

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

12 JAN 2021 Ad Hoc teleconference

Immunity to Radiated Electric Field  
Above 4.0 GHz

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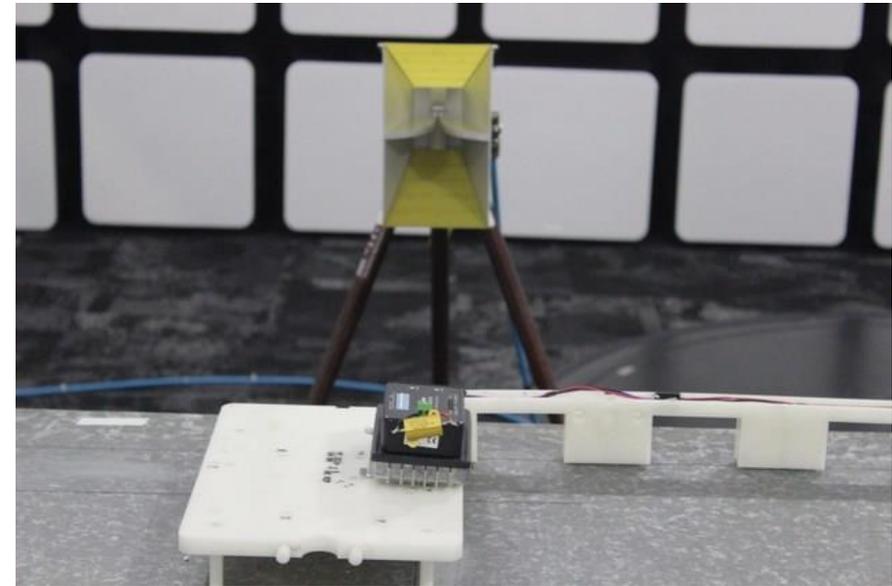
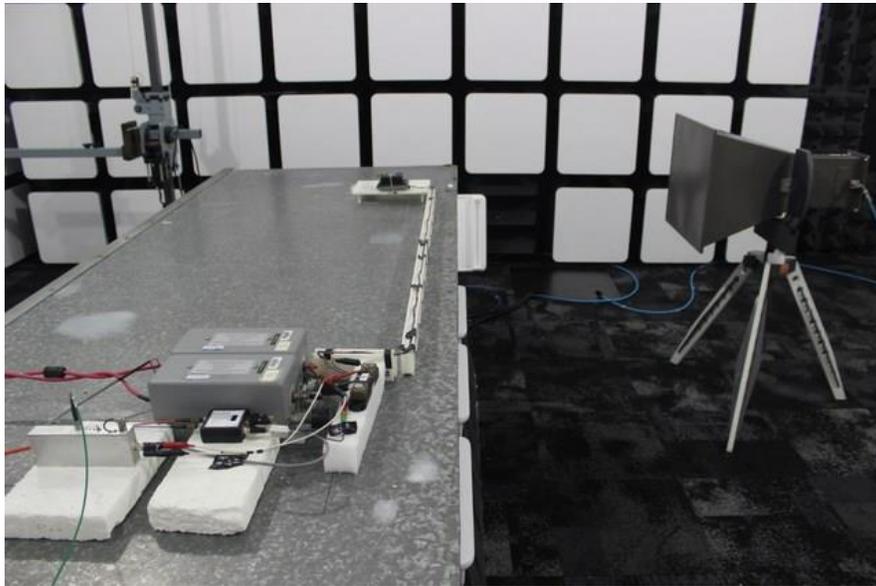
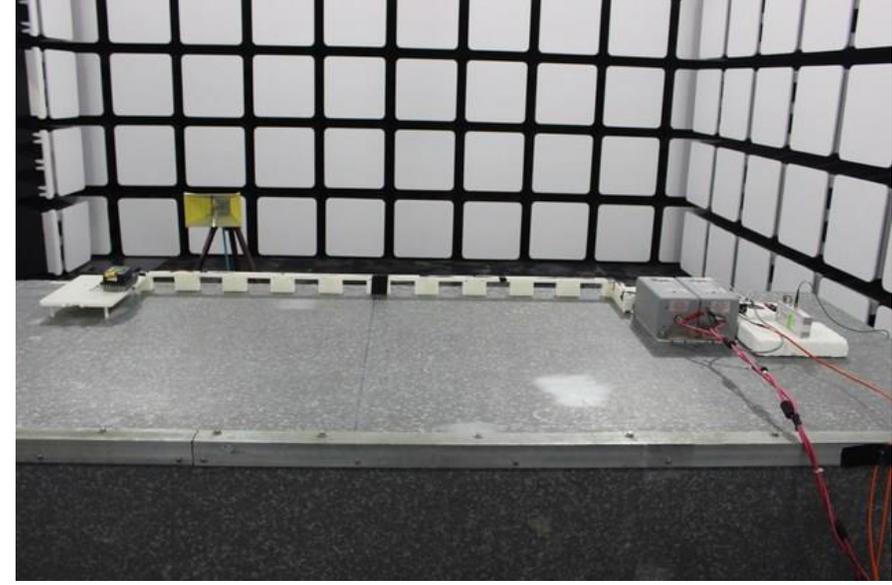
# Disclaimers

- Presentation is not to;
  - Discuss the reasoning of the requirements.
  - Applicability or occurrence of these immunity threats.
  - Suggesting protection schemes.
  - Suggest impact to future work of this committee.
- The purpose of this presentation is to provide known information on possible EM threats greater than 4 GHz.
- This presentation is limited to component level.

# RI Testing According to Base Standard ISO 11452-2

- ISO 11452-2 is a component test method for electrical disturbances from narrowband radiated electromagnetic energy; antenna method in an absorber lined shielded enclosure (ALSE).
- Covers the frequency range of 80 MHz to 18 GHz. User determines frequency range applicable for their use.
- Greater  $> 1$  GHz the antenna aligned with the Device Under Test (DUT).
- Utilizes substitution method of testing.
- For extreme field level testing (e.g. radar) high gain horn antennas are used.
- 1-m antenna spacing; over ground plane; 2-antenna polarizations; 3 DUT orientations.
- Typical antenna used above 1 GHz is Dual Ridge Guide (DRG).
- 4-OEM testing to 6 GHz with field levels  $>50$  V/m. 2-OEM (8.5-10.5) GHz.

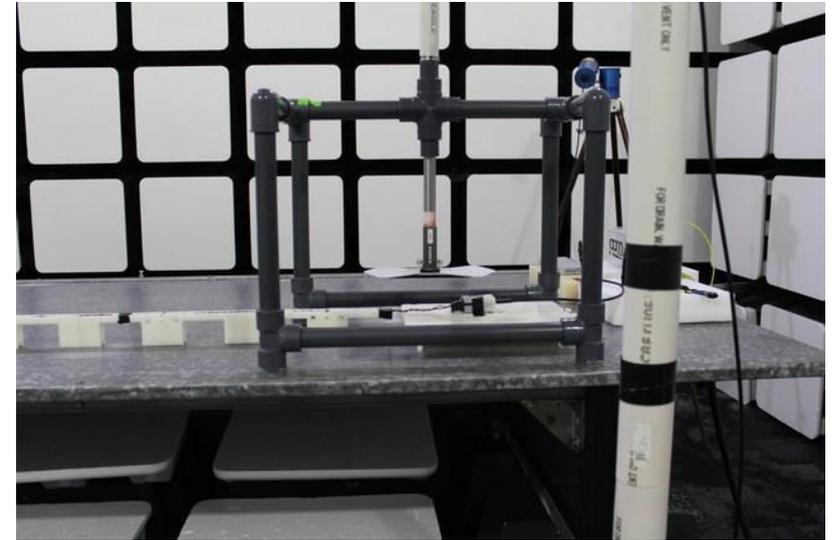
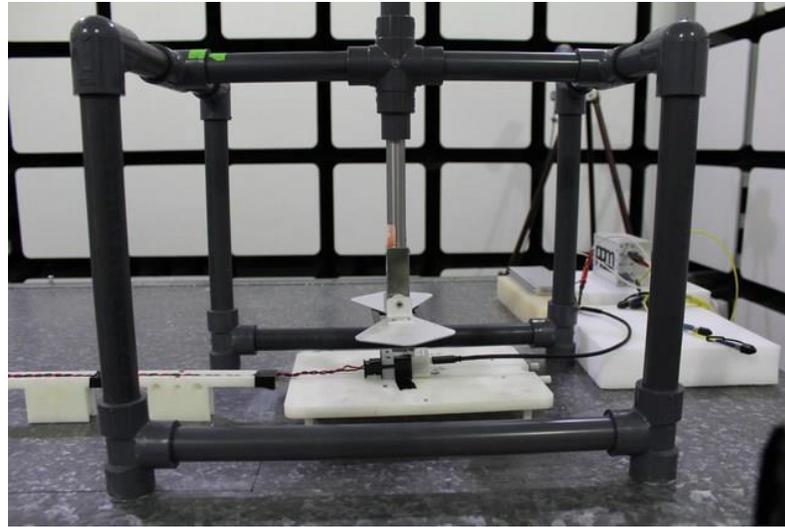
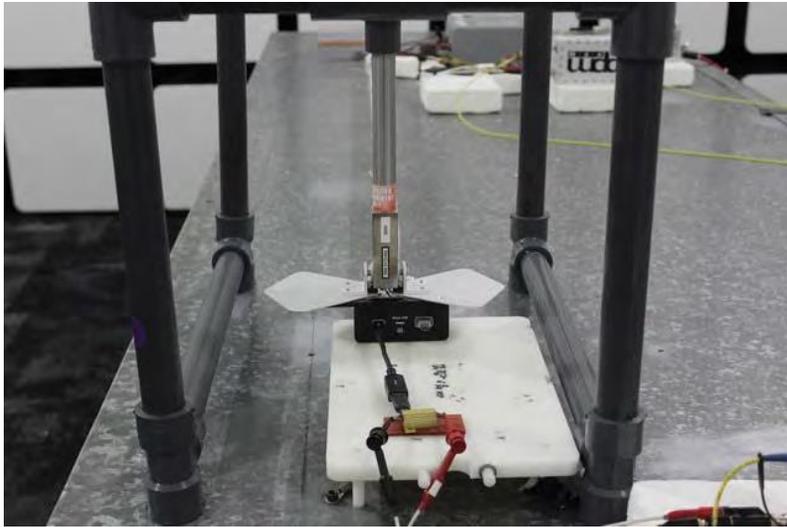
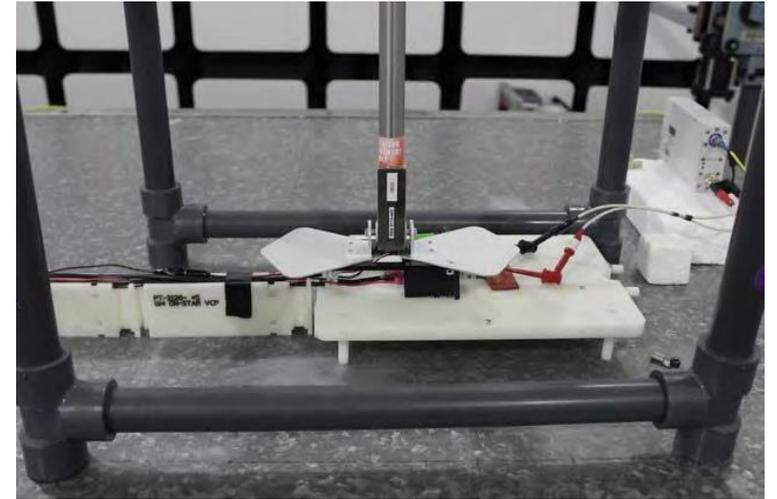
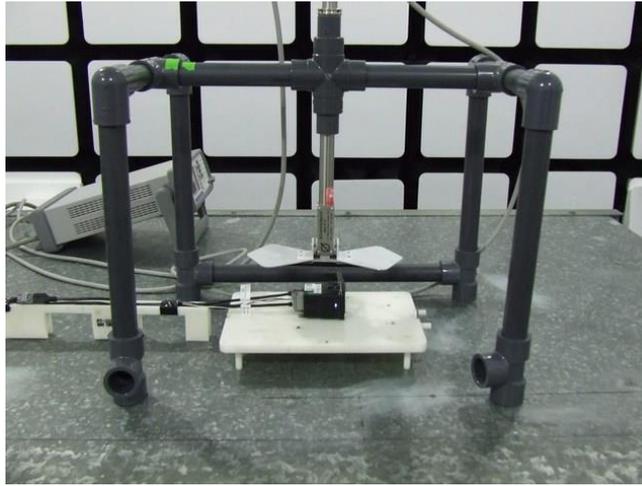
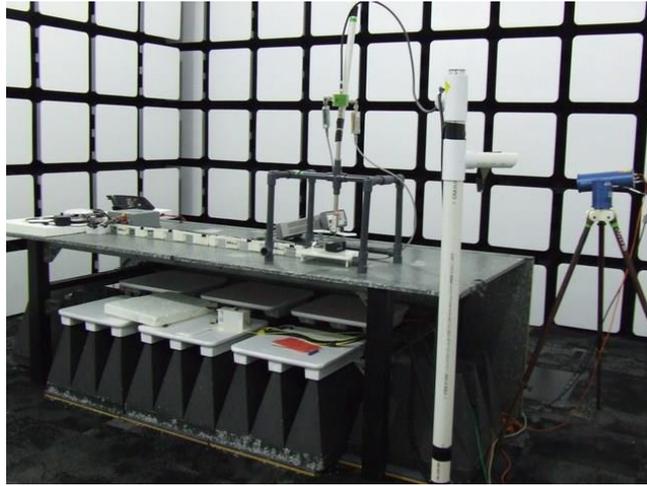
# Typical ISO 11452-2 Testing >4 GHz



# RI Testing According to Base Standard ISO 11452-9

- ISO 11452-9 is a component test method for electrical disturbances from narrowband radiated electromagnetic energy; Portable transmitter.
- Being updated to cover the frequency range of 142 MHz to 6 GHz. Estimating release CY2021.
- Utilizes net input power into known antenna for the method of testing.
- Antennas used (2 to 6) GHz are either broadband dipole antenna or broadband sleeve antenna.
- Antenna is placed 50 mm from DUT or connector surfaces.
- Testing performed over ground plane.
- Determination of applicability of this test is based on the location of DUT.
- 6-OEM already implementing this testing to 6 GHz at >50 V/m.

# Typical ISO 11452-9 Testing (2 – 6) GHz



# Next Steps

- Gain permission to share actual worst case test levels from various OEM.
- Determine an allowable ingress value from immunity testing for this technology.
- Examine source and load impedance to simulate and model impact.
- Create shielding performance limits.
- Start discussions on the best test methodologies to measure the shield performance of PCB header and mating connector. Test methodology will need to be able to comprehend multi-port headers.