

Proposal for Compliance Board Requirements

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- Molex CPD

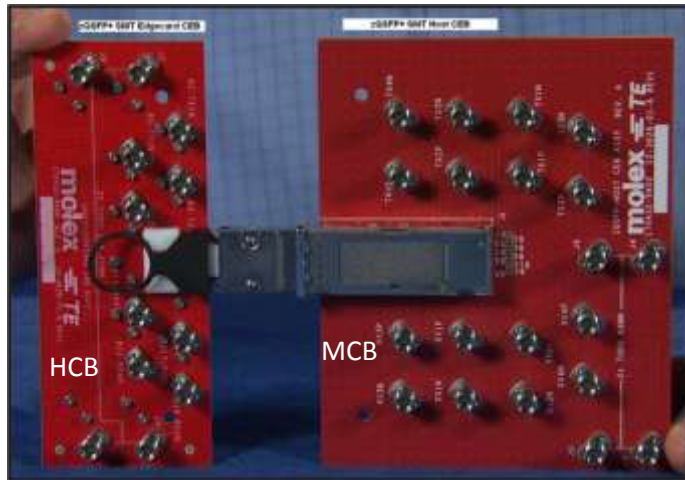
Proposal Summary

- Reference Losses
 - HCB 3.7dB @ 14.0GHz
 - MCB 1.9dB @ 14.0GHz
- Mated Insertion Loss
 - Maximum
 - 6.8dB @ 14.0 GHz [3.7dB (HCB) + 1.9dB (MCB) + 1.2dB (connector + 3/8dB variation)]
 - Minimum
 - 5.4dB @14.0GHz [5.6dB (reference Losses) – ¼dB (variation)]
- Mated Return Loss
 - 20dB -> 15dB -> 12dB -> 3dB
DC 3.5GHz 14GHz 21GHz
- Mode Conversion Loss
 - 30dB @ DC -> 14dB (14 to 21 GHz); scaled from 'ba
- ICN
 - $\sigma_{fx} = 5.0\text{mV}$ $\sigma_{nx} = 2.75\text{mV}$
- Common Mode Return Loss
 - 3dB (constant)

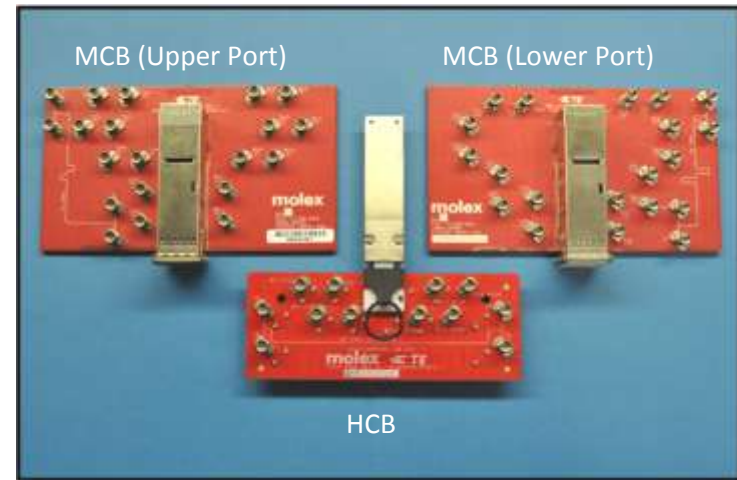
Compliance Boards

Proposal Summary

- zQSFP+ smt



- Stacked zQSFP+



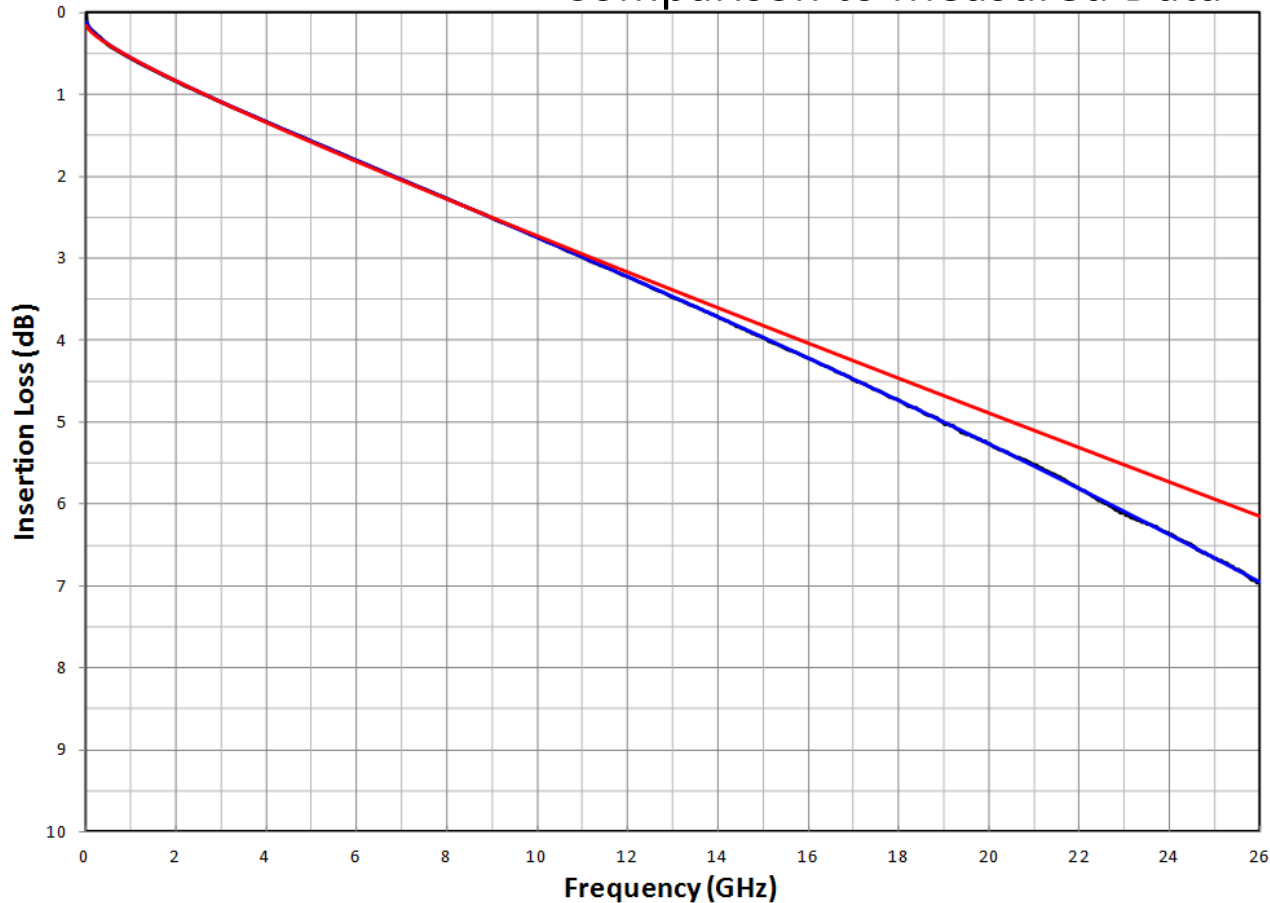
Board Material: Megtron 6 HVLP

Trace Geometry: 5.5-9-5.5

Reference Losses

Reference Loss – Host Compliance Board

Comparison to Measured Data



› Reference Values

› 12.89 GHz

› 3.45dB

› 3.36dB

› 14.0 GHz

› 3.72dB

› 3.60dB

Legend

— Measured Data

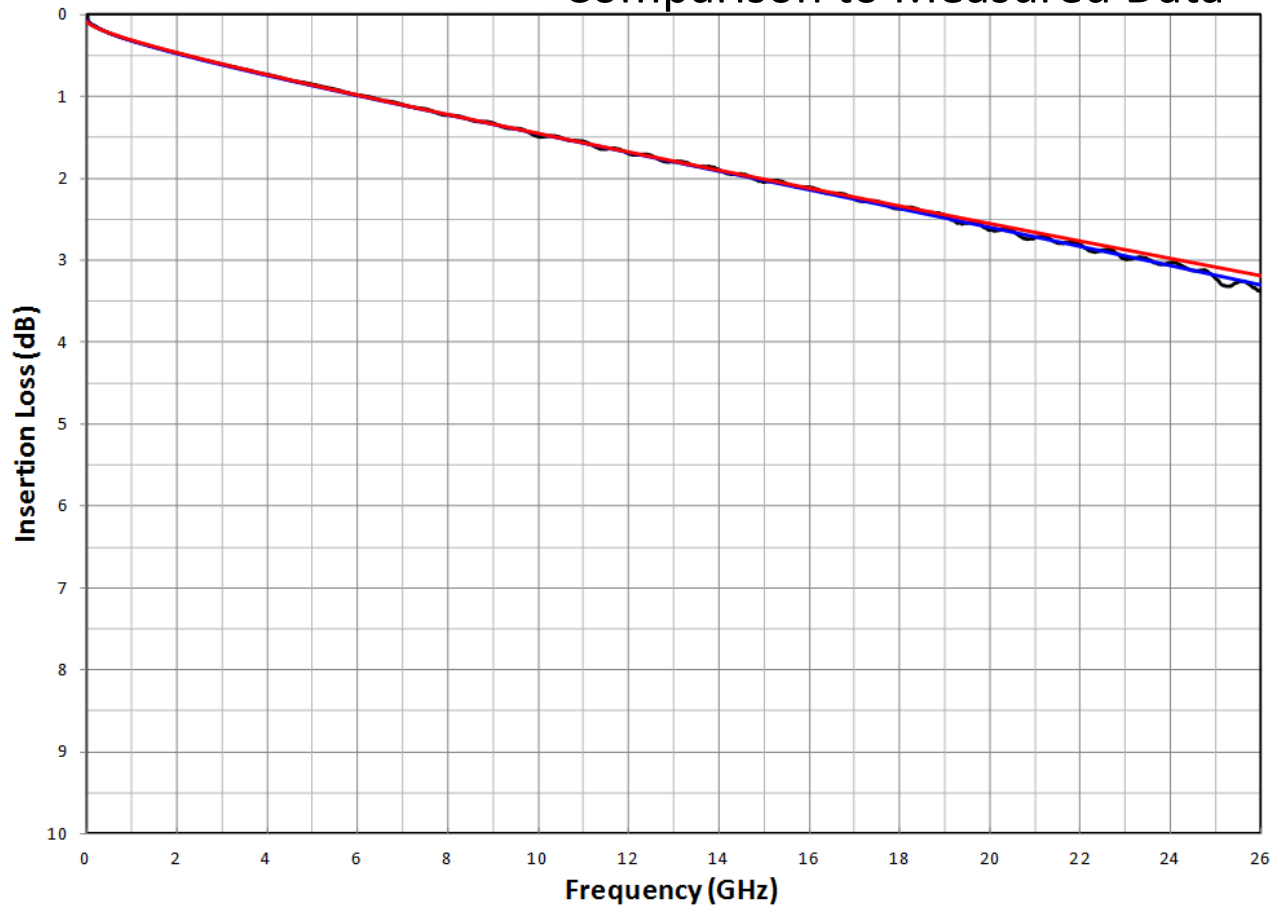
— Fit w/ 2nd order

— Fit

- Better fit to 25GHz by adding 2nd order term
 - $0.131 + 0.233vf + 0.186f$ (limited accuracy for 25GHz bandwidth)
 - $0.086 + 0.331vf + 0.138f + 0.002f^2$ (recommended)

Reference Loss – Module Compliance Board

Comparison to Measured Data



› Reference Values

- › **12.89 GHz**
 - › **1.78dB**
 - › 1.78dB
- › **14.0 GHz**
 - › **1.91dB**
 - › 1.91dB

Legend

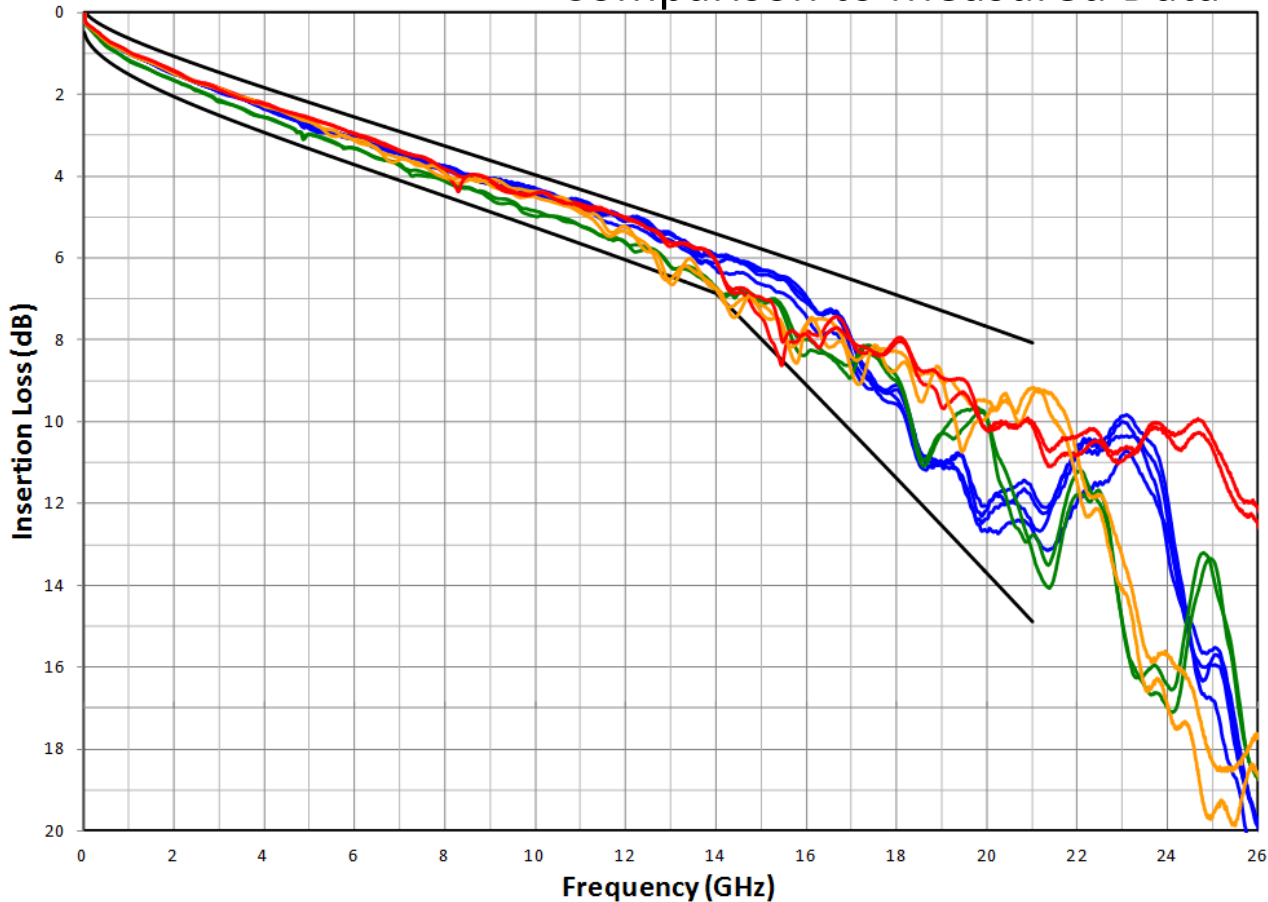
- Measured Data
- Fit w/ 2nd order
- Fit

- Better fit to 25GHz by adding 2nd order term
 - $0.073 + 0.151vf + 0.090f$ (limited accuracy for 25GHz bandwidth)
 - $0.048 + 0.193vf + 0.074f + 0.0005f^2$ (recommended)

Mated Test Fixtures Insertion Loss

Insertion Loss– Mated Compliance Board

Comparison to Measured Data



Reference Values

- **Minimum**
- 5.0dB @ 12.89GHz
- 5.4dB @ 14.0 GHz
- **Maximum**
- 6.4dB @ 12.89GHz
- 6.8dB @ 14.0GHz

Legend

- SMT (top side)
- SMT (bottom side)
- Stacked Upper
- Stacked Lower

Minimum $-0.116 + 0.524vf + 0.212f + 0.003f^2$

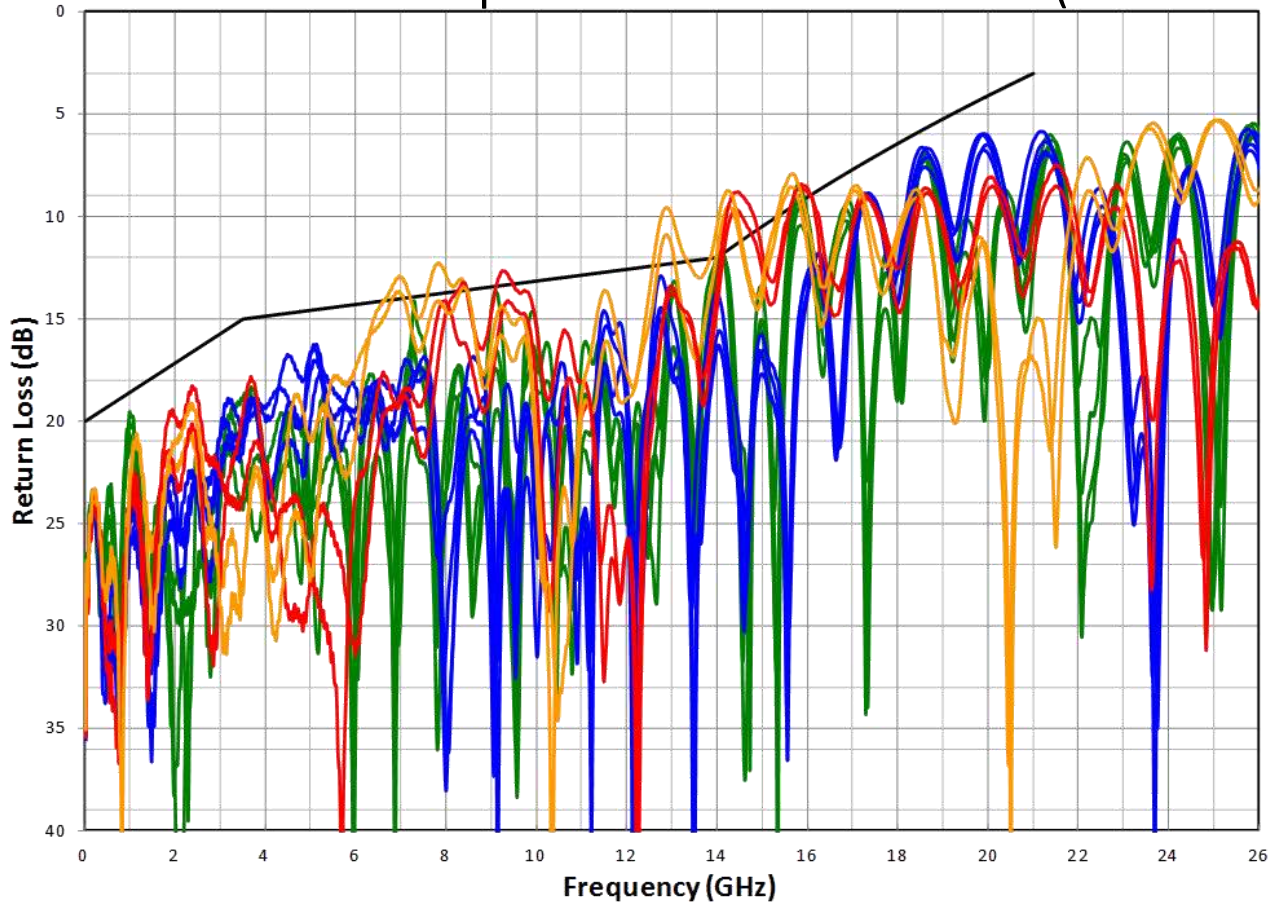
Maximum $0.393 + 1.024vf + 0.100f + 0.006f^2 \quad (f < 14\text{GHz})$

$-9.412 + 1.024vf + 0.800f + 0.006f^2 \quad (14 < f < 21\text{GHz})$

Mated Test Fixtures Return Loss

Return Loss – Mated Compliance Boards

Comparison to Measured Data (from MCB side)



Reference Values

20dB @ DC

15dB @ 3.5GHz

12dB @ 7.0GHz

3dB @ 21.0GHz

Legend

— SMT (top side)

— SMT (bottom side)

— Stacked Upper

— Stacked Lower

Maximum

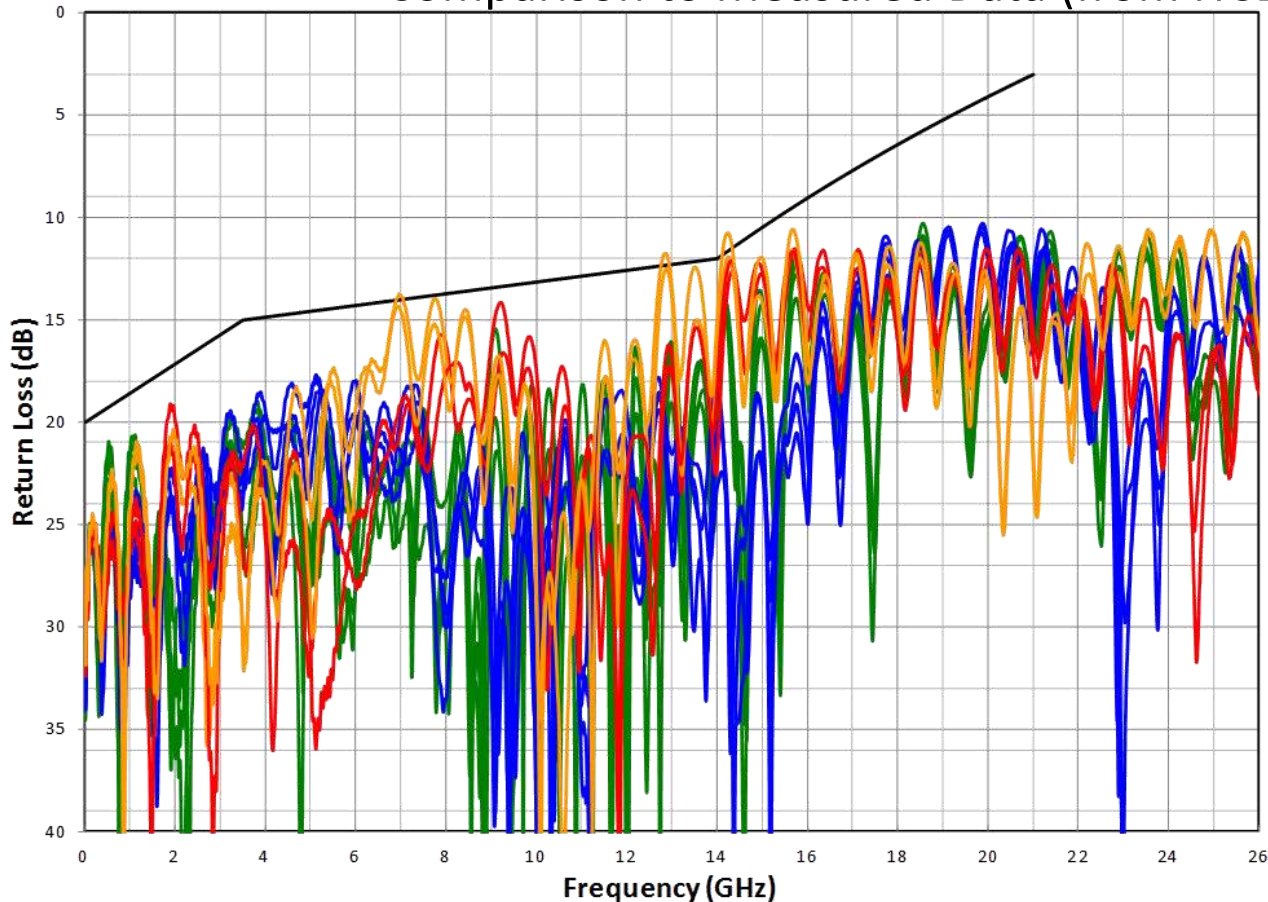
$$20 - 1.429f \quad (f \leq 3.5\text{GHz})$$

$$16 - 0.286f \quad (3.5\text{GHz} < f \leq 14.0\text{GHz})$$

$$12 - 51.1 \cdot \log(f/14) \quad (14.0\text{GHz} < f < 21.0\text{GHz})$$

Return Loss – Mated Compliance Boards

Comparison to Measured Data (from HCB side)



Reference Values

20dB @ DC

15dB @ 3.5GHz

12dB @ 7.0GHz

3dB @ 21.0GHz

Legend

— SMT (top side)

— SMT (bottom side)

— Stacked Upper

— Stacked Lower

Maximum

$$20 - 1.429f \quad (f \leq 3.5\text{GHz})$$

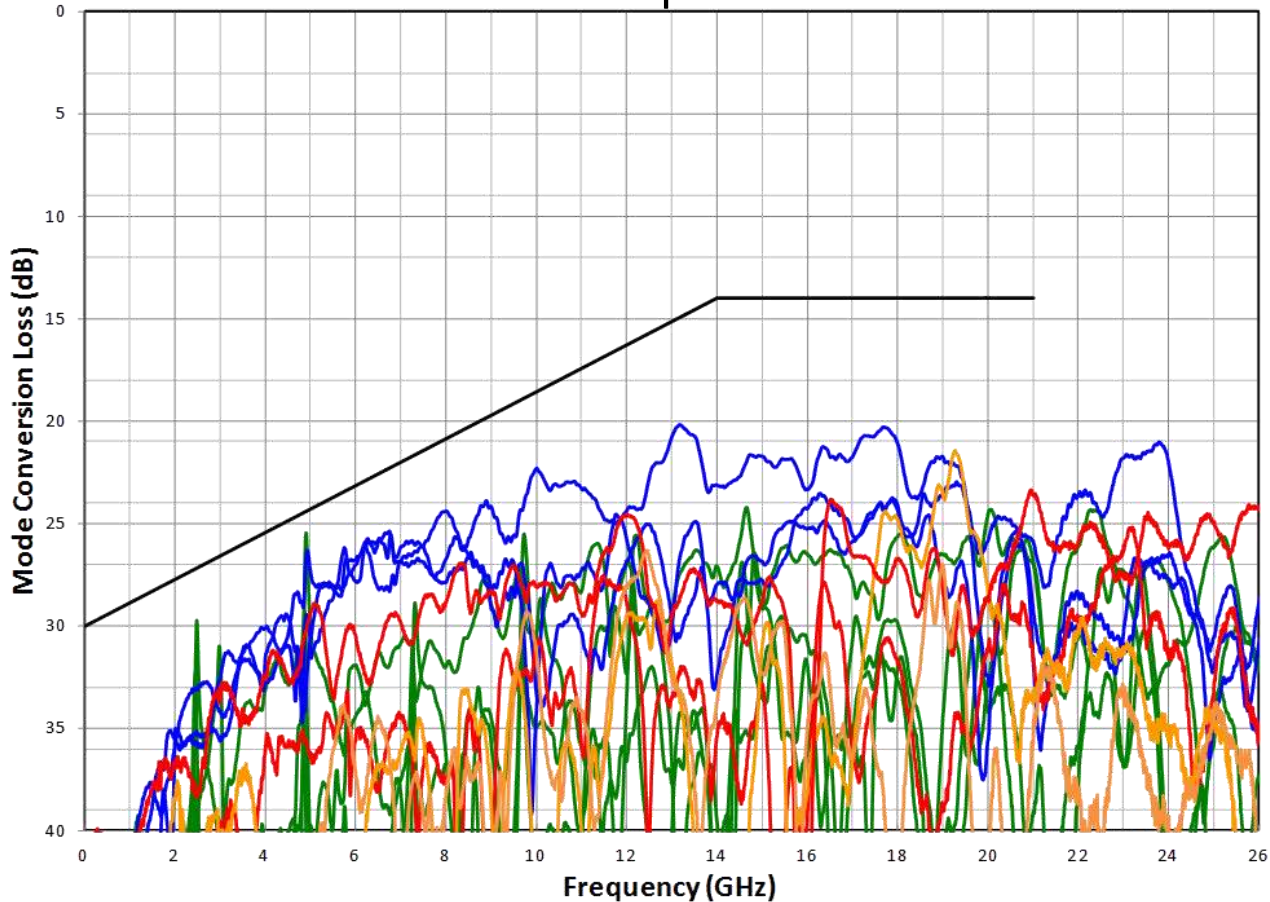
$$16 - 0.286f \quad (3.5\text{GHz} < f \leq 14.0\text{GHz})$$

$$12 - 51.1 \cdot \log(f/14) \quad (14.0\text{GHz} < f < 21.0\text{GHz})$$

Mated Test Fixtures Mode Conversion

Mode Conversion– Mated Compliance Boards

Comparison to Measured Data



Reference Values

30dB @ DC

14dB @ 14GHz

Legend

- SMT (top side)**
- SMT (bottom side)**
- Stacked Upper**
- Stacked Lower**

Maximum

$$30 - 1.143f \quad (f \leq 14\text{GHz})$$

14

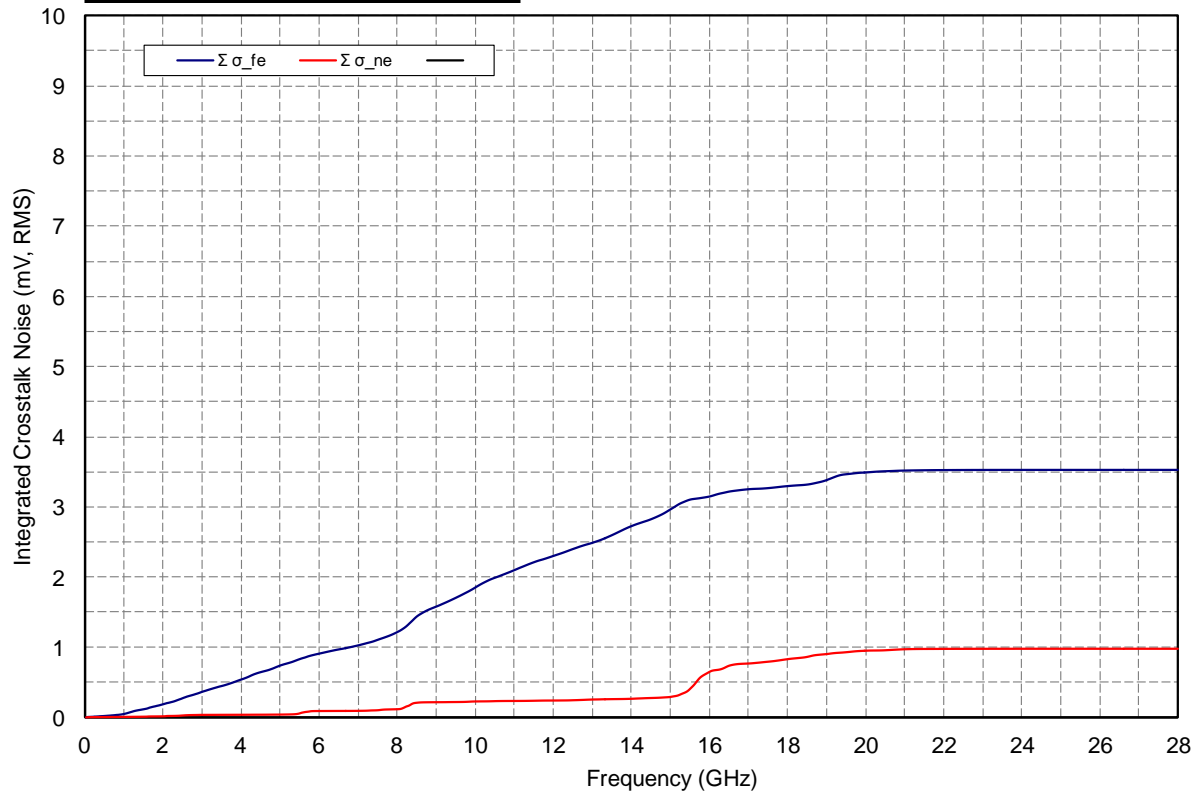
$$(14 < f \leq 21\text{GHz})$$

Mated Test Fixtures ICN

ICN– Mated Compliance Boards

Measured Data - smt

Integration Progress



ICN Values

σ_{fx} 3.5mV

σ_{nx} 1.0mV

Variables

amplitude 600mV (1.2V)

rise-time 9.6ps

Rx filter $\frac{3}{4} \cdot 25.78125\text{GHz}$

Ref. losses See pages 6 & 7

Legend

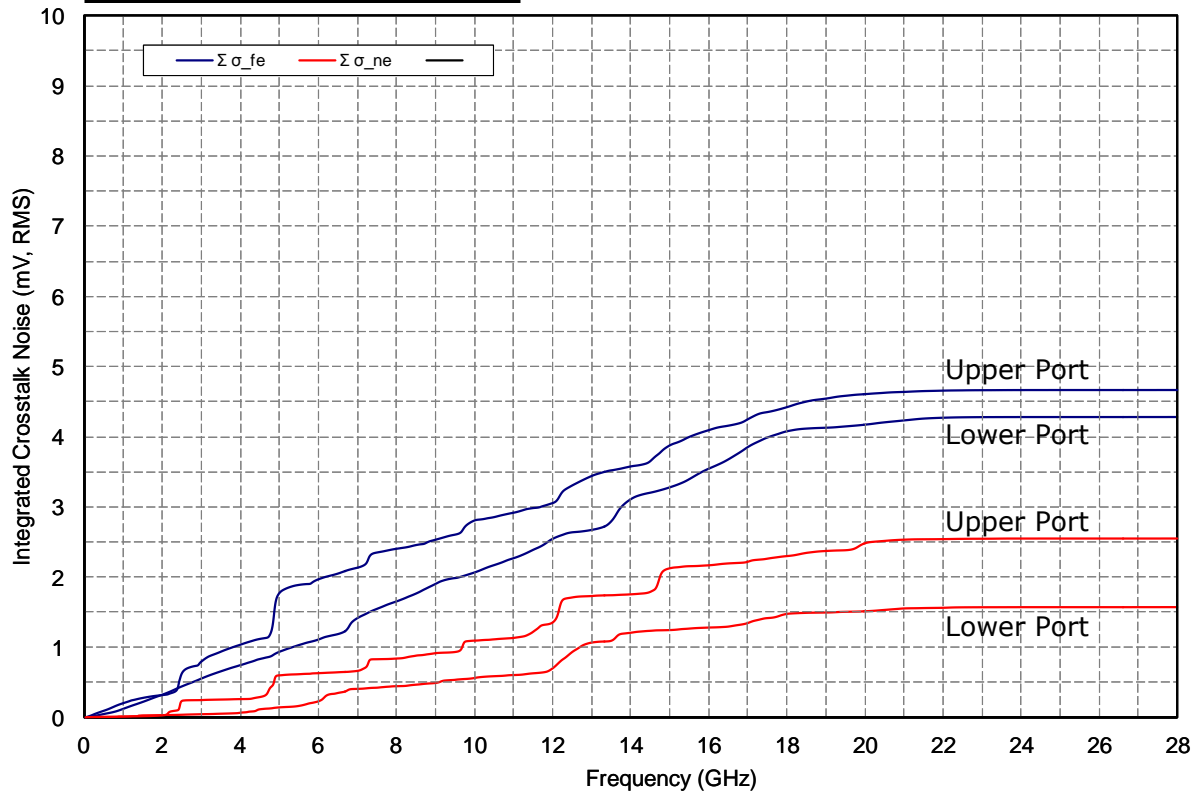
— FEXT

— NEXT

ICN– Mated Compliance Boards

Measured Data - stacked

Integration Progress



ICN Values

σ_{fx}	4.3mV (Lower Port)
	4.7mV (Upper Port)
σ_{nx}	1.6mV (Lower Port)
	2.6mV (Upper Port)

Variables

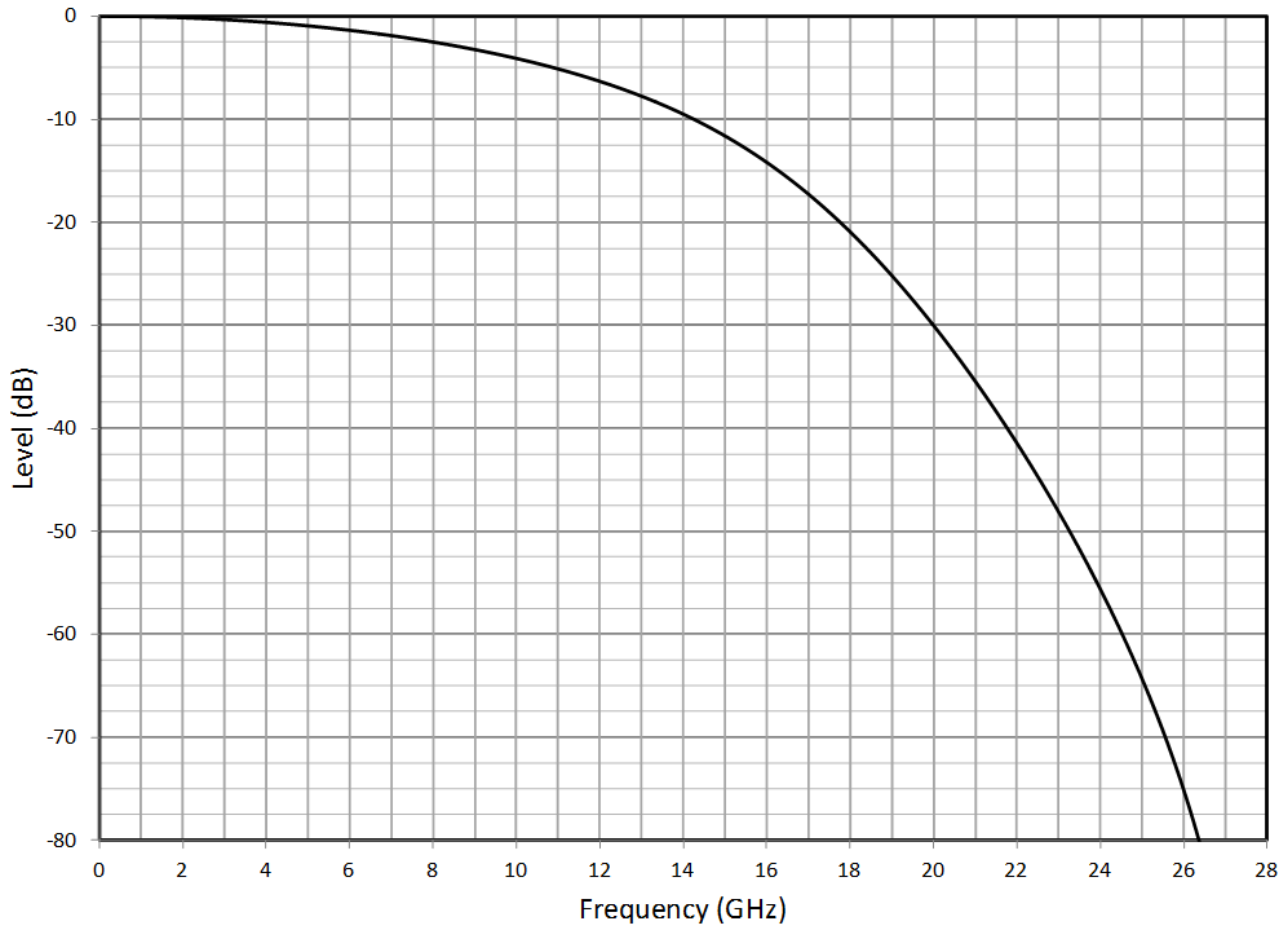
amplitude	600mV (1.2V)
rise-time	9.6ps
Rx filter	$\frac{3}{4} \cdot 25.78125\text{GHz}$
Ref. losses	See pages 6 & 7

Legend

—	FEXT
—	NEXT

Appendix

Reference Trace TDRs



Reference Values	
-0.5dB	@ 3.5GHz
-1.9dB	@ 7.0GHz
-9.5dB	@ 14GHz
-24.0dB	@ 18.75GHz
-64.2dB	@ 25GHz
-40dB	@ 21.8GHz
-50dB	@ 23.3GHz

- Based on ICN equation terms