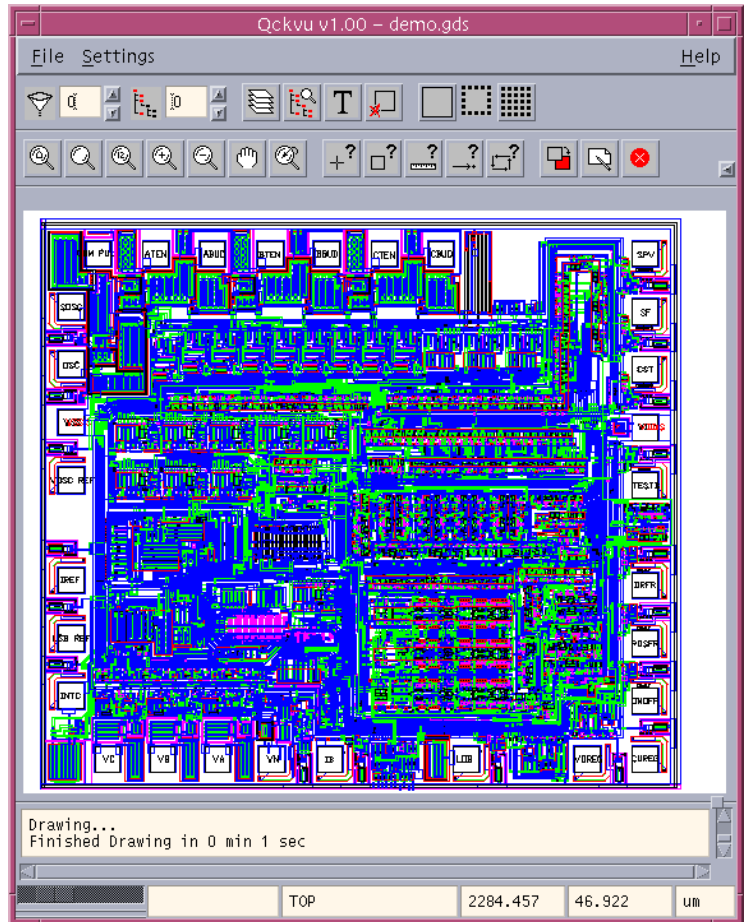# Qckvu™

High Speed GDSII Viewer

Qckvu is a high speed GDSII stream viewer intended for designers that need to view IC databases in the gigabyte range.

It has been optimized to load very large files quickly into memory and then to display the desired structure, layers and window coordinates quickly.

Qckvu takes advantage of the graphic hardware accelerators available on modern workstations by using the **OpenGL** interface - Sun and HP workstations have excellent support for **OpenGL** and newer graphics cards for Windows NT include **OpenGL** support.
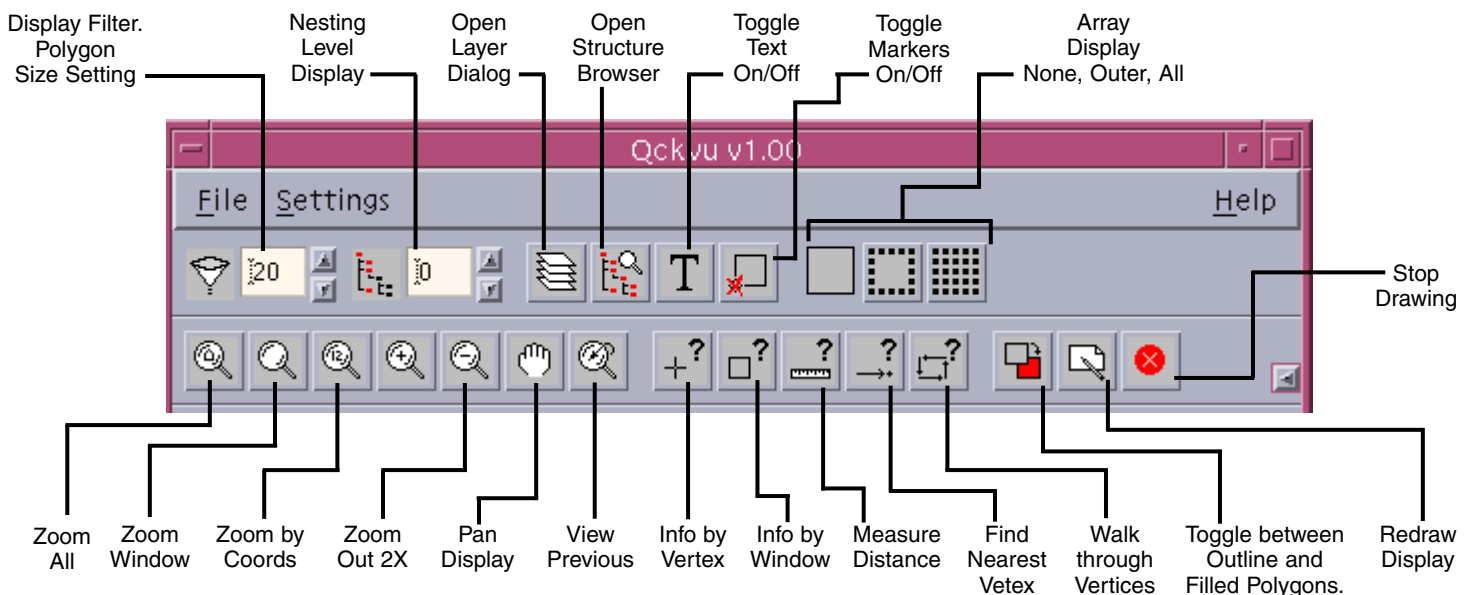
Applications

- **View GDSII files of Size > 1GB in Minutes - not Hours.**

- **64 BIT Operating System Support.**

- **Search and Identify Errors Reported by DRC.**

- **Ideal for Coordinating Between Foundry and Fabless Design Shops.**
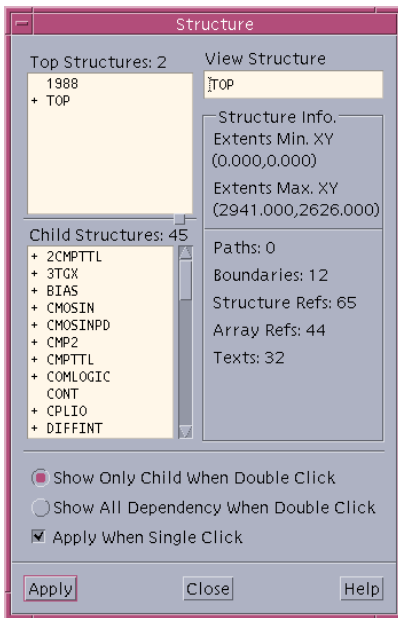
- **Measure Critical Dimensions.**

Qckvu's easy to use interface and blazing speed make it an ideal tool for viewing and debugging large IC layouts.

Easy to Use Interface

Display Filter. Polygon Size Setting
Nesting Level Display
Open Layer Dialog
Open Structure Browser
Toggle Text On/Off
Toggle Markers On/Off
Array Display None, Outer, All
Stop Drawing

Zoom All
Zoom Window
Zoom by Coords
Zoom Out 2X
Pan Display
View Previous
Info by Vertex
Info by Window
Measure Distance
Find Nearest Vetex
Walk through Vertices
Toggle between Outline and Filled Polygons.
Redraw Display

Structure Selection & Information

◀ **Qckvu's** structure selection dialog enables the user to quickly select the structure to view. It also provides a display of your file's hierarchy and detailed information about each structure.
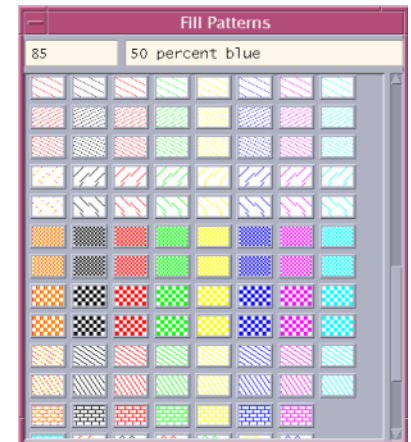
Layer Color and Outline Settings
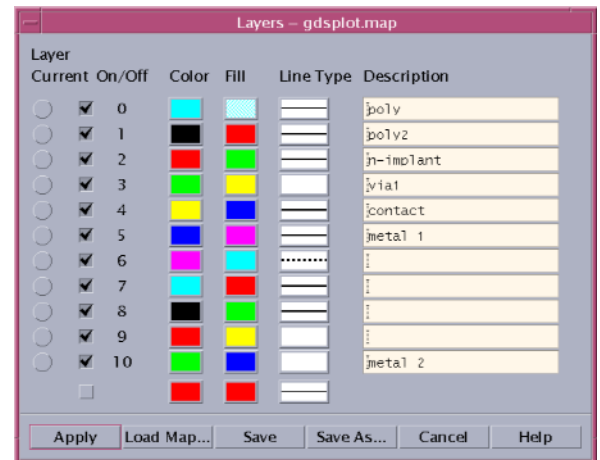
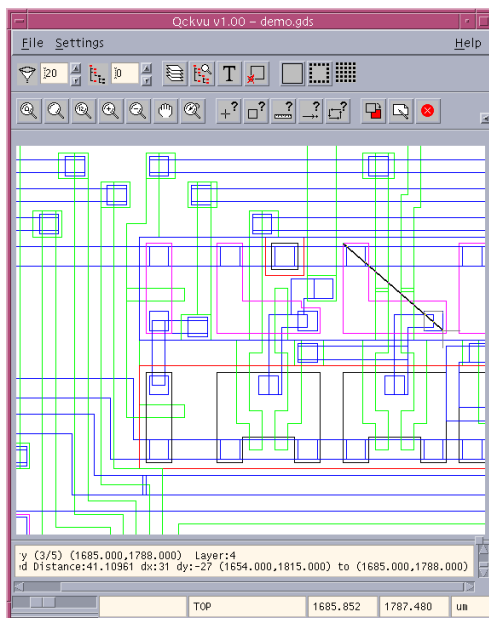Qckvu gives you complete control of layer fill patterns, fill colors, outline color and outline line type.
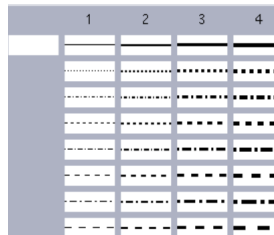
Qckvu's line type selection window.

Qckvu's fill and color pattern selection window.

Measuring Critical Dimensions


Qckvu enables the designer to quickly measure dimensions. The ruler can snap to object vertices to provide an exact measurement. It is also possible to pan and zoom between measurement points so that you can make very precise measurements over large distances.

Identifying Structures, Text and Boundaries

To identify a structure, ▶ make sure markers are "on" and click on the diamond shaped marker. The name, insertion point, scale and rotation will appear in the information box.

To identify a string of text click on its marker; the font, size, rotation and layer will appear.

To identify a boundary or path click on a vertex or use the **window** info to select a window of vertices. The number of vertices, coordinates and layer will be displayed.
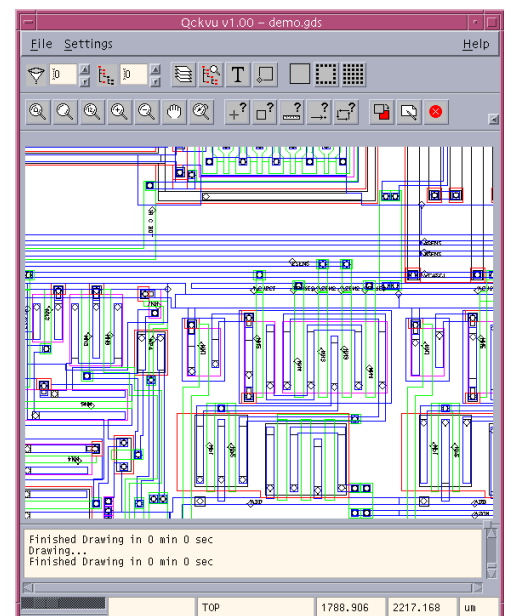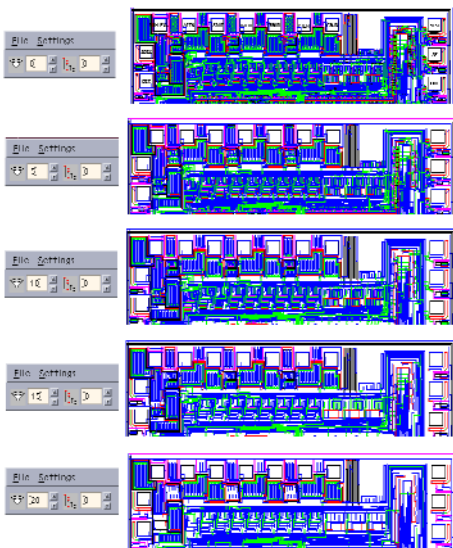
Speeding up the Display

Qckvu has several options that can significantly speed up the display - these become more and more effective as the GDSII file size increases.

The principle behind all of these speed ups is to display only "important" data and to filter out unimportant data.
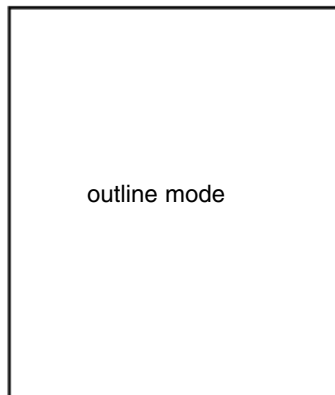
Display Filter

The display filter works by determining how large an entity will appear on screen and then removing it if it is less than the pixel threshold set by the user. Notice the display difference with different threshold settings. (0 passes everything.)

As you zoom in, entities require more pixel space and thus pass the filter. However, when zoomed in there are less entities in the display window to process.
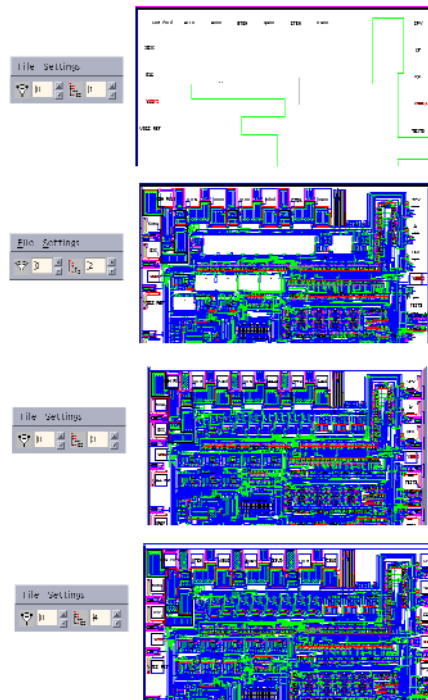
Nesting Level Filter

GDSII files are hierarchical; there can be 5, 10 or even 20 levels of hierarchy in a large IC design.

When first browsing a large design it is not always necessary to see what is going on 10 levels down. Instead, set the nesting level to 2 and you will see entities in the top level and one level below. This is generally enough to get the lay of the land and requires the viewer to display many less entities.

At left you can see the results of different values of nesting on a small IC.

Filled vs. Outlined Polygons
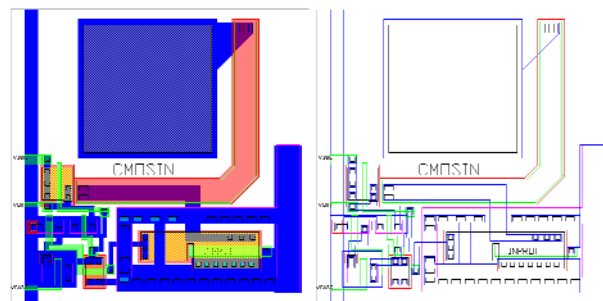
The GDSII file can be displayed using the assigned fill patterns or using only outlines for the data. Even though OpenGL acceleration is used, for large designs it is noticeably faster to display in outline mode.

Display of Arrayed Data

Many IC designs use arrays to define repeated data. These arrays can take a long time to display as they must be "flattened" for the display engine.

Qckvu gives you three array display options - outline only, outer row and column and full array.

outline mode

outer row/column

full array
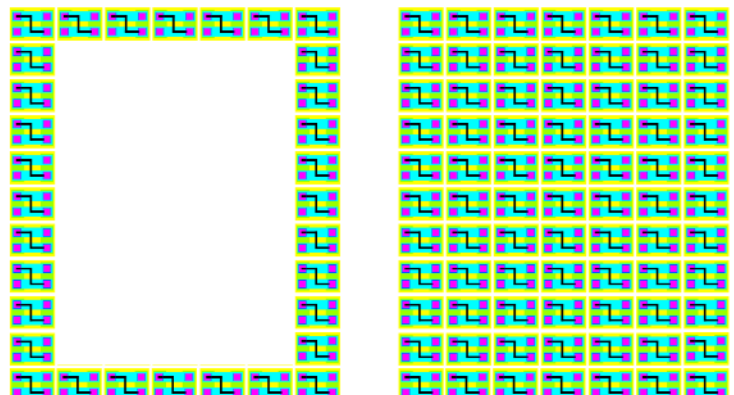
Qckvu Benchmark Report

How fast is **Qckvu**? To provide some time of a measurement we collected large GDSII files and measured the time it took **Qckvu** to scan, load and display these files. We also measured the time required to zoom into a tighter view and the total RAM consumed.

Understanding the Benchmark

To understand the numbers below it helps to know how we define each step and what activity is going on.

Scan Time - Measured from time when you click on OK (open file) to the time that the scan routine is complete. Qckvu scans the entire GDSII file and builds in RAM a list of structures, layers, entities etc... which will be used during loading and display.

Load Time - Measured from the time that scan completes until the program indicates that it has fully loaded the GDSII file into RAM. Note that Qckvu compresses the GDSII data on-the-fly so that a GDSII file much larger than the machine's installed RAM can be loaded.

Display Time - measured from the time the loader is complete to the time the top level view of the chip is completely drawn on screen. Note that this includes all structures referenced by the top structure.

this benchmark is updated regularly on our WEB site: http://www.artwork.com/gdsii/qckvu/benchmark.htm

Display Settings - display settings affect the display time but not the scan or loading time.

> **Display filter=20** means that no objects smaller than 20 x 20 pixels will be displayed.
>
> **AREF=0** means that arrays are shown as an outline only;
>
> **Outline Mode** means that the polygon stipple patterns are suppressed. All three of these settings contribute to the fastest possible display.

These settings are the same as used by Mentor Graphic's *Streamview* when it initially brings up a design.

Zoom in Time - To measure how fast Qckvu zoom's into a detailed area we start from a full screen view of the entire chip and then using the zoom window command, zoom into an area of about 1/2 x 1/2 inch. This is effectively a 25-35 factor zoom in. The time is measured from the last click of the mouse to the completion of drawing for the new view.

Memory Usage - two values are shown - memory needed to actually store the stream file; memory used by both the stream file and Qckvu itself added together.

Ultra 10 440 CPU Solaris 2.7 512 MB RAM 9.1 GB 7200 RPM SCSI Elite 3D Graphics Card							
Filename	File Size (MB)	Scan Time (sec)	Load Time (sec)	Display Time (sec)	Total Time (min:sec)	Zoom In (sec)	RAM for GDSII (MB)	Total RAM (MB)
chip.gds	437	49	33	12	1:34	4	107	131
cb.gds	520	98	57	18	2:53	4	205	205
700mb.gds	727	86	63	19	2:48	9	229	229

Hardware Requirements

Sun workstation running:

- Solaris 2.6 or later
- OpenGL 1.2 Libraries Installed
- 256 MB or more RAM
- Creator 2D Graphics or Better

HP Visualize workstation running:

- HPUX 10.2 or 11 or later
- OpenGL 1.1 Libraries Installed
- 256 MB or more RAM
- fxe, fx[4] or fx[6] Graphics

ARTWORK CONVERSION SOFTWARE, INC.

417 Ingalls St.
Santa Cruz, CA 95060
Tel 831.426.6163 Fax 831.426.2824
email: info@artwork.com
WEB www.artwork.com