

# PROGRAM AT A GLANCE

**12/11(MON)** Registration (4:00 p.m. – 7:00 p.m.) “2F, Conference Center”

12/12(TUE)	Room A (301)	Room B (302)	Room C (303)	Room D (304)	Room E (311+312)	Room F (313+314)	Room G (501)	Room H (502)
9:00 A.M.	Workshop 1 System-on-Chip/ One-Chip Radio	Workshop 2 Advanced MIMO Antenna Techniques	Workshop 3 Standardization of Measurement Methods For Microwave and Millimeter Wave Materials	Workshop 4 Emerging Technology and Application of RFID	Workshop 5 Millimeter and Terahertz Wave Applications	Workshop 6 Technical Hellenism of RF and Information Security	Short Course 1 Metamaterial Engineering for Microwaves	Short Course 2 Digital RF Processor (DRP™): All-Digital TX and Discrete-Time RX
12:00	<b>LUNCH TIME</b>							
1:30 P.M.	Workshop 7 Recent Progress in High Power Widgap Semiconductor Device and its Application to Wireless Communication System	Workshop 8 Application of CIP Method to Electromagnetic Phenomena	Workshop 9 Phase Noise in Oscillator: An Old and Still New Technical Issue	Workshop 10 High Frequency Technologies for ITS	Workshop 11 Advanced Microwave Photonics Technologies and Their Applications	Workshop 12 RF BAW Filters for Mobile Communications	Short Course 3 RF MEMS Circuits for High Frequency Applications	Short Course 4 Wireless Communications Standards, Systems, and RFIC Specifications
4:30	Welcome Reception (5:30 p.m. – 7:30 p.m.) “Yokohama Red Brick Warehouses”				Registration (8:00 a.m. – 6:00 p.m.) “2F, Conference Center”			

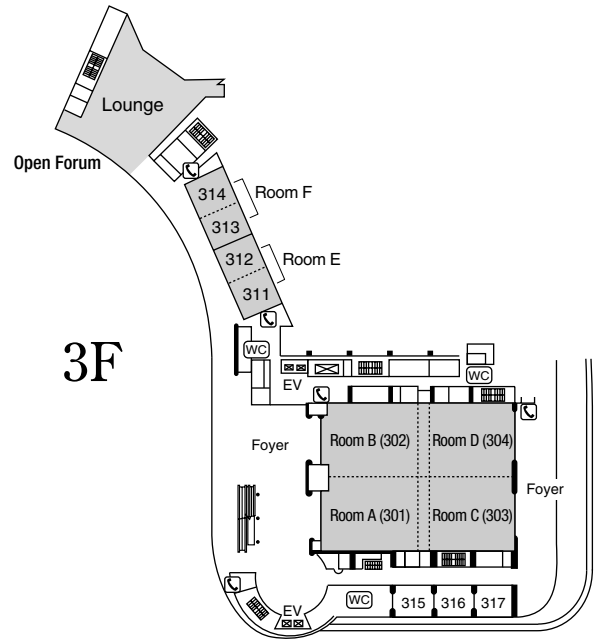
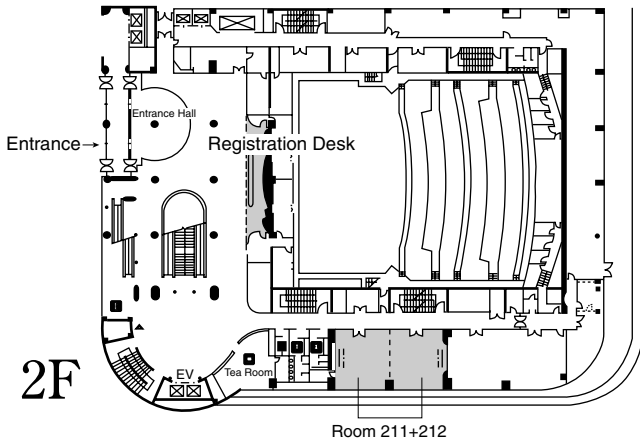
12/13(WED)	Room A (301)	Room B (302)	Room C (303)	Room D (304)	Room E (311+312)	Room F (313+314)	Lounge	
8:50 A.M.	WE1A Microwave Control and Frequency Conversion Circuits	WE1B Ultra-Wide Band Planar Filters (1)	WE1C Biomedical Applications and EMC	WE1D Microstrip Patch Antennas	WE1E Microwave Photonics and Optical Fiber Systems	WE1F Scattering		
10:30	<b>COFFEE BREAK</b>							
10:50	WE2G (Room 501+502) Opening Ceremony Keynote Address							
12:50	<b>LUNCH TIME</b>							
2:00 P.M.	WE3A Silicon Power Amplifier IC Design	WE3B Ultra-Wide Band Planar Filters (2)	WE3C Compound Semiconductor Low-Noise Devices and Amplifiers	WE3D Inverted-F Antennas	WE3E Waveguide Analysis and Design	WE3F Novel Antenna Arrays	2:30–4:00 WEOF Open Forum-1	
3:40	<b>COFFEE BREAK</b>							
4:00	WE4A High-Performance Silicon Front-End Ics	WE4B Device Modeling and Circuit Analysis for Power Amplifiers	WE4C SiGe/CMOS Low-Noise Devices and Circuits for Wireless Applications	WE4D Reconfigurable Antennas	WE4E Recent Advances on Periodic and Multilayered Structures	WE4F Packaging Technology		
6:00	Microwave Exhibition (10:30 a.m. – 5:30 p.m.) “Exhibition Hall A+B”				Registration (8:00 a.m. – 6:00 p.m.) “2F, Conference Center”			

12/14(THU)	Room A (301)	Room B (302)	Room C (303)	Room D (304)	Room E (311+312)	Room F (313+314)	Lounge	
8:50 A.M.	TH1A Microwave Oscillator	TH1B Advances in Tunable and Metamaterial Filters and Resonators	TH1C Miniaturization and Optimization of Hybrid Couplers	TH1D Millimeter Wave and Integrated Antennas (1)	TH1E Advanced High Power Amplifiers	TH1F Numerical Analysis		
10:30	<b>COFFEE BREAK</b>							
10:50	TH2A Frequency Multiplication and Conversion Circuits	TH2B Design and Implementaion Techniques for Microwave Filters	TH2C Advanced Coupler Design and Fabrication Techniques	TH2D Millimeter Wave and Integrated Antennas (2)	TH2E Modulation and Related Technologies	TH2F Lossy Materials		
12:30	<b>LUNCH TIME</b>							
2:00 P.M.	TH3A Linearization Technologies for Power Amplifiers	TH3B Advanced Divider Analysis and Designs	TH3C Artificial and Novel Materials for Antenna Applications (1)	TH3D Novel FDTD Method	TH3E System-Related Technologies (1)	TH3F Microwave Silicon VCO Design	2:30–4:00 THOF Open Forum-2	
3:40	<b>COFFEE BREAK</b>							
4:00	TH4A High Power Devices and Power Amplifiers	TH4B Power Amplifiers and Linearization Technique	TH4C Artificial and Novel Materials for Antenna Applications (2)	TH4D Waveguide Based on Metamaterials	TH4E System-Related Technologies (2)	TH4F Silicon Frequency Generation and Conversion Ics		
6:00	Tea Ceremony (12:00 p.m. – 4:00 p.m.) “65F, Yokohama Royal Park Hotel in Landmark Tower”				Banquet (6:30 p.m. – 8:40 p.m.) “Inter Continental The Grand Yokohama”			
	Microwave Exhibition (10:30 a.m. – 5:30 p.m.) “Exhibition Hall A+B”				Registration (8:00 a.m. – 6:00 p.m.) “2F, Conference Center”			

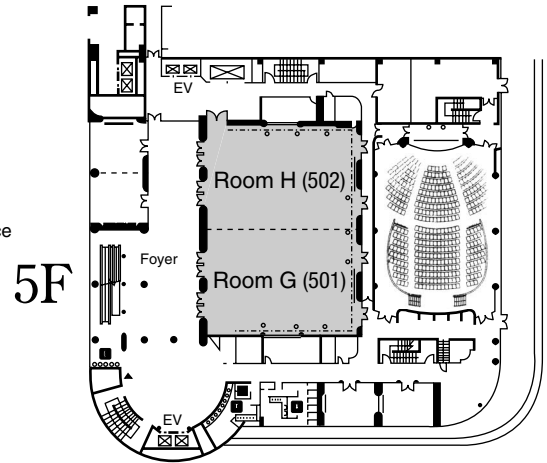
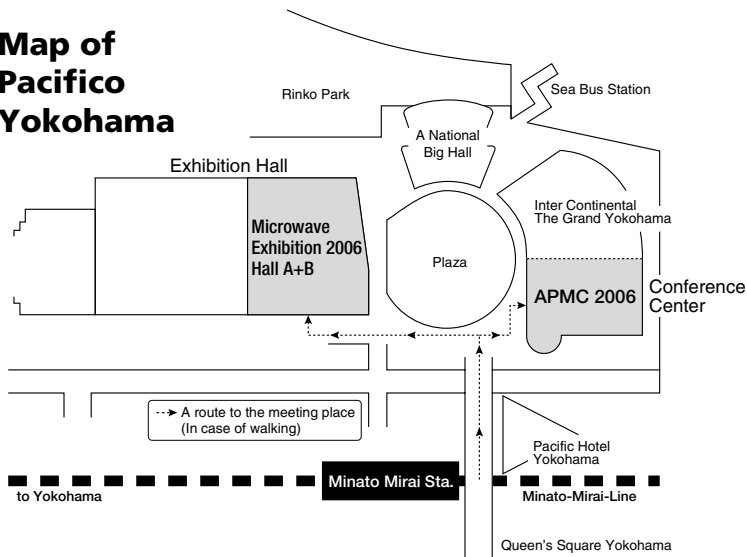
12/15(FRI)	Room A (301)	Room B (302)	Room C (303)	Room D (304)	Room E (311+312)	Room F (313+314)	Lounge	
8:50 A.M.	FR1A Advances on Passive Components	FR1B Miniature Planar and Integrated Filters (1)	FR1C Material Measurements	FR1D Small Antennas for RFID	FR1E Ubiquitous Communications and Location Systems	FR1F Design and Analysis Methods for Printed Antennas		
10:30	<b>COFFEE BREAK</b>							
10:50	FR2A RF-MEMS and Device Modeling	FR2B Miniature Planar and Integrated Filters (2)	FR2C New Measurement Methods	FR2D Small Antennas for Mobile Applications	FR2E Microwave Applications	FR2F UWB Antennas		
12:30	<b>LUNCH TIME</b>							
2:00 P.M.	FR3A Active Planer Circuits	FR3B Planar Filters with Extended Stopband Performance	FR3C Millimeter-Wave Radar Systems	FR3D Multiband Antennas	FR3E Advanced Technologies for Power Amplifiers	FR3F Ferrite and SAW Devices	2:30–4:00 FROF Open Forum-3	
3:40	<b>COFFEE BREAK</b>							
4:00	FR4A Transceivers	FR4B Multi-Band and Multi-mode Planar Filters	FR4C Imaging and Remote Sensing	FR4D Propagation	FR4E Power Amplifiers for Mobile Communication	FR4F Waveguide Circuits		
6:00	Microwave Exhibition (10:30 a.m. – 5:00 p.m.) “Exhibition Hall A+B”				Registration (8:00 a.m. – 12:00 p.m.) “2F, Conference Center”			

# FLOOR PLAN

## Conference Center



## Map of Pacifico Yokohama



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## GREETINGS FROM THE STEERING COMMITTEE CHAIR

Welcome to Yokohama and the 2006 Asia-Pacific Microwave Conference (APMC 2006). The Yokohama Bay Area is faced on the southwest coast of Tokyo Bay and lies about 30 km south of Tokyo. In the neighborhood of the city, there are many companies and laboratories dealing with microwave and related industries.

APMC 2006 is the 18th APMC, which started in 1986 in India, and the 5th to be held here in Japan. During that time, Microwave technologies made remarkable progress supported by civilian demands. We hold the conference under the theme of "Sail for the Microwave Ocean" at Yokohama, one of the eminent harbor towns in Japan.

APMC 2006 will be held at the Conference Center in Pacifico Yokohama, one of the largest convention centers in the world, located in the east coast of Yokohama. The details are given in this brochure.

At the Exhibition Hall adjacent to the Conference Center, an exhibition called "Microwave Exhibition 2006" will be held from December 13 to 15 as the part of APMC 2006. More than 300 companies dealing with Microwave and related industries will participate in this exhibition, not

only from Japan and the United States but also from all over the world. Technical Seminars about new technologies and products will be held. To add to all of this, an exhibition of Japanese microwave history and another exhibition by the universities and colleges will be held in the same hall.

While you are here for APMC 2006, you can visit the surrounding area. Yokohama is very famous for Chinatown, one of the biggest in Japan. To the south of Yokohama, there is Kamakura, a historical and cultural city as there was shogunal government from 1192 to 1333, where you can enjoy old shrines and temples.

I wish you will join APMC 2006 and sail for a wonderful voyage at the Microwave oceans, sailing into the brilliant future.

Masayoshi Aikawa  
APMC 2006 Steering Committee Chair



## MESSAGE FROM THE TECHNICAL PROGRAM COMMITTEE CHAIR

On behalf of the Technical Program Committee, I cordially welcome you to APMC 2006 in Yokohama.

The 2006 APMC Technical Program Committee has organized a highly qualified and exciting program covering wide varieties of microwave technologies and related fields.

This year, a total of 694 papers from 42 countries were submitted to APMC 2006, which is the largest number in APMC's history held in Japan. Due to the high professional quality of these papers, it was an extremely difficult task for the Technical Program Committee to select the 498 papers (312 for oral presentations, 186 for open forums), the maximum allowable number in this location and this period, with 192 reviewers around the world participating in the paper review and selection processes.

The technical activities begin at 9:00 a.m., on Tuesday, December 12, with workshops and short courses, which have been selected from the most exciting topics in our fields. This year there are 12 workshops and 4 short courses. APMC regular sessions commence at 8:50 a.m., on Wednesday, December 13, with 6 sessions proceeding simultaneously. A total of 66 oral presentation sessions and 3 open

forum sessions are scheduled for paper presentations. The plenary session is scheduled at 10:40 a.m. on Wednesday, December 13, where Mr. Toshio Miki, NTT DoCoMo Inc. will present Keynote Address entitled "Mobile Communication Evolution". And Prof. Tatsuo Itoh, UCLA will present "New Avenues of Microwave Component Design" as well. This year we have also invited 18 outstanding speakers who are very active in their field.

The Technical Program Committee has worked hard to make APMC 2006 successful and memorable. I would like to express my sincere appreciation to the members and reviewers

of the Technical Program Committee for their dedication in organizing the technical program. We are looking forward to meeting you at the conference.

Kiyomichi Araki  
Technical Program Committee Chair



# GENERAL INFORMATION

## CONFERENCE SITE

The APMC 2006 will be held from December 12 to 15 at the Conference Center in Pacifico Yokohama. Pacifico Yokohama is one of the largest convention centers in the world, consisting of the Conference Center, the Exhibition Hall, a hotel and a big national hall, and is located in the Minato Mirai 21 (MM21) area of Yokohama (see the map on the back cover). Its beautiful shell-and-sail-shaped appearance is impressive when viewed from sea and from land as well.

The conference will be held in the Conference Center: 2nd Floor Entrance Hall for Registration; 3rd Floor Meeting Rooms and Lounge for Technical Sessions, Workshops and Short Courses; and 5th Floor Meeting Rooms for the Opening Ceremony and Keynote Address.

## YOKOHAMA

Yokohama faces the western coast of Tokyo Bay and lies mere 30 kilometers from Tokyo. The port of Yokohama, a naturally blessed harbor surrounded by gently undulating hills, opened in 1859, and ever since has played a major role as the window to the world. Japan's first Western style hotel and restaurant were opened in Yokohama, and the city was also the site of Japan's first coffee shop and bakery as well as its first modern waterworks and railroads. Yokohama, built on its rich heritage of enterprising endeavor, has become a truly international city and Japan's largest international trading port.

Yokohama has a host of exciting places to visit. You can savor various works of art, familiarize yourself with Yokohama's history and culture. Red Brick Warehouse Park is one of such visiting spots, for example. Lovely red brick buildings with their original facades (about 100 years old) have been refurbished from top to bottom. In these buildings, there is a hall, multipurpose space, a restaurant with live performances, a beer garden, and 31 shops selling a variety of food and goods. Outside the building, you can relax with greenery and trees.

To the south lies Kamakura, once the political and cultural capital of the Shogunate, from 1192 to 1333. It boasts a heritage comparable with that of Kyoto and Nara. You can experience the charm of many ancient temples and shrines, including the famous Great Buddha statue. It can be reached by train in 30 min from Yokohama.

## REGISTRATION

Pre-registration is accepted only through APMC 2006 Web site (<http://www.apmc2006.org>) from July 31 to November 30, 2006. All the technical session speakers are requested to pre-register by September 15, by declaring the "Presentation No. (e.g.: WE1A-1)" informed in the Notification of Acceptance on August 1.

After November 30, all registration will be accepted at the conference site, Pacifico Yokohama, Yokohama, Japan, from December 11 to 15, 2006.

## Registration fees

Conference Fee*1	Regular	Jul. 31–Sep. 30, 2006	42,000 JPY
		Oct. 1–Nov. 30, 2006	47,000 JPY
		Onsite (Dec. 11–Dec. 15, 2006)	55,000 JPY
	Student*2 (pre-registration/onsite)		15,000 JPY
	Retiree*3 (pre-registration/onsite)		15,000 JPY
Workshops and Short Courses Fee*4 (pre-registration/onsite)			5,000 JPY

\*1. The Conference Fee covers all the technical sessions from December 13 to 15, but does not cover the Workshops and Short Courses on December 12. This fee also covers other events such as the Opening Ceremony, Welcome Reception, Banquet, and the Registration Kit. The kit includes a nameplate, a conference bag, and a copy of the Conference Proceedings and the CD-ROM.

\*2. We will prepare a different type of nameplate for students. The definition of "student" is as follows: a person who is attending graduate school, university, junior college, technical college, or similar educational institution as of December 12. Please show your student ID at the registration desk. Without an ID, you will have to pay extra fee to make up the difference.

\*3. The definition of "retiree" is as follows: a person who is attaining the age of 60 years and not gainfully employed as of December 12, 2006.

\*4. The Workshops and Short Courses Fee covers all the Workshop and Short Course sessions on December 12, but does not cover any other technical session or event in APMC 2006. Each registrant for Workshops and Short Courses will receive a copy of the Digest, which includes presentation materials for the Workshops and Short Courses.

If you are not going to participate in the Conference from December 13 to 15, please register for Workshops and Short Courses onsite on December 12, not by pre-registration.

## Payment

The payment is accepted only by "Credit Card" in principle.

## Accompanying Person

Each participant in the Conference from December 13 to 15 (except "Student") can bring one of her/his family members as an Accompanying Person, who can participate in the Welcome Reception (free of charge), the Opening Ceremony, Banquet (free of charge), Tea Ceremony (1,000 JPY), and the Technical Sessions. The accompanying person will receive a nameplate, but not a copy of the Conference Proceedings.

## Cancellation

In the event of the cancellation, written notification should be sent to Prof. Masayoshi Aikawa, Chair of the Steering Committee, before October 31, 2006, Japan Standard Time. A cancellation fee of 5,000 JPY will be deduced from the refund. After October 31, 2006, no refund

# GENERAL INFORMATION

can be made and a copy of the Conference Proceedings will be sent to the registrant after the conference.

APMC 2006 Secretariat:

Prof. Masayoshi Aikawa [Chair, Steering Committee]  
c/o Real Communications Corp.

3F Shimmatsudo S. Bldg., 1-409 Shimmatsudo,  
Matsudo, Chiba 270-0034, Japan

Phone: +81-47-309-3616, Fax: +81-47-309-3617

E-mail: mweapmc@io.ocn.ne.jp

## Registration Desk

The registration and information desk is located at the 2nd Floor Entrance Hall of Pacifico Yokohama Conference Center. It will be open during the following hours:

December 11 4:00 p.m.–7:00 p.m.

December 12 8:00 a.m.–6:00 p.m.

December 13 8:00 a.m.–6:00 p.m.

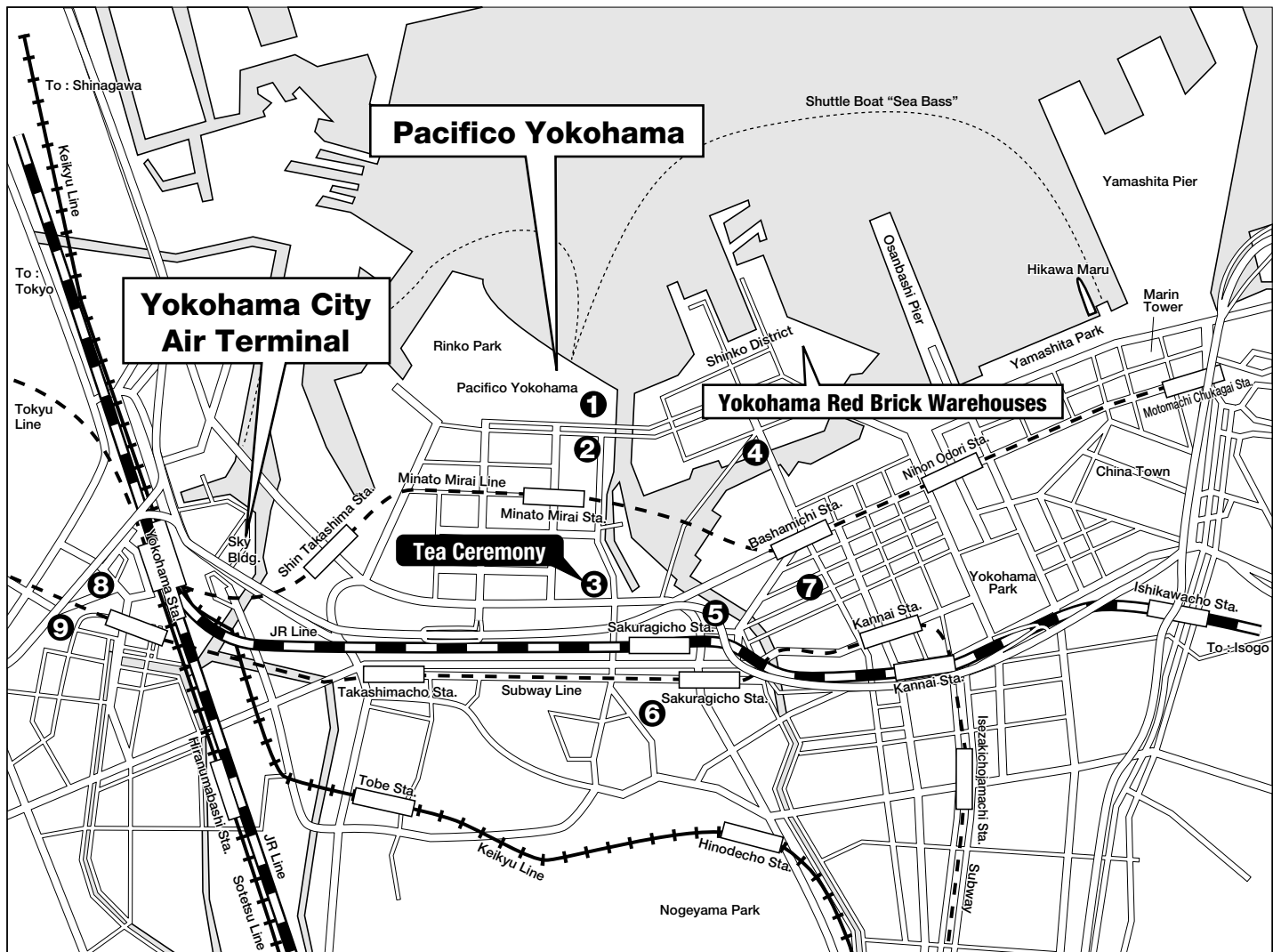
December 14 8:00 a.m.–6:00 p.m.

December 15 8:00 a.m.–12:00 p.m.

## HOTEL ACCOMMODATIONS

Rooms at nine hotels in Yokohama, which are accessible from/to Pacifico Yokohama, have been blocked. Reservations must be made through the web site for the hotel accommodations. Applications should be accompanied by the payment of the hotel accommodation with the handling charge of 525 JPY per request. No reservation will be confirmed in the absence of the payment.

## Hotel Location



- ①** Inter Continental The Grand Yokohama    **②** Pan Pacific Yokohama    **③** Yokohama Royal Park Hotel  
**④** Navios Yokohama    **⑤** Yokohama Sakuragicho Washington Hotel    **⑥** Sanai Hotel Yokohama Hotel  
**⑦** Yokohama Heiwa Plaza Hotel    **⑧** Yokohama Bay Sheraton    **⑨** Camelot Japan

# GENERAL INFORMATION

## OFFICIAL TRAVEL AGENT

JTB Metropolitan Corp. Group Tours Office Yokohama has been appointed as the official travel agent for the Conference and will handle hotel accommodations. Applications and Inquiries concerning hotel accommodations should be addressed to:

JTB Metropolitan Corp. Group Tours Office Yokohama  
Convention Desk  
6F, Yasuda 6th Bldg. 3-29-1, Tsuruya-cho, Kanagawa-ku, Yokohama 221-0835, Japan  
Phone: +81-45-316-4602 Fax : +81-45-316-5701  
E-mail: jtb\_convention@jtb.jp

Please contact to JTB for information on sightseeing tours as well.

## YOUTH HOSTEL INFORMATION

Also, for those with very limited budget, you may want to contact directly with the below Youth Hostel, which is about a 15 minutes' walk to the Convention site, Pacifico Yokohama.

Name : Kanagawa Youth Hostel  
TEL : 045-241-6503 FAX : 045-241-6501  
Address : 1 Momijigaoka, Nishi-ku, Yokohama-shi, Kanagawa-ken 220-0044  
URL : <http://www.jyh.or.jp/english/index.html>

## TRANSPORTATION

The closest airports to Yokohama are the international Narita Airport and the domestic Haneda Airport. Narita Airport, formerly also known as New Tokyo International Airport, is located in the city of Narita in Chiba Prefecture, about 60 km outside of Tokyo. There are heavy traffic jams in Tokyo and Yokohama area. Public transportation (railways and subways) networks are convenient. Purchase your ticket by cash using the machine at the entrance. For most trains no advance reservation is needed. However, for JR Shinkansen limited express (bullet trains), advance reservation is recommended in order to secure a seat.

Yokohama is served by four railway companies (JR East, Tokyu Railway, Keikyu Railway and Sagami Railway), a municipal subway line and a bus network. The city has two major railway stations: Yokohama Station and Shin-Yokohama Station ("New Yokohama Station"). Train lines of all four railway companies and the subway line pass through Yokohama Station, which is located in the city center. Shin-Yokohama Station, on the other hand, is located outside of the city center, about 10 minutes from Yokohama Station by the JR Yokohama Line or the municipal subway. The shinkansen stops at Shin-Yokohama Station.

The nearest station to Pacifico Yokohama is Minato Mirai Station on the Minato Mirai Line, two stops from Yokohama Station. The Minato Mirai Line is directly connected to the Tokyu Toyoko Line. It takes about 3 minutes and costs 180 JPY from Yokohama to Minato Mirai. Pacifico Yokohama is also conveniently accessed from Sakuragicho Station on the JR Keihin-Tohoku Line (Negishi Line) and the municipal subway. (See the map on the back cover.)

### How to get to Yokohama from Narita Airport

#### By Japan Railways (JR):

The fastest option to get to Yokohama is the JR Narita Express (NEX), requiring roughly 90 minutes for the one way journey. All seats are reserved. The one way fare between Narita Airport and Yokohama Station is about 4,200 JPY. There is about one connection per hour.

The JR Sobu Line (Rapid Service) is a slower, but cheaper JR alternative to the Narita Express. It takes roughly two hours from Narita Airport to Yokohama Station and costs 1,890 JPY for the one way journey. There is about one connection per hour.

#### By Keisei and Keikyu Railways:

Take the Keisei Limited Express from Narita Airport to Aoto Station (60 minutes) and transfer to a Keikyu train to Yokohama (60 minutes). A second transfer of trains may be required at Shinagawa Station. The one way fare is 1,450 JPY. There are about three connections per hour.

#### By limousine bus:

Limousine buses to the Yokohama City Air Terminal (YCAT) near Yokohama Station depart Narita Airport every 20 to 30 minutes. The one way journey takes about 90 minutes and costs 3,500 JPY. In addition, there are direct limousine bus connections to several major hotels in Yokohama.

#### By taxi:

Since Narita Airport is located about 60 km outside of Tokyo, a taxi ride into central Tokyo is very expensive and not recommended to common travelers.

#### By rental Cars:

Rental cars are available at major railway stations and airports.

## VISA REQUIREMENT FOR FOREIGN ATTENDEES

Citizens of other countries may have to carry a passport (valid for at least 6 months beyond the applicant's intended period of stay in Japan) and a visa to enter Japan. Foreign participants should contact the Japan Embassy, Consulate, or Agency of Tourism in their home country AS SOON AS POSSIBLE to determine their particular visa requirements and time estimate for their visa applications. Participants requiring visas must initiate the application process well in advance of their departure date.

Some general information on visa application procedures can be found on the Japanese Government websites at

# GENERAL INFORMATION

[http://www.mofa.go.jp/j\\_info/visit/visa/index.html](http://www.mofa.go.jp/j_info/visit/visa/index.html). Due to the complex nature of visa requirements, the APMC 2006 Committees CANNOT contact or intervene with any Japan Embassy or Consulate office abroad on your behalf. We advise you to contact the Consular Section of the Embassy or Consulate General of Japan in your country for more information and advice.

## OTHER INFORMATION

### Electricity

Electricity supply is 100 Volts/50 Hz in eastern Japan including the Yokohama area, and 100 Volts/60 Hz in western Japan.

### Weather

Yokohama lies in the temperate zone and has four distinct seasons. December is the beginning of winter, when Yokohama is rather cold but rarely has snow. The temperature ranges between 4°C (39F) and 12°C (54F), averaging 8°C (46F). Coats or sweaters are needed.

### No Smoking Policy

Smoking is prohibited in the Conference Center except at limited smoking corners.

### Currency

Japanese yen (JPY) is the only currency that is used at stores and restaurants. You can exchange foreign currencies for Japanese yen at foreign exchange banks and other authorized money exchangers by showing your passport. The exchange rate fluctuates daily.

### Traveller's Checks and Credit Cards

Since traveller's checks are not common in Japan, you may use them only at major hotels and leading banks. Major credit cards, such as VISA, Master Card, AMEX, and JCB, can be used at restaurants, hotels, souvenir shops, etc.

### Tipping

Tipping is not customary in Japan. For example, you do not need to tip waiters/waitresses at restaurants.

### Rental Cars

Rental cars are available at major railway stations (e.g. Tokyo station) and airports (e.g. Narita airport).

### Japanese Traffic

There are heavy traffic jams in Tokyo and Yokohama area. Public transportation (railways and subways) networks are convenient. Purchase your ticket by cash using the machine at the entrance. For most trains no advance reservation is needed. However, for JR Shinkansen limited express (Bullet train), advance reservation is recommended in order to secure a seat.

### Internet connection

Internet connection through Wireless LAN and Ethernet cable will be available at the Conference Center. There is no charge for the service.

## SOCIAL PROGRAM

The APMC 2006 will provide original and colorful events: Welcome reception, the Opening Ceremony, Tea Ceremony, and Banquet.

### WELCOME RECEPTION AT "YOKOHAMA RED BRICK WAREHOUSES"

All the participants in the Conference (from December 13 to 15) are invited to the Welcome Reception to be held from 5:30 p.m. to 7:30 p.m. on Tuesday, December 12, at the historical "Yokohama Red Brick Warehouses", located in the Yokohama seaside area, about a 15–20 minutes' walk from Pacifico Yokohama. A free bus transportation service from Pacifico Yokohama will be available for all the Conference participants. A special performance will be given by the Yokohama Mandolin Club, organized by the city officers of Yokohama.

### History of Yokohama Red Brick Warehouses:

The historical Yokohama Red Brick Warehouses were constructed between 1911 and 1913 as a symbol of the modernization and development of Yokohama. In 1994, work began on the restoration and revitalization of the buildings. After eight years, the valiant figure of these buildings, which withstood the Great Kanto Earthquake and the Second World War, has risen once again. With the restoration work, from the standpoint of the conservation of cultural treasures, while making as much use of the original as possible, advanced technology was also used, including earthquake resistance strengthening work, and repair work to the exterior walls and roofs.



Yokohama Red Brick Warehouses



# GENERAL INFORMATION

## OPENING CEREMONY

The APMC 2006 Opening Ceremony will be held from 10:40 a.m. to 12:50 p.m. in Room 501+502 (5th floor) of Pacifico Yokohama Conference Center on Wednesday, December 13. A declaration and brief report by the APMC 2006 Steering Committee Chair and congratulatory addresses by invited representatives of sponsoring organizations including IEEE MTT-S, URSI, EuMA are scheduled at the beginning of the ceremony. Then, we will have the Keynote Addresses given by Mr. Toshio Miki, Managing Director of Communication Device Development Department, NTT DoCoMo Inc., and Professor Tatsuo Itoh, UCLA. The respective titles of their talks are “Mobile Communication Evolution” and “New Avenues for Microwave Component Design”.

## BANQUET

The APMC 2006 Banquet will be held from 6:30 p.m. to 8:40 p.m. on Thursday, December 14, in the 3rd-floor Grand Ballroom of the Inter Continental The Grand Yokohama adjacent to the Conference Center. With a variety of cuisine, the banquet will introduce winners of Japan Microwave Prize. The Banquet will be a buffet style so that all the participants in the Conference (from December 13 to 15) are invited. After the greetings by the Conference Chair, you will experience the ceremony “Kagamiwari”, where a large barrel of sake (Japanese rice-wine) is cracked on the top with wooden hammers to celebrate the success of APMC 2006. The APMC 2006 Microwave Prize will be given to the winners selected by the Prize Committee from all participants presenting a paper at the conference. As special entertainment, the Banquet will feature a professional performance of traditional Japanese drums called “Taiko”. Taiko practitioners have been instrumental in introducing Japanese traditional culture worldwide, and the performances are said to convey heart to heart the spirit of Japan.

## TEA CEREMONY

Would you like to enjoy a tea ceremony between your busy sessions or exhibitions? The tea ceremony will be held for all APMC 2006 participants. Ladies wearing Japanese traditional kimonos will serve you a bowl of green tea “*maccha*” and a Japanese-style confection “*okashi*”. You will find the atmosphere of the tea ceremony comfortable and relaxing —

the gentle bubbling sound of water in a teakettle, the fragrance of incense, the lovely flower arrangements, and the artistic calligraphy on a scroll hanging in the alcove. The Way of Tea ceremony “茶の湯 = *Chanoyu*” is a Japanese cultural tradition. In the 16th century, Tea Master Rikyu Sen established the foundations of “*Chanoyu*”, where one respects everyone without distinction of status or rank. That is, the spiritual aspect is the most important in “*Chanoyu*”. The culture of “*Chanoyu*” has greatly influenced various aspects of Japanese culture, such as architecture, gardening, textiles, food, and cooking. You can experience the entire process of “*Chanoyu*” in a *hiroma* (*tatami-mat* room) as shown in the photo 1. For those who prefer a more casual style, *ryurei-seki* (a less formal tea ceremony with tables and chairs) will also be offered for your comfort.

It is our pleasure that we provide you with everything you need to relax at the tea ceremony room.

Date: Thursday, December 14, 2006

Time: 12:00 p.m. – 4:00 p.m.

Place: Tea ceremony room “*Kaiko-an*”, 65F, Yokohama Royal Park Hotel in Landmark Tower

Tickets: 1,000 JPY per person at the registration desk



Photo 1. hiroma



Photo 2. Tea Ceremony in APMC 1998

# GENERAL INFORMATION

## MEETINGS INFORMATION

### IEEE MTT-S REGION 10 CHAPTER CHAIR'S MEETING

The IEEE MTT-S Region 10 Chapter Chair's Meeting will be held on Wednesday, December 13, 2006, from 1:00 p.m. to 2:00 p.m., at Room 211+212.

### APMC INTERNATIONAL STEERING COMMITTEE MEETING

The APMC International Steering Committee Meeting will be held on Thursday, December 14, 2006, from 12:00 p.m. to 3:00 p.m., at Room 211+212.

## APMC 2006 PRIZE

Papers presented at APMC 2006 will be judged by the APMC 2006 Prize Award Committee, and the authors of selected papers will be awarded the APMC 2006 Prize for outstanding contributions to the microwave field.

In addition, outstanding student papers submitted at the

conference will be awarded the APMC 2006 Student Prize.

These Prizes, which consist of the commemorative certificates and rewards, will be presented to all recipients at the APMC 2006 Banquet to be held on Thursday, December 14, 2006.

# TECHNICAL SESSION

Wednesday, December 13

8:50 a.m. – 10:30 a.m.

## Room A (301)

### Session WE1A

#### Microwave Control and Frequency Conversion Circuits

Chairs : H. Okazaki, *NTT DoCoMo, Inc., JAPAN*  
K. Miyaguchi, *Mitsubishi Electric Corp., JAPAN*

#### WE1A-1

38-80 GHz SPDT Traveling Wave Switch MMIC Utilizing Fully Distributed FET

H. Mizutani, N. Iwata, Y. Takayama\*, and K. Honjo\*\*, *NEC Electronics Corp., \*Univ. of Hyogo, \*\*The Univ. of Electro-Communications, JAPAN*

#### WE1A-2

A High Power CMOS SP4T Switch Using a Switched Resonator for Dual Band Applications

M. Ahn, J. J. Chang\*, W.-M. Woo\*, K. Yang, C.-H. Lee\*, B.-S. Kim\*\*, and J. Laskar, *Georgia Institute of Technology, \*Samsung RFIC design Center at Georgia Tech, U.S.A., \*\*Sungkyunkwan Univ., KOREA*

#### WE1A-3

A Q-band Miniature Monolithic Subharmonically Pumped Resistive Mixer

S.-Y. Chen, J.-H. Tsai, P.-S. Wu, T.-W. Huang, and H. Wang, *National Taiwan Univ., TAIWAN*

#### WE1A-4

Tunable Coplanar Filter for F-band Wireless Receivers

H. Takahashi, T. Kosugi, A. Hirata, K. Murata, and T. Nagatsuma, *NTT, JAPAN*

#### WE1A-5

Voltage Controlled Phase Shifters on CMOS Technology

G. Mascarenhas\*\*, J. Caldas Vaz\*\*, and J. Costa Freire\*\*, *ISEC MAR, REP. DE CABO VERDE, \*\*Instituto de Telecomunicações, Instituto Superior Técnico, PORTUGAL*

## Room B (302)

### Session WE1B

#### Ultra-Wide Band Planar Filters (1)

Chairs : I. Awai, *Ryukoku Univ., JAPAN*  
J.-K. Rhee, *Dongguk Univ., KOREA*

#### WE1B-1

Analysis and Optimization of Ultra-Wideband Bandpass Filters on Coplanar Waveguide

J. Gao and L. Zhu, *Nanyang Technological Univ., SINGAPORE*

#### WE1B-2

Ultra-Wideband (UWB) Bandpass Filters with Improved Upper-Stopband Performance

S. W. Wong, S. Sun, L. Zhu, and Z. N. Chen\*, *Nanyang Technological Univ., \*Institute of Infocomm Research, SINGAPORE*

#### WE1B-3

A Novel Ultra Wideband Bandpass Filter Using Microstrip Double-Ring Resonators

W. Liu, Z. Ma\*, C.-P. Chen\*\*, G. Zheng and T. Anada\*\*, *Shanghai Univ., CHINA, \*Saitama Univ., \*\*Kanagawa Univ., JAPAN*

#### WE1B-4

Modeling of an Ultra-Wideband Bandpass Filtering Structure

K. Li and J.-S. Hong\*, *NICT, JAPAN, \*Heriot-Watt Univ., U.K.*

#### WE1B-5

An Ultra-Wideband (UWB) Bandpass Filter Using Broadside-Coupled Structure and Shunt Stub with Chip Capacitor

K. Li, Y. Yamamoto\*, T. Matsui, and O. Hashimoto\*, *NICT, \*Aoyama Gakuin Univ., JAPAN*

## Room C (303)

### Session WE1C

#### Biomedical Applications and EMC

Chairs : Y. Nikawa, *Kokushikan Univ., JAPAN*  
J. G. Yook, *Yonsei Univ., KOREA*

#### WE1C-1

Non-Invasive Measurement of Blood Sugar Level by Reflection of Millimeter-Waves

Y. Nikawa and T. Michiyama, *Kokushikan Univ., JAPAN*

#### WE1C-2

Sub- $\mu$ W Signal Power Doppler Radar Heart Rate Detection

S. Yamada, M. Chen, and V. Lubecke, *Univ. of Hawaii at Manoa, U.S.A.*

#### WE1C-3

Analysis of Aperiodic EBG Structures for Suppression of Ground Bounce Noise

J.-K. Du, J.-M. Kim, S.-S. Oh, and J.-G. Yook, *Yonsei Univ., KOREA*

#### WE1C-4

Reduction Effect of Ground Patterns on Conductive Noise Currents from Printed Circuit Board

T. Maeno\*\*, T. Unou\*, K. Ichikawa\*, and O. Fujiwara\*\*, *DENSO Corp., \*\*Nagoya Institute of Technology, JAPAN*

#### WE1C-5

Wave Absorber Based on Reinforced Plastic with Periodic Lattice for Improving ETC Environment

K. Matsumoto, M. Takimoto, O. Hashimoto, and M. Sakai\*, *Aoyama Gakuin Univ., \*Mitsui Engineering & Shipbuilding Co., Ltd., JAPAN*

Wednesday, December 13

10:50 a.m. – 12:50 p.m.

## Room G+H (501+502)

### Session WE2G Opening Ceremony

#### Opening Ceremony

#### Keynote Addresses (1) : Mobile Communication Evolution

Speaker : Toshio Miki, *Managing Director of Communication Device Development Department, NTT DoCoMo Inc., Japan*

#### Abstract :

With the growing demand for high-speed and high-capacity data transmission in mobile communications, DoCoMo launched 3rd generation (3G) cellular services "FOMA" with the maximum data rate of 384 kbps in 2001. DoCoMo proposed the "Super 3G concept" as the long-term evolution of 3G after the global deployment of 3G. This is because the long-term evolution of 3G is constitutive for 3G system to keep a highly competitive position. Super 3G also enables a smooth migration path towards 4th generation (4G) aiming at the target data rate; e.g. 100 Mbps at high mobility and 1 Gbps at low mobility.

Besides higher data rate, future mobile services will promote a ubiquitous communications environment in which all kinds of devices and objects are interconnected to attain real space and virtual space interaction. They are expected to facilitate the development of the so-called "mobile ubiquitous world". In a mobile ubiquitous world, all kinds of things will be interconnected as needed to form ubiquitous networks that should arise frequently and simultaneously while changing continuously.

This speech presents the current status of the 3G services, views on the migration scenario from 3G to 4G, and research activities for achieving 4G services and mobile ubiquitous world.

**Toshio Miki** is the Managing Director of Communication Device Development Department, NTT DoCoMo Inc. since July 2006. Mr. Miki was born in Osaka, Japan, on March 5, 1956. He received the B.S. and



M.S. degrees in electronics engineering from Kyoto University, Kyoto, Japan, in 1978 and 1980, respectively. Since 1980, he has been with the Research Labs. of NTT and NTT DoCoMo. He was a residential researcher of AT&T Bell Labs. in 1988. From 1999 through 2003, he was the founding President & CEO of DoCoMo Communications Laboratories USA Inc. After that, he was the managing Director of Multimedia Labs. in 2004, and Wireless Labs. in 2005.

From 1977 to 1984, he was engaged in the research of digital mobile communication technologies, in particular, modulation/demodulation and diversity reception. He started the research of speech coding in 1985, aiming for PDC (Japanese Digital Cellular Systems). His proposal, PSI-CELP, was standardized and widely used as PDC half-rate speech codec. He extended his research field to audio-visual coding in 1994, such as MPEG-4 and relevant ITU-T standards.

He had been a member of ARIB STD-27 CODEC WG from 1991 through 1995 for the work of PDC half-rate speech coding standardization.

From 1995 through 1999, he served as the MPEG-4 subcommittee chairman of Japanese National Body. He also served as the Co-Chairman of the Video Verification Tests Ad-Hoc Group and the Audio Error Resilience Ad-Hoc Group in MPEG.

From 2002 through 2004, he was a trustee of ISOC (Internet Society).

Mr. Miki was awarded the IEEE Vehicular Technology Society Paper of the Year and the IEICE young engineers award in 1984. He received the Achievement Award of IEICE in 1992. He is a senior member of IEEE, and a member of IEICE of Japan, IPSCJ, and ISOC.

# TECHNICAL SESSION

8:50 a.m. – 10:30 a.m.

Wednesday, December 13

Room D (304)

## Session WE1D

### Microstrip Patch Antennas

Chairs : K. Y. Yazdandoost, *NICT, JAPAN*  
K.-M. Luk, *City Univ. of Hong Kong, CHINA*

#### WE1D-1

A New Single-Feed Proximity Coupled Circularly Polarized Square Ring Antenna

K.-F. Tong, *Univ. College London, U.K.*

#### WE1D-2

Gain-Enhanced Slot Antenna Fed by Conductor-Backed Coplanar Waveguide

I.-C. Lan and P. Hsu, *National Taiwan Univ., TAIWAN*

#### WE1D-3

Polarization Controllable Microstrip Antenna Using Beam Lead PIN Diodes

E. Nishiyama and M. Aikawa, *Saga Univ., JAPAN*

#### WE1D-4

A Wideband Circularly Polarized Reconfigurable Patch Antenna Excited by L-shaped Probes

S. S. L. Yang and K. M. Luk, *City Univ. of Hong Kong, CHINA*

#### WE1D-5

Unidirectional Antenna Composed of a Planar Dipole and a Shorted Patch

H. Wong and K.-M. Luk, *City Univ. of Hong Kong, CHINA*

Room E (311+312)

## Session WE1E

### Microwave Photonics and Optical Fiber Systems

Chairs : Y. Horiuchi, *KDDI Lab., JAPAN*  
J. H. Tarng, *National Chiao Tung Univ., TAIWAN*

#### WE1E-1

Proposal of New Optical CDMA Systems and Fast Code Acquisition Techniques

T. Matsuba, T. Ishikawa, H. Fukuyama\*, M. Hirata\*, M. Kijima, and M. Muraguchi, *Tokyo Univ. of Science, \*NTT, JAPAN*

#### WE1E-2

Low-Cost Radio-Over-Fiber in-building Distribution Network for WLAN, UWB and Digital TV Broadcasting

M. Yee, L. Michael Ong, C. Sim, and L. Bin, *Institute of Infocomm Research, SINGAPORE*

#### WE1E-3

A Study on a Long-Distance Transmission of Terrestrial Digital TV Signal Using Optical Fibers

K. Haeiwa, Y. Toba\*, M. Onizawa\*, and M. Nakamura\*\*, *Hiroshima City Univ., \*NEC TOKIN Corp., \*\*NHK, JAPAN*

#### WE1E-4

Tunable and Configurable Photonic Microwave Bandpass Filter Implemented in a Radio-over-Fiber Link

X. Yu, X. Zheng, and H. Zhang, *Tsinghua Univ., CHINA*

#### WE1E-5

Analysis of The Guided Modes in Photonic Bandgap Fiber Using Compact 2D-FDTD Method

J.-J. Wu, R.-J. Li, T.-J. Yang, and J.-H. Tarng, *WuFu Rd., TAIWAN*

Room F (313+314)

## Session WE1F

### Scattering

Chairs : A. Matsushima, *Kumamoto Univ., JAPAN*  
L.-W. Li, *National Univ. of Singapore, SINGAPORE*

#### WE1F-1

AIM Analysis of Electromagnetic Transmission Through Dielectric Radomes

W.-B. Ewe, E.-P. Li, and L.-W. Li\*, *Institute of High Performance Computing, \*National Univ. of Singapore, SINGAPORE*

#### WE1F-2

A Spectral Two-Step Preconditioner for Efficient Solution of EFIE in The FMM Context

P. L. Rui and R. S. Chen, *Nanjing Univ. of Science and Technology, CHINA*

#### WE1F-3

Low Grazing Incident Effects from Rough Surface

G. Hu\*\*\* and S. Zhang\*\*, *\*Air Force Engineering Univ., \*\*Xidian Univ., CHINA*

#### WE1F-4

Localization of Electromagnetic Radiating Sources in the Near-Field of a Uniform Circular Array

M. J. Abedin and A. Sanagavarapu Mohan, *UTS, AUSTRALIA*

#### WE1F-5

Application of BiCG+FFT Techniques to Solution of Large-Scale Electromagnetic Inverse Problems

J.-L. Hu, *Northwestern Polytechnical Univ., CHINA*

10:50 a.m. – 12:50 p.m.

Wednesday, December 13

### Keynote Addresses (2) : New Avenues for Microwave Component Design

Speaker : Tatsuo Itoh, *Professor of UCLA, U.S.A.*

#### Abstract :

This talk will present a subjective view for emerging microwave component and circuit designs deviating from traditional approaches. First, a trend started about 10 year ago is a global design in which active device characterizations are combined with passive circuit and electromagnetic analysis. Second and more recent trend is to take into account the propagation aspects of the communication channel into hardware design. The third is the dispersion engineering recently coming to greater recognition by the emergence of metamaterials.



**Tatsuo Itoh** is Professor of Electrical Engineering and holder of the Northrop Grumman Endowed Chair in Microwave and Millimeter Wave Electronics at UCLA. He is a Fellow of the IEEE, served as the Editor of IEEE Transactions on Microwave Theory and Techniques, President of the MTT Society and Editor-in-Chief of IEEE Microwave and Guided Wave Letters. He was elected as an Honorary Life Member of MTT Society in 1994. He received a number

of awards including IEEE Third Millennium Medal and IEEE MTT Distinguished Educator Award. He is a member of National Academy of Engineering. He has over 1000 publications and generated 65 Ph.D's.

# TECHNICAL SESSION

Wednesday, December 13

2:00 p.m. – 3:40 p.m.

Room A (301)

## Session WE3A

### Silicon Power Amplifier IC Design

Chairs : S. Tanaka, *Hitachi, Ltd., JAPAN*  
H. Wang, *National Taiwan Univ., TAIWAN*

#### WE3A-1

SiGe HBT Power Amplifier with Distortion-Controllable Bias Circuit and Its Application to 802.11g Wireless LANs  
T. Oka, M. Hirata, Y. Ishimaru, H. Kawamura, and K. Sakuno, *Sharp Corp., JAPAN*

#### WE3A-2

A Wideband Power Efficient SiGe BiCMOS Medium Power Amplifier  
H.-C. Bae, S.-H. Kim, S.-H. Lee, H.-K. Yu, and S.-H. Oh\*, *ETRI, \*National Univ. of Chungnam, KOREA*

#### WE3A-3

Vdd Gate Biasing RF CMOS Amplifier Design Technique Based on the Effect of Carrier Velocity Saturation  
N. Ishihara, *Gunma Univ., JAPAN*

#### WE3A-4

A CMOS Power Amplifier for a UHF RFID Reader  
Y. Kim, J. Han, D. Lee, C. Park, and S. Hong, *KAIST, KOREA*

#### WE3A-5

A Novel Linearizer and a Fully Integrated CMOS Power Amplifier  
S. Ko and J. Lin, *Univ. of Florida, U.S.A.*

Room B (302)

## Session WE3B

### Ultra-Wide Band Planar Filters (2)

Chairs : Y. Horii, *Kansai Univ., JAPAN*  
S.-W. Yun, *Sogang Univ., KOREA*

#### WE3B-1

Wideband Chebyshev-Response Bandpass Filter by Cascading of Cascadable 180° Hybrid Rings  
C.-H. Chi and C.-Y. Chang, *National Chiao Tung Univ., TAIWAN*

#### WE3B-2

Compact Planar Ultra-Wide Pass-Band Filters with Source-Load Coupling and Impedance Stubs  
M. Mokhtari, J. Bornemann, and S. Amari\*, *Univ. of Victoria, \*Royal Military College of Canada, CANADA*

#### WE3B-3

Synthesis and Realization of Novel Ultra-Wideband Bandpass Filters Using 3/4 Wavelength Parallel-Coupled Line Resonators  
P. Cai, Z. Ma\*, X. Guan, Y. Kobayashi\*, T. Anada\*\*, and G. Hagiwara\*\*\*, *Shanghai Univ., CHINA, \*Saitama Univ., \*\*Kanagawa Univ., \*\*\*Link Circuit Inc., JAPAN*

#### WE3B-4

Compact Sub-Millimeter-Wave Ultra-Wideband Bandpass Filter Using Dual-Mode Ring Resonator and Multiple-Mode Parallel-Coupled Line Structure  
P. Cai, Z. Ma\*, X. Guan, Y. Kobayashi\*, T. Anada\*\*, and G. Hagiwara\*\*\*, *Shanghai Univ., CHINA, \*Saitama Univ., \*\*Kanagawa Univ., \*\*\*Link Circuit Inc., JAPAN*

#### WE3B-5

Open Ring Resonators Applicable to Wide-Band BPF  
I. Awai and A. K. Saha, *Ryukoku Univ., JAPAN*

Room C (303)

## Session WE3C

### Compound Semiconductor Low-Noise Devices and Amplifiers

Chairs : Y. Umeda, *Tokyo Univ. of Science, JAPAN*  
T. Tsukii, *Raytheon, U.S.A.*

#### WE3C-1

Coplanar 155 GHz MHEMT MMIC Low Noise Amplifiers  
M. Kantanen, M. Varonen\*, M. Kärkkäinen\*, T. Karttaavi, R. Weber\*\*, A. Leuther\*\*, M. Seelmann-Eggebert\*\*, T. Närhi\*\*\*, and K. A. I. Halonen\*, *Technical Research Centre of Finland, \*Helsinki Univ. of Technology, FINLAND, \*\*IAF, GERMANY, \*\*\*ESTEC, NETHERLANDS*

#### WE3C-2

A Comparison of Cryogenically Cooled Pseudomorphic and Lattice Matched InP HEMTs: Implementation in an Ultra-Low Noise Amplifier  
A. Malmros, N. Wadefalk, P. Starski, and J. Grahn, *Chalmers Univ. of Technology, SWEDEN*

#### WE3C-3

12-GHz Low Noise MIC Amplifier with 0.86 dB Noise Figure  
H. Yukawa, Y. Tsuyama, T. Hamabe\*, A. Iida\*, Y. Tahara, K. Mori, and M. Nakayama, *Mitsubishi Electric Corp., \*Mitsubishi Electric TOKKI Systems Corp., JAPAN*

#### WE3C-4

Microwave Noise Modeling for PHEMT Using Artificial Neural Network Technique  
J. Gao, X. Li\*, and Q.-J. Zhang\*\*, *Southeast Univ., \*Beijing Univ. of Posts and Telecommunications, CHINA, \*\*Carleton Univ., CANADA*

#### WE3C-5

High Performance LNA in 0.35 um SiGe RF Transceiver One Chip for Cellular Applications  
K.-H. Ahn, D.-J. Keum\*, I.-H. Rhyu\*, H.-S. Kim\*, Y.-B. Jeon\*, H.-Y. Yoo\*, J.-Y. Han\*, and J.-H. Baek\*, *Korea Electronics Technology Institute, \*Samsung Electronics Inc., KOREA*

Wednesday, December 13

4:00 p.m. – 6:00 p.m.

Room A (301)

## Session WE4A

### High-Performance Silicon Front-End ICs

Chairs : K. Agawa, *Toshiba Corp., JAPAN*  
N. Suematsu, *Mitsubishi Electric Corp., JAPAN*

#### WE4A-1

A Novel CMOS Down-Conversion Mixer with Body Effect  
H. S. Kang, S. G. Lee, N. G. Myoung\*, B. G. Choi\*, S. S. Park\*, and C. S. Park, *ICU, \*ETRI, KOREA*

#### WE4A-2

10-GHz 0.35-um SiGe BiCMOS Bottom-LO-Sub-Harmonic Gilbert Mixer with Lumped-Element Rat-Races  
S.-C. Tseng and C. Meng, *National Chiao Tung Univ., TAIWAN*

#### WE4A-3

A CMOS Transceiver for IEEE 802.11a/b/g Wireless LAN Applications  
Z. Soe, G. Watanabe, S. Zhou, F. Yang, K. Li, and R. Yan, *Realtek Semiconductor Corp., U.S.A.*

#### WE4A-4

A CMOS 5GHz RF Transceiver for Wireless HDTV Distribution  
S. Shu, C. Liang, G. Tong, and B. Hu, *Amedia Networks, Inc., U.S.A.*

#### WE4A-5 (INVITED)

Silicon-Based Monolithic Millimeter-Wave Integrated Circuits  
H. Wang, *National Taiwan Univ., TAIWAN*

Room B (302)

## Session WE4B

### Device Modeling and Circuit Analysis for Power Amplifiers

Chairs : K. Honjo, *The Univ. of Electro-Communications, JAPAN*  
C. Snowden, *Surrey Univ., U.K.*

#### WE4B-1

Large-Signal Modelling and Comparison of AlGaIn/GaN HEMTs and SiC MESFETs  
I. Angelov, K. Andersson, D. Schreuers\*, N. Rorsman, V. Desmaris, M. Sudow, and H. Zirath, *Chalmers Univ. of Technology, SWEDEN, \*KU Leuven, BELGIUM*

#### WE4B-2

Application of Optimal Delays Selection on Parallel Cascade Hammerstein Models for the Prediction of RF-Power Amplifier Behavior  
D. D. Silveira, P. L. Gilabert\*, G. Magerl, and E. Bertran\*, *Vienna Univ. of Technology, AUSTRIA, \*Universitat Politècnica de Catalunya, SPAIN*

#### WE4B-3

Precise Modeling of Thermal Memory Effect for Power Amplifier Using Multi-Stage Thermal RC-Ladder Network  
Y. Takahashi, R. Ishikawa, and K. Honjo, *The Univ. of Electro-Communications, JAPAN*

#### WE4B-4

Long-Finger HBT Analysis Based on Device and EM Co-Simulation Using FDTD Method  
Y. Shinohara, R. Ishikawa, and K. Honjo, *The Univ. of Electro-Communications, JAPAN*

#### WE4B-5 (INVITED)

Coupled Electrothermal and Electromagnetic Modeling, Simulation and Design of RF and Microwave Power FETs  
C. M. Snowden, *Univ. of Surrey, U.K.*

Room C (303)

## Session WE4C

### SiGe/CMOS Low-Noise Devices and Circuits for Wireless Applications

Chairs : Y. Itoh, *Shonan Institute of Technology, JAPAN*  
M. Madihian, *NEC Laboratories America, Inc., U.S.A.*

#### WE4C-1 (INVITED)

A Low Power SiGe GSM/DCS/WCDMA Receiver  
M. Madihian, *NEC Laboratories America, Inc., U.S.A.*

#### WE4C-2

A 5.8 GHz 1.7 dB NF Fully Integrated Differential Low Noise Amplifier in CMOS  
L. Aspemyr\*\*\*, H. Sjöland\*\*, H. Jacobsson\*, M. Bao\*, and G. Carchon\*\*\*, *\*Ericsson AB, \*\*Lund Univ., SWEDEN, \*\*\*IMEC, BELGIUM*

#### WE4C-3

An Ultra-Low Voltage UWB CMOS Low Noise Amplifier  
Y.-H. Yu, Y.-J. E. Chen, and D. Heo\*, *National Taiwan Univ., TAIWAN, \*Washington State Univ., U.S.A.*

#### WE4C-4

A Ka-Band Low Noise Amplifier Using Standard 0.18 um CMOS Technology for Ka-Band Communication System Applications  
S.-H. Yen, Y.-S. Lin, and C.-C. Chen, *National Chi-Nan Univ., TAIWAN*

#### WE4C-5

A High Performance CMOS LNA for System-on-Chip GPS  
B. Bokinge, W. Einerman, A. Emericks, C. Grewing, O. Pettersson, D. Theil, and S. Waasen, *Infineon Technologies Nordic AB, SWEDEN*

# TECHNICAL SESSION

2:00 p.m. – 3:40 p.m.

Wednesday, December 13

Room D (304)

## Session WE3D

### Inverted-F Antennas

Chairs : K. Li, *NICT, JAPAN*  
Z. Feng, *Tsinghua Univ., CHINA*

#### WE3D-1

PIFA with Multi-Layered Structure for Bandwidth Enhancement  
K. Huang and T. Chiu, *National Central Univ., TAIWAN*

#### WE3D-2

The High Isolation Dual-Band Inverted F Antenna Diversity System with the Small N-Section Resonators on the Ground Plane  
K.-J. Kim and K.-H. Park, *Korea Electronics Technology Institute Wireless Components & Telecommunication Research Center, KOREA*

#### WE3D-3

Compact Internal IFA for 900/1800MHz Mobile Handsets  
J. Wu and Z. Feng, *Tsinghua Univ., CHINA*

#### WE3D-4

Design of an Enhanced Bandwidth PIFA with Modified Shorting Strip  
H. Jung, H. Park, S. Hong, U. Kim, and J. Choi, *Hanyang Univ., KOREA*

#### WE3D-5

Planar Inverted-F Antenna with Folded Capacitive Feed Structure  
Y. Ding and Z. Du, *Tsinghua Univ., CHINA*

Room E (311+312)

## Session WE3E

### Waveguide Analysis and Design

Chairs : F. Kuroki, *Kure National College of Technology, JAPAN*  
F. Arndt, *Univ. of Bremen, GERMANY*

#### WE3E-1

Guided Modes in Shielded Slot Transmission Line  
F. Kuroki and K. Miyamoto, *Kure National College of Technology, JAPAN*

#### WE3E-2

A 3-D Analysis of The Waveguide with Periodic Structure in Time Domain  
Z. Yu, *Univ. of Electronic Science and Technology of China, CHINA*

#### WE3E-3

Hybrid CAD Techniques for the Efficient Full-Wave Optimization of Arbitrarily Shaped Waveguide Components and Large Aperture Antennas  
F. Arndt, V. Catina, and J. Brandt\*, *Univ. of Bremen, \*MiG, GERMANY*

#### WE3E-4

Design of an Inverted Slot Mode Slow-Wave Circuit Using Quasi-TEM Analysis  
V. L. Christie, L. Kumar, and N. Balakrishnan\*, *MTRDC, \*IISC, INDIA*

#### WE3E-5

On the Characteristics of Conjugately Characteristic-Impedance Transmission Lines with Active Characteristic Impedance  
S. Lamultree and D. Torrungrueng, *Asian Univ., THAILAND*

Room F (313+314)

## Session WE3F

### Novel Antenna Arrays

Chairs : T. Hirano, *Tokyo Institute of Technology, JAPAN*  
L. C. Godara, *The Univ. of New South Wales, AUSTRALIA*

#### WE3F-1

A Wideband Circularly-Polarized Active Van Atta Retrodirective Transponder with Information Carrying Ability  
L. Chiu, Q. Xue, and C. H. Chan, *City Univ. of Hong Kong, CHINA*

#### WE3F-2

Active Broadband Integrated Antenna for Differential Application  
S.-Y. Mok, K.-T. Mok, and W.-S. Chan, *City Univ. of Hong Kong, CHINA*

#### WE3F-3

Multipath Fading Reduction Using a Phase-Conjugating Array in a Dual-Reflector Environment  
B. O. Takase, R. N. Pang, J. M. Akagi, M. K. Watanabe, G. S. Shiroma, and W. A. Shiroma, *Univ. of Hawaii, U.S.A.*

#### WE3F-4

A Novel Dimensionality Metric for Multi-Antenna Systems  
M. S. Elnaggar, S. Safavi-Naeini, and S. K. Chaudhuri, *Univ. of Waterloo, CANADA*

#### WE3F-5

A Design of Partitioned Processor for Broadband Antenna Array Using Convolution Constraints  
L. C. Godara and M. R. Sayyah Jahromi, *Univ. of New South Wales, AUSTRALIA*

4:00 p.m. – 6:00 p.m.

Wednesday, December 13

Room D (304)

## Session WE4D

### Reconfigurable Antennas

Chairs : K. Nishizawa, *Mitsubishi Electric Corp., JAPAN*  
R. Sorrentino, *Univ. of Perugia, ITALY*

#### WE4D-1 (INVITED)

Dual Band Reconfigurable Beam Forming Networks for WLAN Applications  
R. Sorrentino, R. V. Gatti, L. Marcaccioli, A. Ocera, E. Sbarra, and M. A. Corbucci, *Univ. of Perugia, ITALY*

#### WE4D-2

Waveguide Slot Array In-Motion Antenna for Receiving Both RHCP and LHCP Using Single Layer Polarizer  
K.-S. Son, S.-Y. Hwang\*, C.-G. Park\*, and J.-W. Yu, *KAIST, \*Wiworld Co., Ltd., KOREA*

#### WE4D-3

Design of Compact Switched Slot Antenna  
W. H. Chen, Z. H. Feng, J. W. Sun, Y. Furuya\*, and A. Kuramoto\*, *Tsinghua Univ., CHINA, \*NEC Corp., JAPAN*

#### WE4D-4

Realization and Measurements of Planar Switchable Antenna System  
J. Sun, W. Chen, X. Wang, Z. Feng, Y. Furuya\*, and A. Kuramoto\*, *Tsinghua Univ., CHINA, \*NEC Corp., JAPAN*

#### WE4D-5

A Consideration On A Beam Adjustable Microstrip Array Antenna  
M. Yassir, Y. Kimura, and M. Haneishi, *Saitama Univ., JAPAN*

Room E (311+312)

## Session WE4E

### Recent Advances on Periodic and Multilayered Structures

Chairs : T. Hiraoka, *Kanagawa Univ., JAPAN*  
C. L. Wang, *National Taiwan Univ. of Science and Technology, TAIWAN*

#### WE4E-1

Control of the Electrodynamic Properties of The Waveguide Formed by the Gap between Two Periodic Layered Structures by Means of the External Fields  
A. A. Bulgakov, V. K. Kononenko, and O. V. Kostlyova, *Institute of Electronics and Radiophysics of NAS of Ukraine, UKRAINE*

#### WE4E-2

Investigation of Reflection and Transmission Coefficients on Active Multilayered Semiconductor Structure  
A. A. Bulgakov and O. V. Shramkova, *The National Academy of Sciences of Ukraine, UKRAINE*

#### WE4E-3

Advanced 3D LTCC Passive Components Using Cavity Structures for 60GHz Gigabit Wireless Systems  
J.-H. Lee, N. Kidera\*, A. Traille, S. Pinel, J. Laskar, and M. Tentzeris, *Georgia Institute of Technology, U.S.A., \*Asahi Glass Co., Ltd., JAPAN*

#### WE4E-4

Wideband Aperture Coupled Stacked Patch Type Microstrip to Waveguide Transition for V-Band  
H. Y. Lee, D. S. Jun, S. E. Moon, E. K. Kim, J. H. Park, and K. H. Park, *Electronics and Telecommunications Research Institute, KOREA*

#### WE4E-5 (INVITED)

Periodically Loaded Transmission Line Media/Materials with Infinite Extent on Coplanar Waveguide: Guided-Wave Performances  
L. Zhu, *Nanyang Technological Univ., SINGAPORE*

Room F (313+314)

## Session WE4F

### Packaging Technology

Chairs : H. Kondoh, *Hitachi, Ltd., JAPAN*  
H. Barnes, *Agilent Technologies, U.S.A.*

#### WE4F-1

Design-for-Manufacturability (DFM) Methodology and Yield Analysis for Embedded RF Circuits for System-in-Package (SiP) Applications  
S. Mukherjee and M. Swaminathan, *Georgia Institute of Technology, U.S.A.*

#### WE4F-2

Estimation of Radiated Emission from the Power/Ground Planes and Its Reduction Using an Improved Calculation Method  
S. Kahng, *Univ. of Incheon, KOREA*

#### WE4F-3

Development of a Pogo Pin Assembly and Via Design for Multi-Gigabit Interfaces on Automatic Test Equipment  
H. Barnes, J. Moreira\*, H. Ossoinig\*, M. Wollitzer\*\*, T. Schmid\*\* and M. Tsai\*\*\*, *Verigy Inc., U.S.A., \*Verigy Inc., GERMANY, \*\*Rosenberger, GERMANY, \*\*\*Xilinx Inc., U.S.A.*

#### WE4F-4

A Front-End Module for CDMA Based on Zero Shrinkage of LTCC  
D. Kim, H.-M. Cho, J.-I. Ryu, J.-C. Kim, J.-C. Park, and N.-K. Kang, *Korea Electronics Technology Institute, KOREA*

#### WE4F-5 (INVITED)

On-Wafer Level Packaging of RF MEMS Devices for Ka-Band Applications  
Q. Wu\*, B.-S. Jin\*, K. Tang\*, X.-J. He\*, F. Zhang\*\*, and J.-C. Lee\*\*\*, *\*Harbin Institute of Technology, CHINA, \*\*Kwangwoon Univ., KOREA*

# TECHNICAL SESSION

Thursday, December 14

8:50 a.m. – 10:30 a.m.

Room A (301)

## Session TH1A

### Microwave Oscillator

Chairs : T. Tokumitsu, *Eudyna Devices, JAPAN*  
K. Itoh, *Mitsubishi Electric Corp., JAPAN*

#### TH1A-1

Novel Methods for Phase Noise Reduction and Harmonic Suppression in a Planar Oscillator Circuit Based on Split Ring Resonators

C. G. Hwang and N. H. Myung, *KAIST, KOREA*

#### TH1A-2

Technological Scaling and Minimization of  $1/f$  Noise in SiGe HBTs Coupled Mode N-Push Oscillator/VCO

U. L. Rohde and A. K. Poddar, *Synergy Microwave Corp., U.S.A.*

#### TH1A-3

A Ku-Band Push-Push VCO Using Phase Shifters

M. Tsutsumi, T. Tanaka, and M. Aikawa, *Saga Univ., JAPAN*

#### TH1A-4

A High-Efficiency GaN/AlGaN HEMT Oscillator Operating at L-Band

J. S. Kim, W. Wu, J. Lin, A. Verma, S. Jang, F. Ren, S. Pearton, R. Fitch\*, and J. Gillespie\*, *Univ. of Florida, \*Air Force Research Laboratory, U.S.A.*

#### TH1A-5

Power Enhancement of Microwave Oscillator Using a High-Q Spiral-Shaped DGS Resonator

J. Jung, D.-J. Woo, C. S. Cho, and T.-K. Lee, *Hankuk Aviation Univ., KOREA*

Room B (302)

## Session TH1B

### Advances in Tunable and Metamaterial Filters and Resonators

Chairs : M. Miyazaki, *Mitsubishi Electric Corp., JAPAN*  
C. Quendo, *LEST-UBO, FRANCE*

#### TH1B-1

A Widely-Tunable Balanced Bandstop Filter with Low Reflections and Separate Stop-Bands

H. Uchida, A. Sato, A. Ohno, N. Yoneda, Y. Konishi, and S. Makino, *Mitsubishi Electric Corp., JAPAN*

#### TH1B-2

Varactor-Tuned Hairpin Bandpass Filter with Enhanced Stopband Performance

M.-S. Chung, I.-S. Kim, and S.-W. Yun, *Sogang Univ., KOREA*

#### TH1B-3

Coupling Compensated  $180^\circ$  Phase Shift Coupled-Line Filters Terminated in Arbitrary Impedances

H.-R. Ahn, K. Min, D. Kang, S. Hong, and B. Kim, *POSTECH, KOREA*

#### TH1B-4

Piezoelectric-Based Tunable Microstrip Shunt Resonator

M. Al-Ahmad, N. Rolland, and P.-A. Rolland, *IEMN, FRANCE*

#### TH1B-5

CRLH Zeroth Order Resonator (ZOR) : Experimental Demonstration of Insensitivity to Losses and to Size

S. Abielmona, H. V. Nguyen, and C. Caloz, *École Polytechnique de Montréal, CANADA*

Room C (303)

## Session TH1C

### Miniaturization and Optimization of Hybrid Couplers

Chairs : T. Kawai, *Univ. of Hyogo, JAPAN*  
M. E. Bialkowski, *Univ. of Queensland, AUSTRALIA*

#### TH1C-1

Periodic Stepped-Impedance Rat Race Coupler with Arbitrary Power Division

Y.-C. Chiou, J.-S. Wu, and J.-T. Kuo, *National Chiao Tung Univ., TAIWAN*

#### TH1C-2

A Compact Rat Race Coupler Design For Dual-Band Applications

F.-L. Wong and K.-K. Cheng, *The Chinese Univ. of Hong Kong, CHINA*

#### TH1C-3

Harmonic Suppression and Size Reduction of Planar Rat-Race Hybrid Couplers

P. Mondal and A. Chakrabarty, *Indian Institute of Technology, INDIA*

#### TH1C-4

A Novel Compact-Size Ka-Band Branch-Line Coupler

S.-S. Liao, P.-T. Sun, H.-W. Liu, and C.-C. Chen, *Feng-Chia Univ., TAIWAN*

#### TH1C-5

Wideband Multi-Section Quadrupled Inductive-Compensated Parallel-Coupled Lines

M. Chongcheawchamnan, V. Channanphrai\*\*, and R. Phromlousri\*\*\*, *Research Center of Electromagnetic-Wave Applications, \*Mahanakorn Univ. of Technology, \*\*Rajamangala Univ. of Technology Isan, THAILAND*

Thursday, December 14

10:50 a.m. – 12:30 p.m.

Room A (301)

## Session TH2A

### Frequency Multiplication and Conversion Circuits

Chairs : N. Itoh, *Toshiba Corp., JAPAN*  
K. Nishikawa, *NTT, JAPAN*

#### TH2A-1

A High Performance Ka-Band Push-Push Oscillator Using Finite Ground CPW Structure

Y.-L. Zou and H.-K. Chiou, *National Central Univ., TAIWAN*

#### TH2A-2

A 1V 50 GHz Digital-Controlled CMOS Frequency Divider

S.-Y. Bai, T.-N. Luo, and Y.-J. Emery Chen, *National Taiwan Univ., TAIWAN*

#### TH2A-3

Multi-Band/Multi-Mode Current Folded Up-Convert Mixer Design

C.-C. Huang and W.-T. Chen, *Yuan Ze Univ., TAIWAN*

#### TH2A-4

A High-Efficiency, Broadband and High Output Power PHEMT Balanced K-Band Doubler with Integrated Balun

W.-R. Lee, S.-F. Chao, Z.-M. Tsai, P.-C. Huang, C.-H. Lien, J.-H. Tsai, and H. Wang, *National Taiwan Univ., TAIWAN*

#### TH2A-5

A Passive Frequency Tripler Using the New Small-Size Bandpass Filter with Low Insertion Loss

J.-K. Min, H.-J. Kim, Y.-H. Kim, D.-J. Kang\*, H.-S. Yun\*\*, and U.-S. Hong, *Kwangwoon Univ., \*Korea Information & Communication Polytechnic College, \*\*Samsung SDS Co., LTD., KOREA*

Room B (302)

## Session TH2B

### Design and Implementaion Techniques for Microwave Filters

Chairs : K. Suzuki, *ISTEC, JAPAN*  
O. Bartz, *Panasonic Electronic Devices Europe GmbH, GERMANY*

#### TH2B-1

Efficient Time Domain Calculus of Microwave Resonator Parameters

I. Awai, T. Ishida, and Y. Zhang, *Ryukoku Univ., JAPAN*

#### TH2B-2

Full Wave Coupled Resonator Filter Optimization Using a Multi-Port Admittance-Matrix

S. Otto, A. Lauer, J. Kassner, and A. Rennings, *IMST GmbH, GERMANY*

#### TH2B-3

Compact Compline Filter with Improved Cross Coupling Assembly and Temperature Compensation

M. Höft, S. Burger, T. Magath, and O. Bartz, *Panasonic Electronic Devices Europe GmbH, GERMANY*

#### TH2B-4

A 55GHz 5-pole NRD Guide E-Plane Bandpass Filter for Millimeter Wave OFDM Applications

T. Shimizu, Y. Kawahara\*, T. Nakagawa\*\*, and T. Yoneyama, *Tohoku Institute of Technology, \*MMEx Inc., \*\*NHK, JAPAN*

#### TH2B-5

Ultra-Narrowband HTS Filter with 2.5-Wavelength Hairpin Resonators in 7 GHz Band

N. Shiokawa, H. Kayano, M. Yamazaki, T. Watanabe, F. Aiga, and T. Hashimoto, *Toshiba Corp., JAPAN*

Room C (303)

## Session TH2C

### Advanced Coupler Design and Fabrication Techniques

Chairs : H. Oh-hashii, *Mitsubishi Electric Corp., JAPAN*  
K. K. M. Cheng, *The Chinese University of Hong Kong, CHINA*

#### TH2C-1

CMRR Analysis for Wideband Passive Monolithic Differential Quadrature Coupler Implemented Using GaAs Process

K. W. Hamed, A. P. Freundorfer, and Y. M. M. Antar\*, *Queen's Univ., \*Royal Military College, CANADA*

#### TH2C-2

High Compactness/High Isolation 3D-Broadside Couplers Design Methodology

M.-N. Do\*, D. Dubuc\*\*\*, K. Grenier\*, L. Bary\*, L. Mazenq\*, and R. Plana\*\*\*, *\*LAAS-CNRS, \*\*Paul Sabatier Univ., FRANCE*

#### TH2C-3

Non-Uniform Tapered Ultra Wideband Directional Coupler Design and Modern Ultra Wideband Balun Integration

P. Salem, C. Wu\*, and M. C. E. Yagoub, *Univ. of Ottawa-SITE, \*Defence R&D Canada, CANADA*

#### TH2C-4

A CPW Hybrid Coupler with an Enhanced Coupling Microstructure

Y. Kitsukawa, M. Hangai, S.-S. Lee, T. Nishino, Y. Yoshida, and M. Miyazaki, *Mitsubishi Electric Corp., JAPAN*

#### TH2C-5

Monolithic Integration of Microstrip Line Couplers for Automotive Radar Applications at 77 GHz Using a Si-HBT Technology

M. Hartmann, K. Seemann, H. Jäeger\*, E. Kolmhofer\*, and R. Weigel, *Univ. of Erlangen-Nuremberg, GERMANY, \*Danube Integrated Circuit Engineering, AUSTRIA*

# TECHNICAL SESSION

8:50 a.m. – 10:30 a.m.

Thursday, December 14

Room D (304)

## Session TH1D

### Millimeter Wave and Integrated Antennas (1)

Chairs : J. Hirokawa, *Tokyo Institute of Technology, JAPAN*  
K. Ghorbani, *RMIT Univ., AUSTRALIA*

#### TH1D-1

InP Aperture Coupled Patch Antenna for Millimeter-Wave/Photonic Integrated Circuits

W. S. T. Rowe and K. Ghorbani, *RMIT Univ., AUSTRALIA*

#### TH1D-2

Flip-Chip Bonded Stacked Patch Antenna for Monolithic Microwave Integrated Circuits

A. S. Elmezghi and W. S. T. Rowe, *RMIT Univ., AUSTRALIA*

#### TH1D-3

Micromachined Inset-Fed Patch Antenna at Ka-Band

P. Sharma, S. K. Koul, and S. Chandra, *Indian Institute of Technology, INDIA*

#### TH1D-4

Ultrawide-Band Integrated Circuit Package Antenna in LTCC Technology

M. Sun and Y. P. Zhang, *Nanyang Technological Univ., SINGAPORE*

#### TH1D-5

Electromagnetic Radiation of Carbon Nanotube Array in Microwave Frequencies

Q. Zhu, *Univ. of Science and Technology of China, CHINA*

Room E (311+312)

## Session TH1E

### Advanced High Power Amplifiers

Chairs : K. Maruhashi, *NEC Corp., JAPAN*  
H.-K. Chiou, *National Central Univ., TAIWAN*

#### TH1E-1

A Family of 20 W Linear Driver ICs for RF High Power Amplifiers

C. D. Shih, P. Andersson\*, R. Bagger, Y. Yu, A. Rivera, J. Sjöström\*\*, and R. Hooper, *Infineon Technologies, North American Corp., U.S.A.*

#### TH1E-2

Closed-Loop Power Control of Radio Frequency Power Amplifier Module with an on-Chip Embedded Power Detector

J.-W. Wu, S.-W. Chen, and C.-W. Tang, *National Chung Cheng Univ., TAIWAN*

#### TH1E-3

1.5 kW, S-Band Solid-State Pulsed Power Amplifier with Digitally Controlled Automatic Gain Equalizer Circuit

K. H. Kim, Y. R. Lee, J. H. Joo, H. J. Kim, J. J. Choi, and D. M. Park\*, *Kwangwoon Univ., \*Samsung-Thales Co., Ltd, KOREA*

#### TH1E-4

Ka-Band Flip-Chip Assembled Power Amplifier

C.-S. Lee, W.-K. Huang, C.-M. Wang, Y.-M. Hsin, and T.-J. Yeh\*, *National Central Univ., \*WIN Semiconductors Corp., TAIWAN*

#### TH1E-5

A 26 – 65 GHz GaAs pHEMT Cascaded Single Stage Distributed Amplifier with High Gain/Area Efficiency

K.-Y. Lin, I.-S. Chen, and H.-K. Chiou, *National Central Univ., TAIWAN*

Room F (313+314)

## Session TH1F

### Numerical Analysis

Chairs : K. Nishimura, *Ryukoku Univ., JAPAN*  
J. Rautio, *Sonnet Software, Inc., U.S.A.*

#### TH1F-1

Exact Calibration of Multiple Coupled Internal Ports in Electromagnetic Analysis

J. C. Rautio, *Sonnet Software, Inc., U.S.A.*

#### TH1F-2

Application of Stopband of Composite Right/left-Handed Transmission Line for Broadband Power Divider Design

K.-H. Tsai and C.-K. Tzuan, *National Taiwan Univ., TAIWAN*

#### TH1F-3

An Efficient Variant of GMRES Iterative Method for FMM Implementation

P. L. Rui and R. S. Chen, *Nanjing Univ. of Science and Technology, CHINA*

#### TH1F-4

The Multigrid Preconditioned Flexible GMRES Solver for Hierarchical TVFEM Analysis

X. W. Ping and R. S. Chen, *Nanjing Univ. of Science and Technology, CHINA*

#### TH1F-5

The Application of  $p$ -Level Schwarz Method for Simulation of Electromagnetic Problems with FEM

X. W. Ping and R. S. Chen, *Nanjing Univ. of Science and Technology, CHINA*

10:50 a.m. – 12:30 p.m.

Thursday, December 14

Room D (304)

## Session TH2D

### Millimeter Wave and Integrated Antennas (2)

Chairs : H. Sato, *Tohoku Univ., JAPAN*  
K. Eccleston, *Univ. of Canterbury, NEW ZEALAND*

#### TH2D-1

Design of Millimeter-Wave Microstrip Comb-Line Antenna Array Beam-Tilting in Perpendicular Plane of Feeding Line

Y. Kashino, K. Sakakibara, Y. Tanaka\*, N. Kikuma, and H. Hirayama, *Nagoya Institute of Technology, \*Toyota Central R&D Labs., JAPAN*

#### TH2D-2

A Compact Cavity-Backed Annular Slot Antenna Array for 60-GHz Applications

K.-F. Hung and Y.-C. Lin, *National Taiwan Univ., TAIWAN*

#### TH2D-3

Slot Array Antennas Fed by Integrated Wave Guide on Liquid Crystal Polymer for V-Band Wireless LAN Application

I.-K. Kim, K.-S. Yang, S. Pinel, and J. Laskar, *Georgia Institute of Technology, U.S.A.*

#### TH2D-4

Measurements of a Compact Surface Wave Launcher Array with Application to Single Frequency Beam Steering Leaky Wave Antennas

A. P. Freundorfer, M. Z. I. Bekheit, and Y. M. M. Antar\*, *Queen's Univ., \*Royal Military College, CANADA*

#### TH2D-5

Four-Way Power Combining Integrated Antenna

K. W. Eccleston, *Univ. of Canterbury, NEW ZEALAND*

Room E (311+312)

## Session TH2E

### Modulation and Related Technologies

Chairs : H. Furuta, *NHK, JAPAN*  
W.-M. Woo, *Samsung RFIC Design Center at Georgia Tech, U.S.A.*

#### TH2E-1

Frequency and Power Saving of the Future Generation Wireless Communications by Superconducting Filter

M. Shigaki, Y. Hagiwara, K. Yamanaka\*, and K. Kurihara\*, *Fujitsu Wireless Systems Ltd., \*Fujitsu Ltd., JAPAN*

#### TH2E-2

Spatially Superposed M-Ary QAM Wireless Communication System

M. Tanaka and T. Eguchi, *Nihon Univ., JAPAN*

#### TH2E-3

Evaluation of Millimeter-Wave MIMO-OFDM Transmission Performance in a TV Studio

S. Suzuki, T. Nakagawa, H. Furuta, and T. Ikeda, *NHK, JAPAN*

#### TH2E-4

Analytic Quantization Modeling of OFDM Signals Using Normal Gaussian Distribution

H. Ehm, S. Winter, and R. Weigel, *Univ. of Erlangen-Nuremberg, GERMANY*

#### TH2E-5

A Case Study on Frequency Reuse in OFDMA Systems Using a Hierarchical Resource Radio Resource Management

B. Roy, M. Einhaus\*, and C. K. Roy, *Queen's Univ., CANADA, \*RWTH Aachen Univ., GERMANY*

Room F (313+314)

## Session TH2F

### Lossy Materials

Chairs : S. Watanabe, *Aoyama Gakuin Univ., JAPAN*  
K. L. Wu, *Chinese Univ. of Hong Kong, CHINA*

#### TH2F-1

Radiation Characteristics of a Periodically Slotted Parallel Plate Waveguide Filled with a Transversely Magnetized Ferrite

K. Nishimura, *Ryukoku Univ., JAPAN*

#### TH2F-2

Physical Model Order Reduction for Multilayer Lossy RF Embedded Passives

H. Hu, J. Wang, and K.-L. Wu, *the Chinese Univ. of Hong Kong, CHINA*

#### TH2F-3

Study of Reflection Properties of Thin Slabs Based on Artificial Materials

A. Munir and H. Kubo, *Yamaguchi Univ., JAPAN*

#### TH2F-4

Guiding Modes of Electromagnetic Crystal Waveguides Consisting of Magnetized Ferrite

H. Jia and K. Yasumoto, *Kyushu Univ., JAPAN*

#### TH2F-5

Analytical Study of Temperature Distribution of One-Layer EM-Absorber Using a Lossy Dielectric Material

S. Watanabe, K. Saito, T. Kurakata, and O. Hashimoto, *Aoyama Gakuin Univ., JAPAN*



# TECHNICAL SESSION

Thursday, December 14

2:00 p.m. – 3:40 p.m.

Room A (301)

## Session TH3A

### Linearization Technologies for Power Amplifiers

Chairs : T. Nojima, *Hokkaido Univ., JAPAN*

Y.-H. Jeong, *Pohang Univ. of Science and Technology, KOREA*

#### TH3A-1

Pre-Distortion Linearizer Using Self Base Bias Control Circuit

S. Shinjo, K. Totani, H. Tokunaga, K. Mori, and N. Suematsu, *Mitsubishi Electric Corp., JAPAN*

#### TH3A-2

Series Anti-Parallel Diode Linearizer for Class-B Power Amplifiers with a Gain Expansion

K. Yamauchi, H. Noto, S. Ishizaka, Y. Hamamatsu, M. Nakayama, and Y. Isota, *Mitsubishi Electric Corp., JAPAN*

#### TH3A-3

Linearity Improvement of RF Power Amplifiers Using a Simple High-Order Predistorter for WCDMA Applications

Y.-S. Lee, K.-I. Jeon\*, and Y.-H. Jeong, *Pohang Univ. of Science and Technology, \*RFcore Ltd., KOREA*

#### TH3A-4

A Polar Function Linearizer Using Even Order Harmonic Signals

E.-K. Kim, K.-K. Jeon, Y. Kim, and Y.-C. Yoon\*, *Kumoh National Institute of Technology, \*Kwangdong Univ., KOREA*

#### TH3A-5

Adaptive Linearization Technique for a Multi-Port Amplifier

T. Kaho, Y. Yamaguchi, T. Nakagawa, and K. Araki\*, *NTT, \*Tokyo Institute of Technology, JAPAN*

Room B (302)

## Session TH3B

### Advanced Divider Analysis and Designs

Chairs : I. Sakagami, *Toyama Univ., JAPAN*

S. Kahng, *Univ. of Incheon, KOREA*

#### TH3B-1

A New Parallel-Strip Power Divider with Enhanced Isolation Performance

L. Chiu and Q. Xue, *City Univ. of Hong Kong, CHINA*

#### TH3B-2

An UWB Planar Out-of-Phase Power Divider Employing Microstrip-Slot and Parallel Stripline-Microstrip Transitions

A. M. Abbosh\*\*, M. E. Bialkowski\*, and J. Mazierska\*\*\*, *\*Univ. of Queensland, AUSTRALIA, \*\*Mosul Univ., IRAQ, \*\*\*Massey Univ., NEW ZEALAND*

#### TH3B-3

A New Type of 3-Way Power Divider Using An Intentional Mismatched Termination

J.-S. Bae, J.-S. Lim, K.-S. Kim, J. Kim, and D. Ahn, *Soonchunhyang Univ., KOREA*

#### TH3B-4

A Design Method of Dual-Frequency Wilkinson Power Divider

T. Kawai, J. Yamasaki\*, Y. Kokubo, and I. Ohta, *Univ. of Hyogo, \*SANYO Electric Co., Ltd., JAPAN*

#### TH3B-5

Half-Mode SIW(HMSIW) Multi-Way Power Divider

B. Liu\*, W. Hong\*, L. Tian\*, H.-B. Zhu\*, W. Jiang\*, and K. Wu\*\*\*, *\*Southeast Univ., CHINA, \*\*Poly-Grames Research Center, CANADA*

Room C (303)

## Session TH3C

### Artificial and Novel Materials for Antenna Applications (1)

Chairs : T. Maruyama, *NTT DoCoMo, Inc., JAPAN*

K. Eccleston, *Univ. of Canterbury, NEW ZEALAND*

#### TH3C-1

Slotted Composite Right/Left-Handed Strip Lines for Leaky Wave Antenna Applications

Y. Sasaki, A. Sanada, and H. Kubo, *Yamaguchi Univ., JAPAN*

#### TH3C-2

Investigation of a Tessellated Meta-Material Planar Circuit

K. W. Eccleston, *Univ. of Canterbury, NEW ZEALAND*

#### TH3C-3

Electromagnetic Band Gap (EBG) Structure Synthesizer Using Genetic Algorithm for Wireless System Applications

T. H. Kim, E. Engin, and M. Swaminathan, *Georgia Institute of Technology, U.S.A.*

#### TH3C-4

Performance Evaluation of a Very Small Magnetic Core Loop Antenna for an LF Receiver

K. Abe and J. Takada\*, *CASIO Computer Co., Ltd., \*Tokyo Institute of Technology, JAPAN*

#### TH3C-5

Operational Frequency Tuning for Meander-Line Antenna Fed by Coplanar Waveguide with Finite Ground Plane

F. Kuroki and H. Ohta, *Kure National College of Technology, JAPAN*

Thursday, December 14

4:00 p.m. – 6:00 p.m.

Room A (301)

## Session TH4A

### High Power Devices and Power Amplifiers

Chairs : M. Kuzuhara, *Fukui Univ., JAPAN*

C.-S. Kwak, *ETRI, KOREA*

#### TH4A-1

Numerical Analysis and IR Scan Test for Thermal Resistance of GaAs MMIC in a Communications Satellite

C. S. Kwak, K. B. Ahn, D. P. Chang, and I. B. Yom, *ETRI, KOREA*

#### TH4A-2

A 2.14 GHz Class-E LDMOS Power Amplifier

Y.-S. Lee, K.-I. Jeon\*, and Y.-H. Joeng, *Pohang Univ. of Science and Technology, \*RFcore Ltd., KOREA*

#### TH4A-3

Reduced Gate Leakage-Current and RF Power Performance of AlGaIn/GaN HEMTs with an Inner Field-Plate

K. Lee, K. Ko, S. Lee, and K. Yang, *KAIST, KOREA*

#### TH4A-4

Prospective and Issues for GaN Microwave Electronics into Space Satellites

J.-L. Cazaux, S. Forestier, J.-F. Villemazet, O. Vendier, C. Schaffauser, C. Drevon, and J.-L. Muraro, *Alcatel Alenia Space, FRANCE*

#### TH4A-5 (INVITED)

Recent Progress of High Power GaN-HEMT for Wireless Application

K. Joshin and T. Kikkawa, *Fujitsu Laboratories Ltd., JAPAN*

Room B (302)

## Session TH4B

### Power Amplifiers and Linearization Technique

Chairs : T. Yoshimasu, *Waseda Univ., JAPAN*

L. Larson, *Univ. of California, San Diego, U.S.A.*

#### TH4B-1

High Linearity-Wideband PHEMT Darlington Amplifier with +40 dBm IP3

K. W. Kobayashi, *Sirenza Microdevices, U.S.A.*

#### TH4B-2

Development of an MCPA Using Digital Pre-Distortion for Digital Terrestrial TV Broadcasting

K. Haeiwa, K. Kanamori\*, and T. Abe\*, *Hiroshima City Univ., \*NHK, JAPAN*

#### TH4B-3

A Recursive Digital Predistorter for Linearizing RF Power Amplifiers with Memory Effects

P. L. Gilbert, G. Montoro, and A. Cesari\*, *Universitat Politècnica de Catalunya, SPAIN, \*LAAS-CNRS, FRANCE*

#### TH4B-4

Short Term Memory Effects Study for Optimal Predistortion-Based Linearization of Base-Stations Wireless Transmitters

M. Helaoui\*\*, S. Boumaiza\*, A. Ghazel\*\*, and F. M. Ghannouchi\*, *\*Univ. of Calgary, CANADA, \*\*Ecole Supérieure des Communications de Tunis, TUNISIA*

#### TH4B-5 (INVITED)

Digital Predistortion Techniques for Linearized Power Amplifiers

L. Larson, D. Kimball, P. Asbeck, P. Draxler, J. Deng, and M. Li, *Univ. of California, San Diego, U.S.A.*

Room C (303)

## Session TH4C

### Artificial and Novel Materials for Antenna Applications (2)

Chairs : A. Sanada, *Yamaguchi Univ., JAPAN*

J. Modelski, *Warsaw Univ. of Technology, POLAND*

#### TH4C-1 (INVITED)

Semiconductor and Ferroelectric Antennas

J. Modelski and Y. Yashchishyn, *Warsaw Univ. of Technology, POLAND*

#### TH4C-2

Power Combining Oscillator Array Using Metamaterial Based Injection Locking Coupling Network

K. M. K. H. Leong, A. Lai, and T. Itoh, *UCLA, U.S.A.*

#### TH4C-3

Design of an 8-Element Planar Composite Right/Left-Handed Leaky Wave Antenna Array for 2-D Beam Steering

T. Kaneda, A. Sanada, and H. Kubo, *Yamaguchi Univ., JAPAN*

#### TH4C-4

On the Reduction of Mutual Couplings between Closely Separated Patch Antennas

G. S. A. Shaker and S. Safavi-Naeini, *Univ. of Waterloo, CANADA*

#### TH4C-5

A Broadband Planar Patch Array Resonator Antenna

D. Kim, M. Kim, M. Tanaka\*, and K. Matsugatan\*, *Korea Univ., KOREA, \*DENSO Corp., JAPAN*

# TECHNICAL SESSION

2:00 p.m. – 3:40 p.m.

Thursday, December 14

Room D (304)

## Session TH3D

### Novel FDTD Method

Chairs : K. Fujimori, *Okayama Univ., JAPAN*  
F.-C. Chen, *National Chiao Tung Univ., TAIWAN*

#### TH3D-1

Effect of the Conductivity Profile on the Stability of the ADI-FDTD Method with Split-Field PML

J.-N. Hwang and F.-C. Chen, *National Chiao Tung Univ., TAIWAN*

#### TH3D-2

Hybrid PML-ABC Truncation Techniques for Finite-Volume Time-Domain Simulations

K. Sankaran, C. Fumeaux, and R. Vahldieck, *ETH Zurich, SWITZERLAND*

#### TH3D-3

A Novel Extended FDTD Method for the Analysis of the Active Integrated Circuit and Antenna Mounted Non-Linear Devices

N. Kawashima, K. Fujimori, M. Sanagi, and S. Nogi, *Okayama Univ., JAPAN*

#### TH3D-4

An Efficient FDTD Algorithm for Computation of Resonance Frequencies of an Inhomogeneous Cylindrical Structure

K. V. Srivastava, V. V. Mishra, and A. Biswas, *Indian Institute of Technology, INDIA*

#### TH3D-5

Efficient Analysis of Resonator by the Three-Dimensional Iterative ADI-FDTD Method

Z. B. Ye and R. S. Chen, *Nanjing Univ. of Science and Technology, CHINA*

Room E (311+312)

## Session TH3E

### System-Related Technologies (1)

Chairs : D. Gray, *NICT, JAPAN*  
T. Liu, *Univ. of Calgary, CANADA*

#### TH3E-1

Dynamic Nonlinear Behavior Characterization for Wideband RF Transmitters Using Augmented Hammerstein Models

T. Liu, S. Boumaiza, A. B. Sesay, and F. M. Ghannouchi, *Univ. of Calgary, CANADA*

#### TH3E-2

Analog Integrator and Analog-to-Digital Converter Effect on a Multi-Resolution Spectrum Sensing (MRSS) for Cognitive Radio Systems

J. Park, Y. Hur\*, K. Lim, C.-H. Lee\*, H. Kim\*\*, and J. Laskar, *Georgia Institute of Technology, \*Samsung RFIC Design Center at Georgia Tech., U.S.A., \*\*Hanbat National Univ., KOREA*

#### TH3E-3

A Study of Wireless Parallel Data Transmission of Extremely High Data Rate up to 6.17 Gbps per Channel

P. Håkansson, A. Huynh, and S. Gong, *Linköping Univ., SWEDEN*

#### TH3E-4

Review of Helices for DTV Broadcast from Prototype HAPS Airship

D. Gray, M. Nagatsuka, and R. Miura, *NICT, JAPAN*

#### TH3E-5

A New Long-Distance Delay Profile Measuring Equipment for Single Frequency Networks in Digital Terrestrial TV Broadcasting

K. Kitayama, K. Haeiwa\*, Y. Kawana\*\*, and Y. Morii\*\*\*, *NHK Integrated Technology, \*Hiroshima City Univ., \*\*NHK Engineering Administration Dept., \*\*\*NHK Engineering Service, JAPAN*

Room F (313+314)

## Session TH3F

### Microwave Silicon VCO Design

Chairs : H. Sato, *Renesas Technology Corp., JAPAN*  
H. Zirath, *Chalmers Univ. of Technology, SWEDEN*

#### TH3F-1

A 5.5GHz, 8mW, LC Tank CMOS VCO with Optimal Phase Noise Performance

S.-M. Oh, B.-H. Jo, Y.-S. Na, and T.-S. Kim, *Samsung Electro-Mechanics Corp., KOREA*

#### TH3F-2

Differential VCO Design with a Wide Frequency Tuning Range

L. Lin, W.-Y. Yin, J. Mao, and Y.-Y. Wang, *Shanghai Jiao Tong Univ., CHINA*

#### TH3F-3

A Low Noise Bulk-Coupled Colpitts CMOS Quadrature VCO

Y.-H. Cho, F.-C. Chang, M.-F. Lei, M.-D. Tsai, H.-Y. Chang, and H. Wang, *National Taiwan Univ., TAIWAN*

#### TH3F-4

Design of Low Power and High Efficiency Colpitts VCO with a Cascoded NMOS Cross-Coupled pair

C. I. Shie, J. M. Lin, and Y. C. Chiang, *Chang Gung Univ., TAIWAN*

#### TH3F-5

A 2.5 GHz CMOS LC VCO with Improved Phase Noise Based on the Transformer Feedback Scheme

Y. Hara, H. Sakurai, and Y. Sugimoto, *Chuo Univ., JAPAN*

4:00 p.m. – 6:00 p.m.

Thursday, December 14

Room D (304)

## Session TH4D

### Waveguide Based on Metamaterials

Chairs : H. Kubo, *Yamaguchi Univ., JAPAN*  
T. Itoh, *UCLA, U.S.A.*

#### TH4D-1

Leaky Wave Radiation from Left-Handed Transmission Lines Composed of a Cut-off Parallel-Plate Waveguide Loaded with Dielectric Resonators

T. Ueda, A. Lai\*, N. Michishita\*, and T. Itoh\*, *Kyoto Institute of Technology, JAPAN, \*UCLA, U.S.A.*

#### TH4D-2

Guided-Wave Characteristics of Coplanar Waveguide Metamaterials Composed of Unsymmetrical Unit Cells

J. Gao and L. Zhu, *Nanyang Technological Univ., SINGAPORE*

#### TH4D-3

Metallic Wire Substrate (MWS) for Miniaturization in Planar Microwave Applications

H. V. Nguyen, J. Gauthier, J. M. Fernandez\*, M. S. Sierra-Castañer\*, and C. Caloz, *École Polytechnique de Montréal, CANADA \*Universidad Politécnica de Madrid, SPAIN*

#### TH4D-4

Parallel Conductor Particle for Artificial Magnetic Material in Microwave Frequency

H. Kubo, A. Matsumoto, and A. Sanada, *Yamaguchi Univ., JAPAN*

#### TH4D-5 (INVITED)

Left-Handed Wave Propagation in Rod Media

A. Sanada, *Yamaguchi Univ., JAPAN*

Room E (311+312)

## Session TH4E

### System-Related Technologies (2)

Chairs : K. Hamaguchi, *NICT, JAPAN*  
R. Weigel, *Univ. of Erlangen-Nuremberg, GERMANY*

#### TH4E-1

Dual-Mode & Dual-Band RF Module Designed Based on Homodyne Technology

Z. Jiang, J. Zhao\*, and X. Zhu, *Southeast Univ., \*Greatest Communication Technology Co., Ltd., CHINA*

#### TH4E-2

A Novel Linear Polar Transmitter Architecture Using Low-Power Analog Predistortion for EDGE Applications

W. Woo, K. H. An\*, O. Lee\*, J. J. Chang, C.-H. Lee, K. Yang\*, H. Kim\*\*, and J. Laskar\*, *Samsung RFIC Design Center at Georgia Tech, \*Georgia Institute of Technology, U.S.A., \*Hanbat National Univ., KOREA*

#### TH4E-3

All-Microstrip Design of Three Multiplexed Antennas and LNA for UWB Systems

A. Serban, M. Karlsson, and S. Gong, *Linköping Univ., SWEDEN*

#### TH4E-4

Design and Characteristics of High Order Derivative Gaussian Pulse Generator for DS-UWB

D.-H. Kim, G.-N. Bang, and C. Park, *Myongji Univ., KOREA*

#### TH4E-5 (INVITED)

The System Design of Integrated Passive Transponder Devices

K. Seemann and \*R. Weigel, *Univ. of Erlangen-Nuremberg, GERMANY*

Room F (313+314)

## Session TH4F

### Silicon Frequency Generation and Conversion ICs

Chairs : T. Masuda, *Hitachi, Ltd., JAPAN*  
M. Madhian, *NEC Laboratories America, Inc., U.S.A.*

#### TH4F-1

A Double Tuned Ku-Band SiGe-MMIC VCO with Variable Feed-Back Capacitor

K. Tsutsumi, M. Kagano, and N. Suematsu, *Mitsubishi Electric Corp., JAPAN*

#### TH4F-2

A Low Phase Noise 26-GHz Push-Push VCO with a Wide Tuning Range in 0.18- $\mu$ m CMOS Technology

C.-H. Chiu, K.-H. Liang, H.-Y. Chang, and Y.-J. Chan, *National Central Univ., TAIWAN*

#### TH4F-3

A 16-GHz CMOS Differential Colpitts VCO for DS-UWB and 60-GHz Applications

C.-C. Lee, C.-L. Lu\*, and H.-R. Chuang, *National Cheng Kung Univ., \*Kun Shan Univ., TAIWAN*

#### TH4F-4

A 1.5-V 2.4 GHz CMOS Variable Gain Front-End for Bluetooth and Wireless LAN Applications

S. K. Alam, *The Ohio State Univ., U.S.A.*

#### TH4F-5 (INVITED)

CMOS Devices and Circuits for Microwave and Millimetre Wave Applications

H. Zirath\*\*, M. Ferndahl\*, B. M. Motlagh\*, A. Masud\*, I. Angelov\*, and H.-O. Vickers\*\*\*, *\*Chalmers Univ. of Technology, \*\*Ericsson AB, \*\*\*Ericsson Microwave Systems, SWEDEN*

# TECHNICAL SESSION

Friday, December 15

8:50 a.m. – 10:30 a.m.

## Room A (301)

### Session FR1A

#### Advances on Passive Components

Chairs : A. Sanada, *Yamaguchi Univ., JAPAN*  
C. Caloz, *École Polytechnique de Montréal, CANADA*

##### FR1A-1

Extended Composite Right/Left-Handed (E-CRLH) Metamaterial and its Application as Quadband Quarter-Wavelength Transmission Line

A. Rennings, S. Otto, J. Mosig, C. Caloz\*, and I. Wolff, *IMST GmbH, GERMANY*, \**École Polytechnique de Montréal, CANADA*

##### FR1A-2

Group Delay Compensation Technique for UWB MMIC Using Composite Right/Left-Handed Circuit

K. Murase, R. Ishikawa, and K. Honjo, *The Univ. of Electro-Communications, JAPAN*

##### FR1A-3

A Single-Diode Frequency Doubler Using a Feed-Forward Technique

P. Rajanarok, A. Namahoot, and P. Akkaraekthalin, *King Mongkut's Institute of Technology North Bangkok, THAILAND*

##### FR1A-4

Use of Quad-Phase Surface Acoustic Wave Filters as Power Combiner/Divider for RF Power Amplifiers

J. G. Wen\*\*, K. Hashimoto\*\*, and M. Yamaguchi\*\*, \**University of Electronic Science and Technology of China, CHINA*, \*\**Chiba Univ., JAPAN*

##### FR1A-5

An Ultra-Low-Loss Micromachined RF Monolithic Transformer with Partial Pattern Ground Shields (PPGS) for UWB RFIC Applications

Y.-S. Lin, C.-C. Chen, H.-B. Liang, T. Wang\*, and S.-S. Lu\*, *National Chi-Nan Univ., \*National Taiwan Univ., TAIWAN*

## Room B (302)

### Session FR1B

#### Miniature Planar and Integrated Filters (1)

Chairs : Z. Ma, *Saitama Univ., JAPAN*  
C. Phongcharoenpanich, *King Mongkut Institute of Technology Ladkrabang, THAILAND*

##### FR1B-1

Miniaturized Microstrip Interlocked-Coupled Bandpass Filters Using Folded Quarter-Wavelength Resonators

S.-C. Lin, Y.-S. Lin, and C. H. Chen, *National Taiwan Univ., TAIWAN*

##### FR1B-2

Compact Bandpass Filters Based on Microstrip and Coplanar Waveguide Resonators

T.-N. Kuo, S.-C. Lin, C.-H. Wang, and C.-H. Chen, *National Taiwan Univ., TAIWAN*

##### FR1B-3

A Novel Compact Microstrip Bandstop Filter Based on Complementary Split-Ring Resonators

J.-H. Lee, Y.-C. Oh, and N.-H. Myung, *KAIST, KOREA*

##### FR1B-4

A Miniaturized Microstrip Common Resonator Triplexer without Extra Matching Network

C.-F. Chen, T.-Y. Huang, T.-M. Shen, and R.-B. Wu, *National Taiwan Univ., TAIWAN*

##### FR1B-5

A Compact Multilayered Balanced Filter Using Resonators Based on Interdigitally-Coupled Lines

T. Fukunaga and K. Wada\*, *TDK Corp., \*The Univ. of Electro-Communications, JAPAN*

## Room C (303)

### Session FR1C

#### Material Measurements

Chairs : S. Kurokawa, *AIST, JAPAN*  
M. Jacob, *James Cook Univ., AUSTRALIA*

##### FR1C-1

Study on Complex Permittivity of Materials With Temperature Change by Microwave Heating

Y. Guan\*\*, T. Nakayama\*, and Y. Nikawa\*\*, \**Micro Denshi Co., Ltd., \*\*Kokushikan Univ., JAPAN*

##### FR1C-2

Temperature Dependence of Complex Permittivity of Planar Microwave Materials

M. V. Jacob\*, J. Krupka\*\*, J. Mazierska\*\*\*\*, and M. Bialkowski\*\*\*\*, \**James Cook Univ., AUSTRALIA*, \*\**Politechniki Warszawskiej, POLAND*, \*\*\**Massey Univ., NEW ZEALAND*, \*\*\*\**Univ. of Queensland, AUSTRALIA*

##### FR1C-3

Evaluation of Complex Permittivity of Materials Partially Filled in Coaxial Line by Using Hybrid Numerical Method

H. Yoshitake, H. Miyagawa, T. Nishikawa, K. Wakino, and T. Kitazawa, *Ritsumeikan Univ., JAPAN*

##### FR1C-4

A Short-Circuit Transmission Line Method for PIM Evaluation of Metallic Materials

Y. Yamamoto and N. Kuga, *Yokohama National Univ., JAPAN*

##### FR1C-5

Measurement Accuracy of a TM<sub>0m0</sub> Mode Cavity Method To Measure Complex Permittivity of Rod Samples

H. Kawabata, T. Kobayashi\*, Y. Kobayashi\*, and Z. Ma\*, *Gunma Industrial Technology Center, \*Saitama Univ., JAPAN*

Friday, December 15

10:50 a.m. – 12:30 p.m.

## Room A (301)

### Session FR2A

#### RF-MEMS and Device Modeling

Chairs : T. Nishino, *Mitsubishi Electric Corp., JAPAN*  
K. Wu, *École Polytechnique de Montréal, CANADA*

##### FR2A-1

Design of H-Shaped Low Actuation-Voltage RF-MEMS Switches

A. Batmanov, E. K. I. Hamad, E. P. Burte, and A. S. Omar, *Univ. of Magdeburg, GERMANY*

##### FR2A-2

Top vs. Bottom Charging of the Dielectric in RF MEMS Capacitive Switches

Z. Peng, X. Yuan, J. C. M. Hwang, D. Forehand\*, and C. L. Goldsmith\*, *Lehigh Univ., \*MEMtronics Corp., U.S.A.*

##### FR2A-3

Scalable Nonlinear Resistor Model for GaAs MMIC

Y. Zhu, C. Wei, O. Klimashov, C. Zhang, and Y. Tkachenko, *Skyworks Solution Inc., U.S.A.*

##### FR2A-4

An Inductor with Taper Stacked Metals on Silicon Chip

S.-Y. Lee, *VIA Technologies, Inc., TAIWAN*

##### FR2A-5

Barium Strontium Titanate Thin Film Varactors on R-Plane Sapphire

E. A. Fardin, A. S. Holland, K. Ghorbani, W. K. Simon\*, E. K. Akdogan\*, and A. Safari\*, *RMIT Univ., AUSTRALIA*, \**The State Univ. of New Jersey, U.S.A.*

## Room B (302)

### Session FR2B

#### Miniature Planar and Integrated Filters (2)

Chairs : J.-P. Hsu, *Kanagawa Univ., JAPAN*  
T. Ishizaki, *Panasonic Electronic Devices Co., Ltd., JAPAN*

##### FR2B-1

The Microstrip Filter With Multiple Stacked Capacitively-Loaded Coupled Lines

C.-W. Tang, J.-W. Wu, C.-C. Hu, H.-C. Lin\*, and S.-S. Yeh\*, *National Chung Cheng Univ., \*Industrial Technology Research Institute, TAIWAN*

##### FR2B-2

A Novel Bandpass Filter Design Using Cascaded CPW/Slotline Ring Resonators with Tapered Step Impedance CPW Fed Structure

C.-F. Tai, I.-C. Chen, and H.-K. Chiou, *National Central Univ., TAIWAN*

##### FR2B-3

A Design of Vertical Coupled Stacked Bandpass Filter Using Multilayer Structure without Via

W.-J. Guan and L.A. Carpenter, *Penn State Univ., U.S.A.*

##### FR2B-4

94 GHz CPW Branch-Line Bandpass Filter for Planar Integrated Millimeter-Wave Circuits

H.-J. Kwon, S.-W. Moon, D. An, M.-K. Lee, S.-J. Lee, B.-C. Jun, D.-H. Shin, H.-C. Park, and J.-K. Rhee, *Dongguk Univ., KOREA*

##### FR2B-5

Miniaturized Dual-Mode Quasi-Elliptic Function Bandpass Filter with Wide Rejection Bandwidth

Y.-Z. Wang, C.-A. Wang, and K.-Y. Lin, *Nan Kai Institute of Technology, TAIWAN*

## Room C (303)

### Session FR2C

#### New Measurement Methods

Chairs : I. Ida, *Fujitsu Ltd., JAPAN*  
N. Cherpak, *National Academy of Sciences of Ukraine, UKRAINE*

##### FR2C-1

Millimeter Wave Measurements of Complex Permittivity of Lossy Liquids Based on Whispering Gallery Dielectric Resonator Method

N. T. Cherpak, A. A. Barannik, Y. V. Prokopenko, A. Y. Kirichenko, E. N. Shaforost, and I. A. Shipilova, *National Academy of Sciences of Ukraine, UKRAINE*

##### FR2C-2

A Method for Evaluating a Complex Permittivity of Dielectric Material by Using Whispering Gallery modes on a Spherical Resonator

M. Matsubara, Y. Kogami, and Y. Tomabechi, *Utsunomiya Univ., JAPAN*

##### FR2C-3

High Frequency Characteristics of Cu/Ta/Hydrogen Silsesquioxane (HSQ) System and the Effects of NH<sub>3</sub> Plasma Treatment on the Electrical Properties for Hydrogen Silsesquioxane

C.-C. Ho and B.-S. Chiou, *National Chiao Tung Univ., TAIWAN*

##### FR2C-4

Multiport Scattering Matrix Measurement with a Two-port Network Analyzer Using Only Virtual Auxiliary Terminations

C.-J. Chen and T.-H. Chu, *National Taiwan Univ., TAIWAN*

##### FR2C-5

10,000 Parallel Heterodyne System for Instantaneous Photonics-Based Acquisition of Near-Fields Images over Microwave Devices/Circuits

K. Sasagawa, T. Kawanishi, and M. Tsuchiya, *NICT, JAPAN*

# TECHNICAL SESSION

8:50 a.m. – 10:30 a.m.

Friday, December 15

Room D (304)

## Session FR1D

### Small Antennas for RFID

Chairs : Y. Karasawa, *The Univ. of Electro-Communications, JAPAN*  
J. Choi, *Hanyang Univ., KOREA*

#### FR1D-1

A Novel Design of an UHF RFID Reader Antenna for PDA  
S. Kim, H. Park, D. Lee, and J. Choi, *Hanyang Univ., KOREA*

#### FR1D-2

Development of Insensitive RFID Tag for Variation of Chip Impedance  
K.-S. Min and J.-W. Kim, *Korea Maritime Univ., KOREA*

#### FR1D-3

Trapezoidal Dual Loop Antenna for Radio Frequency Identification (RFID) System at Low Frequency  
C. Mansap, P. Wouchoum, C. Phongcharoenpanich, and D. Torrungrueng\*, *King Mongkut's Institute of Technology Ladkrabang, \*Asian Univ., THAILAND*

#### FR1D-4

Feeding Point Determination Regarding Hand Effect of PIFA for Mobile RFID Band  
Y. H. Lim, K. Chang, Y. J. Yoon, and Y. Kim\*, *Yonsei Univ., \*Samsung Advanced Institute of Technology, KOREA*

#### FR1D-5

A Passive UHF RFID Meandered Tag Antenna with Tuning Stubs  
S.-J. Wu and T.-G. Ma, *National Taiwan Univ. of Science and Technology, TAIWAN*

Room E (311+312)

## Session FR1E

### Ubiquitous Communications and Location Systems

Chairs : T. Wada, *Kansai Univ., JAPAN*  
S. Tenqchen, *Chunghwa Telecom Telecommunication Labs., TAIWAN*

#### FR1E-1

Design and Development of Novel Miniaturized UHF RFID Tags on Ultra-Low-Cost Paper-Based Substrates  
L. Yang, S. Basat, A. Rida, and M. M. Tentzeris, *Georgia Institute of Technology, U.S.A.*

#### FR1E-2

Helping to Collect Traffic Information Using RFID Tag Implemented on Urban-bus for Traffic Information  
S. Tenqchen, F.-S. Chang\*, Y.-C. Lee\*\*, C.-H. Wang, C.-H. Lee, and S.-L. Tung, *Chunghwa Telecom Telecommunication Labs., \*Ministry of Transportation and Communication, \*\*THI Asia Consultants Ltd., TAIWAN*

#### FR1E-3

Low Cost Transceiver for DSRC Applications  
N. Almeida, R. Abreu, J. N. Matos, N. B. Carvalho, and J. S. Gomes\*, *Univ. de Aveiro, \*Brisa Autoestradas de Portugal, PORTUGAL*

#### FR1E-4

Transmission Performance of UWB-IR System using DLL Timing Synchronization  
T. Wada and H. Okada, *Kansai Univ., JAPAN*

#### FR1E-5

Position Estimation Techniques for the Local Position Measurement System LPM  
K. Pourvoyeur, A. Stelzer\*, and G. Gassenbauer\*\*, *LCM, \*Univ. of Linz, \*\*Abatec Electronic AG, AUSTRIA*

Room F (313+314)

## Session FR1F

### Design and Analysis Methods for Printed Antennas

Chairs : M. Haneishi, *Saitama Univ., JAPAN*  
J.-S. Sun, *National Taipei Univ. of Technology, TAIWAN*

#### FR1F-1

Analyzing Radiation From a Cylindrical-Rectangular Microstrip Patch Antenna Loaded with a Superstrate and an Air Gap, Using The Electric Surface Current Model  
F. R. Cooray and J. S. Kot, *CSIRO ICT Centre, AUSTRALIA*

#### FR1F-2

L-Probe Fed Multiband Microstrip Antennas with Slots  
C. D. Salamat, M. Haneishi, and Y. Kimura, *Saitama Univ., JAPAN*

#### FR1F-3

Study of Various Slots in Circular Patch for Circularly Polarized Antennas and Enhancing their Gain by Short Horns  
N. Nasimuddin, K. P. Esselle, and A. K. Verma, *Macquarie Univ., AUSTRALIA*

#### FR1F-4

Characterization of Elliptically Polarized Antenna by Complex Effective Length  
J. Kapor, *National Communication Authority, HUNGARY*

#### FR1F-5

Theoretical Analysis on the Radiation Properties of a Circular Sector Microstrip Antenna Under Re-Entry Conditions  
D. Bhatnagar, A. Kimothi, V. K. Tiwari, V. K. Saxena, and J. S. Saini, *Univ. of Rajasthan, INDIA*

10:50 a.m. – 12:30 p.m.

Friday, December 15

Room D (304)

## Session FR2D

### Small Antennas for Mobile Applications

Chairs : Q. Chen, *Tohoku Univ., JAPAN*  
K. Tong, *Univ. College London, U.K.*

#### FR2D-1

Compact 2-Channel MIMO Antenna for WiBro Handy Terminal Application  
D.-J. Kim, K.-S. Min, Y.-M. Moon\*, and Y.-E. Kim\*, *Korea Maritime Univ., \*Samsung Advanced Institute of Technology, KOREA*

#### FR2D-2

Effects of Bending GPS Antennas  
T. Kellomäki, J. Heikkinen, and M. Kivikoski, *Tampere Univ. of Technology, FINLAND*

#### FR2D-3

Design of an Internal DTV Antenna for Portable Multimedia Player  
Y.-S. Yu, D.-H. Seo, S.-G. Jeon, and J.-H. Choi, *Hanyang Univ., KOREA*

#### FR2D-4

A Design of Wide Band Small Chip Antenna Using the Branch Structure for Mobile Phone  
M. Kim, S. Park, J. Min, and H. Kim, *Hanyang Univ., KOREA*

#### FR2D-5

Design of Ceramic Chip Antenna for Bluetooth Application in LTCC Technology  
H.-Y. Zou\*\*\*, Q.-X. Liang\*, and Q.-X. Chu\*, *\*South China Univ. of Technology, \*\*Xidian Univ., CHINA*

Room E (311+312)

## Session FR2E

### Microwave Applications

Chairs : Y. Nikawa, *Kokushikan Univ., JAPAN*  
Y. Lu, *Nanyang Technological Univ., SINGAPORE*

#### FR2E-1

5.8-GHz Planar Hybrid Rectenna for Wireless Powered Applications  
M. Furukawa, Y. Takahashi\*1, T. Fujiwara\*2, S. Mihara\*3, T. Saito\*3, Y. Kobayashi\*3, S. Kawasaki\*4, N. Shinohara\*4, Y. Fujino\*5, K. Tanaka\*6, and S. Sasaki\*6, *Nihon Dengyo Kousaku Co., Ltd., \*1IHI Aerospace Co., Ltd., \*\*Sho Engineering Co., Ltd., \*\*Institute for Unmanned Space Experiment Free Flyer, \*\*Kyoto Univ., \*\*NICT, \*\*JAXA, JAPAN*

#### FR2E-2

A Self-Steering Array and its Application to Phase Synchronization  
K. Hashimoto, H. Shibata\*, and H. Matsumoto, *Kyoto Univ., \*Ministry of Land, Infrastructure and Transport Government of Japan, JAPAN*

#### FR2E-3

Patch Array to Heat Thin Material Using Microwave  
Y. Nikawa and Y. Guan, *Kokushikan Univ., JAPAN*

#### FR2E-4

A Micro-machined Cantilever PSA Sensor with Digital Wireless Interface  
H.-T. Chou, R.-Z. Hwang, C.-M. Hung, L.-S. Huang, and S.-S. Lu, *National Taiwan Univ., TAIWAN*

#### FR2E-5

An Experimental GSM Based Passive Radar  
Y. Lu, D. Tan, and H. Sun, *Nanyang Technological Univ., SINGAPORE*

Room F (313+314)

## Session FR2F

### UWB Antennas

Chairs : N. Kuga, *Yokohama National Univ., JAPAN*  
Y.-J. Yoon, *Yonsei Univ., KOREA*

#### FR2F-1

Rolled Monopole with Bandstop Function for UWB Applications  
H.-K. Yoon, W.-S. Kang, Y.-J. Yoon, S.-M. Han\*, and Y.-H. Kim\*, *Yonsei Univ., \*Samsung Advanced Institute of Technology, KOREA*

#### FR2F-2

CPW-Fed UWB Slot Antenna  
Y.-C. Lee, S.-C. Lin, and J.-S. Sun, *National Taipei Univ. of Technology, TAIWAN*

#### FR2F-3

A Compact Microstrip Slot Antennas Fed by a Microstrip Line with a Multi Tuning Stubs for UWB Applications  
I. Fitri and E. T. Rahardjo, *Univ. of Indonesia, INDONESIA*

#### FR2F-4

Ultra-Wideband Circularly-Polarized Patch Antenna  
K. W. Khoo, Y. X. Guo, and L. C. Ong, *Institute for Infocomm Research, SINGAPORE*

#### FR2F-5

UWB Antenna for Wireless Body Area Network  
K. Y. Yazdandoost and R. Kohno, *NICT, JAPAN*

# TECHNICAL SESSION

Friday, December 15

2:00 p.m. – 3:40 p.m.

## Room A (301)

### Session FR3A

#### Active Planer Circuits

Chairs : J. Bae, *Nagoya Institute of Technology, JAPAN*  
A. Freundorfer, *Queen's Univ., CANADA*

#### FR3A-1

Design and Characterization of a 45 GHz Yagi-Uda Antenna Receiver Fabricated on GaAs Micromachined Membrane

D. Neculoiu, G. Konstantinidis\*, A. Muller, A. Stavinidris\*, D. Vasilache, Z. Chatzopoulos\*, L. Bary\*\*, and R. Plana\*\*, *IMT-Bucharest, ROMANIA*, \**MRG-IESL-FORTH Heraklion, GREECE*, \*\**LAAS CNRS Toulouse, FRANCE*

#### FR3A-2

A GaAs pHEMT Based V-Band Balanced Amplifier Using Uniplanar Tandem Couplers

S.-W. Moon, M. Han, J.-H. Oh, H.-J. Kwon, H.-C. Park, J.-K. Rhee, and S.-D. Kim, *Dongguk Univ., KOREA*

#### FR3A-3

A Direct Digital 2 Gb/s Modulator/Demodulator Experiment in GaAs HBT at 30 GHz

A. P. Freundorfer, K. Hamed, Y. Sun, Y. Antar, P. Frank\*, and D. Sawatzky\*, *Queen's Univ., \*Gain Microwave, CANADA*

#### FR3A-4

A BPSK Modulator Using a Ring-Hybrid and HFET Switches

C. E. Saavedra and Y. Zheng, *Queen's Univ., CANADA*

#### FR3A-5

Doppler Frequency Converter Using a Semiconductor Plasma Boundary Moving at a Relativistic Speed

J. Bae, Y. J. Xian, and S. Yamada, *Nagoya Institute of Technology, JAPAN*

## Room B (302)

### Session FR3B

#### Planar Filters with Extended Stopband Performance

Chairs : K. Wada, *The Univ. of Electro-Communications, JAPAN*  
T. Ishizaki, *Panasonic Electronic Devices Co., Ltd., JAPAN*

#### FR3B-1

Microstrip Parallel-Coupled Bandpass Filters With Source-Load Coupling

C.-H. Wu, C.-H. Wang, and C.-H. Chen, *National Taiwan Univ., TAIWAN*

#### FR3B-2

The Microstrip Bandpass Filters with Wide Stopband Range

M.-G. Chen, C.-W. Tang, P.-J. Hsieh, and J.-W. Wu, *National Chung Cheng Univ., TAIWAN*

#### FR3B-3

A Novel Bandpass Filter with Sharp Attenuations and Wide Stopband Developed through the Combined Use of Composite Resonators and Stepped Impedance Resonators

H. Miki, Z. Ma, and Y. Kobayashi, *Saitama Univ., JAPAN*

#### FR3B-4

Compact Low-Pass Filter for Harmonics Suppression

R. Li, D. I. Kim, and C. M. Choi, *Korea Maritime Univ., KOREA*

#### FR3B-5

Multi-Path Design for Stepped-Impedance Low-Pass Filter to Create Transmission Zeros and Wide Rejection Band

M.-C. Kang and J.-T. Kuo, *National Chiao Tung Univ., TAIWAN*

## Room C (303)

### Session FR3C

#### Millimeter-Wave Radar Systems

Chairs : K. Sato, *Toyota R&D Labs. Inc., JAPAN*  
T. Derham, *NHK, JAPAN*

#### FR3C-1

Digital Signal Processing of Multi-Reflection for Short Range Detection Using NRD Guide Pulse Radar Front-End at 60 GHz

F. Kuroki, T. Izuhou, and T. Yoneyama\*, *Kure National College of Technology, \*Tohoku Institute of Technology, JAPAN*

#### FR3C-2

Estimation of FMCW Radar System Performance Using Measurement Data of a 77-GHz Transmitter

C. Wagner, A. Stelzer\*, and H. Jäger, *DICE GmbH & Co KG, \*Univ. of Linz (ICIE), AUSTRIA*

#### FR3C-3

Modeling and Development of Software-Configurable Range Radar

H. Zhang, L. Li, and K. Wu, *Polytechnique de Montreal, CANADA*

#### FR3C-4

Target Identification With Polarization Dependent Transfer Functions

S. Hantscher, A. Reizenzahn, and C. G. Diskus, *Johannes Kepler Univ., AUSTRIA*

#### FR3C-5

A Method of Imaging by Standing Wave Radar

Y. Okubo and T. Uebo, *Saika Technological Institute Foundation, JAPAN*

Friday, December 15

4:00 p.m. – 6:00 p.m.

## Room A (301)

### Session FR4A

#### Transceivers

Chairs : T. Nakagawa, *NTT, JAPAN*  
B. Staszewski, *Texas Instruments Inc., U.S.A.*

#### FR4A-1

A Fully Integrated 2.4 GHz IEEE 802.15.4 Transceiver for Zigbee Applications

J. H. Lim, K. S. Cho, B. L. Seo, Y. I. Kwon, W. S. Lee, K. M. Lee, M. S. Kim, S. H. Min, and T. J. Park, *SAMSUNG Electro-Mechanics, KOREA*

#### FR4A-2

A Novel TDD Mode Direct Conversion Digital Transceiver Using Six-Port Technology

H. S. Lim, W. K. Kim, J. W. Yu, H. C. Park\*, W. J. Byun\*\*, and M. S. Song\*\*, *KAIST, \*Hanbat National Univ., \*\*ETRI, KOREA*

#### FR4A-3

Programmable Microwave Function Array, PROMFA

C. Samuelsson and A. Ouacha, *Swedish Defence Research Agency, SWEDEN*

#### FR4A-4

Serial-Parallel Connection of Direct Sampling Mixer

Y. Morishita, K. Araki, Y. Hosokawa\*, K. Abe\*, and N. Saito\*, *Tokyo Institute of Technology, \*Matsushita Electric Industrial Co., Ltd., JAPAN*

#### FR4A-5 (INVITED)

Fully-Integrated CMOS RF Transceivers

W. Krenik and B. Staszewski, *Texas Instruments Inc., U.S.A.*

## Room B (302)

### Session FR4B

#### Multi-Band and Multi-mode Planar Filters

Chairs : Y. Kogami, *Utsunomiya Univ., JAPAN*  
J.-T. Kuo, *National Chiao Tung Univ., TAIWAN*

#### FR4B-1

Dual-Behavior Resonator (DBR) Filters with Spurious Responses Suppression

A. Manchec, C. Quendo, E. Rius, J. F. Favennec, and C. Person, *LEST-UMR CNRS, FRANCE*

#### FR4B-2

Dual-Behavior Resonator (DBR) C-Band Planar Band-Pass Filter for a Space Application

E. Rius, C. Quendo, Y. Clavet, A. Manchec, C. Person, J. F. Favennec, P. Moroni\*, J. C. Cayrou\*, and J. L. Cazaux\*, *LEST Laboratoire d'Electronique et des Systemes de Telecommunications, \*Alcatel Alenia Space France, FRANCE*

#### FR4B-3

Design of Microstrip Miniature Dual-Band Filter Using Embedded Resonators

C.-Y. Hsu, C.-Y. Chen\*, and H.-R. Chuang, *National Cheng Kung Univ., \*Southern Taiwan Univ. of Technology, TAIWAN*

#### FR4B-4

Novel Compact Dual-Band Bandpass Filters Using Composite Resonators to Obtain Separately Controllable Passbands

Z. Ma, T. Shimizu, Y. Kobayashi, T. Anada\*, and G. Hagiwara\*\*, *Saitama Univ., \*Kanagawa Univ., \*\*Link Circuit Inc., JAPAN*

#### FR4B-5 (INVITED)

Novel Design and Implementation Methods of High-Performance RF/Microwave Filters Using Composite Resonators

Z. Ma, *Saitama Univ., JAPAN*

## Room C (303)

### Session FR4C

#### Imaging and Remote Sensing

Chairs : K. Sakakibara, *Nagoya Institute of Technology, JAPAN*  
F. Yanovsky, *National Aviation Univ., UKRAINE*

#### FR4C-1 (INVITED)

Comparison of the Capabilities of the Millimeter Wave Region and the THz Region

K. Mizuno, *Tohoku Univ., JAPAN*

#### FR4C-2

Frequency-Encoding Technique for Active MMW Imaging

T. Derham, H. Kamoda, and T. Kuki, *NHK, JAPAN*

#### FR4C-3

Design of Detector Circuit for Layer Structured Imaging Module

K. Ohkawa, K. Sakakibara, Y. Aoki\*, N. Kikuma, and H. Hirayama, *Nagoya Institute of Technology, \*Denso Corp., JAPAN*

#### FR4C-4

Doppler-Polarimetric Microwave Remote Sensing of Clouds and Precipitation: Models and Algorithms

F. J. Yanovsky, V. V. Marchuk\*, and Y. P. Ostrovsky\*, *IRCTR, NETHERLANDS, \*National Aviation Univ., UKRAINE*

#### FR4C-5

Sensitivity of FMCW 95GHz Cloud Radar for High Clouds

J. Yamaguchi, T. Takano, K. Akita, T. Takamura, H. Kumagai\*, and Y. Ohno\*, *Chiba Univ., \*NICT, JAPAN*

# TECHNICAL SESSION

2:00 p.m. – 3:40 p.m.

Friday, December 15

Room D (304)

## Session FR3D

### Multiband Antennas

Chairs : T. Teshirogi, *Anritsu Corp., JAPAN*  
W. Hong, *Southeast Univ., CHINA*

#### FR3D-1

A Printed Triple-Band Antenna for WiFi and WiMAX Applications

Y.-C. Shen, Y.-S. Wang, and S.-J. Chung, *National Chiao Tung Univ., TAIWAN*

#### FR3D-2

A Design of Miniaturized Built-in Penta Band Chip Antenna For EGSM/GPS/DCS-1800/USPCS/WCDMA Mobile Handset

H. Choi, D. Shin, J. Cho, and H. Kim, *Hanyang Univ., KOREA*

#### FR3D-3

The Performance of Dual-Band CPW-Fed Printed Antennas for Wireless Body-Worn Applications

X. Qiu and A. S. Mohan, *Univ. of Technology, Sydney, AUSTRALIA*

#### FR3D-4

Compact Multi-Band Antenn for Mobile Telephone Applications

S.-Y. Huang and J.-S. Sun, *National Taipei Univ. of Technology, TAIWAN*

#### FR3D-5

Dual-Band Printed T-Shaped Slot Antenna for WLAN Application

S.-S. Zhong and X.-L. Liang, *Shanghai Univ., CHINA*

Room E (311+312)

## Session FR3E

### Advanced Technologies for Power Amplifiers

Chairs : Y. Takayama, *Univ. of Hyogo, JAPAN*  
T.-W. Huang, *National Taiwan Univ., TAIWAN*

#### FR3E-1

Improvement of Intermodulation Distortion in Microwave Power Amplifiers with Intrinsic Second-Harmonic Short-Circuit Termination

K. Watanabe, Y. Takayama, K. Yamaguchi, T. Fujita, and K. Maenaka, *Univ. of Hyogo, JAPAN*

#### FR3E-2

Compact Device-Level Linearisation Technique Using a Reduced Complexity Derivative Superposition Approach

R. Negra\*\*, F. M. Ghannouchi\*\*, and W. Bächtold\*,

\*ETH Zurich, SWITZERLAND, \*\*Univ. of Calgary, CANADA

#### FR3E-3

Minimum ACPR "Sweet-Spot" Using Statistical Power Distribution Function

J.-H. Tsai, S.-Y. Chen, W.-C. Chen, and T.-W. Huang, *National Taiwan Univ., TAIWAN*

#### FR3E-4

InGaP/GaAs HBT Power Amplifier Based on Flexible Printed Circuit Board

S.-S. Myoung, S.-H. Cheon\*, J.-W. Park\*, J.-S. Jang\*\*, M.-H. Dong\*\*, and J.-G. Yook, *Yonsei Univ., \*Agency for Defense Development, \*\*Knowledge\*on, KOREA*

#### FR3E-5

Third-Order Intermodulation Distortion Characteristics of Millimeter-Wave Self-Heterodyne Transmission Techniques

C.-S. Choi and Y. Shoji, *NICT, JAPAN*

Room F (313+314)

## Session FR3F

### Ferrite and SAW Devices

Chairs : M. Tsutsumi, *Fukui Univ. of Technology, JAPAN*  
A. Alphones, *Nanyang Technological Univ., SINGAPORE*

#### FR3F-1

Micromachined GaN-Based FBAR Structures for Microwave Applications  
K. Mutamba, D. Neculoiu\*, A. Muller\*, G. Konstantinidis\*\*, D. Vasilache\*, C. Sydlo, A. Kostopoulos\*\*, A. Adikimenakis\*\*, A. Georgakilas\*\*, and H. L. Hartnagel, *Technische Universitaet Darmstadt, GERMANY, \*IMT Bucharest, ROMANIA, \*\*MRG-IESL-FORTH, GREECE*

#### FR3F-2

Prediction of Phase Noise in 2.4GHz SAW Oscillator with Surface Transverse Wave Resonator

J.-H. Lin and Y.-H. Kao, *National Chiao-Tung Univ., TAIWAN*

#### FR3F-3

Some Nonlinear Properties on the Electromagnetic Waves in Magnetic Material

K. Kawabe, T. Kodera\*, and Y. Satomura, *Osaka Institute of Technology, \*ATR, JAPAN*

#### FR3F-4

Effect of Nonuniform Magnetic Field on Left Handed Ferrite Microstrip Line

K. Okubo and M. Tsutsumi\*, *Okayama Prefectural Univ., \*Fukui Univ. of Technology, JAPAN*

#### FR3F-5

Tunable Stepped Impedance Resonator Bandpass Filter Using Ferroelectric Materials

T.-S. Yun\*, H.-S. Kim\*\*, T.-S. Hyun\*\*, S.-S. Kwoun\*\*\*\*, H.-G. Kim\*\*, and J.-C. Lee\*, *Kwangwoon Univ., \*\*KAIST, \*\*\*LG-Nortel R&D Complex, KOREA*

4:00 p.m. – 6:00 p.m.

Friday, December 15

Room D (304)

## Session FR4D

### Propagation

Chairs : T. Fujii, *Japan Telecom., JAPAN*  
S. Takahashi, *Hiroshima City Univ., JAPAN*

#### FR4D-1

Measurements on UHF Radio Propagation over the Seto Inland Sea

M. Nishi, T. Iwami, S. Takahashi, and T. Yoshida, *Hiroshima City Univ., JAPAN*

#### FR4D-2

Millimeter Wave Propagation in a Short Outdoor Link Using the Vectorial Gaussian Beam Tracing Method

M. Shabani and A. A. Shishegar, *Sharif Univ. of Technology, IRAN*

#### FR4D-3

Proposal of Novel Statistic Channel Model for Millimeter-Wave WPAN

H. Sawada, Y. Shoji, and C.-S. Choi, *NICT, JAPAN*

#### FR4D-4

A New Computational Parallel Model Applied in 3D Ray-Tracing Techniques for Radio-Propagation Prediction

A. Cavalcante, M. Sousa, J. Crisostomo, C. Frances, and G. Cavalcante, *Federal Univ. of Par , BRAZIL*

#### FR4D-5 (INVITED)

MIMO Multidimensional Propagation Channel Modeling

Y. Karasawa, *The Univ. of Electro-Communications, JAPAN*

Room E (311+312)

## Session FR4E

### Power Amplifiers for Mobile Communication

Chairs : K. Mori, *Mitsubishi Electric Corp., JAPAN*  
B. Kim, *Pohang Univ. of Science and Technology, KOREA*

#### FR4E-1

Surface-Mount Power Amplifier Module for WiMAX Application

N. Yoshimura, K. Matsuzaki, T. Hashinaga, and S. Nakajima, *Eudyna Devices Inc., JAPAN*

#### FR4E-2

GaAs HBT Power Amplifier for WiBro Applications

P. Li, H. Fuh, L. Prestia, C. Huber, S. Kadambala, C. Masse, D. Wilson, and E. Balboni, *Analog Devices, Inc., U.S.A.*

#### FR4E-3

Reduced Gain Variation against Temperature with Thermistor on HPA Module for W-CDMA System

A. Kuriyama, S. Yuyama\*, M. Ohnishi, H. Matsumoto, T. Tanoue\*, and I. Ohbu\*, *Hitachi, Ltd., \*Renesas Technology Corp., JAPAN*

#### FR4E-4

A Doherty Power Amplifier Module for Mobile Terminals with Variable Linearity Function

T. Kato, K. Yamaguchi, and Y. Kuriyama, *Toshiba Corp., JAPAN*

#### FR4E-5 (INVITED)

Doherty Linear Power Amplifiers for Mobile Handset Applications

B. Kim, J. Nam, and D. Yu, *Pohang Univ. of Science and Technology, KOREA*

Room F (313+314)

## Session FR4F

### Waveguide Circuits

Chairs : T. Yakabe, *The Univ. of Electro-Communications, JAPAN*  
C.-H. Chen, *National Taiwan Univ., TAIWAN*

#### FR4F-1 (INVITED)

Substrate Integrated Circuits for Radio-Frequency and Millimeter-Wave System Applications-Status and Outlook

K. Wu, *Ecole Polytechnique (Univ. of Montreal), CANADA*

#### FR4F-2

Design of Substrate Integrated Waveguide Sum-Difference Comparator

Y. Tang and W. Wu, *Nanjing Univ. of Science and Technology, CHINA*

#### FR4F-3

Low-Loss LIGA-Fabricated Coplanar Waveguide and Filters

M. A. Forman, *Sandia National Laboratories, U.S.A.*

#### FR4F-4

A Broadband, Low-Reflection H-Plane Waveguide Corner with a Dielectric Circular Post

K. Toda, I. Ohta, and M. Kishihara\*, *Univ. of Hyogo, \*Okayama Prefectural Univ., JAPAN*

#### FR4F-5

Analysis of Quadruple-Ridged Square Waveguide by Multilayer Perceptron Neural Network Model

Y. Tang and W. Wu, *Nanjing Univ. of Science and Technology, CHINA*

# OPEN FORUM

Wednesday, December 13

2:30 p.m. – 4:00 p.m.

## Lounge

### Session WEOF

#### WEOF-01

Comparison of CMOS LNAs Implemented with Different Capacitor and Inductor Structures

M. T. A. Gusad and L. P. Alarcon, *Univ. of the Philippines, PHILIPPINES*

#### WEOF-02

A 1V, 0.9dB Noise-Figure High Linearity LNA MMIC for Concurrent GPS Handset Application

Y. H. Chow, T. L. Tan, and W.-K. Kim\*, *Avago Technologies Malaysia, MALAYSIA, \*Avago Technologies Korea, KOREA*

#### WEOF-03

1.5V 5 GHz Low Noise Amplifier With Source Degeneration

M.-T. Hsu, T.-Y. Chih, and G.-R. Li, *National Yunlin Univ. of Science and Technology, TAIWAN*

#### WEOF-04

The Design of Full-Band (3.1–10.6GHz) CMOS UWB Low Noise Amplifier with Thermal Noise Canceling

S.-C. Chen, R.-L. Wang\*, H.-C. Kuo, and M.-L. Kung, *National Yunlin Univ. of Science & Technology, \*National Kaohsiung Marine Univ. of Science & Technology, TAIWAN*

#### WEOF-05

Dual-Band LNA for 2.4/5.2GHz Applications

V. K. Dao, B. G. Choi, Q. D. Bui, and C. S. Park, *ICU, KOREA*

#### WEOF-06

A CMOS Ultra-Wideband Differential Low Noise Amplifier

T. B. Merkin, S. Jung, J. Gao, and Y. Joo\*, *The Univ. of Texas at Arlington, \*Arizona State Univ., U.S.A.*

#### WEOF-07

Numerical Analysis of Pulsed *I-V* Curves and Current Compression in GaN FETs

K. Itagaki, H. Takayanagi, H. Nakano, and K. Horio, *Shibaura Institute of Technology, JAPAN*

#### WEOF-08

Closed-Form Expression of IMD Considering Input/Output Frequency Responses in Nonlinear RF Power Amplifiers for Digital Predistortion

H. Ku, *Konkuk Univ., KOREA*

#### WEOF-09

Quasi-Invariant Single-Parameter Criterion for Unconditional Stability: Review and Application

E. L. Tan, *Nanyang Technological Univ., SINGAPORE*

#### WEOF-10

Numerical Investigation on Thermal Characteristics of GaN HFETs for High Power Applications

J. Xu, W.-Y. Yin, and J. Mao, *Shanghai Jiao Tong Univ., CHINA*

#### WEOF-11

Harmonic Orthogonality Condition in RF Class-E Power Amplifiers

M. A. Yarleque Medina, D. Schreurs, and B. Nauwelaers, *Katholieke Universiteit Leuven, BELGIUM*

#### WEOF-12

An Accurate Technique for Characterizing Non-Linear Currents in MESFET/HEMT Devices

S. L. Henriquez, A. J. Ogunniyi, C. Karangu, D. Harvey, and C. White, *Morgan State Univ., U.S.A.*

#### WEOF-13

Single-Stage, High Efficiency, 26-Watt Power Amplifier Using SiC LE-MESFET

S. Azam\*, R. Jonsson\*\*, and Q. Wahab\*\*\*, *\*Linköping Univ., \*\*Swedish Defence Research Agency, SWEDEN*

#### WEOF-14

The Suppression of Intermodulation Products in Multichannel Amplifiers Close to Saturation

N. Maleš-Ilić and B. Milovanović, *Univ. of Nis, SERBIA*

#### WEOF-15

Volterra Series Approach to Behavioral Modeling: Application to an FET Amplifier

C. Crespo-Cadenas, J. Reina-Tosina, and M. J. Madero-Ayora, *Univ. of Seville, SPAIN*

#### WEOF-16

Investigation into RF Feedback for Improving The Efficiency-Linearity Trade-off in Power Amplifiers

Y. J. Tian and D. G. Haigh, *Imperial College London, U.K.*

#### WEOF-17

A High Power Performance 60 GHz Push-Push Oscillator MMIC in Metamorphic HEMT Technology

J.-W. Lee, K. Seol\*, and K. Seo\*, *Kyung Hee Univ., \*Seoul National Univ., KOREA*

#### WEOF-18

Accurately Measure Phase-Locked Loop (PLL) Lock Time in Production

L. Zhang, *Texas Instruments, Inc., U.S.A.*

#### WEOF-19

Intermodulation Nulling in Anti-Parallel Diode Pair Mixers

V. Gutta, T. Fattorini\*, and A. Parker, *Macquarie Univ., \*Mimix Broadband, AUSTRALIA*

#### WEOF-20

A Simple Oscillator Design with the Frequency Controlled by Patch Size

D. H. Lee, J. I. Lee, J.-S. Rieh, and M. Kim, *Korea Univ., KOREA*

#### WEOF-21

Wide BST-Based Tuning of Voltage Controlled Oscillator

M. Al-Ahmad, C. Loyez, N. Rolland, and P.-A. Rolland, *IEMN, FRANCE*

#### WEOF-22

Residual and Oscillator Phase Noise in GaAs HEMTs

M. Ferndahl\* and H. Zirath\*\*\*, *\*Chalmers Univ., \*\*Ericsson AB, SWEDEN*

#### WEOF-23

Switchless Bi-Directional Amplifier

C. S. Yu, K. T. Mok, and W. S. Chan, *City Univ. of Hong Kong, CHINA*

#### WEOF-24

On the Improvement of the Linear Dynamic Range of Ka-Band Up-Converters

E. Bertran, J. Berenguer, G. Montoro, and A. Cidronali\*, *Technical Univ. of Catalonia, SPAIN, \*Univ. of Firenze, ITALY*

#### WEOF-25

Five-Port Software Defined Radio Receiver Implementation in Ka-Band

R. Mirzavand, A. Mohammadi, and A. Abdipour, *Amirkabir Univ., IRAN*

#### WEOF-26

Sub Milli-Watt, 2.4 GHz, Super-Regenerative Transceiver with Ultra Low Duty Cycle

I. McGregor, E. Wasige, and I. Thayne, *Glasgow Univ., U.K.*

#### WEOF-27

A High Linear Upconversion Mixer and VCO Design Using Fully Integrated Current Injection Technique

M.-J. Kim and N.-Y. Kim, *Kwangwoon Univ., KOREA*

#### WEOF-28

A Novel Approach for Implementation of a Matrix Amplifier

G. Moradi and A. Abdipour, *Amirkabir Univ. of Technology, IRAN*

#### WEOF-29

Design of Cartesian Feedback Loop Linearization Chip for UHF Band

M.-S. Kang, Y.-J. Chong, S.-J. You, and T.-J. Chung, *ETRI, KOREA*

#### WEOF-30

A Low Power 0.18 $\mu$ m CMOS Even-Harmonic Mixer

Y.-C. Chen, T.-N. Luo, Y.-H. Yu, Y.-J. E. Chen, and D. Heo\*, *National Taiwan Univ., TAIWAN, \*Washington State Univ., U.S.A.*

#### WEOF-31

Differential Power Combining Technique for General Power Amplifiers Using Lumped Component Network

H.-L. Chang, P.-T. Lin, W.-C. Hua, C.-P. Lin, C.-Y. Lin, C.-W. Liu, T.-Y. Yang\*, and G.-K. Ma\*, *National Taiwan Univ., \*Industrial Technology Research Institute, TAIWAN*

#### WEOF-32

0.25  $\mu$ m CMOS Resistive Ring Subthreshold Mixer

X. Wang, M. Chen, and O. Boric-Lubecke, *Univ. of Hawaii at Manoa, U.S.A.*

#### WEOF-33

A New Implementation for RF SiCMOS Transistor Model Using SDD for Quantifying Individual Contribution to Distortion from Transistor's Nonlinear Parameters

A. Abuelmaatti, I. Thayne, I. McGregor, and E. Wasige, *Univ. of Glasgow, U.K.*

#### WEOF-34

A Reconfigurable CMOS Power Amplifier with Flexible Matching Network

S.-O. Yun and H.-J. Yoo, *ICU, KOREA*

#### WEOF-35

High Susceptibility of Micro-Phonic and Phase-Hit Dual Loop Push-Push Synthesizer Design for High Modulation Microwave Digital Radios

Y. Shen, L. Villeneuve, and N. Hassaine, *Harris Corp., U.S.A.*

#### WEOF-36

13 GHz Cascaded 4:1 CMOS Injection Locked Frequency Divider

P. Mayr, T. Mronga\*, M. Tiebout\*\*, C. Kienmayer\*\*, R. Thueringer\*\*\*, and U. Langmann, *Ruhr-Universitaet Bochum, \*Altek GmbH, GERMANY, \*\*Infineon Technologies AG, AUSTRIA, \*\*\*Infineon Technologies AG, GERMANY*

#### WEOF-37

Experimental Evaluation of Service Area in Wireless Service Over IP Systems

Y. Fujisawa, T. Higashino, K. Tsukamoto, and S. Komaki, *Osaka Univ., JAPAN*

#### WEOF-38

SSR-MAC: A Novel MAC Protocol for Mobile Ad Hoc Network

F. Jun, L. Zhitang, and W. Li, *Huazhong Univ of Sci & Tech, CHINA*

#### WEOF-39

The Remote HF-Doppler Detection of the Sunrise Effect

Y. Zhang and Y. Wang, *Dalian Maritime Univ., CHINA*

# OPEN FORUM

2:30 p.m. – 4:00 p.m.

Thursday, December 14

Lounge

## Session THOF

### WEOF-40

Markov Characterization of Channels and its Applications in Powerline Communications Systems

M. Zhai, *North China Electric Power Univ., CHINA*

### WEOF-41

A Novel Simulation Testbed for Space-Time Signal Processor of Smart Antenna System Based on HILS Technology

W. Liu, Q. Zhang, and Z. Feng, *Tsinghua Univ., CHINA*

### WEOF-42

The New Approach to Microwave RFID

I. B. Shirokov and Y. B. Gimpilevich, *Sevastopol National Technical Univ., UKRAINE*

### WEOF-43

Detection of Dielectric Contrast of Breast Tissues Using Confocal Microwave Technique

G. Bindu, C. K. Aanandan\*, K. T. Mathew\*, and S. J. Abraham\*\*, *Manipal Institute of Technology, \*Cochin Univ. of Science and Technology, \*\*Lourde Hospital, INDIA*

### WEOF-44

EM Field Coupling to Coplanar Transmission Lines

H. Khodabakhshi, A. Cheldavi, and M. Khalaj-Amirhosseini, *Iran Univ. of Science and Technology, IRAN*

### WEOF-45

Electric and Magnetic Shielding Effectiveness of Metallic Enclosures with Apertures

M. Z. M. Jenu and F. A. Po'ad, *Kolej Universiti Teknologi Tun Hussein Onn, MALAYSIA*

### WEOF-46

Analysis of Electromagnetic Noise Suppression in Microstrip Lines with Absorber Sheets

V. B. Bregar\*\*\* and A. Žnidaršič\*\*, *\*Nanotesla Institute, \*\*Iskra Ferit, SLOVENIA*

### WEOF-47

Microwave Measurement of Biological and Allied Materials

D. Faktorová and K. Grondžák, *Univ. of Žilina, SLOVAK REPUBLIC*

### WEOF-48

Effect of Metallic Helmet on the Microwave Absorption in a Spherical Phantom of a Dipole Antenna User Head

V. V. Radchenko and A. I. Nosich, *NASU, UKRAINE*

### WEOF-49

Analytic Solutions of Ground Bounces in PCBs Using Perfect Magnetic Wall Approximations

C.-C. Huang, *Yuan Ze Univ., TAIWAN*

### WEOF-50

A Radar for Range-Finding of Multiple Targets Based on a Simplified FMCW Method

T. Uebo and Y. Okubo, *Saika Technological Institute Foundation, JAPAN*

### WEOF-51

Dual-Frequency SAR for the Measurement of Soil Moisture at Depth

X. Zhang, W. Zhang, X. Lu, G. Kang, and G. Fang, *Chinese Academy of Sciences, CHINA*

### WEOF-52

Observations of Cloud Properties Using the Millimeter-Wave FM-CW Radar of Chiba Univ.

T. Takano, J. Yamaguchi, H. Abe, K. Futaba, S. Yokote, H. Kubo, K. Akita, Y. Kawamura, H. Kumagai<sup>\*1</sup>, Y. Ohno<sup>\*1</sup>, T. Takamura, T. Nakajima<sup>\*2</sup>, H. Okamoto<sup>\*3</sup>, Y. Fujiyoshi<sup>\*4</sup>, and N. Sugimoto<sup>\*5</sup>, *Chiba Univ., \*<sup>1</sup>NICT, \*<sup>2</sup>The Univ. of Tokyo, \*<sup>3</sup>Hokkaido Univ., \*<sup>4</sup>NIES, JAPAN*

### WEOF-53

Analysis of Coupled Anisotropic Optical Waveguides

M. A. Boroujeni and M. Shahabadi, *Univ. of Tehran, IRAN*

### WEOF-54

FIR Cavity for Terahertz Laser

A. Dubey and H. Dave, *Physical Research Laboratory, INDIA*

### WEOF-55

A Proposal for High-Precision Fiber Optic Displacement Sensor

M. Noshad, H. Hedayati, and A. Rostami, *Univ. of Tabriz, IRAN*

### WEOF-56

Enhanced Linear Dynamic Range of Electrooptic Modulators Based on Birefringent Gires -Tournois Interferometer

J. E. B. Oliveira and B. F. R. Sakamoto, *Instituto Tecnológico de Aeronáutica ITA - Brazilian Air Force, BRAZIL*

### WEOF-57

Measurements of Conductivity of Thin Gold Films at Microwave Frequencies Employing Resonant Techniques

T. Zychowicz, J. Krupka, and J. Mazierska\*, *Warsaw Univ. of Technology, POLAND, \*Massey Univ., NEW ZEALAND*

### WEOF-58

Removing S-Parameters on-Wafer Measurements Parasitic Elements Using Time Domain Gating: Application to Transmission Lines

D. Abessolo-Bidzo\*\*\*, P. Poirier\*, P. Descamps\*, and O. Hubert\*\*, *\*LaMIP, \*\*Philips Semiconductors, FRANCE*

### WEOF-59

Characterization of Dielectric Properties for PZN-PMN-PT Ferroelectric Thin Films at Microwave Frequencies

H. M. Wong, B. Luo\*, L. C. Ong\*, and K. Yao\*\*, *Nanyang Technological Univ., \*Institute for Infocomm Research, \*\*Institute of Materials Research and Engineering, SINGAPORE*

### WEOF-60

A Measurement System for Space-Time Variation of Rainfall Rate and Millimeter-Wave Specific Attenuation in Indonesia

G. Hendranto, A. Mauludiyanto, and P. Handayani, *Institut Teknologi Sepuluh Nopember, INDONESIA*

### WEOF-61

Obliquely Cut Open Ended Coaxial Probe for Obtaining Complex Permittivity of Lossy Materials

T. Michiyama, E. Tanabe\*, and Y. Nikawa, *Kokushikan Univ., \*AET, Inc., JAPAN*

### WEOF-62

New Technique for Analysing Coplanar Lines on Ceramic Up to 110 GHz

C. Min and C. E. Free, *Univ. of Surrey, U.K.*

### WEOF-63

Measurements of Complex Permittivity and Permeability with Changing an Angle of Incidence of Parallel Beam generated by Dielectric Lenses

H. Suzuki, T. Hocchi, and M. Inoue, *KEYCOM Corp., JAPAN*

### THOF-01

DGS Based SIR Filters for Wireless Communication on Anisotropic Substrate

S. Singh and B. Rawat, *Univ. of Nevada, U.S.A.*

### THOF-02

Circuit Direct Replacement Method Enhanced Skirt Response of Open Stub Low-Pass Filter

J.-D. Tseng and W.-T. Liu, *Chin Yi Institute of Technology, TAIWAN*

### THOF-03

Design of a Vertically Stacked Waveguide Filter with Novel Cross Coupling Structures in LTCC

T.-M. Shen, T.-Y. Hung, C.-F. Chen, and R.-B. Wu, *National Taiwan Univ., TAIWAN*

### THOF-04

A Bandpass Filter with Cross-Coupled L-Shape Folded Resonators for Compact Size and Spurious Suppression

P. Akkaraekthalin, S. Hongdamnuen, and V. Vivek, *King Mongkut's Institute of Technology North Bangkok, THAILAND*

### THOF-05

Novel Compact Dual-Band Bandpass Filter with Improved Stopband Characteristics

X. Guan, Z. Ma\*, P. Cai, D. Xu, T. Anada\*\*, and G. Hagiwara\*\*\*, *Shanghai Univ., CHINA, \*Saitama Univ., \*\*Kanagawa Univ., \*\*\*Link Circuit Inc., JAPAN*

### THOF-06

A Hybrid Synthesis Technique for N-tuplets Microwave Filters Cascaded by Resonator

W. Meng and K.-L. Wu, *the Chinese Univ. of Hong Kong, CHINA*

### THOF-07

Novel Microstrip Dual-Band Bandstop Filter with Controllable Dual-Stopband Response

Z. Ma, K. Kikuchi, Y. Kobayashi, T. Anada\*, and G. Hagiwara\*\*, *Saitama Univ., \*Kanagawa Univ., \*\*Link Circuit Inc., JAPAN*

### THOF-08

A Novel Suspended Substrate Bandpass Filter Using H-Shaped Resonator

J. S. Kim, Y. J. Kim\*, W. G. Moon\*, and S. G. Byeon, *Korea Electronics Technology Institute, \*Acewavetech, KOREA*

### THOF-09

A Method of Synthesis of Cross-Coupled Bandpass Resonator Filters by Using Genetic Algorithms

Y. Hsu and Z.-H. Feng, *Tsinghua Univ., CHINA*

### THOF-10

Vibration Modal Analysis Used Finite Element Method of Microwave Amplitude Equalizer

M. Yang\*\*\*, X. Du\*\*, D. Zhang\*\*, and Z. Niu\*\*, *\*Zhengzhou Univ., \*\*Information Engineering Univ., CHINA*

### THOF-11

Reduced-Sized Single Coupled-Line Low Pass Filter

J.-D. Tseng and P.-S. Chen, *Chin Yi Institute of Technology, TAIWAN*

### THOF-12

A Semicircle DGS With High Q Factor for Microstrip Line and Low-Pass Filter

S. Lin\*\*, W. Tian\*\*\*, S. Zheng\*\*\*, and X. Sun\*, *Shanghai Institute of Micro-system & Information Technology, \*\*Chinese Academy of Science, CHINA*

### THOF-13

Dielectric Loaded Cavity Filter with Wide Spurious Free Region and Better Out-of-Band Rejection

X.-G. Sun, *Transcend Communication Co., CHINA*



# OPEN FORUM

Thursday, December 14

2:30 p.m. – 4:00 p.m.

## THOF-14

A Novel Compact Defected Ground Structure (DGS) Low Pass Filter

A. Mohan and A. Biswas, *Indian Institute of Technology, INDIA*

## THOF-15

Sharp-Rejection, Compact Wide-Band Bandpass Filters

M. K. Mandal and S. Sanyal, *Indian Institute of Technology, INDIA*

## THOF-16

Equalizing of Group Delay for Feed Forward Amplifier Using Dielectric Filters

J. Hayashi and Y. Nikawa\*, *Soshin Electric Co., Ltd., \*Kokushikan Univ., JAPAN*

## THOF-17

Low Loss Planar Dielectric Waveguide Filter with Cross Coupling Using LTCC Technology at 60GHz Band

D.-S. Jun, H.-C. Kim, and H.-K. Yu, *ETRI, KOREA*

## THOF-18

Ultra-Wideband (UWB) Bandpass Filters Using Hybrid Microstrip/CPW Structures

H. Wang, L. Zhu, W. Menzel\*, and Z. N. Chen\*\*, *Nanyang Technological Univ., SINGAPORE, \*Univ. of Ulm, GERMANY, \*\*Institute for Infocomm Research, SINGAPORE*

## THOF-19

The Microstrip Bandpass Filters With Wide Outband Suppression

C.-W. Tang, C.-C. Hu, J.-W. Wu, and S.-F. You, *National Chung Cheng Univ., TAIWAN*

## THOF-20

The Multilayered Triplexer with Low Insertion Loss

C.-W. Tang, J.-W. Wu, C.-C. Hu, S.-F. You, H.-C. Lin\*, and S.-S. Yeh\*, *National Chung Cheng Univ., \*Industrial Technology Research Institute, TAIWAN*

## THOF-21

Compact Microstrip Diplexers Based on a Dual-Passband Filter

P.-H. Deng, C.-H. Wang, and C.-H. Chen, *National Taiwan Univ., TAIWAN*

## THOF-22

Design of a Novel Microstrip Bandstop Filter Using One Compact C-Open-Loop Resonator

A. Boutejdar, A. Elsherbiny\*, S. Amari\*\*, M. Awida\*, and A. S. Omar, *Univ. of Magdeburg, GERMANY, \*Ain Shams Univ., EGYPT, \*\*Royal Military College of Canada, CANADA*

## THOF-23

A Microstrip Bandpass Filter Using a Line Periodically Loaded with Unbalanced SIRs for Size Reduction and Spurious Suppression

T. Majaeng, S. Chaimool, J. Jantree, and P. Akkaraekthalin, *King Mongkut's Institute of Technology North Bangkok, THAILAND*

## THOF-24

Design of Microstrip Dual-Band Filters Using Double-Diplexing Configuration

C.-L. Hsu and J.-T. Kuo, *National Chiao Tung Univ., TAIWAN*

## THOF-25

Simulation of Resonant Frequencies of the Metal Cavity by the Unconditionally Stable 3D Crank-Nicolson FDTD Method

Y. Yang and R. S. Chen, *Nanjing Univ. of Science and Technology, CHINA*

## THOF-26

An Ultrawide Bandpass Filter Using Ceramic Multilayer Configuration

C.-S. Yoo, J.-K. Lee, D. Kim, H.-C. Jung, N.-K. Kang, K.-S. Seo, and W.-S. Lee, *Korea Electronics Technology Institute, KOREA*

## THOF-27

A Class of UWB Microstrip Bandpass Filter Using Quasi-Lumped Element Resonators with Controllable Stopbands

T. Ohno, Y. Ohno, K. Wada\*, and O. Hashimoto, *Aoyama Gakuin Univ., \*The Univ. of Electro-Communications, JAPAN*

## THOF-28

Improved High-Q Microwave Dielectric Resonator Using B<sub>2</sub>O<sub>3</sub> Doped Nd(Co<sub>1/2</sub>Ti<sub>1/2</sub>)O<sub>3</sub> Ceramics

C.-F. Tseng and C.-L. Huang, *National Cheng Kung Univ., TAIWAN*

## THOF-29

Group Delay Analysis of Differential-Mode Coupled Four Lines Bandpass Filters

K.-P. Ahn, A. Saitou\*, and K. Honjo, *The Univ. of Electro-Communications, \*YKC Corp., JAPAN*

## THOF-30

Coupled-Line Sharp Notch Filter with Significant Improvement of Attenuation

H. Ishida and K. Araki\*, *NICT, \*Tokyo Institute of Technology, JAPAN*

## THOF-31

Microwave Characterization of High-Tc Superconducting Microstrip Line Using FDTD Technique

H. Ghamlouche, M. Benkraouda, M. Hussein, and T. Badameh, *United Arab Emirates Univ., U.A.E.*

## THOF-32

A New Compact Capacitive-Gap-Coupled Microstrip Bandpass Filter Using Arrowhead Shape as Defected Ground Structure (DGS)

A. Boutejdar, A. Elsherbiny\*, and A. S. Omar, *Univ. of Magdeburg, GERMANY, \*Ain Shams Univ., EGYPT*

## THOF-33

A New Mathematical Design Method of Microstrip Tapped-Line Filters

I.-W. Lee, S.-H. Han, T.-S. Yun, K.-C. Yoon, Z. Fang, and J.-C. Lee, *Kwangwoon Univ., KOREA*

## THOF-34

A Tunable Bandpass Filter Using Tapped  $\lambda/4$  Resonators Loaded with Inductive Variable Capacitor

T. Ohno, K. Omata, K. Wada\*, and O. Hashimoto, *Aoyama Gakuin Univ., \*The Univ. of Electro-Communications, JAPAN*

## THOF-35

High-Temperature Superconducting Reaction-Type Transmitting Filter Consisting of Novel Split Open-Ring Resonators

S. Futatsumori, T. Hikage, and T. Nojima, *Hokkaido Univ., JAPAN*

## THOF-36

Evaluation of Loss and APHC of DC-Biased Low K Transmission Line in MMICs Technologies

H.-W. Wu, M.-H. Weng\*, Y.-K. Su, C.-Y. Hung, and R.-Y. Yang, *National Cheng Kung Univ., \*National Nano Device Laboratories, TAIWAN*

## THOF-37

Efficient Evaluation of a 2-Feed Method to Reduce Fields along the Edge of the Power/Ground Planes

S. Kahng, *Univ. of Incheon, KOREA*

## THOF-38

A Novel Planar Structure of Double Negative Material

Z. Zhang and S. Xu, *Univ. of Science and Technology of China, CHINA*

## THOF-39

Standing Waves in a Coaxial Cavity Gyrotron with a Corrugated Insert

O. Kononenko and Y. Gandel, *Kharkov National Univ., UKRAINE*

## THOF-40

A Microwave Modeling of Multilayered Chip Inductors

B.-H. Choi, J.-H. Lim, and T.-Y. Yun, *Hanyang Univ., KOREA*

## THOF-41

Tunable Optical Delay Line Using Two Port Ring Resonator

G. Rostami\*,\*\*, A. Rostami\*, H. Akhavan\*\*, and A. Zarifkar\*\*, *\*Univ. of Tabriz, \*\*ITRC, IRAN*

## THOF-42

Identification of Complex Bragg Gratings (Apodized and Chirped) Using Artificial Neural Networks (ANN)

A. Rostami and A. Yazdanpanah-Goharrizi, *Univ. of Tabriz, IRAN*

## THOF-43

Design of High Power Phase Shifter with Left-Handed Transmission Line

S.-Y. Wang, Q. Zhu, and J.-F. Zhu, *Univ. of Science and Technology of China, CHINA*

## THOF-44

An Left Handed Material on Si CMOS Chip with Wafer Level Package Process

J.-G. Kim, K. Okada, T. Yamouch, T. Sato, and K. Masu, *Tokyo Institute of Technology, JAPAN*

## THOF-45

A Single Matching Network Design for a Double Band PIFA Antenna Via Simplified Real Frequency Technique

B. S. Yarman, M. Sengul\*, P. Lindberg\*\*, and A. Rydberg\*\*, *Tokyo Institute of Technology, JAPAN, \*Kadir Has Univ., TURKEY, \*\*Uppsala Univ., SWEDEN*

## THOF-46

Highly Miniaturized On-Chip Impedance Transformers Employing PPGM with Single-Sided Via Holes for Application to GaAs MMIC

Y. Yun, C.-R. Kim, and K.-S. Lee, *Korea Maritime Univ., KOREA*

## THOF-47

RF Passives on a 0.25 $\mu$ m Digital CMOS Process

J. Hizon, M. Rosales, H. Tan\*, L. Alarcon, and D. Sabido\*\*, *Univ. of the Philippines, \*Intel Manufacturing Philippines, \*\*Eaxiz Inc., PHILIPPINES*

## THOF-48

Power Control in Passive Waveguide Circuits

J. Zehentner, J. Machac, and P. Zablouil, *Czech Technical Univ., CZECH REPUBLIC*

## THOF-49

A Novel Type of Wideband Self-Adapting Coplanar Feeding Network

W. Chai and X. Zhang, *Chinese Academy of Sciences, CHINA*

## THOF-50

Coupled Mode Theory Approximation for Arbitrary Conventional/Metamaterial Contradirectional Coupled-Line Couplers

H. V. Nguyen and C. Caloz, *École Polytechnique de Montréal, CANADA*

## THOF-51

Compact CPW Rat-Race and Branch-Line Hybrids Utilizing Slow-Wave Structure

T. Fujii, Y. Kokubo, and I. Ohta, *Univ. of Hyogo, JAPAN*

## THOF-52

A New Type of Multi-Way Microwave Power Divider Based on Bagley Polygon Power Divider

I. Sakagami, T. Wuren, M. Fujii, and Y. Tomoda, *Toyama Univ., JAPAN*

# OPEN FORUM

2:30 p.m. – 4:00 p.m.

Friday, December 15

## Lounge

### Session FROF

#### THOF-53

Transient Analysis of Multi-Section Wilkinson Power Divider Using MCD Method

K. Murakami, *Kinki Univ., JAPAN*

#### THOF-54

Modeling of Carbon Nanotube Interconnects and Comparative Analysis with Cu Interconnects

H. Li, W.-Y. Yin, and J.-F. Mao, *Shanghai Jiao Tong Univ., CHINA*

#### THOF-55

Performances Optimization of Capacitive Parallel MEMS Switches

C. Bordas, K. Grenier, D. Dubuc, M. Paillard\*, J.-L. Cazaux\*, and R. Plana, *Univ. Toulouse, \*Alcatel Alenia Space Corp., FRANCE*

#### THOF-56

Integrated Switchable Inductors with Symmetric Differential Layout

J.-L. Wang, Y.-R. Tzeng, and T.-H. Huang, *National Cheng-King Univ., TAIWAN*

#### THOF-57

A Micromachined Wide-Band Suspended-Line Coupler at 24GHz for Vehicle Radar Applications

A. Corona-Chavez, I. Llamas-Garro, J.-M. Kim\*, and Y.-K. Kim\*, *INAOE, MEXICO, \*Seoul National Univ., KOREA*

#### THOF-58

A Branch Line Hybrid Having Arbitrary Power Division Ratio and Port Impedances

Y.-B. Kim, H.-T. Kim, K.-S. Kim, J.-S. Lim, and D. Ahn, *Soonchunhyang Univ., KOREA*

#### THOF-59

Design High-Directivity Parallel-Coupled Lines Using Quadrupled Inductive-Compensated Technique

R. Phromloungrsi, V. Chamnanphrai\*, and M. Chongcheawchamnan, *Mahanakorn Univ. of Technology, \*Rajamangala Univ. of Technology Isan (RMUTI), THAILAND*

#### THOF-60

Analysis of a Directional Coupler Using Magnetic/Dielectric Hybrid Transmission-Line for Cellular Phone

K. Takizawa, S. Mizuta, M. Nakazawa, T. Sato, K. Yamasawa, Y. Miura, Y. Miyake\*, M. Akie\*, Y. Uehara\*, M. Munakata\*\*, and M. Yagi\*\*, *Shinshu Univ., \*Fujitsu Ltd., \*\*Sojo Univ., JAPAN*

#### THOF-61

Terahertz Waveguide Design for GaSb Quantum Cascade Laser

H. Yasuda, I. Hosako, and N. Sekine, *NICT, JAPAN*

#### THOF-62

The Propagation Characteristics of Double-Layer Substrate Integrated Waveguide (SIW) Structure

W. Che, L. Xu, L. Geng, and D. Wang, *Nanjing Univ. of Science & Technology, CHINA*

#### THOF-63

Low-Loss Millimeter-Wave Waveguide Using a Multilayer Printed-Circuit Board Technology

N. Ranjkesh and M. Shahabadi, *Univ. of Tehran, IRAN*

#### THOF-64

A Generalized Partial Capacitance/Elastance Approach to the Analysis of Transmission Lines on Multilayered Substrates

A. N. Sychev, *Tomsk State Univ., RUSSIA*

#### THOF-65

Wideband Slotline-to-Rectangular Waveguide Transition Using Truncated Bow-Tie Antenna

R.-Y. Fang and C.-L. Wang, *National Taiwan Univ. of Science and Technology, TAIWAN*

#### FROF-01

Estimation of Rain Induced Attenuation at 10–300 GHz over Earth-Space Path Links Over Amritsar (India)

I. S. Hudiara, P. Sharma\*, and M. L. Singh\*, *K C College of Engg., And IT, \*Guru Nanak Dev Univ., INDIA*

#### FROF-02

A New Microwave-Excited Plasma Source Using an Internal Dielectric Microwave Applicator

K. Shimatani, Y. Tsugami, and I. P. Ganachev, *Shibaura Mechatronics Corp., JAPAN*

#### FROF-03

Observation of VHF Broadcast Radio Waves Propagating From China

M. Yoneji, T. Takano, H. Nakata, and S. Shimakura, *Chiba Univ., JAPAN*

#### FROF-04

The Concept and Evaluation of GPS Skyward Visibility Archive for Future-Oriented Vehicular Satellite Communications

M. Takahashi, *Univ. of Tokyo, NICT, JAPAN*

#### FROF-05

Coupled Computational Intelligence and Time-Domain Method for Design of the Microwave Devices

H. S. Chu, E.-P. Li, E. Liu, and J.-L. Dubard\*, *Institute of High Performance Computing, SINGAPORE \*Univ. de Nice-Sophia Antipolis, FRANCE*

#### FROF-06

Edge-Based Vector FEM for Electromagnetic Wave Tool

A. Chen, A. Chen, and D. Su, *Beijing Univ., CHINA*

#### FROF-07

A Novel High Order MoM/PO Hybrid Method for 3D EM Scattering Problems

S. Liu and X. Zhang, *Chinese Academy of Science, CHINA*

#### FROF-08

Macro Element Methods in FEM for 3-D Electromagnetic Radiation Problems

N. Feng, D. Shuo, Z. Lezhu, and X. Mingyao, *Peking Univ., CHINA*

#### FROF-09

Efficient Design Approach of MW-Class RF-Dc Conversion Rectenna Circuits by FDTD Analysis

T. Takagaki, T. Yamamoto, K. Fujimori, M. Sanagi, and S. Nogi, *Okayama Univ., JAPAN*

#### FROF-10

Microwave Absorption Studies of the Granular Magnetic Plate

A. V. Babushkin, I. V. Bychkov\*, and V. D. Buchel'nikov\*, *Federal State Unitary Enterprise, \*Chelyabinsk State Univ., RUSSIA*

#### FROF-11

An efficient Modified Interpolation Technique for the Translation Operators in MLFMM with Curvilinear RWG Basis

D. Z. Ding, R. S. Chen, C. Wang, and Q. L. Zhang, *Nanjing Univ. of Science and Technology, CHINA*

#### FROF-12

Embedding of Short-Open Calibration Technique in Commercial MoM Simulators for Parameter Extraction of Planar Integrated Circuits

L. Han\*, K. Wu\*\*, W. Hong\*, L. Li\*\*, and X. Chen\*, *\*Southeast Univ., CHINA, \*\*Ecole Polytechnique de Montréal, CANADA*

#### FROF-13

An Enhancement of Input Impedance Bandwidth of Circular-Disc Loaded Monopole Antenna with Horizontal and Vertical Parasitic Strips

J. W. Lee, K. K. Kang, C.-S. Cho, and J. Kim\*, *Hankuk Aviation Univ., \*Information and Communications Univ., KOREA*

#### FROF-14

A P-Version Multigrid Method for Fast Hierarchical Vector Finite-Element Analysis of Waveguiding Structures

J. Zhu and R. S. Chen, *Nanjing Univ. of Science and Technology, CHINA*

#### FROF-15

On Dispersion in Different Position of Microstrip Line

P. Shi, X. Yin, and W. Hong, *Southeast Univ., CHINA*

#### FROF-16

Theoretical Analysis of Field Distribution and Radiation of Vivaldi

Y. Yao and Z. Feng, *Tsinghua Univ., CHINA*

#### FROF-17

A Novel Band-Notched Ultra-Wideband Microstrip-Line Fed Wide-Slot Antenna

Y. Yao and Z. Feng, *Tsinghua Univ., CHINA*

#### FROF-18

Stacked Square Microstrip Antenna with a Shorting Post for Dual Band Operation in WLAN Applications

T. Fujimoto and K. Tanaka, *Nagasaki Univ., JAPAN*

#### FROF-19

Parasitically Loaded Broad Band Microstrip Antennas for Proposed IEEE 802.15.3a (UWB) Communication Systems

S. Chakraborty, U. K. Dey, S. Panda, and B. Gupta, *Jadavpur Univ., INDIA*

#### FROF-20

A New Half-Loop Antenna for UWB Spectrum

Y.-C. Lee, C.-J. Wang, and J.-S. Sun, *Taipei Univ. of Technology, TAIWAN*

#### FROF-21

Unequal Cross Aperture Coupled Compact CP Antenna with Four Y-Shaped Slits and Four Normal Slits

Y.-A. Lee, H.-Y. Kim, B.-I. Mun, and H.-M. Lee, *Kyonggi Univ., KOREA*

#### FROF-22

Inverted Triangle Printed Monopole Antenna with Half-disk for UWB Applications

R. Chayono, M. Haneishi, and Y. Kimura, *Saitama Univ., JAPAN*

#### FROF-23

Spectral Domain Analysis of Resonant Characteristics of a Circular Patch Microstrip Antenna on Uniaxial Substrate

A. Motevasselian and A. Tavakoli, *Amirkabir Univ. of Technology, IRAN*

#### FROF-24

A Novel Wideband Patch Antenna for 2.4/5 GHz WLAN Applications

K. S. Yoon, S. M. Kim, and W. G. Yang, *Univ. of Incheon, KOREA*

#### FROF-25

A Wideband Rectangular Ring Antenna Fed by Planar Disc Monopole

S. Lamultree\*\*\*, C. Phongcharoenpanich\*\*, S. Kosulvit\*\*, and M. Krairiksh\*\*, *\*Asian Univ., \*\*King Mongkut's Institute of Technology Ladkrabang, THAILAND*

#### FROF-26

CPW-Fed Ultra Wideband (UWB) Monopoles with Band Rejection Characteristic on Ultra Thin Organic Substrate

S. Nikolaou, B. Kim, Y.-S. Kim\*, J. Papapolymerou, and M. M. Tentzeris, *Georgia Institute of Technology, U.S.A., \*Korea Univ., KOREA*

# OPEN FORUM

Friday, December 15

2:30 p.m. – 4:00 p.m.

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**FROF-27**

On the Design of Fractal Elements for Miniaturized Antenna Applications

G. S. A. Shaker and S. Safavi-Naeini, *Univ. of Waterloo, CANADA*

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**FROF-28**

Dual-Band and Dual-Polarization Patch Antenna with High Isolation Characteristic

D.-H. Choi and S.-O. Park, *Information and Communications Univ., KOREA*

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**FROF-29**

Antenna in HSBGA Package for 2.4 GHz WLAN Application

T.-H. Lu, S.-H. Yeh, and C.-L. Tang, *Industrial Technology Research Institute, TAIWAN*

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**FROF-30**

Influence of Coupling and Diagram Correlation on MIMO Capacity Performances at 2 GHz

S. Vergerio, J.-P. Rossi, and P. Sabouroux\*, *France Télécom R&D, \*Institut Fresnel, FRANCE*

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**FROF-31**

A Wideband C-Shaped Vertical Patch Antenna

K.-L. Lau, K.-M. Luk, and K.-F. Lee\*, *City Univ. of Hong Kong, CHINA, \*The Univ. of Mississippi, U.S.A.*

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**FROF-32**

A Novel Planar Highly Shaped-Beam Antenna Using Leaky-Wave Characteristics

R. B. Hwang, *National Chiao Tung Univ., TAIWAN*

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**FROF-33**

Development of Low-Loss Millimeter-Wave Antennas on Fluorine Substrate Using Electro-Fine-Forming Fabrication

N. Ito\*\*, A. Mase\*, N. Seko\*\*, M. Tamada\*\*, E. Sakata\*\*, and Y. Kogi\*, *\*Kyushu Univ., \*\*Kyushu Hitachi Maxell, Ltd., \*\*\*Japan Atomic Energy Agency, JAPAN*

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**FROF-34**

Performance of Reflectarray Cells Printed on Liquid Crystal Film

M. Y. Ismail\*\*, W. Hu\*, R. Cahill\*, H. S. Gamble\*, R. Dickie\*, V. F. Fusco\*, D. Linton\*, S. P. Rea\*\*, and N. Grant\*\*, *\*Queen's Univ. Belfast, \*\*Univ. College of Technology of Tun Hussein Omm, \*\*\*EADS ASTRIUM Ltd., U.K.*

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**FROF-35**

Three-Dimensional On-Chip Conical Spiral Antennas on Video-Monitored Micromachined (100) Silicon Wafers

H. Sedaghat-Pisheh, S. Mohajerzadeh, and M. Shahabadi, *Univ. of Tehran, IRAN*

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**FROF-36**

High Transmission Gain Slot Antennas on Silicon Substrate for Wireless Interconnect

L. Jiang, J. Mao, and W.-Y. Yin, *Shanghai Jiao Tong Univ., CHINA*

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**FROF-37**

A Dielectric-Position-Controlled Beam Adjustable Leaky-Wave Antenna

C.-C. Hsiao and R. B. Hwang\*, *Ching Yun Univ., \*National Chiao Tung Univ., TAIWAN*

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**FROF-38**

A Study of the Performance of a Small Radiator near a Miniaturized Artificial Magnetic Surface (AMC)

G. S. A. Shaker and S. Safavi-Naeini, *Univ. of Waterloo, CANADA*

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**FROF-39**

Study on COBRA Lens Horn for Miniaturization and Improvement of Pattern

S. H. Lee, J. Ahn, Y. J. Yoon, and J.-H. So\*, *Yonsei Univ., \*Agency for Defense Development, KOREA*

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**FROF-40**

Radiation from an Antenna in Manhole

S. Mizushima, A. Adachi, and T. Watanabe\*, *Enegene Co., Ltd., \*Shizuoka Univ., JAPAN*

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**FROF-41**

Novel S-DMB Antenna Design Using Modified QHA

G.-S. Chae, Y.-C. Park, J.-S. Lim, and M.-N. Kim, *Baekseok Univ., KOREA*

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**FROF-42**

Reconfigurable Antenna for Korean WIBRO and DMB Systems

S.-B. Byun, J.-A. Lee, J.-H. Lim, and T.-Y. Yun, *Hanyang Univ., KOREA*

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**FROF-43**

Design of Magnetic Antenna with Dual Circular Polarizations

W. Hong, H.-H. Wang, Y.-D. Lin\*, and T. Kitazawa\*\*, *National Changhua Univ. of Education, \*National Chiao Tung Univ., TAIWAN, \*\*Ritsumeikan Univ., JAPAN*

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**FROF-44**

Antenna Arrays with Linear and Circular Polarization for The Meteorological Radar

S. T. Knyazev, B. A. Panchenko, and S. N. Shabunin, *Ural State Technical Univ., RUSSIA*

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**FROF-45**

A Dual-Band Beam-Switched Slot Array for GSM 900/1800MHz

Y. Liu, Z. Shen, B. Zheng, and W. Tan, *Nanyang Technological Univ., SINGAPORE*

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**FROF-46**

Wide-Band Circular Antenna Arrays Consisting of Bicone, Semi Bicone or Bowtie elements

R. Gunnarsson, T. Martin, and A. Ouacha, *Swedish Defence Research Agency, SWEDEN*

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**FROF-47**

A Four-Element Reflecto-Nulling Antenna Array

S.-N. Hsieh and T.-H. Chu, *National Taiwan Univ., TAIWAN*

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**FROF-48**

A Recursive Procedure for Evaluating the Impedance Matrix of the Peano-Gosper Fractal Array

W. Kuhirun, *Kasetsart Univ., THAILAND*

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**FROF-49**

Proximity-Coupled and Dual-Polarized Microstrip Patch Antenna for WCDMA Base Station Arrays

J. Säily, *VTT Technical Research Centre of Finland, FINLAND*

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**FROF-50**

Sidelobe Reduction in Square-Planar Fractal Arrays Synthesis Using Genetic Algorithms

M. Polpasee and N. Homsup, *Kasetsart Univ., THAILAND*

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**FROF-51**

Analysis of Mutual Coupling in MIMO Antenna Array by TARC Calculation

S. H. Chae, W. I. Kawk, S.-O. Park, and K. Lee\*, *Information and Communications Univ., \*Electronics and Telecommunications Research Institute, KOREA*

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**FROF-52**

Radiations from Switchable Rectangular Planar Array Antenna in L-Band

D. Kumar and P. K. S. Pourush, *Agra College, INDIA*

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**FROF-53**

Simulation Study on a Multi-band Adaptive Hemispherical Helix Array

D. Li, Z. Feng, and L. Zhang, *Tsinghua Univ., CHINA*

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**FROF-54**

A Dual Feed Switched-Beam Patch Antenna for a Phased Array of Switched-Beam Elements

J. Tagapanij, C. Phongcharoenpanich, and M. Krairiksh, *King Mongkut's Institute of Technology Ladkrabang, THAILAND*

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**FROF-55**

An LTCC-Based Compact Folded Rotman Lens for Phased Array Applications

G. Tudosie and R. Vahldieck, *ETH Zurich, SWITZERLAND*

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**FROF-56**

Post-IDFT Multidimensional Beamforming for STC-OFDM Systems

H. Liu and Q. Feng, *Southwest Jiaotong Univ., CHINA*

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**FROF-57**

New Methods of Reducing The Phase Quantization Error Effects on Beam Pointing and Parasitic Side Lobe Level of The Phased Array Antennas

S. Taheri and F. Farzaneh, *Sharif Univ. of Technology, IRAN*

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**FROF-58**

Experimental Study on The Radiation Beam Scan of a Waveguide Slot Array Antenna Filled with a Ferrite

H. Shimasaki and T. Itoh, *Kyoto Institute of Technology, JAPAN*

# WORKSHOP

Tuesday, December 12

9:00 a.m. – 12:00 p.m.

## Room A (301)

### Workshop 1

#### System-on-Chip/One-Chip Radio

*Organizer:* Tadao Nakagawa, *NTT, Japan*

*Chair:* Tadao Nakagawa, *NTT, Japan*

The demand for small, inexpensive radio modules is increasing. RF integrated circuits on Si, which are the key components of radio modules, have evolved remarkably in recent years. RF systems on a chip (SoC) that integrate RF, analog, and digital circuits have been developed to reduce occupied circuit area and off-chip discrete components that add to assembly and test costs. Today, the RF SoC is dominant in applications such as Bluetooth and wireless LAN, and many RF SoC devices have been developed in applications such as GPS, ETC, and GSM. Moreover, the demand for multi-band and multi-mode transceivers that can be used in various applications and that are able to connect to networks anytime, anywhere using the most suitable application among all available applications is increasing. RF SoC devices are indispensable in making multi-band and multi-mode transceivers small and economical.

This workshop presents a review of the SoC developments in various applications and of the technical issues that must be overcome.

WS1-1 A 1-V operation single chip bluetooth RF transceiver  
Mitsuru Harada, *NTT, Japan*

WS1-2 SiGe-MMIC transceiver for 5.8GHz ETC Terminals  
Noriharu Suematsu, *Mitsubishi Electric Corp., Japan*

WS1-3 Calibration Systems on RFICs  
Satoshi Tanaka, *Hitachi, Ltd., Japan*

## Room B (302)

### Workshop 2

#### Advanced MIMO Antenna Technologies

*Organizer:* Yoshihide Yamada,  
*National Defense Academy, Japan*

*Chair:* Yoshihide Yamada,  
*National Defense Academy, Japan*

High speed transmission through a limited frequency bandwidth is strongly demanded in such systems as wireless local area networks (LANs) and cellular networks. Multiple-Input Multiple-Output (MIMO) systems that have multiple antennas at both of the transmitter and receiver in multipath channel environments have attracted much attention for these years. When independent signals are transmitted from the different antennas and they are separated at the receiver side, transmission speed is increased by the number of the transmit antennas. Also, if the transmitter side has multipath channel state information, maximum throughput can be achieved by the eigen beamforming technique. In frequency selective multipath channels, the MIMO technique is employed together with orthogonal frequency division multiplexing (MIMO-OFDM). Other than the above spatial multiplexing technique, the MIMO

system can achieve reliable wireless communications by the space time coding that is a combination of the MIMO system and the coding technique.

In this workshop, starting from overview of MIMO technologies, performance evaluation of MIMO systems in home and cellular environments will be presented. Furthermore, considerations on antenna configuration of MIMO systems will be given. The workshop will be useful for understanding of the latest MIMO technologies.

WS2-1 Overview of MIMO Technologies and their Applications  
Yasutaka Ogawa, *Hokkaido Univ., Japan*

WS2-2 Performance Evaluation of MIMO Communication Systems in Home Environment  
Kei Sakaguchi, *Tokyo Institute of Technology, Japan*

WS2-3 MIMO Techniques and Experiments for Future Broadband Mobile Communications  
Mamoru Sawahashi, Kenichi Higuchi\*, Hidekazu Taoka\* and Dai Ki\*, *Musashi Institute of Technology, \*NTT DoCoMo, Japan*

WS2-4 Handset MIMO Technologies: Antenna Configurations, Analysis and Measurements Systems  
Koichi Ogawa, *Matsushita Electric Industrial Co., Ltd., Japan*

## Room C (303)

### Workshop 3

#### Standardization of Measurement Methods for Microwave and Millimeter Wave Materials

*Organizer:* Osamu Hashimoto, *Aoyama Gakuin Univ., Japan*

*Chair:* Yoshinori Kogami, *Utsunomiya Univ., Japan*

Microwave and millimeter-wave technologies have been developed further and their applications have been spread widely in recent years. The standardization of these technologies which has been discussed in the International Electro-technical Commission is necessary for us to promote the international cooperation. The role of IEC, which attained the one hundredth anniversary of its existence, becomes still more important.

In this workshop, the activity of the standardization and its recent trend will be discussed at first. The actions on the standardization of the evaluation method for the microwave and millimeter-wave materials, which have been investigated in the IEC domestic committees in Japan, will be introduced subsequently.

WS3-1 Address for the 100 Anniversary IEC  
Akira Izumi, *Ministry of Economy, Trade and Industry, Japan*

WS3-2 Standardization Activities of the IEICE Japan.  
Shozo Komaki, *Osaka Univ., Japan*

# WORKSHOP

9:00 a.m. – 12:00 p.m.

Tuesday, December 12

WS3-3 Activity of IEC/TC49 Japanese National Committee for Measurement Method of Complex Permittivity at Microwave and Millimeter Wave Frequencies  
Hiroshi Tamura, *Murata Manufacturing Co., Ltd., Japan*

WS3-4 Electronic Characteristic Measurements — Surface Resistance of Superconductors at Microwave Frequencies  
Haruhiko Obara and Shin Kosaka, *NAIST (National Institute of Advanced Industrial Science and Technology), Japan*

WS3-5 Measurement Method for Complex Permittivity of Low Loss Dielectric Materials in Microwave and Millimeter Wave Frequency Range  
Akira Nakayama, *Kyocera Corp., Japan*

WS3-6 Measurement Methods for Reflectivity of Electromagnetic Absorbers in Millimeter Wave Frequency  
Yutaka Higashida, *Japan Fine Ceramics Center, Japan*

## Room D (304)

### Workshop 4

#### Emerging Technologies and Applications of RFID

*Organizer:* Jin Mitsugi, *Keio Univ., Japan*

*Chair:* Jin Mitsugi, *Keio Univ., Japan*

RFID (Radio Frequency Identification) has been gathering significant industrial interests. Contactless card type RFID has already widely adopted in commercial uses. Long range RFID and fusion of RFID and sensors/actuators are in the early stage of the industrial adoptions. The major technical difficulties for long range RFID resides in the fast and stable reading performance and the avoidance of interference among transmitters. The proper definition and evaluation of RFID wireless system needs to be exploited. Since the long range RFID and sensor RFID are still in their infancy, the technical requirements from industries need to be understood by the technology proponents. In this workshop, Emerging Technologies and Applications in RFID, accordingly, leading researches and expectations from industry on long range and sensor RFID technology are presented.

WS4-1 RFID: Expectation and Requirement from Consumer Electronics Industry  
Tatsuya Yoshimura, *SONY, Japan*

WS4-2 Advanced RFID Multi-Reading Using Independent Component Analysis  
Hidehisa Shiomi and Yasuyuki Okamoto, *Osaka Univ., Japan*

WS4-3 Interference Avoidance Technologies for Passive RFID Systems  
Yoshinori Tanaka, *Fujitsu Laboratory, Japan*

WS4-4 Multipurpose Sensor RFID Tag  
Jin Mitsugi, *Keio Univ., Japan*

## Room E (311+312)

### Workshop 5

#### Millimeter and Terahertz Wave Applications

*Organizer:* Tadao Nagatsuma, *NTT, Japan*

*Chair:* Tadao Nagatsuma, *NTT, Japan*

Electromagnetic waves called “millimeter waves” (30 GHz–300 GHz) and/or “terahertz waves” (100 GHz–10 THz) are considered to be major resources for mankind in the 21st century. These frequency bands cover interdisciplinary regions between radio waves and light waves, which are both bases of today’s telecommunications technologies, i.e., wireless and fiber-optic communications. The exploration of such undeveloped frequencies has recently been accelerated with rapid evolutions of both electronic and photonic device/circuit technologies. This workshop will address an overview of the latest development in the millimeter and terahertz-wave devices and their applications to communications, sensors and measurements. The first part of the workshop will concentrate on millimeter-wave technologies, and in the second part, emerging terahertz device technologies and their promising applications will be presented.

WS5-1 Millimeter-Wave Devices and Circuits  
Toshihiko Kosugi, *NTT, Japan*

WS5-2 Millimeter-Wave Wireless Personal Area Network Systems  
Yozo Shoji, *NICT, Japan*

WS5-3 Trends in Terahertz Device Technologies  
Taiichi Otsuji, *Tohoku Univ., Japan*

WS5-4 Promising Areas of Terahertz Application  
Iwao Hosako, *NICT, Japan*

## Room F (313+314)

### Workshop 6

#### Technical Hellenism of RF and Information Security

*Organizer:* Takashi Ohira, *ATR, Japan*

*Chair:* Takashi Ohira, *ATR, Japan*

While the demand for data communications over wireless links is rapidly growing, there is strong social interest in guarding personal information and official secrets. Wireless security is inevitable for microwave and RF systems to break through the worldwide market. This session explores span-new possibility of harmonizing two originally different technical topics: RF and security. You will find technical Hellenism between Maxwellian engineering and information theory in the three invited presentations.

# WORKSHOP

Tuesday, December 12

1:30 p.m. – 4:30 p.m.

WS6-1 IEEE802.15.4 Wireless Secret Key Generator  
Takashi Ohira and Hideichi Sasaoka\*, *ATR, \*Doshisha Univ., Japan*

WS6-2 Security Performance of Esparskey as Viewed from Information Theory  
Hideki Imai and Kazukuni Kobara\*, *Chuo Univ., \*AIST, Japan*

WS6-3 Mathematical Aspects Common to Microwave Filters and Elliptic Encryptions  
Kiyomichi Araki, *Tokyo Institute of Technology, Japan*

## Room A (301)

### Workshop 7

#### Recent Progress in High Power Widegap Semiconductor Device and its Application to Wireless Communication System

*Organizer:* Hajime Okumura, *National Institute of Advanced Industrial Science and Technology (AIST), Japan*

*Chair:* Hajime Okumura, *National Institute of Advanced Industrial Science and Technology (AIST), Japan*

For the development of information and communication technology to support the advanced information society of the 21st century, the large-capacity high-speed information communication connecting a wide range of information processing hardware to a network is indispensable. It is wireless communication technology, together with optical communication technology. In the wireless communication, one hundred and several tens of Mbps class speed will be required for a mobile access system; and a high-power high-frequency (HF) device operating with high efficiency in the frequency range from several GHz to several tens of GHz is the most important key issue for this purpose.

In this technological domain, any essential development cannot be expected even though there are huge needs, as long as conventional semiconductor devices made of Si or GaAs are used, because the characteristic parameters of Si and GaAs are not enough as semiconductor materials. For a breakthrough in this domain, the development of high-performance devices made of widegap semiconductors such as GaN is indispensable. Recently, the innovation has come to exhibit a reality owing to the progress of device process and crystal growth technologies for the widegap semiconductors.

In this workshop, the role of wireless communication in the IT society and the present status of widegap semiconductor high-power HF devices are introduced, and the future prospect is discussed.

WS7-1 Widegap Semiconductor High-Frequency Device in Future IT Society  
Masaaki Kuzuhara, *Fukui Univ., Japan*

WS7-2 Physics and Prospects of III-Nitride MIS Devices  
Narihiko Maeda, *NTT, Japan*

WS7-3 High Power GaN-Based Heterojunction FETs for Base Station Applications

Y. Ando, Y. Okamoto, A. Wakejima, T. Inoue, T. Nakayama, Y. Murase, K. Ota, K. Yamanoguchi, N. Kuroda, M. Tanomura, K. Matsunaga, H. Miyamoto, *R&D Association of Future Electron Devices, Japan*

## Room B (302)

### Workshop 8

#### Application of CIP Method to Electromagnetic Phenomena

*Organizers:* Takashi Yabe, *Tokyo Institute of Technology, Japan*  
Yoichi Ogata, *Tokyo Institute of Technology, Japan*

*Chair:* Takashi Yabe, *Tokyo Institute of Technology, Japan*

The CIP method (Cubic Interpolated Propagation / Constrained interpolation Profile) that gives quite accurate and less-diffusive results is known as a powerful hyperbolic equations solver. The CIP method has been developed to various sophisticated versions, and although it has been applied to all kinds of phenomena like hydrodynamics for around 20 years, it is proved that CIP method is very effective for electromagnetic phenomena that can be also described by hyperbolic equations system as well, compared to the other conventional schemes.

In this workshop, new improvement of simulation techniques by CIP method and the latest practical applications of CIP method for electromagnetic phenomena will be presented. The subject matter ranges widely, such as “electromagnetic field analysis based on Maxwell’s Equations”, “plasma physics and astrophysics based on magnetohydrodynamics (MHD)” and “thermal radiation”. In order to discuss the theme from these points mentioned above, we have invited six distinguished speakers.

WS8-1 Plasma and Fluid Flow in Magnetohydrodynamical Energy Conversion  
Yoshihiro Okuno, *Tokyo Institute of Technology, Japan*

WS8-2 Application of CIP-Based MHD Code in Astrophysics  
Takahiro Kudoh, *National Astronomical Observatory of Japan, Japan*

WS8-3 CIP Method of Characteristics for Maxwell Equation  
Yoichi Ogata and Takashi Yabe, *Tokyo Institute of Technology, Japan*

WS8-4 Modified CIP Method for Light Propagation in Absorbing Media  
Daisuke Barada\*\*,\*, Takashi Fukuda\*\*,\*, Masahide Itoh\*\*, and Toyohiko Yatagai\*\*, *\*AIST, \*\*Univ. of Tsukuba, Japan*

WS8-5 Simulation of Thermal Radiation Emitted from Atomic Lattice through CIP and MD Methods  
Takushi Kawaguchi, Teppei Masuhara, and Katsunori Hanamura, *Tokyo Institute of Technology, Japan*

# WORKSHOP

1:30 p.m. – 4:30 p.m.

Tuesday, December 12

- WS8-6 Numerical Analysis for Thermal Radiation Emitted from a Ni Rectangular Micro-Cavity  
Daisuke Hirashima, Yuki Kameya, and Katsunori Hanamura, *Tokyo Institute of Technology, Japan*

## Room C (303)

### Workshop 9

#### Phase Noise in Oscillator: An Old and Still New Technical Issue

Organizer: Kenji Itoh, *Mitsubishi Electric Corp., Japan*

Co-organizer: Takashi Ohira, *ATR, Japan*

Chair: Kenji Itoh, *Mitsubishi Electric Corp., Japan*

Phase noise is an old and still new technical issue for oscillator designers. For fundamental understandings on phase noise, we need knowledge on communication system, PLL system, oscillator circuits, semiconductor devices, resonators and mathematical representation of phase noise itself. This makes difficulties for understanding of oscillator phase noise. In this workshop, phase noise is discussed from several technical aspects: (a) Phase noise influence on system performance of radio communication systems, (b) Recent progress of low phase noise oscillators on Si RF-IC, (c) Principal definition of “Leeson’s Q” for phase noise characterization, (d) Mathematical formulation method for phase noise simulation.

- WS9-1 Welcome Address

- WS9-2 Why Low Phase Noise in Modern Radio Systems ?  
Kenji Itoh, *Mitsubishi Electric Corp., Japan*

- WS9-3 Phase Noise in Modern Si-Integrated VCOs  
Larry Larson, *Univ. of California, San Diego, U.S.A.*

- WS9-4 A Simple but Persuading Approach to Oscillator Characterization  
Takashi Ohira, *ATR, Japan*

- WS9-5 Simulation Methods for Oscillator Noises  
Makiko Okumura, *Kanagawa Institute of Technology, Japan*

## Room D (304)

### Workshop 10

#### High Frequency Technologies for ITS

Organizer: Kazuo Sato, *Toyota Central R&D Labs. Inc., Japan*

Chair: Kazuo Sato, *Toyota Central R&D Labs. Inc., Japan*

As further advances are made in sensing technologies and communication technologies in the future, ITS (Intelligent Transport systems) are expected to become more comprehensive, linking vehicles to infrastructures and even to people, through information. I believe that these advances in ITS will help decrease traffic accidents, traffic congestion and environmental impact. To realize

next-generation ITS, various technologies, such as those for sensing, communications, information processing and high frequency technologies, need to be developed and integrated. In this workshop, the latest vehicular communication systems and high frequency technologies for ITS will be introduced. The first two presentations will focus on UWB (Ultra Wideband) ranging and inter-vehicle communication systems for car safety. The following two presentations will focus on electromagnetic simulation technique and design of automotive microwave and millimeter-wave applications, such as tire pressure monitoring systems, millimeter-wave radar systems and so on.

- WS10-1 26GHz-Band UWB Ranging and Communication Systems

Yasushi Aoyagi, Masaharu Uchino\*, Toshiyuki Hirose\*\*, Kenichi Takizawa\*\*\*, Kiyoshi Hamaguchi\*\*\*, and Ryuji Kohno\*\*\*, *The Furukawa Electric Co., Ltd., \*Anritsu Corp., \*\*Siemens K.K., \*\*\*NICT, Japan*

- WS10-2 Inter-Vehicle Safety Communication Systems  
Noriyoshi Suzuki, *Toyota Central R&D Labs. Inc., Japan*

- WS10-3 Electrical Field Simulations of a Car and Applications  
Yoshihide Yamada, Kazuo Sato\*, Satoru Horiuchi\*\*, and Eiji Hirose\*\*\*, *National Defense Academy, \*Toyota Central R&D Labs. Inc., \*\*Yazaki Corp., \*\*\*The Yokohama Rubber Co., Ltd., Japan*

- WS10-4 Millimeter-Wave Antenna Technologies for Automotive Radar and Sensor Systems  
Kunio Sakakibara, *Nagoya Institute of Technology, Japan*

## Room E (311+312)

### Workshop 11

#### Advanced Microwave Photonics Technologies and Their Applications

Organizer: Katsutoshi Tsukamoto, *Osaka Univ., Japan*

Chair: Katsutoshi Tsukamoto, *Osaka Univ., Japan*

A rapid progress in broadband wireless communication technologies accelerates the realization of ubiquitous networks, where various types of wireless and broadcasting services are converged in common infrastructure. Microwave photonics (MWP) can make a great contribution towards such a convergence between fixed and mobile communication (FMC), because its wideband and transparency capability for various types of wireless communication and broadcasting services will provide a seamless connectable common platform. In this workshop, the first two presentations will introduce the latest applications of MWP technologies to mobile communications and terrestrial broadcasting networks. Furthermore, the following two presentations will focus on future millimeter-wave photonic communication networks using coherent photonic techniques and advanced microwave-lightwave convert-

# WORKSHOP

Tuesday, December 12

1:30 p.m. – 4:30 p.m.

er technology for RoF (radio on fiber) systems such as advanced optical SSB modulators, broadband photodetectors so on.

WS11-1 Future Millimeter-Wave Photonics Communication Networks

Toshiaki Kuri, *NICT, Japan*

WS11-2 Advanced Millimeter-Wave-Lightwave Converter Technology for ROF Systems

Hiroshi Murata, *Osaka Univ., Japan*

WS11-3 ROF Applications for Mobile Phone Systems Applications

Yukio Horiuchi, *KDDI R&D Laboratories, Co., Ltd., Japan*

WS11-4 Recent Trends of Light Microwave Fused Technology in Broadcasting

Kazuhisa Haeiwa, *Hiroshima City Univ., Japan*

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Room F (313+314)

## Workshop 12

### RF BAW Filters for Mobile Communications

*Organizers:* Ken-ya Hashimoto, *Chiba Univ., Japan*

Robert Weigel, *Univ. of Erlangen-Nürnberg, Germany*

*Chairs:* Ken-ya Hashimoto, *Chiba Univ., Japan*

Robert Weigel, *Univ. of Erlangen-Nürnberg, Germany*

For long years, surface acoustic wave (SAW) filters have been widely used as the radio frequency (RF) front-end filters and duplexers for modern mobile communication systems. Recently, RF bulk acoustic wave devices (BAW) have been evolved surprisingly and are attempting to take over the current RF filter mar-

ket from RF SAW devices. RF BAW devices are also paid much attention for the use as a core element for the development of sophisticated RF front-end and/or one-chip radio modules based on the system-on-chip (SoC) or system-in-package (SiP) integration with active circuitry.

In this workshop, speakers from leading-edge companies (Avagotech, TriQuint/SAWTEK, Infineon Technologies, Fujitsu Labs, EPCOS) will report on the latest developments and future trends in the RF BAW devices for the mobile communications. Fabrication technologies and approaches will be discussed from various aspects for the realization of state-of-the-art RF BAW devices. Their implementation in RF modules will be demonstrated.

WS12-1 Overview of FBAR Filters, Duplexers, Quadraplexers, Quintiplexers, and Front End Modules (FEM) at Avago (formerly of Agilent)

Rich Ruby, *Avagotech, U.S.A.*

WS12-2 Bulk Acoustic Wave Filters for RF Applications

Gernot Fattinger, et al., *TriQuint/SAWTEK, U.S.A.*

WS12-3 Challenges and Success Factors of High Volume BAW Manufacturing in a CMOS Fab

Lueder Elbrecht, *Infineon Technologies AG, Germany*

WS12-4 FBAR and SAW Technologies and their Applications for Mobile Communications

Masanori Ueda, *Fujitsu Laboratories, Japan*

WS12-5 Solidly Mounted BAW Resonator Technology for Use in Mobile Communication Systems

Stefan Marksteiner, *EPCOS AG, Germany*



# SHORT COURSE

Tuesday, December 12 9:00 a.m. – 12:00 p.m.

Room G (501)

## Short Course 1

### Metamaterial Engineering for Microwaves

Lecturer: Tatsuo Itoh, *UCLA, U.S.A.*

This course is intended to provide realistic approaches to applications of metamaterial structures, specifically the so-called left handed or double negative materials, for microwave engineering. After brief historical remarks, some fundamental concepts are explained. A number of microwave components with unique characteristics are presented mostly based on the transmission line approach, called the Composite Right/Left Handed structure. Classes of the components discussed are antennas, passive devices, active and nonlinear circuits, and two-dimensional beam optics structures. Engineering aspects including the fabrication issues and homogeneity problems are discussed.

Room H (502)

## Short Course 2

### Digital RF Processor (DRP™): All-Digital TX and Discrete-Time RX

Lecturer: Robert Bogdan Staszewski, *Texas Instruments, U.S.A.*

RF circuits for multi-GHz frequencies have recently migrated to low-cost digital deep-submicron CMOS processes. Unfortunately, this process environment, which is optimized only for digital logic and SRAM memory, is extremely unfriendly for conventional analog and RF designs. We present fundamental techniques recently developed that transform the RF and analog circuit design complexity to digital domain for a wireless RF transceiver, so that it enjoys the benefits of digital approach, such as process node scaling and design automation. All-digital phase locked loop, all-digital control of phase and amplitude of a polar transmitter, and direct RF sampling techniques allow great flexibility in reconfigurable radio design. Digital signal processing concepts are used to help relieve analog design complexity, allowing one to reduce cost and power consumption in a reconfigurable design environment. The ideas presented have been used in Texas Instruments to develop two generations of commercial digital RF processors: a single-chip Bluetooth radio and a single-chip GSM radio.

Tuesday, December 12 1:30 p.m. – 4:30 p.m.

Room G (501)

## Short Course 3

### RF MEMS Circuits for High Frequency Applications

Lecturer: Linda Katehi and Dimitris Peroulis\*, *Univ. of Illinois, \*Purdue Univ., U.S.A.*

RF MEMS has been identified as an area which has the potential to provide a major impact on existing RF architectures in sensors (radar) and communications by reducing weight, cost, size, and power dissipation. The impact of this technology to communication system cost, size and volume is a few orders of magnitude. Key MEMS devices for current RF architectures are switches and microrelays in radar systems and filters in communications systems. Several RF MEMS switches have been developed in the past decade. The main driving force behind these efforts is the outstanding RF performance demonstrated by the MEMS devices. In most cases, RF MEMS switches have been electrostatic in nature. They have the distinct advantage of using only a few mW of DC power as compared to several mW for solid state devices. This presentation will cover a broad range of RF MEMS devices including switches and varactors and will discuss in detail issues related to device architecture and device reliability.

Room H (502)

## Short Course 4

### Wireless Communications Standards, Systems, and RFIC Specifications

Lecturer: Jenshan Lin, *Univ. of Florida, U.S.A.*

This tutorial links RFIC design specifications and system requirements defined in wireless communications standards. Many RFIC designers design the circuits without knowing where and how the specifications come from. The objective of this tutorial is to let attendees learn how to derive RFIC specifications from wireless communication standards, tradeoffs in different transceiver architectures, and an overall picture of RFIC and wireless communication systems. As RFIC design advances from component-level building blocks to system-level integration, this link between standards and RFIC specifications is becoming more important. A reference system design of GSM receiver will be given as an example.

# EXHIBITION

Microwave Exhibition 2006 will be held in association with the 2006 Asia-Pacific Microwave Conference (APMC 2006) at the Exhibition Hall A and B in Pacifico Yokohama, the venue of the conference, from Wednesday, December 13 to Friday, December 15, 2006.

More than 300 microwave-related companies from all over the world will display their latest products and services including systems, sub-systems, components, parts, materials, instruments and CAD softwares. The main language in the Exhibition Hall is Japanese.

At the same time, the following attractive programs are also featured:

- Technical seminars on the new technologies and products presented by the exhibitors.
- Tutorial lectures related to foundations for microwave semiconductor devices, active and passive circuits, and mobile & fixed telecommunication systems, provided in Japanese by Japanese authorities.

- The historical exhibition of microwave technologies in Japan, where more than 100 panels as well as products with respect to antennas, semiconductors, filters and systems will be displayed.
- Display of a satellite model and demonstration of multimedia mobile access systems in the special area.
- The university exhibition, where more than twenty universities will demonstrate their unique research activities in the field of microwaves.

This exhibition is open to all visitors with no entrance fee. In order to enter, you need to show your participant badge, which is given to you after the free registration at the reception desk in the Exhibition Hall. The Conference participants in APMC 2006 can also enter the exhibition hall freely by showing the registration nameplate. All visitors will be provided with a free guidebook. A copy of the text-book for the tutorial lectures is 2,000 JPY.

## EXHIBITORS

(Following is the list of exhibiting companies as of August 31 and those who exhibited in 2005)

ACE TRONIX CO., LTD.  
ADVANCED TECHNOLOGY, INC.  
ADVANTEST CORP.  
AET JAPAN, INC.  
AGILENT TECHNOLOGIES JAPAN LTD.  
AIAA-JFSC  
AMTECHS CORP.  
AMT INC.  
ANRITSU CORP.  
ANSOFT JAPAN K.K.  
APOLLOWAVE CORP.  
ARUMOTECH CORP.  
ASAHI GLASS CO., LTD.  
ATN JAPAN, LTD.  
ATR  
AVAGO TECHNOLOGIES JAPAN, LTD.  
CADENCE DESIGN SYSTEMS, JAPAN  
CANDOX SYSTEMS, INC.  
CASCADE MICROTECH JAPAN, INC.  
CHRONIX INC.  
CIRCUIT DESIGN, INC.  
COAX CO., LTD.  
COMCRAFT CORP.  
COMTECS CO., LTD.  
CORNES DODWELL LTD.  
COTEAU VERT CO., LTD.  
CRC SOLUTIONS CORP.  
CYBERNET SYSTEMS CO., LTD.  
DAIDO STEEL CO., LTD.  
DEVICE CO., LTD.  
DIGITAL SIGNAL TECHNOLOGY, INC.  
E&C ENGINEERING K.K.  
ELENA ELECTRONICS CO., LTD.  
ETS-LINDGREN JAPAN, INC.  
EUDYNA DEVICES INC.  
FARAD CORP.  
FLOMERICS, LTD.  
FREESCALE SEMICONDUCTOR JAPAN LTD.  
FUJI DENKA, INC.  
FUJITSU LTD.

FUJITSU MEDIA DEVICE LTD.  
FUSOH SHOJI CO., LTD.  
G. T. ELECTRONICS CORP.  
HIGHTECH CORP.  
HIROSE ELECTRIC CO., LTD.  
HISOL, INC.  
HI-TECHNOLOGY TRADING, INC.  
HONDA TSUSHIN KOGYO CO., LTD.  
IDAQS CO., LTD.  
INNERTRON ELECTRONICS CO., LTD.  
JAPAN TELEGARTNER LTD.  
JUNKOSHA INC.  
KANAGAWA INDUSTRIAL TECHNOLOGY  
RESEARCH INSTITUTE  
KANTO ELECTRONICS APPLICATION &  
DEVELOPMENT INC.  
KAWASHIMA MANUFACTURING CO., LTD.  
KEISOKU ENGINEERING SYSTEM CO., LTD.  
KEYCOM CORP.  
KIETHLEY INSTRUMENTS, K.K.  
KIKUSUI ELECTRONICS CORP.  
KITAGAWA INDUSTRIES CO., LTD.  
KNOWLEDGE\*ON INC.  
KODEN ELECTRONICS CO., LTD.  
KOZO KEIKAKU ENGINEERING INC.  
KYOKUTO BOEKI KAISHA, LTD.  
LPKF JAPAN CO., LTD.  
MAJ CO., LTD.  
MARUWA CO., LTD.  
MATSUSHITA ELECTRIC WORKS, LTD.  
MEL INC.  
MICRO WAVE FACTORY CO., LTD.  
MIDORIYA ELECTRIC CO., LTD.  
MINI-CIRCUITS YOKOHAMA, LTD.  
MITS ELECTRONICS  
MITSUBISHI ELECTRIC CORP.  
MITSUBISHI ELECTRIC TOKKI SYSTEMS  
CORP.  
MIYAZAKI ELECTRIC WIRE & CABLE CO.,  
LTD.  
MKT TAISEI CO., LTD.  
MMEX, INC.  
MOUBIC INC.  
MPD DEVICE CO., LTD.  
M-RF CO., LTD.

MURATA MANUFACTURING CO., LTD.  
NAGASE & CO., LTD.  
NAKA & CO., LTD.  
NAKAO CORP.  
NATIONAL INSTRUMENTS JAPAN CORP.  
NEC COMPOUND SEMICONDUCTOR DEVICES,  
LTD.  
NEC ELECTRONICS CORP.  
NEC ENGINEERING, LTD.  
NEC MICROWAVE TUBE, LTD.  
NETWELL CORP.  
NEW JAPAN RADIO CO., LTD.  
NEW METALS AND CHEMICALS CO., LTD.  
NGK SPARK PLUG CO., LTD.  
NHK  
NIDEC COPAL ELECTRONICS CORP.  
NIHON DEMPYA KOGYO CO., LTD.  
NIHON KOSHUHA CO., LTD.  
NIHON RADIAL K.K.  
NIPPO ELECTRONICS CO., LTD.  
NIPPON PILLAR PACKING CO., LTD.  
NIPPON STEEL CHEMICAL CO., LTD.  
NIPPON TUNGSTEN CO., LTD.  
NPS, INC.  
OKAYA ELECTRIC INDUSTRIES CO., LTD.  
OMRON CORP.  
OPTOSIRIUS CORP.  
ORIENT MICROWAVE CORP.  
OTSUKA CHEMICAL CO., LTD.  
POLYPLASTICS CO., LTD.  
PTM CORP.  
PVJ INC.  
R&K CO., LTD.  
REPIC CORP.  
RF DEVICE CO., LTD.  
RICHARDSON ELECTRONICS K.K.  
RIKEI CORP.  
RIKEN CORP.  
RIKEN DENGU SEIZO CO., LTD.  
ROHDE & SCHWARZ JAPAN K.K.  
SAINT TECHNOLOGY CORP.  
SANKEN CO., LTD.  
SANYU SWITCH CO., LTD.  
SEKI TECHNOTRON CORP.  
SHINKO PHOTO SERVICE CO., LTD.

# EXHIBITION

SHINTAKE SANGYO CO., LTD.  
SHOSHIN CORP.  
SOGO ELECTRONICS, INC.  
SONNET GIKEN CO., LTD.  
SOSHIN ELECTRIC CO., LTD.  
SPC ELECTRONICS CORP.  
STACK ELECTRONICS CO., LTD.  
SUMITOMO METAL(SMI) ELECTRONICS DEVICES INC.  
SUSS MICROTEC KK  
SYSTEC RESEARCH INC.  
TAMA DEVICE CO., LTD.  
TAMAGAWA ELECTRONICS CO., LTD.  
TAMAOKI ELECTRONICS CO., LTD.  
TDK CORP.  
TECDIA CO., LTD.  
TECHNOPROBE CO., LTD.  
TEKTRONIX JAPAN, LTD.  
TOKIMEC INC.  
TOKO DENSHI CO., LTD.  
TOKO TRADING INC.  
TOSHIBA CORP.  
TOTAL SHIELDING SYSTEMS JAPAN  
TOYO MEDIC CO., LTD.  
UBE INDUSTRIES, LTD.  
UM-SERVICES, LTD.  
UNIVERSAL SYSTEMS CO., LTD.  
VEGA TECHNOLOGY INC.  
WAKA MANUFACTURING CO., LTD.  
WAKOH COMMUNICATION INDUSTRIAL CO., LTD.  
WAVE TECHNOLOGY INC.  
W. L. GORE & ASSOCIATES, INC.  
YOKOGAWA ELECTRIC CORP.  
YOKOHAMA DENSHI SEIKO CO., LTD.  
YOKOWO DS CO., LTD.  
YUETSU SEIKI CO., LTD.

(The list of overseas exhibitors with Japanese Agent in 2005)

AC MICROWAVE GMBH  
ACTIVE AND PASSIVE TECHNOLOGY CO., LTD.  
ADVANCED CONTROL COMPONENTS INC.  
ADVANCED ELECTRONICS TECHNOLOGY ASSOCIATES, INC.  
ADVANCED FERRITE TECHNOLOGY GMBH  
ADVANCED MICROWAVE, INC.  
ADVANCED POWER TECHNOLOGY, INC.  
ADVANCED SEMICONDUCTOR BUSINESS INC.  
ADVANCED SEMICONDUCTOR, INC.  
ADVANCED TECHNICAL MATERIALS, INC.  
ADVANCED TECHNOLOGY GROUP, INC.  
ADVANTECH-ADVANCED MICROWAVE TECHNOLOGIES INC.  
AEROCOMM CO., LTD.  
AEROFLEX METELICS CORP.  
AEROSCOU USA  
AEROTEK CO., LTD.  
AKON, INC.  
ALAN INDUSTRIES, INC.  
ALC MICROWAVE INC.  
ALDETEC, INC.  
ALTRONIC RESEARCH, INC.  
AMERICAN OIL & SUPPLY CO.  
AMERICAN TECHNICAL CERAMICS CORP.  
AMPLICAL CORP.  
AMPLITECH, INC.

ANAREN MICROWAVE, INC.  
ANTCOM CORP.  
APOLLO MICROWAVES LTD.  
APPLIED ENGINEERING PRODUCTS  
APPLIED SYSTEMS ENGINEERING, INC.  
ARAFTEK, INC.  
ARLON, INC. MATERIALS FOR ELECTRONIDS DIVISION  
ARRA, INC.  
ARRIS CXM  
ARTECH HOUSE PUBLISHERS  
ASCOR, INC.  
ATLANTIC MICROWAVE CORP.  
ATLANTIC MICROWAVE LTD.  
BABCOCK, INC.  
BANDWIDTH SEMICONDUCTOR, LLC  
BECKELEC INC.  
BETA THERM IRELAND LTD.  
BOARDTEK ELECTRONICS CORP.  
BSC FILTERS LTD.  
CALIFORNIA TUBE LABORATORY, INC.  
CAP WIRELESS, INC.  
CENTELLAX INC.  
CENTER TECHNOLOGIES  
CENTRE FOR INTEGRATED PHOTONICS, LTD.  
CERAGON NETWORK LTD.  
CERNEX, INC.  
CHANNEL MICROWAVE CORP.  
CHIN NAN@ PRECISION ELECTRONICS CO., LTD.  
CHRONIX INC.  
CIAO WIRELESS, INC.  
CML ENGINEERING SALES, INC.  
COM DEV LTD.  
COMMERCIAL MICROWAVE TECHNOLOGY, INC.  
COMOTECH  
COMPEX CORP.  
COMSOL AB  
COMTECH PST CORP.  
CONTINENTAL MICROWAVE & TOOL COMPANY, INC.  
CORNING GILBERT INC.  
CREE, INC.  
CST GMBH  
C-TECH CO., LTD.  
CUMING CORP.  
CUSTOM MICROWAVE COMPONENTS, INC.  
CUSTOM MICROWAVE, INC.  
CYBER WIRELESS CORP.  
DAICO INDUSTRIES, INC.  
DB CONTROL  
DBP MICROWAVE  
DELTA ELECTRONICS, INC.  
DIAMOND ANTENNA & MICROWAVE CORP.  
DIELECTRIC LABORATORIES INC.  
DISCERA INC.  
DITOM MICROWAVE, INC.  
DORADO INTERNATIONAL CORP.  
DOW-KEY MICROWAVE CORP.  
DUCOMMUN TECHNOLOGIES, INC.(DMT)  
DYNAMICWAVE TELECOM, INC.  
DYNETICS, INC.  
E2V TECHNOLOGIES  
EAGLE  
EAGLEWARE CORP.  
ECLIPSE MICROWAVE, INC.

EDO RECONNAISSANCE AND SURVEILLANCE SYSTEMS  
EKSPLA  
ELCOM THCHNOLOGIES, INC.  
ELVA-1 LTD.  
EMCORE CORP.  
EMC TECHNOLOGY  
EM RESEARCH, INC.  
EM SOFTWARE & SYSTEMS  
ENDWAVE CORP.  
ENON MICROWAVE, INC. MICRONETICS  
ENSIGN POWER SYSTEMS, INC.  
ENVIRO MENTOR AB  
ERICKSON INSTRUMENTS LLC  
EUROPEAN ANTENNAS LTD.  
EVERBEING INT'L CORP.  
EXCELICS SEMICONDUCTOR, INC.  
EZ FORM CABLE CORP.  
FARRAN TECHNOLOGY, LTD.(A SMITHS DETECTION COMPANY)  
FILTRONIC COMPOUND SEMICONDUCTORS  
FILTRONIC PTY LTD, AUSTRALIA  
FLEXCO MICROWAVE INC.  
FLORIDA RF LABS  
FOCUS MICROWAVES, INC.  
FREESCALE SEMICONDUCTOR JAPAN LTD.  
FREQUENCY ELECTRONICS, INC.  
GIGAANT  
GIGALANE CO., LTD.  
GIGA TECH CO., LTD.  
GIGA-TRONICS, INC.  
GLOBAL COMMUNICATION SEMICONDUCTORS, INC.  
G.T. MICROWAVE, INC.  
HEATWAVE LABS, INC.  
HEI, INC.  
HERLEY-CTI  
HERLEY, INDUSTORIES, INC.  
HEROTEK, INC.  
HITTITE MICROWAVE CORP.  
HNL, INC.  
HUBER+SUHNER AG  
ICS/MICRO NETWORKS CORP.  
IEEE-PRESS  
IF ENGINEERING CORP.  
INFINION TECHNOLOGIES  
INMET CORP.  
INPHI CORP.  
INTEGRA TECHNOLOGIES, INC.  
INTER-CONTINENTAL MICROWAVE  
IRONCAD LLC  
ITERRA COMMUNICATIONS  
IW (INSULATED WIRE INC.)  
JACKET MICRO DEVICES INC.  
JFW INDUSTRIES, INC.  
J MICRO TECHNOLOGY  
JOHNSON COMPONENTS, INC.  
JOHN WILEY & SONS, LTD.  
KEVLIN CORP.  
K & L MICROWAVE, INC.  
KMIC TECHNOLOGY, INC.  
KRYTAR  
L-3 COMMUNICATIONS, ELECTRON DEVICES  
L-3 COMMUNICATIONS, NARDA MICROWAVE-EAST  
L-3 COMMUNICATIONS, NARDA MICROWAVE-WEST  
LABTECH LTD.  
LINX TECHNOLOGIES INC.  
LITEPOINT, CORP.

# EXHIBITION

LOGUS MICROWAVE CORP.  
LORCH MICROWAVE  
LPKF LASER & ELECTRONICS AG  
LUCIX CORP.  
LUNEBERG TECHNOLOGIES  
M/A-COM, INC.  
MARKI MICROWAVE  
MATRIX SYSTEMS CORP.  
MAURY MICROWAVE, CORP.  
MCL, INC.  
MEGA INDUSTRIES  
MEGAPHASE LLC  
MERET OPTICAL COMMUNICATIONS(OSICOM TECHNOLOGIES, INC.)  
MICA MICROWAVE CORP.  
MICRO-COAX INC.  
MICRO CRYSTAL(A DIV.OF ETA SA)  
MICROELECTRONICS CAPACITORS LTD.  
MICROKIM  
MICROLAB/FXR  
MICRO LAMBDA WIRELESS, INC.  
MICRO METALSMITHS, LTD.  
MICROSEMI MICROWAVE PRODUCTS  
MICROSOURCE, INC.  
MICRO SUBSTRATES CORP.  
MICROTECH INC.  
MICRO-TRONICS, INC.  
MICROWAVE AMPLIFIERS LTD.  
MICROWAVE DEVELOPMENT LABORATORIES, INC.  
MICROWAVE DEVICE TECHNOLOGY CORP.  
MICROWAVE DYNAMICS  
MICROWAVE ENGINEERING CORP.  
MICROWAVE PHOTONIC SYSTEMS, INC.  
MICROWAVE SOLUTIONS, INC.  
MICROWAVE TECHNOLOGY CORP.  
MICROWAVE TECHNOLOGY, INC.  
MICROWAVE & VIDEO SYSTEMS, INC.  
MIDWEST MICROWAVE INTERNATIONAL, LTD.  
MILLITECH, LLC  
MIMIX BROADBAND, INC.  
MINI-CIRCUITS  
MINI-SYSTEMS, INC.  
MI TECHNOLOGIES, LLC  
MITEQ, INC.  
MMCOMM INC.  
M&M INDUSTRIES, INC.  
MODCO, INC.  
M-PULSE MICROWAVE  
MUEGGE ELECTRONIC GMBH  
M-WAVE  
NAKA & CO., LTD.  
NALLATECH LTD.  
NARDA SAFETY TEST SOLUTIONS GMBH  
NEARFIELD SYSTEMS, INC.  
NEXTEC MICROWAVE & RF INC.  
NOBLE PUBLISHING CORP.  
NORDIX GRUPO  
NORTHROP GRUMMAN SPACE TECHNOLOGY VELOCIMUM PRODUCTS  
NUBICOM INC.  
NURAD TECHNOLOGIES INC.  
OE WAVES  
OLESON MICROWAVE LABS.  
OMNIYIG, INC.  
ORBIT/FR-ENGINEERING LTD.  
ORTEL A DIVISION OF EMCORE  
OSCILLOQUARTZ SA  
PACIFIC MILLIMETER PRODUCTS

PACIFIC MONOLITHICS, INC.  
PASCALL ELECTRONICS, LTD.(ENGLAND)  
PASTERNAK ENTERPRISES, LLC  
PENN ENGINEERING COMPONENTS  
PEREGRINE SEMICONDUCTOR, INC.  
PHASE MATRIX, INC.  
PHASE ONE MICROWAVE, INC.  
PICONICS, INC.  
PILKOR ELECTRONICS CO., LTD.  
PLANAR ELECTRONICS TECHNOLOGY, INC.  
POLYFET RF DEVICES  
POLYPHASE CORP.  
PRESIDIO COMPONENTS, INC.  
PUESCHNER GMBH  
PULSAR MICROWAVE CORP.  
QMC INSTRUMENTS LTD.  
QPAR ANGUS LTD.  
QUINSTAR TECHNOLOGY, INC.  
RADAR TECHNOLOGY, INC.  
RADIOMETER PHYSICS GMBH  
RADITEK  
RALTRON ELECTRONICS CORP.  
REACTEL, INC.  
RELCOMM TECHNOLOGIES, INC.  
RES LTD.  
RESOTECH, INC.  
RFCORE CO., LTD.  
RFHIC  
RFHIC COMPANY  
R.F. HITEC, INC.  
RFIC TECHNOLOGY CORP.  
RF TECHNOLOGIES CORP.  
RH LABORATORIES, INC.  
RICHARDSON ELECTRONICS, LTD.  
RLC ELECTRONICS, INC.  
ROGERS CORP. ADVANCED CIRCUIT MATERIALS DIVISION  
ROSENBERGER  
RS MICROWAVE COMPANY, INC.  
SAGE LABORATORIES  
SAMSYS TECHNOLOGIES INC.  
SANGSHIN ELECOM CO., LTD.  
SAWCOM TECH, INC.  
SCIENTIFIC MICROWAVE CORP.  
SDP COMPONENTS INC.  
SEASOLVE SOFTWARE, INC.  
SECTOR MICROWAVE INDUSTRIES, INC.  
SEMELAB PLC  
SEMIFLEX, INC.  
SG MCGEARY COMPANY  
SHENGLU AUTENNA CO., LTD.  
SIERRA MICROWAVE TECHNOLOGY  
SIGNAL TECHNOLOGY CORP., KELTEC OPERATION  
SIMLAB SOFTWARE GMBH  
SIRENZA MICRODEVICES, INC.  
SIVERS IMA, AB  
SIVERS LAB, AB  
SKYWORKS SOLUTIONS, INC.  
SONNET SOFTWARE, INC.  
SONOMA INSTRUMENT  
SOUTHWEST MICROWAVE, INC.  
SPACEK LABS, INC.  
SPECTRACOM  
SPECTRA-MAT, INC.  
SPECTRUM CONTROL, INC.  
SPECTRUM ELECTROTECHNIK GMBH  
SPECTRUM MICROWAVE, INC.  
SPINNAKER MICROWAVE  
SPINNER GMBH

SPIRENT COMMUNICATIONS(SW) LTD.  
SSI CABLE CORP.  
STANFORD RESEARCH SYSTEMS, INC.  
STANGENES INDUSTRIES, INC.  
STATE OF THE ART, INC.  
STC MICROWAVE SYSTEMS, ARIZONA.  
STC MICROWAVE SYSTEMS, OLEKTRON  
STORM PRODUCTS CORP.  
STRATEDGE CORP.  
SUMMITEK INSTRUMENTS, INC.  
SUNNY ELECTRONICS  
SUPERCONDUCTOR TECHNOLOGIES INC.  
SV MICROWAVE  
SYFER TECHNOLOGY, LTD.  
SYNERGY MICROWAVE CORP.  
TACONIC CO., LTD.  
TECHFILM SERVICES INC.  
TECHNICAL SERVICES LABORATORY, INC.  
TECHTROL CYCLONETICS, INC.  
TECOM INDUSTRIES, INC.  
TELEDYNE COUGAR(COUGAR COMPONENTS)  
TELEDYNE COUGAR(TELEDYNE MICROWAVE, INC.)  
TELEDYNE MICROWAVE  
TENSOLITE  
TERABEAM CORP.  
THE FERRITE COMPONENTS, INC.  
THE MCGRAW-HILL CO.  
(INTERNATIONAL MARKETING MCGRAW-HILL PROFESSIONAL)  
THE PHOENIX COMPANY OF CHICAGO, INC.  
THE WAVEGUIDE SOLUTION LTD.  
THOMAS KEATING LTD.  
TIMES MICROWAVE SYSTEMS  
TLC PRECISION WAFER TECHNOLOGY, INC.  
TRAK MICROWAVE CORP.  
TRANS-TECH, INC.  
TRILITHIC, INC.  
TRONER INC.  
TRU CORP.  
T-TECH, INC.  
TYCO ELECTRONICS AMP  
UNITED MONOLITHIC SEMICONDUCTORS S.A.S.  
UNIVERSAL MICROWAVE TECHNOLOGY, INC.  
VECTOR FIELDS LTD.  
VECTRON INTERNATIONAL  
VERTEX MICROWAVE PRODUCTS, INC.  
VICTORY MICROWAVE CORP.  
VIDA PRODUCTS, INC.  
VIRGINIA DIODES, INC.  
WEINSCHEL ASSOCIATES  
WEINSCHEL CORP.  
WEST · BOND INC.  
WIDE BAND SYSTEMS, INC.  
WISEWAVE TECHNOLOGIES, INC.  
WJ COMMUNICATIONS  
W. L. GORE & ASSOCIATES, INC.  
XICOM TECHNOLOGY, INC.  
X-IDENT TECHNOLOGY GMBH  
XSI ELECTRONICS, INC.  
ZELAND SOFTWARE, INC.  
ZELIGSOFT

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Kiyotoshi YASUMOTO Kyushu University

### Secretary:

Toshio NOJIMA Hokkaido University

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### Secretary:

Atsushi SANADA Yamaguchi University

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Yoichi ARAI AI Electronics Ltd.  
Mitsuo HASEGAWA Fujitsu Component Ltd.  
Osamu HASHIMOTO Aoyama Gakuin University

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