EECS 143
Microfabrication
Technology

Device Characterization

Table of Contents

Textbooks

- R. S. Muller, T.I. Kamins, *Device Electronics for Integrated Circuits*, Wiley, New York, second ed. 1987.
- D. A. Hodges, H. G. Jackson, *Analysis and Design of Digital Integrated Circuits*, McGraw-Hill, New York, second ed. 1988.

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1. Line Width and Misalignment Measurements

A. Test Structure 1a

Background:

The resolution test patterns have lines of varying width (2, 3, 4, and 8 μm).

Measure:

- *Measure the degree of over/under etch on the resolution test patterns.*

Inspection Station 1: 1 line = 1.52 microns
Inspection Station 2: 1 line = 2.47 microns

B. Test Structure 1b

Background:

The vernier consists of two sets of bars, one on top of the other. Each bar in both sets is 4 μm wide. The bottom set of 42 bars are equally spaced by 4 μm. The top set of bars are equally spaced by 4.2 μm. Ideally the center bar in the top set is centered over the gap between the middle two bars of the lower set. There are two sets of verniers, one for the X and Y directions. (0.2 μm / finger offset)

Measure:

- *Determine the X and Y misalignment of each of the 4 sets of verniers.*

2. Resistors

A. Test Structures 2a-b

Background:

The n+ diffused resistor is formed during source/drain diffusion. Its resistance is measured by the 4-point probe method: current from a constant current source is passed through the outer probes and the voltage is measured between the inner probes. The diffused resistor value is:

$$R_{diff} = \frac{V}{I} = \frac{L}{W}R_S$$

where R_S is the sheet resistance, V is the voltage, I is the current, L is the length between inner probes and W is the line width. Resistivity in Ω-cm can be calculated if the diffusion depth is known:

$$\rho = R_S x_j$$

where ρ is the resistivity of the diffused layer and x_j is the junction depth.

Since polysilicon lines are used as interconnects, the resistance of these interconnects is of great importance in circuit design.

$$\rho_{poly} = R_s t_{poly}$$

where ρ_{poly} is the resistivity of the polysilicon layer and t_{poly} is the thickness of the polysilicon layer.

Measure:

- *Measure the value of the diffused resistor, 2a, and the diffused resistor, 2b.*

2a	2b
Plot	Plot
Data	Data

- *Optically measure the line width of the poly resistor, 2b.*

Calculate:

- *Compare R_S with the sheet resistance measured on the control wafer after drive-in.*

- *Using the x_j value calculated in Lab Report 1, determine doping concentration and electron mobility from standard tables in Muller and Kamins.*

- *Using the measured line width of the poly resistor, 2b, determine R_S in (Ω/sq) for the measured R_{poly}. Calculate polysilicon resistivity in (ohm-cm).*

B. Test Structure 2c-d

Background:

The contact chain is basically a resistor made up of n+ diffused (n+ doped polysilicon) and aluminum sections. The resistance of the aluminum sections is very low compared to the n+ sections and can be neglected. However, contact resistance cannot be neglected; thus the value of the total resistance is:

$$R_{total} = 7R_{block}$$
$$R_{block} = \eta R_S + R_C$$

where R_C is the contact resistance per contact hole, and $1 < \eta < 3$. Current density is determined by the geometry of the resistor pattern. The equivalent resistance of the squares containing the contact holes is found to be 0.65 squares; thus η has a value of 2.3 for this configuration.

Measure:

- *Measure the resistance of the contact chain on both diffused, 2c, and polysilicon, 2d, structures*

2c	2d
Plot	Plot
Data	Data

Calculate:

- *Calculate contact resistance using R_S determined above.*

3. Capacitors: (Measurement Help)

There are two types of capacitors used in integrated circuits: MOS capacitors and junction capacitors. Measurement of these capacitors is somewhat more involved than measurement of other devices on the wafer.

A. Field Oxide Capacitor (Test Structure 3)

Background:

The field (thick) oxide MOS capacitance is basically independent of applied voltage because the depletion layer in the substrate is small compared to the thickness of the oxide:

$$C = \frac{A\varepsilon_o}{t_{ox}}$$

When measuring capacitances, care must be taken to account for the parasitic capacitances of the measurement set-up. Parasitic capacitance is measured by lifting the probe until it is just above the top plate of the capacitor without touching. Actual capacitance is then calculated by:

$$C_{actual} = C_{measured} - C_{parasitic}$$

Modern capacitance meters allow the user to "zero out" the parasitic capacitance.

Measure:

- *Plot C-V from -10 V to +10 V to see any effect of bias. Explain.*

Plot
Data

Calculate:

- *Determine the field oxide capacitance at -5 V*
- *Calculate field oxide thickness.*

B. Gate Oxide Capacitor (Test Structure 4)

Background:

The measured value of the gate oxide capacitor, as it is laid out, includes the field oxide capacitance of the contact pad and the ring around the active area:

$$C_{measured} = \left(A_{active}\, \frac{\varepsilon_{ox}}{t_{gox}} \right) + \left(A_{pad+ring}\, \frac{\varepsilon_{ox}}{t_{fox}} \right) + C_{parasitic}$$

The gate oxide capacitance varies with applied voltage. As the silicon surface is depleted with increasing gate voltage, the capacitance is obtained from the series connection of the oxide capacitance (constant) and the depletion region capacitance. Since the width of the surface depletion layer depends on the bias voltage, the substrate doping, and oxide quality, the C-V plot for the gate oxide capacitor can be used to measure/calculate doping concentration, flat band voltage and interface charge density, Q_{SS}.

Measure:

- *Make a C-V plot (-5 V to +5 V) and determine minimum capacitance. Do this with light on and off.*

Light on	Light off
Plot	Plot
Data	Data

Calculate:

- *Determine the gate oxide capacitance at -5 V.*
- *Determine gate oxide thickness and C' (capacitance / unit area).*
- *Calculate maximum depletion width and substrate doping concentration.*
- *Calculate the flat band capacitance (C_{FB}), flat band voltage (V_{FB}) and interface fixed charge density ($Q_{SS} = Q_f$: new nomenclature). Explain the difference caused by turning the light on and off.*

C. Intermediate Oxide Capacitor (Test Structure 5)

Background:

The bottom plate of the intermediate oxide capacitor is the n+ diffusion, contacted by the side pad. The oxide is grown during n+ drive-in and it is the same thickness as that over the source/drain areas of devices. Again,

$$C = C_{measured} - C_{parasitic}$$

Measure:

- *Plot C-V from -5 V to 0 V.*

Plot
Data

Calculate:

- *Determine the intermediate oxide capacitance at -5V.*
- *Determine intermediate oxide thickness from the capacitance measurement at -5V.*

4. Diode: (Test Structure 7)

Background:

The n+ diffusion forms a diode in the p substrate, which can be contacted through the back of the wafer. (There should be no oxide on the back.) In the forward biased mode, the anode (p) is positive with respect to the cathode (n+). Forward turn-on voltage (V_F) can be estimated from the I_D vs. V_D characteristic; the series resistance, R_S, is the slope of the I_D vs. V_D curve on the high (100 mA) current scale.

Measure:

- *Plot the I-V characteristic; read off V_F, reverse breakdown voltage BV_R, and the series resistance R_S.*

PlotA	Plot B
Data A	Data B

Calculate:

- *Draw the circuit representation of a diode (including R_S), indicate current direction and voltage polarities.*

5. MOSFETs(Test Structures 8, 9)

These are polysilicon gate, enhancement-mode, n-channel field effect transistors of varying gate lengths and widths. They will be used to completely characterize the process and to extract important parameters for circuit design. A summary of intrinsic device equations (excluding the effects of drain/source series resistances) relevant to this exercise is included in the following:

A. Plots of I_D vs. V_{DS} . (Devices 8-9)

Measure:

- *Plot I_D vs. V_{DS} , V_G = 0 to 7 V (1 V steps) to show current-voltage characteristics of each MOSFET.*

8a	8b	8c	8d	9a	9b	9c	10	11
Plot	Plot	Plot	Plot	Plot	Plot	Plot	Plot	Plot
Data	Data	Data	Data	Data	Data	Data	Data	Data

B. Determining , V_T , Υ and N_A. Plots of I_D vs. V_G. (Devices 8-9)

Background:

The body-bias coefficient (γ) can be determined using

$$V_T = V_{T0} + \gamma\left(\sqrt{V_{SB} + 0.7V} - \sqrt{0.7V}\right)$$

$$\gamma = \frac{\sqrt{2\varepsilon_{Si}qN_A}}{C'_{ox}}$$

Measure:

- *Device 8, 9: Plot I_D vs. V_G at $V_{DS} = 50mV$ and $V_{BS} = 0V$.*

8a	8b	8c	8d	9a	9b	9c
Plot	Plot	Plot	Plot	Plot	Plot	Plot
Data	Data	Data	Data	Data	Data	Data

Calculate:

- *Device 8, 9: Determine V_T for each transistor. The field oxide MOSFET is used to determine the field threshold voltage. A high $V_{T-field} > V_{DD}$ is needed to ensure proper isolation of the devices.*

C. Effective Channel Length. (Device 8)

Background:

Determine source/drain resistance and effective channel length (L_{eff}) as follows:

$$L_{drawn} = 4,6,8,10 \mu m$$

$$R_m = R_{external} + R_{channel}$$

$$R_m = R_{external} + \frac{(L - \Delta L)}{W \mu_{eff} C_{ox}(V_G - V_T)}$$

Measure:

- *Plot $R_{measured} = \dfrac{V_D}{I_D}$ vs. V_G for V_G = 0 to 12 V, with $V_D = 50mV$*

8a	8b	8c	8d
Plot	Plot	Plot	Plot
Data	Data	Data	Data

Calculate:

- *Take points from the R_m vs. V_G curves and plot R_m vs. L_{drawn}, one line for each ($V_G - V_T = 2,4,6,8,10V$).*

- *Determine ΔL. The lines from the previous graph should intersect in one point, of which the abscissa = ΔL and the ordinate = $R_{external} = R_{S/D} = R_S + R_D$. $L_{eff} = L_{drawn} - \Delta L$.*

- *Plot V_T vs. L_{eff} at $V_D = 50mV$ to observe short-channel effect .*

D. Determining V_T and k. (Devices 8, 9)

Background:

Saturation region ($V_{DS} > V_{D-SAT}$):

$$I_D \cong I_{D-SAT}\left(1 + \lambda V_{DS}\right)$$

where λ is the channel-length modulation parameter;

$$I_{D-SAT} \cong \frac{k}{2}\left(V_G - V_T\right)^2$$

where k is the device transconductance parameter and

$$k = \frac{W_{eff}}{L_{eff}}\mu_{eff-sat}C_{ox}$$

$$k' = \mu_{eff-sat}C_{ox}$$

Calculate:

- *Determine V_T and k for each transistor*

6. Circuits:

A. Test Structure 14 (Inverter)

Background:

The NMOS inverter has a saturated enhancement load. The inverting device has a $\frac{W}{L} = \frac{80}{10}$ and the load device has $\frac{W}{L} = \frac{10}{20}$.

Measure:

- *Plot the voltage transfer characteristics (VTC) for $V_{DD} = 5,10,15V$.*

Plot
Data

Calculate:

- *Determine V_{OH}, V_{OL}, V_{IH}, V_{IL}, unity gain point ($V_{in} = V_{out}$) and logic swing.*

- *Construct and check truth table.*

- *Draw the inverter circuit (indicate $\dfrac{W}{L}$ of devices) and logic symbol.*

7. MEMS Testing

BIMORPH

Background:

A bimorph is a sandwich structure with two materials of different thermal expansion. In our example, that sandwich is aluminum and SiO_2. The thermal expansion coefficient of aluminum is about 25×10^{-6}/K and that of SiO_2 is 0.35×10^{-6}/K. This means that when we pass current through the beam, it will curl downward because the aluminum expands more than the SiO_2. You should also note that the beam will curl upwards when released. This is because of residual stress.

Measure:

- *Get I-V data from the released bimorph. (Place your probes on the aluminum pads and ramp voltage in steps of 0.5V from 0 to about 20V.) Look for the voltage at which the bimorph starts to glow--- should be around 17 V. Also note the voltage at which the bimorph is destroyed--should be about 19V (and you will know because the current becomes very low).*

- *Repeat the above for the unreleased bimorph.*

Calculate:

- *Plot the I-V from 0V to 15V and extract resistance (R) at each point.*

- *Based on the R value you extracted and the temperature coefficient of resistance (TCR) of silicon (1 E-3/K), estimate the temerature at 5V, 10V, and the voltage at which the bimorph glows.*
  Note that the current becomes very low, indicating the structure has been destroyed.

- *Repeat #1 for the unreleased bimorph. Plot the released and unreleased bimorph I-V data on the same graph and discuss any differences.*

CANTILEVER

Measure

- *Measure I-V from 0V to 10V for cantilevers and the reference. You will need this for lab report question #1.*

- *Increase the voltage up to 20V to see if it glows. Does it glow? Compare your result on glowing vs not-glowing to the bimorph. If the cantilever glows, explain why. If it does not glow, explain why not.*

8. Expected Device Response Curves

Resistors:

Resistors

Diode/BJT:

Diode

BJT

Capacitors:

Capacitor — field oxide

Capacitor — gate oxide

Capacitor — structure 6a, 6b
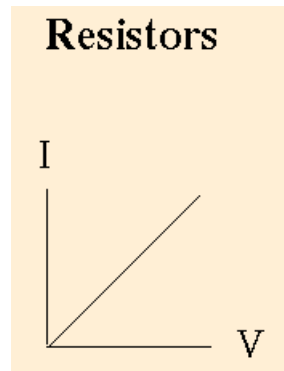
Capacitor — diode
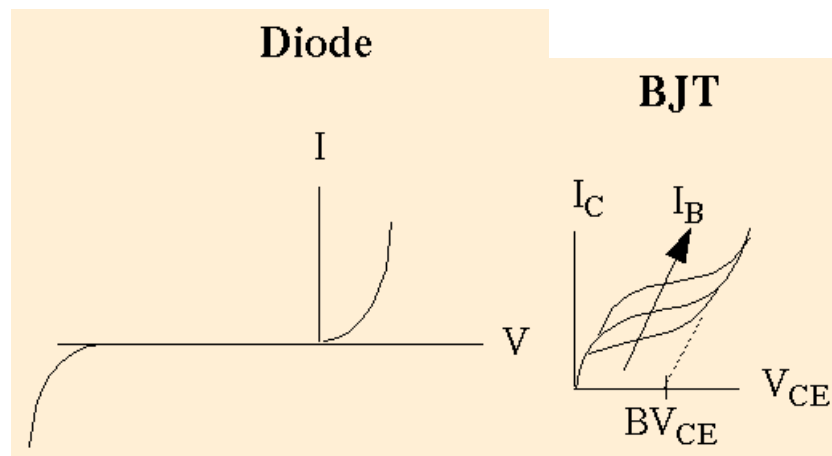
MOSFETs

K. Voros, Spring 1993
Mason Freed, Spring 1999
EE143 TA Team, Spring 2000

Appendix 1 - Measurement Help

Just how do I set up the capacitance meter with Metrics?

(It is assumed that you have basically followed the Metrics tutorial before ending up on this page). On the source setup page for the 'CMH' source be sure to select the Cp-Q capacitance model (for our values of capacitance this gives better readings than a series model). Also, be sure to choose a cable length of 1 (our cables are 1m long after all). Finally, choose an appropriate frequency (note: units are Khz) and bias sweep range and voltage for the measurement. For now, also choose a short integration time and only one average. Later you can increase these values to get a cleaner measurement.

Before making your first measurement you must calibrate the lcr meter either manually or with the Metrics software. To calibrate manually use the following procedure: first hit the 'lcl' button on the lcr meter. Then use the cursor control keys to select the same values for measurement type and conditions as you did in Metrics (Cp-Q, same frequency, same ac voltage amplitude). Then hit the 'meas setup' key on the lcr meter and double check the settings on the screen and change if necessary.

Then select 'correction' to get to the correction screen. Again, make sure all displayed settings are consistent with the Metrics settings. Next,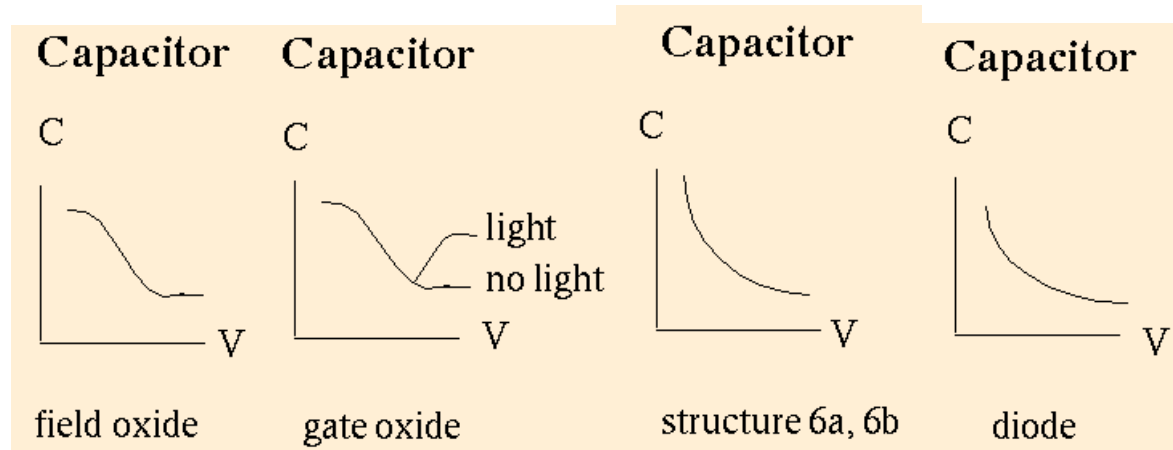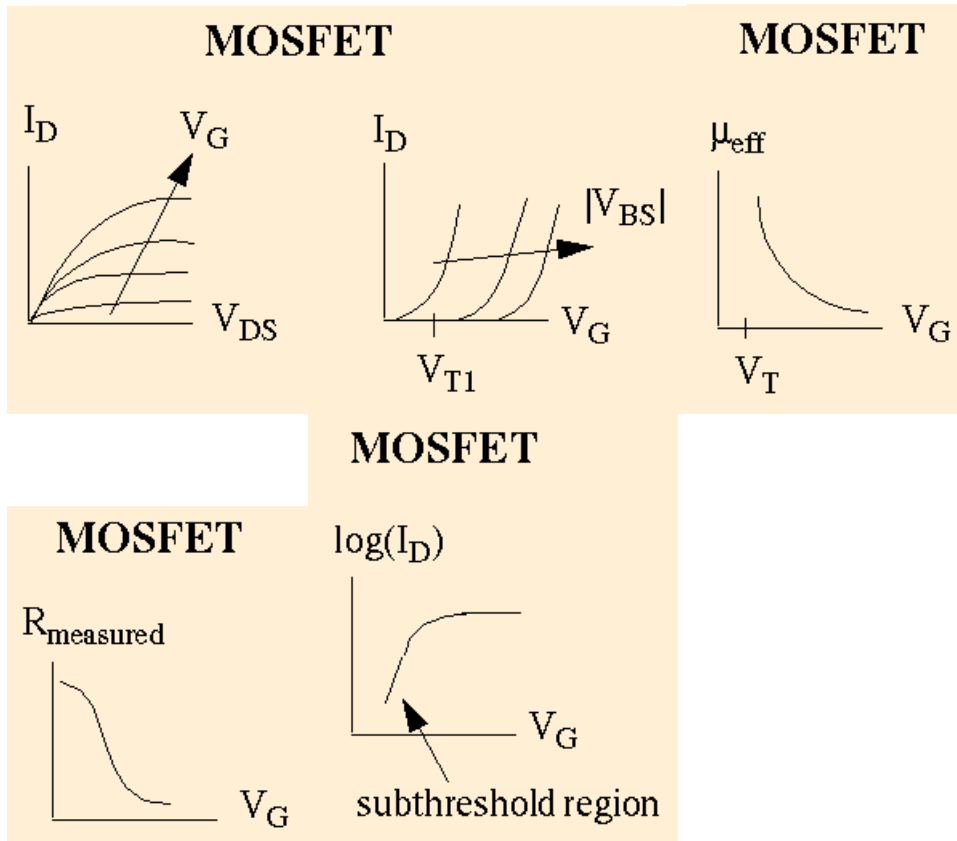 set the open correction to 'on' and the closed correction to 'off'. Finally, connect your circuit and cables and just barely lift the probe tip off the device you are measuring. To perform calibration select 'meas open' (visible when the cursor is on the open area) and wait until it is done. You are now ready to select 'measure' in Metrics.

If you don't do the calibration properly the software will give bad readings. Really. If you suspect your setup or calibration take a reading of air. It should be no more than a few hundred femtofarads.

I've decided to change measurement frequency. Do I need to recalibrate?

Yes. The cable impedance is a function of frequency and will change.

My capacitance values look weird/suspicious. What can I do?

Hopefully you got here after thinking about what your capacitance values should look like. Here's some things to check.

1. Did my calibration work properly? Do a measurement of the capacitance with the probe just lifted off again. It should be close to zero.

2. Are the probes in contact?

3. Did I just switch from a 'one probe' contact arrangement (as for field oxide and gate oxide measurements) to a 'two probe' arrangement (as for intermediate oxide) and forget to check the calibration?

I'm confused about the polarities for the diffusion and sidewall cap measurement

These should be done in a state where the diode formed by the substrate and the active area diffusion is reverse biased. Have your TA check your setup before you proceed.

Appendix 2 - Plots and Data

2a Plot
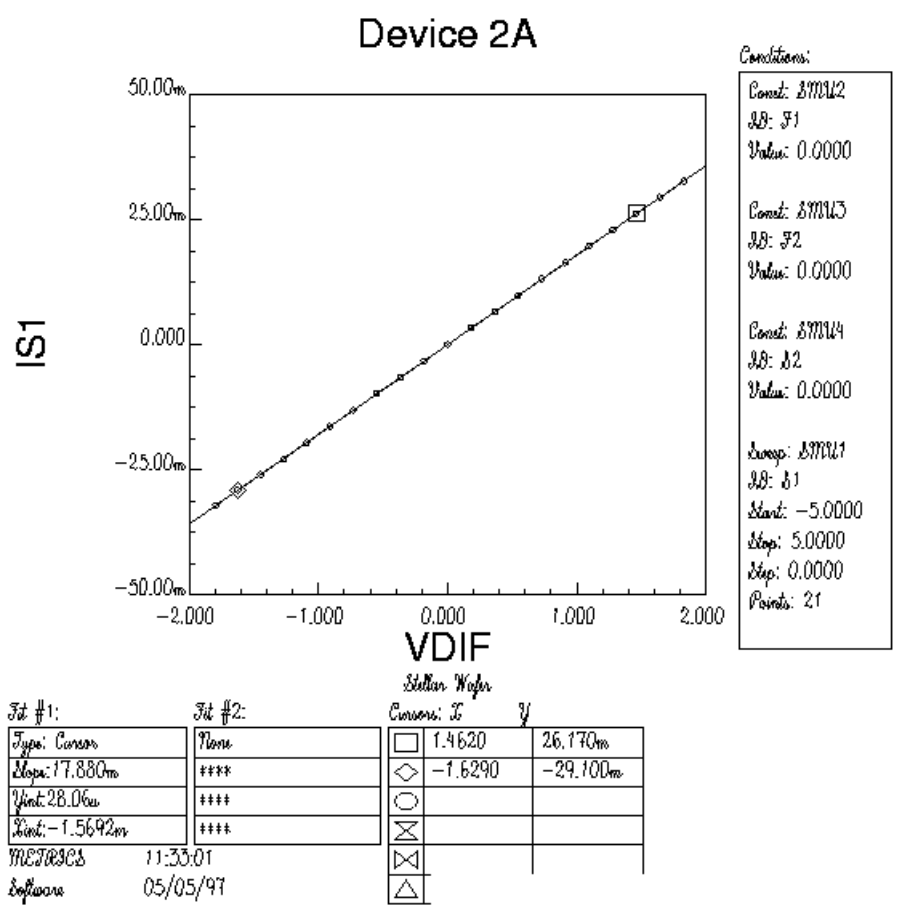
2a Data

```
PROJECT:NONAME      LOT:1 WAFER:1      DIE:1 DEV:1 USER: ;
COMMENT: ;


SETUP:"SAD"
DATA:


SETUP:"RESISTOR"
ID:   F1          UNIT: SMU2       START:      0        STOP: 1        PNTS: 1        STEP: 0
ID:   F2          UNIT: SMU3       START:      0        STOP: 1        PNTS: 1        STEP: 0
ID:   S2          UNIT: SMU4       START:      0        STOP: 1        PNTS: 1        STEP: 0
ID:   S1          UNIT: SMU1       START:     -5        STOP: 5        PNTS: 21       STEP: 0
DATA:
IS1             VF1            VF2            VDIF
-0.032091       -3.319         -1.522         -1.797
-0.0291         -3.006         -1.377         -1.629
-0.02596        -2.677         -1.227         -1.45
-0.02279        -2.348         -1.075         -1.273
-0.019605       -2.017         -0.92398       -1.09302
-0.016365       -1.682         -0.76898       -0.91302
-0.01311        -1.346         -0.616         -0.73
-0.0098486      -1.011         -0.46199       -0.54901
-0.006573       -0.67398       -0.308         -0.36598
-0.0032926      -0.33699       -0.154         -0.18299
-6.9055e-006    -0.00099999     0             -0.00099999
 0.0032771       0.336          0.155          0.181
 0.0065615       0.673          0.308          0.365
 0.0098419       1.01           0.46199        0.54801
 0.01312         1.346          0.617          0.729
 0.01639         1.683          0.76999        0.91301
 0.019655        2.02           0.92398        1.09602
 0.022921        2.3569         1.078          1.2789
 0.02617         2.694          1.232          1.462
 0.029415        3.032          1.387          1.645
 0.03265         3.37           1.54           1.83
```

2b Plot

Device 2B: I vs V

2b Data

```
PROJECT:NONAME      LOT:1 WAFER:1      DIE:1 DEV:1 USER: ;
COMMENT: ;


SETUP:"SAD"
DATA:


SETUP:"RESISTOR"
ID:   F1           UNIT: SMU2      START:      0          STOP: 1          PNTS: 1          STEP: 0
ID:   F2           UNIT: SMU3      START:      0          STOP: 1          PNTS: 1          STEP: 0
ID:   S2           UNIT: SMU4      START:      0          STOP: 1          PNTS: 1          STEP: 0
ID:   S1           UNIT: SMU1      START:    -20          STOP: 20         PNTS: 51         STEP: 0.8
DATA:
  IS1           VF1          VF2           VDIF
 -0.0050864   -13.599      -6.2349       -7.3641
 -0.0048916   -13.056      -5.9849       -7.0711
 -0.0046949   -12.513      -5.7358       -6.7772
 -0.0044985   -11.97       -5.4858       -6.4842
 -0.0043011   -11.427      -5.2368       -6.1902
 -0.0041034   -10.883      -4.9868       -5.8962
 -0.0039035   -10.339      -4.7371       -5.6019
 -0.0037025    -9.7959     -4.488        -5.3079
 -0.0035015    -9.252      -4.238        -5.014
 -0.0033001    -8.709      -3.9889       -4.7201
 -0.0030975    -8.1641     -3.74         -4.4241
 -0.0028945    -7.6199     -3.49         -4.1299
 -0.0026901    -7.0759     -3.24         -3.8359
 -0.002485     -6.532      -2.991        -3.541
 -0.00228      -5.989      -2.7419       -3.2471
 -0.002075     -5.4438     -2.4929       -2.9509
 -0.001869     -4.8999     -2.2429       -2.657
 -0.001662     -4.354      -1.993        -2.361
 -0.001455     -3.8099     -1.743        -2.0669
 -0.0012475    -3.266      -1.494        -1.772
 -0.00104      -2.7219     -1.246        -1.4759
 -0.00083265   -2.178      -0.996        -1.182
 -0.00062436   -1.633      -0.74698      -0.88602
 -0.00041616   -1.089      -0.49699      -0.59201
```
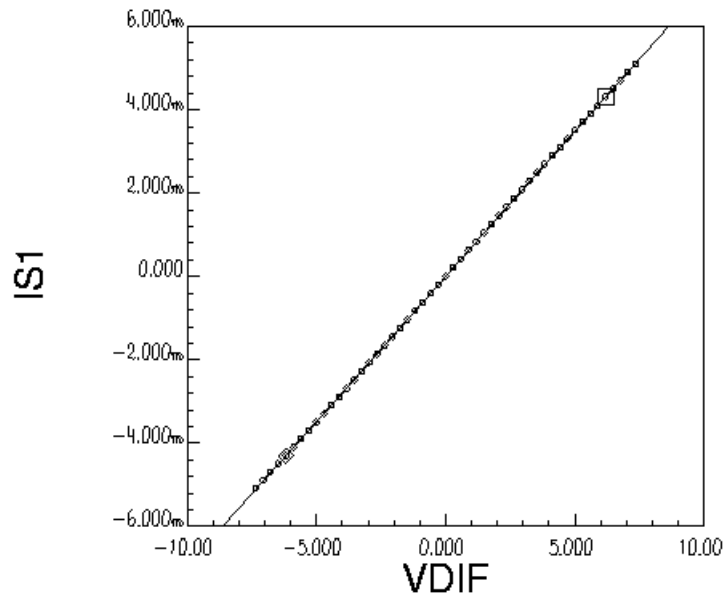
```
-0.00020795    -0.54498    -0.24799     -0.29699
 8.6897e-008    0.00099993 0.00099993    0
 0.00020785     0.54401     0.24999      0.29402
 0.00041595     1.089       0.49899      0.59001
 0.00062436     1.634       0.74899      0.88501
 0.00083262     2.178       0.99698      1.18102
 0.0010403      2.7219      1.246        1.4759
 0.001247       3.267       1.496        1.771
 0.0014545      3.8109      1.745        2.0659
 0.0016615      4.355       1.995        2.36
 0.0018685      4.8989      2.244        2.6549
 0.002075       5.4438      2.4929       2.9509
 0.0022805      5.989       2.7429       3.2461
 0.002485       6.533       2.9919       3.5411
 0.0026895      7.0769      3.2419       3.835
 0.002894       7.6208      3.491        4.1298
 0.0030975      8.1641      3.74         4.4241
 0.0033001      8.707       3.9889       4.7181
 0.0035015      9.251       4.239        5.012
 0.003702       9.7949      4.489        5.3059
 0.003903      10.339       4.739        5.6
 0.0041029     10.881       4.9868       5.8942
 0.0043015     11.425       5.2368       6.1882
 0.004499      11.968       5.4868       6.4812
 0.0046945     12.511       5.7368       6.7742
 0.0048904     13.054       5.9868       7.0672
 0.0050855     13.597       6.2368       7.3602
```

2c Plot

Device 2c: I vs V

Conditions:

Sweep: SMU1
ID: A
Start: −5.0000
Stop: 5.0000
Step: 250.00m
Points: 41

Const: SMU2
ID: X
Value: 0.0000

Fit #1:	Fit #2:	Cursors:	X	Y
Type: Cursor	None	□	2.5000	40.746m
Slope:16.274m	****	◇	−3.0000	−48.764m
Yint:58.638u	****	○		
Xint:−3.603m	****	⊠		
METRICS 11:38:53		⋈		
Software 05/05/97		△		

2c Data

```
PROJECT:NONAME        LOT:1 WAFER:1       DIE:1 DEV:1 USER: ;
COMMENT: ;


SETUP:"SAD"
DATA:


SETUP:"RESISTOR"
ID:   F1          UNIT: SMU2      START:      0         STOP: 1        PNTS: 1        STEP: 0
ID:   F2          UNIT: SMU3      START:      0         STOP: 1        PNTS: 1        STEP: 0
ID:   S2          UNIT: SMU4      START:      0         STOP: 1        PNTS: 1        STEP: 0
ID:   S1          UNIT: SMU1      START:      -20       STOP: 20       PNTS: 51       STEP: 0.8
DATA:
IS1            VF1          VF2           VDIF
 -0.0050864   -13.599      -6.2349       -7.3641
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 -0.0043011   -11.427      -5.2368       -6.1902
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 -0.0039035   -10.339      -4.7371       -5.6019
 -0.0037025    -9.7959     -4.488        -5.3079
 -0.0035015    -9.252      -4.238        -5.014
 -0.0033001    -8.709      -3.9889       -4.7201
 -0.0030975    -8.1641     -3.74         -4.4241
 -0.0028945    -7.6199     -3.49         -4.1299
 -0.0026901    -7.0759     -3.24         -3.8359
 -0.002485     -6.532      -2.991        -3.541
 -0.00228      -5.989      -2.7419       -3.2471
 -0.002075     -5.4438     -2.4929       -2.9509
 -0.001869     -4.8999     -2.2429       -2.657
 -0.001662     -4.354      -1.993        -2.361
 -0.001455     -3.8099     -1.743        -2.0669
 -0.0012475    -3.266      -1.494        -1.772
 -0.00104      -2.7219     -1.246        -1.4759
 -0.00083265   -2.178      -0.996        -1.182
 -0.00062436   -1.633      -0.74698      -0.88602
```
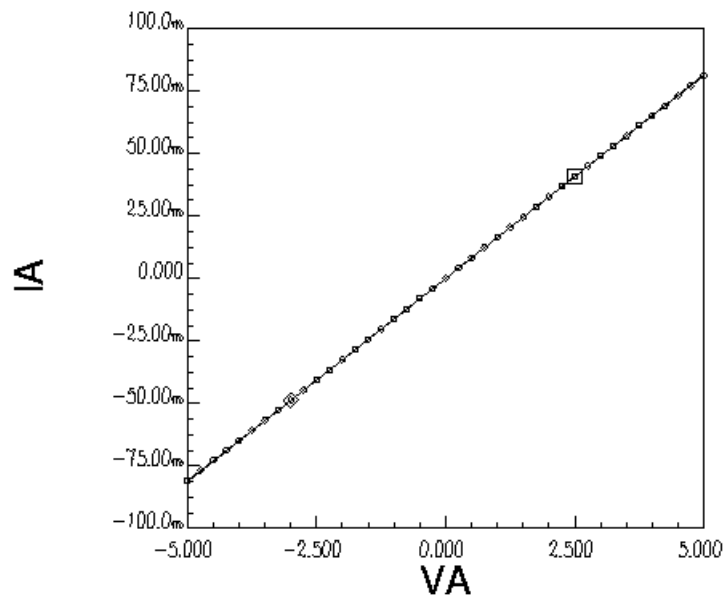
```
-0.00041616   -1.089       -0.49699     -0.59201
-0.00020795   -0.54498     -0.24799     -0.29699
 8.6897e-008   0.00099993   0.00099993   0
 0.00020785    0.54401      0.24999      0.29402
 0.00041595    1.089        0.49899      0.59001
 0.00062436    1.634        0.74899      0.88501
 0.00083262    2.178        0.99698      1.18102
 0.0010403     2.7219       1.246        1.4759
 0.001247      3.267        1.496        1.771
 0.0014545     3.8109       1.745        2.0659
 0.0016615     4.355        1.995        2.36
 0.0018685     4.8989       2.244        2.6549
 0.002075      5.4438       2.4929       2.9509
 0.0022805     5.989        2.7429       3.2461
 0.002485      6.533        2.9919       3.5411
 0.0026895     7.0769       3.2419       3.835
 0.002894      7.6208       3.491        4.1298
 0.0030975     8.1641       3.74         4.4241
 0.0033001     8.707        3.9889       4.7181
 0.0035015     9.251        4.239        5.012
 0.003702      9.7949       4.489        5.3059
 0.003903      10.339       4.739        5.6
 0.0041029     10.881       4.9868       5.8942
 0.0043015     11.425       5.2368       6.1882
 0.004499      11.968       5.4868       6.4812
 0.0046945     12.511       5.7368       6.7742
 0.0048904     13.054       5.9868       7.0672
 .0050855      13.597       6.2368       7.3602
```

SETUP:"RES2"

ID:	A	UNIT: SMU1	START:	-5	STOP: 5	PNTS: 41	STEP: 0.25
ID:	K	UNIT: SMU2	START:	0	STOP: 1	PNTS: 1	STEP: 0

DATA:

```
VA    IA
 -5          -0.080875
 -4.75       -0.07687
 -4.5        -0.072876
 -4.25       -0.068871
 -4          -0.064861
 -3.75       -0.060846
 -3.5        -0.056831
```

```
-3.25        -0.052801
-3           -0.048765
-2.75        -0.044725
-2.5         -0.040689
-2.25        -0.03664
-2           -0.032579
-1.75        -0.028521
-1.5         -0.024455
-1.25        -0.02038
-1           -0.01631
-0.75        -0.012225
-0.5         -0.0081482
-0.25        -0.0040674
 0            1.1565e-005
 0.25         0.0040901
 0.5          0.0081739
 0.75         0.01226
 1            0.01633
 1.25         0.020411
 1.5          0.02448
 1.75         0.028555
 2            0.032625
 2.25         0.036675
 2.5          0.040745
 2.75         0.044785
 3            0.048836
 3.25         0.052876
 3.5          0.056896
 3.75         0.060925
 4            0.064926
 4.25         0.068935
 4.5          0.072929
 4.75         0.076897
 5            0.080879
```

2d Plot

Device 2d: I vs V

Conditions:

Sweep: SMU1
VB: A
Start: -5.0000
Stop: 5.0000
Step: 0.0000
Points: 41

Const: SMU2
VB: X
Value: 0.0000

Fit #1:

| Type: Cursor |
| Slope: 7.2672n |
| Yint: -10.12n |
| Xint: 1.3923 |

Fit #2:

| None |
| **** |
| **** |
| **** |

METRICS   11:44:30
Software   05/05/97

Cursors: X   Y

	X	Y
□	2.5000	8.050n
◇	-3.0000	-31.92n
○		
⊠		
⋈		
△		

2d Data

PROJECT:NONAME   LOT:1 WAFER:1   DIE:1 DEV:1 USER: ;
COMMENT: ;

SETUP:"SAD"
DATA:

SETUP:"RESISTOR"
ID:	F1	UNIT: SMU2	START:	0	STOP: 1	PNTS: 1	STEP: 0
ID:	F2	UNIT: SMU3	START:	0	STOP: 1	PNTS: 1	STEP: 0
ID:	S2	UNIT: SMU4	START:	0	STOP: 1	PNTS: 1	STEP: 0
ID:	S1	UNIT: SMU1	START:	-20	STOP: 20	PNTS: 51	STEP: 0.8

DATA:
IS1	VF1	VF2	VDIF
-0.0050864	-13.599	-6.2349	-7.3641
-0.0048916	-13.056	-5.9849	-7.0711
-0.0046949	-12.513	-5.7358	-6.7772
-0.0044985	-11.97	-5.4858	-6.4842
-0.0043011	-11.427	-5.2368	-6.1902
-0.0041034	-10.883	-4.9868	-5.8962
-0.0039035	-10.339	-4.7371	-5.6019
-0.0037025	-9.7959	-4.488	-5.3079
-0.0035015	-9.252	-4.238	-5.014
-0.0033001	-8.709	-3.9889	-4.7201
-0.0030975	-8.1641	-3.74	-4.4241
-0.0028945	-7.6199	-3.49	-4.1299
-0.0026901	-7.0759	-3.24	-3.8359
-0.002485	-6.532	-2.991	-3.541
-0.00228	-5.989	-2.7419	-3.2471
-0.002075	-5.4438	-2.4929	-2.9509
-0.001869	-4.8999	-2.2429	-2.657
-0.001662	-4.354	-1.993	-2.361
-0.001455	-3.8099	-1.743	-2.0669
-0.0012475	-3.266	-1.494	-1.772
-0.00104	-2.7219	-1.246	-1.4759
-0.00083265	-2.178	-0.996	-1.182
-0.00062436	-1.633	-0.74698	-0.88602
-0.00041616	-1.089	-0.49699	-0.59201

```
-0.00020795  -0.54498    -0.24799   -0.29699
 8.6897e-008  0.00099993  0.00099993 0
 0.00020785   0.54401     0.24999    0.29402
 0.00041595   1.089       0.49899    0.59001
 0.00062436   1.634       0.74899    0.88501
 0.00083262   2.178       0.99698    1.18102
 0.0010403    2.7219      1.246      1.4759
 0.001247     3.267       1.496      1.771
 0.0014545    3.8109      1.745      2.0659
 0.0016615    4.355       1.995      2.36
 0.0018685    4.8989      2.244      2.6549
 0.002075     5.4438      2.4929     2.9509
 0.0022805    5.989       2.7429     3.2461
 0.002485     6.533       2.9919     3.5411
 0.0026895    7.0769      3.2419     3.835
 0.002894     7.6208      3.491      4.1298
 0.0030975    8.1641      3.74       4.4241
 0.0033001    8.707       3.9889     4.7181
 0.0035015    9.251       4.239      5.012
 0.003702     9.7949      4.489      5.3059
 0.003903    10.339       4.739      5.6
 0.0041029   10.881       4.9868     5.8942
 0.0043015   11.425       5.2368     6.1882
 0.004499    11.968       5.4868     6.4812
 0.0046945   12.511       5.7368     6.7742
 0.0048904   13.054       5.9868     7.0672
 0.0050855   13.597       6.2368     7.3602
```

```
SETUP:"RES2"
ID:   A          UNIT: SMU1    START:    -5     STOP: 5     PNTS: 41    STEP: 0
ID:   K          UNIT: SMU2    START:     0     STOP: 1     PNTS: 1     STEP: 0
DATA:
  VA       IA
 -5         1.87e-009
 -4.75     -7.6302e-009
 -4.5       3.575e-009
 -4.25      3.3e-010
 -4        -3.7149e-009
 -3.75     -1.946e-008
 -3.5      -3.1296e-008
 -3.25     -2.9921e-008
```

Appendix - 15

```
-3        -3.192e-008
-2.75     -2.5585e-008
-2.5      -1.688e-008
-2.25     -4.2351e-009
-2         1.1035e-008
-1.75      2.872e-008
-1.5      -1.4e-008
-1.25     -1.585e-009
-1         5.08e-009
-0.75     -7.075e-009
-0.5       3.285e-009
-0.25     -3.655e-009
 0         4.3999e-009
 0.25     -5.26e-009
 0.5       7.24e-009
 0.75     -3.015e-009
 1         3.9099e-009
 1.25     -4.52e-009
 1.5       5.9349e-009
 1.75     -3.255e-009
 2         4.54e-009
 2.25     -5.8501e-009
 2.5       8.0499e-009
 2.75     -3.52e-009
 3         4.645e-009
 3.25     -4.3051e-009
 3.5       6.145e-009
 3.75     -7.4399e-009
 4         3.355e-009
 4.25     -3.71e-009
 4.5       4.705e-009
 4.75     -5.73e-009
 5         1.0705e-008
```

3 Plot

Device 3: Field Oxide Sample

Conditions:

Sweep: CMX
ID: A
Start: −10.000
Stop: 10.000
Step: 200.00m
Points: 200.00m

Const: CML
ID: X
Value: 0.0000
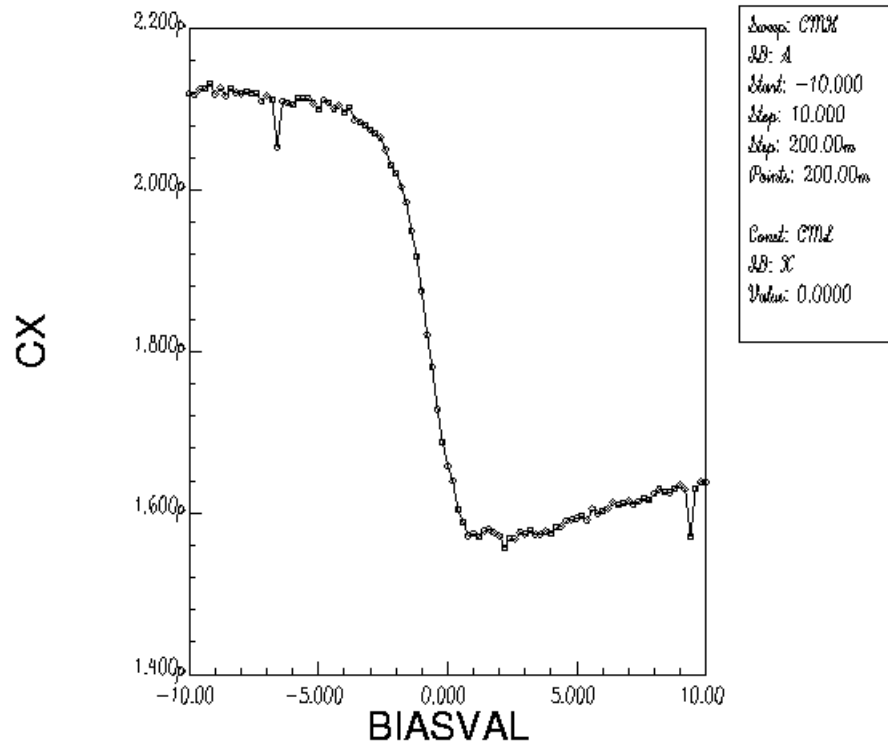
METRICS   16:56:07
Software   04/28/97

3 Data

```
PROJECT:NONAME      LOT:1 WAFER:1       DIE:1 DEV:1 USER: ;
COMMENT: ;


SETUP:"CAP"
ID: A           UNIT: CMH          START: -10          STOP: 10    POINTS: 101          STEP: 0.2
ID: K           UNIT: CML          START: 0            STOP: 0     POINTS: 0            STEP: 0
DATA:
 BIASVAL  CX
-10       2.11853e-012
-9.8      2.1179e-012
-9.6      2.12428e-012
-9.4      2.12482e-012
-9.2      2.13124e-012
-9        2.11832e-012
-8.8      2.12568e-012
-8.6      2.11629e-012
-8.4      2.12537e-012
-8.2      2.11997e-012
-8        2.11865e-012
-7.8      2.12113e-012
-7.6      2.11967e-012
-7.4      2.11912e-012
-7.2      2.10954e-012
-7        2.11651e-012
-6.8      2.11162e-012
-6.6      2.0528e-012
-6.4      2.10894e-012
-6.2      2.10736e-012
-6        2.10529e-012
-5.8      2.11315e-012
-5.6      2.11327e-012
-5.4      2.11292e-012
-5.2      2.10678e-012
-5        2.0996e-012
-4.8      2.11076e-012
-4.6      2.10729e-012
-4.4      2.10023e-012
-4.2      2.10418e-012
```

```
-4        2.09602e-012
-3.8      2.10218e-012
-3.6      2.08651e-012
-3.4      2.08385e-012
-3.2      2.07981e-012
-3        2.07465e-012
-2.8      2.06967e-012
-2.6      2.06444e-012
-2.4      2.04924e-012
-2.2      2.02997e-012
-2        2.02063e-012
-1.8      2.00366e-012
-1.6      1.9839e-012
-1.4      1.94889e-012
-1.2      1.91686e-012
-1        1.87439e-012
-0.8      1.82023e-012
-0.6      1.78052e-012
-0.4      1.72765e-012
-0.2      1.68753e-012
 0        1.65788e-012
 0.2      1.63925e-012
 0.4      1.60362e-012
 0.6      1.58835e-012
 0.8      1.57107e-012
 1        1.57438e-012
 1.2      1.56969e-012
 1.4      1.57745e-012
 1.6      1.5795e-012
 1.8      1.57563e-012
 2        1.57121e-012
 2.2      1.55675e-012
 2.4      1.5677e-012
 2.6      1.5673e-012
 2.8      1.57575e-012
 3        1.57369e-012
 3.2      1.57779e-012
 3.4      1.57311e-012
 3.6      1.57315e-012
 3.8      1.57675e-012
 4        1.57471e-012
```

```
 4.2        1.58164e-012
 4.4        1.58292e-012
 4.6        1.59035e-012
 4.8        1.59119e-012
 5          1.59303e-012
 5.2        1.59641e-012
 5.4        1.59081e-012
 5.6        1.6049e-012
 5.8        1.59904e-012
 6          1.60201e-012
 6.2        1.60502e-012
 6.4        1.61299e-012
 6.6        1.60972e-012
 6.8        1.61164e-012
 7          1.61452e-012
 7.2        1.61043e-012
 7.4        1.6138e-012
 7.6        1.61746e-012
 7.8        1.61552e-012
 8          1.62383e-012
 8.2        1.62922e-012
 8.4        1.62535e-012
 8.6        1.62498e-012
 8.8        1.63042e-012
 9          1.63466e-012
 9.2        1.62865e-012
 9.4        1.57007e-012
 9.6        1.63018e-012
 9.8        1.63816e-012
10          1.63734e-012
```

4 Plot (w/light)

Device 4: Gate Oxide w/ Light Sample

Conditions:
Sweep: CMX
ID: A
Start: -5.0000
Stop: 5.0000
Step: 100.00m
Points: 100.00m

Const: CML
ID: X
Value: 0.0000
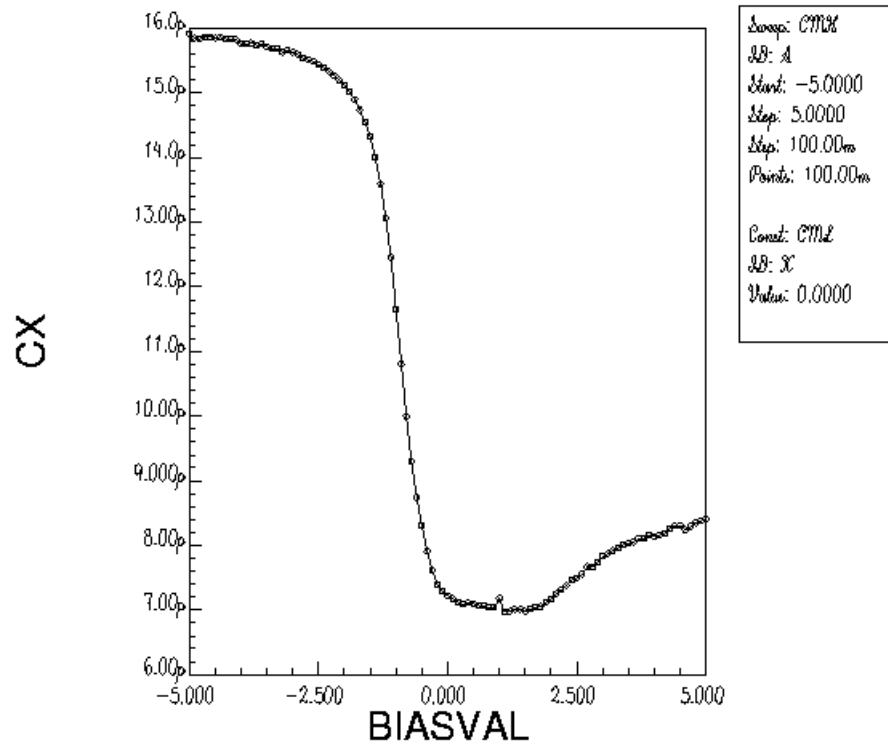
METRICS   16:39:38
Software   04/28/97

4 Data (w/light)

PROJECT:NONAME   LOT:1 WAFER:1   DIE:1 DEV:1 USER: ;
COMMENT: ;

SETUP:"CAP"
ID: A   UNIT: CMH   START: -5   STOP: 5   POINTS: 101   STEP: 0.1
ID: K   UNIT: CML   START: 0   STOP: 0   POINTS: 0   STEP: 0
DATA:
BIASVAL   CX
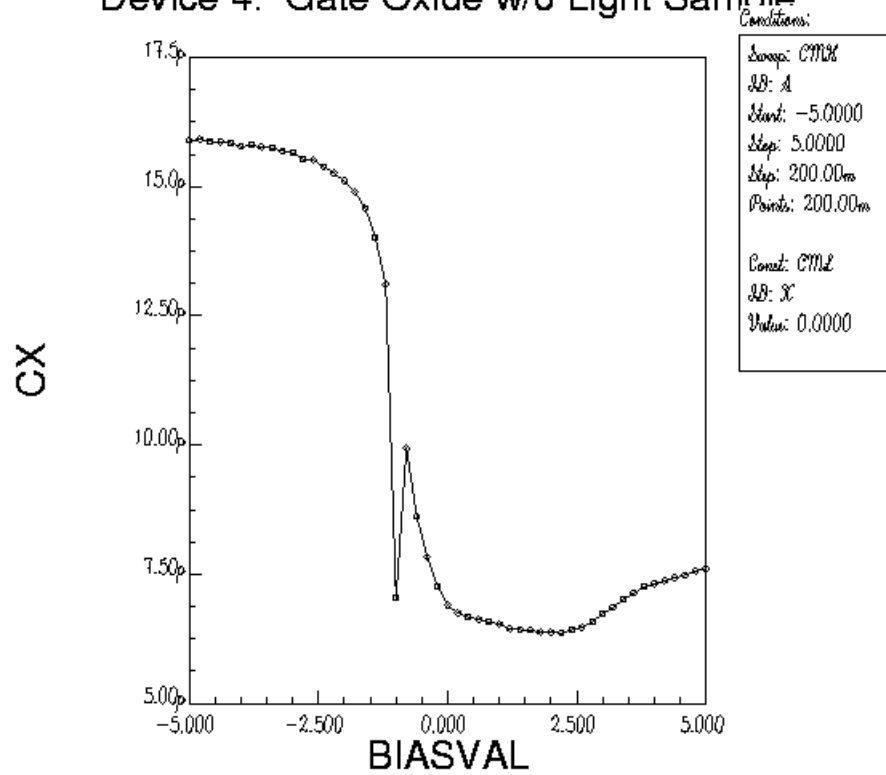 -5   1.59146e-011
 -4.9   1.58478e-011
 -4.8   1.58313e-011
 -4.7   1.5865e-011
 -4.6   1.5866e-011
 -4.5   1.58478e-011
 -4.4   1.58605e-011
 -4.3   1.58353e-011
 -4.2   1.583e-011
 -4.1   1.58188e-011
 -4   1.57583e-011
 -3.9   1.57574e-011
 -3.8   1.57688e-011
 -3.7   1.57312e-011
 -3.6   1.57595e-011
 -3.5   1.57142e-011
 -3.4   1.56843e-011
 -3.3   1.56875e-011
 -3.2   1.5625e-011
 -3.1   1.56534e-011
 -3   1.56231e-011
 -2.9   1.55965e-011
 -2.8   1.55302e-011
 -2.7   1.55146e-011
 -2.6   1.54853e-011
 -2.5   1.5428e-011
 -2.4   1.53924e-011
 -2.3   1.53274e-011
 -2.2   1.52693e-011
 -2.1   1.51999e-011

```
-2          1.51181e-011
-1.9        1.50214e-011
-1.8        1.48939e-011
-1.7        1.47356e-011
-1.6        1.45453e-011
-1.5        1.43181e-011
-1.4        1.40036e-011
-1.3        1.3587e-011
-1.2        1.30553e-011
-1.1        1.2448e-011
-1          1.16427e-011
-0.9        1.07955e-011
-0.8        9.9901e-012
-0.7        9.28859e-012
-0.6        8.73346e-012
-0.5        8.30063e-012
-0.4        7.90294e-012
-0.3        7.60561e-012
-0.2        7.38832e-012
-0.1        7.28348e-012
 0          7.21358e-012
 0.1        7.17409e-012
 0.2        7.11027e-012
 0.3        7.08122e-012
 0.4        7.10337e-012
 0.5        7.09155e-012
 0.6        7.06365e-012
 0.7        7.05564e-012
 0.8        7.03306e-012
 0.9        7.03578e-012
 1          7.17837e-012
 1.1        6.9701e-012
 1.2        6.97657e-012
 1.3        7.0049e-012
 1.4        7.00333e-012
 1.5        6.97537e-012
 1.6        7.01155e-012
 1.7        7.03683e-012
 1.8        7.04899e-012
 1.9        7.1141e-012
 2          7.16609e-012
```

```
2.1        7.24555e-012
2.2        7.30759e-012
2.3        7.37374e-012
2.4        7.45821e-012
2.5        7.49511e-012
2.6        7.55449e-012
2.7        7.66273e-012
2.8        7.66476e-012
2.9        7.73209e-012
3          7.82333e-012
3.1        7.86511e-012
3.2        7.91499e-012
3.3        7.95221e-012
3.4        8.00731e-012
3.5        8.02447e-012
3.6        8.04296e-012
3.7        8.1058e-012
3.8        8.10414e-012
3.9        8.15017e-012
4          8.13439e-012
4.1        8.14956e-012
4.2        8.18197e-012
4.3        8.25613e-012
4.4        8.29306e-012
4.5        8.29836e-012
4.6        8.23814e-012
4.7        8.28854e-012
4.8        8.3396e-012
4.9        8.37004e-012
5          8.40123e-012
```

4 Plot (w/o light)

Device 4: Gate Oxide w/o Light Sample

Conditions:

Sweep: CMX
AB: A
Start: -5.0000
Stop: 5.0000
Step: 200.00m
Points: 200.00m

Const: CML
AB: X
Value: 0.0000

METRICS Software   16:36:39   04/28/97

4 Data (w/o light)

```
PROJECT:NONAME        LOT:1 WAFER:1        DIE:1 DEV:1 USER: ;
COMMENT: ;

SETUP:"CAP"
ID: A         UNIT: CMH        START:       -5        STOP: 5        POINTS:    51        STEP: 0.2
ID: K         UNIT: CML        START:        0        STOP: 0        POINTS:     0        STEP: 0
DATA:
BIASVAL    CX
 -5        1.58872e-011
 -4.8      1.59071e-011
 -4.6      1.5874e-011
 -4.4      1.58579e-011
 -4.2      1.58394e-011
 -4        1.57717e-011
 -3.8      1.57995e-011
 -3.6      1.57629e-011
 -3.4      1.57354e-011
 -3.2      1.56862e-011
 -3        1.5639e-011
 -2.8      1.55311e-011
 -2.6      1.55055e-011
 -2.4      1.53787e-011
 -2.2      1.52547e-011
 -2        1.5108e-011
 -1.8      1.48881e-011
 -1.6      1.4583e-011
 -1.4      1.40119e-011
 -1.2      1.30978e-011
 -1        7.0378e-012
 -0.8      9.93746e-012
 -0.6      8.61293e-012
 -0.4      7.82983e-012
 -0.2      7.26977e-012
  0        6.89213e-012
  0.2      6.74328e-012
  0.4      6.66978e-012
  0.6      6.61639e-012
```
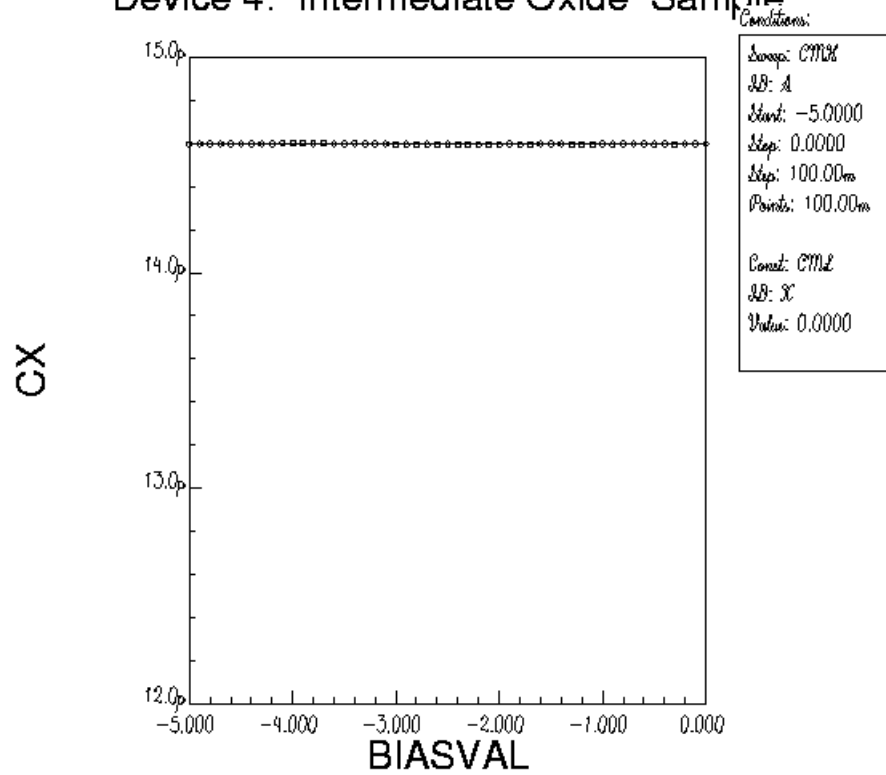
```
0.8     6.57529e-012
1       6.52769e-012
1.2     6.44377e-012
1.4     6.4277e-012
1.6     6.41084e-012
1.8     6.37449e-012
2       6.37592e-012
2.2     6.36317e-012
2.4     6.42511e-012
2.6     6.46573e-012
2.8     6.58088e-012
3       6.7289e-012
3.2     6.85906e-012
3.4     7.00933e-012
3.6     7.13157e-012
3.8     7.25094e-012
4       7.31095e-012
4.2     7.3734e-012
4.4     7.43029e-012
4.6     7.48133e-012
4.8     7.5559e-012
5       7.60204e-012
```

5 Plot

Device 4: Intermediate Oxide Sample

Conditions:

Sweep: CMX
AB: A
Start: -5.0000
Stop: 0.0000
Step: 100.00m
Points: 100.00m

Const: CML
AB: X
Value: 0.0000

CX

BIASVAL

METRICS   16:41:36
Software   04/28/97

5 Data

```
PROJECT:NONAME     LOT:1 WAFER:1      DIE:1 DEV:1 USER: ;
COMMENT: ;

SETUP:"CAP"
ID: A        UNIT: CMH        START:      -5        STOP: 0        POINTS:    51        STEP: 0.1
ID: K        UNIT: CML        START:       0        STOP: 0        POINTS:     0        STEP: 0
DATA:
BIASVAL     CX
-5    1.45968e-011
-4.9  1.45976e-011
-4.8  1.45967e-011
-4.7  1.45971e-011
-4.6  1.45977e-011
-4.5  1.45965e-011
-4.4  1.45971e-011
-4.3  1.45967e-011
-4.2  1.45971e-011
-4.1  1.45979e-011
-4    1.45982e-011
-3.9  1.45978e-011
-3.8  1.45989e-011
-3.7  1.45982e-011
-3.6  1.45976e-011
-3.5  1.45975e-011
-3.4  1.45989e-011
-3.3  1.45976e-011
-3.2  1.4597e-011
-3.1  1.45967e-011
-3    1.45957e-011
-2.9  1.45948e-011
-2.8  1.4595e-011
-2.7  1.4595e-011
-2.6  1.45956e-011
-2.5  1.45953e-011
-2.4  1.45956e-011
-2.3  1.45954e-011
-2.2  1.45959e-011
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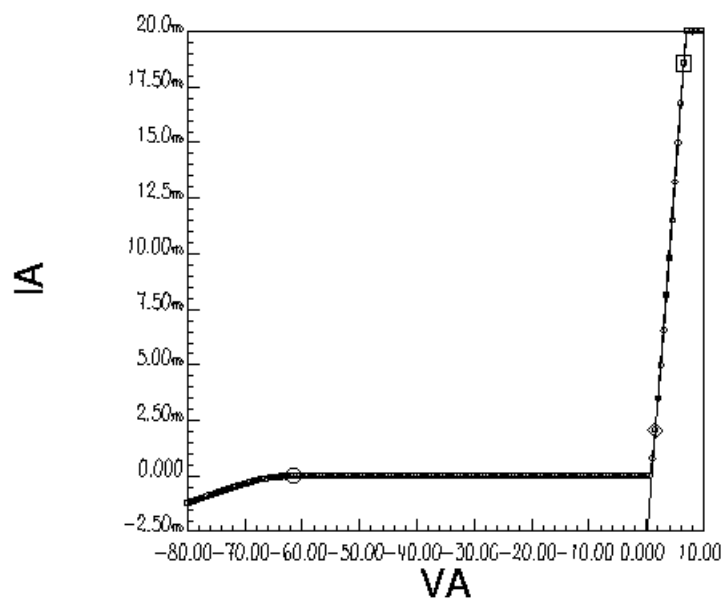
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-2.1  1.45955e-011
-2    1.45959e-011
-1.9  1.45965e-011
-1.8  1.45959e-011
-1.7  1.45957e-011
-1.6  1.45961e-011
-1.5  1.45962e-011
-1.4  1.45964e-011
-1.3  1.4596e-011
-1.2  1.4596e-011
-1.1  1.4596e-011
-1    1.45962e-011
-0.9  1.45957e-011
-0.8  1.45961e-011
-0.7  1.45963e-011
-0.6  1.45961e-011
-0.5  1.4596e-011
-0.4  1.45965e-011
-0.3  1.45958e-011
-0.2  1.45963e-011
-0.1  1.45963e-011
0     1.45966e-011
```

7 Plot A

Device 7: I vs V

Fit #1:	Fit #2:	Cursors:	X	Y
Type: Cursor	None	□	6.5000	18.56m
Slope: 3.301m	****	◇	1.5000	2.0554m
Yint: −2.896m	****	○	−61.500	−767.02n
Xint: 877.3m	****	⊠		
METRICS 11:01:52		⋈		
Software 04/29/97		△		

7 Data A

PROJECT:NONAME   LOT:1 WAFER:1   DIE:1 DEV:1 USER: ;
COMMENT:;

SETUP:"MOSFET"

ID:	D	UNIT: SMU1	START:	0.05	STOP: 5	PNTS: 2	STEP: 4.95
ID:	G	UNIT: SMU2	START:	0	STOP: 12	PNTS: 121	STEP: 0.1
ID:	S	UNIT: SMU3	START:	0	STOP: 1	PNTS: 1	STEP: 0
ID:	B	UNIT: SMU4	START:	0	STOP: -3	PNTS: 4	STEP: -1

DATA:

VD	ID	VD2	ID2	VG	R	R2
0.05	4.2801e-009	5	5.3849e-009	0	1.1682e+007	9.28522e+008
0.05	4.2451e-009	5	5.3899e-009	0.1	1.17783e+007	9.27661e+008
0.05	4.4899e-009	5	5.3201e-009	0.2	1.11361e+007	9.39832e+008
0.05	4.7751e-009	5	5.555e-009	0.3	1.0471e+007	9.0009e+008
0.05	5.585e-009	5	7.145e-009	0.4	8.95255e+006	6.9979e+008
0.05	1.2125e-008	5	1.7055e-008	0.5	4.12371e+006	2.93169e+008
0.05	3.778e-008	5	5.714e-008	0.6	1.32345e+006	8.75044e+007
0.05	8.8399e-008	5	1.6054e-007	0.7	565617	3.11449e+007
0.05	1.562e-007	5	3.5074e-007	0.8	320102	1.42556e+007
0.05	2.3405e-007	5	6.4383e-007	0.9	213630	7.76603e+006
0.05	3.171e-007	5	1.047e-006	1	157679	4.77555e+006
0.05	4.0264e-007	5	1.5645e-006	1.1	124180	3.19591e+006
0.05	4.8935e-007	5	2.2009e-006	1.2	102176	2.2718e+006
0.05	5.762e-007	5	2.956e-006	1.3	86775.4	1.69148e+006
0.05	6.6348e-007	5	3.8284e-006	1.4	75360.2	1.30603e+006
0.05	7.4925e-007	5	4.8205e-006	1.5	66733.4	1.03724e+006
0.05	8.3423e-007	5	5.9304e-006	1.6	59935.5	843113
0.05	9.1974e-007	5	7.1565e-006	1.7	54363.2	698666
0.05	1.0042e-006	5	8.4979e-006	1.8	49790.9	588381
0.05	1.0865e-006	5	9.9596e-006	1.9	46019.3	502028
0.05	1.1685e-006	5	1.1535e-005	2	42789.9	433463
0.05	1.25e-006	5	1.322e-005	2.1	40000	378215
0.05	1.331e-006	5	1.502e-005	2.2	37565.7	332889
0.05	1.411e-006	5	1.693e-005	2.3	35435.9	295334
0.05	1.4915e-006	5	1.8955e-005	2.4	33523.3	263783
0.05	1.57e-006	5	2.1085e-005	2.5	31847.1	237135
0.05	1.6475e-006	5	2.3325e-005	2.6	30349	214362
0.05	1.7275e-006	5	2.5675e-005	2.7	28943.6	194742

0.05	1.8035e-006	5	2.8125e-005	2.8	27723.9	177778
0.05	1.8795e-006	5	3.068e-005	2.9	26602.8	162973
0.05	1.9554e-006	5	3.3345e-005	3	25570.2	149948
0.05	2.0334e-006	5	3.6109e-005	3.1	24589.4	138470
0.05	2.1055e-006	5	3.898e-005	3.2	23747.3	128271
0.05	2.1785e-006	5	4.1949e-005	3.3	22951.6	119192
0.05	2.251e-006	5	4.5015e-005	3.4	22212.3	111074
0.05	2.3245e-006	5	4.8179e-005	3.5	21510	103780
0.05	2.3959e-006	5	5.1444e-005	3.6	20869	97193.1
0.05	2.468e-006	5	5.4814e-005	3.7	20259.3	91217.6
0.05	2.539e-006	5	5.8269e-005	3.8	19692.8	85808.9
0.05	2.609e-006	5	6.1821e-005	3.9	19164.4	80878.7
0.05	2.6805e-006	5	6.5468e-005	4	18653.2	76373.2
0.05	2.7515e-006	5	6.9216e-005	4.1	18171.9	72237.6
0.05	2.822e-006	5	7.3038e-005	4.2	17717.9	68457.5
0.05	2.892e-006	5	7.6964e-005	4.3	17289.1	64965.4
0.05	2.9624e-006	5	8.0984e-005	4.4	16878.2	61740.6
0.05	3.0354e-006	5	8.5089e-005	4.5	16472.3	58762
0.05	3.1055e-006	5	8.9284e-005	4.6	16100.5	56001.1
0.05	3.1759e-006	5	9.3575e-005	4.7	15743.6	53433.1
0.05	3.253e-006	5	9.7949e-005	4.8	15370.4	51047
0.05	3.3255e-006	5	0.00010242	4.9	15035.3	48818.6
0.05	3.4025e-006	5	0.00010695	5	14695.1	46750.8
0.05	3.4779e-006	5	0.00011155	5.1	14376.5	44823
0.05	3.555e-006	5	0.0001163	5.2	14064.7	42992.3
0.05	3.631e-006	5	0.0001211	5.3	13770.3	41288.2
0.05	3.7055e-006	5	0.000126	5.4	13493.5	39682.5
0.05	3.7829e-006	5	0.00013095	5.5	13217.4	38182.5
0.05	3.858e-006	5	0.00013605	5.6	12960.1	36751.2
0.05	3.9355e-006	5	0.00014115	5.7	12704.9	35423.3
0.05	4.011e-006	5	0.0001464	5.8	12465.7	34153
0.05	4.0894e-006	5	0.0001517	5.9	12226.7	32959.8
0.05	4.1665e-006	5	0.0001571	6	12000.5	31826.9
0.05	4.2415e-006	5	0.00016255	6.1	11788.3	30759.8
0.05	4.3195e-006	5	0.0001681	6.2	11575.4	29744.2
0.05	4.3965e-006	5	0.0001737	6.3	11372.7	28785.3
0.05	4.4711e-006	5	0.0001794	6.4	11182.9	27870.7
0.05	4.5484e-006	5	0.00018515	6.5	10992.9	27005.1
0.05	4.6245e-006	5	0.0001909	6.6	10812	26191.7
0.05	4.7004e-006	5	0.0001968	6.7	10637.4	25406.5
0.05	4.7765e-006	5	0.00020275	6.8	10467.9	24660.9

0.05	4.852e-006	5	0.00020875	6.9	10305	23952.1
0.05	4.926e-006	5	0.0002148	7	10150.2	23277.5
0.05	5.0005e-006	5	0.00022095	7.1	9999	22629.6
0.05	5.078e-006	5	0.0002271	7.2	9846.4	22016.7
0.05	5.154e-006	5	0.00023326	7.3	9701.2	21435.3
0.05	5.2275e-006	5	0.0002395	7.4	9564.8	20876.8
0.05	5.3025e-006	5	0.00024575	7.5	9429.51	20345.9
0.05	5.3749e-006	5	0.00025201	7.6	9302.5	19840.5
0.05	5.4489e-006	5	0.00025836	7.7	9176.16	19352.8
0.05	5.5209e-006	5	0.0002647	7.8	9056.49	18889.3
0.05	5.5949e-006	5	0.00027101	7.9	8936.71	18449.5
0.05	5.6699e-006	5	0.0002773	8	8818.5	18031
0.05	5.7418e-006	5	0.00028366	8.1	8708.07	17626.7
0.05	5.8175e-006	5	0.00028995	8.2	8594.76	17244.4
0.05	5.8895e-006	5	0.00029631	8.3	8489.69	16874.2
0.05	5.963e-006	5	0.0003026	8.4	8385.04	16523.5
0.05	6.0329e-006	5	0.00030895	8.5	8287.89	16183.8
0.05	6.1074e-006	5	0.00031525	8.6	8186.79	15860.4
0.05	6.1789e-006	5	0.00032155	8.7	8092.06	15549.7
0.05	6.2524e-006	5	0.00032786	8.8	7996.93	15250.4
0.05	6.3235e-006	5	0.00033416	8.9	7907.01	14962.9
0.05	6.3963e-006	5	0.0003404	9	7817.02	14688.6
0.05	6.465e-006	5	0.00034671	9.1	7733.95	14421.3
0.05	6.536e-006	5	0.00035295	9.2	7649.94	14166.3
0.05	6.6094e-006	5	0.00035921	9.3	7564.98	13919.4
0.05	6.6794e-006	5	0.00036545	9.4	7485.7	13681.8
0.05	6.75e-006	5	0.00037171	9.5	7407.41	13451.3
0.05	6.821e-006	5	0.00037791	9.6	7330.3	13230.7
0.05	6.8934e-006	5	0.00038415	9.7	7253.31	13015.7
0.05	6.9623e-006	5	0.00039035	9.8	7181.53	12809
0.05	7.0329e-006	5	0.00039651	9.9	7109.44	12610
0.05	7.1034e-006	5	0.0004027	10	7038.88	12416.2
0.05	7.1723e-006	5	0.0004089	10.1	6971.26	12227.9
0.05	7.2394e-006	5	0.000415	10.2	6906.65	12048.2
0.05	7.3109e-006	5	0.0004212	10.3	6839.1	11870.8
0.05	7.3789e-006	5	0.00042735	10.4	6776.08	11700
0.05	7.4504e-006	5	0.0004335	10.5	6711.05	11534
0.05	7.5179e-006	5	0.0004396	10.6	6650.79	11374
0.05	7.5859e-006	5	0.00044571	10.7	6591.18	11218.1
0.05	7.6518e-006	5	0.00045185	10.8	6534.41	11065.6
0.05	7.7225e-006	5	0.00045796	10.9	6474.59	10918

```
0.05   7.7947e-006    5    0.00046405    11     6414.62    10774.7
0.05   7.8608e-006    5    0.0004701     11.1   6360.68    10636
0.05   7.926e-006     5    0.0004762     11.2   6308.35    10499.8
0.05   7.9935e-006    5    0.00048231    11.3   6255.08    10366.8
0.05   8.0606e-006    5    0.00048834    11.4   6203.01    10238.8
0.05   8.1304e-006    5    0.00049439    11.5   6149.76    10113.5
0.05   8.2003e-006    5    0.00050044    11.6   6097.34     9991.21
0.05   8.265e-006     5    0.00050649    11.7   6049.61     9871.86
0.05   8.3326e-006    5    0.00051254    11.8   6000.53     9755.34
0.05   8.3973e-006    5    0.00051856    11.9   5954.29     9642.09
0.05   8.4662e-006    5    0.00052461    12     5905.84     9530.89

SETUP:"DIODE"
ID:    A          UNIT: SMU2      START:      -80      STOP: 20     PNTS: 201     STEP: 0.5
ID:    K          UNIT: SMU1      START:       0       STOP: 1      PNTS: 1       STEP: 0
DATA:
VA         IA
-80        -0.001237
-79.5      -0.001191
-79        -0.001143
-78.5      -0.0010955
-78        -0.001049
-77.5      -0.0010012
-77        -0.00095606
-76.5      -0.00091076
-76        -0.00086525
-75.5      -0.00082052
-75        -0.00077584
-74.5      -0.00073194
-74        -0.00068819
-73.5      -0.00064465
-73        -0.00060207
-72.5      -0.00056079
-72        -0.00051954
-71.5      -0.00047891
-71        -0.0004399
-70.5      -0.00039905
-70        -0.00036155
-69.5      -0.00032155
-69        -0.00027931
-68.5      -0.00023905
```

```
-68        -0.00020245
-67.5      -0.0001729
-67        -0.0001506
-66.5      -0.0001297
-66        -0.00010745
-65.5      -7.8846e-005
-65        -6.495e-005
-64.5      -5.4795e-005
-64        -4.6125e-005
-63.5      -3.5524e-005
-63        -2.803e-005
-62.5      -1.712e-005
-62        -1.983e-006
-61.5      -7.6703e-007
-61         6.8632e-007
-60.5      -8.1272e-007
-60         8.042e-007
-59.5      -7.4753e-007
-59         4.4139e-007
-58.5      -1.977e-007
-58         5.3149e-008
-57.5       5.7905e-007
-57        -7.3138e-007
-56.5       7.5795e-007
-56        -8.4849e-007
-55.5       8.4014e-007
-55        -7.6709e-007
-54.5       5.4913e-007
-54        -2.819e-007
-53.5       7.0999e-008
-53         4.0054e-007
-52.5      -7.2448e-007
-52         7.2282e-007
-51.5      -8.5533e-007
-51         8.3344e-007
-50.5      -7.8679e-007
-50         6.2692e-007
-49.5      -3.3354e-007
-49         9.8098e-008
-48.5       2.3225e-007
-48        -6.636e-007
```

```
-47.5      6.9418e-007
-47       -8.8822e-007
-46.5      8.418e-007
-46       -7.6103e-007
-45.5      5.2823e-007
-45       -2.8525e-007
-44.5      8.0799e-008
-44        2.6499e-007
-43.5     -6.4389e-007
-43        6.8239e-007
-42.5     -8.1278e-007
-42        8.4098e-007
-41.5     -8.4922e-007
-41        6.8248e-007
-40.5     -5.0245e-007
-40        1.682e-007
-39.5     -1.099e-007
-39       -1.4095e-007
-38.5      5.9794e-007
-38       -7.3874e-007
-37.5      7.6473e-007
-37       -8.7818e-007
-36.5      8.2707e-007
-36       -7.5149e-007
-35.5      5.429e-007
-35       -2.2165e-007
-34.5      7.1199e-008
-34        3.3279e-007
-33.5     -6.8772e-007
-33        7.0603e-007
-32.5     -7.9049e-007
-32        8.4153e-007
-31.5     -8.1229e-007
-31        6.5024e-007
-30.5     -4.3244e-007
-30        1.492e-007
-29.5     -8.2098e-008
-29       -5.9375e-007
-28.5      7.0804e-007
-28       -8.1054e-007
-27.5      8.4314e-007
```

```
-27        -6.6444e-007
-26.5       3.045e-007
-26        -1.2785e-007
-25.5       1.21e-008
-25         7.003e-007
-24.5      -7.2009e-007
-24         7.6293e-007
-23.5      -8.5353e-007
-23         7.9878e-007
-22.5      -7.2818e-007
-22         5.014e-007
-21.5      -1.286e-007
-21         2.575e-008
-20.5       6.2585e-007
-20        -7.278e-007
-19.5       8.0987e-007
-19        -8.7238e-007
-18.5       7.9148e-007
-18        -6.842e-007
-17.5       4.0609e-007
-17        -1.5995e-007
-16.5       5.2549e-008
-16         5.7655e-007
-15.5      -7.3333e-007
-15         7.5562e-007
-14.5      -8.3257e-007
-14         8.526e-007
-13.5      -7.7602e-007
-13         6.2433e-007
-12.5      -3.2215e-007
-12         1.0715e-007
-11.5      -2.26e-008
-11        -7.1604e-007
-10.5       7.2975e-007
-10        -8.4319e-007
 -9.5       8.4709e-007
- 9        -7.9529e-007
 -8.5       6.4703e-007
 -8        -4.098e-007
 -7.5       1.366e-007
 -7        -7.2399e-008
```

```
-6.5    -6.0754e-007
-6       6.9919e-007
-5.5    -7.7643e-007
-5       8.6124e-007
-4.5    -8.5684e-007
-4       7.2949e-007
-3.5    -5.1153e-007
-3       1.7889e-007
-2.5    -8.16e-008
-2      -5.0178e-007
-1.5     7.216e-007
-1      -7.3208e-007
-0.5     8.4459e-007
 0      -8.4587e-007
 0.5     3.567e-006
 1       0.00077614
 1.5     0.0020555
 2       0.0034756
 2.5     0.0049741
 3       0.0065296
 3.5     0.0081368
 4       0.0097828
 4.5     0.01149
 5       0.01321
 5.5     0.014965
 6       0.01675
 6.5     0.01856
 7       0.020005
 7.5     0.020005
 8       0.02
 8.5     0.02
 9       0.020005
 9.5     0.02
10       0.020005
10.5     0.020005
11       0.02
11.5     0.02
12       0.02
12.5     0.02
13       0.02
13.5     0.02
```

```
14       0.02
14.5     0.02
15       0.02
15.5     0.02
16       0.02
16.5     0.02
17       0.02
17.5     0.02
18       0.02
18.5     0.02
19       0.020005
19.5     0.02
20       0.02
```

7 Plot B

Device 7: I vs V
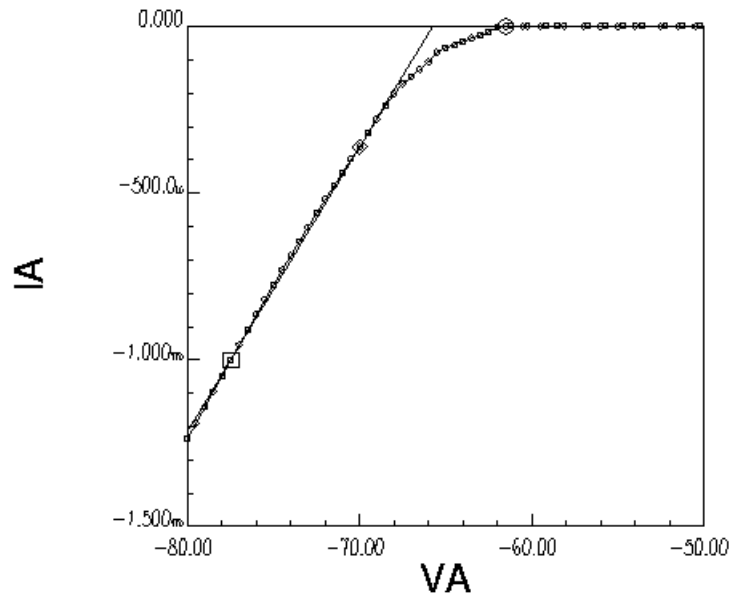
Conditions:

Sweep: SMU2
ID: A
Start: -80.000
Stop: 20.000
Step: 500.00m
Points: 201

Const: SMU1
ID: X
Value: 0.0000

Fit #1:	Fit #2:	Cursors:	X	Y
Type: Cursor	None	□	-77.500	-1.0012m
Slope:85.287u	****	◇	-70.000	-361.54u
Yint:5.6086m	****	○	-61.500	-767.02n
Xint:-65.760	****	⊠		
METRICS	11:02:48	⋈		
Software	04/29/97	△		

7 Data B

PROJECT:NONAME   LOT:1 WAFER:1   DIE:1 DEV:1 USER: ;
COMMENT:;

SETUP:"MOSFET"

ID:	D	UNIT: SMU1	START:	0.05	STOP: 5	PNTS: 2	STEP: 4.95
ID:	G	UNIT: SMU2	START:	0	STOP: 12	PNTS: 121	STEP: 0.1
ID:	S	UNIT: SMU3	START:	0	STOP: 1	PNTS: 1	STEP: 0
ID:	B	UNIT: SMU4	START:	0	STOP: -3	PNTS: 4	STEP: -1

DATA:

VD	ID	VD2	ID2	VG	R	R2
0.05	4.2801e-009	5	5.3849e-009	0	1.1682e+007	9.28522e+008
0.05	4.2451e-009	5	5.3899e-009	0.1	1.17783e+007	9.27661e+008
0.05	4.4899e-009	5	5.3201e-009	0.2	1.11361e+007	9.39832e+008
0.05	4.7751e-009	5	5.555e-009	0.3	1.0471e+007	9.0009e+008
0.05	5.585e-009	5	7.145e-009	0.4	8.95255e+006	6.9979e+008
0.05	1.2125e-008	5	1.7055e-008	0.5	4.12371e+006	2.93169e+008
0.05	3.778e-008	5	5.714e-008	0.6	1.32345e+006	8.75044e+007
0.05	8.8399e-008	5	1.6054e-007	0.7	565617	3.11449e+007
0.05	1.562e-007	5	3.5074e-007	0.8	320102	1.42556e+007
0.05	2.3405e-007	5	6.4383e-007	0.9	213630	7.76603e+006
0.05	3.171e-007	5	1.047e-006	1	157679	4.77555e+006
0.05	4.0264e-007	5	1.5645e-006	1.1	124180	3.19591e+006
0.05	4.8935e-007	5	2.2009e-006	1.2	102176	2.2718e+006
0.05	5.762e-007	5	2.956e-006	1.3	86775.4	1.69148e+006
0.05	6.6348e-007	5	3.8284e-006	1.4	75360.2	1.30603e+006
0.05	7.4925e-007	5	4.8205e-006	1.5	66733.4	1.03724e+006
0.05	8.3423e-007	5	5.9304e-006	1.6	59935.5	843113
0.05	9.1974e-007	5	7.1565e-006	1.7	54363.2	698666
0.05	1.0042e-006	5	8.4979e-006	1.8	49790.9	588381
0.05	1.0865e-006	5	9.9596e-006	1.9	46019.3	502028
0.05	1.1685e-006	5	1.1535e-005	2	42789.9	433463
0.05	1.25e-006	5	1.322e-005	2.1	40000	378215
0.05	1.331e-006	5	1.502e-005	2.2	37565.7	332889
0.05	1.411e-006	5	1.693e-005	2.3	35435.9	295334
0.05	1.4915e-006	5	1.8955e-005	2.4	33523.3	263783
0.05	1.57e-006	5	2.1085e-005	2.5	31847.1	237135
0.05	1.6475e-006	5	2.3325e-005	2.6	30349	214362
0.05	1.7275e-006	5	2.5675e-005	2.7	28943.6	194742

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0.05   1.8035e-006 5      2.8125e-005 2.8    27723.9    177778
0.05   1.8795e-006 5      3.068e-005  2.9    26602.8    162973
0.05   1.9554e-006 5      3.3345e-005 3      25570.2    149948
0.05   2.0334e-006 5      3.6109e-005 3.1    24589.4    138470
0.05   2.1055e-006 5      3.898e-005  3.2    23747.3    128271
0.05   2.1785e-006 5      4.1949e-005 3.3    22951.6    119192
0.05   2.251e-006  5      4.5015e-005 3.4    22212.3    111074
0.05   2.3245e-006 5      4.8179e-005 3.5    21510 103780
0.05   2.3959e-006 5      5.1444e-005 3.6    20869 97193.1
0.05   2.468e-006  5      5.4814e-005 3.7    20259.3    91217.6
0.05   2.539e-006  5      5.8269e-005 3.8    19692.8    85808.9
0.05   2.609e-006  5      6.1821e-005 3.9    19164.4    80878.7
0.05   2.6805e-006 5      6.5468e-005 4      18653.2    76373.2
0.05   2.7515e-006 5      6.9216e-005 4.1    18171.9    72237.6
0.05   2.822e-006  5      7.3038e-005 4.2    17717.9    68457.5
0.05   2.892e-006  5      7.6964e-005 4.3    17289.1    64965.4
0.05   2.9624e-006 5      8.0984e-005 4.4    16878.2    61740.6
0.05   3.0354e-006 5      8.5089e-005 4.5    16472.3    58762
0.05   3.1055e-006 5      8.9284e-005 4.6    16100.5    56001.1
0.05   3.1759e-006 5      9.3575e-005 4.7    15743.6    53433.1
0.05   3.253e-006  5      9.7949e-005 4.8    15370.4    51047
0.05   3.3255e-006 5      0.00010242  4.9    15035.3    48818.6
0.05   3.4025e-006 5      0.00010695  5      14695.1    46750.8
0.05   3.4779e-006 5      0.00011155  5.1    14376.5    44823
0.05   3.555e-006  5      0.0001163   5.2    14064.7    42992.3
0.05   3.631e-006  5      0.0001211   5.3    13770.3    41288.2
0.05   3.7055e-006 5      0.000126    5.4    13493.5    39682.5
0.05   3.7829e-006 5      0.00013095  5.5    13217.4    38182.5
0.05   3.858e-006  5      0.00013605  5.6    12960.1    36751.2
0.05   3.9355e-006 5      0.00014115  5.7    12704.9    35423.3
0.05   4.011e-006  5      0.0001464   5.8    12465.7    34153
0.05   4.0894e-006 5      0.0001517   5.9    12226.7    32959.8
0.05   4.1665e-006 5      0.0001571   6      12000.5    31826.9
0.05   4.2415e-006 5      0.00016255  6.1    11788.3    30759.8
0.05   4.3195e-006 5      0.0001681   6.2    11575.4    29744.2
0.05   4.3965e-006 5      0.0001737   6.3    11372.7    28785.3
0.05   4.4711e-006 5      0.0001794   6.4    11182.9    27870.7
0.05   4.5484e-006 5      0.00018515  6.5    10992.9    27005.1
0.05   4.6245e-006 5      0.0001909   6.6    10812 26191.7
0.05   4.7004e-006 5      0.0001968   6.7    10637.4    25406.5
0.05   4.7765e-006 5      0.00020275  6.8    10467.9    24660.9
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0.05   4.852e-006   5   0.00020875   6.9    10305  23952.1
0.05   4.926e-006   5   0.0002148    7      10150.2      23277.5
0.05   5.0005e-006  5   0.00022095   7.1    9999   22629.6
0.05   5.078e-006   5   0.0002271    7.2    9846.4       22016.7
0.05   5.154e-006   5   0.00023326   7.3    9701.2       21435.3
0.05   5.2275e-006  5   0.0002395    7.4    9564.8       20876.8
0.05   5.3025e-006  5   0.00024575   7.5    9429.51      20345.9
0.05   5.3749e-006  5   0.00025201   7.6    9302.5       19840.5
0.05   5.4489e-006  5   0.00025836   7.7    9176.16      19352.8
0.05   5.5209e-006  5   0.0002647    7.8    9056.49      18889.3
0.05   5.5949e-006  5   0.00027101   7.9    8936.71      18449.5
0.05   5.6699e-006  5   0.0002773    8      8818.5       18031
0.05   5.7418e-006  5   0.00028366   8.1    8708.07      17626.7
0.05   5.8175e-006  5   0.00028995   8.2    8594.76      17244.4
0.05   5.8895e-006  5   0.00029631   8.3    8489.69      16874.2
0.05   5.963e-006   5   0.0003026    8.4    8385.04      16523.5
0.05   6.0329e-006  5   0.00030895   8.5    8287.89      16183.8
0.05   6.1074e-006  5   0.00031525   8.6    8186.79      15860.4
0.05   6.1789e-006  5   0.00032155   8.7    8092.06      15549.7
0.05   6.2524e-006  5   0.00032786   8.8    7996.93      15250.4
0.05   6.3235e-006  5   0.00033416   8.9    7907.01      14962.9
0.05   6.3963e-006  5   0.0003404    9      7817.02      14688.6
0.05   6.465e-006   5   0.00034671   9.1    7733.95      14421.3
0.05   6.536e-006   5   0.00035295   9.2    7649.94      14166.3
0.05   6.6094e-006  5   0.00035921   9.3    7564.98      13919.4
0.05   6.6794e-006  5   0.00036545   9.4    7485.7       13681.8
0.05   6.75e-006    5   0.00037171   9.5    7407.41      13451.3
0.05   6.821e-006   5   0.00037791   9.6    7330.3       13230.7
0.05   6.8934e-006  5   0.00038415   9.7    7253.31      13015.7
0.05   6.9623e-006  5   0.00039035   9.8    7181.53      12809
0.05   7.0329e-006  5   0.00039651   9.9    7109.44      12610
0.05   7.1034e-006  5   0.0004027    10     7038.88      12416.2
0.05   7.1723e-006  5   0.0004089    10.1   6971.26      12227.9
0.05   7.2394e-006  5   0.000415     10.2   6906.65      12048.2
0.05   7.3109e-006  5   0.0004212    10.3   6839.1       11870.8
0.05   7.3789e-006  5   0.00042735   10.4   6776.08      11700
0.05   7.4504e-006  5   0.0004335    10.5   6711.05      11534
0.05   7.5179e-006  5   0.0004396    10.6   6650.79      11374
0.05   7.5859e-006  5   0.00044571   10.7   6591.18      11218.1
0.05   7.6518e-006  5   0.00045185   10.8   6534.41      11065.6
0.05   7.7225e-006  5   0.00045796   10.9   6474.59      10918
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0.05   7.7947e-006 5      0.00046405  11    6414.62     10774.7
0.05   7.8608e-006 5      0.0004701   11.1  6360.68     10636
0.05   7.926e-006  5      0.0004762   11.2  6308.35     10499.8
0.05   7.9935e-006 5      0.00048231  11.3  6255.08     10366.8
0.05   8.0606e-006 5      0.00048834  11.4  6203.01     10238.8
0.05   8.1304e-006 5      0.00049439  11.5  6149.76     10113.5
0.05   8.2003e-006 5      0.00050044  11.6  6097.34     9991.21
0.05   8.265e-006  5      0.00050649  11.7  6049.61     9871.86
0.05   8.3326e-006 5      0.00051254  11.8  6000.53     9755.34
0.05   8.3973e-006 5      0.00051856  11.9  5954.29     9642.09
0.05   8.4662e-006 5      0.00052461  12    5905.84     9530.89

SETUP:"DIODE"
ID:   A            UNIT: SMU2     START:      -80       STOP: 20      PNTS: 201     STEP: 0.5
ID:   K            UNIT: SMU1     START:       0        STOP: 1       PNTS: 1       STEP: 0
DATA:
VA    IA
-80   -0.001237
-79.5 -0.001191
-79   -0.001143
-78.5 -0.0010955
-78   -0.001049
-77.5 -0.0010012
-77   -0.00095606
-76.5 -0.00091076
-76   -0.00086525
-75.5 -0.00082052
-75   -0.00077584
-74.5 -0.00073194
-74   -0.00068819
-73.5 -0.00064465
-73   -0.00060207
-72.5 -0.00056079
-72   -0.00051954
-71.5 -0.00047891
-71   -0.0004399
-70.5 -0.00039905
-70   -0.00036155
-69.5 -0.00032155
-69   -0.00027931
-68.5 -0.00023905
```

```
-68   -0.00020245
-67.5 -0.0001729
-67   -0.0001506
-66.5 -0.0001297
-66   -0.00010745
-65.5 -7.8846e-005
-65   -6.495e-005
-64.5 -5.4795e-005
-64   -4.6125e-005
-63.5 -3.5524e-005
-63   -2.803e-005
-62.5 -1.712e-005
-62   -1.983e-006
-61.5 -7.6703e-007
-61   6.8632e-007
-60.5 -8.1272e-007
-60   8.042e-007
-59.5 -7.4753e-007
-59   4.4139e-007
-58.5 -1.977e-007
-58   5.3149e-008
-57.5 5.7905e-007
-57   -7.3138e-007
-56.5 7.5795e-007
-56   -8.4849e-007
-55.5 8.4014e-007
-55   -7.6709e-007
-54.5 5.4913e-007
-54   -2.819e-007
-53.5 7.0999e-008
-53   4.0054e-007
-52.5 -7.2448e-007
-52   7.2282e-007
-51.5 -8.5533e-007
-51   8.3344e-007
-50.5 -7.8679e-007
-50   6.2692e-007
-49.5 -3.3354e-007
-49   9.8098e-008
-48.5 2.3225e-007
-48   -6.636e-007
```

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-47.5 6.9418e-007
-47   -8.8822e-007
-46.5 8.418e-007
-46   -7.6103e-007
-45.5 5.2823e-007
-45   -2.8525e-007
-44.5 8.0799e-008
-44   2.6499e-007
-43.5 -6.4389e-007
-43   6.8239e-007
-42.5 -8.1278e-007
-42   8.4098e-007
-41.5 -8.4922e-007
-41   6.8248e-007
-40.5 -5.0245e-007
-40   1.682e-007
-39.5 -1.099e-007
-39   -1.4095e-007
-38.5 5.9794e-007
-38   -7.3874e-007
-37.5 7.6473e-007
-37   -8.7818e-007
-36.5 8.2707e-007
-36   -7.5149e-007
-35.5 5.429e-007
-35   -2.2165e-007
-34.5 7.1199e-008
-34   3.3279e-007
-33.5 -6.8772e-007
-33   7.0603e-007
-32.5 -7.9049e-007
-32   8.4153e-007
-31.5 -8.1229e-007
-31   6.5024e-007
-30.5 -4.3244e-007
-30   1.492e-007
-29.5 -8.2098e-008
-29   -5.9375e-007
-28.5 7.0804e-007
-28   -8.1054e-007
-27.5 8.4314e-007
```

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-27    -6.6444e-007
-26.5 3.045e-007
-26    -1.2785e-007
-25.5 1.21e-008
-25    7.003e-007
-24.5 -7.2009e-007
-24    7.6293e-007
-23.5 -8.5353e-007
-23    7.9878e-007
-22.5 -7.2818e-007
-22    5.014e-007
-21.5 -1.286e-007
-21    2.575e-008
-20.5 6.2585e-007
-20    -7.278e-007
-19.5 8.0987e-007
-19    -8.7238e-007
-18.5 7.9148e-007
-18    -6.842e-007
-17.5 4.0609e-007
-17    -1.5995e-007
-16.5 5.2549e-008
-16    5.7655e-007
-15.5 -7.3333e-007
-15    7.5562e-007
-14.5 -8.3257e-007
-14    8.526e-007
-13.5 -7.7602e-007
-13    6.2433e-007
-12.5 -3.2215e-007
-12    1.0715e-007
-11.5 -2.26e-008
-11    -7.1604e-007
-10.5 7.2975e-007
-10    -8.4319e-007
-9.5  8.4709e-007
-9    -7.9529e-007
-8.5  6.4703e-007
-8    -4.098e-007
-7.5  1.366e-007
-7    -7.2399e-008
```

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-6.5   -6.0754e-007
-6      6.9919e-007
-5.5   -7.7643e-007
-5      8.6124e-007
-4.5   -8.5684e-007
-4      7.2949e-007
-3.5   -5.1153e-007
-3      1.7889e-007
-2.5   -8.16e-008
-2     -5.0178e-007
-1.5    7.216e-007
-1     -7.3208e-007
-0.5    8.4459e-007
0      -8.4587e-007
0.5     3.567e-006
1       0.00077614
1.5     0.0020555
2       0.0034756
2.5     0.0049741
3       0.0065296
3.5     0.0081368
4       0.0097828
4.5     0.01149
5       0.01321
5.5     0.014965
6       0.01675
6.5     0.01856
7       0.020005
7.5     0.020005
8       0.02
8.5     0.02
9       0.020005
9.5     0.02
10      0.020005
10.5    0.020005
11      0.02
11.5    0.02
12      0.02
12.5    0.02
13      0.02
13.5    0.02
```

```
14    0.02
14.5  0.02
15    0.02
15.5  0.02
16    0.02
16.5  0.02
17    0.02
17.5  0.02
18    0.02
18.5  0.02
19    0.020005
19.5  0.02
20    0.02
```

8a Plot

Device 8a: ID vs VD
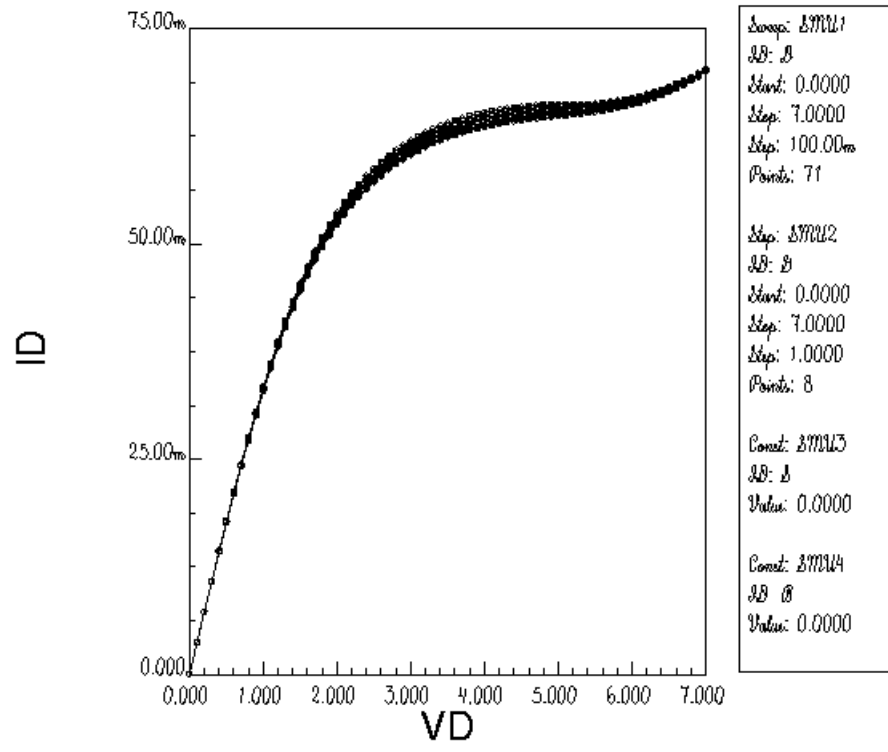
Conditions:

Sweep: SMU1
ID: B
Start: 0.0000
Stop: 7.0000
Step: 100.00m
Points: 71

Step: SMU2
ID: B
Start: 0.0000
Stop: 7.0000
Step: 1.0000
Points: 8

Const: SMU3
ID: B
Value: 0.0000

Const: SMU4
ID: B
Value: 0.0000

METRICS   10:49:39
Software   04/29/97

8a Data

PROJECT:NONAME   LOT:1 WAFER:1   DIE:1 DEV:1 USER: ;
COMMENT:;

SETUP:"MOSFET"

ID:	D	UNIT: SMU1	START:	0	STOP: 7	PNTS: 71	STEP: 0.1
ID:	G	UNIT: SMU2	START:	0	STOP: 7	PNTS: 8	STEP: 1
ID:	S	UNIT: SMU3	START:	0	STOP: 1	PNTS: 1	STEP: 0
ID:	B	UNIT: SMU4	START:	0	STOP: 1	PNTS: 1	STEP: 0

DATA:

VD	ID	ID2	ID3	ID4	ID5	ID6	ID7	ID8
0	3.2565e-005	3.4204e-005	3.266e-005	3.4865e-005	3.2499e-005	3.3159e-005	3.252e-005	3.255e-005
0.1	0.0036531	0.0036485	0.0036545	0.0036695	0.003672	0.0036656	0.0036715	0.0036706
0.2	0.0072491	0.0072269	0.0072346	0.0072615	0.0072806	0.0072601	0.0072696	0.007282
0.3	0.010795	0.010765	0.01078	0.01083	0.010845	0.01082	0.010835	0.01085
0.4	0.01428	0.01424	0.01426	0.014315	0.014355	0.014315	0.014335	0.01436
0.5	0.017685	0.017635	0.01766	0.01773	0.01778	0.01773	0.01776	0.017796
0.6	0.02099	0.020926	0.02097	0.021035	0.021105	0.021055	0.021095	0.02114
0.7	0.02418	0.024105	0.02416	0.024245	0.024325	0.02427	0.024321	0.024375
0.8	0.02725	0.02717	0.02723	0.027335	0.02742	0.027375	0.027435	0.027495
0.9	0.03019	0.0301	0.03017	0.030285	0.030385	0.030345	0.03041	0.030485
1	0.03298	0.03289	0.03297	0.0331	0.033215	0.03318	0.03326	0.033346
1.1	0.035631	0.035524	0.035616	0.035765	0.035894	0.03586	0.035961	0.036066
1.2	0.03812	0.03801	0.038115	0.038275	0.038416	0.038401	0.038521	0.03863
1.3	0.040445	0.040325	0.040445	0.040621	0.040781	0.040775	0.040911	0.04104
1.4	0.042616	0.042486	0.042625	0.042816	0.042986	0.042995	0.043146	0.043295
1.5	0.044615	0.044481	0.04463	0.04483	0.045021	0.045055	0.045219	0.045376
1.6	0.046455	0.04632	0.046486	0.046696	0.0469	0.046951	0.047136	0.04731
1.7	0.048145	0.048006	0.04818	0.048405	0.04862	0.048695	0.048895	0.04908
1.8	0.04969	0.049551	0.04973	0.049971	0.050196	0.050285	0.050501	0.050701
1.9	0.051096	0.050961	0.051151	0.051401	0.05163	0.05175	0.05197	0.052185
2	0.052376	0.05224	0.052441	0.0527	0.05294	0.053076	0.05331	0.053535
2.1	0.053545	0.053406	0.053616	0.053881	0.054131	0.054285	0.054531	0.054766
2.2	0.054611	0.05447	0.054686	0.05496	0.05522	0.055391	0.055641	0.055885
2.3	0.05558	0.055445	0.055666	0.055941	0.056206	0.056391	0.05665	0.0569
2.4	0.056465	0.05633	0.056561	0.056841	0.05711	0.057306	0.05757	0.057835
2.5	0.05728	0.057146	0.057375	0.057661	0.057936	0.05814	0.058411	0.05868
2.6	0.05802	0.05789	0.058121	0.058411	0.058685	0.058905	0.059181	0.059456
2.7	0.058701	0.058571	0.058805	0.059095	0.059376	0.059605	0.059881	0.06016

2.8	0.05932	0.059195	0.059431	0.059721	0.060005	0.06024	0.06052	0.060801
2.9	0.059885	0.059771	0.060005	0.060295	0.060581	0.06082	0.061106	0.061386
3	0.060406	0.060295	0.060535	0.06082	0.061106	0.06135	0.061636	0.061926
3.1	0.060881	0.060776	0.06101	0.0613	0.061586	0.061836	0.062121	0.062416
3.2	0.061316	0.061216	0.061455	0.061741	0.062025	0.062281	0.062565	0.062859
3.3	0.06171	0.061615	0.061855	0.062141	0.062426	0.062679	0.062969	0.063267
3.4	0.062071	0.061981	0.06222	0.062504	0.06279	0.063049	0.063339	0.063629
3.5	0.062395	0.062315	0.062557	0.062836	0.063122	0.063381	0.063671	0.063969
3.6	0.062691	0.062614	0.062855	0.063137	0.063419	0.063686	0.063976	0.064266
3.7	0.062962	0.062889	0.063129	0.063412	0.06369	0.063957	0.064247	0.064541
3.8	0.063202	0.063141	0.063381	0.063656	0.06393	0.064201	0.064491	0.064781
3.9	0.063419	0.063366	0.063599	0.063877	0.064152	0.064419	0.064709	0.064999
4	0.063614	0.063572	0.063801	0.064075	0.06435	0.064621	0.064907	0.065197
4.1	0.063786	0.063755	0.063984	0.064255	0.064526	0.064796	0.065079	0.065365
4.2	0.063946	0.063919	0.064144	0.064415	0.064686	0.064957	0.065235	0.065521
4.3	0.064087	0.064064	0.064289	0.06456	0.064827	0.065094	0.065376	0.065655
4.4	0.064217	0.064201	0.064426	0.064686	0.064949	0.06522	0.065495	0.065777
4.5	0.064331	0.06432	0.064541	0.0648	0.065067	0.06533	0.065601	0.065876
4.6	0.06443	0.06443	0.064651	0.064907	0.065166	0.065426	0.065697	0.065964
4.7	0.064526	0.064537	0.064751	0.064999	0.065254	0.065514	0.065781	0.06604
4.8	0.064617	0.064629	0.064846	0.06509	0.065342	0.065594	0.065849	0.066101
4.9	0.064701	0.06472	0.06493	0.065174	0.065426	0.06567	0.065914	0.066151
5	0.064785	0.064812	0.065022	0.065262	0.065506	0.065739	0.065964	0.066177
5.1	0.064869	0.064907	0.065109	0.065346	0.065586	0.065807	0.066006	0.066185
5.2	0.064961	0.064999	0.065201	0.065437	0.065666	0.065872	0.066036	0.066181
5.3	0.065056	0.065102	0.0653	0.065525	0.065754	0.065929	0.066059	0.06617
5.4	0.065159	0.065212	0.065407	0.065632	0.065849	0.066006	0.066097	0.06617
5.5	0.065277	0.065334	0.065525	0.065746	0.06596	0.066086	0.066139	0.066219
5.6	0.065407	0.065472	0.065655	0.065872	0.066082	0.066185	0.066215	0.066311
5.7	0.065556	0.06562	0.065807	0.066017	0.066212	0.066299	0.066322	0.066421
5.8	0.06572	0.065796	0.065971	0.06617	0.06636	0.066441	0.066456	0.066555
5.9	0.06591	0.065987	0.066154	0.066349	0.066536	0.066601	0.066612	0.066711
6	0.06612	0.0662	0.066364	0.066555	0.066727	0.06678	0.066792	0.066887
6.1	0.06636	0.066441	0.066601	0.066784	0.066944	0.06699	0.067001	0.067089
6.2	0.066624	0.066704	0.066864	0.06704	0.067181	0.067226	0.067234	0.067326
6.3	0.066925	0.067005	0.067154	0.067326	0.067444	0.067486	0.06749	0.067581
6.4	0.067249	0.067329	0.067471	0.067631	0.067741	0.067772	0.06778	0.067867
6.5	0.067604	0.06768	0.067822	0.06797	0.068066	0.068085	0.068096	0.068176
6.6	0.067989	0.068069	0.068195	0.068336	0.068417	0.068436	0.06844	0.06852
6.7	0.068417	0.068485	0.068607	0.068737	0.068802	0.06881	0.06881	0.06889
6.8	0.068882	0.068947	0.069054	0.069176	0.069214	0.069225	0.069225	0.069294

6.9	0.069397	0.069462	0.06955	0.069656	0.069679	0.069679	0.069675	0.069744
7	0.069965	0.070019	0.070099	0.070187	0.07019	0.07019	0.070179	0.07024

8b Plot

Device 8b: ID vs VD

8b Data

PROJECT:NONAME   LOT:1 WAFER:1   DIE:1 DEV:1 USER: ;
COMMENT:;

SETUP:"MOSFET"

ID:	UNIT:	START:	STOP:	PNTS:	STEP:
ID: D	UNIT: SMU1	START: 0	STOP: 7	PNTS: 71	STEP: 0.1
ID: G	UNIT: SMU2	START: 0	STOP: 7	PNTS: 8	STEP: 1
ID: S	UNIT: SMU3	START: 0	STOP: 1	PNTS: 1	STEP: 0
ID: B	UNIT: SMU4	START: 0	STOP: 1	PNTS: 1	STEP: 0

DATA:

VD	ID	ID2	ID3	ID4	ID5	ID6	ID7	ID8
0	2.844e-008	-3.4635e-008	-6.9194e-008	-5.1399e-008	-1.12e-007	-1.115e-007	-1.3399e-007	-1.264e-007
0.1	-1.6665e-008	1.2845e-005	3.453e-005	5.2659e-005	6.8855e-005	8.3603e-005	9.777e-005	0.00011085
0.2	2.034e-008	2.2295e-005	6.574e-005	0.00010227	0.00013455	0.000164	0.0001923	0.0002188
0.3	1.4865e-008	2.8689e-005	9.3605e-005	0.00014875	0.0001972	0.0002416	0.0002836	0.0003238
0.4	2.695e-008	3.2905e-005	0.00011795	0.00019165	0.00025655	0.0003158	0.00037165	0.000425
0.5	3.0124e-008	3.5794e-005	0.00013865	0.00023085	0.0003121	0.00038625	0.00045601	0.00052264
0.6	2.6045e-008	3.802e-005	0.00015605	0.00026636	0.00036401	0.00045291	0.00053635	0.00061601
0.7	2.5665e-008	3.9849e-005	0.00017035	0.00029805	0.00041175	0.0005154	0.00061235	0.0007048
0.8	8.245e-009	4.15e-005	0.000182	0.0003261	0.00045565	0.00057369	0.00068426	0.00078931
0.9	7.7548e-009	4.3049e-005	0.0001914	0.00035065	0.00049549	0.00062776	0.0007517	0.0008696
1	6.9699e-009	4.445e-005	0.0001991	0.00037201	0.00053149	0.00067785	0.00081494	0.00094512
1.1	-1.2485e-008	4.5869e-005	0.00020555	0.00039035	0.00056401	0.00072396	0.00087374	0.0010161
1.2	-1.26e-008	4.7259e-005	0.0002112	0.00040621	0.0005931	0.00076607	0.00092855	0.001083
1.3	-1.168e-008	4.8595e-005	0.0002162	0.00041975	0.00061891	0.00080445	0.00097913	0.001145
1.4	1.405e-008	4.9954e-005	0.0002207	0.00043155	0.00064164	0.00083941	0.0010257	0.001203
1.5	1.3905e-008	5.1245e-005	0.00022496	0.00044176	0.00066185	0.00087091	0.0010685	0.001257
1.6	-8.38e-009	5.2599e-005	0.00022895	0.00045076	0.00067979	0.00089934	0.001108	0.001307
1.7	2.6645e-008	5.389e-005	0.0002327	0.00045885	0.0006955	0.000925	0.001144	0.0013535
1.8	-1.2765e-008	5.522e-005	0.00023635	0.00046615	0.00070959	0.00094801	0.0011765	0.001396
1.9	3.5945e-008	5.6574e-005	0.0002399	0.00047301	0.00072211	0.00096881	0.001206	0.001435
2	-1.83e-009	5.7835e-005	0.0002434	0.00047936	0.00073335	0.00098741	0.001234	0.001472
2.1	3.0575e-008	5.9165e-005	0.0002467	0.00048526	0.00074372	0.0010042	0.0012585	0.001505
2.2	1.8455e-008	6.0489e-005	0.00025	0.00049099	0.00075304	0.0010194	0.0012815	0.0015355
2.3	4.2451e-009	6.181e-005	0.00025325	0.00049645	0.00076175	0.0010332	0.001302	0.0015635
2.4	4.0014e-008	6.3211e-005	0.0002564	0.00050181	0.00076994	0.0010459	0.0013205	0.0015895
2.5	-2.395e-009	6.4488e-005	0.00025965	0.00050685	0.0007776	0.0010575	0.0013375	0.001613
2.6	4.7779e-008	6.5833e-005	0.0002628	0.00051176	0.00078505	0.001068	0.0013535	0.001635

2.7	5.4199e-009	6.7219e-005	0.0002659	0.00051671	0.00079206	0.001078	0.001368	0.0016545
2.8	5.3986e-008	6.8549e-005	0.000269	0.00052151	0.00079885	0.001088	0.0013815	0.001673
2.9	1.1635e-008	7.0013e-005	0.00027195	0.00052616	0.00080532	0.001097	0.001394	0.00169
3	3.939e-008	7.1395e-005	0.00027511	0.00053075	0.00081167	0.0011055	0.0014055	0.001706
3.1	4.4791e-008	7.277e-005	0.00027806	0.00053525	0.00081795	0.0011135	0.0014165	0.001721
3.2	2.459e-008	7.4223e-005	0.0002811	0.0005399	0.000824	0.0011215	0.001427	0.0017345
3.3	7.5251e-008	7.5582e-005	0.00028405	0.00054425	0.00082991	0.0011295	0.001437	0.0017475
3.4	3.5219e-008	7.7095e-005	0.00028706	0.0005486	0.00083574	0.001137	0.001446	0.00176
3.5	6.791e-008	7.8533e-005	0.00029016	0.00055295	0.0008415	0.001144	0.0014555	0.0017715
3.6	7.6496e-008	8.0019e-005	0.00029311	0.0005573	0.00084722	0.001151	0.0014645	0.0017825
3.7	6.0969e-008	8.1539e-005	0.000296	0.00056159	0.00085261	0.001158	0.001473	0.0017935
3.8	9.3299e-008	8.3018e-005	0.00029905	0.0005658	0.0008581	0.0011645	0.0014815	0.0018035
3.9	1.0585e-007	8.4609e-005	0.000302	0.00057006	0.00086349	0.0011715	0.0014895	0.001813
4	9.9149e-008	8.6199e-005	0.00030495	0.00057435	0.00086895	0.001178	0.0014975	0.001823
4.1	1.557e-007	8.7716e-005	0.00030801	0.00057855	0.00087431	0.0011845	0.001505	0.001832
4.2	1.282e-007	8.9358e-005	0.00031096	0.00058269	0.0008795	0.001191	0.0015125	0.001841
4.3	1.9064e-007	9.0904e-005	0.0003141	0.00058681	0.00088477	0.0011975	0.00152	0.00185
4.4	1.9454e-007	9.2611e-005	0.00031701	0.00059104	0.00088996	0.001204	0.0015275	0.0018585
4.5	2.1035e-007	9.4306e-005	0.00032011	0.00059521	0.00089514	0.00121	0.001535	0.0018665
4.6	2.7365e-007	9.596e-005	0.00032315	0.00059935	0.00090042	0.001216	0.001542	0.001875
4.7	2.6294e-007	9.774e-005	0.0003262	0.00060362	0.00090551	0.0012225	0.001549	0.001883
4.8	3.4274e-007	9.9443e-005	0.00032935	0.0006077	0.00091061	0.001228	0.001556	0.001891
4.9	3.7e-007	0.00010123	0.0003324	0.00061181	0.00091571	0.001234	0.0015625	0.001899
5	4.0475e-007	0.00010309	0.00033556	0.00061604	0.00092071	0.00124	0.00157	0.0019065
5.1	4.9808e-007	0.00010495	0.0003387	0.00062016	0.00092587	0.001246	0.001576	0.001914
5.2	5.1758e-007	0.00010675	0.0003418	0.00062436	0.0009309	0.001252	0.001583	0.0019215
5.3	6.2544e-007	0.0001087	0.0003451	0.0006285	0.00093576	0.0012575	0.00159	0.001929
5.4	6.8563e-007	0.0001106	0.00034826	0.0006327	0.00094092	0.001263	0.0015965	0.001936
5.5	7.59e-007	0.0001126	0.0003514	0.00063682	0.0009458	0.001269	0.0016025	0.0019435
5.6	8.8959e-007	0.00011465	0.00035465	0.0006409	0.00095075	0.001275	0.001609	0.0019505
5.7	9.5542e-007	0.00011655	0.00035775	0.00064504	0.0009557	0.0012805	0.0016155	0.001958
5.8	1.106e-006	0.00011865	0.0003611	0.00064921	0.0009605	0.001286	0.001622	0.0019646
5.9	1.2e-006	0.0001206	0.0003642	0.00065327	0.00096545	0.0012915	0.001628	0.0019715
6	1.3955e-006	0.00012275	0.00036736	0.00065741	0.00097036	0.0012975	0.0016345	0.0019785
6.1	1.5015e-006	0.0001248	0.00037065	0.00066146	0.00097522	0.0013025	0.0016405	0.0019856
6.2	1.681e-006	0.0001268	0.00037386	0.00066555	0.00098008	0.0013085	0.0016465	0.001992
6.3	1.8705e-006	0.000129	0.00037715	0.00066966	0.00098485	0.0013135	0.0016525	0.001999
6.4	2.0275e-006	0.00013105	0.00038035	0.00067365	0.00098974	0.001319	0.0016585	0.0020055
6.5	2.2835e-006	0.0001333	0.00038356	0.00067779	0.00099438	0.0013245	0.0016645	0.002012
6.6	2.4539e-006	0.00013535	0.0003868	0.00068182	0.00099915	0.00133	0.0016705	0.0020186
6.7	2.6985e-006	0.0001375	0.00039001	0.00068584	0.001004	0.001335	0.0016765	0.002025

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6.8   2.968e-006  0.00013965  0.00039326  0.00068989  0.0010086  0.0013405  0.0016825  0.0020316
6.9   3.2064e-006 0.0001418   0.00039655  0.00069395  0.0010133  0.001346   0.0016885  0.002038
7     3.5169e-006 0.000144    0.00039975  0.00069806  0.0010181  0.001351   0.0016945  0.002044
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8c Plot

Device 8c: ID vs VD
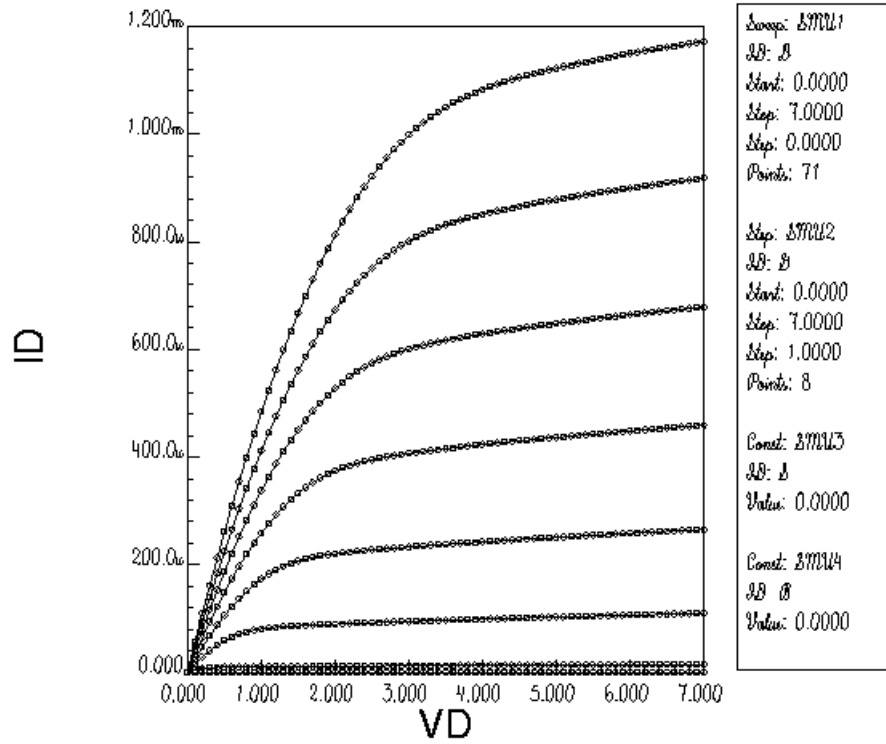
8c Data

```
PROJECT:NONAME      LOT:1 WAFER:1      DIE:1 DEV:1 USER: ;
COMMENT: ;


SETUP:"MOSFET"
ID:   D           UNIT: SMU1      START:      0        STOP: 7       PNTS: 71      STEP: 0
ID:   G           UNIT: SMU2      START:      0        STOP: 7       PNTS: 8       STEP: 1
ID:   S           UNIT: SMU3      START:      0        STOP: 1       PNTS: 1       STEP: 0
ID:   B           UNIT: SMU4      START:      0        STOP: 1       PNTS: 1       STEP: 0
DATA:
VD    ID      ID2     ID3    ID4     ID5     ID6     ID7     ID8
0     4.9846e-008 5.3906e-008 5.277e-008  4.2464e-008 7.7529e-008 7.3451e-008 7.4094e-008 5.1785e-008
0.1   7.2821e-008 4.5404e-006 1.505e-005  2.4305e-005 3.263e-005  4.046e-005  4.8095e-005 5.5443e-005
0.2   5.9848e-008 7.2974e-006 2.837e-005  4.6974e-005 6.3743e-005 7.9315e-005 9.4503e-005 0.00010925
0.3   6.1045e-008 8.72e-006   4.0034e-005 6.8106e-005 9.3374e-005 0.0001168   0.00013945  0.00016155
0.4   6.099e-008  9.344e-006  5.009e-005  8.7686e-005 0.00012155  0.0001528   0.0001828   0.0002121
0.5   5.9699e-008 9.6443e-006 5.8539e-005 0.0001058   0.0001482   0.0001873   0.0002247   0.00026116
0.6   6.6586e-008 9.8287e-006 6.5498e-005 0.0001223   0.00017335  0.00022035  0.00026515  0.00030871
0.7   8.0974e-008 9.9796e-006 7.1008e-005 0.0001373   0.00019695  0.0002519   0.0003041   0.00035465
0.8   8.0956e-008 1.0111e-005 7.5221e-005 0.0001507   0.0002191   0.00028194  0.00034145  0.0003991
0.9   8.0388e-008 1.0236e-005 7.8354e-005 0.00016265  0.0002397   0.0003105   0.00037736  0.000442
1     7.782e-008  1.0355e-005 8.0638e-005 0.0001732   0.00025876  0.00033756  0.00041181  0.00048341
1.1   7.4364e-008 1.0474e-005 8.2332e-005 0.0001823   0.0002764   0.00036305  0.00044471  0.0005233
1.2   7.0933e-008 1.0565e-005 8.3633e-005 0.00019015  0.00029255  0.0003871   0.00047611  0.00056156
1.3   6.8441e-008 1.0645e-005 8.465e-005  0.00019665  0.00030725  0.00040965  0.00050595  0.00059831
1.4   7.2785e-008 1.0755e-005 8.5547e-005 0.00020215  0.00032051  0.00043066  0.00053427  0.00063342
1.5   7.6375e-008 1.0835e-005 8.6337e-005 0.00020665  0.00033246  0.00045025  0.00056106  0.00066706
1.6   6.313e-008  1.092e-005  8.7038e-005 0.00021035  0.00034305  0.0004683   0.00058636  0.00069916
1.7   8.4666e-008 1.1015e-005 8.7734e-005 0.00021335  0.00035246  0.00048505  0.0006102   0.00072977
1.8   7.0304e-008 1.109e-005  8.836e-005  0.00021595  0.00036065  0.00050044  0.00063249  0.00075877
1.9   7.4455e-008 1.1185e-005 8.8934e-005 0.00021815  0.00036785  0.00051445  0.00065342  0.00078622
2     7.7903e-008 1.126e-005  8.9519e-005 0.00022     0.00037405  0.0005272   0.00067291  0.00081226
2.1   6.4574e-008 1.1335e-005 9.0059e-005 0.0002217   0.0003794   0.00053871  0.00069106  0.00083682
2.2   8.6234e-008 1.1435e-005 9.0603e-005 0.0002232   0.000384    0.00054905  0.00070789  0.00085995
2.3   7.2148e-008 1.149e-005  9.1106e-005 0.00022465  0.000388    0.00055835  0.0007233   0.0008817
2.4   7.5975e-008 1.1585e-005 9.162e-005  0.000226    0.00039156  0.00056666  0.00073755  0.00090197
2.5   7.9435e-008 1.165e-005  9.2123e-005 0.00022725  0.00039466  0.00057399  0.00075066  0.00092101
2.6   6.6015e-008 1.1715e-005 9.2611e-005 0.00022845  0.0003974   0.00058049  0.00076264  0.00093874
2.7   8.7773e-008 1.18e-005   9.3095e-005 0.0002296   0.00039995  0.00058636  0.00077352  0.00095531
```

2.8	7.368e-008	1.1865e-005	9.3564e-005	0.00023075	0.00040226	0.00059155	0.00078335	0.00097066
2.9	7.7063e-008	1.1955e-005	9.4008e-005	0.00023185	0.00040436	0.00059611	0.00079235	0.00098479
3	8.144e-008	1.201e-005	9.4473e-005	0.00023285	0.00040646	0.00060031	0.00080046	0.00099784
3.1	6.7244e-008	1.207e-005	9.4909e-005	0.00023395	0.00040831	0.000604	0.00080779	0.0010099
3.2	8.9516e-008	1.215e-005	9.5352e-005	0.0002349	0.0004102	0.00060746	0.00081447	0.001021
3.3	7.5961e-008	1.221e-005	9.5777e-005	0.00023585	0.00041196	0.00061065	0.0008204	0.0010312
3.4	7.854e-008	1.2295e-005	9.6206e-005	0.00023685	0.00041366	0.0006136	0.00082585	0.0010405
3.5	8.2909e-008	1.2355e-005	9.6653e-005	0.0002378	0.00041536	0.00061634	0.0008308	0.001049
3.6	6.8568e-008	1.242e-005	9.7047e-005	0.00023875	0.0004169	0.00061896	0.00083536	0.001057
3.7	9.0866e-008	1.249e-005	9.7468e-005	0.00023966	0.00041845	0.0006215	0.0008395	0.0010635
3.8	7.7918e-008	1.2545e-005	9.79e-005	0.00024055	0.00041996	0.00062391	0.0008434	0.0010705
3.9	7.9526e-008	1.2635e-005	9.8296e-005	0.00024145	0.00042145	0.00062615	0.00084704	0.0010765
4	8.4354e-008	1.2685e-005	9.8709e-005	0.00024235	0.00042296	0.00062835	0.00085047	0.001082
4.1	7.0289e-008	1.275e-005	9.9085e-005	0.0002432	0.00042436	0.0006305	0.00085372	0.001087
4.2	9.2445e-008	1.2825e-005	9.9499e-005	0.00024405	0.00042576	0.00063261	0.00085676	0.001092
4.3	7.9315e-008	1.287e-005	9.9864e-005	0.0002449	0.0004271	0.00063464	0.00085971	0.0010965
4.4	8.0588e-008	1.296e-005	0.00010027	0.0002457	0.00042845	0.00063661	0.00086251	0.0011005
4.5	8.6245e-008	1.3005e-005	0.00010067	0.00024655	0.00042985	0.00063854	0.00086525	0.0011045
4.6	7.2101e-008	1.3065e-005	0.00010103	0.0002474	0.00043111	0.00064045	0.00086784	0.001108
4.7	9.3834e-008	1.314e-005	0.00010141	0.00024815	0.0004324	0.0006423	0.00087047	0.0011115
4.8	8.22e-008	1.3195e-005	0.0001018	0.00024895	0.0004337	0.00064412	0.00087291	0.001115
4.9	8.124e-008	1.3275e-005	0.00010217	0.00024976	0.00043495	0.00064591	0.00087535	0.0011185
5	8.8319e-008	1.332e-005	0.00010255	0.00025055	0.0004362	0.00064766	0.00087777	0.0011215
5.1	7.3796e-008	1.338e-005	0.0001029	0.00025135	0.00043741	0.00064936	0.00088006	0.001125
5.2	9.5719e-008	1.3455e-005	0.00010327	0.0002521	0.0004386	0.00065106	0.0008823	0.0011275
5.3	8.3524e-008	1.35e-005	0.00010364	0.00025286	0.00043985	0.00065276	0.0008845	0.0011305
5.4	8.1985e-008	1.359e-005	0.00010399	0.00025365	0.00044106	0.0006544	0.00088665	0.001133
5.5	9.0178e-008	1.3635e-005	0.00010438	0.00025441	0.00044225	0.00065607	0.00088885	0.001136
5.6	7.5786e-008	1.37e-005	0.0001047	0.0002552	0.00044335	0.00065771	0.00089097	0.001139
5.7	9.7025e-008	1.3765e-005	0.0001051	0.0002559	0.0004445	0.00065932	0.00089297	0.0011415
5.8	8.638e-008	1.3815e-005	0.00010545	0.0002566	0.00044571	0.00066087	0.00089511	0.001144
5.9	8.2454e-008	1.3895e-005	0.0001058	0.0002574	0.00044686	0.00066242	0.00089711	0.0011465
6	9.1579e-008	1.3945e-005	0.00010615	0.0002581	0.000448	0.00066397	0.00089911	0.001149
6.1	7.6728e-008	1.4015e-005	0.0001066	0.0002588	0.00044911	0.00066551	0.00090101	0.0011515
6.2	9.7796e-008	1.407e-005	0.0001069	0.00025955	0.00045021	0.00066695	0.00090295	0.001154
6.3	8.6023e-008	1.412e-005	0.0001073	0.00026025	0.0004513	0.00066846	0.00090492	0.001156
6.4	8.4936e-008	1.4205e-005	0.0001076	0.00026095	0.00045236	0.0006699	0.00090676	0.0011585
6.5	8.853e-008	1.424e-005	0.00010795	0.00026165	0.0004535	0.00067144	0.00090864	0.001161
6.6	7.814e-008	1.43e-005	0.00010825	0.00026235	0.0004545	0.00067297	0.00091046	0.001163
6.7	9.7763e-008	1.4365e-005	0.0001086	0.0002631	0.0004556	0.00067437	0.00091225	0.001165
6.8	8.3251e-008	1.4415e-005	0.000109	0.00026375	0.00045671	0.00067577	0.00091409	0.0011675

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6.9   9.4471e-008 1.4495e-005 0.0001093   0.0002645   0.0004577   0.00067717  0.00091591  0.0011695
7     8.968e-008  1.454e-005  0.00010965  0.00026515  0.00045881  0.00067866  0.00091764  0.0011715
```

8d Plot

Device 8d: ID vs VD

Conditions:

Sweep: SMU1
ID: D
Start: 0.0000
Stop: 7.0000
Step: 100.00m
Points: 71

Step: SMU2
ID: D
Start: 0.0000
Stop: 7.0000
Step: 1.0000
Points: 8

Const: SMU3
ID: S
Value: 0.0000

Const: SMU4
ID: B
Value: 0.0000

METRICS   10:50:46
Software   04/29/97

8d Data

SETUP:"MOSFET"

ID:	UNIT:	START:	STOP:	PNTS:	STEP:
D	SMU1	0	7	71	0.1
G	SMU2	0	7	8	1
S	SMU3	0	1	1	0
B	SMU4	0	1	1	0

DATA:

VD	ID	ID2	ID3	ID4	ID5	ID6	ID7	ID8
0	-2.0075e-008	-2.1295e-008	2.0905e-008	1.3795e-008	4.279e-008	-1.2875e-008	-9.5051e-009	-2.1265e-008
0.1	2.676e-008	2.7489e-006	9.7104e-006	1.599e-005	2.171e-005	2.699e-005	3.2336e-005	3.738e-005
0.2	2.685e-009	4.3234e-006	1.8305e-005	3.0879e-005	4.2275e-005	5.2979e-005	6.3401e-005	7.3668e-005
0.3	4.105e-009	5.075e-006	2.573e-005	4.4744e-005	6.1914e-005	7.7963e-005	9.3478e-005	0.00010875
0.4	-5.1e-009	5.3379e-006	3.2119e-005	5.7589e-005	8.0533e-005	0.00010199	0.00012255	0.0001429
0.5	-7.255e-009	5.4284e-006	3.7424e-005	6.9398e-005	9.821e-005	0.000125	0.00015075	0.00017601
0.6	-1.6665e-008	5.4808e-006	4.1705e-005	8.0146e-005	0.00011495	0.0001472	0.00017795	0.00020805
0.7	-1.8935e-008	5.5295e-006	4.5044e-005	8.9928e-005	0.00013065	0.00016835	0.00020425	0.0002391
0.8	-1.8905e-008	5.5796e-006	4.7505e-005	9.8742e-005	0.0001454	0.0001886	0.0002296	0.00026935
0.9	-1.3375e-008	5.607e-006	4.9224e-005	0.0001066	0.00015925	0.0002079	0.00025405	0.0002986
1	-6.07e-009	5.6394e-006	5.0435e-005	0.0001135	0.00017215	0.0002263	0.00027755	0.00032695
1.1	3.39e-009	5.6943e-006	5.123e-005	0.0001194	0.00018405	0.00024375	0.00030015	0.00035445
1.2	1.436e-008	5.7239e-006	5.1795e-005	0.0001245	0.00019505	0.00026031	0.00032185	0.00038105
1.3	2.7625e-008	5.7619e-006	5.2229e-005	0.0001287	0.0002051	0.00027595	0.00034265	0.0004067
1.4	3.9049e-009	5.7819e-006	5.254e-005	0.0001322	0.0002143	0.0002906	0.0003625	0.0004314
1.5	4.2851e-009	5.7845e-006	5.2905e-005	0.00013495	0.0002226	0.0003044	0.0003815	0.00045526
1.6	1.157e-008	5.8555e-006	5.3178e-005	0.0001372	0.00023005	0.00031725	0.0003995	0.0004781
1.7	-1.5085e-008	5.8294e-006	5.3404e-005	0.0001389	0.00023655	0.00032935	0.00041665	0.00050026
1.8	3.1596e-008	5.8934e-006	5.3665e-005	0.0001403	0.0002423	0.00034045	0.00043295	0.0005213
1.9	-1.4725e-008	5.9013e-006	5.3869e-005	0.00014145	0.00024736	0.00035065	0.00044835	0.00054151
2	1.363e-008	5.9009e-006	5.4125e-005	0.00014235	0.00025161	0.0003601	0.00046291	0.00056085
2.1	9.7748e-009	5.9679e-006	5.433e-005	0.0001432	0.00025535	0.00036865	0.00047645	0.00057927
2.2	1.855e-009	5.9405e-006	5.4505e-005	0.00014385	0.00025836	0.00037651	0.0004892	0.00059685
2.3	1.1765e-008	6.0005e-006	5.4749e-005	0.0001445	0.00026101	0.00038345	0.0005011	0.00061351
2.4	-1.4465e-008	6.0098e-006	5.4885e-005	0.00014515	0.00026315	0.00038965	0.00051221	0.00062931
2.5	3.196e-008	6.0035e-006	5.5104e-005	0.00014565	0.000265	0.00039525	0.00052249	0.0006443

2.6	-1.456e-008	6.065e-006	5.5265e-005	0.00014625	0.00026666	0.0004001	0.00053194	0.00065836
2.7	2.252e-008	6.0434e-006	5.5414e-005	0.00014675	0.00026806	0.0004044	0.00054061	0.00067165
2.8	8.5751e-009	6.0939e-006	5.5639e-005	0.0001472	0.00026931	0.0004082	0.00054854	0.00068405
2.9	4.2501e-009	6.1044e-006	5.576e-005	0.0001477	0.00027046	0.00041151	0.00055581	0.00069571
3	1.3885e-008	6.1004e-006	5.5959e-005	0.00014815	0.0002715	0.0004144	0.0005624	0.00070661
3.1	-1.3375e-008	6.1654e-006	5.6134e-005	0.00014865	0.00027256	0.0004169	0.00056821	0.00071665
3.2	3.2114e-008	6.1369e-006	5.6254e-005	0.000149	0.00027341	0.00041915	0.00057354	0.00072604
3.3	-1.4605e-008	6.1844e-006	5.6459e-005	0.00014945	0.00027426	0.00042111	0.00057831	0.00073466
3.4	1.7565e-008	6.1989e-006	5.6559e-005	0.00014995	0.00027511	0.00042291	0.00058252	0.00074261
3.5	9.325e-009	6.1935e-006	5.6758e-005	0.0001503	0.0002759	0.00042461	0.00058636	0.00074995
3.6	3.435e-009	6.2415e-006	5.6894e-005	0.0001507	0.0002767	0.00042601	0.0005897	0.00075659
3.7	1.0895e-008	6.2219e-006	5.7004e-005	0.00015105	0.0002774	0.00042741	0.00059277	0.00076264
3.8	-1.2765e-008	6.2729e-006	5.72e-005	0.00015145	0.00027814	0.00042881	0.00059551	0.00076821
3.9	3.1159e-008	6.2839e-006	5.7299e-005	0.00015185	0.00027885	0.00043	0.00059789	0.00077319
4	-1.495e-008	6.2781e-006	5.747e-005	0.0001522	0.00027955	0.00043126	0.00060031	0.00077781
4.1	1.897e-008	6.3384e-006	5.761e-005	0.00015255	0.00028031	0.00043236	0.00060239	0.00078189
4.2	9.35e-009	6.3079e-006	5.7708e-005	0.0001529	0.0002809	0.00043346	0.00060424	0.00078565
4.3	3.8699e-009	6.3554e-006	5.7904e-005	0.00015325	0.00028156	0.00043455	0.00060609	0.00078911
4.4	1.5815e-008	6.3684e-006	5.7993e-005	0.00015365	0.0002822	0.00043555	0.00060776	0.0007922
4.5	-1.5815e-008	6.3539e-006	5.8159e-005	0.00015395	0.00028275	0.00043665	0.0006094	0.0007951
4.6	3.21e-008	6.4185e-006	5.829e-005	0.00015435	0.00028351	0.0004376	0.00061092	0.00079772
4.7	-1.423e-008	6.3924e-006	5.839e-005	0.00015465	0.00028405	0.0004385	0.00061241	0.00080016
4.8	1.2035e-008	6.4359e-006	5.856e-005	0.00015495	0.0002846	0.00043955	0.00061387	0.00080252
4.9	1.0535e-008	6.4424e-006	5.8655e-005	0.00015535	0.00028525	0.0004404	0.00061515	0.0008046
5	-1.2515e-008	6.4385e-006	5.8824e-005	0.0001556	0.0002858	0.0004414	0.00061655	0.00080672
5.1	3.157e-008	6.4929e-006	5.8945e-005	0.000156	0.00028644	0.00044221	0.00061786	0.0008086
5.2	-1.4545e-008	6.4615e-006	5.9044e-005	0.00015625	0.000287	0.0004431	0.00061905	0.00081035
5.3	1.987e-008	6.5104e-006	5.921e-005	0.0001566	0.00028755	0.00044395	0.00062036	0.00081214
5.4	9.4801e-009	6.5169e-006	5.9279e-005	0.00015695	0.0002881	0.0004448	0.00062147	0.00081384
5.5	4.7801e-009	6.5055e-006	5.9454e-005	0.0001572	0.00028861	0.00044571	0.00062275	0.00081551
5.6	1.311e-008	6.5705e-006	5.9575e-005	0.00015755	0.0002892	0.0004465	0.00062385	0.00081712
5.7	-1.465e-008	6.5339e-006	5.9664e-005	0.0001578	0.00028975	0.00044726	0.00062501	0.00081861
5.8	3.2485e-008	6.5865e-006	5.9849e-005	0.0001581	0.0002902	0.00044811	0.00062615	0.00082022
5.9	-1.401e-008	6.5963e-006	5.9914e-005	0.00015845	0.0002908	0.00044885	0.00062722	0.00082165
6	1.3e-008	6.5793e-006	6.0068e-005	0.00015865	0.00029126	0.0004497	0.00062835	0.00082311
6.1	1.01e-008	6.6473e-006	6.018e-005	0.00015905	0.00029175	0.00045045	0.0006294	0.00082451
6.2	2.7199e-009	6.6094e-006	6.027e-005	0.0001593	0.0002923	0.00045121	0.00063041	0.00082591
6.3	1.217e-008	6.6564e-006	6.0419e-005	0.0001596	0.00029281	0.00045191	0.00063154	0.00082731
6.4	-1.3355e-008	6.6655e-006	6.051e-005	0.0001599	0.00029336	0.00045265	0.00063246	0.00082865
6.5	3.1794e-008	6.662e-006	6.0664e-005	0.0001601	0.00029375	0.00045346	0.00063351	0.00082991
6.6	-1.545e-008	6.7174e-006	6.0774e-005	0.0001605	0.00029425	0.00045416	0.00063446	0.00083125

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6.7    2.5005e-008 6.682e-006  6.0869e-005 0.00016075  0.00029474  0.00045486  0.00063541  0.0008325
6.8    8.9349e-009 6.7314e-006 6.102e-005  0.000161    0.00029525  0.0004556   0.00063646  0.00083387
6.9    5.625e-009  6.737e-006  6.1084e-005 0.0001613   0.00029576  0.0004563   0.00063735  0.00083494
7      1.2545e-008 6.7269e-006 6.1233e-005 0.00016155  0.00029621  0.00045696  0.00063831  0.00083616
```

9a Plot

Device 9a: ID vs VD

Conditions:

Sweep: SMU1
ID: B
Start: 0.0000
Stop: 7.0000
Step: 100.00m
Points: 71

Step: SMU2
ID: B
Start: 0.0000
Stop: 7.0000
Step: 1.0000
Points: 8

Const: SMU3
ID: S
Value: 0.0000

Const: SMU4
ID B
Value: 0.0000
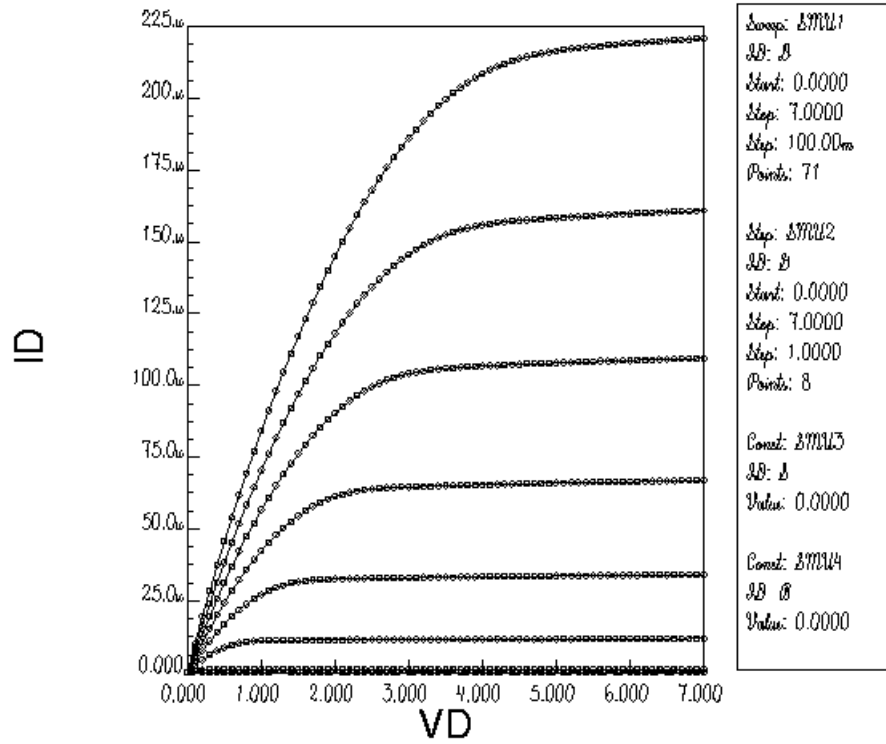
METRICS   10:52:20
Software   04/29/97

9a Data

PROJECT:NONAME   LOT:1 WAFER:1   DIE:1 DEV:1 USER: ;
COMMENT:;

SETUP:"MOSFET"

ID:	D	UNIT: SMU1	START:	0	STOP: 7	PNTS: 71	STEP: 0.1
ID:	G	UNIT: SMU2	START:	0	STOP: 7	PNTS: 8	STEP: 1
ID:	S	UNIT: SMU3	START:	0	STOP: 1	PNTS: 1	STEP: 0
ID:	B	UNIT: SMU4	START:	0	STOP: 1	PNTS: 1	STEP: 0

DATA:

VD	ID	ID2	ID3	ID4	ID5	ID6	ID7	ID8
0	2.5855e-008	-8.6152e-009	3.38e-009	-5.6296e-008	-6.4796e-008	-8.9996e-008	-9.255e-008	-7.0798e-008
0.1	-2.039e-008	5.6284e-007	2.263e-006	3.9046e-006	5.381e-006	6.808e-006	8.2892e-006	9.8083e-006
0.2	2.6255e-008	8.5757e-007	4.3081e-006	7.4874e-006	1.0436e-005	1.327e-005	1.628e-005	1.934e-005
0.3	2.6245e-008	9.5577e-007	6.0294e-006	1.084e-005	1.529e-005	1.9555e-005	2.3895e-005	2.8419e-005
0.4	2.6375e-008	9.6241e-007	7.4659e-006	1.3955e-005	1.9929e-005	2.5555e-005	3.124e-005	3.718e-005
0.5	2.9495e-008	9.5792e-007	8.6241e-006	1.6775e-005	2.4275e-005	3.1309e-005	3.8324e-005	4.562e-005
0.6	3.0084e-008	9.5717e-007	9.5181e-006	1.934e-005	2.837e-005	3.6839e-005	4.518e-005	5.3784e-005
0.7	2.7965e-008	9.6351e-007	1.0164e-005	2.1645e-005	3.2205e-005	4.2114e-005	5.1789e-005	6.1668e-005
0.8	1.8785e-008	9.6927e-007	1.0585e-005	2.3695e-005	3.5804e-005	4.7155e-005	5.8189e-005	6.9328e-005
0.9	1.1885e-008	9.847e-007	1.0815e-005	2.5489e-005	3.9164e-005	5.196e-005	6.4373e-005	7.6778e-005
1	1.3085e-008	9.9093e-007	1.0955e-005	2.703e-005	4.2289e-005	5.6544e-005	7.0315e-005	8.4005e-005
1.1	1.39e-009	1.0139e-006	1.105e-005	2.8349e-005	4.516e-005	6.0899e-005	7.6041e-005	9.1035e-005
1.2	-8.6552e-009	1.0164e-006	1.1095e-005	2.9425e-005	4.7825e-005	6.5014e-005	8.1543e-005	9.7863e-005
1.3	-1.5755e-008	1.0192e-006	1.1125e-005	3.0295e-005	5.026e-005	6.8933e-005	8.6829e-005	0.00010446
1.4	8.5301e-009	9.8773e-007	1.113e-005	3.0985e-005	5.2499e-005	7.2636e-005	9.1899e-005	0.00011085
1.5	7.5051e-009	9.9564e-007	1.115e-005	3.149e-005	5.449e-005	7.6137e-005	9.6805e-005	0.000117
1.6	2.63e-009	1.02e-006	1.1195e-005	3.1799e-005	5.6229e-005	7.936e-005	0.00010143	0.000123
1.7	9.12e-009	9.7614e-007	1.117e-005	3.208e-005	5.7829e-005	8.2474e-005	0.0001059	0.00012875
1.8	1.05e-010	1.0247e-006	1.123e-005	3.2205e-005	5.9124e-005	8.5264e-005	0.0001102	0.00013435
1.9	1.1125e-008	1.0032e-006	1.122e-005	3.2336e-005	6.0299e-005	8.7894e-005	0.00011415	0.00013975
2	-1.6255e-008	9.9646e-007	1.1235e-005	3.244e-005	6.1248e-005	9.0338e-005	0.00011805	0.0001449
2.1	3.0795e-008	1.0291e-006	1.127e-005	3.2475e-005	6.2e-005	9.251e-005	0.0001217	0.0001499
2.2	-1.588e-008	9.8493e-007	1.1245e-005	3.2589e-005	6.267e-005	9.4578e-005	0.0001251	0.0001547
2.3	1.487e-008	1.0281e-006	1.1305e-005	3.2604e-005	6.3095e-005	9.6355e-005	0.0001284	0.00015925
2.4	8.235e-009	1.0129e-006	1.129e-005	3.2665e-005	6.3483e-005	9.7964e-005	0.0001314	0.0001637
2.5	1.9349e-009	9.9541e-007	1.1305e-005	3.2725e-005	6.3773e-005	9.9413e-005	0.0001342	0.0001679
2.6	1.0085e-008	1.0374e-006	1.134e-005	3.273e-005	6.3956e-005	0.00010062	0.0001369	0.0001719

2.7	2.86e-009	9.9221e-007	1.131e-005	3.282e-005	6.4179e-005	0.00010174	0.00013935	0.00017575
2.8	1.3265e-008	1.0231e-006	1.137e-005	3.2829e-005	6.428e-005	0.00010261	0.0001416	0.0001793
2.9	-1.3635e-008	1.0202e-006	1.1355e-005	3.2874e-005	6.441e-005	0.00010337	0.0001437	0.0001828
3	3.0561e-008	9.9727e-007	1.1365e-005	3.2935e-005	6.4533e-005	0.00010401	0.00014555	0.000186
3.1	-1.566e-008	1.0424e-006	1.14e-005	3.293e-005	6.4604e-005	0.00010448	0.0001473	0.00018905
3.2	1.766e-008	9.9721e-007	1.1365e-005	3.3015e-005	6.4749e-005	0.00010493	0.0001488	0.00019195
3.3	8.22e-009	1.0227e-006	1.1425e-005	3.3019e-005	6.479e-005	0.00010525	0.00015015	0.0001946
3.4	2.535e-009	1.0263e-006	1.141e-005	3.3049e-005	6.488e-005	0.00010555	0.00015135	0.00019715
3.5	1.459e-008	9.9908e-007	1.142e-005	3.3114e-005	6.4973e-005	0.00010575	0.00015235	0.00019945
3.6	-1.6515e-008	1.0459e-006	1.1455e-005	3.3105e-005	6.5014e-005	0.000106	0.0001533	0.00020161
3.7	3.0164e-008	1.003e-006	1.142e-005	3.3179e-005	6.5129e-005	0.00010615	0.00015405	0.00020355
3.8	-1.499e-008	1.0229e-006	1.148e-005	3.3179e-005	6.5163e-005	0.00010635	0.0001547	0.00020535
3.9	7.7398e-009	1.0255e-006	1.146e-005	3.3215e-005	6.5234e-005	0.00010645	0.00015525	0.000207
4	8.4501e-009	1.0445e-006	1.147e-005	3.3271e-005	6.5323e-005	0.0001066	0.0001557	0.00020845
4.1	1.87e-009	1.0008e-006	1.1505e-005	3.3254e-005	6.5345e-005	0.00010675	0.00015615	0.00020975
4.2	1.069e-008	1.049e-006	1.1475e-005	3.3334e-005	6.5461e-005	0.0001068	0.00015645	0.00021095
4.3	-1.368e-008	1.029e-006	1.1525e-005	3.3325e-005	6.549e-005	0.000107	0.0001568	0.00021195
4.4	3.1305e-008	1.032e-006	1.151e-005	3.336e-005	6.555e-005	0.0001071	0.00015705	0.0002129
4.5	-1.5625e-008	1.0225e-006	1.1515e-005	3.3414e-005	6.5628e-005	0.0001072	0.00015725	0.00021365
4.6	2.378e-008	1.0265e-006	1.1545e-005	3.3395e-005	6.564e-005	0.00010735	0.0001575	0.00021435
4.7	7.22e-009	1.05e-006	1.151e-005	3.3475e-005	6.5744e-005	0.0001074	0.00015765	0.00021495
4.8	1.51e-009	1.0385e-006	1.157e-005	3.3464e-005	6.5774e-005	0.00010755	0.00015785	0.00021545
4.9	1.1015e-008	1.0315e-006	1.1545e-005	3.35e-005	6.5833e-005	0.0001076	0.00015805	0.00021595
5	-1.337e-008	1.023e-006	1.156e-005	3.3544e-005	6.5908e-005	0.00010765	0.00015815	0.00021635
5.1	3.105e-008	1.056e-006	1.1595e-005	3.3529e-005	6.5923e-005	0.0001078	0.0001584	0.0002167
5.2	-1.5195e-008	1.043e-006	1.1555e-005	3.3604e-005	6.602e-005	0.00010785	0.0001585	0.00021705
5.3	1.8e-008	1.037e-006	1.1605e-005	3.3595e-005	6.6053e-005	0.000108	0.0001587	0.0002173
5.4	8.5151e-009	1.0245e-006	1.1595e-005	3.3624e-005	6.6094e-005	0.00010805	0.00015885	0.00021765
5.5	2.805e-009	1.059e-006	1.16e-005	3.3669e-005	6.6176e-005	0.00010815	0.00015895	0.00021785
5.6	1.5515e-008	1.043e-006	1.163e-005	3.3654e-005	6.618e-005	0.0001083	0.00015915	0.00021805
5.7	-1.723e-008	1.0345e-006	1.1595e-005	3.3725e-005	6.6269e-005	0.0001083	0.00015925	0.0002183
5.8	2.9705e-008	1.029e-006	1.165e-005	3.3714e-005	6.6288e-005	0.0001084	0.0001594	0.0002185
5.9	-1.5045e-008	1.058e-006	1.163e-005	3.3746e-005	6.6329e-005	0.00010845	0.00015955	0.0002188
6	7.8298e-009	1.0505e-006	1.164e-005	3.379e-005	6.6414e-005	0.00010855	0.0001596	0.00021895
6.1	8.5552e-009	1.0415e-006	1.167e-005	3.377e-005	6.6414e-005	0.0001087	0.0001598	0.00021915
6.2	2.815e-009	1.0255e-006	1.164e-005	3.384e-005	6.6504e-005	0.0001087	0.0001599	0.00021935
6.3	1.5305e-008	1.0665e-006	1.17e-005	3.3829e-005	6.653e-005	0.0001088	0.00016	0.0002195
6.4	-1.5985e-008	1.02e-006	1.167e-005	3.385e-005	6.6563e-005	0.00010885	0.00016015	0.0002197
6.5	3.0375e-008	1.059e-006	1.168e-005	3.39e-005	6.6638e-005	0.00010895	0.0001602	0.00021985
6.6	-1.538e-008	1.0485e-006	1.171e-005	3.3874e-005	6.6645e-005	0.00010905	0.0001604	0.00022
6.7	1.3895e-008	1.032e-006	1.1675e-005	3.3954e-005	6.6731e-005	0.0001091	0.00016045	0.0002202

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6.8    9.4051e-009 1.07e-006   1.173e-005  3.3945e-005 6.675e-005  0.0001092   0.00016055  0.00022035
6.9    1.46e-009   1.0255e-006 1.1705e-005 3.396e-005  6.6768e-005 0.00010925  0.0001607   0.00022055
7      1.2895e-008 1.0675e-006 1.171e-005  3.4014e-005 6.6858e-005 0.0001093   0.0001608   0.00022075
```

9b Plot

Device 9b: ID vs VD

Conditions:

Sweep: SMU1
ID: B
Start: 0.0000
Stop: 7.0000
Step: 100.00m
Points: 71

Step: SMU2
ID: B
Start: 0.0000
Stop: 7.0000
Step: 1.0000
Points: 8

Const: SMU3
ID: B
Value: 0.0000

Const: SMU4
ID: B
Value: 0.0000
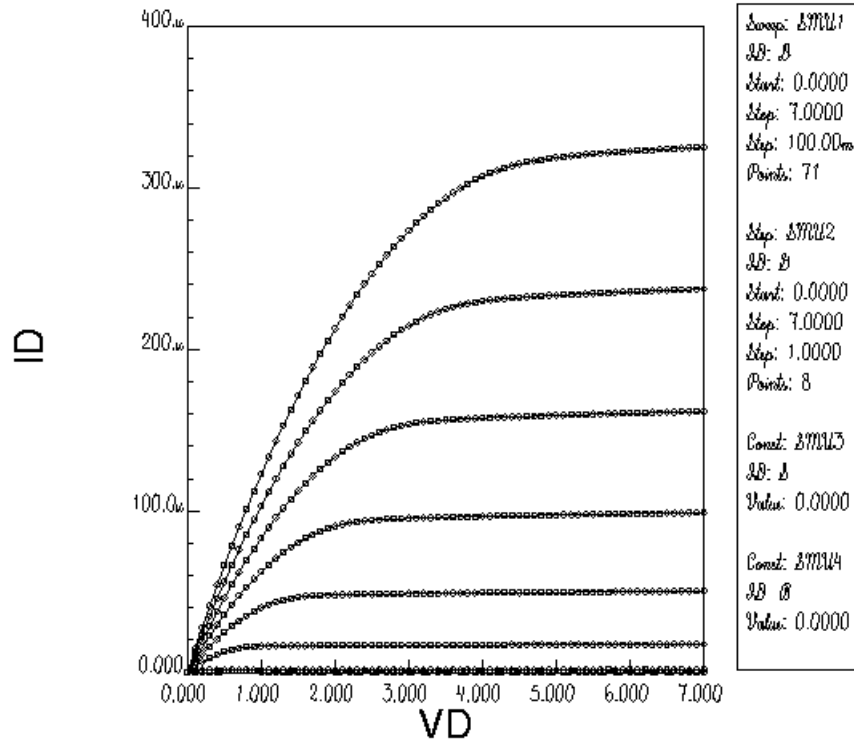
METRICS   10:53:00
Software   04/29/97

9b Data

PROJECT:NONAME   LOT:1 WAFER:1   DIE:1 DEV:1 USER: ;
COMMENT:;

SETUP:"MOSFET"
ID: D   UNIT: SMU1   START: 0   STOP: 7   PNTS: 71   STEP: 0.1
ID: G   UNIT: SMU2   START: 0   STOP: 7   PNTS: 8   STEP: 1
ID: S   UNIT: SMU3   START: 0   STOP: 1   PNTS: 1   STEP: 0
ID: B   UNIT: SMU4   START: 0   STOP: 1   PNTS: 1   STEP: 0
DATA:

VD	ID	ID2	ID3	ID4	ID5	ID6	ID7	ID8
0	-8.8248e-009	-8.6502e-009	-5.525e-009	-4.5555e-008	-5.125e-008	-7.7798e-008	-1.2055e-007	-1.4695e-007
0.1	7.175e-009	8.1808e-007	3.355e-006	5.692e-006	7.8841e-006	9.9098e-006	1.204e-005	1.416e-005
0.2	7.7748e-009	1.2405e-006	6.3269e-006	1.108e-005	1.538e-005	1.9515e-005	2.368e-005	2.7819e-005
0.3	8.9799e-009	1.421e-006	8.8718e-006	1.598e-005	2.2535e-005	2.867e-005	3.4874e-005	4.109e-005
0.4	7.5602e-009	1.45e-006	1.1015e-005	2.053e-005	2.9335e-005	3.7495e-005	4.5655e-005	5.3884e-005
0.5	-1.3655e-008	1.4375e-006	1.2715e-005	2.4689e-005	3.574e-005	4.5985e-005	5.6079e-005	6.6239e-005
0.6	-1.5625e-008	1.4485e-006	1.4035e-005	2.8485e-005	4.1779e-005	5.4104e-005	6.6161e-005	7.8209e-005
0.7	-1.929e-008	1.447e-006	1.499e-005	3.1885e-005	4.7445e-005	6.1888e-005	7.5888e-005	8.9835e-005
0.8	-8.4001e-009	1.448e-006	1.5605e-005	3.4919e-005	5.2759e-005	6.9335e-005	8.5291e-005	0.00010114
0.9	-1.485e-009	1.4515e-006	1.5975e-005	3.7605e-005	5.7729e-005	7.645e-005	9.4369e-005	0.0001121
1	7.5301e-009	1.454e-006	1.6155e-005	3.9924e-005	6.2358e-005	8.3238e-005	0.00010315	0.00012275
1.1	9.18e-009	1.4455e-006	1.6275e-005	4.1895e-005	6.6638e-005	8.9679e-005	0.00011165	0.00013315
1.2	1.1495e-008	1.452e-006	1.634e-005	4.3524e-005	7.0579e-005	9.5785e-005	0.00011975	0.00014315
1.3	2.8085e-008	1.454e-006	1.6389e-005	4.4815e-005	7.417e-005	0.00010159	0.00012755	0.0001529
1.4	-6.3901e-009	1.4565e-006	1.645e-005	4.5769e-005	7.7493e-005	0.00010705	0.0001351	0.00016235
1.5	8.6052e-009	1.4815e-006	1.6435e-005	4.6525e-005	8.0429e-005	0.00011215	0.00014225	0.00017145
1.6	8.8048e-009	1.435e-006	1.6515e-005	4.7045e-005	8.3033e-005	0.00011705	0.00014925	0.00018035
1.7	3.31e-009	1.4895e-006	1.651e-005	4.7354e-005	8.5372e-005	0.00012155	0.0001558	0.00018885
1.8	1.541e-008	1.466e-006	1.6535e-005	4.7635e-005	8.7328e-005	0.00012575	0.00016205	0.00019715
1.9	-1.542e-008	1.462e-006	1.6585e-005	4.7754e-005	8.9068e-005	0.00012965	0.0001681	0.0002051
2	3.1585e-008	1.4925e-006	1.657e-005	4.7909e-005	9.0487e-005	0.0001332	0.00017375	0.0002127
2.1	-1.479e-008	1.452e-006	1.664e-005	4.8019e-005	9.1605e-005	0.00013655	0.0001792	0.00022015
2.2	1.052e-008	1.5e-006	1.6625e-005	4.8084e-005	9.257e-005	0.0001395	0.00018431	0.00022721
2.3	1.062e-008	1.476e-006	1.6645e-005	4.8209e-005	9.3233e-005	0.0001422	0.00018905	0.000234
2.4	-1.386e-008	1.473e-006	1.6695e-005	4.8239e-005	9.3799e-005	0.00014465	0.0001936	0.0002405
2.5	3.1951e-008	1.5015e-006	1.667e-005	4.833e-005	9.422e-005	0.0001467	0.0001978	0.0002467
2.6	-1.4945e-008	1.456e-006	1.674e-005	4.8399e-005	9.4496e-005	0.0001486	0.0002017	0.00025271

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2.7    1.948e-008   1.509e-006  1.6725e-005 4.8429e-005 9.4805e-005 0.00015015  0.00020535  0.0002583
2.8    8.5251e-009 1.4805e-006 1.674e-005  4.8539e-005 9.4969e-005 0.00015155  0.0002087   0.00026365
2.9    3.8949e-009 1.4835e-006 1.6785e-005 4.8554e-005 9.5162e-005 0.00015265  0.00021181  0.0002688
3      1.413e-008   1.509e-006  1.6765e-005 4.8639e-005 9.5338e-005 0.00015355  0.0002146   0.0002736
3.1    -1.541e-008 1.466e-006  1.6825e-005 4.8695e-005 9.5449e-005 0.00015435  0.00021715  0.00027814
3.2    3.1765e-008 1.5145e-006 1.6805e-005 4.8719e-005 9.5628e-005 0.00015495  0.0002194   0.00028241
3.3    -1.451e-008 1.4925e-006 1.683e-005  4.882e-005  9.5718e-005 0.0001554   0.0002214   0.0002864
3.4    1.0975e-008 1.4915e-006 1.687e-005  4.882e-005  9.5844e-005 0.00015585  0.0002232   0.00029016
3.5    1.136e-008   1.521e-006  1.6845e-005 4.89e-005   9.5989e-005 0.0001562   0.0002247   0.00029351
3.6    -1.3715e-008    1.472e-006  1.691e-005  4.8954e-005 9.6049e-005 0.00015655  0.0002261   0.00029676
3.7    3.2285e-008 1.518e-006  1.6885e-005 4.8965e-005 9.6206e-005 0.00015675  0.00022725  0.00029965
3.8    -1.48e-008  1.4945e-006 1.6904e-005 4.906e-005  9.6273e-005 0.00015695  0.0002282   0.0003023
3.9    1.7065e-008 1.497e-006  1.694e-005  4.9064e-005 9.6373e-005 0.00015725  0.00022905  0.0003048
4      9.5301e-009 1.5235e-006 1.6915e-005 4.9125e-005 9.6492e-005 0.0001574   0.0002297   0.0003069
4.1    3.145e-009   1.476e-006  1.698e-005  4.9174e-005 9.6548e-005 0.0001576   0.00023035  0.0003089
4.2    1.1155e-008 1.5265e-006 1.6955e-005 4.9194e-005 9.6694e-005 0.0001578   0.00023085  0.00031066
4.3    -1.2535e-008    1.5035e-006 1.6975e-005 4.928e-005  9.6764e-005 0.00015795  0.0002312   0.00031215
4.4    3.1059e-008 1.506e-006  1.7015e-005 4.9274e-005 9.6839e-005 0.00015815  0.00023165  0.00031355
4.5    -1.637e-008 1.53e-006   1.6985e-005 4.9334e-005 9.6954e-005 0.00015825  0.00023195  0.00031465
4.6    2.7935e-008 1.4865e-006 1.7045e-005 4.9379e-005 9.6999e-005 0.00015845  0.0002323   0.0003157
4.7    7.4101e-009 1.5315e-006 1.7025e-005 4.9394e-005 9.7118e-005 0.0001586   0.0002326   0.00031661
4.8    3.4699e-009 1.511e-006  1.7045e-005 4.9485e-005 9.7185e-005 0.0001587   0.00023285  0.00031735
4.9    1.2135e-008 1.5115e-006 1.7075e-005 4.947e-005  9.7248e-005 0.00015895  0.0002332   0.00031805
5      -1.3965e-008    1.536e-006  1.7054e-005 4.9535e-005 9.7368e-005 0.000159    0.0002334   0.00031865
5.1    3.151e-008   1.491e-006  1.711e-005  4.9574e-005 9.7398e-005 0.00015915  0.00023365  0.00031915
5.2    -1.4305e-008    1.543e-006  1.709e-005  4.958e-005  9.7513e-005 0.0001593   0.0002339   0.0003197
5.3    1.5725e-008 1.5175e-006 1.711e-005  4.9664e-005 9.7584e-005 0.00015945  0.00023405  0.00032005
5.4    1.017e-008   1.5135e-006 1.714e-005  4.9654e-005 9.7632e-005 0.0001596   0.0002343   0.00032055
5.5    2.85e-009    1.5415e-006 1.711e-005  4.972e-005  9.7755e-005 0.0001597   0.0002345   0.00032085
5.6    1.2e-008     1.496e-006  1.717e-005  4.9759e-005 9.7774e-005 0.00015985  0.00023475  0.00032121
5.7    -1.3765e-008    1.5465e-006 1.7145e-005 4.9764e-005 9.7874e-005 0.00016     0.00023495  0.00032155
5.8    3.296e-008   1.5175e-006 1.7165e-005 4.9844e-005 9.7953e-005 0.00016005  0.00023516  0.00032185
5.9    -1.4095e-008    1.521e-006  1.7195e-005 4.9839e-005 9.7997e-005 0.00016025  0.00023535  0.00032225
6      1.359e-008   1.5485e-006 1.717e-005  4.9889e-005 9.8109e-005 0.0001603   0.00023551  0.00032251
6.1    1.051e-008   1.503e-006  1.7229e-005 4.993e-005  9.8128e-005 0.00016045  0.0002357   0.0003228
6.2    -6.57e-009  1.5525e-006 1.72e-005   4.993e-005  9.8225e-005 0.00016055  0.0002359   0.0003231
6.3    1.342e-008   1.526e-006  1.7225e-005 5.0019e-005 9.8299e-005 0.00016065  0.00023605  0.0003233
6.4    -1.443e-008 1.5265e-006 1.725e-005  4.9999e-005 9.8333e-005 0.0001608   0.0002363   0.00032365
6.5    3.2774e-008 1.549e-006  1.7225e-005 5.0059e-005 9.8456e-005 0.0001609   0.0002364   0.00032391
6.6    -1.611e-008 1.5085e-006 1.7284e-005 5.0094e-005 9.8474e-005 0.000161    0.0002366   0.0003241
6.7    2.532e-008   1.5595e-006 1.7255e-005 5.0094e-005 9.856e-005  0.00016115  0.0002368   0.0003244
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6.8   8.14e-009   1.5165e-006 1.7275e-005 5.018e-005  9.8631e-005 0.0001612   0.0002369   0.00032461
6.9   2.795e-009  1.533e-006  1.7305e-005 5.0165e-005 9.8668e-005 0.00016135  0.00023715  0.0003249
7     1.3795e-008 1.5515e-006 1.7275e-005 5.0209e-005 9.8769e-005 0.00016145  0.00023725  0.0003251
```

9c Plot

Device 9c: ID vs VD
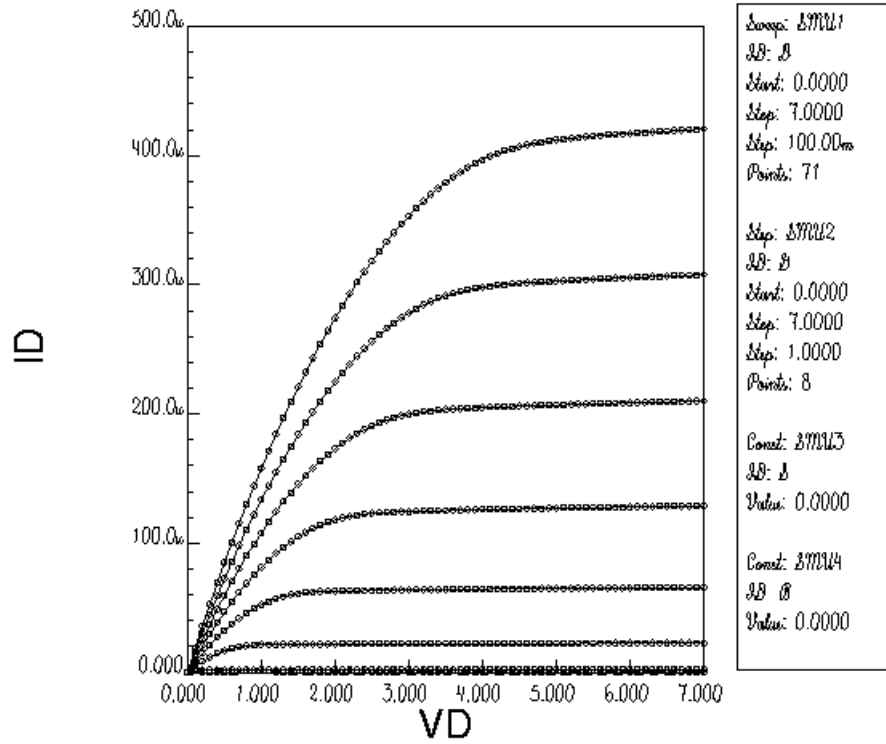
Conditions:

Sweep: SMU1
ID: D
Start: 0.0000
Stop: 7.0000
Step: 100.00m
Points: 71

Step: SMU2
ID: D
Start: 0.0000
Stop: 7.0000
Step: 1.0000
Points: 8

Const: SMU3
ID: D
Value: 0.0000

Const: SMU4
ID: D
Value: 0.0000

METRICS   10:53:33
Software   04/29/97

9c Data

PROJECT:NONAME   LOT:1 WAFER:1   DIE:1 DEV:1 USER: ;
COMMENT:;

SETUP:"MOSFET"

ID:		UNIT:	START:	STOP:	PNTS:	STEP:
ID:	D	UNIT: SMU1	START: 0	STOP: 7	PNTS: 71	STEP: 0.1
ID:	G	UNIT: SMU2	START: 0	STOP: 7	PNTS: 8	STEP: 1
ID:	S	UNIT: SMU3	START: 0	STOP: 1	PNTS: 1	STEP: 0
ID:	B	UNIT: SMU4	START: 0	STOP: 1	PNTS: 1	STEP: 0

DATA:

VD	ID	ID2	ID3	ID4	ID5	ID6	ID7	ID8
0	2.008e-008	3.119e-008	1.3235e-008	4.09e-008	2.535e-009	-4.13e-009	2.4425e-008	3.4895e-008
0.1	-1.959e-008	1.0705e-006	4.4724e-006	7.5409e-006	1.0306e-005	1.2985e-005	1.5605e-005	1.824e-005
0.2	3.0044e-008	1.653e-006	8.3246e-006	1.45e-005	2.013e-005	2.5339e-005	3.0575e-005	3.569e-005
0.3	2.9895e-008	1.838e-006	1.1675e-005	2.095e-005	2.9379e-005	3.7275e-005	4.502e-005	5.2685e-005
0.4	2.8655e-008	1.873e-006	1.4465e-005	2.6914e-005	3.8195e-005	4.8725e-005	5.8945e-005	6.9093e-005
0.5	1.6075e-008	1.8855e-006	1.672e-005	3.2354e-005	4.654e-005	5.9709e-005	7.2434e-005	8.4989e-005
0.6	9.35e-009	1.9075e-006	1.846e-005	3.7309e-005	5.4389e-005	7.027e-005	8.5428e-005	0.00010044
0.7	-6.185e-009	1.911e-006	1.9705e-005	4.1764e-005	6.1788e-005	8.0384e-005	9.8035e-005	0.00011545
0.8	-1.2185e-008	1.911e-006	2.0535e-005	4.573e-005	6.8739e-005	9.0029e-005	0.0001103	0.00013
0.9	-1.722e-008	1.926e-006	2.102e-005	4.923e-005	7.5225e-005	9.9264e-005	0.000122	0.00014415
1	-1.917e-008	1.933e-006	2.127e-005	5.2249e-005	8.1278e-005	0.00010805	0.00013335	0.0001579
1.1	-1.588e-008	1.928e-006	2.1405e-005	5.4814e-005	8.6862e-005	0.0001164	0.0001443	0.00017125
1.2	3.7401e-009	1.929e-006	2.1489e-005	5.6939e-005	9.2015e-005	0.00012435	0.0001548	0.00018425
1.3	4.8201e-009	1.9114e-006	2.1555e-005	5.8655e-005	9.6712e-005	0.00013185	0.000165	0.00019685
1.4	1.3675e-008	1.9065e-006	2.1635e-005	5.9929e-005	0.00010096	0.00013895	0.0001748	0.000209
1.5	-1.5255e-008	1.938e-006	2.1635e-005	6.0964e-005	0.00010486	0.0001457	0.00018405	0.00022081
1.6	3.2874e-008	1.8945e-006	2.1719e-005	6.159e-005	0.0001083	0.00015195	0.000193	0.00023225
1.7	-1.457e-008	1.946e-006	2.1725e-005	6.2063e-005	0.0001113	0.0001579	0.00020161	0.00024325
1.8	1.4755e-008	1.921e-006	2.1755e-005	6.2391e-005	0.00011395	0.0001633	0.0002097	0.00025395
1.9	1.002e-008	1.917e-006	2.1814e-005	6.2581e-005	0.0001162	0.0001684	0.00021755	0.00026426
2	2.52e-009	1.949e-006	2.1795e-005	6.2793e-005	0.000118	0.0001731	0.00022485	0.00027415
2.1	1.158e-008	1.9075e-006	2.1875e-005	6.2905e-005	0.00011955	0.00017735	0.0002319	0.0002837
2.2	-1.284e-008	1.9534e-006	2.1865e-005	6.3013e-005	0.00012075	0.00018135	0.00023855	0.00029285
2.3	3.2645e-008	1.9314e-006	2.189e-005	6.3151e-005	0.0001217	0.0001848	0.00024475	0.00030175
2.4	-1.446e-008	1.933e-006	2.1945e-005	6.32e-005	0.00012245	0.00018795	0.00025065	0.00031011
2.5	1.883e-008	1.961e-006	2.192e-005	6.3341e-005	0.00012295	0.00019075	0.00025605	0.00031816
2.6	9.6702e-009	1.9105e-006	2.1995e-005	6.3393e-005	0.00012345	0.00019315	0.0002612	0.0003259
2.7	3.9299e-009	1.9625e-006	2.1989e-005	6.3464e-005	0.0001237	0.0001953	0.000266	0.0003332

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2.8   1.681e-008   1.9419e-006 2.2004e-005 6.3576e-005 0.000124   0.00019705  0.00027035  0.00034021
2.9   -1.5705e-008     1.934e-006  2.205e-005  6.3605e-005 0.00012425 0.00019855  0.00027441  0.00034681
3     3.2314e-008  1.9639e-006 2.2025e-005 6.3725e-005 0.0001244  0.00019975  0.00027806  0.00035305
3.1   -1.3595e-008     1.9205e-006 2.2095e-005 6.377e-005  0.0001247  0.00020075  0.00028135  0.00035895
3.2   8.5151e-009  1.9695e-006 2.209e-005  6.3814e-005 0.0001248  0.00020161  0.0002844   0.00036445
3.3   1.005e-008   1.9465e-006 2.2099e-005 6.3915e-005 0.00012495 0.0002022   0.00028695  0.0003697
3.4   3.635e-009   1.9445e-006 2.2145e-005 6.3941e-005 0.00012515 0.00020275  0.0002894   0.00037456
3.5   1.161e-008   1.9739e-006 2.2124e-005 6.4045e-005 0.0001252  0.00020325  0.00029141  0.000379
3.6   -1.291e-008  1.9299e-006 2.219e-005  6.409e-005  0.0001254  0.00020355  0.00029315  0.00038326
3.7   3.2731e-008  1.982e-006  2.2185e-005 6.412e-005  0.00012555 0.00020395  0.0002947   0.000387
3.8   -1.427e-008  1.955e-006  2.219e-005  6.4213e-005 0.00012565 0.00020425  0.00029591  0.0003906
3.9   1.705e-008   1.9484e-006 2.224e-005  6.4228e-005 0.0001258  0.00020455  0.00029705  0.00039375
4     1.023e-008   1.98e-006   2.22e-005   6.4328e-005 0.0001259  0.0002048   0.00029795  0.00039661
4.1   -9.8899e-009     1.9375e-006 2.228e-005  6.4369e-005 0.00012605 0.000205    0.00029871  0.0003992
4.2   1.163e-008   1.985e-006  2.2265e-005 6.4395e-005 0.00012615 0.0002053   0.00029941  0.00040145
4.3   -1.279e-008  1.963e-006  2.2274e-005 6.4488e-005 0.00012625 0.0002055   0.00029995  0.00040351
4.4   3.2474e-008  1.9575e-006 2.232e-005  6.45e-005   0.0001264  0.0002057   0.00030045  0.0004053
4.5   -1.402e-008  1.9885e-006 2.2289e-005 6.4589e-005 0.00012645 0.00020595  0.0003009   0.0004068
4.6   1.996e-008   1.939e-006  2.236e-005  6.4623e-005 0.0001266  0.0002061   0.0003013   0.0004082
4.7   1.0035e-008  1.9865e-006 2.235e-005  6.4649e-005 0.00012665 0.00020635  0.00030175  0.00040931
4.8   3.8649e-009  1.971e-006  2.235e-005  6.4734e-005 0.00012675 0.0002065   0.000302    0.00041035
4.9   1.8785e-008  1.9685e-006 2.24e-005   6.4738e-005 0.00012695 0.0002067   0.0003024   0.00041126
5     -1.6305e-008     1.9944e-006 2.2369e-005 6.482e-005  0.00012695 0.00020685  0.0003027   0.000412
5.1   3.1894e-008  1.9484e-006 2.243e-005  6.4861e-005 0.00012715 0.000207    0.00030296  0.0004127
5.2   -1.3515e-008     1.9944e-006 2.2415e-005 6.4876e-005 0.00012715 0.00020725  0.0003033   0.0004133
5.3   8.5552e-009  1.976e-006  2.2424e-005 6.4969e-005 0.0001273  0.0002074   0.0003036   0.00041385
5.4   1.0345e-008  1.9685e-006 2.247e-005  6.4969e-005 0.0001274  0.00020755  0.00030385  0.0004144
5.5   -9.9398e-009     1.9994e-006 2.244e-005  6.5051e-005 0.00012745 0.00020775  0.00030415  0.00041485
5.6   1.2465e-008  1.954e-006  2.25e-005   6.5081e-005 0.0001276  0.00020785  0.0003044   0.0004154
5.7   -1.2895e-008     2.0005e-006 2.249e-005  6.5103e-005 0.00012765 0.00020805  0.0003047   0.00041576
5.8   3.322e-008   1.9795e-006 2.2495e-005 6.5189e-005 0.0001277  0.0002082   0.00030491  0.00041616
5.9   -1.391e-008  1.977e-006  2.2545e-005 6.5189e-005 0.00012785 0.00020835  0.0003051   0.00041661
6     1.7385e-008  2.0065e-006 2.2504e-005 6.5248e-005 0.0001279  0.0002085   0.0003054   0.0004169
6.1   1.0495e-008  1.9604e-006 2.2565e-005 6.5293e-005 0.00012805 0.0002086   0.00030561  0.00041735
6.2   -1.001e-008  2.0094e-006 2.2565e-005 6.5301e-005 0.00012805 0.0002088   0.00030591  0.00041765
6.3   1.188e-008   1.9839e-006 2.257e-005  6.5397e-005 0.0001282  0.00020895  0.00030605  0.00041801
6.4   -1.2485e-008     1.9805e-006 2.2605e-005 6.539e-005  0.0001283  0.00020905  0.00030625  0.00041841
6.5   3.286e-008   2.0105e-006 2.2574e-005 6.545e-005  0.0001283  0.00020925  0.0003065   0.00041865
6.6   -1.353e-008  1.9665e-006 2.2635e-005 6.5494e-005 0.00012845 0.00020935  0.0003067   0.00041901
6.7   2.207e-008   2.0144e-006 2.263e-005  6.5509e-005 0.0001285  0.00020955  0.00030701  0.00041935
6.8   9.9398e-009  1.9894e-006 2.263e-005  6.5587e-005 0.00012855 0.00020965  0.00030716  0.0004196
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6.9    5.08e-009   1.9859e-006 2.2669e-005 6.5584e-005 0.0001287   0.0002098   0.00030735  0.00041996
7      1.794e-008  2.0179e-006 2.2635e-005 6.5636e-005 0.0001287   0.00020995  0.00030761  0.0004202
```

10 Plot

Device 10: ID vs VD

Conditions:

Sweep: SMU1
ID: B
Start: 0.0000
Stop: 7.0000
Step: 100.00m
Points: 71

Step: SMU2
ID: B
Start: 0.0000
Stop: 7.0000
Step: 1.0000
Points: 8

Const: SMU3
ID: B
Value: 0.0000

Const: SMU4
ID: B
Value: 0.0000
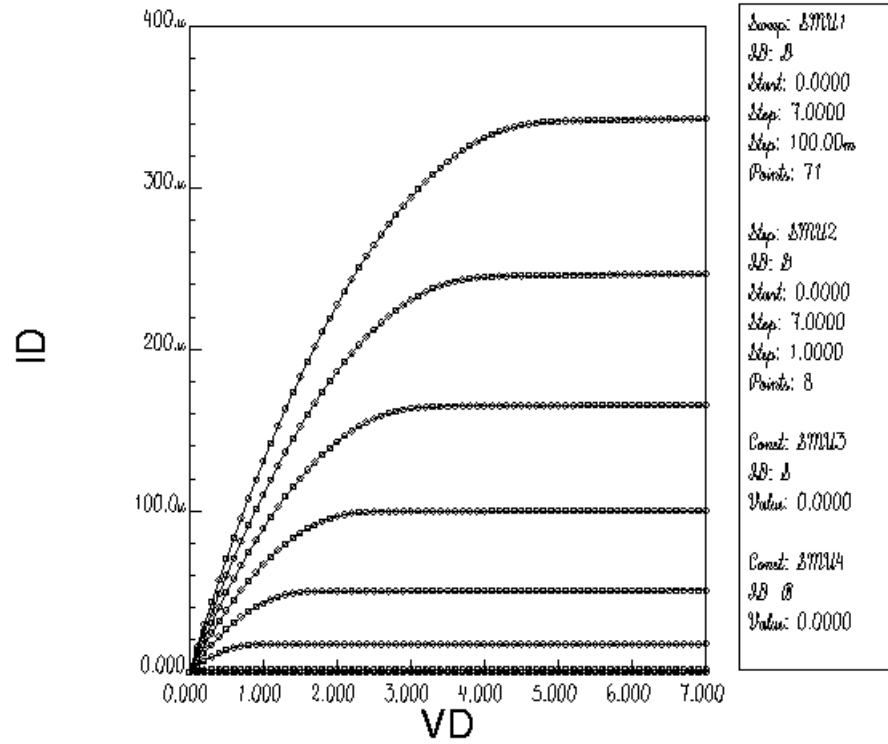
METRICS   10:48:28
Software   04/29/97

10 Data

SETUP:"MOSFET"

ID:	D	UNIT: SMU1	START:	0	STOP: 7	PNTS: 71	STEP: 0.1
ID:	G	UNIT: SMU2	START:	0	STOP: 7	PNTS: 8	STEP: 1
ID:	S	UNIT: SMU3	START:	0	STOP: 1	PNTS: 1	STEP: 0
ID:	B	UNIT: SMU4	START:	0	STOP: -3	PNTS: 4	STEP: -1

DATA:

VD	ID	ID2	ID3	ID4	ID5	ID6	ID7	ID8
0	8.6852e-009	2.229e-008	5.4575e-008	8.4248e-008	1.116e-007	1.337e-007	1.604e-007	1.8314e-007
0.1	8.6902e-009	9.5067e-007	3.7084e-006	6.2394e-006	8.5663e-006	1.078e-005	1.298e-005	1.5115e-005
0.2	8.8899e-009	1.4435e-006	6.8864e-006	1.1945e-005	1.6579e-005	2.0965e-005	2.5299e-005	2.954e-005
0.3	9.0199e-009	1.6095e-006	9.6239e-006	1.7235e-005	2.421e-005	3.076e-005	3.7204e-005	4.3549e-005
0.4	9.0099e-009	1.6335e-006	1.1915e-005	2.2105e-005	3.1445e-005	4.0185e-005	4.8699e-005	5.7124e-005
0.5	9.18e-009	1.6365e-006	1.377e-005	2.6565e-005	3.8279e-005	4.922e-005	5.9819e-005	7.0285e-005
0.6	8.8598e-009	1.6385e-006	1.52e-005	3.0614e-005	4.473e-005	5.7895e-005	7.0576e-005	8.3055e-005
0.7	8.9849e-009	1.6365e-006	1.622e-005	3.426e-005	5.0804e-005	6.6206e-005	8.098e-005	9.5464e-005
0.8	9.0899e-009	1.638e-006	1.686e-005	3.751e-005	5.65e-005	7.4159e-005	9.1042e-005	0.00010755
0.9	9.1099e-009	1.638e-006	1.7175e-005	4.036e-005	6.1825e-005	8.1759e-005	0.00010077	0.00011925
1	9.195e-009	1.64e-006	1.728e-005	4.2824e-005	6.6776e-005	8.9005e-005	0.00011015	0.0001307
1.1	9.1099e-009	1.642e-006	1.731e-005	4.4899e-005	7.1365e-005	9.5904e-005	0.0001192	0.00014175
1.2	9.0249e-009	1.639e-006	1.732e-005	4.6594e-005	7.559e-005	0.00010247	0.00012795	0.00015255
1.3	9.285e-009	1.641e-006	1.733e-005	4.792e-005	7.9449e-005	0.0001087	0.00013635	0.000163
1.4	9.4351e-009	1.6405e-006	1.7335e-005	4.8889e-005	8.2955e-005	0.00011455	0.00014435	0.00017315
1.5	9.31e-009	1.642e-006	1.7339e-005	4.9524e-005	8.6088e-005	0.0001201	0.00015215	0.00018295
1.6	9.295e-009	1.6435e-006	1.7345e-005	4.9885e-005	8.8874e-005	0.0001253	0.0001596	0.00019245
1.7	9.26e-009	1.642e-006	1.735e-005	5.0049e-005	9.1303e-005	0.00013015	0.0001667	0.0002017
1.8	9.3851e-009	1.644e-006	1.736e-005	5.012e-005	9.3378e-005	0.00013465	0.0001735	0.0002106
1.9	9.5501e-009	1.646e-006	1.736e-005	5.0159e-005	9.511e-005	0.0001388	0.00017995	0.0002192
2	9.4051e-009	1.6465e-006	1.7364e-005	5.0185e-005	9.6507e-005	0.0001427	0.0001861	0.0002275
2.1	9.6051e-009	1.644e-006	1.7364e-005	5.02e-005	9.758e-005	0.0001462	0.00019195	0.00023551
2.2	9.39e-009	1.6445e-006	1.737e-005	5.0215e-005	9.8344e-005	0.0001494	0.00019745	0.0002432
2.3	9.4751e-009	1.6455e-006	1.7375e-005	5.023e-005	9.8851e-005	0.00015225	0.00020265	0.00025061
2.4	9.4351e-009	1.646e-006	1.7375e-005	5.0245e-005	9.9145e-005	0.00015475	0.00020755	0.0002577
2.5	9.3701e-009	1.644e-006	1.7379e-005	5.0254e-005	9.9309e-005	0.000157	0.00021215	0.00026445
2.6	9.26e-009	1.644e-006	1.7385e-005	5.0265e-005	9.9394e-005	0.00015885	0.00021635	0.00027095
2.7	9.315e-009	1.6465e-006	1.7385e-005	5.028e-005	9.9454e-005	0.0001604	0.00022035	0.00027721

2.8	9.225e-009	1.646e-006	1.739e-005	5.0289e-005	9.9495e-005	0.0001617	0.000224	0.00028311
2.9	9.36e-009	1.6455e-006	1.7395e-005	5.0295e-005	9.9529e-005	0.00016265	0.0002273	0.00028869
3	9.33e-009	1.6455e-006	1.74e-005	5.031e-005	9.9555e-005	0.0001634	0.00023035	0.000294
3.1	9.31e-009	1.645e-006	1.7395e-005	5.0314e-005	9.9584e-005	0.00016385	0.000233	0.00029901
3.2	9.19e-009	1.646e-006	1.74e-005	5.0325e-005	9.9603e-005	0.0001642	0.0002354	0.0003037
3.3	9.205e-009	1.6465e-006	1.7405e-005	5.0334e-005	9.9629e-005	0.00016435	0.0002375	0.0003081
3.4	9.325e-009	1.646e-006	1.7405e-005	5.034e-005	9.9648e-005	0.0001645	0.00023935	0.00031225
3.5	9.305e-009	1.6455e-006	1.741e-005	5.0349e-005	9.9663e-005	0.0001646	0.00024086	0.00031605
3.6	9.4151e-009	1.647e-006	1.741e-005	5.036e-005	9.9689e-005	0.0001647	0.00024205	0.0003196
3.7	9.4901e-009	1.647e-006	1.7415e-005	5.0364e-005	9.9704e-005	0.0001647	0.00024305	0.00032285
3.8	9.6351e-009	1.6475e-006	1.7415e-005	5.0375e-005	9.9722e-005	0.00016475	0.00024381	0.00032575
3.9	9.8598e-009	1.6485e-006	1.7419e-005	5.0379e-005	9.9744e-005	0.0001648	0.00024435	0.00032841
4	1.0075e-008	1.6475e-006	1.7419e-005	5.0384e-005	9.9752e-005	0.00016485	0.00024475	0.00033081
4.1	9.9048e-009	1.647e-006	1.7425e-005	5.0394e-005	9.9771e-005	0.00016485	0.00024501	0.00033291
4.2	9.6502e-009	1.649e-006	1.7425e-005	5.0405e-005	9.9789e-005	0.0001649	0.0002452	0.00033471
4.3	9.6702e-009	1.6485e-006	1.743e-005	5.0409e-005	9.9804e-005	0.00016495	0.0002453	0.00033626
4.4	9.4901e-009	1.649e-006	1.743e-005	5.0414e-005	9.9819e-005	0.000165	0.00024541	0.00033756
4.5	9.8598e-009	1.65e-006	1.7434e-005	5.0424e-005	9.983e-005	0.000165	0.0002455	0.00033855
4.6	9.5501e-009	1.652e-006	1.7434e-005	5.0429e-005	9.9845e-005	0.00016505	0.00024556	0.0003394
4.7	9.6852e-009	1.653e-006	1.7434e-005	5.0435e-005	9.9864e-005	0.00016505	0.0002456	0.00034
4.8	9.5001e-009	1.6495e-006	1.7434e-005	5.0438e-005	9.9875e-005	0.0001651	0.00024565	0.00034051
4.9	9.7948e-009	1.6495e-006	1.744e-005	5.045e-005	9.9882e-005	0.0001651	0.0002457	0.00034085
5	9.8148e-009	1.6495e-006	1.744e-005	5.0455e-005	9.9905e-005	0.00016515	0.00024575	0.0003411
5.1	1.0085e-008	1.652e-006	1.744e-005	5.0459e-005	9.9912e-005	0.00016515	0.00024579	0.00034125
5.2	1.0015e-008	1.6505e-006	1.7445e-005	5.047e-005	9.9935e-005	0.00016515	0.00024585	0.0003414
5.3	1.0025e-008	1.65e-006	1.745e-005	5.0474e-005	9.9942e-005	0.0001652	0.0002459	0.00034155
5.4	9.9799e-009	1.652e-006	1.745e-005	5.048e-005	9.9953e-005	0.0001652	0.00024596	0.00034165
5.5	9.9048e-009	1.6515e-006	1.7455e-005	5.0485e-005	9.9968e-005	0.00016525	0.000246	0.00034176
5.6	9.9699e-009	1.6525e-006	1.7455e-005	5.0489e-005	9.9983e-005	0.00016525	0.000246	0.0003418
5.7	9.8248e-009	1.6525e-006	1.7455e-005	5.0494e-005	9.9994e-005	0.0001653	0.00024605	0.00034185
5.8	9.8948e-009	1.652e-006	1.7455e-005	5.05e-005	0.00010001	0.00016535	0.00024611	0.00034195
5.9	9.7848e-009	1.652e-006	1.746e-005	5.0509e-005	0.00010001	0.00016535	0.00024615	0.000342
6	9.9298e-009	1.656e-006	1.7465e-005	5.0515e-005	0.00010003	0.00016535	0.00024615	0.00034206
6.1	9.8398e-009	1.654e-006	1.746e-005	5.0519e-005	0.00010004	0.00016535	0.0002462	0.0003421
6.2	9.8848e-009	1.6545e-006	1.746e-005	5.0524e-005	0.00010005	0.0001654	0.00024626	0.00034221
6.3	9.8048e-009	1.6545e-006	1.7465e-005	5.0534e-005	0.00010006	0.00016545	0.00024626	0.00034225
6.4	9.9398e-009	1.652e-006	1.7465e-005	5.0534e-005	0.00010007	0.00016545	0.0002463	0.00034231
6.5	9.9549e-009	1.654e-006	1.747e-005	5.0539e-005	0.00010008	0.00016545	0.00024635	0.00034235
6.6	9.9149e-009	1.652e-006	1.747e-005	5.0545e-005	0.00010009	0.0001655	0.00024641	0.0003424
6.7	1.0135e-008	1.652e-006	1.747e-005	5.055e-005	0.0001001	0.0001655	0.00024641	0.00034246
6.8	9.9849e-009	1.652e-006	1.7474e-005	5.0554e-005	0.00010012	0.0001655	0.00024641	0.0003425

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6.9    1.0185e-008 1.6515e-006 1.7474e-005 5.056e-005  0.00010013  0.00016555  0.00024645  0.00034255
7      9.8798e-009 1.6535e-006 1.748e-005  5.0569e-005 0.00010014  0.00016555  0.0002465   0.00034261
```

11 Plot

Device 11: ID vs VD
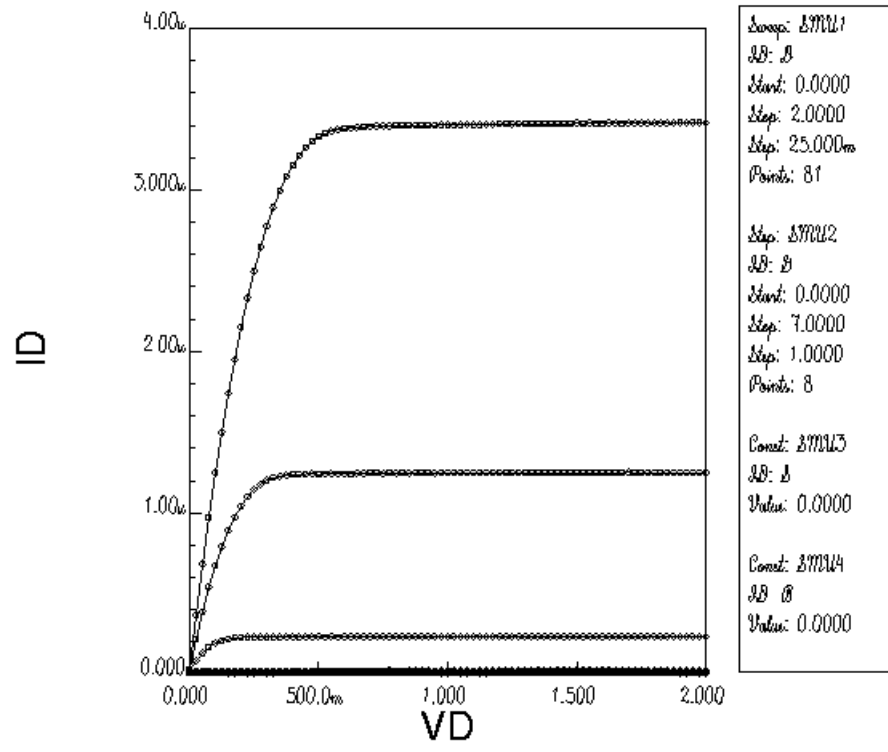
Conditions:

Sweep: SMU1
ID: D
Start: 0.0000
Step: 2.0000
Stop: 25.000m
Points: 81

Step: SMU2
ID: D
Start: 0.0000
Step: 7.0000
Stop: 1.0000
Points: 8

Const: SMU3
ID: S
Value: 0.0000

Const: SMU4
ID: B
Value: 0.0000

METRICS   10:49:10
Software   04/29/97

11 Data

PROJECT:NONAME   LOT:1 WAFER:1   DIE:1 DEV:1 USER: ;
COMMENT:;

SETUP:"MOSFET"
ID: D   UNIT: SMU1   START: 0   STOP: 2   PNTS: 81   STEP: 0.025
ID: G   UNIT: SMU2   START: 0   STOP: 7   PNTS: 8   STEP: 1
ID: S   UNIT: SMU3   START: 0   STOP: 1   PNTS: 1   STEP: 0
ID: B   UNIT: SMU4   START: 0   STOP: 1   PNTS: 1   STEP: 0
DATA:

VD	ID	ID2	ID3	ID4	ID5	ID6	ID7	ID8
0	6.8151e-009	7.15e-009	1.3625e-008	1.713e-008	1.7745e-008	2.0705e-008	2.67e-008	3.3349e-008
0.025	6.745e-009	7.29e-009	1.3315e-008	1.7345e-008	2.01e-008	8.3298e-008	2.1634e-007	3.669e-007
0.05	6.9349e-009	7.225e-009	1.3535e-008	1.723e-008	2.13e-008	1.315e-007	3.8689e-007	6.8033e-007
0.075	6.8301e-009	7.29e-009	1.3505e-008	1.741e-008	2.1465e-008	1.6745e-007	5.3874e-007	9.7358e-007
0.1	7.085e-009	7.4051e-009	1.368e-008	1.7315e-008	2.1895e-008	1.9254e-007	6.7302e-007	1.247e-006
0.125	6.9399e-009	7.6752e-009	1.3645e-008	1.7195e-008	2.189e-008	2.0929e-007	7.8964e-007	1.499e-006
0.15	6.9749e-009	7.5602e-009	1.3675e-008	1.7405e-008	2.2155e-008	2.1965e-007	8.8994e-007	1.7375e-006
0.175	7.0199e-009	7.7048e-009	1.376e-008	1.7375e-008	2.207e-008	2.251e-007	9.7376e-007	1.9484e-006
0.2	7.025e-009	7.6102e-009	1.366e-008	1.75e-008	2.1955e-008	2.283e-007	1.042e-006	2.151e-006
0.225	7.135e-009	7.7348e-009	1.39e-008	1.753e-008	2.1825e-008	2.295e-007	1.098e-006	2.3314e-006
0.25	7.2e-009	7.6302e-009	1.389e-008	1.743e-008	2.186e-008	2.305e-007	1.143e-006	2.4955e-006
0.275	7.15e-009	7.7198e-009	1.3885e-008	1.744e-008	2.2055e-008	2.3105e-007	1.175e-006	2.6445e-006
0.3	7.0449e-009	7.6302e-009	1.373e-008	1.7485e-008	2.216e-008	2.3114e-007	1.2e-006	2.7745e-006
0.325	7.15e-009	7.6102e-009	1.386e-008	1.7525e-008	2.225e-008	2.3124e-007	1.2165e-006	2.89e-006
0.35	7.2e-009	7.5251e-009	1.391e-008	1.7595e-008	2.2185e-008	2.3124e-007	1.2255e-006	2.9909e-006
0.375	7.245e-009	7.5902e-009	1.402e-008	1.76e-008	2.2275e-008	2.3159e-007	1.2315e-006	3.0785e-006
0.4	7.2951e-009	7.6402e-009	1.3945e-008	1.7435e-008	2.2165e-008	2.3159e-007	1.2355e-006	3.15e-006
0.425	7.21e-009	7.7198e-009	1.3875e-008	1.7585e-008	2.24e-008	2.3164e-007	1.238e-006	3.2095e-006
0.45	7.2e-009	7.6552e-009	1.389e-008	1.7505e-008	2.2395e-008	2.317e-007	1.2395e-006	3.2585e-006
0.475	7.195e-009	7.5651e-009	1.403e-008	1.7795e-008	2.2275e-008	2.317e-007	1.2405e-006	3.2975e-006
0.5	7.235e-009	7.6102e-009	1.4035e-008	1.7705e-008	2.2355e-008	2.3199e-007	1.24e-006	3.326e-006
0.525	7.4151e-009	7.6102e-009	1.3885e-008	1.767e-008	2.2215e-008	2.3185e-007	1.2425e-006	3.345e-006
0.55	7.24e-009	7.7798e-009	1.398e-008	1.7705e-008	2.2405e-008	2.3194e-007	1.242e-006	3.3615e-006
0.575	7.3951e-009	7.6502e-009	1.3895e-008	1.758e-008	2.237e-008	2.3185e-007	1.2415e-006	3.3715e-006
0.6	7.24e-009	7.8248e-009	1.406e-008	1.7755e-008	2.2465e-008	2.3194e-007	1.2425e-006	3.3779e-006
0.625	7.2801e-009	7.6552e-009	1.4075e-008	1.7845e-008	2.242e-008	2.3199e-007	1.24e-006	3.3824e-006
0.65	7.3651e-009	7.6898e-009	1.3995e-008	1.7765e-008	2.247e-008	2.3215e-007	1.2435e-006	3.3835e-006
0.675	7.3951e-009	7.7398e-009	1.4065e-008	1.7795e-008	2.224e-008	2.3199e-007	1.244e-006	3.387e-006

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0.7    7.4249e-009 7.8148e-009 1.396e-008  1.772e-008  2.254e-008  2.321e-007  1.245e-006  3.3914e-006
0.725  7.3551e-009 7.8548e-009 1.394e-008  1.7735e-008 2.254e-008  2.3215e-007 1.2455e-006 3.3929e-006
0.75   7.3201e-009 7.8498e-009 1.406e-008  1.784e-008  2.2525e-008 2.3234e-007 1.2425e-006 3.3925e-006
0.775  7.3351e-009 7.7648e-009 1.411e-008  1.7905e-008 2.2635e-008 2.3234e-007 1.245e-006  3.394e-006
0.8    7.4551e-009 7.7398e-009 1.39e-008   1.7825e-008 2.2525e-008 2.322e-007  1.2445e-006 3.3955e-006
0.825  7.4551e-009 7.8848e-009 1.403e-008  1.7765e-008 2.258e-008  2.3234e-007 1.2455e-006 3.3955e-006
0.85   7.4851e-009 7.8798e-009 1.397e-008  1.7725e-008 2.2645e-008 2.3234e-007 1.2435e-006 3.3964e-006
0.875  7.3801e-009 7.8999e-009 1.4e-008    1.78e-008   2.261e-008  2.325e-007  1.246e-006  3.3959e-006
0.9    7.3901e-009 7.6052e-009 1.4075e-008 1.7945e-008 2.2685e-008 2.3245e-007 1.246e-006  3.397e-006
0.925  7.4001e-009 7.8698e-009 1.408e-008  1.7805e-008 2.264e-008  2.323e-007  1.2465e-006 3.399e-006
0.95   7.4901e-009 7.8698e-009 1.4065e-008 1.7935e-008 2.254e-008  2.325e-007  1.2445e-006 3.3979e-006
0.975  7.5151e-009 8.12e-009   1.411e-008  1.775e-008  2.2665e-008 2.3239e-007 1.2455e-006 3.4014e-006
1      7.5251e-009 8.0149e-009 1.4075e-008 1.7875e-008 2.2635e-008 2.3269e-007 1.246e-006  3.3999e-006
1.025  7.4399e-009 8.0299e-009 1.423e-008  1.788e-008  2.2725e-008 2.325e-007  1.2465e-006 3.401e-006
1.05   7.4399e-009 7.9749e-009 1.428e-008  1.787e-008  2.262e-008  2.326e-007  1.2455e-006 3.4005e-006
1.075  7.4249e-009 8.105e-009  1.419e-008  1.803e-008  2.2555e-008 2.326e-007  1.245e-006  3.402e-006
1.1    7.6202e-009 8.0999e-009 1.4155e-008 1.795e-008  2.2585e-008 2.326e-007  1.248e-006  3.4014e-006
1.125  7.5752e-009 8.2e-009    1.416e-008  1.7805e-008 2.2625e-008 2.3274e-007 1.2455e-006 3.4014e-006
1.15   7.4399e-009 8.0649e-009 1.4175e-008 1.7925e-008 2.28e-008   2.326e-007  1.245e-006  3.4025e-006
1.175  7.5251e-009 8.0249e-009 1.422e-008  1.794e-008  2.2695e-008 2.3274e-007 1.246e-006  3.4035e-006
1.2    7.4651e-009 8.135e-009  1.4295e-008 1.8185e-008 2.2675e-008 2.326e-007  1.249e-006  3.4044e-006
1.225  7.5452e-009 8.205e-009  1.418e-008  1.8045e-008 2.275e-008  2.3285e-007 1.2475e-006 3.4049e-006
1.25   7.5852e-009 8.0999e-009 1.409e-008  1.798e-008  2.274e-008  2.329e-007  1.246e-006  3.4055e-006
1.275  7.6402e-009 8.0699e-009 1.4135e-008 1.793e-008  2.276e-008  2.3265e-007 1.2475e-006 3.4055e-006
1.3    7.5602e-009 7.9699e-009 1.42e-008   1.81e-008   2.2825e-008 2.3279e-007 1.246e-006  3.406e-006
1.325  7.5502e-009 8.155e-009  1.4295e-008 1.8065e-008 2.2855e-008 2.3285e-007 1.248e-006  3.4044e-006
1.35   7.5051e-009 7.8449e-009 1.432e-008  1.811e-008  2.2655e-008 2.3295e-007 1.2495e-006 3.4064e-006
1.375  7.5502e-009 7.9899e-009 1.4215e-008 1.811e-008  2.283e-008  2.329e-007  1.2475e-006 3.4084e-006
1.4    7.7998e-009 7.9199e-009 1.4155e-008 1.8065e-008 2.265e-008  2.329e-007  1.2485e-006 3.4084e-006
1.425  7.6552e-009 8.16e-009   1.4235e-008 1.809e-008  2.279e-008  2.329e-007  1.2475e-006 3.4075e-006
1.45   7.6652e-009 8.0699e-009 1.423e-008  1.8005e-008 2.296e-008  2.3295e-007 1.247e-006  3.4084e-006
1.475  7.4751e-009 8.235e-009  1.4235e-008 1.816e-008  2.2835e-008 2.3309e-007 1.2485e-006 3.4079e-006
1.5    7.6252e-009 8.245e-009  1.44e-008   1.822e-008  2.2805e-008 2.33e-007   1.248e-006  3.412e-006
1.525  7.6402e-009 8.165e-009  1.42e-008   1.8035e-008 2.2775e-008 2.33e-007   1.2475e-006 3.4075e-006
1.55   7.7648e-009 8.305e-009  1.4175e-008 1.821e-008  2.2925e-008 2.3309e-007 1.247e-006  3.412e-006
1.575  7.6052e-009 8.275e-009  1.434e-008  1.793e-008  2.2865e-008 2.3309e-007 1.2455e-006 3.4095e-006
1.6    7.6847e-009 8.31e-009   1.4425e-008 1.8245e-008 2.296e-008  2.3305e-007 1.2485e-006 3.4099e-006
1.625  7.5902e-009 8.4501e-009 1.4255e-008 1.812e-008  2.281e-008  2.3325e-007 1.248e-006  3.4125e-006
1.65   7.6252e-009 8.3401e-009 1.434e-008  1.8275e-008 2.2825e-008 2.33e-007   1.2495e-006 3.4129e-006
1.675  7.6652e-009 8.37e-009   1.4165e-008 1.8115e-008 2.2795e-008 2.3325e-007 1.2475e-006 3.411e-006
1.7    7.8348e-009 8.305e-009  1.4265e-008 1.821e-008  2.28e-008   2.3314e-007 1.2505e-006 3.412e-006
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1.725 7.6898e-009 8.4701e-009 1.441e-008  1.8055e-008 2.2975e-008 2.3314e-007 1.2485e-006 3.4125e-006
1.75  7.6552e-009 8.4951e-009 1.4295e-008 1.8235e-008 2.2855e-008 2.3325e-007 1.2495e-006 3.4134e-006
1.775 7.5902e-009 8.4101e-009 1.4425e-008 1.8235e-008 2.2925e-008 2.3309e-007 1.2485e-006 3.4129e-006
1.8   7.6152e-009 8.26e-009   1.4275e-008 1.822e-008  2.28e-008   2.3319e-007 1.2485e-006 3.4125e-006
1.825 7.7598e-009 8.325e-009  1.437e-008  1.8145e-008 2.2955e-008 2.3314e-007 1.249e-006  3.4134e-006
1.85  7.7498e-009 8.38e-009   1.423e-008  1.82e-008   2.2935e-008 2.333e-007  1.2475e-006 3.4134e-006
1.875 7.7898e-009 8.4301e-009 1.4405e-008 1.818e-008  2.31e-008   2.3335e-007 1.2475e-006 3.4134e-006
1.9   7.6302e-009 8.4751e-009 1.44e-008   1.8295e-008 2.296e-008  2.3314e-007 1.249e-006  3.4149e-006
1.925 7.6802e-009 8.37e-009   1.447e-008  1.832e-008  2.3105e-008 2.334e-007  1.2495e-006 3.4125e-006
1.95  7.6752e-009 8.3601e-009 1.4375e-008 1.83e-008   2.2825e-008 2.3325e-007 1.2485e-006 3.414e-006
1.975 7.8148e-009 8.4001e-009 1.433e-008  1.821e-008  2.311e-008  2.3349e-007 1.249e-006  3.4145e-006
2     7.8599e-009 8.5501e-009 1.4365e-008 1.814e-008  2.3105e-008 2.3319e-007 1.25e-006   3.4134e-006
```

8a Plot

Device 8A: ID vs VG, VD=50mV

8a Data

```
PROJECT:NONAME      LOT:1 WAFER:1      DIE:1 DEV:1 USER: ;
COMMENT:;


SETUP:"MOSFET"
ID:   D          UNIT: SMU1      START:      0.05      STOP: 7      PNTS: 71      STEP: 0.1
ID:   G          UNIT: SMU2      START:      0         STOP: 3      PNTS: 61      STEP: 0.05
ID:   S          UNIT: SMU3      START:      0         STOP: 1      PNTS: 1       STEP: 0
ID:   B          UNIT: SMU4      START:      0         STOP: 1      PNTS: 1       STEP: 0
DATA:
ID      VG
0.001138    0
0.0011375   0.05
0.001138    0.1
0.0011375   0.15
0.001138    0.2
0.0011375   0.25
0.0011375   0.3
0.001138    0.35
0.001138    0.4
0.001138    0.45
0.0011375   0.5
0.001138    0.55
0.001138    0.6
0.001138    0.65
0.001138    0.7
0.0011375   0.75
0.001138    0.8
0.0011375   0.85
0.001138    0.9
0.001138    0.95
0.0011385   1
0.001138    1.05
0.001138    1.1
0.0011385   1.15
0.001138    1.2
0.0011385   1.25
0.001138    1.3
0.001138    1.35
```
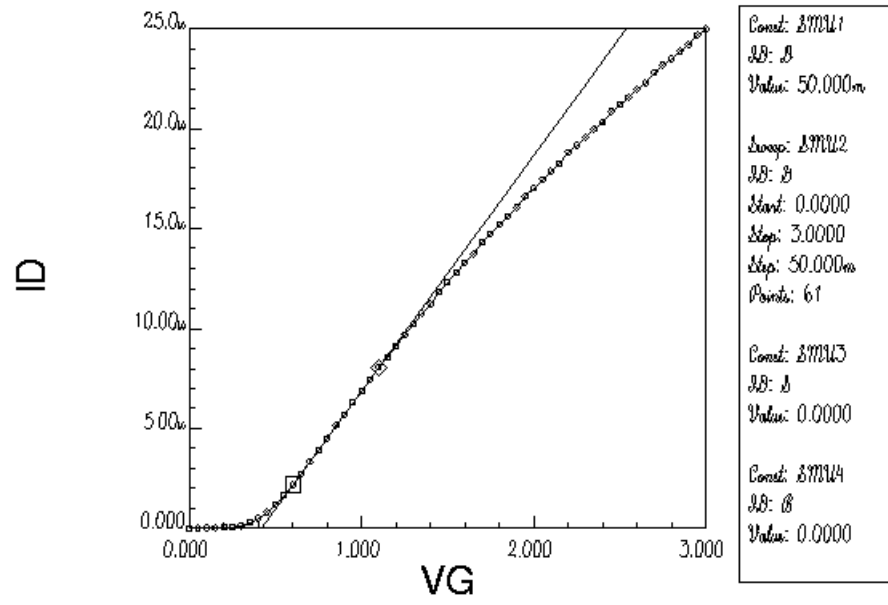
```
0.0011385    1.4
0.001139     1.45
0.0011385    1.5
0.0011385    1.55
0.001138     1.6
0.0011385    1.65
0.0011385    1.7
0.0011385    1.75
0.0011385    1.8
0.001139     1.85
0.001139     1.9
0.001139     1.95
0.001139     2
0.001139     2.05
0.001139     2.1
0.001139     2.15
0.001139     2.2
0.0011395    2.25
0.0011395    2.3
0.0011395    2.35
0.0011395    2.4
0.0011395    2.45
0.00114      2.5
0.0011395    2.55
0.00114      2.6
0.00114      2.65
0.00114      2.7
0.0011405    2.75
0.0011395    2.8
0.0011405    2.85
0.00114      2.9
0.0011405    2.95
0.0011405    3
```

8b Plot

Device 8B: ID vs VG, VD=50mV

Conditions:

Const: SMU1
ID: B
Value: 50.000m

Sweep: SMU2
ID: B
Start: 0.0000
Stop: 3.0000
Step: 50.000m
Points: 61

Const: SMU3
ID: S
Value: 0.0000

Const: SMU4
ID: B
Value: 0.0000

Fit #1:		Fit #2:	Cursors:	X	Y
Type: Cursor		None	☐	600.00m	2.1646u
Slope:11.77u		****	◇	1.1000	8.049u
Yint:−4.897u		****	○		
Xint:416.1m		****	⊠		
METRICS	10:57:40		⋈		
Software	04/29/97		△		

8b Data

PROJECT:NONAME   LOT:1 WAFER:1   DIE:1 DEV:1 USER: ;
COMMENT:;

SETUP:"MOSFET"

ID:	D	UNIT: SMU1	START:	0.05	STOP: 7	PNTS: 71	STEP: 0.1
ID:	G	UNIT: SMU2	START:	0	STOP: 3	PNTS: 61	STEP: 0.05
ID:	S	UNIT: SMU3	START:	0	STOP: 1	PNTS: 1	STEP: 0
ID:	B	UNIT: SMU4	START:	0	STOP: 1	PNTS: 1	STEP: 0

DATA:

ID	VG
6.2e-009	0
1.085e-009	0.05
1.244e-008	0.1
2.448e-008	0.15
3.147e-008	0.2
6.5811e-008	0.25
1.1515e-007	0.3
2.7989e-007	0.35
5.0419e-007	0.4
8.0952e-007	0.45
1.2005e-006	0.5
1.65e-006	0.55
2.1645e-006	0.6
2.7175e-006	0.65
3.3125e-006	0.7
3.9234e-006	0.75
4.4925e-006	0.8
5.1383e-006	0.85
5.6785e-006	0.9
6.2878e-006	0.95
6.8739e-006	1
7.4438e-006	1.05
8.049e-006	1.1
8.5374e-006	1.15
9.1163e-006	1.2
9.6681e-006	1.25
1.0191e-005	1.3
1.076e-005	1.35

```
1.1205e-005 1.4
1.1815e-005 1.45
1.229e-005  1.5
1.2785e-005 1.55
1.329e-005  1.6
1.371e-005  1.65
1.428e-005  1.7
1.473e-005  1.75
1.5175e-005 1.8
1.562e-005  1.85
1.6035e-005 1.9
1.6595e-005 1.95
1.699e-005  2
1.7434e-005 2.05
1.7854e-005 2.1
1.8225e-005 2.15
1.8789e-005 2.2
1.9145e-005 2.25
1.9555e-005 2.3
1.9945e-005 2.35
2.0285e-005 2.4
2.0824e-005 2.45
2.1155e-005 2.5
2.1545e-005 2.55
2.1955e-005 2.6
2.225e-005  2.65
2.2785e-005 2.7
2.315e-005  2.75
2.3465e-005 2.8
2.384e-005  2.85
2.4165e-005 2.9
2.4655e-005 2.95
2.4959e-005 3
```

8c Plot

Device 8C: ID vs VG, VD=50mV

Conditions:

Const: SMU1
ID: D
Value: 50.000m

Sweep: SMU2
ID: G
Start: 0.0000
Stop: 3.0000
Step: 50.000m
Points: 61

Const: SMU3
ID: S
Value: 0.0000

Const: SMU4
ID: B
Value: 0.0000
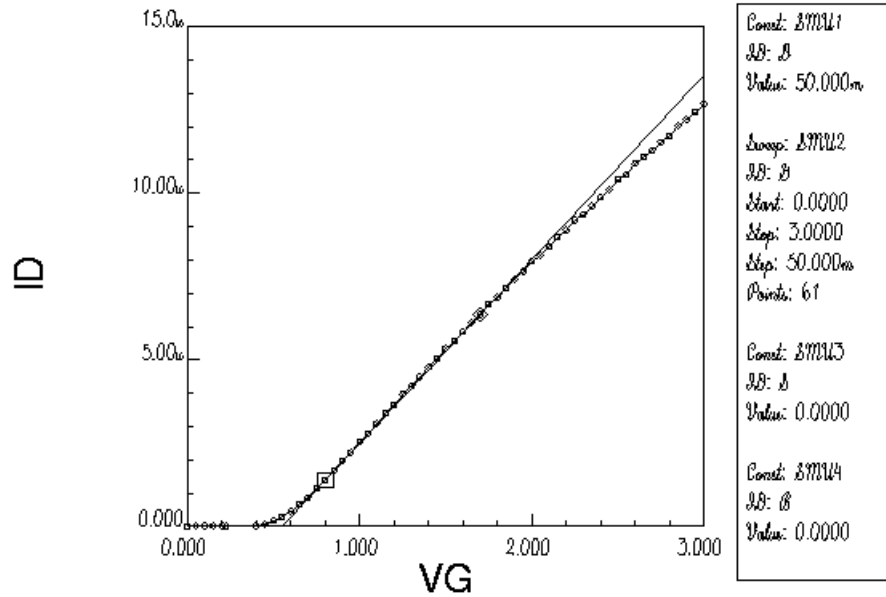
Fit #1:		Fit #2:	Cursors:	X	Y
Type: Cursor		None	□	800.00m	1.3866u
Slope:5.5176u		****	◇	1.7000	6.3522u
Yint:-3.0276u		****	○		
Xint:548.71m		****	⊠		
METRICS	10:58:09		⋈		
Software	04/29/97		△		

8c Data

PROJECT:NONAME   LOT:1 WAFER:1   DIE:1 DEV:1 USER: ;
COMMENT:;

SETUP:"MOSFET"
ID: D   UNIT: SMU1   START: 0.05   STOP: 7   PNTS: 71   STEP: 0.1
ID: G   UNIT: SMU2   START: 0   STOP: 3   PNTS: 61   STEP: 0.05
ID: S   UNIT: SMU3   START: 0   STOP: 1   PNTS: 1   STEP: 0
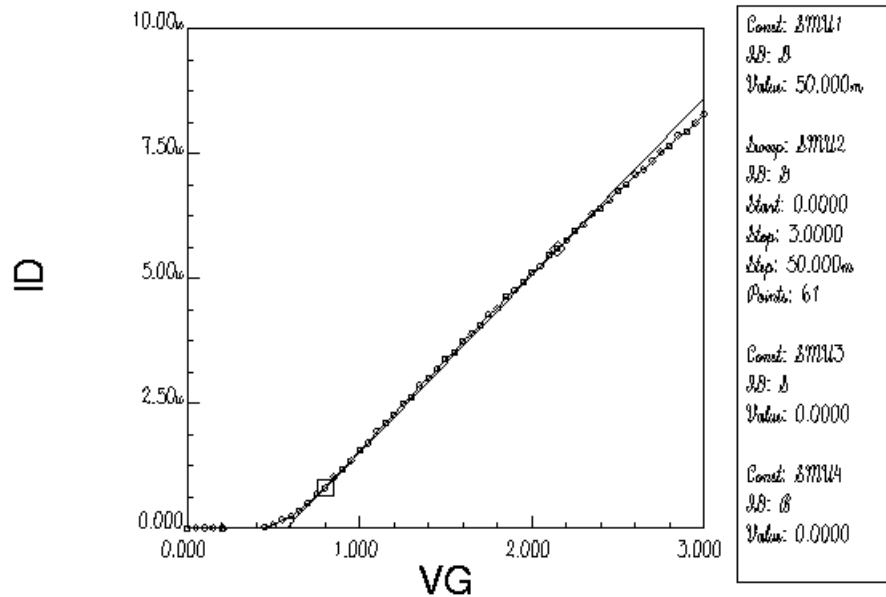ID: B   UNIT: SMU4   START: 0   STOP: 1   PNTS: 1   STEP: 0
DATA:
ID   VG
-7.4449e-009   0
6.105e-009 0.05
6.7501e-009 0.1
1.17e-008   0.15
8.3551e-009 0.2
-8.3551e-009   0.25
-8.9249e-009   0.3
-4.8601e-009   0.35
1.283e-008 0.4
5.5725e-008 0.45
1.5565e-007 0.5
2.827e-007 0.55
4.5315e-007 0.6
6.5518e-007 0.65
8.6523e-007 0.7
1.1565e-006 0.75
1.3865e-006 0.8
1.667e-006 0.85
1.9685e-006 0.9
2.2125e-006 0.95
2.549e-006 1
2.7824e-006 1.05
3.0809e-006 1.1
3.3844e-006 1.15
3.6319e-006 1.2
3.964e-006 1.25
4.1931e-006 1.3
4.4815e-006 1.35

```
4.7705e-006 1.4
5.0194e-006 1.45
5.336e-006  1.5
5.5526e-006 1.55
5.8294e-006 1.6
6.1114e-006 1.65
6.3523e-006 1.7
6.662e-006  1.75
6.8625e-006 1.8
7.1365e-006 1.85
7.4089e-006 1.9
7.635e-006  1.95
7.9433e-006 2
8.1272e-006 2.05
8.4029e-006 2.1
8.6664e-006 2.15
8.8853e-006 2.2
9.1829e-006 2.25
9.351e-006  2.3
9.6075e-006 2.35
9.8609e-006 2.4
1.0097e-005 2.45
1.0392e-005 2.5
1.0555e-005 2.55
1.087e-005  2.6
1.107e-005  2.65
1.1275e-005 2.7
1.1515e-005 2.75
1.17e-005   2.8
1.202e-005  2.85
1.2195e-005 2.9
1.2415e-005 2.95
1.267e-005  3
```

8d Plot

Device 8D: ID vs VG, VD=50mV

Conditions:

Const: SMU1
ID: B
Value: 50.000m

Sweep: SMU2
ID: B
Start: 0.0000
Stop: 3.0000
Step: 50.000m
Points: 61

Const: SMU3
ID: S
Value: 0.0000

Const: SMU4
ID: B
Value: 0.0000

Fit #1:		Fit #2:	Cursors:	X	Y
Type: Cursor		None	□	800.00m	807.48n
Slope: 3.5427u		****	◇	2.1500	5.5900u
Yint: -2.0267u		****	○		
Xint: 572.07m		****	⊠		
METRICS	10:58:51		⋈		
Software	04/29/97		△		

8d Data

```
PROJECT:NONAME      LOT:1 WAFER:1       DIE:1 DEV:1 USER: ;
COMMENT:;


SETUP:"MOSFET"
ID:    D         UNIT: SMU1       START:      0.05       STOP: 7        PNTS: 71      STEP: 0.1
ID:    G         UNIT: SMU2       START:      0          STOP: 3        PNTS: 61      STEP: 0.05
ID:    S         UNIT: SMU3       START:      0          STOP: 1        PNTS: 1       STEP: 0
ID:    B         UNIT: SMU4       START:      0          STOP: 1        PNTS: 1       STEP: 0
DATA:
ID     VG
-1.3525e-008      0
4.16e-009   0.05
8.1249e-009 0.1
8.9399e-009 0.15
3.335e-009  0.2
-1.6055e-008      0.25
-1.451e-008 0.3
-1.563e-008 0.35
-6.0199e-009      0.4
2.5315e-008 0.45
6.7273e-008 0.5
1.697e-007  0.55
2.3974e-007 0.6
3.5089e-007 0.65
5.0565e-007 0.7
6.8088e-007 0.75
8.0748e-007 0.8
1.0283e-006 0.85
1.1825e-006 0.9
1.3485e-006 0.95
1.5675e-006 1
1.7015e-006 1.05
1.9325e-006 1.1
2.0944e-006 1.15
2.272e-006  1.2
2.485e-006  1.25
2.6214e-006 1.3
2.8574e-006 1.35
```
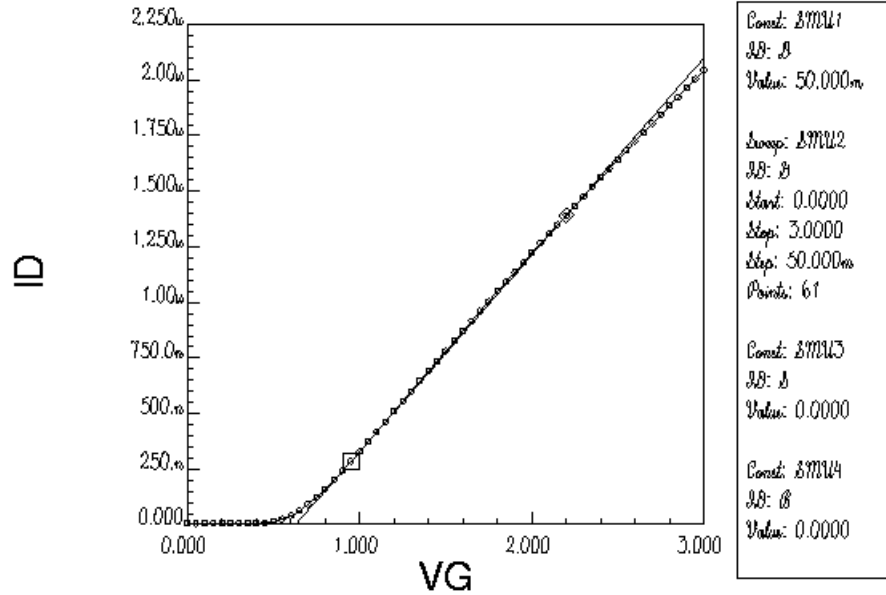
```
2.9994e-006 1.4
3.1809e-006 1.45
3.3875e-006 1.5
3.5195e-006 1.55
3.7504e-006 1.6
3.892e-006  1.65
4.065e-006  1.7
4.2676e-006 1.75
4.3965e-006 1.8
4.621e-006  1.85
4.7539e-006 1.9
4.9255e-006 1.95
5.113e-006  2
5.2399e-006 2.05
5.4645e-006 2.1
5.59e-006   2.15
5.756e-006  2.2
5.9379e-006 2.25
6.0645e-006 2.3
6.2815e-006 2.35
6.3889e-006 2.4
6.5619e-006 2.45
6.743e-006  2.5
6.8664e-006 2.55
7.072e-006  2.6
7.1705e-006 2.65
7.34e-006   2.7
7.5253e-006 2.75
7.6429e-006 2.8
7.8557e-006 2.85
7.9349e-006 2.9
8.1039e-006 2.95
8.2744e-006 3
```

9a Plot

Device 9A: ID vs VG, VD=50mV

9a Data

PROJECT:NONAME   LOT:1 WAFER:1   DIE:1 DEV:1 USER: ;
COMMENT:;

SETUP:"MOSFET"
ID: D   UNIT: SMU1   START: 0.05   STOP: 7   PNTS: 71   STEP: 0.1
ID: G   UNIT: SMU2   START: 0   STOP: 3   PNTS: 61   STEP: 0.05
ID: S   UNIT: SMU3   START: 0   STOP: 1   PNTS: 1   STEP: 0
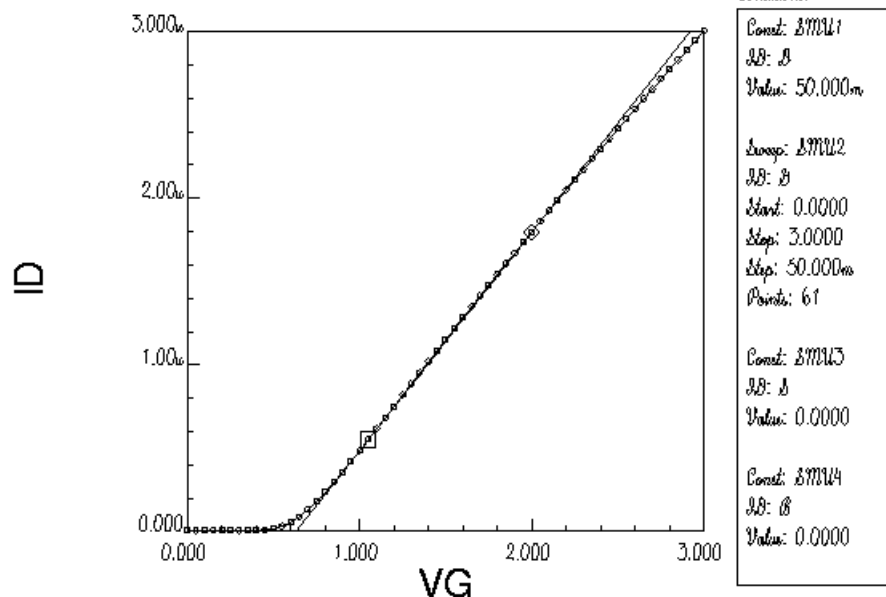ID: B   UNIT: SMU4   START: 0   STOP: 1   PNTS: 1   STEP: 0
DATA:
ID   VG
4.125e-009 0
4.11e-009   0.05
4.21e-009   0.1
3.9699e-009 0.15
4.125e-009 0.2
4.055e-009 0.25
4.3649e-009 0.3
4.54e-009   0.35
5.3751e-009 0.4
7.4051e-009 0.45
1.2485e-008 0.5
2.2165e-008 0.55
3.792e-008 0.6
6.0783e-008 0.65
8.9298e-008 0.7
1.229e-007 0.75
1.5985e-007 0.8
1.994e-007 0.85
2.4079e-007 0.9
2.8389e-007 0.95
3.2745e-007 1
3.7199e-007 1.05
4.1674e-007 1.1
4.6214e-007 1.15
5.0745e-007 1.2
5.5283e-007 1.25
5.9849e-007 1.3
6.4424e-007 1.35

```
6.8944e-007 1.4
7.347e-007  1.45
7.7969e-007 1.5
8.2503e-007 1.55
8.6962e-007 1.6
9.1444e-007 1.65
9.5845e-007 1.7
1.0029e-006 1.75
1.0495e-006 1.8
1.0905e-006 1.85
1.133e-006  1.9
1.1775e-006 1.95
1.222e-006  2
1.2655e-006 2.05
1.306e-006  2.1
1.348e-006  2.15
1.39e-006   2.2
1.431e-006  2.25
1.4745e-006 2.3
1.5175e-006 2.35
1.5585e-006 2.4
1.5985e-006 2.45
1.64e-006   2.5
1.681e-006  2.55
1.723e-006  2.6
1.762e-006  2.65
1.803e-006  2.7
1.843e-006  2.75
1.8835e-006 2.8
1.9225e-006 2.85
1.9639e-006 2.9
2.0029e-006 2.95
2.0419e-006 3
```

9b Plot

Device 9B: ID vs VG, VD=50mV

9b Data

```
PROJECT:NONAME       LOT:1 WAFER:1        DIE:1 DEV:1 USER: ;
COMMENT:;

SETUP:"MOSFET"
ID:    D          UNIT: SMU1      START:      0.05      STOP: 7      PNTS: 71      STEP: 0.1
ID:    G          UNIT: SMU2      START:      0         STOP: 3      PNTS: 61      STEP: 0.05
ID:    S          UNIT: SMU3      START:      0         STOP: 1      PNTS: 1       STEP: 0
ID:    B          UNIT: SMU4      START:      0         STOP: 1      PNTS: 1       STEP: 0
DATA:
ID     VG
4.9649e-009 0
4.9549e-009 0.05
4.8649e-009 0.1
4.9099e-009 0.15
4.9899e-009 0.2
5.2301e-009 0.25
5.69e-009   0.3
6.085e-009  0.35
7.0299e-009 0.4
1.003e-008  0.45
1.6995e-008 0.5
3.099e-008  0.55
5.4175e-008 0.6
8.7697e-008 0.65
1.3035e-007 0.7
1.8025e-007 0.75
2.352e-007  0.8
2.9405e-007 0.85
3.5584e-007 0.9
4.1914e-007 0.95
4.84e-007   1
5.4963e-007 1.05
6.1595e-007 1.1
6.8277e-007 1.15
7.4983e-007 1.2
8.1744e-007 1.25
8.8473e-007 1.3
9.5163e-007 1.35
```
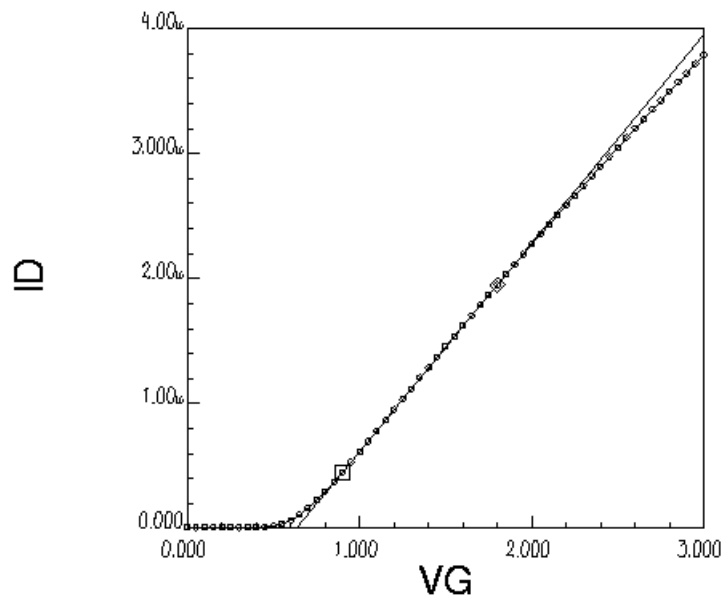
```
1.0185e-006 1.4
1.084e-006  1.45
1.149e-006  1.5
1.2165e-006 1.55
1.283e-006  1.6
1.348e-006  1.65
1.413e-006  1.7
1.477e-006  1.75
1.5415e-006 1.8
1.605e-006  1.85
1.669e-006  1.9
1.733e-006  1.95
1.7945e-006 2
1.86e-006   2.05
1.9229e-006 2.1
1.9835e-006 2.15
2.048e-006  2.2
2.1094e-006 2.25
2.1715e-006 2.3
2.232e-006  2.35
2.292e-006  2.4
2.3535e-006 2.45
2.4145e-006 2.5
2.473e-006  2.55
2.5319e-006 2.6
2.5944e-006 2.65
2.65e-006   2.7
2.711e-006  2.75
2.7685e-006 2.8
2.828e-006  2.85
2.8859e-006 2.9
2.9434e-006 2.95
3.0005e-006 3
```

9c Plot

Device 9C: ID vs VG, VD=50mV

9c Data

```
PROJECT:NONAME      LOT:1 WAFER:1      DIE:1 DEV:1 USER: ;
COMMENT:;


SETUP:"MOSFET"
ID:   D          UNIT: SMU1      START:      0.05      STOP: 7      PNTS: 71      STEP: 0.1
ID:   G          UNIT: SMU2      START:      0         STOP: 3      PNTS: 61      STEP: 0.05
ID:   S          UNIT: SMU3      START:      0         STOP: 1      PNTS: 1       STEP: 0
ID:   B          UNIT: SMU4      START:      0         STOP: 1      PNTS: 1       STEP: 0
DATA:
ID     VG
5.4799e-009 0
5.3301e-009 0.05
5.64e-009   0.1
5.2851e-009 0.15
5.3051e-009 0.2
5.4599e-009 0.25
5.695e-009  0.3
6.21e-009   0.35
7.5402e-009 0.4
1.1085e-008 0.45
1.9735e-008 0.5
3.6725e-008 0.55
6.5804e-008 0.6
1.0775e-007 0.65
1.6145e-007 0.7
2.247e-007  0.75
2.945e-007  0.8
3.6934e-007 0.85
4.4759e-007 0.9
5.2844e-007 0.95
6.1048e-007 1
6.9398e-007 1.05
7.7797e-007 1.1
8.6284e-007 1.15
9.4829e-007 1.2
1.032e-006  1.25
1.1155e-006 1.3
1.203e-006  1.35
```

```
1.285e-006  1.4
1.37e-006   1.45
1.4545e-006 1.5
1.537e-006  1.55
1.6195e-006 1.6
1.702e-006  1.65
1.785e-006  1.7
1.8665e-006 1.75
1.9484e-006 1.8
2.0305e-006 1.85
2.1085e-006 1.9
2.19e-006   1.95
2.2704e-006 2
2.349e-006  2.05
2.4284e-006 2.1
2.507e-006  2.15
2.5844e-006 2.2
2.6619e-006 2.25
2.7375e-006 2.3
2.8164e-006 2.35
2.8944e-006 2.4
2.9705e-006 2.45
3.046e-006  2.5
3.123e-006  2.55
3.1979e-006 2.6
3.27e-006   2.65
3.3475e-006 2.7
3.4199e-006 2.75
3.4964e-006 2.8
3.5659e-006 2.85
3.6384e-006 2.9
3.7134e-006 2.95
3.785e-006  3
```

8a Plot

Device 8a: R vs VG, VD=50mV

Conditions:

Const: SMU1
JD: B
Value: 50.000m

Sweep: SMU2
JD: B
Start: 0.0000
Stop: 12.000
Step: 100.00m
Points: 121

Const: SMU3
JD: S
Value: 0.0000

Const: SMU4
JD: B
Value: 0.0000
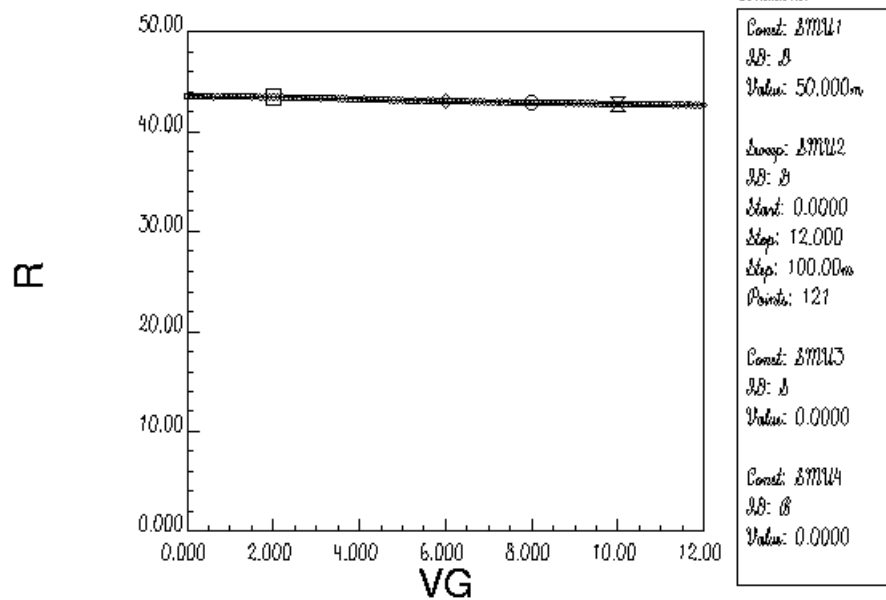
Fit #1:	Fit #2:	Cursors:	X	Y
None	None	□	2.0000	43.383
****	****	◇	6.0000	43.010
****	****	◯	8.0000	42.844
****	****	⊠	10.000	42.70
METRICS	11:10:04	⋈		
Software	04/29/97	△		

8a Data

PROJECT:NONAME   LOT:1 WAFER:1   DIE:1 DEV:1 USER: ;
COMMENT:;

SETUP:"MOSFET"
ID: D   UNIT: SMU1   START: 0.05   STOP: 7   PNTS: 71   STEP: 0.1
ID: G   UNIT: SMU2   START: 0   STOP: 12   PNTS: 121   STEP: 0.1
ID: S   UNIT: SMU3   START: 0   STOP: 1   PNTS: 1   STEP: 0
ID: B   UNIT: SMU4   START: 0   STOP: -3   PNTS: 4   STEP: -1
DATA:

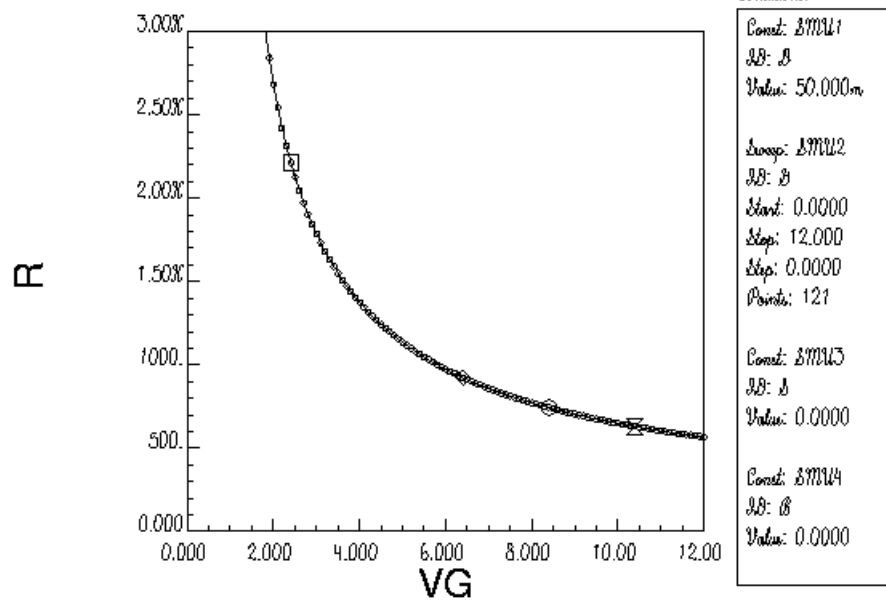| VD	ID	VG	R
0.05	0.001149	0	43.5161
0.05	0.0011495	0.1	43.4972
0.05	0.0011495	0.2	43.4972
0.05	0.0011495	0.3	43.4972
0.05	0.0011505	0.4	43.4594
0.05	0.0011505	0.5	43.4594
0.05	0.001151	0.6	43.4405
0.05	0.001151	0.7	43.4405
0.05	0.001151	0.8	43.4405
0.05	0.0011505	0.9	43.4594
0.05	0.0011505	1	43.4594
0.05	0.0011505	1.1	43.4594
0.05	0.0011505	1.2	43.4594
0.05	0.0011505	1.3	43.4594
0.05	0.001151	1.4	43.4405
0.05	0.001151	1.5	43.4405
0.05	0.0011515	1.6	43.4216
0.05	0.0011525	1.7	43.3839
0.05	0.001152	1.8	43.4028
0.05	0.001152	1.9	43.4028
0.05	0.0011525	2	43.3839
0.05	0.0011525	2.1	43.3839
0.05	0.0011525	2.2	43.3839
0.05	0.001153	2.3	43.3651
0.05	0.0011535	2.4	43.3463
0.05	0.001153	2.5	43.3651
0.05	0.001153	2.6	43.3651
0.05	0.001154	2.7	43.3276

```
0.05   0.001154    2.8    43.3276
0.05   0.0011545   2.9    43.3088
0.05   0.0011545   3      43.3088
0.05   0.001155    3.1    43.29
0.05   0.0011555   3.2    43.2713
0.05   0.0011555   3.3    43.2713
0.05   0.0011555   3.4    43.2713
0.05   0.001156    3.5    43.2526
0.05   0.001156    3.6    43.2526
0.05   0.0011565   3.7    43.2339
0.05   0.001157    3.8    43.2152
0.05   0.001157    3.9    43.2152
0.05   0.0011575   4      43.1965
0.05   0.0011575   4.1    43.1965
0.05   0.001158    4.2    43.1779
0.05   0.001159    4.3    43.1406
0.05   0.001159    4.4    43.1406
0.05   0.001159    4.5    43.1406
0.05   0.0011595   4.6    43.122
0.05   0.00116     4.7    43.1034
0.05   0.00116     4.8    43.1034
0.05   0.00116     4.9    43.1034
0.05   0.00116     5      43.1034
0.05   0.001161    5.1    43.0663
0.05   0.001161    5.2    43.0663
0.05   0.001161    5.3    43.0663
0.05   0.001161    5.4    43.0663
0.05   0.0011615   5.5    43.0478
0.05   0.0011615   5.6    43.0478
0.05   0.0011615   5.7    43.0478
0.05   0.001162    5.8    43.0293
0.05   0.0011625   5.9    43.0108
0.05   0.0011625   6      43.0108
0.05   0.001163    6.1    42.9923
0.05   0.001163    6.2    42.9923
0.05   0.001163    6.3    42.9923
0.05   0.0011635   6.4    42.9738
0.05   0.0011635   6.5    42.9738
0.05   0.0011645   6.6    42.9369
0.05   0.0011645   6.7    42.9369
0.05   0.001165    6.8    42.9185
```

```
0.05   0.001165     6.9    42.9185
0.05   0.0011655    7      42.9
0.05   0.0011655    7.1    42.9
0.05   0.001166     7.2    42.8816
0.05   0.0011655    7.3    42.9
0.05   0.001166     7.4    42.8816
0.05   0.001166     7.5    42.8816
0.05   0.0011665    7.6    42.8633
0.05   0.0011665    7.7    42.8633
0.05   0.0011665    7.8    42.8633
0.05   0.0011665    7.9    42.8633
0.05   0.001167     8      42.8449
0.05   0.001167     8.1    42.8449
0.05   0.0011675    8.2    42.8266
0.05   0.0011675    8.3    42.8266
0.05   0.0011675    8.4    42.8266
0.05   0.001168     8.5    42.8082
0.05   0.001168     8.6    42.8082
0.05   0.001168     8.7    42.8082
0.05   0.0011685    8.8    42.7899
0.05   0.001168     8.9    42.8082
0.05   0.0011685    9      42.7899
0.05   0.001169     9.1    42.7716
0.05   0.001169     9.2    42.7716
0.05   0.001169     9.3    42.7716
0.05   0.001169     9.4    42.7716
0.05   0.00117      9.5    42.735
0.05   0.00117      9.6    42.735
0.05   0.0011705    9.7    42.7168
0.05   0.0011705    9.8    42.7168
0.05   0.0011705    9.9    42.7168
0.05   0.001171     10     42.6985
0.05   0.0011705    10.1   42.7168
0.05   0.0011705    10.2   42.7168
0.05   0.001171     10.3   42.6985
0.05   0.0011715    10.4   42.6803
0.05   0.001172     10.5   42.6621
0.05   0.0011715    10.6   42.6803
0.05   0.0011715    10.7   42.6803
0.05   0.0011715    10.8   42.6803
0.05   0.0011725    10.9   42.6439
```

```
0.05  0.001172    11    42.6621
0.05  0.001172    11.1  42.6621
0.05  0.0011725   11.2  42.6439
0.05  0.001173    11.3  42.6257
0.05  0.0011725   11.4  42.6439
0.05  0.001173    11.5  42.6257
0.05  0.0011735   11.6  42.6076
0.05  0.0011735   11.7  42.6076
0.05  0.001174    11.8  42.5894
0.05  0.001174    11.9  42.5894
0.05  0.0011745   12    42.5713
```

8b Plot

Device 8b: R vs VG, VD=50mV

Conditions:

Const: SMU1
ID: B
Value: 50.000m

Sweep: SMU2
ID: B
Start: 0.0000
Stop: 12.000
Step: 0.0000
Points: 121

Const: SMU3
ID: A
Value: 0.0000

Const: SMU4
ID: B
Value: 0.0000

Fit #1:		Fit #2:		Cursors: X		Y
None		None		□	2.4000	2.213X
****		****		◇	6.4000	921.91
****		****		○	8.400	740.83
****		****		⊠	10.40	628.2
METRICS	12:32:06			⋈		
Software	05/05/97			△		

8b Data

PROJECT:NONAME   LOT:1 WAFER:1   DIE:1 DEV:1 USER: ;
COMMENT: ;

SETUP:"MOSFET"
ID: D   UNIT: SMU1   START: 0.05   STOP: 7   PNTS: 71   STEP: 0.1
ID: G   UNIT: SMU2   START: 0   STOP: 12   PNTS: 121   STEP: 0
ID: S   UNIT: SMU3   START: 0   STOP: 1   PNTS: 1   STEP: 0
ID: B   UNIT: SMU4   START: 0   STOP: -3   PNTS: 4   STEP: -1
DATA:

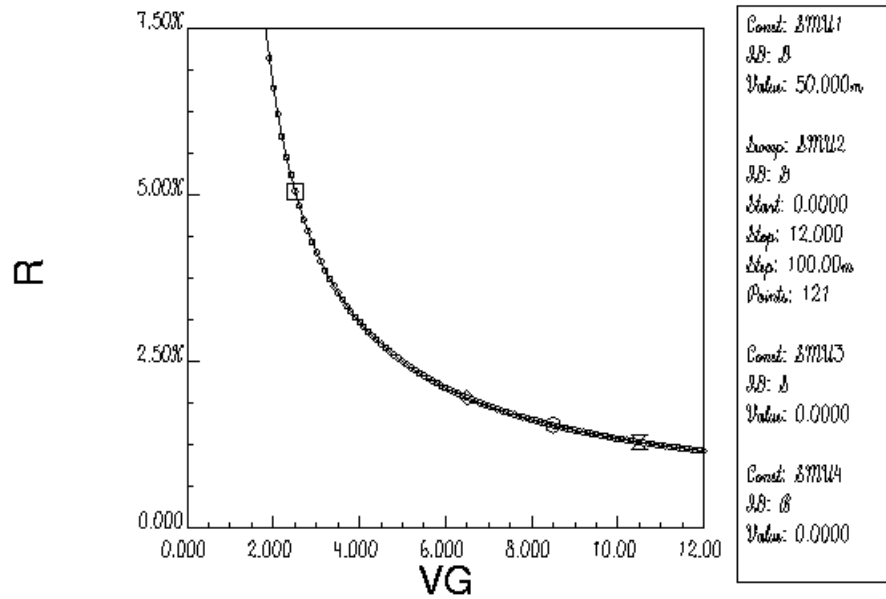| VD	ID	VG	R
0.05	3.961e-008	0	1.26231e+006
0.05	4.2621e-008	0.1	1.17313e+006
0.05	6.2991e-008	0.2	793764
0.05	1.7445e-007	0.3	286615
0.05	5.6013e-007	0.4	89265
0.05	1.3445e-006	0.5	37188.5
0.05	2.427e-006	0.6	20601.6
0.05	3.6535e-006	0.7	13685.5
0.05	4.9225e-006	0.8	10157.4
0.05	6.19e-006	0.9	8077.54
0.05	7.4434e-006	1	6717.36
0.05	8.679e-006	1.1	5761.03
0.05	9.8841e-006	1.2	5058.63
0.05	1.1065e-005	1.3	4518.75
0.05	1.2215e-005	1.4	4093.33
0.05	1.3345e-005	1.5	3746.72
0.05	1.4445e-005	1.6	3461.41
0.05	1.5534e-005	1.7	3218.75
0.05	1.66e-005	1.8	3012.05
0.05	1.7635e-005	1.9	2835.27
0.05	1.8665e-005	2	2678.81
0.05	1.967e-005	2.1	2541.94
0.05	2.066e-005	2.2	2420.14
0.05	2.1635e-005	2.3	2311.07
0.05	2.2595e-005	2.4	2212.88
0.05	2.354e-005	2.5	2124.04
0.05	2.4475e-005	2.6	2042.9
0.05	2.5385e-005	2.7	1969.67

```
0.05   2.63e-005    2.8   1901.14
0.05   2.719e-005   2.9   1838.91
0.05   2.8085e-005  3     1780.31
0.05   2.8945e-005  3.1   1727.41
0.05   2.9814e-005  3.2   1677.06
0.05   3.0659e-005  3.3   1630.84
0.05   3.1514e-005  3.4   1586.6
0.05   3.2354e-005  3.5   1545.4
0.05   3.3176e-005  3.6   1507.11
0.05   3.3995e-005  3.7   1470.8
0.05   3.4805e-005  3.8   1436.58
0.05   3.5614e-005  3.9   1403.94
0.05   3.6415e-005  4     1373.06
0.05   3.7195e-005  4.1   1344.27
0.05   3.7974e-005  4.2   1316.69
0.05   3.876e-005   4.3   1289.99
0.05   3.954e-005   4.4   1264.54
0.05   4.0304e-005  4.5   1240.57
0.05   4.1075e-005  4.6   1217.29
0.05   4.1835e-005  4.7   1195.17
0.05   4.2584e-005  4.8   1174.15
0.05   4.334e-005   4.9   1153.67
0.05   4.41e-005    5     1133.79
0.05   4.486e-005   5.1   1114.58
0.05   4.5594e-005  5.2   1096.64
0.05   4.6339e-005  5.3   1079
0.05   4.708e-005   5.4   1062.02
0.05   4.7825e-005  5.5   1045.48
0.05   4.8529e-005  5.6   1030.31
0.05   4.9274e-005  5.7   1014.73
0.05   4.9984e-005  5.8   1000.32
0.05   5.0705e-005  5.9   986.096
0.05   5.1424e-005  6     972.309
0.05   5.213e-005   6.1   959.141
0.05   5.2839e-005  6.2   946.271
0.05   5.3534e-005  6.3   933.986
0.05   5.4235e-005  6.4   921.914
0.05   5.4924e-005  6.5   910.349
0.05   5.5624e-005  6.6   898.893
0.05   5.6324e-005  6.7   887.721
0.05   5.6989e-005  6.8   877.362
```

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0.05   5.7679e-005 6.9   866.867
0.05   5.8364e-005 7     856.692
0.05   5.9029e-005 7.1   847.041
0.05   5.9705e-005 7.2   837.451
0.05   6.037e-005  7.3   828.226
0.05   6.1043e-005 7.4   819.095
0.05   6.1706e-005 7.5   810.294
0.05   6.2339e-005 7.6   802.066
0.05   6.2965e-005 7.7   794.092
0.05   6.3609e-005 7.8   786.052
0.05   6.4291e-005 7.9   777.714
0.05   6.4921e-005 8     770.167
0.05   6.5569e-005 8.1   762.555
0.05   6.6206e-005 8.2   755.219
0.05   6.6854e-005 8.3   747.898
0.05   6.7491e-005 8.4   740.84
0.05   6.8106e-005 8.5   734.15
0.05   6.8743e-005 8.6   727.347
0.05   6.935e-005  8.7   720.981
0.05   6.9998e-005 8.8   714.306
0.05   7.0613e-005 8.9   708.085
0.05   7.1213e-005 9     702.119
0.05   7.1835e-005 9.1   696.04
0.05   7.2438e-005 9.2   690.245
0.05   7.306e-005  9.3   684.369
0.05   7.3645e-005 9.4   678.933
0.05   7.4252e-005 9.5   673.383
0.05   7.4878e-005 9.6   667.753
0.05   7.5471e-005 9.7   662.506
0.05   7.6078e-005 9.8   657.22
0.05   7.6663e-005 9.9   652.205
0.05   7.7229e-005 10    647.425
0.05   7.784e-005  10.1  642.343
0.05   7.8429e-005 10.2  637.519
0.05   7.9009e-005 10.3  632.839
0.05   7.9594e-005 10.4  628.188
0.05   8.0153e-005 10.5  623.807
0.05   8.0734e-005 10.6  619.318
0.05   8.1301e-005 10.7  614.999
0.05   8.1904e-005 10.8  610.471
0.05   8.2474e-005 10.9  606.252
```

```
0.05  8.3029e-005 11    602.199
0.05  8.361e-005  11.1  598.015
0.05  8.4158e-005 11.2  594.121
0.05  8.4728e-005 11.3  590.124
0.05  8.5268e-005 11.4  586.386
0.05  8.5846e-005 11.5  582.438
0.05  8.6389e-005 11.6  578.777
0.05  8.6945e-005 11.7  575.076
0.05  8.7496e-005 11.8  571.455
0.05  8.8028e-005 11.9  568.001
0.05  8.861e-005  12    564.27
```

8c Plot

Device 8c: R vs VG, VD=50mV

Conditions:

Const: SMU1
ID: B
Value: 50.000m

Sweep: SMU2
ID: B
Start: 0.0000
Stop: 12.000
Step: 100.00m
Points: 121

Const: SMU3
ID: S
Value: 0.0000

Const: SMU4
ID: B
Value: 0.0000

Fit #1:	Fit #2:	Cursors:	X	Y
None	None	□	2.5000	5.054%
****	****	◇	6.5000	1.9586%
****	****	○	8.5000	1.545%
****	****	⊠	10.500	1.2911%
METRICS	11:11:08	⋈		
Software	04/29/97	△		

8c Data

PROJECT:NONAME   LOT:1 WAFER:1   DIE:1 DEV:1 USER: ;
COMMENT:;

SETUP:"MOSFET"

ID:	D	UNIT: SMU1	START:	0.05	STOP: 7	PNTS: 71	STEP: 0.1
ID:	G	UNIT: SMU2	START:	0	STOP: 12	PNTS: 121	STEP: 0.1
ID:	S	UNIT: SMU3	START:	0	STOP: 1	PNTS: 1	STEP: 0
ID:	B	UNIT: SMU4	START:	0	STOP: -3	PNTS: 4	STEP: -1

DATA:

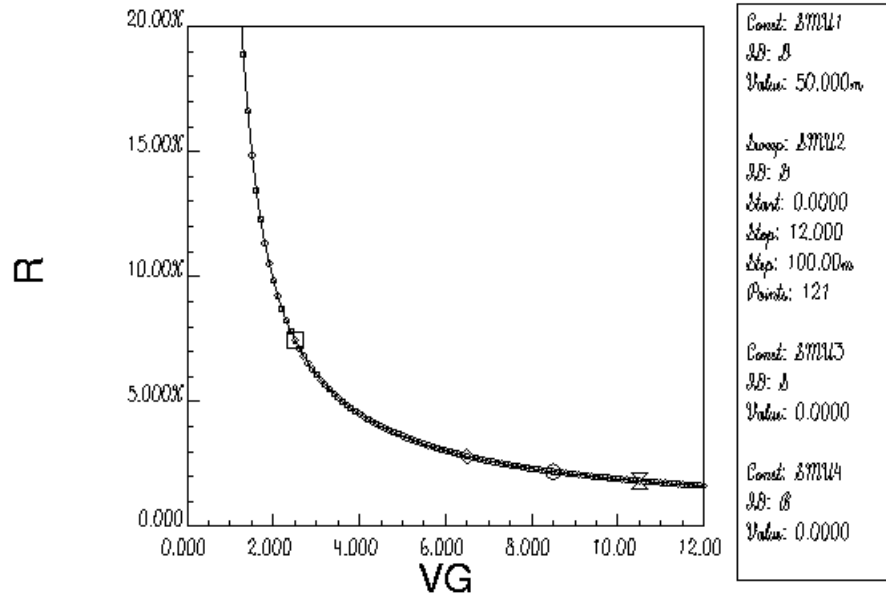| VD	ID	VG	R
0.05	4.4449e-009	0	1.12488e+007
0.05	4.2951e-009	0.1	1.16412e+007
0.05	4.8749e-009	0.2	1.02566e+007
0.05	8.9249e-009	0.3	5.6023e+006
0.05	3.5911e-008	0.4	1.39233e+006
0.05	1.5469e-007	0.5	323227
0.05	4.3999e-007	0.6	113639
0.05	8.6354e-007	0.7	57901.2
0.05	1.359e-006	0.8	36791.8
0.05	1.887e-006	0.9	26497.1
0.05	2.428e-006	1	20593.1
0.05	2.9685e-006	1.1	16843.5
0.05	3.5095e-006	1.2	14247
0.05	4.0394e-006	1.3	12378.1
0.05	4.5665e-006	1.4	10949.3
0.05	5.0864e-006	1.5	9830.14
0.05	5.5975e-006	1.6	8932.56
0.05	6.102e-006	1.7	8194.03
0.05	6.601e-006	1.8	7574.61
0.05	7.0899e-006	1.9	7052.29
0.05	7.5749e-006	2	6600.75
0.05	8.0485e-006	2.1	6212.34
0.05	8.5183e-006	2.2	5869.72
0.05	8.9849e-006	2.3	5564.89
0.05	9.4469e-006	2.4	5292.74
0.05	9.8935e-006	2.5	5053.82
0.05	1.0346e-005	2.6	4832.79
0.05	1.079e-005	2.7	4633.92

```
0.05   1.1225e-005 2.8    4454.34
0.05   1.1665e-005 2.9    4286.33
0.05   1.209e-005  3      4135.65
0.05   1.2515e-005 3.1    3995.21
0.05   1.293e-005  3.2    3866.98
0.05   1.335e-005  3.3    3745.32
0.05   1.376e-005  3.4    3633.72
0.05   1.4165e-005 3.5    3529.83
0.05   1.4575e-005 3.6    3430.53
0.05   1.498e-005  3.7    3337.78
0.05   1.538e-005  3.8    3250.98
0.05   1.5775e-005 3.9    3169.57
0.05   1.6155e-005 4      3095.02
0.05   1.6555e-005 4.1    3020.24
0.05   1.6944e-005 4.2    2950.9
0.05   1.733e-005  4.3    2885.17
0.05   1.771e-005  4.4    2823.26
0.05   1.8095e-005 4.5    2763.19
0.05   1.847e-005  4.6    2707.09
0.05   1.885e-005  4.7    2652.52
0.05   1.924e-005  4.8    2598.75
0.05   1.961e-005  4.9    2549.72
0.05   1.9995e-005 5      2500.63
0.05   2.038e-005  5.1    2453.39
0.05   2.0755e-005 5.2    2409.06
0.05   2.113e-005  5.3    2366.3
0.05   2.151e-005  5.4    2324.5
0.05   2.1875e-005 5.5    2285.71
0.05   2.225e-005  5.6    2247.19
0.05   2.2625e-005 5.7    2209.94
0.05   2.299e-005  5.8    2174.86
0.05   2.3365e-005 5.9    2139.95
0.05   2.372e-005  6      2107.93
0.05   2.4095e-005 6.1    2075.12
0.05   2.445e-005  6.2    2044.99
0.05   2.4815e-005 6.3    2014.91
0.05   2.518e-005  6.4    1985.7
0.05   2.5529e-005 6.5    1958.56
0.05   2.589e-005  6.6    1931.25
0.05   2.6245e-005 6.7    1905.12
0.05   2.66e-005   6.8    1879.7
```

```
0.05   2.6954e-005 6.9    1855.01
0.05   2.7305e-005 7      1831.17
0.05   2.7655e-005 7.1    1807.99
0.05   2.8005e-005 7.2    1785.4
0.05   2.8349e-005 7.3    1763.73
0.05   2.8685e-005 7.4    1743.07
0.05   2.904e-005  7.5    1721.76
0.05   2.936e-005  7.6    1703
0.05   2.9705e-005 7.7    1683.22
0.05   3.004e-005  7.8    1664.45
0.05   3.0369e-005 7.9    1646.42
0.05   3.0715e-005 8      1627.87
0.05   3.1054e-005 8.1    1610.1
0.05   3.1389e-005 8.2    1592.91
0.05   3.171e-005  8.3    1576.79
0.05   3.2054e-005 8.4    1559.87
0.05   3.2365e-005 8.5    1544.88
0.05   3.271e-005  8.6    1528.58
0.05   3.3039e-005 8.7    1513.36
0.05   3.336e-005  8.8    1498.8
0.05   3.368e-005  8.9    1484.56
0.05   3.4019e-005 9      1469.77
0.05   3.4334e-005 9.1    1456.28
0.05   3.466e-005  9.2    1442.59
0.05   3.4969e-005 9.3    1429.84
0.05   3.5284e-005 9.4    1417.07
0.05   3.561e-005  9.5    1404.1
0.05   3.5919e-005 9.6    1392.02
0.05   3.6225e-005 9.7    1380.26
0.05   3.6564e-005 9.8    1367.47
0.05   3.6869e-005 9.9    1356.15
0.05   3.718e-005  10     1344.81
0.05   3.7484e-005 10.1   1333.9
0.05   3.7801e-005 10.2   1322.72
0.05   3.811e-005  10.3   1311.99
0.05   3.8415e-005 10.4   1301.57
0.05   3.8724e-005 10.5   1291.19
0.05   3.9035e-005 10.6   1280.9
0.05   3.9335e-005 10.7   1271.13
0.05   3.963e-005  10.8   1261.67
0.05   3.9944e-005 10.9   1251.75
```

```
0.05   4.0235e-005 11    1242.7
0.05   4.054e-005  11.1  1233.35
0.05   4.084e-005  11.2  1224.29
0.05   4.1129e-005 11.3  1215.69
0.05   4.1429e-005 11.4  1206.88
0.05   4.1719e-005 11.5  1198.49
0.05   4.2019e-005 11.6  1189.94
0.05   4.2319e-005 11.7  1181.5
0.05   4.2604e-005 11.8  1173.6
0.05   4.2915e-005 11.9  1165.09
0.05   4.32e-005   12    1157.41
```

8d Plot

Device 8d: R vs VG, VD=50mV

Fit #1:		Fit #2:		Cursors: X	Y
None		None		□ 2.5000	7.4410%
****		****		◇ 6.5000	2.8004%
****		****		○ 8.5000	2.1862%
****		****		⊠ 10.500	1.814%
METRICS	11:11:38			⋈	
Software	04/29/97			△	

Conditions:

Const: SMU1
ID: B
Value: 50.000m

Sweep: SMU2
ID: B
Start: 0.0000
Stop: 12.000
Step: 100.00m
Points: 121

Const: SMU3
ID: S
Value: 0.0000

Const: SMU4
ID: B
Value: 0.0000

8d Data

PROJECT:NONAME   LOT:1 WAFER:1   DIE:1 DEV:1 USER: ;
COMMENT: ;

SETUP:"MOSFET"
ID: D   UNIT: SMU1   START: 0.05   STOP: 7   PNTS: 71   STEP: 0.1
ID: G   UNIT: SMU2   START: 0   STOP: 12   PNTS: 121   STEP: 0.1
ID: S   UNIT: SMU3   START: 0   STOP: 1   PNTS: 1   STEP: 0
ID: B   UNIT: SMU4   START: 0   STOP: -3   PNTS: 4   STEP: -1
DATA:
VD   ID   VG   R
0.05   4.105e-009 0   1.21803e+007
0.05   4.4549e-009 0.1   1.12236e+007
0.05   4.47e-009   0.2   1.11857e+007
0.05   6.3401e-009 0.3   7.88631e+006
0.05   1.9705e-008 0.4   2.53743e+006
0.05   8.3349e-008 0.5   599887
0.05   2.5224e-007 0.6   198224
0.05   5.1813e-007 0.7   96500.9
0.05   8.4098e-007 0.8   59454.4
0.05   1.189e-006 0.9   42052.1
0.05   1.551e-006 1   32237.3
0.05   1.919e-006 1.1   26055.2
0.05   2.287e-006 1.2   21862.7
0.05   2.65e-006   1.3   18867.9
0.05   3.011e-006 1.4   16605.8
0.05   3.368e-006 1.5   14845.6
0.05   3.7219e-006 1.6   13434
0.05   4.0724e-006 1.7   12277.8
0.05   4.4154e-006 1.8   11324
0.05   4.76e-006   1.9   10504.2
0.05   5.0943e-006 2   9814.89
0.05   5.428e-006 2.1   9211.5
0.05   5.7565e-006 2.2   8685.83
0.05   6.0804e-006 2.3   8223.14
0.05   6.4019e-006 2.4   7810.18
0.05   6.7195e-006 2.5   7441.03
0.05   7.0315e-006 2.6   7110.86
0.05   7.3458e-006 2.7   6806.61

```
0.05   7.6541e-006 2.8     6532.45
0.05   7.9568e-006 2.9     6283.93
0.05   8.2576e-006 3       6055.03
0.05   8.557e-006  3.1     5843.17
0.05   8.8522e-006 3.2     5648.31
0.05   9.1493e-006 3.3     5464.9
0.05   9.4325e-006 3.4     5300.82
0.05   9.7221e-006 3.5     5142.92
0.05   1.0009e-005 3.6     4995.5
0.05   1.0293e-005 3.7     4857.67
0.05   1.058e-005  3.8     4725.9
0.05   1.0855e-005 3.9     4606.17
0.05   1.113e-005  4       4492.36
0.05   1.141e-005  4.1     4382.12
0.05   1.168e-005  4.2     4280.82
0.05   1.1955e-005 4.3     4182.35
0.05   1.223e-005  4.4     4088.31
0.05   1.25e-005   4.5     4000
0.05   1.277e-005  4.6     3915.43
0.05   1.305e-005  4.7     3831.42
0.05   1.3315e-005 4.8     3755.16
0.05   1.3585e-005 4.9     3680.53
0.05   1.386e-005  5       3607.5
0.05   1.413e-005  5.1     3538.57
0.05   1.44e-005   5.2     3472.22
0.05   1.467e-005  5.3     3408.32
0.05   1.4945e-005 5.4     3345.6
0.05   1.521e-005  5.5     3287.31
0.05   1.548e-005  5.6     3229.97
0.05   1.575e-005  5.7     3174.6
0.05   1.602e-005  5.8     3121.1
0.05   1.6285e-005 5.9     3070.31
0.05   1.655e-005  6       3021.15
0.05   1.6815e-005 6.1     2973.54
0.05   1.7075e-005 6.2     2928.26
0.05   1.7335e-005 6.3     2884.34
0.05   1.76e-005   6.4     2840.91
0.05   1.7854e-005 6.5     2800.49
0.05   1.8124e-005 6.6     2758.77
0.05   1.838e-005  6.7     2720.35
0.05   1.8645e-005 6.8     2681.68
```

```
0.05   1.8895e-005 6.9    2646.2
0.05   1.915e-005  7      2610.97
0.05   1.941e-005  7.1    2575.99
0.05   1.9665e-005 7.2    2542.59
0.05   1.991e-005  7.3    2511.3
0.05   2.0159e-005 7.4    2480.28
0.05   2.041e-005  7.5    2449.78
0.05   2.067e-005  7.6    2418.96
0.05   2.091e-005  7.7    2391.2
0.05   2.116e-005  7.8    2362.95
0.05   2.1405e-005 7.9    2335.9
0.05   2.1645e-005 8      2310
0.05   2.1894e-005 8.1    2283.73
0.05   2.213e-005  8.2    2259.38
0.05   2.238e-005  8.3    2234.14
0.05   2.264e-005  8.4    2208.48
0.05   2.287e-005  8.5    2186.27
0.05   2.3115e-005 8.6    2163.1
0.05   2.3355e-005 8.7    2140.87
0.05   2.3595e-005 8.8    2119.09
0.05   2.383e-005  8.9    2098.2
0.05   2.4064e-005 9      2077.79
0.05   2.4309e-005 9.1    2056.85
0.05   2.4545e-005 9.2    2037.07
0.05   2.4775e-005 9.3    2018.16
0.05   2.5005e-005 9.4    1999.6
0.05   2.5244e-005 9.5    1980.67
0.05   2.5485e-005 9.6    1961.94
0.05   2.571e-005  9.7    1944.77
0.05   2.5955e-005 9.8    1926.41
0.05   2.6179e-005 9.9    1909.93
0.05   2.641e-005  10     1893.22
0.05   2.664e-005  10.1   1876.88
0.05   2.6865e-005 10.2   1861.16
0.05   2.7104e-005 10.3   1844.75
0.05   2.7325e-005 10.4   1829.83
0.05   2.7564e-005 10.5   1813.96
0.05   2.778e-005  10.6   1799.86
0.05   2.801e-005  10.7   1785.08
0.05   2.8235e-005 10.8   1770.85
0.05   2.8455e-005 10.9   1757.16
```

```
0.05   2.868e-005   11     1743.38
0.05   2.8905e-005  11.1   1729.8
0.05   2.9124e-005  11.2   1716.8
0.05   2.9345e-005  11.3   1703.87
0.05   2.9565e-005  11.4   1691.19
0.05   2.9795e-005  11.5   1678.13
0.05   3.0015e-005  11.6   1665.83
0.05   3.024e-005   11.7   1653.44
0.05   3.0445e-005  11.8   1642.31
0.05   3.067e-005   11.9   1630.26
0.05   3.0894e-005  12     1618.44
```

14 Plot

Device 14 (Inverter): VO vs VI
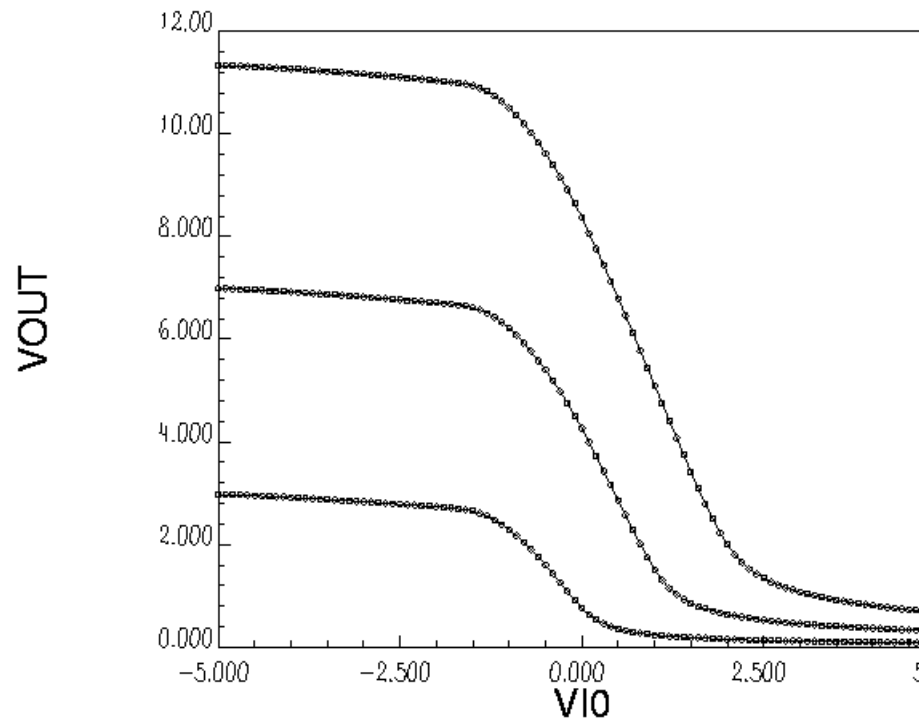
14 Data

SETUP:"NORGATE"
ID:	VDD	UNIT: SMU3	START:	5	STOP: 1	PNTS: 1	STEP: 0
ID:	I0	UNIT: SMU2	START:	0	STOP: 5	PNTS: 2	STEP: 5
ID:	I1	UNIT: SMU4	START:	0	STOP: 5	PNTS: 6	STEP: 1
ID:	OUT	UNIT: SMU1	START:	0	STOP: 1	PNTS: 1	STEP: 0

DATA:

```
VOUT  VI0   II0    IVDD   VI1    II1    VOUT2 II02   IVDD2 VI12  II12  VOUT3 II03   IVDD3 VI13  II13  VOUT4 II04
    IVDD4 VI14  II14
-8.426      -10  -0.04376   0.0037885   -10  -4.4149e-009      -8.4751   -0.045851   0.0040066   -5
    1.098e-008  -0.375     -1.067e-007 5.156e-006  0   -6.8251e-009   -0.37599   2.5349e-008
    5.234e-006  5    -1.057e-008
-7.6379     -9   -0.039131  0.0035371   -10  8.6802e-009 -7.616    -0.04211    0.0037285   -5
    6.3301e-009 -0.37599   4e-008     5.2298e-006 0   7.4651e-009 -0.37399   -1.2424e-007
    5.1935e-006 5    -5.2501e-010
-6.7478     -8   -0.034685  0.0032235   -10  -1.174e-008 -6.75 -0.037205   0.003396    -5   -1.1255e-
008  -0.377     8.9999e-009 5.2808e-006 0   -9.6652e-009      -0.377     4.9999e-009 5.296e-006  5
    8.9599e-009
-5.8799     -7   -0.0301    0.002894    -10  -7.5702e-009      -5.884    -0.03215    0.0030431   -5
    -6.8201e-009   -0.37599   -4.5e-009   5.2825e-006 0   9.5451e-009 -0.377     5.9999e-009
    5.3034e-006 5    -9.3551e-009
-5.0159     -6   -0.025305  0.002548    -10  1.082e-008 -5.0178    -0.027115   0.0026845   -5
    1.061e-008  -0.37599   -4.8949e-008   5.2229e-006 0   -6.9599e-009      -0.377     1.6999e-008
    5.2834e-006 5    8.0799e-009
-4.148      -5   -0.020616  0.0021875   -10  5.8801e-009 -4.1528    -0.022036   0.0023046   -5   4.5e-
009  -0.377     -4.8999e-009   5.2895e-006 0   9.5051e-009 -0.377     -1.22e-008 5.2839e-006 5
    -8.1249e-009
-3.288      -4   -0.015825  0.0018055   -10  -1.072e-008 -3.293    -0.01698    0.001908    -5   -
9.6252e-009 -0.377     -1.45e-009  5.2699e-006 0   -9.0399e-009      -0.377     4.1998e-009 5.3039e-006
    5    9.0799e-009
-2.4249     -3   -0.011165  0.0014      -10  -5.2401e-009      -2.432    -0.01197    0.001485    -5
    1.0975e-008 -0.37599   -1.7099e-008   5.2725e-006 0   8.4451e-009 -0.377     1.765e-008
    5.2846e-006 5    -8.4101e-009
-1.573      -2   -0.0064976 0.00095501  -10  9.7448e-009 -1.576    -0.006963   0.0010099   -5
    4.3001e-009 -0.37599   1.24e-008   5.2503e-006 0   -7.9049e-009      -0.37599   -1.545e-008
    5.2545e-006 5    6.3601e-009
```

-0.73599   -1   -0.0018795 0.00036651 -10   -1.0395e-008   -0.73798   -0.0020031 0.00039355 -5
        -9.9098e-009   -0.37599   4.13e-008   5.2534e-006 0   7.26e-009   -0.377   1.6999e-008
        5.293e-006 5   -8.27e-009
-0.375   0   -1.83e-005 2.266e-005 -10   1.0965e-008 -0.37599   -1.864e-005 2.312e-005 -5   -
7.6898e-009 -0.37599   -2.4949e-008   5.2599e-006 0   -7.9799e-009   -0.37599   -1.235e-008
        5.2515e-006 5   6.21e-009
-0.37599   1   -2.548e-006 7.5875e-006 -10   -7.8498e-009   -0.375   -2.6565e-006   7.8934e-006
        -5   6.08e-009   -0.37599   4.6899e-008 5.2485e-006 0   6.8901e-009 -0.37599   -6.9198e-008
        5.2494e-006 5   -6.195e-009
-0.37599   2   3.3149e-006 2.1275e-006 -10   9.8198e-009 -0.375   3.2415e-006 2.1585e-006 -5   -
8.26e-009   -0.377   1.04e-008   5.2585e-006 0   -7.7298e-009   -0.377   4.5e-009   5.323e-006
        5   8.9599e-009
-0.377   3   3.6685e-006 1.72e-006   -10   -9.9699e-009   -0.37599   3.7844e-006 1.7185e-006 -5
        1.092e-008 -0.37599   4.1649e-008 5.2569e-006 0   7.255e-009 -0.37599   1.805e-008 5.3069e-006
        5   -8.15e-009
-0.37599   4   3.7794e-006 1.726e-006   -10   9.7102e-009 -0.37399   3.9784e-006 1.679e-006   -5
        6.08e-009   -0.377   1.625e-008 5.2794e-006 0   -8.195e-009 -0.377   4.3999e-009 5.326e-006
        5   8.9549e-009
-0.377   5   3.7375e-006 1.716e-006   -10   -1.031e-008 -0.37599   3.8319e-006 1.6875e-006 -5   -
9.7648e-009 -0.37599   -1.83e-008 5.2955e-006 0   8.5952e-009 -0.37599   2.1099e-008 5.3165e-006 5
        -8.8848e-009

SETUP:"RING"
ID: D   UNIT: SMU4   START: 0   STOP: 1   PNTS: 1   STEP: 0
ID: G   UNIT: SMU2   START: 5   STOP: 5   PNTS: 1   STEP: 0
ID: B   UNIT: SMU3   START: 0   STOP: 1   PNTS: 1   STEP: 0
DATA:
VG   IG   IB   VB   ID
5   2.539e-005 0   0.030999   -1.533e-005

SETUP:"NOR"
ID: VDD   UNIT: SMU3   START: 5   STOP: 15   PNTS: 3   STEP: 5
ID: I0   UNIT: SMU1   START: -5   STOP: 5   PNTS: 101   STEP: 0.1
ID: VSS   UNIT: SMU4   START: 0   STOP: 1   PNTS: 1   STEP: 0
ID: OUT   UNIT: SMU2   START: 0   STOP: 1   PNTS: 1   STEP: 0
DATA:
VOUT VOUT2 VOUT3 VI0
2.97 6.978 11.325   -5
2.965 6.978 11.317   -4.9
2.964 6.97 11.318   -4.8
2.959 6.968 11.31 -4.7

```
2.953 6.9609      11.305      -4.6
2.948 6.9529      11.297      -4.5
2.9409      6.947 11.29 -4.4
2.937 6.938 11.284      -4.3
2.9259      6.9329      11.272      -4.2
2.922 6.9209      11.266      -4.1
2.912 6.916 11.254      -4
2.906 6.9038      11.249      -3.9
2.896 6.897 11.235      -3.8
2.89  6.885 11.229      -3.7
2.881 6.8779      11.216      -3.6
2.8729      6.8689      11.208      -3.5
2.864 6.8579      11.195      -3.4
2.854 6.8489      11.186      -3.3
2.848 6.8369      11.174      -3.2
2.835 6.8289      11.163      -3.1
2.829 6.8149      11.153      -3
2.818 6.8069      11.14 -2.9
2.8109      6.7939      11.132      -2.8
2.799 6.7849      11.116      -2.7
2.791 6.772 11.107      -2.6
2.7799      6.762 11.093      -2.5
2.77  6.751 11.082      -2.4
2.761 6.7378      11.068      -2.3
2.75  6.728 11.057      -2.2
2.7419      6.7139      11.044      -2.1
2.7279      6.7048      11.03 -2
2.72  6.689 11.016      -1.9
2.7059      6.678 11.001      -1.8
2.694 6.6599      10.986      -1.7
2.673 6.6409      10.961      -1.6
2.646 6.6079      10.931      -1.5
2.606 6.5649      10.881      -1.4
2.551 6.5029      10.82 -1.3
2.48  6.4219      10.73 -1.2
2.39  6.324 10.626      -1.1
2.2899      6.2029      10.497      -1
2.1689      6.073 10.351      -0.9
2.0439      5.918 10.189      -0.8
1.9   5.76  10.007      -0.7
1.754 5.5769      9.8179      -0.6
```

```
1.593 5.3928      9.606 -0.5
1.431 5.189 9.3921      -0.4
1.258 4.9771      9.1509      -0.3
1.083 4.748 8.9048      -0.2
0.90997     4.5068      8.6328      -0.1
0.75198     4.2539      8.3569      0
0.629 3.984 8.0591      0.1
0.53101     3.715 7.7529      0.2
0.45799     3.428 7.439 0.3
0.39799     3.1499      7.1118      0.4
0.35399     2.856 6.7859      0.5
0.319 2.574 6.447 0.6
0.29199     2.2849      6.116 0.7
0.269 2.009 5.7678      0.8
0.25099     1.741 5.4329      0.9
0.235 1.502 5.0869      1
0.222 1.304 4.748 1.1
0.21  1.144 4.407 1.2
0.201 1.023 4.0701      1.3
0.19099     0.927 3.7389      1.4
0.183 0.85498     3.408 1.5
0.176 0.793 3.0919      1.6
0.169 0.746 2.7799      1.7
0.16199     0.70398     2.496 1.8
0.157 0.66901     2.224 1.9
0.153 0.638 1.994 2
0.147 0.60999     1.798 2.1
0.143 0.586 1.644 2.2
0.138 0.565 1.519 2.3
0.13499     0.54498     1.418 2.4
0.13  0.526 1.336 2.5
0.127 0.50998     1.266 2.6
0.124 0.49399     1.208 2.7
0.121 0.48  1.155 2.8
0.119 0.46699     1.111 2.9
0.116 0.45499     1.068 3
0.113 0.44299     1.033 3.1
0.111 0.43199     0.99899     3.2
0.108 0.422 0.96899     3.3
0.106 0.41199     0.94  3.4
0.104 0.40399     0.914 3.5
```

```
0.102 0.39499     0.88998     3.6
0.1   0.38699     0.86697     3.7
0.098 0.37799     0.84698     3.8
0.097 0.37199     0.827 3.9
0.094997     0.36499     0.80798     4
0.092998     0.358 0.78998     4.1
0.091999     0.351 0.77399     4.2
0.09  0.34399     0.75799     4.3
0.089001     0.33899     0.74298     4.4
0.087997     0.334 0.728 4.5
0.085999     0.328 0.716 4.6
0.084999     0.323 0.70398     4.7
0.083 0.31799     0.69098     4.8
0.082001     0.313 0.67899     4.9
0.080997     0.308 0.668 5
```