Rosenberger

802.3ch ALSE ingress noise

Thomas Müller

802.3ch ALSE ingress noise

Rosenberger

Overview

- How much differential noise has to be expected at the receiver during an automotive EMC test?
- Additional measurement results of ALSE according to ISO 11451-2 antenna method as presented here

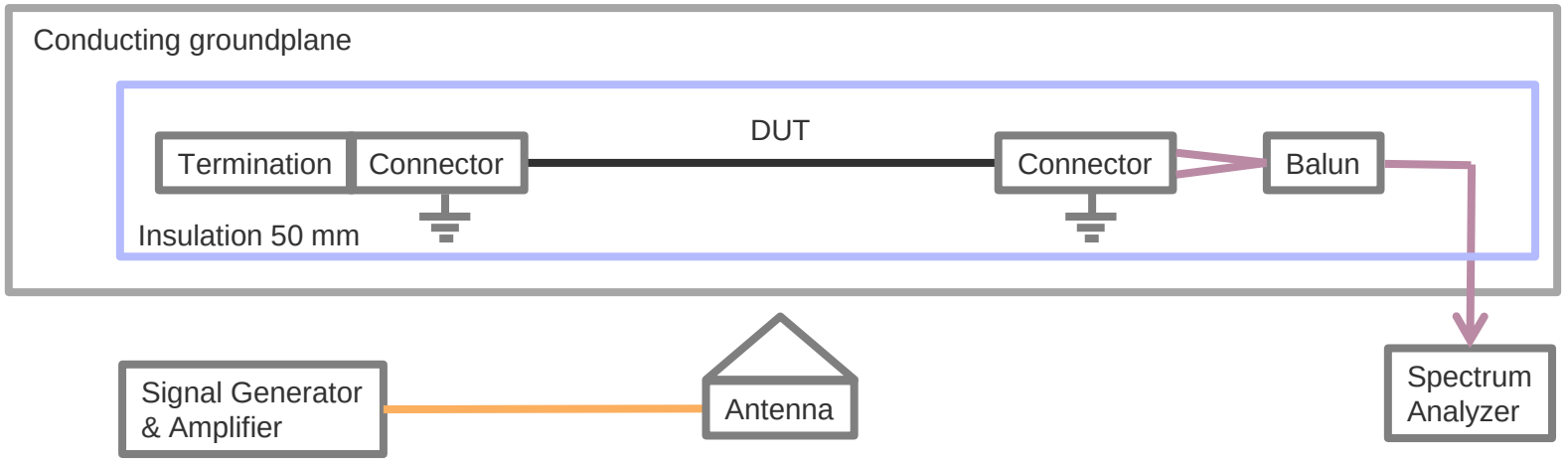
  http://www.ieee802.org/3/ch/public/nov17/Cohen_Shirani_3ch_01_1108.pdf

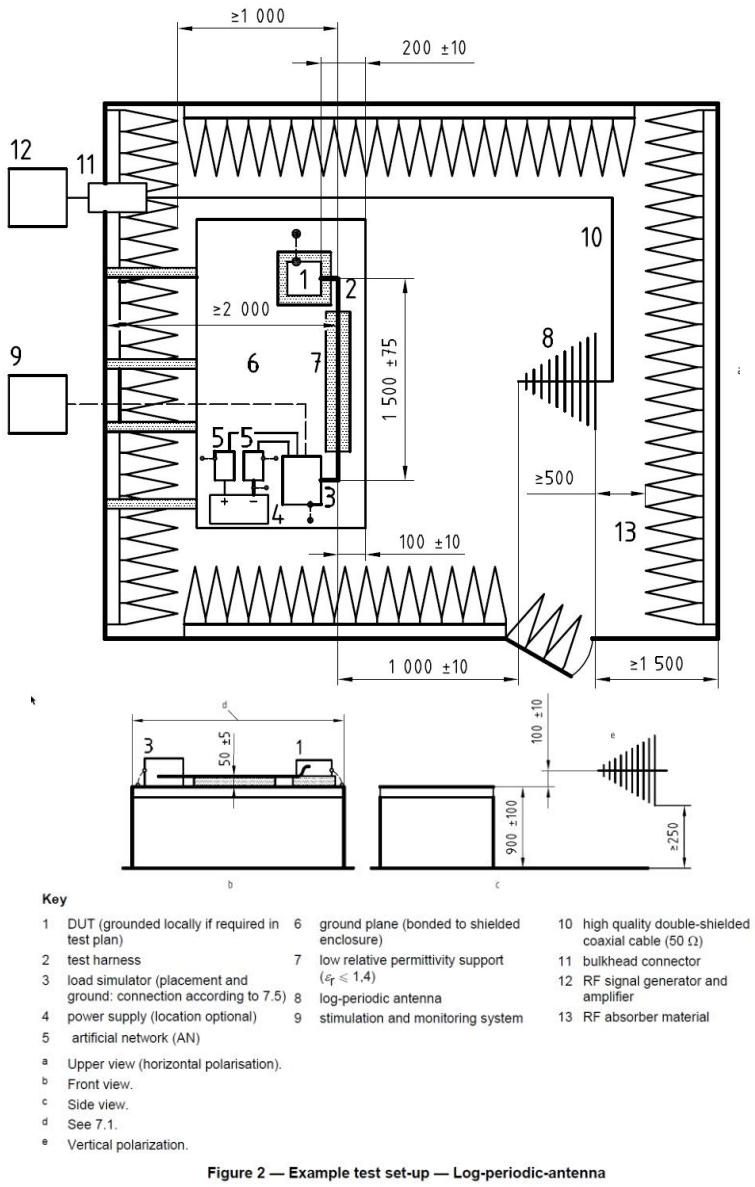
802.3ch ALSE ingress noise

Rosenberger

Measurement Setup

- ISO 11451-2 ALSE 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





Key

1	DUT (grounded locally if required in test plan)	6	ground plane (bonded to shielded enclosure)	10	high quality double-shielded coaxial cable (50 Ω)
2	test harness	7	low relative permittivity support ($\varepsilon_r \leq 1{,}4$)	11	bulkhead connector
3	load simulator (placement and ground: connection according to 7.5)	8	log-periodic antenna	12	RF signal generator and amplifier
4	power supply (location optional)	9	stimulation and monitoring system	13	RF absorber material
5	artificial network (AN)				

a Upper view (horizontal polarisation).
b Front view.
c Side view.
d See 7.1.
e Vertical polarization.

Figure 2 — Example test set-up — Log-periodic-antenna

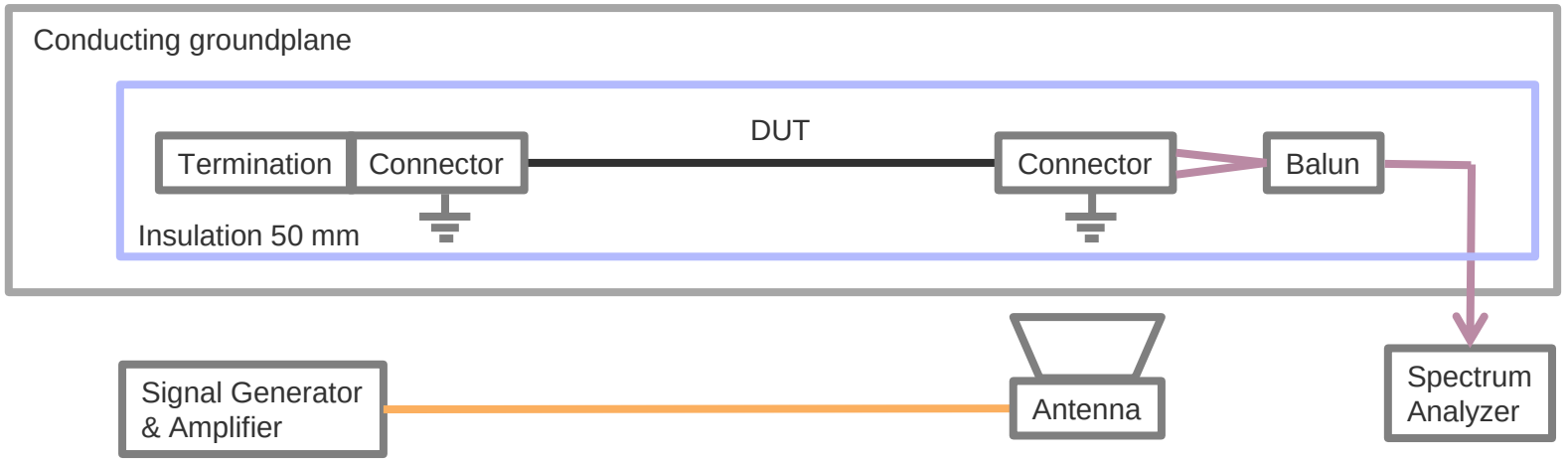
source ISO 11451-2 2004-11-01

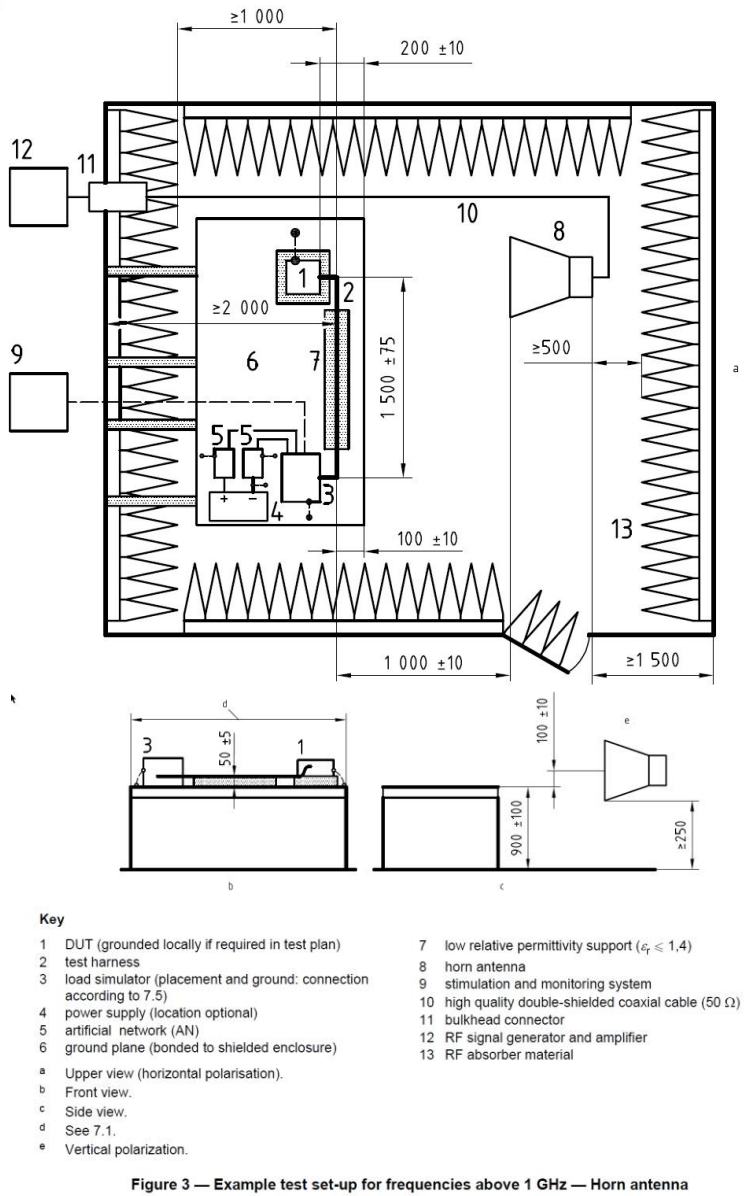
802.3ch ALSE ingress noise

Rosenberger

Measurement Setup

- ISO 11451-2 ALSE 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
- Antenna position centred and offset above 1 GHz





Key

1 DUT (grounded locally if required in test plan)
2 test harness
3 load simulator (placement and ground: connection according to 7.5)
4 power supply (location optional)
5 artificial network (AN)
6 ground plane (bonded to shielded enclosure)
7 low relative permittivity support ($\varepsilon_r \leq 1{,}4$)
8 horn antenna
9 stimulation and monitoring system
10 high quality double-shielded coaxial cable (50 Ω)
11 bulkhead connector
12 RF signal generator and amplifier
13 RF absorber material

a Upper view (horizontal polarisation).
b Front view.
c Side view.
d See 7.1.
e Vertical polarization.

Figure 3 — Example test set-up for frequencies above 1 GHz — Horn antenna

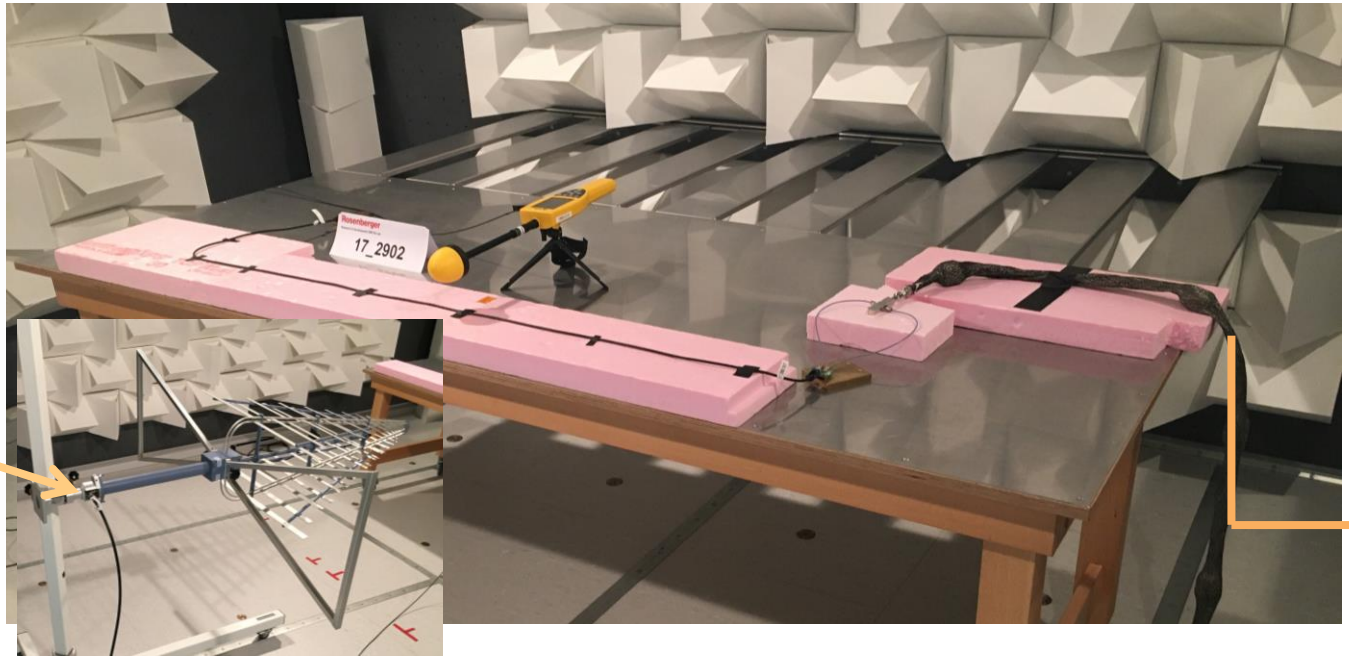
source ISO 11451-2 2004-11-01

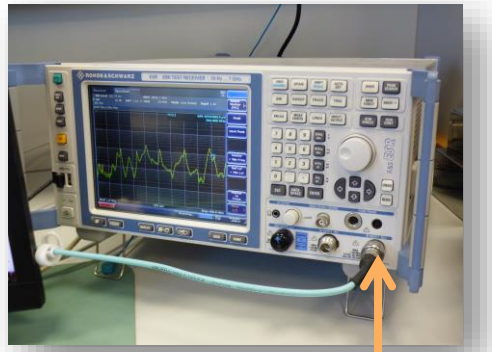
802.3ch ALSE ingress noise

Rosenberger

Measurement Setup

- ISO 11451-2 ALSE method





802.3ch ALSE ingress noise

Rosenberger

Measurement Setup

- ISO 11451-2 ALSE 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
- Calibrated 50 V/m test severity level II
  from 1 – 400 MHz and 700 – 2200 MHz
- Step sizes
  - 80 – 400 MHz 0.8 MHz
  - 700 – 1000 MHz 1.75 MHz
  - 1000 – 2200 MHz 5 MHz
  - No appropriate amplifier between 400 MHz and 700 MHz
- Horizontal and vertical antenna polarisation

Table C.1 — Suggested test severity levels

Test severity level	Value V/m
I	25
II	50
III	75
IV	100
V	Specific value agreed between the users of this part of ISO 11452, if necessary

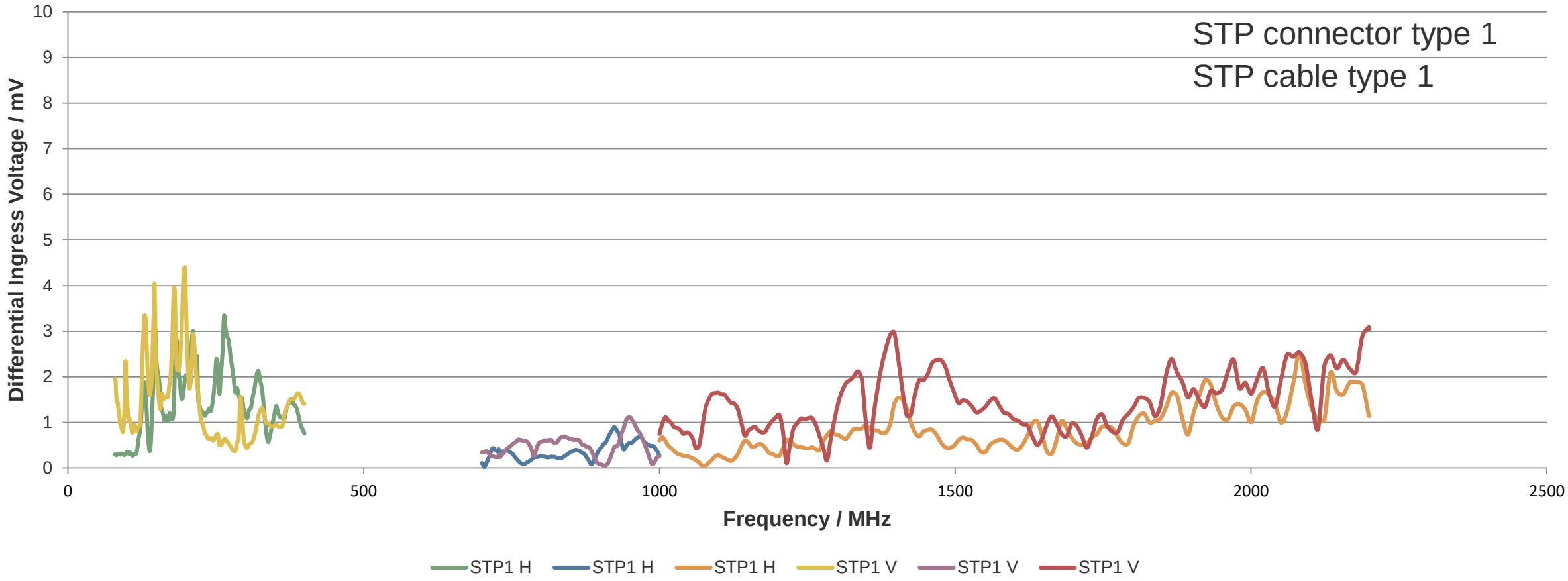
Table C.2 — Frequency bands

Frequency band	Frequency range MHz
F1	> 80 to ⩽ 400
F2	> 400 to ⩽ 1 000
F3	> 1 000 to ⩽ 10 000
F4	> 10 000 to ⩽ 18 000

source ISO 11451-2 2004-11-01

802.3ch ALSE ingress noise

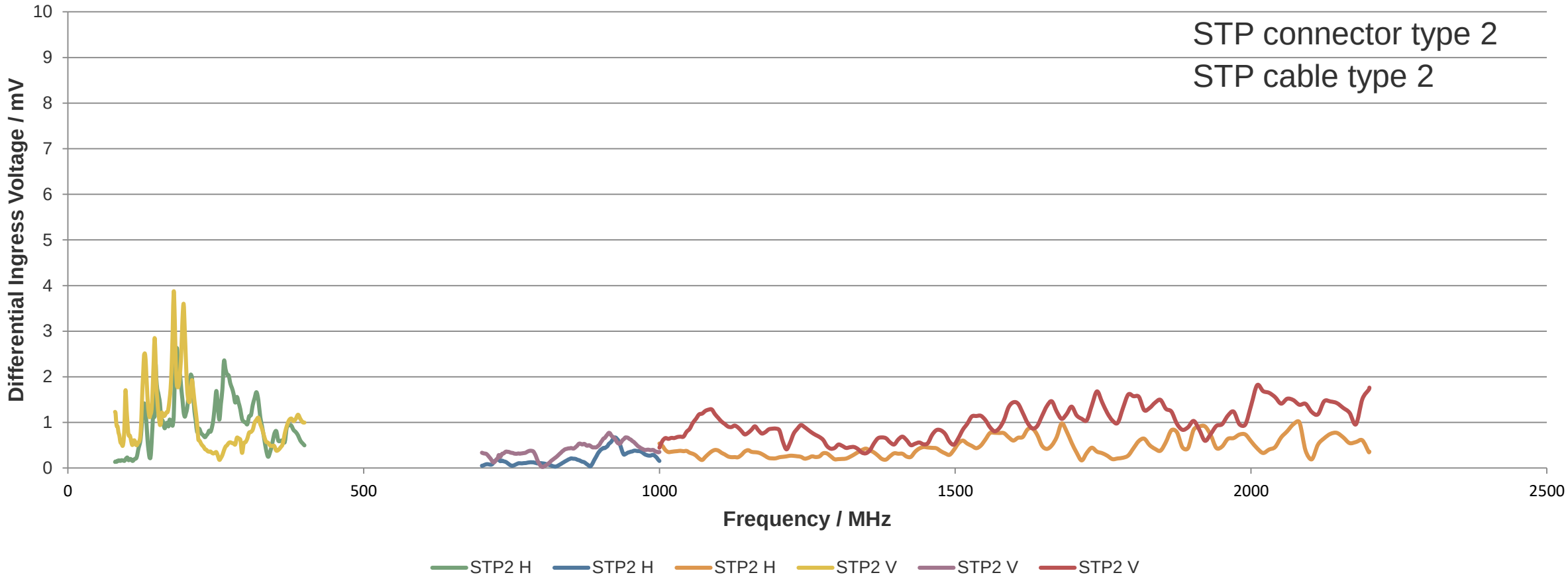
Measurement Results



- the measured differential noise is below 5 mV.

802.3ch ALSE ingress noise

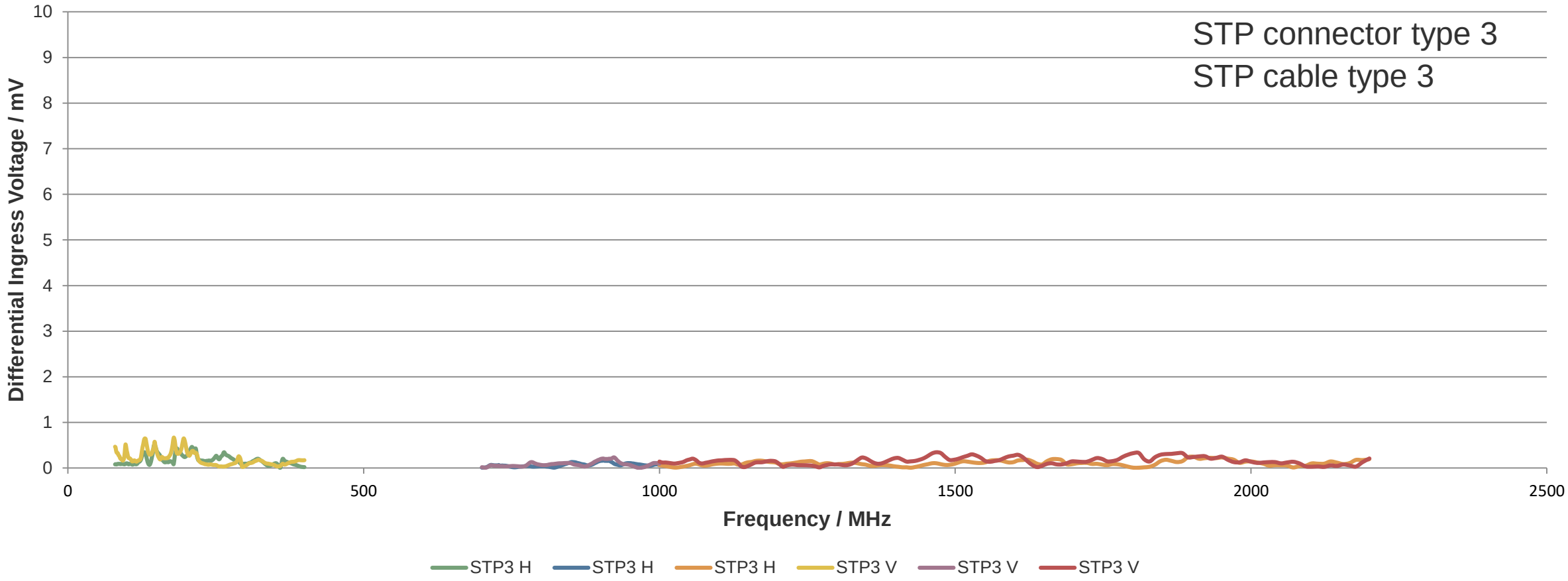
Measurement Results



- The measured differential noise is below 4 mV.

802.3ch ALSE ingress noise

Measurement Results



- The measured differential noise is below 1 mV.

802.3ch ALSE ingress noise

Rosenberger

Summary

- The data presented is meant to support PHY design by giving measured values for the noise occurring during a typical OEM component EMC susceptibility test
- Data for the differential noise, that is coupled to typical automotive channels during a component EMC test according to ISO 11451-2 ALSE method are presented
- Test results for higher severity levels can be scaled up based on the 50 V/m data
- The maximum differential noise coupled to a STP link may be assumed to be below 5 mV based on the data presented. The overall value is dependent on the quality of the shield termination and grounding concept of the ECU under test.
- Considering 100 V/m security level, the system should be able to tolerate higher differential noise levels than 5 mV

- Additional data about the ingress noise during a component EMC test according to ISO 11451-4 BCI method have been presented before http://www.ieee802.org/3/ch/public/nov17/mueller_3ch_01_1117.pdf
- Link segment transmission data has been presented before http://www.ieee802.org/3/ch/public/mar18/mueller_3ch_01_0318.pdf

source ISO 11451-2 2004-11-01