
Semiconductor Parameter Analyzer

Print/Plot Guide

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**HP 4155A/4156A
Print/Plot Guide**

HP 4155A/4156A Print/PLOT Guide

This is a guide for efficient printing/plotting with the HP 4155A/4156A.

NOTE

This guide applies to instruments that have been updated to firmware revision 1.04. Please contact your nearest HP Service Center if you require the ROM Upgrade Kit.

You can check your firmware revisions by pushing the **[SYSTEM]** front panel key followed by the **Config** softkey. Your configuration should match the one below.

SYSTEM : CONFIGURATION	
* SOFTWARE REVISION	
* CONFIGURATION	
HOSTC	01.04
SMUC	01.04
ADC	01.00
SLOT	UNIT
0	VSU1, VSU2, VMU1, VMU2
1	SMU1 : MP
2	SMU2 : MP
3	SMU3 : MP
4	SMU4 : MP
5	
6	
7	
8	

Supported Peripherals

The HP 4155A/4156A supports many peripherals. Table 1-1 below should help you select a printer that best meets your needs. If a peripheral listed is not available, please consult your local printer dealer for a compatible replacement.

Table 1-1. HP 4155A/4156A Supported Printers/Plotters

Model	HP-IB	Serial	Parallel	PCL	HP-GL	Color ¹	P/L ²
HP 2225A/C/D Thinkjet	Yes	Yes	Yes	Yes		B/W	P
HP C2106A Deskjet 500		Yes	Yes	Yes		B/W	P
HP C2114A Deskjet 500C		Yes	Yes	Yes		8	P
HP C2168A Deskjet 560C			Yes	Yes		8	P
HP C2164A Deskjet 660C			Yes	Yes		8	P
HP C1676A Deskjet 1200C			Yes	Yes	Yes	16	P/L
HP Laserjet Family		Yes	Yes	Yes	Yes	B/W	P/L
HP 3630A Paintjet	Yes	Yes		Yes		16	P
HP 74XX plotters	Yes	Yes			Yes	2-8	L
HP 75XX plotters	Yes	Yes			Yes	2-8	L

1 B/W = Black & White

Numbers = Pen/cartridge color capability

2 P = Portrait

L = Landscape

There are major differences between PCL and HP-GL. Detailed information and examples are in later sections. Use the summary comparison below to help you decide which mode is best for your needs.

	PCL	HP-GL
Supported Peripheral	Laserjets,Deskjets and Paintjet	Laserjets,Deskjet 1200C and Plotters
Output Quality	Resolution changes <i>size</i> not quality of graph	High quality outputs compared to PCL
Output Region	Changes <i>position</i> not aspect ratio of graph or size of text	Changes <i>size</i> and <i>position</i> and aspect ratio of graph and text
Font Size	Independent from the graph size	All fonts are scaled with the graph

Peripheral Connection

The HP 4155A/4156A has HP-IB and serial interfaces for hardcopies. If your printer only has a parallel (Centronics) interface, you must convert to HP-IB or serial. Refer to Table 1-2 for the required cables and converters to interface to your printer.

Table 1-2. Required Cables and Converters

Interface	Cable p/n	Description
HP-IB	10833A	HP-IB cable, 1m
Serial	24542G	9-pin f/25-pin m printer cable, 3m
	24542H	9-pin f/25-pin f printer cable, 3m
Parallel/HP-IB	ITEL-45CHVU	MicroPrint HP-IB/Centronics Converter
	C2950A	36-pin m /25-pin m printer cable, 2m
	10833A	HP-IB cable, 1m

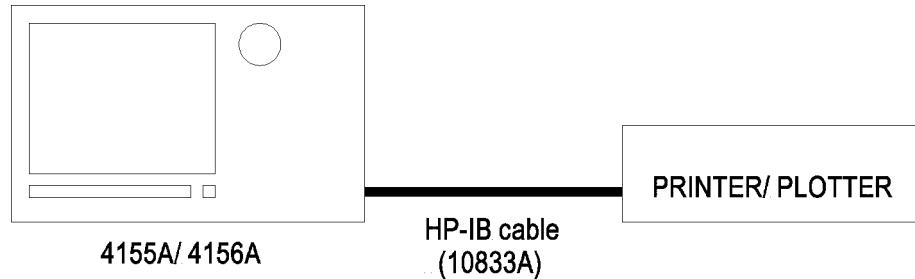


Figure 1-1. Connecting to HP-IB Peripherals

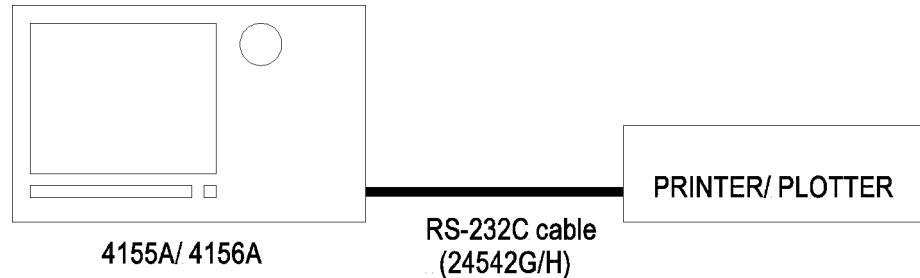


Figure 1-2. Connecting to Serial Peripherals

CAUTION

Serial cables may look the same but the pin assignments are different. Make sure you use a *printer cable* not a modem cable for this setup.

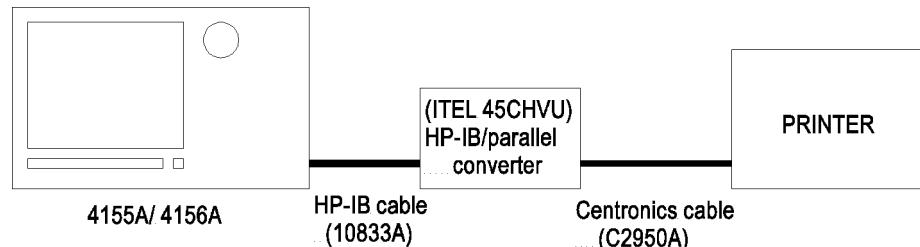


Figure 1-3. Connecting to Parallel Printers via HP-IB Interface

Table 1-3. Dip Switches of MICROPRINT Converter

Switch	Function
1 to 5	Address
6,8	Not use
7	Listen always Should be set "OFF"

MISCELLANEOUS Page

Some parameters are stored in non-volatile memory in the HP 4155A/4156A. Therefore they are restored when you boot-up the instrument. You can set these parameters by pushing the **SYSTEM** front panel key followed by the **MISCELLANEOUS** softkey. Refer to Figure 1-4 for the descriptions of the parameters in the MISCELLANEOUS page.

- (1) Select **SYSTEM CONTROLLER** for HP-IB peripherals.
- (2) Select the appropriate power line frequency for your location.
- (3) Set this number the same as the address of your HP-IB peripheral.
- (4) Set these parameters the same as your serial peripheral.

SYSTEM : MISCELLANEOUS

* HP 4155A is ***** (1)*****	* POWER LINE FREQUENCY ***** (2)*****																				
* HP-IB ADDRESS <table border="1"><tr><td>HP 4155A</td><td>17</td></tr><tr><td>HARD COPY</td><td>*****(3)*****</td></tr></table>	HP 4155A	17	HARD COPY	***** (3)*****	* SERIAL INTERFACE <table border="1"><tr><td>BAUD RATE</td><td>9600 bps</td></tr><tr><td>DATA BITS</td><td>8</td></tr><tr><td>PARITY</td><td>None</td></tr><tr><td>STOP BIT(S)</td><td>1</td></tr><tr><td>TRANSMIT</td><td>HARDWIRE</td></tr><tr><td>PACING</td><td></td></tr><tr><td>RECEIVE</td><td>HARDWIRE</td></tr><tr><td>PACING</td><td></td></tr></table>	BAUD RATE	9600 bps	DATA BITS	8	PARITY	None	STOP BIT(S)	1	TRANSMIT	HARDWIRE	PACING		RECEIVE	HARDWIRE	PACING	
HP 4155A	17																				
HARD COPY	***** (3)*****																				
BAUD RATE	9600 bps																				
DATA BITS	8																				
PARITY	None																				
STOP BIT(S)	1																				
TRANSMIT	HARDWIRE																				
PACING																					
RECEIVE	HARDWIRE																				
PACING																					
* REMOTE CONTROL <table border="1"><tr><td>COMMAND SET</td><td>HP 4155 / 56</td></tr></table>	COMMAND SET	HP 4155 / 56	(4)																		
COMMAND SET	HP 4155 / 56																				
* CLOCK <table border="1"><tr><td>Y</td><td>M</td><td>D</td><td>H</td><td>M</td></tr><tr><td>1995</td><td>10</td><td>7</td><td>20</td><td>18</td></tr></table>	Y	M	D	H	M	1995	10	7	20	18											
Y	M	D	H	M																	
1995	10	7	20	18																	
* BEEP <table border="1"><tr><td>ON</td></tr></table>	ON																				
ON																					

Figure 1-4. MISCELLANEOUS Page

PRINT/PLOT SETUP Page

The HP 4155A/56A must be setup the same as your peripheral in order to communicate successfully. These setups are lost when the instrument is powered off. You can save these setups for later use as a customized file (*.CST). You set these parameters by pushing the **SYSTEM** front panel key then the **PRINT SETUP** softkey. Refer to Figure 1-5 for the descriptions of the parameters in the PRINT/PLOT SETUP page.

- (1) Select which INTERFACE to use: **HP-IB** or **SERIAL**.
- (2) Select which LANGUAGE to use: **PCL** or **HP-GL**. (See later sections)
- (3) Select FORM FEED = **ENABLE** or **DISABLE**
- (4) Select whether to use **B/W**, **FIXED CLR** or **COLOR**.

B/W : Black & White (print without color)

FIXED CLR : HP 4155/56A sets the printer's colors automatically.
(Printers/plotters with 8 color capability).

COLOR : Corresponds to the colors selected in COLOR SETUP page.
(Printers/plotters with 16 color capability).

- (5) Select which RESOLUTION to use.
(PCL mode only - See "PCL Resolution(size)")
- (6) Select which PAPER SIZE to use. (1 inch = 25.4 mm)

CUSTOM: Enter any LENGTH or WIDTH between 7 and 20 inches.

A3 :	297 by 420	mm
A4 :	210 by 297	mm
B4 :	257 by 354	mm
B5 :	182 by 257	mm
A :	8.50 by 11.00	in (letter)
B :	11.00 by 17.00	in

- (7) Select FEED DIR to use: LONG SIDE or SHORT SIDE. This field does *not* change landscape/portrait orientation of your graph, which you change using printer ESC codes as described in "PCL Commands".
For portrait, specify SHORT SIDE. For landscape, specify LONG SIDE.

PRINT/PLOT SETUP Page

This purpose of this field is only to make sure specified OUTPUT REGION is calculated correctly for desired orientation. See "GRAPH PLOT" window.

- (8) Select whether the HEADER information = **ENABLE** or **DISABLE**.
- (9) Select whether COMMENTS = **ENABLE** or **DISABLE**.
- (10) Select which GRAPH choices = **ENABLE** or **DISABLE**.
("—" means all choices are always enabled in PCL mode.)
- (11) Optional fields for sending ESC characters to your peripheral before sending the data.
- (12) Optional fields for sending ESC characters to your peripheral after sending the data.

SYSTEM : PRINT / PLOT SETUP			
* DESTINATION	***(1)***	* LANGUAGE	***(2)***
* FORM FEED	***(3)***	* LINE	60
* COLOR / B/W	***(4)***	* COLUMN	80
* PAPER		* RESOLUTION	
SIZE	***(6)***	TITLE	***(8)***
FEED DIR	***(7)***	DATE & TIME	***(8)***
LENGTH	-----	PAGE NO.	***(8)***
WIDTH	-----	USER COMMENT	***(9)***
UNIT	-----	PRINT / PLOT COMMENT	***(9)***
* OUTPUT ITEM			
GRAPH TRACE	***(10)***	GRAPH FRAME & GRID	***(10)***
GRAPH AXIS TEXT	***(10)***	GRAPH TEXT	***(10)***
* INIT STRING			
(11)			
* TRAILER STRING			
(12)			

Figure 1-5. PRINT/PLOT SETUP Page

To Dump Screen Image to Printer/Plotter

1. Display the desired page to dump.
2. Press the green key, then press **Plot/Print** front-panel key. The SCREEN DUMP setup window is displayed.
3. In the DESTINATION field, select **PRINTER/PLOTTER** secondary softkey.
4. Select **PRINT/PLOT** primary softkey. Dump is performed.
5. Select **EXIT** primary softkey to exit SCREEN DUMP setup window.

For details about setting up the OUTPUT REGION table, refer to “GRAPH PLOT Window”.

To cancel during dumping.

Select **ABORT** primary softkey.

To resetup the SYSTEM: PRINT/PLOT SETUP page.

Select **PR/PL SETUP** primary softkey.

To Output Setup Data to Printer/Plotter

1. Display desired setup page to output.
2. Press **Plot/Print** front-panel key. The PRINT/PLOT SETUP DATA window is displayed.
3. In the DESTINATION field, select **PRINTER/PLOTTER** secondary softkey.
4. In the OUTPUT PAGE field, select:
 - **CURRENT** secondary softkey to output currently displayed setup page.
 - **GROUP** secondary softkey to output the page group that includes the currently displayed setup page.
 - **ALL** secondary softkey to output all setup pages.
5. (Optional) In the PRINT/PLOT COMMENT field, enter a comment.
 - maximum characters: 58
6. Select **PRINT/PLOT** primary softkey. Output is performed.
7. Select **EXIT** primary softkey to exit PRINT/PLOT SETUP DATA window.

The PRINT/PLOT COMMENT is output *only* if ENABLE is set in the PRINT/PLOT COMMENT field of the OUTPUT ITEM table on the SYSTEM: PRINT/PLOT SETUP page.

For LANGUAGE=PCL, only the UPPER LEFT fields of the OUTPUT REGION appear. For details about setting up the OUTPUT REGION table, refer to "GRAPH PLOT Window".

The settings of the PRINT/PLOT SETUP DATA window can be stored onto diskette as part of CST type setup data file, which is for customizing system data. To store the settings, refer to "To Store Hardcopy Image to Diskette".

To cancel during the output of setup data.

Select **ABORT** primary softkey.

To resetup the SYSTEM: PRINT/PLOT SETUP page.

Select **PR/PL SETUP** primary softkey.

Example.

The following figure shows an example setup to output the currently displayed CHANNELS: CHANNELS DEFINITION page.

CHANNELS: CHANNEL DEFINITION					92APR01: 02:30PM																														
*MEASUREMENT MODE					<input checked="" type="checkbox"/> CURRENT																														
<input type="checkbox"/> SWEEP					<input type="checkbox"/> GROUP																														
*CHANNELS					<input type="checkbox"/> ALL																														
<table border="1"> <thead> <tr> <th colspan="5">MEASURE</th> </tr> <tr> <th>UNIT</th> <th>VNAME</th> <th>INAME</th> <th>MODE</th> <th>FCTN</th> </tr> </thead> <tbody> <tr> <td>SMU1:MP</td> <td>V1</td> <td>I1</td> <td>COMMON</td> <td>CONST</td> </tr> <tr> <td>SMU2:MP</td> <td>V2</td> <td>I2</td> <td>I</td> <td>VAR2</td> </tr> <tr> <td>SMU3:MP</td> <td>V3</td> <td>I3</td> <td>V</td> <td>VAR1</td> </tr> <tr> <td>SMU4:MP</td> <td>V4</td> <td>I4</td> <td>V</td> <td>CONST</td> </tr> </tbody> </table>					MEASURE					UNIT	VNAME	INAME	MODE	FCTN	SMU1:MP	V1	I1	COMMON	CONST	SMU2:MP	V2	I2	I	VAR2	SMU3:MP	V3	I3	V	VAR1	SMU4:MP	V4	I4	V	CONST	<input type="checkbox"/> SERIES RESISTANCE
MEASURE																																			
UNIT	VNAME	INAME	MODE	FCTN																															
SMU1:MP	V1	I1	COMMON	CONST																															
SMU2:MP	V2	I2	I	VAR2																															
SMU3:MP	V3	I3	V	VAR1																															
SMU4:MP	V4	I4	V	CONST																															
					<input type="checkbox"/> 0 ohm																														
					<input type="checkbox"/> 0 ohm																														
PRINT/ PLOT SETUP DATA																																			
<input type="checkbox"/> *DESTINATION <input type="checkbox"/> PRINTER/PLOTTER					<input type="checkbox"/> CURRENT																														
<input type="checkbox"/> *OUTPUT REGION <table border="1"> <tr> <td>UPPER LEFT</td> <td>X 10%</td> <td>Y 10%</td> </tr> </table>					UPPER LEFT	X 10%	Y 10%	<input type="checkbox"/> CURRENT																											
UPPER LEFT	X 10%	Y 10%																																	
<input type="checkbox"/> *PRINT/ PLOT COMMENT					<input type="checkbox"/> CURRENT																														
CURRENT																																			
<input type="checkbox"/> PRINT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> PR/PL SETUP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> EXIT																												

To Output LIST Result Data to Printer/Plotter

1. Display the GRAPH/LIST: LIST page to output.
 2. Press **Plot/Print** front-panel key. The PRINT/PLOT DATA LIST setup window is displayed.
 3. In the DESTINATION field, select **PRINTER/PLOTTER** secondary softkey.
 4. In the OUTPUT DATA fields, enter the index number (NO.) range of list to specify which data to output.
 - left field: beginning NO.
 - right field: end NO.
- Select **ALL** secondary softkey to specify output of all measurement data.
5. (Optional) In the PRINT/PLOT COMMENT field, enter a comment.
 - maximum characters: 58
 6. Select **PRINT/PLOT** primary softkey. Output is performed.
 7. Select **EXIT** primary softkey to exit PRINT/PLOT DATA LIST setup window.

The PRINT/PLOT COMMENT is output *only* when ENABLE is set in the PRINT/PLOT COMMENT field of the OUTPUT ITEM table on the SYSTEM: PRINT/PLOT SETUP page.

For LANGUAGE=PCL, only the UPPER LEFT fields of the OUTPUT REGION appear. For details about setting up the OUTPUT REGION table, refer to "GRAPH PLOT Window".

To cancel during output of measurement data.

Select **ABORT** front-panel key.

To resetup the SYSTEM: PRINT/PLOT SETUP page.

Select **PR/PL SETUP** primary softkey.

The settings of the PRINT/PLOT DATA LIST setup window can be stored onto diskette as part of CST type setup data file, which is for customizing system data. To store the settings, refer to "To Store Hardcopy Image to Diskette".

HP 4155A/4156A Print/Plot Guide
To Output LIST Result Data to Printer/Plotter

Example.

The following figure shows an example setup that outputs all the measurement data of a GRAPH/LIST: LIST page.

GRAPH/LIST: LIST		SHORT		92APR01: 02:30PM		ALL
NO.	Vc V	Hfe	Vb V			
1	0.0000V	-999m	0.5030V			
2	0.0100V	-197m	0.5120V			
3	0.0200V	976m	0.5220V			
4	0.0300V	2.61	0.5320V			
5	0.0400V	4.93	0.5400V			
6	0.0500V	8.08	0.5490V			
7	0.0600V	12.5	0.5590V			

PRINT/PLOT DATA LIST

*DESTINATION PRINTER/PLOTTER

*OUTPUT REGION *OUTPUT DATA (INDEX NO.)
UPPER LEFT X 10% Y 10% 1 <--> MAX

*PRINT/PLOT COMMENT

MAX

PRINT PLOT PR/PL SETUP EXIT

UGT03020, 100*80

To Output GRAPHICS Data to Printer/Plotter

1. Display the GRAPH/LIST: GRAPH page to output.
2. Press **Plot/Print** front-panel key. The GRAPH PLOT setup window is displayed.
3. In the DESTINATION field, select **PRINTER/PLOTTER** secondary softkey.
4. (For HP-GL only) In the GRAPH TRACE ONLY field, select:
 - **YES** secondary softkey to output graph trace only.
 - **NO** secondary softkey to output graphics with items that are enabled in the OUTPUT ITEMS table of the SYSTEM: PRINT/PLOT SETUP page.For PCL, the graph trace is always output, so this field does not appear.
5. (Optional) In the PRINT/PLOT COMMENT field, enter a comment.
 - maximum characters: 58
6. (Optional) In the PRINT SETUP DATA field, select:
 - **YES** secondary softkey to output graphics with measurement setup data.
 - **NO** secondary softkey to output graphics only.
7. Select **PRINT/PLOT** primary softkey. Output is performed.
8. Select **EXIT** primary softkey to exit GRAPH PLOT setup window.

The PRINT/PLOT COMMENT is output *only* if ENABLE is set in the PRINT/PLOT COMMENT field of the OUTPUT ITEM table on the SYSTEM: PRINT/PLOT SETUP page.

For details about setting up the OUTPUT REGION table, refer to “GRAPH PLOT Window”.

The settings of the GRAPH PLOT setup window can be stored onto diskette as part of CST type setup data file, which is for customizing system data. To store the settings, refer to “To Store Hardcopy Image to Diskette”.

To cancel during the output of graphics display.

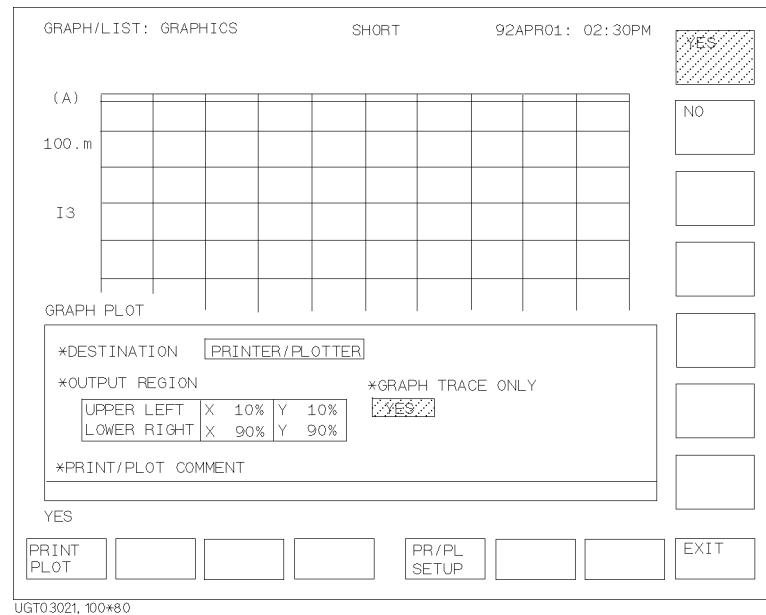
Select **ABORT** primary softkey.

To resetup the SYSTEM: PRINT/PLOT SETUP page.

Select **PRINT SETUP** primary softkey.

Example.

The following figure shows an example setup that outputs graph trace only.



To Store Hardcopy Image to Diskette

1. Insert a diskette into the flexible disk drive.
2. Display the desired page to store hardcopy image to diskette.
3. Press **Plot/Print** front-panel key. The PRINT/PLOT setup window is displayed.
Or for dumping screen image, press the green key. Then press **Plot/Print** front-panel key. The SCREEN DUMP setup window is displayed.
4. In the DESTINATION field, select **FILE** secondary softkey.
5. In the FILE NAME field, enter a file name.
Alpha characters must be upper case.
6. Select **PRINT/PLOT** primary softkey. The hardcopy image is stored into the file.
7. Select **EXIT** primary softkey to exit the PRINT/PLOT or SCREEN DUMP setup window.

To cancel during the storing of hardcopy image.

Select **ABORT** primary softkey.

To resetup the SYSTEM: PRINT/PLOT SETUP page.

Select **PR/PL SETUP** primary softkey.

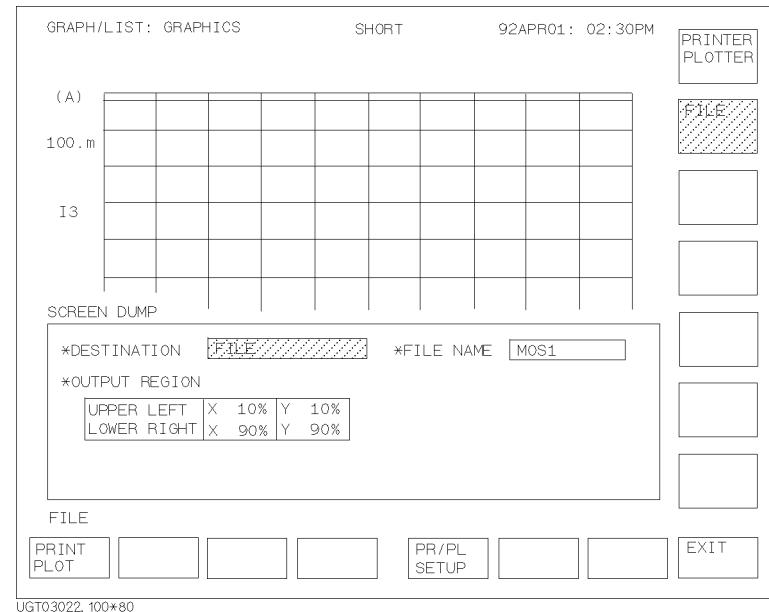
To list file names on diskette.

Select **FILE CATALOG** secondary softkey.

HP 4155A/4156A Print/Plot Guide
To Store Hardcopy Image to Diskette

Example.

The following figure shows an example setup to dump a screen image to diskette file *MOS1*.



GRAPH PLOT Window

The HP 4155A/4156A has the ability to dump a screen image, output setup data, output list results, or output graphics to a printer/plotter or file. You set these parameters by pushing the **[GRAPH/LIST]** front panel key followed by the **[PLOT/PRINT]** front panel key. Refer to Figure 1-6 for the descriptions of the parameters in the GRAPH PLOT window.

- (1) Select DESTINATION = **PRINTER/PLOTTER** for a hardcopy output.
Select DESTINATION = **FILE** to store to the floppy disk.
- (2) Select the desired OUTPUT REGION of your graph.
- (3) Select GRAPH TRACE ONLY = **YES** or **NO**.
(HP-GL mode only)
- (4) Select PRINT SETUP DATA = **YES** or **NO**.
- (5) Select position of SETUP DATA = **BOTTOM** or **RIGHT**. This column only appears when LANGUAGE = **HP-GL** and PRINT SETUP DATA = **YES**.
- (6) Optional field for printing a header comment.

GRAPH PLOT			
* DESTINATION	<input type="text" value="***(1)***"/>		
* OUTPUT REGION	<input type="text" value="***(2)***"/>		
UPPER LEFT LOWER RIGHT	**(x1)** **(x2)**	**(y1)** **(y2)**	* GRAPH TRACE ONLY <input type="text" value="***3***"/> * PRINT. SETUP. DATA <input type="text" value="***4***"/> <input type="text" value="***5***"/>
* PRINT / PLOT COMMENT <input type="text" value="***6***"/>			

Figure 1-6. GRAPH PLOT Window Setup

You can memorize and recall OUTPUT REGION settings by using the **STORE REGION** and **RECALL REGION** softkeys. You can also use the softkeys to set the OUTPUT REGION automatically to a desired quarter or whole area of the paper as in shown in Figure 1-7.

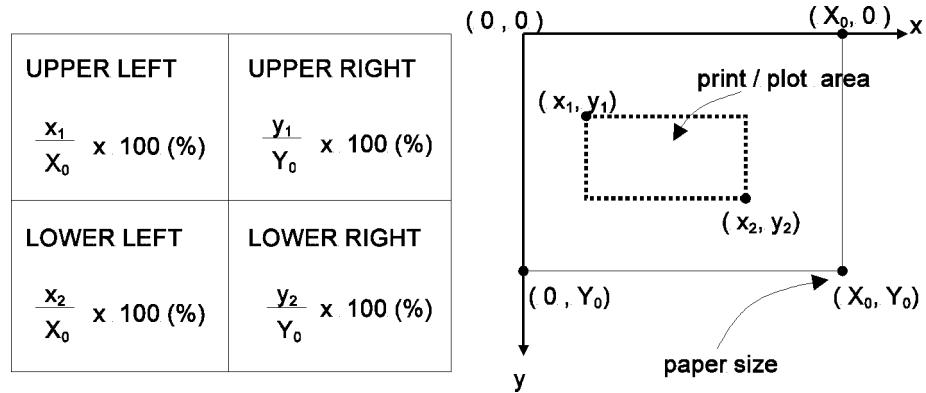


Figure 1-7. OUTPUT REGION

NOTE

For OUTPUT REGION to be calculated correctly for the orientation, make sure you set FEED DIR field of PRINT/PLOT SETUP page to SHORT SIDE for portrait or LONG SIDE for landscape. See "PRINT/PLOT SETUP Page". You change orientation by using printer ESC codes as described in "PCL Commands".

PCL Mode and Examples

This section describes how the HP 4155A/4156A prints in PCL mode. “PCL” is Printer Command Language. This language processes graphic data as the gathering of pixels.

PCL Resolution(size)

You can change the *size* of your graph in PCL mode by varying the RESOLUTION setting in the PRINT/PLOT SETUP page. However, you cannot change the graph’s aspect ratio of width to height. Refer to Table 1-4 to select a resolution that is available on your printer.

Table 1-4. Printer Resolutions

MODEL	75	90	100	150	180	300	600
HP 2225A/C/D ThinkJet			Yes				
HP DeskJet 5XX Family	Yes		Yes	Yes			
HP C2164A DeskJet 660C	Yes		Yes	Yes		Yes	Yes ¹
HP Laserjet Family	Yes		Yes	Yes		Yes	Yes
HP C1676A DeskJet 1200C	Yes		Yes	Yes		Yes	
HP 3630A Paintjet		Yes			Yes		

¹ 600 dpi resolution setting of 660C is not really 600 dpi. It thins out half of the transferred data. So, the actual resolution is 300 dpi and the output looks a bit ugly. Also, it takes long to print out.

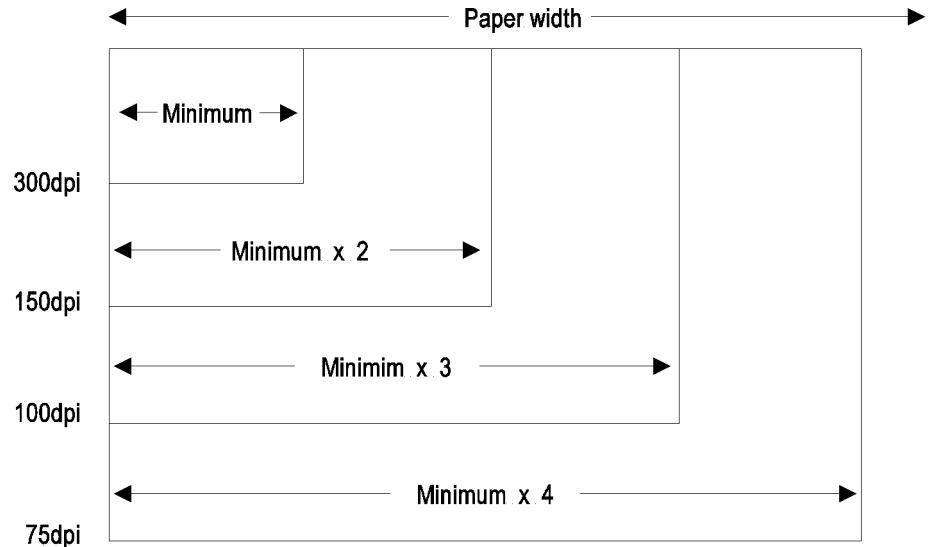


Figure 1-8. Relation between Resolution and Graph Size

NOTE

If you select a HIGH resolution, the graph size becomes SMALLER. If you select a LOW resolution, the graph size becomes BIGGER.

NOTE

We recommend to use 75dpi, 100dpi, or 150dpi because 300dpi and 600dpi are so high resolution that graph becomes too small.

PCL Output Region (position)

You can change the *position* of the graph in PCL by varying the OUTPUT REGION settings in the GRAPH PLOT window. These settings depend on the PAPER settings in the PRINT/PLOT SETUP page to maintain the same aspect ratio. See below for relationship of FEED DIR field of PRINT/PLOT SETUP page and OUTPUT REGION.

PCL Commands

You can send special printer commands by using the INIT STRING and TRAILER STRING fields in the PRINT/PLOT SETUP page. You can use printer commands to print in landscape mode(long side). Refer to your printer manual for more detail on these and other special commands which are available for your printer.

Landscape = \0033&/10\0033*r0F

NOTE

Take care not to use number in mistake for a alphabet. For example "0"(zero) and "O"(alphabet).

NOTE

If you specify landscape orientation, you also need to set FEED DIR field to LONG SIDE, so that OUTPUT REGION will be calculated correctly. For portrait orientation, set FEED DIR field to SHORT SIDE.

PCL Examples

The following pages are several examples of various ways you can print graphs in PCL mode. A Laserjet IIIp was used with a serial interface.

1. Press the **Graph/List** front key to display the GRAPHICS page.
2. Press the **Plot/Print** front key. GRAPH PLOT setup window opens.
3. Select the **PR/PL SETUP** softkey. PRINT/PLOT SETUP page is displayed.
Set the parameters as given.
4. Select the **EXIT** softkey to return to the GRAPH PLOT window and set the parameters as given.
5. Select the **PRINT/PLOT** softkey to print to the printer

NOTE

If you want to print more than one graph per page, you must set the parameters in the GRAPH PLOT window, and select the **PRINT/PLOT** softkey for each graph. You must also manually re-feed the same page.

If your output does not fit properly on the paper, try the following:

- Change the OUTPUT REGION settings in the GRAPH PLOT window
- Decrease the number of graphs per page(ex. 4 graphs -> 2graphs)
- Set PRINT SETUP DATA =NO in GRAPH PLOT window
- Set OUTPUT ITEMS = DISABLE in PRINT/PLOT SETUP page

PCL Mode and Examples**Example 1: One graph per page(portrait).**

This configuration is to print the largest graph with the setup data. The remaining examples will be a variation of this one.

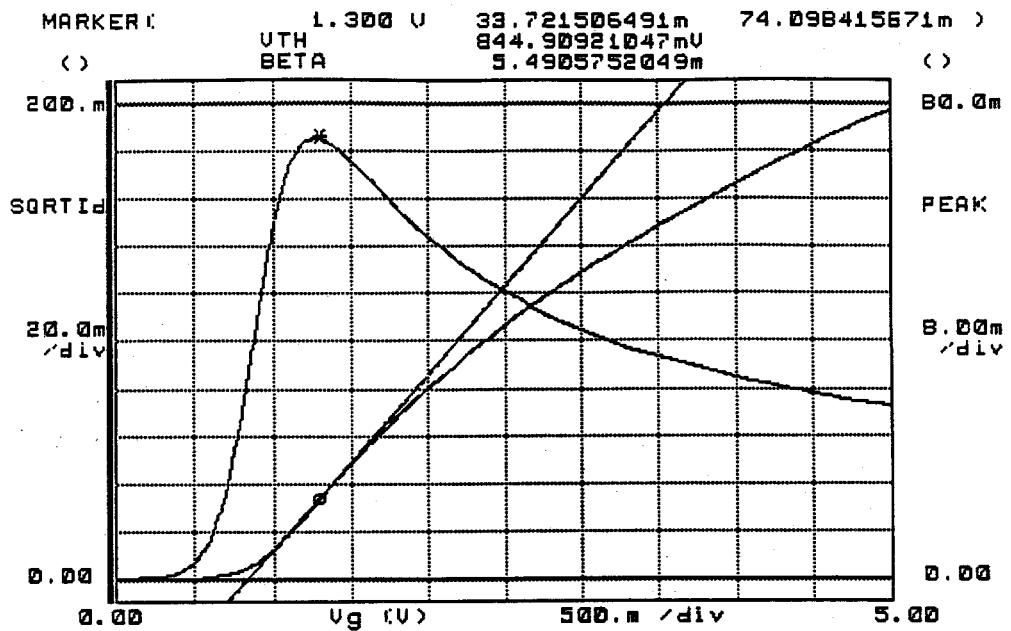
SYSTEM : PRINT / PLOT SETUP			
* DESTINATION	SERIAL	* LANGUAGE	PCL
* FORM FEED	ENABLE	* LINE	60
* COLOR / B/W	B/W	* COLUMN	80
* PAPER SIZE A FEED DIR SHORT SIDE LENGTH ----- WIDTH ----- UNIT -----		* RESOLUTION 75 DPI	
* OUTPUT ITEM TITLE ENABLE DATE & TIME ENABLE PAGE NO. ENABLE USER COMMENT ENABLE PRINT / PLOT COMMENT ENABLE GRAPH TRACE ----- GRAPH FRAME & GRID ----- GRAPH AXIS TEXT ----- GRAPH TEXT -----			
* INIT STRING <input type="text"/>			
* TRAILER STRING <input type="text"/>			

OUTPUT REGION = WHOLE

GRAPH PLOT			
* DESTINATION	PRINTER / PLOTTER		
* OUTPUT REGION UPPER LEFT X 5 % Y 0 % LOWER RIGHT X 81 % Y 92 %			
* PRINT SETUP DATA YES			
* PRINT / PLOT COMMENT <input type="text"/>			

Figure 1-9. Setup Pages for Example 1

*** HP 4156A GRAPH PLOT *** Jul 27 12:50:36 1995 PAGE 1
Saturation Region Vth



```
*VARIABLE      VAR1
UNIT          SMU2:HR
NAME          Vd
LIN/LOG       LINEAR
START         0.0000 V
STOP          5.000 V
STEP          100.0mV
*CONSTANT
UNIT          SMU1:HR    SMU4:HR
NAME          Vd          Vsb
SOURCE        5.000 V    0.0000 V  -----
*USER FUNCTION
NAME          UNIT      DEFINITION
SQRTId       V         SQRT(Id)
PEAK          V         DIFF(SQRTId,Vg)
VTH           V         @L1X
BETA          V         @L1G^2
```

Figure 1-10. Output Image of Example 1

PCL Mode and Examples**Example 2: Two graphs per page(portrait).**

You can print two graphs per page by disabling FORM FEED, increasing the RESOLUTION, and setting the OUTPUT REGION parameters to print in the desired areas.

SYSTEM : PRINT / PLOT SETUP

* DESTINATION	SERIAL	* LANGUAGE	PCL
* FORM FEED	DISABLE	* LINE	60
* COLOR / B/W	B/W	* COLUMN	80
* PAPER		* RESOLUTION	
SIZE	A	150 DPI	
FEED DIR	SHORT SIDE		
LENGTH	-----		
WIDTH	-----		
UNIT	-----		

* INIT STRING

* TRAILER STRING

OUTPUT REGION = UPPER LEFT

GRAPH PLOT

* DESTINATION	PRINTER / PLOTTER
* OUTPUT REGION	
UPPER LEFT	X 5% Y 0%
LOWER RIGHT	X 43% Y 72%
* PRINT SETUP DATA YES	
* PRINT / PLOT COMMENT	

OUTPUT REGION = LOWER LEFT

GRAPH PLOT

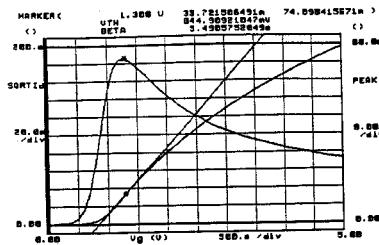
* DESTINATION	PRINTER / PLOTTER
* OUTPUT REGION	
UPPER LEFT	X 5% Y 52%
LOWER RIGHT	X 43% Y 124%
* PRINT SETUP DATA YES	
* PRINT / PLOT COMMENT	

Figure 1-11. Setup Pages for Example 2

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PCL Mode and Examples

*** HP 4156A GRAPH PLOT *** Jul 27 12:07:42 1995 PAGE 1

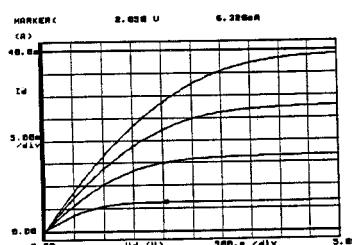
Saturation Region Vth



```
*VARIABLE      VAR1
UNIT          SMU1:HR
NAME          Vg
LIN/LOG       LINEAR
START         0.0000 V
STOP          5.000 V
STEP          100.0mV
*CONSTANT
UNIT          SMU1:HR    SMU4:HR
NAME          Vd          Vsb
SOURCE        5.000 V    0.0000 V
*USER FUNCTION
NAME          UNIT      DEFINITION
SORTID        SQRT(Id)
PEAK          DIF(SQRTId,Vg)
VTH           V          @LIX
BETA          @LIG^2
```

*** HP 4156A GRAPH PLOT *** Jul 27 12:09:00 1995 PAGE 1

Id-Vd Characteristics



```
*VARIABLE      VAR1      VAR2
UNIT          SMU1:HR   SMU2:HR
NAME          Vd          Vg
LIN/LOG       LINEAR    LINEAR
START         0.0000 V   2.0000 V
STOP          5.000 V    5.000 V
STEP          50.0mV    1.0000 V
*CONSTANT
UNIT          SMU4:HR
NAME          Vsb
SOURCE        0.0000 V
```

Figure 1-12. Output Image of Example 2

PCL Mode and Examples**Example 3: Four graphs per page(portrait).**

Since RESOLUTION settings do not apply to any text outside the graph, this example does not print the header or comments. You can print four graphs per page by disabling FORM FEED, increasing the RESOLUTION, disabling all the OUTPUT ITEM parameters, and setting the OUTPUT REGION parameters to print in the desired areas.

SYSTEM : PRINT / PLOT SETUP

* DESTINATION	SERIAL	* LANGUAGE	PCL
* FORM FEED	DISABLE	* LINE	60
* COLOR / B/W	B/W	* COLUMN	80
		* RESOLUTION	150 DPI
* PAPER SIZE A FEED DIR SHORT SIDE LENGTH WIDTH UNIT			
* OUTPUT ITEM TITLE DISABLE DATE & TIME DISABLE PAGE NO. DISABLE USER COMMENT DISABLE PRINT / PLOT COMMENT DISABLE GRAPH TRACE GRAPH FRAME & GRID GRAPH AXIS TEXT GRAPH TEXT			
* INIT STRING <input type="text"/>			
* TRAILER STRING <input type="text"/>			

OUTPUT REGION = UPPER LEFT

GRAPH PLOT

* DESTINATION	PRINTER / PLOTTER
* OUTPUT REGION UPPER LEFT X 5% Y 0% LOWER RIGHT X 43% Y 72% * PRINT SETUP DATA YES	
* PRINT / PLOT COMMENT <input type="text"/>	

OUTPUT REGION = UPPER RIGHT

GRAPH PLOT

* DESTINATION	PRINTER / PLOTTER
* OUTPUT REGION UPPER LEFT X 51% Y 0% LOWER RIGHT X 68% Y 72% * PRINT SETUP DATA YES	
* PRINT / PLOT COMMENT <input type="text"/>	

OUTPUT REGION = LOWER LEFT

GRAPH PLOT

* DESTINATION	PRINTER / PLOTTER
* OUTPUT REGION UPPER LEFT X 5% Y 92% LOWER RIGHT X 43% Y 124% * PRINT SETUP DATA YES	
* PRINT / PLOT COMMENT <input type="text"/>	

OUTPUT REGION = LOWER RIGHT

GRAPH PLOT

* DESTINATION	PRINTER / PLOTTER
* OUTPUT REGION UPPER LEFT X 8% Y 0% LOWER RIGHT X 88% Y 92% * PRINT SETUP DATA YES	
* PRINT / PLOT COMMENT <input type="text"/>	

Figure 1-13. Setup Pages for Example 3

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PCL Mode and Examples

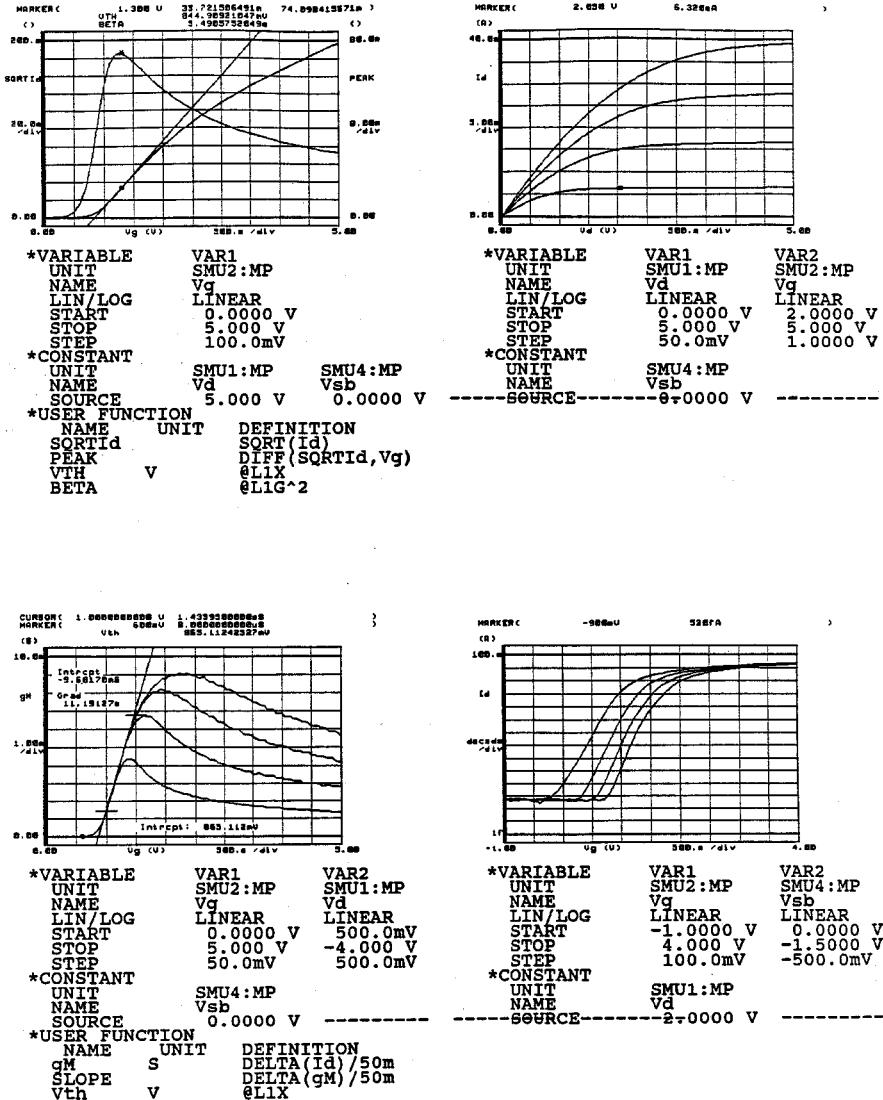


Figure 1-14. Output Image of Example 3

PCL Mode and Examples**Example 4: Two graphs per page(landscape).**

You can print two large graphs with setup data by disabling FORM FEED, increasing the RESOLUTION, changing the FEED DIRECTION, disabling the header information in the OUTPUT ITEM parameters, setting the INIT STRING for landscape mode, and setting the OUTPUT REGION parameters to print in the desired areas.

SYSTEM : PRINT / PLOT SETUP			
* DESTINATION	SERIAL	* LANGUAGE	PCL
* FORM FEED	<input checked="" type="checkbox"/> DISABLE	* LINE	60
* COLOR / B/W	B/W	* COLUMN	80
		* RESOLUTION	100 DPI
* PAPER SIZE A FEED DIR LONG SIDE LENGTH WIDTH UNIT			
* OUTPUT ITEM TITLE <input checked="" type="checkbox"/> DISABLE DATE & TIME <input checked="" type="checkbox"/> DISABLE PAGE NO. <input checked="" type="checkbox"/> DISABLE USER COMMENT <input type="checkbox"/> ENABLE PRINT / PLOT COMMENT <input type="checkbox"/> ENABLE GRAPH TRACE GRAPH FRAME & GRID GRAPH AXIS TEXT GRAPH TEXT			
* INIT STRING <code>\0033&I1O\0033*r0F</code>			
* TRAILER STRING <code></code>			

OUTPUT REGION = UPPER LEFT			
GRAPH PLOT			
* DESTINATION	PRINTER / PLOTTER		
* OUTPUT REGION UPPER LEFT X 5% Y 0% LOWER RIGHT X 49% Y 48%		* PRINT SETUP DATA	<input type="checkbox"/> YES
* PRINT / PLOT COMMENT <code></code>			

OUTPUT REGION = UPPER RIGHT			
GRAPH PLOT			
* DESTINATION	PRINTER / PLOTTER		
* OUTPUT REGION UPPER LEFT X 51% Y 0% LOWER RIGHT X 95% Y 48%		* PRINT SETUP DATA	<input type="checkbox"/> YES
* PRINT / PLOT COMMENT <code></code>			

Figure 1-15. Setup Pages for Example 4

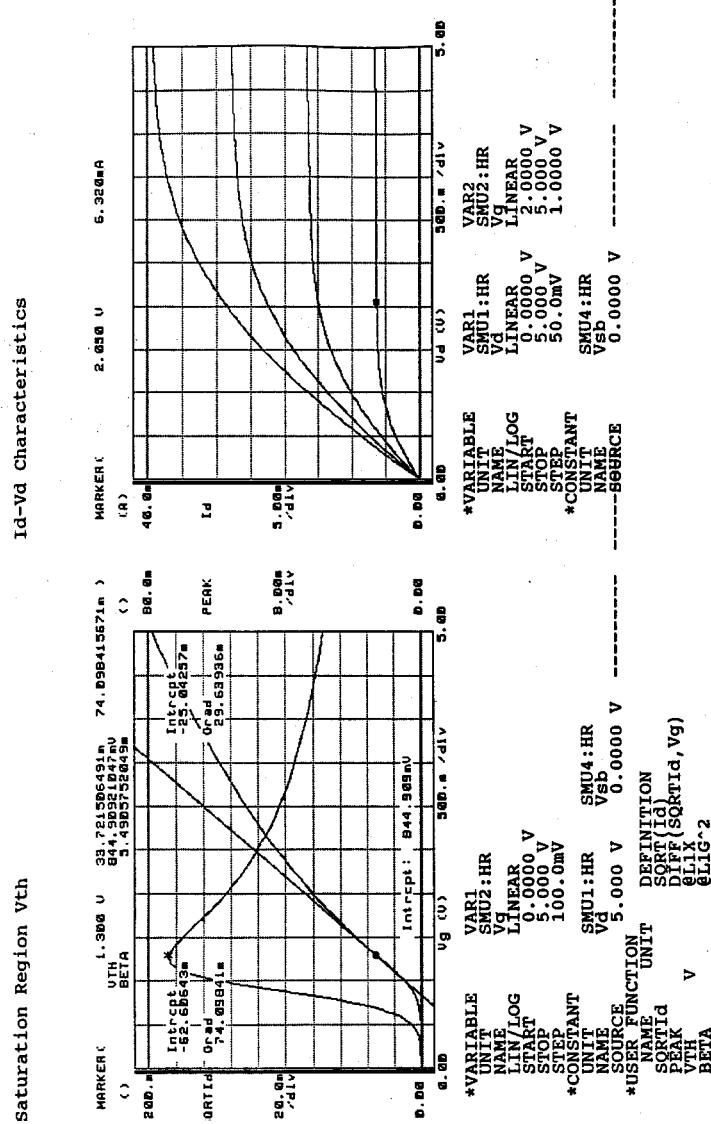


Figure 1-16. Output Image of Example 4

PCL Mode and Examples**Example 5: Four graphs per page(landscape).**

Since RESOLUTION settings do not apply to any text outside the graph, this procedure does not print the header, comments or setup data. You can print four large graphs per page by disabling FORM FEED, increasing the RESOLUTION, disabling all the OUTPUT ITEM parameters, setting the INIT STRING for landscape mode, not printing the SETUP DATA, and setting the OUTPUT REGION parameters to print in the desired areas.

SYSTEM : PRINT / PLOT SETUP	
* DESTINATION	SERIAL
* FORM FEED	<input checked="" type="checkbox"/> DISABLE
* COLOR / B/W	B/W
* PAPER	
SIZE	A
FEED DIR	LONG SIDE
LENGTH	-----
WIDTH	-----
UNIT	-----
* LANGUAGE PCL	
* LINE	60
* COLUMN	80
* RESOLUTION	100 DPI
* OUTPUT ITEM	
TITLE	<input checked="" type="checkbox"/> DISABLE
DATE & TIME	<input checked="" type="checkbox"/> DISABLE
PAGE NO.	<input checked="" type="checkbox"/> DISABLE
USER COMMENT	<input checked="" type="checkbox"/> DISABLE
PRINT / PLOT COMMENT	<input checked="" type="checkbox"/> DISABLE
GRAPH TRACE	-----
GRAPH FRAME & GRID	-----
GRAPH AXIS TEXT	-----
GRAPH TEXT	-----
* INIT STRING <input checked="" type="checkbox"/> 10033&1010033*OF	
* TRAILER STRING	

OUTPUT REGION = UPPER LEFT	
GRAPH PLOT	
* DESTINATION	PRINTER / PLOTTER
* OUTPUT REGION	UPPER LEFT X 5 % Y 8 % LOWER RIGHT X 49 % Y 51 %
* PRINT / PLOT COMMENT	
* PRINT / PLOT DATA	<input checked="" type="checkbox"/> NO

OUTPUT REGION = UPPER RIGHT	
GRAPH PLOT	
* DESTINATION	PRINTER / PLOTTER
* OUTPUT REGION	UPPER LEFT X 51 % Y 8 % LOWER RIGHT X 95 % Y 51 %
* PRINT / PLOT COMMENT	
* PRINT / PLOT DATA	<input checked="" type="checkbox"/> NO

OUTPUT REGION = LOWER LEFT	
GRAPH PLOT	
* DESTINATION	PRINTER / PLOTTER
* OUTPUT REGION	UPPER LEFT X 5 % Y 52 % LOWER RIGHT X 49 % Y 103 %
* PRINT / PLOT COMMENT	
* PRINT / PLOT DATA	<input checked="" type="checkbox"/> NO

OUTPUT REGION = LOWER RIGHT	
GRAPH PLOT	
* DESTINATION	PRINTER / PLOTTER
* OUTPUT REGION	UPPER LEFT X 51 % Y 52 % LOWER RIGHT X 95 % Y 103 %
* PRINT / PLOT COMMENT	
* PRINT / PLOT DATA	<input checked="" type="checkbox"/> NO

Figure 1-17. Setup Pages for Example 5

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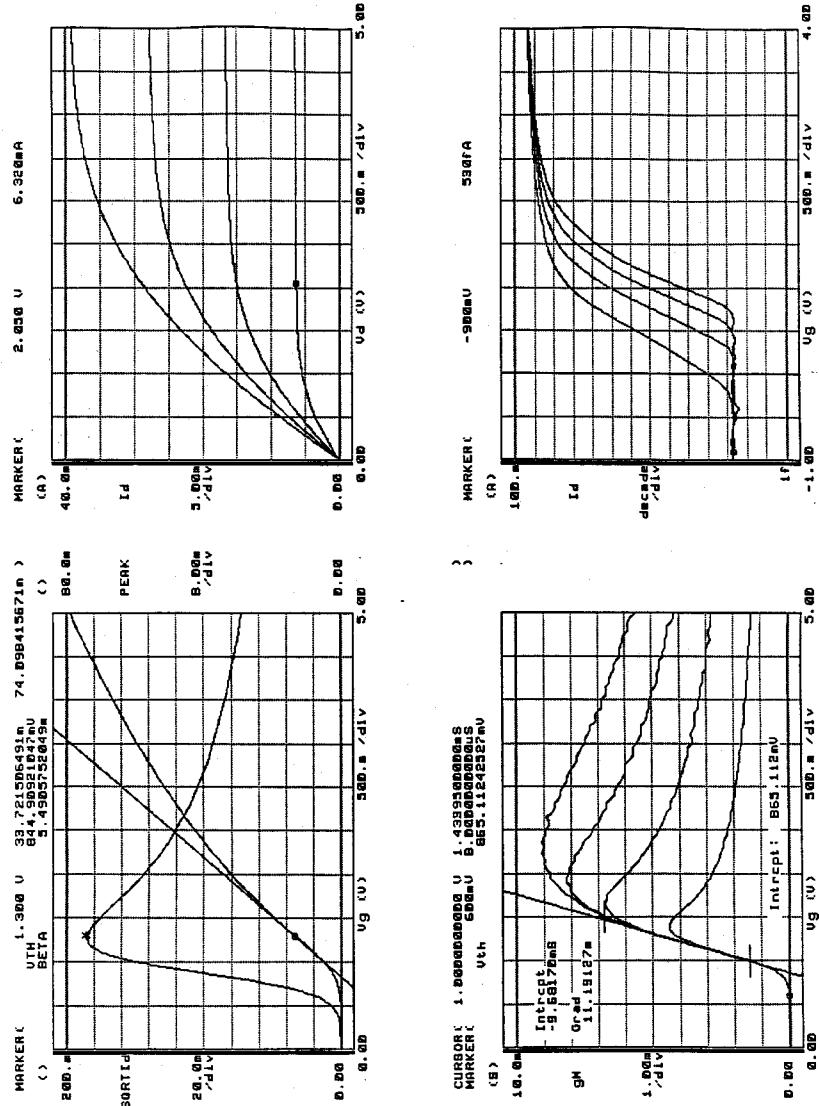


Figure 1-18. Output Image of Example 5

HP-GL Mode and Examples

This section describes how the HP 4155A/4156A prints/plots in HP-GL mode. “HP-GL” is a Graphics Language for all plotters and some printers. This language processes graphic data as vectors.

HP-GL Resolution

Resolution settings have no meaning in HP-GL mode.

HP-GL Output Region (size and position)

You can change the *size* and also *position* of the graph in HP-GL mode by varying the OUTPUT REGION settings in the GRAPH PLOT window. These settings depend on the PAPER settings in the PRINT/PLOT SETUP page to assure a valid print area. See “PCL Commands” for relationship of FEED DIR field, print orientation, and OUTPUT REGION.

NOTE

OUTPUT REGION settings apply to the graph and any text outside of the graph such as header, comments, or setup data. If you select PRINT SETUP DATA = YES in the GRAPH PLOT window setup, the graph gets smaller.

HP-GL COMMANDS

You can send special printer commands by using the INIT STRING and TRAILER STRING fields in the PRINT/PLOT SETUP page to put your printer in HP-GL mode if it is available. It is recommended to MENU RESET your printer to return to PCL mode. Refer to Table 1-5 for the HP-GL printer commands for the Laserjets and Deskjet 1200C.

Table 1-5. Printer Commands for HP-GL Mode

Model	Command(Portrait)	Command(Landscape)
Laserjet Family	\0033%0B	\0033&/10\0033*/0A\0033%0B
C1676A Deskjet 1200C ¹	\0033%0B	\0033%-1B

1 Set the rear-panel switches for HP-GL

NOTE

Take care not to use number in mistake for a alphabet. For example "0"(zero) and "O"(alphabet).

HP-GL EXAMPLES

The following pages are several examples of various ways you can print graphs in HP-GL mode. A Laserjet IIIp was used with a serial interface.

1. Press the **Graph/List** front key to display the GRAPHICS page.
2. Press the **Plot/Print** front key. GRAPH PLOT setup window opens.
3. Select the **PR/PL SETUP** softkey. PRINT/PLOT SETUP page is displayed. Set the parameters as given. (Remember to set the proper INIT STRING for HP-GL mode.)
4. Select the **EXIT** softkey to return to the GRAPH PLOT window, then set the parameters as given.
5. Select the **PRINT/PLOT** softkey to print to the printer

NOTE

If you want to print more than one graph per page, you must set the parameters in the GRAPH PLOT window and select the **PRINT/PLOT** softkey for each graph. You must also manually re-feed the same page.

If your output does not fit properly on the paper, try the following:

- Change the OUTPUT REGION settings in the GRAPH PLOT window
- Decrease the number of graphs per page (ex. 4 graphs -> 2 graphs)
- Set PRINT SETUP DATA = **YES** and **RIGHT** in GRAPH PLOT window
- Set PRINT SETUP DATA = **NO** in GRAPH PLOT window
- Set OUTPUT ITEMS = **DISABLE** in PRINT/PLOT SETUP page

HP-GL Mode and Examples**Example 1: One graph per page (portrait).**

This configuration is to print the largest graph with the setup data at bottom of the page.

SYSTEM : PRINT / PLOT SETUP			
* DESTINATION	SERIAL	* LANGUAGE	HP-GL
* FORM FEED	ENABLE	* LINE	60
* COLOR / B/W	B/W	* COLUMN	80
* PAPER SIZE A FEED DIR SHORT SIDE LENGTH ----- WIDTH ----- UNIT -----		* OUTPUT ITEM TITLE ENABLE DATE & TIME ENABLE PAGE NO. ENABLE USER COMMENT ENABLE PRINT / PLOT COMMENT ENABLE GRAPH TRACE ----- GRAPH FRAME & GRID ----- GRAPH AXIS TEXT ----- GRAPH TEXT -----	
* INIT STRING \0033%0B			
* TRAILER STRING -----			

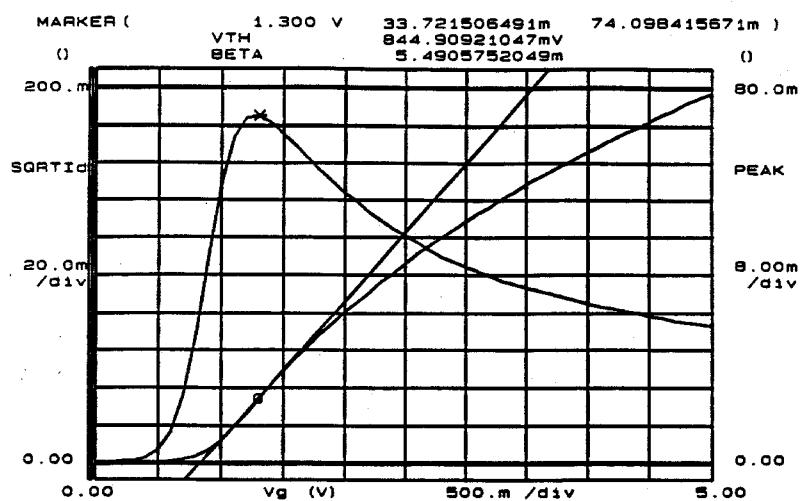
OUTPUT REGION = WHOLE

GRAPH PLOT			
* DESTINATION	PRINTER / PLOTTER		
* OUTPUT REGION UPPER LEFT X 5 % Y 0 % LOWER RIGHT X 81 % Y 92 %			
* PRINT SETUP DATA			YES BOTTOM
* PRINT / PLOT COMMENT -----			

Figure 1-19. Setup Pages for Example 1

*** HP 4156A GRAPH PLOT *** Jul 27 12:39:09 1995 PAGE 1

Saturation Region Vth



*VARIABLE VAR1
UNIT SMU2: HR
NAME Vg
LIN/LOG LINEAR
START 0.0000 V
STOP 5.000 V
STEP 100.0mV
*CONSTANT
UNIT SMU1: HR SMU4: HR
NAME Vd Vs_b
SOURCE 5.000 V 0.0000 V ----- -----
*USER FUNCTION
NAME UNIT DEFINITION
SQTId SQT (Id)
PEAK DIFF (SQTId, Vg)
VTH V 8L1X
BETA 8L1G^2

Figure 1-20. Output Image of Example 1

HP-GL Mode and Examples**Example 2: One graph per page (portrait).**

This configuration is to print the largest graph with the setup data on right side of the page. This is a new feature of firmware revision 1.04.

SYSTEM : PRINT / PLOT SETUP

* DESTINATION	SERIAL	* LANGUAGE	HP-GL
* FORM FEED	ENABLE	* LINE	60
* COLOR / B/W	B/W	* COLUMN	80
* PAPER		* OUTPUT ITEM	
SIZE	A	TITLE	ENABLE
FEED DIR	SHORT SIDE	DATE & TIME	ENABLE
LENGTH	-----	PAGE NO.	ENABLE
WIDTH	-----	USER COMMENT	ENABLE
UNIT	-----	PRINT / PLOT COMMENT	ENABLE
		GRAPH TRACE	ENABLE
		GRAPH FRAME & GRID	ENABLE
		GRAPH AXIS TEXT	ENABLE
		GRAPH TEXT	ENABLE
* INIT STRING			
10033%0B			
* TRAILER STRING			

OUTPUT REGION = WHOLE

GRAPH PLOT

* DESTINATION	PRINTER / PLOTTER	
* GRAPH TRACE ONLY		NO
* PRINT. SETUP DATA		YES
RIGHT		
* PRINT / PLOT COMMENT		

Figure 1-21. Setup Pages for Example 2

HP 4155A/4156A Print/Plot Guide
HP-GL Mode and Examples

*** HP 4156A GRAPH PLOT *** Oct 25 11:53:56 1995 PAGE 1

Vth of MOSFET (SQRT(Id) -> Vth)

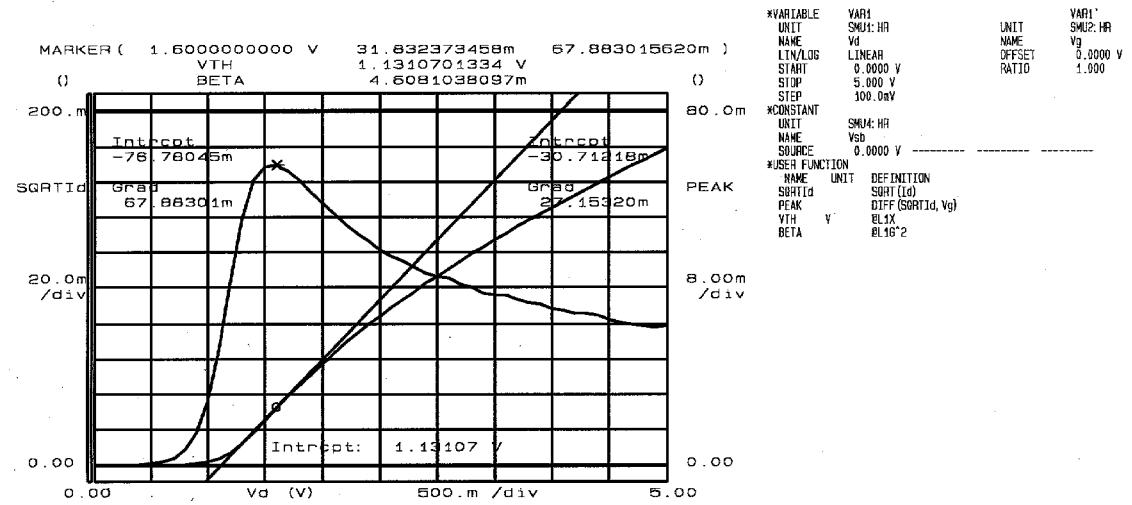


Figure 1-22. Output Image of Example 2

HP-GL Mode and Examples**Example 3: One graph per page (portrait).**

This configuration is to print the largest graph without the setup data.

SYSTEM: PRINT / PLOT SETUP			
* DESTINATION	SERIAL	* LANGUAGE	HP-GL
* FORM FEED	ENABLE	* LINE	60
* COLOR / B/W	B/W	* COLUMN	80
* PAPER		* RESOLUTION	
SIZE	A	-----	
FEED DIR	SHORT SIDE	-----	
LENGTH	-----	-----	
WIDTH	-----	-----	
UNIT	-----	-----	
* OUTPUT ITEM			
TITLE	ENABLE	-----	
DATE & TIME	ENABLE	-----	
PAGE NO.	ENABLE	-----	
USER COMMENT	ENABLE	-----	
PRINT / PLOT COMMENT	ENABLE	-----	
GRAPH TRACE	ENABLE	-----	
GRAPH FRAME & GRID	ENABLE	-----	
GRAPH AXIS TEXT	ENABLE	-----	
GRAPH TEXT	ENABLE	-----	
* INIT STRING			
10033%0B			
* TRAILER STRING			

OUTPUT REGION = WHOLE

GRAPH PLOT			
* DESTINATION	PRINTER / PLOTTER		
* OUTPUT REGION			
UPPER LEFT	X 5 %	Y 0 %	* PRINT SETUP DATA <input checked="" type="checkbox"/> NO
LOWER RIGHT	X 100%	Y 100 %	
* PRINT / PLOT COMMENT			

Figure 1-23. Setup Pages for Example 3

*** HP 4155A GRAPH PLOT *** Jul 27 16:35:17 1995 PAGE 1

Saturation Region Vth

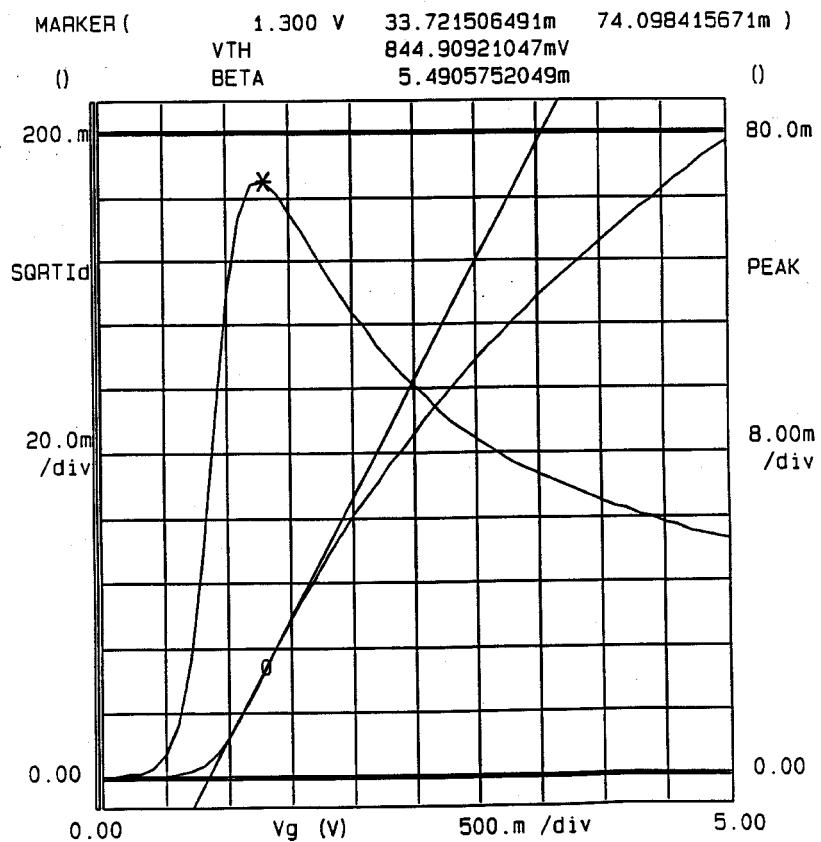


Figure 1-24. Output Image of Example 3

HP-GL Mode and Examples**Example 4: Two graphs per page (portrait).**

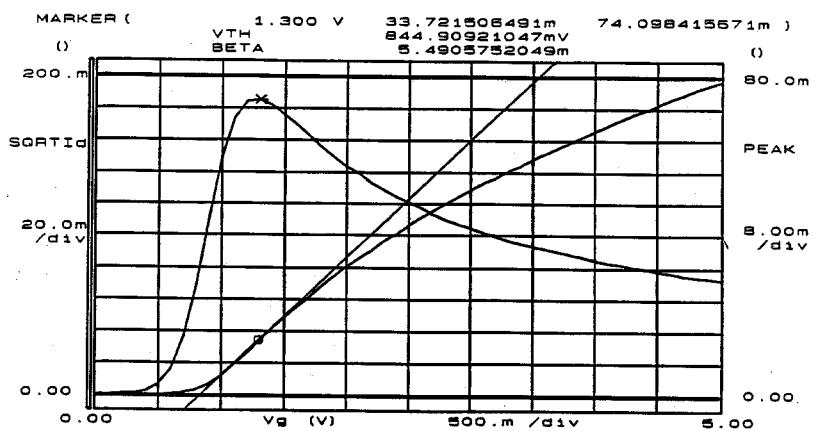
You can print two large graphs per page by disabling FORM FEED, not printing the SETUP DATA, and setting the OUTPUT REGION parameters to print in the desired areas.

SYSTEM : PRINT / PLOT SETUP			
* DESTINATION	SERIAL	* LANGUAGE	HP-GL
* FORM FEED	<input checked="" type="checkbox"/> DISABLE	* LINE	60
* COLOR / B/W	B/W	* COLUMN	80
* PAPER		* RESOLUTION	
SIZE	A	-----	-----
FEED DIR	SHORT SIDE	* OUTPUT ITEM	
LENGTH	-----	TITLE	ENABLE
WIDTH	-----	DATE & TIME	ENABLE
UNIT	-----	PAGE NO.	ENABLE
* INIT STRING		USER COMMENT	ENABLE
<input checked="" type="checkbox"/> 10033%0B		PRINT / PLOT COMMENT	ENABLE
* TRAILER STRING		GRAPH TRACE	ENABLE
		GRAPH FRAME & GRID	ENABLE
		GRAPH AXIS TEXT	ENABLE
		GRAPH TEXT	ENABLE
* OUTPUT REGION = UPPER LEFT			
GRAPH PLOT			
* DESTINATION	PRINTER / PLOTTER		
* OUTPUT REGION	X 5 %	Y 0 %	* GRAPH TRACE ONLY NO
UPPER LEFT			
LOWER RIGHT	X 100%	Y 50 %	* PRINT SETUP DATA <input checked="" type="checkbox"/> NO
* PRINT / PLOT COMMENT			
* OUTPUT REGION = LOWER LEFT			
GRAPH PLOT			
* DESTINATION	PRINTER / PLOTTER		
* OUTPUT REGION	X 5 %	Y 50 %	* GRAPH TRACE ONLY NO
UPPER LEFT			
LOWER RIGHT	X 100%	Y 100 %	* PRINT SETUP DATA <input checked="" type="checkbox"/> NO
* PRINT / PLOT COMMENT			

Figure 1-25. Setup Pages for Example 4

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HP-GL Mode and Examples

*** HP 4155A GRAPH PLOT *** Jul 27 18:58:06 1995 PAGE 1
Saturation Region Vth



*** HP 4155A GRAPH PLOT *** Jul 27 18:58:50 1995 PAGE 1
Id-Vd Characteristics

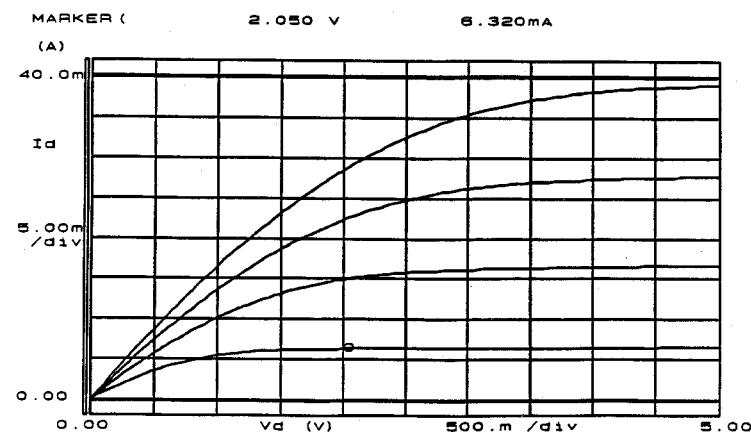


Figure 1-26. Output Image of Example 4

HP-GL Mode and Examples**Example 5: Two graphs per page (portrait).**

You can print two large graphs per page with setup data on right side of the page by disabling FORM FEED, not printing the SETUP DATA, and setting the OUTPUT REGION parameters to print in the desired areas.

SYSTEM : PRINT / PLOT SETUP			
* DESTINATION	SERIAL	* LANGUAGE	HP-GL
* FORM FEED	<input checked="" type="checkbox"/> DISABLE	* LINE	60
* COLOR / B/W	B/W	* COLUMN	80
* PAPER		* RESOLUTION	
SIZE	A	-----	-----
FEED DIR	SHORT SIDE	* OUTPUT ITEM	
LENGTH	-----	TITLE	ENABLE
WIDTH	-----	DATE & TIME	ENABLE
UNIT	-----	PAGE NO.	ENABLE
		USER COMMENT	ENABLE
		PRINT / PLOT COMMENT	ENABLE
		GRAPH TRACE	ENABLE
		GRAPH FRAME & GRID	ENABLE
		GRAPH AXIS TEXT	ENABLE
		GRAPH TEXT	ENABLE
* INIT STRING			
<input checked="" type="checkbox"/> 10033%0B			
* TRAILER STRING			

OUTPUT REGION = UPPER LEFT			
GRAPH PLOT			
* DESTINATION	PRINTER / PLOTTER		
* OUTPUT REGION		* GRAPH TRACE ONLY	
UPPER LEFT	X 5 %	Y 0 %	<input type="checkbox"/> NO
LOWER RIGHT	X 100%	Y 37 %	* PRINT SETUP DATA <input checked="" type="checkbox"/> YES <input type="checkbox"/> RIGHT
* PRINT / PLOT COMMENT			

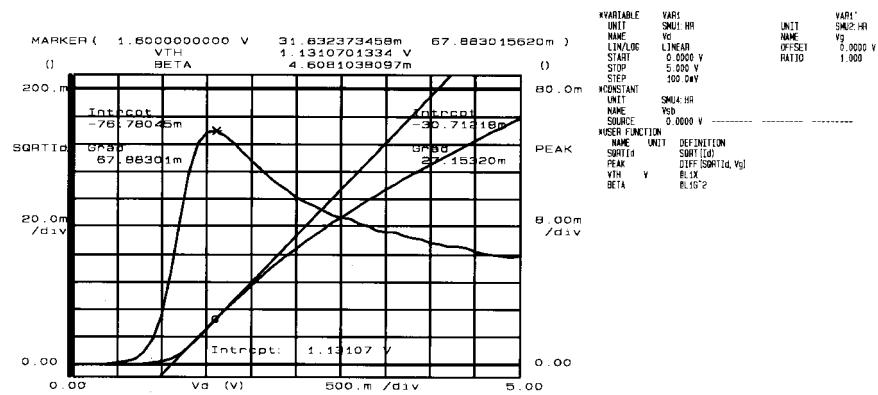
OUTPUT REGION = LOWER LEFT			
GRAPH PLOT			
* DESTINATION	PRINTER / PLOTTER		
* OUTPUT REGION		* GRAPH TRACE ONLY	
UPPER LEFT	X 5 %	Y 50 %	<input type="checkbox"/> NO
LOWER RIGHT	X 100%	Y 87 %	* PRINT SETUP DATA <input checked="" type="checkbox"/> YES <input type="checkbox"/> RIGHT
* PRINT / PLOT COMMENT			

Figure 1-27. Setup Pages for Example 5

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HP-GL Mode and Examples

*** HP 4156A GRAPH PLOT *** Oct 25 14:00:34 1995 PAGE 1
Vth of MOSFET (SQRT(Id) -> Vth)



*** HP 4156A GRAPH PLOT *** Oct 25 14:01:52 1995 PAGE 1
Vth of MOSFET (SQRT(Id) -> Vth)

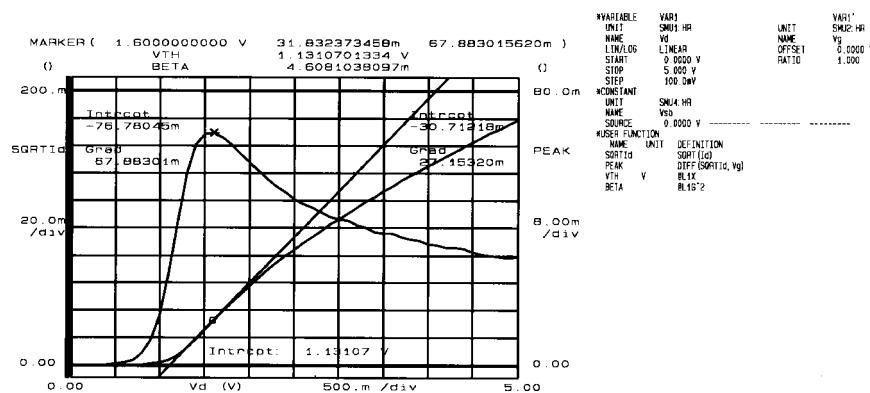


Figure 1-28. Output Image of Example 5

HP-GL Mode and Examples**Example 6: Four graphs per page (portrait).**

Since OUTPUT REGION settings apply to the graph and any text outside the graph, printing the header, comments, and setup data limits the size of your graph. You can print four graphs per page by disabling FORM FEED and setting the OUTPUT REGION parameters to print in the desired areas.

SYSTEM : PRINT / PLOT SETUP			
* DESTINATION	SERIAL	* LANGUAGE	HP-GL
* FORM FEED	DISABLE	* LINE	60
* COLOR / B/W	B/W	* COLUMN	80
* PAPER		* OUTPUT ITEM	
SIZE	A	TITLE	ENABLE
FEED DIR	SHORT SIDE	DATE & TIME	ENABLE
LENGTH	=====	PAGE NO.	ENABLE
WIDTH	=====	USER COMMENT	ENABLE
UNIT	=====	PRINT / PLOT COMMENT	ENABLE
* INIT STRING 10033%0B			
* TRAILER STRING =====			

OUTPUT REGION = UPPER LEFT

GRAPH PLOT	
* DESTINATION	PRINTER/PLOTTER
* OUTPUT REGION	X 6% Y 0% X 41% Y 49%
* GRAPH TRACE ONLY <input type="checkbox"/> NO	
* PRINT SETUP DATA <input type="checkbox"/> YES	
* PRINT / PLOT COMMENT =====	

OUTPUT REGION = UPPER RIGHT

GRAPH PLOT	
* DESTINATION	PRINTER/PLOTTER
* OUTPUT REGION	X 66% Y 0% X 81% Y 49%
* GRAPH TRACE ONLY <input type="checkbox"/> NO	
* PRINT SETUP DATA <input type="checkbox"/> YES	
* PRINT / PLOT COMMENT =====	

OUTPUT REGION = LOWER LEFT

GRAPH PLOT	
* DESTINATION	PRINTER/PLOTTER
* OUTPUT REGION	X 6% Y 82% X 41% Y 100%
* GRAPH TRACE ONLY <input type="checkbox"/> NO	
* PRINT SETUP DATA <input type="checkbox"/> YES	
* PRINT / PLOT COMMENT =====	

OUTPUT REGION = LOWER RIGHT

GRAPH PLOT	
* DESTINATION	PRINTER/PLOTTER
* OUTPUT REGION	X 66% Y 82% X 81% Y 100%
* GRAPH TRACE ONLY <input type="checkbox"/> NO	
* PRINT SETUP DATA <input type="checkbox"/> YES	
* PRINT / PLOT COMMENT =====	

Figure 1-29. Setup Pages for Example 6

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HP-GL Mode and Examples

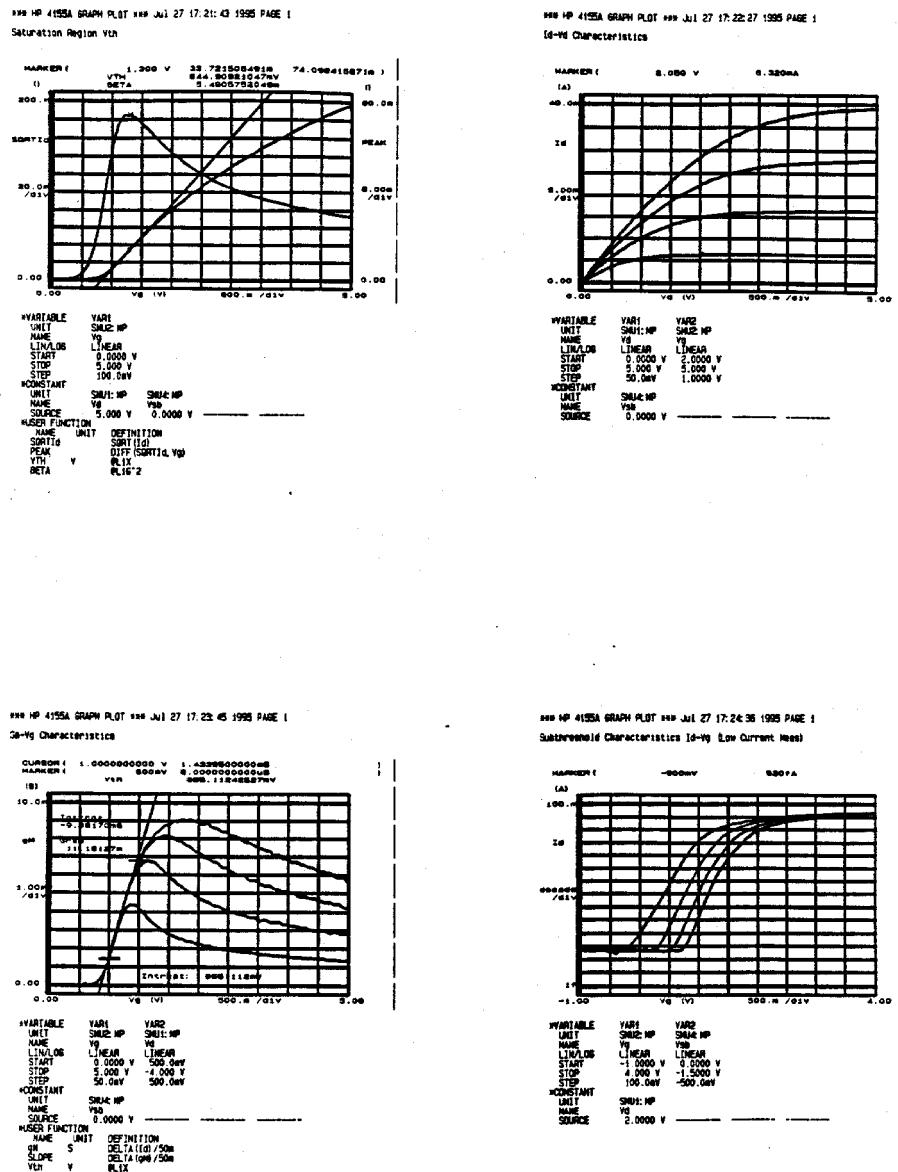


Figure 1-30. Output Image of Example 6

HP-GL Mode and Examples**Example 7: Four graphs per page (portrait).**

Since OUTPUT REGION settings apply to the graph and any text outside the graph, printing the header, comments, and setup data limits the size of your graph. You can print four large graphs per page by disabling FORM FEED, not printing the SETUP DATA, and setting the OUTPUT REGION parameters to print in the desired areas.

SYSTEM : PRINT / PLOT SETUP			
* DESTINATION	SERIAL	* LANGUAGE	HP-GL
* FORM FEED	<input checked="" type="radio"/> DISABLE	* LINE	60
* COLOR / B/W	B/W	* COLUMN	80
* PAPER		* RESOLUTION	
SIZE	A	DATE & TIME	ENABLE
FEED DIR	SHORT SIDE	PAGE NO.	ENABLE
LENGTH	USER COMMENT	ENABLE
WIDTH	PRINT / PLOT COMMENT	ENABLE
UNIT	GRAPH TRACE	ENABLE
* INIT STRING <input checked="" type="radio"/> 10033%0B			
* TRAILER STRING			

OUTPUT REGION = UPPER LEFT

GRAPH PLOT	
* DESTINATION	PRINTER/PLOTTER
* OUTPUT REGION	* GRAPH TRACE ONLY... NO
UPPER LEFT X 5% Y 0%	LOWER RIGHT X 48% Y 48%
* PRINT / PLOT COMMENT	
* PRINT / PLOT DATA NO	

OUTPUT REGION = UPPER RIGHT

GRAPH PLOT	
* DESTINATION	PRINTER/PLOTTER
* OUTPUT REGION	* GRAPH TRACE ONLY... NO
UPPER LEFT X 62% Y 0%	LOWER RIGHT X 100% Y 48%
* PRINT / PLOT COMMENT	
* PRINT / PLOT DATA NO	

OUTPUT REGION = LOWER LEFT

GRAPH PLOT	
* DESTINATION	PRINTER/PLOTTER
* OUTPUT REGION	* GRAPH TRACE ONLY... NO
UPPER LEFT X 5% Y 82%	LOWER RIGHT X 48% Y 100%
* PRINT / PLOT COMMENT	
* PRINT / PLOT DATA NO	

OUTPUT REGION = LOWER RIGHT

GRAPH PLOT	
* DESTINATION	PRINTER/PLOTTER
* OUTPUT REGION	* GRAPH TRACE ONLY... NO
UPPER LEFT X 82% Y 82%	LOWER RIGHT X 100% Y 100%
* PRINT / PLOT COMMENT	
* PRINT / PLOT DATA NO	

Figure 1-31. Setup Pages for Example 7

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HP-GL Mode and Examples

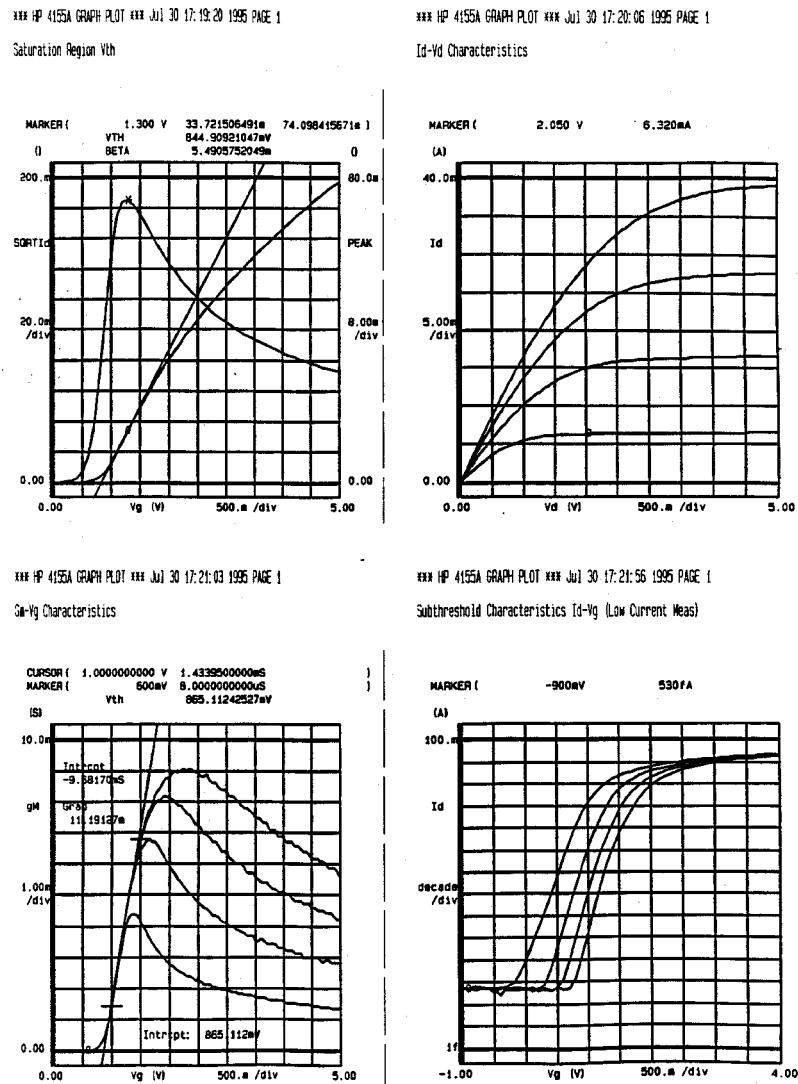


Figure 1-32. Output Image of Example 7

HP-GL Mode and Examples**Example 8: One graph per page (landscape).**

You can print one large graph by manually setting your printer for landscape mode, changing the FEED DIRECTION, not printing the SETUP DATA, and setting the OUTPUT REGION parameters to print in the WHOLE area.

SYSTEM: PRINT / PLOT SETUP			
* DESTINATION	SERIAL	* LANGUAGE	HP-GL
* FORM FEED	ENABLE	* LINE	60
* COLOR / B/W	B/W	* COLUMN	80
* PAPER		* RESOLUTION	
SIZE	A	TITLE	ENABLE
FEED DIR	LONG SIDE	DATE & TIME	ENABLE
LENGTH	-----	PAGE NO.	ENABLE
WIDTH	-----	USER COMMENT	ENABLE
UNIT	-----	PRINT / PLOT COMMENT	ENABLE
* OUTPUT ITEM			
GRAPH TRACE			
GRAPH FRAME & GRID			
GRAPH AXIS TEXT			
GRAPH TEXT			
* INIT STRING			
\0033&I1O\0033*r0F\0033%0B			
* TRAILER STRING			

OUTPUT REGION = WHOLE			
GRAPH PLOT			
* DESTINATION	PRINTER / PLOTTER		
* OUTPUT REGION			
UPPER LEFT	X 5 %	Y 0 %	* PRINT SETUP DATA
LOWER RIGHT	X 100%	Y 97 %	
* PRINT / PLOT COMMENT			

Figure 1-33. Setup Pages for Example 8

*** HP 4155A GRAPH PLOT *** Jul 27 16:52:54 1995 PAGE 1
Saturation Region Vth

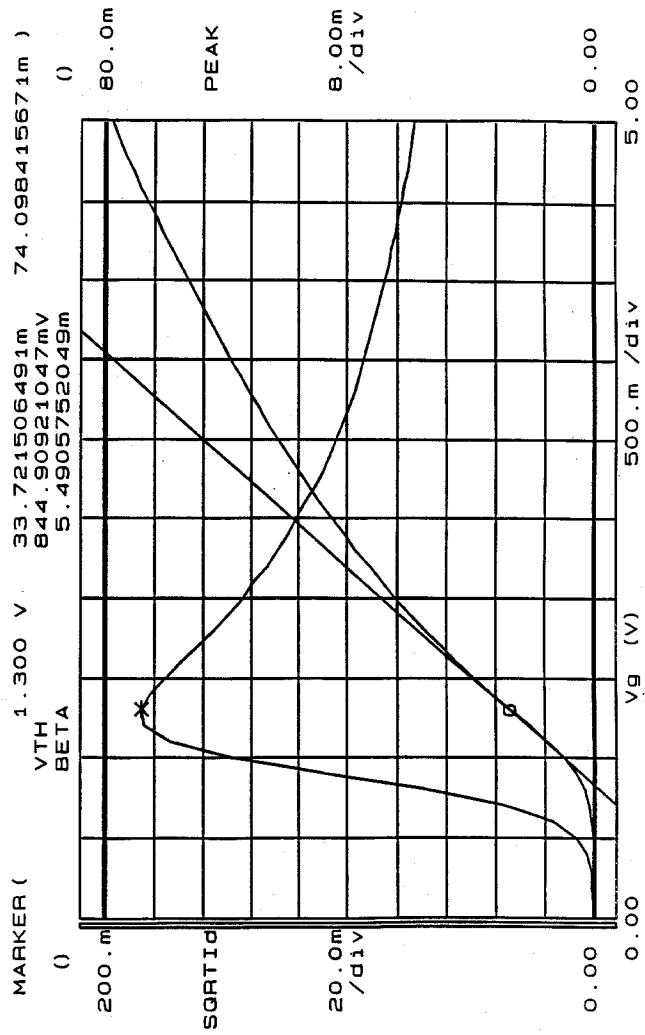


Figure 1-34. Output Image of Example 8

HP-GL Mode and Examples**Example 9: Two graphs per page (landscape).**

You can print two large graphs by manually setting your printer for landscape mode, disabling FORM FEED, changing the FEED DIRECTION, and setting the OUTPUT REGION parameters to print in the desired areas.

SYSTEM: PRINT / PLOT SETUP			
* DESTINATION	SERIAL	* LANGUAGE	HP-GL
* FORM FEED	DISABLE	* LINE	60
* COLOR / B/W	B/W	* COLUMN	80
* PAPER		* RESOLUTION	
SIZE	A		
FEED DIR	LONG SIDE		
LENGTH			
WIDTH			
UNIT			
* OUTPUT ITEM			
TITLE	ENABLE		
DATE & TIME	ENABLE		
PAGE NO.	ENABLE		
USER COMMENT	ENABLE		
PRINT / PLOT COMMENT	ENABLE		
GRAPH TRACE	ENABLE		
GRAPH FRAME & GRID	ENABLE		
GRAPH AXIS TEXT	ENABLE		
GRAPH TEXT	ENABLE		
* INIT STRING			
\0033&11O\0033*0F0033%0B			
* TRAILER STRING			

OUTPUT REGION = UPPER LEFT			
GRAPH PLOT			
* DESTINATION	PRINTER / PLOTTER	* GRAPH TRACE ONLY	
* OUTPUT REGION		NO	
UPPER LEFT	X 5 % Y 0 %	* PRINT SETUP DATA	
LOWER RIGHT	X 50 % Y 100 %	YES	BOTTOM
* PRINT / PLOT COMMENT			

OUTPUT REGION = UPPER RIGHT			
GRAPH PLOT			
* DESTINATION	PRINTER / PLOTTER	* GRAPH TRACE ONLY	
* OUTPUT REGION		NO	
UPPER LEFT	X 55 % Y 0 %	* PRINT SETUP DATA	
LOWER RIGHT	X 100 % Y 100 %	YES	BOTTOM
* PRINT / PLOT COMMENT			

Figure 1-35. Setup Pages for Example 9

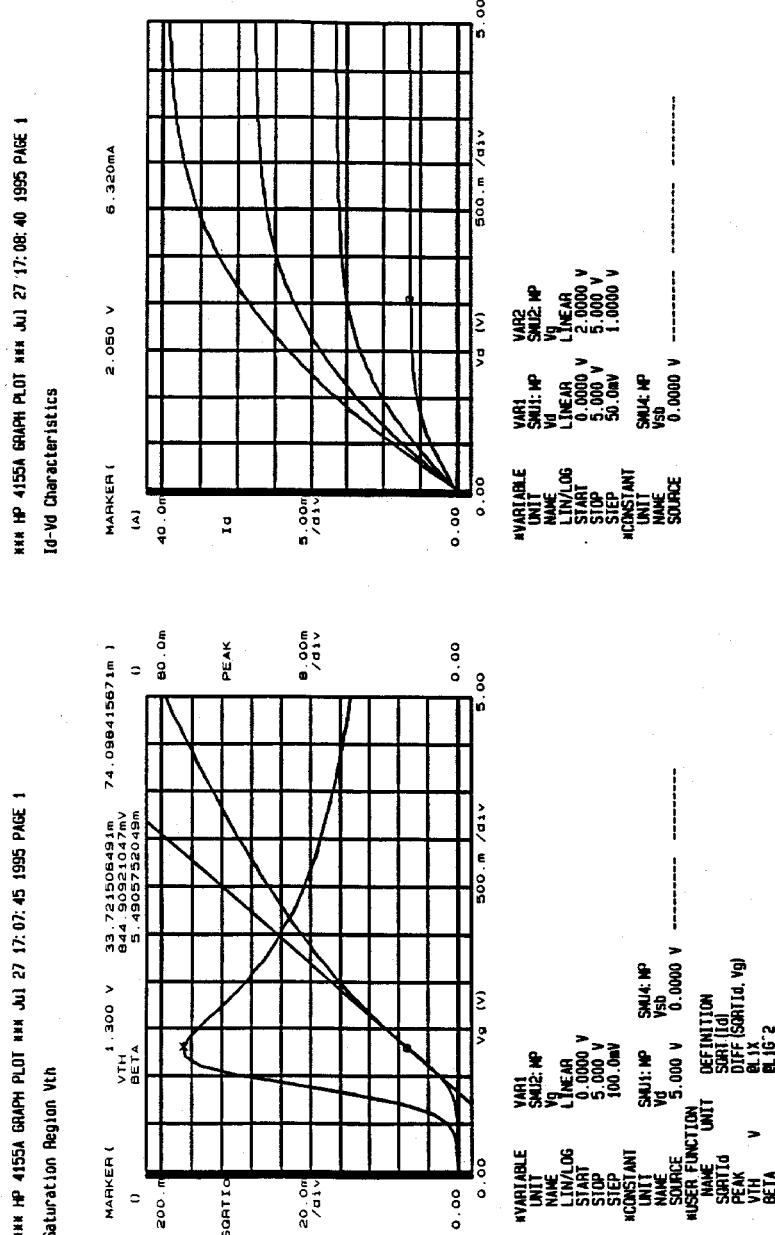


Figure 1-36. Output Image of Example 9

HP-GL Mode and Examples**Example 10: Four graphs per page (landscape).**

You can print four large graphs by manually setting your printer for landscape mode, disabling FORM FEED, changing the FEED DIRECTION, not printing the SETUP DATA, and setting the OUTPUT REGION parameters to print in the desired areas.

SYSTEM : PRINT / PLOT SETUP			
* DESTINATION	SERIAL		
* FORM FEED	DISABLE		
* COLOR / B/W	B/W		
* PAPER			
SIZE	A		
FEED DIR	LONG SIDE		
LENGTH	-----		
WIDTH	-----		
UNIT	-----		
* INIT STRING \0033&1O\0033;rF0033%0B			
* TRAILER STRING -----			
* LANGUAGE HP-GL			
* LINE	60	* COLUMN	80
* RESOLUTION -----			
* OUTPUT ITEM			
TITLE	ENABLE		
DATE & TIME	ENABLE		
PAGE NO.	ENABLE		
USER COMMENT	ENABLE		
PRINT / PLOT COMMENT	ENABLE		
GRAPH TRACE	ENABLE		
GRAPH FRAME & GRID	ENABLE		
GRAPH AXIS TEXT	ENABLE		
GRAPH TEXT	ENABLE		
OUTPUT REGION = UPPER LEFT			
GRAPH PLOT			
* DESTINATION	PRINTER / PLOTTER		
* OUTPUT REGION	UPPER LEFT X 5% Y 0% LOWER RIGHT X 81% Y 48%		
* GRAPH TRACE ONLY	NO		
* PRINT SETUP DATA	NO		
* PRINT / PLOT COMMENT			
OUTPUT REGION = UPPER RIGHT			
GRAPH PLOT			
* DESTINATION	PRINTER / PLOTTER		
* OUTPUT REGION	UPPER LEFT X 65% Y 0% LOWER RIGHT X 100% Y 48%		
* GRAPH TRACE ONLY	NO		
* PRINT SETUP DATA	NO		
* PRINT / PLOT COMMENT			
OUTPUT REGION = LOWER LEFT			
GRAPH PLOT			
* DESTINATION	PRINTER / PLOTTER		
* OUTPUT REGION	UPPER LEFT X 5% Y 82% LOWER RIGHT X 81% Y 88%		
* GRAPH TRACE ONLY	NO		
* PRINT SETUP DATA	NO		
* PRINT / PLOT COMMENT			
OUTPUT REGION = LOWER RIGHT			
GRAPH PLOT			
* DESTINATION	PRINTER / PLOTTER		
* OUTPUT REGION	UPPER LEFT X 85% Y 82% LOWER RIGHT X 100% Y 88%		
* GRAPH TRACE ONLY	NO		
* PRINT SETUP DATA	NO		
* PRINT / PLOT COMMENT			

Figure 1-37. Setup Pages for Example 10

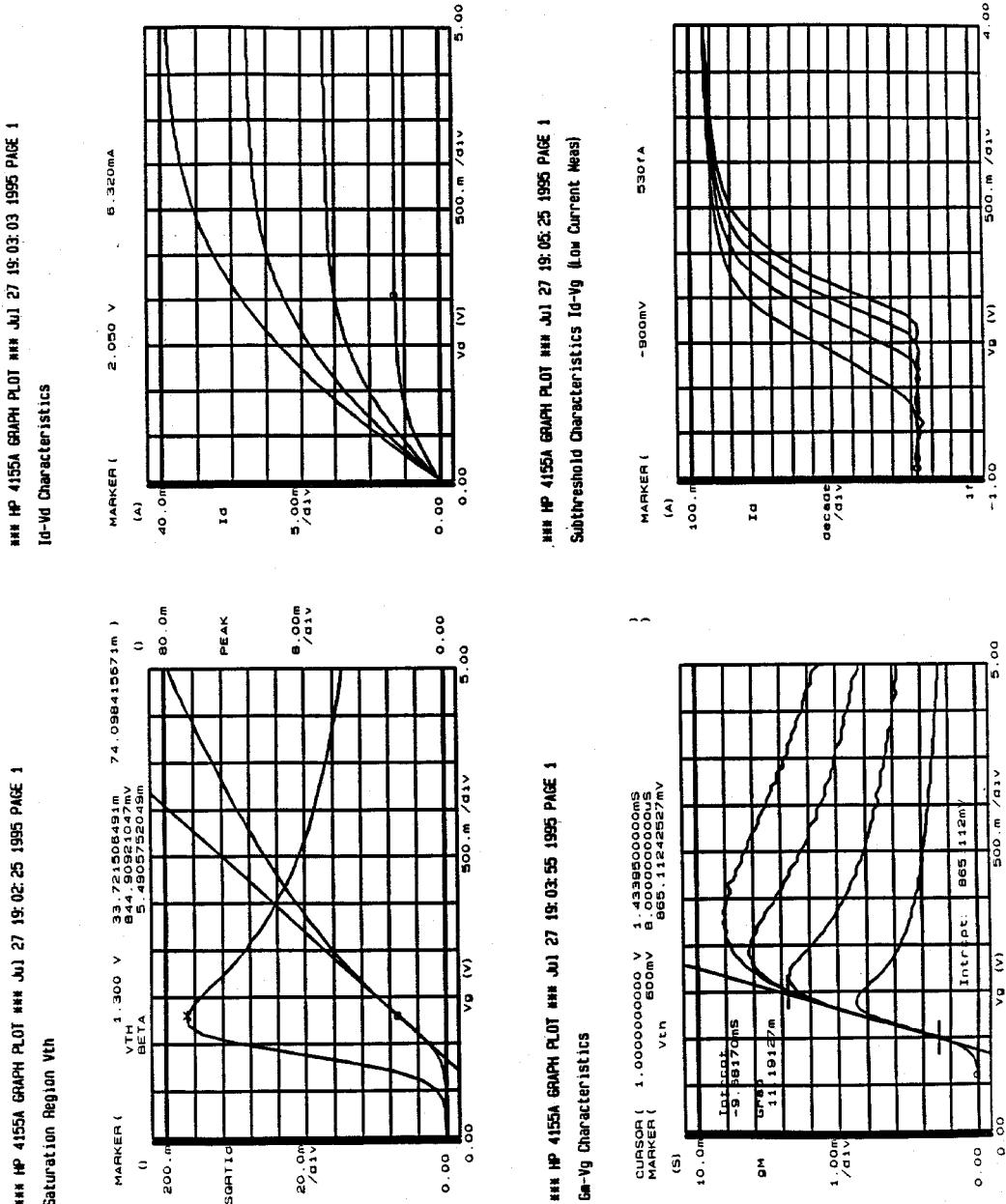


Figure 1-38. Output Image of Example 10

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HP-GL Mode and Examples