



IEEE 802.3cy Greater than 10 Gb/s Electrical Automotive Ethernet TF

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EMC Ingress Into Shielded Connection Systems

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Disclaimers

- Only One;
 - Lab.
 - Test.
 - Design.
 - Test Method.
 - Operator.
 - Set Of Measurements.
- Only Performed Repeatability Of The Measurements Over 12-Day period Of Specific Setup, 2 Tear Down And Setups And 2 Samples.
- Only Measured A Prototype Headers With Specific PCB Design.

Bottom Line: Need More Measurements

Motivation

- Better understanding of automotive shield performance results (e.g. IEC 62153-4-7) of connection systems to automotive specific immunity testing.
- Methods to measure voltages coupled into the system during immunity testing.
- Improve EMC performance of high-speed data comm. in vehicles.
- Understand more about immunity ingress into high-speed diff. pairs.
- Help in determining necessary SNR for IEEE 802.3cy.
- Verification of proposed limits of shielding and coupling attenuation (a_s and a_c) both magnitude and frequency for 802.3cy.

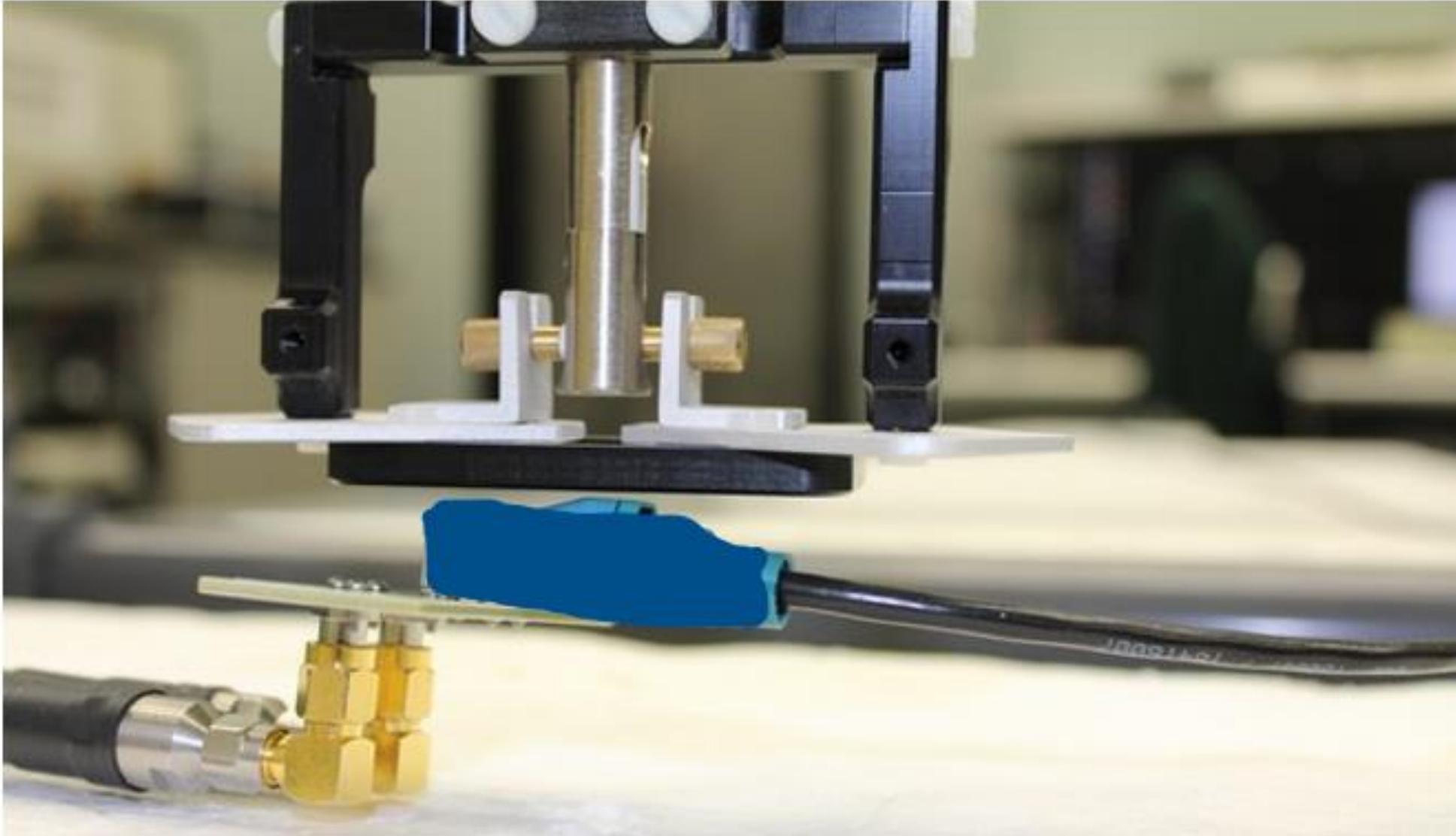
Details of the Testing

- Frequencies tested for this presentation; 4 GHz and 6 GHz.
- Prototype header connector assembly measured.
- Typical automotive OEM requirements for immunity test;
 - Net power level at antenna used to determine immunity level.
 - Antenna spacing of antenna (5 mm).
 - Test methodologies were used to determine max. ingress.
 - Prototype automotive module header connector.
- Use known vehicle OEM req. of net antenna power level of 1 W.
- Shielded differential pairs were tested.
- Micro Strip PCB. Note; PCB optimized for header connector development.
- Keysight DSAV164A 80 Gsa/s, 16 GHz BW.

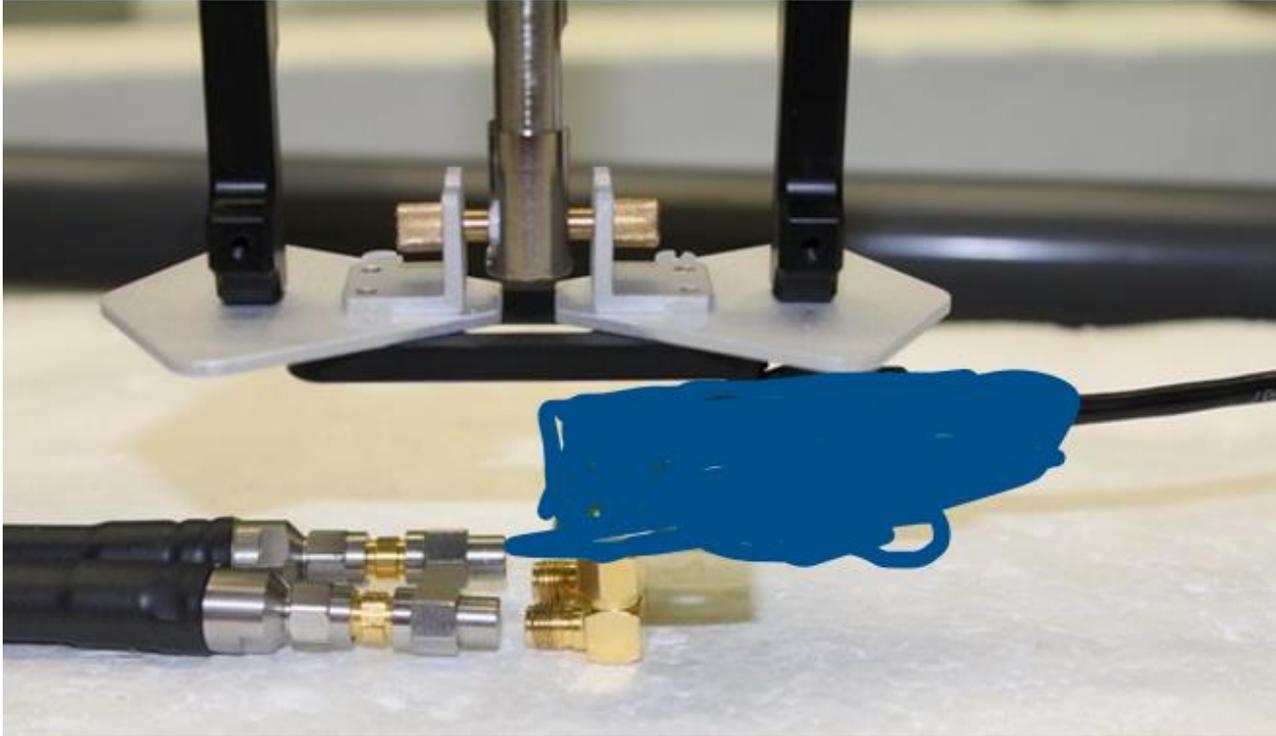
Test Setup



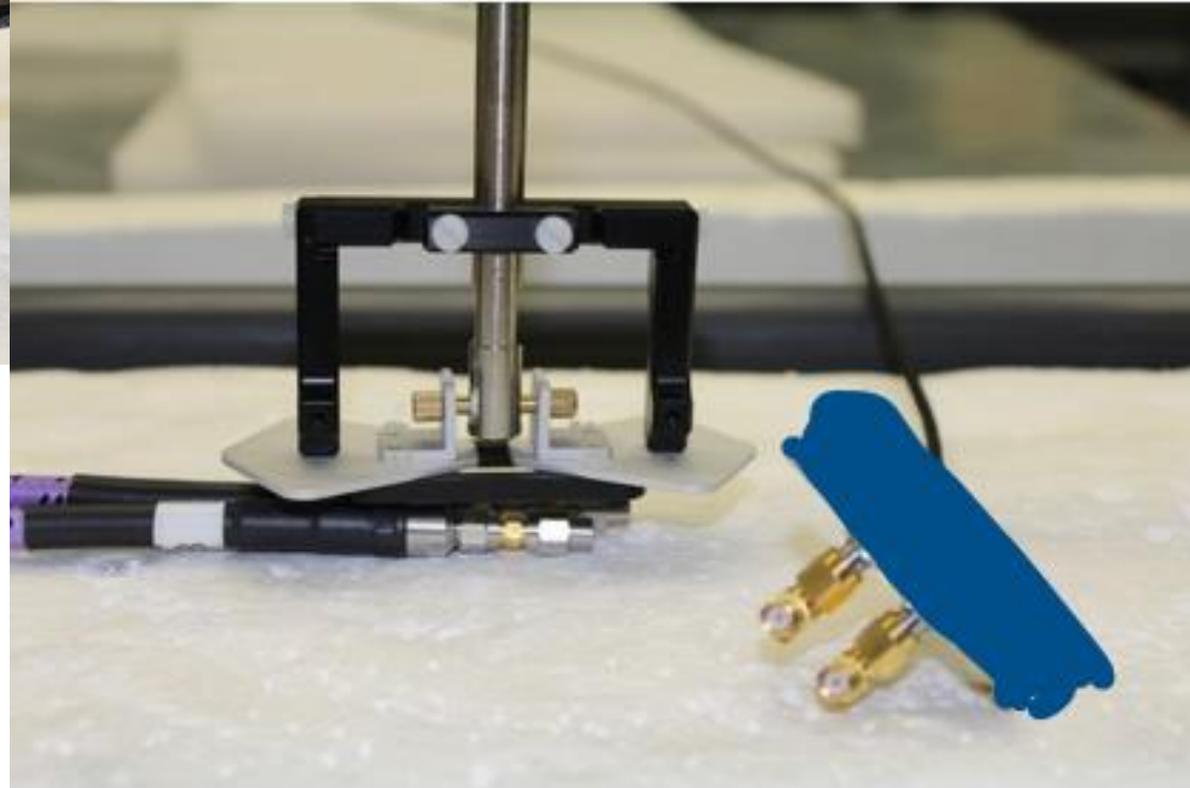
Test Setup Showing 5 mm Antenna Spacing



Test Setup Showing 5 mm Antenna Spacing Loads



No measurable difference between RF On and RF Off



Summary of Measured Data

Header #1 - 1 Watt Immunity Level

Frequency	Common	Differential
4 GHz	29.8 mV _{rms}	3.6 mV _{rms}
6 GHz	58.2 mV _{rms}	11.4 mV _{rms}

Header #2 - 1 Watt Immunity Level

Frequency	Common	Differential
4 GHz	36.7 mV _{rms}	11.3 mV _{rms}
6 GHz	91.2 mV _{rms}	24.8 mV _{rms}

Next Steps

- *Is this type of information useful for 802.3cy? If yes then;*
- Need some 3D EM modeling performed.
- Repeat with different operators and more frequency points.
- Test;
 - with a different antennas
 - with different method, ISO 11452-2 and reverb
 - with different PCB layouts
- Measure a_s and a_c on headers using IEC 62153-4-7.
- Try a pattern generator as simulation of a source.