

1990 Technical Program

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Session J
(Joint with MMIC Symp.)
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West Ballroom A, B

1:30 p.m. to 3:00 p.m.

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West Ballroom A, B

3:30 p.m. to 5:00 p.m.

Tuesday, May 8, 1990

Chairman: B. S. Perlman—US Army Electronics Technology and Devices Laboratory

- | | | |
|--------------------------------|--|------------|
| N-1
3:30 p.m. | Computer-Aided Design Techniques for Microwave Monolithic Integrated Circuits
A. K. Sharma, H. Wang, N. Ton, M. Aust, J. Yonaki, J. Shioli, S. Dow, D. Yang and L. C. T. Liu
TRW/ESG
Electronics and Technology Division
Redondo Beach, CA | 555 |
| N-2
3:50 p.m. | Iterative, Monotonically Convergent Hybrid-Mode Simulation of Complex, Multiply-Branched (M)MIC Conductor Geometries
W. Wertgen
University of Duisburg
Dept. of El. Eng.
West Germany

R. H. Jansen
Industrial Microwave and RF Tech. Inc.
Ratingen, West Germany | 559 |
| N-3
4:10 p.m. | Losses in GaAs Microstrip
M. E. Goldfarb, A. Platzker
Raytheon Company
Research Division
Lexington, MA | 563 |
| N-4
4:30 p.m. | Properties of FET Parameter Statistical Data Bases
J. Purviance
Dept. of EE
Univ. of Idaho
Moscow, ID

M. Meehan
EEsof Inc.
Westlake Village, CA

D. Collins
Cadence Design Systems, Inc.
Santa Clara, CA | 567 |

Session O

Passive Components 2: Directional Couplers West Ballroom C

3:30 p.m. to 5:00 p.m.

Tuesday, May 8, 1990

Chairman: A. Davis—University of Texas, Arlington

O-1 3:30 p.m.	A Microstrip Re-Entrant Mode Quadrature Coupler for Hybrid and Monolithic Circuit Applications A. M. Pavio and S. K. Sutton Texas Instruments Incorporated Dallas, TX	573
O-2 3:50 p.m.	Rigorous Modal-S-Matrix Design of a New Class of Broadband 180-Degree Branch Guide Couplers F. Arndt, T. Sieverding and P. Anders Microwave Department University of Bremen Bremen, West Germany	577
O-3 4:10 p.m.	Accurate Design of Microstrip Directional Couplers with Capacitive Compensation M. Dydyk Motorola, Inc. Government Electronics Group Scottsdale, AZ	581
O-4 4:30 p.m.	A Novel Branch-Line Coupler Design for Millimeter-Wave Applications P. Meaney Alpha Industries, Inc. TRG Millimeter Wave Division Methuen, MA	585
O-5 4:40 p.m.	Compact High Power Wide Band Coupler H. F. Chapel Sage Laboratories, Inc. Natick, MA	589

Session P**Millimeter Wave Integrated Circuits
West Ballroom D****3:30 p.m. to 5:00 p.m.****Tuesday, May 8, 1990**

Chairman: K. Tomiyasu—General Electric Co.

P-1 3:30 p.m.	W-Band In GaAs HEMT Low Noise Amplifiers K. H. G. Duh, P. C. Chao, P. Ho, A. Tessmer, S. M. J. Liu, M. Y. Kao, P. M. Smith and J. M. Ballingall GE Electronics Laboratory Syracuse, NY	595
P-2 3:50 p.m.	Monolithic 40 to 60 GHz LNA N. Camilleri, P. Chye, A. Lee and P. Gregory Avantek Incorporated Folsom, CA	599
P-3 4:00 p.m.	A 44 GHz HEMT Doubler/Amplifier Chain P. D. Chow, Y. Hwang, D. Garske, J. Velebir and H. C. Yen TRW Electronic Systems Group Redondo Beach, CA	603
P-4 4:10 p.m.	Photoconductor-Based 10-110-GHz On-Chip Device Characterization Technique C. Rauscher Naval Research Laboratory, Washington, DC	607
P-5 4:30 p.m.	High-Speed Millimeter-Wave Modulator/Demodulator M. V. Schneider, R. Trambarulo, A. Gnauck and M. J. Gans AT&T Bell Laboratories Crawford Hill Laboratory Holmdel, NJ	611

Session Q
Microwave Packaging and Manufacturing
W101

3:30 p.m. to 5:00 p.m.

Tuesday, May 8, 1990

Chairman: D. Maki—M/A-COM

- | | | |
|--------------------------------|---|------------|
| Q-1
3:30 p.m. | MMIC Temperature Stabilization Through Phase Change Energy Absorption
S. A. Dittman and M. Kumar
American Electronic Laboratories
Lansdale, PA | 617 |
| Q-2
3:50 p.m. | A New Instrument for the Measurement of Resonant Field Distributions in Microwave Housings and Packages
D. W. Griffin
Department of Electrical and Electronic Engineering
The University of Adelaide
Adelaide, South Australia | 621 |
| Q-3
4:00 p.m. | Low-Cost Package Technology for Advanced MMIC Applications
S. Chai, R. Kirschman and S. Ludvik
Teledyne Monolithic Microwave
Mountain View, CA

J. Bedinger, L. Harmon and R. Burkholder
Texas Instruments
Dallas, TX

M. Fallica, S. Tarbox and M. Doherty
Raytheon MSD
Tewksbury, MA

J. Oenning and I. Clark
Metcer Technology Corp.
San Diego, CA | 625 |
| Q-4
4:10 p.m. | A New Method to Calculate parameters of Configurable Integrated Test Model
H. Wang, D. Yang, G. Ng and S-T. Chen
TRW
Microwave Technology Development Operation
Redondo Beach, CA | 629 |
| Q-5
4:30 p.m. | Production Results of X-Band GaAs MMIC 5-Bit Phase Shifters
F. Ali, S. Mitchell, A. Murphy, A. Adar, P. Ho and A. Podell
Pacific Monolithics
Sunnyvale, CA | 633 |

Session R
Open Forum 2
West Hall Lobby

4:00 p.m. to 6:00 p.m.

Tuesday, May 8, 1990

Chairman: H. Ling—University of Texas, Austin

- | | | |
|------------|---|------------|
| R-1 | Transient Analysis of Distortion and Coupling in Lossy Coupled Microstrips
J. P. Gilb and C. A. Balanis
Telecommunications Research Center
Department of Electrical and Computer Engineering
Arizona State University
Tempe, AZ | 641 |
| R-2 | A New Method for the Time-Domain Analysis of Lossy Coupled Transmission Lines
R. Griffith and M. Nakhla
Department of Electronics
Carleton University
Ottawa, Canada | 645 |
| R-3 | Full Wave Analysis of 94 GHz Patch Coupler
V. F. Fusco and L. N. Merugu
Microwave Research Group
The Queen's University of Belfast
Northern Ireland | 649 |
| R-4 | S-Parameters of Microwave Components Computed with the 3D Condensed Symmetrical TLM Node
J. Uher, S. Liang and W. J. R. Hoefer
Laboratory for Electromagnetics and Microwaves
Electrical Engineering Department
University of Ottawa
Canada | 653 |
| R-5 | Effects of Substrate Anisotropy on the Dispersion of Transient Signals in Microstrip Lines
G. W. Zheng and K. S. Chen
Zhejiang University
Hangzhou, China

S. T. Peng
New York Institute of Technology
Old Westbury, NY | 657 |
| R-6 | New Procedures for 2-D and 3-D Microwave Circuit Analysis with the TLM Method
P. Eswarappa, P. M. So and W. J. R. Hoefer
Laboratory for Electromagnetics and Microwaves
Department of Electrical Engineering
University of Ottawa
Ottawa, Ontario, Canada | 661 |

R-7	Basic Properties of Microstrip Circuit Elements on Nonreciprocal Substrate-Superstrate Structures I. Y. Hsia, H-Y. Yang and N. G. Alexopoulos Electrical Engineering Department University of California Los Angeles, CA	665
R-8	Asymmetric Coupled Transmission Lines with Anisotropic Coupling P. Weaver Department of Electrical Engineering University of Hawaii Honolulu, HI J. M. Pond Microwave Technology Branch Naval Research Laboratory Washington, DC	669
R-9	Asymmetrical Coplanar Waveguide with Finite Metallization Thickness Containing Anisotropic Media T. Kitazawa and T. Itoh Department of Electrical and Computer Engineering The University of Texas at Austin Austin, TX	673
R-10	Modal Transition Phenomena in Shielded Microstrip with Anisotropic Substrates L. Carin Department of Electrical Engineering and Computer Science Polytechnic University Farmingdale, NY G. W. Slade and K. J. Webb School of Electrical Engineering Purdue University West Lafayette, IN	677
R-11	Analysis of Waveguides with Dielectric Inserts A. S. Omar and K. Schünemann Technische Universität Hamburg-Harburg Arbeitsbereich Hochfrequenztechnik Hamburg, West Germany	681
R-12	Comparative Study of Homogeneously and Inhomogeneously Doped Microstrip Coplanar Transmission Lines K. Wu and R. Vahldieck Department of Electrical and Computer Engineering University of Victoria Victoria, B.C. Canada P. Saguet EMO-ENSERG Grenoble Cedex, France	685

R-13	Variational Solutions to E-Plane Bilateral Septum in Waveguide T. Q. Ho, Y. C. Shih and V. Pham Hughes Aircraft Company Los Angeles, CA	689
R-14	Method-of-Moments Solution for the Posts in a Circular Waveguide X. Zhu, D. Chen and S. Wang Beijing Institute of Radio Measurement Beijing, China	693
R-15	Electromagnetic Radiation from Printed Traces on a Circuit Board with Coated Plastic Cover J-F Kiang IBM T. J. Watson Research Center Yorktown Heights, NY	697
R-16	Triangular Cells in an Electromagnetic Analysis of Arbitrary Microstrip Circuits J. C. Rautio Sonnet Software, Inc. Liverpool, NY	701
R-17	Full-Wave Analysis of Waveguides involving Finite-Size Dielectric Regions B. J. Rubin IBM T. J. Watson Research Center Yorktown Heights, NY	705
R-18	Numerical Modelling of Chamfered Bends and Other Microstrip Junctions of General Shap in MMICS J. X. Zheng and D. C. Chang MIMICAD Center University of Colorado Boulder, CO	709
R-19	Comparative Study of TE_{mn}^x Versus TE_{mn}—TM_{mn} Mode Analysis and Its Application to Waveguide Discontinuity Modeling J. Bornemann and R. Vahldieck Department of Electrical and Computer Engineering University of Victoria Victoria, B.C. Canada	713
R-20	Finite Element Modeling of Two-Dimensional Transmission Line Structures Using a New Asymptotic Boundary Condition A. B. Kouki, A. Khebir and R. Mittra Department of Electrical & Computer Engineering University of Illinois Urbana, IL	717
R-21	Integrated Microwave Field Simulation Using Three Dimensional Finite Elements Z. J. Cendes, J. F. Lee, D. N. Shenton, B. Shyamkumar, E. Smetak and D. K. Sun ANSOFT Corp Four Station Square Pittsburgh, PA	721

R-22	Miniaturation 8-18 GHz Four Channel Frequency Converter S. Roos, P. Griffith, R. Sheehan, F. McMahon and M. Kumar American Electronic Laboratories, Inc. Lansdale, PA	725
R-23	A 900 MHz Saw Microstrip Antenna-Duplexer for Mobile Radio K. Anemogiannis Siemens Corporate Research and Development München München FRG C. Beck, A. Roth, P. Russer and R. Weigel Lehrstuhl für Hochfrequenztechnik Technische Universität München München, FRG	729
R-24	A Dual Mode Variable Polarization Phase Shifter K-Z Wei Nanjing Research Institute of Electronic Technology Nanjing, China	733
R-25	Observation of a Doublet Ferromagnetic Resonance in Cubic and Hexagonal Ferrites at Millimeter Wavelengths M. N. Afsar and H. Chi Department of Electrical Engineering Tufts University Medford, MA	737
R-26	Nonlinear Design Approach of a Broadband Hybrid Integrated Ku-Band Common-Source GaAs FET VCO R. Gratzl, J. Hausner and P. Russer Institut f. Hochfrequenztechnik Technische Universität München Munich, West Germany	739
R-27	Versatile FET Nonlinear Transfer Function Generator Elements A. Katz and S. Moolchalla GE Astro Space Division Princeton, NJ	743
R-28	Parameter Extraction Technique for Non-Linear MESFET Models A. Davies and A. K. Jastrzebski University of Kent Electronic Engineering Laboratories Canterbury, Kent, England	747
R-29	New Low Noise FET Structure A. Truitt, D. Heston and J. Klein Texas Instruments, Incorporated Dallas, TX	751

R-30	A Logarithmic Distributed Amplifier N. Nazoa-Ruiz ERA Technology Ltd. Letherhead, Surrey, UK C. S. Aitchison Burnel University Dept. Elec. Eng. Uxbridge, Middx., UK	753
R-31	Dual-Diode Limiter for High-Power/Low-Spike-Leakage Applications R. J. Tan and R. Kaul Harry Diamond Laboratories Adelphi, MD	757
R-32	Calculated and Measured Silicon Pin Limiter Short-Pulse Damage Thresholds A. L. Ward, R. J. Tan and R. Kaul Harry Diamond Laboratories Adelphi, MD	761
R-33	W-Band Double-Drift Pulsed IMPATT by Advanced Si MBE H. Uchida Compound Semiconductor Device Division NEC Corporation Kawasaki, Japan T. Tatsumi Microelectronics Research Laboratories NEC Corporation Kawasaki, Japan (Paper not available at the time of printing)	
R-34	An S-Band Double Balanced Mixer with Very High Lo/RF-Port and Lo/If-Port Isolation J. J. Krantz Centre for Electronic Services University of Stellenbosch Stellenbosch, South Africa	765
R-35	Slotline Coupled Varactor Tuning of Voltage Controlled Oscillators J. B. De Swardt and P. W. van der Walt Department of Electronic Engineering University of Stellenbosch Stellenbosch, Republic of South Africa	767
R-36	Optimization of the QWITT Diode Using Equivalent Circuit Models M. J. Paulus, D. W. Whitson, C. E. Stutz, K. R. Evans, E. T. Koenig and R. Neidhard Electronic Technology Laboratory Wright Research and Development Center Wright-Patterson, OH	769

R-37	Large-Signal Design of MMIC High Efficient Power Amplifier V. D. Hwang, Y. C. Shih and D. C. Wang Hughes Aircraft Company Microwave Products Division Torrance, CA	773
R-38	A 2-18 GHz Monolithic Variable Attenuator Using Novel Triple-Gate MESFETS H. J. Sun and J. Ewan Teledyne Monolithic Microwave Mountain View, CA	777
R-39	A Temperature-Compensated Linearizing Technique for MMIC Attenuators Utilizing GaAs MESFETS as Voltage-Variable Resistors D. A. Fisher and D. M. Dobkin Watkins-Johnson Company Palo Alto, CA	781
R-40	Broadband GaAs Monolithic Equalizing Amplifiers for Multigigabit-Per-Second Optical Receivers H. Kikuchi and T. Kimura NTT LSI Laboratories Morinosato, Wakamiya Kanagawa, Japan Y. Miyagawa NTT Transmission Systems Laboratories Take, Yokosuka Kanagawa, Japan	785
R-41	A Fully Monolithic 4-18 GHz Digital Vector Modulator G. B. Norris, D. C. Boire, G. St. Onge, C. Wutke, C. Barratt, W. Coughlin and J. Chickanosky Microwave Technology Center Lockheed Sanders, Inc. Nashua, NH	789
R-42	Paper was withdrawn	
R-43	Active Endfire Antenna Elements and Power Combiners Using Notch Antennas J. A. Navarro, Y. H. Shu and K. Chang Department of Electrical Engineering Texas A&M University College Station, TX	793
R-44	Performance Characteristics of Phase-Correcting Fresnel Zone Plates J. E. Garrett and J. C. Wiltse Georgia Tech Research Institute Atlanta, GA	797

R-45	Integrated Active Antenna Module For Space Station Multiple Access Communication R. W. Shaw and J. K. Kovitz Shason Microwave Corporation Houston, TX L. Johnson and B. Lu Lockheed Engineering and Sciences Company Houston, TX	801
R-46	Design Techniques for Compact Monopulse Antenna Feeds for W-Band Radar Systems W. L. Storkus M/A-COM, Inc. Burlington, MA	805
R-47	Ka-Band MMIC Beam Steered Planar Array Feed D. Rascoe, R. Crist, A. L. Riley, T. Cooley, L. Duffy, D. Antsos, V. Lubecke and W. Chew Jet Propulsion Laboratory California Institute of Technology Pasadena, CA K. S. Yngvesson and D. H. Schaubert Department of Electrical & Computer Engineering University of Massachusetts Amherst, MA	809

Plenary Session

Dallas Convention Center Arena

8:15 a.m.–10:30 a.m.
Wednesday, May 9, 1990

Following welcoming remarks from John Wassel and Shashi Sanzgiri, General Chairmen for the MTT-S and AP-S Symposia respectively, we will have a brief address from MTT Society President and 1990 MTT-S Technical Program Co-Chairman, Dr. Tatsuo Itoh. Three speakers will present their viewpoints of “Merging Technologies for the 90’s” from their unique position on industry, university and government. Dr. Harold (Hal) Sobol of the University of Texas at Arlington will speak first, followed by Robert Mailloux of the Hanscom Air Force Base, and William (Bill) Edwards of the Air Force Avionics Laboratory.

Session S

Monolithic Integrated Circuits: 1

West Ballroom A, B

1:30 p.m. to 3:00 p.m.

Wednesday, May 9, 1990

Chairman: H. A. Hung—COMSAT Laboratories
Co-Chairman: J. C. Chen—Hughes Aircraft Co.

S-1 1:30 p.m.	GaAs MMIC Phase Locked Source J. Andrews, A. Podell, J. Mogri, C. Karmel and K. Lee Pacific Monolithics, Inc. Sunnyvale, CA	815
S-2 1:40 p.m.	A Miniaturized, Broadband MMIC Frequency Doubler T. Hiraoka, T. Tokumitsu and M. Akaike ATR Optical and Radio Communications Research Laboratories Inuidani, Seika-cho, Soraku-gun Kyoto, Japan	819
S-3 2:00 p.m.	An Octave-Band MMIC Active Filter R. R. Bonetti and A. E. Williams COMSAT Laboratories Clarksburg, MD	823
S-4 2:20 p.m.	An X-Band Low Cost GaAs Monolithic Transceiver W. Yau, M. I. Herman, G. Mendolia, C. P. Wen and J. C. Chen Hughes Aircraft Company Microwave Products Division Torrance, CA	827
S-5 2:30 p.m.	Multilayer MMIC Using a $3\mu\text{m} \times 3$-Layer Dielectric Film Structure T. Tokumitsu, T. Hiraoka, H. Nakamoto and T. Takenaka ATR Optical and Radio Communications Research Laboratories Radio Systems Department Sanpeidani, Inuidani, Seika-cho Soraku-gun, Kyoto, Japan	831

Session T
(Special Session)
Smith Chart
West Ballroom C

Wednesday, May 9, 1990

Chairman: R. Ham—Tracor Aerospace

- | | | |
|--------------------------------|---|------------|
| T-1
1:30 p.m. | Phillip Smith—A Brief Biography
T. S. Saad
Sage Laboratories, Inc.
Natick, MA | 837 |
| T-2
1:50 p.m. | The Smith Chart Tutorial and Comments
S. F. Adam
Adam Microwave Consulting, Inc.
Palo Alto, CA
(Paper not available at the time of printing) | |

Session U
Solid State Devices and Circuits
West Ball Room C

1:30 p.m. to 3:00 p.m.

Wednesday, May 9, 1990

Chairman: N. Camilleri—Avantek

U-1 2:20 p.m.	X-Band Monolithic GaAs PIN Diode Variable Attenuation Limiter D. J. Seymour, D. D. Heston, R. E. Lehmann and D. Zych Texas Instruments Incorporated Dallas, TX	841
U-2 2:40 p.m.	Full Monolithic Sampling Head IC A. Miura, S. Kobayashi, T. Yakhara, S. Uchida, H. Kamada and S. Oka Yokogawa Electric Corporation Tokyo, Japan	845

Session V (Focused Session)

Microwave and Millimeter-Wave Superconductivity Technology West Ballroom D

1:30 p.m. to 3:00 p.m.

Wednesday, May 9, 1990

Chairman: E. Belohoubek—David Sarnoff Research Center

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|--------------------------------|--|------------|
| V-1
1:30 p.m. | A Fully Integrated SIS Mixer for 75-110 GHz
A. R. Kerr and S.-K. Pan
National Radio Astronomy Observatory
Charlottesville, VA

S. Whiteley, M. Radparvar and S. Faris
Hypres, Inc.
Elmsford, NY | 851 |
| V-2
1:50 p.m. | Effect of Finite Thickness on the Surface Impedance of High T_c Thin Films
H. Chaloupka, N. Klein and S. Orbach
University of Wuppertal
Wuppertal, West Germany | 855 |
| V-3
2:10 p.m. | Microwave properties and Modeling of High-T_c Superconducting Thin Film Meander Line
A. Fathy, D. Kalokitis, V. Pendrick and E. Belohoubek
David Sarnoff Research Center
Princeton, NJ

T. Venkatesan, L. Nazar and J. B. Barner
Bellcore
Red Bank, NJ

A. Findikoglu, A. Inam, X. D. Wu, X. X. Xi and W. L. McLean
Rutgers University
Piscataway, NJ | 859 |
| V-4
2:30 p.m. | Testchip for High Temperature Superconductor Passive Devices
R. Dill, J. Otto, G. Riha, L. Schultz, G. Sölkner and E. Wolfgang
Siemens AG
Research Laboratories
Munich and Erlangen, West Germany

P. Russer and A. A. Valenzuela
Institut für Hochfrequenztechnik
Technical University of Munich
West Germany | 863 |

V-5
2:40 p.m.

**Superconducting Tl-Ca-Ba-Cu-O Thin Film Microstrip Resonator and its
Power Handling Performance at 77K**

867

R. B. Hammond, G. V. Negrete, M. S. Schmidt, M. J. Moskowitz, M. M. Eddy,
D. D. Strother and D. L. Skoglund
Superconductor Technologies Inc.
Santa Barbara, CA

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II

Session W
MMICs in Communications Systems
W101

1:30 p.m. to 3:00 p.m.

Wednesday, May 9, 1990

Chairman: C. E. Mahle—COMSAT Laboratories

W-1 1:30 p.m.	26 GHz-Band Full MMIC Transmitters and Receivers Using a Uniplanar Technique M. Muraguchi, T. Hirota, A. Minakawa and H. Ogawa NTT Radio Communication Systems Laboratories Yokosuka, Japan Y. Imai NTT LSI Laboratories Atsugi, Japan F. Ishitsuka NTT Applied Electronics Laboratories Musashino, Japan	873
W-2 1:40 p.m.	Combining Prefiltering and Predistortion in a High Power Direct PSK Modulator K. Kathiravan McMaster University Hamilton, Canada S. Kumar and G. Harron University of Saskatchewan Saskatoon, Canada	877
W-3 1:50 p.m.	MMICs Insertion in a K_u-Band Active Phased Array for Communications Satellites J. R. Potukuchi, R. C. Mott, A. I. Zaghloul, R. K. Gupta, F. T. Assal and R. M. Sorbello COMSAT Laboratories Clarksburg, MD	881
W-4 2:10 p.m.	A Microwave Switch Matrix using MMICs for Satellite Applications R. Gupta, F. Assal and T. Hampsch COMSAT Laboratories Clarksburg, MD	885
W-5 2:30 p.m.	10.6 Gbit/s 2:1 Time Division Multiplexer Using Dual Gate GaAs MESFETs Q. Z. Liu Center for Broadband Telecommunications Electromagnetics Institute Technical University of Denmark Denmark	889

Session X

Monolithic Integrated Circuits: 2

West Ballroom A, B

3:30 p.m. to 5:00 p.m.

Wednesday, May 9, 1990

Chairman: F. Ali—Pacific Monolithics

Co-Chairman: R. Gupta—COMSAT Laboratories

X-1 3:30 p.m.	A Q-Band Monolithic Balanced Diode Mixer Using AlGaAs/GaAs HEMT and CPW Hybrid T. H. Chen, T. N. Ton, G. S. Dow, K. Nakano, L. C. T. Liu and J. Berenz TRW/ESG Electronics and Technology Division Redondo Beach, CA	895
X-2 3:50 p.m.	A Monolithic Mixer IC: Design and Characteristics on N-Implant Only, Buried P-And MBE Wafers S. S. Bharj, Y-H Yun and D. Hou M/A-COM Inc. Lowell, MA	899
X-3 4:00 p.m.	A W-Band Monolithic Amplifier N. Camilleri, P. Chye, P. Gregory and A. Lee Avantek Incorporated Folsom, CA	903
X-4 4:10 p.m.	Wideband Bidirectional MMIC Amplifiers for New Generation T/R Module T. Tsukii and S. G. Houg Raytheon Company Electromagnetic Systems Division Goleta, CA M. J. Schindler Raytheon Research Division Lexington, MA	907
X-5 4:20 p.m.	A 6-18 GHz, High Dynamic Range MMIC Amplifier Using a Feedforward Technique V. Steel, D. Scott and S. Ludvik Teledyne Monolithic Microwave Mountain View, CA	911
X-6 4:40 p.m.	A Low Loss Monolithic Five-Bit Pin Diode Phase Shifter R. Coats, J. Klein, S. D. Pritchett and D. Zimmermann Texas Instruments Incorporated Dallas, TX	915

Session Y
Millimeter Wave Solid State Devices and Circuits
West Ballroom C

3:30 p.m. to 5:00 p.m.

Wednesday, May 9, 1990

Chairman: T. A. Midford—Hughes Aircraft

Y-1 3:30 p.m.	A Phase Modulator With Gain for Microwave Millimeter-Wave Systems R. S. Robertson Hughes Aircraft Company Missile Systems Group Canoga Park, CA	921
Y-2 3:50 p.m.	High Power Epitaxially-Stacked Varactor Diode Multipliers: Performance and Applications at W-Band J. F. Cushman, F. Occhiuti, E. M. McDonagh, M. E. Hines and P. W. Staecker M/A-COM, Inc. Burlington, MA	923
Y-3 4:10 p.m.	Millimeter-Wave Double-Drift Hybrid Read Profile Si Impatt Diodes C. K. Pao, J. C. Chen, R. K. Rolph, A. T. Igawa and M. I. Herman Hughes Aircraft Company Microwave Products Division Torrance, CA	927
Y-4 4:30 p.m.	A 2 W Solid State Transmitter for Short Range Data Communication at 60 GHz H. Barth and M. Pirkel Telefunken Systemtechnik Ulm, West Germany	931

Session Z

Merging of Optical and Microwave Technologies

West Ballroom D

3:30 p.m. to 5:00 p.m.

Wednesday, May 9, 1990

Chairman: H. Sobol—University of Texas, Arlington

Z-1 3:30 p.m.	Nonlinear Circuit Analysis of Laser Diodes Under Microwave Direct Modulation S. Iezekiel and C. M. Snowden Department of Electronic and Electrical Engineering University of Leeds Leeds, England	937
Z-2 3:50 p.m.	Optically Controlled GaAs MMIC Switch Using a MESFET As An Optical Detector A. Paoletta and D. Sturzebecher US Army Labcom Electronics Tech. and Device Lab. Ft. Monmouth, NJ A. Madjar and P. R. Herczfeld Center for Microwave-Lightwave Engineering Drexel Univ. Philadelphia, PA	941
Z-3 4:10 p.m.	Microwave Modulation of Optical Signal by Electro-Optic Effect in GaAs Microstrips M. G. Li, E. A. Chauchard and C. H. Lee Electrical Engineering Dept. University of Maryland College Park, MD H-L. A. Hung COMSAT Laboratories Clarksburg, MD	945
Z-4 4:30 p.m.	Optically-Controlled Tunable CPW Resonators M. S. Islam, P. Cheung, C. Y. Chang, D. P. Neikirk and T. Itoh Department of Electrical and Computer Engineering The University of Texas at Austin Austin, TX	949
Z-5 4:40 p.m.	Compression and Reshaping of Picosecond Electrical Pulses using Dispersive Microwave Transmission Lines Y. Qian and E. Yamashita University of Electro-communications Tokyo, Japan	951

Session AA
Microwave Systems
W101

3:30 p.m. to 5:00 p.m.

Wednesday, May 9, 1990

Chairman: K. D. Breuer—AIL Systems

AA-1 3:30 p.m.	Compact Microwave Remote Recognition System with Newly Developed SSB Modulation T. Ohta, H. Nakano and M. Tokuda Central Research Laboratories Sharp Corporation Tenri-shi Nara, Japan	957
AA-2 3:50 p.m.	A Rapid Channel Detection System for EW Receivers R. G. Ranson and S. G. Gibbons Watkins-Johnson Company Palo Alto, CA	961
AA-3 4:00 p.m.	Design of a Miniature Solid State Feed-Thru Nuller G. G. Raleigh and M. A. Pollack Watkins-Johnson Company Palo Alto, CA	965
AA-4 4:20 p.m.	MMW Radar Target Acquisition System A. Archdate British Aerospace Military Aircraft Limited Lancashire, England	969
AA-5 4:40 p.m.	A 15 Element Imaging Array for 100 GHz N. R. Erickson, P. F. Goldsmith, C. R. Predmore, G. A. Novak and P. J. Viscuso Five College Radio Astronomy Observatory Department of Physics and Astronomy University of Massachusetts Amherst, MA	973

Session BB
Microwave Power Transistors
West Ballroom A, B

8:00 a.m. to 9:30 a.m.

Thursday, May 10, 1990

Chairman: P. Staecker—M/A-COM

BB-1 8:00 a.m.	A C-Band 25 Watt Linear Power FET Y. Taniguchi, Y. Hasegawa, Y. Aoki and J. Fukaya Fujitsu Limited Compound Semiconductor Division Microwave Device Engineering Department Kawasaki, Japan	981
BB-2 8:10 a.m.	5-GHz Band 30 Watt Power GaAs FETS S. Yanagawa, K. Takagi and Y. Yamada Microwave Solid-State Department Komukai Works Toshiba Corporation Kawasaki, Japan	985
BB-3 8:20 p.m.	Harmonic Tuning of Power FETs At X-Band M. A. Khatibzadeh and H. Q. Tserng Texas Instruments Incorporated Dallas, TX	989
BB-4 8:40 a.m.	High-Efficiency, Class-B, S-Band Power Amplifier M. A. Khatibzadeh and B. Bayraktaroglu Texas Instruments Incorporated Dallas, TX	993
BB-5 9:00 a.m.	18 GHz High Gain, High Efficiency Power Operation of AlGaAs/GaAs HBT N. L. Wang, N. H. Sheng, W. J. Ho, M. F. Chang, G. J. Sullivan, J. A. Higgins and P. M. Asbeck Rockwell International Science Center Thousand Oaks, CA	997

Session CC
Ferrite Devices
West Ballroom C

8:00 a.m. to 9:30 a.m.

Thursday, May 10, 1990

Chairman: J. M. Owens—NSF

CC-1 8:00 a.m.	Ferrite Rotary-Field Phase Shifters with Reduced Cross-Section C. R. Boyd, Jr. and C. M. Oness Microwave Applications Group Santa Maria, CA	1003
CC-2 8:20 a.m.	An Edge-Guide Mode Microstrip Isolator with Transverse Slot Discontinuity R. C. Kane Motorola Inc. Schaumburg, IL Thomas Wong Illinois Institute of Technology Dept. of Electrical & Computer Engineering Chicago, IL	1007
CC-3 8:30 a.m.	Magnetically Tunable Stripline Y Circulator T. Nagao and Z. Tanaka Department of Electrical Engineering National Defense Academy Hashirimizu, Yokosuka Kanagawa, Japan	1011
CC-4 8:50 a.m.	High Performance Millimeter-Wave Microstrip Circulator for Deep Space Communications J. J. Pan and M. Shih E-Tek Dynamics, Inc. San Jose, CA L. Riley Jet Propulsion Laboratory Pasadena, CA	1015
CC-5 9:00 a.m.	A 4-40 GHZ Wide Bandwidth, Magnetically Tuned Bandpass Filter D. L. Harris Tektronix, Inc. Microwave and RF Instrument Division Beaverton, OR	1019

Session DD
Network Measurements
West Ballroom D

8:00 a.m. to 9:30 a.m.

Thursday, May 10, 1990

Chairman: R. D. Pollard—University of Leeds

DD-1 8:00 a.m.	A Vector Network Analyzer Integrated into Coplanar-Waveguide Probes J. V. Bellantoni and R. C. Compton School of Electrical Engineering Cornell University Ithaca, NY	1025
DD-2 8:10 a.m.	Verification of MMIC On-Wafer Microstrip TRL Calibration C. Woodin and M. Goff Lockheed Sanders, Inc. Microwave Technology Center Nashua, NH	1029
DD-3 8:30 a.m.	Millimeter-Wave Deembedding Using the Extended TRL (ETRL) Approach M. I. Herman, C. K. Pao, G. L. Lan and J. C. Chen Hughes Aircraft Company Microwave Products Division Torrance, CA	1033
DD-4 8:40 a.m.	Millimetre-Wave Vector Measurements Using Multistate Reflectometers with Diode Detectors M. Perkins Siemens-Plessey Assessment Services Ltd. Titchfield, Hampshire, U.K. R. D. Pollard Department of Electrical and Electronic Engineering The University of Leeds Leeds, UK	1037
DD-5 9:00 a.m.	Reducing the Effects of Random Errors in Six-Port Network Analysers A. S. Wright, A. J. Wilkinson and S. K. Judah University of Hull Hull, England	1041
DD-6 9:10 a.m.	New Time Domain Reflectometry Techniques Suitable for Testing Microwave and Millimeter Wave Circuits Z-Y. Shen HYPRES, Incorporated Elmsford, NY	1045

Session EE
Advanced Transmission Line Structures
W101

8:00 a.m. to 9:30 a.m.

Thursday, May 10, 1990

Chairman: J. C. Rautio—Sonnet Software

EE-1 8:00 a.m.	Modeling of Radial Microstrip Bends A. Weisshaar, S. Luo, M. Thorburn and V. K. Tripathi Oregon State University Corvallis, OR M. Goldfarb Raytheon Research Laboratoriaies Lexington, MA J. L. Lee and E. Reese Texas Instruments Microwave Laboratory Dallas, TX	1051
EE-2 8:10 a.m.	A Generalized Method for the Distinction of Radiation and Surface-Wave Losses in Microstrip Discontinuities T. S. Horng, S. C. Wu, H. Y. Yang and N. G. Alexopoulos Electrical Engineering Department University of California Los Angeles, CA	1055
EE-3 8:20 a.m.	Rigorous Analysis of a Longitudinal Strip on the Surface of Inset Dielectric Guide P. D. Sewell Department of Electrical Engineering University of Bath UK T. Rozzi Dipartimento di Elettronica Universita di Ancona Italy and Department of Electrical Engineering University of Bath UK	1059
EE-4 8:40 a.m.	A New Mode-Coupling Effect on Coplanar Waveguides of Finite Width H. Shigesawa and M. Tsuji Department of Electronics Doshisha University Kyoto, Japan A. A. Oliner Weber Research Institute Polytechnic University Brooklyn, NY	1063

EE-5 9:00 a.m.	The Transition Region Between Bound-Wave and Leaky-Wave Ranges for a Partially Dielectric-Loaded Open Guiding Structure P. Lampariello and F. Frezza Dipartimento di Elettronica Università di Roma "La Sapienza" Rome, Italy A. A. Oliner Weber Research Institute Polytechnic University Brooklyn, NY	1067
EE-6 9:10 a.m.	Optimum Field Theory Design of Stepped E-Plane Finned Waveguide Transformers of Different Inner Cross-Sections J. Bornemann Dept. of E. C. E. University of Victoria Victoria, B.C., Canada F. Arndt Microwave Department University of Bremen Bremen, W.-Germany	1071

Session FF
FET Devices and Circuits
West Ballroom A, B

10:00 a.m. to 11:30 a.m.

Thursday, May 10, 1990

Chairman: E. C. Niehenke—Westinghouse ESG

FF-1 10:00 a.m.	RF Characteristics of P-Well GaAs MESFETS P. C. Canfield and D. J. Allstot Department of Electrical and Computer Engineering Oregon State University Corvallis, OR	1077
FF-2 10:00 a.m.	Pulse-Doped GaAs MESFETs with Planar Self-Aligned Gate for MMIC S. Nakajima, K. Otobe, N. Kuwata, N. Shiga, K. Matsuzaki and H. Hayashi Advanced Semiconductor Devices R & D Department Sumitomo Electric Industries Ltd. Yokohama, Japan	1081
FF-3 10:20 a.m.	Monolithic Indium Phosphide-Based HEMT Multioctave Distributed Amplifier E. Sovero, D. Deakin, W. J. Ho, G. D. Robinson, C. W. Farley, J. A. Higgins and M. F. Chang Rockwell International Science Center Thousand Oaks, CA	1085
FF-4 10:40 a.m.	Distributed and Lossy Match Active Power Splitters Using Bridged-T Low-Pass Filter Networks Y. Ito Aero & Defense Systems Division Tokyo Keiki Co., Ltd. Tokyo, Japan	1089
FF-5 11:00 a.m.	2-18 GHZ Logarithmic Amplification Componentry E. Gertel, D. M. Johnson and M. Kumar American Electronic Laboratories, Inc. Lansdale, PA	1093

Session GG (Focused Session)

Acoustic Charge Transport (ACT) Technology West Ballroom C

10:00 a.m. to 11:30 a.m.

Thursday, May 10, 1990

Chairman: B. R. McAvoy—Westinghouse S&TC

GG-1 10:00 a.m.	The Advent of the Signal Microprocessor (Invited) B. J. Hunsinger Electronic Decisions Incorporated Urbana, IL	1099
GG-2 10:20 a.m.	Heterojunction Acoustic Charge Transport (HACT)—Experiments and Proposed Applications S. Olson and E. Garber TRW Electronic Systems Group Redondo Beach, CA (Paper not available at the time of printing)	
GG-3 10:40 a.m.	Current and Voltage Sensing in ACT 'Block NDS' Transversal Filters R. L. Miller and D. S. Bailey Westinghouse Electric Corp. Linthicum, MD	1103
GG-4 10:50 a.m.	Heterostructure Acoustic Charge Transport Technology for Programmable Transversal Filters W. J. Tanski, S. W. Merritt, D. E. Cullen, R. D. Carroll, E. J. Branciforte, and R. N. Sacks United Technologies Research Center East Hartford, CT W. D. Hunt Georgia Institute of Technology Atlanta, GA	1107
GG-5 11:00 a.m.	Acoustic Charge Transport Digitally Programmable Transversal Filter Development R. W. Miller and R. J. Kansy Electronic Decisions Incorporated Urbana, IL	1111
GG-6 11:10 a.m.	Development of a Monolithic, Programmable Saw Filter in Silicon J. C. Haartsen Delft University of Technology Electrical Engineering Dept. Delft, The Netherlands	1115

Session HH
Measurement of Material Properties
West Ballroom D

10:00 a.m. to 11:30 a.m.

Thursday, May 10, 1990

Chairman: R. E. Ham—Tracor Aerospace

HH-1 10:00 a.m.	High Spatial Resolution Dielectric Constant Uniformity Measurements Using Microstrip Resonant Probes M. S. Wang, S. Bothra, J. M. Borrego Electrical, Computer, and Systems Engineering Department Rensselaer Polytechnic Institute Troy, NY K. W. Kristal Rogers Corporation Rogers, CT	1121
HH-2 10:10 a.m.	An Automated 60 GHz Open Resonator System for Precision Dielectric Measurement M. N. Afsar, X. Li and H. Chi Department of Electrical Engineering Tufts University Medford, MA	1125
HH-3 10:30 a.m.	Characterization of Conductor-Backed Coplanar Waveguide Using Accurate On-Wafer Measurement Techniques Y-C. Shih and Mark Maher Hughes Aircraft Company Microwave Products Division Torrance, CA	1129
HH-4 10:40 a.m.	Dual-Mode Stripline Resonator Array for Fast Error Compensated Moisture Mapping of Paper Web M. Fischer, P. Vainikainen and E. Nyfors Helsinki University of Technology Radio Laboratory ESPOO, Finland	1133
HH-5 11:00 a.m.	Characterization of GaAs Devices by a Versatile Pulsed I-V Measurement System A. Platzker, A. Palevsky, S. Nash, W. Struble and Y. Tajima Raytheon Research Division Lexington, MA	1137

Session II

Field Theory of Integrated-Circuit Discontinuities

W101

10:00 a.m. to 11:30 a.m.

Thursday, May 10, 1990

Chairman: D. Rutledge—CALTECH

II-1 10:00 a.m.	A Three-Dimensional Finite-Difference Calculation of Equivalent Capacitances of Coplanar Waveguide Discontinuities M. Naghed and I. Wolff Department of Electrical Engineering and Sonderforschungsbereich 254 Duisberg University Duisburg, West Germany	1143
II-2 10:20 a.m.	Analysis of Complex Passive (M)MIC-Components Using the Finite Difference Time-Domain Approach M. Rittweger and I. Wolff Department of Electrical Engineering and Sonderforschungsbereich 254 Duisburg University Duisburg, FRG	1147
II-3 10:40 a.m.	A Rigorous Dispersive Characterization of Microstrip Cross and Tee Junctions S-C. Wu, H-Y. Yang and N. G. Alexopoulos Electrical Engineering Department University of California Los Angeles, CA	1151
II-4 11:00 a.m.	Full Wave Modeling of Electrically Wide Microstrip Open End Discontinuities Via A Deterministic Spectral Domain Method J. McLean, H. Ling and T. Itoh Department of Electrical and Computer Engineering The University of Texas at Austin Austin, TX	1155
II-5 11:20 a.m.	An Efficient Finite Element Approach for the Analysis of Three-Dimensional Transmission Line Discontinuities Using an Asymptotic Boundary Condition A. Khebir, A. B. Kouki and R. Mittra Department of Electrical & Computer Engineering University of Illinois Urbana, IL	1159

Session JJ
European Session
West Ballroom A, B

11:50 a.m. to 1:15 p.m.

Thursday, May 10, 1990

Chairman: R. Sparks—Raytheon Co.

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| JJ-1
11:45 a.m. | Short Range Microwave Links for Traffic and Transport Applications (Invited)
B. Hane and P. Weissglas
Swedish Institute of Microelectronics
Kista, Sweden
(Paper not available at the time of printing) | |
| JJ-2
12:15 p.m. | Microwave Communications Activity in Eastern Europe (Invited)
T. Berceci
Research Institute for Telecommunications
Technical University of Budapest
Budapest, Hungary | 1165 |
| JJ-3
12:45 p.m. | Short Range Microwave Links for Traffic and Transport Applications (Invited)
B. Hane and P. Weissglas
Swedish Institute of Microelectronics
Kista, Sweden | 1169 |

Session KK

CAD Techniques for Microwave Applications

West Ballroom A, B

1:30 p.m. to 3:00 p.m.

Thursday, May 10, 1990

Chairman: S. L. March—Tracor Aerospace

KK-1 1:30 p.m.	Efficient CAD of E-Plane Steps in Rectangular Waveguide M. Mongiardo Dipartimento di Ingegneria Elettronica Universita di Roma, 'Tor Vergata' Rome, Italy T. Rozzi Dipartimento di Elettronica e Automatica Universita di Ancona Italy and Department of Electrical Engineering University of Bath UK	1175
KK-2 1:40 p.m.	An Accurate CAD Algorithm for E-Plane Type Bandpass Filters Using a New Passband Correction Method Combined with the Synthesis Procedures J-B. Lim Department of Electronics Engineering Kookmin University Seoul, Korea C-W. Lee Department of Electronics Engineering Seoul National University Seoul, Korea T. Itoh Department of Electrical and Computer Engineering The University of Texas at Austin Austin, TX	1179
KK-3 2:00 p.m.	Expert System for Microwave Filter Design A. H. Nakamura, K. Hibino, F. Yamamoto and S. Kamihashi Microwave Solid-State Department Komukai Works, Toshiba Corporation Kawasaki, Japan	1183
KK-4 2:10 p.m.	New Microwave Network Identities for CAD Modeling D. Neuf RHG Division, M/A-COM Deer Park, NY	1187

KK-5 2:20 p.m.	Time Domain Simulation of Uniform and Nonuniform Multiconductor Lossy Lines by the Method of Characteristics N. Orhanovic and V. K. Tripathi Department of Electrical and Computer Engineering Oregon State University Corvallis, OR P. Wang Contec Microelectronics U.S.A., Inc. San Jose, CA	1191
KK-6 2:40 p.m.	A Series of CAD Techniques for Designing Microwave Feedback Amplifiers and Simplifying the Design of Reactivity Matched Single-Ended Amplifiers P. L. D. Abraie AMPSA CC Pretoria, Republic of South Africa	1195

Session LL (Focused Session)

(Joint with URSI, Commission D)

Active Quasi-Optical Techniques

West Ballroom C

1:30 p.m. to 3:00 p.m.

Thursday, May 10, 1990

Chairman: J. W. Mink—US Army Research Office

LL-1 1:30 p.m.	Quasi-Optical Power-Combining Arrays D. B. Rutledge, Z. B. Popović, R. M. Weikle II, M. Kim and K. A. Potter Division of Engineering and Applied Science California Institute of Technology Pasadena, CA R. C. Compton and R. A. York School of Electrical Engineering Cornell University Ithaca, NY	1201
LL-2 1:50 p.m.	Recent Efforts on Planar Components for Active Quasi-Optical Applications K. D. Stephan Dept. of Electrical and Computer Engineering University of Massachusetts Amherst, MA T. Itoh Dept. of Electrical and Computer Engineering The University of Texas Austin, TX	1205
LL-3 2:10 p.m.	Millimeter and Submillimeter Wave Quasi-Optical Oscillator with Multi-Elements M. Nakayama, M. Hieda, T. Tanaka and K. Mizuno Research Institute of Electrical Communication Tohoku University Sendai, Japan	1209
LL-4 2:20 p.m.	A Periodic Second Harmonic Spatial Power Combining Oscillator A. Mortazawi and T. Itoh The University of Texas at Austin Department of Electrical and Computer Engineering Austin, TX	1213
LL-5 2:30 p.m.	Spatial Power Combining Using Push-Pull FET Oscillators with Microstrip Patch Resonators J. Birkeland and T. Itoh Department of Electrical and Computer Engineering The University of Texas at Austin Austin, TX	1217

Session MM
(Joint with AP Symp.)
Phased Array Techniques
West Ballroom D

1:30 p.m. to 3:00 p.m.

Thursday, May 10, 1990

Chariman: J. D. Adams—Georgia Institute of Technology

MM-1 1:30 p.m.	A New Approach to Active Phased Arrays Through RF-Wafer Scale Integration L. R. Whicker and J. J. Zingaro Westinghouse Electric Corporation Electronic Systems Group Baltimore, MD M. C. Driver and R. C. Clarke Westinghouse Electric Corporation Science and Technology Center Pittsburgh, PA	1223
MM-2 1:50 p.m.	Transmit/Receive Modules for 6 to 18 GHz Multifunction Arrays M. Priolo, G. St Onge, W. Coughlin III, J. Bugeau and D. Meharry Lockheed Sanders, Inc. Microwave Technology Center Nashua, NH	1227
MM-3 2:00 p.m.	Q-Band Monolithic Phase and Amplitude Weights J. A. Lester, K. Nakano and Y. C. Ngan TRW Electronics and Defense Redondo Beach, CA	1231
MM-4 2:10 p.m.	A Single Chip C-Band GaAs Monolithic Five Bit Phase Shifter with On Chip Digital Decoder F. Ali, S. Mitchell, J. Mogri and A. Podell Pacific Monolithics Sunnyvale, CA	1235
MM-5 2:20 p.m.	Composite Stripline Phase Shifter with Low Loss and Minimum Weight P. M. Esker, A. W. Morse, J. W. Gipprich, Z. A. Diaz and S. R. Kramer Westinghouse Electric Corporation Baltimore, MD	1239
MM-6 2:30 p.m.	An Efficient Mode Launcher for Arrays of Longitudinal Dipoles in IDG T. Rozzi and L. Ma School of Electrical Engineering Bath University UK	1243

MM-7
2:40 p.m.

Phase Control of Optically Injection Locked Oscillators for Phased Arrays

1247

A. S. Daryoush, R. Saedi and D. Polifko
Millimeter Wave & Lightwave Engineering Lab
Center for Microwave-Lightwave Engineering
Dept of ECE
Drexel University
Philadelphia PA

M. Francisco
GE, Astro-Space Division
East Windsor, NJ

R. Kunath
NASA
Lewis Research Center
Cleveland, OH

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Session NN
Low Noise Techniques
W101

1:30 p.m. to 3:00 p.m.

Thursday, May 10, 1990

Chairman: J. J. Whelehan—AIL Systems

NN-1 1:30 p.m.	Broadband, Low-Noise, Cryogenically-Coolable Amplifiers in 1 to 40 GHz Range M. W. Pospieszalski, J. D. Gallego and W. J. Lakatosh National Radio Astronomy Observatory Charlottesville, VA	1253
NN-2 1:50 p.m.	Super Low-Noise Self-Aligned Gate GaAs MESFET With Noise Figure of 0.87dB at 12GHz K. Hosogi, N. Ayaki, T. Kato, T. Oku, Y. Kohno, H. Nakano, T. Shimura, H. Takano and K. Nishitani Optoelectronic and Microwave Devices R&D Laboratory Mitsubishi Electric Corp. Itami, Japan	1257
NN-3 2:00 p.m.	Measurement of the Cross Correlation Between Baseband and Transposed Flicker Noises in a GaAs MESFET. P. A. Dallas and J. K. A. Everard King's College London Department of Electrical and Electronics Engineering London, England	1261
NN-4 2:20 p.m.	Figures of Merit for Characterizing FET Oscillators O. A. A. Elnor and K. Schünemann Technical University Hamburg-Hamburg Hamburg, FRG A. Jacob Lawrence Berkeley Laboratory Berkeley, CA	1265
NN-5 2:30 p.m.	Phase Noise Characterization of SAW Oscillators Based on a Newton Minimization Procedure D. P. Klemer and K-M. Shih NSF/Center for Advanced Electron Devices and Systems The University of Texas at Arlington Arlington, TX E. E. Clark, III RF Monolithics, Inc. Dallas, TX	1269

NN-6
2:40 p.m. **A High Performance Spectrum Analyzer Phase Lock System**
D. Huffman, L. Purinton, L. Gumm and L. Lockwood
Tektronix, Inc.
Microwave and RF Instruments Division
Beaverton, OR
(Paper not available at the time of printing)

NN-7
2:50 p.m. **Simple Noise Analysis Applied to Power Combiners**
A. S. Morris and R. J. Trew
High Frequency Electronics Laboratory
Electrical and Computer Engineering Department
North Carolina State University
Raleigh, NC

1273

Session OO
Nonlinear CAD
West Ballroom A, B

3:30 p.m. to 5:00 p.m.

Thursday, May 10, 1990

Chairman: M. B. Steer—North Carolina State University

- | | | |
|---------------------------------|---|-------------|
| OO-1
3:30 p.m. | Choosing an Optimum Large Signal Model for GaAs MESFETs and HEMTs
M. Miller, M. Golio, B. Beckwith and E. Arnold
Motorola Strategic Electronics Division
Chandler, AZ

D. Halchin, S. Ageno and S. Dorn
Motorola Phoenix Corporate Research Laboratories
Tempe, AZ | 1279 |
| OO-2
3:50 p.m. | A New and Efficient Approach to the Analysis and Design of GaAs MESFET Microwave Oscillators
K. K. M. Cheng and J. K. A. Everard
Dept. of Electrical and Electronic Engineering
King's College London
London, England | 1283 |
| OO-3
4:00 p.m. | A General Program for Steady State, Stability, and FM Noise Analysis of Microwave Oscillators
J. M. Paillot
LEP-3, av. Descartes
Brevannes, France

J. C. Nallatamby, M. Hessane, R. Quere, M. Prigent and J. Rousset
IRCOM-Faculté des Sciences
Limoges, France | 1287 |
| OO-4
4:20 p.m. | Modeling MESFETs for Intermodulation Analysis of Mixers and Amplifiers
S. A. Maas
Independent Consultant
Long Beach, CA

D. Neilson
TRW
Redondo Beach, CA | 1291 |
| OO-5
4:30 p.m. | The Exploitation of Sparse-Matrix Techniques in Conjunction with the Piecewise Harmonic-Balance Method for Nonlinear Microwave Circuit Analysis
V. Rizzoli, F. Masti* and F. Scallari†
Dipartimento di Elettronica
Informatica e Sistemistica
University of Bologna
*Dipartimento di Matematica
†Istituto di Elettrotecnica

V. Frontini
CINECA-Centro Interuniversitario di Calcolo dell' Italia Nordorientale
Casalecchio di Reno, Italy | 1295 |

Session PP
Submillimeter Wave Techniques and Devices
West Ballroom C

3:30 p.m. to 5:00 p.m.

Thursday, May 10, 1990

Chairman: M. N. Afsar—Tufts University

PP-1 3:30 p.m.	High Efficiency Submillimeter Frequency Multipliers N. Erickson Millitech Corp. S. Deerfield, MA and Five College Radio Astronomy Observatory University of Massachusetts Amherst, MA	1301
PP-2 3:50 p.m.	A Micron-Thickness, Planar Schottky Diode Chip for Terahertz Applications with Theoretical Minimum Parasitic Capacitance W. L. Bishop, E. R. Meiburg, R. J. Mattauch and T. W. Crowe University of Virginia Semiconductor Device Laboratory Electrical Engineering Department Charlottesville, VA	1305
PP-3 4:10 p.m.	Far-Infrared Composite Microbolometers S. M. Wentworth and D. P. Neikirk Microelectronics Research Center Department of Electrical and Computer Engineering The University of Texas at Austin Austin, TX	1309
PP-4 4:30 p.m.	A Technique for Fabricating Free Standing Electrically Thick Metallic Mesh and Parallel Wire Grids for Use as Submillimeter Wavelength Filters and Polarizers P. H. Siegel Jet Propulsion Laboratory Pasadena, CA J. A. Lichtenberger MetaPlate Dayton, OH	1311
PP-5 4:40 p.m.	A Wideband Monolithic Submillimeter-Wave Quasi-Optical Power Meter C. C. Ling and G. M. Rebeiz NASA/Center for Space Terahertz Technology Radiation Laboratory Electrical Engineering and Computer Science Department The University of Michigan Ann Arbor, MI	1315

Session QQ
High Power Devices
West Ballroom D

3:30 p.m. to 5:00 p.m.

Thursday, May 10, 1990

Chairman: J. Goel—TRW, ESG

QQ-1 3:30 p.m.	The Reverse Bias Requirement for Pin Diodes in High Power Switches and Phase Shifters G. Hiller Semiconductor Products Division M/A-COM Inc. Burlington, MA R. H. Caverly Dept. of Electrical and Computer Engineering Southeastern Massachusetts University North Dartmouth, MA	1321
QQ-2 3:50 p.m.	Thermal Considerations in High Average Power Microwave Pin Diode Switches J. C. Hill and H. S. Maddix Enon Microwave, Inc. Topsfield, MA	1325
QQ-3 4:00 p.m.	High Power Four-Way Power Divider/Combiner K. Chang, M. Li and K. A. Hummer Department of Electrical Engineering Texas A&M University College Station, TX R. A. Speciale General Dynamics Company Ontario, CA	1329
QQ-4 4:10 p.m.	High CW Power with Multi-Octave Bandwidth from Power-Combined Mini-TWTs R. Mallavarpu and M. P. Puri Raytheon Company Microwave and Power Tube Division Waltham, MA	1333
QQ-5 4:30 p.m.	A 12.5 GHz-Band 50W Solid-State Power Amplifier for Future Broadcasting Satellites H. Mizuno, H. Mitsumoto and N. Yazawa Science and Technical Research Laboratories of NHK Tokyo, Japan	1337