

Overview

- Screening- and coupling attenuation
 - Methods and results for measuring the EMC properties of cables and connectors using IEC 62153-4-4 (-7) triaxial tube have been presented
 - Additional measurement results of screening- and coupling attenuation for STP and SDP (SPP) cables to build consensus

- BCI ingress noise
 - How does the measured coupling attenuation relate to an absolute differential noise at the receiver?
 - Additional measurement results of BCI according to ISO 11451-4 substitution method as presented here
http://www.ieee802.org/3/NGAUTO/public/may17/cohen_shirani_3ch_01_0517.pdf

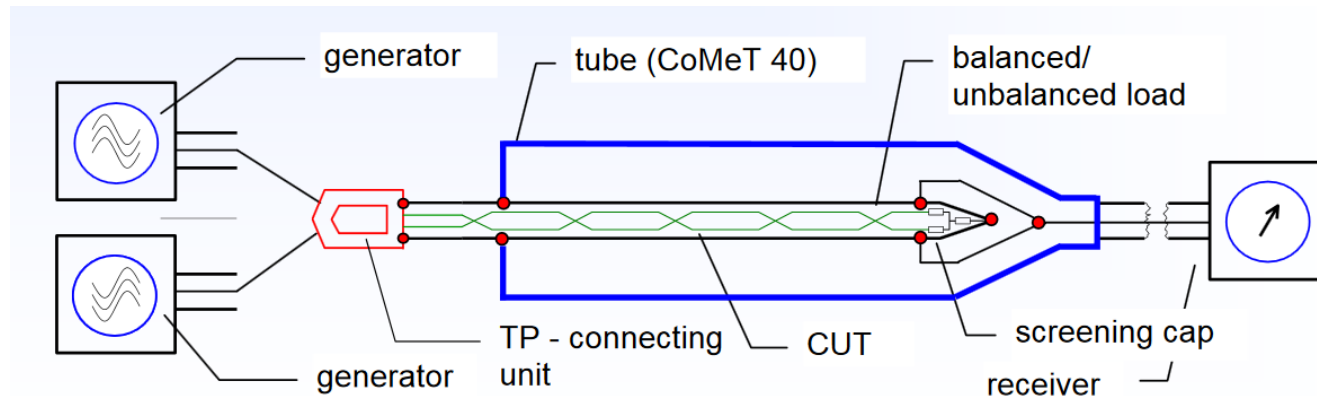
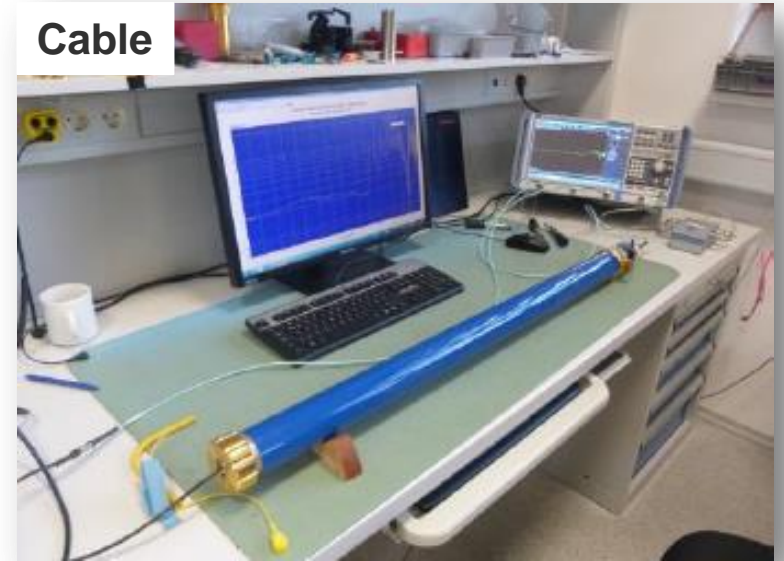
Overview

- Screening- and coupling attenuation

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Cable measurements

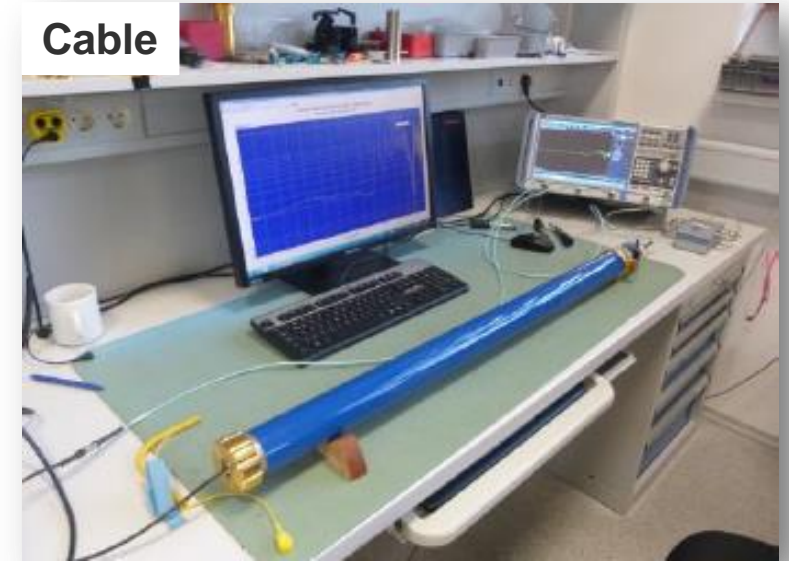
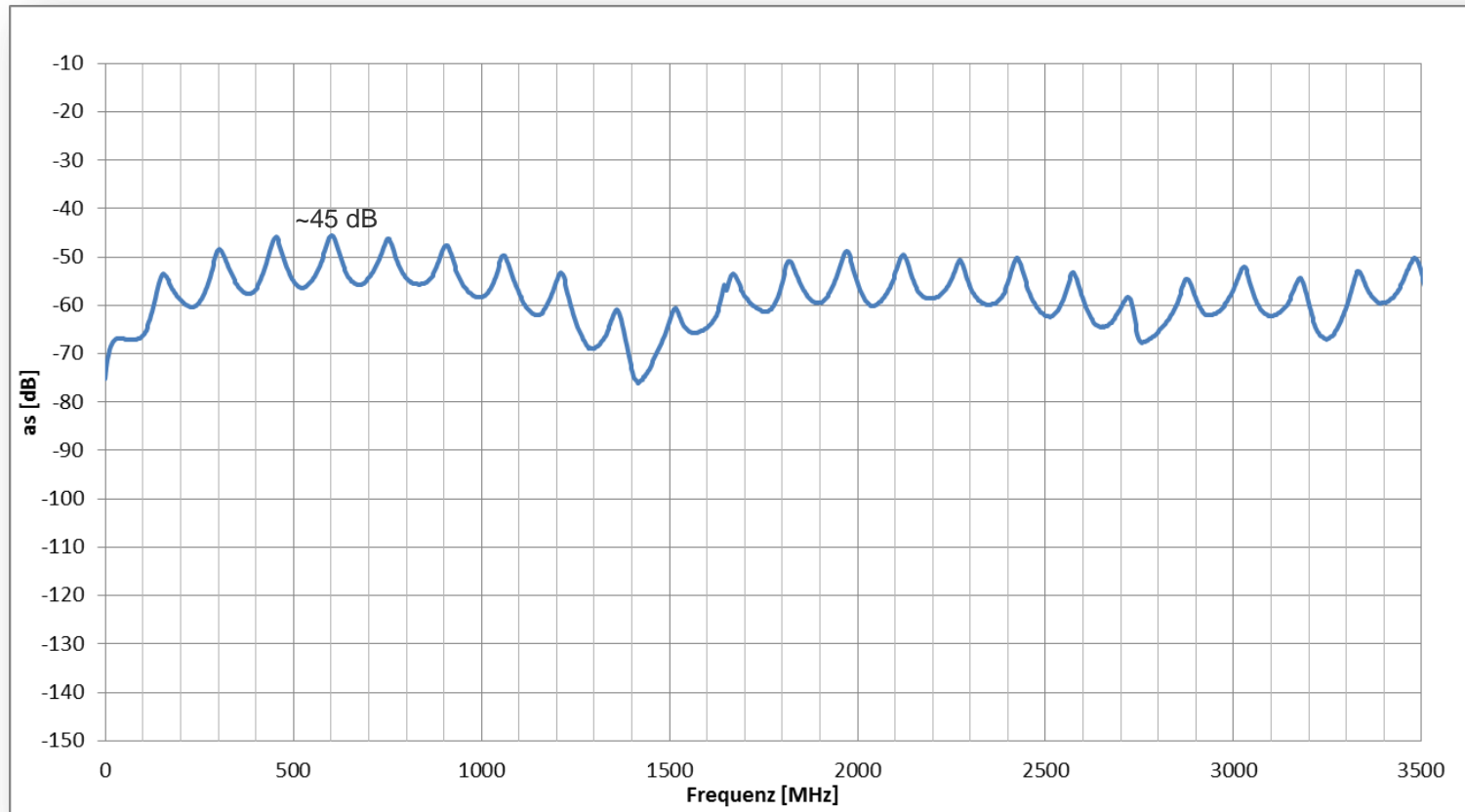
- Screening and coupling attenuation of the cable are measured according to IEC 62153-4-4 (balun less method)
- DUT length 1 m
- STP and SDP cable
- Frequency range measured 1 – 3500 MHz



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Cable measurements

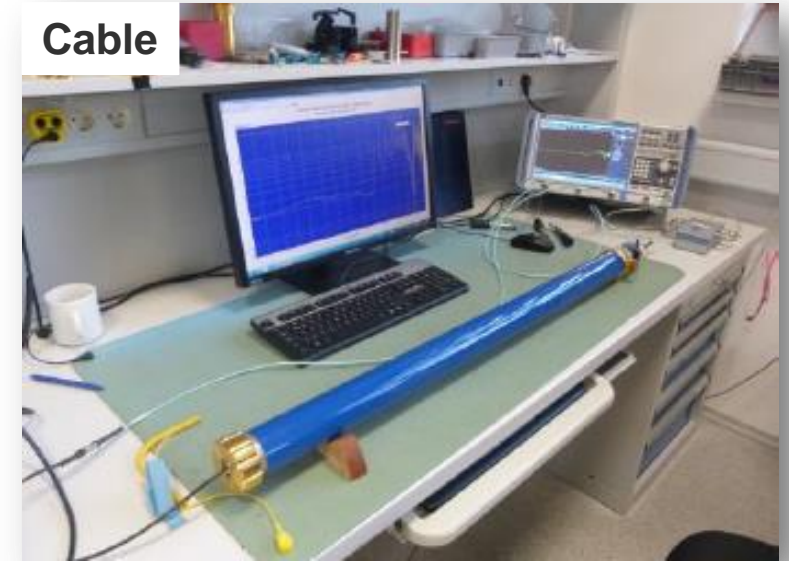
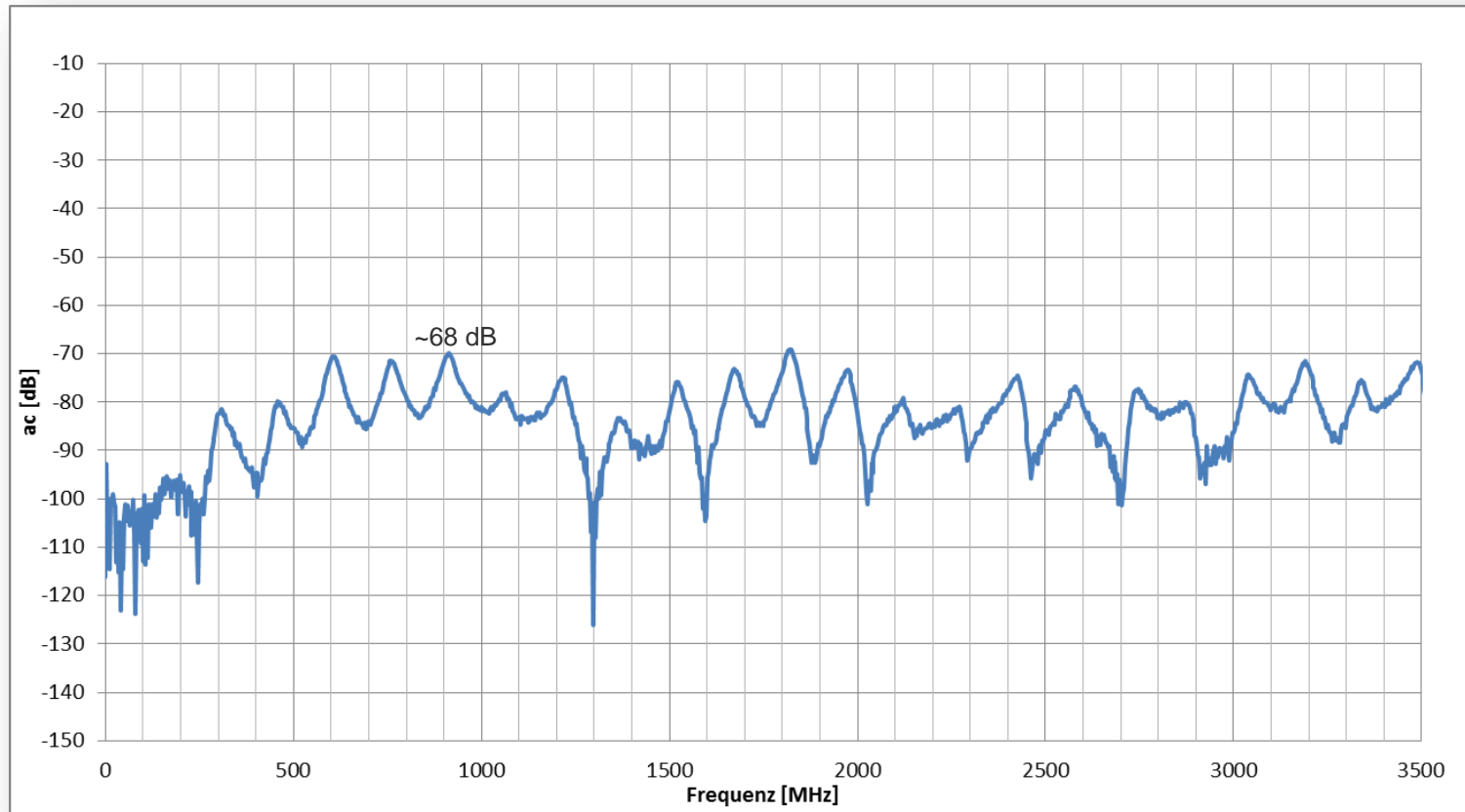
- Screening attenuation of 1 m SDP cable
- ≥ 45 dB



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Cable measurements

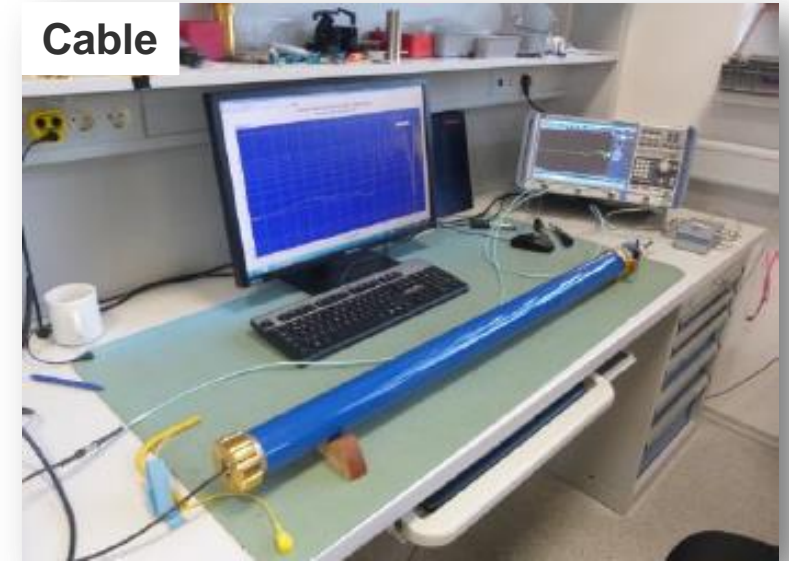
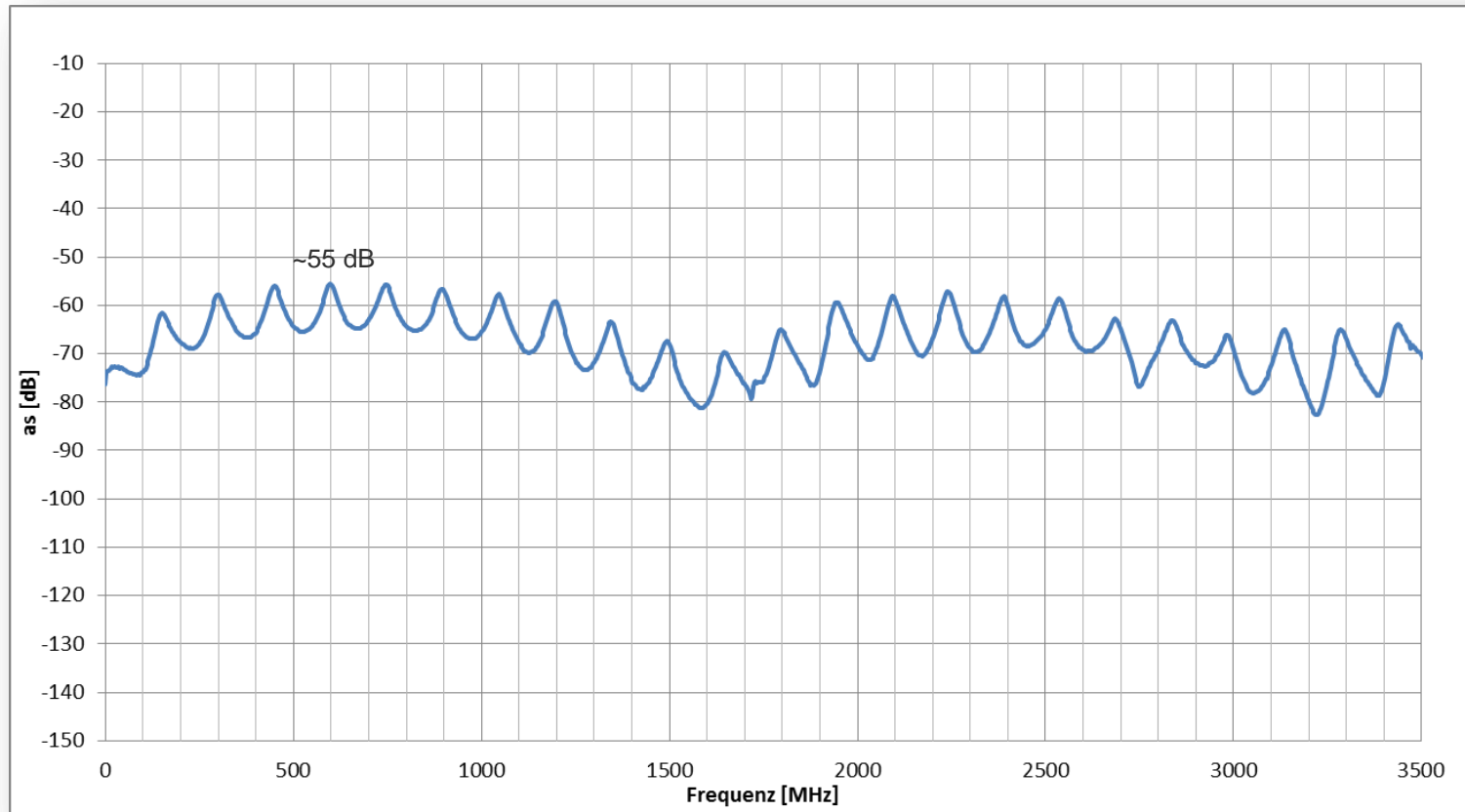
- Coupling attenuation of 1 m SDP cable
- ≥ 68 dB



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Cable measurements

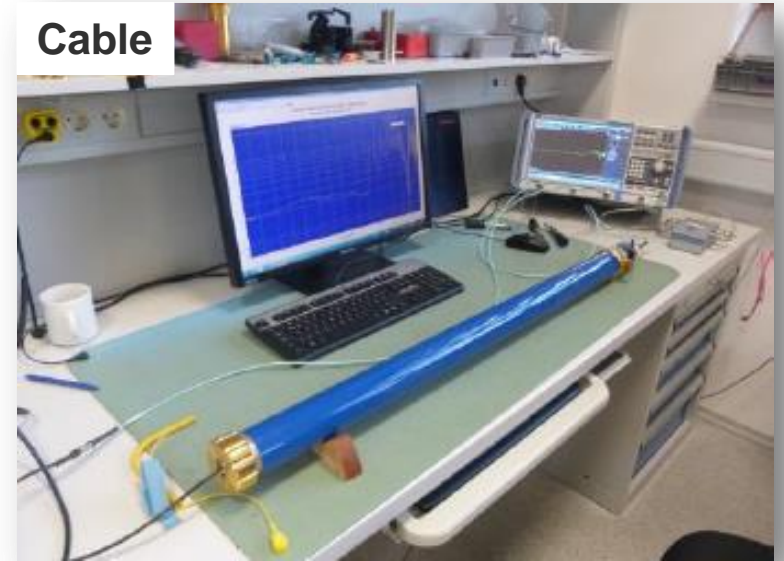
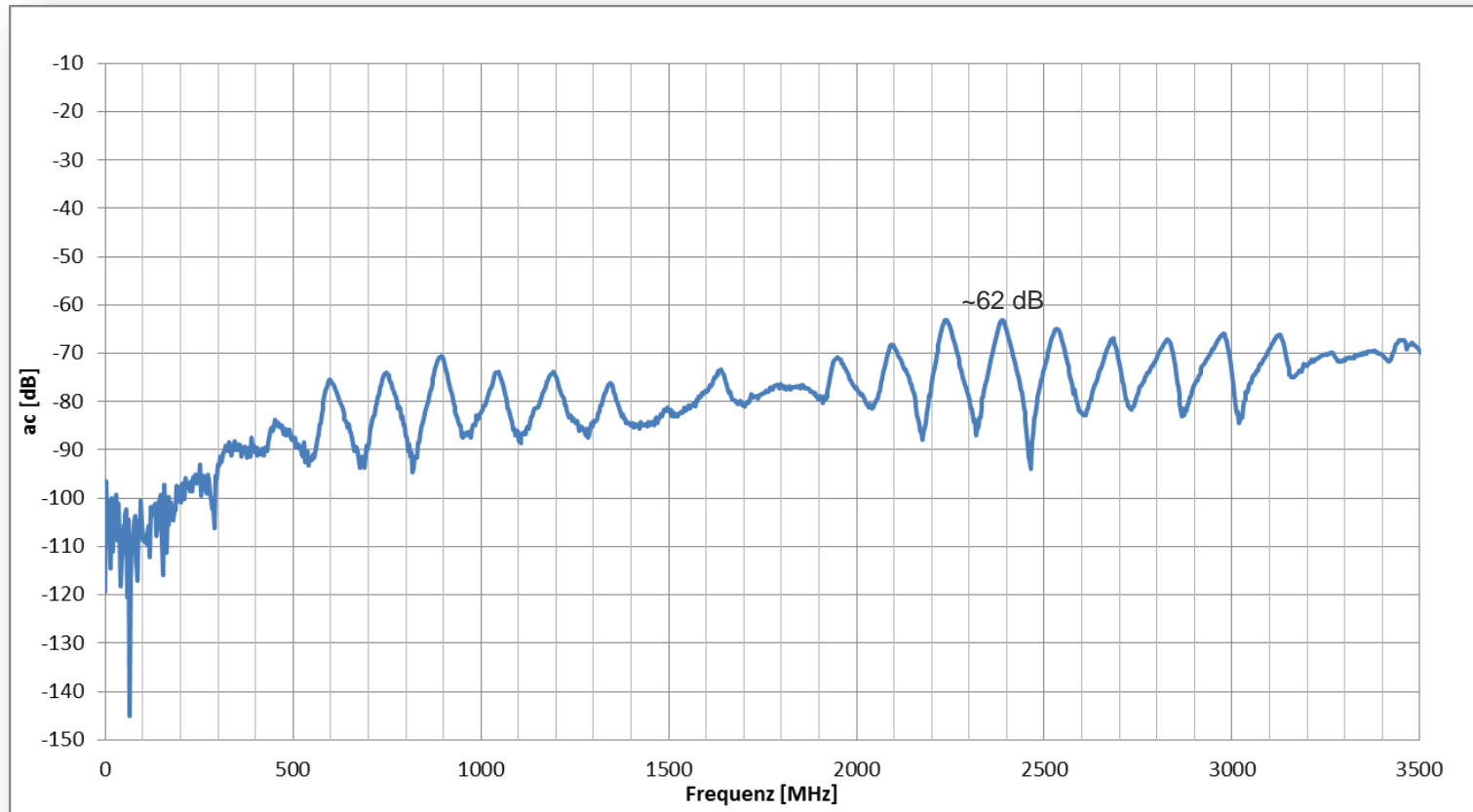
- Screening attenuation of 1 m typical STP cable
- ≥ 55 dB



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Cable measurements

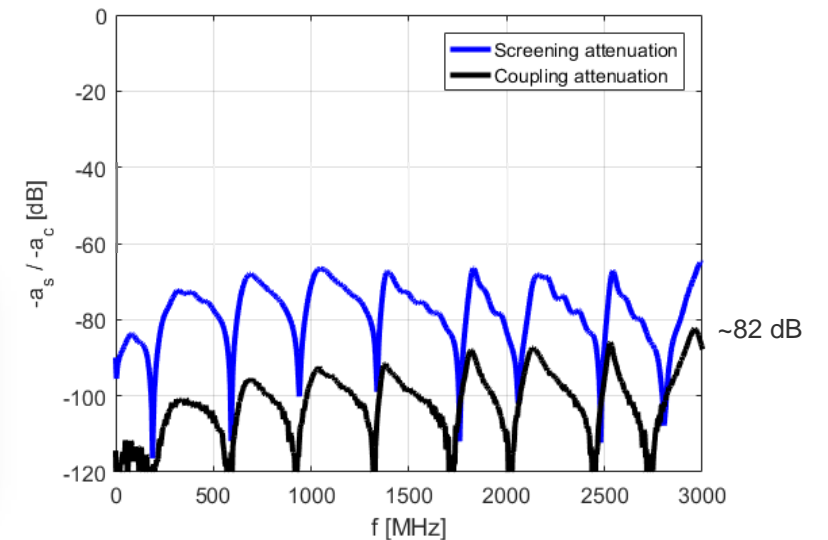
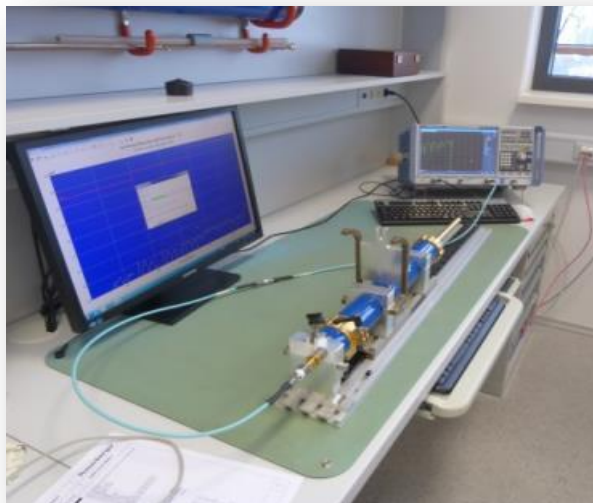
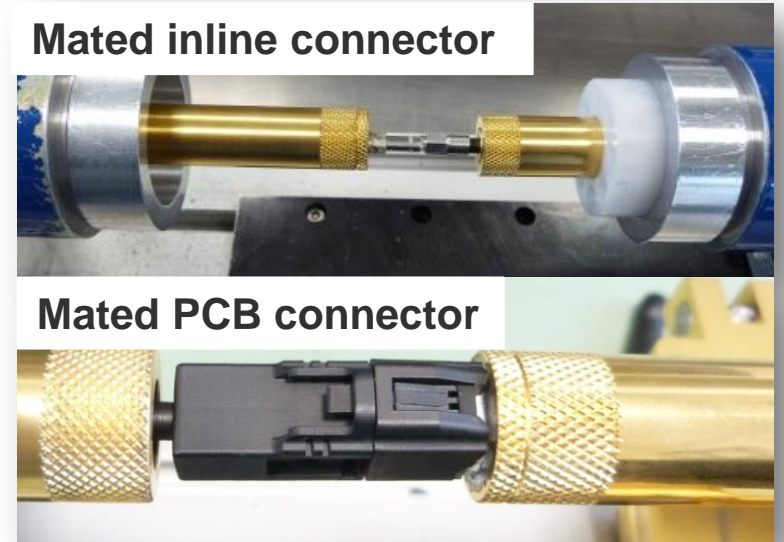
- Coupling attenuation of 1 m typical STP cable
- ≥ 62 dB



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Connector measurements

- Screening and coupling attenuation of PCB- and inline-connectors acc. to IEC 62153-4-7 (tube-in-tube)
- Coupling attenuation of connector ≥ 80 dB
- Coupling attenuation of the connector is higher than the one of the cable
- Cable is the limiting element at present

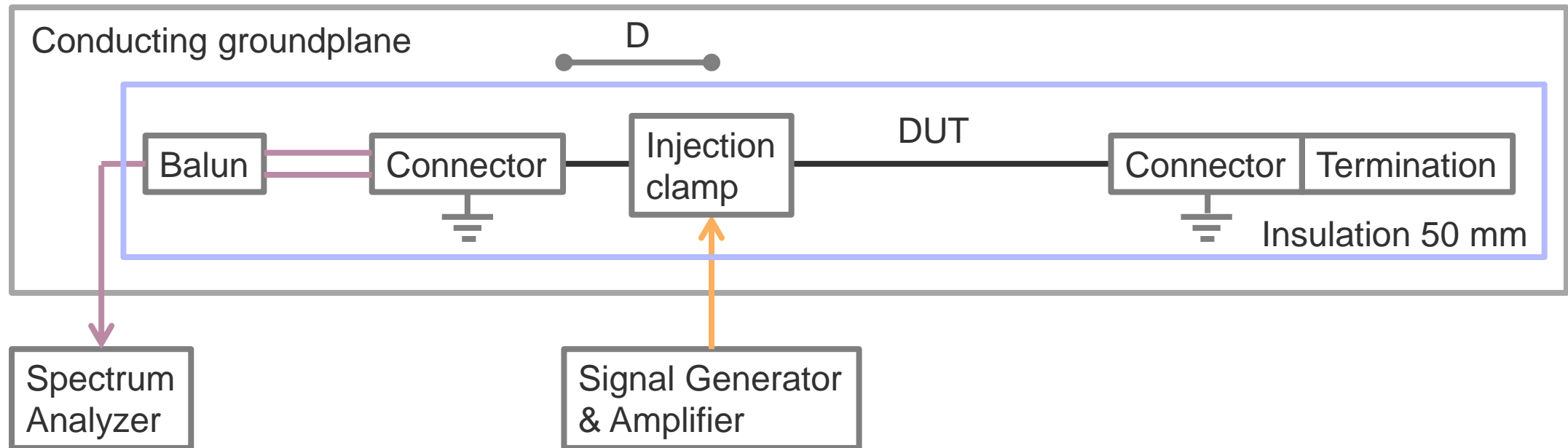


Overview

- BCI ingress noise

Measurement Setup

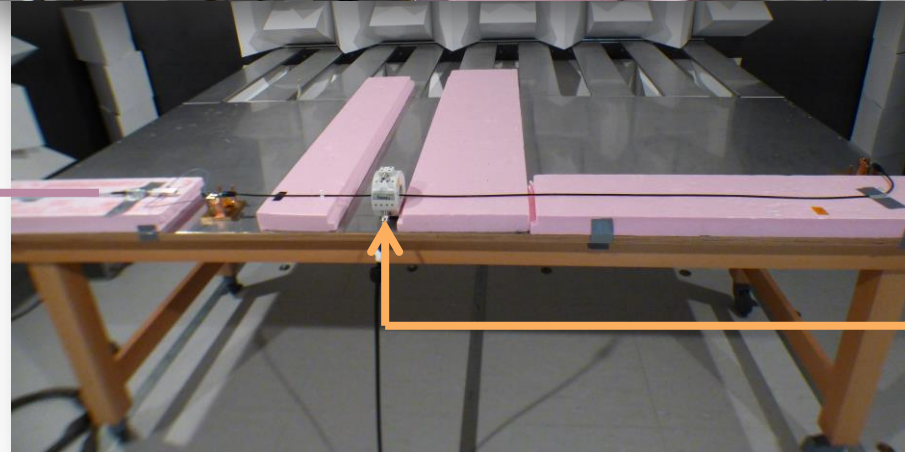
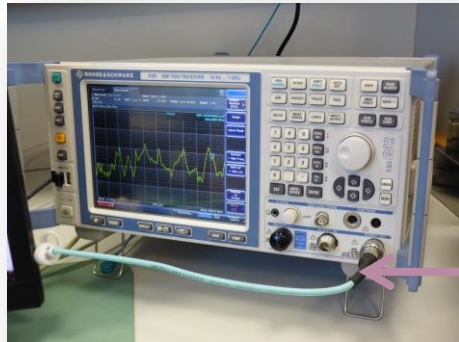
- ISO 11451-4 substitution method
- Inject narrow band interference (CW)
- Monitor differential noise on spectrum analyser
- High balance Balun
- Losses of cables and Balun considered
- Automotive STP cables 1.7 m and 2 m
- 200 mA flat current profile from 1 – 400 MHz
- Step size 0.25 MHz and dwell time 0.25 s
- RMS and Peak detector
- Probe position $D = 450$ mm and 150 mm



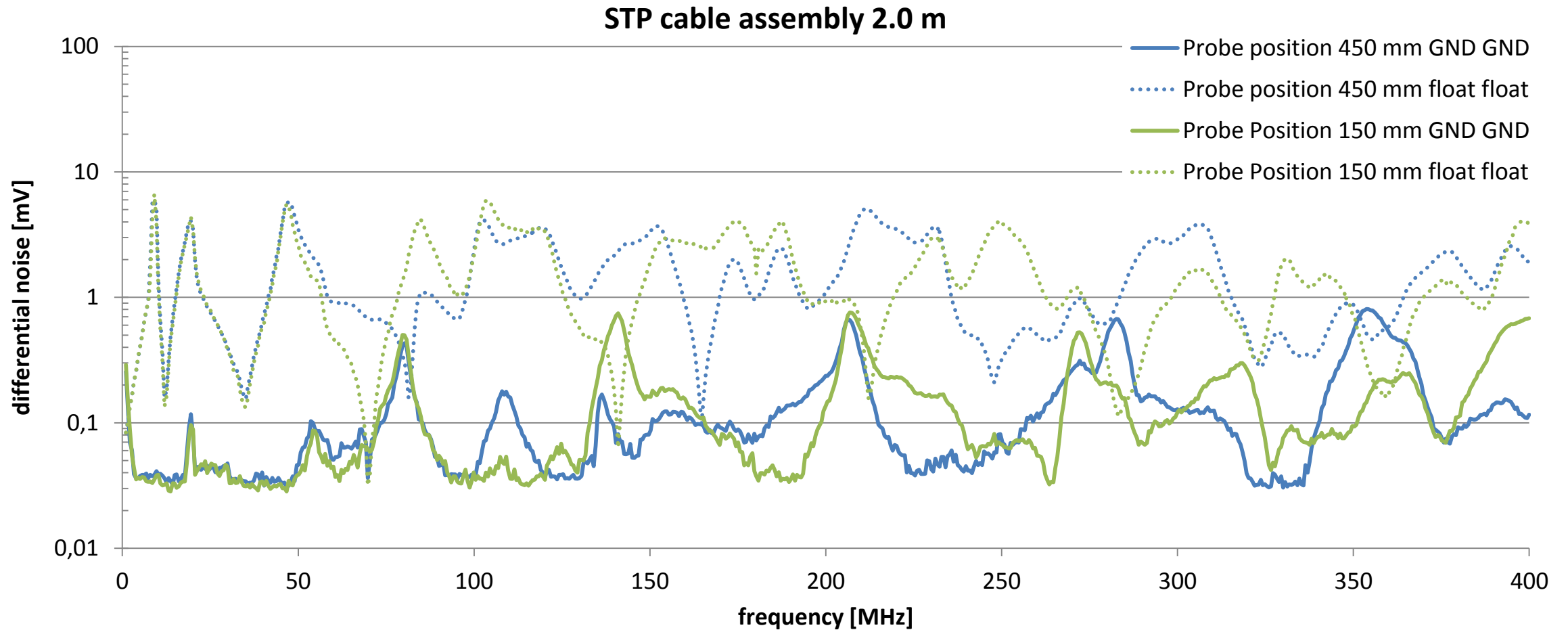
802.3ch BCI ingress noise

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Measurement Results



- With properly applied shielding and grounding, the measured differential noise is below 1 mV.
- The position of the injection clamp has got a smaller influence than the grounding

Summary

- Currently available automotive cable assemblies generally fulfil the EMC requirements if correctly implemented as proved for various protocols.
- Achievable coupling attenuation for an assembly of connectors and cable is typically ≥ 60 dB.
- Figures for the differential noise during BCI test were presented. Depending on the grounding, the measured values range from 1 mV up to 8 mV.
- Stripline measurements might be considered to define the lower portion of the PSD Mask (up to 1 GHz). Transfer function of STQ cable assembly to stripline given and process explained here
http://www.ieee802.org/3/bp/public/jul13/mueller_3bp_01a_0713.pdf