

APPROVED MINUTES
ANSC C63® SC1: Techniques and Development
Webex Meeting and In-Person Meeting
Tuesday, October 7, 2025
Qualcomm, San Diego, CA

Members Present:

Nicholas Abbondante (via Webex)
David Chamberlain
Zhong Chen
Bob DeLisi
Mac Elliott
Andy Griffin (Chair)
Brandon Hobbs (via Webex)
Victor Kuczynski
Randy Long
Jason Nixon (Vice Chair)
Janet O’Neil (Secretary)
Richard Reitz
Denys Shumakov

Employer:

Intertek
ISED Canada
ETS-Lindgren
UL Solutions
TUV Sud America
Cisco
AMD
Vican Electronics
ANAB
ISED Canada
ETS-Lindgren
Retlif Testing Labs
ISED Canada

Members Absent:

Mike Antola
Harry Hodes
Nima Molaei
Tim Harrington
Mike Heckrotte
Dan Hoolihan
Greg Kiemel
Jeff Klinger
Doug Kramer
Bob Mitchell
Nate Potts
Tim Royer
David Schaefer
Jeff Silberberg
Soham Surve
David Zimmerman

Employer:

UL Solutions
PTSI LLC
Element Materials Technology
FCC
UL Solutions
Hoolihan EMC Consulting
Apple
Cetecom
Apple
TUV Rheinland
Keysight Technologies
Timco Engineering
Element Materials Technology
C63 Member Emeritus
Amazon Lab 126
Spectrum EMC, LLC

Guests:

Conrad Trautmann
Henry Benitez
Tom Braxton
Jose Cuevas
John Forrester
Kenth Skoglund
Ernesto Mendoza
Bill Graff
Ken Gjerde
Hamish Parilch
Horia Popovici (via Webex)

Employer:

ARRL
IEEE EMC Society
ARRL
Apple
Qualcomm
Ericsson
Signify
TCB Council
Starke
Qualcomm
ISED

Guests:

Vignesh Rajamani
Deanna Zakharia

Employer:

Rohde & Schwarz
Motorola Solutions

1.0 Call to Order: Chair

Chair Andy Griffin called the meeting to order at 8:40 am PDT.

2.0 Approval of the Consent Agenda: Secretary

Secretary O’Neil presented the consent agenda. This includes the draft meeting agenda for Oct 7, 2025. The consent agenda included acceptance of the terms contained in the [patent slides](#) by all attendees, and approval of the minutes from the last meeting held on May 6, 2025. Andy reviewed the slides with the committee. The consent agenda was approved as presented. (See Attachment A for the approved amended agenda. See Attachment B for the Approved Minutes of the May 6, 2025 meeting.)

3.0 Review of [Subcommittee Membership](#) and Scope: Secretary

3.1 Review of Membership – Members at Risk. Secretary Janet O’Neil reviewed the Member Attendance Log included in the agenda. (See Attachment A). Nima Molaei has missed four consecutive meetings; his membership is at risk – Secretary O’Neil will let him know. Jeff Silberberg has retired from the FDA and would like to be a member emeritus of SC1. He will be added to the SC1 roster.

3.2 Consideration of New Members – Working Group Rosters

The C63.4 Working Group has accepted the applications of Angel Escamilla and Ryan McGann to join the group subject to approval in SC 1. This will be voted upon under “New Business.”

The current Working Group Roster is shown [here](#).

ACTION ITEM: All Working Group (WG) Chairs need to complete their rosters and indicate their officers (Vice Chair and Secretary) and submit to SC1 Chair prior to the next meeting.

4.0 Working Group Reports

C63.2: Field Strength Measuring Instrumentation

Chair Andy Griffin updated the agenda to show the correct wording related to creating the documents C63.2.2 and C63.2.3. Working Group Chair Horia Popovivi presented his report. (See Attachment C for C63.2.2 and Attachment D for C63.2.3.)

The two working groups did not want to include cables, filters, attenuators, and pre-amplifiers in the C63.2.2 and C63.2.3 documents.

Regarding C63.2.2: “Specifications for Conducted Emission Measurement Transducers,” per the PINS,

this project will create a new standard for ancillary equipment used in performing conducted emission measurements. The most important part is the LISN, but the standard will also include other equipment used for conducted emission measurements, such as the voltage probe for in situ measurements. It will incorporate, as necessary, corresponding material that is currently in C63.4, C63.29 and C63.30. Since this ancillary equipment (and in particular the LISN) is used for conducted emissions tests by many C63 standards, it is beneficial to have the corresponding requirements in a separate C63 standard, which can then be referred to by any C63 product-specific standard.

Horia noted the PINS was approved at the previous meeting (May 2025), by both SC1 and the C63 main committee. The working group roster is included in his report. They have held several meetings. They looked at older versions of C63.2 (when it still had “sensors”), but decided there is nothing that can be reused from those documents. The two LISNs currently in C63.4 were carried over in the new C63.2.2 (50/250 μ H LISN and 50 μ H LISN, for the 9-150kHz and 0.15-30MHz frequency ranges, respectively). The corresponding requirements were taken from the latest draft of the next edition of C63.4 (aligned with CISPR 16-1-2) and not from the published C63.4-2014.

The 5 μ H LISN was added too, from CISPR 16-1-2 (for the 0.15-30MHz frequency range), because this is included in C63.29 for high-power dimmers. This LISN is also specified (with very minor differences) in FCC’s MP-5, which is currently the test method for ISM equipment. The voltage probe was also added, from the latest draft of the next edition of C63.4. Only the specification and requirements for the voltage probe were carried over, not the test method. The working group decided not to include requirements for preamplifiers (the preferred place for that is in C63.2, together with the receiver) or other passives (such as cables, attenuators, and filters).

The draft C63.2.2 is now complete. The WG still must address various minor text updates and should have a final draft for balloting after a few more meetings.

Regarding C63.2.3: “Specifications for Antennas,” Horia advised this document will create a new standard for ancillary equipment used in performing radiated emission measurements. The most important part is the antenna, but the standard will also include other equipment used for radiated emission measurements. It will incorporate, as necessary, corresponding material that is currently in C63.4, C63.25.1 and C63.25.2. Since this ancillary equipment (and in particular the antenna) is used for radiated emissions tests by many C63 standards, it is beneficial to have the corresponding requirements in a separate C63 standard, which can then be referred to by any C63 product-specific standard and the C63.25-series of site validation standards.

Horia noted the PINS was approved at the previous meeting (May 2025), by both SC1 and the C63 main committee. The working group roster is included in his report. They have held several meetings. The working group looked at older versions of C63.2 (when it still had “sensors”), but decided there is nothing that can be reused from those documents. The antenna requirements from the latest draft of next edition of C63.4 were carried over into the new C63.2.3 draft document, but the material was then simplified (removed the many table footnotes that just repeated requirements already in the text).

The antenna table for the first two activities listed in C63.4 (frequency identification and comparison measurements) was removed, and these activities are now only mentioned in a note. The large loop antenna system (LLAS) was also added, from the latest draft of next edition of C63.29. This is currently used in C63.29 and C63.30, and it will also be called out in C63.31. As in the published

C63.29/C63.30, the LLAS requirements are the same as in CISPR 16-1-4, except that the 1V/A “sensitivity” is a recommendation (not a requirement) and that each of the three LLAS sensors must be calibrated. The requirements currently in the published C63.29/C63.30 were augmented to also include the “non-standard” LLAS of 3m and 4m, same as in CISPR 16-1-4.

The “standard biconical dipole” requirements of C63.25.2 were also added. C63.2.3 also includes content from the “hybrid/bicon qualification” annex of C63.4. Only the antenna requirements were included, not the qualification method and criteria.

The working group decided not to include requirements for preamplifiers (best place for that is in C63.2, together with the receiver). On other passives (such as cables, attenuators, and filters), the working group decided to have these only in one standard, not both, and that the best place for them is in C63.2.2. This will be discussed at the next C63.2.2 WG meeting.

On future activity, the working group still has to address various text updates but should have a final draft for balloting after a few more meetings.

In the future, Andy suggested that perhaps C63 SC1 would want to create a PINS to add preamplifiers to C63.2 as an amendment. Once Horia and the WG have finalized C63.2.2 and C63.2.3, then we can address a new PINS and creating the amendment to C63.2.

C63.4: Emissions Measurements

Working Group Chair: Andy Griffin

Status: C63.4: Current 2014. Publication Expected in Mid/Late 2025; PINS for reaffirmation sent to parent committee in February 2024

Status C63.4a: Merged into C63.25.1

Andy Griffin presented his report (see Attachment E). There is a wide range of working group members, which keeps growing, but not all members contribute equally.

As a reminder, the vote on the latest draft closed on Feb. 21, 2020, and passed (14 yes, 10 no, and 3 abstain). Eight members submitted a total of 122 comments. Since the start of 2023, the working group has met every two weeks to try and sort out the remaining issues. More members are wanting to contribute, which is incredibly positive.

After completing the major part of the document, the working group sent version PC63.4/D2.3, February 2024, to members of SC1 and the Task Force members for a six-week comment period that ended March 20, 2024. This was extended further due to "popular demand," to April 5, 2024.

Andy discussed the comment submission/matrix. Comments were received from Mark Arthurs, Andy Griffin, Apple, UL, Harry Hodes, David Zimmerman and Randy Long. The working group has held monthly meetings to address the issues. Of the approximate 50 comments, some 18 comments were not accepted. Harry Hodes requested that tilting (or bore-sighting) be put back in the draft. This was not agreed but it was agreed to include an annex explaining the rationale behind the method proposed to replacing the current text in C63.4 about aiming the antenna at the source of the emission. We agreed to use the current process back in early 2022. There is no support for having multiple methods within the document.

Regarding the power requirements, Andy advised that the working group agreed to some fixing of the power requirements, but then the FCC published a KDB 174176. It was then agreed to add the 5% back in. One of the reasons was safety. See

<https://apps.fcc.gov/oetcf/kdb/forms/FTSSearchResultPage.cfm?id=34866&switch=P>

Alternatively, any lower ac mains voltage is acceptable as it is expected to result in worst-case emissions from the EUT. When performing ac power line conducted emission measurements, which public utility AC power line voltages and frequencies must be used for a Part 15 or Part 18 device?

Devices subject to Part 15 must be tested for all available U.S. low voltage distribution (identified below) for utilization equipment and frequencies as defined in ANSI C84.1 and in the NFPA 70 National Electric Code (NEC) for +5% allowable service voltage tolerance around nominal 120 Vac, 208 Vac, 240 Vac, 277 Vac, 480 and 600 Vac at 60 Hz for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies. Intentional radiators must be tested according to the test procedures in ANSI C63.10-2020, unintentional radiators must be tested according to ANSI C63.4-2014, and Part 18 devices must be tested according to measurement procedure MP-5:1986.

Andy noted the two results are the same; for the US, do you have to perform both 50 Hz and 60 Hz testing? But the US does not have a 50 Hz supply and there is no 1 Hz supply; it is 50/60 Hz. Andy asked about products cover by ANSI C63.26, ANSI C63.29, and ANSI C63.30.

On the Informative Annex about the above 1 GHz test method, this was developed and the working group is still discussing it, but the summary of the annex is shown below. Andy advised the working group reached consensus back in 2022 (everybody is equally unhappy).

- All methods have problems (many methods and many problems)
- Only the fixed height matches site validation method
- We did not want multiple methods
- We don't want to develop another validation method
- Existing text is very vague and allows too much variance
- Balance between test / cost and achieving reasonable results is important
- Simple EUT setup and access to it during testing is also important
- Overcomplicated, the reproducibility and repeatability suffer as it increases the chances that test laboratories do not perform the measurement the same way; standardization is important
- Alignment with other relevant international, national and regional standards is desirable

However, the FCC now asks how does the proposed method compare to the existing requirements? So, we need to restructure the annex. From the discussion in C63.26 Radiated Emissions TG - AI 24, it appears the FCC wants to start from scratch? Andy felt that the FCC is still in the process of defining what they are looking for.

Andy then shared the following information describing the current method for measurements above 1 GHz:

Place the antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the antenna aimed at the source of emissions at each

frequency of significant emissions, with polarization oriented for maximum response. The antenna may be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final antenna elevation shall be that which maximizes the emissions. The antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m.

Zhong Chen reiterated that the FCC in a previous online working group meeting requested that Andy provide the test article so other labs can validate the measurement data used in the annex. Zhong believes that test data also should be established based on a broad range of EUTs, and from different test facilities. He noted the FCC (Chad Beattie) requested a round robin test be conducted before a significant change can be adopted.

Andy then asked several questions, including:

- Text assumes a manual measurement?
- How accurately do you have to aim?
- What is a source, how big is the area?
- 1 m to 4 m is a limitation, not required to scan?
- Could just do 2 heights 1 m and 4 m?
- Amplitude goes up then down, is it a maximum?
- What is the radiation pattern of the emission?

C63.5: Antenna Calibration

Working Group Chair: Nate Potts
Status: Current-2017

Bob Delisi provided an update on the document for Nate Potts who was not able to attend the meeting. The working group met on October 1, 2025, to review the draft after edits were performed by David Knight and Tim Harrington. Currently editorial changes are being addressed, including updates to references, normative standards formatting and general formatting. The next meeting is scheduled for October 15, 2025. The working group goal is to have the draft ready for circulation in SC1 by the end of 2025. The document is nearly finished, but editorial work needs to be completed. Bob is working on making these updates and putting the document in the required IEEE template. Bob noted that frequency constraints were removed – these can potentially be addressed in C63.2.3?

C63.7: Construction of Test Sites

Working Group Chair: None
Status: Published update on March 9, 2015; Working Group disbanded. Nothing new to report.

Bob DeLisi said this standard has been withdrawn. He instructed the secretary to remove it from future SC1 meeting agendas.

C63.23: Measurement Uncertainty

Working Group Chair: None – Candidate Requested
Status: Reaffirmed in May 2018 by the parent committee. IEEE reaffirmed C63.23 on August 10, 2020; it was posted to IEEE Xplore in October 2020. Future work is needed to revise the standard or C63 should refer users to the CISPR equivalent standard.

Bob DeLisi would like to see editorial changes made to the document to refer to CISPR and ETSI for the relevant requirements. He knows there are labs that use C63.23. Once C63.5 is finalized in hopefully the spring 2026, we may have the manpower available to update C63.23.

C63.25: Time Domain Applications for Test Site Validation

Working Group Chair: Andy Griffin

Status: New Standard. Draft being written. PINS approved by SC1 on October 27, 2014

This work addresses the family of C63.25 standards:

- o C63.25.1 (1 GHz to 18 GHz) TDR – Published March 2019 – WG Chair: Zhong Chen
- o C63.25.2 (30 MHz to 1000 MHz) NSA – Work began in January 2019 – WG Chair: Bob DeLisi
- o C63.25.3 (18 GHz to 40 GHz) – Future plan to address NSA above 18 GHz – WG Chair: Nick Abbondante

On C63.25.1, Zhong Chen advised that he is looking at this document as more of a refinement than a complete redo. David Chamberlain mentioned C63.25.2, that we may want to include some of this content in C63.25.1. The issue to address is related to moving the antenna and having to re-validate the chamber performance. Zhong agreed to consider these comments in the document refinement discussion.

On C63.25.2, this standard will be published in the near future. Working Group Chair Bob DeLisi said this document is moving along and we'll get a status update at the parent committee meeting as part of the IEEE report.

On C63.25.3, Working Group chair Nick Abbondante presented his report. (See Attachment F.) Current site validation methods only extend up to 18 GHz; however, testing is being performed at frequencies as high as 231 GHz. This standard will develop a list of acceptable types of test sites and their corresponding site validation methods and recommended criteria for frequencies from 18 to 40 GHz. Existing site validation methods will be leveraged where possible. Update: The frequency range for Reverb and CATR will NOT be limited. The test environments include:

- SAC/OATS/FAR/FSOATS - exploring use of sVSWR, Time Domain sVSWR, and Mode Filtered sVSWR techniques
- Compact Antenna Test Range (CATR)
- Reverberation Chamber

Following is an update on task group activity:

SAC/OATS/FAR/FSOATS: Martin Wiles is the task group chair. A number of antenna manufacturers are now participating, including ETS-Lindgren, Steatite, Schwarzbeck Mess, and Seibersdorf. The initial design of the Alford's Loop antenna is now available and has been demonstrated. Round robin testing of multiple antennas in one chamber is being discussed, also demonstrating a chamber that passes below 18 GHz, but fails above 18 GHz. Work is currently focusing on adapting the antenna specifications from CISPR 16-1-4 below 18 GHz to the above 18 GHz frequency range. Small tweaks to the requirements and patterns may be in order as shown in the graphs included in Attachment F.

On the Vector sVSWR method proposed by Alexander Kriz, Nick confirmed that this method is based on Alexander's simulations only. Measurements made using the method have proven to be problematic. Zhong noted that he attended the CISPR meeting in Milan in June where Dr. Jerdvisanop Chakarothai (with NCIT Japan, currently at NIST Boulder) had difficulty making these measurements per Alexander's method.

CATR: Robert Paxman is the task group chair. Several meetings have occurred since the last SC meeting. Active discussions are occurring, and text is being edited – the task group is aiming for a complete first draft in the next few months. Zhong suggested that the CMF method can be used for a compact chamber as well. Robert is stepping back from this work and the goal is to get the draft to the working group and move it forward from there.

Reverberation Chamber: Phil Miller is the task group chair. The group is finalizing text methodically – directivity is one of the major topics. The goal is to have a first draft of text available for review in the next few months.

Andy volunteered to try the reverb site validation method if Nick or Phil could send him the latest document

On future C63.25.3 activity, the main working group is not meeting very often; the last meeting was held on December 5 – work is taking place in the task groups. Once text is available from the task groups, the main working group will resume meetings. Task groups are meeting roughly monthly; some are meeting every two weeks. The goals are to obtain first drafts of validation text for the standard, determine basic antenna requirements for SAC, and develop round robins to validate the methods and cross correlate results across chamber types.

In summary, the SAC task group is focusing on transmit antennas. The Reverb and CATR task groups are making good progress on text; completion of initial text should hopefully be this year, CATR and Reverb look to be back on track to be included in first edition. The timeline will be dependent on the time it takes to perform the round robin testing, as appropriate.

5.0 Old Business – Chair

There was no old business to discuss.

6.0 New Business – Chair

Vote to Approve C63.4 Working Group Applications of Angel Escamilla of Element and Ryan McGann of Bureau Veritas – The applications and resumes of Angel Escamilla and Ryan McGann to join the C63.4 working group were circulated to SC1 for review. **It was moved, seconded, and approved to accept the C63.4 working group applications of Angel Escamilla and Ryan McGann.**

7.0 Interpretation Requests: The secretary reviewed the following open interpretation requests since the last SC1 meeting on May 6, 2025:

C63.4 (2014) Annex F Insulating Ground Plane received from Brandon Hobbs, December 13, 2023. Call for task group chair/members sent to members of SC1 on May 16 with follow up sent on August 12. Task group members include Victor Kuczynski and Harry Hodes.

Brandon reviewed the response with SC1. The response was updated. Bradon agreed with the changes. Bob DeLisi asked to have the response be formally changed as being prepared by SC1 (i.e. not by Brandon Hobbs). The final amended response was voted upon by SC1 and approved for sending to the parent committee for further action. (See Attachment G.)

C63.5 (2017) Annex F Delta Antenna Factors – Call for task chair and members sent in July 2025 – mild response received. Bob DeLisi, Victor Kuczynski, and Nate Potts volunteered to assist. Andy Griffin led a discussion on the response for this interpretation request. As a result, it was addressed in real-time during the meeting. The final response was voted upon by SC1 and approved for sending to the parent committee for further action. (See Attachment H.)

[Click here for more information about interpretation request procedures](#) (see pages 12-14).

8.0 [C63.org](#) Website Use and Updates

On behalf of Jerry Ramie, Andy Griffin requested that SC1 members be specific with any requests for postings to the website. Andy asked SC1 members to be sure to update or confirm with Jerry directly that they are correctly listed on the website.

9.0 Review of Action Items from Previous Meetings: Secretary

Secretary O’Neil advised that an updated action item list would be distributed to the SC1 members along with the draft minutes from this meeting.

ACTION ITEM: O’Neil to distribute the updated consolidated action items and draft minutes from the October 7, 2025, meeting to the committee.

10.0 Time and Place of Next Meeting: Chair

Andy advised that SC1 would meet during the next C63 meeting series scheduled for the first week in May 2026 at NIST in Boulder, Colorado. The host hotel will be located nearby.

11.0 Closing Remarks and Adjournment: Chair

With no further business, Andy adjourned the meeting at 12:00 pm PDT. He thanked everyone for attending the meeting.

Minutes submitted by:



Janet O’Neil, Secretary, SC1

ATTACHMENTS

- Attachment A: Approved Agenda for Oct 7, 2025, SC1 Meeting
- Attachment B: Approved Minutes from May 6, 2025, SC1 Meeting
- Attachment C: Popovici Report on C63.2.2
- Attachment D: Popovici Report on C63.2.3
- Attachment E: Griffin Report on C63.4
- Attachment F: Abbondante Report on C63.25.3
- Attachment G: Interpretation Response – C63.4 (2014) Annex F Gaps in Ground Plane
- Attachment H: Interpretation Response - C63.5 (2017) Annex F Delta Antenna Factors