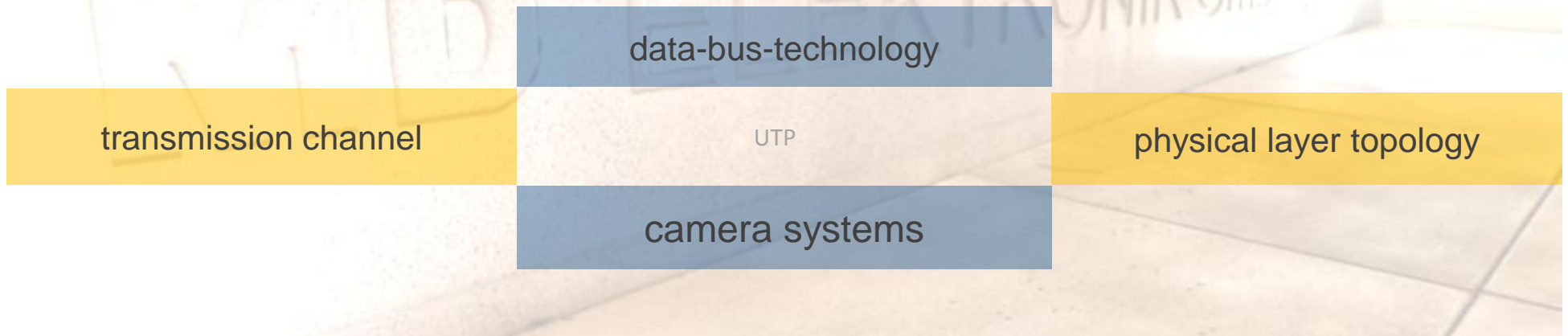


Ethernet-Technology for automotive application

Worst Case Alien-Near-End-Crosstalk Measurements and Analysis for IEEE 802.3bp



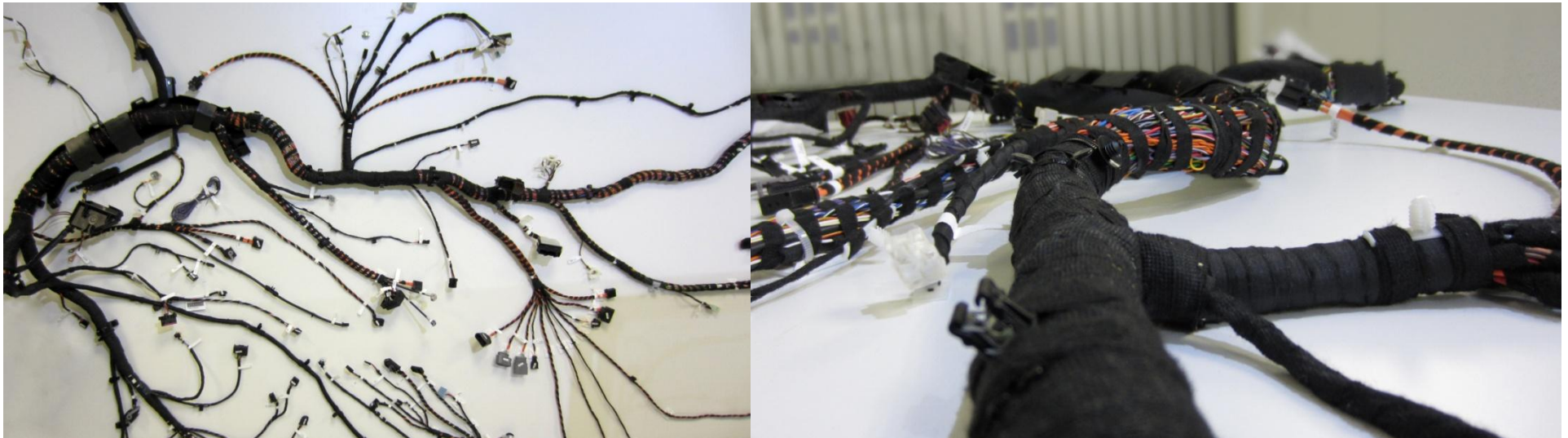
MD Elektronik GmbH

Presenter: Martin Meurer

Content: Dmitrij Semilovsky, Martin Huber

Objectives

- Investigation on alien-near-end-crosstalk with different data cables
- Discussion on current limit lines for alien-near-end-crosstalk



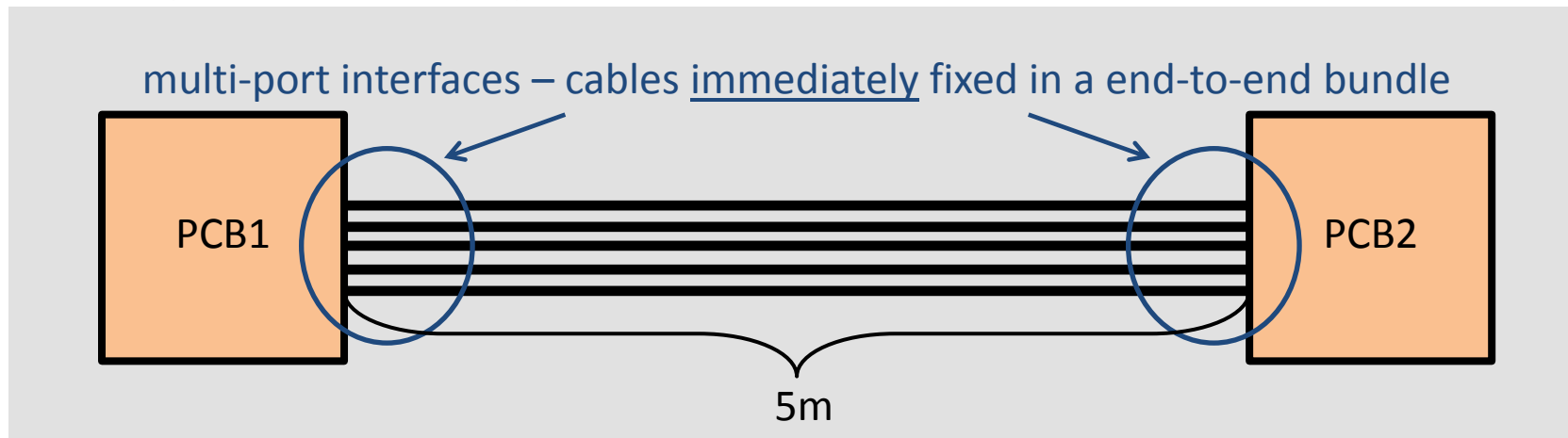
Contents

1. Definition of worst case channel
2. Measurement Setup
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3. Measurement Results PSANEXT
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Definition of worst case channel

WORST CASE CHANNEL

- Measurement Setup was slightly modified according to the scenario "Camera Module with more Cameras" ([matheus 3bp 02 0113.pdf](#))
- The influence of inline connectors on PSANEXT can be neglect ([mueller 01a 0114.pdf](#))
→ MD confirms this statement
- Grounding effects can be neglect to PSANEXT measurements



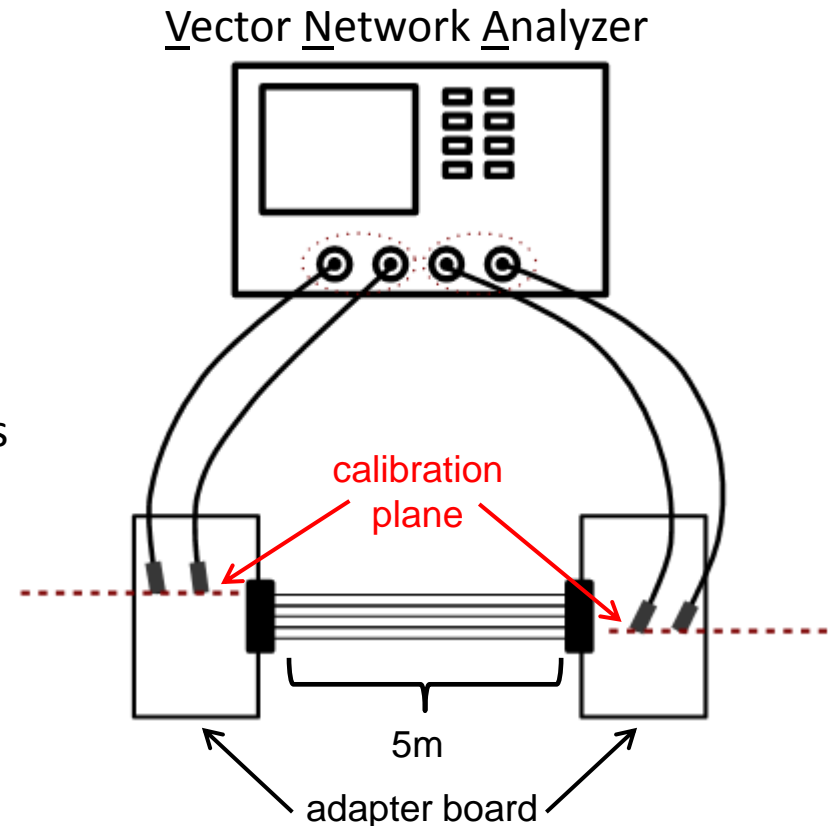
The laboratory setup should be as strict as possible to ensure nearly a "real-vehicle-simulation"

Measurement Setup /Overview

VNA SETTINGS:

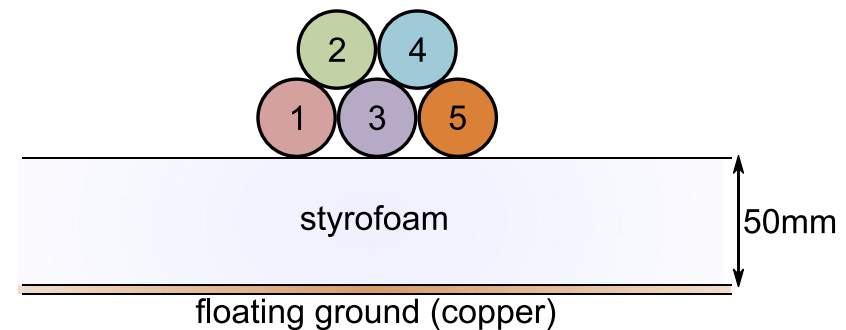
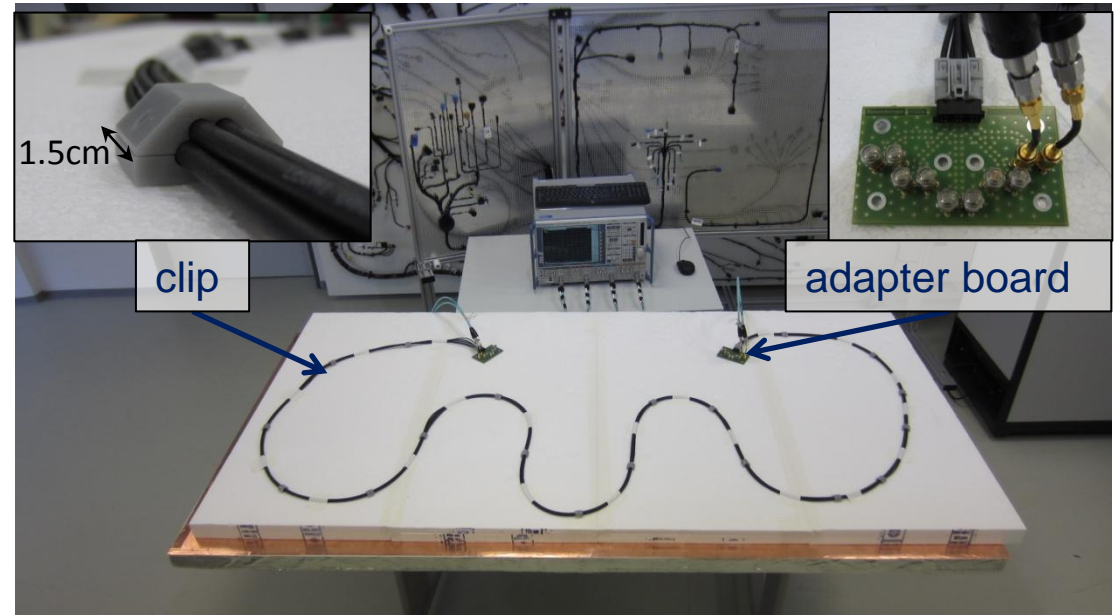
Calibration: via ECal (sufficient for PSANEXT)
VNA: R&S ZVA 8
Frequency Range: 300kHz – 1000MHz
Meas. Bandwidth: 10kHz

- 4-port VNA measurement with 2 differential ports
- Low loss and phase stable test cables were used and fixed on work plate to avoid phase shift



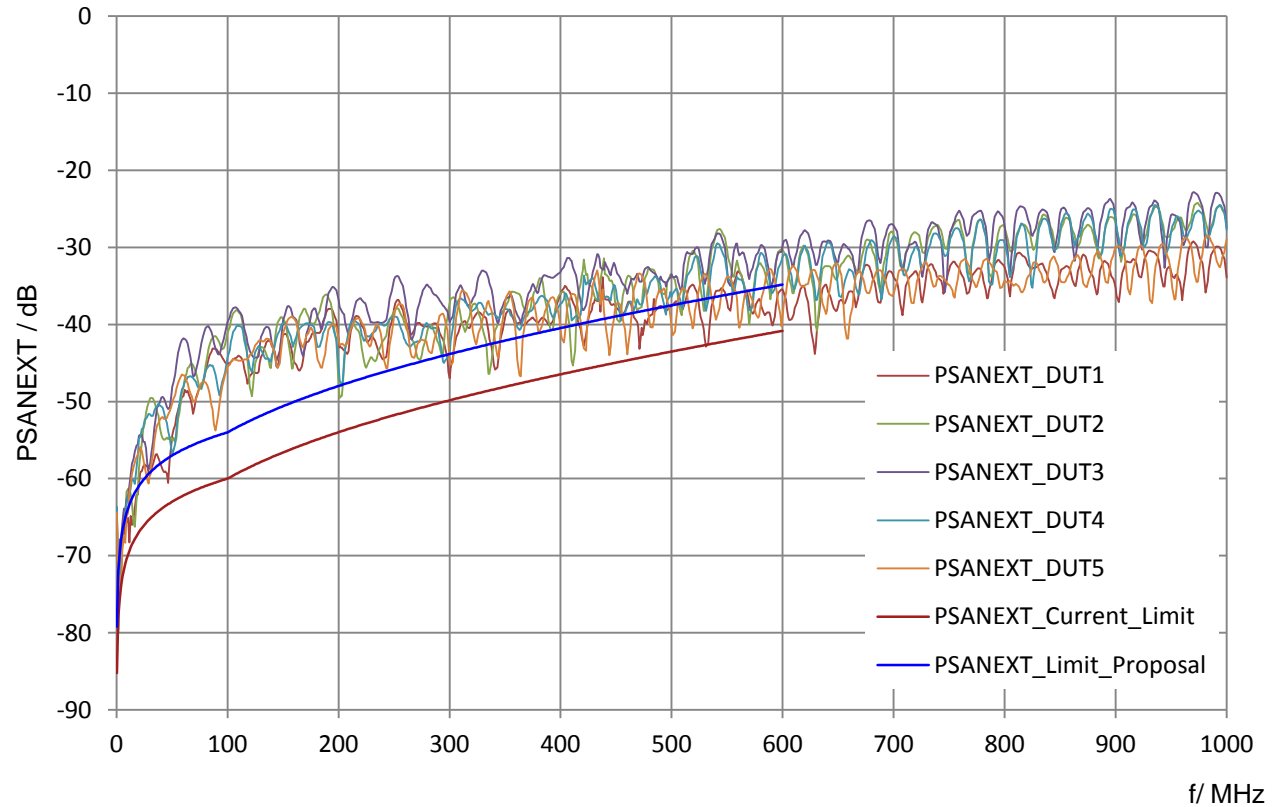
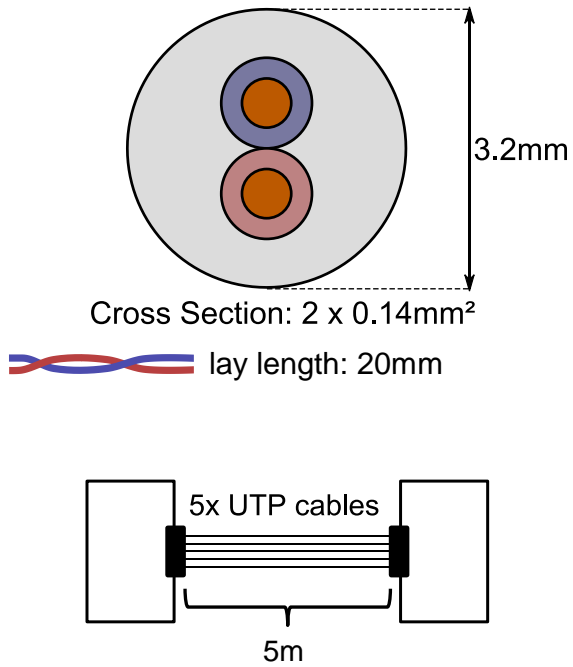
Measurement Setup /Detailed Description

- 50mm styrofoam insulation above floating ground (wiring and adapter boards)
- Special clips were used to ensure high packing density
- Matched adapter boards to ensure low influence on measurements
- Measurements were performed in a laboratory - no anechoic chamber
- All cables were measured in four-around-one constellation



Measurement Results /Cable 1

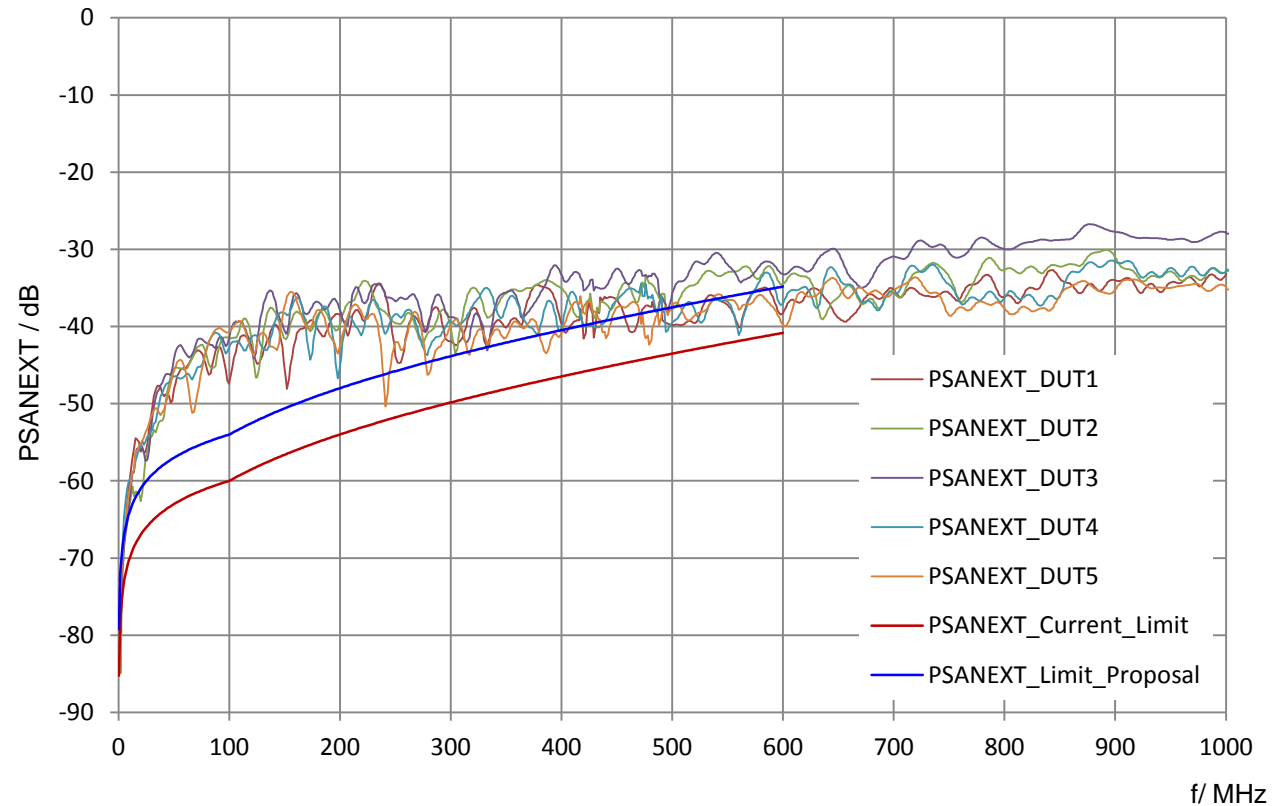
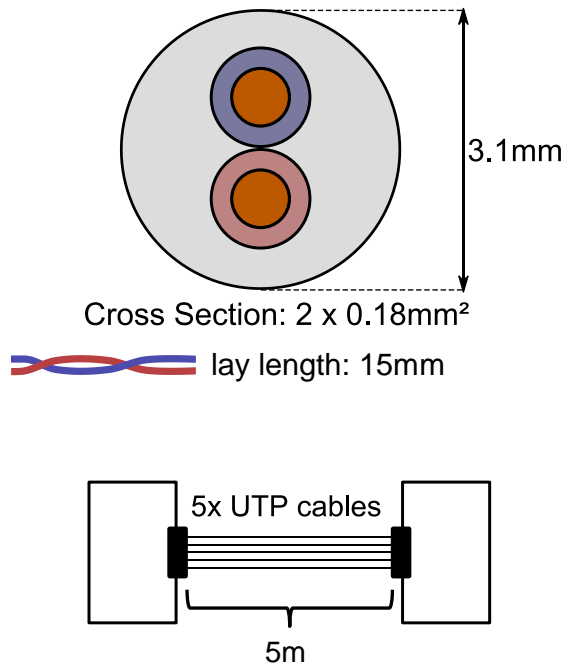
preferred 1000BASE-T1 cable - PSANEXT



WORST CASE MEASUREMENTS DO NOT FULLFILL THE LIMIT LINES!!!

Measurement Results /Cable 2

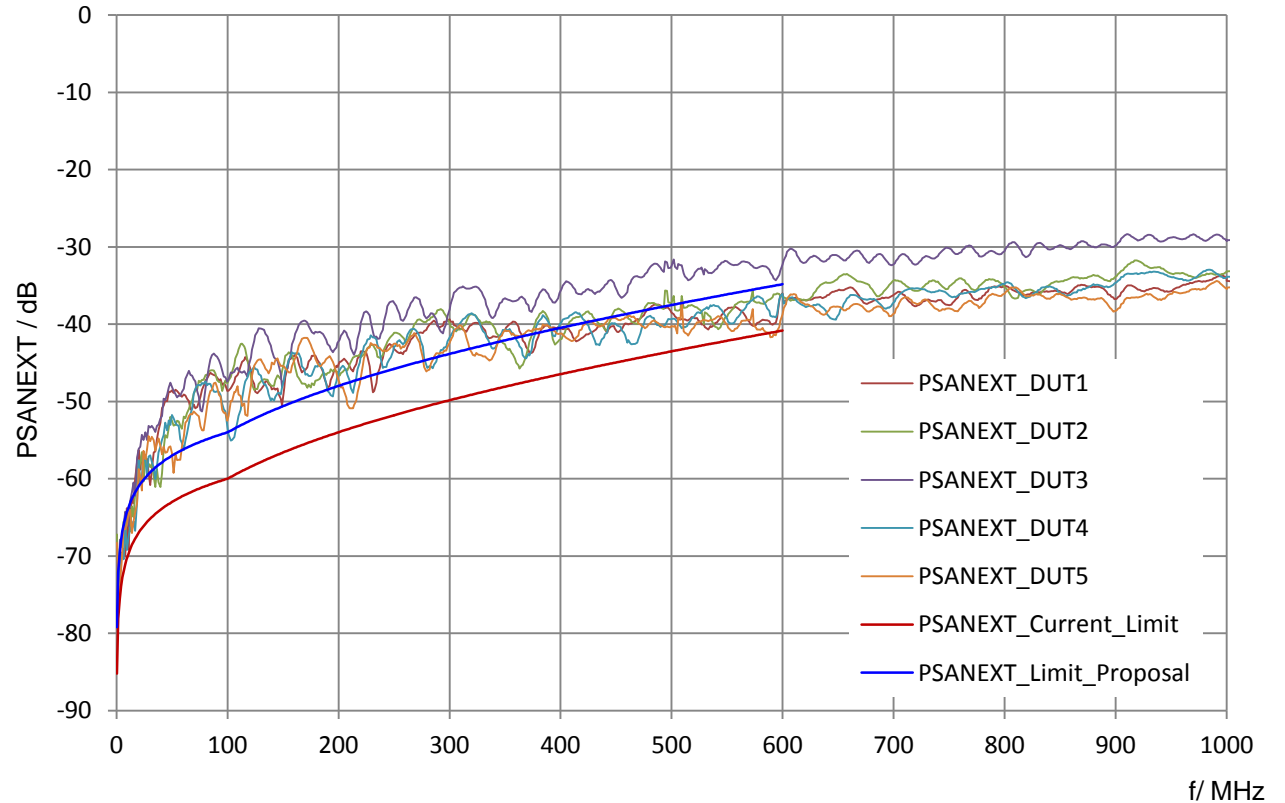
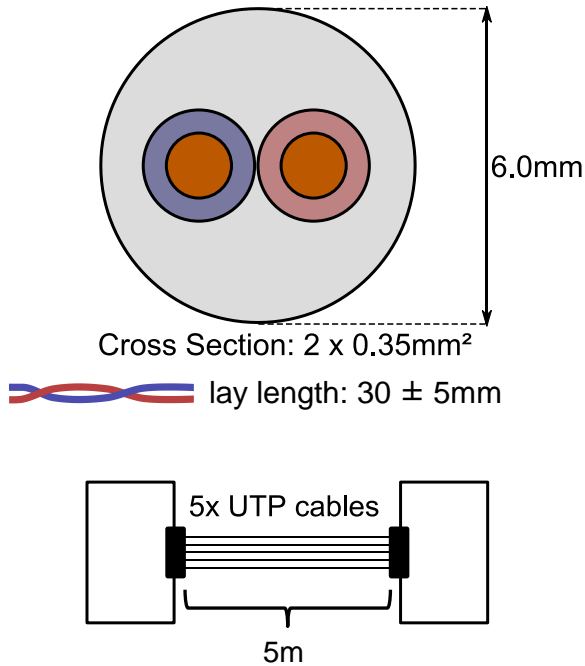
established UTP Data cable - PSANEXT



WORST CASE MEASUREMENTS DO NOT FULLFILL THE LIMIT LINES!!!

Measurement Results /Cable 3

established FlexRay cable - PSANEXT



WORST CASE MEASUREMENTS DO NOT FULLFILL THE LIMIT LINES!!!

Conclusion

- Alien-near-end-crosstalk investigation confirms the need of a new limit line
- Tightly packed wiring harness in real vehicles must be taken into account
- Definition for a reproducible measurement setup for alien-near-end-crosstalk is necessary

QUESTIONS?

THANK YOU FOR YOUR ATTENTION!