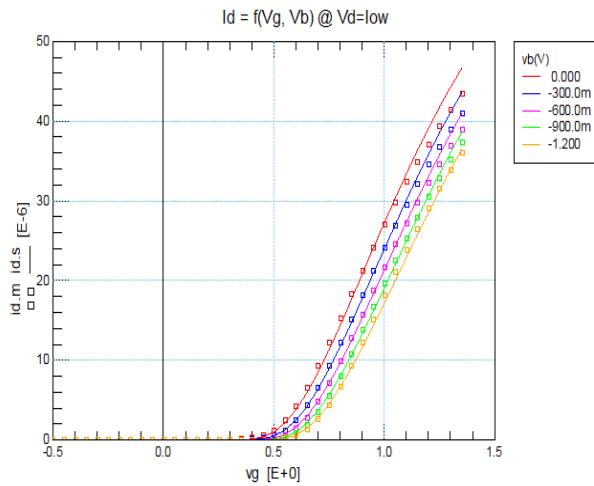


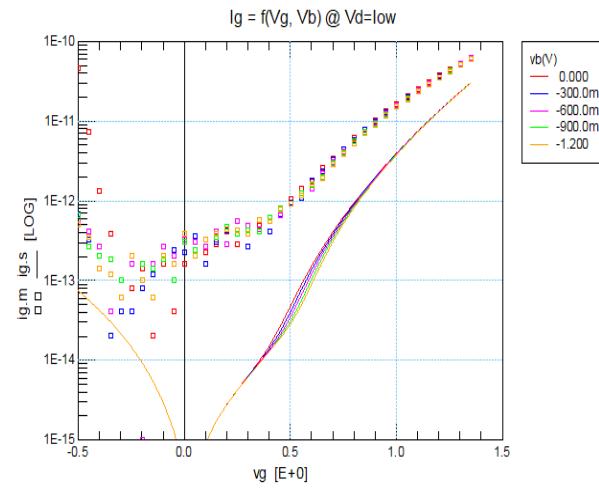
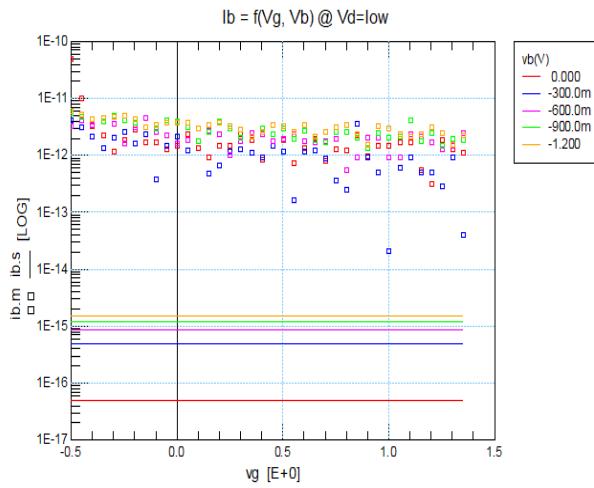
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C



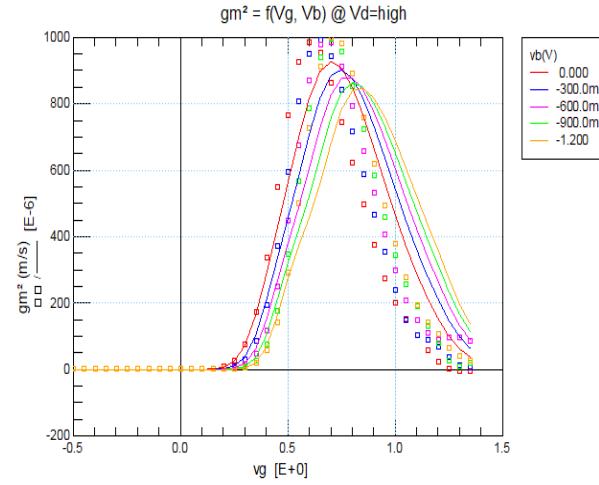
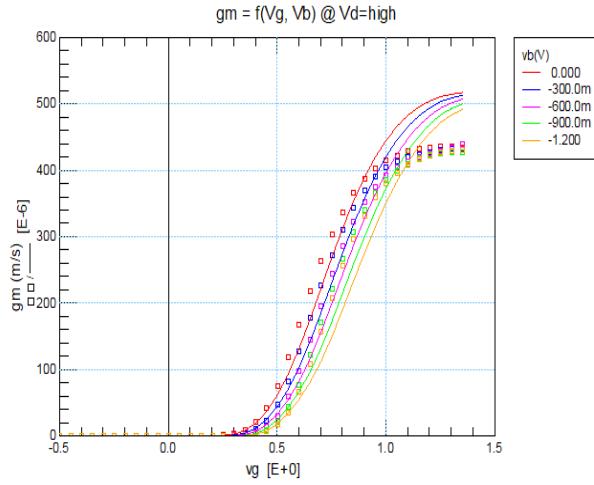
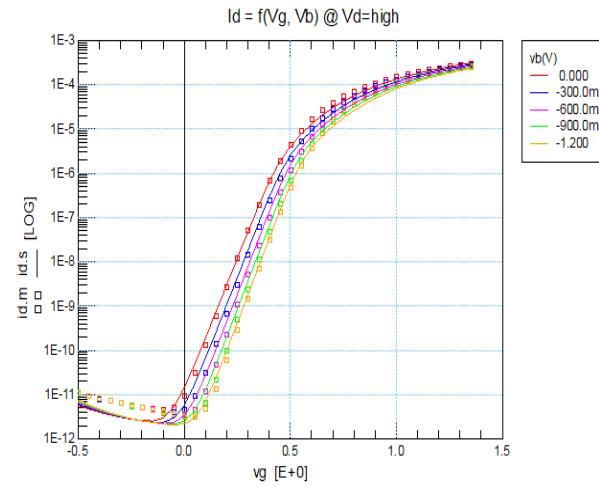
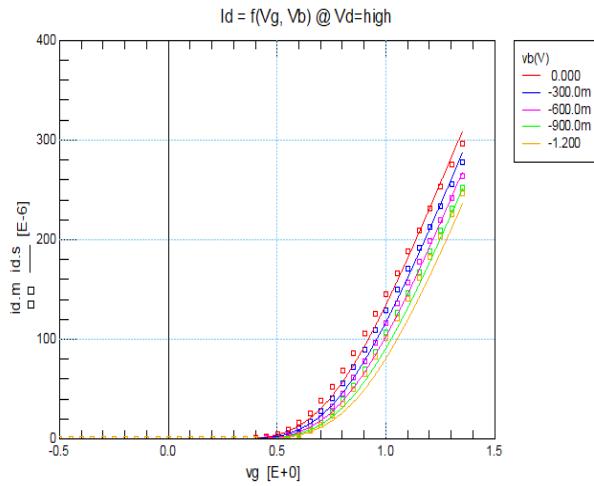
## 4.33 W0u6\_L0u13\_S543\_2

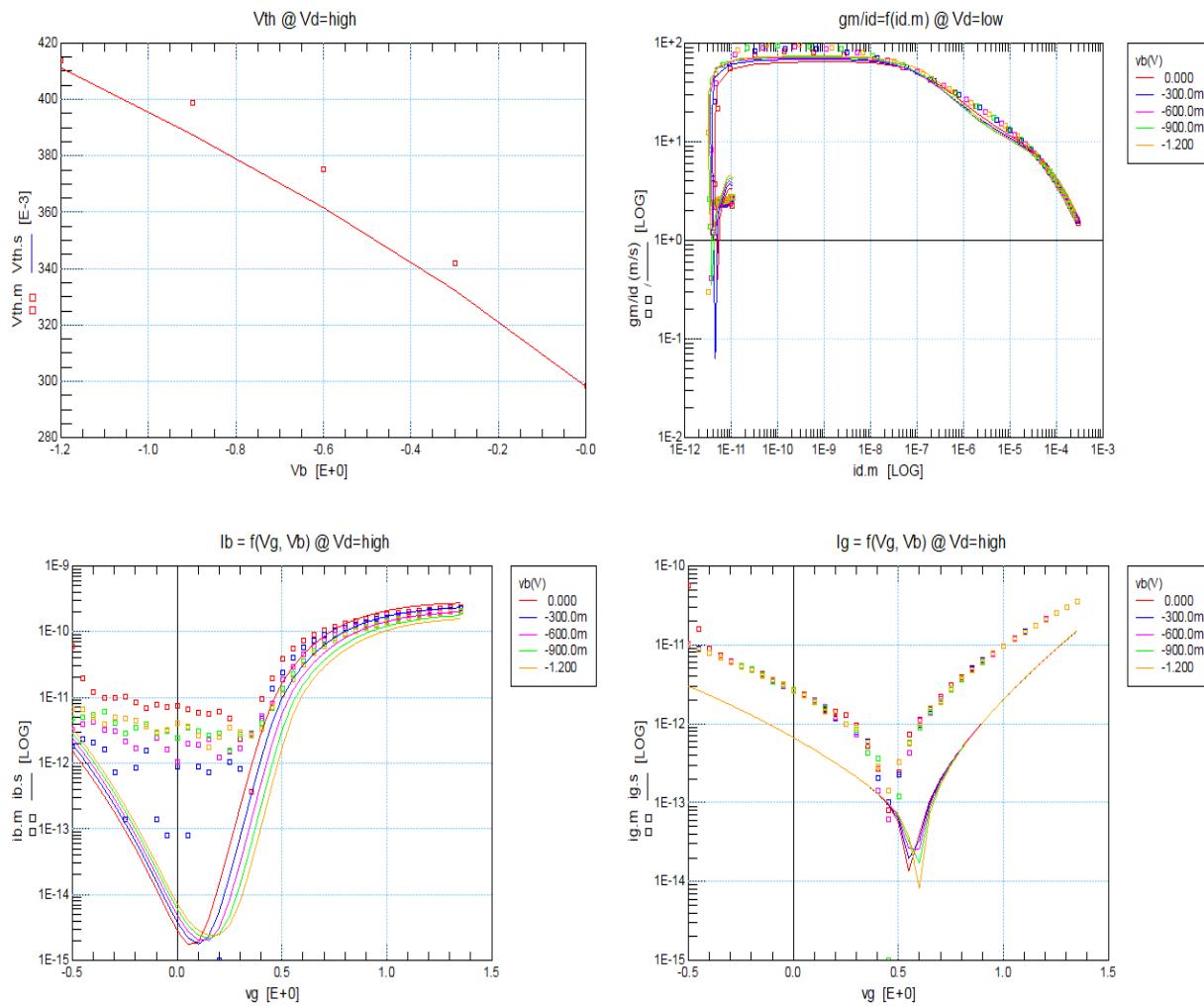
idvg, Vd = 0.05V, T = 27°C



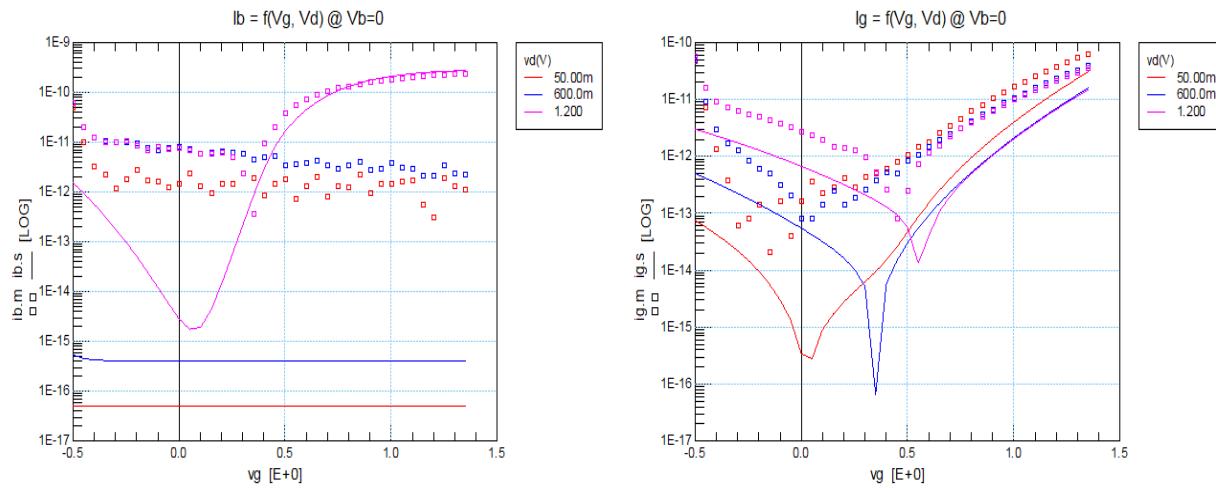


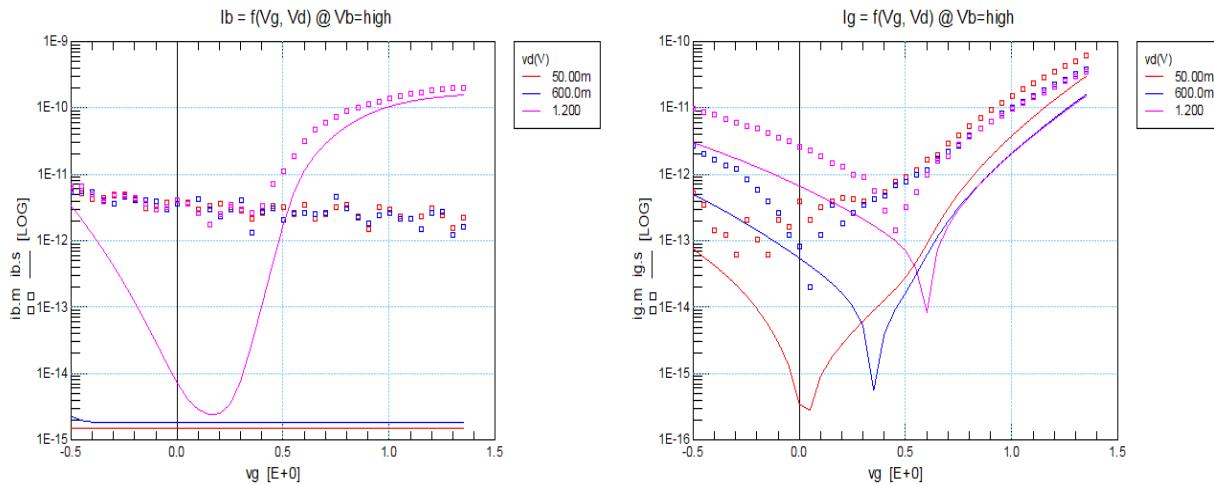
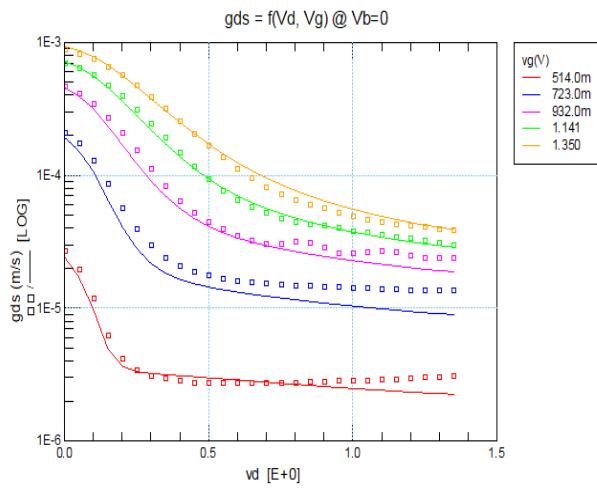
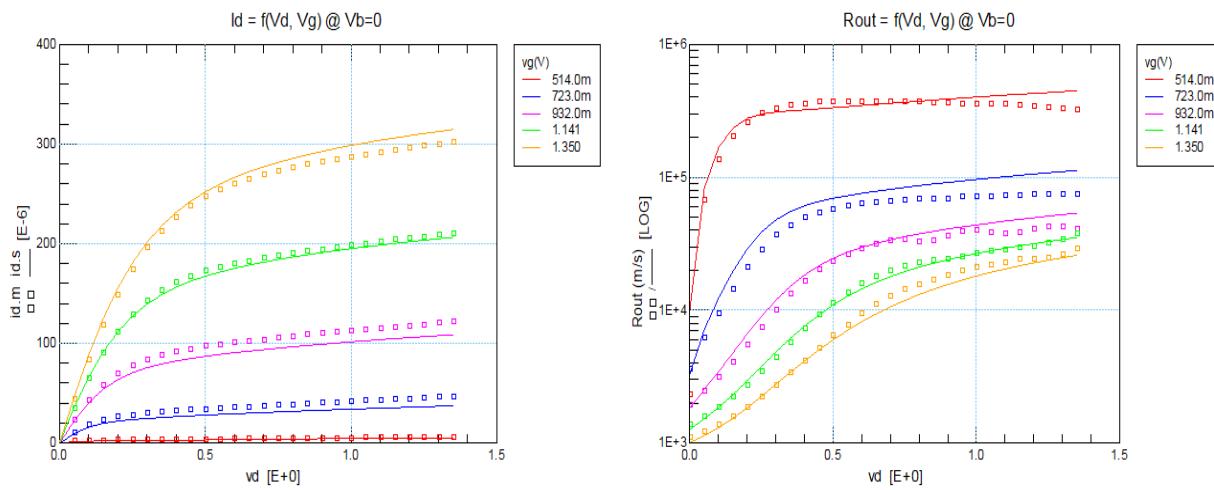
### $i_{dvg}, V_d = 1.2V, T = 27^\circ C$

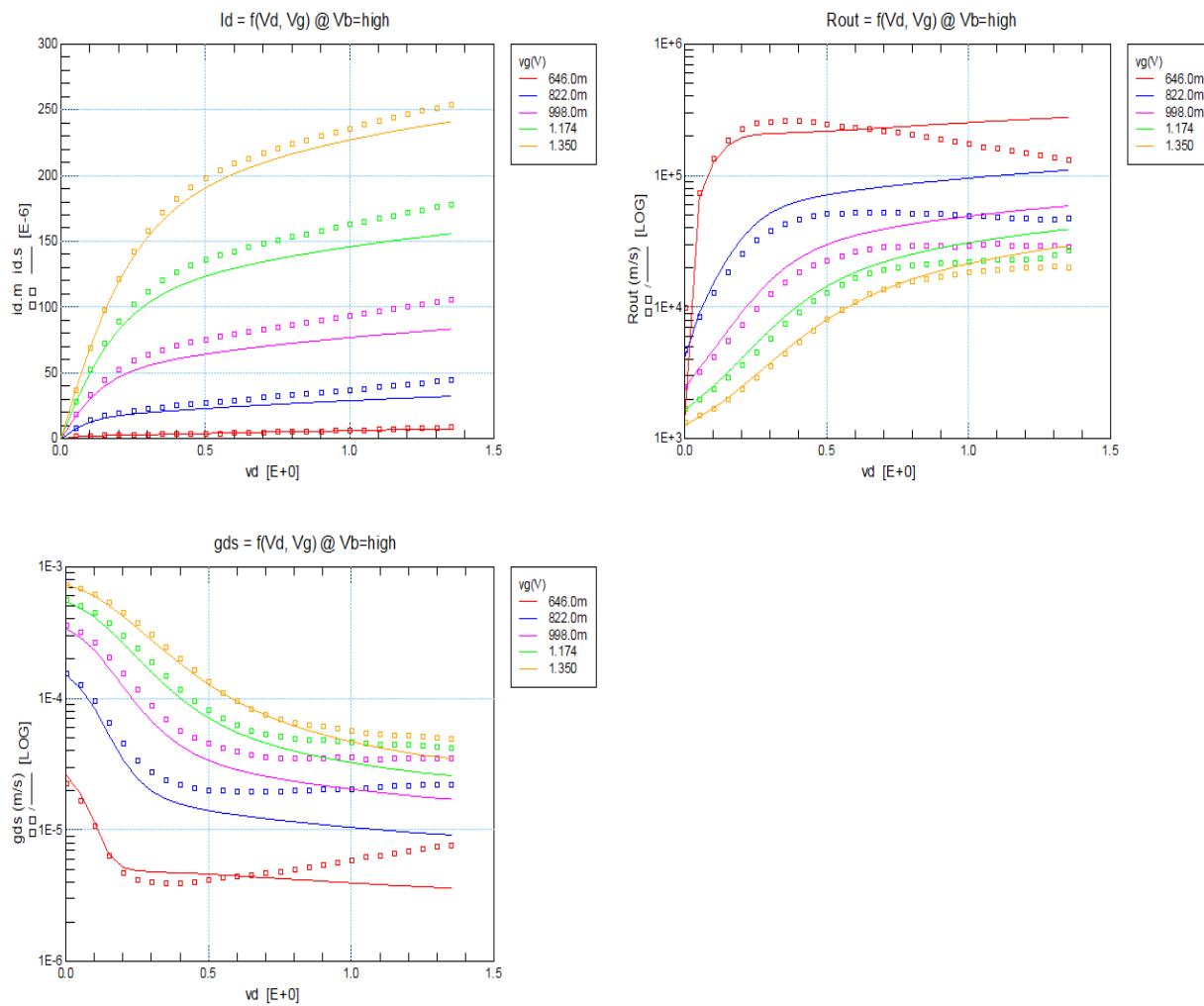
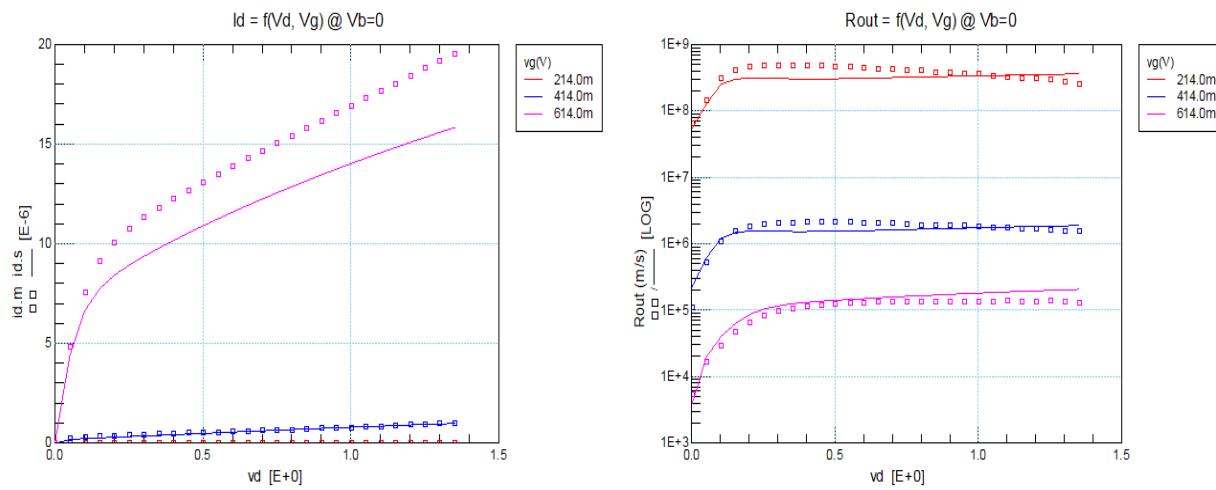


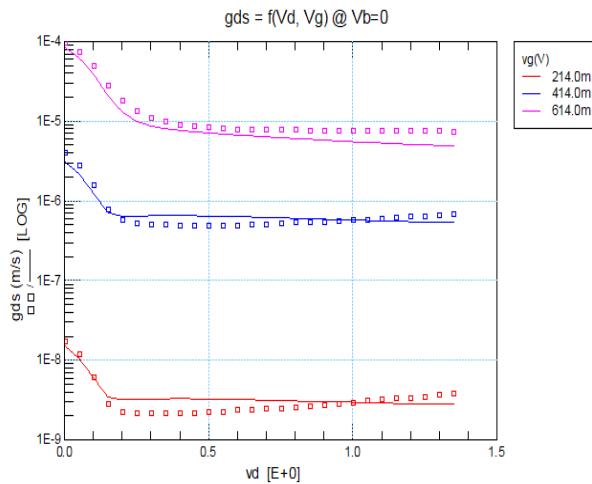


**idvg, Ib, Ig, Vb = 0V, T = 27°C**

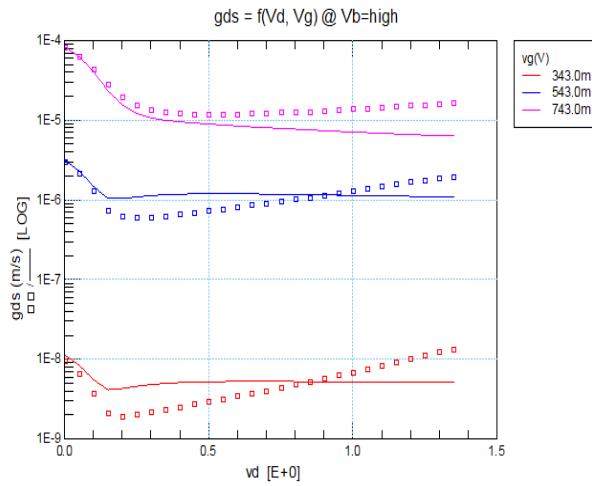
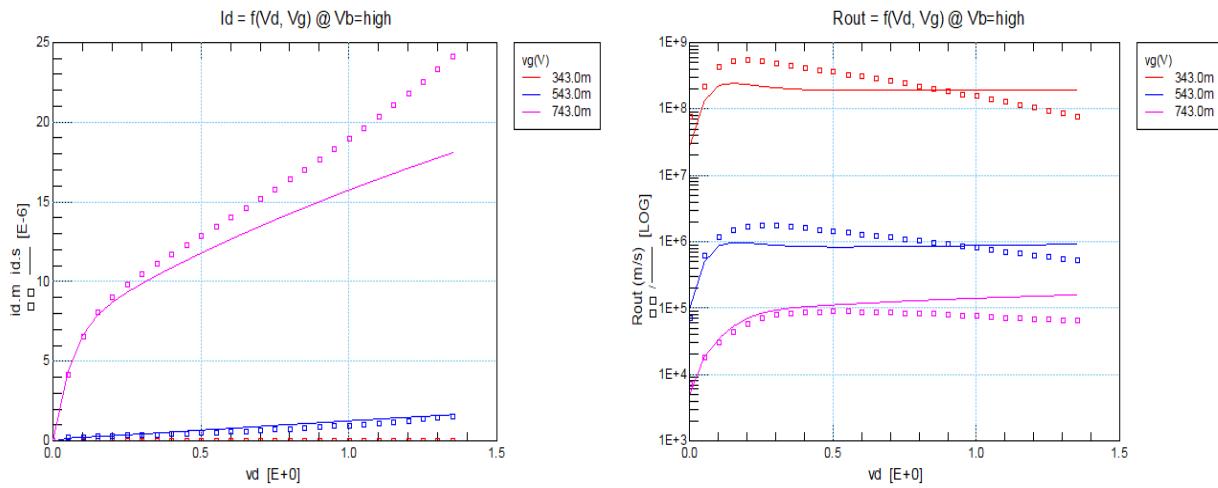


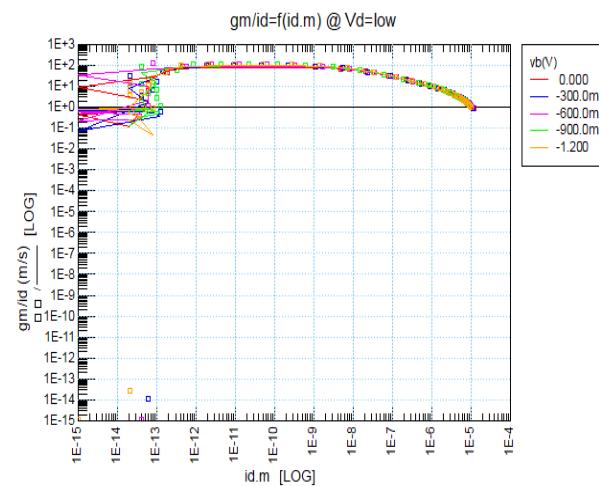
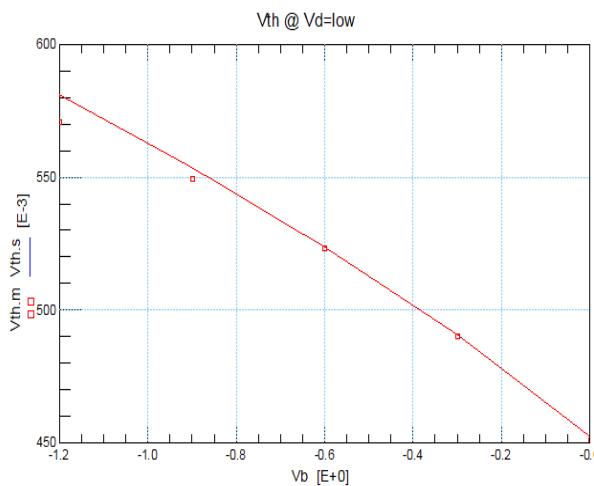
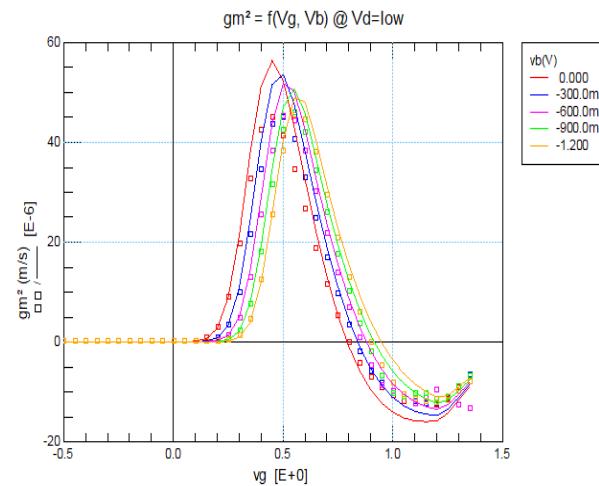
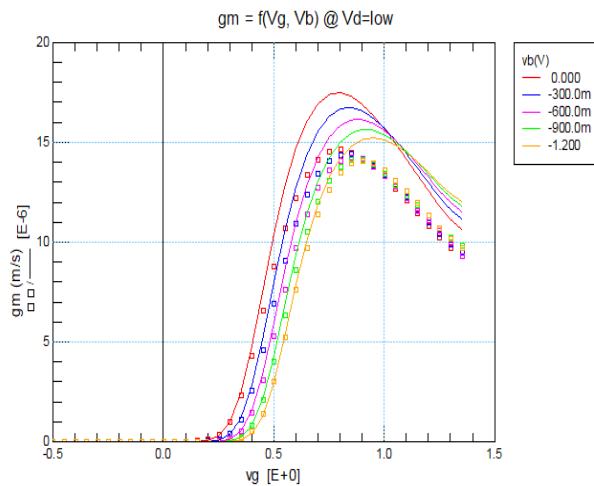
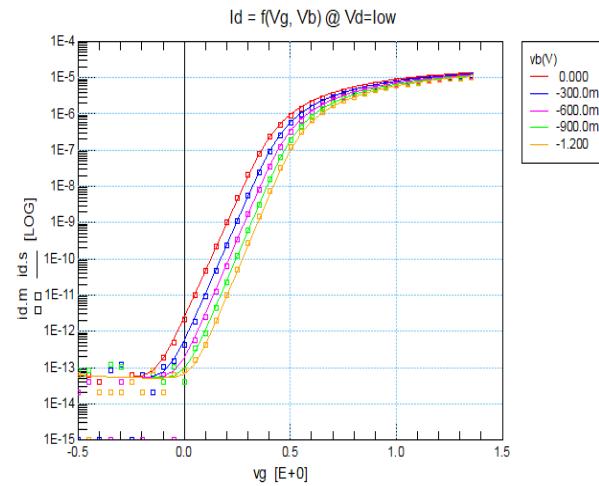
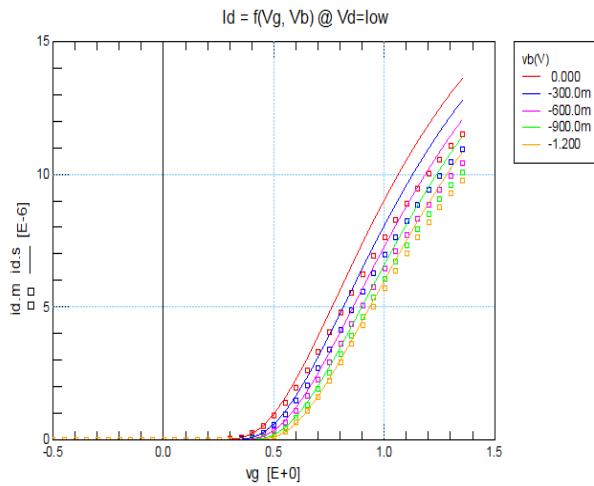
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


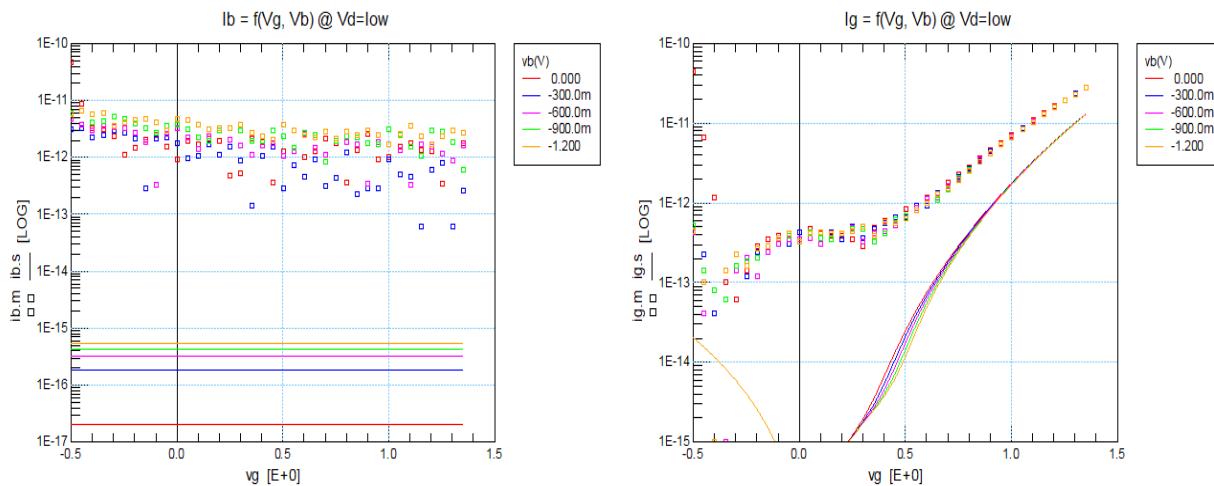
**idvd\_vbmin, Vb = -1.2V, T = 27°C**

**idvd\_vth, Vb = 0V, T = 27°C**




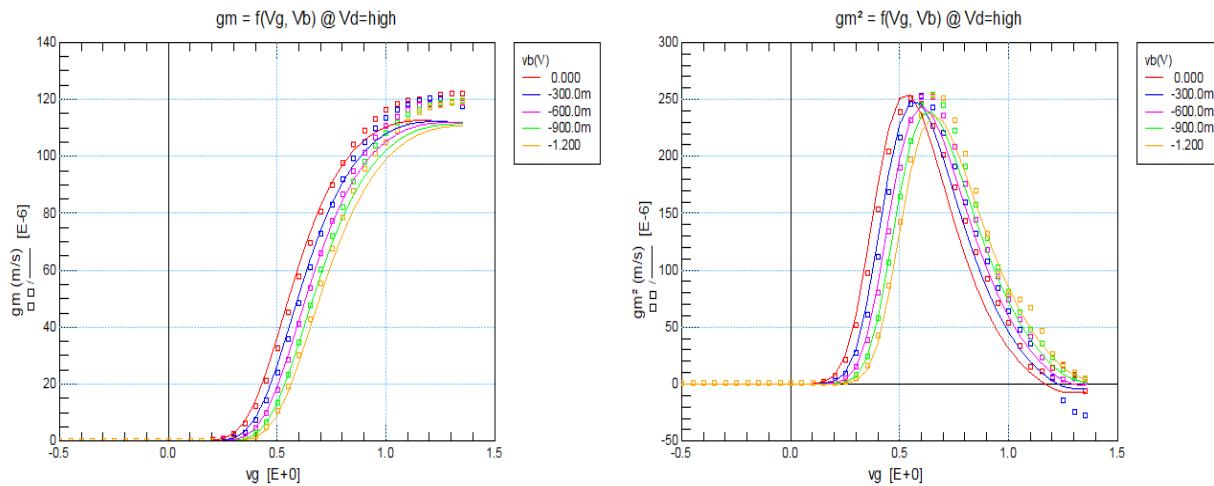
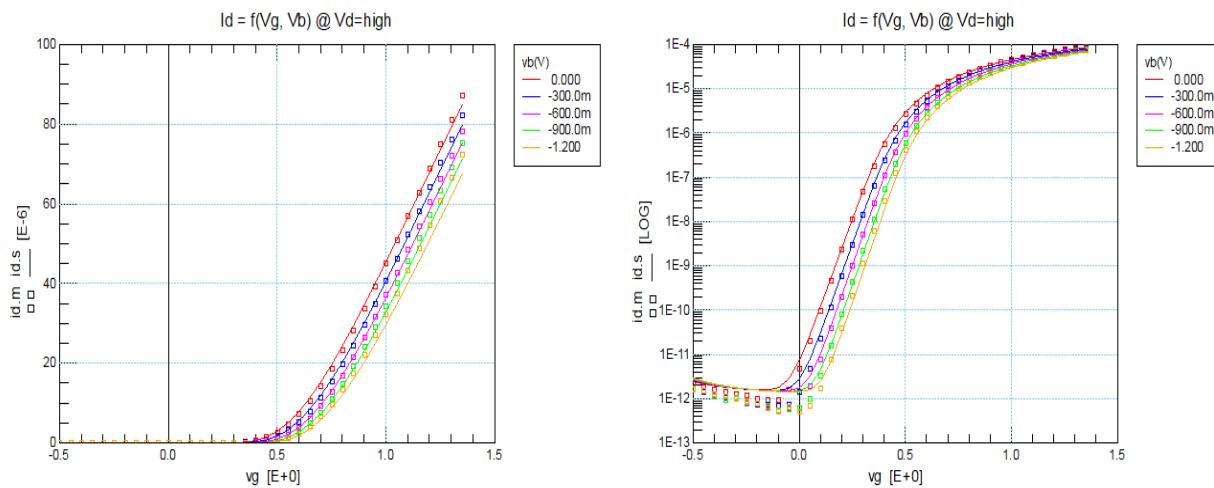
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

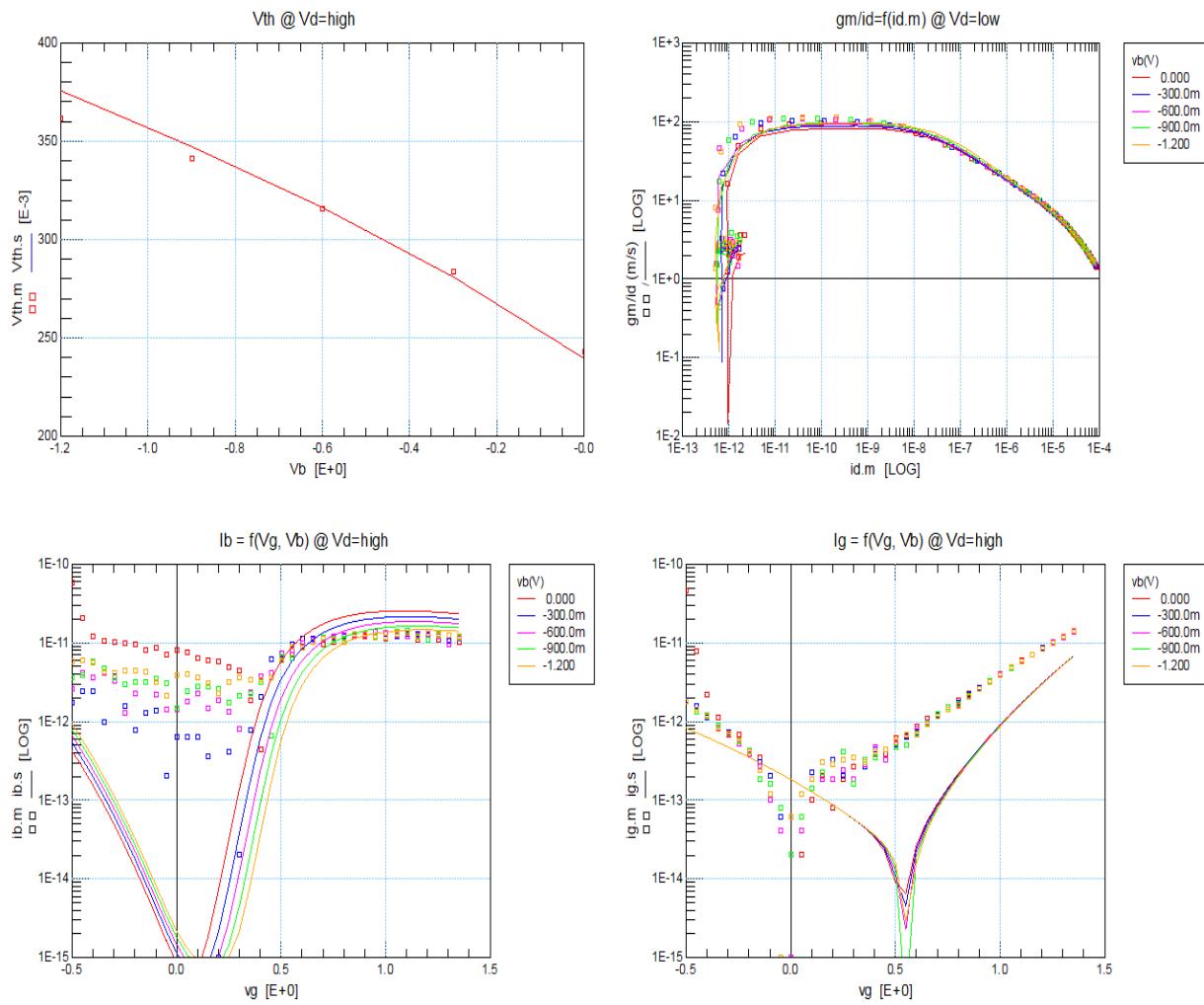


**4.34 W0u15\_L0u18\_S547\_1****idvg, Vd = 0.05V, T = 27°C**

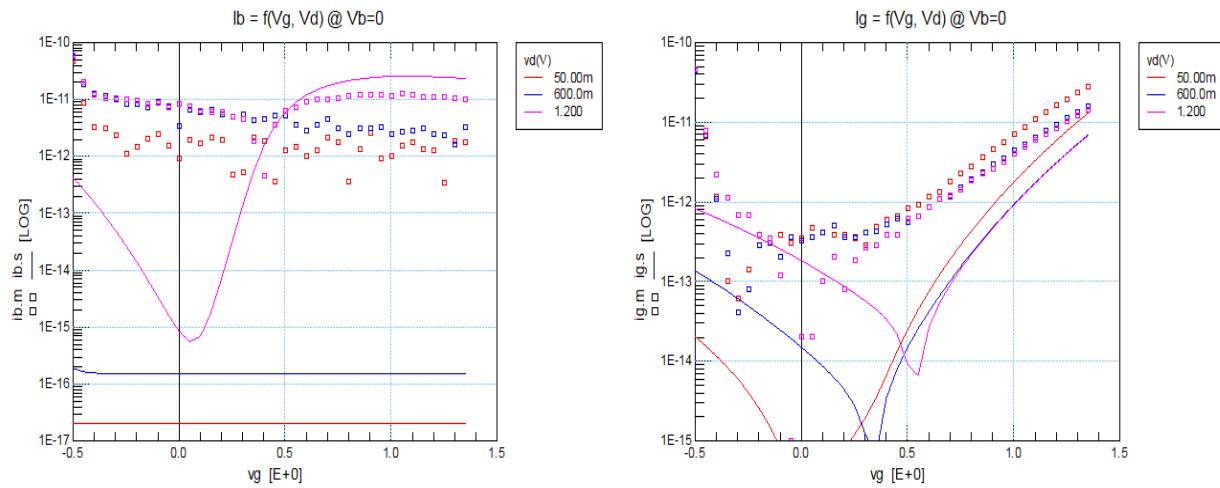


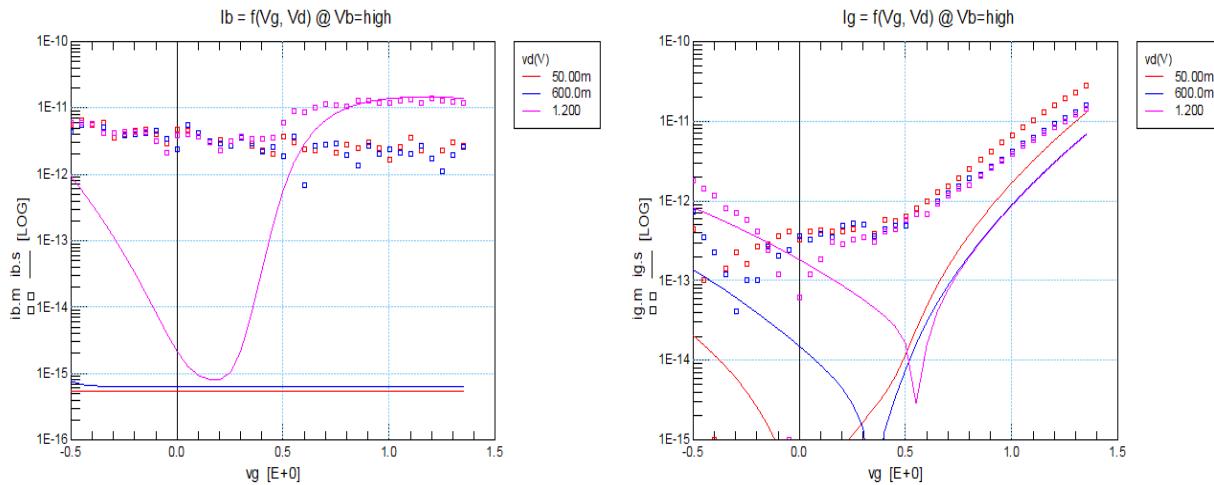
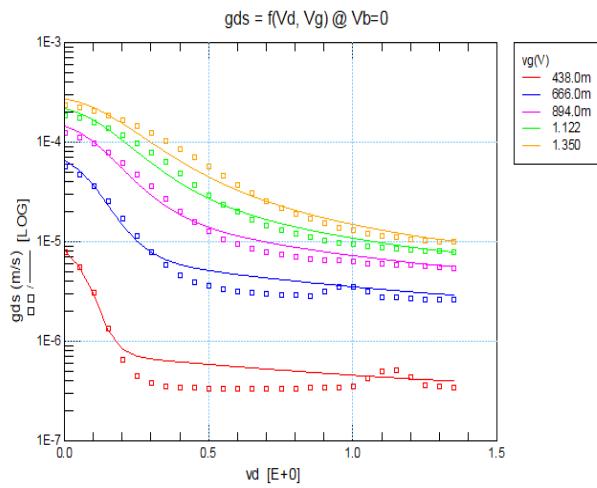
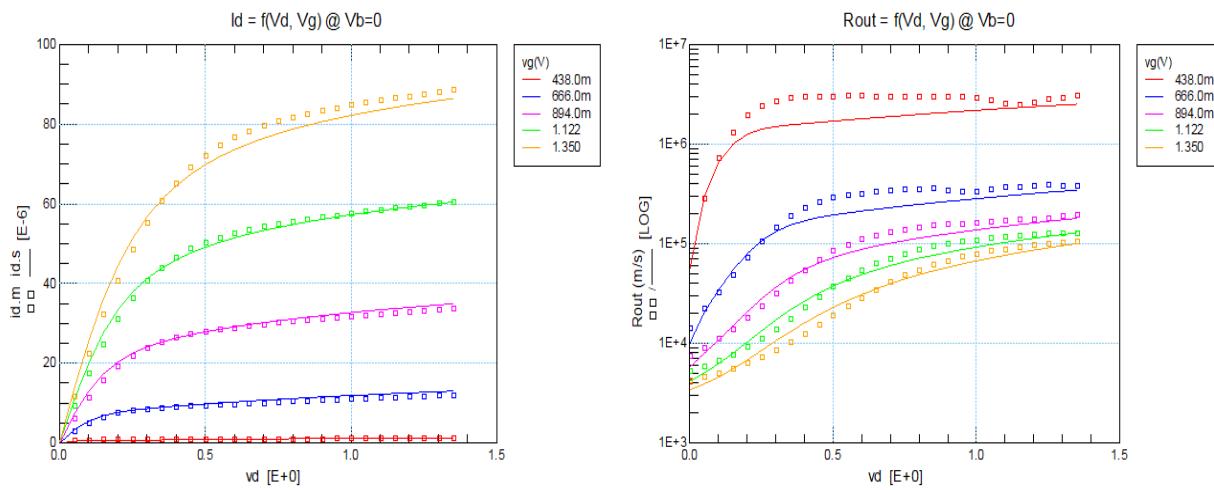
**idvg, Vd = 1.2V, T = 27°C**

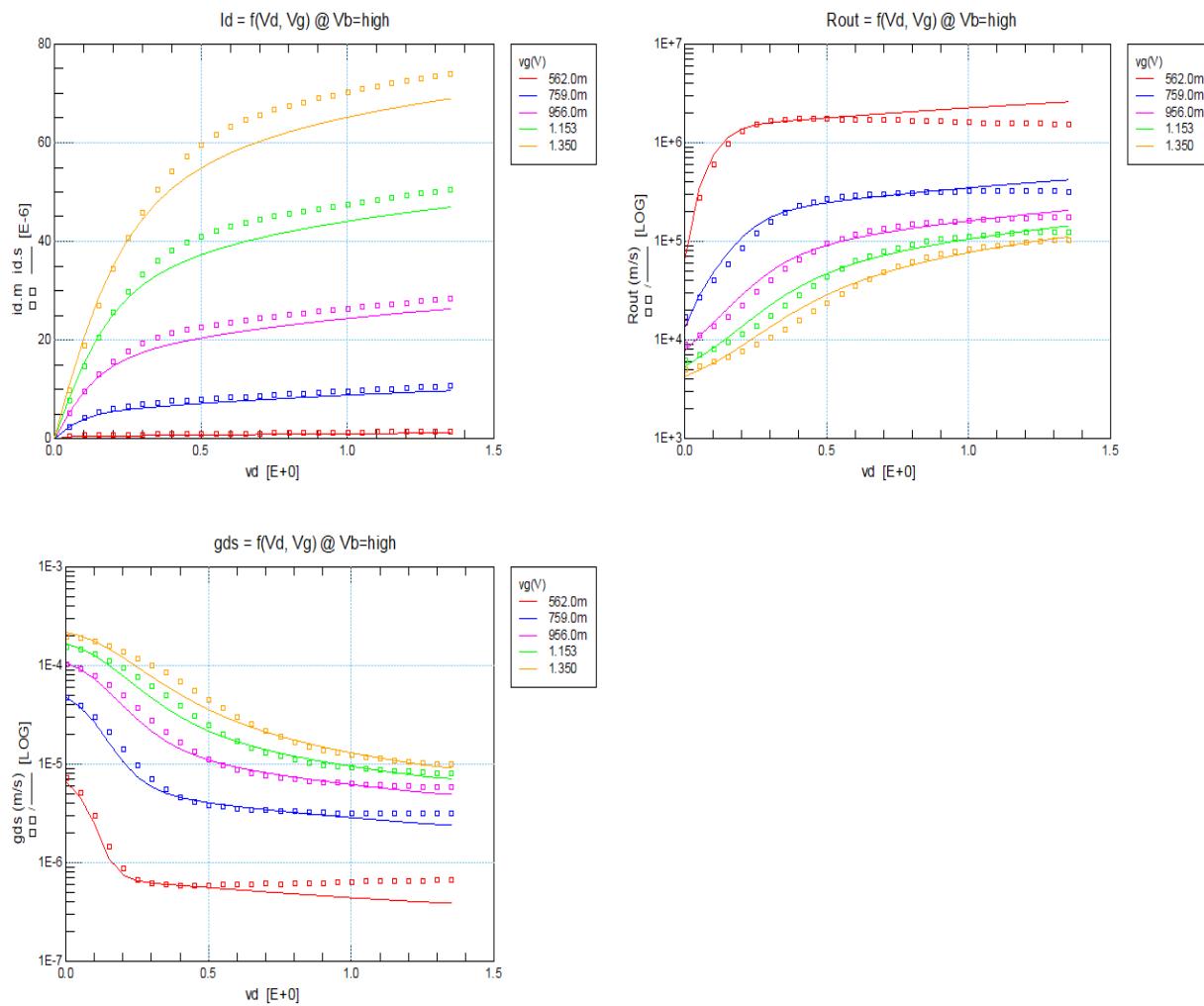
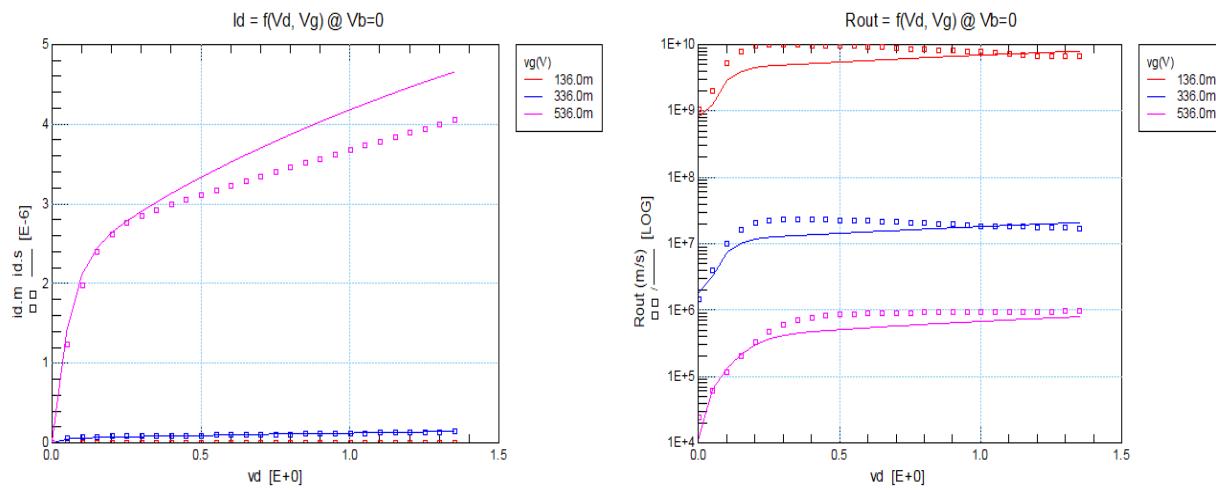


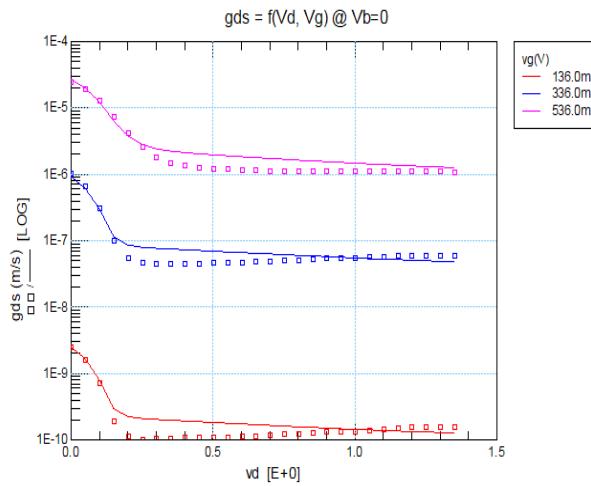


$id_{vg}, I_b, Ig, V_b = 0V, T = 27^\circ C$

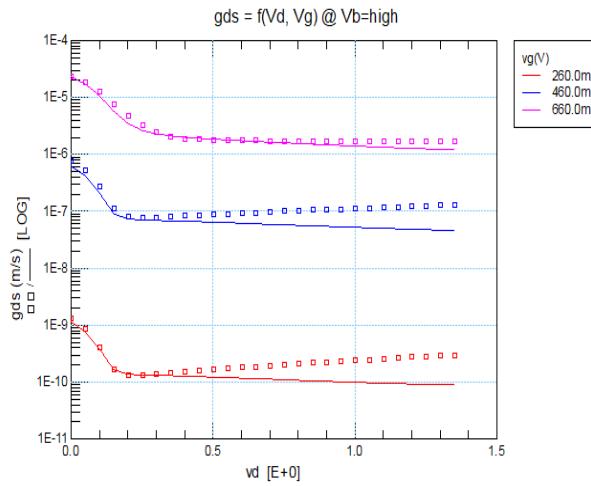
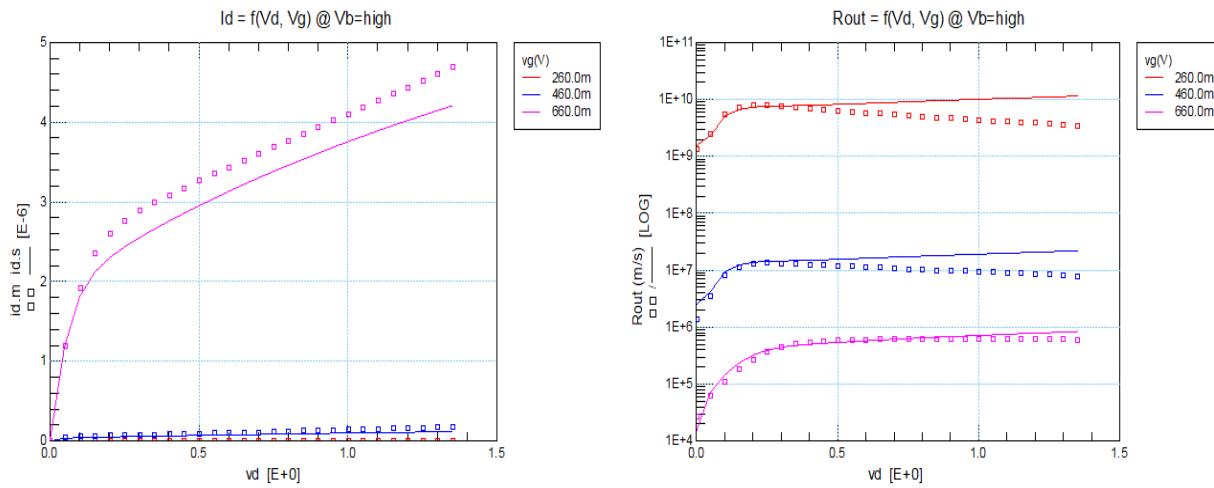


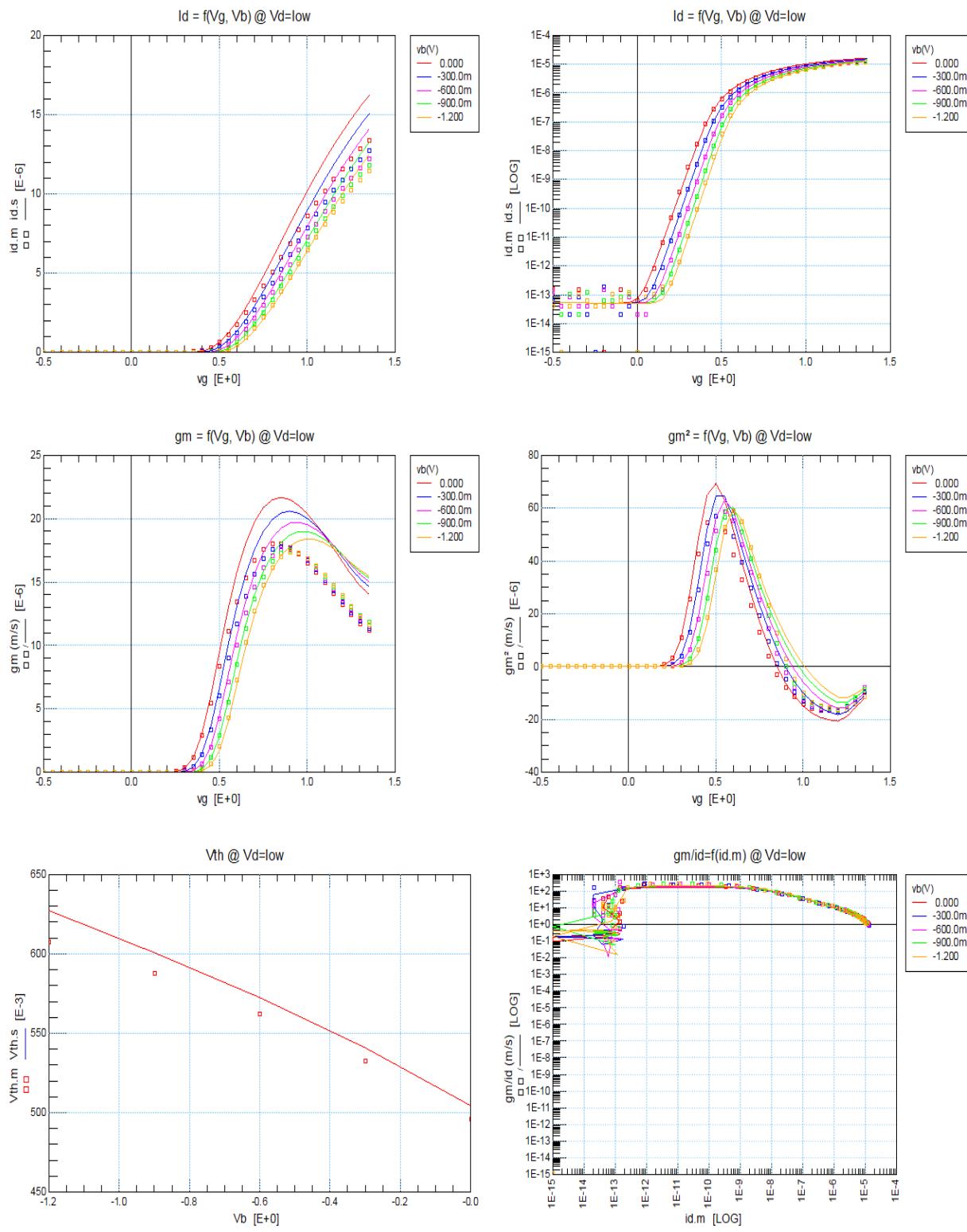
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


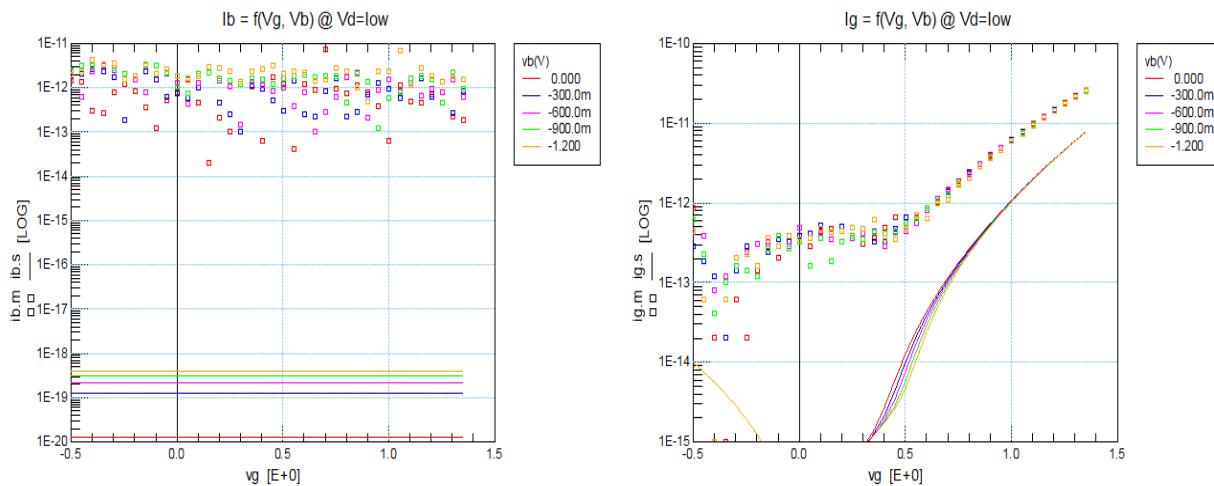
**idvd\_vbmin, Vb = -1.2V, T = 27°C**

**idvd\_vth, Vb = 0V, T = 27°C**




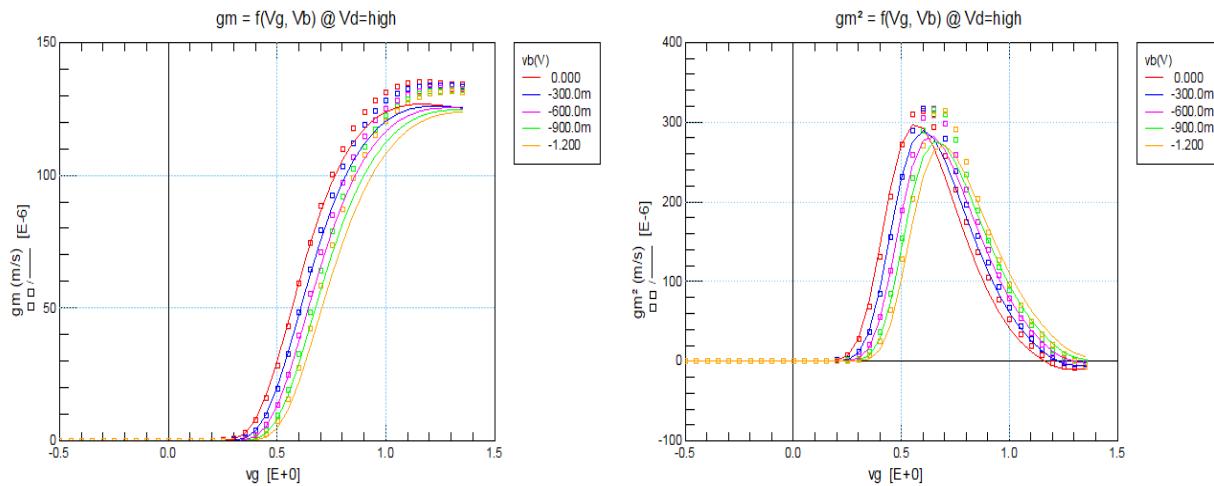
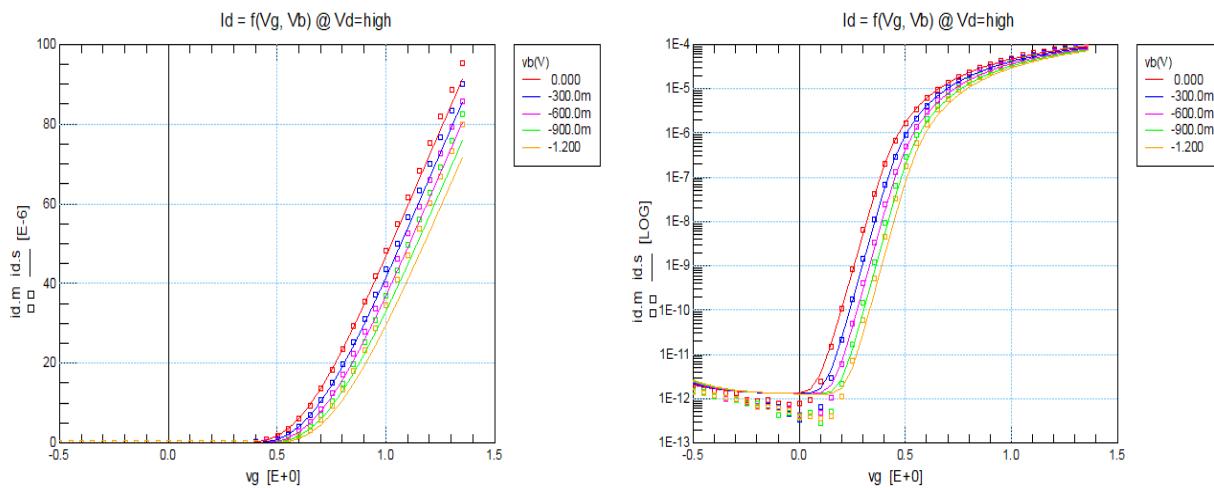
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

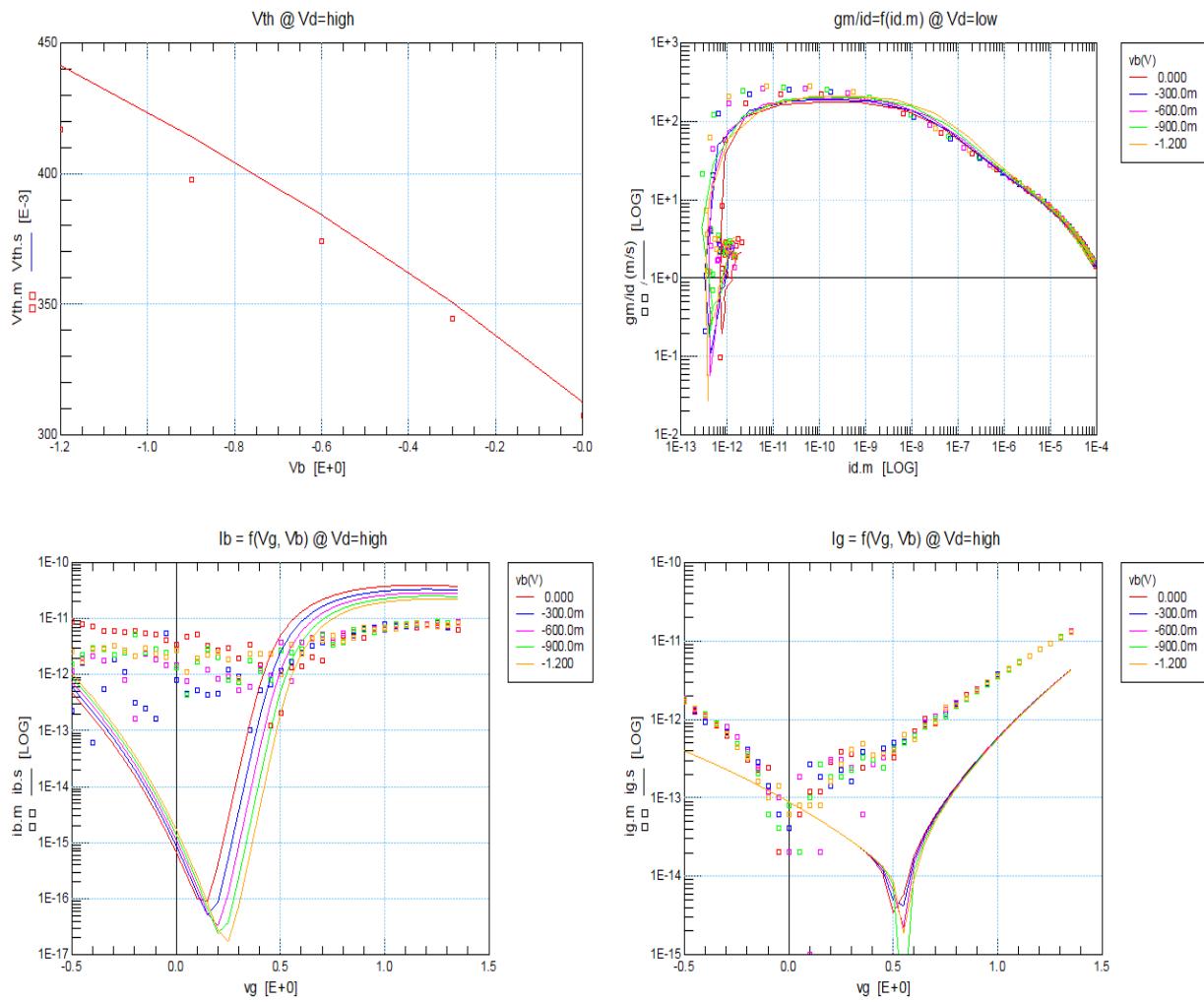


**idvg, Vd = 0.05V, T = -40°C**


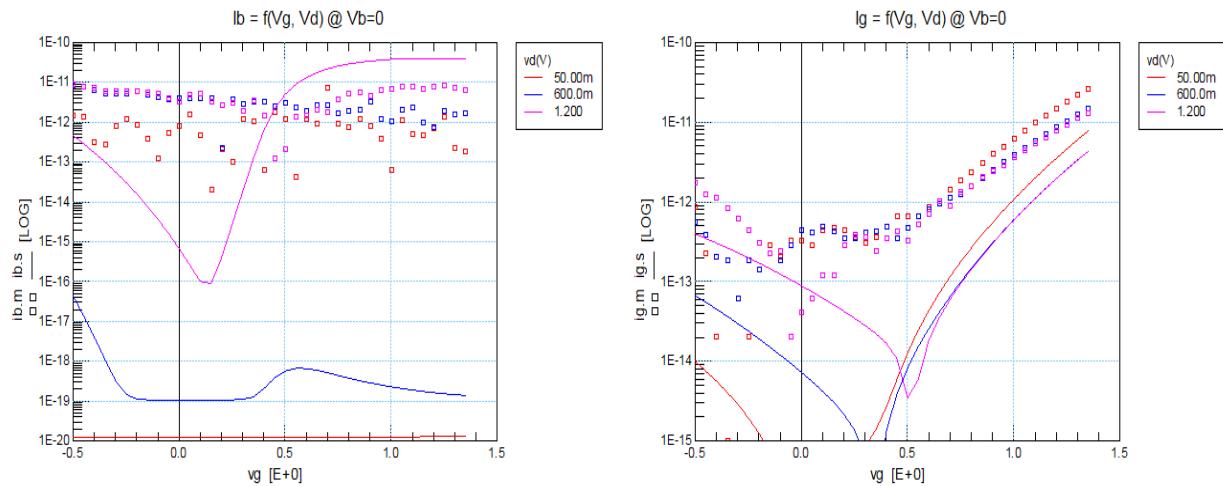


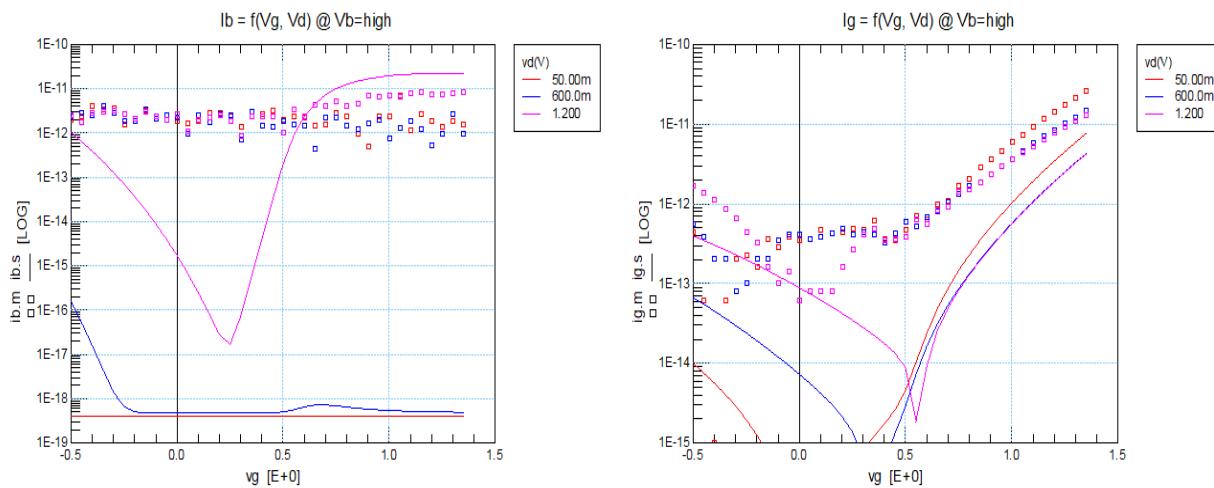
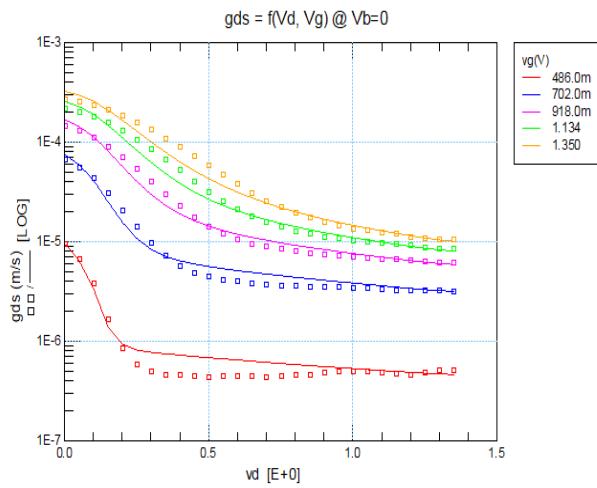
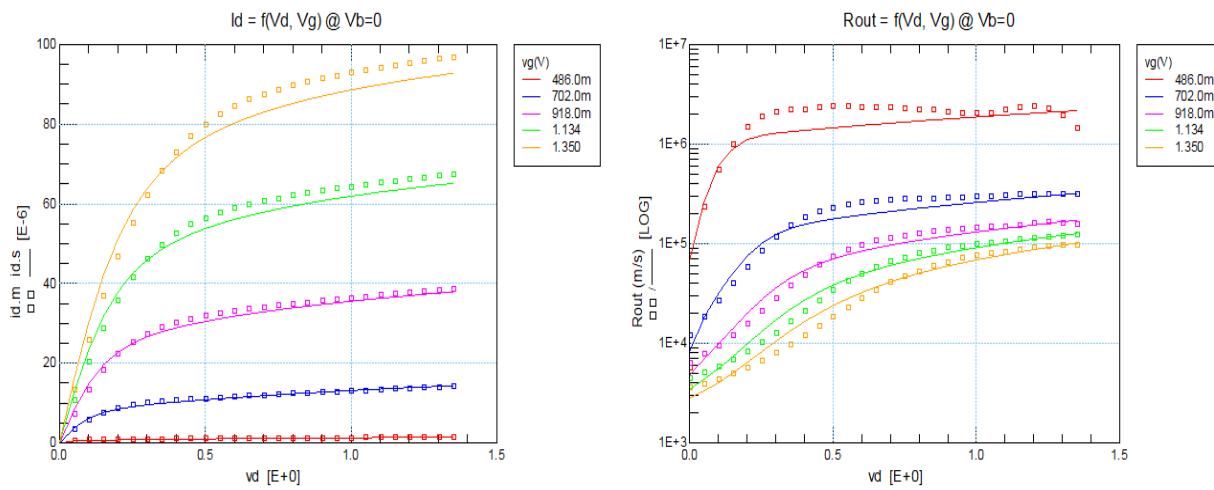
$idvg, V_d = 1.2V, T = -40^\circ C$

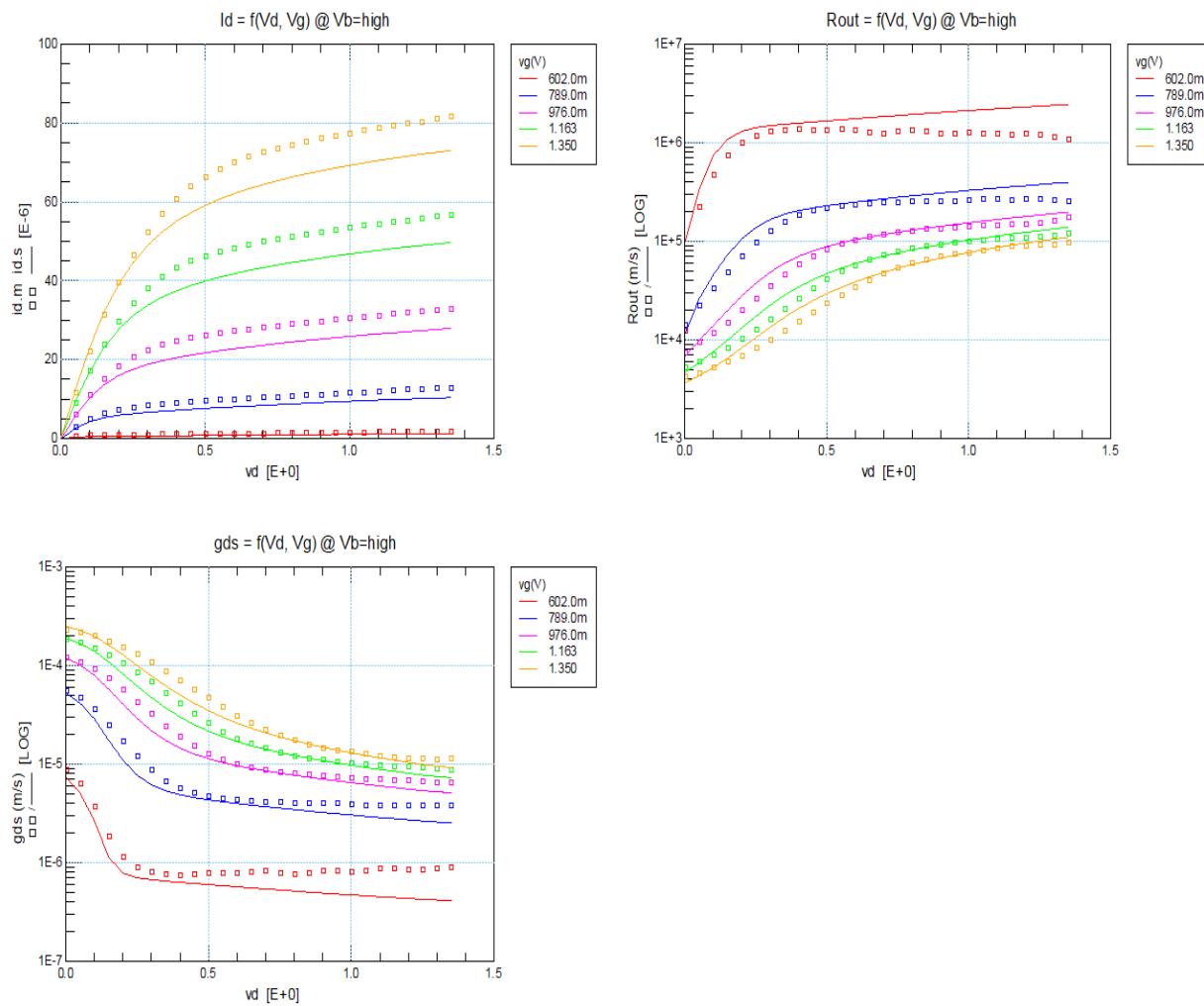
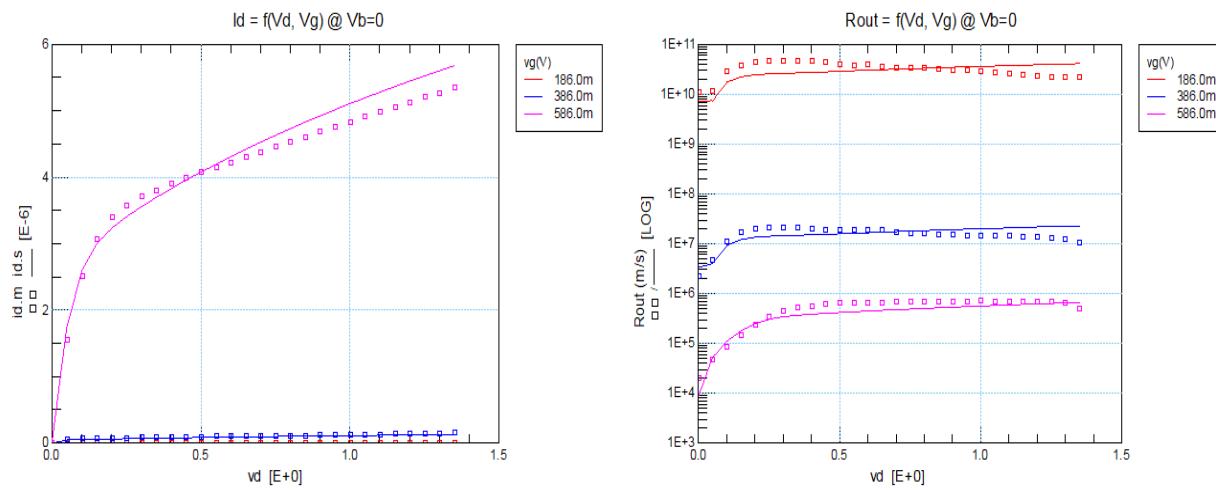


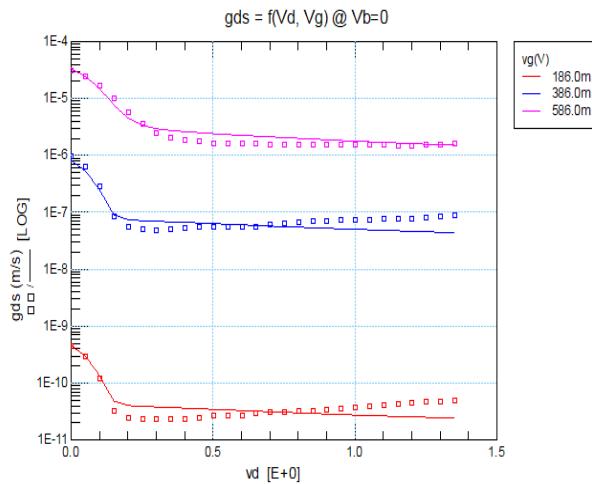


**idvg, Ib,Ig, Vb = 0V, T = -40°C**

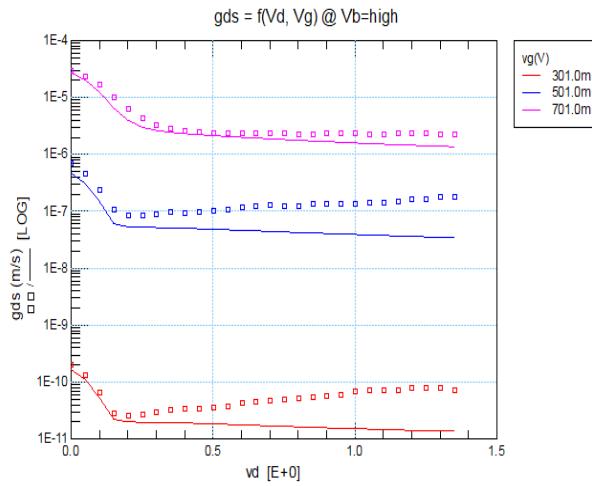
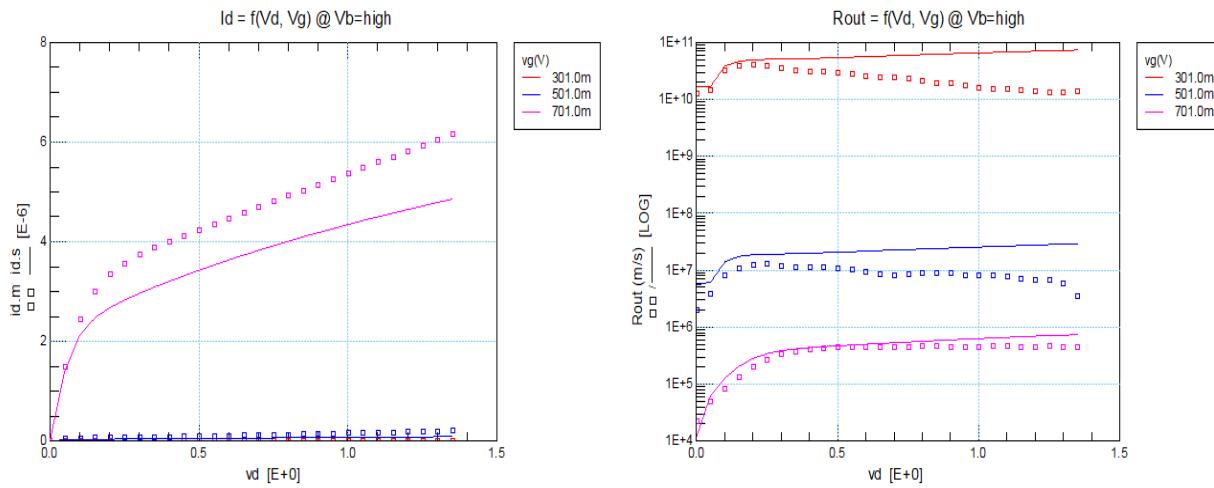


**idvg, Ib,Ig, Vb = -1.2V, T = -40°C**

**idvd, Vb = 0V, T = -40°C**


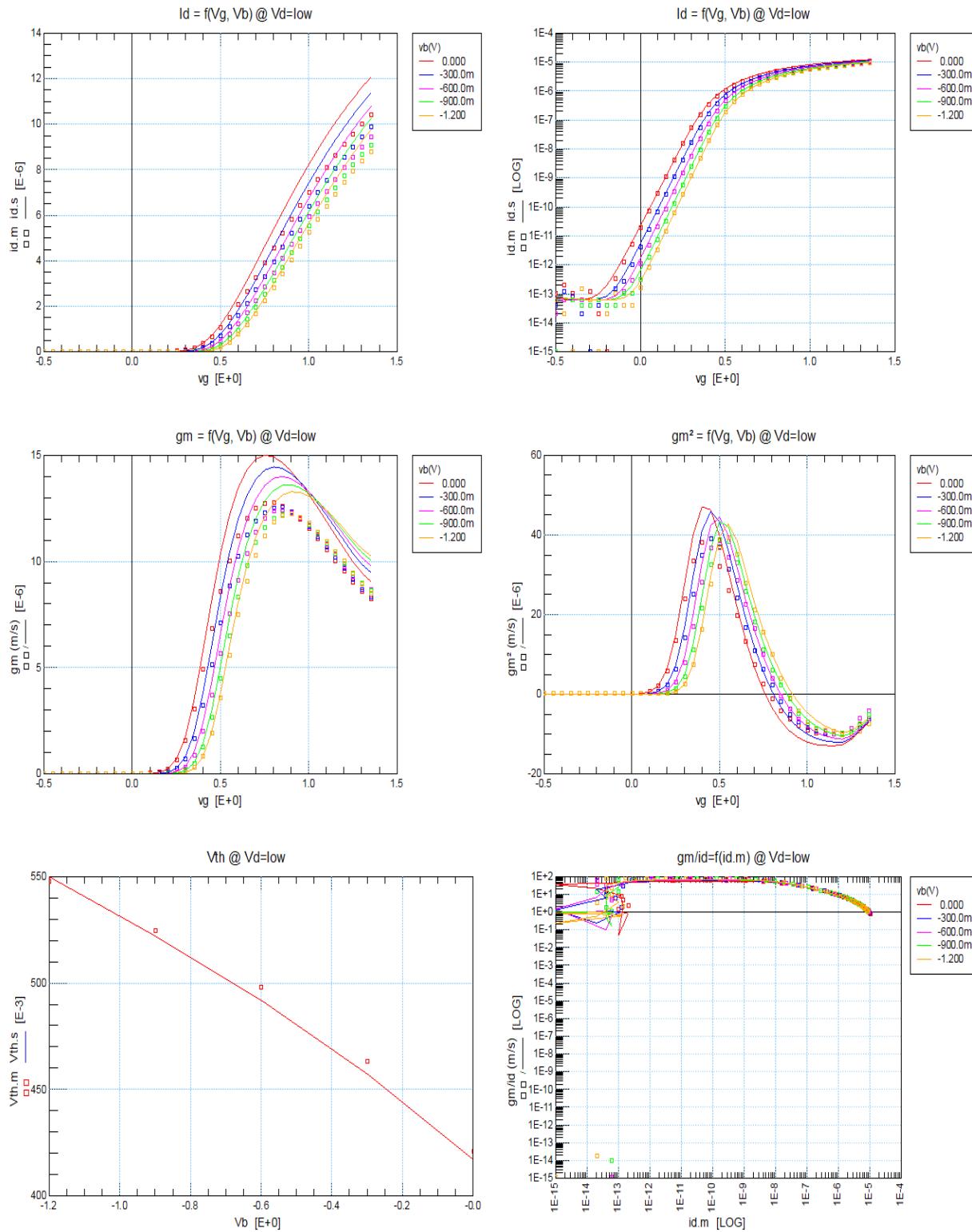
**idvd\_vbmin, Vb = -1.2V, T = -40°C**

**idvd\_vth, Vb = 0V, T = -40°C**


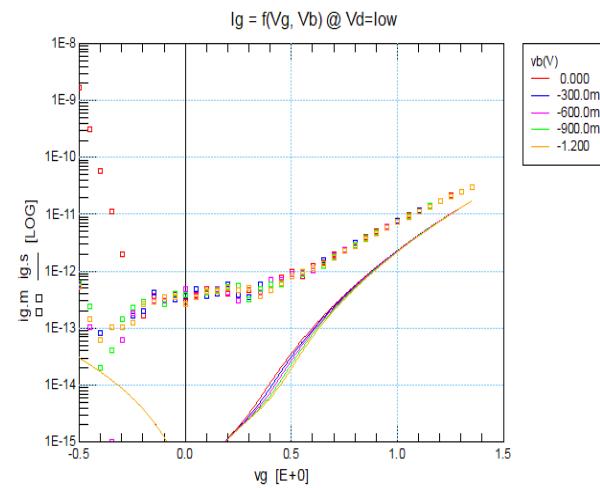
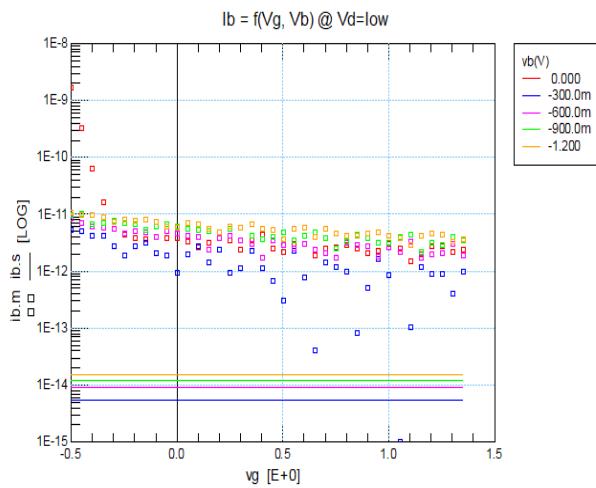


### idvd\_vth\_vbmin, Vb = -1.2V, T = -40°C

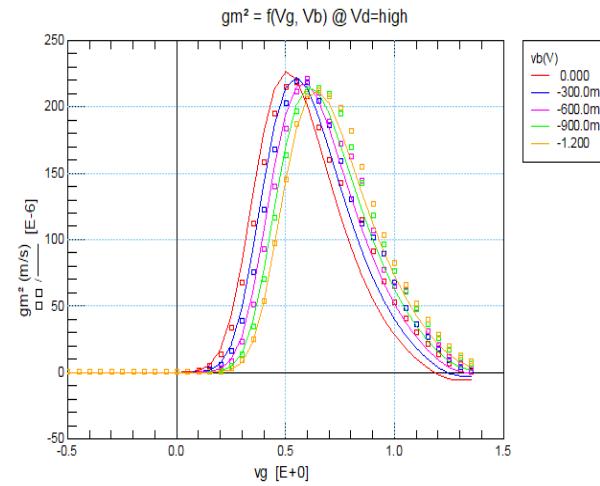
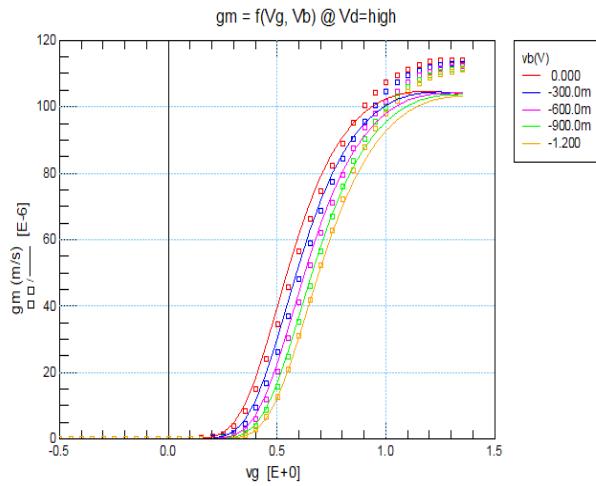
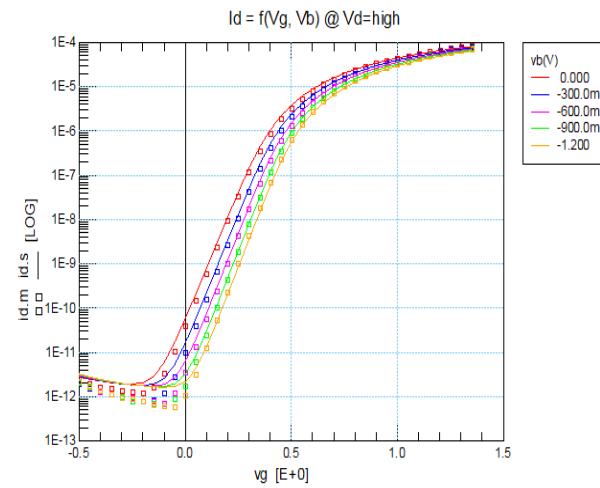
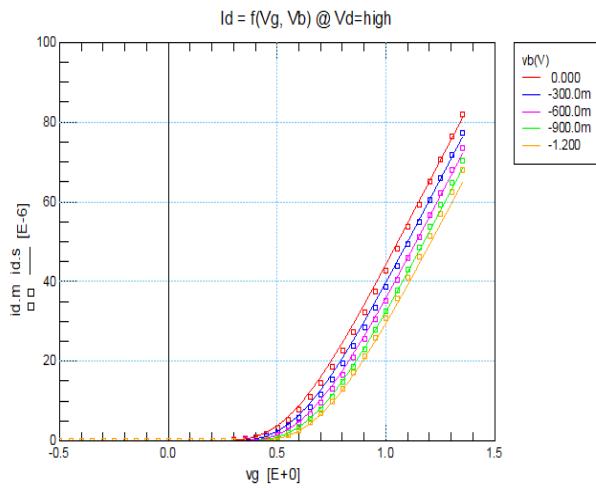


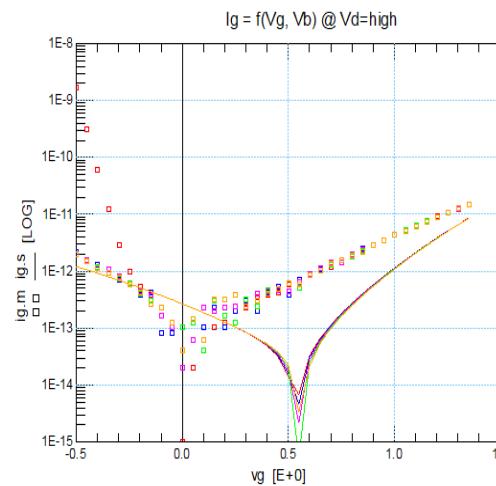
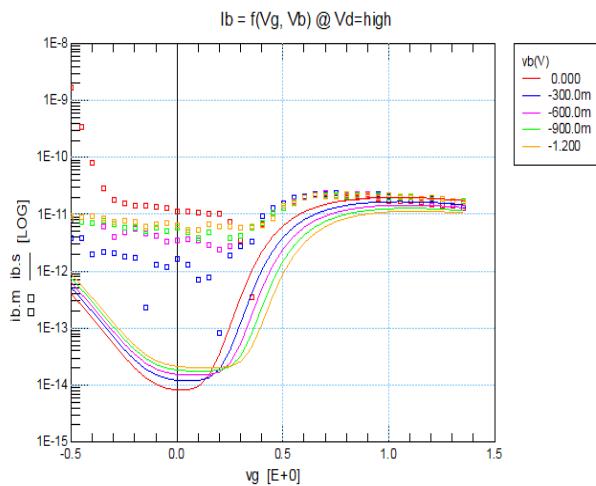
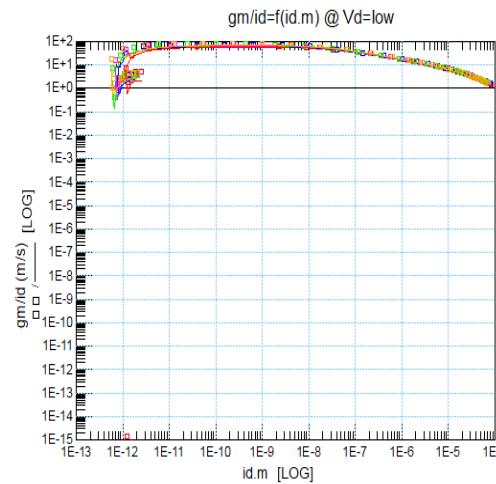
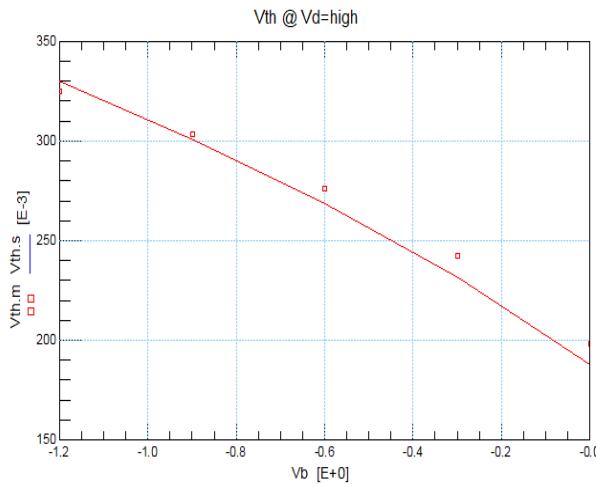
**idvg, Vd = 0.05V, T = 70°C**



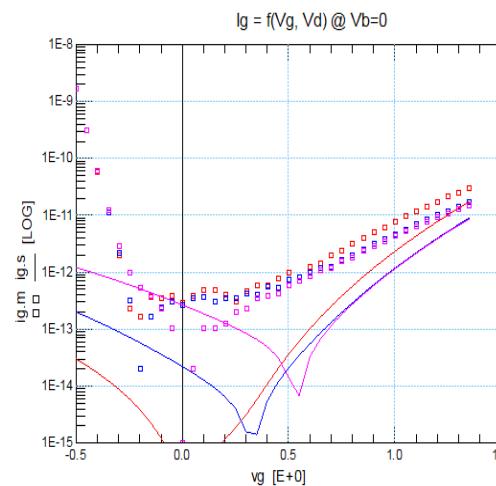
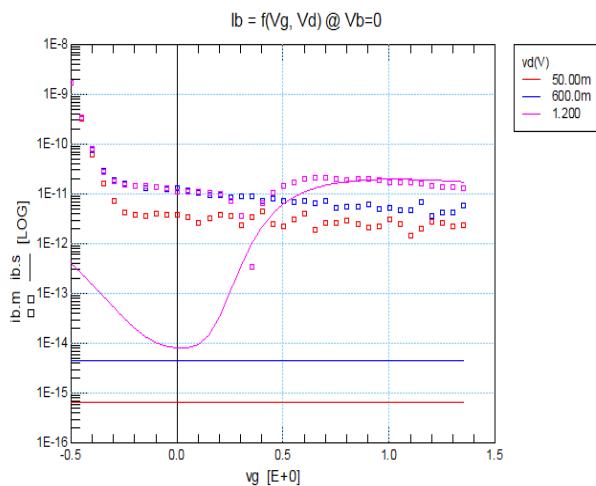


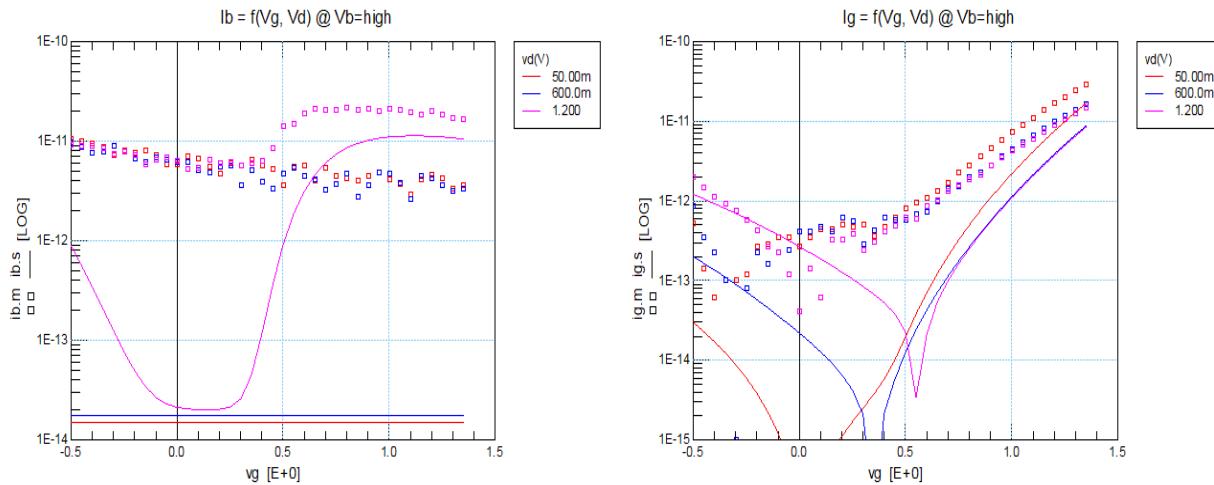
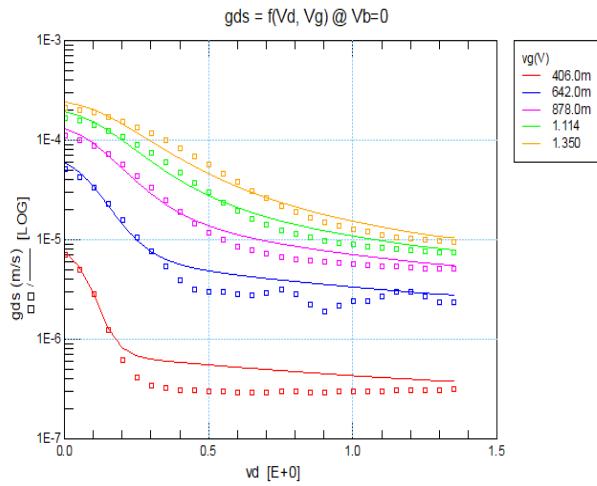
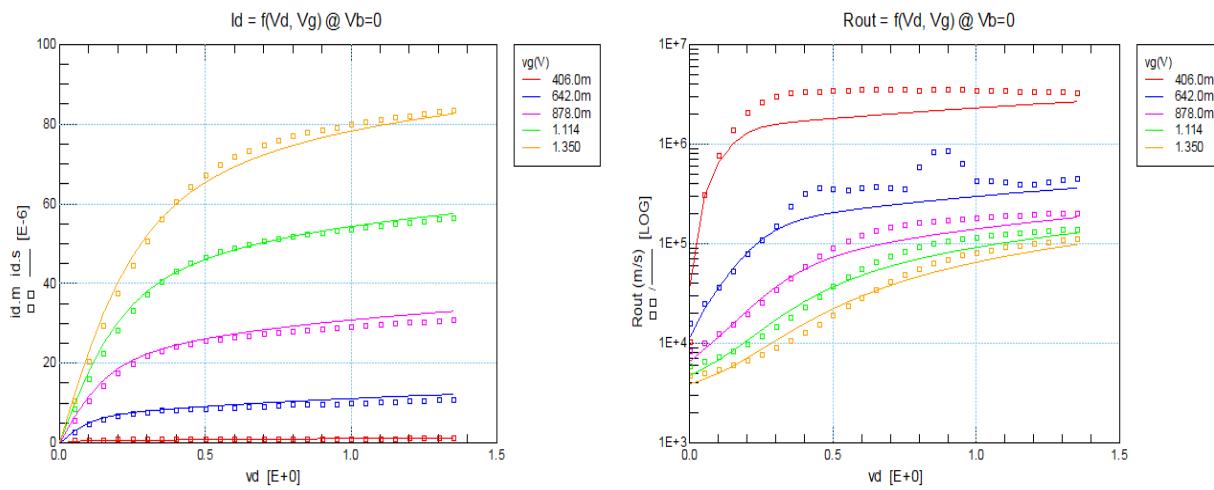
### $i_{dvg}, V_d = 1.2V, T = 70^\circ C$

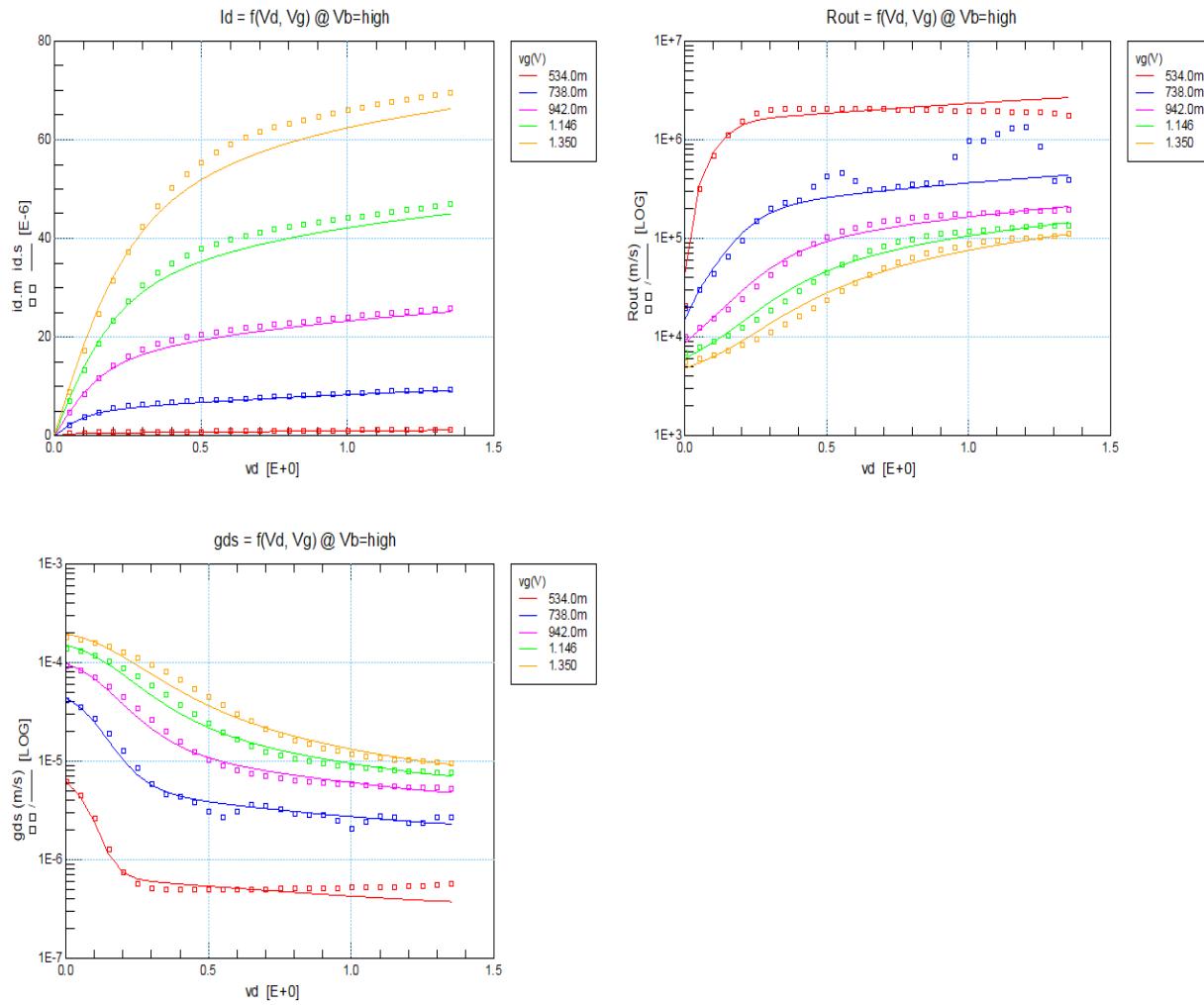
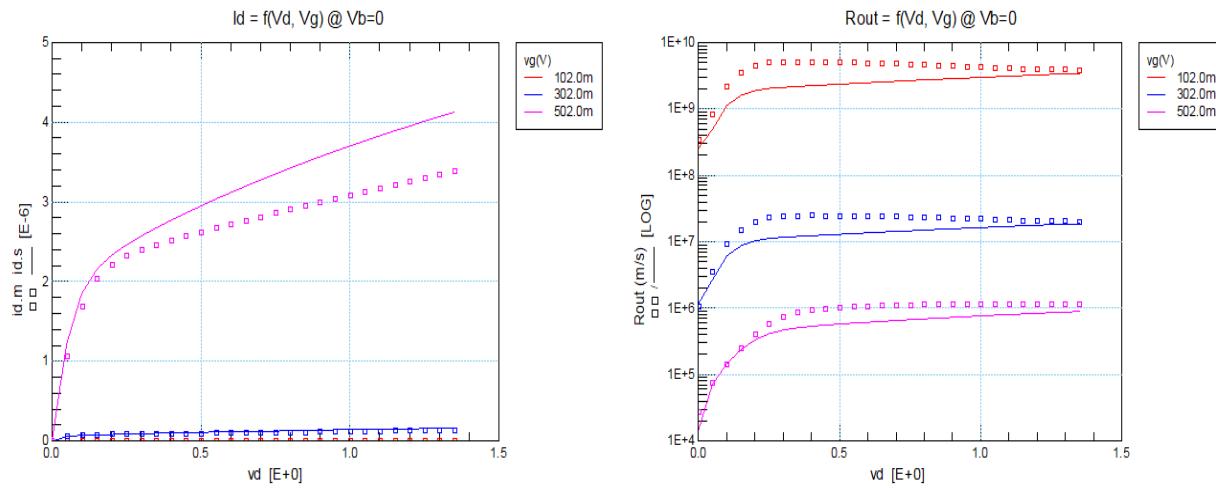


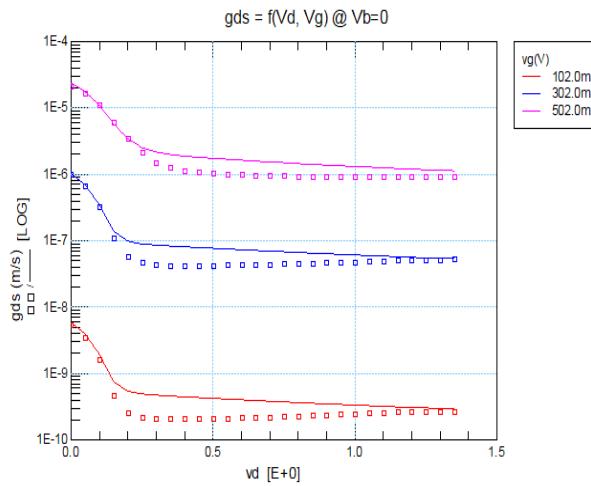


### idvg, lb, lg, Vb = 0V, T = 70°C

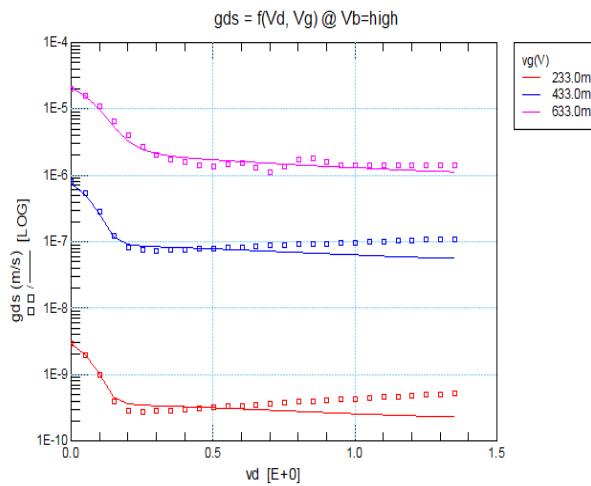
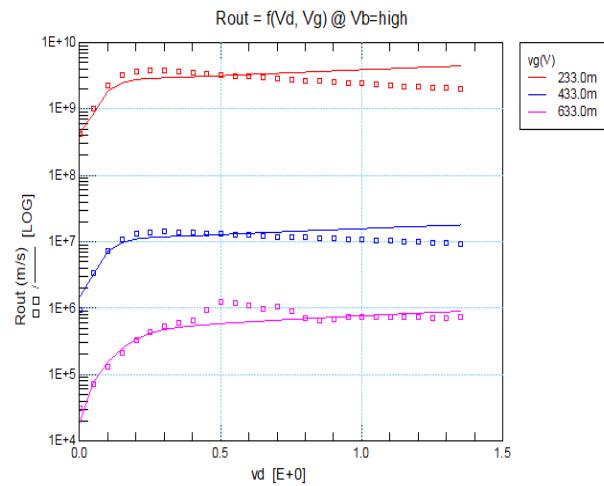
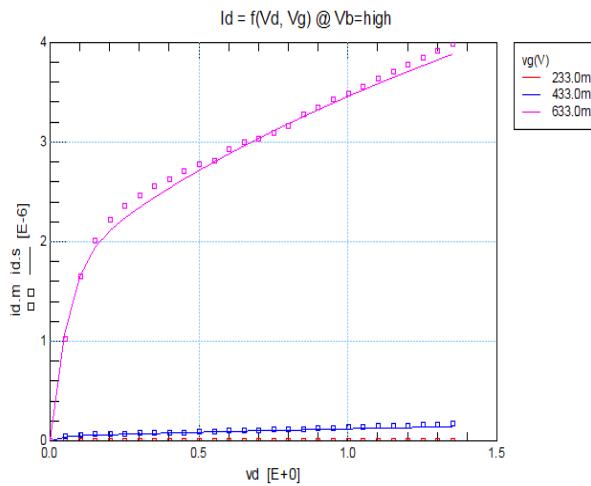


**idvg, Ib,Ig, Vb = -1.2V, T = 70°C**

**idvd, Vb = 0V, T = 70°C**


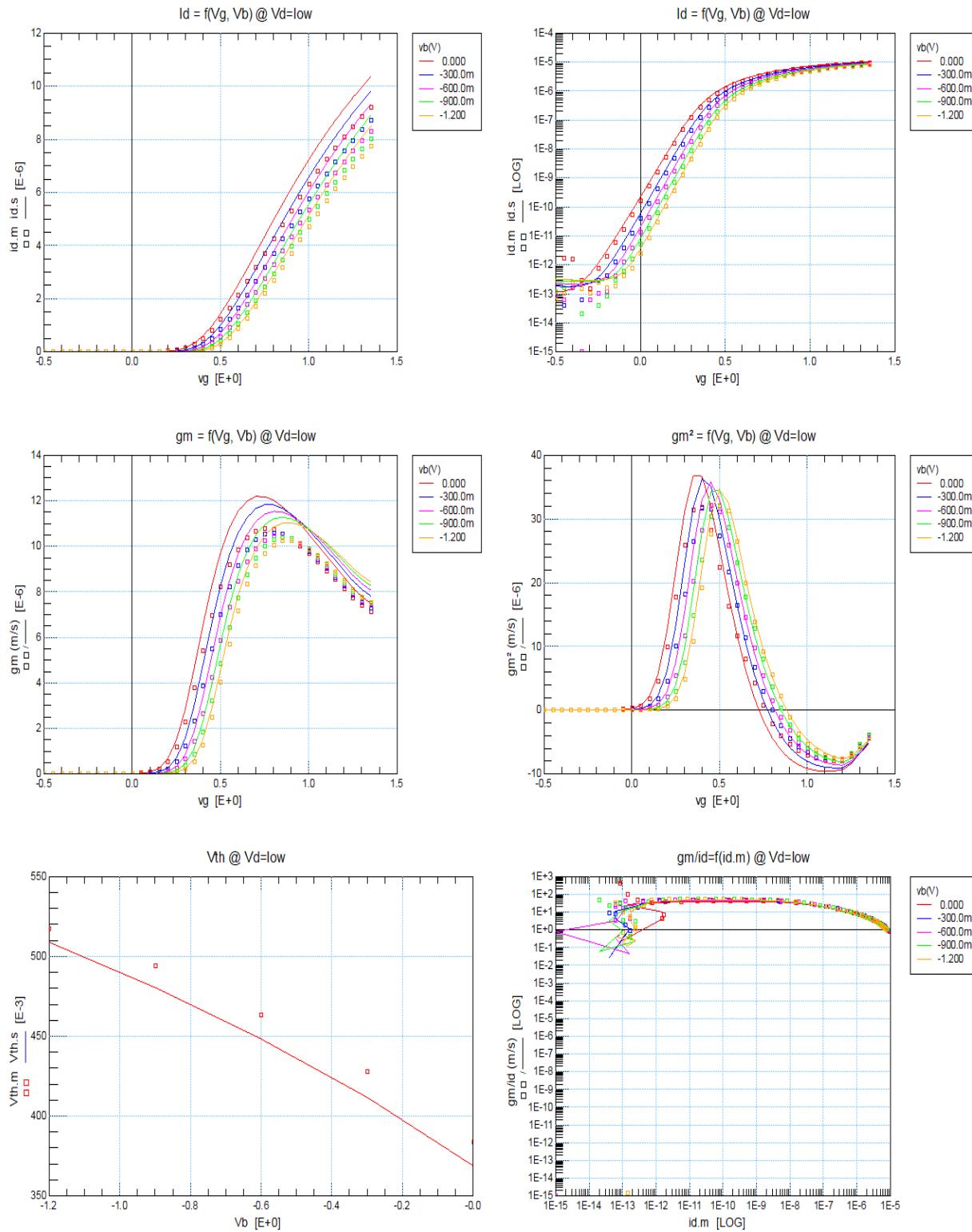
**idvd\_vbmin, Vb = -1.2V, T = 70°C**

**idvd\_vth, Vb = 0V, T = 70°C**


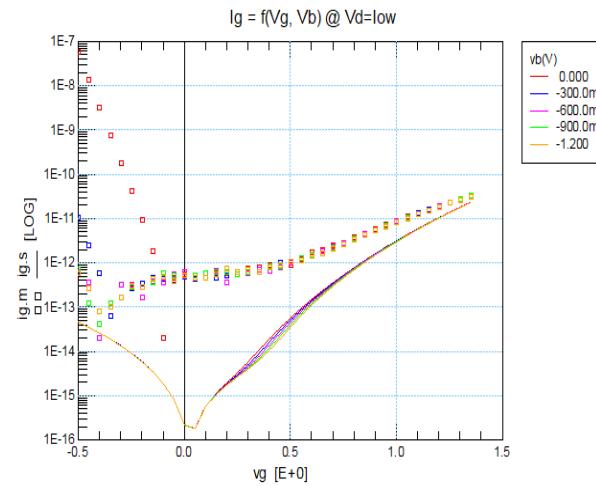
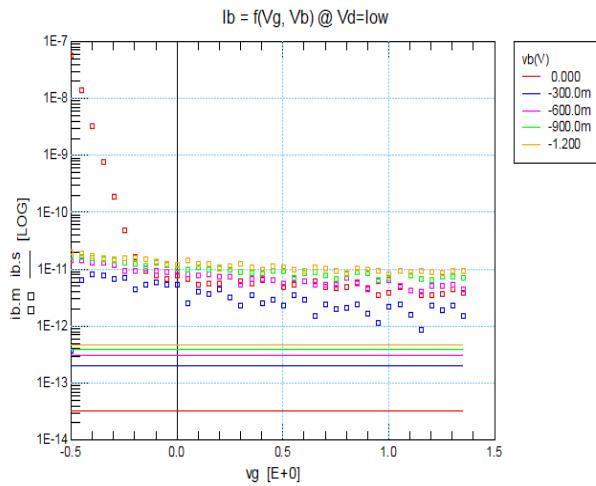


### idvd\_vth\_vbmin, Vb = -1.2V, T = 70°C

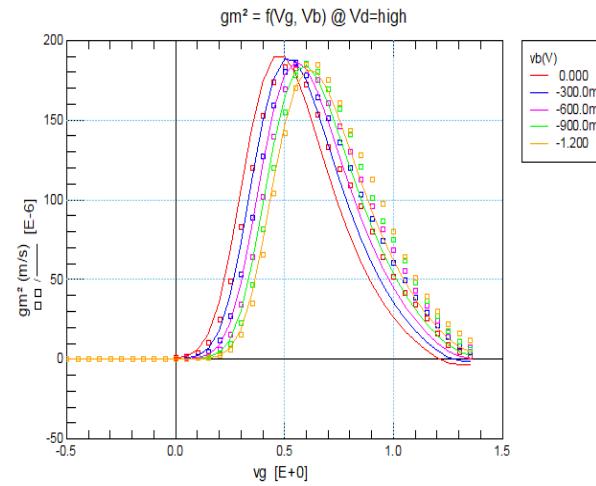
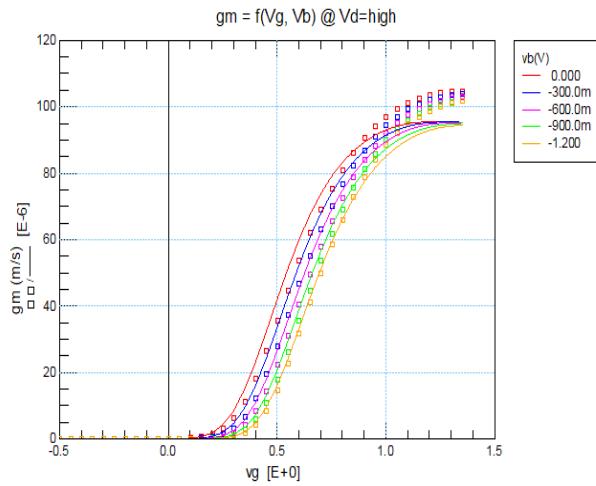
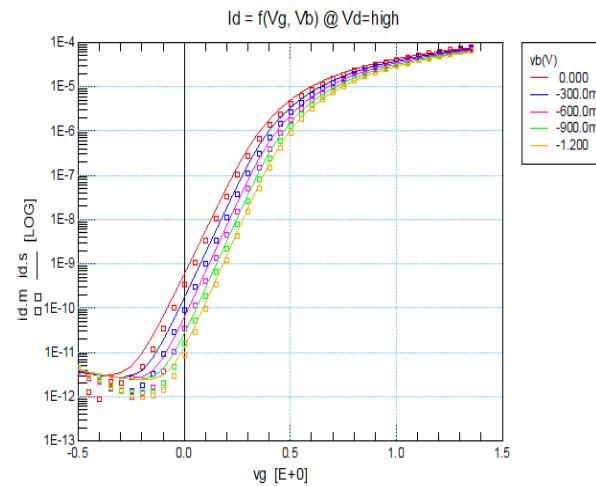
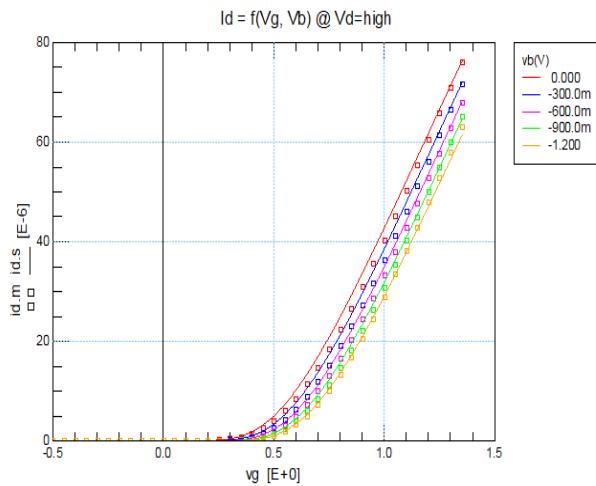


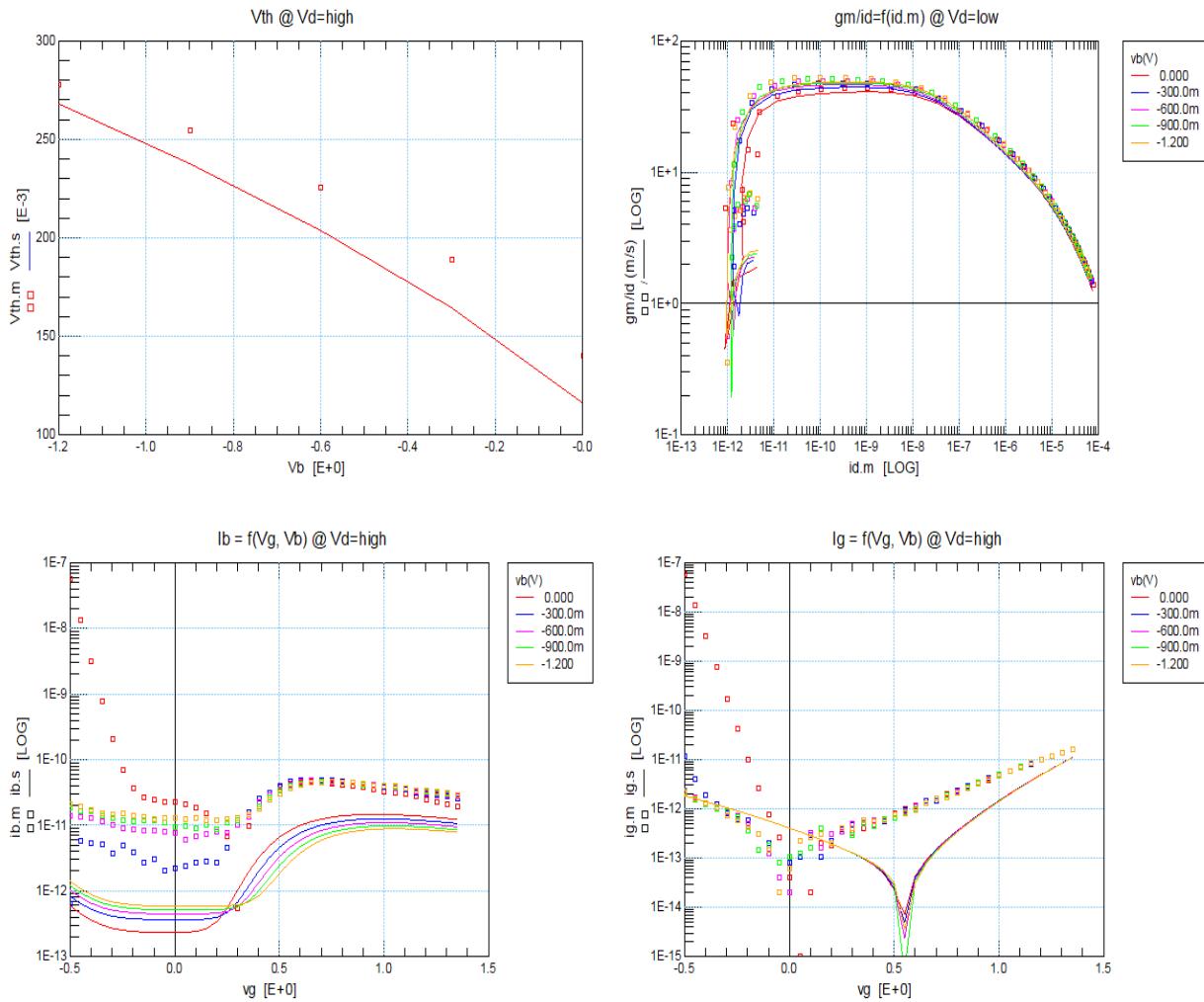
**idvg, Vd = 0.05V, T = 125°C**



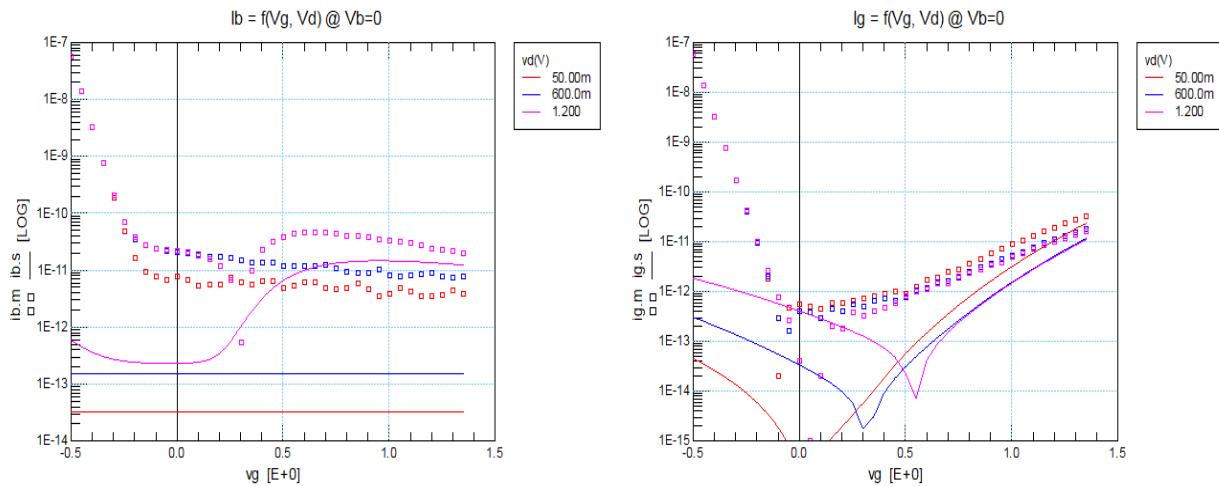


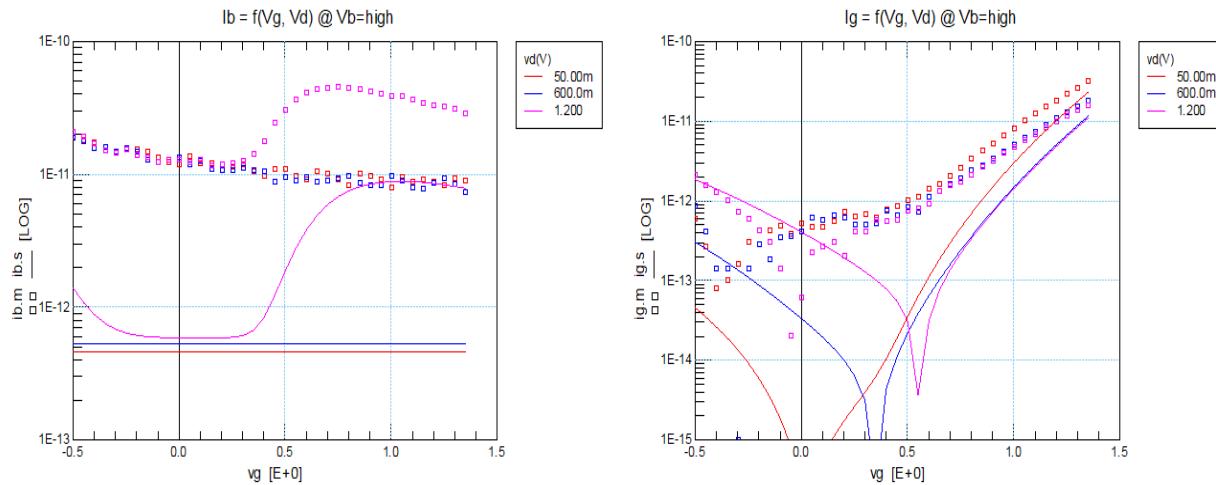
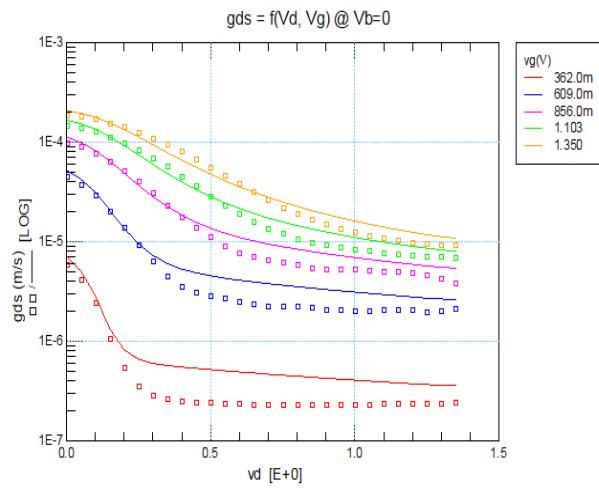
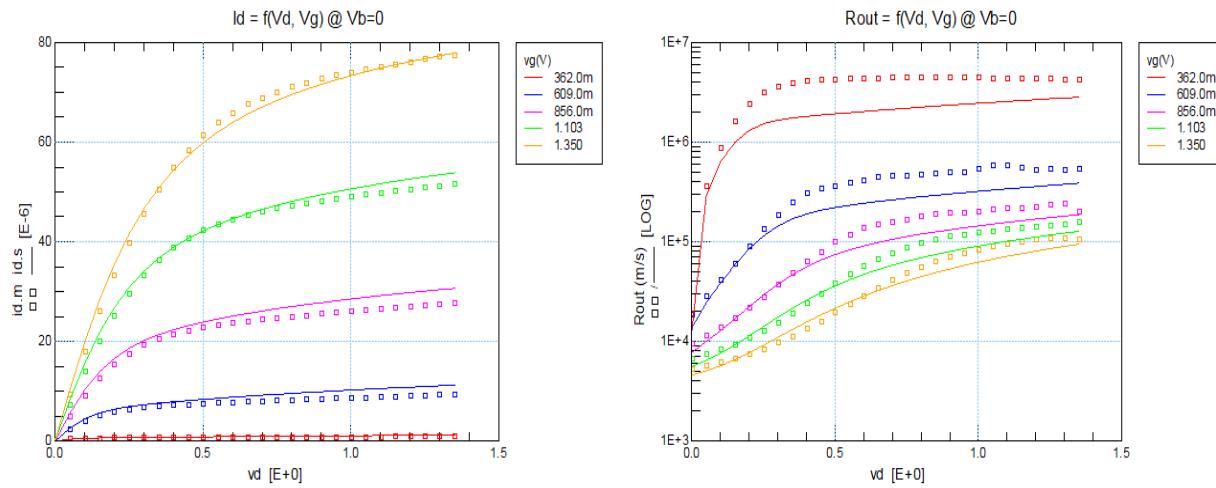
$i_{dvg}, V_d = 1.2V, T = 125^\circ C$

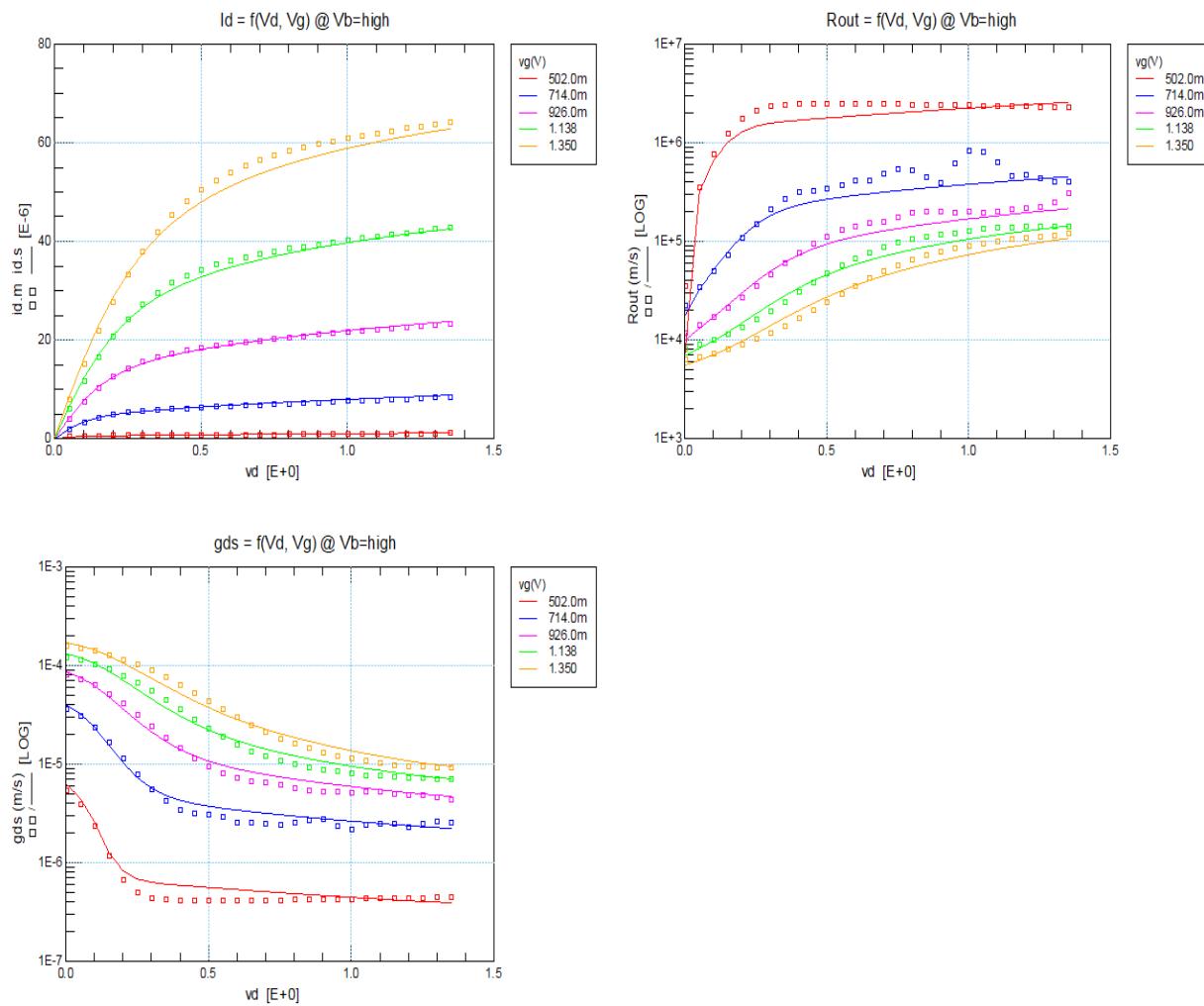
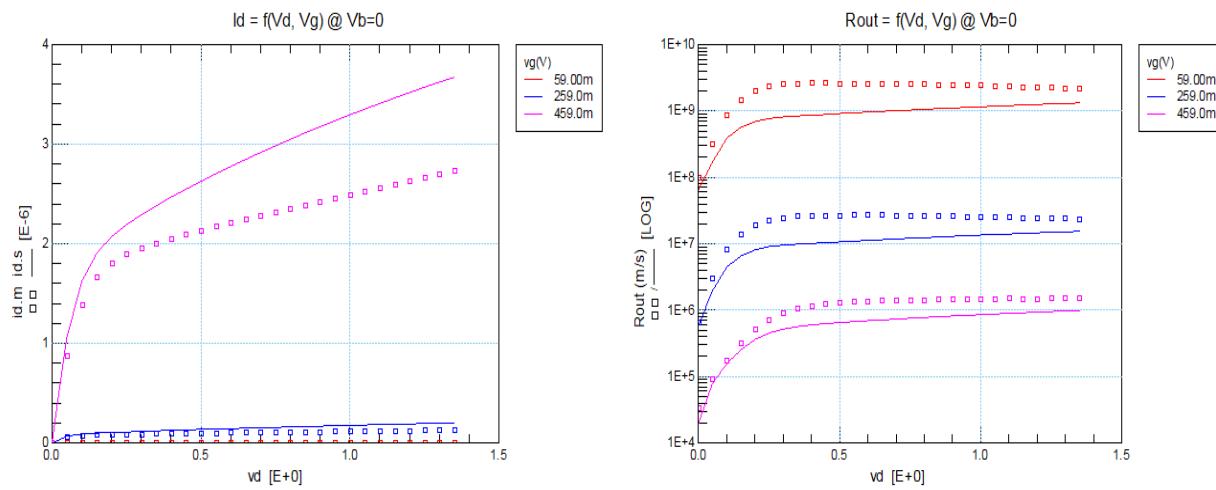


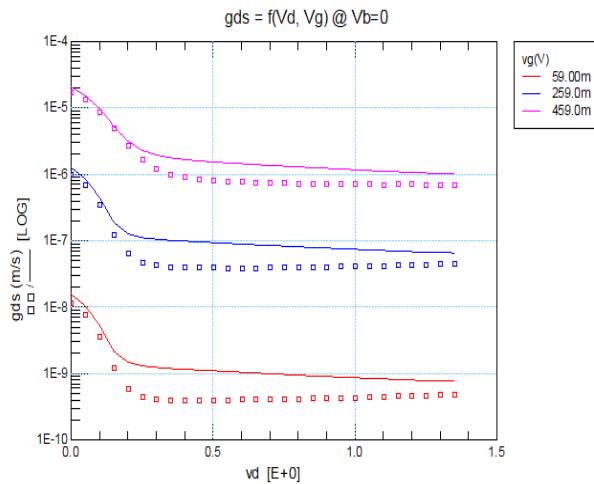


**$id_{vg}, I_b, Ig, V_b = 0V, T = 125^\circ C$**

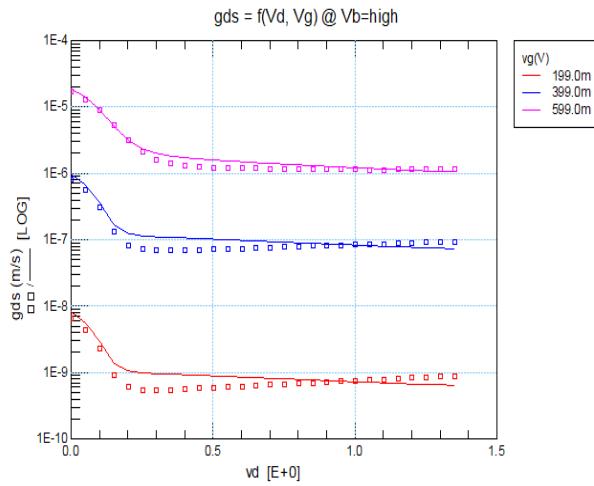
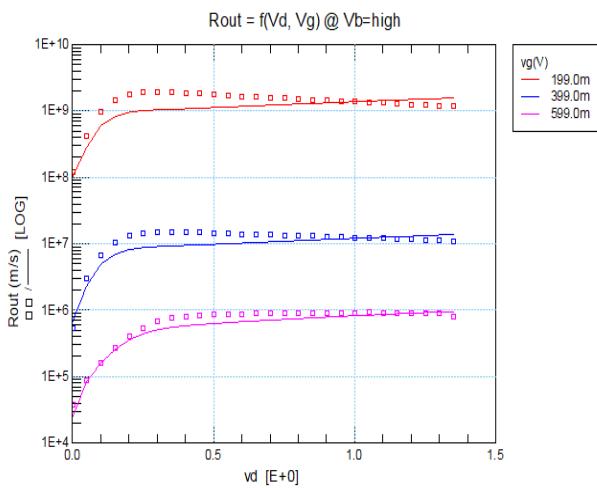
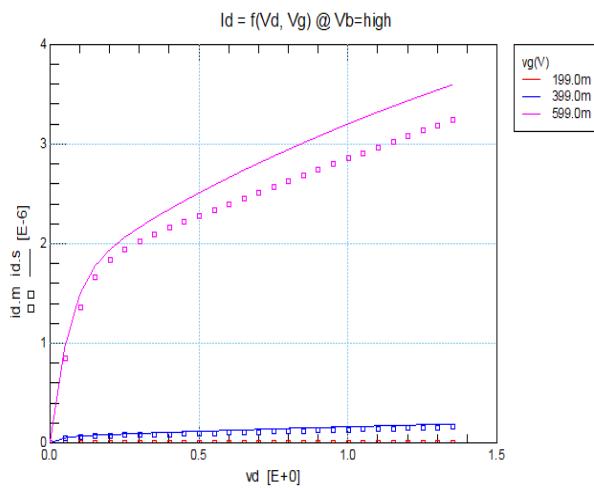


**idvg, Ib,Ig, Vb = -1.2V, T = 125°C**

**idvd, Vb = 0V, T = 125°C**


**idvd\_vbmin, Vb = -1.2V, T = 125°C**

**idvd\_vth, Vb = 0V, T = 125°C**


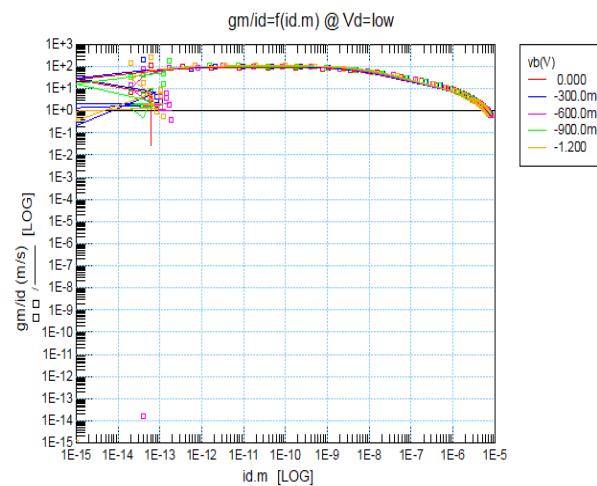
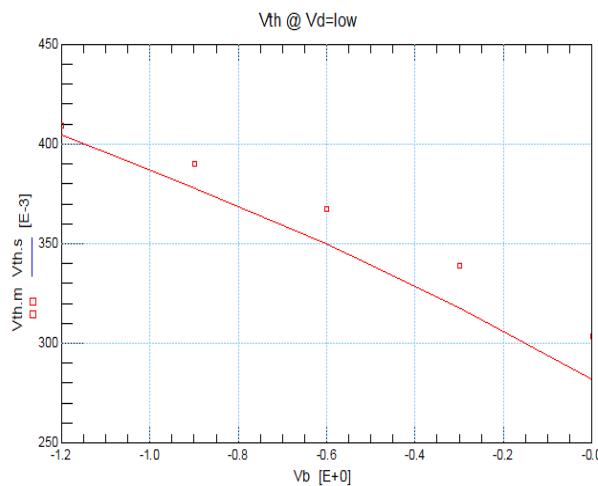
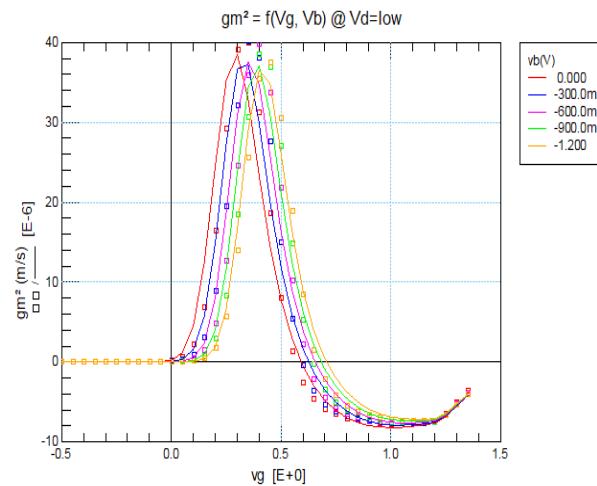
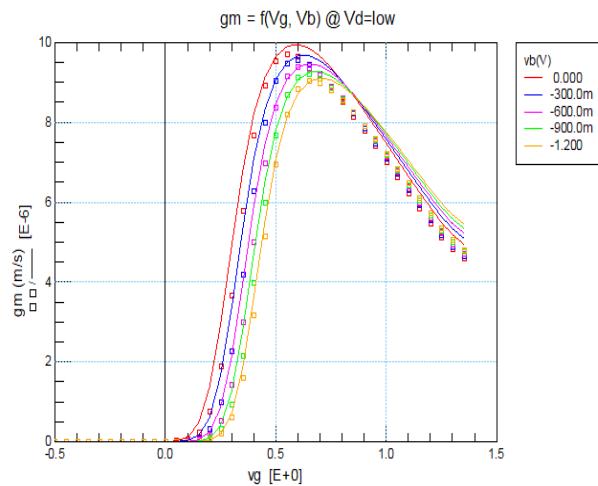
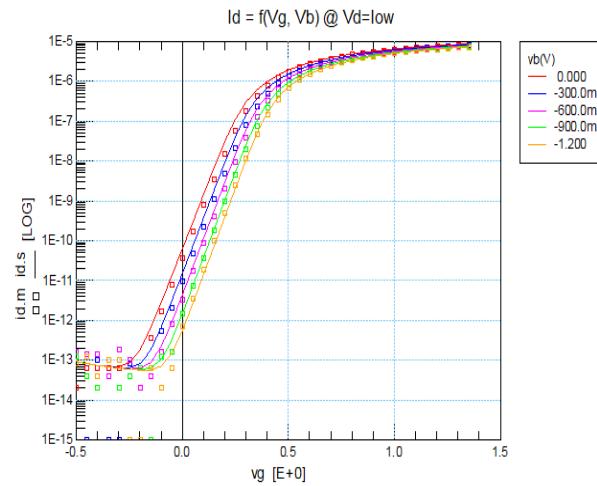
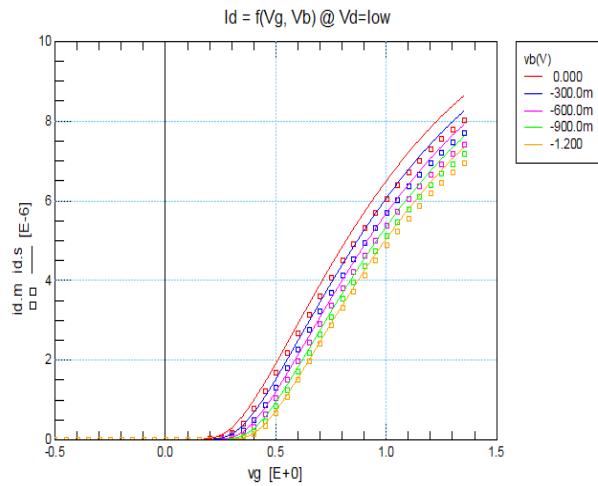


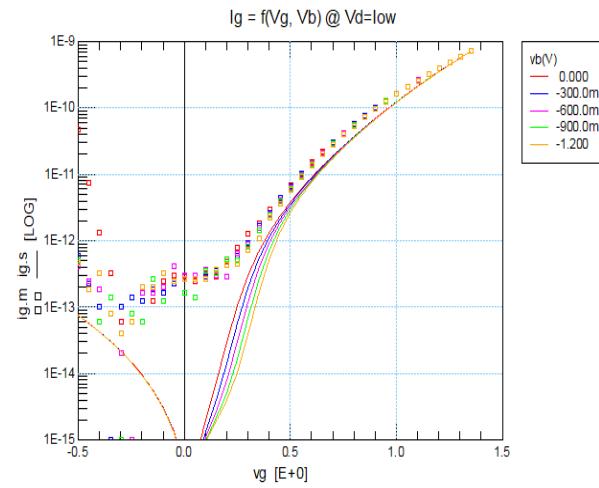
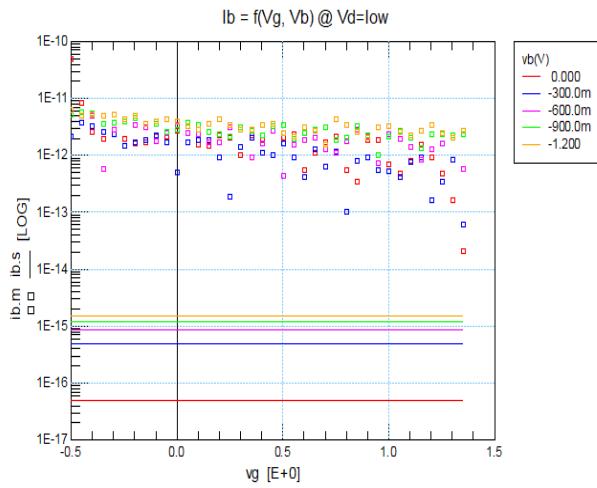
### idvd\_vth\_vbmin, Vb = -1.2V, T = 125°C



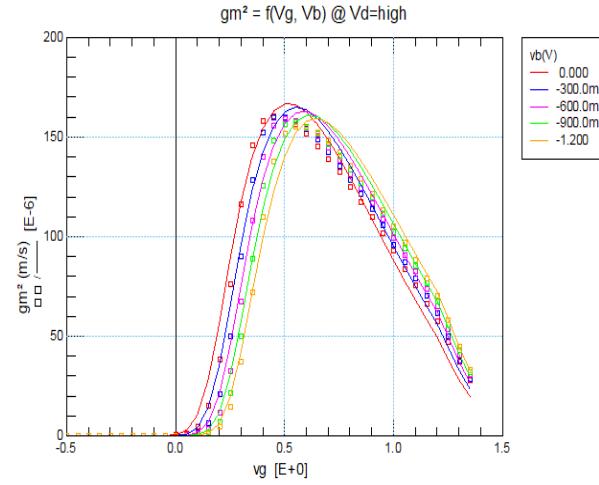
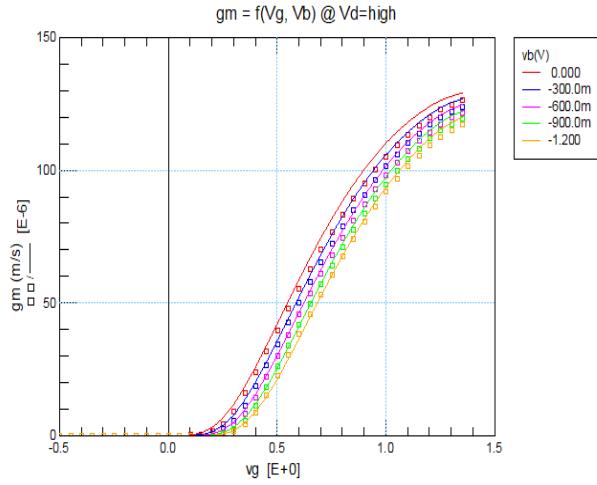
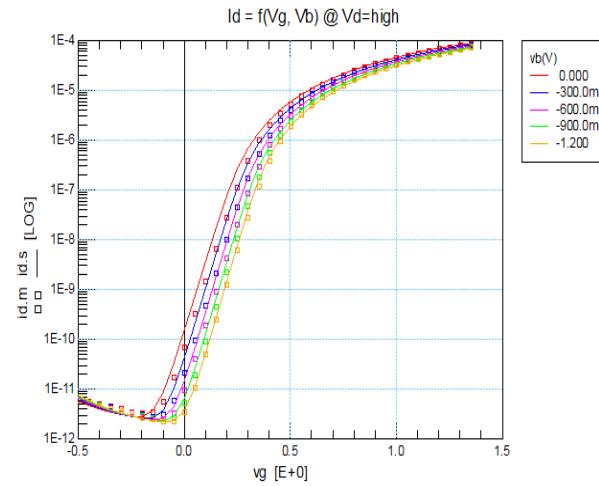
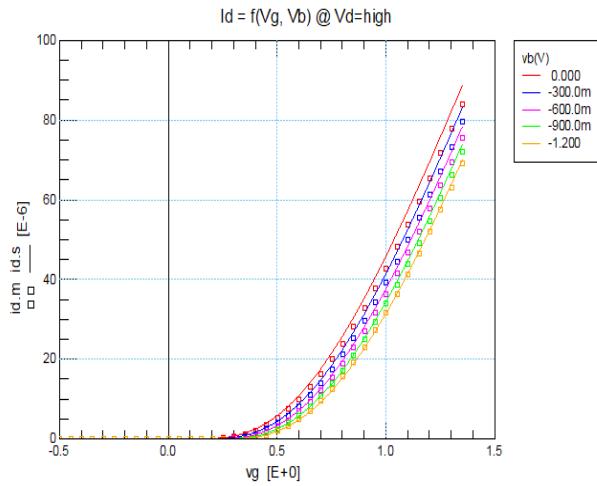
## 4.35 W0u6\_L1u2\_S543\_5

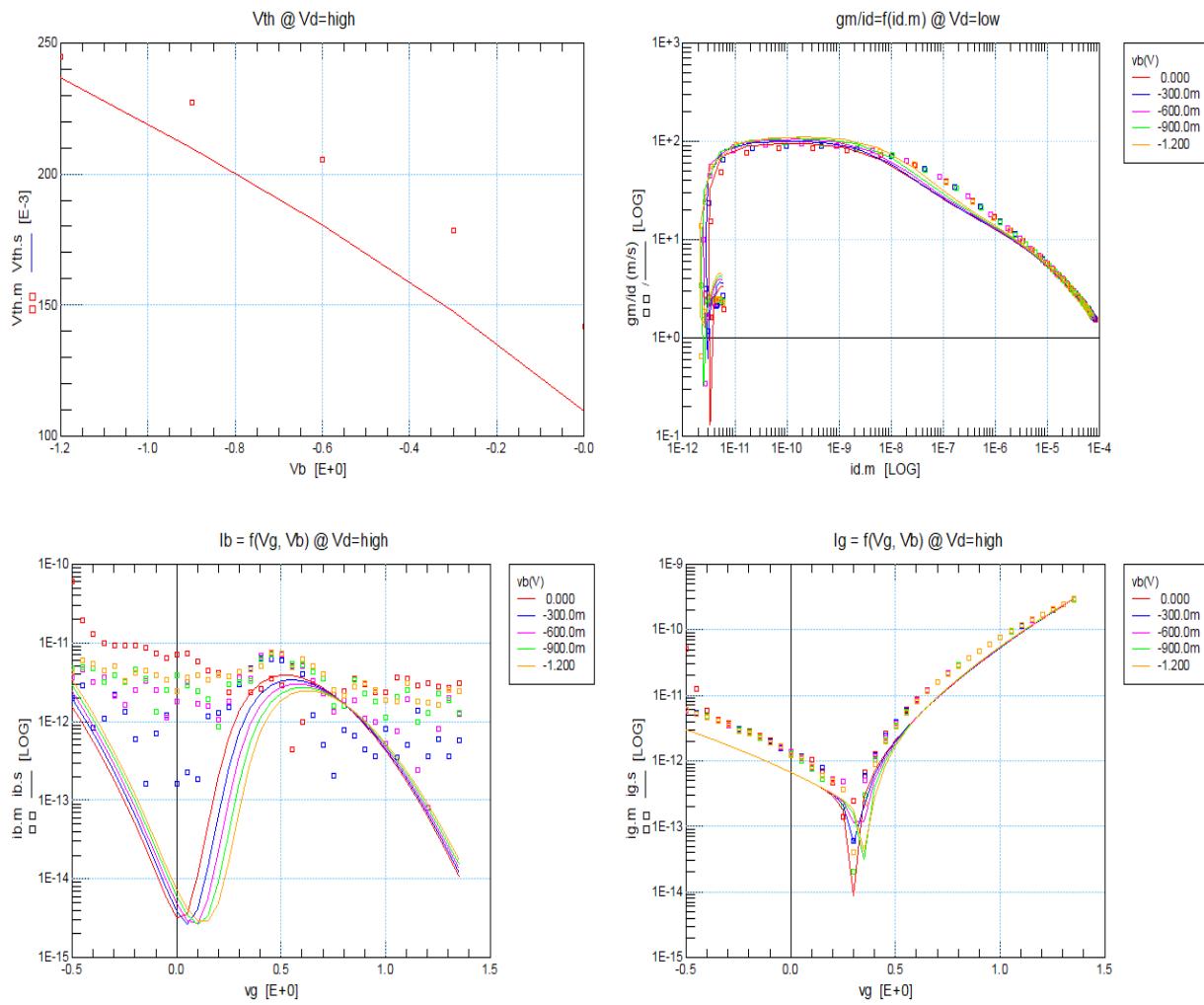
idvg, Vd = 0.05V, T = 27°C



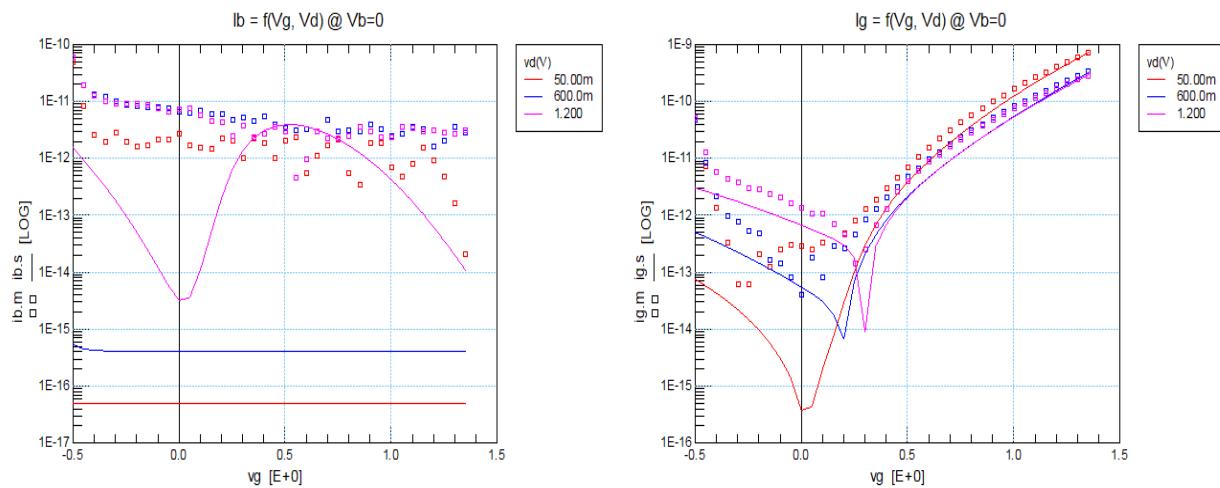


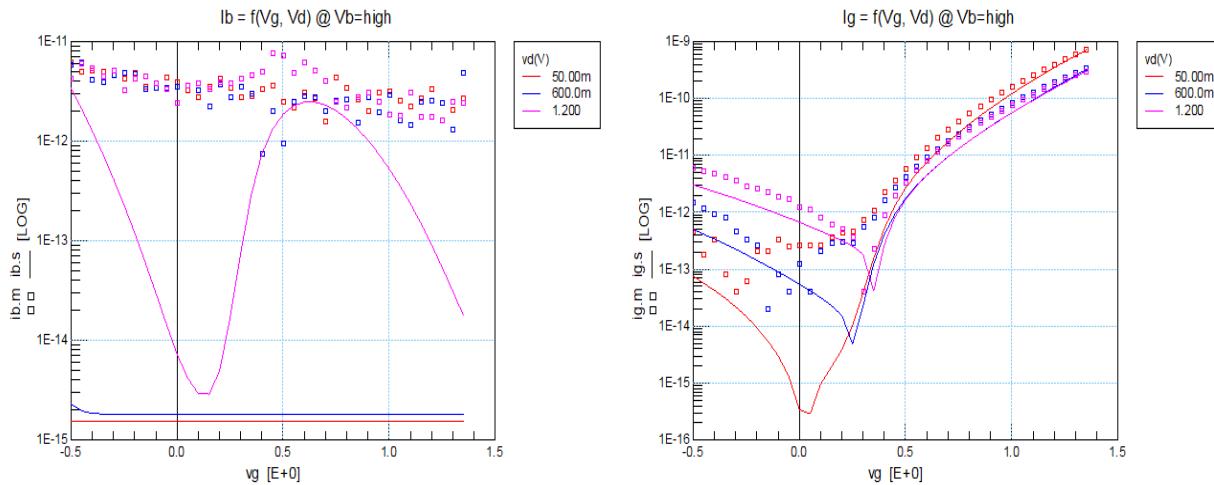
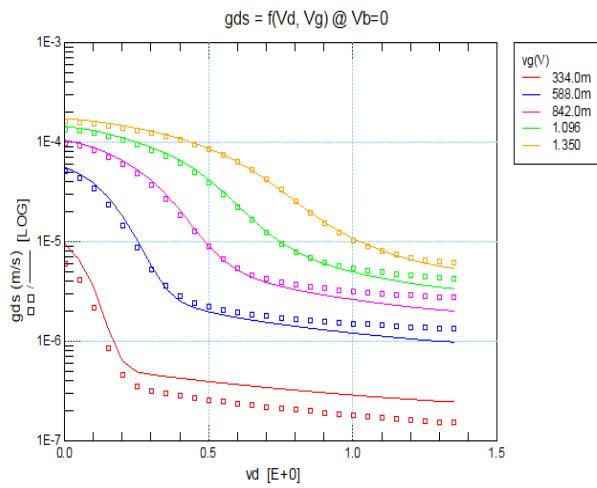
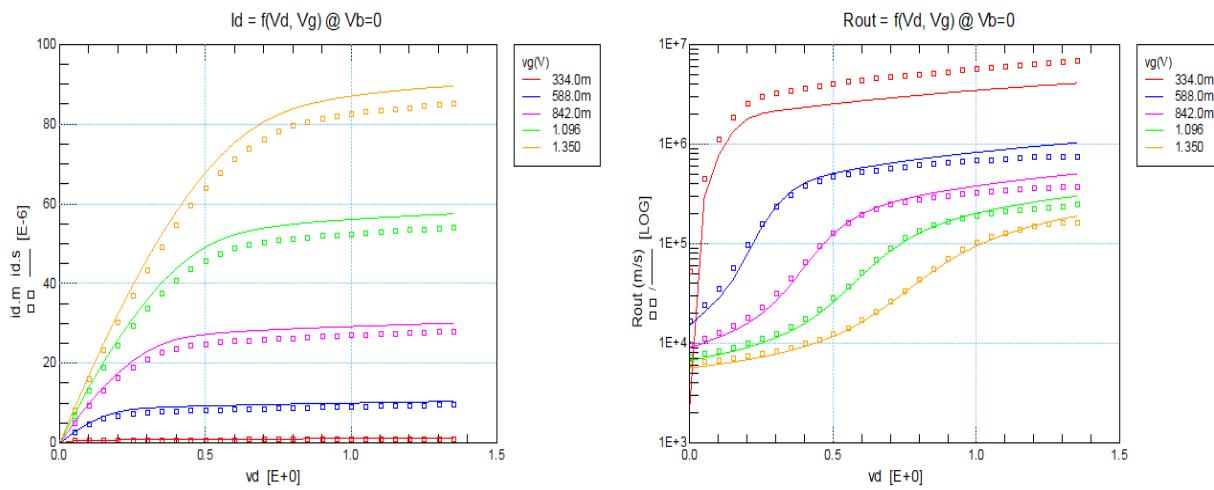
$i_{dvg}, V_d = 1.2V, T = 27^\circ C$

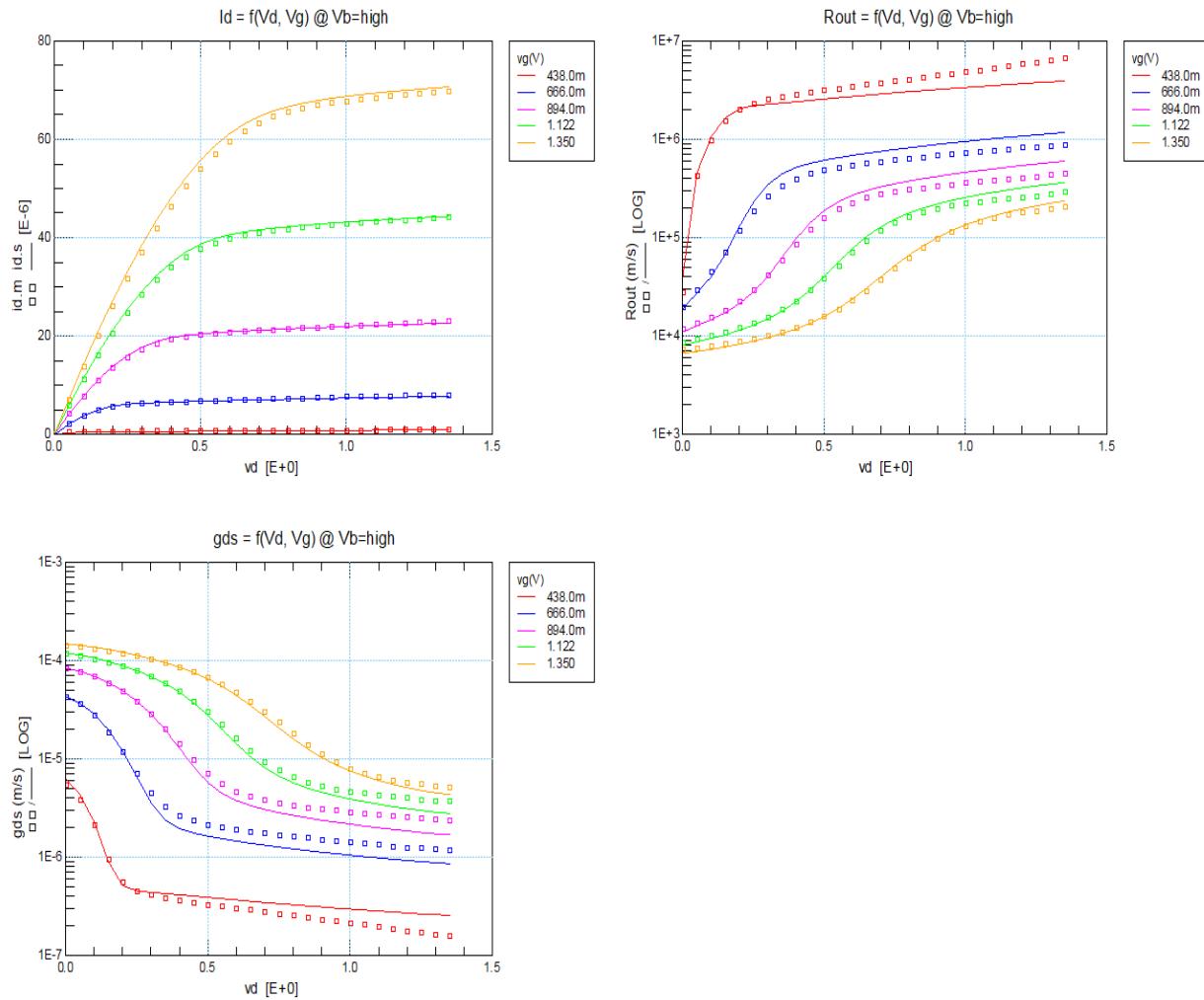
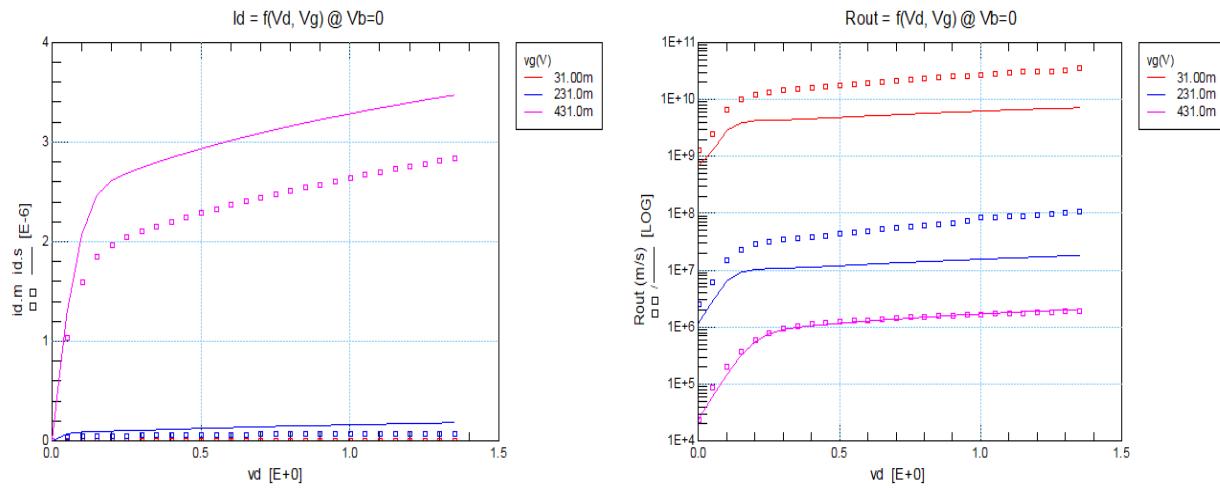


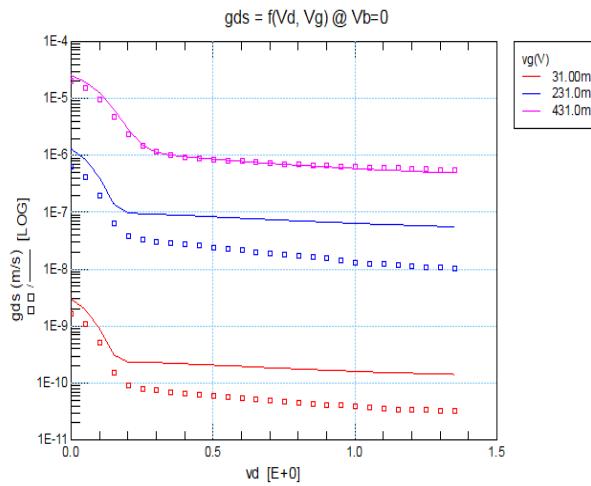


### idvg, Ib,Ig, Vb = 0V, T = 27°C

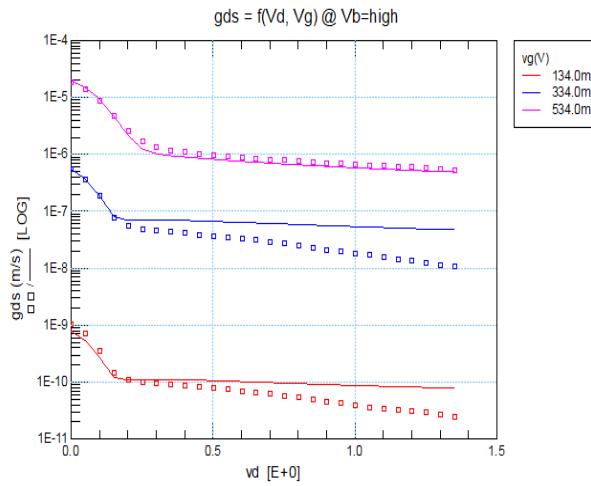
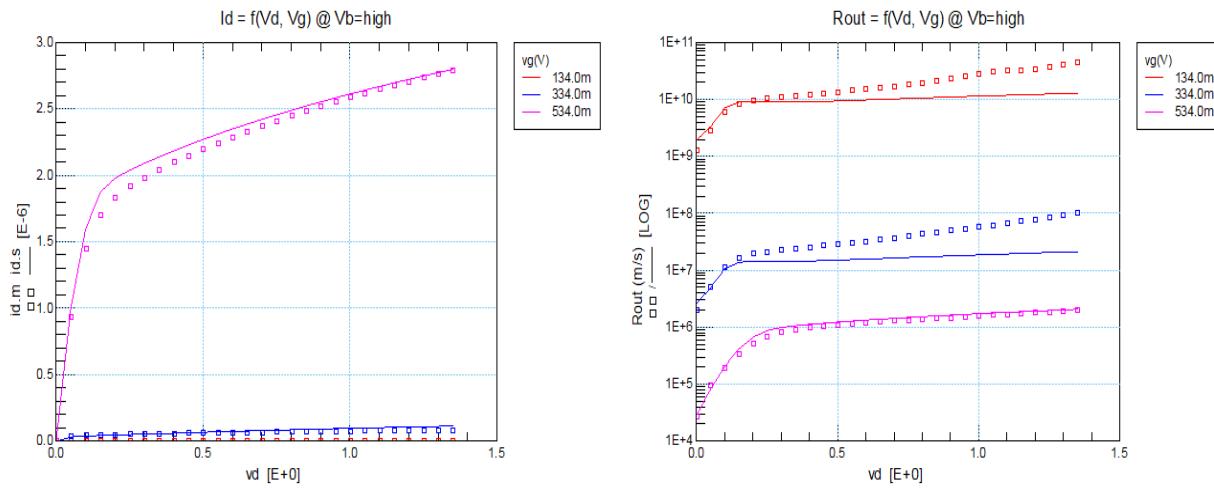


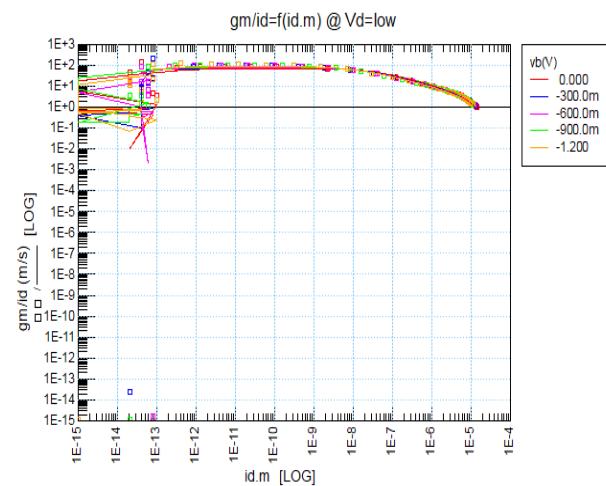
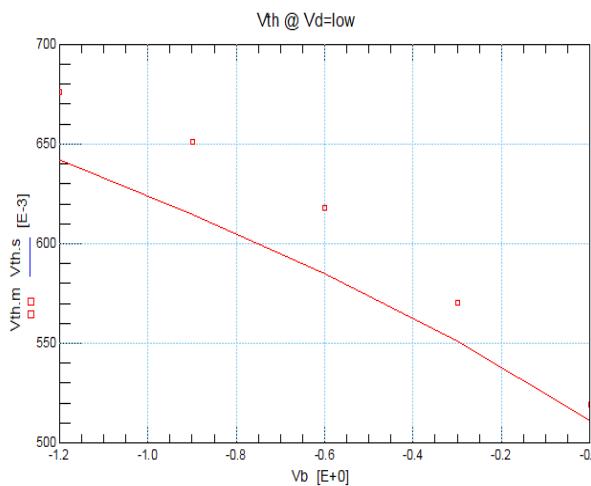
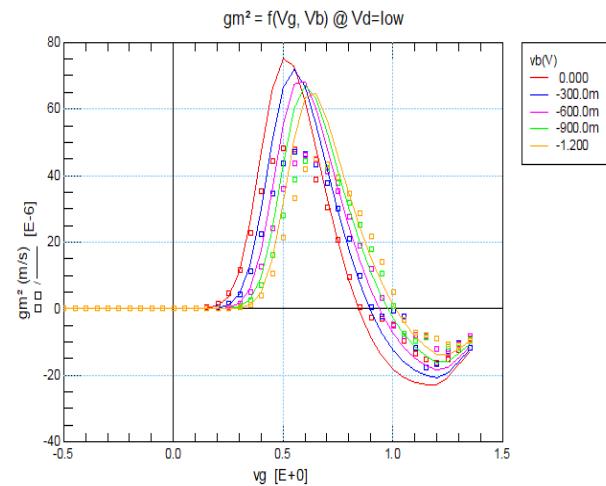
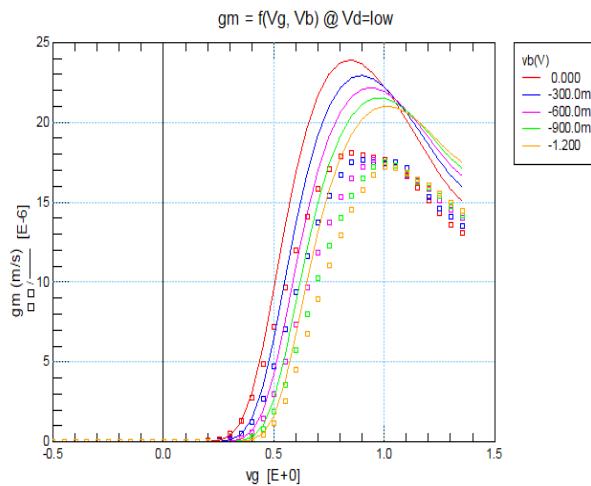
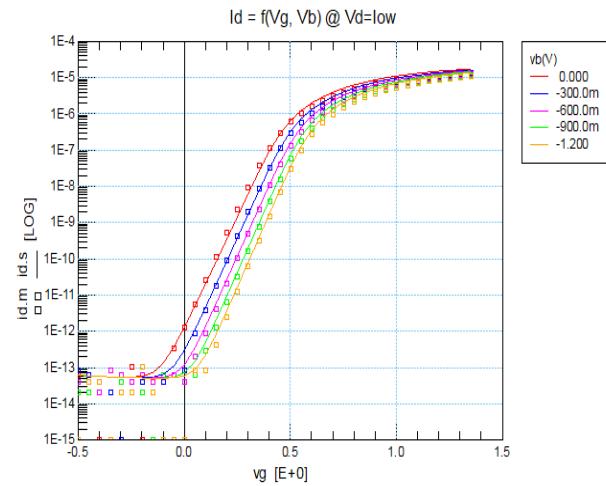
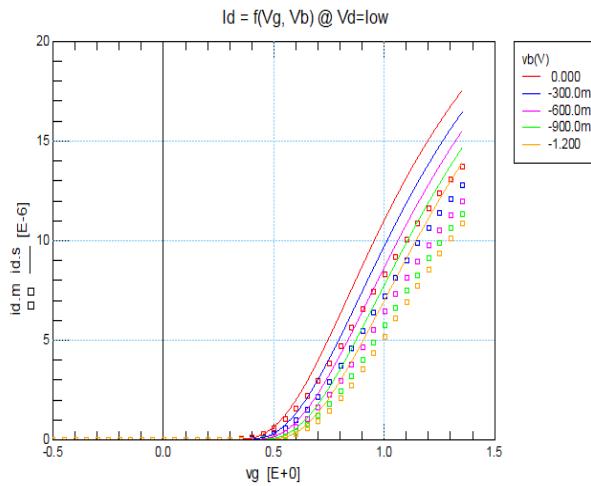
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


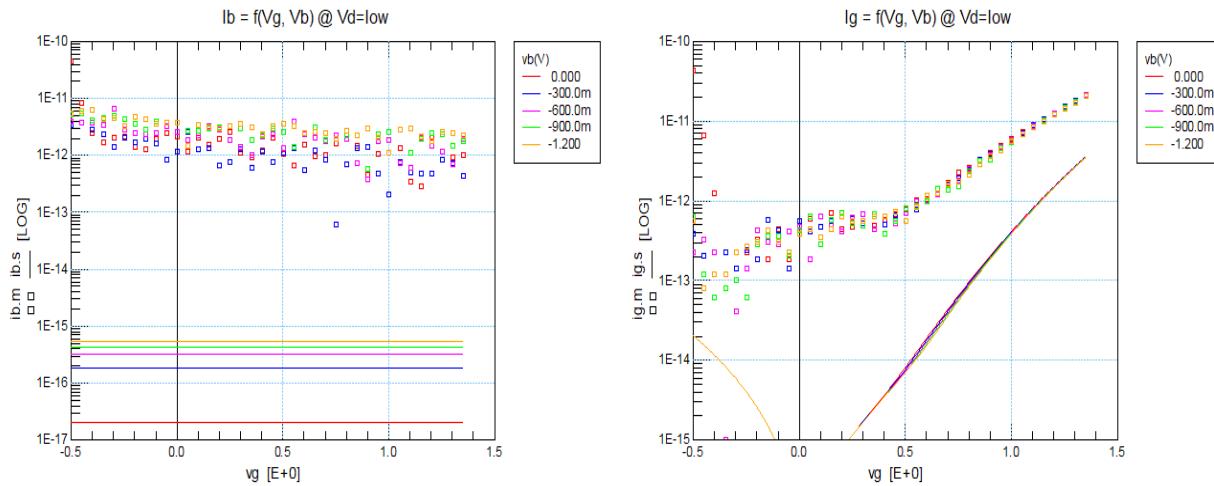
**idvd\_vbmin, Vb = -1.2V, T = 27°C**

**idvd\_vth, Vb = 0V, T = 27°C**




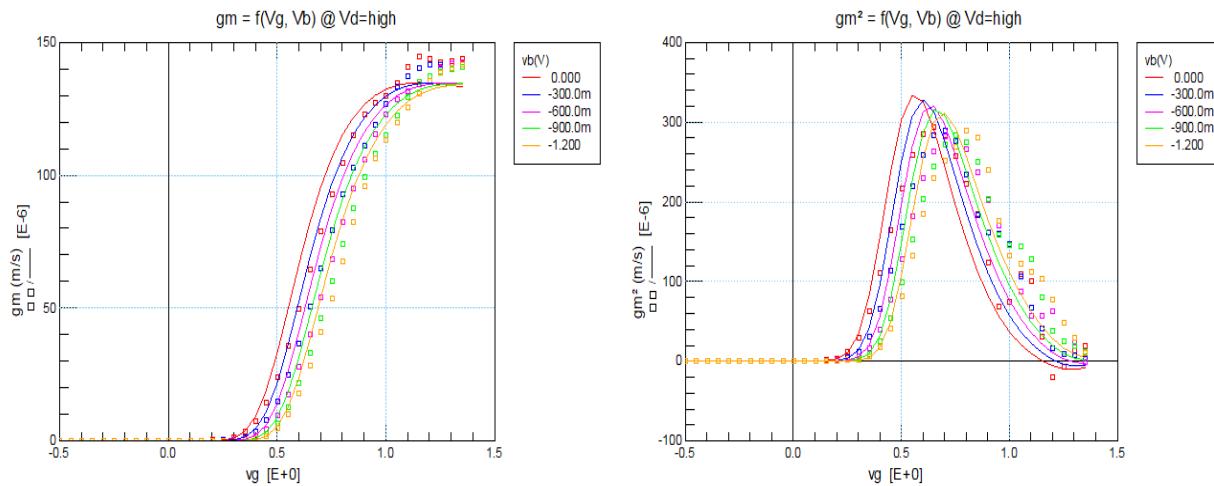
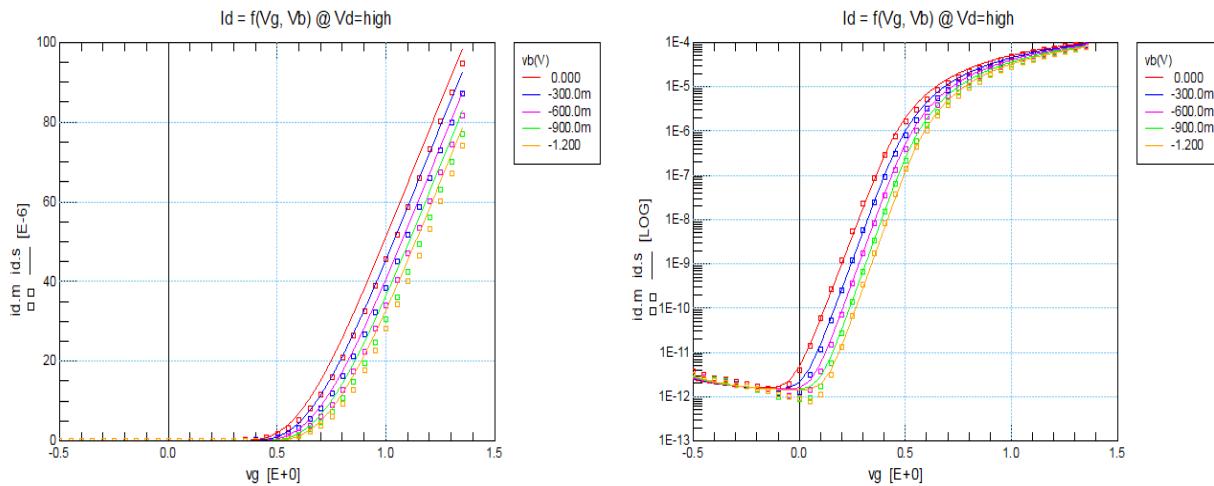
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

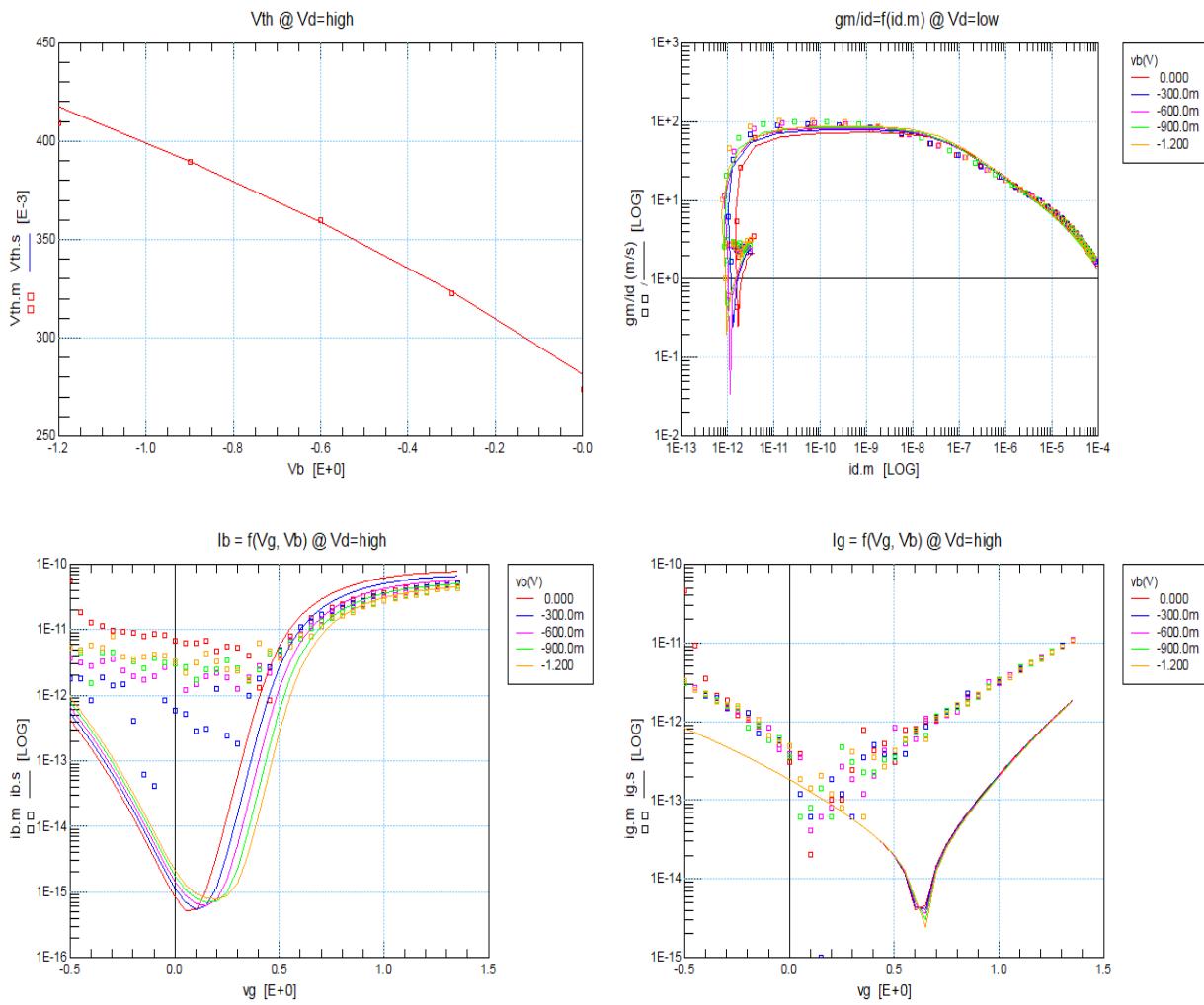


**4.36 W0u15\_L0u14\_S546\_4****idvg, Vd = 0.05V, T = 27°C**

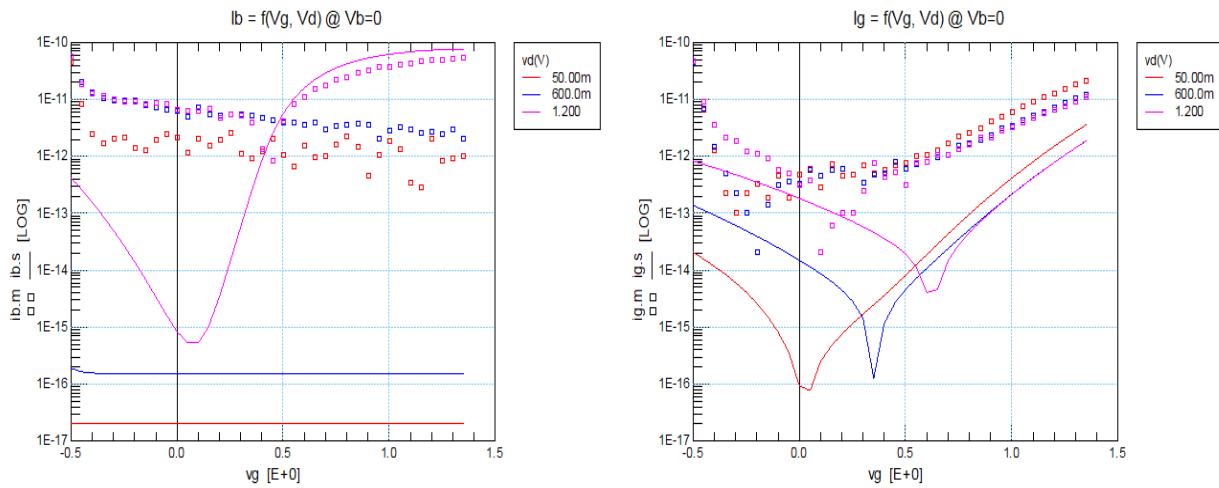


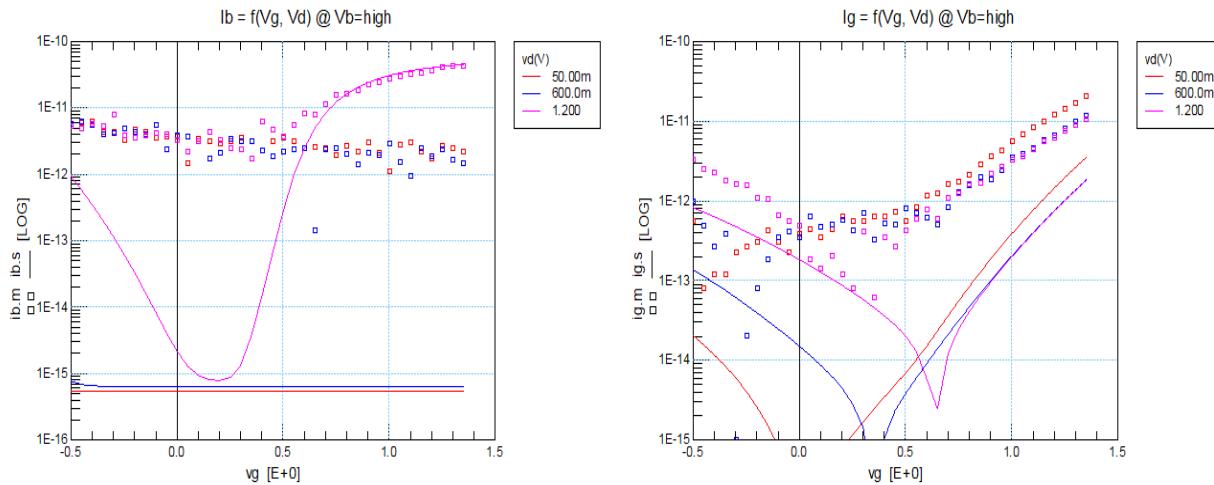
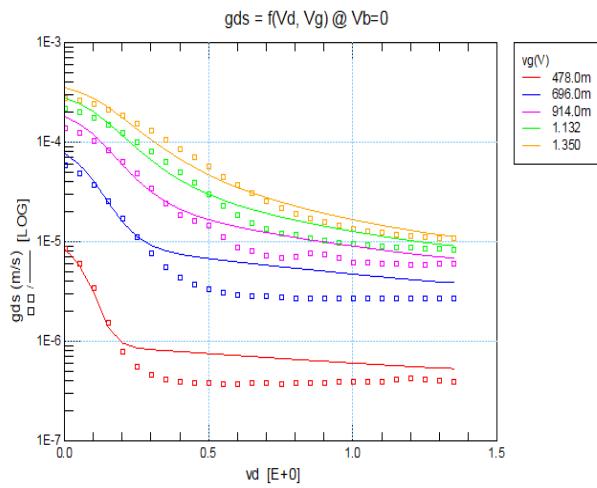
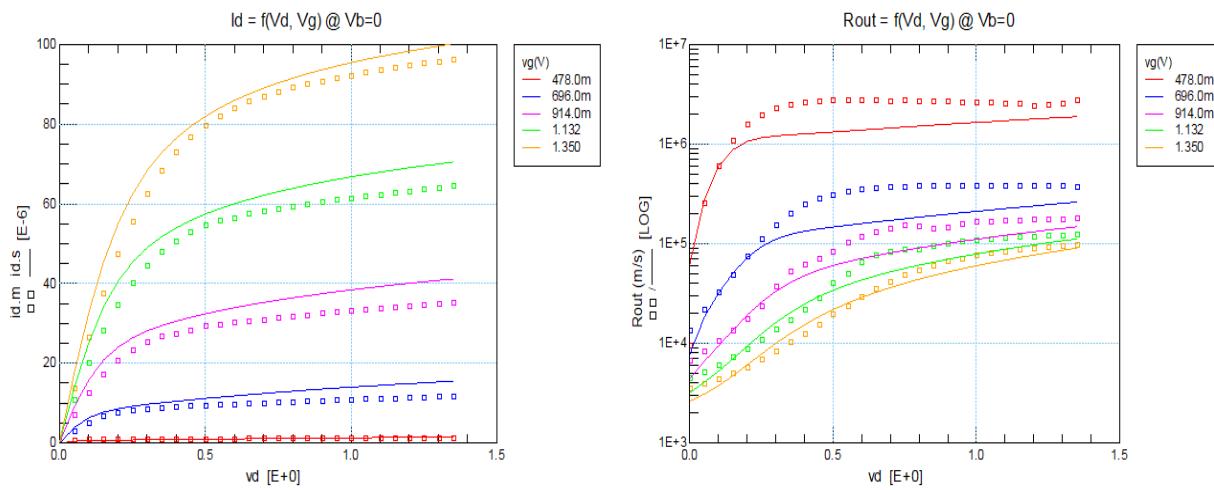
$idv_g, V_d = 1.2V, T = 27^\circ C$

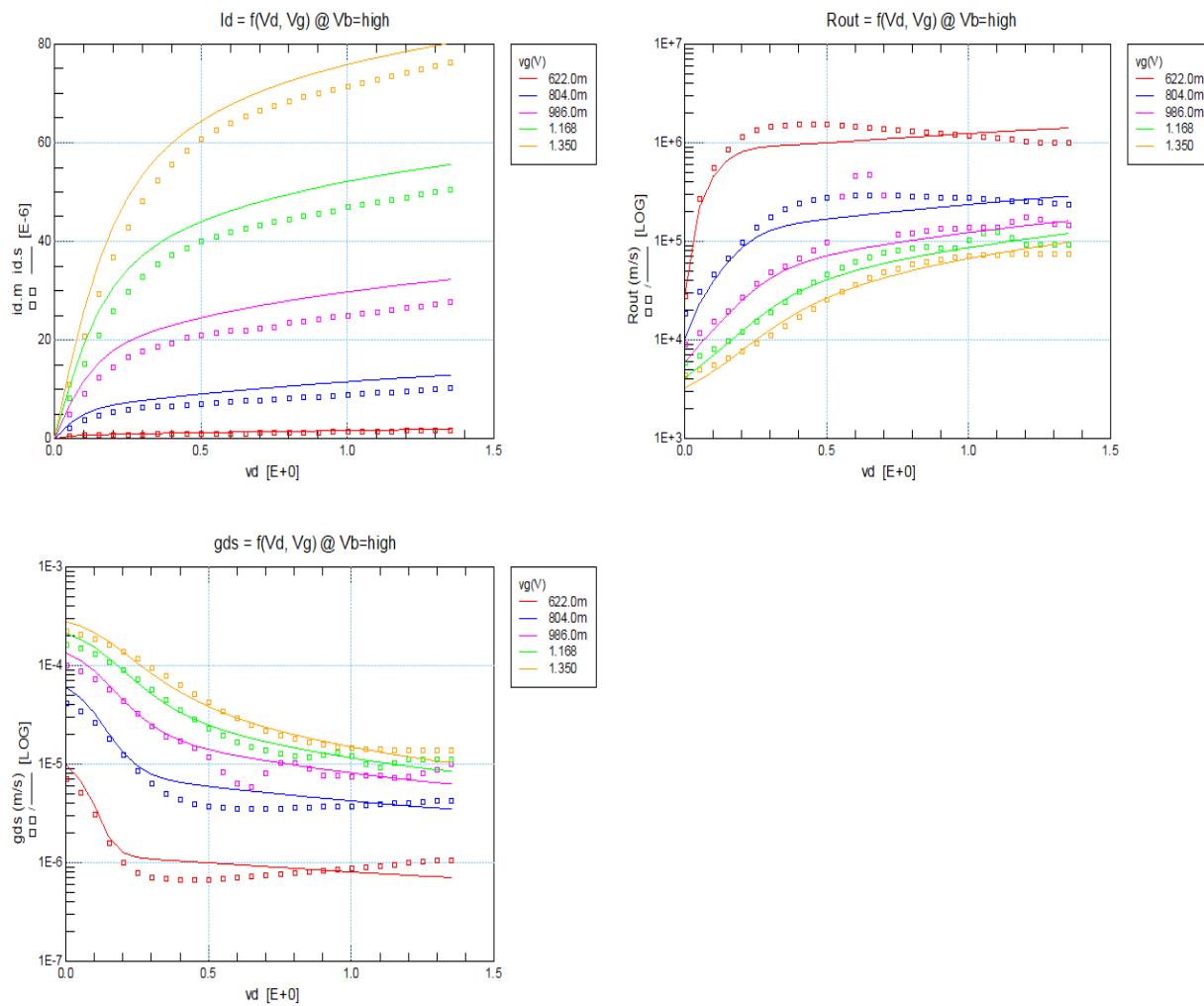
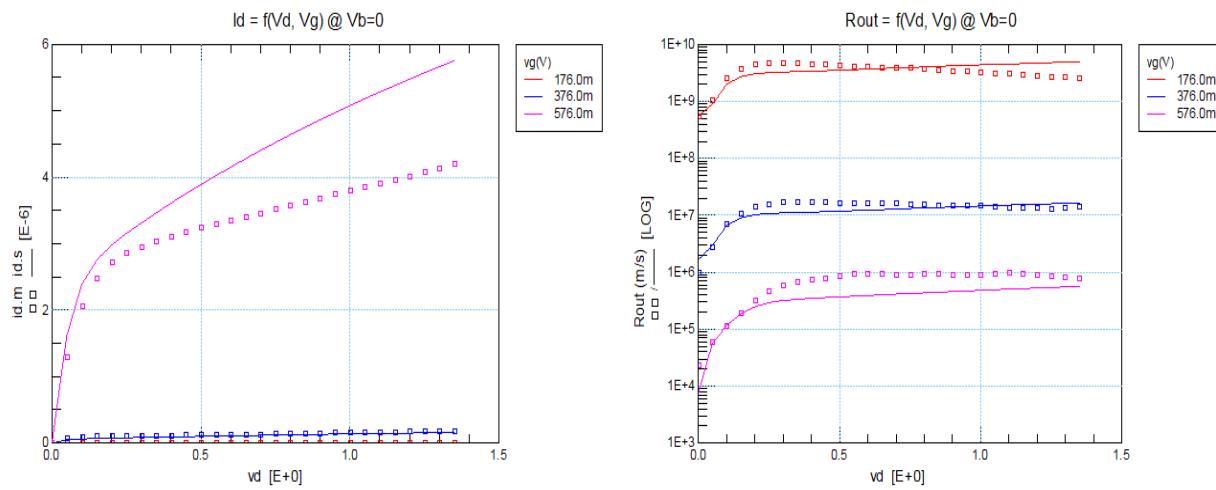


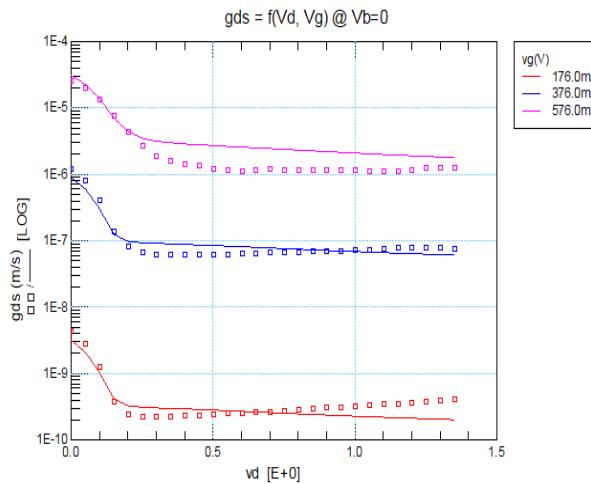


### $i_{dvg}, I_b, I_g, V_b = 0V, T = 27^\circ C$

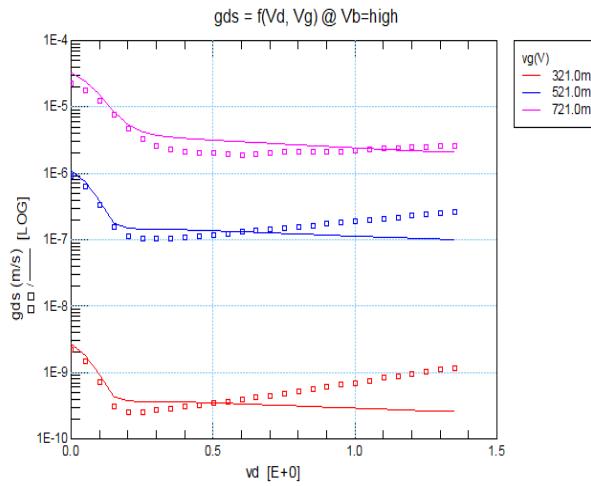
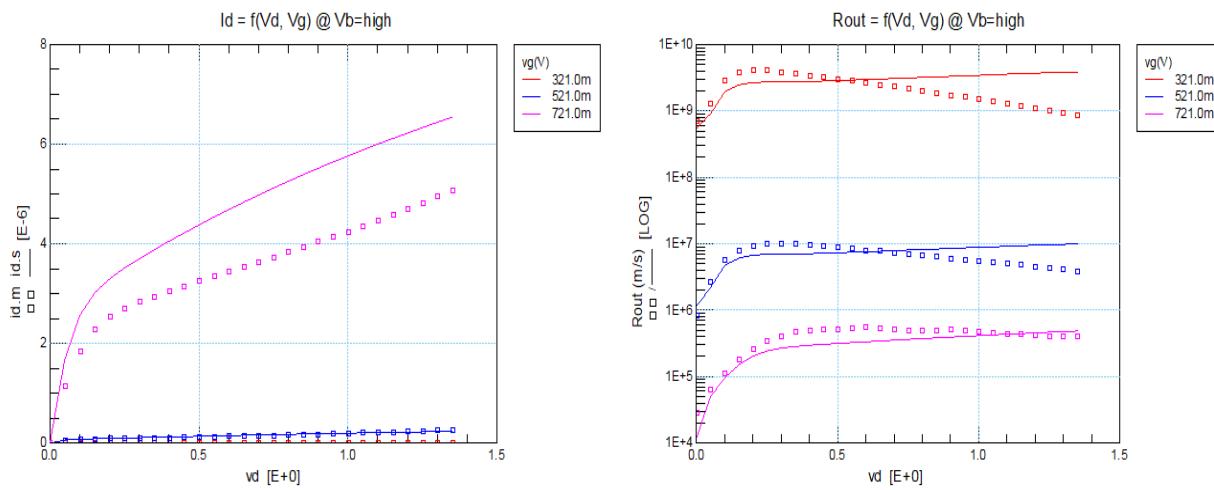


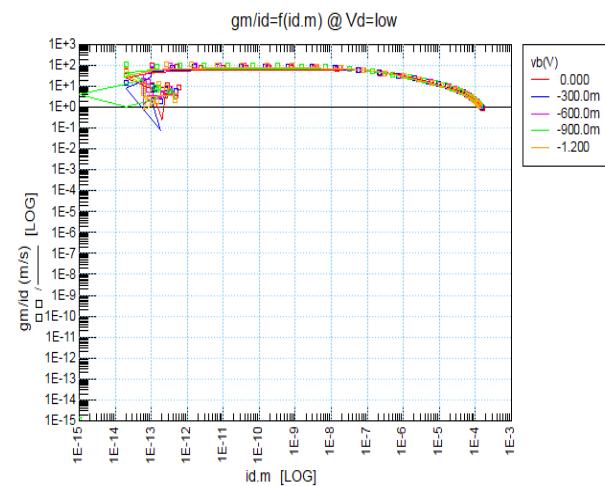
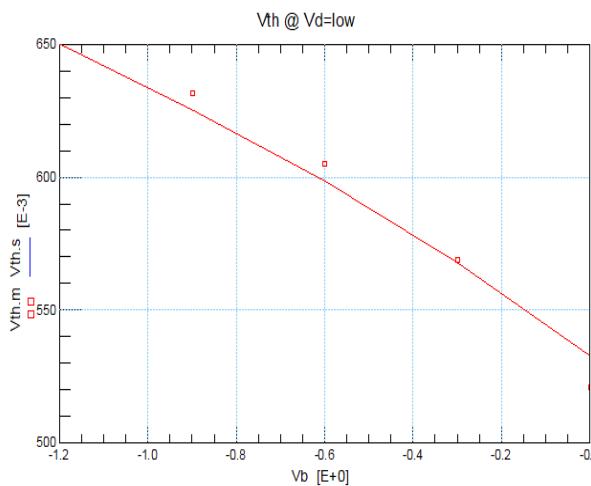
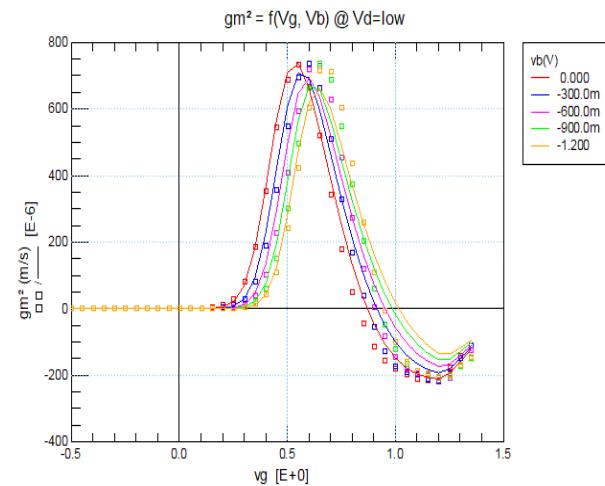
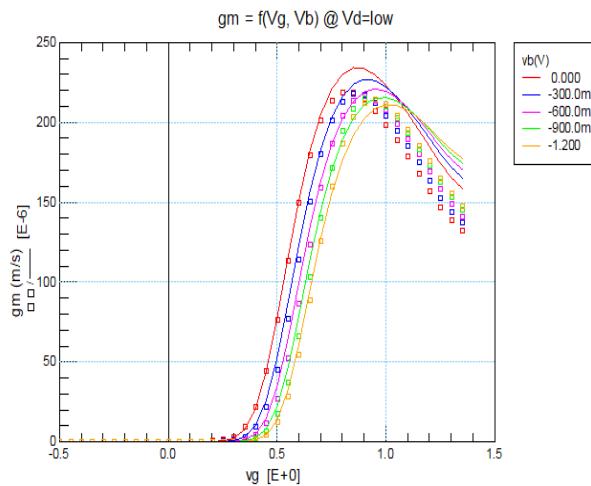
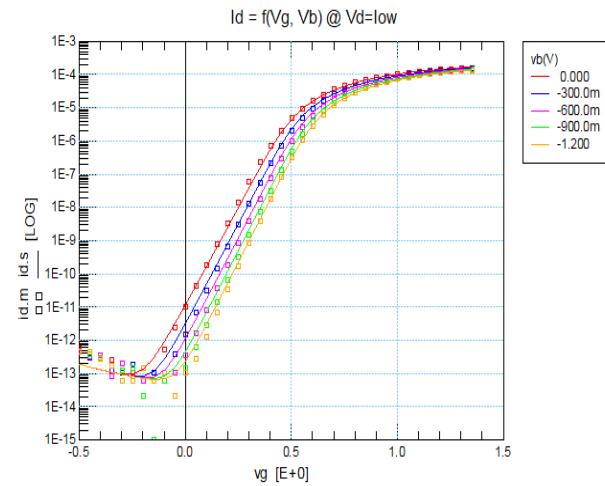
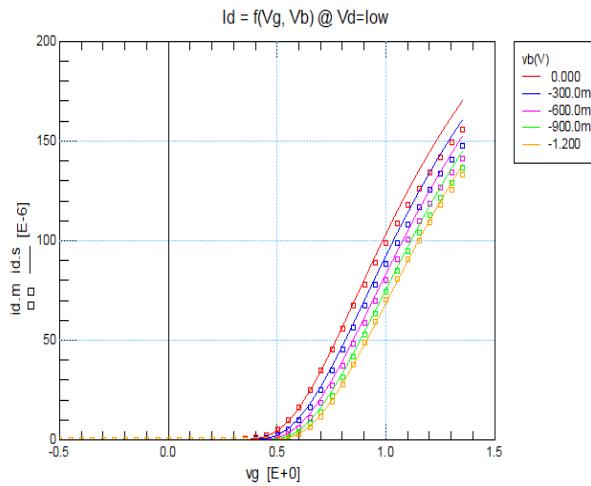
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


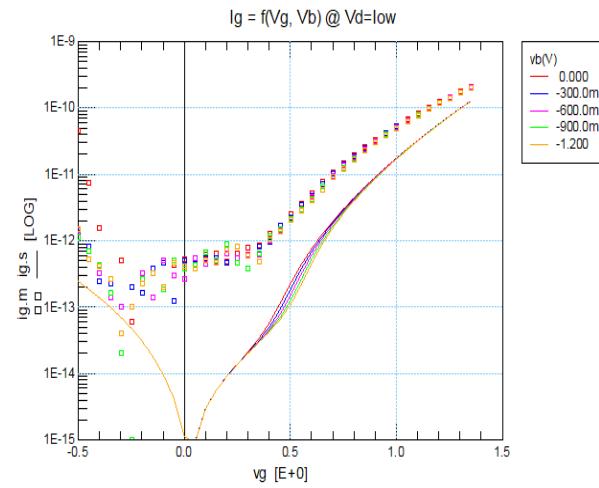
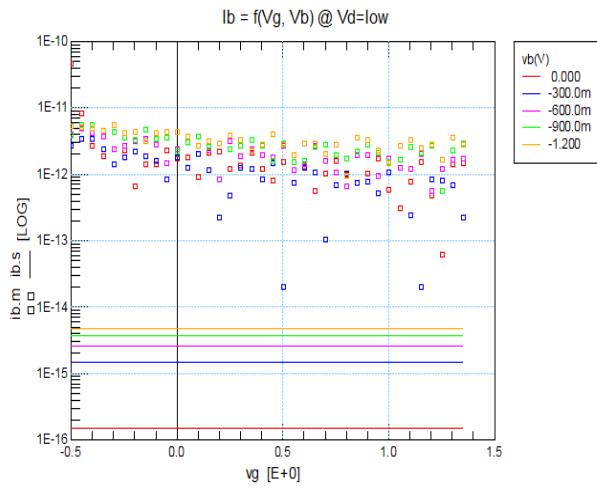
**idvd\_vbmin, Vb = -1.2V, T = 27°C****idvd\_vth, Vb = 0V, T = 27°C**



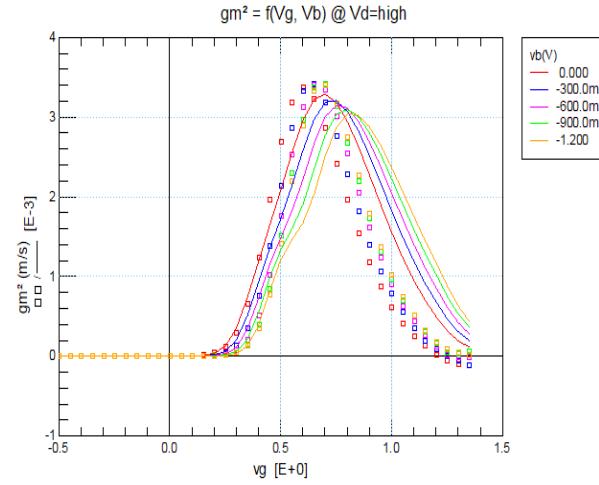
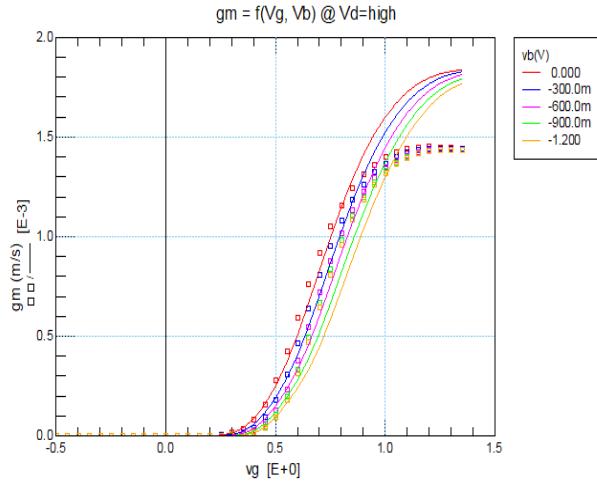
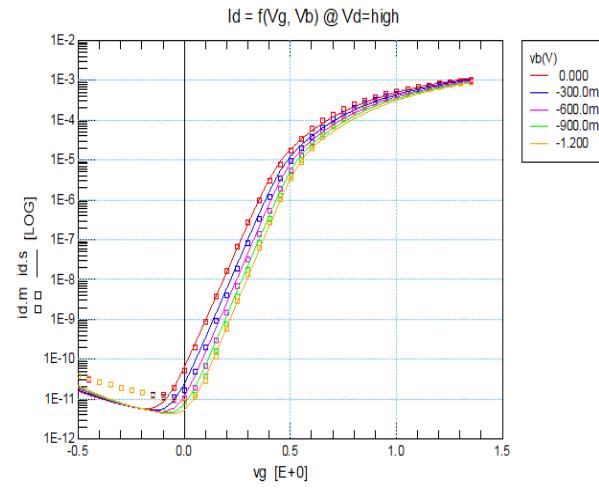
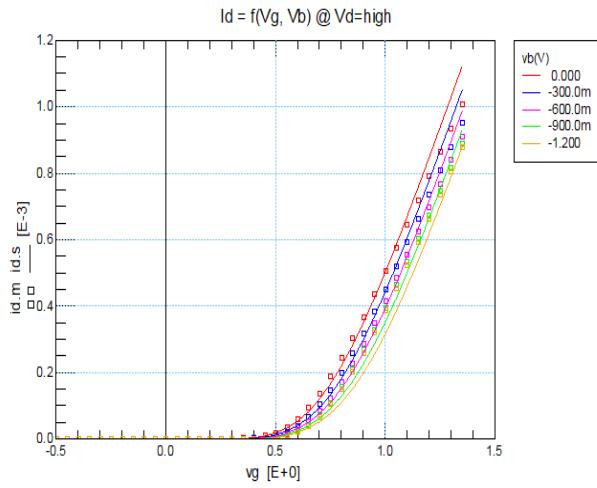
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

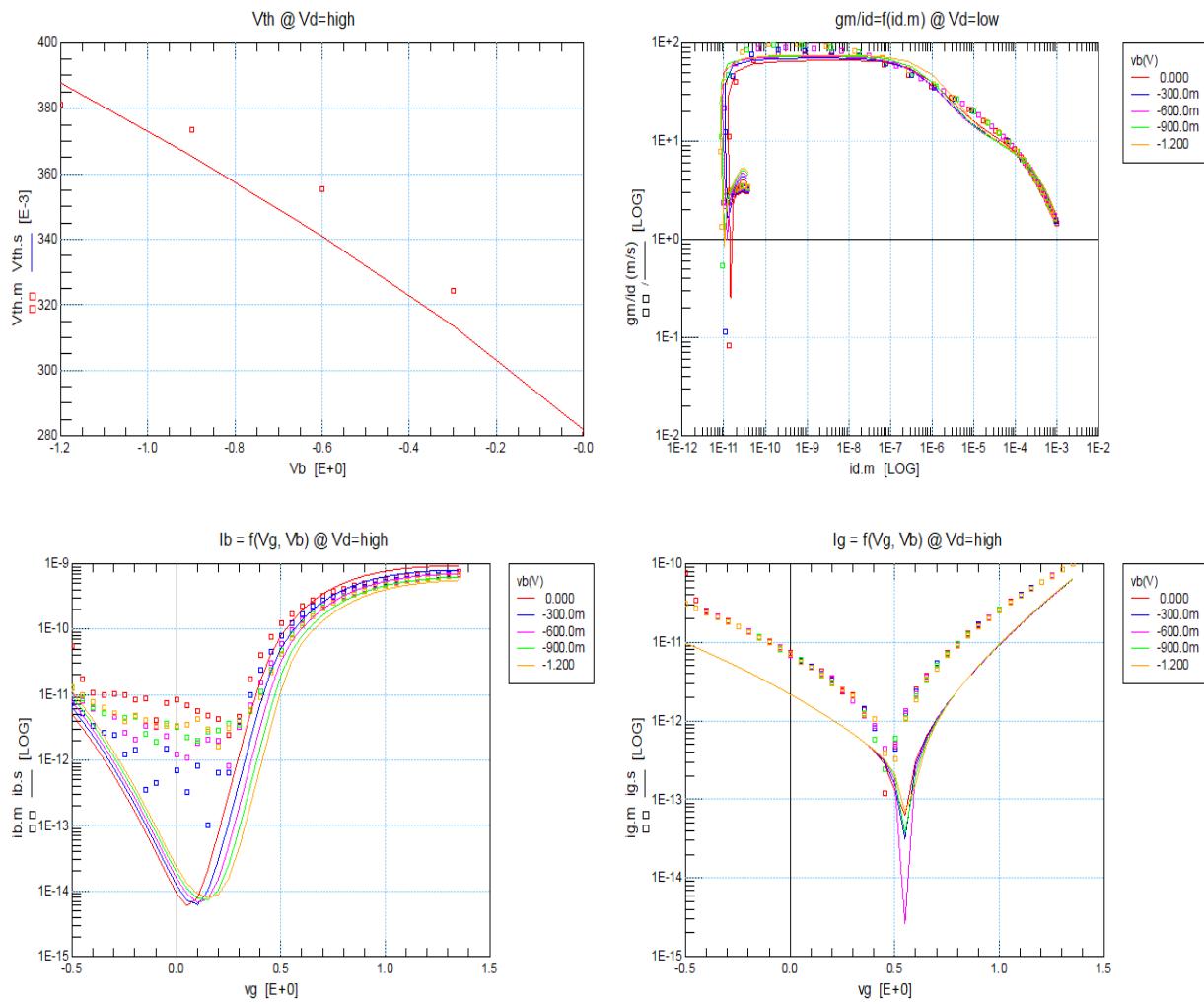


**4.37W02u0\_L0u13\_S542\_4****idvg, Vd = 0.05V, T = 27°C**

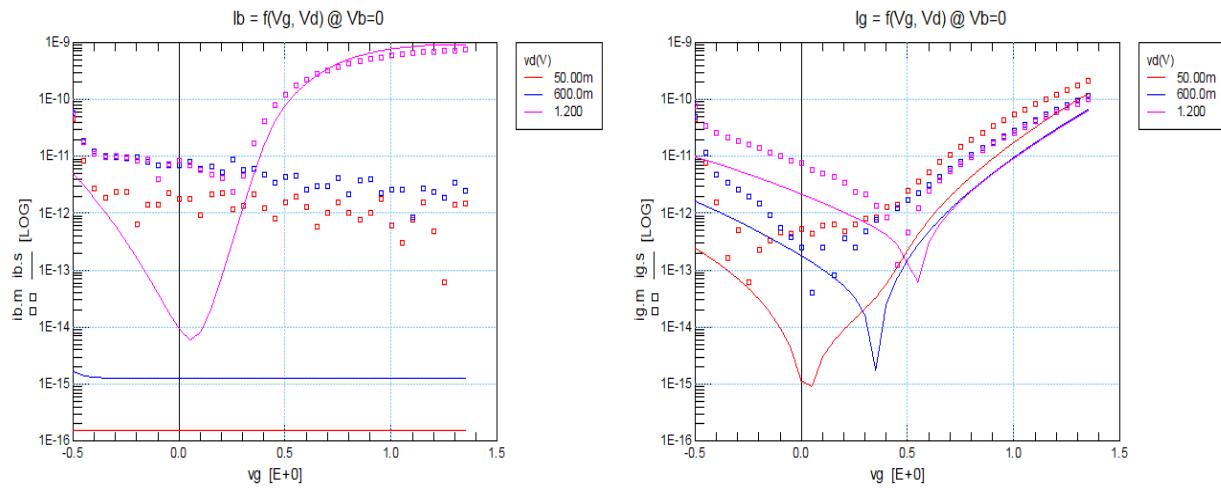


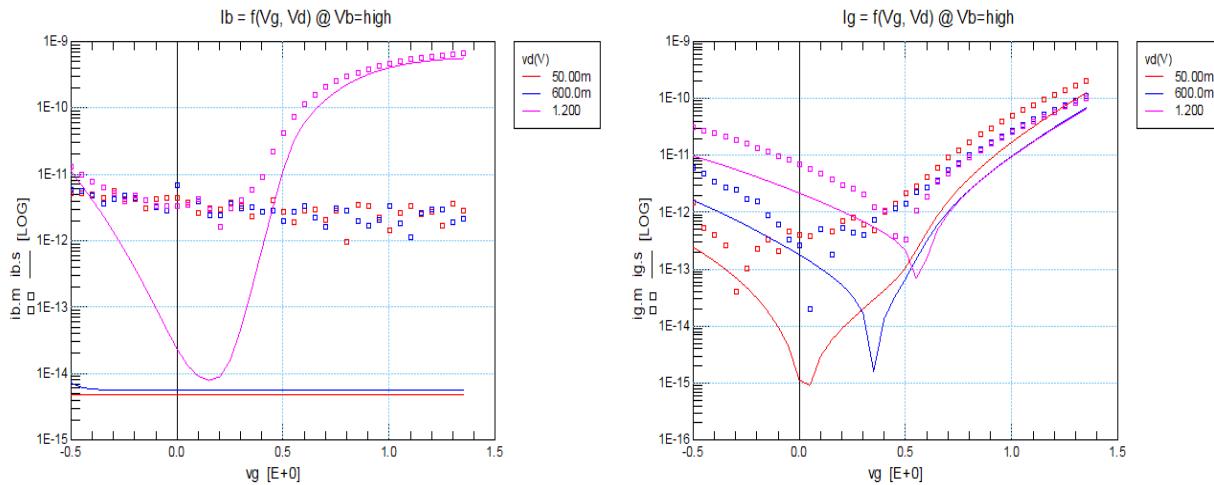
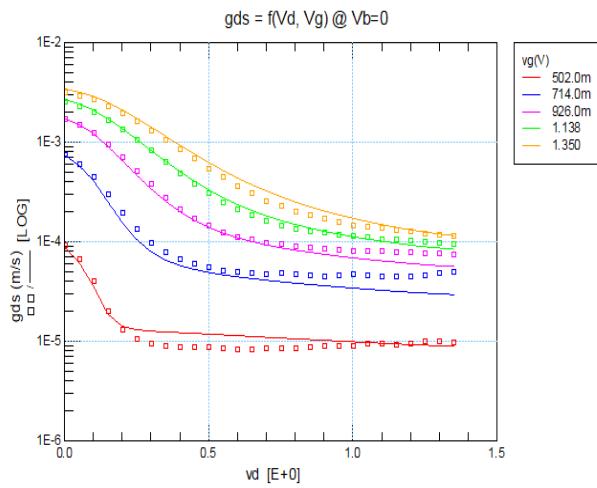
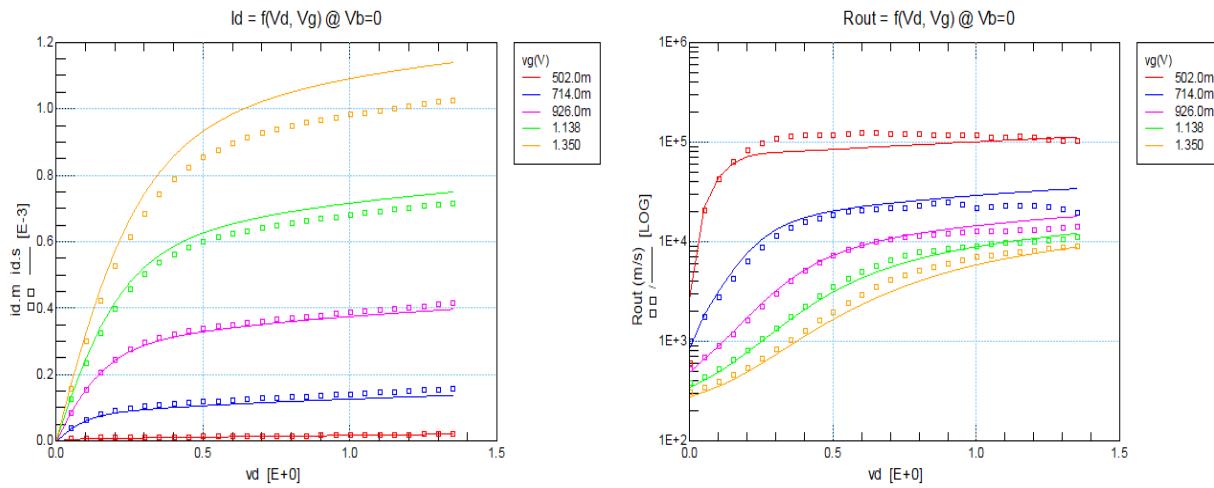
$i_{dvg}, V_d = 1.2V, T = 27^\circ C$

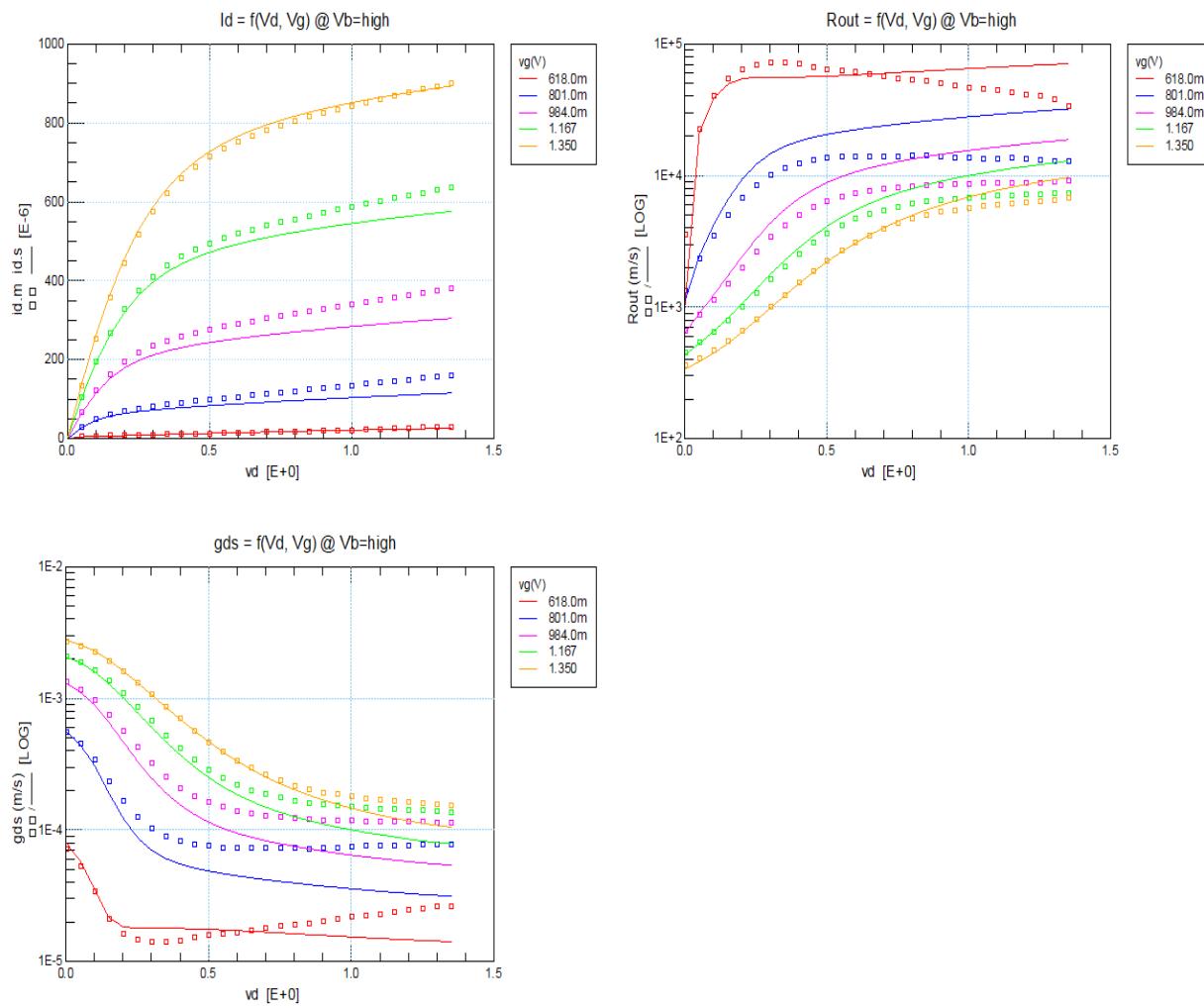
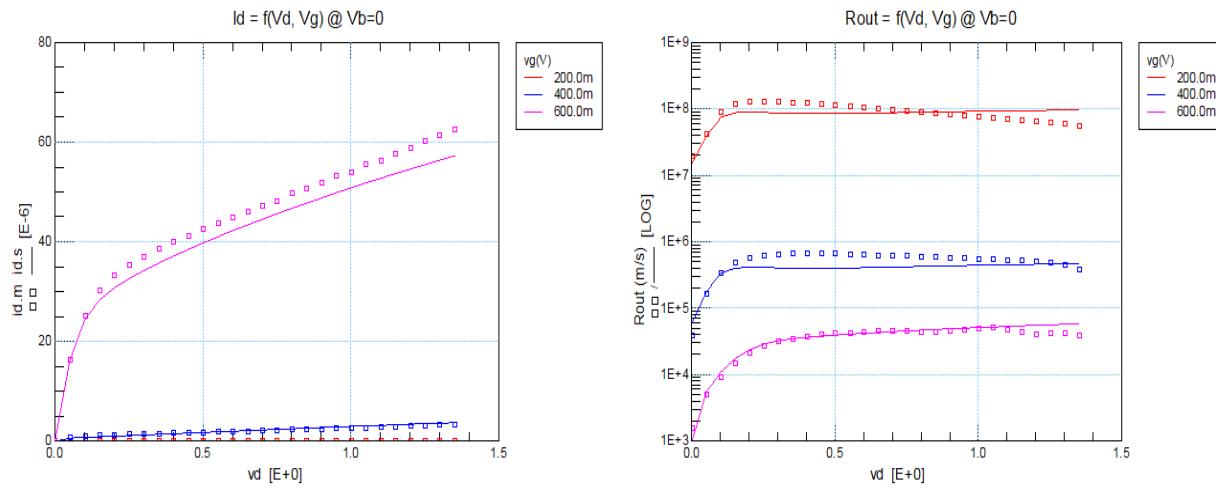


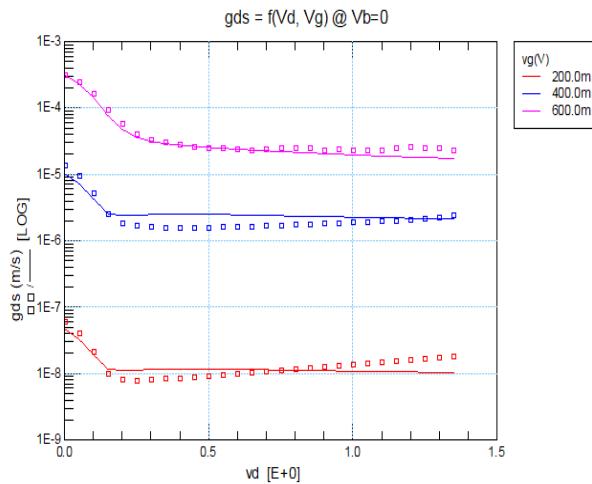


### $id_{vg}, I_b, I_g, V_b = 0V, T = 27^\circ C$

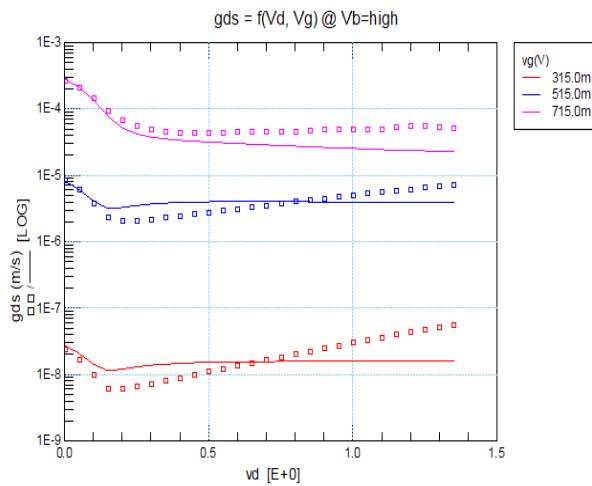
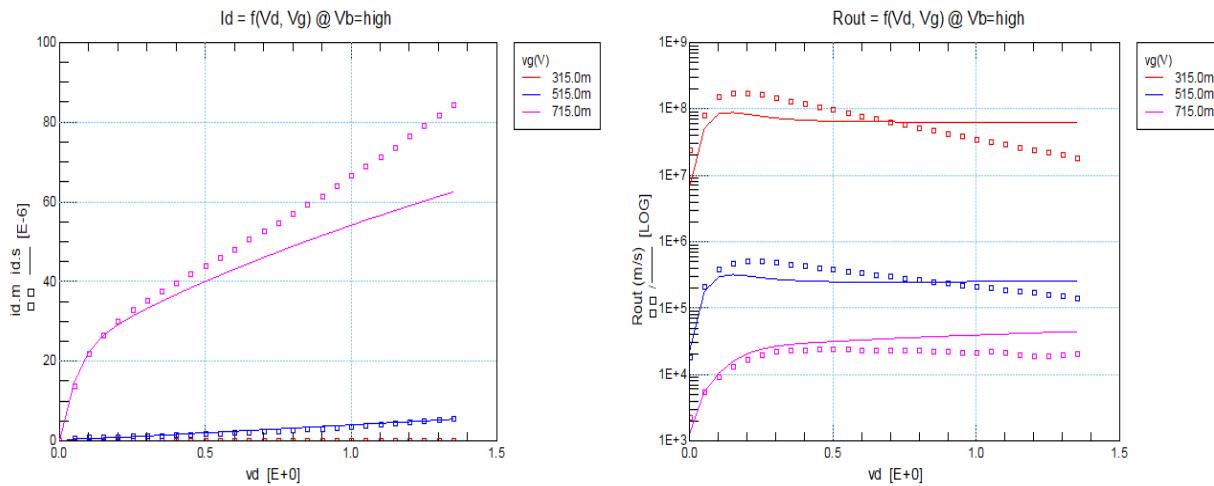


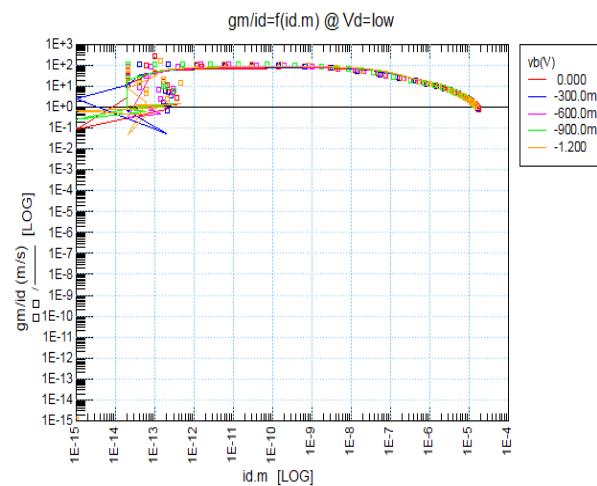
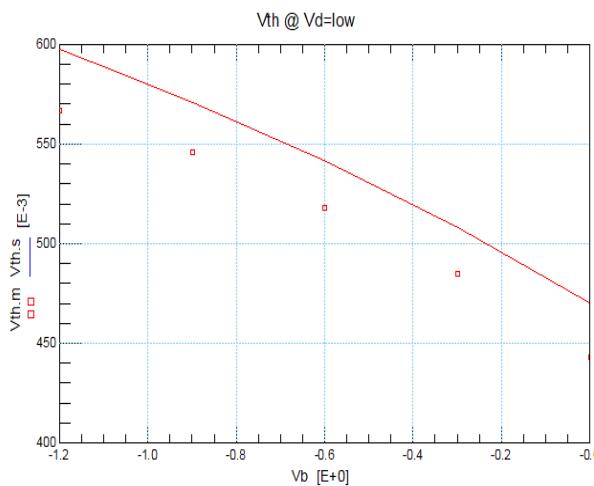
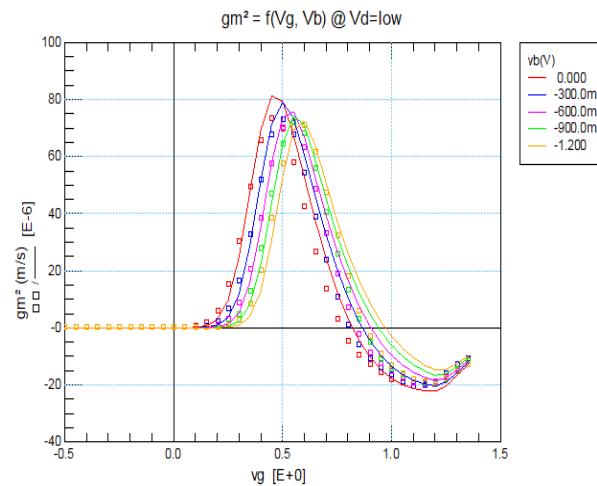
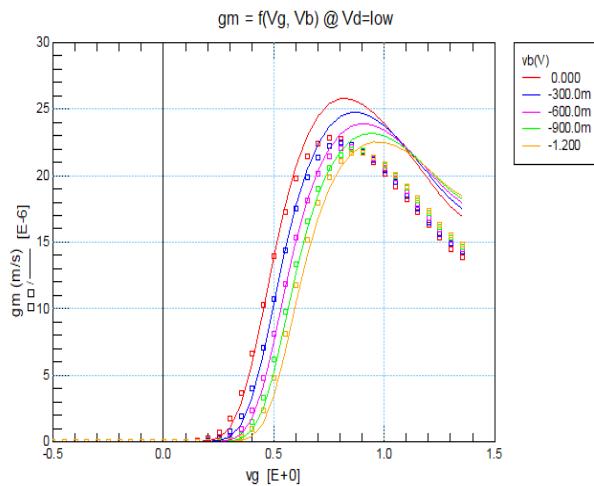
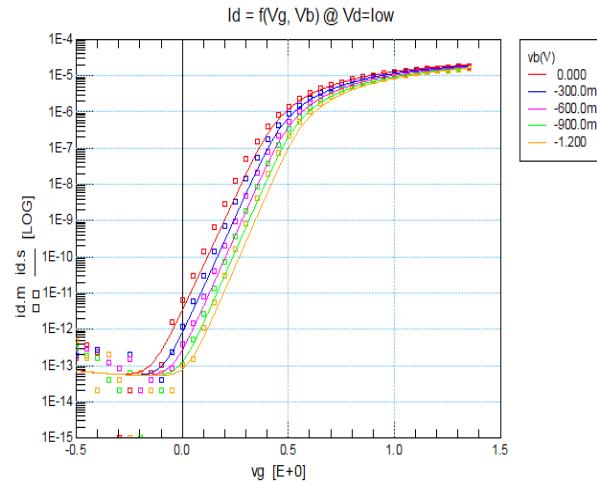
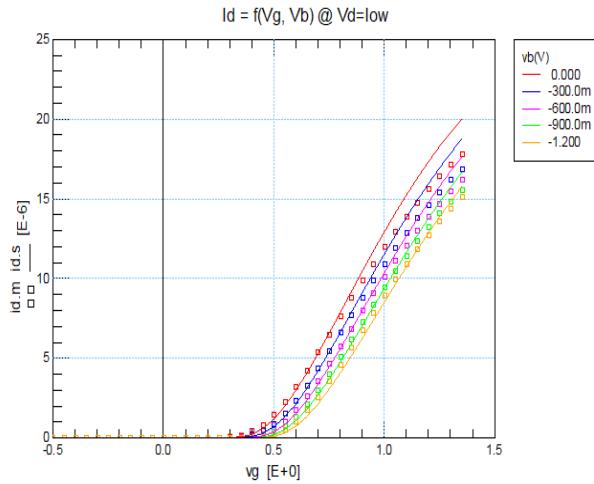
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


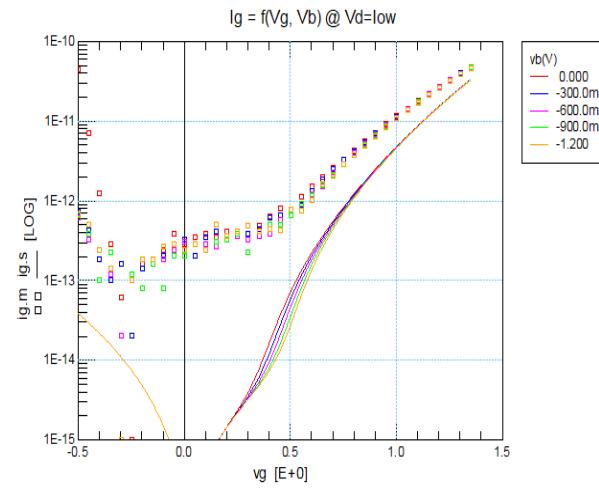
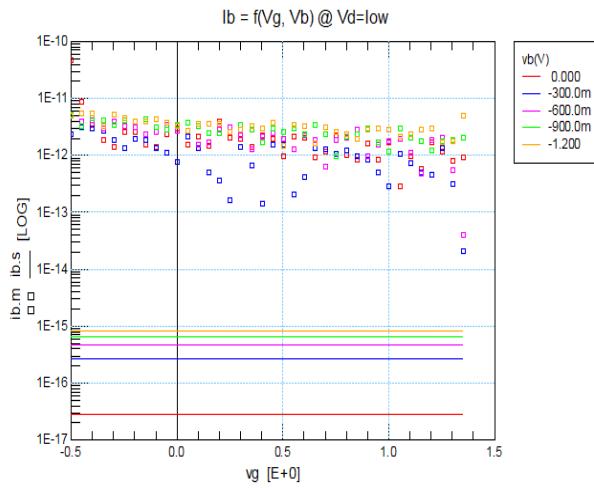
**idvd\_vbmin, Vb = -1.2V, T = 27°C****idvd\_vth, Vb = 0V, T = 27°C**



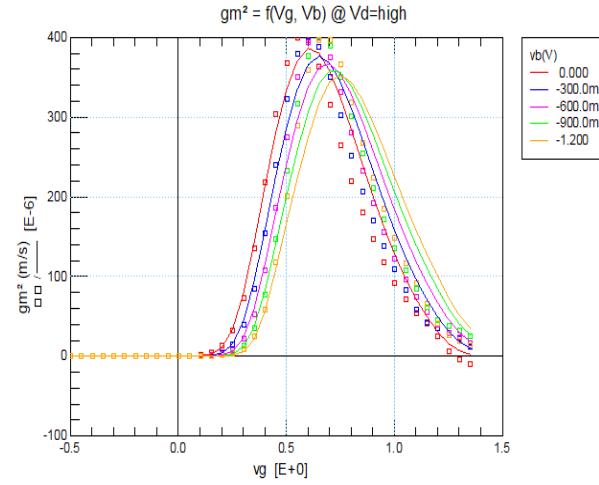
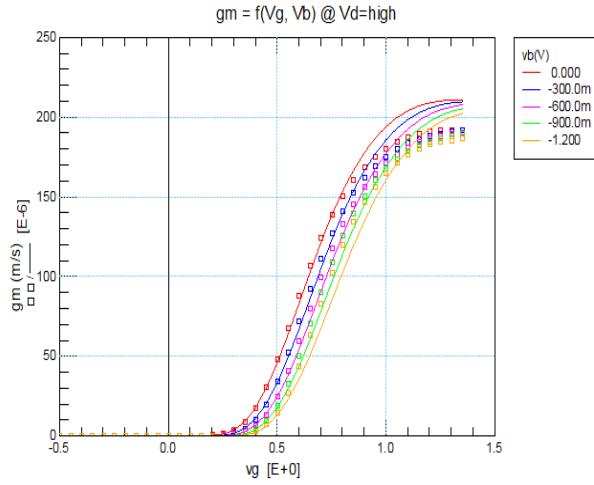
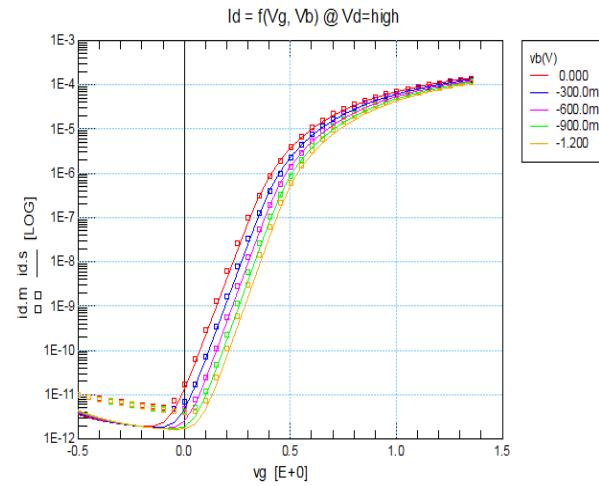
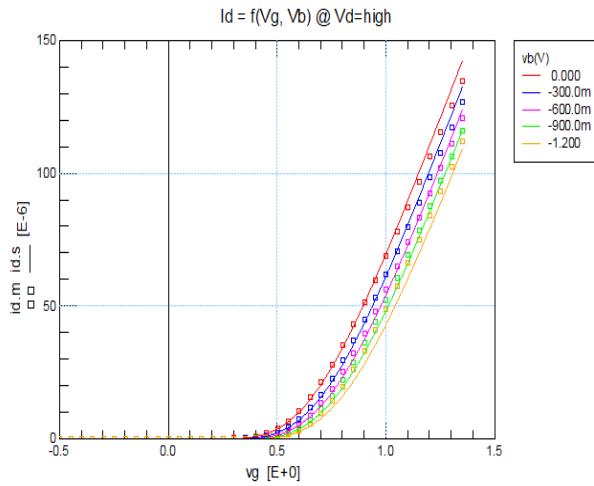
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

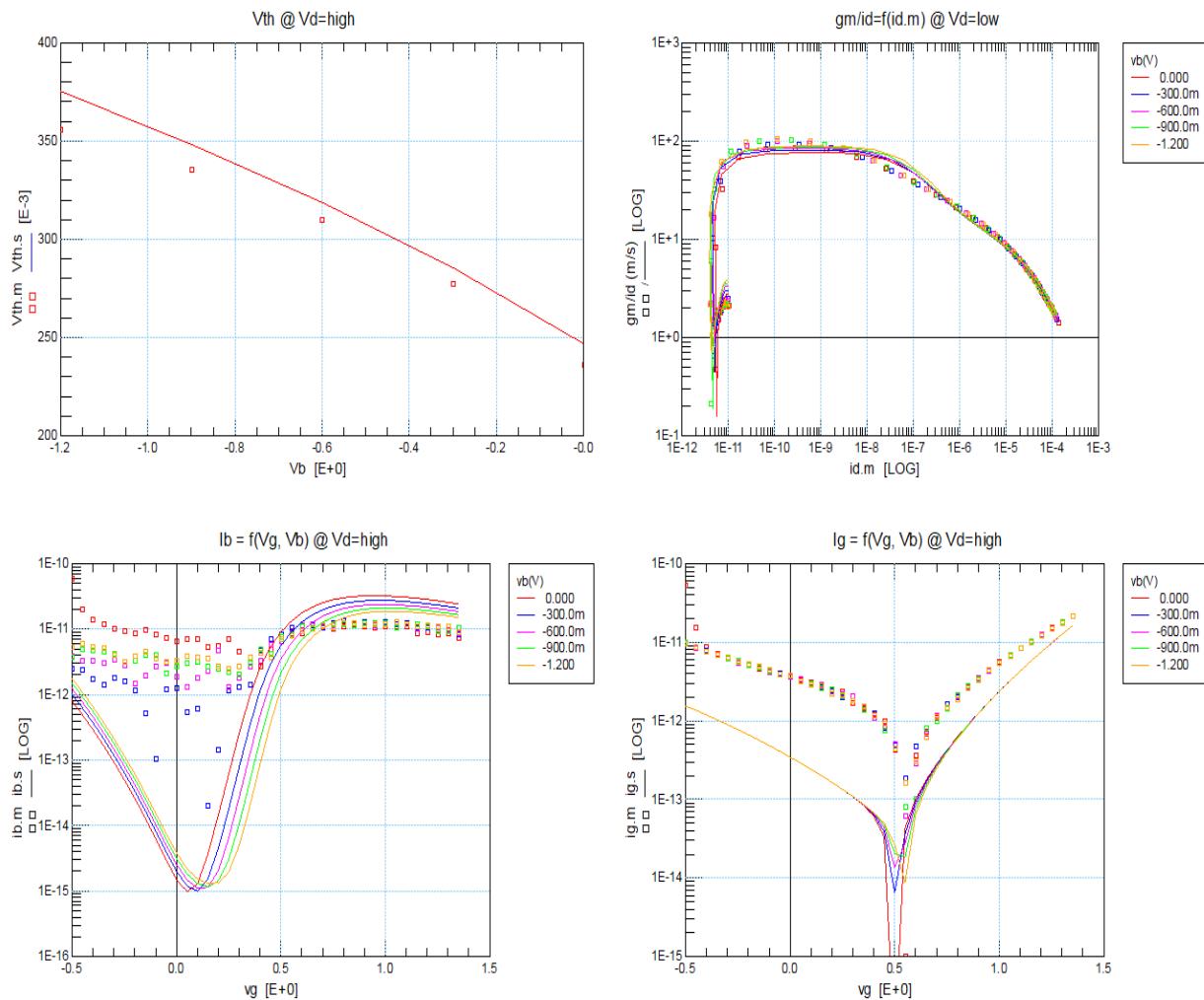


**4.38 W0u3\_L0u18\_S544\_5****idvg, Vd = 0.05V, T = 27°C**

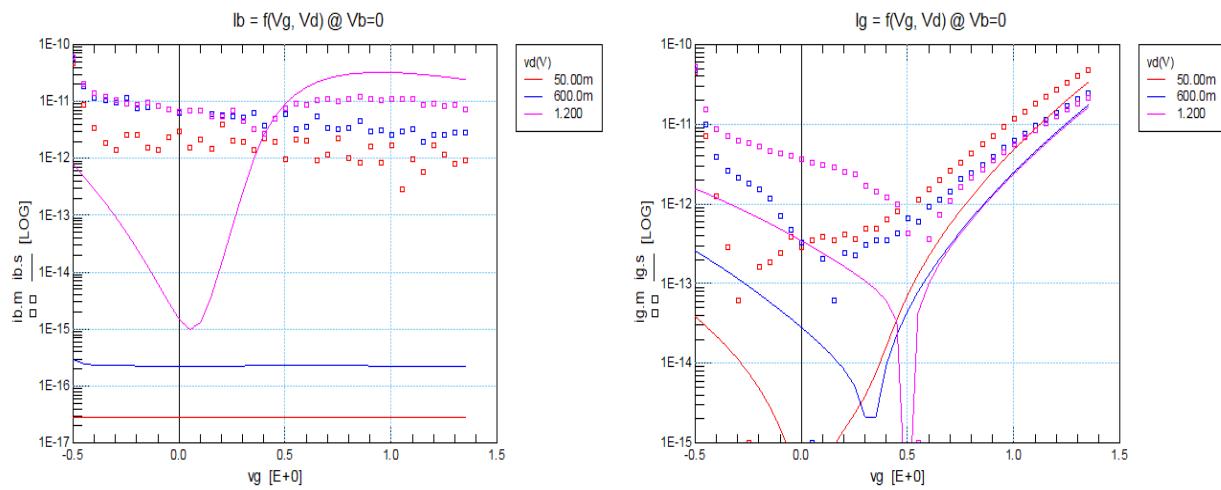


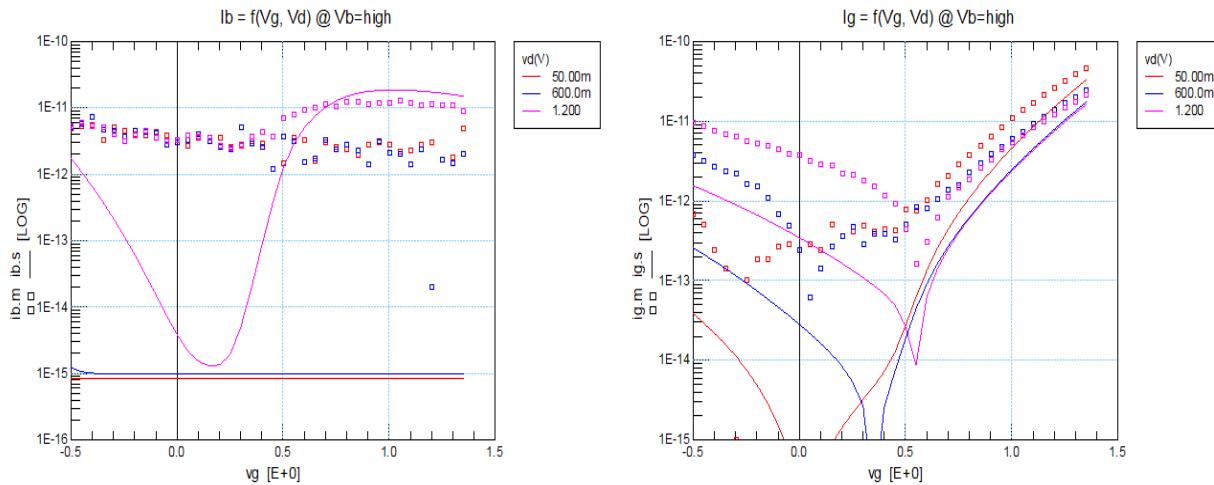
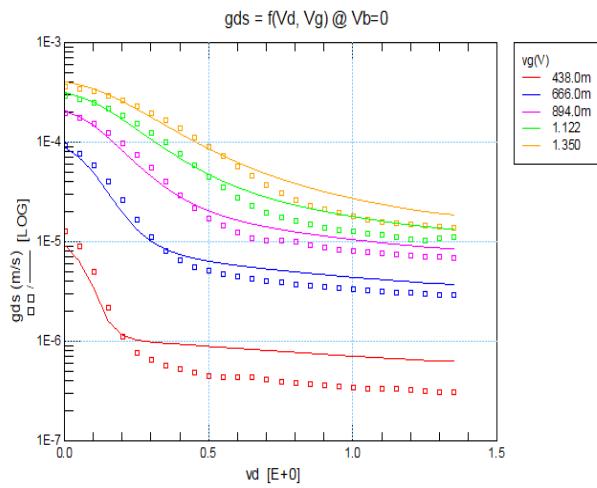
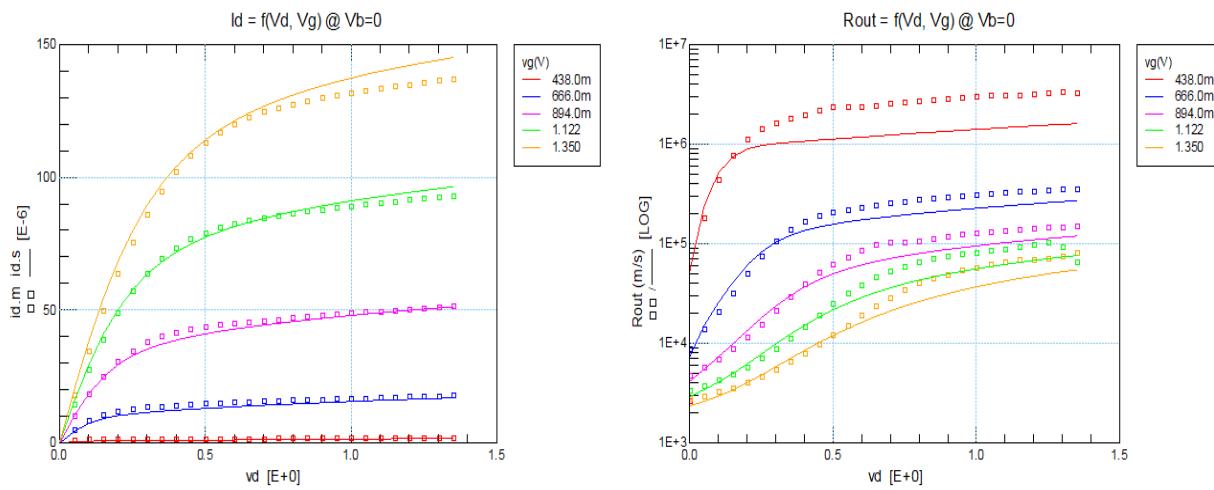
### $i_{dvg}, V_d = 1.2V, T = 27^\circ C$

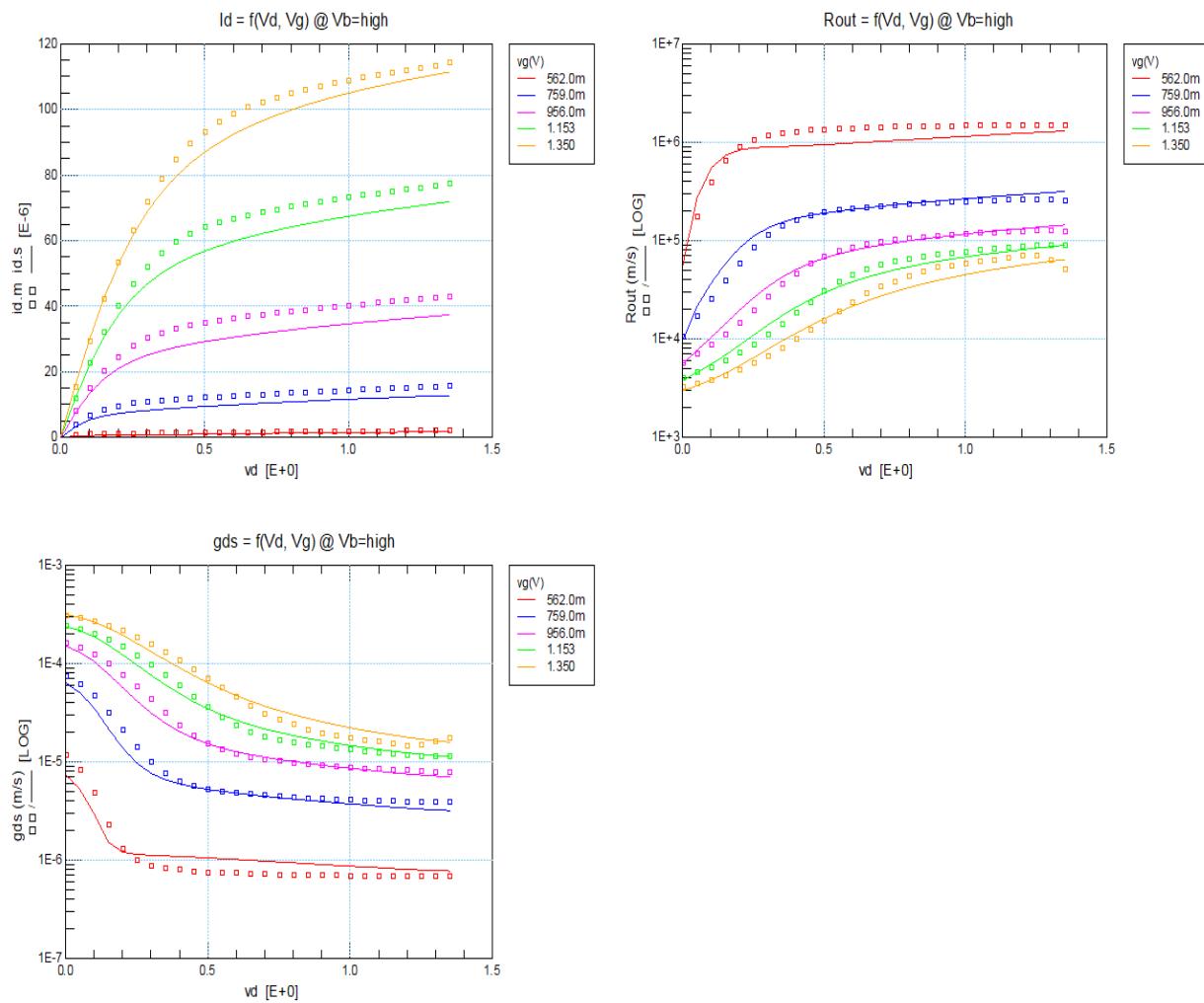
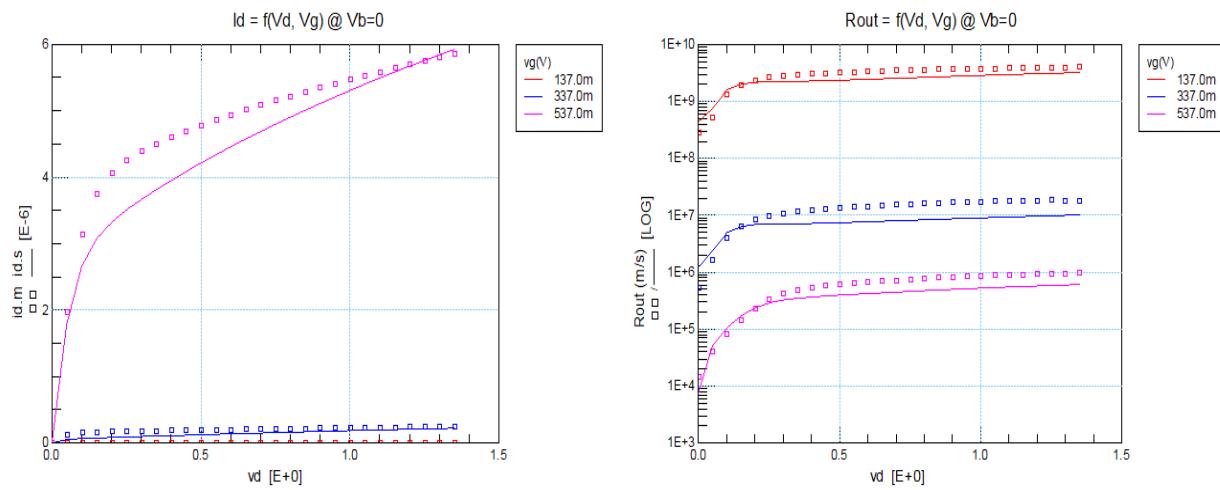


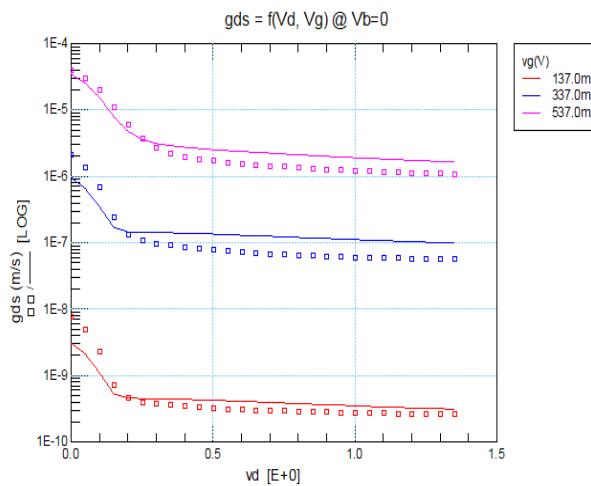


$id_{vg}, I_b, I_g, V_b = 0V, T = 27^\circ C$

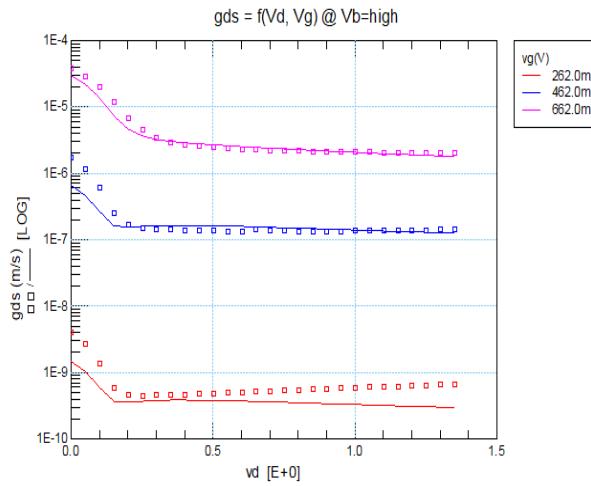
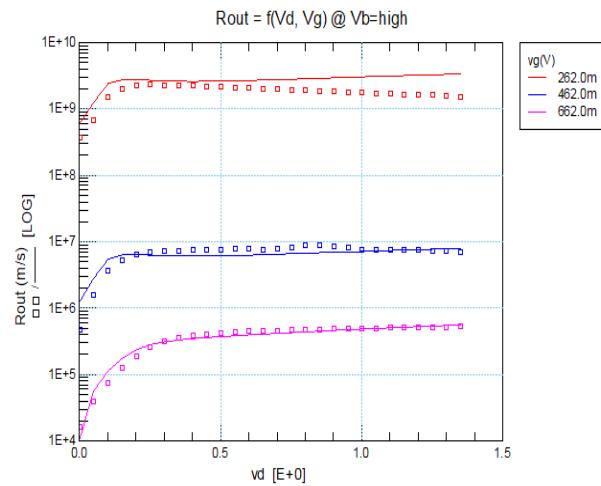
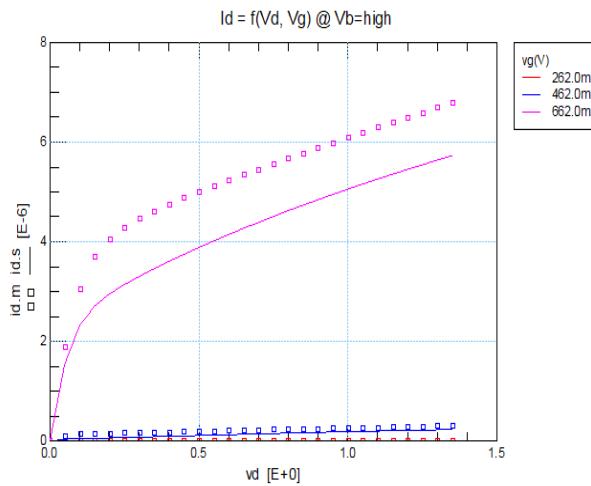


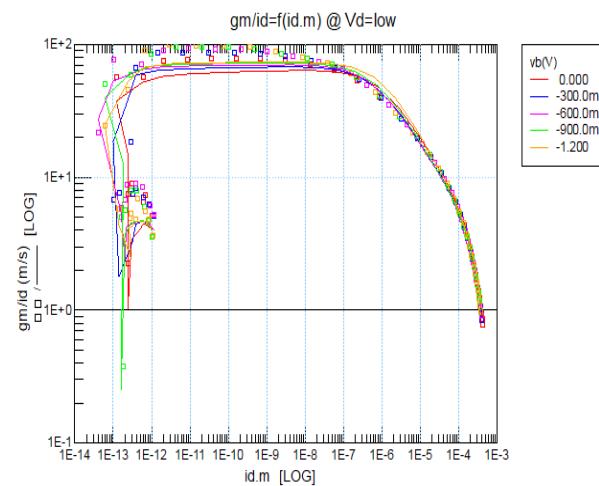
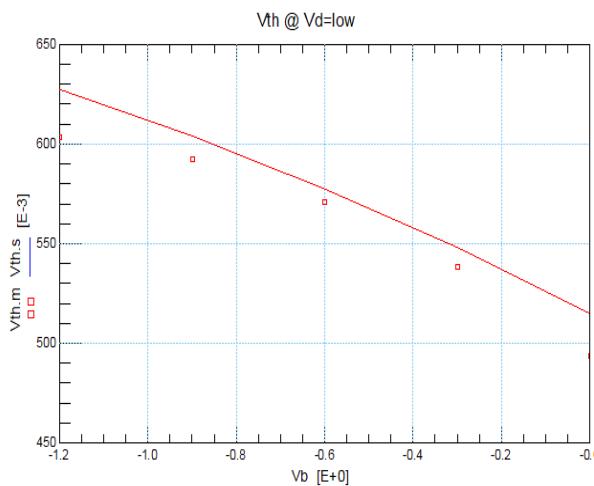
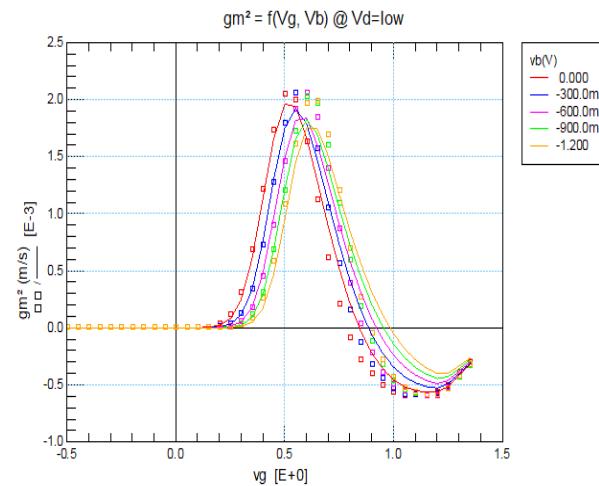
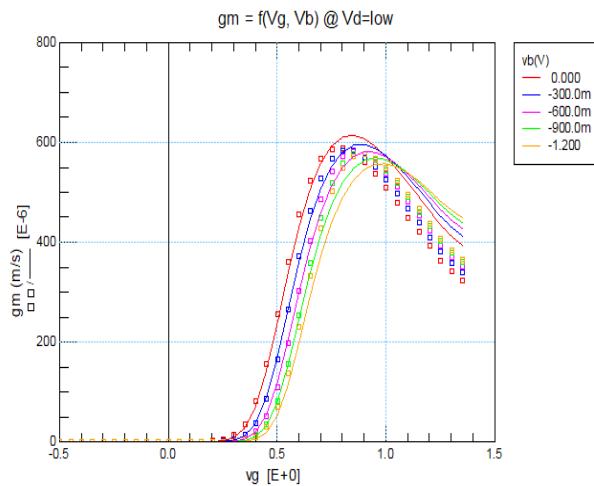
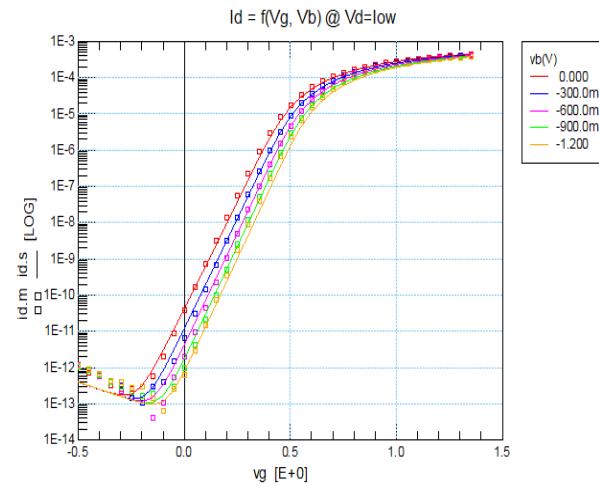
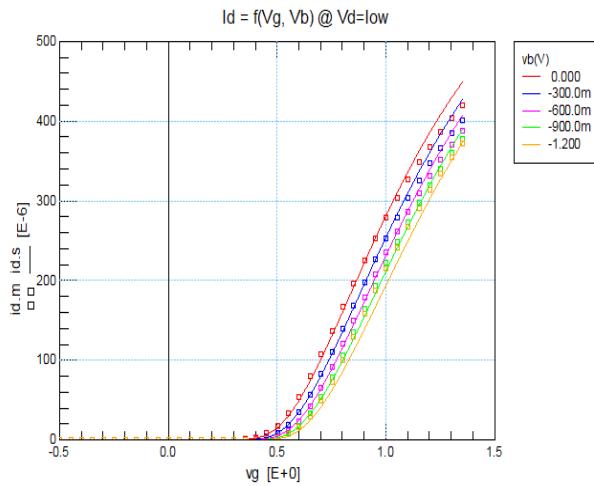
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


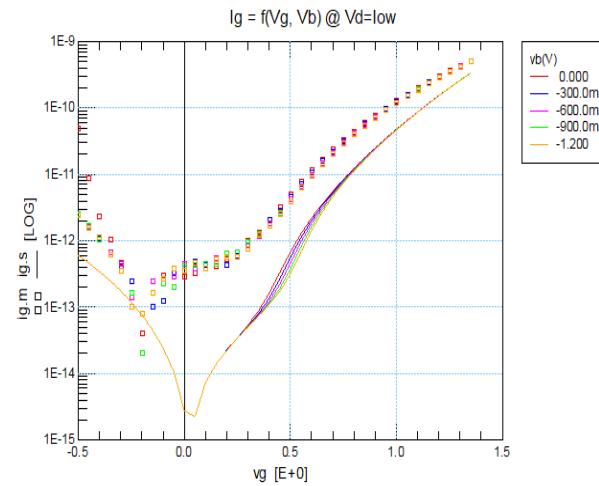
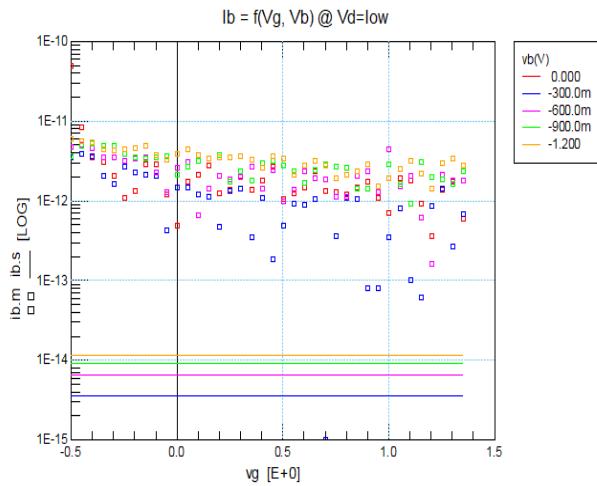
**idvd\_vbmin, Vb = -1.2V, T = 27°C****idvd\_vth, Vb = 0V, T = 27°C**



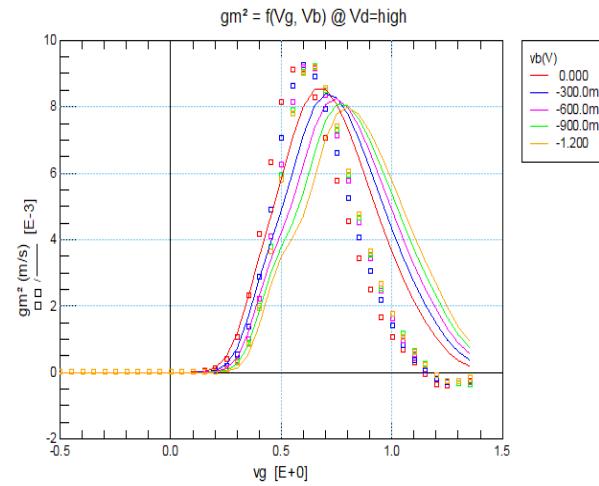
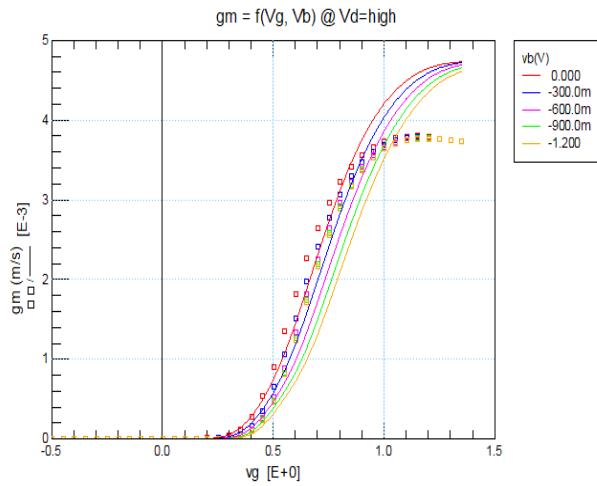
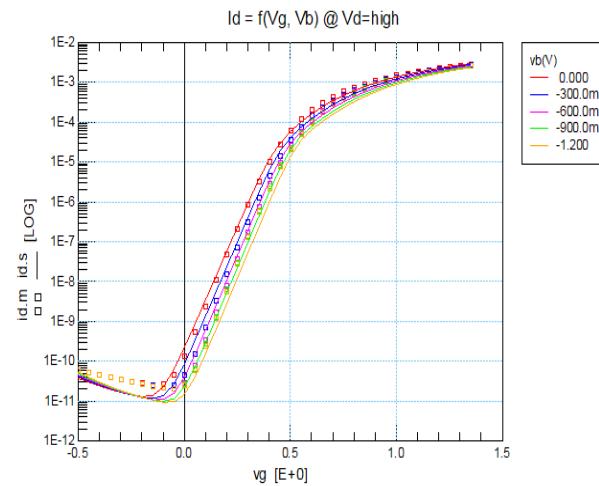
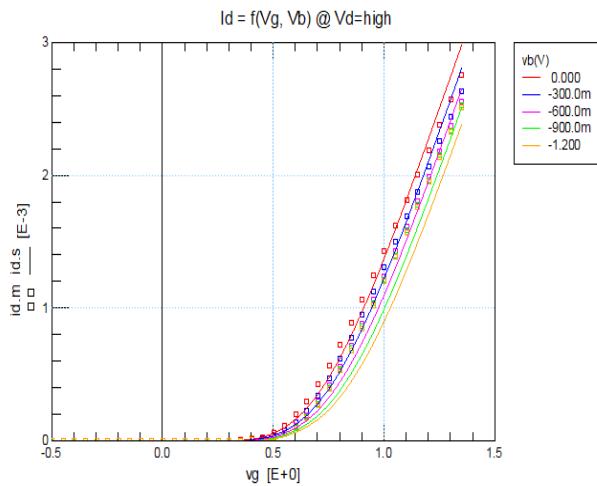
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

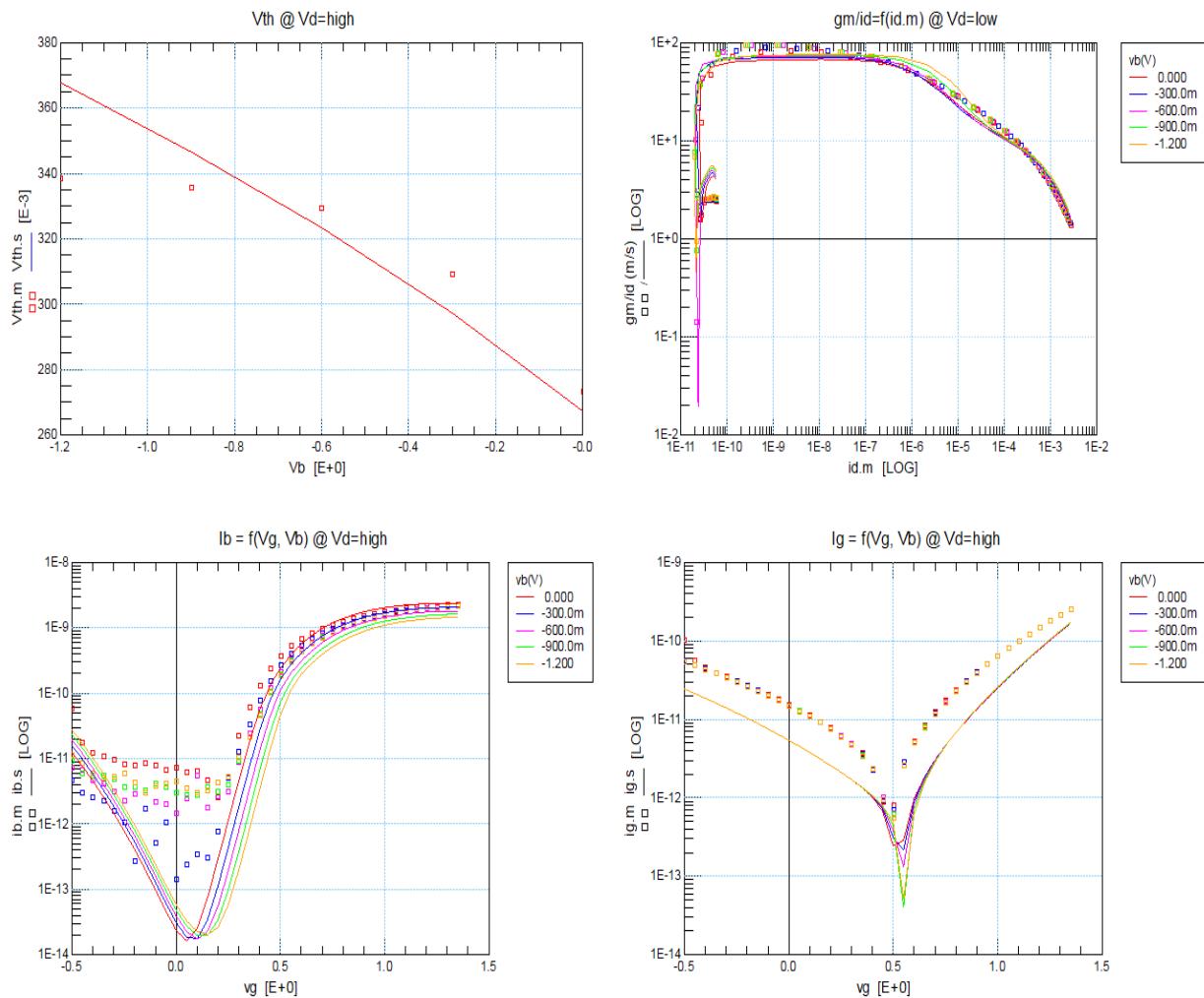


**4.39 W05u0\_L0u13\_S542\_1****idvg, Vd = 0.05V, T = 27°C**

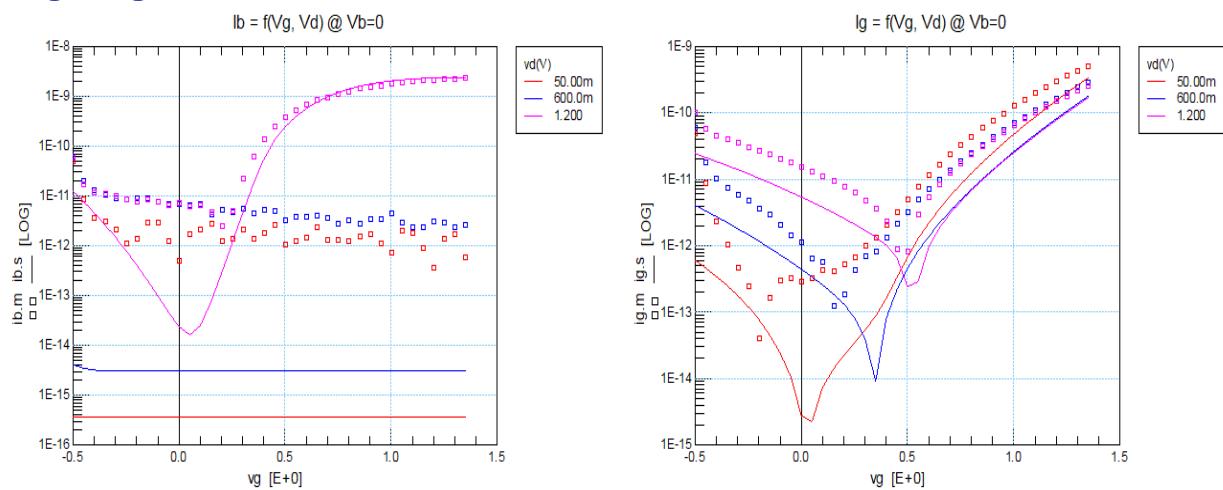


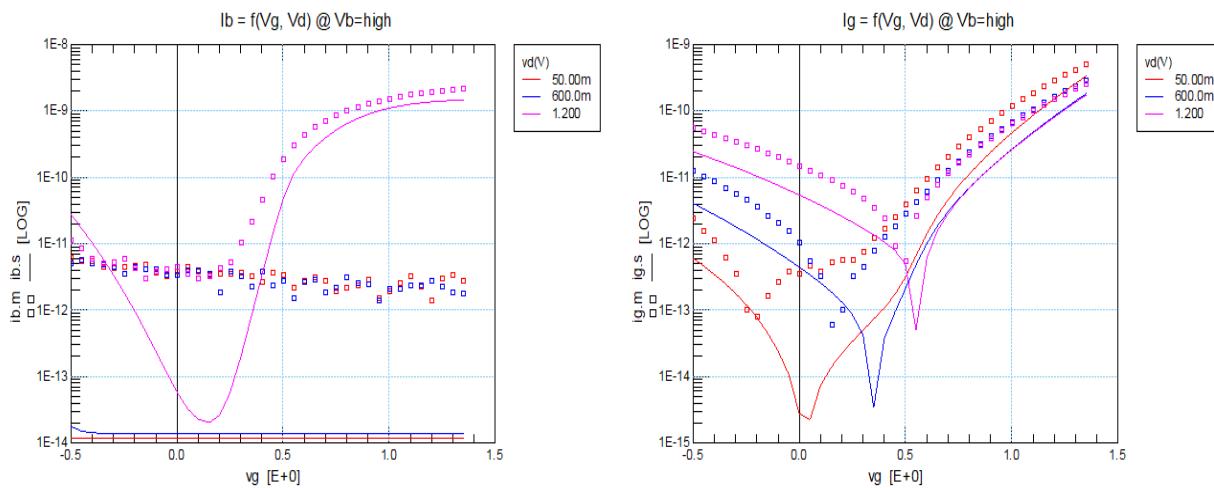
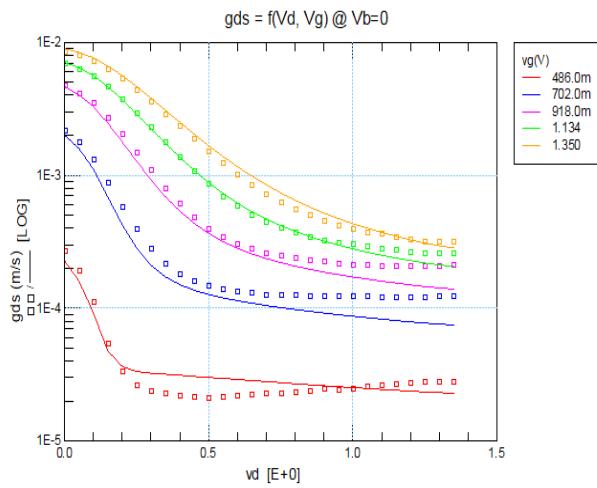
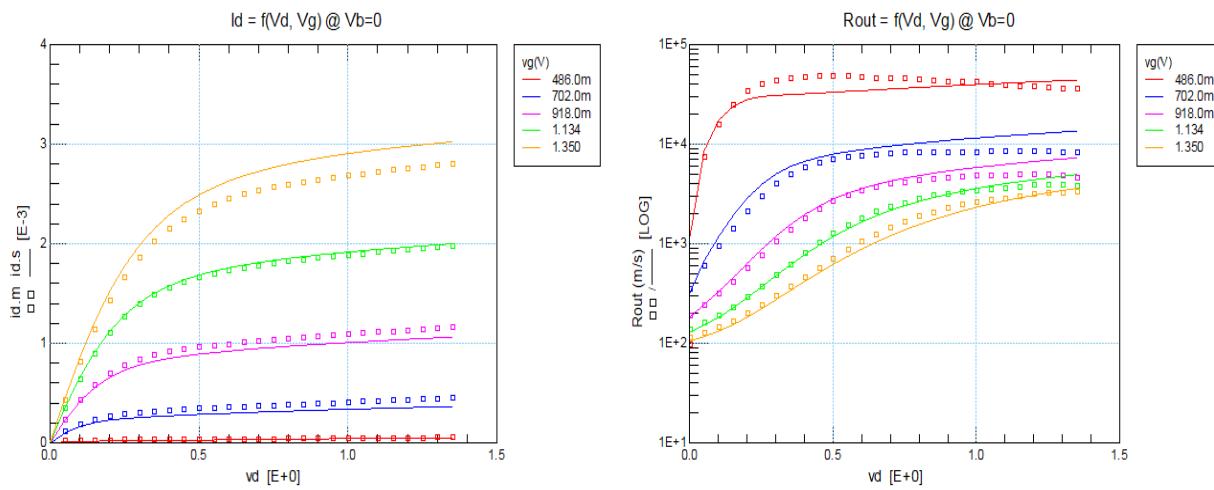
$i_d v_g, V_d = 1.2V, T = 27^\circ C$

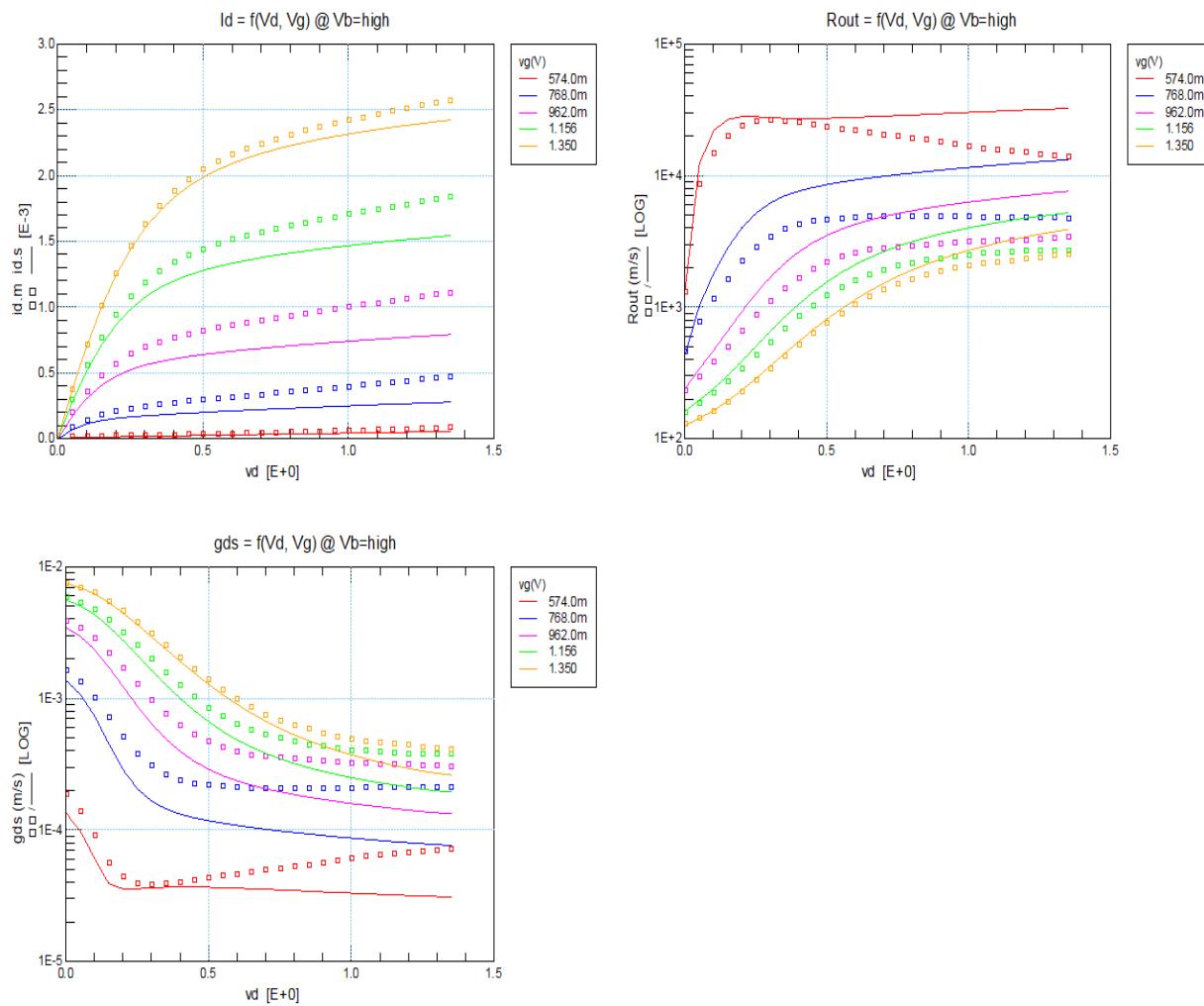
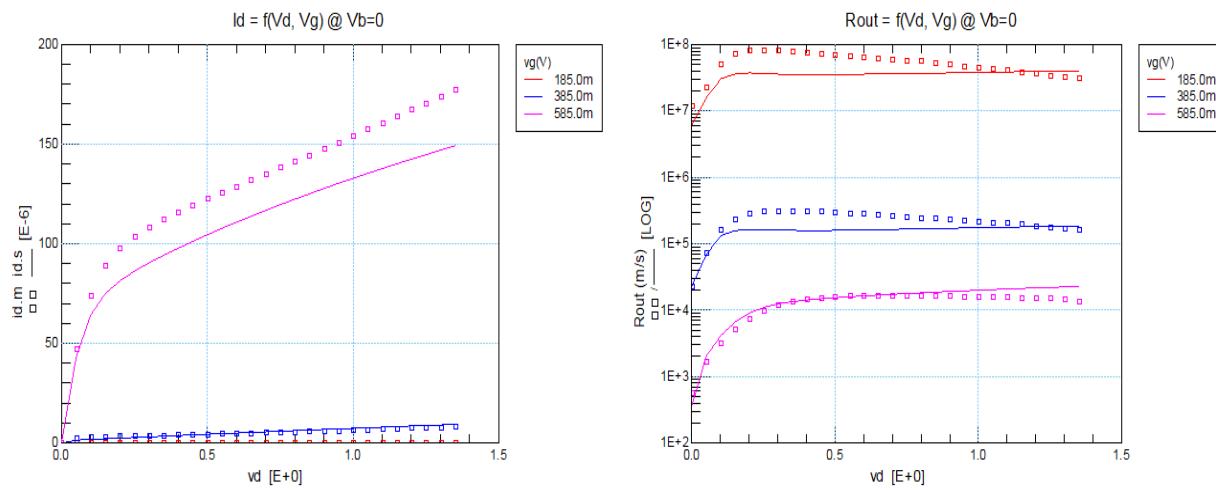


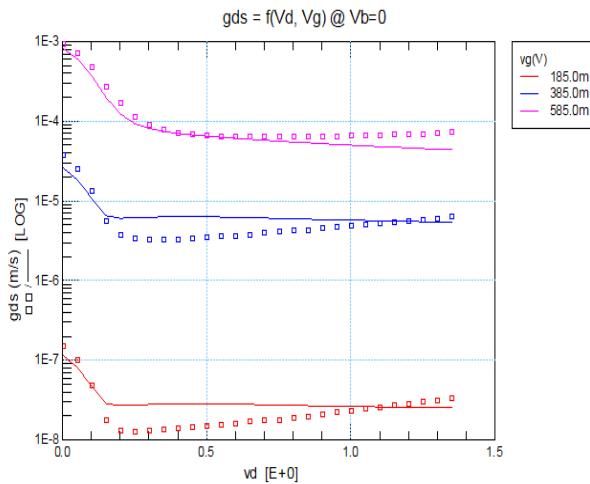


**idvg, Ib, Ig, Vb = 0V, T = 27°C**

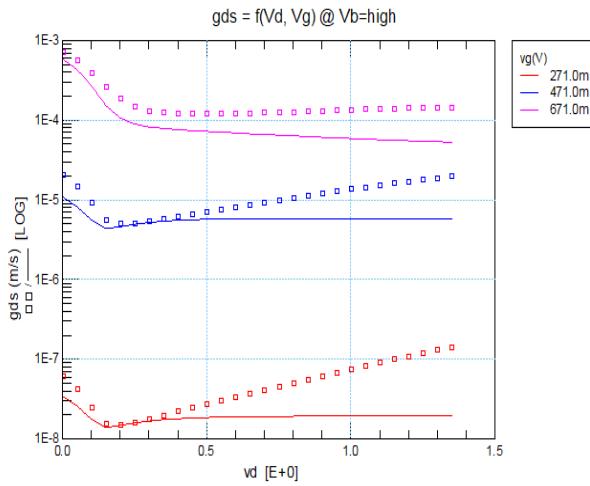
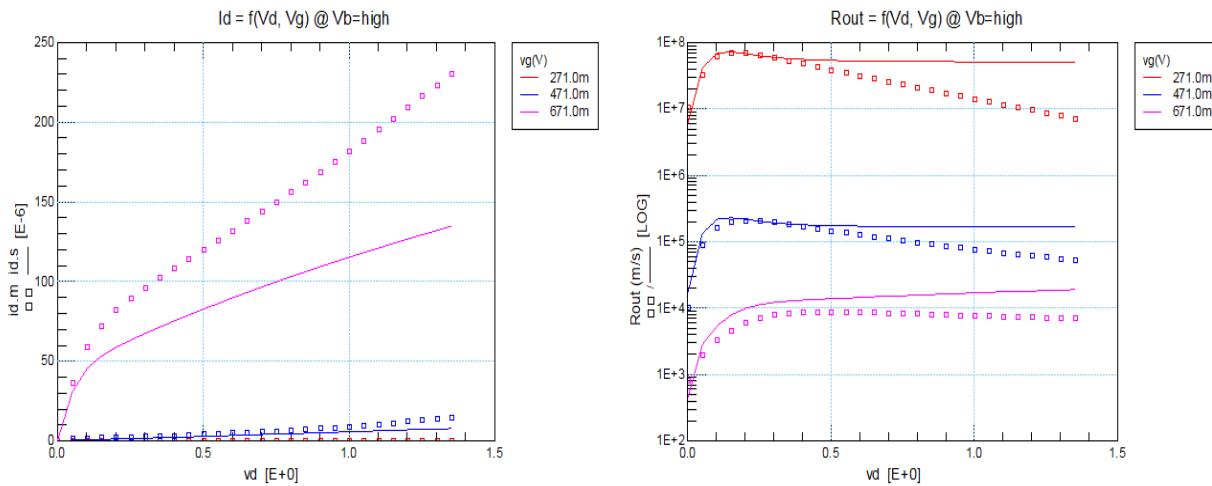


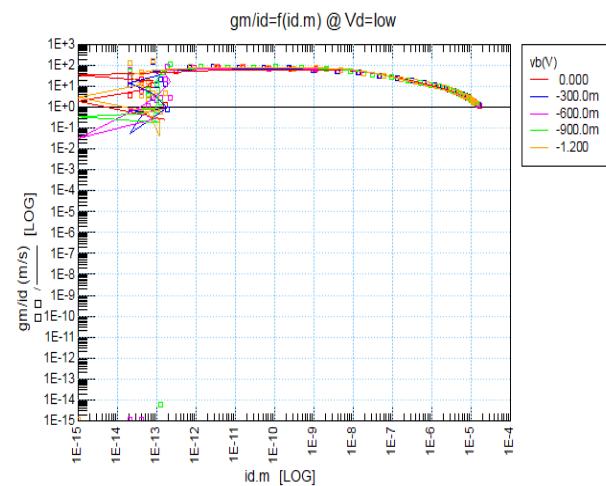
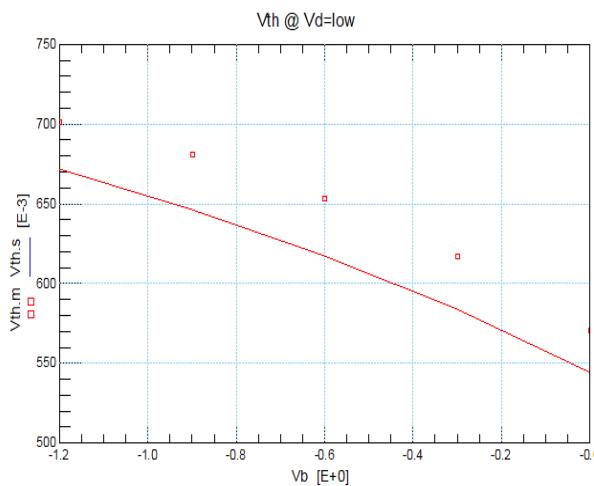
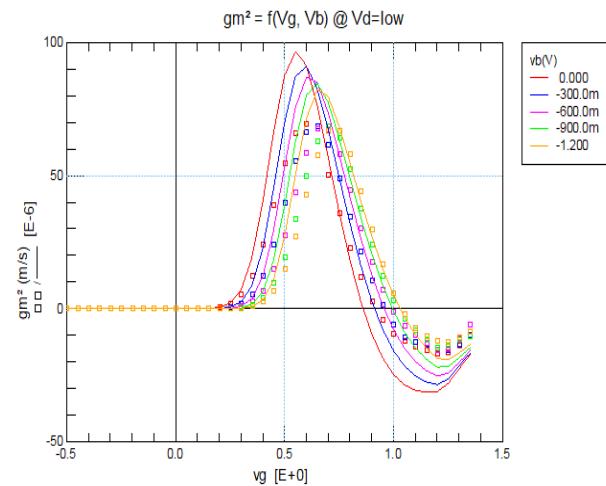
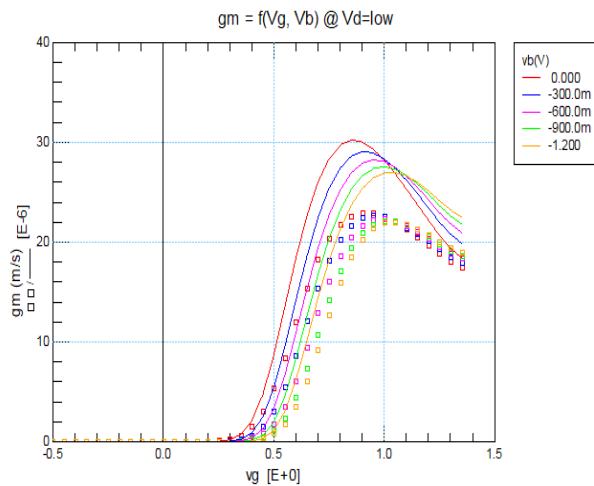
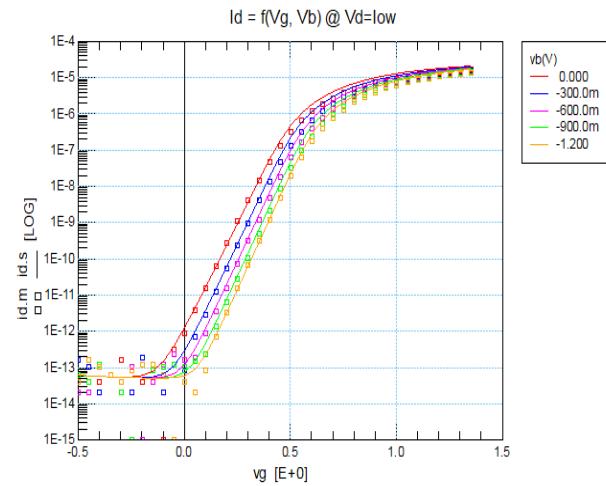
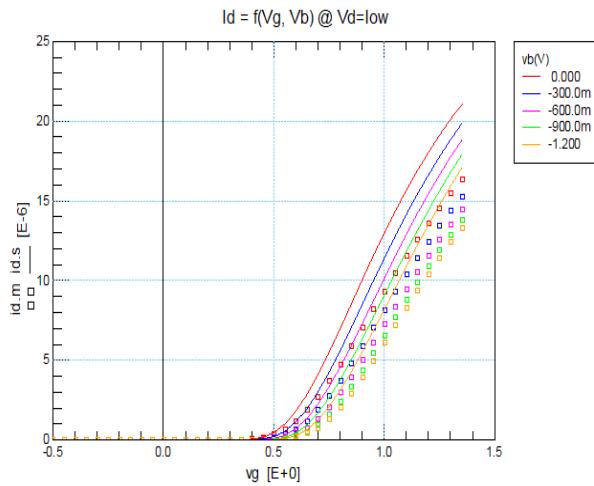
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


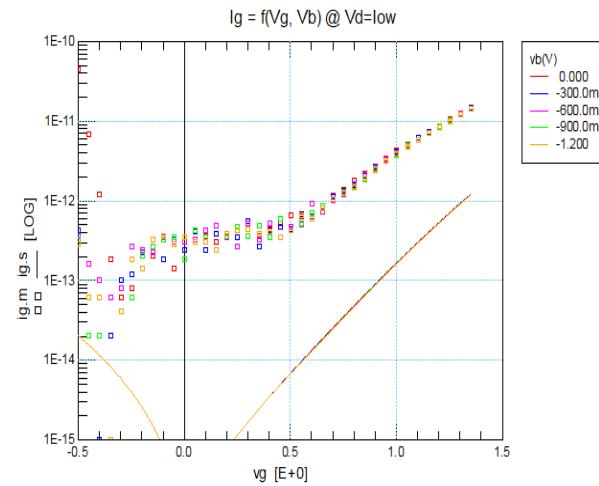
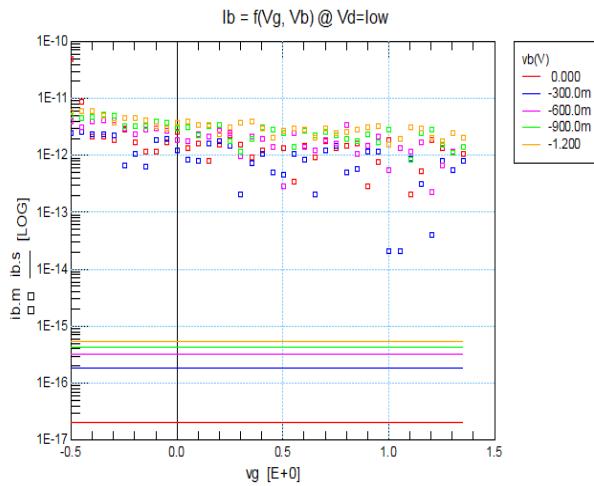
**idvd\_vbmin, Vb = -1.2V, T = 27°C****idvd\_vth, Vb = 0V, T = 27°C**



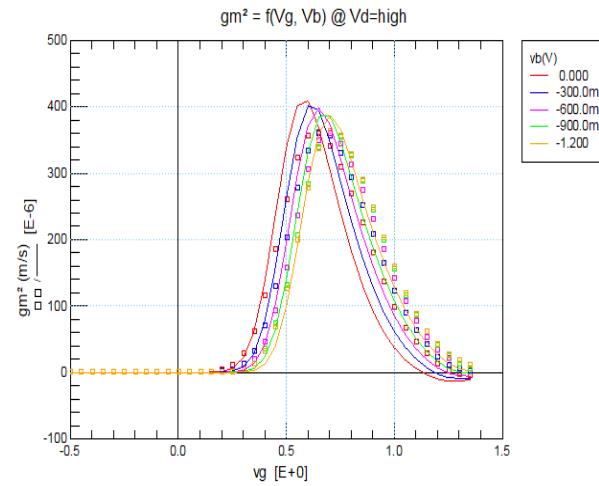
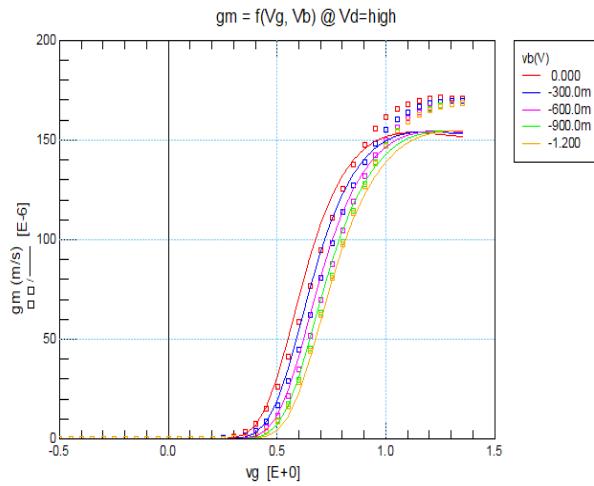
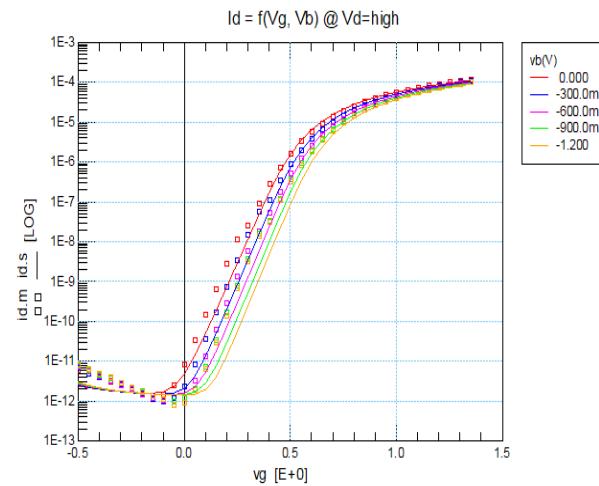
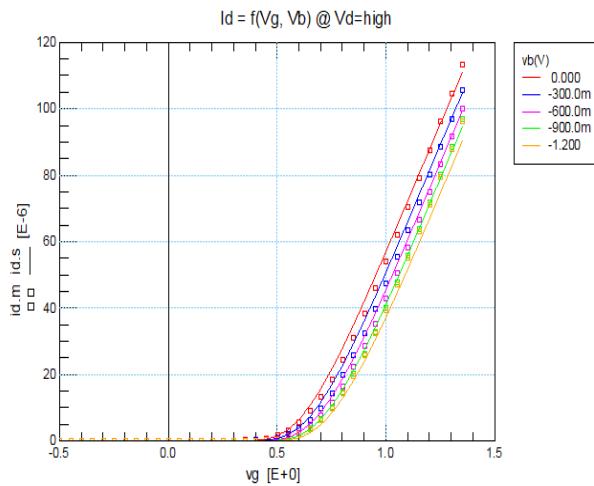
### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

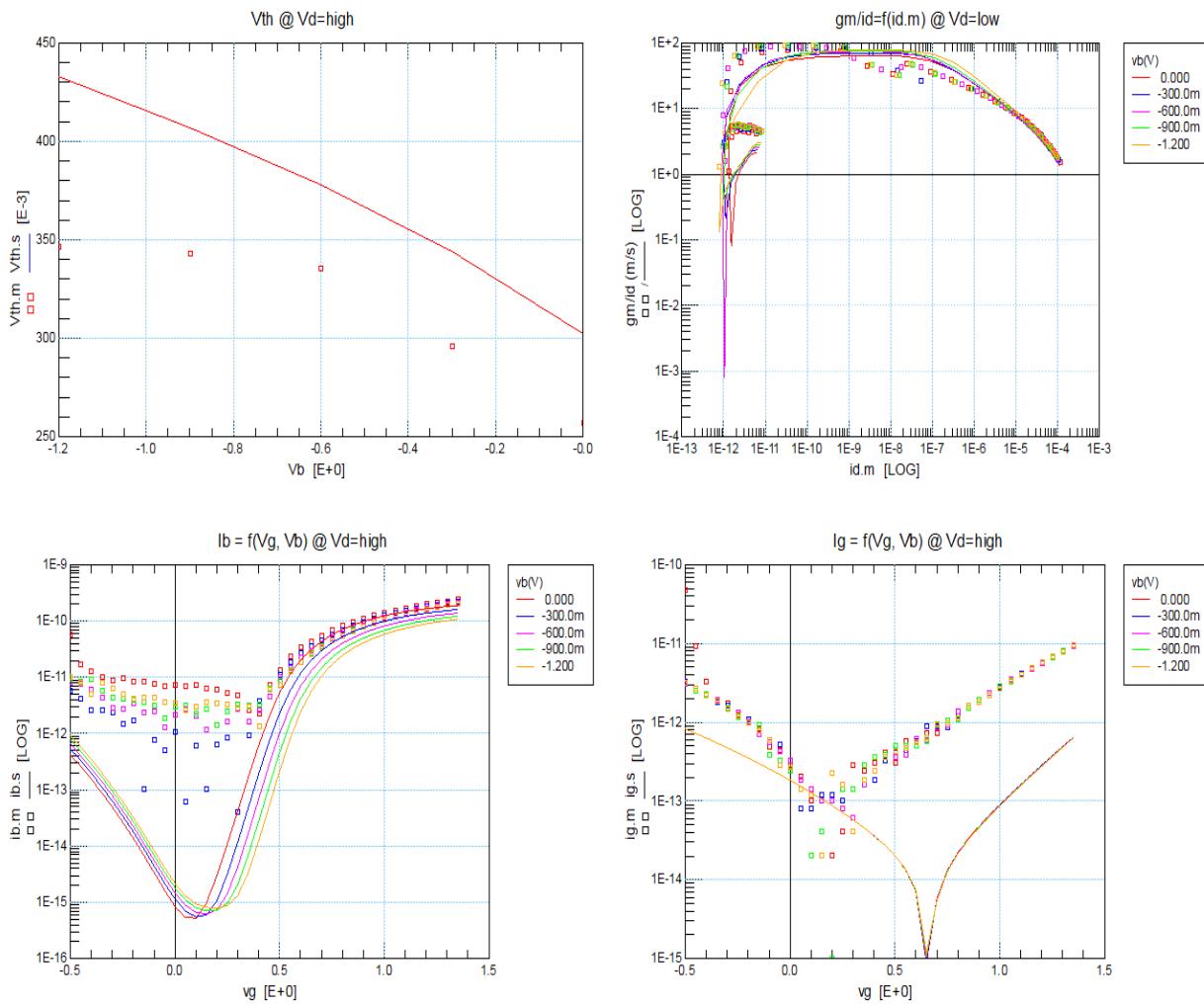


**4.40 W0u15\_L0u12\_S546\_2****idvg, Vd = 0.05V, T = 27°C**

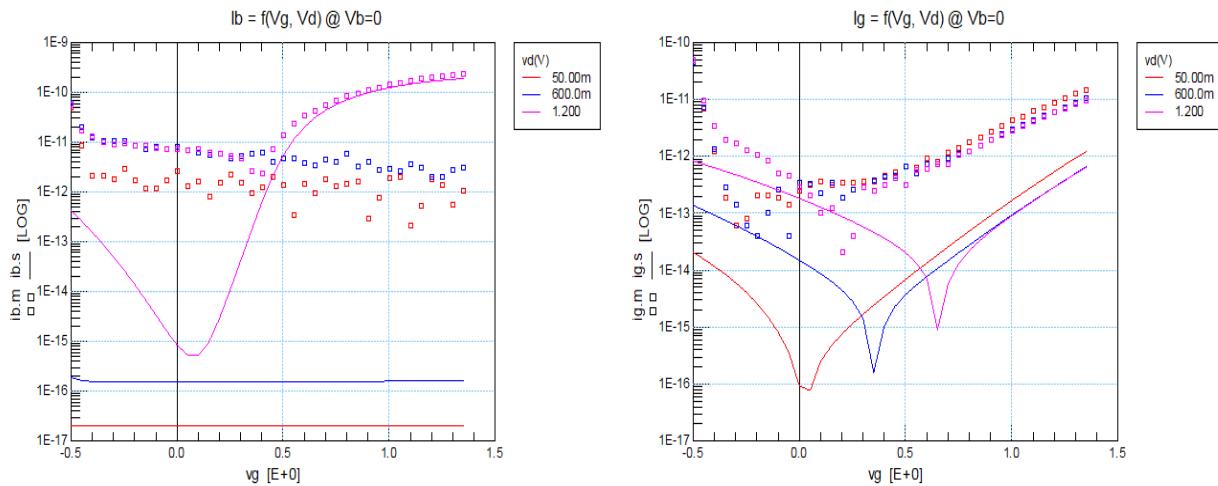


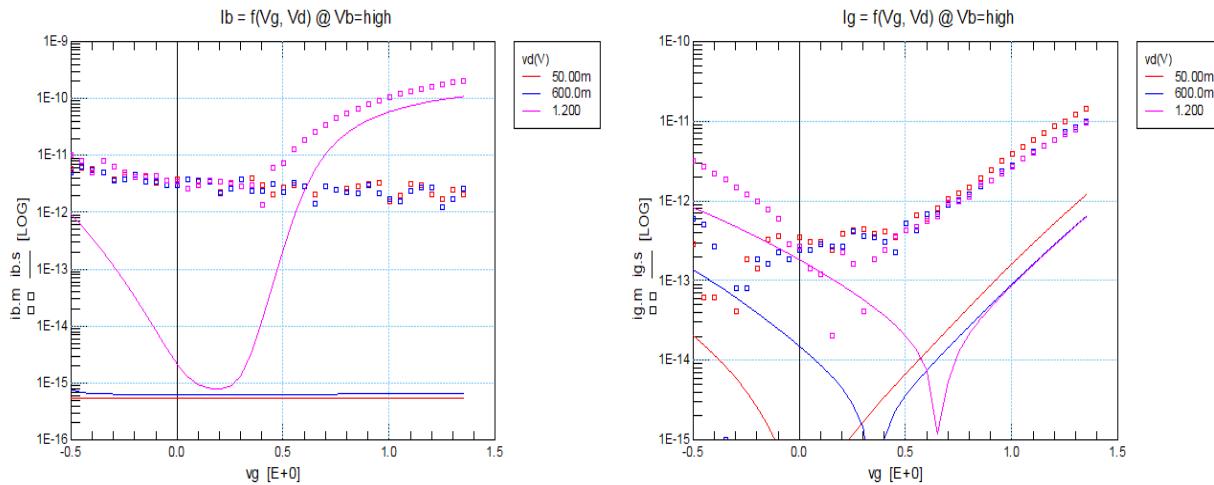
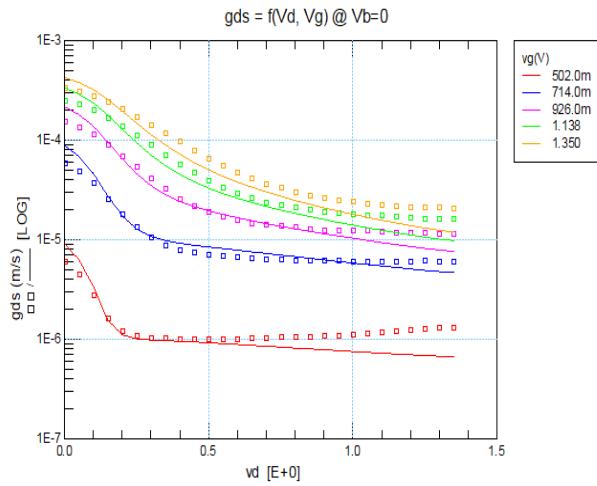
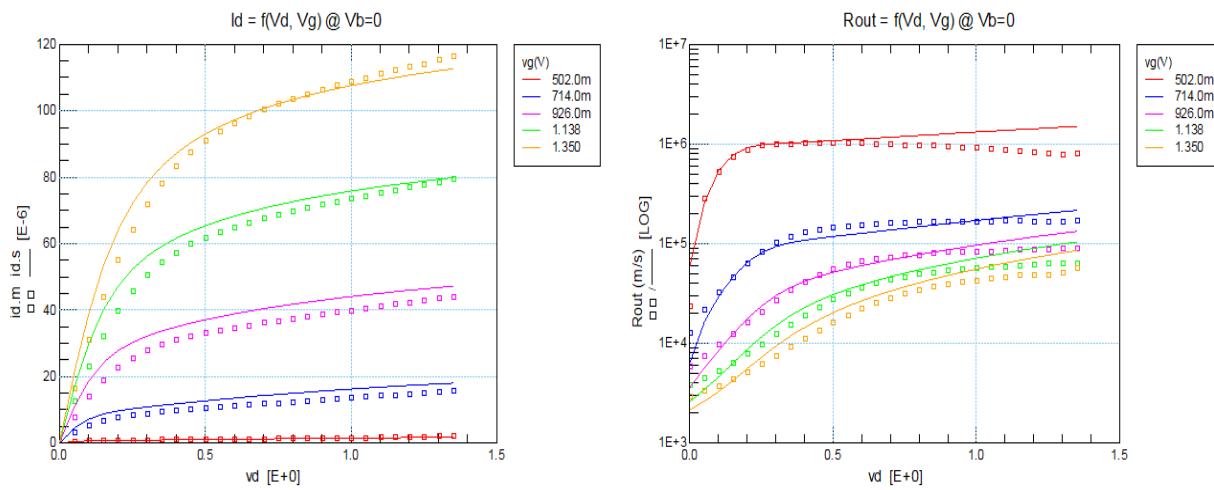
### $i_{dvg}, V_d = 1.2V, T = 27^\circ C$

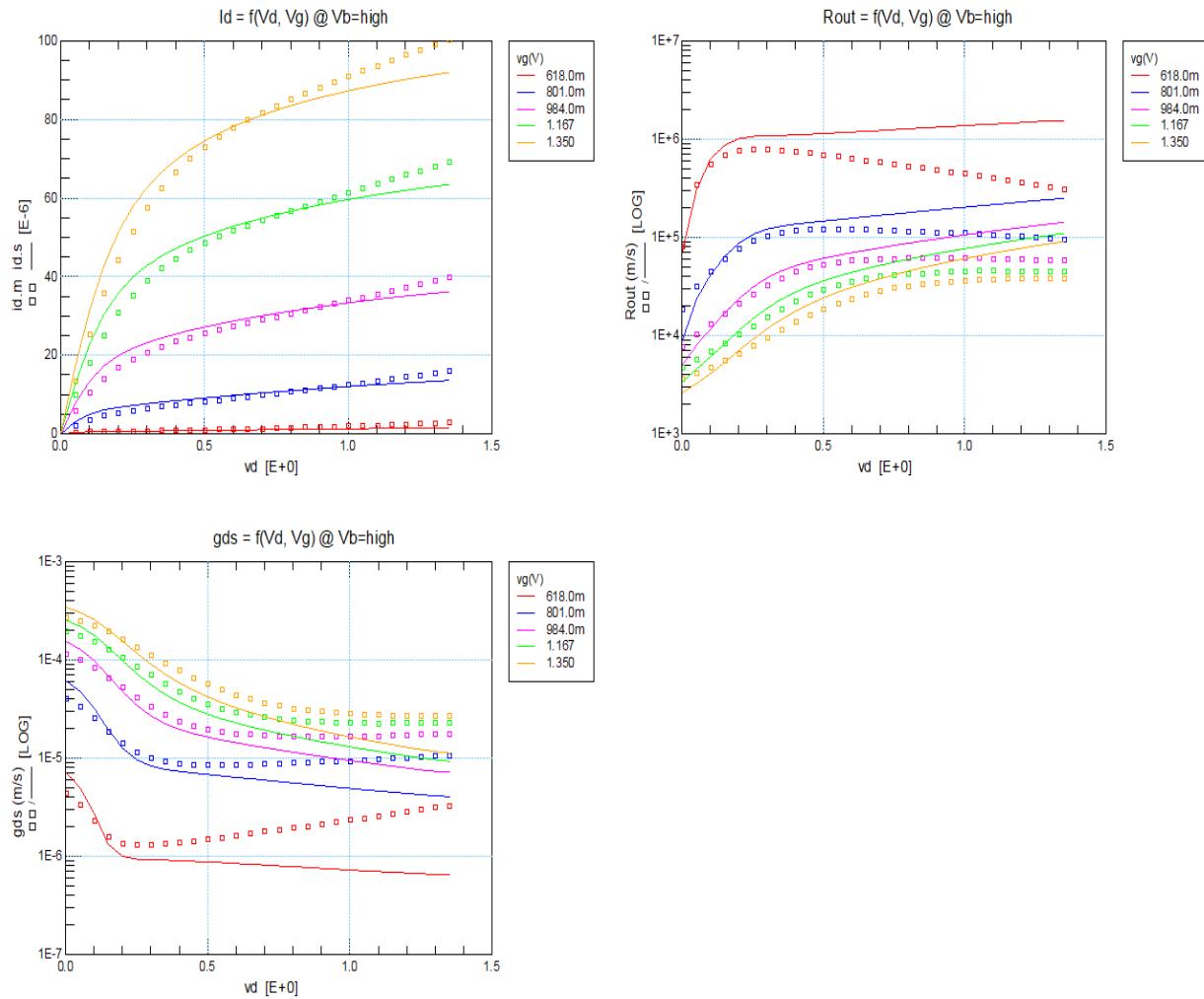
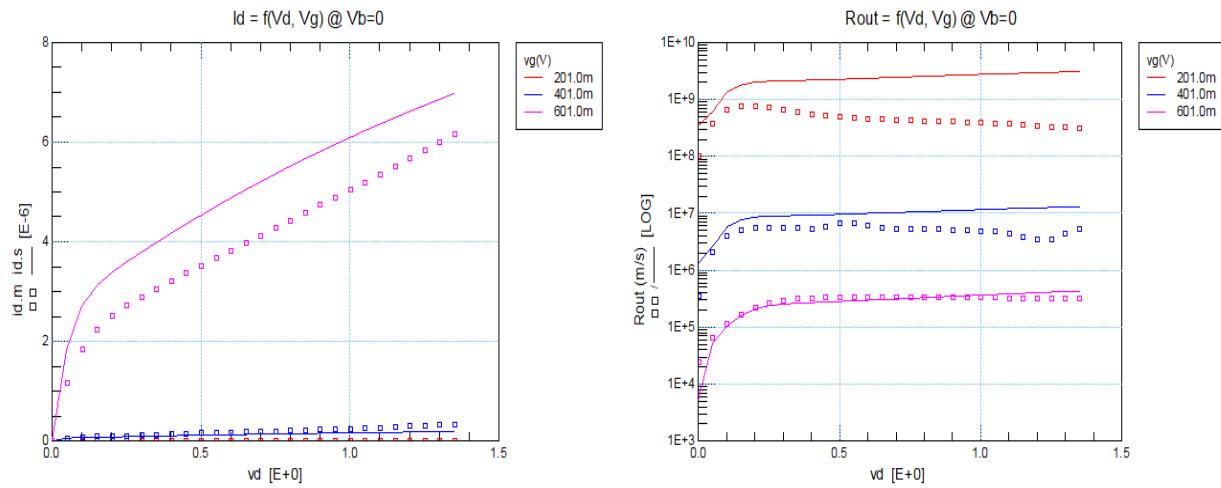


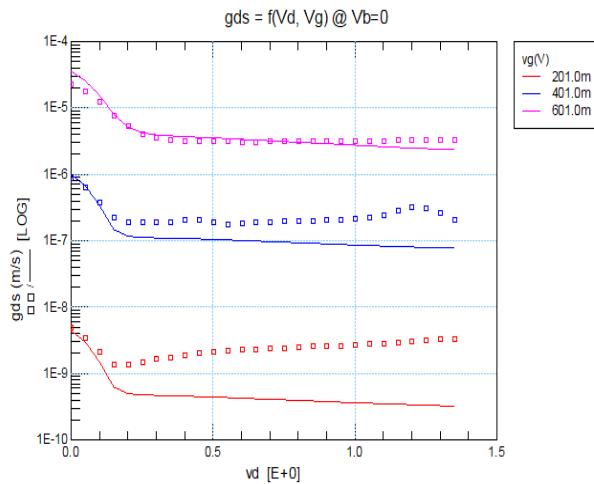


### $idvg, I_b, I_g, V_b = 0V, T = 27^\circ C$

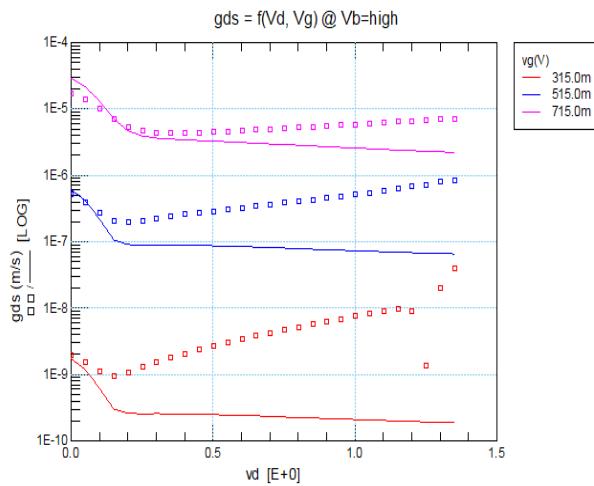
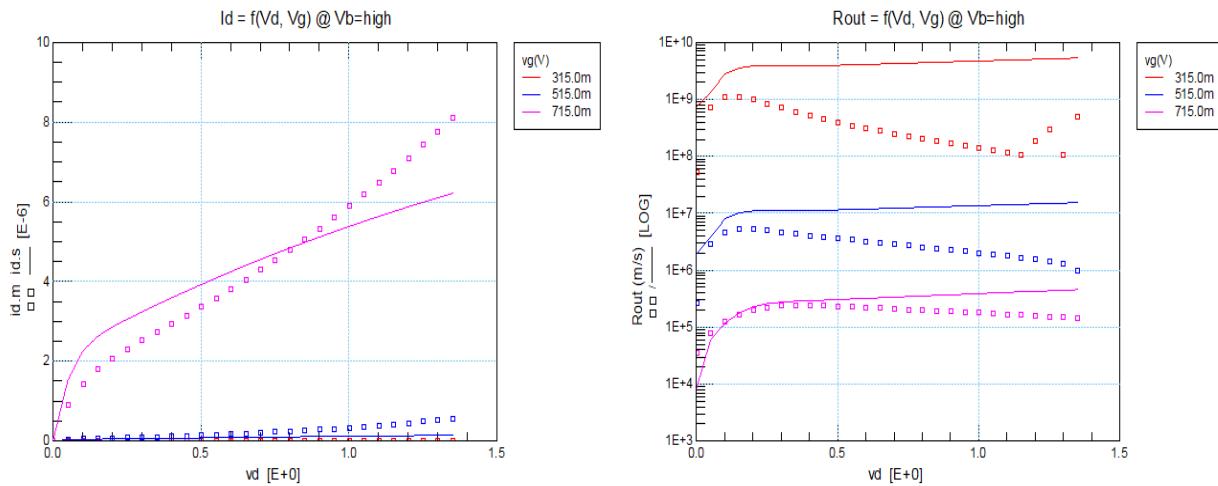


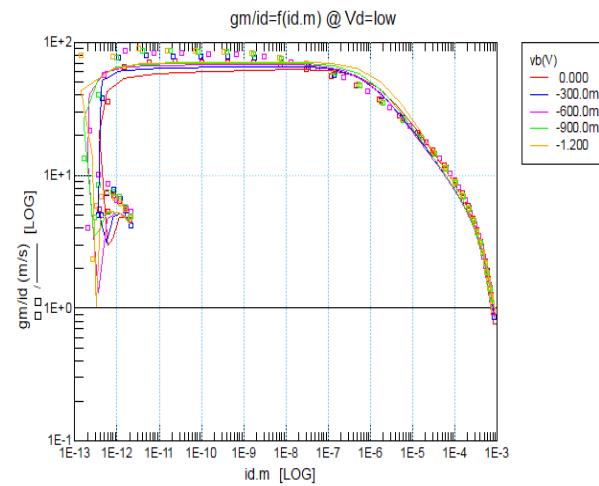
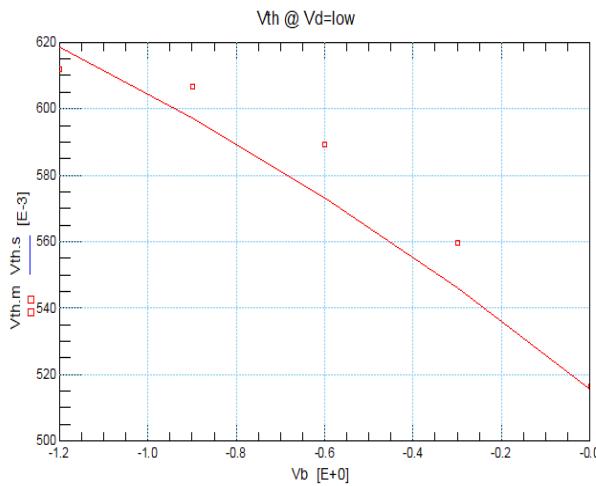
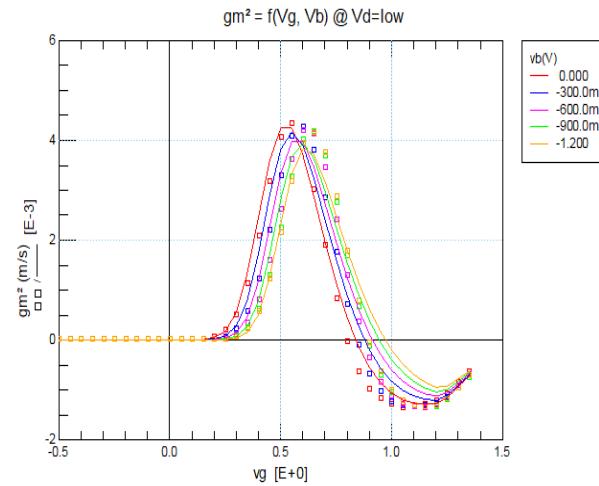
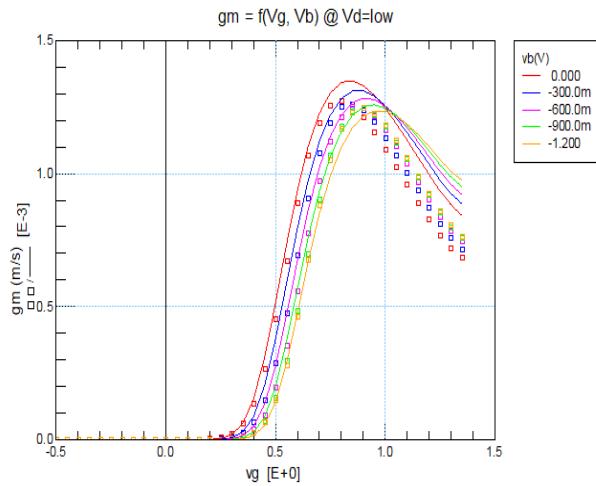
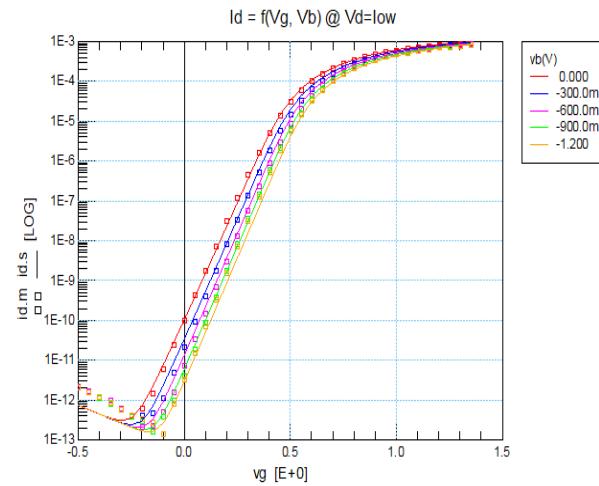
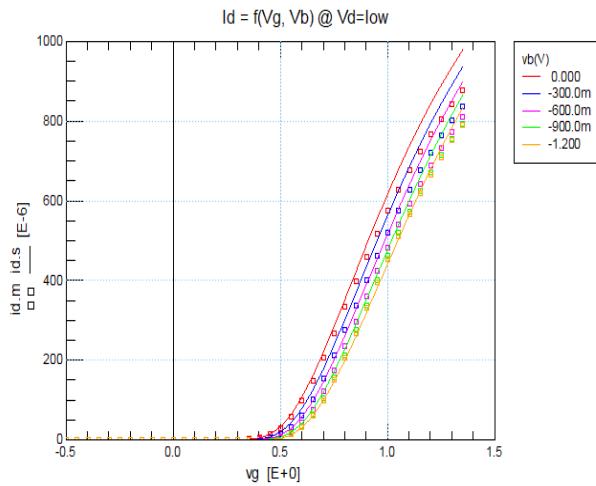
**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


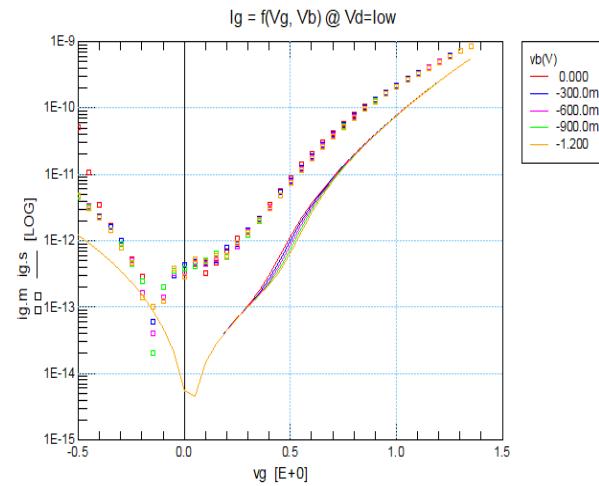
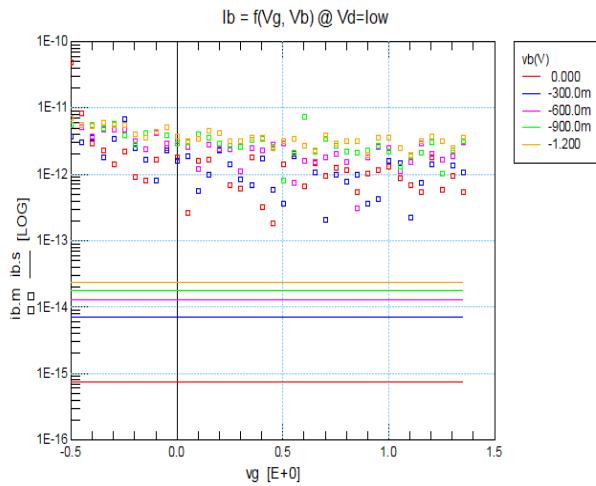
**idvd\_vbmin, Vb = -1.2V, T = 27°C**

**idvd\_vth, Vb = 0V, T = 27°C**




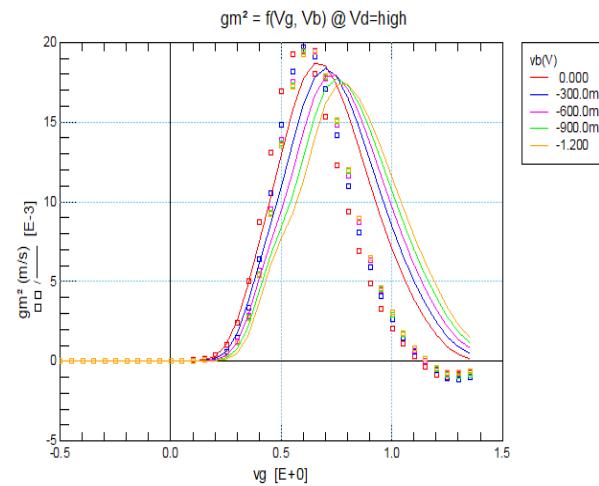
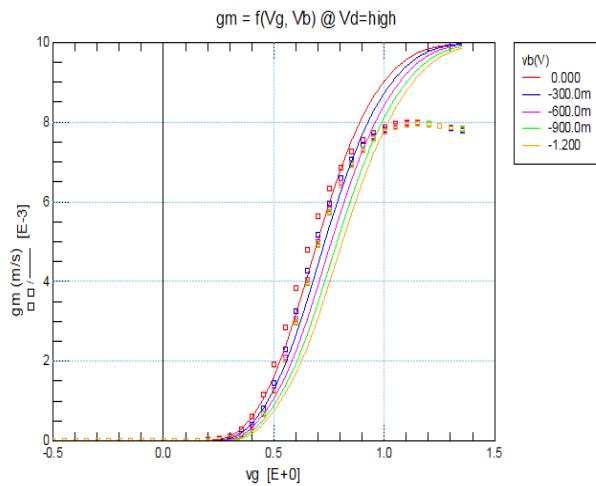
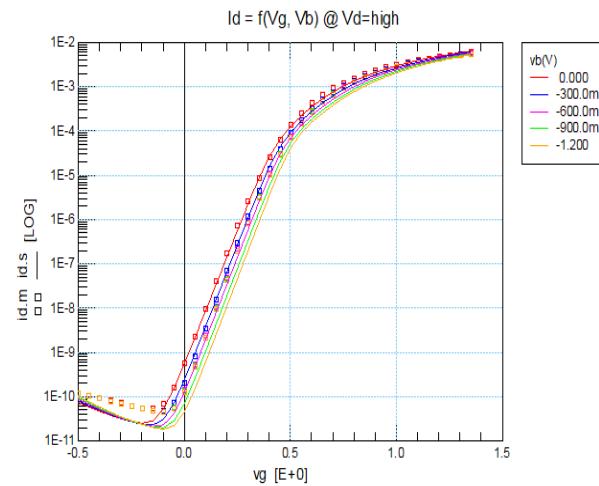
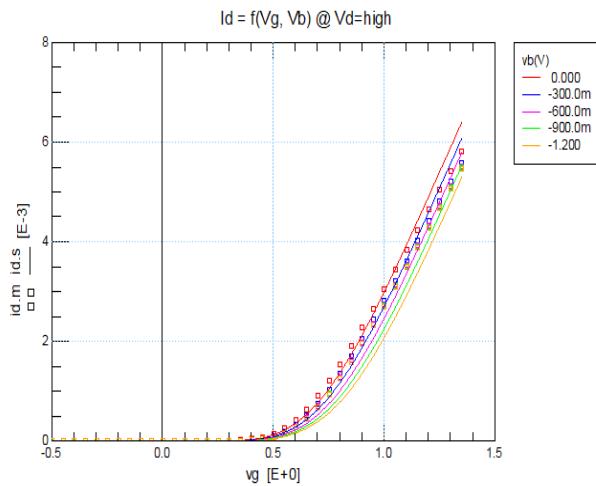
idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

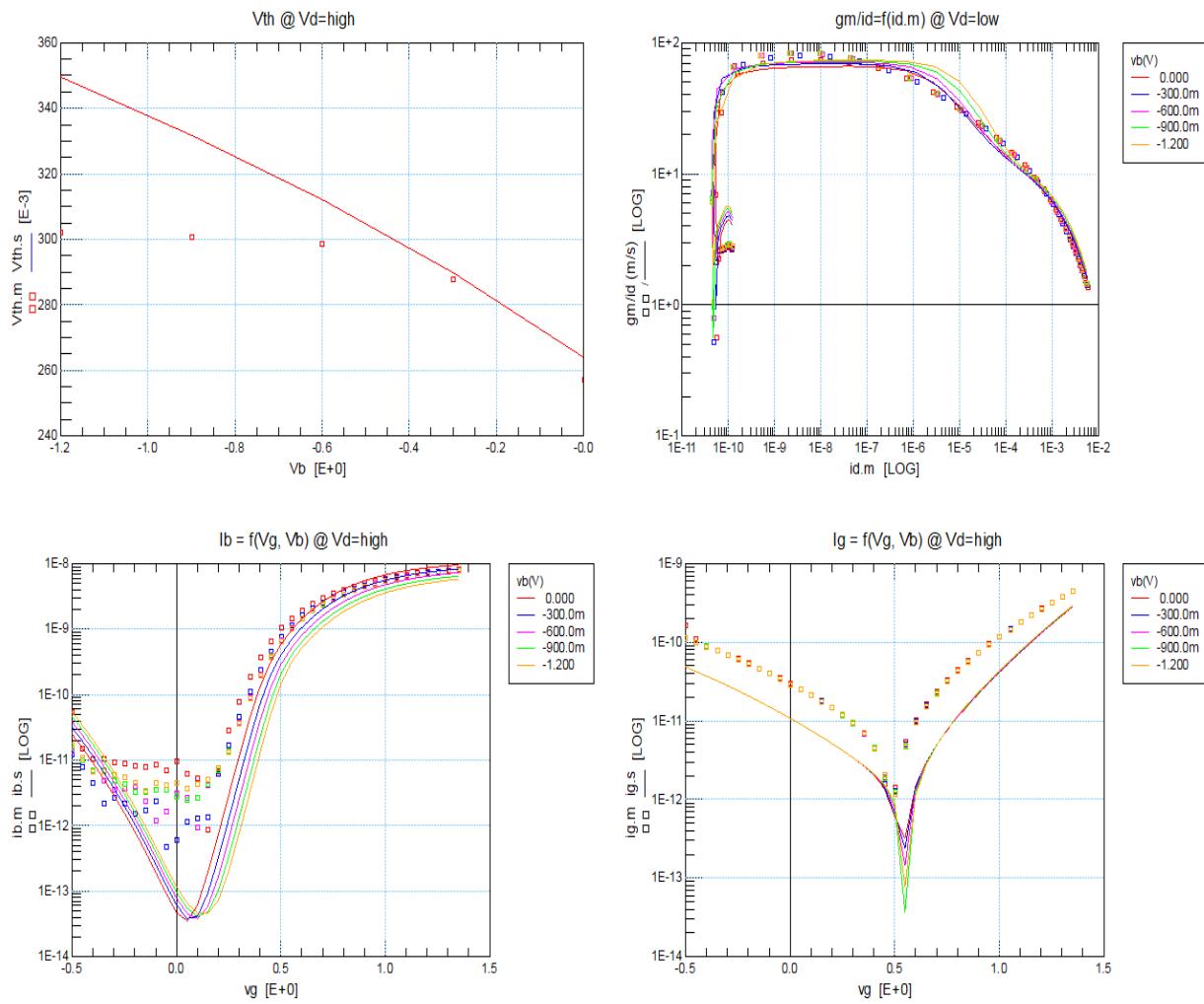


**4.41 W10u0\_L0u12\_S540\_1****idvg, Vd = 0.05V, T = 27°C**

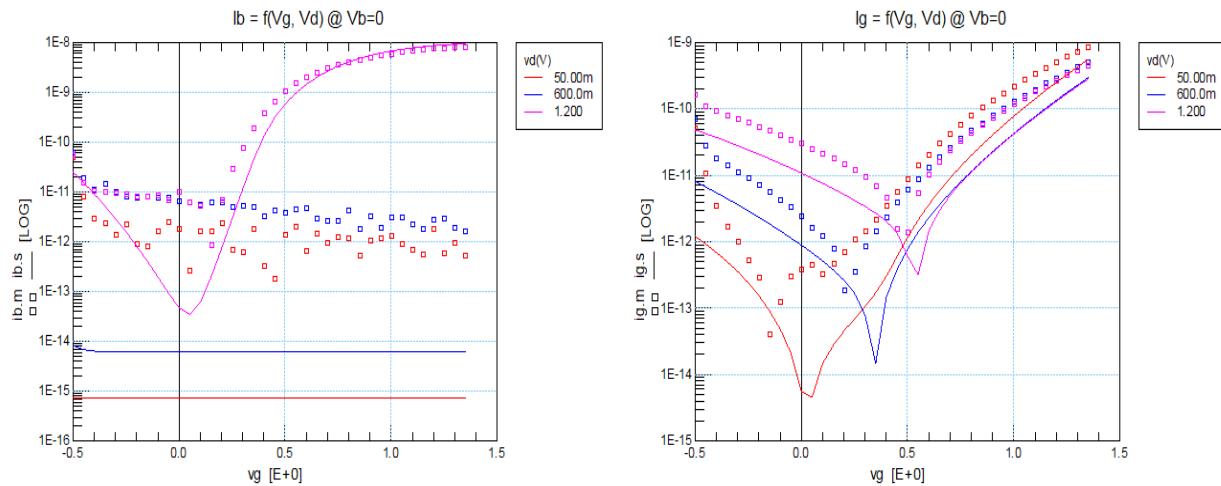


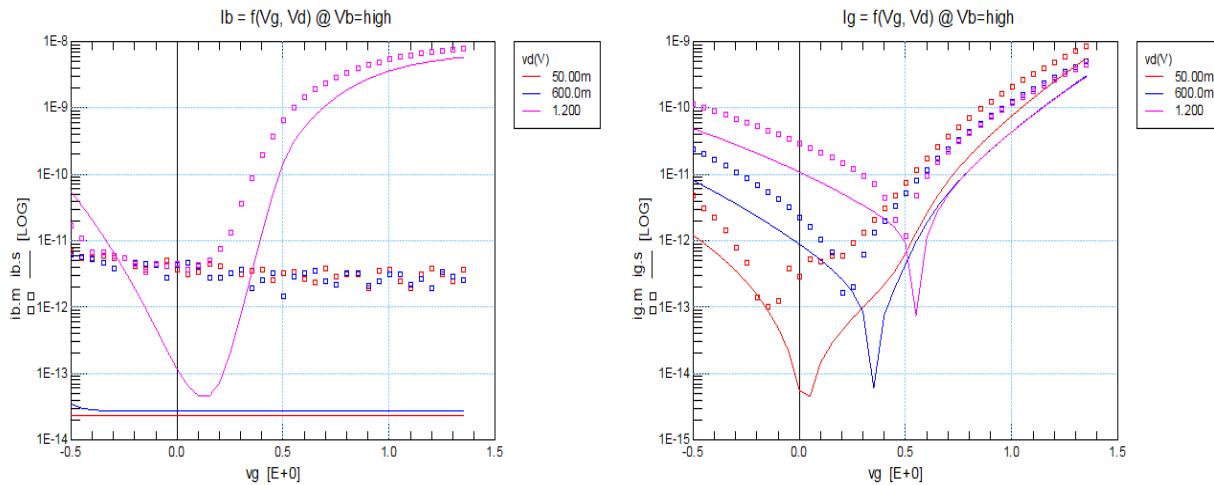
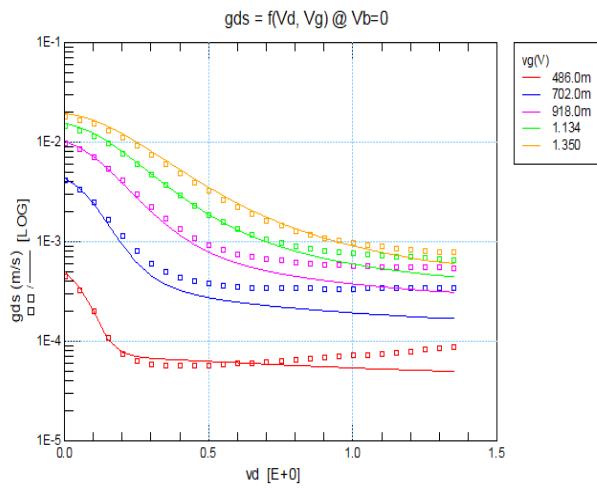
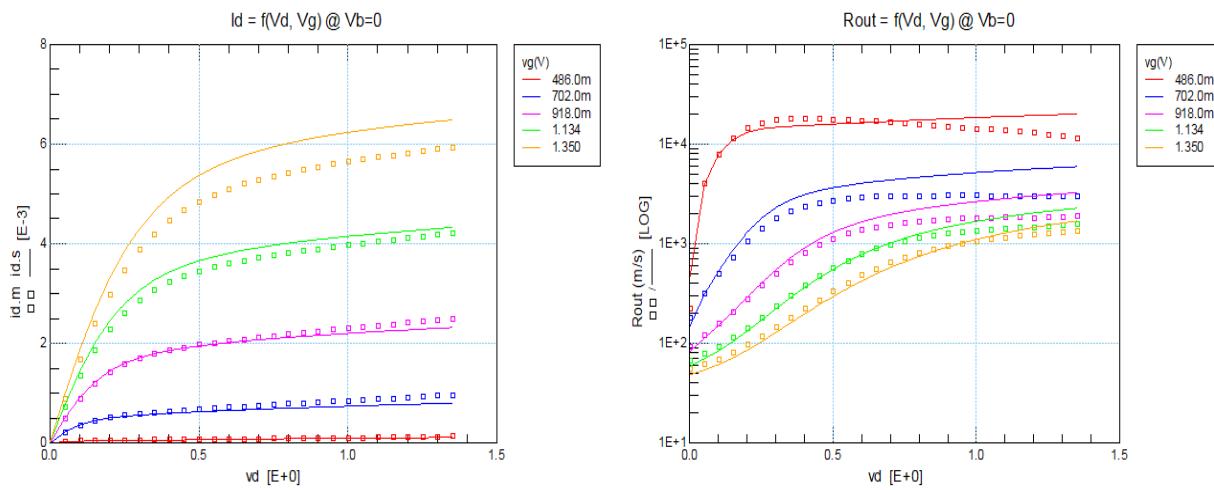
### $i_{dvg}, V_d = 1.2V, T = 27^\circ C$

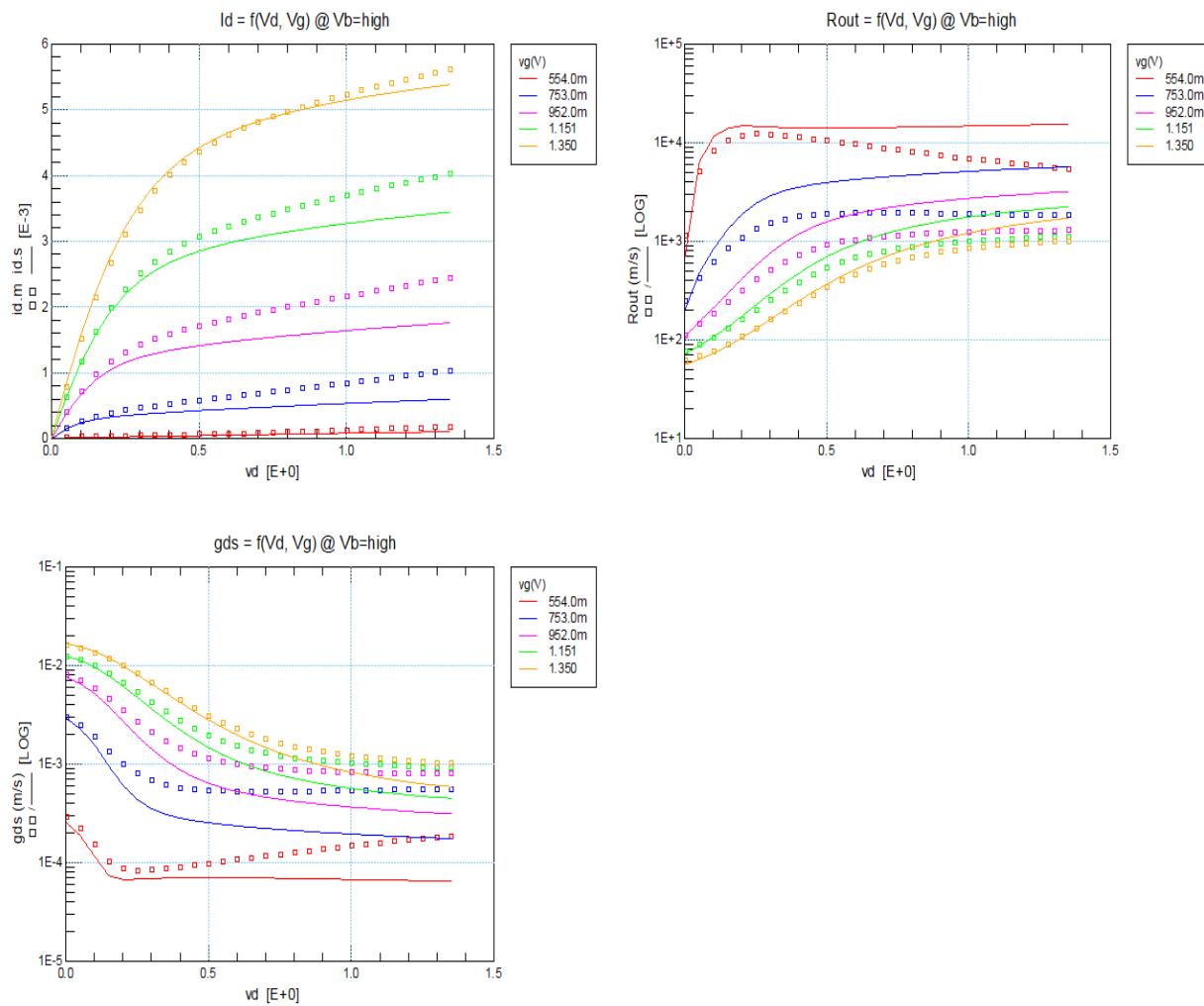
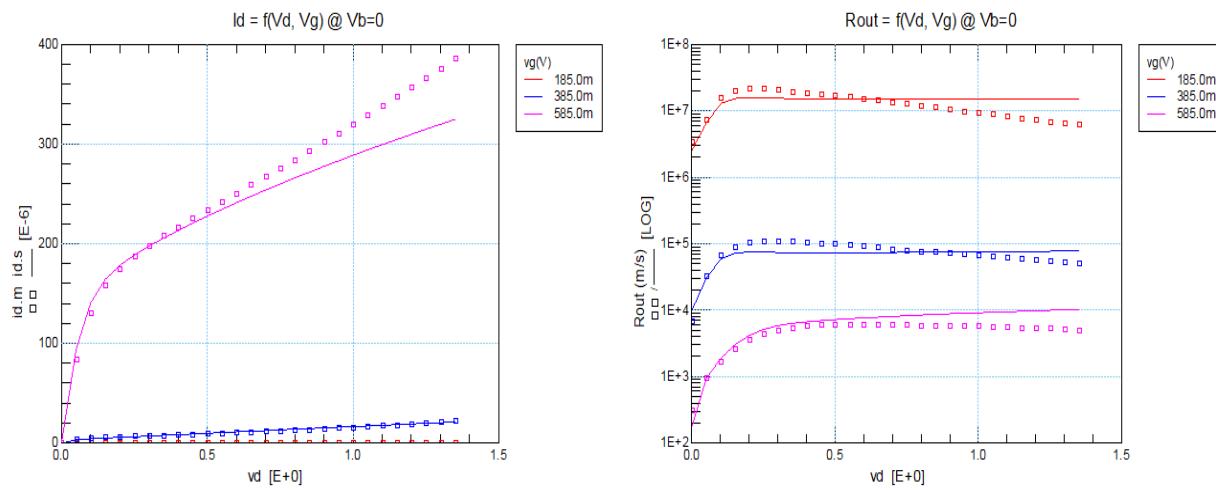


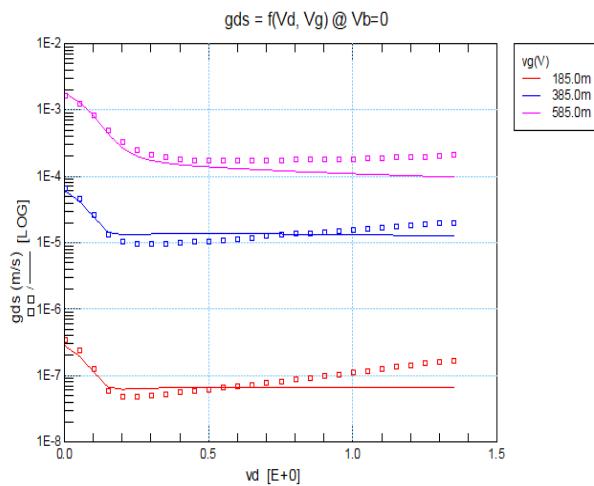


### $id_{vg}, I_b, I_g, V_b = 0V, T = 27^\circ\text{C}$

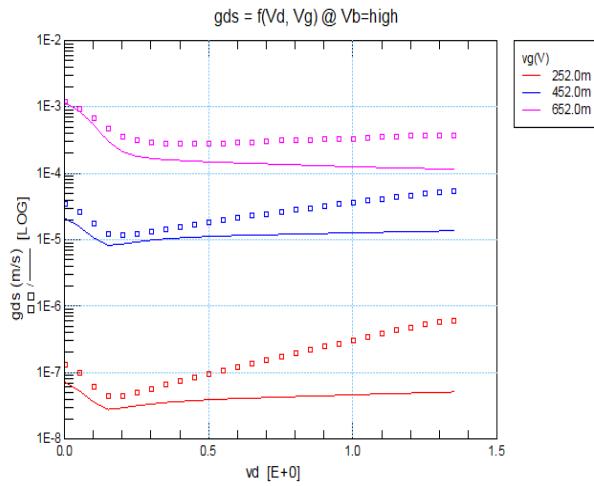
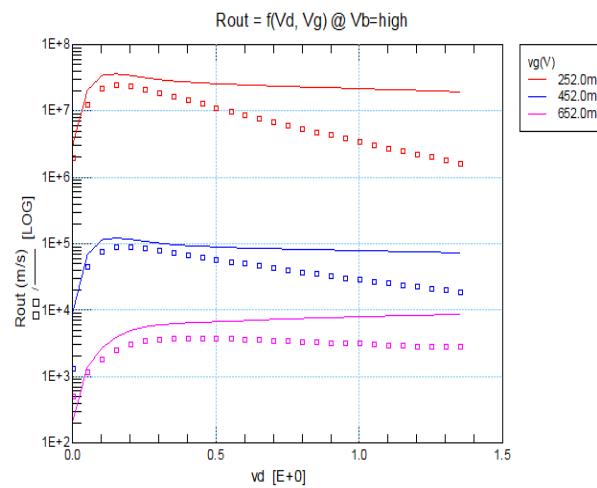
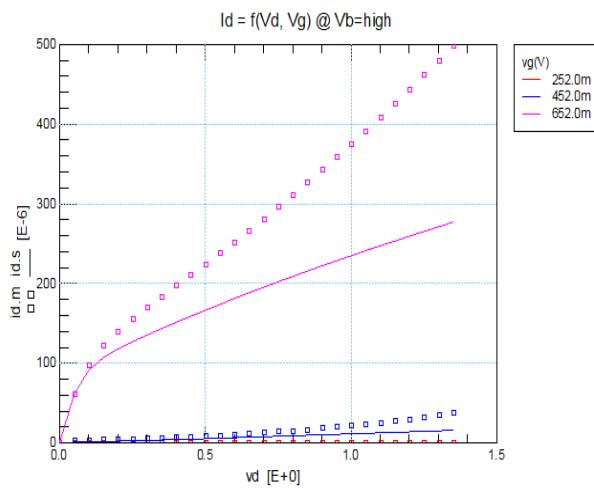


**idvg, Ib,Ig, Vb = -1.2V, T = 27°C**

**idvd, Vb = 0V, T = 27°C**


**idvd\_vbmin, Vb = -1.2V, T = 27°C****idvd\_vth, Vb = 0V, T = 27°C**

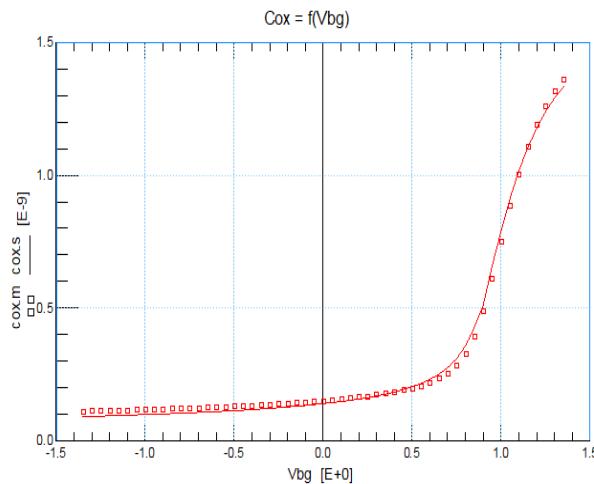


### idvd\_vth\_vbmin, Vb = -1.2V, T = 27°C

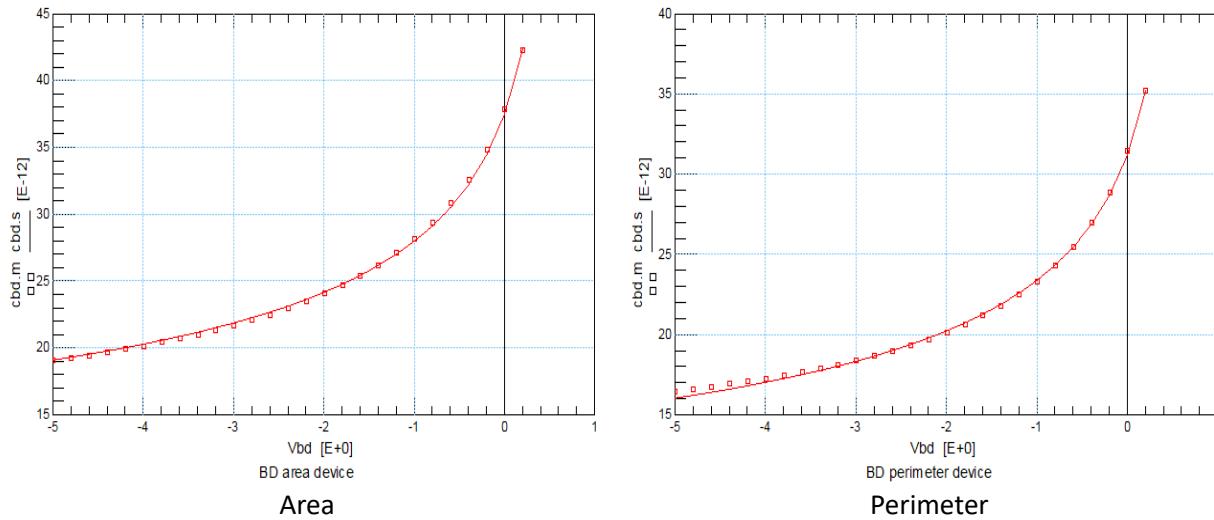


## 5 Capacitances

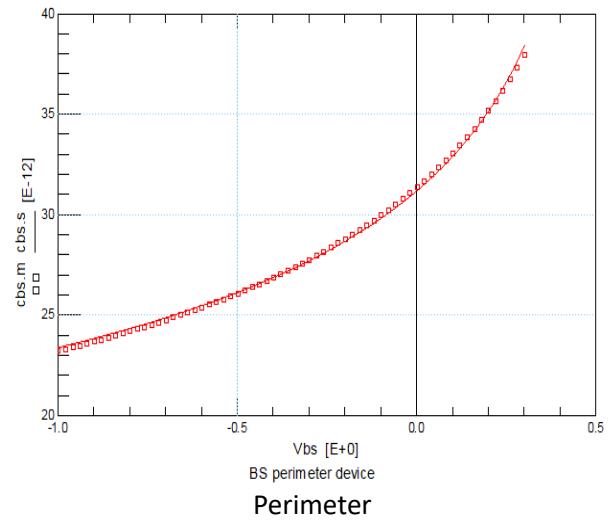
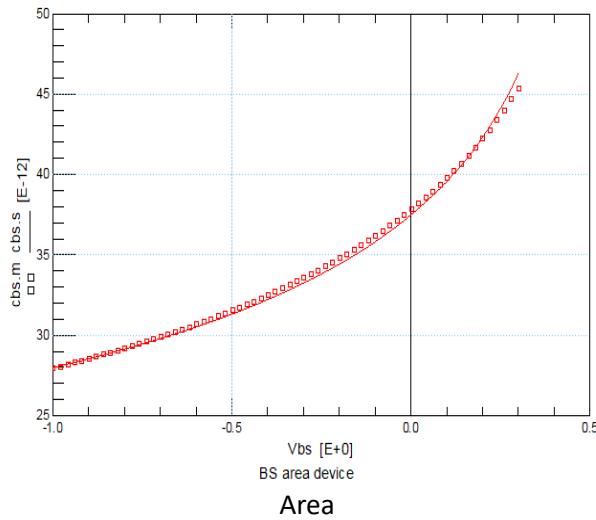
### 5.1 Gate Oxide Capacitance



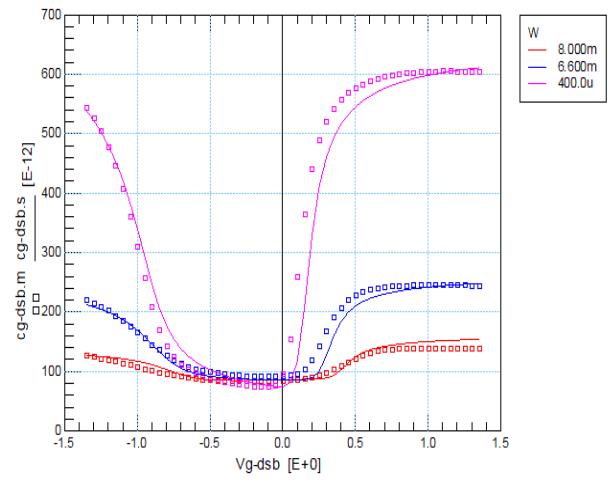
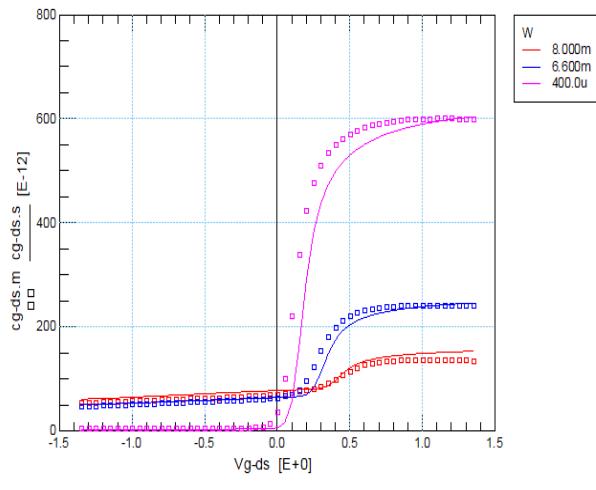
### 5.2 Junction Capacitance Bulk - Drain



### 5.3 Junction Capacitance Bulk - Source

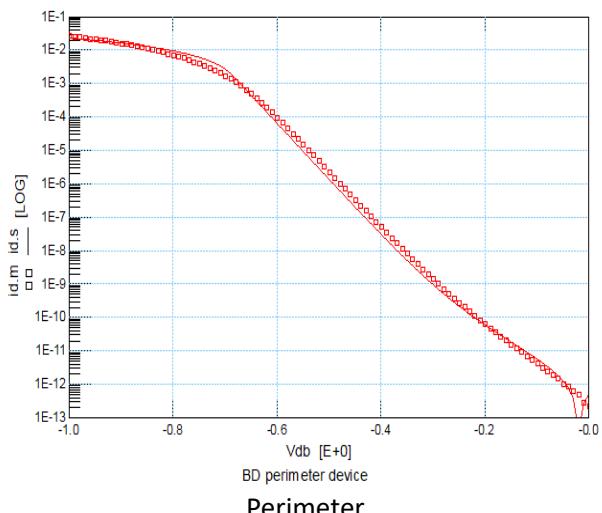
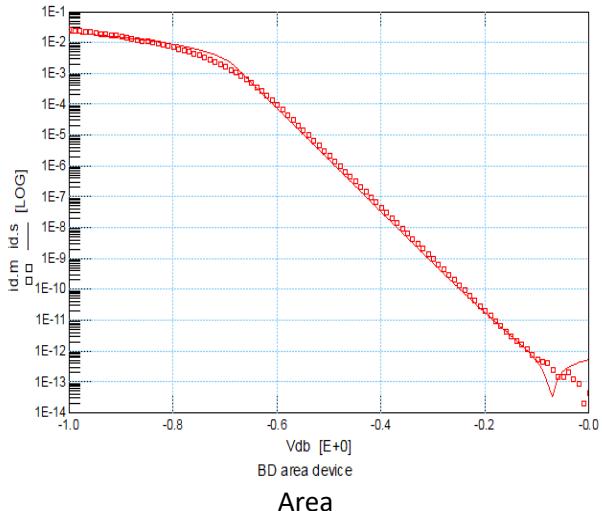
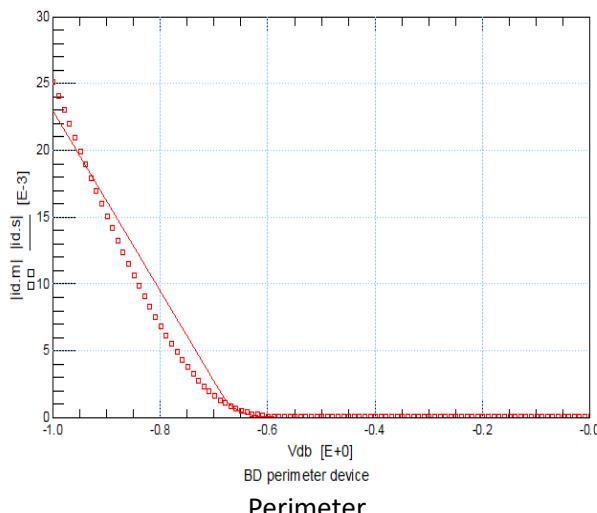
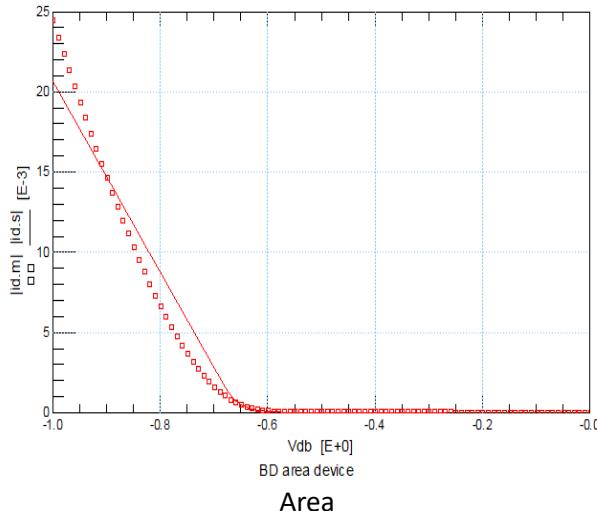


### 5.4 Overlap Capacitance

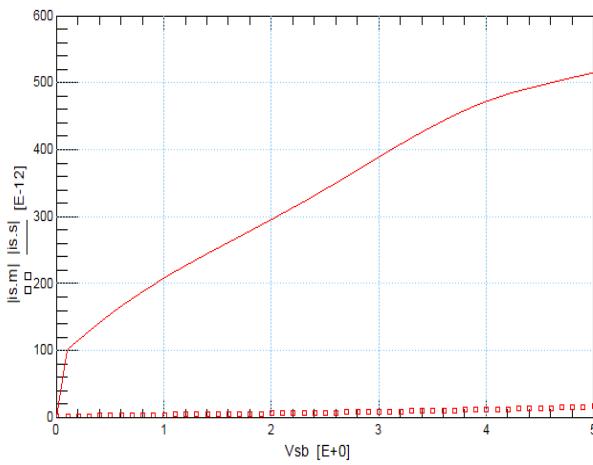


## 6 Diodes

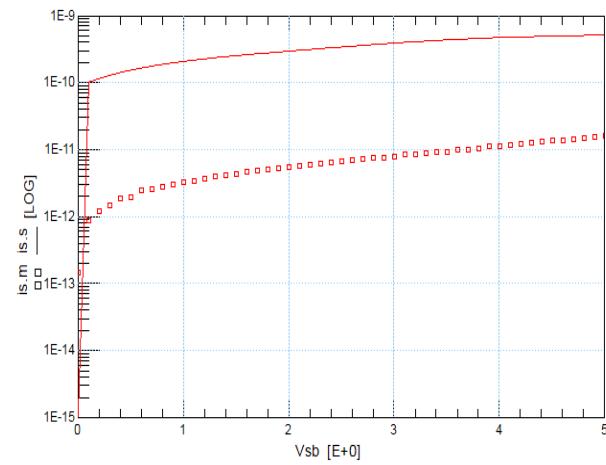
### 6.1 Diode Bulk - Drain



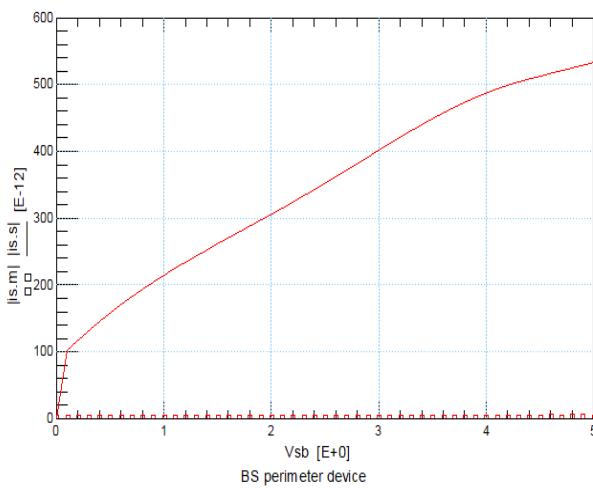
## 6.2 Diode Bulk - Source



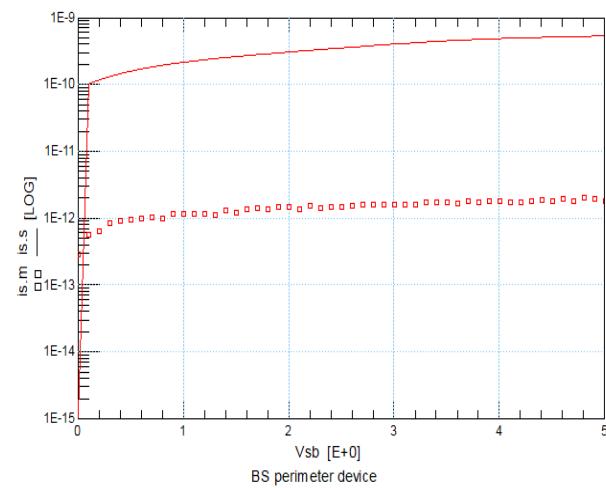
Area



Area



Perimeter

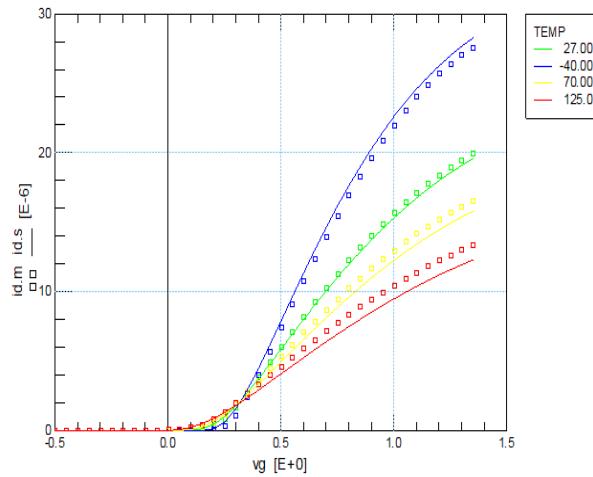


Perimeter

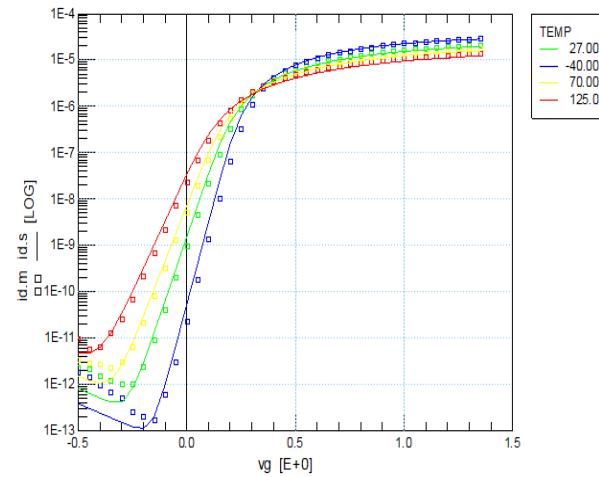
## 7 Temperature Measurement

### 7.1 Transistors

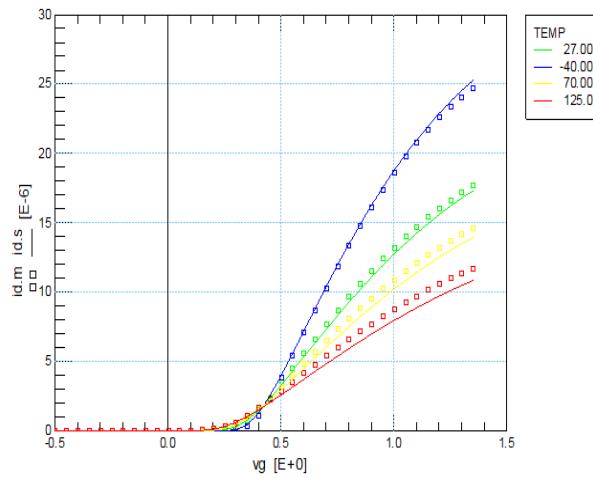
#### 7.1.1 W10u0\_L10u0\_S541\_5



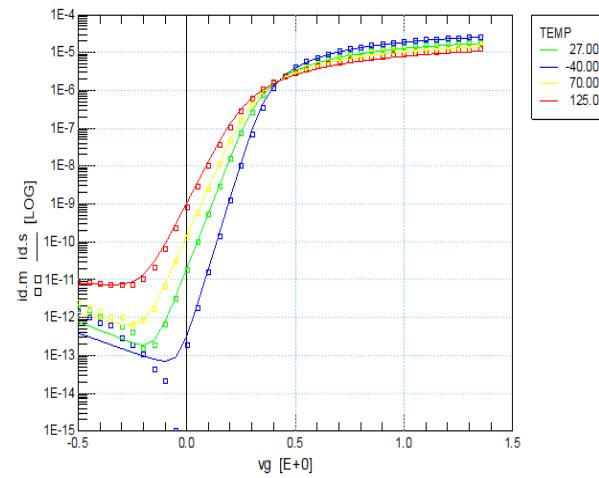
$$Id = f(vg, T) \text{ @ low } Vds, Vbs = 0$$



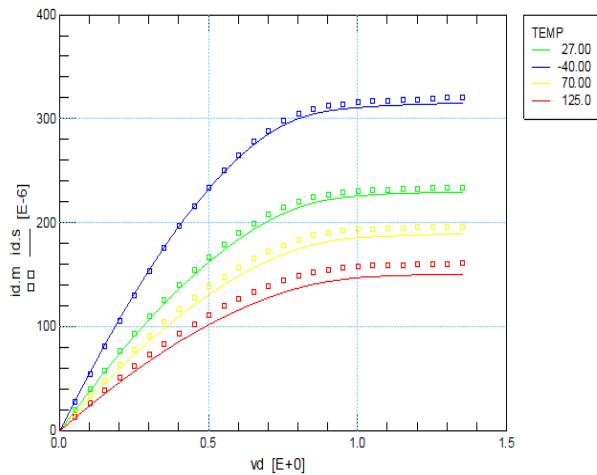
$$\log(Id) = f(vg, T) \text{ @ low } Vds, Vbs = 0$$



$$Id = f(vg, T) \text{ @ low } Vds, Vbs = \text{max}$$

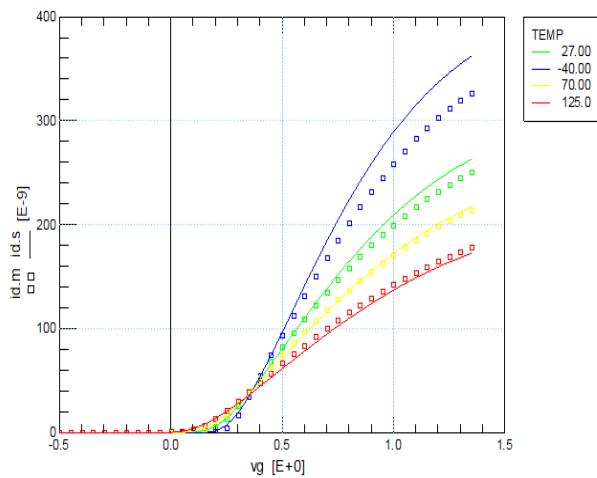


$$\log(Id) = f(vg, T) \text{ @ low } Vds, Vbs = \text{max}$$

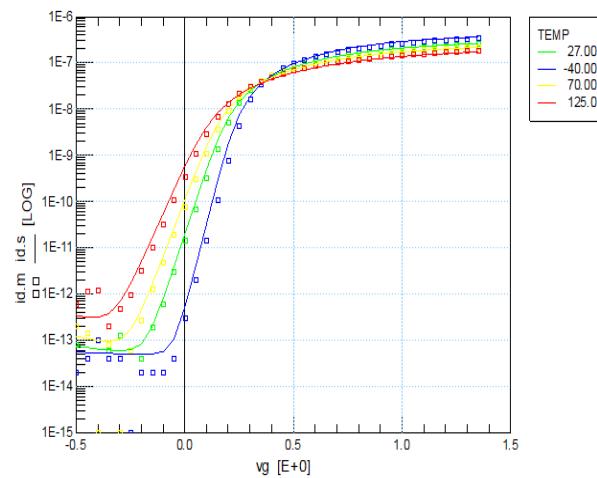


$$Id = f(Vd, Vg, T) @ Vbs = 0$$

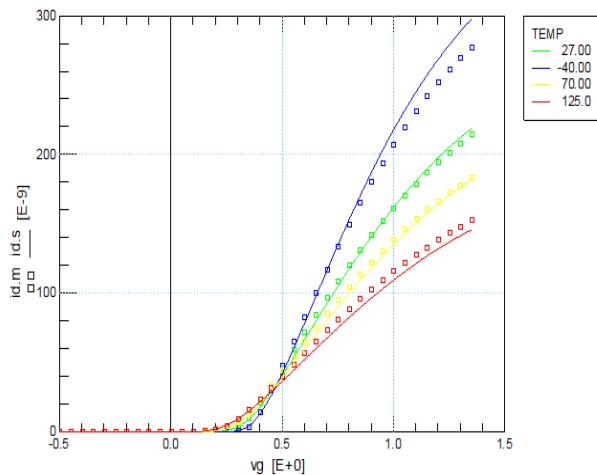
### 7.1.2 W0u15\_L10u0\_S547\_3



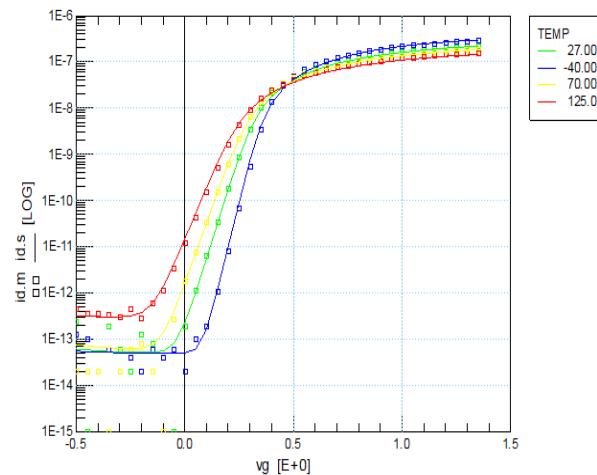
$$Id = f(vg, T) @ \text{low } Vds, Vbs = 0$$



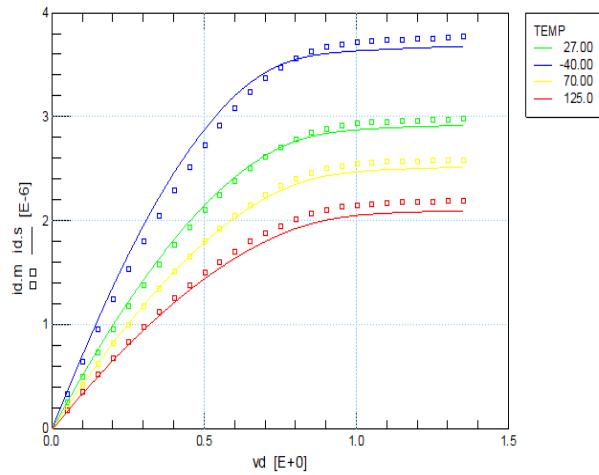
$$\log(Id) = f(vg, T) @ \text{low } Vds, Vbs = 0$$



$$Id = f(vg, T) @ \text{low } Vds, Vbs = \text{max}$$

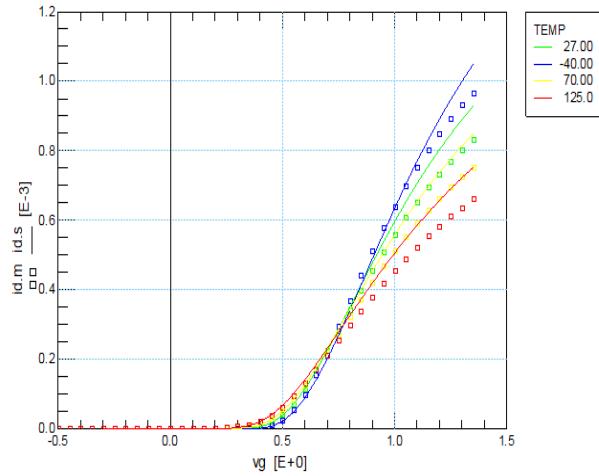


$$\log(Id) = f(vg, T) @ \text{low } Vds, Vbs = \text{max}$$

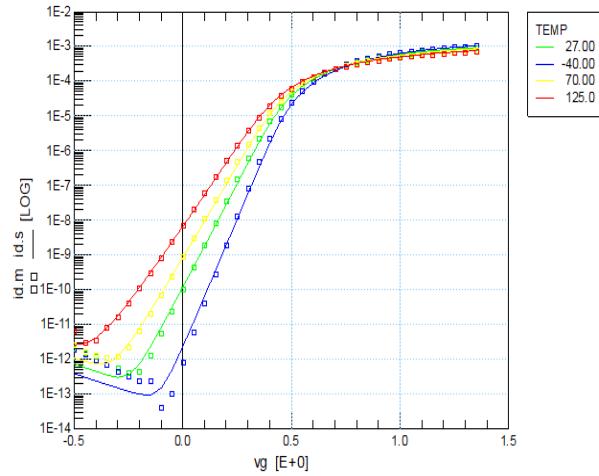


$Id = f(Vd, Vg, T) @ Vbs = 0$

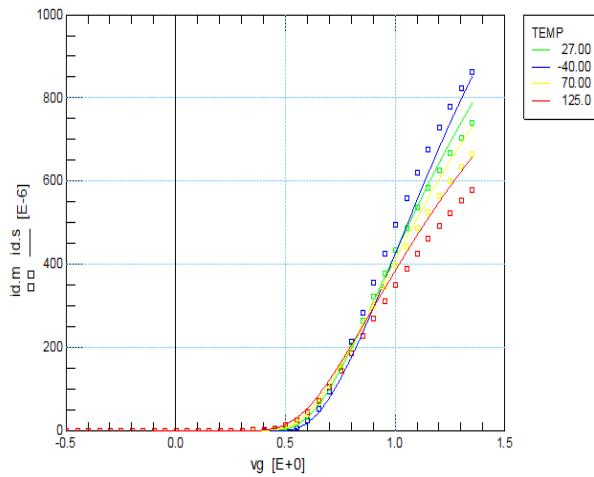
### 7.1.3 W10u0\_L0u13\_S540\_2



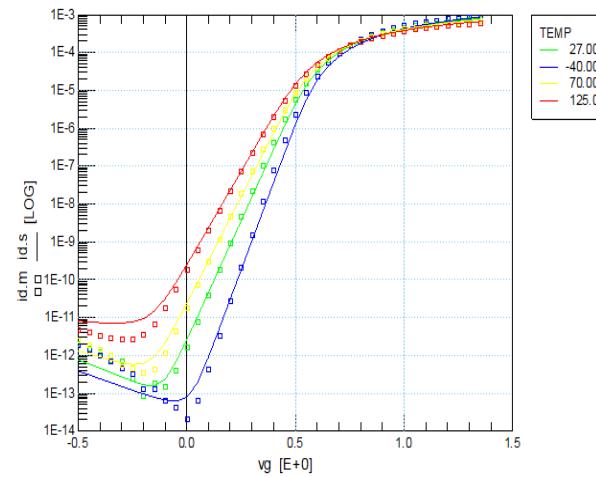
$Id = f(vg, T) @ \text{low } Vds, Vbs = 0$



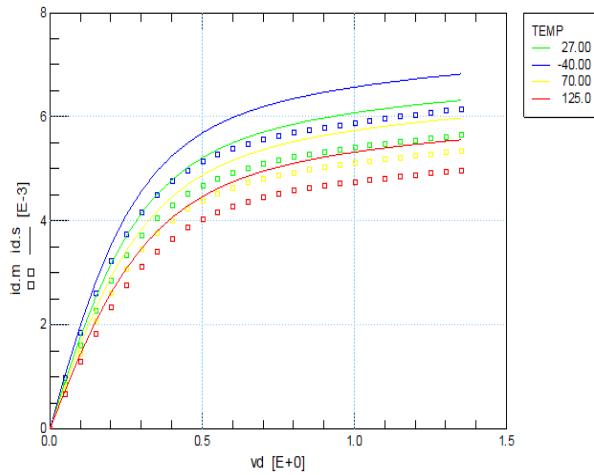
$\log(Id) = f(vg, T) @ \text{low } Vds, Vbs = 0$



$Id = f(Vg, T) @ \text{low } Vds, Vbs = \text{max}$

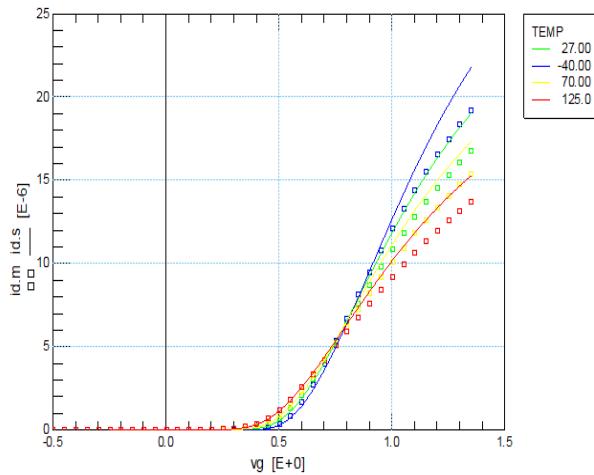


$\log(Id) = f(Vg, T) @ \text{low } Vds, Vbs = \text{max}$

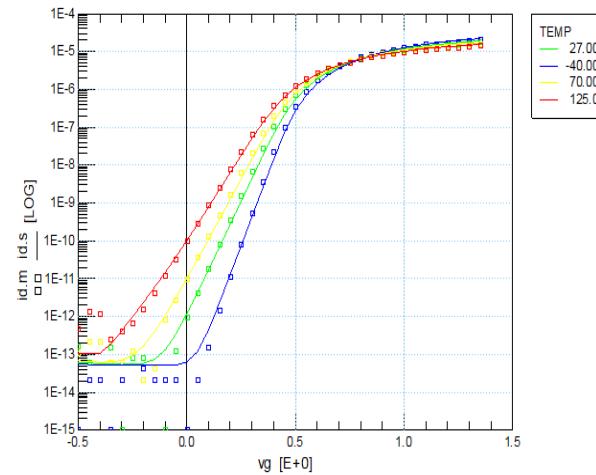


$Id = f(Vd, Vg, T) @ Vbs = 0$

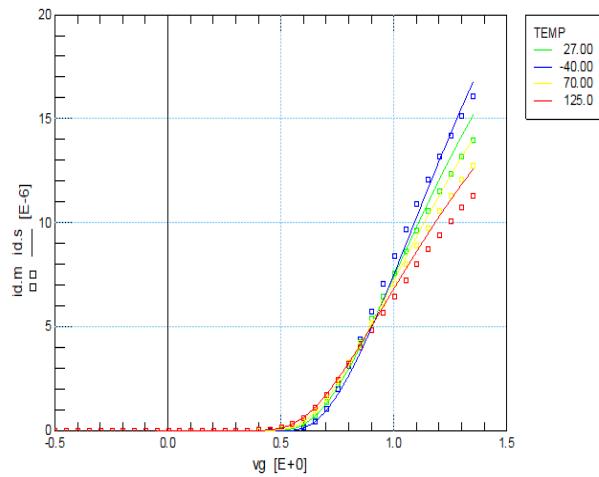
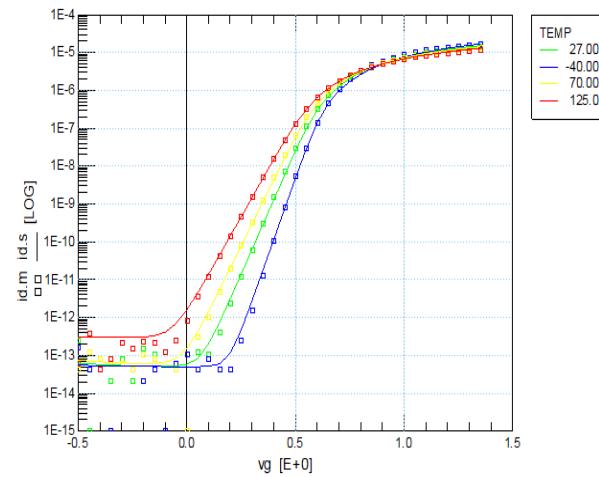
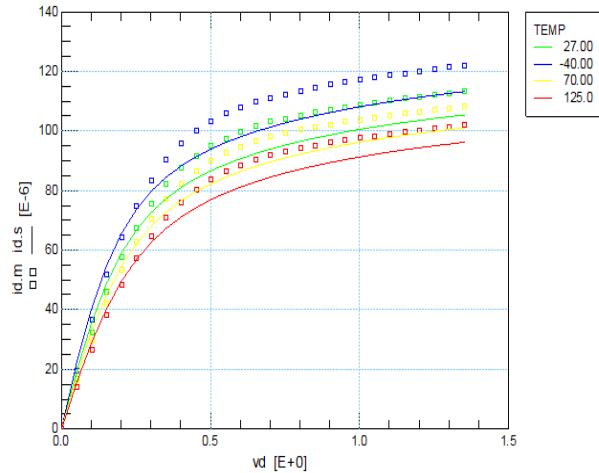
#### 7.1.4 W0u15\_L0u13\_S546\_3



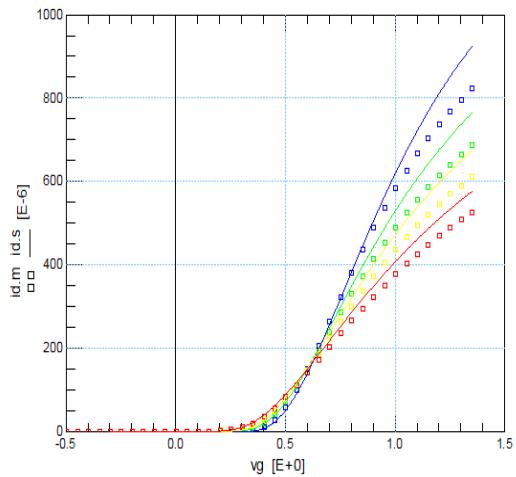
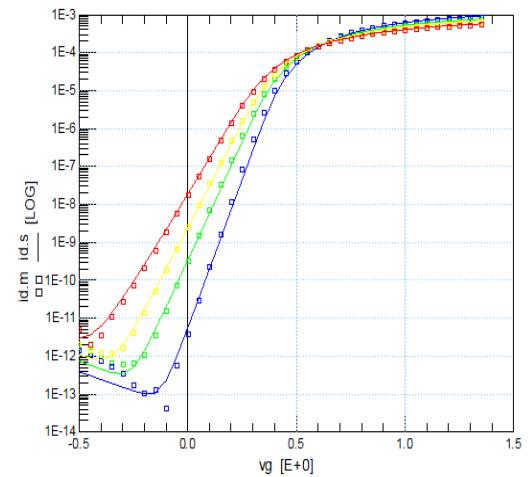
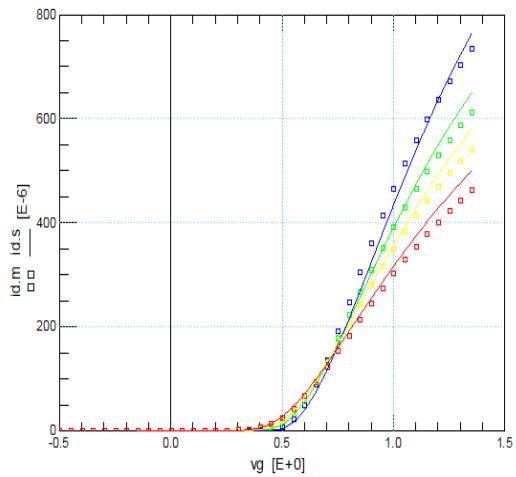
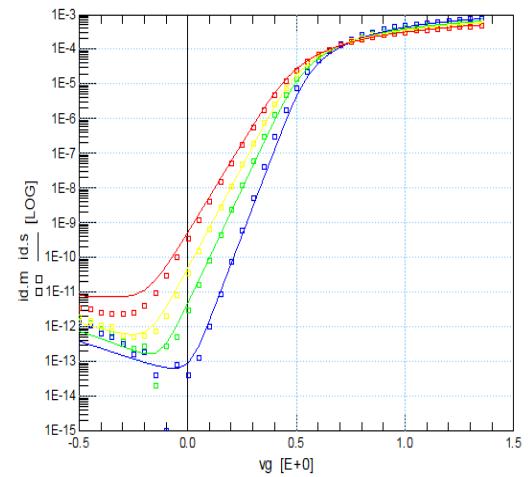
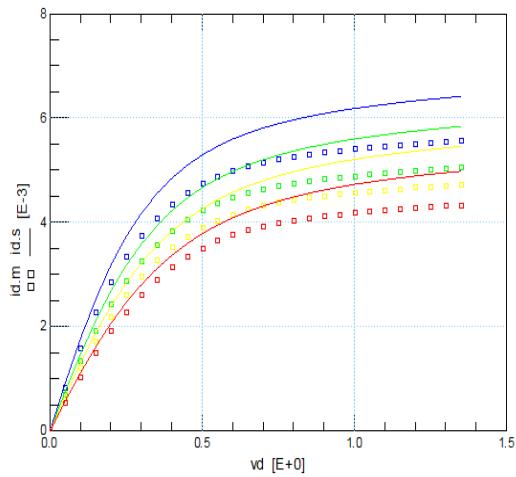
$Id = f(Vg, T) @ \text{low } Vds, Vbs = 0$



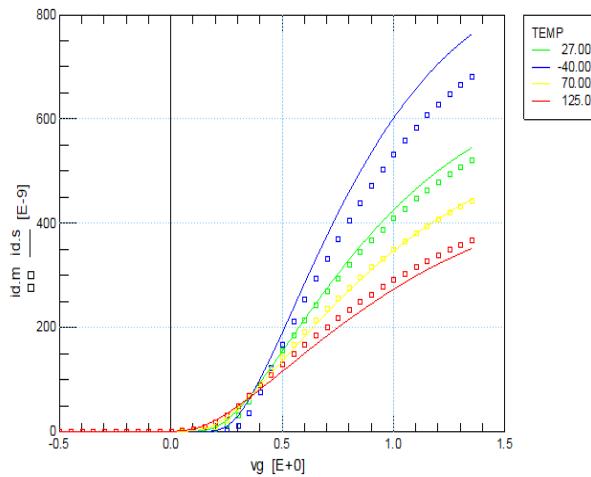
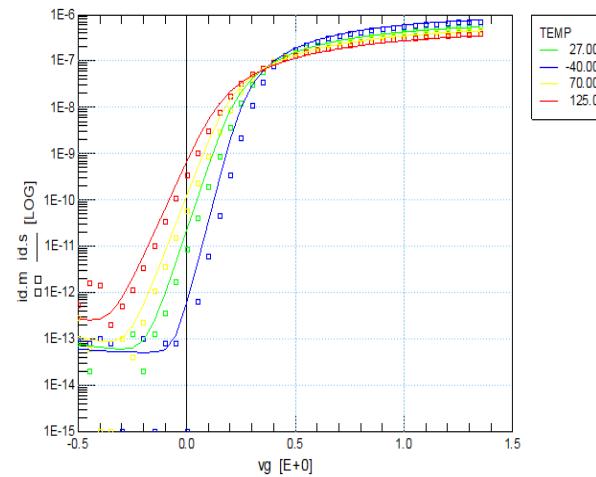
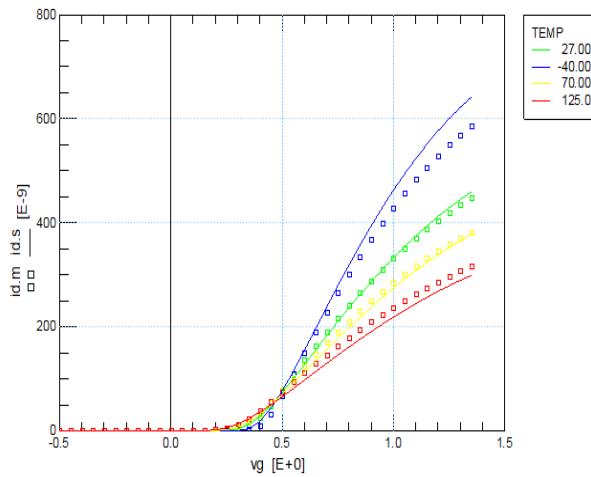
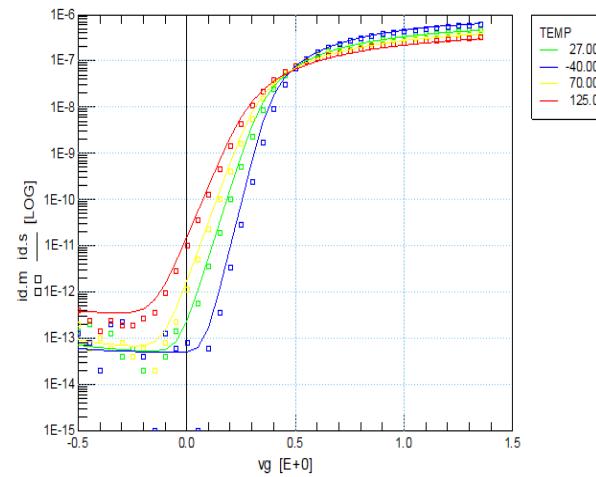
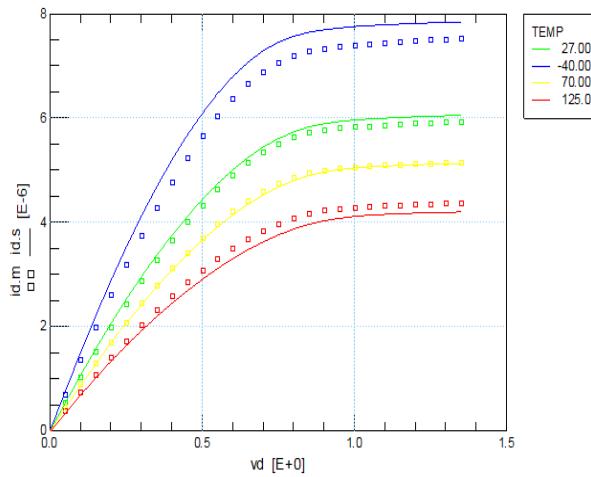
$\log(Id) = f(Vg, T) @ \text{low } Vds, Vbs = 0$

 $Id = f(vg, T) @ \text{low } Vds, Vbs = \text{max}$  $\log(Id) = f(vg, T) @ \text{low } Vds, Vbs = \text{max}$  $Id = f(Vd, Vg, T) @ Vbs = 0$

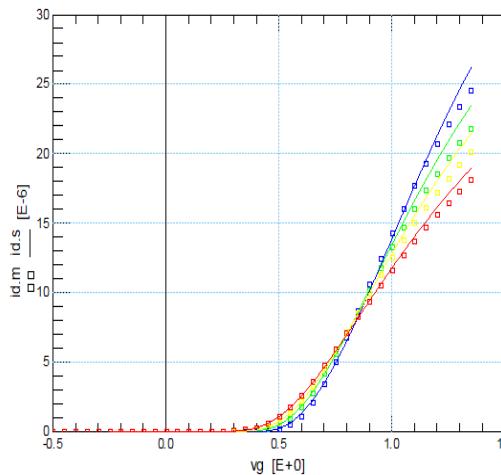
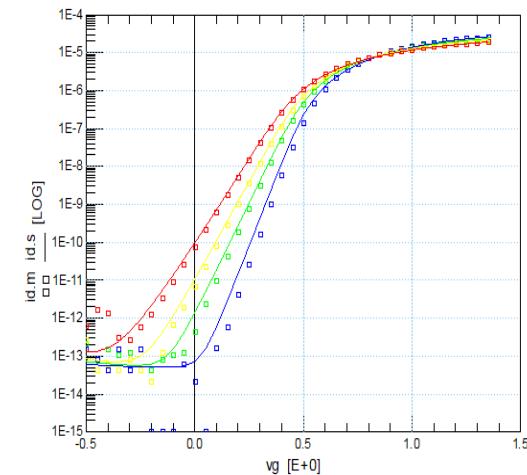
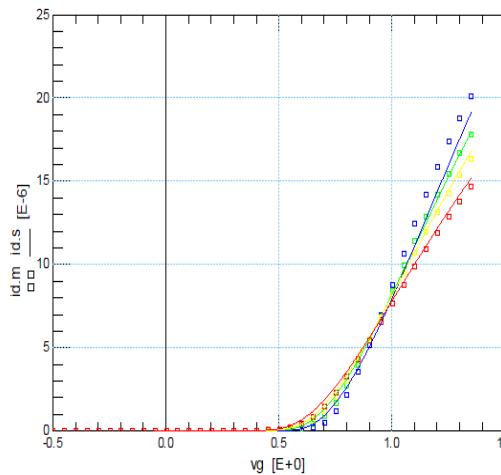
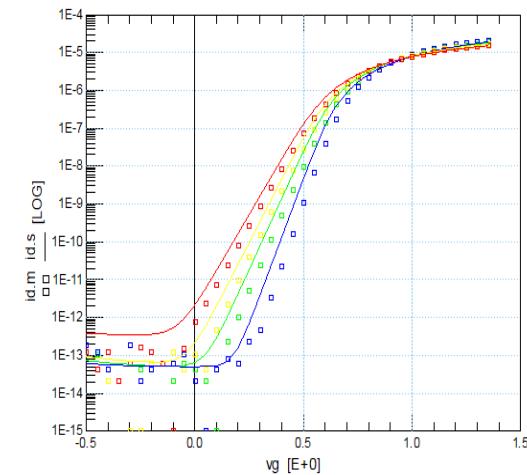
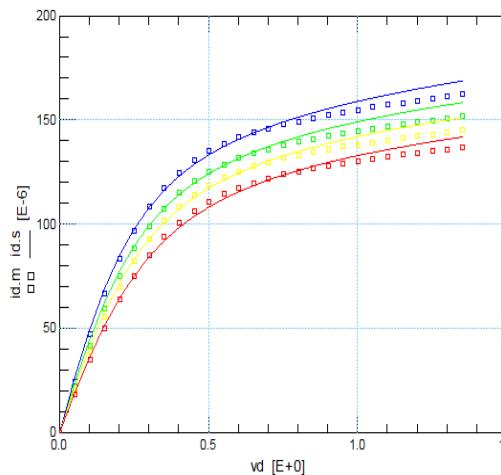
### 7.1.5 W10u0\_L0u18\_S540\_5

 $Id = f(Vg, T) @ \text{low } Vds, Vbs = 0$  $\log(Id) = f(Vg, T) @ \text{low } Vds, Vbs = 0$  $Id = f(Vg, T) @ \text{low } Vds, Vbs = \text{max}$  $\log(Id) = f(Vg, T) @ \text{low } Vds, Vbs = \text{max}$  $Id = f(Vd, Vg, T) @ Vbs = 0$

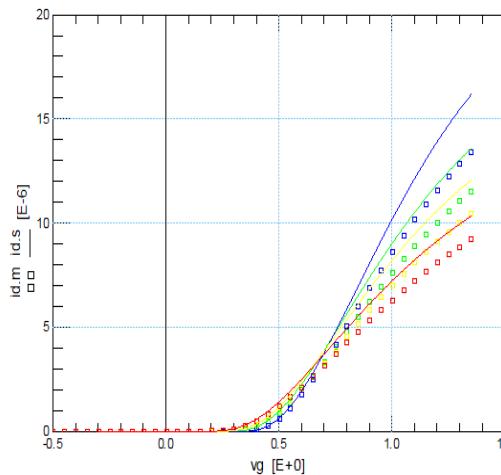
### 7.1.6 W0u3\_L10u0\_S545\_2

 $Id = f(vg, T) @ \text{low } Vds, Vbs = 0$  $\log(Id) = f(vg, T) @ \text{low } Vds, Vbs = 0$  $Id = f(vg, T) @ \text{low } Vds, Vbs = \text{max}$  $\log(Id) = f(vg, T) @ \text{low } Vds, Vbs = \text{max}$  $Id = f(Vd, Vg, T) @ Vbs = 0$

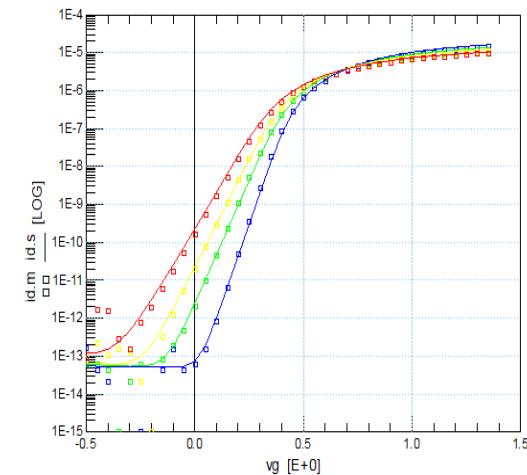
## 7.1.7 W0u3\_L0u13\_S544\_2

 $Id = f(Vg, T) @ \text{low } Vds, Vbs = 0$  $\log(Id) = f(Vg, T) @ \text{low } Vds, Vbs = 0$  $Id = f(Vg, T) @ \text{low } Vds, Vbs = \text{max}$  $\log(Id) = f(Vg, T) @ \text{low } Vds, Vbs = \text{max}$  $Id = f(Vd, Vg, T) @ Vbs = 0$

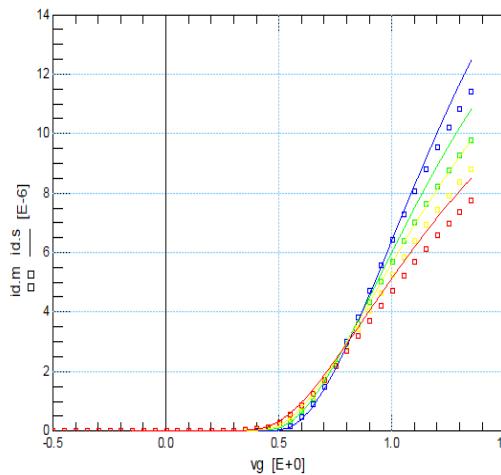
### 7.1.8 W0u15\_L0u18\_S547\_1



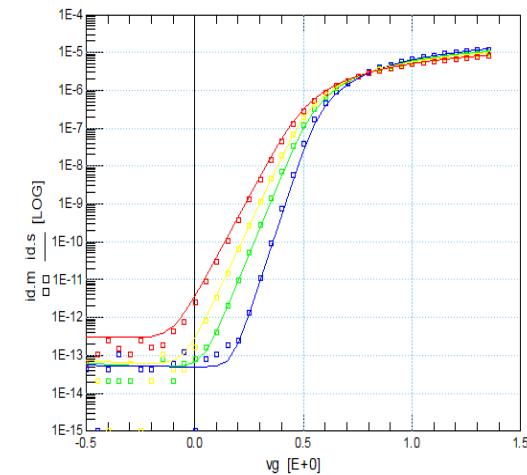
$Id = f(Vg, T) @ \text{low } Vds, Vbs = 0$



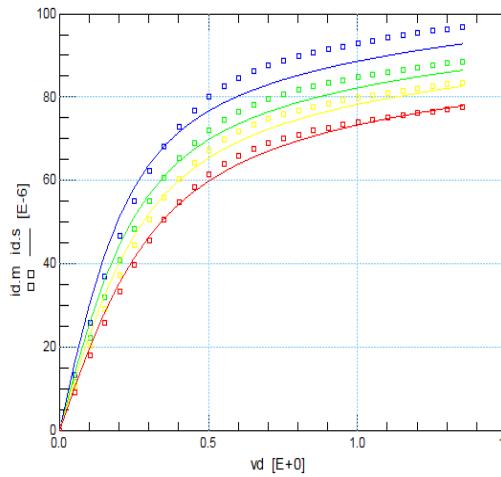
$\log(Id) = f(Vg, T) @ \text{low } Vds, Vbs = 0$



$Id = f(Vg, T) @ \text{low } Vds, Vbs = \text{max}$



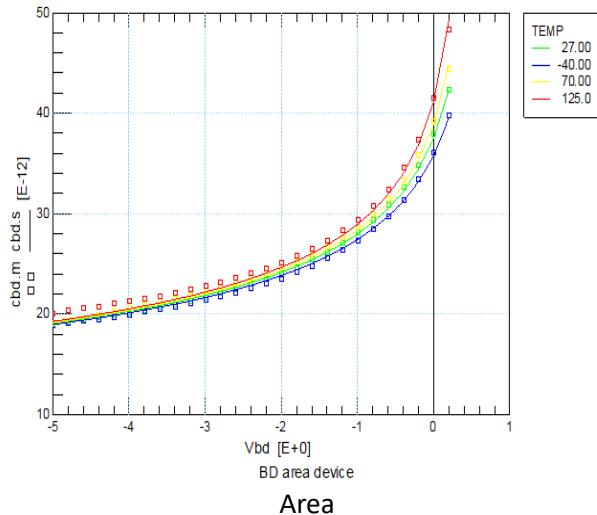
$\log(Id) = f(Vg, T) @ \text{low } Vds, Vbs = \text{max}$



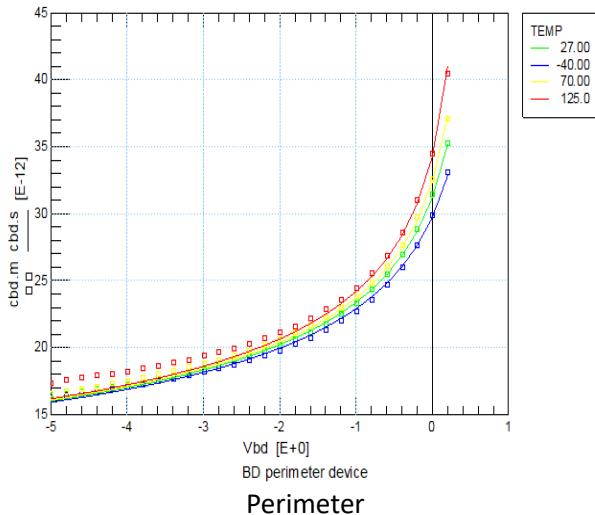
$Id = f(Vd, Vg, T) @ Vbs = 0$

## 7.2 Junction Capacitance

### 7.2.1 Bulk - Drain

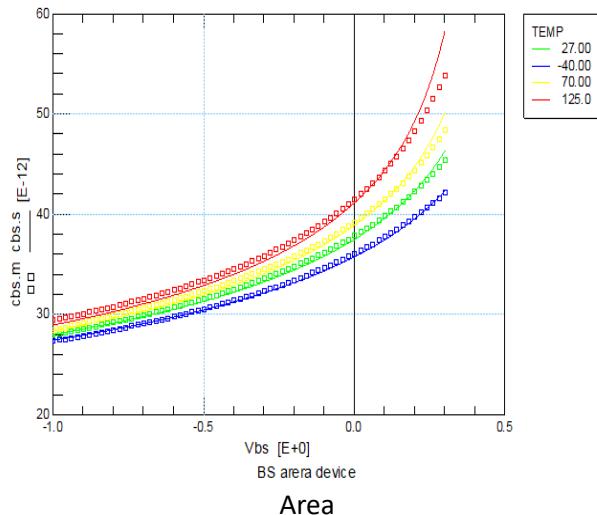


Area

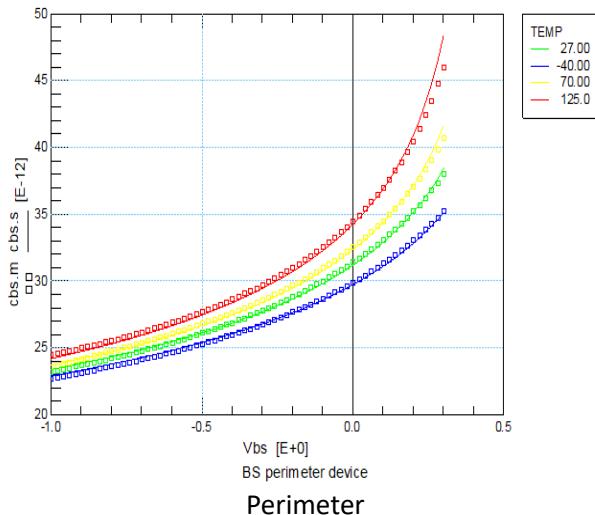


Perimeter

### 7.2.2 Bulk - Source



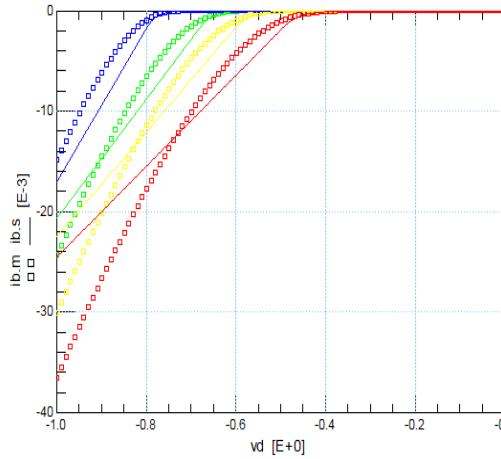
Area



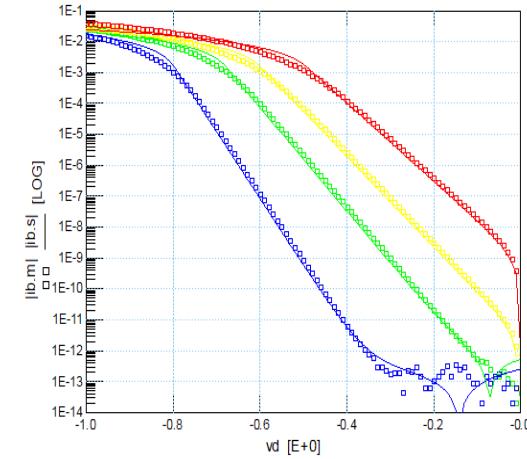
Perimeter

## 7.3 Parasitic Diodes

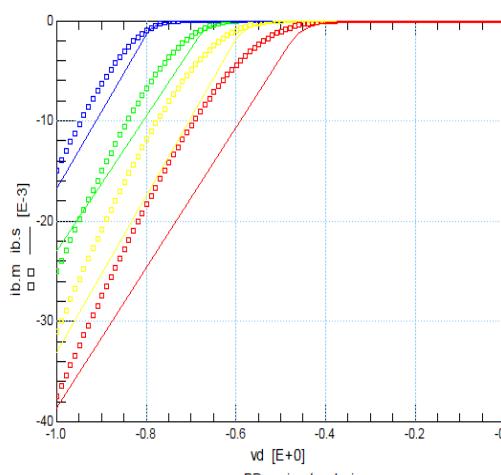
### 7.3.1 Bulk - Drain



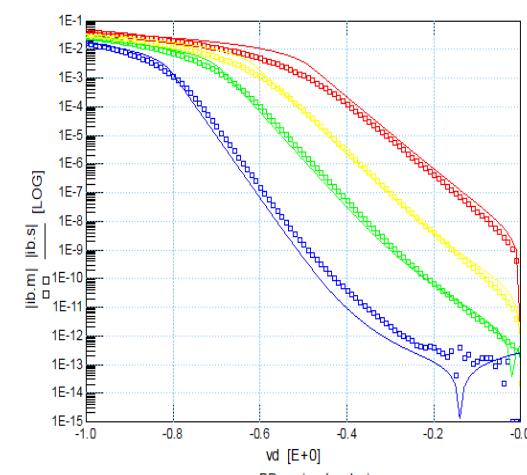
Area



Area

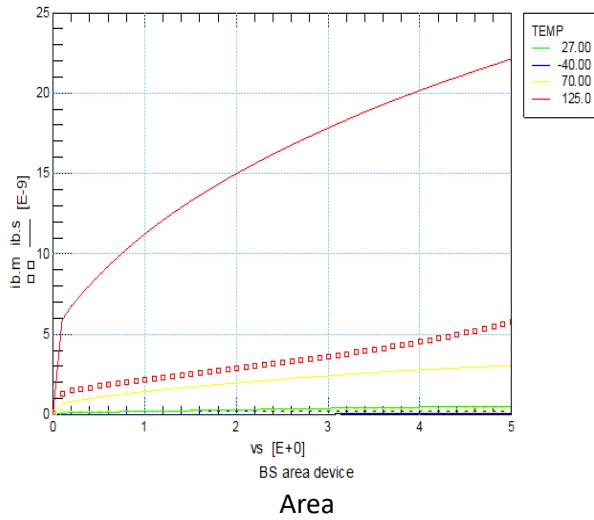


Perimeter

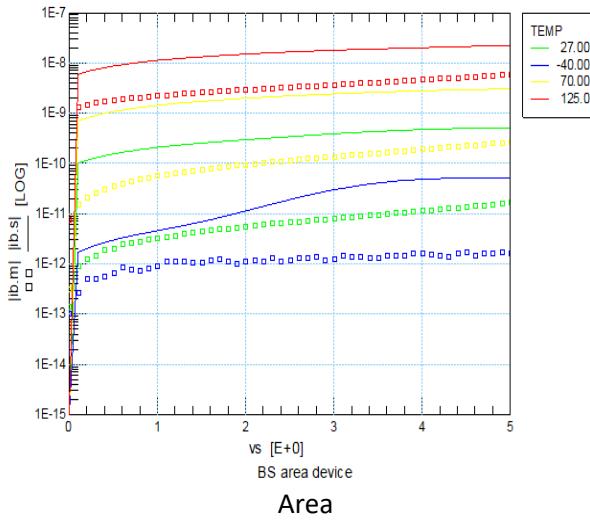


Perimeter

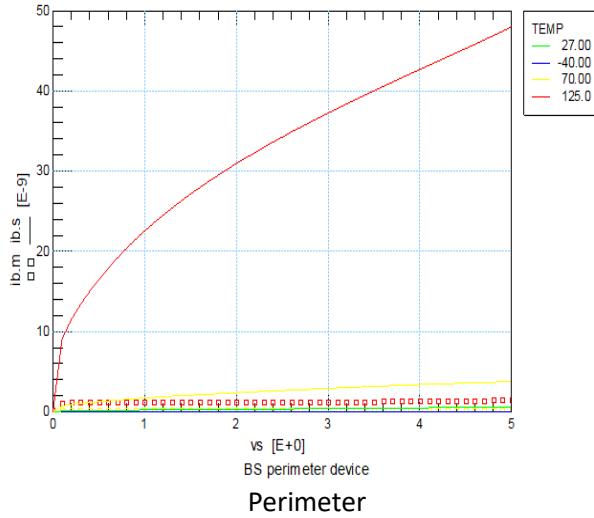
### 7.3.2 Bulk - Source



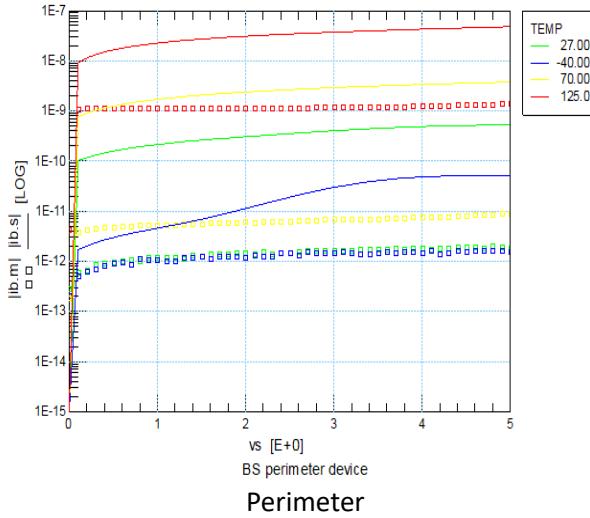
Area



Area



Perimeter



Perimeter

## 8 Flicker Noise

Flicker noise model parameters are taken from the SG13 simulation models.

### 8.1 Measurement Conditions

Not defined as no flicker noise measurements are yet done on SG13G2 devices.

### 8.2 Devices

Not defined as no flicker noise measurements are yet done on SG13G2 devices.

## 9 Change History

Revision	Device	Changes
190606	All	Initial version
190730	All	Adjust temperature and RF behavior
190924	Summarized Results	Legend added