



18th International Zurich Symposium on Electromagnetic Compatibility

WS-2 on Monday September 24

Round Robin Testing in EMC applications

Organizer's name P.A. Beeckman
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Short summary of the workshop:

Round Robin Tests (RRTs) and Interlaboratory Comparisons (ILCs) are practical means to evaluate the quality and uncertainties of EMC test methods. They are used to verify the performance of draft standards, for proficiency testing of EMC test laboratories, or to compare results of alternative test methods.

Reduction of uncertainties in EMC testing, development of new/alternative test methods and IEC17025-accreditation of laboratories are the main drivers for organising or participation in a RRT or ILC. Several RRTs and ILCs have been organised in the past years through CISPR or through other organisations.

This workshop will address the setup and organisation of an ILC/RRT and the statistical analysis of results. Several speakers will explain setup and results of specific ILCs/RRTs.

Program

13:50-14:00	Beeckman	Introduction
14:00-14:20	Beeckman	How to setup and organise an RRT?
14:20-14:40	Ryser	RRT on conducted emission measurements at the mains connection
14:40-15:00	Dunker	Report of the RRT Measurements above 1 GHz
15:00-15:20	COFFEE BREAK	
15:20-15:40	Stecher	CISPR/A RRT on meandering/bundling of cables in conducted emission measurements for improvement of CISPR 16-2-1
15:40-16:00	Beeckman	Philips ILC for various disturbance tests
16:00-16:20	Šimunić	ILC of EMF Measurements for RF Human Exposure
16:20-16:40	Wrap Up	

Title contribution 1 How to setup and organise an RRT?

Speaker P.A. Beeckman

Affiliation speaker Philips Applied Technologies, Eindhoven, The Netherlands

Abstract

RRTs may be organised for different purposes. They may be used to verify the performance of draft standards, for proficiency testing of EMC test laboratories, or to compare results of alternative test methods. In all cases, the development of an RRT requires a lot of effort. The definition of the purpose, the preparation, selection of participants, selection of test article, the drafting of test instructions and templates, the analysis and reporting of results and the management should be performed with care. These aspects and the associated pitfalls are presented in this contribution.

Title contribution 2 RRT on conducted emission measurements at the mains connection

Speaker H. Ryser

Affiliation speaker Swiss Federal Office of Metrology (METAS), Bern-Wabern, Switzerland

Abstract

A round robin test has been performed by METAS to investigate the possible deviations between conducted emission tests at the mains connection. Small deviations for this very simple EMC measurement were expected. However, surprisingly the results showed large deviations of up to +/- 10 dB at frequencies between 20 MHz and 30 MHz. Several possible sources of these deviations have been studied and some improvements are proposed within CISPR/A. One possible improvement is to use a PE simulation network in the ground wire connection. This means that the ground wire is connected to the same RF impedance as all other wires of the power supply cable. All observed influence factors are significantly reduced if this simple improvement is adopted.

Title contribution 3	RRT on the CISPR/A measurement method above 1 GHz
Speaker	L. Dunker
Affiliation speaker	Bundesnetzagentur, Berlin, Germany

Abstract

A RRT was performed with test houses in Germany and members of CISPR/A in the time period from 2004 to 2006. The purpose of the RRT was to estimate the reproducibility of the radiated emission measurement procedure above 1 GHz which is now standardized in CISPR 16-2-3. For this RRT, an EUT was designed which generates a field strength in the frequency range from 1 GHz to 18 GHz. The EUT has a radiation pattern with multiple lobes which can be expected also for a real EUT.

The RRT results show that the influence of the uncertainty of the measurement instrumentation is low. It will be shown that the radiation pattern of the EUT influences the reproducibility of field strength measurement in this frequency range. Furthermore it is shown that the preliminary measurement procedure contains uncertainties since the variation in the vertical pattern of the EUT is not taken into account.

Title contribution 4	CISPR/A RRT on meandering/bundling of cable in conducted emission measurements for improvement of CISPR 16-2-1
Speaker	M. Stecher
Affiliation speaker	Rohde & Schwarz, Munich, Germany

Abstract

In CISPR a proposal was made to replace the “bundling” of long cables by “meandering” in order to improve the reproducibility of emission measuring results. Measurements have shown that if “bundling” is replaced, the possible resonances of the cable arrangement will move to higher frequencies. It is assumed that exactly defined bundling arrangement will also improve the reproducibility of the results of conducted emission measurements. It was principally agreed to organize a round robin test to investigate the influence of the cable arrangement on conducted emission measurement results at the mains port. As an artificial EUT, a comb generator will be used with a sufficiently dense spectrum, e.g. with 100 kHz frequency steps. The mains cable has 3 m length of which 2,2 m has to be arranged in a bundle or a meander.

The workshop contribution will show how the RRT is organized to give a statistically clear answer to the committee.

Title contribution 5 Philips ILC for various disturbance tests

Speaker P.A. Beeckman

Affiliation speaker Philips Applied Technologies, Eindhoven, The Netherlands

Abstract

An ILC has been organised in the period 2003 to 2005 by the Philips EMC Competence Center. This ILC covered three important standardized emission measurement methods: radiated emission, conducted emission and disturbance power measurement method. In this contribution, the general purpose and setup of this ILC, the different types of tests and reference EUTs used are described in detail. Also the analysis method, the results and the conclusions are presented.

Title contribution 6 ILC of EMF measurements for RF human exposure

Speaker D. Šimunić

Authors D. Šimunić, J. Karpowicz, P. Gajšek

Affiliation speaker University of Zagreb, Zagreb, Croatia

Abstract

The first international interlaboratory comparison, performed in Zagreb, Croatia has been organised on September 15, 2006 by an international consortium from three countries: University of Zagreb, Croatia; CIOP, Poland; and INIS, Slovenia. The ILC has been oriented to comparison at ELF and RF frequencies for laboratories with a national accreditation for non-ionizing radiation dosimetry measurements. The ILC has been organized in conjunction with European COST 281 Workshop related to dosimetry uncertainty of non-ionizing EMF human exposure assessment. The presentation encompasses details of general purpose, setup and results of the RF part of ILC, which has been oriented to simultaneous measurements of base stations of mobile telecommunications by a number of international teams.