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Yamaichi Enhanced QSFP Connector

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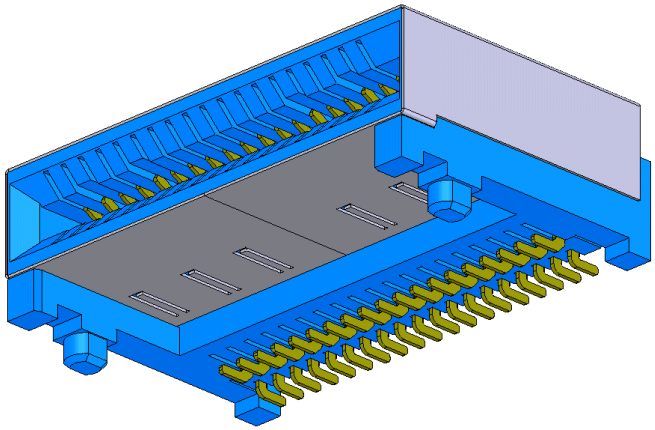

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Proposal Scope and Goals

- Our Enhanced QSFP connector is footprint and plug compatible with as the QSFP+ and can perform a 25/28 Gbps
- Legacy design suffers from large pad sizes on the module PCB; reducing these pad sizes may be required to achieve target performance
- Yamaichi is also exploring a plug connector flavor of this design to further increase performance

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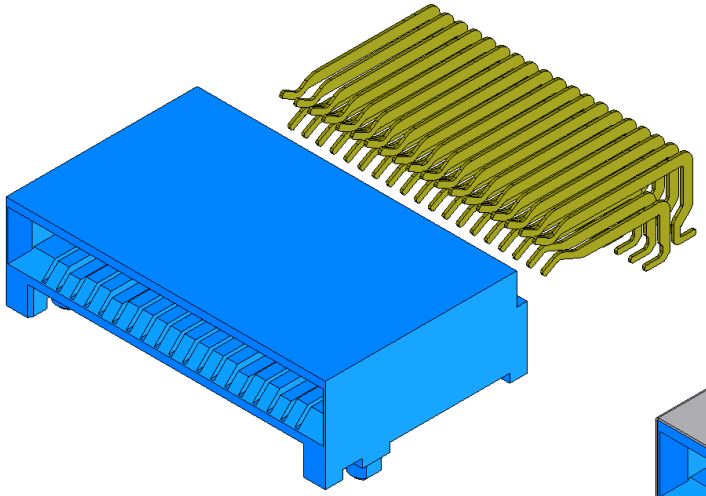
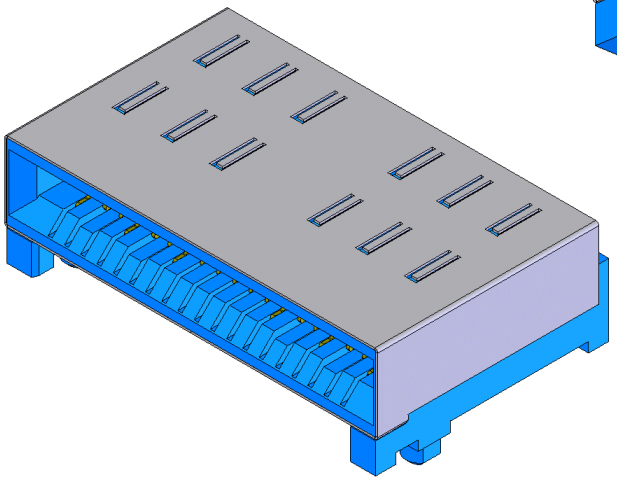
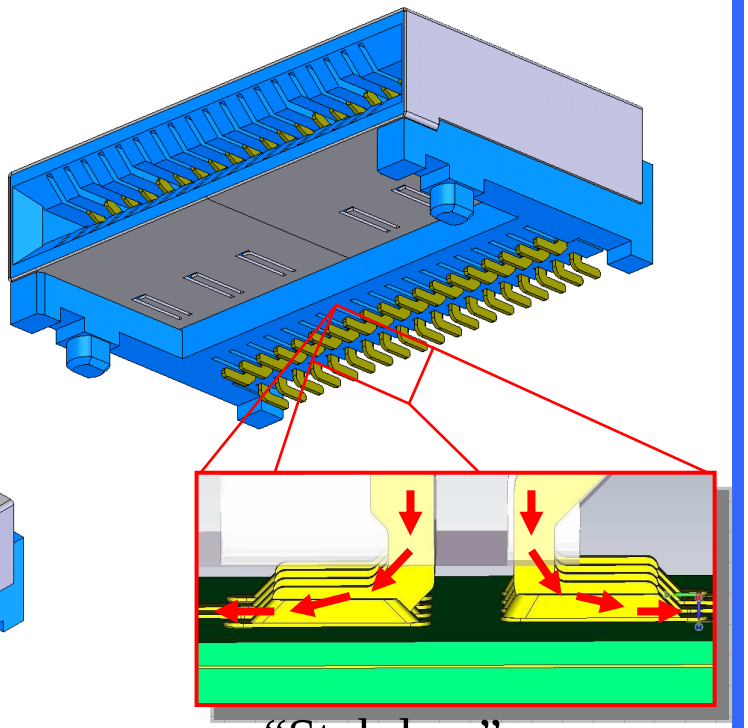
QSFP Design Summary

Enhanced QSFP

- Mating compatible with existing module boards
- Footprint compatible with existing QSFP specification
- Simple and Smooth shape contact design
- “stub-less solder terminal design with Lower contacts
- Common GND structure integrated into connector for good SI performance







“Stub less” escape

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Performance Summary

Insertion Loss		<0.8dB to 14 GHz
Return Loss		<14 dB to 14 GHz
Common Mode Conversion		<30 dB to 14 GHz

And footprint and mating compatible with existing QSFP+ specifications!

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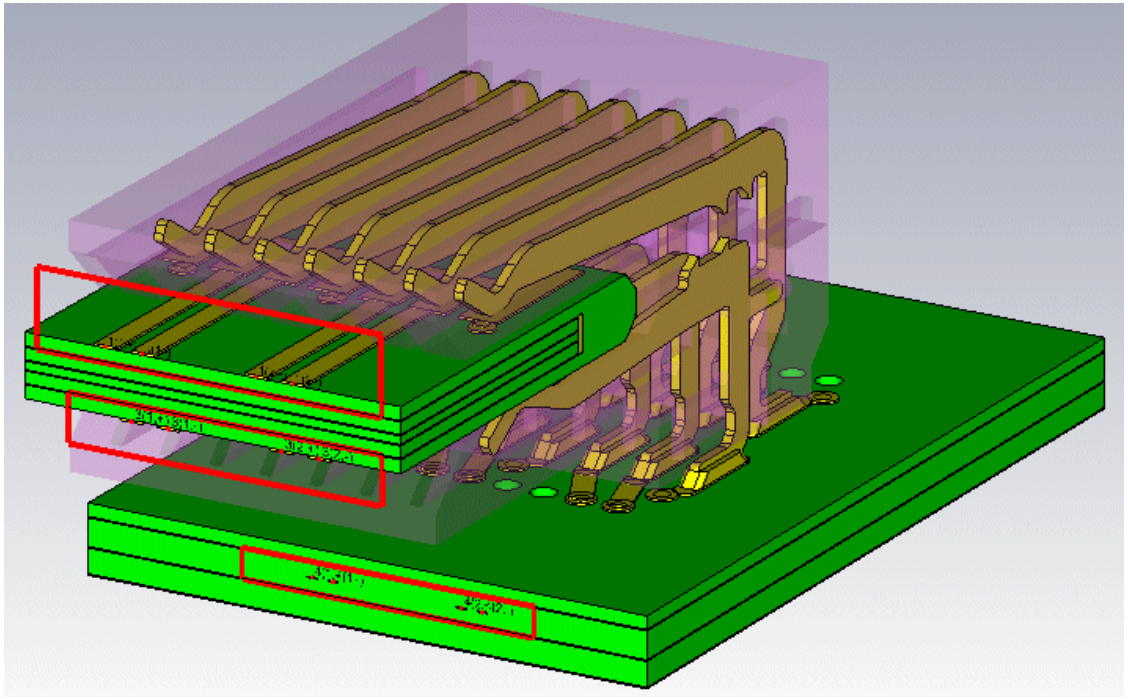
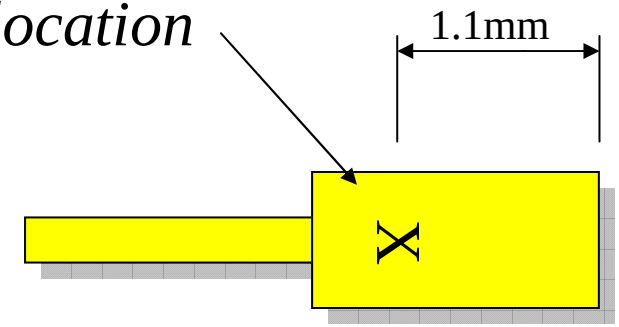
Enhanced QSFP + Reduced Pad Size SI Simulation Results

Simulation Profile

- Simulation done using CST Microwave Studio 2010.03
- > 4 million mesh nodes models used
- All measurements are differential
- QSFP Simulation Model – Top and bottom slice pin model shown below



Module board touchdown location



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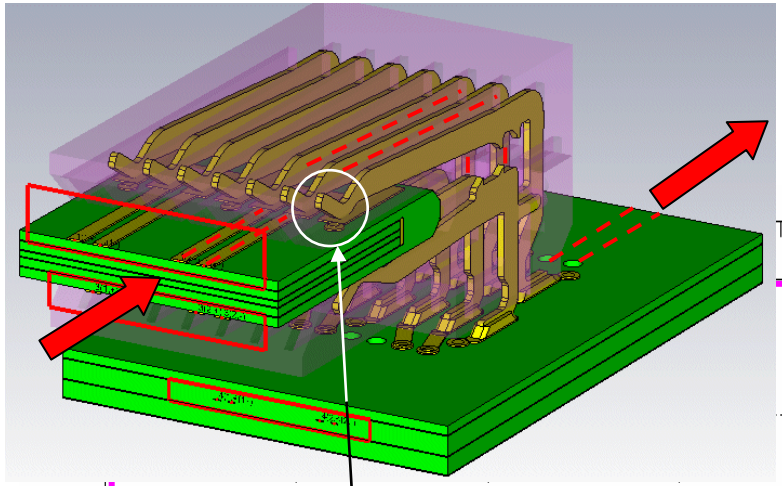
Connector Analysis



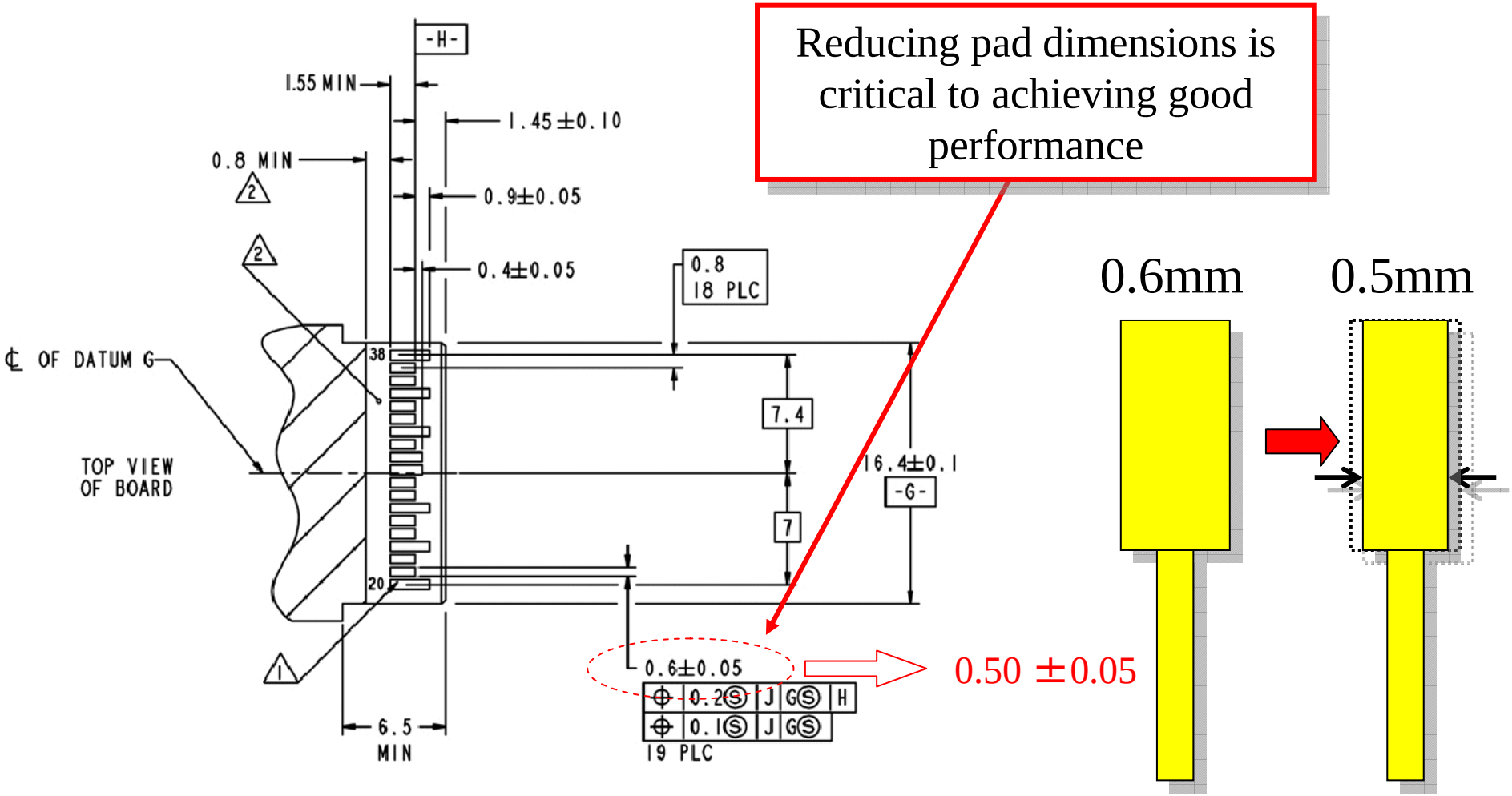
TDR

SPEC.PAD

Primary discontinuity caused by Module pads

(Previous connector version)

Reduced Module Pads Size



(Detailed explanation will be added at later updated presentation)

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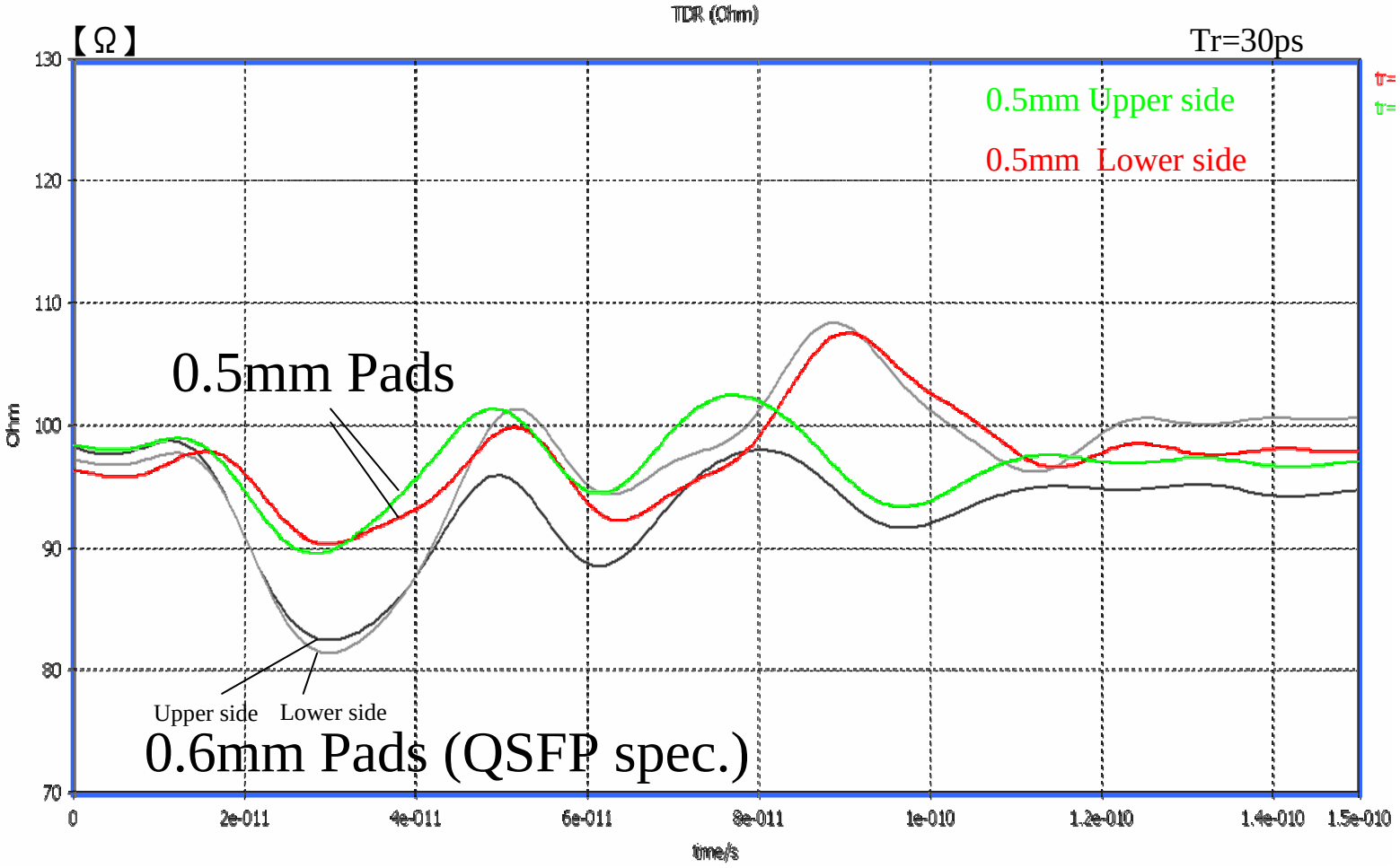
TDR with reduced pad width



(Previous connector version)

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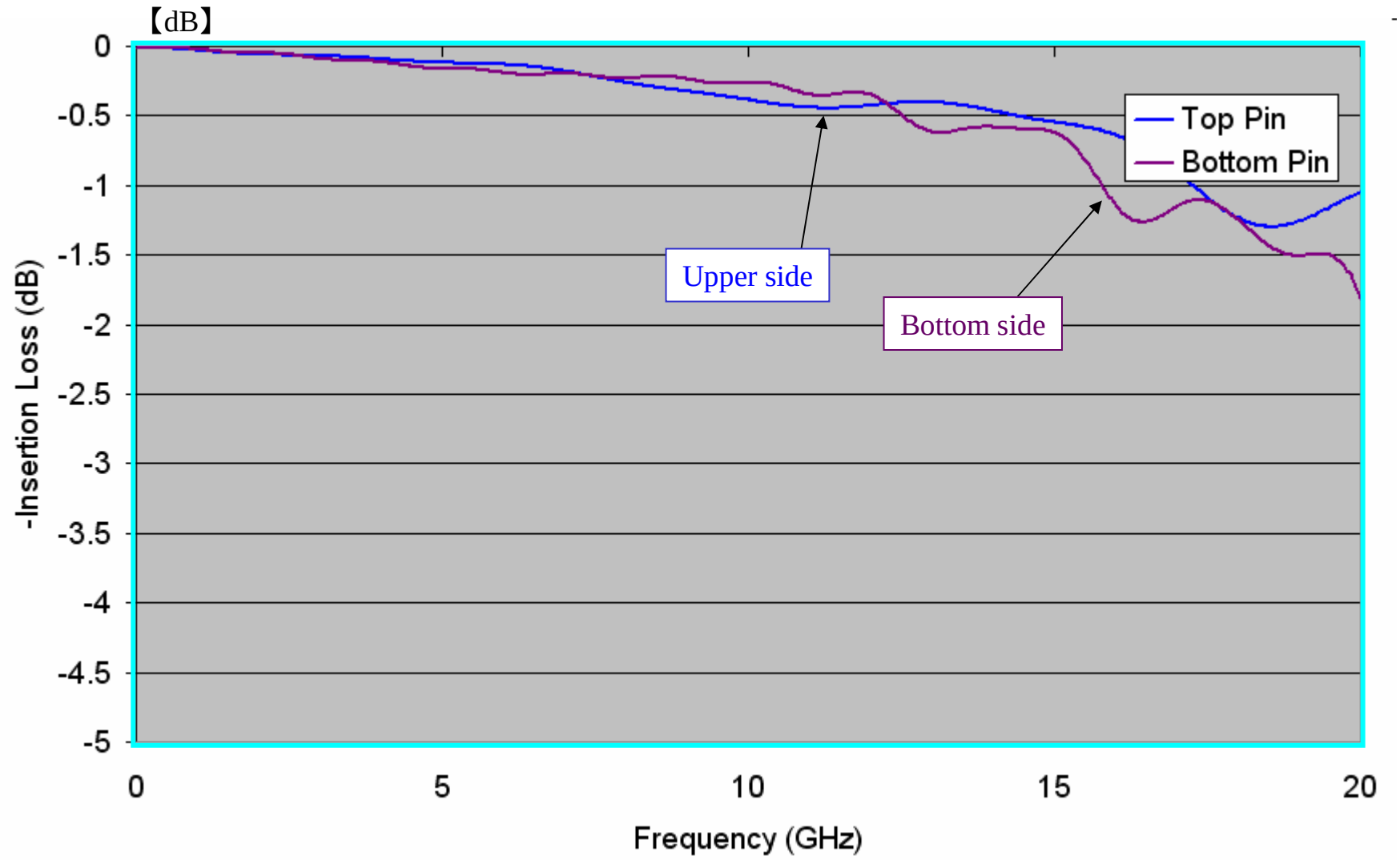
Insertion Loss(Sdd21)



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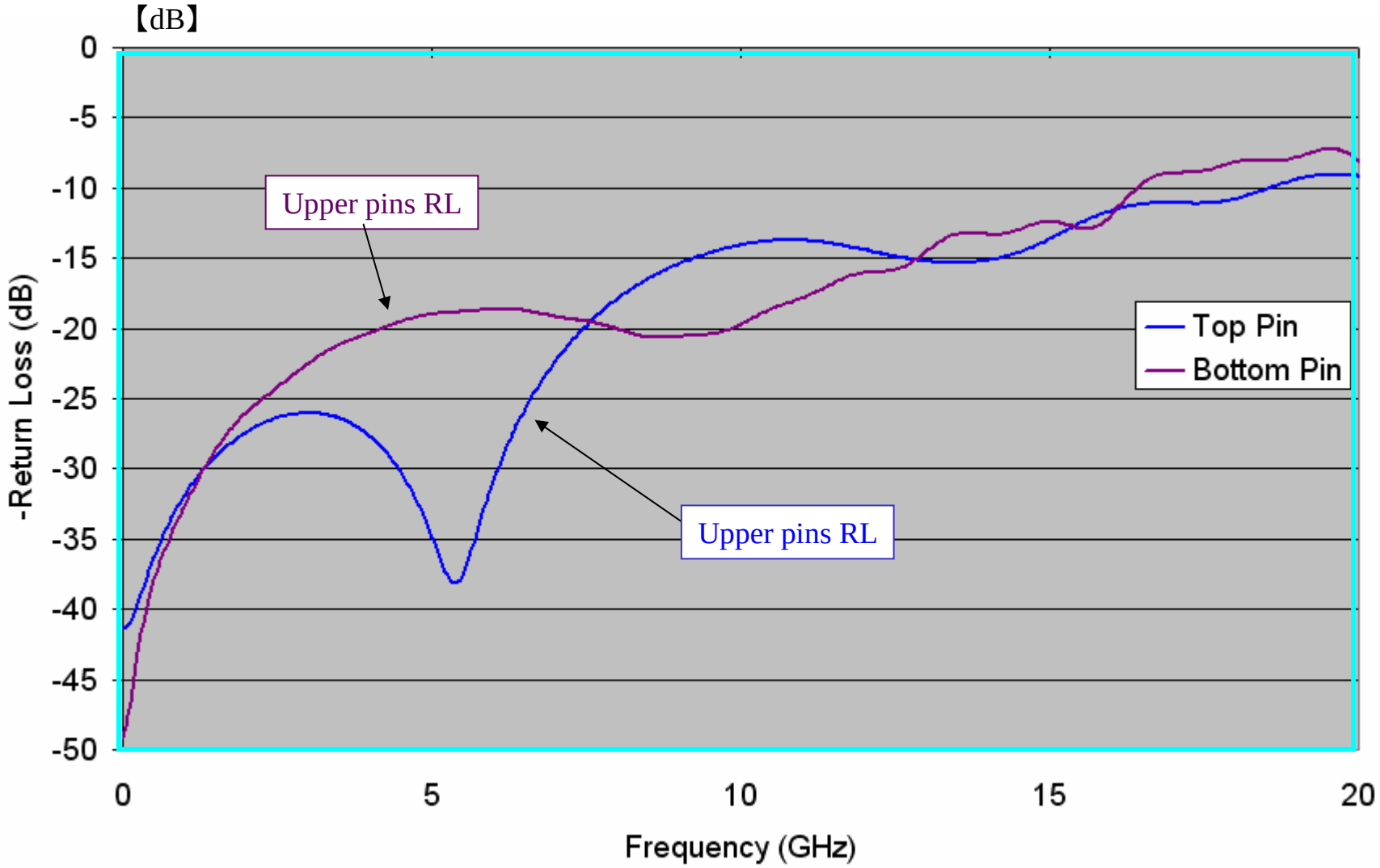
Return Loss (Sdd11), (Sdd22)



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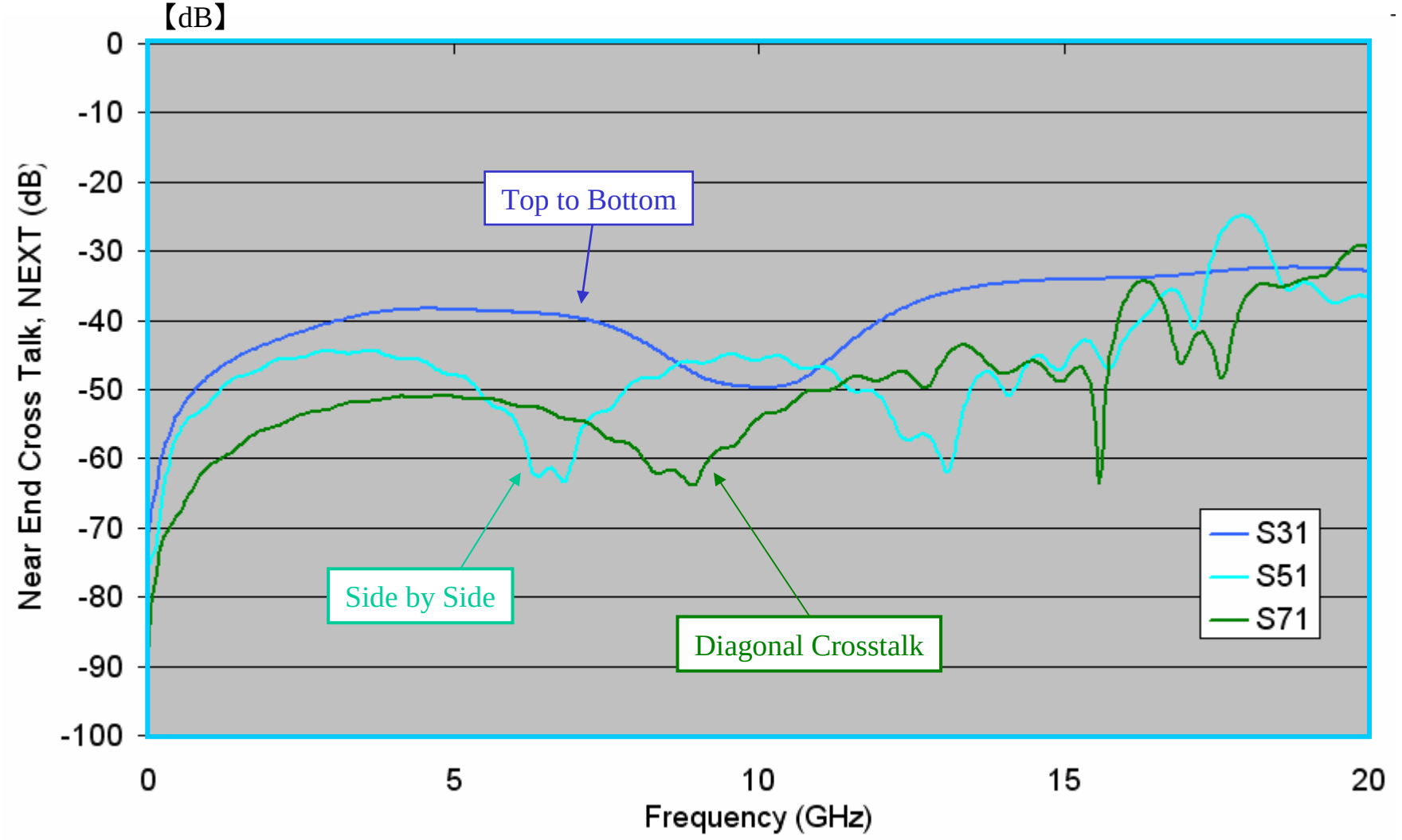
Near End Crosstalk



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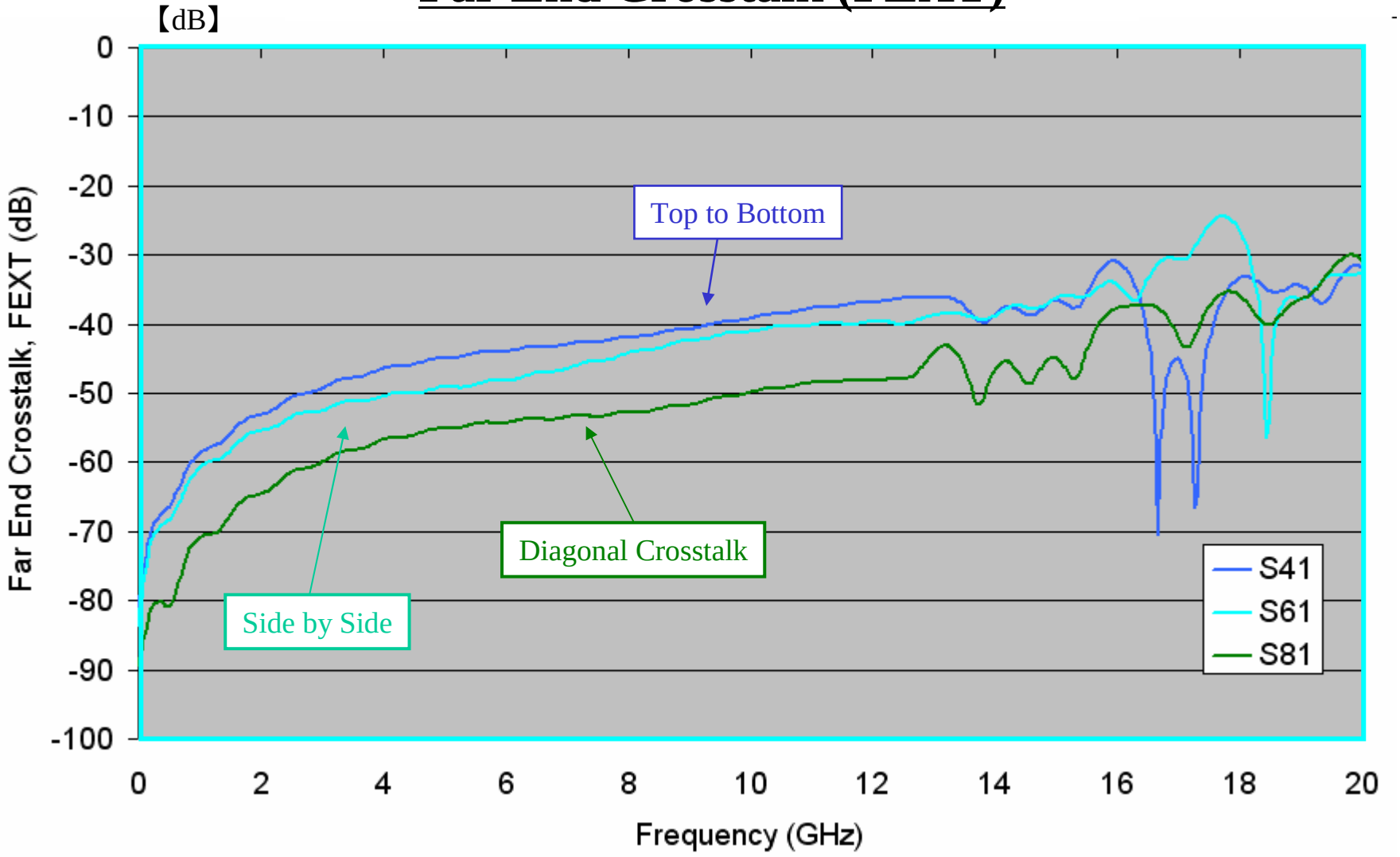
Far End Crosstalk (FEXT)



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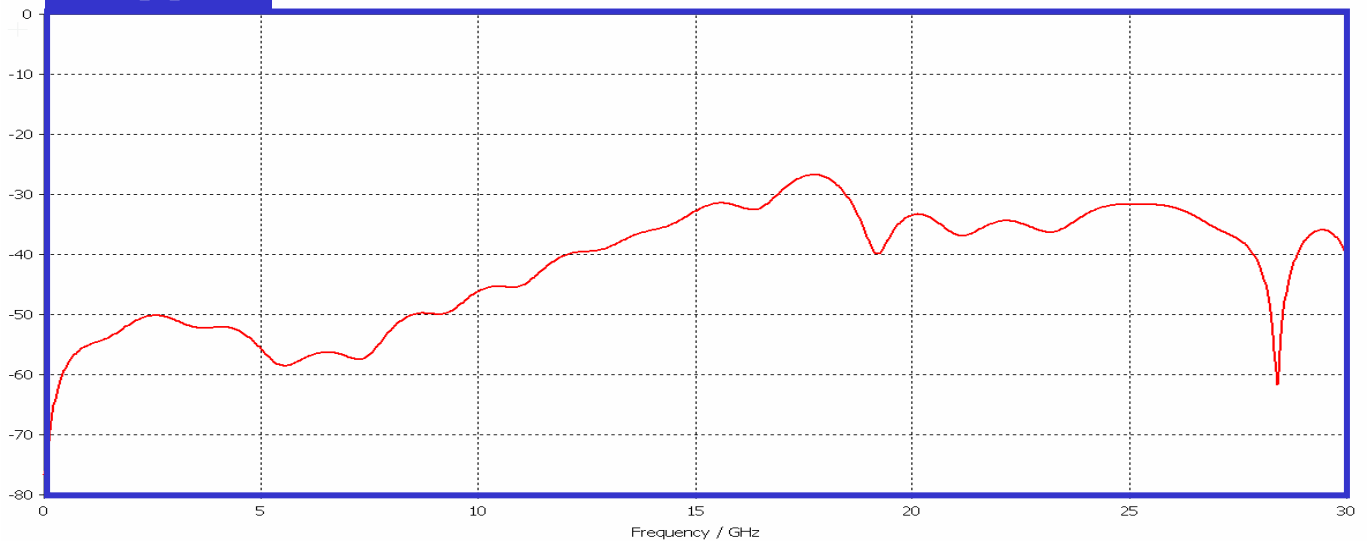
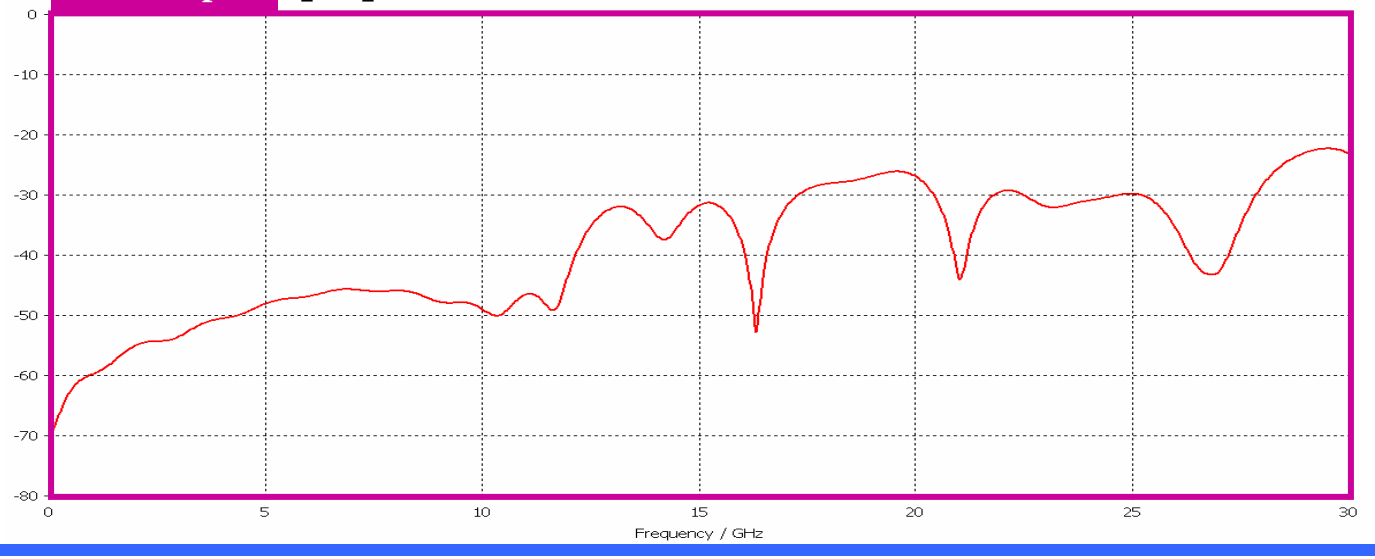
Common mode conversion(Scd21)

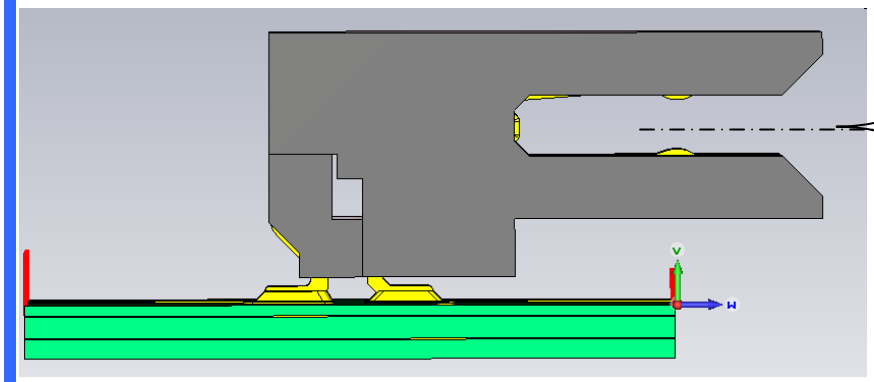
Top pin 【dB】



Bottom pin 【dB】



Scalable Mating Options



0.6mm pads – Legacy Module

0.5mm pads – Advanced Performance

Mating connector on Module board
- Superior Performance

(In development)

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Conclusion

By improving the connector design and reducing the pad width we can achieve 28Gbps performance and maintain backward compatibility with QSFP+

Plug connector design and data are currently in development

Prototype connector and evaluation boards are currently in production

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Thank you

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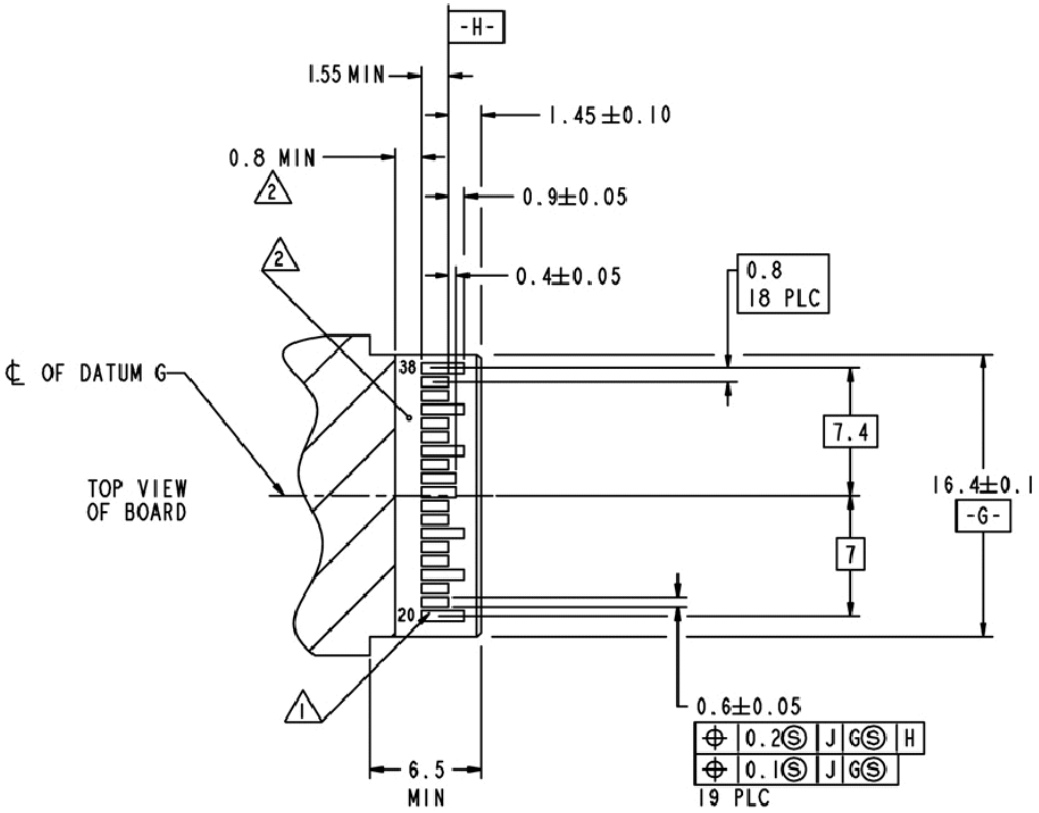
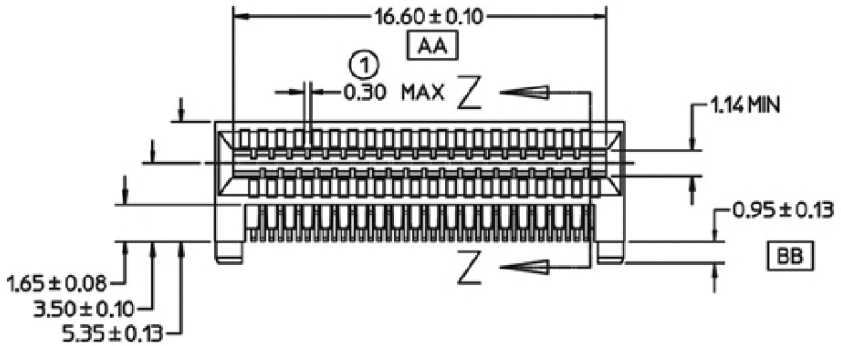
Appendix A:
Tolerance Analysis of
Reduced Module Pad Width

Current QSFP Spec.



QSFP PCB

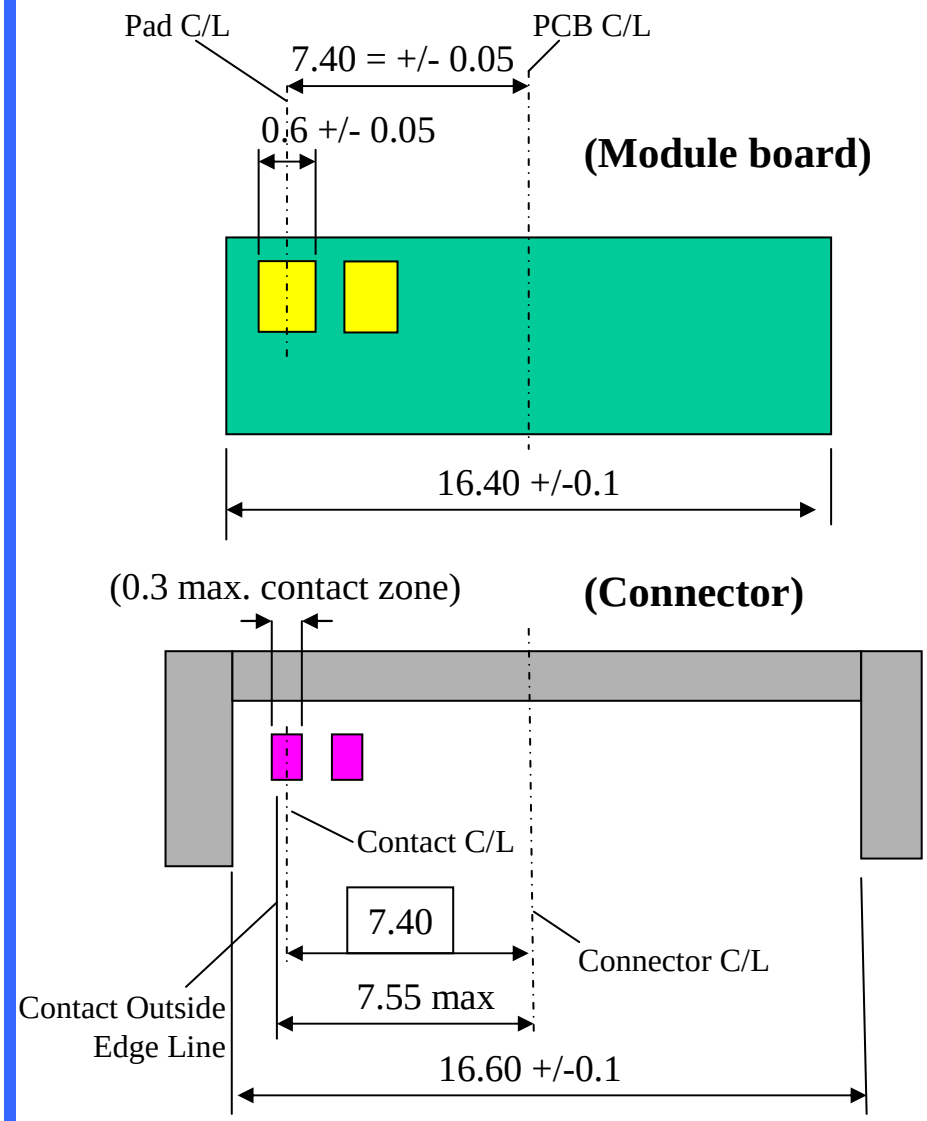


Connector

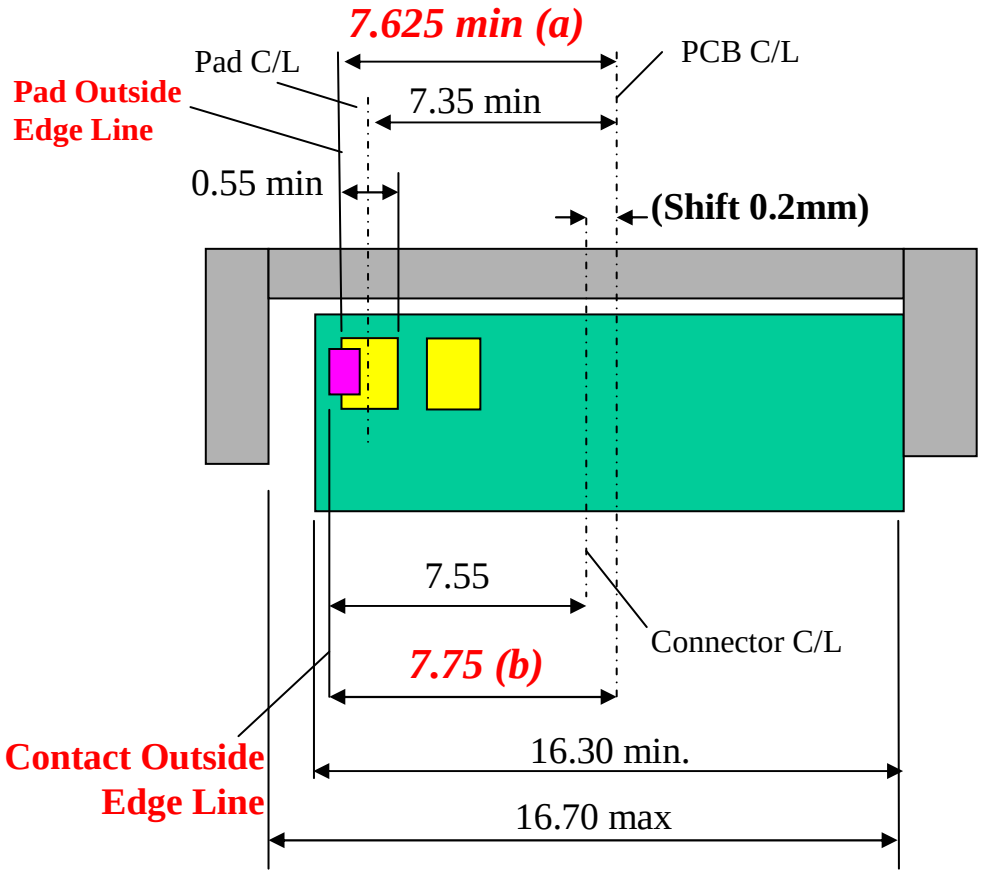
(Connector contact “width” & “position tolerance” are not specified)

Study of Existing QSFP SPEC.

QSFP Spec.



Worst Case Contact Shifting

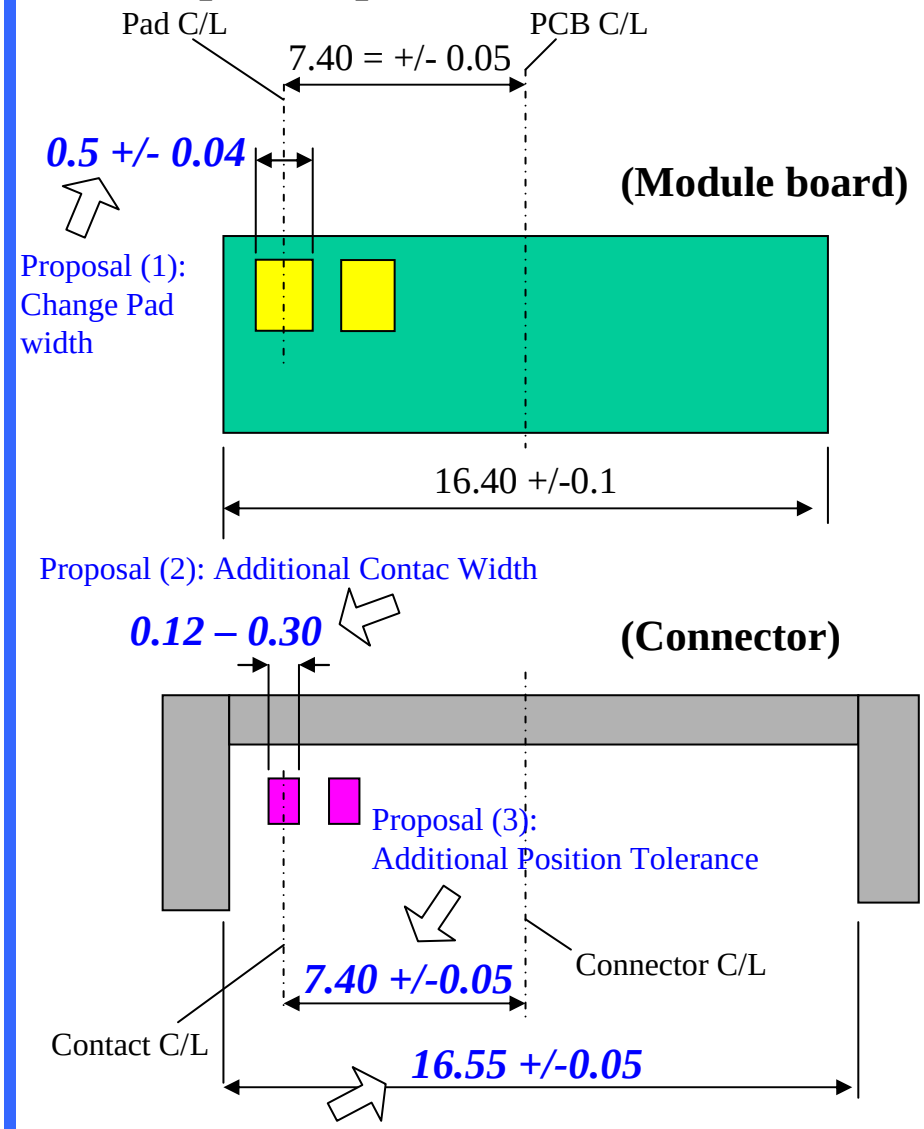


***Contact edge is over hanging 0.125mm from the pad edge line … (a)-(b) = 7.625-7.75 = -0.125**

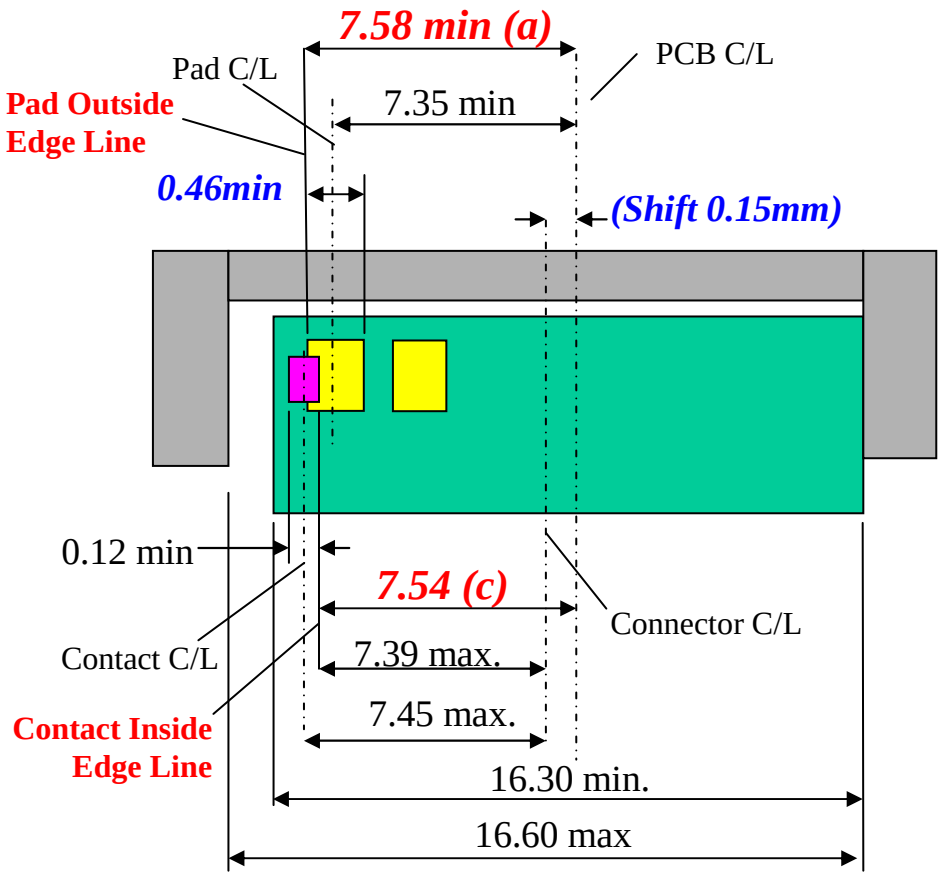
***Contact width has not been defined … Contact completely off from the pad, if it is smaller than 0.125mm**

Reduced Pad Proposal

New Spec Proposal



Worst Case Contact Shifting



Based on the combination of proposal (1) (2) (3) & (4), Pad size can be reduced, and the contact is kept on the pad even at the worst case tolerance condition … (a) - (c) = 7.58-7.54 = 0.04