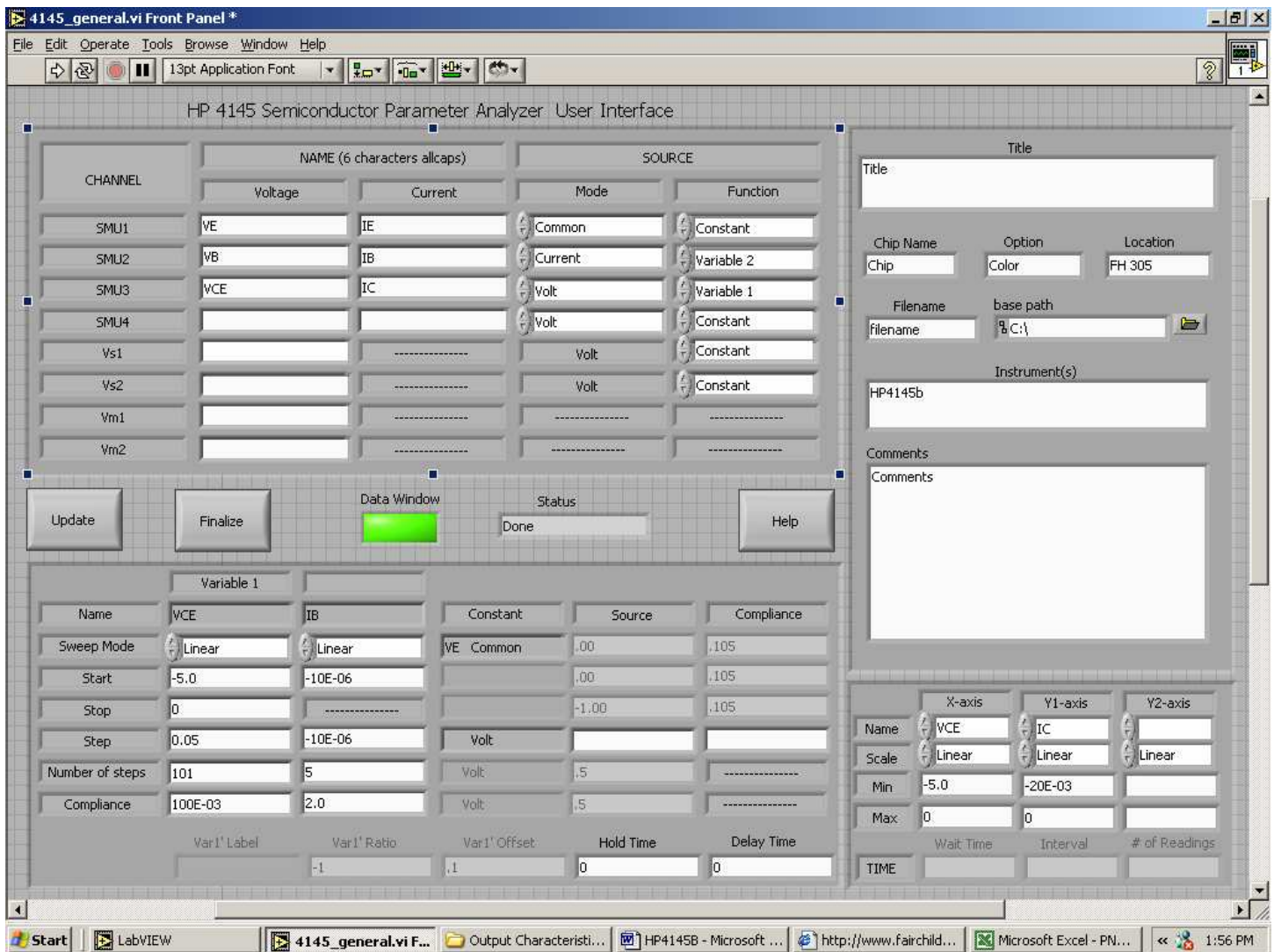


## Notes for using HP4145B & Exporting data to Labview:

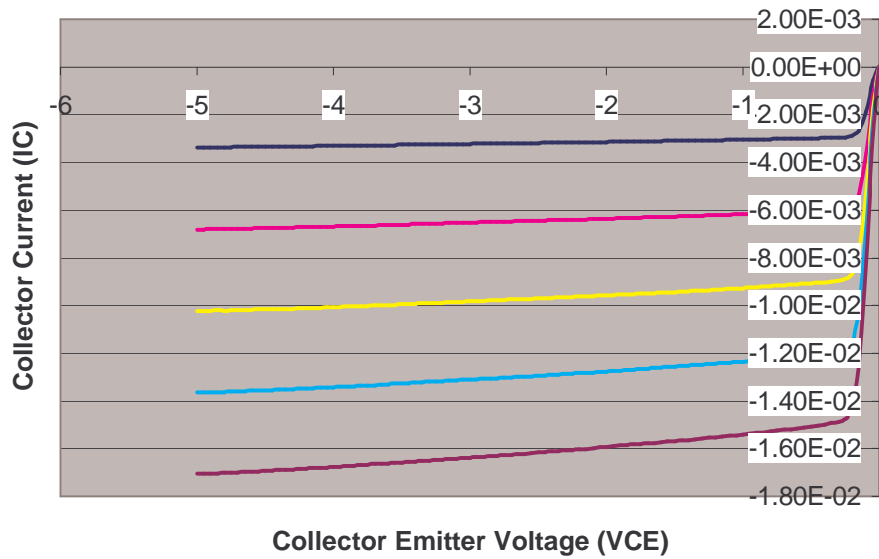
- Labview is interfaced with HP4145B to extract the parameter and to plot the curve.
- N-channel MOS and BJT (NPN) will have the entire plot in the first quadrant.
- P-channel MOS and BJT (PNP) will have the entire plot in the Third quadrant.
- To get the Transfer Characteristics for BJT, set  $V_{CE}$  carefully ( $-3V$  for PNP and  $3V$  for NPN)
- After exporting the data from Labview, plot it with Excel or other software (In Labview, the curve for the previous simulation is shown, which is wrong).
- Please have the data sheet with you for HP4145B measurements to ensure the terminal connections are correct.

### 2N4403 (PNP Transistor)



2N4403 (PNP) – Output characteristics (From LabView)

## PNP - Output Characteristics



2N4403 (PNP) – Output characteristics

4145\_general.vi Front Panel\*

File Edit Operate Tools Browse Window Help

HP 4145 Semiconductor Parameter Analyzer User Interface

CHANNEL	NAME (6 characters allcaps)		SOURCE	
	Voltage	Current	Mode	Function
SMU1	VE	IE	Common	Constant
SMU2	VB	IB	Volt	Variable 1
SMU3	VCE	IC	Volt	Constant
SMU4			Volt	Constant
Vs1			Volt	Constant
Vs2			Volt	Constant
Vm1				
Vm2				

Update Finalize Data Window Status Done Help

Variable 1		Constant	Source	Compliance
Name	VB	VE Common	.00	.105
Sweep Mode	Linear	VCE Volt	-1.00	.105
Start	-0.8	Volt		
Stop	0	Volt	.5	
Step	0.01	Volt	.5	
Number of steps	81	Volt		
Compliance	100E-03	Volt	.5	

Var1' Label: -1 Var1' Ratio: .1 Var1' Offset: 0 Hold Time: 0 Delay Time: 0

Title

Chip Name: Chip Option: Color Location: FH 305

Filename: base path filename: %C:\

Instrument(s): HP4145b

Comments

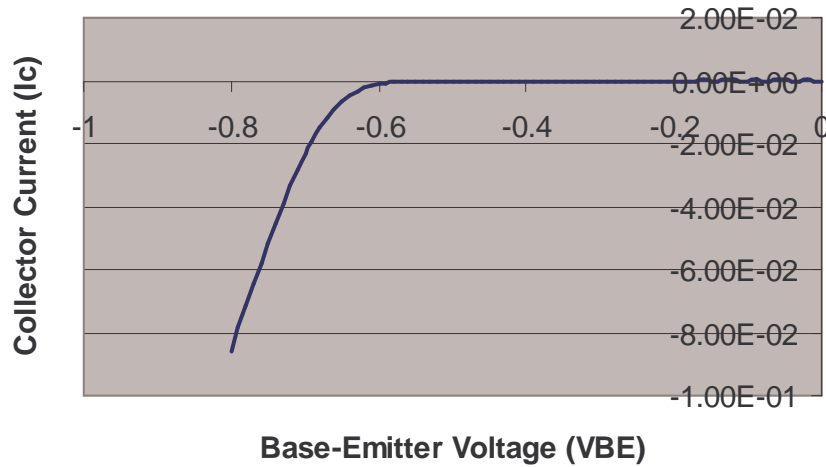
Comments

	X-axis	Y1-axis	Y2-axis
Name	VB	IC	
Scale	Linear	Linear	Linear
Min	-0.8	-30E-03	
Max	0	0	
Wait Time		Interval	# of Readings
TIME			

Start LabVIEW 4145\_general... Output Charact... HP4145B - Micro... http://www.fair... Google Search: ... Microsoft Excel -... 1:36 PM

2N4403 (PNP) – Transfer characteristics (From LabView)

## PNP Transfer Characteristics



2N4403 (PNP) – Transfer characteristics

## 2N3904 : NPN Transistor

The screenshot shows the HP 4145 Semiconductor Parameter Analyzer User Interface. The main window is titled "4145\_general.vi Front Panel \*". The interface includes a menu bar (File, Edit, Operate, Tools, Browse, Window, Help) and a toolbar with various icons. The main area is divided into several sections:

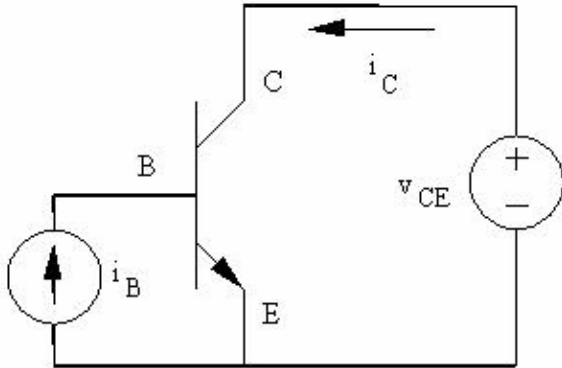
- Channel Configuration Table:**

CHANNEL	NAME (6 characters allcaps)		SOURCE	
	Voltage	Current	Mode	Function
SMU1	VE	IE	Common	Constant
SMU2	VB	IB	Current	Variable 2
SMU3	VCE	IC	Volt	Variable 1
SMU4			Volt	Constant
Vs1			Volt	Constant
Vs2			Volt	Constant
Vm1				
Vm2				
- Chip Information:**
  - Chip Name: Chip
  - Option: Color
  - Location: FH 305
  - Filename: base path
  - Instrument(s): HP4145b
- Variable 1 Configuration Table:**

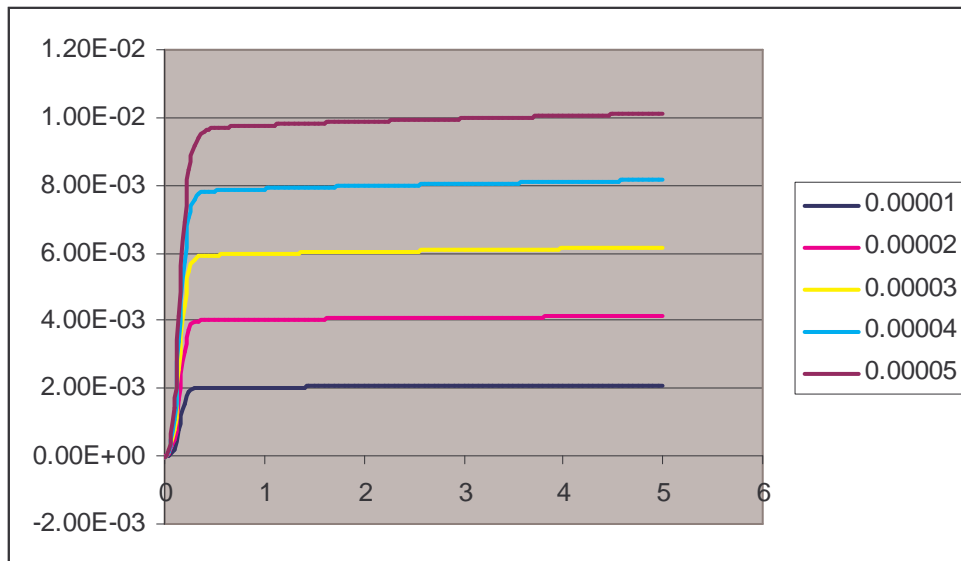
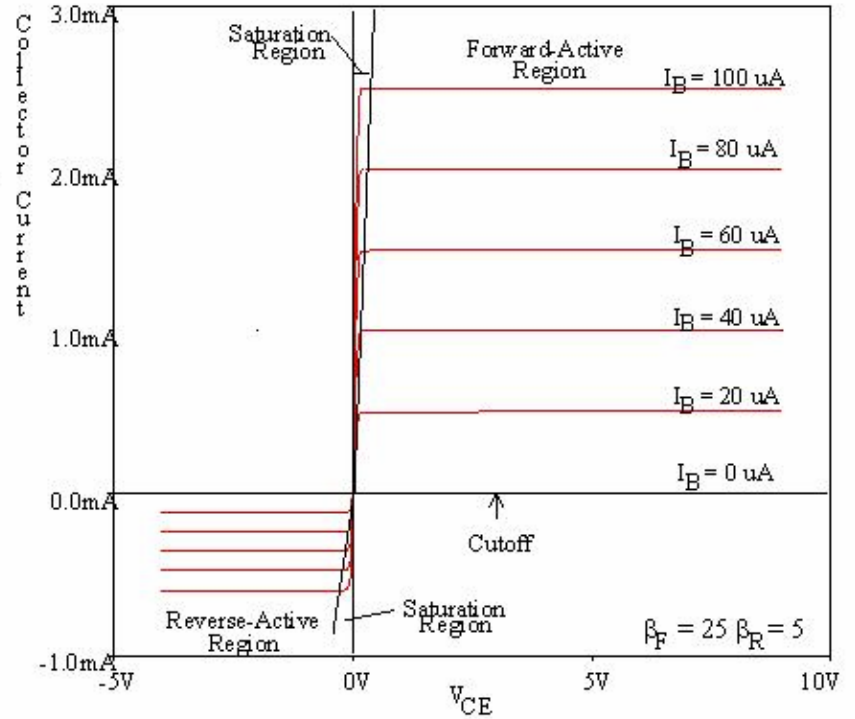
Name	VCE	IB	Constant	Source	Compliance
Sweep Mode	Linear	Linear	VE Common	.00	.105
Start	0	10E-06		.00	.105
Stop	5			.00	.105
Step	0.05	10E-06	Volt		
Number of steps	101	5	Volt	.5	
Compliance	100E-03	2.0	Volt	.5	
- Axis Configuration:**
  - X-axis: Name: VCE, Scale: Linear, Min: 0, Max: 5
  - Y1-axis: Name: IC, Scale: Linear, Min: 0, Max: 10E-03
  - Y2-axis: Name: (empty), Scale: Linear, Min: (empty), Max: (empty)
- Buttons:** Update, Finalize, Data Window (highlighted in green), Status: Done, Help.

Fig: 2N3904 (NPN) – Output characteristics (From LabView)

# Output Characteristics



Circuit for determining the common-emitter output characteristics of an NPN transistor



2N3904 (NPN) output char [From Excel Plot]

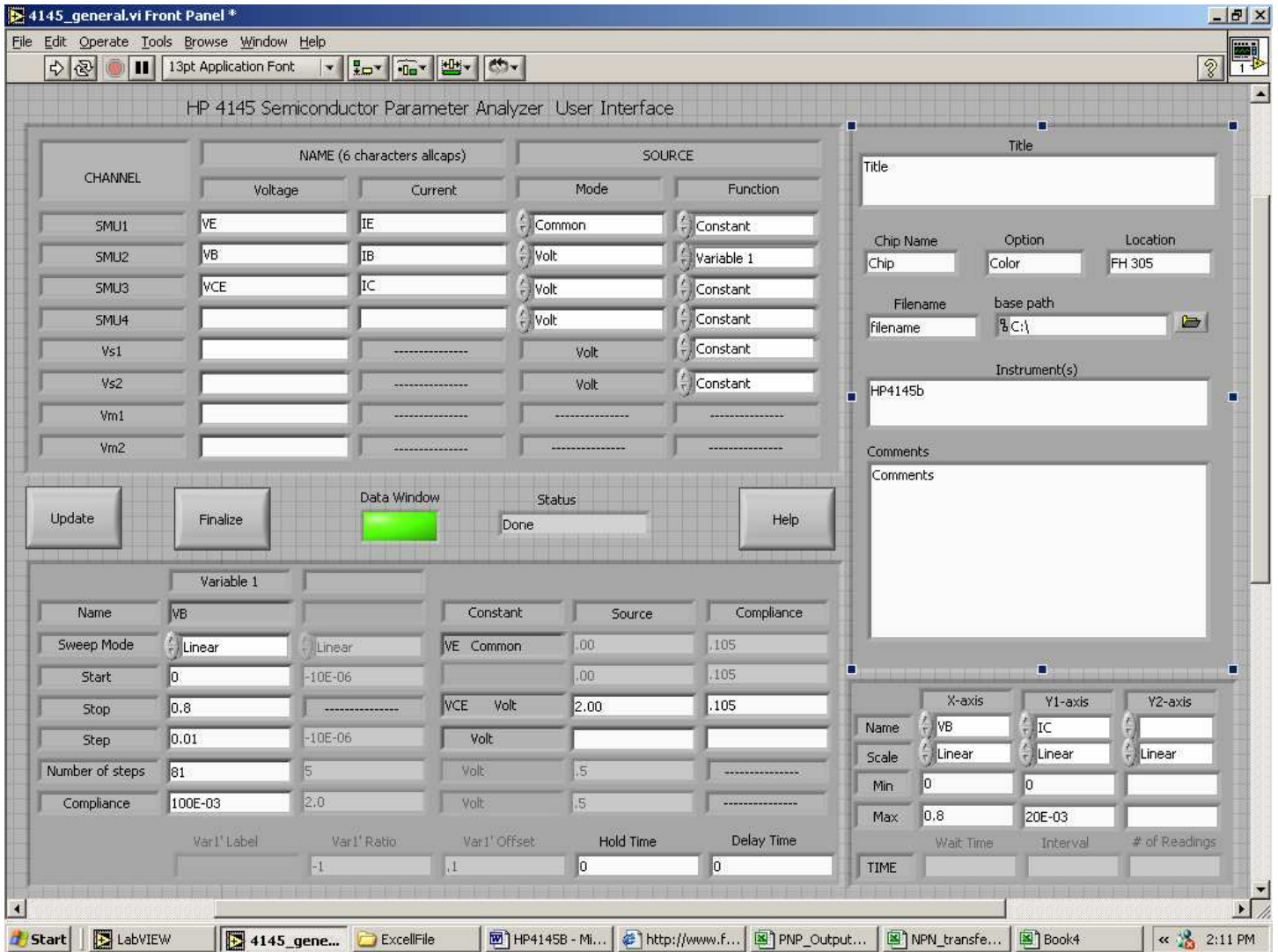
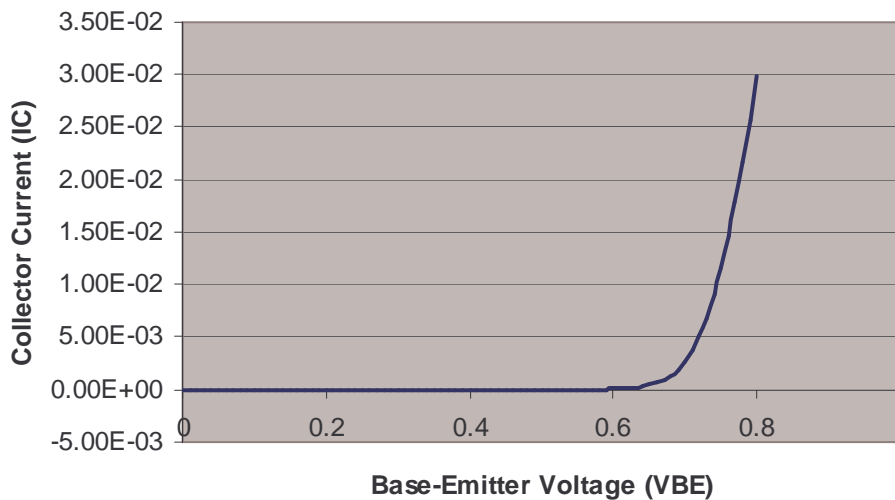


Fig: 2N3904 (NPN) – Transfer characteristics (From LabView)

### NPN Transfer Characteristics



2N3904 (NPN) – Transfer characteristics

## J271 (p-channel JFET)

4145\_general.vi Front Panel \*

File Edit Operate Tools Browse Window Help

13pt Application Font

HP 4145 Semiconductor Parameter Analyzer User Interface

CHANNEL	NAME (6 characters allcaps)		SOURCE	
	Voltage	Current	Mode	Function
SMU1	VS	IS	Common	Constant
SMU2	VD	ID	Volt	Variable 1
SMU3	VG	IG	Volt	Variable 2
SMU4			Volt	Constant
Vs1			Volt	Constant
Vs2			Volt	Constant
Vm1				
Vm2				

Update

Finalize

Data Window

Status: Done

Help

Title

Chip Name: Chip    Option: Color    Location: FH 305

Filename:    base path: C:\

Instrument(s): HP4145b

Comments:

Variable 1		Constant	Source	Compliance
Name	VD    VG	VS Common	.00	.105
Sweep Mode	Linear    Linear		.00	.105
Start	-5    0		.00	.105
Stop	0    -----		.00	.105
Step	0.05    -0.2	volt		
Number of steps	101    5	Volt	.5	
Compliance	40E-03    .001	Volt	5	

Var1' Label

Var1' Ratio: -1

Var1' Offset: .1

Hold Time: 0

Delay Time: 0

X-axis: Name: VD    Y1-axis: ID    Y2-axis: ID

Scale: Linear    Linear    Linear

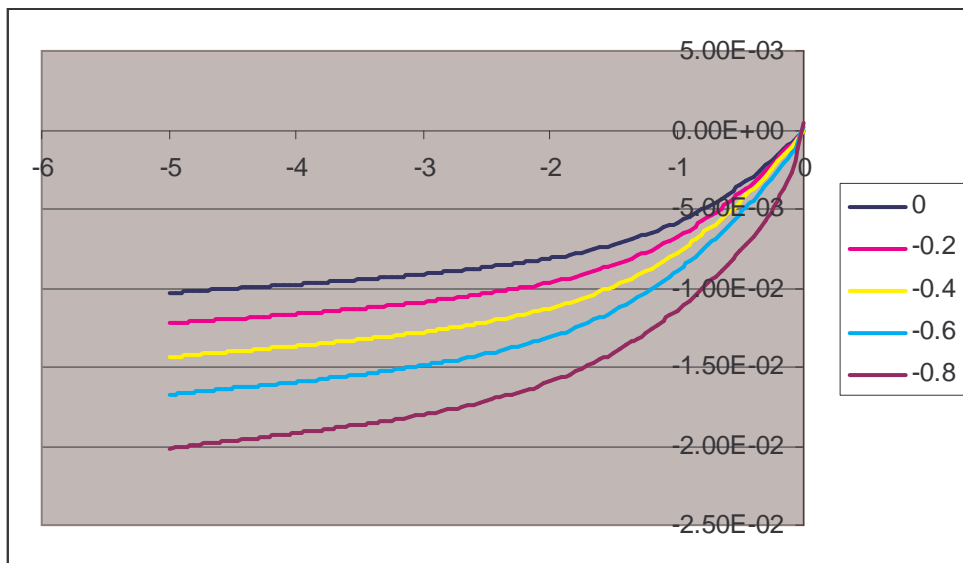
Min: -5.0    -22E-03

Max: 0    0

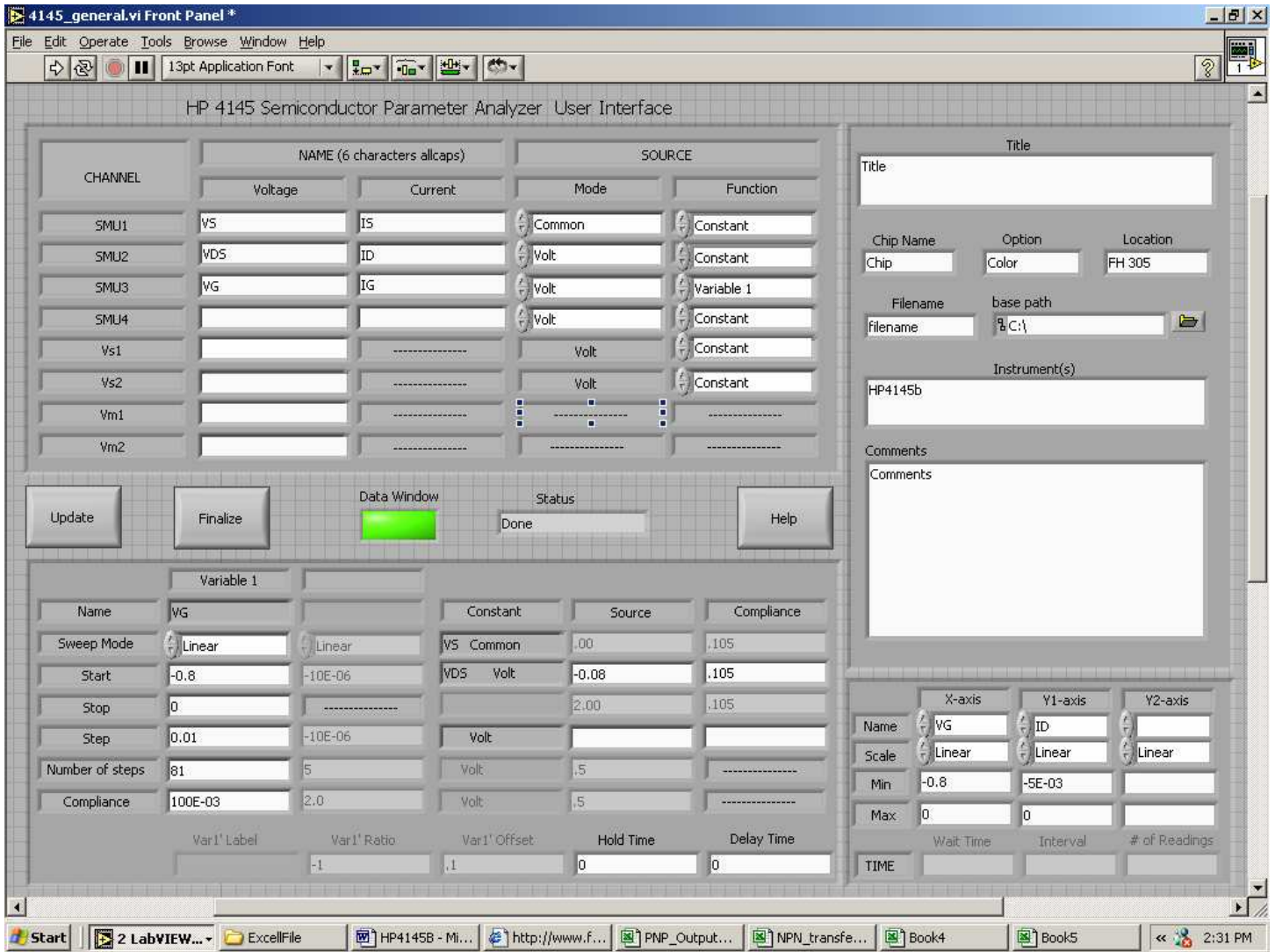
Wait Time:    Interval:    # of Readings:

TIME

J271 (P-channel) – Output characteristics (From LabView)

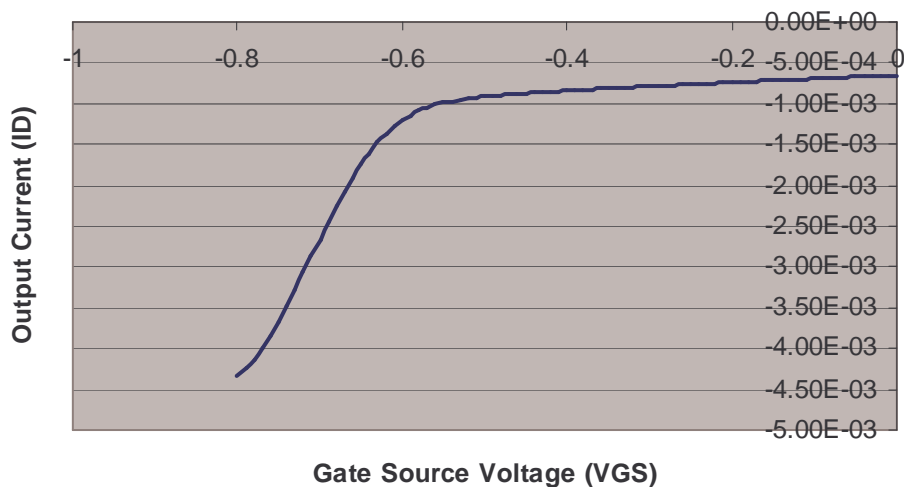


J271 – Output characteristics



J271 (P-channel) – Transfer characteristics (From LabView)

### J271 (P-channel) Transfer Char



J271 (P-channel) – Transfer characteristics