2007 IEEE MTT-S

International Microwave Symposium

Honolulu, Hawai'i · 3–8 June 2007

IEEE

www.IMS2007.org

MICROWAVE WEEK

Saturday

Registration 14:00–18:00

Sunday — 3 June 2007

07:00–08:00 Workshop and Short Course Breakfast

8:00 Full-Day and Morning Workshops and Short Courses

- **WSA**: Architectural Design and System Verification for Wireless SoC - Nice to Have or a Real Necessity?
- **WSB**: Wireless Reconfigurable Terminals: Adaptive Analog Circuits or Digital RF Processing?
- **WSD**: Nanoscale RFIC Design Challenges and Foundry Solutions
- **WSE**: System-in-Package Technologies for Cost, Size, and Performance
- **WSF**: Advances in WiMAX RF Technology
- **WSG**: Solid-State Power Invades the Tube Realm
- **WSH**: UWB Radio: From Building Block to SoC
- **WSJ**: RFID
- **WSM**: 24 GHz ISM-Band Communications
- **WSO**: Silicon BiCMOS and CMOS PA from RF to Millimeter-Wave
- **TSA**: RFIC Circuit and System Design Tutorial
- **TSB**: Analog and High-Speed Circuit Design Solutions for Nano RF CMOS
- **TSC**: Tutorial Workshop on RF and Microwave Filter Design
- **TSD**: SDR and Cognitive Radio — The Need for Reconfigurable RF Front-Ends
- **CSA**: Micro Coaxial Lines: Theory, Design and CEM Lab
- **CSB**: Galileo — Europe's Share for a Global Navigation Satellite Service

13:00 Afternoon Workshops

- **WSC**: Optimum CMOS Integrated LNA Design Techniques for Handsets
- **WSI**: Advances in Mixer Design for UWB Transceivers
- **WSK**: Emerging RFID and Wireless Sensors: Technologies and Applications
- **WSL**: Software-Defined Radio to Cognitive Radio
- **WSN**: Millimeter-Wave, Quasimillimeter-Wave Highly Integrated Circuits
- **WSP**: Integrated Broadband Tuners for Satellite and Terrestrial Applications

Registration 07:00–18:00 • **RFIC** Plenary Session 17:30–19:00 (HCC 311)

Social Events

- RFIC Reception 19:00–21:00 HCC Rooftop Garden

Guest Program

- One Day Maui Tour 05:00–20:00
- Hospitality Suite 07:00–12:00

Monday — 4 June 2007

07:00–08:00 Workshop and Short Course Breakfast

8:00 Full-Day and Morning Workshops and Short Courses

- **WMA**: Advances in Active Device Characterization and Modeling for RF and Microwave
- **WMB**: On-Chip/Off-Chip DC, RF, and Microwave Measurement Modules for RFIC, SoC and SiP Self Characterization, Self Test, Self Debug, and Diagnosis
- **WMC**: High-Speed Signal Integrity
- **WMD**: Emerging Packaging Technology and Applications at Millimeter-Wave Frequencies
- **WME**: High-Q RF MEMS Tunable Filters
- **WMF**: Theory and Design of Phase Locked Loops
- **WMG**: Challenges of High Power Device Characterization and Modeling
- **WMH**: High Power Issues of Microwave Filter Design and Realization
- **WMI**: Noise in Nonlinear Circuits: Theory, Modeling, and Measurement Techniques
- **WMK**: Ultrafast Analog-to-Digital (A/D) Conversion Technique and its Applications
- **TMA**: High-Frequency Characterization of Printed Circuit-Board Materials
- **TMB**: Practical Analysis, Stabilization, and Exploitation of Nonlinear Dynamics in RF, Microwave, and Optical Circuits
- **TMC**: How to Do Business in Far East
- **CMA**: RFID — Design of Integrated Passive Transponders
- **CMB**: Millimeter-Wave and THz Electromagnetics, Components, and Systems

12:00-13:15 Panel

- **PMA**: RFID (HCC 313C)

13:00 Afternoon Workshops

- **WMJ**: Will Wide Band-Gap Power Transistors Render Silicon Power Transistors Obsolete?
- **TMD**: Novel Materials for RF MEMS

Registration 07:00–17:00 • **RFIC** Symposium 08:00–17:10

Social Events

- *Microwave Journal* Reception 18:00–20:00 HCC Rooftop Garden

Guest Program

- Kualoa Ranch 07:10–14:00
- Arizona Memorial, USS Missouri, and City Tour 06:30–15:30
- Hospitality Suite 07:00–12:00

Tuesday — 5 June 2007

07:00–09:00 Attendee Continental Breakfast

10:10–11:50 TU2 Plenary Session

- **TU2A**: Plenary Session (HCC Ballroom B, C)

12:00–13:15 Panel

- **PTUA**: CMOS Millimeter-Wave MMIC, Real or Bubble? (HCC 313C)
- **PTUB**: Your GaAs Foundry and the Future: Anyone Have Issues? Of Course! (HCC 316C)

13:20–15:00 TU3 Oral Sessions

- **TU3A**: Advances in RF Power Amplifier Technology (HCC 311)
- **TU3B**: Hybrids and Couplers I (HCC 312)
- **TU3D**: Microwave Photonic Links (HCC 316A)
- **TU3E**: Digital Microwave Architectures (HCC 315)
- **TU3F**: Advances in CAD Techniques (HCC 314)
- **TU3G**: Special: Microwave/Millimeter-Wave Activities in the Pacific Rim (HCC 317AB)

15:30–17:10 TU4 Oral Sessions

- **TU4A**: Adv Tech for Wireless Power Amp Effic and Linearity Enhancement (HCC 311)
- **TU4B**: Hybrids and Couplers II (HCC 312)
- **TU4C**: Multi-GHz Circuits and Systems for Comm and Instrumentation (HCC 316B)
- **TU4D**: Microwave Photonic Devices (HCC 316A)
- **TU4E**: Advanced Components for Wireless Systems (HCC 315)
- **TU4F**: Applied Frequency Domain Techniques (HCC 314)
- **TU4G**: Special Session: A Tribute to Dr. Leo Young (HCC 317AB)

Student High-Efficiency Power Amplifier Competition (Ballroom A Foyer) 13:30–16:30

Student Paper Competition (Ballroom A) 14:00–16:00

Registration 07:00–17:00 • IMS **Exhibition** 09:00–17:00 • Historical Exhibit 09:00–17:00 • **MicroApps** 12:00–16:00 • **RFIC** Symposium 08:00–17:10 • **RFIC** Interactive Forum 14:00–17:00

Social Events

- Women in Microwaves Reception 18:00–20:00 Hilton Village Green
- Student Reception 19:00–21:00 Hilton Kalia Tower Pool
- MTT-17 Anniversary Reception 19:00–20:00 Hilton Mid-Pacific Conference Ctr Coral 2
- Ham Radio Social 20:00–22:00 Hilton Mid-Pacific Conference Ctr Coral 2

Guest Program

- Hole in the Wall Lunch Tour 09:45–14:00
- One-Day Big Island and Volcano Tour 06:00–20:00
- Hospitality Suite 07:00–12:00

Wednesday — 6 June 2007

07:00–09:00 Attendee Continental Breakfast

08:00–09:40 WE1 Oral Sessions

- **WE1A**: Pwr Charac and Perform Enhncement Tech for III-V and Si Devices (HCC 311)
- **WE1B**: Innovative Active Circuits Operating Above 100 GHz (HCC 312)
- **WE1C**: Innovative Design and Construction of RF MEMS Switches (HCC 313A)
- **WE1E**: Special Session: A Tribute to K. C. Gupta (HCC 316A)
- **WE1F**: Microwave Sensors for Object and Presence Detection (HCC 315)
- **WE1G**: Power Dividers and Combiners (HCC 314)

10:10–11:50 WE2 Oral Sessions

- **WE2A**: Low Noise CMOS and Low Power HEMT Technologies (HCC 311)
- **WE2B**: Modules and Chipsets for mm-Wave Commercial Applications (HCC 312)
- **WE2C**: RF MEMS Tunable Circuits (HCC 313A)
- **WE2D**: Material Measurement (HCC 316B)
- **WE2E**: Design and Synthesis of Planar Filters (HCC 316A)
- **WE2F**: Sensors and Sensor Systems (HCC 315)
- **WE2G**: Nonlinear Transistor Modeling (HCC 314)

12:00–13:15 Panel

- **PWA**: Is GaN Ready for Prime Time? (HCC 313C)
- **PWB**: Will RF-MEMS Make the Commercial Leap? (HCC 316C)
- **PWC**: Grant Opportunities at the National Science Foundation (HCC 317A)

13:20–15:00 WE3 Oral Sessions

- **WE3A**: Focused Session: Advances in GaN Technology (HCC 311)
- **WE3B**: Advances in Microwave and mm-Wave VCOs (HCC 312)
- **WE3C**: Ferrite and Ferroelectric Components (HCC 313A)
- **WE3D**: Accuracy Evaluation and Enhncment in Time Domain EM Modeling (HCC 316B)
- **WE3E**: Wideband Planar Filters (HCC 316A)
- **WE3F**: Focused Session: Microwaves in Support of Societal Security (HCC 315)
- **WE3G**: Linear Device Modeling (HCC 314)

15:30–17:10 WE4 Oral Sessions

- **WE4A**: X-Band and Millimeter-Wave Devices and Power Amplifiers (HCC 311)
- **WE4B**: Novel Signal Generation Techniques and Applications (HCC 312)
- **WE4C**: SAW and FBAR RF Filters and Modules (HCC 313A)
- **WE4D**: Problems of Scale and Hybrid Modeling in Time Domain EM (HCC 316B)
- **WE4E**: Planar Dual-Mode and Dual-Bandpass Filters (HCC 316A)
- **WE4F**: Focused Session: Adv in Microwave Sys for Deep Space Missions (HCC 315)
- **WE4G**: Nonlinear Circuit Analysis and System Simulation (HCC 314)

WEP1: Interactive Forum (Ballroom A) 09:30-11:30

WEP2: Interactive Forum (Ballroom A) 14:00-16:00

Registration 07:00–17:00 • IMS **Exhibition** 09:00–17:00 • Historical Exhibit 09:00–17:00 • **MicroApps** 09:20–17:00

Social Events

- Industry-Hosted Cocktail Reception 18:00–20:00 Hilton Mid-Pacific Conference Ctr Coral 3
- MTT-S Awards Banquet 19:30–22:00 Hilton Mid-Pacific Conference Ctr Coral 4

Guest Program

- Shangri-La: The Honolulu Estate of Miss Doris Duke 07:30–11:30, 10:00–14:00, 12:30–16:30
- Sea Life Park Luau 17:05–21:30
- Hospitality Suite 07:00–12:00

Thursday — 7 June 2007

07:00–09:00 Attendee Continental Breakfast

08:00–09:40 TH1 Oral Sessions

- **TH1A**: High Power Amplifiers I (HCC 311)
- **TH1B**: Nonplanar Filters and Multiplexers (HCC 312)
- **TH1C**: Advances in Radar Systems (HCC 313A)
- **TH1D**: Biological Effects and Medical Applications (HCC 316B)
- **TH1E**: Components, Systems, and Appl for mm-Wave and THz Imaging (HCC 316A)
- **TH1F**: Frequency Conversion and Control (HCC 315)
- **TH1G**: Periodic Structures and Applications (HCC 314)

10:10–11:50 TH2 Oral Sessions

- **TH2A**: Power Amplifier Linearization (HCC 311)
- **PTHA**: Career Development: Giving Your Career a Never-Ending Boost (HCC 317A)
- **TH2C**: Imaging and Ultra-Wideband Radars (HCC 313A)
- **TH2D**: Nonlinear and Linear Measurement (HCC 316B)
- **TH2E**: Focused Sess: Adv. Signal Processing Tech for Microwave Photonics (HCC 316A)
- **TH2F**: New Trends in High Frequency Signal Generation (HCC 315)
- **TH2G**: Transmission Line and Waveguide Transitions (HCC 314)

12:00–13:15 Panel

- **PTHB**: THz Electronics for the 21st Century (HCC 313C)
- **PTHC**: RF Techniques for Signal Integrity Engineering (HCC 316C)

Student Awards Luncheon (HCC Ballroom C)

13:20–15:00 TH3 Oral Sessions

- **TH3A**: High Power Amplifiers II (HCC 311)
- **TH3B**: Reconfigurable and Active Filters (HCC 312)
- **TH3C**: Advanced Packaging (HCC 313A)
- **TH3D**: Novel Radiation and Prop Effects on Waveguiding Structures (HCC 316B)
- **TH3E**: Focused Session: Millimeter and Submillimeter Wave Imaging (HCC 316A)
- **TH3F**: Smart Antenna Technologies and Applications (HCC 315)
- **TH3G**: Innovative Passive Components (HCC 314)

15:30–17:10 TH4 Oral Sessions

- **TH4A**: Low-Noise Devices, Amplifiers, and Receivers (HCC 311)
- **TH4B**: High Reliability RF MEMS Switches (HCC 312)
- **TH4D**: Novel Metamaterial Elements: Their Characteristics and Applications (HCC 316B)
- **TH4E**: Special: Submillimeter Wave Radio Astronomy and Mauna Kea (HCC 316A)
- **TH4F**: Phased-Array Systems and Enabling Technologies (HCC 315)
- **TH4G**: New Developments in Transformers and Inductors (HCC 314)

THP1: Interactive Forum (Ballroom A) 09:30–11:30

THP2: Interactive Forum (Ballroom A) 14:00–16:00

Registration 07:00–15:00 • IMS **Exhibition** 09:00–15:00 • Historical Exhibit 09:00–15:00 • **MicroApps** 09:20–13:00

Social Events

- MTT-S GOLD Reception 17:30–18:30 Sheraton Diamond Head Lawn
- MTT-S GOLD Luau 18:00–21:00 Royal Hawaiian Hotel Ocean Lawn

Guest Program

- Grand Circle Island 08:15–17:30
- Tropical Ocean Fun Cruise 08:25–13:00
- Hospitality Suite 07:00–12:00

Friday — 8 June 2007

07:00–08:00 Workshop and Course Breakfast

8:00 Full-Day and Morning Workshops and Short Courses

- **WFA**: Reconfigurable and Smart Antennas
- **WFB**: Recent Advances in Electromagnetic Metamaterials: Theory, Computation, and Applications
- **WFC**: Low-Cost, Integrated Automotive and Industrial Radar Sensors
- **WFD**: Advances in Imaging Radar Technology
- **WFE**: Terahertz Device Characterization and Security Applications
- **WFF**: Wireless Local Positioning
- **WFI**: GaN Device and Circuit Reliability
- **TFA**: Microwave and Millimeter-Wave Packaging and Manufacturing 202
- **TFC**: Nanoelectronic Devices: RF Characterization, Modeling, and Applications
- **CFA**: Applications of Artificial Neural Networks to RF and Microwave Design
- **CFB**: Time-Domain Electromagnetic Simulators
- **CFC**: RF Linear Accelerators
- **CFD**: LTCC for Micro- and Millimeter-Wave Applications

13:00 Afternoon Workshops

- **WFG**: Wireless Power Transmission for Space Solar Power Generation
- **WFH**: Miniature, Electronically Tuned Filter Technology
- **TFB**: Multidomain Physics Modeling of MEMS and NEMS

ARFTG Conference and Exhibition 07:00–17:00 • ARFTG Late Registration (Hilton Mid-Pacific Conference Center) 07:00–11:00

Registration 07:00–09:00

Guest Program

- Polynesian Cultural Center 12:05–22:15
- Star Sunset Dinner Cruise 16:30–20:00
- Hospitality Suite 07:00–12:00

Saturday

Guest Program

- IMS 2007 Golf Tournament Ko Olina Golf Club 11:00–21:15

Table of Contents

For questions regarding the contents of this Program Book, please email the Editor at programbook.ims2007@gmail.com.

Welcome from the IMS Chair

Ekomo mai — Welcome to what is widely regarded as the most prestigious microwave industry gathering in the world: the 2007 International Microwave Symposium (IMS 2007), to be held 3–8 June 2007 in Honolulu, Hawaii.

IMS 2007 is the largest international conference devoted to the research, development, and application of RF and microwave theory and techniques and is expected to draw over 10,000 participants and 400 exhibiting companies from around the world. This conference is organized and sponsored by the Microwave Theory and Techniques Society (MTT-S) of the Institute of Electrical and Electronics Engineers (IEEE).

This is the 50th year that MTT-S has organized this symposium and coincidentally it's being held in the 50th state of the USA. It is also the first time that this symposium is being held off of the North American continent. Hawaii has long been regarded as the Crossroads of the Pacific, making it the perfect venue to bridge East and West by encouraging attendees and exhibitors alike to interact in what is now a global microwave village.

IMS 2007 (www.ims2007.org) is the centerpiece of Microwave Week 2007, which also includes the Radio-Frequency Integrated Circuit Symposium (www.rfic2007.org) and the Automatic Radio-Frequency Techniques Group Conference (www.arftg.org).

Additional IEEE conferences in Honolulu this summer include the IEEE International Symposium on Antennas and Propagation (10–15 June) and the IEEE International Symposium on Electromagnetic Compatibility (8–13 July).

You may also consider vacationing in Hawaii before or after the conference. The Hawaiian Islands are a world-renowned visitor destination with many activities for you and your family to enjoy. Snorkel among tropical fish at Hanauma Bay. Learn to surf at Waikiki Beach. Golf at one of more than 80 courses and world-class resorts. Explore fiery lava flows on the Big Island. Hike through lush rainforests on Kauai. Cruise down a Maui volcano on a mountain bike. Many of these and other historical Hawaiian cultural activities are part of our guest program.

I look forward to meeting you in Hawaii.

Aloha Kakou,
Wayne A. Shiroma
General Chair, IMS 2007

What's New for 2007

'Ike Loa (Learning)

In addition to the traditional array of Advanced- and Tutorial-level Workshops, IMS 2007 is offering eight new Short Courses, allowing participants to earn IEEE continuing educational units.

The popular All-Workshop CD-ROM introduced last year is back. Unlike last year, it does not include a workshop of one's choice but the cost of the CD-ROM has been reduced accordingly.

On Tuesday morning, there are no IMS technical sessions preceding the Plenary Session, allowing you to enjoy the Exhibition.

New this year is an expanded Interactive Forum during the morning and afternoon of Wednesday and Thursday, with *ono* (delicious) refreshments for all.

Ho'okipa (Hospitality)

There are two Hospitality Suites for the exclusive use of spouses and children of symposium attendees. The operating hours are 07:00–12:00, reduced compared to previous years since most guests are anticipated to be going *holoholo* (on excursions).

As a gesture of *aloha* to attendees of the IEEE International Antennas and Propagation Symposium (APS), IMS technical sessions, workshops, and short courses focused on electromagnetic theory are scheduled on Thursday and Friday. APS attendees will also be offered complimentary Exhibit Hall passes on Thursday.

Holoholo (Excursions)

In addition to the exciting Oahu-based guest tours are one-day neighbor-island getaways as well as pre- and post-conference vacation packages. Visit our website for more details.

Sign up for the IMS 2007 Golf Tournament on Saturday, 9 June. Recognized as one of *Golf Digest's* "Top 75 Golf Resorts in the US," the Ko Olina Golf Resort is the perfect venue to close the conference.

Kama'aina (Native)

Whether attending the conference either as a presenting author or as a general attendee, we encourage everyone to dress like a *kama'aina* — leave your coat and ties at home. Conservative and tasteful aloha wear is the standard business attire in Hawaii.

IMS 2007 has partnered with Hilo Hatties to have a Hawaiian Hut at the Hawaii Convention Center Lobby. Conference attendees can purchase aloha wear at a 20% discount, valid only at the IMS 2007 Hawaiian Hut, not at Hilo Hatties retail outlets.

'Ohana (Family)

IMS 2007 is making special efforts to welcome students to the IEEE and MTT-S *'ohana*. There are NSF, DARPA, and IMS 2007 travel grants, two Student Competitions, a Student Reception, and a Student Awards Banquet. New this year is a Student Volunteer Lounge for those that volunteer to help.

Another part of the MTT-S *'ohana* are Graduates of the Last Decade (GOLD). The newly formed MTT-S GOLD Committee is sponsoring a panel session on "Career Development: Giving your Career a Never-Ending Boost" on Thursday. A reception/luau for all GOLD members will be held at the Sheraton Waikiki Hotel/Royal Hawaiian Hotel on Thursday. Refer to the Social Events section for more details.

IEEE and MTT-S Membership

IEEE

The IEEE is a nonprofit, professional association with more than 367,000 members (including 73,000 students) in over 150 countries. This global organization helps support the development and application of technology and science around the world — for the benefit of humanity, the individual, and the profession.

MTT-S

The IEEE Microwave Theory and Techniques Society (MTT-S) is a transnational society with more than 9,000 members and 80 chapters worldwide. Our Society promotes the advancement of microwave theory and its applications, at frequencies from 200 MHz to 1 THz and beyond. As we enter into an exciting future, our mission is to continue to understand and influence microwave technology.

Join the IEEE now and save $185 on your conference registration!

Benefits of Membership

The benefits of IEEE membership include:

- Discounted conference registration rates
- Subscriptions to the award-winning *IEEE Spectrum* and online access to *IEEE Potentials* magazines
- Online access to the tables of contents and expanded abstracts from over one million IEEE documents with full text-searching capability
- Free IEEE e-mail alias including virus scanning and optional spam filtering
- The IEEE Financial Advantage — negotiated exclusively for IEEE members

Join the IEEE and MTT-S

To join the IEEE or renew your membership, please visit, email, or call:

www.ieee.org/services/join
new.membership@ieee.org
1-800-678-IEEE

Attendees who join the IEEE for $80.50 and MTT-S for $7.00 before the Symposium will save $185 on their registration fee. The price of an IEEE/MTT-S membership more than pays for itself!

Half-year rates apply to new members only. New applications received between 1 March 2007 and 15 August 2007 will automatically be processed for half-year membership. An exception is if the applicant specifically requests their application be processed for the full year.

IEEE and MTT-S Membership Dues

	IEEE Half-Year Dues		MTT-S Half-Year Dues	
Residence	**Member**	**Student**	**Member**	**Student**
United States	$80.50	$15.00	$7.00	$4.00
Canada (including GST)	$74.69	$15.90	$7.00	$4.00
Canada (including HST)	$79.61	$17.10	$7.00	$4.00
Africa, Europe, Middle East	$67.00	$12.50	$7.00	$4.00
Latin America	$63.50	$12.50	$7.00	$4.00
Asia, Pacific	$64.00	$12.50	$7.00	$4.00

The optional MTT-S dues include a subscription to *IEEE Microwave Magazine*. MTT-S members can also purchase electronic and print subscriptions to the *IEEE Transactions on Microwave Theory and Techniques*, *IEEE Microwave and Wireless Components Letters*, *IEEE/OSA Journal of Lightwave Technology*, and *IEEE MTT CD-ROM Collection*. See IEEE membership website for pricing.

Advance Registration Information

Advance Registration

Please follow these instructions for completing the Advance Registration Form on the facing page. Advance registration rates are valid until the deadlines shown on the form and are approximately 30 % lower than the on-site fees shown on Page 10. Registration is required for all attendees, including session chairs and presenters. Only paid attendees will be admitted to the breakfasts, workshops, technical sessions, and Exhibition Hall. This form is not used for guest tour registration, which is described elsewhere in this Program Book. Each registrant must submit a separate form with payment. Registration by telephone is not available but for handicap, special needs, or information only, call 1-781-769-9750.

1 Methods of Registration

Individuals can register online, by FAX, or by mail. Those registering by mail should send their form in early enough to ensure the application is received by the deadline, otherwise on-site fees will be charged. If the registration is sent by FAX, do not send it by mail. Additional items can be added on site after advance registration.

2 Personal Information

For phone numbers outside the U.S., please include a country code. If you would like to receive information by email from the IEEE, MTT-S, or microwave companies, mark the appropriate boxes. An optional complimentary badge for one guest allows access to the Hospitality Suite, Plenary Session, and Exhibition Hall but does not allow access to technical sessions, Workshops, and Short Courses.

3 Membership

Check the boxes of all organizations of which you are a member. To receive IEEE member rates, enter your member number and present your IEEE card upon check in at the conference. Registrants who do not have a current IEEE membership card at check-in will be charged the nonmember rate. If you are not a member and wish to take advantage of the member rates, call 1-800-678-IEEE or visit www.ieee.org/services/join prior to registering.

4 Symposia

Microwave Week hosts three symposia: the International Microwave Symposium (IMS), the RFIC Symposium, and the ARFTG Conference. Select the conferences you wish to attend. Students, retirees, and IEEE Life Members receive a discount on registration fees. To qualify as a student, a registrant must be either an IEEE Student Member or a full-time student carrying a course load of at least nine credit hours.

- IMS technical sessions are held on Tuesday, Wednesday, and Thursday. Registration includes continental breakfast, admission to exhibits, abstract books, and a CD-ROM.
- RFIC technical sessions are held on Monday and Tuesday. Registration includes continental breakfast, admission to the RFIC Reception and exhibits, a digest, and a CD-ROM.
- ARFTG technical sessions are held on Friday. Registration includes breakfast, lunch, a CD-ROM, and admission to the ARFTG exhibition. ARFTG Conference member rates are available to both ARFTG and IEEE members.
- Microwave Week hosts the largest exhibition of its kind with over 400 companies. Exhibit-only registration is available on-site for $20.

5 Extra CD-ROMs and Digests

Additional CD-ROMs and digests are available for purchase and pickup at the conference. After the symposium, digests and CD-ROMs will be available for purchase from IEEE.

6 Awards Banquet

The MTT-S Awards Banquet will be held on Wednesday from 19:30 to 22:00 at the Hilton Mid-Pacific Conference Center Coral Ballroom 4. The evening will include a fine dinner, awards presentation, and entertainment. Major Society awards will be presented.

7 Box Lunches

Optional box lunches are available for purchase by all attendees, but are especially convenient for those attending the Panel Sessions or Exhibition Hall during lunchtime, since dining alternatives in the vicinity of the Convention Center are limited. Purchase now, because on-site pricing will be higher. Sorry, but no refunds are possible since these lunches are preordered.

8 Workshops and Short Courses

The Workshop fee includes a CD-ROM and speakers' notes for that workshop. The Short-Course fee includes all instructor-provided material for that course. Full-day workshops, morning workshops, and morning short courses include continental breakfast, a box lunch, and refreshment breaks. Afternoon workshops include a box lunch and afternoon refreshments. The All-Workshop CD-ROM fee includes material for all workshops on one CD-ROM but does not include admission to any workshops.

9 Remittance

Individual remittance must accompany the registration form and is payable in U.S. dollars only, using a personal check drawn on a U.S. bank, traveler's check, international money order, or credit card (VISA, MasterCard, or American Express only). Personal checks must be encoded at the bottom with the bank, account, and check number. Bank drafts, wire transfers, cash, and purchase orders are unacceptable and will be returned. Make checks and money orders payable to "IEEE/MTT-S." Written requests for refunds will be honored if received by 4 May 2007. See Page 10 for the full refund policy.

IMS · RFIC · ARFTG
Honolulu, HI · 3–8 June 2007

1 Use the numbered instructions on the left as a guide to help you fill out the form below. Advance registration rates are available by FAX and mail until 4 May 2007 and online until 7 May 2007.

WWW	FAX	Mail
www.mtt-sregistration.com	1-781-769-5037	MTT-S Registration 685 Canton St. Norwood, MA 02062-2608

2

Name (First) (Last)

Affiliation (Company) (Mail stop)

Address (Street)

(City) (State) (Postal code) (Country)

E-mail

Telephone E-mails from ◯ IEEE and MTT-S? ◯ Industry?

Guest name (First) (Last)

3 Member of ◯ MTT-S ◯ ARFTG ◯ IEEE IEEE membership number

4

IMS	IEEE Member	Nonmember	Cost
All IMS sessions	◯ $380	◯ $565	$
All IMS sessions (no CD-ROM)	◯ $330	◯ $505	$
Single-day registration	◯ $195	◯ $280	$
Student, Retiree, Life Member	◯ $60	◯ $125	$

RFIC Symposium	IEEE Member	Nonmember	Cost
All RFIC sessions	◯ $200	◯ $300	$
RFIC Reception only	◯ $50	◯ $70	$

ARFTG Conference	IEEE or ARFTG	Nonmember	Cost
All ARFTG sessions	◯ $200	◯ $310	$
Student, Retiree, Life Member	◯ $130	◯ $130	$

5

Extra CDs and Digests	IEEE Member	Nonmember	Cost
IMS and ARFTG CD-ROM	# × $50	# × $100	$
RFIC Digest	# × $50	# × $100	$
RFIC CD-ROM	# × $50	# × $100	$

6

Awards Banquet	Cost per Ticket	Cost
Awards Banquet	# × $75	$

7

Lunch	Monday	Tuesday	Wednesday	Thursday	Cost
Box lunch	◯ $20	◯ $20	◯ $20	◯ $20	$

8 Workshops and Short Courses

Sunday		Monday		Friday	
◯ WSA	Full day	◯ WMA	Full day	◯ WFA	Full day
◯ WSB	Full day	◯ WMB	Full day	◯ WFB	Full day
◯ WSC	Afternoon	◯ WMC	Full day	◯ WFC	Full day
◯ WSD	Full day	◯ WMD	Full day	◯ WFD	Full day
◯ WSE	Full day	◯ WME	Full day	◯ WFE	Full day
◯ WSF	Full day	◯ WMF	Full day	◯ WFF	Morning
◯ WSG	Full day	◯ WMG	Full day	◯ WFG	Afternoon
◯ WSH	Morning	◯ WMH	Full day	◯ WFH	Afternoon
◯ WSI	Afternoon	◯ WMI	Morning	◯ WFI	Morning
◯ WSJ	Morning	◯ WMJ	Afternoon	◯ TFA	Morning
◯ WSK	Afternoon	◯ WMK	Morning	◯ TFB	Afternoon
◯ WSL	Afternoon	◯ TMA	Full day	◯ TFC	Morning
◯ WSM	Morning	◯ TMB	Full day	◯ CFA	Full day
◯ WSN	Afternoon	◯ TMC	Morning	◯ CFB	Full day
◯ WSO	Morning	◯ TMD	Afternoon	◯ CFC	Morning
◯ WSP	Afternoon	◯ CMA	Morning	◯ CFD	Full day
◯ TSA	Full day	◯ CMB	Full day		
◯ TSB	Full day				
◯ TSC	Full day				
◯ TSD	Morning				
◯ CSA	Full day				
◯ CSB	Morning				

See the Workshop Section for a complete list of Workshops and Short Courses.

	Member	Nonmember	Reduced†	Cost
Full day	# × $155	# × $225	# × $105	$
Half day	# × $105	# × $175	# × $80	$
All-Workshop CD	# × $185	# × $275	# × $120	$

†Reduced fees apply to students, retirees, and IEEE Life Members. **Total** $

9 ◯ MasterCard ◯ VISA ◯ American Express Expiration date (Month) / (Year) Total remittance $

Card number Signature

By submitting this form you acknowledge that you have read and understand the policies regarding methods of payment, registration, refunds, and requirements for proof of membership.

Version 2007-02-21

On-Site Registration Information

On-Site Registration

On-site registration for all Microwave Week events will be available at the Hawaii Convention Center. Registration hours are:

Day	Time
Saturday, 2 June 2007	14:00–18:00
Sunday, 3 June 2007	07:00–18:00
Monday, 4 June 2007	07:00–17:00
Tuesday, 5 June 2007	07:00–17:00
Wednesday, 6 June 2007	07:00–17:00
Thursday, 7 June 2007	07:00–15:00
Friday, 8 June 2007	07:00–09:00

Exhibition-Only Registration

Exhibition-only registration is available on-site for $20.

Guest Tour Registration

Registration for guest tours are handled at the Hospitality Suites and in the Hawaii Convention Center Lobby. Refer to the Guest Program section of this Program Book for further details.

Press Registration

Credentialed press representatives are welcome to register without cost, receiving access to technical sessions and exhibits. Digests are not included. The Press Room is located in HCC 328 on Tuesday through Thursday.

ARFTG Registration

Late on-site ARFTG registration will be available at the Hilton Mid-Pacific Conference Center on Friday from 07:00 to 11:00. If at all possible, please preregister earlier in the week to reduce the on-site workload.

Registration Fees

On-site registration fees are as follows:

Event	Member	Nonmember
IMS sessions	$495 ($75)†	$740 ($155)
IMS sessions (no CD-ROM)	$425	$630
Single-day registration	$260	$360
RFIC sessions	$250	$375
RFIC Reception only	$60	$80
ARFTG sessions	$260 ($165)	$400 ($165)
IMS and ARFTG CD	$70	$140
RFIC Digest	$70	$130
RFIC CD-ROM	$70	$130
Box lunches (per day)	$25	$25
Awards Banquet	$90	$90
Workshops (full day)	$200 ($135)	$300 ($135)
Workshops (half day)	$150 ($100)	$225 ($100)
All-Workshop CD-ROM	$240 ($115)	$350 ($115)
ARFTG Conference Compendium CD-ROM	$105	$140
ARFTG Workshop Compendium CD-ROM	$70	$105
Exhibition-only pass	$20	$20

†Student, retiree, and IEEE Life Member prices are shown in parentheses.

Refund Policy

Written requests received by 4 May 2007 will be honored. Refund requests postmarked after this date and on-site refunds will be granted only if an event is cancelled. This policy applies to registrations for the symposium sessions, Workshops, Short Courses, digests, extra CD-ROMs, Awards Banquet, and box lunches. Please state the preregistrant's name and provide a mailing address for the refund check. If registration was paid by credit card, the refund will be made through an account credit. An account number must be provided if the initial registration was done on-line. Address your requests to:

MTT-S Registration
685 Canton St.
Norwood, MA USA 02062-2608

United States Visa Advisory

The U.S. has updated its visa policies to increase security. It will likely take longer to get a visa than it used to and applicants will find that a few new security measures have been put into place. For details that may apply specifically to your country, see information posted by your nearest U.S. Consulate or Embassy.

Citizens of certain countries, traveling for visitor visa purposes for 90 days or less and who meet all the requirements, can travel to the U.S. for tourism or business under the Visa Waiver Program (VWP).

Visa Waiver Program

Currently, the 27 countries shown below participate in the VWP. Some citizens of Canada and Bermuda do not need a visa to visit the U.S.

Andorra	Australia	Austria
Belgium	Brunei	Denmark
Finland	France	Germany
Iceland	Ireland	Italy
Japan	Liechtenstein	Luxembourg
Monaco	The Netherlands	New Zealand
Norway	Portugal	San Marino
Singapore	Slovenia	Spain
Sweden	Switzerland	United Kingdom

Passports

Since October 2004 visa waiver travelers from all VWP countries must present a machine-readable passport at the U.S. port of entry. Machine-readable passports issued since October 2005 require a digital photograph printed on the data page or integrated chip with information from the data page.

A passport with a validity date at least six months beyond the applicant's intended period of stay in the U.S. is required. If more than one person is included in the passport, each person desiring a visa must make a separate application. Special attention must be given for temporary passports.

Recommendations

To avoid frustration and disappointment:

- Advance planning by travelers is essential. Review your visa status and find out if you need a U.S. visa or a visa renewal.
- Plan to submit your visa application well in advance of your departure date. Contact your nearest U.S. embassy or consulate for a current time estimate and recommendations.
- Visit the embassy or consular section website, where you will apply for your visa and find information on how to schedule an interview appointment and pay fees. An interview is required as a standard part of processing for most visa applicants.
- Applicants must now also have two index-finger scans collected as part of the visa application process. These finger scans are normally collected by the consular officer at the visa interview window but in some countries they are collected prior to the visa interview.

Disclaimer

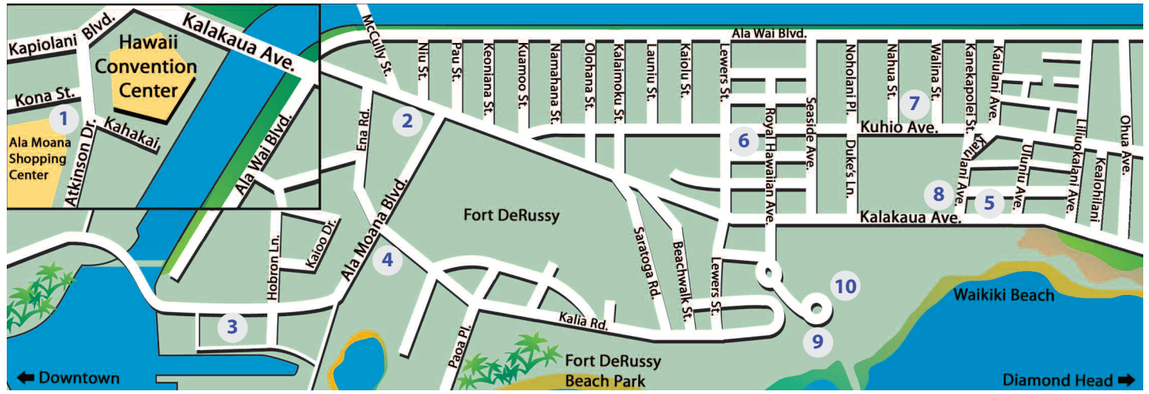
Please note that this information is given in good faith but that the regulations may change and the only authoritative sources of information are the U.S. Government websites at www.unitedstatesvisas.gov and travel.state.gov/visa/visa_1750.html.

Visa Letters

A visa support letter may be provided for authors and registered attendees. Further, spouses requiring visa assistance must be registered for an IMS Guest Program event. See the IMS 2007 website (www.ims2007.org) for Guest Program details.

For additional visa assistance, please contact Dr. Zaher Bardai at zb@ieee.org.

Attendee Accommodations



No.	Hotel	Room View or Type	Rate
1	Ala Moana Hotel	Suite	$176
2	Doubletree Alana Waikiki	City view, Mountain view	$180
3	Hawaii Prince Hotel	Ocean view	$229
4	Hilton Hawaiian Village	Garden view	$219
	(Headquarters hotel)	Partial ocean view	$249
		Ocean view	$275
		Deluxe ocean view (Rainbow Tower)	$295
5	Hyatt Regency Waikiki	Single, Double	$248
		Triple	$278
		Quadruple	$343
6	Ohana Waikiki Malia	Single, Double	$121
		Triple	$151
		Quadruple	$181
7	Ohana Waikiki West	Single, Double kitchenette	$137
		Triple kitchenette	$167
		Quadruple kitchenette	$197
8	Sheraton Princess Kaiulani	City view	$155
		Ocean view	$190
9	Sheraton Waikiki	Manor room (dormitory style)	$125
		City view	$185
		Mountain view	$210
		Partial ocean view	$230
		Ocean front	$270
10	Royal Hawaiian Hotel	Historic garden view	$230

A limited number of rooms at the listed rates are available until 1 May 2007.
See www.ims2007.org/hotel_info.php for government rates, triple and quadruple occupancy, and information.

IMS · RFIC · ARFTG
Honolulu, HI · 3–8 June 2007

Reservations, modifications, and cancellations will be accepted by the Housing Bureau until 1 May 2007. Listed convention rates are available until 1 May 2007 based on availability.

WWW
www.ims2007.org

FAX
1-732-465-6447

Mail
IEEE IMS 2007 Housing Bureau
Attn: Christy Bahn
455 Hoes Lane, Piscataway, NJ 08855

Name _____ (First) _____ (Last)
Affiliation _____ (Company) _____ (Mail stop)
Address _____ (Street)
_____ (City) _____ (State) _____ (Postal code) _____ (Country)
E-mail _____
Telephone _____
Guest name _____ (First) _____ (Last)
Guest e-mail _____

○ MasterCard ○ VISA ○ American Express ○ Discover ○ Diners Club
Card number _____ Expiration date ___ (Month) / ___ (Year)
Signature _____

Housing Bureau Policies

- Reservations guaranteed by credit card may be cancelled without penalty until 1 May 2007. After 1 May 2007 a $15 fee will be charged for cancellations. After 14 May 2007 changes must be made directly with the hotel.
- A confirmation will be sent after each reservation booking, modification, or cancellation within 14 days of receipt. If you do not receive a confirmation via e-mail, fax, or mail within 14 days of any transaction, contact the Housing Bureau by phone or e-mail. Confirmations will not be sent by the hotel. For questions about room blocks call 1-800-810-4333 or e-mail mtt-s07reservations@ieee.org.
- A deposit equal to the room rate for one night is required for each reservation. All rates are per room per night and subject to an additional 11.962 % tax. Credit cards must be valid through June 2007 to be used for deposits.
- Specific room types will be assigned at check in. Note that room requests are not guaranteed. A valid government ID will be required at check-in for government-rate rooms.
- If more than one room is required, attach a list providing the occupants names and above information for each additional room. Requests for blocks of rooms without named occupants will not be accepted.

Hotel Preference

Using the list of hotels on the facing page, please choose your top four choices.

First choice _____ Second choice _____
Third choice _____ Fourth choice _____

If your hotel choices are unavailable, which is more important to you? ○ Location ○ Rate

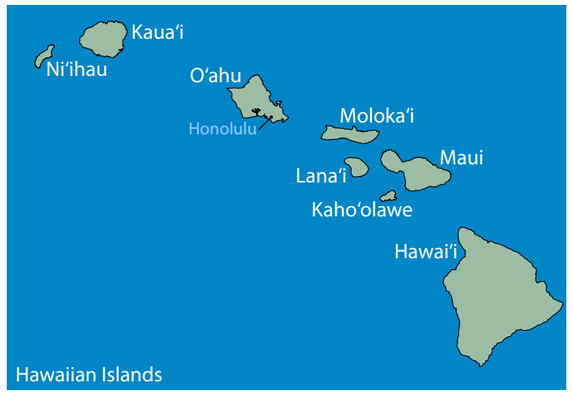
Room Requests

Arrival date ___ (Month) / ___ (Day) Departure date ___ (Month) / ___ (Day) Government rate? ○ Yes ○ No

Room size ○ Single or Double ○ Triple ○ Quadruple
Room view or type ○ Deluxe ocean ○ Ocean view ○ Partial ocean ○ City view ○ Garden view ○ Mountain view ○ Manor room ○ Suite
Special requests ○ Nonsmoking ○ Smoking ○ King-size bed ○ Wheelchair accessible

About Hawaii

Hawaii is the 50th state of the United States of America and an archipelago of eight major islands: Hawaii (Big Island), Maui, Kahoolawe, Lanai, Molokai, Oahu, Kauai, and Niihau. The state has only two seasons, dry and rainy, both of which are warm. During the spring and summer months, the temperature is between 24–31 °C (75–88 °F). During the winter months, the temperature is between 20–27 °C (68–80 °F). Because of its location close to the Earth's equator, Hawaii weather is somewhat humid. Visitors are encouraged to wear casual and breathable clothes.



Hawaiian Islands

About 1500 years ago, Polynesians sailed across the Pacific Ocean to migrate to the Hawaiian Islands. For hundreds of years, the Hawaiians lived amongst these islands in a caste society. In 1778, British explorer Captain James Cook made the first European contact with the Hawaiian Islands, setting foot onto the island of Kauai. However, it was not until 1810 that Kamehameha I conquered and unified all the Hawaiian Islands, establishing a dynasty that would rule Hawaii for the majority of the 1800s. Lunalilo succeed the last of the Kamehamehas (Kamehameha V). He was later succeeded by Kalakaua, whom was succeeded by Liliuokalani. Overthrown in 1896, Queen Liliuokalani was the last of Hawaii's monarchy. Hawaii became a Republic and later an annex of the United States before eventually becoming a state in 1959.

Today, Hawaii is regarded as one of the most beautiful places on Earth and ranks amongst the most popular of tourist destinations. It is home to the world's most active volcano and the world's tallest sea mountain. Its rich and diverse history has created a warm and welcoming culture known as the Aloha Spirit. It is this Aloha Spirit that sets Hawaii apart from any other tourist destination.

Honolulu, located on the island of Oahu, is the state capital and is the State's economic, academic, and political center. About 400,000 of Hawaii's 1.2 million total population reside within Honolulu's city limits (19 km wide and 42 km long). Most of the residents live in the city proper, but there are a number of surrounding suburbs that also serve as residential neighborhoods. Although similar to any American metropolitan area in many ways, Honolulu consists of rainforests, canyons, waterfalls, mountains, gold-sand beaches, and more.

For more information, please visit www.gohawaii.com.

Honolulu International Airport (HNL)
300 Rodgers Blvd.
Honolulu, Hawaii 96819

Hawaii Convention Center (HCC)
1801 Kalakaua Ave.
Honolulu, Hawaii 96815

Transportation

Official Airlines

IMS 2007 has partnered with the following airlines to provide reduced airfare to Honolulu. Please contact the respective airlines for details regarding discounts.

Airline	American Airlines	Continental Airlines	United Airlines
Travel period	27 May–15 June	29 May–13 June	28 May–13 June
Contact information	AA Meeting Services 1-800-433-1790 Code: A5757AB	Continental Airlines Meeting Works 1-800-468-7022 Code: ZUHX Agreement Code: BYM1CS	United Meeting Plus 1-800-521-4041 Code: 565PW

Transportation from the Airport

The Honolulu International Airport (HNL) is on the south shore of Oahu, just west of Honolulu's central metropolitan center. It is approximately 13 km (8 mi) from the Hawaii Convention Center (HCC) and is approximately 30 minutes away depending on traffic.

Taxi

Taxi service is available on the center median fronting the terminal baggage claim areas. The fare from the airport to Waikiki during for periods outside of rush hour is $25–$35.

24-Hour Bus Service

Air-conditioned bus service operated by Roberts Hawaii is available 24 hours a day and departs from the airport approximately every 20 minutes. Fares are $9 one way, $15 roundtrip. Call 1-808-954-8652 for information or visit www.robertshawaii.com/hat.htm.

Prearranged Ground Transportation

There are numerous shuttle companies available on a prearranged basis. Company names and telephone numbers are available at www.hawaii.gov/dot/airports/hnl/hnl_ground_trans.htm.

Rental Cars

Major rental car companies at HNL include Hertz, Alamo, Dollar, Enterprise, Budget, and Thrifty. Please visit their respective web sites for further information. There are two primary ways to get from HNL to HCC by the highway and through the city. For the highway route, follow signs from airport to H-1 ramp, merge onto H-1 east, take the Punahou St. exit, turn right at Punahou St., turn right at S. Beretania St. and turn left at Kalakaua Ave. For the city route, follow signs from airport to Nimitz Hwy., take Nimitz Hwy. east, continue east on Ala Moana Blvd., turn left at Atkinson Dr., HCC is on the corner of Atkinson Dr. and Kalakaua Ave.

Hotel to HCC Bus Service

Complimentary bus service to and from HCC will be provided for those reserving their hotel room through the IMS 2007 Housing Bureau. The pick-up and drop-off zones are located at:

- Zone 1: Hilton Hawaiian Village, Doubletree
- Zone 2: Hawaii Prince
- Zone 3: Sheraton, Royal Hawaiian, Ohana Waikiki
- Zone 4: Hyatt, Princess Kaiulani, Ohana West

City Bus

Public transportation is available for $2 via the city bus service, "The Bus." Drop-off and pick-up points, as well as hours of operation, can be found at www.thebus.org.

Convention Center Parking

There are 690 parking stalls at HCC. The cost is $5 per entry. A $25 parking card, valid for 30 days, is available for purchase (cash only) from the HCC Security Department.

Message from the IMS Technical Program Chair

On behalf of the Technical Program Committee, I extend my welcome to the 2007 International Microwave Symposium, held outside the North American Continent for the first time. The Technical Program Committee consisting of 232 reviewers worked very hard to provide you with the best possible technical program. Out of a near-record number of 1069 submitted papers, 381 were selected for oral presentation, and 142 for the Interactive Forum (IF). This year, we rearranged the IF into four two-hour sessions so that the IF presenters have more flexibility to attend oral sessions. There are five Focused and four Special Sessions organized by Kevin Kobayashi and his team. One Special Session pays tribute to the late Leo Young organized by Robert Trew and another Special Session is dedicated to the memory of the late K. C. Gupta, organized by Inder Bahl and Madhu Gupta. Panel Sessions organized by John Cowles and his team occur during lunchtime as usual. We have clarified the rules for the Student Paper Competition and expect it to run smoothly thanks to Ryan Miyamoto's efforts.

Thanks to the efforts of K. C. Gupta before his untimely passing, we are introducing Short Courses for the first time in recent IMS history. Our Workshop Chair Yi-Chi Shih and his committee organized 47 Advanced- and Tutorial-level Workshops. Both Short Courses and Workshops are distributed on Sunday, Monday, and Friday. Events with a strong electromagnetic-field flavor are scheduled on Friday for the convenience of those attending the IEEE Antennas and Propagation Symposium, to be held in Honolulu the week following IMS.

I would like to thank many individuals for making this event possible. First are the two TPC Vice Chairs, Olga Boric-Lubecke and Ethan Wang, and TPC Administrator, Cynthia Hang. Thanks go to Jeff Pond, Jonathan Hacker, and Roger Pollard for Electronic Paper Management. Thank you Larry Whicker for administration and guidance and Dave Rutledge for conducting a paper-sorting party. A tremendous amount of guidance was provided by Roger Pollard, Paul Khanna, Mike DeLisio, and Wayne Shiroma. I am indebted to the dedicated effort of a number of volunteers from Hawaii and the Continental U.S., mainly Southern California.

Finally, I should note that this symposium would not have been possible without the dedicated efforts of the authors of the technical papers submitted for the symposium and workshops. It is hoped that you will enjoy the technical depth and breadth of the program during Microwave Week in Honolulu.

Tatsuo Itoh
Chair, IMS 2007 Technical Program Committee

Tuesday Plenary Session Ballroom B, C 10:10–11:50

The Future of Mobile Broadband

Anil Kripalani, Senior Vice President for Global Technology Affairs, QUALCOMM, San Diego, California

The most critical question in the communications industry today is "What's coming next in mobile communications?" This keynote presentation will first cover emerging technologies that are critical to the success and proliferation of mobile-based services such as CDMA2000/EV-DO, WCDMA/HSPA, OFDMA/UMB, and LTE. For comparison, a perspective will be presented on WiMAX and the realities of how WiMAX is expected to perform in comparison with other WWAN technologies. After setting the foundation with enabling technologies, the presentation elaborates on the future capabilities of mobile devices, the convergence of mobile devices and consumer electronics, and the benefits and innovative services/applications new devices will offer device manufacturers, operators, content providers, application developers and end users.

Anil Kripalani is Corporate Senior Vice President for Global Technology Affairs at QUALCOMM Inc. based in San Diego, California. Kripalani actively promotes the global adoption and deployment of current broadband standards as well as positions next-generation wireless air interface and network technologies that enable wireless multimedia services. Prior to joining QUALCOMM in 1994, Kripalani spent over 18 years at AT&T Bell Laboratories, AT&T Network Wireless Systems, and AT&T Information Systems and served as a department head for Wireless Systems and Local Access Architecture in AT&T's Chief Architects Division.

The Next Direction of Advanced Wireless Communication Technology — Medical ICT!

Ryuji Kohno, Ph.D., Professor and Director, Center of Medical Information and Communication Technology, Yokohama National University, Japan

Mobile wireless communications face new challenges in the near future. If we look at what's next in info-communication technology (ICT), a ubiquitous medical healthcare system using advanced ICT technologies such as UWB, SDR, and MIMO holds great promise for both academia and industry. This new advanced "Medical ICT" can be used to address the serious problems of an aging population. Currently, Medical ICT is engaged as one of the most significant innovations in a new Japanese governmental primary plan for promoting science and technology. This keynote speech will introduce Medical ICT projects and activities in order to encourage global collaboration as well as plant many R&D and business seeds in academia and industry.

Ryuji Kohno received the Ph.D. degree from the University of Tokyo in 1984. Dr. Kohno is currently a Professor in the Division of Physics, Electrical and Computer Engineering, and the Director of Center on Medical Information and Communication Technology at Yokohama National University. He served as director of the Advanced Telecommunications Laboratory of SONY CSL during 1998–2002 and a director of the UWB Technology Institute of the National Institute of Information and Communications Technology (NICT) during 2002–2006. He currently is a director of the Medical ICT Institute of the NICT.

Tuesday Technical Sessions 13:20–15:00

TU3A
Advances in RF Power Amplifier Technology
Chair: Alina Moussessian
Cochair: Yoshio Nikawa
HCC 311

13:20
TU3A-01: A Highly Efficient UHF Power Amplifier Using GaAs FETs for Space Applications
A. Katz, The College of NJ, Ewing, USA; J. L. Martinetti, Lockheed Martin Commercial Space Systems, Newton, USA; M. J. Franco, Linearizer Technology Inc., Hamilton, USA

13:40
TU3A-02: Model for the Low-Frequency Performance of Ferrite-Loaded Balun Transformers
F. H. Raab, Green Mountain Radio Research Co., Colchester, USA

13:50
TU3A-03: Technique to Extend Class-E Mode Operation to Broadband UHF Amplifiers
J. B. Call, Z. Chen, W. Taylor, Thales Communications Inc., Clarksburg, USA

14:10
TU3A-04: Class-E Amplifier Design Equations for Maximizing the Frequency Utilization of a Device
A. Mediano, P. Molina-Gaudo, C. Bernal, University of Zaragoza, Zaragoza, Spain

14:20
TU3A-05: UHF-Band Long-Pulse Radar Power Amplifiers using Push-Pull and Balanced Configurations
J. Park, J. Burger, J. Titizian, Integra Technologies Inc., El Segundo, USA

14:40
TU3A-06: Class-E Silicon Carbide VHF Power Amplifier
M. J. Franco, Linearizer Technology Inc., Hamilton, USA; A. Katz, The College of New Jersey, Ewing, USA

TU3B
Hybrids and Couplers I
Chair: Inder Bahl
Cochair: John Owens
HCC 312

13:20
TU3B-01: Compact Rat-Race Hybrid Coupler Implemented Through Artificial Left-Handed and Right-Handed Lines
G. Siso, J. Bonache, M. Gil, J. Garcia-Garcia, F. Martin, Universitat Autònoma de Barcelona, Bellaterra (Cerdanyola del Valles), Spain

13:40
TU3B-02: Miniaturized Branch-Line Coupler with Harmonic Suppression for RFID Applications using Artificial Transmission Lines
C. Wang, T. Ma, C. Yang, National Taiwan University of Science and Technology, Taipei, Taiwan

13:50
TU3B-03: A New Miniaturized Type of Three-Dimensional SiGe 90° Hybrid Coupler at 20 GHz using The Meandering TFMS and Stripline Shunt Stub Loading
K. Hettak, M. Stubbs, Communications Research Centre, Ottawa, Canada; G. Morin, Defence R&D Canada, Ottawa, Canada

14:20
TU3B-04: A Compact Low-Loss Magic-T using Microstrip-Slotline Transitions
K. U.-Yen, E. J. Wollack, S. H. Moseley, NASA, Greenbelt, USA; J. Papapolymerou, J. Laskar, Georgia Institute of Technology, Atlanta, USA

14:40
TU3B-05: A New Six-Port Circuit Architecture using Only Power Dividers/Combiners
L. Gerardi, M. Bozzi, L. Perregrini, University of Pavia, Pavia, Italy; Y. Xu, Y. Zhao, K. Wu, R.G. Bosisio, École Polytechnique de Montréal, Montréal, Canada

TU3D
Microwave Photonic Links
Chair: Ed Rezek
Cochair: Dalma Novak
HCC 316A

13:20
TU3D-01: Coherent Optical Receiver for Linear Optical Phase Demodulation
L. A. Johansson, H. Chou, A. Ramaswamy, L. A. Coldren, J. E. Bowers, University of California, Santa Barbara, Santa Barbara, USA

13:40
TU3D-02: Signal-to-Noise Performance of Two Analog Photonic Links Using Different Noise Reduction Techniques
E. I. Ackerman, G. E. Betts, W. K. Burns, C. H. Cox, J. L. Prince, M. D. Regan, H. V. Roussell, Photonic Sys., USA; J.C. Campbell, N. Duan, U. of Virginia, USA

13:50
TU3D-03: Link Characteristics for Optical Single-Sideband Modulation with Linearization Technique Incorporating RF Nonlinearity
C. Lim, University of Melbourne, Australia; A. Nirmalathas, National ICT Australia, Victoria Research Lab, Melbourne, Australia; D. Novak, R. Waterhouse, Pharad, LLC, Glen Burnie, USA

14:10
TU3D-04: Dualband LTCC-Based Wireless Transceiver with Optical Interface using Polymer Fiber
L. Pergola, R. Vahldieck, ETH Zürich, Zürich, Switzerland; M. Buelters, R. Gindera, I. Moellers, D. Jaeger, Universität Duisburg-Essen, Duisburg, Germany

14:30
TU3D-05: 1.25 Gbps Optical Data Channel Up-Conversion in 20 GHz-Band via a Frequency-Doubling Optoelectronic Oscillator for Radio-Over-Fiber Systems
M. Shin, P. Kumar, Northwestern University, Evanston, USA

14:40
TU3D-06: All-Optical Frequency Up-conversion Technique using Four-wave Mixing in Semiconductor Optical Amplifiers for Radio-over-fiber Applications
J. Song, H. Kim, Gwangju Institute of Science and Technology, Gwangju, South Korea; H. Song, NTT, Japan

TU3E
Digital Microwave Architectures
Chair: Johann F. Luy
Cochair: Shoichi Narahashi
HCC 315

13:20
TU3E-01: A Polar Delta-Sigma Modulation (PDSM) Scheme for High-Efficiency Wireless Transmitters
Y. E. Wang, UCLA, Los Angeles, USA

13:40
TU3E-02: System Design Issues in a HQPM-Based Transmitter
C. Li, T. Horng, National Sun Yat-Sen University, Kaohsiung, Taiwan; J. Jau, J. Li, Industrial Technology Research Institute, Hsinchu, Taiwan

14:00
TU3E-03: A Delta-Sigma-Digitized RF Transmitter
J. Choi, J. Yim, J. Yang, J. Cha, B. Kim, Postech, Pohang, Republic of Korea; J. Kim, Handong Global University, Pohang, Republic of Korea

14:20
TU3E-04: A New DC-Offset and I/Q-Mismatch Compensation Technique for a CMOS Direct-Conversion WLAN Transmitter
K. Yanagisawa, N. Matsuno, T. Maeda, S. Tanaka, NEC Corp., Kawasaki, Japan

14:40
TU3E-05: Reduction of Six-Port Calibration to Linear Equalization
T. Eireiner, Q. Lu, T. Muller, Daimler-Chrysler Research and Technology, Ulm, Germany; M. Wetz, C. Pietsch, I. Perisa, University of Ulm, Ulm, Germany

Tuesday Technical Sessions 13:20–15:00

TU3F
Advances in CAD Techniques
Chair: Arvind K. Sharma
Cochair: Jose E. Rayas-Sanchez
HCC 314

13:20
TU3F-01: Moments Based Computation of Intermodulation Distortion of Mixer Circuits
D. Tannir, R. Khazaka, McGill University, Montréal, Canada

13:40
TU3F-02: Real-Part Sufficiency and its Application to the Rational Function Fitting of Passive Electromagnetic Responses
A. Y. Woo, A. C. Cangellaris, University of Illinois, Urbana, USA

14:00
TU3F-03: Parallel Automatic Model Generation Technique for Microwave Modeling
L. Zhang, Y. Cao, S. Wan, H. Kabir, Q. Zhang, Carleton University, Ottawa, Canada

14:20
TU3F-04: Coarse and Surrogate Model Assessment for Engineering Design Optimization with Space Mapping
S. Koziel, McMaster University, Hamilton, Canada; J. W. Bandler, Bandler Corp., Dundas, Canada

14:40
TU3F-05: EM-Based Space Mapping Optimization of Left-Handed Coplanar Waveguide Filters with Split-Ring Resonators
L. J. Rogla, V. E. Boria, J. Carbonell, Univ. Politécnica de Valencia, Spain; J. E. Rayas-Sanchez, Inst. Tec., Tlaquepaque, Mexico

14:50
TU3F-06: Optimal Synthesis for Multiband Microwave Filters
V. Lunot, F. Seyfert, INRIA, Sophia Antipolis, France; S. Bila, XLIM, Limoges, France

TU3G: Special Session
Microwave/Millimeter-Wave Activities in the Pacific Rim
Chair: Olga Boric-Lubecke
Cochair: Koji Mizuno
HCC 317AB

13:20
TU3G-01: Research Advances on RF Technologies for 3G/B3G Mobile Communications
H. Wei, J. Zhou, W. Jiang, H. Wang, J. Liu, X. Zhou, J. Zhao, L. Zhang, State Key Lab of Millimeter Waves, Nanjing, P. R. China

13:40
TU3G-02: Microwave Activities in Taiwan
R. Wu, H. Wang, C. Chen, National Taiwan University, Taipei, ROC; S. Chung, National Chiao Tung University, Hsin-Chu, ROC; C. Lu, Industrial Technology Research Institute, Hsin-Chu, ROC

14:00
TU3G-03: The Secure Satellite IP Network — SSATIN
C. J. Cocks, T. M. Cox, P. Van Barneveld, P. A. Stimson, Defence Science Technology Organisation, Edinburgh, Australia; G. T. O'Shea, EJW Systems, West Lakes Shore, Australia

14:20
TU3G-04: Millimeter-Wave Activities in Japan
K. Araki, Tokyo Institute of Technology, Tokyo, Japan

TUESDAY

Tuesday Panel, Special, and Focused Sessions

12:00–13:15 PTUB HCC 316C

Your GaAs Foundry and the Future: Anyone Have Issues? Of Course!

Moderator:
- Brad Nelson, Sirenza Microdevices
- Paul Blount, Custom MMIC Design Services

Panelists:
- Wing Yau, Global Communication Semiconductors
- Bob Donahue, Win Semiconductor
- Phillipe Labasse, United Monolithic Semiconductors
- Mike Peters, TriQuint Semiconductor
- Marc Rocchi, Ommic
- David Smith, Filtronic

Sponsor: IMS

Come ask the foundries how they plan to solve your problems. This panel session will address key issues facing GaAs foundries and their customers today and in the future: performance, reducing cost, quality control, emerging markets, second sourcing, consolidation, and disruptive technologies.

13:20–15:00 TU3G HCC 317AB

Microwave and Millimeter-Wave Activities in the Pacific Rim

This special session brings together talks on microwave and millimeter-wave activities in the Pacific Rim from China, Japan, and Australia. A range of topics, including recent cellular infrastructure development, microwave and millimeter-wave technology, and defense satellite communication networks in Asia, will be included.

15:30–17:10 TU4G HCC 317AB

A Tribute to Dr. Leo Young

Dr. Leo Young passed away at the age of 80 in September 2006. He pioneered the development of microwave filter technology, publishing 14 books and over 100 technical articles, and receiving 20 patents on various aspects of microwave technology. In 1964 together with his colleagues, George Matthaei and E. M. T. Jones, Leo wrote *Microwave Filters* and *Impedance-Matching Networks and Coupling Structures,* included in the Microwave Hall of Fame and generally considered "the bible" for microwave filter design. Leo's extensive professional activities included serving as President of the IEEE and the MTT-S. He received numerous awards, including the Microwave Prize, Distinguished Service Award, and the Microwave Career Award. Leo was a Life Fellow of IEEE, a member of the National Academy of Engineering, and a Foreign Member of the UK Royal Academy of Engineering. Leo was the U.S. DoD's Director of Research and established many of its policies and programs that define support for basic research.

13:30–16:30 Ballroom A Foyer

Student High-Efficiency Power Amplifier Design Competition

The Third Student High Efficiency Power Amplifier Design Competition is open to all students registered at an educational institution. Competitors are required to design, construct, and measure a high-efficiency power amplifier at a frequency of their choice above 1 GHz but less than 20 GHz and having an output power level of at least 5 W but less than 100 W into a 50 Ω load. The winner will be judged on the design demonstrating the highest power added efficiency. The amplifiers will be tested to verify their performance starting at 13:30 and will be on display during the Student Paper Competition. All participants will be recognized at the Student Awards Luncheon on Thursday. The winner will receive a $1000 prize and will be invited to submit a paper describing the design to the *IEEE Microwave Magazine*. For more details see www.ims2007.org.

Student Paper Competition

14:00–16:00 Ballroom A

The Student Paper Competition has become one of the largest technical events at the IMS. The purpose of the competition is to determine and acknowledge the best student work of the year in the MTT-S. This year we received 183 student papers, approximately 20% of all submitted papers. Each student paper went through the regular review process by the Technical Program Committee. Approximately 50% of the submitted papers were accepted for presentation. Based on the review scores, only 24 of the accepted student papers were selected as finalists. Many of the student paper finalists were ranked by their reviewing subcommittee as the best paper they reviewed. The finalists are given complimentary registration for IMS 2007, complimentary tickets to the MTT-S Awards Banquet, and travel subsidies.

The student finalists will present their papers at their appropriate regular sessions and make special presentations at the Interactive Forum on Tuesday from 14:00–16:00. All symposium participants are welcome and encouraged to visit the student papers during the Interactive Forum, at which time they will also be evaluated by a group of judges. Six top papers and four honorable mentions will be selected to receive cash awards, certificates, and gifts. These will be announced and presented during the Student Awards Luncheon on Thursday. We are very pleased to announce the finalists for the IMS 2007 Student Paper Competition:

"A Single-Chip 25 pJ/bit Multigigabit 60 GHz Receiver Module," S. Sarkar, J. Laskar, Georgia Institute of Technology, USA

"Passive RF Receiver Design for Wireless Sensor Networks," P. V. Kolinko, L. E. Larson, Univ. of California San Diego, USA

"Method for High-Precision Radar Distance Measurement and Synchronization of Wireless Units," S. Roehr, M. Vossiek, P. Gulden, Clausthal Univ. of Technology, Germany

"An Active Electronic Ka-Band Antenna Beam-Forming Network based on Injection-Locked Local Oscillators," H. Grubinger, H. Barth, R. Vahldieck, ETH Zürich, Switzerland

"Radial Absorbers for Conformal Time-Domain Methods: A Solution to Corner Problems in Mesh Truncation," K. Sankaran, C. Fumeaux, R. Vahldieck, ETH Zürich, Switzerland

"2 GHz Automatically Tuned Q-Enhanced CMOS Bandpass Filter," J. K. Nakaska, J. W. Haslett, Univ. of Calgary, Canada

"A DC Voltage-Dependent Switchable Thin-Film Bulk-Wave Acoustic Resonator Using Ferroelectric Thin Film," X. Zhu, J. D. Phillips, A. Mortazawi, Univ. of Michigan, USA

"RF Linearity and Nonlinear Source Resistance in AlGaN/GaN HFETs," Y. Liu, R. J. Trew, G. Bilbro, North Carolina State Univ., USA

"A Nondisjoint Hexahedral Space Discretization for the Finite-Volume Technique," K. Krohne, R. Vahldieck, ETH Zürich, Switzerland

"Circuital and Experimental Demonstration of a 3D Isotropic LH Metamaterial Based on the Rotated TLM Scheme," M. Zedler, P. Russer, C. Caloz, Technische Universität München

"A Gated Envelope Feedback Technique for Automatic Hardware Conditioning of RFIC PA's at Low Power Levels," N. G. Constantin, P. J. Zampardi, M. N. El-Gamal, McGill Univ., Canada

"Multilayer Quasielliptic Filters using Dual-Mode Resonators on Liquid Crystal Polymer Technology," R. Bairavasubramanian, J. Papapolymerou, Georgia Institute of Technology, USA

"Design and Testing of a Thermally Stable Filter Using Bimetal Compensation," B. F. Keats, R. R. Mansour, R. B. Gorbet, Univ. of Waterloo, Canada

"Moments-Based Computation of Intermodulation Distortion of Mixer Circuits," D. Tannir, R. Khazaka, McGill Univ., Canada

"Semianalytical Formulation for the Stability Analysis of Coexisting Solutions in Coupled-Oscillator Systems," A. Collado, A. Suarez, S. Sancho, Univ. of Cantabria, Spain

"Analysis and Suppression of Memory Effects in Envelope Elimination and Restoration (EER) Power Amplifiers," P. Fedorenko, J. S. Kenney, Georgia Institute of Technology, USA

"Nontoxic Liquid-Metal 2–100 GHz MEMS Switch," C. Chen, J. Whalen, D. Peroulis, Purdue University, USA

"Broadband Quadrature Hybrid Design Using Metamaterial Transmission Line and its Application in the Broadband Continuous Phase Shifter," C. Lee, K. M. Leong, T. Itoh, Univ. of California Los Angeles, USA

"Dual-Mode Metamaterial with Backward- and Forward-Wave Selectivity," A. Lai, K. M. Leong, T. Itoh, University of California Los Angeles, USA

"Design and Characterization of Novel Paper-Based Inkjet-Printed RFID and Microwave Structures for Telecommunication and Sensing Applications," L. Yang, M. M. Tentzeris, Georgia Institute of Technology, USA

"Time-Domain Impedance Adaptors for Pulse-Based Systems with High Q_RC Loads," X. Wang, L. P. Katehi, D. Peroulis, Purdue Univ., USA

"Traveling Wave Spatial Quantized Analog-to-Digital Conversion," M. Jarrahi, T. H. Lee, Stanford University, USA

"Oscillation Condition and Uncertainty Principle," J. Kwon, I. S. Kim, Kyunghee Univ., South Korea

"Distributed Body-Worn Transceiver System with the Use of Electrotextile Antennas," Y. Ouyang, W. J. Chappell, Purdue, USA

Tuesday

Technical Sessions

15:30–17:10

TU4A: Advanced Techniques for Wireless Power Amplifier Efficiency and Linearity Enhancement

Chair: Chuck Weitzel
Cochair: Vikram Krishnamurthy
HCC 311

TU4A-01: A Gated Envelope Feedback Technique for Automatic Hardware Conditioning of RFIC PAs at Low Power Levels
N. G. Constantin, M. N. El-Gamal, McGill University, Montréal, Canada; P. J. Zampardi, Skyworks Solutions Inc., Newbury Park, USA

TU4A-02: Design Approach for Realization of Very High-Efficiency Power Amplifiers
C. Roff, J. Benedikt, P. J. Tasker, Cardiff University, Cardiff, UK

TU4A-03: A Novel High Efficiency and Linearity Power Amplifier with Over-Voltage Protection
H. Zhang, TriQuint Semiconductor, Chelmsford, USA; H. Gao, G. Li, University of California Irvine, Irvine, USA; Y. Ma, Rockwell Scientific Co., Thousand Oaks, USA

TU4A-04: An HBT 4-Cell Monolithic Stacked Power Amplifier
Z. Tsai, M. Lei, H. Wang, National Taiwan University, Taipei, ROC

TU4A-05: Distributed Amplifier with Narrowband Amplifier Efficiency
S. A. Olson, B. M. Thompson, B. E. Stengel, Motorola, Plantation, USA

TU4A-06: Single-Chip Dual-Mode Power Amplifier MMIC using GaAs E-pHEMT for WiMAX/WLAN Applications
Y. Hsu, S. Wang, C. Chen, Industrial Technology Research Institute, Hsinchu, Taiwan; W. Ho, C. Lin, WIN Semiconductors Corp., Tao Yuan, Taiwan

TU4A-07: Quad-Band GSM Silicon PA Module on LTCC Embedding a Coupler-Based RF Power Controller
A. Pallotta, F. Pidala', L. Labate, A. Moscatelli, STMicroelectronics, Cornaredo, Italy

TU4B
Hybrids and Couplers II

Chair: Peter Russer
Cochair: Guiseppe Macchiarella
HCC 312

TU4B-01: Miniaturized Rat-Race Coupler with Microstrip-to-CPW Broadside-Coupled Structure and Stepped-Impedance Sections
J. Kuo, Y. Chiou, J. Wu, National Chiao Tung University, Hsinchu, Taiwan

TU4B-02: Multilayer Multisection Broadband LTCC Stripline Directional Couplers
M. M. Fahmi, K. A. Zaki, University of Maryland, College Park, USA; J. A. Ruiz-Cruz, Universidad Autónoma de Madrid, Madrid, Spain; A. J. Piloto, Kyocera America, San Diego, USA

TU4B-03: Design of Dualband Microstrip Rat Race Coupler with Circuit Miniaturization
C. Hsu, C. Chang, J. Kuo, National Chiao Tung University, Hsinchu, Taiwan

TU4B-04: Low Insertion Loss Broadside Coupler in a Multilayer Above-IC Technology for K-Band Applications
N. Do, D. Dubuc, K. Grenier, R. Plana, Laas CNRS, Toulouse, France

TU4B-05: A Software-Configurable Coupler with Programmable Coupling Coefficient
S. Wang, Industrial Technology Research Institute, Chutung, Taiwan, ROC; C. Chang, National Chiao-Tung University, Hsinchu, Taiwan, ROC; J. Lin, University of Florida, Gainesville, USA

TU4B-06: Novel Substrate Integrated Waveguide Fixed Phase Shifter for 180° Directional Coupler
C. Yujian, H. Wei, State Key Lab of Millimeter Waves, Nanjing, China; W. Ke, Poly-Grames Research Center, Montréal, Canada

TU4C: Multi-GHz Circuits and Systems for Communication and Instrumentation

Chair: A. Konczykowska
Cochair: Koichi Murata
HCC 316B

TU4C-01: An 18 GHz Bandwidth, 60 GS/s Sample Rate Real-Time Waveform Digitizing System
P. J. Pupalaikis, LeCroy Corp., Chestnut Ridge, USA

TU4C-02: Antenna-Based Signal Processor Using Reconfigurable Receiver
L. Zhou, A. S. Daryoush, Drexel University, Philadelphia, USA

TU4C-03: A Novel Analog Decision-Feedback Equalizer for 10 Gb/s Multimode Fiber Dispersion Compensation
S. Chandramouli, F. Bien, H. Kim, E. Gebara, J. Laskar, C. Scholz, Georgia Electronic Design Center, Georgia Institute of Technology, Atlanta, USA

TU4C-04: Electrical Dispersion Compensator for a Gigabit Passive Optical Network System with Fabry-Perot Laser
H. Kim, F. Bien, S. Chandramouli, J. de Ginestous, C. Scholz, E. Gebara, J. Laskar, Georgia Institute of Technology, Atlanta, USA

TU4C-05: A 2 Gb/s Delta-Sigma Directly Driven Wireless Link
Q. Mu, L. Sankey, Z. Popović, University of Colorado, Boulder, USA

TU4C-06: Odd Phase Switching Prescaler Based on Injection-Locked Frequency Divider
X. Yan, X. Yu, Zhejiang University, Hangzhou, P.R. China; M. Do, W. Lim, K. Yeo, Nanyang Tech. Univ., Singapore, Singapore

TU4D
Microwave Photonic Devices

Chair: Dieter Jaeger
Cochair: Asher Madjar
HCC 316A

TU4D-01: All-Dielectric Wireless Receiver
R. C. Hsu, A. Ayazi, B. Houshmand, B. Jalali, University of California Los Angeles, Los Angeles, USA

TU4D-02: Traveling-Wave Spatial Quantized Analog-to-Digital Conversion
M. Jarrahi, T. H. Lee, Stanford University, Stanford, USA

TU4D-03: 2nd Order Distortion Cancellation in Photonic Time Stretch Analog-to-Digital Converter
S. Gupta, B. Jalali, University of California Los Angeles, Los Angeles, USA

TU4D-04: CMOS-Compatible 60 GHz Harmonic Optoelectronic Mixer
H. Kang, W. Choi, Yonsei University, Seoul, Korea

TU4D-05: Optically Injection-Locked Self-Oscillating HBT MMIC Optoelectronic Mixer for Bidirectional Fiber-Fed Wireless Links
J. Kim, W. Choi, Yonsei University, Seoul, Korea; H. Kamitsuna, M. Ida, K. Kurishima, NTT Corp., Atsugi-shi, Japan

TU4D-06: Optimization of Optical Delay Lines based on Photonic Crystal Coupled Cavity Waveguides
A. Gujjula, J. Sabarinathan, University of Western Ontario, London, Canada

Tuesday

Technical Sessions

15:30–17:10

TU4E
Advanced Components for Wireless Systems

Chair: Bernard D. Geller
Cochair: Chang-Ho Lee
HCC 315

TU4E-01: Ultralinear Dualband WLAN Front-End Module for 802.11a/b/g/n Applications with Wide Voltage and Temperature Range Operation
C. P. Huang, C. Masse, C. Zelley, C. Christmas, T. Ted Whittaker, J. Soricelli, W. Vaillancourt, A. Parolin, SiGe Semi., Methuen, USA

TU4E-02: A Complete Antenna-to-CMOS 4×6 mm Front End Module for Dualband 802.11abgn WLAN
H. T. Morkner, M. Vice, M. Karakucuk, W. Abey, L. D. Nguyen, J. F. Kessler, G. Carr, Avago Technologies, San Jose, USA

TU4E-03: Coexistence of an Electronically Tunable DVB-H Antenna with the GSM Transmitter in a Mobile Phone
L. Huang, W. L. Schroeder, BenQ Mobile, Kamp-Lintfort, Germany; P. Russer, Technische Universität München, Munich, Germany

TU4E-04: A Compact Triband PIFA with Multiple-Folded Parasitic Elements
D. Kim, J. Lee, C. Cho, Hankuk Aviation University, Goyang, Korea, South; J. Kim, Information and Communications University, Taejon, South Korea

TU4E-05: Complementary Bipolar Devices for Base Station Applications
E. Tiiliharju, Microelectronics Lab, Turku, Finland; H. Pellikka, Nokia Mobile Phones, Salo, Finland

TU4E-06: High-Level Integrated ICs for Low-Cost, Compact WiMAX Dualband RF Modules
C. Yuen, K. Laursen, D. Chu, M. Adams, H. Nguyen, Epic Communications Inc., Sunnyvale, USA

TU4F
Applied Frequency Domain Techniques

Chair: Abbas Omar
Cochair: Luca Perregrini
HCC 314

TU4F-01: Short-Open Calibration Technique for Field-Theory-Based Parametric Extraction of Planar Discontinuities with Nonuniform Feed Lines
S. Sun, L. Zhu, Nanyang Technological University, Singapore, Singapore

TU4F-02: A New SCN-based Frequency-Domain TLM Node and its Applications with the Diakoptic Method
K. Sung, Z. D. Chen, Dalhousie University, Halifax, Canada

TU4F-03: A Nondisjoint Hexahedral Space Discretization for the Finite-Volume Technique
K. Krohne, R. Vahldieck, ETH Zürich, Zürich, Switzerland

TU4F-04: Fully Automatic HP Adaptivity for Electromagnetics, Application to the Analysis of H-Plane and E-Plane Rectangular Waveguide Discontinuities
L. E. Garcia-Castillo, Univ. Carlos III de Madrid, Leganes, Spain; L. F. Demkowicz, D. Pardo-Zubiaur, Univ. of Texas, Austin, USA

TU4F-05: An Incremental Fullwave EM Simulator for RF and Microwave Design
F. Ling, W. Harris, X. Wang, A. Dengi, Cadence Design Systems, Tempe, USA

TU4F-06: Optimizing the FDFD Method in Order to Minimize PML-Related Numerical Problems
P. K. Talukder, F. Schmuckle, W. Heinrich, FBH, Berlin, Germany; R. Schlundt, WIAS, Berlin, Germany

TU4G: Special Session
A Tribute to Dr. Leo Young

Chair: Robert J. Trew
HCC 317A, B

TU4G-01: A Tribute to Dr. Leo Young
R. Trew, North Carolina State University, Raleigh, USA

Dr. Leo Young passed away at the age of 80 in September 2006. He pioneered the development of microwave filter technology, publishing 14 books and over 100 technical articles, and receiving 20 patents on various aspects of microwave technology. In 1964 together with his colleagues, George Matthaei and E.M.T. Jones, Leo wrote *Microwave Filters, Impedance-Matching Networks, and Coupling Structures,* included in the Microwave Hall of Fame and generally considered "the bible" for microwave filter design. Leo's extensive professional activities included serving as President of the IEEE and the MTT-S. He received numerous awards, including the Microwave Prize, Distinguished Service Award, and the Microwave Career Award. Leo was a Life Fellow of IEEE, a member of the National Academy of Engineering, and a Foreign Member of the UK Royal Academy of Engineering. Leo was the U.S. DoD's Director of Research and established many of its policies and programs that define support for basic research.

Wednesday Technical Sessions 08:00–09:40

WE1A: Power Characteristics and Perf. Enhancement Techniques for III-V and Silicon Based Devices

Chair: Zaher Bardai
Cochair: Paul Watson
HCC 311

WE1A-01: Voltage-Dependent Characteristics of 48 V AlGaN/GaN High Electron Mobility Transistor Technology on Silicon Carbide
J. D. Brown, S. Lee, J. Martin, R. Vetury, M. Poulton, J. Shealy, RFMD, Charlotte, USA

WE1A-02: Survivability of AlGaN/GaN HEMT
Y. Chen, R. Coffie, W. Luo, M. Wojtowicz, I. Smorchkova, B. Heying, Y. Kim, M. V. Aust, A. Oki, Northrop Grumman Corp., Redondo Beach, USA

WE1A-03: FET Gate Length Impact on Reliability
A. M. Darwish, A. Bayba, A. Hung, Army Research Lab, Adelphi, USA

WE1A-04: Robustness of GaAs Field-Plate Based MESFETs
T. A. Winslow, MACOM/Tyco Electronics, Roanoke, USA

WE1A-05: Varactor Topologies for RF Adaptivity with Improved Power Handling and Linearity
K. Buisman, C. Huang, A. Akhnoukh, M. Marchetti, L.C. de Vreede, L. K.Nanver, Delft University of Technology, Delft, The Netherlands; L. E. Larson, University of California at San Diego, La Jolla, USA

WE1A-06: Design for Integration of RF Power Transistors in 0.13 µm Advanced CMOS Technology
S. Huang, C. Chang, Nat'l Chiao Tung Univ.; K. Chen, G. Huang, Nat'l Nano Device Labs; C. Hung, V. Liang, United Microelectronics Corp. Hinschu, Taiwan

WE1B Innovative Active Circuits Operating Above 100 GHz

Chair: Rudy Emrick
Cochair: Ed Niehenke
HCC 312

WE1B-01: A 245 GHz MMIC Amplifier with 80 µm Output Periphery and 12 dB Gain
W. R. Deal, X.B. Mei, V. Radisic, W. Yoshida, P.H. Liu, J. Uyeda, M. Barsky, R. Lai, Northrop Grumman Corp., Redondo Beach, USA; T. Gaier, A. Fung, L. Samoska, Jet Propulsion Lab, Pasadena, USA

WE1B-02: A SiGe Monolithically Integrated 278 GHz Push-Push Oscillator
R. Wanner, G. R. Olbrich, P. Russer, Technische Universität München, München, Germany; R. Lachner, Infineon Technologies, Neubiberg, Germany

WE1B-03: High-Efficiency Terahertz Frequency Triplers
D.W. Porterfield, Virginia Diodes Inc., Charlottesville, USA

WE1B-04: Highly Efficient Harmonically Tuned InP D-HBT Push-Push Oscillators Operating up to 287 GHz
Y. Baeyens, N. Weimann, V. Houtsma, J. Weiner, Y. Yang, J. Frackoviak, P. Roux, A. Tate, Y. Chen, Alcatel-Lucent

WE1B-05: New Trend in THz Detection: High T_c Superconducting Hot Electron Bolometer Technology May Exhibit Advantage versus Low T_c Devices
A. J. Kreisler, A. F. Degardin, M. Aurino, C. Peroz, J. Villegier, G. Beaudin, Y. Delorme, M. Redon, A. Sentz, CEA, France

WE1B-06: A 100 GHz Tunable Photonic Millimeter Wave Synthesizer for the Atacama Large Millimeter Array Radiotelescope
J. Cliche, M. Tetu, M. Poulin, TeraXion, Québec, Canada; B. Shillue, National Radio Astronomy Observatory, Charlottesville, USA

WE1B-07: Metamorphic H-Band Low-Noise Amplifier MMICs
A. Tessmann, A. Leuther, H. Massler, M. Schlechtweg, Fraunhofer IAF, Freiburg, Germany

WE1C: Innovative Design and Construction of RF MEMS Switches

Chair: Chuck Goldsmith
Cochair: Jack Ebel
HCC 313A

WE1C-01: Coplanar-Waveguide Embedded Mechanically-Bistable DC-to-RF MEMS Switches
M. Sterner, N. Roxhed, G. Stemme, J. Oberhammer, Royal Institute of Technology, Stockholm, Sweden

WE1C-02: Nontoxic Liquid-Metal 2–100 GHz MEMS Switch
C. Chen, J. Whalen, D. Peroulis, Purdue University, West Lafayette, USA

WE1C-03: Thermally Actuated Nanocrystalline Diamond Microbridges for Microwave and High-Power RF Applications
S. Balachandran, Univ. of South Florida, Tampa, USA; J. Kusterer, D. Maier, M. Dipalo, E. Kohn, Univ. of Ulm, Ulm, Germany; R. Connick, T.M. Weller, Modelithics Inc., Tampa, USA

WE1C-04: Design of a 20 GHz Low-Loss Ohmic-Contact RF MEMS Switch
D. A. Goins, R. D. Nelson, J. S. McKillop, TeraVicta Technologies Inc., Austin, USA

WE1C-05: Carbon Nanotube Based Dielectric for Enhanced RF MEMS Reliability
C. Bordas, K. Grenier, D. Dubuc, S. Pacchini, E. Flahaut, M. Paillard, J. L. Cazaux, CNRS, CIRIMAT, Alcatel, Toulouse, France

WE1C-06: Schottky Contact RF MEMS Switch Characterization
B. W. Pillans, F. Morris, P. Chahal, G. Frazier, Raytheon, Dallas, USA; J. Lee, University of Texas at Dallas, Richardson, USA

WE1E: Special Session A Tribute to Dr. K. C. Gupta

Chair: Inder J. Bahl
Cochair: Madhu S. Gupta
HCC 316A

WE1E: A Tribute to Dr. K. C. Gupta

Dr. K. C. Gupta passed away at the age of 66 in February 2007. He was not only a scholar and a dedicated leader in the microwave field but also touched the lives of many people by his warmth, selfless service, and sincerity. KC was a most valuable role model, collaborator, mentor, educator, and wonderful friend whose wisdom and counsel will be remembered by many. Dr. Gupta was a pioneer in the field of microwave education and computer-aided design. Some of KC's well-known books are *Microstrip Lines and Slotlines*, *Computer-Aided Design of Microwave Circuits*, and *Neural Networks for RF and Microwave Design*. He was the founding editor for the *International Journal of RF and Microwave Computer-Aided Engineering*. KC's extensive professional activities included service as the IEEE MTT-S President in 2005. He received numerous awards including the IEEE Millennium Medal, the MTT-S Distinguished Service Award, and the MTT-S Distinguished Educator Award. Dr. Gupta was a Fellow of IEEE and a Life Fellow of IETE, India.

Wednesday Technical Sessions 08:00–09:40

WE1F Microwave Sensors for Object and Presence Detection

Chair: Ian Gresham
Cochair: Roger Sudbury
HCC 315

WE1F-01: A Ka-Band Correlation Radiometer for Human Presence Detection from a Moving Platform
J. A. Nanzer, R. L. Rogers, University of Texas Applied Research Labs, Austin, USA

WE1F-02: 24 GHz Intruder Detection Radar with Beam-Switched Area Coverage
M. Morinaga, T. Nagasaku, H. Shinoda, H. Kondoh, Hitachi, Ltd., Central Research Lab, Kokubunji-shi, Japan

WE1F-03: New Microwave Flow Sensor Based on a Left-Handed Transmission-Line Resonator
A. Penirschke, M. Schubler, R. Jakoby, Darmstadt University of Technology, Darmstadt, Germany

WE1F-04: A Robust 3D High-Precision Radio Location System
C. Meier, S. Lindenmeier, University of the Bundeswehr, Neubiberg, Germany; A. Terzis, DaimlerChrysler, Ulm, Germany

WE1F-05: Live Electrooptic Imaging of Microwave Near Fields via Ultraparallel Photonic Heterodyne
K. Sasagawa, A. Kanno, T. Kawanishi, M. Tsuchiya, National Institute of Information and Communications Technology, Koganei, Japan

WE1F-06: Composite Patch Array Antenna with Built-in Polarizer for Reducing Road Clutter Noises of 76 GHz Automotive Radars
H. Shinoda, H. Kondoh, Central Research Lab, Hitachi, Ltd., Tokyo, Japan

WE1G Power Dividers and Combiners

Chair: M. Salazar-Palma
Cochair: Mohamed Abouzahra
HCC 314

WE1G-01: An Unequal Wilkinson Power Divider with Variable Dividing Ratio
S. Oh, J. Koo, M. Hwang, C. Park, J. Lim, K. Choi, D. Ahn, Soonchunhyang University, Asan, Rep. of Korea; Y. Jeong, Chonbuk National University, Jeonju, Republic of Korea

WE1G-02: A Broadband Traveling-Wave Power Divider/Combiner using Asymmetric Tapered-Line Power Dividers
Y. Tahara, H. Oh-hashi, Y. Tarui, M. Miyazaki, Mitsubishi Electric Corp., Kamakura, Japan

WE1G-03: Compact Multi-Way Power Dividers Similar to the Bagley Polygon
I. Sakagami, T. Wuren, M. Fujii, M. Tahara, Univ. of Toyama, Toyama, Japan

WE1G-04: A Novel Compact Dualband Reconfigurable Power Divider for Smart Antenna Systems
R. Vincenti Gatti, A. Ocera, S. Bastioli, L. Marcaccioli, R. Sorrentino, University of Perugia, Perugia, Italy

WE1G-05: Synthesis of an Arbitrary Power Split Ratio Divider Using Substrate Integrated Waveguides
S. Yang, A. Fathy, Univ. of Tennessee, Knoxville, USA

WE1G-06: Universal Single-Layer Waveguide Power Divider for Slot Array Antenna Applications
D. Deslandes, F. Boone, University of Sherbrooke, Sherbrooke, Canada; K. Wu, École Polytechnique of Montréal, Montréal, Canada

WE1G-07: Modeling and Implementation of a Novel Coaxial Line Multioctave High-Power Combiners with Low-Intermodulation Distortion
S. Lin, A. E. Fathy, University of Tennessee Knoxville, Knoxville, USA; G. M. Hegazi, T. T. Chu, Rockwell Collins Inc, Cedar Rapids, USA

08:00–09:40

WEP1 Interactive Forum

Chair: Eric Bryerton
Cochair: Michael Forman
HCC Ballroom A

WEP1: Interactive Forum

WEP1A
Transmission Line Elements

WEP1A-01: Dark and Bright Solutions in Left-Handed Nonlinear Transmission Line Metamaterials.
S. Gupta, C. Caloz, École Polytechnique de Montréal, Montréal, Canada

WEP1A-02: Characterizing and Modeling Conductor-Backed CPW Periodic Bandstop Filter with Miniaturized Size
K. Chan, MEDs Technologies Pte Ltd, Singapore, Singapore; S. Xiao, J. Ma, University of Electronic Science and Technology of China, Chengdu, China; K. Ma, K. Yeo, M. Do, Nanyang Technological University, Singapore

WEP1B
Passive Circuit Elements

WEP1B-01: Compact-Size Directional Coupler for Mobile RFID Reader
J. Jung, K. Nae, J.P. Thakur, H. Oh, Y. Seong, J. Park, Kookmin University, Seoul, South Korea

WEP1B-02: HTS Microstrip Hybrid Couplers for Radio Astronomy C-Band Receivers
G. Zhang, M.J. Lancaster, Emerging Device Technologies, Birmingham, UK; N. Roddis, Jodrell Bank Observatory, Cheshire, UK

WEP1B-03: Realization of Ultracompact Planar Microstrip Branch-Line Couplers with High-Impedance Open Stubs
C. Tang, M. Chen, J. Wu, National Chung Cheng University, Chiayi, Taiwan

WEP1B-04: Design of a Compact Microwave Six-Port Vector Voltmeter for UWB Applications
M.E. Bialkowski, A.M. Abbosh, J. Swayn, The University of Queensland, Brisbane, Australia

WEP1B-05: A Parallel-Crossed H-Plane Waveguide Eight-Port Hybrid and its Application to a Planar Magic Tee
K. Toda, I. Ohta, University of Hyogo, Himeji, Japan; M. Kishihara, Okayama Prefectural University, Soja, Japan

WEP1B-06: Miniaturized Ultra-Wideband Self-Complementary Antennas using High-Permittivity Thick-Resin Material
A. Saitou, C. Quan, K. Watanabe, YKC Corp., Musashi-Murayama, Japan; K. Aoki, K. Honjo, The University of Electro-Communications, Chofu, Japan

WEP1B-07: A Six-Port Receiver's Analog Front-End of Reduced Size Based on a Multilayer Layout
A. Koelpin, S. Winter, R. Weigel, Friedrich-Alexander University of Erlangen-Nuremberg, Erlangen, Germany

WEP1B-08: LTCC Broadside Coupler Design with Branch Lines for Enhanced Performances
Y. Noh, M. Uhm, I. Yom, Electronics and Telecommunications Research Institute (ETRI), Daejeon, Korea, South

WEP1B-09: Novel Reconfigurable Isolator
T. Furuta, A. Fukuda, H. Okazaki, S. Narahashi, NTT DoCoMo Inc., Yokosuka-shi, Japan

WEP1B-10: Compacted Ka-Band CMOS Rat-Race Hybrid Using Synthesized Transmission Lines
S. Wang, C. C. Tzuang, National Taiwan University, Taipei, Taiwan

WEP1B-11: Flexible RF Switch-PIN Diodes using Single-Crystal Si-Nanomembranes
H. Yuan, Z. Ma, Univ. of Wisconsin-Madison, Madison, USA; G.K. Celler, Soitec, Peabody, USA

WEP1B-12: A Fully Micromachined W–Band Coplanar Waveguide to Rectangular Waveguide Transition
Y. Li, B. Pan, M.M. Tentzeris, J. Papapolymerou, GEDC, School of Electrical and Computer Engineering, Atlanta, USA

WEP1C
Active and Integrated Filters

WEP1C-01: Piezoelectric Transducer-Controlled Reconfigurable Dual-Mode Switchable Bandpass Filter
W. Tu, S. Hsu, K. Chang, Texas A&M University, College Station, USA

WEP1C-02: LTCC Multilayer Coupled Strip-Resonator Filters
Y. Zhang, K.A. Zaki, University of Maryland, College Park, USA

WEP1C-03: Nonlinear Matched Reflection-Mode Bandstop Filters for Frequency-Selective Limiting Applications
P. Phudpong, I.C. Hunter, University of Leeds, Leeds, UK

WEP1D
HF/VHF/UHF Technologies and Applications

WEP1D-01: Low-Pass Active Filter enabling DVB-H/T and GSM Standard Coexistence
D. Lo Hine Tong, R. Lababidi, F. Baron, A. Louzir, Thomson R & D France, Cesson-Sevigne, France

WEP1D-02: Adjacent-Channel Power Contributions of Silicon MOSFET Switches in RF and Microwave Systems
R. H. Caverly, Villanova University, Villanova, USA

WEP1D-03: High-Frequency Power Amplifiers without Ground
R. L. Campbell, Cascade Microtech, Inc, Beaverton, USA

WEP1D-04: 0.25 µm CMOS Dual Feedback Wideband UHF Low-Noise Amplifier
I.I. Lo, O. Boric-Lubecke, V. Lubecke, University of Hawaii at Manoa, Honolulu, USA

WEP1E
Power-Amplifier Devices and Integrated Circuits

WEP1E-01: High-Gain, High-Efficiency 12 V pHEMT Power Transistors for WiMAX Applications
M. Bokatius, M. Miller, Freescale Semiconductor Inc., Tempe, USA

WEP1E-02: Overcoming pHEMT Linearity Dependence on Fundamental Input Tuning by Digital Predistortion
M. Bokatius, M. Lefevre, M. Miller, Freescale Semiconductor Inc., Tempe, USA

WEP1E-03: Ka-Band SiGe HBT Power Amplifier for Single-Chip T/R Module Applications
P. J. Riemer, J. S. Humble, J. F. Prairie, J. D. Coker, B. A. Randall, B. K. Gilbert, E. S. Daniel, Mayo Clinic, Rochester, USA

WEP1E-04: 20 W LDMOS Power Amplifier IC for Linear Driver Application
R. Bagger, P. Andersson, Infineon Technologies Nordic AB, Kista, Sweden; C. D. Shih, Infineon Technologies North America Corp., Tempe, USA

WEP1E-05: A 6–18 GHz Push-Pull Power Amplifier with Wideband Even-Order Distortion Cancellation in LCP Module
A. C. Chen, A. H. Pham, University of California Davis, Davis, USA; R. E. Leoni, Raytheon Co., Andover, USA

WEP1E-06: Linearity of X-Band Class-E Power Amplifiers in a Digital Polar Transmitter
N. Wang, N.D. Lopez, V. Yousefzadeh, J. Hoversten, D. Maksimovic, Z. Popović, University of Colorado, Boulder, USA

WEP1E-07: A 2.4 GHz GaAs-HBT Class-E MMIC Amplifier with 65 % PAE
C. Meliani, M. Rudolph, P. Kurpas, W. Heinrich, Ferdinand-Braun-Institut (FBH), Berlin, Germany; L. Schmidt, C. Rheinfelder, Ubidyne GmbH, Ulm, Germany

WEP1E-08: H-Bridge Class-D Power Amplifiers for Digital Pulse Modulation Transmitters
T. Hung, J. Rode, L. E. Larson, P.M. Asbeck, University of California, San Diego, LA Jolla, USA

WEP1E-09: Variable-Voltage Class-E Power Amplifiers
M. Acar, A. J. Annema, B. Nauta, University of Twente, Enschede, The Netherlands

WEP1F
High-Power Amplifiers

WEP1F-01: Applications of GaN HEMTs and SiC MESFETs in High-Efficiency Class-E Power Amplifier Design for WCDMA Applications
Y. Lee, Y. Jeong, Pohang University of Science and Technology, Pohang, Republic of Korea

WEP1F-02: Negative Group Delay Circuit for Feed-Forward Amplifier
H. Noto, K. Yamauchi, M. Nakayama, Y. Isota, Mitsubishi Electric Corp., Kamakura, Japan

WEP1F-03: Analogue Dynamic Supply Voltage L-Band GaN High Power Amplifier with Improvement of Efficiency and Linearity
K. Matsunaga, M. Tanomura, T. Nakayama, Y. Ando, H. Miyamoto, H. Shimawaki, NEC Corp., Otsu, Japan

WEP1F-04: A 2.5 Watt, 3.3–3.9 GHz Power Amplifier for WiMAX Applications using a GaN HEMT in a Small Surface-Mount Package
S.M. Wood, A. Prejs, R.S. Pengelly, W. Pribble, Cree Inc.; E.J. Crescenzi, Jr., Central Coast Microwave Design

WEP1F-05: Cross Postdistortion Balanced Power Amplifier
H. Choi, Y. Jeong, Chonbuk National University, Jeonju, Republic of Korea; J. Kenny, Georgia Institute of Technology, Atlanta, USA; C. Kim, Sewon Teletech Inc., Anyang, Republic of Korea

WEDNESDAY

Wednesday Technical Sessions 10:10–11:50

WE2A
Low-Noise CMOS and Low-Power HEMT Technologies
Chair: Tsuneo Tokumitsu
Cochair: Ho C. Huang
HCC 311

WE2A-01: Edge-Extended Design for Improved Flicker Noise Characteristics in 0.13 µm RF NMOS
C. Chan, Y. Lin, Y. Huang, S. Hsu, National Tsing Hua University, Hsinchu, Taiwan; Y. Juang, National Chip Implementation Center, Hsinchu, Taiwan

WE2A-02: A Silicon RFCMOS SOI Technology for Integrated Cellular/WLAN RF TX Modules
J. Costa, M. Carroll, J. Jorgenson, T. Mckay, T. Ivanov, T. Dinh, D. Kozuch, G. Remoundos, D. Kerr, A. Tombak, J. McMacken, M. Zybura, RF Micro Devices, Greensboro, USA

WE2A-03: Low-Loss Low-Cost All-Silicon CMOS NLTLs for Pulse Compression
M. Li, R.E. Amaya, R.G. Harrison, G.N. Tarr, Carleton University, Ottawa, Canada; J. Duchamp, P. Ferrari, Institute of Microelectronics, Grenoble, France

WE2A-04: 1.8 dB Insertion Loss 200 GHz CPW Bandpass Filter Integrated in HR SOI CMOS Technology
F. Gianesello, D. Gloria, S. Montusclat, S. Boret, B. Martineau, R. Pilard, C. Raynaud, G. Dambrine, S. Lepilliet

WE2A-05: High-power III-Nitride Integrated Microwave Switch with Capacitively-Coupled Contacts
G. Simin, Z. Yang, University of South Carolina, Columbia, USA

WE2A-06: Manufacturable and Reliable 0.1 µm AlSb/InAs HEMT MMIC Technology for Ultralow-Power Apps
Y. Chou, J. Yang, C. Lin, J. Lee, M. Lange, R. Tsai, N. Peter, N. Matt, A. Gutierrez, H. Quach, R. Lai, D. Farkas, M. Wojtowicz, P. Chin, M. Barsky, A. Oki, Northrop Grumman Corp.

WE2A-07: Ni-Zn Ferrite Film Coated on-Chip RF Inductor Fabricated by a Novel Powder-Mixed-Photoresist Coating Technique
C. Yang, F. Liu, T. Ren, L. Liu, Tsinghua Univ.; G. Chen, X. Guan, A.Z. Wang, Z. Yue, Tsinghua Univ.

WE2B
Modules and Chipsets for mm-Wave Commercial Applications
Chair: Debabani Choudhury
Cochair: James Wiltse
HCC 312

WE2B-01: A 6 Gbps Millimetre Wave Wireless Link with 2.4 b/Hz Spectral Efficiency
V. Dyadyuk, O. Sevimli, J. Bunton, J. Pathikulangara, L. Stokes, CSIRO, Epping, Australia

WE2B-02: A Single-Chip 25 pJ/b Multigigabit 60 GHz Receiver Module
S. Sarkar, J. Laskar, Georgia Electronic Design Center, Atlanta, USA

WE2B-03: Ka-Band BiCMOS 4 b Phase Shifter with Integrated LNA for Phased-Array T/R Modules
B. Min, University of Michigan, Ann Arbor, USA; G.M. Rebeiz, University of California, San Diego, USA

WE2B-04: A 40 GHz MMIC SPDT Bandpass Filter Integrated Switch
S. Chao, C. Kuo, Z. Tsai, H. Wang, National Taiwan University, Taipei, Taiwan

WE2B-05: A 2.5 V 77 GHz Automotive Radar Chipset
S. T. Nicolson, K. A. Tang, K. H. Yau, S. P. Voinigescu, University of Toronto, Toronto, Canada; P. Chevalier, B. Sautreuil, STMicroelectronics, Crolles, France

WE2C
RF MEMS Tunable Circuits
Chair: Youngwoo Kwon
Cochair: Tom Weller
HCC 313A

WE2C-01: Fully Packaged 4 bit 100 ps RFMEMS Time Delay
J. B. Muldavin, C. O. Bozler, S. Rabe, C. Keast, MIT Lincoln Lab, Lexington, USA

WE2C-02: A MEMS Tunable Frequency-Selective Surface Monolithically Integrated on a Flexible Substrate
G. M. Coutts, R. R. Mansour, S. K. Chaudhuri, University of Waterloo, Waterloo, Canada

WE2C-03: A MEMS-Reconfigurable Power Divider on High-Resistivity Silicon Substrate
A. Ocera, P. Farinelli, F. Cherubini, P. Mezzanotte, R. Sorrentino, University of Perugia, Perugia, Italy; B. Margesin, F. Giacomozzi, ITC-IRST, Povo, Italy

WE2C-04: An Integrated Tunable Bandpass Filter Using MEMS Parallel-Plate Variable Capacitors Implemented with 0.35 µm CMOS Technology
S. Fouladi, M. Bakri-Kassem, R. Mansour, University of Waterloo, Waterloo, Canada

WE2C-05: Narrowband Monolithic Piezoelectric-on-Substrate Filter Technology
R. Abdolvand, F. Ayazi, Georgia Institute of Technology, Atlanta, USA

WE2D
Material Measurement
Chair: Bela Szendrenyi
Cochair: Michael Janezic
HCC 316B

WE2D-01: Measurements of the Surface Resistance and the Effective Conductivity of Copper Cladded Laminates Employing Dielectric Resonator Technique
J. Krupka, Warsaw University of Technology, Warsaw, Poland

WE2D-02: A High-Temperature-Capable Planar-Type Coaxial Probe for Complex Permittivity Measurements up to 40 GHz
N. Kim, J. Yoon, D. Kim, Y. Kwon, Seoul Nat'l Univ., Seoul, S. Korea; J. Cho, Korea Inst. of Science and Tech., Seoul, South Korea; C. Cheon, Univ. of Seoul, Seoul, S. Korea

WE2D-03: Extracting the Broadband Permittivity of Liquids from Transmission Line Measurements with Microfluidic Channels
J. Mateu, N. Orloff, M. Rinehart, J. Booth, National Institute of Standards and Technology, Boulder, USA

WE2D-04: The Simultaneous Measuring Method of Permittivity and Permeability using Two-Port Probe
S. Park, J. Lee, C. Cheon, Department of Electrical Engineering, Seoul, Korea; Y. Chung, Department of Radio Science Engineering, Seoul, Korea; Y. Kwon, School of Electrical Engineering, Seoul, Korea

WE2D-05: Measurement of Complex Permittivity and Permeability using Two Flanged Rectangular Waveguides
M.W. Hyde, M.J. Havrilla, Air Force Institute of Technology, Wright-Patterson Air Force Base, USA

Wednesday Technical Sessions 10:10–11:50

WE2E
Design and Synthesis of Planar Filters
Chair: Chi Wang
Cochair: Kawthar A. Zaki
HCC 316A

WE2E-01: Exact Synthesis of Microwave Filters with Nonuniform Dissipation
A.C. Guyette, I.C. Hunter, R.D. Pollard, University of Leeds, Leeds, UK

WE2E-02: TEM Mode-Matching Analysis of Multicoupled Strip-Line Filters
J.A. Ruiz-Cruz, Univ Autónoma de Madrid; Y. Zhang, K.A. Zaki, Univ of Maryland, USA; J.M. Rebollar, J.R. Montejo-Garai, Universidad Politécnica de Madrid; A.J. Piloto, Kyocera America, San Diego, USA

WE2E-03: Nonreflective Transmission-Line Filters for Gain-Slope Equalization
M. A. Morgan, T. A. Boyd, National Radio Astronomy Observatory, Charlottesville, USA; T.L. Newton, R.H. Hayward, National Radio Astronomy Observatory, Socorro, USA

WE2E-04: Multilayer Quasielliptic Filters using Dual-Mode Resonators on Liquid Crystal Polymer Technology
R. Bairavasubramanian, J. Papapolymerou, Georgia Electronic Design Center, Georgia Tech, Atlanta, USA

WE2E-05: Novel Corrugated Coupled Stages with Multiharmonic Suppression and its Application to Bandpass Filter Design
J. Kuo, U. Lok, M. Wu, National Chiao Tung University, Hsinchu, Taiwan

WE2E-06: Two-Bit Switchable Bandpass Filter for 0.3–0.6 GHz
M. Koochakzadeh, A. Abbaspour-Tamijani, Ira A. Fulton School of Engineering, Arizona State University, Tempe, USA

WE2F
Sensors and Sensor Systems
Chair: Hiroshi Kondoh
Cochair: Alan Jenkins
HCC 315

WE2F-01: Millimeterwave Imaging Sensor Nets: A Scalable 60 GHz Wireless Sensor Network
M. Seo, B. Ananthasubramaniam, M. Rodwell, U. Madhow, Santa Barbara, USA

WE2F-02: Passive RF Receiver Design for Wireless Sensor Networks
P. V. Kolinko, L. E. Larson, University of California San Diego, La Jolla, USA

WE2F-03: A 1 Mbps 1.6 µA Micropower Active RFID CMOS LSI for the 300 MHz Frequency Band
K. Suzuki, M. Ugajin, M. Harada, NTT, Atsugi, Japan

WE2F-04: FMCW Based Readout System Accuracy Enhancement Techniques for Surface Acoustic Wave RFID Sensor
G. A. Hofbauer, PULSAR Electronics Corp., Waldschach, Austria

WE2F-05: Noncontact Measurement of Periodic Movements by a 22–40 GHz Radar Sensor using Nonlinear Phase Modulation
C. Li, J. Lin, University of Florida, Gainesville, USA

WE2G
Nonlinear Transistor Modeling
Chair: Matthias Rudolph
Cochair: Raghu Mallavarpu
HCC 314

WE2G-01: DC and Large-Signal Microwave MOSFET Model Applicable to Partially-Depleted, Body-Contacted SOI Technology
D. R. Burke, T. J. Brazil, Univ. College Dublin, Dublin, Ireland; M. El Kaamouchi, D. Vanoenacker-Janvier, Université Catholique de Louvain, Louvain-la-Neuve, Belgium

WE2G-02: A New Nonlinear HEMT Model Allowing Accurate Simulation of Very Low IM3 Levels for High-Frequency Highly Linear Amplifiers Design
J. Lhortolary, C. Chang, M. Camiade, J. Obregon, United Monolithic Semicond., Orsay, France; T. Reveyrand, M. Campovecchio, Lab Xlim CNRS, Limoges, France

WE2G-03: Large-Signal FET Modeling based on Pulsed Measurements
R.G. Brady, G. Rafael-Valdivia, T.J. Brazil, University College Dublin, Dublin, Ireland

WE2G-04: RF Linearity and Nonlinear Source Resistance in AlGaN/GaN HFETs
Y. Liu, R.J. Trew, G. Bilbro, North Carolina State University, Raleigh, USA

WE2G-05: A Drain-Lag Model for AlGaN/GaN Power HEMTs
O. Jardel, F. De Groote, T. Reveyrand, J. Teyssier, R. Quere, XLIM, Brive, France; C. Charbonniaud, AMCAD Engineering, Limoges, France; D. Floriot, Alcatel Thales III-V Lab, Marcoussis, France

WE2G-06: Virtual Gate Large-Signal Model of GaN HFETs
A.M. Conway, P.M. Asbeck, University of California, San Diego, La Jolla, USA

WE2G-07: Modeling and Characterization of Subnanosecond Impulse Response of High-Voltage Heterojunction Bipolar Transistors
S. Halder, R. Jin, J.C. Hwang, Lehigh University, Bethlehem, USA

WEP1
Interactive Forum
Chair: Eric Bryerton
Cochair: Michael Forman
HCC Ballroom A

WEP1: Interactive Forum

Wednesday Panel Sessions

12:00–13:15 PWA HCC 313C

Is GaN Ready for Prime Time?

Moderator:
- Mark Rosker, DARPA

Panelists:
- Mike Wojtowicz, NGST
- Toshi Kikkawa, Fujitsu
- Silvain Delage, Alcatel
- Paul Saunier, TriQuint Semiconductor
- Jeff Shealy, RFMD
- John Palmour, Cree

Sponsor: IMS

GaN-based materials and devices have been in development worldwide for years. In a market packed with established technologies, what is the readiness of GaN-based devices and where will they find a home?

12:00–13:15 PWB HCC 316C

Will RF-MEMS Make the Commercial Leap?

Moderator:
- Scott Barker, University of Virginia
- Gabriel Rebeiz, University of California San Diego

Panelists:
- William Panton, Qualcomm
- John McKillop, TeraVicta
- John Maciel, Radant MEMS
- John Ebel, U.S. Air Force Research Laboratory

Sponsor: MTT-21

RF-MEMS devices have recently achieved dramatic increases in reliability and power handling. Therefore, the attainment of real-time adaptable RF front ends should be at hand but will system designers consider RF-MEMS for use within cell phones in the near future? This panel session will bring together industry experts from cell phone manufacturers as well as leading RF-MEMS researchers to explore this question.

12:00–13:15 PWC HCC 317A

Grant Opportunities at the National Science Foundation

Panelists:
- Leda Lunaradi, NSF
- Don Senich, NSF

Sponsor: IMS

The National Science Foundation (NSF) is a federal agency committed to support fundamental research, generating new technologies and scientific understanding and developing a well-educated workforce. This session will provide an overview of the agency, information on several programs of interest, and guidelines on how to submit a proposal.

Wednesday Special and Focused Sessions

08:00–09:40 WE1E HCC 316A

A Tribute to Dr. K. C. Gupta

Dr. K. C. Gupta passed away at the age of 66 in February 2007. He was not only a scholar and a dedicated leader in the microwave field but also touched the lives of many people by his warmth, selfless service, and sincerity. KC was a most valuable role model, collaborator, mentor, educator, and wonderful friend whose wisdom and counsel will be remembered by many. Dr. Gupta was a pioneer in the field of microwave education and computer-aided design. Some of KC's well-known books are *Microstrip Lines and Slotlines*, *Computer-Aided Design of Microwave Circuits*, and *Neural Networks for RF and Microwave Design*. He was the founding editor for the *International Journal of RF and Microwave Computer-Aided Engineering*. KC's extensive professional activities included service as the IEEE MTT-S President in 2005. He received numerous awards including the IEEE Millennium Medal, the MTT-S Distinguished Service Award, and the MTT-S Distinguished Educator Award. Dr. Gupta was a Fellow of IEEE and a Life Fellow of IETE, India.

13:20–15:00 WE3A HCC 311

Advances in GaN Technology

This focused session highlights advances in GaN MMIC power and low-noise performance and maturation of the technology to enable multiple commercial applications. New broadband power and efficiency benchmarks are reported for designs in NDPA distributive technology. Wideband sub-dB noise figure has been achieved in a broadband L- and C-band amplifier with 2W output power, and over 50% PA efficiency is reported at 35 GHz. Devices packaged in commercial plastic packaging have achieved 18W output at 3.5 GHz. GaN device reliability improvement is addressed through reduction in early current drop degradation.

13:20–15:00 WE3F HCC 315

Microwaves in Support of Societal Security

Microwaves play a key role in support of societal security. The frequency range used extends from the MHz region to 100 GHz for various communication and detection systems. Threat detection, counter threat techniques, and first response technology to man-made as well as natural disasters will be considered. This session will present detection technology that is under development to protect societies against threats as experienced by multiple nations from terrorists. Passive imaging, radar, and ultra-wideband sensors will be presented that have a variety of applications of great use to make life safer and provide a key advantage under low-visibility conditions.

15:30–17:00 WE4F HCC 315

Advances in Microwave Systems for Deep Space Missions

Current and planned deep-space missions depend on advanced techniques in microwave/RF design to accomplish demanding science and telecommunications requirements. This session focuses on advances in microwave systems and technologies in recently launched missions, including the New Horizons Mission to Pluto and the MESSENGER mission to Mercury, on planned improvements to NASA's Deep Space Network, and on the technologies that future missions to the Moon, to Mars, and beyond are depending on to achieve their goals.

Wednesday

Technical Sessions

13:20–15:00

WE3A: Focused Session
Advances in GaN Technology

Chair: Aryeh Platzker
Cochair: John L Heaton
HCC 311

13:20

WE3A-01: Wideband, High-Efficiency GaN Power Amplifiers Utilizing a Nonuniform Distributed Topology
J. Gassmann, P. Watson, L. Kehias, Air Force Research Lab, Wright-Patterson AFB, USA; G. Henry, Northrop Grumman, Linthicum, USA

13:30

13:40

WE3A-02: A 2 Watt, Sub-dB Noise Figure GaN MMIC LNA-PA Amplifier with Multi-Octave Bandwidth from 0.2–8 GHz
K.W. Kobayashi, Sirenza Microdevices, Torrance, USA; Y. Chen, I. Smorchkova, R. Tsai, M. Wojtowicz, A. Oki, NGST, Redondo Beach, USA

13:50

14:00

WE3A-03: Deep-Recessed GaN HEMTs using Selective-Etch Technology Exhibiting High-mW Performance without Surface Passivation
L. Shen, Y. Pei, L. McCarthy, C. Poblenz, A. Corrion, N. Fichtenbaum, S. Keller, S.P. Denbaars, J.S. Speck, U.K. Mishra, Univ. of California, Santa Barbara, Santa Barbara, USA

14:10

14:20

WE3A-04: AlGaN/GaN HEMTs with PAE of 53% at 35 GHz for HPA and Multifunction MMIC Applications
M. Kao, C. Lee, R. Hajji, P. Saunier, H. Tserng, TriQuint Semiconductor, Richardson, USA

14:30

WE3A-05: Multi-Watt Wideband MMICs in GaN and GaAs
D.E. Meharry, R.J. Lender, K. Chu, L.L. Gunter, K.E. Beech, BAE Systems Electron, USA

14:40

WE3A-06: A Comparison of AlGaN GaN HFETs on Si Substrates in Ceramic Air Cavity and Plastic Overmold Packages
R.J. Therrien, A. Chaudhari, S. Singhal, C. Snow, A. Edwards, C. Park, W. Nagy, J.W. Johnson, A.W. Hanson, K.J. Linthicum, I.C. Kizilyalli

14:50

WE3A-07: Degradation-Mode Analysis for Highly Reliable GaN-HEMT
Y. Inoue, S. Masuda, M. Kanamura, T. Ohki, K. Makiyama, N. Okamoto, K. Imanishi, H. Shigematsu, T. Kikkawa, N. Hara, K. Joshin, Fujitsu LABS, Atsugi, Japan

WE3B
Advances in Microwave and mm-Wave VCOs

Chair: Scott Wetenkamp
Cochair: Prasad Shastry
HCC 312

WE3B-01: A Fundamental VCO with Integrated Output Buffer Beyond 120 GHz in SiGe Bipolar Technology
S. Trotta, H. Knapp, K. Aufinger, T.F. Meister, J. Bock, W. Simbuerger, Infineon AG, Munich, Germany; A.L. Scholtz, Vienna University of Technology, Vienna, Austria

WE3B-02: Fundamental W-Band InP DHBT-Based VCOs With Low Phase Noise and Wide Tuning Range
R.E. Makon, R. Driad, K. Schneider, R. Aidam, M. Schlechtweg, G. Weimann, Fraunhofer IAF, Freiburg, Germany

WE3B-03: A PLL-Stabilized W-Band MHEMT push-push VCO with Integrated Frequency Divider Circuit
R. Weber, M. Kuri, M. Lang, A. Tessmann, M. Seelmann-Eggebert, A. Leuther, Fraunhofer Institute for Applied Solid-State Physics (IAF), Freiburg, Germany

WE3B-04: A 26 GHz Integrated Differential DRO Implemented using SiGe-HBT Technology
K.W. Hamed, A.P. Freundorfer, Queen's University, Kingston, Canada; Y.M. Antar, Royal Military College of Canada, Kingston, Canada

WE3B-05: An X-band Low Noise InP HBT VCO with Separate Varactor Layers
T. Magrisso, D. Elad, N. Buadana, Rafael, Haifa, Israel; S. Kraus, D. Cohen Elias, A. Gavrilov, S. Cohen, D. Ritter, Technion, Haifa, Israel

WE3C
Ferrite and Ferroelectric Components

Chair: Michael Steer
Cochair: Douglas Adam
HCC 313A

WE3C-01: Compact Analog Phase Shifters using Thin-Film (Ba,Sr)TiO_3 Varactors
L. Chen, R. Forse, T.C. Watson, Agile Materials and Technologies, Goleta, USA; R.A. York, University of California, Santa Barbara, USA

WE3C-02: A DC Voltage Dependent Switchable Thin Film Bulk Wave Acoustic Resonator Using Ferroelectric Thin Film
X. Zhu, J.D. Phillips, A. Mortazawi, University of Michigan, Ann Arbor, USA

WE3C-03: Frequency Agile 90° Hybrid Coupler Using Barium Strontium Titanate Varactors
E.A. Fardin, A.S. Holland, K. Ghorbani, RMIT University, Melbourne, Australia

WE3C-04: Tunable IF Filter using Thin-Film BST Varactors
G. Sanderson, T.C. Watson, Agile Materials & Technologies, Goleta, USA; D. Chase, Vareda, Goleta, USA; M. Roy, J.M. Paricka, Rockwell Collins, Cedar Rapids, USA; R.A. York, UCSB

WE3C-05: Experimental Characterization of the 3rd Order Nonlinearities in Thin-Film Parallel-Plate Ferroelectric Varactors
A. Deleniv, P. Rundqvist, A. Vorobiev, E. Kollberg, Chalmers University of Tech.; S. Gevorgian, Ericsson AB, Sweden

WE3C-06: 6–18 GHz Edge Mode Isolator
J.D. Adam, S.N. Stitzer, Northrop Grumman, Baltimore, USA; S. Gaglione, Northrop Grumman, Boca Raton, USA

WE3C-07: Microwave and Magnetostatic Characterization of Ferrite LTCC for Tunable and Reconfigurable SiP Applications
A. Shamim, L. Roy, N. Hojjat, Carleton Univ.; J. Bray, R.A. Elasoued, Royal Military; D. Baillargeat, Univ. of Limoge

WE3C-08: A High-Power Single-Bridge SP4T Waveguide Reciprocal Ferrite Switch
C.R. Boyd, Jr., Microwave Applications Group, Santa Maria, USA

WE3C-09: Development of High-Power Fast RF Vector Modulator with TEM Ferrite Phase Shifters
Y.W. Kang, J.L. Wilson, T.W. Hardek, A.V. Vassioutchenko, Oak Ridge National Lab, Oak Ridge, USA

WE3C-10: Numerical Modelling of Unbiased Microstrip Circulators Based on Magnetic Nanowired Substrate: Use of a Ferrite-Equivalent model
J. Allaeys, J. Mage, Thales, Palaiseau, France

WE3D
Accuracy Evaluation and Enhancement in TD EM Modeling

Chair: Zhizhang David Chen
Cochair: Manos Tentzeris
HCC 316B

WE3D-01: Radial Absorbers for Conformal Time-Domain Methods: A Solution to Corner Problems in Mesh Truncation
K. Sankaran, C. Fumeaux, R. Vahldieck, ETH Zürich, Zürich, Switzerland

WE3D-02: A Nonuniform Mesh High-Order Finite-Difference Time-Domain Method based on Biorthogonal Interpolating Functions
C.D. Sarris, University of Toronto, Toronto, Canada

WE3D-03: A Lagrangian Approach for the Handling of Curved Boundaries in the Finite-Difference Time-Domain Method
J.A. Russer, P.S. Sumant, A.C. Cangellaris, University of Illinois at Urbana-Champaign, Urbana, USA

WE3D-04: A High-Resolution Z-Transform Tensor Formulation of the FDTD Method
D.M. Sullivan, University of Idaho, Moscow, USA; J. Nadobny, Charite, Berlin, Germany

WE3D-05: Numerical Stability Analysis of FDTD Algorithms in Gyrotropic Media
M. Celuch, A. Moryc, W.K. Gwarek, Institute of Radioelectronics Warsaw University of Technology, Warsaw, Poland

WE3D-06: Numerical Dispersion of the ADI-FDTD Technique Including Lumped Models
Z. Chen, Q. Chu, Research Institute of RF and Wireless Techniques, Guangzhou, China

Wednesday

Technical Sessions

13:20–15:00

WE3E
Wideband Planar Filters

Chair: Sridhar Kanamaluru
Cochair: Roberto Sorrentino
HCC 316A

WE3E-01: A Wideband CPS Bandpass Filter with Ultrawide Upper Stopband Using Stepped-Impedance Rat-Race Hybrid Couplers
C. Chi, C. Chang, National Chiao Tung University, Hsinchu, Taiwan

WE3E-02: Wideband Microwave Bandpass Filters With Hybrid Rings
R. Gomez-Garcia, University of Alcala, Alcala de Henares, Spain

WE3E-03: A Novel Millimeter-Wave Ultra-Wideband Bandpass Filter Using Microstrip Dual-Mode Ring Resonators Loaded with Open Tuning Stubs of Different Lengths
Z. Ma, Y. Kobayashi; P. Cai, X. Guan; T. Anada; G. Hagiwara

WE3E-04: Folded Compact Ultra-Wideband Stepped-Impedance Resonator Filters
M. Mokhtaari, J. Bornemann, University of Victoria, Victoria, Canada; S. Amari, Royal Military College of Canada, Kingston, Canada

WE3E-05: A Novel Compact Ultra-Wideband Bandpass Filter Using a Microstrip Stepped-Impedance Four-Modes Resonator
P. Cai, X. Guan, Shanghai Univ.; Z. Ma, Y. Kobayashi, Saitama Univ.; T. Anada, Kanagawa Univ.; G. Hagiwara

WE3E-06: Broadband and Compact Double Stepped-Impedance CPS Filters with Coupled-Resonance Enhanced Selectivity
N. Yang, C. Christophe, K. Wu, École Polytechnique, Montréal, Montréal, Canada; Z. Chen, Institute for Infocomm Research, Singapore, Singapore

WE3F: Focused Session
Microwaves in Support of Societal Security

Chair: Ed Niehenke
Cochair: K. Breuer, B. Spielman
HCC 315

WE3F-01: Advances in Security Technologies: Imaging, Anomaly Detection, and Target and Biometric Recognition
J.A. O'Sullivan, R. Pless, Washington University, St. Louis, USA

WE3F-02: Radar Based Concealed Threat Detector
J. Hausner, N.M. West, Electro Science Technologies, Albuquerque, USA

WE3F-03: Through-the-Wall Radar Life Detection and Monitoring
V.M. Lubecke, O. Boric-Lubecke, A. Host-Madsen, University of Hawaii, Honolulu, USA; A. Fathy, University of Tennessee, Knoxville, USA

WE3F-04: Imaging Through the Atmosphere at Terahertz Frequencies
M.J. Rosker, DARPA, Arlington, USA; H.B. Wallace, MMW Concepts LLC, Havre de Grace, USA

WE3F-05: Retrodirective Radar for Small Projectile Detection
E.R. Brown, E.B. Brown, Physical Domains, LLC, La Canada, USA; R.F. Sinclair, Sinclair R.F., Inc., Thousand Oaks, USA

WE3G
Linear Device Modeling

Chair: Wayne Struble
Cochair: Peter Aaen
HCC 314

WE3G-01: Robust Extraction of Access Elements for Broadband Small-Signal FET Models
A.E. Parker, Macquarie University, Macquarie University, Australia; S.J. Mahon, Mimix Broadband, Houston, USA

WE3G-02: A New Physics-Based Compact Model for AlGaN/GaN HFETs
H. Yin, G.L. Bilbro, R.J. Trew, North Carolina State University, Raleigh, USA

WE3G-03: A New and Better Method for Extracting the Parasitic Elements of On-Wafer GaN Transistors
A. Zarate-de Landa, J.E. Zuniga-Juarez, J.A. Reynoso-Hernadez, M.C. Maya-Sanchez, Centro de Investigacion Cientifica y de Educacion Superior de Ensenada, Ensenada, Mexico; E.L. Piner, K.J. Linthicum, Nitronex Corp. Raleigh, USA

WE3G-04: Switch-Based GaN HEMT Model Suitable for Highly-Efficient RF Power Amplifier Design
R. Negra, S. Boumaiza, F. M. Ghannouchi, University of Calgary, Canada; T. D. Chu, G. M. Hegazi, Government Systems, Cedar Rapids, USA

WE3G-05: Microwave Device Modeling Using Space-Mapping and Radial Basis Functions
S. Koziel, McMaster University, Hamilton, Canada; J.W. Bandler, Bandler Corp., Dundas, Canada

WEP2
Interactive Forum

Chair: Eric Bryerton
Cochair: Bela Szendrenyi
HCC Ballroom A

WEP2: Interactive Forum

13:20
13:30
13:40
13:50
14:00
14:10
14:20
14:30
14:40
14:50

WEDNESDAY

WEP2A
Millimeter Wave and Terahertz Components and Technologies

WEP2A-01: An Analogue, 4:2 MUX/DEMUX Front-End MIMIC for Wireless 60 GHz Multiple Antenna Transceivers
S. Koch, M. Uno, Sony Deutschland GmbH; I. Kallfass, R. Weber, A. Leuther, M. Schlechtweg, Fraunhofer Inst. Phys.

WEP2A-02: Measurement of Terahertz Refractive Index for Plasmon Waveguides
H. Yasuda, NICT, Koganei, Japan

WEP2A-03: A 90 nm CMOS Broadband and Miniature Q-Band Balanced Medium Power Amplifier
J. Tsai, Y. Lee, T. Huang, C. Yu, J. Chern, National Taiwan University, Taipei, Taiwan

WEP2A-04: A Miniature 38–48 GHz MMIC Subharmonic Transmitter with Postdistortion Linearization
J. Tsai, H. Yang, T. Huang, National Taiwan University, Taipei, Taiwan

WEP2A-05: Effective Medium Theory for Carbon Nanotube Composites and their Potential Applications as Metamaterials
S.M. Mikki, A.A. Kishk, University of Mississippi, University, USA

WEP2A-06: Silicon Micromachined Multiplier Utilizing Heterostructure Barrier Varactor Diode
P.L. Kirby, Y. Li, J. Papapolymerou, Georgia Inst. of Tech., Atlanta, USA; Q. Xiao, Univ. of Virginia, Charlottesville, USA; J. Hesler, Virginia Diodes Inc., Charlottesville, USA

WEP2A-07: Microfabricated Left-Handed Transmission Line Operating at 50 GHz
C. Qin, A. Kozyrev, A. Karbassi, V. Joshkin, D.W. van der Weide, University of Wisconsin-Madison, Madison, USA

WEP2A-08: Simulations of Quasi-Optical Output Systems for High-Power Gyrotrons based on the Electric Field Integral Equation
O. Prinz, Forschungszentrum Karlsruhe, Karlsruhe, Germany; M. Thumm, University Karlsruhe, Karlsruhe, Germany

WEP2A-09: Integrated 585 GHz Hot-Electron Mixers Based on Annular Slot Antennas
L. Liu, Q. Xiao, A.W. Lichtenberger, R.M. Weikle, II, University of Virginia, Charlottesville, USA

WEP2A-10: Balanced Low-Loss Ka-Band μ-Coaxial Hybrids
K.J. Vanhille, D.S. Filipović, Z. Popović, University of Colorado; C. Nichols, Rohm & Haas Elec Mat'ls, LLC; D.L. Fontaine, BAE Systems; W. Wilkins, E. Daniel, Mayo Foundation

WEP2A-11: A Reflection Based, Pulsed THz Imaging System with 1 mm Spatial Resolution
Z.D. Taylor, R.S. Singh, E.R. Brown, J.E. Bjarnason, M.P. Hanson, A.C. Gossard, University of California, Santa Barbara, Santa Barbara, USA

WEP2A-12: Integrated Microbolometer Antenna Characterization from 95 to 650 GHz
C.R. Dietlein, J.D. Chisum, M.D. Ramirez, Z. Popović, University of Colorado, Boulder, USA; E.N. Grossman, National Institute of Standards and Technology, Boulder, USA; A. Luukanen, VTT Tech Res Centre of Finland, Espoo, Finland

WEP2B
Packaging, Interconnects, MCMs, and Hybrid Manufacturing

WEP2B-01: A 30 GHz Waveguide-to-Microstrip-Transition
F.J. Schmueckle, W. Heinrich, Ferdinand-Braun-Inst für Hochstfrequenztechnik, Berlin, Germany; W. Gross, K. Hirche, M. Rostewitz, Tesat Spacecom GmbH & Co. KG, Backnang, Germany

WEP2B-02: Integrated Passive Technology for Wireless Basestation Applications
L. Liu, C. Ramiah, Q. Li, S. Pacheco, S. Kuo, M. Miller, S. Marshall, M. Watts, P. Piel, Freescale Semiconductor Inc., Tempe, USA

WEP2C
Instrumentation and Measurement Techniques

WEP2C-01: Broadband Characterization of Multilayer Dielectric Thin Films
J.C. Booth, NIST; N.D. Orloff, M. Murakami, I. Takeuchi, University of Maryland; J. Mateu, Univ. Politecna de Cataluna

WEP2C-02: Characterization of Multiwalled Carbon Nanotube (MWNT) Papers using X-Band Waveguides
H. Xin, L. Wang, University of Arizona, Tucson, USA; D. Carnahan, Nano-Lab Inc., Newton, USA

WEP2C-03: Microstrip Resonator Technique for Measuring Dielectric Permittivity of Liquid Solvents and for Solution Sensing
K. Saeed, A.C. Guyette, I.C. Hunter, R.D. Pollard, University of Leeds, Leeds, UK

WEP2C-04: High Power Microwave Device Temperature Measurement — Methodology and Applications for Pulsed Devices
M. Mahalingam, E. Mares, W. Brakensiek, K. Burger, C. Hsu, Freescale Semiconductor Inc., Tempe, USA

WEP2C-05: Gaining Advanced Insight in the Phase Stability of Comb Generators using a Large-Signal Network Analyzer
G. Pailloncy, F. Verbeyst, M. Vanden Bossche, NMDG Engineering bvba, Bornem, Belgium

WEP2D
Smart Antennas, Spatial Power Combining, and Phased Arrays

WEP2D-01: A Tunable Quasilumped Microstrip Coupler and RF Applications
F. Ferrero, G. Jacquemod, University of Nice, Valbonne, France

WEP2D-02: Active Integrated Antenna Based on Planar Dielectric Resonator with Tuning Ferroelectric Varactor
O. Y. Buslov, A. A. Golovkov, V. N. Keis, A. B. Kozyrev, S. V. Krasilnikov, T. B. Samoilova, A.Y. Shimko; D. Ginley, T. Kaydanova

WEP2D-03: Analysis and Experimental Study of Wideband Dielectric Resonator Antenna Arrays for Waveguide-Based Spatial Power Combining
Y. Zhang, A. A. Kishk, A. B. Yakovlev, A. W. Glisson, The University of Mississippi, University, USA

WEP2D-04: A Low Profile Twin-PIFA Laptop Reconfigurable Multiband Antenna for Switchable and Fixed Services Wireless Applications
C. Zhang, S. Yang, S. Lee, S. M. El-Ghazaly, A. E. Fathy, Univ. of Tennessee, Knoxville, USA; H. K. Pan, V. K. Nair, Intel Corp., Hillsboro, USA

WEP2E
Radars and Broadband Communication Systems

WEP2E-01: Balancing Target Noise Against Thermal Noise — On the Optimum Beamwidth for Mean Radar Reflectivity Estimation
F. Gerbl, E. M. Biebl, Technische Universität München, München, Germany

WEP2E-02: Concurrent Circuit-Level/System-Level Optimization of a 24 GHz Mixer for Automotive Applications Using a Hybrid Electromagnetic/Statistical Technique
F.P. Placentino, A. Scarponi, Univ. of Perugia, Perugia, Italy; D. Staiculescu, S. Nikolaou, M.M. Tentzeris, Georgia Inst. of Tech., Atlanta, USA; L.J. Martin, Motorola, Plantation, USA

WEP2F
Wireless and Cellular Communication Systems

WEP2F-01: Design of an Overmoded-Waveguide Directional Antenna for use in In-Building Ventilation Duct Wireless Networks
J.C. Hess, B.E. Henty, D.D. Stancil, Carnegie Mellon University, Pittsburgh, USA

WEP2F-02: Adaptive Linearization of Frequency Doubler Using DGS
S.M. Kang, K.H. Koo, University of Incheon, Incheon, S. Korea; S.W. Nam, Seoul National University, Seoul, S. Korea

WEP2F-03: Distributed Body-Worn Transceiver System with the Use of Electrotextile Antennas
Y. Ouyang, W.J. Chappell, Purdue University, West Lafayette, USA

WEP2G
Sensors and Sensor Systems

WEP2G-01: Noninvasive Determination of Temperature Trajectories During a Defrosting Process using Microwave Radiometry
P. Cresson, L. Dubois, J.P. Pribetich, IEMN Université de Lille, Villeneuve d'Ascq, France

WEP2G-02: A 5.8 GHz Local Positioning and Communication System
R. Mosshammer, M. Huemer, University of Erlangen-Nuremberg, Erlangen, Germany; R. Szumny, K. Kurek, Warsaw University of Technology, Warsaw, Poland; J. Huttner, R. Gierlich, Siemens AG, Munich, Germany

WEP2G-03: Sensor Nodes for Doppler Radar Measurements of Life Signs
I. Mostafanezhad, B. Park, O. Boric-Lubecke, V. Lubecke, A. Host-Madsen, University of Hawaii at Manoa, Honolulu, USA

WE4A
X-Band and Millimeter-Wave Devices and Power Amplifiers
Chair: Anh-Vu Pham
Cochair: Eliot D. Cohen
HCC 311

WE4A-01: Compact InP HBT Power Amplifiers using Integrated Thick BCB Dielectrics
J.B. Hacker, W. Ha, C. Hillman, M. Urteaga, R. Pierson, B. Brar, Teledyne Scientific Co., Thousand Oaks, USA

WE4A-02: A High Efficiency and High Linearity 20 GHz InP HBT Monolithic Power Amplifier for Phased-Array Applications
M.V. Aust, A.K. Sharma, A.T. Chau, A.L. Gutierrez-Aitken, Northrop Grumman, Redondo Beach, USA

WE4A-03: A Robust 11 W High-Efficiency X-Band GaInP HBT Amplifier
A. Couturier, S. Heckmann, V. Serru, T. Huet, P. Chaumas, J. Fontecave, M. Camiade, J. Viaud, United Monolithic Semiconductors (UMS), Orsay, France; S. Piotrowicz, Alcatel-Thales, France

WE4A-04: A High-Gain, Two-Stage, X-Band SiGe Power Amplifier
J.M. Andrews, J.D. Cressler, M. Mitchell, Georgia Tech, Atlanta, USA

WE4A-05: A High Power and High-Breakdown Voltage Millimeter-wave GaAs pHEMT with Low Nonlinear Drain Resistance
H. Amasuga, A. Inoue, S. Goto, T. Kunii, Y. Yamamoto, T. Oku, T. Ishikawa, Mitsubishi Electric Corp., Itami, Japan

WE4A-06: A K-Band Low-Cost Plastic-Packaged High Linearity Power Amplifier with Integrated ESD Protection for Multiband Telecom Applications
B. Lefebvre, D. Bouw, J. Lhortolary, C. Chang, S. Tranchant, M. Camiade, United Monolithic Semiconductors

WE4A-07: Ka-Band 2 W and 4 W MMIC Power Amplifier In 7×7 mm Low-Cost SMT Package
K. Fujii, H. Morkner, Avago Tech Inc., San Jose, USA

WE4B
Novel Signal-Generation Techniques and Applications
Chair: Kenjiro Nishikawa
Cochair: John Kuno
HCC 312

WE4B-01: Novel Phase Difference Control Between Output Signals using Fractional-N PLL Synthesizers by Cyclic Shift of Control Data
K. Tajima, R. Hayashi, Mitsubishi Electric Co., Kamakura, Japan

WE4B-02: UWB Pulse Oscillator at 24 GHz with 2.1 GHz Bandwidth for Industrial Radar Sensor Applications
T. Wuchenauer, Siemens AG, Munich, Germany; M. Nalezinski, Epcos AG, Munich, Germany; W. Menzel, University of Ulm, Ulm, Germany

WE4B-03: New Frequency Plan and Reconfigurable 6.6/7.128 GHz CMOS Quadrature VCO for MB-OFDM UWB Application
T. Huang, J. Wang, National Cheng Kung University, Tainan, Taiwan, ROC

WE4B-04: A 1.1 V Low Phase Noise CMOS Quadrature LC VCO with 4-Way Center-Tapped Inductor
P. Upadhyaya, D. Heo, D.M. Rector, Washington State University, Pullman, USA; Y.E. Chen, National Taiwan University, Taipei, Taiwan

WE4B-05: A Low Phase-Noise 9 GHz CMOS Quadrature VCO using Novel Source-Follower Coupling Technique
H. Chen, S. Lu, D. Chang, Y. Juang, National Taiwan University, Taipei, ROC

WE4B-06: Low-Power OOK Transmitter for Wireless Capsule Endoscope
J. Ryu, S. Nam, J. Lee, M. Kim, School of EE and INMC, Seoul, South Korea; B. Kim, School of Information and Comm Eng, Seoul, South Korea; M. Lee, Dept; of E&CE, Seoul, S. Korea

WE4C
SAW and FBAR RF Filters and Modules
Chair: Robert Weigel
Cochair: Clemens Ruppel
HCC 313A

WE4C-01: High-Performance Single-Balanced Duplexer
P. Girard, M. Solal, Triquint Semiconductor, Apopka, USA

WE4C-02: Characterization of SAW Duplexer Inserts for LTCC RF Front-End Modules by Simulation and Measurement
R.D. Koch, R. Weigel, University of Erlangen-Nuremberg, Erlangen, Germany; F.M. Pitschi, J.E. Kiwitt, Epcos AG, Munich, Germany

WE4C-03: Low-Loss, Narrowband SAW Filters on Leaky Substrates
J. Meltaus, O. Holmgren, K. Kokkonen, Helsinki University of Technology, Espoo, Finland; S. Hong, Samsung Electro-Mechanics Co., Suwon, Korea; V.P. Plessky, GVR Trade SA, Bevaix, Switzerland

WE4C-04: Single-Crystal FBAR with $LiNbO_3$ and $LiTaO_3$ Piezoelectric Substance Layers
Y. Osugi, T. Yoshino, K. Suzuki, NGK Insulators, Ltd, Nagoya, Japan; T. Hirai, Soshin Electric Co., Ltd., Saku, Japan

WE4C-05: MW FBAR Structures Fabricated using Micromachined GaN Membranes
D. Neculoiu, A. Muller, D. Vasilache, IMT-Bucharest, Romania; G. Konstantinidis, A. Kosopoulos, Found. for Res and Techn-Hellas FORTH-IELS-MRG, Heraklion, Greece; K. Mutamba, Infineon Tech, Regensburg, Ger.; C. Sydlo, H.L. Hartnagel, Technische Univ. Darmstadt, Ger.; L. Bary, R. Plana, LAAS-CNRS, Toulouse, France

WE4D: Problems of Scale and Hybrid Modeling in Time-Domain Electromagnetics
Chair: Malgorzata Celuch
Cochair: Atef Elsherbeni
HCC 316B

WE4D-01: A New Multiresolution FDTD Approach Based on the Hybridization of MR-FDTD and DG-FDTD methods
R. Pascaud, R. Gillard, R. Loison, Institut d'Electronique et des Telecommunications de Rennes, Rennes, France; J. Wiart, M. Wong, France Telecom, Issy Les Moulineuax, France

WE4D-02: FDTD Modeling of Finite Electromagnetic Source over Periodic Structure via a Spectral Expansion Approach
R. Qiang, J. Chen, University of Houston, Houston, USA; F. Yang, University of Mississippi, University, USA

WE4D-03: Overcoming Limitations of Laguerre-FDTD for Fast Time-Domain EM Simulation
K. Srinivasan, M. Swaminathan, E. Engin, Georgia Institute of Technology, Atlanta, USA

WE4D-04: Central-Node Approach for Accurate Self-Adjoint Sensitivity Analysis of Dielectric Structures
Y. Song, N.K. Nikolova, McMaster University, Hamilton, Canada

WE4D-05: 2D Particle-in-Cell Simulation on Rising-Sun Magnetron
N. Faure, P. Leveque, XLIM, Limoges, France

WE4E
Planar Dual-Mode and Dual-Bandpass Filters
Chair: Richard Chen
Cochair: Toshio Nishikawa
HCC 316A

WE4E-01: Compact Dualband Bandpass Filters Using Dual-Mode Resonators
A. Gorur, Nigde University, Nigde, Turkey; C. Karpuz, Pamukkale University, Denizli, Turkey

WE4E-02: Analytical Synthesis Algorithm of Dualband Filters with Asymmetric Pass Bands and Generalized Topology
A. Garcia-Lamperez, Universidad Politécnica de Madrid, Madrid, Spain

WE4E-03: Multibandpass Filters Using Multiarmed Open-Loop Resonators with Direct Feed
M.H. Awida, A.M. Safwat, H. El-Hennawy, Ain Shams University, Cairo, Egypt; A. Boutejdar, A.S. Omar, University of Magdeburg, Magdeburg, Germany

WE4E-04: A Novel Broadband Suspended Substrate Stripline Filter using Resonators with T-Shaped Open-Circuited Stubs
J.S. Kim, KETI, Seongnam-si, South Korea; N.S. Kim, W.G. Moon, Acewavetech, Incheon, South Korea

WE4E-05: A Novel Compact Dual-Mode Filter Using Cross-Slotted Patch Resonator for Dualband Applications
W. Min-Hang; W. Sean,; J. Shih-Bin, L. Maw-Shung; C. Yu-Chi (Taiwan)

WE4E-06: A Compact-Size and High-Isolation Dualband Coplanar-Waveguide Bandpass Filter
H. Cheng-Yuan, Y. Ru-Yuan, S. Yan-Kuin, Nat'l Cheng Kung Univ.; Y. Chang-Sin, H. Chun-Yueh, Nat'l Univ. of Tainan; W. Min-Hang, Nat'l Nano Dev Lab, Taiwan

WE4F: Focused Session
Advances in Microwave Systems for Deep-Space Missions
Chair: Christopher C. DeBoy
Cochair: Timothy Pham
HCC 315

WE4F-01: Engineering the Next-Generation Deep-Space Network
B.J. Geldzahler, J.J. Rush, National Aeronautics and Space Administration, Washington, USA; L.J. Deutsch, J.I. Statman, Jet Propulsion Lab, Pasadena, USA

WE4F-02: Microwave Technologies for the New Horizons Mission to Pluto
C.B. Haskins, C.C. DeBoy, Johns Hopkins University, Applied Physics Lab, Laurel, USA

WE4F-03: Advances in Microwave/RF Design for the MESSENGER Mission to Mercury
R.E. Wallis, S. Cheng, P.M. Malouf, R.K. Stilwell, Johns Hopkins Applied Physics Lab, Laurel, USA

WE4F-04: Polarization Combining in the DSN — Recent Results
T.T. Pham, Jet Propulsion Lab, Pasadena, USA; C.C. DeBoy, Johns Hopkins University Applied Physics Lab, Laurel, USA

WE4F-05: Advanced RF Systems for ESA Deep Space Missions
P. Schmitz, M. Lanucara, R. Madde, European Space Agency/European Space Operations Center, Darmstadt, Germany

WE4G
Nonlinear Circuit Analysis and System Simulation
Chair: Stephen Maas
Cochair: Kevin Gard
HCC 314

WE4G-01: Fast Nonlinear Analysis of Reconfigurable Microwave Systems by a Behavioral Model of MEMS Switches
V. Rizzoli, D. Masotti, F. Mastri, University of Bologna, Bologna, Italy

WE4G-02: Nonlinear Distortion Analysis of Polar Transmitters
J.C. Pedro, P.M. Cabral, Universidade de Aveiro, Aveiro, Portugal; J.A. Garcia, Universidad de Cantabria, Santander, Spain

WE4G-03: The Impact of Long Term Memory Effects in Wireless QPSK Modulated Signals
R.E. Santos, N.B. Carvalho, Instituto de Telecomunicações, Universidade de Aveiro, Aveiro, Portugal; K.G. Gard, North Carolina State University, Raleigh, USA

WE4G-04: Distortion Evaluation of RF Power Amplifiers Using Dynamic Deviation Reduction Based Volterra Series
A. Zhu, University College Dublin, Dublin, Ireland; J.C. Pedro, University of Aveiro, Aveiro, Portugal

WE4G-05: Multitone, Multiport, and Dynamic Memory Enhancements to PHD Nonlinear Behavioral Models from Large-Signal Measurements and Simulations
J. Verspecht; D. Gunyan, J.M. Horn, J. Xu, A. Cognata, D.E. Root

WE4G-06: Semianalytical Formulation for the Stability Analysis of Coexisting Solutions in Coupled-Oscillator Systems
A. Collado, A. Suarez, S. Sancho, University of Cantabria, Santander, Spain

WEP2
Interactive Forum
Chair: Eric Bryerton
Cochair: Bela Szendrenyi
HCC Ballroom A

WEP2: Interactive Forum

Thursday Technical Sessions 08:00–09:40

TH1A
High Power Amplifiers I

Chair: Wayne Kennan
Cochair: Kiki Ikossi
HCC 311

TH1A-01: High-Efficiency GaN HEMT Power Amplifier Optimized for OFDM EER Transmitter
S. Hong, Y.Y. Woo, I. Kim, J. Kim, J. Moon, B. Kim, Postech, Pohang, Republic of Korea; H.S. Kim, J.S. Lee, Samsung Electronics Co., LTD., Suwon

TH1A-02: C-Band GaN HEMT Power Amplifier with 220 W Output Power
K. Yamanaka, K. Mori, K. Iyomasa, H. Ohtsuka, H. Noto, M. Nakayama, Y. Isota, Mitsubishi Elec Corp., Kamakura, Japan; Y. Tsuyama, Mitsubishi Elec Corp., Amagasaki, Japan; Y. Kamo, Mitsubishi Elec Corp., Itami, Japan

TH1A-03: GaN HEMT 60 W Output Power Amplifier with Over 50% Efficiency at C-Band 15% Relative Bandwidth using Combined Short and Open-Circuited Stubs
K. Iyomasa, K. Yamanaka, K. Mori, H. Noto, H. Ohtsuka, M. Nakayama, S. Yoneda, Y. Isota, Mitsubishi Elec., Kamakura, Japan; Y. Tsuyama, Mitsubishi Elec., Amagasaki, Japan; Y. Kamo, Mitsubishi Elec., Itami, Japan

TH1A-04: A 80 W Two-Stage GaN HEMT Doherty Amplifier with -50 dBc ACLR, 42% Efficiency 32 dB Gain with DPD for W-CDMA Base Station
N. Ui, H. Sano, S. Sano, Eudyna Devices Inc., Nakakoma-gun, Japan

TH1A-05: 50% Drain Efficiency Doherty Amplifier with Optimized Power Range for W-CDMA Signal
T. Yamamoto, T. Kitahara, S. Hiura, Toshiba Corp., Corporate Manufacturing Engineering Center, Yokohama-Shi, Japan

TH1A-06: Efficient Operation of Traveling-Wave Tube Amplifier with Dynamically Adjusted Collector Bias Voltages
J.X. Qiu, D.K. Abe, B.G. Danly, B. Levush, Naval Res Lab, Wash, USA; T.M. Antonsen, Jr., Science App. Int'l Corp., McLean, USA; R.E. Myers, ATK Corp., Newington, USA

TH1B
Nonplanar Filters and Multiplexers

Chair: Dick Snyder
Cochair: Clark Bell
HCC 312

TH1B-01: Analytical Synthesis of Generalized Multiband Microwave Filters
Y. Zhang, K.A. Zaki, University of Maryland, College Park, USA; J.A. Ruiz-Cruz, Universidad Autónoma de Madrid, Madrid, Spain; A.E. Atia, Orbital Science Corp., Dulles, USA

TH1B-02: Novel Folded Resonators and Filters
H. Lin, Industrial Technology Research Institute, Chutung, Hsinchu, Taiwan

TH1B-03: Design of a Bandpass Transversal Filter Employing a Novel Hybrid Waveguide-Printed Structure
M. Martinez-Mendoza, J.S. Gomez-Diaz, D. Canete-Rebenaque, J.L. Gomez-Tornero, A. Alvarez-Melcon, Technical University of Cartagena

TH1B-04: Miniature High Power Combline Filters
S. Mehta, P. Petre, J. Foschaar, HRL Labs, Malibu, USA

TH1B-05: Dualband Filters for Base Station Multiband Combiners
G. Macchiarella, Politecnico di Milano, Milano, Italy; S. Tamiazzo, Andrew Telecommunication Products, Agrate Brianza, Italy

TH1B-06: Design and Testing of a Thermally Stable Filter Using Bimetal Compensation
B.F. Keats, R.R. Mansour, R.B. Gorbet, University of Waterloo, Waterloo, Canada

TH1B-07: Synthesis and Design Procedure for High Performance Waveguide Filters Based on Nonresonating Nodes
S. Cogollos, V.E. Boria; R.J. Cameron, M. Yu, Comdev; R.R. Mansour

TH1B-08: CMOS-Compatible Encapsulated Silver Bandpass Filters
M. Rais-Zadeh, H.M. Lavasani, F. Ayazi, Georgia Institute of Technology, Atlanta, USA

TH1C
Advances in Radar Systems

Chair: Arne F. Jacob
Cochair: Roger Kaul
HCC 313A

TH1C-01: Fully Integrated SiGe-BiCMOS Receiver (RX) and Transmitter (TX) Chips for 76.5 GHz FMCW Automotive Radar Systems Including Demonstrator Board Design
J. Feige, P. Wennekers, C. Trigas, J. Kirchge, R. Reuter, H. Li, Y. Yin, A. Ghazinour, Freescale, Munich, Germany; I. To, D. Morgan, P. Welch, S. Braithwaite, B. Knappenberger, D.G. Scheitlin, J.P. John, M. Huang, M. Tutt, Freescale, Tempe, USA; D. Jahn, Astyx, GMBH, Ottobrunn, Germany

TH1C-02: A 26 GHz Short-Range UWB Vehicular Radar using 2.5 Gc/s Spread-Spectrum Modulation
T. Fukuda, N. Negoro, S. Ujita, S. Nagai, M. Nishijima, H. Sakai, T. Tanaka, D. Ueda, Matsushita Electric Industrial Co., Ltd., Takatsuki, Japan

TH1C-03: Method for High-Precision Radar Distance Measurement and Synchronization of Wireless Units
S. Roehr, P. Gulden, Symeo GmbH, Munich, Germany; M. Vossiek, Clausthal University of Technology, Clausthal-Zellerfeld, Germany

TH1C-04: Adaptive Frequency Sweep Linearization Based on Phase Accumulator Principle
C. Wagner, H. Jaeger, DICE, Linz, Austria; A. Stelzer, University of Linz, Linz, Austria

TH1C-05: Center Tracking Quadrature Demodulation for a Doppler Radar Motion Detector
B. Park, V.M. Lubecke, O. Boric-Lubecke, University of Hawaii at Manoa, Honolulu, USA

TH1C-06: A Low-Cost 24 GHz Long-Range, Narrowband Monopulse Radar Front End for Automotive ACC Applications
V. Cojocaru, D. Humphrey, B. Clarke, T. Young, V. Napijalo, M. Chinn, S. Seawright; H. Kurata, T. Yokoyama, H. Shimoda, H. Ikeda, T. Adachi, T. Honya, Y. Yamashita

TH1D
Biological Effects and Medical Applications

Chair: Arye Rosen
Cochair: Joseph Pribetich
HCC 316B

TH1D-01: A 433 MHz Hyperthermia System using Rotating Spiral Antennas for Uniform Treatment of Large Superficial and Subsuperficial Tumors
O. Arabe, Duke University, Durham, USA

TH1D-02: Role of Microwave Accelerators in Cancer Treatment
S.M. Hanna, Microwave Innovative Accelerators, Danville, USA

TH1D-03: High Frequency Dielectric Characteristics of Tumorous and Non-tumorous Breast Tissues
U.A. Khan, N. Al Moayed, N. Nguyen, M. Obol, K. Korolev, M.N. Afsar, High Freq. Mtls Meas. & Info Ctr., Medford, USA; S. Naber, Tufts Medical Center, Boston, USA

TH1D-04: Large-Scale Simulations Including a Human-Body Model for MRI
M.H. Vogel, Ansoft Corp., Pittsburgh, USA; R.P. Kleihorst, Philips Medical Systems, Best, The Netherlands

TH1D-05: Specific Absorption Rate (SAR) Numerical Evaluation: A Critical Discussion
L. Catarinucci, L. Tarricone, University of Lecce, Lecce, Italy

TH1D-06: Design Considerations for the Implanted Antennas
A. Mahanfar, Simon Fraser University, Burnaby, Canada; S. Bila, M. Aubourg, S. Verdeyme, XLIM, Limoges, France

Thursday Technical Sessions 08:00–09:40

TH1E
Components, Systems, and Applications for Millimeter-Wave and THz Imaging

Chair: John Cunningham
Cochair: Robert Weikle
HCC 316A

TH1E-01: Multichannel Receiver for an E-Band FMCW Imaging Radar
J. Schellenberg, R. Chedester, J. McCoy, Trex Enterprises, Kahului, USA

TH1E-02: A Low-Noise Chipset for Passive Millimeter-Wave Imaging
H.P. Moyer, J.J. Lynch, J.N. Schulman, R.L. Bowen, J.H. Schaffner, A.K. Kurdoghlian, T.Y. Hsu, HRL Labs, LLC, Malibu, USA

TH1E-03: Ultrasensitive ErAs/InGaAlAs Direct Detectors for Millimeter Wave and THz Imaging Applications
H. Kazemi, G. Nagy, L. Tran; E. Grossman, E. Brown, A. Gossard, A. Young, J. Zimmerman; G. Boreman; B. Lial

TH1E-04: 600 GHz Imaging Radar with 2 cm Range Resolution
R.J. Dengler, K.B. Cooper, G. Chattopadhyay, I. Mehdi, E. Schlecht, A. Skalare, P.H. Siegel, Jet Propulsion Lab, Pasadena, USA; C. Chen, University of Delaware, Newark, USA

TH1E-05: A Micromachined 94 GHz Dielectric Resonator Antenna for Focal Plane Array Applications
D. Karlen, P. Enoksson, Chalmers U. of Tech.; L. Huss, J. Svedin, Swedish Defence Res. Agency; C. Rusu, The Imego Inst., Goteborg, Sweden

TH1E-06: Application of Finite Difference Time Domain Methods to Terahertz Spectroscopy Measurements of Breast Cancer
E. Pickwell-MacPherson; T. Lo, A. Fitzgerald, V. Wallace; E. Provanzano, S. Pinder; A. Purushotham

TH1E-07: Broadband Microwave-to-Terahertz Near-Field Imaging
S.V. Danylyuk, U. Poppe, N. Klein, Forschungszentrum Juelich, Germany; F. Kadec, P. Kuzel, M. Berta, Inst. of Physics, Acad. of Sci., Prague; R.C. Pullar, London South Bank U., UK; H. Romanus, Tech U., Ilmenau, Germany

TH1F
Frequency Conversion and Control

Chair: Huei Wang
Cochair: Mohammad Madihian
HCC 315

TH1F-01: An S-band 100 W GaN Protection Switch
M. Hangai, T. Nishino, Y. Kamo, M. Miyazaki, Mitsubishi Electric Corp., Kamakura, Japan

TH1F-02: A Novel Multistack Device Structure and its Analysis for High-Power CMOS Switch Design
M. Ahn, J. Laskar, Georgia Inst. of Tech.; C. Lee, Samsung RFIC Design Center, Atlanta, USA; B. Kim, Sungkyunkwan University, Suwon, South Korea

TH1F-03: A 35–50 GHz IQ-Demodulator in 0.13 µm CMOS Technology
C. Lin, P. Wu, K. Lin, H. Wang, National Taiwan University, Taipei, Taiwan; H. Chang, National Central University, Jhongli City, Taiwan

TH1F-04: A Planar Image-Rejection Mixer with 135/45° Power Dividers
K. Nishida, H. Mizutani, M. Tsuru, K. Kawakami, M. Miyazaki, Y. Isota, Mitsubishi Electric Corp., Kamakura, Japan

TH1F-05: K-Band LTCC Star Mixer with Broadband IF Output Network
T. Baras, J. Mueller, A.F. Jacob, Hamburg Univ. of Technology, Hamburg, Germany

TH1F-06: A 44 GHz 0.18 µm CMOS Superharmonic Frequency Divider
T. Luo, Y.E. Chen, National Taiwan University, Taipei, Taiwan

TH1G
Periodic Structures and Applications

Chair: Branka Jokanovic
Cochair: George E. Ponchak
HCC 314

TH1G-01: Superconducting Tunable Composite Right/Left-Handed Transmission Lines using Ferroelectric Thin Films with a Resistive Bias Network
Y. Wang, M.J. Lancaster, F. Huang, P.M. Suherman, D.M. Holdom, T.J. Jackson, University of Birmingham, Birmingham, UK

TH1G-02: New Left-Handed Microstrip Lines with Complementary Split-Ring Resonators (CSRRs) Etched in the Signal Strip
M. Gil Barba, J. Bonache, J. Garcia-Garcia, F. Martin, Universitat Autònoma Barcelona, Bellaterra, Spain

TH1G-03: Dual-Mode Metamaterial with Backward and Forward Wave Selectivity
A. Lai, K.M. Leong, T. Itoh, University of California Los Angeles, Los Angeles, USA

TH1G-04: Double-Lorentz Transmission-Line Metamaterial and its Application to Triband Devices
A. Rennings, T. Liebig, I. Wolff, IMST GmbH, Kamp-Lintfort, Germany; C. Caloz, École Polytechnique de Montréal, Montréal, Canada

TH1G-05: Large Experimental Bandpass Waveguide in 3D EBG Woodpile Manufactured by Layer-by-Layer Ceramic Stereolithography
N. Delhote, D. Baillargeat, S. Verdeyme, M. Thevenot, Xlim UMR CNRS 6172, Limoges, France; C. Delage, C. Chaput, Centre de transfert de Tech. Cer., Limoges, France

THP1
Interactive Forum

Chair: Eric Bryerton
Cochair: Scott Barker
HCC Ballroom A

THP1: Interactive Forum

THP1A
Field Analysis and Guided Waves

THP1A-01: Transient Analysis of Mode Structures and Quantification of Crosstalk in Printed Metal Strips
S. Ahmed, D. Linton, Institute of Electronics, Communications and Information Technology, Belfast, UK

THP1A-02: Rigorous Mode-Matching Method for Circular to Off-Centre-Rectangular Side-Coupled Waveguide Junctions
J. Zheng, M. Yu, COM DEV Ltd, Cambridge, Canada

THP1A-03: Modeling of Spurious Coupling Between Modes in Metal Packages and Embedded Circuits
T. Bolz, IMST GmbH, Kamp-Lintfort, Germany; S. Held, M. Neinhus, A. Beyer, K. Solbach, University of Duisburg-Essen, Duisburg, Germany

THP1A-04: Analysis of Post-Wall Waveguide by H-Plane Planar Circuit Approach
M. Kishihara, K. Yamane, Okayama Prefectural University, Soja, Japan; I. Ohta, University of Hyogo, Himeji, Japan

THP1A-05: Electromagnetic Scattering From Multiple Arbitrary Shape Grooves: A Generalized Formulation
M.A. Basha, S.K. Chaudhuri, S. Safavi_Naeini, University of Waterloo, Waterloo, Canada

THP1A-06: Modeling and Suppressing Substrate Coupling of RF CMOS FMCW Sensor Incorporating Synthetic Quasi-TEM Transmission Lines
S. Wang, H. Wu, C.C. Tzuang, National Taiwan Univ.; C. Chang, National Chiao Tung Univ.

THP1A-07: Computational Modeling Analysis of Radar Scattering by Metallic Body-Worn Explosive Devices Covered with Wrinkled Clothing
A.J. Angell, C. Rappaport, The Gordon Center for Subsurface Sensing and Imaging Systems, Northeastern University, Boston, USA

THP1B
Frequency Domain Techniques

THP1B-01: Numerical Evaluation of the Green's Functions for Arbitrarily Shaped Enclosures
J. S. Gomez Diaz, M. Martinez Mendoza, F. D. Quesada Pereira, J. Pascual Garcia, F. J. Perez Soler, A. Alvarez Melcon, Technical University of Cartagena

THP1B-02: Improved Finite-Difference Frequency-Domain Scheme for the Analysis of 2D Photonic Crystals
Y. Chiang, National Chung-Hsing University, Taichung, Taiwan; H. Chang, Y. Chiou, National Taiwan University, Taipei, Taiwan

THP1B-03: Higher-Order Vector Bases for the Method of Moments Analysis of a Class of Waveguide and Dielectric Resonator Filters Involving Curved Boundaries
V. Catina, F. Arndt, University of Bremen; J. Brandt, MiG, Bremen, Germany

THP1B-04: Enchanced Multiple Cells Lumped Elements and Ports for Vector Finite Element Method
A. D. Grigoryev, R.V. Salimov, R. I. Tikhonov, Saint Petersburg State Electrotechnical University LETI

THP1C
Time Domain Techniques

THP1C-01: On-Chip Interconnects Modeling in Time Domain using the Explicit DuFort-Frankel Algorithm
M. Matthaiou, Univ. of Edinburgh, Edinburgh, UK; K. Konstantinou, Univ. of Surrey, Guildford, UK; T. Yioultsis, Aristotle Univ. of Thessaloniki, Greece

THP1C-02: Efficient Mixed-Order FDTD Using the Laguerre Polynomials on Nonuniform Meshes
P. Fernandes, Z.D. Chen, Dalhousie University, Halifax, Canada

THP1C-03: Numerical Dispersion Characteristics of the Three-Dimensional Precise Integration Time-Domain Method
Z.D. Chen, Dalhousie University, Halifax, Canada; L. Jiang, J. Ma, Shanghai Jiao Tong University, Shanghai, China

THP1C-04: Discrete and Modal Source Modeling with Connection Networks for the Transmission Line Matrix (TLM) Method
P. Lorenz, Rohde & Schwarz GmbH, München, Germany; P. Russer, Technische Universität München, Germany

THP1C-05: Including Quantum Effects in Electromagnetic System — An FDTD Solution to Maxwell-Schrödinger Equations
W. Sui, J. Yang, X. Yun, Zhejiang University, Hangzhou, China

THP1C-06: Modeling of Mutual Coupling Between Electromagnetic and Thermal Fields in Microwave Heating
M. Pauli, T. Kayser, G. Adamiuk, W. Wiesbeck, Universität Karlsruhe (TH), Karlsruhe, Germany

THP1C-07: Theoretical Investigation on the One-Step Temporal Method
J. Silly-Carette, M. Wong, J. Wiart, France Telecom Research & Development, Issy Les Moulineaux, France; D. Lautru, V. Fouad Hanna, Université Pierre et Marie Curie, Paris, France

THP1C-08: Reconstructing the Impedance Profiles of Nonuniform Transmission Lines
C.M. Jackson, Raytheon SAS, Huntington Beach, USA

THP1D
CAD Algorithms and Techniques

THP1D-01: Improving Efficiency of Space-Mapping Optimization of Microwave Structures and Devices
S. Koziel, Q.S. Cheng, McMaster University, Hamilton, Canada; J.W. Bandler, Bandler Corp., Dundas, Canada

THP1D-02: Moment Method Using Fuzzy Basis Functions
V. Miraftab, M. Yu, COM DEV Ltd., Cambridge, Canada; R. Mansour, University of Waterloo, Waterloo, Canada

THP1E
Linear Device Modeling

THP1E-01: A Passive Macromodeling Technique for Nonuniform Transmission Lines based on Delay Extraction via the Theory of Lie Algebra and Lie Groups
E. Gad, University of Ottawa, Ottawa, Canada

THP1F
Nonlinear Device Modeling

THP1F-01: Extraction and Improvements of a Behavioral Model Based on the Wiener-Bose Structure Used for Baseband Volterra Kernels Estimation
D. D. Silveira, G. Magerl, Vienna University of Technology, Vienna, Austria

THP1F-02: Drain-Source Symmetric Artificial Neural Network-Based FET Model with Robust Extrapolation Beyond Training Data
J. Xu, D. Gunyan, M. Iwamoto, J. M. Horn, A. Cognata, D. E. Root, Agilent Technologies, Inc., Santa Rosa, USA

THP1F-03: Modeling and Measurements of Electrical and Thermal Memory Effects for RF Power LDMOS
O.G. Tornblad, W. Dai, C. Blair, Infineon Technologies, Morgan Hill, USA; B. Wu, R.W. Dutton, Stanford University; G. Ma, Infineon Technologies

THP1F-04: Novel Nonlinear Model for Rapid Waveform-Based Extraction Enabling Accurate High-Power PA Design
H. Qi, J. Benedikt, P. J. Tasker, Cardiff University, Cardiff, UK

THP1G
Nonlinear Circuit Analysis and System Simulations

THP1G-01: Detuning and Saturation of Superconducting Devices: Formulation and Measurements
C. Collado, J. Mateu, J. O'Callaghan, Universitat Politècnica de Catalunya, Barcelona, Spain; J. Booth, National Institute of Standards and Technology

THP1G-02: General Nonlinear Feed-Forward RF Model for Power Amplifiers
T.R. Cunha, J.C. Pedro, P. Cabral, Instituto de Telecomunicações, Universidade de Aveiro, Aveiro, Portugal; A. Zhu, University College Dublin, Dublin, Ireland

THP1G-03: CAD Procedures for the Nonlinear/ Electromagnetic Codesign of Integrated Microwave Transmitters
V. Rizzoli, A. Costanzo, E. Montanari, P. Spadoni, University of Bologna, Bologna, Italy

THP1G-04: A Transient Model UWB Antennas Using Cascaded Ideal Transmission Lines for Circuit Cosimulation
Z. Su, T.J. Brazil, University College Dublin, Dublin, Ireland

THP1G-05: Analysis and Synthesis of a Bipolar-Based Circuit with Stochastic Resonance
F. Ramirez, A. Suarez, University of Cantabria, Santander, Spain; J. Collantes, University of the Basque Country, Leioa, Spain

THP1H
Ferroelectric, Ferrite, and Acoustic Wave Components

THP1H-01: Planar Two-Dimensional Electron Gas (2DEG) IDT SAW Filter on AlGaN/GaN Heterostructure
K. Wong, W. Tang, K. Lau, K. Chen, Hong Kong University of Science and Technology, Hong Kong, Hong Kong

THP1H-02: High-Q BAW Resonator on Pt/Ta_2O_5/SiO_2-based Reflector Stack
J. Lobeek, R. Strijbos, A. Jansman, N. Xin Li, B. Smolders, N. Pulsford, NXP Semiconductors, Nijmegen, Netherlands

THP1H-03: Properties of Narrow Metal Reflectors Used in Reflective-Array Compressors and Surface Acoustic Wave Tags
S. Harma, Helsinki U. of Tech.; C. Kim, U. of Ulsan, Ulsan, S. Korea; S. Balashov, EFTECH Co. Ltd.; V. Plessky

THP1H-04: Performance of Coplanar Waveguides on Surface -Passivated Highly Resistive Silicon Covered by Ferroelectric Film
D. Kuylenstierna, M. Norling, A. Vorobiev; K. Reimann; D. Lederer, J. P. Raskin; S. Gevorgian

THP1H-05: Tunable DBR Resonators Using KTN Ferroelectric Thin-Films
V. Laur, G. Tanne, P. Laurent, F. Huret, LEST-UBO/ENSTBr, Brest, France; A. Moussavou, V. Bouquet, S. Deputier, M. Guilloux-Viry, Unite Sciences Chimiques, Rennes, France

THP1H-06: Resonance Technique for Accurate On-Wafer Characterization of Ferroelectric Varactors
A.N. Deleniv, Chalmers, Goteborg, Sweden; S.S. Gevorgian, Ericsson AB, Goteborg, Sweden; V. Sherman, T. Yamada, N. Setter, Swiss Federal Inst., EPFL

THP1H-07: A Twin Toroid Ferrite Phase Shifter
A. Abuelma'atti, A. Gibson, University of Manchester, Manchester, England; I. Khairuddin, I. Morgan, COM DEV Europe Ltd, Stoke Mandeville, England

THP1H-08: Interferometric Measurements of Dispersion Curves and Transmission Characteristics of the Acoustic Mirror in Thin Film BAW Resonator
K. Kokkonen, M. Kaivola, Helsinki U. of Tech., Espoo, Finland; T. Pensala, VTT Tech. Research Centre of Finland, Espoo, Finland

THP1J
MEMS Components and Technologies

THP1J-01: Low-Cost Method for Localized Packaging of Temperature-Sensitive Capacitive RF MEMS Switches in Liquid Crystal Polymer
M.A. Morton, N.D. Kingsley, J. Papapolymerou, Georgia Institute of Technology, Atlanta, USA

THP1J-02: Piezoelectric MEMS Variable Capacitor for a UHF Band Tunable Built-In Antenna
M. Nishigaki, T. Nagano, T. Miyazaki, K. Itaya, M. Nishio, S. Sekine, Toshiba, Kawasaki, Japan; T. Kawakubo, Toshiba Research Consulting Corp., Japan

THP1J-03: Advances in Piezoelectrically Actuated RF MEMS Switches and Phase Shifters
R.G. Polcawich, D. Judy, J.S. Pulskamp, M. Dubey, U.S. Army Research Lab, Adelphi, USA

THP1K
Low Noise Components and Receivers

THP1K-01: Cryogenic Performance of a MMIC Ka-Band Radiometer Front-End
D. Kettle, N. Roddis, University of Manchester, Manchester, UK

THP1K-02: A 2.4 GHz Fully Integrated ESD-Protected Low-Noise Amplifier in 130 nm PD SOI CMOS Technology
M. El Kaamouchi, M. Si Moussa, J. Raskin, D. Vanhoenacker-Janvier, Microwave Lab., Louvain-La-Neuve, Belgium; P. Delatte, CISSOID s.a, Louvain-La-Neuve, Belgium; G. Wybo, A. Bens, Sarnoff Europe, Aalter, Belgium

THP1K-03: Study of PM Noise and Noise Figure in Low Noise Amplifiers Working under Small- and Large-Signal Conditions
N. Garmendia, J. Portilla, University of the Basque Country, Bilbao, Spain

THP1K-04: Reduction of Noise in Wideband Distributed Amplifiers
D.E. Meharry, W. Kong, BAE Systems Electronics & Integrated Solutions, Nashua, USA

TH2A
Power Amplifier Linearization

Chair: James Komiak
Cochair: F. M. Ghannouchi
HCC 311

TH2A-01: A 20 W Chireix Outphasing Transmitter for WCDMA Base Stations
A. Huttunen, R. Kaunisto, Nokia, Helsinki, Finland

TH2A-02: Spline-Based Model for Digital Predistortion of Wideband Signals for High-Power Amplifier Linearization
N. Safari, T. Roste, NTNU, Trondheim, Norway; P. Fedorenko, J. Kenney, Georgia Institute of Technology, Atlanta, USA

TH2A-03: A New Adaptive Digital Predistortion Technique Employing Feedback Technique
Y.Y. Woo, J. Kim, S. Hong, I. Kim, J. Moon, B. Kim, Postech, Pohang, Republic of Korea; J. Yi, LG Electronics Inc., Seoul, Republic of Korea

TH2A-04: Open-Loop Digital Predistortion Using Cartesian Feedback for Adaptive RF Power Amplifier Linearization
S. Chung, J.W. Holloway, J.L. Dawson, MIT, Cambridge, USA

TH2A-05: Analysis and Suppression of Memory Effects in Envelope Elimination and Restoration (EER) Power Amplifiers
P. Fedorenko, J.S. Kenney, Georgia Institute of Technology, Atlanta, USA

TH2C
Imaging and Ultra-Wideband Radars

Chair: Gregory Lyons
Cochair: Alfred Hung
HCC 313A

TH2C-01: An E-Band Electronically Scanned Imaging Radar System
K. Miyashiro, J. Schellenberg, J. Loveberg, V. Kolinko, J. McCoy, Trex Enterprises, Kahului, USA

TH2C-02: An UWB Wall Scanner Based on a Shape Estimating SAR Algorithm
S. Hantscher, A. Reisenzahn, C.G. Diskus, Johannes Kepler University, Linz, Austria

TH2C-03: Design and Implementation of a Low-Cost Real-Time Ultra-Wideband See-Through-Wall-Imaging Radar System
Y. Yang, A. Fathy, The University of Tennessee, Knoxville, USA

TH2C-04: FCC Compliant 3.1–10.6 GHz UWB Pulse Radar System Using Correlation Detection
J. Dederer, B. Schleicher, F. De Andrade Tabarani Santos, A. Trasser, H. Schumacher, University of Ulm, Ulm, Germany

TH2C-05: On the Design of Radar Absorbing Materials Using Left-Handed Transmission Line
H. Wang, W. Tang, Z. Shen, Nanyang Technological University, Singapore, Singapore

TH2C-06: Synthetic Aperture Radar Ghost Image Cancellation Using Broadband Time Reversal Averaging Techniques
Y. Jiang, J. Zhu, Carnegie Mellon University, Pittsburgh, USA

TH2D
Nonlinear and Linear Measurement

Chair: Jon Martens
Cochair: Dominique Schreurs
HCC 316B

TH2D-01: Complete Pure-Mode Balanced Measurement System
J. Dunsmore, K. Anderson, D. Blackham, Agilent Technologies, Santa Rosa, USA

TH2D-02: A Smart Load-Pull Method to Safely Reach Optimal Matching Impedances of Power Transistors
T. Reveyrand, D. Barataud, S. Mons, J. Nebus, XLIM, Limoges, France; T. Gasseling, AMCAD Engineering, Limoges, France

TH2D-03: New Ultrafast Real-Time Active Load-Pull Measurements for High-Speed RF Power Amplifier Design
P. Roblin, S. Doo, X. Cui, Ohio State Univ., Columbus, USA; G.H. Jessen, AF Res. Lab, Dayton, USA; D. Chaillot, CEA, Bordeaux, France; J. Strahler, Andrew, Columbus, USA

TH2D-04: Singular-Value-Decomposition Based Four-Port Deembedding and Single-Step Error Calibration for On-Chip Measurement
X. Wei, G. Niu, Auburn University, Auburn, USA

TH2E: Focused Session
Advanced Signal Processing Techniques for Microwave Photonics

Chair: Young-Kai Chen
Cochair: Charlie Cox
HCC 316A

TH2E-01: Real-Time Digital Carrier and Data Recovery for a Synchronous Optical Quadrature Phase Shift Keying Transmission System
R. Noe, T. Pfau, O. Adamczyk, R. Peveling, V. Herath, S. Hoffmann, M. Porrmann, S.K. Ibrahim, S. Bhandare, Univ. Paderborn, Paderborn, Germany

TH2E-02: DSP-Based Highly Linear Microwave Photonic Link
T.R. Clark, M.L. Dennis, JHU Applied Physics Lab, Laurel, USA

TH2E-03: Feed-Forward Phase and Frequency Estimation in Coherent Digital and Analog Photonic Links using Digital Signal Processing
A. Leven, U. Koc, Y. Chen, Lucent Technologies, Murray Hill, USA; N. Kaneda, Lucent Technologies, Holmdel, USA

TH2E-04: 2-Dimensional Spatiotemporal Signal Processing for Dispersion Compensation in Optical Systems
A. Tarighat, B. Jalali, University of California Los Angeles, Los Angeles, USA

TH2E-05: Low Noise Figure Microwave Photonic Link
A. Karim, J. Devenport, L-3 Photonics, Carlsbad, USA

TH2F
New Trends in High Frequency Signal Generation

Chair: Paul Khanna
Cochair: John Papapolymerou
HCC 315

TH2F-01: Design of Low Phase Noise Dielectric Resonator Oscillators with GaInP HBT Devices Exploiting a Nonlinear Noise Model
C. Florian, P.A. Traverso, F. Filicori, University of Bologna, Bologna, Italy; G. Vannini, University of Ferrara, Ferrara, Italy

TH2F-02: An X-Band Low Phase Noise Oscillator Employing a Four-Pole Elliptic-Response Microstrip Bandpass Filter
J. Choi, M. Chen, A. Mortazawi, University of Michigan, Ann Arbor, USA

TH2F-03: A 2.4/5 GHz Dualband VCO using a Variable Inductor and Switched Resonator
H.L. Kao, Chang Gung Univ., Tao-Yuan, Taiwan; D.Y. Yang, A. Chin, Nat'l Chiao-Tung Univ., Hsinchu, Taiwan; S.P. McAlister, Nat'l Res. Council of Canada, Ottawa, Canada

TH2F-04: A Second-Harmonic Oscillator Using an Overmoded-Waveguide Resonator with Gunn Diodes
J. Bae, M. Ikeda, Nagoya Institute of Technology, Nagoya, Japan

TH2F-05: Phase-Hit Immunity Methods for High Speed Communication Systems
Y. Qin, F. Matsumoto, D. Pham, C. Easaw, Stratex Networks, San Jose, USA

TH2F-06: A Single-VCO Fractional-N Frequency Synthesizer for Digital TV Tuners
Y. Yang, F. Lee, S. Lu, National Taiwan University, Taipei, ROC

TH2G
Transmission Line and Waveguide Transitions

Chair: Charles Buntschuh
Cochair: Ke Wu
HCC 314

TH2G-01: 94 GHz Broadband Transition from Coplanar Waveguide to Substrate Integrated Image Guide (SIIG)
A. Patrovsky, K. Wu, Poly-Grames Research Center, Montréal, Canada

TH2G-02: Substrate Integrated Waveguide-to-Microstrip Transition in Multilayer Substrate
Y. Ding, K. Wu, Poly-Games Research Center, Montréal, Canada

TH2G-03: A Novel Approach for a Periodic Structure Shielded Microstrip Line to Rectangular Waveguide Transition
F. Poprawa, A. Ziroff, Siemens AG, Munich, Germany; F. Ellinger, Dresden University of Technology, Dresden, Germany

TH2G-04: A New Ultra-Wideband Microstrip-to-CPS Transition
Y. Kim, D. Woo, K.W. Kim, Y. Cho, Kyungpook National University, Daegu, S. Korea

TH2G-05: Multilayer Coplanar Waveguide Transmission Lines Compatible with Standard Digital Silicon Technologies
Y. Zhu, S. Wang, H. Wu, University of Rochester, Rochester, USA

THP1
Interactive Forum

Chair: Eric Bryerton
Cochair: Scott Barker
HCC Ballroom A

THP1: Interactive Forum

THURSDAY

Thursday Panel Sessions

10:10–11:50 PTHA HCC 317A

Career Development: Giving Your Career A Never-Ending Boost

Chair:
- S. Pacheco, Freescale Semiconductor
- R. Henderson, Freescale Semiconductor

Panel:
- Peter Blakey, Northern Arizona University
- Rhonda Drayton, University of Minnesota
- Larry Dunleavy, Modelithics, Inc.
- Mike Golio, *IEEE Microwave Magazine*, Editor
- Barry Perlman, U.S. Army Research

Sponsor: IEEE MTT-S GOLD Committee

In the past, employers partnered with their employees by assisting them in their career planning and development. Today, employers are coming to view career development primarily as the employee's responsibility. This places new employees as well as those looking to make a career change at a disadvantage. In this panel session, representatives from academia, industry, and government will show you how to take charge of your career. They will discuss the intricacies of developing a career plan and how to manage it through the very dynamic professional climate in which engineers work. A wide array of topics will be presented, such as networking, influence, diversity, balancing work and life, starting your own company, investing, and planning for retirement. Thus, the IEEE MTT-S GOLD Committee is glad to invite all of its GOLD members as well as anyone who is interested in learning and discussing ideas for giving your career a never-ending boost!

12:00–13:15 PTHB HCC 313C

THz Electronics for the 21st Century

Moderator:
- Richard Lai, NGST

Panelists:
- Lorene Samoska, Jet Propulsion Laboratory
- Axel Tessmann, Fraunhofer University
- Bobby Weikle, University of Virginia
- Eliott Brown, University of California Santa Barbara
- Mark Rosker, DARPA

Sponsor: IMS

Solid state electronic advancements at terahertz frequencies (0.1 THz to 10 THz) will enhance and enable future imaging and sensing applications. The panel will address the latest capabilities, future challenges for system insertions, and critical system requirements.

12:00–13:15 PTHC HCC 316C

RF Techniques for Signal Integrity Engineering

Moderator:
- Ashok Bindra, *RF Design* Editor

Panelists:
- Colin Warwick, The MathWorks
- Jeff Sinsky, Alcatel-Lucent
- Niranjan Kanaglekar, Agilent Technologies
- Juergen Hartung, Cadence Design Systems

Sponsor: MTT-1, MTT-9, MTT-11

The reliable transmission of multigigabit-per-second serial data over board traces and back-planes is compromised by the distributed nature of the propagation media. Can RF and microwave engineers transfer their skills to the growing field of signal integrity? If so, how?

Thursday Special and Focused Sessions

10:10–11:50 TH2E HCC 316A

Advanced Signal Processing Techniques for Microwave Photonics

Microwave photonic links promise low loss and high bandwidth, which are essential for many wireless applications such as antenna remoting and low-loss backhaul of wireless basestations to central offices. Recently, significant progress has been made in utilizing digital signal processing techniques to significantly enhance the signal integrity of microwave analog and digital signals which are transported using an optical carrier either in silica fiber or via free space. In this focused session, we will survey several emerging optical signal-processing techniques in the signal generation, signal integrity, and coherent detection of microwave signals, utilizing innovative optical means in combination with electronic processing.

13:20–15:00 TH3E HCC 316A

Millimeter- and Submillimeter-Wave Imaging

Millimeter- and submillimeter-wave imaging is a rapidly developing area, not only due to renewed interests in security screening but also because of advances in technology that have enabled video rate detection and display capability up to and beyond 100 GHz. Both small and large companies as well as government and university research labs have been actively pursuing a wide range of available techniques and accompanying source and sensor technologies. The variety and quality of the images are growing each year. These systems bring together the whole range of microwave components, techniques, and data processing schemes. This focused session will cover active and passive imaging at frequencies from 100 GHz to over 1 THz.

15:30–17:00 TH4E HCC 316A

Submillimeter-Wave Radio Astronomy and Mauna Kea

The historic role that Mauna Kea has played in the development of Radio Astronomy as well as the historic role that radio astronomy has played in the MTT society will be highlighted in this very special focus session on submillimeter wave instrumentation, techniques, and astronomy. A wide range of talks will cover both current topics in millimeter and submillimeter wave astronomy and technology, as well as a look backwards at some of the major contributions this field has had in microwave theory and techniques. The session chair and cochair are active long-time members of the radio astronomy community and past participants in this conference series.

Thursday Technical Sessions 13:20–15:00

TH3A
High Power Amplifiers II

Chair: S.C. Cripps
Cochair: B. Kim
HCC 311

TH3A-01: Advanced Design of Linear Doherty Amplifier for High Efficiency using Saturation Amplifier
J. Kim, B. Kim, Postech, Pohang, Republic of Korea; Y.Y. Woo, Samsung Electronics Co., LTD, Suwon, Republic of Korea

TH3A-02: A 900 MHz, 500 W Doherty Power Amplifier Using Optimized Output Matched Si LDMOS Power Transistors
C. Burns, A. Chang, D. Runton, Freescale Semiconductor, Tempe, USA

TH3A-03: N-Way Distributed Doherty Amplifier with an Extended Efficiency Range
K. Cho, W. Kim, S.P. Stapleton, Simon Fraser University, Burnaby, Canada; D. Kim, J. Kim, Kwangwoon University, Nowon-Gu, Republic of Korea

TH3A-04: Industry First 100 W Two-Stage RFIC for 900 MHz GSM EDGE Base Station Applications
X. Moronval, P. Peyrot, Freescale, Toulouse, France

TH3A-05: Hybrid High-Power Amplifiers for L-Band Space Application
C. Florian, I. Melczarsky, R. Cignani, F. Filicori, U. of Bologna, Italy; F. Scappaviva, M. Pirazzini, MEC SRL, Italy; G. Vannini, U. of Ferra, Italy; R.P. Paganelli, CNR, Italy; R. Giordani, M. Feudale, Alcatel Alenia Space, Italy

TH3A-06: 1 kW Push-Pull High-Efficiency RF BJT Transistor for Radar Applications
T. Shi, J. Chang, L. Leverich, M. Mallinger, C. Leader, Microsemi Corp., Santa Clara, USA

TH3B
Reconfigurable and Active Filters

Chair: Har Dayal
Cochair: Yoji Kotsuka
HCC 312

TH3B-01: 2 GHz Automatically Tuned Q-Enhanced CMOS Bandpass Filter
J.K. Nakaska, J.W. Haslett, University of Calgary, Calgary, Canada

TH3B-02: A New Method to Reconfigure BAW-SMR Filters using CMOS Transistors
M.H. El Hassan, E. Kerherve, Y. Deval, IXL Microelectronics Lab, Talence, France; D. Belot, ST Microelectronics, Crolles, France

TH3B-03: A Reconfigurable Filter Based on Doublet Configuration
C. Liao, C. Chang, National Chiao Tung University, Hsinchu, Taiwan; J. Lin, University of Florida, Gainesville, USA

TH3B-04: Compact Tunable Bandstop Filter Integrated with Large Deflected Actuators
W.D. Yan, R.R. Mansour, University of Waterloo, Waterloo, Canada

TH3B-05: 0.8 GHz to 2.4 GHz Tunable Ceramic Microwave Bandpass Filters
R. Matz, Siemens, Munich, Germany; P. Russer, M. Al Ahmad, TU Munich, Munich, Germany

H3B-06: High Performance and Compact Balanced-Filter Design for WiMAX Front-End Modules (FEM) Using LCP-Based Organic Substrates
R. Wu, C. Mmasi, V. Govind, S. Dalmia, C. Ghiu, G. White, Jacket Micro Devices Inc., Atlanta, USA

TH3B-07: Fixed Frequency and Tunable Metamaterial-Based Ring Resonators with Narrowly Spaced Resonances
C.A. Allen, K.M. Leong, T. Itoh, University of California, Los Angeles, Los Angeles, USA

TH3B-08: Novel Computer Controllable Metamaterial Beyond Conventional Configurations and its Microwave Absorber Application
Y. Kotsuka, C. Kawamura, Toaki University, Hiratsuka, Japan

TH3C
Advanced Packaging

Chair: Kavita Goverdhanam
Cochair: Clive Tzuang
HCC 313A

TH3C-01: Design and Characterization of Novel Paper-Based Inkjet-Printed RFID and Microwave Structures for Telecommunication and Sensing Applications
L. Yang, M.M. Tentzeris, Georgia Institute of Technology, Atlanta, USA

TH3C-02: An Ultra-Wideband BGA-Via Transition for High-Speed Digital and Millimeter-Wave Packaging Applications
T. Kangasvieri, J. Halme, J. Vahakangas, University of Oulu, Oulu, Finland; M. Lahti, VTT, Oulu, Finland

TH3C-03: Demonstration of a Low-Loss W-Band Interconnect and Circuit Isolation Structure for Wafer-Scale Assembly
D.S. Farkas, T. Luna, P.P. Chang-Chien, K. Tornquist, O. Fordham, R. Tsai, Northrop Grumman Corp., Redondo Beach, USA

TH3C-04: Broadband Flip-Chip Interconnects for Millimeter-Wave Si-Carrier System on Package
C. Li, C. Fu, T. Chao, C. Kuo, Y. Cheng, D.C. Chang, Chiao Tung University, Hsinchu, Taiwan

TH3C-05: Compact 60 GHz LTCC Stripline Parallel-Coupled Bandpass Filter with Parasitic Elements for Millimeter-Wave System on Package
K. Nishikawa, T. Seki, I. Toyoda, S. Kubota, NTT Corp., Yokosuka, Japan

TH3C-06: Integrated Hybrid Dielectric Resonator Antenna for System-in-Package Application
A.P. Popov, B. Ooi, M. Leong, National University of Singapore, Singapore; Y. Gao, Institute of Microelectronics, Singapore, Singapore

TH3D
Novel Radiation and Propagation Effects on Waveguiding Structures

Chair: David Jackson
Cochair: Tapan Sarkar
HCC 316B

TH3D-01: Effects of Frequency Selective Surface (FSS) on Enhancing the Radiation Efficiency of Metal-Surface Mounted Dipole Antenna
S. Zhan, R.J. Weber, J. Song, Iowa State University, Ames, USA

TH3D-02: Leaky Modes on a Grounded Wire-Medium Slab
P. Burghignoli, G. Lovat, F. Capolino, D.R. Jackson, D.R. Wilton, La Sapienza University of Rome, Italy

TH3D-03: Full-Wave Analysis of Periodic Microstrip Lines Excited by an Aperiodic Delta-Gap Source
R. Rodriguez-Berral, F. Mesa, University of Seville, Seville, Spain; G. Valerio, P. Baccarelli, P. Burghignoli, A. Galli, La Sapienza University of Rome, Italy

TH3D-04: Loss Reduction Technique of Printed Transmission Line at Millimeter-Wave Frequency
F. Kuroki, R. Tamaru, R. Masumoto, K. Miyamoto, Kure Nat'l Coll of Tech, Kure, Japan

TH3D-05: Full-Wave Analysis of Arbitrary Polygonal Section Waveguides
M. Lucido, G. Panariello, F. Schettino, University of Cassino, Cassino, Italy

TH3D-06: Full-Wave Analysis of Image Lines
M. Lucido, G. Panariello, F. Schettino, University of Cassino, Cassino, Italy

TH3D-07: Frequency Deviation Due to a Sample Insertion Hole in a Cylindrical Cavity by Circuital Analysis
F.L. Penaranda-Foix, J.M. Catala-Civera, A.J. Canos-Marin, B. Garcia-Banos, Technical University of Valencia, Valencia, Spain

Thursday Technical Sessions 13:20–15:00

TH3E: Focused Session
Millimeter and Submillimeter Wave Imaging

Chair: Peter H. Siegel
Cochair: Koji Mizuno
HCC 316A

TH3E-01: Video-Rate Passive Millimeter-Wave Imaging using Phased Arrays
J.A. Lovberg, C. Martin, V. Kolinko, Sago Systems Inc., San Diego, USA

TH3E-02: Near-Field Imaging at Microwave and Millimeter-Wave Frequencies
D.M. Sheen, D.L. McMakin, T.E. Hall, Pacific Northwest National Lab, Richland, USA

TH3E-03: Terahertz Time-Domain Spectroscopy: Present and Future Modalities
J. Cunningham, C. Wood, A. Burnett, P. Uphadya, W. Fan, E. Linfield, G. Davies, University of Leeds, Leeds, UK

TH3E-04: THz Generation and Applications with Photonic Sources
C. Otani, RIKEN, Sendai, Japan; K. Kawase, Y. Ogawa, Tohoku Univ., Sendai, Japan

TH3E-05: Practical Challenges for the Commercialization of Terahertz Electronics
C.M. Mann, Thruvision Ltd, Abingdon, UK

TH3F
Smart-Antenna Technologies and Applications

Chair: Nicholas E. Buris
Cochair: Glenn Hopkins
HCC 315

TH3F-01: A New Millimeter-Wave Broadband Retrodirective Antenna Array
Y. Ren, K. Chang, Texas A&M University, College Station, USA

TH3F-02: A Retrodirective Array Based on Phase Detection and Frequency Scanning
M.K. Watanabe, G.S. Shiroma, B.O. Takase, J.M. Akagi, W.A. Shiroma, University of Hawaii, Honolulu, USA

TH3F-03: Interleaved Retrodirective Subarrays for Null-Steering Interference Rejection
D.S. Goshi, K.M. Leong, T. Itoh, University of California Los Angeles, Los Angeles, USA

TH3F-04: A Supergain Beamforming Approach with Closely Spaced Antennas
T. Lee, Y.E. Wang, UCLA, Los Angeles, USA

TH3F-05: Design of Coupled Oscillator Arrays for Second Harmonic Radiation
A. Georgiadis, Univ. of Cantabria, Santander, Spain

TH3F-06: Antenna-Array Detection in Highly Cluttered Environment using Time-Reversal Method
Y. Jiang, D.D. Stancil, J. Zhu, Carnegie Mellon University, Pittsburgh, USA

TH3F-07: Experimental Evaluation of Multiple Antenna Techniques for Remote Sensing of Physiological Motion
D. Samardzija, T. Sizer, Lucent Technologies, Holmdel, USA; B. Park, O. Boric-Lubecke, V.M. Lubecke, University of Hawaii, Honolulu, USA

TH3G
Innovative Passive Components

Chair: V. E. Boria-Esbert
Cochair: Aly Fathy
HCC 314

TH3G-01: Time-Domain Impedance Adaptors for Pulse-Based Systems with High-Q RC loads
X. Wang, D. Peroulis, Purdue University, West Lafayette, USA; L.P. Katehi, University of Illinois, Champaign, USA

TH3G-02: Broadband Quadrature Hybrid Design using Metamaterial Transmission Line and its Application in the Broadband Continuous Phase Shifter
C. Lee, K.M. Leong, T. Itoh, University of California Los Angeles, Los Angeles, USA

TH3G-03: Broadband Transitions for Micromachined Waveguides
E.J. Wollack, NASA/Goddard Space Flight Center, Greenbelt, USA; F.M. Vanin, University of Maryland, College Park, USA

TH3G-04: A Novel DGS-Marchand Balun from 40 to 80 GHz with IF-Tap for Mixer Design
R. Rehner, D. Schneiderbanger, M. Sterns, S. Martius, L.P. Schmidt, University of Erlangen-Nuremberg, Erlangen, Germany

TH3G-05: A Hybrid Coupled-Resonator Bandpass Filter Topology Implemented on Lossy Semiconductor Substrates
R. Frye, RF Design Consulting, LLC; K. Liu, STATS ChipPAC Inc.; G. Badakere, Y. Lin, STATS ChipPAC

TH3G-06: Optimization of RF Performance of MIM Damascene Capacitors in Backend of Line
J. Piquet, C. Bermond, T. Lacrevaz, T. VoB. Flechet, LAHC; M. Thomas, A. Farcy, J. Torres, STMicroelectronics, Crolles, France

TH3G-07: Microwave Dissipation Spectra in Arrays of Silicon Nanowires
M. Lee, C. Highstrete, Sandia National Labs, Albuquerque, USA; A.L. Vallett, S.M. Dilts, J.M. Redwing, T.S. Mayer, Penn State Univ, University Park, USA

TH3G-08: Ring Hybrid Balun with Good Amplitude and Phase Balance
M. Lee, W. Na, J. Song, I. Cho, University of Seoul, Seoul, South Korea; K. Ryu, Hanbat National University, Daejeon, South Korea

THP2
Interactive Forum

Chair: Eric Bryerton
Cochair: Matthew Morgan
HCC Ballroom A

THP2: Interactive Forum

THP2B
Nonplanar Passive Filters and Multiplexers

THP2B-01: Ring-Type Dielectric Resonator Cavity Filters with Wide Spurious-Free Region
X. Sun, Transcend Communications Co., Jinan, China

THP2B-02: Synthesis of Bandstop Filters with Ultrawide Upper Passband
N. Yildirim, Middle East Technical University, Ankara, Turkey

THP2B-03: A Small-Size High-Rejection LTCC Diplexer for WLAN Applications Based on a New Dualband Bandpass Filter
A. Yatsenko, D. Orlenko, S. Sakhnenko, G. Sevskiy, P. Heide, Epcos AG, Munich, Germany

THP2B-04: Small Form Factor Integrated Passive Devices for SiP Applications
K. Liu, STATS ChipPAC, Tempe, USA; R.C. Frye, RF Design Consulting, Piscataway, USA

THP2B-05: One-Dimensional Numerical Modelling of Microwave Breakdown in OMUX Filters
K. Frigui, D. Baillargeat, S. Verdeyme, S. Bila, XLIM, Limoges, France; A. Catherinot, SPCTS, Limoges, France

THP2B-06: 60 MHz DR Filter for Both PCS and UMTS in the Same Housing
K.D. Pance, Z. Zhang, M/A-COM Inc., Lowell, USA

THP2B-07: Direct Synthesis of Elliptic Bandstop Filter using Transformations
S. Shin, RS Microwave, Butler, USA

THP2B-08: Highly Loaded Evanescent Cavities for Widely Tunable High-Q Filters
H. Joshi, H.H. Sigmarsson, D. Peroulis, W.J. Chappell, Purdue University, West Lafayette, USA

THP2C
Semiconductor Devices and Monolithic IC Technologies

THP2C-01: Inductorless Broadband RF Front-End Using 2 μm GaInP/GaAs HBT Technology
T. Wu, C. Meng, National Chiao Tung University, Hsin-Chu, Taiwan; G. Huang, National Nano Device Labs, Hsin-chu, Taiwan

THP2C-02: SiGe HBT Gilbert Downconverter with an Integrated Miniaturized Marchand Balun for UWB Applications
S. Tseng, C. Meng, C. Chang, National Chiao Tung University; G. Huang, National Nano Device Labs, Taiwan

THP2C-03: AlInN/GaN a Suitable HEMT Device for Extremely High-Power High-Frequency Applications
C. Gaquiere, E. Delos, S. Vandenbrouck, IEMN, Villeneuve d'Ascq, France; F. Medjdoub, E. Kohn, ULM.; J.F. Carlin, E. Feltin, N. Grandjean, EPFL

THP2C-04: Low-Voltage GaInP/GaAs HBT Wideband Gilbert Downconverter using Transformer RF Balun
S. Tseng, C. Meng, C. Wu, National Chiao Tung University, Hsinchu, Taiwan; G. Huang, National Nano Device Labs, Hsinchu, Taiwan

THP2D
Signal Generation

THP2D-01: Mode-Coupled Stubs-Tuned Planar Resonator Based Spectral Pure Signal Source For Wireless Communication Systems
U.L. Rohde, A.K. Poddar, Synergy Microwave Corp., Paterson, USA

THP2D-02: A Signal Generator for MB-OFDM UWB System in 0.18 μm CMOS Process
S. Tarng, Y. Tsai, Y. Shen, C. Jou, National Chiao-Tung University, Hsincsu, Taiwan

THP2D-03: Oscillation Condition and Uncertainty Principle
J. Kwon, I.S. Kim, Kyunghee University, Yongin, South Korea

THP2E
Frequency Conversion and Control

THP2E-01: A Miniature 35–110 GHz Modified Reflection-Type BPSK Modulator Using 65 nm CMOS Technology
H. Chang, National Central Univ.; H. Wang, National Taiwan University; W. Lin, Taiwan Semiconductor Mfg. Co.

THP2E-02: A Broadband Frequency Sixtupler MIMIC for the W-Band with 7 dBm Output Power and 6 dB Conversion Gain
I. Kallfass, H. Massler, A. Tessmann, A. Leuther, M. Schlechtweg, G. Weimann, IAF, Germany

THP2E-03: A Bidirectional Electronically Tunable CMOS Phase Shifter Using the High-Pass Topology
M.A. Abdalla, K. Phang, G.V. Eleftheriades, University of Toronto, Toronto, Canada

THP2E-04: Synthesis of Broadband Negative Group Delay Active Circuits
B. Ravelo, A. Perennec, M. Le Roy, LEST, Brest, France

THP2E-05: Broadband GaInP/GaAs HBT Regenerative Frequency Divider with Active Loads
H. Wei, C. Meng, Y. Chang, National Chiao Tung University, Hsinchu, Taiwan; G. Huang, National Nano Device Labs, Hsinchu, Taiwan

THP2E-06: A Novel Design of a Frequency Tripler Using Composite Right/Left Handed Transmission Line
S. Seo, Y. Jeong, Chonbuk Nat'l Univ., Jeonju, Republic of Korea; J. Lim, Soonchunhyang Univ., Asan, Republic of Korea; B. Gray, J.S. Kenney, Georgia Inst. of Tech., Atlanta, USA

THP2F
Microwave Photonics

THP2F-01: High-Frequency Photonic Signal Generation using 2 GHz Electronics and Optical Repetition Rate Multiplication
J.M. Lee, K.J. Seo, D.S. Seo, Myong-Ji University, Yongin, Korea, South

THP2F-02: Bandwidth Reduction of UTC-TW Photo Detector at High Optical Power Levels
A. Madjar, N. Koka, Temple University, Philadelphia, USA; M. Draa, J. Bloch, P.K. Yu, University of California, La Jolla, USA

THP2F-03: Building Extended-Reach Radio-over-Fiber Links by Exploiting Optical Frequency Multiplication's Dispersion Tolerance
A. Ng'oma, G. Rijckenberg, T. Koonen, COBRA Institute, Eindhoven University of Technology, The Netherlands

THP2G
Digital Circuits and Systems at GHz Speeds

THP2G-01: A Self-Calibrating Subpicosecond-Resolution Digital-to-Time Converter
G. Nagaraj, B. Stengel, G. Cafaro, T. Gradishar, S. Olson, R. Hekmann, Motorola, Plantation, USA; S. Miller, Texas A & M University, College Station, USA

THP2G-02: Analysis and Measurement of Spurious Emission and Phase Noise Performance of an RF All-Digital Phase Locked Loop using a Frequency Discriminator
C. Wicpalek, Y. Liu; T. Mayer, L. Maurer; U. Vollenbruch, A. Springer, Austria

THP2G-03: Addressing the Broadband Crosstalk Challenges on Pogo Pin Type Interfaces for High-Density High-Speed Digital Applications
B.B. Szendrenyi, H. Barnes, J. Moreira, Verigy Inc.; M. Wollitzer, T. Schmid, Rosenberger; M. Tsai, Xilinx Inc., USA

THP2H
Biological Effects and Medical Applications

THP2H-01: Radio Frequency Electromagnetic Field (900 MHz) Induces Oxidative Damage to DNA and Biomembranes in Tobacco-Shoot Cells (Nicotiana Tabacum)
S. Radic, M. Tkalec, B. Pevalek-Kozlina, P. Cvjetko; K. Malaric, Croatia

THP2H-02: Computational Analysis and Validation of Coil Arrays for Whole-Brain MR-Imaging at 7 T
J. Froehlich, D. Baumann, R. Vahldieck, ETH Zürich, IFH, Zürich, Switzerland; D.O. Brunner, K.P. Pruessmann, ETH Zürich, BIOMED, Zürich, Switzerland

THP2H-03: Electromagnetic Dosimetry and Thermal Analysis of a New Exposure Setup for In Vitro Studies on a Large Frequency Band
A. Collin, M. Cueille, C. Pivain, P. Leveque, XLIM, Limoges, France; A. Perrin, CRSSA, La Tronche, France

Thursday Technical Sessions 15:30–17:10

TH4A
Low Noise Devices, Amplifiers, and Receivers
Chair: Terry Cisco
Cochair: Francois Danneville
HCC 311

TH4A-01: 94 GHz Band High-Gain and Low-Noise Amplifier Using InP-HEMTs for Passive Millimeter Wave Imager
M. Sato, T. Hirose, T. Ohki, Fujitsu, Atsugi, Japan; H. Sato, K. Sawaya, K. Mizuno, Tohoku University, Sendai, Japan

TH4A-02: A Broadband 42–63 GHz Amplifier Using 0.13 µm CMOS Technology
T. Wang, H. Wang, National Taiwan University, Taipei, Taiwan

TH4A-03: On Compact HBT RF Noise Modeling
M. Rudolph, P. Heymann, Ferdinand-Braun-Institut (FBH), Berlin, Germany

TH4A-04: Ultralow-Power X-Band SiGe HBT Low-Noise Amplifiers
P. Roux, Lucent Technologies, Le Plessis Robinson, France; Y. Baeyens, J. Weiner, Y. Chen, Lucent Technologies, Murray Hill, USA

TH4A-05: A SiGe-BiCMOS UWB Receiver for 24 GHz Short-Range Automotive Radar Applications
H. Veenstra, E. van der Heijden, M. Notten, G. Dolmans, Philips, Eindhoven, The Netherlands

TH4A-06: A 10.8 GHz CMOS Low-Noise Amplifier Using Parallel-Resonant Inductor
K. Sun, Z. Tsai, K. Lin, H. Wang, National Taiwan University, Taipei, Taiwan

TH4B
High Reliability RF MEMS Switches
Chair: N. Scott Barker
Cochair: Dimitrios Peroulis
HCC 312

TH4B-01: High-Power High-Reliability Submicrosecond RF MEMS Switched Capacitors
B. Lakshminarayanan, G.M. Rebeiz, University of California, San Diego, La Jolla, USA

TH4B-02: High-Cycle Life Testing of RF MEMS Switches
C.L. Goldsmith, D.I. Forehand, MEMtronics Corp., Plano, USA; Z. Peng, J.C. Hwang, Lehigh University, Bethlehem, USA

TH4B-03: Hot-Switching Test of Noncontact Type MEMS Switches
E. Shim, J. Park, W. Choi, Y. Kim, U. Kim, Y. Kwon, D. Cho, Seoul National University, Seoul, Korea

TH4B-04: A Novel Warped-Beam Design that Enhances RF Performance of Capacitive MEMS Switches
R. Al-Dahleh, R.R. Mansour, University of Waterloo, Waterloo, Canada

TH4B-05: Dielectric Charging of RF MEMS Capacitive Switches under Bipolar Control-Voltage Waveforms
Z. Peng, J. Hwang, Lehigh University, Bethlehem, USA; X. Yuan, IBM Microelectronics Div., Hopewell Jct, USA; D. Forehand, C.L.

TH4D: Novel Metamaterial Elements: Their Characteristics and Applications
Chair: Jan Zehentner
Cochair: Kai Chang
HCC 316B

TH4D-01: Composite Right/Left Handed Metamaterial Structures Composed of Dielectric Resonators and Parallel Mesh Plates
T. Ueda, Kyoto Institute of Technology, Kyoto, Japan; T. Itoh, N. Michishita, University of California at Los Angeles, Los Angeles, USA

TH4D-02: Circuital and Experimental Demonstration of a 3D Isotropic LH Metamaterial Based on the Rotated TLM Scheme
M. Zedler, P. Russer, Lst.f.HF-Technik, TU Munich, Munich, Germany; C. Caloz, PolyGrames, Polytechnique Montréal, Montréal, Canada

TH4D-03: Isotropic Epsilon-Negative Particles
J. Machac, P. Protiva, J. Zehentner, Czech Technical University in Prague, Prague 6, Czech Republic

TH4D-04: Theoretical and Experimental Analysis of Magnetic Inclusions for the Realization of Metamaterials at Different Frequencies
F. Bilotti, A. Toscano, L. Vegni, University of Roma Tre, Rome, Italy; K. Aydin, K.B. Alici, E. Ozbay, Nanotechnology Research Center, Ankara, Turkey

TH4D-05: Bandpass Filtering by Below-Cutoff Waveguides Loaded with Split-Ring Resonators: Relevance to the Lefthandedness
E. Semouchkina, S. Mudunuri, G. Semouchkin, R. Mittra, Penn State University, University Park, USA

TH4E: Special Session
Submillimeter-Wave Radio Astronomy and Mauna Kea
Chair: Paul Goldsmith
Cochair: Peter H. Siegel
HCC 316A

TH4E-01: Submillimeter Astronomy and Mauna Kea — An Overview
P.F. Goldsmith, California Institute of Technology, Pasadena, USA

TH4E-02: The Caltech Submillimeter Observatory
T.G. Phillips, California Institute of Technology, Pasadena, USA

TH4E-03: Submillimetre Astronomy with the James Clerk Maxwell Telescope
G. Davis, A. Chrysostomou, Joint Astronomy Centre, Hilo, USA

TH4E-04: The Submillimeter Array
R. Blundell, Smithsonian Astrophysical Observatory, Cambridge, USA

TH4E-05: Technology for Submillimeter Astronomy
J. Zmuidzinas, California Institute of Technology, Pasadena, USA

Thursday Technical Sessions 15:30–17:10

TH4F
Phased-Array Systems and Enabling Technologies
Chair: William R. Deal
Cochair: Ryan Miyamoto
HCC 315

TH4F-01: Wideband Antenna Arrays with Reconfigurable Beamforming and Beamshaping
A. Ouacha, R. Erickson, R. Gunnarsson, B. Carlegrim, C. Samuelsson, S. Leijon, Swedish Defence Research Agency, Linkoping, Sweden

TH4F-02: A Monopulse Rotman Lens Phased Array for Enhanced Angular Resolution
L. Schulwitz, A. Mortazawi, University of Michigan, Ann Arbor, USA

TH4F-03: An Active Electronic Ka-Band Antenna Beam-Forming Network Based on Injection-Locked Local Oscillators
H. Grubinger, H. Barth, R. Vahldieck, ETH Zürich, Zürich, Switzerland

TH4F-04: Wafer-Level Integrated Antenna Front End Module For Low-Cost Phased Array Implementation
J. M. Yang, Y. Chung, M. Nishimoto, M. Battung, T. Long, P. Chang-chien, K. Tornquist, M. Siddiqui, R. Lai, Northrop Grumman Space Technology

TH4F-05: A Two-Dimensional Beam Scanning Antenna Array Using Composite Right/Left-Handed Microstrip Leaky-Wave Antennas
D. Lee, S. Lee, Y. Kwon, Seoul National University, Seoul, Korea; C. Cheon, University of Seoul, Seoul, Korea

TH4F-06: 20 GHz to 40 GHz Beam-Shaping/Steering Phased Antenna Array System using Fermi Tapered Slot Antenna
L. Yang, C. W. Domier, N. C. Luhmann, University of California, Davis, Davis, USA; N. Ito, A. Mase, Kuyshu University, Kasuga, Japan

TH4G
New Developments in Transformers and Inductors
Chair: Jesse Taub
Cochair: Tapan K. Sarkar
HCC 314

TH4G-01: Broadband Impedance Transformer Based on Asymmetric Coupled Transmission Lines in Nonhomogeneous Medium
V. Zhurbenko, V. Krozer, P. Meincke, Technical University of Denmark, Kgs. Lyngby, Denmark

TH4G-02: High-Performance 3D Helical RF Transformers
D. Weon, S. Mohammadi, Purdue University, West Lafayette, USA

TH4G-03: Fully Embedded 2.4 GHz LC Balun into Organic Package Substrate with Series Resonant Tank Circuit
J. Park, H. Seo, J. Park, Kwangwoon University, Seoul, Republic of Korea

TH4G-04: High-Q Solenoidal Inductive Elements
Z. Feng, M. B. Steer, North Carolina State University, Raleigh, USA; C. A. Bower, J. Carlson, M. Lueck, D. Temple, RTI International, Research Triangle Park, USA

TH4G-05: Symmetric Monolithic T-Coils for Broadband IC Design
M.T. Reiha, J.R. Long, Dimes, Delft, The Netherlands

TH4G-06: High-Value Passive Component Integration in LTCC Technology
E. E. Hoppenjans, W. J. Chappell, Purdue, West Lafayette, USA

15:30–17:10

THP2
Interactive Forum
Chair: Eric Bryerton
Cochair: Matthew Morgan
HCC Ballroom A

THP2: Interactive Forum

15:30 15:40 15:50 16:00 16:10 16:20 16:30 16:40 16:50 17:00

THURSDAY

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University of Hawaii
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Michael DeLisio
Wavestream Corporation
Vice Chair
Plenary Session (Chair)

IMS 2007 is the culmination of eight long years of planning by the dedicated set of volunteers featured on these pages. Like the paddlers of the outrigger canoes that you see gliding along Waikiki Beach, our committee members worked as a synchronized team to make IMS 2007 — Microwaves Across the Pacific — a reality. Mahalo Nui Loa to all.

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Electronic Paper Management

Roger Pollard
University of Leeds
Electronic Paper Management

Yi-Chi Shih
MMCOMM Inc.
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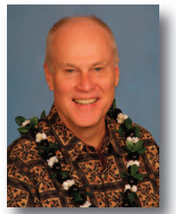

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Workshops

Bill Deal
Northrop Grumman
Workshops

Vesna Radisic
Northrop Grumman
Workshops

Kiet Mai
MMCOMM Inc.
Workshops (CD-ROM)

K.C. Gupta
Short Courses (Chair)

Aaron Oki
Northrop Grumman
Panel Sessions

Kevin Kobayashi
Sirenza
Focused/Special Sessions (Chair)

Jay Banwait
Northrop Grumman
Focused/Special Sessions (Vice Chair)

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National Radio Astronomy Observatory
Interactive Forum (Chair)
Grants Administration (Chair)

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Verigy, Inc.
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ARFTG Liaison

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Oceanit
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Grants Admin (Vice Chair)
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UCLA
Abstract Book
Workshops

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Transportation (Chair)

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RCUH
Daybook (Chair)

Joseph Cardenas
Oceanit
Daybook

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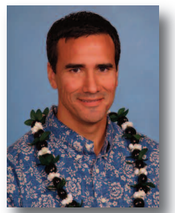
Signage (Chair)
Daybook
Publicity–Calendar



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Oceanit
AV / Cyber Café / Wireless

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SC Photograhper
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Guest Program (Chair)
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Feast
Hospitality Suite (Cochair)

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Translation–Chinese

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VISA Letters

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IMS 2007 Steering Committee Meeting, Honolulu, 26 November 2006.

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- Operations: Pierre Blondy (Translation–French), Hermann Boss (Translation–German), Paul Kim (Translation–Korean)
- Local Arrangements: Wade Tonaki (Signage)
- Exhibition Support: Michael Kim (Korea), Mansoor Siddiqui (Pakistan and Bangadesh)

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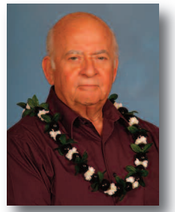

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Emeritus Chair (IMS 1992)

Richard Snyder
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Karl Varian
Raytheon
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IMS 2007 Steering Committee Meeting, Long Beach, 6 January 2007

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MTT-1 Computer-Aided Design	MTT-13 Microwave Ferrites and Ferroelectrics
MTT-2 Microwave Acoustics	MTT-14 Microwave Low-Noise Techniques
MTT-3 Microwave Photonics	MTT-15 Microwave Field Theory
MTT-4 Terahertz Technology and Applications	MTT-16 Microwave Systems
MTT-5 Microwave High-Power Techniques	MTT-17 HF-VHF-UHF Technology
MTT-6 Microwave and Millimeter-Wave Integrated Circuits	MTT-18 Microwave Superconductivity
MTT-7 Microwave and Millimeter-Wave Solid-State Devices	MTT-19 Microwave Technology Business Issues
MTT-8 Filters and Passive Components	MTT-20 Wireless Communications
MTT-9 Digital Signal Processing	MTT-21 RF MEMS
MTT-10 Biological Effects and Medical Applications	MTT-22 Signal Generation and Frequency Conversion
MTT-11 Microwave Measurements	MTT-23 RFIC
MTT-12 Microwave and Millimeter-Wave Packaging and Manufacturing	

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Future IMS Locations

IMS 2008 • Atlanta, GA

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IMS 2012 • Montréal, CAN
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Tom Raschko
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Tom.Raschko@ieee.org

IMS 2014 • Tampa, FL
Larry Dunleavy
University of South Florida
dunleavy@eng.usf.edu

IEEE MTT-S Awards

Microwave Career Award

This award recognizes an individual for a career of meritorious achievement and outstanding technical contribution in the field of microwave theory and techniques. This year's recipient is Robert J. Wenzel.

"For a career of leadership, meritorious achievement, creativity, and outstanding contributions in the fields of microwave theory and techniques."

Distinguished Service Award

This award recognizes significant contributions and outstanding service to the MTT-S and the microwave profession over a sustained period of time. This year's recipient is Lawrence R. Whicker.

"For his outstanding and dedicated service to the Society."

Distinguished Educator Award

This award was inspired by the untimely death of Prof. F.J. Rosenbaum (1937–1992), an outstanding teacher of microwave science and a dedicated AdCom Member and contributor. The award recognizes a distinguished educator in the field of microwave engineering and science who best exemplifies the special human qualities of Fred Rosenbaum who considered teaching a high calling and demonstrated his dedication to the Society through tireless service. This year's recipients are Les Besser and Kai Chang.

"For outstanding achievements as an educator, mentor, and role model of microwave engineers and engineering students."

Microwave Pioneer Award

This award recognizes an individual or a team not exceeding three persons having made outstanding pioneering technical contributions that advance microwave theory and techniques, described in an archival paper published at least 20 years prior to the year of the award. This year's recipients are the team of Alan Sokal and Nathan Sokal.

"For development of the Class-E power amplifier."

Microwave Application Award

This award recognizes an individual or team for outstanding application of microwave theory and techniques. This year's recipient is Robert Weigel.

"For the development of ultrahigh frequency microwave acoustic devices for wireless communication and sensing."

Outstanding Young Engineer Award

This award recognizes MTT-S members, who have distinguished themselves through technical achievements, service to the MTT-S, or a combination of both. Nominees must not have reached their 39th birthday and must be an MTT-S member at the time of nomination. This year's recipients are Christophe Caloz and Vesna Radisic.

Christophe Caloz: "For pioneering contributions to the development of novel concepts and applications of electromagnetic metamaterials."

Vesna Radisic: "For leadership in the field of microwave applications of defected ground structures, active antennas, and millimeter-wave electronics."

N. Walter Cox Award

This award was established in recognition of the qualities of N. Walter Cox and his service to the MTT-S prior to his untimely death in 1988. It is given to a Society volunteer whose efforts on behalf of MTT-S best exemplify Walter's spirit and dedication. This year's recipient is Jenshan Lin.

"For exemplary service, given in a spirit of selfless dedication and cooperation."

Microwave Prize

This award recognizes on an annual basis the most significant contribution by a published paper within the MTT-S's field of interest. Papers under consideration are those published during the calendar year preceding the Fall Meeting of the AdCom. This year's recipients are Thomas Lüthi and Christian Mätzler.

"For their paper, 'Stereoscopic Passive Millimeter-Wave Imaging and Ranging,' *IEEE Transactions on Microwave Theory and Techniques*, MTT-53, pp. 2594-2599 (2005)."

IEEE Fellows

The member grade of Fellow is conferred in recognition of unusual and outstanding professional distinction. It is awarded at the initiative of the IEEE Board of Directors following a rigorous nomination and evaluation process. Individuals receiving this distinction have demonstrated extraordinary contributions to one or more fields of electrical engineering, electronics, computer engineering, or related sciences. This grade is not conferred automatically on nomination — only a fraction of those nominated are elected. Sixteen MTT-S members who were evaluated by our Society were elected to the grade of Fellow, effective 1 January 2007.

In addition, seventeen other MTT-S members were elected to the grade of Fellow in 2007 after their qualifications were evaluated by other IEEE societies.

Edward Ackerman	For contributions to the optimization of analog optical links
Fadhel Ghannouchi	For contributions to advanced microwave amplification circuits and subsystems
Giovanni Ghione	For contributions to numerical physics-based modeling of passive and active integrated microwave components
Ramesh K. Gupta	For contributions to monolithic microwave integrated circuits
Stefan Heinen	For contributions to radio frequency integrated circuits and wireless systems
Ian Hunter	For contributions to theory and design of microwave filters
Charles Jackson	For leadership in the development of high-temperature superconductor microwave devices, quasi-optical techniques, and millimeter-wave subsystems
William Jemison	For contributions to microwave photonics for radar and communications
Bumman Kim	For contributions to linear power amplifiers, gallium arsenide microwave and millimeter-wave power devices, and monolithic microwave integrated circuits
Dalma Novak	For contributions to enabling technologies for the implementation of fiber radio systems
Hiroyo Ogawa	For contributions to microwave and millimeter-wave technology
Aaron Oki	For technical innovation in advancing gallium arsenide and indium phosphide microelectronics technology
Abbas Omar	For contributions to techniques for the analysis of microwave structures
Jose Pedro	For contributions to nonlinear distortion analysis of microwave devices and circuits
Jan Verspecht	For contributions to the area of large-signal microwave measurements
John Wood	For contributions to the nonlinear microwave device and behavioral modeling, and technology
Robert Fontana (AES)	For contributions to short pulse electromagnetics as applied to ultra-wideband systems
Barry Chambers (AP)	For contributions to active electromagnetic materials and structures
Atef Elsherbeni (AP)	For contributions to computational electromagnetics, antenna and microwave applications
Robert Nevels (AP)	For contributions to electromagnetic field theory for quantum mechanics
Kin-Lu Wong (AP)	For contributions to microstrip and planar antenna designs
Kenneth Kundert (CAS)	For contributions to simulation and modeling of analog radio frequency and mixed signal circuits
Jose Schutt-Aine (CPMT)	For contributions to modeling and simulation of distributed circuits with applications to signal integrity
Clark Nguyen (ED)	For contributions to the physics and technology of microelectromechanical systems
Jayasimha Prasad (ED)	For contributions to compound semiconductor heterojunction bipolar transistors
Yan-Kuin Su (ED)	For contributions to optoelectronics and nanophotonics research and education
Alan Sahakian (EMB)	For contributions to electrophysiology of atrial cardiac arrhythmias
Flavio Canavero (EMC)	For contributions to the modeling of circuit and electronic interconnects
James Drewniak (EMC)	For contributions in electromagnetic interference coupling paths and numerical modeling for compatibility design
Antonio Orlandi (EMC)	For contributions to high-speed digital systems
Andrew Podgorski (EMC)	For contributions to broadband immunity and compatibility certification
Kun-Shan Chen (GRS)	For contributions to remote sensing image and signal processing
Abdullah Atalar (UFFC)	For contributions to acoustic and atomic force microscopy

Message from the RFIC Chairs

Welcome to the 2007 RFIC Symposium.

The 2007 RFIC Symposium maintains its reputation as one of the foremost IEEE technical conferences dedicated to the latest innovations in RFIC development for wireless and wireline communication ICs. Running in conjunction with the International Microwave Symposium and Exhibition, the RFIC Symposium adds to the excitement of Microwave Week with three days focused exclusively on RFIC technology and innovation. The symposium begins on Sunday with workshops targeted at RF technology, design, and system issues. Sunday evening activities continue at 17:30 with the Plenary Session where two speakers will share their views on the direction and challenges that the RF IC industry will be facing. The first speaker, Charles Persico, Senior Vice President of Engineering at Qualcomm Inc., will discuss "Wireless Convergence — Your Phone is Not Just a Phone Anymore." The second speaker, Dwight C. Streit, Ph.D., Vice President, Electronics Technology, Northrop Grumman Space Technology, will discuss "Technology Directions for Future RF Applications." Following the Plenary Session, the RFIC Reception will be hosted on the Convention Center Rooftop Garden. This social event is a key component of the conference with the opportunity to connect with old friends and new acquaintances and catch up on the wireless industry.

The technical program includes 30 oral sessions, an Interactive Forum, and two lunchtime panel sessions. The technical program formally starts on Monday with four parallel oral sessions in the morning and in the afternoon. An all-time record number of 349 papers were submitted to RFIC Symposium this year. As a result, more technical sessions are planned on Tuesday to accommodate the increased number of accepted papers. The Interactive Forum will be held on Tuesday afternoon and is the perfect place for more detailed technical discussions with the authors. In the tradition of the RFIC Symposium, the Tuesday morning activity will be paused during the IMS Plenary Session, from 10:10–11:50. Panel Sessions are also planned at lunchtime on Monday and Tuesday. The RFIC Symposium concludes on Tuesday allowing participants to attend the IMS and ARFTG as well as plenty of time to visit the exhibit hall. The RFIC organization is thankful to the Microwave Week team for making this conference possible. Most of all, we are particularly thankful to all the technical contributors to the RFIC. We look forward to your participation. Please continue to make this conference so vibrant within the RFIC industry!

Enjoy the conference!

Luciano Boglione
General Chair
2007 RFIC Symposium

Jenshan Lin and Tina Quach
Technical Program Committee Cochairs
2007 RFIC Symposium

Sunday Plenary Session HCC 311 17:30–19:00

Wireless Convergence — Your Phone is Not Just a Phone Anymore

Charles Persico, Senior Vice President of Engineering, Qualcomm Inc

A look at wireless convergence in the mobile phone market goes beyond voice to photography, video, gaming, music, multimedia broadcast, internet access, position location, VOIP, WiFi, Bluetooth to name several. It has only been a few years since voice-only cellular mobile phones have become ubiquitous and considered indispensable in our daily lives. What is the future direction for integration of multiple radios and concurrent operation between various protocols?

Charles Persico is Senior Vice President of Engineering at Qualcomm Inc. He is in charge of Qualcomm's RF, analog, and mixed signal IC design, product, and test engineering and responsible for more than a billion dollar revenue business.. He received his BS from Union College in electrical engineering in 1985 and MS from Syracuse University in electrical engineering in 1987. In 1985 he joined GE Avionics systems working on advanced radar systems. He also worked at Honeywell Space Systems on various satellite electronic systems. In 1991 he joined Philips Semiconductor and was involved in RFIC design for various cellular standards. He has been with Qualcomm since 1995.

Technology Directions for Future RF Applications

Dwight C. Streit, Vice President, Electronics Technology, Northrop Grumman Space Technology

Recent advances in the performance and maturity of a number of key technologies are enabling a new generation of electronic systems for future RF applications. Advanced semiconductors, photonics, and nanotechnology are converging with new design, processing, and packaging schemes to revolutionize RF system performance. We present here an overview of the key technologies behind these achievements, and discuss their impact on future electronic systems.

Dwight Streit is Vice President, Electronics Technology, for Northrop Grumman Space Technology. He is responsible for the research and technology development required for advanced semiconductors, microelectronics, communications, and satellite payload electronics. Dr. Streit joined Northrop Grumman via the acquisition of TRW in 2002 and joined TRW Space & Electronics in 1987. He is an IEEE Fellow and a member of the National Academy of Engineering. He received his Ph.D. in electrical engineering from UCLA in 1986 and was the UCLA Engineering Alumnus of the Year in 2003.

Panel Sessions

12:00–13:15 Monday PMA HCC 313C

RFID: New Revolution or Remarketing of Existing Technologies in a New Package?

Moderator: Sayfe Kiaei, Arizona State University

Panelists: Reza Rofougaran, Broadcom Inc.; Ganesh K. Balachandran, Texas Instruments; Mitsuo Usami, Hitachi, Ltd.; Frank Mau-Chung Chang, UCLA; Robert Plana, LAAS-CNRS; Issy. Kipnis, Intel; Scott Chiu, Intel; John Adams, Freescale Inc.

This panel will focus on the development, architecture, applications, security, and system-level issues of RFIDs. New RFID technologies have the potential to revolutionize business processes and help create innovative end-user applications. This panel will discuss the future of RFID technologies and the potential impacts of this technology: What is unique and new in RFID? What is different from ZIGBEE and other 802.11 low-power solutions? Will it take the Bluetooth path? Is it a marketing hype or a reality? What are the RF-design challenges here?

12:00–13:15 Tuesday PTUA HCC 313C

CMOS Millimeter-Wave MMIC: Real or Bubble?

Moderator: Hiroshi Kondoh, Hitachi Ltd.

Panelists: Sorin Voinigescu, University of Toronto; Rudolf Lachner, Infineon Technology; Huei Wang, National Taiwan University; Kenjiro Nishikawa, NTT; Tuneo Tokumitsu, Eudyna Devices; Herbert Zirath, Chalmers Univ. of Technology; Ali M. Niknejad, University of California Berkeley

CMOS would be the most promising device for millimeter applications. But, when will the millimeter-wave CMOS IC be a real product? What kinds of applications are expected? The panel will discuss the pros and cons of CMOS and other devices and will show technical trends and market forecasts.

Monday Technical Sessions 08:00–11:50

	RMO1A **Cellular Transceivers** Chair: Fazal Ali Cochair: Jyoti P. Mondal **HCC 313A**	RMO1B **Pulsed UWB Transceivers** Chair: Ranjit Gharpurey Cochair: Madhukar Reddy **HCC 313B**	RMO1C: Broadband and Reconfigurable CMOS LNAs Chair: Kirk Ashby Cochair: Dan Nobbe **HCC 316B**	RMO1D **PAs for Wireless Connectivity** Chair: David Ngo Cochair: Noriharu Suematsu **HCC 316A**	
08:00	**RMO1A-1: INVITED Single-Chip Cellular Radios for GSM,GPRS, EDGE** D. Seippel, M. Hammes, J. Kissing, P. De Nicola, C. Vannier	**RMO1B-1: A 10 GS/s 5-Bit Ultra-Low Power DAC for Spectral Encoded Ultra-Wideband Transmitters** J. I. Jamp, J. Deng, L. E. Larson	**RMO1C-1: A 1.2 V Inductorless Broadband LNA in 90 nm CMOS LP** M. Vidojkovic, M. Sanduleanu, J. van der Tang, P. Baltus, A. van Roermund	**RMO1D-1: A WCDMA HBT Power Amplifier Module with Integrated Si DC Power Management IC for Current Reduction under Backoff Operation** G. Hau, J. Turpel, J. Garrett, H. Golladay	
08:20	**RMO1A-2: Integrated Blocker Filtering RF Front Ends** A. Safarian, A. Shameli, A. Rofougaran, M. Rofougaran, F. De Flaviis	**RMO1B-2: A 10 GS/s Distributed Waveform Generator for Subnanosecond Pulse Generation and Modulation in 0.18 µm Standard Digital CMOS** Y. Zhu, J. D. Zuegel, J. R. Marciante, H. Wu	**RMO1C-2: A 12 mW 7.5 GHz Bandwidth Inductorless CMOS LNA for Low-Power Low-Cost MultiStandard Receivers** B. G. Perumana, J-H. C. Zhan, S. S. Taylor, J. Laskar	**RMO1D-2: A Flip-Chip Silicon IPMOS Power Amplifier and a DC/DC Converter for GSM 850/900/1800/1900 MHz Systems** A. Tombak, R.J. Baeten, J.D. Jorgenson, D.C. Dening	
08:40	**RMO1A-3: A 90 nm CMOS Direct Conversion Transmitter for WCDMA** X. Yang, A. B. Davierwalla, D. W. Mann, K. G. Gard	**RMO1B-3: A Fully Integrated CMOS Transmitter for Ultra-Wideband Applications** T. Yuan, Y. J. Zheng, C. W. Ang, L. W. Li	**RMO1C-3: A Highly Linear Broadband CMOS LNA Employing Noise and Distortion Cancellation** W. Chen, G. Liu, B. Zdravko, A. Niknejad	**RMO1D-3: A 27.4 dBm DECT Power Amplifier for 2.5 V Supply in 0.13 µm CMOS** N. Zimmermann, T. Johansson, W. Simbürger, R. Thüringer, S. Heinen	
09:00	**RMO1A-4: A Superheterodyne Receiver Front-End With On-Chip Automatically Q-Tuned Notch Filters** B. Chi, Z. Wang, S. Wong	**RMO1B-4: 65 nm CMOS Burst Generator for Ultra-Wideband Low Data Rate Systems** D. Marchaland, F. Badets, M. Villegas, D. Belot	**RMO1C-4: A 2.4 to 5.4 GHz Low Power CMOS Reconfigurable LNA for Multistandard Wireless Receiver** C.T. Fu, C.L. Ko, C.N. Kuo	**RMO1D-4: A Compact Dual-Band Power Amplifier Driver for 2.4 GHz and 5.2 GHz WLAN Transmitters** H. Magnusson, H. Olsson	
09:20	**RMO1A-5: A Dual-Band High Efficiency CMOS Transmitter for Wireless CDMA Applications** J. Deng, M. Chew, S. Vora, M. Cassia, T. Marra, K. Sahota	**RMO1B-5: A 0.18 µm CMOS UWB LNA with 5 GHz Interference Rejection** Y. Gao, Y. J. Zheng, B. L. Ooi	**RMO1C-5: A Multiband 900 MHz/1.8 GHz/5.2 GHz LNA for Reconfigurable Radio** V. K. Dao, Q. D. Bui, C. S. Park	**RMO1D-5: A 3.5 GHz 25 W Silicon LDMOS RFIC power amplifier for WiMAX applications** C. Cassan, P. Gola	
	RMO2A **Power Efficient Transceivers** Chair: Derek Shaeffer Cochair: Steve Lloyd **HCC 313A**	RMO2B **Voltage Controlled Oscillators** Chair: Tian-Wei Huang Cochair: Lars Jansson **HCC 313B**	RMO2C **Millimeter Wave Front-Ends** Chair: Georg Boeck Cochair: Reynold Kagiwada **HCC 316B**	RMO2D **Device Technology** Chair: Aditya Gupta Cochair: Chang-Ho Lee **HCC 316A**	
10:10	**RMO2A-1: INVITED CMOS Radio with an Integrated 26 dBm Power Amplifier for a Complete System-on-Chip Cordless Phone** C. Grewing, S. VanWaasen, B. Bokinge, W. Einerman, A. Emericks, R. Engberg, C. Hedenäs, R. Thüringer, et al.	**RMO2B-1: A 10 GHz Distributed Voltage Controlled Oscillator for WLAN Application in a VLSI 65 nm CMOS Process** N. Seller, A. Cathelin, H. Lapuyade, J.-B. Bégueret, E. Chataigner, D. Belot	**RMO2C-1: 40 GHz Low-Noise-Receiver Circuits using BCB Above-Silicon Technology Optimized for Millimeter-Wave Applications** S. Pruvost, R. Cuchet, D. Pellissier, I. Telliez, M. Devulder, X. Gagnard, P. Ancey, M. Aid, F. Danneville, S. Lepilliet, et al.	**RMO2D-1: INVITED The Present State of the Art of Wide-Bandgap Semiconductors and Their Future** M. J. Rosker	
10:30	**RMO2A-2: A Sub-10 mW 2 Mbps BFSK Transceiver at 1.35 to 1.75 GHz** T. M. Hancock, M. Straayer, A. Messier	**RMO2B-2: A Q-band Low Phase Noise Voltage Controlled Oscillator Using Balanced pi-Feedback in 2-µm GaAs HBT Process** C-H. Lin, K-H. Liang, H-Y. Chang, Y-J. Chan, C-J. Chiong, E. Bryerton	**RMO2C-2: A 60 GHz Double Balanced Gilbert Cell Down Conversion Mixer on 130 nm CMOS** F. Zhang, E. Skafidas, W. Shieh	**RMO2D-2: Experimental Study on the Role of Hot Carrier Induced Damage on High frequency Noise in Deep Submicron NMOSFETs** H. Su, H. Wang, T. Xu, R. Zeng	
10:50	**RMO2A-3: A 6.3 GHz BFSK Transmitter with On-Chip Antenna for Self-Powered Medical Sensor Applications** V. Karam, P. H. R. Popplewell, A. Shamim, J. Rogers, C. Plett	**RMO2B-3: An X-Band Superharmonic Injection-Coupled Quadrature VCO (IC-QVCO) with a Tunable Tail Filter for I/Q Phase Calibration** I. R. Chamas, S. Raman	**RMO2C-3: A 77 GHz Receiver Front-End for Passive Imaging** J. Powell, H. Kim, C. G. Sodini	**RMO2D-3: High-Q Integrated Inductor Using Post-CMOS Selective Grown Porous Silicon (SGPS) Technique for RFIC Applications** C. Li, H. Liao, C. Wang, J. Yin, R. Huang	
11:10	**RMO2A-4: A 0.13 µm CMOS Ultra-Low-Power Front-End Receiver for Wireless Sensor Networks** W. Chen, T. Copani, H. J. Barnaby, S. Kiaei	**RMO2B-4: A 2.4-GHz LC-Tank VCO with Minimum Supply Pushing Regulation Technique** X. Wang, B. Bakkaloglu	**RMO2C-4: A Low-Power Low-Noise Single-Chip Receiver Front-End for Automotive Radar at 77 GHz in Silicon-Germanium Bipolar Technology** M. Hartmann, C. Wagner, K. Seemann, J. Platz, H. Jaeger, R. Weigel	**RMO2D-4: Characterization and Modeling of Metal-Double-Insulator-Metal Diodes** S. Rockwell, D. Lim, B. Bosco, J. Baker, B. Eliasson, M. Forsyth, M. Cromar	
11:30	**RMO2A-5: A 0.5 V Receiver in 90 nm CMOS for 2.4 GHz Applications** N. Stanic, A. Balankutty, P. Kinget, Y. Tsividis	**RMO2B-5: 2 GHz CMOS Voltage Controlled Oscillator with Optimal Design of Phase Noise and Power Dissipation** D. J. Young, S. J. Mallin, M. Cross	**RMO2C-5: 80 GHz and 160 GHz Transceiver in SiGe HBT Technology** E. Laskin, P. Chevalier, , A. Chantre, B. Sautreuil, S. P. Voinigescu	**RMO2D-5: Fully Depleted SOI RF Switch with Dynamic Biasing** C. L. Chen, C. K. Chen, P. W. Wyatt, J. M. Knecht, D.-R. Yost, P. M. Gouker, P. D. Healey, C. L. Keast	

Monday Technical Sessions 13:20–17:10

	RMO3A **3G and SDR** Chair: Didier Belot Cochair: Andre Hanke **HCC 313A**	RMO3B **Techniques for WiMedia UWB** Chair: Stefan Heinen Cochair: Jacques C. Rudell **HCC 313B**	RMO3C: Advanced Frequency Synthesis Techniques Chair: Bertan Bakkaloglu Cochair: Ting-Ping Liu **HCC 316B**	RMO3D: Transmitter Linearization Techniques Chair: Freek van Straten Cochair: Joe Staudinger **HCC 316A**	
13:20	**RMO3A-1: INVITED Digital RF Processor (DRP) for Mobile Phones** R. B. Staszewski, K. Muhammad, O. Eliezer	**RMO3B-1: INVITED Low-Cost Direct Conversion RF Front-Ends** J.-H. C. Zhan, B. R. Carlton, S. S. Taylor	**RMO3C-1: INVITED Single and Dual Loop Ring Oscillator Based Frequency Synthesizers for Broadband Tuner Applications** A. Maxim	**RMO3D-1: INVITED Application of Digital Adaptive Predistortion to Mobile Wireless Devices** G. Norris, J. Staudinger, J-H. Chen, C. Rey, P. Pratt, R. Sherman, H. Fraz	
13:40	**RMO3A-2: Analog Path for Triple-Band WCDMA Polar Modulated Transmitter in 90 nm CMOS** S. Akhtar, P. Litmanen, M. Ipek, J. Lin, S. Pennisi, F-J. Huang, R. B. Staszewski	**RMO3B-2: 3.1–4.7 GHz WiMedia UWB RF/Analog Front-End in 130 nm CMOS** M. W. Lynch, C. Demirdag, N. Belabbes, S. Carnevali, C. Lacy, M. Yu, W. An, H. Jin, J. Park, D. S. Malhi	**RMO3C-2: Frequency Synthesizer and FSK Modulator for IEEE 802.15.4 Based Applications** W. Rahajandraibe, L. Zaid, V. C. de Beaupré, G. Bas	**RMO3D-2: A High Performance Balanced Power Amplifier and its Integration into a Front-End Module at PCS Band** G. Zhang, S. Chang, Z. Alon	
14:00	**RMO3A-3: A 100 MHz – 2.5 GHz Direct-Conversion CMOS Transceiver for SDR Applications** G. Cafaro, T. Gradishar, J. Heck, S. Machan, G. Nagaraj, S. Olson, R. Salvi, B. Stengel, B. Ziemer	**RMO3B-3: A Dual-Band Direct-Conversion RF Front-End for WiMedia UWB Receiver** J. Kaukovuori, J. Ryynänen, K. A. I. Halonen	**RMO3C-3: A 9.1-to-11.5 GHz Four-Band PLL for Ku-Band Satellite and Optical Communication Applications** J-Y. Lee, K. Kim, S-C. Lee, J-K. Kwon, J. Kim, S-H. Lee	**RMO3D-3: Power Amplifier Predistortion Linearization using a CMOS polynomial Generator** A. A. Kidwai	
14:20	**RMO3A-4: A Wideband OFDM Transceiver Implementation for Beyond 3G Radio Systems** J. S. Koskinen, P. T. Eloranta, P. Seppinen, P. Kosonen, A. Pärssinen	**RMO3B-4: A 0.18 µm CMOS Low-Spurious Local Signal Generator for MB-OFDM UWB Radio** T. Tokairin, N. Matsuno, K. Numata, T. Maeda, S. Tanaka	**RMO3C-4: A Fully On-Chip 10 Gb/s CDR in a Standard 0.18 µm CMOS Technology** J. Li, J. Silva-Martinez	**RMO3D-4: Switched Doherty Power Amplifiers for CDMA and WCDMA** T. R. Apel, Y. Tang, O. Berger	
14:40	**RMO3A-5: A Disruptive Software-Defined Radio Receiver Architecture Based on Sampled Analog Signal Processing** F. Rivet, Y. Deval, J-B. Begueret, D. Dallet, D. Belot	**RMO3B-5: A Cochlea-Based Preselector for UWB Applications** C. Galbraith, G. M. Rebeiz, R. Drangmeister	**RMO3C-5: A 9-Bit 9.6 GHz 1.9 W Direct Digital Synthesizer RFIC Implemented In 0.18 µm SiGe BiCMOS Technology** X. Yu, F. F. Dai, D. Yang, V. Kakani, J. D. Irwin, R.C. Jaeger	**RMO3D-5: A 2.4 GHz Fully Integrated Transmitter Front End with +26.5 dBm On-Chip CMOS Power Amplifier** P. C. Wang, C. J. Chang, W. M. Chiu, P. J. Chiu, C. C. Wang, C. H. Lu, K.T. Chen, M. C. Huang, Y. M. Chang, S. M. Lin, K. U. Chan, Y. H. Lin, C. C. Lee	
	RMO4A **RFID** Chair: Natallino Camilleri Cochair: Srenik Mehta **HCC 313A**	RMO4B : Advanced Interconnect and Pad Modeling Chair: Francis Rotella Cochair: Louis Liu **HCC 313B**	RMO4C : Advanced Front-End Circuits Chair: Sayfe Kiaei Cochair: Walid Ali-Ahmad **HCC 316B**	RMO4D : Advanced Testing Techniques Chair: Patrick Yue Cochair: Danilo Manstretta **HCC 316A**	
15:30	**RMO4A-1: An 860 to 960 MHz RFID Reader IC in CMOS** P. B. Khannur, X. Chen, D. L. Yan, D. Shen, B. Zhao, M. K. Raja, Y. Wu, A. B. Ajjikuttira, W. G. Yeoh, R. Singh	**RMO4B-1: A Wideband Scalable and SPICE-Compatible Model for On-Chip Interconnects Up To 80 GHz** K. Kang, L. Nan, S. C. Rustagi, K. Mouthaan, J. Shi, R. Kumar, L.-W. Li	**RMO4C-1: Asymmetric DC Offsets and IIP2 in the Presence of LO Leakage in a Wireless Receiver** I. Elahi, K. Muhammad	**RMO4D-1: INVITED Built-In Self Test of RF Transceiver SoCs: From Signal Chain to RF Synthesizers** A. Valdes-Garcia, W. Khalil, B. Bakkaloglu, J. Silva-Martinez, E. Sanchez-Sinencio	
15:50	**RMO4A-2: A UHF Mobile RFID Reader IC with Self-Leakage Canceller** J.Y. Lee, J.H. Choi, K.H. Lee, B.K. Kim, M.S. Jeong, Y.H. Cho, H.Y. Yoo, K.O. Yang, S.Y. Kim, S.M. Moon, J.Y. Lee, S.K. Park, W.C. Kong, J. Kim, T.J. Lee, B.E. Kim, B.K. Ko	**RMO4B-2: CPW and Discontinuities Modeling for Circuit Design up to 110 GHz in SOI CMOS Technology** A. Siligaris, C. Mounet, B. Reig, P. Vincent	**RMO4C-2: A Low-Noise 2.5 GHz Direct-Conversion Receiver Front-End With Low-Distortion Baseband Filters** O. Shana'a	**RMO4D-2: Built-In Self Testing of a DRP-Based GSM Transmitter** O. Eliezer, I. Bashir, R. B. Staszewski, P. T. Balsara	
16:10	**RMO4A-3: A 900 MHz Direct-Conversion Transceiver for Mobile RFID Systems** J. Jang, H. Lee, S. W. Choi, K. Ahn, M. S. Jung, E. S. Song, J. Kim, H. H. Roh, G. B. Kim, S. W. Bae, H. R. Oh, Y. R. Seong, J. S. Park	**RMO4B-3: A Scalable Lossy Substrate Model for Nanoscale RF MOSFET Noise Extraction and Simulation Adapted to Various Pad Structures** J. C. Guo, Y. H. Tsai	**RMO4C-3: A CMOS 5 GHz Image-Reject Receiver Front-End Architecture** D. Ozis, J. Paramesh, D. J. Allstot	**RMO4D-3: A Sub-1 V CMOS LNA Dedicated to 802.11b/g Applications with Self-Test and High-Reliability Capabilities** M. Cimino, M. De Matos, H. Lapuyade, T. Taris, Y. Deval, J. B. Bégueret	
16:30	**RMO4A-4: Development of Long-Range UHF-band RFID Tag chip Using Schottky Diodes in Standard CMOS Technology** N. Tran, B. Lee, J. W. Lee	**RMO4B-4: Ultralow-Capacitance Bond Pad for RF Applications in CMOS Technology** Y.-W. Hsiao, M.-D. Ker	**RMO4C-4: A 500 µW 2.4 GHz CMOS Subthreshold Mixer for Ultralow-Power Applications** H. Lee, S. Mohammadi	**RMO4D-4: On-Chip Circuit for Measuring Data Jitter in the Time or Frequency Domain** M. Ishida, K. Ichiyama, T. J. Yamaguchi, M. Soma, M. Suda, T. Okayasu	
16:50	**RMO4A-5: An RFID System with Fully Integrated Transponder** A. Shameli, A. Safarian, A. Rofougaran, M. Rofougaran, F. De Flaviis	**RMO4B-5: Experimental Characterization of the Effect of Metal Dummies on Spiral Inductors** L. Nan, K. Mouthaan, Y.-Z. Xiong, J. Shi, S. C. Rustagi, B.-L. Ooi	**RMO4C-5: A 2.5 mW 900 MHz Receiver Employing Multiband Feedback with Bias Current Reuse** J. Han, R. Gharpurey	**RMO4D-5: Direct Extraction Techniques for Thermal Resistance of MESFET and HEMT Devices** I. Angelov, C. Kärnfelt	

Tuesday Technical Sessions 08:00–09:40

	RTU1A **Wireless LAN Transceivers** Chair: Glenn Chang Cochair: Srenik Mehta **HCC 313A**	RTU1B: High-Frequency Wideband Techniques Chair: Madhukar Reddy Cochair: Ranjit Gharpurey **HCC 313B**	RTU1C **High Performance VCOs** Chair: Stephen Dow Cochair: Yann Deval **HCC 316B**	RTU1D **Full Integrated CMOS PAs** Chair: Noriharu Suematsu Cochair: Joe Staudinger **HCC 316A**
08:00	RTU1A-1: An Area and Power Efficient Cartesian Phase Shifter + Mixer Circuit Applied to WLAN System A. Afsahi, A. Behzad, S. Au, R. Roufoogaran, J. Rael	RTU1B-1: A 24 GHz Pulse-Mode Transmitter for Short-Range Car Radar P. Zhao, H. Veenstra, J. R. Long	RTU1C-1: 11.8 GHz CMOS VCO with 62 % Tuning Range Using Switched-Coupled Inductors M. Demirkan, S. P. Bruss, R. R. Spencer	RTU1D-1: A Monolithic Voltage-Boosting Parallel-Primary Transformer Structures for Fully Integrated CMOS Power Amplifier Design K. H. An, Y. Kim, K. S. Yang, H. Kim, W. Woo, J. J. Chang, C.-H. Lee, H. Kim, J. Laskar
08:20	RTU1A-2: A Low-Power 5 GHz Transceiver in 0.13 µm CMOS for OFDM Applications with Sub-mm² Area Y. Han, L. E. Larson	RTU1B-2: A 0.13 µm CMOS Digital Phase Shifter for K-Band Phased Arrays K.-J. Koh, G. M. Rebeiz	RTU1C-2: A Colpitts Oscillator Design for a GSM Base Station Synthesizer J. Steinkamp, F. Henkel, P. Waldow, O. Pettersson, C. Hedenäs, B. Medin	RTU1D-2: A 90 nm CMOS Doherty Power Amplifier with Integrated Hybrid Coupler and Impedance Transformer M. Elmala, R. Bishop
08:40	RTU1A-3: A Single Chip 802.11abgn Enhancement Mode PHEMT MMIC with dual LNAs, Switches, and Distortion Compensation Power Amplifiers H. Morkner, M. Vice, M. Karakucuk, W. Abey, L. Nguyen, J. Kessler, R. Ruebusch	RTU1B-3: Low-Noise Low-Cost RX Solutions for Pulsed 24 GHz Automotive Radar Sensors S. Pruvost, L. Moquillon, E. Imbs, M. Marchetti, P. Garcia	RTU1C-3: Temperature-Compensated 2.45 GHz Ring Oscillator with Double Frequency Control W. Rahajandraibe, L. Zaïd, V. Cheynet de Beaupré, G. Bas	RTU1D-3: A 2.4 V_{pp} Output, 0.045–32.5 GHz CMOS Distributed Amplifier J. Aguirre, C. Plett
09:00	RTU1A-4: A WiMAX Receiver with Variable Bandwidth of 2.5–20 MHz and 93 dB Dynamic Gain Range in 0.13 µm CMOS Process D.-R. Huang, S.-W. Kao, Y.-H. Pang	RTU1B-4: A 52 GHz, 8.5 dB Traveling Wave Amplifier in 0.13 µm Standard CMOS process M. Egels, J. Gaubert, P. Pannier and S. Bourdel	RTU1C-4: A Low-Phase-Noise Low-Power 27 GHz SiGe VCO using Merged-Transformer Matching-Circuit Technique T. Nakamura, T. Masuda, K. Washio, H. Kondoh	RTU1D-4: A 5.8 GHz Linear Power Amplifier in a Standard 90 nm CMOS Process using a 1V Power Supply P. Haldi, D. Chowdhury, G. Liu, A. M. Niknejad
09:20	RTU1A-5: A Multistandard Digital Envelope Modulator for Polar Transmitters in 90 nm CMOS P. T. M. van Zeijl, M. Collados	RTU1B-5: A 2–10 GHz Digital CMOS Phase Shifter for Ultra-Wideband Phased Array System D.-W. Kang, S. Hong	RTU1C-5: A Low Phase Noise 9 GHz CMOS Quadrature VCO using Novel Source-Follower Coupling Technique H.-K. Chen, S.-S. Lu, D.-C. Chang, Y.-Z. Juang	RTU1D-5: A 1.8 GHz 2 W Fully Integrated CMOS Push-Pull Parallel-Combined Power Amplifier Design O. Lee, K.S. Yang, Y. Kim, H. Kim, J. J. Chang, W. Woo, C.-H. Lee and J. Laskar

	RTU1E: Passive Components and Techniques Chair: Eli Reese Cochair: Aditya Gupta **HCC 315**	RTU1F: Novel Circuit Simulation and Modeling Chair: Kevin McCarthy Cochair: Bob Stengel **HCC 314**
08:00	RTU1E-1: A 0.3 mm² Miniaturized X-Band On-Chip Slot Antenna in 0.13 µm CMOS N. Behdad, D. Shi, W. Hong, K. Sarabandi, M.P. Flynn	RTU1F-1: Internal Unilateralization Technique for CMOS mm-Wave Amplifiers B. Heydari, E. Adabi, M. Bohsali, B. Afshar, M. A. Arbabian, A. M. Niknejad
08:20	RTU1E-2: A 60-GHz Millimeter-Wave CMOS Marchand Balun J.-X. Liu. C.-Y. Hsu, H.-R. Chuang, C.-Y. Chen	RTU1F-2: Novel High-Q Inductor using Active Inductor Structure and Feedback Parallel Resonance Circuit S. Seo, N. Ryu, H. Choi, Y. Jeong
08:40	RTU1E-3: De-Embedding Considerations for High Q RFIC Inductors K. Goverdhanam, Y. Tretiakov, G. Ali Rezvani	RTU1F-3: Stability Analysis of On-Chip Multi-Stage RF Power Amplifier M. Unterweissacher, K. Mertens, T. Brandtner, W. Pribyl
09:00	RTU1E-4: A Low-Loss Compact Linear Varactor Based Phase Shifter J. H. Qureshi, S. Kim, K. Buisman, C. Huang, M. Pelk, A. Akhnoukh, L. E. Larson, L. K. Nanver, L. C. N. de Vreede	RTU1F-4: Top-Down PLL Design Methodology Combining Block Diagram, Behavioral, and Transistor-Level Simulators B. Nicolle, W. Tatinian, J.-J. Mayol, J. Oudinot, G. Jacquemod
09:20	RTU1E-5: Design and Layout Techniques for the Optimization of nMOS SPDT Series-Shunt Switches in a 130 nm SiGe BiCMOS Technology J. P. Comeau, J. D. Cressler, M. Mitchell	RTU1F-5: Nonlinear Behavioral Modeling of Passive RFID-Transponder-Frontends K. Seemann, M. Hartmann, F. Cilek, A. Missoni, G. Holweg, R. Weigel

The pages shown here are an abridged version of the full RFIC Technical Program. Full details and recent changes can be found at www.rfic2007.org or in the RFIC Program Book.

Tuesday Technical Sessions 13:20–17:10

	RTU3A: UWB and High-Frequency Front-Ends Chair: Frank Henkel Cochair: Georg Boeck **HCC 313A**	RTU3B **Wideband Potpourri** Chair: Jacques C Rudell Cochair: Stefan Heinen **HCC 313B**	RTU3C: Microwave and mm-wave Synthesizers and Components Chair: Sanjay Raman Cochair: Lawrence Kushner **HCC 301A**	RTU3D: Silicon Technology for mm-Wave ICs Chair: Marko Sokolich Cochair: Mahesh Kumar **HCC 301B**
13:20	RTU3A-1: A 24 GHz CMOS Direct-Downconversion Subharmonic Downconverter R. M. Kodkani, L. E. Larson	RTU3B-1: INVITED Power-Efficient Decision-Feedback Equalizers for Multi-Gb/s CMOS Serial Links J. F. Bulzacchelli, A.V. Rylyakov, D. J. Friedman	RTU3C-1: Performance and Yield Optimization of mm-Wave PLL Front-End in 65 nm SOI CMOS D. Lim, J. Kim, J.-O. Plouchart, D. Kim, C. Cho, D. S. Boning	RTU3D-1: INVITED Silicon Schottky Diode Power Converters Beyond 100 GHz C. Mishra, U. Pfeiffer, R. Rassel, S. Reynolds
13:40	RTU3A-2: A 1.2 V, 5.8 mW Ultra-Wideband Folded Mixer in 0.13 µm CMOS K. H. Choi, D. H. Shin, C. P. Yue	RTU3B-2: A Single-Chip DBS Tuner-Demodulator SoC using Discrete AGC, Continuous I/Q Correction, and 200 MS/s Pipeline ADCs A. Maxim, R. Poorfard, R. Johnson, P. Crawley, J. Kao, Z. Dong, M. Chennam, T. Nutt, D. Trager	RTU3C-2: A 16 to 19 GHz Subinteger Frequency Synthesizer for a 60 GHz Transceiver B. A. Floyd	RTU3D-2: Hot Carrier Degradation and Performance of 65 nm RF n-MOSFET M. Fakhruddin, M. C. Tang, J. Kuo, J. Karp, D. Chen, C. S. Yeh, S. C. Chien
14:00	RTU3A-3: A Broadband CMOS Multiplier-Based Correlator for IR-UWB Transceiver SoC H. Xie, X. Wang, A. Wang	RTU3B-3: Heterogeneously Integrated 10 Gb/s CMOS Optoelectronic Receiver for Long-Haul Telecommunication H. Sharifi, S. Mohammadi	RTU3C-3: A 16 mW 8 Mbps Fractional-N FSK Modulator at 15.8–18.9GHz M. Straayer, A. Messier, T. Hancock	RTU3D-3: 65 nm HR SOI CMOS Technology: emergence of Millimeter-Wave SoC F. Gianesello, S. Montusclat, B. Martineau, D. Gloria, C. Raynaud, S. Boret, G. Dambrine, S. Lepilliet, R. Pilard
14:20	RTU3A-4: A 3 to 9 GHz Dual-Band Up-Converter for a DS-UWB Transmitter in 0.18 µm CMOS M. Annamalai, Y. Zheng, W. G. Yeoh	RTU3B-4: Tuned LC Clock Buffers with Static Phase Adjust V. P. Reddy, W. S. Titus, J. G. Kenney	RTU3C-4: A 15 GHz 7-Channel SiGe:C PLL for 60 GHz WPAN Application J.-Y. Lee, S.-H. Lee, H. Kim, H.-K. Yu	RTU3D-4: Novel Collector Structure Enabling Low-Cost Millimeter-Wave SiGe:C BiCMOS Technology J. P. John, J. Kirchgessner, D. Morgan, J. Hildreth, M. Dawdy, R. Reuter, H. Li
14:40	RTU3A-5: A Miniature, Folded-Switching, Up-Conversion Mixer for UWB Applications Using 0.1 µm CMOS Process P.-C. Huang, F.-C. Chang, S.-F. Chao, H. Wang		RTU3C-5: A Ka-Band, Static, MCML Frequency Divider in Standard 90 nm CMOS LP for 60 GHz Applications H. M. Cheema, R. Mahmoudi, A. H. M. van Roermund, M. A. T. Sanduleanu	RTU3D-5: Vertical-Ground-Plane Transmission Lines for Miniaturized Silicon-Based MMIC J.-W. Huang, C.-S. Wang, C.-K. Wang, S.-H. Yeh

	RTU4A: Advanced Transmitter Building Blocks Chair: Freek van Straten Cochair: David Ngo **HCC 313A**	RTU4B : New Trends in VCO Techniques Chair: Jinghong Chen Cochair: Tian-Wei Huang **HCC 313B**	RTU4C: Advances in Low-Noise Amplifiers Chair: Brian A. Floyd Cochair: Leonard D. Reynolds **HCC 301A**	RTU4D : MOSFET Characterization and Modeling Chair: Yuhua Cheng Cochair: Bumman Kim **HCC 301B**
15:30	RTU4A-1: Ka-Band Low-Loss and High-Isolation 0.13 µm CMOS SPST/SPDT Switches Using High Substrate Resistance B. Min, G. M. Rebeiz	RTU4B-1: A Compact 5 GHz Standing-Wave Resonator-Based VCO in 0.13 µm CMOS D. Shi, J. East and M. P. Flynn	RTU4C-1: AGM-Boosted Current-Reuse LNA in 0.18 µm CMOS J. S. Walling, S. Shekhar, D. J. Allstot	RTU4D-1: A New Approach of High-Frequency Noise Modeling for 70 nm NMOS by Accurate Noise-Source Extraction Y. Kiyota, C.- H. Chen, T. Kubodera, A. Nakamura, K. Takeshita, M. J. Deen
15:50	RTU4A-2: RF-MEMS Based Adaptive Antenna Matching Module A. v. Bezooijen, F. v. Straten, J. Sneep, R. Mahmoudi, A .H .M. v. Roermund	RTU4B-2: A Dual-Band, Wide-Tuning-Range CMOS Voltage Controlled Oscillator for Multiband Radio B. Catli, M. M. Hella	RTU4C-2: A 2.4 GHz 0.82 mW Hybrid Balun for Low-Power Fully-Differential Direct Conversion Receivers in 0.18 µm CMOS H. Shin, J. Park	RTU4D-2: A New Noise-Parameter Model of Short-Channel MOSFETs J. Jeon, I. M. Kang, Y. Yun, B.-G. Park, J. D. Lee, H. Shin
16:10	RTU4A-3: An 8 GHz Beamforming Transmitter IC in 130 nm CMOS J. Wernehag, H. Sjöland	RTU4B-3: Double Cross Coupled Colpitts VCO with Low Phase Noise using InGaP/GaAs HBT Technology B. Shrestha, N. Y. Kim	RTU4C-3: A Wide-Band CMOS Variable-Gain Low Noise Amplifier for Multistandard Terrestrial and Cable TV Tuner D. G. Im, S. S. Song, H. T. Kim, K. Lee	RTU4D-3: CR018 Wideband Noise Model for AMS/RF CMOS Simulation M. T. Yang, C. W. Kuo, P. P. C. Ho, D. C. W. Kuo, C. C. Chen, T. J. Yeh, C. Tseng, J. Jayapalan, G. Brown, G. Yeap, Y. Du, S. Liu
16:30	RTU4A-4: A Spectrally Pure 5.0 W, High-PAE (6–12 GHz) GaN Monolithic Class-E Power Amplifier for Advanced T/R Modules R. Tayrani	RTU4B-4: A 12 GHz Low Phase Noise VCO by Employing Novel CMOS Field-Plate Transistors C.-C. Wei, H.-C. Chiu, W.-S. Feng	RTU4C-4: 30 GHz CMOS Low Noise Amplifier E. Adabi, B. Heydari, M. Bohsali, A. M. Niknejad	RTU4D-4: MOSFET Model Extraction Using 50 GHz Four-Port Measurements S. C. Rustagi, J. Shi, F. Lin
16:50	RTU4A-5: 1 Watt Conventional and Cascoded GaN-SiC Darlington MMIC Amplifiers to 18 GHz K. W. Kobayashi, Y. Chen, I. Smorchkova, R. Tsai, M. Wojtowicz, A. Oki	RTU4B-5: A Tuned-Input Tuned-Output VCO in 0.18 µm CMOS S. Shekhar, S. Aniruddhan, D. J. Allstot	RTU4C-5: A 2 mW, Sub-2 dB Noise Figure, SiGe Low-Noise Amplifier For X-band High-Altitude or Space-based Radar Applications T. K. Thrivikraman, W.-M. L. Kuo, J. P. Comeau, A. K. Sutton, J. D. Cressler, P. W. Marshall , M. A. Mitchell	RTU4D-5: Distortion Simulations with the PSP Model: Common-Gate Circuits C. M. Olsen, L. F. Wagner, J. Watts, J. R. Jones, J. J. Pekarik

TUESDAY

Tuesday Interactive Forum 14:00–17:00

RTUP
RFIC Interactive Forum
Chair: Tina Quach
Cochair: Jenshan Lin
Ballroom A

RTUP-01: Coherent BPSK Demodulator MMIC Using an Antiparallel Synchronization Loop
Y. Zheng, C. E. Saavedra

RTUP-02: A 0.13 µm CMOS 5 GHz Fully Integrated 2×3 MIMO Transceiver IC with over 40 dB Isolation
R. Tachibana, S. Kousai, T. Kato, H. Kobayashi, R. Ito, A. Maki, D. Miyashita, Y. Araki, T. Hashimoto, H. Hoshino, T. Sekiguchi, M. Ashida, I. Seto, M. Hamada, R. Fujimoto, H. Yoshida, S. Otaka

RTUP-03: A 5×5 mm Highly Integrated Dual-Band WLAN Front-End Module Simplifies 802.11a/b/g and 802.11n Radio Designs
C. W. P. Huang, W. Vaillancourt, C. Masse, J. Soricelli, T. Quaglietta, A. Long, G. Rabjohn, A. Parolin

RTUP-04: A 5.2 GHz BFSK Receiver with On-Chip Antenna for Self-Powered RFID Tags and Medical Sensors
P.H. R. Popplewell, V. Karam, A. Shamim, J. Rogers, C. Plett

RTUP-05: Achieving Wideband Sub-1 dB Noise Figure and High Gain with MOSFETs if Input Power Matching is Not Required
E. A. M. Klumperink, Q. Zhang, G. J. M. Wienk, R. Witvers, J. G. B. de Vaate, E. E. M. Woestenburg, B. Nauta

RTUP-06: A Bondpad-Size Narrowband LNA for Digital CMOS
J. Borremans, P. Wambacq, G. V. der Plas, Y. Rolain, M. Kuijk

RTUP-07: Fully Integrated High-Q Switched Capacitor Bandpass Filter with Center Frequency and Bandwidth Tuning
A. E. Oualkadi, M. E. Kaamouchi, D. Flandre

RTUP-08: 60 GHz LNA using a Hybrid Transmission Line and Conductive Path to Ground Technique in Sillicon
J. Alvarado Jr., K.T. Kornegay, D. Dawn, S. Pinel, J. Lasker

RTUP-09: A Low Distortion FM Tuner Analog Front-End with Multi-tanh Low Noise Amplifier
J. Hu, M. R. May, M. D. Felder, L. DiSanza, L. H. Ragan

RTUP-10: A 10 GHz Low Phase Noise 0.13 µm CMOS LC-VCO for Mixed-Signal SoCs Using Noise Rejection Caged Inductors
A. Maxim

RTUP-11: All-PMOS Wideband VCO with an Automatic Amplitude Controller for Multiband Multistandard Radios
Q. D. Bui, C. S. Park

RTUP-12: A 5.8 GHz VCO with Precision Gain Control
L. Jia, A. Tamura, S. Kubota, Y. B. Choi, W. G. Yeoh

RTUP-13: Substrate Coupling Effect under Various Noise Injection Topologies in LC-Voltage Controlled Oscillator
S.-S. Wang, Y.-C. Wu, S. S. H. Hsu, C.-Y. Chan

RTUP-14: A 45-to-60 GHz SiGe:C VCO for Millimeter-Wave Applications
J.-Y. Lee, S.-H. Lee, H. Kim, H.-K. Yu

RTUP-15: 5 GHz Frequency Synthesizer with Auto Calibration Loop
M. Kim, K. Lee, Y. Kwon, J. Lim, T. J. Park

RTUP-16: Regenerative Frequency Divider with Synchronous Fractional Outputs
O. Momeni, K. Sengupta, H. Hashemi

RTUP-17: A Highly Efficient Broadband (7–14 GHz) Monolithic Class-E Power Amplifier for Space-Based Radar
R. Tayrani

RTUP-18: A 60 GHz CMOS Transmit/Receive Switch
C. M. Ta, S. Skafidas, R. Evans

RTUP-19: A 26 to 40 GHz Wideband SiGe Balanced Power Amplifier IC
M. Chang, G. M. Rebeiz

RTUP-20: Parasitic Capacitance Optimization of GaAs HBT Class-E Power Amplifier for High Efficiency CDMA EER Transmitter
K. Y. Kim, J. H. Kim, S. M. Park, C. S. Park

RTUP-21: A High Dynamic Range CMOS RF Power Amplifier with a Switchable Transformer for Polar Transmitters
Y. Kim, B.-H. Ku, C. Park, D. H. Lee, S. Hong

RTUP-22: 1.8 GHz CMOS Power Amplifier with Stage-Convertible Structure Using Differential-Line Inductor
C. Park, D. H. Lee, J. Han, S.-H. Baek, Y. Kim, S. Hong

RTUP-23: A 97.2 mW 1.8 GHz Low-Power CMOS Transmitter for Mobile WiBro and WiMAX
H. Yoo, J. Kim, T. W. Kim, M. Jeong, Y. Cho, B. Kim, H. Shin, B.-E. Kim, B.-K. Ko

RTUP-24: Low-Capacitance SCR with Waffle Layout Structure for On-Chip ESD Protection in RF ICs
C.-Y. Lin, M.-D. Ker

RTUP-25: On the P+ Guard Ring Sizing Strategy to Shield Against Substrate Noise
S. Bronckers, G. Vandersteen, G. Van der Plas, Y. Rolain

RTUP-26: A Highly Integrated X-Band Frequency Quadrupler MMIC
Y. Yamaguchi, T. Kaho, K. Uehara

RTUP-27: An Efficient Technique for Performance Analysis of a Receiver in the Presence of Calibration/Compensation Algorithms
C. Fernando, K. Muhammad

RTUP-28: Frequency Dependence of the Quality Factor and Design Rules of Integrated Magnetic Inductors
D. W. Lee, L. L. Li, K.-P. Hwang, Y. Min, S.X. Wang

RTUP-29: Broadband Noise Modeling of SiGe HBT under Cryogenic Temperatures
B. Banerjee, S. Venkataraman, C.-H. Lee, J. Laskar

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Message from the ARFTG Chairs

The 69th Automatic RF Techniques Group (ARFTG) Microwave Measurement Conference will be held at the Hilton Hawaiian Village on Friday, 8 June 2007. The conference theme is "Addressing Metrology Needs for Future High-Speed Information and Communication Systems."

Dr. Wolfgang Heinrich from FBH Berlin will kick off the conference with a keynote speech on the emerging topic of "Characterization Challenges for Future Base-Station Power Amplifiers." Regular papers will focus on wideband measurements for high-speed communication systems, digital communication system metrics, complex waveform analysis, linear and nonlinear vector network analysis, multiport and differential measurements, and other areas of microwave and millimeter-wave measurements.

As the ARFTG paper submission deadline is traditionally in February, the ARFTG technical program was not available at the time of printing, so attendees are referred to the ARFTG website www.arftg.org for the latest updates. The 69th ARFTG conference will be the first ARFTG Spring Conference without a paper digest. Technical papers will be included in the ARFTG section on the IMS CD-ROM and an abstract book will be provided to the attendees.

There are two other CD-ROMs that can be purchased through on-line or on-site registration: the brand new ARFTG Workshop Compendium CD-ROM, covering all Fall ARFTG Nonlinear Measurements Workshops to date (2001–2006), and the ARFTG Conference Compendium CD-ROM.

The conference will be preceded on Thursday by the Nonlinear Vector Network Analyzer (NVNA) Users' Forum, an informal discussion group devoted to sharing information and issues related to instrumentation utilized in vector large-signal analysis of microwave circuits and systems that contain nonlinear elements. All interested are welcome to attend.

Also, be sure to check out the joint ARFTG/IMS workshops. ARFTG is cosponsoring and coorganizing two workshops on Monday: "WMA: Advances in Active Device Characterization and Modeling for RF and Microwave" and "WMC: High-Speed Digital Signal Integrity."

An important part of all ARFTG Conferences is the opportunity to interact one-on-one with colleagues, experts, and vendors in the RF and microwave test and measurement community. Starting with the continental breakfast in the exhibition area, continuing through the two exhibition/interactive forum sessions and the luncheon, there will be ample opportunity for discussion with others facing similar challenges. So, come and join us. You'll find that the atmosphere is informal, open, and friendly.

Dominique Schreurs
Conference Chair
69th ARFTG Conference

Uwe Arz
Technical Program Chair
69th ARFTG Conference

ARFTG Technical Program

Monday, 4 June

08:00–17:00	Joint ARFTG/IMS Workshops

Thursday, 7 June

16:30–18:30	NVNA Users' Forum

Friday, 8 June

07:00–16:00	Exhibition and Interactive Forum
07:00–08:00	Attendees and Speakers' Breakfast
08:00–09:45	Technical Session 1
09:45–10:30	Exhibition and Interactive Forum
10:30–11:50	Technical Session 2
11:50–13:00	Awards Luncheon
13:00–14:40	Technical Session 3
14:40–15:20	Exhibition and Interactive Forum
15:20–17:00	Technical Session 4

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Workshops and Short Courses

Workshops and Short Courses are offered on Sunday, Monday, and Friday and are distinguished by the following features:

- Advanced-level Workshops (designated as WSA, WSB, etc.) present the state of the art to specialists who are already experienced in the topic area.
- Tutorial-level Workshops (TSA, TSB, etc.) are targeted toward educating attendees in new areas of microwave technology, reviewing material that is primarily a revision of previously published information
- Short Courses (CSA, CSB, etc.) are offered by a well-coordinated team of two experts following a detailed course outline, providing a coherent tutorial presentation of a single topic to non-specialists. Each participant earns IEEE continuing education units.

All Workshops and Short Courses will be held at the Hawaii Convention Center. Specific room assignments will be announced at check-in.

Sunday Workshops and Short Courses

08:00–17:00 WSA

Architectural Design and System Verification for Wireless SoC — Nice to Have or a Real Necessity?

Topics and Speakers:

- Best Practices for Adopting Model-Based Design into Wireless SoC Development Flow, C. Warwick, The Mathworks
- Analog-on-Top Verification of AMS-RF Applications, J. Hartung, Cadence
- Automated Design Validation Flow for Mixed-Signal SoCs, T. Tarim and O. Eliezer, Texas Instruments
- Study of Existing Methods for Wireless System Design and Propose a New Method for Top-down and Bottom-up Design in RF, Y. Miyahara, Panasonic R&D Company of America
- System-Level Verification from RF-Level Design, S. Wedge, Synopsys
- Architectural Design and System Verification for Wireless SoC, a Must for Multimode Cellular Transceivers, D. Schwarz, Freescale Semiconductor
- Architectural Design and System Verification for Wireless SoC - Nice to Have or a Real Necessity? M. Barnasconi, NXP Semiconductors
- A Top Down Design Methodology for Mixed-Signal Integrated Circuits using C++ Behavioral Modeling, M. Perrott, MIT-EECS

Organizers: J. Niehof, NXP Semiconductors; M. Barnasconi, NXP Semiconductors

Sponsor: RFIC

As more and more digital signal processing is included in the RF pipe, not only for modulation and demodulation purposes, but also to facilitate digital calibration, testing and configuration, an overall system-level design approach at architecture level is essential. Furthermore, verification of the complete embedded system solution, including RF and mixed-signal circuitry, is becoming recognized as an essential step in the design release process before committing to tape-out.

08:00–17:00 WSB

Wireless Reconfigurable Terminals: Adaptive Analog Circuits or Digital RF Processing?

Topics and Speakers:

- Reconfigurable Si RF Receiver Front-Ends for Multistandard Radios, M. Brandolini, Broadcom Corporation
- Reconfigurable Analog Baseband Circuit Design, O. K. Shanaa, Maxim Integrated Products
- Digital RF Processing for Wireless Receivers, K. Muhammad, Texas Instruments
- Digital RF Processing for Wireless Transmitters, O. Eliezer, Texas Instruments
- Reconfigurable Transmitters and Power Amplifiers, L. Larson, UC San Diego
- Polar Transmitters for Reconfigurable Radios, E. McCune, Panasonic Emerging Advanced RF Laboratory
- Reconfigurable ADCs / DACs for Multimode Terminals, K. Gulati, BitWave Semiconductor Inc
- Reconfigurable VCOs and Synthesizers, A. Gnudi, University of Bologna

Organizers: W. Y. Ali-Ahmad, American University of Beirut; O. K. Shanaa, Maxim Integrated Products

Sponsor: RFIC

"Life goes wireless!" This motto for the 21st century is pushing the evolution of new wireless devices, which confirm to multi-wireless standards and operate over multifrequency bands. This workshop will review current adaptivity design concepts for reconfigurable RF and analog base band integrated front-ends. In addition, it will present new Digital RF Processing (DRP) techniques for wireless transceivers, which move the radio reconfigurability concept to the digital domain.

13:00–17:00 WSC

Optimum CMOS Integrated LNA Design Techniques for Handsets

Topics and Speakers:

Sunday Workshops and Short Courses

- Design of CMOS Receiver LNAs, J. Long, Delft University of Technology
- State of the Art Techniques for High Linearity Integrated CMOS Low Noise Amplifiers, V. Aparin, Qualcomm
- Modulated-Signal Distortion Measurements to Support Nonlinear Circuit Simulation, K. Remley, NIST
- Device Modeling and Technology Parameters Affecting LNA Performance, J. Pekarik, IBM
- Interface, Co-Integration and Stability Aspects of Modern CMOS LNA Designs, T. McKay, RFMD
- Case Studies of Three Cellular LNA Designs in 90 nm CMOS, D. Griffith and S. Pennisi, Texas Instruments

Organizers: T. McKay, RFMD; J. Pekarik, IBM; L. Reynolds, RFMD

Sponsor: RFIC

This workshop will cover new techniques specific to CMOS LNA design for handsets in existing and emerging standards bands in the 800 MHz to 6 GHz frequency range. Focus on exploiting CMOS technology, with learning from 0.25 µm through 90 nm, emphasizing 90 nm and below where design iteration is prohibitive and excellence is demanded. By expounding on issues such as source mismatch, stability, nonlinear simulation accuracy, manufacturability, increased confidence in new techniques is developed.

08:00–17:00 WSD

Nanoscale RFIC Design Challenges and Foundry Solutions

Topics and Speakers:

- Advanced Nanoscale RFCMOS Foundry Technology Challenges and Solutions, J. Chern, S. Liu, TSMC
- Nanoscale RFCMOS Foundry Technologies and Design Support, A. Yen, UMC
- Design Challenge of ESD Protection, RF I/O, and Low Voltage Consideration in Mixed Process Note Deep Submicron and Nanometer CMOS Technologies, P. Ouyang, T. Yu, F. Lo, I.C. Chen and L.W. Yang, SMIC, R. Huang, H. Liao, PKU, Beijing, Y. Cheng, SHRIME, Peking U., A. Wang, Illinois Institute of Technology
- Foundry Solutions for Next-Generation RFIC Design, M. Racanelli, Jazz Semiconductor
- Topics in Wireless RFIC Design Methodology Going to Submicron Semiconductor Processes, R. A. Mullen, Cadence Design System
- RF SiP Solution and Challenges, C.T. Chiu, ASE Corp.
- Enhancing Overall Nanoscale RF CMOS System Performance with the Right Packaging Solution, N. Karim, Amkor Technology
- CMOS Scaling Impacts to RF/Mixed-Signal Circuit Design, M.C. Frank Chang, UCLA
- CMOS RF Transceivers for 5-GHz Broadband Wireless Access, S. S. Lu, H. C. Chen, National Taiwan U.
- Mixed-Signal Design Techniques for Deep-Submicron CMOS Single-Chip Receiver SOCs, A. Maxim and R. Poorfard, Silicon Laboratories
- Device Variability of Nanoscale RF CMOS Circuits and its System Mitigation, B. Staszewski and O. Eliezer, Texas Instruments Inc.

Organizers: L. W. Yang, SMIC; K. C. Wang, UMC; J. Lin, University of Florida

Sponsors: RFIC, MTT-9

Semiconductor foundries have been playing an increasingly important role in IC industry. RFCMOS technologies are mostly based on the processes for digital applications. The traditional RF design techniques are limited by transistor leakage current, device mismatches, passive components, ESD protection, noise and substrate modeling. This workshop addresses these limitations and solutions.

08:00–17:00 WSE

System-in-Package Technologies for Cost, Size, and Performance

Topics and Speakers:

- RF SiP Technology and Capability Overview, M. P. Gaynor, Antenova
- Laminate SiP Modules, M. Mangrum, Freescale
- RF SiP Modeling and Design, F. Lin, A*STAR IME
- Design and Implementation of Chip Scale Modules for Wireless Applications, K. Sun, Murata
- LTCC-Based SiPs and FEMs for Ultrasmall Size WLAN/WiMAX/BT Connectivity Solutions, P. Heide, EPCOS AG
- Global Universal Radio Units (GURU) Realized Using Multilayer Organics (MLO), G. White JMD
- Silicon Integrated Passive Devices for RF SiP, R. Frey, Independent Consultant
- RF Module Packages, E. Gongora, STATS Chippac
- System on Chip (SoC) as an Alternative to SiP, D. Nobbe, Peregrine

Organizers: M. P. Gaynor, Antenova; P. Heide, EPCOS AG; F. Lin, A*STAR IME

Sponsors: MTT-20, MTT-16

This workshop covers in detail all common current options for System in Package RF modules including laminates, LTCC, LCP, and silicon or GaAs IPDs. These options are constantly balanced by module designers to achieve the lowest cost and size with required RF performance. The trend towards full radio modules from the current PA modules and Front End Modules is demanding ever-higher levels of integration with the passive

WORKSHOPS

Sunday Workshops and Short Courses

circuitry lagging the active MMIC.

08:00–17:00 WSF

Advances in WiMAX RF Technology

Topics and Speakers:
- Mobile WiMAX: Do We Really Need Another Air-Interface, M. Cooper, ArrayComm Inc.
- Samsung's WiMAX Deployment and Perspectives, K. Lee, Samsung Telecommunications America
- RF Issues Associated with WiMAX in the WCS Band, T. Sutton, NextWave Broadband Inc.
- Compatibility Analysis of Multiple Radios in Mobile/Portable Stations, Q. Gu, Marvell Semiconductor Inc.
- RFIC Architectures and Tradeoffs for WiMAX, R. Eline, Intel Corporation
- Chip-Level RF Technology Aspects for WiMAX, M. Livingston and T. Dillahunty, Atmel Corporation
- Channel Estimation for MIMO Systems for WiFi Applications, N. E. Buris, Mototola Inc.
- Efficient Enhancement Techniques for WiMAX Power Amplifiers, L. E. Larson, UCSD Center for Wireless Communications, University of California, San Diego
- High Efficiency Power Amplifier Developments Using GaN Technology for Both Fixed and Mobile WiMAX Systems, R. Pengelly, CREE
- Circuit Architectures and Designs for WiMAX and Multimode RF Receivers, N. K. Yanduru, Texas Instruments Inc

Organizers: E. Niehenke, Niehenke Consulting; U. Dhaliwal, Future Wireless Technologies; B. Spielman, Washington University at St Louis

Sponsors: MTT-20, MTT-6

This workshop will present RF system requirements and market requirements needs for successful WiMAX systems (802.16). The latest transmitter and receiver architectures and tradeoffs will be presented including efficiency transmitter enhancement techniques. Co-existence with other wireless systems such as Bluetooth, WLAN, and emerging UWB devices will be presented. The latest WiMAX architecture and chip sets designs from the leading manufactures will be shown.

08:00–17:00 WSG

Solid-State Power Invades the Tube Realm

Topics and Speakers:
- High-Power Microwave and Millimeter-wave Vacuum Electronics for Military Applications, B. Levush, Naval Research Laboratory
- Today's Vacuum Electronics Industry: Powering Tomorrow's Frontiers, C. Armstrong, L-3 Communications
- Device Technology for High-Power Applications, C. Weitzel, Freescale
- Device Technology for Millimeter-wave Applications, A. Oki, Northrop Grumman
- Characterization and Modeling of GaAs, GaN, SiC and LDMOS RF Power Transistors, W. Curtice, W.R. Curtice Consulting
- A New Perspective on PA Efficiency Enhancement Techniques, S. Cripps, Hywave Associates
- High-Power Power Combining Techniques, R. York, University of California at Santa Barbara
- 500 W L-band / 800 W S-Band GaN HEMTs for High Power Pulsed Applications, E. Mitani, Eudyna Devices
- kW-Class Solid-State PAs for L/S-Band Radar, D. Dawson, Northrop Grumman

Organizers: J. Schellenberg, Trex Hawaii; D. Dawson, Northrop Grumman

Sponsor: MTT-5

Solid-state power amplifiers continue to invade the performance realm of the vacuum tube. At L and S-band frequencies, solid-state power amplifiers are pushing into the kilowatt region and at X-band into the hecto-watt realm. Even at mm-wave frequencies, we are seeing solid-state PAs with power levels of 10 watts or more. Clearly, the future of the tube is limited, or is it? This workshop brings together leading experts from both industries to discuss this issue and present the latest data.

08:00–12:00 WSH

UWB Radio: From Building Block to SoC

Topics and Speakers:
- Use of Cognitive Radio Techniques for OFDM Ultra-Wideband Coexistence with WiMAX, J. Lansford, Alereon, Inc.
- RF/Mixed-Signal IC Design for UWB OFDM Systems, S. Raman, Virginia Polytechnic Institute and State University.
- Design Strategies for CMOS UWB Radios, A. H-C. Kang, Realtek
- ESD Protection for Wideband RF CMOS Circuits — Challenges, Options and Trade-offs, N. Iyer, Silterra Malaysia Sdn Bhd
- Front-end Amplifier Design for Ultra-Wideband Systems, R. Gharpurey, University of Texas at Austin
- C-Wave UWB Chipsets, R. Sengottalyan, Pulse-Link

Organizers: A. Wang, Illinois Institute of Technology; L. Yang, SMIC; Y. Zhou, The Chinese Academy of Sciences

Sponsor: RFIC

This workshop focuses on advances in developing Si-based ultra-wideband (UWB) radio integrated circuit systems. Topics covers from front-end blocks to UWB SoCs, including, low noise amplifiers, pulse generators, mixers, multipliers, ADC, transmitters, receivers, timing, digital baseband, MAC, etc. Attendees will be exposed to critical design issues and tricks related to UWB SoC designs.

13:00–17:00 WSI

Advances in Mixer Design for UWB Transceivers

Topics and Speakers:
- Mixers in UWB Systems — an Overview, Modeling and System Aspects, R. Follmann, IMST
- Ultra-wideband Linear Mixers for High Datarate Communication and Remote Sensing Systems Based on mHEMT, pHEMT, and CMOS MMIC Technologies, H. Zirath, Chalmers University
- A Mixer Based Method of Generating Pulses for Indoor UWB Systems, A. Beyer, Duisburg-Essen University
- CMOS Transmitter Design for Low Power Low Data-Rate UWB Communication, J. Ryckaert, IMEC
- Use of Six-Port Technology in UWB Transceiver Design, K. Wu, Poly-Grames

Organizers: A. Beyer, Duisburg-Essen University; D. Schreurs, K.U.Leuven; S. Maas, AWR

Sponsors: MTT-1, MTT-22, MTT-20

During the last decade rapidly increased developments in wireless telecommunication applications can be observed. The most challenging in terms of (sub-) system design is the emerging UWB technology. In this workshop, we focus on recent advances in UWB transceiver design and the mixer building block in particular. The talks will treat topics like architectures, analysis methods, circuit design techniques, and performance.

08:00–12:00 WSJ

RFID

Topics and Speakers:
- Introduction to RFID and Passive Tag ICs, N. Camilleri, Alien Technology
- Passive UHF RFID CMOS Tag IC Using Ferroelectric RAM Technology, S. Masui and T. Ninomiya, Fujitsu
- Challenges and Design of UHF RFID Reader Integrated Transceivers, I. Kipnis, Intel Corporation
- Trends for Mobile RFID Reader SoCs, Developed by Korean ASIC Companies, J.S. Park, Kookmin University
- Fully Integrated UHF RFID Systems for Near-field and Far-field Applications, R. Rofougaran and M. Rofougaran, Broadcom
- Reader Chipset for UHF RFID, M. O'Neal, WJ Communications

Organizer: N. Camilleri, Alien Technology

Sponsor: RFIC

RFID technology has come a long way in the last decade. RFIC implementations have enabled very small RFID tag chips that work at 13, 900, and 2400 MHz. Reader technology has also come a long way and is currently morphing from several discrete implementations to custom integrated solutions. The workshop will provide an introduction to RFID and then will dive into the tradeoffs and techniques that one has to do to implement small tag ICs and high performance reader chip sets.

13:00–17:00 WSK

Emerging RFID and Wireless Sensors: Technologies and Applications

Topics and Speakers:
- Paper-based RFID and Wireless Sensors: Is it the Ultimate Low-Cost Solution?, M. Tentzeris, Georgia Tech
- Cognitive Radio and Analog Sensing for Wireless Sensors, J. Laskar, Georgia Tech
- Printed Batteries and Miniaturized Energy Scavenging for RFID and Wireless Sensors, L. Johnson, Excellatron
- RF Performance of Conductive Inks for RFID and Sensors' Printed Circuits, M. Oljaca, Cabot
- Integration and Matching of Low-Power RFID IC in Conformal Sensor Modules, M. Penry, NSC
- Miniaturized Antennas for Enhanced-Range RFID, R. Banerjee, 3M

Organizers: M. Tentzeris, Georgia Tech; J. Laskar, Georgia Tech

Sponsors: MTT-16, MTT-12

This workshop will review and explore challenges in RFID and wireless sensors for both traditional and emerging applications. It will also cover ultralow-cost paper-based electronics, energy scavenging approaches, RFID IC approaches and matching, as well as RF performance under various challenging sensor topologies.

13:00–17:00 WSL

Software Defined Radio to Cognitive Radio

Topics and Speakers:
- Software Defined Radio Transceiver SOC approach, A. Abidi, UCLA
- Software Defined Radio Transceiver SIP approach, L. Larson, UCSD
- Industrial Software Defined Radio Transceiver example, R. B. Staszewski, Texas Instruments
- Towards Cognitive Radio, T. Martin, Science & Technology Associates

Organizers: D. Belot, STMicroelectronics; J. B. Begueret, IXL Lab

Sponsor: RFIC

This workshop will focus on new design of radio architectures (circuits and systems) dedicated to Software Defined Radio

(SDR) and Cognitive Radio (CR), which is the main challenge for the next generation of RF transceivers. In order to frame the workshop we have extracted two definitions of what are SDR and CR.

SDR is a radio that includes a transmitter in which the operating parameters of frequency range, modulation type or maximum radiated power (either radiated or conducted), or the circumstances under which the transmitter operates can be altered by making a change in software without making any changes to hardware components that affect the RF emission.

Extracted from U.S. FCC Cognitive Radio Report and Order, CR is a radio or system that senses and is aware of its operational environment and can be trained to dynamically and autonomously adjust its radio operating parameters accordingly.

08:00–12:00 WSM

24 GHz ISM-Band Communications

Topics and Speakers:
- SiGe for mmWave Applications: Capabilities and Limitations, B. Goucher, IBM
- 65 nm CMOS for 24 GHz: Potential and Pitfalls, J. Rizk, Intel
- Standards and System Level Issues in 24 GHz ISM Communications: Smart Antennas and Phased Arrays for Reliable Link Design, W. Ali-Ahmad, MAXIM
- Silicon Phased Arrays: Comparison between RF, LO and IF Phase-Shifting Architectures and latest results from UCSD/Intel, G. Rebeiz, UCSD
- 24 GHz CMOS Phased Arrays: Latest Developments at USC, H. Hashemi, USC
- 24 GHz Low Cost Plastic Packaging and High-Volume IC Testing, A. Street, MACOM

Organizers: I. Gresham, Tyco Electronics Wireless Systems; G. Rebeiz, UCSD

Sponsor(s): MTT-16

CMOS has now reached the level of maturity that low-cost transceivers with sophisticated performance can be envisaged. This workshop will review the status of the technologies, standards, and applications, and postulate what the next steps may be before commercial products become widely available.

13:00–17:00 WSN

Millimeter-Wave/Quasi-Millimeter-Wave Highly Integrated Circuits

Topics and Speakers:
- Silicon Technology, Circuits, Packages, and Systems for 60–100 GHz Communications and Radar Systems, B. Floyd, IBM
- Highly Integrated GaAs MMICs using Three-dimensional MMIC Technology, Y. Yamaguchi, NTT Corporation
- SoP Integration of 60 GHz Radio, C.S. Park, Information and Communications University
- CMOS Millimeter-wave Frequency Sources, C. Cao and K. K. Oh, University of Florida

Organizers: T. Nakagawa, NTT Corporation; N. Suematsu, Mitsubishi Electric Corp.

Sponsor: RFIC

There are many RF system-on-chip devices in which the operating frequencies are below 6 GHz. Because millimeter-wave and quasi-millimeter-wave integrated circuits are traditionally implemented using compound semiconductors such as GaAs or InP, the integration scale is limited. However, recent progress in device technology can overcome the problem. This workshop will focus on highly integrated circuits whose operating frequency is over 20 GHz.

08:00–12:00 WSO

Silicon BiCMOS and CMOS PA from RF to mmWave

Topics and Speakers:
- CMOS Devices for Power Amplifiers, J. D. Alamo, MIT
- CMOS Power Amplifiers for mmWave Applications, A. Niknejad, University of Berkeley
- RF CMOS PA for Cellular and WLAN Applications, D. Masliah, Acco Company
- CMOS Transmitter Combining Amplitude Modulator and Power Amplifier, J. Loraine, RadioSis, Limited

Organizers: D. Belot, STMicroelectronics; E. Kerherv, IXL Lab; Y. Deval, IXL Lab

Sponsor: RFIC

This workshop will deal with the most recent developments of CMOS or BiCMOS power amplifiers for cellular, LAN, PAN, satellite and radar applications. The frequency range covered is from 1 GHz up to 100 GHz. The presenters will compare new BiCMOS or CMOS circuits and/or devices with existing ones in technologies brought into play presently (i.e., InP, GaAs). The presenters will be balanced with academic and industrial affiliations.

13:00–17:00 WSP

Integrated Broadband Tuners for Satellite and Terrestrial Applications

Topics and Speakers:

- Silicon RFICs for Direct Broadcast Satellite Communications, W. Gao, Conexant Systems
- Multiband Multimode Mobile TV Tuner in CMOS, B. Kim, Integrant Technologies Inc.
- Frequency Synthesizer Architectures for Broadband Tuners: Ring Oscillator versus LC Oscillator and Low-IF versus Zero-IF Receivers, A. Maxim, Silicon Laboratories
- SiGe IC Design for Satellite Microwave Front-Ends, C. Vaucher, NXP Semiconductors

Organizers: B. Bakkaloglu, Arizona State University; S. Kiaei, Arizona State University; Y. Deval, University of Bordeaux

Sponsor: RFIC

Integrated broadband tuners have several design challenges due to wide tuning range, linearity under several blocker channels, dynamic range and harmonic mixing of blocker channels. This workshop will focus on architectures and circuits for addressing several design challenges associated with integrated broadband tuners for terrestrial, cable and satellite applications.

08:00–17:00 TSA

RFIC Circuit and System Design Tutorial

Topics and Speakers:
- On-chip Inductor and Transformer Modeling, D. K. Shaeffer, Beceem Communications
- RF CMOS IC Simulation Improvements and New Industry Standard MOSFET and CMOS Varactor Models, J. Victory, Jazz Semiconductor
- Transmitter Architectures and Circuits, J. C. Rudell, Intel Corporation
- Receivers: Architectures and Circuit Design, D. Ozis, Telegent Systems
- A/D Converters for Wireless Communication in Nanometer CMOS, Y. Chiu, University of Illinois
- Piezoelectric Contour-Mode Vibrating RF MEMS, G. Piazza, University of Pennsylvania
- Frequency Synthesis for Wireless Systems, W. Khalil, Intel Corporation
- All-Digital TX and Discrete-Time RX, R. Staszewski, Texas Instruments

Organizer: J. C. Rudell, Intel Corporation; D. K. Shaeffer, Aspendos Communications

Sponsor: RFIC

This workshop will begin by covering the basics of transceiver design. Topics will range from CMOS device and passive component modeling to wireless building block design to the realization of full transceiver systems on a chip. High integration transmitters, receivers, and synthesizers as well as newer digital transceivers systems will be discussed. In general, this tutorial heavily emphasizes CMOS circuit design and high integration radios for common commercial standards including cellular and Wireless LAN.

08:00–17:00 TSB

Analog and High-Speed Circuit Design Solutions for Nano RF CMOS

Topics and Speakers:
- RFIC Case Study, D. Schmidt, Intel Corporation
- Challenges for Nanoscale Transceivers Embedded in Highly Complex SoC´s, A. Hanke, Infineon Technologies
- Digital RF Processor (DRP™) Wireless SoC in Nano RF CMOS, S. Pennisi, Texas Instruments
- Silicon – Package Co-Design, N. Karim, Amkor
- Overview of 90 nm Challenges, A. Yen, UMC Corporation
- On-chip Transformer Cascode Circuit Design Techniques, D. Huang, UCLA
- EDA Design Solutions for Nano CMOS, D. Wu, Ansoft Corporation
- Nano-scale CMOS Computer Hands-on Session, Ansoft Corporation

Organizer: L. I. Williams, Ansoft Corporation; Y. Cheng, Siliconlinx Inc.

Sponsor: RFIC

Better performance and integration motivates RF designers to implement circuits at the 90-nm node and below. This scaling enables greater performance but introduces significant risks for designing and fabricating RF, analog, and high-speed circuits. This workshop provides practical design solutions to challenges of nano-scale CMOS by leading experts in IC design, packaging, foundry, and EDA. Issues such as low-threshold voltage, noise, high leakage, high variability, and DFM will be explored. A unique computer hands-on session allows attendees to simulate many of the concepts covered.

08:00–17:00 TSC

Tutorial Workshop on RF and Microwave Filter Design

Speaker and Organizer: H. Clark Bell, HF Plus

Sponsor: MTT-8

Topics include two-port parameters; lowpass/highpass ladders; Chebyshev filter; immittance inverters and narrowband design; resonator Q, delay and loss, and lossy coupling; TEM bandpass filters and bandstop filters; waveguide bandpass filters; general coupled-resonator prototype; loss approximation, the elliptic function filter; realization polynomials and immittances; bandpass filters with cross couplings; dual mode filters; environmen-

Sunday Workshops and Short Courses

tal effects on filter performance.

08:00–12:00 TSD

SDR and Cognitive Radio — The Need for Reconfigurable RF Front-Ends

Topics and Speakers:
- RF Requirements for Evolution of SDR, C. Bostian, A.B. MacKenzie, and S. Raman, Virginia Tech
- Front End Challenges for Cognitive Radio, J. Mitola, Mitre Corporation
- Front Ends for Commercial Digitally Controlled Radios, B. Krenik, Texas Instruments
- Tunable RF Front-End Technologies, S. Toncich, Qualcomm
- Reconfigurable Front-End Microsystems, J. Papapolymerou, Georgia Tech
- BST Technology for RF Front-Ends, T. Watson, AgileRF

Organizers: A.S. Morris, wiSpry, Inc.; R.F. Drayton, University of Minnesota

Sponsor: MTT-21

This half-day workshop will begin with the system requirements for tunable front-end sub-systems to enable SDR and CR. Details of needed components for these subsystems will be presented and their required performance and features will be elucidated. Candidate technology solutions will follow including details of remaining challenges. Both industrial and academic perspectives will be presented.

08:00–17:00 CSA

Micro Coaxial Lines: Theory, Design, and CEM Lab

Instructors: Dejan S. Filipović, University of Colorado; Chris Nichols, Rohm and Hass

Topics: Miniature Coaxial Lines; Recta-Coax Design; Multiphysics Modeling; Fabrication and Measurements; Resonators; Antennas; Butler Matrix as Integration Example

Sponsor: MTT-1

High level of three-dimensional (3D) integration of various passive components is necessary for achieving compact, low-cost, multifunctional millimeter-wave systems designed to deliver high quality performance. In this course, attendees will be introduced to the theory, modeling, design, fabrication, measurements and application of rectangular coaxial lines (RCLs) and components built using surface micromachining. Focus will be on a recently developed PolyStrata process (by Rohm and Hass). Low loss, high packaging density, low crosstalk, dispersion-free transmission lines, high Q-factor resonators and filters, multilevel directional couplers, efficient antennas are just a few topics that will be covered. Ka-band phased array with Butler matrix beamforming network will be used to demonstrate the integration capabilities. The laboratory component will include three computational exercises, where attendees will develop conformal mapping and finite element based analytical and numerical models of RCLs.

08:00–12:00 CSB

Galileo — Europe's Share for a Global Navigation Satellite Service

Instructors: Henning Ehm and Robert Weigel, Institute for Electronics Engineering, University Erlangen-Nuremberg, Germany

Topics: Satellite Navigation; Galileo; GPS; Receiver Technology; Modulation

Sponsor: MTT-9

Galileo is Europe's first satellite navigation system, which is at present in the in-orbit validation phase and will be fully available from 2011 on. With Galileo, the first civil and global satellite navigation system will be introduced. With Galileo a completely new set of services and signals will be introduced, with higher accuracy than today's GPS, which will lead to new classes of applications. Furthermore, for the first time availability and integrity data of the satellite navigation signal will directly be available on a global scale, paving the way to security critical applications, e.g., aircraft landing and train- and ship-guiding.

This course gives a broad introduction to the Galileo satellite system. The course will start with a general introduction into satellite navigation. In the second part the Galileo system will be presented in detail, containing services, signals, system architecture, etc. In the third part advanced receiver architectures for combined Galileo/GPS reception will be presented and an outlook to upcoming and future trends in the area of satellite navigation will be given.

WORKSHOPS

Monday Workshops and Short Courses

08:00–17:00 WMA

Advances in Active Device Characterization and Modeling for RF and Microwave

Topics and Speakers:
- Nonlinear FET Modeling Fundamentals and Neural Network Applications, D. E. Root, Agilent Technologies
- The Chalmers University FET Model and Applications, I. Angelov, Chalmers University
- Characterization of FET Dynamics and Nonlinearity, A. E. Parker, Macquarie University
- Large-Signal Characterization and Modeling of Transistors, D. Schreurs, Katholieke Universiteit Leuven
- HBT Characterization and Modeling, M. Rudolph, Ferdinand Braun Institute
- High-Power Measurements of RF Transistors, P. J. Tasker, Cardiff University
- Product and Package Modeling for High Power RF Transistors, P. H. Aaen, Freescale Semiconductor
- Global Modeling of Nonlinear Transistors and Devices, M. B. Steer, North Carolina State University
- Neuro-Space-Mapping Techniques for Transistor Modeling, Q. J. Zhang, Carleton University

Organizer: J. Wood, Freescale Semiconductor; D. Schreurs, Katholieke Universiteit Leuven

Sponsors: MTT-1, MTT-11, ARFTG

In recent years, several new microwave device technologies have been developed and are entering the marketplace, including LDMOS, GaN FETs; SiGe and III-V HBTs, and RF CMOS. There have been contemporary developments in nonlinear device characterization methods during this time, such as fast pulse measurement systems at DC and RF, and the large-signal network analyzer, for example. We have also seen a tremendous development in nonlinear device modeling techniques, including optimization for parameter extraction, in multivariate function-fitting for generating the model functions, and advances in integration of several simulation engines, in "Global Modeling" methods. In this workshop, we bring together the leading exponents in these fields to present an up-to-date view of a range of nonlinear RF and microwave transistor modeling and characterization methods, reviewing established practices and presenting new techniques.

08:00–17:00 WMB

On-Chip/Off-Chip DC, RF, and Microwave Measurement Modules for RFIC, SoC, and SiP Self Characterization, Self Test, Self Debug, and Diagnosis

Topics and Speakers:
- RF and Microwave Measurement Block Requirements for DFC, DFT and DFDD, J.L. Carbonéro, ST Microelectronics
- RF to DC Correlation Used for Pass/Fail Screening to Reduce Test Cost in Production Environment, M. Slamani, IBM
- Current Sensor Design for ZIGBEE LNA Monitoring, H. Lapuyade, University of Bordeaux
- Low Cost Built-In Test of Wireless DATA Transceivers, A. Chatterjee, Georgia Tech Institute
- Progress in On-Chip S-Parameter Measurement Techniques, W.R. Eisenstadt, University of Florida
- On-Chip Estimation of RF Power Amplifier's Non-Linearity, J.M. da Silva, University of Porto
- Embedded Test Strategies for System in Package and Multi Technology MEMS, A. Richardson, University of Lancaster
- Effect of Advances in RF and Radio Architectures on Test Strategies, S. Abdennadher, Intel

Organizers: J.L. Carbonéro, ST Microelectronincs; H. Lapuyade, University of Bordeau; W.R. Eisenstadt, University of Florida

Sponsors: MTT-11, MTT-23

More and more SoC or SiP products incorporate Analog, Mixed-Signal and RF parts. The Characterization, Test, Diagnostic and Debug of these parts are very challenging and costly, especially when the parts are embedded in a larger digital system. One way to reduce these test costs is to design and develop off-chip measurement modules to be incorporated on the test board itself or to implement DFT inside the chip in order to reduce either the test time or the required test resources. This workshop will present recent results obtained in the RF and microwave frequency range for on-chip and off-chip measurement blocks. DC measurement modules for these circuits will also be presented as an alternate or companion methods to test microwave and RF circuits. A mini-panel will conclude the workshop by a discussion on the advantages and drawback of on-chip solutions compared to off-chip ones.

08:00–17:00 WMC

High-Speed Signal Integrity

Topics and Speakers:
- Building Bridges between Today's Digital and Microwave Technologies, M. Resso, Agilent Technologies
- Measurement-based Modeling for High Speed Semiconductor Test Interface Boards, H. Barnes, Verigy
- Challenges and Solutions for Measuring Multiple Aggressor Differential Crosstalk, B. Schaefer, Agilent Technologies
- Practical Design and Implementation of Stripline TRL Calibration Fixtures for 10 Gigabit Interconnect Analysis, D. Dunham, Molex
- Packaging a Supercomputer in a PCI Express Form Factor, G. Edlund, IBM
- Analysis of Supply Noise-Induced Jitter in Gigabit I/O Interfaces, R. Schmitt, Rambus

- Why Do We Need Multi-port VNA's for Signal Integrity? T. Ruttan and B. Grossman, Intel Corp.
- Panel Session, H. Barnes, Verigy, B. Schaefer, Agilent, D. Dunham, Molex, G. Edlund, IBM, R. Schmitt, Rambus, B. Grossman, Intel

Organizers: T. Ruttan, Intel Corp., M. Resso, Agilent Technologies, J. D'Ambrosia, Force 10 Networks

Sponsors: MTT-12, ARFTG, MTT-11

In industry there is demand for higher data-transfer rates from computer and communications systems for fast internet downloads, streaming video, CAD applications, and graphics for gaming. As a result, designers are focusing on increasing the bandwidth of ICs, connectors, and board-level interconnects. Most design tools and techniques are well adapted to the boundary conditions found in shielded, constant-impedance microwave and RF products. However, they not well sutied to modeling high-speed IO lines with dense routing, nonideal impedances, and little shielding.

This workshop presents the opportunity for microwave engineers to understand these new boundary conditions, apply microwave modeling and measurement techniques to these problems and to gain insight into the architectural challenges that drive these system designs. This workshop will cover measurement techniques, modeling of key interconnect structures along with verification methods, the role of industry standards and how they drive design practices, optimization of channel performance through equalization and show how typical impedance discontinuities and other transmission line anomalies translate to data errors, such as increased timing jitter and eye diagram closure.

08:00–17:00 WMD

Emerging Packaging Technology and Applications at Millimeter-Wave Frequencies

Topics and Speakers:
- 60 GHz Technology On The Way to Standardization, K. Kimyacioglu, Phillips Research
- Multigigabit Wireless: CMOS and FR-4 at 60 GHz, J. Laskar, Georgia Institute of Technology
- Low-Cost Alternatives for the Partitioning and Packaging of mm-Wave Subsystems, E. Stoneham, Endwave Corporation
- Packaging for Microwave and Millimeter-wave Microsystems, K.J. Herrick, Raytheon Company
- Development of Gpbs Wireless Modules at 60 GHz, L. Franca-Neto, Rambus
- Development of Millimeter Wave Surface Mount Packages, A.V. Pham, University of California, Davis
- Manufacturing of Liquid Crystal Polymer Flex and its Characteristics, K. Takata, Nippon Steel Chemical
- Fabrication of Low-cost, High-frequency Circuits Utilizing Liquid Crystal Polymer (LCP) Substrates and Standard Printed Circuit Board Manufacturing Techniques, K.Walker, Dynaco Corporation

Organizers: A.V. Pham, University of California, Davis; J. Laskar, Georgia Institute of Technology

Sponsor: MTT-12

Traditionally, millimeter-wave components and systems have been perceived as low-volume and high-end products. A fundamental challenge in millimeter wave packaging is how to manufacture affordable, lightweight and small-sized components in low volume and with infrastructure that is not scalable toward mass production. The continued development of defense and commercial markets (including renewed interest in the 60 GHz band) has created opportunities for high-volume communications and radar products. The packaging paradigm for millimeter-wave products must be shifted toward cell-phone-like manufacturing technology to further enable the millimeter-wave application space. This workshop will review and explore challenges in millimeter-wave packaging for both traditional and emerging applications. It will also cover commercially available packaging methods and emerging technology.

08:00–17:00 WME

High-Q RF MEMS Tunable Filters

Topics and Speakers:
- High-Q Tunable Filters for Multiband Wireless Systems, S. Mollenkopf, Qualcomm
- High-Q Tunable Filters for Defense Applications, J. Evans, DARPA
- 2-18 GHz Tunable Filters with High Rejection, B. Pillans, Raytheon
- Low-Loss Bandpass and Notch RF Filters Using MEMS Capacitance Switches, J.D. Adam and R. M. Young, Northrop Grumman Corp.
- RF MEMS High-Q Tunable Bandpass Filters for 4-6 GHz Applications, G. M. Rebeiz, UCSD
- RF MEMS Tunable Filters in Europe: MEMS2Tune and Other Efforts, P. Blondy, Univ. Limoges
- High-Q 3-D Tunable RF MEMS Filters for 2-6 GHz, W. Chappell, Purdue University
- RF MEMS Reliability: An Overview of the Latest Results, J. Ebel, AFRL
- 3-D Waveguide Based mm-Wave MEMS Filters: Results and Potential Tuning Capabilities, J. Reid, AFRL

Organizers: G. M. Rebeiz, UCSD; W. Chappell, Purdue University

Sponsor: MTT-21

This workshop will present a commercial and defense perspective

WORKSHOPS

Monday Workshops and Short Courses

to high-Q tunable filters, followed by state of the art work at Purdue, UCSD, Raytheon, NG, R&H, and Europe. The workshop will also cover 3-D high-Q filters, and even though these are not tunable yet, they have a high potential for integration with MEMS. The workshop will conclude with a summary of RF MEMS reliability, which is very important for this field.

08:00–17:00 WMF

Theory and Design of Phase Locked Loops

Topics and Speakers:
- Design of Phase Locked Loops, L. Dayaratna, Lockheed Martin
- Phase Locked Loop Design Optimization, P. White Applied Radio Labs
- Fractional-N PLL Frequency Synthesizers, R. Reedy, Peregrine Semiconductor
- Phase Locked loop Noise Optimization, D. Banerjee, National Semiconductor
- PLL System Design and Optimization, C. Vaucher, Phillips Research

Organizers: L. Dayaratna, Lockheed Martin; P. White, Applied Radio Labs

Sponsors: MTT-22, MTT-20, MTT-17, MTT-16, MTT-11

The workshop is tailored as a laboratory hands-on course with live hardware and software demonstrations. The following topics will be addressed in detail: Voltage controlled Oscillators, Phase detector Circuits, Loop filter design, Phase Locked loop design, Loop characterization, Fractional-N synthesis, DDS, Multi Loop synthesis, Composite DDS/PLL solutions, Noise in Phase Locked loop circuits.

08:00–17:00 WMG

Challenges of High Power Device Characterization and Modeling

Topics and Speakers:
- Physical Models for Linearity and Reliability Modeling of AlGaN/GaN HFET's, R. J. Trew, North Carolina State University
- High Power GaN HEMT Modeling, N. Ui, Eudyna Devices, Y. Tajima, Auriga Measurement Systems
- Large Signal GaN HEMT Models and their Application to Hybrid and Monolithic Circuit Designs, W. Pribble, Cree
- Meeting the Challenges in High-Power Device Modeling, L. Dunleavy, Modelithics, Inc., University of South Florida
- Multiharmonic Tuner for Wideband Load Pull Testing, C. Tsironis, Focus Microwaves
- Application of Pulsed S Parameter and IV Measurement to High Power Device Modeling, D. Wandrei, Auriga Measurement Systems
- Measurement of Large-Signal, Time-Domain I/V Characteristics of High-Power HEMTs, W. Stiebler, Raytheon
- LDMOS Device Characterization and Modelling for RF Power Applications, L. de Vreede, Delft University of Technology

Organizer: Y. Tajima, Auriga Measurement Systems

Sponsors: MTT-5, MTT-11

Challenges of modeling and characterizing high power devices will be discussed. The first papers discuss the challenges of modeling high power devices with output power extending to 100 W. Actual application of these models to hybrid and monolithic circuit designs will be presented. The second group of papers discusses the challenges in measuring large devices. New development in harmonic load-pull, device IV and S parameter characterization techniques will be introduced.

08:00–17:00 WMH

High Power Issues of Microwave Filter Design and Realization

Topics and Speakers:
- Introduction to High Power Issues of Microwave Filter Design and Realization, M. Yu, COM DEV
- Basic Physical Theory of Microwave Breakdown in Air and Recent Theoretical Results, V. Semenov, Russian Academy of Sciences
- Microwave Breakdown in Air, Testing and Prevention, T. Olsson, Powerwave Technologies
- Multipactor RF Breakdown at ESA: Standards, R&D Investigations and Testing Techniques, D. Raboso, European Space Agency
- Prediction Tools of Multifactor Breakdown Effects in Passive Components, W. Pribbl and V. E. Boria, Universidad Politécnica Valencia
- High Power Design for Microwave Bandstop Filters, D. Snyder, RS Microwave
- Passive Intermodulation at Junctions, H. L. Hartnagel, Technische University Darmstadt
- Design of Low PIM Diplexers, C. Radcliffe, Phase2 Microwave

Organizers: M. Yu, COM DEV; A. Atia, Orbital Sciences Corp.

Sponsor: MTT-8

High power related issues such as Multipactor, Corona breakdown and Passive Intermodulation (PIM) will be covered for passive microwave components especially filters.

08:00–12:00 WMI

Noise in Nonlinear Circuits: Theory, Modeling, and Measurement Techniques

Topics and Speakers:

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- Nonlinear Noise in Devices: Sources, Frequency Conversion Mechanisms and Statistical Noise Process Characterization, F. Bonani, Politecnico di Torino
- Compact Noise Modeling of GaAs HBTs for Nonlinear Simulation, M. Rudolph, Ferdinand-Braun-Institut für Höchstfrequenztechnik
- Empirical Non-Linear Noise Models of Field-Effect Devices for Microwave Circuit Large-Signal Noise Analysis, F. Filicori, Bologna University
- Minimization of Noise in Frequency Conversion Circuits, S. Maas, Applied Wave Research, Inc.
- Nonlinear Noise Measurement of Microwave Amplifiers: HF Noise Parameters and Residual Phase Noise, O. Llopis and L. Escotte, Laboratoire d'Analyse et d'Architecture des Systèmes (LAAS) du CNRS
- Fundamentals of Phase Noise and its Relationship to Jitter and Bit Error Rate in Digital Communications Systems, E. M. Godshalk, Maxim Integrated Products

Organizers: F. Bonani, Politecnico di Torino; A. Ferrero, Politecnico di Torino

Sponsors: MTT-14, MTT-11

In this half day workshop, the participants will receive a wide perspective on up-to-date modeling, design and measurements techniques applied to the determination of noise properties in nonlinear microwave circuits and systems where the effect of noise frequency conversion plays a significant role. Topics covered by the presentations (from both academia and industry) will include the following: 1) Introduction and basic theory of noise in nonlinear systems including the frequency conversion effect 2) Non linear modeling of state-of-the-art device technologies, both bipolar and III-V FET-based 3) Design techniques for low noise applications 4) Non linear noise measurement techniques in amplifiers 5) Fundamentals of phase noise and jitter in a digital communication system perspective, including a description of phase noise measurement techniques.

13:00–17:00 WMJ

Will Wide Band-Gap Power Transistors Render Silicon Power Transistors Obsolete?

Topics and Speakers:
- The Market for Wide Band-Gap Transistors at RF, P. Roussel, Yole
- Reliability and Linearity Issues of GaN HFET's, B. Trew, North Carolina State University
- Are Dinosaurs Obsolete: Is there Life Left for Si BJTs Operating at RF Frequencies?, J. Curtis, Integra Technologies
- Silicon VDMOS Transistors, J. L. B. Walker, Semelab PLC
- RF-LDMOS: An Ideal Device Technology for ISM to WiMAX?, W. Burger, Freescale Semiconductor
- GaN-on-Si RF Power Transistors: Status and Outlook, W. Johnson, Nitronex
- GaN HEMTs on SiC, S. Nakajima, Eudyna
- Diamond Transistors for RF Power Amplifiers, K. Ueda, NTT

Organizer: J. L. B. Walker, Semelab plc

Sponsor: MTT-17

Wide band-gap power transistors based on GaN and SiC have made significant progress in the last few years, but most results have focused on the microwave frequency range. The aim of this workshop is to consider their use at RF.

08:00-12:00 WMK

Ultrafast Analog-to-Digital (A/D) Conversion Technique and its Applications

Topics and Speakers:
- Overview of Optical and Optically-Assisted A/D Conversion, G. Valley, The Aerospace Corporation
- High Performance Analog-to-Digital Conversion Techniques for Emerging Telecom and Defense Applications, J. Lee, Lucent Technologies, Bell Labs.
- Ultrahigh-Speed Spatially Sampled All-Optical Analog-to-Digital Converter, A. S. Daryoush, Drexel University
- Demonstration of a 40 Gigasample per Second Real-Time Photonic Analog-to-Digital Converter, J. Stigwall, Chalmers University of Technology
- Analog-to-Digital Conversion in the Early 21st Century, R. H. Walden, The Aerospace Corporation
- An Approach to High-Speed, High-Resolution All-Optical A/D Conversion Using Nonlinear Optical Loop Mirror, Y. Miyoshi, Osaka University
- Femtosecond Real-Time Single-Shot Digitizer, J. Chou, University of California, Los Angeles

Organizers: K. Kitayama, Osaka University; B. Jalali, University of California, Los Angeles

Sponsor: MTT-3

This workshop is focused on cutting-edge ultrafast A/D conversion techniques that hold promise for direct conversion at 100 GS/s and toward TS/s regime. It will cover both optoelectronic as well as optical domain techniques. There have been growing demand for digital signal processing that employ ultrafast A/D converters for applications in advanced communications as well as emerging scientific applications.

08:00–17:00 TMA

High-Frequency Characterization of Printed-Circuit Board Materials

Topics and Speakers:
- Overview of Dielectric Measurement Methods, J. Baker-Jarvis, National Institute of Standards and Technology
- High-Frequency Electrical Testing of Printed-Circuit Boards — A Material Manufacturer's Perspective, S. Bertling, Park Nelco
- Complex Permittivity Measurement with a Split-Post Resonator, J. Krupka, Warsaw University of Technology
- Measurement of Dielectric Substrates at Millimeter-Wave Frequencies, S. Begley, Agilent Technologies
- High-Frequency Electrical Properties of PCB Materials Using a Split-Cylinder Resonator, M. Janezic, National Institute of Standards and Technologies
- Complex Permittivity of Printed Circuit Boards using Planar Transmission Lines, K. Bois, Hewlett-Packard Company

Organizers: M. D. Janezic, National Institute of Standards and Technology; S. Begley, Agilent Technologies

Sponsor: MTT-11

The first half of this tutorial will include an overview of the state-of-the-art measurement methods used to accurately characterize the electrical properties of dielectric substrates, such as printed circuit boards, from 1 to 100 GHz. A discussion of each technique's merits and limitations will be addressed. The second half of the tutorial will comprise of live demonstrations of several techniques, where experts in the field will explain how to perform accurate substrate measurements.

08:00–17:00 TMB

Practical Analysis, Stabilization, and Exploitation of Nonlinear Dynamics in RF, Microwave, and Optical Circuits

Topics and Speakers:
- Large-Signal Stability Analysis through Pole-Zero Identification, J. M. Collantes, University of the Basque Country
- Nonlinear Stability Analysis of Microwave Oscillators, T. Heath, Georgia Tech Research Institute
- Bifurcation Analysis and Control with Harmonic-Balance Techniques, A. Suaréz, University of Cantabria
- Hysteresis and Noisy Precursors in Power Amplifiers and Oscillators, S. Jeon, California Institute of Technology
- Overview of Chaos and Its Information Applications, C.P. Silva, The Aerospace Corporation
- Applications and Implications of Chaos for Radar and Sonar, C. Williams, Bristol University
- Optical Chaos-Based Communications at High Bit Rates Using Commercial Fiber-Optic Links, C.R. Mirasso, University of Balearic Islands
- Chaotic Waveform Generation and Radar, K.A. Lukin, Usikov Institute of Radiophysics & Electronics
- Chaotic Microwave Oscillators and Synthesizers for Chaotic Frequency Hopping Communications Systems, A. Layec, INRIA

Organizers: A. Suaréz, University of Cantabria; C.P. Silva, The Aerospace Corporation

Sponsor: MTT-16

This workshop addresses three closely related topics: the in-depth analysis and elimination of circuit instability phenomena using simple techniques, the optimized and efficient design of autonomous circuits, and the application of chaos to signal transmission, conditioning, and processing. Fundamental background on nonlinear dynamics will be provided, including the concepts of local and global stability, bifurcations, and chaos. Examples of bifurcation control will be given, together with a representative survey of chaos applications to cryptography, baseband through optical communications, signal detection, and radar. An RF chaotic oscillator suitable for these applications will also be demonstrated.

08:00–12:00 TMC

How to Do Business in Far East

Topics and Speakers:
- Doing Business in China, S. X.Yan, Chinese Academy of Science, Suzhou Institute of Nanotech and Nanobionics
- Doing Business in India, Rahul Dixit, Raytheon
- Doing Business in Korea
- Doing Business in Singapore
- Doing Business in Thailand

Organizers: C. P. Wen, Peking University; T. Shishido, MMCOMM, Inc.

Sponsors: MTT-19, IMS 2007 Steering Committee

How to seek microwave and millimeter wave business opportunities in the Far East. Invited speakers from the following countries: China, Japan, Korea, India, and possibly Singapore, Malaysia, and Thailand. The business infrastructure and government business regulations to operate a successful business enterprise are the subjects for this workshop.

13:00 – 17:00 TMD

Novel Materials for RF MEMS

Topics and Speakers:
- CMOS/MEMS Monolithic Integration for Frequency References, E. Quevy, Silicon Clocks
- Application of Silicon Carbide to RF MEMS, X. Fu, Case Western Reserve University
- Science and Technology of Piezoelectric/Diamond Heterostructures for Monolithically Integrated High Performance MEMS/NEMS/CMOS Devices, O. Auciello, Argonne National Laboratory
- Piezoelectric Aluminum Nitride Contour-Mode MEMS Resonators and Filters, P. Stephanou, Harmonic Devices

WORKSHOPS

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- PZT Films for Low Voltage Operation RF MEMS Switch Devices, J. Y. Park, Kwangwoon University

Organizers: S. Pacheco, Freescale Semiconductor, Inc.; G. Piazza, University of Pennsylvania

Sponsor: MTT-21

This workshop will gather leaders in the research area of novel materials for RF MEMS from both academia and industry. The latest advancements on the development of RF MEMS using new classes of materials will be presented. Attendees will be exposed to proven material systems that are being presently commercialized (startups) and to innovative materials that are starting to gain traction in the RF MEMS arena. Finally, this workshop will allow the attendees to foster new networking opportunities. Topics specifically covered in this tutorial workshop include:

- CMOS/MEMS monolithic integration to enable high performance, compact frequency references. Process issues, device performances, and system level advantages will be discussed.
- Review of silicon carbide semiconductor technology for MEMS/NEMS devices and its application in the field of RF communications.
- Piezoelectric/diamond heterostructures based on ultrananocrystalline diamond (UNCD) films for the realization of low-power, high-performance MEMS/NEMS devices. The material science as well as the fabrication and integration of devices will be discussed.
- Introduction to CMOS-compatible, low-loss bandpass filters in the GHz range based on piezoelectric aluminum nitride contour-mode MEMS resonators.
- Low-voltage operation of RF MEMS devices achieved via use of sol-gel based PZT thin films. The design, fabrication methods, and experimental data for MEMS switches with operation biases as low as 2–4 V will be discussed.

08:00–12:00 CMA

RFID – Design of Integrated Passive Transponders

Instructors: Robert Weigel and Kay Seemann, Institute for Electronics Engineering, University Erlangen-Nuremberg, Germany

Topics: Introduction to RFID; Integrated RFID Transponders; Design and Modeling of Passive UHF-Frontend Devices for RFID

Sponsors: MTT-9, MTT-16

Beside several research activities concerning the high integration of multistandard communication devices, a lot of work is in progress to realize inexpensive ubiquitous communication and sensor networks. Recently, the passive radio frequency identification technology (RFID) has gained a lot of interest, since it is a widely used synonym for low-cost wireless identification and sensor devices.

This tutorial outlines general system considerations and specific aspects of the analogue and RF circuit design for the development of integrated passive CMOS-RFID tags. In the first part of the tutorial, the general passive transponder principles, the regulatory background and the existing standards are reviewed and summarized. We also address typical environmental parameters and properties, further we exemplify subsequent restrictions for common applications. Within part two the general architecture of RFID-Transponders and the main important analog and digital building blocks will be explained. Finally, part three deals with specific challenges given by the CMOS technology in the context of UHF-RFID devices. Therefore, the design and the modeling of the main important analog RF-Frontend devices will be discussed. These are the RF power-rectifier, the backscatter modulator and the RF power limiter.

08:00–17:00 CMB

Millimeter-Wave and THz Electromagnetics, Components, and Systems

Instructors: Zoya Popović, University of Colorado, Boulder; Elliott Brown, University of California Santa Barbara

Topics: Fundamental Electromagnetics; THz Transmission Lines and Antennas; Quasi-Optical Techniques and Components; THz Measurements; THz Properties of Materials; Survey of THz Solid-State and Vacuum Coherent Sources; THz Direct Detectors and Mixers; THz Remote Sensing Systems and Trade-Offs

Sponsor: MTT-4

The terahertz region remains as a last frontier of the electromagnetic spectrum where the engineering of components and systems has always been a fringe area involving quasi-optical techniques for radiation coupling and control, frequency multiplication (up conversion) or photomixing (down conversion) to produce coherent sources, and fast (unipolar) Schottky diodes for mixing and rectification. The goal of this short course is first to summarize the fundamental principles and the state of the art for each of these common techniques, particularly the quasi-optical techniques that have been successful in coupling detectors and mixers to free space. Then, the course will cover some of the key issues behind THz systems, such as the different modalities commonly used for point and remote THz sensors, both passive and active. A timely example is THz imaging of concealed objects where the trade-offs between passive heterodyne and direct detection will be analyzed.

Friday Workshops and Short Courses

08:00–17:00 WFA

Reconfigurable and Smart Antennas

Topics and Speakers:

- Impact of Smart Antenna Characteristics on Network Throughput and Communication Channel BER, C.A. Balanis, Arizona State University
- Reconfigurable Antennas for Universal Wireless Receivers, S. El-Ghazaly, University of Tennessee
- Smart Antennas and Digital Beam Forming, M. Salazar-Palma, Universidad Carlos III de Madrid
- Results from Experimental Trials Involving Smart Antenna and MIMO-based Testbeds, B. Daneshrad, UCLA
- Analog Smart Antenna System, H. Arai, Yokohama National University
- MEMS-based Reconfigurable Antennas – State of the Art and Future Potential, J. T. Bernhard, University of Illinois
- MEMS-Reconfigurable Reflect Arrays, R. Sorrentino, University of Perugia
- Wireless Smart Antennas for Noise Cancellation, S. Kanalamuru, Herley Industries
- Antenna Design and Optimizations for Modern Wireless and MIMO Applications, Y. Rahmat-Samii, UCLA

Organizers: A. Fathy, University of Tennessee; V. K. Nair, Intel; S. El-Ghazaly, University of Tennessee

Sponsors: MTT-15, MTT-20

Extensive efforts are under way to develop compact low cost multifunctional antennas for wireless systems including cell phones, laptops, and base stations. Well-known expert in the field will represent an overview of the latest breakthroughs in developing reconfigurable and smart antennas to address market needs. Detailed discussions of various design issues of developing low cost, compact products for multiband, multiservice, and diversity applications will be conducted.

08:00–17:00 WFB

Recent Advances in Electromagnetic Metamaterials: Theory, Computation, and Applications

Topics and Speakers:

- Advances in Subdiffraction Imaging by Magnetic Metamaterial Structures, R. Marqués and M. J. Freire, Univ. de Sevilla
- Field Energy Density and Effective Parameter Dispersion in Artificial Materials, S. Tretyakov and P. Ikonen, Helsinki University of Technology
- Computational Transmission Line (TLM) Models of Negative Refractive Index Metamaterials, W. J. R. Hoefer, University of Victoria
- Fundamental Structures of Two- and Three-dimensional Metamaterials, P. Russer, Technische Universität München
- Recent Advances in Negative-Refractive-Index Transmission-Line Metamaterials, G. V. Eleftheriades and A. K. Iyer, University of Toronto
- Metamaterial-Based Waveguides: Principles and Applications, S. Hrabar, University of Zhagreb.
- Recent Advances in Resonant type Metamaterial Transmission Lines, F. Martín and J. Bonache, Univ. Autònoma de Barcelona
- A Few Directions Towards the Next Generation of Electromagnetic Metamaterials, C. Caloz, École Poly. de Montréal
- Recent Progress on Dielectric Based Left Handed Structures, T. Ueda, Kyoto Institute of Technology, N. Michishita and T. Itoh, University of California Los Angeles.
- Metamaterials and Plasmonics: Bridging Microwaves to Optics, N. Engheta, University of Pennsylvania
- Metamaterial-Based Electrically Small Antenna Systems: Designs, Simulations and Experiments, R. W. Ziolkowski, University of Arizona

Organizers: C. Caloz, École Polytechnique de Montréal; F. Martín, Universitat Autònoma de Barcelona

Sponsors: MTT-15, MTT- 4

The workshop will focus on the latest results of metamaterials research carried out by leading experts. The scheduled talks allow for a wide vision of metamaterials, including the main challenging aspects for microwave and optical technology (computation and implementation of 3D metamaterials, conception of new subwavelength imaging devices, the development of new metamaterial based components and antennas, and the search for new directions and fields of applications).

08:00–17:00 WFC

Low-Cost, Integrated Automotive and Industrial Radar Sensors

Topics and Speakers:

- Introduction of Automotive Radar Sensors - Challenges, Solutions, and Benefits, J. Wenger, DaimlerChrysler AG
- Low Cost SiGe Technology for Automotive Radar Sensors in the 76-81 GHz Band, R. Lachner, Infineon AG
- Advances in Microsystems Technology and RF Microelectronics for Highly Integrated 77 GHz Automotive Radar Sensors, M. Schneider, University Bremen
- FMCW Radar Transceiver System Design and Simulation, O. Günther, University Erlangen-Nuremberg
- Front-End Concepts, Linearization Methods, and Systematical Errors in FMCW Radar Sensors, A. Stelzer, Johannes Kepler University Linz
- 24GHz UWB Radar Sensor Design, I. Gresham, M/A-COM
- Wideband Radar Sensors and its Antennas, S. Lindenmeier, Universität der Bundeswehr
- Challenges in Metrology for Automotive Radar SiGe-MMICs, E. Kolmhofer, DICE GmbH
- Pulsed Microwave and Millimeter Wave Measurements for Radar Component Characterization, L. Betts, Agilent

Organizers: A. Stelzer, Johannes Kepler University Linz, R. Weigel, University Erlangen-Nurember, R. Knoechel, University of Kiel

Sponsors: MTT-16, MTT-2

Recent developments in semiconductor technology have made available integrated Si and SiGe components that function at frequencies of 100 GHz and beyond. Smaller and less costly then their predecessors, typically put to use in military and civilian-aviation applications, these components have direct application to next-generation mass-marketed products such as industrial sensors, sport sensors, automobile guidance systems.

In this workshop an overview of state-of-the-art integrated radar sensors, especially for automotive and industrial applications, will be presented. Discussions will include modern systems, advanced semiconductor technologies, and the design and simulation challenges of upcoming 24 and 77 to 79 GHz. systems Design methodolgy of radar sensors will be treated, as well as the difficulties in measuring highly integrated systems at high frequencies.

08:00–17:00 WFD

Advances in Imaging Radar Technology

Topics and Speakers:
- Light Weight, Low Cost SAR for UAV Applications, J. C. Kirk, Goleta Engineering
- Real-Aperture Imaging Radar for Landing Guidance, L. Q. Bui, MMCOMM
- Full-Resolution Real-Time Processing of SAR Data, G. Franceschetti, Universutat Federico II
- History of Spaceborne SAR, Celebrating 25 Years Since SIR-A, D. L. Evans, JPL
- Using ATR Performance as a Measure to Improve ISAR Imaging of Small Craft, T. Sparr, FFI-III Land and Air Systems Division
- ISAR Imaging Paper, R. Samaniego, Raytheon
- New Results for Through-the-Wall Impulse SAR Imaging, J. Tatoian, Eureka Aerospace
- Passive MMW Imaging, L. Yujiri, NGC
- A Low-Complexity Radar Sensor for Human Tracking, H. Ling, University of Texas

Organizers: J. C. Kirk, Goleta Engineering; L. Q. Bui, MMCOMM, Inc.

Sponsor: MTT-16

Imaging radar is now an extremely broad field combining advances in microwave/millimeter-wave and beyond technology with digital processing and computing technology. This workshop seeks to bring together a broad spectrum of researchers to address specific areas of wide bandwidth, 2-D imaging, 3-D imaging, super-resolution, automatic recognition and identification, SAR, ISAR, millimeter-wave imaging, and submillimeter-wave imaging.

08:00–17:00 WFE

Terahertz Device Characterization and Security Applications

Topics and Speakers:
- Progress Towards a THz Imager, M. Rosker, DARPA
- Generation of THz by Frequency Multiplication, A. Maestrini, Université Pierre et Marie Curie
- Trends in the Development of THz Receiver Technology, D. Matheson, Rutherford Appleton Laboratory
- Terahertz Spectroscopy: Applications, Potentials in Chemical and Biochemical Sensing, T. Vo-Dinh, Duke University
- Terahertz Scattering Parameter Measurement Systems for Device and Material Characterization, R. Weikle, Univ. of Virginia
- Imaging of Concealed Weapons at Sub-millimeter and THz Wavelengths with Arrays of Cryogenic Antenna-Coupled Microbolometers, A. Luukanen, VTT Technical Research Centre of Finland
- The Potential for Stand-off Detection of IEDs Between 100 GHz and 1 THz, R. Appleby, Qinetiq LTD
- THz Emission Detection for Standoff Sensing of Improvised Explosive Devices, D. H. Wu, Naval Research Lab
- Atmospheric Correction of THz Signals for Explosives Traces Detection, S. G. Kong, University of Tennessee

Organizers: A. E. Fathy, University of Tennessee; V. F. Hanna, Université Pierre et Marie Curie; A. Maestrini, Université Pierre et Marie Curie

Sponsors: MTT-4, MTT-15

There have been lots of efforts to explore the Advanced THz Sensing (ATS) technology for use in security screening and rapid detection of hidden improvised explosive devices (IED). ATS is capable of probing intermolecular interactions and large amplitude vibrational and rotational modes, and is polarization sensitive. ATS can see through materials considered opaque to other optical techniques, and rich in its interaction with chemical materials including explosive residue. The goal of the proposed workshop is to investigate the techniques for rapid and non-intrusive IED detection.

08:00–12:00 WFF

Wireless Local Positioning

Topics and Speakers:
- Basics of Wireless Local Positioning, M. Vossiek, Clausthal University of Technology
- Relative Position Sensing Between Mobile Units, P. Gulden, Symeo GmbH

WORKSHOPS

Friday Workshops and Short Courses

- High Speed Position Sensing, A. Stelzer, Johannes Kepler University Linz
- UWB Localization and its Application to Ultraprecise Indoor Asset Tracking, A. Fathy, University of Tennessee
- High Precision Local Positioning in Reflective Environment, S. Lindenmeier, Bundeswehr University, Munich

Organizers: R. Knoechel, Christian-Albrechts-University Kiel; G. Boeck, Berlin University of Technology; M. Vossiek, Clausthal University of Technology

Sponsor: MTT-16

Radio localization requires emerging wireless technologies including new data transmission principles and transceiver technologies. Context dependent information services, RF-localization systems for production and logistics, tracking systems for sports applications or guiding of blind people are only some of the numerous application areas. The workshop will focus on principles and challenges referring to the realization of such future systems. Present wireless local position sensing techniques and emerging solutions, such as relative position sensing between mobile units, position sensing within milliseconds and an accuracy of some centimeters using active transponders, as well as a time difference of arrival (TDOA) approach based on UWB signals and the utilization of UWB-technology for high precision local positioning in reflective environment will be presented.

13:00–17:00 WFG

Wireless Power Transmission for Space Solar Power Generation

Topics and Speakers:
- New Antenna Systems for Microwave Power Transmission, T. Takano, Institute of Space and Astronautical Science
- High Efficiency GaN-HEMT PAs for Microwave Solar Power Transmission, S. Nakajima, Eudyna Devices, Inc.
- Development of Wearable Rectenna for Ubiquitous Power Source, N. Shinahora, Kyoto University
- Recent Developments of Rectennas at Texas A&M University, K. Chang, Texas A&M University
- Free-Space Combining Oscillator Arrays, An Approach for Solar Power Conversion to High RF Power for Wireless Transmission, A. Mortazawi, University of Michigan
- GaN Based Material Growth and Devices for Microwave Power Transmission Systems, J. Lin and/or F. Ren, University of Florida

Organizers: A. Mortazawi, University of Michigan; S. Kawasaki, Kyoto University

Sponsor: MTT-16

Global energy demand continues to grow. Space-based, solar power generation may become an important source of energy in the 21st century. Space solar power via wireless power transmission proposes solar-generated, DC power to be converted to microwaves and beamed to earth using a large antenna array. The beam would be captured using a antenna array and converted back into DC power for terrestrial electrical grids.

13:00–17:00 WFH

Miniature, Electronically Tuned Filter Technology

Topics and Speakers:
- An Overview of Miniaturization of Varactor Tuned Printed Filter Technology, H. Dayal, BAE Systems Inc.
- Tunable Microwave Filters Using Thin Film Ferroelectric Varactors, A. Mortazawi, University of Michigan
- High Quality Ferrite-Loaded Dielectric Resonator Tuanable Filters, A. Abramowicz, Warsaw University of Technology
- Tunable and Compact Microwave Filters and Resonators Based on Metamaterials, F. Martin, Univ. Autònoma de Barcelona
- Tunable Filters Based on RF MEMS: An Overview, G. Rebeiz, University of California, San Diego

Organizers: H. Dayal, BAE Systems Inc.; V. Boria, Universidad Politécnica de Valencia

Sponsors: MTT-8, MTT-21

In summary, this workshop plans to address miniaturized filter design and tuning techniques including recent developmental MEMS, BST and printed resonator work using stepped impedance, split ring resonators, and open stubs for spur cancellations, dual mode tuning and other auto tuning techniques.

08:00–12:00 WFI

GaN Device and Circuit Reliability

Topics and Speakers:
- The Physics of AlGaN/GaN Reliability, R. J. Trew, North Carolina State University
- Designing GaN for Reliability, A. A. Immorlica, BAE Systems
- Production GaN HEMTs for High-Reliability Applications, A. Ward, CREE
- Performance and Reliability of AlGaN/GaN HFETs on s.i. SiC Substrates, R. Quay, Fraunhofer Institute
- Drift, Stability and Robustness Issues of GaN HFETs, J. Wurfl, Ferdinand-Braun-Institut für Hochstfrequenztechnik
- AlGaN/GaN HEMT Technology and Reliability Status, E. Morvan, Alcatel Thales III-V Lab/TIGER

Organizers: F. J. Sullivan, Raytheon; R. Jansen, ITHE RWTH Aachen University

Sponsors: MTT-6, MTT-7

WORKSHOPS

Friday Workshops and Short Courses

This workshop will address the reliability issues associated with GaN devices and MMICs. The technology is being pushed hard toward actual field operation in the near future. Some of the device reliability topics include leakage currents, both surface and subsurface, trap generation and nitrogen impact. Understanding the reliability effects of using different substrate materials will also be considered. These include GaN on SiC, on native GaN and on silicon substrates.

08:00–12:00 TFA

Microwave and Millimeter-Wave Packaging and Manufacturing 202

Topics and Speakers:
- Interconnnect Technologies with Selected Performance Issues
- Accuracy of Package and Interconnect Simulation Models, M. Heimlich, Applied Wave Research Inc.
- Thermal and Mechanical Analysis and Simulation, J. Carter, StratEdge Corporation
- Electrical Variability Due to Interconnect and Material Technologies, A. Lindner, REMEC Defense & Space
- Measurement and Tuning Repeatability for Calibration and Assembly, R. Ginley, NIST
- Novel Coatings and Encapsulation, O. Sneh, Sundew Technologies, LLC

Organizer: A. Lindner, REMEC Defense & Space

Sponsor: MTT-12

Packaging, assembly and test of most microwave and millimeter-wave devices are a challenging task. The variability of interconnects and temperature variations can further complicate the design and testing. This tutorial workshop expands on what was presented last year and gives the attendees the opportunity to review the issues and increase their design capability on this important issue.

13:00–17:00 TFB

Multidomain Physics Modeling of MEMS and NEMS

Topics and Speakers:
- The State of Commercial Tools for Simulation-Driven Design of MEMS devices, D. Ostergaard, ANSYS
- Multiphysics Modeling of Dielectric Charging in RF Switches, J. Hwang, Lehigh University, C. Goldsmith, MEMtronics
- In-Situ Process Characterization for Accurate MEMS Modeling, D. Peroulis and J. V. Clark, Purdue University
- Multiphysics Modeling of MEMS, N. Aluru, University of Illinois at Urbana-Champaign
- Simulation and Physical Co-Design of MEMS Devices and Electronics M. A. Maher, SoftMEMS
- System-Level Modeling and Simulation of Micro- and Nano-Scale Systems, J. V. Clark, Pudue University
- The Broad Role of System-Level Modeling in RF-MEMS: From Robust Electromechanical Device Design to MEMS/IC Cosimulation, M. Kamon, Coventor

Organizers: A. C. Cangellaris, University of Illinois at Urbana-Champaign; N. Aluru, University of Illinois at Urbana-Champaign

Sponsors: MTT-15, MTT-21

Efficient design and prototyping of MEMS is critically dependent on accurate modeling of the different physical domains (electrical, magnetic, mechanical, thermal, fluidic) that govern the operation of the devices and their nonlinear coupling. The purpose of this tutorial is to present the state of the art in such modeling, highlight recent advances and discuss future challenges, needs, and opportunities. More specifically, recent advances will be reported in the incorporation of uncertainties in material/geometric parameters and operating conditions in the modeling of MEMS devices; experiment-based, multiphysics modeling of dielectric charging in RF switches; methodology for accurate characterization of the impact of fabrication process on material and geometric parameters of MEMS devices; methodologies for MEMS-IC cosimulation, in support of tradeoffs in design between the MEMS, packaging and electronics, subject to performance-driven optimization constraints; and exploitation of the nonlinearity of the coupled multiphysics attributes of MEMS for the computer-aided design exploration of new device concepts.

08:00–12:00 TFC

Nanoelectronic Devices: RF Characterization, Modeling, and Applications

Topics and Speakers:
- Carbon Nanotubes as Microwave and Millimeter-wave Antennas, P. Burke, University of California, Irvine
- Modeling DC and AC Transport of Carbon Nanotube Field Effect Transistors, P. Wong, Stanford University
- Carbon Nanotubes for Thin Film Electronics, J. Rogers, University of Illinois at Urbana Champaign
- Theory and Performance of Nanocomposite Transistors, M. A. Alam, Purdue University
- Microwave Measurements of Nanotube Devices, G. Dambrine, University of Lille

Organizer: I. Amlani, Motorola, Inc.

Sponsor: MTT-4

Nanoelectronic devices based on carbon nanotubes, nanowires, and other variations are emerging with interesting and novel properties. Despite tremendous interest and progress, RF characterization and modeling of these devices has proven challenging. This workshop will bring together speakers from industry and academia to discuss progress, opportunities, challenges and potential solutions relating to this exciting and emerging field.

Friday Workshops and Short Courses

08:00–17:00 CFA

Applications of Artificial Neural Networks to RF and Microwave Design

Instructor: Q. J. Zhang, Carleton University

Topics: ANN Basics, Applications to RF/Microwave Design

Sponsor: MTT-1

Artificial Neural Networks (ANNs) are recognized as new vehicles for enhancing the speed, accuracy and flexibility of RF/microwave modeling and CAD. ANN has been applied to modeling and design of microstrip and CPW circuits, multilayer interconnects, embedded passives, printed antennas, LTCC circuits, semiconductor devices, filters, power amplifiers and more. This short course presents the fundamentals of ANN for RF and microwave design, application examples, and emerging trends and directions.

08:00–17:00 CFB

Time-Domain Electromagnetic Simulators

Instructors: Zhizhang (David) Chen, Dalhousie University, Halifax, Canada; Wolfgang J. R. Hoefer and Poman P. M. So, Uni-versity of Victoria, Canada

Topics:
- Time-Domain Simulation
- Time-Domain Formulation of Electromagnetic Theory
- Generalization of a Time-Domain Numerical Methods
- Convergence, Errors and Validation
- FDTD, FIT-TD, TLM, FEM-TD Methods
- Imaging for Computational Electromagnetics
- Architecture of a Time Domain Simulator
- FDTD/FIT Simulators
- TLM Simulators

Sponsors: MTT-1, MTT-15

This short course is intended to introduce microwave professionals and researchers to the theoretical foundations and the effective use of time-domain electromagnetic simulators. More specifically, the Short Course will provide insight into the operating principles of time-domain electromagnetic simulators, and show how these principles are translated or mapped into the functionality and operation of time-domain based CAD tools.

08:00–12:00 CFC

RF Linear Accelerators

Instructor: Samy M. Hanna, Microwave Innovative Accelerators (MINA)

Topic: RF Linear Accelerators

Sponsors: MTT-5, MTT-10

In spite of the wide range of applications for RF accelerators, the number of microwave engineers who have the knowledge and the skill to work in this field is disproportionately low. The goal of this tutorial short course is to motivate more microwave engineers to learn about RF accelerators and their applications to meet the demand for such expertise. These applications include cancer radiation therapy, electron beam medical sterilization, food sterilization, homeland security, cargo inspection, industrial material processing, and nondestructive testing (NDT). In this short course, we will discuss the concept of operation of RF linear accelerators (linacs) and its constituent components such as the electron gun, accelerating structure, RF window, and X-ray target. We will review the associated RF system that provides the RF power to a linac. That system includes an RF source (Klystron or Magnetron), a circulator, an automatic frequency control (AFC), and waveguide transmission system. A survey of different linac applications will be presented.

08:00–17:00 CFD

LTCC for Micro- and Millimeter-Wave Applications

Instructors: Ingo Wolff, Reinhard Kulke, and Peter Uhlig, IMST GmbH; Tim Mobley, DuPont Electronic Technologies

Topics: LTCC Process; 3D-Simulation and Test Methods; Survey of LTCC Material Systems and Manufacturers; Applications in Telecommunication and Sensor Electronics

Sponsors: MTT-1, MTT-15

LTCC as a ceramic multilayer technology has a great potential for micro- and millimeter-wave applications. The dielectric tapes as well as the gold and silver conductors have the appropriate physical and electrical performance. In spite of being a very mature technology, LTCC has recently gone through large improvements in material development and has become available for communication equipment manufacturers through LTCC foundries. The competitive price of materials and production make LTCC an ideal basis for System in a Package (SiP) and Multi Chip Modules (MCM). LTCC circuits can consist of a nearly arbitrary number of layers. Components can be integrated in cavities. LTCC substrates are rugged, hermetic and environmentally stable. These features and further favorable characteristics are utilized to develop compact and efficient modules for communication and sensor applications.

EXHIBITION

Commercial Exhibit

Held annually since 1970, the MTT-S Exhibition comprises more than 400 microwave, subassembly, component, device, material, instrument, and design software suppliers, and draws approximately 10,000 engineers involved in the design of microwave systems, subsystems, components, and devices. The 2007 Exhibition will occupy all three halls of the Hawaii Convention Center, and will be open from 09:00 to 17:00 on Tuesday and Wednesday, and from 09:00 to 15:00 on Thursday. Sorry, but children under the age of 14 will not be admitted to the exhibition hall at any time. Following is a list of exhibiting companies that was complete as of press time.

A-Alpha Waveguide Co.
Acceleware Corp.
Actipass Co. Ltd.
Advance Reproductions Corp.
Advanced Control Components Inc.
Aeroflex Inc.
Aerowave Inc.
Aethercomm Inc.
Agilent Technologies
Akon Inc.
Aldetec Inc.
Allrizon-TG Communications Equipmnt
American Microwave Corp.
American Standard Circuits Inc.
American Technical Ceramics
Ametek HCC Industries
Ametek Specialty Metal Products
AML Communications Inc.
AmpliTech Inc.
Analog Devices Inc.
Anaren Inc.
Anritsu Co.
Ansoft Corp.
Antenna Systems & Technology Mag.
Apollo Microwaves Ltd.
Applied Thin-Film Products
Applied Wave Research Inc.
AR Worldwide
ARA
ARC Technologies Inc.
Artech House
ASB Inc.
Assemblies Inc.
Astrolab Inc.
Auriga Measurement Systems
Avnet Electronics Marketing
B&Z Technologies
Barry Industries Inc.
BeMiTec AG - Ferdinand-Braun-Inst
Besser Associates Inc.
Bird Technologies Group
BL Microwave Ltd.
Bliley Technologies Inc.
Boonton Electronics
Bowei Integrated Circuits Co. Ltd.
Brush Ceramic Products
C-MAC MicroTechnology
Cadence Design Systems Inc.
California Eastern Labs
Cambridge University Press
CAP Wireless Inc.
Cascade Microtech
Centellax Inc.
Ceramic Products Group
Cernex Inc.
Chengdu AINFO Inc.
Ciao Wireless Inc.
Circuits Processing Technology
Cobham DES
Coining of America LLC
COM DEV/CodeOne
Compex Corp.
Component Distributors Inc.
CoorsTek
Corning Gilbert Inc.
CPI Canada
Cree Inc.
CST of America Inc.
CTT Inc.
Cuming Microwave Corp.
Custom Cable Assemblies Inc.
Custom Microwave Components Inc.
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Delta Electronics Mfg Corp.
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Delta RF Technology Inc.
DeWeyl Tool Co.
Diamond Antenna
Dielectric Laboratories Inc.
Dow Key Microwave
Ducommun Technologies Inc.
DuPont
Dynawave Inc.
e2v Technologies
EADS NA Defense Test & Services
Eagle Comtronics
Elcom Technologies Inc.
Electro Rent Corp.
Electromagnetic Technologies Inds.
Elisra Electronic Systems Ltd.
EM Research Inc.
EM Software & Systems (PTY) Ltd.
EMAG Technologies Inc.
EMC Technology Inc.
Emerson & Cuming
Emerson & Cuming Microwave Products
Emerson Network Power Connectivity
Emhiser Micro-Tech
Endwave Corp.
Eudyna Devices Inc.
European Microwave Week
Excelics Semiconductor Inc.
F&K Delvotec Inc.
Fairchild Semiconductor
Farran Technology Ltd.
The Ferrite Company Inc.
Filtel Microwave Inc.
Filtran Microcircuits Inc.
Filtronic Compound Semiconductors
Filtronic Sage Laboratories Inc.
Flexco Microwave Inc.
Florida RF Labs Inc.
Focus Microwaves Inc.
Freescale Semiconductor
Gaiser Tool Co.
General Dynamics C4, VertexRSI
Gerotron Communication GmbH
GGB Industries Inc.
Giga-tronics Inc.
GigaLane Co. Ltd.
Global Communication Semiconductors
WL Gore & Associates Inc.
Gowanda Electronics
Gryphics Inc.
GT Microwave Inc.
Hantechnic Inc.
Herley Industries Inc.
Herotek Inc.
Hesse & Knipps Inc.
High Frequency Electronics
Hittite Microwave Corp.
HTMicrowave Co. Ltd.
IEEE Communications Magazine
IEEE Microwave Magazine
IHP GmbH
IMST GmbH
Infineon Technologies
Inphi Corp.
Instruments for Industry (IFI)
Integra Technologies Inc.
International Manufacturing Svcs.
Ion Beam Milling Inc.
iTerra Communications
ITF Co. Ltd.
ITT Corporation
IW Inc.
J MicroTechnology Inc.
Jacket Micro Devices Inc.
Jazz Semiconductor
Jersey Microwave
JFW Industries Inc.
Johanson Manufacturing Corp.
Johanson Technology Inc.
Johnson Components
Johnstech International Corp.
Junper Interconnection Co. Ltd.
K&L Microwave Inc.
Keithley Instruments Inc.
KMIC Technology Inc.
Krytar Inc.
Kyocera America Inc.
L-3 Communications, Narda-East
LadyBug Technologies LLC
Lansdale Semiconductor Inc.
Laser Process Mfg. Inc.
Linear Photonics
Linearizer Technology
Litron Inc.
Lorch Microwave
LPKF Laser & Electronics
M2 Global Technology Ltd.
M/A-COM Inc.
Marubeni Chemix Corp.
Maury Microwave Corp.
MCV Technologies Inc.
MECA Electronics Inc.
Mega Circuit Inc.
Meggitt Safety Systems Inc.
Merix Corp.
Merrimac Industries Inc.
MICA Microwave
Mician GmbH
Micreo Limited
Micro Lambda Wireless Inc.
Micro-Chem Inc.
Microlab/FXR
Micrometrics Inc.
Micronews
Microsemi Corp.
Microtech Inc.
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Microwave Communications Labs Inc.
Microwave Development Labs Inc.
Microwave Device Technology Corp.
Microwave Innovation Group
Microwave Journal
Microwave Product Digest
Microwave Technology Inc.
Microwaves & RF
Midwest Microwave
Military & Aerospace Electronics
Millitech Inc.
Mimix Broadband Inc.
Mini-Systems Inc.
Mission Telecom Co.
MITEQ Inc.
MITS Electronics
Mitsubishi Electric & Electronics
Modelithics Inc.
Modular Components National Inc.
Molex RF/Microwave Div.
MPDevice Co. Ltd.
MtronPTI
Murata Electronics
NaF Technology Corp.
Natel Engineering Co. Inc.
National Instruments
NDK America Inc.
Nelco
Netcom Inc.
Nitronex Corp.
NOF Corp.
Noise Com
Northrop Grumman/Velocium Products
NTK Technologies Inc.
Nuhertz Technologies LLC
NXP Semiconductors
Octagon Communications
Orient Microwave Corp.
Ortel, division of Emcore
P/M Industries Inc.
Pascall Electronics Ltd.
Passive Microwave Technology
Pendulum Instruments-XL Microwave
Penton Media Inc.
Peregrine Semiconductor Corp.
Phase Matrix Inc.
Picosecond Pulse Labs
Planar Electronics Technology
Planar Monolithics Industries Inc.
Plextek Ltd.
Polyfet RF Devices
Precision Photo-Fab Inc.
Presidio Components Inc.
Prewell Corp.
Q_Microwave Inc.
QUEST Microwave Inc.
QuinStar Technology Inc.
QWED
R&K Company Ltd.
R-Theta Thermal Solutions Inc.
Radant MEMS Inc.
Reactel Inc.
Reed Business Information
Reinhardt Microtech AG
RelComm Technologies Inc.
Remcom Inc.

Microwave Week 2007 features over 400 commerical exhibitors. Get some swag!

Renaissance Electronics Corp.
RF Depot.Com Inc.
RF Design Magazine
RF Globalnet
RF Morecom
RFMW Inc.
Richardson Electronics
RJR Polymers Inc.
RLC Electronics Inc.
RFMD
Rogers Corp.-Advanced Circuit Mat.
Rohde & Schwarz Inc.
Roos Instruments Inc.
Rosenberger North America LLC
Roth & Rau AG
San-tron Inc.
Schleifring und Apparatebau GmbH
Schmid & Partner Engineering AG
Scientific Microwave Corp.
Shenzhen ATTEN Electronics Co. Ltd.
Shenzhen Kingsignal Cable Tech Co.
Sigma Systems Corp.
Signatone (Lucas/Signatone)
Simulation Technology & Applied Res
Sirenza Microdevices Inc.
Sonnet Software Inc.
Sources East Inc.
Southwest Microwave Inc.
Spectrum Elektrotechnik GmbH
Spectrum Microwave Inc.
SSI Cable Corp.
State of the Art Inc.
STC Microwave Systems Inc.
Stellar Industries Corp.
Storm Products Co.
StratEdge Corp.
Summitek Instruments Inc.
Sunny Electronic Corp. USA
SUSS MicroTec Inc.
SV Microwave Inc.
CW Swift & Associates Inc.
Synergy Microwave Corp.
T-Tech Inc.
Taconic
Tecdia Inc.
Tech-On
Tegam Inc.
Tektronix Inc.
Telcon Co. Ltd.
Teledyne Microelectronic Tech.
Temptronic Corp.
Tensolite
Terabeam/HXI
TeraVicta Technologies Inc.
Test & Measurement World
Thales Components Corp.
Thunderline-Z
Times Microwave Systems
Toshiba America Electronic Comp.
TRAK Microwave Corp.
Trans-Tech Inc.
Trilithic Inc.
TriQuint Semiconductor
Tronser Inc.
TRS-RenTelco
TRU Corporation Inc.
TTE Inc.
Tyco Electronics
UBE Industries Ltd.
UltraSource Inc.
United Monolithic Semiconductors
Universal Microwave Corp.
UTE Microwave Inc.
Valpey Fisher Corp.
Vector Fields Inc.
Vectron International
VIDA Products Inc.
Vishay Intertechnology Inc.
Voltronics Corp.
Wave-Tech
Weinschel Associates
Werlatone Inc.
West Bond Inc.
Wiley
Willtek
WIN Semiconductor Corp.
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Yixin Microwave Electronics Co. Ltd
Z-Communications Inc.
Zeland Software Inc.
ZIFOR Enterprise Co. Ltd.

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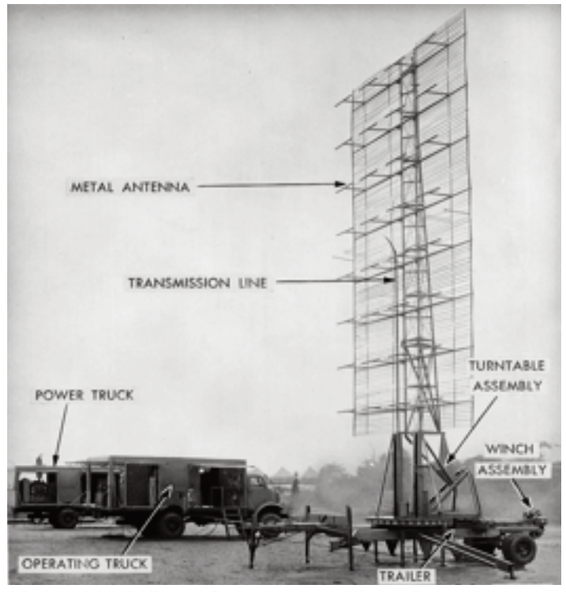
Anritsu Co.
Zeland Software Inc.

Historical Exhibit

The MTT-S Historical Exhibit will be open Tuesday through Thursday during the regular exhibition hours in the Exhibition Hall. The Historical Exhibit this year will include parts and photographs of the SCR 270 radar that detected Japanese warplanes on 7 December 1941. The MTT-S is fortunate to have Dr. Seymour Cohn contribute his laboratory notes that will be part of the exhibit. Also on display will be a collection of past IMS digests to commemorate the 50 years of this Symposium.

The Historical Electronics Museum is the permanent home of the MTT-S Historical Collection between Symposia. The Museum holds many microwave-related items besides the MTT-S collection, including a complete SCR-584 radar that was used with a proximity fuze in World War II. It also contains an impressive library of over 10,000 books and 11,000 journals. The Museum is located near Baltimore-Washington International Airport and is approximately 20 minutes from Baltimore. Additional information on the Museum can be found at www.hem-usa.org, or call 1-410-765-2345.



Model of the SCR-270 Radar located at Opana Point, Oahu, that detected the Pearl Harbor attacking planes 55 minutes prior to the attack on 7 December 1941.

MicroApps

The Microwave Application Seminars (MicroApps), inaugurated in 1996, serves as a forum for IMS exhibitors to present the technology behind their commercial products and their special capabilities. The presentations are 20 minutes in length and are open to all conference and exhibit attendees. Everyone who attends MicroApps will receive a free CD-ROM that includes informative details from every presentation. The MicroApps presentation room is located along the right-side wall when entering the Exhibition Hall, adjacent to the MTT-S Historical Exhibit.

Tuesday PM

TUMA
Packaging Processes

HCC Exhibition Hall

12:00 **TUMA-1: Advances in Heatsink Design**
A. Zaghlol, R. Theta, Thermal Solutions

12:20 **TUMA-2: Material Characterization**
D. Koether, IMST

12:40 **TUMA-3: QFN Packaged High-Power Frequency Doubler for Microwave and Millimeter-Wave Systems**
S. Nam, F. Traut, Hittite Microwave

13:00 **TUMA-4: R-Pak Quad Flat No-Lead (QFN) Microwave Air Cavity Liquid Crystal Polymer Packages**
J. Roman, RJR Polymers

TUMB
Subassemblies

13:20 **TUMB-1: Zero-Chirp Transmission Performance in 1550 nm Directly Modulated Microwave Laser Transmitters**
J. Iannelli, T. Wang, J. Li, H. Hou, Emcore Ortel

13:40 **TUMB-2: RFID Synthesizers**
J. Bienstock, V. Losik, C. Weigand, Tyco M/A-Com

14:00 **TUMB-3: Microwave Fiber Optic Links Solve the Problem of Remotely Locating Low-Noise Amplifiers**
H. Hausman, MITEQ

TUMC
Active Devices and Components

14:20 **TUMC-1: Open**

14:40 **TUMC-2: Large-Signal Models of Eudyna GaN HEMTs and Applications**
S. Sano, Eudyna Devices

15:00 **TUMC-3: A 26–40 GHz Compact Millimeter Wave Power Amplifier**
C. Marchewka, C. Wan, J. Taylor, T. Schoemehl, C. Colombo, R. True, R. Watkins, T. Hargreaves, C. Armstrong, L-3 Comm EDD

15:20 **TUMC-4: State-of-the-Art 6 bit mHEMT Phase Shifter**
A. Khalil, J. Lynch, F. Traut, Hittite Microwave

15:20 **TUMC-5: 10 GHz Narrowband VCO**
M. Busse, Dielectric Labs, Vectron International, Mimix

Wednesday AM

WEMA
Mechanical and Passive Components
HCC Exhibition Hall

09:20 **WEMA-1: Novel Structure of Bandpass Filter and Balun with Composite Right/Left-Handed Transmission Line**
Y. GuoSheng, Z. Jian, HT Microwave Co.,LTD.

09:40 **WEMA-2: High-Power and Broadband Matched Bandpass/Bandstop Diplexers**
R. Hershtig, K&L Microwave

10:00 **WEMA-3: Applications of Connectorless RF Connections in Microwave Multifunction Assemblies and Systems**
G. Mau, Custom Microwave

10:20 **WEMA-4: Low Temperature Cofire Chip Antennas**
W. Wong, Johanson Technology

10:40 **WEMA-5: Phase Shifters, Vector Modulators, Delay Lines, and Frequency Translators App Notes**
A. Baliotis, GT Microwave

11:00 **WEMA-6: M/A-COM Surmount™ Chip-Scale PIN Switches Eliminate Plastic Package Parasitics and Chip-and-Wire Costs and Variability**
J. Brogle, Tyco M/A-Com

11:20 **WEMA-7: Extending the Band of an All-Shunt PIN Diode Switch**
G. Mau, Custom Microwave

11:40 **WEMA-8: A Monolithic High-Power High-Linearity, Multioctave PIN Diode T/R Switch**
T. Boles, J. Brogle, R. Hubert, Tyco M/A-Com

12:00 **WEMA-9: A 200 W Switch for IED Applications**
G. Mau, Custom Microwave

12:20 **WEMA-10: Design Criteria and Construction Techniques for Manufacturing Isolators and Circulators**
A. Edridge, R. Quintanilla, M2 Global Technology

12:40 **WEMA-11: Passive Intermodulation Test of Isolators and Circulators**
S. Zheng, Yixin Microwave

Wednesday PM

WEMB
CAD and Modeling Products and Techniques
HCC Exhibition Hall

13:00 **WEMB-1: Linear Microwave Fiber Optic Link System Design**
J. MacDonald, A. Katz, Linear Photonics

13:20 **WEMB-2: Phase-Noise Cancellation in RF Transceivers**
R. Holtzman, Elisra Electronic Systems

13:40 **WEMB-3: QuickWave Electromagnetic Software Adapted for Optical Defectoscopy of Integrated Circuits**
M. Celuch, QWED

14:00 **WEMB-4: EMLOUNGE: A Modular Electromagnetic Simulation Environment**
K. Sabet, EMAG Technologies Inc.

14:20 **WEMB-5: Real-Time Full-Wave EM Design Using FastEM Design Kit in IE3D Rel. 12**
J. Zheng, Zeland Software, Inc.

14:40 **WEMB-6: Accelerated FDTD Kernel Architecture**
W. Simon, IMST GmbH

15:00 **WEMB-7: μWave Wizard — The Fast and Accurate CAD Solution for Passive Waveguide Components**
R. Beyer, Mician

15:20 **WEMB-8: SEMCAD X Optimizer: Genetic Algorithm Based Optimization of CAD Derived Structures**
E. Ofli, N. Chavannes, SPEAG Zeughausstrasse

15:40 **WEMB-9: Layout Automation and Extraction of Parasitic RF/Microwave Elements**
M. Heimlich, Applied Wave Research (AWR)

16:00 **WEMB-10: Transient Signals in Digital RF Systems Exposed by Fast Spectral Transforms and Digital Phosphor Display**
K. Engholm, Tektronix

16:20 **WEMB-11: A New Technique for Accurate On-Wafer RF Device Characterization**
J. Preston, SUSS MicroTec Test Systems

Thursday

THMA
Instrumentation and Measurement Technique
HCC Exhibition Hall

09:20 **THMA-1: X-Band High Power Load-Pull System using Prematched Probes**
R. Meierer, V. Mallette, G. Boll, Focus Microwaves

09:40 **THMA-2: High-Power Load Pull at 40 MHz using Low Frequency Tuners, LFT**
S. Dudkiewicz, V. Mallette, Focus Microwaves

10:00 **THMA-3: Pulsed RF Power Measurement**
R. Theiss, Boonton Electronics

10:20 **THMA-4: 0.8–8 GHz Multipurpose Tuner MPT-808-TC**
C. Tsironis, Dr. Ing, Focus Microwaves

10:40 **THMA-5: The Effects of Harmonic Tuning on EVM**
S. Dudkiewicz, V. Mallette, Focus Microwaves

11:00 **THMA-6: IEEE 802.16 WiMAX Receiver Testing**
B. Muro, Noisecom

11:20 **THMA-7: Optimizing Phase Noise Testing Time for Phased Array Antenna Modules**
G. de Giovanni, Aeroflex

11:40 **THMA-8: Real-time Correction in RF and Microwave Instrumentation**
Y. He, Tektronix

12:00 **THMA-9: Optimizing Effective Bit Resolution for Ultra-Widebandwidth Applications through the use of Arbitrary FIR Filters in High-Speed Oscilloscopes**
D. McCarthy, Tektronix

12:20 **THMA-10: AP3501 35 GHz Integrated Sampler**
U. Lott, J. Kucera, AnaPico Gerotron Comm.

12:40

Social Events

The Hilton Mid-Pacific Conference Center is abbreviated in the text below as Hilton MPCC.

Sunday, 3 June

19:00–21:00 HCC Rooftop Garden

RFIC Reception

Immediately following the RFIC Plenary Session is the RFIC Reception on the Rooftop Garden of the Hawaii Convention Center. This social event is a key component of the RFIC Symposium, providing the opportunity to connect with old friends, make new acquaintances, and catch up on the wireless industry. Admittance is included with RFIC Symposium registration. Additional tickets can also be purchased separately at registration.

Monday, 4 June

18:00–20:00 HCC Rooftop Garden

Microwave Journal Reception

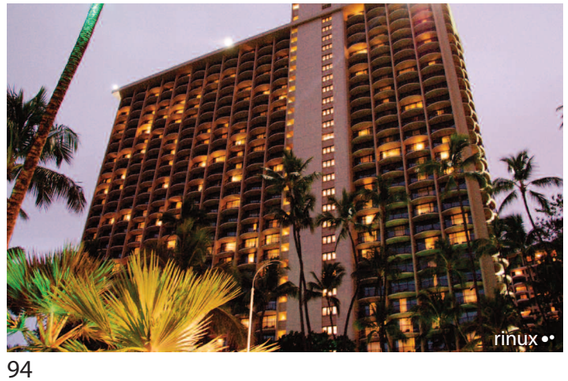
All Microwave Week attendees and exhibitors are invited to attend a reception hosted by *Microwave Journal*. The venue is the 2.5 acre landscaped roof-top garden atop the Hawaii Convention Center.

Tuesday, 5 June

18:00–20:00 Hilton Village Green

Women in Microwaves Reception

Surrounded by lush tropical gardens, gentle waterfalls, and an adjacent koi pond, the beautiful Village Green, centrally located between the Tapa Tower and Main Lobby at the Hilton Hawaiian Village, is the perfect venue for celebrating the diversity of MTT-S.




Jordan Dawe

19:00–21:00 Hilton Kalia Tower Pool

Student Reception

All students are invited to socialize poolside in a relaxed and casual atmosphere to wind down after the conference. The pool is located on the 2nd floor of the Kalia Tower at the Hilton Hawaiian Village.

19:00–20:00 Hilton MPCC Coral 2

MTT-17 Anniversary Reception

Magnetic resonance imaging (MRI) is an important tool for medical diagnostics and other applications. It is also a major application of HF/VHF/UHF technology. To celebrate its tenth anniversary, Technical Committee MTT-17 will present a talk on "Trends in Magnetic Resonance Imaging (MRI)" by J. Thomas Vaughn. Dr. Vaughn is a professor at the University of Minnesota and a recognized expert on the RF aspects of MRI. MTT members and guests are welcome.

20:00–22:00 Hilton MPCC Coral 2

Ham Radio Social

All radio amateurs attending IMS 2007 are invited. Al Katz, W2UYH, will kick off the evening with a talk on earth-moon-earth communication, known as EME or moon bounce.

Wednesday, 6 June

18:00–20:00 Hilton MPCC Coral 3

Industry-Hosted Cocktail Reception

Symposium exhibitors will host a cocktail reception. Complimentary beverage tickets will be included in the registration packages.


Sarah Camp

19:30–22:00 Hilton MPCC Coral 4

MTT-S Awards Banquet

The MTT-S Awards Banquet includes a fine dinner, awards presentation, and entertainment. Major society awards will be presented. Tickets can be purchased at the time of registration.

Thursday, 7 June

12:00–14:00 HCC Ballroom C

MTT-S Student Awards Luncheon

All students are invited to attend the luncheon, which recognizes recipients of the IMS 2007 Student Paper Awards, MTT-S Graduate Fellowships, MTT-S Undergraduate Scholarships, and the Student High-Efficiency Power Amplifier Competition Prize.

17:30–21:00 Sheraton Diamond Head Lawn

MTT-S GOLD Reception and Luau

The IEEE MTT-S Graduates of the Last Decade (GOLD) Committee invites all GOLD members to a relaxing reception overlooking Waikiki Beach. Transportation will be provided from the Hawaii Convention Center to the Sheraton Waikiki. The reception will be followed by a luau located next door at the Royal Hawaiian Hotel. Luau tickets will be presented to GOLD members who complete a brief survey at either the IEEE MTT-S Membership-GOLD Booth or at the end of the IEEE MTT-S GOLD Committee sponsored Panel Session PTHA on "Career Development."

Saturday, 9 June

11:00–21:15 Ko Olina Golf Club

IMS 2007 Golf Tournament

After a busy week at the conference, relax with fellow conference attendees at the IMS 2007 Golf Tournament. In the format of a four-man scramble, the tournament will take place at the Ko Olina Golf Club (www.koolinagolf. com), once recognized as one of *Golf Digest's* "Top 75 Resort Courses in the US." Individual and team prizes will be given after the tournament and attendees can choose to participate in a dinner after the awards are announced. Please join us to celebrate the conference, of which you, the participants, are a key ingredient. All skill levels are welcome. The Golf Tournament is sponsored by Anritsu, Ansoft, AWR, and IMS 2007.

Transportation departs Hilton Hawaiian Village and Sheraton at 11:00. Check-in at 12:00. Shotgun Tournament from 13:00–17:00. Optional dinner at JW Marriott at 18:30, returning at approximately 21:15. If not attending dinner, returning at 19:30.

Register at www.mcahawaii.com/grps07/ims2007hi.


Steven Tom

Hospitality Suite and Recreational Activities

Hospitality Suite

We are pleased to offer two hospitality suites for the families of our technical attendees to relax and enjoy while experiencing everything that Hawaii has to offer. Both suites are open Sunday, 3 June through Friday, 8 June from 07:00 to 12:00 and offer a delicious breakfast and grab-and-go snacks, as well as assistance from our destination management company to aid you in booking tours. Both hotels offer exciting activities for your *keiki* (children). Please refer to the websites below for additional information and reservation procedures.

Hilton Hawaiian Village Hospitality Suite

Honolulu Suite (second floor of the Tapa Tower, overlooking the Tapa Tower Pool) Keiki program:
www.hiltonhawaiianvillage.com/activities/children-programs.asp

Sheraton Waikiki Hospitality Suite

Niihau Suite (second floor near the main elevators)
Keiki program:
www.sheraton-waikiki.com/act_keiki_aloha.htm

Please note that guest badges are required for entry into both Hospitality Suites.

Recreational Activities

Aloha! We are pleased to provide all IMS 2007 attendees and their guests with a wide variety of tours and other activities for your enjoyment during your stay in Hawaii.

We have retained the services of MC&A, Inc., the leading destination management company in Hawaii. They will handle all aspects of the activity registration and logistics on the day of your event. We encourage participants to register before the conference via website (www.mcahawaii.com/grps07/ims2007hi), as we believe it is the most convenient option. MC&A may also be reached via email (ims2007hawaii@mcahawaii.com) or via fax at 1-808-589-5583.

Since Hawaii has so much more to see and do then what we have captured in the featured tours described here, additional tours and customized outer-island vacation packages can also be arranged at the above website.

The preconference registration deadline for all activities is 15 May, but for those that miss this deadline, a desk will be set up at the Hawaii Convention Center and both Hospitality Suites during the convention. However, we strongly encourage advance registration, due to the limited number of openings for some tours. There may be slight changes in tour times, so please check the website above or the Hospitality Suite for the most up-to-date information.

Unless otherwise specified, prices include round-trip transportation from the Hilton Hawaiian Village Tapa Tower bus depot and the Sheraton Waikiki bus depot.

One Day Maui Tour

Sunday, 3 June, 05:00–20:00

In Hawaii, they say *Maui no ka oi* — Maui is the best. Come and see why for yourself on an exhilarating motor-coach tour that takes you to some of the best sites on the island. From impressive natural wonders to sprawling, man-made, lavish resorts, the Valley Island of Maui has it all.

Your island trek begins with a visit to the "House of the Sun," Haleakala Crater, the world's largest dormant volcano rising to 10,000 feet high. From the Crater you'll be transported to the lush carpeted lands of spectacular Iao Needle in Iao Valley, where King Kamehameha defeated the chief of Maui, his last major rival in uniting the islands. Tour the historic former whaling port of Lahaina filled with a rich nautical tradition and a fabulous array of art galleries, pleasant souvenir shops and world-renowned restaurants. Visit the quiet town of Wailuku and the elegant Kaanapali resort area. This fully narrated tour points out the best points of interest so you don't miss a thing. A no-host lunch stop will be made en route to satisfy hearty appetites.

$300.00 per adult, $295.00 per child (2–11 years) includes: roundtrip transportation, roundtrip airfare (confirmed at time of reservations), admission to Haleakala National Park, state tax.

Kualoa Ranch

Monday, 4 June, 07:10–14:00

Experience the best land activities bundled into two exciting adventure packages. Located on Oahu's northeastern shore, Kualoa

Ranch rests at the base of two spectacular mountain ranges and has been the backdrop of such Hollywood blockbusters as Jurassic Park, Windtalkers, George of the Jungle, Tears of the Sun and the hit television series Lost. With the magnificent Koolau Mountains as your backdrop, it makes for the perfect setting for horseback tours, ATV tours, jungle expedition tours, a movie set tour and more!

$94.00 per adult, $59.00 per child (3–11 years) includes: roundtrip transportation, choice of up to 2 activities, and buffet lunch. Please see registration website for activities, age restrictions, and menu.

Arizona Memorial, USS Missouri, and City Tour

Monday, 4 June, 06:30–15:30

Celebrate the honor, valor, and courage of the U.S. Servicemen who served during World War II on this special Stars and Stripes tour. It's a nostalgic journey to the two historic places that marked the beginning and end of the war for the United States — Pearl Harbor and the USS Missouri.

At the site of Pearl Harbor, you'll view the Arizona Memorial where the remains of the USS Arizona lay silent beneath the waves. The events of the 1941 attack on Pearl Harbor are unfolded through detailed narrations and photos. While at Pearl Harbor, you'll travel across the Ford Island Bridge to the historic USS Missouri battleship, otherwise known as the "Mighty Mo." It was on the decks of this celebrated warship that the Japanese surrender ceremony took place, signaling the end of their involvement in World War II. Explore the passages, rooms, and corridors on a special guided tour.

From Pearl Harbor, you'll take a drive through metropolitan Honolulu and up to the Punchbowl Crater for a drive through the National Cemetery of the Pacific. After enjoying the serenity and spectacular view atop Punchbowl, you'll wind through Downtown Honolulu for a cruise through its many highlights.

$55.00 per adult, $35.75 per child (3–11 years) includes: roundtrip transportation, USS Missouri admission and guided tour, and state tax.

Don't pick up glowing rocks. They be hot.

Hole in the Wall Lunch Tour

Tuesday, 5 June, 09:45–14:00

Featuring yummy food, fascinating history, and culinary decadence! Bring a big appetite for this tour! You'll taste, touch, and visit several different food gems and exotic ethnic restaurants that contribute to Honolulu's delicious melting pot. We asked Hawaii's best chefs what they like to eat on their day off and here's what specialties they suggested you try: Hawaiian plate lunch, Chinese dumplings, local style grinds, pastry, Thai noodles, barbecued meat satay, Vietnamese summer rolls, bento boxes, Mediterranean, and Hawaii's mysterious crack seed. Your guide will answer all your food questions. You'll get valuable tips on how to make your Hawaii vacation more memorable. Prepare yourself for a fantastic day of eating behind the scenes in beautiful Honolulu!

$103.75 per adult/child includes: roundtrip transportation, lunch, state tax.

One Day Big Island/Volcano Tour

Tuesday, 5 June, 06:00–20:00

From raging volcanoes to serene snow-capped mountaintops, the Big Island of Hawaii is an island of extreme power and beauty. Come visit the legendary Volcanoes National Park to witness the workings of Madame Pele (Hawaiian goddess of fire). You'll trek through miles of recent lava flows at Kalapana and the mysterious Halemaumau Fire Pit.

The tour continues with a stop at the tranquil town of Hilo, home to the beautiful Rainbow Falls. While you gaze at the thundering waters, glistening rainbows float in and out of its mist. At your next stop, you'll uncover the secrets of how Hawaii's favorite nut, the macadamia, is made into a variety of mouthwatering treats. For a viewing of true tropical elegance in bloom, an abundance of fragrant orchids await your discovery at a local orchid nursery. A

no-host lunch stop will be made at the Volcano House.

$300.00 per adult, $295.00 per child (2–11 years) includes: roundtrip transportation, roundtrip airfare (confirmed at the time of reservations), admission to Volcanoes National Park, state tax.

Shangri-La: The Honolulu Estate of Miss Doris Duke

Wednesday, 6 June

Trip # 1: 07:30 – 11:30 (Maximum 25 guests)
Trip # 2: 10:00 – 14:00 (Maximum 25 guests)
Trip # 3: 12:30 – 16:30 (Maximum 25 guests)

Fiercely independent, rich beyond avarice, an international celebrity and socialite, activist and philanthropist, Miss Doris Duke, one of the wealthiest people in history, was certainly a force to be reckoned with! Unbeknownst to the world, Miss Duke inconspicuously created a veritable palace of treasures on the southern shore of Oahu. Shangri-La, Miss Duke's Honolulu estate is now open to IEEE for a glimpse into the life of this extremely remarkable, private, and fascinating individual.

You will begin your journey at the Honolulu Academy of the Arts where you will be shown an orientation video of the Shangri-La residence and get a first peek at the treasures housed on property. From there, you will be escorted via minicoach to Diamond Head's exclusive Black Point district, location of the estate. Upon completion of the tour, you will then be returned to the Honolulu Academy of the Arts to experience the museum's revolving collection at your leisure.

$65.50 per person includes: roundtrip transportation, admission to the Honolulu Academy of Arts, admission to Shangri-La, guided tour, driver/guide gratuity. Sorry, no children under 12 allowed.

Sea Life Park Luau

Wednesday, 6 June, 18:00–21:00 (luau)

17:05 – 21:30 with optional bus pick-up

Sea Life Park offers the island's most beautiful setting for a traditional Hawaiian Luau! Overlooking the ocean above Makapu'u Point, the Sea Life Park luau is held in an unparalleled location revealing breathtaking views of Rabbit Island, the historic lighthouse, and the cliffs adjacent to the park. Only at the Sea Life Park Luau can guests witness a spectacular night time dolphin show, enjoy delicious traditional Hawaiian food, and a sensational Polynesian Revue provided by the famed performers of Tihat — all of this in an easily accessible location. Luau price includes park admission, enabling guests to experience the daily shows, activities, and educational displays on the day of their luau or on another day within 30 days of the luau. With the traditional sound of the conch shell, you will be transported to a magical world of music, food, dancing and dolphins in true Sea Life Park style.

$83.50 per adult, $50.00 per child (4–12 years) includes: all-day admission to Sea Life Park, lei greeting, welcome drink, Polynesian Revue, luau buffet (see website for menu), state tax. Optional roundtrip transportation available for $16.00 per person.

Grand Circle Island

Thursday, 7 June, 08:15–17:30

Get to know Hawaii from the inside out with an all-day tour that covers 120 miles of Oahu's best sightseeing spots. You'll circle the entire island, beginning with a tour of the stunning, world-famous Diamond Head Crater. For a close-up view of a seawater eruption, you'll visit Hawaii's own Old Faithful known as the "Blow Hole," where you'll witness oceanside water play at full force. Besides a stop at Sandy Beach, a favorite for body surfers, you'll venture to the most celebrated surfing zones in the world along the North Shore, Waimea Bay, Sunset Beach, and the spectacular Banzai Pipeline. At Dole Plantation you will ride the pineapple express train and learn about the history of Hawaii's pineapple industry. You may choose between a stroll through the plantation gardens or test your skill at the pineapple garden maze.

In colorful contrast to the brilliant blue of the crystalline waters, you'll also find emerald oceans of shimmering pineapple and sugar cane fields waving gently in the breeze. Take a glimpse into the Hawaii of long ago as you pass remnants of old homesteads on your return to Waikiki. Be sure to bring your camera to record the marvels that gave Hawaii its name and reputation as Paradise.

$64.00 per adult, $37.75 per child (4–11 years old) includes: roundtrip transportation, Pineapple Express train ride at Dole Plantation, choice of stroll through Plantation Gardens or Pineapple Garden Maze, state tax.

Tropical Ocean Fun Cruise

Thursday, 7 June, 08:25–13:00

Every day is summer in paradise! Take advantage of the beautiful Hawaiian sunshine and warm island waters aboard the Tropical Ocean Fun Cruise! You'll enjoy this longer cruise with more activities, including fishing, waterslide, giant water trampoline, kayaking, water toys and rafts, jumping plank, fish feeding and sun deck! Explore the Rainbow Reef with provided snorkel equipment, instruction and tours. And get your cameras ready for Green sea turtles, Spinner dolphins and flying fish too! After building up your appetite, eat your fill of a delicious BBQ lunch buffet freshly grilled on-board by friendly Starlet crew and open soda bar!

$76.50 per adult, $50.00 per child (3–11 years old) includes: roundtrip transportation, BBQ buffet lunch (see website for menu), open soda bar, state and harbor tax.

Polynesian Cultural Center

Friday, 8 June, 12:05–22:15

Polynesia comes alive in a celebration of song, dance and culture at Hawaii's most popular attraction, the Polynesian Cultural Center. Nestled along the island's scenic North Shore, this is one must-see event. Travel across the South Pacific in a day, as you take an escorted tour through seven authentic Polynesian island villages, Tahiti, Tonga, Fiji, Samoa, New Zealand, the Marquesas, and Old Hawaii. Meet real Pacific Islanders and see them demonstrate the arts and crafts of their native lands.

See the breathtaking IMAX film "The Coral Reef" and learn the story of how reefs are formed, as well as the steps being taken to preserve their delicate ecosystem. Experience the regal spectacle of the Pageant of the Long Canoes. Shop for authentic Polynesian crafts and gifts at the Treasures of Polynesia Shopping Plaza. Indulge in a sumptuous dinner buffet. The evening ignites with "HORIZONS", an extravaganza of song and dance showcasing all the pride and color of the people of Polynesia.

$99.00 per adult, $75.00 per child (3–11 years) includes: roundtrip transportation, admission, IMAX Theatre, evening show, luau dinner (see website for menu), and state tax. See website for upgrade package: $134.00 per adult, $99.00 per child (3–11 years).

Star Sunset Dinner Cruise

Friday, 8 June, 16:30–20:00

Embark across the waves on a romantic dinner cruise aboard the luxurious Star of Honolulu. Delight in your favorite tropical libation beneath a crimson washed sky as the Star takes you on an intimate journey along the quiet Waikiki coastline. The twinkling city lights of Honolulu are your evening companions while you enjoy a tempting steak and crab dinner. You'll sway and dance to the gentle island rhythms performed on-board as the ship sails silently out to famed Diamond Head Crater. The action picks up with a welcome of Hawaiian dance and song. Then it's the all new "My Hawaii — Lei of Memories" show, celebrating Hawaii's glorious tradition. Featuring Hawaii's most talented troupe of entertainers, this is one show you won't want to miss.

$89.00 per adult, $57.00 per child (3–11 years old) includes: roundtrip transportation, dinner (see website for menu), one drink, show, state and harbor tax.

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