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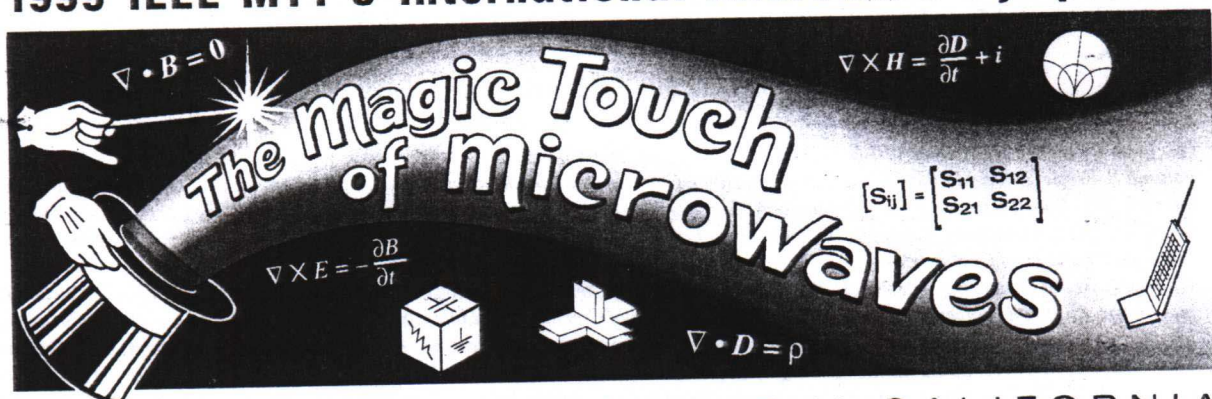
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1999 Microwave Symposium Technical Program Schedule

Session WE1A Passive Structures

8:00 am–9:40 am

Room A1

Wednesday, June 16, 1999

Chair: C. Tzuang, National Chao Tong University

Co-Chair: W.C. Tang, COM DEV International

WE1A-1	Lateral Microwave Transformers and Inductors Implemented in a Si/SiGe HBT Process	855
8:00 am	D.C. Laney, L.E. Larson, P. Chan, J. Malinowski, D. Hareme, S. Subbanna, R. Volant and M. Case	
WE1A-2	Loss Considerations for Lumped Inductors in Silicon MMICs	859
8:20 am	S. Gevorgyan, O. Aval, B. Hansson, H. Jacobsson and T. Lewin	
WE1A-3	Broadband Design Consideration of Uniplanar Double-Y Baluns for Hybrid and Monolithic Integrated Circuits	863
8:40 am	H. Gu and K. Wu	
WE1A-4	Hybrid FGCPW/CPS Scheme in the Building Block Design of Low-Cost Uniplanar and Multilayer Circuit and Antenna	867
9:00 am	L. Zhu and K. Wu	
WE1A-5	Leakage Suppression in Coplanar Waveguide Circuits by Patterned Backside Metallization	871
9:20 am	J. Hesselbarth and R. Vahldieck	

Session WE1B

(Focused Session)

Optical Processing of Microwave Signals

8:00 am–9:40 am

Room A9

Wednesday, June 16, 1999

Chair: A. Seeds, University College London

Co-Chair: K. Breuer, Marconi AES

WE1B-1	Photonic Signal Processing for Microwave Applications	877
8:00 am	P.J. Matthews and P.D. Biernacki	
WE1B-2	Simultaneous Electro-Optical Upconversion, Remote Oscillator Generation and Air Transmission of Multiple Optical WDM Channels for a 60 GHz High Capacity Indoor System	881
8:30 am	H. Kaluzni, K. Kojucharow, W. Nowak, J. Peupelmann, M. Sauer, D. Sommer, A. Finger and D. Ferling	
WE1B-3	A Four Channel Angle of Arrival Detector Using Optical Downconversion	885
8:50 am	P.D. Biernacki, R. Madara, L.T. Nichols, A. Ward and P.J. Matthews	
WE1B-4	Time-Domain Optical Sampling of Nonlinear Microwave Amplifiers	889
9:10 am	M. Weiss, M. Crites, E. Bryerton, J. Whitaker and Zoya Popović	
TH2C-5	Laminated Photonic Band Structures with High Conductivity and High Transparency	893
11:30 am	M.J. Bloemer, M. Scalora and J.P. Dowling (Note: This paper has been moved)	

Session WE1C

Filters-Network Theory

8:00 am–9:40 am

Room A10

Wednesday, June 16, 1999

Chair: D. Swanson, AMP M/A-COM

Co-Chair: C. Kudsia, COM DEV Ltd.

WE1C-1	Analytical Design of Contiguous Multiplexers	899
8:00 am	R. Levy	
WE1C-2	Cascaded Triplet Filter Design Using Cascade Synthesis Approach	903
8:20 am	N. Yildirim, M. Karaaslan, Y. Sen, and O.A. Sen	
WE1C-3	General Coupled Resonator Filters Design Based on Canonical Asymmetric Building Blocks	907
8:40 am	J.-F. Liang and D. Zhang	
WE1C-4	Resonant Aperture Filters in Rectangular Waveguide	911
9:00 am	M. Piloni, R. Ravanelli and M. Guglielmi	
WE1C-5	Microwave Breakdown in Air-Filled Resonators	915
9:10 am	T. Olsson, D. Andersson, U. Jordan, M. Lisak, V. Semenov and M. Åhlander	
WE1C-6	A Novel Uniplanar Compact PBG Structure for Filter and Mixer Applications	919
9:20 am	F.-R. Yang, Y. Qian and T. Itoh	

Session WE1D

(Focused Session)

Submillimeter-Wave and Terahertz Technologies

8:00 am–9:40 am

Room AR1/AR2

Wednesday, June 16, 1999

Chair: D. Woolard, Army Research Office

Co-Chair: R. Kaul, Army Research Lab

WE1D-1	Terahertz Electronics for Chemical and Biological Warfare Agent Detection	925
8:00 am	D. Woolard, R. Kaul, R. Suenram, A.H. Walker, T. Globus and A. Samuels	
WE1D-2	Optoelectric CW Terahertz Sources	Manuscript not available at time of printing
8:10 am	E.R. Brown	
WE1D-3	GaAs Devices and Circuits for Terahertz Applications	929
8:30 am	T.W. Crowe, R.M. Weikle and J.L. Hesler	
WE1D-4	Hot-Electron Superconductive Mixers for THz Frequencies	Manuscript not available at time of printing
8:40 am	W.R. McGrath, B.S. Karasik, A. Skalare, R.A. Wyss, B. Bumble, H.G. LeDuc, J.B. Barner and A.W. Kleinsasser	
WE1D-5	Potential and Capabilities of Two-Terminal Devices as Millimeter- and Submillimeter-Wave Fundamental Sources	933
8:50 am	H. Eisele and G.I. Haddad	
WE1D-6	Terahertz Applications of Plasma Wave Electronics	937
9:10 am	M.S. Shur, J.-Q. Lü and M.I. Dyakonov	
WE1D-7	THz Imaging via Electro-Optic Effect	941
9:30 am	Z. Jiang and X.-C. Zhang	

Session WE1E

High Power Transistor Amplifiers for X-Band Through Ka-Band

8:00 am–9:40 am

Room A6/A7

Wednesday, June 16, 1999

Chair: A. Platzker, Raytheon Systems Co.

Co-Chair: J.L. Heaton, Sanders, a Lockheed-Martin Co.

WE1E-1 8:00 am	Fully Monolithic 4 Watt High Efficiency Ka-Band Power Amplifier J.J. Komiak, W. Kong, P.C. Chao and K. Nichols	947
WE1E-2 8:20 am	A High Power Broadband Monolithic Power Amplifier for Ka-Band Ground Terminals M.K. Siddiqui, A.K. Sharma, L.G. Callejo and R. Lai	951
WE1E-3 8:30 am	35% PAE 6 W Ku-Band Power Amplifier Module A. Ishimaru, M. Maeda, T. Yoshida, J. Ozaki and S. Kamihashi	955
WE1E-4 8:40 am	A Compact 6 to 18 GHz Power Amplifier Module with 10W Output Power A.R. Barnes, M.T. Moore, M.B. Allenson and R.G. Davis	959
WE1E-5 8:50 am	A 68% P.A.E. Power pHEMT for K-Band Satellite Communication System T. Satoh, A. Betti-Berutto, C. Poledrelli, C. Khandavalli, J. Nikaido, S. Kuroda, T. Yokoyama and J. Fukaya	963
WE1E-6 9:00 am	A Compact Network for Eliminating Parametric Oscillations in High Power MMIC Amplifiers D. Teeter, A. Platzker and R. Bourque	967
WE1E-7 9:20 am	A Push-Pull Power MMIC Operating at K/Ka-Band Frequencies J. Schellenberg and H. Do-Ky	971

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Session WE2A

Advances in Nonlinear Design and Simulation Techniques

10:10 am–11:50 am

Room A1

Wednesday, June 16, 1999

Chair: S. Kenney, Spectrian, Inc.

Co-Chair: V. Rizzoli, University of Bologna

WE2A-1 10:10 am	Effect of Out-of-Band Terminations on Intermodulation Distortion in Common-Emitter Circuits V. Aparin and C. Persico	977
WE2A-2 10:30 am	The Method of Envelope Currents for Rapid Simulation of Weakly Nonlinear Communications Circuits V. Borich, J. East and G. Haddad	981
WE2A-3 10:50 am	Spectral Regrowth in Microwave Amplifiers Using Transformation of Signal Statistics H. Gutierrez, K. Gard and M.B. Steer	985
WE2A-4 11:10 am	Nonlinear Design of Microwave Oscillators Based on Electromagnetic Analysis V. Rizzoli and A. Costanzo	989
WE2A-5 11:30 am	A Unified Approach for the Linear and Nonlinear Stability Analysis of Microwave Circuits Using Commercially Available Tools S. Mons, M.A. Perez, R. Quéré and J. Obregon	993

Session WE2B

Microwave Photonic Components

10:10 am–11:50 am

Room A9

Wednesday, June 16, 1999

Chair: P. Matthews, Naval Research Lab
Co-Chair: C. Gee, Ortel Corp.

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10:10 am	E.I. Ackerman	
WE2B-2	The Effects of Photocurrent on Microwave Properties of Electroabsorption Modulators	1003
10:30 am	G.L. Li, W.X. Chen, P.K.L. Yu, C.K. Sun and S.A. Pappert	
WE2B-3	Microwave Modeling and Characterization of Thick Coplanar Waveguides on Oxide-Coated Lithium Niobate Substrates for Electro-Optical Applications	1007
10:40 am	G. Ghione, M. Goano, G. Madonna, G. Omegna, M. Pirola, S. Bosso, D. Frassati and A. Perasso	
WE2B-4	Four-Branch Optical Frequency Shifter Using Coupled Inverted Slot Lines at 60 GHz	1011
11:00 am	W. Chujo, T. Hanasaka, M. Naganuma and T. Yoneyama	
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11:20 am	K. Li, J.X. Ge, T. Matsui and M. Izutsu	

Session WE2C

Filters with Novel Resonator Structures

10:10 am–11:50 am

Room A10

Wednesday, June 16, 1999

Chair: G. Matthaei, Super Conductor Technology
Co-Chair: J. Fiedziuszko, Space Systems/Loral

WE2C-1	Dual-Mode Filters with Conductor Loaded Dielectric Resonators	1021
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Session WE2D

Microwave Communication Systems for Y2K and Beyond

10:10 am–11:50 am

Room AR1/AR2

Wednesday, June 16, 1999

Chair H.C. Huang, AMCOM Communications Systems

Co-Chair E. Camargo, FCSI

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Session WE2E

(Focused Session)

Processing Technologies for the 21st Century

10:10 am–11:50 am

Room A6/A7

Wednesday, June 16, 1999

Chair G. Bechtel, Strategies Unlimited

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WE2E-3	Applications of Si/SiGe Technology for High-Speed Communications Systems (Invited)	1077
11:00 am	L.E. Larson and M.J. Delaney	
WE2E-4	GaN Electronic Devices for Future Systems (Invited)	1081
11:30 am	S.C. Binari	

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Session WE3A

Power Amplifier Devices and Technology for Wireless Applications

1:20 pm–3:00 pm

Room A1

Wednesday, June 16, 1999

Chair: J. Degenford, Northrup Grumman

Co-Chair: J. Crescenzi, Spectrian Corp.

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WE3A-5 2:20 pm	0.2 cc HBT Power Amplifier Module with 40% Power-Added Efficiency for 1.95 GHz Wide-Band CDMA Cellular Phones N. Miyazawa, H. Itoh, Y. Nakashima, T. Iwai, T. Miyashita, S. Ohara and K. Joshin	1099
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Session WE3B

Optically Controlled Array Antennas

1:20 pm–3:00 pm

Room A9

Wednesday, June 16, 1999

Chair: A. Paoletta, Lockheed-Martin

Co-Chair: P. Herczfeld, Drexel University

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WE3B-2 1:40 pm	Optically Controlled Two-Dimensional Beam Steering System for Phased-Array Antennas S. Yegnanarayanan and B. Jalali	Manuscript not available at time of printing
WE3B-3 2:00 pm	Coherent Photonic Integrated Beamformer for Phased-Array Antennas J. Stulemeijer, F.E. van Vliet, K.W. Benoist, D.H.P. Maat and M.K. Smit	1113
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Session WE3C

Planar and Coaxial Filters

1:20 pm–3:00 pm

Room A10

Wednesday, June 16, 1999

Chair: M. Guglielmi, ESTEC

Co-Chair: D. Schmitt, Bosch-Telecom

WE3C-1	A Design of the Novel Coupled Line Low-Pass Filter with Attenuation Poles	1127
1:20 pm	D.H. Lee, Y.W. Lee, J.S. Park, D. Ahn, H.S. Kim, K.Y. Kang	
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1:30 pm	V. Boria, G. Gerini, M. Guglielmi and P. Arcioni	
WE3C-3	Band-Pass Filters with Self-Filtering Resonators: A Solution to Control Spurious Resonances	1135
1:50 pm	C. Quendo, J.Ph. Coupez, C. Person, E. Rius, M. Le Roy, S. Toutain	
WE3C-4	A $\lambda/2$ CPW Resonator BPF with Multiple Attenuation Poles and Its Miniaturization	1139
2:00 pm	K. Wada and I. Awai	
WE3C-5	Balanced-Input-Output Configuration of Laminated Planar Filter Suitable for Next-Generation Super-Compact Portable Telephones	1143
2:20 pm	H. Miyake, T. Ishizaki, S. Kitazawa, T. Yamada, K. Ogawa and I. Awai	
WE3C-6	Low Temperature Cofired Ceramic (LTCC) Ridge Waveguide Bandpass Filters	1147
2:40 pm	Y. Rong, K.A. Zaki, M. Haageman, D. Stevens and J. Gippich	

Session WE3D

Ferrite Devices and Characterization

1:20 pm–3:00 pm

Room AR1/AR2

Wednesday, June 16, 1999

Chair: D. Adam, Northrup Grumman

Co-Chair: D. Webb, Naval Research Lab

WE3D-1	Design and Measurement of Ferrite Coupled Line Circulators	1153
1:20 pm	L.E. Davis, K. Xie, B.J. Climer, K.D. Newsome and N.E. Priestley	
WE3D-2	Low Cost Ferrite Toroid Phase Shifter for Broadband Applications	1157
1:40 pm	E.-B. El-Sharawy, S. Gaglione and D. Partlow	
WE3D-3	Temperature Stabilization of a Lumped Element Circulator without an Apparent Compensating Element	1161
2:00 pm	T. Miura, M. Hasegawa, H. Oh'hata and T. Kurahashi	
WE3D-4	Lumped Element Circulator (LEC) with Variable Couplings	1165
2:10 pm	A.G. Schuchinsky	
WE3D-5	The Millimeter Wave Magneto-Optics: New Method for Characterization of Ferrites in the Millimeter Wave Range	1169
2:20 pm	K.N. Kocharyan, M.N. Afsar and I.I. Tkachov	
WE3D-6	Frequency and Phase Selective Magnetostatic Wave Switch	1173
2:40 pm	P.A. Kolodin, P. Kabos and C.E. Patton	

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Session WE3E

Southern California Firsts in Microwave Systems

1:20 pm–3:00 pm

Room A6/A7

Wednesday, June 16, 1999

Chair: G. Oltman, Oltman Associates

WE3E-1	Commercial Communications Satellites: History and Highlights (Invited)	1919
1:20 pm	D.M. O'Neal	
WE3E-2	Contributions to Deep Space Exploration by the Jet Propulsion Laboratory (Invited)	Manuscript not available at time of printing
1:50 pm	C. Foster	
WE3E-3	Microwaves at Gilfillan Division, ITT Industries Past, Present, and Future (Invited)	1177
2:20 pm	J.M. Milan	

Session WE4A

Device Technology for Power Amplifiers

3:30 pm–5:10 pm

Room A1

Wednesday, June 16, 1999

Chair: P. Asbeck, University of California-San Diego

Co-Chair: M. Cohn, M. Cohn Consulting

WE4A-1	Greater than 70% PAE Enhancement-Mode GaAs HJFET Power Amplifier MMIC with Extremely Low Leakage Current	1183
3:30 pm	S. Yoshida, Y. Wakabayashi, M. Kohno and K. Uemura	
WE4A-2	High Breakdown Voltage InAlGaAs/In_{0.32}Ga_{0.68}As Metamorphic HEMT for Microwave and mm-Wave Power Applications	1187
3:50 pm	C.S. Whelan, W.E. Hoke, R.A. McTaggart, P.S. Lyman, P.F. Marsh, R.E. Leoni III, S.J. Lichwala and T.E. Kazior	
WE4A-3	Small- and Large-Signal Operation of X-Band CE and CB SiGe/Si Power HBT's	1191
4:10 pm	J.-S. Rieh, L.-H. Lu, Z. Ma, X. Liu, L.P.B. Katehi, P. Bhattacharya and E.T. Croke	
WE4A-4	High Efficiency 0.4μm Gate LDMOS Power FET for Low Voltage Wireless Communications	1195
4:30 pm	G. Ma, W. Burger and M. Shields	
WE4A-5	High Power (15W) Silicon RFIC	Manuscript not available at time of printing
4:50 pm	G. Bouisse, S. Martin and D. Lamey	

Session WE4B

Fiber Fed Wireless Access Systems

3:30 pm–5:10 pm

Room A9

Wednesday, June 16, 1999

Chair: R.H. Knerr, Lucent Technologies

Co-Chair: N.R. Dietrich, Tyco Submarine Systems

WE4B-1 3:30 pm	Full-Duplex Broadband Fiber-Wireless System Incorporating Baseband Data Transmission and a Novel Dispersion Tolerant Modulation Scheme C. Lim, A. Nirmalathas, D. Novak, R. Waterhouse and K. Ghorbani	1201
WE4B-2 3:50 pm	Demonstration of Dispersion-Tolerant 34 MBIT/S Data Transmission in Electro-Optically Upconverted 28 GHz LMDS Fiber-Optic Link V. Polo, F. Ramos, J. Marti and J.M. Fuster	1205
WE4B-3 4:10 pm	Multi-Channel Upstream Data Transmission in a Millimeter-Wave Fiber-Radio System C. Lim, A. Nirmalathas and D. Novak	1209
WE4B-4 4:30 pm	Novel Fiber Fed WDM Links for Millimeter-Wave Wireless Access Systems H. Ogawa, H. Tsuji and M. Hirakawa	1213
WE4B-5 4:50 pm	Third-Order Intermodulation Distortion in an Optical Multichannel MM-Wave System in the 60 GHz-Band C.G. Schäffer, R.-P. Braun, G. Grosskopf, F. Schmidt and M. Rhode	1217

Session WE4C

Active and MEMS Filters

3:30 pm–5:10 pm

Room A10

Wednesday, June 16, 1999

Chair: R.V. Snyder, RS Microwave

Co-Chair: P. Guillon, IRCOM

WE4C-1 3:30 pm	Analysis and Optimization of Noise and Gain Performances for Various Topologies of Microwave Ring Resonator Planar Active Filters L. Nenert, D. Denis, L. Billonnet, B. Jarry and P. Guillon	1223
WE4C-2 3:50 pm	Low Noise and Frequency Tunable Microwave Active Recursive Filters Using Power Summation Principles A. Cenac, H. Ezzedine, L. Billonnet, B. Jarry and P. Guillon	1227
WE4C-4 4:10 pm	A High-Performance Integrated K-Band Diplexer A.R. Brown and G.M. Rebeiz	1231
WE4C-5 4:20 pm	Millimeter-Wave Micromachined Tunable Filters H.-T. Kim, J.-H. Park, Y.-K. Kim and Y. Kwon	1235
WE4C-6 4:40 pm	Back-to-Back Microstrip Open-Loop Resonator Filters with Aperture Couplings J.-S. Hong and M.J. Lancaster	1239

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Session WEF1

Interactive Forum

Analysis, Techniques and Application of EM Theory

2:30 pm–5:00 pm

Convention Center Arena

Wednesday, June 16, 1999

Chair: S.M. El-Ghazaly, Arizona State University

WEF1-1 2:30 pm	Antennas on High-Impedance Ground Planes D. Siévenpiper, R. Broas and E. Yablonovitch	1245
WEF1-2 2:30 pm	Effective Dielectric Constant of the Embedded Transmission Line (ETL)—A Multilayer Stripline-Like Structure A. Darwish, A. Ezzeddine, H.C. Huang and M. Mah	1249
WEF1-3 2:30 pm	New Boundary and Edge Conditions for Real Planar Circuits M. Farina, A. Angeloni and T. Rozzi	1253
WEF1-4 2:30 pm	FDTD-Analysis of 3D-Optical and Optoelectronic Waveguide-Based Devices F. Zepparelli, F. Alimenti, P. Bassi, P. Mezzanotte, L. Roselli and R. Sorrentino	1257
WEF1-5 2:30 pm	Spurious Leaky Mode Solutions and Experimental Verification of the Second Leaky Wave J. Zehentner, J. Macháč, J. Mrkvica, P. Vacek and J. Polívka	1261
WEF1-6 2:30 pm	Accurate Full Wave Analysis of Open Hemispherical Resonators Loaded with Dielectric Layers A. Ćwikła, J. Mielewski, M. Mrozowski and J. Wosik	1265
WEF1-7 2:30 pm	Generalized Y-Matrix of Arbitrary 3D Waveguide Junctions by the BI-RME Method M. Bozzi, M. Bressan and L. Perregini	1269
WEF1-8 2:30 pm	Mode-Matching Analysis of General Waveguide Multiport Junctions W. Wessel, T. Sieverding and F. Arndt	1273
WEF1-9 2:30 pm	Locally Conformed Subgrid FD-FD Technique for the Analysis of 3D Waveguide Structures with Curved Metallic Objects R. Lotz, J. Ritter and F. Arndt	1277
WEF1-10 2:30 pm	Simulation of Large Electromagnetic MMICs Using Time-Domain Impedance Concept S.M. Hammadi and S.M. El-Ghazaly	1281
WEF1-11 2:30 pm	Parallel Higher-Order-Compact Time-Domain Solutions to Maxwell's Equations P.R. Hayes, M. O'Keefe and A. Gopinath	1285
WEF1-12 2:30 pm	Far Field Computation for the FDTD Method in Curvilinear Coordinates K. Ravard, C. Rostoll, R. Gillard and J. Citerne	1289
WEF1-13 2:30 pm	Successful Applications of PML-ABC to the Symplectic FDTD Scheme with 4th-Order Accuracy in Time and Space T. Hirono, W.W. Lui and S. Seki	1293
WEF1-14 2:30 pm	TLM Analysis of Microstrip Patch Antenna on Ferrite Substrate M.I. Sobhy, M.W.R. Ng, R.J. Langley and J.C. Batchelor	1297
WEF1-15 2:30 pm	An Algorithm for Realizing Yee's FDTD-Method in the Wavelet Domain M. Walter and I. Wolff	1301
WEF1-16 2:30 pm	Mixed Circuit/Electromagnetic Analysis of Radiation from High-Speed Interconnects I. Erdin and M. Nakhla	1305

Session WEF2

Interactive Forum

Passive Components and Filters

2:30 pm–5:00 pm

Convention Center Arena

Wednesday, June 16, 1999

Chair: A. Fathy, Sarnoff Corporation

WEF2-1 2:30 pm	Exact, Conformal-Mapping Models for the High-Frequency Losses of Coplanar Waveguides with Thick Electrodes of Rectangular or Trapezoidal Cross Section G. Ghione, M. Goano and M. Pirola	1311
WEF2-2 2:30 pm	Analysis of Stripline Right-Angle Bend with Slant-Wise Corner Cut Based on Eigenmode Expansion Method and Foster-Type Equivalent Network J.-P. Hsu, T. Hiraoka and Y. Tabei	1315
WEF2-3 2:30 pm	A Broad-Band Differential Phase Shifter of Novel Design W.J. Brown and J.P. Starski	1319
WEF2-4 2:30 pm	Finite Element Realization of Ultra-High Quality Factor Frequency-Temperature Compensated Sapphire-Rutile Whispering Gallery Mode Resonators M.E. Tobar, D. Cros, P. Blondy, J.G. Hartnett and P. Guillon	1323
WEF2-5 2:30 pm	Broadband Flat Coupling Two-Branch and Multibranch Directional Couplers R. Knöchel	1327
WEF2-6 2:30 pm	Radiation Leakage from an Under Metallized Silicon Cavity Y. Wu, Q. Chen, V.F. Fusco, M. Zheng and P.S. Hall	1331
WEF2-7 2:30 pm	A New Class of Miniature Radiationless CPW Shunt Stubs Printed on the Center Conductor K. Hettak, N. Dib and A. Omar	1335
WEF2-8 2:30 pm	Comparison of the Stored Energy Distributions in a QC-Type and a TC-Type Prototype with the Same Power Transfer Function C. Ernst and V. Postoyalko	1339
WEF2-9 2:30 pm	The Improvement of Miniaturized Multilayer Ceramic Band-Pass Filter N. Ishitobi, E. Ajioka, T. Abe and H. Ninomiya	1343
WEF2-10 2:30 pm	Millimeter Wave H-Plane Diplexers Y. Rong, H.-W. Yao, K.A. Zaki and T. Dolan	1347
WEF2-11 2:30 pm	Tuning Band Pass Filters in the Time Domain J. Dunsmore	1351
WEF2-12 2:30 pm	Dielectric Waveguide Filter with Low Profile and Low Insertion Loss K. Sano and M. Miyashita	1355

