



18th International Zurich Symposium on Electromagnetic Compatibility

WS-6 on Monday September 24

Requirements and Solutions for Emission Measurements

S. Braun, Institute for High-Frequency Engineering, TU-Munich, Germany

M. Stecher, Rohde & Schwarz, Munich Germany

In this workshop an overview of techniques of radiated and conducted emission measurements will be given. The basics about EMI receivers as well as the new CISPR-Average and RMS detectors as well as the APD measurement function will be presented. The dynamic range requirements according to CISPR 16-1-1 are described. The theory of measurement systems that perform the emission measurement in time-domain is discussed. Those measurement systems use the fast Fourier transform and a digital implementation of the detectors to perform emission measurements. The obtained reduction of the measurement time for several systems is presented. Pre-compliance solutions as well as full compliance solutions are discussed. Reports on the use of time-domain EMI measurement systems in the automotive industry are presented.

Dieter Schwarzbeck (Schwarzbeck Mess – Elektronik, Schönau, Germany)

The EMI Receiver according to CISPR 16-1-1

Measurements of conducted and radiated emissions in the frequency domain are performed with receivers complying to CISPR 16-1-1. The basic operation principle and the most important receiver characteristics for cw and pulsed signals and their evaluation are explained in detail.

M. Stecher (Rohde & Schwarz, Munich Germany)

The new detection modes CISPR Average, CISPR RMS and the APD measurement function

CISPR 16-1-1 specifies time constants for the average detector (i.e. the CISPR average detector) and the measurement of the amplitude probability distribution (APD). In addition, a new RMS-average (CISPR RMS) detector is close to publication. The purpose and function of these new weighting methods are explained.

S. Braun (TU-Munich, Germany), F. Krug (Siemens, Munich, Germany)

The theory of emission measurements in time-domain, an overview

Basic Theory about emission measurement in time-domain is explained. The characteristics of EMI receivers like the impulse bandwidth and the detector modes are discussed. Methods to model and to simulate the behaviour of EMI Receivers digitally via the FFT and further digital signal processing are discussed.

S. Braun (TU-Munich, Germany)

Requirements for full compliance EMI measurements based on the Fast Fourier Transform

The current requirements of CISPR16-1-1 are discussed. Requirements for emission measurements in time-domain concerning the dynamic range are discussed. Requirements for a modelling and simulation of a full compliant EMI Receiver via the short-time fast Fourier transform and the simulation of the detector modes are discussed.

M. Stecher (Rohde & Schwarz, Munich Germany)

Enhancement of an EMI Receiver by the FFT

An EMI measuring system consisting of a fully CISPR 16-1-1 compliant receiver with FFT added to reduce the measurement time by significant factors will enable faster and better EMI measurements. The contribution is to show how FFT techniques can be implemented.

J.C. Nickel (Siemens VDO Automotive, Regensburg, Germany)
Application of the FFT in EMI measurements in automotive test applications
Emission Measurements with the system "FFTem" are presented.

M. Aidam (DaimlerChrysler, Sindelfingen, Germany)
Speeding up Automotive EMI measurements by a real-time time-domain EMI measurement system
Results from typical automotive EMI measurements are presented including measurements on short-duration devices and events.

Schedule Monday September 24

8:20 - 8:45 Dieter Schwarzbeck (Schwarzbeck Mess – Elektronik, Schönau, Germany)
8:45 - 9:10 M. Stecher (Rohde & Schwarz, Munich Germany)
9:10 - 9:35 S. Braun (TU-Munich, Germany), F. Krug (Siemens, Munich, Germany)
9:35 - 10:00 S. Braun (TU-Munich, Germany)

Break: 40 Minutes

10:40 - 11:05 M. Stecher (Rohde & Schwarz, Munich Germany)
11:05 - 11:30 J.C. Nickel (Siemens VDO Automotive, Regensburg, Germany)
11:30 - 11:55 M. Aidam (DaimlerChrysler, Sindelfingen, Germany)