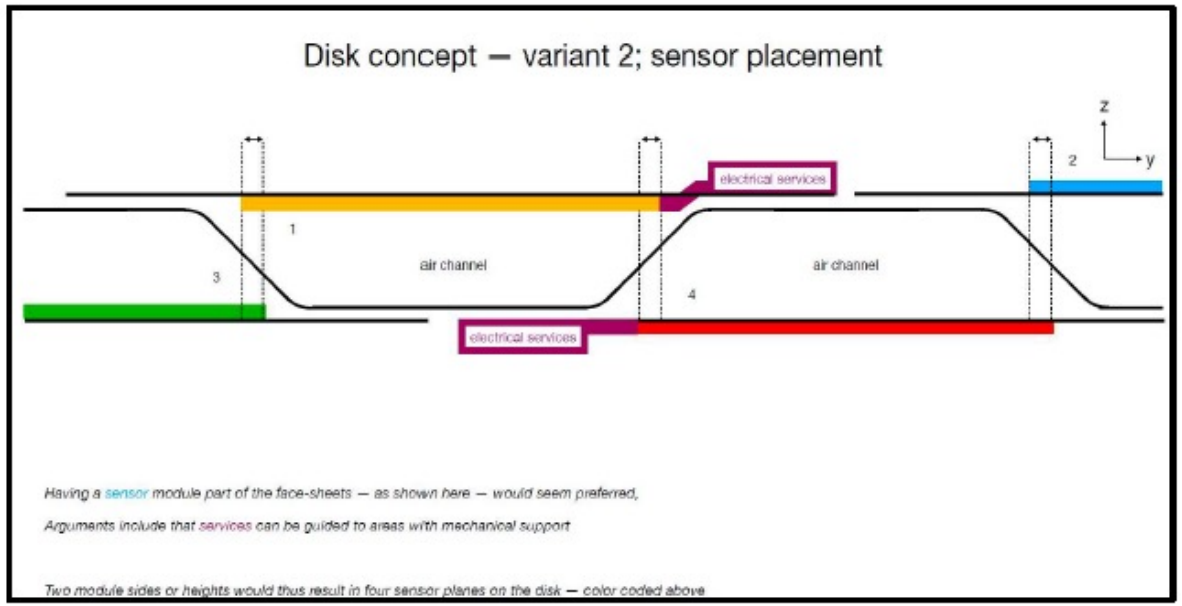
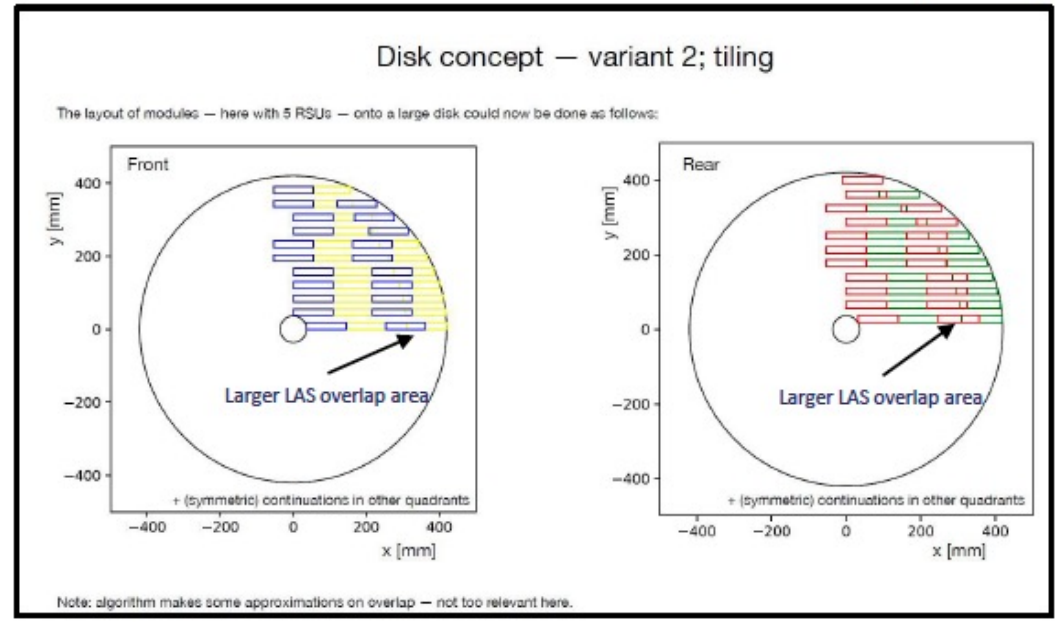
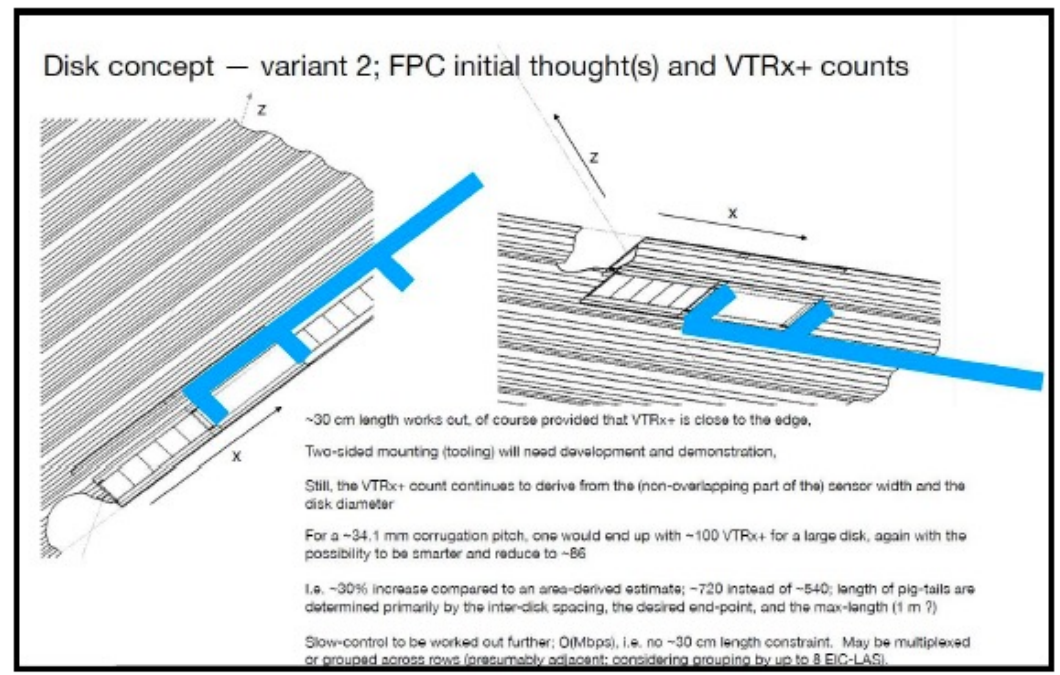
Disk configuration

Credit E.Sichtermann, N.Apadula







Note:
Only T5 LAS considered for tiling disks;

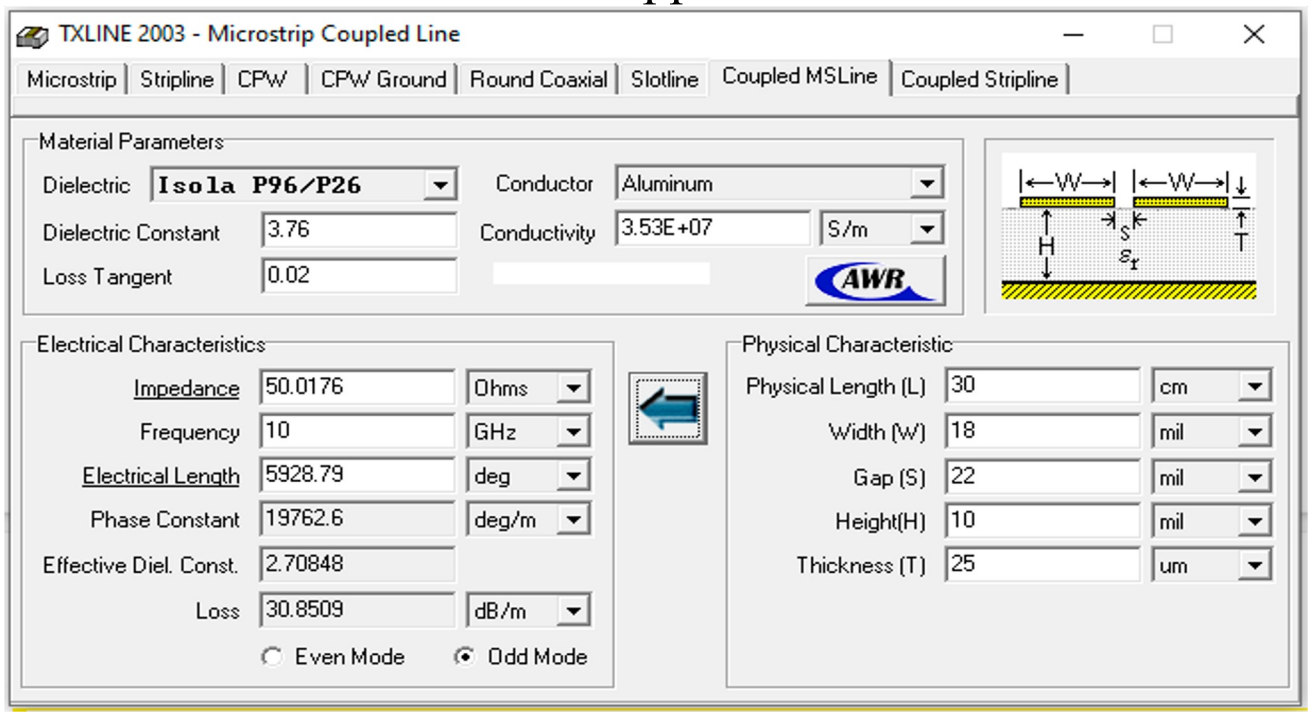
LEC overlaps REC like in barrels to increase hermeticity;

Science and Technology Facilities Council

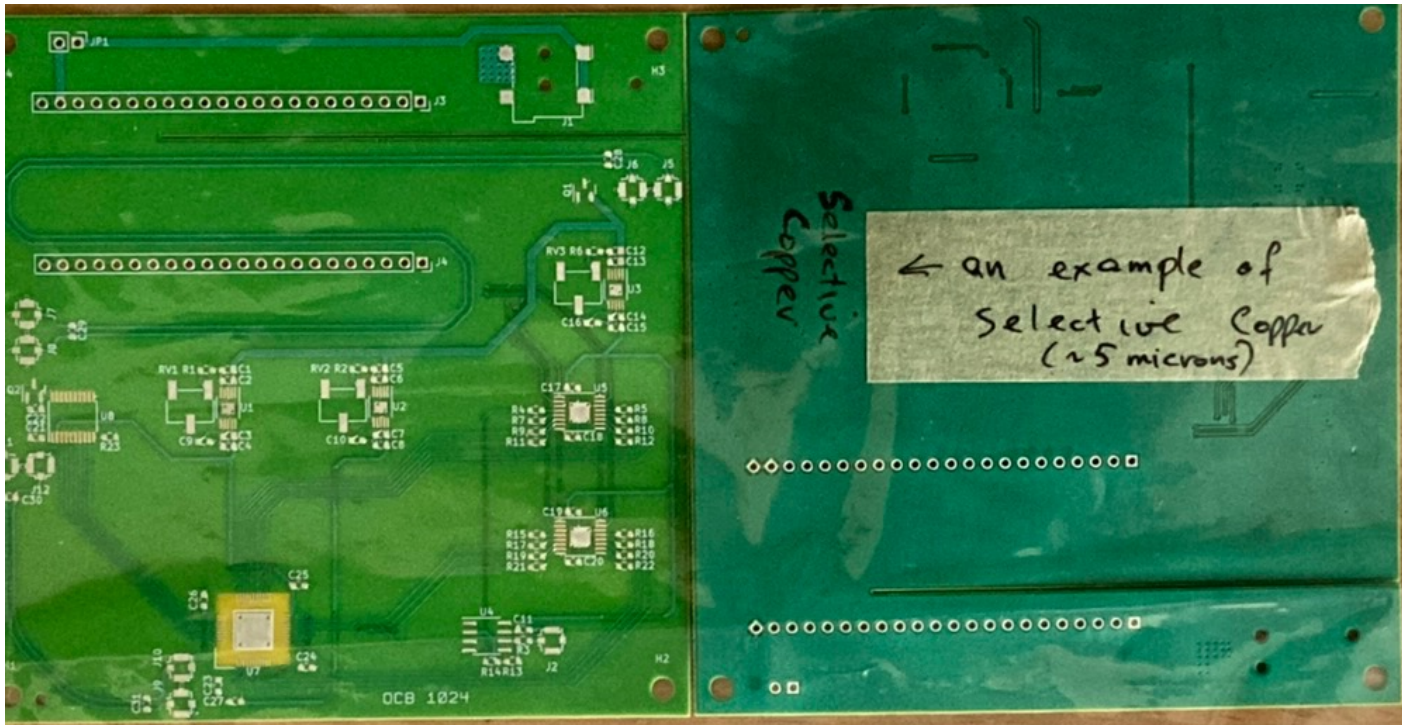
Al-based FPC (Yuan Mei)

Constraints from vendor

- Prefer 1mil thick Polyimide-fiber glass substrate (Isola);
- Prefer 20µm Al - 8µm Cu - Polyimide stack. Can be without Cu, but Al - Polyimide adhesion is weak.
- Prefer burying traces between substrates for added strength. 5mil/5mil width/spacing in small area, 7mil/7mil for long traces.
- Not support SMD soldering. Al in a few small places can be plated with 5µm copper for solder.
- 0.016” wide (minimum) cutout. Plated vias must be copper based.

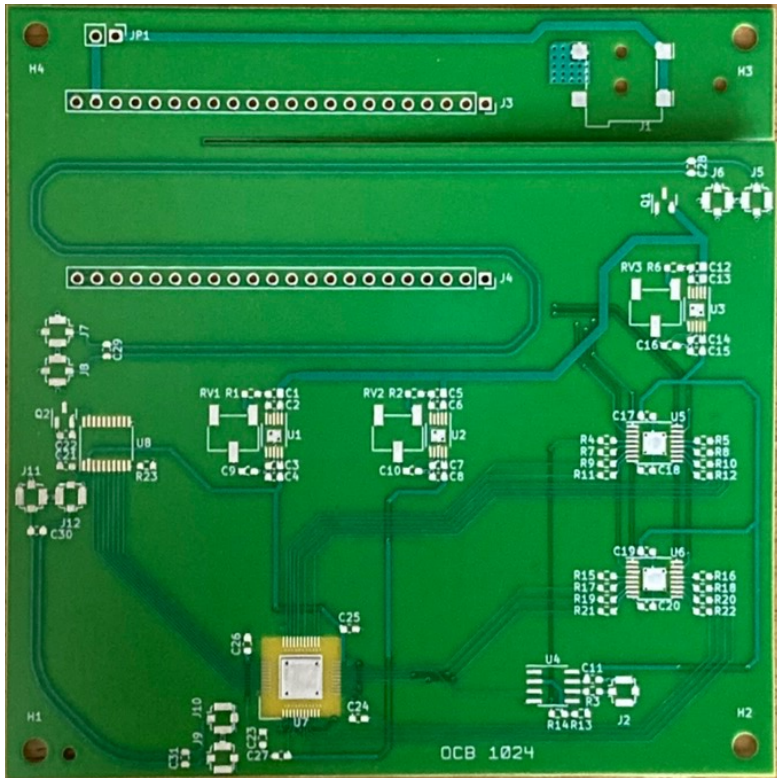


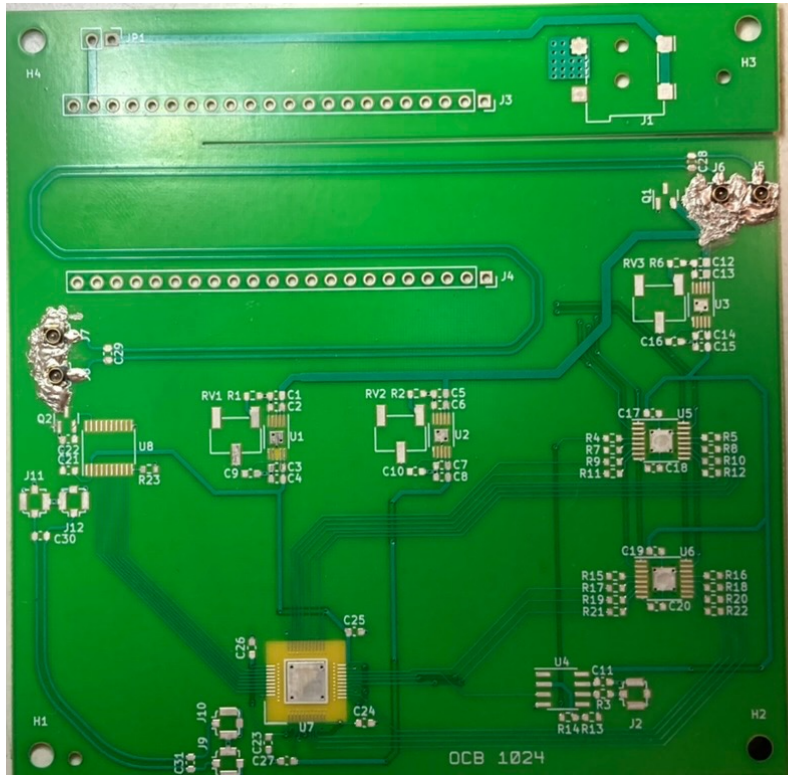
First Low TRL Prototypes

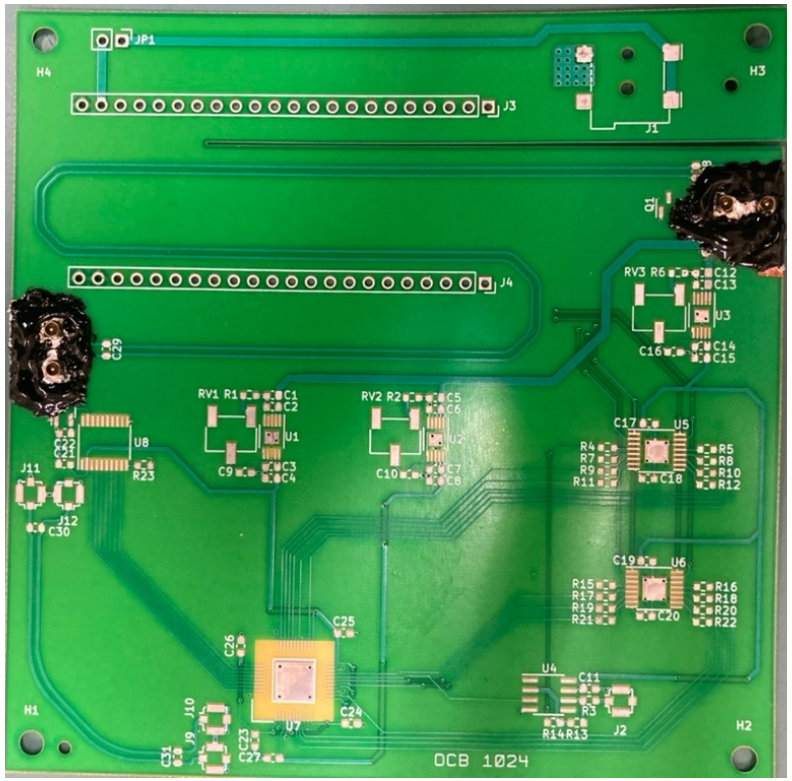


- A PCB design from another project was adapted to produce the first TRL FPC prototype
- 3 prototypes produced, one of them has 5um copper in selective area

First Low TRL Prototypes

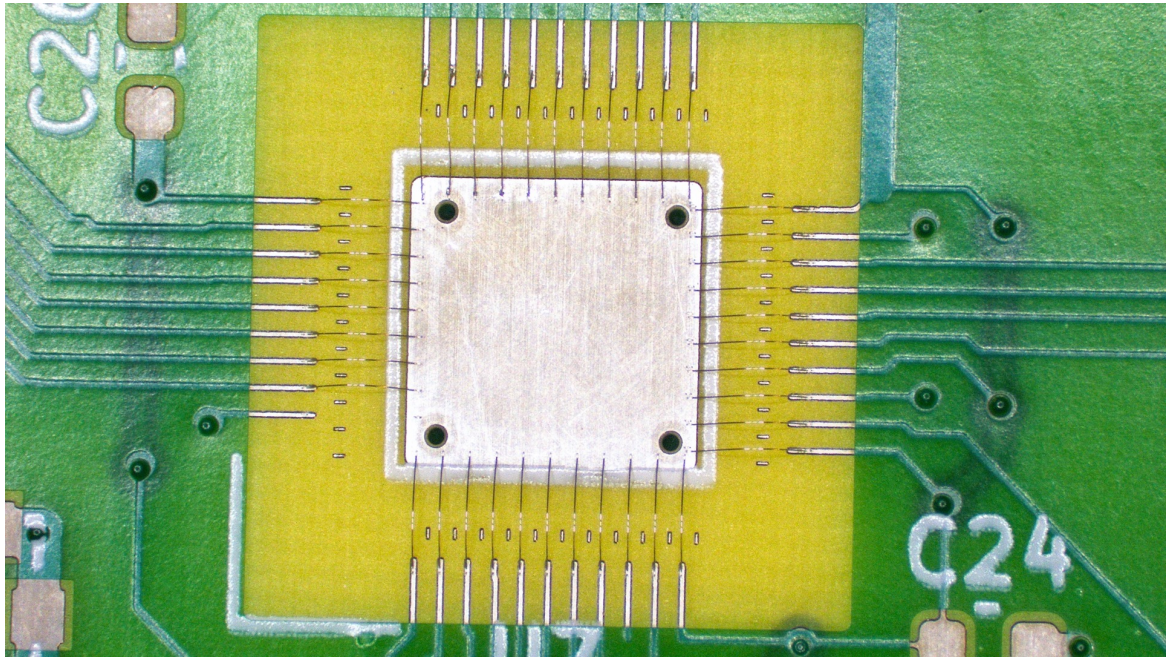


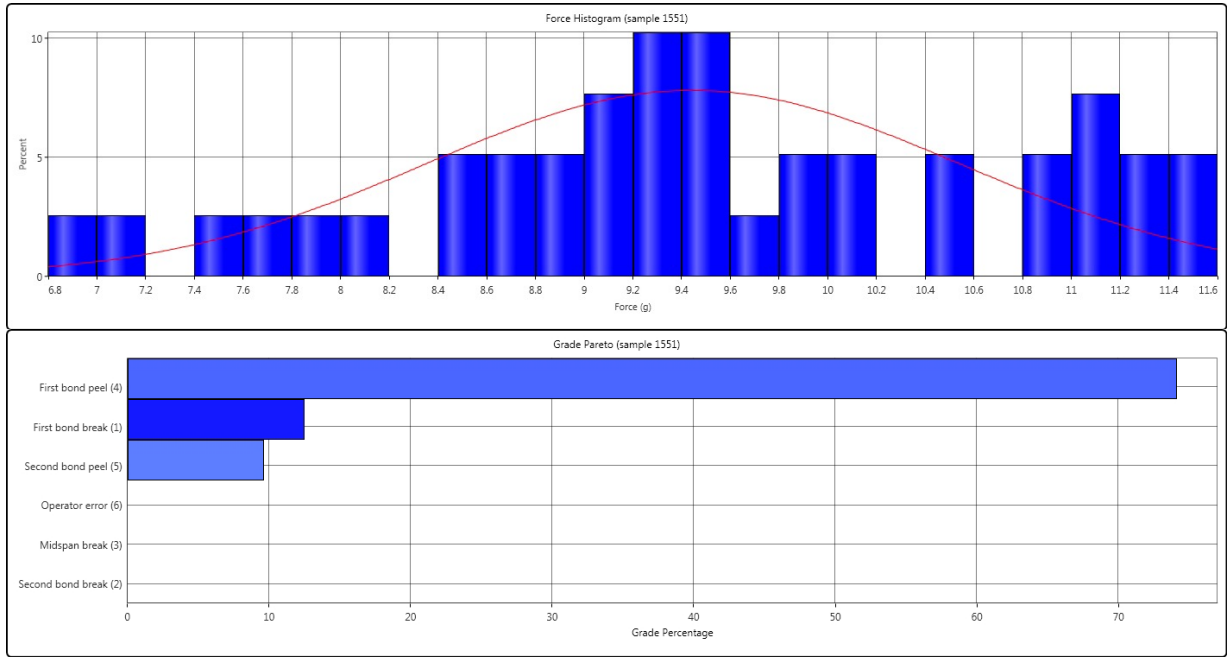




- Connectors were mounted via non-standard methods (removing the soldermask, epoxies).

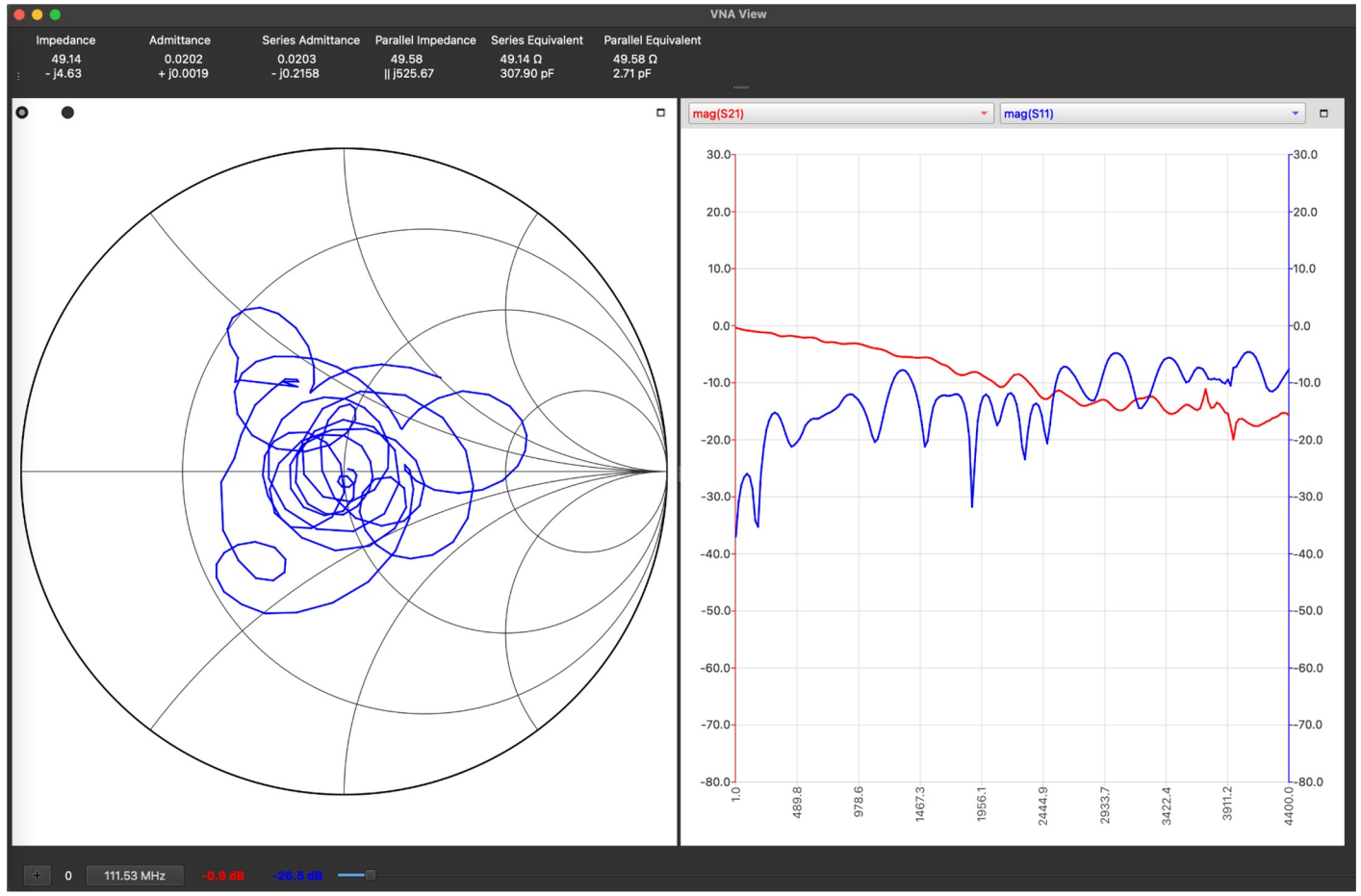
Wire-bonding and Pull Tests





- Number of tests: 39
- Mean - 3 * standard deviation: 5.7782 g
- Minimum load: 6.9011 g
- Maximum load: 11.570 g
- Mean: 9.5195 g
- Standard Deviation: 1.2471 g

Single-ended VNA Measurements



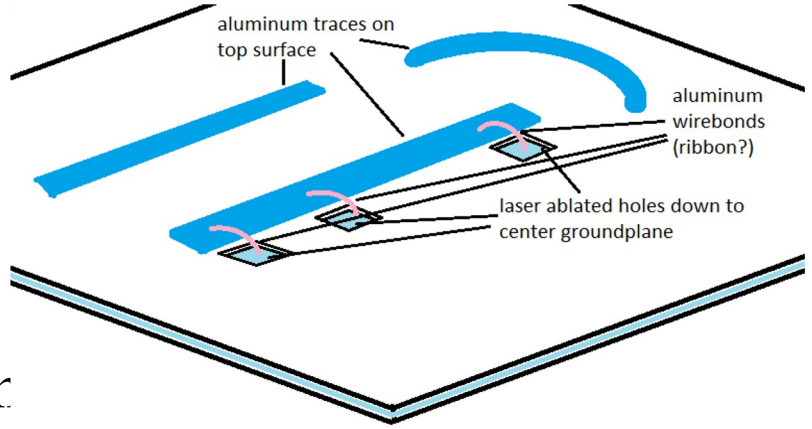
$$\alpha_d = 0.9106 \times \sqrt{\epsilon_R} \times F_{GHz} \times tan\delta \quad \text{(dB/cm)}$$

	polyimide	ArlonEMD	soldermask
Dk	0.9106	0.9106	0.9106
	3.76	4.3	3.6
Df	1	1	1
	0.017	0.0036	0.025
dB/cm	0.030017	0.006798	0.043194

- More signal loss than expected

Summary and Outlook

- First low TRL prototypes produced and evaluated
  - Based on a PCB design from another project
  - Ok for wire-bonding but not soldering
  - Significant signal loss at high frequency



- Second iteration is being worked on
  - Dedicated for signal transmission investigation to understar and improve signal losses: different substrate materials, different width/pitch, with and without soldering mask
  - Make use of selective Cu plating for soldering, and wire-bonding to connect top and bottom
  - Make plated-thru holes in an all-aluminum stack