



**31st IEEE COMPOUND
SEMICONDUCTOR IC
(CSIC) SYMPOSIUM**

Program

Presenting:

CSICS: Goin' to Carolina

**Oct 11th – Oct 14th, 2009
Sheraton Greensboro Hotel
at Four Seasons**

**Greensboro, North Carolina,
USA**



CO- SPONSORED BY

**The IEEE Electron Devices Society,
The IEEE Solid-State Circuits Society, and
The IEEE Microwave Theory and Techniques Society.**

SYMPOSIUM

Saturday, October 10th, 2009

REGISTRATION (Short Course & Primer Course Only)

Sunday, October 11th, 2009

REGISTRATION (Short Course & Primer Course Only)

Short Course Continental Breakfast

SHORT COURSE: PA Design Fundamentals, Advanced Techniques and Technologies

Short Course Lunch

REGISTRATION for Symposium (and Primer Course until 4:00pm)

PRIMER COURSE: Basics of Compound Semiconductor ICs

CSIC Symposium Opening Reception

Monday, October 12th, 2009

REGISTRATION

Continental Breakfast

SYMPOSIUM OPENING

SESSION A: Plenary Session

SESSION B: Millimeter-Wave Multifunction MMICs

SESSION C: Novel Technologies

PANEL SESSION 1: Digitally-controlled mm-wave circuits. – I don't know a NAND gate from a Volkswagen?

Exhibition Opening Reception

Tuesday, October 13th, 2009

REGISTRATION

Technology Exhibition

Continental Breakfast

SESSION D: High Power Amplifiers

SESSION E: mm-Wave Systems and Circuits

Exhibition Luncheon

SESSION F: Wireless Communication Components

PANEL SESSION 2: Saturated Power Amplifier MMICs for Radar- A Really Hot Subject!

Symposium Theme Party

Wednesday, October 14th, 2009

REGISTRATION

Continental Breakfast

SESSION G: InP and Modeling

SESSION H: Receiver Building Blocks

SESSION I: High Speed Digital and Mixed Signal

PANEL SESSION 3: GaN Reliability – Show me the Data!

SESSION J: Late News Papers

Close of Symposium

Visit us at: <http://www.csics.org/>

AT A GLANCE

Saturday, October 10th, 2009

6:00 p.m. – 8:00 p.m. Guilford Lobby

Sunday, October 11th, 2009

7:00 a.m. – 8:00 a.m. Guilford Lobby

7:00 a.m. – 8:00 a.m. Guilford

8:30 a.m. – 4:45 p.m. Auditorium II

12:00 p.m. – 1:00 p.m. Guilford D

3:00 p.m. – 8:00 p.m. Guilford Lobby

4:00 p.m. – 7:00 p.m. Auditorium III

6:00 p.m. – 8:00 p.m. Guilford DE

Monday, October 12th, 2009

7:00 a.m. – 5:00 p.m. Guilford Lobby

7:00 a.m. – 8:00 a.m. Guilford Lobby

8:00 a.m. – 8:30 a.m. Guilford D

8:30 a.m. – 12:00 p.m. Guilford D

1:30 p.m. – 2:50 p.m. Guilford D

3:30 p.m. – 5:10 p.m. Guilford D

3:30 p.m. – 5:00 p.m. Guilford E

5:30 p.m. – 8:00 p.m. Guilford AB

Tuesday, October 13th, 2009

7:00 a.m. – 5:00 p.m. Guilford Lobby

7:00 a.m. – 4:00 p.m. Guilford AB

7:00 a.m. – 8:30 a.m. Guilford AB

8:30 a.m. – 10:00 a.m. Guilford D

10:30 a.m. – 12:10 a.m. Guilford D

12:10 a.m. – 1:30 p.m. Guilford AB

1:30 p.m. – 3:20 p.m. Guilford D

3:30 p.m. – 5:00 p.m. Guilford D

6:00 p.m. – 10:00 p.m. Sheraton Greensboro

Wednesday, October 14th, 2009

7:00 a.m. – 12:00 p.m. Guilford Lobby

7:00 a.m. – 8:30 a.m. Guilford Lobby

8:30 a.m. – 10:00 a.m. Guilford D

10:30 a.m. – 11:50 a.m. Guilford D

1:30 p.m. – 3:10 p.m. Guilford D

1:30 p.m. – 3:00 p.m. Guilford E

3:30 p.m. – 5:10 p.m. Guilford D

5:10 p.m.

CHAIR'S MESSAGE

On behalf of the organizing committee and the IEEE Electron Devices Society, the Microwave Theory and Techniques Society, and the Solid-State Circuits Society, I invite you to be a part of the 2009 IEEE Compound Semiconductor IC Symposium (CSICS). This year's symposium will be held October 11th – October 14th in Greensboro, NC.

CSICS has been going strong for 31 years. This year we chose to locate in what has become a hub of Compound Semiconductor research and manufacturing. I don't think that anyone at the 1979 meeting of the GaAs IC Symposium (the first) would have imagined that the largest manufacturer of GaAs in the year 2000 would be in the cellular (or in late 70's parlance... "portable") telephone business. Yet by 1990 it was clear that this was one of the most promising applications of this fledgling technology. Through the years, the GaAs IC Symposium grew in size and breadth as GaAs integrated circuits spread into defense and commercial products. Corporate and academic programs in GaAs research led to exciting advances in materials growth, device physics, higher integration levels and commercial applications. As GaAs technology matured, other III-V materials systems came into the mix. In 2004 in Monterey, CA, the Symposium changed its name to IEEE Compound Semiconductor IC Symposium (CSICS) to reflect the evolution of the III-V industry and the interests of its participants.

The CSIC Symposium is the preeminent international forum on developments in integrated circuits using compound semiconductors such as GaAs, InP, GaN, SiGe and other materials. Coverage embraces all aspects of the technology, from materials issues and device fabrication, through IC design and testing, high volume manufacturing, and system applications.

Several social events are planned that allow our attendees to interact in a relaxed setting. Events include the Sunday Evening Opening Reception, the Monday evening Technology Exhibition Opening Reception, the Tuesday Technology Exhibition Luncheon, and the Tuesday Theme Party. This year's Theme Party has a distinct Southern flavor that I'm sure you will enjoy. We also offer daily breakfast and AM/PM coffee breaks Monday through Wednesday.

The IEEE CSICS is also offering a short course entitled "PA Design Fundamentals, Advanced Techniques and Technologies" on Sunday Oct. 11th, 2009. This course offers the student detailed instruction on circuit design techniques for various technologies as well as design examples by leaders in the compound semiconductor industry. In addition, we offer our "Primer Course" which is an excellent tutorial presented within the context of our Symposium technical program. The Primer Course is offered on Sunday Oct. 11th, 2009.

We hope you will join us again this year as we're goin' to Carolina!

Marko Sokolich, Chair
2009 IEEE CSICS

CORPORATE BENEFACTORS

This year, we are pleased to continue with the IEEE Compound Semiconductor IC Symposium Corporate Benefactors Program. This program allows companies interested in compound semiconductors to show their support of the Symposium by making contributions towards the cost of some of our social events.

These additional resources enable the Symposium to increase the quality of our event, as well as allowing companies an opportunity for some tasteful promotional activities. To discuss any of the benefactor opportunities in more depth, please contact:

Marko Sokolich
Tel: +1-310-317-5148
E-mail: msokolich@hrl.com

As of this printing, the Corporate Benefactors for the 2009 Compound Semiconductor IC Symposium are as follows.

Gold Level Benefactor :

RF MICRO DEVICES, INC.



Silver Level Benefactors:

TriQuint Semiconductor

OMMIC

HRL Laboratories, LLC

AWR Corporation

The Symposium Web Site www.csics.org has become a critical tool for the dissemination of information to prospective attendees, committee members and sponsors of the Symposium. Every year, the web site must be updated and maintained to effectively serve this purpose. We would like to acknowledge the following benefactor for providing the Symposium web site support for the 2009 CSIC Symposium:



Comments regarding the web site or any publicity materials should be directed to the Publicity Chair, Douglas McPherson (douglas.mcpherson@zarlink.com). Links to our corporate benefactors appear on our symposium website.

GENERAL INFORMATION

IEEE 31st CSIC Symposium
Oct 11th - Oct 14th, 2009
Sheraton Greensboro Hotel
At Four Seasons
Greensboro, NC
REGISTRATION

	<u>Advance</u> (Received by Sept. 18 th)	<u>Regular</u> (After Sept. 18 th or on site)
Symposium Registration		
IEEE Member	\$490	\$575
Non-IEEE	\$590	\$700
IEEE Life-Member	\$290	\$320
Student	\$290	\$350
Special One-day IEEE Member ¹	\$290	\$350
Special One Day Non-IEEE ¹	\$350	\$400
Extra Exhibitor Registration	\$200	\$200

Short/Primer Course Fee

Short Course	\$390	\$450
Short Course Student	\$200	\$250
Primer Course	\$175	\$225
Primer Course Student	\$100	\$100

Additional Items

Guest Opening Reception Ticket	\$50	\$50
Guest Theme Party Ticket	\$90	\$90
Adtl. Technical Digest	\$120	\$120
Adtl. Digest CD ROM	\$100	\$150
Adtl. Short Course CD ROM	\$100	\$100
Adtl. Short Course Notes Only	\$150	\$150
Adtl. Primer Course Notes	\$50	\$50

All fees are denominated in US\$

Full Registration Includes: Technical Digest, CD-ROM, Opening Reception, Theme Party, all technical sessions, panels, exhibits, Exhibition Opening Reception and Exhibition Lunch.

Short Course Registration Includes: Short Course Notes and CD-ROM, continental breakfast and Short Course Lunch

¹Special One-day Registration Includes: CD-ROM only (no social functions)

Primer Course Registration includes: Primer Course Notes Only

²The Extra Exhibitor Registration enables Exhibitors to attend any/all of CSICS activities including the theme party and opening reception!

For **ADVANCE REGISTRATION** click on the Symposium Registration link on the Symposium website (www.csics.org). You may register either through the website or complete the enclosed

Advance Registration Form with your remittance of the appropriate fee (check or credit card) **By September 18th, 2009**. Prices will increase after the September 18th deadline.

Mail or Fax Completed Advance Registration Form to:
IEEE/MCM: Lukrecija Lelong, CSICS Registrar,
445 Hoes Lane, Piscataway, NJ, 08854 USA
Tel: +1-732-465-7810
Toll Free (US or Canada) +1-800-810-4333
FAX : +1-732-465-6447
Email: csics09reg@ieee.org

The remittance is payable by checks in U.S. dollars only, by personal/company check drawn on a U.S. bank, U.S. currency traveler's checks, or international money order. Checks must be made payable to "IEEE/2009 CSICS" and must be encoded with the bank number, account number, and check number. Credit cards and wire transfers may also be used. Bank drafts from non-U.S. banks and foreign currency are unacceptable and will be returned.

When you register for the Conference, the contact information you provide (including your name, address, phone, and email address) may be shared with CSICS and vendor exhibitors.

We urge you to pre-register to reduce your costs and to simplify your check-in at the Symposium. Your Technical Digest and registration materials will be ready for you at the Advance Registration Desk.

Registration Center:

The Symposium Registration Center is located in the Guilford Foyer on Saturday through Wednesday. The operating hours will be as follows:

Short & Primer Course Registration only

Saturday, October 10 th	6:00 p.m. – 8:00 p.m.
Sunday, October 11 th	7:00 a.m. – 8:00 a.m.
Sunday, October 11 th	3:00 p.m. – 4:00 p.m. (Primer)

Symposium Registration

Sunday, October 11 th	3:00 p.m. – 8:00 p.m.
Monday, October 12 th	7:00 a.m. – 5:00 p.m.
Tuesday, October 13 th	7:00 a.m. – 5:00 p.m.
Wednesday, October 14 th	7:00 a.m. – 12:00 noon

Refund Policy:

All requests for refund/cancellation must be received in writing by September 18th, 2009. No refunds can be provided after this date. Cancellations will incur a \$25 administration fee. Please submit cancellation requests via email to csics09reg@ieee.org.

ACCOMMODATIONS

Hotel Reservations:

A block of rooms has been reserved at special discounted rates for Symposium participants at our headquarters hotel, the Sheraton Greensboro Hotel at Four Seasons. Conveniently located midway between Washington and Atlanta, adjacent to Interstates 40 and 85, the hotel is only ten miles from the Piedmont Triad International Airport (PTI) and less than 75 and 100 miles from the Raleigh-Durham and Charlotte/Douglas International Airports, respectively.

The hotel guest rooms offer cable TV, radio telephones with voice messaging and a mini-bar. Rooms are available for non-smokers and with wheelchair access. They also feature room service, restaurants, cafes, cocktail lounges with entertainment, sports bars, outdoor pool and spa, health club, and many fine shops.

Hotel Address and Phone Numbers:

Sheraton Greensboro Hotel at Four Seasons
3121 High Point Road at I-40
Greensboro, NC 27407
Phone: 336-292-9161
Sales and Reservation Phone: 800-242-6556
Sales Fax: 336-2982-0819

Click on the "Hotel" link on the conference website or go directly to (attendee code: ELECTRIC):

https://reservations.ihotelier.com/crs/g_login.cfm?hotelid=2576

We ask you to please support your Symposium and more fully enjoy all the activities by staying at our official headquarters hotel. The Symposium relies on attendees staying at the Sheraton Greensboro Hotel to reduce the costs charged for the use of meeting rooms. Room reservations should be made as soon as possible, and no later than 5pm, EDT, September 8, 2009. Rooms are available at the special Symposium group rates of \$135 single or double per night. These rates do not include room taxes which is currently at 12.75%. Rates are net for travel agents. Free parking and complimentary wireless internet access is provided in guest rooms and meeting rooms for the attendees of the conference.

To make a reservation by phone, please call the hotel direct at 1-800-242-6556 and reference IEJ08C to get the Special Group Rate for the IEEE CSIC Symposium.

After the September 8, 2009 deadline, rooms will be on a space available basis at possibly higher rates. Check-in time is 3 p.m. or later; check-out time is 12 noon. If necessary, you may cancel your reservation at the Sheraton Greensboro Hotel up to 6p.m. the day of your scheduled arrival.

TRANSPORTATION

Special Airfares:

Travel arrangements using the IEEE negotiated air carriers or the carriers of your choice can be made through World Travel, Inc by calling between the hours of 8:00 a.m. and 5:30 p.m. EST. Monday through Friday. Within the US and Canada, call (800) TRY-IEEE, (+1 800 879 4333); and outside of the US and Canada, call +1 717 556 1100. Or, you may visit their on-line travel service web site at <http://www.ieee.org/travel>. This secure site offers simple and convenient service through which you can search, reserve, and ticket your travel anytime, anywhere. Or you can e-mail your request to ieee@worldtravelinc.com.

IEEE corporate car rental discounts are also available to all attendees of the symposium. Discount codes below entitle attendees to receive special rates that have also been negotiated with Avis A606000, Budget X520000, Hertz 61368, and Enterprise NA24IE1.

Airport Transportation:

The Piedmont Triad International Airport offers commercial service with convenient connecting flights to and from anywhere in the world. Alternatively, you can fly into the area's major airports, Raleigh-Durham and Charlotte/Douglas, and drive to Greensboro.

Driving Directions:

Directions from Piedmont Triad International Airport (GSO):

Turn right on to Bryan Boulevard East, take the exit reading I-40 Winston-Salem, travel 1 1/2 miles to Business I-40 East to Greensboro (Exit 1), take exit 217 Koury Blvd./High Point Road. Hotel is immediately on the left.

Directions from the Raleigh-Durham International Airport:

From the airport, travel NW on Terminal Blvd go 0.3 mi. Continue on Departure Dr towards Rental Car Return go 0.4 mi. Turn Left on Terminal Blvd go 1.1 mi. Continue on Airport Blvd go 0.1 mi. Turn Right to take I-40 West toward Chapel Hill/Durham go 25.7 mi. Continue on I-40 West/I-85 South go 38.5 mi. Follow Business I-40 West to Exit 217 (Koury Blvd./High Point Road). Exit 217 (Koury Blvd./High Point Road). Driving time is about 1.5 hours.

Directions from the Charlotte/Douglas International Airport:

From the airport travel towards the Airport Exit on RC Josh Birmingham Pky go 0.1 mi. RC Josh Birmingham Pky becomes Airport Loop go 0.1 mi. Continue on Airport Loop/Airport Parking Dr go 0.1 mi. Continue on Airport Parking Dr go 0.1 mi. Turn right on Airport Parking Dr/Rental Car Rd go 0.2 mi. Turn right onto Old Dowd Rd go 0.2 mi. Continue on Little Rock Rd go 0.8 mi. Bear right to take I-85 North go 89.9 mi. Take Exit 120-B to access I-40 West/I-73 North. Take Exit 212-B to Business I-40 East. Take Exit 217 (High Point Road). Go through light. Hotel is on immediate left. Driving time is about 2 hours.

ADDITIONAL INFORMATION

Message Desk:

A Symposium Message Desk will be in operation in the Registration area during registration hours from Sunday, October 11th at 5 p.m. to Wednesday, October 14th at noon. Please advise callers who wish to reach you during the day to ask the hotel operator for the IEEE CSIC Symposium message desk. The Sheraton Greensboro Hotel main telephone number is +1-336-292-9161. The main desk will transfer you to the registration desk. Please check the message board periodically during the Symposium.

Distribution of Relevant Information:

The CSIC Symposium will provide an officially designated area near the registration desk to serve as the proper display area for those in need of space to disseminate free material relevant to the CSIC industry. Printed material of any form will not be allowed to be indiscriminately proliferated in the registration area, hallways, lobbies, or other gathering areas, in proximity to the Symposium, technical sessions, evening social activities, panel sessions, or the exhibition.

No Photographic and/or Recording Equipment:

No photographic or recording equipment will be permitted at any time during the technical sessions of the IEEE CSIC Symposium.

Breakfast and Lunch Locations:

Breakfasts:

The location of breakfasts will be as follows:

Short Course Registrants (only) – Sunday, October 11 th :	Guilford
Symposium Registrants – Monday, October 12 th :	Guilford Lobby
Tuesday, October 13 th :	Guilford AB
Wednesday, October 14 th :	Guilford Lobby

Lunches:

The location of lunches will be as follows:

Short Course Registrants (only) – Sunday, October 11 th :	Guilford D
Symposium Registrants – Monday, October 12 th :	Lunch on your own
Tuesday, October 13 th :	Guilford AB
Wednesday, October 14 th :	Lunch on your own

Symposium Social Events:

We welcome you to Greensboro on Sunday evening, October 11th from 6:00 p.m. to 8:00 p.m. in the Guilford Ballroom. Come and meet up with your old friends and make new acquaintances over light hors d'oeuvres and wine, beer, or soft drinks. One free admission is included with your registration including two drink tickets, and extra tickets may be purchased at registration for \$50.

EXHIBITION OPENING RECEPTION

Our exhibitors are hosting a reception to mark the exhibition opening on Monday, October 12th from 5:30 p.m. to 8:00 p.m in the Guilford Ballroom. Every Symposium participant is invited to enjoy the hors d'oeuvres and schmooze and cruise the exhibits.

EXHIBITION LUNCH

The Exhibition Luncheon will be hosted on Tuesday October 13th at noon and is free to all Symposium participants. Please come along, visit with the exhibitors, ask questions, make deals and find out what is going on in our industry.

SYMPOSIUM PARTY

Join us for the Symposium Theme Party on Tuesday, October 13th, from 6:00pm to 10:00pm for an evening of “*Hospitality-Southern Style*” which promises to surpass our famously fun-filled CSICS parties of the past.

The fascinating atmosphere and the good local food and refreshments will provide an excellent time to meet with colleagues old and new. One free admission to the Symposium Party is included with each full registration, and extra tickets can be purchased at the registration center for only \$90 prior to Sep 19th and \$90 thereafter subject to availability.

Greensboro Attractions:

NORTH CAROLINA ZOO Visit one of the top zoos in the country. Roam through the 300 acre African region to see more than 36,000 tropical plants, 800 exotic animals and exhibits that replicate their wild environment. **OLD SALEM** Experience the old fashioned Moravian Village founded in 1776 in Old Salem, one of

the most authentic living history towns in the U.S. **FOUR SEASONS TOWN CENTRE** One of the largest enclosed malls in the Southeast, offering over 200 major stores, with specialty shops and restaurants. **THE VILLAGE AT**

NORTH ELM Nestled on 35 acres between Greensboro’s premier neighborhoods and only minutes from downtown, the Village combines the simplicity of yesterday with the highest design standards of today. This “main street” lifestyle center offers the area’s finest collection of unique shops, restaurants, cafes and services, with offices above, and luxury apartments, all in a compact and intimate setting.

GUILFORD COURTHOUSE NATIONAL

MILITARY PARK Over 200 acres of walking trails and memorials honor the site of one of the most pivotal battles of The Revolutionary War. **BARN DINNER THEATRE** Enjoy

a popular Broadway play after a hearty buffet at one of the oldest dinner theaters in the country.

Greensboro Weather:

The average maximum for October is 70 F and the average minimum is 47F. The average precipitation is 3.73 in.

SYMPOSIUM HIGHLIGHTS

Technical Program:

The technical program for the 2009 IEEE CSIC Symposium consists of 38 technical papers, 3 panel sessions, an industry exhibit, and a short course: "PA Design Fundamentals, Advanced Techniques and Technologies." We will also be offering our annual introductory level class "Basics of Compound Semiconductor ICs" (Primer Course). This year we have invited 14 papers on a wide range of important topics encompassing device engineering to circuit application using advanced compound and other related semiconductor technologies. In addition, we will continue the tradition of including important "late breaking news" papers.

Exciting new developments from a variety of compound semiconductor disciplines will be presented. This year there is considerable interest in GaN based devices spanning both design and technology. As always there is a tremendous amount of activity in wireless communications, as well as a strong interest in military electronics.

Short Course: "PA Design Fundamentals, Advanced Techniques and Technologies"

Short Course Description

As RF system requirements continue to evolve, so do the technologies and techniques for PA design. This course offers the student detailed instruction on circuit design techniques for various technologies as well as design examples by leaders in the compound semiconductor industry.

Topics Covered and Instructors:

- a) Introduction to Compound Semiconductor PA design– Paul White
- b) GaAs PA Design Techniques with Examples – Seyed Tabatabaei, Endwave
- c) Advanced PA design in GaN – Chuck Campbell, TriQuint
- d) Wireless system handset PA Design - Requirements and Advanced Technologies – Julio Costa, RFMD

Registration for the course is as noted in "Registration". A limited number of Short Course Notes will be available after the course for purchase by Symposium registrants, subject to availability.

Direct questions to:

Dan Scherrer, Short Course Coordinator
Northrop Grumman Corporation
(310) 812-5892
Dan.Scherrer@ngc.com

Primer Course: Basics of Compound Semiconductor ICs

The popular primer course "Basics of Compound Semiconductor ICs" is an introductory-level class intended for professionals in the electronic industry with little or no experience in compound semiconductor IC technology. It also provides an excellent review for those with more experience. The course covers: digital and analog/RF/microwave circuits; III/V materials including wide bandgap GaN and SiC; MOS and bipolar devices. The course is tailored to provide background for symposium participants to better understand and appreciate the papers presented, including a glossary of those ever-cryptic acronyms. Throughout the course, comparisons among the compound semiconductor technologies will be presented as well as comparisons with silicon technologies. Also, a number of compound semiconductor integrated circuits along with the intended applications will be described.

Instructors Stephen I. Long and Donald B. Estreich each have over 25 years of experience working with compound semiconductor ICs. A copy of the viewgraphs with an extensive bibliography will be distributed to each Primer Course registrant. Ample discussion time will provide an opportunity for participants to have questions answered by the instructors.

Course Agenda:

4:00 p.m. Introduction
4:05 p.m. Compound Semiconductor Materials
4:30 p.m. Device Operation
5:00 p.m. Discussion
5:10 p.m. Break
5:20 p.m. Analog/RF/Microwave Circuits
6:00 p.m. RFIC Design Examples
6:40 p.m. Summary and Discussion
7:00 p.m. Close

The registration fee is \$175 for professionals and \$100 for students. The fee includes a handout containing a copy of the overheads with an extensive reference list. Space is limited, so **ADVANCE REGISTRATION IS HIGHLY RECOMMENDED.**

A limited number of copies of the handouts will be available to symposium registrants, subject to availability. The cost is \$50. For additional information, please contact the Primer Course Coordinator:

Primer Course Coordinator:

Francois Colomb, Primer Course Organizer and Chair
Raytheon Integrated Defense Systems
362 Lowell Street
Andover, MA 01810, USA
(978) 684-5435 francois_y_colomb@raytheon.com

Panel Sessions:

This year we have three exciting Panel Sessions spread over the 3 days of the technical sessions. These are intended to be timely, thought-provoking, educational, and hopefully controversial. The three panel topics are as follows:

PANEL SESSION 1:

“Digitally-controlled mm-wave circuits. I don’t know a NAND gate from a Volkswagen!”

Monday, October 12th, 3:30-5:00 p.m.

PANEL SESSION 2:

“Saturated Power Amplifier MMIC’s for Radar – A Really Hot Subject!”

Tuesday, October 13th, 3:30-5:00 p.m.

PANEL SESSION 3:

“GaN Reliability – Show Me the Data!”

Wednesday, October 14th, 1:30-3:00 p.m.

Please see the "Symposium Program" section later in this brochure for more complete descriptions of each of these Panel Sessions (listed according to their day and time).

2009 ROCS Workshop:

The 24th annual ROCS Workshop - formerly known as the GaAs Rel Workshop - will be held in conjunction with CSIC Symposium on Sunday October 11th, 2009, at the Sheraton Greensboro Hotel at Four Seasons. The ROCS Workshop brings together researchers, manufacturers and users of compound semiconductor materials, devices and circuits. Papers presenting latest results, including work-in-progress and new developments in all aspects of compound semiconductor reliability are presented. For further information please refer to "2009 ROCS Workshop" under "OTHER MEETINGS".

Technology Exhibition:

The 2009 IEEE CSICS Technology Exhibition will be held on October 13 and 14 in Guilford AB in the Koury Convention Center of the Sheraton Greensboro Hotel at Four Seasons. The Exhibition is open to all Symposium registrants. The combined exhibition gives companies and attendees access to the entire array of compound semiconductor products and services, i.e., materials, manufacturing, device technology, integrated circuits, related services, commercial and military applications. Last year’s exhibitors included:

Accel-RF
AWR Corporation
AXT, Inc.
EpiWorks
HRL Laboratories
IQE
KLA -Tencor
Maxtek Components Corp
Momentive Performance Materials
Picogiga International (Soitec Group)
Semiconductor Today
Sonnet Software, Inc.
Synopsys, Inc.
Temescal, a part of BOC Edwards

Veeco Instruments, Inc.
Zeland Software

The Exhibition will feature informative and interesting displays with corporate representatives on hand between the hours of 5:00 p.m. and 8:00 p.m. on Monday, October 12 and between 7:00 a.m. and 4:00 p.m. on Tuesday, October 13. The Exhibition will also host the Exhibition Opening Reception on Monday evening from 5:00 p.m. until 8:00 p.m. and the Exhibition Luncheon from 11:00 a.m. until 1:00 p.m. on Tuesday. All Symposium coffee breaks on Tuesday will be held in the exhibition area.

Those interested in participating in the Exhibition should contact Jessica Lotito, j.lotito@ieee.org Tel: (732) 562-5350. For more information, please visit the Symposium website at <http://www.csics.org/> and click on the Exhibition Information link.

Late-Breaking News Papers:

We have solicited papers containing late-breaking news for the Symposium Program. The times and locations of these presentations will be posted at the Symposium, as well as on the Symposium website.

Technical Digest:

Extra copies of the Technical Digest can be purchased by Symposium registrants through Advance Registration. A limited number of digests may also be available for sale at the Registration Desk. The cost of the paper bound digest, if ordered through Advance Registration or purchased on-site is \$120. The CD ROM Digest for 2009 will also be offered for \$100. Both current and past digests will be available through IEEE after the Symposium by mail from the IEEE Customer Service Center, 445 Hoes Lane, Piscataway, NJ 08854 at (800) 701-4333.

Outstanding Paper Award:

The 2009 IEEE CSIC Symposium will select a contributed paper for the Outstanding Paper Award. All contributed regular papers (not the invited papers) will automatically be considered as candidates. Symposium attendees will have an opportunity to provide feedback through a Symposium questionnaire as well as to the Session Chairpersons. The award winner will be publicly announced shortly after this year's Symposium with the award formally presented at next year's Compound Semiconductor IC Symposium.

Short Course

Sunday, October 11th, 2009
Sheraton Greensboro
Auditorium II
8:30a.m. - 4:45p.m.

Course Coordinator: Dan Scherrer
Northrop Grumman Corp.
310-812-5892
Dan.Scherrer@ngc.com

“PA Design Fundamentals, Advanced Techniques and Technologies”

As RF system requirements continue to evolve, so do the techniques and technologies for PA design. This course offers the student detailed instruction on circuit design fundamentals and design techniques specific to advanced technologies as well as design examples by leaders in the compound semiconductor industry.

Topics Covered and Instructors:

- 1) Introduction to Compound Semiconductor PA design– Paul White
- 2) GaAs PA Design techniques with examples – Seyed Tabatabaei, Endwave
- 3) Advanced PA design in GaN – Chuck Campbell, TriQuint
- 4) Wireless system handset PA Design - Requirements and Advanced Technologies – Julio Costa, RFMD

Short Course Schedule

The course will be held on Sunday October 11th and will begin with a continental breakfast. A lunch will be provided as well as a morning refreshment break.

7:00 a.m.	Registration and Breakfast
8:30 a.m.	Introduction and Overview
8:35 a.m.	Introduction to Compound Semiconductor PA design - Part I Paul White
9:45 a.m.	Coffee Break
10:00 a.m.	Introduction to Compound Semiconductor PA design - Part II Paul White
12:00 p.m.	Lunch
1:00 p.m.	GaAs PA Design techniques with examples Seyed Tabatabaei, Endwave

2:30 p.m.	Advanced PA design in GaN Chuck Campbell, TriQuint
3:25 p.m.	Coffee Break
3:35 p.m.	Advanced Technologies for Handset PA Design Julio Costa, RFMD
4:30 p.m.	Questions and Discussion
4:45 p.m.	Close of Short Course

Who Should Attend

The short course is a must for everyone interested in designing PAs for both defense and commercial markets. Our lecturers will cater to a range of interests and experience levels. The course is designed to give all attendees a solid overview of the design process, particularly for designing into the most advanced technologies. It will cover fundamentals through specific circuit examples and applications.

Short Course Pre-Registration

So that we may properly plan for attendance, we encourage you to pre-register for the Short Course. A limited number of short course registrations will be available on site Sunday October 11th, 7am.-8am. The registration fee is \$450 for professionals and \$250 for students. This includes the lectures, a book of Short Course Notes, continental breakfast, lunch, and morning/afternoon refreshments. Additional copies of the Short Course Notes may be purchased for \$100 each.

Primer Course

Sunday, October 11th, 2009
Sheraton Greensboro
Auditorium III
4:00 p.m. - 7:00 p.m.

"Basics of Compound Semiconductor ICs"

Instructors: **Stephen I. Long**
University of California
Santa Barbara, CA
Donald B. Estreich
Agilent Technologies
Santa Rosa, CA

Course Coordinator: **Francois Colomb**
Raytheon

Course Objective and Description:

The popular primer course "Basics of Compound Semiconductor ICs" is an introductory-level class intended for professionals in the electronic industry with little or no experience in compound semiconductor IC technology. It also provides an excellent review for those with more experience. The course covers: digital and analog/RF/microwave circuits; III/V materials including wide bandgap GaN and SiC; MOS and bipolar devices. The course is tailored to provide background for symposium participants to better understand and appreciate the papers presented, including a glossary of those ever-cryptic acronyms. Throughout the course, comparisons among the compound semiconductor technologies will be presented as well as comparisons with silicon technologies. Also, a number of compound semiconductor integrated circuits along with the intended applications will be described.

Instructors Stephen I. Long and Donald B. Estreich each have over 25 years of experience working with compound semiconductor ICs. A copy of the viewgraphs with an extensive bibliography will be distributed to each Primer Course registrant. Ample discussion time will provide an opportunity for participants to have questions answered by the instructors.

Course Agenda:

4:00 p.m. Introduction
4:05 p.m. Compound Semiconductor Materials
4:30 p.m. Device Operation
5:00 p.m. Discussion
5:10 p.m. Break
5:20 p.m. Analog/RF/Microwave Circuits
6:00 p.m. RFIC Design Examples

6:40 p.m. Summary and Discussion

7:00 p.m. Close

The advanced registration fee is \$175 for professionals and \$100 for students. The fee includes a handout containing a copy of the overheads with an extensive reference list. Space is limited, so ADVANCE REGISTRATION IS HIGHLY RECOMMENDED.

A limited number of copies of the handouts will be available to symposium registrants, subject to availability. The cost is \$50. For additional information, please contact the Primer Course Coordinator:

Primer Course Coordinator:

Francois Colomb, Primer Course Organizer and Chair
Raytheon Integrated Defense Systems
362 Lowell Street
Andover, MA 01810, USA
(978) 684-5435 francois_y_colomb@raytheon.com

OTHER MEETINGS

2009 ROCS Workshop

Reliability of Compound Semiconductors

Sunday, October 11th, 2009

Sheraton Greensboro Hotel at Four Seasons

Room: To Be Assigned

8:00 a.m. - 5:00 p.m.

The 24th annual ROCS Workshop - formerly known as the GaAs Rel Workshop - will be held in conjunction with CSIC Symposium on Sunday October 11th, 2009, at the Sheraton Greensboro Hotel at Four Seasons, Greensboro, North Carolina. This meeting is sponsored by the JEDEC JC-14.7 Committee on GaAs Reliability and Quality Standards and the EIA, and with co-sponsorship of the Electron Devices Society of the IEEE.

The ROCS Workshop brings together researchers, manufacturers and users of compound semiconductor materials, devices and circuits. Papers presenting latest results, including work-in-progress and new developments in all aspects of compound semiconductor reliability will be presented. Potential authors are invited to submit an electronic copy of a one to two page comprehensive summary, suitable for a 15 minute presentation, to: Peter Erslund, Peter.Erslund@macomtech.com, (978)-656-2817. The deadline for receipt of submissions is August 3rd, 2009; late papers of significant interest may be considered up to the date of the Workshop. The Advanced Program will be published at <http://www.jedec.org/home/gaas/> approximately one month prior to the meeting.

Advance registration for the workshop is \$175.00 for JEDEC and IEEE members and \$200.00 for non-members; on-site registration is \$225.00 at the door. To pre-register, mail your name, address, email address, and phone number with a check by Monday, September 28th, 2009 to: JEDEC, ROCS Workshop, 3103 North 10th Street, Suite 240-S, Arlington, VA 22201 USA. Visa, MasterCard and American Express credit cards are also accepted. Registration includes a full day of ROCS presentations, two breaks, a luncheon and a copy of the Proceedings. Late registration will be available from 7:30 a.m. to 8:00 a.m. on the morning of the workshop. For further information or to download a pre-registration form, visit our WEB site at <http://www.jedec.org/home/gaas/>, or contact: Dr. Anthony A. Immorlica, Jr., Workshop Chair, BAE SYSTEMS, P.O. Box 868, MER15-1351, Nashua, NH 03061-0868, (603) 885-1100, anthony.a.immorlica@baesystems.com.

Monday, October 12th, 2009

SYMPOSIUM PROGRAM

REGISTRATION AND CONTINENTAL BREAKFAST

7:00 a.m. – 5:00 p.m.

Registration – Guilford Lobby

7:00 a.m. – 8:00 a.m.

Continental Breakfast – Guilford Lobby

SYMPOSIUM OPENING

8:00 a.m. – 8:30 a.m.

Guilford D – Sheraton Greensboro Hotel at Four Seasons

Opening Remarks

2009 Symposium Chair

Marko Sokolich, *HRL Laboratories, LLC*

Technical Program Overview

2009 Technical Program Chair

Dave Halchin, *Peregrine Semiconductor*

SESSION A: PLENARY SESSION

8:30 a.m. – 12:00 p.m.

Guilford D – Sheraton Greensboro Hotel at Four Seasons

Chairpersons: Dan Scherrer, *Northrop-Grumman Corporation*
Sorin Voinescu, *University of Toronto*

8:30 a.m.

A.1 **The Life of James Clerk Maxwell (Invited)**

J.C. Rautio, *Sonnet Software, Inc, North Syracuse, NY.*

9:30 a.m.

A.2 **IMT Advanced – Objectives and Challenges (Invited)**

K.J. Miyahara, *NEC Corporation, Kawasaki, Japan*

10:00 a.m.

A.3 **RF Waveform Measurement and Engineering (Invited)**

P.J. Tasker, *Cardiff University, Cardiff, United Kingdom*

10:30 a.m. – 11:00 a.m.

Coffee Break

11:00 a.m.

A.4 **The Evolution and Importance of Composition in RF Compound Semiconductors (Invited)**

C.A. Barratt, *RF Micro Devices, Greensboro, NC*

11:30 a.m.

A.5 **GaN technology for RF electronics – Development Status in Europe**

H. Blanck¹, J. Splettstößer¹, D. Floriot², ¹*United Monolithic Semiconductors, Ulm, Germany,* ²*United Monolithic Semiconductors, Orsay, France*

Monday, October 12th, 2009

12:00 p.m.

End of Session A

12:00 p.m. – 1:30 p.m.

Break for Lunch

SESSION B: Millimeter-Wave Multifunction MMICs

1:30 p.m. – 2:50 p.m.

Guilford D – Sheraton Greensboro Hotel at Four Seasons

Chairpersons: Herbert Zirath, *Chalmers University*
Steve Brown, *TriQuint Semiconductor*

1:30 p.m.

B.1 A 140 GHz Heterodyne Receiver Chipset for Passive Millimeter Wave Imaging Applications

S. Koch¹, M. Guthoerl¹, I. Kallfass², A. Leuther², S. Saito¹
¹*Sony Deutschland GmbH, Stuttgart, Germany*, ²*Fraunhofer Institute for Applied Solid-State Physics, Freiburg, Germany*

1:50 p.m.

B.2 Ultra Low Power 60 GHz ASK SiGe Receiver with 3-6 GBPS Capabilities

W. Shin, M. Uzunkol, G. M. Rebeiz, *University of California, San Diego, United States*

2:10 p.m.

B.3 A Fully Integrated, Compound Transceiver MIMIC utilizing Six Antenna Ports for 60 GHz Wireless Applications

S. Koch¹, I. Kallfass², R. Weber², A. Leuther², M. Schlechtweg², S. Saito¹
¹*Sony Deutschland GmbH, Stuttgart, Germany*, ²*Fraunhofer Institute for Applied Solid-State Physics, Freiburg, Germany*

2:30 p.m.

B.4 A 12-Gb/s, Direct QPSK Modulation SiGe BiCMOS Transceiver for Last Mile Links in the 70-80 GHz Band

I. Sarkas¹, S. T. Nicolson¹, A. Tomkins¹, E. Laskin¹, P. Chevalier², B. Sautreuil², S. P. Voinigescu¹
¹*University of Toronto, Toronto, Canada*, ²*STMicroelectronics, Crolles, France*

2:50 p.m.

End of Session B

2:50 p.m. – 3:30 p.m.

Coffee Break

SESSION C: Novel Technologies

3:30 p.m. – 5:10 p.m.

Guilford D – Sheraton Greensboro Hotel at Four Seasons

Chairpersons: Toshi Kikkawa, *Fujitsu Laboratories*
Brian Moser, *RFMD*

3:30 p.m.

C.1 Normally-Off Operation GaN Based MOSFETs for Power Electronics (Invited)

Y. Niiyama, S. Ootomo, H. Kambayashi, N. Ikeda, T. Nomura, S. Kato, *Furukawa Electric Co., Yokohama, Japan*

Monday, October 12th, 2009

4.00 p.m.

C.2 On-Wafer Seamless Integration of GaN and Si (100) Electronics (Invited)

Jin Wook Chung, Bin Lu, Tomas Palacios, *Dept. of Electrical Engineering and Computer Science and Microsystems Technologies Laboratories, Massachusetts Institute of Technology, Cambridge, MA, United States*

4.30 p.m.

C.3 High Linearity AlGaAs/InGaAs pseudomorphic HEMT Driver Amplifier using Tunable Field-plate Voltage Technology

Chia-Shih Cheng, Shao-Wei Lin, Jeffrey S. Fu, Hsien-Chin Chiu, *Dept. Electronic Engineering, Chang Gung University, Taiwan*

4.50 p.m.

C.4 High Aspect ratio CPW fabricated using a Micromachining Process combining DRIE, Thermal Oxidation, Electroplating and Planarization

Shane T. Todd, Xiaojun T. Huang, John E. Bowers, Noel C. MacDonald, *Department of Electrical and Computer Engineering and Department of Mechanical Engineering University of California, Santa Barbara, Santa Barbara, CA, USA*

5:10 p.m.

End of Session C

PANEL SESSION 1: Digitally-controlled mm-wave circuits. - I don't know a NAND gate from a Volkswagen!

3:30 p.m. – 5:00 p.m.

Guilford E – Sheraton Greensboro Hotel at Four Seasons

Moderators: *Sorin Voinigescu University of Toronto*
Jonghae Kim, Qualcomm Inc.
Tod Dickson, IBM

During the last few years digital-RF concepts have started to migrate towards mm-wave frequencies. This is especially true of mm-wave nanoscale CMOS circuits which greatly benefit from digital assistance not only to hide their flaws but also to enable new mm-wave functions. The latter include multi-bit DCOs, direct digital modulators, digitally controlled attenuators, switches, gain cells and phase shifters. Is this a marriage made in CMOS or in COSMOS? Is there a place for SiGe HBTs or III-Vs? Is digital assistance really necessary? These are just some of the issues that will be hotly debated by our highly opinionated experts. Come and join the band...wagon.

Panel Members:

Charles F. Campbell	GaAs/GaN	<i>TriQuint Semiconductor</i>
Harris P Moyer	GaAs/GaN	<i>HLR</i>
Byunghoo Jung	SiGe	<i>Purdue University</i>
Gabriel Rebeiz	SiGe/CMOS	<i>UCSD</i>

Monday, October 12th, 2009

Piet Wambacq

CMOS

IMEC

5:00 p.m.

End of Panel Session 1

**Technology Exhibition
Opening Reception
Guilford AB
Sheraton Greensboro
5:30 p.m. - 8:00 p.m.**

Tuesday, October 13th, 2009

REGISTRATION AND BREAKFAST

7:00 a.m. – 5:00 p.m.

Registration – Guilford Lobby

7:00 a.m. – 8:30 a.m.

Continental Breakfast – Guilford AB

SESSION D: High Power Amplifiers

8:30 a.m. – 10:00 a.m.

Guilford D – Sheraton Greensboro Hotel at Four Seasons

Chairpersons: Chuck Campbell, *TriQuint Semiconductor*
Jim Carroll, *AWR Corporation*

8:30 a.m.

D.1 Design Method for UHF Class-E Power Amplifiers (Invited)

N. D. Lopez, J. Hoversten, Z. Popovic, *University of Colorado at Boulder, Boulder, United States*

9:00 a.m.

D.2 0.5–2.5 GHz, 10W MMIC Power Amplifier in GaN HEMT Technology

K. Krishnamurthy, D. Green, R. Vetry, M. Poulton, J. Martin, *RF Micro Devices Inc., Charlotte, United States*

9:20 a.m.

D.3 High Efficiency Digital GaN MMIC Power Amplifiers for Future Switch-Mode Based Mobile Communication Systems

S. Maroldt, C. Haupt, R. Kiefer, W. Bronner, W. Benz, S. Müller, R. Quay, O. Ambacher, *Fraunhofer Institute for Applied Solid State Physics (IAF), Freiburg, Germany*

9:40 a.m.

D.4 A Pulsed Load Modulation (PLM) Power Amplifier with 0.35 μ m pHEMT Technology

S. Liao, Y. E. Wang, *University of California, Los Angeles, Los Angeles, United States*

10:00 a.m.

End of Session D

10:00 a.m. - 10:30 a.m.

Coffee Break

SESSION E: mmWave Systems and Circuits

10:30 a.m. – 12:10 p.m.

Guilford D – Sheraton Greensboro Hotel at Four Seasons

Chairpersons: Tod Dickson, *IBM T.J. Watson Research Center*
Jonghae Kim, *Qualcomm*

10:30 a.m.

E.1 10-Gbit/s Wireless Transmission Systems Using 120-GHz-Band Photodiode and MMIC Technologies (Invited)

Naoya Kukutsu¹, Akihiko Hirata¹, Toshihiko Kosugi², Hiroyuki Takahashi¹, Tadao Nagatsuma^{1,3}, Yuichi Kado¹, Hiroshi Nishikawa⁴, Akihiko Irino⁴, Toshihiro Nakayama⁴, Naohiro Sudo⁴,

Tuesday, October 13th, 2009

¹*NTT Microsystem Integration Laboratories, NTT Corporation,*
²*NTT Photonics Laboratories, NTT Corporation,* ³*Osaka*
University, ⁴*Fuji Television Network, Inc., Japan*

11:00 a.m.

**E.2 Low-cost CMOS-based Receive Modules for 60 GHz
Wireless Communication (invited)**

Piet Wambacq^{1,3}, Kuba Raczkowski^{1,2}, Valery Ramon¹,
Alexander Vasylchenko^{1,2}, Amin Enayati^{1,2}, Michael Libois¹,
Jonathan Borremans¹, Karen Scheir^{1,3}, Stephane Bronckers^{1,3},
Bob Verbruggen^{1,3}, Andre Bourdoux¹, Steven Brebels¹, Wim
Van Thillo^{1,2}, Christophe Pavageau¹, Bart Nauwelaers², Guy
Vandenbosch², Walter De Raedt¹, Charlotte Soens¹,
¹*IMEC, Belgium*
²*ESAT, Katholieke Universiteit Leuven, Belgium*
³*Vrije Universiteit Brussel, Belgium*

11:30 a.m.

E.3 A Passive W-Band Imager in 65nm Bulk CMOS

A. Tomkins¹, P. Garcia², S. P. Voinigescu¹,
¹*Edward S. Rogers Sr. Dept. of ECE, University of Toronto,*
Toronto, ON, M5S 3G4, Canada
²*STMicroelectronics, 850 rue Jean Monnet, f-38926 Crolles,*
France

11:50 a.m.

**E.4 A Compact Cascode Power Amplifier in 45-nm CMOS for
60-GHz Wireless Systems**

Torgil Kjellberg^{1,2}, Morteza Abbasi¹, Mattias Ferndahl¹, Anton
de Graauw³, Edwin v.d. Heijden³, Herbert Zirath¹,
¹*Microwave Electronics Laboratory, Chalmers University of*
Technology, 41296 Göteborg, Sweden
²*Chalmers Industrial Technologies, Göteborg, Sweden*
³*NXP Semiconductors, Research, Eindhoven, the Netherlands*

12:10 p.m.

End of Session E

Technology Exhibition Lunch
Guilford AB
Sheraton Greensboro
12:10 p.m. – 1:30 p.m.

Tuesday, October 13th, 2009

SESSION F: Wireless Communication Components

1:30 p.m. – 3:20 p.m.

Guilford D – Sheraton Greensboro Hotel at Four Seasons

Chairpersons: Gilberto De La Rosa, *Anadigics*
Wolfram Stiebler, *TriQuint Semiconductor*

1:30 p.m.

F.1 A 2.5-V Low-Reference-Voltage, 2.8-V Low-Collector-Voltage Operation, HBT Power Amplifier for 0.8-0.9-GHz Broadband CDMA Applications

K. Yamamoto, A. Okamura, T. Matsuzuka, Y. Yoshii, N. Ogawa, M. Nakayama, T. Shimura, N. Yoshida, Mitsubishi Electric Corporation, Itami, Japan

1:50 p.m.

F.2 Dual Transformer-injected Injection Locked Frequency Divider using GaAs E/D-Mode pHEMT Process

P. Ke, T. Chen, H. Chiu, J. Fu, Chang Gung University, Tao-Yuan, Taiwan

2:10 p.m.

F.3 Modeling of an InGaP/GaAs BiFET Voltage-Variable Resistor Device

W. Clausen, B. Moser, RFMD, Greensboro, United States

2:30 p.m.

F.4 2x2 and 4x4 CMOS Switching Matrices for 0.01-12 GHz Applications

D. Shin, G. M. Rebeiz, UCSD, La Jolla, United States

2:50 p.m.

F.5 High-Resistivity SOI CMOS Cellular Antenna Switches (Invited)

M. Carroll, D. Kerr, C. Iversen, A. Tombak, P. Mason, J. Costa, RF Micro Devices, Greensboro, United States

3:20 p.m.

End of Session F

3:20 p.m. - 3:30 p.m.

Coffee Break

PANEL SESSION 2: Saturated Power Amplifier MMICs for Radar – A Really Hot Subject!

3:30 p.m. – 5:00 p.m.

Guilford E – Sheraton Greensboro Hotel at Four Seasons

Moderators: Charles F. Campbell, *TriQuint Semiconductor*
Francois Y. Colomb, *Raytheon*

Next generation radar systems require highly efficient power MMICs. In many cases the driver for high efficiency is not just the size of the resident power supply, but the ability to remove large amounts of heat from the system. New high power MMIC technologies such as GaN and high voltage GaAs promise near order of magnitude increases in RF output power. However, there is accompanying near order of

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magnitude increase in heat concentrated over roughly the same mounting footprint. Substrate materials such as SiC or diamond effectively conduct heat from transistor channels, however, the user is still faced with a significant challenge to transfer that heat away from the MMICs. The speakers in this panel session will discuss the thermal issues that drive the need for very high efficiency power amplifier MMICs and debate the circuit design / technology choices that produce an optimal solution.

Panel Members:

Mike Harris	<i>Georgia Tech Research Institute</i>
Colin Whelan	<i>Raytheon Integrated Defense Systems</i>
Bruce Kopp	<i>DPM Consulting</i>
Eli Reese	<i>TriQuint Semiconductor</i>
Matthew J. Poulton	<i>RF Micro Devices</i>
Bill Pribble	<i>Cree</i>

5:00 p.m.

End of Panel Session 2

Symposium Theme Party
"Hospitality-Southern Style"
Sheraton Greensboro
6:00 p.m. - 10:00 p.m.

Wednesday, October 14th, 2009

REGISTRATION AND CONTINENTAL BREAKFAST

7:00 a.m. – 12:00 p.m.

Registration – Guilford Lobby

7:00 a.m. – 8:30 a.m.

Continental Breakfast – Guilford Lobby

SESSION G: InP and Modeling

8:30 a.m. – 10:00 a.m.

Guilford D – Sheraton Greensboro Hotel at Four Seasons

Chairpersons: Rik Jos, *NXP Semiconductors*
Nils Weimann, *Alcatel-Lucent Bell Labs*

8:30 a.m.

G.1 Advanced InP HBT Technology at Northrop Grumman Aerospace Systems (Invited)

A. Gutierrez-Aitken, C. Monier, P. Chang, E. Kaneshiro, D. Scott, B. Chan, M. D'Amore, S. Lin, B. Oyama, K. Sato, A. Cavus, A. Oki, *Northrop Grumman Corporation, Redondo Beach, CA, USA*

9:00 a.m.

G.2 V-Band Amplifier MMIC's using Multi-finger InP/GaAsSb DHBT Technology

J. Godin¹, V. Nodjiadjim¹, M. Riet¹, P. Berdager¹, S. Piotrowicz¹, A. Scavennec¹, S. Laurent², M. Werquin³
¹*Alcatel Thales III-V Lab, Marcoussis, France*, ²*Xlim-CNRS, Brive-la-Gaillarde, France*, ³*MC2 Technologies, Villeneuve d'Ascq, France*

9:20 a.m.

G.3 Sub-mW Operation of InP HEMT X-band Low-Noise Amplifiers for Low Power Application

C. H. Lin, X. B. Mei, Y. C. Chou, L. S. Lee, J. M. Yang, M. Y. Nishimoto, P. H. Liu, R. To, A. Cavus, R. Tsai, M. Wojtowicz, R. Lai, *Northrop Grumman Corporation, Redondo Beach, CA, USA*

9:40 a.m.

G.4 Accurate HEMT Switch Large-Signal Device Model derived from Pulsed-Bias Capacitance and Current Characteristics
Shinichiro Takatani, Chen-Duan Chen, *Win Semiconductors Corp. Taiwan*

10:00 a.m.

End of Session G

10:00 a.m. - 10:30 a.m.

Coffee Break

Wednesday, October 14th, 2009

SESSION H: Receiver Building Blocks

10:30 a.m. – 11:50 a.m.

Guilford D – Sheraton Greensboro Hotel at Four Seasons

Chairpersons: Dan Scherrer, *Northrop Grumman Corporation*
Kazuya Yamamoto, *Mitsubishi Electric Corporation*

10:30 a.m.

H.1 An Image Reject Mixer for High-Speed E-band (71-76, 81-86 GHz) Wireless Communication

M. Gavell^{1,2}, M. Ferndahl^{1,2}, S. E. Gunnarsson^{1,2}, M. Abbasi^{1,2},
H. Zirath^{1,2}, ¹*Chalmers University of Technology, Göteborg, Sweden*, ²*Gotmic AB, Göteborg, Sweden*

10:50 a.m.

H.2 Robust AlGaIn/GaN Low Noise Amplifier MMICs for C-, Ku- and Ka-band Space Applications

E. M. Suijker¹, M. Rodenburg¹, J. A. Hoogland¹, M. van Heijningen¹, M. Seelmann-Eggebert², R. Quay², P. Brückner²,
F.E. van Vliet¹, ¹*TNO Defence, The Hague, Netherlands*, ²*Fraunhofer Institute of Applied Solid State Physics, Freiburg, Germany*

11:10 a.m.

H.3 Compact and Broadband Millimeter-Wave Mixer Based on the New Phase Relationship

Y. A. Lai, S. H. Hung, Y. H. Wang, ¹*National Cheng-Kung University, Tainan, Taiwan*

11:30 a.m.

H.4 X/Ku-Band SiGe BiCMOS Phased Array Chips with Simultaneous 2- and 4-Beam Capabilities

Dong-Woo Kang¹, Kwang-Jin Koh², Gabriel M. Rebeiz¹,
¹*University of California at San Diego, United States*, ²*Intel Corporation, Portland, United States*

11:50 a.m.

End of Session H

11:50 a.m. – 1:30 p.m.

Break for Lunch

SESSION I: High Speed Digital and Mixed Signal

1:30 p.m. – 3:10 p.m.

Guilford D – Sheraton Greensboro Hotel at Four Seasons

Chairpersons: Erik Daniel, *Mayo Clinic*
Peter Cheng, *Northrop Grumman*

1:30 p.m.

I.1 A 2x22.3 Gb/s SFI5.2 SerDes in 65 nm CMOS (Invited)

N. Nedovic¹, A. Kristensson¹, S. Parikh¹, S. Reddy¹, H. Tamura¹,
S. McLeod¹, K. Kanada¹, T. Yamamoto¹, S. Matsubara¹, M.
Kibune¹, Y. Doi¹, S. Ide¹, Y. Tsunoda¹, T. Yamabana¹, T.
Shibasaki¹, Y. Tomita¹, T. Hamada¹, M. Sugawara¹, J. Ogawa¹,

Wednesday, October 14th, 2009

W. Walker¹, T. Ikeuchi^{2,3}, ¹*Fujitsu Laboratories Ltd, Sunnyvale, CA, United States*, ²*Fujitsu, Ltd.*, ³*OITDA*

2:00 p.m.

I.2 **A 0.25- μ m InP DHBT 200 GHz+ Static Frequency Divider**
M. D'Amore, C. Monier, S. Lin, B. Oyama, D. Scott, E. Kaneshiro, A. Gutierrez-Aitken, A. Oki, *Northrop Grumman Aerospace Systems, Redondo Beach, CA, United States*

2:20 p.m.

I.3 **A 32-GS/s 6-bit Double-Sampling DAC in InP HBT Technology**
M. Nagatani, H. Nosaka, S. Yamanaka, K. Sano, K. Murata, *NTT Photonics Laboratories, NTT Corporation, Kanagawa, Japan*

2:40 p.m.

I.4 **Ultra-Low-Power 500-MSPS 12-bit A/D Converter Using Interleaving and CMOS Charge-Domain Technology (Invited)**
G. Sollner, M. Anthony, *Intersil Corporation, Woburn, MA, United States*

3:10 p.m.

End of Session I

PANEL SESSION 3: GaN Reliability - Show Me the Data!

1:30 p.m. – 3:00 p.m.

Guilford E – Sheraton Greensboro Hotel at Four Seasons

Moderators: Marc Rocchi, *Ommic*
Ming-Yih Kao, *TriQuint Semiconductor*

GaN technology for DC/DC power conversion and RF power applications is under development by many laboratories and commercial foundries. Recently, several companies have claimed that this technology is reliable and viable for use in both consumer and military systems. This panel will try to give an answer to the burning question of the status of GaN reliability.

Panel Members:

Allan Ward	<i>Cree</i>
Toshi Kikkawa	<i>Fujitsu</i>
Donald A. Gajewski	<i>Nitronex</i>
Jose Jimenez	<i>TriQuint Semiconductor</i>
Hervé Blanck	<i>UMS</i>
Steven Binari	<i>U.S. Naval Research Laboratory</i>
Thomas Joseph	<i>RF Micro Devices</i>

3:00 p.m.

End of Panel Session 3

3:00 p.m. – 3:30 p.m.

Coffee Break

SESSION J: Late News Papers

Wednesday, October 14th, 2009

3:30 p.m. – 5:10 p.m.

Guilford D – Sheraton Greensboro Hotel at Four Seasons

Chairpersons: Marko Sokolich, *HRL Laboratories LLC*
Dave Halchin, *Peregrine Semiconductor, Inc.*

3:30 p.m.

5:10 p.m.

End of Session J

5:10 p.m.

Close of Symposium

2009 IEEE CSIC Symposium Organizers

EXECUTIVE COMMITTEE

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by September 18th to qualify for advance registration fee.

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NOTES

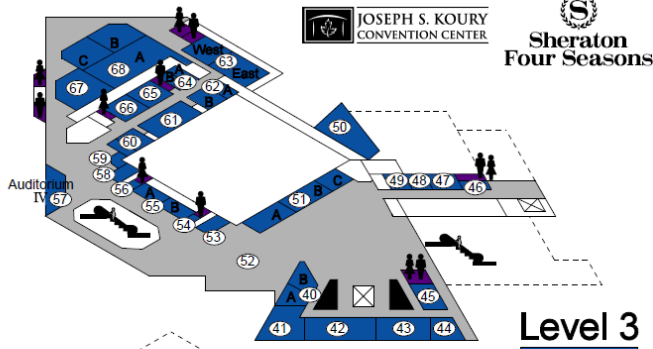
NOTES

(Placeholder for Advance Registration Foldout)

Sheraton Greensboro Hotel at Four Seasons and Conference Center

Level 3

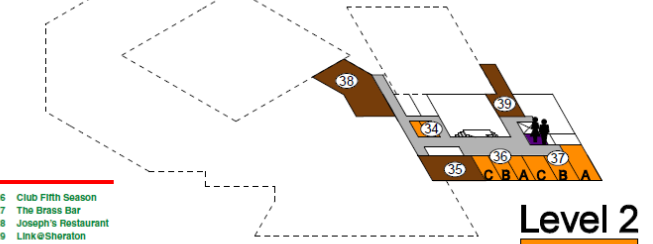
- 40 Heritage
- 41 Olympia
- 42 Turnberry
- 43 Pinhurst
- 44 Bear Creek
- 45 Marsh Harbour
- 46 Edgewood
- 47 Meadowbrook
- 48 Links
- 49 McCormick
- 50 Sawgrass
- 51 Colony
- 52 Prefunction Area III
- 53 Riverdale
- 54 Oyster Bay
- 55 Arrowhead
- 56 Eastmoreland
- 57 Auditorium IV
- 58 St. Andrews
- 59 Torry Pines
- 60 Pebble Beach
- 61 Edinburgh
- 62 Augusta
- 63 Grandover
- 64 Tidewater
- 65 Sandpiper
- 66 Tanglewood
- 67 Blue Ash
- 68 Victoria Ballroom



Level 3

Level 2

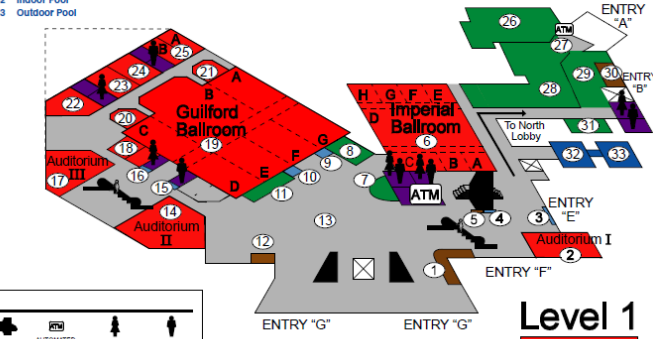
- 34 Birch
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Level 1

- | | |
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| 3 Convention Desk I | 28 Joseph's Restaurant |
| 4 Convention Desk II | 29 Link@Sheraton |
| 5 Concierge | 30 Administration |
| 6 Imperial Ballroom | 31 The Connection Bar |
| 7 The Bar Down Under | 32 Indoor Pool |
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| 9 Convention Desk III | |
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| 15 Convention Desk V | |
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| 23 Blandwood | |
| 24 Morshead | |
| 25 Biltmore | |



Level 1

