Title - Class D, E and F Channel Performance to 625 MHz

Subject - IEEE 803.2 10GBASE-T Study Group

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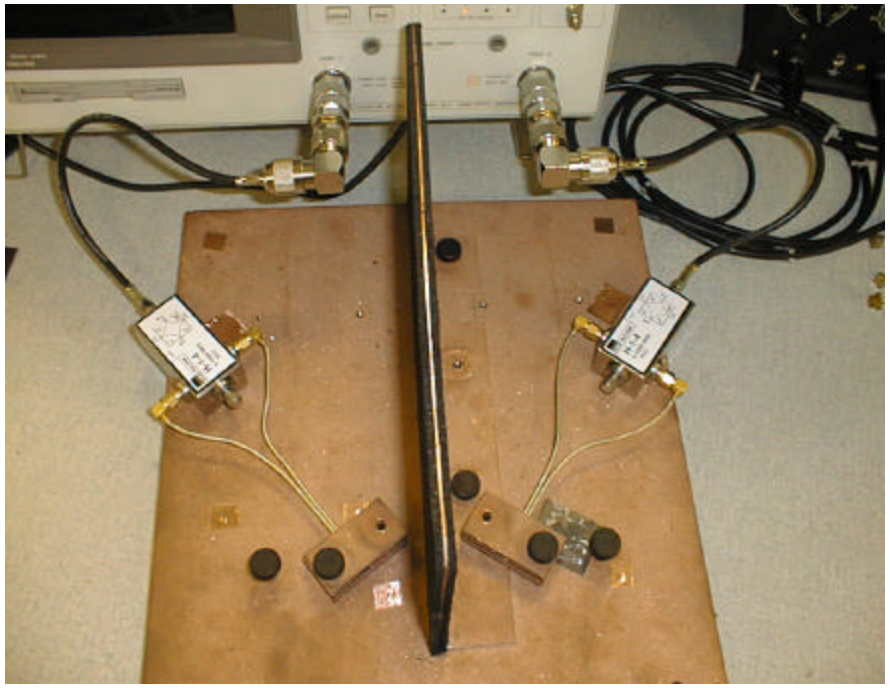
Overview

- Measurement Setup
- Channel Configuration
- Class D, E and F cable and channel performance to 625 MHz
  - Insertion Loss
  - Return Loss
  - PS NEXT
  - PS ELFEXT
- Summary

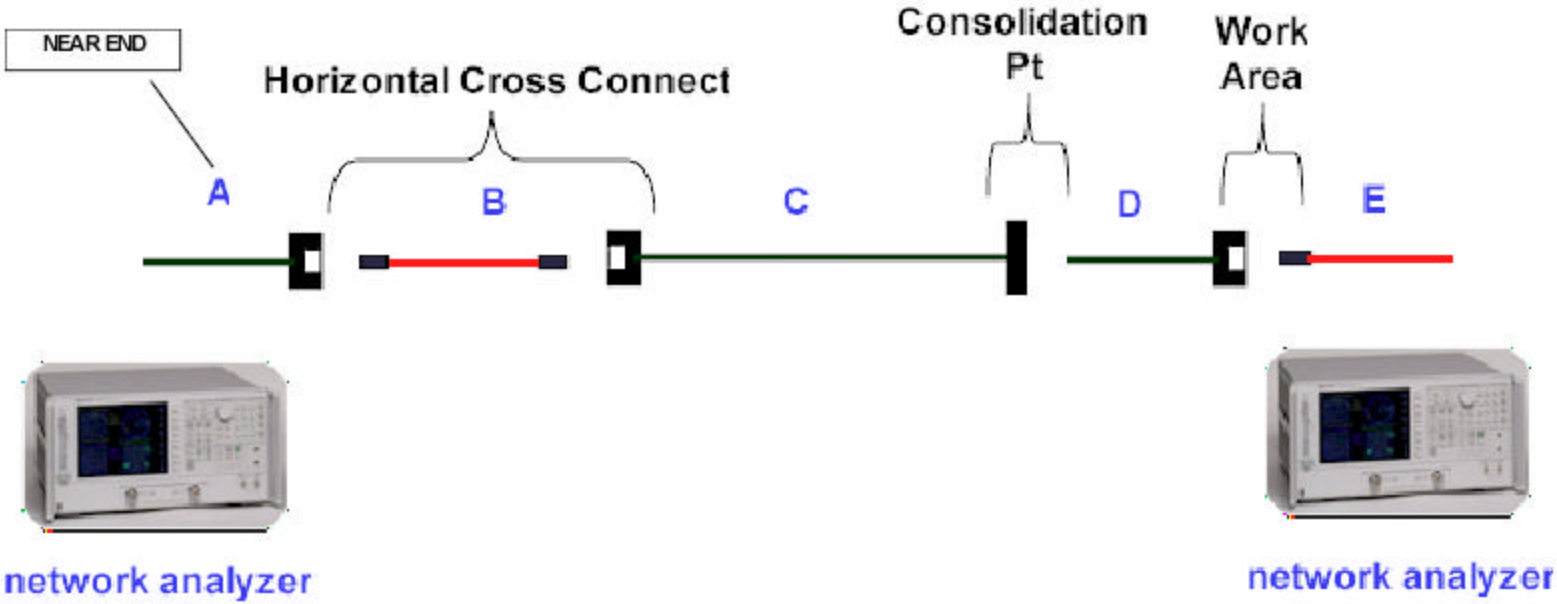
Measurement Setup

- HP 8753D Network Analyzer
  - Full 2 Port Network Analyzer Calibration Correction
- 180º Hybrid Power Dividers
  - Class A per ISO/IEC 61935-1
    - **IL, Long bal. & CMR**
- Linear Frequency Sweep
  - 1601 data points
- Measurements from near end
  - floor distributor

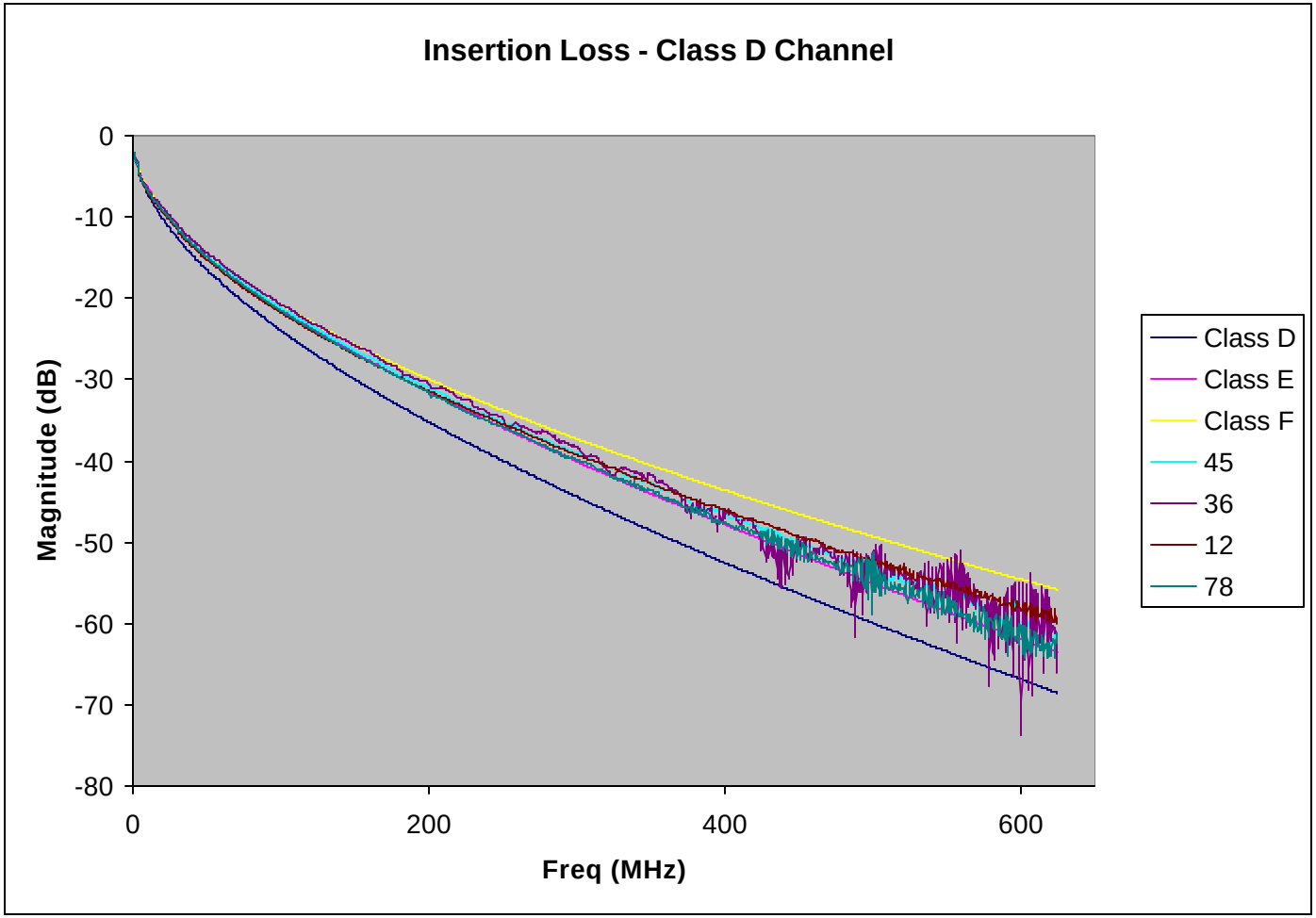


Class D Channel Configuration

	A	B	C	D	E
Class D Channel	7' (2m)	15' (4.6m)	266' (81m)	33' (10m)	7' (2.1m)
Cabling Adhoc	6.6' (2m)	9.8' (3m)	278.8' (85m)	16.4' (5m)	16.4' (5m)



Insertion Loss - Class D Channel



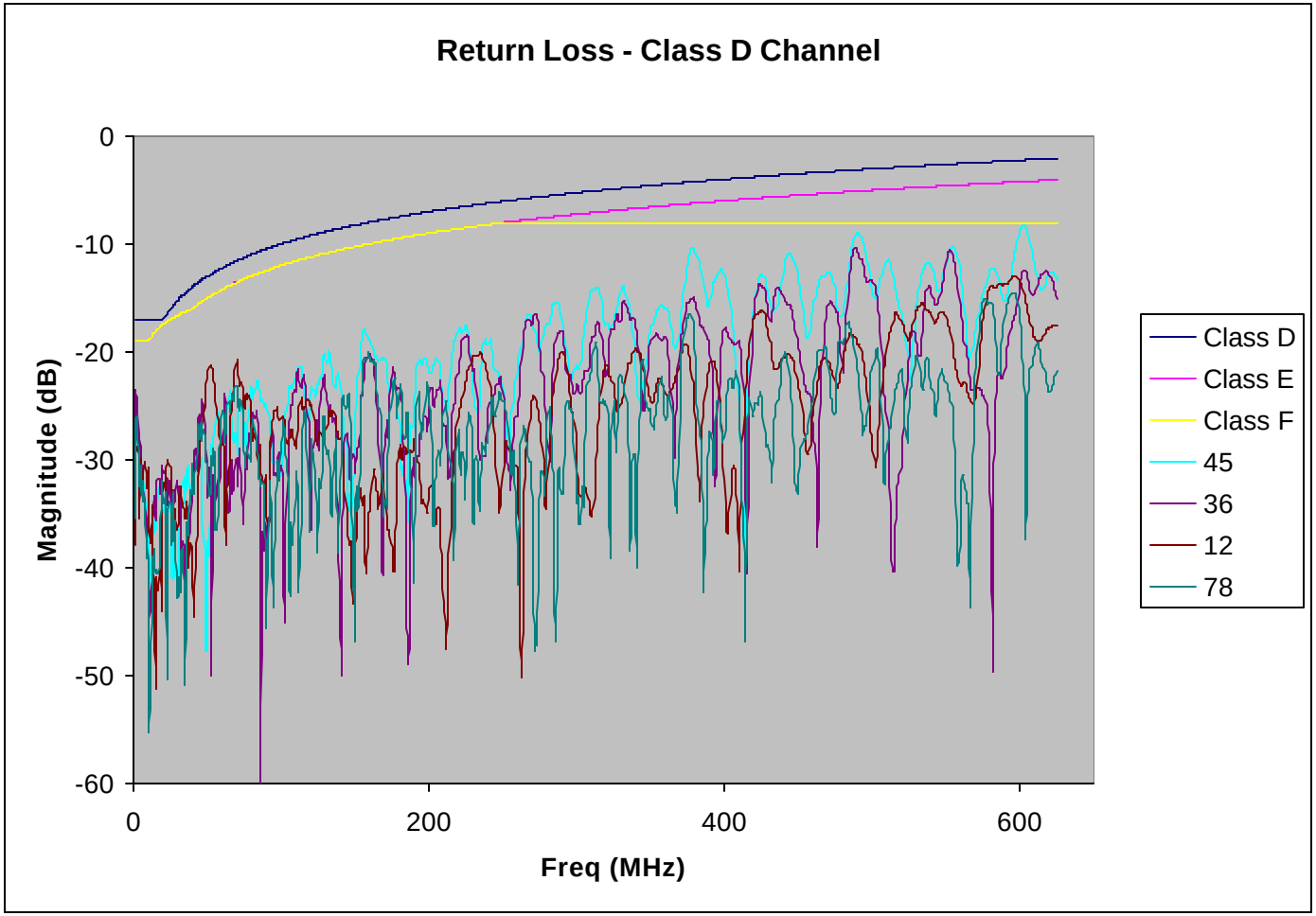
Class	Margin
D	-6.8 dB
E	-11.7 dB
F	-19.0 dB

IL = -73.6 dB

Freq. 600 MHz

No smoothing algorithm

Return Loss - Class D Channel

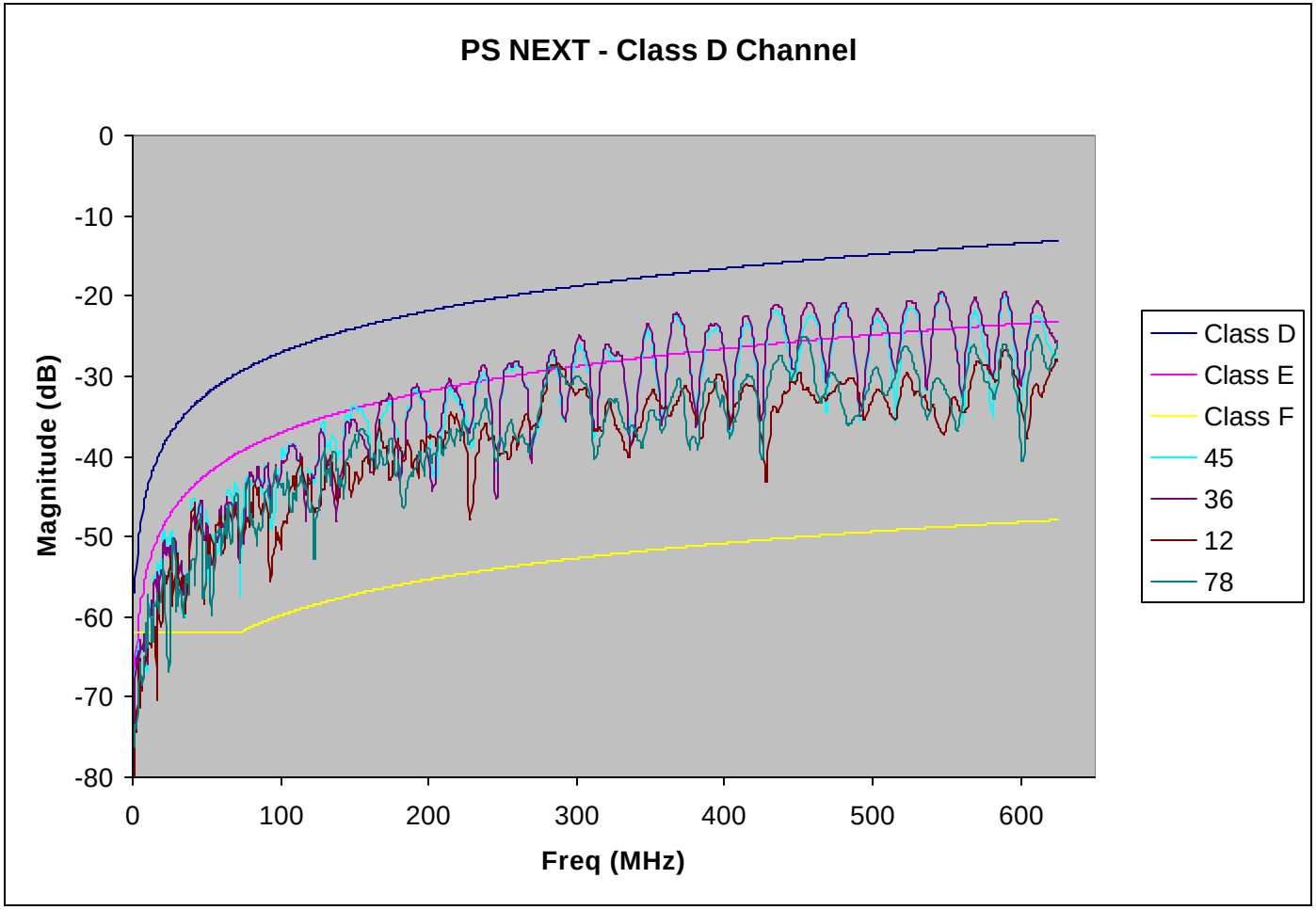


Class	Margin
D	6.1 dB
E	4.1 dB
F	0.3 dB

RL = -8.3 dB

Freq. 603 MHz

PS NEXT - Class D Channel

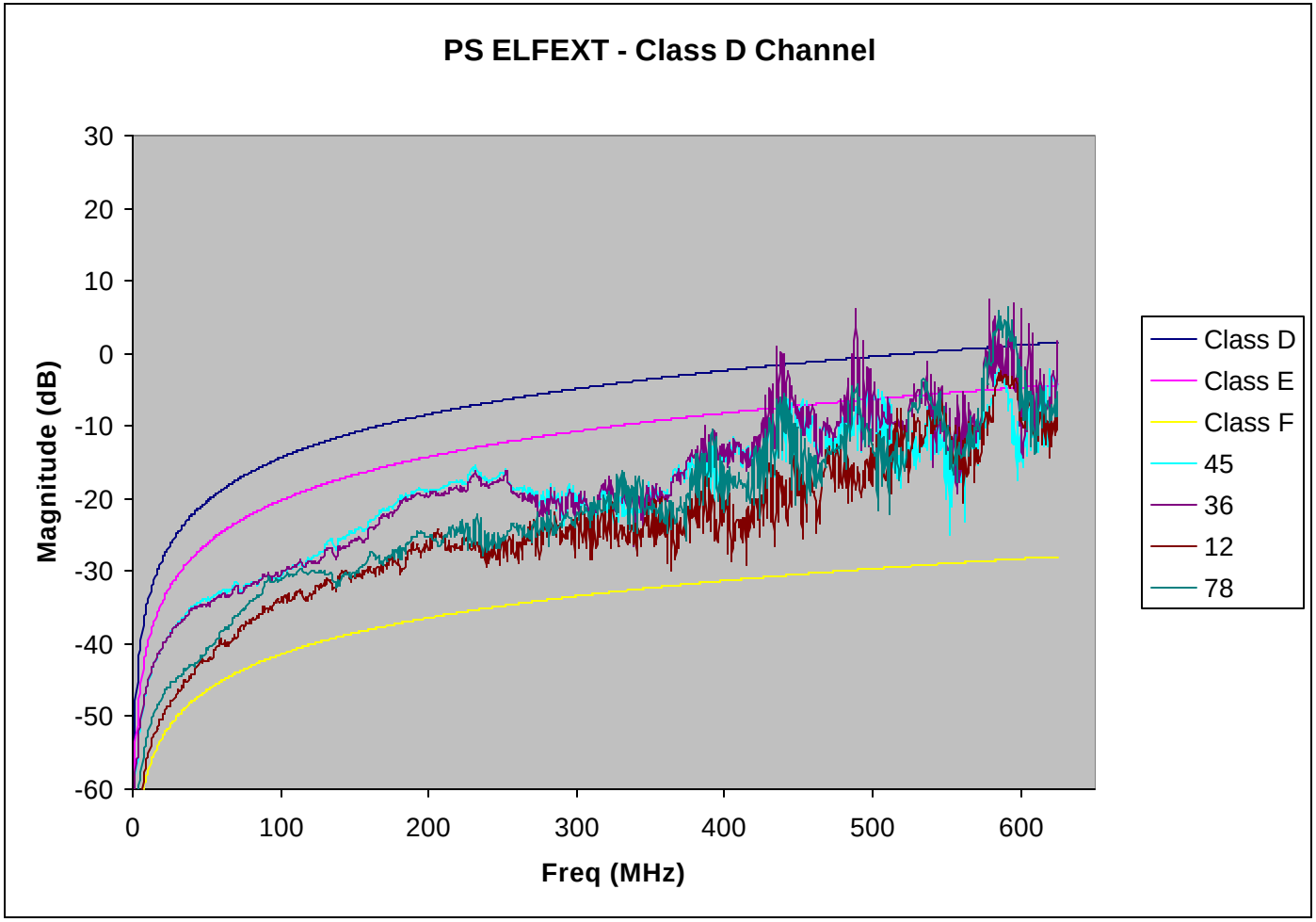


Class	Margin
D	5.4 dB
E	-4.6 dB
F	-29.3 dB

PSNEXT= -19.5 dB

Freq. 547 MHz

PS ELFEXT - Class D Channel



Class	Margin
D	-6.6 dB
E	-12.5 dB
F	-36.0 dB

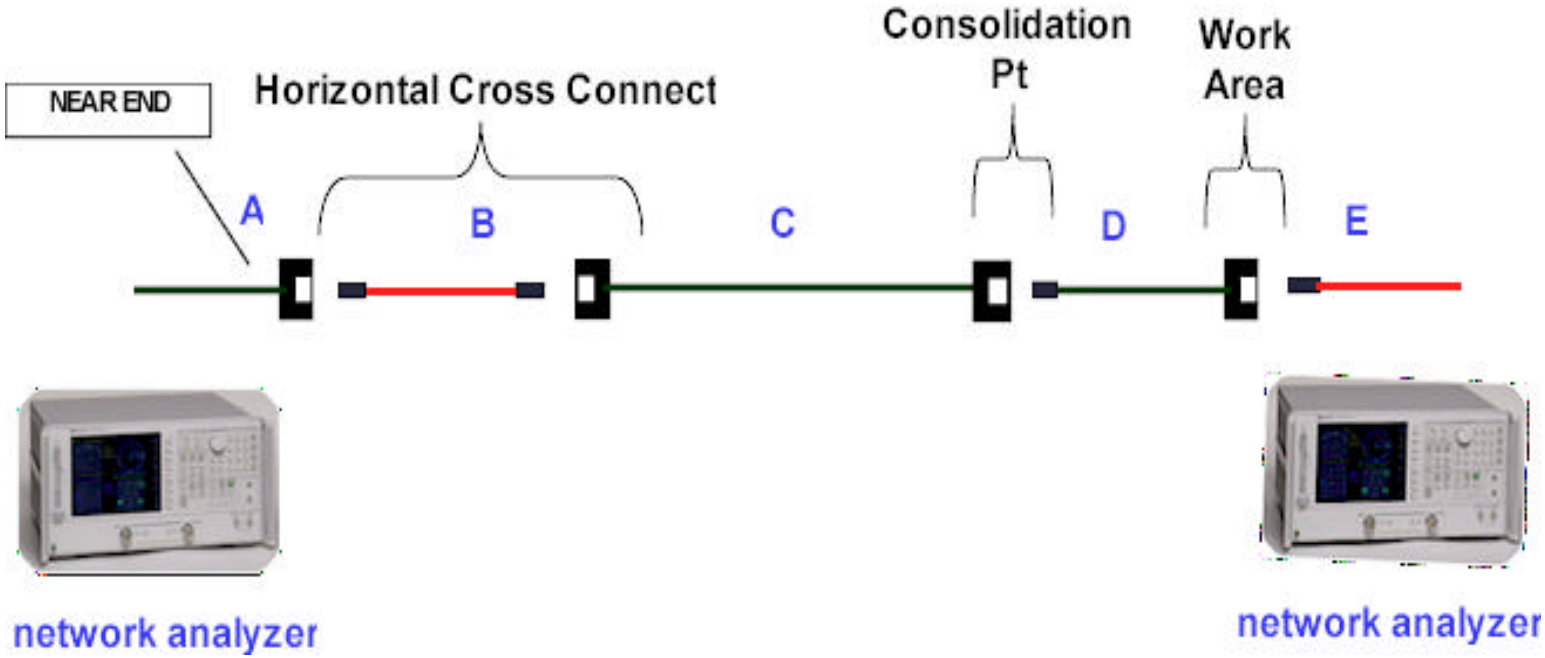
PSELFEXT = 7.5 dB

Freq. 579 MHz

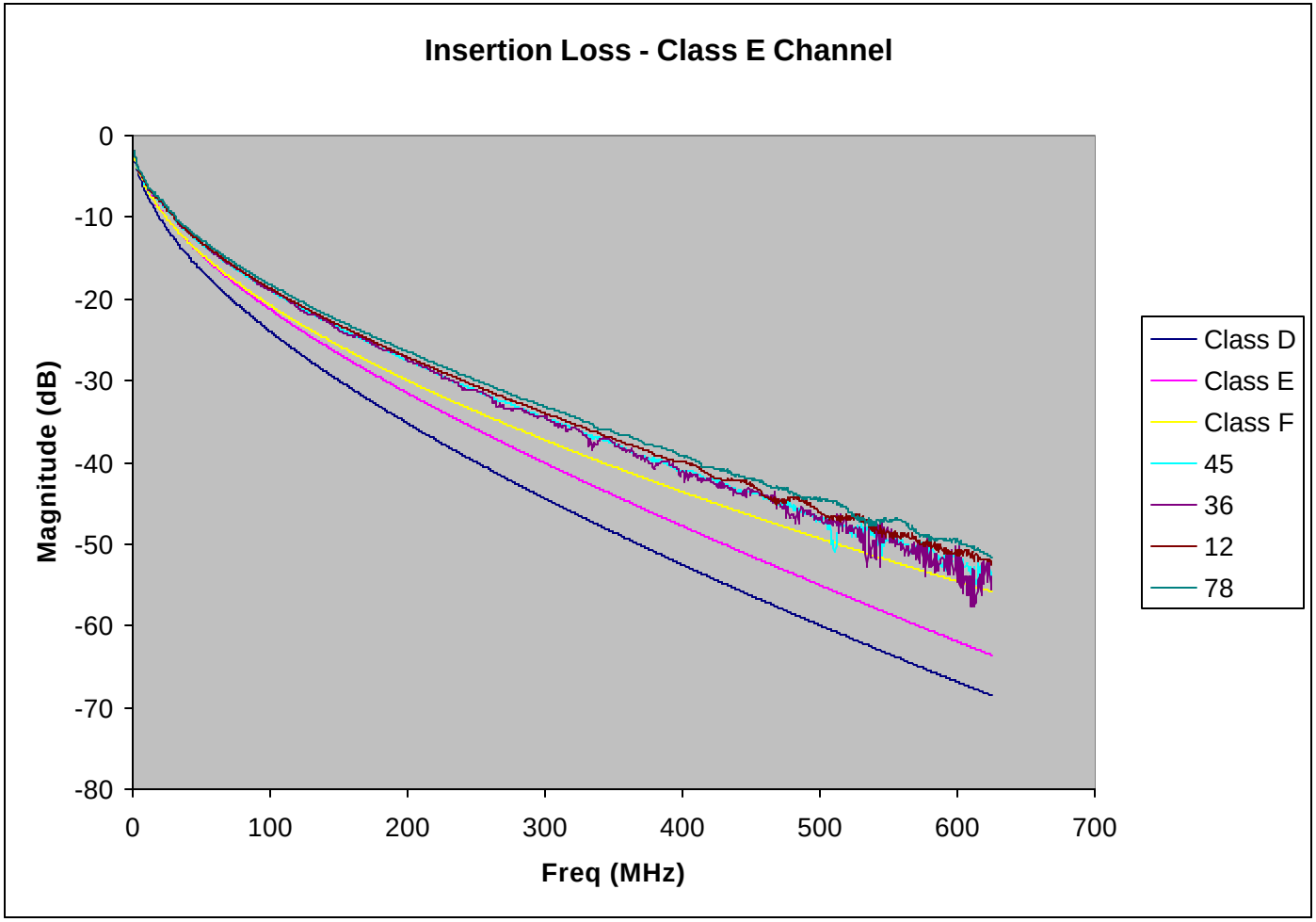
No smoothing algorithm

Class E Channel Configuration

	A	B	C	D	E
Class E Channel	7' (2.1m)	10' (3m)	278.8' (85m)	15' (4.6m)	15' (4.6m)
Cabling Adhoc	6.6' (2m)	9.8' (3m)	278.8' (85m)	16.4' (5m)	16.4' (5m)



Insertion Loss - Class E Channel



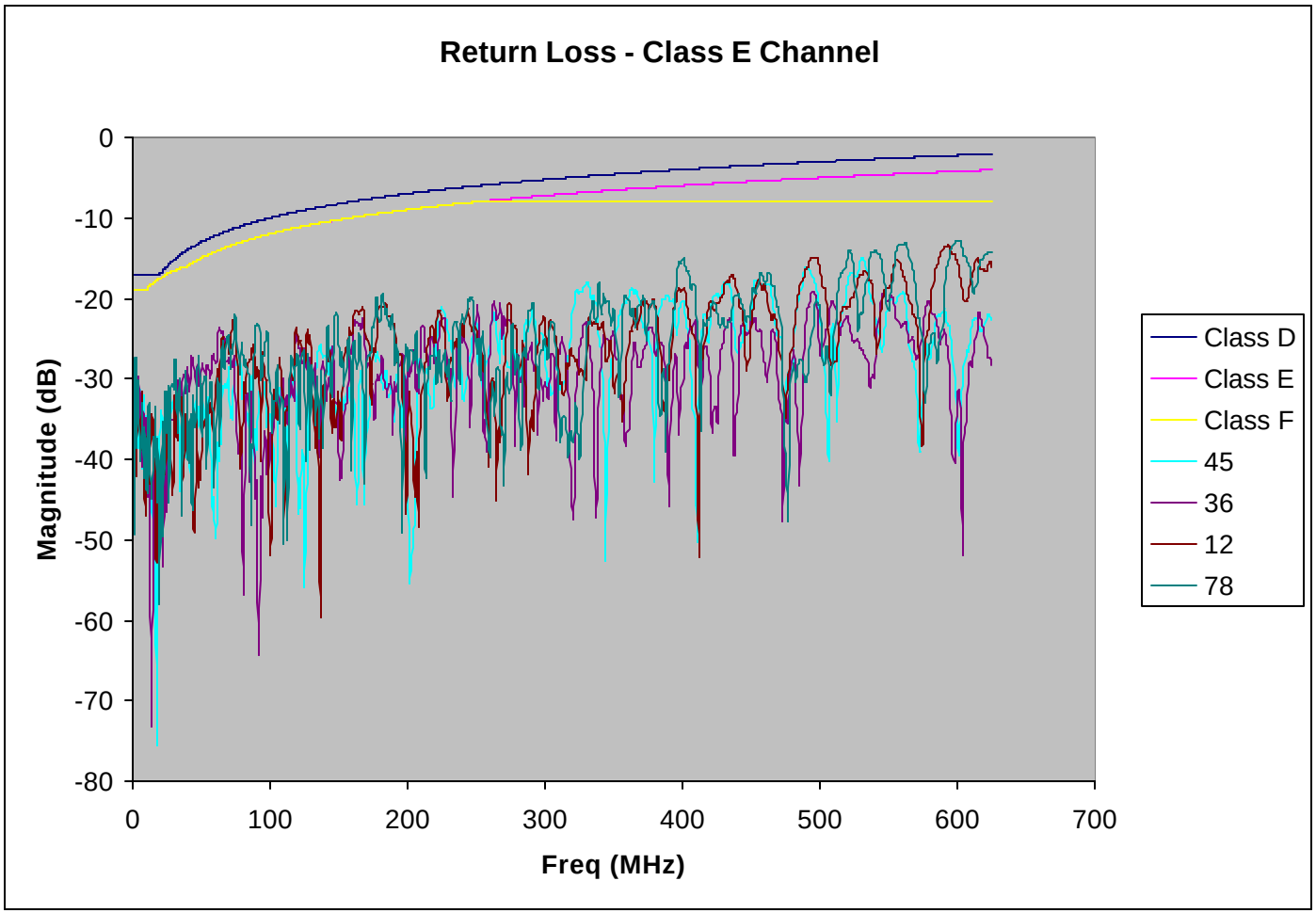
Class	Margin
D	16.9 dB
E	12.0 dB
F	-4.2 dB

IL = -51.6 dB

Freq. 624 MHz

No smoothing algorithm

Return Loss - Class E Channel

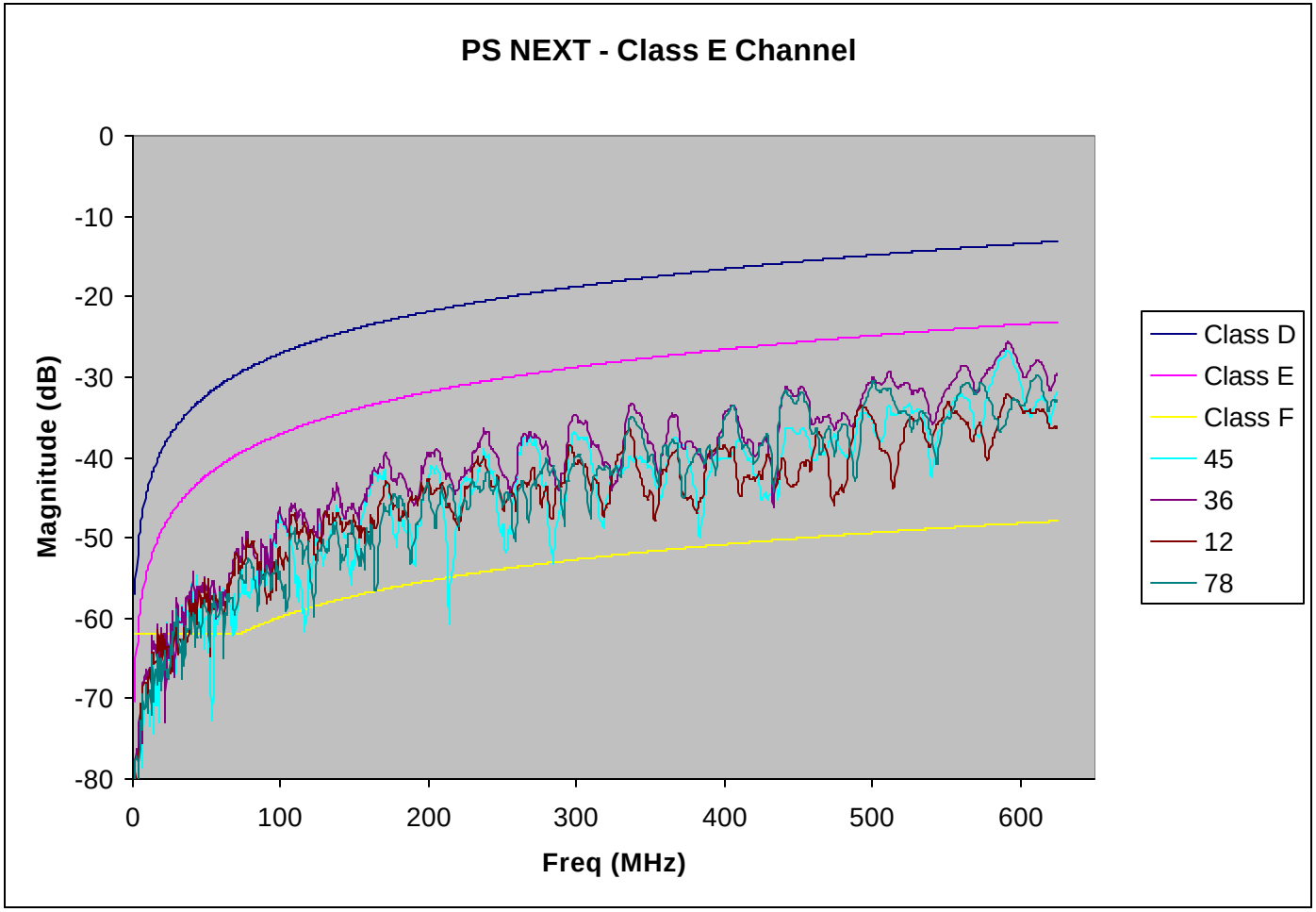


Class	Margin
D	10.6 dB
E	8.6 dB
F	4.8 dB

RL = -12.8 dB

Freq. 602 MHz

PS NEXT - Class E Channel

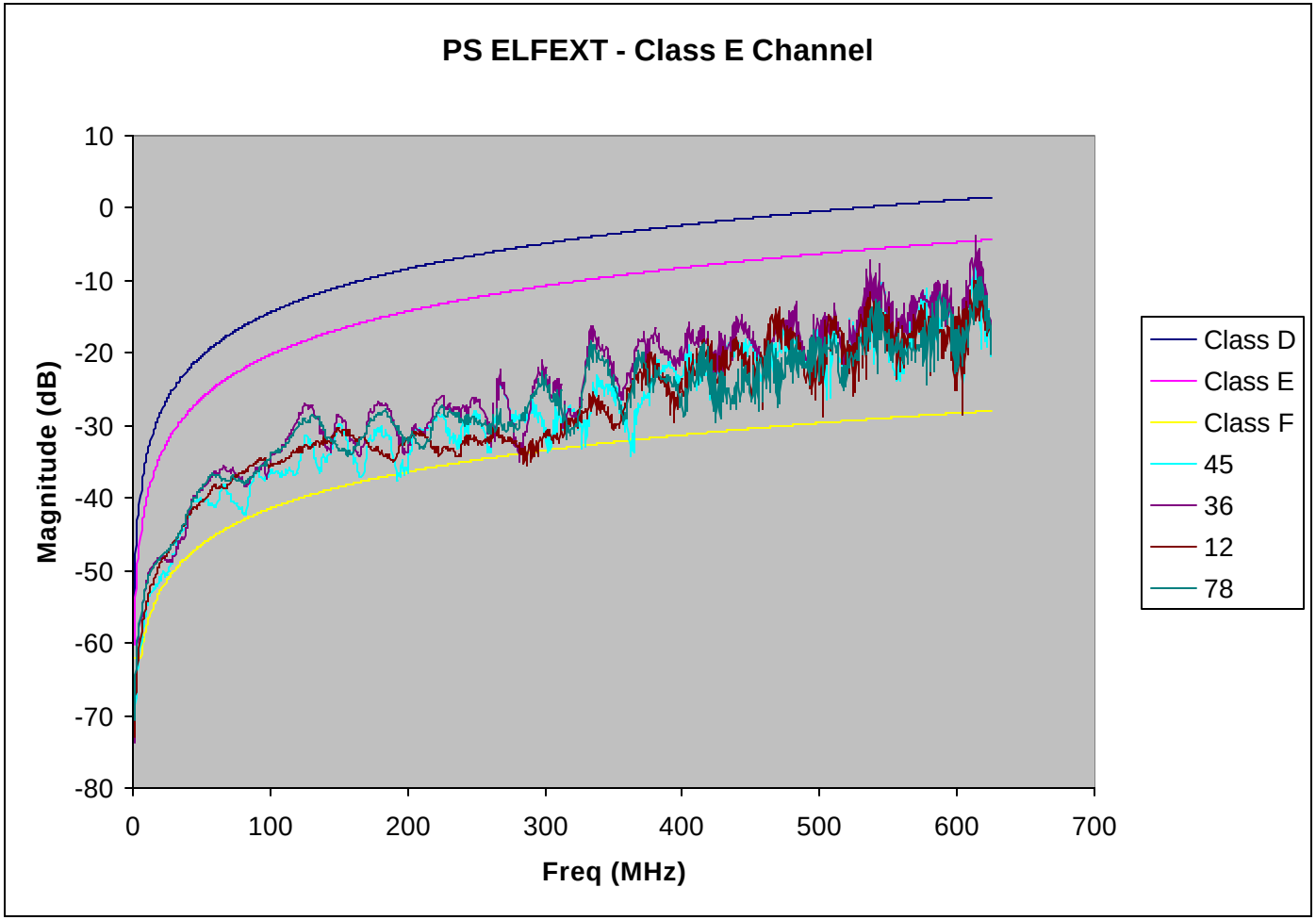


Class	Margin
D	12.1 dB
E	2.1 dB
F	-22.6 dB

PSNEXT= -25.7dB

Freq. 592 MHz

PS ELFEXT - Class E Channel



Class	Margin
D	5.1 dB
E	-0.8 dB
F	-24.4 dB

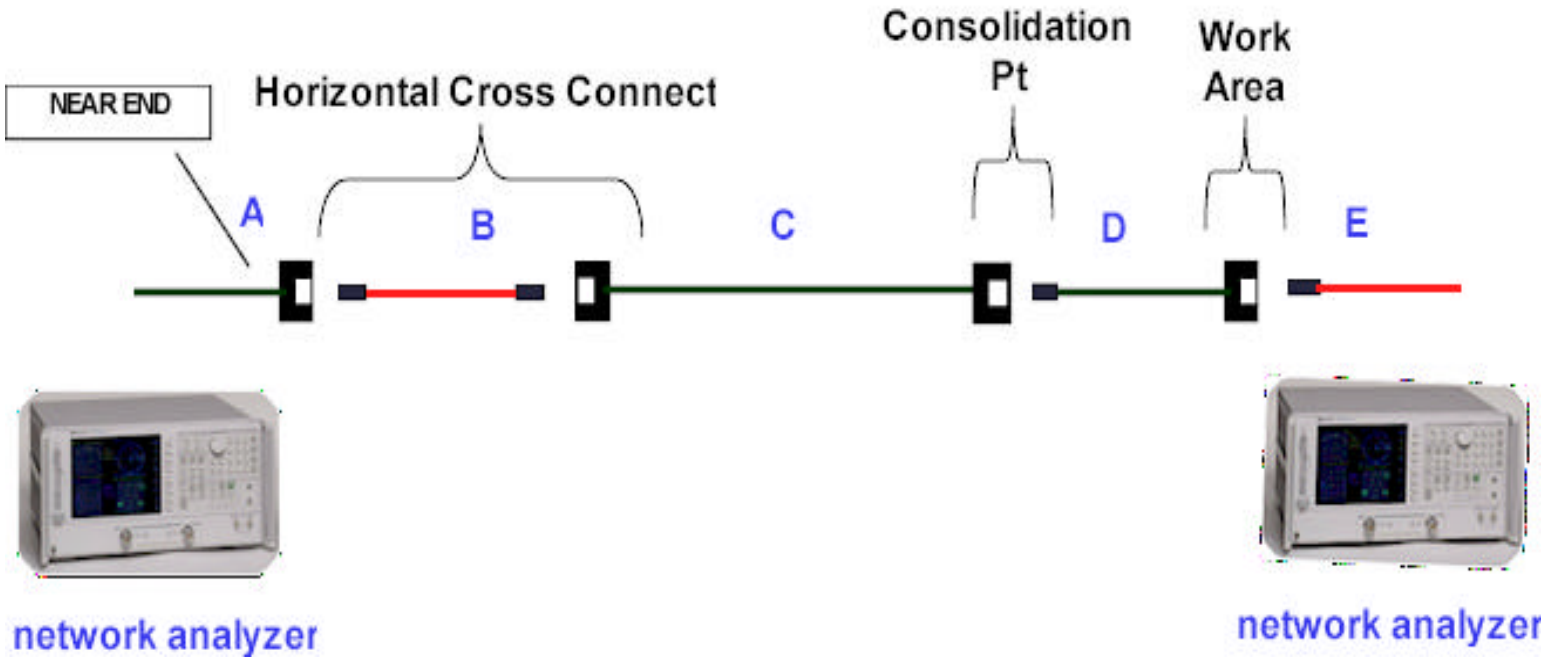
PSELFEXT = -3.7dB

Freq. 613 MHz

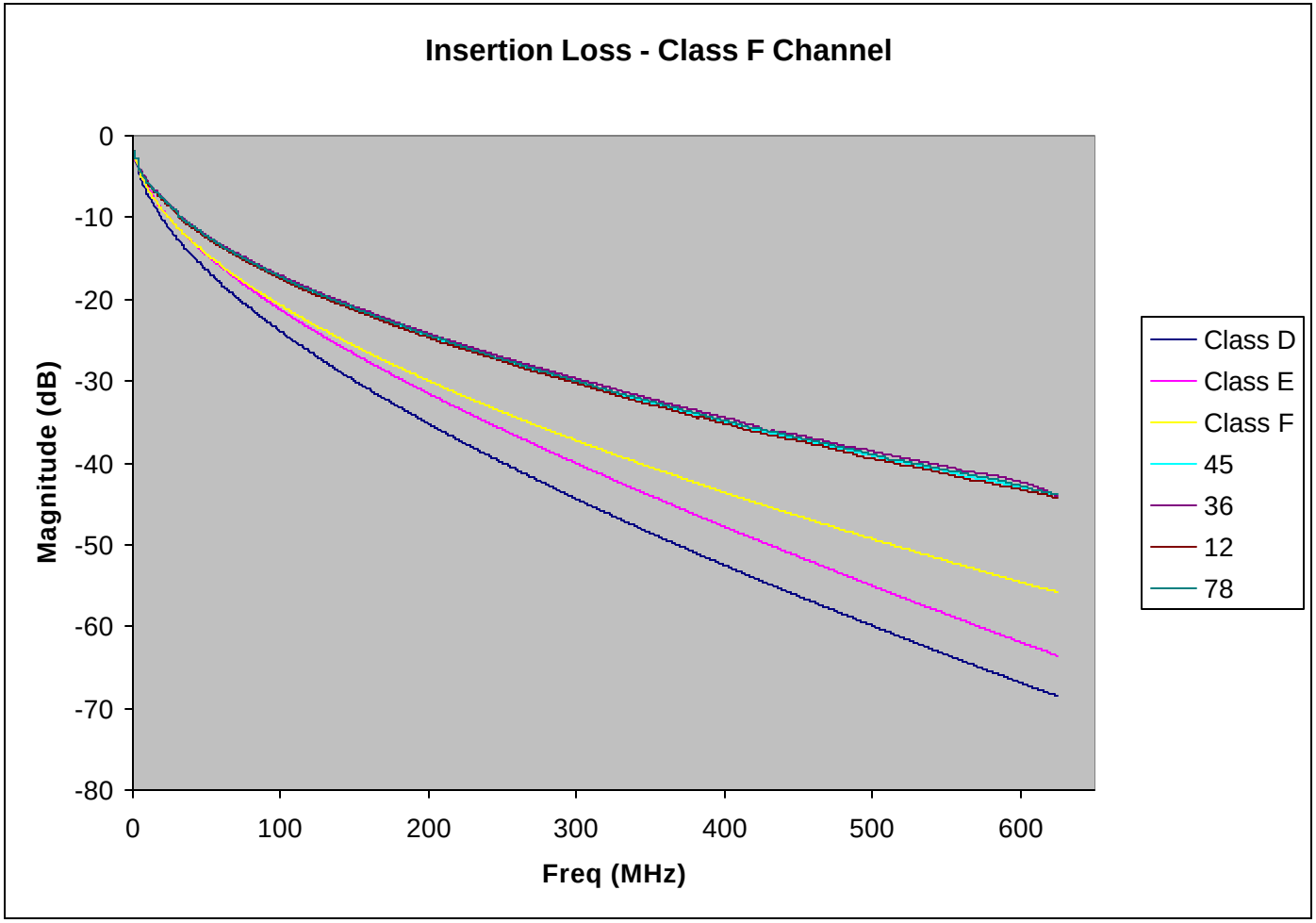
No smoothing algorithm

Class F Channel Configuration

	A	B	C	D	E
Class F Channel	13.1' (4m)	3.3' (1m)	278.8' (85m)	16.4' (5m)	16.4' (5m)
Cabling Adhoc	6.6' (2m)	9.8' (3m)	278.8' (85m)	16.4' (5m)	16.4' (5m)



Insertion Loss - Class F Channel



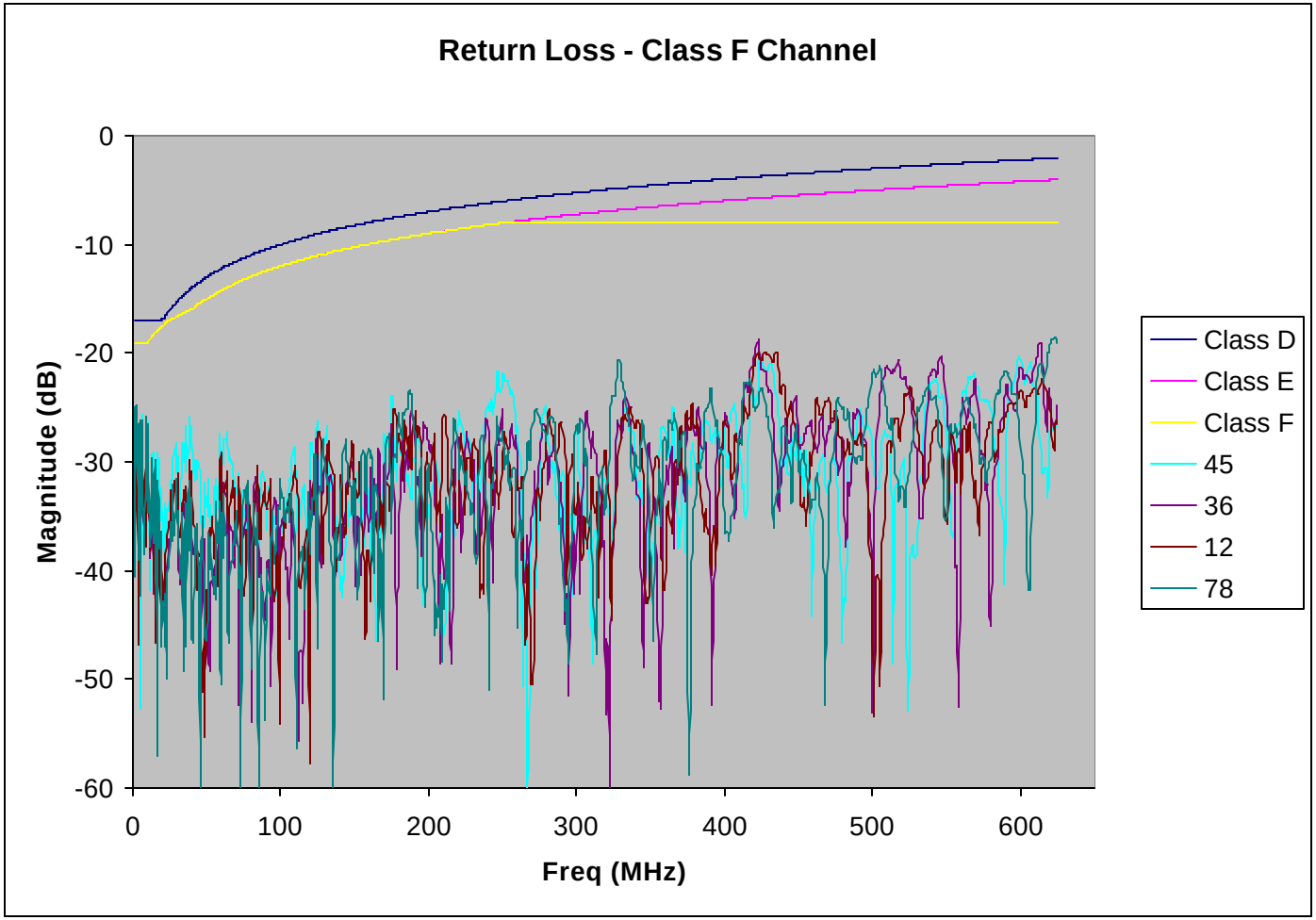
Class	Margin
D	24.7 dB
E	19.8 dB
F	12.0 dB

IL = -43.8 dB

Freq. 625 MHz

No smoothing algorithm

Return Loss - Class F Channel

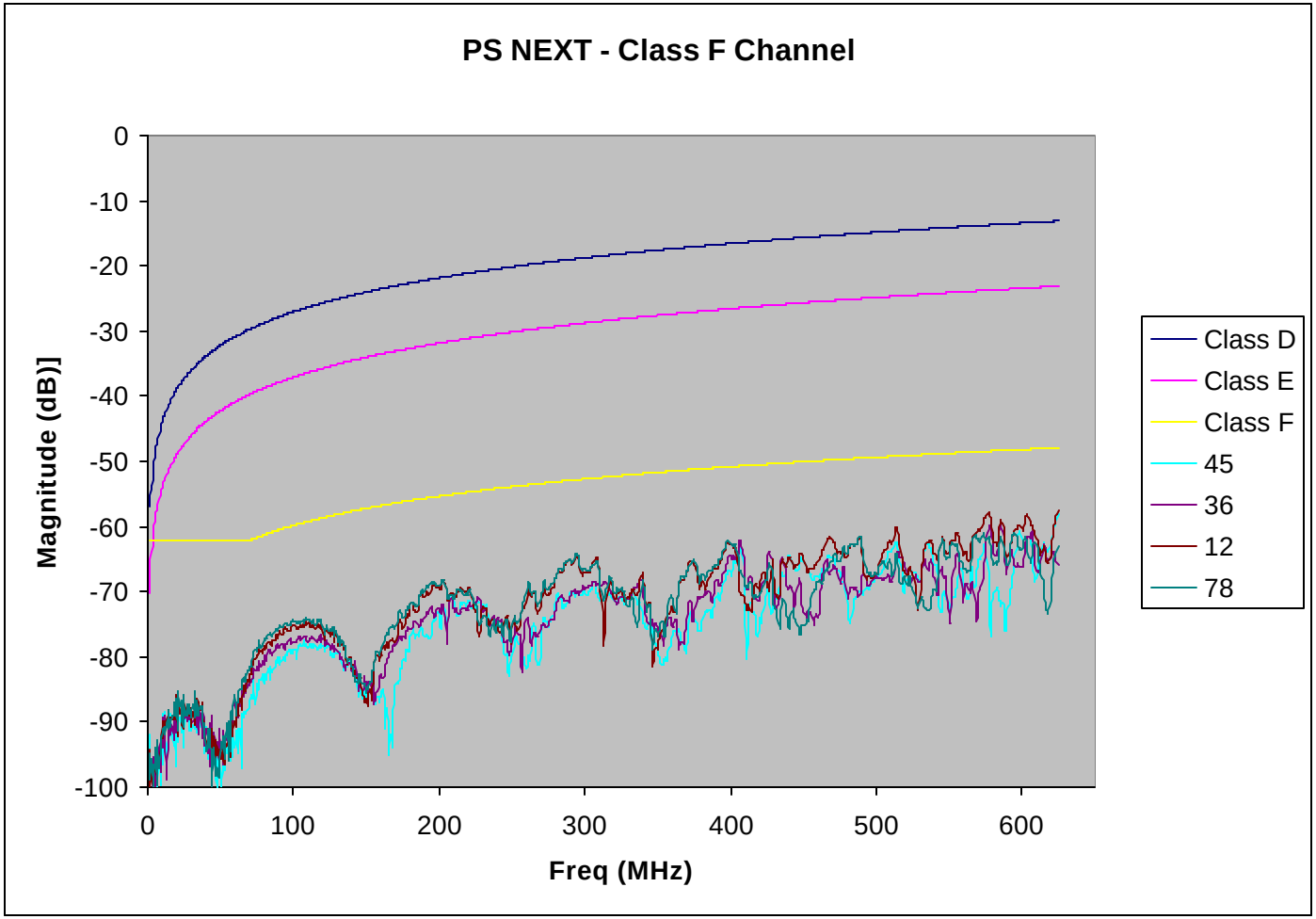


Class	Margin
D	16.6 dB
E	14.6 dB
F	10.6 dB

RL = -18.6 dB

Freq. 623 MHz

PS NEXT - Class F Channel

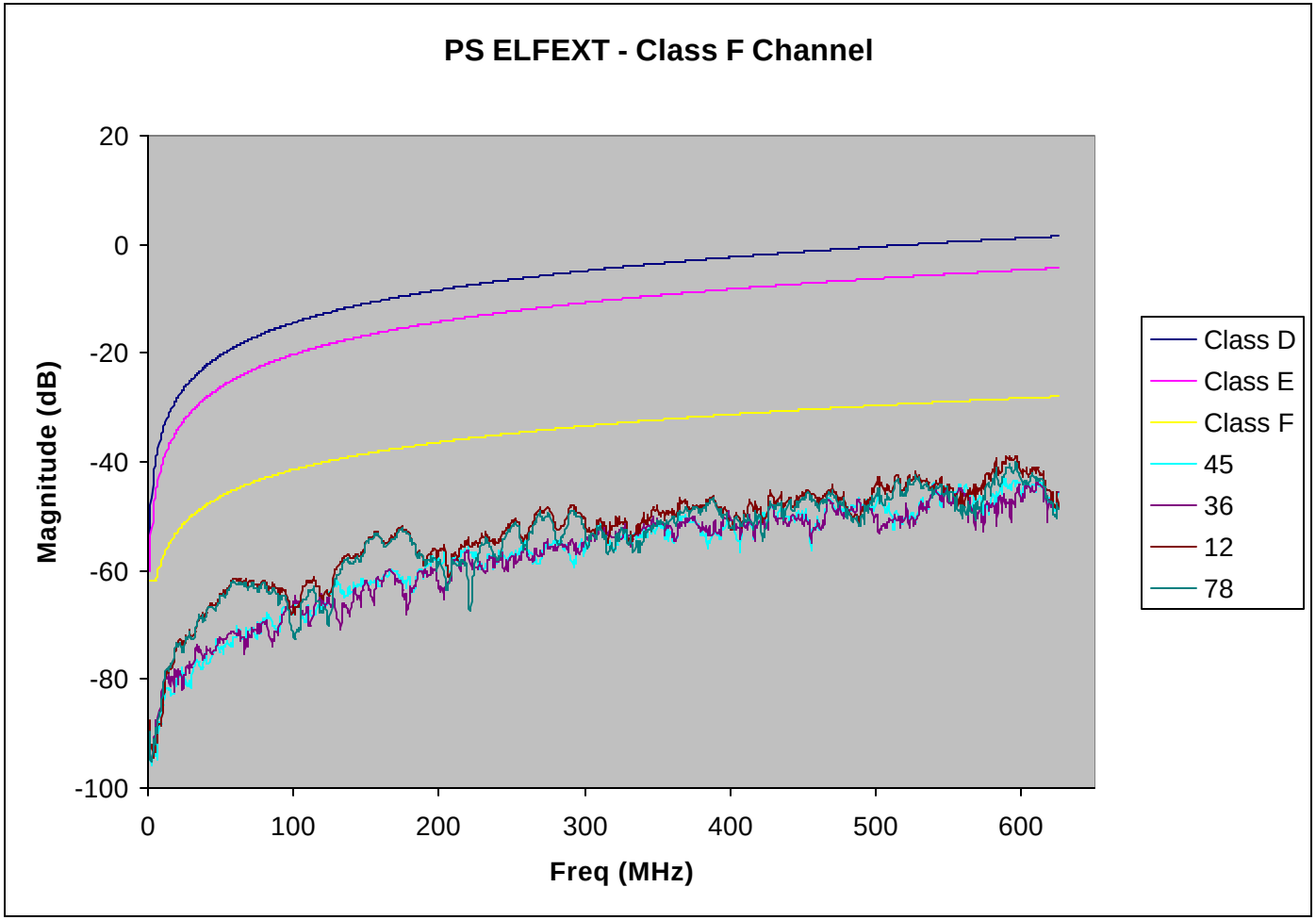


Class	Margin
D	44.3 dB
E	34.3 dB
F	9.5 dB

PSNEXT = -57.4 dB

Freq. 625 MHz

PS ELFEXT - Class F Channel



Class	Margin
D	39.8 dB
E	34.0 dB
F	10.4 dB

PSELFEXT= -38.8 dB

Freq. 592 MHz

No smoothing algorithm

Summary

- ILD issues for Class D and E channels at extended frequencies require additional research
- Enhanced performance of Class D and/or E cables and connectors are required to support extended limits
- Test methodology at extended frequencies require standards support
  - For example fixturing, test set-up, cable layout
- Significant improvements in channel performance can be realized with higher class systems
  - More copper is better

Thank you

Q&A