

# CAD at CNF Using L-Edit

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## Terms

**GDSII** Industry standard exchange format for Electronic CAD data. Also called GDS (Graphical Data System), STREAM, or CALMA. Usually, your CAD data will be converted to GDS, and then the GDS data will be converted into machine-specific instructions to actually expose your mask/wafer.

**Cell** The building block of your pattern, containing geometric figures, text, and possibly references to other cells or arrays of cells. (Simple patterns typically are a single cell. More complex ones will usually have a hierarchy of cells.)

**Layer** Primarily a mechanism to identify distinct lithography steps in your pattern, but may also be used for tone-reversal, notes, and certain special cases. GDSII contains a maximum of 64 layers, numbered 0 - 63, with 63 reserved for a cell boundary.

**Layout/Library** File keeping track of your various cells, layers and similar pieces. You can have more than one structure in this file. L-Edit layout files have extension **.tdb** (Tanner database).

## Important

- **Do not use layer 0 (zero).** Some of our conversion routines and utilities don't handle layer 0.
- **Default layer setup is with numerical names that are the same as GDS layer numbers.** If this is not the case when L-Edit starts, and you want to set up L-Edit this way, open the following file on the System disk: **\Program Files\Tanner EDA\L-Edit 11.1\Samples\layers\readgds.tdb**
- **To create a regular polygon as an instance in your cell,** according to values you specify, use **Cell → Instance → Browse Button (“...”)** to find **CNF\_Ref\_Cells.tdb** on the desktop or in [System disk]\Program Files\CNF\, then choose the **CNF\_Gen\_Poly** cell. While it is still a cell instance, you can edit it and make an array. To replace the instance with the actual polygon, use the **Ungroup (Flatten Selected Instances)** command or button.
- **The manufacturing grid size is another mechanism to adjust how circles and curves are converted to polygons.** Toggle display of curves using the manufacturing grid in **Setup→Design →Grid tab.**

## In L-Edit...

- On the **Setup→Design** menu's **Grid tab**, you can change the spacing of displayed grid dots and control the size of the grid that vertices of shapes snap to.

- The mouse buttons are context-sensitive. On the screen, it will display what the current definitions are.
- **Edit** a selected object (**Ctrl-E** is the shortcut) to change location, size, or, for a cell instance, make and/or adjust an array.

## Export GDS file

- Use **File**→**Export mask data**→**GDSII** and put the GDS file in W:\private if working on a PC, or your private folder if working on a Sunray.
- Check the box to **Fracture polygons with more than 199 vertices**, since our conversion software has a limit of 199 vertices per polygon.
- GDSII units should be the **GDSII default (1 database unit = 0.001 microns)**
- Cell names must be **Upper case**. Some of our conversion routines and utilities don't handle lowercase cell names.

## Check GDS file

It is cheaper, quicker and easier to check your results at this point, instead of later, when you start wondering about the missing or extra shapes on your completed mask. Quit and restart L-Edit, then use **File**→**Import mask data**→**GDSII** to import and inspect the GDS file.

## Transfer GDS file to conversion server...

- To make a mask with the Mann 3600 Pattern Generator (PG) use FTP (**binary mode**) to transfer the file(s) to your account on nnfvax.cnf.cornell.edu. **WS\_FTP** is a graphical FTP program on the PC desktop. **Transfer the GDS file as binary**, and not as text.
- To convert the GDS file to e beam lithography formats, drag and drop the GDS file icon to the **W:** drive, which is your home folder on the AFS (Andrew File System) server.

## Log in to conversion server...

- For e beam lithography, log in on korat.cnf.cornell.edu or minx.cnf.cornell.edu using Putty (icons for korat and minx are on the desktop) to run **cats** or **LayoutBEAMER**. The home folder on korat or minx is the same location as the W: drive on the Windows PC. See the LayoutBEAMER quick start on the GenISys LayoutBEAMER page on the cnfusers web site for more details.
- On NNFVAX, **GDSPG** will convert your GDS file for the PG. Answer the questions. When it asks for your GDS file, include the “.GDS” extension. Once it completes, **PGFLASH** will summarize flash counts, and **PGCHECK** will display the result. It is also possible to convert to PG format using **cats** on korat or minx.