

All-Silicon Meeting

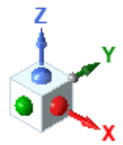
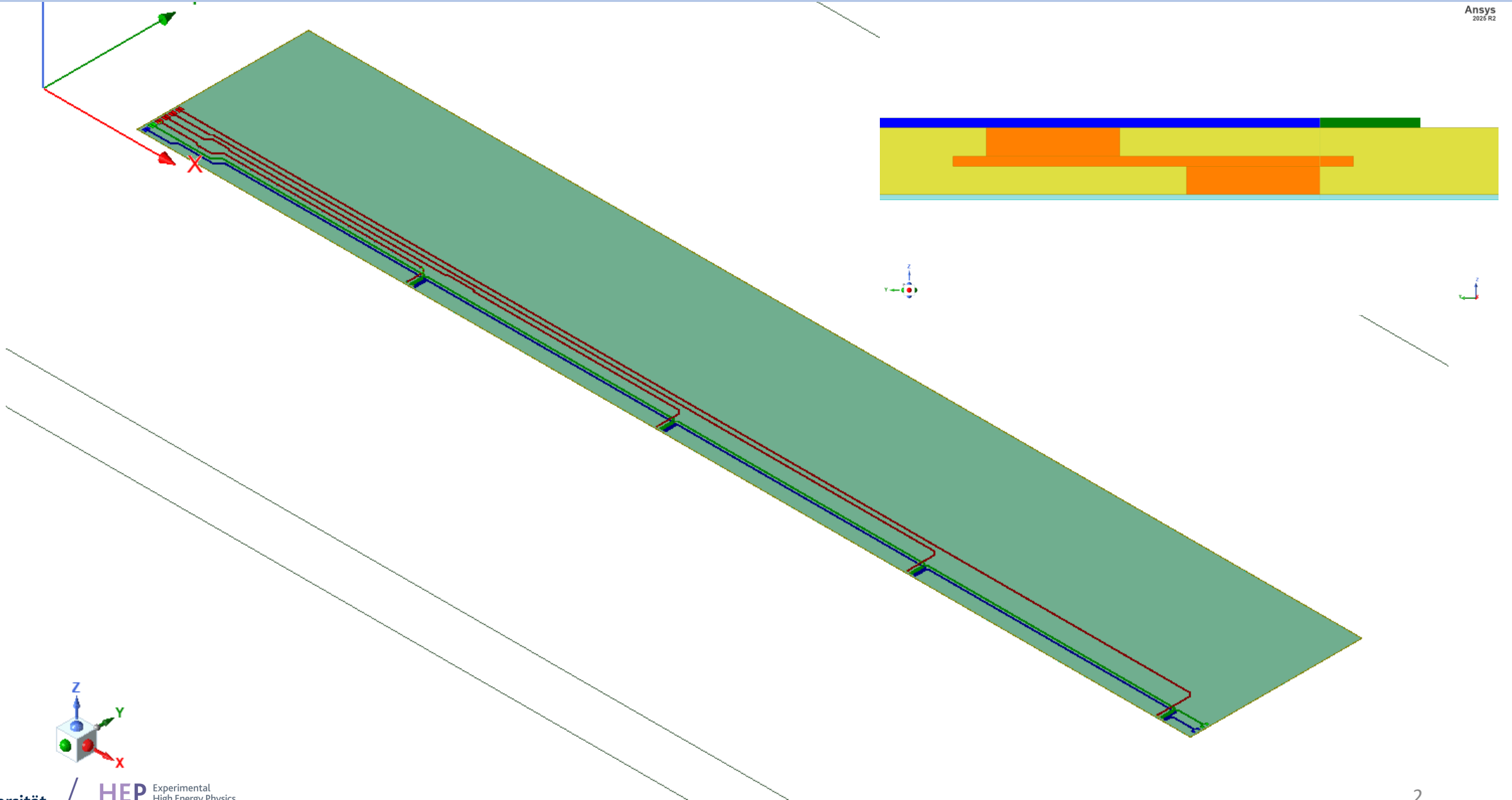
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22.05.2026

In collaboration with

Ansys (HFSS) Simulations Design of IZM structure

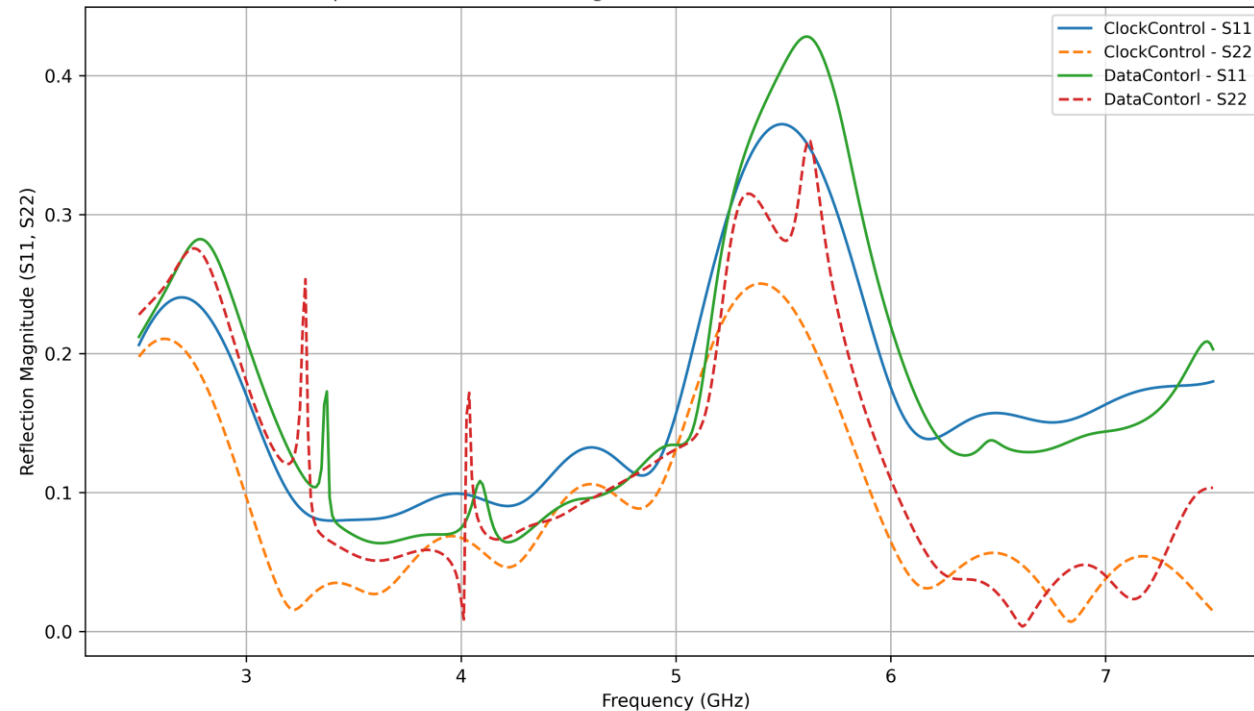
Ansys
2025 R2



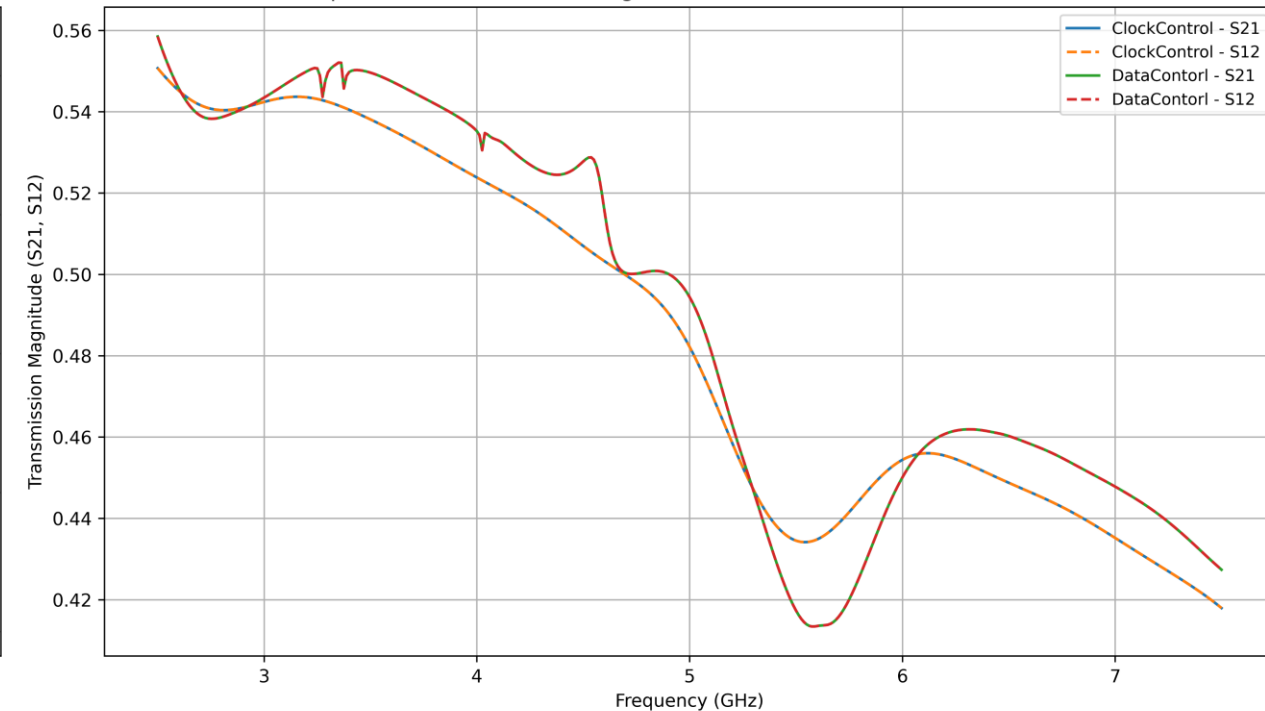
Ansys (HFSS) Simulations results of IZM structure

What is the reason behind the resonance pattern?

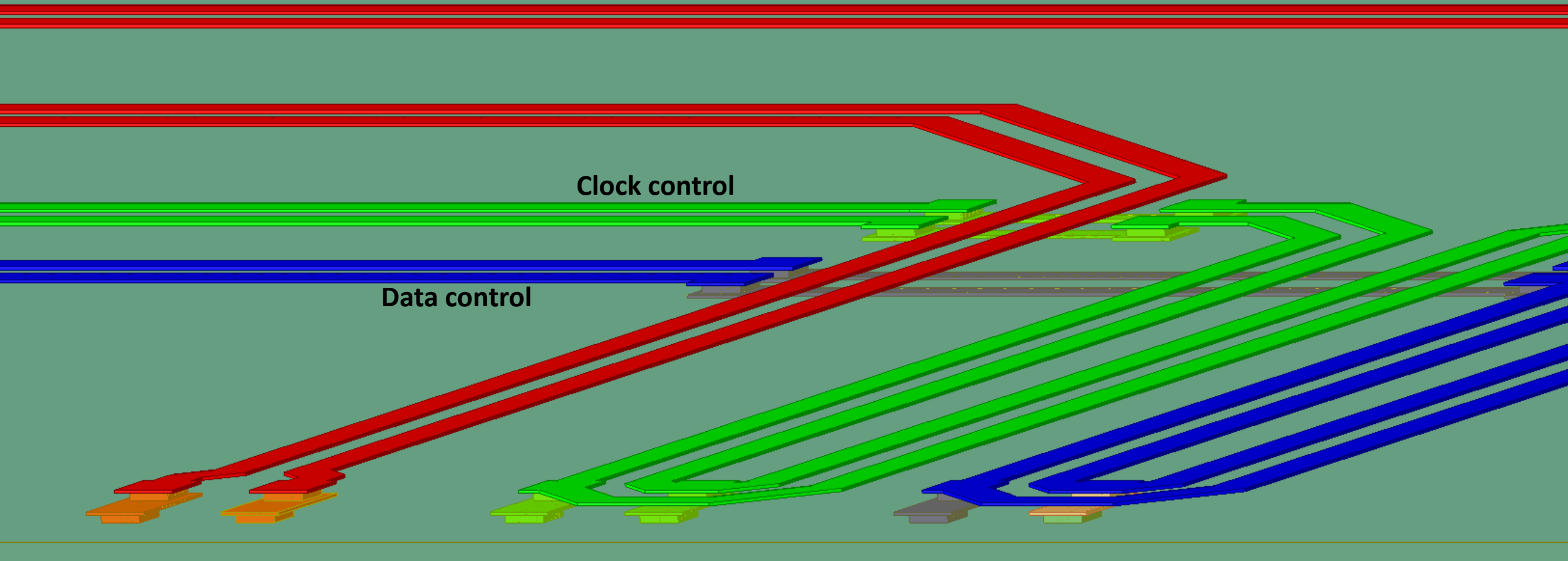
Comparison of Reflection Magnitude of Differential Lines in IZM Structure



Comparison of Transmission Magnitude of Differential Lines in IZM Structure



Ansys (HFSS) Simulations Design of IZM structure

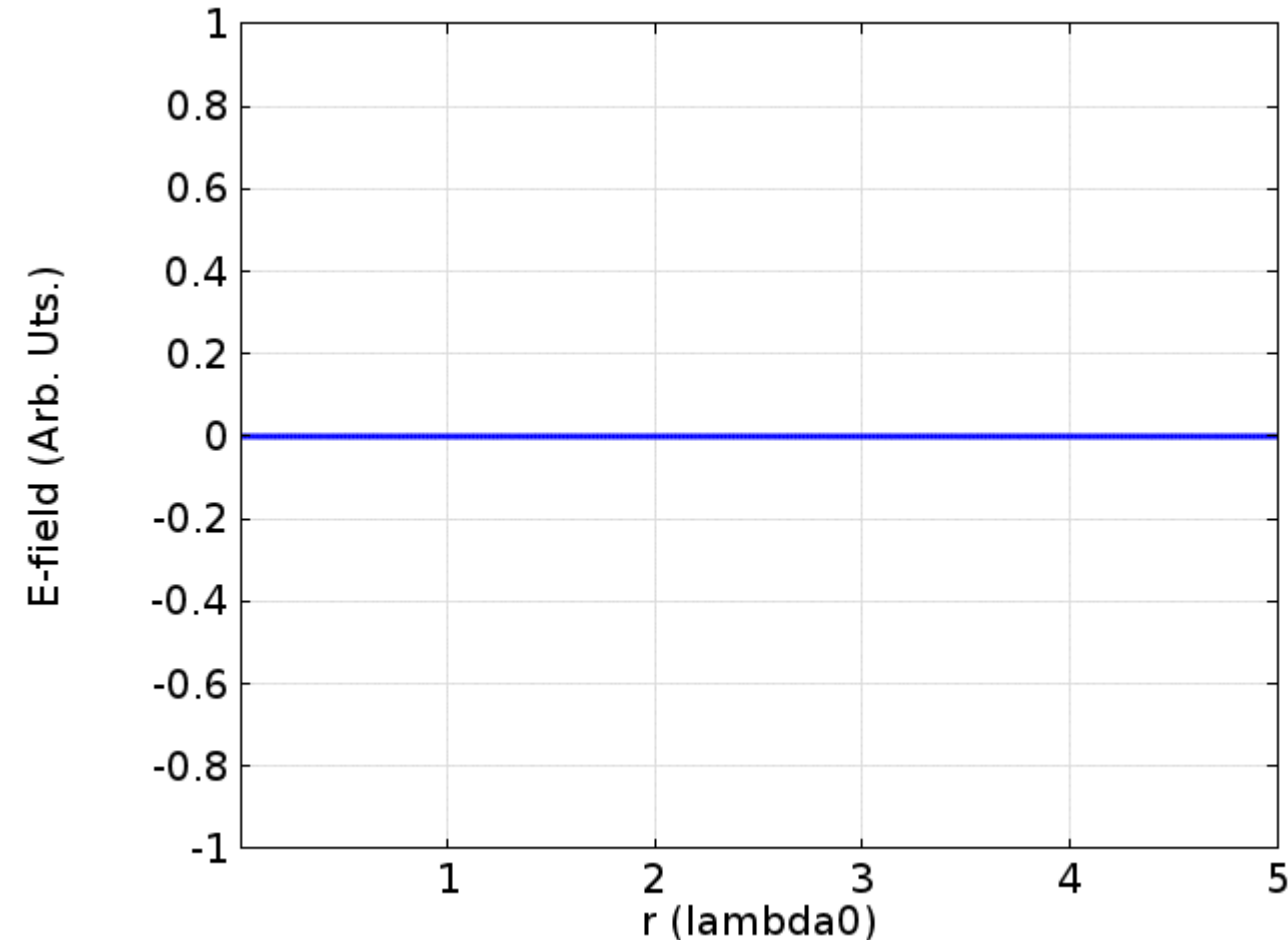


Clock control

Data control



Ansys (HFSS) Simulations results of IZM structure



- In differential pairs of IZM structure, we have impedance mismatch due to the vias, which is why part of the input signal reflects.

We then have:

Forward wave: $V^+(x, t)$

Reflected wave: $V^-(x, t)$

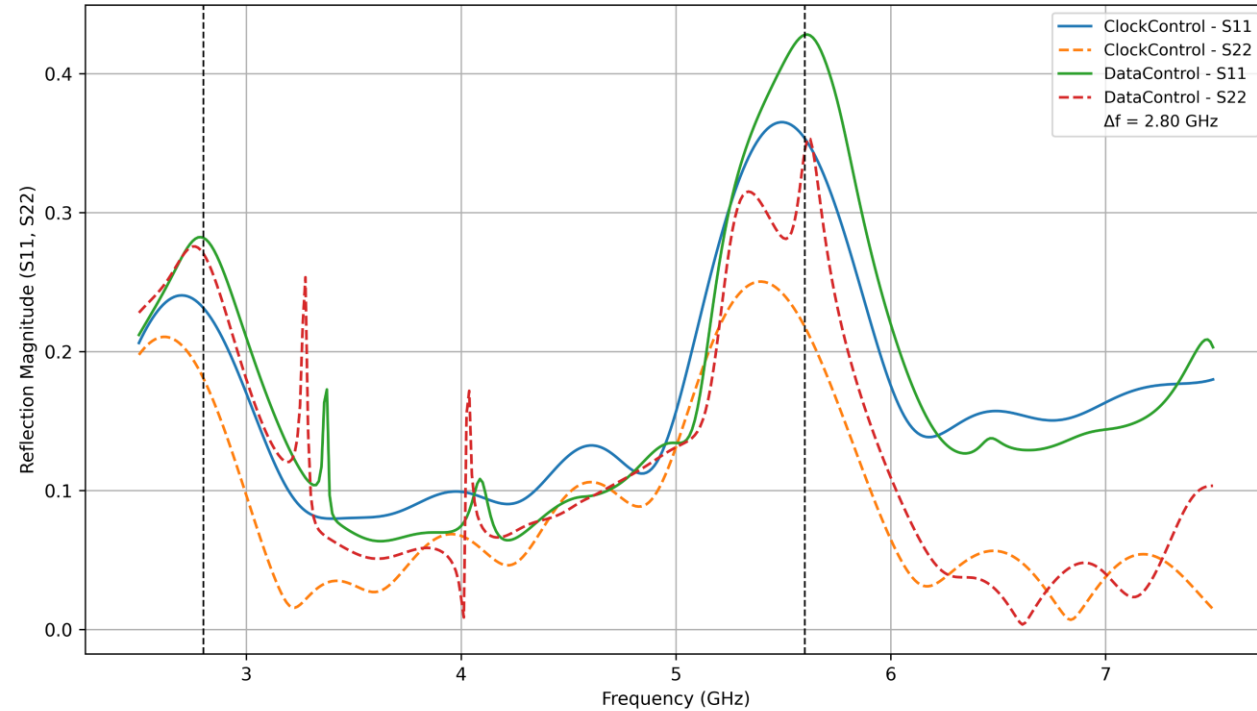
- This reflected wave interferes with forward wave and create constructive and destructive interference pattern
- The following equation can quantify this interference pattern,

$$\Delta f = \frac{c}{2l\sqrt{\epsilon_{eff}}}$$

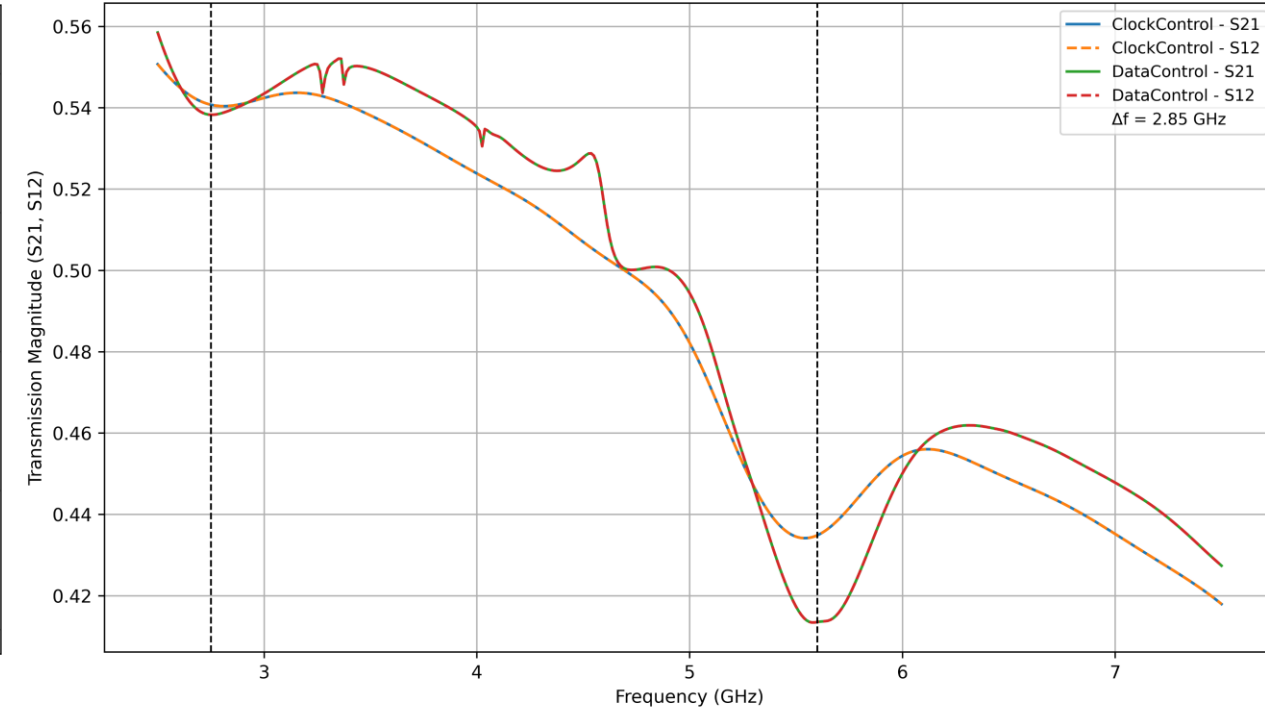
- Where ϵ_{eff} is the effective permittivity of substrate material

Ansys (HFSS) Simulations results of IZM structure

Comparison of Reflection Magnitude of Differential Lines in IZM Structure

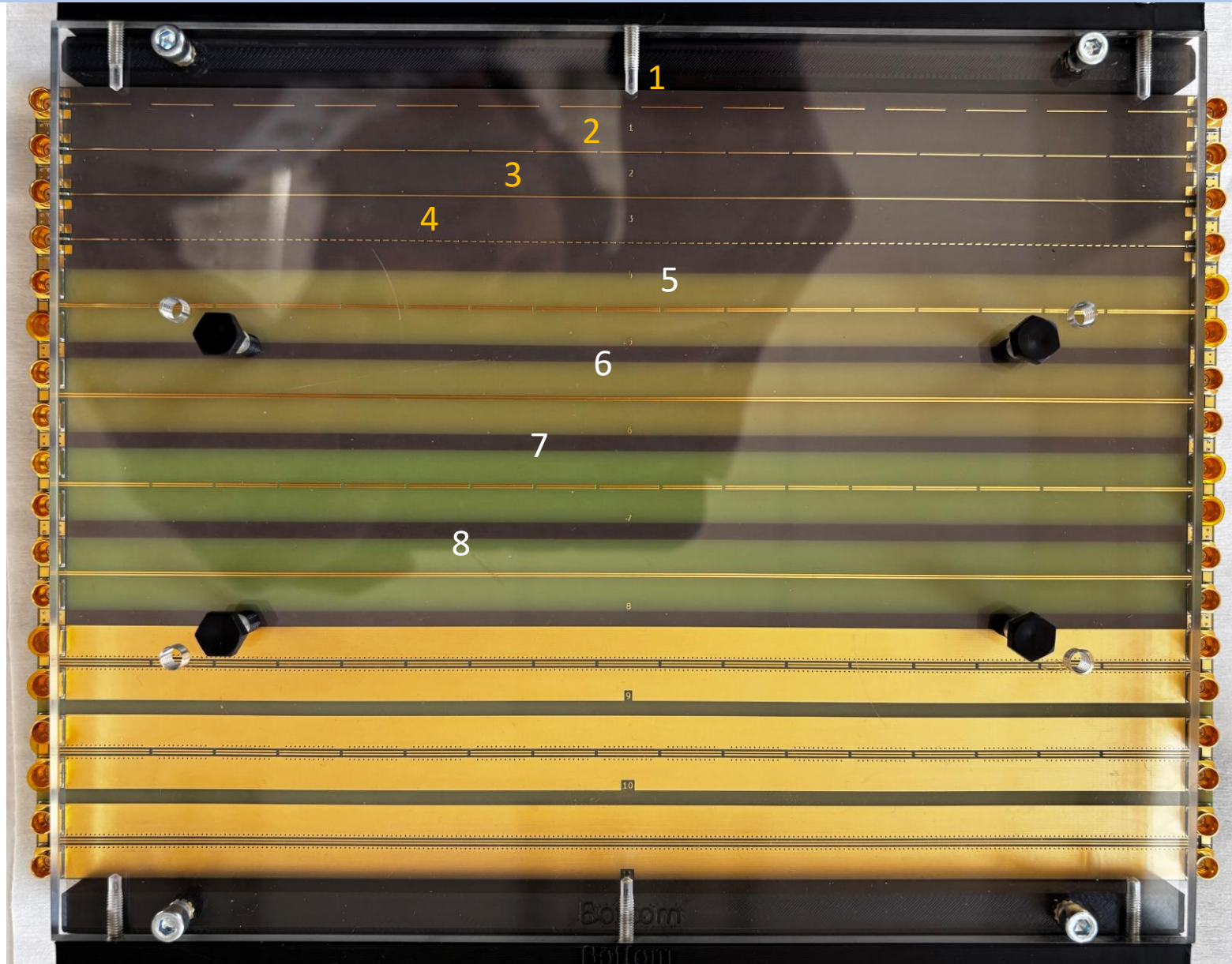


Comparison of Transmission Magnitude of Differential Lines in IZM Structure



- In the IZM structure, we have an impedance mismatch in the clock line and the data control line at length $l = 32$ mm
- By putting this value in the equation, we get $\Delta f = 2.8$ GHz
- This result suggests that the difference between 2 resonance peaks will be 2.8 GHz

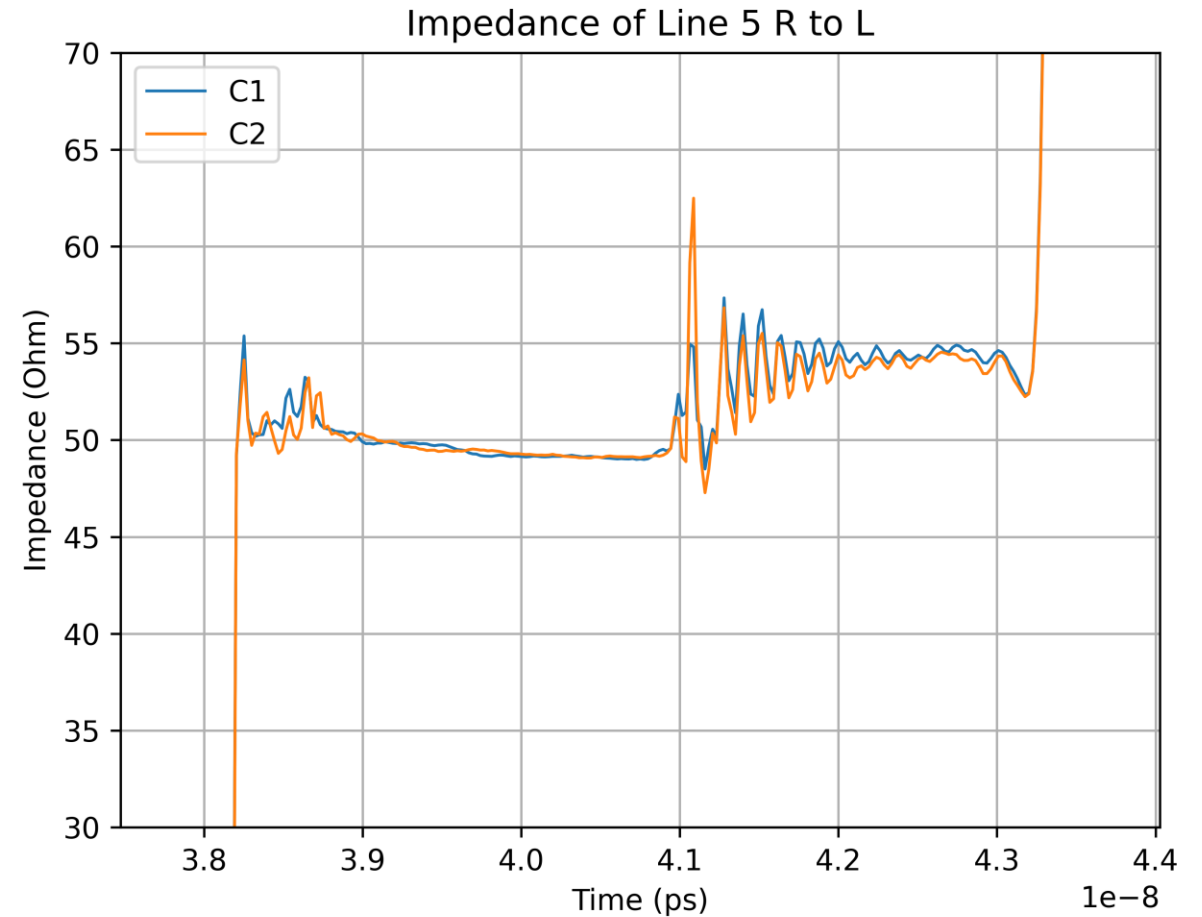
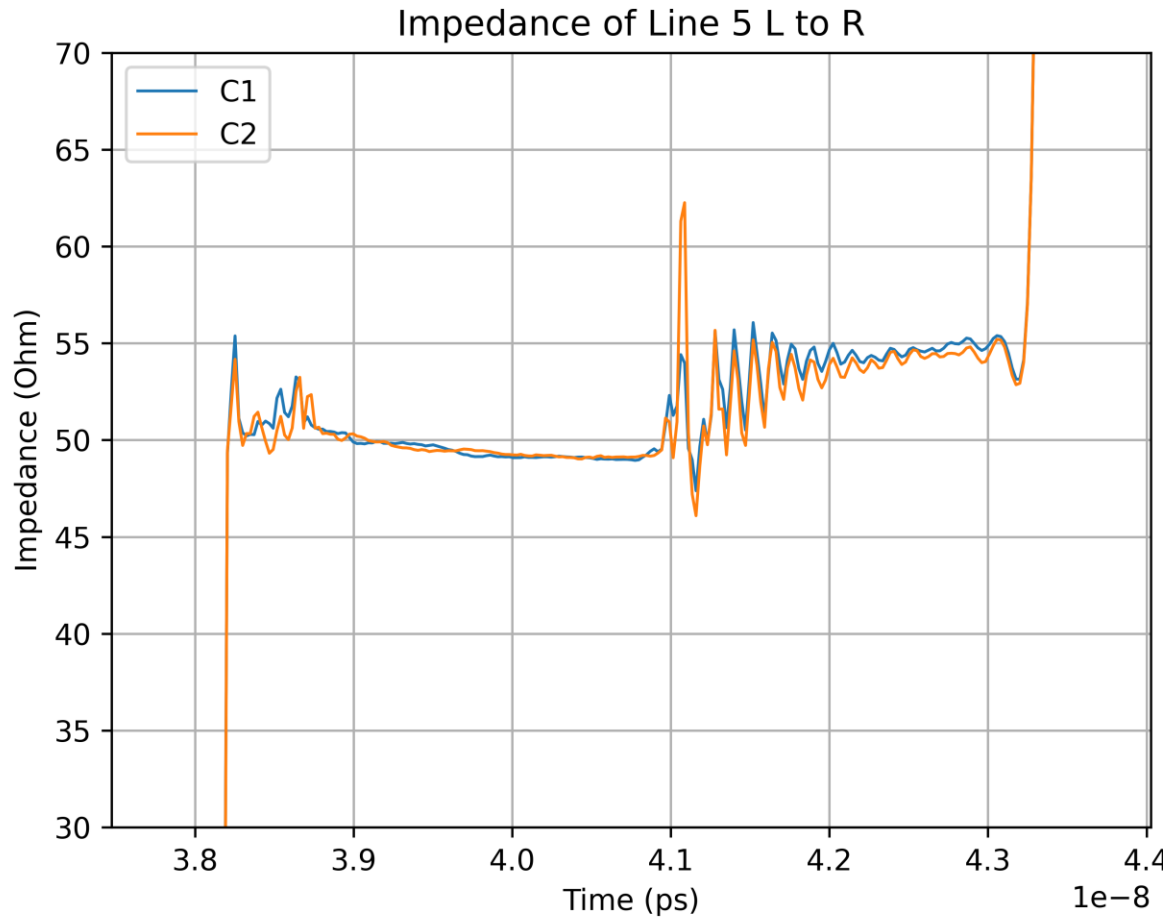
TDR measurements of the wire-bond test PCB



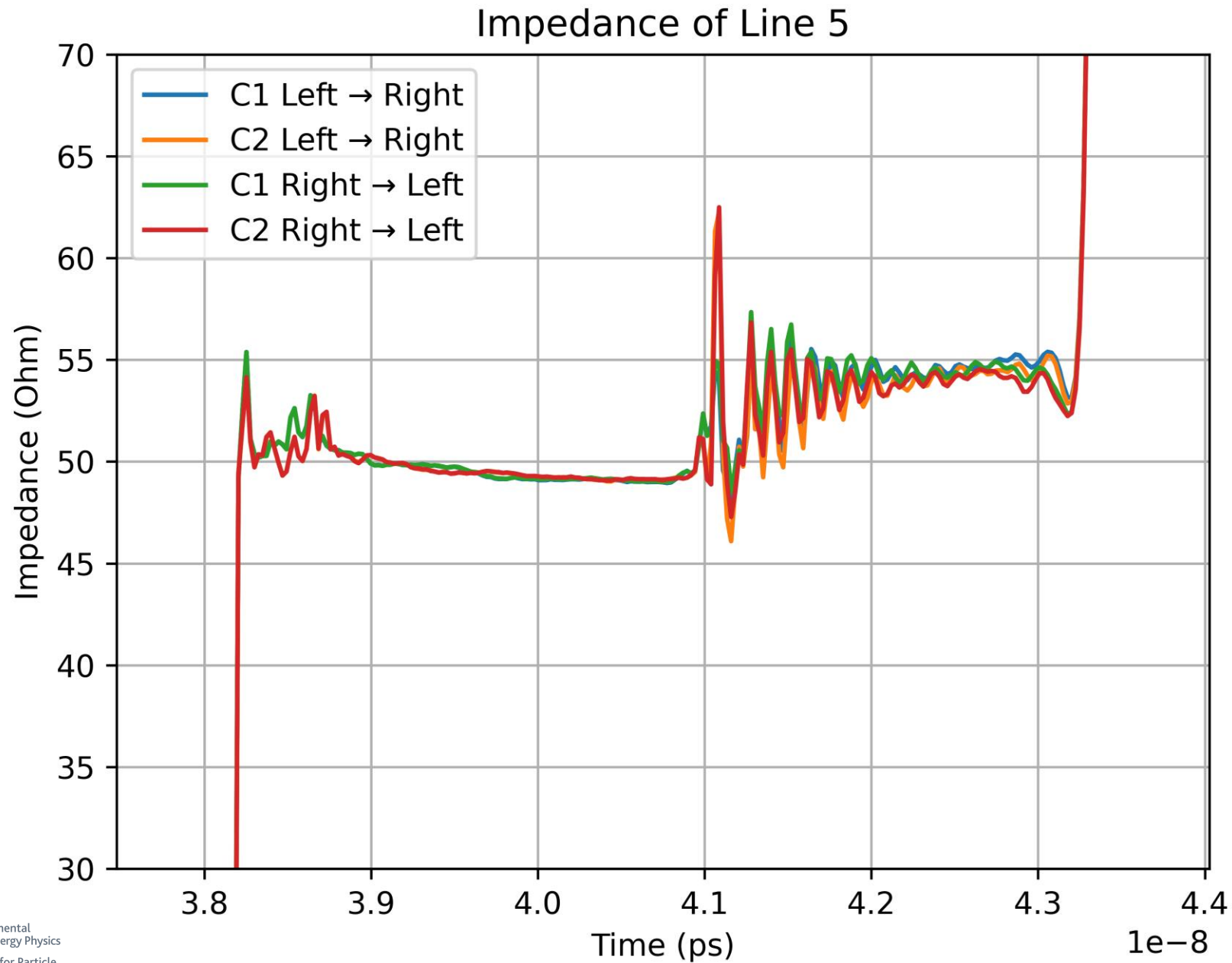
TDR measurements of the wire-bond test PCB

wrp: With reference plane

Impedance measurements of line-5^{wrp}



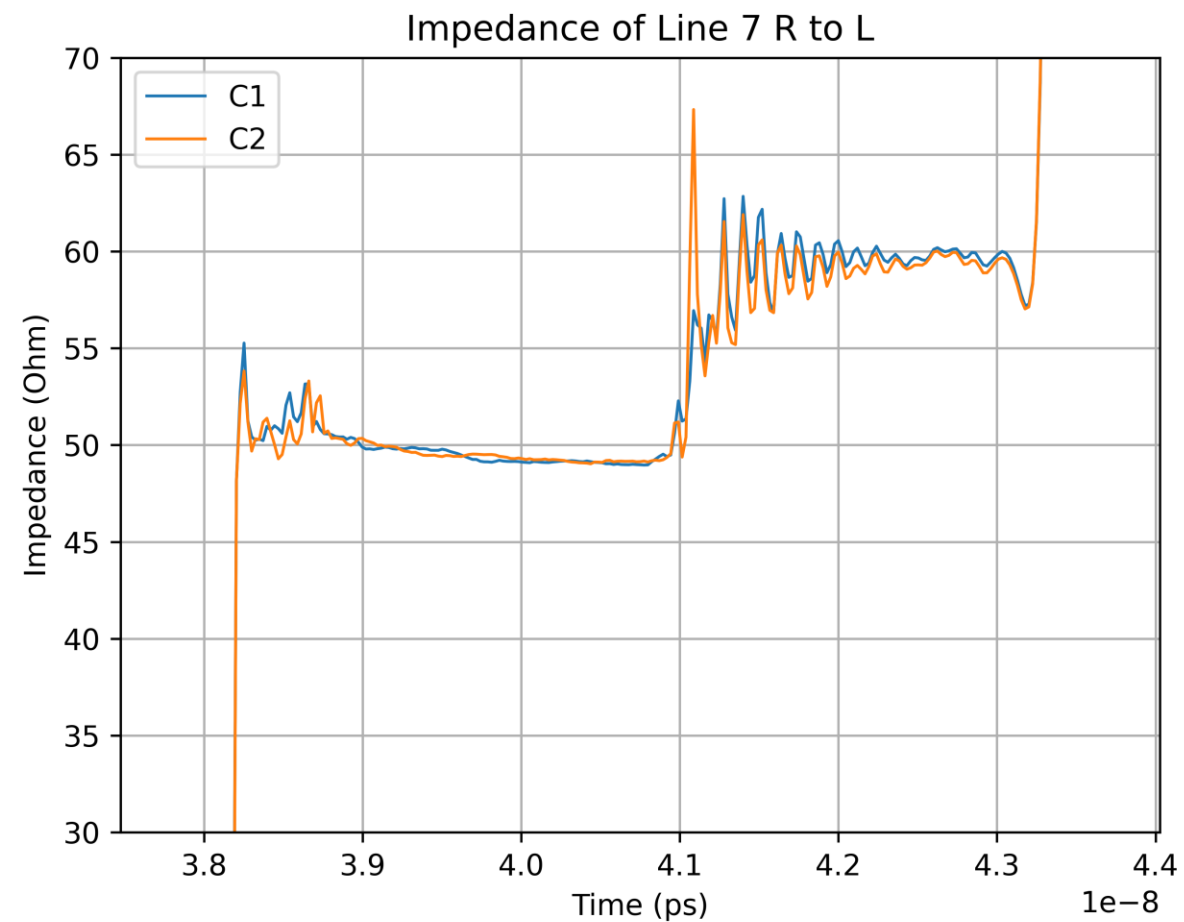
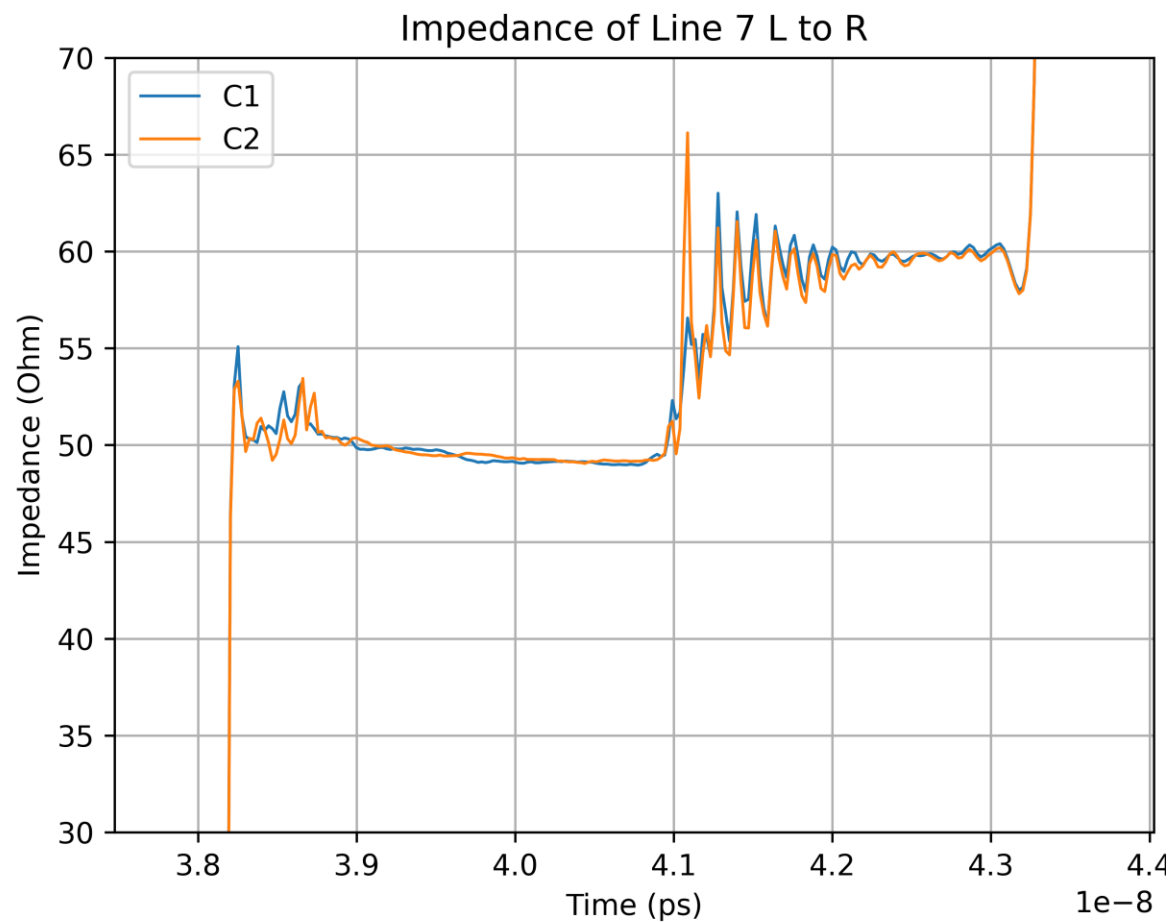
TDR measurements of the wire-bond test PCB



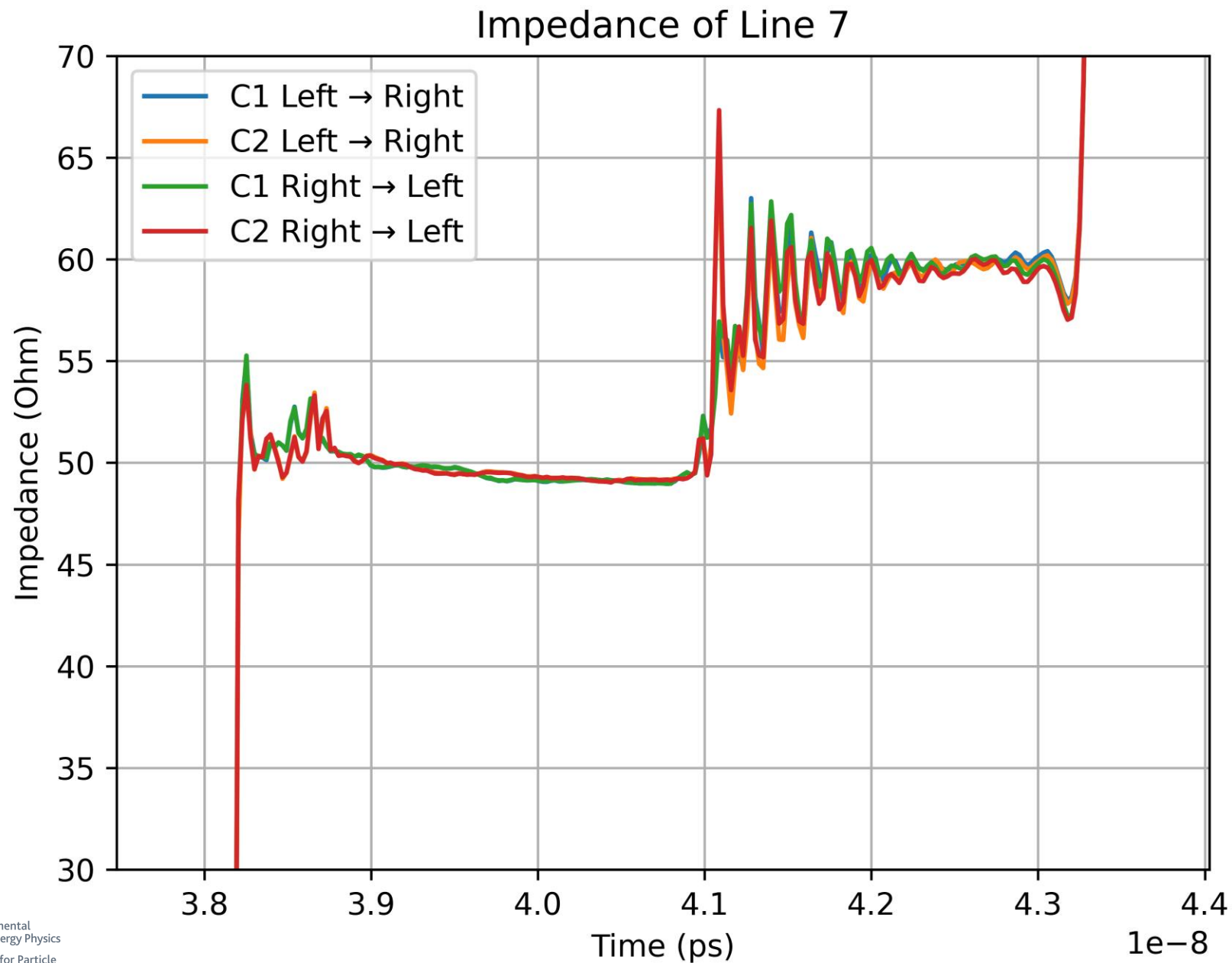
TDR measurements of the wire-bond test PCB

w/orp: Without reference plane

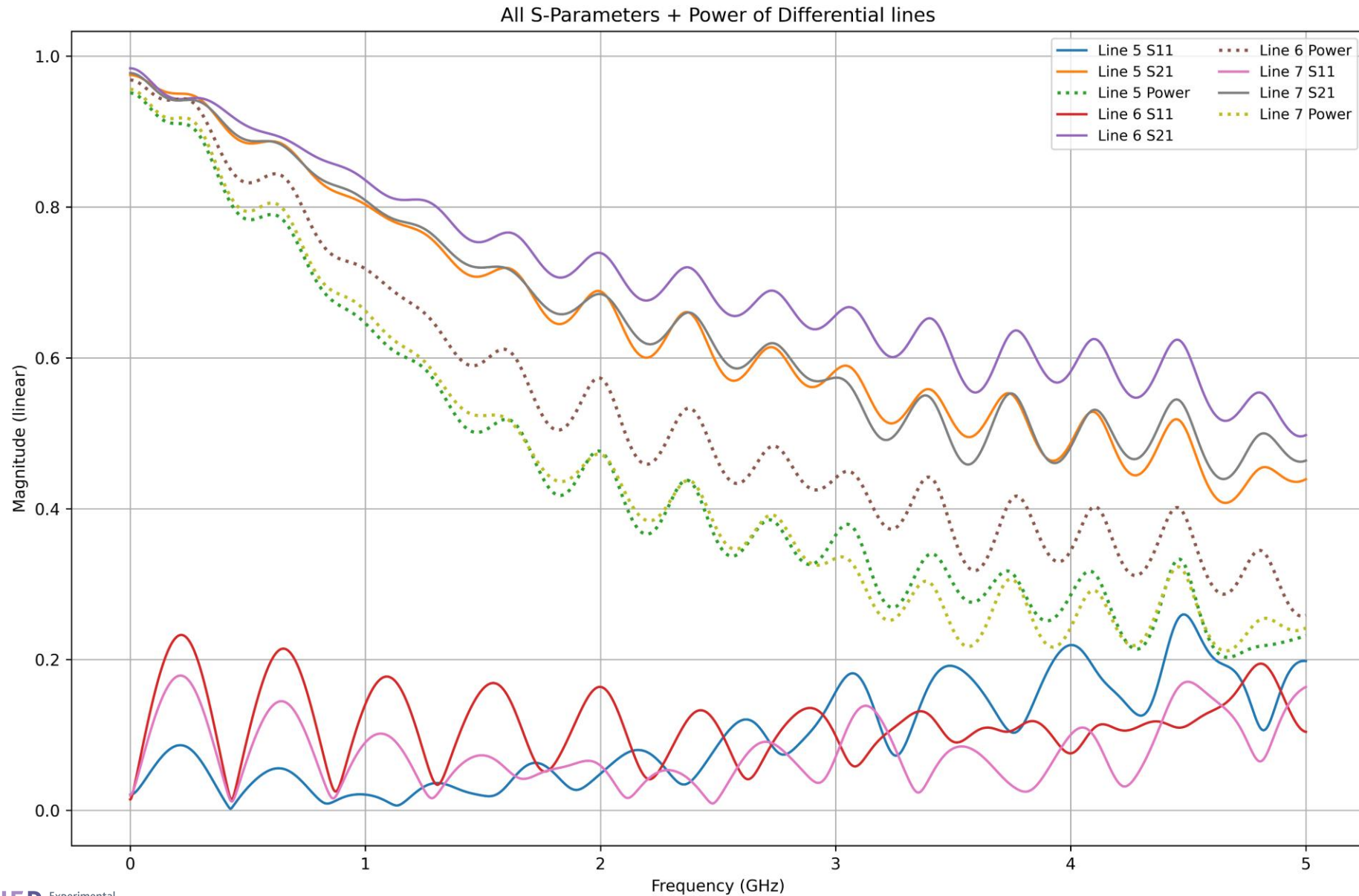
Impedance measurements of line-7^{w/orp}



TDR measurements of the wire-bond test PCB



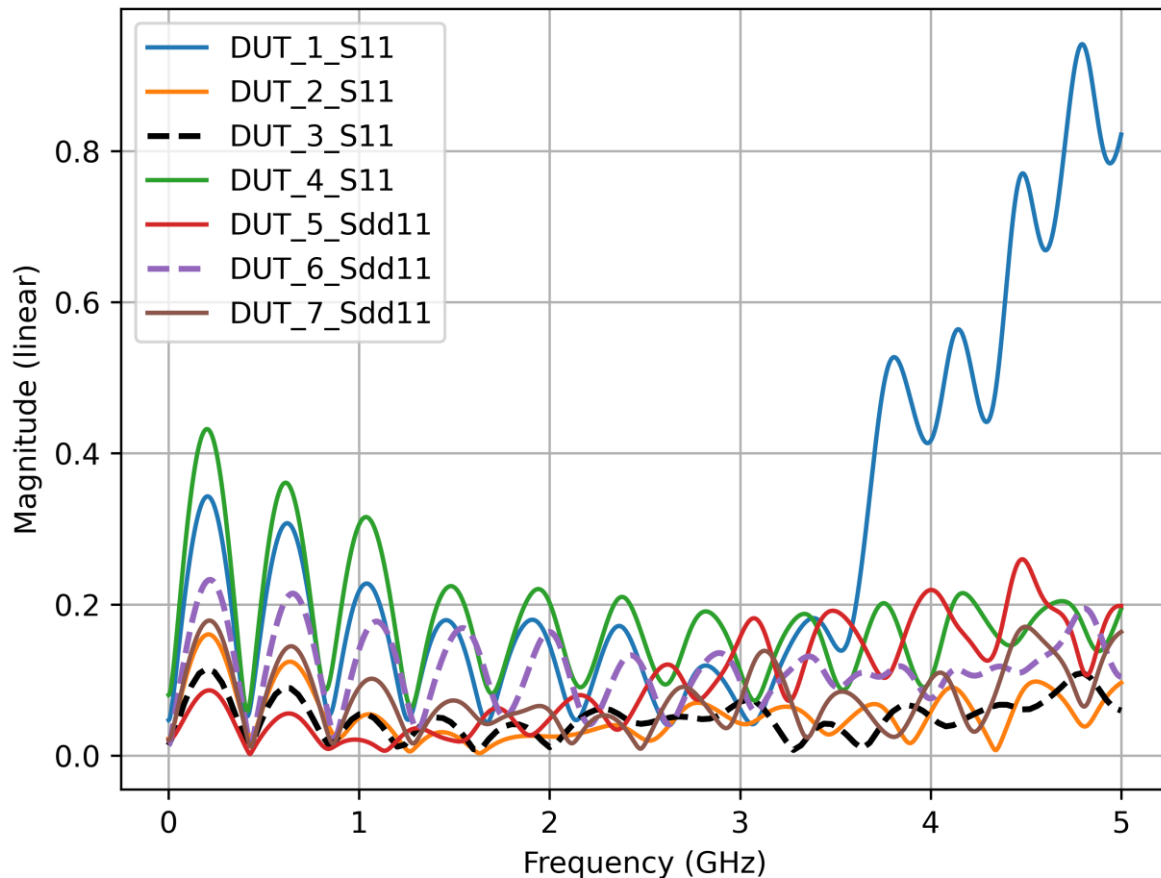
TDR measurements of the wire-bond test PCB



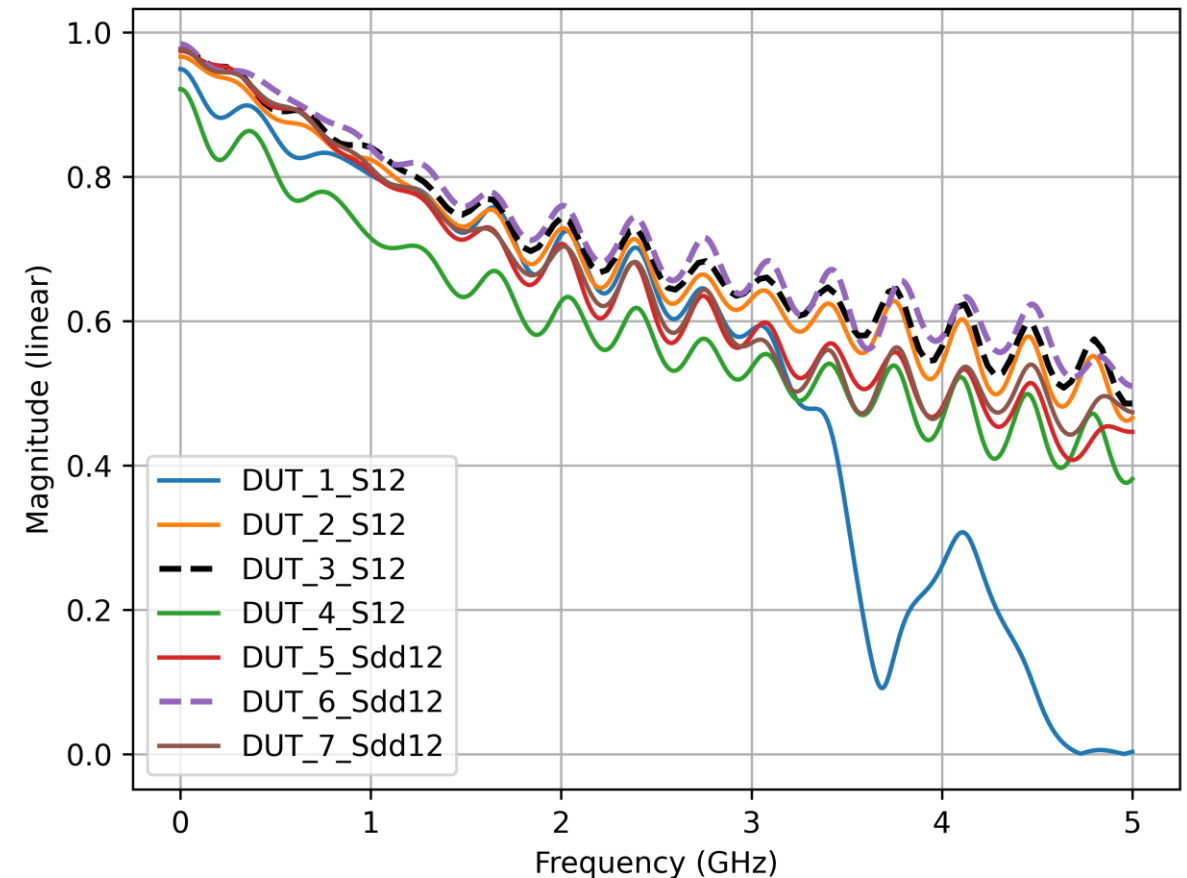
TDR measurements of the wire-bond test PCB

S-parameter comparison of all transmission lines

S11 Comparison for all microstrips in TEST PCB



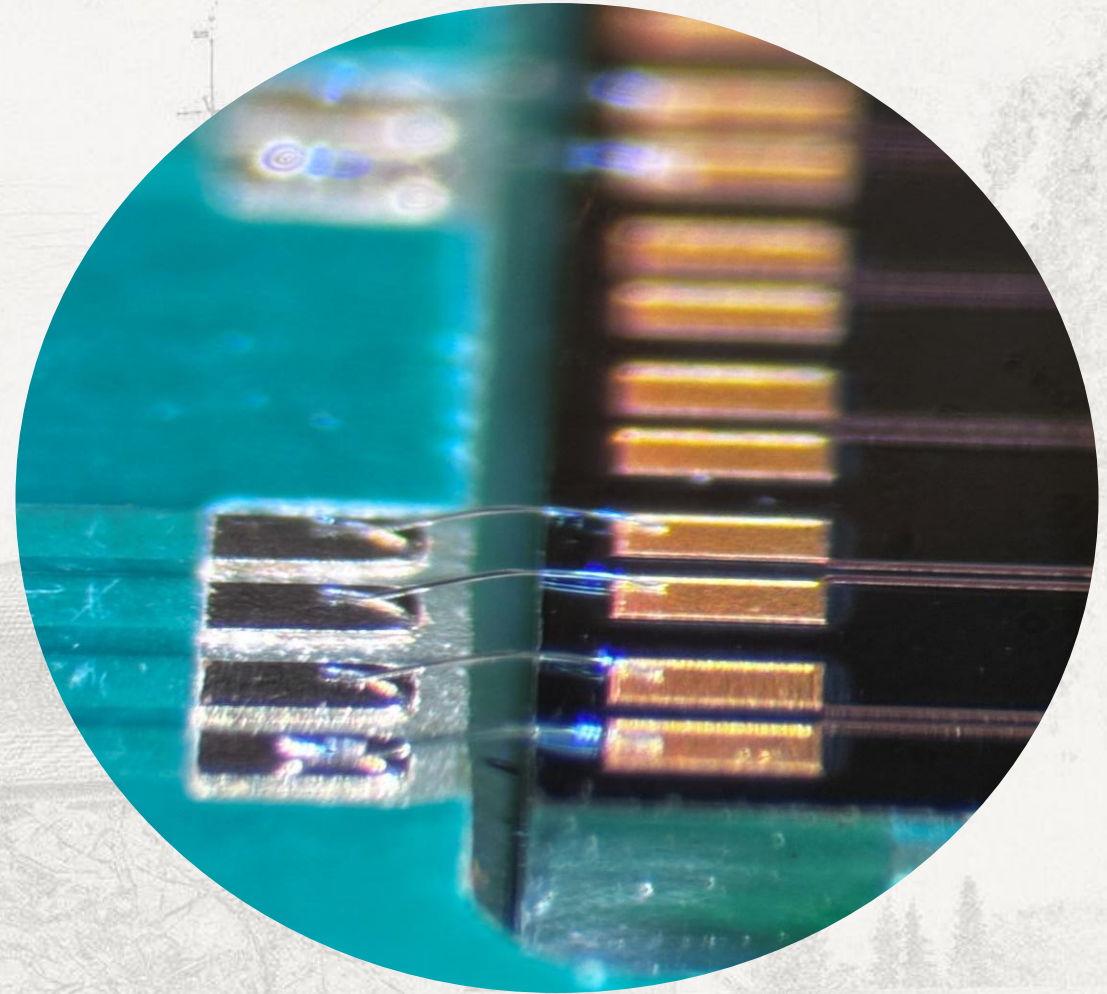
S12 Comparison for all microstrips in TEST PCB



Next steps :

- Simulations of the IZM structure with surface roughness are in progress
- Wire-bonding of IZM structure is done, next Wednesday, TDR measurements will be done

Suggestions?

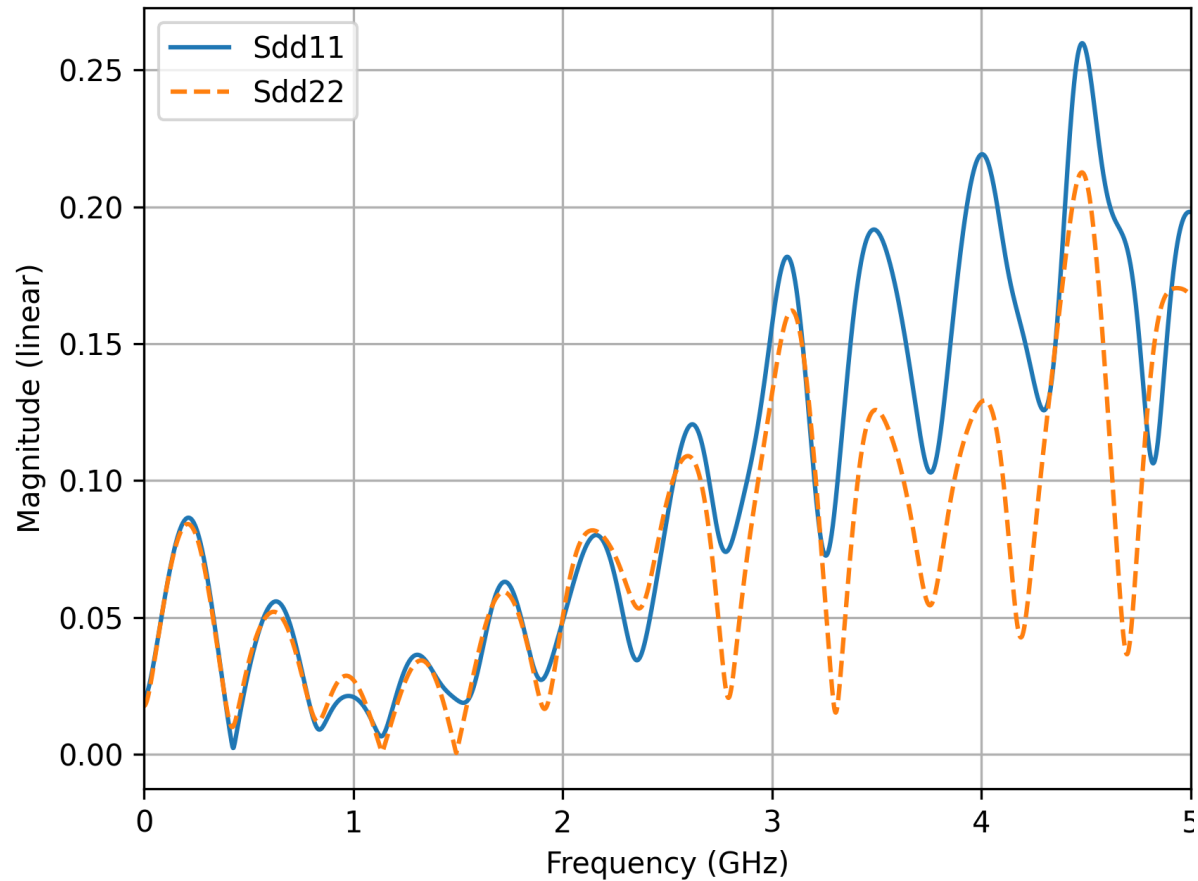


Backup slides

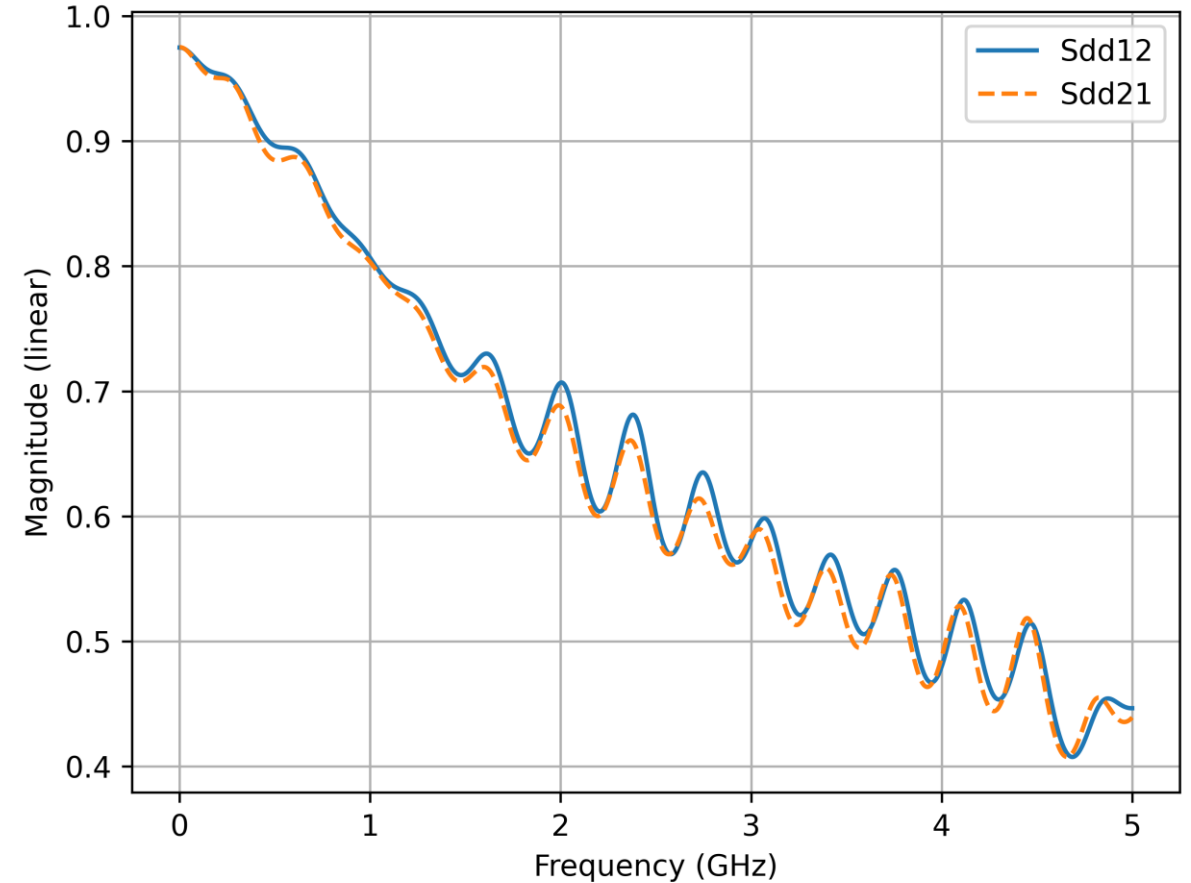
TDR measurements of the wire-bond test PCB

S-parameter measurements of line-5^{wrp}

Sdd11 and Sdd22 (Linear) of TL 5



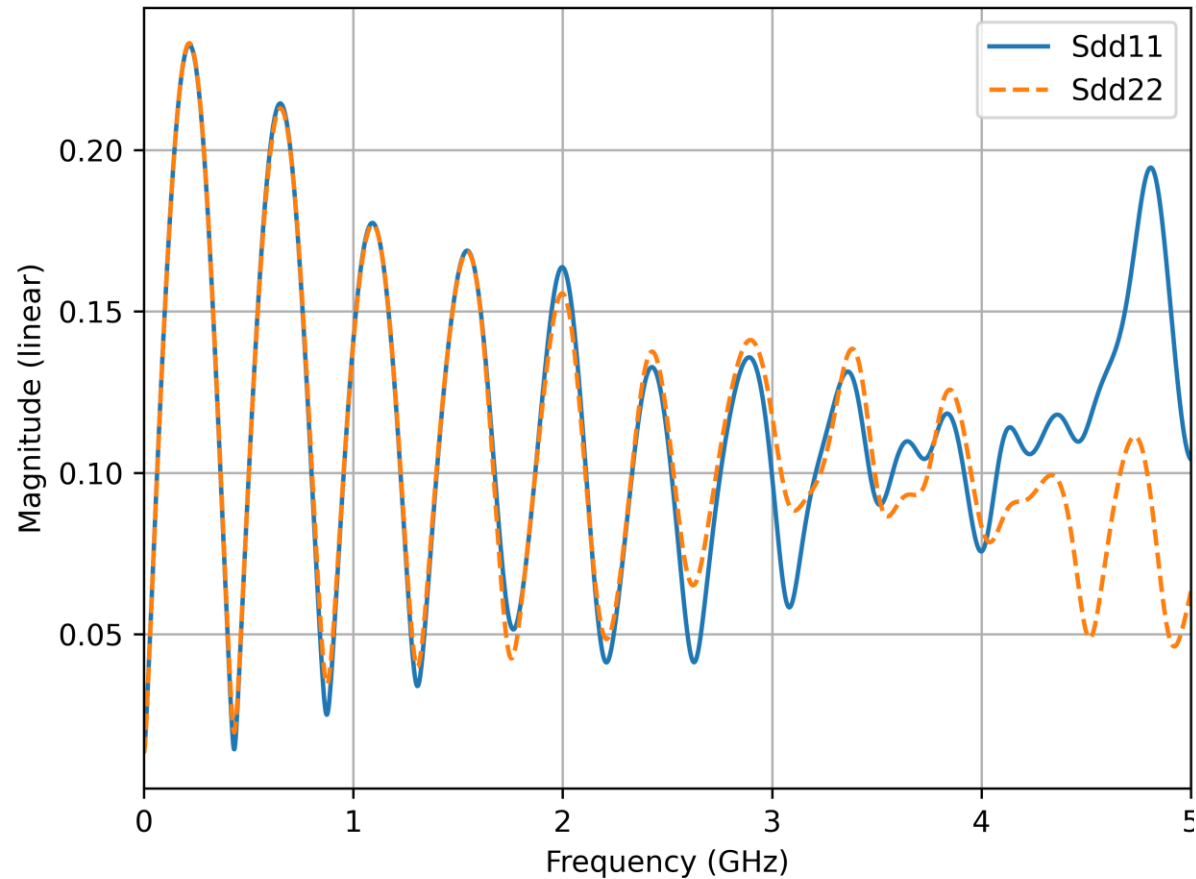
Sdd12 and Sdd21 (Linear) of TL 5



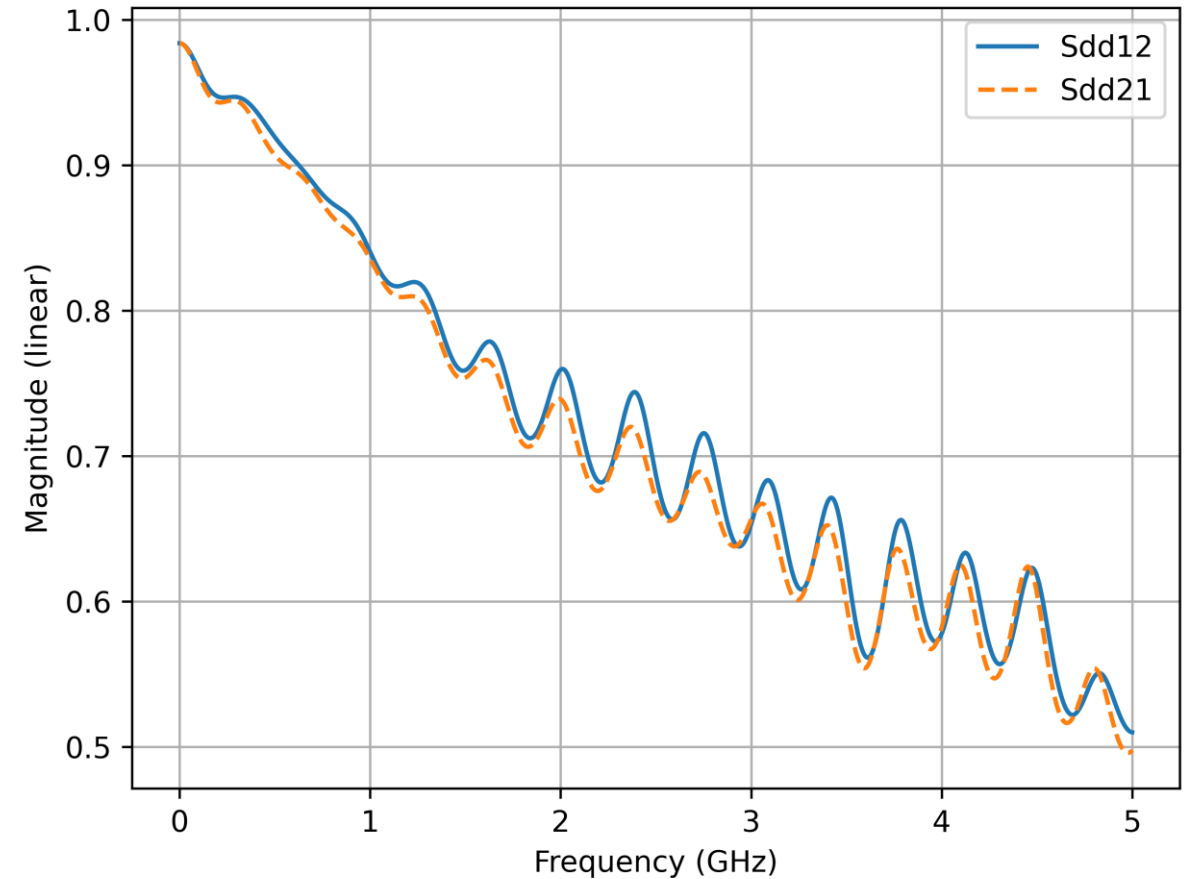
TDR measurements of the wire-bond test PCB

S-parameter measurements of line-6^{wrp}

Sdd11 and Sdd22 (Linear) of TL 6



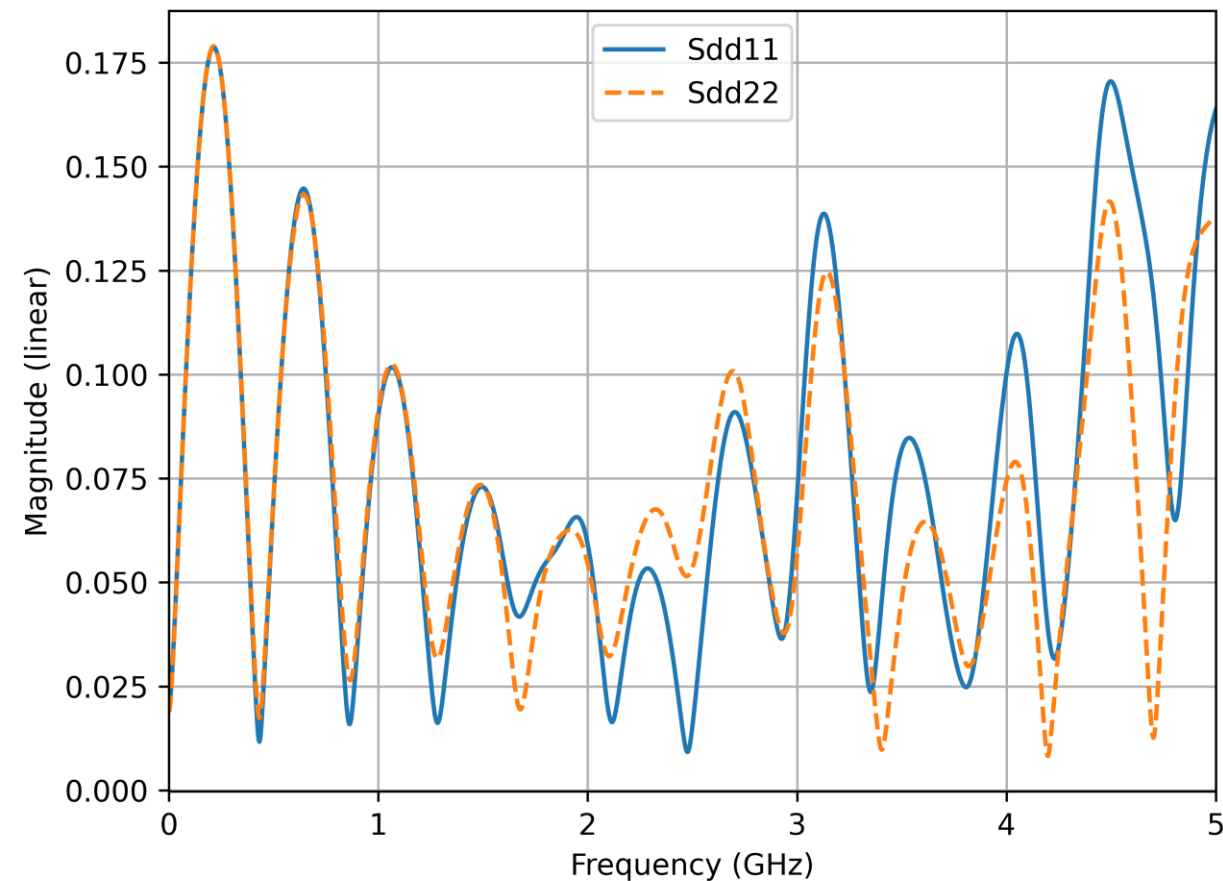
Sdd12 and Sdd21 (Linear) of TL 6



TDR measurements of the wire-bond test PCB

S-parameter measurements of line-7^{w/orp}

Sdd11 and Sdd22 (Linear) of TL 7



Sdd12 and Sdd21 (Linear) of TL 7

