Next Generation Field Testing

Orlando, Florida
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Summary

- **Availability of field testers to assess post-installation performance of cabling an integral component of Ethernet ecosystem**

- **Field tester capability keeping pace with increased bandwidth requirements of Next Generation BASE-T**

- **Field tester S-parameter measurements to 2 GHz are presented and compared to VNA measurements and Category 8 draft 0.5 specification limits**

Background

•**TIA/EIA-TSB-67:** *Transmission Performance Specifications for Field Testing of Unshielded Twisted-Pair Cabling Systems*, published in 1995. Category 3, Category 4 and Category 5, 10BASE-T and 100BASE-TX

•**TIA/EIA-TSB-95:** *Additional Transmission Performance Guidelines for 4-Pair 100 Ω Category 5 Cabling,* published in 1999, the TSB-95 included accuracy recommendations for enhanced level II (Level II-E) field testers. Category 5e, 1000BASE-T

•**TIA/EIA-568-B.2-1**: *The Transmission Performance Specifications for 4-pair 100 Ω Category 6 Cabling*, published in 2002, provided the accuracy requirements for level III field testers; Category 6.

TIA/EIA-TSB-155-A: Guidelines for the Assessment And Mitigation of Installed Category 6 Cabling To Support 10GBASE-T, published in 2010, The guidelines to further characterize existing category 6 cabling plant as specified in TIA-568B.2-1 for 10GBASE-T applications. Category 6, 10GBASE-T.

Background

•**TIA/EIA-568-B.2-10:** *The Transmission Performance Specifications for 4-pair 100 Ω Augmented Category 6 Cabling* Annex I, published 2008, specifies accuracy requirements for level IIIe field testers used to perform the assessment of category 6A cabling; Category 6A, 10GBASE-T.

•**TIA-1152:** Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling, published 2009, Standalone field test document addressing accuracy requirements for Level IIe (category 5e), Level III (Category 6) and Level IIIe (category 6A).

IEC 61935-1 Ed 4.0 (draft)*

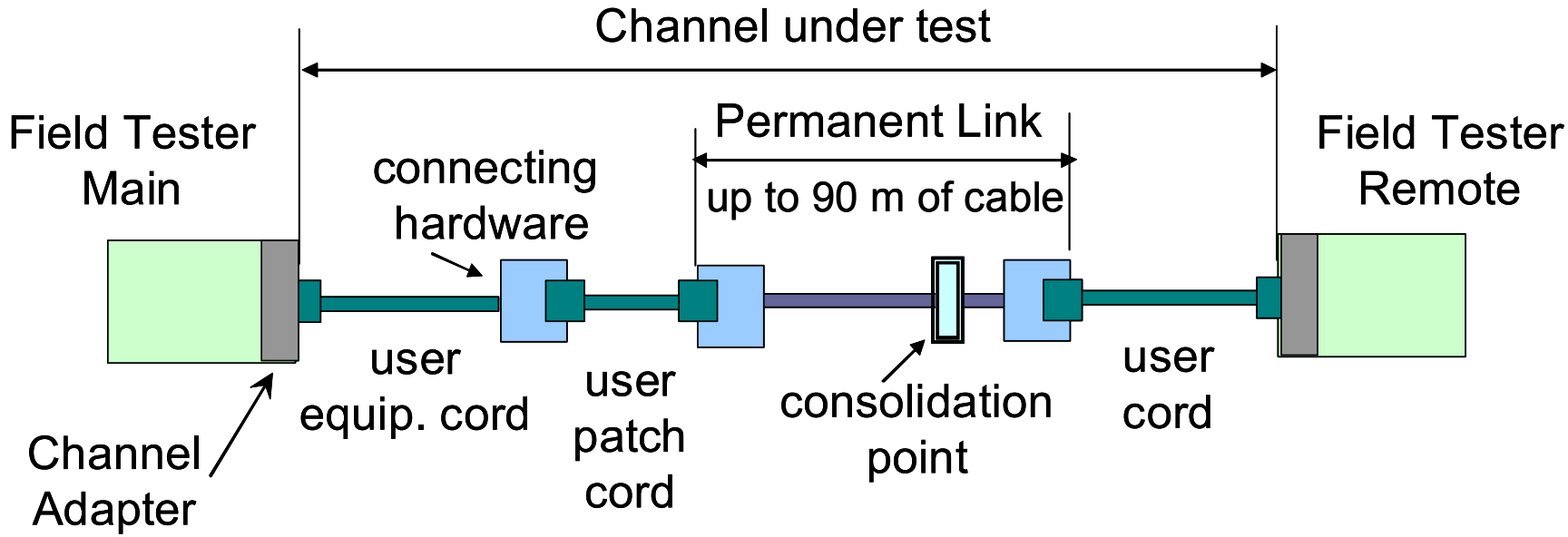
•Title: IEC 61935-1 ed 4.0: Testing of Balanced Communications Cabling in Accordance with ISO/IEC 11801 Part 1: Installed cabling.

•Specifies requirements for field test equipment used to certify class D, E, EA, F and FA cabling as defined in ISO/IEC 11801.

- Level IIE test equipment or better is required to test class D cabling (100 MHz)
- Level III test equipment or better is required to test class E cabling (250 MHz)
- Level IIIe test equipment or better is required to test class EA cabling (500 MHz)
- Level IV test equipment or better is required to test class F cabling (600 MHz)
- Level V test equipment or better is required to test class FA cabling (1000 MHz)

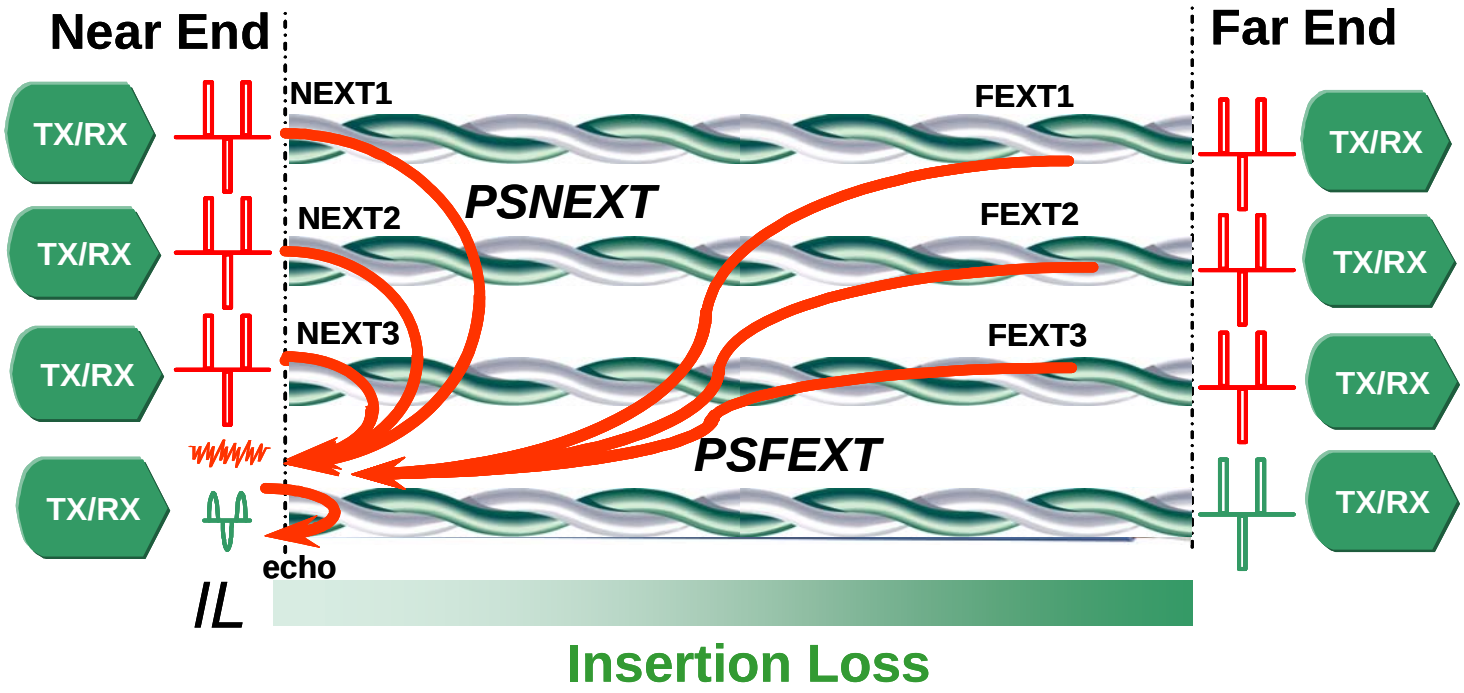
**publication expected 2013*

Field testing internal cable impairments



- **Channel and permanent link test configurations**

Transmission parameters – internal to cable



- **Insertion loss, return loss, pair-to-pair NEXT Loss, power sum NEXT Loss, pair-to-pair ELFEXT, power sum ELFEXT, return loss, and delay.**

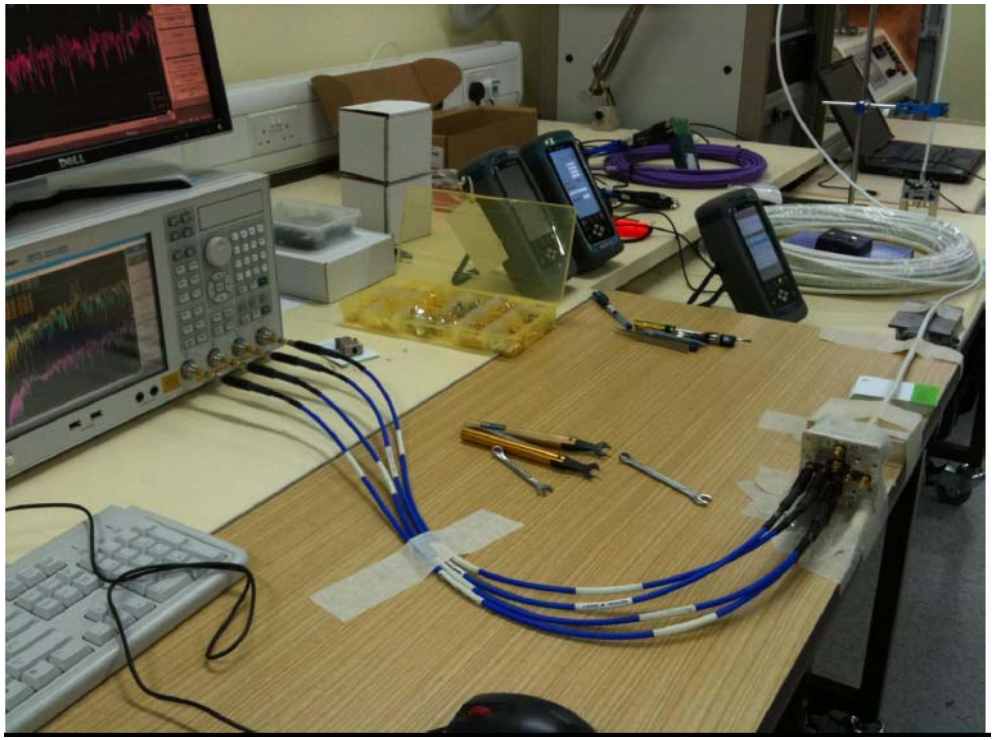
Field testing internal cable parameters

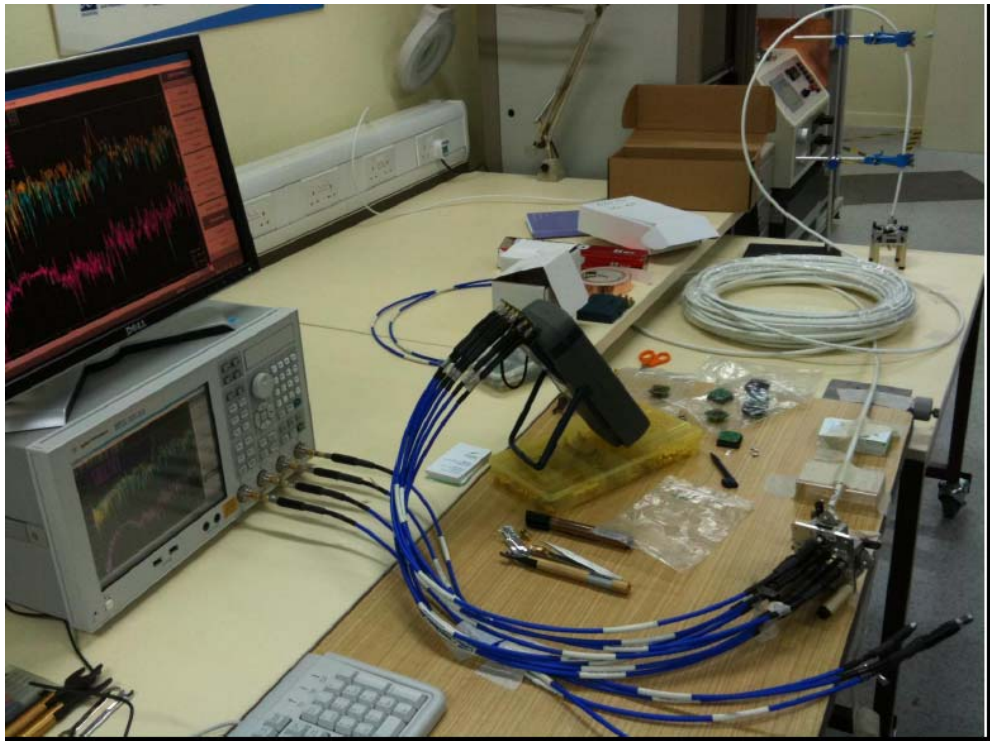
Internal measurement parameters	Number of measurements	10GBASE-T
Insertion loss	1 measurement per pair	X
NEXT loss pair-to-pair, measured from local end	6 pair-to-pair measurements	X
NEXT loss pair-to-pair, measured from far-end	6 pair-to pair measurements	X
NEXT loss power sum, measured from local end	power sum calculation from 6 pair-to-pair measurements	X
NEXT loss power sum, measured from far-end	power sum calculation from 6 pair-to-pair measurements	X
ELFEXT, pair-to-pair	6 pair-to-pair FEXT measurements and 12 ELFEXT calculations	X
ELFEXT, power sum	power sum calculations form 12 ELFEXT results	X

Internal measurement parameters	Number of measurements	10GBASE-T
Return loss, measured from local end	1 measurement per pair 4 measurements	X
Return loss, measured from far end	1 measurement per pair 4 measurements	X
Propagation delay	1 measurement per pair 4 measurements	X
Delay skew	1 measurement per pair 4 measurements	X
Length	1 measurement per pair 4 measurements	X
Wire map, including shield connection if present	4 to 5 measurements depending on shield	X

- All measurements can be performed in 10 seconds

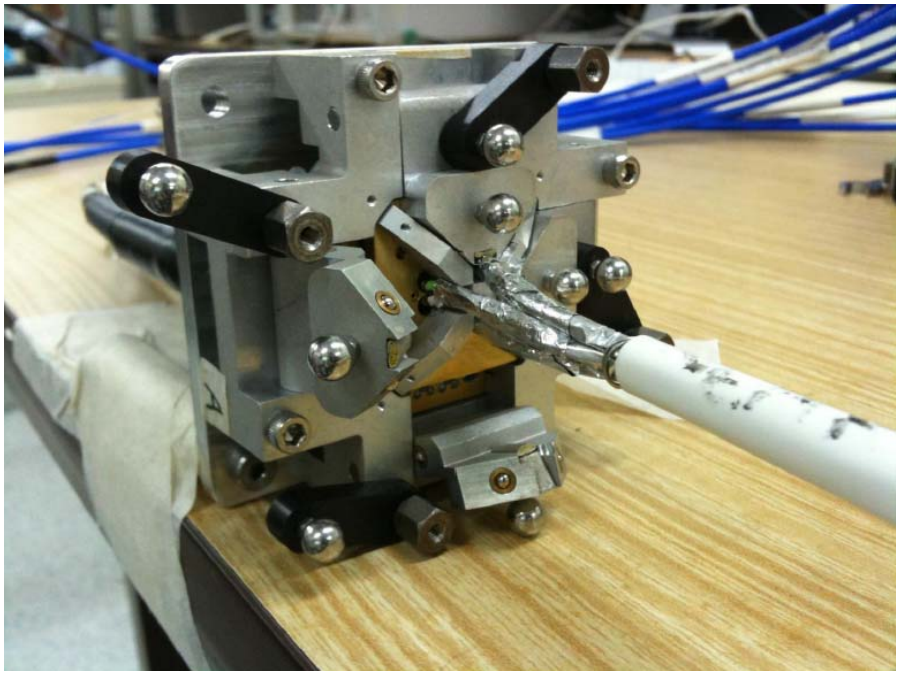
Test Setup for 2 GHz Testing





Test Setup for 2GHz Testing using Field Tester VNA Adapter and OCC Fixture
Arvind C Patel, Psiber Data Pte Ltd,TR42.7-2012-08-084-2GHzTestSetUp.pdf

Test Setup for 2 GHz Testing



Insertion loss:
reference calibration

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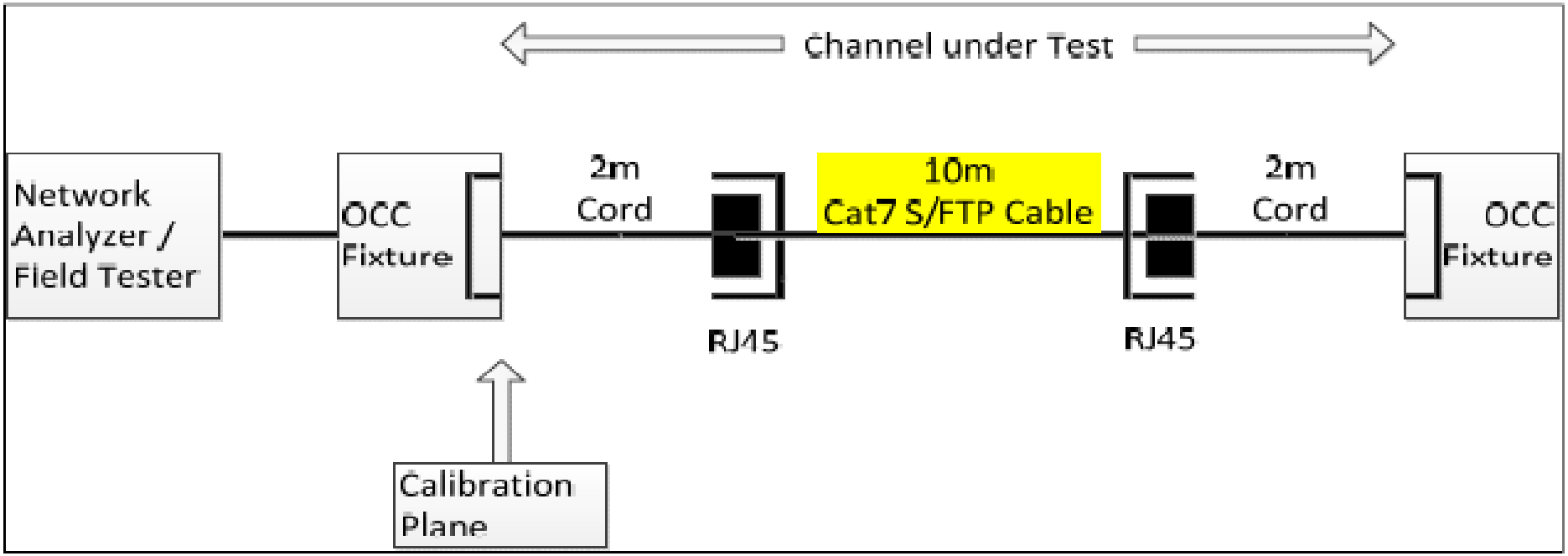
Test Channel



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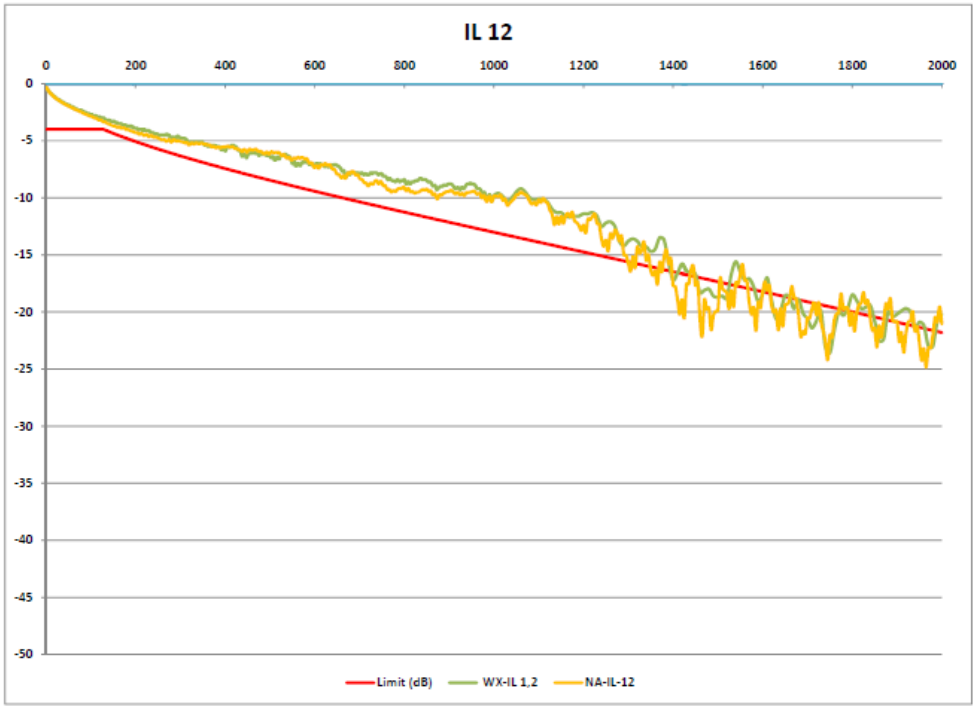
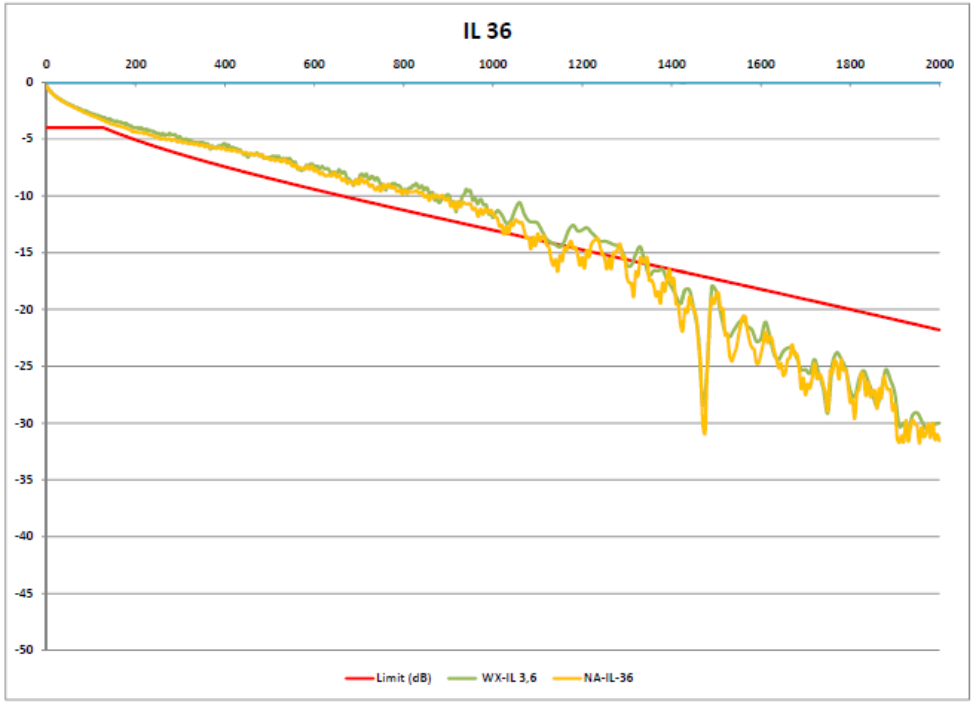
Insertion loss





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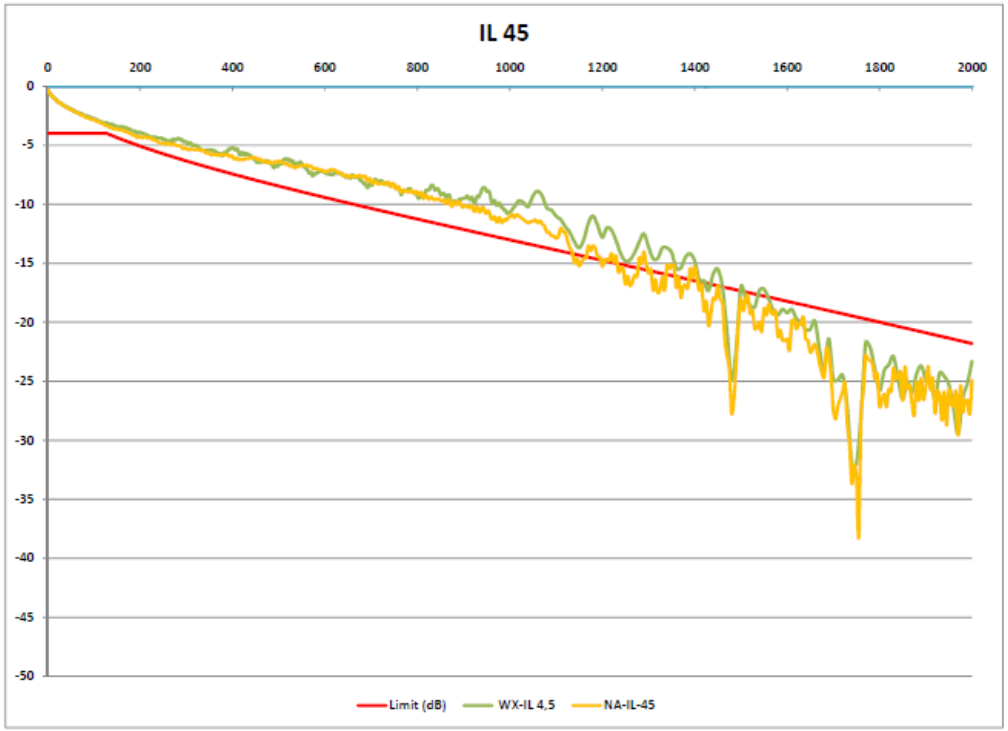

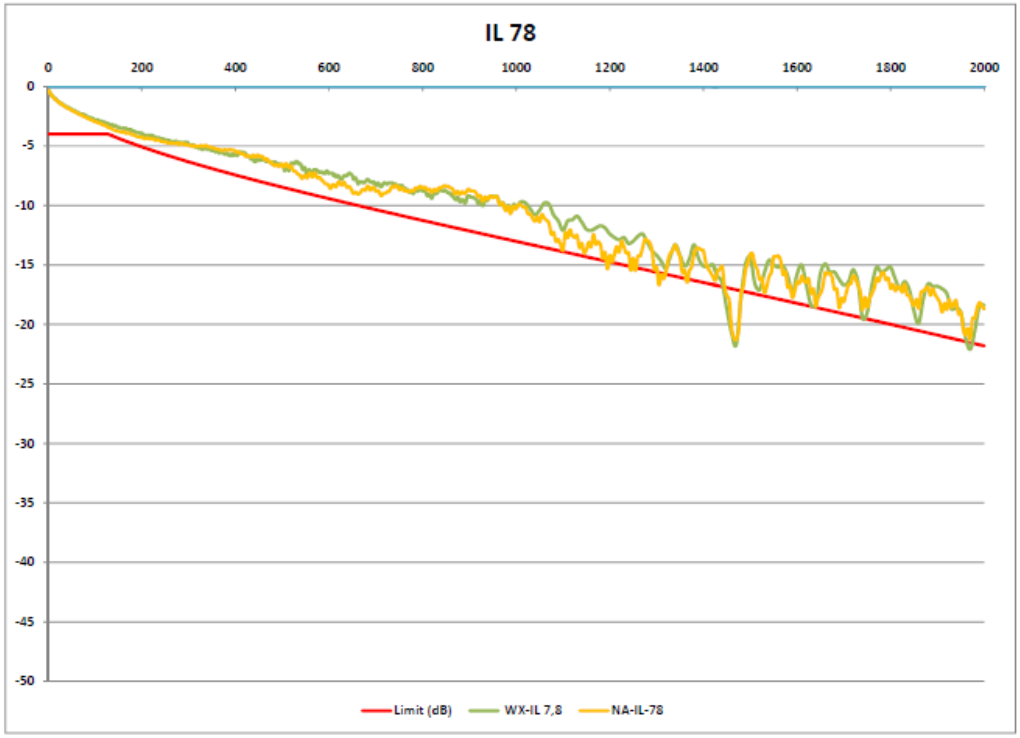

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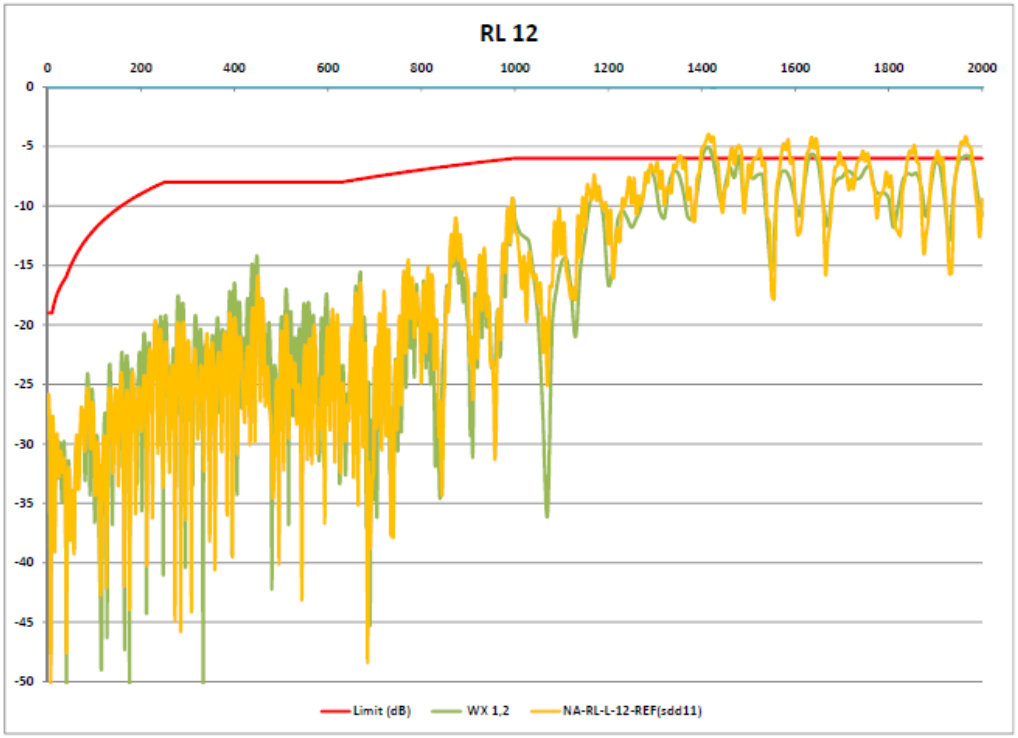
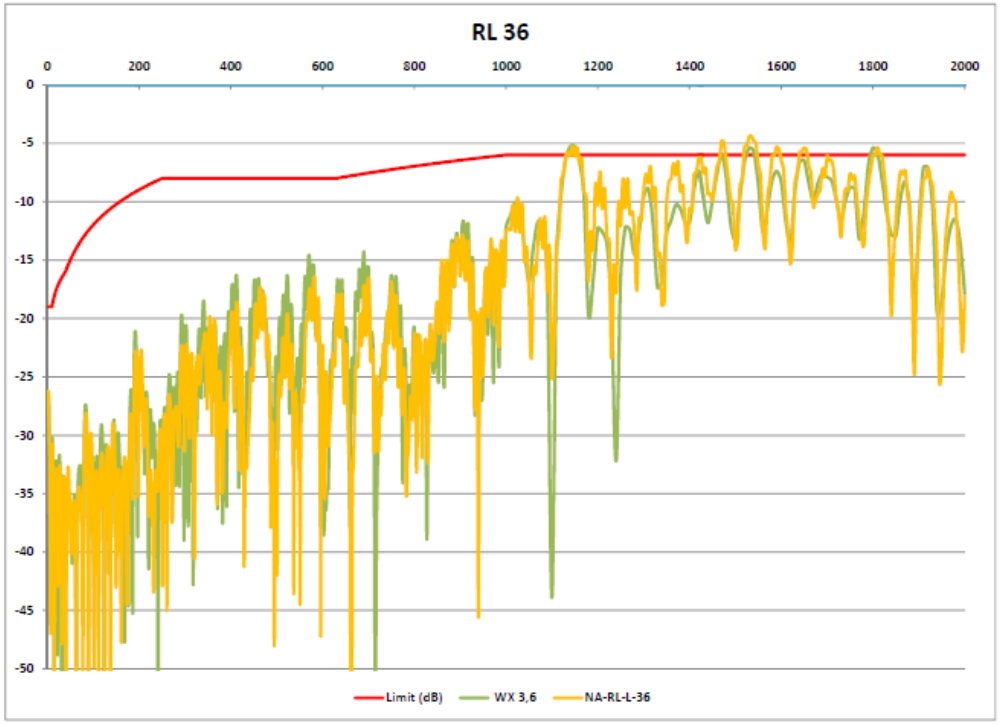
Return loss





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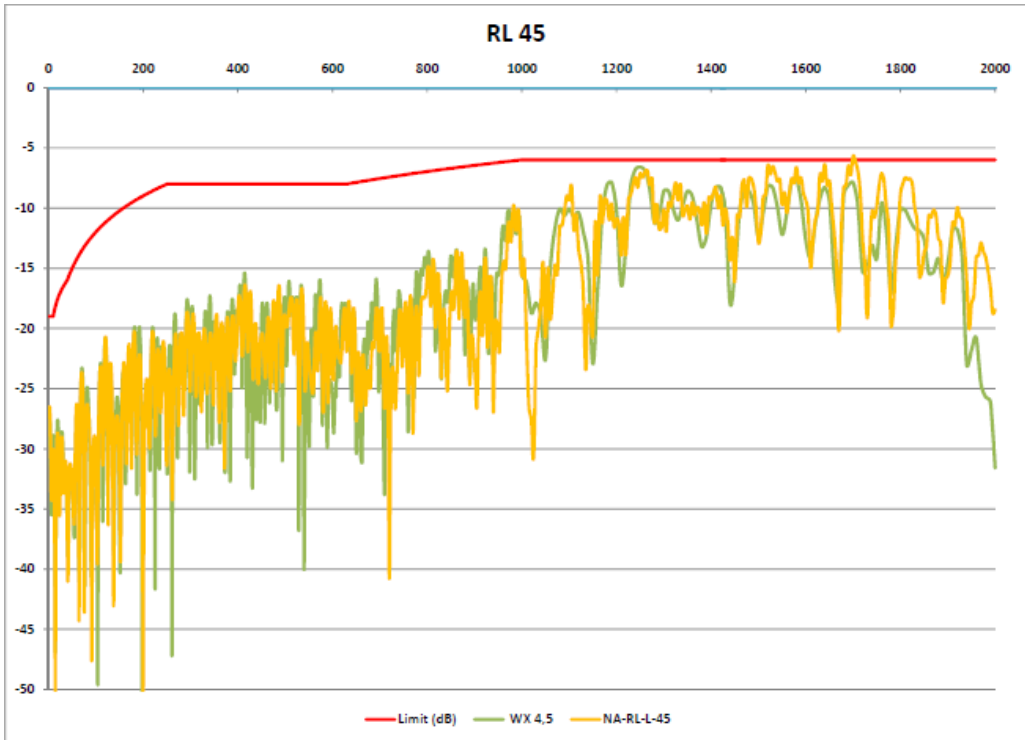

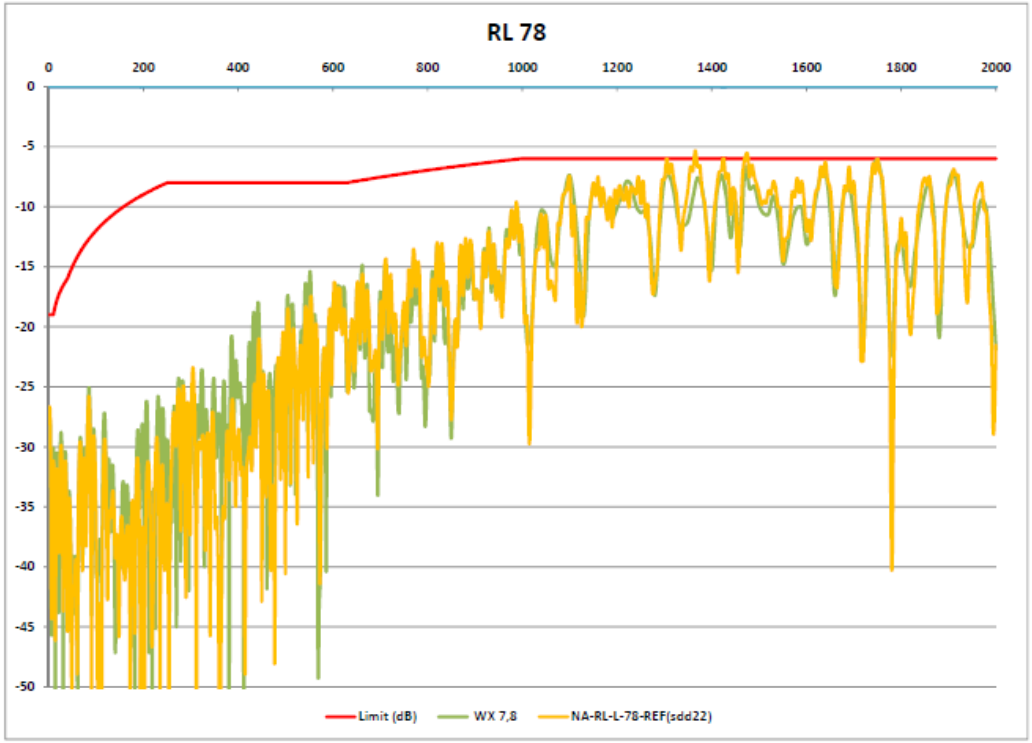

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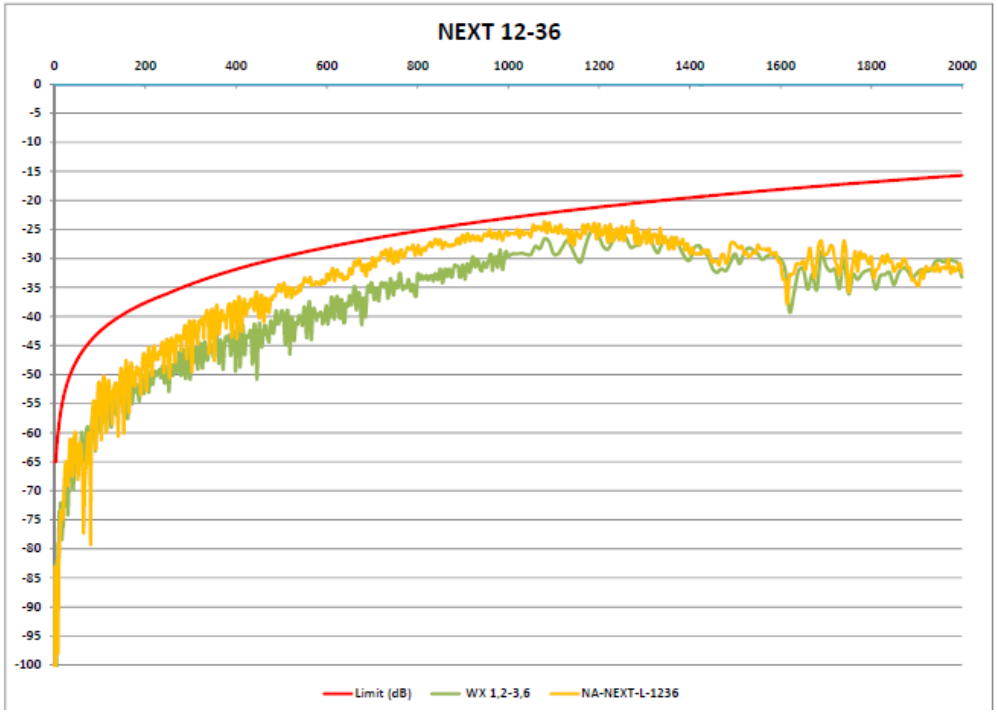

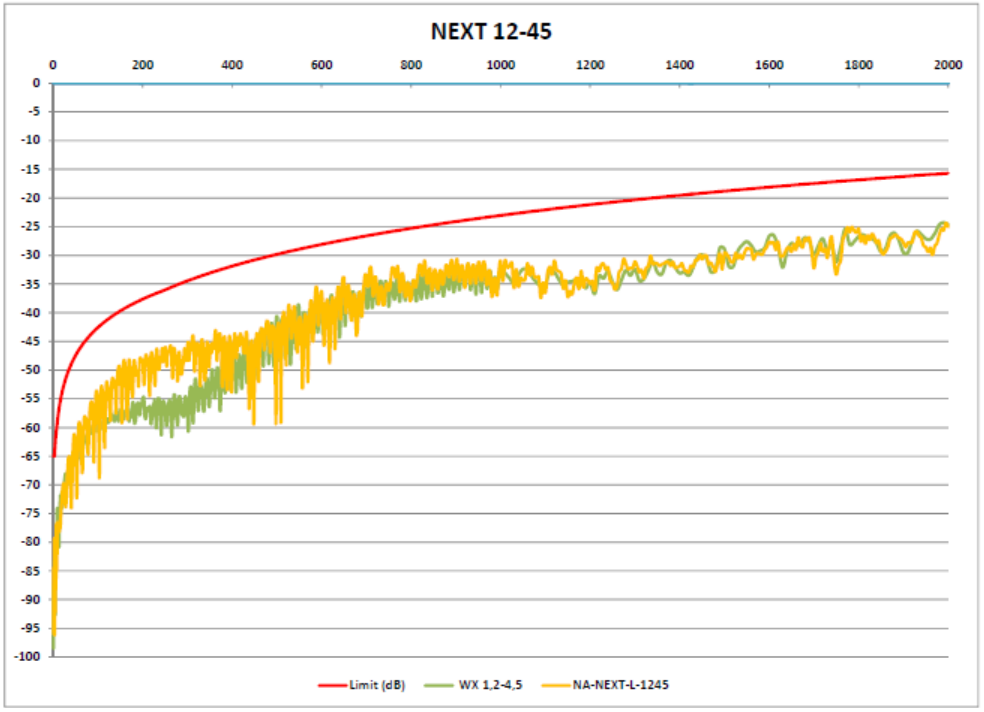

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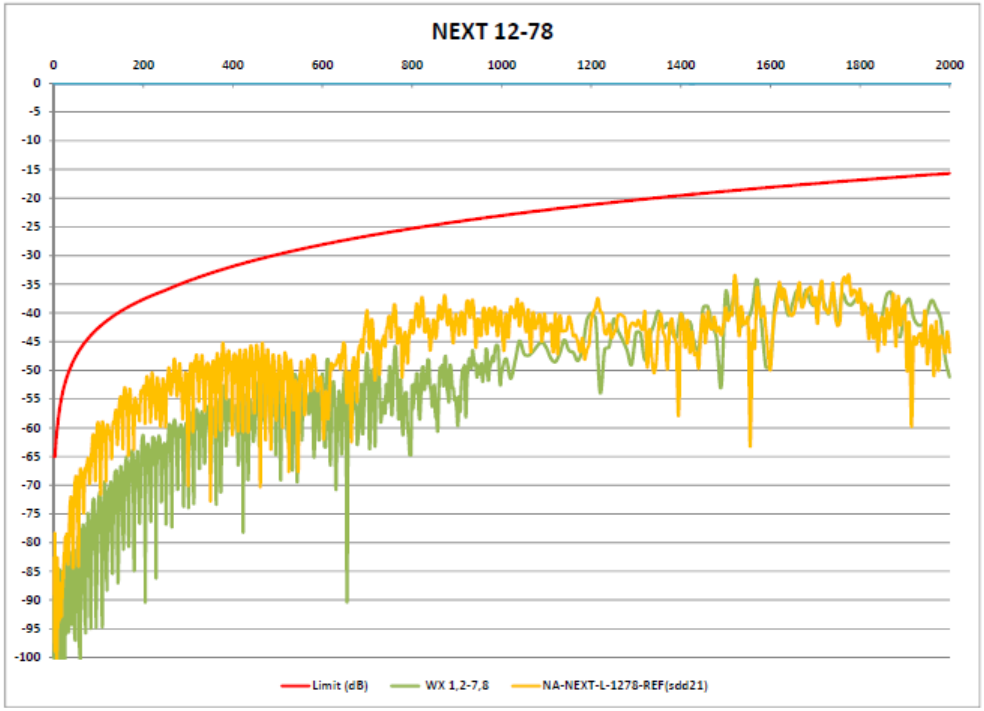

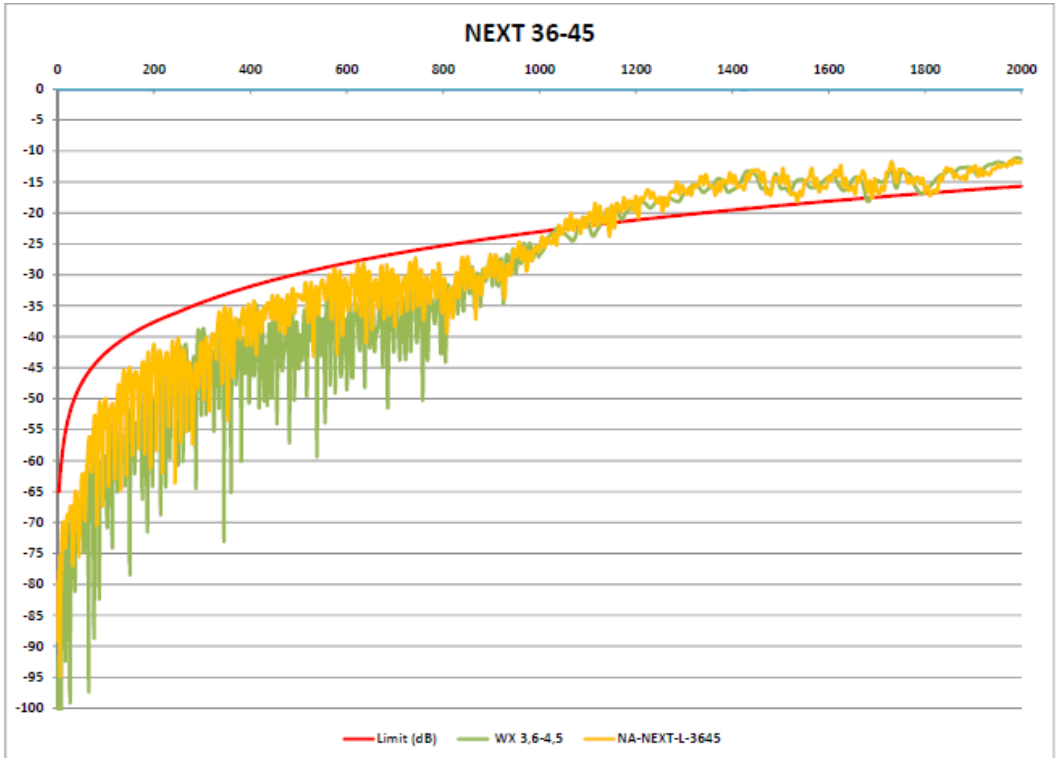

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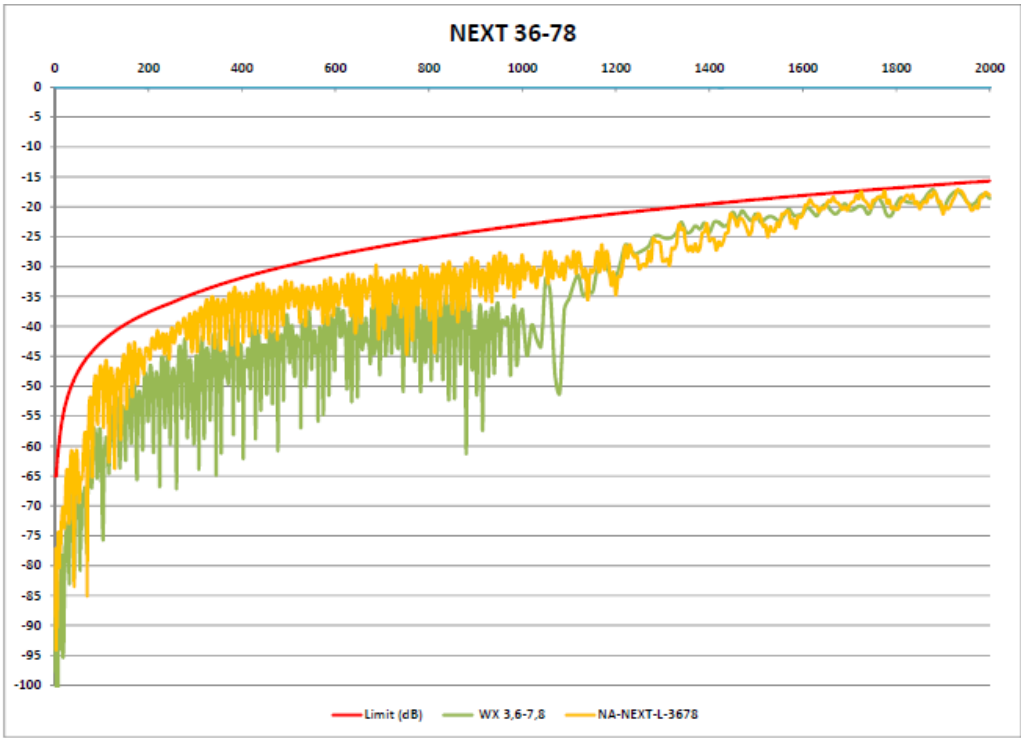

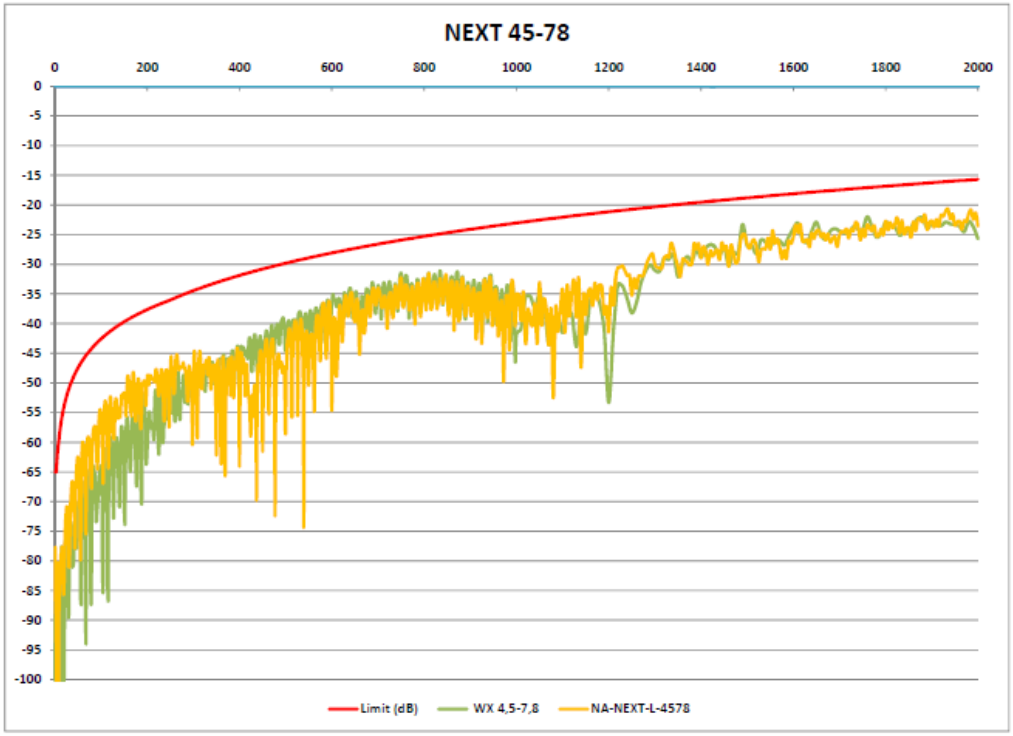

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