Proceedings of
Thailand – Japan MicroWave 2015
(TJMW 2015)

TJMW2015 is sponsored by IEICE Technical Committee on Microwaves and is jointly hosted by Chulalongkorn University

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IEICE Bangkok Section,
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ECTI Association,
IEEE MTT-S Japan / Kansai / Nagoya Chapters,
IEICE Technical Committee on Integrated Circuits and Devices,
IEICE Technical Committee on Wireless Power Transfer
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Message from the General Co-Chair of TJMW2015

On behalf of Chulalongkorn University, it is our great pleasure to organize the Thailand-Japan MicroWave (TJMW2015). This conference is a platform for researchers to share the recent research trends and experiences between researchers from Japan, Thailand, ASEAN countries and the vicinity. It is technically co-sponsored by IEICE Bangkok Section, ECTI Association, and IEEE MTT/AP/ED Thailand Chapter.

Our technical program covers variety of topics ranging from RF circuits, microwave systems and active components, antenna techniques and applications, metamaterials, and optical fiber systems. The tutorial session on fundamentals of microwave measurements is organized on August 6, 2015. The technical program lasts two days from August 7 to August 8, 2015.

We faithfully appreciate the contributions of the invited speakers from Japan, Indonesia, the Philippines and Brunei. The young researcher session is organized to encourage the new generation researchers.

I would like to thank the members of Steering Committee, Organizing Committee and Technical Program Committee for their constant support and cooperation. In particular, I would like to thank the authors who have made this conference possible. In addition, the supports from Rohde & Schwarz Japan and Rohde & Schwarz Thailand are highly appreciated.

I believe that there might be some inconveniences both during the preparation time and possibly during your stay. I solely accept all your complaints. However, if there is any impression, please acknowledge that it results from the hard work of the organizing committee members. By the way, during your stay if you need any help, please do not hesitate to let us know. We will be pleased to serve you.

I wish you enjoy your stay and have fruitful discussions.

Tuptim Angkaew,
Chulalongkorn University,
TJMW2015 General Co-Chair (Thailand)
Welcome to 2015 Thailand-Japan MicroWave (TJMW2015)!
It is my great pleasure to see all of microwave friends again in Bangkok, Thailand.
Microwave researchers in Thailand and Japan organize this conference to accumulate
friendship between both societies. First of all I need to say my appreciation to all of
microwave friends, related societies and affiliations. Also we can have this conference
again under the deep understandings of Chulalongkorn University.

In 1999, we had the first TJMW at Pattaya, Thailand. It was a small, but great step for both
microwave societies. Unfortunately, there were fewer opportunities to have technical
discussions on microwave theory and techniques after TJMW1999. Through the
discussions in APMC2007 held in Bangkok, all of members feel the warm atmosphere and
intentions between Thailand and Japan, resulting in organizing TJMW again. The renewal
TJMW started at King Mongkut’s University of Technology North Bangkok (KNUTNB) in
2009. Since 2009, TJMW has held in Bangkok every year except 2010. The 6th renewal
TJMW, TJMW2015, will be held on Aug. 6-8, at Chulalongkorn University again.

TJMW2015 is organized and co-sponsored by IEICE Technical Committee on Microwaves
and is jointly hosted by Chulalongkorn University. The workshop is also technically
co-sponsored by IEICE Bangkok Section, IEEE MTT/AP/ED Thailand chapter, ECTI
Association, IEEE MTT-S Japan/Kansai/Nagoya chapters, IEICE Technical Committee on
Integrated Circuits and Devices, and IEICE Technical Committee on Wireless Power
Transfer. With the great helps from above societies, we received many paper submissions
of more than 70 including 40 young researchers’ papers. I appreciate all of you.

For long years, our microwave society have been keeping important role as “the hub port of
technologies” among antenna, communication, optics, electronic devices, integrated circuits,
EMC and so on. Also TJMW is becoming the important hub port of the regional human
network between ASEAN and Japan. It is our pleasure to contribute for the construction
of the hubs/networks in technologies. We expect accumulations of strong friendships
among multi-regions and multi-generations in TJMW2015.

I would like to express my appreciation to Prof. Tuptim Angkaew and her team for their
continuous support that makes this conference success. Finally, I would like to appreciate
all the authors, speakers, and attendees.

Kenjiro Nishikawa,
Kagoshima University,
TJMW2015 General Co-Chair (Japan)
Thursday, August 6th, 2015  
09:50 - 12:00  
Tutorial Session:  

Chairs: Panuwat Janpugdee, Chulalongkorn Univ., Thailand  

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<tr>
<th>Registration time</th>
<th>09:30 - 10:00</th>
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<td>Opening:</td>
<td>09:50 - 10:00</td>
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<td>Time:</td>
<td>10:00 - 12:00</td>
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**Tutorial Topic**: Evolution toward 5G-Next Generation Mobile Network and Its Applications  

**Speaker**: Dr. Hiroshi Okazaki  
NTT DOCOMO, Japan  

**Venue**: 2nd Floor Auditorium, Engineering 4 Building  
Faculty of Engineering, Chulalongkorn University
Thursday, August 6th, 2015
13:00-14:00 (Oral)
14:00-15:30 (Poster)
TH1: Young Researchers Session

Chairs: Sarawuth Chaimool, Udon Thani Rajabhat University, Thailand
        Shoichi Narahashi, NTT DOCOMO, Japan

**TH1-01** Okumura-Hata Model Optimization for DVB-T2 Propagation in Urban Area of Surattani, Southern Thailand
Pitak Keawbunsong, Sathaporn Promwong
KMITL, Thailand

**TH1-02** Dual-band Dual-pole Antenna for compatibility of MPT with communication
Naoki Hasegawa*, Hyeonjae Ju#, Satoshi Yoshida**, Akihira Miyachi##,
Makoto Matsunoshita ##, Kenjiro Nishikawa**, Shigeo Kawasaki##
* Kyoto Univ, Japan, # The Univ. of Tokyo, Japan,
** Kagoshima Univ., Japan. ## ISAS/JAXA, Japan

**TH1-03** Comparison on Optimization and Calibration Methods for DTTV Propagation in Urban Area of Surattani, Southern Thailand
Pitak Keawbunsong, Sathaporn Promwong
KMITL, Thailand

**TH1-04** Study of Radio Wave Propagation for low-power Autonomous WSN
-- Attenuation and Fading Modeling by Measurements --
Ryohei Yamane, Tatsuki Tokunou, Toshihiko Hamasaki
Hiroshima Inst. of Tech., Japan

**TH1-05** UHF RFID Reader using Slanted Slot Patch Metasurface on Microstrip Patch Antenna
Pawares Vijitsulakkana*, Wanwisa Thaiwirot*, Sarawuth Chaimool#,
Prayoot Akkaraekthalin*
*KMUTNB, Thailand, # UDRU, Thailand
TH1-06 Basic characteristics of the third order PLL oscillator
Junki Ogawa, Kenji Itoh, Keisuke Noguchi, Tetsuo Hirota, Shigeru Makino
Kanazawa Inst. of Tech., Japan

TH1-07 Combination of Substrate Integrated Waveguide and Microstrip Structure for Controllable Wideband Bandpass Filters
Nonchanutt Chudpooti*, Sarawuth Chaimool#, Prayoot Akkaraekthalin*
* KMUTNB, Thailand, #UDRU, Thailand

TH1-08 The Output Power Formulas of the Balanced Diode Mixer Driven by the Square Wave LO
Honami Hama, Kenji Itoh, Keisuke Noguchi, Tetsuo Hirota, Shigeru Makino
Kanazawa Inst. of Tech., Japan

TH1-10 A 24-GHz Low-Noise Amplifier in 180nm CMOS
Yoshiki Sato*, Yohei Kondo#, Kiyotaka Komoku*, Takayuki Morishita*, Nobuyuki Itoh*
* Okayama Pref. Univ., Japan, # Sharp Takaya, Japan

TH1-11 BAN-UWB Transmission Model for Wireless Body Area Network
Phouthong Southisombath, Sanit Teawchim, Sathaporn Promwong
KMITL, Thailand

TH1-12 The 500MHz band low power rectenna with a high impedance antenna
Takahiro Furuta, Motoki Ito, Kenji Itoh, Keisuke Noguchi, Jiro Ida
Kanazawa Institute of Tech., Japan

TH1-13 Coupled Slot Antenna for Mango Classification
* KMITL, Thailand, # RSU, Thailand

TH1-14 A study on LH ferrite waveguide using half mode waveguide
Sho Yasugi, Kensuke Okubo, Mitsuyoshi kishihara, Hironori Takimoto
Okayama Pref. Univ., Japan

TH1-15 Microwave Sensor for Defected-Fruit Classification
Prapan Leekul, Chinarong Kittiyapunnya, Sorawat Chivapreecha,
Monai Krairiksh
KMITL, Thailand
TH1-16 A numerical study on nonreciprocal transmission characteristics of antiparallel magnetized LH ferrite waveguide
Taichi Adachi, Kensuke Okubo, Mitsuyoshi Kishihara, Hironori Takimoto
Okayama Pref. Univ., Japan

TH1-17 Bandwidth Enhancement of Unidirectional Bow Tie Antenna Using Incision Gap for Terrestrial Digital Video Broadcasting
Bancha Luadang, Chuwong Phongcharoenpanich
KMITL, Thailand

TH1-18 Maximum symbol rate feasible for LED visible light communication with low-frame-rate CMOS camera
Tomoki Kondo, Ryotaro Kitaoka, Wataru Chujo
Meijo Univ., Japan

TH1-19 Truncated-Corner Loop Tag Antenna Radiating Circular Polarization for National UHF-RFID Standard
Arnon Sakonkanapong, Chuwong Phongcharoenpanich
KMITL, Thailand

TH1-20 Flicker-free modulation technique for LED visible light communication with low-frame-rate CMOS camera
Ryotaro Kitaoka, Tomoki Kondo, Wataru Chujo
Meijo Univ., Japan

TH1-21 Integrated Antenna using a Magneto-Dielectric Substrate for DVB-H Application
Pipat Bumrungkarn, Bancha Luadang, Chuwong Phongcharoenpanich
KMITL, Thailand

TH1-22 Consideration on Mounting Structure for MEMS Switch at 60 GHz Band
Kengo Nakajima*, Futoshi Kuroki*, Masanori Eguchi#, Takeshi Yamakawa#
* NIT, Kure, Japan, # FLSI, Japan

TH1-23 The FOA Design for Linear Antenna Array Optimization Problem
Nattaset Mhudtongon*, Chuwong Phongcharoenpanich*, Supakit Kawdungta#
* KMITL, Thailand, # RMUTL, Thailand
TH1-24 Equivalent Circuit Model of Multi-layered Coils at Mediate Frequencies
Kaiji Nakahara, Futoshi Kuroki
NIT, Kure, Japan

TH1-25 Perturbation of a Probe Excited Circular Ring Antenna above the Square Reflector with Inserted Slabs for Circularly Polarized Radiation
Rungsinee Sukamat, Nattaset Mhudtongon, Chuwong Phongcharoenpanich
KMITL, Thailand

TH1-26 Evaluation Method of Transmission Loss Using Unloaded Q factor of Transmission Line
Yoshihiko Kamo, Futoshi Kuroki
NIT, Kure, Japan

TH1-27 A Study of Electromagnetic Wave Diffracted from Corners of Thin Material Coated Metallic Surface
Awika Pimpatang, Titipong Lertwiryaprapa
KMUTNB, Thailand

TH1-28 Consideration on Wireless Power Transmission Efficiency in KHz Frequency Bands
Katsuyoshi Aoki*, Kenji Shodai#, Kouichi Yamanoue**, Futoshi Kuroki*
*NIT, Kure, Japan, #Hiroshima Univ., Japan, **Imasen Co.Ltd, Japan

TH1-29 Study of Electromagnetic Absorber Made by Natural Rubber
Kiadtisak Salayong, Titipong Lertwiryaprapa
KMUTNB, Thailand

TH1-30 The far-carrier phase noise measurement of the RF oscillator
Yasuhiro Tonomo, Kenji Itoh, Tetsuo Hirota, Keisuke Noguchi, Shigeru Makino
Kanazawa Institute of Tech., Japan

TH1-31 Design of a Low cost and Simple Wireless Battery Charging by using Repeater Antenna Technique
Warayut Samakkhee, Kittisak Phaebua, Titipong Lertwiryaprapa
KMUTNB, Thailand
**TH1-32**  
Technique to expand power transfer area on short range wireless power transfer system  
Tatsuro Kuwahara, Ryo Takamori, Kenjiro Nishikawa  
Kagoshima Univ., Japan

**TH1-33**  
Measurement for Radar Target Identification using Matrix Pencil Method  
Feaveya Kheawprae, Akkarat Boonpoonga  
KMUTNB, Thailand

**TH1-34**  
Modeling of Grounded CPW Line with Anomalous Skin Effect in THz band.  
Yuta Sakiyama, Masashi Muraguchi, Hiroto Sakaki, Kenjiro Nishikawa  
Kagoshima Univ., Japan

**TH1-35**  
Radar Target Identification of Coated Object Using Cauchy Method  
Nattawat Chantasen, Akkarat Boonpoonga  
KMUTNB, Thailand

**TH1-36**  
An RF Universal Board for SSOP Elements  
Motohiro Takayasu, Toshiaki Gonda, Yosuke Ishikawa, Hiroyuki Ito,  
Noboru Ishihara, Kazuya Masu  
Tokyo Tech., Japan

**TH1-37**  
Analysis of Object Buried in Multi-layer Soil by using Matrix Pencil Method  
Lakkhana Bannawat, Cheepchanok Yochanang, Akkarat Boonpoonga  
KMUTNB, Thailand

**TH1-38**  
Pattern Diversity Unidirectional Antenna using Elevated Strip on Rectangular Ground Plane for WLAN Applications  
Sukumarn Sankaewthong, Sitthichai Dentri, Chuwong Phongcharoenpanich  
KMITL, Thailand

**TH1-39**  
A Dual-band Textile Antenna using Two Layers of Strip Line and Round-off Circular Patch  
Warangkana Chaihongsa, Chuwong Phongcharoenpanich  
KMITL, Thailand
Friday, August 7th, 2015
09:00-10:20
Plenary Session

2nd Floor Auditorium, 100 Year Anniversary Engineering Building
Faculty of Engineering, Chulalongkorn University

Chair: Kenjiro Nishikawa, Kagoshima Univ., Japan

Opening Remarks
Message from General Chair
Tuptim Angkaew
Chulalongkorn Univ., Thailand

Plenary Wireless Smart-city Technologies Launched from Asian Activities
Futoshi Kuroki
NIT, Kure, Japan

Keynote Convergence of radio and optical technologies for high resolution imaging
Tetsuya Kawanishi
Waseda Univ., Japan
FR1: Novel Passive Components and Technologies
2nd Floor Auditorium, 100 Year Anniversary Engineering Building

Chairs: Prayoot Akkaraekthalin, KMUTNB, Thailand
       Masataka Ohira, Saitama Univ., Japan

FR1-01 [Invited] Low-loss Silica-Based Bandpass Filter for 60-GHz applications
Yusuke Uemichi*, Osamu Nukaga*, Kei Nakamura*, Xu Han*, Ryouhei Hosono*, Ning Guan*, Shuhei Amakawa#
* Fujikura Ltd., Japan, # Hiroshima Univ., Japan

FR1-02 On the Design Method of Microstrip Filtering Antennas Using Only Amplitude Property of Input Reflection Responses
Masataka Ohira, Zhewang Ma
Saitama Univ., Japan

FR1-03 A Fourth Band BPF using Interdigital and Step-Impedance Techniques for 4G, WiMAX and WLAN Systems
Mr. Pongpat Ketkuntod
KMUNB, Thailand

FR1-04 Study of influences of underfill material on CPW type millimeter-wave MMIC by flip chip packaging
Takashi Shimizu*, Yoshinori Kogami*, Yasutake Hirachi#
* Utsunomiya Univ., Japan, # Tokyo Tech., Japan

FR1-05 Planar Waveguide-to-Microstrip Transition with Multiple Microstrip-line Output Ports
Kunio Sakakibara, Nobuyoshi Kikuma
NITech, Japan

FR1-06 Geometrical interpretation of edge states in transmission lines
Kei Sawada
RIKEN, Japan
FR2: Advanced Antenna Technologies
2nd Floor Auditorium, 100 Year Anniversary Engineering Building

Chairs: Chuwong Pongjareonpanich, KMITL, Thailand
Kunio Sakakibara, NITech., Japan

FR2-01 A Multiband Antenna with Square Slots and Capacitive CPW Feed for LTE, WiMAX and WLAN Systems
P. Singsura, P. Chomtong, S. Meesomklin, P. Akkaraekthalin
KMUTNB, Thailand

FR2-02 Fundamental Study of the Helmet Antenna for Disaster Prevention
Hisashi Morishita, Naoto Nishiyama, Naobumi Michishita
National Defense Academy, Japan

FR2-03 Development of a Microstrip Antenna for In-Vehicle Digital Television Reception
Teerapong Pratumsiri, Panuwat Janpugdee
Chulalongkorn Univ., Thailand

FR2-04 Self Resonant Characteristics of Normal-Mode Helical Antennas Embedded in Dielectric or Magnetic Materials
Nguyen Thanh Tuan*, Yoshihide Yamada*, Nguyen Quoc Dinh#
*MJIIT, Malaysia, # Le Quy Don Technical University, Vietnam

FR2-05 Dispersion and Far-Field Analysis of a Hertzian Dipole Embedded in Multiple Periodic Structures of Lossless Multilayer Slabs Using the Equivalent CCITL Model
Supakit Kawdungta*, Danai Torrungrueng#
* RMUTL, Thailand, # Asian University, Thailand

FR2-06 Experimental study of an improved mono-pulse DOA estimation antenna by integrating microwave circuits
Eisuke Nishiyama, Ryo Tanaka, Ichihiko Toyoda
Saga Univ., Japan
FR3: Advanced Measurement Techniques
2nd Floor Auditorium, 100 Year Anniversary Engineering Building

Chairs: Thitipong Lertwiriyarapra, KMUTNB, Thailand
Masahiro Horibe, NMIJ-AIST, Japan

FR3-01 [Invited] Measurement and Analysis of Nanoparticle Ferromagnetic Resonance -- Non-Resonant Transmission Line Technique --
Khattiya Chalapat*, Jaakko Timonen#, Maija Huupola#, Lari Koponen#, Christoffer Johans#, Robin Ras#, Olli Ikkala#, Markku Oksanen**, Eira Sepp**,
Sorin Paraoanu#
* KMITL, Thailand, # Aalto University, Finland,
** Nokia Research Center, Finland

FR3-02 [Invited] A Reflectometer with Beam Switching Capability
Chainarong Kittiyapunya, Monai Krairiksh
KMITL, Thailand

FR3-03 Permittivity measurement of low-loss material by installation into microwave cavity
Yuto Kato, Masahiro Horibe
AIST, Japan

FR3-04 Impact of Adaptor on Impedance Measurement at RF Frequency
Ryoko Kishikawa, Masahiro Horibe
AIST, Japan

FR3-05 Comparing Measurement Results between Waveguide Vector Network Analyzer Measurement System with Different Cable Setup
Masahiro Horibe, Ryoko Kishikawa, Yuto Kato
NMIJ-AIST, Japan
FR4: Novel Radar and Sensor Systems
2nd Floor Auditorium, 100 Year Anniversary Engineering Building

Chairs:  
Panuwat Janpugdee, Chulalongkorn Univ., Thailand  
Hiroshi Okazaki, NTT DOCOMO, Japan

FR4-01  [Invited] Ground Penetrating Radar (GPR) for Counter Improvised-Explosive Devices in Thailand  
Akkarat Boonpoonga  
KMUTNB, Thailand

FR4-02  ZigBee Sensor Network Installed with Ultrasonic Radar Sensor for Care Environment -- Comparison to Millimeter-Wave Radar --  
Mitsutaka Hikita, Takeo Sato, Yukari Kaneda  
Kogakuin Univ., Japan

FR4-03  Field trial of radio-over-fiber based high-resolution radar  
Tetsuya Kawanishi*, Atsushi Kanno#, Nobuhiko Shibagaki**,  
Naruto Yonemoto##, Tuptim Angkaew†, Panuwat Janpugdee†  
* Waseda Univ., Japan, # NICT, Japan, ** Hitachi, Japan,  
## ENRI, Japan, † Chulalongkorn Univ., Thailand
Saturday, August 8th, 2015
10:00-11:30
SA1: Special Session: RF Power Devices and Its Applications
2nd Floor Auditorium, 100 Year Anniversary Engineering Building

Chairs: Thitipong Lertwiriyaprapa, KMUTNB, Thailand
Kenji Itoh, Kanazawa Inst. of Tech., Japan

SA1-01 [Invited] Microwave high power devices for social infrastructure systems in south east Asia
Koji Yamanaka, Kazuhiro Iyomasa, Shintaro Shinjo, Masatake Hangai
Mitsubishi Electric Corp., Japan

SA1-02 [Invited] An X-band Dual-Polarimetric Doppler Weather Radar System as Applications of Microwave Circuits and Its Observation Examples
Takuo Kashiwa, Toshiaki Takaki, Masahiro Minowa, Yuta Ishigaki
Furuno Electric, Japan
Saturday, August 8th, 2015
13:00-13:55
SA2: Advanced Millimeter Wave Device and Systems
2nd Floor Auditorium, 100 Year Anniversary Engineering Building

Chairs: Sarawuth Chaimool, Udon Thani Rajabhat Univ., Thailand
       Koji Yamanaka, Mitsubishi Electric Corp., Japan

SA2-01 [Invited] The Three-Dimensional MMIC and Its Evolution to Wafer-Level Chip Size Package MMIC
       Tsuneo Tokumitsu
       SEI, Japan

SA2-02 [Invited] A 60GHz Band 3-D Phased Array Antenna Module for Beam Forming W-PAN receivers
       Noriharu Suematsu, Mizuki Motoyoshi, Satoshi Yoshida, Yuya Suzuki, Wenying Ye, Surugu Kameda, Tadashi Takagi, Kazuo Tsubouchi
       Tohoku Univ., Japan

SA2-03 Research on a Millimeter-Wave Close Proximity High-Speed Data Transfer System
       Tadao Nakagawa*, Hideki Toshinaga*, Toshimitsu Tsubaki*, Tomohiro Seki#, Ken Hiraga*, Masashi Shimizu*
       * NTT, Japan, # Nihon Univ., Japan
Saturday, August 8th, 2015
14:15-15:25
SA3: Advanced CMOS Technologies
2nd Floor Auditorium, 100 Year Anniversary Engineering Building

Chairs: Panuwat Janpugdee, Chulalongkorn Univ., Thailand
        Minoru Fujishima, Hiroshima Univ., Japan

SA3-01 [Invited] Innovation challenges from materials, devices and circuits in IoT/IoE era
        Kazuya Masu
        Tokyo Tech., Japan

SA3-02 [Invited] Present Status of Characteristics Variability in Scaled MOS Transistors
        Toshiro Hiramoto
        Univ. of Tokyo, Japan

SA3-04 Power line decoupling up to 325 GHz in CMOS
        Shuhei Amakawa, Ryuhei Goda, Kosuke Katayama, Kyoya Takano, Takeshi Yoshida, Minoru Fujishima
        Hiroshima Univ., Japan
Saturday, August 8th, 2015
15:25-15:35
Closing Session
2nd Floor Auditorium, 100 Year Anniversary Engineering Building

Chair: Tuptim Angkaew, Chulalongkorn Univ., Thailand

Closing Remarks
Kenjiro Nishikawa
Kagoshima Univ., Japan