

2011 Asia Pacific EMC Symposium

Date: May 16~19, 2011

Venue: Ramada Plaza Jeju Hotel, Jeju, Korea

Final Program





Table of Contents

| Welcome to APEMC 2011

- 3** Chairman's Message
- 4** Co-organizer's Message
- 5** TPC Chair's Message
- 6** Symposium Committee
- 7** TPC Committee

| Technical Program

- 8** Symposium at a Glance
- 10** Plenary Speech
- 12** Tutorials
- 22** Workshops
- 27** Special Sessions
- 37** Technical Sessions
- 50** Poster Sessions
- 55** Project Meeting
- 56** iNARTE

| General Information

- 57** Venue & Accommodations
- 60** Registration
- 61** Transportation
- 62** Official & Social Program
- 63** Speaker Guide
- 64** Tour Program

| Exhibition

- 68** Exhibition

Chairman's Message

It is our great pleasure to announce the 2011 APEMC in Jeju Island, Korea. Continuing the success of the 2008 APEMC in Singapore jointly organized with the 19th EMC Zurich Symposium and the 2010 Asia Pacific EMC Symposium in Beijing, we cordially invite you to Jeju Island. Jeju Island has very beautiful and peculiar landscape with rich cultures and fabulous facilities. We are sure that the APEMC 2011 will provide an excellent opportunity to exchange their expertise and to build up friendship for the members of the EMC community of the Asia Pacific region as well as other regions of the world.

The 2011 Asia Pacific EMC Symposium and Technical Exhibition will be held in Jeju Island, Monday, May 16 through Thursday, May 19, 2011. Following the tradition of APEMC, the symposium will cover the entire scope of electromagnetic compatibility, including electromagnetic interference, EMC measurement techniques, system-level & PCB-level EMC, lightning & power system EMC, high power EMC, transportation & automotive EMC, antenna and wave propagation issues, computational electromagnetics, nanotechnology for EMC, semiconductor & chip-level EMC, communication EMC, EMC material, bio-medical electromagnetics, EMC management, Regulatory activities and safety trends etc. In addition to regular sessions, we also solicit proposals for special sessions, industrial forums, workshops, tutorials and topical meetings.

All members of the EMC community are invited to submit papers for their recent findings and join us to enjoy all the delight things in Jeju Island and to make the APEMC 2011 successful. A variety of invited speakers will give excellent talks on new and upcoming issues. The TPC(Technical Program Committee) members are consisted of the well-known EMC experts worldwide as in the previous meetings. Papers will be selected on the basis of their scientific contribution, their impact on industry as well as their interest to the EMC community as usual.

Come and join the Asia Pacific EMC Week in Jeju Island in May 2011 !!

We will provide a rich scientific and social program, and offer a good forum for mutual exchange among all participants. Please encourage your colleagues to join the meeting.



Jeong-Ki Pack (Chungnam National University)

Honorary President, KIEES
Symposium Chair, APEMC 2011



Co-organizer's Message

It is indeed a great pleasure for me to be here today at this important international conference held in the most beautiful island in Korea, in this wonderful season. I would like to congratulate all of you to be the distinguished participants with your great contributions at this 2011 Asia Pacific EMC Symposium.

First of all, I would like to express my sincere thanks to professor Jeong-Ki Pack of Chungnam University who has made great effort for successful conference. And I also express my sincere thanks to all the EMC experts participating in this event. Now the world is advancing the information society in a huge trend of green ICT and digital convergence. Development of ICT technology and convergence services has created smart-phones and smart-pads with a wide range of applications available for social network.

The rapid increase of the use of broadcasting/communication equipments, computers, and electric/electronic devices may effect more interfere on the radio communications and more malfunctions on those devices, which raises the urgent need for EMC measures and development of technical standards in order to minimize those adverse effects.

The APEMC symposium has, I believe, made a great contribution to the development of the EMC technology by exchanging of academic information and I am very proud of being a supporter of the APEMC. At this event, there are keynote presentations about EMC issues of wireless power transmission and automobiles and many other major papers about electromagnetic interference, EMC measurement technologies and high power electromagnetic waves. Realizing that the best experts in the EMC field are meeting together at this conference, I hope 2011 APEMC gives us an opportunity to move EMC technology one step further through active discussions and encouragement among participants. I hope this symposium helps to strengthen the industry, academia, institutes, and the government and contributes to development of EMC technology and vigorous R&D activities through the sharing of information on EMC technology.

Jeju island has its prominent mountain Halla at the center and is surrounded by sea outside, so you can enjoy fantastic views wherever you go on this island. I wish you can enjoy your stay in Jeju having relax time to refresh your spirits at the wonderful tourist site.

Finally I sincerely appreciate to those who did not spare any effort in preparation for 2011 APEMC despite of many difficulties and again to all of you for taking time from your busy schedule to participate in this event.

Thank you very much.

Leem, Cha Sik

President of the Radio Research Agency
Korea Communications Commission

TPC Chair's Message

At the 2011 Asia Pacific EMC (APEMC) Symposium, the most important papers will be introduced by many talented professionals.

The Technical Program Committee (TPC), consisting of 36 international TPC members from all over the world and 41 local TPC members from Korea, has worked hard to ensure the technical quality of the papers which are presented at this conference. There are 5 kinds of technical sessions: plenary session, tutorial session, regular paper session, special paper session, and workshop session. The two most famous speakers will present the plenary session. The 26 tutorials for 10 topics will be presented by 27 speakers on Monday and Thursday and the 4 workshops for 4 topics will be held on Thursday. The 50 papers for 10 special sessions are scheduled on Tuesday and Wednesday.

The TPC received 115 technical papers from 20 countries just for regular paper session. Each paper was reviewed by multiple qualified 76 reviewers and final decisions regarding the technical papers and program were made at a TPC meeting held in Daejeon last February. Paper submissions for the APEMC 2011 Symposium covered a wide range of EMC-related topics. The topic areas receiving the most submissions were Sources of Electromagnetic Interference, EMC Management, EMC Measurement Techniques, System-Level EMC and PCB EMC, Antenna and Propagation Issues, Electronic Packaging and Integration EMC, Power Integrity and Signal Integrity, Computational Electromagnetics, Semiconductor EMC, and Electromagnetic Interference with Medical Devices.

We hope that you can find something you want. Please enjoy APEMC 2011 in beautiful Jeju.



Joung-ho Kim (KAIST)
TPC Chair, APEMC 2011



Symposium Committee

Symposium Chair

Jeong-Ki Pack (Chungnam National Univ.)

International Advisory Committee

F. Maradei (IEEE EMC Society President 10-11)
Osamu Fujiwara (Japan EMC society President)
Bruce Archambeault (IBM)
Jing Liang He (Tsinghua Univ.)

Elya B. Joffe (IEEE EMC Society President 09-10)
Erping Li (A-STAR IHPC)
Dong-Chul Park (Chungnam National Univ.)
Dong-Il Kim (Korea Maritime Univ.)

Local Advisory Committee

Hai-Young Lee (Ajou Univ.)
Nam Kim (Chungbuk National Univ.)

Jeong-Hae Lee (Hongik Univ.)

Publication Chair

Hyung-Do Choi (ETRI)

Jong-Hwa Kwon (ETRI)

Finance Chair

Jae-Hyun Lee (Chungnam National Univ.)

Jungyu Yang (RRA)

Local Arrangement Chair

Yeon-Choon Chung (Seokyeong Univ.)

Heung-Soo Kim (Jeju National Univ.)

Publicity Chair

Ki-Chai Kim (Yeungnam Univ.)

Exhibition Chair

Wansoo Nah (Sungkyunkwan Univ.)

Symposium Secretary

Sungtek Kahng (Incheon Univ.)

TPC Committee

TPC Chair

Jounggho Kim (KAIST)

TPC Co-chair

Todd Hubing (Clemson Univ.)

Workshop & Special Program Chair

Jong-Gwan Yook (Yonsei Univ.)

International TPC Members

Todd Hubing
Yoshihiro Baba
Ing. Heyno Garbe
Francesca Maradei
Wang Jun Hong
Wei Xing Chang
Franz Schlagenhauer
Sonia Ben Dhia
Hong Wei
Antonio Orlandi
Toshio Sudo
Jun-Fa Mao

Wenlie Liang
Vladimir A. Rakov
W. Radasky
Tzong-Lin Wu
Sungtek Kahng
Jun Fan
Xinqing Sheng
Thomas Steinecke
Hiroshi Inoue
Jeong-Ki Pack
Osamu Fujiwara
Wen-Yan Yin

Perry Wilson
Farhad Rachidi
Cui Xiang
Sergio Pignari
Jounggho Kim
Peter Leung
Erping Li
Jianqing Wang
Janet O'Neil
David Pommerenke
Christos CHRISTOPOULOS

Local TPC Members

Jounggho Kim
Ki-Chai Kim
Haeyoung Lee
H. B. Park
Jonghoon Kim
Jun So Pak
Hee Jae Lee
C. S. Ryu
Dongshik Shin
Hangseon Lee
Tae Hoon Yoo
Tae-hoon Oh
Goonyun Kim
Hyungdo Choi

Jong-Gwan Yook
Nam Kim
Wansoo Nah
IL Seong
Junho Lee
Jiseong Kim
S. Y. Ahn
J. G. Yang
Kyunghee Park
Gye Jae Lim
Gi-Ho Yun
Jaechul Ju
Jaegon Shin
Alfred Jung

Sungtek Kahng
Yeon-Choon Chung
Jae-Hyun Lee
Hyunho Park
Hyungsoo Kim
Junggun Byun
E. H. Song
Jong-Hwa Kwon
Jaewook Lee
Ic-Pyo Hong
Chulsoo Kim
Tae-Weon Kang
Taeheon Jang



Symposium at a Glance

Sunday, May 15, 2011

15:00-18:00	Registration / Convention Lobby, 2F
18:00-20:00	Welcome Reception / Ramada Ballroom 1

Monday, May 16, 2011

9:00-18:00 Registration / Convention Lobby, 2F					
Room	Ramada Ballroom 2, 2F	Ramada Ballroom 3, 2F	Ramada Ballroom 4, 2F	Biyang Room, 2F	Chuja Room, 2F
Session	Tutorial Tu-Mo1	Tutorial Tu-Mo2	Tutorial Tu-Mo3	Tutorial Tu-Mo4	Tutorial Tu-Mo5
	WPT & EMC	Intro. to Auto. EMC Testing	Modeling of IC Susceptibility to EMI	Radiated Meas. using Ant. & Field Probes	EMP2- EM Pulses & EM Protection
10:00-12:00	Tu-Mo1	Tu-Mo2	Tu-Mo3	Tu-Mo4	Tu-Mo5
12:00-13:00 Lunch / Tutorial Speakers Lunch					
13:00-14:00					Tu-Mo5
14:00-15:00	Tu-Mo1	Tu-Mo2	Tu-Mo3	Tu-Mo4	
15:00-15:30 Coffee Break / Convention Lobby, 2F					
15:30-17:30	Tu-Mo1	Tu-Mo2	Tu-Mo3	Tu-Mo4	

Tuesday, May 17, 2011

8:30-18:00 Registration / Convention Lobby, 2F					
09:30-18:30 Exhibition / Exhibition Hall, 2F					
9:30-09:50 Welcome Speech / Ramada Ballroom 1, 2F					
09:50-10:50 Plenary Speech P-Tu1 / Ramada Ballroom , 2F					
10:50-11:50 Plenary Speech P-Tu2 / Ramada Ballroom 1, 2F					
11:50-13:00 Lunch / Plenary Speakers Lunch					
Room	Ramada Ballroom 2, 2F	Ramada Ballroom 3, 2F	Ramada Ballroom 4, 2F	Biyang Room, 2F	Chuja Room, 2F
Session	Technical T-Tu1	Technical T-Tu2	Technical T-Tu3	Special S-Tu1	Special S-Tu2
Topic	EMC on System	Fundamental EMC	EMC on PKG & Semicon.	Biomedical Devices	EMC Tech. in GHz
13:00-13:20	T-Tu1-1	T-Tu2-1	T-Tu3-1	S-Tu1-1	S-Tu2-1
13:20-13:40	T-Tu1-2	T-Tu2-2	T-Tu3-2	S-Tu1-2	S-Tu2-2
13:30-14:00	T-Tu1-3	T-Tu2-3	T-Tu3-3	S-Tu1-3	S-Tu2-3
14:00-14:20	T-Tu1-4	T-Tu2-4	T-Tu3-4	S-Tu1-4	S-Tu2-4
14:20-14:40	T-Tu1-5		T-Tu3-5	S-Tu1-5	S-Tu2-5
14:40-15:00	T-Tu1-6			S-Tu1-6	S-Tu2-6
15:00-15:30 Coffee Break / Convention Lobby, 2F					
Session					Special S-Tu3
Topic					EMC Design of PCB for Digital Wireless Comm.
15:30-15:50	T-Tu1-7	T-Tu2-5	T-Tu3-6	S-Tu1-7	S-Tu3-1
15:50-16:10	T-Tu1-8	T-Tu2-6	T-Tu3-7	S-Tu1-8	S-Tu3-2
16:10-16:30	T-Tu1-9	T-Tu2-7	T-Tu3-8	S-Tu1-9	S-Tu3-3
16:30-16:50	T-Tu1-10	T-Tu2-8	T-Tu3-9	S-Tu1-10	S-Tu3-4
16:50-17:10	T-Tu1-11		T-Tu3-10	S-Tu1-11	S-Tu3-5
17:10-17:30					S-Tu3-6
17:30-18:30 Poster I / Convention Lobby, 2F					
18:30-21:30 Banquet & Award / Ramada Ballroom 1					

APEMC 2011

2011 Asia Pacific EMC Symposium

Wednesday, May 18, 2011

8:00-18:00	Registration / Convention Lobby, 2F				
9:00-17:00	Exhibition / Exhibition Hall, 2F				
Room	Ramada Ballroom 2, 2F	Ramada Ballroom 3, 2F	Ramada Ballroom 4, 2F	Biyang Room, 2F	Chuja Room, 2F
Session	Technical T-We1	Technical T-We2	Technical T-We3	Special S-We1	Special S-We2
Topic	Lightning & Power System	EMC Measurement	EMC on Bio-Medical	IEMI/HEMP	EMC Problem with Med. Elec. Equip.
09:00-09:20	T-We1-1	T-We2-1	T-We3-1	S-We1-1	S-We2-1
09:20-09:40	T-We1-2	T-We2-2	T-We3-2	S-We1-2	S-We2-2
09:40-10:00	T-We1-3	T-We2-3	T-We3-3	S-We1-3	S-We2-3
10:00-10:20	T-We1-4	T-We2-4	T-We3-4	S-We1-4	
10:20-10:40	Coffee Break / Convention Lobby, 2F				
Session					Special S-We3
Topic					Topics for EMC Tech. of Telecomm. Sys.
10:40-11:00	T-We1-5	T-We2-5	T-We3-5	S-We1-5	S-We3-1
11:00-11:20	T-We1-6	T-We2-6	T-We3-6	S-We1-6	S-We3-2
11:20-11:40	T-We1-7	T-We2-7	T-We3-7		S-We3-3
11:40-12:00	T-We1-8		T-We3-8		S-We3-4
12:00-13:00	Lunch				
13:00-14:00	Poster II / Convention Lobby, 2F				
Room	Ramada Ballroom 2, 2F	Ramada Ballroom 3, 2F	Ramada Ballroom 4, 2F	Biyang Room, 2F	Chuja Room, 2F
Session	Technical T-We4	Technical T-We5	Special S-We4	Technical T-We6	Project Meeting of IEC SC77C
Topic	PI & SI	Automotive EMC	Computational Dosimetry in RF	Antenna & Propagation	
14:00-14:20	T-We4-1	T-We5-1	S-We4-1	T-We6-1	Project Meeting of IEC SC77C
14:20-14:40	T-We4-2	T-We5-2	S-We4-2	T-We6-2	
14:40-15:00	T-We4-3	T-We5-3	S-We4-3	T-We6-3	
15:00-15:20	T-We4-4	T-We5-4	S-We4-4	T-We6-4	
15:20-15:40			S-We4-5		
15:40-16:10	Coffee Break / Convention Lobby, 2F				
Session		Special S-We5	Special S-We6		Project Meeting of IEC SC77C
Topic		ESD Transient	Computational Dosimetry in ELF/ Intermediate Freq.		
16:10-16:30	T-We4-5	S-We5-1	S-We6-1	T-We6-5	
16:30-16:50	T-We4-6	S-We5-2	S-We6-2	T-We6-6	
16:50-17:10	T-We4-7	S-We5-3	S-We6-3		
17:10-17:30		S-We5-4	S-We6-4		
17:30-17:50		S-We5-5			
18:00-21:00	Organizing Committee Dinner				

Thursday, May 19, 2011

8:00-12:00	Registration / Convention Lobby, 2F			
Room	Tamra Hall, 8F	Halla Hall, 8F	Ara Hall, 8F	Ora Hall 4, 8F
Session	Workshop W-Th1	Workshop W-Th2	Tutorial Tu-Th1	Tutorial Tu-Th2
Topic	Modeling and Design of Chip-PKG-PCB Level SI & PI	PDN Analysis and Design for PCBs and PKGs	PCB EMC	Meta-Mat., Periodic Structures & EBG in EMC/Ant./RF
09:00-12:00	W-Th1	W-Th2	Tu-Th1-1 Intro. To PCB	Tu-Th2
12:00-13:00	Lunch			
Session		Workshop W-Th3		
Topic		Modelling and Solutions for CM Noise on Diff. Chs.		
13:00-15:00	W-Th1	W-Th3	Tu-Th1-2 PCB and Sys. Design	
15:00-15:30	Coffee Break Convention Lobby, 8F			
15:30-17:30	W-Th1	W-Th3	Tu-Th1-3 De-,Bypass-, & Embedded Caps.	



Plenary Speech

Tuesday, May 17, 2011

Room	Ramada Ballroom 1, 2F
09:50 ~ 10:50	Plenary Speech P-Tu1
	Ensuring the Electromagnetic Compatibility of Safety Critical Automotive Systems
10:50 ~ 11:50	Plenary Speech P-Tu2
	EMF Health Issues: Perspective of Risk Analysis and Risk Management

Plenary Speech P-Tu1

Ensuring the Electromagnetic Compatibility of Safety Critical Automotive Systems

Ramada Ballroom 1, 2F | 09:50 ~ 10:50 | Monday, May 16, 2011

Speaker : Prof. Todd H. Hubing, Clemson Univ., USA



Automotive technology is advancing at a record pace. Ten years ago, cars and trucks were primarily mechanical machines with various electronic controls. Development cycles were 5 years or longer and designs were largely driven by mechanical innovations and constraints. The vehicles being developed today are highly integrated electronic systems. Computers play a key role in everything from running the engine to “rolling down” the windows. Very few aspects of vehicle operation are controlled directly by the driver without one or more computer systems intervening. As a result, today’s automobiles are safer, more reliable and more fuel efficient than ever before. However, greater reliance on electronic systems demands greater emphasis the electromagnetic compatibility and reliability of these systems. It is more important than ever before to ensure that system failures due to electromagnetic interference, electrical faults or software glitches do not compromise vehicle safety. As we continue to incorporate more electronics into the automotive platform, we must rethink the way that automobiles are designed, manufactured and tested. This will require abandoning certain aspects of traditional automotive development in favor of processes borrowed from the aerospace and consumer electronics industries. The leading automotive companies in the next decade will be those companies that successfully make this transition.

Biography

Prof. Todd Hubing is the Michelin Professor of Vehicle Electronics at the Clemson University International Center for Automotive Research (CU-ICAR) in Greenville, South Carolina, USA. He holds a BSEE from the Massachusetts Institute of Technology, an MSEE from Purdue University, and a Ph.D. from North Carolina State University. He began his career as an EMC engineer for IBM in 1982, where he did EMC testing and troubleshooting on a variety of computer and network communications products. In 1989, he became a faculty member at the University of Missouri-Rolla (now the Missouri University of Science and Technology) where he worked with other faculty and students to analyze and develop solutions for a wide range of EMC problems affecting the electronics industry. Since coming to Clemson in 2006, he has continued his work in electromagnetic compatibility and computational electromagnetic modeling, particularly as it is applied to automotive and aerospace electronics. He is a Past-President of the IEEE Electromagnetic Compatibility Society, an IEEE Fellow and a Fellow of the Applied Computational Electromagnetics Society.

Plenary Speech P-Tu2

EMF Health Issues: Perspective of Risk Analysis and Risk Management

Ramada Ballroom 1, 2F | 10:50 ~ 11:50 | Monday, May 16, 2011

Speaker : Prof. Masao Taki, Tokyo Metropolitan University, Japan



Concerns about possible health risks of electromagnetic fields (EMF) are growing in many countries with the rapid penetration of wireless technology and novel applications of electrical energy into daily lives. A vast amount of resources has been invested to researches on this issue since 1990's. The results mainly confirmed the absence of health effects of low-level exposures especially of researches with good dosimetry or quantitative exposure assessment. The demands on the good dosimetry stimulated progress in computational electromagnetics and development of sophisticated numerical human models. We now have much more evidences about the safety of EMF exposure owing to the progress in the electromagnetic dosimetry. Some recent progress regarding those topics will be shown in the talk. On the other hand epidemiological studies have been suggesting possible associations between EMF exposure and cancer. The limitation in epidemiology derives from the precision of exposure assessment in spite of great efforts devoted to exposure assessment for epidemiology. World Health Organization recommended adopting international guidelines on the limit of exposures, and assessment of exposures from sources where exposures might be expected to exceed limit values. The exposure assessment is mandatory in the development of any products of application of electromagnetic energy. Assessment of compliance with the guidelines is of interest in emerging technologies. Some recent progress in this issue will be discussed.

Biography

Prof. Masao Taki is a Professor of Electrical and Electronic Engineering at Tokyo Metropolitan University, Tokyo, Japan. He received his B.E., M.E., and Ph.D. degrees in electronic engineering from the University of Tokyo in 1976, 1978, and 1981, respectively. He then joined Department of Electrical Engineering of Tokyo Metropolitan University, where he started researches on bioelectromagnetics in 1981. Since then he has been engaged in electromagnetic dosimetry and assessment of health risks of humans exposed to electromagnetic fields. He has also been involved in biological studies in vivo and in vitro, and also in epidemiological studies for risk assessment of electromagnetic field exposures. He was a member of International Commission of Non-ionizing Radiation Protection (ICNIRP) from 1995 to 2008, and chairing the ICNIRP SCIII from 2000 until 2004. He served as a board member of Bioelectromagnetics Society in 2005 – 2007. He is currently the Vice-chair of Commission K of the International Union of radio Science (URSI).



Tutorial

Monday, May 16, 2011

Room	Ramada Ballroom 2, 2F	Ramada Ballroom 3, 2F	Ramada Ballroom 4, 2F	Biyang Room, 2F	Chuja Room, 2F
	Tutorial Tu-Mo1	Tutorial Tu-Mo2	Tutorial Tu-Mo3	Tutorial Tu-Mo4	Tutorial Tu-Mo5
10:00-12:00	Wireless Power Transfer and Electromagnetic Compatibility	Introduction to Automotive EMC Testing	Initiation to the modeling and simulation of susceptibility of integrated circuits to electromagnetic interferences	Practical Radiated Measurements using Antennas and Field Probes - Fundamental and Advanced Topics	EMP2- Electromagnetic Pulses and Electromagnetic Protection
12:00-13:00	Lunch / Tutorial Speakers Lunch				
13:00-14:00	Tu-Mo1	Tu-Mo2	Tu-Mo3	Tu-Mo4	Tu-Mo5
14:00-15:00					
15:00-15:30	Coffee Break				
15:30-17:30	Tu-Mo1	Tu-Mo2	Tu-Mo3	Tu-Mo4	

Thursday, May 19, 2011

Room	Ara Hall, 8F	Ora Hall 4, 8F
	Tutorial Tu-Th1	Tutorial Tu-Th2
09:00-12:00	PCB EMC Tu-Th1-1: Introduction to Printed Circuit Board Design, Specification, Manufacturing and Construction	Metamaterials, Periodic Structures and EBG in EMC/ Antenna/RF Designs
12:00-13:00	Lunch	
13:00-15:00	Tu-Th1	
13:00-15:00	Tu-Th1-2: Printed Circuit Board and System Design for Technology of the Future	
15:00-15:30	Coffee Break	
15:30-17:30	Tu-Th1	
15:30-17:30	Tu-Th1-3: Decoupling, Bypassing and Embedded Capacitance for Enhanced PCB Performance	

Monday, May 16, 2011 – Full-day Schedule / 10:00~17:30

Tutorial Tu-Mo1 Wireless Power Transfer and Electromagnetic Compatibility

Ramada Ballroom 2, 2F | 10:00 ~ 17:30

Organizer & Chair : Seungyoung Ahn, KAIST, Korea



Prof. Seungyoung Ahn received the B.S., M.S., and Ph. D. degrees in electrical engineering from the Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea, in 1998, 2000, and 2005, respectively.

He was with Samsung Electronics as a senior engineer and worked on the design of laptop computer system, from 2005 to 2009. He has been working as a research professor of electrical engineering at KAIST.

His research interests include the signal integrity and power integrity for high speed digital system, wireless power transfer system, and design of electric vehicle with consideration of EMI/EMC

Abstract

Since wireless power transfer technology using strong-coupled regime is proposed a few years ago, there is a global movement where cables are taken away from electrical equipment for real mobile electronics. And recently, researches on the first stage are now appearing by the pioneers in each country based on the wireless power transfer technology. As various types of commercial products from the industries are about to be released in near future, it is a high time to share the technologies, trends, and ideas with engineers in wireless power transfer technology fields.

In this tutorial course, the fundamental technologies of wireless power transfer system are introduced, and practical issues for commercialization, international standards and trends, and future applications will be discussed. Six professionals will provide with basic theories and applications to the mobile phones, electrical vehicles, and medical instruments on the cutting edge from the years of experience. We expect this tutorial course would be helpful to researchers and engineers for the inspiration of the future research directions and ideas for solutions of current problems.

Speakers list

1. Basic theory of magnetic-coupled-resonant wireless power transfer and recent progress

Hiroshi Hirayama, Nagoya Institute of Technology, Nagoya, Japan

2. Practical design issues of wireless power transmission system based on magnetic resonance

Young Jin Park, KERI, Changwon, Korea

3. Frequency Tracing of Resonance Frequency Variation of L-C Circuit for Wireless Energy Transmission to Medical Devices in the Human Organs

Yoon-Myoung Gimm, Dankook University, Yongin, Korea

4. Design of Dual-Rail Pickup with Gradual multi-windings for KAIST OLEV

Seong-Jeub Jeon, Pukyong National University, Busan, Korea

5. Standardization trends and Design Review for Wireless power transfer system

Yoon-Sang Kook, Hanrim Postech, Suwon, Korea



Tutorial Tu-Mo2 Introduction to Automotive EMC Testing

Ramada Ballroom 3, 2F | 10:00 ~ 17:30

Organizer & Chair : Kefeng Liu, ETS-Lindgren, USA / Janet O'Neil, ETS-Lindgren, USA



Dr. Kefeng Liu dedicated his industrial career to the application of numerical electromagnetic computational methods to the analysis and design verification of RF and microwave absorbers, anechoic chambers, and antenna design; and to the accurate evaluation of low observable RF absorber performance and antenna measurements from 10 MHz to 110 GHz. He was the designer of the ETS-Lindgren's curvilinear, FS-series, and PS-Series absorber product lines, and the broadband dual-polarized ridged horn antennas. Mr. Liu also led the business development of the ETS-Lindgren's telecommunication Over-The-Air test system and the EMC certification test system solutions. Mr. Liu is a member of IEEE-APS/EMC and MTT societies, and Antenna Measurement Technique Associations (AMTA).



Dr. Janet O'Neil is a customer relations specialist with ETS-Lindgren. Her responsibilities include coordination of the company's technical contributions to industry conferences worldwide. She has over 20 years experience in the RF Microwave and Electromagnetic Compatibility (EMC) industries. She is a member of the Board of Directors of the IEEE Electromagnetic Compatibility (EMC) Society as well as of the Antenna Measurement Techniques Association (AMTA). She is also a member of Subcommittee 1 (Techniques and Development) of ANSI ASC C63® and vice-chair of the 2011 IEEE International Symposium on EMC in Long Beach, California.

Abstract

This "Introduction to Automotive EMC Testing" tutorial is designed to be a full-day, two-part workshop. The morning session will provide an overview of EMC design theory related to automotive EMC compliance. We will also include illustrations on emerging EMC challenges on electric and hybrid vehicle testing. The afternoon session will include an overview on the construction of both component level and full vehicle size EMC test facilities. EMC test system planning for both component level and full-vehicle level radiated emission and radiated immunity will be addressed. The session concludes with an overview of global automotive EMC standards, including SAE standards in the US as well as ISO and CISPR standards in European and Asian countries. This tutorial is intended for both experienced and beginner EMC design and test engineers interested in the international automotive EMC test requirements and learning about hands-on EMC testing and design experiences for both component and full vehicle levels. Automotive EMC lab managers and vehicle project planners will benefit from attending this tutorial.

Speakers list

1. Designing Automotive Components for Compliance with EMC Requirements

Todd H. Hubing, Clemson University., Clemson, USA

2. Hybrid Electric Vehicle EMI Challenges

Gary Skibinski, Rockwell Automation/Rockwell Collins, WI, USA

3. Automotive EMC Test Chamber Design and Validation" and "Test System Overview for Full-Vehicle and Component Testing

Kefeng Liu, ETS-Lindgren, CA, USA

4. Automotive EMC Standards and Testing

Jaekon Shin, KATRI, Hwasung, Korea

Tutorial Tu-Mo3 Initiation to the modeling and simulation of susceptibility of integrated circuits to electromagnetic interferences

Ramada Ballroom 4, 2F | 10:00 ~ 17:30

Organizer & Chair : Alexandre Boyer, LAAS-INSA de Toulouse, France / Sonia Ben Dhia, LAAS-INSA de Toulouse, France



Dr. Alexandre Boyer obtained his Master degree in electrical engineering in 2004 and a PhD in Electronics from the Institut Nationale des Sciences Appliquées (INSA) in Toulouse, France, in 2004. He is currently an Assistant Professor in the Department of Electrical and Computer Engineering at INSA, Toulouse. His current research interests include IC susceptibility modeling, reliability of ICs and computer aided design (CAD) tool development for electromagnetic compatibility (IC-EMC freeware).



Dr. Sonia Ben Dhia obtained her Master degree in electrical engineering in 1995, and a Ph.D. in Electronic Design from the Institut Nationale des Sciences Appliquées (INSA), Toulouse, France, in 1998. She currently holds the rank of associate professor at INSA-Toulouse, Department of Electrical and Computer Engineering, where she teaches digital electronics, IC testability and reliability, and analog and RF CMOS design. She is a member of the INSA Studies Directorate board, organizes transversal educational courses and is responsible for internal organization. Her research interests include signal integrity in deep sub-micron CMOS ICs and electromagnetic compatibility and reliability of ICs. She has authored technical papers on signal integrity and EMC.

She has also contributed to the publication of 3 books.

Abstract

Susceptibility of integrated circuits (IC) to electromagnetic interferences (EMI) constitutes a tricky issue for IC and electronic systems designers. Ensuring high immunity of ICs requires a solid knowledge about the coupling of EMI to circuits and the complex behaviors of IC submitted to disturbances. Specific modeling and simulation techniques are in development for several years to predict susceptibility levels before IC and electronic systems fabrication and help designers to fix immunity issues.

The proposed tutorial aims at presenting the basic concepts of conducted susceptibility modeling and simulation at IC level. The tutorial is not a lecture but a lab with a set of problems associated to the major issues of susceptibility of ICs. The lab is based on IC-EMC, software entirely dedicated to EMC of ICs and developed by the speaker of the tutorial for research and training purposes (more information on IC-EMC at www.ic-emc.org).

The covered topics proposed during this tutorial are: identification of the origins of susceptibility issues at IC level, main coupling paths of EMI in ICs, typical responses of circuits (digital, analog, RF) to EMI, evaluating the impact of circuit power distribution network on noise coupling, susceptibility modeling and simulation at IC level.

Speakers list

1. Initiation to the modeling and simulation of susceptibility of integrated circuits to electromagnetic interferences

Alexandre Boyer, LAAS – INSA de Toulouse, Toulouse, France

2. Initiation to the modeling and simulation of susceptibility of integrated circuits to electromagnetic interferences

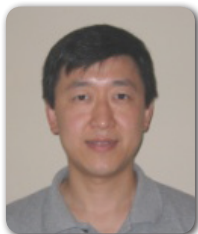
Sonia Ben Dhia, LAAS – INSA de Toulouse, Toulouse, France



Tutorial Tu-Mo4 Practical Radiated Measurements using Antennas and Field Probes - Fundamental and Advanced Topics

Biyang room, 2F | 10:00 ~ 17:30

Organizer & Chair : Zhong Chen, ETS-Lindgren, USA / Janet O'Neil, ETS-Lindgren, USA



Dr. Zhong Chen is a senior principal design engineer with ETS-Lindgren, USA. He has over 10 years of experience in research and product development, responsible for numerous antenna and field probe designs. He is also active in US and international standards development committee. He is a chair person for the standard IEEE 1309 (calibration for field probes), and a member of the ANSI ASC C63[®] committees (including the standard C63.5 on antenna calibration).



Dr. Janet O'Neil is a customer relations specialist with ETS-Lindgren. Her responsibilities include coordination of the company's technical contributions to industry conferences worldwide. She has over 20 years experience in the RF Microwave and Electromagnetic Compatibility (EMC) industries. She is a member of the Board of Directors of the IEEE Electromagnetic Compatibility (EMC) Society as well as of the Antenna Measurement Techniques Association (AMTA). She is also a member of Subcommittee 1 (Techniques and Development) of ANSI ASC C63[®] and vice-chair of the 2011 IEEE International Symposium on EMC in Long Beach, California.

Abstract

This tutorial is designed to be a half-day session addressing the applications of radiated measurements using antennas and field probes. The discussions are concentrated on specific aspects of antennas and probes in calibration and testing to EMC industry standards, such as background information and rationales for recent changes in the standards, and the impact of these changes on daily EMC measurements. Other topics addressed include the novel uses of antennas for remote sensing and tomographic applications.

Speakers list

1. Basic Antenna Theory

John Norgard, NASA Houston, TX, USA

2. Properly Applied Calibration Factors for Antennas and Electric Field Probes

Zhong Chen, ETS-Lindgren, CA, USA

3. High Precision Radiated Field and Correction Methods for Probe Calibration

Kefeng Liu, ETS-Lindgren, CA, USA

4. Tomographic Techniques (Microwave CAT Scans) for Detecting/Imaging Obscured Objects

John Norgard, NASA Houston, TX, USA

Tutorial Tu-Mo5 EMP2- Electromagnetic Pulses and Electromagnetic Protection

Chuja room, 2F | 10:00 ~ 14:00

Organizer & Chair : Wen-Yan Yin, Zhejiang University, China



Prof. Wen Yan Yin (M'99-SM'01) received his M.Sc. degree from Xidian University in 1989 and Ph.D. degree from Xi'an Jiaotong University in 1994. He worked in the Department of Electronic Engineering, Northwestern Polytechnic University as an Associate Professor from 1993 to 1996. He was a Research Fellow with the Department of Electrical Engineering at Duisburg University, granted by the Alexander von Humboldt-Stiftung of Germany from 1996 to 1998. Since Dec.1998, he has been with the MMIC Modeling and Packing Lab, Department of ECE of National University of Singapore (NUS) as a Research Fellow. In March 2002, he joined the Temasek Laboratories of NUS, as a Research Scientist. From April 2005 to Dec.2008, he was with the School of Electronic Information and Electrical Engineering, as a Professor of Shanghai Jiao Tong University (SJTU). He was also the Director of Center for Microwave and RF Technologies (CMRFT) of SJTU. From Jan. 2009 to now, he is the "Qiu Shi" Chair Professor of Zhejiang

University (ZJU), working at the Centre for Optical and Electromagnetic Research, National State Key Lab of MOI, ZJU of China. He is also the adjunct Professor of CMRFT, SJTU. His main research interests are in the development of modeling techniques for passive and active RF and millimeter wave device and circuits, nanoelectronics, electromagnetic compatibility (EMC) and electromagnetic protection (EMP) of communication platforms, computational multiphysics methods and its applications.

He has published more than 180 international journal articles (including one international book, 15 book chapters and more than sixty IEEE Papers). One chapter of "Complex Media" is included in the Encyclopedia of RF and Microwave Engineering, published in 2005 by John Wiley & Sons, Inc. Dr. Yin is the IEEE EMC Society Distinguished Lecturer from 2011 to 2012, General Co-Chair of IEEE EDAPS'2011. He received the Science and Technology Promotion Award of the first class from the local Shanghai government of China in 2005, the Technology Invention Award of the first class from the Educational Ministry of China in 2008, the National Technology Invention Award of the second class from Chinese government in 2008, and the Best Paper Award of APEMC'2008.

Abstract

This tutorial will be focused on three parts as follows:

- (1) Description of Various Electromagnetic Pulses (EMP);
- (2) Hybrid Time-Domain Computational Electromagnetic Methods (TDIE- TDPO, etc.) for Fast Capturing Various EMP Effects, Together with Some Experimental Results Given;
Typical Methods for Electromagnetic Protection (EMP) of Various Platforms.

Speakers list

1. EMP2- Electromagnetic Pulses and Electromagnetic Protection
Wen-Yan Yin, Zhejiang University, Hangzhou, China



Thursday, May 19, 2011 – Full-day Schedule / 09:00~17:30

Tutorial Tu-Th1 PCB EMC

Ara Hall, 8F | 09:00 ~ 17:30

Organizer & Chair : Mark Montrose, Montrose Compliance Services, USA

Tu-Th1-1

Introduction to Printed Circuit Board Design, Specification, Manufacturing and Construction

Organizer & Chair : Mark Montrose, Montrose Compliance Services Inc., CA, USA



Mr. Mark Montrose is principle consultant of Montrose Compliance Services, a full service regulatory compliance company in California with 30 years of applied EMC experience. His consulting activities include system and printed circuit board design to achieve EMC, testing and troubleshooting, and in-house training. He is a past Board of Director for both the IEEE (Division VI Director) and the IEEE EMC Society, and authored popular textbooks on EMC with translation in Chinese, Japanese and Korean

Abstract

The field of electrical engineering has reached new levels of complexity. Printed circuit boards must be designed to minimize EMI while also being immune to external field disruption. To work with state of the art technology and higher speed circuits, physical characteristics for printed circuit board construction material must change for functional and operational requirements. Higher speed components and the RoHS Directive is making use of FR-4 difficult and obsolete, causing this inexpensive and popular core substrate to become sub-optimal related to performance. Newer board materials are now required for enhanced signal integrity, minimize transmission line losses, and to survive higher process temperatures in addition to second and third order effects rarely considered during the selection of board material and its interface with logic circuitry and I/O interconnects.

Areas presented include an overview on the PCB manufacturing process including RoHS, material selection parameters and characteristics, internal losses, different types of flex circuit configurations, maintaining impedance control for transmission line routing, fiber optic interconnects, buried capacitive structures, and both active and passive embedded components, including nanotechnology circuits which cannot be implemented on FR-4.

Speakers list

1. Introduction to Printed Circuit Board Design, Specification, Manufacturing and Construction

Mark Montrose, Montrose Compliance Services Inc., CA, USA

Tu-Th1-2

Printed Circuit Board and System Design for Technology of the Future

Organizer & Chair : Mark Montrose, Montrose Compliance Services Inc., CA, USA

Edward Nakauchi, G&M Compliance, China



Mr. Mark Montrose is principle consultant of Montrose Compliance Services, a full service regulatory compliance company in California with 30 years of applied EMC experience. His consulting activities include system and printed circuit board design to achieve EMC, testing and troubleshooting, and in-house training. He is a past Board of Director for both the IEEE (Division VI Director) and the IEEE EMC Society, and authored popular textbooks on EMC with translation in Chinese, Japanese and Korean.



Mr. Ed Nakauchi is currently a consultant for G&M Compliance and senior advisor for Beijing CQC Testing Services Ltd. He is a NARTE Certified EMC/ESD Engineer with senior membership in the IEEE. He helped developed the CASSPER system which is an innovative correlation analyzer and has worked on projects that include the Space Shuttle, Global Positioning Satellite, submarines, Tesla Motors, and the B-2 Bomber. Mr. Nakauchi co-authored a book with Mr. Montrose titled, "Testing for EMC Compliance: Approaches and Techniques."

Abstract

Technology of today, when designing systems for both EMC compliance and functionality, has advanced to where current design techniques and rules of thumb are becoming less effective. A new view of the field of electrical engineering must occur if one is to be successful based on what the future is bringing with higher speed components, greater power consumption, higher bandwidth interconnects, along with lightweight enclosures and their relationship to shielding effectiveness.

This course has a focus toward hands-on or applied engineering along with fundamentals of both time- and frequency-domain aspects of system design. Without understanding what Maxwell tells us, we can spend considerable time, money and effort experimenting to achieve EMC.

All EMC problems begin and end with electronic circuitry. One must recognize there are second order effects that may cause system-wide failure. EMC engineers of today need to understand both signal integrity (time domain) as well as EMI (frequency domain), along with advances in printed circuit board manufacturing technology, system reliability, lossy transmission line implementation, and use of new, higher-speed printed circuit board materials for GHz-based systems.

Realizing that suppression of EMI at the component and printed circuit board level is nearly impossible for most applications, shielding becomes the final solution to solving EMC. Internal radiated field coupling, lightweight plastic enclosures, Gigahertz signals, and numerous other variables must be understood for a cost effective design. In addition, if improper handling of return currents is ineffective, additional problems may occur. One must consider overall system level design aspect of a product for EMC, and not focus strictly at the printed circuit board or how well an enclosure performs. In addition, new test procedures are being required to evaluate systems at higher frequencies.

Speakers list

1. Printed Circuit Board and System Design for Technology of the Future

Mark Montrose, Montrose Compliance Services Inc., CA, USA

2. Printed Circuit Board and System Design for Technology of the Future

Edward Nakauchi, G&M Compliance, China



Tu-Th1-3

Decoupling, Bypassing and Embedded Capacitance for Enhanced PCB Performance

Organizer & Chair : Mark Montrose, Montrose Compliance Services Inc., CA, USA



Mr. Mark Montrose is principle consultant of Montrose Compliance Services, a full service regulatory compliance company in California with 30 years of applied EMC experience. His consulting activities include system and printed circuit board design to achieve EMC, testing and troubleshooting, and in-house training. He is a past Board of Director for both the IEEE (Division VI Director) and the IEEE EMC Society, and authored popular textbooks on EMC with translation in Chinese, Japanese and Korean.

Abstract

With advances in semiconductor manufacturing, larger pin count devices, greater power consumption and higher clock speeds, an optimal power distribution network on printed circuit boards is now a primary concern for designers. Signal integrity must be ensured while maintaining electromagnetic compatibility for an intended operating environment, such as telecommunication, information technology or industrial control.

Power plane resonances and lack of energy charge to digital components are now causing functional and operational problems. Understanding how to incorporate basic capacitive structures in power distribution networks is becoming a mandatory aspect of design engineering along with the PCB layout process. Areas of concern deal with application of use, proper implementation techniques, equivalent series resistance/ inductance, minimizing lead and loop inductance, discrete component placement, multi-pole methodology, and of course capacitance value. Characteristic parameters on how capacitors function and selection criteria are presented. A case study analyzes of what may happen when incorrect implementation of a single decoupling capacitor occurs with excessive lead inductance is presented.

This is an introductory course on the concept of designing a power distribution network that targets design engineers who need to understand how and why capacitive structures work in a simplified manner, and how to design an efficient power distribution network at minimal cost.

Speakers list

1. Decoupling, Bypassing and Embedded Capacitance for Enhanced PCB Performance

Mark I. Montrose, Montrose Compliance Services, Inc., CA, USA

Tutorial Tu-Th2 Metamaterials, Periodic Structures and EBG in EMC/Antenna/RF Designs

Ora Hall, 8F | 09:00 ~ 12:00

Organizer & Chair : Prof. Sungtek Kahng, Incheon University, Korea



Prof. Sungtek Kahng received the Ph.D. degree in electronics and communication engineering from Hanyang University, Seoul, Korea in 2000, with the specialty in radio science and engineering. From year 2000 to early 2004, he worked for the Electronics and Telecommunication Research Institute, where he worked on numerical electromagnetic characterization of and developed the RF passive components, and antennas for satellites(Korea Sat. 5 and COMS 1). Since March 2004, he has been with the department of Information and Telecommunication engineering at the university of Incheon that he has continued research on analysis and advanced design methods of microwave components and antennas including metamaterial technologies and wireless power transfer. Also on the same field, he has provided consultancy for Samsung Electronics as well as LG Innotek, LG Electronics, Songdo Defense Technologies Complex, AceAntenna, and the like, and he is accredited to be in the Science & Engineering of Marquis Who's Who in the World and holds patents concerning miniaturized and function-enhanced components/antennas and EMC solutions as well.

Abstract

As the operating frequency goes higher and the demands on complex architectures of electronics and new materials increase, the classic guide lines and design rules on EMC and RF device designs are facing the challenges and limitations in meeting the requirements.

In response to the need to find the alternatives, periodic structures such as FSS are adopted or hybridized with the conventional practices to stop the radiated/conducted noise and unwanted resonance more effectively.

Especially, the photonic bandgap design as the periodic structures with perfect or imperfect periodicity is revisited and becomes the EBG by being adapted to RF frequency from optics.

With a different motivation, metamaterial is researched that when permittivity and permeability the constitutive parameters of a material are given unusual or usual values, they possibly result in phenomena interpreted meaningful to overcome the limitations above in EMC and microwave engineering. Particularly, the left-handedness and the infinite wavelength are introduced by negative permittivity and negative permeability and zero refractive index, respectively, and they are used to change the direction or phase of wave propagation. The dispersion engineering stemming from the metamaterials has drawn attention in that it is helpful to reduce the volume of a structure and form a bandgap free from the resonance condition of the conventional periodic structure approach.

So, in this session, the analysis and design methods of FSS, DNG/SNG/AMC and EBG are dealt with as well as advanced applications to EMC/antenna/RF designs. Also, we discuss the slow-wave effects of a periodic geometry and the resonant slots(non-metamaterial) of DGS and SRR/CSRR. Last but not least, a number of electromagnetic computational methods are shown to efficiently and accurately predict the scattering and radiation of the aforementioned structures.

Speakers list

1. Metamaterials, Periodic Structures and EBG in EMC/Antenna/RF Designs Part 1

Sungtek Kahng, University of Incheon, Incheon, Korea

2. Metamaterials, Periodic Structures and EBG in EMC/Antenna/RF Designs Part 2

Jeongho Ju, ETRI, Daejeon, Korea



Workshop

Thursday, May 19, 2011

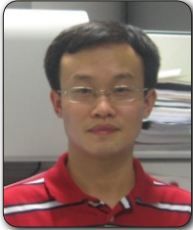
Room	Tamra Hall, 8F	Halla Hall, 8F
Session	Workshop W-Th1	Workshop W-Th2
Topic	Modeling and Design of Chip-Package-PCB level Signal Integrity and Power Integrity	Power Distribution Network Analysis and Design for PCBs and Packages
09:00-12:00	W-Th1	W-Th2
12:00-13:00	Lunch	
Session		Workshop W-Th3
Topic		Modelling and Solutions for Common Mode Noise on High-speed Differential Channels
13:00-15:00	W-Th1	W-Th3
15:00-15:30	Coffee Break	
15:30-17:30	W-Th1	W-Th3

Thursday, May 19, 2011 – Fullday Schedule / 09:00~17:30

Workshop W-Th1 Modeling and Design of Chip-Package-PCB level Signal Integrity and Power Integrity

Tamra Hall, 8F | 09:00 ~ 17:30 | Thursday, May 19, 2011

Organizer & Chair : Wei Xing Chang, Zhejiang University / Liu En Xiao, A*STAR IHPC



Prof. Xing-Chang Wei (M'01-SM'09) received the Ph.D degree in electrical engineering from Xi'an University of Electronic Science and Technology, China, in 2001. From 2001 to 2010, he has been with the ASTAR Institute of High Performance Computing, Singapore, as a research fellow, senior research engineer, and then a research scientist. He joined Zhejiang University, Hangzhou, China as a professor in 2010. His main research interests include 3D IC analysis, power integrity and signal integrity simulation and design, EMC modelling and simulation, and the development of fast algorithms for computational electromagnetics.

He authored over 40 papers published in prestigious international journals and conferences. He was the recipient of the 2007 Singapore IES (Institution of Engineers) Prestigious Engineering Achievement Award for his contribution on the development of a novel electromagnetic compatibility simulation facility. He was the Co-Chair of technical program committee of 2010 IEEE electrical design of advanced packaging & systems symposium.



Dr. En-Xiao Liu (M'05-SM'09) received the Ph.D. degree in electrical engineering from the National University of Singapore in 2005. In 2005 he joined the Institute of High Performance Computing (IHPC), A*STAR, Singapore, where he is currently a group manager cum senior research engineer of the RF engineering group, Electronics and Photonics Department. He has published over 50 papers in refereed international journals and conferences. His research interests are in the areas of computational electromagnetics, high-speed interconnects and packaging, 3D IC and TSV, and electromagnetic compatibility (EMC).

Dr. Liu received the Best-Paper-of-the-Year Award (FY09) from the IHPC in 2010. He was the chair of the IEEE EMC Society Singapore Chapter in 2009. He has served 9 international conferences in different capacities including the organizing chair, technical subcommittee chair, session chair, and organizing committee member.

Abstract

The ever-increasing demand of digital computing and wireless communication have been driving the semiconductor industry to integrate more and more circuits into one single package or printed circuit board (PCB), such as the System-in-Package (SiP) and 3D integration. At the same time, the voltage supply level is continuously reduced with the increased power density. These make the electromagnetic compatibility (EMC) become very critical for the successful design of a complex integrated system. The signal integrity and power integrity are two main EMC issues for the high-speed and high-density integration system. According to the prediction of International Technology Roadmap of Semiconductors (ITRS), the on-chip clock speed will increase to 14.3 GHz by 2022. Considering the harmonic of the clock frequency, the interesting EM spectrum on the chip and inside the package will cover very high frequency. The size of those tiny structures on the chip and inside the package is now comparable with the wavelength of interest. The EM wave propagation and coupling effects must be considered for multi-scale region: chip, package, and PCB.

This workshop will present the state-of-the-art of the modeling and design of the chip-package-PCB level signal and power integrity problems, which are still challenges for both industry and academic research. In this workshop, we will illustrate the methodologies to efficiently model the signal interconnect, through-hole vias, and power distribution network (PDN). This will help EMC engineers to better understand the EM field behavior inside the complex integrated system. We will present the latest development of the noise suppression structures including the electromagnetic bandgap (EBG) structures. This workshop also introduces the novel



APEMC 2011

2011 Asia Pacific EMC Symposium

technology for the electrical and electromagnetic modeling of the three-dimensional ICs and through-silicon vias (TSVs) array. Many examples will be discussed in this workshop. This workshop provides a training course for practical EMC engineers to understand the fundamental and last progress on chip-package-PCB level EMC, and help them to mitigate EMC problems in real integrated systems.

Speakers list

1. Co-design of Power and Signal Integrity for High-Speed Digital Systems

Toshio Sudo, Shibaura Institute of Technology, Japan

2. Models for Signal and Power Integrity Analysis of TSV Based 3D IC

Jun So Pak, KAIST, Daejeon, Korea

3. Rigorous Electromagnetic-Thermal Co-Analysis for 3-D Real-life ICs using Non-conformal Domain Decomposition Method

Zhen Peng, Ohio State University, Ohio, USA

4. PI/SI/EMI Simulation Technology for Chip/Package/Board Co-Design

Hideki Asai, Shizuoka University, Shizuoka, Japan

5. Simulation of Signal and Power Integrity by using Integral Equation Equivalent Circuit Method

WEI Xing Chang, Zhejiang University, Hangzhou, China

6. Modeling Techniques for Signal and Power Integrity (SI/PI) Simulation – overview and recent developments

LIU En Xiao, A*STAR IHPC, Singapore

Workshop W-Th2 Power Distribution Network Analysis and Design for PCBs and Packages

Halla Hall, 8F | 09:00 ~ 12:00 | Thursday, May 19, 2011

Organizer & Chair : James L. Drewniak, Missouri University of Science and Technology, Rolla, USA



Prof. James L. Drewniak received the B.S., M.S., and Ph.D. degrees in electrical engineering from the University of Illinois, Urbana-Champaign, in 1985, 1987, and 1991, respectively. In 1991, he joined the Electrical and Computer Engineering Department, Missouri University of Science and Technology, Rolla, where he has been one of the principal investigators in the Electromagnetic Compatibility (EMC) Laboratory. From 2002 to 2007, he was the Director of the Materials Research Center, University of Missouri-Rolla. His current research interests include EMC in high-speed digital and mixed signal designs, electronic packaging, Microelectro-mechanical systems, EMC in power electronic-based systems, and numerical modeling for EMC applications.

Abstract

Fundamental principles for moving from complicated PCB and package PDN layouts and constraints to models from which design methodologies and directions can be established are detailed. The physics-based modeling approach will begin with a production 26-layer board design and outline the design considerations including choosing the layer stackup; decoupling capacitor mounting, location, and distribution around the IC; package PWR/GND pin layout; and noise coupling to other logic levels through the PDN. The current-path physics underlying these details will be presented, the resulting inductance and mutual inductance identified, and the basics for developing a physics-based model will be given.

A physics-based modeling approach will be detailed that begins with the complex layer stackup, and breaks down the PDN geometry on a layer-by-layer basis and then connects all layers together in a straight-forward and systematic fashion. The resulting network will then be reduced in a fashion that will provide direct design insight without any loss of generality. The 26-layer production PCB will provide the example for this approach. Modeling and experimental results will be presented.

Design guidelines that result from the physics-based modeling paradigm will be provided and demonstrated. The resulting PDN response in frequency will be related to the physics and design choices, and will be related to voltage ripple on the PDN in time as well.

Speakers list

1. Fundamental Concept and Methodology for Power Distribution Network Design

James L. Drewniak, Missouri University of Science and Technology, Rolla, USA

2. Physics-Based PDN Modeling Approach

Tzong-Lin Wu, National Taiwan University, Taipei, Taiwan

3. Design Applications for Power Distribution Network

Joungho Kim, KAIST, Daejeon, Korea



Workshop W-Th3 Modelling and Solutions for Common Mode Noise on High-speed Differential Channels

Halla Hall, 8F | 13:00 ~ 17:30 | Thursday, May 19, 2011

Organizer & Chair : Tzong-Lin Wu, National Taiwan University / Ryuji Koga, Okayama University



Prof. Tzong-Lin Wu received BS and Ph.D. degree from National Taiwan Univ. in 1991 and 1995. Now, he is Professor of Department of Electrical Engineering, National Taiwan University, Taiwan.



Prof. Ryuji Koga graduated from Doc. Course, Kyoto Univ. in 1972. He experienced Research and Education both in Kyoto and Okayama Universities. He retired on Spring, 2010, from Okayama University. He was past Chair of EMCJ, and now, he is a Director in Large of BoD, IEEE EMCS.

Abstract

This workshop will focus on design and modelling techniques for common mode noise mitigation on above-GHz differential signal links. The normal modes of the coupled lines will be first derived based on the telegrapher's equations. The impact of the common-mode on the signal integrity is discussed. A simple model to evaluate the quantity of the common mode current/voltage is proposed and exemplified of its convenience based on the assumption of TEM mode being retained over the two lines. The equivalent circuit for the common mode noise based on travelling wave scattering parameters will also be proposed and the application on EMC design will be shown. The solutions for the common mode noise suppression will also be highlighted based on the defected ground structure or meta-material concept.

Speakers list

- 1. Modal analysis for multi-conductor transmission line and application to estimating signal integrity in differential-mode networks**
Yoshio Kami, University of Electro-Communications, Tokyo, Japan
- 2. A Brief Model of the Common-mode Excitation in Non-uniform Transmission Lines**
Ryuji Koga, Okayama University, Okayama, Japan
- 3. Equivalent Circuit for Common Mode Current and Some Applications**
Umberto Paoletti, Hitachi, Ltd., Yokohama, Japan
- 4. Common Mode Currents and Radiated Emissions from Differential Signals in Multi-Board Systems**
Christian Schuster, Technische Universität Hamburg-Harburg, Hamburg, Germany
- 5. Solutions for Common-mode Noise Mitigation**
Tzong-Lin Wu, National Taiwan University, Taipei, Taiwan

Special Session

Tuesday, May 17, 2011		
Room	Biyang Room, 2F	Chuja Room, 2F
Session	Special S-Tu1	Special S-Tu2
Topic	Biomedical Devices	EMC Techniques in GHz Range
13:00-13:20	S-Tu1-1	S-Tu2-1
13:20-13:40	S-Tu1-2	S-Tu2-2
13:30-14:00	S-Tu1-3	S-Tu2-3
14:00-14:20	S-Tu1-4	S-Tu2-4
14:20-14:40	S-Tu1-5	S-Tu2-5
14:40-15:00	S-Tu1-6	S-Tu2-6
15:00-15:30	Coffee Break	
Session		Special S-Tu3
Topic		EMC design of PCB related to digital wireless communication
15:30-15:50	S-Tu1-7	S-Tu3-1
15:50-16:10	S-Tu1-8	S-Tu3-2
16:10-16:30	S-Tu1-9	S-Tu3-3
16:30-16:50	S-Tu1-10	S-Tu3-4
16:50-17:10	S-Tu1-11	S-Tu3-5
17:10-17:30		S-Tu3-6
Wednesday, May 18, 2011		
Room	Biyang Room, 2F	Chuja Room, 2F
Session	Special S-We1	Special S-We2
Topic	IEMI/HEMP	EMC problem with medical electronic equipment caused by wireless communications and radiated interferences
09:00-09:20	S-We1-1	S-We2-1
09:20-09:40	S-We1-2	S-We2-2
09:40-10:00	S-We1-3	S-We2-3
10:00-10:20	S-We1-4	
10:20-10:40	Coffee Break	
Session		Special S-We3
Topic		Recent topics concerning EMC technology of telecommunication system
10:40-11:00	S-We1-5	S-We3-1
11:00-11:20	S-We1-6	S-We3-2
11:20-11:40		S-We3-3
11:40-12:00		S-We3-4
12:00-13:00	Lunch	
Room	Ramada Ballroom 3, 2F	Ramada Ballroom 4, 2F
Session		Special S-We4
Topic		Computational Dosimetry in RF
14:00-14:20		S-We4-1
14:20-14:40		S-We4-2
14:40-15:00		S-We4-3
15:00-15:20		S-We4-4
15:20-15:40		S-We4-5
15:40-16:10	Coffee Break	
Session	Special S-We5	Special S-We6
Topic	ESD Transient	Computational Dosimetry in ELF/Intermediate Frequency
16:10-16:30	S-We5-1	S-We6-1
16:30-16:50	S-We5-2	S-We6-2
16:50-17:10	S-We5-3	S-We6-3
17:10-17:30	S-We5-4	S-We6-4
17:30-17:50	S-We5-5	



Tuesday, May 17, 2011 – Afternoon Schedule / 13:00~17:10

Special S-Tu1 Biomedical Devices

Biyang Room, 2F | 13:00 ~ 17:10

Chair : Jianqing Wang, NiTech / Soon Ik Jeon, ETRI

13:00~13:20 | S-Tu1-1

- **A Study of Wireless Power Transmission for Capsular Endoscope in Consideration with the Effect of Human Body**

T. Kumagai, K. Saito, M. Takahashi, K. Ito
Chiba University, Chiba, Japan

13:20~13:40 | S-Tu1-2

- **Media Channel Evaluation in UHF EM Tomography System for Breast Cancer Detection**

Soon Ik Jeon, Nikolai Simonov, Hyuk Je Kim, Seong Ho Son, Jong Moon Lee
ETRI, Daejeon, Korea

13:40~14:00 | S-Tu1-3

- **Electrode Design for Watch-type Intra-body Communication Device**

Ken Sasaki, Takuma Maesaka, Fukuro Koshiji, Shudo Takenaka
University of Tokyo, Kashiwa, Japan

14:00~14:20 | S-Tu1-4

- **X-band Radar System for Detecting Heart and Respiration Rates**

Jee-Hoon Lee, Yun-Taek Im, Seong-Ook Park
KAIST, Daejeon, Korea

14:20~14:40 | S-Tu1-5

- **Investigations of an IR-UWB Based Hardware Demonstrator for Wireless Patient Monitoring**

Oliver Lauer, David Barras, Marco Zahner, Jürg Fröhlich
ETH Zürich, Switzerland

14:40~15:00 | S-Tu1-6

- **Electromagnetic Characteristics of an Aperture Antenna in Metal Housing Wall of Handheld Equipments**

Fukuro Koshiji¹, Kohji Koshiji¹, Takahiko Yamamoto¹, Ken Sasaki²
1 Tokyo University of Science, Noda, Japan
2 The University of Tokyo, Kashiwa-, Japan

15:30~15:50 | S-Tu1-7

- **Consideration on the Reconstruction Algorithms for Breast Cancer Detection**

Min-Gyeong Seo¹, Tae-Hong Kim¹, Ki-Chai Kim², Jeong-Ki Pack¹
1 Chungnam National University, Daejeon, Korea
2 Yeungnam University, Gyeonsan, Korea

15:50~16:10 | S-Tu1-8

• A Low Power CMOS Chirp-Spread-Spectrum OOK Transmitter for In-Body Communication

Junghee Choi, Kihyun Kim, and Sangwook Nam
Seoul National University, Seoul, Korea

16:10~16:30 | S-Tu1-9

• A Feasibility Study of In-body to On-body Transmission with IR-UWB Transceiver

Jingjing Shi, Jianqing Wang
Nagoya Institute of Technology, Nagoya, Japan

16:30~16:50 | S-Tu1-10

• Evaluating of Surface Heating for Medical Implants Associated with MRI RF Exposure

Yan Liu, Ji Chen¹, Wolfgang Kainz², Frank G. Shellock³
1 University of Houston, Houston, U.S.A
2 Food and Drug Administration, Silver Spring, USA
3 Keck School of Medicine and University of Southern California Institute for Magnetic Resonance Safety, Education, and Research, LA, USA

16:50~17:10 | S-Tu1-11

• Experimental Assessment of Interference in the 2.4 GHz ISM Band from Wireless Medical Sensors on the Imaging System of an Advanced Operating Room

R. Chávez-Santiago^{1,2,3}, K. Øyri^{1,2}, S. Støa^{1,2,4}, I. Balasingham^{1,2,3}, E. Fosse^{1,2}
1 Oslo University Hospital, Oslo, Norway
2 University of Oslo, Oslo, Norway
3 NTNU, Trondheim, Norway
4 Novelda AS, Oslo, Norway

Special S-Tu2 EMC Techniques in GHz Range

Chuja Room, 2F | 13:00 ~ 15:00

Chair : Takashi Harada, NEC / Eiji Hankui, NEC

13:00~13:20 | S-Tu2-1

• Real-Time Visualization of Propagations of Electric Waves in GHz Range

Masahiro Tsuchiya¹, Takahiro Shiozwa²
1 National Institute of Information and Communications Technology, Tokyo, Japan
2 Kagawa National College of Technology, Kagawa, Japan

13:20~13:40 | S-Tu2-2

• Noise Coupling and Shielding in Through-Silicon Via (TSV)-based 3D IC

Jonghyun Cho¹, Joohee Kim¹, Jun So Pak¹, Joungho Kim¹, Junho Lee², Hyungdong Lee², Kunwoo Park²
1 KAIST, Daejeon, Korea
2 Hynix Semiconductor Inc., Icheon, Korea



13:40~14:00 | S-Tu2-3

- **Vertically Alternating Impedance Electromagnetic Bandgap (VAI-EBG) Structure for Noise Mitigation in Multi-layer PCBs**

Myunghoi Kim, Kyoungchoul Koo, Sunkyu Kong, Bumhee Bae, Sangrok Lee, JoungHo Kim
KAIST, Daejeon, Korea

14:00~14:20 | S-Tu2-4

- **Estimating Radiated Emissions from Heatsinks on Printed Circuit Boards above 1 GHz**

Todd H. Hubing, X. He
Clemson University, Clemson, USA

14:20~14:40 | S-Tu2-5

- **Prediction of EM Radiation at GHz Frequency from a PCB Driven by a Connected Feed Cable**

Yoshiki Kayano, Hiroshi Inoue
Akita University, Akita-shi, Japan

14:40~15:00 | S-Tu2-6

- **GHz Noise Suppression of Printed Wiring Boards Using a Directly-plated Ferrite Thin Film**

Koichi Kondo¹, Shigeyoshi Yoshida¹, Hiroshi Ono¹, Tadashi Kubodera²
1 NEC Tokin Corp., Sendai, Miyagi, Japan
2 System Design Laboratory Co., Ltd., Kanagawa, Japan

Special S-Tu3 EMC Design of PCB Related to Digital Wireless Communication

Chuja Room, 2F | 15:30 ~ 17:30

Chair : Masahiro Yamaguchi, Tohoku University / Takashi Harada, NEC

15:30~15:50 | S-Tu3-1

- **APD Measurement of Electromagnetic Noise as an Approach to Effective Detection of EMI Issues in Wireless Systems**

Yasushi Matsumoto
National Institute of Information and Communications Technology, Tokyo, Japan

15:50~16:10 | S-Tu3-2

- **Wide-angle EM-wave Absorber Design Using Loop Array Metamaterial**

Atsuhiko Nishikata, Tatsuya Yamaguchi, Takuya Nasu
Tokyo Institute of Technology, Tokyo, Japan

16:10~16:30 | S-Tu3-3

- **Evaluation of Electromagnetic Noise Coupling Channel in Wireless LAN Mounted Printed Circuit Boards**

Mizuki Iwanami, Hiroshi Fukuda, Manabu Kusumoto, and Takashi Harada
NEC Corporation, Kawasaki, Japan

16:30~16:50 | S-Tu3-4

- **Experimental Demonstrations of EMI Suppression Using Open Stub Electromagnetic Bandgap Structures**

Hiroshi Toyao, Masashi Kawakami, Akira Shojiguchi, Manabu Kusumoto, Hisashi Ishida, Takashi Harada
NEC Corporation, Kawasaki, Japan

16:50~17:10 | S-Tu3-5

- **Detecting Elctromagnetic Coupling paths in Printed Circuit Boards Using Time Series Analysis**

Akira Shojiguchi, Manabu Kusumoto, Takashi Harada
NEC Corporation, Kanagawa, Japan

17:10~17:30 | S-Tu3-6

- **Miniature EBG Designs Using SPICE Models of Multiple Planes**

Naoki Kobayashi, Noriaki Ando, Hiroshi Toyao
NEC Corporation, Kawaski, Japan





Wednesday, May 18, 2011 – **Morning Schedule** / 09:00~12:00

Special S-We1 IEMI/HEMP

Biyang Room, 2F | 09:00 ~ 11:20

Organizer & Chair : William A. Radasky, Metatech / Leonid Siniy, All Russia Research Institute of Automatic

09:00~09:20 | S-We1-1

- **Approach for the Threat Assessment of E1 HEMP and Wideband IEMI on Commercial Electronics**

W. A. Radasky, E. B. Savage, J. L. Gilbert
Metatech Corporation, CA, USA

09:20~09:40 | S-We1-2

- **Options for Mitigation of IEMI Induced Pulses on Commercial Building Cabling**

E. B. Savage, W. A. Radasky, J. L. Gilbert
Metatech Corporation, CA, USA

09:40~10:00 | S-We1-3

- **IEMI Detection Method Based on the Observation of the Network Traffic**

Evgeni Genender¹, Heiko Bell¹, Adrian Kreth¹, Heyno Garbe¹, Stefan Potthast²

¹ Leibniz Universität Hannover, Hannover, Germany

² Bundeswehr Research Institute for Protective Technologies and NBC-Protection, Munster, Germany

10:00~10:20 | S-We1-4

- **Stochastic Topological Approach Using Wave-chaos for Electromagnetic Effects (STUWEE)**

Edl Schamiloglu¹, Sameer D. Hemmady²

¹ University of New Mexico, Albuquerque, USA

² TechFlow Inc., Albuquerque, USA

10:40~11:00 | S-We1-5

- **Modeling of Surface Transfer Impedance in Time Domain**

Qi Zhang, Li-hua Shi

Nanjing Engineering Institute, Nanjing, China

11:00~11:20 | S-We1-6

- **Improvement of Russian Regulatory System on Protection against Electromagnetic Attacks**

Vladimir Chvanov, Ruslan Kirichek

FSUE "CenterInform", Saint-Petersburg, Russia

Special S-We2 EMC Problem with Medical Electronic Equipment caused by Wireless Communications and Radiated Interferences

Chuja Room, 2F | 09:00 ~ 10:00

Chair : Eisuke Hanada, Shimane University Hospital

09:00~09:20 | S-We2-1

• A Safe and Reliable Method for Installing Wireless LAN into a Hospital

Eisuke Hanada¹, Takato Kudou²

1 Shimane University Hospital, Izumo, Japan

2 Oita University, Oita, Japan

09:20~09:40 | S-We2-2

• FDTD Simulations for Constructing Appropriate Medical/Healthcare Electromagnetic Environment

Takato Kudou¹, Eisuke Hanada²

1 Oita University, Oita, Japan

2 Shimane University Hospital, Izumo, Japan

09:40~10:00 | S-We2-3

• Method for Evaluating EMI of Implanted Medical Devices from Body Area Network Devices

Satoshi Ishihara, Takahiro Iyama, Teruo Onishi, Yoshiaki Tarusawa

NTT Docomo, Inc., Yokosuka, Japan

Special S-We3 Recent Topics Concerning EMC Technology of Telecommunication System

Chuja Room, 2F | 10:40 ~ 12:00

Chair : Nobuo Kuwabara, KiTech / Kazuo Murakawa, NTT / Yoshiharu Akiyama, NTT

10:40~11:00 | S-We3-1

• Lightning Protections for Telecommunication Equipment of FTTH Services in Customer Premises

Kazuo Murakawa¹, Shoichi Kuramoto², Hironori Makino¹

1 NTT East Technical Tokyo, Japan

2 NTT Energy, Tokyo, Japan

11:00~11:20 | S-We3-2

• Lightning Surge Current Inducing on In-house Power and Telecommunication Networks

Toshihisa Masuda, Shouichi Kuramoto, Yasuhiro Honma, Kazuaki Yano

NTT Energy Musashino, Japan

11:20~11:40 | S-We3-3

• Investigating Relation between EFTB Test and RF Conductive Immunity Test using BER

Nobuo Kuwabara¹, Yasuhiro Irie¹, Norihito Hirasawa², Yoshiharu Akiyama²

1 Kyushu Institute of Technology, Kitakyushu, Japan

2 NTT, Musashino, Japan



11:40~12:00 | S-We3-4

- **Comparison of Common Mode Disturbances Measured by using Different Types of Impedance Stabilization Networks**

Norihito Hirasawa, Yasunao Suzuki, Yoshiharu Akiyama
NTT, Tokyo, Japan

Wednesday, May 18, 2011 – Afternoon Schedule / 14:00~17:10

Special S-We4 Computational Dosimetry in RF

Ramada Ballroom 4, 2F | 14:00 ~ 15:40

Chair : Soichi Watanabe, NICT / Ae-Kyoung Lee, ETRI

14:00~14:20 | S-We4-1

- **Korean Voxel Models and FDTD Calculations of Whole-Body Averaged SAR in Free Space**

Ae-Kyoung Lee¹, Hyung-Do Choi¹, Richard Findlay²
1 ETRI, Daejeon, Korea
2 Health Protection Agency, Chilton, UK

14:20~14:40 | S-We4-2

- **Chinese Adult Anatomical Models for EMF Exposure Assessment and Discussion on Population Representation**

WU Tongning¹, TAN Liwen²
1 M.I.I.T., Beijing, China
2 College of Basic Medical Sciences Third, Military Medical University, Chongqing, China

14:40~15:00 | S-We4-3

- **Variability in Whole-Body Averaged SAR for Young Children Exposed to Vertically and Horizontally Polarized Electromagnetic Plane Waves from 30 MHz to 3 GHz**

Tomoaki Nagaoka, Soichi Watanabe
NICT, Tokyo, Japan

15:00~15:20 | S-We4-4

- **SAR Calculations for Mice in a Cage in the Whole-Body Exposure Environment.**

Joon-Hyeok Oh, Ji-Yeon Mun, Tae-Hong Kim, Jeong-Ki Park
Chungnam National University, Daejeon, KOREA

15:20~15:40 | S-We4-5

- **Whole-Body Averaged SAR Estimation of Japanese Humans Exposed to 2 GHz H-Polarized Plane-Wave Using External Electric-Field Scanning**

Yoshifumi Kawamura¹, Takashi Hikage¹, Toshio Nojima¹, Tomoaki Nagaoka², Soichi Watanabe²
1 Hokkaido University, Sapporo, Japan
2 NICT, Tokyo, Japan

Special S-We5 ESD and Transient

Ramada Ballroom 3, 2F | 16:10 ~ 17:50

Chair : Ken Kawamata, HiTech

16:10~16:30 | S-We5-1

- **Two-dimensional clustering approach to an analysis of electrostatic discharge in terms of EMI assessment**

Masao Masugi¹, Norihito Hirasawa², Yoshiharu Akiyama²

1 Ritsumeikan University, Kusatsu, Japan

2 NTT Corporation, Tokyo, Japan

16:30~16:50 | S-We5-2

- **Characteristic of Radiated Electromagnetic Wave by ON/OFF Discharge on Sub-micron Gap**

Takayoshi Ohtsu, Shunsuke Okada, Shota Ito, Shogo Imai, Ryota Oka, Kazuyuki Tanitsuji, Taro Takai, Hiromichi Fujikawa

Suzuka National College of Technology, Shiroko-cho, Japan

16:50~17:10 | S-We5-3

- **Wideband Measurement of Discharge Currents below 2 kV for Air Discharges of an ESD-gun**

Ikuko Mori¹, Osamu Fujiwara², Heyno Garbe³

1 Suzuka National College of Technology, Suzuka, Japan

2 Nagoya Institute of Technology, Nagoya, Japan

3 Leibniz Universitaet Hannover, Hannover, Germany

17:10~17:30 | S-We5-4

- **Amplitude Properties of Radiated Electromagnetic Field Intensity Caused by Low Voltage ESD in Spherical Electrode**

Ken Kawamata¹, Shigeki Minegishi², Osamu Fujiwara³

1 HiTech, Hachinohe, Japan

2 Tohoku Gakuin University, Tagajo, Japan

3 Nagoya Institute of Technology, Nagoya, Japan

17:30~17:50 | S-We5-5

- **EMC Problem Caused by Arc Discharge at Slowly Separating Silver-Based Contacts**

Hiroshi Inoue, Yoshiki Kayano, Kazuaki Miyanaga

Akita University, Akita, Japan



APEMC 2011

2011 Asia Pacific EMC Symposium

Special S-We6 Computational Dosimetry in ELF/Intermediate Frequency

Ramada Ballroom 4, 2F | 16:10 ~ 17:30

Organizer & Chair : P. S. W. Leung, City University of Hong Kong / A. Hirata, NiTech / Dr. Heesung Ahn, KESRI

16:10~16:30 | S-We6-1

- Numerical Investigation of Contact Current and Internal Body Resistances of Human at 60 Hz

Isao Hamamoto¹, Noriyuki Hayashi¹, Hiroo Tarao², Katsuo Isaka³

1 Miyazaki University, Miyazaki, Japan

2 Kagawa NCT, Kagawa, Japan

3 Tokushima University, Tokushima, Japan

16:30~16:50 | S-We6-2

- Measurement of Induced Current in Phantom Brain Model under Uniform 60Hz Magnetic field

EungSik Kim¹, Suk Won Min², Sung Ho Myung³, HeeSung Ahn⁴, Chany Lee⁵

1 Hoseo University Asan, Korea

2 Soonchunhyang University Asan, Korea

3 KERI, Changwon, Korea

4 Korea Electrical Engineering & Science Research Institute, Seoul, Korea

5 Korea University Medical Center, Seoul, Korea

16:50~17:10 | S-We6-3

- Dosimetry of Induced Quantities within Human Body due to Non-uniform Magnetic Field Exposure in Intermediate Frequency Band

Yukihisa Suzuki¹, Masao Taki¹, Kanako Wake²

1 TMU, Tokyo, JAPAN

2 NICT, Tokyo, JAPAN

17:10~17:30 | S-We6-4

- A Study on Human Exposure to Power Frequency Radiation in High-Rise Buildings

K H Chan, S W Leung, Y M Siu, and K T Ng

City University of Hong Kong, Hong Kong SAR, China

Technical Session

Tuesday, May 17, 2011

Room	Ramada Ballroom 2, 2F	Ramada Ballroom 3, 2F	Ramada Ballroom 4, 2F
Session	Technical T-Tu1	Technical T-Tu2	Technical T-Tu3
Topic	EMC on System	Fundamental EMC	EMC on PKG & Semicon.
13:00-13:20	T-Tu1-1	T-Tu2-1	T-Tu3-1
13:20-13:40	T-Tu1-2	T-Tu2-2	T-Tu3-2
13:30-14:00	T-Tu1-3	T-Tu2-3	T-Tu3-3
14:00-14:20	T-Tu1-4	T-Tu2-4	T-Tu3-4
14:20-14:40	T-Tu1-5		T-Tu3-5
14:40-15:00	T-Tu1-6		
15:00-15:30	Coffee Break		
15:30-15:50	T-Tu1-7	T-Tu2-5	T-Tu3-6
15:50-16:10	T-Tu1-8	T-Tu2-6	T-Tu3-7
16:10-16:30	T-Tu1-9	T-Tu2-7	T-Tu3-8
16:30-16:50	T-Tu1-10	T-Tu2-8	T-Tu3-9
16:50-17:10	T-Tu1-11		T-Tu3-10

Wednesday, May 18, 2011

Room	Ramada Ballroom 2, 2F	Ramada Ballroom 3, 2F	Ramada Ballroom 4, 2F
Session	Technical T-We1	Technical T-We2	Technical T-We3
Topic	Lightning & Power System	EMC Measurement	EMC on Bio-Medical
09:00-09:20	T-We1-1	T-We2-1	T-We3-1
09:20-09:40	T-We1-2	T-We2-2	T-We3-2
09:40-10:00	T-We1-3	T-We2-3	T-We3-3
10:00-10:20	T-We1-4	T-We2-4	T-We3-4
10:20-10:40	Coffee Break		
10:40-11:00	T-We1-5	T-We2-5	T-We3-5
11:00-11:20	T-We1-6	T-We2-6	T-We3-6
11:20-11:40	T-We1-7	T-We2-7	T-We3-7
11:40-12:00	T-We1-8		T-We3-8
12:00-13:00	Lunch		
Room	Ramada Ballroom 2, 2F	Ramada Ballroom 3, 2F	Biyang Room, 2F
Session	Technical T-We4	Technical T-We5	Technical T-We6
Topic	PI & SI	Automotive EMC	Antenna & Propagation
14:00-14:20	T-We4-1	T-We5-1	T-We6-1
14:20-14:40	T-We4-2	T-We5-2	T-We6-2
14:40-15:00	T-We4-3	T-We5-3	T-We6-3
15:00-15:20	T-We4-4	T-We5-4	T-We6-4
15:40-16:10	Coffee Break		
16:10-16:30	T-We4-5		T-We6-5
16:30-16:50	T-We4-6		T-We6-6
16:50-17:10	T-We4-7		



Tuesday, May 17, 2011 – Afternoon Schedule / 13:00~17:10

Technical T-Tu1 EMC on System

Ramada Ballroom 2, 2F | 13:00~17:10

Chair : Toshio Sudo, Shibaura Institute / Jae-Hyun Lee, Chungnam National University

13:00~13:20 | T-Tu1-1

- **EMC Expert System for Architecture Design**

Marcel van Doorn

Philips Electromagnetics Competence Center, Eindhoven, Netherlands

13:20~13:40 | T-Tu1-2

- **A Time-Domain System for CISPR 16-1-1 Compliant Measurements above 1 GHz**

Christian Hoffmann, Peter Russer

Technische Universität München, Munich, Germany

13:40~14:00 | T-Tu1-3

- **Prediction of Noise Coupling Mechanism from External Digital Interconnect to Antenna System**

Hee-do Kang, Tong-Ho Chung, Il-Young Oh, Jong-Gwan Yook

Yonsei University, Seoul, Korea

14:00~14:20 | T-Tu1-4

- **Mode-equivalent Modelling of System Consisting of Transmission Lines with Different Imbalance Factors**

Yoshitaka Toyota¹, Kengo Iokibe¹, Ryuji Koga¹, Tetsushi Watanabe²

1 Okayama University, Okayama, Japan

2 Industrial Technology Center of Okayama Prefecture, Okayama, Japan

14:20~14:40 | T-Tu1-5

- **Transmitted Signal Analysis in Multiplexing Transmission Lines**

Gyu-Yeol Kim, Jongmin Kim, Wansoo Nah

Sungkyunkwan University, Suwon, Korea

14:40~15:00 | T-Tu1-6

- **Influence of the PCB Dielectric Material on the Coupling of PCB Traces to Enclosure Cavities**

Christian Poschalko¹, Siegfried Selberherr²

1 Robert Bosch AG, Vienna, Austria

2 Technische Universität Wien, Vienna, Austria

15:30~15:50 | T-Tu1-7

- **Analysis of Multilayer PCB Resonance and Enclosure Aperture Radiation**

Hwan Su Yoo¹, Hyoung Seok Jang², Soong Keun Lee¹, Jae Hyun Lee¹, Dong Chul Park¹

1 Chungnam National University, Daejeon, Korea

2 Hyundai Mobis, Yongin, Korea

15:50~16:10 | T-Tu1-8

• Impact of Bend Routing on Radiated Emission from Differential Signal Pairs

Hongmei Fan¹, Xiaoxia Zhou¹, Alpesh Bhobe², Jinghan Yu¹, Hailong Zhang¹, Philippe Sochoux²

1 Cisco Systems (China) R&D Co., Ltd., Shanghai, China

2 Cisco Systems, Inc., San Jose, USA

16:10~16:30 | T-Tu1-9

• Study of Effectiveness of Edge-Mounted Capacitors on High-Speed Board Emission

Wei-Shan Soh¹, Weng-Yew Chang, Richard², Lin-Biao Wang¹, Kye-Yak See¹

1 Nanyang Technological University, Nanyang, Singapore

2 DSO National Laboratories, Park Drive, Singapore

16:30~16:50 | T-Tu1-10

• PCB Edge Structure for Reducing Radiated Emission

Ha Yeon Kim, Haeng Seon Lee

Sogang University, Seoul, Korea

16:50~17:10 | T-Tu1-11

• Equivalent Circuit for Common Mode Current and Some Applications

Umberto Paoletti, Takashi Suga, Hideki Osaka

Hitachi, Ltd., Yokohama, Japan

Technical T-Tu2 Fundamental EMC

Ramada Ballroom 3, 2F | 13:00~16:50

Chair: Erping Li, A*STAR IHPC / Yeon-Choon Chung, Seokyeong University

13:00~13:20 | T-Tu2-1

• Current Status of Standardization related to Electromagnetic Compatibility and Functional Safety

Bernd W. Jaekel¹, Aleksandra V. Miroshchinskaya²

1 Siemens AG, Erlangen, Germany

2 University Graz, Graz, Austria

13:20~13:40 | T-Tu2-2

• Design of the Radar Absorbing Structure for Wind Turbine Blades

Jin-Bong Kim, Jung-Eun Nam

KIMS, Changwon, Korea

13:40~14:00 | T-Tu2-3

• Approximation Methods in Insertion Loss Analysis of Transmission Line Crossing a Rectangular Aperture in an Infinite Ground Plane

Sung-Woo Jung¹, Jung-Hi Jin², Beom-Jin Choi³, Ki-Chai Kim¹

1 Yeungnam University, Gyeongsan, Korea

2 Korea Electromagnetic Research, Daejeon, Korea

3 KATECH, Cheonan, Korea



14:00~14:20 | T-Tu2-4

- **The Interference Effect of Radiated Emissions below 30 MHz from PDP TV onto AM and SW Broadcasting Reception**

Jungyu YANG¹, Hongsik Keum²
1 RRA, Seoul, Korea
2 RAPA, Seoul, Korea

15:30~15:50 | T-Tu2-5

- **Transient Responses of 3-D PEC Composites Illuminated by an EMP**

Ming-Da Zhu¹, Xi-Lang Zhou¹, Wen-Yan Yin^{2,1}
1 Shanghai Jiao Tong University, Shanghai, China.
2 Zhejiang University, Hangzhou, China

15:50~16:10 | T-Tu2-6

- **An Improved Method for Evaluating Low-frequency Shielding Performance of 3D Conductive Plates**

Y. Du, Nenghou Xia, Mingli Chen
The Hong Kong Polytechnic University, Hong Kong

16:10~16:30 | T-Tu2-7

- **Modified Theory of Physical Optics and Applications**

Mücahit Sarnik, Ugur Yalçın
Uludağ University, Görükle-BURSA, Türkiye

16:30-16:50 | T-Tu2-8

- **Investigation on Electromagnetic Responses of Wire-Surface Composite Objects Illuminated by an EMP using Hybrid TDPO-MOT Method**

Wei Luo¹, Ming-Da Zh¹, Jun-Fa Mao¹, and Wen-Yan Yin^{2,1}
1 Shanghai Jiao Tong University, Shangha, China
2 Zhejiang University, Hangzhou, China

Technical T-Tu3 EMC on PKG & Semicon

Ramada Ballroom 4, 2F | 13:00~17:10

Chair : Sonia Ben Dhia, INSA de Toulouse / Wansoo Nah, Sungkyunkwan University

13:00~13:20 | T-Tu3-1

- **The Effects of Substrate Doping Density on The Electrical Performance of Through-Silicon-Via (TSV)**

Hanfeng Wang, Jingoek Kim, Yiyu Shi, Jun Fan
Missouri University of Science and Technology, Rolla, USA

13:20~13:40 | T-Tu3-2

- **GHz EMI Generator in 3D Stacked Chip-PDN with Through Silicon Via (TSV) Connections**

Jun So Pak¹, Jonghyun Cho¹, Joohee Kim¹, Kiyoung Kim¹, Heegon Kim¹, Joungno Kim¹, Junho Lee²,
Hyungdong Lee², and Kunwoo Park²
1 KAIST, Daejeon, Korea
2 Hynix Semiconductor Inc. Icheon, Korea

13:40~14:00 | T-Tu3-3

• Vein Power Plane for Printed Circuit Board Based on Constructed Vein Tree

Hui - Fen Huang, Shi - yun Liu, Qing - Xin Chu
South China University of Technology, Guangzhou, China

14:00~14:20 | T-Tu3-4

• Modeling and Analysis of Power Supply Noise Effects on Analog-to-Digital Converter with Off-chip PDN Effects

Bumhee Bae, Yujeong Shim, Myunghoi Kim, Jonghyun Cho, and Joungho Kim
KAIST, Daejeon, Korea

14:20~14:40 | T-Tu3-5

• Magnetoresistive Sensor Readout Circuit and Field Canceling System in Next Generation Nano-Fab

Feng-Chang Chuang^{1,2}, Ching-Yuan Yang¹, Yu-Lin Song³, Chwen Yu⁴, Sen-Gui Shsu², Tzyh-Ghuang Ma⁶,
Tzong-Lin Wu², Luh-Maan Chang²

1 National Chung Hsing University, Taichung, Taiwan.

2 National Taiwan University, Taipei, Taiwan

3 Yen Tjing Ling Industrial Research Institute, Taipei, Taiwan

4 Taiwan Semiconductor Manufacturing Company, Ltd., Hsinchu, Taiwan

5 National Taiwan University of Science and Technology, Taipei, Taiwan

15:30~15:50 | T-Tu3-6

• Effect of Electromagnetic Interference (EMI) on the DC Shift and Harmonic Performance of DIODE-Connected NMOSFET

Muhammad Taher Abuelma'atti¹, Ali Muhammad Taher Abuelmaatti²
1 King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia
2 RFMD (UK) Ltd., County Durham, U.K.

15:50~16:10 | T-Tu3-7

• Estimation of Vertical Noise Coupling on 900MHz Low Noise Amplifier from 200MHz On-chip Switching-mode Power Supply in 3D-IC

Kyoungchoul Koo, Myunghoi Kim, Sangrok Lee and Joungho Kim
KAIST, Daejeon, Korea

16:10~16:30 | T-Tu3-8

• Investigations on the Suitability of Reverberation Chambers for Radiated EMC Testing of Integrated Circuits

Ralf Heinrich, Robert Bechly
Teseq GmbH, Berlin, Germany

16:30~16:50 | T-Tu3-9

• Development of an Immunity Model of a Phase-Locked Loop

A. Boyer, B. Li¹, S. Ben Dhia¹, C. Lemoine¹, B. Vrignon²
1 INSA de Toulouse, University of Toulouse, Toulouse, France
2 Freescale Semiconductor, Toulouse, France



16:50~17:10 | T-Tu3-10

• **Bulk Current Injection modeling and validation on passive loads and an active circuit**

Bertrand Vrignon¹, Mikael Deobarro¹, Alexandre Boyer², Sonia Ben Dhia²

¹ Freescale Semiconductor, Toulouse, France

² INSA-LATTIS, University of Toulouse, Toulouse, France

Wednesday, May 18, 2011 – Morning Schedule / 09:00~12:00

Technical T-We1 Lightning & Power System

Ramada Ballroom 2, 2F | 09:00~12:00

Chair : Yoshino BaBa, Doshisha Univ. / Dongshik Shin, LG

09:00~09:20 | T-We1-1

- **Development of A Wideband Transient Electric Field Sensor**

Zhang Xiaoming¹, Meng Cui¹, Wei Ming², Liu Shanghe²

1 Tsinghua University, Beijing, China

2 Institute of Electrostatic & Electromagnetic Protection Ordnance Engineering College, Shijiazhuang, China

09:20~09:40 | T-We1-2

- **A Simplified Model of Corona Discharge on an Overhead Wire for FDTD Simulations**

Tran Huu Thang¹, Yoshihiro Baba¹, Naoto Nagaoka¹, Akihiro Ametani¹, Jun Takami², Shigemitsu Okabe²
Vladimir A. Rakov³

1 Doshisha University, Kyoto, Japan

2 Tokyo Electric Power Company, Kanagawa, Japan

3 University of Florida Gainesville, FL, USA

09:40~10:00 | T-We1-3

- **Modeling and Calculation for Conductive Coupling Caused by Lightning Over-voltage in Substation Based on Numerical Inverse Laplace Transform**

Zhong-yuan Zhang, Shuai Tang, Shi-peng Bian

School of Electrical and Electronic Engineering, North China Electric Power University, Baoding, China

10:00~10:20 | T-We1-4

- **The Field of Power/Ground Planes influenced by the HPEM Source, and its Damage Reduction**

Sungtek Kahng

Incheon University, Incheon, Korea

10:40~11:00 | T-We1-5

- **Micro-Air gap Velocity Effect of Inter-electrode on Parameters**

Fangming Ruan¹, Rui Zhang², Tomasz Dlugosz³, Feng Zhou², Xiaolu Wang¹, Liang Wu¹

1 Guizhou Normal University, Guiyang, China

2 Communication Metrology Center, Ministry of Industry & Informatization of China, Beijing, China

3, Wroclaw University of Technology, Wroclaw, Poland

11:00~11:20 | T-We1-6

- **Electromagnetic Numerical and Experimental Study for Optimizing the Lightning Protection System of the SOYUZ Launching Pad in Kourou**

E. Bachelier, F. Issac, S. Bertuol, JP. Parmantier

ONERA, Toulouse, France



11:20~11:40 | T-We1-7

• Detection Efficiency of A Regional Lightning Location Network in China

Mingli Chen¹, Yaping Du¹, Dong Zheng², Yijun Zhang²

1 The Hong Kong Polytechnic University, Hong Kong, China

2 Chinese Academy of Meteorological Sciences, Beijing, China

11:40~12:00 | T-We1-8

• EMC in Power Systems including Smart Grid

William A. Radasky¹, Alex McEachern², Magnus Olofsson³

1 Metatech Corporation, Goleta, CA, USA

2 Power Standards Lab, Alameda, CA, USA

3 Swedish National Electrical Safety Board, Kristinehamn, Sweden

Technical T-We2 EMC Measurement

Ramada Ballroom 3, 2F | 09:00~11:40

Chair : Wei Xing Chang, Zhejiang University / Ki-Chai Kim, Yeungnam University

09:00~09:20 | T-We2-1

• A New Method for Measuring of Complex Near Electromagnetic Field on PCB

Toshihiro Takatsu¹, Fengchao Xiao¹, Yoshio Kami¹, Kimitoshi Murano²

1 The University of Electro-communications, Tokyo, Japan

2 Tokai University, Kanagawa, Japan

09:20~09:40 | T-We2-2

• Conditional use of Spectrum Analyzers for EMI Compliance Measurements

Jens Medler

Rohde & Schwarz GmbH & Co. KG, Munich, Germany

09:40~10:00 | T-We2-3

• A Measurement Method for 2-D EMF Distributions Using Infrared Tracker

Ken Sato, Hiroaki Kawata, Yoshitsugu Kamimura

Utsunomiya University, Utsunomiya, Japan

10:00~10:20 | T-We2-4

• Design of Radiated EMI Analysis System in GTEM cell Based on Lab VIEW*

Rong Rong¹, Wei Yan^{1,2}, Pengchao Chu¹, Yang Zhao^{1,3}, Zhiyi zhu¹, Lingxiang Deng⁴, Lei Zhou⁴

1. Nanjing Normal University, Nanjing, China

2. Suzhou 3cTest Electronic Co., Ltd, Suzhou, China

3. Southeast University, Nanjing, China

4. Jiangsu Metrology Institute of Science & Technology, Nanjing, China

10:40~11:00 | T-We2-5

• Analysis of Reference Site Method in Korean OATSs

Seungwoo Lee¹, Nam Kim¹, Jungyu Yang², Bohyun Kim³

1 Chungbuk National University, Cheongju, Korea

2 RRA, Seoul, Korea

3 RAPA, Seoul, Korea

11:00~11:20 | T-We2-6

• Radiated Emissions Measurements in an Open Area Test Site

Dennis Handlon

Agilent Technology, Santa Rosa, USA

11:20~11:40 | T-We2-7

• Effect of a Shelter on SVSWR Validation at OATS

Jungyu Yang¹, Seungwoo Lee², Hongsik Keum³, Nam Kim²

1 RRA, Seoul, Korea

2 Chungbuk National University, Cheongju, Korea

3 RAPA, Seoul, Korea

Technical T-We3 EMC on Bio-Medical

Ramada Ballroom 4, 2F | 09:00~12:00

Chair : Fukuro Koshiji, Tokyo University / Nam Kim, Chungbuk National University

09:00~09:20 | T-We3-1

• Magnetic Field Analysis and Lumped Inductance Extraction for Wireless Power Transfer in Implanted Medical Devices

Mauro Feliziani, Valerio De Santis

University of L'Aquila, L'Aquila, Italy

09:20~09:40 | T-We3-2

• Conservative Estimation of Whole-Body Averaged SAR in Grounded Human Models for Plane Wave Exposure at Resonant Frequencies

Akimasa Hirata¹, Kazuya Yanase¹, Osamu Fujiwara¹, Tomoaki Nagaoka², Soichi Watanabe²

1 Nagoya Institute of Technology, Nagoya, Japan

2 National Institute of Information and Communications Technology, Tokyo, Japan

9:40~10:00 | T-We3-3

• Propagation of UWB Electromagnetic Noise Due to Electrostatic Discharge on the Human Body

Akimasa Hirata, Toshihiro Nagai, Teruyoshi Koyama, Osamu Fujiwara

Nagoya Institute of Technology, Nagoya, Japan



10:00~10:20 | T-We3-4

- **Investigations Concerning Far-Field to Near-Field Relations in the Frequency Range 30 – 1000 MHz
Assessment with regard to the Generic Standard IEC 62311**

Bernd W. Jaekel¹, Ana Mladenovic², Mirjana Peric², Dusan Vuckovic², Slavoljub Aleksic²

1 Siemens AG, Erlangen, Germany

2 University of Nis, Nis, Serbia

10:40~11:00 | T-We3-5

- **Application of Improved Multi-scale Sample Entropy Method to Analyze the Complexity of Red Blood Cell's Flickering with the Effect of Aging and ELF Exposure**

Chen Zhang¹, Congsheng Li², Yu Li³, Tongning Wu¹

1 M.I.I.T, Beijing, China

2 Beijing Information Science and Technology University, Beijing, China

3 Beijing University of Aeronautics & Astronautics Science and Technology University, Beijing, China

11:00~11:20 | T-We3-6

- **Effect of Extremely Low Frequency Electromagnetic Fields on Levels of Intracellular Reactive Oxygen Species and Gene Expression Profile in MCF10A Cells**

Mi-Na Hong¹, Bong-Cho Kim¹, Yun-Sil Lee², Yoon-Myung Gimm³, Sung-Ho Myung⁴, Jae-Seon Lee¹

1 KIRAMS, Seoul, Korea

2 Ewha womans university, Seoul, Korea

3 Dankook University, Yongin, Korea

4 KERI, Changwon, Korea

11:20~11:40 | T-We3-7

- **On the Construction of Physics-inspired Integral Representations for the Dirac δ -Function in EMC Applications (Invited)**

Alireza Baghai-Wadji^{1,2}

1 RMIT University, Melbourne, Australia

2 BIT, Beijing, China

11:40~12:00 | T-We3-8

- **On the Genesis of Differential Operators in EMC Applications (Invited)**

Alireza Baghai-Wadji^{1,2}

1 RMIT University, Melbourne, Australia

2 BIT, Beijing, China

Wednesday, May 18, 2011 – Afternoon Schedule / 14:00~17:10

Technical T-We4 PI & SI

Ramada Ballroom 2, 2F | 14:00 ~ 17:10

Chair : James L. Drewniak, MUST /Jong-Gwan Yook, Yonsei University

14:00~14:20 | T-We4-1

- **F/2-Rule: In-Depth Jitter Analysis from Spectral, Noise, and System Perspectives**

Lian Nee Soh, Joseph Kho, Chee Seong Fong
Altera Corporation (M) Sdn Bhd, Penang, Malaysia

14:20~14:40 | T-We4-2

- **A Hybrid CIM/MoM Approach for Power Plane Analysis Including Radiation Loss**

Xiaomin Duan, Renato Rimolo-Donadio, Heinz Dietrich Brüns, Christian Schuster
Technische Universität Hamburg-Harburg, Hamburg, Germany

14:40~15:00 | T-We4-3

- **Crosstalk Analysis of Sufficiently Separated Two Sets of Coupled Trace Pair Over Ground Split**

Seiji Torigoe¹, Fengchao Xiao¹, Yoshio Kami¹, Kimitoshi Muro²
1 The University of Electro-Communications Tokyo, Japan
2 Tokai University, Kanagawa, Japan

15:00~15:20 | T-We4-4

- **Quantifying High-Speed Channel Performance Using A Novel Time-Domain Convolution Method**

Dazhao Liu¹, Jun Fan¹, Jue Chen², Zhiping Yang²
1 Missouri University of Science and Technology, Rolla, USA
2 Cisco Systems, Inc. San Jose, CA, USA

16:10~16:30 | T-We4-5

- **A Wide-band Passive Equalizer Design Using Multi-layer PCB Parasitics for 30 Gbps Serial Data Transmission**

Eakhwan Song¹, Jiseong Kim¹, Heegon Kim¹, Joungho Kim¹, Jeonghyeon Cho²
1 KAIST, Daejeon, South Korea
2 Samsung Electronics Co., Ltd, Suwon, Korea

16:30~16:50 | T-We4-6

- **Equivalent Circuit Model for Modeling Via-Stripline Transition in Multilayered Electronic Packages**

Zaw Zaw Oo¹, En-Xiao Liu¹, Xingchang Wei¹, Erping Li¹, Yao-Jiang Zhang²
1 A*STAR IHPC, Singapore
2 Missouri University of Science and Technology, Rolla, USA

16:50~17:10 | T-We4-7

- **Enhancement of Signal Integrity in Asymmetric Branch Structure for High-Speed Digital Circuits**

Tae-Lim Song, Hee-do Kang, Tong-Ho Chung, Jong-Gwan Yook
Yonsei University, Seoul, Korea



Technical T-We5 Automotive EMC

Ramada Ballroom 3, 2F | 14:00 ~ 15:20

Chair : Todd H. Hubing, Clemson University / Seungyoung Ahn, KAIST

14:00~14:20 | T-We5-1

- **Analysis of Radiated Emission Characteristic Generated from an Electric Railway System**

Jungyu Yang¹, Jaehyun Oh², Hongsik Keum²

1 RRA, Seoul, Korea

2 RAPA, Seoul, Korea

14:20~14:40 | T-We5-2

- **Modeling, Simulation, and Measurement of Common-Mode Current for Automotive Electromagnetic Compatibility**

Shingo Okada¹, Takanori Uno², Hideki Asai¹

1 Shizuoka University, Hamamatsu, Japan

2 Denso Corp., Kariya, Japan

14:40~15:00 | T-We5-3

- **Analysis of Switching Noise and Radiation of Aperture and Cable**

Han Ol Choi¹, Eun Ha Kim², Dong Chul Park¹, Jae Hyun Lee¹

1 Chungnam National University, Daejeon, Korea

2 KATECH, Chonan, Korea

15:00~15:20 | T-We5-4

- **Improved Direct Power Injection Model of 16-bit Microcontroller for Electromagnetic Immunity Prediction**

Xuelian Gao, Congying Tian, Liyuan Lao, Jufang Wei, Yinghong Chen, Yanyu Chen

North China Electric Power University, Beijing, China

Technical T-We6 Antenna & Propagation

Biyang room, 2F | 14:00 ~ 16:50

Chair : Tzong-Lin Wu, NTU / Sungtek Kahng, Incheon University

14:00~14:20 | T-We6-1

- **Novel Approximate Electromagnetic Formulations to Estimate the Performance of Parabolic Reflector Antennas**

Shih-Chung Tuan¹, Hsi-Tseng Chou²

1 Oriental Institute of Technology, Pan-Chiao, Taiwan

2 Yuan Ze University, Chung-Li, Taiwan

14:20~14:40 | T-We6-2

- **Development of VHF and UHF Ferrite Fin Absorber Panel for Buildings and Evaluation with Edge Diffraction Treatment**

Toshihiro Yamane^{1,2}, Atsuhiko Nishikata²

1 Shimizu Corp., Tokyo, Japan

2 Tokyo Institute of Technology, Tokyo, Japan

14:40~15:00 | T-We6-3

- **A novel Multi-band CPW-fed Antenna with Band-passed and -notched Characteristics for WLAN/UWB Application**

Li Xiao, Nam Kim, Seungwoo Lee

Chungbuk National University, Chungbuk, Korea

15:00~15:20 | T-We6-4

- **CPW-fed Circular Slot Monopole Antenna with a Band-notch Structure for UWB Applications**

Mohsen Hosseini-Varkiani, Farokh Hojat-Kashani

Islamic Azad University, Tehran, Iran

16:10~16:30 | T-We6-5

- **Microwave Application using Rectangular Barium Strontium Titanate (BST) Dielectric Ceramic Array Antenna**

F.H. Wee, F. Malek

Universiti Malaysia Perlis, Perlis, Malaysia

16:30~16:50 | T-We6-6

- **Study of the Organic Semiconductor Thin Film Device Embedded Into A Patch Antenna**

Chia-Ching Chu¹, Lih-Shan Chen¹, Hsien-Chiao Teng¹, Yu-Jung Huang¹, Shen Cherng²

1 I-Shou University, Kaohsiung County, Taiwan.

2 Chengshiu University, Kaohsiung County, Taiwan



Poster Session

Tuesday, May 17, 2011	
Room	Convention Lobby, 2F
17:30-18:30	Poster Session I
Wednesday, May 18, 2011	
Room	Convention Lobby, 2F
13:00-14:00	Poster Session II

Tuesday, May 17, 2011 – Afternoon Schedule / 17:30~18:30

Poster Session I
Convention Lobby, 2F
 Chair : Hiroshi Inoue, Akita University / Jun So Pak, KAIST

Poster I-1

- **Radiated EMI Analysis for CMOS Camera Module with TEM Cell and Far-field Testing**
 Han-Nien Lin¹, Jing-Ting Cheng¹, Jian-Li Dong², Jay-San Chen²
 1 Feng-Chia University, Taichung, Taiwan
 2 M.O.E.A, Taipei, Taiwan

Poster I-2

- **Design and Characteristic Analysis of TEM Cell for IC and Module EMC Testing**
 Han-Nien Lin¹, Ming-Feng Cheng¹, Han-Chang Hsieh², Jay-San Chen²
 1 Feng-Chia University, Taichung, Taiwan
 2 M.O.E.A, Taipei, Taiwan

Poster I-3

- **Material Measurement by the Waveguide-Penetration Method Calibrated using a inimum Number of Reference Materials**
 Alfred Kik, Atsuhiko Nishikata
 CRADLE Tokyo Institute of Technology, Tokyo, Japan

Poster I-4

• Design of High Sensitivity Near-Field Probe and Application on IC EMI Detection

Han-Nien Lin¹, Chung-Shun Chang¹, Gang-Wei Cao², Cheng-Chang Chen², Jay-San Chen²

1 Feng-Chia University, Taichung, Taiwan

2 M.O.E.A, Taipei, Taiwan

Poster I-5

• Non-destructive Slot Splitting Methods for Reducing Penetration Electromagnetic Fields

Byoung Jin Lim¹, Jun Ho Cho², Ki Chai Kim¹, Sung Min Lim³

1Yeungnam University, Gyeongsan, Korea

2 KATECH, Chonan, Korea

3 SL Corp., Gyeongsan, Korea

Poster I-6

• Influence Analysis of LCD Modules Noise on Performance of 802.11b

Han-Nien Lin, Ming-Cheng Chang, Jia-Li Chang

Feng-Chia University, Taichung, Taiwan

Poster I-7

• Lumped Parameter Modeling of Transformer windings under VFTO

Juan Du, Guishu Liang, Haifeng Sun, Xin Liu, Xixiao Liu

North China Electric Power University, Hebei, China.

Poster I-8

• Design of Miniaturized Thin Metamaterial Absorber for 2 GHz Frequency Band

Hongmin Lee, Taejun Jo

Kyonggi University, Suwon, Korea

Poster I-9

• Analysis on Electric Field Distribution of $\pm 1000\text{kV}$ DC Wall Bushing during Polarity Reversal

Li Zhang¹, Yudi Cong¹, Pan Gong¹, Qingmin Li¹, Yongchao Liu²

1 Shandong University, Jinan, China

2 SEPCO, Jinan, China

Poster I-10

• Analysis and Proposal of a Protocol to measure the Levels of Radiation Emitted by Cell Phone Base Stations

Emmanuel Abundis Gutiérrez, Leonardo Soto Sumuano

University of Guadalajara, Zapopan. México

Poster I-11

• Modeling of FBGA Package for High Performance Digital System

Bo Pu¹, June-Sang Lee¹, Jongmin Kim¹, Wansoo Nah¹, Myoungcho Cha², Hyouk Lee²

1 Sungkyunkwan University, Suwon, Korea

2 HANA Micron Inc., Asan, Korea



Poster I-12

- **Implementation of LTCC-MCM to reduce PDP EMI**

Dongshik Shin, Taehoon Oh
LG Electronics., Pyungtaik, Korea

Poster I-13

- **Measurement and Analysis of the Radiated Disturbance Level from the Plasma TV below 30 MHz**

Tae Heon Jang¹, Jong Hwa Kwon², Seung Keun Park²
1 KTL, Ansan, Korea
2 ETRI, Daejeon, Korea

Wednesday, May 18, 2011 – Afternoon Schedule / 13:00~14:00

Poster Session II

Convention Lobby, 2F

Chair : Wen Yan Yin, Zhejiang University / Jun Gyu Yang, RRA

Poster II-1

- **Complex Domain Analysis Method Based on EM Waving for Transmission Line Transient**

WANG Zezhong, PAN Chao, DONG Bo, ZHENG Qing
North China Electric Power University, Beijing, China

Poster II-2

- **The Effect of Conductor Parameters on the Lightning Protection Performance of ± 800 kV UHVDC Transmission Line**

Wei Shi, Xinchang Lv, Qingmin Li, Qiuqin Sun
Shandong University, Jinan, China

Poster II-3

- **Evaluation of EMI for BOP(Balance of Plant) of Fuel Cell Electric Vehicle(FCEV)**

Soonyong Lee, Wonbum Seo, Bongsik Kang, Jaehoon Choi
Hanyang University, Seoul, Korea

Poster II-4

- **Automotive Harness Length Effects on Conducted Emission**

Min Hee Nam¹, Seung Ryul Ryu¹, Dong Chul Park¹, Jae Hyun Lee¹
1 Chungnam National University, Daejeon, Korea
2 KATECH, Chunan, Korea

Poster II-5

• Standard Electromagnetic Interference (EMI) Measurement for Hybrid and Electrical Vehicles

Seungyoung Ahn¹, Heejae Lee¹, Jung-Gun Byun¹, Joungho Kim¹, Jungyu Yang², Young-Choul Lim³, Hongsik Keum³, Jae Man Song⁴

1 KAIST, Daejeon, Korea

2 RRA, Seoul, Korea

3 RAPA, Seoul, Korea

4 Busan Techno-Park, Busan, Korea

Poster II-6

• An observation of Hand Effects on Measurement of RF Strength in the HAC Evaluation of the Mobile Phones

Dong-Geun Choi¹, Chung-Sang Ryu¹, Sungtek Kahng², Do-Hwan Kwon, Sun-Goo Kim³, Chan-ho Jeong⁴, Jae-Hoon Choi⁵

1 RRA, Seoul, Korea

2 Incheon University, Incheon, Korea

3 EPIK,

4 LG Electronics, Seoul, Korea

5 Hanyang university, Seoul, Korea

Poster II-7

• Comparison of Specific Absorption Rate from UHF RFID Reader Antenna in Various Homogeneous Phantom Models

Sung-Sik Kong¹, Jae-Hoon Choi²

1 RRA, Seoul, Korea

2 Hanyang University, Seoul, Korea

Poster II-8

• Influence of Whole Body Exposure of 914 MHz RFID on Secretary Function of Thyroid System

Hye Sun Kim¹, Youn Ju Kim¹, Man Jeung Paik¹, Jin Young Shin¹, Gwang Lee¹, Yun-Sil Lee², Nam Kim³, Young Hwan Ahn¹

1 Ajou University School of Medicine, Suwon, Korea,

2 Ewha Womans University, Seoul, Korea

3 Chungbuk National University, Cheongju, Korea.

Poster II-9

• A Band-notched Broadband Monopole Antenna using Complementary Split Ring Resonator

Jang Yeol Kim, Nam Kim, Seungwoo Lee

Chungbuk National University, Cheongju, Korea

Poster II-10

• Design of Internal Multiband Monopole Antenna by using 3D Structure

Joo Hun Yang, Nam Kim, Seungwoo Lee

Chungbuk National University, Cheongju, Korea



Poster II-11

• Impact of PDN Impedance Peak on Signal Integrity of DDR3 System

Masato Kanazawa¹, Hayato Sasaki¹, Toshio Sudo¹, Atsushi Tomishima², Toshiyuki Kaneko³

1 Shibaura Institute of Technology, Tokyo, Japan

2 Toshiba Semiconductor, Kawasaki, Japan

3 Toppan NEC Circuit Solution Inc., Shibaura, Tokyo, Japan

Poster II-12

• Chip-Package-Board Modelling for LCD Driver IC

Koji Sakuma, Toshio Sudo

Shibaura Institute of Technology, Tokyo, Japan

Poster II-13

• Partial EBG Structures for Mitigating Noise Coupling through Cutout in Multilayer PCB Structures

Jong Hwa Kwon, Sang Il Kwak, Dong Uk Sim, and Hyung Do Choi

ETRI, Daejeon, Korea

Poster II-14

• Research on EM Simulation and Certification Tests of Digital Electronics Devices

Bong-sik Kang¹, Tae-seung Song², Jae-hoon Choi²

1 Hanyang University, Seoul, Korea

2 KTL, Ansan, Korea

Project Meeting

Project Meeting of IEC SC77C

Chuja room, 2F | 14:00 ~ 17:50 | Wednesday, May 18, 2011

Organized by William A. Radasky, Metatech

This Project Meeting is intended to update project members on the states of approached projects in IEC SC77C (EMC: High Power Transient Phenomena). Discussions dealing with IEMI, Immunity, test methods, HEMP Immunity test methods and protection methods are planned. IEC project experts and guests are invited.



iNARTE

Workshop and Events at APEMC 2011

Workshop

Ballroom 1, 2F | 08:00 ~ 12:00 | Monday, May 16, 2011

The iNARTE Examinations Preparation Tutorial will be valuable to those anyone interested in validating their expertise as an EMC or ESD professional. At the Workshop we will advise attendees as to the iNARTE certification process, and the format of our examinations. We will discuss the best approach to ensure success and provide some working examples of typical exam questions. There will also be presentations from two iNARTE regional Partners in Korea, RAPA and CORE Insight Inc. RAPA will discuss their EMC education and assistance programs and CORE will present their ESD programs. The last two hours of the Workshop will be devoted to a trial examination paper, where we will pose 24 typical questions. All attendees are invited to bring reference materials and laptop computers if planning to take this trial examination. There is no cost involved to take this trial exam.

Exhibition

Exhibition hall, 2F | 09:30~18:30 | Tuesday, May 17, 2011

Exhibition hall, 2F | 09:00~17:00 | Wednesday, May 18, 2011

iNARTE will be at an Exhibition Booth each day, together with representatives from both RAPA and CORE. We invite all our members and anyone interested in learning more about iNARTE and our Certification programs to come and visit us there. You can register for any of the Thursday Examinations at our Booth, if you have not previously registered. We will also have on display, and for purchase, books and CD's that may be used as Study Guides for the Examinations.

Brian Lawrence, Executive Director
lawrence@inarte.us

iNARTE, Inc.

840 Queen Street, New Bern, NC 28560
Phone : (252) 672-0200, 1-800-89-NARTE
Fax : (252) 672-0111 | Website : www.narte.org

Venue & Accommodations



Ramada Plaza Jeju

Website : <http://www.ramadajeju.co.kr/>

Address : 1255 Samdo 2-dong, Jeju City, Jeju-do, Korea

Tel : 82-64-729-8100, Fax : 82-64-729-8554

The Ramada Plaza Jeju Hotel was established on July 1, 2003, with a 100% investment by the Korea Teachers Credit Union. This internationally renowned deluxe resort-style business hotel was opened to raise management and its accommodation facilities to world class standards, and thus satisfy worldwide business travelers and tourists. Modeled after a deluxe cruise ship in Northern Europe, this floating hotel is located within five minutes' ride from both Jeju harbor and Jeju International Airport. It can be reached within an hour wherever you are on the Jeju Island. Visitors from home and abroad can experience the essence of Jeju culture enjoying the nearby spectacles of Chilsung-Ro street, Tap-dong outdoor performance hall, Sanjicheon, Yongduam, and Yongyeon bridge especially during the night time. Ramada is the first floating hotel in Korea, whose guest rooms make its guests have a unique experience of feeling as if they were on the sea. Each room boasts off its characteristics with high quality interior design. Various types of 380 guest rooms which command a magnificent view of mountains and the sea are in place awaiting their guests. Besides, attached facilities such as the convention center which can accommodate up to 1200 people, small and medium-sized seminar rooms, health club, indoor and outdoor swimming pools, and hot spa, etc. guarantee successful business transactions and comfortable amenities to its guests.

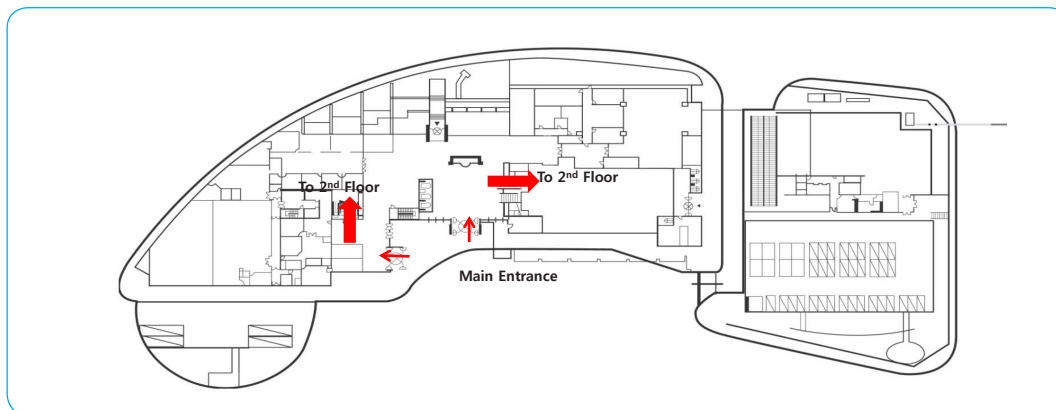
Internet

Free wireless internet available inside the Ramada Ballroom 1. Participants will have free access to the internet café at the Ramada Ballroom 1 on the 2F.

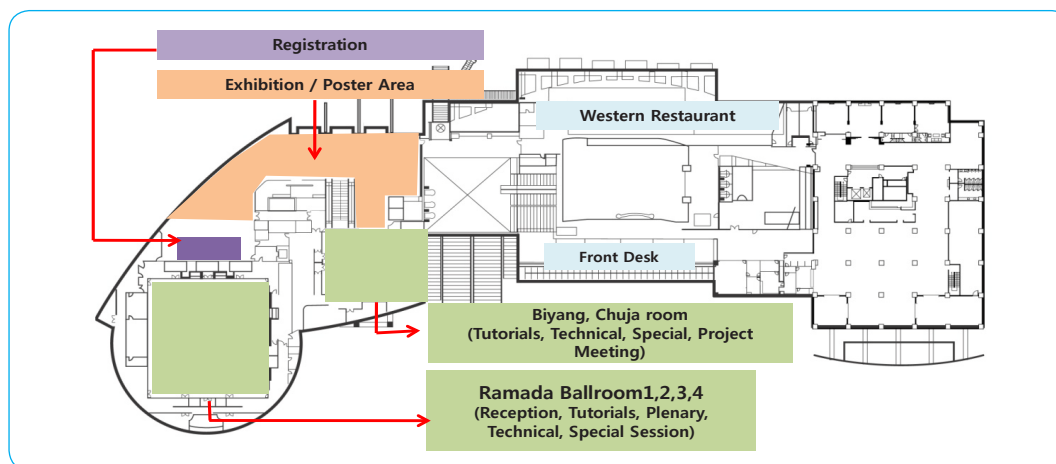


Venue Plans

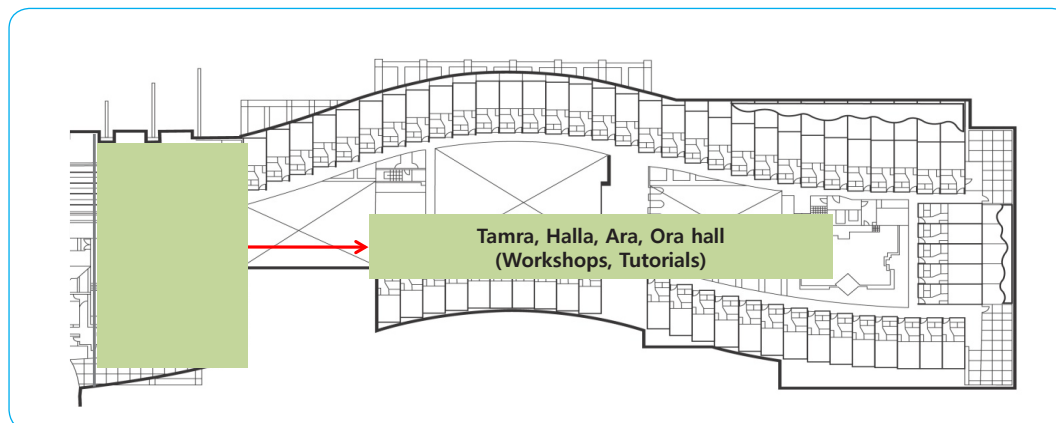
1st Floor



2nd Floor



8th Floor



Other Hotels



Jeju Pacific Hotel

Telephone: +82-64-758-2500

Fax: +82-64-758-2521

Address: 159-1, YONGDAM-1DONG, JEJUSI, SOUTH KOREA

Homepage: <http://www.jejupacific.co.kr>

Distance to venue: 10 minute walk



Robero Hotel

Telephone: +82-64-757-7111

Fax: +82-64-755-9001

Address: 57-2, SAMDO-1-DONG, JEJUSI, SOUTH KOREA

Homepage: <http://www.roberohotel.com>

Distance to venue: 10 minute walk



Registration

On-line registration is highly recommended at the official website of the APEMC 2011. If you want to register by e-mail or fax, you can make a payment by bank transfer, credit card. Notification of cancellation must be made in writing and sent to the congress secretariat by fax or e-mail before April 10, 2011.

E-mail : sejong3@sejongconvention.com / Fax : +82-2-783-3475

Registration Fee

Category	Before April 24, 2011		After April 24, 2011	
	Regular	Student	Regular	Student
For participant				
Full registration	\$550	\$275	\$610	\$310
Tutorial only	\$250	\$150	\$300	\$200
For accompanying person				
Welcome reception			\$35	
Banquet			\$85	
Lunch			\$23	

* Full registration fee includes Tutorial, Workshop, Welcome reception, Banquet, Lunch and Proceeding.

* Tutorial only registration fee includes Lunch and Tutorial materials.

Registration Hours

Admission to all sessions and hosted functions requires identification.

Please wear your name badge at all times.

Registration Desk is composed of Pre-Registration Desk and On-Site Registration Desk in front of Ramada Ballroom

- Sunday, May 15 15:00 ~ 18:00
- Monday, May 16 09:00 ~ 18:00
- Tuesday, May 17 08:30 ~ 18:00
- Wednesday, May 18 08:00 ~ 18:00
- Thursday, May 19 08:00 ~ 12:00

*** Symposium kit**

A Symposium kit will be served when you are registered. Please swap symposium kit coupon for symposium kit. It contains a final program book, proceeding (USB Flash Memory), Tutorial book, Workshop Book, Welcome reception, Banquet and Lunch Coupon will be in the name badge.

*** Name badges**

You are kindly requested to wear your name badge during all the session. Please note that admission to the all session rooms is strictly restricted to the registered participants wearing their badges. If you lose your badge, ask the registration desk for a new one.

Transportation



Taxi Information

The Venue (Ramada Plaza Jeju Hotel) and Hotels are located near Jeju International Airport.

The time getting to Venue is about 10 minute by Taxi from Jeju International Airport.

- * Distance from the Airport: About 3.8 km
- * Fee : about 3,500 KRW(USD \$3~\$4)

Shuttle Bus

During the symposium, free shuttle bus services will be provided for participants to commute between the Jeju Airport and Ramada Plaza Jeju Hotel (Conference venue.)

- * Bus stand : Parking lot 7
- * Required time : 10~15 min

Shuttle Bus Schedule

	Date	Time
Jeju Airport to Venue	5.15(Sun)	15:00
		16:00
		17:00
	5.16(Mon)	09:00
10:00		
11:00		
Venue to Jeju Airport	5.19(Thu)	17:40
		18:10
		18:40
	5.20(Fri)	08:00
		09:00
		10:00



Official & Social Program

Welcome Speech

Place : Ramada Ballroom 1, 2F | Time & Date : 09:30~09:50, Tuesday, 17 May, 2011

Plenary Speech

Place : Ramada Ballroom 1, 2F

P-Tu1 - Time & Date : 09:50~10:50, Tuesday, 17 May, 2011 | Speaker : Prof. Todd Hubing

P-Tu2 - Time & Date : 10:50~11:50, Tuesday, 17 May, 2011 | Speaker : Prof. Masao Taki

Welcome Reception

Place : Ramada Ballroom 1, 2F | Time & Date : 18:00~20:00, Sunday, May 15, 2011

Symposium participants are invited to mingle while enjoying the light food and drinks during the opening welcome reception.

Lunch

Place : Tammora, 1F (Korean Restaurant) / The Blue, 2F (Western Restaurant)

Time & Date : 12:00~13:00, Monday, May 16, 2011 | 11:50~13:00, Tuesday, May 17, 2011

12:00~13:00, Wednesday, May 18, 2011 | 12:00~13:00, Thursday, May 19, 2011

Every lunch will be prepared two different cuisine for your taste.

Coffee Break

Place : Convention Lobby, 2F

Time & Date : 15:00~15:30, Monday, May 16, 2011 | 15:00~15:30, Tuesday, May 17, 2011

10:20~10:40, Wednesday, May 18, 2011 | 15:40~16:10, Wednesday, May 18, 2011

15:00~15:30, Thursday, May 19, 2011

Banquet & Awards

Place : Ramada Ballroom 1 | Time & Date : 18:30~21:30, Tuesday, May 17, 2011

The highlight of the official & social program will be "Banquet". Also, the awards will be presented during the banquet.

Tutorial Speakers Lunch

Place : Tammora, 1F (Korean Restaurant) | Time & Date : 12:00~13:00, Monday, May 16, 2011

It will be served for tutorial speakers.

Plenary Speakers Lunch

Place : Tammora, 1F (Korean Restaurant) | Time & Date : 11:50~13:00, Tuesday, May 17, 2011

It will be served for plenary speakers.

Organizing Committee Dinner

Place : Ora room, 8F | Time & Date : 18:00~21:00, Wednesday, May 18, 2011

It will be served for organizing committee of APEMC 2011.

Speaker Guide

Oral Presentation

1. Prepare your Presentation

- 1) All oral presentation materials should be prepared in English.
- 2) Each oral presentation is limited to 20 minutes including Q&A's and changeover to the next speaker.
- 3) Power Point format or Adobe Acrobat format (PDF) is highly recommended.
- 4) All video clips should have WMV file format.
- 5) Each oral presentation materials should be uploaded to the equipped computer of each session room before the session starts. (USB memory stick and CD-R are acceptable)
- 6) Each oral presentation should be checked in the preview room before the session starts.
The preview room is open from Sunday 09:00~18:00 to Thursday 09:00~12:00
- 7) All presentation materials will be deleted after the session finishes.

2. Equipments in the session room

- 1) 1-Screen, 1-LCD Projector, 1-Window-based Laptop Computer, and 1-Laser Pointer
- 2) MS Windows XP Professional OS and MS Office 2007 are installed in the computer.
- 3) Private Laptop computers are not recommended for keeping each allocated time.

Poster Presentation

1. Prepare your poster

- 1) Available poster board size for each poster speaker is 110cm (height) x 90cm (width).
- 2) Each poster should have the title, all author names, and corresponding author's contact information of your paper.
- 3) There is no poster template, but it is recommended that 'APEMC 2011' is included in your poster.

2. Mount and demount your poster

- 1) Poster boards will be prepared at the convention lobby (2F) in front of Registration desk.
- 2) Each poster should be mounted and demounted following the designated times.
- 3) Your paper ID number will be posted on Poster boards.
- 4) The designated times are referred to the below time table.

3. Prepared materials for mounting your poster

- 1) Cellular tapes, pushpins, scissors, and etc.
- 2) Staffs around Poster board and Registration desk will help you if you are in trouble during mounting your poster
- 3) After demounting time, all posters on poster boards will be discarded without notice.




Session	Session Day	Mounting time	Presentation time	Demounting time
Poster Session I	17 May, 2011	14:30~17:30	17:30~18:30	18:30~19:30
Poster Session II	18 May, 2011	10:00~13:00	13:00~14:00	14:00~15:00



Tour Program




1. Theme Tour (Southwest Course)

Experience well-known Korean culture. Visit to the set of Korean famous movies and the museum O-sulloc, which has the fields of green tea mingled with Mountain Halla.

Time	09:00 – 17:30 Monday, 16 May				
Course	Oedolgae (Dae Jang Geum) → Yakchensa Temple (D-War) → Lunch → Teddy Bear Museum (Gung) → Mountain Song-ak (Dae Jang Geum) → O-sulloc				
Remarks	Lunch, entry fees and transportation included. English-speaking guide assistance along the tour.				
Price	More 10 persons	7~9 persons	5~6 persons	3~4 persons	2 persons
	KRW 85,000	KRW 95,000	KRW 115,000	KRW 160,000	KRW 255,000
<div style="display: flex; justify-content: space-around; align-items: center;">    </div>					

2. Theme Tour (East Course)

Jeju has become an even more popular destination since it has been the scenic set for several Korean TV dramas and movies. Jeju Island's diverse cultural attractions and breathtaking natural beauty draw many drama and filmmakers. An increasing number of tourists and newlyweds from Korea and around the world flock to this beautiful island to catch a glimpse of these much talked-about places. Take in the glamorous image of TV stars.

Time	10:00 – 17:30 Monday, 16 May				
Course	The Park Southern Land → Seongsan Ilchulbong → Lunch → Seopjikoji (All in) → Jeju Folk village museum(Dae Jang Geum)				
Remarks	Lunch(@ Seongsan Ilchulbong), entry fees and transportation included. English-speaking guide assistance along the tour.				
Price	More 10 persons	7~9 persons	5~6 persons	3~4 persons	2 persons
	KRW 95,000	KRW 105,000	KRW 130,000	KRW 170,000	KRW 265,000
<div style="display: flex; justify-content: space-around; align-items: center;">    </div>					

3. Jeju Olle Trekking (Route 7)

This route is a seaside walking trail beginning at Oedolgae Rock passing through Beophwan Pogu (port) and the Poonglim Resort. Pampas grass and wild flowers are abundant on this trail. One of the most loved points on the route is the Subong-ro (pathway) and Subong-gyo (bridge). They are named after Kim, Subong who built them himself. He used a shovel and picks to clear the road and moved big stones to make the bridge.

Time	10:00 – 16:00 Tuesday, 17 May				
Course	Oedolgae Rock → Dombenang Gil(street) → Street in Pension complex → Sewage disposal plant in Hogeun-dong(3.1Km) → Sokgol → Subong-ro(pathway)(3.81km) → Beophwan Pogu(port)(4.79km) → Dumony Mul → Ilgangjeong/Seogeon Island(7.75km) → Poonglim Resort(8.88Km) → Teddy Bear Museum				
Remarks	Lunch(@ Poonglim Resort), entry fees and transportation included. English-speaking guide assistance along the tour.				
Price	More 10 persons	7~9 persons	5~6 persons	3~4 persons	2 persons
	KRW 85,000	KRW 95,000	KRW 115,000	KRW 160,000	KRW 255,000



4. Luxury Yachting

Lurching at sudden winds and rocking on high tides, the yacht can be a unique experience! The view of the blue and magnificent ocean from Jeju is a beautiful sight, but the view of the Island from the ocean from the ocean will be an unforgettable sight also, experience the feeling of hope in a yacht on the coast of Jeju.

Time	10:00 – 16:00 Wednesday, 18 May				
Course	Yacht → Lunch → Seogwipo Recreational Forest				
Remarks	Lunch(@ Seafood Buffet), entry fees and transportation included. English-speaking guide assistance along the tour.				
Price	More 10 persons	7~9 persons	5~6 persons	3~4 persons	2 persons
	KRW 175,000	KRW 185,000	KRW 205,000	KRW 245,000	KRW 345,000

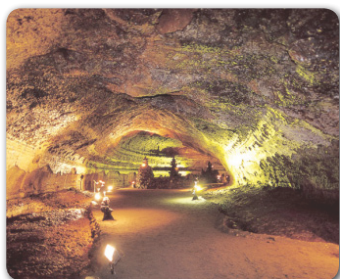




5. Natural Dyeing Experience

You are invited to discover the wonder of natural dyes for yourself. Indigenous natural sources including persimmon extract will help you gain first-hand knowledge about dyeing textiles. The beautiful hues obtained from natural dyes are said to become permanent and have a harmony and a depth that are missing from synthetic ones.

Time	13:00 – 18:00 Wednesday, 18 May				
Course	Ilchulland (Natural Dyeing Experience) → Seongup Jeju Folk Village				
Remarks	Entry fees and transportation included. English-speaking guide assistance along the tour. Experience fee is excluded.				
Price	More 10 persons	7~9 persons	5~6 persons	3~4 persons	2 persons
	KRW 70,000	KRW 80,000	KRW 105,000	KRW 145,000	KRW 240,000



6. World Heritage Tour

Jeju Island is the southernmost territory of the Republic of Korea. The island was formed from volcanic activities occurring at the end of the Tertiary Period. In other words, it was built up above the sea level as a result of volcanic activities that began about two million years ago. ‘Jeju volcanic Island and Lava Tubes’ were listed as the ‘World Natural Heritage’ of UNESCO in June, 2007.

Time	09:00 – 16:00 Thursday, 19 May				
Course	Geomunoreum Lava Tube → Seongsan Ilchulbong → Manjang Cave				
Remarks	Lunch(@ Seongsan Ilchulbong), entry fees and transportation included. English-speaking guide assistance along the tour.				
Price	More 10 persons	7~9 persons	5~6 persons	3~4 persons	2 persons
	KRW 80,000	KRW 90,000	KRW 115,000	KRW 155,000	KRW 250,000



7. Eco Tour

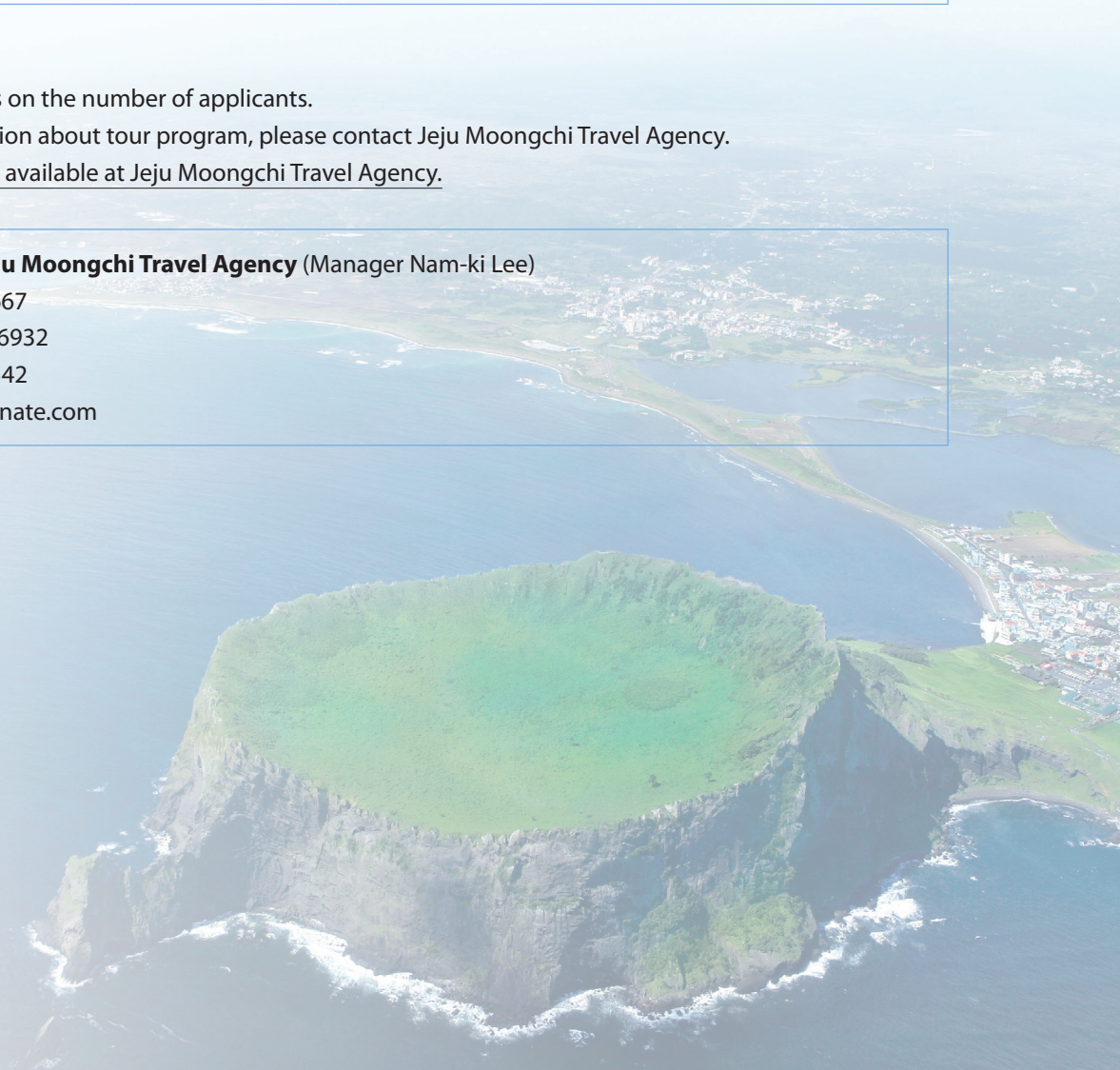
Passing by the aromatic fields of green tea, enjoying the well-kept plants delicately and feeling the breeze of Jeju Island on the top of Suwol-bong.

Time	13:00 – 18:00 Thursday, 19 May				
Course	Green Tea Field → Spirited Garden → Suwol-bong				
Remarks	Entry fees and transportation included. English-speaking guide assistance along the tour.				
Price	More 10 persons	7~9 persons	5~6 persons	3~4 persons	2 persons
	KRW 70,000	KRW 85,000	KRW 105,000	KRW 145,000	KRW 240,000



- * The price depends on the number of applicants.
- * For more information about tour program, please contact Jeju Moongchi Travel Agency.
- * Tour reservation is available at Jeju Moongchi Travel Agency.

Contact Point : Jeju Moongchi Travel Agency (Manager Nam-ki Lee)
 Tel : +82-64-724-8667
 Mobile : 010-7770-6932
 Fax :+82-64-724-7542
 E-mail : cute6932@nate.com





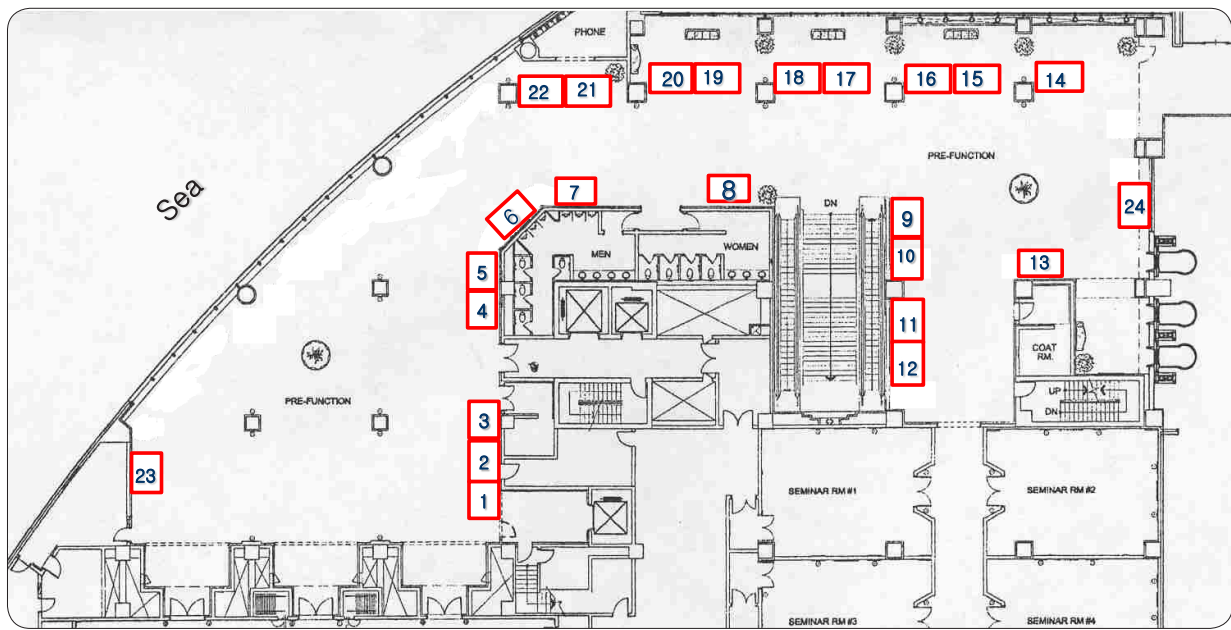
Exhibition

The exhibition will be held in the exhibition hall (Ramada Plaza jeju Hotel 2F)

Exhibition Hours

09:30~18:30 | Tuesday, May 17

09:00~17:00 | Wednesday, May 18



Exhibitors

Booth No.	Company Name	Booth No.	Company Name
1	CMS Technologies	13	SAFETY & EMC Magazine
2		14	Agilent Korea
3	EMF Safety	15	
4	AR RF/ Microwave Instrumentation TDK RF Solutions Inc. EMC Solutions Inc.	16	FRONTIS Corp.
5		17	
6		18	Rohde & Schwarz Korea LTD EM TEST AG
7	19		
8	CST of Korea	20	
9	Eretec Inc.	21	IEEE EMC Society
10		22	
11	iNARTE	23	Korea Radio Promotion Association (RAPA)
12	ETS-Lidgren	24	

Exhibitor Profiles

Agilent Korea Booth 14,15,16

<http://www.agilent.co.kr/>

Tel : +82-1588-5522 Fax : +82-2-2004-5522

Address : 25-12, Yeouido-dong, Youngdeungpo-gu, Seoul, Korea.

As the world's premier measurement company, Agilent is a technology leader in communications, electronics, life sciences and chemical analysis. The company's 19,000 employees serve customers in more than 110 countries. Agilent provides a full line of test tools used in EMC labs worldwide from handheld instruments to bench top systems and integrated solutions – helping you meet your immunity and emissions testing requirements for pre-compliance through full CISPR compliance.

Ansys Korea Booth 17

<http://ansys.co.kr>

Tel : +82-2-472-4703 Fax : +82-2-472-4704

Address : 448-8, Daseung Building 5F, Seungnae-dong, Gangdong-gu, Seoul, Korea

ANSYS, Inc. is one of the world's leading engineering simulation software providers. Its technology has enabled customers to predict with accuracy that their product designs will thrive in the real world. The Company's focus is to offer a common platform of fully integrated multiphysics software tools designed to optimize product development processes for a wide range of industries, including aerospace, automotive, civil engineering, consumer products, chemical process, electronics, environmental, healthcare, marine, power, sports and others. Applied to design concept, final-stage testing, validation and trouble-shooting existing designs, software from ANSYS can significantly speed design and development times, reduce costs, and provide insight and understanding into product and process performance. ANSYS software not only delivers efficiency, it drives innovation. The technology's ability to go beyond physical constraints and perform simulated tests that would otherwise not be possible is critical to exploring and expanding operational boundaries in developing leading-edge products and processes. In this way, modeling and simulation can be used to drive new solutions rather than to merely verify existing ones. ANSYS calls this process Simulation Driven Product Development™.

AR RF/ Microwave Instrumentation (EMC Solution Inc.) Booth 4,5

<http://www.ar-worldwide.com/> <http://www.emcs.co.kr/>

Tel : +1-888-933-8181 / +82-2-2168-3910 Fax : +1-866-859-0582 / +82-2-2168-3920

Address : 160 School House Rd. Souderton, PA 18964-9990 USA

604, Hyundai 41 Tower, 917-9, Mok-dong, Yangcheon-gu, Seoul, Korea

A R RF/Microwave Instrumentation is a manufacturer and distributor of high power broadband amplifiers from dc-45GHz, 1-50,000 watts that are well suited for radiated and conducted immunity testing as well as equally suitable for general laboratory use. Available are a full line of complimentary test accessories including antennas, directional couplers, field monitoring equipment, power meters, signal generators, EMI receivers and EMC test software. We also offer several RF conducted immunity generators and EMC test systems.

CMS Technologies Booth 1,2

<http://www.cms-tech.co.kr/>

Tel : +82-2-711-8290 Fax : +82-31-711-8431

Address : 1505, Parkview Tower, JeongJa-dong, Bundang-gu, Seongnam-city, Gyeonggi, Korea

Sigrity develops and globally supports advanced software analysis solutions to ensure power integrity and signal integrity in chips, packages and printed circuit boards; and physical design tools for single die and SiP implementations. Over 200 companies utilize Sigrity products as part of industry standard design flows and with layout tools from Cadence, Mentor Graphics, Zuken and other EDA suppliers. Sigrity solutions help companies overcome design challenges to reduce costly respins and get to market faster. Over 60% of Sigrity's 100+ employees are in research and development positions creating breakthrough solutions targeting real-world challenges.



CST of Korea Booth 8

<http://www.cst-korea.co.kr/>

Tel : +82-31-781-6866

Address : FC Building 4F, 173-2, Bundang-dong, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea.

CST is a world leader in computer simulation of radiated emissions and susceptibility. CST MICROWAVE STUDIO® TLM solver (Microstripes) and CST CABLE STUDIO™ Provide powerful features for complex EMC analysis including coupled simulations which allow for large system analysis and installed performance studies. Many years of in house expertise support the tools and give customers confidence in our simulation results. Contact us for free technical support and samples.

EM TEST AG Booth 21,22

<http://www.emtest.com>

Tel : +41-61-717-91-85

E-mail: a.straumann@emtest.ch

Address : Sternenhofstrasse 15, CH-4153 Reinach, Switzerland

EM Test is the world's leading supplier of EMC test instruments to virtually all industries. Our testers provide a wide range of capability from ESD, Surge, and avionics manufacturers. From test pulses, conducted RF or AF, programmable AC/DC sources, Harmonic & Flicker analyzers to special couplers, probes and cables, we have it all. Multiple software releases per year insure all EM Test instruments are up-to-date with the latest standards and requirements changes, and all software is Windows 7 compatible.

EMF Safety Booth 3

<http://emfsafety.koreasme.com/>

Tel : +82-2-793-7133 Fax : +82-2-793-1150

Address : Seventh Floor, Eongo Officetel, 72-17, Hannam 1 Dong, Youngsangu, Seoul, Korea

Safety Co., Ltd. was established as intramural venture company in Dankook Univ. with professors and other willing people as shareholder on June 2000. EMF Safety means human safety on electromagnetic field of machinery and equipments . We developed system to measure SAR that is generated from mobile phone, and delivered to several organizations such as government authority, university, industries, and certificate authority etc. And we performed electro wave policy research service (The Ministry of Labor Affairs, The Ministry of Information & Communication) and electromagnetic field environment measuring service (Korean National Railroad and other enterprises).

Eretec Inc. Booth 9,10

<http://www.eretec.com/>

Tel : +82-31-436-1100 Fax : +82-31-436-1110

Address : SK Ventium, 101-703, #522, Dangjeong-dong, Gunpo-si, Gyeonggi-do, South Korea.

Eretec Inc. supplies all kinds of test facility, measurement system and software worldwide such as EMC measurement chamber, Antenna (Cell phone, Radar, Aircraft, Military use, etc.) measurement chamber, EMC/Antenna/Transient measurement system and Software, etc. by being provided from foreign companies or by developing and manufacturing using our own technologies.

Currently not only the bright future industry RFID but also the safety for the microwave environment in the various Electronic, Electromagnetic, Automobile, Health, Environment Industry, etc. is getting lots of interest. The local technology in this field, however, has yet reached to the level of developed countries. So we will do our best to deeply study from EMC field to RFID, EMP, EME, TEMPEST and HPEM, etc. and develop its application technology and will provide upgraded customer support service based on the excellent technology.

ETS-Lindgren Booth 12

<http://www.ets-lindgren.com/>

Tel : +1-512-531-6400 Fax : +1-512-531-6500

Address : 1301 Arrow Point Drive, Cedar Park, Texas 78613 USA

ETS-Lindgren is the proven world leader for components and systems that measure, shield and control electromagnetic energy. We provide solutions for EMI/RFI/EMF test and measurement applications as well as medical, industrial and governmental RF shielding requirements. Our product line ranges from simple bench-top diagnostic tools to fully integrated turnkey facilities. ETS-Lindgren also offers Calibration Services Plus!™, a special service offering a fully customized calibration and repairs management program. ETS-Lindgren has more than 75 years of combined company experience and expertise. We were formed by joining a number of leading companies which pioneered many of today's widely accepted products and practices in our industry. Not surprisingly, ETS-Lindgren continues to maintain its reputation as a leader and innovator today.

FRONTIS Corp. Booth 18

<http://www.frontis.co.kr/>

Tel : +82-31-695-6988 Fax : +82-31-695-6988

Address : 101-1205, Digital Empire II, #486, Shin-dong, Yeongtong-gu, Suwoni, Gyeonggi-do, Korea

Reliability & Design Verification Total Solution

We have been constantly growing more than 170 percent of revenue every year, and strongly trying to establish new business relationship with overseas companies to secure high-end technology and superior quality items of Reliability.

IEEE EMC Society Booth 23

<http://www.ieee.org>

Tel : +1-732-981-0060 Fax : +1-732-562-6380

IEEE is the world's largest professional association dedicated to advancing technological innovation and excellence for the benefit of humanity. IEEE and its members inspire a global community through IEEE's highly cited publications, conferences, technology standards, and professional and educational activities.

iNARTE Booth 11

<http://www.inarte.us/>

Tel : +1-252-672-0200 Fax : +1-252-672-0111

Address: 840 QUEEN STREET, NEW BERN, NC 28560 USA

iNARTE, (eye-NAR-tee) is an independent, non profit organization, offers Certification Programs to validate the credentials of professional Engineers and Technicians in EMC/EMI disciplines. The purpose of iNARTE EMC Certification is to foster technical excellence in EMC engineering. Our programs establish competency criteria for EMC/EMI work. Our Certification benefits the individual practitioner and the entire EMC community by establishing a standard of excellence and recognition for those that achieve it.

Korea Radio Promotion Association (RAPA) Booth 24

<http://www.rapa.or.kr>

Tel : +82-2-317-6000

Address : 4F 160-4 Donggyo-dong Mapo-gu Seoul, 121-817 Korea

The Association was founded based on Radio Legislation Act#66 as a special corporation with an objective of contribute to fostering the development basis for the radio promotion by scheming an effective utilization of radio resource, preparing to the change of radio circumstance, strengthening the cooperation and bond between radio related enterprise, preparing a sound upbringing development of radio use technology by internationalization of radio industry and radio use technology standardization.



Rohde & Schwarz Korea LTD Booth 19,20

<http://www2.rohde-schwarz.co.kr/>

Tel : +82-2-3485-1900 Fax : +82-514-4549

Address : Rohde & Schwarz Korea Ltd., 135-010, #83-29, Nonhyun-Dong, Kangnam-Ku, Seoul, Korea

Rohde & Schwarz is a leading manufacturer of EMC, communication, signal analysis and signal generation equipment. We cover all EMC requirements in Automotive, Military and Commercial sectors. Established 75 years ago, Rohde & Schwarz has a global presence and a dedicated service network in over 70 countries including an accredited ISO 17025 calibration lab. It has approximately 7400 employees and achieved net revenue of € 1.3 billion (fiscal year July 09 to June 10). A service and sales network with subsidiaries and offices in more than 70 countries worldwide helps to ensure that customers always find a Rohde & Schwarz office nearby. Exports make up about 90 percent of company business.

SAFETY & EMC Magazine Booth 13

<http://www.semc.cesi.cn>

Tel : +86-10-8402 9073 Fax : +86-10-8402-9210

Address : NO. 1 Andigmen Dongdajie Beijing 100007 China

SAFETY & EMC is a bimonthly publication with a cohesive, innovative and professional workforce. In 2008, it started its English edition yearly, and erected the bridge for international academic communication. Until now, its readers are more 500'000. Most of them are engineers, teachers and students; however, there are a lot of marketing and purchasing personnel becoming its faithful readers. Its column arrangement is subject to professional and technical features, for instance, Certification & Marks, Standard & Application, Testing & Measurement, Electromagnetic Interference Suppression Technology, Material Application in EMC, Professional Research, EMC Classroom, Conference Release, New Products, Company profile and so on.

TDK RF Solutions Inc. (EMC Solutions Inc.) Booth 6,7

<http://www.tdkrfsolutions.com/> <http://www.emcs.co.kr/>

Tel : +1 (512) 258-9478 / +82-2-2168-3910 Fax : +1 (512) 258-0740 / +82-2-2168-3920

Address : 1101 Cypress Creek Rd., Cedar Park, Texas 78613 USA

604, Hyundai 41 Tower, 917-9, Mok-dong, Yangcheon-gu, Seoul, Korea.

TDK RF Solutions is a world leader in the design, development, and manufacture of technical solutions for the electromagnetic compatibility testing industry. We offer a complete range of solutions, including automated test systems, TDK anechoic chambers, software, antennas, and a wide range of test products. We call it Total System Technology®, and it means TDK RF Solutions is your best choice of partner for proven solutions and services backed by internal technical expertise.

전력설비 전자계 (=극저주파 전자계)

모르면 "불안" 알면 "편안"

한국전력은 전자계 국제가이드라인 대비 최대 6.6% 이내로 안전하게 전력설비를 운영하고 있습니다.

국내·외 연구결과

- ◆ 세계보건기구(WHO), 낮은 수준의 자계 노출에 의해 암이 진전된다는 생체작용은 밝혀진 바 없음 ('07.6)
- ◆ 전기연구원/안전성평가연구소, 송전선로 전자계와 뇌암유발 연관성 발견되지 않음 ('08. 10)
- ◆ 서울의과대학 연구팀, 자계 노출과 소아암 발병과의 관련성은 관찰되지 않았던 것으로 발표 ('08. 12)
- ◆ 국제비전리 방사선보호위원회(ICNIRP) 전자계 노출 국제 가이드라인 개정: 일반인 83.3 μ T \rightarrow 200 μ T ('10. 11)

※ 궁금사항은 전자계 홈페이지(<http://www.emtsafe.kr>)를 참조하세요



자동차 부품산업 기술경쟁력 향상을 주도하는 자동차부품기술지원센터

사업목표

자동차부품기업의 고부가가치 기술개발 및 종합 기술지원체계 구축

세부사업

자동차부품 안정성평가 기반구축사업

- 그린카부품관련 전자파 및 경량부품 시험 장비 구축
- 신제품 설계, 생산 및 제품화 기술의 통합지원시스템 구축
- 사업기간: 2009년~2012년(3년간)
- 경영: 경영부품 설계, 해석, 시제품 제작 및 신뢰성 평가지원
- 전장: 전장품, 완성차 및 그린카(전기자동차) 전자파 해석 및 평가지원

자동차부품 현장기술기능 인력양성지원사업

- 자동차 부품관련 개발형 및 맞춤형 전문기술교육
- 사업기간: 2009년~2012년(4년간)
- 개발형, 기업 맞춤형 및 전문 기술지원

자동차부품소재 기업지원 서비스사업

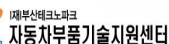
- 자동차 부품산업기업의 소재물 기술개발 지원
- 사업기간: 2009년~2012년(4년간)
- 소재물 제작 및 신상품, 신공정 제품 고급화 개발지원

전자파환경 유해성 대책 Green Belt 사업

- 동남권 대경권 전자파 기원들이 구축된 인프라 연계협력체를 통하여 기업의 전장부품 설계능력향상
- 사업기간: 2010년~2012년(3년간)
- 전자파 컨설팅, 대비성 및 제품성용화 지원

BLDC 모터 표준화 및 표준모델 보급사업

- BLDC 모터 표준모델 형상 성능 정형화 및 플랫폼 완성
- 사업기간: 2010년~2012년(3년간)
- BLDC 모터 표준모델 설계, 해석, 시제품 제작 및 시험평가지원



619-230 부산광역시 강서구 지사동 127번지
Tel: (051)974-9202 Fax: (051)974-9219

<http://www.bac.re.kr>



APEMC 2011

2011 Asia Pacific EMC Symposium

첨단통신의 미래를 창조하는
(주)하이게인 안테나

역사가 노하우를 만듭니다.
1970년 창업 이래 TV방송용 안테나 납품을 시작으로 위성용 안테나에서 레이더까지 순수한 우리 기술과 연구로 제작, 납품하는 중단없는 기술 개발을 해 왔으며 오늘날 하이게인은 부설 전자통신 연구소는 24시가 잠들지 않고 있습니다.

품질, 가격, 납기로 수부입니다.
국내 유일의 안테나 전문 제조업체인 하이게인은 미국, 유럽 등의 어느 안테나와 비교해도 결코 손색이 없는 기술력과 품질로 오늘의 자리를 굳건히 지켜 왔습니다. 앞으로도 하이게인은 풍부한 기술력과 최고의 품질, 가격, 납기로 승부하겠습니다.

안락한 A/S를 추구합니다.
신속정확하고 신뢰감있는 A/S와 철저한 사후관리로 30년 역사의 하이게인 안테나의 명예를 지켜가겠습니다.

(주)하이게인안테나
WWW.Highgain.co.kr

(주)빅텍은 전자전시스템, 전원공급장치 및 RFID/USN 전문기업입니다.

<p>전자전 시스템</p> <p>적의 위협신호를 수신 및 분석하여 전자지원, 전자공격, 전자보호를 수행하는 최첨단 시스템</p> <ul style="list-style-type: none"> • 육·해·공 방위방위 장치 • 통신전자전 시스템 • 전자전 핵심부품 	<p>RTL</p> <p>실시간으로 사명, 사물의 위치 추적을 통하여 고장편의를 제공</p> <ul style="list-style-type: none"> • U-에어트 주파수 RTL • U-항안물류 RTL • U-이동통신 RTL • U-국방 RTL
<p>군용 전원</p> <p>다양한 방산장비의 특수 전원</p> <ul style="list-style-type: none"> • 통신 장비용 및 전차전 • 기동 및 유도 무기체계 • 항공 항공 무기체계 • 고출력 송신용 HVPS • 그 외 특수용 전원 	<p>RFID / USN</p> <p>RFID/USN 기술을 활용하여 모든 사물의 자동화, 정보화, 네트워크화하는 솔루션 제공</p> <ul style="list-style-type: none"> • 각종 Reader & Tag 및 M/W • 항공/항안 물류자동 솔루션 • U-Barcode 솔루션 • 응용 시스템
<p>정보감시정찰</p> <p>공중, 지상 및 수중의 목표물을 지속적으로 체계적으로 관측하는 네트워크 중심의 필수적인 첨단 시스템</p> <ul style="list-style-type: none"> • 전방감시정찰 유닛 • 파이프라인 유닛 • 레이더 핵심 유닛 	<p>대체 에너지</p> <p>가속 화석에너지의 고갈문제와 환경문제를 해결하는 대체에너지의 각종 솔루션 제공</p> <ul style="list-style-type: none"> • 대체에너지 전력변환장치 • 태양광 시스템 • 각종 제어장치

주식회사 빅 텍
경기도 이천시 마장면 각평리 349번지 **KOSDAQ**

www.eretec.com

보이지 않는 전자파, 이레테크의 측정 기술로는 보입니다!

EMC(EMI/EMS)·ANTENNA TOTAL SOLUTION

with EMP Protection System

Amplifier · Antenna · Chamber · Transient CDN/Clamp(BCI) · GTEM/TEM Cells · ESD ISN/LISN · Near Field Probe · EMC Software EMP Protection Filter

(주)이레테크 부설연구소
본사 : 경기도 군포시 당정동 522 SK벤티움 101동 703호
TEL_031-436-1100 FAX_031-436-1110
www.eretec.com / eretec@eretec.com

EM TEST offers:

EMC-Simulators
for Automotive + Telecom + Consumer Products + Military + Industrial + Medical + Avionics + Renewable Energy

EMC-Solutions
for standards such as:
IEC/EN 61000-4-2,-4,-5,-6,-8,-9,-11,-16,-29, ISO 7637, ISO 11452, MIL-Std., DO-160, Airbus, Boeing and so on

EMC-Service
Guaranteed by our excellent technical support and accredited calibration laboratory

EMC- Labs and Seminars
Implementation and effective transfer of our testing expertise and design knowledge for interference suppression

Your **direct** link to EM TEST is www.emtest.com

More Power To You!



Our Newest "S" Series Amps Now Offers Powers From 20 To 1200 watts, And Everything In Between.

Once again AR has turned up the power on our "S" Series 0.8-4.2 GHz solid-state amplifiers.



Recently we made them smaller and lighter, with more power. Now we've added **more** power without increasing size or weight.

One thing we didn't change was something we call **Subampability**™ giving you expandable power. It's a unique money-saving feature that lets you add amplifiers when you need more power. And you can use these amps independently for tests that don't require as much power.

AR products are backed by the best and most comprehensive warranty in the industry. We back them better because we build them better. And we support our customers with a global network that reaches the far corners of the world.

So when you need a new power amplifier, there are some very powerful reasons to choose an "S" Series amp from AR.

Visit us at www.arworld.us or call 215-723-8181.

ISO 9001:2008
Certified



rf/microwave instrumentation

Other **ar** divisions: modular rf • receiver systems • ar europe

USA 215-723-8181. For an applications engineer, call 800-933-8181.

In Europe, call ar United Kingdom 441-908-282766 • ar France 33-1-47-91-75-30 • emv GmbH 89-614-1710 • ar Benelux 31-172-423-000

Copyright © 2011 AR. The orange stripe on AR products is Reg. U.S. Pat. & TM. Off.



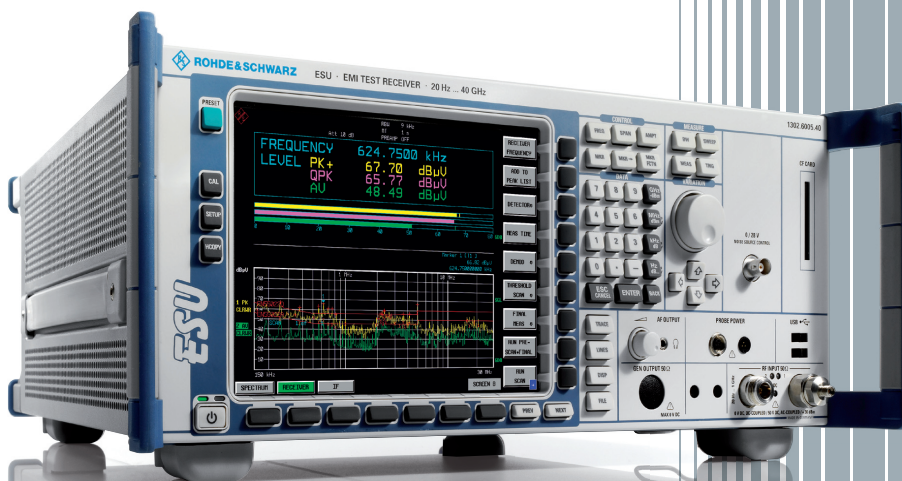
The high-end instrument among EMI test receivers.

The R&S®ESU 8/26/40

The new R&S®ESU 8/26/40 EMI test receivers not only surpass the tried-and-true R&S®ESIB when it comes to measurement speed. They are even up to a hundred times faster, covering the full compliance range with models for 20 Hz to 8 GHz, 26.5 GHz, and 40 GHz. Thus, the R&S®ESU test receivers also speed up return on investment. And they set new standards in other areas as well:

- ▮ Time-domain scan (FFT)
- ▮ Preselection 20 Hz to 3.6 GHz; built-in preamplifier
- ▮ Realtime IF analysis +/- 5 MHz
- ▮ All EMI detectors including CISPR-AV and CISPR-RMS
- ▮ Integrated R&S®FSU spectrum analyzer
- ▮ Significantly enhanced reporting functions
- ▮ State-of-the-art working environment with Windows XP
- ▮ Compact design

www.rohde-schwarz.com/ad/esu



ROHDE & SCHWARZ



Korea Communications Agency

Korea Communications Agency (KCA) was established in accordance with Article 66 of Radio Waves Act and has since contributed to an increased public accessibility to radio use and its promotion on

radio, broadcasting, and communications. As the communication leader of the future convergence era, KCA conducts policy research on radio frequency, broadcasting and communications and strengthens foundations for radio, its frequency usage, the promotion of the broadcasting and communications industry, and the improvement and vitalization of media user rights while delivering customer satisfaction. Our key areas of interest and activity include :

Policy Research

- ▶ Enrich Relevant Radio Rules and Regulations
- ▶ Build an Infrastructure for Reframing Radio Spectrums
- ▶ Compensation for the withdrawal and relocation of radio frequency
- ▶ Boost Public Interest and Media Diversity of Broadcasting
- ▶ Vitalize Broadcasting Market and Establish Relevant Policies to Meet Changes

Radio Industry Promotion

- ▶ Radio Industry Promotion Planning and Foundation Establishment
- ▶ Support the Government's Digital TV Transition Policies
- ▶ Technical Support for Radio Industry

Broadcasting and Communications Industry Promotion

- ▶ Support Policy Research to Facilitate Convergence
- ▶ Build an Infrastructure for Next Generation Broadcasting and Communications Industry
- ▶ Implementation of Viewer's Welfare Programs

Broadcasting Contents Industry Promotion

- ▶ Support High-Quality Broadcasting Contents Production
- ▶ Support Overseas Korean Broadcasting Industry/Investment and Finance Contents Production
- ▶ Construct 'Digital Broadcasting Contents Support Center' by 2012

Improve Radio Spectrum Environment

- ▶ Radio Station Inspection and EMF Strength Measurement
- ▶ Set up Radio Station Database
- ▶ National Certification Examination for Technical Analysis

Customer Satisfaction Management, Funds Management and R&D Planning

- ▶ Ethical Management and Social Contribution
- ▶ Expand R&D Activities on Convergence of Broadcasting Communication Industry
- ▶ Promote Broadcasting communications Convergence and Public Interest

Website is available at : www.kca.kr



APEMC 2011

2011 Asia Pacific EMC Symposium



Electromagnetic wave Technology Institute(EMTI) of Korea Radio Promotion Association(RAPA) has been dedicated to various activities, like troubleshootings and precautions against EMC problems facing many companies and also, provides EMC technical education for engineers. In addition, the Institute is offering measurement services for antennas of cell phones and wireless communication devices.

Technical and measurement support for small and medium-sized companies

EMTI supports companies with EMC design and solutions, operates an EMC Open Lab where they can freely use EMC design/analysis tools and measurement equipment, and an antenna chamber where they can use equipment inside through the whole process of product, from design and development to production.

○ Technical support for EMC design/solution (free of charge)

- Technical support in a PCB design level considering EMC
- Technical support in a system design level considering EMC
- Technical support for design/solution in a commercialization level

○ Measurement services for antennas(charged services)

- Measurements for medium and large-sized antennas
- Measurements for cell phone antennas
- Measurements for millimeter-wave antennas
- Measurements for Passive Intermodulation Distortion(PIMD)

Technical education on electromagnetic compatibility

EMTI offers EMC and antenna education courses with theory and experiment combined, with which engineers and developers in the EMC-related fields can apply in their works.

○ Comprehensive EMC technical education(theory- and experiment-oriented) and antenna technical education

- Technical education associated with local authorities and communities
- Online education (beginning, intermediate, and advanced levels)

Information on electromagnetic compatibilities

EMTI conducts research and analysis on recent trends of electromagnetic regulations and EMC technologies, and offers the information to companies.

- EMC solutions(a database of cases)
- Technical informations(standardization, recent papers/patents)
- Newsletters and webzines

EMTI also engages in various activities including EMC consulting (for example, electric locomotive), EMC/EMF standardization, and standard development for wireless power transmission. And the annual EMC Fest for this year will be held in October 2011. We welcome the participation of anyone who is interested in this event.

For more information, please visit our website www.emti.or.kr.

Contact



Electromagnetic wave Technology Institute(EMTI) of Korea Radio Promotion Association(RAPA)

EMTI, Wonhyoro 3-1, Yongsan Gu, Seoul, Korea
T : EMC technical support division 02-703-2414~6, 02-703-2468~9
Antenna measurement support division 02-719-1785
F : 02-703-2417 E-mail : emti@rapa.or.kr
Web site : www.rapa.or.kr, www.emti.or.kr



Organized by



Sponsored by



Supported by



2011 Asia Pacific EMC Symposium

Date: May 16~19, 2011

Venue: Ramada Plaza Jeju Hotel, Jeju, Korea



APEMC 2011 Secretariat

Further inquires can be made at :

Web site : <http://www.apemc2011.org>

Sejong Convention Services Ltd.

Tel : +82-2-783-3473~3474 / Fax : +82-2-783-3475 / E-mail : secretariat@apemc2011.org

Address : Rm.505 Taeyang Bldg. 44-2, Yoido-dong, Yongdeungpo-gu, Seoul 150-890, Korea