Automotive link segment measurement results

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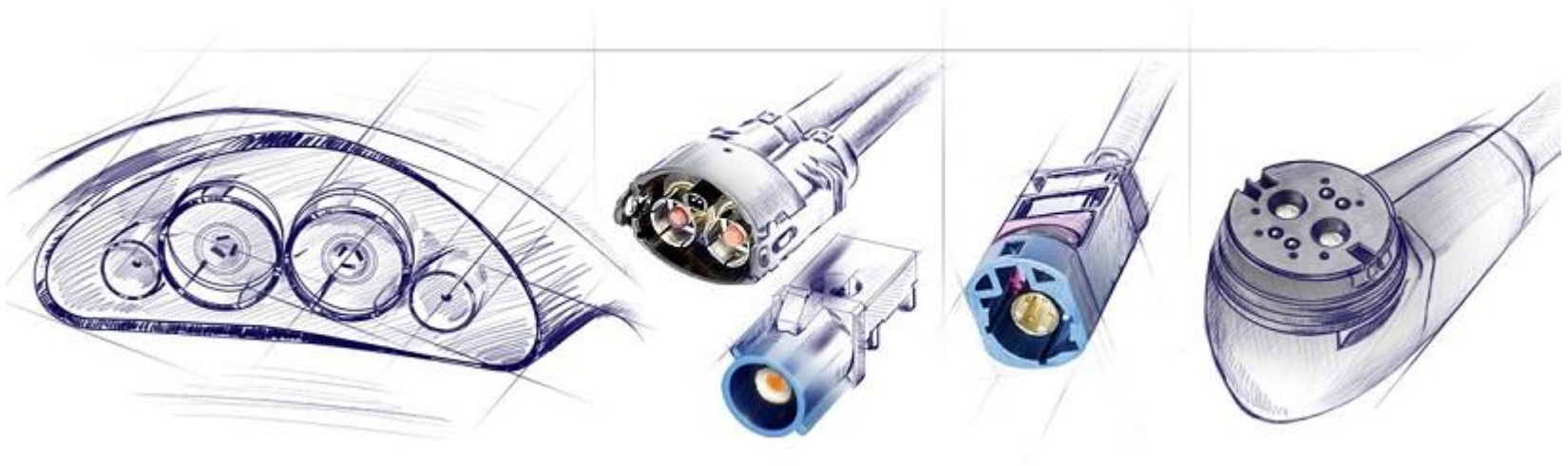

802.3cy channel return loss

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Scope

- To define return loss requirements on the link segment, more data was requested on automotive cables, that have been optimized for this application.
- 802.ch (equations 149-22 and -23, N=0) as reference

$$RL \geq \begin{cases} 20 & 1 \leq f < 480 \\ 20 - 10log_{10}\left(\frac{f}{480}\right) & 480 \leq f < 3000 \\ 12 & 3000 \leq f < 4000 \end{cases}$$

f *is the frequency in MHz*

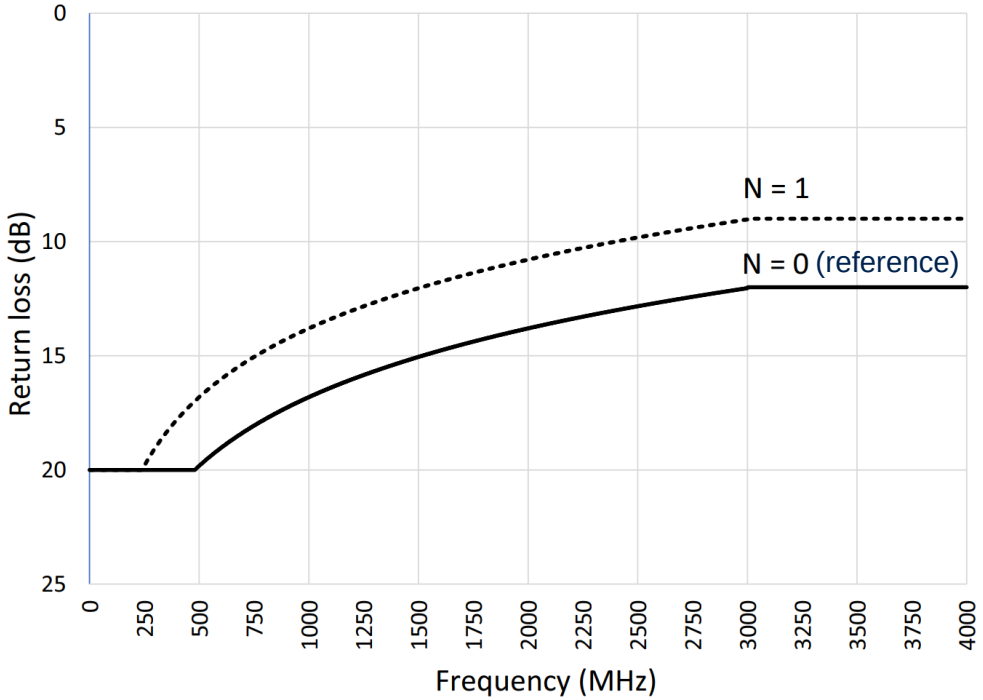

Figure 149–44—Return loss calculated using Equation (149–22) and Equation (149–23)

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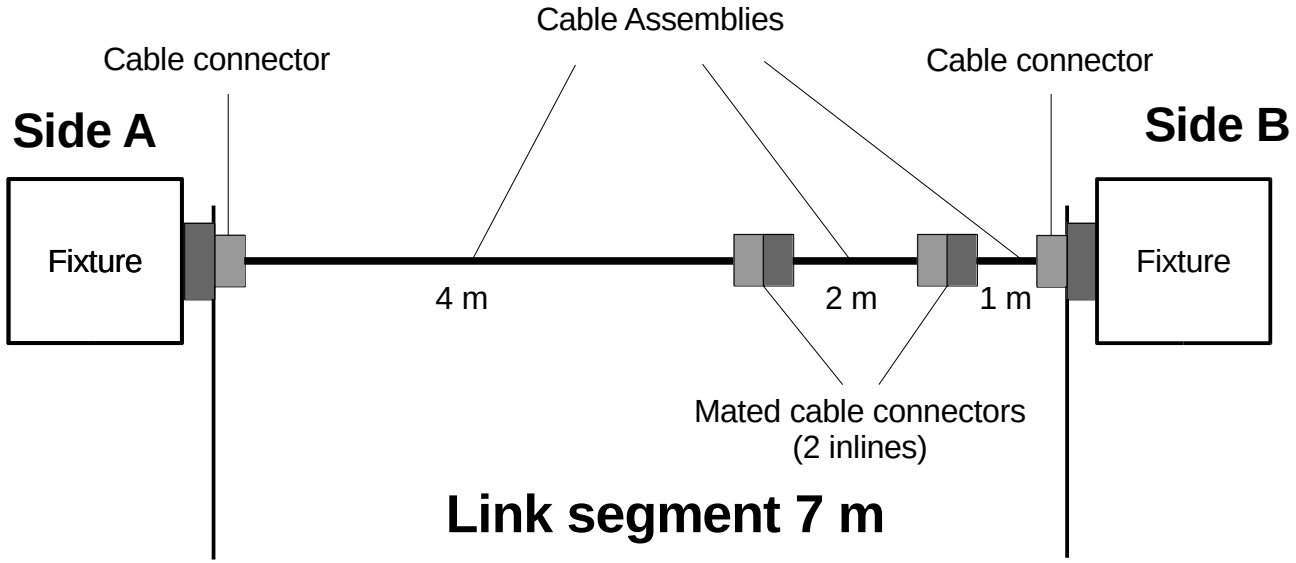
Measurement setup

- Automotive grade STP cable (f_{max} ~ 9 GHz).
- Link segment 7 m overall length (4 + 2 + 1 m) with connectors based on H-MTD interface.
- Precision measurement fixtures (no PCB, included in the results).
- Connectors and fixtures outside the climate chamber.
- Temperatures +20°C, -40°C and +105°C.



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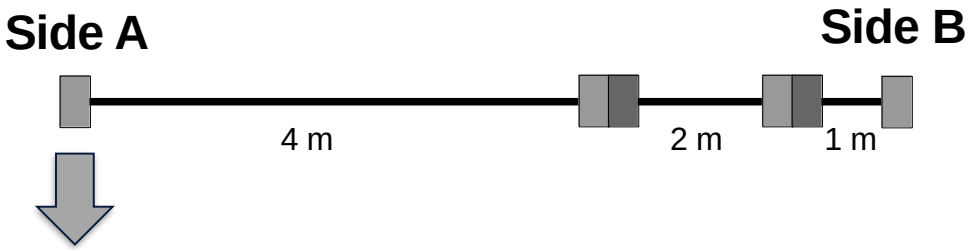
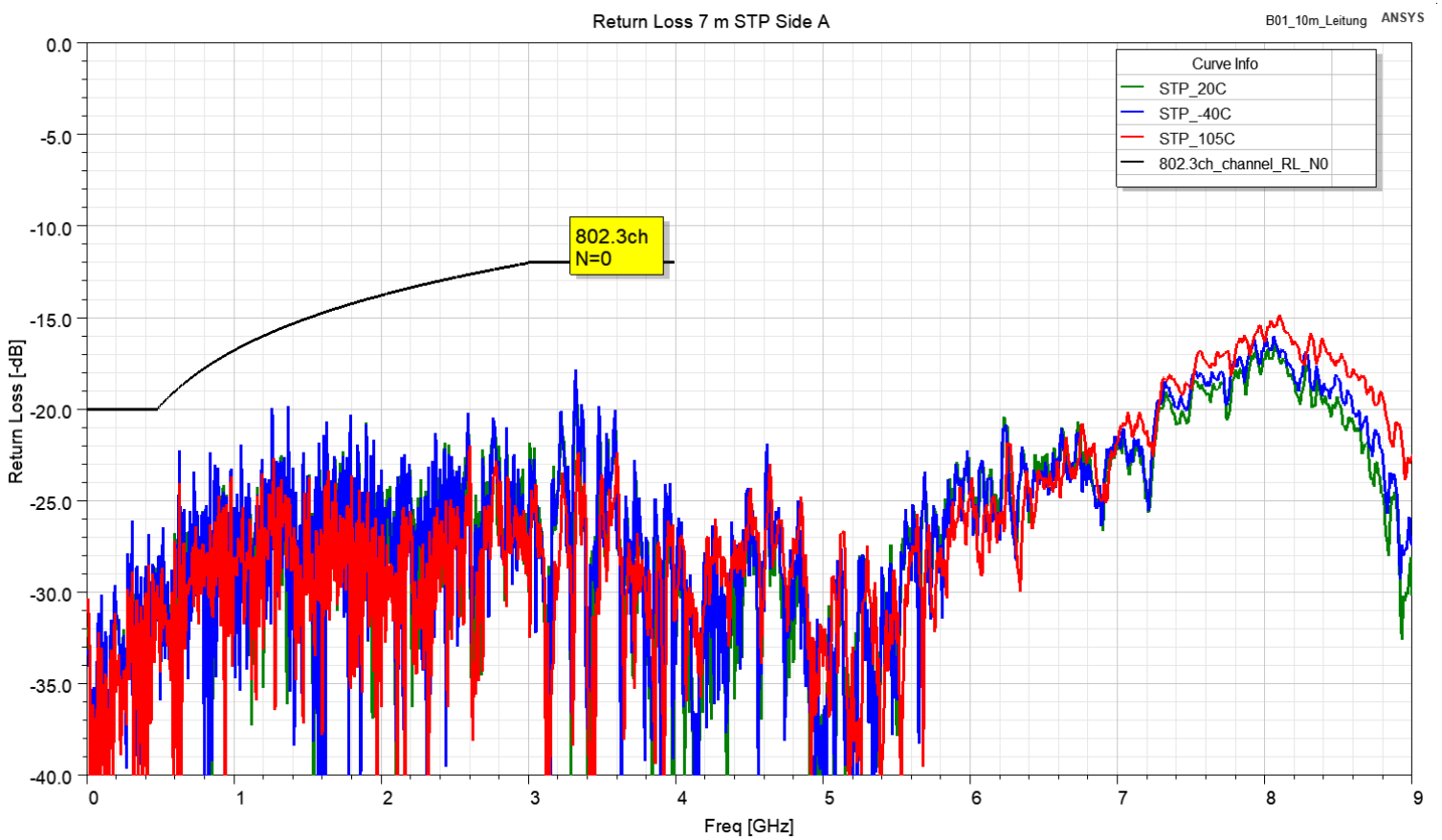
Link segment return loss

- Link segment 7 m overall length (4 + 2 + 1 m) side A





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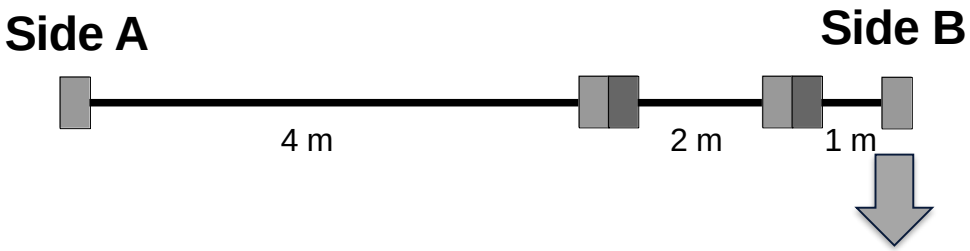
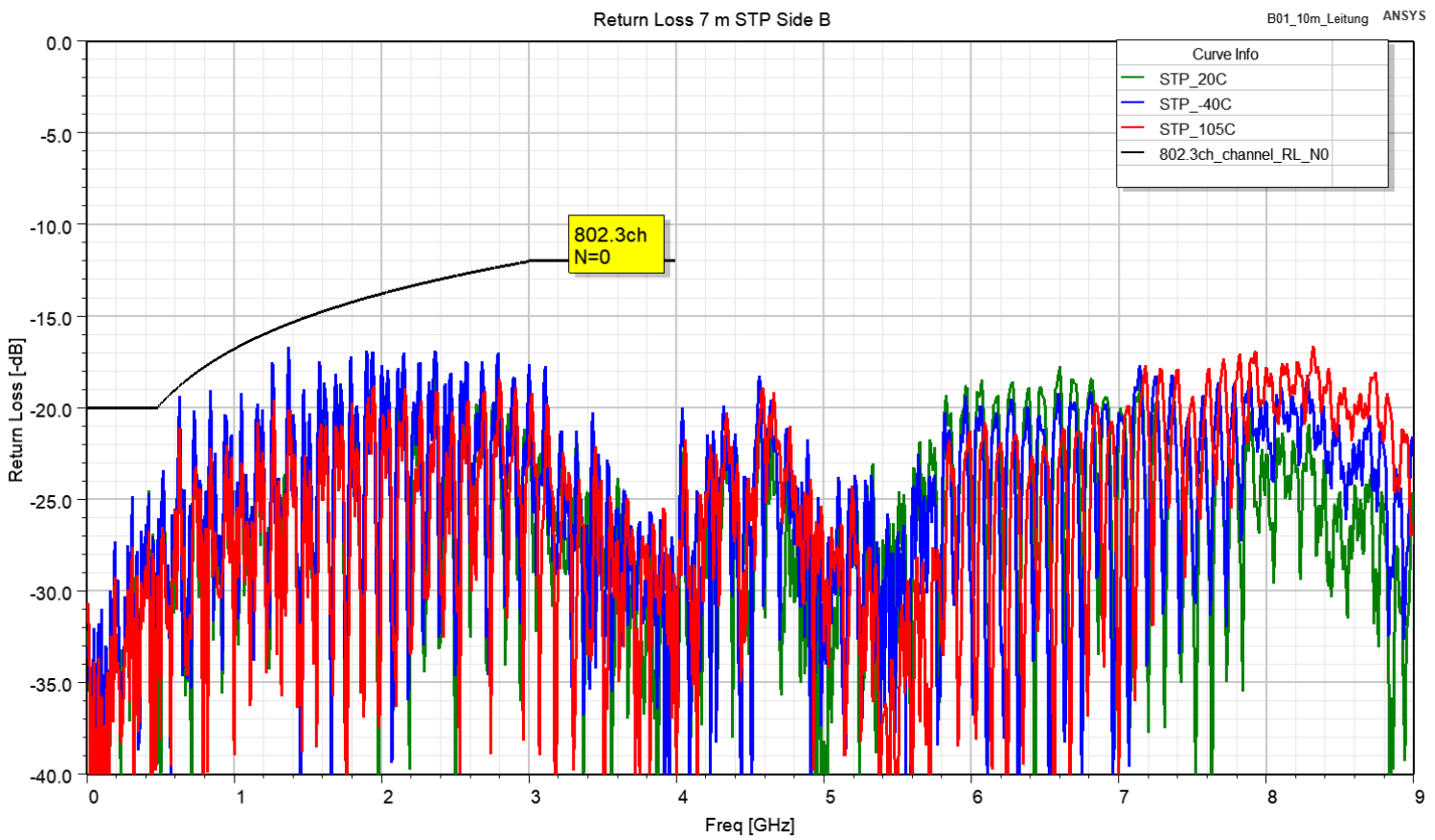
Link segment return loss

- Link segment 7 m overall length (4 + 2 + 1 m) side B





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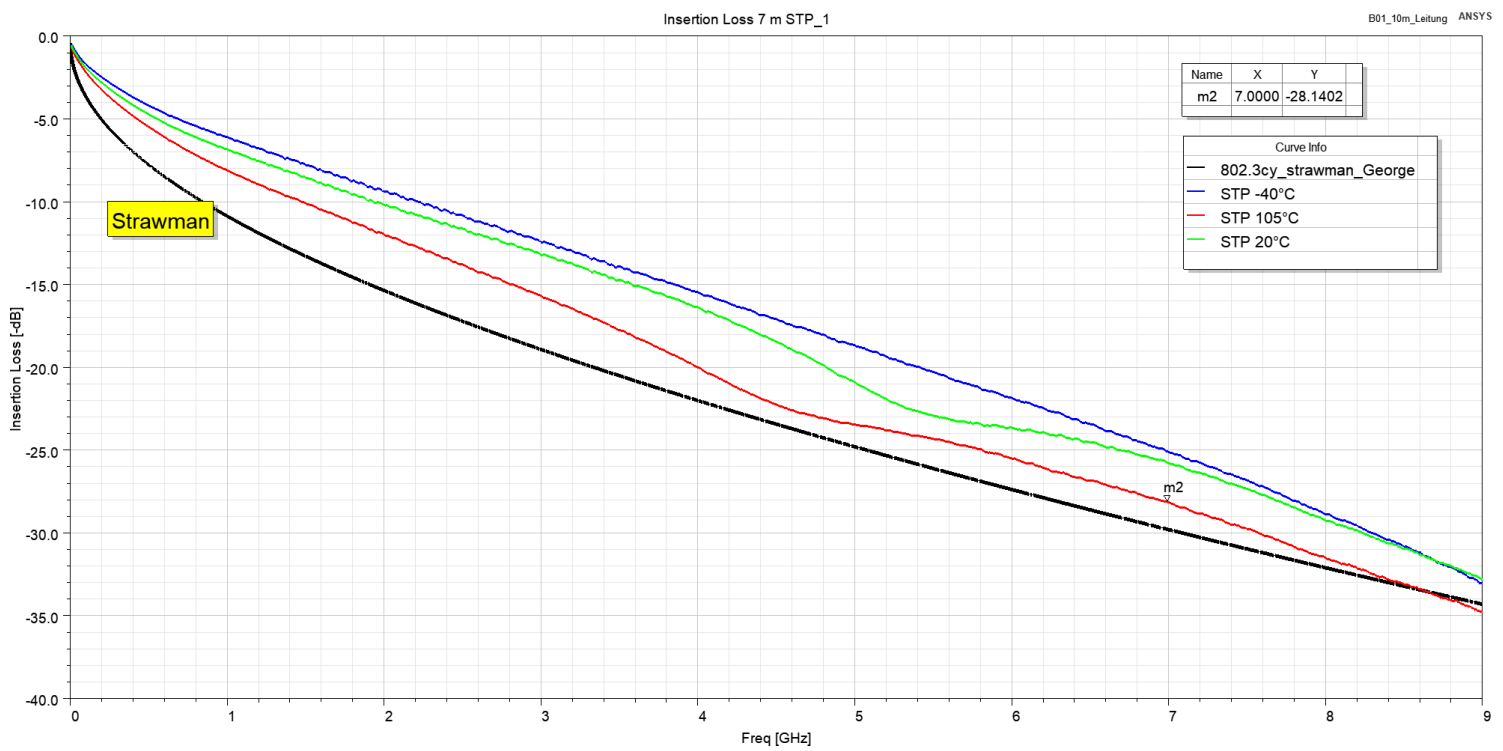
Link segment insertion loss

- 7 m link segment with 2 inline connectors passes strawman proposal at room temperature.
- Maximum link segment length exposed to +105°C t.b.d.

- Further improvements on the temperature variation is expected.



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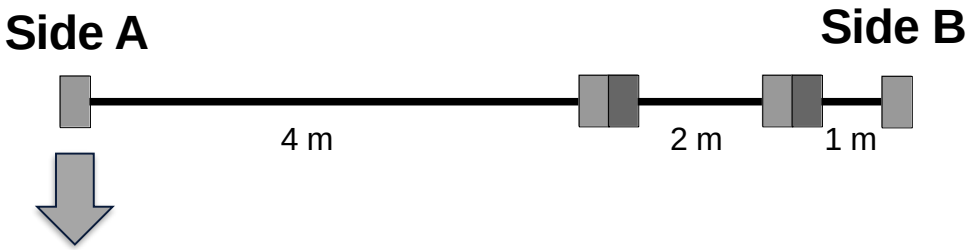
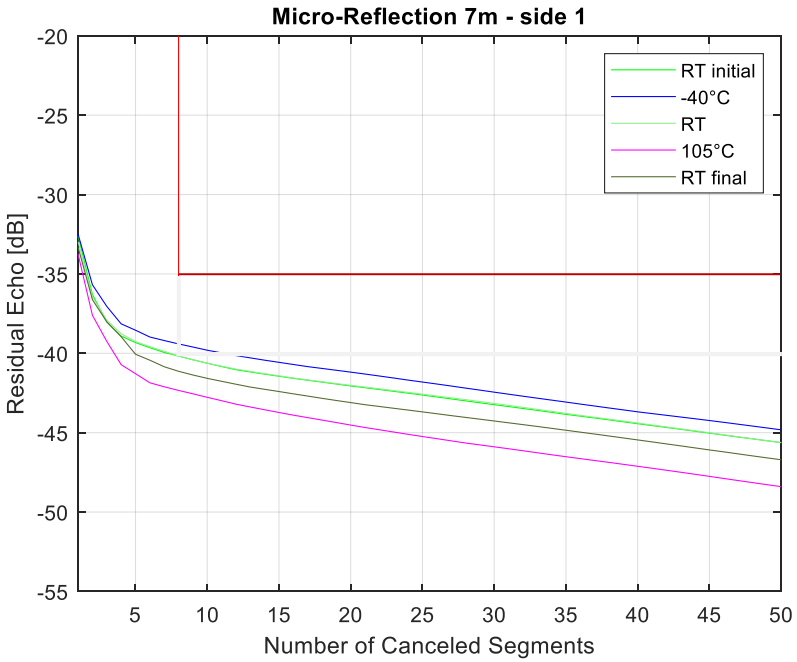
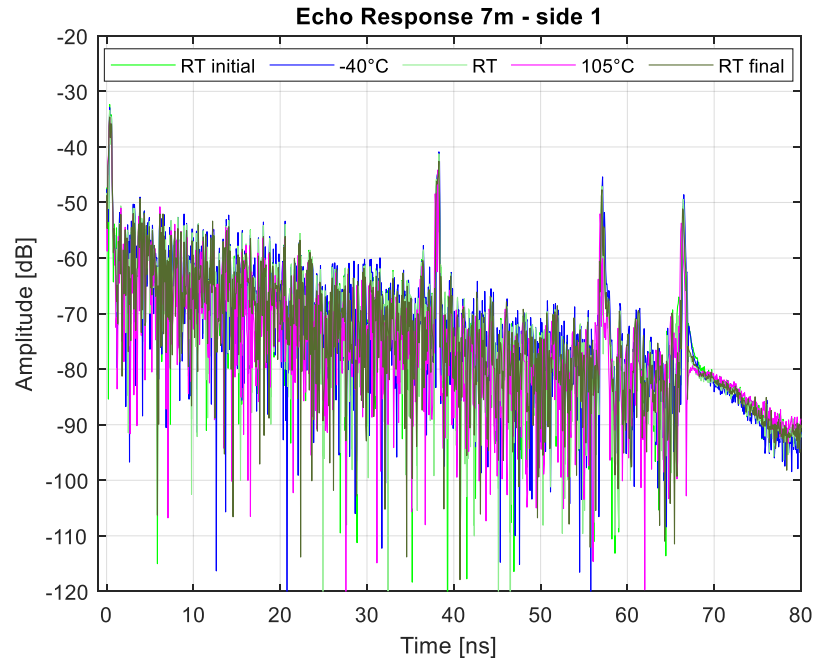
Link segment micro reflexions

- Micro reflexions analysis acc. to Ragnar's updated method (jonsson_3cy_01_12_08_20.pdf)

$$ResidualEchoLimit(IL@Nyquist) = MIN(-35, -IL@Nyquist - 15)$$







- Acceptance criteria updated from -40 dB to -35 dB.

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Link segment micro reflexions

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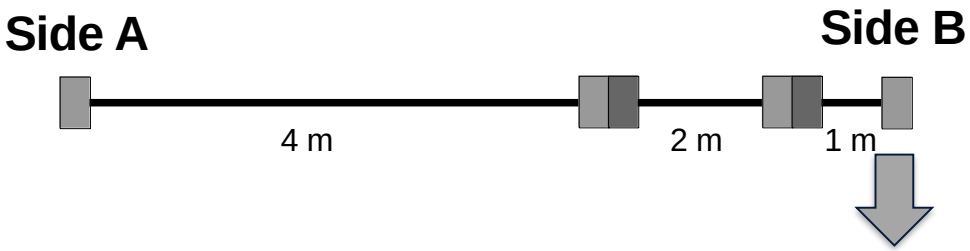

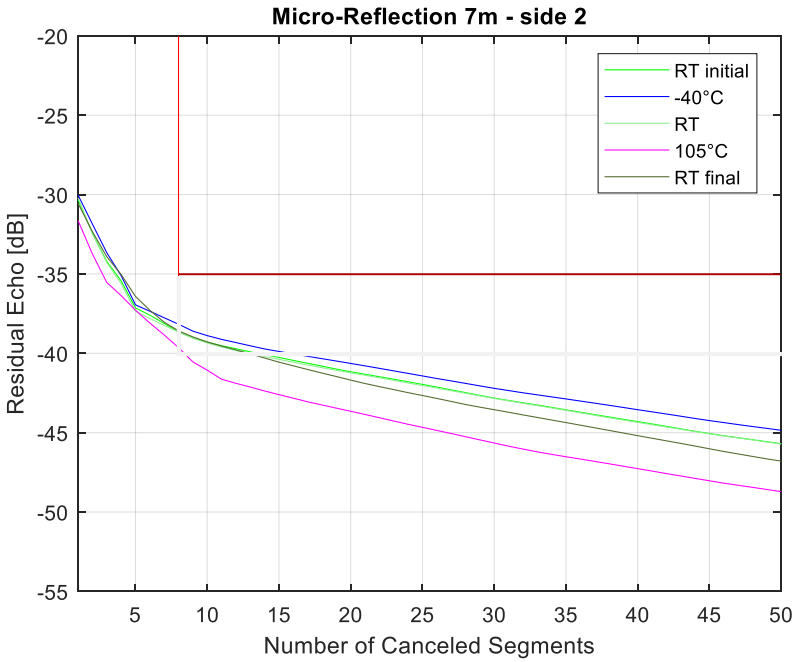

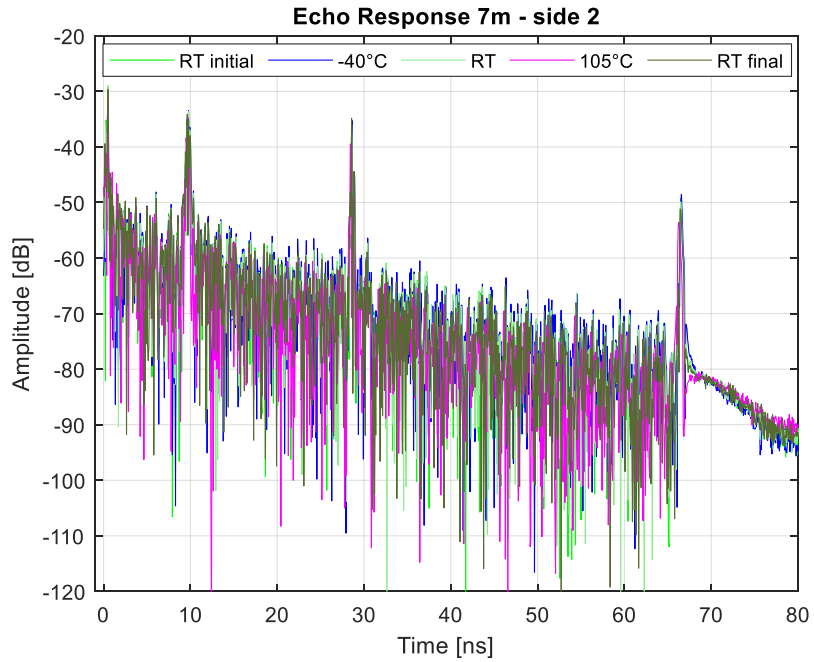

- Acceptance criteria updated from -40 dB to -35 dB.

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Conclusion

- Measurement results for an automotive link segment based on STP cable and H-MTD style connector with usable bandwidth of 9 GHz were shown.
- Return loss was shown with reference to 802.3ch 10GBASE-T1 N=0.
- Further gradual improvements on the insertion loss slope and return loss are expected.
- The channel passes the micro-reflexions criteria according to the latest update.