



**37th IEEE COMPOUND
SEMICONDUCTOR IC
(CSIC) SYMPOSIUM**

Program

Presenting:

**CSICS: III-V's, Silicon and
all that Jazz**

**Oct 11th – Oct 14th, 2015
Sheraton New Orleans Hotel**

**New Orleans, Louisiana,
USA**



CO- SPONSORED BY

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

SYMPOSIUM

Sunday, October 11th, 2015

Short Course Continental Breakfast

SHORT COURSE 1: Transmit and Receive IC Design for Fiber Optic Links

Short Course Lunch

REGISTRATION for Symposium

SHORT COURSE 2: Microwave Package Design Fundamentals

PRIMER COURSE: Introduction to Si RFIC Design

CSIC Symposium Opening Cocktails

Monday, October 12th, 2015

REGISTRATION

Continental Breakfast

SYMPOSIUM OPENING

SESSION A: Plenary Session

SESSION B: Silicon Technologies for Next Generation Applications

SESSION C: Thermal Management Technologies

SESSION D: E- to G-Band High Power Amplifiers

SESSION E: Silicon Photonics

Exhibition Opening Reception

Technology Exhibition

Tuesday, October 13th, 2015

REGISTRATION

Technology Exhibition

Continental Breakfast

SESSION F: Advanced mmW and THz MMICs

SESSION G: HBT Modeling and Applications

PANEL SESSION 1: Next Generational Optical Modules

Exhibition Lunch

SESSION H: Optical Coherent Transceivers

SESSION I: GaN Power Amplifier Technology

SESSION J: Emerging sub-mm-Wave Devices

SESSION K: SESSION K: Power Technology

PANEL SESSION 2: GaN on Silicon or GaN on SiC?

Wednesday, October 14th, 2015

REGISTRATION

Continental Breakfast

SESSION L: FET Device Concepts and Modeling

SESSION M: Millimeter-Wave ICs for Radar and Communication

SESSION N: High Frequency Devices & Packaging

SESSION O: Circuits for Future Optical Systems

PANEL SESSION 3: Multi-Physics Simulation: Heavenly Accuracy or Convergence Hell?

SESSION P: High Efficiency Amplifiers

SESSION Q: Advanced Technology and Circuit Solutions for Optical Communications

SESSION R: Late-Breaking News Papers I

SESSION S: Late-Breaking News Papers II

Close of Symposium

AT A GLANCE

Sunday, October 11th, 2015

7:00 a.m. – 7:30 a.m.	Estherwood (Breakfast)
8:00 a.m. – 2:30 p.m.	Nottoway (Short Course 1)
12:00 p.m. – 1:00 p.m.	Estherwood (Lunch)
3:00 p.m. – 8:00 p.m.	4th Floor Foyer (Registration)
3:00 p.m. – 7:00 p.m.	Nottoway (Short Course 2)
2:00 p.m. – 6:00p.m.	Gallier AB (Primer)
7:00 p.m. – 8:00 p.m.	Lagniappe (Cocktails)

Monday, October 12th, 2015

7:00 a.m. – 5:00 p.m.	Waterbury Foyer (Registration)
7:00 a.m. – 8:30 a.m.	Lagniappe (Breakfast)
8:30 a.m. – 9:00 a.m.	Waterbury (Symposium Opening)
9:00 a.m. – 12:00 p.m.	Waterbury (Plenary)
1:30 p.m. – 3:00 p.m.	Waterbury Session B)
1:30 p.m. – 3:00 p.m.	Gallery (Session C)
3:30 p.m. – 5:00 p.m.	Waterbury (Session D)
3:30 p.m. – 5:00 p.m.	Gallery (Session E)
5:30 p.m. – 7:30 p.m.	Rhythms Ballroom (Exhibition)
5:30 p.m. – 7:30 p.m.	Rhythms Ballroom (Reception)

Tuesday, October 13th, 2015

7:00 a.m. – 5:00 p.m.	Waterbury Foyer (Registration)
7:00 a.m. – 4:00 p.m.	Rhythms Ballroom (Exhibition)
7:00 a.m. – 8:30 a.m.	Rhythms Ballroom (Breakfast)
8:30 a.m. – 10:30 a.m.	Waterbury (Session F)
8:30 a.m. – 10:00 a.m.	Gallery (Session G)
10:30 a.m. – 12:00 p.m.	Waterbury (Panel 1)
12:00 p.m. – 1:30 p.m.	Rhythms Ballroom (Lunch)
1:30 p.m. – 3:00 p.m.	Waterbury (Session H)
1:30 p.m. – 2:40 p.m.	Gallery (Session I)
3:30 p.m. – 4:50 p.m.	Waterbury (Session J)
3:30 p.m. – 5:00 p.m.	Gallery (Session K)
5:30 p.m. – 7:00 p.m.	Waterbury (Panel 2)

Wednesday, October 14th, 2015

7:00 a.m. – 12:00 p.m.	Waterbury Foyer (Registration)
7:00 a.m. – 8:30 a.m.	Lagniappe (Breakfast)
8:30 a.m. – 10:00 a.m.	Waterbury (Session L)
8:30 a.m. – 10:10 a.m.	Gallery (Session M)
10:30 a.m. – 12:00 p.m.	Waterbury (Session N)
10:30 a.m. – 12:00 p.m.	Gallery (Session O)
12:00 p.m. – 1:30 p.m.	Waterbury (Panel 3)
1:30 p.m. – 3:10 p.m.	Waterbury (Session P)
1:30 p.m. – 2:50 p.m.	Gallery (Session Q)
3:30 p.m. – 4:40 p.m.	Waterbury (Late-Breaking Papers I)
3:30 p.m. – 4:20 p.m.	Gallery (Late-Breaking Papers II)

5:00 p.m. End of Symposium

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

CHAIR'S MESSAGE

It is with great pleasure that I invite you to be a part of the 2015 IEEE Compound Semiconductor IC Symposium (CSICS). Thanks to the efforts of the many dedicated volunteers on the organizing committee and the generous support of the IEEE Electron Devices, Microwave Theory and Techniques, and Solid-State Circuits Societies, CSICS is proud to offer a world class technical program. For this 37th edition, CSICS will be held on October 11-14 in New Orleans, Louisiana.

From its origins in 1978 as an international gathering for distinguished experts to present their latest results in GaAs IC technology and Monolithic Microwave Integrated Circuit design, the symposium has become much more and now embraces GaN, InP, SiGe, nanoscale CMOS, and many other emerging technologies. This convergence allows CSICS to offer a perfect blend of state of the art IC performance, innovative design techniques, and advanced device technologies. There are no other events in the world where you can see GaN HPAs, InP THz PAs, 100 Gb/s CMOS/SiGe transceivers, GaN HEMT power devices, and advances in compact modeling all presented alongside each other.

Following its tradition, CSICS will include presentations from worldwide submissions on all aspects of the technology, from materials and device fabrication and modeling to IC design and testing, high-volume manufacturing, and system applications. It will also feature the very latest results in RF/microwave, millimeter-wave, THz, analog mixed signal, and optoelectronic integrated circuits.

On Sunday prior to the symposium opening, CSICS will offer topical short and primer courses. Taught by leading experts, the short courses are intended for both technologists and IC designers who seek a comprehensive understanding of the latest industry trends and techniques. The primer courses are intended to be tutorials, introducing the key concepts, techniques and practices for Si mixed signal and RF circuit design.

As a complement to the technical program, the symposium includes numerous social events that allow participants to interact and network in a relaxed setting. These include the Sunday Evening Opening Reception, the Monday Evening Exhibition Opening Reception, and the Technology Exhibition Luncheon on Tuesday. CSICS also offers a daily breakfast and AM/PM coffee breaks on Monday through to Wednesday.

Please join us at the Compound Semiconductor IC Symposium in historic New Orleans, Louisiana

Charles F. Campbell, Chair

2015 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 for 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:

Charles F. Campbell
Tel: +1-972-994-3644
E-mail: charles.campbell@qorvo.com

As of this version, the Corporate Benefactors for the 2015 Compound Semiconductor IC Symposium are as follows.

Gold Level Benefactor

Qorvo



Silver Level Benefactors

Keysight Technologies



OMMIC



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 2015 CSIC Symposium:



Media Partners and Other Partner Conferences



Power Amplifier Symposium

IEEE THERM CONFERENCE

INTERNATIONAL
SYMPOSIUM
FOR TESTING AND
FAILURE ANALYSIS

Comments regarding the web site or any publicity materials should be directed to the Publicity Chair, Bruce Green (bruce_green@ieee.org). Links to our corporate benefactors appear on our symposium website.

GENERAL INFORMATION

IEEE 37th CSIC Symposium Oct 11th - Oct 14th, 2015 Sheraton New Orleans Hotel New Orleans, Louisiana, USA

REGISTRATION

	<u>Advance</u> (Received by Sept. 13 th)	<u>Regular</u> (After Sept. 13 th or on site)
Symposium Registration		
IEEE Member	\$675	\$725
Non-IEEE	\$725	\$825
IEEE Life-Member	\$340	\$340
Student	\$340	\$390
Special One Day - IEEE Member ¹	\$340	\$410
Special One Day - Non-IEEE ¹	\$370	\$430
Special One Day - Student ¹	\$230	\$260
Short/Primer Course		
Short Course 1+2	\$500	\$500
Short Course 1+2 Student	\$250	\$250
Primer Course	\$250	\$250
Primer Course Student	\$150	\$150
Additional Items		
Guest Opening Cocktail Reception Ticket	\$80	\$80
Guest Exhibition Opening Reception Ticket	\$80	\$80
Adtl. Digest USB	\$100	\$100
Adtl. Short Course USB	\$100	\$100
Adtl. Primer Course Notes USB	\$100	\$100
Adtl. Full Access Exhibitor Registration	\$295	\$295
Adtl. Exhibits Only Registration	\$195	\$195

All fees are denominated in US\$

Full Registration Includes: USB Digest, Opening Cocktail, all technical sessions, panels, exhibits, Exhibition Opening Reception, Exhibition Lunch, and all coffee breaks.

Short Course Registration Includes: Short Course Notes on USB, continental breakfast and Short Course Lunch

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

Primer Course Registration includes: Primer Course Notes on USB Only

For **ADVANCE REGISTRATION**, click on the Symposium Registration link on the Symposium website (www.csics.org). Please note that advance registration ends on September 13th.

For registration and payment related questions, please contact:

IEEE/MCM: Brianna Hunt, CSICS Registrar,
445 Hoes Lane, Piscataway, NJ, 08854 USA
Tel: +1-844-816-1739
Fax : +1-609-689-0069
Email: csicsreg@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 or traveler's checks. Checks must be made payable to "IEEE/2015 CSICS" and must be encoded with the bank number, account number, and check number. Credit cards 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, with your explicit consent, 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 4th Floor Foyer on Sunday, Waterbury Foyer on Monday and Grand Foyer on Tuesday & Wednesday. The operating hours will be as follows:

Short & Primer Course Registration only

Sunday, October 11 th	7:00 a.m. – 8:30 a.m. Waterbury Foyer
Sunday, October 11 th	12:00 p.m. – 1:00 p.m. Waterbury Foyer

Symposium Registration

Sunday, October 11 th	3:00 p.m. – 8:00 p.m. 4 th Floor Foyer
Monday, October 12 th	7:00 a.m. – 5:00 p.m. Waterbury Foyer
Tuesday, October 13 th	7:00 a.m. – 5:00 p.m. Waterbury Foyer
Wednesday, October 14 th	7:00 a.m. – 12:00 p.m. Waterbury Foyer

Refund Policy:

All requests for refund/cancellation must be received in writing by September 12th, 2015. No refunds can be provided after this date. Cancellations will incur a US\$50 administration fee. Please submit cancellation requests via email to csicsreg@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 New Orleans. This hotel offers the very best in comfort and in service, from guest rooms to meeting rooms. Located in the heart of New Orleans, you can: arise to a breakfast of beignets just steps from the French Quarter, spend an afternoon shopping Royal Street and the French Market, relax in Jackson Square, enjoy the legendary music or dine at a world famous restaurant. Place yourself in the middle of all the things to do in New Orleans. It's all right here, centrally located on the most celebrated parade route in the world. Enjoy the spirit of the city that wrote the book on good times; a city that celebrates life by enjoying every minute of it.

Hotel Address and Phone Numbers:

Sheraton New Orleans
500 Canal Street
New Orleans, LA, USA, 70130
Tel: +1 504 525 2500
Fax: +1 504 595 5552
Web Site: <http://www.sheratonneworleans.com/>

While there are alternatives, we would like to remind attendees to please support the Symposium and fully enjoy all the activities by staying at the official headquarters hotel. The Symposium relies on attendees staying at the conference Hotel to reduce the costs charged for the use of meeting rooms. Room reservations should be made as soon as possible, as there are a limited number available at the symposium rate. **To qualify for the discounted rate reservations must be made by 5:00pm Central time, September 19, 2015.** Rooms are available at the special Symposium group rate of US\$199 per night (additional person \$25 above two adults). These rates do not include room taxes, which are 13%.

To make a reservation, you can follow the link on the symposium website or contact the hotel direct at +1.888.627.7033 and ask for Reservations. Be certain to request the Special Group Rate for the IEEE CSIC Symposium or reserve on-line at:

<https://www.starwoodmeeting.com/events/start.action?id=1411214493&key=DC2E208>

Rooms will be subject to availability and possibly be charged at higher rates. Check-in time is 3 p.m. or later; check-out time is 12 noon. If necessary, you may cancel your reservation 24 hours prior to arrival to avoid a one (1) night plus tax penalty charge.

TRANSPORTATION

Travel Arrangements:

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 Louis Armstrong New Orleans International Airport (MSY) is about 15 miles from the Sheraton New Orleans. The airport accommodates domestic and international travel.

Airport Transfer:

Airport Shuttle New Orleans: You may reserve a shared ride service between the Sheraton New Orleans Hotel and Louis Armstrong New Orleans International Airport through New Orleans Airport Shuttle. Rates are \$20 per person one way / \$38 per person roundtrip. Please call +1 504 522 3500 for information or make reservations online at least 24 hours prior to your flight departure time at: Sheraton New Orleans Hotel Airport Shuttle

Taxi: the average fare from Louis Armstrong New Orleans International Airport to the Sheraton New Orleans hotel is \$33 one way with pick up outside of the baggage claim area.

For more ground transportation options please visit the Louis Armstrong New Orleans International Airport website at <http://www.flymsy.com/>

Driving Directions:

From New Orleans Int'l Airport (15.5 miles):

- Take Interstate 10 East to the New Orleans Business District.
- Continue on to the Poydras Street Exit.
- Continue down Poydras Street to Camp Street.
- Turn left on Camp Street.
- Go three blocks and the hotel will be on the right side on the corner of Camp and Canal

Additional directions from other locations can be found on-line at:

<http://www.sheratonneworleans.com/driving-directions>

ADDITIONAL INFORMATION

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.

Photography:

Attendance at, or participation in, this conference constitutes consent to the use and distribution by IEEE of the attendee's image or voice for informational, publicity, promotional and/or reporting purposes in print or electronic communications media. No flash photography will be used. Video recording by participants and other attendees during any portion of the conference is not allowed without special prior written permission of IEEE. Photographs of copyrighted PowerPoint or other slides are for personal use only and are not to be reproduced or distributed. Do not photograph any such images that are labeled as confidential and/or proprietary.

Non Discrimination Policy

IEEE is committed to the principle that all persons shall have equal access to programs, facilities, services, and employment without regard to personal characteristics not related to ability, performance, or qualifications as determined by IEEE policy and/or applicable laws. For more information on the IEEE policy visit:

http://www.ieee.org/about/corporate/governance/p9-26.html?WT.mc_id=hpf_pol

Breakfast and Lunch Locations:

Breakfasts:

The location of breakfasts will be as follows:

Short Course Registrants (only) –
Sunday, October 11th Estherwood

Symposium Registrants –
Monday, October 12th: Lagniappe
Tuesday, October 13th: Rhythms Ballroom
Wednesday, October 14th: Lagniappe

Lunches:

The location of lunches will be as follows:

Short Course Registrants (only) –
Sunday, October 11th: Estherwood

Exhibition Luncheon –
Tuesday, October 13th: Rhythms Ballroom

Coffee Breaks:

The location of coffee breaks will be as follows:

Short Course and Primer Course registrants (only) –

Sunday, October 11th: Nottoway

Symposium Registrants –

Monday, October 12th: Lagniappe

Tuesday, October 13th: Rhythms Ballroom

Wednesday, October 14th: Lagniappe

Symposium Social Events:

SYMPOSIUM Opening Cocktail

We welcome you to New Orleans on Sunday evening, October 11th from 7:00 p.m. to 8:30 p.m. in the Lagniappe room of the Sheraton New Orleans. Come and meet up with your old friends and make new acquaintances over cheese and wine, beer or soft drinks. One free admission is included with your registration including two drink tickets, and extra reception tickets may be purchased at registration for \$80.

EXHIBITION OPENING RECEPTION

The exhibition opening reception will be held on Monday evening, October 12th from 5:30 p.m. to 7:30 p.m. in the Rhythms Ballroom of the Sheraton New Orleans. Come along; visit with the exhibitors over light hors d'oeuvres and wine, beer, or soft drinks. One free admission is included with your registration, and extra reception tickets may be purchased at registration for \$80.

EXHIBITION LUNCHEON

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

New Orleans Attractions:

So much more than a Mardi Gras destination or a target for hurricanes, New Orleans is a laid-back spectacle of history, culture and music. Arguably America's oldest cocktail, the Sazerac, originated in New Orleans. To paraphrase Lincoln, New Orleans is where the Father of Waters meets the Sea, which matches the tag line for the conference (where III-V meets Si). "The Big Easy" is also known for its cuisine (po boys, gumbo, crawfish, muflettas and beignets) as well as its jazz and blues music and venues. The home of living musical legends Fats Domino, Ellis Marsallis (still playing on Friday nights at the Snug Harbor Bistro), and birthplace of Lil Wayne and Doctor John, New Orleans was called home by the likes of Professor Longhair, Louis Prima, and Louis Armstrong. NOLA was the ultimate destination in the critically acclaimed 1967 indie film "Easy Rider".

New Orleans Weather:

October in New Orleans brings an average high of 80°F (27°C) and an average low of 62°F (17°C).

SYMPOSIUM HIGHLIGHTS

The technical program for the 2015 IEEE CSIC Symposium consists of 65 technical papers, three panel sessions, an industry exhibit, and two short courses: "Transmit and Receive IC Design for Fiber Optic Links" and "Microwave Package Design Fundamentals." We will also be offering a primer level class, "Introduction to Si RFIC Design".

This year we have invited 26 papers on a wide range of important topics encompassing advanced device engineering to circuit application using compound and other related semiconductor technologies.

Exciting new developments from a variety of compound semiconductor disciplines will be presented. This year there is considerable interest in InP HEMT and HBT amplifiers operating above 100 GHz, GaN devices and circuits, optoelectronic circuits, Si photonics, semiconductor processes for >100 GHz applications, HBT modeling, and thermal management of high power devices. As always there is a tremendous amount of activity in wireless communications and military electronics.

Late-Breaking News Papers:

We have nine later breaking new papers in Sessions R and S starting at 3:30 on Wednesday October 14.

Technical Digest:

Extra USB Technical Digests can be purchased by Symposium registrants through Advance Registration. A limited number of Digests USBs may also be available for sale at the Registration Desk. The cost of the USB ordered through Advance Registration or purchased on-site is \$100.

Outstanding Paper Award:

The 2015 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 announced after this year's Symposium with the award being formally presented during the 2016 CSIC Symposium.

Student Paper Competition:

In recognition of the exceptional contributions made by students, CSICS is proud to hold its second annual Student Paper Competition. To participate in the competition, an eligible student must submit a regular contributed paper naming, at a minimum, themselves and their principal supervisor as authors. The Student Paper Finalists must present their own papers at their assigned symposium session. We congratulate our thirteen Student Paper Finalists for 2015 CSICS. The winner of the student paper competition will be announced at the beginning of Session S.

Short Course 1: “Transmit and Receive IC Design for Fiber Optic Links”

Fiber Optic Links have become the cornerstone of the internet as we know it. Ever faster transmission speeds are needed to keep up with the user’s insatiable desire for more bandwidth. Key for the growth of the fiber optic market is the analog ICs on both transmit and receive side of the fiber optic systems. This course covers the basics of high speed IC design for those fiber optic links.

Short Course 2: “Microwave Package Design Fundamentals”

The IC designer’s job has traditionally been done after they design their high frequency MMIC. However, higher integration and performance needs have forced the MMIC development process to include the design of the package and MMIC interfaces during the MMIC design process. This course is intended as an introductory to intermediate level course for process engineers, designers, quality engineers, and managers responsible for design and manufacture of microwave circuits and devices in packaging technology.

Panel Sessions:

This year we have three exciting Panel Sessions on Tuesday October 13th and Wednesday October 14th. These are intended to be timely, thought-provoking, educational, and hopefully controversial. The three panel topics are as follows:

PANEL SESSION 1:

Next Generation Optical Modules – What will be the technologies of choice? Tuesday, October 13th, 10:30 a.m. - 12:00 p.m.

PANEL SESSION 2:

GaN on Silicon or GaN on SiC?
Tuesday, October 13th, 5:30 p.m. - 7:00 p.m. (cash bar)

PANEL SESSION 3:

Multi-Physics Simulation: Heavenly Accuracy or Convergence Hell?
Wednesday, October 14th, 12:00 p.m. - 1:30 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 day and time).

Technology Exhibition:

The 2015 IEEE CSICS Technology Exhibition will be held on Monday evening October 12th and Tuesday the 13th in the Pavilion and 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, as well as the latest information on modeling and design simulation tools. As of printing, this year’s exhibitors are:

Accel-RF Corp.
Integrand Software, Inc.
Nuhertz Technologies, LLC
Sonnet Software, Inc.
Rhode & Schwarz GmbH

Keysight Technologies
Maury Microwave Corp.
Presidio Components Corp.
StratEdge Corp.
NI-AWR Group

Kyocera, Inc.

The Exhibition will feature informative and interesting displays with corporate representatives on hand between the hours of 6:00 p.m. and 8:00 p.m. on Monday, October 12th, and between 7:00 a.m. and 4:00 p.m. on Tuesday, October 13th. The Exhibition will also host the Exhibition Opening Reception from 6:00 p.m. until 7:30 p.m. on Monday evening and the Exhibition Luncheon from 12:00 noon to 1:30 p.m. on Tuesday. The Exhibition Opening Reception, the Exhibition Luncheon, and the Tuesday coffee breaks will be held in the exhibition area in the Rhythms Ballroom.

To participate in the Exhibition, please contact Candi Wooldridge (MP Associates), candi@mpassociates.com, (303) 530-4562. Please visit the Symposium website at www.csics.org for additional information.

Short Courses

Sunday, October 11th, 2015
Sheraton New Orleans - Nottoway
8:00a.m. – 7:00p.m.

Course Coordinator: **Jim Carroll**
 NI-AWR
 (469) 248-5462
 Jim.Carroll@awrcorp.com

“Transmit and Receive IC Design for Fiber Optic Links”

Fiber Optic Links have become the cornerstone of the internet as we know it. Ever faster transmission speeds are needed to keep up with the user’s insatiable desire for more bandwidth. Key for the growth of the fiber optic market is the analog ICs on both transmit and receive side of the fiber optic systems. This course covers the basics of high speed IC design for fiber optic links and is broken into the following three parts.

The first portion of the course examines design theories and trade-offs for trans-impedance amplifiers and direct modulated laser and external modulator drivers used in today’s advanced optical systems. Different topologies of TIA and drivers are examined along with appropriate analog equalization and pre-distortion to increase robustness of the system. A holistic approach that includes device nonlinear characteristics as well as the packaging will be discussed. The focus is on high-speed, high-density, low-power and low-cost requirements to make optical interconnect ubiquitous.

Clock and Data Recovery (CDR) is a key function in a communication system. We begin this part of the course with a review of the fundamentals of CDR in Non-Return-to-Zero (NRZ) serial links. System level metrics like jitter-tolerance, jitter-transfer and jitter-generation are introduced to evaluate performance of CDR. Several CDR architectures are discussed. Their advantages and drawbacks specifically for high-speed optical systems are compared. Many optical systems require a reference-less CDR. Various techniques to extract frequency from incoming data are explained in detail. Linear and bang-bang phase detectors at full-rate are introduced. Sub-rate structures that ease speed requirements of circuits are also described.

The last section of the course covers optical modulators. Silicon Photonic based Mach-Zehnder modulators are targeted as key elements for next generation optical communication systems. This course will address the current designs, approaches and applications for silicon photonic modulators. Fundamental concepts in photonic device design, such as optical waveguide basics, optical modulation in silicon, modulator bandwidth, loss, and efficiency shall be covered.

Topics Covered and Instructors:

- 1) Optical Frontends - The’ Linh Nguyen (Finisar)
- 2) Clock and Data Recovery Techniques for Optical Communication Systems - Kumar Lakshmikumar (Cisco Systems)
- 3) SiP MZM Technology - Mark Webster (Cisco Systems)

“Microwave Package Design Fundamentals”

The IC designer’s job has traditionally been done after they design their high frequency MMIC. However, higher integration and performance needs have forced the MMIC development process to include the design of the package and MMIC interfaces during the MMIC design process. This course is intended as an introductory to intermediate level course for process engineers, designers, quality engineers, and managers responsible for design and manufacture of microwave circuits and devices in packaging technology. This course examines the aspects of RF microwave packaging from a practical perspective with the instructors sharing valuable lessons learned from years of experience. Both high speed and high power microwave applications are covered along with design issues, material trade-offs and process selection. Microwave Design for Manufacturability concepts are introduced along with mitigating the RF parasitics that inherently are created when packaging microwave ICs and devices.

Topics Covered and Instructors:

- 1) Packaging Fundamentals - Tom Green
(TJ Green Associates) <http://www.tjgreenllc.com/>
- 2) IC Design for Packaging – Mike Heimlich
(Macquarie University, Australia)

Short Course Schedule

The short courses will be held on Sunday October 11th in Nottoway. A continental breakfast is available to all registered Short Course attendees and instructors. The first course “Transmit and Receive IC Design for Fiber Optic Links” will begin at 8:00 am and finish at 2:30 pm. A lunch will be provided as well as morning breakfast at 7am and afternoon refreshment break.

The second short course “Microwave Package Design Fundamentals” will begin at 3:00 pm and finish at 7:00 pm and includes a refreshment break. All participants are invited to join the Symposium Opening Reception afterwards in the Lagniappe room.

Who Should Attend

The first course is intended to appeal to both technologists and circuit designers of all backgrounds who have an interest in understanding the design of ICs for Fiber optic links. Each lecturer has industry experience in each of the component designs and will highlight the relevant state-of-the-art IC topologies for these types of links.

The second course will be of interest to designers and managers who would like to better understand the challenges and pitfalls of packaging MMICs for today’s systems. The first lecturer will introduce the fundamentals necessary to understand basic high frequency packages. The second lecturer will continue the short course by talking about dealing with the requirements of packaging a MMIC from an RF designer’s perspective.

Short Course Pre-Registration

So that we may properly plan for attendance, we encourage you to pre-register for the Short Courses. A limited number of Short Course registrations will be available on site Sunday October 11th 7:00 am – 8:00 am. The registration fee for Short Course I and II is \$500 for professionals and \$250 for students. This includes attending the lectures, notes for both Short Courses available for download and on a USB stick, a continental breakfast, a lunch and morning/afternoon refreshments during breaks. Additional copies of the Short Course Notes on USB may be purchased for \$100 each.

Primer Course

Sunday, October 11th in Gallier AB
2:00 p.m. – 6:00 p.m.

Primer Course—Introduction to Si RFIC Design

Instructor: Prof. Waleed Khalil
The Ohio State University
Columbus, OH

Course Objective and Description:

Silicon Radio Frequency Integrated Circuits (RFICs) are the dominant technology for wireless transceivers and sensors due to their low cost, ease of integration with digital functions, and excellent RF performance. This course is intended for semiconductor professionals of all technical backgrounds who wish to learn or refresh their understanding of the fundamentals of designing the principal circuit building blocks in radio and radar SoCs. The primer will begin with an overview of the nanoscale CMOS transistors and integrated passives from an RF perspective, analyzing key concepts in device modeling and noise behavior. This will be followed by a comparison to SiGe and III-V transistor design. In so doing, the intent is to provide guidance on how the circuit design process differs and to enlighten attendees on subjects such as transistor sizing, proper layout practices, parasitic reduction strategies and transceiver integration. In the second part of the primer, the focus will shift to the key building blocks that make up Silicon based integrated transceivers. Among the blocks to be covered are LNAs, Mixers and VCOs. For each one, designers are confronted with a variety of different circuit topologies, each with its attendant strengths and performance metrics. Making the right choice very much depends on having an awareness of what the options are, good specmanship and how the block will affect overall transceiver performance. Finally, the course will provide examples of circuit blocks implemented in CMOS technology.

The course instructor, Dr. Waleed Khalil, is currently serving as an Associate professor at the ECE department and the ElectroScience Lab, The Ohio State University. Prior to joining Ohio State, Prof. Khalil spent 16 years at Intel Corporation where he held various technical and leadership positions in wireless and wireline communication groups. While at Intel, he established Intel's first analog device modeling methodology for mixed signal circuit design and also contributed to the development of Intel's first RF process technology. Prof. Khalil's current research areas of interest include: RF and mm-wave circuits and systems, sub-THz circuits, front-end actives and passives, high performance clocking circuits, GHz A/D and D/A circuits.

Primer Agenda:

- 3:00 P.M. **Introduction and Overview**
- 3:15 P.M. **CMOS RFIC Technology Perspective:**
Active and Passive Device Modeling
- 4:30 P.M. **Coffee Break**

5:00 P.M. **RF CMOS Block Level Design**

Fundamentals and Examples

7:00 P.M. **Close of Primer II**

Primer Course Coordinator:

Peter Zampardi

Qorvo

30700 Russell Ranch Road, Suite 120

Westlake Village, CA 91362

(818) 483-1557

peter.zampardi@qorvo.com

Student Paper Finalists

Competition Chair: Prof. Waleed Khalil
*The Ohio State University
Columbus, OH*

Presentation Schedule for the thirteen Student Paper Finalists:

Monday, October 12, 2:00 p.m. (Waterbury)

- B.2 **A Watt-Class, High-Efficiency, Digitally Modulated Polar Power Amplifier in SOI CMOS**
V. Diddi, H. Gheidi, Youjiang Liu, J. F. Buckwalter and P. Asbeck, *University of California San Diego, La Jolla, United States*

Monday, October 12, 2:40 p.m. (Waterbury)

- B.4 **28 GHz >250 mW CMOS Power Amplifier Using Multigate-Cell Design**
J. A. Jayamon¹, J. F. Buckwalter^{1,2}, and P. M. Asbeck¹,
¹*University of California San Diego, La Jolla, United States*,
²*University of California Santa Barbara, Santa Barbara, United States*

Monday, October 12, 2:20 p.m. (Gallery)

- C.3 **Evaluating Thermal Composites Using Asymptotic Homogenization**
M. Beckert¹, J. H. Nadler², ¹*Georgia Institute of Technology, Atlanta, United States*, ²*Georgia Tech Research Institute, Atlanta, United States*

Monday, October 12, 4:20 p.m. (Waterbury)

- D.3 **High-gain AlGaIn/GaN HEMT Single Chip E-Band Power Amplifier MMIC with 30 dBm Output Power**
E. Ture, D. Schwantuschke, A. Tessman, S. Wagner, P. Brückner, M. Mikulla, R. Quay, O. Ambacher, *Fraunhofer Institute for Applied Solid-State Physics, Freiburg, Germany*

Tuesday, October 12, 9:40 a.m. (Waterbury)

- F.4 **250 GHz SiGe-BiCMOS Cascaded Single-Stage Distributed Amplifier**
P. Testa, R. Paulo, C. Carta, F. Ellinger, *Technische Universitat Dresden, Germany*

Tuesday, October 12, 9:40 a.m. (Gallery)

- G.4 **An Evaluation of extraction methods for the external collector resistance for InP DHBTs**
T. Nardmann¹, M. Schroter^{1,2}, ¹*Technical University of Dresden, Dresden, Germany*, ²*UC San Diego, La Jolla, United States*

Tuesday, October 12, 2:20 p.m. (Gallery)

- L.3 **A 4.2-W 10-GHz GaN MMIC Doherty Power Amplifier**
M. Coffey¹, P. MomenRoodaki¹, A. Zai², Z. Popović¹,
¹*University of Colorado Boulder, Boulder, United States*,
²*Lincoln Laboratory, Lexington, United States*

Tuesday, October 12, 9:30 a.m. (Gallery)

- L.3 **MIT virtual source RF model as a tool for GaN-based LNA and oscillator design**
U. Radhakrishna, P. Choi, L.-S. Peh, D. Antoniadis, *MIT, Cambridge, United States*

Wednesday, October 12, 9:30 a.m. (Gallery)

M.4 A New Active Quasi-Circulator Structure with High Isolation for 77-GHz Automotive FMCW Radar Systems in SiGe Technology

M. Porranzi¹, C. Wagner², H. Jaeger², A. Stelzer¹

¹Johannes Kepler Univeristät Linz, Linz, Austria, ²DICE, Linz, Austria

Wednesday, October 12, 9:50 a.m. (Gallery)

M.5 A 70 GHz Bidirectional Front-End for Half-Duplex Transceiver in 90-nm SiGe BiCMOS

F. Kijсанayotin¹, J. Li¹, J. Buckwalter²

¹Department of Electrical & Computer Engineering, University of California, San Diego, La Jolla, United States. ²Department of Electrical & Computer Engineering, University of California, Santa Barbara, Santa Barbara, United States

Wednesday, October 12, 11:40 a.m. (Gallery)

O.4 A 15-Gb/s AC-coupled VCSEL Driver with Waveform Shaping in 65nm CMOS

V. Kozlov and A.C. Carusone

University of Toronto, Toronto, Ontario, Canada

Wednesday, October 12, 2:30 p.m. (Waterbury)

P.3 Multi-Level Chireix Outphasing GaN MMIC PA

M. Litchfield, Z. Popović, University of Colorado at Boulder, Boulder, United States

Wednesday, October 12, 2:30 p.m. (Gallery)

Q.3 A Low Noise, DC-135GHz MOS-HBT Distributed Amplifier for Receiver Applications

J. Hoffman¹, S. P. Voinigescu¹, P. Chevalier², A. Cathelin², and P. Schvan³, ¹University of Toronto, Toronto, Canada,

²STMicroelectronics, Crolles, France, ³Ciena Corporation, Ottawa, Canada

**CSIC Symposium Opening
Cocktail Hour
Lagniappe
7:00 p.m. - 8:30 p.m.**

Monday, October 12th, 2015

SYMPOSIUM PROGRAM

REGISTRATION AND CONTINENTAL BREAKFAST

7:00 a.m. – 5:00 p.m.

Registration – Waterbury Foyer– Sheraton New Orleans

7:00 a.m. – 8:30 a.m.

Continental Breakfast – Lagniappe

SYMPOSIUM OPENING

8:30 a.m. – 9:00 a.m.

Waterbury – Sheraton New Orleans

Opening Remarks

2015 Symposium General Chair

Charles F. Campbell, *Qorvo*

Technical Program Overview

2015 Technical Program Chair

Harris P. Moyer, *HRL Laboratories*

SESSION A: PLENARY SESSION

9:00 a.m. – 11:45 a.m.

Waterbury – Sheraton New Orleans

Chairpersons: Jim Carroll, *NI-AWR Group*
Brian Moser, *Qorvo*

9:00 a.m.

A.1 **DARPA MMW System Programs and How They Drive Compound Semiconductor Technology Needs (Invited)**
H. B. Wallace, *DARPA, Arlington, United States*

9:30 a.m.

A.2 **Single-Chip GaN X-band MMIC Dynamic Supply PAs (Invited)**
Z. Popović, University of Colorado, Boulder, United States

10:00 a.m. - 10:15 a.m.

Coffee Break

10:15 a.m.

A.3 **European Frontiers in RF GaN (Invited)**
F. E. van Vliet, P. de Hek, *TNO, The Hague, The Netherlands*

10:45 a.m.

A.4 **Future of Integrated Coherent Optics: Pluggable Optics and Beyond (Invited)**
I. Betty, *Ciena Corporation, Ottawa, Canada*

11:15 a.m.

A.5 **DC-240 GHz PolyStrata® Combining Architecture for High Efficiency and Compact SSPAs**
D. Miller¹, H. Kazemi², M. Urteaga³, Z. M. Griffith³, J.-M. Rollin¹, ¹*Nuvotronics Inc., Durham, United States*,
²*Raytheon Company, Rancho Cucamonga, United States*,³*Teledyne Scientific, Thousand Oaks, United States*

11:45 a.m.

Monday, October 12th, 2015

End of Session A

12:00 p.m. – 1:30 p.m.

Break for Lunch

Monday, October 12th, 2015

SESSION B: Silicon Technologies for Next Generation Applications

1:30 p.m. – 3:00 p.m.

Waterbury – Sheraton New Orleans

Chairpersons: Nabil El-Hinnawy, *Northrop Grumman Electronic Systems*
Tomoya Kaneko, *NEC Corporation*

1:30 p.m.

B.1 More than Moore - Wafer Scale Integration of Dissimilar Materials on a Si Platform (Invited)

T. E. Kazior, J. R. LaRoche, *Raytheon Company, Andover, United States*

2:00 p.m.

B.2 A Watt-Class, High-Efficiency, Digitally Modulated Polar Power Amplifier in SOI CMOS

V. Diddi, H. Gheidi, Youjiang Liu, J. F. Buckwalter and P. Asbeck, *University of California San Diego, La Jolla, United States*

2:20 p.m.

B.3 A Wideband 25-35GHz 5-Bit Low Power 2x2 CMOS Beam Forming Network IC for Reconfigurable Phased Arrays

N. Daftari, L. Gilreath, A. D. Smith, M. Thai, K. Thai, M. Watanabe, Y. Wu, C. Jackson, A. Danial, D. Scherrer, T. LaRocca, *Northrop Grumman Aerospace Systems, Redondo Beach, United States*

2:40 p.m.

B.4 28 GHz >250 mW CMOS Power Amplifier Using Multigate-Cell Design

J. A. Jayamon¹, J. F. Buckwalter^{1,2}, and P. M. Asbeck¹,
¹*University of California San Diego, La Jolla, United States,*
²*University of California Santa Barbara, Santa Barbara, United States*

3:00 p.m.

End of Session B

3:00 p.m. – 3:30 p.m.

Coffee Break

Monday, October 12th, 2015

SESSION C: Thermal Management Technologies

1:30 p.m. – 3:00 p.m.

Gallery – Sheraton New Orleans

Chairpersons: Kazutaka Inoue, *Sumitomo Electric Industries, Ltd.*
Barry Wu, *Keysight Technologies, Inc.*

1:30 p.m.

C.1 High Performance GaN-on-Diamond HEMTs Fabricated by Low-Temperature Device Transfer Process (Invited)

K. K. Chu¹, P. C. Chao¹, J. A. Diaz¹, T. Yurovchak¹, B. J. Schmanski¹, C. T. Creamer¹, S. Sweetland¹, R. L. Kallaher², C. McGray², G. D. Via³, J. D. Blevins³, ¹*BAE Systems, Nashua, United States*, ²*Modern Microsystems, Silver Spring, United States*, ³*Air Force Research Laboratory, Dayton, United States*

2:00 p.m.

C.2 Sub-Micron Thermal Imaging Characterization of GaN HEMT and MMIC Devices

K. Yazawa^{1,2}, D. Kendig¹, A. Shakouri², ¹*Microsanj LLC., Santa Clara, United States*, ²*Purdue University, West Lafayette, United States*

2:20 p.m.

C.3 Evaluating Thermal Composites Using Asymptotic Homogenization

M. Beckert¹, J. H. Nadler², ¹*Georgia Institute of Technology, Atlanta, United States*, ²*Georgia Tech Research Institute, Atlanta, United States*

2:40 p.m.

C.4 Self-Heating in a GaN-Based Heterojunction Field-Effect Transistor Investigated by Ultraviolet and Visible Micro-Raman Spectroscopy

M. Nazari, B. L. Hancock, E. L. Piner, M. W. Holtz, *Texas State University, San Marcos, United States*

3:00 p.m.

End of Session C

3:00 p.m. – 3:30 p.m.

Coffee Break

Monday, October 12th, 2015

SESSION D: E- to G-Band High Power Amplifiers

3:30 p.m. – 5:00 p.m.

Waterbury – Sheraton New Orleans

Chairpersons: Marc Rocchi, *OMMIC*
Kazuya Yamamoto, *Mitsubishi Electric Corp.*

3:30 p.m.

D.1 **W- and G-Band Solid State Power Combining (Invited)**
K. W. Brown, D. M. Gritters, H. Kazemi, *Raytheon Company,*
Rancho Cucamonga, United States

4:00 p.m.

D.2 **340-440mW Broadband, High-Efficiency E-band PA's in InP HBT**
Z. Griffith, M. Urteaga, P. Rowell, R. Pierson, *Teledyne*
Scientific Company, Thousand Oaks, United States

4:20 p.m.

D.3 **High-gain AlGaIn/GaN HEMT Single Chip E-Band Power Amplifier MMIC with 30 dBm Output Power**
E. Ture, D. Schwantuschke, A. Tessman, S. Wagner, P.
Brückner, M. Mikulla, R. Quay, O. Ambacher, *Fraunhofer*
Institute for Applied Solid-State Physics, Freiburg, Germany

4:40 p.m.

D.4 **A 22 dBm, 0.6 mm² D-band SiGe HBT Power Amplifier using Series Power Combining Sub-Quarter-Wavelength Baluns**
S. Daneshgar¹, J. F. Buckwalter², ¹*University of California San*
Diego, La Jolla, United States, ²*University of California Santa*
Barbara, Santa Barbara, United States

5:00 p.m.

End of Session D

Monday, October 12th, 2015

SESSION E: Silicon Photonics

3:30 p.m. – 5:00 p.m.

Gallery – Sheraton New Orleans

Chairpersons: The' Linh Nguyen, *Finisar*
Kumar Lakshmi Kumar, *Cisco Systems*

3:30 p.m.

E.1 Development of Silicon Photonic Products for Telecom & Datacom (Invited)

M. Poulin¹, C. Latrasse¹, M.-J. Picard¹, Y. Painchaud²,
F. Pelletier¹ and M. Guy¹, ¹*TeraXion, Québec, Canada*,
²*Handyem, Québec, Canada*

4:00 p.m.

E.2 Silicon Photonic Microring Resonator-Based Transceivers for Compact WDM Optical Interconnects (Invited)

S. Palermo¹, P. Chiang^{2,3}, C. Li⁴, C.-H. Chen⁴, M. Fiorentino⁴, R. Beausoleil⁴, H. Li², K. Yu¹, B. Wang¹, R. Bai², A. Shafik¹, and A. Titriku¹, ¹*Texas A&M University, College Station, United States*, ²*Oregon State University, Corvallis, United States*, ³*Fudan University, Shanghai, China*, ⁴*HP Labs, Hewlett-Packard Company, Palo Alto, United States*

4:30 p.m.

E.3 Multilayer Silicon Nitride-on-Silicon Integrated Photonic Platforms (Invited)

J. K. S. Poon¹, W. D. Sacher¹, Y. Huang², and G-Q. Lo²,
¹*University of Toronto, Toronto, Canada*, ²*A*STAR, Singapore*

5:00 p.m.

End of Session E

**Technology Exhibition
Opening Reception
Rhythms Ballroom
6:00 p.m. - 7:30 p.m.**

Tuesday, October 13th, 2015

REGISTRATION AND BREAKFAST

7:00 a.m. – 5:00 p.m.

Registration – Waterbury Foyer

7:00 a.m. – 8:30 a.m.

Continental Breakfast – Lagniappe

SESSION F: Advanced mmW and THz MMICs

8:30 a.m. – 10:30 a.m.

Waterbury – Sheraton New Orleans

Chairpersons: Hooman Kazemi, *Raytheon Ranch Innovations*
Bodhisatwa Sadhu, *IBM T.J Watson Research*

8:30 a.m.

F.1 Progress in InP HEMT Submillimeter Wave Circuits and Packaging (Invited)

K. Leong, G. Mei, W. Yoshida, M. Lange, A. Zamora, B. Gorospe, W. Deal, *Northrup Grumman Corporation, Redondo Beach, United States*

9:00 a.m.

F.2 190-260GHz High-Power, Broadband PA's in 250nm InP HBT

Z. Griffith, M. Urteaga, P. Rowell, R. Pierson, *Teledyne Scientific Company, Thousand Oaks, United States*

9:20 a.m.

F.3 Compact W-band PA MMICs in Commercially Available 0.1um GaAs PHEMT Process

A. Bessemoulin¹, M. Rodriguez¹, J. Tarazi¹, G. McCulloch¹, A. Parker², S. Mahon², ¹*MACOM Technology Solutions, North Sydney, Australia*, ²*Macquarie University, Australia*

9:40 a.m.

F.4 250 GHz SiGe-BiCMOS Cascaded Single-Stage Distributed Amplifier

P. Testa, R. Paulo, C. Carta, F. Ellinger, *Technische Universitat Dresden, Germany*

10:00 a.m.

End of Session F

10:00 a.m. – 10:30 a.m.

Coffee Break

Tuesday, October 13th, 2015

SESSION G: HBT Modeling and Applications

8:30 a.m. – 10:00 a.m.

Gallery – Sheraton New Orleans

Chairpersons: Faramarz Kharabi, *Qorvo Inc.*
Paul Tasker, *Cardiff University*

8:30 a.m.

G.1 Compact Model Validation Strategies Based on Dedicated and Benchmark Circuit Blocks for the mm-Wave Frequency Range (Invited)

B. Ardouin¹, M. Schroter², T. Zimmer³, K. Aufinger⁴, U. Pfeiffer⁵, C. Raya¹, A. Mukherjee², S. Malz⁵, S. Fregonese³, R. D'Espito³, M. De Matos³, ¹*XMOD Technologies, Bordeaux, France*, ²*TU Dresden, Dresden, Germany*, ³*Laboratoires IMS University of Bordeaux, Bordeaux, France*, ⁴*Infineon Technologies, Munich, Germany*, ⁵*University of Wuppertal, Wuppertal, Germany*

9:00 a.m.

G.2 HBT Model Scaling for Different Epi Materials and Geometries

Y. Yang¹, P. J. Zampardi², K. Kwok¹, ¹*Skyworks Solutions, Newburg Park, United States*, ²*Qorvo, Greensboro, United States*,

9:20 a.m.

G.3 Comparison of Technologies for APT and ET Applications

B. Moser¹, P. J. Zampardi¹, M. S. Tenberge², D. Limanto¹, ¹*Qorvo, Greensboro, United States*, ²*Maury Microwave, Ontario, United States*

9:40 a.m.

G.4 An Evaluation of extraction methods for the external collector resistance for InP DHBTs

T. Nardmann¹, M. Schroter^{1,2}, ¹*TU Dresden, Dresden, Germany*, ²*UC San Diego, La Jolla, United States*

10:00 a.m.

End of Session G

10:00 a.m. – 10:30 a.m.

Coffee Break

Tuesday, October 13th, 2015

PANEL SESSION 1: Next Generation Optical Modules – What will be the technologies of choice?

10:30 a.m. – 12:00 p.m.

Waterbury – Sheraton New Orleans Hotel

Moderators: Thé Linh Nguyen, *Finisar Corp.*
Craig Steinbeiser, *Qorvo*

Demand for higher data throughput is rippling through the entire optical communications network placing higher expectations on next generation optical technologies to ease bottlenecks within the datacenter, to/from datacenters, and across metro/regional/long-haul service areas. Innovation in III-V and Silicon based technologies are key enablers to balance performance, cost, size, and manufacturability.

This panel will discuss what's next including modulation formats, transmit architectures, high speed electronics, and availability of new optical transmission technology to realize low-power, low-cost and high-density optical modules for use in metro/regional/long-haul and datacenter networks. In long-haul applications III-V technology appears to have staked its claim in current solutions where the electro-optics function is separated from the DSP. How long will it last and can it move into the client side and datacenter where volumes are astronomical? Will advancements in III-V technology continue to trump as baud rates increase or will Silicon intercept? New silicon modulator technologies enable direct drive of the optical modulator from the DSP, eliminating the need for DACs and linear drivers, will this finally enable the DSP to be integrated into the electro-optics function? The same dynamics are at work in the short reach applications where GaAs VCSEL and InP DFB lasers are incumbent while Silicon Photonics solutions are making a serious attempt to be the technology of choice. Will this drive the need for more standardization or less?

Panel Members:

Ian Betty	<i>Line-side Coherent Optics</i>	<i>Ciena</i>
Matt Traverso	<i>SiPh Coherent Optics</i>	<i>Cisco</i>
Afshin Momtaz	<i>DSP/DAC</i>	<i>Broadcom</i>
Chris Cole	<i>Technology Atheist</i>	<i>Finisar</i>
Jon Proesel	<i>Client-side</i>	<i>IBM</i>

12:00 p.m.

End of Panel Session 1

Tuesday, October 13th, 2015

Technology Exhibition Lunch
Rhythms Ballroom
12:00 p.m. – 1:30 p.m.

SESSION H: Optical Coherent Transceivers

1:30 p.m. – 3:00 p.m.

Waterbury – Sheraton New Orleans

Chairpersons: Munehiko Nagatani, *NTT Corporation*
Craig Steinbeiser, *Qorvo*

1:30 p.m.

H.1 **Compact Low-Power Optical/Electrical Devices and
Coherent Transceivers for Datacom (Invited)**
S. Yamanaka^{1,2}, ¹*PETRA, Tokyo, Japan*, ²*NTT Corporation,
Atsugi, Japan*

2:00 p.m.

H.2 **Indium Phosphide based IQ-Modulators for Coherent
Pluggable Optical Transceivers (Invited)**
E. Rouvalis, *Finisar Germany GmbH, Berlin, Germany*

2:30 p.m.

H.3 **Electro-Optical Co-Design to Minimize Power Consumption
of 32 GBd Optical IQ-Transmitter Using InP MZ-
Modulators (Invited)**
N. Wolf, L. Yan, J.-H. Choi, T. Kapa, S. Wunsch, R. Klötzer,
K.-O. Velthaus, H.-G. Bach, and M. Schell, *Fraunhofer HHI,
Berlin, Germany*

3:00 p.m.

End of Session H

3:00 p.m. – 3:30 p.m.

Coffee Break

Tuesday, October 13th, 2015

SESSION I: GaN Power Amplifier Technology

1:30 p.m. – 2:40 p.m.

Gallery – Sheraton New Orleans

Chairpersons: Jon Mooney, *Raytheon Company*
Shuoqi Chen, *Qorvo*

1:30 p.m.

I.1 **120W Ka-Band Amplifier Utilizing GaN MMICs and Coaxial Waveguide Spatial Power Combining (Invited)**
P. G. Courtney, J. Zeng, T. Tran, H. Trinh, S. Behan, *Qorvo*,
Newbury Park, United States

2:00 p.m.

I.2 **GaN MMIC for Ka-Band with 18W**
K. Takagi, C. Y. Ng, H. Sakurai, K. Matsushita, *Toshiba*,
Kawasaki, Japan

2:20 p.m.

I.3 **A 4.2-W 10-GHz GaN MMIC Doherty Power Amplifier**
M. Coffey¹, P. MomenRoodaki¹, A. Zai², Z. Popović¹,
¹*University of Colorado Boulder, Boulder, United States*,
²*Lincoln Laboratory, Lexington, United States*

2:40 p.m.

End of Session I

3:00 p.m. – 3:30 p.m.

Coffee Break

Tuesday, October 13th, 2015

SESSION J: Emerging sub-mm-Wave Devices

3:30 p.m. – 4:50 p.m.

Waterbury – Sheraton New Orleans

Chairpersons: Zach Griffith, *Teledyne Scientific Company*
Frank van Vliet, *TNO*

3:30 p.m.

J.1 Submillimeter-Wave Amplifier Circuits based on Thin-Film Microstrip Line Front-Side Technology

A. Tessman, A. Leuther, M. Ohlrogge, H. Massler, *Fraunhofer Institute for Applied Solid-State Physics, Freiburg, Germany*

3:50 p.m.

J.2 Advances in InP HEMT WR1.5 Amplifier MMICs

A. Zamora, X. Mei, K. Leong, M. Lange, J. Lee, W. Yoshida, B. Gorospe, W. Deal, *Northrup Grumman Corporation, Redondo Beach, United States*

4:10 p.m.

J.3 VO₂ Switches for Millimeter and Submillimeter-wave Applications

C. Hillman, P.A. Stupar, Z. Griffith, *Teledyne Scientific Company, Thousand Oaks, United States*

4:30 p.m.

J.4 High Performance Resonant Tunneling Diode Oscillators for THz Applications

J. Wang, K. Alharbi, A. Ofiare, H. Zhou, A. Khalid, D. Cumming, E. Wasige, *University of Glasgow, Glasgow, United Kingdom*

4:50 p.m.

End of Session J

SESSION K: Power Technology

3:30 p.m. – 5:00 p.m.

Gallery – Sheraton New Orleans

Chairpersons: Noriyuki Watanabe, *NTT Corporation*
Kenneth Chu, *BAE Systems*

3:30 p.m.

K.1 Current Status of Gallium Oxide-Based Power Device Technology (Invited)

M. Higashiwaki¹, K. Sasaki^{2,1}, M. H. Wong¹, T. Kamimura¹, K. Goto², K. Nomura³, Q. T. Thieu³, R. Togashi³, H. Murakami³, Y. Kumagai³, B. Monemar^{3,4}, A. Koukitu³, A. Kuramata², T. Masui², S. Yamakoshi², ¹*National Institute of Information and Communications Technology, Koganei, Japan*, ²*Tamura Corporation, Sayama, Japan*, ³*Tokyo University of Agriculture and Technology, Koganei, Japan*, ⁴*Linköping University, Linköping, Sweden*

4:00 p.m.

K.2 An Overview of GaN-Based Monolithic Power Integrated Circuit Technology on Polarization-Junction Platform (Invited)

A. Nakajima¹, S. Kubota², R. Kayanuma², K. Tsutsui², K. Kakushima², H. Wakabayashi², H. Iwai², S. Nishizawa¹, H. Ohashi², ¹*National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan*, ²*Tokyo Institute of Technology, Yokohama, Japan*

4:30 p.m.

K.3 Monolithically-Integrated Multilevel Inverter on Lateral GaN-on-Si Technology for High-Voltage Applications

B. Weiss, R. Reiner, P. Waltereit, S. Müller, M. Wespel, R. Quay, O. Ambacher, *Fraunhofer Institute for Applied Solid State Physics, Freiburg, Germany*

4:50 p.m.

End of Session K

Tuesday, October 13th, 2015

PANEL SESSION 2: GaN on Silicon or GaN on SiC?

5:45 p.m. – 7:15 p.m.

Waterbury – Sheraton New Orleans

Moderators: Wayne Struble, *MACOM*

The market demands for RF power and high power switching at ever increasing supply voltages, power densities, efficiencies, and frequencies, has pushed improvements in both GaN on Silicon and GaN on Silicon Carbide semiconductor technologies. Today's applications using GaN range in frequency from DC to mm-wave and are as diverse as high voltage power switching to linear base-station power to mm-wave low noise amplification. Both GaN substrate technologies have advantages and disadvantages depending on these market segments and end application.

This panel session will debate both the merits and short comings of GaN on Silicon versus GaN on Silicon Carbide technologies as they pertain to cost, performance, reliability and commercial versus non-commercial markets and applications. Which technology will ultimately win? GaN on Silicon? GaN on Silicon Carbide? Both?

Watch as this panel of industry experts “face off” for the ultimate GaN showdown.

A cash bar serving beer, wine, and soft drinks will be provided during this panel session.

Panel Members:

Kazutaka Inoue	<i>Sumitomo Electric Industries</i>
Tom Kazior	<i>Raytheon Company</i>
Kevin Linthicum	<i>MACOM</i>
Elias Reese	<i>Qorvo</i>
Marc Rocchi	<i>Ommic</i>
David Runton	<i>MACOM</i>
Phillip Smith	<i>BAE Systems</i>
Akio Wakejima	<i>Nagoya Institute of Technology</i>
Noriyuki Watanabe	<i>NTT Device Technology Labs</i>

7:15 p.m.

End of Panel Session 2

Wednesday, October 14th, 2015

REGISTRATION AND CONTINENTAL BREAKFAST

7:00 a.m. – 5:00 p.m.

Registration – Waterbury Foyer– Sheraton New Orleans

7:00 a.m. – 8:30 a.m.

Continental Breakfast – Lagniappe

SESSION L: FET Device Concepts and Modeling

8:30 a.m. – 10:00 a.m.

Waterbury – Sheraton New Orleans

Chairpersons: Rob Jones, *Raytheon Company*
Michael Schroter, *TU Dresden/UCSD*

8:30 a.m.

L.1 III-V MOSFETs for future CMOS (Invited)

J. del Alamo, D. Antoniadis, J. Lin, W. Lu, A. Vardi, X. Zhao,
MIT, Cambridge, United States

9:00 a.m.

L.2 High-frequency InGaAs nanowire MOSFETs (Invited)

E. Lind, *Lund University, Lund, Sweden*

9:30 a.m.

L.3 MIT virtual source RF model as a tool for GaN-based LNA and oscillator design

U. Radhakrishna, P. Choi, L.-S. Peh, D. Antoniadis, *MIT, Cambridge, United States*

9:50 a.m.

L.4 Surface-potential-based RF large-signal compact model for Gallium Nitride HEMTs

S. Khandelwal¹, S. Ghosh², Y. Chauhan², B. Iniguez³, T. Fjeldly⁴, ¹*UC Berkeley, Berkeley, United States*; ²*IIT Kanpur, India*; ³*URV, Tarragona, Spain*; ⁴*NTNU, Trondheim, Norway*

10:10 a.m.

End of Session L

10:00 a.m. – 10:30 a.m.

Coffee Break

Wednesday, October 14th, 2015

SESSION M: Millimeter-Wave ICs for Radar and Communication

8:30 a.m. – 10:10 a.m.

Gallery – Sheraton New Orleans

Chairpersons: Shahriar Shahramian, *Alcatel-Lucent*
Herbert Knapp, *Infineon Technologies*

8:30 a.m.

M.1 A Highly Integrated 60-GHz 6-Channel Transceiver Chip in 0.35 μm SiGe Technology for Smart Sensing and Short-Range Communications

I. Nasr¹, E. Karagozler², I. Poupyrev², S. Trotta¹
¹*Infineon Technologies, Neubiberg, Germany*, ²*Google Inc., Mountain View, United States*

8:50 a.m.

M.2 300-GHz Band 20-Gbps ASK Transmitter Module Based on InP-HEMT MMICs

H. Hamada, T. Kosugi, H. Song, M. Yaita, A. E. Moutaouakil, H. Matsuzaki, A. Hirata
NTT Corporation, Atsugi, Japan

9:10 a.m.

M.3 120GHz 256QAM GaAs Transceiver Module for Over-10Gbps Wireless Communications

S. Iino, M. Ito, Y. Wada, T. Kuwabara, T. Marumoto
NEC Corporation, Kawasaki, Japan

9:30 a.m.

M.4 A New Active Quasi-Circulator Structure with High Isolation for 77-GHz Automotive FMCW Radar Systems in SiGe Technology

M. Porranzl¹, C. Wagner², H. Jaeger², A. Stelzer¹
¹*Johannes Kepler Univeristät Linz, Linz, Austria*, ²*DICE, Linz, Austria*

9:50 a.m.

M.5 A 70 GHz Bidirectional Front-End for Half-Duplex Transceiver in 90-nm SiGe BiCMOS

F. Kijsanayotin¹, J. Li¹, J. Buckwalter²
¹*Department of Electrical & Computer Engineering, University of California, San Diego, La Jolla, United States*. ²*Department of Electrical & Computer Engineering, University of California, Santa Barbara, Santa Barbara, United States*

10:10 a.m.

End of Session M

10:00 a.m. – 10:30 a.m.

Coffee Break

Wednesday, October 14th, 2015

SESSION N: High Frequency Devices & Packaging

10:30 a.m. – 12:00 p.m.

Waterbury – Sheraton New Orleans

Chairpersons: Robert Howell, *Northrop Grumman Electronic Systems*
Han Wui Then, *Intel Corp*

10:30 a.m.

N.1 Plasma Mode HEMTs with RTD Gate and Multiple 2DEG Channels for Stable Terahertz Operation (Invited)

J.L. Volakis, S. Bhardwaj, *Ohio State University, Columbus, United States*

11:00 a.m.

N.2 Grating-Induced Frequency Multiplication in Gunn Diodes

D.D. Smith, *Freescale Discovery Labs, Austin, United States*

11:20 a.m.

N.3 Lumped-Element Modeling of Millimeter-Wave HEMT Parasitics via Full-Wave Electromagnetic Analysis

Y. Karisan, C. Caglayan, G.C. Trichopoulos, K. Sertel, *Ohio State University, Columbus, United States*

11:40 a.m.

N.4 A Lossy Electromagnetic Bandgap Structure for Mode Suppression in Chip Scale Packages

W.E. McKinzie III, *WEMTEC, Inc., Fulton, United States*

12:00 p.m.

End of Session N

12:00 p.m. – 1:30 p.m.

Break for Lunch

Wednesday, October 14th, 2015

SESSION O: Circuits for Future Optical Systems

10:30 a.m. – 12:00 p.m.

Gallery – Sheraton New Orleans

Chairpersons: Yuriy Greshishchev, *Ciena Corp.*
Hui Pan, *Broadcom Corp.*

10:30 a.m.

O.1 **A 56-Gb/s Wireline Transceiver in 20nm CMOS (Invited)**
T. Shibasaki, Y. Chen, Y. Doi, H. Takauchi, T. Mori, Y.
Koyanagi, and H. Tamura, *Fujitsu Laboratories, Kawasaki,*
Japan

11:00 a.m.

O.2 **A 56-Gb/s PAM4 InP HBT Driver IC Compensating for
Nonlinearity of extinction curve of EAM**
T. Kishi¹, M. Nagatani¹, S. Kanazawa², W. Kobayashi¹, H.
Yamazaki¹, M. Ida¹, K. Kurishima¹, M. Nogawa², S. Kimura²,
and H. Nosaka¹, ¹*NTT Device Technology Laboratories, NTT*
Corporation, Atsugi, Japan, ²*NTT Device Innovation Center,*
NTT Corporation, Atsugi, Japan

11:20 a.m.

O.3 **59-dBQ 68-GHz Variable Gain-Bandwidth Differential
Linear TIA in 0.7- μ m InP DHBT for 400-Gb/s Optical
Communication Systems**
J.-Y. Dupuy, F. Jorge, M. Riet, V. Nodjiadjim, H. Aubry, and A.
Konczykowska, *III-V Lab, Marcoussis, France*

11:40 a.m.

O.4 **A 15-Gb/s AC-coupled VCSEL Driver with Waveform
Shaping in 65nm CMOS**
V. Kozlov and A.C. Carusone
University of Toronto, Toronto, Ontario, Canada

12:00 p.m.

End of Session O

12:00 p.m. – 1:30 p.m.

Break for Lunch

Wednesday, October 14th, 2015

PANEL SESSION 3: Multi-Physics Simulation: Heavenly Accuracy or Convergence Hell?

12:00 p.m. – 1:30 p.m.

Waterbury– Sheraton New Orleans

Moderators: Rob Jones, *Raytheon Company*
Barry Wu, *Keysight Technologies*

With the proliferation of high power and high voltage GaN IC design, the expansion of 3D chip integration, and growing interest in heterogeneous technology integration, the need for multi-physics simulation capability for design and reliability analysis has never been greater. One good example where such analysis is useful is in the design of reliable inductors, air-bridges, matching networks, and transistors in a very high power GaN solid-state MMIC amplifier in a package or module. While simulation accuracy may be improved with a multi-physics simulation, convergence for multi-transistor designs under highly compressed (or nonlinear) conditions must be maintained in a timely manner for MMIC designers to embrace such capability.

This panel will discuss examples of multi-physics IC simulations and different approaches to achieving efficient multi-physics IC simulations as well as the limitations of current approaches and where further development is needed. Questions for the panel include:

- What IC design problems today could benefit from some form of device model coupled with EM, thermal, and mechanical simulation?
- What form (e.g. compact model to ab initio model) is best for each domain (device physics, EM, thermal, and mechanical) to achieve an accurate and efficient coupled multi-physics simulation?
- What is possible today at the device level?
- Will this ever be a reality for IC design? For module, packaged IC, or heterogeneous/3D integration design?
- What are the limitations for achieving coupled finite element EM, thermal, and mechanical simulations coupled with some form (finite element, equivalent circuit, Verilog behavioral, table-based, etc.) of device simulation? Can efficient convergence be guaranteed? Who should be funding work to overcome the limitations?
- Will designers ever be patient enough for such simulations?

Panel Members:

Peter Aaen	<i>University of Surrey</i>
Chuck Campbell	<i>Qorvo</i>
Colin McAndrew	<i>Freescale Semiconductor</i>
Rick Poore	<i>Keysight Technologies</i>
Weimin Sun	<i>Skyworks Solutions</i>
Larry Williams	<i>ANSYS</i>

Given the time of this panel, the hotel store “Perks” in the lobby has been heavily stocked with sandwiches, snacks, and beverages to quickly grab before the session.

1:30 p.m.

End of Panel Session 3

Wednesday, October 14th, 2015

SESSION P: High Efficiency Amplifiers

1:30 p.m. – 3:10 p.m.

Waterbury – Sheraton New Orleans

Chairpersons: Wayne Struble, *M/A-COM*
Rik Jos, *NXP Semiconductors*

1:30 p.m.

**P.1 High Efficiency GaN HEMT Power Amplifier/Rectifier
Module Design Using Time Reversal Duality (Invited)**

K. Honjo, R. Ishikawa, *The University of Electro-
Communications, Chofu, Japan*

2:00 p.m.

**P.2 Efficiency First: Outphasing Architectures for Power
Amplification of High-PAPR Signals (Invited)**

T. W. Barton, *The University of Texas at Dallas, Richardson,
United States*

2:30 p.m.

P.3 Multi-Level Chireix Outphasing GaN MMIC PA

M. Litchfield, Z. Popović, *University of Colorado at Boulder,
Boulder, United States*

2:50 p.m.

**P.4 Envelope Modulator & X-band MMICs On Highly
Integrated 3D Tunable Microcoax Substrate**

D. F. Kimball¹, H. Kazeimi², J. J. Yan¹, P. T. Theilmann¹,
I. Telleiz¹, G. Collins³,

¹*MaXentric Technologies, LLC, La Jolla, United States*

²*Raytheon Rancho Innovations, Rancho Cucamonga, United
States*

³*Intel, Hillsboro, United States*

3:10 p.m.

End of Session P

3:00 p.m. – 3:30 p.m.

Coffee Break

Wednesday, October 14th, 2015

SESSION Q: Advanced Technology and Circuit Solutions for Optical Communications

1:30 p.m. – 2:50 p.m.

Gallery – Sheraton New Orleans

Chairpersons: Jim Buckwalter, *UCSB*
Thomas Toifl, *IBM Research GmbH*

1:30 p.m.

Q.1 Challenges and Solutions for High-Volume Production in SiGe BICMOS and CMOS Technologies for High-Frequency and Optical Communications (Invited)
P. Galy and P. Chevalier, *STMicroelectronics, Crolles, France*

2:00 p.m.

Q.2 A 112Gb/s 4-PAM Transceiver Chipset in 0.18um SiGe BiCMOS Technology for Optical Communication Systems (Invited)
S. Shahramian¹, J. Lee¹, J. Weiner¹, R. Aroca², Y. Baeyens¹, and Y. K. Chen¹, ¹*Bell Laboratories, Alcatel-Lucent, Murray Hill, United States*, ²*Developed while at Bell Laboratories, currently with Acacia Communications, Hazlet, United States*

2:30 p.m.

Q.3 A Low Noise, DC-135GHz MOS-HBT Distributed Amplifier for Receiver Applications
J. Hoffman¹, S. P. Voinigescu¹, P. Chevalier², A. Cathelin², and P. Schvan³, ¹*University of Toronto, Toronto, Canada*, ²*STMicroelectronics, Crolles, France*, ³*Ciena Corporation, Ottawa, Canada*

2:50 p.m.

End of Session Q

3:00 p.m. – 3:30 p.m.

Coffee Break

SESSION R: Late-Breaking News Papers I

3:30 p.m. – 4:40 p.m.

Waterbury – Sheraton New Orleans

Chairpersons: Harris P. Moyer, *HRL Laboratories*
Pete Zampardi, *Qorvo*

3:30 p.m.

R.1 A X-band Reconfigurable Phased Array Antenna System Using 0.13- μ m SiGe BiCMOS IC with 5-bit IF Phase Shifters

N. Oshima¹, I. Ando¹, Y. Kitagishi², E. Matsumura², S. Kameda³, N. Suematsu³, K. Kunihiro¹, ¹*NEC Corporation, Kawasaki, Japan*, ²*NEC Corporation, Fuchu, Japan*, ³*Tohoku University, Sendai, Japan*

3:20 p.m.

R.2 A 240GHz Synthesizer in 55nm SiGe BiCMOS

S. Shopov¹, J. Hasch², P. Chevalier³, A. Cathelin³, S. P. Voignescu¹, ¹*University of Toronto, Toronto, Canada*, ²*Robert Bosch GmbH, Stuttgart, Germany*, ³*STMicroelectronics, Crolles, France*

3:40 p.m.

R.3 A SiGe-Based D-Band Fundamental-Wave VCO with 9 dBm Output Power and -185 dBc/Hz FoMT

F. Ahmed¹, M. Furqan¹, B. Heinemann², A. Stelzer¹, ¹*Johannes Kepler University, Linz, Austria*, ²*IHP GmbH, Frankfurt (Oder), Germany*

4:00 p.m.

R.4 A MMIC GaN HEMT Voltage-Controlled-Oscillator with High Tuning Linearity and Low Phase Noise

T. N. Do, S. Lai, M. Hörberg, H. Zirath, D. Kuyslentierna, *Chalmers University of Technology, Gothenburg, Sweden*

4:20 p.m.

R.5 A 9–81/38–189 GHz Dual-Band Switchable Dynamic Frequency Divider

J. Al-Eryani^{1,2}, H. Knapp², H. Li², K. Aufinger², J. Wursthorn^{2,1}, S. Majied², L. Maurer¹, ¹*Universitaet der Bundeswehr Muenchen, Neubiberg, Germany*, ²*Infineon Technologies AG, Neubiberg, Germany*

4:40 p.m.

End of Session R

Wednesday, October 14th, 2015

SESSION S: Late-Breaking News Papers II

3:30 p.m. – 4:20 p.m.

Gallery – Sheraton New Orleans

Chairpersons: Charles F. Campbell, *Qorvo*
Jim Carroll, *NI-AWR Group*

3:30 p.m.

Student Paper Competition Winner Pronouncement

3:35 p.m.

S.1 **A Novel 100 MHz-45 GHz GaN HEMT Low Noise Non-Gate-Terminated Distributed Amplifier based on a 6-inch 0.15 μ m GaN-SiC mm-Wave Process Technology**
K. W. Kobayashi, D. Denninghoff, D. Miller, *Qorvo, Torrance, United States*

3:25 p.m.

S.2 **A 6-41 GHz Distributed Amplifier with Supply Scaling for Efficiency Enhancement**
S. C. S. Levy, J. F. Buckwalter, *University of California San Diego, La Jolla, United States*

3:45 p.m.

S.3 **A Study of GaN HEMTs Current Collapse Impacts on Doherty Multistage PA Linearity**
Y. Murao, M. Hayakawa, K. Ohgami, T. Kaneko, *NEC Corporation, Kawasaki, Japan*

4:05 p.m.

S.4 **A 140–180-GHz Broadband Amplifier with 7 dBm OP1dB and 400 GHz GBW in SiGe BiCMOS**
M. Furqan¹, F. Ahmed¹, H. Rucker², A. Stelzer¹, ¹*Johannes Kepler University, Linz, Austria*, ²*IHP GmbH, Frankfurt (Oder), Germany*

4:25 p.m.

End of Session S

4:40 p.m.

Close of Symposium

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jean.bae@ieee.org

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445 Hoes Lane, Piscataway, NJ 08854 USA
Phone: + 1-732-562-5441
Email: l.lelong@ieee.org

EXHIBIT MANAGEMENT

Candi Wooldridge

Exhibit Coordinator
MP Associates, Inc.
1721 Box Elder St., Ste. 107
Louisville, CO, 80027, USA
Tel: (310) 530-4562
FAX: (310) 530-4334
Email: candi@mpassociates.com

Susie Horn

Director of Exhibits Operations
MP Associates, Inc.
1721 Box Elder St., Ste. 107
Louisville, CO, 80027, USA
Tel: (310) 530-4562
FAX: (310) 530-4334
Email: susie@mpassociates.com

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Sheraton New Orleans Hotel
500 Canal Street
New Orleans, LA, USA, 70130
Tel: +1 504 525 2500
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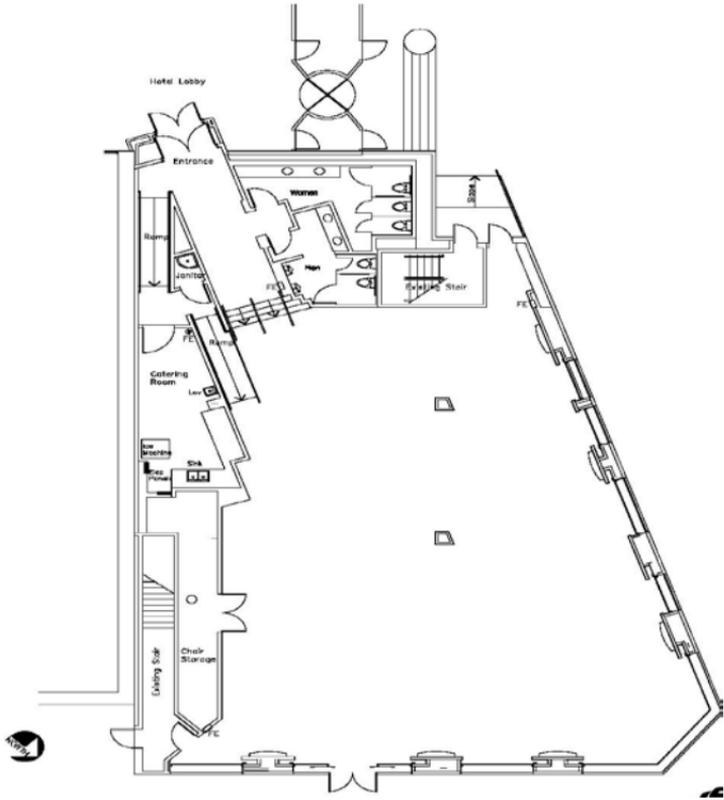
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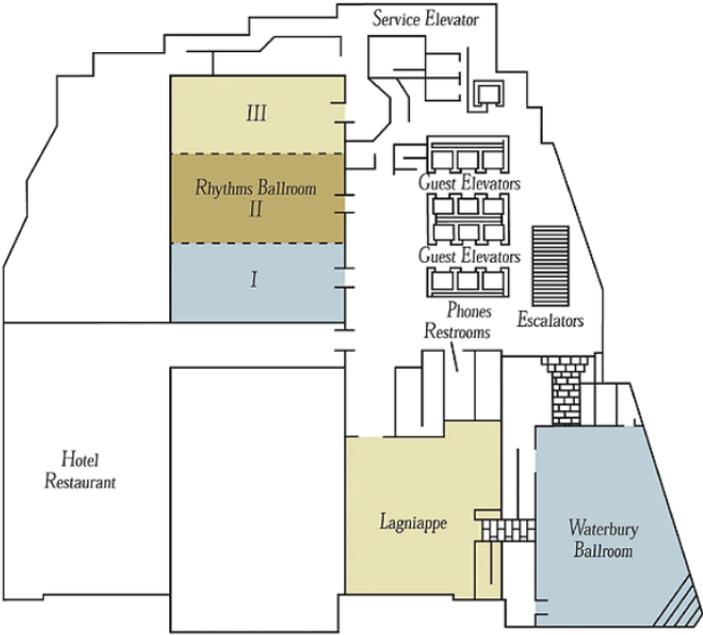
EXHIBITOR INFORMATION

Contact: **Candi Wooldridge**
Exhibit Coordinator
MP Associates, Inc.
1721 Box Elder St., Ste. 107
Louisville, CO, 80027, USA
Tel: (310) 530-4562
FAX: (310) 530-4334
Email: candi@mpassociates.com

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CSICS Week – Schedule Overview

Please note that the times are approximate. Please refer to the detailed schedule on pp. 2 and 3.

CSICS 2015 Technical Program

		Saturday October 10		Sunday October 11		Monday October 12		Tuesday October 13		Wednesday October 14	
7:00 - 7:30 AM											7:00 - 7:30 AM
7:30 - 8:00 AM				Short Course Breakfast <i>Estherwood</i>		Continental Breakfast <i>Lagniappe</i>		Continental Breakfast <i>Rhythms</i>		Continental Breakfast <i>Lagniappe</i>	7:30 - 8:00 AM
8:00 - 8:30 AM				Short Course 1 GaN HEMT Modeling <i>Nottoway</i>		Symposium Opening Session A: Plenary Waterbury		Session F Adv. MMW and THz MMICs Waterbury		Session L FET Modeling and Concepts Waterbury	8:00 - 8:30 AM
8:30 - 9:00 AM				AM Break -		Break		Session G HBT Modeling Waterbury		Session M MMW ICs for Radar&Comm Waterbury	8:30 - 9:00 AM
9:00 - 9:30 AM						Session A: Plenary (cont'd) Waterbury		Break		Session N High Freq Devices Waterbury	9:00 - 9:30 AM
9:30 - 10:00 AM								Panel 1 Next Generation Optical Modules Waterbury		Session O Ckts. Future Opt Sys Waterbury	9:30 - 10:00 AM
10:00 - 10:30 AM								Exhibition Luncheon <i>Rhythms</i>		Panel 3 Multi-Physics Simulations Waterbury	10:00 - 10:30 AM
10:30 - 11:00 AM				Short Course 1 GaN HEMT Modeling <i>Nottoway</i>		Lunch (on your own)		Session H Opt. Coherent Xcvr Waterbury		Session P High Eff. Amps Waterbury	10:30 - 11:00 AM
11:00 - 11:30 AM								Session I GaN PA Tech Waterbury		Session Q Adv. Ckts. Opt. Comm Waterbury	11:00 - 11:30 AM
11:30 - 12:00 PM				Short Course Lunch <i>Estherwood</i>		Session B SI Tech for Next Gen. Waterbury		Session J Emerging SubMMW dev. Waterbury		Session R Late Breaking News I Waterbury	11:30 - 12:00 PM
12:00 - 12:30 PM								Session K Power Technologies Waterbury		Session S Late Breaking News II Waterbury	12:00 - 12:30 PM
12:30 - 1:00 PM								Break		Break	12:30 - 1:00 PM
1:00 - 1:30 PM				Short Course 1 GaN Modeling <i>Nottoway</i>		Session C Thermal Management Waterbury		Session D E to G-Band PAs Waterbury		Session T Late Breaking News III Waterbury	1:00 - 1:30 PM
1:30 - 2:00 PM								Session E SI Photonics Waterbury		Registration - Grand Foyer	1:30 - 2:00 PM
2:00 - 2:30 PM								Break		Registration - Grand Foyer	2:00 - 2:30 PM
2:30 - 3:00 PM				Break				Session F SI Photonics PAs Waterbury		Registration - Grand Foyer	2:30 - 3:00 PM
3:00 - 3:30 PM				Short Course 2 Pwr Con & ET SI RF Design <i>Nottoway</i>		Session D E to G-Band PAs Waterbury		Session G Emerging SubMMW dev. Waterbury		Registration - Grand Foyer	3:00 - 3:30 PM
3:30 - 4:00 PM								Session H Emerging SubMMW dev. Waterbury		Registration - Grand Foyer	3:30 - 4:00 PM
4:00 - 4:30 PM				Break				Session I GaN PA Tech Waterbury		Registration - Grand Foyer	4:00 - 4:30 PM
4:30 - 5:00 PM								Session J Emerging SubMMW dev. Waterbury		Registration - Grand Foyer	4:30 - 5:00 PM
5:00 - 5:30 PM				Short Course 2 Pwr Con & ET SI RF Design <i>Nottoway</i>		Session E SI Photonics Waterbury		Session K Power Technologies Waterbury		Registration - Grand Foyer	5:00 - 5:30 PM
5:30 - 6:00 PM								Session L Emerging SubMMW dev. Waterbury		Registration - Grand Foyer	5:30 - 6:00 PM
6:00 - 6:30 PM				Short Course 2 Pwr Con & ET SI RF Design <i>Nottoway</i>		Exhibition Opening Reception <i>Rhythms</i>		Panel 2 GaN on Silicon or GaN on SiC? Waterbury		Registration - Grand Foyer	6:00 - 6:30 PM
6:30 - 7:00 PM								Exhibition		Registration - Grand Foyer	6:30 - 7:00 PM
7:00 - 7:30 PM				Opening Cocktail <i>Lagniappe</i>						Registration - Grand Foyer	7:00 - 7:30 PM
7:30 - 8:00 PM										Registration - Grand Foyer	7:30 - 8:00 PM

NOTES

