



# EMCABS

## EMC Abstracts

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As the EMC Society becomes more international, we will be adding additional worldwide abstractors who will be reviewing articles and papers in many languages. We will continue to set up these informal cooperation networks to assist members in getting the information or contacting the author(s). We are particularly interested in symposium proceedings which have not been available for review in the past. Thank you for any assistance you can give to expand the EMCS knowledge base. **EMC**

### EMCABS: 01-08-2009

#### RESONANCE AND RADIATION CHARACTERISTICS OF ENCLOSURE WITH A MULTILAYER PCB AND AN APERTURE

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Proc. of 2009 Korea-Japan Joint Conference on AP/EMC/EMT, Incheon, Korea, May 14-15, 2009, pp. 147-150.

*Abstract:* When a PCB is installed inside a chassis, the emitted noise from the PCB causes the enclosure resonance inside the chassis. In case the chassis has an aperture on the surface, aperture radiation may occur due to the enclosure resonance phenomena. Since this aperture radiation may interfere with other components, circuits, and systems, it is necessary to estimate and control the level of aperture radiation from the EMI/EMC viewpoint. First, this paper describes the power/ground plane resonance of a multilayer PCB. In describing the enclosure resonance, we proposed the load impedance concept for the resonating enclosure. Secondly, the resonance frequency change due to the location of the PCB is investigated and, thirdly, the aperture radiation from the chassis aperture is estimated. Ansoft's HFSS is utilized to simulate the S-parameters and the electric field distributions related to the power/ground plane resonance of the

multilayer PCB and the enclosure resonance. Also, the aperture radiation fields are simulated.

*Index terms:* Multilayer PCB, metallic enclosure, aperture radiation, power/ground plane resonance.

### EMCABS: 02-08-2009

#### WIDEBAND SUPPRESSION OF SIMULTANEOUS SWITCHING NOISE WITH NOVEL POWER PLANE VIA HOLE STRUCTURES

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Proc. of 2009 Korea-Japan Joint Conference on AP/EMC/EMT, Incheon, Korea, May 14-15, 2009, pp. 151-154.

*Abstract:* Using power plane applied spiral resonators, GBN (ground bouncing noise) and SSN (simultaneous switching noise) can be suppressed through very wideband from 0.22 GHz to 12.5 GHz under -25 dB. Also, to reduce generated fields by a resonator, a novel structure which has opposite current distribution is proposed. The designed spiral resonator and modified spiral structure are just located on the intersection between power plane and power via, and the diameter of the resonator is 3.2 mm. Due to the localized small size of resonator, which is almost the same as the clearance pad (3.0 mm) of the ground plane, the degree of freedom for power plane design and signal integrity for guaranteed return current path are bet-

ter than a periodic EBG (electromagnetic band gap) structure. Therefore, signal integrity and power integrity can be guaranteed in a low noise condition by using a spiral resonator and modified spiral structure mounted on a power plane.

*Index terms:* Simultaneous switching noise, ground bounce noise, power plane applied spiral resonators, wideband suppression.

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#### EMCABS: 03-08-2009

#### COMBINATION OF IBIS AND LECCS-CORE MODELS FOR SI ANALYSIS UNDER NON-IDEAL POWER SUPPLY CONDITIONS

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Proc. of 2009 Korea-Japan Joint Conference on AP/EMC/EMT, Incheon, Korea, May 14-15, 2009, pp.159-162.

*Abstract:* The effects of the power-ground resonance in SI (signal integrity) analysis were described, then a structure adding a LECCS-core model to an existing input/output buffer information specification (IBIS) model was presented. Two models of a commercial digital device were constructed from measurements: the combinational model of IBIS and LECCS-core models and the IBIS model. The simulated results from these models were compared to the measured results, and it was shown that the better results can be obtained using the combinational model.

*Index terms:* Signal integrity, power-ground resonance, combination model, analysis, measurement.

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#### EMCABS: 04-08-2009

#### RESONANCE CHARACTERISTICS OF A METALLIC ENCLOSURE HAVING SUB-CAVITY FILLED WITH LOSSY MATERIALS

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Proc. of 2009 Korea-Japan Joint Conference on AP/EMC/EMT, Incheon, Korea, May 14-15, 2009, pp. 163-166.

*Abstract:* This paper presents the use of carbon polystyrene-foam as lossy dielectric material in a sub-cavity attached on a metallic enclosure to suppress the radiation of EM fields in the metallic enclosure, and the suppression effects of the resonance were investigated by controlling the amount of carbon in lossy dielectric material. The suppression of the resonance can be effectively achieved when the width of a sub-cavity filled with a lossy dielectric material is wider and the amount of carbon in the lossy dielectric material is increased.

*Index terms:* Metallic enclosure, resonance, EM radiation, lossy material, suppression effects.

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#### EMCABS: 05-08-2009

#### WHOLE-BODY AVERAGED SAR ESTIMATION METHOD USING CYLINDRICAL SCANNING OF EXTERNAL RADIATED FIELDS

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Proc. of 2009 Korea-Japan Joint Conference on AP/EMC/EMT, Incheon, Korea, May 14-15, 2009, pp. 167-170.

*Abstract:* Based on the cylindrical field scanning technique, a new whole-body averaged SAR estimation method that is appropriate for developing the experimental system is proposed. The computational results suggest that it is possible to derive the averaged SAR of the whole body by using the proposed method for measurements. Moreover, the actual experiment system that is shown in this paper is constructed, and some measurement results of whole-body averaged SAR for plane-wave exposure are reported.

*Index terms:* Whole-body averaged SAR, experimental estimation, cylindrical field scanning technique.

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#### EMCABS: 06-08-2009

#### STUDY ON SET-UP TABLE EFFECT IN GHZ BANDS

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Proc. of 2009 Korea-Japan Joint Conference on AP/EMC/EMT, Incheon, Korea, May 14-15, 2009, pp. 179-182.

*Abstract:* We analyze the effect of the nonmetallic set-up table in the EMI measurement over GHz bands (1-18 GHz). By the measured results, the set-up table could be affected to the experiment over GHz bands, and the distance between the received and transmitted antenna could also be affected. For corrected measurement, therefore, the site validation of the anechoic room is basically needed. In addition, the suitably transmitted antenna for GHz bands is necessary. Also, the quality, type, shapes and permittivity of the table is affected to the experiment. Finally, the experiment standard of which is the received or transmitted antenna types and distance, table types, and the environment condition of the anechoic room should be established.

*Index terms:* EMI measurement in GHz bands, anechoic room, site validation, effect of non-metallic set-up table.

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#### EMCABS: 07-08-2009

#### ESTIMATION OF DISCHARGE CURRENTS INJECTED ONTO GROUND FOR CONTACT DISCHARGES FROM ESD-GENERATORS USING MAGNETIC NEAR-FIELD

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Proc. of 2009 Korea-Japan Joint Conference on AP/EMC/EMT, Incheon, Korea, May 14-15, 2009, pp. 207-210.

*Abstract:* We have measured magnetic near-fields caused by discharge currents from an ESD generator to reveal that there is good agreement between discharge currents injected onto a commercially available calibration target and a ground plate. Furthermore, we have also found that discharge currents injected onto a metal ring on the top cover of a laptop computer approximately agree with those onto a ground plate sufficiently larger compared to the size of the metal ring. Our future task is to estimate discharge currents from the resultant magnetic near-fields for contact/air discharges of ESD generators to the various frame grounds of electronic devices.

*Index terms:* ESD-generators, contact discharges onto ground, discharge currents, magnetic near-field measurement, estimation.

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#### EMCABS: 08-08-2009

#### DESIGN OF MULTIPLE-FREQUENCY WHOLE-BODY EXPOSURE SYSTEM FOR IN VIVO EXPERIMENTS

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Proc. of 2009 Korea-Japan Joint Conference on AP/EMC/EMT, Incheon, Korea, May 14-15, 2009, pp. 211-214.

*Abstract:* A multiple-frequency whole-body exposure system for in vivo experiments in the mobile-phone frequency band has been developed using a reverberation chamber and the validity of the chamber was confirmed by measurement. The real CDMA (code division multiple access) signals are supplied to the chamber, and the exposure level can be controlled by computer. The maximum output power is 60 W for both systems, and exposure time schedule can be set up by computer. Proper ventilation and illumination are also provided. The field uniformities in the exposure chambers were verified by measurement.

*Index terms:* In-vivo experiment, multiple-frequency whole-body exposure system, reverberation chamber, validation.

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#### EMCABS:09-08-2009

#### CHARACTERISTICS OF EM RADIATION FROM A PCB DRIVEN BY FEED-CABLE

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Proc. of 2009 Korea-Japan Joint Conference on AP/EMC/EMT, Incheon, Korea, May 14-15, 2009, pp. 219-222.

*Abstract:* In this paper, characteristics of EM radiation from a PCB driven by a feed cable are investigated experimentally and with FDTD modeling. In order to characterize the electromagnetic (EM) radiation, the frequency response of the common-mode (CM) current, the electric field near the PCB and the far-electric field are discussed. It is suggested that the dominant component in the EM radiation at a gigahertz frequency from the PCB with high-speed traces is not always the CM component. Therefore, identifying the dominant component is essential for suppressing the EM radiation. This study is a basic consideration to realize a technique which is effective on the suppression of the EM radiation from the PCB.

*Index terms:* PCB driven by a feed cable, EM radiation, frequency characteristics, experiment and FDTD simulation.

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#### EMCABS: 10-08-2009

#### RADIATED ELECTROMAGNETIC INTERFERENCE (EMI) SUPPRESSION FROM PLASMA DISPLAY PANEL (PDP) BY USING FILTERING METHOD BASED ON MEASUREMENTS

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Proc. of 2009 Korea-Japan Joint Conference on AP/EMC/EMT, Incheon, Korea, May 14-15, 2009, pp. 223-226.

*Abstract:* The currently developed display equipments are separated in two directions in accordance with their size. One is smaller and the other is larger. The former is for the mobile device, and the latter is for the home display system. But the latter has very large structures and high current switching. Therefore, the latter radiates more critical EMI to human body and other equipments. Consequently, large size display equipment such as a plasma display panel (PDP) should be designed in consideration with radiated EMI from the first design procedure. Especially since PDP has many electrodes in the front panel and high current switching sustain circuits, we should be very careful to design sustainable circuits with optimized EMI filters.

*Index terms:* Plasma display panel, radiated EMI, suppression, filtering method.

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#### EMCABS:11-08-2009

#### A RELATIONSHIP BETWEEN MAGNETIC FIELD DISTRIBUTION AND CURRENT DISTRIBUTION CONNECTOR CONTACT FAILURE

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Proc. of 2009 Korea-Japan Joint Conference on AP/EMC/EMT, Incheon, Korea, May 14-15, 2009, pp. 227-230.

*Abstract:* In this paper, we show the relation between the current of the contact spots and magnetic field around the transmission line. This result implies that the distribution of the magnetic field depends on a current distribution of each resistor. The current on the cross-section of the connector changes depending on the contact distribution and the contact resistance, and thus the immunity degradation of the transmission line is caused by CM current. It is difficult to measure a current distribution in a connector from outside. However, our result shows the current of a connector is possibly estimated by measuring magnetic field distribution around a connector. We hope that this would be applied to the detection of connector contact failure.

*Index terms:* Connector, contact failure, mechanism, contact current, magnetic field distribution.

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**EMCABS: 12-08-2009**

ANALYSIS OF EM WAVE ABSORBER FABRICATED  
BY USING SPHERE SENDUST POWDER AND  
FLAKE SENDUST POWDER

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Proc. of 2009 Korea-Japan Joint Conference on AP/EMC/EMT,  
Incheon, Korea, May 14-15, 2009, pp. 235-238.

*Abstract:* In this paper, we analyze the EM wave absorber fabricated by using sphere Sendust powder and flake Sendust powder. The flake Sendust powder is made by attrition milling. First, we have fabricated two types of EM wave absorber samples by using the sphere Sendust powder and flake Sendust powder with CPE (Chlorinated Polyethylene) and measured the S-parameters of the EM wave absorber. The complex relative permittivity and permeability are calculated from the measured data. As a result, it is confirmed that the EM wave absorber by using flake Sendust powder has better absorption ability in the high frequency range for the reduction of eddy current loss (increase of permeability) and the increase of space charge polarization (increase of permittivity).

*Index terms:* EM wave absorber, sphere and flake Sendust powder, complex permittivity and permeability, absorption ability. **EMC**

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