SILVACO

TonyPlot

Release Notes

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April 2008

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1.1: New Features

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- Link dynamically with Qt/Qsa.

1.1.2: Version 3.6.4

- Support for export to Spice RAW format.

1.1.3: Version 3.6.7

- Added option to draw lines as contours.

1.1.4: Version 3.6.8

- Added option to draw both lines and contours simultaneously.

1.1.5: Version 3.6.9

- Added more options for line contouring.

1.1.6: Version 3.6.13

- Re-enable saving plots to jpeg. Added `'app_exit'` and `'print "/path/to/file"'` as new set file commands.

1.1.7: Version 3.6.15

- Added the `"save"` command as a new set file command.

1.2: Enhancements

1.2.1: Version 3.6.1

- Added export to CSV format.

1.2.2: Version 3.6.2

- Stability fixes.
- Library updates.

1.2.3: Version 3.6.3

- Stability fixes.

1.2.4: Version 3.6.4

- Library updates.
- Documentation update.

1.2.5: Version 3.6.5

- Library updates. Have SFLM retry connection 5 times before issuing a warning dialog box.

1.2.6: Version 3.6.6

- Library updates.

1.2.7: Version 3.6.10

- Revamped look of lines dialog to be cleaner.

1.2.8: Version 3.6.11

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1.2.9: Version 3.6.12

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1.2.10: Version 3.6.13

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1.2.11: Version 3.6.14

- Library updates. Roll back to Qt 3.3.5.

1.2.12: Version 3.6.15

- Library updates.

1.2.13: Version 3.6.16

- Library updates. Updated documentation.

2:Version 3.4.R

2.1: New Features

- Implementation of new Qt based tool
- Added customizable file filter.
- Japanese Language support.
- Implemented the new **Save Series** function.
- Added Keyboard accelerators.
- File Load/Save Dialog Enhancements.
- Ability to optionally sort impurity names.
- Added new **Save Series** function.
- Tool fixes.
- Configurable company info (SILVACO/SIMUCAD).

2.2: Enhancements

2.2.1: Version 3.4.1

- Stability fixes.

2.2.2: Version 3.4.2

- Library updates.
- Translation updates.

2.2.3: Version 3.4.3

- Refresh fixes.
- Stability fixes.

2.2.4: Version 3.4.4

- Stability fixes.
- Updated translation.

3: Version 3.3.R

3.1: New Features

Implemented the new **Save series** functionality.

3.2: Enhancements

3.2.1: Version 3.3.1

- Robustness Enhancements.
- Tool fixes.

3.2.2: Version 3.3.2

- Robustness Enhancements.

4: Version 3.2.R

4.1: New Features

- Implemented a `-nosplash` option to disable the splash screen.
- Implemented a new Open dialog box with **Replace Plot** functionality.
- Tool fixes.
- Optimized loading time.

4.2: Enhancements

4.2.1: Version 3.2.1

- Implemented separate **Load/Save Set File** functionality for TONYPLOT 2.x.

4.2.2: Version 3.2.2

- Robustness Enhancements.

4.2.3: Version 3.2.3

- Robustness Enhancements.
- Tool fixes.

4.2.4: Version 3.2.4

- Added accelerators for everything.
- Added support for `uncompress` command.
- Implemented a checkbox in the Open dialog box that will allow you to keep it open after loading a file.
- Added code to save geometry of all dialogs/windows.
- Tool fixes.

5:Version 3.1.R

5.1: Enhancements

5.1.1: Version 3.1.0

- Japanese support.
- Tool fixes.
- Sipc fixes.
- Added Stacked Window mode.

5.1.2: Version 3.1.2

- Tool fixes.
- Revamped Display 2D dialog box.

6: Version 3.0.R

This is the initial Qt release.

6.1: Enhancements

6.1.1: Version 3.0.1

- Robustness Enhancements. Added customizable file filter.

6.1.2: Version 3.0.2

- Tool fixes.

6.1.3: Version 3.0.3

- Robustness Enhancements.

6.1.4: Version 3.0.6

- Robustness Enhancements.
- Optionally sort impurity names.
- Printing fixes.

6.1.5: Version 3.0.7

- Removed **Release Notes** menu item.

6.1.6: Version 3.0.9

- Production tool fixes.

6.1.7: Version 3.0.10

- Production tool fixes.

6.1.8: Version 3.0.11

- Robustness Enhancements.

7: Versions 2.8.23.A

7.1: Enhancements

- The production mode doesn't require an extra license.
- Ability to define vectors quantities with custom X and Y components in the Vector Popup.
- The `lpstat` command is used to build the list of available printers in the Printers Dialog.
- Speeded up the Printers Dialog to be usable in an network environment with hundreds of available printers.
- Ability to define a specific printer with the environment variable `PRINTER` when the lpstat service is unavailable.

8: Versions 2.4.2

8.1: PLATFORM SPECIFIC RELEASE NOTES

8.1.1: sparc-sunos413

- There are no release notes specific to this platform.

8.1.2: sparc-solaris2

- There are no release notes specific to this platform.

8.1.3: rs6000-aix32

- There are no release notes specific to this platform.

8.1.4: hp700-hpux901

- There are no release notes specific to this platform.

8.1.5: decalpha-osf1

- Due to problems with the XView libraries on this platform, the "drag and drop" feature is unavailable. The drop site that normally appears on the TONYPLOT frame will be missing.

8.1.6: mips32-irix5

- TONYPLOT requires that backing store be enabled. If there is no backing store, edit the file `/var/X11/xdm/Xservers` and make sure the `-bs` option is not present. This option turns the backing store off.
- If the TonyPlot Window is empty when it first appears, click in the plot area. This will reactivate the TonyPlot Window. This will not happen if the cursor is outside the Tonyplot Window when it first appears.
- The **Movie** tool and the movie feature of the **Cutline** tool may exhibit slow refreshes. The first time some movie slides are shown, they may appear blank but after that, they will appear as normal and the movie will run at full speed.

9:VERSION SPECIFIC RELEASE NOTES

9.1: Version 2.6.5.R

9.1.1: New Features

- **Load** allows multiple files to be selected and loaded at once. Use the Shift key while selecting to do this.
- Graph line ticks are now saved into the set file.
- Ability to switch on/off marks and lines for individual levels.
- Marks sizes and thicknesses that can be altered.
- line thicknesses now have 4 levels instead of two.
- Allow functions to include `distance` as a variable.

9.1.2: Enhancements

- Grouping multiple graphs, colours are now represented correctly.
- Probe popups width has been expanded to accomodate values fully.
- Remote display can now show movie.
- Prevented footers being cut off when printing.
- Fixed printing brackets followed by numbers outputting ascii values.
- Fill was solid on integration. This is now light grey.
- The default cutline is now horizontal.
- The default for ticks on log axis is now set to 8.
- Contour functions now a substitute for the longest quantity possible first.
- Electrode regions not automatically closed and drawn correctly.

9.2: Version 2.6.0.R

9.2.1: New Features

- **Net Doping**: Added chemical and active indium to net doping calculations
- **SSF Structure**: Added new Atlas probe line 'o' line stuff for XY quantities.
- **Probe**: Added the option to refresh plot after each probe.

9.2.2: Enhancements

- **Probe**: Find functions always update popup.
- **Tonyplot security**: Prevents continual looping when no license present.
- **Production tools security**: Now operates correctly for no license.
- **RSM**: Fixed for overlaying two RSM's in 2D contour mode.
- **Integration**: Extended limit for X points when integrating.
- **Lines**: Fixed field line key last value and not to show range for all types.
- **Cutline tool option**: Fixed cutline **X axis offset** option. This now only works for 1D.
- **'I'** button: Fixed abort on 'I' keypress for 2D mesh file.

9.3: Version 2.5.3.A

9.3.1: New Features

- **Depletion Edges**: Added as an option to "Junctions" - did this earlier but there seems to be no entry in this file yet.
- **Added sign(x) function**: This TPCS function returns 1,0 or -1 depending on the sign of "x".
- **User Data Tags Reads:** User data files with SPBS tags and uses the 'i' key to show tag strings.
- **EField Lines**: Improved the Define popup for lines,and improved the legend.

9.3.2: Enhancements

- **Zooming**: When X and Y axes are inverted, zooming works correctly.
- **Function Macros**: Functions macros can be used more than once in the same function definition.
- **Recombination Rate**: This is no longer logged (changed in STF library 1.3.3). Now we can plot `"sign(rr) * log10(abs(rr))"` instead

9.4: Version 2.5.2.A

9.4.1: New Features

- **SSF electricals**: Extra `impurity` electrical parameters plotted (STF 1.3.2).
- **A4 forms:** Replaced basic A4 form with A4(P) and A4(L)
- **Page mode**: When switching to **Page** mode. The first selected plot becomes the top page.
- **Delete overlay levels**: From the Level Names popup, you can delete single levels from plots as long as those plots have more than one level
- **Report bias info**: For 2D structures (ATLAS), pressing the 'b' key will show a popup notice listing all the bias point info for that structure.
- **TPCS help system:** Improved help system for TPCS with self-documenting code.
- **Vector clipping:** You can use set upper and lower clipping limits to vector values.
- **TPCS from stdin**: When starting TONYPLOT with the `-tpcs` options, it will read TPCS (set file) commands from STDIN.
- **Mesh difference**: New feature to make new plot by taking the difference between to structures
- **Gas**: The parameters for `Gas` in the `$SILVACO` default table have been changed to "white" and "not on legend".

9.4.2: Enhancements

- **Empty user data files**: Fixed core dump when loading user data file with no data.
- **Beams in set files**: Beam information is correctly stored into set files and correctly read back.
- **Contour lines**: Added some "missing" line portions in line contour plots.
- **Overlays & Grouping**: **OK** to overlay and group, with multiple Y quantities.
- **Postscript**: Fixed a bug in the printing of parentheses to Postscript.

9.5: Version 2.5.1.A

9.5.1: New Features

- **RBF nets**: Linked with GRF 1.3.0 for new RBF neural nets.
- **RSM plot density control**: `setenv RSM_DENSITY_LOW _MED _HIGH _SUPER` to control density of RSM plot sampling.
- **Improved Tracers**: Jump scaling is fixed and a **min-jump** option has been added to the popup.

- **Duplicate command**: The new TPCS command `DUPLICATE` duplicates selected plots.

9.5.2: Enhancements

- **RSM Measured data**: Fixed bug measured datapoint plotting (RSMs).
- **Vectors on inverted plots**: Vectors are drawn correctly in x- or y-inverted plots.
- **Min contour default**: Min Contour property saved to and loaded from defaults file.

9.6: Version 2.5.0.A

9.6.1: New Features

- **User data comments**: Comment lines allowed in user-data files (after line 2).
- **Saving defaults**: Fixed bugs in defaults-file saving -- zeros allowed.
- **Lines**: Lines only drawn when selected from the Display popup.
- **CCD**: Use the `-ccd` option to enable a special feature: loading DAT file from **Extract** to show the trace of max potential.

9.6.2: Enhancements

- **Saving defaults**: Fixed bugs in defaults-file saving -- zeros allowed.
- **Improved EPS**: Extra fields in EPS headers/trailers.
- **Traps clipped**: Traps are clipped like regular dopants.

9.7: Version 2.4.2.A

9.7.1: New Features

- **Structure File**: The STF library reads "L" lines and TONYPLOT always draws them.
- **Marks**: The sequence used when choosing marks can be define from the Properties popup, just like sequence colors.
- **Export**: You can only export the displayed data (when exporting **XYGraphs** or **XSections** to **User Data** or **SSF**s only).
- **Contouring**: Added a new property (**Contour Drawing Order**) that makes contour plots draw triangles-first or heights-first. The second method (default) is much faster.
- **Contouring**: A new property allows the minimum contour to be omitted (or drawn transparently, depending on your point of view).
- **RSMs**: A new feature of the Production Popup is to "specify" values for inputs that allows grouped RSM plots to be drawn in 1D mode.
- **Production Mode - Measured Data**: You can now load measured data into Production Mode. When the "check" is selected on the RSM display popup, relevant measured data will be drawn.
- **Production Mode - Calibration**: The **Calibration** feature now tries to fit and RSM to measured data points. Like the OPTIMIZER, you can specify a full matrix of input values to find the best match.
- **Production Mode - Interactive**: This fixes y axis while dragging interactive sliders.
- **Tracers**: Tracer paths can be calculated forwards (with the vector field) or backwards (against the vector field).
- **User-data files**: User data files can be joined together and loaded as one. Each "set" in the combined file will produce its own plot.

9.7.2: Enhancements

- Probe "Find" functions update entire popup.

- Postscript monochrome greyscale matches screen greyscale.
- **Postscript**: **OK** to write parentheses in text.
- **RSMs**: Prohibits overlaying of 3D RSM plots (previously core dumped).
- **Postscript output**: An extra benefit of drawing contours heights-first is that the size of postscript files is much reduced.
- **Annotation**: Fixed a bug where grid lines would not line up in the Y-direction when both linear and log quantities were plotted on xy-graphs.
- **Stats Plots**: When fitting curves to histograms, the fitted mean and sigma values are drawn so that values for different levels do not overlap.
- **Functions**: Macros are read from the initialization file, so that they can be saved in one session and used in another.
- **Functions**: The built-in `dydx()` operator has been improved so that it can part of any expression.
- **Properties**: The **data ratio** property works correctly.
- **Printing**: Temporary `printcap` files created for systems other than Solaris 1 are created only once.
- **SPICE**: External circuit node names are read and used correctly for use with SMARTSPICE graphics.
- **Cutlines**: Fixed a memory problem with interface cutlines, which would cause problems when cutting a mesh with large numbers of grid points along the cutline.
- **User-material colors**: Colors set for user-defined materials are correctly stored and loaded from the defaults files. Names of user-defined materials are now shown in 'single' quotes instead of "double" quotes.

9.8: Version 2.4.0.A

9.8.1: New Features

- **Border** is printed on hardcopies but it can be turned off.
- Reduced size PostScript files generated.
- Function macros can be loaded and saved as defaults.
- The colors used in contour plots are written to and read from set files.

9.8.2: Enhancements

- Functions are re-calculated when a cutline is shifted.
- Removed the bug in the **Probe** tool, where using the **Find** feature before placing the probe would crash TONYPLOT.
- Improved the labeling of contour keys.

9.8.3: Known Problems

- When saving material information, TONYPLOT uses a file in the directory `$HOME/.silvaco`.
- This directory must already exist since TONYPLOT does not create it.

9.9: Version 2.3.8.A

9.9.1: New Features

- The XView interface library ensures that the windows and colormaps are created on an appropriate visual. If none exists, TONYPLOT will not run.

- Some extra suppress features are available for use when loading setfiles. Added an `-suppress` command line argument and a popup notice to enable suppressions when loading the file.

9.9.2: Enhancements

- Added a new method for calculating positions of minor ticks marks on log scale axes, correcting the bug of previous versions. Thanks to Stacy Leon for help with this.

9.10: Version 2.3.7.A

9.10.1: New Features

- The Probe can be used on 2D RSM plots as well as Mesh plots.
- RSM plots can be drawn with log scales on the X or Y axes or both.
- Graphical editor makes defining input distributions easier (used in Production Mode).
- New fonts: All text is now drawn with X11 fonts, but the original vector font is still available if needed.
- You can load compressed or gzipped files. TONYPLOT will uncompress or gunzip them as appropriate.

9.10.2: Enhancements

- Switching between 1D/2D and 3D mode on RSM plot display popup keeps chosen quantities correctly and uses better defaults.
- Random number generator fixed, where yield analysis provides better results.
- Fixed the **Movie** tool so it will work under Solaris 2.x.
- You can now set the movie popup size from the Properties popup. It did not work previously.

9.10.3: Known Problems

- The **Ruler** tool does not give the correct readings when the ruler is positioned exactly vertical. The values for x-intercept and inverse slope are wrong.
- It is impossible to include quotes as part of quantity names in TPCS. Therefore, any set file that includes quotes will not load.

  Solution: This will not be a problem as long as no data file includes quotes as parts of names (electrode names, for example).

- If you summon the Plot Display popup for a Failure Analysis result plot and there are no changes, press **Apply** and the plot will change. This is because "user defined bins", which were added by the Failure Analysis routines, are removed resulting in a different scaling for the X-axis.

  Solution: After applying the Display popup, summon the Annotation popup. The bin values are retained on the popup. Therefore, just select **User bins** and press **Apply** to return the plot to its former scaling.

9.11: Version 2.3.5.B

9.11.1: New Features

- Can export yield analysis plots in SPAYN and NEURAL NET file formats for links to other products.
- Can load technology files from VWF to specify attributes, such as parameter distributions, SPC limits, and process attributes.
- Added support for RSM plots defined with NEURAL NET data from VWF and the neural net tool.

- Can Plot SPC charts from RSM data, using links from and to the VWF.
- Added DISPOSITION as a synthesis option: finding inputs to match the output to SPC center spec limit.
- Faster drawing of axes for all plots. More accurate divisions and less number overlap.
- Can draw RSM Plots in 3D.
- Can add Standard distribution curves to histograms in Stats plots (generated mainly by Production Mode features).
- Can directly set Zoom factor and origin by typing in values manually in the new **Set Zoom** popup.
- Various additions: Added options such as the **Duplicate Selected** and more options in the Integrate tool.
- Helpviewer popups (Help and Release notes) are now capable of printing individual pages, sections, or the whole document.

9.11.2: Enhancements

- Improved automatic placing of electrode names (2D mesh plots).
- Removed memory leak from TPCS parser. Slow leak occurred each time a set file was loaded.

9.11.3: Known Problems

- Some **Production Mode** features require RSM plots to be drawn in 1D mode only.

  Solution: None at present.

- Light Ray popup for 2D meshes that sometimes do not show correct number of beams.

  Solution: Quit TONYPLOT and restart.

- After creating an Interface cutline, the original 2D mesh sometimes does not resize correctly.

  Solution: Redraw the plots.

- Functions nested inside functions do not get evaluated the first time they are used.

  Solution: Apply the function twice.

- After altering the default size of the Movie popup, movies sometimes appear with blank frames.

  Solution: Dismiss the movie window and then recreate it. The second time should work.

9.12: Version 2.3.4.A

9.12.1: New Features

- Added ASA (Adaptive Simulated Annealing) to complement the OPTIMIZER as a **Synthesis** method (Production Mode).
- **New plot type**: The Response Surface Models for use with VWF and the new Production Mode.
- **VWF Production Mode features**: **Synthesis**, **Calibration**, **Yield Analysis**, and **Failure Analysis**.
- Faster contouring, improved contour keys, and more efficient 3D plots of 2D meshes.
- A new XSYSNAME feature allows correct displaying using a multi-platform networked X environment.
- Support available by emailing directly through TONYPLOT.
- Leader lines on user-defined labels can have an optional **blob** on the end of the line.
- Overlay plots of 2D meshes are easier to view: mesh, edge and data are more readily distinguishable.
- Improved control over the Integrate and Poisson Solver tools by direct plot manipulation.

9.12.2: Enhancements

- Correct cross-section x-axis start setting to work in all situations.
- Fixed errors in set files. Set files also now store set up information for all plot configurations--previously missing information is now saved.
- Improved appearance of hardcopy output on monochrome printers.

9.13: Version 2.3.3.B

9.13.1: New Features

- Smith and polar charts have greatly improved. Automatic parameter selection, more plot options, better display controls.
- More type of statistic plots available, sun ray plots, box plots and residual plots, for use with future Production Mode graphics.
- **New function operator:** *dydx* (*yquant*, *xquant*) allows gradients and derivatives to be plotted of graph quantities.
- You can manually invert plots in the X and Y direction.
- All tools are now re-written to better handle window events and running of several tools simultaneously (e.g., Ruler and Cutline at the same time).

9.13.2: Enhancements

- Can now scale and rotate 3D plots of 2D meshes correctly.
- Can now postscript to correct standards of EPS. It is easier to import into DTP packages.
- Color postscript output of graphs draws graph lines in actual colors seen on screen, rather than in black.

9.14: Version 2.2.1.R

- There are no release notes specific to this version.

10:FUNCTIONS

10.1: General

Functions have been rewritten in Version 2.1. Here are some further instructions about using functions.

Any function whose domain argument is illegal. For example, sqrt(-1) will print an error to `stdout` and return zero.

The functions available at the current time are as follows:

- sin(x),
- cos(x),
- tan(x),
- asin(x),
- acos(x),
- atan(x)
- log10(x), log(x), exp(x)
- sqrt(x), abs(x), hypot(x,y)
- min(x,y), max(x,y)

The operators available at the current time are as follows:

- x+y,
- x-y,
- x*y,
- x/y,
- x^y (x to the power y)

In previous versions, the `unary` minus operator did not work. But in the new version, it works. Therefore, an expression such as `-current` is now valid.

The variable `distance` can be used in deferential functions.

11: EXTENDED CHARACTER SET

11.1: General

The extended character set in TONYPLOT is accessed by preceding a normal character with a tilde (~). An extended tilde is just a tilde so use ~~ for a tilde.

11.2: Greek characters

The greek characters (upper and lower case available) are more of a transliteration of the regular alphabet rather than a translation.

100 n c 1	100 n c 2	100 n c 1	100 n c 1
Roman	**Greek**	**Roman**	**Greek**
~A	alpha	~N	nu
~B	beta	~O	omicron
~C	chi	~P	pi
~D	delta	~Q	theta
~E	epsilon	~R	rho
~F	phi	~S	sigma
~G	gamma	~T	tau
~H	eta	~U	upsilon
~I	iota	~W	omega
~K	kappa	~X	xi
~L	lambda	~Y	psi
~M	mu	~Z	zeta

There is no greek equivalent to the letters J or V.

11.3: Numbers

Superscript and subscript numbers are also available.

100 n c 1	100 n c 2	100 n c 1
Number	**Subscript**	**Superscript**
0	~0	~!
1	~1	~@
2	~2	~#
3	~3	~$
4	~4	~%
5	~5	~^
6	~6	~&
7	~7	~*
8	~8	~(
9	~9	~)

11.4: Symbols

The punctuation marks, when extended, provide graphic characters or symbols.

100 n c 1	100 n c 2	100 n c 1	100 n c 1
Character	**Symbol**	**Character**	**Symbol**
~-	circle	~+	square
~=	triangle	~\	flag
~pipe	star	~{	lightship
~}	anchor	~[	airplane
~]	mine	~;	pylon
~'	slope	~`	tree 1
~<	tree 2	~>	marsh
~,	tree 3	~.	tree 4
~?	shamrock	~/	moon
~V	degree	~v	divide
~j	multiply		

11.5: Undocument Commands

There are some key commands in TONYPLOT that are not documented in the manual that was issued with it. These are functions that were added at the last minute, or were not seen fit to describe in the general documentation, but are included here for the curious.

11.5.1: o (overlay limit toggle)

There is a limit to the number of plots that can be included in an overlay. This limit arises due to the limitied ways of portraying large amounts of data. The limit for XYG plots and XSEC plots is 64. For M2D plots, however, it is only 3. The check for this limit can be disable/enabled with this key.

11.5.2: ESC (abort drawing)

This key will tell TonyPlot to stop drawing the current plot and will go to the next plot. There are, however, a few limitations. First, only contour drawing can be aborted this way. Second, the TonyPlot Base Window must have keyboard focus while it is drawing.

11.5.3: j (junk parameter list)

Some Master format files contain "junk parameters" that store general information about the data or its source or both. Pressing the 'j' key over a plot will print these parameters to `stdout`.

11.5.4: r (region parameter list)

Some Master format files contain "region parameters" that store general information about the material regions in the file. Pressing the 'r' key over a region will print these parameters to `stdout`.

11.5.5: O (obtuse triangle highlight)

Press this key to fill all obtuse triangles with the current mesh color. Any triangle with an angle greater than 90° will be shown. Note that since data is scaled separately in the X and Y directions, it is impossible to see whether a triangle is obtuse merely by looking at it.

12: STATISTICS PLOTS

12.1: General

Since version 2.3.4 Alpha, TONYPLOT has supported a new plot type-- the **Statistics Plot**. At this stage, however, the full feature set for these plots has not yet been implemented.

In **Production Mode**, TONYPLOT generates **Statistics Plots** from its **Failure Analysis** and **Yield Analysis** functions. They can also be created by loading data files of the correct format. This format is currently undocumented.

In the future, TONYPLOT will provide the graphics support for SILVACO's SPAYN-2 product. Currently, the link from this application is incomplete.

12.2: Plot Control

Statistics plots fit into the same framework as other Tonyplot plot types. The usual Display, Annotation, and Label popups and features, such as key commands and pointer zooming, will work.

Statistics plot display is not fully implemented, and remains an undocumented feature. We encourage you to alter the display of Statistics plots and discover the features by trial-and-error.

12.3: Support

Although undocumented and only partially implemented, support is available if you have any trouble using Statistics plots. Please contact your sales representative or email support@silvaco.com for assistance.

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