Agenda
IEEE EMC Society TC 5: High Power Electromagnetics (HPEM)
Wednesday, 22 May 2024 (1:00-2:00 PM Okinawa Time)
Meeting Room C-1

1. Opening of the meeting and approval of the agenda	W. Radasky, Chair
2. Review and approval of the minutes of the last TC 5 Meeting in Grand Rapids, Michigan, USA	W. Radasky
3. Present TC 5 membership list	W. Radasky
4. Report on the paper review process for Okinawa and Phoenix - Review Tutorials, Special Sessions, Regular Sessions	W. Radasky
5. Report from the Lightning Subcommittee	M. Rubinstein, F. Rachidi
6. Report from the EM Information Leakage Subcommittee	Y. Hayashi
7. Report from the HEMP/IEMI Subcommittee	M. McInerney, W. Radasky, S. Fisahn
8. Report from ESD Subcommittee	S. Marathe, M. Khazhinsky, J. Kinnear
9. Coordination with SC 1, Smart Grid	M. McInerney, Chair SC1
10. Status of the TC 5 web page	M. McInerney, VC TC 5
11. Review of HPEM activities since last TC 5 meeting (Grand Rapids)	All
12. Discussion concerning future special sessions and tutorials	All
13. Note the status of TC-5 officers (serving 3 year term, ending 31 December 2025)	All
14. Any other business	All
15. Adjournment	All

Note 1: The agenda indicates the names of those preparing the listed presentations. For those not attending this meeting, the presentations will be presented by Dr. Radasky or Prof. Hayashi who will be in attendance.
Note 2: The lunches at the conference will be provided as a box lunch, so those who attend the TC 5 meeting should pick up their box lunch and then come to the meeting location (Room C-1) on Wednesday, 22 May. The technical sessions in the morning end at 12:40 PM, and the afternoon sessions start at 2:10 PM, so our meeting at 1:00 – 2:00 PM should not conflict with any technical session.

IEEE TC 5: High Power Electromagnetics (HPEM) Technical Committee

Minutes of Grand Rapids Hybrid Meeting
Wednesday, 2 August 2023 (Noon – 1:30 PM Easterm Daylight U.S. Time)

Unconfirmed Minutes

1) **Opening of the meeting and approval of the agenda – Bill Radasky, Chairman**

Chairman Dr. William (Bill) Radasky brought the meeting to order at 12:10 PM, Eastern Daylight Time. It is noted that this was a hybrid meeting with 19 individuals attending in person and 2 individuals attending virtually (we started 30 minutes before the meeting to set up the virtual system, and it took 40 minutes to get it done with the help of a local expert). The Chairman, Bill Radasky, the Vice Chairman, Mike McInerney and the Secretary, Yuichi Hayashi were all present. Radasky welcomed the attendees, reviewed the agenda and asked for suggested changes; none were offered. McInerney made a motion to approve the agenda. Motion Seconded and Carried (MSC).

2) **Review and approval of minutes of previous TC 5 meeting – Bill Radasky, Chairman**

The unconfirmed minutes from the Spokane TC 5 meeting on 3 August 2022 were approved without any changes. They are attached to these minutes and will separately be placed on the TC 5 web page.

3) **TC 5 membership list update – All**

The TC 5 membership list covering the past 5 years was reviewed. The previous membership list was displayed without email addresses, and it was noted that several attendees during the past 2 virtual meetings do not have email addresses known. Thus it will not be possible to reach them by email. We had 21 attendees at this meeting with 19 in person and 2 virtual. We do not publish the detailed (with email addresses) 5-year list on the website or in the minutes, as there may be private information contained in it. Only the officers' and subcommittee chairs' email addresses are published on the website, and this procedure has been approved by the IEEE.

4) **Report on the paper review process and sessions for Grand Rapids – Bill Radasky**

Radasky reviewed the paper review process for this Grand Rapids conference and also the tutorial that was presented. There were 10 regular and 5 abstract papers submitted; 15 were

accepted. We ended up with an all-day session on Thursday for the TC 5 papers. There were some problems in assigning session chairs due to limitations in the software being used. In addition, we tried to assign each grouping of papers in the session with a subtitle, but that also did not work due to the limitations in the software. Once all of the papers were put into 1 very long session, it was not possible to assign subtitles or different session chairs for the "sub-sessions". We complained about the process and the TAC promised this would be fixed for the next year. The papers presented covered the topics of HEMP, EM Information Leakage, IEMI, and ESD. There were no lightning papers.

We had a sufficient number of reviewers this year, and they should be recognized for their hard work. The reviewers were: Homma, Khazhinsky, McInerney, Sabath, Savage, Thomas and Willemen.

A tutorial was presented on Wednesday afternoon:

- WE-PM-G: Wednesday, 2 August 2023
  - Recent Advancements in HEMP, EMP, and IEMI Protection – A Global Perspective
  - Organizers: Tara Kellogg and Chaouki Kasmi
  - Presentations by: Chaouki Kasmi, Sergio Longoria, Ryan Marietta, Frank Sabath

It is especially notable that 3 papers submitted for this conference were nominated for best EMC Paper and/or best EMC Student paper. The papers are:

1. Best EMC Paper Finalist: "Early-time Electromagnetic Pulse Response Validation of Surge Arrester Models," by Tyler Bowman, Thomas Kmieciak, Laura Biedermann
2. Best EMC Paper and Best EMC Student Paper Finalist: "Reconstruction of Sound Information Leakage Signals Obtained from Multiple Demodulation Methods," Taiki Kitazawa, Seiya Takano, Yuichi Hayashi
3. Best EMC Student Paper Finalist: "Failure Mechanisms Analysis in GaN HEMTs under High-Power Microwave Pulses," Yue Zhang, Liang Zhou

While none of the papers was selected as the Best Paper, Paper 2 above was given an honorable mention for the Best Student Paper.

5) **Report from the Lightning Subcommittee – Marcos Rubinstein and Farhad Rachidi**

A presentation audio/visual presentation was prepared by Marcos Rubinstein and Farhad Rachidi. Marcos prerecorded his voice while presenting the charts. The charts are attached, but the audio/visual presentation is a very large file that cannot be included with these minutes. The conferences and other events planned and held thus far in 2023 were discussed along with the events planned for 2024. Also 9 WGs in CIGRE Study Committee C4 currently working were identified during the presentation. One WG in IEEE PES was also mentioned. In addition, other lightning activities were summarized. Radasky thanked the Lightning Subcommittee for providing a comprehensive report.

Further details can be found on this agenda item in the Attachments.

6) **Report from the EM Information Leakage Subcommittee – Yuichi Hayashi**

Yuichi Hayashi provided his report beginning with an overview of the 5 regular papers submitted and presented at this year's conference. He also reviewed the special session to be presented at EMC Europe this year (8 papers) and a workshop on Tempest (with 5 talks). He also mentioned the activities that they have supported in the IEEE Digital Privacy Initiative.

Hayashi mentioned that from 20-24 May 2024, APEMC and Japan's EMC2024 Conferences will be combined in Okinawa, Japan and there will definitely be coverage of EM Information Leakage at this symposium. Of course all EMC researchers are welcome to submit papers and attend. Radasky mentioned that TC 5 should plan on a meeting at this conference, as we have on occasion met in Asia (Singapore for APEMC) and at EMC Europe (Dresden for EMC Europe). This gives regional engineers an opportunity to attend a TC 5 meeting when it is difficult for them to attend the meetings in the U.S. Hayashi indicated that he will carry this proposal forward to the conference organizers.

Prof. Hayashi was complemented on his efforts to provide a complete review of activities in the EM Leakage area, worldwide.

Further details can be found on this agenda item in the Attachment.

7) **Report from the HEMP/IEMI Subcommittee – Mike McInerney**

Mike McInerney presented the HEMP/IEMI report in two parts. For the HEMP aspects, Bill Radasky provided a summary of HEMP activities (which have continued since 2021) including:

- The U.S. Department of Energy has published an open document to specify recommended HEMP waveforms to use to evaluate the vulnerability of the U.S. infrastructure. Many power companies are still reacting to this development.
- The IEC is updating IEC 61000-2-9 (HEMP radiated environment): the first draft document has been produced, and the IEC is evaluating the update. Depending on the comments, it is possible this update could be published in 2025.
- Power companies are investigating ways to protect their electronics from HEMP (and IEMI). One company has selected their best substation building construction design after testing, and is planning to update the design to reduce the penetration of high-frequency fields. If successful, this new design will be their prototype for their future substation control house construction.

With regard to the IEMI aspects, Sven Fisahn compiled the report. The report covered the 2023 IEEE EMC Symposium tutorial in Grand Rapids, and a workshop held at EMC Europe in 2022 in Gothenburg. Frank Sabath presented the report at the meeting and provided additional information on the tutorial and workshop.

8) **Report from ESD Subcommittee – Shubhankar Marathe and Misha Khazhinsky**

Shubhankar Marathe presented the report from the ESD subcommittee, which was coauthored by Michael Khazhinsky. He discussed the paper exchange program between ESDA and the IEEE EMC Society. In particular the EOS/ESD Symposium scheduled for October 2023 in Riverside, California has 5 ESD papers, including 2 papers under the paper exchange agreement with the IEEE EMC Society. Also an update of ESD standards mainly from ANSI was provided.

Radasky commented that there were other ESD activities at the APEMC and EMC Europe conferences that should be reported upon in the future. In addition, the important ESD standard, IEC 61000-4-2 is being updated, and it would be good to know what changes are being planned, as they will affect ESD testing worldwide. The purpose of the subcommittees in TC 5 are to update its members on worldwide activities in each field.

Further details can be found on this agenda item in the Attachment.

9) **Coordination with SC-1, Smart Grid – Mike McInerney**

McInerney introduced the activities of Special Committee 1 (Smart Grid), which is a coordinating committee, and he indicated that the SC 1 meeting had been held on Monday, with good attendance. It is noted that Mike McInerney is the Chairman of SC 1 and Bill Radasky continues in his role as Vice Chair while Prof. Thomas was not able to continue as Secretary. Leonardo Sandrolini was elected as Secretary. McInerney commented that TC 5 is keeping track of any issues involving Smart Grid and HPEM, and both the Chair and the Vice Chair of TC 5 have been attending the SC 1 meetings for many years.

10) **TC 5 web page – Mike McInerney, Vice Chairman**

McInerney is continuing in his role as webmaster for TC 5. He is usually able to quickly update the website, although this year there is a new system and software for updating the web page, and unfortunately the TCs were not notified of this in advance. The TAC promises to try to warn the TCs in the future of changes. The webpage for TC 5 can be found at: https://www.emcs.org/committees/technical-committees/tc-5-high-power-electromagnetics/

11) **Review of HPEM activities since last TC 5 meeting in Spokane – All**

Due to a lack of time, there was no detailed discussion concerning new developments in HPEM. McInerney asked that any new documents of a public nature be sent to him to post on our website.

12) **TC 5 Tutorials/Special Sessions planned at the EMC 2024 in Phoenix**

Based on the presentations provided at this meeting from the subcommittees, it appears that several tutorials and a special session will be proposed. Three proposals were discussed: one tutorial on HEMP/IEMI IEC Standards (Radasky); one special session on IEMI Risk Management (Sabath); and one tutorial on EM Information Leakage (Hayashi).

It is expected that in the December time frame, new proposals will be due, and the Chairman, Bill Radasky, will remind the subcommittee chairs to prepare their proposals for the 2024 conference. It is important that all proposals be coordinated with the management of TC 5 in order to ensure the proper endorsements are made.

13) **Discussion of Standardization Activities**

After many years of discussion concerning the need for a new IEEE standard dealing with the effects on electronics when an aircraft is struck by lightning, a new PAR 2838 has been approved. It is titled, "Aircraft Component Lightning Strike Direct Effects Qualification." Fred Heather mentioned that he is still looking for more experts to join the WG, and he has organized a meeting for the next day, Thursday. TC 5 members were encouraged to attend.

14) **Election Status of TC 5 Officers**

The current officers of TC 5 are serving 3-year terms that ends on 31 December 2025.

15) **Any other business - All**

No other business was raised.

16) **Adjournment**

The meeting was adjourned at 1:30 PM.

Attachments (labeled with agenda item)

1-Meeting Agenda
2-Confirmed Spokane Minutes
3-TC 5 Membership Update (including 2023 meeting attendees)
4-Report on Paper Review Process
5-Lightning Subcommittee Report
6-EM Information Leakage Subcommittee Report
7-HEMP/IEMI Subcommittee Report
8-ESD Subcommittee Report
12-Tutorial Proposal for 2024: IEC Standards for HEMP/IEMI

2024 TC 5 Membership List	Updated: 17 February 2024						
		New Orleans	Reno-Virtual	Glasgow-Virtual	Spokane	Grand Rapids	
Name	Affiliation	2019	2020	2021	2022	2023	
Rami Amin	?		X				
Mariya Antyufeyeva	?		X				
Carlos Aviles	USAF					X	
Dr. Daryl Beetner	Missouri University of Science and Technology	X		X			
Dr. Tyler Bowman	Sandia National Laboratories	X		X	X	X	
Dr. Felix Burghardt	Leibniz University, Hannover, Germany	X	X				
Dr. Ying Cao	Apple Computer (added Feb 2024)						
Tim Cash	Baltimore EMC Society		X				
Paul Clem	Boeing					X	
Larry Cohen	Consultant					X	
Dan Donato	?		X				
Sven Fisahn	Bundeswehr Research Institute, Germany	X	X	X	V		
Dr. Ali Foudazi	Amazon Lab126				*	V	
Ryan From	Boeing	X					
Dr. Heyno Garbe	Leibniz University, Hannover, Germany	X		X		V	
Matt Halligan	Sandia National Laboratories	X	X				
Ed Hare	AARL		X	X			
Aaron Harmon	MST EMC Lab					X	
Dr. Yu-ichi Hayashi	Tohoku University, Japan	X			X	X	
Fred Heather	USN	X		X	X	X	
Prof. Kengo Iokibe	Okayama University, Japan	X					
Tom Jarse	Boeing				X	X	
Randy J. Jost	Utah State University					X	
Dr. Michael Khazhinsky	Silicon Labs and ESDA	X	X				
Jong Hwa Kwon	ETRI				X	X	
Matt Lara	APELC				X		
Dr. Frank Leferink	Thales, Univ of Twente, Netherlands	X	X	X			
Dr. Sergio Longoria	ETS-Lindgren					X	
Jim Lukash	Lockheed Martin		X		X		
Shubhankar Marathe	Amazon Lab126		X	X	X	X	
Mike McInerney	USACE-ERDC	X	X	X	X	X	
Don McPherson	SRC, Inc.		X				
Kingsley McRae	EMC Society Australia	X					
Monrad Monsen	Oracle		X				
Dr. Nicolas Mora	Technology and Innovation Institute, Abu Dhabi	X	X	X	X		
Prof. Petre-Marian Nicolae	University of Craiova, Romania	X					
Mike Oliver	MAJR Products Corp.					X	
Dr. Michal Pietrzyk	Thysseukrupp Marine Systems					X	
Dr. Andrew Podgorski	Consultant		X	X	V		
Valter Mariani Primian	UNIVPM, Ancona, Italy		X				
Prof. Farhad Rachidi	Swiss Federal Institute of Technology	X	X				
Dr. William Radasky	Metatech	X	X	X	X	X	
Dr. Marcos Rubinstein	Univ. of Applied Science, Switzerland	X	X				
Dr. Frank Sabath	Bundeswehr Research Institute, Germany			X	X	X	
Dr. Luis San Martin	Sandia National Laboratories	X					

Dr. Edward Savage	Metatech				X		
Martin Schaarschmidt	Bundeswehr Research Institute, Germany			X	X		
Melissa Schwager	Ford Motor Company		X				
Harry Skinner	Intel				X		
Hywel Sollis	UK Ministry of Defence				X		
Zareh Soghomonian	?						
Abtin Spantman	AETANT	X	X				
Mark Steffka	University of Detroit, Mercy						
Dr. Adrian Sun	Aerospace Corporation			X		X	
Kin Sze	National Defence QETE, Canada	X		X		X	
Dr. Joost Willemen	Infineon Technology, Germany	X	X	X			
Ali Yaqoob	Technology and Innovation Institute, Abu Dhabi						
Jong-Gwan Yook	Yonsei University				X		
Names not available on WEBEX			4X				
Corresponding Members							
Dr. Harald Gossner	Intel						
Joe P. Huynh	Boeing/BR&T						
Phil Johns	Johns Hopkins APL						
		23	29	17	20	21	

TC 5 Meeting in Okinawa Wednesday, 22 May 2024

Name	**Affiliation**
William Radasky	Metatech Corporation
Yuichi Hayashi	NAIST
Euibum Lee	Yonsei University
Dong Hoon Choi	Yonsei University
Frank Leferink	Unitversity of Twente
David Martinez	Technology Innovation Institute
Taiki Kitazawa	NAIST
Daisuka Fujimoto	NAIST
Masahiro Kinugawa	The University of Fukuchiyama
Shinobu Ishigami	Tohuku Gakuin University
Ken Kawamata	Tohuku Gakuin University
Soki Akutsu	Mitsubishi Heavy Industry
Takuya Hoshino	NTT-AT
Tetsuya Tominaga	NTT-AT
Takahiro Yoshida	Tokyo University of Science
Takayuki Kubo	Noise Laboratory
Takeshi Ishida	Noise Laboratory
Akiyoshi Tatematsu	CRIEPI
Juwichi Fujigaki	Noise Laboratory
Youngwoo Kim	Sejong University
Kengo Iokibe	Okayama University
Flavia Grassi	Politecnico di Milano
Daryl Beetner	Missouri University of Science and Technology
Mikael Grudd	Roxtec
Martin Robertsson	Roxtec

TC-5 Meeting, Okinawa 2024

Report on Lightning Activities

22 May 2024

M. Rubinstein
F. Rachidi

Main Events with Lightning Related Content in 2024

- APEMC. 20-24 May, Okinawa, Japan (this conference)
- URSI AT-AP-RASC, 19-24 May, Gran Canaria, Spain
- IEEE EMC & SIPI. 29 July- 2 August, Phoenix, AZ
- ICLP, 1-7 September, Dresden, Germany
- EMC Europe. 2-5 September, Bruges, Belgium
- ICOLSE, 9-12 September, Sao Paolo, Brazil
- GlobalEM, 14-19 July, Austin, TX, USA

Main Events with Lightning Related Content in 2025

- AMS Annual meeting. Jan 12-16, New Orleans, USA
- IEEE EMC & SIPI, Aug 18-25, Raleigh, NC, USA
- URSI AP-RASC 2025. Aug 17-22, Sydney, Australia
- EMC Europe 2025. Sep 1-5, Paris, France
- SIPDA, no information available at this time
- APEMC, no information available at this time
- AGU Fall Meeting. Dec 15-19, New Orleans, USA

CIGRE Working Groups on Lightning

- WG C4.57, “Guidelines for the Estimation of Overhead Distribution Line Lightning Performance and its Application to Lightning Protection Design”, Convenor: Koji Michishita (JAPAN)
- WG C4.59, “Real-time Lightning Protection of the Electricity Supply Systems of the Future”, Chair: Chong Tong (China)
- WG C4.61, “Lightning transient sensing, monitoring and application in electric power systems”, Chair: Jingliang He (China)
- WG 4.66. “New concept for analysis of multiphase back-flashover phenomena of overhead transmission lines due to lightning”, Megumu Miki (Japan)
- WG4.67, Lightning Protection of Hybrid Overhead Lines, Alexandre Piantini, Brazil.
- WG C4.69, “Quantifying the lightning response of tower-footing electrodes of overhead transmission lines_methods of measurement”. Convener: Silverio Visacro (Brazil)
- WG C4.70, Jan 2022-, “Application of space-based lightning detection in power systems”, Convenor: Joan Montanyà (Spain)
- JWG C4_B4.72, “Lightning and Switching Induced Electromagnetic Compatibility (EMC) issues in DC power systems and new emerging power electronics-based DC equipment”, Convenor: Qingmin Li (China)
- JWG B2_C4.76, “Lightning & Grounding Considerations for Overhead Line Rebuilding and Refurbishing Projects, AC and DC”, Convener: William A. Chisholm (CA)

Other Working Groups

- IEEE PES Lightning Performance of Overhead Lines Working Group
  - This year, meeting held 21–25 July in Seattle, Washington.
  - Next year's annual meeting will be held in conjunction with the 2025 IEEE PES GM (no information at this time will be held in).

This year's activities

- Papers to be presented at EGU in Vienna and ILCP in Dresden.
- A tutorial on lightning to be given at GlobalEM in Austin, Texas in July.

Proposed work for 2025

- Organize lightning session at one of the conferences
- Papers at different events with lightning content

22 May 2024

IEEE EMC Society TC5 Subcommittee: Electromagnetic Information Leakage

Yuichi Hayashi

Special Session in EMC Japan/APEMC Okinawa 2024

MonPM1A/2A: Recent Research Trends in Offensive Electromagnetic Information Security Supporting Hardware as the Root of Trust (Sponsored by TC-5)

Session Organizers: Yuichi Hayashi (Nara Institute of Science and Technology, Japan) , Jong-Gwan Yook (Yonsei University), and William Radasky (Metatech Corporation)

Number of papers: 10 papers

	Title	Authors
14:10	Recent Research Trends in Offensive Electromagnetic Information Security Supporting Hardware as the Root of Trust	Y. Hayashi, J. Yook, W. Radasky
14:30	Extraction of Audio Information From EM Emission Caused by Loose Connectors	T. Kitazawa, D. Fujimoto, Y. Hayashi
14:50	Enhancing Video System Security Through TMDS Encoding With Color Combination	D. Choi, E. Lee, T. Nam, W. Choi, J. Yook
15:10	Non-Uniform Sampling for Signal Reconstruction Using EM Signatures of Spread Spectrum	E. Lee, D. Choi, T. Nam, J. Yook
15:30	Fundamental Study of Investigation of Vulnerable Frequencies on Echo TEMPEST	M. Kinugawa, Y. Hayashi
15:50	Secured Power Delivery Network Design for Cryptographic Devices	Y. Kim
16:40	Challenges in Feasible Simulation of Side-Channel Attack Resistance for Cryptographic Hardware	K. Iokibe, M. Himuro, Y. Toyota
17:00	Fundamental Study on Electromagnetic Analysis Attack Detection Using Oscillation Shift of Ring Oscillator	D. Fujimoto, T. Sato, K. Abe, Y. Hayashi
17:20	Find Vulnerable EM Emitting Points via Pre-Trained Deep Learning Models With Power Consumption	J. Hwan Kim, K. Hee Choi, D. Han
17:40	Measured Traces Reduction Using SNR of Leakage for Tolerance Evaluation to Deep Learning-Based Side-Channel Attack	T. Sakagami, M. Himuro, K. Iokibe, Y. Toyota

Tutorial Session in EMC+SIPI 2024 Symposium

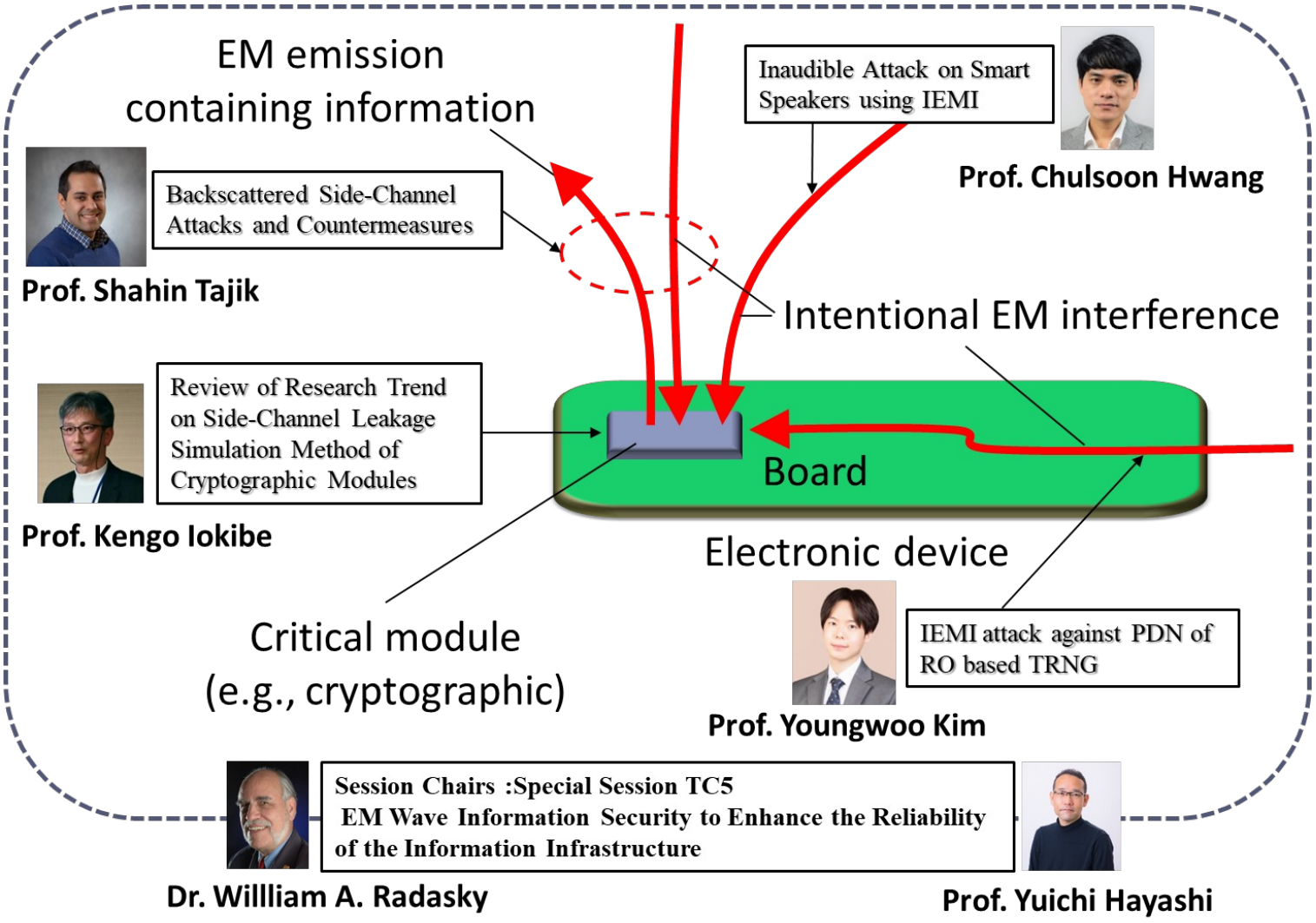
Title: EM Wave Information Security to Enhance the Reliability of the Information Infrastructure (Sponsored by TC-5)

Session Organizers: Yuichi Hayashi (Nara Institute of Science and Technology, Japan) and William Radasky (Metatech Corporation)

Abstract

In today's digital world, protecting information systems is crucial due to the sensitive data they handle, like personal information, financial records, and intellectual property. Securing systems at all layers is important, but hardware security is particularly vital as it forms the trust foundation. This tutorial session will focus on electromagnetic wave-based hardware attacks, a major concern since they can compromise security without leaving evidence. The session will also cover emerging research trends and countermeasures and offer foundational knowledge for those less familiar with hardware security.

1. **Introduction**
2. **Inaudible Attack on Smart Speakers using IEMI**
3. **Review of Research Trend on Side-Channel Leakage Simulation Method of Cryptographic Modules**
4. **Backscattered Side-Channel Attacks and Countermeasures**
5. **IEMI attack against PDN of RO based TRNG**


EM emission
containing information
Inaudible Attack on Smart Speakers using IEMI
Prof. Chulsoon Hwang
Backscattered Side-Channel Attacks and Countermeasures
Prof. Shahin Tajik
Intentional EM interference
Review of Research Trend on Side-Channel Leakage Simulation Method of Cryptographic Modules
Prof. Kengo Iokibe
Board
Electronic device
Critical module
(e.g., cryptographic)
IEMI attack against PDN of RO based TRNG
Prof. Youngwoo Kim
Session Chairs :Special Session TC5
EM Wave Information Security to Enhance the Reliability of the Information Infrastructure
Dr. Willliam A. Radasky
Prof. Yuichi Hayashi

Special Sessions in EMC Europe 2024

SS-TEMP: Special Session on TEMPEST

Session Organizers: Frank Leferink (University of Twente/THALES, Netherlands) and Yuichi Hayashi (Nara Institute of Science and Technology, Japan)

Number of papers: 12 papers

	Title	Authors
11:00	Fundamental Study on Simple Power Analysis Using Backscattering from Switching Regulators	T. Kitazawa, D. Fujimoto, Y. Hayashi
11:22	Electromagnetic Information Leakage of Audio Signals Induced by RF Illumination	F. BULUT, HASAN SEÇKİN EFENDİOĞLU, V. SOLAK
11:45	SDR-Based Shielding Effectiveness Measurement Technique Using Signals-of-Opportunity	R. Aba, M. Figueirinhas, R. Vogt-Ardatjew, F. Leferink
12:07	A SDR-Based Inside-Out in-situ Shielding Effectiveness Measurement Technique	M. Figueirinhas, H. Schipper, R. Aba, R. Vogt-Ardatjew, F. Leferink
14:00	Fundamental Study on Detection of Counterfeit Parts with Abnormal Aging Characteristics Using Electromagnetic Backscattering from I/O Circuits	S. Kaji, M. Kinugawa, D. Fujimoto, Y. Hayashi
14:22	Counter-Screen - A No-Hardware Method To Prevent Eavesdropping Of Video Using TMDS	R. Groot, Duncan Van Meeteren, F. Leferink
14:45	Timing-Controlled EM Fault Injection Method Focusing on EM Leakage from Communication Channel	H. Nishiyama, D. Fujimoto, Y. Hayashi
15:07	Practical Considerations for the Use of Comb Generators in Shielding Effectiveness Measurements	M. Figueirinhas, H. Schipper, R. Aba, R. Vogt-Ardatjew, F. Leferink
16:00	Benefits of coherent demodulation for eavesdropping on HDMI emissions	D. Erdeljan, Markus G. Kuhn
16:22	Fundamental Study on Restoration Method of Encoded Data from Electromagnetic Leakage Focusing on Error Detection Codes	K. Abe, T. Kitazawa, D. Fujimoto, Y. Hayashi
16:45	Shielding Effectiveness of a Filled Cabinet	H. Schipper, M. Figueirinhas, F. Leferink
17:07	A Novel Approach to Measure Shielding Effectiveness in TEMPEST-Protected Buildings	F. BULUT, V. SOLAK, Hasan Seçkin EFENDİOĞLU

Future activity

Activities to be carried out at future EMC symposiums and related conferences to promote the field of EM information security.

- Workshop/Tutorial Session in Workshop in EMC Europe 2024 (2-5 September 2024, Bruges, Belgium) (accepted)

- Asian Hardware Oriented Security and Trust Symposium (December 16-18, 2024, Kobe, Japan, https://www.asianhost.org/2024/authors.htm#cfp)

Asian Hardware Oriented Security and Trust Symposium

December 16-18, 2024, Kobe, Japan

asianhost.org

General Chairs
Makoto Nagata (Kobe University, Japan)
Weiqiang Liu (Nanjing University of Aeronautics and Astronautics, China)

TPC Chairs
Yuichi Hayashi (Nara Institute of Science and Technology, Japan)
Aijiao Cui (Harbin Institute of Technology, Shenzhen, China)

Finance Chairs
Yier Jin (University of Science and Technology in China, China)

Publication Chair
Md Tanvir Arafin (George Mason University, USA)

Local Arrangements Chairs
Noriyuki Miura (Osaka University, Japan)

Publicity Chairs
Yijun Cui (Nanjing University of Aeronautics and Astronautics, China)
Chongyan Gu (Queen's University Belfast, UK)
Qiaoyan Yu (University of New Hampshire, USA)
Takashi Sato (Kyoto University, Japan)

Registration Arrangements Chairs
Daisuke Fujimoto (Nara Institute of Science and Technology (NAIST), Japan)
Yang Li (The University of Electro-Communications, Japan)

Sponsors

IEEE CEDA
IEEE Council on Electronic Design Automation

Call for Papers

Historically, cybersecurity community believed that the underlying hardware is secure and trustworthy. However, the globalization of the IC supply chain invalidates the illusion of an isolated and trusted supply chain; the wide connection of computing devices also exposes new and powerful attack surfaces. Heavy reliance on third-party resources/services renders hardware security and trust a concern. With the advances in artificial intelligence and internet of things, the threat landscape is evolving with relentless new problems and challenges awaiting the hardware security community to address. Multi-disciplinary research and multi-pronged approaches are sought for the development of fully operational software and hardware platforms with enhanced security targeting different phases in the entire IC life cycle.

Asian Hardware Oriented Security and Trust Symposium (AsianHOST) aims to facilitate the rapid growth of hardware security research and development in Asia and South Pacific areas. AsianHOST highlights new results in the area of hardware and system security. Relevant research topics include techniques, tools, design/test methods, architectures, circuits, and applications of secure hardware. **AsianHOST 2024** invites original contributions related to, but not limited by, the following topics:

- **Hardware-intrinsic security primitives (e.g., PUF, TRNG and PQC/FHE/NTT)**
- **Architectural and microarchitectural attacks and defenses**
- **Secure system-on-chip (SoC) architecture**
- **EM information security**
- **Trusted platform modules and hardware virtualization**
- **Side-channel attacks and countermeasures**
- **Hardware Trojan attacks and detection techniques**
- **Security analysis and protection of Internet of Things (IoT)**
- **Hardware IP core protection and trust for consumer electronics systems and IoT**
- **Security and trust of AI/ML, and AI/ML for hardware security**
- **Automobile, self-drive and autonomous vehicle security**
- **5G and physical layer security**
- **Hardware-assisted cross-layer security**
- **Cyber-physical system (CPS) security and resilience**
- **Metrics, policies, models and standards related to hardware security**
- **Security verification at IP, IC, and system levels**
- **Reverse engineering and hardware obfuscation**
- **Supply chain risks mitigation including counterfeit detection & avoidance**
- **Trusted manufacturing including split manufacturing, 2.5D and 3D ICs, and heterogeneous integration**
- **Emerging nanoscale technologies in hardware security applications**

To contribute to the symposium, submit a PDF version of your paper on the symposium submission website (https://easychair.org/conferences/?conf=asianhost2024). The page limit is 6 pages, double column, IEEE format, with a minimum font size of 9 pts (preferably 10 pts). Submissions must be anonymous and must not identify the authors, directly or indirectly, anywhere in the manuscript. In addition to the full papers, AsianHOST 2024 will accept selected submissions as four-page short papers to be presented in a poster session. Accepted papers will be submitted for inclusion into IEEE Xplore subject to meeting IEEE Xplore's scope and quality requirements. Best paper award will be presented to the authors of a paper whose first author is a full-time student at the submission time.

Important Dates:

Submission of Paper:	**July 14, 2024, 23:59:59 JST**
Notification of Acceptance:	**September 11, 2024**
Camera-ready Version:	**October 30, 2024**

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- **Hardware-intrinsic security primitives (e.g., PUF, TRNG and PQC/FHE/NTT)**
- **Architectural and microarchitectural attacks and defenses**
- **Secure system-on-chip (SoC) architecture**
- **EM information security** — **New topic!**
- **Trusted platform modules and hardware virtualization**
- **Side-channel attacks and countermeasures**

HEMP/IEMI Subcommittee Report to TC 5 (HPEM)

Mike McInerney

22 May 2024

TC5 HEMP / IEMI Subcommittee

- Created in 2020 to improve the organization of the website and ease subcommittee reporting
  - HEMP information had been placed only in meeting minutes, while other subcommittees placed relevant information on their respective sub-pages on the website
  - Since parts of HEMP and IEMI have similar fast rising time waveforms and are high power EM, they are associated
  - HEMP (and IEMI) literature is now listed on the HEMP / IEMI web page
  - Mike McInerney is the General POC for the HEMP / IEMI subcommittee
  - Bill Radasky is the POC for the HEMP subcommittee
  - Sven Fisahn is the POC for the IEMI subcommittee

Recent HEMP Activities

Report from the TC5 Subcommittee on HEMP
Compiled by William Radasky
8 May 2024

Recent HEMP Activities

- Several important HEMP activities have continued since our last conference and TC5 meeting in 2023
  1. The IEC is updating IEC 61000-2-9 (HEMP radiated environment) and it has received a unanimous vote for the CDV
  2. IEC 61000-5-6 Ed. 2 (Mitigation of external EM influences) was published in April 2024
  3. CIGRE Study Committee C4 has a working group considering approaches to protect high voltage power control house electronics against HEMP
  4. Power companies are investigating ways to protect their electronics from HEMP (and IEMI)
  5. GlobalEM is the new name for the old AMEREM/EUROEM/ASIAEM series of HPEM conferences. The next conference is in Austin, Texas from 14-19 July 2024. https://www.globalemconf.com
  6. Items 1 and 4 are discussed in more detail in the following two charts

IEC 61000-2-9 Update Plans - 1

- IEC Subcommittee 77C has started maintenance on its body of both IEMI and HEMP publications
  - Several HEMP and IEMI publications are being updated
- For the HEMP radiated environment, there are several areas of IEC 61000-2-9 that have been discussed for more than 4 years to improve the standard which was published in 1996
- The maintenance work for IEC 61000-2-9 is underway
  - Project Leader: Dr. William Radasky
  - Document has been circulated as a Committee Draft for vote (CDV) and was approved with a unanimous vote
  - Summary of improvements are on the next chart

IEC 61000-2-9 Update Plans - 2

- Key improvements being evaluated
  - Provide information for the variation of the E1 and E3 HEMP fields as a function of position. This will include sample ground contour plots and/or range dependent variations for the peak values and the pulse shapes for E1 HEMP.
  - Add additional analytic E1 HEMP waveforms with different rise times and pulse widths.
  - Provide new analytic E3 HEMP waveforms (both B- and E-fields) based on new openly published information from the U.S. EMP Commission.
  - Provide information on how to compute the E3 E-field from the incident B-field and provide a few ground conductivity profiles for those calculations.
  - Provide an annex that shows an equivalent QEXP (Quotient of Exponentials) waveform that is more accurate above 100 MHz for the E1 HEMP waveform. This will help those who try to extend the DEXP (Difference of Exponentials) waveform in the frequency domain to frequencies well above 100 MHz.
  - Explain why the E1 HEMP waveform in time does not require a “zero area”. This has caused a great deal of confusion regarding the way the E1 HEMP waveform is specified.

Power Company Activities

- Over the past 3 years several power companies are evaluating the shielding effectiveness of their existing transmission substation buildings
- One U.S. power company has upgraded a current metal building design to improve its shielding effectiveness
  - Screen mesh windows
  - Shielded yard cables and/or the use of fiber optics
  - Better external cable bonding before entry
  - Testing before and after changes to demonstrate the effectiveness of improvements
- Many of the improvements in protection are based on papers from IEEE EMC Conferences and Transactions and IEC standards

Recent IEMI Activities

Report from the TC5 Subcommittee IEMI
Compiled by Sven Fisahn
8 May 2024

Recent IEMI Activities

2023 IEEE International Symposium on Electromagnetic Compatibility, Signal & Power Integrity (EMC+SIPI 2023 Grand Rapids)

- Workshop chaired by Tara Kellogg: “Recent Advancements in HPEM, HEMP, and IEMI Protection –A Global Perspective”, Contribution “Tolerance Values and Confidence Level of HEMP System Tests” by Frank Sabath
- Workshop chaired by M. Lanzrath and S. Fisahn: “Risk Management for Critical Infrastructures“ (accepted for) International Symposium and Exhibition on Electromagnetic Compatibility (EMC Europe 2024)

ESD Update

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TC-5 (HPEM) Meeting

May 22, 2024

ESD Technical Exchange – 2024 Updates

- The 2024 EOS/ESD Symposium again has a focus on EMC and system-level related topics.
  - 1 Sessions with 4 papers
    - 1 EMC Society exchanges
    - 2 Accepted
    - 1 Invited Talk

- Paper exchange program between IEEE EMC+SIPI Symposium and ESDA continues in 2024.
  - ESD Behavior of RF Switches and Importance of System Efficient ESD Design

ESD Standards – 2024 Updates

- 10 ESD standard documents have been published:
  - ANSI/ESD S20.20 – Korean Translation
  - ANSI/ESD S20.20 – Traditional Chinese Translation
  - ESD TR5.5-04-23 – Transmission Line Pulse (TLP) User Guide
  - ESD TR25.0-02-23 – Charged Board Event (CBE) Characterization Methods for Electronic Assemblies
  - ESD TR26.0-01-23 – Behavioral IC Modeling to Perform System Level ESD Simulations – General Description and Trends
  - ANSI/ESD SP5.0-2023 – Reporting ESD Withstand Levels on Datasheets
  - ESD ADV1.0-2024 – Glossary of Terms
  - ESD TR26.0-02-24 – Quasistatic Model Definition – Building Models
  - ESD TR29.0-01-24 – Guidance for Control of Electrostatic Hazards in Healthcare Facilities
  - ANSI/ESD STM3.1-2024 - Ionization
- Upcoming publications
  - ANSI/ESDA/JEDEC JS-002 – Charged Device Model (CDM)
  - ANSI/ESDA/JEDEC JS-001 – Human Body Model (HBM)
  - ESDA/JEDEC JTR002-01 – CDM user guide
  - ANSI/ESD SP5.1.4 – HBM Testing – A Method for Random Sampling of Power Pins
  - ANSI/ESD SP27.1 - Recommended Information Flow for Potential EOS Issues between Automotive OEM, Tier 1, and Semiconductor Manufacturers

Coordination with SC 1, Smart Grid

Mike McInerney

Chair of SC 1, Vice Chair of TC 5

5-22-24

Introduction

Worldwide, there are major efforts to make more efficient use of the electric power grid. This requires greater monitoring and control of power entering industrial facilities, commercial buildings, and homes; and ultimately direct control of large power loads. If there are local generating or storage devices, there is the opportunity to provide excess power to the grid. This system is referred to as the "Smart Grid".

Installation, facility and building power monitors and device controllers may be located on the outside at the point of power entry or may be built directly into larger devices. These monitors and controllers operate in the ambient RF environment both outside and inside. Also, these monitors and controllers may be sources of RF emissions to the nearby RF environment either directly or by pickup and insertion into the external connected power lines.

This presents a case to address EMC for Smart Grid applications.

SC 1 Smart Grid Support and EMC Issues serves as a liaison between IEEE EMC Society technical committees and other IEEE societies and outside organizations with Smart Grid related topics. For example:

- EMC Society TC 2 on EMC Measurements
- EMC Society TC 4 on EMC design
- EMC Society TC 5 on High Power EM
- EMC Society TC 7 Low Frequency Phenomenon
- IEEE Power and Energy Society
- National Institute of Standards and Technology (NIST) Smart Grid Interoperability Panel (SGIP)

IEEE EMC Workshop in Phoenix

The next in-person SC 1 meeting will be at the 2024 IEEE EMC Symposium in Phoenix, Arizona, USA this August.

SC 1 will also be hosting a workshop at the Symposium, “Smart Grid and EMC Issues.”

The workshop will include presentations on:

- “Introduction to the IEEE EMC Society Special Committee 1 (SC 1) and residential solar, real-world examples”
- “Internal EMC Issues in Low Voltage Grid with Significant Share of Prosumers”
- "IEEE Standards Update: Four Revised EMC Standards for Utility Controls Testing"
- “SEPA (Smart Electric Power Alliance) Electromagnetic Interoperability Issues Sub-Group (EMIISG) – history, achievements, and status”

The webpage for SC 1 can be found at: SC 1 – Smart Grid Support and EMC Issues – EMC Society