

Multi-Gig PHY Emission Performance Investigation

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Problem Statement

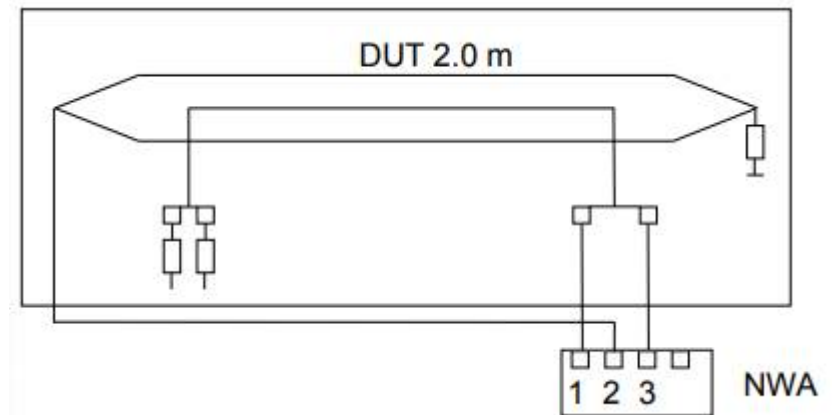
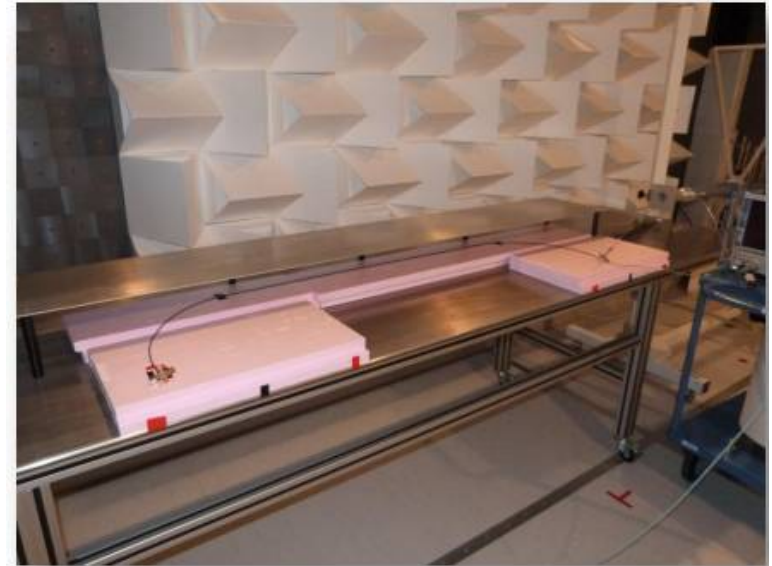
- Last contribution [[Pandey_3ch_01_1117.pdf](#)] on TX-PSD mask and emission was based on Triaxial tube test setup
[\[DiBiaso_3NGAUTO_01_0517.pdf\]](#) data up to ~3GHz
- Automotive emission test is based on stripline test setup (ISO 11452-5) that gives coupling attenuation transfer
- Understand differences in coupling attenuation from Triaxial tube and stripline test setups

Objective

- Understand the correlation between Triaxial tube [[DiBiaso_3NGAUTO_01_0517.pdf](#)] and stripline test setup measurement results up to 1GHz

Stripline Test Setup

- Measure differential and common mode coupling to stripline
- Setup is based on ISO 11452-5
- Freq. range up to 1GHz
- DUT length 2m
- 50mm isolation material height



Source: T. Müller, Rosenberger

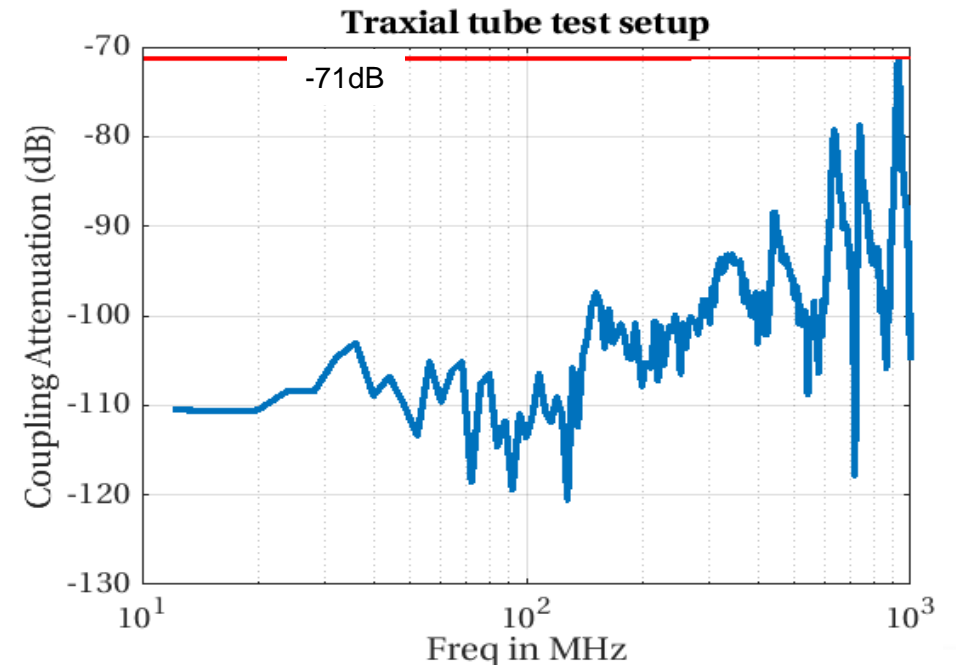
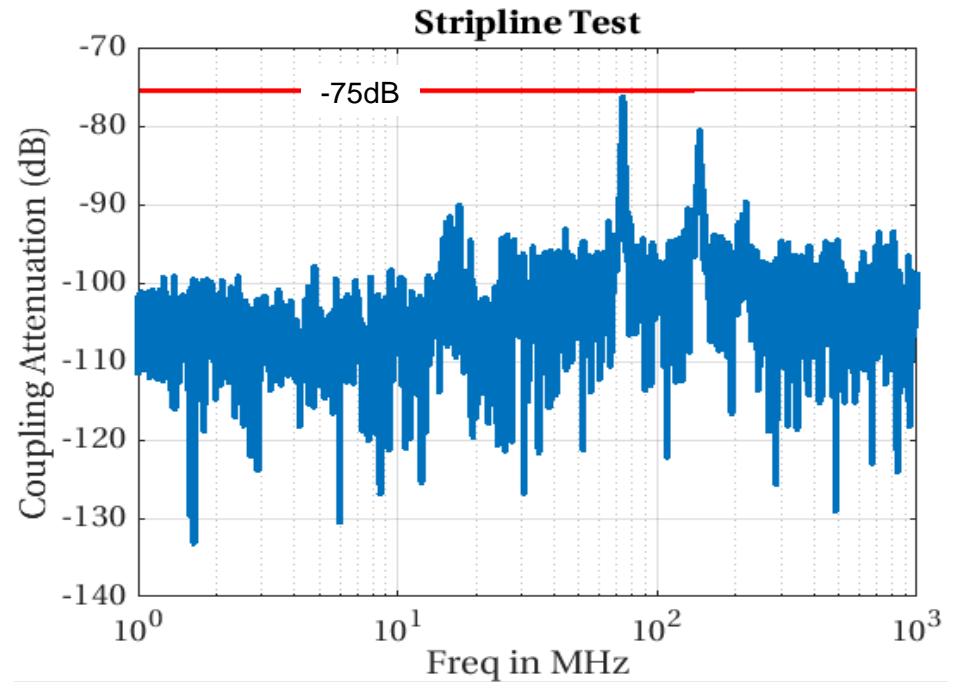


Definition

- While choosing the TX-PSD mask it shall meet the peak emission requirement that is set by the OEMs
- OEMs define 15dBuV peak radiated emission from 70MHz to 1GHz based on stripline test
- Emission = TX-PSD Mask (dBuV) + Coupling Attenuation (dB)
- Coupling attenuation is obtained from stripline test setup up to 1GHz
- For calculation we consider coupling attenuation of STQ cable with HSD connectors as in previous contribution [[Pandey_3ch_01_1117](#)]

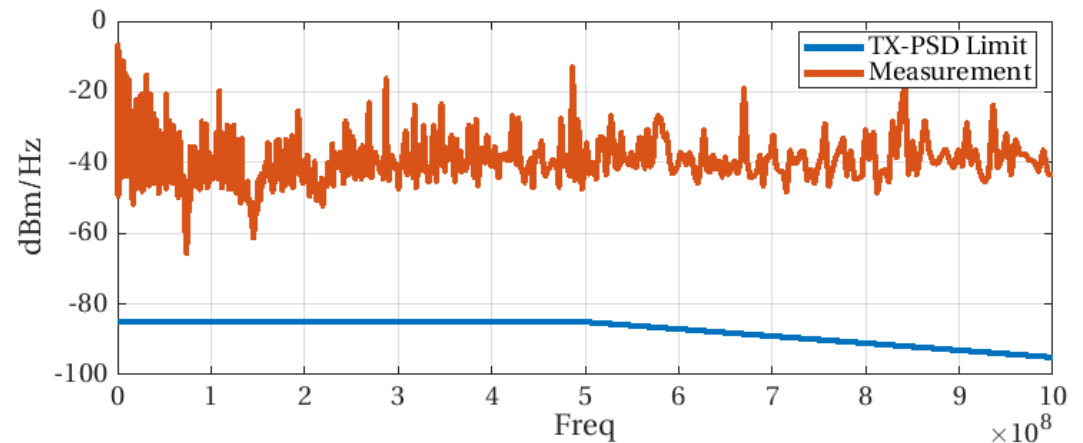
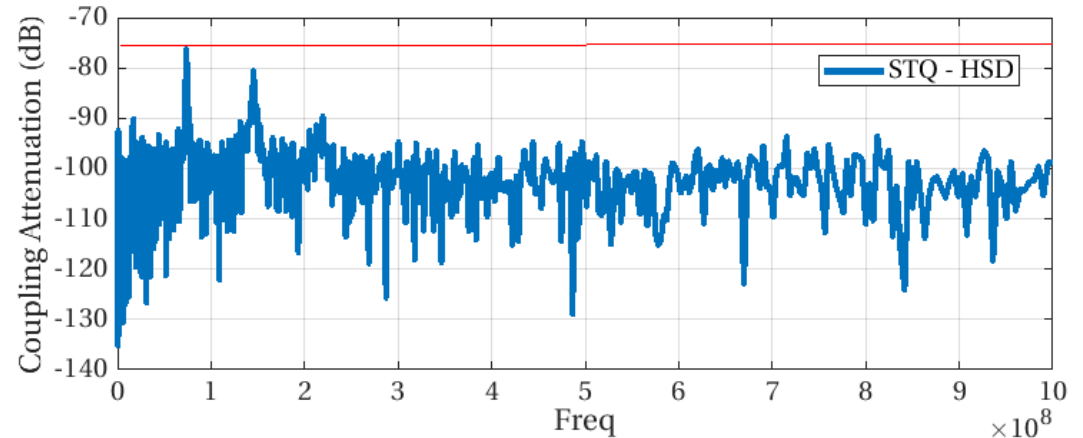
Coupling Attenuation

- For comparison STQ cable with HSD connector was considered for both measurement setups
- Results are from Triaxial tube and stripline test setups
- Stripline test
 - -75dB of coupling attenuation between (50 – 200) MHz frequency range
- Triaxial tube test
 - -71dB coupling attenuation between (0.5 – 1) GHz frequency range



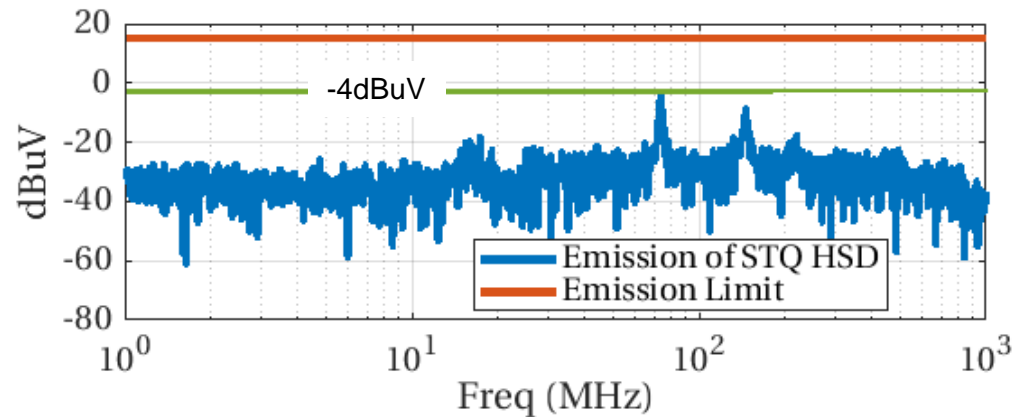
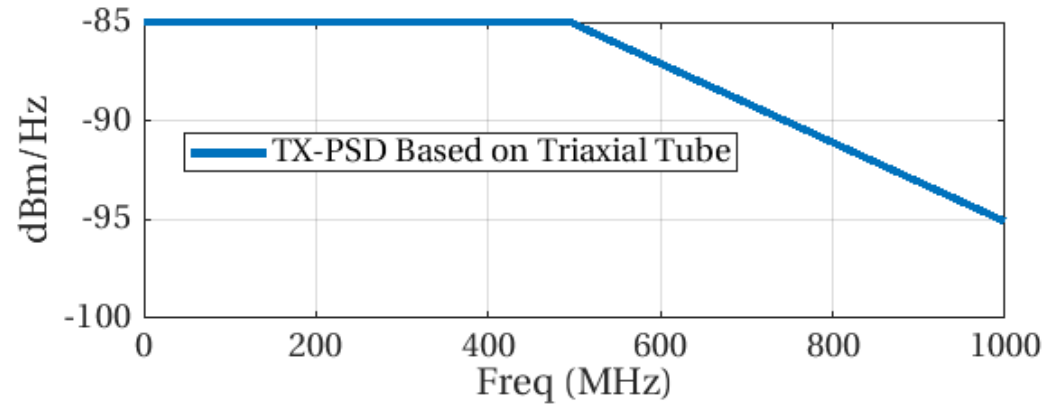
Definition of TX-PSD Limit (1/2)

- TX-PSD Mask = Emission (dBuV) – Coupling Att. (dB)
- RBW = 100kHz
- TX-PSD mask is based on previous contribution [[Pandey_3ch_01_1117](#)] with ~15dB margin over the coupling attenuation limit for Triaxial Tube test setup



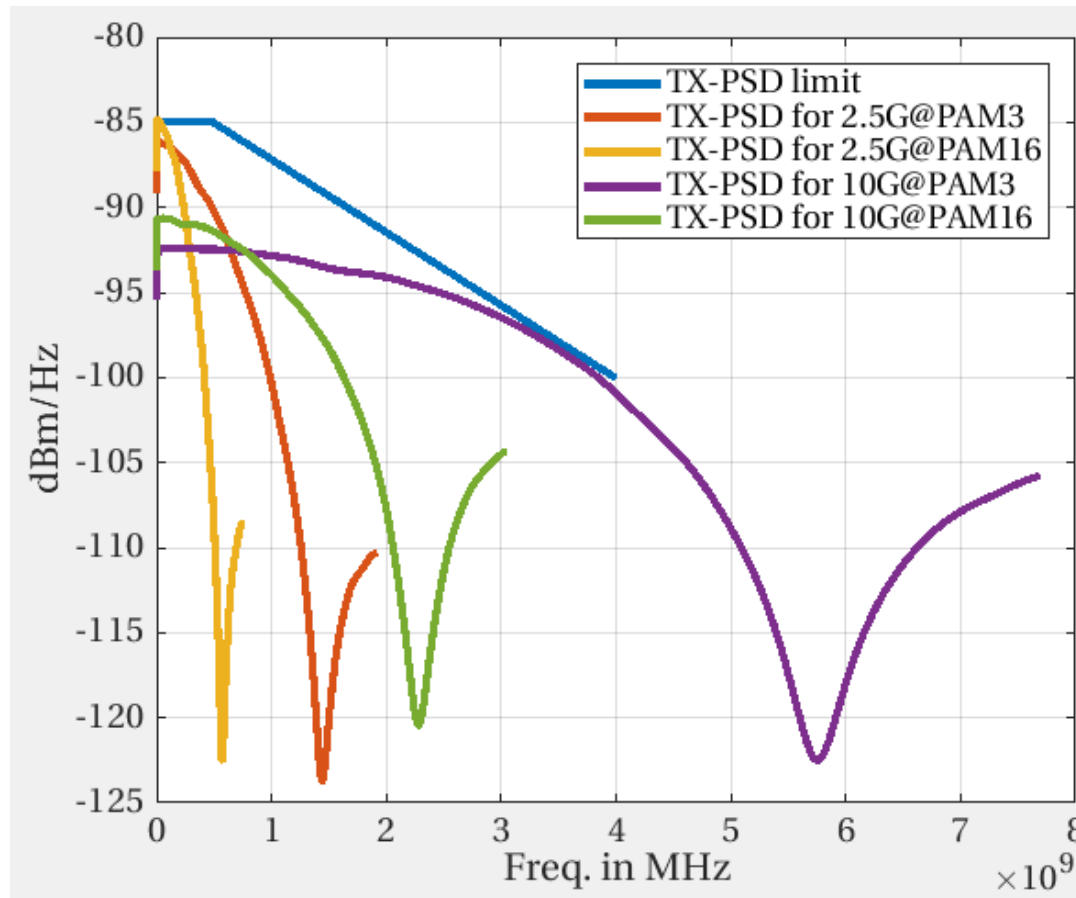
Definition of TX-PSD Limit (2/2)

- -75dB coupling attenuation gives about 19dB margin
 - Can go higher than 1Vpp launch voltage to meet immunity requirement ??
- Measurement data of Triaxial and Stripline setups have about 4dB difference within 1GHz



TX-PSD for Different Speeds and Modulations

- 1Vpp launch voltage



Summary

- Coupling attenuation measurement results from Triaxial Tube and Stripline test setups are in the same order of magnitude with 4dB difference
- Stripline test setup gives peak emission in frequency range from 50 to 200 MHz
- Further at high frequency coupling attenuation tend to remain flat for stripline test
- Triaxial tube test setup gives peak emission in frequency range from 0.1 to 1GHz
- Coupling attenuation gets poor as frequency increases for Triaxial tube test setup



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