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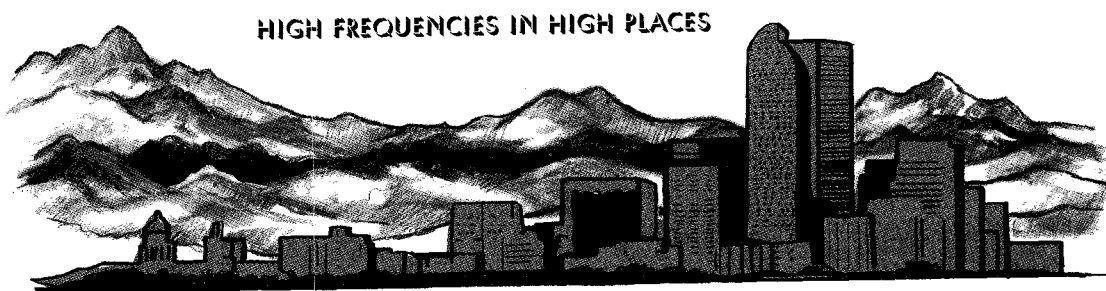
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**1997 IEEE MTT-S
INTERNATIONAL MICROWAVE
SYMPOSIUM DIGEST**

*Technical Program Contents
Tuesday, June 10*



1997 IEEE MTT-S INTERNATIONAL MICROWAVE SYMPOSIUM
DENVER, COLORADO



JUNE 8-13, 1997

1997 Microwave Symposium Technical Program Schedule

TU
1A

TU
1B

TU
1C

TU
1D

Session TU1A (Joint RFIC and IMS Session) Amplifier Technology

8:00 am–9:40 am

Room A201

Tuesday, June 10, 1997

Chair: J. Schellenburg, Schellenburg Associates
Co-Chair: S. Weinreb, University of Massachusetts

TU1A-1	Silicon RF GCMOS Performance for Portable Communications Applications	1
8:00 am	E. Spears, D. Ngo, J. Ma, H.-B. Liang, D. Spooner, J. Ford, S. Cheng, B. Courson, B. Yeung, J. Alvarez, J. Bhalla and D. Lamey	
TU1A-2	High Dynamic Range Variable Gain Amplifier for CDMA Applications	5
8:20 am	M. Kasashima, S. Tachi, and K. Tanaka	
TU1A-3	A Novel Integrated Microwave Bias Network for Low Cost Multistage Amplifiers	9
8:40 am	H. Morkner, M. Frank, K. Negus, T.-M. Kao	
TU1A-4	MMIC GaAs Transimpedance Amplifiers for Optoelectronic Applications	13
9:00 am	P. Duême, M. Schaller, D. Mathoorasing, S. Bouchoule, C. Kazmierski, S. Maricot, and C. Rumelhard	
TU1A-5	Ka-Band Ultra Low Noise MMIC Amplifier Using Pseudomorphic HEMTs	17
9:20 am	S. Fujimoto, T. Katoh, T. Ishida, T. Oku, Y. Sasaki, T. Ishikawa and Y. Mitsui	

Session TU1B

(Focused Session)

Millimeter-Waves Over Fiber Systems

8:00 am–9:40 am

Room A207

Tuesday, June 10, 1997

Chair: J.B. Horton, TRW
Co-Chair: A.J. Seeds, University College London

TU1B-1	Broadband Wireless Access Using Millimetre-Wave Over Fibre Systems	23
8:00 am	A.J. Seeds	
TU1B-2	Wideband Millimeter Wave/Optical Network Applications in Japan	27
8:20 am	N. Imai, H. Kawamura, K. Inagaki and Y. Karasawa	
TU1B-3	Outdoor and Indoor Applications for Broadband Local Loop with Fibre supported mm-wave Radio Systems	31
8:40 am	M. Goloubkoff, E. Pénard, D. Tanguy, P. Legaud, D. Mathoorasing, F. Devaux and C. Minot	
TU1B-4	(Invited) An Optical Link for W-Band Transmit/Receive Applications	35
9:00 am	E.C. Niehenke and P. Herczfeld	
TU1B-5	A 60GHz 120Mb/s QPSK Fibre-Radio Transmission Experiment Incorporating an Electroabsorption Modulator Transceiver for a Full Duplex Optical Data Path	39
9:20 am	D. Wake, L. Noel, D.G. Moodie, D.D. Marcenac, L.D. Westbrook and D. Nessel	

Session TU1C

(Focused Session)

Microwave Applications of Silicon Carbide

8:00 am–9:40 am

Room A102

Tuesday, June 10, 1997

Chair: R. Kaul, U.S. Army Research Lab

Co-Chair: K.D. Breuer, AEL Industries

TU1C-1	The Operation of Microwave Power Amplifiers Fabricated from Wide Bandgap Semiconductors	
8:00 am	R.J. Trew	45
TU1C-2	Wide Dynamic Range RF Mixers Using Wide-Bandgap Semiconductors	49
8:20 am	C. Fazi and P.G. Neudeck	
TU1C-3	Recent Application of Silicon Carbide to High Power Microwave	53
8:40 am	A.W. Morse, P.M. Esker, S. Sriram, J.J. Hawkins, L.S. Chen, J.A. Ostop, T.J. Smith, C.D. Davis, R.R. Barron, R.C. Clarke, R.R. Siergiej and C.D. Brandt	
TU1C-4	Silicon Carbide MESFET's for High-Power S-Band Applications	57
9:00 am	S.T. Allen, R.A. Sadler, T.S. Alcorn, J.W. Palmour and C.H. Carter, Jr.	
TU1C-5	3C-SiC and AlN Photoconductive Switches for High Speed Pulse Generation	late
	S. Sheng, X. Tang, M.G. Spencer and C.H. Lee	

Session TU1D

Numerical Methods in Time Domain I

8:00 am–9:40 am

Room A101

Tuesday, June 10, 1997

Chair: K. Naishadham, Wright State University

TU1D-1	Transient Electromagnetic Analysis and Model Complexity Reduction Using the Partial Element Equivalent Circuit Formulation	
8:00 am	W. Pinello, A. Cangellaris and A. Ruehli	63
TU1D-2	Nonlinear Analysis of a Microwave Diode Mixer Using the Extended FDTD	67
8:20 am	M. Chen, S.T. Chew and T. Itoh	
TU1D-3	A Magnetic Current Formulation for Modelling Discrete Components Using the FDTD Method	71
8:30 am	R. Gillard, K. Moustadir, F. Le Bolzer and J. Citerne	
TU1D-4	An FDTD Impedance Boundary Condition and Its Application to Waveguide Discontinuity Analyses	75
8:40 am	T. Shibata, Y. Qian and T. Itoh	
TU1D-5	Physical Simulation of Complete Millimeter-Wave Amplifiers Using Full-Wave FDTD Technique	79
9:00 am	S.M. Sohel Imtiaz and S.M. El-Ghazaly	
TU1D-6	Relationship Between the Compact Complex and Real Variable 2-D FDTD Methods in Arbitrary Anisotropic Dielectric Waveguides	83
9:20 am	A.P. Zhao, J. Juntunen and A.V. Räisänen	
TU1D-7	A Hybrid Full-Wave Analysis of Via Hole Grounds Using Finite Difference and Finite Element Time Domain Methods	89
9:30 am	D. Koh, H.-B. Lee and T. Itoh	

Session TU1E

Medical Applications and Biological Effects

8:00 am–9:40 am

Room A108

Tuesday, June 10, 1997

Chair: M.A. Stuchly, University of Victoria, Canada

TU1E-1	Human Organs Dosimetry for Transient Electromagnetic Fields	95
8:00 am	M. Mrozowski, M. Okoniewski, E. Okoniewska and M.A. Stuchly	
TU1E-2	Modeling of Interaction of Electromagnetic Fields from a Cellular Telephone with	
8:20 am	Hearing Aids	99
	M. Okoniewski, M.A. Stuchly and S.S. Stuchly	
TU1E-3	Theoretical Analysis of Voltage-Gated Membrane Channels Under GSM and DECT Exposure	103
8:40 am	F. Apollonio, G. D'Inzeo and L. Tarricone	
TU1E-4	Measurements of Complex Permittivity of Biological and Organic Liquids Up to 110 GHz	107
9:00 am	F. Duhamel, I. Huynen and A.V. Vorst	
TU1E-5	Coupling Parameters of a Concentric Multi-Element Waveguide Array	111
9:20 am	K.S. Nikita and N.K. Uzunoglu	
TU1E-6	An Attempt of High-Speed Imaging of the Chirp Radar-Type Microwave	
9:30 am	Computed Tomography	115
	M. Miyakawa and T. Hayashi	

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**TU
2A**

**TU
3A**

**TU
3B**

Session TU2A

(Plenary Session)

New Microwave Telecommunications Infrastructures

10:10 am–11:50 am

Ballroom 4

Tuesday, June 10, 1997

Speakers: Bernard B. Bossard, Chief Technical Officer, Cellular Vision, New York
Robert C. Dixon: Chief Scientist, Omnipoint Corp., Colorado Springs

Session TU3A

(Joint RFIC and IMS Session)

Monolithic Wireless Technology

1:20 pm–3:00 pm

Room A201

Tuesday, June 10, 1997

Chair: N. Camilleri, Advanced Micro Devices

Co-Chair: Z. Bardai, Hughes Aircraft

TU3A-1	Silicon RF-GCMOS IC Technology for RF Mixed-Mode Wireless Applications	123
1:20 pm	J. Ma, H.-B. Liang, D. Ngo, E. Spears, B. Yeung, B. Courson, D. Spooner, D. Lamey, J. Alvarez, T. Teraji, J. Ford and S. Cheng	
TU3A-2	Optimization of High Q CMOS-Compatible Microwave Inductors Using Silicon CMOS Technology	129
1:40 pm	M. Park, S. Lee, H.K. Yu and K.S. Nam	
TU3A-3	Low-Frequency Noise Characteristics of Self-Aligned AlGaAs/GaAs HBT's with a Noise Corner Frequency Below 3 kHz	133
2:00 pm	J.-H. Shin, J. Kim, Y. Chung, J. Lee, K.H. Ahn and B. Kim	
TU3A-4	28 V Low Thermal Impedance HBT with 20 W CW Output Power	137
2:20 pm	D. Hill and T. Kim	
TU3A-5	High-Reliability GaAs HBT Monolithic Microwave Amplifier	141
2:40 pm	F.M. Yamada, A.K. Oki, D.C. Streit, D.K. Umemoto, L.T. Tran, T.R. Block, D.T. Okazaki, M.M. Hoppe and E.A. Rezek	
TU3A-6	Systematic Investigations on Mesfets and Passive Components Transplanted by Epitaxial Lift Off Onto Host Materials with Various Resistivities	145
2:50 pm	T. Morf, C. Biber and W. Bächtold	

Session TU3B

(Focused Session)

Electromagnetic Wave Interactions with Electron Devices and Circuits

1:20 pm–3:00 pm

Room A207

Tuesday, June 10, 1997

Chair: J. Harvey, U.S. Army Research Office

TU3B-1	Electromagnetic Interfacing of Semiconductor Devices and Circuits	151
1:20 pm	S.M. El-Ghazaly and T. Itoh	
TU3B-2	Characterization and Modelling of Microwave and Millimeter-Wave Large-Signal Device-Circuit Interaction Based on Electro-Thermal Physical Models	155
1:50 pm	C.M. Snowden	
TU3B-3	Active Transmission Lines	<i>late</i>
2:10 pm	E. Brown	
TU3B-4	Full Wave BIE Analysis of Travelling Waves in Unbiased/Velocity Saturated FET Structures With Linearly Controlled Current Density	159
2:30 pm	W. Schroeder, W. Prost and I. Wolff	
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2:40 pm	K.A. Remley, A. Weisshaar, S.M. Goodnick, and V.K. Tripathi	

Session TU3C

(Focused Session)

Acoustic Wave Devices for Portable Telecommunication

1:20 pm–3:00 pm

Room A102

Tuesday, June 10, 1997

Chair: R. Weigel, University of Linz, Austria

TU3C-1	Recent Progress in SAW Filters at GHz Frequencies	169
1:20 pm	D. Penunuri	
TU3C-2	Design, Fabrication, and Application of GHz SAW Devices	1821
1:50 pm	U. Knauer, J. Machui and C.W. Ruppel	
TU3C-3	(Invited) Recent and Future RF SAW Technology for Mobile Communications	173
2:10 pm	M. Hikita, N. Shibagaki, A. Isobe, K. Asai and K. Sakiyama	
TU3C-4	High Frequency SAW Devices	177
2:30 pm	J.H. Hines and D.C. Malocha	
TU3C-5	Thin Film ZnO Based Bulk Acoustic Mode Filters	181
2:40 pm	C.W. Seabury, P.H. Kobrin, R. Addison and D.P. Havens	
TU3C-6	Novel 24 GHz FMCW Front-End with 2.45 GHz SAW Reference Path for High-Precision Distance Measurements	185
2:50 pm	M. Nalezinski, M. Vossiek and P. Heide	

Session TU3D

Numerical Methods in Frequency Domain I

1:20 pm–3:00 pm

Room A101

Tuesday, June 10, 1997

Chair: N. Alexopoulos, University of California-Irvine

TU3D-1	Double Vector-Integral-Equation Method for Microstrip-Lines on Photonic Band-Gap Substrates	191
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TU3D-2	A Finite Element-Generalized Network Analysis of Finite Thickness Photonic Crystals	195
1:40 pm	R. Coccioli, T. Itoh and G. Pelosi	
TU3D-3	Accurate Calculation of the Modes of the Circular Multiridge Waveguide	199
1:50 pm	A. Morini, T. Rozzi, A. Angeloni and M. Guglielmi	
TU3D-4	A New Modal Approach for Planar Transmission Line to Waveguide Three-Port Transition	203
2:00 pm	B. Storer, H. Aubert and H. Baudrand	
TU3D-5	Scattering Properties of Asymmetric Rectangular Iris in a Circular Waveguide Using Edge-Conditioned Basis Functions	207
2:10 pm	T. Lenadan, S. Amari, R. Vahldieck and J. Bornemann	
TU3D-6	Generalized Y-Matrix of Arbitrary H-Plane Waveguide Junctions by the BI-RME Method	211
2:30 pm	P. Arcioni, M. Bressan, G. Conciauro and L. Perregrini	

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Session TU3E

Analog Fiberoptic Link Technology

1:20 pm–3:00 pm

Room A108

Tuesday, June 10, 1997

Chair: D. Jager, Duisburg University, Germany
Co-Chair: C. Gee, Ortel Corp.

TU3E-1	Wireless Distribution Via Fiber-Optic Technology	217
1:20 pm	J.K. Plourde	
TU3E-2	Stable and High-Power Laser Diode Module for Millimeter-Wave Generation	221
1:40 pm	T. Kuri and K.-I. Kitayama	
TU3E-3	Fiberoptic Microwave Generation for Bidirectional Broadband Mobile Communications	225
2:00 pm	R.-P. Braun, G. Grosskopf, R. Hentges, S. Loch, D. Rohde and F. Schmidt	
TU3E-4	Nd:LiNbO₃ Microchip Laser with 20GHz Subcarrier	229
2:20 pm	A.J.C. Vieira, P.R. Herczfeld and V.M. Contarino	
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2:40 pm	G. Hanke	
TU3E-6	Input Impedance Conditions for Minimizing the Noise Figure of an Analog Optical Link	237
2:50 pm	E. Ackerman, C. Cox III, G. Betts, H. Roussell, K. Ray and F. O'Donnell	

Session TU4A

(Joint RFIC and IMS Session)

Millimeter-Wave Monolithic Circuits

3:30 pm–5:10 pm

Room A201

Tuesday, June 10, 1997

Chair: H.A. Hung, TRW
Co-Chair: S.S. Bharj, Princeton Microwave Technology

TU4A-1	A 6 Watt Ka-Band Power Module Using MMIC Power Amplifiers	1183
3:30 pm	D.L. Ingram, D.I. Stone, T.W. Huang, H. Wang, M. Siddiqui, M. Nishimoto, B. Allen, D. Tamura, R. Lai, M. Biedenbender and H.C. Yen	
TU4A-2	Compact Integrated Coplanar T/R-Modules for Automotive Applications	243
3:50 pm	L. Verweyen, A. Bangert, H. Massler, T. Fink, M. Neumann, R. Osorio, T. Krems, T. Jakobus, W.H. Haydl and M. Schlechtweg	
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4:20 pm	Y. Yamane, K. Onodera, T. Nittono, K. Nishimura, K. Yamasaki and A. Kanda	
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4:40 pm	M.S. Heins, D.W. Barlage, M.T. Fresina, D.A. Ahmari, Q.J. Hartmann, G.E. Stillman and M. Feng	
TU4A-6	1 Watt, 65% PAE K-Band AlGaAs/GaAs Heterojunction Bipolar Transistors Using Emitter Air-Bridge Technology	259
5:00 pm	H.-F. Chau, D. Hill, R. Yarborough and T. Kim	

Session TU4B

Passive Components I

3:30 pm–5:10 pm

Room A207

Tuesday, June 10, 1997

Chair: W.-C. Tang, Com Dev

TU4B-1	Air-Gap Transmission Lines for OEICs and MMICs Using Glass Substrates	265
3:30 pm	J. Chuang, S.M. El-Ghazaly, D.K. Schroder, Y.H. Zhang, G.N. Maracas and A.C. Reyes	
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4:20 pm	R.H. Jansen, J. Jotzo and M. Engels	
TU4B-5	A Compact MMIC 90° Coupler for ISM Applications	281
4:30 pm	G.F. Avitabile, A. Cidronali, C. Salvador, M. Speciale	
TU4B-6	Arbitrary Termination Impedances, Arbitrary Power Divisions and Small-Sized Ring Hybrids	285
4:40 pm	H.R. Ahn, I. Wolff and I.-S. Chang	
TU4B-7	Line-to-Ring Coupling Circuit Model and Its Parametric Effects for Optimized Design of Microstrip Ring Circuits and Antennas	289
4:50 pm	L. Zhu and K. Wu	

Session TU4C

Superconductive Technology

3:30 pm–5:10 pm

Room A102

Tuesday, June 10, 1997

Chair: W.G. Lyons, MIT Lincoln Laboratory

TU4C-1	HTS Diplexer & Low Noise Amplifier RF Module	295
3:30 pm	G.L. Hey-Shipton, N.O. Fenzi and K.F. Raihn	
TU4C-2	A Novel Split-Resonator High Power HTS Planar Filter	299
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TU4C-3	Tunable Superconducting Resonators Using Ferrite Substrates	303
4:10 pm	D.E. Oates and G.F. Dionne	
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TU4C-5	A New High-Temperature Superconducting Double-Hybrid Coupler with Wide Bandwidth	311
4:50 pm	Th. Bechteler, B. Mayer and R. Weigel	

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Session TU4D

Numerical Methods in Time Domain II

3:30 pm–5:10 pm

Room A101

Tuesday, June 10, 1997

Chair: P. Russer, University of Technology-Munich, Germany

TU4D-1	Special 3D-TLM Corner Nodes for Singular Field Regions	317
3:30 pm	G. Tardioli, L. Cascio, M. Righi and W.J.R. Hoefer	
TU4D-2	Electromagnetic Analysis of Planar Circuitry and the Dimensionality Argument	321
3:50 pm	L. Albasha and C.M. Snowden	
TU4D-3	Modal Boundary Conditions for Waveguides of Arbitrary Cross-Section with SCN TLM	325
4:10 pm	J.L. Herring, M. Righi and W.J.R. Hoefer	
TU4D-4	The TLM-Equivalent FD-TD Analysis of Antenna Radiation Problems With the PML Absorbing Conditions	329
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TU4D-6	Space- and Time-Adaptive Gridding Using MRTD Technique	337
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TU4D-7	Efficient ARMA Modeling of FDTD Time Sequences for Microwave Resonant Structures	341
5:00 pm	A.K. Shaw and K. Naishadham	

Session TU4E

Microwave Photonic Systems and Components

3:30 pm–5:10 pm

Room A108

Tuesday, June 10, 1997

Chair: A. Gopinath, University of Minnesota
Co-Chair: A. Paolella, Lockheed-Martin

TU4E-1	A Wideband, Fiber-Optic, True Time-Steered Array Receiver	347
3:30 pm	P.J. Matthews, M.Y. Frankel and R.D. Esman	
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3:50 pm	A.S. Daryoush, K. Kamogawa, K. Horikawa, T. Tokumitsu and H. Ogawa	
TU4E-3	Electrical Characterization and Application of Very High Speed Vertical Cavity Surface Emitting Lasers (VCSELs)	355
4:10 pm	V.M. Hietala, K.L. Lear, M.G. Armendariz, C.P. Tigges, H.Q. Hou and J.C. Zolper	
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4:30 pm	C.P. Liu, Y. Betser, A.J. Seeds, D. Ritter and A. Madjar	