

RESEARCH CONCERNING CHARACTERIZATION AND IMPROVEMENT OF THE ELECTROMAGNETIC ENVIRONMENT IN MODERN CARS

Goal of the project

- Assessment of the electromagnetic environment in modern vehicles: technical and legal aspects;
- Assessment and analysis of measuring and testing methods and of equipment involved in Automotive EMC;
- Implementation of novel test and measurement methods in Automotive EMC and improvement of the testing repeatability
- Applications of metamaterials to Automotive EMC.

Short description of the project

This project is component of the complex project *Hybrid Platform for Communication in Visible Light and Augmented Reality for the Development of Intelligent Systems for Assistance and Active Security of Vehicles*, 21PCCDI / 2018.

Project implemented by

Politehnica University Timișoara,
Faculty of Electronics, Communications and Information Technology,
Department of Measurements and Optical Electronics

Implementation period

18.05.2018 - 16.11.2020

Main activities

1. Characterization of the electromagnetic environment in vehicles:
 - Near field and far field measurement;
 - Spectral occupancy measurement.
2. Improvement of repeatability of Automotive MC tests
 - Assessment of devices and equipment involved;
 - Interlaboratory testing and comparisons
 - Far-field prediction from near-field measurements data;
 - Prediction of far-field radiation from current measurement.
3. Methods of reduction of conducted and radiated emissions;
 - Resonance analysis of systems that fail EMC tests;
 - Applications of metamaterials: filtering, suppressing of cavity oscillations, screening with frequency selective surfaces.

Results

2018

- Documentation concerning assessment of electromagnetic field in modern cars;
- Documentation concerning foreseen electromagnetic environment in electric cars and related EMC aspects;
- Documentation concerning applications of metamaterials in the Automotive EMC field;
- 10 published papers on:
 - Emissions and immunity testing in Automotive EMC (Fig. 1);
 - Interlaboratory comparison of radiated emissions;
 - ALSE chamber validation (Fig. 2);
 - Stripline measurements in Automotive EMC;
 - Near field measurements and applications to emission reduction (Fig. 3);
 - Frequency selective surfaces;
 - Spectrum occupancy measurement in the HF domain;
 - Application of Raspberry Pi.

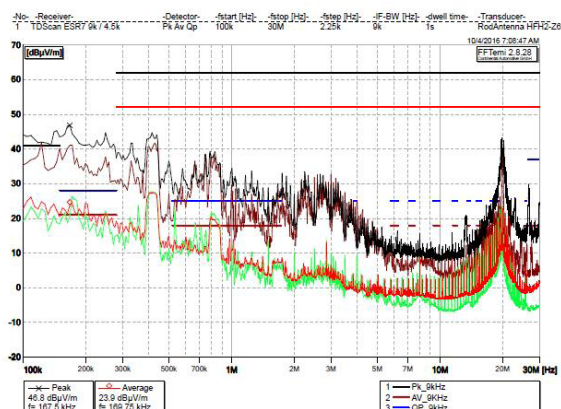


Fig. 1. Results of radiated emission tests on the same DUT using a monopole antenna in two different semi-anechoic chambers.



Fig. 2. Testing setup for chamber validation with biconic antenna

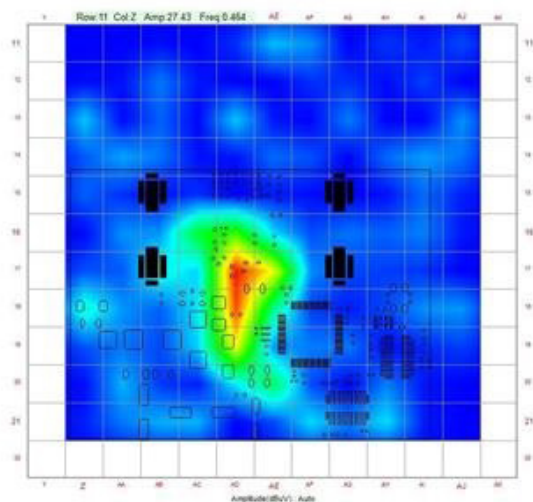


Fig. 3. Near-field scanning

Applicability and transferability of the results

Results obtained in this research might be useful to:

- EMC laboratories, mainly related to Automotive industry;
- EMC professionals;
- EMC research community;
- EMC standards elaboration;
- Legal authorities that regulate spectrum occupancy;
- Professionals working in Automotive design.

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Research centre

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