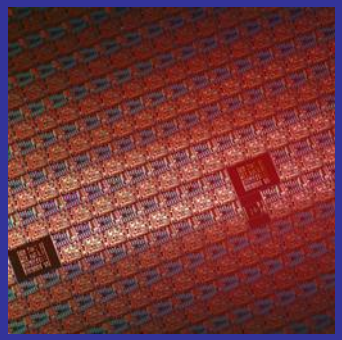
Accelerating the next technology revolution

Fiducial Discussions

IEUVI Mask TWG

September 30, 2012, Brussels, Belgium



Summary / Plan Discussion

- **P48 patterning specification of the markers does not meet our needs.**
  - Specifically, the line length, depth, CD, LER, etc., of the crosses
- **The global layout - specifically, the four (4) *"L"-shaped* areas for marker placement - still meet our needs.**
- **Action plans:**
  - Near term plan: Lean the learning to optimize marker specifications, including marker patterning, characterization, integration.

    Completion date: end of Q1, 2013

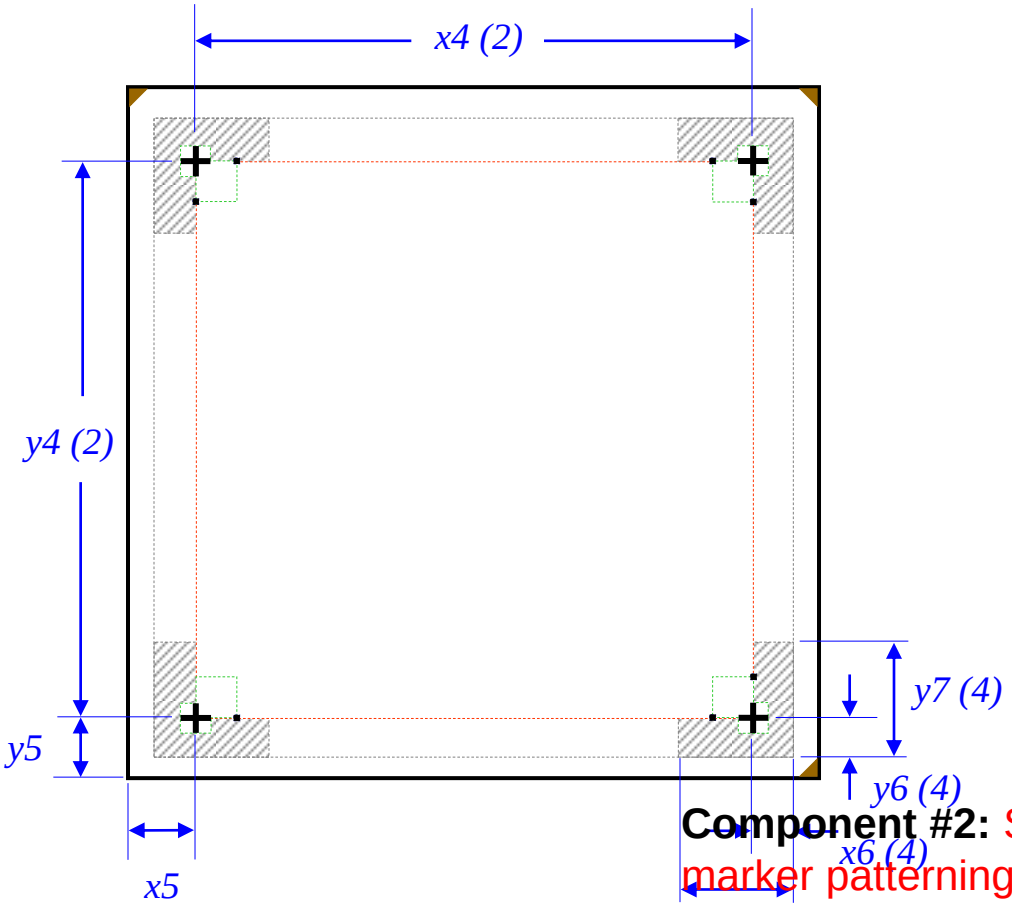
    Owner: all stakeholders / Mask TWG
  - Follow-up plan: Update P48 once we understand how to best specify fiducial requirements

    Targeted Yellow Ballot submission: July 2013

    Owner: SEMI Fiducial TF

P48 Fiducial Mark Standard

P48 enables current fiducial development activities. But, significant update has been long anticipated.

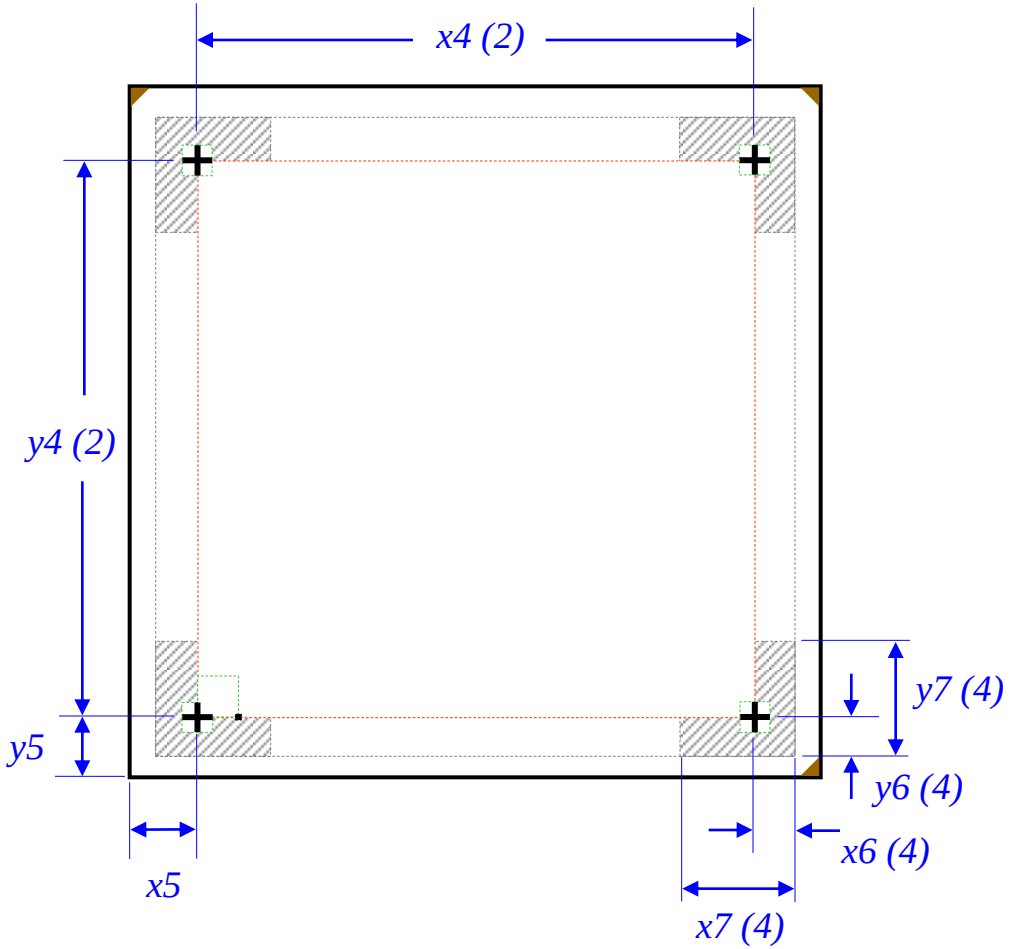


Component #1: Specification of real estate for marker layout (maybe OK here)

Component #2: Specifications of marker patterning either are lacking or do not meet defect mitigation needs. (need more work)

Current Consensus Proposal

- **Changes:**
  - Remove 6 small crosses
  - Replace marker parameters with learnings: CD, LER, etc.
- **Addition:**
  - On which layers markers are patterned
- **No Change:**
  - Layout real estate



Proposed new P48 Fiducial layout

Initial Consensus Reached On Fiducial

- **Fiducial patterning: After ML capping layer dep. (under absorber)**
- **Mark line width: <1 ~ 4 um (max of 4 um)**
  - MB, ABI and e-beam representation limited by field of view
- **Line length: 550 um**
  - For optical (LT) tool, < 500 um. However, location accuracy target might not be met.
- **Line depth: 100 ~ 200 nm. The lower limit was per early EIDEC data, requiring further validation.**
- **LER: TBD (no data)**
- **Side wall angle: TBD (current performance is in the range of 50 ~ 60^{o})**
  - Both LER and wall angle specifications will be determined primarily by line edge detection accuracies of e-beam writers and blank inspection.
  - Sample to sample repeatability is key.
- **Investigate tool specific alignment errors, for estimate of total alignment error budget**
- **Number of crosses: 5**
  - The minimal is one at each of the 4 corners. But, need one more to notate blank orientation. The 5th cross could be identical or smaller (TBD).
- **Revisit if fiducial layout can reference to the blank center**
  - P48 location of the first mark references to one corner, 8.0 ± 0.5 mm from the 2 closest mask edges.
- **KLA-Tencor proposal of much larger fiducial line width needs more understanding.**
- **AIMS/Scanner/Repair have no special requirements, but need to revisit later.**
  - Requirement at final inspection(PMI) needs more understanding.