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TA1: Technology Challenges for “Killer Devices” in the IoT World-1

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TC1: Printed Electronics-1

10:25-12:30 Thursday, April 16

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TE3: Interconnection-3

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FA1: Taiwan Session-1

9:30-10:45 Friday, April 17

FA1-1 <Session Invited>	FOWLP and Bio CSP Development	James Lin, Powertech Technology / Taiwan	
FA1-2	Development of Simulation-Approach for 3D Chip Stacking with Fine-Pitch Array-Type Microbumps	Chang-Chun Lee, Tzai-Liang Tzeng, Pei-Chen Huan, Chung Yuan Christian University / Taiwan	514
FA1-3	Fabrication of Arrays of (100) Cu Under-bump-metallization for 3D IC Packaging	Wei-lan Chiu ¹ , Chia-Ling Lu ¹ , Han-Wen Lin ¹ , Chien-Min Liu ¹ , Yi-Sa Huang ¹ , Tien-Lin Lu ¹ , Tao-Chi Liu ¹ , Hsiang-Yao Hsiao ¹ , Chih Chen ¹ , Jui-Chao Kuo ² , King-Ning Tu ³ , ¹ National Chiao Tung University, ² National Cheng Kung University / Taiwan, ³ University of California at Los Angeles / USA	518

FA2: Taiwan Session-2

11:00-12:15 Friday, April 17

FA2-1	Low-Temperature and Low Pressure Copper-to-Copper Direct Bonding Enabled by Creep on Highly (111)-Oriented Cu Surfaces	Chih-Han Tseng ¹ , Chien-Min Liu ¹ , Han-wen Lin ¹ , Yi-Cheng Chu ¹ , Chih Chen ¹ , Dian-Rong Lyu ¹ , Kuan-Neng Chen ¹ , King-Ning Tu ² , ¹ National Chiao Tung University / Taiwan, ² University of California at Los Angeles / USA	523
FA2-2	Mechanical and Electrical Properties Investigation of Micro-size Single Metal-coated Polymer Particle	Che-Hao Shih, Kai-Chi Chen, Hsun-Tien Li, Industrial Technology Research Institute / Taiwan	527
FA2-3	On the Thermal Performance Analysis of Three-dimensional Chip Stacking Electronic Packaging with Through Silicon Vias	Hsuan-Chi Hu ¹ , Hsien-Chie Cheng ² , Tzu-Chin Huang ¹ , Wen-Hwa Chen ¹ , Shen-Tsai Wu ³ , Wei-Chung Lo ³ , ¹ National Tsing Hua University, ² Feng Chia University, ³ Industrial Technology Research Institute / Taiwan	532

FA3: Power Electronics Integration-1

13:25-15:05 Friday, April 17

FA3-1 <Session Invited>	Opportunities in Packaging and Integration for Wide-Bandgap Power Electronics	Khai Doan The Ngo, Virginia Polytechnic Institute and State University / USA	
FA3-2	Wafer Bonding of SiC-SiC and SiC-Si by Modified Surface Activated Bonding Method	Fengwen Mu ¹ , Masahisa Fujino ¹ , Tadamoto Suga ¹ , Yoshikazu Takahashi ² , Haruo Nakazawa ² , Kennichi Iguchi ² , ¹ The University of Tokyo, ² Fuji Electric / Japan	542
FA3-3	Utilization of Zn Alloy for the Manufacture of Automotive Power Device Modules	Kuo-Shu Kao, Su-Ching Chung, Chia-Wen Fan, Jing-Yao Chang, and Tao-Chih Chang, Industrial Technology Research Institute / Taiwan	546
FA3-4	Heat Resistant Bi-Ag-X Solders for Power IC Die Attachment	Jenn-Ming Song, Zhang-Hong Chang, National Chung Hsing University / Taiwan	550

FA4: Power Electronics Integration-2

15:20-17:00 Friday, April 17

FA4-1 <Session Invited>	Silver Sintering for Power Electronics Integration	Cyril Buttay ¹ , Bruno Allard ¹ , Raphaël Riva ² , ¹ Université de Lyon, ² IRT Saint Exupéry / France	554
FA4-2	Relationship between Transient Thermal Impedance and Shear Strength of Pressureless Sintered Silver as Die Attachment for Power Devices	Meiyun Wang ¹ , Yunhui Mei ¹ , Xin Li ¹ , Guo-Quan Lu ^{1,2} , ¹ Tianjin University / China, ² Virginia Polytechnic Institute and State University / USA	559
FA4-3	Effect of Heating Rate on Bonding Strength of Pressure-free Sintered Nanosilver Joint	Kewei Xiao ¹ , Guangyin Lei ² , Khai D.T. Ngo ¹ , Guo-Quan Lu ¹ , ¹ Virginia Polytechnic Institute and State University, ² Ford Motor / USA	565

FB1: Advanced Packaging-2

9:30-10:45 Friday, April 17

FB1-1	Copper-filled Anodized Aluminum Oxide -a potential material for low temperature bonding for 3D packaging	Kosuke Yamashita, Yoshinori Hotta, Shunji Kurooka, Hirofumi Abe, Shiro Tan, FUJIFILM / Japan	571
FB1-2	High-Volume-Manufacturing (HVM) of BVA Enabled Advanced Package-on- Package (PoP)	Rey Co, Rajesh Katkar, Ashok S Prabhu, Wael Zohni, Invensas / USA	575
FB1-3	The Model Optimized of Mini Packaging -for quantum dots photodetector readout	H. D. Lu, B. Y. Chen, F. M. Guo, East China Normal University / China	581

FB2: Materials and Processes-2

11:00-12:15 Friday, April 17

FB2-1	Massive Spalling in Pb-Free Solder on Co-Based Surface Finishes	Chun-Hao Huang ¹ , Yi-Ling Tsai ¹ , Yu Ting Chang ² , Albert T. Wu ¹ , ¹ National Central University, ² Taiwan Uyemura / Taiwan	586
FB2-2	Effect of Silver Content and Vacuum Reflow Soldering on Thermal Fatigue Life of Sn-Ag-Cu Solder	Mitsuharu Yamabe, Toshiba / Japan	590
FB2-3	Nanotwinned Cu Thin Film with Different Twin Boundary Orientations Deposited by Unbalanced Magnetron Sputtering	Hsin-Yuan Chen, Kai Hung Yang, Fan-Yi Ouyang, National Tsing Hua University / Taiwan	596

FB3: Thermal Management-3

13:25-15:05 Friday, April 17

FB3-1	Wettability and Evaporation Enhancement for Heat Transport Devices by High Performance Oxide Layer	Kazuhisa Yuki ¹ , Katsuki Fukushima ¹ , Akihiro Takemura ² , Koichi Suzuki ¹ , ¹ Tokyo University of Science-Yamaguchi, ² Tsuyama National College of Technology / Japan	601
FB3-2	Cooling Performance of Impinging Jet from Piezoelectric Micro Blower Mounted in Narrow Flow Passage	Takashi Fukue ¹ , Koichi Hirose ¹ , Hirotoshi Terao ² , ¹ Iwate University, ² ALPS Electronic / Japan	605
FB3-3	An Initial Investigation of The Thermal-Fluid Characterization of a Visualized Visualized Loop Thermosyphon	Yinfeng Wang, Yuezhao Zhu, Yu Qian, Haijun Chen, Li Yang, Nanjing Tech University / China	611
FB3-4	Seeking an Energy-Efficient Modular Data Center: Impact of Pressure Loss on the Server Fan Power	Masanori Sato, Arihiro Matsunaga, Masaki Chiba, Akira, Shoujiguchi, Minoru Yoshikawa, NEC / Japan	617

FB4: Materials and Processes-3

15:20-17:00 Friday, April 17

FB4-1	Examining the Required Properties of Build-up Dielectric Materials for Next Generation IC Package Substrates	Hidenobu Deguchi, Tatsushi Hayashi, Teruhisa Tanaka, Toshiaki Tanaka, Kazutaka Shirahase, Sekisui Chemical / Japan	623
FB4-2	Advanced Plating Photoresist Development for Semiconductor Packages	Hirokazu Sakakibara, Hisanori Akimaru, Akito Hiro, Keiichi Sato, Koichi Fujiwara, Kenji Okamoto, Shiro Kusumoto, JSR / Japan	628
FB4-3	Development of Lift-off Photoresists with Unique Bottom Profile	Hirokazu Ito, Kouichi Hasegawa, Tomohiro Matsuki, Shiro Kusumoto, JSR / Japan	633
FB4-4	Modeling of Positional Plasma Characteristics by Inserting Body Tube of Optical Emission Spectroscopy for Plasma Assisted Atomic Layer Deposition System	In Joong Kim, Yong Hyeon Shin, Ilgu Yun, Yonsei University / Korea	638

FC1: Optoelectronics-1

9:30-10:45 Friday, April 17

FC1-1	The Study of Thermal Cycling Performance of Enacpasulant Material in SMD LEDs Application	Chih-Hao Lin, Kai-Chi Chen, Shu-Chen Huang, Hsun-Tien Li, Industrial Technology Research Institute / Taiwan	642
FC1-2	Higher Polarization Crosstalk of 38.5 dB and Low PDL with Silane Modified Highly Moisture Resistant Adhesives in Assembling Optical Devices	Seiko Mitachi ¹ , Hirokazu Kageyama ² , Kazushi Kimura ² , Ryo Nagase ³ , ¹ Tokyo University of Technology, ² The Yokohama Rubber, ³ Chiba Institute of Technology / Japan	
FC1-3	Reflection Optical Notch Filtering Behavior of Cavity- Resonator- Integrated Guided- Mode Resonance Mirror	Masahiro Nakata ¹ , Tomohiro Kondo ¹ , Kenji Kintaka ² , Junichi Inoue ¹ , Shogo Ura ¹ , ¹ Kyoto Institute of Technology, ² National Institute of Advanced Industrial Science and Technology / Japan	652

FC2: Optoelectronics-2

11:00-12:15 Friday, April 17

FC2-1	Small-footprint 128-Gb/s DP-QPSK Silicon Optical Modulator in Ceramic-based Metal Package with Low Optical Coupling Loss	Hiroki Ishihara ¹ , Yasuhiro Mashiko ¹ , Kazuhiro Goi ¹ , Kensuke Ogawa ¹ , Tsung-Yang Liow ² , Xiaoguang Tu ² , Guo-Qiang Lo ² , Dim-Lee Kwong ² , ¹ Fujikura / Japan, ² A*STAR / Singapore	656
FC2-2	Opto-Electronic Hybrid Integrated Chip Packaging Technology for Silicon Photonic Platform Using Gold-Stud Bump Bonding	Mistuo Usui, Kotaro Takeda, Hirooki Hirata, Hiroshi Fukuda, Tai Tsuchizawa, Hidetaka Nishi, Rai Kou, Tatsuro Hiraki, Kentaro Honda, Masashi Nogawa, Koji Yamada, Tsuyoshi Yamamoto, NTT / Japan	660
FC2-3	Influence of Atmospheric- Pressure Plasma Treatment on Surface and Electrical Properties of Photodiode Chips	So Ikeda, Eiji Higurashi, Tadatomo Suga, The University of Tokyo / Japan	666

FC3: Optoelectronics-3

13:25-15:05 Friday, April 17

FC3-1 <Session Invited>	Flip Chip, CSP or WL-PKG, the Near Future of LED Device	Tetsuya Onishi, Grand Joint Technology / Hong Kong	
FC3-2	A Measure Against the Latest Problem of LED Package	Hirofumi Torigoe, Yoshiteru Miyawaki, SANYU REC / Japan	678
FC3-3 <Session Invited>	Flip Chip LED COB Bonding Process with Low-Temperature-Curable Conductive Paste	H. Kashitani, A.Uchida, Ohashi Engineering / Japan	
FC3-4	Determination of the Junction Temperature of Gallium Nitride (GaN)-based High Power LED under Thermal with Current Loading Condition	Feng-Mao Hsu, Yen-Fu Su, Kuo-Ning Chiang, National Tsing Hua University / Taiwan	691

FC4: RF

15:20-17:00 Friday, April 17

FC4-1	Impedance Balance Control for Reduction of Common Mode Noise in Full Bridge Converter	Masaaki Maeda, Tohlu Matsushima, Takashi Hisakado, Osami Wada, Kyoto University / Japan	695
FC4-2	Suppression of Mode-Conversion by DNG Material Placed on Differential-Paired Lines with Bend Discontinuities	Yoshiki Kayano ¹ , Hiroshi Inoue ² , ¹ Akita University, ² The Open University of Japan / Japan	700
FC4-3	Development of Less than 100µm Thick Sheet for Noise Attenuation by Electromagnetic Induction	Kishio Hidaka ¹ , Toru Nihei ² , Noriji Tashiro ² , Atsushi Hujita ² , ¹ Yamagata University, ² Hitachi Chemical / Japan	704
FC4-4 <Session Invited>	Development of Battery-less Integral Type Wireless Current Sensor Node	Hironao Okada, Toshihiro Itoh, National Institute of Advanced Industrial Science and Technology / Japan	

FD1: DMR*-Electrical-1

9:30-10:45 Friday, April 17

FD1-1	Improved Delay-Matching Bus Routing by using Multi-layers	Yang Tian, Takahiro Watanabe, Waseda University / Japan	708
FD1-2	Method for Automatic Compensation of the Loading Effect for High-Precision Buffer Amplifiers	Seitaro Kon, Tatsuji Yamada, National Institute of Advanced Industrial Science and Technology / Japan	714
FD1-3	A Testable Design for Electrical Interconnect Tests of 3D ICs	Akihiro Odoriba ¹ , Shoichi Umezu ¹ , Masaki Hashizume ¹ , Hiroyuki Yotsuyanagi ¹ , Fara Ashikin Binti Ali ² , Shyue-Kung Lu ³ , ¹ Tokushima University / Japan, ² Universiti Teknikal Malaysia Melaka / Malaysia, ³ National Taiwan University of Science and Technology / Taiwan	718

FD2: DMR*-Electrical-2

11:00-12:15 Friday, April 17

FD2-1	Optimum Characteristic and Structural Design of PWB Radiation Detector Considering Gas Amplification Reaction	Kohei Ota, Motonori Oono, Tomohisa Motomura, Dai Nippon Printing / Japan	723
FD2-2	Practical Optimization Flow using a New System Design Methodology	Ken Kawamura ¹ , Hidenori Murata ¹ , Yoshiharu Iwata ¹ , Ryohei Satoh ¹ , Takeshi Sakamoto ² , Kazuya Okamoto ¹ , ¹ Osaka University, ² GLOBALASSIST / Japan	728

* DMR: Design Modeling and Reliability

FD3: DMR*-Electrical-3

13:25-15:05 Friday, April 17

FD3-1	On-Die Intrinsic Capacitance Extraction Methodology -an alternative approach in power integrity modeling by leveraging silicon intrinsic capacitance	Fern Nee Tan, Intel Microelectronics / Malaysia	
FD3-2	Characterization of On Die Capacitance and Silicon Measurement Correlation	Li Chuang Quek, Ming Dak Chai, Heng Chuan Shu, Intel Microelectronics / Malaysia	739
FD3-3	MIM Capacitance Efficiency Study for High Speed I/O Power Integrity Network Design -MIM and MIMless high speed I/O performance characterization	Fern Nee Tan, Intel Microelectronics / Malaysia	743
FD3-4	Silicon Level Circuit Implementation for System-On-Chip Power Integrity Improvement	Chee Hong Aw, Li Chuang Quek, Heng Chuan Shu, Intel Microelectronics / Malaysia	748

FD4: DMR*-Electrical-4

15:20-17:00 Friday, April 17

FD4-1	Efficient Method for Predictive Modeling of Irregular Shaped Power Distribution Network	Afef Bouchaala ^{1,2} , Lionel Courau ¹ , Olivier Bonnaud ¹ , Philippe Galy, ¹ STMicroelectronics, ² IETR / France	752
FD4-2	Fundamental Phenomena of Signal Transmission in GHz Region - verification by experimental basis supported by simulation	Yutaka Akiyama, Chihiro Ueda, Kanji Otsuka, Meisei University / Japan	757
FD4-3	The Study of Suppression Method for Power Radiation between GND Planes from Signal Via in MultiLayer Board	Hiroshi Itakura, Keitaro Yamagishi, Yoshihiro Akeboshi, Mitsubishi Electric / Japan	761
FD4-4	Interposer Design and Measurement with Various Capacitors for Reducing Total System PDN Impedance	D. Tanaka ¹ , K. Mihara ¹ , N. Kobayashi ¹ , Y. Hiyama ¹ , S. Kiyoshige ² , W. Ichimura ² , T. Yamaguchi ² , T. Sudo ² , ¹ Murata Manufacturing, ² Shibaura Institute of Technology / Japan	767

FE1: DMR*-Mechanical-1

9:30-10:45 Friday, April 17

FE1-1	Warpage Modeling Technique of Organic Interposer Considering Deformation by Insulator Material Shrinkage	Keishi Okamoto, Sayuri Kohara, Hirokazu Noma, Kazushige Toriyama and Hiroyuki Mori, IBM Japan / Japan	771
FE1-2	Estimation Method of Cracking Probability of Stacked Overhang Die during Wire Bonding	Kanako Sawada ¹ , Hideo Aoki ¹ , Eigo Matsuura ¹ , Hideko Mukaïda ¹ , Fumiyoshi Minami ² , ¹ Toshiba, ² Osaka University / Japan	776

* DMR: Design Modeling and Reliability

FE2: DMR*-Mechanical-2

11:00-12:15 Friday, April 17

FE2-1	Advancement in Modeling Vapor Pressure Induced Stresses in Electronic Packaging	Loh Wei Keat, Lee Yung Hsiang, Ong Kang Eu, Chin Ian, Leong Jenn Seong, Intel Technology / Malaysia	781
FE2-2	Analysis of LED Wire Bonding Process Using Arbitrary Lagrangian-Eulerian and Equilibrium Mesh Smoothing Algorithm	Che-Chia Yang, Chia-Chi Tsia, Yen-Fu Su, Kuo- Ning Chiang, National Tsing Hua University / Taiwan	787
FE2-3	High Reliability Packaging Technologies for 175deg.C Continuous Operation in IGBT Module	T. Saito, Y. Nishimura, F. Momose, A. Hirao, A. Morozumi, Y. Tamai, E. Mochizuki and Y. Takahashi, Fuji Electric / Japan	791

FE3: Interconnection-5

13:25-15:05 Friday, April 17

FE3-1	Evaluation of Residual Stress Caused by Flip-Chip Bonding Process using Piezo-Resistor Embedded Test Element Group Chips	Toshio Enami, Kyosuke Nanami, Osamu Horiuchi, Young-Gun Han, Hajime Tomokage, Fukuoka University / Japan	795
FE3-2	Effects of Internal Stress of Electroless Ni Plating on Solder Joining Strength	Katsumi Miyama, Kanou Yoshida, Shigeru Saitou, Toshiyuki Takashima, Hokkaido University of Science / Japan	800
FE3-3	The Effects of Ag Content in the Solder on Electromigration Behavior	Ying-Ta Chiu, Yu-Hsiu Shao, Ping-Feng Yang, Advanced Semiconductor Engineering / Taiwan	804
FE3-4	The Beneficial Effect of Zn Additions on the Microstructure of SnCu and SnCuNi Solder Joints to Cu Substrates	Wayne Ng ¹ , Guang Zeng ² , Takatoshi Nishimura ¹ , Keith Sweatman ¹ , Stuart D. McDonald ² , Kazuhiro Nogita ² , ¹ Nihon Superior / Japan, ² University of Queensland / Australia	809

* DMR: Design Modeling and Reliability

Poster Session

P01	Embedded Planar Power Inductor Technology for Package-level DC Power Grid	Yuta Kondo ¹ , Yuichiro Yazaki ¹ , Makoto Sonehara ¹ , Toshiro Sato ¹ , Tetsuro Watanabe ² , Yuto Seino ² , Nobuhiro Matsushita ² , Tomoharu Fujii ³ , Kazutaka Kobayashi ³ , Hiroshi Shimizu ³ , Yuki Yanagisawa ⁴ , Teruki Someya ⁴ , Hiroshi Fuketa ⁴ , Makoto Takamiya ⁴ , Takayasu Sakurai ⁴ , ¹ Shinshu University, ² Tokyo Institute of Technology, ³ SHINKO Electric Industries, ⁴ The University of Tokyo / Japan	814
P02	Stress and Strain Analysis using Multi-Physics Solver for Power Device Heat Dissipation Structures under Thermal Cycling Test	Takahiro Asai ¹ , Masaaki Aoki ¹ , Akihiro Mochizuki ² , Takamitsu Honjo ² , Hitoshi Kida ² , Goro Yoshinari ² , Nobuhiko Nakano ¹ , ¹ Keio University, ² Alent Japan / Japan	818
P03	Heat Dissipation Characterization and Application of SiC Power Devices by Transient Thermal Measurement	Ryo Endoh, Junichi Watanabe, Ryuichi Sugie, Takashi Yamamoto, Toray Research Center / Japan	822
P04	Synthesis and Characterization of Polydopamine Modified Carbon Nanotube (CNT)/ Polydimethylsiloxane (PDMS) Composites	Chih-Feng Wang ¹ , Pei-Kang Huang ¹ , Pei-Rung Hung ¹ , Chan-Chih Hsu ¹ , Sheng-Rui Jian ¹ , Ping-Feng Yang ² , Min-Hua Chung ² , ¹ I-Shou University, ² Advanced Semiconductor Engineering / Taiwan	826
P05	Effect of Au Nanoporous Structure on Bonding Strength	Kaori Matsunaga ¹ , Min-Su Kim ¹ , Hiroshi Nishikawa ¹ , Mikiko Saito ² , Jun Mizuno ² , ¹ Osaka University, ² Waseda University / Japan	830
P06	Cu/BCB Hybrid Bonding with TSV for 3D Integration by using Fly Cutting Technology	Zhi-Cheng Hsiao, Cheng-Ta Ko, Hsiang-Hung Chang, Huan-Chun Fu, Chia-Wei Chiang, Chao-Kai Hsu, Wen-Wei Shen, Wei-Chung Lo, Industrial Technology Research Institute / Taiwan	834
P07	In Situ Observations of Micromechanical Behaviours of Intermetallic Compounds for Structural Applications in 3D IC Micro Joints	Jen-Jui Yu, Jui-Yang Wu, Li-Jen Yu, C. Robert Kao, National Taiwan University / Taiwan	838
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P10	Low Temperature Au-Au Surface-Activated Bonding Using Nitrogen Atmospheric-Pressure Plasma Treatment for Optical Microsystems	Seiya Matsuoka ¹ , Michitaka Yamamoto ¹ , Eiji Higurashi ¹ , Tadatomo Suga ¹ , Renshi Sawada ² , ¹ The University of Tokyo, ² Kyusyu University / Japan	850

P11	CSP LED Validation through Optical Simulations for High Irradiance UV LED Module	Hao-Xiang Lin, Chin-Chang Hsu, Cheng-Chun Liao, Chung-Min Chang, Chih-Peng Hsu, Advanced Optoelectronic Technology / Taiwan	854
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P14	Fabrication of SERS Active Noble Metallic Nanostructure by Synchrotron Radiation Induced Photochemical Reaction	Takeshi Matsumoto ¹ , Ikuo Okada ² , Ikuya Sakurai ² , Yuichi Utsumi ¹ , Akinobu Yamaguchi ¹ , ¹ University of Hyogo, ² Nagoya University / Japan	866
P15	A Novel MEMS-Based Lab-on-a-Tube Technology and Its Application	Yi Zhang, Toshihiro Itoh, Ryutaro Maeda, National Institute of Advanced Industrial Science and Technology / Japan	870
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P17	A Study of High-Density Differential Transmission Line of the Package Board Based on Crosstalk Reduction	Takashi Kuwahara ¹ , Yoshihiro Akeboshi ¹ , Seiichi Saito ² , ¹ Mitsubishi Electric, ² Salesian Polytechnic / Japan	878
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P19	Embedded Band-pass Filter Design in Packaging Substrate	Bo You Chen ¹ , Sung Mao Wu ¹ , Ming Shan Lin ¹ , Tzu-Wen Kung ² , ¹ Nation University of Kaohsiung, ² Ministry of Economic Affairs / Taiwan	886
P20	Optimum Conifiguraiton of SI/PI Co-Simulation using Electro-Magnetic Simulator	Mitsuharu Umekawa, Keysight Technologies Japan / Japan	890