



7 August 2020

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Minutes

Committee: TC-2; Electromagnetic Compatibility (EMC) Measurements
Place: Virtual on Webex
Date: 7 August 2020 (Friday)
Time: 1:00 to 2:30 PM Central Daylight Time (CDT)

1.0 Call to Order/Introductions

Tom Fagan (Vice-Chair) opened the meeting at 1:16PM Central. In attendance were:

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| Dave Arnett (M) | Kevin Johnson (V) | John Maas (M) |
| Joshua Brehm (M) | Randy Jost (M) | Monrad Monsen (M) |
| Colin Brench (M) | Jeff Klingler (M) | Ghery Pettit (M) |
| Tom Fagan (M) | Istwaan Knijff (V) | Rodrigo Menendez (V) |
| Ed Hare (M) | John Kraemer (V) | Abitin Spantman (M) |
| Bob Hoffman (M) | Bill Kuhn (V) | Ahalya Srikanth (M) |

M = Member

V = Visitor

1.1 Quorum Check: TC2 Meeting Quorum shall be 20% of the membership. Ballots for new officers shall have minimum voting participation of 50% and may include email ballots in the participation count.

13/23 or 56.5% of membership attended. We have quorum.

1.2 Charter

The committee reviews the adequacy of measurement procedures and measurement instrumentation specifications for radiated and conducted emission and immunity tests. Also discussed is the rationale for product emission limits and immunity test levels including performance requirements. The committee also supports EMC standards and procedures that deal with measurements and their uncertainty and how they are interpreted and applied.

2.0 Approval of Minutes from IEEE EMC TC-2 meeting (23 Jul 2019) in New Orleans at the IEEE EMC+SIPI 2019 Symposium.

The New Orleans TC2 minutes received unanimous approval.

3.0 TC2 Election Announcement

Our last TC2 election was held by email 16-27 August 2017. The next elections will be held this fall 2020 with the officer term transition occurring 1 January 2021. Don Heirman (our chair) has chosen to not stand for re-election. The remaining current officers have put their names in for the officer progression (Tom Fagan as new chair and Monrad Monsen as new vice-chair), so the secretary position is open. Members may place their name on the ballot any of these offices (chairman, vice-chairman or secretary), but we especially need a self-nomination for the secretary position.

Ahalya Srikanth self-nominated for TC2 secretary during the meeting. Other candidates may self-nominate during the subsequent week after which we will send out election details.

4.0 Privacy

Personal data will be handled in accordance with the IEEE Privacy Policy which can be found at: <https://www.ieee.org/security-privacy.html> . The TC2 minutes will have list attendee names unless you contact the TC2 secretary to ask for your name to not be mentioned. The information you provide in the sign-in roster (including email and company) will be used by the chapter officers for TC2 related notifications/communications.

Note: Because this meeting is entirely virtual, the secretary (Monrad) will note the attendance from the Webex. First-time attendees are encouraged to send the secretary an email (monrad_monsen@ieee.org) your name, company and email address so you will be on the distribution list for future TC2 email news and meeting announcements.

5.0 Committee Membership Status

5.1 Removal of non-active participants from membership roster.

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| Membership indicates that you have attended the TC-2 committee meeting at least two (2) or more times in the last four (4) years; candidates are shown as attending a single meeting on or after 2015 and no other. By committee rules, these candidates are not members of TC-2 unless they attend a second face-to-face symposium meeting within a four year period. |
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All attendees will initial the sign-in roster. After the August 2020 virtual TC-2 meeting, those that have not attended a face-to-face TC-2 meeting since 2017 will no longer a TC-2 member but will remain on the list for one additional year (2021) to receive meeting announcements. Those that have not attended a face-to-face TC-2 meeting since 2016 are removed from the list. Any of those that are dropped from the membership list can rejoin TC-2 by attending the requisite number of face-to-face meetings in the time frame noted above.

6.0 Current Symposium Activity, July 2019

6.1 Symposium paper review status (top paper, top TC-2 paper, Round 2 reviewing, etc).

6.1.1 FULL PAPERS

- 1st round number submitted: 19
- 1st round number accepted or accepted with optional comments/changes: 7
- 1st round number requiring mandatory changes: 7
- 1st round number rejected: 5
- 2nd round number submitted: 19
- 2nd round number accepted: 12
- 2nd round number rejected: 5
- Actually presented (not withdrawn): 13
- Note: We submitted two papers for best paper.

6.1.2 ABSTRACT REVIEW PAPERS

- 1st round number submitted: 5
- Actually presented (not withdrawn): 2

6.1.3 Special Program (APEMC, Sydney, Australia)

- Actually presented (not withdrawn): 2

6.2 Symposium Sessions sponsored by TC2 as shown in the final program. TC2 is to be congratulated for sponsoring or participating in the **five** sessions/tutorials listed below.

- 8:30AM-12:00PM, Tuesday (8/4/2020): “Smart Grid Support and EMC Issues” tutorial session, 4 presentations, Jerry Ramie and Monrad Monsen (Co-Chairs)
- 1:00PM-4:15PM, Tuesday (8/4/2020): “Emissions and Reverberation Chambers” technical session, 6 presentations, Tom Fagan (Chair)
- 8:30AM-12:00PM, Thursday (8/6/2020): “Basic EMC Measurements” tutorial session, 4 presentations, Monrad Monsen (Chair)
- 1:00PM-4:45PM, Tuesday (8/18/2020): “EMC Standards Topics” technical session, 7 presentations, Monrad Monsen (Chair)
- 1:00PM-3:00PM, Thursday (8/20/2020): “Antenna, Cable, Filter and Sensor Design Evaluation” technical session, 4 presentations, Monrad Monsen (Chair)

7.0 Standards Sponsorship Support Review

Below is an excerpt of information from the full matrix from the EMC Society site.

Here is the part that standards play in Technical Committee activity. It is from the EMC Society Bylaws and in particular clause 10.3 which states:

10.3 Functions:

Each Technical Committee shall promote activities in its field of interest and shall provide expert knowledge and assistance to:

- a. Receive, generate, and review technical papers within its scope in cooperation with the Transactions Editor and/or the Technical Papers Committee.

- b. Organize and host sessions at meetings of the IEEE at all levels and at meetings of other organizations with which the Society is desirous of cooperating, in accordance with the rules in effect at such meetings.
- c. Arrange for publishing pertinent papers in IEEE publications.
- d. Generate and develop appropriate standards in its field for processing by the IEEE Standards Committee, through the Society's Standards Committee and in accordance with IEEE policies.
- e. Evaluate "state of the art" in the area of committee interest.

Clause 10.3 d above is directly applicable to TC2 (EMC Measurements).

This table shows via the short title and highlighted in yellow those EMCS standards which directly involve measurements and hence TC2 interest. Note that by far the number of standards devoted to measurements is the vast majority.

| IEEE Standard | Title | Standard Expiration Date | Status | Chair and Sponsor Contact | PAR | Tech Comm | Notes |
|------------------------------|--|--------------------------|-----------------------------------|---|---|-----------|---|
| Std.139-1988 | Recommended Practice for the Measurement of RF Emission from ISM Equipment on User's Premises (More information) | Expires: 12/31/2022 | Current Standard | Past Chair: Daniel Weinberg Sponsor contact: Ed Hare | No active PAR | TC2 | No maintenance underway. SDECom will consider revision (minor or major) 2020 Symposium meeting. |
| Std. 187-2003 Project 187 | Standard Measurement Methods of Emissions from FM and Television Broadcast Receivers in the Frequency Range of 9 kHz to 40 GHz (More information) | Expires: 12/31/2028 | Current Standard | Past Chair: David Traver Sponsor contact: Ed Hare | No active PAR | TC2 | No maintenance underway. |
| Std. 299-2006 | Standard Method for Measuring the Effectiveness of Shielding Enclosures (ANSI Recognized) (More information) | Expires: 12/31/2022 | Current standard | Past Co-Chair: Dale Svetanoff Past Co-Chair: Maria Sarto Sponsor contact: Ed Hare | No active PAR | | No maintenance underway. SDECom will consider revision (minor or major) at Feb 8, 2020 meeting. |
| Std. 299.1-2013 | Standard Method for Measuring the Shielding Effectiveness of Enclosures and Boxes Having Dimensions Between 0.1 and 2m (More information) | Expires: 12/31/2023 | Current Standard | Past Chair: Maria Sarto Sponsor contact: Ed Hare | No active PAR | | No maintenance underway. SDECom will consider revision (minor or major) 2020 Symposium meeting. |
| Project 370 | Electrical Characterization of Printed Circuit Board and Related | New project | Draft approve to send to ballot 7 | Chair: Xiaoning Ye Vice Chair: Sam | IEEE PAR Expires: 12/31/2020 | | In comment resolution in ballot. |

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| | Interconnects at Frequencies up to 50 GHz (More information) | | April 2019 | Connor Vice Chair: Brice Achkir Secretary: Alistair Duffy | | | |
| Std. 377-1980 | Recommended Practice on the Measurement of Spurious Emissions from Land-Mobile Comm. Transmitters (ANSI Recognized) (More information) | Expired: 12/31/2018 | Admin withdrawn | Sponsor contact: Ed Hare | No active PAR | | Needs revision. SDECom formed a study group to look for best ways to update standard. |
| Project 473 | Recommended Practice for an Electromagnetic Site Survey (10 kHz to 40 GHz) (More information) | Expired: 12/31/2006 New project | Revision in progress | Chair: Chad Kiger Vice Chair: Secretary: | IEEE PAR Expires: 12/31/2020 | TC3 | Parallel development w C63.24. Project has been reassigned to TC3. |
| Std. 475-2000 | Measurement Procedure for Field Disturbance Sensors, 300 MHz to 40 GHz (ANSI Recognized) (More information) | Expires: 12/31/2022 | Current standard | Past Chair: Hugh Denny Sponsor contact: Ed Hare | No active PAR | | No maintenance underway, but there is interest in having the frequency range extended below 300 MHz. A Chair and participation is being sought. |
| Std. 1128-1998 | Recommended Practice for RF Absorber Evaluation in the Range of 30 MHz to 5 GHz (More information) | Expires: 12/31/2022 | Current standard Revision in progress | Chair: Zhong Chen Sponsor contact: Ed Hare | IEEE PAR Expires: 12/31/2021 | | Range being extended to 40 GHz. Cosponsored by Antennas and Propagation Society |
| Std. 1302-2008 Project 1302 | Guide for the Electromagnetic Characterization of Conductive Gaskets in the Frequency Range of DC to 40 GHz (More information) | Expire: 12/31/2029 | Current standard | Past Chair: Johan Catrysse Vice Chair: Gary Fennical Davy Pissoort Secretary: Yoeri Arien | No active PAR | | Published November 7, 2019 No maintenance underway. |
| Std. 1309-2013 | Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9 kHz to 40 GHz (More information) | Expires: 12/31/2023 | Current Standard | Past Chair: Zhong Chen Sponsor contact: Ed Hare | No active PAR | | No maintenance underway. |
| Std. 1560-2013 | Methods of Measurement of Radio Frequency Interference Filter Suppression Capability in the Range of 100 Hz to 10 GHz (More information) | Expires: 12/31/2023 | Current standard | Past Chair: Kermit Phipps Sponsor contact: Ed Hare | No active PAR | | No maintenance underway. |

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| Std. 1597.1-2008 Project 1597.1 | Standard for validation of CEM Computer Modeling (CEM) and Simulation (More information) | Expires: 12/31/2018 | Current standard Revision in progress | Chair: Alistair Duffy Vice Chair: Secretary: | IEEE PAR Expires: 12/31/2019 | | The Standard is administratively withdrawn and revisions are behind schedule. Needs increased priority and oversight. |
| Std. 1597.2-2010 | Recommended Practice for Computational Electromagnetics (CEM) Computer Modeling and Simulation Applications (More information) | Expires: 12/31/2020 | Current standard | Past Chair: Andy Drozd Sponsor contact: Ed Hare | No active PAR | | No maintenance underway. |
| P1613 Std. 1613-2009 | Standard for Environmental and Testing Requirements for Devices with Communications Functions in Electric Transmission and Distribution Facilities. | Expires 12/31/2019 | Current standard Being revised | Chair: John Tengden | IEEE PAR Expires 12/31/2020 | | Co sponsored with Power and Energy |
| Std. 1642-2015 | Recommended Practice for Protecting Public Accessible Computer Systems from Intentional EMI (More information) | Expires: 12/31/2025 | Current Standard | Past Chair: Bill Radasky Sponsor contact: Ed Hare | No active PAR | | No maintenance underway. |
| Std. 1688-2015 | Standard for Module Electromagnetic Interference (EMI) Testing (More information) | Expires: 12/31/2025 | Current Standard | Past Chair: Fred Heather Sponsor contact: Ed Hare | No active PAR | | No maintenance underway. |
| Project 1848 | Techniques & Measures to Manage Risks With Regard to Electromagnetic Disturbances (More information) | New project | Drafting in progress | Chair: Keith Armstrong Vice Chair: Alistair Duffy Secretary: Niklas Briest | IEEE PAR Approved: 2/5/2016 Expires: 12/31/2020 | | In comment resolution in ballot. |
| Project 1897 | Resolution of Power-Line Gap-Noise Reports (More information) | New project | Drafting in progress | Chair: Mike Gruber Vice Chair: Brian Cramer Secretary: Jerry Ramie | IEEE PAR Approved: 9/22/2016 Expires: 12/31/2020 | | Work in progress on target |
| Project 2425 | Standard for Electromagnetic Compatibility Testing of Electrical and Instrumentation and Control Equipment | New project | Drafting in progress | Chair: Suresh Channarasa ppa Vice Chair: Secretary: | IEEE PAR Approved: 5/12/2016 Expires: 12/31/2020 | | Sponsor: Nuclear Power Engineering Committee (PE/NPE) Co-sponsor: EMS Society SDECom |

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| | at Nuclear Power Generating Stations and Other Nuclear Facilities (More information) | | | | | | Work in progress, Report needed. |
| Project 2665 | Recommended Practice for Statistical Process Control for EMC Test Laboratories (More information) | New Project | Drafting in progress | Chair: Kimball Williams Vice Chair: Secretary: | IEEE PAR Approved: 12/6/2017 Expires: 12/31/2021 | | Work in progress on target |
| Project 2710 | Electromagnetic Shielding Performance of Enclosures for Portable Electronic Devices (More information) | New project | Drafting in progress | Chair: Alistair Duffy Vice Chair: Secretary: | IEEE PAR Approved: 2/5/2016 Expires: 12/31/2020 | | Work in progress, but market changes are resulting in need for additional text and techniques. |
| Project 2715 | Guide for the Characterization of the Shielding Effectiveness of Planar Materials (More information) | New project | Drafting in progress | Chair: Alpesh Bhobe Vice Chair: Davy Pissoort Secretary: Yoeri Arien | IEEE PAR Approved: 6/30/2016 Expires: 12/31/2020 | | Work in progress on target Round robin testing in progress. |
| Project 2716 | Guide for Characterization of the Effectiveness of Printed Circuit Board Level Shielding (More information) | New project | Drafting in progress | Chair: Davy Pissoort Vice Chair: Andy Marvin Secretary: Yoeri Arien | IEEE PAR Approved: 6/30/2016 Expires: 12/31/2020 | | Work in progress on target. Round robin testing in progress. |
| Project 2717 | Passive Intermodulation Test Methods for Wireless Systems in Low Noise Environments (More information) | New project | Drafting in progress | Chair: Leo Liu Vice Chair: Secretary: | IEEE PAR Approved: 2/17/2017 Expires: 12/31/2021 | | Work in progress, on target. |
| Project 2718 | Guide for Near Field Characterization of Unintentional Stochastic Radiators (More information) | New project | Drafting in progress | Chair: Dave Thomas Vice Chair: Secretary: | IEEE PAR Approved: 2/17/2017 Expires: 12/31/2021 | | Work in progress on target. |
| P2838 | Standard for Aircraft Component Lightning Strike Direct Effects Qualification | New project | Drafting in progress | Chair: Fred Heather Vice Chair: Secretary: | IEEE PAR Approved: 11/7/2019 Expires: 12/31/2023 | | Work in progress on target |
| Project 2855 | Recommended Practice for the Electromagnetic Characterization of Cable/Connector Assembly Shielding Effectiveness in Frequency Range of Direct Current to 40 GHz | New project | Working Group getting organized | Chair: Huadong Li Vice Chair: Secretary: | IEEE PAR Approved: 3/5/2020 Expires: 12/31/2024 | | Work in progress on target. |

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| C37.90 Series | C37.90.1 -Surge protection C37.90.2 -Protective Relays C37.90.3 – ESD for protective relays | Existing standards. Revisions underway. | Various | Various | N/A | | EMC Society seeking co-sponsorship of these standards as they come up for revision. |
|---------------|---|---|---------|-------------------------|---------------------|--|---|

See https://ieeecom.s3.us-east-2.amazonaws.com/Standards_Matrix.html for the latest updates.

Action Item 2020-1: Tom Fagan will assess TC2 membership interest in setting up teams to review existing untouched-for-years IEEE standards to assess their validity or whether they are subjects now addressed in other standards. He will work with Ed Hare on the details.

8.0 iNARTE Exam Question Review Activity

The iNARTE exam has gone to a 3rd party for creation and test question review, so no assistance has been asked for in recent years from TC2. We have not heard any status on how close they are to completing the exam setup and re-engage the professional certification program.

9.0 Future Symposium Activity

9.1 Future topics for the IEEE EMC+SIPI 2021 symposium in Raleigh, NC, USA on 3-6 May 2021 and for the IEEE International EMC+SIPI 2021 symposium in Glasgow, Scotland on 30 July - 6 August 2021.

9.2 Technical Program Responsibilities and session chair reminders

We will not know how many sessions we will have at each symposium until the paper reviews are completed.

9.3 2021 Paper Review Deadlines (Raleigh)

Proposed papers (full papers) due by 19 October 2020.

Acceptance or accept conditioned on changes will be issued by 2 November 2020.

Abstract review paper due 14 December 2020.

Revised full paper due 31 December 2020.

Final decision notification is 31 January 2021.

Final paper (adding author names, etc.) is due 15 January 2021.

9.4 2021 Paper Review Deadlines (Glasgow)

We do not yet have the schedule for Glasgow, but the due dates will likely be 2 months after the above dates reported for Raleigh.

9.5 Paper reviewers

TC2 members are welcome to be paper reviewers. Don's reviewer list from the past is not available, so Tom and Monrad are creating a replacement list. Please send Monrad and Tom your resume along with your subject matter strengths/expertise so we can identify the best

papers for you to review. Those who did last year do not need to resubmit because Monrad still has this data.

9.6 New membership

We are always looking for more members that engage in the activities noted above.

9.7 New areas of interest

In discussion, suggestions included adding more presentations on military standards, shielding effectiveness, and calibration of test instrumentation. Don wants to organize a tutorial on setting up measurement equipment instrumentation. Ghery Pettit offered to assist Don with drawings using his Visio software.

10.0 Any other business?

11.0 Action Items

11.1 ACTION ITEM 2018-2: Session on what we look for in good papers and what are best practices for papers. The TC2 officers (Don) will take this to the TAC meeting on Friday.

23 July 2019: No traction in the TAC meeting on this issue, but they concurred with the paper option. Perhaps with a paper published in 2019, we might setup a WebEx session for reviewer team prior to our TC2 Reno meeting in 2020.

7 Aug 2020: TC2 has brought this request to the TAC. If there is any progress, it will be tracked there and not TC2. {CLOSED}

11.2 ACTION ITEM 2018-3: Don will put together a paper with some of the highlights addressing what we look for in a paper.

23 July 2019: Don commits to work on this action for next time.

7 Aug 2020: Monrad reports that he worked with TAC to create Abstract templates, and in the process reviewed the other paper templates. They include content format and expectations. This will suffice. {CLOSED}

11.3 ACTION ITEM 2018-4: Detectors for EMC high power immunity threats combined session between TC2 (EMC Measurements) and TC5 (High Power Electromagnetics). Frank Sabath will coordinate this combined forum between TC2 and TC5.

23 July 2019: Frank was unable to come to New Orleans and did not provide an update.

7 Aug 2020: {CLOSED}

11.4 ACTION ITEM 2018-5: Ghery Pettit will coordinate an “ask the experts” session for the EMC Symposium in 2020.

23 July 2019: Ghery will work on identifying experts to support the “ask the experts” session during this New Orleans symposium.

7 Aug 2020: {CLOSED}

11.5 ACTION ITEM 2019-1: Don Heirman will contact iNARTE to figure out the process for TC-2 to review EMC measurement related questions.

7 Aug 2020: Ed Hare conforms that TC/SC input is no longer needed for iNARTE.
{CLOSED}

11.6 ACTION ITEM 2019-2: Monrad Monsen will circulate the PAR.

The author submitted the PAR separately. They do not need to go through TCs and SCs but can go directly to the Standards Committee. {CLOSED}

12.0 Set meeting and agenda for next meeting(s)

12.1 Raleigh, North Carolina, USA , Tuesday, May 4, 2021

12.2 Glasgow, Scotland, Tuesday, August 3, 2021 (likely virtual)

13.0 Adjournment

Meeting was adjourned at 2:30PM Central.

Monrad L. Monsen

Secretary, IEEE EMC TC-2 (EMC Measurements)