HRPPD Meeting #8 Update

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Current Status

Ceramic Tasks:

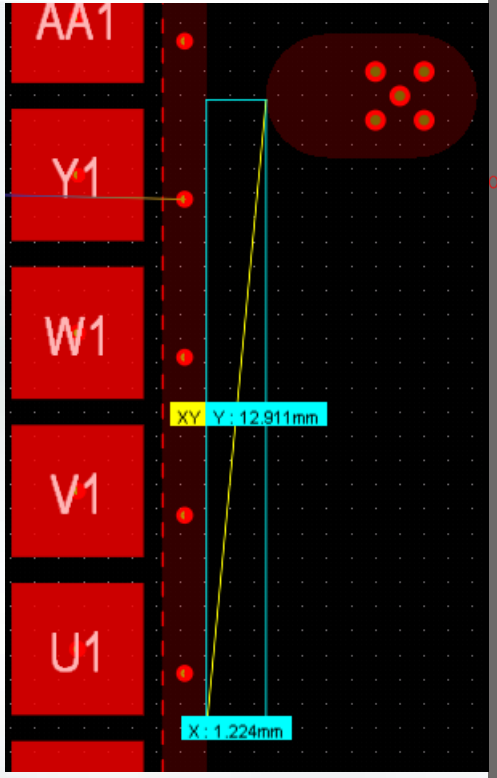
- Incom waiting on funds
- Meeting with Kyocera
  - Kyocera will check design rules after importing
  - Kyocera will provide alternate pricing for special process with less error in dimensions and machining of outer perimeter (±150um rather than 1% accuracy)
  - 25-week lead time – August timeframe for initial units
  - Kyocera is not ready to officially start the process until the contract is signed
- Priority tasks:
  - Changes in progress to design files for preliminary evaluation by Kyocera
    - Aiming for Friday
  - File check
    - Will send 3D model to Alexey
    - Will send design files to Alexander and Gerard
  - Interposer tolerance stackup (air side)
    - Mark to measure an HRPPD
    - Spreadsheet

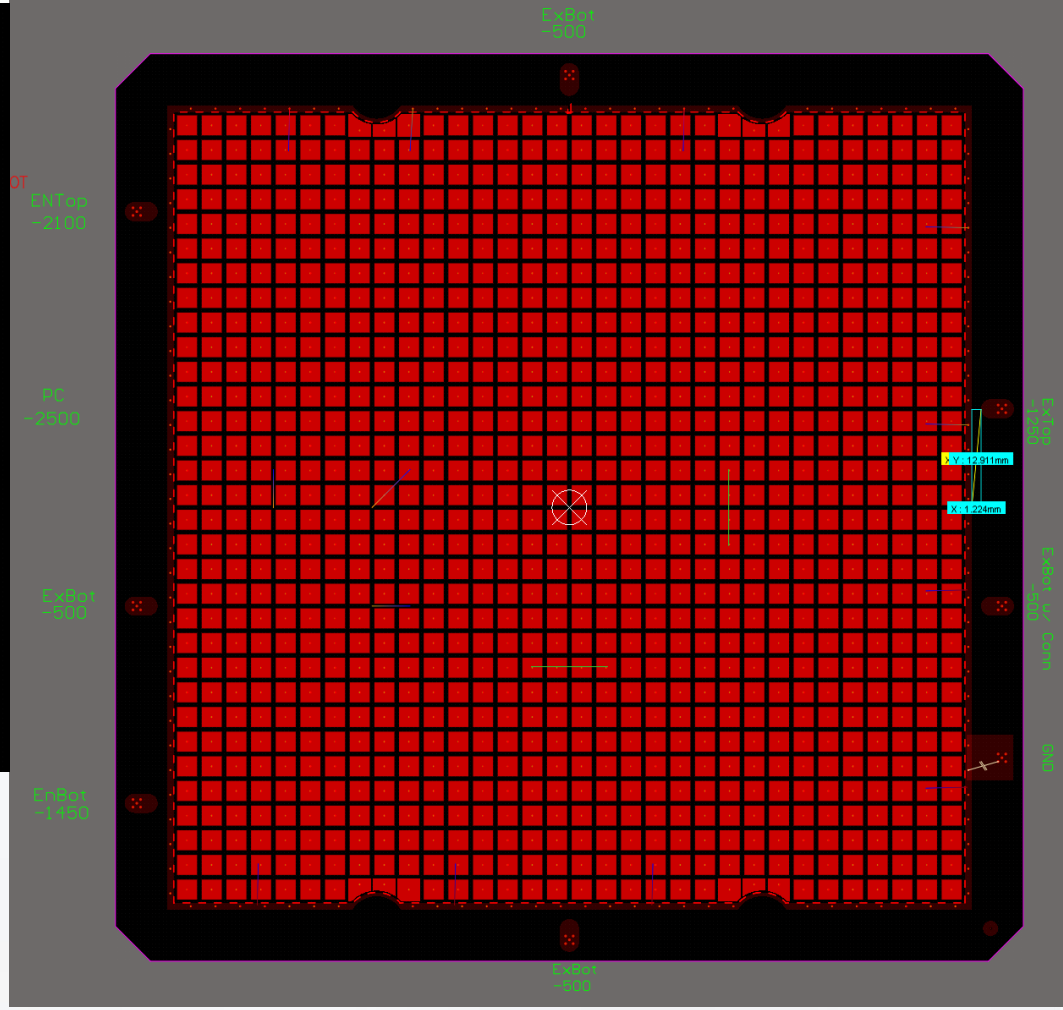
Non-Ceramic Tasks: Due after

- Spacer thickness
  - Waiting for response from Neoconix about centering contact point
  - Will send ceramic and PCB 3D models to Alex once complete for spacer mockup
- Backplane Changes
  - Cables
  - Safety resistors
  - Bypass capacitors + ringing resistors
  - Connectors for HV connections – which model, plastic
  - Pogo pins vs interposer for HV connections
- FCFD Test Board
  - Ordered Jan 21!
  - Aiming for arrival late-February

HV Spacing

- Guidelines
  - Incom: 1kV/mm
  - Gerard: 1kV/mm up to 1.5kV/mm
    - Min spacing: 4kV @ 2.7mm
- Is there any overhang of the brazed tab that will impact these distances?

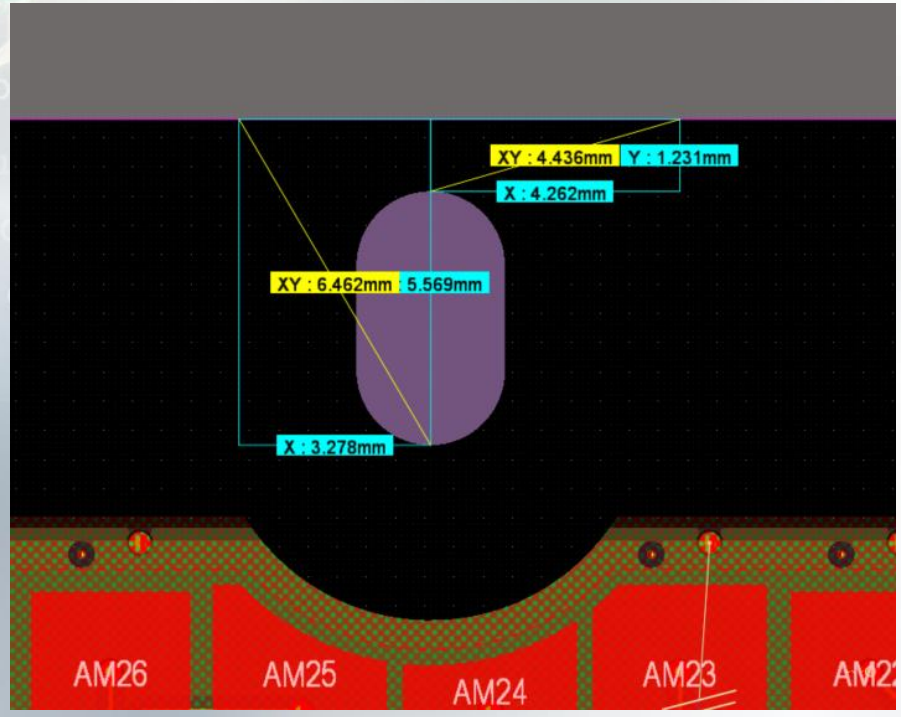


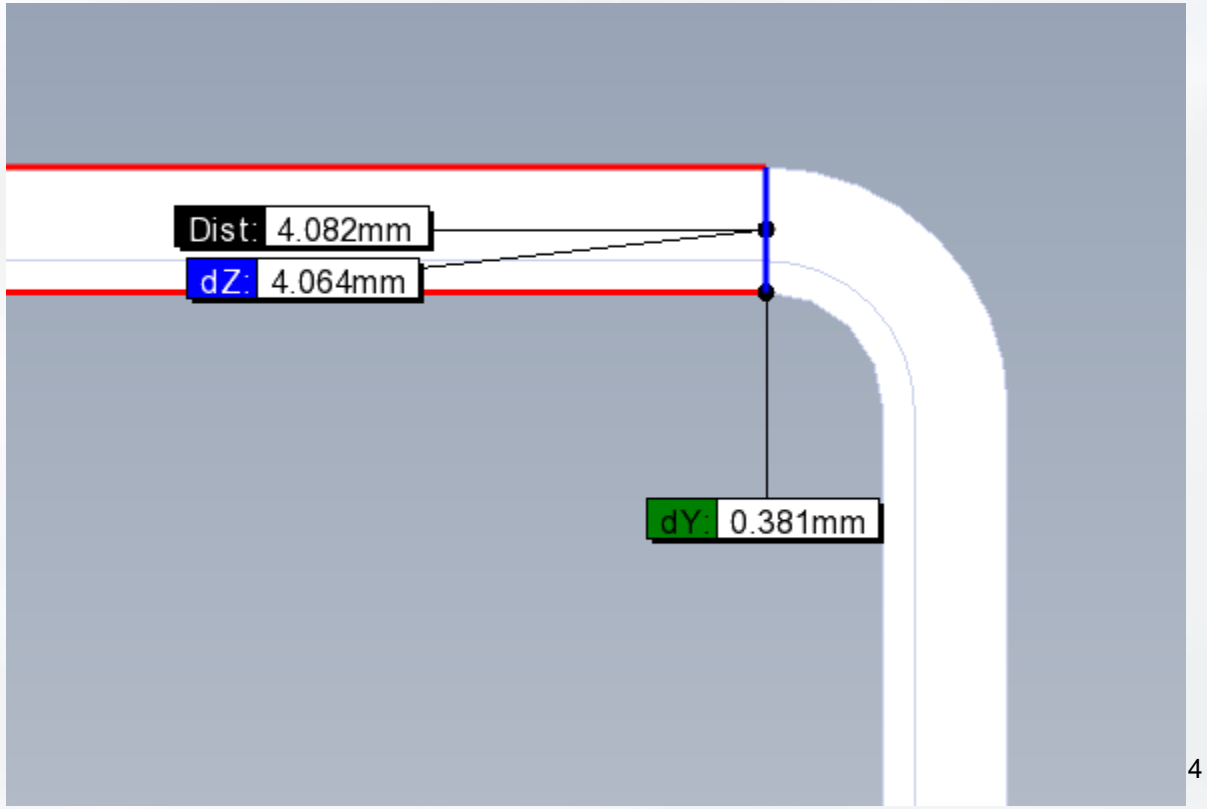


Name	Voltage	Spacing to be Used
~~PC~~	~~-2500 (max)~~	~~2.5mm~~
Top of Entry MCP	-2100	2.5mm
Bottom of Entry MCP	-1450	1.5mm
Top of Exit MCP	-1250	1.5mm
Bottom of Exit MCP	-500 (max)	1.2mm

HV Sidewall Overlap

- Can the HV pad be reduced?
  - Spacer wall is ~4mm wide
  - Pads are ~5.5mm from the edge of ceramic
  - ~1.5mm of exposed pad to braze
  - Can I reduce that amount of exposed metal where brazing still works, say to 1mm (or less)?





Interposer Tolerance Stackup

- Notes from Kyocera about shrinkage
  - Shrinkage across surface is mostly uniform
    - Shrinkage is similar within a batch
  - Displacement of a feature is proportional to its distance from the center
  - For example, an anode produced with +0.5% deviation from nominal dimensions:
    - A pad 30mm from the center will be off by +150um
    - A pad 60mm from the center will be off by +300um
- Alternate proposal
  - Kyocera can guarantee ±300um to the furthest pads of the interposers
    - Sort anodes into 2 batches – a + shrinkage and a – shrinkage wrt nominal
    - Build 2 backplanes, each with dimensions meeting the + or - batches
  - Requires special special process upcost for 0.5% accuracy.
    - Will this work for 1%?
  - Requires additional measuring/sorting of backplanes by Kyocera or BNL
- See spreadsheet for tolerance stackup

Archive

Ceramic Pad Location Tolerance

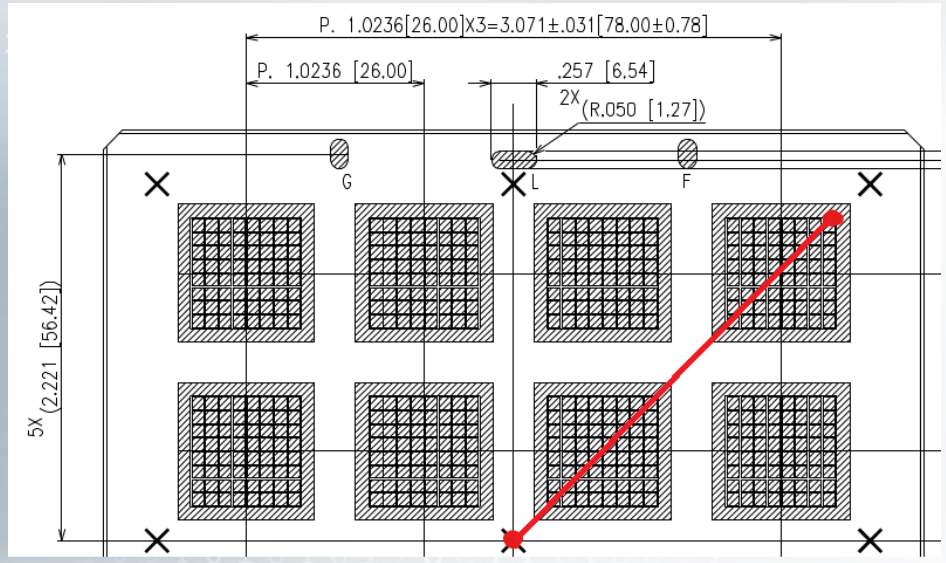
From Kyocera:

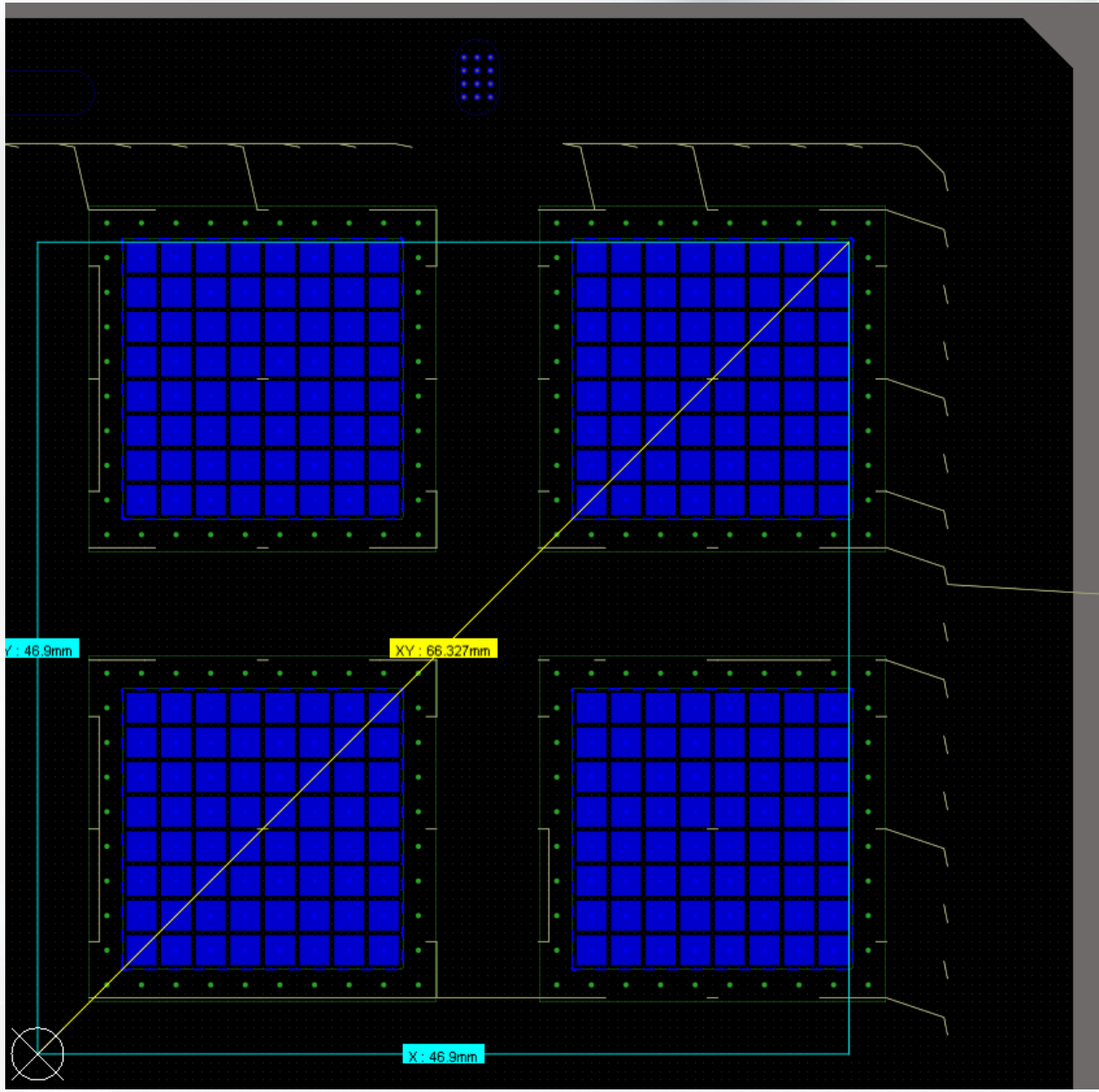
- “We can support +/-0.6mm for the dimension from the center of the board to the edge of the furthest pad.”

From Neoconix:

- Typical tolerance per side is

  18.5 ±0.13 x 18.5 ± 0.13 mm





Record of Design Decisions

- Amount of stitching vias will be increased
- Vacuum pad size will be 2.75mm square
- Interposer footprint will fit either “by2” or “by4” configuration

- Preliminary
  - Air side pads will be 1.2mm round with ground pour with 8mil clearance
  - If needed, HV pads will fit both pogo pins and interposers so either can be used with the ceramic
  - 1mm vs 3mm interposer will be independent of ceramic design

Completed Tasks

- Simulations
  - Complete - stitching vias, air side interposer pad reduction, GND planes
  - Complete 12/16 - Vacuum side pad size selection
  - Complete 12/23 – air side pad size, interposer ground pour
  - Complete 1/6 – Max air pad size + ground pour
  - TBD – Hi-Z input simulations
- High Voltage (HV) Design
  - Complete - preliminary pogo pins selected, HV spacing determined
  - Complete 1/6 – determined pad size for 2 pogos or 1 4x4 interposer, if needed
- Other
  - Complete - Break in ground ring placed
  - Test file import with Kyocera
    - Update 12/23 Kyocera confirmed successful import of ODB++