

L-Edit Tutorial

L-Edit is a program used for mask design. Each file you create will have a number of layers. Each layer corresponds to one mask in your mask set. In a file, you can also create multiple cells. Each cell can be composed of objects containing many layers. Typically, you will have one cell which contains your final layout. You can then design each of your components in other cells and then insert them into the cell containing your final layout. OK, so I know this sounds very confusing, but once you begin using the program you'll see it's not too complicated.

1. Initial Setup

In order for L-Edit to operate properly, the color settings for the computer need to be set to 256 Colors. In Windows XP, you can configure the program so that when it is opened, the color settings will change automatically to 256 Colors (you typically do this when you install the program, and then you never need to worry about it again). For Windows 2000 or earlier, you need to change the color settings each time BEFORE OPENING L-EDIT. To do this, right-click on the desktop and select Properties. Click on the Settings tab, and in the Colors drop-down menu, select 256 Colors.

Now open up L-Edit. The first time you create a file, you will need to set the units and scaling that you will be using. To make things easy, we will all use the same settings. Click on the Setup menu and select Design... For Technology units, select Microns. Under Technology setup, set 1 Internal Unit = 1/10 Microns. Then click on the Grid tab and enter the following settings:

Displayed grid: 5 Locator Units (you can change this one if you want a coarser or finer grid)

Suppress grid less than: 4 Pixels

Cursor type: Snapping

Mouse snap grid: 1 Locator Units (you may also choose to change this setting)

One Locator Unit: 1 Internal Unit

For these settings, one L-Edit unit corresponds to 0.1 microns, and grid points are spaced 0.5 microns apart.

Next, you will want to set up all your layers. The layers are all shown on the left hand side. When you open up a new file, you will see about 50 layers. You probably only need about 4 layers or so, so I suggest deleting all the layers you don't need (you can always add or delete layers later on). The first layer is the grid layer – don't delete that one. Double-click on any of the layers. You can then easily delete all the extra layers and rename any layers you wish to keep. In the area labeled Import/Export, enter a GDSII number for each layer. You can enter any number you want, but each layer must have a

different GDSII number. None of the other settings on this page affect anything we are doing. Next, click on the Rendering tab. Here, you can change the appearance of each of your layers (make sure each layer has its own distinct appearance).

2. Designing a Mask Set

Now you're ready to use L-Edit. First, create your final cell. Under the Cell menu, select New (or just type 'n'), and enter a name for the cell (for your main cell, I would call it something like 'MAIN' or 'FINAL'). Click on the layer you would like to use. By selecting one of the shapes from the menu at the top, you can begin drawing – you will mostly use the rectangle tool. Draw a shape using each layer. To select one of your shapes, select the pointer tool and click on the shape. To move, stretch, or edit a shape, hold down on the Alt key while you click on the shape. You can cut, copy, paste, and delete objects just like in any other Windows program. To hide an entire layer, hold down on the Alt key and click on that layer in the layer menu. To navigate, use the arrow keys (←, →, ↑, ↓). To zoom in or out, click on the plus (+) or minus (-) key. To move to the center of your cell and display the entire cell within the display window, click on the 'Home' key, located in the upper right hand corner of most keyboards.

Notice that the position of your cursor relative to the center marker of the cell is given in the menus above your cell (move the cursor and you'll see the position change). Again, 1 L-Edit unit corresponds to 0.1 microns, since we specified that in the beginning. Now, click on the 'q' key. Notice that the cursor position has reset to [0,0,0]. Now move the cursor, and then click 'q' again, and it switches back to the original mode.

Now, create a new cell, let's call this one 'SHAPE1'. Draw some sort of shape in this cell. Now click on the Window menu and switch back to your first cell. Now go to the Cell menu and select instance (or just type 'i'). Select SHAPE1 and click OK. You will now see an instance of the cell 'SHAPE1' in you main cell. Then go back to the cell SHAPE1 and edit that cell. Then go back to your main cell, and notice that the changes appear in the cell which you have instanced. If you would like to scale the instanced cell to make it larger or smaller, select the cell using the pointer tool and then in the Edit menu select Edit Object(s). This should give you enough info to create a mask design. If you have any other questions or if I have left out some crucial information, please ask.

3. Exporting to GDS

Once your layout is complete, you will need to export your .tdb file to a .gds file. First make sure none of your layers are hidden (hold down Alt and click on any hidden layers). In the File menu, select Export Mask Data... Set 'Export File Type' to GDSII. The file directory should default to the location of your .tdb file, but you can change it if you like. Click on Export. This should generate a .gds file in the directory you specified. To view the .gds file, first close the .tdb file. Then in the File menu, select

Import Mask Data... Under Import file type, select GDSII. In the 'From file:' box, enter your .gds file (or use Browse... to find it). In the 'Use setup file:' box, browse to or enter your .tdb file. Click 'Import'. If you have done the file conversion correctly, you should be able to view your .gds file.