

SMIF Photomask Layout and Generation Guide

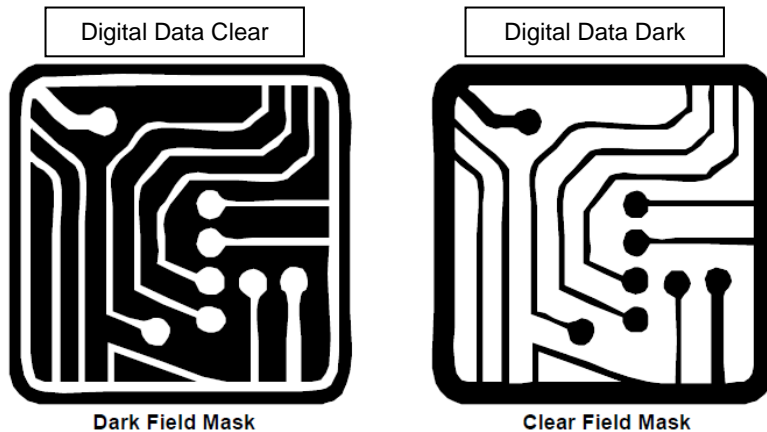
Design and Layout

The pattern that you want to fabricate should be created using a CAD program that can save the files in either a DXF or a GDS-II format. Common CAD programs that are used are:

- **AutoCAD:** creates files in a DXF format. Students can download a free student version from the AutoCAD website at <http://students.autodesk.com/>.
- **Layout Editor:** creates files in GDS-II, DXF and other formats. SMIF users can access this software on the SMIF CAD computer located in the SEM2 lab (Room 1567). Information and help can be found at <http://www.layouteditor.net/wiki/LayoutEditor>.

Photomask Tone

Various terminologies are used to describe the tone of the pattern and background on the photomask. The terms "Dark Field (dark background/clear pattern) and "Clear Field" (clear background/dark pattern) are commonly used, but can sometimes be confusing to the mask shop. The mask shop needs to know if your drawn pattern should be chrome on the mask (digital data dark) or should be clear on the mask (digital data clear). It is often best to supply a PDF plot of the design to the mask shop indicating the tone of the specific areas.



Mask Generation

There are two common types of photomasks that can be used in the SMIF Mask Aligners:

- **Transparency Masks** Photoplot Store (<http://photoplotstore.com/>)
- **Chrome on Glass Masks** Photo Sciences Inc. (<http://photosciences.com/>)

The following table provides a comparison of these two types of masks.

	Transparency Mask	Chrome on Glass Mask
Materials	Ink on transparency film	Laser to pattern chrome on glass
Min. Feature size on mask	~ 20um	~2um
Typical cost	\$40-\$50	\$500-\$750
Usage	<ul style="list-style-type: none">• Adhere to glass plate• Only good for a few uses	<ul style="list-style-type: none">• Can be used many times

Mask Sizes for SMIF Photoaligners

PHOTO1 (Suss MJB3)

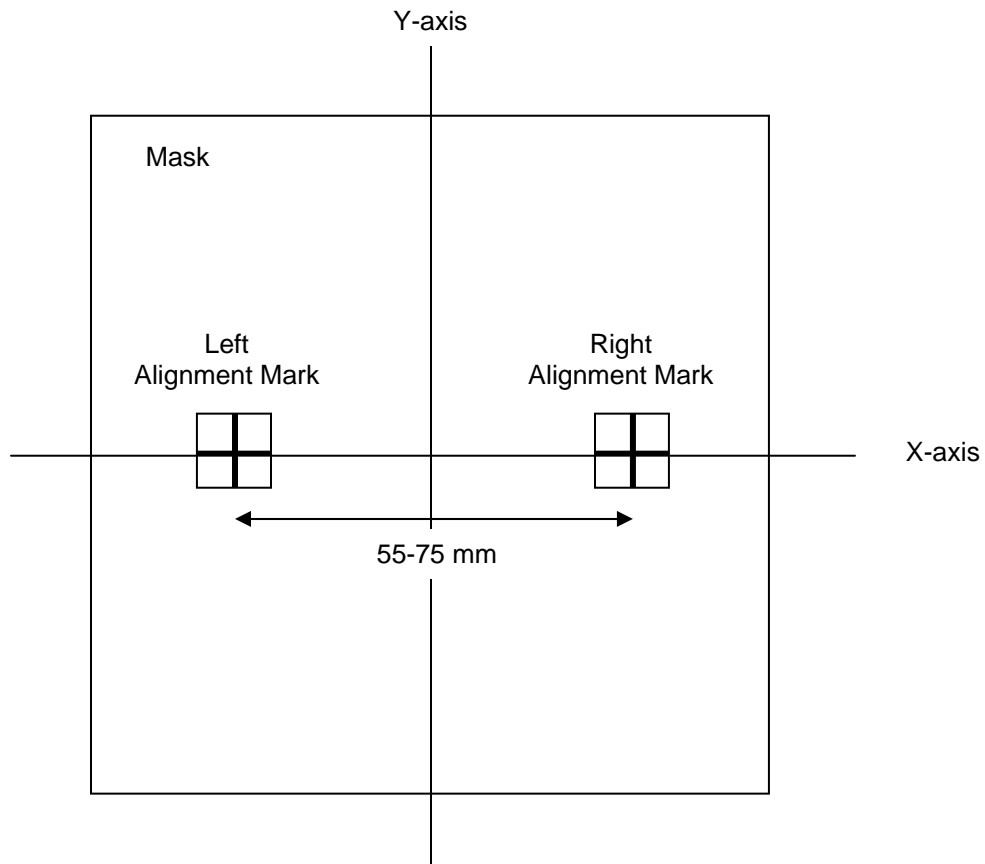
- Mask size should be 4" x 4"

PHOTO2 (Suss MA6/BA6)

- Minimum mask size: 4" x 4" inch (good for 3" wafers and smaller substrates)
- Maximum mask size: 7" x 7" (good for 6" wafers)
- In general, the mask should be 1" larger than wafer size. For example, a 4" wafer would use a 5" x 5" mask

Alignment Marks for SMIF Photoaligners

- Alignment Marks should be placed on the same horizontal plane, no more than ± 25 mm above or below the X axis. They should be 55mm - 75mm apart, centered on the Y axis of the mask. This will ensure that the left and right eyepieces can be used to view the marks simultaneously in PHOTO2. (The same configuration will also work for PHOTO1).
- Typical alignment marks consist of a 20um square outline, with subsequent 20um cross marks that fit into the box. Please contact SMIF staff for more information concerning alignment mark designs.



Note: Not drawn to scale