Radiated EMI Testing in the Semi-Anechoic Chamber

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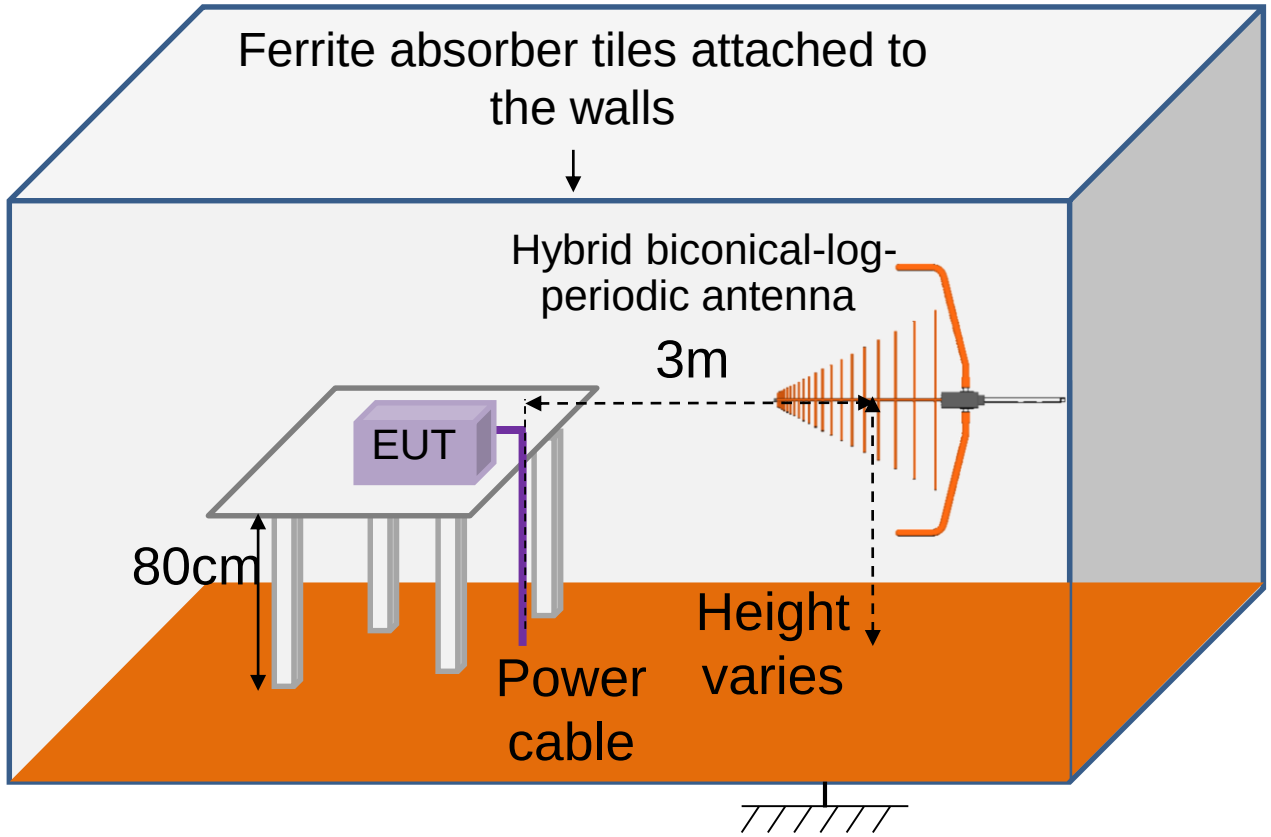
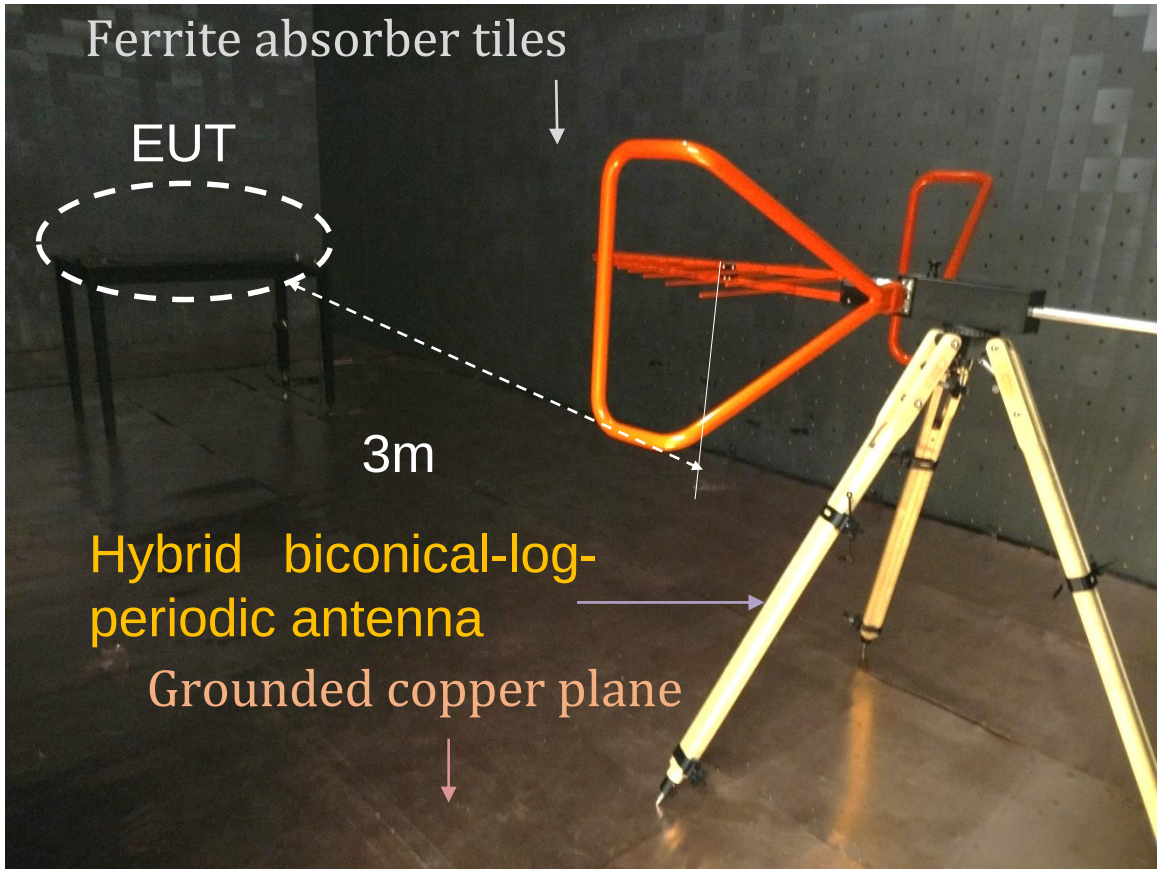
Semi-Anechoic Chamber at PEEPRL, UF

Radiated EMI testing setup for consumer electronics applications (CISPR22)



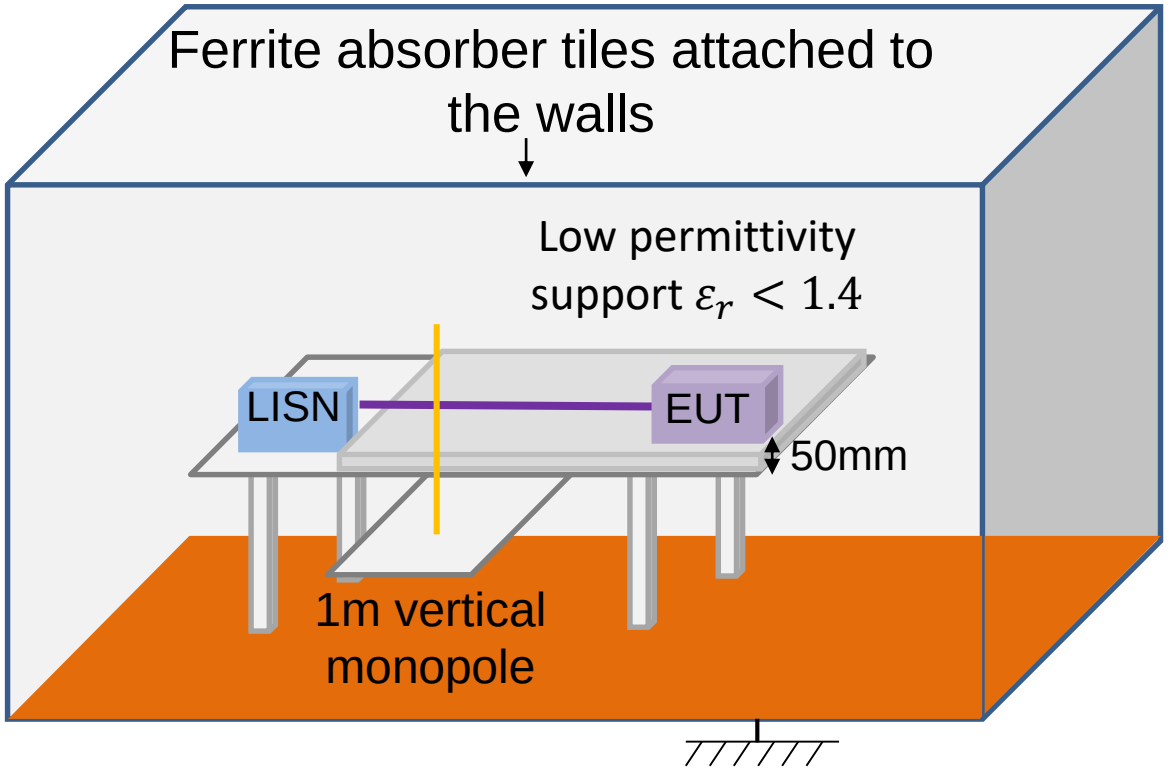


Radiated EMI testing setup (30MHz, 1GHz) in the semi-anechoic chamber according to CISPR 22

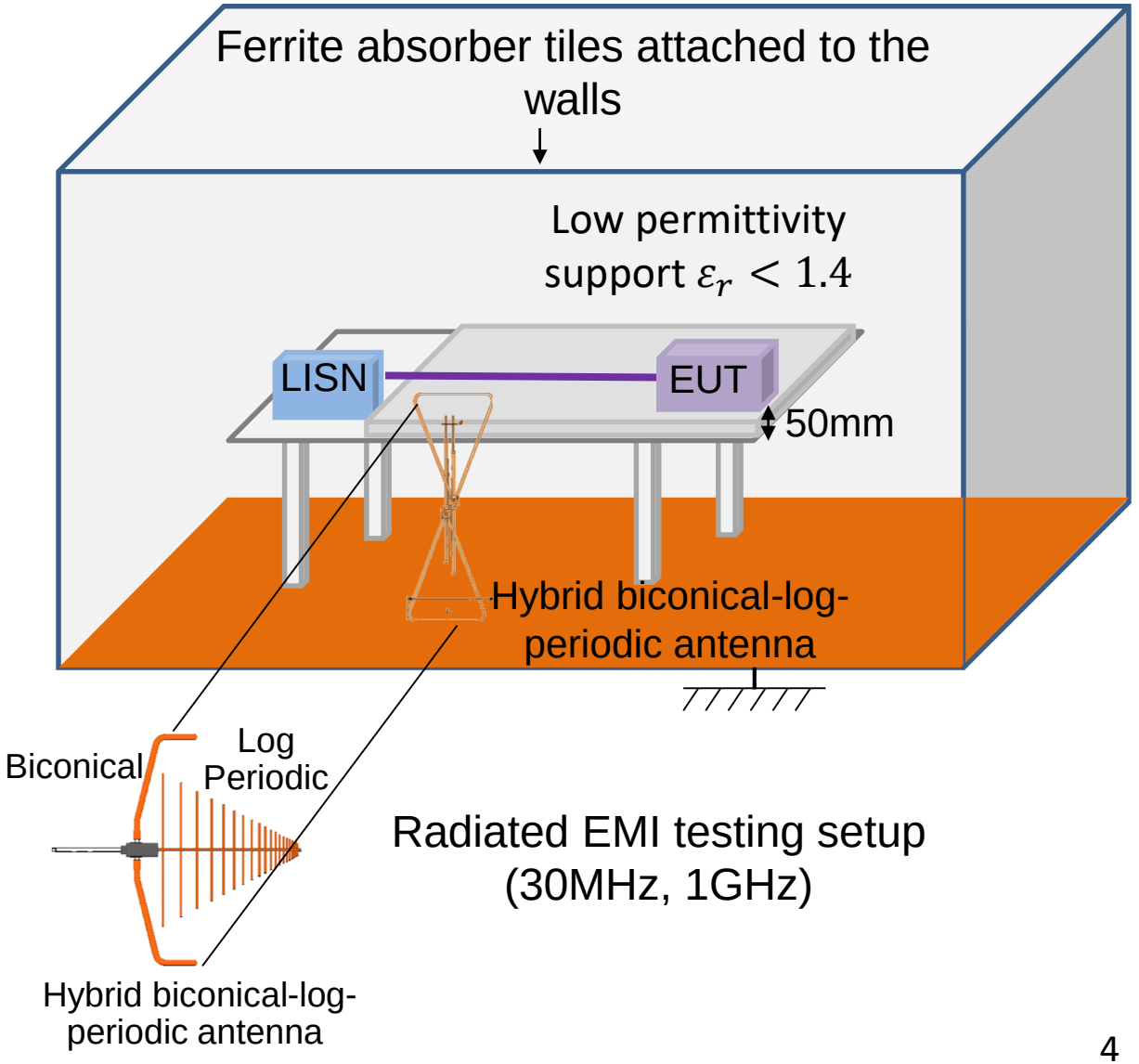
Semi-Anechoic Chamber owned by PEEPRL, UF

Radiated EMI Testing Setups For Power Converters in Automotive Applications

CISPR25



Radiated EMI testing setup
(150kHz, 30MHz)

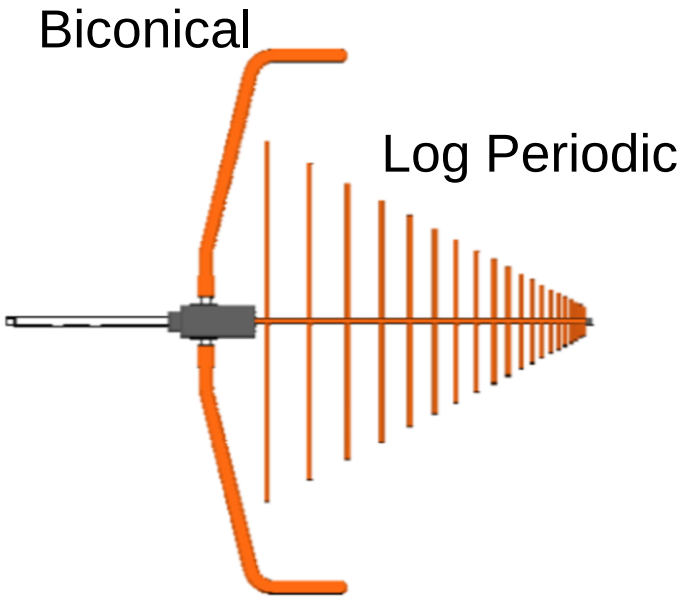


Radiated EMI testing setup
(30MHz, 1GHz)

Receiving Antenna For Wideband Radiated EMI Measurement

Receiving Antenna (SUNAR RF MOTION JB3 SN A030718-SUNAR RF MOTION)

Hybrid biconical-log-periodic antenna



Hybrid biconical-log-periodic antenna

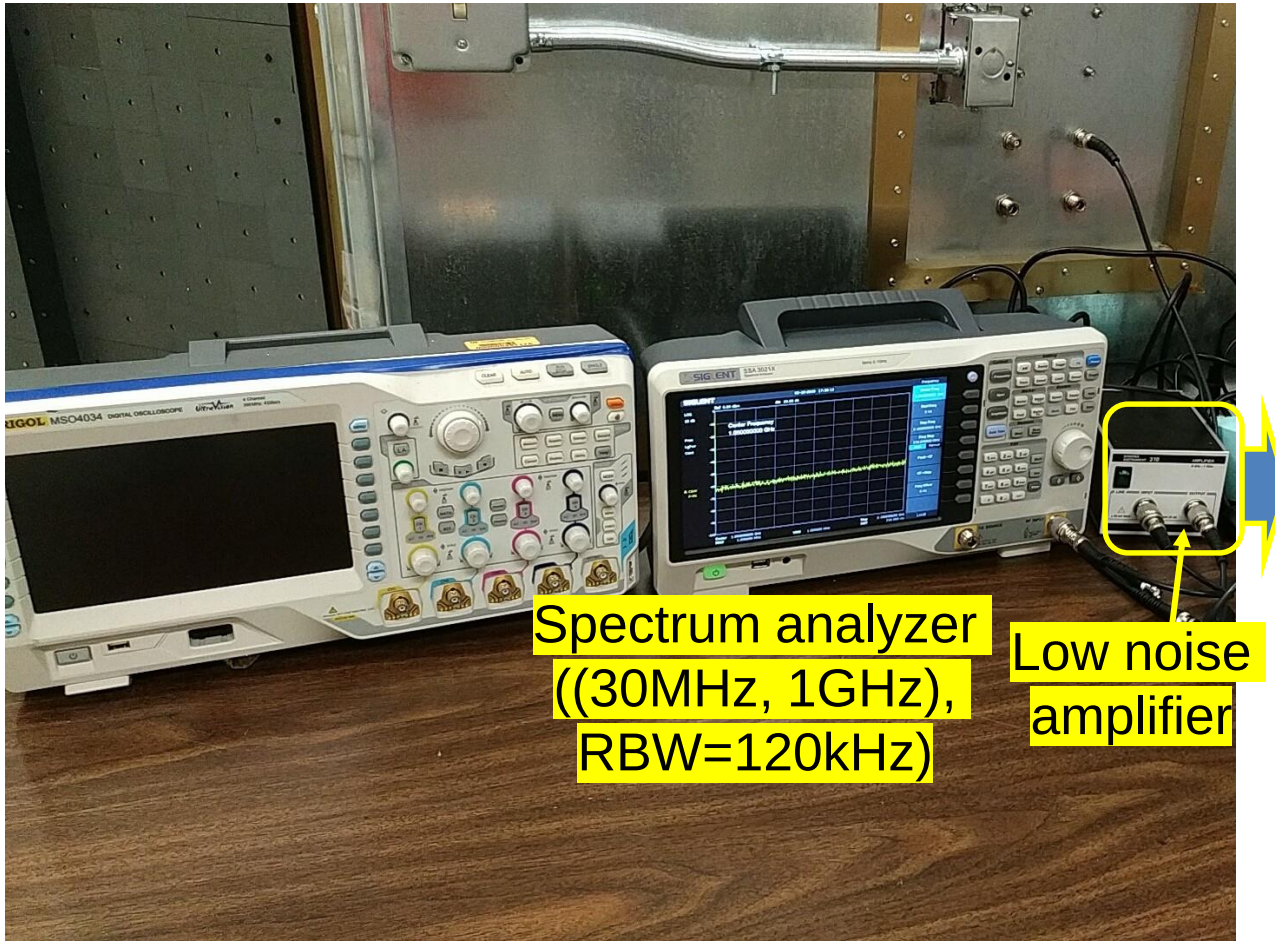
Combination antenna, 30 MHz –3 GHz
Impedance: 50 ohms nominal
Connector: Type N female
Polarization: Linear
Size (LxHxW): 50 x 44 x 19 in, 127 x 112 x 48 cm
Weight: 10 lbs. (5 kg)

The receiving antenna consists of the biconical and the log-periodic parts.

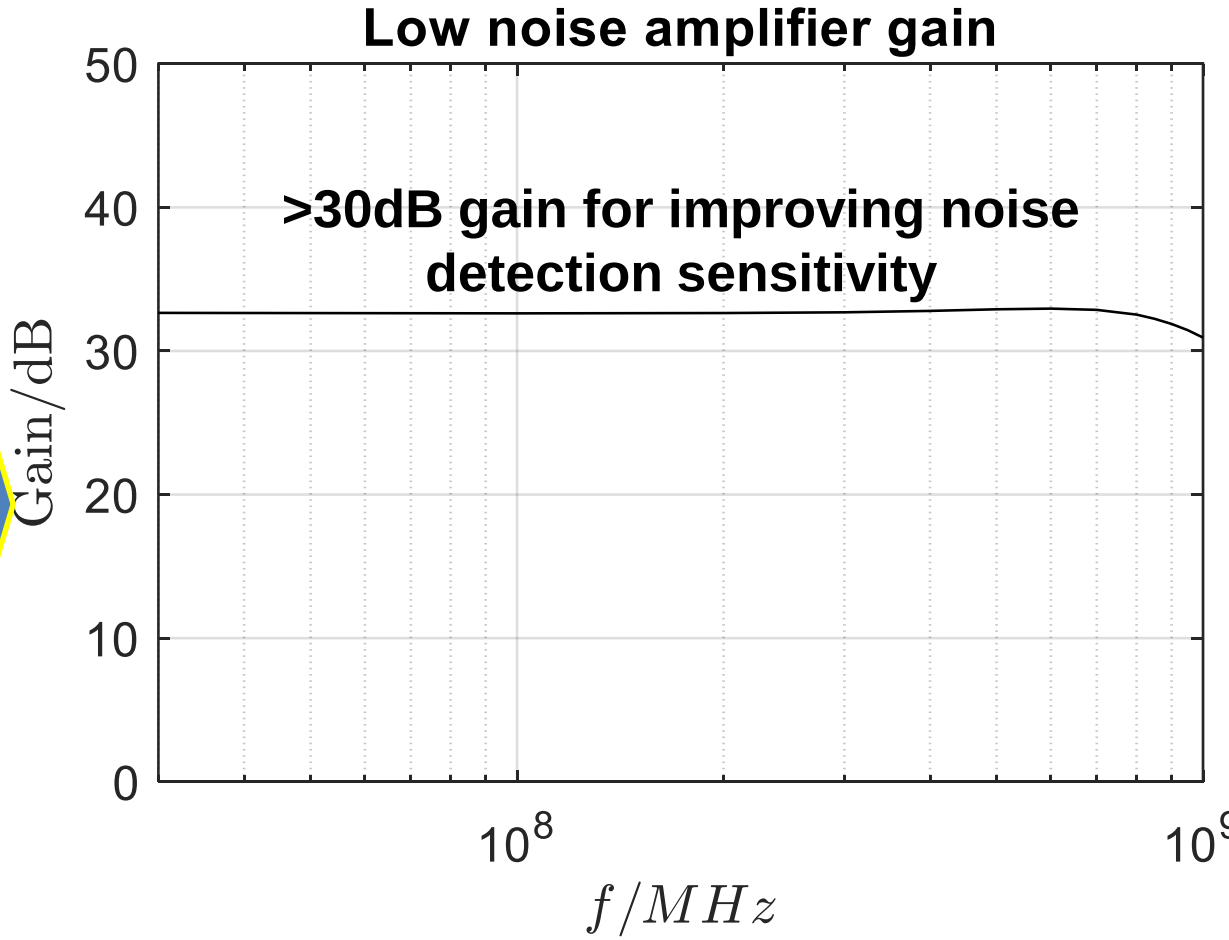
1) The log-periodic antenna consists of multiple dipoles on the same boom, and the length and spacing of the elements increase logarithmically. The smallest dipole is for the highest frequency.

2) The biconical antenna with a large size determines the lowest operating frequency.

Measurement Equipment and Parameters



Measurement equipment of the chamber



High gain of low noise amplifier to improve noise detection sensitivity

Radiated EMI Testing Procedure

Measurement procedure

Identify EMI free environment:

With the spectrum analyzer and the amplifier on, without EUT, the measured radiated EMI is the ambient noise. The ambient noise should be below the radiated EMI limit with >6dB margin.

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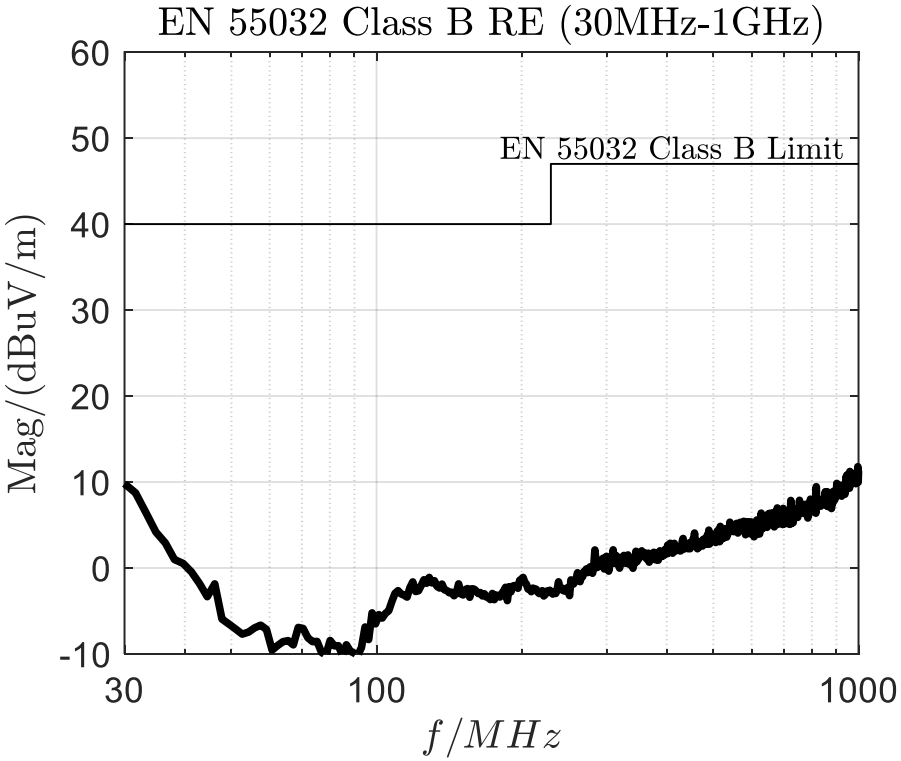
Radiated EMI testing:

With EUT ON, radiated EMI testing:

1) Vertical polarization;

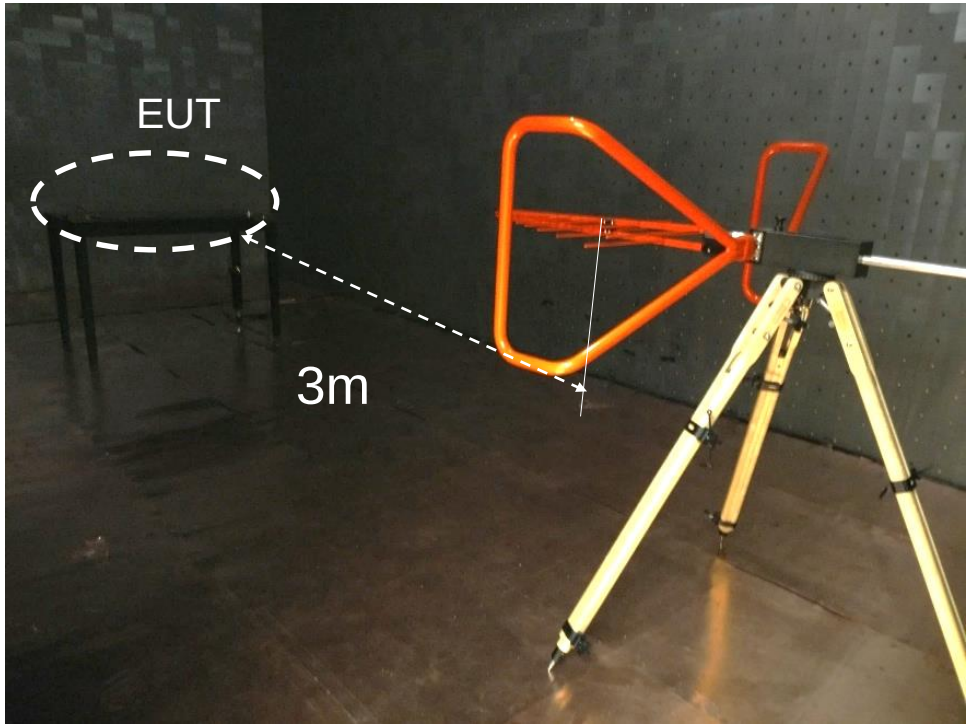
2) Horizontal polarization.



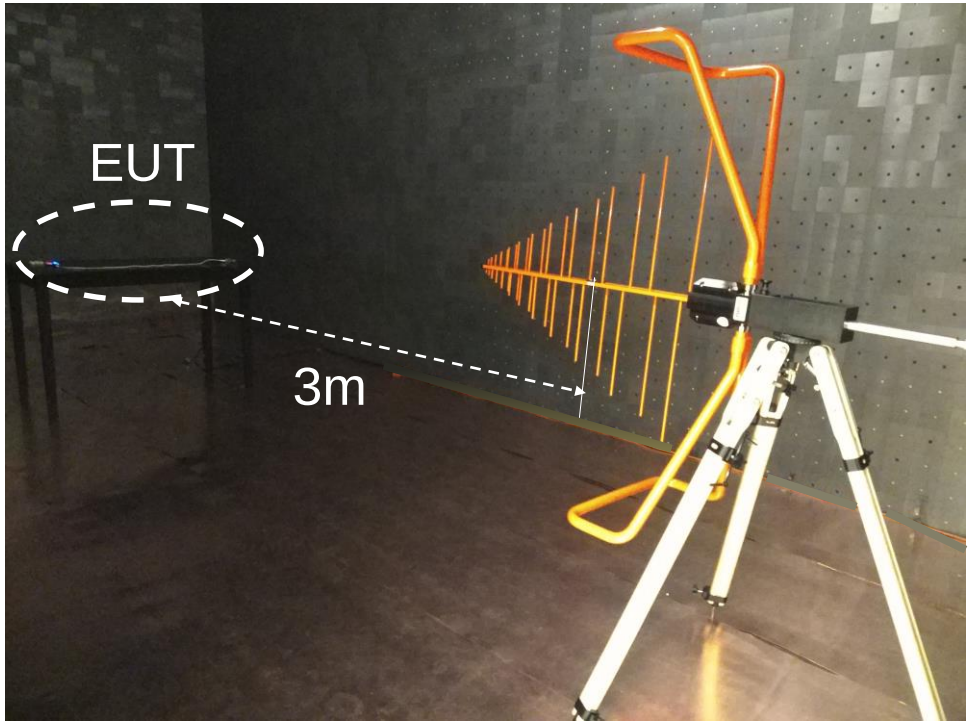
Ambient noise

(Note: The ambient noise should be below the limit with enough margin >6dB)

Radiated Emission Testing with Receiving Antenna in Horizontal and Vertical Polarization



Receiving antenna in horizontal polarization

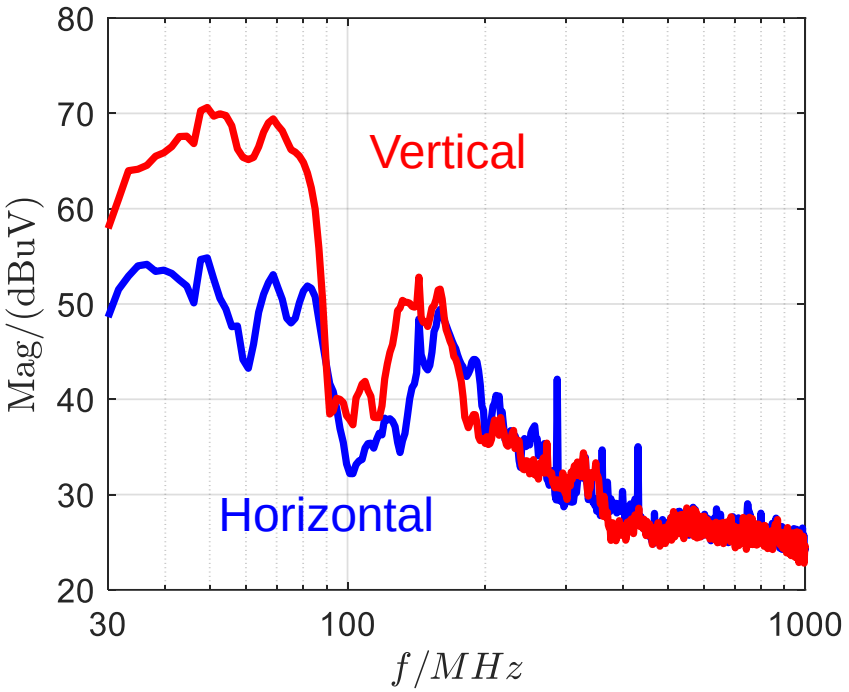


Receiving antenna in vertical polarization

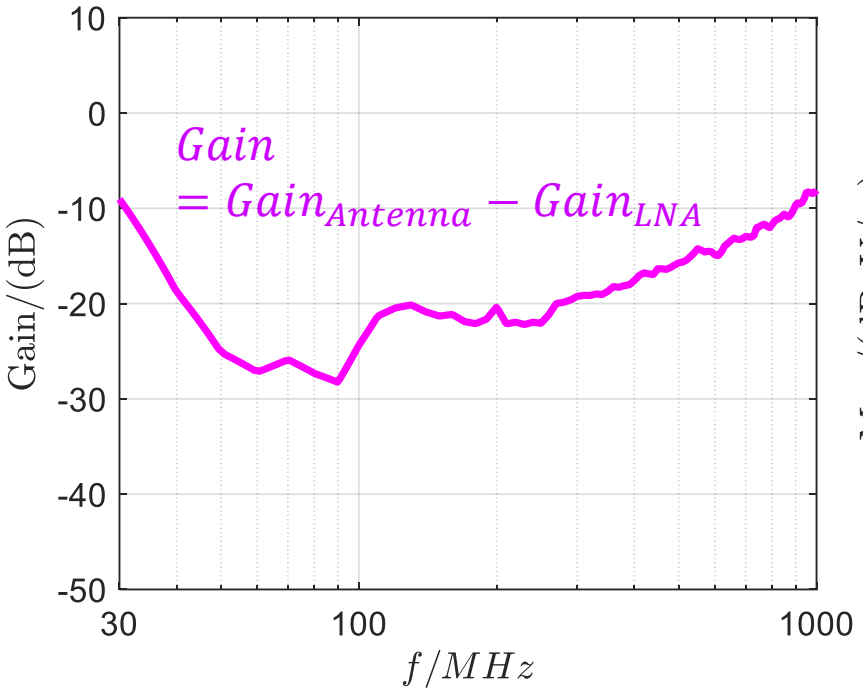
Note: 1) About receiving antenna structure, it consists of a number of half-wave dipole driven elements of gradually increasing length. Those dipole elements are tuned for different operating frequencies.
2) About the horizontal and vertical polarization measurement, since each dipole element has the linear (line) polarization (parallel to the element rod direction), the receiving antenna needs to be set in horizontal and vertical respectively to measure the radiated *E* field intensity components in the two directions.

Data Post-processing of Radiated EMI Measurement Result

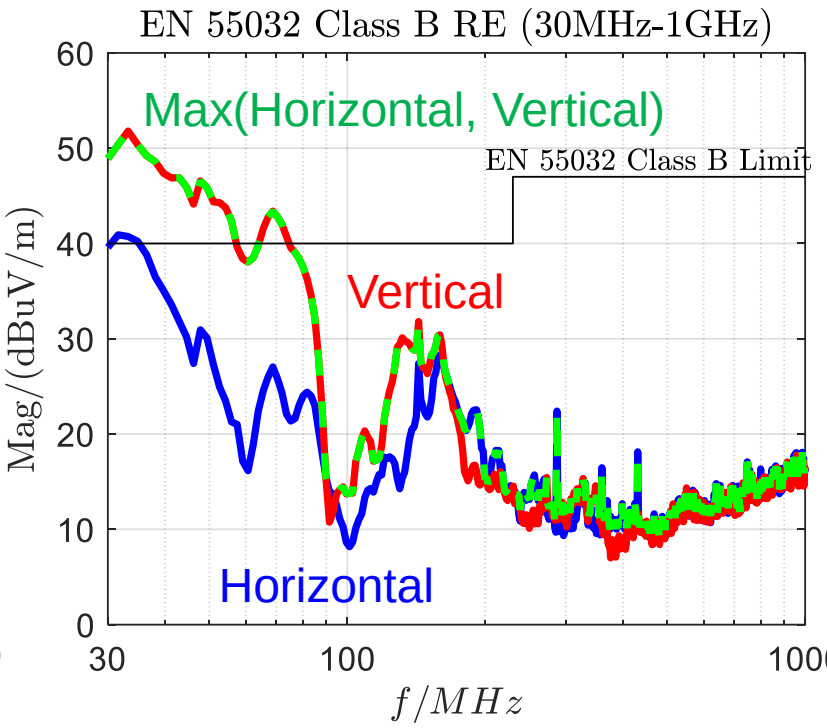
Raw data → **Calibration gain** → **Radiated EMI result**



Raw data from measurement



Gain (Receiving antenna and amplifier both considered)



Radiated EMI result

Summary

- The PEEPRL semi-anechoic chamber is built for radiated EMI testing according to CISPR 22 (for consumer electronics), CISPR 25 (for automotive electronics), etc.
- The radiated EMI testing procedure including the experiment and the data post-processing is presented.

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Thank you!