

LSA marks LSAx, LSAY. Also referred to as fine alignment marks.

These are used to measure and align each exposure position on the wafer.
These are used for overlay, or registration, of the reticle pattern to a previous layer.

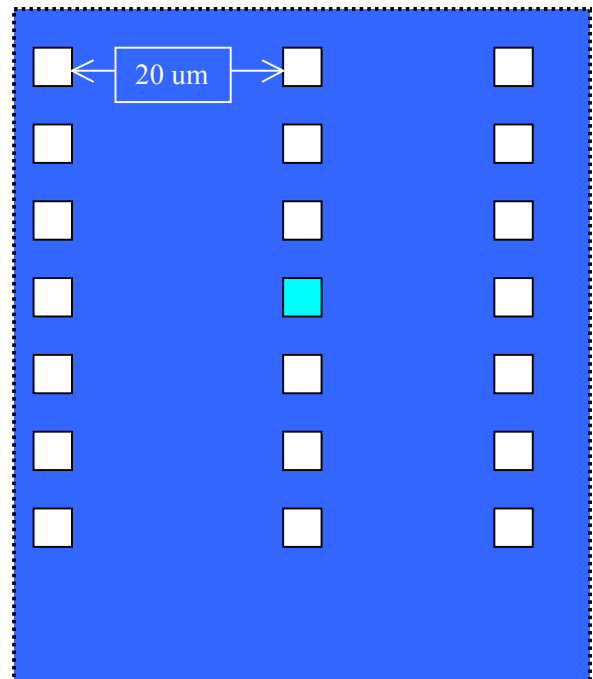
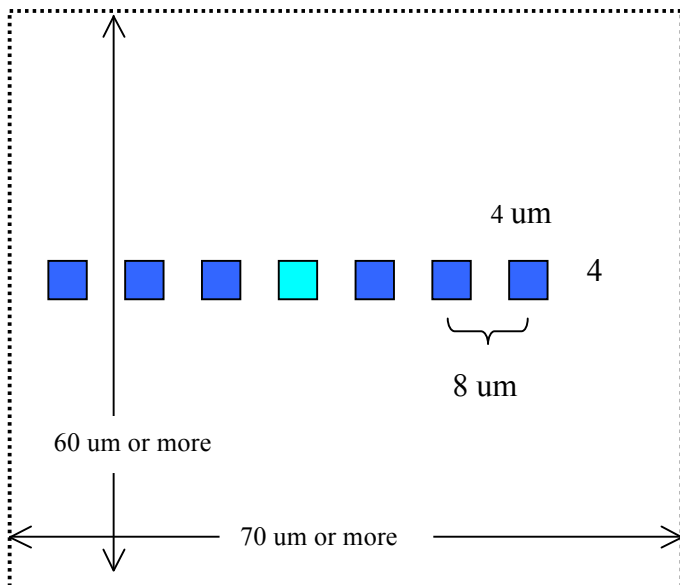
The mask designer must place these within the design somewhere (position is arbitrary.)

Certain design specifications apply:

- mark unit size = 4.0 x 4.0 um
- mark unit pitch = 8.0 um
- array design should be as shown below
- no foreign pattern/edges within 30 um
- both dark and clear field tones should be made.
- you may then select the tone that gives the best waveform signal or the best ITV image.

Multiple marks, as shown below in the right side array, may improve accuracy. In this case the LSA system measures and averages the multiple mark positions.

This example shows 3 rows, up to 7 are acceptable. In every case the lines must be separated by 20 um on the wafer. The area forbidden to foreign edges and patterns is increased to 50 um on either side of the array of rows.



Arrays should be a minimum of seven marks long. The center mark defines the array position in the process program. Either array tone's center mark may serve as LSA target.

These marks should be placed on every permanent masking level that you will align to. (i.e not implants)

- o Placing the LSA marks on the reticle's center lines (LSAx on Y axis, LSAY on X axis) minimizes the effects on lens distortion (including magnification error.)
- o When the LSA marks are placed on the reticle center lines **at the outermost pattern edge**, alignment time is minimized, particularly with die-by-die alignment