



**1999**  
**21<sup>ST</sup> IEEE GaAs IC**  
**SYMPOSIUM**

# Program

**Presenting:**

**Making Waves In Monterey**

**Oct. 17 – 20, 1999**

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**Monterey, California**



**CO- SPONSORED BY**  
**The IEEE Electron Devices Society,**  
**The IEEE Microwave Theory and**  
**Techniques Society, and**  
**The IEEE Solid-State Circuits Society**

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## SYMPOSIUM

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### **SATURDAY, OCTOBER 16, 1999**

REGISTRATION (Short Course & Primer Course Only)

### **SUNDAY, OCTOBER 17, 1999**

REGISTRATION (Short Course & Primer Course Only)

#### **Continental Breakfast for Short Course**

SHORT COURSE: " Millimeter-wave Systems: Little Waves with a Big Impact."

GaAs Reliability Workshop

#### **Short Course Lunch**

REGISTRATION for Symposium (and Primer Course until 5:30)

PRIMER COURSE: "Basics of GaAs ICs"

#### **Symposium Opening Reception**

### **MONDAY, OCTOBER 18, 1999**

REGISTRATION

#### **Continental Breakfast**

SYMPOSIUM OPENING

SESSION A: Plenary Session

Break For Lunch

PANEL SESSION 1: InP Commercial Devices... When?

PANEL SESSION 2: Is Ion Implantation Dead or Dying?

SESSION B: Application Driven Device Technology

SESSION C: HBTs and Novel Materials

#### **GaAs IC Technology Exhibition Opening Reception**

SEMI Compound Semiconductor Standards Committee Meeting

### **TUESDAY, OCTOBER 19, 1999**

REGISTRATION

#### **Continental Breakfast**

GaAs IC TECHNOLOGY EXHIBITION

SESSION D: Advanced Power Amplifier Design

SESSION E: Electro-Optic and Opto-Electronic Integrated Circuits

SESSION F: Millimeter Wave Circuits and Front-End Devices

SESSION G: FET Power Amplifiers

#### **Exhibition Luncheon**

SESSION H: Millimeter Wave Power Amplifiers

SESSION I: Device/Process Optimization & Hot Electron Effects

PANEL SESSION 3: Let's Abandon Digital GaAs and Concentrate On What It's Good For

VENDOR PRODUCT FORUM: New, Improved, Low Cost, WOW

#### **Symposium Party**

### **WEDNESDAY, OCTOBER 20, 1999**

REGISTRATION

#### **Continental Breakfast**

SESSION J: High Speed InP HBT ICs

SESSION K: Frequency Converter and Transceiver MMICs

SESSION L: Metamorphic HEMTs for Low Noise & High Power Millimeter Wave Applications

Break For Lunch

PANEL SESSION 4: Small Waves with BIG Problems: Packaging Issues. Who has the Solution ???!

SESSION M: Millimeter Wave Sources, Dividers, & Multipliers

SESSION N: Novel Control Circuits and Devices

SESSION O: Mixed Signal and Digital ICs

#### **Close of Symposium**

**Visit us on the World-Wide Web at:  
<http://www.gaasic.org/>**

**Coffee Breaks:**

Primer Course and Short Course Registrants (only) –

Sunday, October 17<sup>th</sup> : North Foyer-Marriott Hotel

Symposium Registrants -

Monday, October 18<sup>th</sup> : De Anza Foyer-DoubleTree Hotel

Tuesday, October 19<sup>th</sup>: Serra I Ballroom-MCC

Wednesday, October 20<sup>th</sup>: De Anza Foyer-DoubleTree Hotel

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## AT A GLANCE

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|-----------------------------|--|
| 6:00 p.m.-8:00 p.m.         | Portola Room-DoubleTree Hotel                                |
| 7:00 a.m.-8:00 a.m.         | DeAnza Foyer-DoubleTree Hotel                                |
| <b>7:00 a.m.-7:45 a.m.</b>  | <b>San Carlos North Foyer-Marriott</b>                       |
| 8:00 a.m.-4:45 p.m.         | San Carlos IV-Marriott Hotel                                 |
| 8:00 a.m.-5:00 p.m.         | DeAnza III-DoubleTree Hotel                                  |
| <b>12:20 p.m.-1:30 p.m.</b> | <b>Ferrantes Bayview-Marriott Hotel</b>                      |
| 5:00 p.m.-8:00 p.m.         | De Anza Foyer-DoubleTree Hotel                               |
| 5:30 p.m.-8:30 p.m.         | San Carlos IV-Marriott Hotel                                 |
| <b>5:00 p.m.-8:00 p.m.</b>  | <b>DeAnza Foyer-DoubleTree Hotel</b>                         |
| 7:00 a.m.-5:00 p.m.         | De Anza Foyer-DoubleTree Hotel                               |
| <b>7:00 a.m.-8:00 a.m.</b>  | <b>De Anza Foyer-DoubleTree Hotel</b>                        |
| 8:00 a.m.-8:30 a.m.         | De Anza I & II-DoubleTree Hotel                              |
| 8:30 a.m.-11:30 a.m.        | De Anza I & II-DoubleTree Hotel                              |
| 11:30 a.m.-12:30 p.m.       |  |
| 12:30 p.m.-2:00 p.m.        | De Anza I-DoubleTreeHotel                                    |
| 12:30 p.m.-2:00 p.m.        | De Anza II-DoubleTree Hotel                                  |
| 2:30 p.m.-4:20 p.m.         | De Anza I-DoubleTree Hotel                                   |
| 2:30 p.m.-4:20 p.m.         | De Anza II-DoubleTree Hotel                                  |
| <b>5:00 p.m.-7:00 p.m.</b>  | <b>Serra I Ballroom-Monterey<br/>Conference Center (MCC)</b> |
| 8:00 p.m.-10:00 p.m.        | TBA  |
| 7:00 a.m.-5:00 p.m.         | De Anza Foyer-Double Tree Hotel                              |
| <b>7:30 a.m.-8:30 a.m.</b>  | <b>Serra I Ballroom-MCC</b>                                  |
| 7:30 a.m.-4:00 p.m.         | Serra I Ballroom-MCC   |
| 8:30 a.m.-10:00 a.m.        | De Anza I-DoubleTree Hotel                                   |
| 8:30 a.m.-10:00 a.m.        | De Anza II-DoubleTree Hotel                                  |
| 10:30 a.m.-12:00 p.m.       | De Anza I-DoubleTree Hotel                                   |
| 10:30 a.m.-12:00 p.m.       | De Anza II-DoubleTree Hotel                                  |
| <b>12:00 noon-1:30 p.m.</b> | <b>Serra I Ballroom-MCC</b>                                  |
| 1:30 p.m.-2:50 p.m.         | De Anza I-DoubleTree Hotel                                   |
| 1:30 p.m.-2:50 p.m.         | De Anza II-DoubleTree Hotel                                  |
| 3:20 p.m.-4:50 p.m.         | De Anza I-DoubleTree Hotel                                   |
| 3:20 p.m.-4:50 p.m.         | De Anza II-DoubleTree Hotel                                  |
| <b>7:00 p.m.-10:00 p.m.</b> | <b>Monterey Aquarium</b>                                     |
| 7:00 a.m.-12:00 noon        | De Anza Foyer-DoubleTree Hotel                               |
| <b>7:30 a.m.-8:30 a.m.</b>  | <b>De Anza Foyer-DoubleTree Hotel</b>                        |
| 8:30 a.m.-9:50 a.m.         | De Anza I-DoubleTree Hotel                                   |
| 8:30 a.m.- 9:50 a.m.        | De Anza II-DoubleTree Hotel                                  |
| 10:20 a.m.-11:30 a.m.       | De Anza I-DoubleTree Hotel                                   |
| 11:30 a.m.-1:00 p.m.        |  |
| 1:00 p.m.-2:40 p.m.         | De Anza I-DoubleTree Hotel                                   |
| 1:00 p.m.-2:40 p.m.         | DeAnza II-DoubleTree Hotel                                   |
| 3:10 p.m.-4:30 p.m.         | De Anza I-DoubleTree Hotel                                   |
| 3:10 p.m.-4:30 p.m.         | De Anza II-DoubleTree Hotel                                  |
| <b>4:30 p.m.</b>            |  |

<http://www.gaasic.org/>

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# CHAIRMAN'S MESSAGE

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On behalf of the organizing committee and the IEEE EDS, MTT-S, and SSCS, I invite you to be a part of the upcoming 21st (1999) IEEE GaAs IC Symposium. This year's symposium will be held October 17th to the 20th in the beautiful city of Monterey, California at the DoubleTree and Marriott Hotels by Fisherman's Wharf on the Monterey Peninsula. The GaAs IC Symposium continues its tradition of presenting the best from around the world in GHz frequency microelectronics. Forty percent of this year's technical papers come from outside the US. This year's program continues to demonstrate the strong growth in traditional commercial wireless applications, as well as an explosion of many new applications utilizing mm wave technologies. Major focus areas of this year's GaAs IC Symposium, organized by Jim Komiak and the Technical Program Committee, include state-of-the-art circuits and technology for:

- Wireless and broadband communications
- Very high-speed digital communications
- Highly-efficient, linear, power amplifiers
- Interface electronics and signal processing
- mm-wave defense and commercial systems

The technical sessions will highlight: GaAs IC manufacturing issues, new device development; device modeling, characterization, reliability; design techniques, and software.

This 21st IEEE GaAs IC Symposium continues our tradition of providing focused educational opportunities through our Short Course and Primer Course, both held on Sunday, October 17th. John Sitch has organized a very interesting and highly applicable one-day Short Course on "Millimeter Wave Systems" taught by five industry experts. In addition, Stephen Long and Donald Estreich will once again present our Primer Course on the "Basics of GaAs ICs" which is not only an excellent tutorial but is presented within the context of this year's symposium submissions.

To complement the full technical program, we have provided several social events to allow interactions with colleagues while catching up with the newest technology available on the market. These events include the Sunday evening Opening Reception, the Monday evening Technology Exhibition Reception in the GaAs IC Technology Exhibition Hall, and the Tuesday evening theme party at the world renowned Monterey Bay Aquarium.

We will provide the GaAs IC Technology Exhibition with approximately 40 exhibitors for you to learn of new products just hitting the market for our business. Additionally, potential customers for the latest commercially available GaAs ICs can learn about these in the Vendor Product Forum.

Finally, I want to announce the winner of our 2nd Outstanding Paper Award from the 1998 Symposium to T. Low et al. from Hewlett Packard for their paper "Migration from an AlGaAs to an InGaP Emitter HBT IC Process for Improved Reliability."

We hope you'll join us in Monterey for the 21st IEEE GaAs IC Symposium. We know that we have an outstanding technical and educational program to support our business.

Mark Wilson  
Chairman

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# **CORPORATE BENEFACTORS**

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This year, we are proud to continue with the GaAs IC Symposium Corporate Benefactors Program. This program allows companies interested in our technical area 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.

This year's Advanced Benefactors at the writing of the advance program are:

**ANADIGICS  
and  
INFINEON AG  
and  
NORTEL NETWORKS  
and  
SUMITOMO ELECTRIC**

We thank them for their generosity, and look forward to the continued support from the corporate sector in future years.

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# GENERAL INFORMATION

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**IEEE 21<sup>st</sup> GaAs IC Symposium**  
**October 17-20, 1999**  
**Doubletree Hotel-Marriott Hotel**  
**Monterey, California**  
**REGISTRATION**

|   | <u>Advance</u><br>(Received by<br>Sept 17) | <u>Regular</u><br>(After Sept 17<br>or on site) |
|---|--|---|
| <b>Symposium Registration</b>   |  |   |
| IEEE Member   | \$380                                      | \$430   |
| Non-IEEE  | \$430                                      | \$480   |
| Student   | \$120                                      | \$145   |
| <b>Special 1-day Registration</b><br>(sessions only, no digest or social) |  |   |
| IEEE Member   | \$200                                      | \$225   |
| Non-IEEE  | \$225                                      | \$250   |
| <b>Short Course</b>   |  |   |
| Student Registration  | \$365                                      | \$395   |
|   | \$100                                      | \$125   |
| <b>GaAs IC Primer Course</b>  |  |   |
| Regular Registration  | \$180                                      | \$180   |
| Student Registration  | \$60                                       | \$60  |
| <b>Technical Digest Only</b>  | \$65                                       | \$65  |
| <b>Short Course Notes Only</b>  | \$85                                       | \$85  |
| <b>Digest CD ROM Only</b>   | \$75                                       | \$75  |
| <b>Primer Course Notes Only</b>   | \$55                                       | \$55  |
| <b>Extra Reception Ticket</b>   | \$25                                       | \$25  |
| <b>Extra Theme Party Ticket</b>   | \$50                                       | \$50  |

The full Symposium registration fee includes: attendance at all technical sessions and panels; one copy of the Technical Digest; continental breakfasts; and morning and afternoon coffee breaks. Also included are admittance to: the Sunday Opening Reception; the GaAs IC Technology Exhibition Opening Reception on Monday; all exhibits; the Vendor Product Forums; and the exciting Tuesday evening Theme Party. The special 1-day registration fee, however, does not include the digest and social activities. Additional copies of the Technical Digest and of the Short Course Notes will be available for purchase at the Symposium.

For **ADVANCE REGISTRATION**, complete the enclosed Advance Registration Form with your remittance of the appropriate fee (check or credit card) **BY September 17, 1999** to:

Registrar, 1999 IEEE GaAs IC Symposium  
c/o IEEE  
445 Hoes Lane  
P.O. Box 1331  
Piscataway, NJ 08855-1331  
USA  
Tel: (732) 562-3870  
FAX (732) 981-1203  
email: 99gaasreg@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 "1999 IEEE GaAs IC Symposium" 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.

**We urge you to preregister** 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 at the Portola Room of the DoubleTree Hotel on Saturday and the De Anza Foyer of the DoubleTree Hotel for Sunday through Wednesday. The operating hours will be as follows:

### Short & Primer Course Registration only

|                      |                               |
|----------------------|-------------------------------|
| Saturday, October 16 | 6:00 p.m. - 8:00 p.m.         |
| Sunday, October 17   | 7:00 a.m. - 8:00 a.m.         |
| Sunday, October 17   | 5:00 p.m. - 5:30 p.m.(Primer) |

### Symposium Registration

|                       |                        |
|-----------------------|------------------------|
| Sunday, October 17    | 5:00 p.m. - 8:00 p.m.  |
| Monday, October 18    | 7:00 a.m. - 5:00 p.m.  |
| Tuesday, October 19   | 7:00 a.m. - 5:00 p.m.  |
| Wednesday, October 20 | 7:00 a.m. - 12:00 noon |

## **Refund Policy:**

Please note that after September 17, 1999, your Advance Registration fee, Short Course fee, GaAs IC Primer fee, and fees for additional Symposium Technical Digest, or Reception/Party ticket fees are not refundable. Full refunds less \$50 handling fee will be granted for cancellations received in writing by September 17, 1999. The letter to the Symposium Registrar (see address at IEEE above) requesting the refund should state the preregistrant's name and to whom the refund check should be made payable. All refunds will be processed after the Symposium. **NO PRE-REGISTRATION REFUNDS WILL BE GRANTED AFTER SEPTEMBER 17, 1999.**

# ACCOMMODATIONS

## Hotel Reservations:

A block of rooms has been reserved at special discounted rates for Symposium participants at our two headquarters hotels, the DoubleTree Hotel Monterey and the Monterey Marriott Hotel. They are both located in the heart of Monterey, adjacent to the Monterey Conference Center overlooking scenic Fisherman's Wharf and the Monterey Bay, only four miles from the Monterey Peninsula Airport.

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

DoubleTree Hotel Monterey, 2 Portola Plaza, Monterey, CA 93940  
Phone: 831-649-4511

Monterey Marriott Hotel, 350 Calle Principal, Monterey, CA 93940  
Phone: 831-649-4234

The Symposium will be held in the DoubleTree Hotel, the Short Course in the Marriott Hotel and the Exhibition in the adjoining Monterey Conference Center. We ask you to please support your Symposium and more fully enjoy all the activities by staying at our official headquarters hotels.

Room reservations should be made as soon as possible, and no later than September 17, 1999. Rooms are available at the special Symposium group rates of \$140 single or double per night. These rates do not include state and local taxes, currently 10% plus 15% tourism tax per night. A limited number of rooms have been set aside for the use of U.S. government employees. To make a reservation, please call either hotel at:

**DoubleTree 831-649-4511X146 Reservations**

**Marriott 831-649-4234 ask for Reservations**

and be certain to request the **Special Group Rate for the IEEE GaAs IC Symposium**. Please do not call any regional hotel chain 800 number, since they will not be aware of our special arrangements.

It is recommended that you call the hotels direct thereby obtaining an immediate confirmation. If you choose to mail or fax your request, be sure to follow up on it. For both hotels, after the September 17, 1999 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 DoubleTree up to 24 hours prior to your scheduled arrival, and by 6 pm on the day of arrival for the Marriott.

# TRANSPORTATION

## Special Airfares:

Special discounted airfares for the 1999 IEEE GaAs IC Symposium held in Monterey California on October 17-20, 1999 have been negotiated with Continental and United Airlines. Continental

Airlines is offering a 10% discount off the lowest available super-saver fares, and a 13% discount off coach fares. United Airlines is offering a 5% discount off the lowest available super-saver fares and a 10% discount off coach fares. If booked 60 days in advance, both airline carriers are offering an advance booking incentive that increases the discount by an additional 5%. Where super-saver fares or Saturday night stays are not applicable, both Continental and United are also offering zone fares. Discounted airfares are also available on other airline carriers. Please call IEEE Travel Services for availability. Some restrictions apply and airfares are guaranteed to be lowest available at the time of ticketing. Special rates have also been negotiated with Hertz rental car company

Travel arrangements using the designated carriers, or the carrier of your choice may be made through IEEE Travel Services by calling (800) TRY-IEEE, (800) 879-4333 within the U.S. and Canada. Outside the U.S., call (732) 562-5387 between the hours of 8:30 a.m. and 5:30 p.m. EST, Monday through Friday. Or, you may visit our new on-line travel service web site at [www.ieee.org/travelonline](http://www.ieee.org/travelonline). This secure site offers simple and convenient service through which you can search, reserve, and ticket your travel anytime, anywhere.

You may also fax requirements to the IEEE Travel Service at (732) 562-8815. When faxing, please be sure to include your travel dates, departure time, phone and fax numbers. A Travel Counselor will contact you promptly.

## **Airport Transportation:**

The Monterey Peninsula Airport, serving one of the world's favorite destinations for both business and pleasure, offers commercial service with convenient connecting flights to and from anywhere in the world. Or you can fly into the area's major airports, San Jose and San Francisco, and take the scenic drive to Monterey.

## **Driving Directions:**

From Monterey Peninsula Airport/Highway 68 from Salinas:

Take the Monterey Fisherman's Wharf exit, at first light turn right onto Aguajito, turn left onto Del Monte, at third light get into left lane and the DoubleTree will be to your right and the Marriott to your left on Calle Principal.

From North on Highway 1:

Take the Del Monte/Pacific Grove exit, at seventh light, get into the left lane until the DoubleTree will be to your right and the Marriott to your left on Calle Principal.

From South/Carmel on Highway 1:

Take the Aguajito exit, turn left at the first light (going under the freeway), follow Aguajito to Del Monte, turn left onto Del Monte, at third light get into left lane and the DoubleTree will be to your right and the Marriott to your left on Calle Principal.

## **ADDITIONAL INFORMATION**

## **Message Desk:**

A Symposium Message Desk will be in operation in the Registration area during registration hours from Sunday, October 17 at 5 pm to Wednesday, October 20 at noon. Please advise callers who wish to reach you during the day to ask the hotel operator for the IEEE GaAs IC Symposium message desk. The Hotel's main telephone numbers are:

DoubleTree: 831-649-4511

Please check the message board periodically during the Symposium.

## **Distribution of Relevant Information:**

The GaAs IC 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 GaAs IC industry. Printed material of any form will not be allowed to indiscriminately proliferate the registration area, hallways, lobbies, or other gathering areas, in proximity to the Symposium, technical sessions, evening social activities, panel sessions, or the exhibition.

## **Meeting Room Locations:**

The Technical Sessions, Vendor Product Forums and Panel Sessions will all take place at the DoubleTree Hotel's De Anza Ballrooms; the Short Course and Primer Course will take place at the Marriott Hotel's San Carlos IV Ballroom; the GaAs IC Tech Exhibition will be held in the Serra I Ballroom of the Monterey Conference Center, adjacent to the DoubleTree Hotel. Please refer to the 'Symposium at a Glance' (inside front cover) and the locator map (inside back cover) for specific room locations.

## **No Photographic and/or Recording Equipment:**

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

## **Breakfasts:**

On Sunday, October 17 a continental breakfast will be available for Short Course registrants only in the San Carlos Foyer, Marriott Hotel. On Monday, Tuesday and Wednesday there will be a complimentary continental breakfast for all Symposium attendees to be held in the De Anza Foyer, DoubleTree Hotel on Monday and Wednesday and at the GaAs IC Technical Exhibition on Tuesday in the Serra I Ballroom of the Monterey Conference Center.

## **Coffee Breaks:**

The locations of coffee breaks will be as follows:

Short Course Registrants (only) –

Sunday, October 17<sup>th</sup>: North Foyer, Marriott

Primer Course Registrants (only) –

Sunday, October 17<sup>th</sup> : North Foyer, Marriott

Symposium Registrants –

Monday, October 18<sup>th</sup>: De Anza Foyer-DoubleTree

Tuesday, October 19<sup>th</sup>: Serra I Ballroom (MCC)

Wednesday, October 20<sup>th</sup> De Anza Foyer-DoubleTree

## **Symposium Social Events:**

### **SYMPOSIUM OPENING RECEPTION**

We welcome you to Monterey on Sunday evening, October 17 from 5:00 p.m. to 8:00 p.m. in the DeAnza Foyer DoubleTree Hotel. 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, and extra tickets may be purchased at registration for \$25.

### **EXHIBITION OPENING RECEPTION**

Our exhibitors are hosting a reception to mark the exhibition opening on Monday, October 18 from 5:00 p.m. to 7:00 p.m. Every Symposium participant is invited to enjoy the hors d'oeuvres, to schmooze and cruise the exhibits in the Serra I Ballroom of the Monterey Conference Center.

### **EXHIBITION LUNCH**

On Tuesday at 12 noon the Exhibition Luncheon will be hosted in the Serra I Ballroom of the Monterey Conference Center. 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.

### **SYMPOSIUM PARTY**

Join us for the Symposium Theme Party on Tuesday, October 19, from 7:00 pm to 10:30 pm in the Outer Bay Wing at the world-famous Monterey Aquarium. Buses will be provided for transportation to the aquarium and back. The Outer Bay Wing of the aquarium has been open for only three years and depicts marine life 60 miles offshore in the Monterey Canyon. Among the highlights are the United States' largest collection of jellyfish and a huge million-gallon tank filled with exotic species. This tank is the largest window on the ocean in the world with a visible area of 55 feet long and 17 feet high. In addition, the "Mysteries of the Deep" exhibit, which opened earlier this year, provides a fascinating view of over 40 species collected from waters as deep as 3,300 feet below the ocean's surface. Many of these unique sea animals are not currently on live display anywhere else in the world. Along with these spectacular displays of nature, we will offer an excellent dinner buffet featuring the best of California cuisine, beer, and wine. This fascinating atmosphere and the good food and refreshments will provide an excellent atmosphere 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 \$50.

As a special offer to GaAs IC Symposium attendees and their families and friends, the aquarium is offering additional tickets for sale at a reduced rate of \$6.95 per person for aquarium visits on either Saturday,

Sunday, or Monday before the Party. Interested individuals should notify our local arrangements chair, Tim Henderson (thenderson@tqtx.com) before September 24 for further details and information on how to participate in this offer. Tickets will be purchased directly by the Symposium and distributed by the Symposium to participants.

For further information on the attractions of the Monterey Aquarium, please visit their website at [www.mbayaq.org](http://www.mbayaq.org).

## **Monterey Attractions:**

Among the many features Monterey itself has to offer is historic Cannery Row, a popular visitor area offering a multitude of unique galleries, shops, wine tasting rooms, and restaurants. Fisherman's Wharf, once the center of Monterey's fishing industry, also offers seafood restaurants, fish markets, and specialty shops. Sight-seeing and whale-watching charter and tour companies operate off the wharf daily. Within driving distance of Monterey are numerous wineries offering tours, as well as opportunities for scenic hiking, biking, water sports, golf, and even rock climbing.

## **Weather:**

There is a significant variance in temperatures and weather patterns throughout Monterey County. The average maximum for October in the Monterey Peninsula is 70.4 F and the average minimum 50.8 F. It is advisable to dress in layers, with light to medium weight clothes during the day, and sweaters and jackets at night. For weather information, call 831-656-1725.

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# SYMPOSIUM HIGHLIGHTS

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## Technical Program:

This year's quality technical program focuses on III-V and other compound semiconductor integrated circuits and their associated technologies. The program explores the utilization of these technologies in analog, microwave, millimeter-wave, digital, mixed-signal, and optoelectronic ICs. Featured components of the program are: 62 regular and invited papers (an increase of 12 % compared to 1998); the Short Course "Millimeter-wave Systems---Little Waves With a Big Impact "; the GaAs IC Primer Course (for those wishing to get better acquainted with III-V IC technology and to set the stage for this year's technical sessions); and 4 thought-provoking Panel Sessions. The technical papers and panel sessions illustrate the ever increasing frequencies and data rates that GaAs is penetrating in the commercial market place. In the commercial arena, we are once again pleased to present a Vendor Product Forum (announcing the latest in III-V IC products, simulation software, foundry services, and measurement capability), and the Technology Exhibition. We've tried to arrange the sessions to minimize overlap of common interests while providing opportunities for informal discussions.

This year's Technical Sessions truly reflect the international scope of the Symposium with 43 % of the papers coming from outside the USA. Similarly we have expert Panel Session participants coming from around the globe to provide a broad perspective on four controversial and thought-provoking topics:

1. **InP Commercial Devices . . . When?**
2. **Is Ion Implantation Dead or Dying?**
3. **Let's Abandon Digital GaAs and Concentrate On What It's Good For.**
4. **Small Waves with BIG Problems: Packaging Issues. Who Has The Solution?**

As we approach the millennium, we are featuring a Plenary Session that reflects on the past history of GaAs ICs and looks forward to the future. We hope you will share in our excitement over this year's outstanding technical program which offers a variety of stimulating sessions and plenty of opportunities to exchange ideas (and phone numbers) with new business associates and old friends.

## Short Course:

This year the GaAs IC Symposium will present the fourteenth in a series of Short Courses applicable to various aspects of GaAs technology. This year's course entitled "Millimeter-wave Systems---Little Waves With a Big Impact" will consist of a series of tutorial and exemplary presentations and will be held on Sunday, October 17<sup>th</sup> from 8:00 a.m. to 4:45 p.m.

This one day course is designed to provide participants with insights into the technology underlying Millimeter-wave Systems. The instructors are experts from leading companies in the field.

Because space is limited, **ADVANCE REGISTRATION FOR THIS COURSE IS ENCOURAGED.** Registration includes attendance at the course, a book of materials prepared by the Short Course team, a continental breakfast, lunch, and two refreshment breaks. Please note the deadline for Advance Registration of September 17, 1999. For additional information, please contact the Short Course Coordinator:

John Sitch  
Nortel Networks  
Phone: (613) 763-3851  
Fax: (613) 763-2404  
Email: [sitch@nortelnetworks.com](mailto:sitch@nortelnetworks.com)

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

## GaAs IC Primer Course:

The GaAs IC Symposium will again offer an introductory-level class, "Basics of GaAs ICs," intended for professionals in the electronics industry with little or no experience in GaAs integrated circuits or anyone who wants an excellent review. The class covers analog/microwave and digital ICs and their applications. The material is designed to provide a brief overview of concepts and issues unique to GaAs ICs so that participants will be better able to profit from the Symposium Technical Program. The class is taught by Donald B. Estreich, a Hewlett-Packard manager with 20 years experience in design and application of GaAs analog and microwave ICs, and Steven Long, a University of California, Santa Barbara professor, also with 20 years experience in GaAs IC development. The class will be held Sunday evening, October 17<sup>th</sup>, from 5:30 p.m. to 8:30 p.m.

The registration fee is \$180 for professionals and \$60 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**. For additional information, please contact the Primer Course Coordinator:

Chris Bozada  
Air Force Research Laboratory Sensors Directorate  
Wright-Patterson AFB, OH  
Ph: +1-937-255-1874 x3376

Registration for the class is as noted in "Symposium at a Glance". A limited number of copies of the handouts will be available to symposium registrants, subject to availability. The cost is \$55.

## Panel Sessions:

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

Panel Session 1:

**"InP Commercial Devices...When?"**

Monday, October 18<sup>th</sup>; 12:30 p.m. - 2:00 p.m.

Panel Session 2:

**"Is Ion Implantation Dead or Dying?"**

Monday, October 18<sup>th</sup>; 12:30 p.m. - 2:00 p.m.

Panel Session 3:

**"Let's Abandon Digital GaAs and Concentrate on What It's Good For"**

Tuesday, October 19<sup>th</sup>; 3:20 p.m. - 4:50 p.m.

Panel Session 4:

**"Small Waves with BIG Problems: Packaging Issues. Who Has The Solution??!"**

Wednesday, October 20<sup>th</sup>; 1:00 p.m. - 2:40 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).

## Vendor Product Forum:

The 1999 Vendor Product Forum, coordinated by Mitch Shifrin of Hittite, will provide an opportunity for potential customers, business partners, or other interested parties to learn about some of the latest products from our industry. The forum will be held on Tuesday, October 19<sup>th</sup> from 3:20 p.m. to 4:50 p.m.

This session lasts about 90 minutes with several speakers from reputable companies. Each vendor is given 15 minutes which includes questions. The session will cover various products from RFIC and MMW MMICs to RF/Microwave Simulation Software, Foundry Services, and Measurements.

## **GaAs IC Technology Exhibition:**

The 1999 GaAs IC Technology Exhibition will be held concurrently with the IEEE GaAs IC Symposium on October 18 and 19 in the Serra I Ballroom of the Monterey Conference Center. The Exhibition is open to all Symposium registrants. A wide variety of companies who sell state-of-the-art compound semiconductor integrated circuits as well as companies who sell critical products and services to the III-V IC industry will be represented. The early list of exhibitors already includes:

ADVANCED CERAMICS  
AIRTRON/Div. of LITTON SYSTEMS  
AIXTRON, INC  
ANRITSU COMPANY  
CASCADE MICROTECH, INC  
CHA INDUSTRIES  
COMPOUND SEMICONDUCTOR MAGAZINE  
CVC, INC  
EMCORE CORPORATION  
FREIBERGER COMPOUND MATERIALS  
HEWLETT-PACKARD/EEsof  
III-V's REVIEW – ELSEVIER  
ISE INTEGRATED SYSTEMS ENGINEERING AG  
KOPIN CORPORATION  
M/A-COM  
MBE TECHNOLOGY USA, INC  
PICOGIGA, INC  
PROCOMP INFORMATICS LTD  
QUANTUM EPITAXIAL DESIGNS, INC  
RIBER, INC  
SEMIA, INC-SUMITOMO ELECTRIC  
STRATEDGE CORP.

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 18 and 7:30 a.m. and 4:00 p.m. on Tuesday, October 19. The Exhibition will also host the Exhibition Opening Reception on Monday evening from 5:00 until 7:00 and the Exhibition Luncheon from noon until 1:30 p.m. on Tuesday. All Symposium coffee breaks on Tuesday including breakfast will be held in the exhibition area.

There is still time for additional organizations to participate in the Exhibition. Interested parties should contact Mr. Harry Kuemmerle of VIP Meetings & Conventions, Pacific Palisades, CA at (310) 459-4691, Fax (310) 459-0605, e-mail: vipmtgs@aol.com

## **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 GaAs IC Symposium website at

<http://www.gaasic.org/>

In addition, extended abstracts for these papers will appear in the Symposium Digest.

## **Technical Digest:**

Extra copies of the Technical Digest can be purchased by Symposium registrants through Advance Registration. A limited number of digests will also be available for sale at the Registration Desk after 1:00 p.m. on Tuesday, October 19<sup>th</sup>. The cost of the paper bound digest, if ordered through Advance Registration or purchased on-site, is \$65. The CD ROM Digest for 1999 will also be offered for the first time for \$75. A limited number of digests from previous years will be available for \$25. Digests will also be available 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 1999 IEEE GaAs IC 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 GaAs IC Symposium.

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# SHORT COURSE

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**Sunday, October 17, 1999**

**Marriott Hotel**

**San Carlos IV**

**8:00 a.m. - 4:45 p.m.**

## **“Millimeter-wave Systems: Little Waves With a Big Impact”**

**Course Coordinator: John Sitch**

*Nortel Networks*

*Ottawa, Ontario.*

Phone: (613)763-3851

Fax: (613)763-2404

sitch@nortelnetworks.com

### **Short Course Description**

Long the sole preserve of military and space systems, millimeter waves are now making their debut on the commercial stage. This year's Short Course highlights the systems and technologies in this exciting emergent field. We start with systems-level overviews of two leading millimeter wave applications: automotive RADAR, and point-to-point and point-to-multipoint communications systems. We follow with discussions of signal sources and frequency converters, and amplifiers suitable for millimeter wave systems; and finish up with a tutorial on millimeter wave design techniques. Our instructors combine a wealth of real-world experience with the ability to explain the whys and wherefores of this exciting topic.

### **Instructors for the Short Course**

**Josef Wenger**

*DaimlerChrysler*

**Francois Cardinal**

*Nortel Networks*

**Allen Podell**

*Les Besser Assoc.*

**Julio Perdomo**

*Hewlett-Packard*

**Al Freundorfer**

*Queen's University*

In the unlikely event that a listed instructor is unable to participate, an alternate instructor may be substituted.

## Who Should Attend

This Short Course is a must for everyone interested in millimeter-waves and their emerging commercial applications. Our lectures will cater to a range of interests and experience levels from rookie to veteran. The overviews explain how the systems work and give a perspective on the building-block and MMIC specifications, while the later talks provide insights into millimeter-wave design, all the way from block diagrams to the nitty-gritty of EM simulations.

## Short Course Schedule

The Short Course will be held on Sunday, October 17<sup>th</sup>, starting with a continental breakfast in the San Carlos Foyer of the Marriott Hotel. Instruction will begin promptly at 8:00 a.m. in the San Carlos IV Room. Lunch will be provided for all Short Course attendees at 12:20 p.m. in the Ferrantes Bayview Room. There will be morning and afternoon refreshment breaks. The course will end at 4:45 p.m.

- 7:00 a.m.     **Registration (De Anza Foyer-Doubletree)**  
                  **Continental Breakfast (San Carlos Foyer-Marriott)**
- 8:00 a.m.     **Introduction and Overview**  
                  John Sitch, *Nortel Networks*
- 8:05 a.m.     **Automotive RADAR Systems**  
                  Josef Wenger, *DaimlerChrysler*
- 9:25 a.m.     **Communications Systems**  
                  Francois Cardinal, *Nortel Networks*
- 10:45 a.m.   **Coffee Break (North Foyer-Marriott)**
- 11:00 a.m.   **Sources and Frequency Converters**  
                  Allen Podell, *Les Besser Assoc.*
- 12:20 p.m.   **Lunch (Ferrantes Bayview Room-Marriott)**
- 1:30 p.m.     **Millimeter-wave Amplifiers**  
                  Julio Perdomo, *Hewlett-Packard*
- 2:50 p.m.     **Coffee Break (North Foyer-Marriott)**
- 3:05 p.m.     **Millimeter-wave Design Techniques**  
                  Al Freundorfer, *Queen's University, Kingston*
- 4:25 p.m.     **Questions and Discussion**
- 4:45 p.m.     Close of Short Course

## 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 registrations will be available on-site immediately prior to the start of the course. The price for the Short Course is \$365 for those that pre-register, and \$395 for those that register on-site. The price for students is \$100 for those that pre-register, and \$125 for on-site registration. The registration fee 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 \$85 each.

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# GaAs IC PRIMER COURSE

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**Sunday, October 17, 1999**

**Mariott Hotel**

**San Carlos IV**

**5:30 p.m. - 8:30 p.m.**

## **"Basics of GaAs ICs"**

**Course Coordinator:**

**Chris Bozada**

*Air Force Research Laboratory  
Sensors Directorate  
(937)-255-1874 x3376*

**Instructors:**

**Stephen I. Long**

University of California  
Santa Barbara, CA

**Donald B. Estreich**

Hewlett-Packard  
Santa Rosa, CA

### **Course Objective and Description:**

The popular primer course "Basics of GaAs ICs" is an introductory-level class intended for professionals in the electronic industry with little or no experience in GaAs 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; MOS and bipolar devices; and fabrication technology. 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 GaAs technologies will be presented as well as comparisons with silicon technologies. Also, a number of GaAs integrated circuits along with the intended applications will be described.

Instructors Stephen I. Long and Donald B. Estreich each have over 20 years of experience working with GaAs ICs. A copy of their 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:**

5:30 p.m. Introduction  
5:35 p.m. GaAs History, Materials, and Processes  
6:00 p.m. Device Operation  
6:30 p.m. Discussion  
6:40 p.m. Break  
6:50 p.m. Digital Circuits  
7:30 p.m. Analog/RF/Microwave Circuits

8:10 p.m. Summary and Discussion

8:30 p.m. Close

## **OTHER MEETINGS**

### **1999 GaAs Reliability Workshop:**

The 14th annual Workshop on GaAs Reliability, sponsored by JEDEC JC-14.7 Committee on GaAs Reliability and Quality Standards and the EIA, and with co-sponsorship with the Electron Devices Society of the IEEE, will be held in conjunction with the IC Symposium on Sunday, October 17, 1999, from 8:00 a.m. to 5:00 p.m. in DeAnza III of the DoubleTree Hotel.

The workshop will bring together researchers, manufacturers and users of GaAs and other III-V compound semiconductor devices. Papers presenting the latest results, including work-in-progress, and new developments in all aspects of GaAs reliability will be presented. Potential authors are requested to submit 7 copies of a one to two page comprehensive summary, suitable for a 15 minute presentation, to: Dr. Wallace T. Anderson, Naval Research Laboratory, Code 6835, Washington DC 20375, phone (202) 767-1755. The deadline for receipt of submissions is August 2, 1999, and the Advanced Program will be published on our WEB site when available. Late news papers of significant interest will also be considered.

Registration for the workshop is \$95.00 in advance, or \$125.00 at the door. To pre-register, mail your name, address and phone number with a check for \$95 to: EIA/JEDEC, JC-14.7 Workshop, 2500 Wilson Boulevard, Arlington, VA 22201-3834 by October 7, 1999. Registration includes a full day of GaAs reliability papers, two breaks, a luncheon and a copy of the Proceedings. Late registration will be available from 7:30 a.m. to 8:30 a.m. on the morning of the workshop. For further information or to download a pre-registration form, visit our WEB site at [www.jedec.org/gaas](http://www.jedec.org/gaas), or contact: Anthony A. Immorlica, Jr., Workshop Chairman, Sanders, A Lockheed Martin Co., 65 Spit Brook Road, NHQ6-1551, Nashua, NH, (603) 885-1100, [anthony.a.immorlica@lmco.com](mailto:anthony.a.immorlica@lmco.com).

### **SEMI Compound Semiconductor Standards and ASTM Committee Meetings:**

The next SEMI Compound Semiconductor Standards Meeting is scheduled during the Symposium for Monday October 18, 1999, from 8:00-10:00 p.m. in a room to be determined.

SEMI and ASTM have held joint meetings for over 3 years and continue to develop test methods and specifications as a cooperative effort.

The SEMI Compound (GaAs, InP) Semiconductor Standards Committee would like to invite 1999 IEEE GaAs IC Symposium attendees interested in the development of internationally approved standards for Wafer Specifications (GaAs, InP, SiC dimensions/orientation, electrical properties), Epitaxy Layer Specifications, non-destructive mobility measurements, eddy current probe measurement resolution, test methods for etch pit density (EPD), room temperature resistivity mapping and investigations of electronic data interchange (EDI) codes for wafer marking to attend the next Compound Semiconductor meeting.

Based in Mountain View, CA, Semiconductor Equipment and Materials International (SEMI) is an international trade association serving 1,700 companies and participating in the \$55 billion semiconductor and flat panel display equipment and materials markets.

SEMI maintains offices in Austin, Beijing, Brussels, Hsinchu, Moscow, Tokyo, Seoul, Singapore, Boston, and Washington, DC

For additional information, please contact:

Co-Chair James Oliver  
Northrop-Grumman  
P.O. Box 1521 M/S 3K13  
Baltimore, MD 21203  
Phone/Fax: (410)765-0117 / (410)765-7370  
[james\\_d\\_oliver@md.northgrum.com](mailto:james_d_oliver@md.northgrum.com)

Co-Chair Russ Kremer  
[rkremer@gateway.net](mailto:rkremer@gateway.net)

SEMI Standards Engineer  
Alana Martinez  
SEMI  
805 East Middlefield Road  
Mountain View, CA 94043

Phone/Fax: (650)-940-6974 / (650)940-7943  
[amartinez@semi.org](mailto:amartinez@semi.org)

**Monday, October 18, 1999**

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# **SYMPOSIUM PROGRAM**

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## **REGISTRATION AND CONTINENTAL BREAKFAST**

7:00 a.m.- 5:00 p.m.

**Registration – De Anza Foyer-DoubleTree Hotel**

7:00 a.m. - 8:00 a.m.

**Continental Breakfast De Anza Foyer-DoubleTree Hotel**

## **SYMPOSIUM OPENING**

8:00 a.m. - 8:30 a.m.

**De Anza I & II Ballroom-DoubleTree Hotel**

**Introduction and Awards Presentation**

**1999 Symposium Chairman**

Mark Wilson, *Motorola*

**1999 Technical Program Chairman**

Jim Komiak, *Sanders, A Lockheed-Martin Company*

## **SESSION A: PLENARY SESSION**

8:30 a.m.

**De Anza I & II -DoubleTree Hotel**

**Chairpersons:** Robert Anholt, *Gateway Modeling*  
Zachary Lemnios, *MIT Lincoln Lab*

8:30 a.m.

A.1 **GaAs...THE TECHNOLOGY OF THE FUTURE, FUTURE, FUTURE** (Invited Paper), Allen Podell, *Besser Associates, Mountain View, CA*

9:00 a.m.

A.2 **THE 1999 OUTLOOK FOR GaAs IC MARKETS AND TECHNOLOGY** (Invited Paper), G. Bechtel, *Strategies Unlimited, Mountain View, CA*

9:30 a.m.

A.3 **III-V TECHNOLOGIES: AN INVESTORS' PERSPECTIVE ON THE MARKET** (Invited Paper), E. J. Lum, *Equity Research Analyst, Wireless Communications Equipment, CIBC World Markets, San Francisco, CA*

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

**Coffee Break**

10:30 a.m.

A.4 **AlGaIn/GaN MICROWAVE POWER HEMTs** (Invited Paper), L. F. Eastman, *School of Electrical Engineering and Nanofabrication Facility, Cornell University, Ithaca, NY*

11:00 a.m.

A.5 **GaAs IC TECHNOLOGY IN ATE APPLICATIONS** (Invited Paper), A. Armstrong, *ATE Division, Vitesse Semiconductor, Camarillo, CA*

11:30 a.m.

**End of Session A**

**Break for Lunch**

11:30 a.m. - 12:30 p.m.

**Monday, October 18, 1999**

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**PANEL SESSION 1:**

**InP COMMERCIAL DEVICES...WHEN?**

12:30 p.m. – 2:00 p.m.

**De Anza I-DoubleTree Hotel**

**Organizer & Moderator:** Albert Baca, *Sandia National Laboratories*

We have been hearing or reading reports of these high performance and low noise InP devices for years now, but we wonder when if ever these devices will become commercially available. Our panel members represent companies that have plans to bring out commercial devices using InP HBT, InP HEMT, and metamorphic InP HEMT. They will give overviews of why their company's technology is commercially attractive. In addition, they will address some of the following questions:

Is there a market pull or technology push to get some of these devices out?

Do each of the InP technologies have their own niche or are they competing for the same turf?

Will the substrates be available in 4 inch and larger sizes? Will they always cost a small fortune?

What are the pros and cons of metamorphic HEMTs on GaAs substrates?

**Panel Members:**

|                    |                        |
|--------------------|------------------------|
| Dwight Streit      | <i>TRW</i>             |
| P.C. Chao          | <i>Lockheed Martin</i> |
| Marko Sokolich     | <i>HRL</i>             |
| Kimiyoshi Yamasaki | <i>NTT</i>             |
| John Blevins       | <i>AFRL</i>            |

**PANEL SESSION 2:**

**IS ION IMPLANTATION DEAD OR DYING?**

12:30 p.m. – 2:00 p.m.

**De Anza II-DoubleTree Hotel**

**Moderator:** Robert Anholt, *Gateway Modeling*

With falling epi-wafer costs, are we at the point where the process simplicity afforded by using epi wafers offsets the added material costs? There are certain applications where epi is required (e.g. mm-wave HEMTs and high linearity transistors using Hi-lo-hi doping structures) and there are some where ion-implantation is, such as enhancement/depletion mode processes with more than one pinchoff voltage. This panel examines the fabrication of 2 GHz power amplifiers-technology where epi and ion-implantation are already competing. We consider the questions:

What are the cost tradeoffs?

How low in cost can epi go?

Are there quality, reliability, performance advantages even at 2 GHz where epi is worth the dough?

**Panel Members:**

|                |                 |
|----------------|-----------------|
| Steve Mahon    | <i>Triqint</i>  |
| Stan Shanfield | <i>Raytheon</i> |
| C. Barratt     | <i>RFMD</i>     |
| T. Hierl       | <i>QED</i>      |
| Mark Wilson    | <i>Motorola</i> |

2:00 p.m. – 2:30 p.m.

**Coffee Break**

**Monday, October 18, 1999**

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**SESSION B: Application Driven Device Technology**

2:30 p.m.

**De Anza I-DoubleTree Hotel**

**Chairpersons:** Zachary Lemnios, *MIT Lincoln Lab*  
Neng-Huang Sheng, *Rockwell Science Center*

2:30 p.m.

**B.1 MESFET DIGITAL FOR DATACOM AND TELECOM APPLICATIONS** (Invited Paper), I. Deyhimy, *Vitesse Semiconductor Corporation, Camarillo, CA*

3:00 p.m.

**B.2 STATUS AND ROADMAP OF GaAs TECHNOLOGY IN GEORGIA, FORMER SOVIET UNION** (Invited Paper), N. P. Khuchua, IEEE Member, \*A. B. Gerasimov, \*\*R. I. Chikovani, Z. D. Chakhnakia, IEEE Member, L. V. Khvedelidze, R. G. Melkadze, \*A. P. Bibilashvili, \*\*T. D. Mkheidze, \**Research & Production Complex (RPF), Tbilisi State University, Georgia*, \*\**Georgian Technical University, Tbilisi, Georgia*

3:30 p.m.

**B.3 RAMP-UP OF FIRST SiGe CIRCUITS FOR MOBILE COMMUNICATIONS: POSITIONING OF SiGe vs. GaAs AND SILICON** (Invited Paper), Bernd-Ulrich H. Klepser, Wolfgang Klein, *Infineon Technologies, Munich, Germany*

4:00 p.m.

**B.4 HIGH-SPEED, LOW-POWER DIGITAL AND ANALOG CIRCUITS IMPLEMENTED IN IBM SiGe BIMOS TECHNOLOGY**, K. E. Fritz, B. A. Randall, G. J. Fokken, W. L. Walters, M. J. Lorusung, A. D. Nielson, J. F. Prairie, D. J. Post, B. K. Gilbert, *Special Purpose Processor Development Group Mayo Foundation, Rochester, MN*

4:20 p.m.

**End of Session B**

**SESSION C: HBTs and Novel Materials**

2:30 p.m.

**De Anza II-DoubleTree Hotel**

**Chairpersons:** Tim Henderson, *TriQuint Semiconductor*  
Chris Bozada, *Air Force Research Laboratory*

2:30 p.m.

**C.1 LOW TEMPERATURE (LT) GROWN GaAs BUFFER LAYERS FOR III-V SEMICONDUCTOR PROCESSES** (Invited Paper), T. R. Weatherford, *I-Naval Postgraduate School, Monterey, CA*

3:00 p.m.

**C.2 WIDE BANDGAP SEMICONDUCTOR WIDE BANDWIDTH WIDE-TEMPERATURE-RANGE POWER AMPLIFIERS**, James C. M. Hwang, *Lehigh University, Bethlehem, PA*, L. T. Kehias, J. A. Cook, M. C. Calcaterra, *U.S. Air Force Research Laboratory, Dayton OH*, S. T. Sheppard, *Cree Research, Inc., Durham, NC*

3:20 p.m.

C.3 **AN ON-LEDGE SCHOTTKY POTENTIOMETER FOR THE DIAGNOSIS OF HBT**, P. Ma, P. Zampardi\*, L. Zhang, M.F. Chang, *Electrical Engineering Department, University of California, Los Angeles, CA, \*Rockwell Science Center, Thousand Oaks, CA*

3:40 p.m.

C.4 **INCLUSION OF TOPSIDE METAL HEAT SPREADING IN THE DETERMINATION OF HBT TEMPERATURES BY ELECTRICAL AND GEOMETRICAL METHODS**, B. Yeats, *Hewlett Packard, Santa Rosa, CA*

4:00 p.m.

C.5 **InP/GaAs<sub>0.51</sub>Sb<sub>0.49</sub>/InP DHBTS WITH HIGH  $f_T$  and  $f_{MAX}$  FOR WIRELESS COMMUNICATIONS APPLICATIONS**, C.R. Bolognesi, N. Matine, N. W. Dvorak, X.G. Xu, S.P. Watkins, *Compound Semiconductor Device Laboratory CSDL, School of Engineering Science and Department of Physics, Simon Fraser University, Canada*

4:20 p.m.

**End of Session C**

Monday, October 18, 1999

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**GaAs Technology Exhibition  
Opening Reception  
Serra I Ballroom-MCC  
5:00 p.m. - 7:00 p.m.**

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**Tuesday, October 19, 1999**

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## **REGISTRATION AND CONTINENTAL BREAKFAST**

7:00 a.m. - 5:00 p.m.

**Registration – De Anza Foyer-DoubleTree Hotel**

7:30 a.m. - 8:30 a.m.

**Continental Breakfast – Serra I Ballroom-MCC**

## **SESSION D: Advanced Power Amplifier Design**

8:30 a.m.

**De Anza I-DoubleTree Hotel**

**Chairpersons:** Dave Osika, *ANADIGICS*  
Brad Nelson, *Space System/Loral*

8:30 a.m.

D.1 **POWER AMPLIFIER MODELING ISSUES AND ADVANCEMENT IN JAPAN** (Invited Paper), S. Watanabe, *Microwave Solid State Engineering Department, Komukai Operation, Toshiba Corporation, Japan*

9:00 a.m.

D.2 **HIGH LINEARITY K-BAND InP HBT POWER AMPLIFIER MMIC WITH 62.8% PAE AT 21 GHz**, L. W. Yang, K. W. Kobayashi, D. C. Streit, A. K. Oki, H.C. Yen, P.C. Grossman, T. R. Block, L. T. Tran, A. Gutierrez-Aitken, L. G. Callejo, *TRW Electronics and Space Group, Redondo Beach, CA*, S. Mass, *Nonlinear Technologies Inc, Long Beach, CA*

9:20 a.m.

D.3 **8W C-BAND MMIC AMPLIFIER FOR SPACE APPLICATIONS**, L. Loval\*, A. Darbandi\*\*, H. Buret, F. Michard\*\*, *\*Alcatel, France, \*\* Alcatel Space Industries, France*

9:40 a.m.

D.4 **A > 25% PAE 0.2 – 6 GHz LUMPED POWER AMPLIFIER IN A 18 GHz MESFET TECHNOLOGY**, K. Krishnamurthy, B. Hickey<sup>1</sup>, M.J.W. Rodwell, S. I. Long, *Department of ECE, University of California, Santa Barbara, CA*, <sup>1</sup>*TriQuint Semiconductor, Inc., Hillsboro, OR*

10:00 a.m.

**End of Session D**

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

**Coffee Break**

## **SESSION E: Electro-Optic and Opto-Electronic ICs**

8:30 a.m.

**De Anza II-DoubleTree Hotel**

**Chairpersons:** Tho Vu, *Top-Vu Technology*  
Bill Davenport, *TriQuint Semiconductor*

8:30 a.m.

E.1 **QUANTUM WELL INFRARED PHOTODETECTORS** (Invited Paper), J.S. Ahearn, T. Faska, *Sanders, a Lockheed Martin Company, Nashua, NH*

9:00 a.m.

E.2 **3.3 V MSM-TIA FOR GIGABIT ETHERNET**, A. Jayakumar, M. Bustos, D. Cheskis, S. Pietrucha, M. Bonelli, S. Al-Kuran, *ANADIGICS, Warren, NJ*

9:20 a.m.

E.3 **A 1.25 Gb/s GaAs OEIC FOR GIGABIT ETHERNET**, C.C. Ku, C.H. Lin, M.H. Tsai, J.T. Ting\*, R. H. Yuang\* *X200, Electronics Research and Service Organization / R200, Opto-Electronic & Systems Laboratories\* Industrial Technology Research Institute (ITRI), Taiwan, R.O.C.*

9:40 a.m.

E.4 **HIGH-GAIN TRANSIMPEDANCE AMPLIFIER IN InP-BASED HBT TECHNOLOGY FOR THE RECEIVER IN 40 Gb/s OPTICAL-FIBER TDM LINKS**, J. Mullrich, E. Mullner, J.F> Jensen\*, B. Stanchina\*, M. Kardos\*, H. Thurner, H.M. Rein, *Ruhr-University Bochum, Germany* \* *HRL Laboratories, Malibu, CA*

10:00 a.m.

**End of Session E**

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

**Coffee Break**

**SESSION F: Millimeter Wave Circuits and Front-End Devices**

10:30 a.m.

**De Anza I-DoubleTree Hotel**

**Chairpersons:** David Dening, *RF Micro Devices*  
Steve Consolazio, *Northrop Grumman*

10:30 a.m.

F.1 **MILLIMETER-WAVE MONOLITHIC GaAs IC INTERCONNECT AND PACKAGING TECHNOLOGY TRENDS IN JAPAN** (Invited Paper), K. Ohata, *Kansai Electronics Research Laboratories, NEC Corporation, Otsu, Shiga, Japan*

11:00 a.m.

F.2 **A HIGHLY INTEGRATED MMIC CHIPSET FOR A 42 GHz MVDS TRANSCEIVER SUBSCRIBER TERMINAL**, C. Dourlens, A. M. Couturier, R. Sevin, P. Quentin, D. Pons *United Monolithic Semiconductors (UMS), Cedex, France*

11:20 a.m.

F.3 **A 180-GHz MMIC SUB-HARMONIC MIXER BASED ON InGaAs/InAlAs/InP HEMT DIODES**, Y. L. Kok, H. Wang, R. Lai, M. Sholly, B. Allen, *TRW, Space and Electronics Group, Redondo Beach, CA*

11:40 a.m.

F.4 **A V-BAND DRAIN INJECTED/RESISTIVE DUAL-MODE MONOLITHIC MIXER**, T. Kashiwa\*\*\*, T. Katoh\*, T. Ishida\*, T. Ishikawa\*, Y. Nakayama\*\*, *\*High Frequency & Optical Semiconductor Div., Mitsubishi Electric Corp. \*\* Department of Physics and Electronics, College of Engineering, Osaka Prefecture University, Osaka, Japan*

12:00 p.m.

**End of Session F**

**SESSION G: FET Power Amplifiers**

10:30 a.m.

**De Anza II-DoubleTree Hotel**

**Chairpersons:** Bill Peatman, *Motorola SPS*  
Byong-Jong Moon, *Vitesse Semiconductor*

10:30 a.m.

G.1 **A SINGLE SUPPLY DEVICE TECHNOLOGY FOR WIRELESS APPLICATIONS** (Invited Paper), E. Glass, J. Huang, M. Martinez, E. Spears, O. Hartin, W. Valentine, *Semiconductor Product Sector, Tempe, AZ*

11:00 a.m.

G.2 **E-PHEMT FOR SINGLE SUPPLY, NO DRAIN SWITCH, AND HIGH EFFICIENCY CELLULAR TELEPHONE POWER AMPLIFIERS**, Y. Tkachenko, A. Klimashov, C. Wei, Y. Zhao, D. Bartle, *Alpha Industries, Inc., Woburn, MA*

11:20 a.m.

G.3 **ANALYSIS OF PAE 50% HIGHLY LINEAR CHARACTERISTICS OF NEW STRUCTURE TRANSISTOR "SELF-ALIGNED GATE PHEMT" FOR W-CDMA APPLICATION**, T. Sasaki, Y. Takada, Y. Tanabe, T.

Nitta, Y. Kakiuchi, M. Yoshimura, K. Fujieda, T. Suzuki, M. Hirose, Y. Kitaura, *Research and Development Center, Toshiba Corporation, Japan*

11:40 a.m.

G.4 **A FAST, SCALEABLE FET MODEL THAT ACCOUNTS FOR PROPAGATION EFFECTS**, S. M. Lardizabal, R.E. Leoni, R. Mallavarpu, D. Teeter, M. Snow, S. Nash, *Raytheon Microelectronics, Advanced Device Center, Andover, MA*

12:00 p.m.

**End of Session G**

**Tuesday, October 19, 1999**

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***Exhibition Lunch***  
***Serra I Ballroom-MCC***  
***12:00 noon - 1:30 p.m.***

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**SESSION H: Millimeter Wave Power Amplifiers**

1:30 p.m.

**De Anza I-DoubleTree Hotel**

**Chairpersons:** Doug Teeter, *Raytheon Advanced Design Center*  
Kevin Kobayashi, *TRW*

1:30 p.m.

H.1 **A COMPACT, 40 GHz 0.5W POWER AMPLIFIER MMIC**, C. F. Campbell, S.A. Brown, *TriQuint Semiconductor, Dallas, TX*

1:50 p.m.

H.2 **HIGH EFFICIENCY MONOLITHIC InP BASED HEMT V-BAND POWER AMPLIFIER**, S. M. J. Liu, O. S. A. Tang, W. Kong, K. Nichols, P. C. Chao, *Sanders, A Lockheed Martin Company, Nashua, NH*

2:10 p.m.

H.3 **1-W InP HEMT MMIC AMPLIFIER AT 62 GHz** Y.C. Chen, D. L. Ingram, D. Yamauchi, B. Brunner, J. Kraus, M. Barsky, R. Grundbacher, S. K. Cha, R. Lai, T. Block, M. Wojtowicz, P.T. Chin, B. Allen, H. C. Yen, D.C. Streit, *TRW Electronics & Technology Division, Redondo Beach, CA*

2:30 p.m.

H.4 **A CW 4 WATT KA-BAND POWER AMPLIFIER UTILIZING MMIC MULTI-CHIP TECHNOLOGY**, K. Matsunaga, I. Miura, N. Iwata, *Kansai Electronics Research Laboratories, NEC Corporation, Japan*

2:50 p.m.

**End of Session H**

2:50 p.m. - 3:20 p.m.

**Coffee Break**

## **SESSION I: Device/Process Optimization & Hot Electron Effects**

### **De Anza II-DoubleTree Hotel**

**Chairpersons:** Brad Krongard, *M-A/COM*  
Kenneth Russell, *The Aerospace Corporation*

1:30 p.m.

- I.1 **NOVEL LOW - COST PROCESS FOR 0.1 $\mu$ m T-SHAPED GATE OF InGaP/InGaAs PSEUDOMORPHIC HEMT**, M. Sugiura K. Morizuka, *Research and Development Center, Toshiba Corporation, Saiwai-ku Kawasaki, Japan*

1:50 p.m.

- I.2 **SUPPRESSION OF ELECTROCHEMICAL ETCHING EFFECTS IN GaAs PHEMTs**, Y. Zhao, Y. Tkachenko, D. Bartle, *Alpha Industries, Inc., Woburn, MA*

2:10 p.m.

- I.3 **ANALYSIS OF SURFACE-RELATED KINK PHENOMENA OF GaAs MESFETs**, K. Horio, A. Wakabayashi, *Faculty of Systems Engineering, Shibaura Institute of Technology, Omiya, Japan*

2:30 p.m.

- I.4 **BIAS POINT DEPENDENCE OF THE HOT ELECTRON DEGRADATION OF AlGaAs/GaAs Power HFETs**, R.Menzozi\*, D. Dieci<sup>o</sup>, M. Messori<sup>o</sup>, G. Sozzi\*, C. Lanzieri<sup>#</sup>, C. Canali<sup>o</sup>, \* *Dipartimento di Ingegneria dell'Informazione, University of Parma, Italy*, <sup>o</sup>*Dipartimento de Scienze dell'Ingegneria and INFN, University of Modena and Reggio Emilia*, <sup>#</sup>*Alenia Systems, Roma, Italy*

2:50 p.m.

**End of Session I**

2:50 p.m. - 3:20 p.m.

**Coffee Break**

## **PANEL SESSION 3:**

### **"LET'S ABANDON DIGITAL GaAs AND CONCENTRATE ON WHAT IT'S GOOD FOR":**

3:20 p.m. – 4:50 p.m.

#### **De Anza I-DoubleTree Hotel**

#### **Organizers/Moderators:**

Bill Davenport, *TriQuint Semiconductor*

The digital context is for circuits operating at frequencies above 1.5 GHz. The panel will discuss the attributes of Si CMOS for digital and wireless and SiGe for digital and wireless, and GaAs for digital and wireless. How the strengths of each are manifested in the products and how well the strengths can be leveraged to capture or hold dominant positions in the digital and/or wireless markets. The Si and SiGe members can turn the statement to GaAs vs Si and SiGe by demonstrating how their market positions have evolved and how the strengths of each can be utilized to escalate market dominance for their digital and wireless products.

#### **Panel Members:**

Bob Bayruns                      *Anadigics* -Support GaAs wireless  
Tom Lee                              *Stanford* -Support Si CMOS applications  
MaryJo Nettles -                  *AMCC* -Support SiGe applications  
Gary McCormack - *Vitesse* -Support GaAs digital

**VENDOR PRODUCT FORUM – RFIC MMW  
MMICs, SIMULATION SOFTWARE, FOUNDRY  
SERVICES, AND MEASUREMENTS**

3:20 p.m. – 4:50 p.m.

**De Anza II-DoubleTree Hotel**

**Chairman:**

Mitch Shifrin, *Hittite Microwave Co.*

George Oliver                      *ANADIGICS*  
Michael Poehl                      *INFINEON*  
Dominic Ogbonah                  *TRIQUINT*  
George Studtmann                  *ITT-GTC*  
Dan Green                              *TRIQUINT*

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***Symposium Theme Party***  
***Monterey Aquarium***  
***7:00 p.m. - 10:00 p.m.***

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**Wednesday, October 20, 1999**

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## **REGISTRATION AND CONTINENTAL BREAKFAST**

7:00 a.m. - 12:00 noon

**Registration – De Anza Foyer-DoubleTree Hotel**

7:30 a.m. - 8:30 a.m.

**Continental Breakfast – De Anza Foyer-DoubleTree Hotel**

## **SESSION J: High Speed InP HBT ICs**

8:30 a.m.

**De Anza I-DoubleTree Hotel**

**Chairpersons:** Mehran Mokhtari, *Royal Institute of Technology - Sweden*  
Marko Sokolich, *HRL Labs*

8:30 a.m.

J.1 **IMPLEMENTATION OF DIGITAL CIRCUITS IN AN InP SCALED HBT TECHNOLOGY**, B. A. Randall, D. J. Schwab, W. L. Walters, A. D. Nielsen, E. L. H. Amundsen, B. K. Gilbert, *Special Purpose Processor Development Group Mayo Foundation, Rochester, MN*, M. Sokolich, Y. K. Brown, M. Lui, J. A. Henige, *HRL Laboratories, Malibu, CA*

8:50 a.m.

J.2 **40 Gbit/s OPTICAL COMMUNICATIONS: InP DHBT TECHNOLOGY, CIRCUITS AND SYSTEMS EXPERIMENTS**, J. Godin, P. André, JL Benchimol, S. Blayac, JR Burie, P. Desrousseaux, AM Duchenios, N. Kauffmann, A. Konczykowska, M. Riet, *OPTO+, Groupement d'Intérêt Economique, Marcoussis, France*

9:10 a.m.

J.3 **HIGH-SPEED MULTIPLEXERS: A 50GB/s 4:1 MUX IN InP HBT TECHNOLOGY**, J. P. Mattia<sup>1</sup>, R. Pullela<sup>1</sup>, G. Georgieu<sup>1</sup>, Y. Baeyens<sup>1</sup>, H. S. Tsai<sup>1</sup>, Y. K. Chen<sup>1</sup>, C. Dorschly<sup>2</sup>, T. Winkler<sup>2</sup>, M. Reinhold<sup>2</sup>, C. Groepper<sup>2</sup>, M. Sokolich<sup>3</sup>, L. Nguyen<sup>3</sup>, W. Stanchina<sup>3</sup>, <sup>1</sup>*Bell Laboratories, Lucent Technologies, Murray Hill, NJ*, <sup>2</sup>*Lucent Technologies, Nuremberg, Germany*, <sup>3</sup>*HRL, Malibu, CA*

9:30 a.m.

J.4 **InP DHBT 63 GHz STATIC FREQUENCY DIVIDER**, B. Tang, J. Notthoff, A. Gutierrez-Aitken, E. Kaneshiro, P. Chin, A. Oki, *TRW Space & Electronics Group, Redondo Beach, CA*

9:50 a.m.

**End of Session J**

9:50 a.m. - 10:20 a.m.

**Coffee Break**

## **SESSION K: Frequency Converter and Transceiver MMICs**

8:30 a.m.

**De Anza II-DoubleTree Hotel**

**Chairpersons:** Mohammad Madihian, *NEC*  
Norman Chiang, *California Eastern Laboratories*

8:30 a.m.

K.1 **A GaAs +3V LOW NOISE INTEGRATED DOWNCONVERTER FOR C/X-BAND APPLICATIONS**, C. Trantanello, P. Blount, M. Shifrin, *Hittite Microwave Corporation, Woburn, MA*

8:50 a.m.

K.2 **FULLY-INTEGRATED 5.2 GHz GaAs MESFET TRANSMITTER MMIC FOR HIGH CAPACITY WIRELESS LOCAL AREA NETWORK APPLICATIONS**, J.S. Weiner, Huan-Shang Tsai, Young-Kai Chen, Erik Busking, T. Tieman, J. Kruys, *Bell Labs/Lucent Technologies, Murray Hill, NJ*

9:10 a.m.

K.3 **A 77 GHz GaAs pHEMT TRANSCEIVE MMIC FOR AUTOMOTIVE SENSOR APPLICATIONS**, A. Tessmann, L. Verweyen, M. Neumann, H. Massler, W.H. Haydl, A. Hülsmann, M. Schlechtweg, *Fraunhofer Institute for Applied Solid State Physics (IAF), Freiburg, Germany*

9:30 a.m.

K.4 **77GHz FULLY-MMIC AUTOMOTIVE FORWARD-LOOKING RADAR**, H. Kondoh, K. Sekine, S. Takatani, K. Takano <sup>(1)</sup>, K. Kuroda <sup>(2)</sup>, R. Dabkowschi <sup>(3)</sup>, *Hitachi, Ltd., Central Research Lab, Tokyo, Japan* <sup>(1)</sup> *Hitachi, Automotive Products Division*, <sup>(2)</sup> *Hitachi Research Lab*, <sup>(3)</sup> *Eaton VORAD Technologies*

9:50 a.m.

**End of Session K**

9:50 a.m. - 10:20 a.m.

**Coffee Break**

## **SESSION L: Metamorphic HEMTs for Low Noise & High Power Millimeter Wave Applications**

10:20 a.m.

**De Anza I-DoubleTree Hotel**

**Chairpersons:** Young-Kai Chen, *Lucent Technologies*  
Jan-Erik Mueller, *Infineon-AG*

10:20 a.m.

L.1 **STATUS OF METAMORPHIC  $\text{In}_x\text{Al}_{1-x}\text{As}/\text{In}_x\text{Ga}_{1-x}\text{As}$  HEMTs** (Invited Paper), A. Cappy, Y. Cordier, S. Bollaert, M. Zaknourne, *Institut D'Electronique Et De Microelectronique Du Nord, France*

10:50 a.m.

L.2 **MILLIMETER-WAVE LOW NOISE METAMORPHIC HEMT AMPLIFIERS AND DEVICES ON GaAs SUBSTRATES**, P.F. Marsh, S. Kang, R. Wohlert, P.M. McIntosh, W.E. Hoke, R.A. McTaggart, S.M. Lardizabal, R.E. Leoni III, C.S. Whelan, P.J. Lemonias, T.E. Kazior, *Raytheon Microelectronics, Advanced Device Center, Andover, MA*

11:10 a.m.

L.3 **HIGH POWER AND GAIN AT 35 GHz UTILIZING AN  $\text{InAlGaAs}/\text{In}_{0.32}\text{Ga}_{0.68}\text{As}$  METAMORPHIC HEMT**, C.S. Whelan, W.E. Hoke, R.A. McTaggart, P.S. Lyman, P.F. Marsh,

11:30 a.m.

**End of Session L**

**Break for Lunch**

11:30 a.m.. – 1:00 p.m.

**PANEL SESSION 4:**

**SMALL WAVES WITH BIG PROBLEMS:  
PACKAGING ISSUES. WHO HAS THE  
SOLUTION?!!?**

1:00 p.m. – 2:40 p.m.

De Anza I-DoubleTree Hotel

**Organizer/Moderator:**

Mitch Shifrin, *Hittite Microwave Corporation*

Norman Chiang, *California Eastern Laboratories*

High volume commercial millimeter wave systems have spurred the demand for low cost microwave and mmW packages. Package design must be user-friendly, testable, reliable, flexible, affordable, and perform in the desired bandwidth. Come join the fray along with a potpourri of expert vendors and users of packages. If you want to prove your worth and your pay, come to this panel and see the latest in a ball grid array packaging, bumped flip-chip, ceramic solutions, multi-chip module and cost targets. You will learn; WHO the players are, WHAT frequency ranges the technology is good for, WHERE testing bottlenecks can be avoided, WHEN lead times are critical which technology should be employed, and finally you will be able to say, “WHY limit yourself to these options I just attended a panel and learned of a better solution!”. Be a reporter, question the experts, come to the panel and uncover the 5 Ws of high frequency packaging.

**Panel members:**

|               |                        |
|---------------|------------------------|
| Bob Griffin   | <i>MSC</i>             |
| Terry Cisco   | <i>Raytheon</i>        |
| Dave Bates    | <i>Dielectric Labs</i> |
| Keiichi Ohata | <i>NEC</i>             |
| John Kennedy  | <i>Alpha</i>           |

2:40 p.m.

**End of Panel Session**

2:40 p.m.-3:10 p.m.

**Coffee Break**

**Wednesday, October 20, 1999**

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**SESSION M: Millimeter Wave Sources, Dividers, & Multipliers**

1:00 p.m.

**De Anza II-DoubleTree Hotel**

**Chairpersons:** Mitchell Shifrin, *Hittite Microwave Co.*  
Brad Nelson, *Space Systems/Loral*

1:00 p.m.

M.1 **94/47 GHz REGENERATIVE FREQUENCY DIVIDER MMIC WITH LOW CONVERSION LOSS**, S. Kudzusz, W.H. Haydl, M. Neumann, A. Hülsmann, *Fraunhofer Institute for Applied Solid-State Physics (IAF), Freiburg, Germany*

1:20 p.m.

M.2 **104- and 134-GHz InGaP/InGaAs HBT OSCILLATORS**, K. Uchida, I. Aoki, H. Matsuura, T. Yakihara, S. Kobayashi, S. Oka, T. Fujita, A. Miura, *Teratec Corporatin, Tokyo, Japan*

1:40 p.m.

M.3 **PERFORMANCE OPTIMIZATION OF A FUNDAMENTAL MILLIMETERWAVE VCO**, D. Whitefield, R. Khanna\*, *Alpha Industries, Woburn, MA*, \**The Massachusetts Institute of Technology, MA*

2:00 p.m.

M.4 **A 2.4W W-BAND SOLID-STATE MMIC HIGH POWER MODULE**, D. L. Ingram, P. P. Huang, B. Brunner, I. Stones, D. Yamauchi, Y. C. Chen, M. Biedenbender, J. Elloitt, R. Lai, D. C. Streit, K. F. Lau, H. C. Yen, *TRW, RF Products Center, Redondo Beach, CA*

2:20 p.m.

M.5 **INJECTION-LOCKED OSCILLATOR AS FREQUENCY MULTIPLIER FOR MILLIMETER-WAVE APPLICATIONS**, T. L. Nguyen, *Nortel Networks, Ottawa, Ontario, Canada*

2:40 p.m.

**End of Session M**

2:40 p.m.-3:10 p.m.

**Coffee Break**

**SESSION N: Novel Control Circuits and Devices**

3:10 p.m.

**De Anza I-DoubleTree Hotel**

**Chairpersons:** George Studtmann, *ITT-GTC*  
Mitchell Shifrin, *Hittite Microwave Co.*

3:10 p.m.

N.1 **BI-DIRECTIONAL AMPLIFIERS FOR HALF-DUPLEX TRANSCEIVERS**, J.W. Archer, O. Sevimli, R. A. Batchelor, *CSIRO Telecommunications and Industrial Physics, Australia*

3:30 p.m.

**N.2 A MINIATURIZED MMIC ANALOG PHASE SHIFTER USING TWO QUARTER-WAVE-LENGTH TRANSMISSION LINES**, H. Hayashi, M. Muraguchi, *NTT Network Innovation Laboratories, Wireless Systems Laboratory, Kanagawa, Japan*

3:50 p.m.

**N.3 MULTI-THROW PLASTIC MMIC SWITCHES UP TO 6 GHz WITH INTEGRATED POSITIVE CONTROL LOGIC**, J. Smuk, M. Mahfoudi M. Shifrin, *Hittite Microwave Corporation, Woburn, MA*

4:10 p.m.

**N.4 A LATERAL P-SI-N DIODE SPDT SWITCH FOR Ka-BAND APPLICATIONS**, M. Tanabe, J. S. Iwanage, M. Ishii, K. Miyatsuji, Y. Ota, D. Ueda, *Semiconductor Device Research Center, Semiconductor Company, Matsushita Electronics Corporation, Osaka, Japan*

4:30 p.m.

**End of Session N**

## **SESSION O: Mixed Signal and Digital ICs**

3:10 p.m.

**De Anza II-DoubleTree Hotel**

**Chairpersons:** John Sitch, *Nortel Networks*  
Steve Long, *UCSB*

3:10 p.m.

**O.1 MONOLITHIC 64QAM GaAs HBT MODULATOR**, R. Desrosiers, C. Hornbuckle, E. Mrozek, J. Lanphar, K. Kobayashi, A. Oki, B. Pointer, *TRW Electronics & Technology Division, Redondo Beach, CA*

3:30 p.m.

**O.2 A HIGH SENSITIVITY 10Gb/s DCFL LIMITING AMPLIFIER WITH 0.2  $\mu\text{m}$  GaAs MESFETs**, H. Yamada, H. Murayama, K. Shiiba, T. Ichioka, T. Kimura, *Components Division, Oki Electric Industry, Tokyo, Japan*

3:50 p.m.

**O.3 HIGH RESOLUTION TRACK AND HOLD FOR BROADBAND WIRELESS APPLICATIONS**, S. Shah, S. McGarry, J. Sitch, *Nortel Networks, Ottawa, Ontario, Canada*

4:10 p.m.

**O.4 A 3.3V, 21Gb/s, 7-bit PRBS GENERATOR IN AlGaAs/GaAs HBT Technology**, M.G. Chen, J. K. Notthoff, *TRW Electronics and Technology Division, Redondo Beach, CA*

4:30 p.m.

**End of Session O**

**Close of Symposium**

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Monterey, California

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Monterey, CA 93940

Phone:831-649-4511 X146

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350 Calle Principal

Monterey, CA 93940

Phone: 831-649-4234

## **☐ SYMPOSIUM REGISTRATION**

**Completed Form And Registration Fees  
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## Notes

## Notes

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## Notes